FCC SAR Compliance Test Report

Product Name:	Tablet
Model:	CMR-W09
Report No.:	SYBH(Z-SAR)002012018-2
FCC ID:	QISCMR-W09

	APPROVED (Lab Manager)	PREPARED (Test Engineer)
BY	Wei Huanbin	Bao Fengkai
DATE	2018-01-24	2018-01-24

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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 & 2174.02 & 2174.03

3. The laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named "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.

5. The test report is invalid if there is any evidence of erasure and/or falsification.

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

7. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

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※ ※ Modified History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	2018-01-24	Bao Fengkai

1 General Information

1.1 Statement of Compliance

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

Band	**Max Reported SAR(W/kg)**
	1-g Body (0mm) *
WiFi 2.4G	**0.40**
WiFi 5G	0.32
BT	/
The highest Body SAR and simultaneous SAR value is 0.40 W/kg and 0.40 W/kg per KDB690783 D01.**	

Table 1:Summary of test result

Note:

1)* For body operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and that positions the handset a minimum of 0mm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

2)** Per KDB690783 D01, when the sum of 1-g SAR applies for simultaneous transmission SAR test exclusion, the highest sum of 1-g SAR according to the highest reported stand-alone SAR values is used

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 C95.1:1992/IEEE C95.1:1991, 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

<table>
<tr><td colspan="4">Device Information:</td></tr>
<tr><td>Product Name:</td><td colspan="3">Tablet</td></tr>
<tr><td>Model:</td><td colspan="3">CMR-W09</td></tr>
<tr><td>FCC ID :</td><td colspan="3">QISCMR-W09</td></tr>
<tr><td>SN.:</td><td colspan="3">1#:HQL0117A26000200
2#:HQL0117A26000232
3#:HQL0117A26000239
4#:HQL0117A26000213
5#:HQL0117A26000206
6#:DU5BBM17CF078346</td></tr>
<tr><td>Device Type :</td><td colspan="3">Portable device</td></tr>
<tr><td>Device Phase:</td><td colspan="3">Identical Prototype</td></tr>
<tr><td>Exposure Category:</td><td colspan="3">Uncontrolled environment / general population</td></tr>
<tr><td>Hardware Version :</td><td colspan="3">SH1CMRONLM</td></tr>
<tr><td>Software Version :</td><td colspan="3">CMR-W09 8.0.1.3(SP1C331)</td></tr>
<tr><td>Antenna Type :</td><td colspan="3">Internal antenna</td></tr>
<tr><td>Others Accessories</td><td colspan="3">Protected Cover (Non-metallic)</td></tr>
<tr><td colspan="4">Device Operating Configurations:</td></tr>
<tr><td>Supporting Mode(s)</td><td colspan="3">WiFi 2.4G;WiFi 5G;BT</td></tr>
<tr><td>Test Modulation</td><td colspan="3">WiFi(DSSS/OFDM),BT(GFSK)</td></tr>
<tr><td rowspan="4">Operating Frequency Range(s)</td><td>Band</td><td>Tx (MHz)</td><td>Rx (MHz)</td></tr>
<tr><td>WiFi 2.4G</td><td colspan="2">2412-2462</td></tr>
<tr><td>WiFi 5G</td><td colspan="2">5150-5350
5470-5825</td></tr>
<tr><td>BT</td><td colspan="2">2402-2480</td></tr>
<tr><td rowspan="3">Test Channels (low-mid-high) :</td><td colspan="3">WiFi 2.4G:
802.11b/g/n (20M): 1-6-11
802.11n (40M): 3-6-9</td></tr>
<tr><td colspan="3">WiFi 5G:
802.11a/n/ac (20M): 36-40-44-48-52-56-60-64-100-104-108-112-116-120-124-128-132-136-140-144-149-153-157-161-165
802.11n/ac (40M): 38-46-54-62-102-110-118-126-134-142-151-159
802.11ac (80M): 42-58-106-122-138-155</td></tr>
<tr><td colspan="3">BT:0-19-39-78</td></tr>
</table>

Table 3:Device information and operating configuration

1.3.1 General Description

CMR-W09 runs on Huawei's latest EMUI 8.0 system based on Google Android Oreo (8.0) system, providing easy access to Huawei Cloud services.

Battery information:

Name	Manufacture	Description
Li-ion	SCUD (FUJIAN) Electronics Co., Ltd	Battery Model: HB2994I8ECW Rated capacity: 7350 mAh Nominal Voltage: +3.82V Charging Voltage: +4.4V
Li-ion	Sunwoda Electronic Co., Ltd	Battery Model: HB2994I8ECW Rated capacity: 7350 mAh Nominal Voltage: +3.82V Charging Voltage: +4.4V
Li-ion	Huizhou Desay Battery Co., Ltd	Battery Model: HB2994I8ECW Rated capacity: 7350 mAh Nominal Voltage: +3.82V Charging Voltage: +4.4V

Difference description

The differences between CMR-W19 and CMR-W09 are showed in the following table. Other parts of the Tablet are the same, including the antenna, Chipset, Bluetooth mode, Wifi mode, Adapter, Battery, Mainboard and so on.

Model	CMR-W19	CMR-W09
WIFI 2.4G/5G&BT&GPS	the same	the same
SIM card	None	None
Rear camera	the same	the same
Front camera	the same	the same
FLASH	the same	the same
Mainboard	the same	the same
PCB layout	the same	the same
Appearance	the same	the same
Bluetooth mode	the same	the same
WLAN mode	the same	the same
BT/ WLAN antenna	the same	the same
Adapter	the same	the same
Battery	the same	the same
WIFI/BT Chipset	the same	the same
Main Chipset	the same	the same
RF Parameter	the same	the same
Dimension	the same	the same
Memory	4GB+64GB	4GB+64GB ;4GB+32GB; 4GB+128GB;
Touch Panel	Support Active Pen	Not support Active Pen

Note:According to the difference description above, for each same bands(WiFi/BT), CMR-W09 is tested at the SAR worst case of CMR-W19(Report NO.: SYBH(Z-SAR)005122017-2).

1.3.2 Power reduction specification

This device uses a mobile country code (MCC) detection and proximity sensor mechanism that share the same metallic electrode as the transmitting antenna to facilitate triggering in typical user interactivity with the device. This device uses the mobile country code (MCC) to indicate whether the users in FCC countries or not. It utilizes the proximity sensor to reduce the output power in specific wireless and operating modes to ensure SAR compliance when the MCC information accomplished by operator network is in FCC countries and the DUT is held close to a user's body exposure condition with sensor on.

The following tables summarize the key power reduction information. The detailed full power and reduced conducted power measurement results are provided in Section 6.3 and section 7 of this report per KDB 616217:

Band	**Power Reduction Level Amount (dB)**	
	Other conditions (Full power level)	MCC of FCC countries, Sensor on
WiFi 2.4G 802.11b	0	6.0
WiFi 2.4G 802.11g	0	3.0
WiFi 2.4G 802.11n 20M	0	2.0
WiFi 5G 802.11a	0	12.0
WiFi 5G 802.11n 20M	0	11.0
WiFi 5G 802.11n 40M	0	9.0
WiFi 5G 802.11ac 20M	0	11.0
WiFi 5G 802.11ac 40M	0	9.0
WiFi 5G 802.11ac 80M	0	8.0

1.4 Test specification(s)

ANSI C95.1:1992 /IEEE C95.1:1991	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
KDB447498 D01	General RF Exposure Guidance v06
KDB248227 D01	SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r02
KDB865664 D01	SAR measurement 100 MHz to 6 GHz v01r04
KDB865664 D02	RF Exposure Reporting v01r02
KDB690783 D01	SAR Listings on Grants v01r03
KDB616217 D04	SAR for laptop and tablets v01r02

