

FCC SAR Test Report

FCC ID: QISAGS2-L03

Project No. : 1808C216
Equipment : HUAWEI MediaPad T5
Model Name : AGS2-L03
Applicant : Huawei Technologies Co., Ltd.
Address : Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Date of Receipt : Aug. 24, 2018
Date of Test : Aug. 27, 2018 ~ Sep. 10, 2018
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Tested by : BTL Inc.

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BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

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BTL's laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCC SAR-1-1808C216	Original Issue	Sep. 21, 2018

1. GENERAL SUMMARY

Equipment	HUAWEI MediaPad T5
Brand Name	HUAWEI
Model Name	AGS2-L03
Model difference(s)	N/A
Manufacturer	Huawei Technologies Co., Ltd.
Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Factory	Huawei Technologies Co., Ltd.
Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Standard(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 1528-2013 Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques KDB941225 D01 3G SAR Procedures v03r01 KDB941225 D05 SAR for LTE Devices v02r05 KDB941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r02 KDB447498 D01 General RF Exposure Guidance v06 KDB648474 D04 Handset SAR v01r03 KDB248227 D01 802. 11 Wi-Fi SAR v02r02 KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04 KDB865664 D02 SAR Reporting v01r02 KDB690783 D01 SAR Listings on Grants v01r03 KDB616217 D04 SAR for laptop and tablets v01r02

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCC SAR-1-1808C216) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP according to the ISO-17025 quality assessment standard and technical standard(s).

2. RF EMISSIONS MEASUREMENT

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **SAR room** at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

BTL's test firm number for FCC: 854385

BTL's test designation number for FCC: CN5020

2.2 MEASUREMENT UNCERTAINTY

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

3. GENERAL INFORMATION

3.1 STATEMENT OF COMPLIANCE

Equipment Class	Mode	Highest Body Reported SAR-1g (W/kg) Sensor on	Highest Body Reported SAR-1g (W/kg) Sensor off
PCE	GSM850	0.51	0.26
	GSM1900	0.35	0.40
	UMTS Band 2	0.20	0.46
	UMTS Band 4	0.38	0.52
	UMTS Band 5	0.19	0.25
	LTE Band 2	0.29	0.43
	LTE Band 4	0.21	0.43
	LTE Band 5	0.15	0.24
	LTE Band 7	0.35	0.31
	LTE Band 12	0.12	0.09
DTS	2.4G WLAN	0.63	0.12
NII	5.3G WLAN	0.74	0.59
	5.6G WLAN	0.44	0.37
	5.8G WLAN	0.18	0.25
Note: The highest reported SAR for body and simultaneous transmission exposure conditions are 0.74W/kg and 0.97W/Kg respectively.			

Note:

- 1) The device is in compliance with Specific Absorption Rate(SAR)for general population uncontrolled exposure limits according to the FCC rule §2.1093, the ANSI C95.1:1992/IEEE C95.1:1991, the NCRP Report Number 86 for uncontrolled environment and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 .
- 2) According to TCB workshop October, 2014 RF Exposure Procedures Update(Overlapping LTE Bands):SAR for LTE Band 17 (Frequency range:704-716 MHz) is covered by LTE Band 12 (Frequency range:699-716 MHz) due to similar frequency range, same maximum tune up limit and same channel bandwidth.

3.2 GENERAL DESCRIPTION OF EUT

Equipment	HUAWEI MediaPad T5		
Brand Name	HUAWEI		
Model Name	AGS2-L03		
IMEI Code	004401721233423		
S/N	FQCBB18808150020		
HW Version	A6t6e		
SW Version	AGS2-L03 8.0.0.20(C605)		
Modulation	GSM(GMSK/8PSK),UMTS(QPSK),LTE(QPSK/16QAM),WiFi(DSSS/OFDM),BT(GFSK/ π /4-DQPSK/8-DPSK)		
Operation Frequency Range(s)	Band	TX (MHz)	RX (MHz)
	GSM850	824-849	869-894
	GSM1900	1850-1910	1930-1990
	UMTS Band 2	1850-1910	1930-1990
	UMTS Band 4	1710-1755	2110-2155
	UMTS Band 5	824-849	869-894
	LTE Band 2	1850-1910	1930-1990
	LTE Band 4	1710-1755	2110-2155
	LTE Band 5	824-849	869-894
	LTE Band 7	2500-2570	2620-2690
	LTE Band 12	699-716	729-746
	LTE Band 17	704-716	734-746
	Bluetooth	2402-2480	
	WIFI	2412-2462	
		5150-5250	
5250-5350			
5470-5725			
5725-5850			
GPRS/EDGE Multislot Class(12)	Max Number of Timeslots in Uplink:	4	
	Max Number of Timeslots in Downlink:	4	
	Max Total Timeslot:	5	
GSM Device class	Class B		
HSDPA UE Category	14		
HSUPA UE Category	6		
DC-HSDPA Category	24		
Power Class:	4,tested with power level 5(GSM850)		
	1,tested with power level 0(GSM1900)		
	3, tested with power control “all 1”(UMTS Band 2/4/5)		
	3, tested with power control “all Max” (LTE Band 2/4/5/7/12/17)		
Test Channels (low-mid-high):	128-190-251 (GSM850)		
	512-661-810 (GSM1900)		
	9262-9400-9538(UMTS Band 2)		
	1312-1413-1513 (UMTS Band 4)		
	4132-4182-4233 (UMTS Band 5)		
	18700-18900-19100(LTE Band 2 BW=20MHz)		
	20050-20175-20300(LTE Band 4 BW=20MHz)		
	20450-20525-20600(LTE Band 5 BW=10MHz)		
	20850-21100-21350(LTE Band 7 BW=20MHz)		
	23060-23095-23130(LTE Band 12 BW=10MHz)		
	23780-23790-23800(LTE Band 17 BW=10MHz)		
	0-39-78 (BT)		
	0-19-39 (BLE)		
	1-6-11 (2.4G WIFI 802.11b/g/n HT20)		
	3-6-9 (2.4G WIFI 802.11n HT40)		

