FCC SAR TEST REPORT

FCC ID	:	**2AMK2-RM03AA**
Equipment	:	**Paper Tablet**
Brand Name	:	**reMarkable**
Model Name	:	**2AMK2-RM03AA**
Applicant	:	**reMarkable AS** **Fridtjof Nansens vei 12, 0369 Oslo, Norway**
Manufacturer	:	**reMarkable AS** **Fridtjof Nansens vei 12, 0369 Oslo, Norway**
Standard	:	**FCC 47 CFR Part 2 (2.1093)**

The product was received on Apr. 22, 2025 and testing was started from Apr. 29, 2025 and completed on Jun. 06, 2025. 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

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History of this test report

Report No.	Version	Description	Issued Date
FA541507	01	Initial issue of report	Jun. 18, 2025

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) for reMarkable AS, Paper Tablet, 2AMK2-RM03AA, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary Body (Separation 0mm) 1g SAR (W/kg)	Highest Simultaneous Transmission 1g SAR (W/kg)
DTS	WLAN	2.4GHz WLAN	1.19	1.21
NII		5GHz WLAN	1.15	1.48
DSS	2.4GHz Band	Bluetooth	0.31	1.48
DXX	13.56MHz	WPT	0.02	1.48
Date of Testing:			2025/04/29 ~ 2025/06/06	

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation and the FCC designation No. TW3786 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: Carlie Tsai

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

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	Paper Tablet
Brand Name	reMarkable
Model Name	2AMK2-RM03AA
FCC ID	2AMK2-RM03AA
Sample 1	Main source
Sample 2	2nd source
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 Bluetooth: 2400 MHz ~ 2483.5 MHz WPT: 13.56 MHz
Mode	WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80 Bluetooth BR/EDR/LE WPT: ASK
HW Version	A
EUT Stage	Production Unit

Remark:
1. There are two kinds of samples. Select Sample 1 as the main test, and Sample 2 will spot-check findings in Sample 1.

Sample List			
Main Board	Main source	Vendor	Avary
		Model Number	SB0SDV1BV0G
	2nd source	Vendor	PI
		Model Number	SB0SDV1B00G
Antenna SUB Board	Main source	Vendor	Avary
		Model Number	SB0SDV2BV0D
	2nd source	Vendor	ASKPCB
		Model Number	SB0SDV2B00D
PB FPC	Main source	Vendor	AKM
		Model Number	MESDV14201A
	2nd source	Vendor	ICHIA
		Model Number	MESDV14211A
USB FPC	Main source	Vendor	AKM
		Model Number	MESDV14203A
	2nd source	Vendor	ICHIA
		Model Number	MESDV14213A
Hall Sensor FPC	Main source	Vendor	AKM
		Model Number	MESDV14205A
	2nd source	Vendor	ICHIA
		Model Number	MESDV14215A
DRAM	Main source	Vendor	Micron
		Model Number	MT53E1G16D1ZW-046 WT:C
	2nd source	Vendor	JSC
		Model Number	JSL4BAG167ZAMF-05A

Antenna Information			
Ant. Type	Monopole		
Peak Gain (dBi)			
2400~2483.5MHz	0.4	5470~5725MHz	2.6
5150~5250MHz	1.11	5725~5850MHz	2.1
5250~5350MHz	1.4	5850~5895MHz	1.07

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.

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:

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

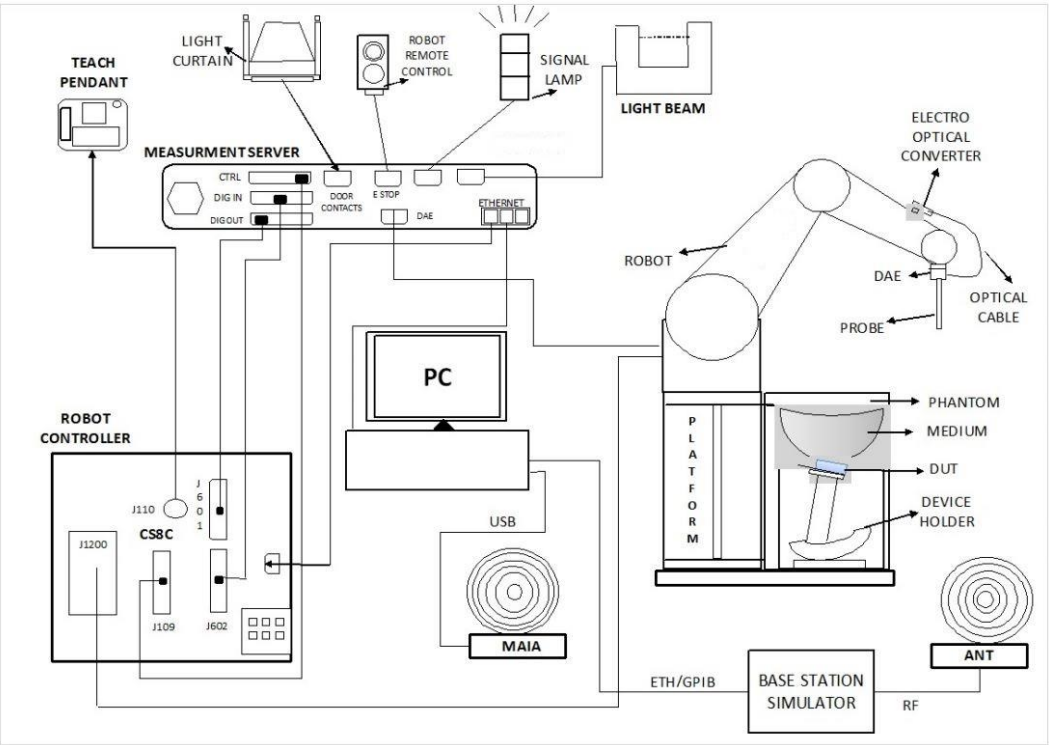
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

