FCC SAR Compliance Test Report

Product Name: Mobile WiFi

Model: 501HW

Report No.: SYBH(Z-SAR)002042015-2

FCC ID: QIS501HW

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※ ※ Modified History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	2015-07-07	Gong Zhong

1 General Information

1.1 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for 501HW is as below Table 1.

Band	Position	MAX Reported SAR_{1g} (W/kg)
LTE Band XXV	Body 10mm	**1.32**
LTE Band XXVI	Body 10mm	1.14
LTE Band XLI	Body 10mm	0.34
2.4G WiFi	Body 10mm	0.34
5G WiFi	Body 10mm	0.32
The highest simultaneous SAR value is 1.57W/kg per KDB690783 D01		

Table 1:Summary of test result

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 1528-2003 & IEEE Std 1528a-2005.

1.2 RF exposure limits

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

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:	Mobile WiFi		
Model:	501HW		
FCC ID :	QIS501HW		
IMEI:	867381020005563(LTE Band XXV/XXVI/XLI) 867381020001166(2.4G/5G WiFi)		
Device Type :	Portable device		
Exposure Category:	Uncontrolled environment / general population		
Hardware Version :	CL1SB04M		
Software Version :	21.306.02.02.643		
Antenna Type :	Internal antenna		
Device Operating Configurations:			
Supporting Mode(s)	LTE Band XXV/XXVI/XLI, 2.4G/5G WiFi		
Test Modulation	LTE(QPSK/16QAM),WiFi(DSSS/OFDM)		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	LTE Band XXV	1850-1915	1930-1995
	LTE Band XXVI	814-849	859-894
	LTE Band XLI	2496-2690	2496-2690
	2.4G WiFi	2412-2462	2412-2462
	5G WiFi	5150-5250 5250-5350 5470-5725	5150-5250 5250-5350 5470-5725
Power Class:	3, tested with power control “all Max”(LTE Band XXV)		
	3, tested with power control “all Max”(LTE Band XXVI)		
	3, tested with power control “all Max”(LTE Band XLI)		
Test Channels(low-mid-high):	26065-26365-26665(LTE Band XXV BW=5MHz)		
	26090-26365-26640(LTE Band XXV BW=10MHz)		
	26115-26365-26615(LTE Band XXV BW=15MHz)		
	26140-26363-26590(LTE Band XXV BW=20MHz)		
	26715-26865-27015(LTE Band XXVI BW=5MHz)		
	26750-26865-26990(LTE Band XXVI BW=10MHz)		
	26775-26865-26965(LTE Band XXVI BW=15MHz)		
	39675-40620-41565(LTE Band XLI BW=5MHz)		
	39700-40620-41540(LTE Band XLI BW=10MHz)		
	39725-40620-41515(LTE Band XLI BW=15MHz)		
	39750-40620-41490(LTE Band XLI BW=20MHz)		
	802.11b/g/n 20M: 1-6-11(2.4G WiFi) 802.11n 40M: 3-6-9(2.4G WiFi)		
	802.11a/ac/n 20M: 36-40-44-48-52-56-60-64-100-104-112-116-120-124-128-132-136-140-144(5G WiFi) 802.11n/ac 40M: 38-46-54-62-102-110-118-126-134(5G WiFi) 802.11ac 80M: 42-58-106-122(5G WiFi)		

Table 3:Device information and operating configuration

1.3.1 General Description

501HW which supports LTE FDD B1,B3,B8,B25,B26,B1+B8 CA,TDD B41+B41 CA,HSPA+/HSDPA/HSUPA/WCDMA 2100M is subscriber equipment in the LTE/WCDMA system. 501HW implement such functions as RF signal receiving/ transmitting, LTE/WCDMA protocol processing, data service etc, and it can act as a Wi-Fi hotspot for user accessing to internet, it supports TV decode, you can watch Television Programme via W-iFi. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface. 501HW has 6 internal antennas as default Wi-Fi, TV, diversity, and main antenna.

Battery information:

Name	Manufacture	Serials number	Description
Battery	HUAWEI	XXXXSIEB26X50056	Battery Model: HB824666RBC Rated capacity: 3000mAh Nominal Voltage: ⎓ +3.8V Charging Voltage: ⎓ +4.35V

1.3.2 Downlink LTE CA additional specification

The device supports downlink intra-band contiguous Release 10 LTE Carrier Aggregation(CA). This device is implemented for Carrier Aggregation downlink only. Other Release 10 features are not supported, including Uplink Carrier Aggregation, Enhanced SC-FDMA and Uplink MIMO or other antenna diversity configurations etc.. All uplink communications are identical to the Release 8 Specifications. The possible LTE CA combinations are as below table:

E-UTRA CA Band	CA Class	E-UTRA Band	Uplink (UL) operating band	Downlink (DL)operating band	Duplex Mode	CA Combinations	Maximum aggregated bandwidth (MHz)
CA_41	Class C	41	2496-2690MHz	2496-2690MHz	TDD	10MHz+20MHz 15MHz+15MHz 15MHz+20MHz 20MHz+20MHz	40

The channel number and frequency for the primary and secondary DL carriers(per 3GPP TS 36.508 V12.3.1):

Table 4.3.1.2.9A-1: Test frequencies for CA_41C

Range	CC-Combo / N_{RB_agg} [RB]	CC1 Note1			CC2 Note1		
		BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]	BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]
Low	50+100	50	39700	2501	100	39844	2515.4
		100	39750	2506	50	39894	2520.4
	75+75	75	39725	2503.5	75	39875	2518.5
	75+100	75	39725	2503.5	100	39896	2520.6
		100	39750	2506	75	39921	2523.1
	100+100	100	39750	2506	100	39948	2525.8
Mid	50+100	50	40520	2583	100	40664	2597.4
		100	40570	2588	50	40714	2602.4
	75+75	75	40545	2585.5	75	40695	2600.5
	75+100	75	40520	2583	100	40691	2600.1
		100	40545	2585.5	75	40716	2602.6
	100+100	100	40520	2583	100	40718	2602.8
High	50+100	50	41346	2665.6	100	41490	2680
		100	41396	2670.6	50	41540	2685
	75+75	75	41365	2667.5	75	41515	2682.5
	75+100	75	41319	2662.9	100	41490	2680
		100	41344	2665.4	75	41515	2682.5
	100+100	100	41292	2660.2	100	41490	2680
Note 1: Carriers in increasing frequency order.							

The conducted power measurement results of downlink LTE CA are provided in Section 7.1 of this report. According to KDB 941225 D05A, the downlink LTE CA SAR test is not required.

1.4 Test specification(s)

ANSI Std 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 1528-2003	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
IEEE Std 1528a-2005	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques Amendment 1: CAD File for Human Head Model (SAM Phantom)
KDB941225 D01	3G SAR Procedures v03
KDB941225 D05	SAR for LTE Devices v02r03
KDB941225 D05A	LTE Rel.10 KDB Inquiry Sheet v01r01
KDB941225 D06	Hot Spot SAR v02
KDB248227 D01	SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r01
KDB447498 D01	General RF Exposure Guidance v05r02
KDB865664 D01	SAR measurement 100 MHz to 6 GHz v01r03
KDB865664 D02	SAR Reporting v01r01
KDB690783 D01	SAR Listings on Grants v01r03

1.5 Testing laboratory

Test Site	The Reliability Laboratory of Huawei Technologies Co., Ltd.
Test Location	Zone G1,Huawei Industrial Base, Bantian Industry Area, Longgang District, Shenzhen, Guangdong, 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

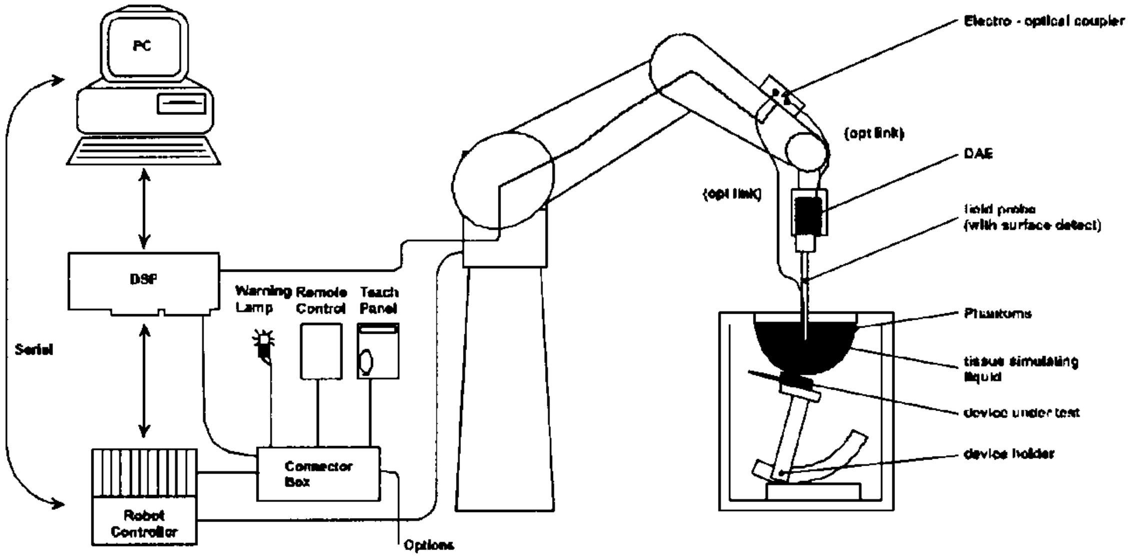
Start Date of test	2015-06-19
End Date of test	2015-07-03

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 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

<table>
<tr><td>Input Impedance</td><td>200MOhm</td><td rowspan="3">
</td></tr>
<tr><td>The Inputs</td><td>symmetrical and floating</td></tr>
<tr><td>Common mode rejection</td><td>above 80 dB</td></tr>
</table>

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

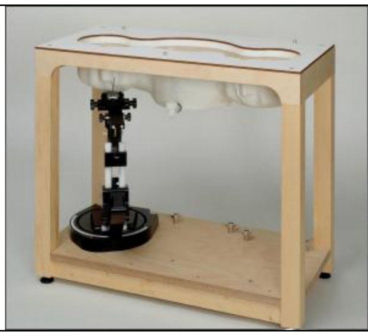
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	ISO/IEC 17025 calibration service available.	
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4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

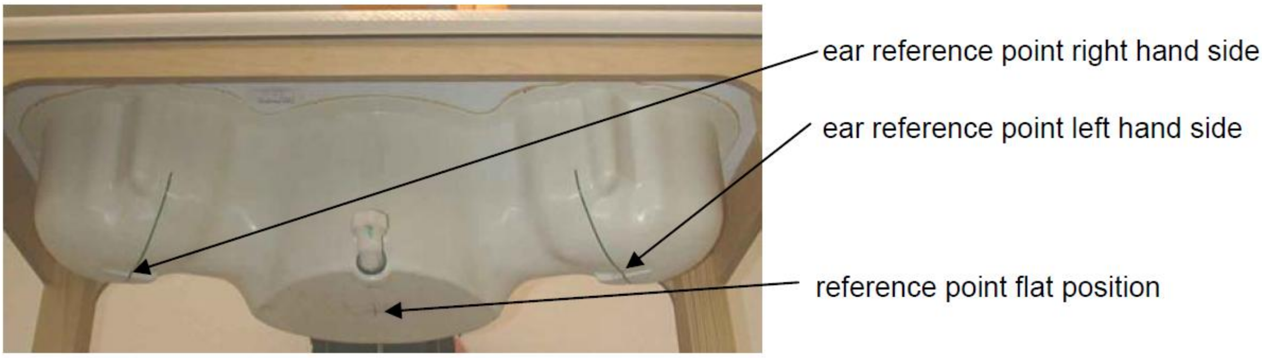
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	ISO/IEC 17025 calibration service available.	
Frequency	10 MHz to >6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)	
Directivity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

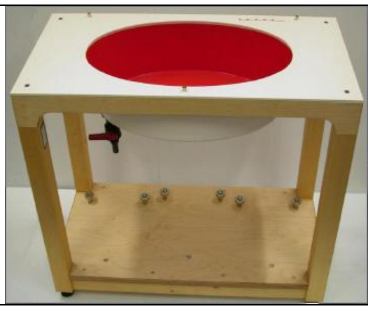
SAM Twin Phantom

Shell Thickness	2mm +/- 0.2 mm; The ear region: 6mm	
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 +/- 0.2 mm	
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 $\leqslant 0.05$.