	5G WIFI	5.2G	5.3G	5.5G	5.8G
	a/n HT20/ ac HT20	36-40-44-48	52-56-60-64	100-104-108-112- 116-132-136-140	149-153-157 -161-165
	n HT40/ ac HT40	38-46	54-62	102-134	151-159
	ac VH80	42	58	106-138	155
Antenna Gain	Band		ANT Main(dBi)		
	GSM 850		-0.40		
	GSM 1900		1.60		
	UMTS B2		0.90		
	UMTS B4		0.20		
	UMTS B5		-0.40		
	LTE B2		0.90		
	LTE B4		0.20		
	LTE B5		-0.40		
	LTE B7		0.80		
	LTE B12		-0.10		
	LTE B17		-0.10		
	BT/LE		0.10		
	WLAN 2.4G		0.10		
	WLAN 5G		1.00		
Other Information					
Battery	Huawei Technologies Co.,Ltd. Battery Model: HB2899C0ECW-C Rated capacity: 4980mAh Nominal Voltage:  + 3.82V Charging Voltage:  + 4.40V 1. SCUD (FUJIAN) Electronics Co., Ltd.				
With Earphone(Yes/No)	No				

3.3 LABORATORY ENVIRONMENT

Temperature	Min. = 18°C, Max. = 25°C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards.	
Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

3.4 MAIN TEST INSTRUMENTS

Item	Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Interval
1	Data Acquisition Electronics	Speag	DAE4	1390	May 11, 2018	1 Year
2	E-field Probe	Speag	EX3DV4	7396	May 29, 2018	1 Year
3	System Validation Dipole	Speag	D750V3	1095	Jun. 05, 2018	3 Years
4	System Validation Dipole	Speag	D835V2	4d160	Jun. 05, 2018	3 Years
5	System Validation Dipole	Speag	D1750V2	1101	Jun. 07, 2018	3 Years
6	System Validation Dipole	Speag	D1900V2	5d179	Jun. 07, 2018	3 Years
7	System Validation Dipole	Speag	D2450V2	919	Jun. 11, 2018	3 Years
8	System Validation Dipole	Speag	D2600V2	1067	Jun. 11, 2018	3 Years
9	System Validation Dipole	Speag	D5GHzV2	1160	Jun. 20, 2018	3 Years
10	ELI4 Phantom	Speag	ELI4 Phantom V5.0	1222	N/A	N/A
11*	8960 Series 10 Wireless Com Test set	Agilent	E5515E	MY52112163	Aug. 11, 2018	1 Year
12	CMW500-Wideband Radio Communication Tester	RS	CMW500	152372	Mar. 11, 2018	1Year
13	CMW500-Wideband Radio Communication Tester	RS	CMW500	153883	Mar. 11, 2018	1Year
14	Power Amplifier	Mini-Circuits	ZHL-42W+	QA1333003	Mar. 09, 2018	1Year
15	Power Amplifier	Mini-Circuits	ZVE-8G+	520701341	Mar. 09, 2018	1Year
16	ENA Network Analyzer	Agilent	E5071C	MY46102965	Mar. 11, 2018	1 Year
17*	MXG Analog Signal Generator	Agilent	N5181A	MY49060477	Aug. 11, 2018	1 Year
18*	P-series power meter	Agilent	N1911A	MY45100473	Aug. 11, 2018	1 Year
19*	wideband power sensor	Agilent	N1921A	MY51100041	Aug. 11, 2018	1 Year
20	power Meter	Anritsu	ML2495A	1128009	Mar. 11, 2018	1 Year
21	Pulse Power Sensor	Anritsu	MA 2411B	1027500	Mar. 11, 2018	1 Year
22	Dielectric Assessment Kit	Speag	DAK-3.5	1226	N/A	N/A
23	Dual directional coupler	Woken	TS-PCC0M-05	107090019	Mar. 11, 2018	1 Year
24	coupler	Woken	0110A05601O-10	COM5BNW1A2	Mar. 11, 2018	1 Year
25*	Bluetooth Test Set	Anritsu	Mt8852B-042	1132009	Aug. 11, 2018	1 Year
26	Digital Thermometer	LKM	DTM3000	3519	Jul. 19, 2018	1 Year
27	Thermohygrometer	TESTO	608-H1	1341359457/304	Oct. 12, 2017	1 Year

Remark:

1. "N/A" denotes no model name, serial No. or calibration specified.
2. * These test equipments have been recalibrated between the test periods. All these test equipments were within the valid period when the tests were performed.
3. 1) Per KDB865664 D01 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 5 Ω from the previous measurement.
- 2) Network analyzer probe calibration against air, distilled water and a short block performed before measuring liquid parameters.

