FCC SAR TEST REPORT

FCC ID	:	C3K2067
Contains FCC ID	:	C3K2066 as Change of ID to PD9AX201D2
Equipment	:	Portable Computing Device
Brand Name	:	Microsoft
Model Name	:	2067
Applicant	:	Microsoft Corporation One Microsoft Way, Redmond, WA 98052-6399 USA
Manufacturer	:	Microsoft Corporation One Microsoft Way, Redmond, WA 98052-6399 USA
Standard	:	FCC 47 CFR Part 2 (2.1093)

The product was received on Mar. 21, 2023 and testing was started from Mar. 23, 2023 and completed on Mar. 30, 2023. 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.

Cona Huang

Approved by: Cona Huang / Deputy Manager

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History of this test report

Report No.	Version	Description	Issued Date
FA2O1320-01	01	Initial issue of report	Jun. 29, 2023
FA2O1320-01	02	Update appendix D	Jul. 26, 2023
FA2O1320-01	03	Update report section12 and appendix D	Jul. 28, 2023
FA2O1320-01	04	Update report section 1, 9, 10, 13, 14, 15 and appendix A, B, C.	Aug. 04, 2023

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) for **Microsoft Corporation, Portable Computing Device, 2067**, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary Body 1g SAR (W/kg)	Highest Simultaneous Transmission 1g SAR (W/kg)
DTS	WLAN	2.4GHz WLAN	0.95	1.02
NII		5GHz WLAN	1.16	1.16
DSS	2.4GHz Band	Bluetooth	0.30	0.90
Date of Testing:			2023/03/23 ~ 2023/03/30	

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: Daisy Peng

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 v01r04
- FCC KDB 865664 D02 v01r02
- FCC KDB 447498 D01 v06
- FCC KDB 248227 D01 v02r02
- FCC KDB 616217 D04 v01r02

3. Equipment Under Test (EUT) Information

3.1 General Information

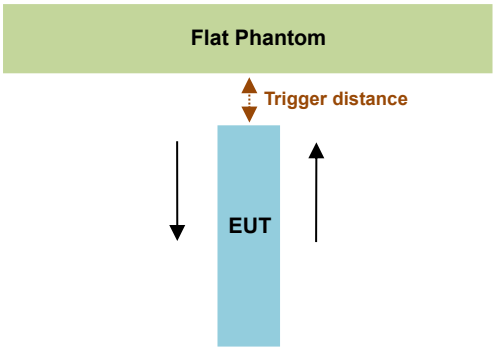
Product Feature & Specification	
Equipment Name	Portable Computing Device
Brand Name	Microsoft
Model Name	2067
FCC ID	C3K2067
Contains FCC ID	C3K2066 as Change of ID to PD9AX201D2
Wireless Technology and Frequency Range	WLAN 2.4 GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2 GHz Band: 5150 MHz ~ 5250 MHz WLAN 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 Bluetooth: 2400 MHz ~ 2483.5 MHz NFC : 13.56 MHz
Mode	WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE NFC: ASK
EUT Stage	Identical Prototype

WLAN Antenna Information			
Ant. Type	Main, loop Aux, monopole	connector	
Model No.	Ant2，tx2: Main, loop Ant1，tx1: Aux, monopole		
Peak Gain (dBi)			
2400~2483.5MHz	Ant2，tx2:2.47 Ant1，tx1:2.63	5470~5725MHz	Ant2，tx2:2.73 Ant1，tx1:2.31
5150~5250MHz	Ant2，tx2:2.72 Ant1，tx1:2.39	5725~5850MHz	Ant2，tx2:2.48 Ant1，tx1:1.52
5250~5350MHz	Ant2，tx2:2.69 Ant1，tx1:2.34		

4. Proximity Sensor Triggering Test

<Proximity Sensor Triggering Distance (KDB 616217 D04 section 6.2)>:

For the device is fully integrated, touch sensing capacitive sensor. It uses a charge transfer capacitive acquisition method that is capable of near range proximity detection. In this device offers a state of the art capacitive sensing engine with an embedded sampling capacitor and voltage regulator allowing the overall solution cost to be reduced and improving system immunity in noisy environments.
Proximity sensor triggering distance testing was performed according to the procedures outlined in KDB 616217 D04 section 6.2, and EUT moving further away from the flat phantom and EUT moving toward the flat phantom were both assessed. The details are illustrated as following, and the shortest triggering distances were reported and used for SAR assessment.
In the preliminary triggering distance testing, the tissue-equivalent medium for different frequency bands were used for verification; no other frequency bands tissue-equivalent medium was found to result in shortest triggering distance than that for 1900MHz, and the tissue-equivalent medium for 1900MHz was used for formal proximity sensor triggering testing.



Proximity Sensor Trigger Distance (mm)				
Exposure Position	Main Antenna			
	Bottom Face		Edge 1	
	Moving toward	Moving away	Moving toward	Moving away
Minimum	5	5	11	10

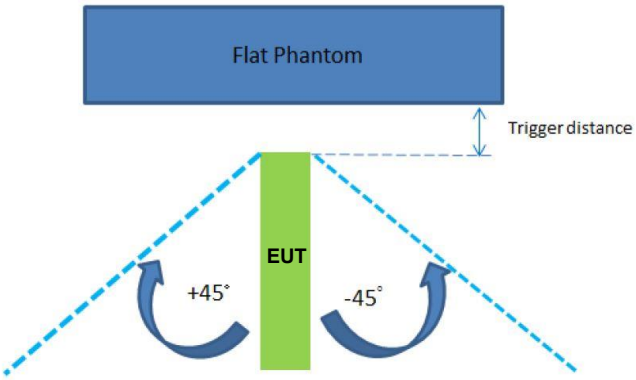
Proximity Sensor Trigger Distance (mm)				
Exposure Position	Aux Antenna			
	Bottom Face		Edge 1	
	Moving toward	Moving away	Moving toward	Moving away
Minimum	4	3	7	7

<Proximity Sensor Triggering Coverage (KDB 616217 D04 section 6.3)>:

Since the antenna and sensor are collocated and all of the peak SAR location is overlapping with the sensor pad for this device, therefore, According to KDB 616217 section6.3, these procedures do not apply and are not required for this device. due to the antenna and sensor are collocated and the peak SAR location is overlapping with the sensor on this device.

<Tilt angle influences to proximity sensor triggering (KDB 616217 D04 section 6.4)>:

The influence of table tilt angles to proximity sensor triggering was determined by positioning each EUT edge that contains a transmitting antenna, perpendicular to the flat phantom, at above separation distance.
Rotating the EUT around the edge next to the phantom in ≤ 10° increments until the EUT is ± 45° from the vertical position at 0°, and the maximum output power remains in the reduced mode.



The Sensor Trigger Distance (mm)		
Position	Main Antenna	Aux Antenna
	Edge 1	Edge 1
Minimum	10	7

Proximity sensor power reduction

Exposure Position / wireless mode	Bottom Face/Edge 1 (1)
2.4GHz WLAN Ant Main	4 dB
2.4GHz WLAN Ant Aux	2.5 dB
5.2GHz WLAN Ant Main	5.5 dB
5.2GHz WLAN Ant Aux	4 dB
5.3GHz WLAN Ant Main	5.5 dB
5.3GHz WLAN Ant Aux	4 dB
5.5GHz WLAN Ant Main	6 dB
5.5GHz WLAN Ant Aux	3.5 dB
5.8GHz WLAN Ant Main	6 dB
5.8GHz WLAN Ant Aux	3.5 dB

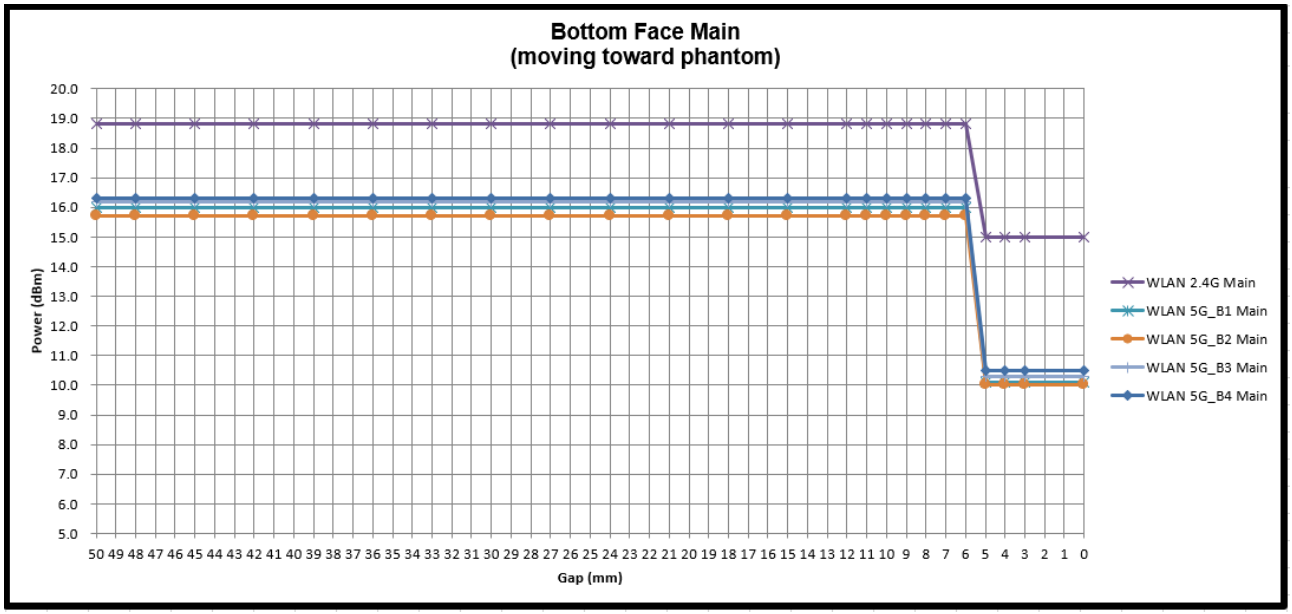
Remark:

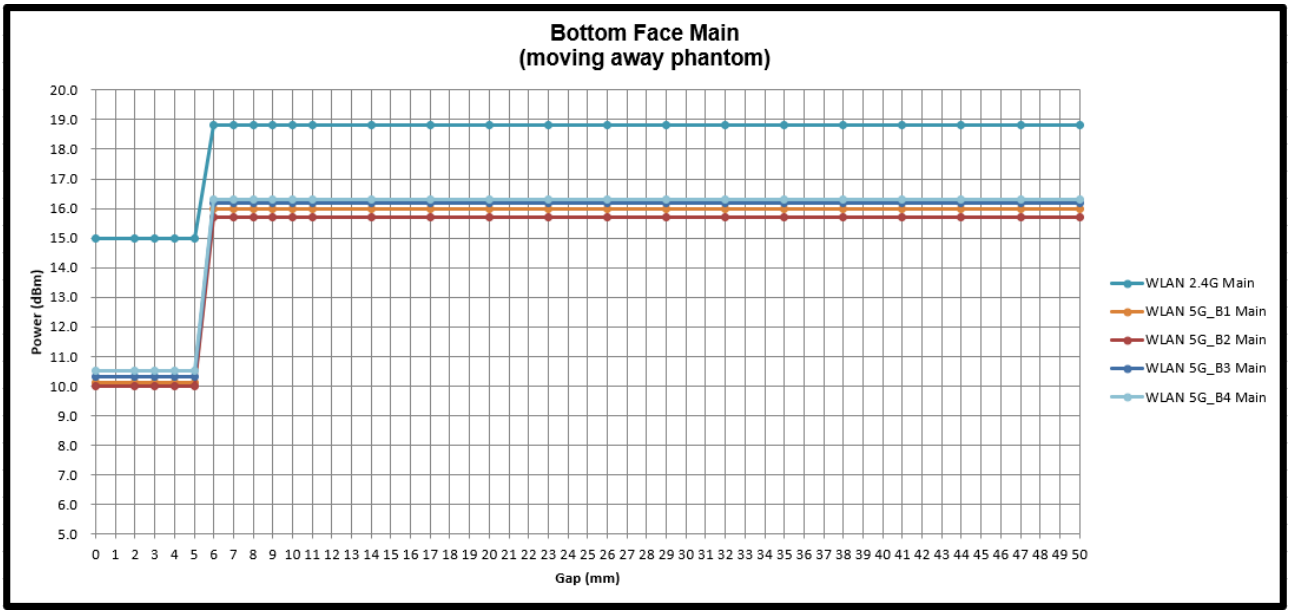
1. (1): Reduced maximum limit applied by activation of proximity sensor.
2. Tests were performed in accordance with KDB 616217 D04 section 6.1, 6.2, 6.3, 6.4 and 6.5.
3. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance was performed:

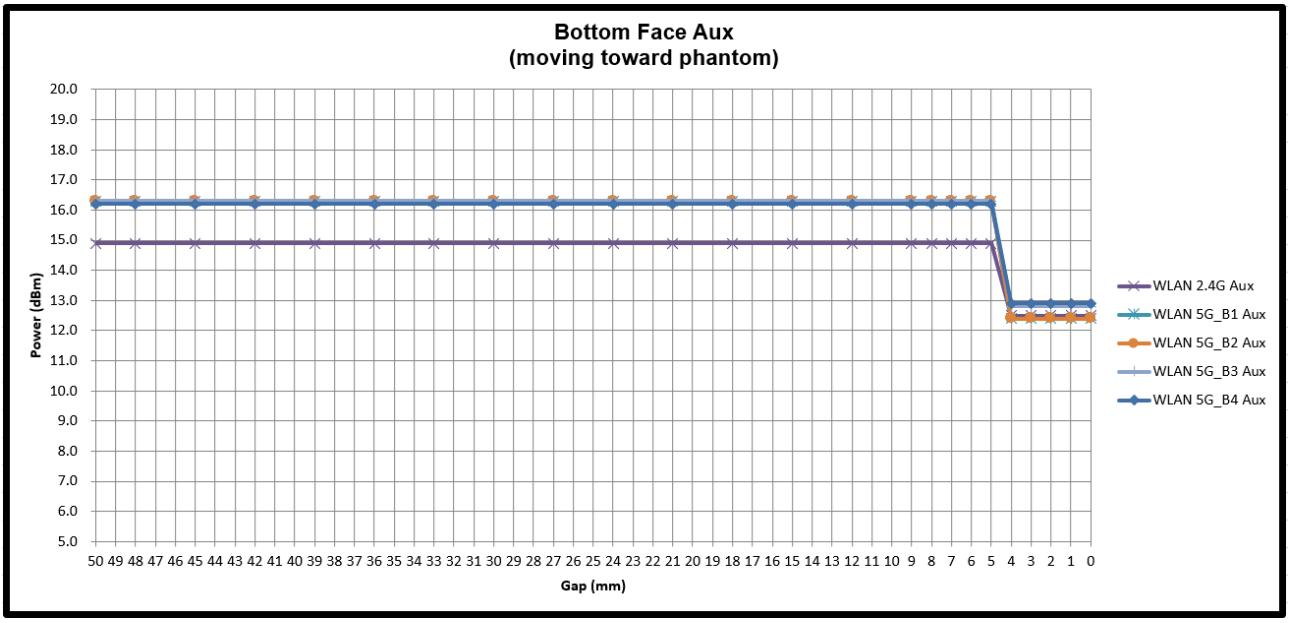
   Main Antenna:
   - Bottom Face: 4 mm
   - Edge1: 9 mm

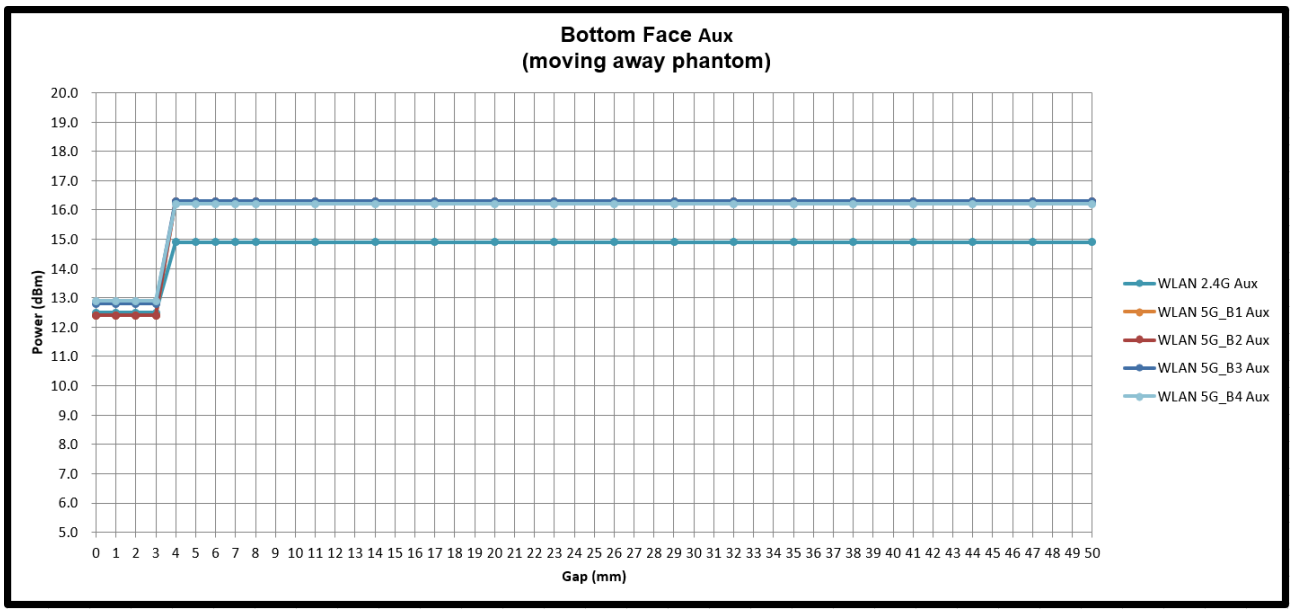
   Aux Antenna:
   - Bottom Face: 2 mm
   - Edge1: 6 mm

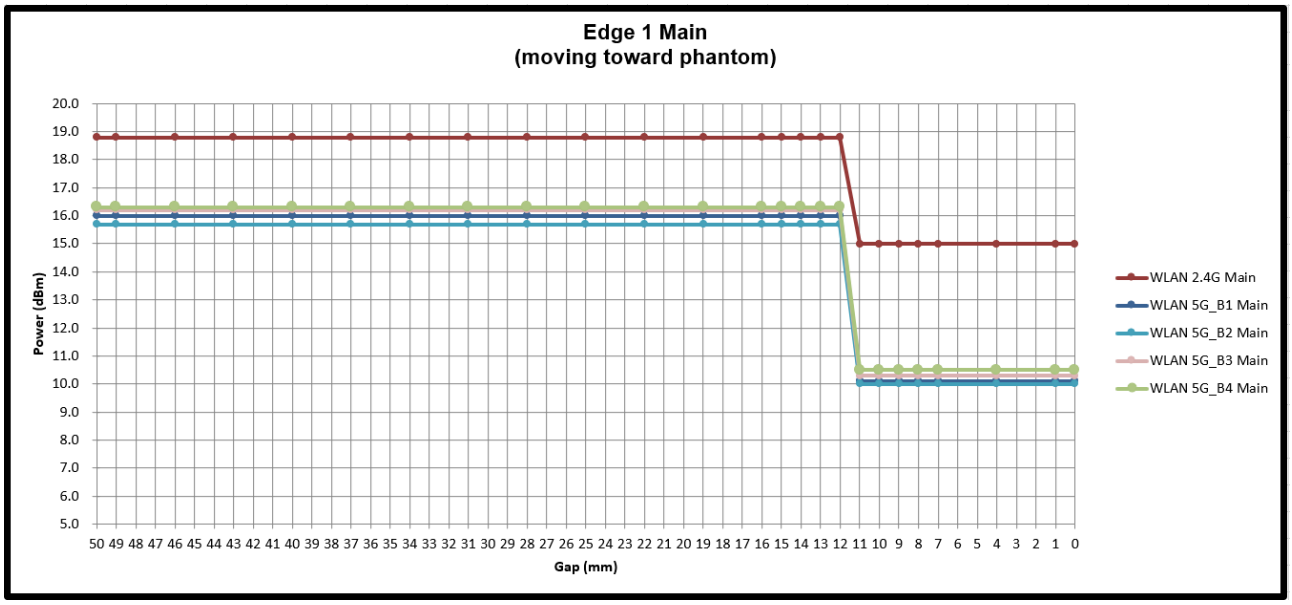
Power Measurement during Sensor Trigger distance testing