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.

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 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	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 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	

6.3 Data Acquisition Electronics (DAE)

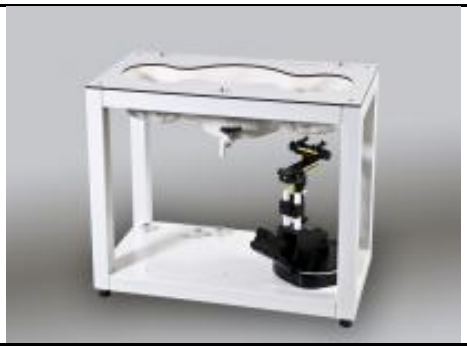
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an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

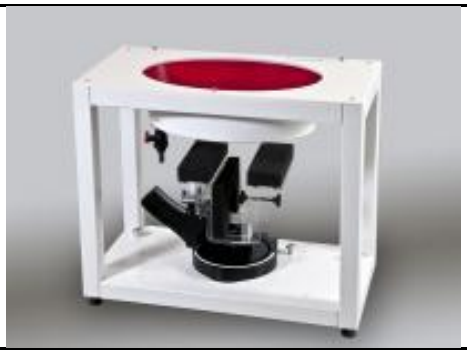
6.4 Phantom

<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 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

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 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.	

7.4 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.

7.5 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.

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	929	Nov. 21, 2022	Nov. 18, 2025
SPEAG	5GHz System Validation Kit	D5GHzV2	1006	Oct. 15, 2024	Oct. 14, 2025
SPEAG	5GHz System Validation Kit(2)	D5GHzV2	1171	Apr. 19, 2024	Apr. 17, 2026
SPEAG	13MHz System Validation Kit(2)	CLA13	1011	Jul. 10, 2023	Jul. 08, 2025
SPEAG	Data Acquisition Electronics	DAE4	1399	Mar. 14, 2025	Mar. 13, 2026
SPEAG	Data Acquisition Electronics	DAE4	1647	Oct. 15, 2024	Oct. 14, 2025
SPEAG	Data Acquisition Electronics	DAE4	1805	May. 22, 2024	May. 21, 2025
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Nov. 19, 2024	Nov. 18, 2025
SPEAG	Dosimetric E-Field Probe	EX3DV4	3976	Jan. 23, 2025	Jan. 22, 2026
SPEAG	Dosimetric E-Field Probe	EX3DV4	7625	Dec. 13, 2024	Dec. 12, 2025
SPEAG	Dosimetric E-Field Probe	EX3DV4	7814	Jun. 20, 2024	Jun. 19, 2025
Testo	Hygro meter	608-H1	45196600	Oct. 28, 2024	Oct. 27, 2025
R&S	BT Base Station	CBT	101136	Oct. 20, 2024	Oct. 19, 2025
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Sep. 24, 2024	Sep. 23, 2025
Keysight	ENA Network Analyzer	E5071C	MY46104758	Oct. 20, 2024	Oct. 19, 2025
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 17, 2024	Sep. 16, 2025
SPEAG	Dielectric Probe Kit	DAK-12	1156	Jul. 15, 2024	Jul. 14, 2025
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3690	Aug. 07, 2024	Aug. 06, 2025
Anritsu	Power Meter	ML2495A	1419002	Aug. 13, 2024	Aug. 12, 2025
Anritsu	Power Sensor	MA2411B	1911176	Aug. 13, 2024	Aug. 12, 2025
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jul. 09, 2024	Jul. 08, 2025
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 23, 2024	Oct. 22, 2025
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℃ 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
13	22.8	0.757	53.245	0.75	55.00	0.93	-3.19	±5	2025/5/5
2450	22.4	1.810	39.600	1.80	39.20	0.56	1.02	±5	2025/4/29
2450	22.4	1.850	40.400	1.80	39.20	2.78	3.06	±5	2025/5/7
2450	22.5	1.858	39.220	1.80	39.20	3.22	0.05	±5	2025/6/6
5250	22.4	4.67	36.4	4.71	35.95	-0.85	1.25	±5	2025/5/8
5250	22.6	4.711	36.619	4.71	35.95	0.02	1.86	±5	2025/5/16
5600	22.4	5.03	35.9	5.07	35.50	-0.79	1.13	±5	2025/5/8
5800	22.4	5.250	35.600	5.27	35.30	-0.38	0.85	±5	2025/5/8
5800	22.5	5.233	35.031	5.27	35.30	-0.70	-0.76	±5	2025/6/6

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.