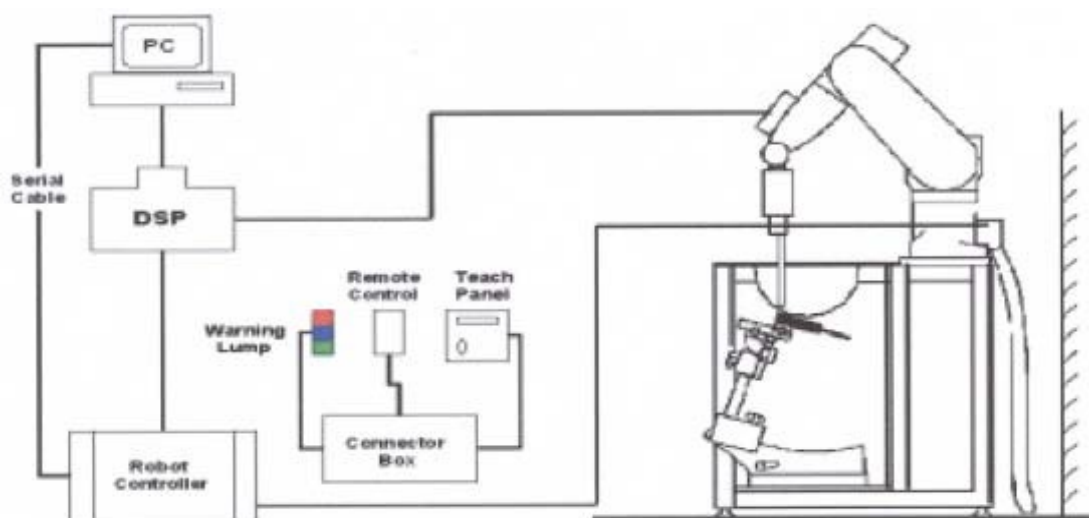
4. SAR MEASUREMENTS SYSTEM CONFIGURATION

4.1 SAR MEASUREMENT SET-UP

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

1. A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. 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.
3. 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.
4. A unit to operate the optical surface detector which is connected to the EOC.
5. 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.
6. 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
7. DASY5 software and SEMCAD data evaluation software.
8. Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
9. The generic twin phantom enabling the testing of left-hand and right-hand usage.
10. The device holder for handheld mobile phones.
11. Tissue simulating liquid mixed according to the given recipes.
12. System validation dipoles allowing to validate the proper functioning of the system.

4.1.1 TEST SETUP LAYOUT

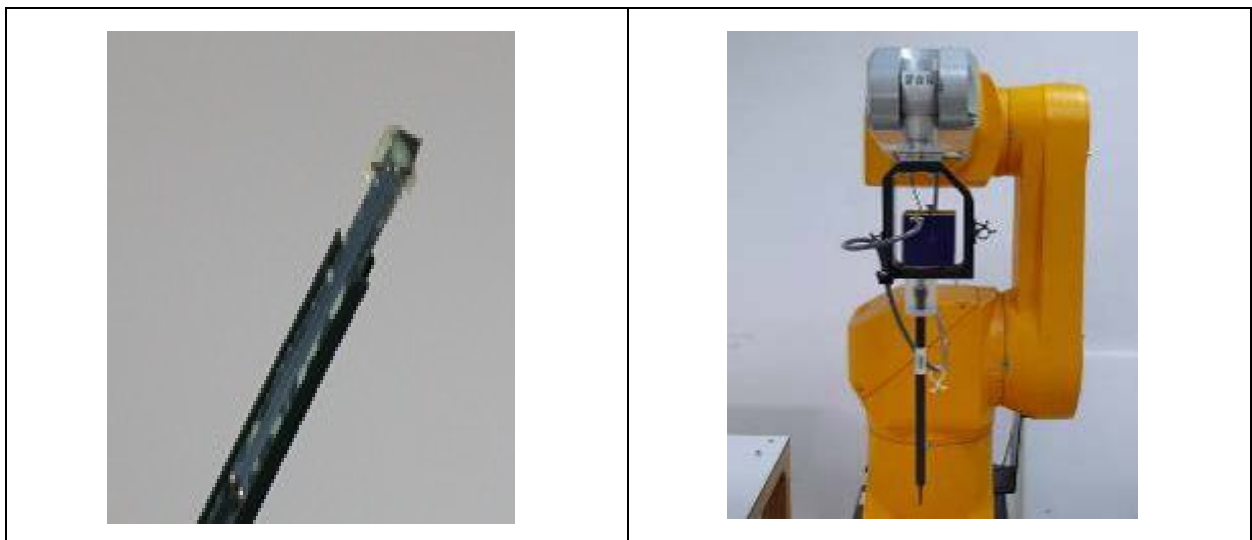


4.2 DASY5E-FIELDPROBESYSTEM

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

4.2.1 EX3DV4 PROBE SPECIFICATION

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 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 μ W/g to > 100 mW/g Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.0 mm