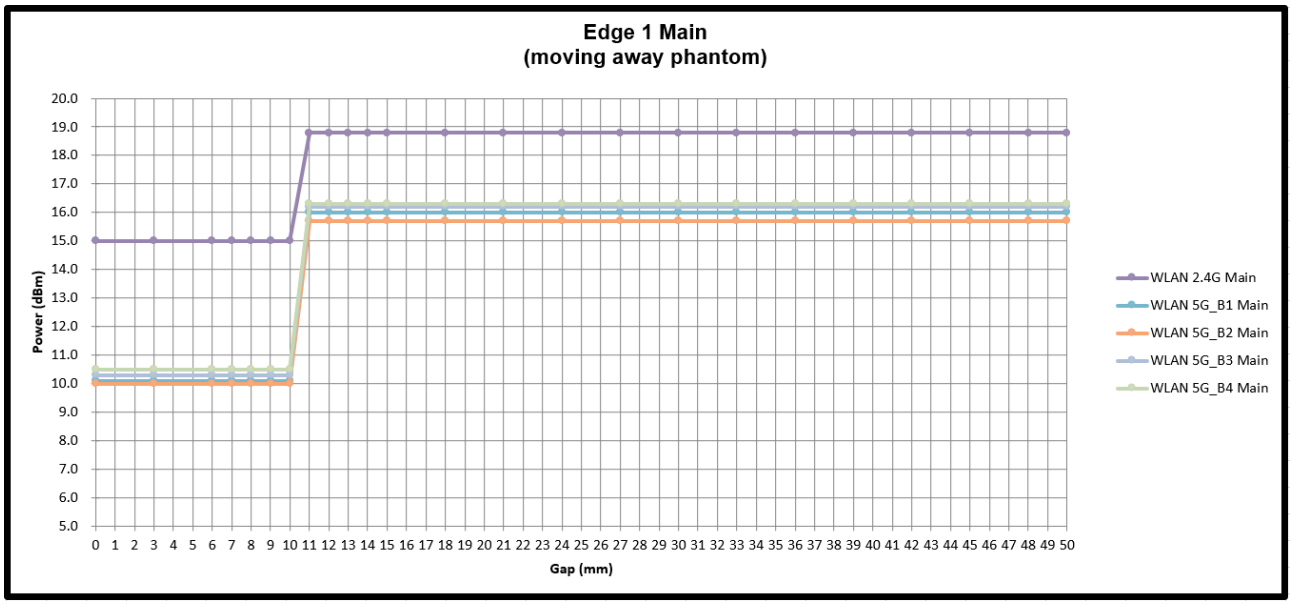


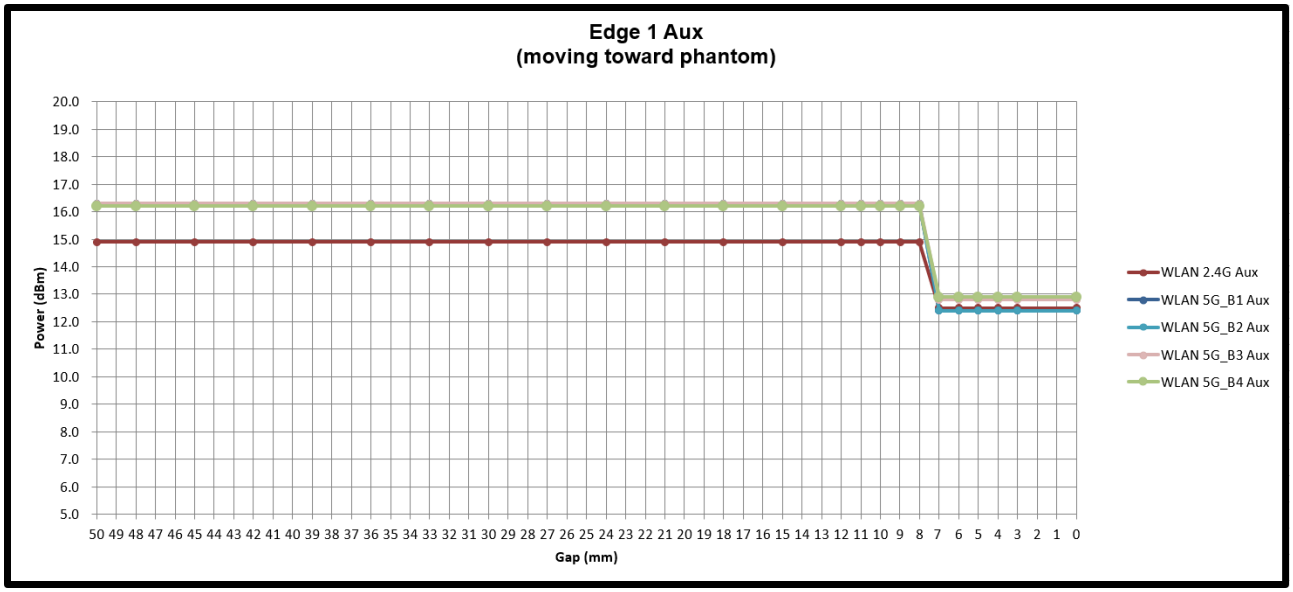


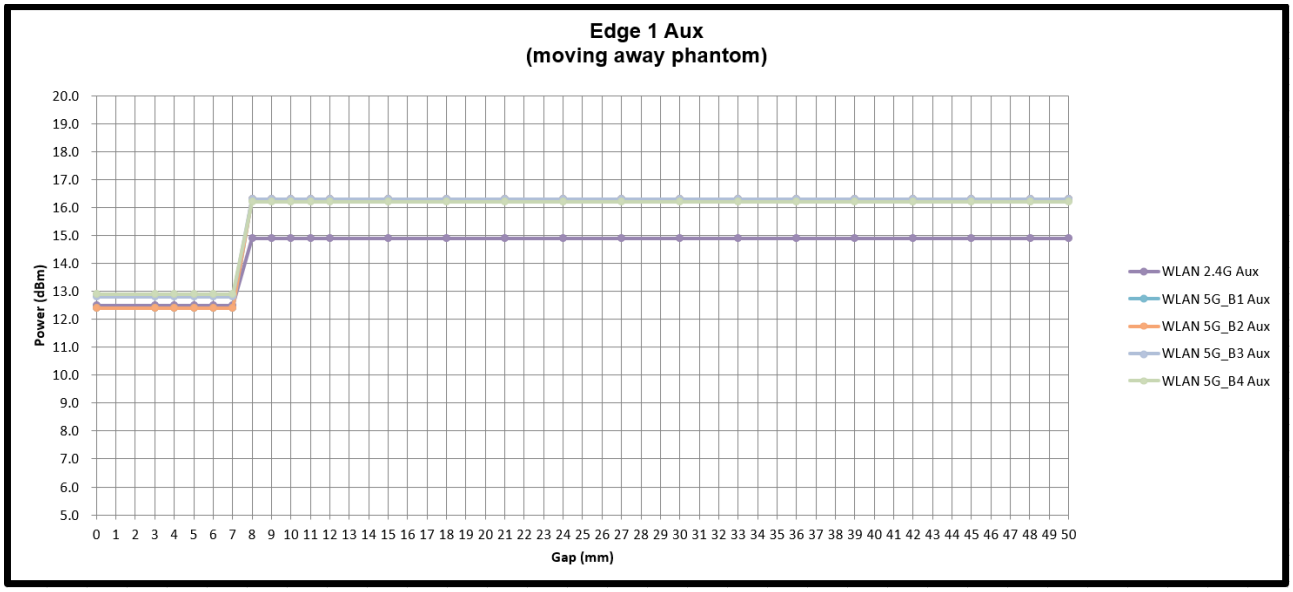

Bottom Face Aux
(moving toward phantom)
Power (dBm)
Gap (mm)
WLAN 2.4G Aux
WLAN 5G_B1 Aux
WLAN 5G_B2 Aux
WLAN 5G_B3 Aux
WLAN 5G_B4 Aux


Bottom Face Aux
(moving away phantom)
Power (dBm)
Gap (mm)
WLAN 2.4G Aux
WLAN 5G_B1 Aux
WLAN 5G_B2 Aux
WLAN 5G_B3 Aux
WLAN 5G_B4 Aux


Edge 1 Main
(moving toward phantom)
Power (dBm)
Gap (mm)
WLAN 2.4G Main
WLAN 5G_B1 Main
WLAN 5G_B2 Main
WLAN 5G_B3 Main
WLAN 5G_B4 Main


Edge 1 Main
(moving away phantom)
Power (dBm)
Gap (mm)
WLAN 2.4G Main
WLAN 5G_B1 Main
WLAN 5G_B2 Main
WLAN 5G_B3 Main
WLAN 5G_B4 Main


Edge 1 Aux
(moving toward phantom)
Power (dBm)
Gap (mm)
WLAN 2.4G Aux
WLAN 5G_B1 Aux
WLAN 5G_B2 Aux
WLAN 5G_B3 Aux
WLAN 5G_B4 Aux


Edge 1 Aux
(moving away phantom)
Power (dBm)
Gap (mm)
WLAN 2.4G Aux
WLAN 5G_B1 Aux
WLAN 5G_B2 Aux
WLAN 5G_B3 Aux
WLAN 5G_B4 Aux

5. RF Exposure Limits

5.1 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.

5.2 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.

6. Specific Absorption Rate (SAR)

6.1 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.

6.2 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:

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

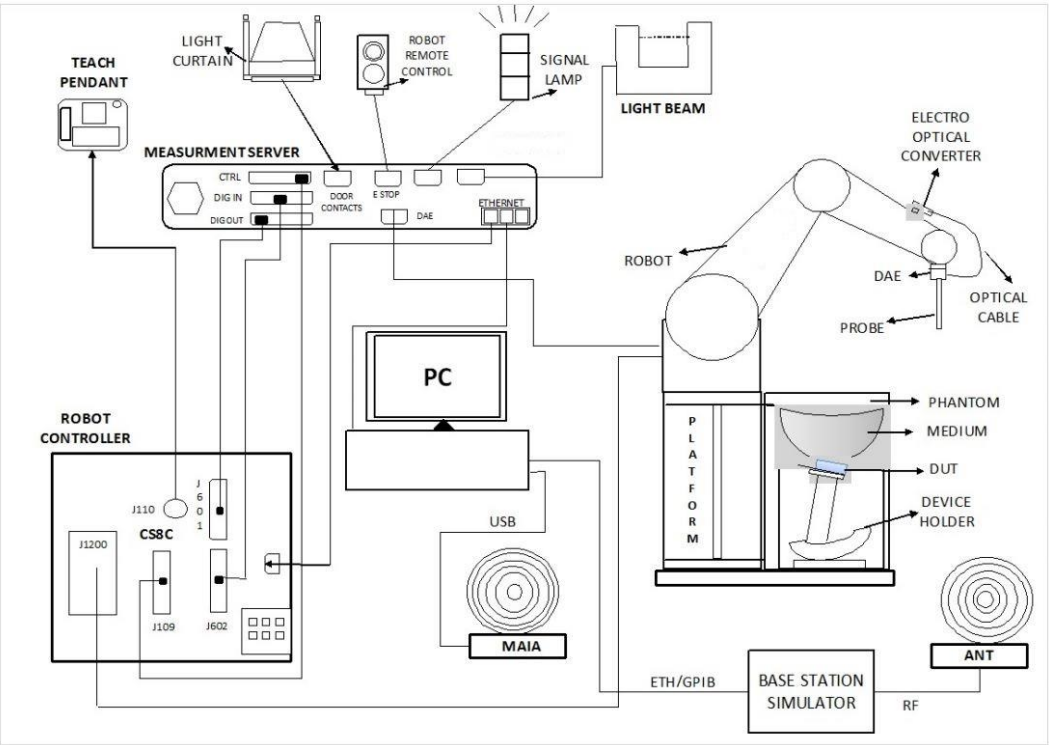
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. 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.

7.1 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.

Test Site	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
	SAR04-HY	SAR05-HY	SAR11-HY	SAR12-HY	SAR16-HY
	SAR06-HY	SAR10-HY	SAR13-HY	SAR14-HY	SAR17-HY

7.2 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	10 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 μW/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	10 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 μW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 μW/g)	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

7.3 Data Acquisition Electronics (DAE)

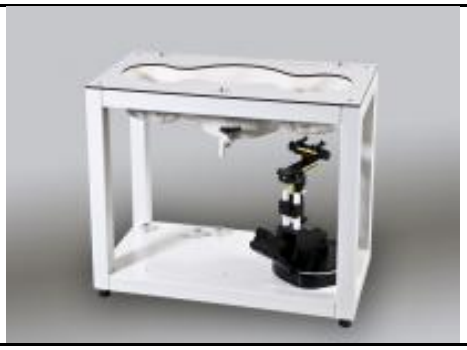
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an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

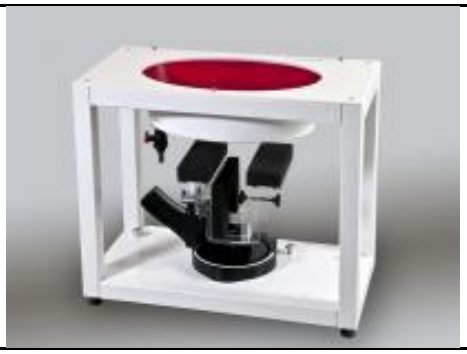
7.4 Phantom

<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.

7.5 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, 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

8. 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

8.1 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 form 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

8.2 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.

8.3 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 dB0 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	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

8.4 Zoom Scan

Zoom scans are used 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 shoes 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: Δx_{Zoom}, Δy_{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 1st 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

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.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* 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.

8.5 Volume Scan Procedures

The volume scan is used for 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.

8.6 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.

9. 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. 15, 2023
SPEAG	5GHz System Validation Kit	D5GHzV2	1128	Nov. 23, 2022	Nov. 22, 2023
SPEAG	Data Acquisition Electronics	DAE4	1694	Nov. 18, 2022	Nov. 17, 2023
SPEAG	Dosimetric E-Field Probe	EX3DV4	7306	Jul. 28, 2022	Jul. 27, 2023
RCPTWN	Thermometer	HTC-1	TM685-1	Jun. 27, 2022	Jun. 26, 2023
R&S	BT Base Station	CBT	100815	Mar. 05, 2023	Mar. 04, 2024
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Oct. 12, 2022	Oct. 11, 2023
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 28, 2022	Sep. 27, 2023
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3796	Jan. 13, 2023	Jan. 12, 2024
Anritsu	Power Meter	ML2495A	1419002	Aug. 16, 2022	Aug. 15, 2023
Anritsu	Power Meter	ML2495A	1804003	Oct. 17, 2022	Oct. 16, 2023
Anritsu	Power Sensor	MA2411B	1726150	Oct. 17, 2022	Oct. 16, 2023
Anritsu	Power Sensor	MA2411B	1911334	Jun. 22, 2022	Jun. 21, 2023
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jul. 21, 2022	Jul. 20, 2023
Anritsu	Spectrum Analyzer	N9010A	MY53470118	Jan. 10, 2023	Jan. 09, 2024
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 14, 2022	Oct. 13, 2023
Mini-Circuits	Power Amplifier	ZVE-8G+	479102029	Sep. 15, 2022	Sep. 14, 2023
ATM	Dual Directional Coupler	C122H-10	P610410z-02	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.