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 & 2174.02 & 2174.03

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

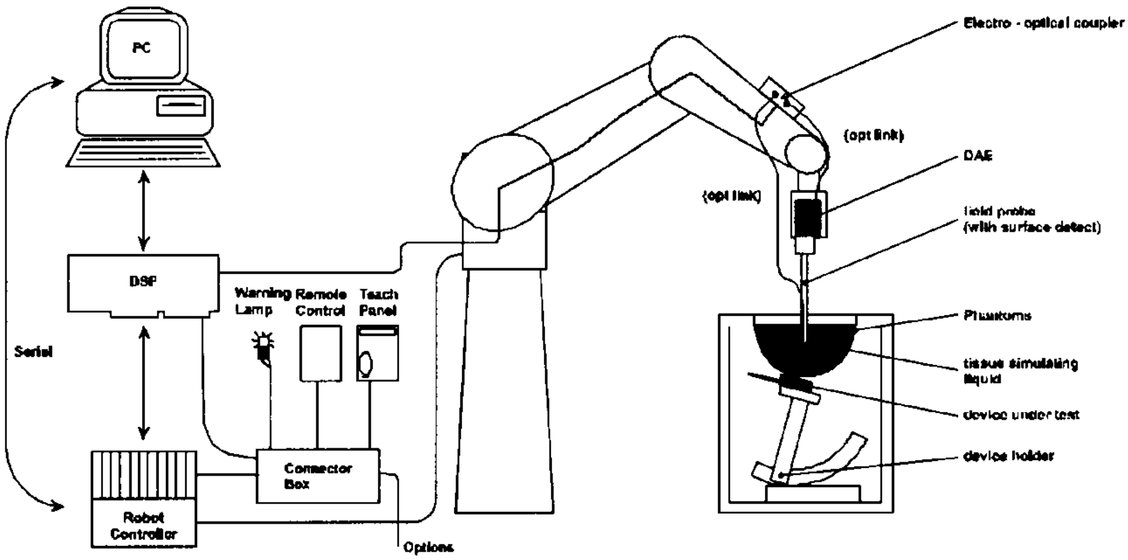
Start Date of test	2017-12-18
End Date of test	2017-12-20

1.8 Ambient Condition

Ambient temperature	18°C – 25°C
Relative Humidity	30% – 70%

2 SAR Measurement System

2.1 SAR Measurement Set-up



The DASY 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 DASY measurement server.
- The DASY 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.
- DASY 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 DASY measurement system is placed at the head end of a room with dimensions:
5 x 2.5 x 3 m³, 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 m² 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

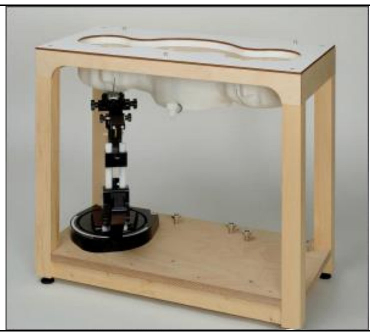
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	 
Calibration	ISO/IEC 17025 calibration service available.	
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 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

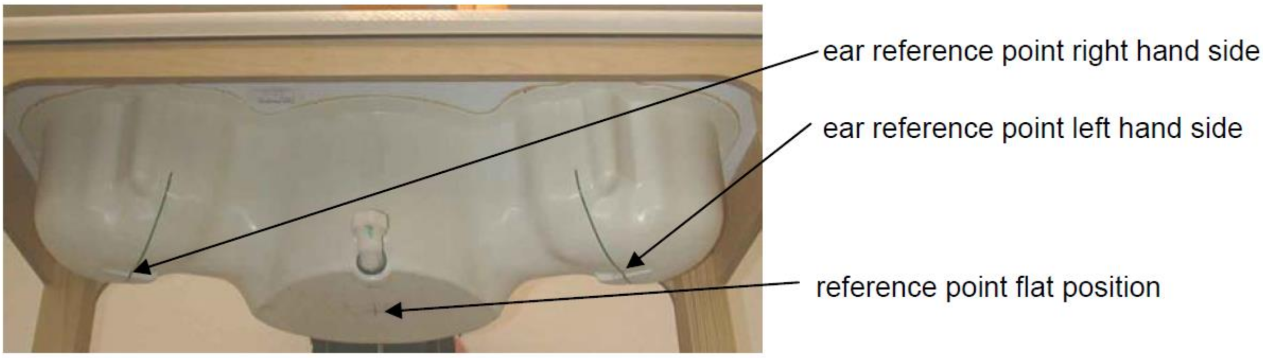
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	 
Calibration	ISO/IEC 17025 calibration service available.	
Frequency	10 MHz to >6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)	
Directivity	± 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

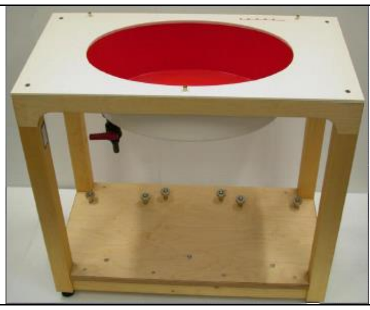
SAM Twin Phantom

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 $2 \le \varepsilon_r \le 5$ at ≤3 GHz,$3 \le \varepsilon_r \le 4$ at >3 GHz and and a loss tangent ≤0.05.

2.6 Device holder description

The DASY 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.

HUAWEI

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	3736	2017-04-27	One year
☒	SPEAG	Data acquisition electronics	DAE4	851	2017-07-18	One year
☒	SPEAG	2450 MHz Dipole	D2450V2	978	2016-02-08	Three years
☒	SPEAG	5GHz Dipole	D5GHzV2	1155	2017-04-26	Three years
☒	SPEAG	Software	DASY5	N/A	NCR	NCR
☐	SPEAG	Twin Phantom	SAM7	TP-1594	NCR	NCR
☒	SPEAG	Flat Phantom	ELI 4.0	TP-1110	NCR	NCR
☐	R & S	Universal Radio Communication Tester	CMU 200	111379	2016-12-29	One year
☒	R & S	WideBand Radio Communication Tester	CMW 500	126855	2017-05-15	One year
☒	Agilent	Network Analyser	E5071C	MY46213349	2016-12-30	One year
☒	Agilent	Dielectric Probe Kit	85070E	2484	NCR	NCR
☒	Agilent	Signal Analyzer	N9030A	MY49431698	2017-07-31	One year
☒	Agilent	Signal Generator	E8257D	MY49281095	2017-02-15	One year
☒	MINI-CIRCUITS	Amplifier	ZHL-42W	QA1402001	NCR	NCR
☒	AR	Directional Coupler	DC7144AM1	0423264	2017-04-12	One year
☒	MINI-CIRCUITS	Amplifier	ZVE-8G+	N523101139	NCR	One year
☒	Agilent	Dual Directional Coupler	772D	MY52180173	2017-01-03	One year
☒	Agilent	Power Meter	E4417A	MY54100027	2017-04-10	One year
☒	Agilent	Power Meter Sensor	E9321A	MY54130007	2017-04-10	One year
☒	Agilent	Power Meter Sensor	E9321A	MY54130001	2017-04-10	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 SAR Measurement Procedure

3.1 Scanning procedure

The DASY 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 DASY 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}, $\Delta y_{zoom} \leq$ 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

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

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3.3 Data Storage and Evaluation

Data Storage

The DASY 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 DASY 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)	**Body Tissue**					
Frequency Band (MHz)	750	835	1750	1900	2450	2600
Water	50.3	52.4	69.91	69.91	73.2	64.493
Salt (NaCl)	1.60	1.40	0.13	0.13	0.04	0.024
Sugar	47.0	45.0	0.0	0.0	0.0	0.0
HEC	0.0	1.0	0.0	0.0	0.0	0.0
Bactericide	0.0	0.1	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0
DGBE	0.0	0.0	29.96	29.96	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 Body Liquid (MBBL600-6000MHz),Manufactured by SPEAG:**

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

Tissue Type	Target Frequency	Target Tissue		Measured Tissue		Deviation (Within +/-5%)		Liquid Temp.	Test Date
		Permit-tivity	Conduc-tivity [S/m]	Permit-tivity	Conduc-tivity [S/m]	$\Delta\varepsilon_r$	$\Delta\sigma$		
2450MHz Body	2410	52.80	1.91	52.07	2.005	-1.38%	4.97%	22.0°C	2017/12/18
	2435	52.70	1.94	52.04	2.027	-1.25%	4.48%		
	2450	52.70	1.95	52.02	2.042	-1.29%	4.72%		
	2460	52.70	1.96	52.00	2.052	-1.33%	4.69%		
5G Hz Body	5250	48.90	5.36	46.90	5.378	-4.09%	0.34%	22.0°C	2017/12/18
	5600	48.50	5.77	46.24	5.867	-4.66%	1.68%	22.0°C	2017/12/18
	5750	48.30	5.94	46.05	6.090	-4.87%	2.53%	22.0°C	2017/12/19