EX3DV4 E-field Probe

4.2.2 E-FIELD PROBE CALIBRATION

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than $\pm 10\%$. The spherical isotropy was evaluated and found to be better than $\pm 0.25\text{dB}$. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies below 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\text{SAR} = C \frac{\Delta T}{\Delta t}$$

Where: Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

Or
$$\text{SAR} = \frac{|E|^2 \sigma}{\rho}$$

Where: σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

4.2.3 OTHER TEST EQUIPMENT

4.2.3.1. Device Holder for Transmitters

Construction: Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices (e.g., laptops, cameras, etc.) It is light weight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI4 and SAM v6.0 Phantoms.

Material: POM, Acrylic glass, Foam

4.2.3.2 Phantom

Model	ELI4 Phantom	
Construction	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
Shell Thickness	2±0.1 mm	
Filling Volume	Approx. 30 liters	
Dimensions	Length: 600 mm ; Width: 190mm Height: adjustable feet	
Available	Special	

Model	Twin SAM	
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.	
Shell Thickness	2 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000mm; Width: 500mm Height: adjustable feet	
Available	Special	

4.2.4 SCANNING PROCEDURE

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. 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. $\pm 5\%$.

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 $\pm 0.1\text{mm}$). 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 $\pm 30^\circ$.)

- Area Scan

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 ($\leq 2\text{GHz}$), 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.

- Zoom Scan

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: $\Delta x_{\text{zoom}}, \Delta y_{\text{zoom}} \leq 2\text{GHz} - \leq 8\text{mm}$, 2-4GHz - $\leq 5\text{ mm}$ and 4-6 GHz - $\leq 4\text{mm}$; $\Delta z_{\text{zoom}} \leq 3\text{GHz} - \leq 5\text{ mm}$, 3-4 GHz - $\leq 4\text{mm}$ and 4-6GHz - $\leq 2\text{mm}$ 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 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.

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

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

4.2.5 SPATIAL PEAK SAR EVALUATION

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

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting "Graph Evaluated".
- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.
- All neighboring volumes are evaluated until no neighboring volume with a higher average value is found.

Extrapolation

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

Interpolation

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computer mathematik, 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 compensate boundary effects on E-field probes.

4.2.6 DATA STORAGE AND EVALUATION

4.2.6.1 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.

4.2.7 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	Normi, a_{i0} , a_{i1} , a_{i2}
	Conversion factor	ConvF _i
	Diode compression point	Dcp _i
Device parameters:	Frequency	f
	Crest factor	cf
Media parameters:	Conductivity	
	Density	

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 multi meter 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:

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

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

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):

$$E_{\text{tot}} = (E_X^2 + E_Y^2 + E_Z^2)^{1/2}$$

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

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

With SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m
= conductivity in [mho/m] or [Siemens/m]
= equivalent tissue density in g/cm³

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.

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

With P_{pwe} = equivalent power density of a plane wave in mW/cm²

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

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

5. SYSTEM VERIFICATION PROCEDURE

5.1 TISSUE VERIFICATION

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within $\pm 5\%$ of the target values.

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

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
Body 750	0.2	-	0.2	0.8	48.8	-	50.0	-
Body 835	0.2	-	0.2	0.9	48.5	-	50.2	-
Body 1750	-	31.0	-	0.2	-	-	68.8	-
Body 1900	-	29.5	-	0.3	-	-	70.2	-
Body 2450	-	31.4	-	0.1	-	-	68.5	-
Body 2600	-	31.8	-	0.1	-	-	68.1	-
Body 5G	-	-	-	-	-	10.7	78.6	10.7

Salt: 99+% Pure Sodium Chloride; Sugar: 98+% Pure Sucrose; Water: De-ionized, 16M + 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

