FCC SAR Compliance Test Report

Product Name:	HUAWEI MateBook
Model:	HZ-W09
Report No.:	SYBH(Z-SAR)019022016-2
FCC ID:	QISHZ-W09

	APPROVED (Lab Manager)	PREPARED (Test Engineer)
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DATE	2016-04-19	2016-04-19

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※ ※ Notice ※ ※

1. The laboratory has passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.

2. The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.

3. The laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named as “Global Compliance and Testing Center of Huawei Technologies Co., Ltd”, the both names have coexisted since 2009.

4. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

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6. The test report is only valid for the test samples.

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※ ※ Modified History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	2016-04-19	Pan Man

1 General Information

1.1 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for HZ-W09 is as below Table 1.

Band	Position	Max Reported 1-g SAR (W/kg)
WiFi 2.4G	Top side(0mm)	1.38
WiFi 5G	Top side(0mm)	**1.46**
BT	Top side(0mm)	0.08
The highest simultaneous SAR value is 1.54 W/kg per KDB690783 D01		

Table 1:Summary of test result

Note:

The device is in compliance with Specific Absorption Rate(SAR)for general population/uncontraolled exposure limits according to the FCC rule §2.1093, the ANSI/IEEE C95.1:1992, the NCRP Report Number 86 for uncontrolled environment, according to the Industry Canada Radio Standards Specification RSS-102 for General Population/Uncontrolled exposure, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013

1.2 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain/Body/Arms/Legs)	**1.60 W/kg**	8.00 W/kg
Spatial Average SAR** (Whole Body)	0.08 W/kg	0.40 W/kg
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	4.00 W/kg	20.00 W/kg

Table 2: RF exposure limits

The limit applied in this test report is shown in **bold** letters

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

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

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.

1.3 EUT Description

Device Information：			
Product Name:	HUAWEI MateBook		
Model:	HZ-W09		
FCC ID :	QISHZ-W09		
SN No.:	1#:2153016035LM61000490 2#:2153016035LM61000509 3#:2153016035LM61000492		
Device Type :	Portable device		
Device Phase:	Identical Prototype		
Exposure Category:	Uncontrolled environment / general population		
Hardware Version :	S1		
Software Version :	HZ-09C001B002		
Antenna Type :	Internal antenna		
Device Operating Configurations:			
Supporting Mode(s)	WiFi 2.4G, WIFI 5G,BT		
Test Modulation	WiFi(DSSS/OFDM),BT(GFSK/π/4-DQPSK/8DPSK)		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	BT	2402-2480	
	WiFi 2.4G	2412-2462	
	WiFi 5G	5150-5250 5250-5350 5470-5725 5725-5850	
Test Channels (low-mid-high):	802.11b/g/n 20M:1-6-11 (WiFi 2.4G)		
	802.11a/n/ac 20M: 36-40-44-48-52-56-60-64-100-104-108-112-116-120-124-128-132-136-140-149-153-157-161-165 802.11 n/ac 40M: 38-46-54-62-102-110-118-126-134-151-159 802.11ac 80M: 42-58-106-122-138-155(WiFi 5G)		
	0-39-78(BT) 0-19-39(BT 4.1)		

Table 3:Device information and operating configuration

1.3.1 General Description

HUAWEI MateBook (MateBook for short) is a 12-inch laptop that incorporates a 6th Gen Intel® Core™ m processor and supports high-speed Wi-Fi Internet.
The MateBook has a slim metallic body that is 6.9 mm thick, making it both stylish and easy to carry.
The MateBook has an IPS display with a 2160 x 1440 pixel LCD screen, NTSC 85% color gamut, and brightness of 400 nits. The screen-to-body ratio is 84%, and the viewing angle can reach an impressive 160 degrees. It is also equipped with a 5 MP front camera. The MateBook is a smart work assistant, supporting Office 2016 and 4K video playback.
The MateBook adopts a USB Type-C charging port that enables the cable to be inserted with either side facing up.
The MateBook offers a seamless office experience based on the Microsoft Windows 10 operating system.

Battery information:

Name	Qty.	Manufacture	Serials number	Description
Li-ion	1#	Sunwoda Electronic Co., LTD	/	Battery Model: HB25B7N4EBC Rated capacity: 4300 mAh Nominal Voltage: ⎓ +7.6V Charging Voltage: ⎓ +8.7V
Li-ion	2#	SCUD (FUJIAN) Electronics Co., Ltd	/	Battery Model: HB25B7N4EBC Rated capacity: 4300 mAh Nominal Voltage: ⎓ +7.6V Charging Voltage: ⎓ +8.7V
Li-ion	3#	Harbin Coslight Power Co., Ltd.	/	Battery Model: HB25B7N4EBC Rated capacity: 4300 mAh Nominal Voltage: ⎓ +7.6V Charging Voltage: ⎓ +8.7V

1.4 Test specification(s)

ANSI C95.1:1992	Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991)
IEEE Std 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
RSS-102	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands (Issue 5 of March 2015)
KDB447498 D01	General RF Exposure Guidance v06
KDB616217 D04	SAR for laptop and tablets v01r02
KDB248227 D01	SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r02
KDB865664 D01	SAR measurement 100 MHz to 6 GHz v01r04
KDB865664 D02	SAR Reporting v01r02
KDB690783 D01	SAR Listings on Grants v01r03

1.5 Testing laboratory

Test Site	The Reliability Laboratory of Huawei Technologies Co., Ltd.
Test Location	Section G1,Huawei Base Bantian, Longgang District, Shenzhen 518129, P.R. China
Telephone	+86 755 28780808
Fax	+86 755 89652518
State of accreditation	The Test laboratory (area of testing) is accredited according to ISO/IEC 17025. CNAS Registration number: L0310 A2LA TESTING CERT #2174.01

1.6 Applicant and Manufacturer

Company Name	HUAWEI TECHNOLOGIES CO., LTD
Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.7 Application details

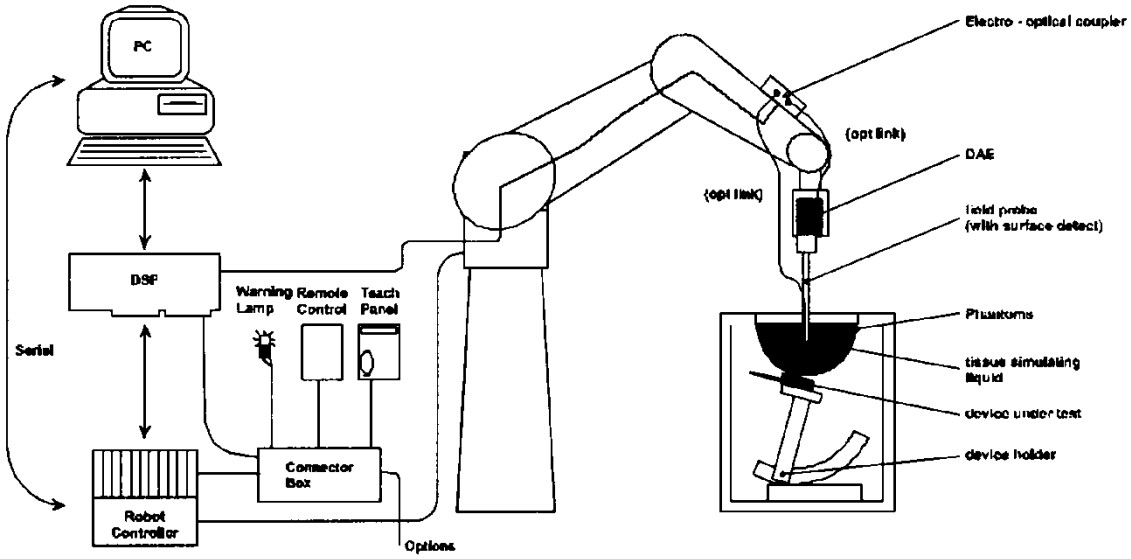
Start Date of test	2016-03-21
End Date of test	2016-03-27

1.8 Ambient Condition

Ambient temperature	20°C – 24°C
Relative Humidity	30% – 70%

2 SAR Measurement System

2.1 SAR Measurement Set-up



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

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).

- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
- The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 7.
- DASY5 software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System check dipoles allowing to validate the proper functioning of the system.

2.2 Test environment

The DASY5 measurement system is placed at the head end of a room with dimensions:
5 x 2.5 x 3 m^3, the SAM phantom is placed in a distance of 75 cm from the side walls and 1.1m from the rear wall. Above the test system a 1.5 x 1.5 m^2 array of pyramid absorbers is installed to reduce reflections from the ceiling.
Picture 1 of the photo documentation shows a complete view of the test environment.
The system allows the measurement of SAR values larger than 0.005 mW/g.

2.3 Data Acquisition Electronics description

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

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

DAE4

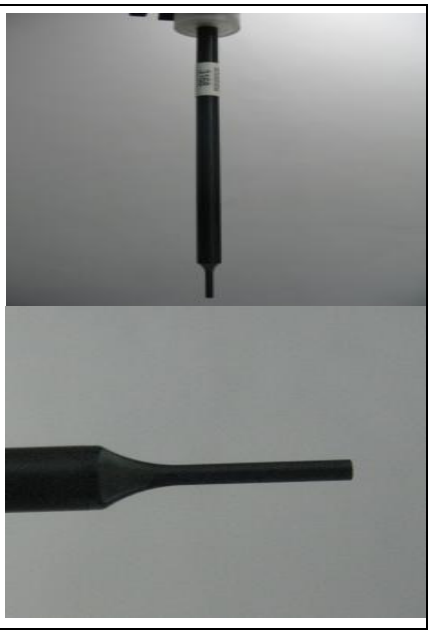
Input Impedance	200MOhm	
The Inputs	symmetrical and floating	
Common mode rejection	above 80 dB	

2.4 Probe description

These probes are specially designed and calibrated for use in liquids with high permittivities. They should not be used in air, since the spherical isotropy in air is poor (±2 dB). The dosimetric probes have special calibrations in various liquids at different frequencies.

Isotropic E-Field Probe ES3DV3 for Dosimetric Measurements

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic range	5 µW/g to > 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: 2.0 mm
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones



Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements

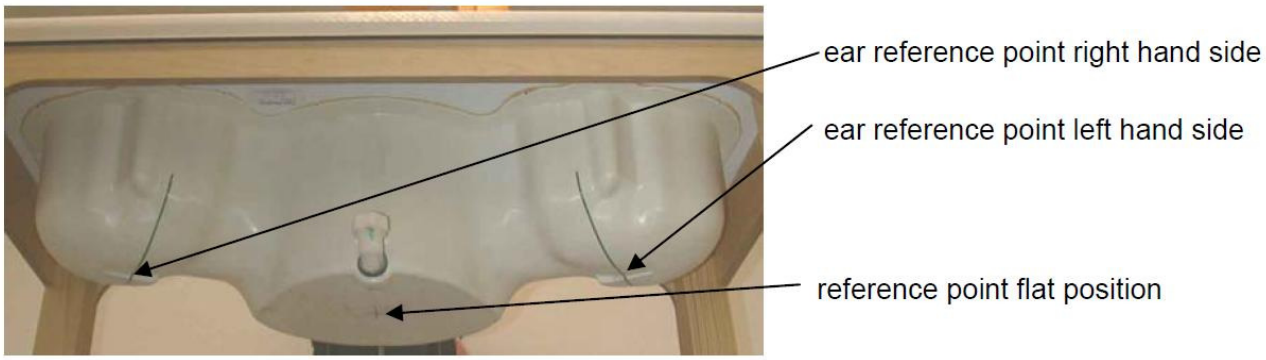
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to >6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic range	10 µW/g to > 100 mW/g; Linearity: ± 0.2 dB(noise:typically<1µW/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: 1mm
Application	High precision dosimetric measurements in any exposure scenario(e.g.,very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%

2.5 Phantom description

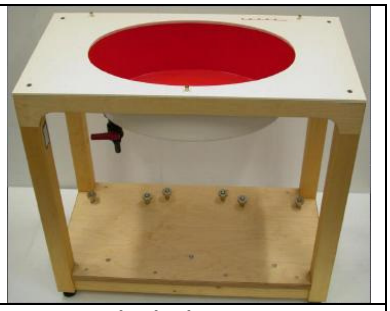
SAM Twin Phantom

Shell Thickness	2mm±0.2mm;The ear region:6.0±0.2mm	
Filling Volume	Approximately 25 liters	
Dimensions	Length:1000mm; Width:500mm; Height: adjustable feet	
Measurement Areas	Left hand Right hand Flat phantom	
The bottom plate contains three pairs 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 cover the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. Free space scans of devices on top of this phantom cover are possible. Three reference marks are provided on the phantom counter. These reference marks are used to teach the absolute phantom position relative to the robot.		