10. System Verification

10.1 Tissue Verification

The tissue dielectric parameters of tissue-equivalent media used for SAR measurements must be characterized within a temperature range of 18℃ to 25℃, 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℃ to 25℃ and within ± 2℃ 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. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
2450	22.5	1.840	38.900	1.80	39.20	2.22	-0.77	±5	2023/3/23
5250	22.5	4.720	35.800	4.71	35.95	0.21	-0.42	±5	2023/3/23
5250	22.6	4.760	36.100	4.71	35.95	1.06	0.42	±5	2023/3/24
5600	22.5	5.120	35.200	5.07	35.50	0.99	-0.85	±5	2023/3/23
5600	22.6	5.170	35.500	5.07	35.50	1.97	0.00	±5	2023/3/24
5750	22.5	5.310	34.900	5.22	35.35	1.72	-1.27	±5	2023/3/23
5750	22.6	5.350	35.200	5.22	35.35	2.49	-0.42	±5	2023/3/24

10.2 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
2023/3/23	2450	50	D2450V2-736	EX3DV4 - SN7306	DAE4 Sn1694	2.460	54.200	49.2	-9.23	SAR10
2023/3/23	5250	50	D5GHzV2-1128-5250	EX3DV4 - SN7306	DAE4 Sn1694	3.690	77.900	73.8	-5.26	SAR10
2023/3/24	5250	50	D5GHzV2-1128-5250	EX3DV4 - SN7306	DAE4 Sn1694	3.720	77.900	74.4	-4.49	SAR10
2023/3/23	5600	50	D5GHzV2-1128-5600	EX3DV4 - SN7306	DAE4 Sn1694	4.260	80.100	85.2	6.37	SAR10
2023/3/24	5600	50	D5GHzV2-1128-5600	EX3DV4 - SN7306	DAE4 Sn1694	4.230	80.100	84.6	5.62	SAR10
2023/3/23	5750	50	D5GHzV2-1128-5750	EX3DV4 - SN7306	DAE4 Sn1694	3.940	79.300	78.8	-0.63	SAR10
2023/3/24	5750	50	D5GHzV2-1128-5750	EX3DV4 - SN7306	DAE4 Sn1694	3.970	79.300	79.4	0.13	SAR10

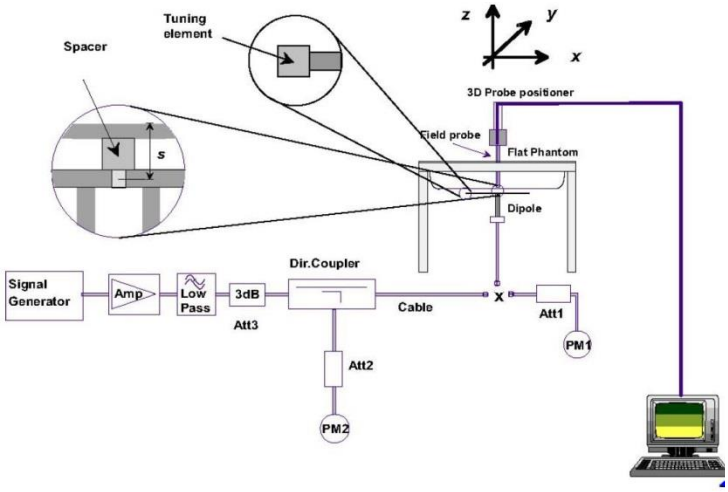


Fig 8.3.1 System Performance Check Setup

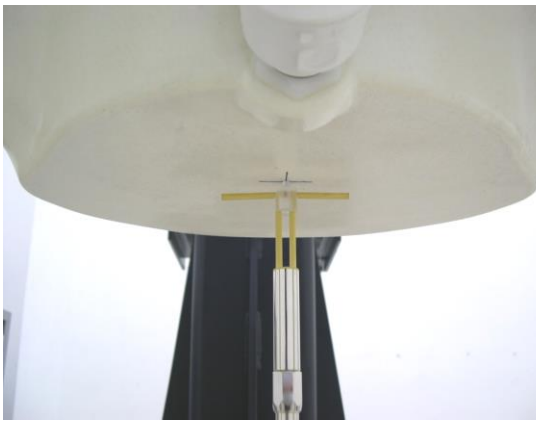


Fig 8.3.2 Setup Photo

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

General Note:

1. The output power was measured using ANSI C63.10_11.9.2.3.2 for WLAN2.4GHz / BLE, C63.10_7.8.5 for BT & KDB 789033 D02 Method PM-G for WLAN 5GHz measurement methods.
2. 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.
3. 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.
4. 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.
5. 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 or hotspot mode configurations with multiple test positions.
6. 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).
7. 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.
8. 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 ≤ 0.4 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 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.
   c. 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.
9. 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)
10. In applying the test guidance, the IEEE 802.11 mode with the maximum output power (out of all modes) should be considered for testing
11. 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
12. 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

Sensor OFF

<2.4GHz WLAN_Default Power>												
				Main Ant			Aux Ant			Main+Aux Ant		
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	18.70	19.50	98.94	14.80	15.50	99.23			
		6	2437	18.60	19.50		14.80	15.50				
		11	2462	18.80	19.50		14.90	15.50				
		12	2467	17.20	18.00		14.80	15.50				
		13	2472	16.10	17.00		14.80	15.50				
	802.11g 6Mbps	1	2412	16.70	17.50	98.93	14.50	15.50	99.05			
		6	2437	18.60	19.50		14.60	15.50				
		11	2462	14.50	15.50		14.50	15.50				
		12	2467	14.30	15.25		14.20	15.25				
		13	2472	10.50	11.50		11.10	11.75				
	802.11n-HT20 MCS0	1	2412	16.60	17.50	98.88	14.40	15.50	98.88	17.46	17.50	99.05
		6	2437	18.50	19.50		14.60	15.50		19.61	19.94	
		11	2462	14.30	15.50		14.50	15.50		16.81	17.00	
		12	2467	14.00	15.25		13.70	15.25		14.21	14.50	
		13	2472	10.90	11.50		10.70	11.75		11.16	11.50	
	802.11n-HT40 MCS0	3	2422	12.50	13.50	98.76	13.00	13.50	98.76	14.51	14.75	99.50
		6	2437	15.50	16.50		14.80	15.50		17.76	18.00	
		9	2452	15.00	16.00		14.40	15.00		16.41	16.50	
		10	2457	11.90	12.75		12.20	12.75		12.76	13.00	
		11	2462	9.40	10.00		10.10	10.50		11.31	11.50	
	802.11ax-HE20 MCS0	1	2412	16.30	17.50	98.76	14.40	15.50	98.76	17.26	17.50	99.50
		6	2437	18.40	19.50		14.50	15.50		19.93	19.94	
		11	2462	14.10	15.50		14.40	15.50		16.81	17.00	
		12	2467	13.90	15.25		13.70	15.25		14.21	14.50	
		13	2472	10.80	11.50		10.80	11.75		11.41	11.50	
	802.11ax-HE40 MCS0	3	2422	12.10	13.50	98.76	12.70	13.50	98.76	14.61	14.75	99.62
		6	2437	15.20	16.50		14.60	15.50		17.66	18.00	
		9	2452	14.60	16.00		14.00	15.00		16.31	16.50	
		10	2457	11.70	12.75		12.10	12.75		12.76	13.00	
		11	2462	9.30	10.00		10.00	10.50		11.31	11.50	

<5.2GHz WLAN_Default Power>												
				Main Ant			Aux Ant			Main+Aux Ant		
	Mode	Channel	Frequency (MHz)	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	15.40	16.50	97.66	16.30	17.50	97.66			
		40	5200	15.50	16.50		16.10	17.50				
		44	5220	15.50	16.50		15.70	17.50				
		48	5240	15.10	16.50		15.80	17.50				
	802.11n-HT20 MCS0	36	5180	15.30	16.50	98.77	16.00	17.50	98.76	18.36	18.50	99.37
		40	5200	15.30	16.50		16.10	17.50		19.85	20.04	
		44	5220	15.10	16.50		15.80	17.50		19.85	20.04	
		48	5240	15.00	16.50		15.90	17.50		19.90	20.04	
	802.11n-HT40 MCS0	38	5190	16.00	16.50	99.25	15.90	17.00	99.01	17.66	17.75	99.37
		46	5230	15.40	16.50		16.00	17.50		19.94	20.04	
	802.11ac-VHT20 MCS0	36	5180	15.30	16.50	98.76	16.20	17.50	98.75	18.36	18.50	99.49
		40	5200	15.30	16.50		16.10	17.50		19.85	20.04	
		44	5220	15.00	16.50		15.80	17.50		19.85	20.04	
		48	5240	15.00	16.50		15.90	17.50		19.90	20.04	
	802.11ac-VHT40 MCS0	38	5190	16.00	16.50	99.25	15.90	17.00	99.01	17.61	17.75	99.37
		46	5230	15.30	16.50		15.90	17.50		19.88	20.04	
	802.11ac-VHT80 MCS0	42	5210	15.60	16.50	98.76	16.30	17.50	99.00	18.91	19.00	99.12
	802.11ax-HE20 MCS0	36	5180	15.40	16.50	98.76	16.10	17.50	98.27	18.16	18.50	99.37
		40	5200	15.40	16.50		16.10	17.50		19.70	20.04	
		44	5220	15.20	16.50		15.70	17.50		19.70	20.04	
		48	5240	14.90	16.50		15.80	17.50		19.70	20.04	
	802.11ax-HE40 MCS0	38	5190	15.70	16.50	99.26	15.70	17.00	99.00	17.31	17.75	99.37
		46	5230	15.00	16.50		15.80	17.50		19.68	20.04	
	802.11ax-HE80 MCS0	42	5210	15.30	16.50	98.76	16.00	17.50	99.00	18.66	19.00	99.37

<5.3GHz WLAN_Default Power>												
				Main Ant			Aux Ant			Main+Aux Ant		
	Mode	Channel	Frequency (MHz)	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	15.50	16.50	97.66	16.00	17.50	97.66			
		56	5280	15.40	16.50		16.10	17.50				
		60	5300	15.60	16.50		16.20	17.50				
		64	5320	15.60	16.50		16.30	17.50				
	802.11n-HT20 MCS0	52	5260	15.50	16.50	98.77	16.10	17.50	98.76	19.95	20.04	99.37
		56	5280	15.50	16.50		16.10	17.50		19.90	20.04	
		60	5300	15.50	16.50		16.00	17.50		19.90	20.04	
		64	5320	15.50	16.50		16.20	17.50		18.96	19.00	
	802.11n-HT40 MCS0	54	5270	15.70	16.50	99.25	16.30	17.50	99.01	19.41	19.50	99.37
		62	5310	15.60	16.50		16.00	17.00		17.41	17.50	
	802.11ac-VHT20 MCS0	52	5260	15.40	16.50	98.76	16.10	17.50	98.75	19.95	20.04	99.49
		56	5280	15.40	16.50		16.20	17.50		19.90	20.04	
		60	5300	15.40	16.50		16.20	17.50		19.84	20.04	
		64	5320	15.40	16.50		16.20	17.50		18.96	19.00	
	802.11ac-VHT40 MCS0	54	5270	15.50	16.50	99.25	16.20	17.50	99.01	19.36	19.50	99.37
		62	5310	15.40	16.50		15.90	17.00		17.31	17.50	
	802.11ac-VHT80 MCS0	58	5290	15.10	15.75	98.76	14.70	15.75	99.00	16.91	17.00	99.12
	802.11ac-VHT160 MCS0	50	5250	11.60	12.25	99.00	11.10	11.75	99.50	13.96	14.25	99.10
	802.11ax-HE20 MCS0	52	5260	15.40	16.50	98.76	16.00	17.50	98.27	19.75	20.04	99.37
		56	5280	15.30	16.50		16.00	17.50		19.64	20.04	
		60	5300	15.40	16.50		16.20	17.50		19.64	20.04	
		64	5320	15.40	16.50		16.10	17.50		18.76	19.00	
	802.11ax-HE40 MCS0	54	5270	15.40	16.50	99.26	16.10	17.50	99.00	19.16	19.50	99.37
		62	5310	15.60	16.50		15.80	17.00		17.21	17.50	
	802.11ax-HE80 MCS0	58	5290	14.90	15.75	98.76	14.50	15.75	99.00	16.66	17.00	99.37
	802.11ax-HE160 MCS0	50	5250	11.40	12.25	98.76	11.00	11.75	98.51	14.06	14.25	99.12