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

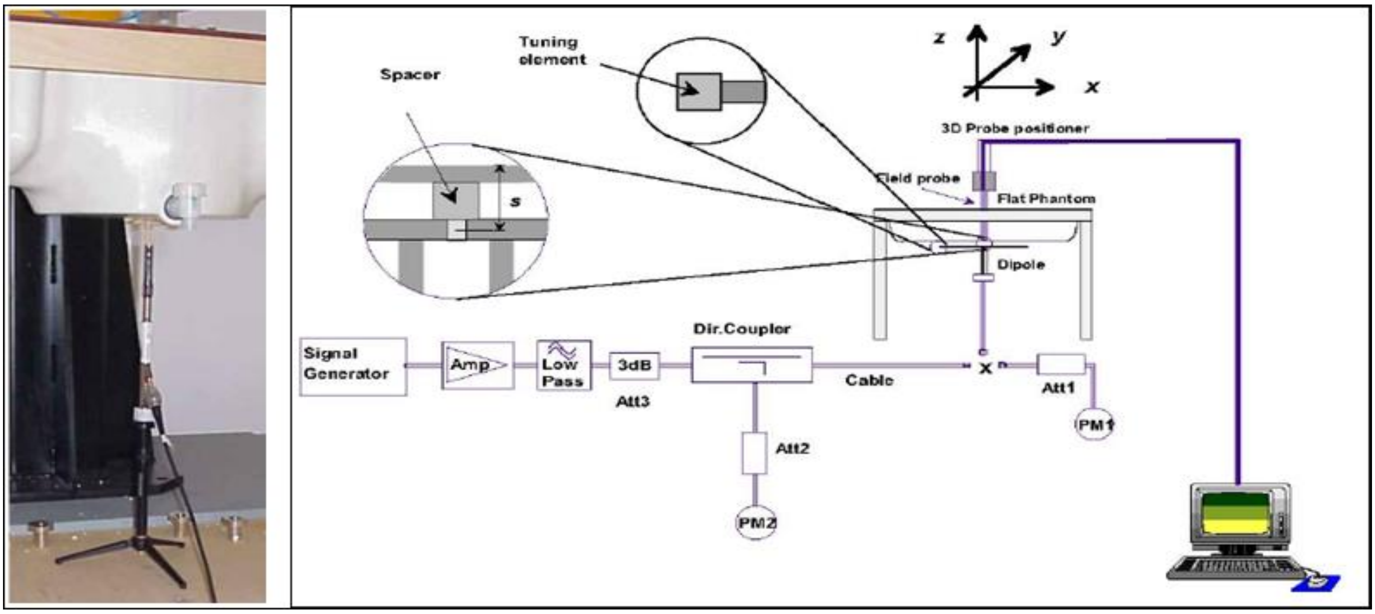
The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEEE 1528 (described above). The following table shows system check results for all frequency bands and tissue liquids used during the tests(Graphic Plot(s) see Appendix A).

System Check	Target SAR (Normalized to 1W)		Measured SAR (Normalized to 1W)		Deviation (Within +/-10%)		Liquid Temp.	Test Date
	1-g (mW/g)	10-g (mW/g)	1-g (mW/g)	10-g (mW/g)	Δ1-g	Δ10-g		
2450MHz Body	52.10	24.70	52.80	24.52	1.34%	-0.73%	22.0°C	2017/12/18
5250MHz Body	74.80	20.90	74.70	21.00	-0.13%	0.48%	22.0°C	2017/12/18
5600MHz Body	78.70	22.10	80.80	23.00	2.67%	4.07%	22.0°C	2017/12/18
5750MHz Body	75.90	21.20	79.80	23.00	5.14%	8.49%	22.0°C	2017/12/19

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 3GHz) or 100mW(3-6GHz). To adjust this power a power meter is used. The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system check to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (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

6.1.1 Body Exposure Condition

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.

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. Per KDB 248227D01, 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.

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 s 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 248227D01). 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 248227D01v02). 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 a/g/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.

6.2.5 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.

6.2.6 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, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification to avoid SAR requirements.10 TDWR restriction does not apply under the new rules; 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.11 When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

6.2.7 OFDM Transmission Mode SAR Test Channel Selection Requirements

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

6.3 Power reduction triggered by capacitive proximity sensor

This device uses a mobile country code (MCC) detection and proximity sensor mechanism that share the same metallic electrode as the transmitting antenna to facilitate triggering in typical user interactivity with the device. This device uses the mobile country code (MCC) to indicate whether the users in FCC countries or not. It utilizes the proximity sensor to reduce the output power in specific wireless and operating modes to ensure SAR compliance when the MCC information accomplished by operator network is in FCC countries and the DUT is held close to a user’s body exposure condition with sensor on.

The following tables summarize the key power reduction information.

Band	Sensor Trigger Distance	Power reduction amount(dB)
WiFi 2.4G 802.11b	Top side: 18mm Back side: 15mm	6.0
WiFi 2.4G 802.11g	Top side: 18mm Back side: 15mm	3.0
WiFi 2.4G 802.11n 20M	Top side: 18mm Back side: 15mm	2.0
WiFi 5G 802.11a	Top side: 18mm Back side: 15mm	12.0
WiFi 5G 802.11n 20M	Top side: 18mm Back side: 15mm	11.0
WiFi 5G 802.11n 40M	Top side: 18mm Back side: 15mm	9.0
WiFi 5G 802.11ac 20M	Top side: 18mm Back side: 15mm	11.0
WiFi 5G 802.11ac 40M	Top side: 18mm Back side: 15mm	9.0
WiFi 5G 802.11ac 80M	Top side: 18mm Back side: 15mm	8.0

Note:

1) Since the capacitive proximity sensor triggering distance for the back side is 15 mm, a conservative distance of 14 mm was requried for addtional SAR test at maximum power level with sensor off.

2) Since the capacitive proximity sensor triggering distance for the top side is 18 mm, a conservative distance of 17 mm was requried for addtional SAR test at maximum power level with sensor off.
3) SAR tests with proximity sensor power reduction are only required for the sides of frequency bands in the table above. For the other sides or other frequency bands of the device, SAR is still tested at the maximum power level with sensor off.

The following procedures in KDB 616217 are applied to determine proximity sensor triggering distances and sensor coverage for normal and tilt positions.

1) Procedures for determining proximity sensor triggering distances

The device was tested by the test lab to determine the proximity sensor triggering distances for the front side, back side and bottom side of the device. To ensure all production units are compliant, the smallest separation distance determined by the sensor triggering minus 1 mm, must be used as the test separation distance for SAR testing.

The proximity sensor triggering distance measurement methods are as below:

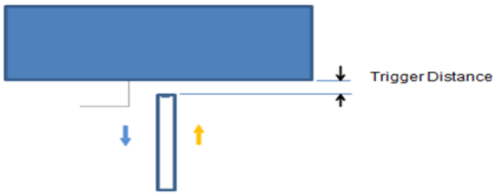
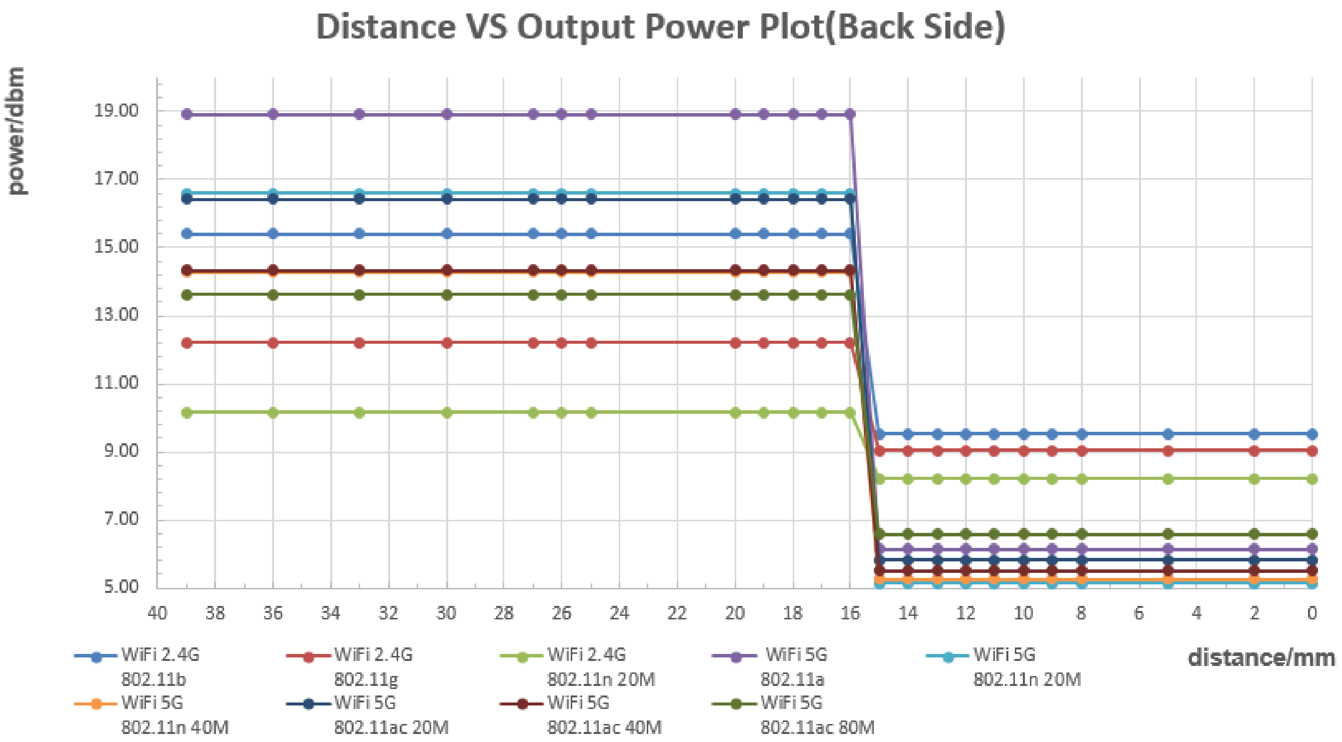