The following figure shows the definition of reference point:



ELI4 Phantom

Shell Thickness	2mm±0.2mm	
Filling Volume	Approximately 30 liters	
Dimensions	Major axis:600mm; Minor axis:400mm;	
Measurement Areas	Flat phantom	
The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30MHz to 6GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209-2 and all known tissue simulating liquids.		

The phantom shell material is resistant to all ingredients used in the tissue-equivalent liquid recipes. The shell of the phantom including ear spacers is constructed from low permittivity and low loss material, with a relative permittivity $2 \leq \varepsilon r \leq 5$ at ≤3 GHz, $3 \leq \varepsilon r \leq 4$ at >3 GHz and and a loss tangent ⩽0.05.

2.6 Device holder description

The DASY5 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. 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. This device holder is used for standard mobile phones or PDA's only. If necessary an additional support of polystyrene material is used.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε =3 and loss tangent σ =0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.
The device holder permits the device to be positioned with a tolerance of ±1° in the tilt angle.

Larger DUT's (e.g. notebooks) cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values.
Therefore those devices are normally only tested at the flat part of the SAM.

2.7 Test Equipment List

This table gives a complete overview of the SAR measurement equipment.
Devices used during the test described are marked ☒

	Manufacturer	Device	Type	Serial number	Date of last calibration*	Valid period
☒	SPEAG	Dosimetric E-Field Probe	EX3DV4	3744	2015-07-24	One year
☒	SPEAG	Dosimetric E-Field Probe	EX3DV4	3736	2015-04-30	One year
☒	SPEAG	Dosimetric E-Field Probe	EX3DV4	7351	2015-10-30	One year
☐	SPEAG	1900MHz Dipole	D1900V2	5d143	2014-09-23	Three years
☐	SPEAG	2300MHz Dipole	D2300V2	1016	2014-11-19	Three years
☒	SPEAG	2450MHz Dipole	D2450V2	860	2015-11-25	Three years
☒	SPEAG	5GHz Dipole	D5GHzV2	1155	2015-04-27	Three years
☒	SPEAG	Data acquisition electronics	DAE4	852	2015-04-27	One year
☒	SPEAG	Data acquisition electronics	DAE4	1236	2015-11-23	One year
☒	SPEAG	Software	DASY 5	N/A	NCR	NCR
☐	SPEAG	Twin Phantom	SAM1	TP-1475	NCR	NCR
☐	SPEAG	Twin Phantom	SAM2	TP-1474	NCR	NCR
☐	SPEAG	Twin Phantom	SAM3	TP-1597	NCR	NCR
☐	SPEAG	Twin Phantom	SAM4	TP-1620	NCR	NCR
☐	SPEAG	Flat Phantom	ELI 4.0	TP-1038	NCR	NCR
☒	SPEAG	Flat Phantom	ELI 5.0	TP-1111	NCR	NCR
☐	R & S	Universal Radio Communication Tester	CMU 200	113989	2015-05-18	One year
☒	Agilent	Wireless Connectivity Test Set	N4010A	MY49081592	2015-10-30	One year
☒	Agilent	Network Analyser	E5071C	MY46213349	2016-01-08	One year
☒	Agilent	Dielectric Probe Kit	85070E	2484	NCR	NCR
☒	Agilent	Signal Generator	N5181A	MY47420989	2015-10-30	One year
☒	MINI-CIRCUITS	Amplifier	ZHL-42W	QA1402001	NCR	NCR
☒	MINI-CIRCUITS	Amplifier	ZVE-8G+	N523101139	NCR	NCR
☒	AR	Directional Coupler	DC7144M1	31190	2015-05-04	One year
☒	Agilent	Dual Directional Coupler	772D	MY52180173	2016-01-06	One year
☒	R & S	Power Meter	NRP	100740	2015-07-02	One year
☒	R & S	Power Meter Sensor	NRP-Z11	106288	2015-07-02	One year
☒	Agilent	Power Meter	E4417A	MY45101339	2016-01-06	One year
☒	Agilent	Power Meter Sensor	E9321A	MY44420359	2016-01-06	One year

Note:
1) Per KDB865664D01 requirements for dipole calibration, the test laboratory has adopted three-year extended calibration interval. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.
a) There is no physical damage on the dipole;
b) System check with specific dipole is within 10% of calibrated value;
c) The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement.
d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.
2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.
3) *All the equipments are within the valid period when the tests are performed.

3 SAR Measurement Procedure

3.1 Scanning procedure

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

- The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. +/- 5 %.

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

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

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

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

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

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

3.2 Spatial Peak SAR Evaluation

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

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting 'Graph Evaluated'.

- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.

- All neighboring volumes are evaluated until no neighboring volume with a higher average value is found.

Extrapolation

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

Interpolation

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

Volume Averaging

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

Advanced Extrapolation

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

3.3 Data Storage and Evaluation

Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension "DAE4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf/dcp_i$$

with V_i = compensated signal of channel i (i = x, y, z)
U_i = input signal of channel i (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

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

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

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

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

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

ConvF = sensitivity enhancement in solution

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

f = carrier frequency [GHz]

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

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

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

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

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

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

with SAR = local specific absorption rate in mW/g

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

σ = conductivity in [mho/m] or [Siemens/m]

ρ = equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.The power flow density is calculated assuming the excitation field to be a free space field.

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

with P_{pwe} = equivalent power density of a plane wave in mW/cm^2

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

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

4 System Verification Procedure

4.1 Tissue Verification

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectic parameter are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within ± 5% of the target values.

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

Ingredients (% of weight)	**Head Tissue**						
Frequency Band (MHz)	750	835	1750	1900	2300	2450	2600
Water	39.2	41.45	52.64	55.242	62.82	62.7	55.242
Salt (NaCl)	2.7	1.45	0.36	0.306	0.51	0.5	0.306
Sugar	57.0	56.0	0.0	0.0	0.0	0.0	0.0
HEC	0.0	1.0	0.0	0.0	0.0	0.0	0.0
Bactericide	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DGBE	0.0	0.0	47.0	44.542	36.67	36.8	44.452
Ingredients (% of weight)	**Body Tissue**						
Frequency Band (MHz)	750	835	1750	1900	2300	**2450**	2600
Water	50.3	52.4	69.91	69.91	73.32	73.2	64.493
Salt (NaCl)	1.60	1.40	0.13	0.13	0.06	0.04	0.024
Sugar	47.0	45.0	0.0	0.0	0.0	0.0	0.0
HEC	0.0	1.0	0.0	0.0	0.0	0.0	0.0
Bactericide	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DGBE	0.0	0.0	29.96	29.96	26.62	26.7	32.252

Table 4: Tissue Dielectric Properties

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

☐**Simulating Head Liquid for 5G(HBBL3500-5800MHz), Manufactured by SPEAG:**

Ingredients	(% by weight)
Water	50-65%
Mineral oil	10-30%
Emulsifiers	8-25%
Sodium salt	0-1.5%

☒**Simulating Body Liquid for 5G(MBBL3500-5800MHz),Manufactured by SPEAG:**

Ingredients	(% by weight)
Water	60-80%
Esters,Emulsifiers,Inhibitors	20-40%
Sodium salt	0-1.5%

Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Deviation (Within +/-5%)		Liquid Temp.	Test Date
		εr	σ (S/m)	εr	σ (S/m)	$\Delta\varepsilon_r$	Δσ		
2450B	2410	52.80	1.91	51.32	1.932	-2.80%	1.15%	21.7°C	2016/03/21
	2435	52.70	1.94	51.19	1.966	-2.87%	1.34%		
	2450	52.70	1.95	51.15	1.984	-2.94%	1.74%		
	2460	52.70	1.96	51.16	1.994	-2.92%	1.73%		
5G B	5200	49.00	5.30	48.04	5.184	-1.98%	-2.19%	21.4°C	2016-03-24
	5300	49.00	5.30	47.79	5.346	-2.47%	0.87%	21.4°C	2016-03-25
	5600	48.50	5.77	47.27	5.869	-2.56%	1.72%	21.4°C	2016-03-26
	5800	48.20	6.00	46.98	6.209	-2.53%	3.48%	21.4°C	2016-03-27

Table 5:Measured Tissue Parameter

Note: 1)The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2°C of the conditions expected during the SAR evaluation to satisfy protocol requirements.

2)KDB 865664 was ensured to be applied for probe calibration frequencies greater than or equal to 50MHz of the EUT frequencies.

3)The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies. The SAR test plots may slightly differ from the table above since the DASY rounds to three significant digits.

4.2 System Check

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

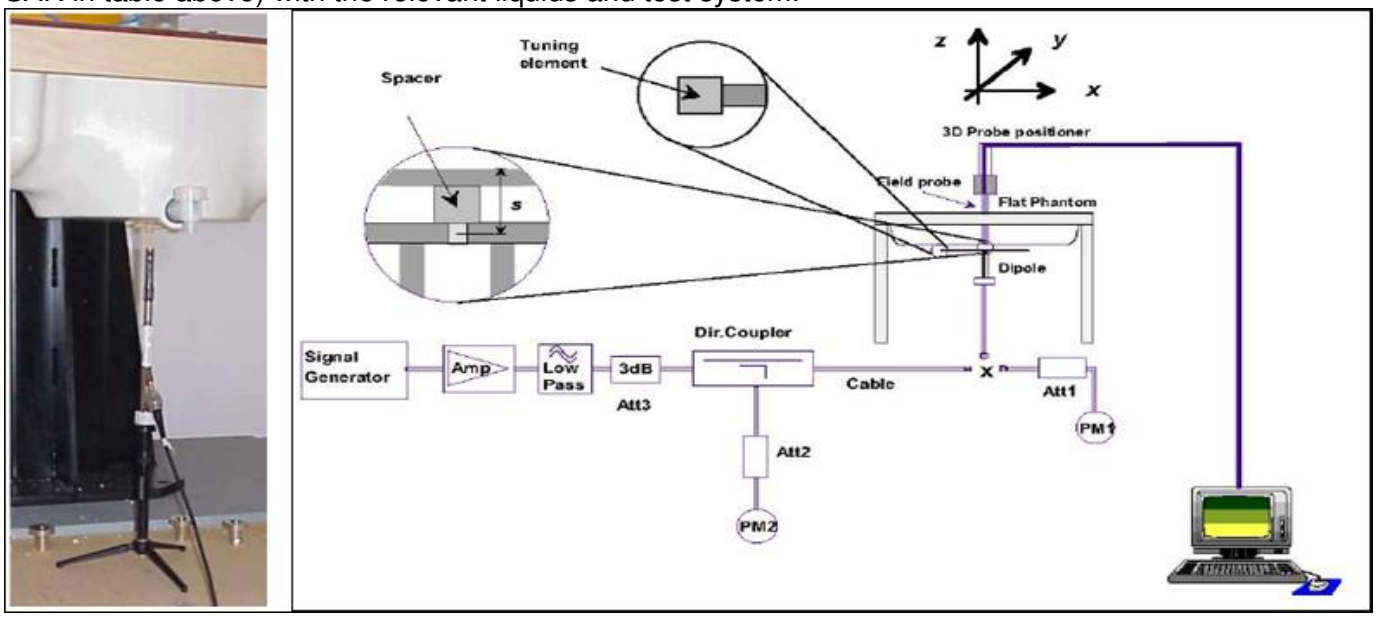
System Check	Target SAR (1W)		Measured SAR (Normalized to 1W)		Deviation (Within +/-10%)		Liquid Temp.	Test Date
	1-g (W/kg)	10-g (W/kg)	1-g (W/kg)	10-g (W/kg)	$\Delta\varepsilon_r$	Δσ		
2450MHz Body	51.90	24.30	54.40	25.04	4.82%	3.05%	21.7°C	2016-03-21
5200MHz Body	74.7	20.9	83.00	23.20	6.96%	7.41%	21.4°C	2016-03-24
5300MHz Body	75.0	21.0	82.60	22.90	5.22%	4.09%	21.4°C	2016-03-25
5300MHz Body	75.0	21.0	79.20	21.90	0.89%	-0.45%	21.4°C	2016-03-26
5600MHz Body	77.8	21.6	85.90	24.00	3.37%	4.80%	21.4°C	2016-03-26
5800MHz Body	76.2	21.0	75.00	21.00	-2.22%	-0.94%	21.4°C	2016-03-27

Table 6:System Check Results

4.3 System check Procedure

The system check is performed by using a system check dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 250 mW(below 5GHz) or 100mW(above 5GHz). To adjust this power a power meter is used. The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system check to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

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



5 SAR measurement variability and uncertainty

5.1 SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ⩾ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ⩾ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ⩾ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

The detailed repeated measurement results are shown in Section 7.2.