Test Site	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 (%)
SAR-13	2025/5/5	13	1000	CLA13-1011	EX3DV4 - SN3931	DAE4 Sn1805	0.496	0.544	0.496	-8.82
SAR-13	2025/4/29	2450	50	D2450V2-929	EX3DV4 - SN3976	DAE4 Sn1805	2.530	52.400	50.6	-3.44
SAR-13	2025/5/7	2450	50	D2450V2-929	EX3DV4 - SN3976	DAE4 Sn1399	2.520	52.400	50.4	-3.82
SAR-08	2025/6/6	2450	50	D2450V2-929	EX3DV4 - SN7625	DAE4 Sn1647	2.600	52.400	52	-0.76
SAR-13	2025/5/8	5250	50	D5GHzV2-1006	EX3DV4 - SN3976	DAE4 Sn1399	3.660	80.600	73.2	-9.18
SAR-12	2025/5/16	5250	50	D5GHzV2-1171	EX3DV4 - SN7814	DAE4 Sn1647	3.700	78.700	74	-5.97
SAR-13	2025/5/8	5600	50	D5GHzV2-1006	EX3DV4 - SN3976	DAE4 Sn1399	3.800	83.400	76	-8.87
SAR-13	2025/5/8	5800	50	D5GHzV2-1006	EX3DV4 - SN3976	DAE4 Sn1399	3.680	80.600	73.6	-8.68
SAR-08	2025/6/6	5800	50	D5GHzV2-1006	EX3DV4 - SN7625	DAE4 Sn1647	4.080	80.600	81.6	1.24

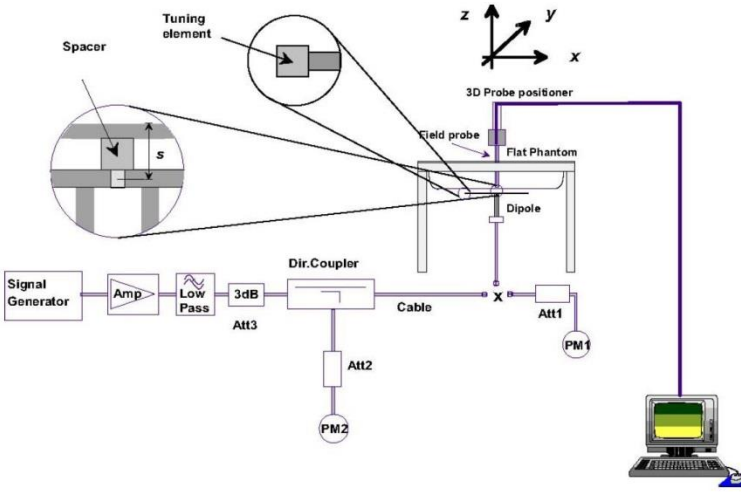


Fig 8.3.1 System Performance Check Setup

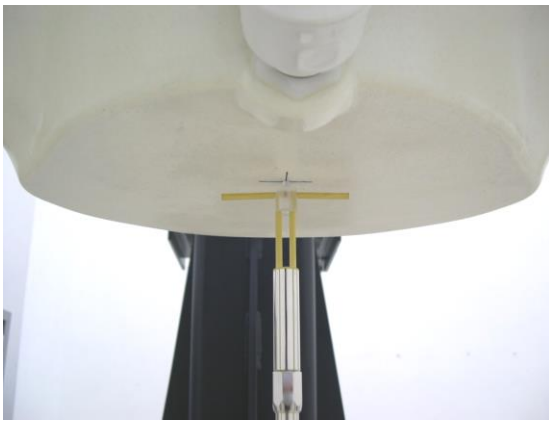


Fig 8.3.2 Setup Photo

10. RF Exposure Positions

10.1 SAR Testing for Tablet

This device can be used also in full sized tablet exposure conditions, due to its size. Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR exclusion threshold in KDB 447498 D01v06 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

11. 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 < 1.6W/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 ≤ 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.
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