Table: Summary of Trigger Distances

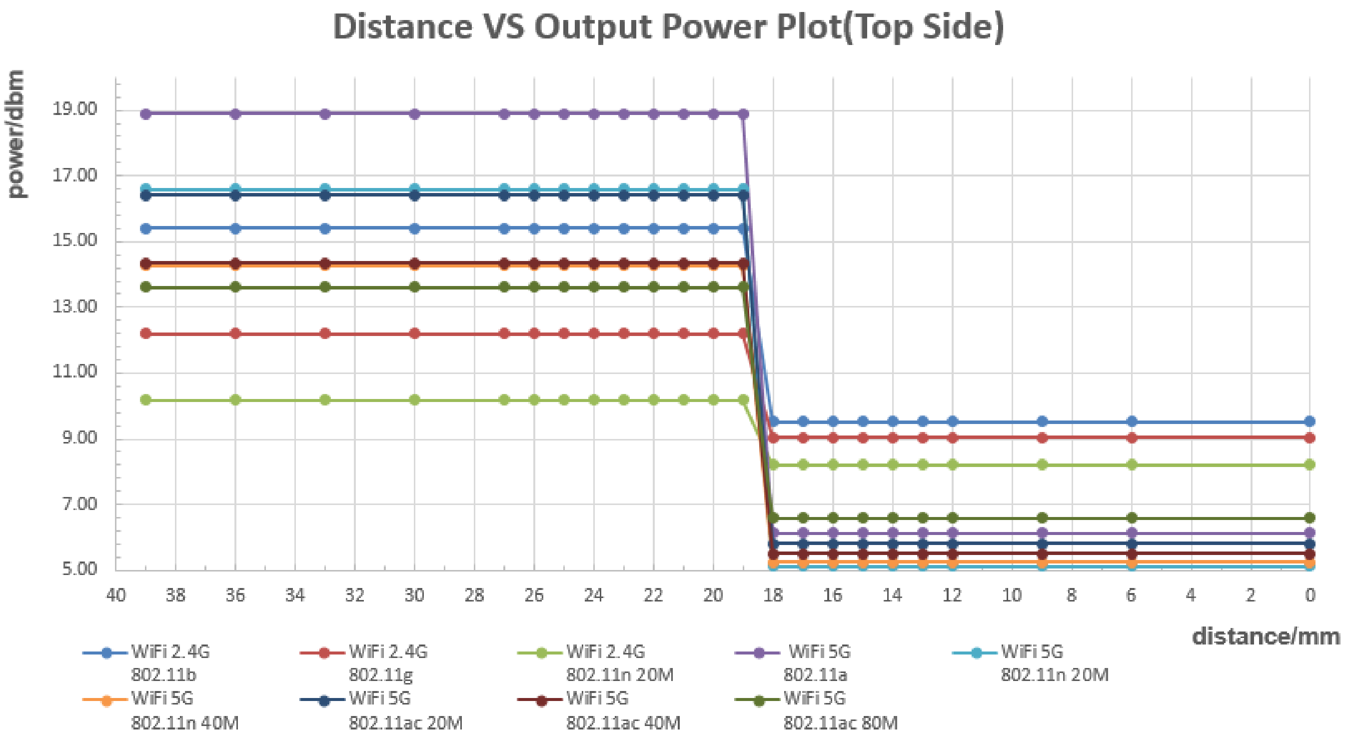
Band(MHz)	Trigger distance-Back Side		Trigger distance-Top Side	
	Moving toward phantom	Moving away from phantom	Moving toward phantom	Moving away from phantom
WIFI	15mm	16mm	18mm	19mm

The detailed conducted power measurement data to determine the triggering distances is as below:

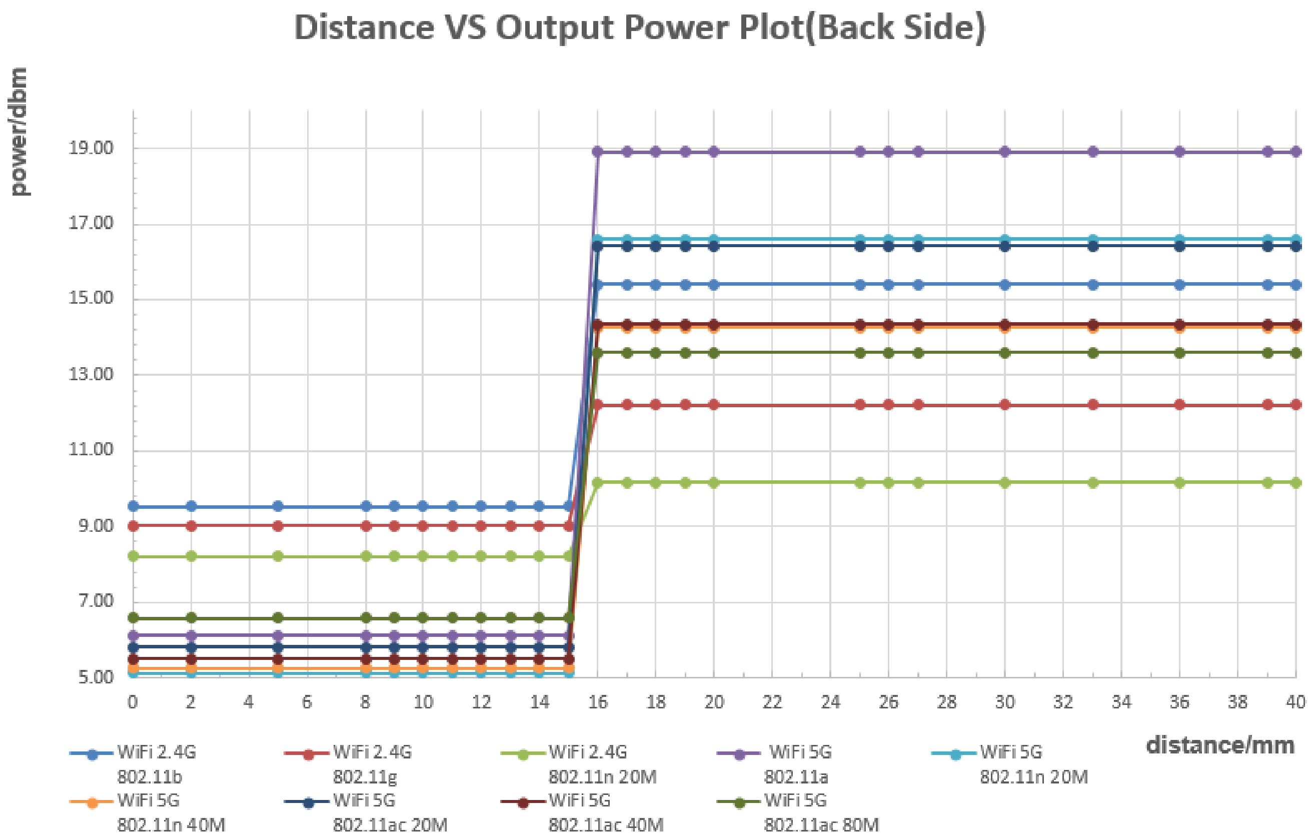
The DUT(Back side) is moved towards the flat phantom:



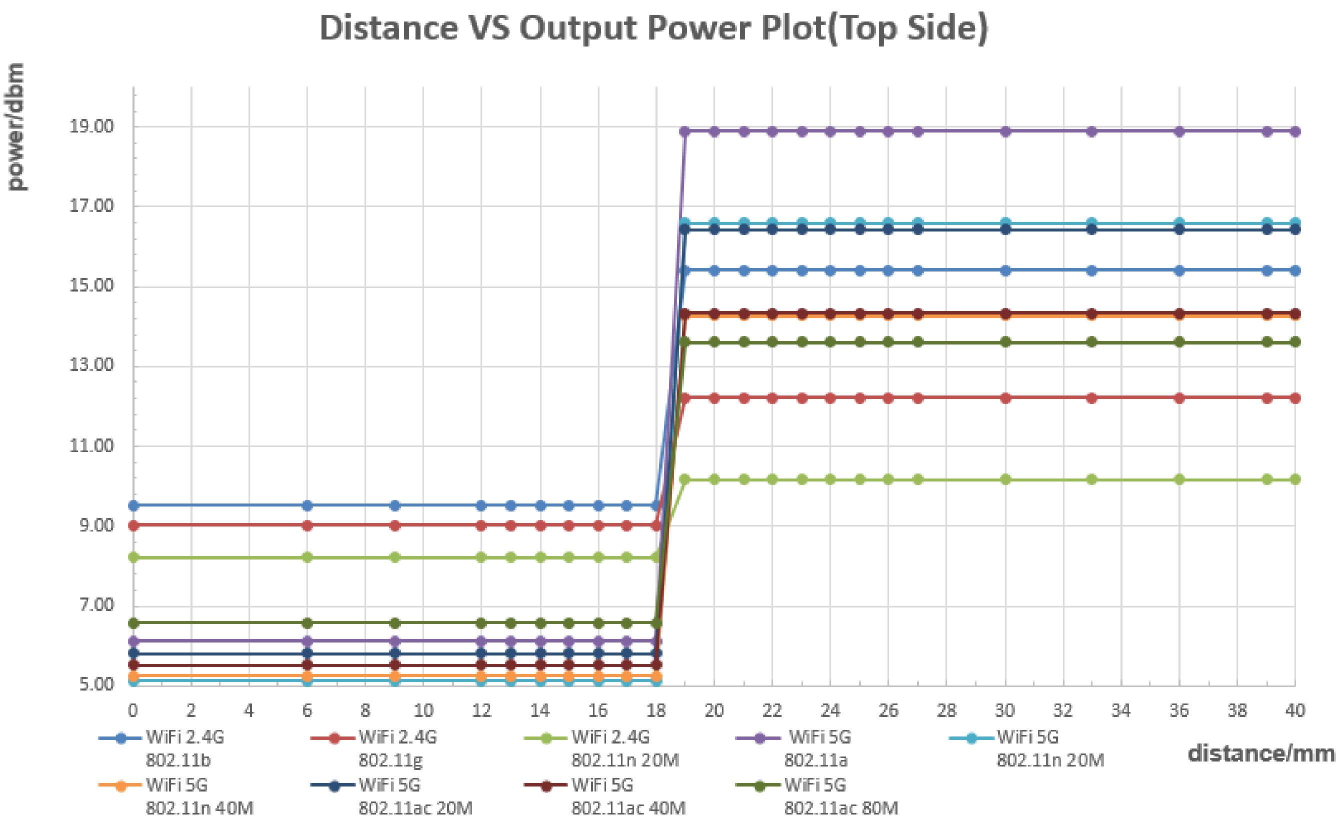
The DUT(Top side) is moved towards the flat phantom:



The DUT(Back side) is moved away from the flat phantom:



The DUT(Top side) is moved away from the flat phantom:



2) Procedures for determining antenna and proximity sensor coverage(Per KDB616217 §6.3)

There is no spatial offset between the Main antenna and the proximity sensor element, so procedures for determining the proximity sensor coverage does not need to be assessed.

3) Procedures for determining device tilt angle influences to proximity sensor triggering(Per KDB616217 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Bottom side parallel to the base of the flat phantom for each band.

The EUT was rotated about Bottom side for angles up to +/- 45°. If the output power increased during the rotation, the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to +/- 45°.

The proximity sensor triggering tilt angle measurement method are as below:

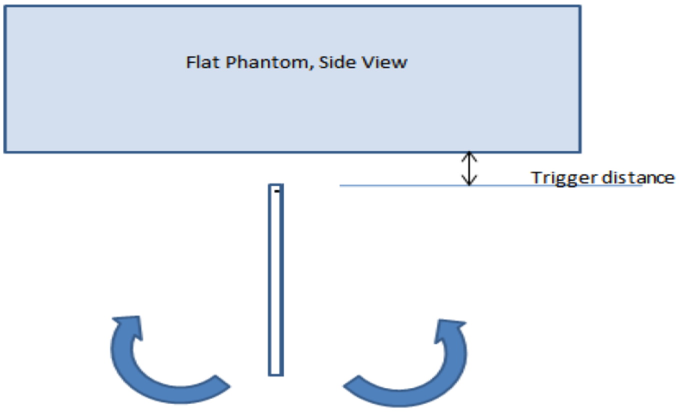


Table: Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering(Top side)

Band	Minimum trigger distance at which power reduction was maintained over ±45°	Power Reduction Status										
		-45°	-35°	-25°	-15°	-5°	0°	5°	15°	25°	35°	45°
WIFI 2.4G	18mm	on	on	on	on	on	on	on	on	on	on	on
WIFI 5G	18mm	on	on	on	on	on	on	on	on	on	on	on

Conclusion: It can be ensured that the proximity sensor can be valid triggered for the DUT tilt coverage exposure condition.

7 SAR Measurement Results

7.1 Conducted power measurements

7.1.1 Conducted power measurements of WiFi 2.4G

The output power of WiFi antenna is as following:

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11b	1	2412	1Mbps	16.0	**15.41**	Yes
	6	2437		16.0	14.74	No
	11	2462		16.0	15.09	No
802.11g	1	2412	6Mbps	13.0	12.48	No
	6	2437		13.0	12.21	No
	11	2462		13.0	11.66	No
802.11n 20M	1	2412	MCS0	12.0	10.44	No
	6	2437		12.0	10.17	No
	11	2462		12.0	10.15	No
802.11n 40M	3	2422	MCS0	10.0	8.35	No
	6	2437		10.0	8.20	No
	9	2452		10.0	8.05	No

Table 7: Conducted power measurement results of WiFi 2.4G (Sensor Off,Full power)

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11b	1	2412	1Mbps	10.0	**9.53**	Yes
	6	2437		10.0	9.23	No
	11	2462		10.0	9.43	No
802.11g	1	2412	6Mbps	10.0	9.11	No
	6	2437		10.0	9.03	No
	11	2462		10.0	8.98	No
802.11n HT20	1	2412	MCS0	10.0	8.41	No
	6	2437		10.0	8.22	No
	11	2462		10.0	7.98	No
802.11n HT40	3	2422	MCS0	10.0	8.35	No
	6	2437		10.0	8.20	No
	9	2452		10.0	8.05	No

Table 8: Conducted power measurement results of WiFi 2.4G (Sensor On,reduced power)

7.1.2 Conducted power measurements of WiFi 5G

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11a	CH 36	5180	6M	19.0	18.25	No
	CH 40	5200		19.0	18.40	No
	CH 44	5220		19.0	18.34	No
	CH 48	5240		19.0	18.38	No
	CH 52	5260		19.0	18.08	No
	CH 56	5280		19.0	18.11	No
	CH 60	5300		19.0	18.21	No
	CH 64	5320		19.0	**18.41**	Yes
	CH 100	5500		19.0	18.81	No
	CH 104	5520		19.0	18.74	No
	CH 108	5540		19.0	18.63	No
	CH 112	5560		19.0	18.50	No
	CH 116	5580		19.0	18.75	No
	CH 120	5600		19.0	18.85	No
	CH 124	5620		19.0	**18.90**	Yes
	CH 128	5640		19.0	18.81	No
	CH 132	5660		19.0	18.76	No
	CH 136	5680		19.0	18.67	No
	CH 140	5700		19.0	18.64	No
	CH 144	5720		19.0	18.76	No
	CH 149	5745		19.0	18.68	No
	CH 153	5765		19.0	**18.82**	Yes
	CH 157	5785		19.0	18.61	No
	CH 161	5805		19.0	18.71	No
	CH 165	5825		19.0	18.69	No

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11n 20M (5GHz)	CH 36	5180	MCS0	18.0	15.91	No
	CH 40	5200		18.0	15.67	No
	CH 44	5220		18.0	15.71	No
	CH 48	5240		18.0	15.83	No
	CH 52	5260		18.0	15.79	No
	CH 56	5280		18.0	15.69	No
	CH 60	5300		18.0	15.81	No
	CH 64	5320		18.0	15.82	No
	CH 100	5500		18.0	16.41	No
	CH 104	5520		18.0	16.29	No
	CH 108	5540		18.0	16.34	No
	CH 112	5560		18.0	16.51	No
	CH 116	5580		18.0	16.29	No
	CH 120	5600		18.0	16.59	No
	CH 124	5620		18.0	16.50	No
	CH 128	5640		18.0	16.35	No
	CH 132	5660		18.0	16.24	No
	CH 136	5680		18.0	16.47	No
	CH 140	5700		18.0	16.29	No
	CH 144	5720		18.0	16.37	No
	CH 149	5745		18.0	16.24	No
	CH 153	5765		18.0	16.27	No
	CH 157	5785		18.0	16.19	No
	CH 161	5805		18.0	16.34	No
	CH 165	5825		18.0	16.28	No
Mode	**Channel**	**Frequency (MHz)**	**Data Rate (Mbps)**	**Tune-up**	**Average Power (dBm)**	**SAR Test (Yes/No)**
802.11n 40M (5GHz)	CH 38	5190	MCS0	16.0	13.97	No
	CH 46	5230		16.0	13.86	No
	CH 54	5270		16.0	13.68	No
	CH 62	5310		16.0	13.59	No
	CH 102	5510		16.0	13.98	No
	CH 110	5550		16.0	14.07	No
	CH 118	5590		16.0	13.97	No
	CH 126	5630		16.0	14.12	No
	CH 134	5670		16.0	14.27	No
	CH 142	5710		16.0	14.09	No
	CH 151	5755		16.0	14.07	No
	CH 159	5795		16.0	14.17	No