5.2 SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04,when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

6 SAR Test Configuration

6.1 Test Positions Configuration

The overall diagonal dimension of the tablet is > 20 cm. Per FCC KDB616217D04, the back side and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR Exclusion Threshold in FCC KDB 447498D01 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.

The device does not have telephone receiver. Next to the ear operation is not supported. Voice mode is limited to speaker mode and headset operations only, so additional Head SAR testing for this type of voice use is not required per KDB616217D04.

6.2 WiFi Test Configuration

For WiFi SAR testing, a communication link is set up with the testing software for WiFi mode test. During the test,at the each test frequency channel, the EUT is operated at the RF continuous emission mode. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The test procedures in KDB 248227D01 are applied.

6.2.1 Initial Test Position Procedure

For exposure condition with multiple test position, such as handsets operating next to the ear, devices with hotspot mode or UMPC mini-tablet , procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all position in an exposure condition. The test position with the highest extrapolated(peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4W/kg, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8W/kg or all test position are measured. For all positions/configurations tested using the initial test position and subsequent test positions, 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.

6.2.2 Initial Test Configuration Procedure

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required (see section 5.3.2 of KDB 248227D01v02). SAR test reduction of subsequent highest output test channels is based on the *reported* SAR of the initial test configuration.

For next to the ear, hotspot mode and UMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode. For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration.

When the *reported* SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for the subsequent next highest measured output power channel(s) in the initial test configuration until the *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.

6.2.3 Sub Test Configuration Procedure

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units.

When the highest reported SAR for the initial test configuration, according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ⩽ 1.2 W/kg, SAR is not required for that subsequent test configuration.

6.2.4 WiFi 2.4G SAR Test Procedures

Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions.

A) 802.11b DSSS SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the *reported* SAR of the highest measured maximum output power channel (section 3.1 of of KDB 248227D01v02) for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2) When the *reported* SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any *reported* SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

B) 2.4GHz 802.11g/n OFDM SAR Test Exclusion Requirements

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3 of of KDB 248227D01v02r02). SAR is not required for the following 2.4 GHz OFDM conditions.

1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.

2) When the highest *reported* SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

C) SAR Test Requirements for OFDM configurations

When SAR measurement is required for 802.11 g/n OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures

6.2.5 WiFi 5G SAR Test Procedures

A) U-NII-1 and U-NII-2A Bands

For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following：

1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR.

2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.

3) The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50. Without additional testing, the maximum output power for this is limited to the lower of the maximum output power certified for the two bands. When SAR measurement is required for at least one of the bands and the highest reported SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is > 1.2 W/kg, SAR is required for the 160 MHz channel. This procedure does not apply to an aggregated band with maximum output higher than the standalone band(s); the aggregated band must be tested independently for SAR. SAR is not required when the 160 MHz channel is operating at a reduced maximum power and also qualifies for SAR test exclusion.

B) U-NII-2C and U-NII-3 Bands

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. when Terminal Doppler Weather Radar (TDWR) restriction applies, all channels that operate at 5.60 – 5.65 GHz must be included to apply the SAR test reduction and measurement procedures.

When the same transmitter and antenna(s) are used for U-NII-2C band and U-NII-3 band or 5.8 GHz band of §15.247, the bands may be aggregated to enable additional channels with 20, 40 or 80 MHz

bandwidth to span across the band gap, as illustrated in Appendix B. The maximum output power for the additional band gap channels is limited to the lower of those certified for the bands. Unless band gap channels are permanently disabled, they must be considered for SAR testing. The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels. When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

C) OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements

The initial test configuration for 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures. When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.

1) The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.

2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.

3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.

4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.

After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following. These channel selection procedures apply to both the initial test configuration and subsequent test configuration(s), with respect to the default power measurement procedures or additional power measurements required for further SAR test reduction. The same procedures also apply to subsequent highest output power channel(s) selection.

1) The channel closest to mid-band frequency is selected for SAR measurement.

2) For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

D) SAR Test Requirements for OFDM configurations

When SAR measurement is required for 802.11 a/n/ac OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. When the same transmitter and antenna(s) are used for U-NII-1 and U-NII-2A bands, additional SAR test reduction applies. When band gap channels between U-NII-2C band and 5.8 GHz U-NII-3 or §15.247 band are supported, the highest maximum output power transmission mode configuration and maximum output power channel across the bands must be used to determine SAR test reduction, according to the initial test configuration and subsequent test configuration requirements. In applying the initial test configuration

and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

6.3 BT Test Configuration

For BT testing, the EUT's BT test mode is open and the EUT is connected with N4010A which provides continuous transmitting RF signal with maximum output power.The N4010A controls the EUT operating at 2441MHz(39CH) with hopping off, and data rata is set for DH5. This RF signal utilized in SAR measurement has almost 100% duty cycle and crest factor is 1.

7 SAR Measurement Results

7.1.1 Conducted power measurements of WiFi 2.4G

Mode	Ant	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11b	ANT0	1	2412	1	17.00	16.57	Yes
		6	2437		17.00	16.70	Yes
		11	2462		17.00	16.68	Yes
	ANT1	1	2412	1	17.00	16.33	Yes
		6	2437		17.00	16.40	Yes
		11	2462		17.00	16.38	Yes
802.11g	ANT0	1	2412	6	17.00	15.66	Yes
		6	2437		17.00	15.90	Yes
		11	2462		17.00	15.86	Yes
	ANT1	1	2412	6	17.00	15.54	No
		6	2437		17.00	15.88	No
		11	2462		17.00	15.81	No
802.11n-20M	ANT0	1	2412	6.5	17.00	15.65	Yes
		6	2437		17.00	15.83	Yes
		11	2462		17.00	15.86	Yes
	ANT1	1	2412	6.5	17.00	15.55	No
		6	2437		17.00	15.81	No
		11	2462		17.00	15.77	No
802.11n-20M	2Tx MIMO	1	2412	13	17.00	16.29	Yes
		6	2437		17.00	16.33	Yes
		11	2462		17.00	16.39	Yes

Table 7: Conducted power measurement results of WiFi 2.4G

Note: 1) The Average conducted power of WiFi is measured with RMS detector.

7.1.2 Conducted power measurements of WiFi 5G

Band (GHz)	Mode	Ant	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
5.2	802.11a	Ant 0	CH 36	5180	6M	12.50	11.83	No
			CH 40	5200		12.50	11.95	No
			CH 44	5220		12.50	11.83	No
			CH 48	5240		12.50	11.81	No
		Ant 1	CH 36	5180	6M	12.50	11.53	Yes
			CH 40	5200		12.50	11.57	Yes
			CH 44	5220		12.50	11.52	Yes
			CH 48	5240		12.50	11.77	Yes
	802.11n 20M	Ant 0	CH 36	5180	6.5M	12.50	11.40	No
			CH 40	5200		12.50	11.36	No
			CH 44	5220		12.50	11.49	No
			CH 48	5240		12.50	11.58	No
		Ant 1	CH 36	5180	6.5M	12.50	11.77	Yes
			CH 40	5200		12.50	11.98	Yes
			CH 44	5220		12.50	11.78	Yes
			CH 48	5240		12.50	11.79	Yes
	802.11n 40M	Ant 0	CH 38	5190	13.5M	12.50	11.53	No
			CH 46	5230		12.50	11.35	No
		Ant 1	CH 38	5190		12.50	12.30	Yes
			CH 46	5230		12.50	11.70	Yes
	802.11ac 20M	Ant 0	CH 36	5180	6.5M	12.50	11.38	No
			CH 40	5200		12.50	11.26	No
			CH 44	5220		12.50	11.49	No
			CH 48	5240		12.50	11.63	No
		Ant 1	CH 36	5180	6.5M	12.50	11.71	Yes
			CH 40	5200		12.50	11.58	Yes
			CH 44	5220		12.50	11.54	Yes
			CH 48	5240		12.50	11.60	Yes
	802.11ac 40M	Ant 0	CH 38	5190	13.5M	12.50	12.12	No
			CH 46	5230		12.50	11.53	No
		Ant 1	CH 38	5190	13.5M	12.50	11.41	Yes
			CH 46	5230		12.50	11.33	Yes
	802.11ac 80M	Ant 0	CH 42	5210	29.3M	12.50	11.82	Yes
		Ant 1	CH 42	5210		12.50	11.67	Yes

Band (GHz)	Mode	Ant	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
5.3	802.11a	Ant 0	CH 52	5260	6M	12.50	11.95	No
			CH 56	5280		12.50	11.74	No
			CH 60	5300		12.50	11.59	No
			CH 64	5320		12.50	11.86	No
		Ant 1	CH 52	5260	6M	12.50	11.46	Yes
			CH 56	5280		12.50	11.40	Yes
			CH 60	5300		12.50	11.51	Yes
			CH 64	5320		12.50	11.29	Yes
	802.11n 20M	Ant 0	CH 52	5260	6.5M	12.50	11.39	No
			CH 56	5280		12.50	11.54	No
			CH 60	5300		12.50	11.32	No
			CH 64	5320		12.50	11.61	No
		Ant 1	CH 52	5260	6.5M	12.50	11.42	Yes
			CH 56	5280		12.50	11.43	Yes
			CH 60	5300		12.50	11.43	Yes
			CH 64	5320		12.50	11.45	Yes
	802.11n 40M	Ant 0	CH 54	5270	13.5M	12.50	11.64	No
			CH 62	5310		12.50	11.53	No
		Ant 1	CH 54	5270	13.5M	12.50	11.94	Yes
			CH 62	5310		12.50	11.95	Yes
	802.11ac 20M	Ant 0	CH 52	5260	6.5M	12.50	11.54	No
			CH 56	5280		12.50	11.64	No
			CH 60	5300		12.50	11.28	No
			CH 64	5320		12.50	11.41	No
		Ant 1	CH 52	5260	6.5M	12.50	11.26	Yes
			CH 56	5280		12.50	11.30	Yes
			CH 60	5300		12.50	11.26	Yes
			CH 64	5320		12.50	11.35	Yes
	802.11ac 40M	Ant 0	CH 54	5270	13.5M	12.50	11.65	No
			CH 62	5310		12.50	11.44	No
		Ant 1	CH 54	5270	13.5M	12.50	11.47	Yes
			CH 62	5310		12.50	11.48	Yes
	802.11ac 80M	Ant 0	CH 58	5290	29.3M	12.50	11.96	Yes
		Ant 1	CH 58	5290	29.3M	12.50	11.58	Yes