<5.5GHz WLAN_Default Power>												
				Main Ant			Aux Ant			Main+Aux Ant		
	Mode	Channel	Frequency (MHz)	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	15.80	17.00	97.66	15.80	17.00	97.66			
		116	5580	15.60	17.00		15.80	17.00				
		124	5620	15.60	17.00		16.00	17.00				
		132	5660	15.50	17.00		15.80	17.00				
		144	5720	15.60	17.00		15.50	17.00				
	802.11n-HT20 MCS0	100	5500	15.80	17.00	98.77	15.70	17.00	98.76	18.21	18.25	99.37
		116	5580	15.60	17.00		15.80	17.00		19.71	20.00	
		124	5620	15.60	17.00		15.90	17.00		19.96	20.00	
		132	5660	15.50	17.00		15.80	17.00		19.86	20.00	
		144	5720	15.60	17.00		15.50	17.00		19.86	20.00	
	802.11n-HT40 MCS0	102	5510	15.60	16.50	99.25	15.50	16.50	99.01	17.66	17.75	99.37
		110	5550	15.90	17.00		15.90	17.00		19.96	20.00	
		126	5630	15.80	17.00		16.30	17.00		19.86	20.00	
		134	5670	15.80	17.00		16.00	17.00		19.81	20.00	
		142	5710	15.80	17.00		15.80	17.00		19.81	20.00	
	802.11ac-VHT20 MCS0	100	5500	15.80	17.00	98.76	15.80	17.00	98.75	18.21	18.25	99.49
		116	5580	16.70	17.00		15.90	17.00		19.66	20.00	
		124	5620	16.70	17.00		16.00	17.00		19.91	20.00	
		132	5660	16.60	17.00		15.90	17.00		19.81	20.00	
		144	5720	16.70	17.00		15.70	17.00		19.81	20.00	
	802.11ac-VHT40 MCS0	102	5510	15.30	16.50	99.25	15.60	16.50	99.01	17.61	17.75	99.37
		110	5550	15.70	17.00		16.00	17.00		19.91	20.00	
		126	5630	15.70	17.00		16.00	17.00		19.81	20.00	
		134	5670	15.60	17.00		16.00	17.00		19.71	20.00	
		142	5710	15.60	17.00		15.70	17.00		19.81	20.00	
	802.11ac-VHT80 MCS0	106	5530	15.10	16.50	98.76	15.50	16.50	99.00	17.86	18.00	99.12
		122	5610	16.20	17.00		16.30	17.00		19.86	20.00	
		138	5690	15.90	17.00		15.90	17.00		19.91	20.00	
	802.11ac-VHT160 MCS0	114	5570	13.50	14.25	99.00	13.30	14.00	99.50	16.01	16.25	99.10
	802.11ax-HE20 MCS0	100	5500	15.70	17.00	98.76	15.70	17.00	98.27	18.11	18.25	99.37
		116	5580	15.50	17.00		15.90	17.00		19.56	20.00	
		124	5620	15.50	17.00		15.90	17.00		19.71	20.00	
		132	5660	15.40	17.00		15.80	17.00		19.66	20.00	
		144	5720	15.50	17.00		15.50	17.00		19.66	20.00	
	802.11ax-HE40 MCS0	102	5510	15.30	16.50	99.26	15.30	16.50	99.00	17.61	17.75	99.37
		110	5550	15.70	17.00		16.10	17.00		19.71	20.00	
		126	5630	15.70	17.00		16.00	17.00		19.61	20.00	
		134	5670	15.60	17.00		15.80	17.00		19.61	20.00	
		142	5710	15.50	17.00		15.50	17.00		19.61	20.00	
	802.11ax-HE80 MCS0	106	5530	14.90	16.50	98.76	15.30	16.50	99.00	17.61	18.00	99.37
		122	5610	15.90	17.00		16.10	17.00		19.61	20.00	
		138	5690	15.60	17.00		15.70	17.00		19.66	20.00	
	802.11ax-HE160 MCS0	114	5570	13.50	14.25	98.76	13.10	14.00	98.51	16.01	16.25	99.12

<5.8GHz WLAN_Default Power>												
				Main Ant			Aux Ant			Main+Aux Ant		
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11a 6Mbps	149	5745	15.60	17.00	97.66	15.50	17.00	97.66			
		157	5785	16.00	17.00		15.90	17.00				
		165	5825	15.80	17.00		15.60	17.00				
	802.11n-HT20 MCS0	149	5745	15.60	17.00	98.77	15.40	17.00	98.76	19.86	20.00	99.37
		157	5785	15.90	17.00		15.90	17.00		19.76	20.00	
		165	5825	15.80	17.00		15.60	17.00		19.51	20.00	
	802.11n-HT40 MCS0	151	5755	15.90	17.00	99.25	16.00	17.00	99.01	19.61	20.00	99.37
		159	5795	16.10	17.00		16.50	17.00		19.86	20.00	
	802.11ac-VHT20 MCS0	149	5745	15.60	17.00	98.76	15.50	17.00	98.75	19.81	20.00	99.49
		157	5785	15.90	17.00		15.90	17.00		19.71	20.00	
		165	5825	15.80	17.00		15.60	17.00		19.46	20.00	
	802.11ac-VHT40 MCS0	151	5755	15.90	17.00	99.25	15.90	17.00	99.01	19.61	20.00	99.37
		159	5795	16.10	17.00		16.10	17.00		19.86	20.00	
	802.11ac-VHT80 MCS0	155	5775	16.30	17.00	98.76	16.20	17.00	99.00	17.86	18.00	99.12
	802.11ax-HE20 MCS0	149	5745	15.30	17.00	98.76	15.40	17.00	98.27	19.76	20.00	99.37
		157	5785	15.60	17.00		15.70	17.00		19.61	20.00	
		165	5825	15.50	17.00		15.80	17.00		19.41	20.00	
	802.11ax-HE40 MCS0	151	5755	15.70	17.00	99.26	15.60	17.00	99.00	19.31	20.00	99.37
		159	5795	15.90	17.00		15.70	17.00		19.61	20.00	
	802.11ax-HE80 MCS0	155	5775	15.90	17.00	98.76	16.00	17.00	99.00	17.61	18.00	99.37

Sensor ON

<2.4GHz WLAN_Reduced Power>												
				Main Ant			Aux Ant			Main+Aux Ant		
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	14.90	15.50	99.52	12.30	13.00	99.52			
		6	2437	14.80	15.50		12.40	13.00				
		11	2462	15.00	15.50		12.50	13.00				
		12	2467	14.60	15.50		12.40	13.00				
		13	2472	14.70	15.50		12.40	13.00				
	802.11g 6Mbps	1	2412	14.70	15.50	98.76	12.30	13.00	98.76			
		6	2437	14.70	15.50		12.30	13.00				
		11	2462	14.50	15.50		12.10	13.00				
		12	2467	14.30	15.25		12.20	13.00				
		13	2472	11.20	11.50		11.20	11.75				
	802.11n-HT20 MCS0	1	2412	14.70	15.50	98.76	12.30	13.00	99.00	16.45	16.82	99.25
		6	2437	14.70	15.50		12.20	13.00		17.14	17.44	
		11	2462	14.50	15.50		12.00	13.00		16.41	16.54	
		12	2467	14.30	15.25		12.20	13.00		14.31	14.50	
		13	2472	11.10	11.50		11.20	11.75		11.11	11.50	
	802.11n-HT40 MCS0	3	2422	12.90	13.50	98.76	12.40	13.00	98.76	14.56	14.75	99.25
		6	2437	14.80	15.50		12.50	13.00		16.86	17.12	
		9	2452	14.70	15.50		12.40	13.00		15.96	16.27	
		10	2457	12.30	12.75		12.20	12.75		12.86	13.00	
		11	2462	9.60	10.00		10.00	10.50		11.26	11.50	
	802.11ax-HE20 MCS0	1	2412	14.50	15.50	98.76	12.10	13.00	99.00	16.60	16.82	99.00
		6	2437	14.50	15.50		12.10	13.00		17.37	17.44	
		11	2462	14.40	15.50		12.00	13.00		16.43	16.54	
		12	2467	14.20	15.25		11.90	13.00		14.31	14.50	
		13	2472	11.00	11.50		11.10	11.75		11.21	11.50	
	802.11ax-HE40 MCS0	3	2422	12.50	13.50	98.76	12.30	13.00	98.76	14.41	14.75	99.62
		6	2437	14.50	15.50		12.20	13.00		17.02	17.12	
		9	2452	14.40	15.50		12.30	13.00		16.17	16.27	
		10	2457	12.00	12.75		12.00	12.75		12.71	13.00	
		11	2462	9.40	10.00		10.00	10.50		11.36	11.50	

<5.2GHz WLAN_Reduced Power>												
				Main Ant			Aux Ant			Main+Aux Ant		
	Mode	Channel	Frequency (MHz)	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	10.10	11.00	97.66	12.50	13.50	97.66			
		40	5200	10.10	11.00		12.20	13.50				
		44	5220	10.10	11.00		11.90	13.50				
		48	5240	9.80	11.00		12.00	13.50				
	802.11n-HT20 MCS0	36	5180	9.90	11.00	98.77	12.40	13.50	98.76	15.30	15.44	99.37
		40	5200	9.80	11.00		12.20	13.50		15.34	15.44	
		44	5220	9.70	11.00		11.80	13.50		15.34	15.44	
		48	5240	9.60	11.00		12.00	13.50		15.27	15.44	
	802.11n-HT40 MCS0	38	5190	10.10	11.00	99.25	12.50	13.50	99.01	15.40	15.44	99.37
		46	5230	9.90	11.00		12.10	13.50		15.37	15.44	
	802.11ac-VHT20 MCS0	36	5180	9.90	11.00	98.76	12.40	13.50	98.75	15.27	15.44	99.49
		40	5200	9.80	11.00		12.30	13.50		15.27	15.44	
		44	5220	9.70	11.00		11.90	13.50		15.34	15.44	
		48	5240	9.50	11.00		12.00	13.50		15.20	15.44	
	802.11ac-VHT40 MCS0	38	5190	10.10	11.00	99.25	12.40	13.50	99.01	15.24	15.44	99.37
		46	5230	9.80	11.00		12.10	13.50		15.30	15.44	
	802.11ac-VHT80 MCS0	42	5210	10.20	11.00	98.76	12.40	13.50	99.00	15.37	15.44	99.12
	802.11ax-HE20 MCS0	36	5180	10.10	11.00	98.76	12.30	13.50	98.27	15.14	15.44	99.37
		40	5200	10.00	11.00		12.00	13.50		15.14	15.44	
		44	5220	9.90	11.00		11.70	13.50		15.14	15.44	
		48	5240	9.50	11.00		11.80	13.50		15.20	15.44	
	802.11ax-HE40 MCS0	38	5190	9.80	11.00	99.26	12.20	13.50	99.00	15.14	15.44	99.37
		46	5230	9.60	11.00		11.70	13.50		15.14	15.44	
	802.11ax-HE80 MCS0	42	5210	9.90	11.00	98.76	12.20	13.50	99.00	15.10	15.44	99.37