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	12.47	12.50	100.00
		6	2437	12.45	12.50	
		11	2462	12.20	12.50	
	802.11g 6Mbps	1	2412	12.48	12.50	98.96
		6	2437	12.47	12.50	
		11	2462	12.45	12.50	
	802.11n-HT20 MCS0	1	2412	12.01	12.50	98.83
		6	2437	12.20	12.50	
		11	2462	12.01	12.50	
	802.11n-HT40 MCS0	3	2422	12.30	12.50	97.79
		6	2437	12.16	12.50	
		9	2452	12.03	12.50	
	802.11ac-VHT20 MCS0	1	2412	12.11	12.50	98.90
		6	2437	12.30	12.50	
		11	2462	12.11	12.50	
	802.11ac-VHT40 MCS0	3	2422	12.40	12.50	97.82
		6	2437	12.26	12.50	
		9	2452	12.13	12.50	
	802.11ax-HE20 MCS0	1	2412	12.22	12.50	98.59
		6	2437	12.41	12.50	
		11	2462	12.22	12.50	
	802.11ax-HE40 MCS0	3	2422	12.47	12.50	97.35
		6	2437	12.38	12.50	
		9	2452	12.25	12.50	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN	802.11a 6Mbps	36	5180	12.86	13.00	98.90
		40	5200	12.54	13.00	
		44	5220	12.59	13.00	
		48	5240	12.57	13.00	
	802.11n-HT20 MCS0	36	5180	12.42	13.00	98.89
		40	5200	12.55	13.00	
		44	5220	12.62	13.00	
		48	5240	12.53	13.00	
	802.11n-HT40 MCS0	38	5190	12.35	13.00	97.50
		46	5230	12.32	13.00	
	802.11ac-VHT20 MCS0	36	5180	12.52	13.00	98.90
		40	5200	12.65	13.00	
		44	5220	12.72	13.00	
		48	5240	12.63	13.00	
	802.11ac-VHT40 MCS0	38	5190	12.45	13.00	97.53
		46	5230	12.42	13.00	
	802.11ac-VHT80 MCS0	42	5210	12.46	13.00	95.40
	802.11ax-HE20 MCS0	36	5180	12.62	13.00	98.40
		40	5200	12.80	13.00	
		44	5220	12.82	13.00	
		48	5240	12.73	13.00	
	802.11ax-HE40 MCS0	38	5190	12.55	13.00	97.35
		46	5230	12.52	13.00	
	802.11ax-HE80 MCS0	42	5210	12.56	13.00	94.82

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN	802.11a 6Mbps	52	5260	12.59	13.00	98.90
		56	5280	12.70	13.00	
		60	5300	12.93	13.00	
		64	5320	12.59	13.00	
	802.11n-HT20 MCS0	52	5260	12.53	13.00	98.89
		56	5280	12.54	13.00	
		60	5300	12.76	13.00	
		64	5320	12.56	13.00	
	802.11n-HT40 MCS0	54	5270	12.44	13.00	97.50
		62	5310	12.48	13.00	
	802.11ac-VHT20 MCS0	52	5260	12.63	13.00	98.90
		56	5280	12.64	13.00	
		60	5300	12.86	13.00	
		64	5320	12.66	13.00	
	802.11ac-VHT40 MCS0	54	5270	12.54	13.00	97.53
		62	5310	12.58	13.00	
	802.11ac-VHT80 MCS0	58	5290	10.85	12.50	95.40
	802.11ax-HE20 MCS0	52	5260	12.73	13.00	98.40
		56	5280	12.96	13.00	
		60	5300	12.96	13.00	
		64	5320	12.76	13.00	
	802.11ax-HE40 MCS0	54	5270	12.64	13.00	97.35
		62	5310	12.68	13.00	
	802.11ax-HE80 MCS0	58	5290	10.95	12.50	94.82

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN	802.11a 6Mbps	100	5500	11.49	11.50	98.90
		116	5580	11.48	11.50	
		124	5620	11.39	11.50	
		132	5660	11.49	11.50	
		140	5700	11.32	11.50	
		144	5720	11.45	11.50	
	802.11n-HT20 MCS0	100	5500	11.28	11.50	98.89
		116	5580	11.09	11.50	
		124	5620	11.23	11.50	
		132	5660	11.33	11.50	
		140	5700	11.29	11.50	
		144	5720	10.99	11.50	
	802.11n-HT40 MCS0	102	5510	10.87	11.50	97.50
		110	5550	10.92	11.50	
		126	5630	10.94	11.50	
		134	5670	10.87	11.50	
		142	5710	10.85	11.50	
	802.11ac-VHT20 MCS0	100	5500	11.38	11.50	98.90
		116	5580	11.19	11.50	
		124	5620	11.33	11.50	
		132	5660	11.43	11.50	
		140	5700	11.39	11.50	
		144	5720	11.09	11.50	
	802.11ac-VHT40 MCS0	102	5510	10.97	11.50	97.53
		110	5550	11.02	11.50	
		126	5630	11.04	11.50	
		134	5670	10.97	11.50	
		142	5710	10.95	11.50	
	802.11ac-VHT80 MCS0	106	5530	11.31	11.50	95.40
		122	5610	11.12	11.50	
		138	5690	11.07	11.50	
	802.11ax-HE20 MCS0	100	5500	11.48	11.50	98.40
		116	5580	11.29	11.50	
		124	5620	11.25	11.50	
		132	5660	11.27	11.50	
		140	5700	11.49	11.50	
		144	5720	11.19	11.50	
	802.11ax-HE40 MCS0	102	5510	11.07	11.50	97.35
		110	5550	11.12	11.50	
		126	5630	11.19	11.50	
		134	5670	11.07	11.50	
		142	5710	11.05	11.50	
	802.11ax-HE80 MCS0	106	5530	11.41	11.50	94.82
		122	5610	11.22	11.50	
		138	5690	11.17	11.50	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11a 6Mbps	149	5745	8.84	9.00	98.90
		157	5785	7.97	9.00	
		165	5825	8.60	9.00	
	802.11n-HT20 MCS0	149	5745	8.59	9.00	98.89
		157	5785	8.77	9.00	
		165	5825	8.68	9.00	
	802.11n-HT40 MCS0	151	5755	8.82	9.00	97.50
		159	5795	8.56	9.00	
	802.11ac-VHT20 MCS0	149	5745	8.69	9.00	98.90
		157	5785	8.87	9.00	
		165	5825	8.78	9.00	
	802.11ac-VHT40 MCS0	151	5755	8.92	9.00	97.53
		159	5795	8.66	9.00	
	802.11ac-VHT80 MCS0	155	5775	7.82	9.00	95.40
	802.11ax-HE20 MCS0	149	5745	8.79	9.00	98.40
		157	5785	8.97	9.00	
		165	5825	8.88	9.00	
	802.11ax-HE40 MCS0	151	5755	9.00	9.00	97.35
		159	5795	8.76	9.00	
	802.11ax-HE80 MCS0	155	5775	8.70	9.00	94.82