Band (GHz)	Mode	Ant	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
5.5	802.11a	Ant 0	CH 100	5500	6M	11.00	10.13	No
			CH 104	5520		11.00	10.21	No
			CH 108	5540		11.00	10.01	No
			CH 112	5560		11.00	10.07	No
			CH 116	5580		11.00	10.24	No
			CH 120	5600		11.00	10.25	No
			CH 124	5620		11.00	10.17	No
			CH 128	5640		11.00	10.11	No
			CH 132	5660		11.00	10.36	No
			CH 136	5680		11.00	10.32	No
			CH 140	5700		11.00	10.27	No
			CH 144	5720		11.00	10.31	No
		Ant 1	CH 100	5500	6M	11.00	10.32	No
			CH 104	5520		11.00	10.14	No
			CH 108	5540		11.00	10.34	No
			CH 112	5560		11.00	10.01	No
			CH 116	5580		11.00	10.08	No
			CH 120	5600		11.00	9.98	No
			CH 124	5620		11.00	10.19	No
			CH 128	5640		11.00	10.06	No
			CH 132	5660		11.00	10.21	No
			CH 136	5680		11.00	10.19	No
			CH 140	5700		11.00	10.22	No
			CH 144	5720		11.00	10.16	No

Band (GHz)	Mode	Ant	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
5.5	802.11n 20M	Ant 0	CH 100	5500	6.5M	11.00	10.03	No
			CH 104	5520		11.00	10.16	No
			CH 108	5540		11.00	9.89	No
			CH 112	5560		11.00	10.33	No
			CH 116	5580		11.00	10.05	No
			CH 120	5600		11.00	10.03	No
			CH 124	5620		11.00	10.27	No
			CH 128	5640		11.00	10.18	No
			CH 132	5660		11.00	10.29	No
			CH 136	5680		11.00	10.16	No
			CH 140	5700		11.00	10.28	No
			CH 144	5720		11.00	10.36	No
		Ant 1	CH 100	5500	6.5M	11.00	10.15	No
			CH 104	5520		11.00	10.23	No
			CH 108	5540		11.00	10.02	No
			CH 112	5560		11.00	9.95	No
			CH 116	5580		11.00	10.06	No
			CH 120	5600		11.00	10.12	No
			CH 124	5620		11.00	10.34	No
			CH 128	5640		11.00	10.26	No
			CH 132	5660		11.00	10.15	No
			CH 136	5680		11.00	10.57	No
			CH 140	5700		11.00	10.21	No
			CH 144	5720		11.00	10.11	No
	802.11n 40M	Ant 0	CH 102	5510	13.5M	11.00	10.13	No
			CH 110	5550		11.00	10.25	No
			CH 118	5590		11.00	10.11	No
			CH 126	5630		11.00	10.05	No
			CH 134	5670		11.00	10.15	No
			CH 142	5710		11.00	10.26	No
		Ant 1	CH 102	5510	13.5M	11.00	10.13	No
			CH 110	5550		11.00	10.26	No
			CH 118	5590		11.00	10.55	No
			CH 126	5630		11.00	10.01	No
			CH 134	5670		11.00	9.89	No
			CH 142	5710		11.00	10.06	No

Band (GHz)	Mode	Ant	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
5.5	802.11ac 20M	Ant 0	CH 100	5500	6.5M	11.00	10.26	No
			CH 104	5520		11.00	10.05	No
			CH 108	5540		11.00	10.08	No
			CH 112	5560		11.00	10.26	No
			CH 116	5580		11.00	10.11	No
			CH 120	5600		11.00	10.28	No
			CH 124	5620		11.00	10.64	No
			CH 128	5640		11.00	10.31	No
			CH 132	5660		11.00	10.58	No
			CH 136	5680		11.00	10.16	No
			CH 140	5700		11.00	10.11	No
			CH 144	5720		11.00	10.34	No
		Ant 1	CH 100	5500	6.5M	11.00	10.21	No
			CH 104	5520		11.00	10.13	No
			CH 108	5540		11.00	10.1	No
			CH 112	5560		11.00	10.05	No
			CH 116	5580		11.00	10.35	No
			CH 120	5600		11.00	10.26	No
			CH 124	5620		11.00	10.54	No
			CH 128	5640		11.00	10.16	No
			CH 132	5660		11.00	10.24	No
			CH 136	5680		11.00	10.11	No
			CH 140	5700		11.00	10.56	No
			CH 144	5720		11.00	10.48	No
	802.11ac 40M	Ant 0	CH 102	5510	13.5M	11.00	10.31	No
			CH 110	5550		11.00	10.31	No
			CH 118	5590		11.00	10.30	No
			CH 126	5630		11.00	10.04	No
			CH 134	5670		11.00	10.36	No
			CH 142	5710		11.00	10.81	No
		Ant 1	CH 102	5510	13.5M	11.00	10.79	No
			CH 110	5550		11.00	10.88	No
			CH 118	5590		11.00	10.26	No
			CH 126	5630		11.00	10.80	No
			CH 134	5670		11.00	10.43	No
			CH 142	5710		11.00	10.43	No
	802.11ac 80M	Ant 0	CH 106	5530	29.3M	11.00	9.44	Yes
			CH 122	5610		11.00	9.92	Yes
			CH 138	5690		11.00	9.95	Yes
		Ant 1	CH 106	5530	29.3M	11.00	9.59	Yes
			CH 122	5610		11.00	10.01	Yes
			CH 138	5690		11.00	9.95	Yes

Band (GHz)	Mode	Ant	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
5.8	802.11a	Ant 0	CH 149	5745	6M	11.00	10.03	No
			CH 153	5765		11.00	10.13	No
			CH 157	5785		11.00	10.25	No
			CH 161	5805		11.00	10.89	No
			CH 165	5825		11.00	10.55	No
		Ant 1	CH 149	5745	6M	11.00	10.01	No
			CH 153	5765		11.00	10.03	No
			CH 157	5785		11.00	10.36	No
			CH 161	5805		11.00	10.78	No
			CH 165	5825		11.00	10.66	No
	802.11n 20M	Ant 0	CH 149	5745	6.5M	11.00	10.37	No
			CH 153	5765		11.00	10.21	No
			CH 157	5785		11.00	10.53	No
			CH 161	5805		11.00	10.78	No
			CH 165	5825		11.00	10.38	No
		Ant 1	CH 149	5745	6.5M	11.00	10.23	No
			CH 153	5765		11.00	10.06	No
			CH 157	5785		11.00	10.38	No
			CH 161	5805		11.00	10.76	No
			CH 165	5825		11.00	10.54	No
	802.11n 40M	Ant 0	CH 151	5755	13.5M	11.00	10.34	No
			CH 159	5795		11.00	10.68	No
		Ant 1	CH 151	5755	13.5M	11.00	10.15	No
			CH 159	5795		11.00	10.71	No
	802.11ac 20M	Ant 0	CH 149	5745	6.5M	11.00	10.16	No
			CH 153	5765		11.00	10.39	No
			CH 157	5785		11.00	10.56	No
			CH 161	5805		11.00	10.83	No
			CH 165	5825		11.00	10.13	No
		Ant 1	CH 149	5745	6.5M	11.00	10.29	No
			CH 153	5765		11.00	10.42	No
			CH 157	5785		11.00	10.23	No
			CH 161	5805		11.00	10.89	No
			CH 165	5825		11.00	10.25	No
	802.11ac 40M	Ant 0	CH 151	5755	13.5M	11.00	10.12	No
			CH 159	5795		11.00	10.42	No
		Ant 1	CH 151	5755	13.5M	11.00	10.76	No
			CH 159	5795		11.00	10.47	No
	802.11ac 80M	Ant 0	CH 155	5775	29.3M	11.00	10.09	Yes
		Ant 1	CH 155	5775	29.3M	11.00	9.85	Yes

Band (GHz)	Mode	Ant	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
5.2	802.11n 20 MIMO	Sum	CH 36	5180	6M	12.50	11.74	No
			CH 40	5200		12.50	11.32	No
			CH 44	5220		12.50	11.23	No
			CH 48	5240		12.50	11.40	No
	802.11n 40M MIMO	Sum	CH 38	5190	13.5M	12.50	11.72	No
			CH 46	5230		12.50	11.37	No
	802.11ac 20M MIMO	Sum	CH 36	5180	6.5M	12.50	11.72	No
			CH 40	5200		12.50	11.30	No
			CH 44	5220		12.50	11.22	No
			CH 48	5240		12.50	11.38	No
	802.11ac 40M MIMO	Sum	CH 38	5190	13.5M	12.50	11.39	No
			CH 46	5230		12.50	11.59	No
	802.11ac 80M MIMO	Sum	CH 42	5210	29.3M	12.50	12.28	Yes
Band (GHz)	**Mode**	**Ant**	**Channel**	**Frequency (MHz)**	**Data Rate (Mbps)**	**Tune-up**	**Average Power (dBm)**	**SAR Test (Yes/No)**
5.3	802.11n 20M MIMO	Sum	CH 52	5260	6M	12.50	11.36	No
			CH 56	5280		12.50	11.34	No
			CH 60	5300		12.50	11.17	No
			CH 64	5320		12.50	11.34	No
	802.11n 40M MIMO	Sum	CH 54	5270	13.5M	12.50	11.50	No
			CH 62	5310		12.50	11.93	No
	802.11ac 20M MIMO	Sum	CH 52	5260	6.5M	12.50	11.34	No
			CH 56	5280		12.50	11.31	No
			CH 60	5300		12.50	11.15	No
			CH 64	5320		12.50	11.32	No
	802.11ac 40M MIMO	Sum	CH 54	5270	13.5M	12.50	11.11	No
			CH 62	5310		12.50	11.30	No
	802.11ac 80M MIMO	Sum	CH 58	5290	29.3M	12.50	11.94	Yes

Band (GHz)	Mode	Ant	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
5.5	802.11n 20M MIMO	Sum	CH 100	5500	6.5M	11.00	9.55	No
			CH 104	5520		11.00	10.11	No
			CH 108	5540		11.00	9.91	No
			CH 112	5560		11.00	10.20	No
			CH 116	5580		11.00	10.30	No
			CH 120	5600		11.00	10.02	No
			CH 124	5620		11.00	10.19	No
			CH 128	5640		11.00	10.01	No
			CH 132	5660		11.00	10.12	No
			CH 136	5680		11.00	10.34	No
			CH 140	5700		11.00	9.96	No
			CH 144	5720		11.00	10.25	No
	802.11n 40M MIMO	Sum	CH 102	5510	13.5M	11.00	10.50	No
			CH 110	5550		11.00	10.54	No
			CH 118	5590		11.00	10.22	No
			CH 126	5630		11.00	10.38	No
			CH 134	5670		11.00	10.34	No
			CH 142	5710		11.00	10.56	No
	802.11ac 20M MIMO	Sum	CH 100	5500	6.5M	11.00	9.53	No
			CH 104	5520		11.00	10.09	No
			CH 108	5540		11.00	9.89	No
			CH 112	5560		11.00	10.18	No
			CH 116	5580		11.00	10.28	No
			CH 120	5600		11.00	10.00	No
			CH 124	5620		11.00	10.17	No
			CH 128	5640		11.00	9.99	No
			CH 132	5660		11.00	10.09	No
			CH 136	5680		11.00	10.32	No
			CH 140	5700		11.00	9.94	No
			CH 144	5720		11.00	10.23	No
	802.11ac 40M MIMO	Sum	CH 102	5510	13.5M	11.00	9.09	No
			CH 110	5550		11.00	10.00	No
			CH 118	5590		11.00	9.81	No
			CH 126	5630		11.00	10.08	No
			CH 134	5670		11.00	10.12	No
			CH 142	5710		11.00	10.00	No
	802.11ac 80M MIMO	Sum	CH 106	5530	29.3M	11.00	9.65	Yes
			CH 122	5610		11.00	10.02	Yes
			CH 138	5690		11.00	9.85	Yes

Band (GHz)	Mode	Ant	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
5.8	802.11n 20M MIMO	Sum	CH 149	5745	6.5M	11.00	10.16	No
			CH 153	5765		11.00	9.97	No
			CH 157	5785		11.00	10.10	No
			CH 161	5805		11.00	10.44	No
			CH 165	5825		11.00	10.13	No
	802.11n 40M MIMO	Sum	CH 151	5755	13.5M	11.00	10.39	No
			CH 159	5795		11.00	10.39	No
	802.11ac 20M MIMO	Sum	CH 149	5745	6.5M	11.00	10.14	No
			CH 153	5765		11.00	9.95	No
			CH 157	5785		11.00	10.08	No
			CH 161	5805		11.00	10.42	No
			CH 165	5825		11.00	10.11	No
	802.11ac 40M MIMO	Sum	CH 151	5755	13.5M	11.00	10.02	No
			CH 159	5795		11.00	10.25	No
	802.11ac 80M MIMO	Sum	CH 155	5775	29.3M	11.00	10.00	Yes

Table 8: Conducted power measurement results of WiFi 5G.