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	2014-07-24	One year
☒	SPEAG	Dosimetric E-Field Probe	EX3DV4	3736	2015-04-30	One year
☒	SPEAG	835 MHz Dipole	D835V2	4d059	2013-05-02	Three years
☐	SPEAG	1750 MHz Dipole	D1750V2	1123	2014-07-08	Three years
☒	SPEAG	1900 MHz Dipole	D1900V2	5d143	2014-09-23	Three years
☒	SPEAG	2450 MHz Dipole	D2450V2	860	2014-11-19	Three years
☒	SPEAG	2600 MHz Dipole	D2600V2	1021	2014-07-16	Three years
☒	SPEAG	5 GHz Dipole	D5GHZV2	1155	2015-04-27	Three years
☒	SPEAG	Data acquisition electronics	DAE4	852	2015-04-27	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 4.0	TP-1111	NCR	NCR
☐	R & S	Universal Radio Communication Tester	CMU 200	111379	2014-07-11	One year
☒	R & S	Universal Radio Communication Tester	CMW 500	126855	2014-07-11	One year
☒	Agilent	Network Analyser	E5071C	MY46213349	2015-02-13	One year
☒	Agilent	Dielectric Probe Kit	85070E	2484	NCR	NCR
☒	Agilent	Signal Generator	N5181A	MY47420989	2015-01-07	One year
☒	MINI-CIRCUITS	Amplifier	ZHL-42W	QA1402001	NCR	NCR
☒	MINI-CIRCUITS	Amplifier	ZVE-8G+	N523101139	NCR	NCR
☒	AR	Directional Coupler	DC7144M1	0423264	2015-03-31	One year
☒	Agilent	Directional Coupler	772D	MY52180173	2015-01-08	One year
☒	R & S	Power Meter	NRP	100740	2014-07-11	One year
☒	R & S	Power Meter Sensor	NRP-Z11	106288	2014-07-11	One year
☒	Agilent	Power Meter	E4417A	MY45101339	2015-01-07	One year
☒	Agilent	Power Meter Sensor	E9321A	MY44420359	2015-01-07	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 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*Δz_{Zoom}(n-1)	≥30mm
2-3GHz	≤12mm	≤5mm	≤5mm	≤4mm	≤1.5*Δz_{Zoom}(n-1)	≥30mm
3-4GHz	≤12mm	≤5mm	≤4mm	≤3mm	≤1.5*Δz_{Zoom}(n-1)	≥28mm
4-5GHz	≤10mm	≤4mm	≤3mm	≤2.5mm	≤1.5*Δz_{Zoom}(n-1)	≥25mm
5-6GHz	≤10mm	≤4mm	≤2mm	≤2mm	≤1.5*Δz_{Zoom}(n-1)	≥22mm

3.2 Spatial Peak SAR Evaluations

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.

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

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)	MSL450	**MSL835**	MSL1750	**MSL1900**	**MSL2450**	MSL2600
Water	51.16	52.4	69.91	69.91	73.2	64.493
Salt (NaCl)	1.49	1.40	0.13	0.13	0.04	0.024
Sugar	46.78	45.0	0.0	0.0	0.0	0.0
HEC	0.52	1.0	0.0	0.0	0.0	0.0
Bactericide	0.05	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 for 5G,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		Liquid Temp.	Test Date
		εr (+/-5%)	σ (S/m) (+/-5%)	εr	σ (S/m)		
835B	825	55.20 (52.44~57.96)	0.97 (0.92~1.02)	55.20	0.954	22.0°C	2015-06-19
	835	55.20 (52.44~57.96)	0.97 (0.92~1.02)	55.10	0.962		
	850	55.20 (52.44~57.96)	0.99 (0.94~1.04)	55.03	0.977		
1900B	1850	53.30 (50.64~55.97)	1.52 (1.44~1.60)	53.54	1.472	22.0°C	2015-06-29
	1880	53.30 (50.64~55.97)	1.52 (1.44~1.60)	53.46	1.503		
	1900	53.30 (50.64~55.97)	1.52 (1.44~1.60)	53.37	1.523		
	1910	53.30 (50.64~55.97)	1.52 (1.44~1.60)	53.34	1.529		
2450B	2410	52.80 (50.16~55.44)	1.91 (1.81~2.00)	52.99	1.872	21.4°C	2015-06-20
	2435	52.70 (50.07~55.34)	1.94 (1.84~2.04)	52.88	1.909		
	2450	52.70 (50.07~55.34)	1.95 (1.85~2.05)	52.81	1.925		
	2460	52.70 (50.07~55.34)	1.96 (1.86~2.06)	52.81	1.939		
2600B	2510	52.62 (49.99~55.25)	2.03 (1.93~2.13)	52.81	2.043	21.0°C	2015-06-18
	2535	52.59 (49.96~55.22)	2.07 (1.97~2.17)	52.72	2.078		
	2560	52.57 (49.94~55.20)	2.09 (1.99~2.19)	52.63	2.113		
	2600	52.5 (49.88~55.13)	2.16 (2.05~2.27)	52.48	2.166		
5GB	5300	49.00 (46.55~51.45)	5.30 (5.04~5.56)	47.41	5.335	21.4°C	2015-07-02
	5600	48.50 (46.08~50.92)	5.77 (5.48~6.05)	48.11	5.600	21.4°C	2015-07-02
ε_r= Relative permittivity, σ= Conductivity							

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).

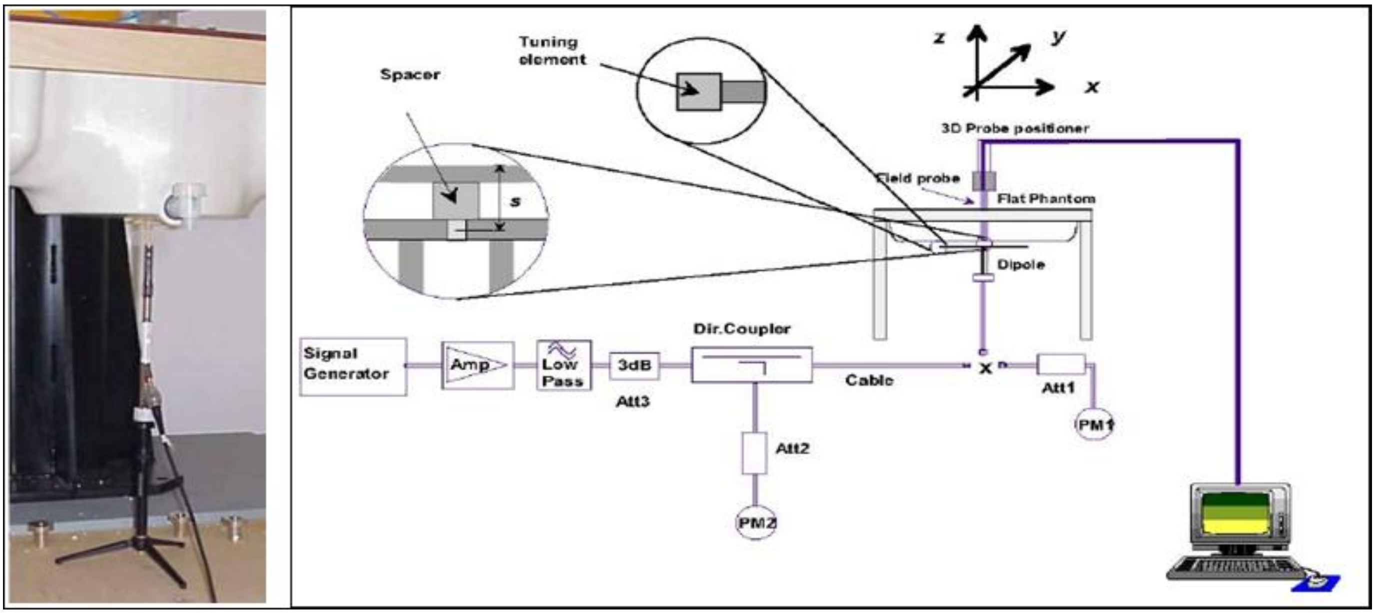
System Check (MHz)	Target SAR (1W) (+/-10%)		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (mW/g)	10-g (mW/g)	1-g (mW/g)	10-g (mW/g)		
835MHz Body	9.42 (8.48~10.36)	6.19 (5.57~6.80)	9.80	6.44	22.0°C	2015-06-19
1900MHz Body	40.20 (36.18~44.22)	21.30 (19.17~23.43)	43.20	22.36	22.0°C	2015-06-29
2450MHz Body	51.4 (46.26~56.54)	23.9 (21.51~26.29)	56.00	25.92	21.4°C	2015-06-20
2600MHz Body	57.6 (51.84~63.36)	25.5 (22.95~28.05)	61.20	26.88	21.0°C	2015-06-18
5300MHz Body	75.0 (67.50~82.50)	21.0 (18.90~23.10)	79.20	21.80	21.4°C	2015-07-02
5600MHz Body	77.8 (70.02~85.58)	21.6 (19.44~23.76)	80.50	22.40	21.4°C	2015-07-02

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 v01r03, 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 v01r03,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 1528-2003 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 LTE Test Configuration

SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02r03. The CMW500 WideBand Radio Communication Tester was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing.SAR test were performed with the same number of RB and RB offsets transmitting on all TTI frames(Maximum TTI)

1) Spectrum Plots for RB configurations

A properly configured base station simulator was used for LTE output power measurements and SAR testing.Therefore, spectrum plots for RB configurations were not required to be included in this report.

2) MPR

When MPR is implemented permanently within the UE, regardless of network requirements, only those RB configurations allowed by 3GPP for the channel bandwidth and modulation combinations may be tested with MPR active. Configurations with RB allocations less than the RB thresholds required by 3GPP must be tested without MPR.

The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

3) A-MPR

A-MPR(Additional MPR) has been disabled for all SAR tests by using Network Signalling Value of “NS_01”on the base station simulator.

4) LTE procedures for SAR testing

A) Largest channel bandwidth standalone SAR test requirements

i) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

ii) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in i) are applied to measure the SAR for QPSK with 50% RB allocation.

iii) QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in i) and ii) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

iv) Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in above sections to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

B) Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.

5) TDD LTE test configuration

According to KDB 941225 D05 SAR for LTE Devices v02r03, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

TDD LTE Band 41 supports 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

Figure 4.2-1: Frame structure type 2

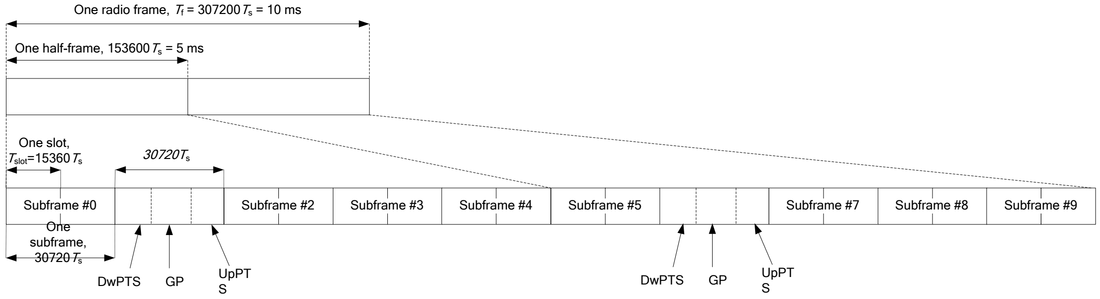


Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Table 4.2-2: Uplink-downlink configurations

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

According to Figure 4.2-1, one radio frame is configured by 10 subframes, which consist of Uplink-subframe, Downlink-subframe and Special subframe. For TDD-LTE, the Duty Cycle should be calculated on Uplink-subframes and Special subframes, due to Special subframe containing both Uplink transmissions. So for one radio frame, Duty Cycle can be calculated with formula as below. The count of Uplink subframes are according to Table 4.2-2:

Duty cycle =(30720Ts*Ups+Uplink Component*Specials)/(307200Ts)

About the uplink component of Special subframes, we can figure out by Table 4.2-1:

Uplink Component=UpPTS

In conclusion, for the TDD LTE Band, Duty Cycle can be calculated with formula as below .all these sets are ok when we test, or we can set as below.

Duty cycle =[(30720Ts*Ups)+ UpPTS *Specials]/(307200Ts)

And we can get different Duty cycles under different configurations:

Uplink downlink configuration	Subframe number			Configuration special subframe							
				Normal cyclic prefix in downlink				Extended cyclic prefix in uplink			
				Normal cyclic prefix in uplink		Extended cyclic prefix in uplink		Normal cyclic prefix in uplink		Extended cyclic prefix in uplink	
	D	S	U	Configuration 0-4	Configuration 5-9	Configuration 0-4	Configuration 5-9	Configuration 0-3	Configuration 4-7	Configuration 0-3	Configuration 4-7
0	2	2	6	61.43%	62.85%	61.67%	63.33%	61.43%	62.85%	61.67%	63.33%
1	4	2	4	41.43%	42.85%	41.68%	43.33%	41.43%	42.85%	41.67%	43.33%
2	6	2	2	21.43%	22.85%	21.67%	23.33%	21.43%	22.85%	21.67%	23.33%
3	6	1	3	30.71%	31.43%	30.83%	31.67%	30.71%	31.43%	30.83%	31.67%
4	7	1	2	20.71%	21.43%	20.83%	21.67%	20.71%	21.43%	20.83%	21.67%
5	8	1	1	10.71%	11.43%	10.83%	11.67%	10.71%	11.43%	10.83%	11.67%
6	3	2	5	51.43%	52.85%	51.67%	53.33%	51.43%	52.85%	51.67%	53.33%

For TDD LTE, this device only supports configuration 1 and 2. So SAR should be tested with the highest transmission duty factor (43.33%) using Uplink-downlink configuration 1 and Special subframe configuration 7 for Frame structure type 2.

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. The RF signal utilized in SAR measurement has 100% duty cycle and its crest factor is 1. The test procedures in KDB 248227D01v02r01 are applied. (Refer to KDB 248227D01v02r01 for more details)

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 248227D01v02r01). 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.

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) OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements

The initial test configuration for 2.4 GHz and 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.

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.

6.2.6 WiFi MIMO SAR Considerations

Per KDB 248227D01v02r01, simultaneous transmission provisions in KDB Publication 447498 should be used to determine simultaneous transmission SAR test exclusion for WiFi MIMO. If the sum of 1-g SAR single transmission SAR measurement is <1.6W/kg, no additional SAR measurements for MIMO are required. Alternatively,SAR for MIMO can be measured with all antennas transmitting simultaneously at the specified maximum output power of MIMO operation.