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.9GHz WLAN	802.11a 6Mbps	169	5845	9.40	9.50	98.90
		173	5865	9.14	9.50	
		177	5885	9.44	9.50	
	802.11n-HT20 MCS0	169	5845	9.24	9.50	98.89
		173	5865	9.15	9.50	
		177	5885	9.06	9.50	
	802.11n-HT40 MCS0	167	5835	9.26	9.50	97.50
		175	5875	9.02	9.50	
	802.11ac-VHT20 MCS0	169	5845	9.34	9.50	98.90
		173	5865	9.25	9.50	
		177	5885	9.16	9.50	
	802.11ac-VHT40 MCS0	167	5835	9.36	9.50	97.53
		175	5875	9.12	9.50	
	802.11ac-VHT80 MCS0	171	5855	9.40	9.50	95.40
	802.11ax-HE20 MCS0	169	5845	9.44	9.50	98.40
		173	5865	9.35	9.50	
		177	5885	9.26	9.50	
	802.11ax-HE40 MCS0	167	5835	9.46	9.50	97.35
		175	5875	9.22	9.50	
	802.11ax-HE80 MCS0	171	5855	9.50	9.50	94.82

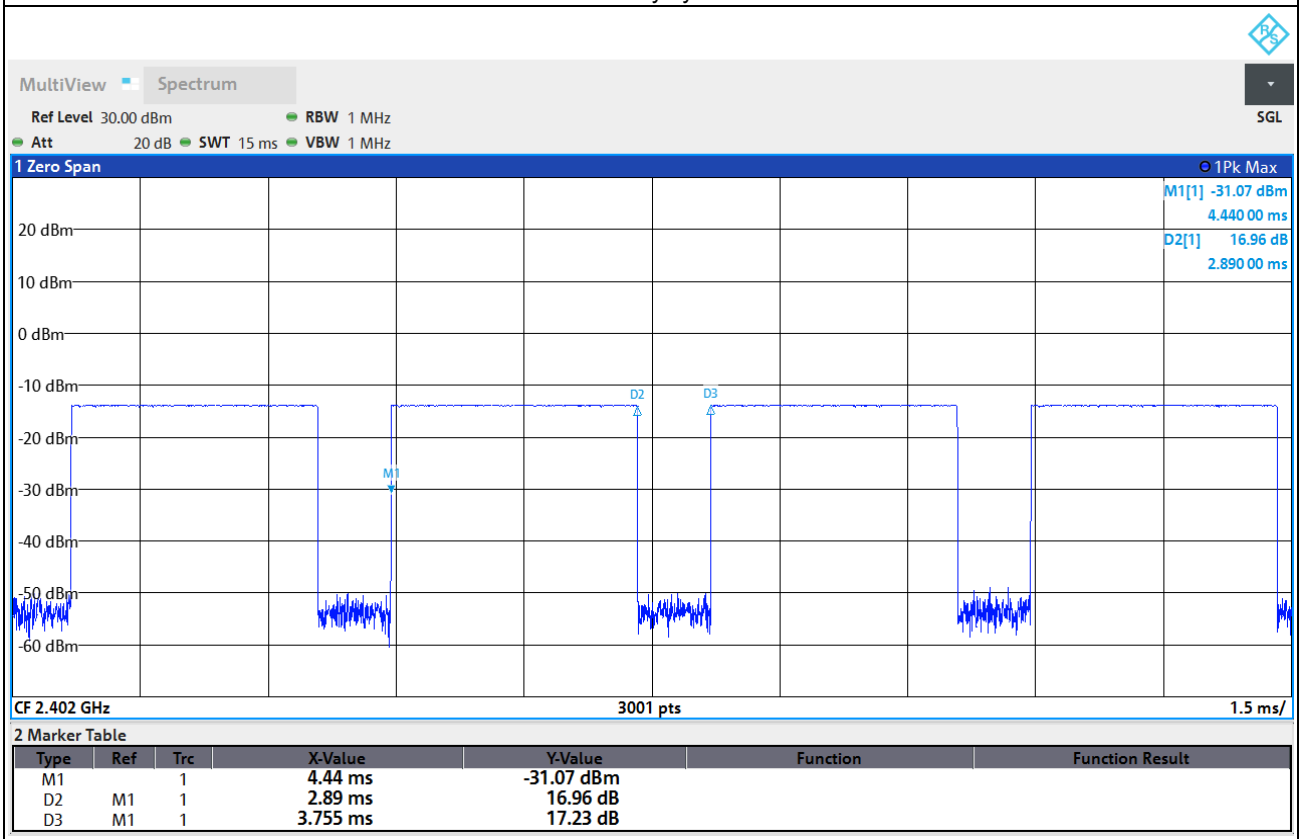
<2.4GHz Bluetooth>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
Bluetooth	BR / EDR 1Mbps	0	2402	9.81	10.00	76.96
		39	2441	9.18	10.00	
		78	2480	8.61	10.00	
	BR / EDR 2Mbps	0	2402	6.99	7.00	77.07
		39	2441	6.79	7.00	
		78	2480	6.63	7.00	
	BR / EDR 3Mbps	0	2402	7.00	7.00	76.93
		39	2441	6.83	7.00	
		78	2480	6.64	7.00	
	LE 1Mbps	0	2402	6.34	7.00	62.08
		19	2440	6.09	7.00	
		39	2480	5.59	7.00	
	LE 2Mbps	0	2402	6.90	7.00	33.12
		19	2440	6.68	7.00	
		39	2480	6.29	7.00	