Note: 1) The Average conducted power of WiFi is measured with RMS detector.

7.1.3 Conducted power measurements of BT

The output power of BT antenna is as following:

BT 2450	Tune-up	Average Conducted Power (dBm)		
		0CH	39CH	78CH
DH5	11.0	9.09	9.32	10.25
2DH5	7.0	6.10	6.03	6.91
3DH5	7.0	5.82	5.85	6.73

BT 2450	Tune-up	Average Conducted Power (dBm)		
		0CH	19CH	39CH
BT 4.1	8.0	6.83	7.40	7.50

Table 9: Conducted power measurement results of BT.

Note: The conducted power of BT is measured with RMS detector.

7.2 SAR measurement Results

General Notes:

1) Per KDB447498 D01v06, all SAR measurement results are scaled to the maximum tune-up tolerance limit to demonstrate SAR compliance.

2) Per KDB447498 D01v06, 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:

● ≤ 0.8W/kg for 1-g or 2.0W/kg for 10-g respectively, when the transmission band is ≤ 100MHz.

● ≤ 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.

When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

3) Per KDB865664 D01v01r04,for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/Kg; if the deviation among the repeated measurement is ≤20%, and the measured SAR <1.45W/Kg, only one repeated measurement is required.

4) Per KDB865664 D02v01r01, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing(Refer to the blue SAR test results in the tables of Section 7.3 and appendix B for detailed SAR plots).

WiFi Notes:

Per KDB248227D01:

1) When reported SAR for the initial test position is ≤ 0.4W/kg, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8W/kg or all test position are measured. For all positions/configurations tested using the initial test position and subsequent test positions, 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.

2) The highest SAR measured for the initial test position or initial test configuration should be used to determine SAR test exclusion according to the sum of 1-g SAR and SAR peak to location ratio provisions in KDB 447498D01. In addition, a test lab may also choose to perform standalone SAR measurements for test positions and 802.11 configurations that are not required by the initial test position or initial test configuration procedures and apply the results to determine simultaneous transmission SAR test exclusion, according to sum of 1-g and SAR peak to location ratio requirements to reduce the number of simultaneous transmission SAR measurements.

3) For WiFi 2.4G , SAR is measured for 2.4 GHz 802.11b DSSS using the initial test position procedure. SAR is not required for the 2.4 GHz 802.11g/n OFDM conditions when KDB Publication 447498 SAR test exclusion applies to the OFDM configuration or 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.

4）For WiFi 5G U-NII-1 and U-NII-2A bands, as the different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest *reported* SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum

output power for the two bands. As the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration.

7.2.1 SAR measurement Result of WiFi 2.4G

Test Position of Body	Test channel /Freq.(MHz)	Test Mode	Test Dist. (mm)	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR1-g (W/kg)
				1-g Area Scan	1-g Zoom Scan				
802.11b Antenna 0									
Test data with battery 1#									
Back Side	6/2437	802.11 b	0	0.377	0.390	0.050	16.70	17.00	0.418
Top Side	6/2437	802.11 b	0	1.030	1.100	-0.160	16.70	17.00	1.179
Top Side	11/2462	802.11 b	0	1.160	**1.220**	0.070	16.68	17.00	**1.313**
Top Side-Repeated	11/2462	802.11 b	0	1.120	1.210	0.190	16.68	17.00	1.303
Top Side	1/2412	802.11 b	0	0.858	0.906	-0.150	16.57	17.00	1.000
Tested at the worst position with battery 2#									
Top Side	11/2462	802.11 b	0	0.807	0.729	-0.110	16.68	17.00	0.785
Tested at the worst position with battery 3#									
Top Side	11/2462	802.11 b	0	0.788	0.742	-0.010	16.68	17.00	0.799
802.11b Antenna 1									
Test data with battery 1#									
Back Side	6/2437	802.11 b	0	0.311	0.132	0.060	16.40	17.00	0.152
Top Side	6/2437	802.11 b	0	0.756	0.709	-0.120	16.40	17.00	0.814
Top Side	11/2462	802.11 b	0	0.720	0.687	-0.120	16.38	17.00	0.792
Tested at the worst position with battery 2#									
Top Side	6/2437	802.11 b	0	0.893	0.916	-0.170	16.40	17.00	1.052
Top Side-Repeated	6/2437	802.11 b	0	0.856	0.749	-0.160	16.40	17.00	0.860
Tested at the worst position with battery 3#									
Top Side	6/2437	802.11 b	0	0.749	0.776	-0.150	16.40	17.00	0.891
MIMO 802.11n 20M									
Test data with battery 1#									
Back Side	6/2437	802.11 n	0	0.075	0.085	-0.140	16.33	17.00	0.099
Top Side	6/2437	802.11 n	0	0.362	0.410	-0.130	16.33	17.00	0.478
Tested at the worst position with battery 2#									
Top Side	6/2437	802.11 n	0	0.504	0.326	-0.180	16.33	17.00	0.380
Tested at the worst position with battery 3#									
Top Side	6/2437	802.11 n	0	0.432	0.353	-0.090	16.33	17.00	0.412
802.11g Antenna 0									
Test data with battery 1#									
Back Side	6/2437	802.11 g	0	0.346	0.359	0.180	15.90	17.00	0.462
Top Side	6/2437	802.11 g	0	0.904	0.815	-0.120	15.90	17.00	1.050
Top Side	11/2462	802.11 g	0	0.904	0.926	0.150	15.86	17.00	1.204
Top Side	1/2412	802.11 g	0	0.654	0.637	0.030	15.66	17.00	0.867

Tested at the worst position with battery 2#									
Top Side	11/2462	802.11 g	0	0.571	0.580	-0.060	15.86	17.00	0.754
Tested at the worst position with battery 3#									
Top Side	11/2462	802.11 g	0	0.610	0.610	-0.040	15.86	17.00	0.793
802.11n 20M Antenna 0									
Test data with battery 1#									
Back Side	6/2437	802.11 n	0	0.310	0.367	0.190	15.83	17.00	0.480
Top Side	6/2437	802.11 n	0	0.788	0.847	-0.150	15.83	17.00	1.109
Top Side	11/2462	802.11 n	0	0.964	1.000	0.070	15.86	17.00	1.300
Top Side	1/2412	802.11 n	0	0.620	0.663	0.170	15.65	17.00	0.905
Tested at the worst position with battery 2#									
Top Side	11/2462	802.11 n	0	0.574	0.571	-0.190	15.86	17.00	0.742
Tested at the worst position with battery 3#									
Top Side	11/2462	802.11 n	0	0.578	0.575	0.090	15.86	17.00	0.748

Table 10: Body SAR test results of WiFi 2450MHz

According to KDB248227 D01,The reported SAR must be scaled to 100% transmission duty factor to determine compliance at maximum tune-up tolerance limit.The scaled reported SAR is presented as below.

Test Mode	Antenna Port	Duty cycle [%]
11b	Ant 0	95
11b	Ant 1	95
11g	Ant 0	95
11g	Ant 1	95
11n 20M_SISO	Ant 0	95
11n 20M_SISO	Ant 1	95
11n 20M_MIMO	Ant 0 + Ant1	95

Table 11:The duty factor of WiFi 2.4G

Test Position of Body 0mm	Test channel / Freq. (MHz)	Test Mode	Scaled SAR_{1-g} (W/kg)	Actual duty factor	Maximum duty factor	Reported SAR_{1-g} (W/kg)
802.11b Antenna 0						
Test data with battery 1#						
Back Side	6/2437	802.11 b	0.418	95.0%	100%	0.440
Top Side	6/2437	802.11 b	1.179	95.0%	100%	1.241
Top Side	11/2462	802.11 b	**1.313**	95.0%	100%	1.382
Top Side-Repeated	11/2462	802.11 b	1.303	95.0%	100%	1.371
Top Side	1/2412	802.11 b	1.000	95.0%	100%	1.053
Tested at the worst position with battery 2#						
Top Side	11/2462	802.11 b	0.785	95.0%	100%	0.826
Tested at the worst position with battery 3#						
Top Side	11/2462	802.11 b	0.799	95.0%	100%	0.841
802.11b Antenna 1						
Test data with battery 1#						
Back Side	6/2437	802.11 b	0.152	95.0%	100%	0.160

Top Side	6/2437	802.11 b	0.814	95.0%	100%	0.857
Top Side	11/2462	802.11 b	0.792	95.0%	100%	0.834
Tested at the worst position with battery 2#						
Top Side	6/2437	802.11 b	1.052	95.0%	100%	1.107
Top Side-Repeated	6/2437	802.11 b	0.860	95.0%	100%	0.905
Tested at the worst position with battery 3#						
Top Side	6/2437	802.11 b	0.891	95.0%	100%	0.938
MIMO 802.11n 20M						
Test data with battery 1#						
Back Side	6/2437	802.11	0.099	95.0%	100%	0.105
Top Side	6/2437	802.11	0.478	95.0%	100%	0.504
Tested at the worst position with battery 2#						
Top Side	6/2437	802.11 n	0.380	95.0%	100%	0.400
Tested at the worst position with battery 3#						
Top Side	6/2437	802.11 n	0.412	95.0%	100%	0.434
802.11g Antenna 0						
Test data with battery 1#						
Back Side	6/2437	802.11 g	0.462	95.0%	100%	0.487
Top Side	6/2437	802.11 g	1.050	95.0%	100%	1.105
Top Side	11/2462	802.11 g	1.204	95.0%	100%	1.267
Top Side	1/2412	802.11 g	0.867	95.0%	100%	0.913
Tested at the worst position with battery 2#						
Top Side	11/2462	802.11 g	0.754	95.0%	100%	0.794
Tested at the worst position with battery 3#						
Top Side	11/2462	802.11 g	0.793	95.0%	100%	0.835
802.11n 20M Antenna 0						
Test data with battery 1#						
Back Side	6/2437	802.11 n	0.480	95.0%	100%	0.506
Top Side	6/2437	802.11 n	1.109	95.0%	100%	1.167
Top Side	11/2462	802.11 n	1.300	95.0%	100%	1.368
Top Side	1/2412	802.11 n	0.905	95.0%	100%	0.952
Tested at the worst position with battery 2#						
Top Side	11/2462	802.11 n	0.742	95.0%	100%	0.781
Tested at the worst position with battery 3#						
Top Side	11/2462	802.11 n	0.748	95.0%	100%	0.787

Mode	Tune-up（dBm）	Tune-up（mW）	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
Antenna 0					
802.11b	17.00	50.12	1.382	/	Yes
802.11g	17.00	50.12	/	1.382	Yes
802.11n 20M	17.00	50.12	/	1.382	Yes
Antenna 1					
802.11b	17.00	50.12	1.107	/	Yes
802.11g	17.00	50.12	/	1.107	No
802.11n 20M	17.00	50.12	/	1.107	No

Note: 1) SAR is measured for 2.4 GHz 802.11b DSSS using the initial test position procedure.