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac 20M (5GHz)	CH 36	5180	MCSAC0	18.0	15.57	No
	CH 40	5200		18.0	15.64	No
	CH 44	5220		18.0	15.52	No
	CH 48	5240		18.0	15.71	No
	CH 52	5260		18.0	15.69	No
	CH 56	5280		18.0	15.72	No
	CH 60	5300		18.0	15.62	No
	CH 64	5320		18.0	15.76	No
	CH 100	5500		18.0	16.29	No
	CH 104	5520		18.0	16.37	No
	CH 108	5540		18.0	16.19	No
	CH 112	5560		18.0	16.38	No
	CH 116	5580		18.0	16.35	No
	CH 120	5600		18.0	16.21	No
	CH 124	5620		18.0	16.37	No
	CH 128	5640		18.0	16.42	No
	CH 132	5660		18.0	16.27	No
	CH 136	5680		18.0	16.23	No
	CH 140	5700		18.0	16.27	No
	CH 144	5720		18.0	16.34	No
	CH 149	5745		18.0	16.22	No
	CH 153	5765		18.0	16.24	No
	CH 157	5785		18.0	16.29	No
	CH 161	5805		18.0	16.19	No
	CH 165	5825		18.0	16.35	No
Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac 40M (5GHz)	CH 38	5190	MCSAC0	16.0	13.84	No
	CH 46	5230		16.0	13.69	No
	CH 54	5270		16.0	13.96	No
	CH 62	5310		16.0	13.81	No
	CH 102	5510		16.0	14.19	No
	CH 110	5550		16.0	14.27	No
	CH 118	5590		16.0	14.16	No
	CH 126	5630		16.0	14.09	No
	CH 134	5670		16.0	14.34	No
	CH 142	5710		16.0	14.27	No
	CH 151	5755		16.0	14.06	No
	CH 159	5795		16.0	14.19	No

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac 80M (5GHz)	CH 42	5210	MCSAC0	15.0	13.4	No
	CH 58	5290		15.0	13.29	No
	CH 106	5530		15.0	13.61	No
	CH 122	5610		15.0	13.71	No
	CH 138	5690		15.0	13.59	No
	CH 155	5775		15.0	13.64	No

Table 9: Conducted power measurement results of WiFi 5G (Sensor Off,full power)

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

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11a	CH 36	5180	6Mbps	7.0	6.03	No
	CH 40	5200		7.0	6.11	No
	CH 44	5220		7.0	6.30	No
	CH 48	5240		7.0	6.58	No
	CH 52	5260		7.0	5.47	No
	CH 56	5280		7.0	5.75	No
	CH 60	5300		7.0	6.03	No
	CH 64	5320		7.0	6.23	No
	CH 100	5500		7.0	6.38	No
	CH 104	5520		7.0	6.35	No
	CH 108	5540		7.0	6.32	No
	CH 112	5560		7.0	6.49	No
	CH 116	5580		7.0	5.67	No
	CH 120	5600		7.0	5.91	No
	CH 124	5620		7.0	6.13	No
	CH 128	5640		7.0	6.18	No
	CH 132	5660		7.0	5.54	No
	CH 136	5680		7.0	5.77	No
	CH 140	5700		7.0	6.17	No
	CH 144	5720		7.0	6.28	No
	CH 149	5745		7.0	6.07	No
	CH 153	5765		7.0	6.43	No
	CH 157	5785		7.0	6.77	No
	CH 161	5805		7.0	6.87	No
	CH 165	5825		7.0	6.89	No

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11n 20M (5GHz)	CH 36	5180	MCS0	7.0	5.23	No
	CH 40	5200		7.0	4.91	No
	CH 44	5220		7.0	5.07	No
	CH 48	5240		7.0	5.17	No
	CH 52	5260		7.0	5.03	No
	CH 56	5280		7.0	5.12	No
	CH 60	5300		7.0	5.09	No
	CH 64	5320		7.0	5.17	No
	CH 100	5500		7.0	5.06	No
	CH 104	5520		7.0	5.16	No
	CH 108	5540		7.0	5.28	No
	CH 112	5560		7.0	5.37	No
	CH 116	5580		7.0	5.57	No
	CH 120	5600		7.0	5.13	No
	CH 124	5620		7.0	5.08	No
	CH 128	5640		7.0	5.17	No
	CH 132	5660		7.0	5.18	No
	CH 136	5680		7.0	5.37	No
	CH 140	5700		7.0	5.27	No
	CH 144	5720		7.0	5.38	No
	CH 149	5745		7.0	6.39	No
	CH 153	5765		7.0	6.53	No
	CH 157	5785		7.0	6.69	No
	CH 161	5805		7.0	6.83	No
	CH 165	5825		7.0	6.62	No
Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11n 40M (5GHz)	CH 38	5190	MCS0	7.0	4.61	No
	CH 46	5230		7.0	5.09	No
	CH 54	5270		7.0	4.51	No
	CH 62	5310		7.0	5.16	No
	CH 102	5510		7.0	5.34	No
	CH 110	5550		7.0	5.55	No
	CH 118	5590		7.0	4.92	No
	CH 126	5630		7.0	5.26	No
	CH 134	5670		7.0	5.00	No
	CH 142	5710		7.0	5.41	No
	CH 151	5755		7.0	5.15	No
	CH 159	5795		7.0	5.53	No

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac 20M (5GHz)	CH 36	5180	MCSAC0	7.0	5.81	No
	CH 40	5200		7.0	5.95	No
	CH 44	5220		7.0	6.16	No
	CH 48	5240		7.0	6.47	No
	CH 52	5260		7.0	5.51	No
	CH 56	5280		7.0	5.80	No
	CH 60	5300		7.0	6.12	No
	CH 64	5320		7.0	6.33	No
	CH 100	5500		7.0	5.87	No
	CH 104	5520		7.0	5.91	No
	CH 108	5540		7.0	6.03	No
	CH 112	5560		7.0	6.21	No
	CH 116	5580		7.0	5.20	No
	CH 120	5600		7.0	5.42	No
	CH 124	5620		7.0	5.62	No
	CH 128	5640		7.0	5.81	No
	CH 132	5660		7.0	5.19	No
	CH 136	5680		7.0	5.51	No
	CH 140	5700		7.0	5.68	No
	CH 144	5720		7.0	5.87	No
	CH 149	5745		7.0	5.65	No
	CH 153	5765		7.0	6.01	No
	CH 157	5785		7.0	6.27	No
	CH 161	5805		7.0	6.17	No
	CH 165	5825		7.0	6.41	No
Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac 40M (5GHz)	CH 38	5190	MCSAC0	7.0	5.20	No
	CH 46	5230		7.0	5.60	No
	CH 54	5270		7.0	5.15	No
	CH 62	5310		7.0	5.65	No
	CH 102	5510		7.0	5.84	No
	CH 110	5550		7.0	5.96	No
	CH 118	5590		7.0	5.47	No
	CH 126	5630		7.0	5.82	No
	CH 134	5670		7.0	5.51	No
	CH 142	5710		7.0	5.92	No
	CH 151	5755		7.0	5.67	No
	CH 159	5795		7.0	6.06	No

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac 80M (5GHz)	CH 42	5210	MCSAC0	7.0	6.45	No
	CH 58	5290		7.0	6.55	Yes
	CH 106	5530		7.0	**6.58**	Yes
	CH 122	5610		7.0	6.44	No
	CH 138	5690		7.0	6.08	No
	CH 155	5775		7.0	6.12	Yes

Table 10: Conducted power measurement results of WiFi 5G (Sensor On,reduced power)

Note: 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)		
	Max.	0CH	39CH	78CH
DH5	9.7	8.78	8.80	8.66
2DH5	9.7	7.66	7.68	7.60
3DH5	9.7	7.65	7.67	7.61

BT 2450	Tune-up	Average Conducted Power (dBm)		
	Max.	0CH	19CH	39CH
BT(BLE)	9.7	6.75	6.02	6.11

Table 11: 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 D01, all SAR measurement results are scaled to the maximum tune-up tolerance limit to demonstrate SAR compliance.
2) Per KDB865664 D01,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.
3) Per KDB941225 D06, the DUT Dimension is bigger than 9 cm x 5 cm, so 10mm is chosen as the test separation distance for Hotspot mode. When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.
4) Per KDB 447498D01, Body-worn accessories that do not contain metallic or conductive components is tested according to worst-case exposure configurations, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics.
5) Per KDB865664 D02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing(Refer to appendix B for details).