7 SAR Measurement Results

7.1 Conducted power measurements

For the measurements a Rohde & Schwarz Radio Communication Tester CMW500 was used.
SAR drift measured at the same position in liquid before and after each SAR test as below 7.2 chapter.

7.1.1 Conducted power measurements of LTE Band XXV

Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					26065CH	26365CH	26665CH
5MHz	QPSK	1	0	23.20	21.98	22.80	22.61
		1	13	23.20	22.40	23.10	22.76
		1	24	23.20	21.85	22.62	22.13
		12	0	22.10	21.06	21.83	21.74
		12	6	22.10	21.26	22.05	21.89
		12	13	22.10	20.93	21.69	21.45
		25	0	22.10	20.98	21.81	21.65
	16QAM	1	0	22.80	21.02	21.85	21.73
		1	13	22.80	21.50	22.13	21.94
		1	24	22.80	20.93	21.69	21.29
		12	0	22.10	21.01	21.72	21.61
		12	6	22.10	21.20	21.95	21.74
		12	13	22.10	20.89	21.60	21.31
		25	0	22.10	20.87	21.66	21.49
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					26090CH	26365CH	26640CH
10MHz	QPSK	1	0	23.20	22.09	23.07	22.59
		1	25	23.20	22.29	23.13	23.08
		1	49	23.20	21.95	22.73	22.31
		25	0	22.10	20.89	21.83	21.65
		25	13	22.10	20.96	21.89	21.91
		25	25	22.10	20.64	21.51	21.53
		50	0	22.10	20.75	21.53	21.53
	16QAM	1	0	22.80	21.48	22.29	21.98
		1	25	22.80	21.74	22.42	22.43
		1	49	22.80	21.46	21.96	21.64
		25	0	22.10	20.82	21.73	21.56
		25	13	22.10	20.88	21.78	21.81
		25	25	22.10	20.56	21.41	21.60
		50	0	22.10	20.64	21.42	21.64

Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 26115CH	Channel 26365CH	Channel 26615CH
15MHz	QPSK	1	0	23.20	21.95	22.90	22.19
		1	38	23.20	22.01	22.96	22.87
		1	74	23.20	22.05	22.43	22.22
		36	0	22.10	20.77	21.74	21.48
		36	18	22.10	20.78	21.75	21.77
		36	39	22.10	20.62	21.26	21.55
		75	0	22.10	20.68	21.56	21.46
	16QAM	1	0	22.80	21.22	22.15	21.45
		1	38	22.80	21.29	22.19	22.11
		1	74	22.80	21.69	21.70	21.46
		36	0	22.10	20.72	21.67	21.44
		36	18	22.10	20.73	21.68	21.70
		36	39	22.10	20.57	21.20	21.69
		75	0	22.10	20.61	21.48	21.59
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 26140CH	Channel 26365CH	Channel 26590CH
20MHz	QPSK	1	0	23.20	21.85	**22.94**	22.02
		1	50	23.20	21.69	22.59	**22.41**
		1	99	23.20	**22.55**	22.03	21.90
		50	0	22.10	20.48	**21.48**	20.95
		50	25	22.10	20.40	21.25	21.14
		50	50	22.10	**20.87**	21.12	**21.30**
		100	0	22.10	20.53	**21.35**	21.34
	16QAM	1	0	22.80	21.30	22.20	21.41
		1	50	22.80	21.11	22.01	21.81
		1	99	22.80	21.90	21.51	21.33
		50	0	22.10	20.39	21.38	20.87
		50	25	22.10	20.32	21.15	21.06
		50	50	22.10	20.78	21.01	21.20
		100	0	22.10	20.47	21.24	21.45

Table 7: Conducted power measurement results of LTE Band XXV

7.1.2 Conducted power measurements of LTE Band XXVI

Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 26715CH	Channel 26865CH	Channel 27015CH
5MHz	QPSK	1	0	23.70	23.14	23.12	22.69
		1	13	23.70	23.40	23.43	23.06
		1	24	23.70	22.90	23.12	22.73
		12	0	22.60	22.39	22.27	21.86
		12	6	22.60	22.44	22.49	22.06
		12	13	22.60	22.17	22.30	21.86
		25	0	22.60	22.09	22.28	21.86
	16QAM	1	0	23.00	22.24	22.50	22.02
		1	13	23.00	22.54	22.79	22.41
		1	24	23.00	21.99	22.49	22.05
		12	0	22.60	22.17	22.35	21.98
		12	6	22.60	22.22	22.55	22.17
		12	13	22.60	22.18	22.39	21.96
		25	0	22.60	22.12	22.32	21.92
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 26750CH	Channel 26865CH	Channel 26990CH
10MHz	QPSK	1	0	23.70	23.25	22.94	22.87
		1	25	23.70	23.32	23.48	23.25
		1	49	23.70	23.16	23.08	22.93
		25	0	22.60	21.99	22.09	21.79
		25	13	22.60	21.98	22.37	22.00
		25	25	22.60	21.64	22.09	21.72
		50	0	22.60	21.74	22.09	21.75
	16QAM	1	0	23.00	22.46	22.05	22.25
		1	25	23.00	22.71	22.65	22.60
		1	49	23.00	22.62	22.50	22.35
		25	0	22.60	22.04	22.19	21.92
		25	13	22.60	22.08	22.46	22.14
		25	25	22.60	21.75	22.18	21.85
		50	0	22.60	21.81	22.15	21.83

Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 26775CH	Channel 26865CH	Channel 26965CH
15MHz	QPSK	1	0	23.70	23.07	22.70	**22.90**
		1	38	23.70	23.03	**23.41**	22.88
		1	74	23.70	**23.32**	22.96	22.89
		36	0	22.60	21.84	22.17	**22.08**
		36	18	22.60	**21.88**	**22.41**	22.02
		36	39	22.60	21.87	22.06	21.87
		75	0	22.60	21.79	**22.19**	21.93
	16QAM	1	0	23.00	22.23	22.23	22.51
		1	38	23.00	22.45	22.79	22.38
		1	74	23.00	22.59	22.28	22.22
		36	0	22.60	21.98	22.10	21.99
		36	18	22.60	22.03	22.32	21.94
		36	39	22.60	22.02	21.97	21.79
		75	0	22.60	21.92	22.08	21.83

Table 8: Conducted power measurement results of LTE Band XXVI

7.1.3 Conducted power measurements of LTE Band XLI

Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 39675CH	Channel 40620CH	Channel 41565CH
5MHz	QPSK	1	0	23.00	21.12	21.73	22.13
		1	13	23.00	21.57	22.15	22.03
		1	24	23.00	21.37	21.83	21.86
		12	0	22.50	20.51	21.03	22.20
		12	6	22.50	20.71	21.31	22.10
		12	13	22.50	20.63	21.15	21.95
		25	0	22.50	20.60	21.10	21.21
	16QAM	1	0	22.50	20.55	21.42	21.61
		1	13	22.50	20.71	21.85	21.52
		1	24	22.50	20.61	21.56	21.33
		12	0	22.00	20.36	21.14	21.24
		12	6	22.00	20.63	21.41	21.13
		12	13	22.00	20.56	21.26	20.97
		25	0	22.00	20.63	21.31	21.05
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 39700CH	Channel 40620CH	Channel 41540CH
10MHz	QPSK	1	0	23.00	21.06	21.87	22.05
		1	25	23.00	22.08	22.36	22.52
		1	49	23.00	21.82	22.02	22.00
		25	0	22.50	20.62	21.08	21.07
		25	13	22.50	20.99	21.29	21.27
		25	25	22.50	20.76	21.07	20.94
		50	0	22.50	20.53	21.05	21.00
	16QAM	1	0	22.50	21.64	21.11	21.46
		1	25	22.50	21.38	21.63	21.93
		1	49	22.50	21.76	21.28	21.49
		25	0	22.00	21.35	21.28	21.28
		25	13	22.00	21.21	21.50	21.48
		25	25	22.00	21.34	21.26	21.15
		50	0	22.00	21.38	21.21	21.17

Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 39725CH	Channel 40620CH	Channel 41515CH
15MHz	QPSK	1	0	23.00	21.64	22.73	22.56
		1	38	23.00	22.71	22.98	22.92
		1	74	23.00	22.47	22.84	22.50
		36	0	22.50	21.19	21.92	22.04
		36	18	22.50	21.55	22.16	22.20
		36	39	22.50	21.77	21.98	21.88
		75	0	22.50	21.61	21.97	21.91
	16QAM	1	0	22.50	20.98	21.76	21.74
		1	38	22.50	22.05	22.13	22.19
		1	74	22.50	21.81	21.86	21.75
		36	0	22.00	21.38	21.77	21.91
		36	18	22.00	21.74	21.83	21.95
		36	39	22.00	21.64	21.82	21.72
		75	0	22.00	21.46	21.79	21.79
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 39750CH	Channel 40620CH	Channel 41490CH
20MHz	QPSK	1	0	23.00	21.12	22.36	22.15
		1	50	23.00	22.23	22.51	**22.62**
		1	99	23.00	22.04	22.33	22.21
		50	0	22.50	21.04	21.50	21.38
		50	25	22.50	21.30	**21.51**	21.41
		50	50	22.50	21.28	21.48	21.37
		100	0	22.50	21.18	21.32	21.38
	16QAM	1	0	22.50	20.78	21.63	21.56
		1	50	22.50	21.55	21.73	22.06
		1	99	22.50	21.39	21.60	21.65
		50	0	22.00	20.93	21.37	21.25
		50	25	22.00	21.18	21.36	21.28
		50	50	22.00	21.16	21.35	21.23
		100	0	22.00	21.09	21.17	21.23

Table 9: Conducted power measurement results of LTE Band XLI

7.1.4 Conducted power measurements of Downlink LTE CA

In this section, the following conducted power measurement results of downlink LTE carrier aggregation are provided to quantify downlink only carrier aggregation SAR test exclusion per KDB 941225 D05A v01r01.

Uplink maximum output power is measured with downlink carrier aggregation active, using the channel with highest measured maximum output power when downlink carrier aggregation is inactive, to confirm that when downlink carrier aggregation is active uplink maximum output power remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output power measured when downlink carrier aggregation inactive.

Power test equipment: a R&S Radio Communication Tester CMW500 was used.

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1			NC[, TL/VL, TL/VH, TH/VL, TH/VH]			
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.			A: Mid range for PCC and SCC			
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration			Lowest N_{RB_agg} Highest N_{RB_agg}			
Test Parameters for CA Configurations						
CA Configuration / N_{RB_agg}		DL Allocation	CC MOD	UL Allocation		
PCC N_{RB}	SCCs N_{RB}	PCC & SCC RB allocation		N_{RB_alloc}	PCC RB allocations (L_{CRB} @ RB_{start})	
6	25	N/A for this test	QPSK	5	P_5@0	-
15	25		QPSK	4	P_4@0	-
25	50		QPSK	8	P_8@0	-
50	75		QPSK	12	P_12@0	-
75	100		QPSK	16	P_16@0	-
100	75		QPSK	18	P_18@0	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1						

Table 10: Conducted power measurement setup of LTE CA per 3GPP TS 36.521-1 V10.5.0

The conducted power measurement results of downlink LTE CA are as below:

Bandwidth	Modulation	PCC UL RB size	PCC UL RB offset	PCC DL RB size	PCC DL RB offset	UL Channel	DL Channel (PCC+SCC)	Tx. Power (dBm)	Tune-up (dBm)	Downlink LTE CA
10M+20M	QPSK	1	25	50	0	41540	41540+ 41396	22.52	23	Inactive
								22.66		Active
20M+10M	QPSK	1	50	100	0	41490	41490+ 41346	22.62	23	Inactive
								22.67		Active
15M+15M	QPSK	1	38	75	0	41515	41515+ 41365	22.92	23	Inactive
								22.96		Active
15M+20M	QPSK	1	38	75	0	41515	41515+ 41344	22.92	23	Inactive
								22.95		Active
20M+15M	QPSK	1	50	100	0	41490	41490+ 41319	22.62	23	Inactive
								22.61		Active
20M+20M	QPSK	1	50	100	0	41490	41490+ 41292	22.62	23	Inactive
								22.58		Active

Bandwidth	Modulation	PCC UL RB size	PCC UL RB offset	PCC DL RB size	PCC DL RB offset	UL Channel	DL Channel (PCC+SCC)	Tx. Power (dBm)	Tune-up (dBm)	Downlink LTE CA
10M+20M	QPSK	1	25	50	0	39700	39700+ 39844	22.10	23	Inactive
								22.17		Active
20M+10M	QPSK	1	50	100	0	39750	39750+ 39894	22.25	23	Inactive
								22.32		Active
15M+15M	QPSK	1	38	75	0	39725	39725+ 39875	22.72	23	Inactive
								22.78		Active
15M+20M	QPSK	1	38	75	0	39725	39725+ 39896	22.75	23	Inactive
								22.81		Active
20M+15M	QPSK	1	50	100	0	39750	39750+ 39921	22.27	23	Inactive
								22.35		Active
20M+20M	QPSK	1	50	100	0	39750	39750+ 39948	22.22	23	Inactive
								22.29		Active

Table 11: Conducted power measurement results of LTE CA- Band 41(PCC) + Band 41(SCC)

Per KDB 941225 D05Av01r01, SAR testing for downlink LTE-CA can be excluded.