Tissue Verification									
Tissue Type	Frequency (MHz)	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Targeted Conductivity (σ)	Targeted Permittivity (ϵ_r)	Deviation Conductivity (σ) (%)	Deviation Permittivity (ϵ_r) (%)	Date
Body	750	22.4	0.968	55.193	0.96	55.5	0.83	-0.55	Sep. 06, 2018
Body	835	22.4	0.991	55.289	0.97	55.2	2.16	0.16	Sep. 06, 2018
Body	1750	22.3	1.498	52.487	1.49	53.4	0.54	-1.71	Sep. 07, 2018
Body	1900	22.5	1.554	53.591	1.52	53.3	2.24	0.55	Sep. 07, 2018
Body	2450	22.5	1.982	51.386	1.95	52.7	1.64	-2.49	Sep. 06, 2018
Body	2600	22.5	2.206	52.282	2.16	52.5	2.13	-0.42	Sep. 06, 2018
Body	5300	22.6	5.487	47.447	5.42	48.9	1.24	-2.97	Sep. 09, 2018
Body	5300	22.5	5.480	47.297	5.42	48.9	1.11	-3.28	Sep. 19, 2018
Body	5500	22.6	5.772	47.087	5.65	48.6	2.16	-3.11	Sep. 09, 2018
Body	5500	22.5	5.752	46.872	5.65	48.6	1.81	-3.56	Sep. 19, 2018
Body	5600	22.6	5.920	46.900	5.77	48.5	2.60	-3.30	Sep. 09, 2018
Body	5600	22.5	5.885	46.679	5.77	48.5	1.99	-3.75	Sep. 19, 2018
Body	5800	22.6	6.209	46.515	6.00	48.2	3.48	-3.50	Sep. 09, 2018
Body	5800	22.5	6.163	46.344	6.00	48.2	2.72	-3.85	Sep. 19, 2018

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.

5.2 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 Std 1528 (described above). The following table shows system check results for all frequency bands and tissue liquids used during the tests.

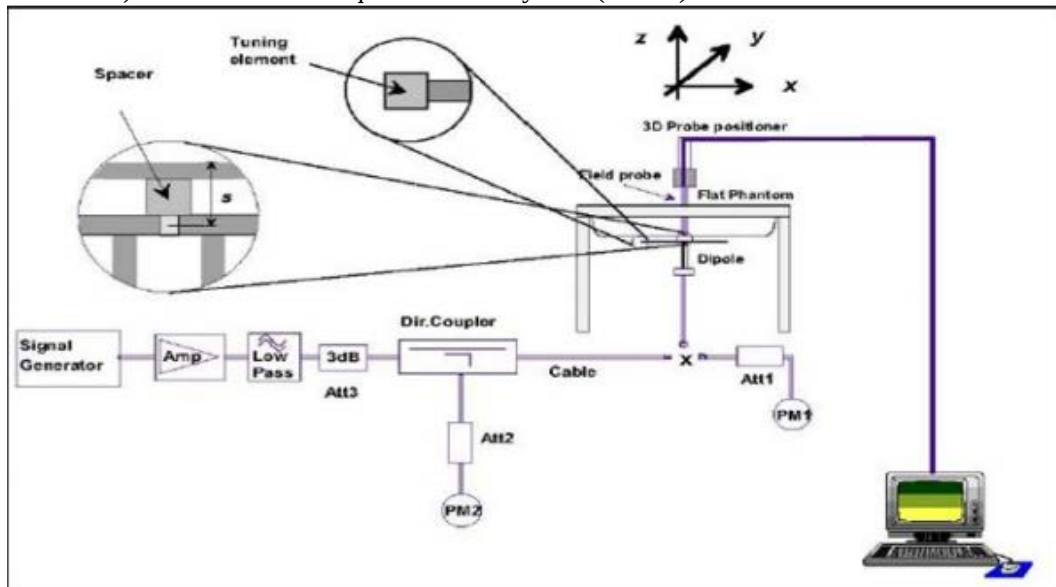
System Check	Date	Frequency (MHz)	Targeted SAR-1g (W/kg)	Measured SAR-1g (W/kg)	normalized SAR-1g (W/kg)	Deviation (%)	Dipole S/N
Body	Sep. 06, 2018	750	8.51	2.09	8.36	-1.76	1095
Body	Sep. 06, 2018	835	9.53	2.46	9.84	3.25	4d160
Body	Sep. 07, 2018	1750	37.40	8.95	35.80	-4.28	1101
Body	Sep. 07, 2018	1900	39.80	10.40	41.60	4.52	5d179
Body	Sep. 06, 2018	2450	50.80	13.10	52.40	3.15	919
Body	Sep. 06, 2018	2600	55.20	13.60	54.40	-1.45	1067
Body	Sep. 09, 2018	5300	72.30	7.04	70.40	-2.63	1160
Body	Sep. 09, 2018	5300	72.30	7.04	70.40	-2.63	1160
Body	Sep. 19, 2018	5300	72.30	7.03	70.30	-2.77	1160
Body	Sep. 09, 2018	5500	76.20	7.72	77.20	1.31	1160
Body	Sep. 19, 2018	5500	76.20	7.69	76.90	0.92	1160
Body	Sep. 09, 2018	5600	77.70	8.08	80.80	3.99	1160
Body	Sep. 19, 2018	5600	77.70	8.13	81.30	4.63	1160
Body	Sep. 09, 2018	5800	76.60	7.68	76.80	0.26	1160

5.3 SYSTEM CHECK PROCEDURE

The system check is performed by using a system check dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 250 mW (below 3GHz) or 100mW (3-6GHz). To adjust this power a power meter is used.

The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system check to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test.

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 ($\pm 10\%$).