General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps due to its highest average power and duty cycle is 76.96% considered in SAR testing, and the duty cycle would be scaled to theoretical 83.3% in reported SAR calculation.

BT Duty cycle



<SAR test exclusion table>

General Note:

1. The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
2. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
3. 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.
4. 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.
5. 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
6. 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

Exposure Position	Wireless Interface	BT	2.4GHz WLAN	5GHz WLAN
	Calculated Frequency (MHz)	2480	2462	5885
	Maximum power (dBm)	10.0	12.5	13.0
	Maximum rated power(mW)	10.00	17.78	19.95
Back	Separation distance(mm)	5.0	5.0	5.0
	exclusion threshold	3.2	5.6	9.7
	Testing required?	Yes	Yes	Yes
Left Edge	Separation distance(mm)	66.6	66.6	66.6
	exclusion threshold	261.0	262.0	228.0
	Testing required?	No	No	No
Right Edge	Separation distance(mm)	16.5	16.5	16.5
	exclusion threshold	1.0	1.7	2.9
	Testing required?	No	No	No
Top Edge	Separation distance(mm)	183.3	183.3	183.3
	exclusion threshold	1428.0	1429.0	1395.0
	Testing required?	No	No	No
Bottom Edge	Separation distance(mm)	5.0	5.0	5.0
	exclusion threshold	3.2	5.6	9.7
	Testing required?	Yes	Yes	Yes

12. 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.

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. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

WPT Note:

1. The WPT active only when the WPT Rx pen is connect with the device.
2. 13.56MHz WPT SAR is measured for all surface edges of the device with a transmitting antenna located within 25 mm.
3. The 13.56MHz WPT antenna port is not available on the device to support conducted power measurement, therefore the measured results are referred to as reported SAR.
4. 13.56MHz WPT SAR test tissue-simulating liquid parameter: refer to IEC/IEEE 62209-1528 2020.