7.1.5 Conducted power measurements of WiFi 2.4G

Mode	Ant	Channel	Frequency (MHz)	Tune-up	Average Power (dBm) for Data Rates (Mbps)							
					1M	**2M**	**5.5M**	**11M**	**/**	**/**	**/**	**/**
802.11b	Ant1	1	2412	16.50	14.08	14.21	14.19	14.16	/	/	/	/
		6	2437	16.50	**14.89**	15.00	14.95	14.99	/	/	/	/
		11	2462	16.50	13.59	13.77	13.71	13.78	/	/	/	/
	Ant2	1	2412	16.50	14.47	14.48	14.61	14.55	/	/	/	/
		6	2437	16.50	**15.60**	15.76	15.70	15.62	/	/	/	/
		11	2462	16.50	15.19	15.09	15.20	15.23	/	/	/	/
		Channel	**Freq.(MHz)**	**Tune-up**	**6M**	**9M**	**12M**	**18M**	**24M**	**36M**	**48M**	**54M**
802.11g	Ant1	1	2412	13.50	11.86	12.02	11.77	11.98	11.92	11.86	11.92	11.80
		6	2437	13.50	12.47	12.48	12.43	12.33	12.56	12.51	12.58	12.40
		11	2462	13.50	11.49	11.39	11.35	11.31	11.38	11.43	11.42	11.37
	Ant2	1	2412	13.50	11.98	11.95	11.87	11.83	12.06	11.82	11.97	11.88
		6	2437	13.50	13.25	13.20	13.18	13.17	13.33	13.25	13.32	13.27
		11	2462	13.50	12.50	12.40	12.49	12.41	12.61	12.56	12.58	12.46
	Ant	**Channel**	**Freq.(MHz)**	**Tune-up**	**6.5M**	**13M**	**19.5M**	**26M**	**39M**	**52M**	**58.5M**	**65M**
802.11n-HT20	Ant1	1	2412	13.00	10.98	10.75	10.68	10.98	10.93	10.89	10.88	10.81
		6	2437	13.00	11.69	11.67	11.66	11.85	11.66	11.75	11.64	11.71
		11	2462	13.00	10.63	10.64	10.61	10.81	10.80	10.65	10.78	10.75
	Ant2	1	2412	13.00	11.29	11.09	11.10	11.24	11.20	11.17	11.14	11.16
		6	2437	13.00	12.26	12.34	12.31	12.35	12.40	12.36	12.42	12.22
		11	2462	13.00	11.85	11.72	11.76	11.96	11.88	11.91	11.86	11.83
	Ant	**Channel**	**Freq.(MHz)**	**Tune-up**	**13.5M**	**27M**	**40.5M**	**54M**	**81M**	**108M**	**121.5M**	**135M**
802.11n-HT40	Ant1	3	2422	13.00	10.58	10.50	10.46	10.57	10.25	10.24	10.20	10.10
		6	2437	13.00	11.14	11.11	10.94	10.98	10.89	10.58	10.65	10.50
		9	2452	13.00	10.67	10.60	10.54	10.71	10.61	10.48	10.47	10.41
	Ant2	3	2422	13.00	11.40	11.23	11.14	11.34	11.09	11.11	11.07	11.02
		6	2437	13.00	11.74	11.67	11.65	11.66	11.53	11.43	11.42	11.25
		9	2452	13.00	11.66	11.58	11.44	11.48	11.46	11.34	11.28	11.22

Mode	Ant	Channel	Frequency (MHz)	Tune-up	Average Power (dBm) for Data Rates (Mbps)							
					13M	26M	39M	52M	78M	104M	117M	130M
802.11n-20M MIMO	Ant1	1	2412	/	10.81	10.95	10.96	10.85	10.73	10.64	10.63	10.58
		6	2437	/	11.56	11.76	11.65	11.60	11.54	11.42	11.39	11.37
		11	2462	/	10.53	10.71	10.70	10.64	10.54	10.49	10.38	10.41
	Ant2	1	2412	/	11.07	11.26	11.24	11.15	11.25	11.16	11.09	11.06
		6	2437	/	12.44	12.60	12.45	11.40	12.27	12.18	12.15	12.09
		11	2462	/	11.77	11.90	11.85	11.81	11.70	11.64	11.54	11.50
	Sum	1	2412	15.80	13.95	14.12	14.11	14.01	14.01	13.92	13.88	13.84
		6	2437	15.80	**15.03**	15.21	15.08	14.51	14.93	14.83	14.80	14.76
		11	2462	15.80	14.20	14.36	14.32	14.27	14.17	14.11	14.01	14.00
		Channel	**Freq.(MHz)**	**Tune-up**	**27M**	**54M**	**81M**	**108M**	**162M**	**216M**	**243M**	**270M**
802.11n-40M MIMO	Ant1	3	2422	/	10.49	10.54	10.45	10.31	10.25	10.12	10.09	10.05
		6	2437	/	11.08	11.06	10.93	10.89	10.75	10.60	10.59	10.58
		9	2452	/	10.75	10.75	10.66	10.59	10.40	10.29	10.22	10.24
	Ant2	3	2422	/	11.55	11.50	11.37	11.24	11.11	11.00	10.96	10.82
		6	2437	/	11.86	11.79	11.72	11.73	11.62	11.43	11.32	11.28
		9	2452	/	11.74	11.77	11.75	11.58	11.52	11.40	11.32	11.25
	Sum	3	2422	15.80	14.06	14.06	13.94	13.81	13.71	13.59	13.56	13.46
		6	2437	15.80	14.50	14.45	14.35	14.34	14.22	14.05	13.98	13.95
		9	2452	15.80	14.28	14.30	14.25	14.12	14.01	13.89	13.82	13.78

Table 12: Conducted power measurement results of WiFi 2.4G.

Note:

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

2) The bolded mode was selected for SAR testing.

7.1.6 Conducted power measurements of WiFi 5G

Mode	Antenna	Channel	Frequency (MHz)	Tune-up	Average Power (dBm) Data Rate (bps)							
					6M	9M	12M	18M	24M	36M	48M	54M
802.11a	Ant1	CH 36	5180	11.00	10.25	10.01	9.94	9.99	10.14	10.06	10.15	10.05
		CH 40	5200	11.00	10.12	10.02	9.96	9.88	9.82	9.90	9.93	10.07
		CH 44	5220	11.00	10.31	10.23	10.18	10.09	10.12	10.20	9.96	10.04
		CH 48	5240	11.00	10.04	10.07	9.98	9.96	10.07	10.00	10.03	9.94
		CH 52	5260	11.00	10.42	10.30	10.41	10.37	10.29	10.27	10.33	10.18
		CH 56	5280	11.00	**10.47**	10.40	10.38	10.41	10.29	10.36	10.24	10.27
		CH 60	5300	11.00	10.21	10.23	10.18	10.17	10.14	10.06	10.13	10.10
		CH 64	5320	11.00	10.31	10.27	10.21	10.12	10.18	10.06	10.03	10.14
		CH 100	5500	11.00	9.37	9.33	9.28	9.26	9.31	9.24	9.28	9.31
		CH 104	5520	11.00	9.39	9.30	9.27	9.29	9.33	9.35	9.26	9.18
		CH 108	5540	11.00	9.16	9.19	9.12	9.03	9.09	9.01	8.96	8.92
		CH 112	5560	11.00	9.16	9.08	8.94	8.95	9.10	9.01	8.97	8.93
		CH 116	5580	11.00	9.20	9.18	9.09	9.12	9.03	8.94	8.88	8.96
		CH 120	5600	11.00	9.66	9.52	9.58	9.47	9.37	9.39	9.42	9.36
		CH 124	5620	11.00	9.73	9.66	9.70	9.58	9.57	9.52	9.49	9.56
		CH 128	5640	11.00	**9.91**	9.85	9.87	9.84	9.79	9.76	9.77	9.83
		CH 132	5660	11.00	9.64	9.58	9.52	9.47	9.50	9.43	9.39	9.34
		CH 136	5680	11.00	9.41	9.47	9.33	9.34	9.28	9.22	9.24	9.13
		CH 140	5700	11.00	9.03	8.94	8.96	8.88	8.82	8.79	8.74	8.83
		CH 144	5720	11.00	8.44	8.33	8.43	8.31	9.23	9.24	9.18	9.16
	Ant2	CH 36	5180	11.00	8.85	8.73	8.74	8.87	8.92	8.88	8.82	8.70
		CH 40	5200	11.00	8.99	8.95	8.89	8.84	8.74	8.68	8.62	8.56
		CH 44	5220	11.00	8.42	8.46	8.37	8.33	8.31	8.28	8.18	8.22
		CH 48	5240	11.00	8.89	8.58	8.65	8.69	8.79	8.71	8.78	8.61
		CH 52	5260	11.00	9.71	9.64	9.67	9.56	9.47	9.51	9.43	9.46
		CH 56	5280	11.00	10.19	10.17	10.05	10.03	9.99	9.92	9.94	9.87
		CH 60	5300	11.00	**10.46**	10.37	10.44	10.28	10.24	10.19	10.23	10.16
		CH 64	5320	11.00	10.43	10.35	10.38	10.42	10.32	10.20	10.23	10.16
		CH 100	5500	11.00	10.20	10.13	10.10	10.04	10.08	10.11	10.05	10.12
		CH 104	5520	11.00	10.38	10.28	10.27	10.16	10.19	10.11	10.07	10.06
		CH 108	5540	11.00	10.33	10.32	10.23	10.24	10.13	10.16	10.07	10.05
		CH 112	5560	11.00	10.27	10.18	10.22	10.07	10.04	9.98	9.94	9.93
		CH 116	5580	11.00	10.30	10.32	10.24	10.23	10.18	10.16	10.17	10.04
		CH 120	5600	11.00	10.25	10.22	10.16	10.17	10.12	10.04	10.02	10.06
		CH 124	5620	11.00	10.23	10.18	10.13	10.15	10.04	10.03	9.98	9.96
		CH 128	5640	11.00	**10.42**	10.18	10.09	10.11	10.15	10.18	10.21	10.14
		CH 132	5660	11.00	9.83	9.66	9.57	9.59	9.65	9.67	9.77	9.76
		CH 136	5680	11.00	9.54	9.34	9.18	9.23	9.26	9.32	9.36	9.33
		CH 140	5700	11.00	8.91	8.74	8.71	8.74	8.85	8.95	9.03	9.00
		CH 144	5720	11.00	8.54	8.31	8.28	8.32	8.41	8.43	8.44	8.37

Mode	Antenna	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)							
					Data Rate (bps)							
					MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
802.11n-HT20 (5GHz)	Ant1	CH 36	5180	11.00	9.71	9.87	9.79	9.63	9.40	9.45	9.31	9.40
		CH 40	5200	11.00	9.76	9.74	9.92	9.79	9.57	9.70	9.47	9.65
		CH 44	5220	11.00	9.58	9.64	9.50	9.35	9.13	9.30	9.06	9.19
		CH 48	5240	11.00	9.65	9.72	9.67	9.51	9.32	9.37	9.22	9.41
		CH 52	5260	11.00	9.84	9.93	9.82	9.71	9.61	9.77	9.60	9.79
		CH 56	5280	11.00	9.77	9.92	9.90	9.85	9.63	9.73	9.52	9.64
		CH 60	5300	11.00	9.59	9.64	9.51	9.46	9.30	9.42	9.27	9.45
		CH 64	5320	11.00	9.79	9.90	9.89	9.84	9.65	9.70	9.55	9.63
		CH 100	5500	11.00	8.76	8.90	8.79	8.65	8.55	8.61	8.46	8.65
		CH 104	5520	11.00	8.57	8.74	8.60	8.55	8.42	8.46	8.21	8.28
		CH 108	5540	11.00	8.51	8.60	8.52	8.47	8.35	8.51	8.29	8.40
		CH 112	5560	11.00	8.44	8.61	8.60	8.52	8.38	8.54	8.28	8.35
		CH 116	5580	11.00	8.48	8.62	8.53	8.40	8.25	8.37	8.21	8.40
		CH 120	5600	11.00	8.97	9.07	9.06	8.94	8.79	8.88	8.74	8.89
		CH 124	5620	11.00	9.09	9.26	9.21	9.14	8.92	9.08	8.95	9.01
		CH 128	5640	11.00	9.40	9.56	9.42	9.28	9.04	9.10	8.86	8.92
		CH 132	5660	11.00	9.12	9.25	9.21	9.11	8.95	9.04	8.92	9.02
		CH 136	5680	11.00	8.86	8.92	8.78	8.70	8.58	8.73	8.48	8.65
		CH 140	5700	11.00	8.53	8.61	8.50	8.34	8.19	8.26	8.13	8.25
		CH 144	5720	11.00	7.88	7.92	7.88	7.82	7.71	7.82	7.59	7.78
	Ant2	CH 36	5180	11.00	8.33	8.50	8.41	8.33	8.21	8.35	8.13	8.31
		CH 40	5200	11.00	8.22	8.31	8.29	8.24	8.02	8.16	7.90	7.97
		CH 44	5220	11.00	8.58	8.75	8.70	8.56	8.40	8.47	8.35	8.53
		CH 48	5240	11.00	8.63	8.76	8.66	8.50	8.34	8.43	8.26	8.42
		CH 52	5260	11.00	9.51	9.65	9.54	9.46	9.35	9.44	9.28	9.44
		CH 56	5280	11.00	9.83	9.89	9.87	9.74	9.53	9.68	9.53	9.64
		CH 60	5300	11.00	10.16	10.28	10.25	10.19	10.04	10.08	9.92	9.98
		CH 64	5320	11.00	10.24	10.28	10.14	10.06	9.94	10.07	9.81	9.87
		CH 100	5500	11.00	9.67	9.81	9.74	9.68	9.58	9.61	9.45	9.51
		CH 104	5520	11.00	9.82	9.96	9.95	9.78	9.62	9.65	9.47	9.58
		CH 108	5540	11.00	10.10	10.15	10.09	9.92	9.81	9.84	9.60	9.75
		CH 112	5560	11.00	10.17	10.23	10.22	10.05	9.87	9.92	9.78	9.84
		CH 116	5580	11.00	9.91	9.97	9.96	9.90	9.77	9.91	9.66	9.81
		CH 120	5600	11.00	9.79	9.84	9.81	9.78	9.55	9.59	9.42	9.53
		CH 124	5620	11.00	9.97	10.12	10.08	10.02	9.79	9.90	9.68	9.78
		CH 128	5640	11.00	9.93	10.00	9.86	9.72	9.52	9.57	9.45	9.60
		CH 132	5660	11.00	9.58	9.66	9.65	9.61	9.45	9.56	9.30	9.38
		CH 136	5680	11.00	9.01	9.09	9.04	9.01	8.80	8.85	8.70	8.90
		CH 140	5700	11.00	8.58	8.66	8.52	8.48	8.30	8.43	8.18	8.28
		CH 144	5720	11.00	8.03	8.08	8.03	7.90	7.66	7.76	7.60	7.75