2) SAR is not required for the 2.4 GHz 802.11g/n OFDM conditions for the antenna 1 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 $\leqslant$ 1.2 W/kg.

2) SAR is required for the 2.4 GHz 802.11g/n OFDM conditions for the antenna 0 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.

7.2.2 SAR measurement Result of WiFi 5G

Test Position of Body	Test channel /Freq.(MHz)	Test Mode	Test Dist. (mm)	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR1-g (W/kg)
				1-g Area Scan	1-g Zoom Scan				
Antenna 0									
5.3G(U-NII-2A Band)									
Test data with battery 1#									
Back Side	58/5290	802.11ac 80M	0	0.068	0.057	0.141	11.96	12.50	0.064
Top Side	58/5290	802.11ac 80M	0	0.587	0.704	0.180	11.96	12.50	0.797
Tested at the worst position with battery 2#									
Top Side	58/5290	802.11ac 80M	0	0.587	0.679	-0.120	11.96	12.50	0.769
Tested at the worst position with battery 3#									
Top Side	58/5290	802.11ac 80M	0	0.563	0.623	0.150	11.96	12.50	0.705
5.5G(U-NII-2C Band)									
Test data with battery 1#									
Back Side	138/5690	802.11ac 80M	0	0.088	0.072	0.020	9.95	11.00	0.092
Top Side	138/5690	802.11ac 80M	0	0.627	0.802	0.120	9.95	11.00	1.021
Top Side	122/5610	802.11ac 80M	0	0.532	0.694	-0.060	9.92	11.00	0.890
Tested at the worst position with battery 2#									
Top Side	138/5690	802.11ac 80M	0	0.528	0.710	0.190	9.95	11.00	0.904
Tested at the worst position with battery 3#									
Top Side	138/5690	802.11ac 80M	0	0.540	0.709	-0.120	9.95	11.00	0.903
5.8G(U-NII-3 Band)									
Test data with battery 1#									
Back Side	155/5775	802.11ac 80M	0	0.126	0.117	-0.170	10.09	11.00	0.144
Top Side	155/5775	802.11ac 80M	0	0.553	0.748	-0.160	10.09	11.00	0.922
Tested at the worst position with battery 2#									
Top Side	155/5775	802.11ac 80M	0	0.454	0.550	-0.190	10.09	11.00	0.678
Tested at the worst position with battery 3#									
Top Side	155/5775	802.11ac 80M	0	0.381	0.530	0.150	10.09	11.00	0.654
Antenna 1									
5.2G(U-NII-1 Band)									
Test data with battery 1#									
Back Side	42/5210	802.11ac 80M	0	0.152	0.164	-0.130	11.67	12.50	0.199

Top Side	42/5210	802.11ac 80M	0	0.752	1.020	-0.130	11.67	12.50	1.235
Back Side	38/5190	802.11ac 40M	0	0.174	0.097	0.000	11.41	12.50	0.125
Top Side	38/5190	802.11ac 40M	0	0.761	1.000	0.100	11.41	12.50	1.285
Top Side	46/5230	802.11ac 40M	0	0.757	1.030	0.100	11.33	12.50	1.348
Back Side	36/5180	802.11ac 20M	0	0.140	0.102	0.000	11.71	12.50	0.122
Top Side	36/5180	802.11ac 20M	0	0.960	1.030	0.010	11.71	12.50	1.235
Top Side	48/5240	802.11ac 20M	0	1.040	1.080	-0.180	11.60	12.50	1.329
Top Side	40/5200	802.11ac 20M	0	0.983	1.040	-0.130	11.58	12.50	1.285
Top Side	44/5220	802.11ac 20M	0	1.080	1.070	0.190	11.54	12.50	1.335
Back Side	38/5190	802.11n 40M	0	0.100	0.106	0.000	12.19	12.50	0.114
Top Side	38/5190	802.11n 40M	0	0.720	1.040	0.170	12.19	12.50	1.117
Back Side	40/5200	802.11n 20M	0	0.128	0.103	0.000	11.98	12.50	0.116
Top Side	40/5200	802.11n 20M	0	1.020	0.990	-0.120	11.98	12.50	1.116
Back Side	48/5240	802.11a	0	0.189	0.123	0.000	11.77	12.50	0.146
Top Side	48/5240	802.11a	0	0.925	0.942	-0.160	11.77	12.50	1.114
5.3G(U-NII-2A Band)									
Test data with battery 1#									
Top Side	58/5290	802.11ac 80M	0	0.796	1.100	0.150	11.58	12.50	1.360
Back Side	58/5290	802.11ac 80M	0	0.123	0.119	0.190	11.58	12.50	0.147
Back Side	62/5310	802.11ac 40M	0	0.189	0.105	0.190	11.48	12.50	0.133
Top Side	62/5310	802.11ac 40M	0	0.913	1.040	-0.130	11.48	12.50	1.315
Top Side	54/5270	802.11ac 40M	0	0.816	1.100	0.080	11.47	12.50	1.394
Back Side	64/5320	802.11ac 20M	0	0.154	0.112	0.000	11.65	12.50	0.136
Top Side	64/5320	802.11ac 20M	0	0.936	1.100	0.180	11.65	12.50	1.338
Top Side	56/5280	802.11ac 20M	0	0.889	1.110	0.070	11.60	12.50	1.366
Top Side	52/5260	802.11ac 20M	0	0.787	1.060	0.150	11.56	12.50	1.316
Top Side	60/5300	802.11ac 20M	0	1.050	1.110	-0.190	11.56	12.50	1.378
Back Side	62/5310	802.11n 40M	0	0.109	0.115	0.190	11.95	12.50	0.131
Top Side	62/5310	802.11n 40M	0	0.863	1.140	-0.030	11.95	12.50	1.294

Top Side	**54/5270**	**802.11n 40M**	**0**	**0.877**	**1.170**	**0.130**	**11.94**	**12.50**	**1.331**
Top Side-Repeated	54/5270	802.11n 40M	0	0.965	1.110	-0.060	11.94	12.50	1.263
Back Side	64/5320	802.11n 20M	0	0.139	0.112	-0.190	11.45	12.50	0.143
Top Side	64/5320	802.11n 20M	0	0.882	1.030	0.180	11.45	12.50	1.312
Top Side	60/5300	802.11n 20M	0	0.893	1.060	-0.020	11.43	12.50	1.356
Top Side	56/5280	802.11n 20M	0	0.905	1.070	0.060	11.43	12.50	1.369
Top Side	52/5260	802.11n 20M	0	1.000	1.080	0.130	11.42	12.50	1.385
Back Side	60/5300	802.11a	0	0.197	0.129	0.190	11.51	12.50	0.162
Top Side	60/5300	802.11a	0	1.010	1.100	-0.170	11.51	12.50	1.382
Top Side	52/5260	802.11a	0	0.965	1.090	0.040	11.46	12.50	1.385
Top Side	56/5280	802.11a	0	0.920	1.070	0.140	11.40	12.50	1.378
Top Side	64/5320	802.11a	0	0.880	1.050	-0.040	11.29	12.50	1.387
Tested at the worst position with battery 2#									
Top Side	54/5270	802.11n 40M	0	0.892	1.070	0.190	11.94	12.50	1.217
Tested at the worst position with battery 3#									
Top Side	54/5270	802.11n 40M	0	0.704	0.938	0.000	11.94	12.50	1.067
5.5G(U-NII-2C Band)									
Test data with battery 1#									
Back Side	122/5610	802.11ac 80M	0	0.092	0.104	0.110	10.10	11.00	0.128
Top Side	122/5610	802.11ac 80M	0	0.432	0.556	0.000	10.10	11.00	0.684
Tested at the worst position with battery 2#									
Top Side	122/5610	802.11ac 80M	0	0.362	0.428	-0.140	10.10	11.00	0.527
Tested at the worst position with battery 3#									
Top Side	122/5610	802.11ac 80M	0	0.320	0.401	0.160	10.10	11.00	0.493
5.8G(U-NII-3 Band)									
Test data with battery 1#									
Back Side	155/5775	802.11ac 80M	0	0.069	0.079	0.090	9.85	11.00	0.103
Top Side	155/5775	802.11ac 80M	0	0.437	0.504	0.110	9.85	11.00	0.657
Tested at the worst position with battery 2#									
Top Side	155/5775	802.11ac 80M	0	0.379	0.444	0.180	9.85	11.00	0.579
Tested at the worst position with battery 3#									
Top Side	155/5775	802.11ac 80M	0	0.345	0.414	-0.120	9.85	11.00	0.540

MIMO 11ac 80M									
5.3G(U-NII-2A Band)									
Test data with battery 1#									
Back Side	58/5290	802.11ac 80M	0	0.046	0.053	0.050	11.94	12.50	0.060
Top Side	58/5290	802.11ac 80M	0	0.474	0.607	-0.090	11.94	12.50	0.691
Tested at the worst position with battery 2#									
Top Side	58/5290	802.11ac 80M	0	0.503	0.611	0.150	11.94	12.50	0.695
Tested at the worst position with battery 3#									
Top Side	58/5290	802.11ac 80M	0	0.388	0.506	0.130	11.94	12.50	0.576
5.5G(U-NII-2C Band)									
Test data with battery 1#									
Back Side	122/5610	802.11ac 80M	0	0.101	0.081	0.000	10.02	11.00	0.102
Top Side	122/5610	802.11ac 80M	0	0.417	0.402	0.110	10.02	11.00	0.504
Tested at the worst position with battery 2#									
Top Side	122/5610	802.11ac 80M	0	0.237	0.325	0.190	10.02	11.00	0.407
Tested at the worst position with battery 3#									
Top Side	122/5610	802.11ac 80M	0	0.364	0.487	0.170	10.02	11.00	0.610
5.8G(U-NII-3 Band)									
Test data with battery 1#									
Back Side	155/5775	802.11ac 80M	0	0.057	0.069	0.150	10.00	11.00	0.087
Top Side	155/5775	802.11ac 80M	0	0.295	0.347	0.180	10.00	11.00	0.437
Tested at the worst position with battery 2#									
Top Side	155/5775	802.11ac 80M	0	0.183	0.210	0.170	10.00	11.00	0.264
Tested at the worst position with battery 3#									
Top Side	155/5775	802.11ac 80M	0	0.188	0.260	0.160	10.00	11.00	0.327

Table 12: Body SAR test results of WiFi 5G

According to KDB248227 D01,The reported SAR must be scaled to 100% transmission duty factor to determine compliance at maximum tune-up tolerance limit.The scaled reported SAR is presented as below.