12.1 Body SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	User Scenario	Accessories	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet	-	1	2412	Sample 1	12.47	12.50	100	0.02	0.910	0.916
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet	-	6	2437	Sample 1	12.45	12.50	100	-0.05	0.739	0.748
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet	-	11	2462	Sample 1	12.20	12.50	100	0.14	0.882	0.946
	WLAN2.4GHz	802.11b 1Mbps	Right Edge	0mm	Tablet	-	1	2412	Sample 1	12.47	12.50	100	0.01	0.095	0.096
	WLAN2.4GHz	802.11b 1Mbps	Bottom Edge	0mm	Tablet	-	1	2412	Sample 1	12.47	12.50	100	0.1	0.066	0.066
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet - Writing	Holster 2	11	2462	Sample 1	12.20	12.50	100	-0.17	0.266	0.285
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet - Folding	Holster 2	11	2462	Sample 1	12.20	12.50	100	0.04	0.415	0.445
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet - Writing	Holster 1	11	2462	Sample 1	12.20	12.50	100	-0.01	0.273	0.293
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet - Folding	Holster 1	11	2462	Sample 1	12.20	12.50	100	-0.08	0.418	0.448
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet	Pen	11	2462	Sample 1	12.20	12.50	100	0.05	0.325	0.348
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet	-	1	2412	Sample 2	12.47	12.50	100	0.17	1.150	1.158
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet	-	6	2437	Sample 2	12.45	12.50	100	-0.17	1.080	1.093
01	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet	-	11	2462	Sample 2	12.20	12.50	100	0.18	1.110	1.190
02	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet	-	62	5310	Sample 1	12.48	13.00	97.5	-0.15	0.946	1.094
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet	-	54	5270	Sample 1	12.44	13.00	97.5	0.16	0.723	0.844
	WLAN5GHz	802.11n-HT40 MCS0	Right Edge	0mm	Tablet	-	62	5310	Sample 1	12.48	13.00	97.5	0	0.001	0.001
	WLAN5GHz	802.11n-HT40 MCS0	Bottom Edge	0mm	Tablet	-	62	5310	Sample 1	12.48	13.00	97.5	-0.08	0.137	0.158
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet - Writing	Holster 2	62	5310	Sample 1	12.48	13.00	97.5	-0.08	0.469	0.542
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet - Folding	Holster 2	62	5310	Sample 1	12.48	13.00	97.5	0.1	0.375	0.434
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet - Writing	Holster 1	62	5310	Sample 1	12.48	13.00	97.5	-0.18	0.543	0.628
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet - Folding	Holster 1	62	5310	Sample 1	12.48	13.00	97.5	0.1	0.456	0.527
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet	Pen	62	5310	Sample 1	12.48	13.00	97.5	0.12	0.763	0.882
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet	-	62	5310	Sample 2	12.48	13.00	97.5	-0.15	0.945	1.093
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet	-	54	5270	Sample 2	12.44	13.00	97.5	-0.01	0.723	0.844
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	-	106	5530	Sample 1	11.31	11.50	95.4	0.05	0.756	0.828
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	-	122	5610	Sample 1	11.12	11.50	95.4	0.06	0.587	0.671
03	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	-	138	5690	Sample 1	11.07	11.50	95.4	-0.06	0.888	1.027
	WLAN5GHz	802.11ac-VHT80 MCS0	Right Edge	0mm	Tablet	-	106	5530	Sample 1	11.31	11.50	95.4	0.08	0.077	0.084
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Edge	0mm	Tablet	-	106	5530	Sample 1	11.31	11.50	95.4	0.01	0.253	0.277
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Writing	Holster 2	138	5690	Sample 1	11.07	11.50	95.4	0.03	0.447	0.517
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Folding	Holster 2	138	5690	Sample 1	11.07	11.50	95.4	-0.08	0.403	0.466
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Writing	Holster 1	138	5690	Sample 1	11.07	11.50	95.4	-0.08	0.451	0.522
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Folding	Holster 1	138	5690	Sample 1	11.07	11.50	95.4	0.1	0.461	0.533
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	Pen	138	5690	Sample 1	11.07	11.50	95.4	-0.18	0.822	0.951
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	-	138	5690	Sample 2	11.07	11.50	95.4	-0.19	0.515	0.596
04	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	-	155	5775	Sample 1	7.82	9.00	95.4	0.12	0.751	1.033
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet	-	151	5755	Sample 1	8.82	9.00	97.5	0.13	0.728	0.778
	WLAN5GHz	802.11ac-VHT80 MCS0	Right Edge	0mm	Tablet	-	155	5775	Sample 1	7.82	9.00	95.4	-0.18	0.015	0.021
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Edge	0mm	Tablet	-	155	5775	Sample 1	7.82	9.00	95.4	0.05	0.143	0.197
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Writing	Holster 2	155	5775	Sample 1	7.82	9.00	95.4	0.09	0.240	0.330
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Folding	Holster 2	155	5775	Sample 1	7.82	9.00	95.4	0.08	0.193	0.265
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Writing	Holster 1	155	5775	Sample 1	7.82	9.00	95.4	0.04	0.327	0.450
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Folding	Holster 1	155	5775	Sample 1	7.82	9.00	95.4	0.01	0.204	0.280
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	Pen	155	5775	Sample 1	7.82	9.00	95.4	0.15	0.531	0.730
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	-	155	5775	Sample 2	7.82	9.00	95.4	0.15	0.744	1.023
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet	-	151	5755	Sample 2	8.82	9.00	97.5	-0.03	0.720	0.770
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	-	171	5855	Sample 1	9.40	9.50	95.4	0.08	0.663	0.711
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet	-	167	5835	Sample 1	9.26	9.50	97.5	0.01	0.595	0.645
	WLAN5GHz	802.11ac-VHT80 MCS0	Right Edge	0mm	Tablet	-	171	5855	Sample 1	9.40	9.50	95.4	-0.08	0.001	0.001
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Edge	0mm	Tablet	-	171	5855	Sample 1	9.40	9.50	95.4	0.1	0.125	0.134
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Writing	Holster 2	171	5855	Sample 1	9.40	9.50	95.4	-0.18	0.223	0.239