Mode	Antenna	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)							
					Data Rate (bps)							
					MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
802.11n-HT40 (5GHz)	Ant1	CH 38	5190	11.00	9.70	9.82	9.73	9.61	9.45	9.53	9.39	9.51
		CH 46	5230	11.00	9.50	9.61	9.56	9.43	9.22	9.33	9.08	9.23
		CH 54	5270	11.00	10.08	10.17	10.11	10.05	9.91	10.04	9.85	9.96
		CH 62	5310	11.00	9.93	10.04	10.02	10.01	9.83	9.91	9.72	9.85
		CH 102	5510	11.00	8.88	8.93	8.94	8.83	8.75	8.81	8.55	8.62
		CH 110	5550	11.00	8.67	8.73	8.72	8.69	8.54	8.74	8.49	8.67
		CH 118	5590	11.00	8.96	9.02	8.92	8.92	8.80	8.91	8.75	8.89
		CH 126	5630	11.00	9.58	9.60	9.61	9.51	9.39	9.45	9.33	9.51
		CH 134	5670	11.00	9.18	9.31	9.27	9.15	8.94	9.11	8.89	9.05
	Ant2	CH 38	5190	11.00	8.67	8.73	8.61	8.54	8.40	8.49	8.31	8.47
		CH 46	5230	11.00	8.77	8.93	8.84	8.85	8.76	8.91	8.77	8.83
		CH 54	5270	11.00	10.07	10.15	10.12	10.07	9.94	10.02	9.77	9.88
		CH 62	5310	11.00	10.44	10.42	10.41	10.32	10.23	10.31	10.07	10.18
		CH 102	5510	11.00	10.42	10.40	10.38	10.27	10.08	10.21	10.04	10.08
		CH 110	5550	11.00	10.36	10.41	10.39	10.34	10.17	10.26	10.07	10.12
		CH 118	5590	11.00	10.45	10.42	10.42	10.40	10.38	10.39	10.41	10.44
		CH 126	5630	11.00	10.26	10.33	10.24	10.19	9.98	10.18	9.99	10.16
		CH 134	5670	11.00	9.80	9.89	9.79	9.71	9.51	9.57	9.34	9.49

Mode	Antenna	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)							
					Data Rate (bps)							
					MCS 8	MCS 9	MCS 10	MCS 11	MCS 12	MCS 13	MCS 14	MCS 15
802.11n-20M MIMO (5GHz)	Ant1	CH 36	5180	/	9.61	9.79	9.69	9.58	9.68	9.71	9.51	9.41
		CH 40	5200	/	9.43	9.54	9.41	9.25	9.35	9.34	9.11	9.01
		CH 44	5220	/	9.31	9.49	9.37	9.23	9.22	9.17	9.04	8.98
		CH 48	5240	/	9.32	9.52	9.37	9.28	9.33	9.37	9.20	9.11
		CH 52	5260	/	9.90	10.01	9.85	9.65	9.65	9.67	9.47	9.41
		CH 56	5280	/	9.75	9.93	9.86	9.66	9.69	9.71	9.48	9.41
		CH 60	5300	/	9.65	9.75	9.58	9.35	9.35	9.34	9.13	9.16
		CH 64	5320	/	10.01	10.07	9.90	9.72	9.71	9.62	9.47	9.43
		CH 100	5500	/	8.56	8.71	8.56	8.36	8.36	8.32	8.11	8.10
		CH 104	5520	/	8.69	8.82	8.66	8.52	8.61	8.64	8.52	8.46
		CH 108	5540	/	8.38	8.48	8.39	8.23	8.33	8.24	8.07	7.97
		CH 112	5560	/	8.40	8.54	8.45	8.24	8.23	8.15	8.02	7.98
		CH 116	5580	/	8.72	8.90	8.84	8.68	8.72	8.73	8.59	8.54
		CH 120	5600	/	8.89	9.09	9.00	8.91	8.87	8.84	8.73	8.72
		CH 124	5620	/	9.14	9.21	9.13	8.95	8.97	8.97	8.78	8.74
		CH 128	5640	/	9.25	9.46	9.30	9.08	9.14	9.15	9.05	9.05
		CH 132	5660	/	9.03	9.24	9.06	8.86	8.95	8.94	8.83	8.83
		CH 136	5680	/	8.75	8.84	8.69	8.52	8.61	8.56	8.41	8.38
		CH 140	5700	/	8.38	8.58	8.50	8.27	8.29	8.32	8.17	8.11
		CH 144	5720	/	7.71	7.91	7.77	7.68	7.73	7.78	7.65	7.62
	Ant2	CH 36	5180	/	8.27	8.44	8.26	8.09	8.19	8.11	7.98	8.01
		CH 40	5200	/	8.37	8.54	8.38	8.17	8.16	8.16	8.05	7.98
		CH 44	5220	/	8.30	8.50	8.35	8.24	8.31	8.36	8.18	8.17
		CH 48	5240	/	8.67	8.79	8.60	8.40	8.40	8.43	8.21	8.19

		CH 52	5260	/	9.28	9.36	9.25	9.05	9.07	9.01	8.86	8.86
		CH 56	5280	/	9.76	9.86	9.79	9.57	9.54	9.51	9.39	9.43
		CH 60	5300	/	10.02	10.20	10.07	9.98	10.06	10.08	9.91	9.87
		CH 64	5320	/	10.34	10.28	10.23	10.12	10.12	10.03	9.80	9.82
		CH 100	5500	/	9.69	9.78	9.66	9.52	9.56	9.47	9.24	9.24
		CH 104	5520	/	9.80	10.00	9.91	9.74	9.79	9.70	9.47	9.43
		CH 108	5540	/	10.24	10.35	10.29	10.15	10.16	10.21	10.09	10.03
		CH 112	5560	/	9.75	9.86	9.78	9.57	9.54	9.54	9.42	9.37
		CH 116	5580	/	9.72	9.81	9.71	9.56	9.54	9.59	9.45	9.40
		CH 120	5600	/	9.89	10.05	9.90	9.77	9.83	9.76	9.59	9.61
		CH 124	5620	/	9.85	10.02	9.91	9.74	9.71	9.66	9.48	9.39
		CH 128	5640	/	9.79	9.98	9.90	9.69	9.67	9.65	9.55	9.54
		CH 132	5660	/	9.39	9.54	9.36	9.21	9.25	9.23	9.10	9.13
		CH 136	5680	/	9.02	9.21	9.06	8.91	8.88	8.82	8.59	8.63
		CH 140	5700	/	8.44	8.64	8.58	8.49	8.49	8.53	8.39	8.40
		CH 144	5720	/	8.06	8.23	8.12	8.03	8.01	7.95	7.86	7.78
	Sum	CH 36	5180	14.00	12.00	12.18	12.04	11.91	12.01	11.99	11.82	11.78
		CH 40	5200	14.00	11.94	12.08	11.94	11.75	11.81	11.80	11.62	11.54
		CH 44	5220	14.00	11.84	12.03	11.90	11.77	11.80	11.79	11.64	11.60
		CH 48	5240	14.00	12.02	12.18	12.01	11.87	11.90	11.94	11.74	11.68
		CH 52	5260	14.00	12.61	12.71	12.57	12.37	12.38	12.36	12.19	12.15
		CH 56	5280	14.00	12.77	12.91	12.84	12.63	12.63	12.62	12.45	12.43
		CH 60	5300	14.00	12.85	12.99	12.84	12.69	12.73	12.74	12.55	12.54
		CH 64	5320	14.00	**13.19**	13.19	13.08	12.93	12.93	12.84	12.65	12.64
		CH 100	5500	14.00	12.17	12.29	12.16	11.99	12.01	11.94	11.72	11.72
		CH 104	5520	14.00	12.29	12.46	12.34	12.18	12.25	12.21	12.03	11.98
		CH 108	5540	14.00	12.42	12.53	12.45	12.31	12.35	12.35	12.21	12.13
		CH 112	5560	14.00	12.14	12.26	12.18	11.97	11.94	11.91	11.79	11.74
		CH 116	5580	14.00	12.26	12.39	12.31	12.15	12.16	12.19	12.05	12.00
		CH 120	5600	14.00	12.43	12.61	12.48	12.37	12.39	12.33	12.19	12.20
		CH 124	5620	14.00	12.52	12.64	12.55	12.37	12.37	12.34	12.15	12.09
		CH 128	5640	14.00	**12.54**	12.74	12.62	12.41	12.42	12.42	12.32	12.31
		CH 132	5660	14.00	12.22	12.40	12.22	12.05	12.11	12.10	11.98	11.99
		CH 136	5680	14.00	11.90	12.04	11.89	11.73	11.76	11.70	11.51	11.52
		CH 140	5700	14.00	11.42	11.62	11.55	11.39	11.40	11.44	11.29	11.27
		CH 144	5720	14.00	10.90	11.08	10.96	10.87	10.88	10.88	10.77	10.71

Mode	Antenna	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)							
					Data Rate (bps)							
					MCS 8	MCS 9	MCS 10	MCS 11	MCS 12	MCS 13	MCS 14	MCS 15
802.11n-40M MIMO (5GHz)	Ant1	CH 38	5190	/	9.66	9.91	9.80	9.66	9.69	9.71	9.63	9.64
		CH 46	5230	/	9.63	9.82	9.75	9.64	9.54	9.58	9.44	9.47
		CH 54	5270	/	10.07	10.23	10.11	9.96	9.87	9.84	9.69	9.66
		CH 62	5310	/	10.11	10.07	10.15	10.05	9.98	10.01	9.94	9.95
		CH 102	5510	/	9.08	9.30	9.21	9.17	9.06	9.02	8.96	8.90
		CH 110	5550	/	8.77	8.97	8.81	8.74	8.63	8.61	8.49	8.47
		CH 118	5590	/	8.89	9.03	8.94	8.88	8.90	8.89	8.76	8.82
		CH 126	5630	/	9.76	9.99	9.96	9.88	9.78	9.78	9.62	9.67
		CH 134	5670	/	9.35	9.51	9.37	9.25	9.15	9.17	9.03	8.96
	Ant2	CH 38	5190	/	8.87	9.07	8.95	8.82	8.73	8.70	8.54	8.48
		CH 46	5230	/	9.07	9.20	9.04	8.94	8.95	8.91	8.79	8.74
		CH 54	5270	/	10.34	10.50	10.40	10.32	10.30	10.23	10.14	10.12
		CH 62	5310	/	10.55	10.31	10.25	10.41	10.30	10.31	10.34	10.26
		CH 102	5510	/	10.35	10.56	10.44	10.41	10.30	10.32	10.25	10.20
		CH 110	5550	/	10.56	10.80	10.67	10.61	10.59	10.54	10.49	10.54
		CH 118	5590	/	10.44	10.63	10.59	10.45	10.46	10.41	10.33	10.39
		CH 126	5630	/	10.57	10.68	10.62	10.49	10.41	10.38	10.21	10.15
		CH 134	5670	/	9.98	10.18	10.02	9.92	9.89	9.86	9.72	9.66
	Sum	CH 38	5190	14.00	12.29	12.52	12.41	12.27	12.25	12.24	12.13	12.11
		CH 46	5230	14.00	12.37	12.53	12.42	12.31	12.27	12.27	12.14	12.13
		CH 54	5270	14.00	13.22	13.38	13.27	13.15	13.10	13.05	12.93	12.91
		CH 62	5310	14.00	13.35	13.20	13.21	13.24	13.15	13.17	13.15	13.12
		CH 102	5510	14.00	12.77	12.99	12.88	12.84	12.73	12.73	12.66	12.61
		CH 110	5550	14.00	12.77	12.99	12.85	12.79	12.73	12.69	12.61	12.64
		CH 118	5590	14.00	12.74	12.91	12.85	12.75	12.76	12.73	12.63	12.69
		CH 126	5630	14.00	13.19	13.36	13.31	13.21	13.12	13.10	12.94	12.93
		CH 134	5670	14.00	12.69	12.87	12.72	12.61	12.55	12.54	12.40	12.33