<5.3GHz WLAN_Reduced Power>

				Main Ant			Aux Ant			Main+Aux Ant		
	Mode	Channel	Frequency (MHz)	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	9.80	11.00	97.66	12.50	13.50	97.66			
		56	5280	9.90	11.00		12.40	13.50				
		60	5300	10.00	11.00		12.60	13.50				
		64	5320	10.00	11.00		12.40	13.50				
	802.11n-HT20 MCS0	52	5260	9.80	11.00	98.77	12.40	13.50	98.76	15.25	15.44	99.37
		56	5280	9.80	11.00		12.40	13.50		15.27	15.44	
		60	5300	9.80	11.00		12.50	13.50		15.30	15.44	
		64	5320	9.90	11.00		12.40	13.50		15.40	15.44	
	802.11n-HT40 MCS0	54	5270	10.00	11.00	99.25	12.40	13.50	99.01	15.34	15.44	99.37
		62	5310	10.20	11.00		12.60	13.50		15.27	15.44	
	802.11ac-VHT20 MCS0	52	5260	9.80	11.00	98.76	12.30	13.50	98.75	15.33	15.44	99.49
		56	5280	9.70	11.00		12.30	13.50		15.30	15.44	
		60	5300	9.70	11.00		12.40	13.50		15.27	15.44	
		64	5320	9.80	11.00		12.40	13.50		15.27	15.44	
	802.11ac-VHT40 MCS0	54	5270	9.90	11.00	99.25	12.30	13.50	99.01	15.24	15.44	99.37
		62	5310	10.00	11.00		12.60	13.50		15.30	15.44	
	802.11ac-VHT80 MCS0	58	5290	10.20	11.00	98.76	12.60	13.50	99.00	15.37	15.44	99.12
	802.11ac-VHT160 MCS0	50	5250	10.40	11.00	99.00	11.00	11.75	99.50	13.96	14.14	99.10
	802.11ax-HE20 MCS0	52	5260	9.60	11.00	98.76	12.30	13.50	98.27	15.17	15.44	99.37
		56	5280	9.60	11.00		12.20	13.50		15.14	15.44	
		60	5300	9.70	11.00		12.40	13.50		15.07	15.44	
		64	5320	9.80	11.00		12.30	13.50		15.17	15.44	
	802.11ax-HE40 MCS0	54	5270	9.70	11.00	99.26	12.00	13.50	99.00	15.10	15.44	99.37
		62	5310	9.90	11.00		12.30	13.50		15.04	15.44	
	802.11ax-HE80 MCS0	58	5290	9.90	11.00	98.76	12.40	13.50	99.00	15.14	15.44	99.37
	802.11ax-HE160 MCS0	50	5250	10.30	11.00	98.76	10.80	11.75	98.51	13.86	14.14	99.12

<5.5GHz WLAN_Reduced Power>												
				Main Ant			Aux Ant			Main+Aux Ant		
	Mode	Channel	Frequency (MHz)	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	9.90	11.00	97.66	12.40	13.50	97.66			
		116	5580	9.90	11.00		12.30	13.50				
		124	5620	10.00	11.00		12.50	13.50				
		132	5660	10.00	11.00		12.50	13.50				
		144	5720	9.80	11.00		12.20	13.50				
	802.11n-HT20 MCS0	100	5500	9.90	11.00	98.77	12.40	13.50	98.76	15.37	15.44	99.37
		116	5580	10.00	11.00		12.20	13.50		15.34	15.44	
		124	5620	10.00	11.00		13.30	13.50		15.34	15.44	
		132	5660	9.80	11.00		12.30	13.50		15.30	15.44	
		144	5720	9.70	11.00		12.00	13.50		15.17	15.44	
	802.11n-HT40 MCS0	102	5510	10.20	11.00	99.25	12.70	13.50	99.01	15.31	15.44	99.37
		110	5550	10.10	11.00		12.50	13.50		15.27	15.44	
		126	5630	10.20	11.00		12.70	13.50		15.21	15.44	
		134	5670	10.10	11.00		12.60	13.50		15.21	15.44	
		142	5710	9.90	11.00		12.40	13.50		15.37	15.44	
	802.11ac-VHT20 MCS0	100	5500	9.90	11.00	98.76	12.30	13.50	98.75	15.31	15.44	99.49
		116	5580	9.90	11.00		12.30	13.50		15.24	15.44	
		124	5620	10.10	11.00		12.10	13.50		15.24	15.44	
		132	5660	10.00	11.00		12.30	13.50		15.24	15.44	
		144	5720	9.80	11.00		12.00	13.50		15.17	15.44	
	802.11ac-VHT40 MCS0	102	5510	10.20	11.00	99.25	12.50	13.50	99.01	15.30	15.44	99.37
		110	5550	10.10	11.00		12.50	13.50		15.27	15.44	
		126	5630	10.30	11.00		12.60	13.50		15.20	15.44	
		134	5670	10.10	11.00		12.30	13.50		15.17	15.44	
		142	5710	9.90	11.00		12.40	13.50		15.30	15.44	
	802.11ac-VHT80 MCS0	106	5530	10.20	11.00	98.76	12.60	13.50	99.00	15.34	15.44	99.12
		122	5610	10.20	11.00		12.80	13.50		15.27	15.44	
		138	5690	10.10	11.00		12.50	13.50		15.37	15.44	
	802.11ac-VHT160 MCS0	114	5570	10.50	11.00	99.00	12.90	13.50	99.50	15.37	15.44	99.10
	802.11ax-HE20 MCS0	100	5500	9.70	11.00	98.76	12.30	13.50	98.27	15.11	15.44	99.37
		116	5580	9.80	11.00		12.10	13.50		15.17	15.44	
		124	5620	9.80	11.00		12.30	13.50		15.17	15.44	
		132	5660	9.80	11.00		12.20	13.50		15.14	15.44	
		144	5720	9.50	11.00		11.90	13.50		15.10	15.44	
	802.11ax-HE40 MCS0	102	5510	9.90	11.00	99.26	12.20	13.50	99.00	15.17	15.44	99.37
		110	5550	9.80	11.00		12.30	13.50		15.10	15.44	
		126	5630	9.90	11.00		12.30	13.50		15.04	15.44	
		134	5670	9.80	11.00		12.40	13.50		15.04	15.44	
		142	5710	9.70	11.00		12.20	13.50		15.14	15.44	
	802.11ax-HE80 MCS0	106	5530	10.10	11.00	98.76	12.40	13.50	99.00	15.04	15.44	99.37
		122	5610	10.10	11.00		12.60	13.50		15.04	15.44	
		138	5690	9.90	11.00		12.30	13.50		15.10	15.44	
	802.11ax-HE160 MCS0	114	5570	10.50	11.00	98.76	12.60	13.50	98.51	15.21	15.44	99.12

<5.8GHz WLAN_Reduced Power>												
				Main Ant			Aux Ant			Main+Aux Ant		
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11a 6Mbps	149	5745	9.80	11.00	97.66	12.20	13.50	97.66			
		157	5785	10.00	11.00		12.50	13.50				
		165	5825	9.90	11.00		12.20	13.50				
	802.11n-HT20 MCS0	149	5745	9.90	11.00	98.77	12.20	13.50	98.76	15.34	15.44	99.37
		157	5785	10.20	11.00		12.50	13.50		15.37	15.44	
		165	5825	10.10	11.00		12.10	13.50		15.37	15.44	
	802.11n-HT40 MCS0	151	5755	10.20	11.00	99.25	12.50	13.50	99.01	15.37	15.44	99.37
		159	5795	10.40	11.00		12.70	13.50		15.34	15.44	
	802.11ac-VHT20 MCS0	149	5745	9.90	11.00	98.76	12.10	13.50	98.75	15.27	15.44	99.49
		157	5785	10.20	11.00		12.40	13.50		15.31	15.44	
		165	5825	10.00	11.00		12.00	13.50		15.31	15.44	
	802.11ac-VHT40 MCS0	151	5755	10.20	11.00	99.25	12.30	13.50	99.01	15.34	15.44	99.37
		159	5795	10.40	11.00		12.60	13.50		15.30	15.44	
	802.11ac-VHT80 MCS0	155	5775	10.50	11.00	98.76	12.90	13.50	99.00	15.34	15.44	99.12
	802.11ax-HE20 MCS0	149	5745	9.60	11.00	98.76	12.20	13.50	98.27	15.10	15.44	99.37
		157	5785	9.90	11.00		12.30	13.50		15.27	15.44	
		165	5825	9.80	11.00		12.00	13.50		15.27	15.44	
	802.11ax-HE40 MCS0	151	5755	10.00	11.00	99.26	12.20	13.50	99.00	15.20	15.44	99.37
		159	5795	10.20	11.00		12.30	13.50		15.10	15.44	
	802.11ax-HE80 MCS0	155	5775	10.20	11.00	98.76	12.50	13.50	99.00	15.14	15.44	99.37

<2.4GHz Bluetooth>

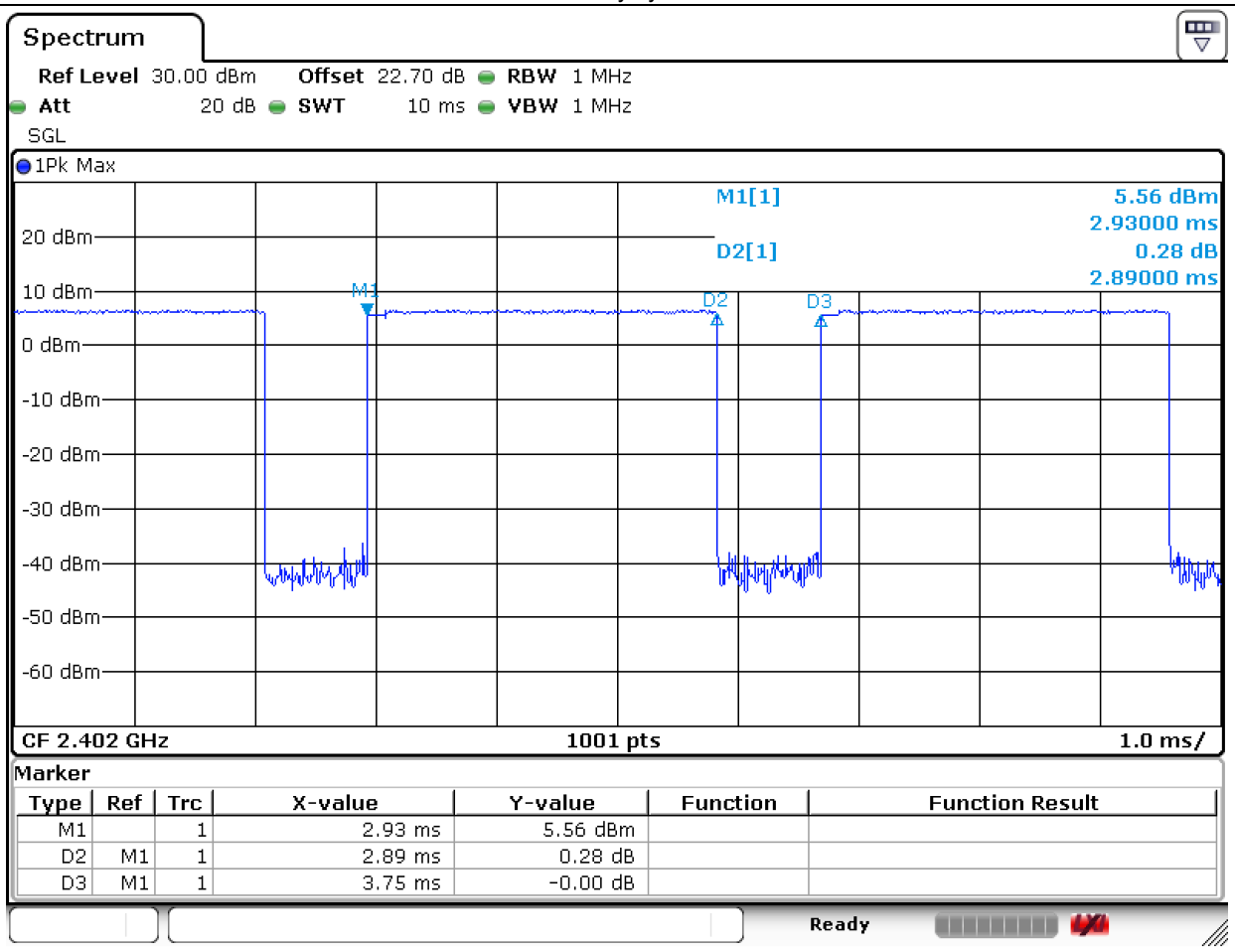
Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
BR / EDR	CH 00	2402	10.21	5.33	5.05
	CH 39	2441	10.41	5.51	5.49
	CH 78	2480	10.50	5.26	5.10
Tune-up Limit			10.50	7.00	7.00

Mode	Channel	Frequency (MHz)	Average power (dBm)	
			1Mbps	2Mbps
LE	CH 00	2402	5.80	5.80
	CH 19	2440	6.00	6.00
	CH 39	2480	5.90	5.90
Tune-up Limit			7.00	7.00

General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps due to its highest average power and duty cycle is 77.07% considered in SAR testing, and the duty cycle would be scaled to theoretical 83.3% in reported SAR calculation.