Test Mode	Antenna Port	Duty cycle [%]
11a	Ant 0	95
11a	Ant 1	95
11n 20M	Ant 0	95
11n 20M	Ant 1	95
11n 20M MIMO	Ant 0 + Ant 1	95
11n 40M	Ant 0	91
11n 40M	Ant 1	91
11n 40M MIMO	Ant 0 + Ant 1	91
11ac 20M	Ant 0	98
11ac 20M	Ant 1	98
11ac 20M MIMO	Ant 0 + Ant 1	98
11ac 40M	Ant 0	97
11ac 40M	Ant 1	97
11ac 40M MIMO	Ant 0 + Ant 1	97
11ac 80M	Ant 0	94
11ac 80M	Ant 1	94
11ac 80M MIMO	Ant 0 + Ant 1	94

Table 13:The duty factor of WiFi 5G

Test Position of Body 0mm	Test channel / Freq. (MHz)	Test Mode	Scaled SAR_{1-g} (W/kg)	Actual duty factor	Maximum duty factor	Reported SAR_{1-g} (W/kg)
Antenna 0						
5.3G(U-NII-2A Band)						
Test data with battery 1#						
Back Side	58/5290	802.11ac 80M	0.064	94%	100%	0.069
Top Side	58/5290	802.11ac 80M	0.797	94%	100%	0.848
Tested at the worst position with battery 2#						
Top Side	58/5290	802.11ac 80M	0.769	94%	100%	0.818
Tested at the worst position with battery 3#						
Top Side	58/5290	802.11ac 80M	0.705	94%	100%	0.751
5.5G(U-NII-2C Band)						
Test data with battery 1#						
Back Side	138/5690	802.11ac 80M	0.092	94%	100%	0.098
Top Side	138/5690	802.11ac 80M	1.021	94%	100%	1.087
Top Side	122/5610	802.11ac 80M	0.890	94%	100%	0.947
Tested at the worst position with battery 2#						

Top Side	138/5690	802.11ac 80M	0.904	94%	100%	0.962
Tested at the worst position with battery 3#						
Top Side	138/5690	802.11ac 80M	0.903	94%	100%	0.961
5.8G(U-NII-3 Band)						
Test data with battery 1#						
Back Side	155/5775	802.11ac 80M	0.144	94%	100%	0.153
Top Side	155/5775	802.11ac 80M	0.922	94%	100%	0.981
Tested at the worst position with battery 2#						
Top Side	155/5775	802.11ac 80M	0.678	94%	100%	0.721
Tested at the worst position with battery 3#						
Top Side	155/5775	802.11ac 80M	0.654	94%	100%	0.695
Antenna 1						
5.2G(U-NII-1 Band)						
Test data with battery 1#						
Back Side	42/5210	802.11ac 80M	0.199	94%	100%	0.211

Top Side	42/5210	802.11ac 80M	1.235	94%	100%	1.314
Back Side	38/5190	802.11ac 40M	0.125	97%	100%	0.129
Top Side	38/5190	802.11ac 40M	1.285	97%	100%	1.325
Top Side	46/5230	802.11ac 40M	1.348	97%	100%	1.390
Back Side	36/5180	802.11ac 20M	0.122	98%	100%	0.124
Top Side	36/5180	802.11ac 20M	1.235	98%	100%	1.261
Top Side	48/5240	802.11ac 20M	1.329	98%	100%	1.356
Top Side	40/5200	802.11ac 20M	1.285	98%	100%	1.312
Top Side	44/5220	802.11ac 20M	1.335	98%	100%	1.362
Back Side	38/5190	802.11n 40M	0.111	91%	100%	0.122
Top Side	38/5190	802.11n 40M	1.089	91%	100%	1.197
Back Side	40/5200	802.11n 20M	0.116	95%	100%	0.122
Top Side	40/5200	802.11n 20M	1.116	95%	100%	1.175
Back Side	48/5240	802.11a	0.146	95%	100%	0.153
Top Side	48/5240	802.11a	1.114	95%	100%	1.173

5.3G(U-NII-2A Band)						
Test data with battery 1#						
Top Side	58/5290	802.11ac 80M	1.360	94%	100%	1.446
Back Side	58/5290	802.11ac 80M	0.147	94%	100%	0.156
Back Side	62/5310	802.11ac 40M	0.133	97%	100%	0.137
Top Side	62/5310	802.11ac 40M	1.315	97%	100%	1.356
Top Side	54/5270	802.11ac 40M	1.394	97%	100%	1.438
Back Side	64/5320	802.11ac 20M	0.136	98%	100%	0.139
Top Side	64/5320	802.11ac 20M	1.338	98%	100%	1.365
Top Side	56/5280	802.11ac 20M	1.366	98%	100%	1.393
Top Side	52/5260	802.11ac 20M	1.316	98%	100%	1.343
Top Side	60/5300	802.11ac 20M	1.378	98%	100%	1.406
Back Side	62/5310	802.11n 40M	0.131	91%	100%	0.143
Top Side	62/5310	802.11n 40M	1.294	91%	100%	1.422
Top Side	54/5270	802.11n 40M	1.331	91%	100%	1.463
Top Side-Repeated	54/5270	802.11n 40M	1.263	91%	100%	1.388
Back Side	64/5320	802.11n 20M	0.143	95%	100%	0.150
Top Side	64/5320	802.11n 20M	1.312	95%	100%	1.381
Top Side	60/5300	802.11n 20M	1.356	95%	100%	1.428
Top Side	56/5280	802.11n 20M	1.369	95%	100%	1.441
Top Side	52/5260	802.11n 20M	1.385	95%	100%	1.458
Back Side	60/5300	802.11a	0.162	95%	100%	0.171
Top Side	60/5300	802.11a	1.382	95%	100%	1.454
Top Side	52/5260	802.11a	1.385	95%	100%	1.458
Top Side	56/5280	802.11a	1.378	95%	100%	1.451
Top Side	64/5320	802.11a	1.387	95%	100%	1.460
Tested at the worst position with battery 2#						
Top Side	54/5270	802.11n 40M	1.217	91%	100%	1.338
Tested at the worst position with battery 3#						
Top Side	54/5270	802.11n 40M	1.067	91%	100%	1.173
5.5G(U-NII-2C Band)						
Test data with battery 1#						

Back Side	122/5610	802.11ac 80M	0.128	94%	100%	0.136
Top Side	122/5610	802.11ac 80M	0.684	94%	100%	0.728
Tested at the worst position with battery 2#						
Top Side	122/5610	802.11ac 80M	0.527	94%	100%	0.560
Tested at the worst position with battery 3#						
Top Side	122/5610	802.11ac 80M	0.493	94%	100%	0.524
5.8G(U-NII-3 Band)						
Test data with battery 1#						
Back Side	155/5775	802.11ac 80M	0.103	94%	100%	0.110
Top Side	155/5775	802.11ac 80M	0.657	94%	100%	0.699
Tested at the worst position with battery 2#						
Top Side	155/5775	802.11ac 80M	0.579	94%	100%	0.616
Tested at the worst position with battery 3#						
Top Side	155/5775	802.11ac 80M	0.540	94%	100%	0.574
MIMO 11ac 80M						
5.3G(U-NII-2A Band)						
Test data with battery 1#						
Back Side	58/5290	802.11ac 80M	0.060	94%	100%	0.064
Top Side	58/5290	802.11ac 80M	0.691	94%	100%	0.735
Tested at the worst position with battery 2#						
Top Side	58/5290	802.11ac 80M	0.695	94%	100%	0.739
Tested at the worst position with battery 3#						
Top Side	58/5290	802.11ac 80M	0.576	94%	100%	0.612
5.5G(U-NII-2C Band)						
Test data with battery 1#						
Back Side	122/5610	802.11ac 80M	0.102	94%	100%	0.108
Top Side	122/5610	802.11ac 80M	0.504	94%	100%	0.536
Tested at the worst position with battery 2#						
Top Side	122/5610	802.11ac 80M	0.407	94%	100%	0.433
Tested at the worst position with battery 3#						
Top Side	122/5610	802.11ac 80M	0.610	94%	100%	0.649
5.8G(U-NII-3 Band)						
Test data with battery 1#						
Back Side	155/5775	802.11ac 80M	0.087	94%	100%	0.092
Top Side	155/5775	802.11ac 80M	0.437	94%	100%	0.465

Tested at the worst position with battery 2#						
Top Side	155/5775	802.11ac 80M	0.264	94%	100%	0.281
Tested at the worst position with battery 3#						
Top Side	155/5775	802.11ac 80M	0.327	94%	100%	0.348

Mode	Tune-up（dBm）	Tune-up（mW）	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
Antenna 0					
5.3G(U-NII-2A Band)					
802.11ac 80M	12.50	17.78	0.848	/	Yes
802.11ac 40M	12.50	17.78	/	0.848	No
802.11ac 20M	12.50	17.78	/	0.848	No
802.11n 40M	12.50	17.78	/	0.848	No
802.11n 20M	12.50	17.78	/	0.848	No
802.11a	12.50	17.78	/	0.848	No
5.5G(U-NII-2C Band)					
802.11ac 80M	11.00	12.59	1.087	/	Yes
802.11ac 40M	11.00	12.59	/	1.087	No
802.11ac 20M	11.00	12.59	/	1.087	No
802.11n 40M	11.00	12.59	/	1.087	No
802.11n 20M	11.00	12.59	/	1.087	No
802.11a	11.00	12.59	/	1.087	No
5.8G(U-NII-3 Band)					
802.11ac 80M	11.00	12.59	0.981	/	Yes
802.11ac 40M	11.00	12.59	/	0.981	No
802.11ac 20M	11.00	12.59	/	0.981	No
802.11n 40M	11.00	12.59	/	0.981	No
802.11n 20M	11.00	12.59	/	0.981	No
802.11a	11.00	12.59	/	0.981	No
Antenna 1					
5.2G(U-NII-1 Band)					
802.11ac 80M	12.50	17.78	1.314	/	Yes
802.11ac 40M	12.50	17.78	/	1.314	Yes
802.11ac 20M	12.50	17.78	/	1.314	Yes
802.11n 40M	12.50	17.78	/	1.314	Yes
802.11n 20M	12.50	17.78	/	1.314	Yes
802.11a	12.50	17.78	/	1.314	Yes
5.3G(U-NII-2A Band)					
802.11ac 80M	12.50	17.78	1.446	/	Yes
802.11ac 40M	12.50	17.78	/	1.446	Yes
802.11ac 20M	12.50	17.78	/	1.446	Yes
802.11n 40M	12.50	17.78	/	1.446	Yes
802.11n 20M	12.50	17.78	/	1.446	Yes
802.11a	12.50	17.78	/	1.446	Yes
5.5G(U-NII-2C Band)					
802.11ac 80M	11.00	12.59	0.728	/	Yes
802.11ac 40M	11.00	12.59	/	0.728	No

802.11ac 20M	11.00	12.59	/	0.728	No
802.11n 40M	11.00	12.59	/	0.728	No
802.11n 20M	11.00	12.59	/	0.728	No
802.11a	11.00	12.59	/	0.728	No
5.8G(U-NII-3 Band)					
802.11ac 80M	11.00	12.59	0.699	/	Yes
802.11ac 40M	11.00	12.59	/	0.699	No
802.11ac 20M	11.00	12.59	/	0.699	No
802.11n 40M	11.00	12.59	/	0.699	No
802.11n 20M	11.00	12.59	/	0.699	No
802.11a	11.00	12.59	/	0.699	No
MIMO					
5.3G(U-NII-2A Band)					
802.11ac 80M	12.50	17.78	0.739	/	Yes
802.11ac 40M	12.50	17.78	/	0.739	No
802.11ac 20M	12.50	17.78	/	0.739	No
802.11n 40M	12.50	17.78	/	0.739	No
802.11n 20M	12.50	17.78	/	0.739	No
5.5G(U-NII-2C Band)					
802.11ac 80M	11.00	12.59	0.649	/	Yes
802.11ac 40M	11.00	12.59	/	0.649	No
802.11ac 20M	11.00	12.59	/	0.649	No
802.11n 40M	11.00	12.59	/	0.649	No
802.11n 20M	11.00	12.59	/	0.649	No
5.8G(U-NII-3 Band)					
802.11ac 80M	11.00	12.59	0.465	/	Yes
802.11ac 40M	11.00	12.59	/	0.465	No
802.11ac 20M	11.00	12.59	/	0.465	No
802.11n 40M	11.00	12.59	/	0.465	No
802.11n 20M	11.00	12.59	/	0.465	No

Note:

1) Per KDB 248227D01, as the same maximum output power is specified for U-NII-1(5.2G) and U-NII-2A(5.3G) bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements.

a) For Ant 0, as the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration.

b) For Ant 1, as the highest reported SAR for a test configuration is > 1.2 W/kg, SAR is required for U-NII-1 band for that configuration.

2) The 802.11ac 80M mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power and maximum bandwidth.

a) For Ant 0, as the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.

a) For Ant 1, as the highest reported SAR for the initial test configuration is adjusted by the ratio of the some subsequent test configurations to initial test configuration specified maximum output power and the adjusted SAR is > 1.2 W/kg, SAR test for these 802.11 modes are required.