Mode	Antenna	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)							
					Data Rate (bps)							
					MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
802.11ac 20M (5GHz)	Ant1	CH 36	5180	10.50	8.31	8.29	8.30	8.31	8.34	8.29	8.13	7.91
		CH 40	5200	10.50	8.61	8.52	8.46	8.35	8.32	8.22	8.11	7.95
		CH 44	5220	10.50	8.33	8.27	8.18	8.11	8.04	8.06	7.90	7.79
		CH 48	5240	10.50	8.45	8.39	8.40	8.41	8.39	8.40	8.19	8.06
		CH 52	5260	10.50	8.71	8.63	8.53	8.50	8.42	8.44	8.34	8.21
		CH 56	5280	10.50	8.73	8.60	8.56	8.44	8.48	8.50	8.30	8.12
		CH 60	5300	10.50	8.57	8.51	8.42	8.32	8.34	8.29	8.08	7.88
		CH 64	5320	10.50	8.60	8.55	8.51	8.48	8.41	8.37	8.17	8.02
		CH 100	5500	10.50	7.76	7.73	7.62	7.53	7.49	7.47	7.38	7.15
		CH 104	5520	10.50	7.52	7.48	7.43	7.37	7.31	7.32	7.21	6.96
		CH 108	5540	10.50	7.68	7.54	7.51	7.50	7.49	7.46	7.24	7.02
		CH 112	5560	10.50	7.47	7.32	7.23	7.14	7.10	7.01	6.86	6.74
		CH 116	5580	10.50	7.65	7.59	7.55	7.45	7.50	7.51	7.38	7.18
		CH 120	5600	10.50	7.77	7.68	7.58	7.46	7.43	7.43	7.28	7.08
		CH 124	5620	10.50	8.17	8.16	8.13	8.01	8.03	8.04	7.91	7.72
		CH 128	5640	10.50	8.47	8.44	8.42	8.42	8.33	8.22	8.04	7.92
		CH 132	5660	10.50	8.07	7.94	7.92	7.82	7.85	7.85	7.65	7.53
		CH 136	5680	10.50	7.63	7.50	7.50	7.46	7.50	7.45	7.27	7.08
		CH 140	5700	10.50	7.36	7.25	7.23	7.10	7.02	6.91	6.69	6.54
		CH 144	5720	10.50	6.76	6.73	6.70	6.64	6.66	6.59	6.48	6.30
	Ant2	CH 36	5180	10.50	7.59	7.48	7.35	7.36	7.30	7.19	7.08	6.84
		CH 40	5200	10.50	7.41	7.40	7.27	7.24	7.28	7.29	7.06	6.89
		CH 44	5220	10.50	7.61	7.55	7.50	7.39	7.41	7.44	7.28	7.13
		CH 48	5240	10.50	8.00	7.90	7.90	7.88	7.85	7.80	7.69	7.48
		CH 52	5260	10.50	8.58	8.57	8.49	8.41	8.35	8.29	8.08	7.96
		CH 56	5280	10.50	8.98	8.93	8.85	8.79	8.73	8.63	8.43	8.22
		CH 60	5300	10.50	9.25	9.20	9.19	9.10	9.11	9.07	8.92	8.73
		CH 64	5320	10.50	9.23	9.22	9.14	9.11	9.08	9.10	8.93	8.68
		CH 100	5500	10.50	8.63	8.56	8.46	8.42	8.45	8.43	8.24	7.99
		CH 104	5520	10.50	8.94	8.84	8.82	8.70	8.65	8.67	8.51	8.33
		CH 108	5540	10.50	8.98	8.92	8.89	8.83	8.86	8.78	8.58	8.47
		CH 112	5560	10.50	8.78	8.63	8.54	8.55	8.53	8.44	8.33	8.13
		CH 116	5580	10.50	8.79	8.68	8.62	8.57	8.48	8.48	8.37	8.25
		CH 120	5600	10.50	8.73	8.67	8.57	8.45	8.46	8.35	8.26	8.06
		CH 124	5620	10.50	8.88	8.78	8.67	8.54	8.52	8.44	8.35	8.11
		CH 128	5640	10.50	8.74	8.62	8.49	8.38	8.37	8.33	8.17	7.98
		CH 132	5660	10.50	8.65	8.52	8.48	8.38	8.30	8.21	8.05	7.85
		CH 136	5680	10.50	8.30	8.23	8.17	8.06	8.09	8.02	7.80	7.68
		CH 140	5700	10.50	7.51	7.41	7.33	7.23	7.28	7.27	7.11	6.87
		CH 144	5720	10.50	6.96	6.83	6.82	6.74	6.74	6.71	6.51	6.28

Mode	Antenna	Channel	Frequency (MHz)	Tune-up	Average Power (dBm) Data Rate (bps) MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
802.11ac 40M (5GHz)	Ant1	CH 38	5190	10.50	8.94	8.82	8.67	8.65	8.56	8.43	8.19	8.03
		CH 46	5230	10.50	8.61	8.42	8.34	8.33	8.20	8.19	7.96	7.79
		CH 54	5270	10.50	8.96	8.80	8.65	8.55	8.48	8.40	8.17	8.03
		CH 62	5310	10.50	8.78	8.58	8.43	8.41	8.26	8.18	7.94	7.77
		CH 102	5510	10.50	8.20	8.04	7.98	7.94	7.84	7.79	7.63	7.40
		CH 110	5550	10.50	7.53	7.40	7.36	7.34	7.26	7.20	7.07	6.85
		CH 118	5590	10.50	7.38	7.30	7.24	7.18	7.16	7.12	6.96	6.78
		CH 126	5630	10.50	7.97	7.77	7.66	7.63	7.58	7.51	7.26	7.14
		CH 134	5670	10.50	8.42	8.33	8.17	8.14	8.08	7.98	7.72	7.61
	Ant2	CH 38	5190	10.50	8.07	8.01	7.86	7.72	7.62	7.50	7.31	7.16
		CH 46	5230	10.50	7.83	7.66	7.49	7.42	7.35	7.21	7.02	6.93
		CH 54	5270	10.50	8.60	8.43	8.39	8.33	8.22	8.10	7.92	7.77
		CH 62	5310	10.50	9.96	9.87	9.79	9.68	9.63	9.51	9.28	9.17
		CH 102	5510	10.50	9.06	8.91	8.82	8.78	8.70	8.69	8.52	8.35
		CH 110	5550	10.50	9.11	9.03	8.95	8.95	8.86	8.85	8.69	8.47
		CH 118	5590	10.50	9.07	8.90	8.73	8.67	8.58	8.49	8.32	8.22
		CH 126	5630	10.50	9.10	9.04	8.92	8.80	8.65	8.53	8.40	8.22
		CH 134	5670	10.50	9.14	9.02	8.89	8.79	8.69	8.63	8.40	8.22

Mode	Antenna	Channel	Frequency (MHz)	Tune-up	Average Power (dBm) Data Rate (bps) MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
802.11ac 80M (5GHz)	Ant1	CH 42	5210	10.50	8.24	8.09	8.07	8.04	8.01	8.00	7.92	7.79
		CH 58	5290	10.50	8.69	8.57	8.48	8.52	8.53	8.42	8.45	8.32
		CH 106	5530	10.50	7.37	7.29	7.29	7.38	7.33	7.28	7.23	7.24
		CH 122	5610	10.50	7.35	7.32	7.22	7.32	7.29	7.30	7.30	7.27
	Ant2	CH 42	5210	10.50	7.28	7.19	7.11	7.17	7.06	6.94	6.93	6.82
		CH 58	5290	10.50	8.88	8.81	8.82	8.86	8.79	8.77	8.78	8.65
		CH 106	5530	10.50	8.69	8.59	8.59	8.69	8.63	8.65	8.59	8.55
		CH 122	5610	10.50	8.58	8.44	8.34	8.39	8.32	8.23	8.15	8.11

Mode	Antenna	Channel	Frequency (MHz)	Tune-up	Average Power (dBm) Data Rate (bps) MCS 8	MCS 9	MCS 10	MCS 11	MCS 12	MCS 13	MCS 14	MCS 15
802.11ac 20M MIMO (5GHz)	Ant1	CH 36	5180	/	8.41	8.55	8.43	8.27	8.30	8.28	8.12	8.09
		CH 40	5200	/	8.55	8.70	8.54	8.46	8.56	8.46	8.32	8.21
		CH 44	5220	/	8.33	8.43	8.34	8.31	8.39	8.33	8.26	8.23
		CH 48	5240	/	8.68	8.43	8.36	8.31	8.35	8.25	8.21	8.20
		CH 52	5260	/	8.46	8.67	8.50	8.46	8.58	8.54	8.47	8.42
		CH 56	5280	/	8.66	8.71	8.50	8.43	8.42	8.41	8.33	8.26
		CH 60	5300	/	8.49	8.54	8.34	8.28	8.37	8.25	8.11	8.04
		CH 64	5320	/	8.65	8.81	8.64	8.47	8.48	8.37	8.22	8.17
		CH 100	5500	/	7.88	8.03	7.94	7.88	7.96	7.92	7.78	7.72
		CH 104	5520	/	7.63	7.80	7.60	7.57	7.64	7.57	7.50	7.38
		CH 108	5540	/	7.21	7.24	7.04	6.96	7.06	7.02	6.92	6.89
		CH 112	5560	/	7.12	7.10	6.92	6.87	6.97	6.94	6.80	6.65
		CH 116	5580	/	6.88	7.05	6.93	6.84	6.92	6.92	6.84	6.70
		CH 120	5600	/	7.42	7.53	7.43	7.28	7.36	7.22	7.14	7.00
		CH 124	5620	/	7.54	7.65	7.55	7.48	7.56	7.53	7.38	7.34
		CH 128	5640	/	7.93	8.09	7.96	7.84	7.90	7.89	7.73	7.71
		CH 132	5660	/	7.97	8.10	7.94	7.89	7.99	7.94	7.92	7.77
		CH 136	5680	/	8.19	8.30	8.18	8.12	8.15	8.13	7.98	7.96
		CH 140	5700	/	8.18	8.26	8.15	8.05	8.06	7.94	7.87	7.77
		CH 144	5720	/	7.91	7.97	7.80	7.65	7.68	7.64	7.49	7.46
	Ant2	CH 36	5180	/	7.72	7.63	7.43	7.26	7.30	7.30	7.24	7.19
		CH 40	5200	/	7.38	7.24	7.12	7.02	7.04	6.94	6.84	6.80
		CH 44	5220	/	7.39	7.46	7.26	7.21	7.23	7.12	6.99	6.88
		CH 48	5240	/	7.58	7.61	7.53	7.49	7.51	7.42	7.35	7.20
		CH 52	5260	/	8.05	8.16	7.95	7.83	7.94	7.94	7.87	7.76
		CH 56	5280	/	8.55	8.65	8.49	8.37	8.39	8.29	8.26	8.14
		CH 60	5300	/	9.17	9.24	9.11	9.05	9.14	9.03	8.91	8.81
		CH 64	5320	/	9.49	9.42	9.51	9.42	9.48	9.38	9.30	9.29
		CH 100	5500	/	8.81	8.77	8.59	8.48	8.56	8.42	8.36	8.29
		CH 104	5520	/	9.07	9.04	8.91	8.79	8.82	8.82	8.73	8.61
		CH 108	5540	/	9.28	9.14	9.02	8.86	8.98	8.92	8.90	8.84
		CH 112	5560	/	8.92	9.01	8.80	8.71	8.79	8.77	8.70	8.59
		CH 116	5580	/	8.83	8.88	8.75	8.68	8.78	8.66	8.55	8.44
		CH 120	5600	/	8.79	8.92	8.74	8.57	8.59	8.45	8.43	8.29
		CH 124	5620	/	8.96	9.02	8.83	8.67	8.78	8.67	8.57	8.49
		CH 128	5640	/	9.15	9.20	9.12	9.01	9.11	9.03	9.01	8.88
		CH 132	5660	/	9.00	9.12	8.99	8.86	8.95	8.94	8.92	8.86
		CH 136	5680	/	8.88	8.70	8.60	8.53	8.51	8.42	8.34	8.23
		CH 140	5700	/	8.70	8.68	8.54	8.43	8.49	8.49	8.38	8.25
		CH 144	5720	/	7.99	8.07	8.00	7.95	7.94	7.91	7.81	7.79
	Sum	CH 36	5180	13.00	11.09	11.12	10.97	10.80	10.84	10.83	10.71	10.67
		CH 40	5200	13.00	11.01	11.04	10.90	10.81	10.88	10.78	10.65	10.57
		CH 44	5220	13.00	10.90	10.98	10.84	10.81	10.86	10.78	10.68	10.62
		CH 48	5240	13.00	11.18	11.05	10.98	10.93	10.96	10.87	10.81	10.74
		CH 52	5260	13.00	11.27	11.43	11.24	11.17	11.28	11.26	11.19	11.11
		CH 56	5280	13.00	11.62	11.69	11.51	11.41	11.42	11.36	11.31	11.21

		CH 60	5300	13.00	11.85	11.91	11.75	11.69	11.78	11.67	11.54	11.45
		CH 64	5320	13.00	12.10	12.14	12.11	11.98	12.02	11.91	11.80	11.78
		CH 100	5500	13.00	11.38	11.43	11.29	11.20	11.28	11.19	11.09	11.02
		CH 104	5520	13.00	11.42	11.47	11.31	11.23	11.28	11.25	11.17	11.05
		CH 108	5540	13.00	11.38	11.30	11.15	11.02	11.14	11.08	11.03	10.98
		CH 112	5560	13.00	11.12	11.17	10.97	10.90	10.98	10.96	10.86	10.74
		CH 116	5580	13.00	10.97	11.07	10.94	10.87	10.96	10.89	10.79	10.67
		CH 120	5600	13.00	11.17	11.29	11.14	10.98	11.03	10.89	10.84	10.70
		CH 124	5620	13.00	11.32	11.40	11.25	11.13	11.22	11.15	11.03	10.96
		CH 128	5640	13.00	11.59	11.69	11.59	11.47	11.56	11.51	11.43	11.34
		CH 132	5660	13.00	11.53	11.65	11.51	11.41	11.51	11.48	11.46	11.36
		CH 136	5680	13.00	11.56	11.51	11.41	11.34	11.34	11.29	11.17	11.11
		CH 140	5700	13.00	11.46	11.49	11.36	11.25	11.29	11.23	11.14	11.03
		CH 144	5720	13.00	10.96	11.03	10.91	10.81	10.82	10.79	10.66	10.64