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) When the DSSS *reported* SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
3) When the highest *reported* SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations
4) 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 447498. 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.

7.2.1 SAR measurement Result of WiFi 2.4G

Test Position of Body	Dist.	Test Channel /Freq.(MHz)	Test Mode	Area Scan 1-g SAR (W/kg)	Measured SAR(W/kg)		Power Drift (dB)	Actual duty factor	Scaled 1-g SAR (W/kg)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
					1-g	10-g								
Test data of CMR-W19														
Back Side	0mm	1/2412	802.11 b	0.177	0.172	0.068	0.00	97%	0.177	9.53	10.00	0.198	Battery 1#	/
Top Side	0mm	1/2412	802.11 b	0.161	/	/	0.04	97%	/	9.53	10.00	/	Battery 1#	/
Back Side	0mm	1/2412	802.11 b	0.200	0.240	0.959	0.00	97%	0.247	9.53	10.00	0.276	Battery 2#	/
Back Side	0mm	1/2412	802.11 b	0.203	0.229	0.091	0.00	97%	0.236	9.53	10.00	0.263	Battery 3#	/
Additional SAR test with Sensor off														
Back Side	14mm	1/2437	802.11b	0.222	0.210	0.105	-0.11	97%	0.216	15.41	16.00	0.248	Battery 1#	/
Top Side	17mm	1/2437	802.11b	0.349	**0.341**	0.174	-0.14	97%	0.352	15.41	16.00	**0.403**	Battery 1#	/
Top Side	17mm	1/2437	802.11b	0.191	0.187	0.099	-0.10	97%	0.193	15.41	16.00	0.221	Battery 1# with protected Cover	/
CMR-W09 test data at the SAR worst case of CMR-W19														
Top Side	17mm	1/2437	802.11b	0.303	**0.292**	0.150	-0.13	97%	0.301	15.41	16.00	**0.345**	Battery 1#	Yes

Table 12: Body SAR test results of WiFi 2.4G

Adjusted SAR (Sensor On):

WiFi 2.4G	Tune-up Limit （dBm）	Tune-up Limit （mW）	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
802.11b	10.00	10.00	0.276	/	Yes
802.11g	10.00	10.00	/	0.276	No
802.11n 20M	10.00	10.00	/	0.276	No
802.11n 40M	10.00	10.00	/	0.276	No

Adjusted SAR (Sensor Off):

WiFi 2.4G	Tune-up Limit （dBm）	Tune-up Limit （mW）	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
802.11b	16.00	39.81	0.403	/	Yes
802.11g	13.00	19.95	/	0.202	No
802.11n 20M	12.00	15.85	/	0.160	No
802.11n 40M	10.00	10.00	/	0.101	No

Note: Per KDB248227D01, for Body SAR test of WiFi 2.4G, SAR is measured for 2.4 GHz 802.11b DSSS using the initial test position procedure.The highest reported SAR for DSSS is adjusted by the ratio of OFDM 802.11g/n to DSSS specified maximum output power and the adjusted SAR is < 1.2 W/kg, so SAR for 802.11g/n is not required.

7.2.2 SAR measurement Result of WiFi 5G

Test Position of Body	Dist.	Test Channel /Freq.(MHz)	Test Mode	Area Scan 1-g SAR (W/kg)	Measured SAR(W/kg) 1-g	Measured SAR(W/kg) 10-g	Power Drift (dB)	Actual duty factor	Scaled 1-g SAR (W/kg)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
Test data of CMR-W19														
Test data of U-NII-1&U-NII-2A band														
Back Side	0mm	58/5290	802.11ac (80M)	0.245	0.229	0.065	0.00	98%	0.234	6.55	7.00	0.259	Battery 1#	/
Top Side	0mm	58/5290	802.11ac (80M)	0.175	/	/	0.10	98%	/	6.55	7.00	/	Battery 1#	/
Back Side	0mm	58/5290	802.11ac (80M)	0.247	0.215	0.062	0.00	98%	0.219	6.55	7.00	0.243	Battery 2#	/
Back Side	0mm	58/5290	802.11ac (80M)	0.225	0.215	0.062	0.00	98%	0.219	6.55	7.00	0.243	Battery 3#	/
Additional SAR test with Sensor off														
Back Side	14mm	64/5320	802.11a	0.203	0.183	0.063	-0.08	99%	0.185	18.41	19.00	0.212	Battery 1#	/
Top Side	17mm	64/5320	802.11a	0.081	0.068	0.025	-0.05	99%	0.068	18.41	19.00	0.078	Battery 1#	/
Test data of U-NII-2C band														
Back Side	0mm	106/5530	802.11ac (80M)	0.268	0.243	0.070	0.00	98%	0.248	6.58	7.00	0.273	Battery 1#	/
Top Side	0mm	106/5530	802.11ac (80M)	0.166	/	/	0.00	98%	/	6.58	7.00	/	Battery 1#	/
Back Side	0mm	106/5530	802.11ac (80M)	0.266	**0.258**	0.074	0.00	98%	0.263	6.58	7.00	0.290	Battery 2#	/
Back Side	0mm	106/5530	802.11ac (80M)	0.245	0.243	0.070	0.00	98%	0.248	6.58	7.00	0.273	Battery 3#	/
Additional SAR test with Sensor off														
Back Side	14mm	124/5620	802.11a	0.132	0.112	0.043	0.09	99%	0.113	18.90	19.00	0.116	Battery 1#	/
Top Side	17mm	124/5620	802.11a	0.151	0.135	0.055	-0.14	99%	0.136	18.90	19.00	0.140	Battery 1#	/
Test data of U-NII-3 band														
Back Side	0mm	155/5775	802.11ac (80M)	0.048	/	/	0.00	98%	/	6.12	7.00	/	Battery 1#	/
Top Side	0mm	155/5775	802.11ac (80M)	0.233	0.255	0.050	0.00	98%	0.260	6.12	7.00	**0.319**	Battery 1#	/
Top Side	0mm	155/5775	802.11ac (80M)	0.221	0.244	0.050	0.00	98%	0.249	6.12	7.00	0.305	Battery 2#	/
Top Side	0mm	155/5775	802.11ac (80M)	0.272	0.238	0.050	0.00	98%	0.243	6.12	7.00	0.297	Battery 3#	/
Top Side	0mm	155/5775	802.11ac (80M)	0.150	0.140	0.031	0.00	98%	0.143	6.12	7.00	0.175	Battery 1# withprotected Cover	/
Additional SAR test with Sensor off														
Back Side	14mm	153/5765	802.11a	0.050	0.033	0.013	0.00	99%	0.034	18.82	19.00	0.035	Battery 1#	/
Top Side	17mm	153/5765	802.11a	0.259	0.237	0.091	0.04	99%	0.239	18.82	19.00	0.250	Battery 1#	/
CMR-W09 test data at the SAR worst case of CMR-W19														
Top Side	0mm	155/5775	802.11ac(80M)	0.191	**0.181**	0.045	0.00	98%	0.185	6.12	7.00	**0.226**	Battery 1#	Yes

Table 13: Body SAR test results of WiFi 5G

Adjusted SAR (Sensor On):

WiFi 5G	Tune-up Limit（dBm）	Tune-up Limit（mW）	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
802.11ac 80M	7.00	5.01	0.319	/	Yes
802.11a	7.00	5.01	/	0.319	No
802.11n 20M	7.00	5.01	/	0.319	No
802.11n 40M	7.00	5.01	/	0.319	No
802.11ac 20M	7.00	5.01	/	0.319	No
802.11ac 40M	7.00	5.01	/	0.319	No

Adjusted SAR (Sensor Off):

WiFi 5G	Tune-up Limit（dBm）	Tune-up Limit（mW）	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
802.11a	19.00	79.43	0.250	/	Yes
802.11n 20M	18.00	63.10	/	0.199	No
802.11n 40M	16.00	39.81	/	0.125	No
802.11ac 20M	18.00	63.10	/	0.199	No
802.11ac 40M	16.00	39.81	/	0.125	No
802.11ac 80M	15.00	31.62	/	0.100	No