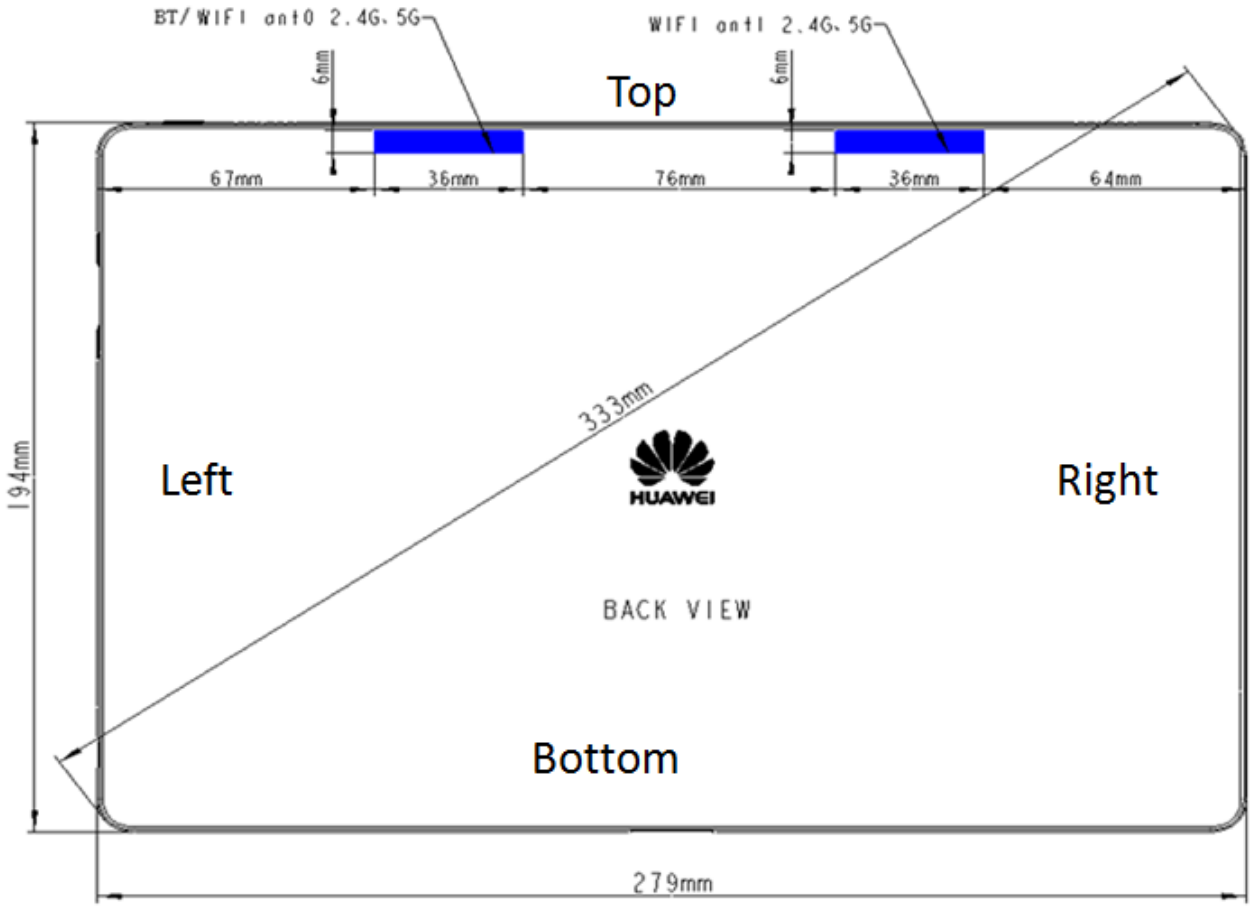
7.2.3 SAR measurement Result of BT

Test Position of Body	Test channel /Freq.(MHz)	Test Mode	Test Dist. (mm)	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR1-g (W/kg)
				1-g	10-g				
Test data with battery 1#									
Back Side	78/2480	DH5	0	0.013	0.004	0.000	10.25	11.00	0.016
Top Side	**78/2480**	**DH5**	**0**	**0.068**	**0.025**	**0.160**	**10.25**	**11.00**	**0.081**
Top Side	0/2402	DH5	0	0.038	0.011	0.130	9.09	11.00	0.059
Top Side	39/2441	DH5	0	0.053	0.020	0.150	9.32	11.00	0.077
Tested at the worst position with battery 2#									
Top Side	78/2480	DH5	0	0.048	0.015	0.190	10.25	11.00	0.057
Tested at the worst position with battery 3#									
Top Side	78/2480	DH5	0	0.050	0.016	0.150	10.25	11.00	0.060

Table 14: Body SAR test results of BT

7.3 Multiple Transmitter Evaluation

The following tables list information which is relevant for the decision if a simultaneous transmit evaluation is necessary according to FCC KDB 447498 D01 General RF Exposure Guidance v06.
The location of the antennas inside the device is shown as below picture:



Note:
1)The overall dimension of the device (Length* Width) is 279mm*194mm . Per KDB 616217, because the diagonal Length is ＞200mm, it is conssidered a “ tablet” device and need to test 0mm 1g Body SAR.

7.3.1 Standalone SAR exclusion calculation

Per FCC KDB 447498D01v06:

1) The 1-g SAR 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, where:

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation

The test exclusions are applicable only when the minimum *test separation distance* is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

2) 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) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz

b) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm) • 10] mW at > 1500 MHz and ≤ 6 GHz

(Antenna 0 <50mm to adjacent sides)

Band	Exposure Condition	f(GHz)	Pmax	Pmax	Seperation Distance(mm)					Calculated Value					SAR Test(yes or no)				
			(dBm)*	(mW)	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side
WiFi 2.4G	Body 0mm	2.450	17.00	50.12	5.0	176.00	67.00	5.0	188.00	15.690	>50mm	>50mm	15.690	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.2G	Body 0mm	5.200	12.50	17.78	5.0	176.00	67.00	5.0	188.00	8.110	>50mm	>50mm	8.110	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.3G	Body 0mm	5.300	12.50	17.78	5.0	176.00	67.00	5.0	188.00	8.188	>50mm	>50mm	8.188	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.5G	Body 0mm	5.500	11.00	12.59	5.0	176.00	67.00	5.0	188.00	5.905	>50mm	>50mm	5.905	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.8G	Body 0mm	5.800	11.00	12.59	5.0	176.00	67.00	5.0	188.00	6.064	>50mm	>50mm	6.064	>50mm	Yes	>50mm	>50mm	Yes	>50mm
BT	Body 0mm	2.450	11.00	12.59	5.0	176.00	67.00	5.0	188.00	3.941	>50mm	>50mm	3.941	>50mm	Yes	>50mm	>50mm	Yes	>50mm

(Antenna 0 >50mm to adjacent sides)

Band	Exposure Condition	f(GHz)	Pmax	Pmax	Seperation Distance(mm)					Calculated Threshold Value					SAR Test(yes or no)				
			(dBm)*	(mW)	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side
WiFi 2.4G	Body 0mm	2.450	17.00	50.12	5.0	176.00	67.00	5.0	188.00	<50mm	1356.00	266.00	<50mm	1476.00	<50mm	No	No	<50mm	No
WiFi 5.2G	Body 0mm	5.200	12.50	17.78	5.0	176.00	67.00	5.0	188.00	<50mm	1322.00	232.00	<50mm	1442.00	<50mm	No	No	<50mm	No
WiFi 5.3G	Body 0mm	5.300	12.50	17.78	5.0	176.00	67.00	5.0	188.00	<50mm	1325.00	235.00	<50mm	1445.00	<50mm	No	No	<50mm	No
WiFi 5.5G	Body 0mm	5.500	11.00	12.59	5.0	176.00	67.00	5.0	188.00	<50mm	1324.00	234.00	<50mm	1444.00	<50mm	No	No	<50mm	No
WiFi 5.8G	Body 0mm	5.800	11.00	12.59	5.0	176.00	67.00	5.0	188.00	<50mm	1322.00	232.00	<50mm	1442.00	<50mm	No	No	<50mm	No
BT	Body 0mm	2.450	11.00	12.59	5.0	176.00	67.00	5.0	188.00	<50mm	1356.00	266.00	<50mm	1476.00	<50mm	No	No	<50mm	No

(Antenna 1 <50mm to adjacent sides)

Band	Exposure Condition	f(GHz)	Pmax	Pmax	Seperation Distance(mm)					Calculated Value					SAR Test(yes or no)				
			(dBm)*	(mW)	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side
WiFi 2.4G	Body 0mm	2.450	17.00	50.12	5.0	64.00	179.00	5.0	188.00	15.690	>50mm	>50mm	15.690	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.2G	Body 0mm	5.200	12.50	17.78	5.0	64.00	179.00	5.0	188.00	8.110	>50mm	>50mm	8.110	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.3G	Body 0mm	5.300	12.50	17.78	5.0	64.00	179.00	5.0	188.00	8.188	>50mm	>50mm	8.188	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.5G	Body 0mm	5.500	11.00	12.59	5.0	64.00	179.00	5.0	188.00	5.905	>50mm	>50mm	5.905	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.8G	Body 0mm	5.800	11.00	12.59	5.0	64.00	179.00	5.0	188.00	6.064	>50mm	>50mm	6.064	>50mm	Yes	>50mm	>50mm	Yes	>50mm

(Antenna 1 >50mm to adjacent sides)

Band	Exposure Condition	f(GHz)	Pmax	Pmax	Seperation Distance(mm)					Calculated Threshold Value					SAR Test(yes or no)				
			(dBm)*	(mW)	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side	Back side	Left side	Right side	Top side	Bottom side
WiFi 2.4G	Body 0mm	2.450	17.00	50.12	5.0	64.00	179.00	5.0	188.00	<50mm	236.00	1386.00	<50mm	1476.00	<50mm	No	No	<50mm	No
WiFi 5.2G	Body 0mm	5.200	12.50	17.78	5.0	64.00	179.00	5.0	188.00	<50mm	202.00	1352.00	<50mm	1442.00	<50mm	No	No	<50mm	No
WiFi 5.3G	Body 0mm	5.300	12.50	17.78	5.0	64.00	179.00	5.0	188.00	<50mm	205.00	1355.00	<50mm	1445.00	<50mm	No	No	<50mm	No
WiFi 5.5G	Body 0mm	5.500	11.00	12.59	5.0	64.00	179.00	5.0	188.00	<50mm	204.00	1354.00	<50mm	1444.00	<50mm	No	No	<50mm	No
WiFi 5.8G	Body 0mm	5.800	11.00	12.59	5.0	64.00	179.00	5.0	188.00	<50mm	202.00	1352.00	<50mm	1442.00	<50mm	No	No	<50mm	No

Note :According to the table above,the SAR test are required for Top side and Back side.

7.3.2 Simultaneous Transmission Possibilities

No	Simultaneous Tx Combination	Body
1	WiFi 2.4G Ant 0 + WiFi 2.4G Ant 1	Yes
2	WiFi 5G Ant 0 + WiFi 5G Ant 1	Yes
3	BT Ant 0 + WiFi 5G Ant 1	Yes

Table 15: Simultaneous Transmission Possibilities

Note:

1) The device does not support simultaneous WiFi 2.4G and BT

2) The device does not support simultaneous WiFi 2.4G and WiFi 5G

7.3.3 SAR Summation Scenario

Test Position		Back Side	Top Side
MAX 1-g SAR (W/kg)	WiFi 5G Ant 1	0.211	1.463
	BT Antenna 0	0.016	0.081
Σ1-g SAR(W/kg)		0.227	**1.544**

Table 16: SAR Simultaneous Tx Combination of Wifi 5G Antenna 1 and BT Antenna.

7.3.4 Simultaneous Transmission Conlcusion

The above numeral summed SAR results and/or SPLSR analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore simultaneous transmission SAR with Volume Scans is not required per KDB 447498 D01v06.

Appendix A. System Check Plots
(Pls See Appendix A.)

Appendix B. SAR Measurement Plots
(Pls See Appendix B.)

Appendix C. Calibration Certificate
(Pls See Appendix C.)

Appendix D. Photo documentation
(Pls See Appendix D.)

End