Mode	Antenna	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)							
					Data Rate (bps)							
					MCS 8	MCS 9	MCS 10	MCS 11	MCS 12	MCS 13	MCS 14	MCS 15
802.11ac 40M MIMO (5GHz)	Ant1	CH 38	5190	/	8.47	8.36	8.28	8.16	8.09	7.92	7.88	7.78
		CH 46	5230	/	8.46	8.33	8.22	8.15	8.06	7.98	7.79	7.63
		CH 54	5270	/	8.94	8.85	8.80	8.75	8.64	8.56	8.33	8.24
		CH 62	5310	/	8.69	8.62	8.58	8.46	8.40	8.34	8.25	8.18
		CH 102	5510	/	7.85	7.91	7.87	7.70	7.62	7.43	7.38	7.40
		CH 110	5550	/	7.38	7.40	7.33	7.30	7.18	7.02	6.92	6.87
		CH 118	5590	/	7.46	7.42	7.37	7.26	7.10	6.97	6.98	6.93
		CH 126	5630	/	8.04	7.93	7.85	7.84	7.71	7.62	7.66	7.68
		CH 134	5670	/	8.52	8.44	8.40	8.38	8.21	8.06	8.08	8.02
	Ant2	CH 38	5190	/	7.97	8.02	7.94	7.81	7.66	7.54	7.53	7.40
		CH 46	5230	/	8.12	7.92	7.95	7.78	7.53	7.41	7.37	7.32
		CH 54	5270	/	8.71	8.69	8.63	8.54	8.39	8.32	8.33	8.39
		CH 62	5310	/	9.79	9.80	9.78	9.70	9.63	9.50	9.42	9.23
		CH 102	5510	/	9.14	9.07	8.96	8.99	8.73	8.67	8.52	8.48
		CH 110	5550	/	9.17	9.20	8.99	8.82	8.74	8.74	8.68	8.63
		CH 118	5590	/	9.05	8.98	8.82	8.58	8.62	8.46	8.34	8.22
		CH 126	5630	/	9.03	9.00	8.91	8.77	8.58	8.52	8.55	8.51
		CH 134	5670	/	9.05	8.97	8.88	8.69	8.62	8.55	8.49	8.47
	Sum	CH 38	5190	13.00	11.24	11.20	11.12	11.00	10.89	10.74	10.72	10.60
		CH 46	5230	13.00	11.30	11.14	11.10	10.98	10.81	10.71	10.60	10.49
		CH 54	5270	13.00	11.84	11.78	11.73	11.66	11.53	11.45	11.34	11.33
		CH 62	5310	13.00	12.29	12.26	12.23	12.13	12.07	11.97	11.88	11.75
		CH 102	5510	13.00	11.55	11.54	11.46	11.40	11.22	11.10	11.00	10.98
		CH 110	5550	13.00	11.38	11.40	11.25	11.14	11.04	10.97	10.90	10.85
		CH 118	5590	13.00	11.34	11.28	11.17	10.98	10.94	10.79	10.72	10.63
		CH 126	5630	13.00	11.57	11.51	11.42	11.34	11.18	11.10	11.14	11.13
		CH 134	5670	13.00	11.80	11.72	11.66	11.55	11.43	11.32	11.30	11.26

Mode	Antenna	Channel	Frequency (MHz)	Tune-up	Average Power (dBm)							
					Data Rate (bps)							
					MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
802.11ac 80M MIMO (5GHz)	**Ant1**	CH 42	5210	/	8.26	8.06	8.03	8.06	7.98	7.92	7.92	7.82
		CH 58	5290	/	8.27	8.17	8.11	8.14	8.08	8.03	8.00	7.94
		CH 106	5530	/	7.28	7.12	7.10	7.09	7.11	7.04	6.98	6.85
		CH 122	5610	/	7.10	7.01	7.03	6.97	6.96	6.93	6.92	6.99
	Ant2	CH 42	5210	/	7.48	7.40	7.37	7.33	7.28	7.28	7.23	7.11
		CH 58	5290	/	8.72	8.65	8.66	8.58	8.43	8.36	8.31	8.20
		CH 106	5530	/	8.76	8.64	8.66	8.57	8.51	8.45	8.38	8.31
		CH 122	5610	/	8.68	8.55	8.52	8.44	8.49	8.45	8.37	8.42
	Sum	CH 42	5210	12.50	10.90	10.75	10.72	10.72	10.65	10.62	10.60	10.49
		CH 58	5290	12.50	11.51	11.43	11.40	11.38	11.27	11.21	11.17	11.08
		CH 106	5530	12.50	11.09	10.96	10.96	10.90	10.88	10.81	10.75	10.65
		CH 122	5610	12.50	10.97	10.86	10.85	10.78	10.80	10.77	10.72	10.77

Table 13: Conducted power measurement results of WiFi 5G.

Note:

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

2) The bolded mode was selected for SAR testing.

7.2 SAR measurement Results

General Notes:

1) Per KDB447498 D01v05r02, all measurement SAR results are scaled to the maximum tune-up tolerance limit to demostrate compliant.

2) Per KDB447498 D01v05r02, 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 KDB 865664 D01v01,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 KDB941225 D06v02, 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.

5) 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 appendix B for detailed SAR plots).

LTE Notes:

1) The LTE test configurations are determined according to KDB941225 D05 SAR for LTE Devices v02r03.The general test procedures used for SAR testing can be found in Section 6.1.

2) A-MPR was disabled for all SAR test by setting NS_01 on the base station simulator.SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames(maximum TTI).

3)Per KDB 941225 D05 SAR for LTE Devices v02r03, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations. For TDD LTE, this device only supports configuration 1 and 2. So SAR should be tested with the highest transmission duty factor (43.33%) using Uplink-downlink configuration 1 and Special subframe configuration 7 for Frame structure type 2.

4)Per KDB 941225 D05A v01r01, for DL LTE-CA, the conducted power measurement results of downlink LTE carrier aggregation can quantify downlink only carrier aggregation SAR test exclusion.

WLAN Notes:

Per KDB248227D01v02r01:

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) For 2.4G WiFi, 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. 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 not required for 2.4 GHz 802.11g/n OFDM configurations.

4) For 5G WiFi, the initial test configration was selected and tested rer KDB248227D01v02r01. 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 subsequent test configuration. When the same maximum output power is specified for U-NII-1 and U-NII-2A, 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.

5) For WiFi MIMO, MIMO SAR is measured with all antennas transmitting simultaneously at the specified maximum output power of MIMO operation following the initial test configuration procedures.

Per KDB248227D01v02r01 and KDB 447498D01v05r02.

6) The deivice supportes IEEE 802.11ac with the following features:

a) Up to 80MHz Bandwidth only

b) No aggregate channel configurations

c) 2 Tx antenna output

d) 256 QAM is supported

7) 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 LTE Band XXV

Test Position of Body with 10mm	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR_{1-g} (W/kg)	Liquid Temp.
			1-g	10-g					
1RB									
Front Side	26365/1882.5	20M QPSK 1RB#0	1.020	0.582	-0.070	22.94	23.20	1.083	22.0°C
Front Side	26140/1860	20M QPSK 1RB#99	1.140	0.645	-0.060	22.55	23.20	1.324	22.0°C
Front Side -repeated	26140/1860	20M QPSK 1RB#99	1.060	0.602	-0.190	22.55	23.20	1.231	22.0°C
Front Side	26590/1905	20M QPSK 1RB#50	0.889	0.512	-0.190	22.41	23.20	1.066	22.0°C
Back Side	26365/1882.5	20M QPSK 1RB#0	0.762	0.455	0.000	22.94	23.20	0.809	22.0°C
Back Side	26140/1860	20M QPSK 1RB#99	0.812	0.484	0.000	22.55	23.20	0.943	22.0°C
Back Side	26590/1905	20M QPSK 1RB#50	0.727	0.433	-0.040	22.41	23.20	0.872	22.0°C
Left Side	26365/1882.5	20M QPSK 1RB#0	0.357	0.209	0.170	22.94	23.20	0.379	22.0°C
Top Side	26365/1882.5	20M QPSK 1RB#0	0.241	0.138	0.000	22.94	23.20	0.256	22.0°C
Bottom Side	26365/1882.5	20M QPSK 1RB#0	0.683	0.423	-0.010	22.94	23.20	0.725	22.0°C
50%RB									
Front Side	26365/1882.5	20M QPSK 50%RB#0	0.785	0.446	-0.180	21.48	22.10	0.905	22.0°C
Front Side	26140/1860	20M QPSK 50%RB#50	0.972	0.550	0.010	20.87	22.10	1.290	22.0°C
Front Side	26590/1905	20M QPSK 50%RB#50	0.754	0.434	-0.040	21.30	22.10	0.907	22.0°C
Back Side	26365/1882.5	20M QPSK 50%RB#0	0.576	0.351	0.040	21.48	22.10	0.664	22.0°C
Left Side	26365/1882.5	20M QPSK 50%RB#0	0.232	0.136	-0.070	21.48	22.10	0.268	22.0°C
Top Side	26365/1882.5	20M QPSK 50%RB#0	0.161	0.092	-0.030	21.48	22.10	0.186	22.0°C
Bottom Side	26365/1882.5	20M QPSK 50%RB#0	0.447	0.259	0.030	21.48	22.10	0.516	22.0°C
100%RB									
Front Side	26365/1882.5	20M QPSK 100%RB#0	0.733	0.417	-0.040	21.35	22.10	0.871	22.0°C
Back Side	26365/1882.5	20M QPSK 100%RB#0	0.539	0.308	0.000	21.35	22.10	0.641	22.0°C

Table 14: Body SAR test results of LTE Band XXV.

7.2.1 SAR measurement Result of LTE Band XXVI

Test Position of Body with 10mm	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR_{1-g} (W/kg)	Liquid Temp.
			1-g	10-g					
1RB									
Front Side	26865/831.5	15M QPSK 1RB#38	0.848	0.596	-0.020	23.41	23.70	0.907	22.0°C
Front Side	26775/822.5	15M QPSK 1RB#74	1.010	0.708	-0.050	23.32	23.70	1.102	22.0°C
Front Side-repeated	26775/822.5	15M QPSK 1RB#74	1.040	0.731	-0.040	23.32	23.70	1.135	22.0°C
Front Side	26965/841.5	15M QPSK 1RB#0	0.836	0.589	-0.020	22.90	23.70	1.005	22.0°C
Back Side	26865/831.5	15M QPSK 1RB#38	0.802	0.579	-0.010	23.41	23.70	0.857	22.0°C
Back Side	26775/822.5	15M QPSK 1RB#74	0.905	0.653	-0.010	23.32	23.70	0.988	22.0°C
Back Side	26965/841.5	15M QPSK 1RB#0	0.852	0.616	0.000	22.90	23.70	1.024	22.0°C
Left Side	26865/831.5	15M QPSK 1RB#38	0.086	0.052	0.000	23.41	23.70	0.091	22.0°C
Top Side	26865/831.5	15M QPSK 1RB#38	0.448	0.317	-0.020	23.41	23.70	0.479	22.0°C
Bottom Side	26865/831.5	15M QPSK 1RB#38	0.484	0.336	-0.020	23.41	23.70	0.517	22.0°C
50%RB									
Front Side	26865/831.5	15M QPSK 50%RB#18	0.787	0.551	0.000	22.41	22.60	0.822	22.0°C
Front Side	26775/822.5	15M QPSK 50%RB#18	0.881	0.608	0.080	21.88	22.60	1.040	22.0°C
Front Side	26965/841.5	15M QPSK 50%RB#0	0.901	0.634	-0.020	22.08	22.60	1.016	22.0°C
Back Side	26865/831.5	15M QPSK 50%RB#18	0.686	0.495	0.040	22.41	22.60	0.717	22.0°C
Left Side	26865/831.5	15M QPSK 50%RB#18	0.060	0.040	-0.180	22.41	22.60	0.063	22.0°C
Top Side	26865/831.5	15M QPSK 50%RB#18	0.382	0.261	0.140	22.41	22.60	0.399	22.0°C
Bottom Side	26865/831.5	15M QPSK 50%RB#18	0.429	0.290	-0.070	22.41	22.60	0.448	22.0°C
100%RB									
Front Side	26865/831.5	15M QPSK 100%RB#0	0.831	0.581	-0.010	22.19	22.60	0.913	22.0°C
Back Side	26865/831.5	15M QPSK 100%RB#0	0.739	0.533	0.010	22.19	22.60	0.812	22.0°C

Table 15: Body SAR test results of LTE Band XXVI.