6. SAR MEASUREMENT VARIABILITY AND UNCERTAINTY

6.1 SAR MEASUREMENT VARIABILITY

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz, 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 ($\sim 10\%$ 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 8.2.

7. OPERATIONAL CONDITIONS DURING TEST

7.1 SAR TEST CONFIGURATION

7.1.1 GSM TEST CONFIGURATION

SAR tests for GSM850 and GSM1900, a communication link is set up with a base station by air link. Using 8960 Series the power lever is set to “5” and “0” in SAR of GSM850 and GSM1900. The tests in the band of GSM850 and GSM1900 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. The EGPRS class is 12 for this EUT, it has at most 4 timeslots in uplink, and at most 4 timeslots in downlink, the maximum total timeslot is 5.

When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8PSK.

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot.

The allowed power reduction in the multi-slot configuration is as following:

Number of timeslots in uplink assignment		Reduction of maximum output power (dB)		
Band	Time Slots	GPRS (GMSK)	EGPRS (GMSK)	EGPRS (8PSK)
GSM850	1 TX slot	0.0	0.0	6.4
	2 TX slots	3.0	3.0	9.4
	3 TX slots	4.8	4.8	11.2
	4 TX slots	6.0	6.0	12.4
GSM1900	1 TX slot	0.0	0.0	4.3
	2 TX slots	3.0	3.0	7.3
	3 TX slots	4.8	4.8	9.1
	4 TX slots	6.0	6.0	10.3

7.1.2 UMTS TEST CONFIGURATION

1. Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the procedures description in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all “1s” for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Result for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) Should be tabulated in the SAR report. All configuration that are not supported by the DUT or cannot be measured due to technical or equipment limitation should be clearly identified.

2. WCDMA

(1). Head SAR Measurements

SAR for next to ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1s”. The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR with 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

(2). Body SAR Measurements

SAR for body-worn accessory is measured using the 12.2 kbps RMC with the TPC bits configured to all “1s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by handset with 12.2 kbps RMC as the primary mode.

3. HSDPA

SAR for body exposure configurations is measured according to the “Body SAR Measurements” procedures of 3G device. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

Per KDB941225 D01, the 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSDPA using the HSDPA body SAR procedures for the highest reported SAR body exposure configuration in 12.2 kbps RMC.

HSDPA should be configured according to UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HAPRQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission condition, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. The β_c and β_d gain factors for DPCCH and DPDCH were set according to the values in the below table, β_{hs} for HS-DPCCH is set automatically to the correct value when ΔACK , $\Delta NACK$, $\Delta CQI = 8$. The variation of the β_c / β_d ratio causes a power reduction at sub-tests 2 - 4.

Sub-test ^o	β_c ^o	β_d ^o	β_d (SF) ^o	β_c / β_d ^o	β_{hs} (1) ^o	CM(dB)(2) ^o	MPR (dB) ^o
1 ^o	2/15 ^o	15/15 ^o	64 ^o	2/15 ^o	4/15 ^o	0.0 ^o	0 ^o
2 ^o	12/15(3) ^o	15/15(3) ^o	64 ^o	12/15(3) ^o	24/15 ^o	1.0 ^o	0 ^o
3 ^o	15/15 ^o	8/15 ^o	64 ^o	15/8 ^o	30/15 ^o	1.5 ^o	0.5 ^o
4 ^o	15/15 ^o	4/15 ^o	64 ^o	15/4 ^o	30/15 ^o	1.5 ^o	0.5 ^o
Note 1: ΔACK , $\Delta NACK$ and $\Delta CQI = 8$ $A_{hs} = \beta_{hs} / \beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$							
Note 2 : CM=1 for $\beta_c / \beta_d = 12/15$, $\beta_{hs} / \beta_c = 24/15$. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases. ^o							
Note 3 : For subtest 2 the β_c / β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$ ^o							

The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK.

Settings of required H-Set 1 QPSK acc. to 3GPP 34.121

Parameter	Value
Nominal average inf. bit rate	534 kbit/s
Inter-TTI Distance	3 TTI"s
Number of HARQ Processes	2 Processes
Information Bit Payload	3202 Bits
MAC-d PDU size	336 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	4800 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	9600 SMLs
Coding Rate	0.67
Number of Physical Channel Codes	5

HSDPA UE category

HS-DSCH Category	Maximum HS-DSCH Codes Received	Minimum Inter-TTI Interval	Maximum HS-DSCH Transport Block Bits/HS-DSCH TTI	Total Soft Channel Bits
1	5	3	7298	19200
2	5	3	7298	28800
3	5	2	7298	28800
4	5	2	7298	38400
5	5	1	7298	57600
6	5	1	7298	67200
7	10	1	14411	115200
8	10	1	14411	134400
9	15	1	25251	172800
10	15	1	27952	172800
11	5	2	3630	14400
12	5	1	3630	28800
13	15	1	34800	259200
14	15	1	42196	259200
15	15	1	23370	345600
16	15	1	27952	345600

4. HSUPA

SAR for Body exposure configurations is measured according to the “Body SAR Measurements” procedures of 3G device. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq 1/4$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is $\leq 1.2\text{W/kg}$, SAR measurement is not required for the secondary mode.