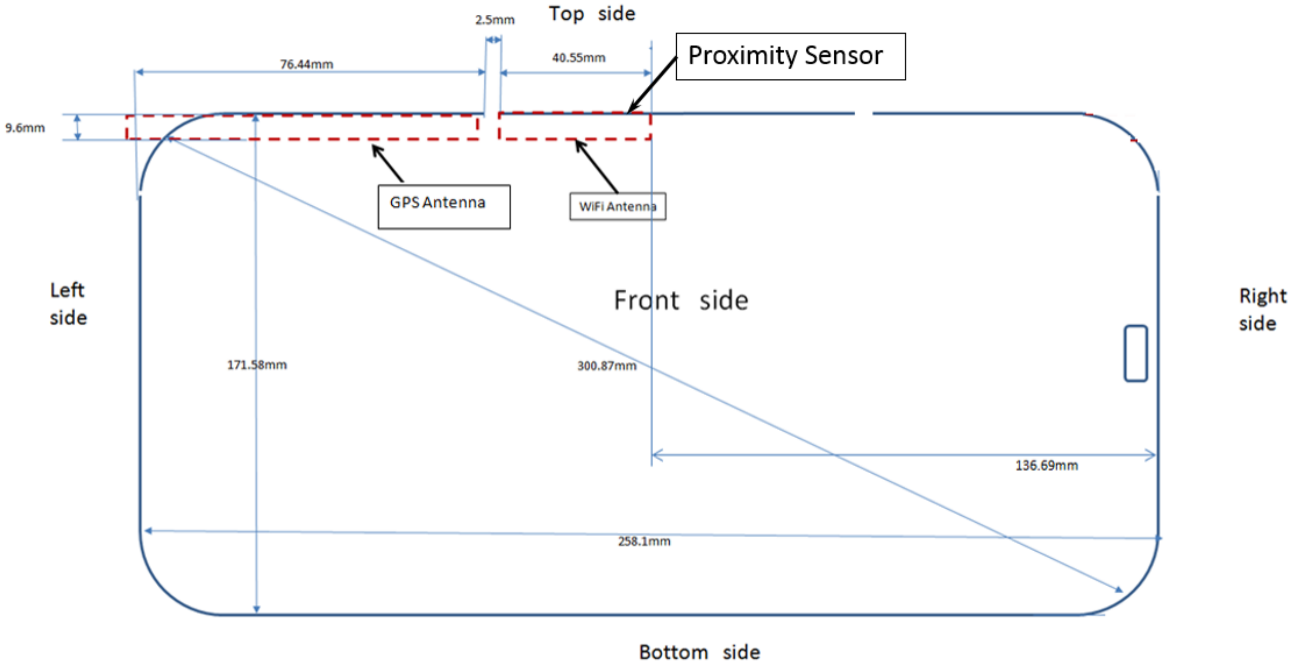
Note:

1) Per KDB248227D01, for Body SAR test of WiFi 5G , SAR is measured for 5GHz 802.11ac 80M using the initial test position procedure.The highest reported SAR is adjusted by the ratio of 802.11ac to other WiFi 5G mode specified maximum output power and the adjusted SAR is < 1.2 W/kg, so SAR for other WiFi 5G mode is not required.

2) 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. 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 (802.11 mode and exposure condition);

7.3 Multiple Transmitter Evaluation

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



Note: Per KDB 616217, the diagonal length is > 200mm, the device is considered a "tablet" device and needed to test 0mm 1-g body SAR.

7.3.1 Stand-alone SAR test exclusion

1) Per FCC KDB 447498D01, 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 Product Specific 10-g SAR 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 result is rounded to one decimal place for comparison

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

1) Standalone SAR exclusion calculation(Antenna to adjacent sides<50mm)

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	2.462	16.00	39.81	5.0	78.9	136.7	5.0	162.0	12.493	>50mm	>50mm	12.493	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.2G	Body 0mm	5.200	19.00	79.43	5.0	78.9	136.7	5.0	162.0	36.227	>50mm	>50mm	36.227	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.3G	Body 0mm	5.300	19.00	79.43	5.0	78.9	136.7	5.0	162.0	36.574	>50mm	>50mm	36.574	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.5G	Body 0mm	5.500	19.00	79.43	5.0	78.9	136.7	5.0	162.0	37.257	>50mm	>50mm	37.257	>50mm	Yes	>50mm	>50mm	Yes	>50mm
WiFi 5.8G	Body 0mm	5.800	19.00	79.43	5.0	78.9	136.7	5.0	162.0	38.260	>50mm	>50mm	38.260	>50mm	Yes	>50mm	>50mm	Yes	>50mm
BT	Body 0mm	2.480	9.70	9.33	5.0	78.9	136.7	5.0	162.0	2.939	>50mm	>50mm	2.939	>50mm	No	>50mm	>50mm	No	>50mm

2) Standalone SAR exclusion calculation(Antenna to adjacent sides>50mm)

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	2.462	16.00	39.81	5.0	78.9	136.7	5.0	162.0	<50mm	385.40	962.90	<50mm	1216.00	<50mm	No	No	<50mm	No
WiFi 5.2G	Body 0mm	5.200	19.00	79.43	5.0	78.9	136.7	5.0	162.0	<50mm	351.40	928.90	<50mm	1182.00	<50mm	No	No	<50mm	No
WiFi 5.3G	Body 0mm	5.300	19.00	79.43	5.0	78.9	136.7	5.0	162.0	<50mm	354.40	931.90	<50mm	1185.00	<50mm	No	No	<50mm	No
WiFi 5.5G	Body 0mm	5.500	19.00	79.43	5.0	78.9	136.7	5.0	162.0	<50mm	353.40	930.90	<50mm	1184.00	<50mm	No	No	<50mm	No
WiFi 5.8G	Body 0mm	5.800	19.00	79.43	5.0	78.9	136.7	5.0	162.0	<50mm	351.40	928.90	<50mm	1182.00	<50mm	No	No	<50mm	No
BT	Body 0mm	2.480	9.70	9.33	5.0	78.9	136.7	5.0	162.0	<50mm	385.40	962.90	<50mm	1216.00	<50mm	No	No	<50mm	No

According to the table above, the standalone test configurations required for this device are as below:

Test configurations	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
WiFi 2.4G	No	Yes	No	No	Yes	No
WiFi 5G	No	Yes	No	No	Yes	No
BT	No	No	No	No	No	No

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

1) (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [$\sqrt{f(GHz)}/x$] W/kg for test separation distances ≤ 50 mm,where x = 7.5 for 1-g SAR and x = 18.75 for 10-g SAR.

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

2) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distance is > 50 mm.

mode	Position	Pmax (dBm)*	Pmax (mW)	test separation distance(mm)					f (GHz)	X	Estimated SAR (W/kg)*				
				Back side	Top side	Left side	Right side	Bottom side			Back side	Top side	Left side	Right side	Bottom side
WiFi 2.4G	Body 0mm	16.00	39.81	5.0	5.0	78.9	136.7	162.0	2.462	7.50	measure	measure	0.4	0.4	0.4
WiFi 5G	Body 0mm	19.00	79.43	5.0	5.0	78.9	136.7	162.0	5.850	7.50	measure	measure	0.4	0.4	0.4
BT	Body 0mm	9.70	9.33	5.0	5.0	78.9	136.7	162.0	2.480	7.50	0.392	0.392	0.4	0.4	0.4

Table 14: Estimated SAR calculation for WiFi and BT

Note:

1) * - maximum possible output power declared by manufacturer

7.3.2 Simultaneous Transmission Possibilities

The Simultaneous Transmission Possibilities of this device are as below:

No.	Configuration	Body
1	WiFi 5G + BT	Yes

Table 15: Simultaneous Transmission Possibilities

Note:

1) WiFi 2.4G and WiFi 5G can't transmit simutanously.

2) WiFi 2.4G and BT can't transmit simutanously.

7.3.3 SAR Summation Scenario

The summed SAR is as below:

Test Position	WiFi 5G SAR (W/kg)	BT SAR (W/kg)	Σ1-g SAR (1.6W/kg Limit)	SPLSR	Volume scan
Body*	0.4	0.4	0.8	NA	NA

Table 16: SAR Simultaneous Tx Combination of WiFi 5G and BT

Note: The highest reported and/or estimated SAR for all required test positions is used for simultaneous transmission SAR test exclusion per KDB 447498.

7.3.4 Simultaneous Transmission Conlcusion

The above numeral summed SAR results and 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 D01

Appendix A. System Check Plots
(Pls See Appendix No.: SYBH(Z-SAR)002012018-2A, total: 8 pages)

Appendix B. SAR Measurement Plots
(Pls See Appendix No.: SYBH(Z-SAR)002012018-2B, total: 5 pages)

Appendix C. Calibration Certificate
(Pls See Appendix No.: SYBH(Z-SAR)002012018-2C, total: 40 pages)

Appendix D. Photo documentation
(Pls See Appendix No.: SYBH(Z-SAR)002012018-2D, total: 5 pages)

End