7.2.1 SAR measurement Result of LTE Band XLI

Test Position of Body with 10mm	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR_{1-g} (W/kg)	Liquid Temp.
			1-g	10-g					
1RB									
Front Side	41490/2680	20M QPSK 1RB#50	0.233	0.122	-0.030	22.62	23.00	0.254	21.0°C
Back Side	41490/2680	20M QPSK 1RB#50	0.205	0.112	0.160	22.62	23.00	0.224	21.0°C
Left Side	41490/2680	20M QPSK 1RB#50	0.133	0.068	0.060	22.62	23.00	0.145	21.0°C
Top Side	41490/2680	20M QPSK 1RB#50	0.074	0.041	-0.180	22.62	23.00	0.081	21.0°C
Bottom Side	41490/2680	20M QPSK 1RB#50	0.315	0.163	0.140	22.62	23.00	0.344	21.0°C
50%RB									
Front Side	40620/2593	20M QPSK 50%RB#25	0.204	0.105	-0.180	21.51	22.50	0.256	21.0°C
Back Side	40620/2593	20M QPSK 50%RB#25	0.176	0.094	0.020	21.51	22.50	0.221	21.0°C
Left Side	40620/2593	20M QPSK 50%RB#25	0.090	0.048	0.040	21.51	22.50	0.113	21.0°C
Top Side	40620/2593	20M QPSK 50%RB#25	0.036	0.021	0.180	21.51	22.50	0.046	21.0°C
Bottom Side	40620/2593	20M QPSK 50%RB#25	0.205	0.105	0.170	21.51	22.50	0.257	21.0°C

Table 16: Body SAR test results of LTE Band XLI.

7.2.2 SAR measurement Result of WiFi 2.4G

Test Position of Body with 10mm	Test channel / Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR_{1-g} (W/kg)	Liquid Temp.
			1-g Area Scan	1-g Zoom Scan					
Ant1									
Front Side	6/2437	802.11b	0.078	/	-0.010	14.89	16.50	/	21.4°C
Back Side	6/2437	802.11b	0.049	/	-0.100	14.89	16.50	/	21.4°C
Right Side	6/2437	802.11b	0.017	/	0.020	14.89	16.50	/	21.4°C
Bottom Side	6/2437	802.11b	0.160	0.171	0.140	14.89	16.50	0.248	21.4°C
Ant2									
Front Side	6/2437	802.11b	0.125	0.130	-0.030	15.60	16.50	0.160	21.4°C
Back Side	6/2437	802.11b	0.059	/	-0.080	15.60	16.50	/	21.4°C
Right Side	6/2437	802.11b	0.034	/	0.020	15.60	16.50	/	21.4°C
Top Side	6/2437	802.11b	0.271	0.278	0.010	15.60	16.50	0.342	21.4°C
MIMO									
Front Side	6/2437	802.11n	0.075	/	0.180	15.03	15.80	/	21.4°C
Back Side	6/2437	802.11n	0.036	/	-0.170	15.03	15.80	/	21.4°C
Right Side	6/2437	802.11n	0.019	/	0.030	15.03	15.80	/	21.4°C
Top Side	6/2437	802.11n	0.117	0.115	-0.070	15.03	15.80	0.137	21.4°C
Bottom Side	6/2437	802.11n	0.070	/	0.080	15.03	15.80	/	21.4°C

Table 17: Body SAR test results of WiFi 2450MHz

7.2.1 SAR measurement Result of WiFi 5G

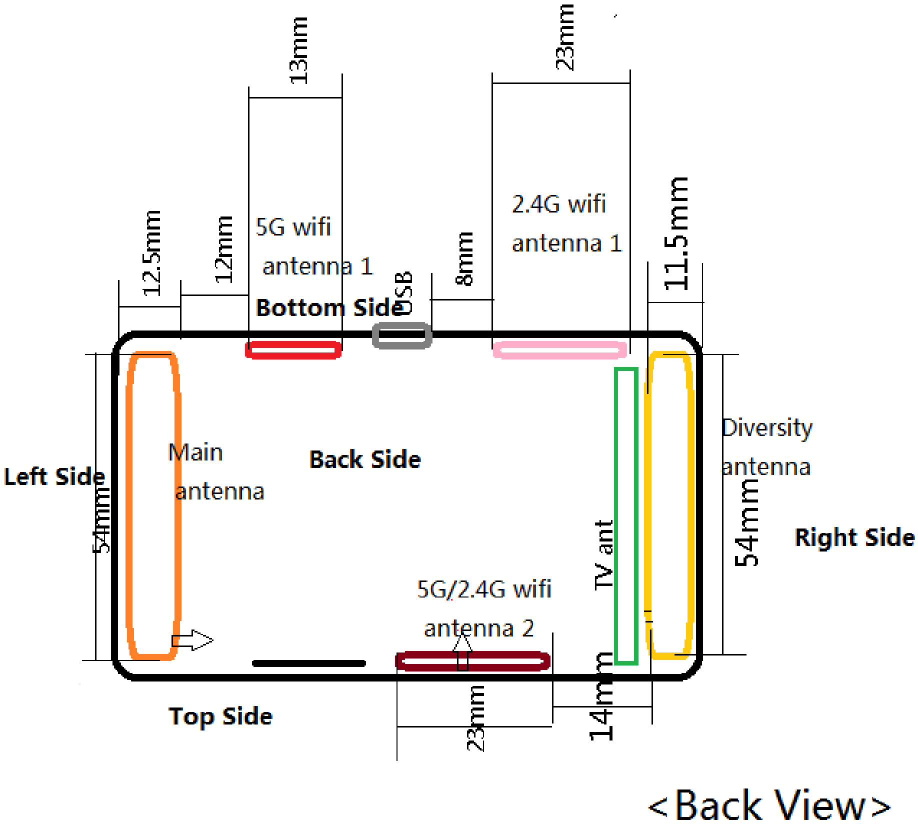
Test Position of Body with 10mm	Test channel / Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR_{1-g} (W/kg)	Liquid Temp.
			1-g Area Scan	1-g Zoom Scan					
Ant1									
Front Side	56/5280	802.11a	0.017	/	0.110	10.47	11.00	0.019	21.4°C
Back Side	56/5280	802.11a	0.005	/	0.040	10.47	11.00	0.005	21.4°C
Left Side	56/5280	802.11a	0.016	/	-0.020	10.47	11.00	0.018	21.4°C
Bottom Side	56/5280	802.11a	0.074	0.055	0.020	10.47	11.00	0.062	21.4°C
Front Side	128/5640	802.11a	0.009	/	-0.170	9.91	11.00	0.011	21.4°C
Back Side	128/5640	802.11a	0.003	/	-0.130	9.91	11.00	0.004	21.4°C
Left Side	128/5640	802.11a	0.005	/	-0.190	9.91	11.00	0.007	21.4°C
Bottom Side	128/5640	802.11a	0.030	0.042	0.190	9.91	11.00	0.054	21.4°C
Ant2									
Front Side	60/5300	802.11a	0.152	/	0.080	10.46	11.00	/	21.4°C
Back Side	60/5300	802.11a	0.001	/	-0.040	10.46	11.00	/	21.4°C
Right Side	60/5300	802.11a	0.003	/	0.090	10.46	11.00	/	21.4°C
Top Side	60/5300	802.11a	0.174	0.171	0.060	10.46	11.00	0.194	21.4°C
Front Side	128/5640	802.11a	0.068	/	-0.190	10.42	11.00	/	21.4°C
Back Side	128/5640	802.11a	0.005	/	0.110	10.42	11.00	/	21.4°C
Right Side	128/5640	802.11a	0.007	/	-0.110	10.42	11.00	/	21.4°C
Top Side	128/5640	802.11a	0.247	0.149	0.130	10.42	11.00	0.170	21.4°C
MIMO									
Front Side	64/5320	802.11n	0.180	0.103	0.020	13.19	14.00	0.124	21.4°C
Back Side	64/5320	802.11n	0.003	/	0.060	13.19	14.00	/	21.4°C
Left Side	64/5320	802.11n	0.004	/	0.060	13.19	14.00	/	21.4°C
Right Side	64/5320	802.11n	0.004	/	0.080	13.19	14.00	/	21.4°C
Top Side	64/5320	802.11n	0.266	0.265	0.130	13.19	14.00	0.319	21.4°C
Bottom Side	64/5320	802.11n	0.084	/	0.110	13.19	14.00	/	21.4°C
Front Side	128/5640	802.11n	0.097	/	-0.070	12.54	14.00	/	21.4°C
Back Side	128/5640	802.11n	0.004	/	0.040	12.54	14.00	/	21.4°C
Left Side	128/5640	802.11n	0.046	/	0.110	12.54	14.00	/	21.4°C
Right Side	128/5640	802.11n	0.004	/	0.100	12.54	14.00	/	21.4°C
Top Side	128/5640	802.11n	0.267	0.143	-0.010	12.54	14.00	0.200	21.4°C
Bottom Side	128/5640	802.11n	0.063	/	0.140	12.54	14.00	/	21.4°C

Table 18: Body SAR test results of WiFi 5GHz

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 447498D01 General RF Exposure Guidance v05r02.

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



Note:

1) Diversity antenna is used to improve the acceptance of performance of the main antenna. It does not have the transmitter function.

The SAR measurement positions of each band are as below:

Antennaa	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
Main Antenna	Yes	Yes	Yes	No	Yes	Yes
2.4G WiFi Antenna1	Yes	Yes	No	Yes	No	Yes
2.4G WiFi Antenna2	Yes	Yes	No	Yes	Yes	No
2.4G WiFi MIMO	Yes	Yes	No	Yes	Yes	Yes
5G WiFi Antenna1	Yes	Yes	Yes	No	No	Yes
5G WiFi Antenna2	Yes	Yes	No	Yes	Yes	No
5G WiFi MIMO	Yes	Yes	Yes	Yes	Yes	Yes

Note: Per KDB 941225 D06, particular DUT edges were not required to be evaluated for SAR if the antenna-to-edge distance is greater than 2.5cm.

7.3.1 Simultaneous Transmission Possibilities

Per FCC KDB 447498D01v05 r02, SAR compliance for simultaneous transmission must be considered when the maximum duration of overlapping transmissions.This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis.

The Simultaneous Transmission Possibilities of this device are as below:

No.	Configuration	Body
1	LTE + 2.4G WiFi SISO	Yes
2	LTE + 2.4G WiFi MIMO	Yes
3	LTE + 5G WiFi SISO	Yes
4	LTE + 5G WiFi MIMO	Yes

Table 19: Simultaneous Transmission Possibilities

Note: WiFi 2.4G and WiFi 5G can't transmit simultaneously.

7.3.2 SAR Summation Scenario

Test Position		Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
MAX 1-g SAR (W/kg)	LTE Band XXV	1.324	0.943	0.379	/	0.256	0.725
	LTE Band XXVI	1.135	1.024	0.091	/	0.479	0.517
	LTE Band XLI	0.256	0.224	0.145	/	0.081	0.344
	2.4G WiFi	0.248	0.248	/	0.248	/	0.248
Σ1-g SAR(W/kg)		**1.568**	1.272	0.379	0.248	0.479	0.973

Table 20: Simultaneous Tx Combination of LTE and 2.4G WiFi Ant1 SISO.

Test Position		Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
MAX 1-g SAR (W/kg)	LTE Band XXV	1.324	0.943	0.379	/	0.256	0.725
	LTE Band XXVI	1.135	1.024	0.091	/	0.479	0.517
	LTE Band XLI	0.256	0.224	0.145	/	0.081	0.344
	2.4G WiFi	0.160	0.342	/	0.342	0.342	/
Σ1-g SAR(W/kg)		**1.484**	1.366	0.379	0.342	0.821	0.725

Table 21: Simultaneous Tx Combination of LTE and 2.4G WiFi Ant2 SISO.

Test Position		Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
MAX 1-g SAR (W/kg)	LTE Band XXV	1.324	0.943	0.379	/	0.256	0.725
	LTE Band XXVI	1.135	1.024	0.091	/	0.479	0.517
	LTE Band XLI	0.256	0.224	0.145	/	0.081	0.344
	2.4G WiFi	0.137	0.137	/	0.137	0.137	0.137
Σ1-g SAR(W/kg)		**1.461**	1.161	0.379	0.137	0.616	0.862

Table 22: Simultaneous Tx Combination of LTE and 2.4G WiFi MIMO.

Test Position		Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
MAX 1-g SAR (W/kg)	LTE Band XXV	1.324	0.943	0.379	/	0.256	0.725
	LTE Band XXVI	1.135	1.024	0.091	/	0.479	0.517
	LTE Band XLI	0.256	0.224	0.145	/	0.081	0.344
	5G WiFi	0.062	0.062	0.062	/	/	0.062
Σ1-g SAR(W/kg)		**1.386**	1.086	0.441	/	0.479	0.787

Table 23: Simultaneous Tx Combination of LTE and 5G WiFi Ant1 SISO.

Test Position		Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
MAX 1-g SAR (W/kg)	LTE Band XXV	1.324	0.943	0.379	/	0.256	0.725
	LTE Band XXVI	1.135	1.024	0.091	/	0.479	0.517
	LTE Band XLI	0.256	0.224	0.145	/	0.081	0.344
	5G WiFi	0.194	0.194	/	0.194	0.194	/
Σ1-g SAR(W/kg)		**1.518**	1.218	0.379	0.194	0.673	0.725

Table 24: Simultaneous Tx Combination of LTE and 5G WiFi Ant2 SISO.

Test Position		Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
MAX 1-g SAR (W/kg)	LTE Band XXV	1.324	0.943	0.379	/	0.256	0.725
	LTE Band XXVI	1.135	1.024	0.091	/	0.479	0.517
	LTE Band XLI	0.256	0.224	0.145	/	0.081	0.344
	5G WiFi	0.124	0.319	0.319	0.319	0.319	0.319
Σ1-g SAR(W/kg)		**1.448**	1.343	0.698	0.319	0.798	1.044

Table 25: Simultaneous Tx Combination of LTE and 5G WiFi MIMO.

7.3.3 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 D01v05r02.

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 documentations

(Pls See Appendix D.)

End