BT Duty cycle



12. Exposure position consideration

<SAR test exclusion table>

General Note:

1. The detail antenna location refer to appendix D.
2. The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
3. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
4. Per KDB 447498 D01v06, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
5. Per KDB 447498 D01v06, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold.
6. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison
7. Per KDB 447498 D01v06, for frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):
   - For test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by [1 + log(100/f(MHz))]
   - For test separation distances ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by ½
8. Per KDB 447498 D01v06, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
   a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
   b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

<Default Power Mode>

Exposure Position	Wireless Interface	BT Aux	2.4GHz WLAN Main	2.4GHz WLAN Aux	5GHz WLAN Main	5GHz WLAN Aux
	Calculated Frequency (MHz)	2480	2472	2472	5825	5825
	Maximum power (dBm)	10.5	19.5	15.5	17.0	17.5
	Maximum rated power(mW)	11.22	89.13	35.48	50.12	56.23
Bottom Face	Separation distance(mm)	5.0	5.0	5.0	5.0	5.0
	exclusion threshold	3.5	28.0	11.2	24.2	27.1
	Testing required?	Yes	Yes	Yes	Yes	Yes
Edge 1	Separation distance(mm)	5.0	5.0	5.0	5.0	5.0
	exclusion threshold	3.5	28.0	11.2	24.2	27.1
	Testing required?	Yes	Yes	Yes	Yes	Yes
Edge 2	Separation distance(mm)	18.6	153.0	18.6	153.0	18.6
	exclusion threshold	1.0	1125.0	3.0	1092.0	7.3
	Testing required?	No	No	No	No	Yes
Edge 3	Separation distance(mm)	164.5	164.5	164.5	164.5	164.5
	exclusion threshold	1240.0	1241.0	1241.0	1207.0	1207.0
	Testing required?	No	No	No	No	No
Edge 4	Separation distance(mm)	195.8	49.0	195.8	49.0	195.8
	exclusion threshold	1553.0	2.9	1553.0	2.5	1520.0
	Testing required?	No	No	No	No	No

RF Exposure Condition	Wireless Interface	NFC
	Calculated Frequency (MHz)	13.56
	Maximum output power (dBm)	26.23
	Maximum rated power(mW)	420.00
All position	exclusion threshold	442.7
	Testing required?	NO

<Reduced Power Mode>

	Wireless Interface	BT Aux	2.4GHz WLAN Main	2.4GHz WLAN Aux	5GHz WLAN Main	5GHz WLAN Aux
Exposure Position	Calculated Frequency (MHz)	2480	2472	2472	5825	5825
	Maximum power (dBm)	10.5	15.5	13.0	11.0	13.5
	Maximum rated power(mW)	11.22	35.48	19.95	12.59	22.39
Bottom Face	Separation distance(mm)	5.0	5.0	5.0	5.0	5.0
	exclusion threshold	3.5	11.2	6.3	6.1	10.8
	Testing required?	Yes	Yes	Yes	Yes	Yes
Edge 1	Separation distance(mm)	5.0	5.0	5.0	5.0	5.0
	exclusion threshold	3.5	11.2	6.3	6.1	10.8
	Testing required?	Yes	Yes	Yes	Yes	Yes
Edge 2	Separation distance(mm)	18.6	153.0	18.6	153.0	18.6
	exclusion threshold	1.0	1125.0	1.7	1092.0	2.9
	Testing required?	No	No	No	No	No
Edge 3	Separation distance(mm)	164.5	164.5	164.5	164.5	164.5
	exclusion threshold	1240.0	1241.0	1241.0	1207.0	1207.0
	Testing required?	No	No	No	No	No
Edge 4	Separation distance(mm)	195.8	49.0	195.8	49.0	195.8
	exclusion threshold	1553.0	1.1	1553.0	0.6	1520.0
	Testing required?	No	No	No	No	No

13. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. 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.
   b. 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)"
   c. For WLAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. 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
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. For the exposure positions that proximity sensor power reduction is applied for SAR compliance, additional SAR testing with EUT transmitting full power in sensor trigger distance was performed according to section 4. The test results just verification the sensor trigger distance to meet KDB 616217 requirement, when in normal usage will not operate at trigger distance, therefore, these results were not using performed Sim-Tx analysis

WLAN Note:

1. 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.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

13.1 Body SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power Reduction	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)
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	4mm	Main	OFF	11	2462	18.80	19.50	1.175	98.94	1.011	-0.02	0.674	0.801
01	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	4mm	Main	OFF	1	2412	18.70	19.50	1.202	98.94	1.011	-0.01	0.783	0.952
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	4mm	Main	OFF	6	2437	18.60	19.50	1.230	98.94	1.011	-0.01	0.732	0.910
	WLAN2.4GHz	802.11b 1Mbps	Edge 1	9mm	Main	OFF	11	2462	18.80	19.50	1.175	98.94	1.011	0.02	0.185	0.220
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0mm	Main	ON	11	2462	15.00	15.50	1.122	99.52	1.005	-0.02	0.653	0.736
	WLAN2.4GHz	802.11b 1Mbps	Edge 1	0mm	Main	ON	11	2462	15.00	15.50	1.122	99.52	1.005	0	0.352	0.397
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	2mm	Aux	OFF	11	2462	14.90	15.50	1.148	99.23	1.008	-0.04	0.575	0.665
	WLAN2.4GHz	802.11b 1Mbps	Edge 1	6mm	Aux	OFF	11	2462	14.90	15.50	1.148	99.23	1.008	0.01	0.139	0.161
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0mm	Aux	ON	11	2462	12.50	13.00	1.122	99.52	1.005	-0.02	0.522	0.589
	WLAN2.4GHz	802.11b 1Mbps	Edge 1	0mm	Aux	ON	11	2462	12.50	13.00	1.122	99.52	1.005	0.02	0.200	0.226
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	4mm	Main	OFF	38	5190	16.00	16.50	1.122	99.25	1.008	-0.01	0.742	0.839
02	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	4mm	Main	OFF	42	5210	15.60	16.50	1.230	98.76	1.013	-0.12	0.929	1.158
	WLAN5GHz	802.11n-HT40 MCS0	Edge 1	9mm	Main	OFF	38	5190	16.00	16.50	1.122	99.25	1.008	0.04	0.498	0.563
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0mm	Main	ON	42	5210	10.20	11.00	1.202	98.76	1.013	0	0.477	0.581
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	0mm	Main	ON	42	5210	10.20	11.00	1.202	98.76	1.013	-0.02	0.807	0.983
	WLAN5GHz	802.11n-HT40 MCS0	Edge 1	0mm	Main	ON	38	5190	10.10	11.00	1.230	99.25	1.008	-0.01	0.790	0.980
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	2mm	Aux	OFF	42	5210	16.30	17.50	1.318	99	1.010	0.04	0.579	0.771
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	6mm	Aux	OFF	42	5210	16.30	17.50	1.318	99	1.010	-0.06	0.416	0.554
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 2	0mm	Aux	OFF	42	5210	16.30	17.50	1.318	99	1.010	0.06	0.078	0.104
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0mm	Aux	ON	42	5210	12.40	13.50	1.288	99	1.010	-0.04	0.375	0.488
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	0mm	Aux	ON	42	5210	12.40	13.50	1.288	99	1.010	0.08	0.482	0.627
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	4mm	Main	OFF	54	5270	15.70	16.50	1.202	99.25	1.008	-0.05	0.691	0.837
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	4mm	Main	OFF	62	5310	15.60	16.50	1.230	99.25	1.008	-0.1	0.763	0.946
	WLAN5GHz	802.11n-HT40 MCS0	Edge 1	9mm	Main	OFF	54	5270	15.70	16.50	1.202	99.25	1.008	0.01	0.527	0.639
	WLAN5GHz	802.11ac-VHT160 MCS0	Bottom Face	0mm	Main	ON	50	5250	10.40	11.00	1.148	99	1.010	0.02	0.492	0.571
	WLAN5GHz	802.11ac-VHT160 MCS0	Edge 1	0mm	Main	ON	50	5250	10.40	11.00	1.148	99	1.010	0.02	0.907	1.052
03	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	0mm	Main	ON	58	5290	10.20	11.00	1.202	98.76	1.013	-0.01	0.877	1.068
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Face	2mm	Aux	OFF	54	5270	16.30	17.50	1.318	99.01	1.010	0.12	0.567	0.755
	WLAN5GHz	802.11n-HT40 MCS0	Edge 1	6mm	Aux	OFF	54	5270	16.30	17.50	1.318	99.01	1.010	0.01	0.353	0.470
	WLAN5GHz	802.11n-HT40 MCS0	Edge 2	0mm	Aux	OFF	54	5270	16.30	17.50	1.318	99.01	1.010	0.04	0.115	0.153
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0mm	Aux	ON	58	5290	12.60	13.50	1.230	99	1.010	-0.04	0.404	0.502
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	0mm	Aux	ON	58	5290	12.60	13.50	1.230	99	1.010	0.01	0.456	0.567
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	4mm	Main	OFF	122	5610	16.20	17.00	1.202	98.76	1.013	0.01	0.781	0.951
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	4mm	Main	OFF	138	5690	15.90	17.00	1.288	98.76	1.013	0.03	0.711	0.928
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	9mm	Main	OFF	122	5610	16.20	17.00	1.202	98.76	1.013	0.17	0.656	0.799
	WLAN5GHz	802.11ac-VHT160 MCS0	Bottom Face	0mm	Main	ON	114	5570	10.50	11.00	1.122	99	1.010	-0.01	0.487	0.552
	WLAN5GHz	802.11ac-VHT160 MCS0	Edge 1	0mm	Main	ON	114	5570	10.50	11.00	1.122	99	1.010	-0.04	0.927	1.051
04	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	0mm	Main	ON	106	5530	10.20	11.00	1.202	98.76	1.013	-0.03	0.939	1.144
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	2mm	Aux	OFF	122	5610	16.30	17.00	1.175	99	1.010	-0.02	0.629	0.746
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	6mm	Aux	OFF	122	5610	16.30	17.00	1.175	99	1.010	-0.01	0.386	0.458
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 2	0mm	Aux	OFF	122	5610	16.30	17.00	1.175	99	1.010	-0.19	0.226	0.268
	WLAN5GHz	802.11ac-VHT160 MCS0	Bottom Face	0mm	Aux	ON	114	5570	12.90	13.50	1.148	99.5	1.005	-0.02	0.465	0.537
	WLAN5GHz	802.11ac-VHT160 MCS0	Edge 1	0mm	Aux	ON	114	5570	12.90	13.50	1.148	99.5	1.005	0	0.590	0.681
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	4mm	Main	OFF	155	5775	16.30	17.00	1.175	98.76	1.013	-0.01	0.647	0.770
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	9mm	Main	OFF	155	5775	16.30	17.00	1.175	98.76	1.013	0.05	0.652	0.776
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0mm	Main	ON	155	5775	10.50	11.00	1.122	98.76	1.013	0.01	0.320	0.364
05	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	0mm	Main	ON	155	5775	10.50	11.00	1.122	98.76	1.013	0.1	0.695	0.790
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	2mm	Aux	OFF	155	5775	16.20	17.00	1.202	99	1.010	-0.06	0.536	0.651
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	6mm	Aux	OFF	155	5775	16.20	17.00	1.202	99	1.010	-0.02	0.323	0.392
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 2	0mm	Aux	OFF	155	5775	16.20	17.00	1.202	99	1.010	-0.09	0.202	0.245
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	0mm	Aux	ON	155	5775	12.90	13.50	1.148	99	1.010	-0.02	0.403	0.467
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	0mm	Aux	ON	155	5775	12.90	13.50	1.148	99	1.010	0.02	0.507	0.588

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	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 Face	0mm	Aux	78	2480	10.50	10.50	1.000	77.07	1.081	-0.03	0.227	0.245
06	Bluetooth	1Mbps	Bottom Face	0mm	Aux	39	2441	10.41	10.50	1.021	77.07	1.081	0	0.270	0.298
	Bluetooth	1Mbps	Bottom Face	0mm	Aux	0	2402	10.21	10.50	1.069	77.07	1.081	0	0.249	0.288
	Bluetooth	1Mbps	Edge 1	0mm	Aux	78	2480	10.50	10.50	1.000	77.07	1.081	0	0.091	0.098

13.2 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power Reduction	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	802.11ac-VHT80 MCS0	Bottom Face	4mm	Main	OFF	42	5210	15.60	16.50	1.230	98.76	1.013	-0.12	0.929	-	1.158
2nd	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Face	4mm	Main	OFF	42	5210	15.60	16.50	1.230	98.76	1.013	0.01	0.908	1.02	1.132
1st	WLAN5GHz	802.11ac-VHT160 MCS0	Edge 1	0mm	Main	ON	50	5250	10.40	11.00	1.148	99	1.010	0.02	0.907	-	1.052
2nd	WLAN5GHz	802.11ac-VHT160 MCS0	Edge 1	0mm	Main	ON	50	5250	10.40	11.00	1.148	99	1.010	-0.04	0.863	1.05	1.001
1st	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	0mm	Main	ON	106	5530	10.20	11.00	1.202	98.76	1.013	-0.03	0.939	-	1.144
2nd	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 1	0mm	Main	ON	106	5530	10.20	11.00	1.202	98.76	1.013	0.02	0.884	1.06	1.077

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/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.

14. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body
1.	WLAN2.4GHz Main Ant + WLAN2.4GHz Aux Ant + NFC	Yes
2.	WLAN2.4GHz Main Ant + Bluetooth Aux Ant + NFC	Yes
3.	WLAN5GHz Main Ant + WLAN5GHz Aux Ant + Bluetooth Aux Ant + NFC	Yes

General Note:

1. The worst case WLAN reported SAR for each configuration was used for SAR summation. Therefore, the following summations represent the absolute worst cases for simultaneous transmission with WLAN.
2. WLAN RF exposure assessment of MIMO mode simultaneous transmission exclusion analysis was performed with SAR test results of each antenna in SISO mode. Therefore SPLSR calculation was choose worst case with SAR test results of each antenna in SISO mode perform evaluation.
3. The Scaled SAR summation is calculated based on the same configuration and test position.
4. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (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 ≤ 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 15.2.
5. NFC antenna qualifies for the standalone SAR test exclusion, therefore NFC SAR is conservatively estimated of 0.4 W/kg per KDB 447498 D01v06 section 4.3.2, and the estimated NFC SAR is used only to determine simultaneous transmission SAR test exclusion.

14.1 Body Exposure Conditions

Exposure Position	1	2	3	4	5	6	1+2+6 Summed 1g SAR (W/kg)	1+5+6 Summed 1g SAR (W/kg)	3+4+5+6 Summed 1g SAR (W/kg)	1+2+6 SPLSR	1+2+6 Case No	1+5+6 SPLSR	1+5+6 Case No	3+4+5+6 SPLSR	3+4+5+6 Case No
	WLAN2.4GHz Main Ant	WLAN2.4GHz Aux Ant	WLAN5GHz Main Ant	WLAN5GHz Aux Ant	Bluetooth Aux Ant	NFC									
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	Estimated 1g SAR (W/kg)									
Bottom Face	0.952	0.665	1.158	0.771	0.298	0.400	2.017	1.650	2.627	0.02	Case 1	0.02	Case 2	0.04	Case 3
Edge 1	0.397	0.226	1.144	0.681	0.098	0.400	1.023	0.895	2.323					0.03	Case 4
Edge 2				0.268		0.400	0.400	0.400	0.668						
Edge 3						0.400	0.400	0.400	0.400						
Edge 4						0.400	0.400	0.400	0.400						

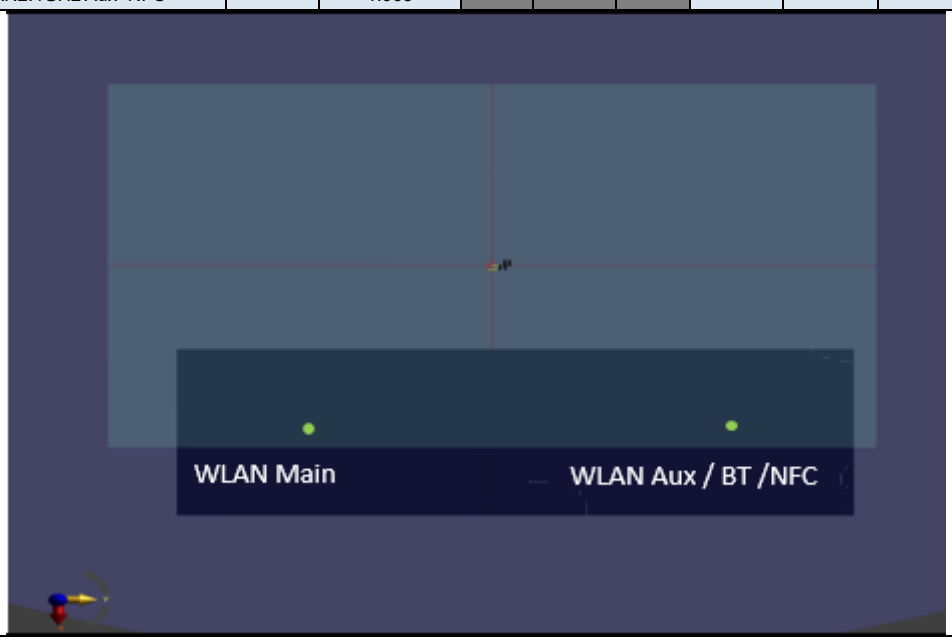
14.2 SPLSR Evaluation and Analysis

General Note:

1. According to antenna location the minimum distance between each transmit antenna is using for SPLSR analysis.
2. 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.
3. SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*). If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary
4. 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.
5. SPLSR Hotspot combination procedure (Hybrid SPLSR) also be considered for simultaneous transmission analysis.
6. In the Hybrid SPLSR calculation, algebraically sum the SAR values of the co-located pair and use that value in SPLSR calculation and used the minimum distance between the spatially separated antenna and the closest antenna of the co-located antenna pair to be conservative.
7. When SAR is estimated, the peak SAR location is assumed to be at the feed-point or geometric center of the antenna, whichever provides a smaller antenna separation distance.

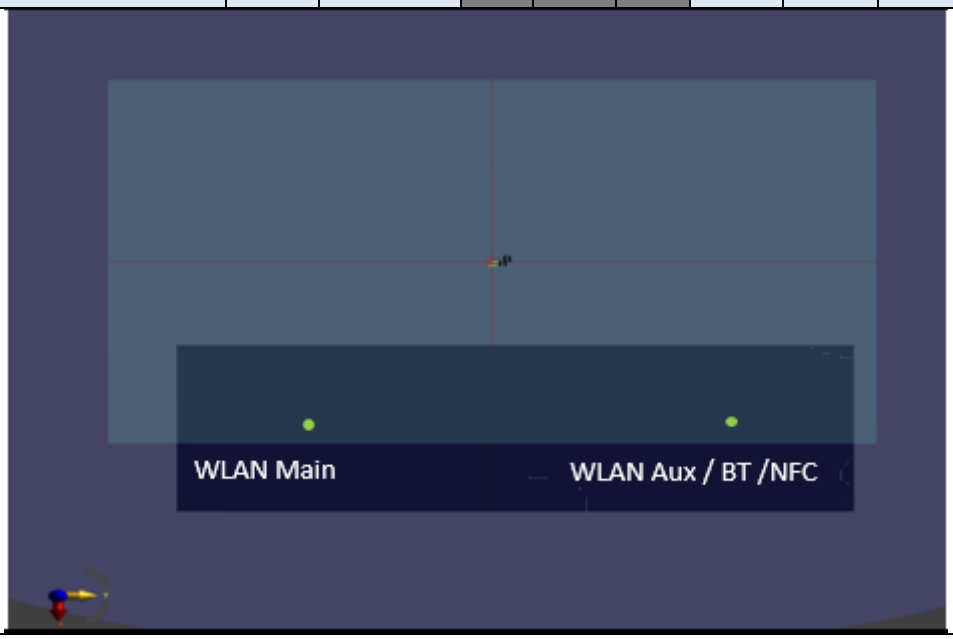
	WLAN2.4GHz Main to WLAN2.4GHz Aux	WLAN2.4GHz Main to NFC
Antenna Separation distance	-	116.2 mm
SAR Peak location separation distance	133 mm	-
Minimum separation distance	116.2 mm	

Case 1	Band	Position	SAR (W/kg)	SAR peak location (mm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
	WLAN2.4GHz Main	Bottom Face	0.952				116.2	2.02	0.02	Not required
	WLAN2.4GHz Aux+NFC		1.065							



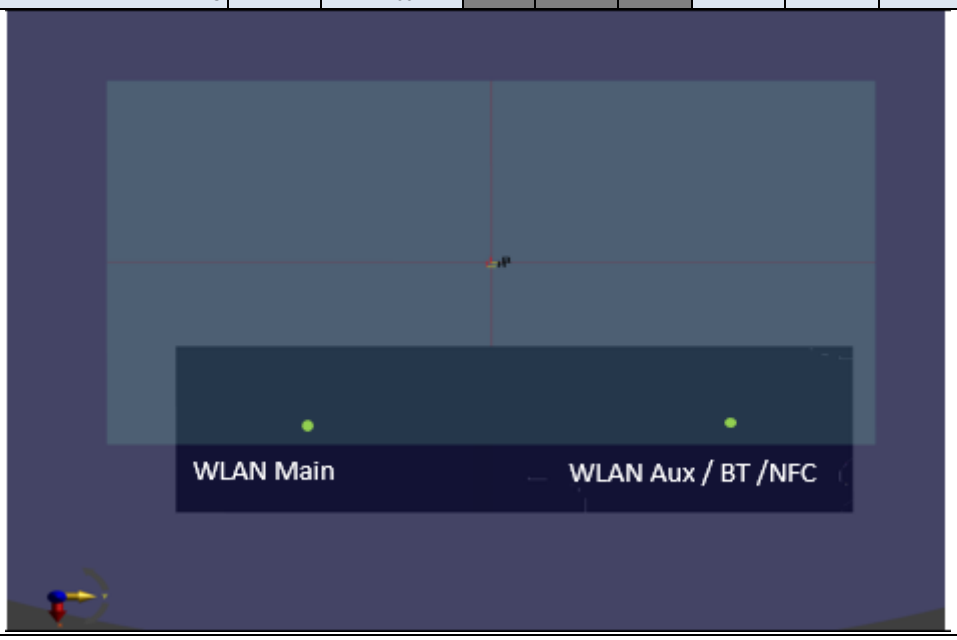
	WLAN2.4GHz Main to Bluetooth	WLAN2.4GHz Main to NFC
Antenna Separation distance	-	116.2 mm
SAR Peak location separation distance	135 mm	-
Minimum separation distance	116.2 mm	

Case 2	Band	Position	SAR (W/kg)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
	WLAN2.4GHz Main	Bottom Face	0.952				116.2	1.65	0.02	Not required
	Bluetooth Aux+NFC		0.698							



	WLAN5GHz Main to WLAN5G Aux	WLAN5GHz Main to Bluetooth	WLAN5GHz Main to NFC
Antenna Separation distance	-	-	116.2 mm
SAR Peak location separation distance	123.9 mm	124.9 mm	-
Minimum separation distance	116.2 mm		

Case 3	Band	Position	SAR (W/kg)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
	WLAN5GHz Main	Bottom Face	1.158				116.2	2.63	0.04	Not required
	WLAN5GHz Aux+Bluetooth Aux+NFC		1.469							



Case 4	Band	Position	SAR (W/kg)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				X	Y	Z				
	WLAN5GHz Main	Edge 1	1.144	5.4	-49.9	-177	122.0	2.32	0.03	Not required
	WLAN5GHz Aux+Bluetooth Aux+NFC		1.179	2.1	72.1	-177				

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15. 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 ≤ 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.

16. 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

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

[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 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.