	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Folding	Holster 2	171	5855	Sample 1	9.40	9.50	95.4	0.1	0.173	0.185
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Writing	Holster 1	171	5855	Sample 1	9.40	9.50	95.4	0.12	0.311	0.333
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet - Folding	Holster 1	171	5855	Sample 1	9.40	9.50	95.4	0.08	0.205	0.220
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	Pen	171	5855	Sample 1	9.40	9.50	95.4	-0.17	0.523	0.561
05	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	-	171	5855	Sample 2	9.40	9.50	95.4	-0.12	1.070	1.147
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet	-	167	5835	Sample 2	9.26	9.50	97.5	-0.08	0.961	1.042

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	User Scenario	Accessories	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
06	Bluetooth	1Mbps	Back	0mm	Tablet	-	0	2402	Sample 1	9.81	10.00	76.96	0.16	0.276	0.312
	Bluetooth	1Mbps	Right Edge	0mm	Tablet	-	0	2402	Sample 1	9.81	10.00	76.96	0	0.001	0.001
	Bluetooth	1Mbps	Bottom Edge	0mm	Tablet	-	0	2402	Sample 1	9.81	10.00	76.96	0	0.001	0.001
	Bluetooth	1Mbps	Back	0mm	Tablet - Writing	Holster 2	0	2402	Sample 1	9.81	10.00	76.96	0.11	0.005	0.006
	Bluetooth	1Mbps	Back	0mm	Tablet - Folding	Holster 2	0	2402	Sample 1	9.81	10.00	76.96	-0.03	0.009	0.010
	Bluetooth	1Mbps	Back	0mm	Tablet - Writing	Holster 1	0	2402	Sample 1	9.81	10.00	76.96	-0.01	0.005	0.006
	Bluetooth	1Mbps	Back	0mm	Tablet - Folding	Holster 1	0	2402	Sample 1	9.81	10.00	76.96	0.04	0.010	0.011
	Bluetooth	1Mbps	Back	0mm	Tablet	Pen	0	2402	Sample 1	9.81	10.00	76.96	0.01	0.236	0.267
	Bluetooth	1Mbps	Back	0mm	Tablet	-	0	2402	Sample 2	9.81	10.00	76.96	0.03	0.253	0.286

<WPT SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	User Scenario	Accessories	Freq. (MHz)	Sample	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
07	WPT	ASK	Back	0mm	Tablet	Pen	13.56	Sample 1	0.08	0.017	0.017
	WPT	ASK	Right Edge	0mm	Tablet	Pen	13.56	Sample 1	-0.15	0.002	0.002
	WPT	ASK	Bottom Edge	0mm	Tablet	Pen	13.56	Sample 1	0	0.001	0.001
	WPT	ASK	Back	0mm	Tablet - Writing	Holster 2 + Pen	13.56	Sample 1	0.07	0.001	0.001
	WPT	ASK	Back	0mm	Tablet - Folding	Holster 2 + Pen	13.56	Sample 1	0.05	0.001	0.001
	WPT	ASK	Back	0mm	Tablet - Writing	Holster 1 + Pen	13.56	Sample 1	0.1	0.001	0.001
	WPT	ASK	Back	0mm	Tablet - Folding	Holster 1 + Pen	13.56	Sample 1	-0.06	0.001	0.001
	WPT	ASK	Back	0mm	Tablet	Pen	13.56	Sample 2	0.08	0.012	0.012

12.2 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (mm)	User Scenario	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet	1	2412	Sample 2	12.47	12.50	100	0.17	1.150	-	1.158
2nd	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Tablet	1	2412	Sample 2	12.47	12.50	100	0.01	1.090	1.06	1.098
1st	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet	62	5310	Sample 1	12.48	13.00	97.5	-0.15	0.946	-	1.094
2nd	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Tablet	62	5310	Sample 1	12.48	13.00	97.5	0.01	0.932	1.02	1.078
1st	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	138	5690	Sample 1	11.07	11.50	95.4	-0.06	0.888	-	1.027
2nd	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	138	5690	Sample 1	11.07	11.50	95.4	0.03	0.874	1.02	1.011
1st	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	171	5855	Sample 2	9.40	9.50	95.4	-0.12	1.070	-	1.147
2nd	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Tablet	171	5855	Sample 2	9.40	9.50	95.4	0.08	1.010	1.06	1.083

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.

13. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body
1.	WLAN2.4GHz + WPT	Yes
2.	WLAN5GHz + Bluetooth + WPT	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. The Scaled SAR summation is calculated based on the same configuration and test position.
3. 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.

13.1 Body Exposure Conditions

Exposure Position	1	2	3	4	1+4 Summed 1g SAR (W/kg)	2+3+4 Summed 1g SAR (W/kg)
	WLAN2.4GHz	WLAN5GHz	Bluetooth	WPT		
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
Back at 0mm	1.190	1.147	0.312	0.017	**1.207**	**1.476**
Right Edge at 0mm	0.096	0.084	0.001	0.002	**0.098**	**0.087**
Bottom Edge at 0mm	0.066	0.277	0.001	0.001	**0.067**	**0.279**

Test Engineer： Charles Shen, Howard Zhao, Kevin Guo and White Hua

14. 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.

15. 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 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.