Per KDB941225 D01, the 3G SAR test reduction procedures is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures for the highest reported body exposure SAR configuration in 12.2 kbps RMC.

Due to inner loop power control requirements in HSUPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSDPA should be configured according to the values indicated below as well as other applicable procedures described in the “WCDMA Handset” and „Release 5 HSDPA Data Device” sections of 3G device.

Subtests for WCDMA Release 6 HSUPA

Sub-test ^o	β_c ^o	β_d ^o	β_d (SF) ^o	β_c/β_d ^o	$\beta_{hs}(1)$ ^o	β_{ec} ^o	β_{ed} ^o	β_c (SF) ^o	β_{ed} (code) ^o	CM ⁽²⁾ ^o (dB) ^o	MP R ^o (dB) ^o	AG ⁽⁴⁾ Inde ^o	E-TFC I ^o
1 ^o	11/15 ⁽³⁾ ^o	15/15 ⁽³⁾ ^o	64 ^o	11/15 ⁽³⁾ ^o	22/15 ^o	209/225 ^o	1039/225 ^o	4 ^o	1 ^o	1.0 ^o	0.0 ^o	20 ^o	75 ^o
2 ^o	6/15 ^o	15/15 ^o	64 ^o	6/15 ^o	12/15 ^o	12/15 ^o	94/75 ^o	4 ^o	1 ^o	3.0 ^o	2.0 ^o	12 ^o	67 ^o
3 ^o	15/15 ^o	9/15 ^o	64 ^o	15/9 ^o	30/15 ^o	30/15 ^o	$\beta_{ed1}:47/15$ $\beta_{ed2}:47/15$	4 ^o	2 ^o	2.0 ^o	1.0 ^o	15 ^o	92 ^o
4 ^o	2/15 ^o	15/15 ^o	64 ^o	2/15 ^o	4/15 ^o	2/15 ^o	56/75 ^o	4 ^o	1 ^o	3.0 ^o	2.0 ^o	17 ^o	71 ^o
5 ^o	15/15 ⁽⁴⁾ ^o	15/15 ⁽⁴⁾ ^o	64 ^o	15/15 ⁽⁴⁾ ^o	30/15 ^o	24/15 ^o	134/15 ^o	4 ^o	1 ^o	1.0 ^o	0.0 ^o	21 ^o	81 ^o
Note 1: ΔACK , ΔNACK and $\Delta \text{CQI} = 8$ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$ Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference. Note 3 : For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$. Note 4 : For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$. Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g. Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.													

HSUPA UE category

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI(ms)	Minimum Spreading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	10	2SF2&2SF4	11484	5.76
	4	4	2		20000	2.00
7 (No DPDCH)	4	8	2	2SF2&2SF4	22996	?
	4	4	10		20000	?

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4. UE categories 1 to 6 support QPSK only. UE category 7 supports QPSK and 16QAM. (TS25.306-7.3.0).

5. DC-HSDPA

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel.5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a Second serving HS-DSCH cell are required to perform the power measurement and for the results to be acceptable.

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS 34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0 Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH_Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

The measurements were performed with a Fixed Reference Channel (FRC) H-Set 12 with QPSK

Parameter	Value
Nominal average inf. bit rate	60 kbit/s
Inter-TTI Distance	1 TTI"s
Number of HARQ Processes	6 Processes
Information Bit Payload	120 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	960 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	3200 SMLs
Coding Rate	0.15
Number of Physical Channel Codes	1

Note:

- 1.The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table above.
- 2.Maximum number of transmission is limited to 1,i.e.,retransmission is not allowed. The redundancy and constellation version 0 shall be used.

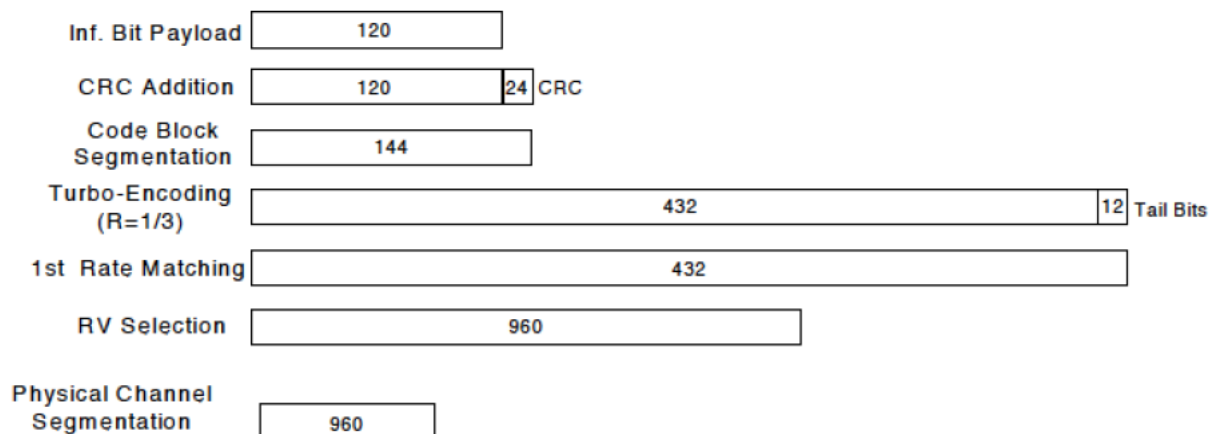


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 5 procedures. A summary of subtest settings are illustrated below:

Sub-test ^o	β_c ^o	β_d ^o	β_d (SF) ^o	β_c/β_d ^o	$\beta_{hs}(1)$ ^o	CM(dB)(2) ^o	MPR (dB) ^o
1 ^o	2/15 ^o	15/15 ^o	64 ^o	2/15 ^o	4/15 ^o	0.0 ^o	0 ^o
2 ^o	12/15(3) ^o	15/15(3) ^o	64 ^o	12/15(3) ^o	24/15 ^o	1.0 ^o	0 ^o
3 ^o	15/15 ^o	8/15 ^o	64 ^o	15/8 ^o	30/15 ^o	1.5 ^o	0.5 ^o
4 ^o	15/15 ^o	4/15 ^o	64 ^o	15/4 ^o	30/15 ^o	1.5 ^o	0.5 ^o

Note 1: Δ ACK, Δ NACK and Δ CQI=8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$ ^o

Note 2: CM=1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.^o

Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$ ^o

Up commands are set continuously to set the UE to Max power.

Note:

1. The Dual Carriers transmission only applies to HSDPA physical channels.
2. The Dual Carriers belong to the same Node and are on adjacent carriers.
3. The Dual Carriers do not support MIMO to serve UEs configured for dual cell operation
4. The Dual Carriers operate in the same frequency band.
5. The device doesn't support the modulation of 16QAM in uplink but 64QAM in downlink for DC-HSDPA mode.
6. The device doesn't support carrier aggregation for it just can operate in Release 8.

7.1.3 LTE TEST CONFIGURATION

SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices. The CMW500 Wide Band 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 (N_{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 $> \frac{1}{2}$ 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 $> \frac{1}{2}$ 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.

7.1.4 LTE CARRIER AGGREGATION POWER

LTE Rel.10 Carrier Aggregation

As the KDB 941225 D05A, when downlink carrier aggregation is active uplink maximum output power remains within the specified tune-up tolerance limits and not more than 1/4dB higher than the maximum output power measured when downlink carrier aggregation is inactive, the CA test is not required.

Contiguous intra-band CA

Appendix : E-UTRA CA configuration / Bandwidth combination set					
E-UTRA CA configuration	Uplink CA configurations	Component carriers in order of increasing carrier frequency		Maximum aggregated bandwidth [MHz]	Bandwidth combination set
		Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]		
CA_2C	NA	5	20	40	0
		10	15,20		
		15	10,15,20		
		20	5,10,15,20		
CA_5B	NA	5,10	10	20	0
		10	5		
CA_7C	NA	15	15	40	0
		20	20		
		10	20	40	1
		15	15, 20		
		20	10, 15, 20		
		15	10,15	40	2
		20	15,20		
CA_12B	NA	5	5,10	15	0
NOTE 1: The CA configuration refers to an operating band and a CA bandwidth class specified in Table 5.6A-1 (the indexing letter). Absence of a CA bandwidth class for an operating band implies support of all classes. NOTE 2: For the supported CC bandwidth combinations, the CC downlink and uplink bandwidths are equal. NOTE 3: Uplink CA configurations are the configurations supported by the present release of specifications.					

Note:

- 1) For the inter-band CA combinations, all the listed bands above can be used as PCC or SCC.
- 2) The channel spacing and aggregated channel bandwidth for CA are identical to the associated specification in 3GPP TS 36.101 V13.2.0.
- 3) The reference test frequencies for CA refers to 3GPP TS 36.508 V13.1.0

Test frequencies for CA_2C

Range	CC-Combo / N _{RB_agg} [RB]	CC1 Note1					CC2 Note1				
		BW [RB]	N _{UL}	f _{UL} [MHz]	N _{DL}	f _{DL} [MHz]	BW [RB]	N _{UL}	f _{UL} [MHz]	N _{DL}	f _{DL} [MHz]
Low	25+100	25	18633	1853.3	633	1933.3	100	18750	1865	750	1945
		100	18700	1860	700	1940	25	18817	1871.7	817	1951.7
	50+75	50	18653	1855.3	653	1935.3	75	18773	1867.3	773	1947.3
		75	18675	1857.5	675	1937.5	50	18795	1869.5	795	1949.5
	50+100	50	18655	1855.5	655	1935.5	100	18799	1869.9	799	1949.9
		100	18700	1860	700	1940	50	18844	1874.4	844	1954.4
	75+75	75	18675	1857.5	675	1937.5	75	18825	1872.5	825	1952.5
	75+100	75	18678	1857.8	678	1937.8	100	18849	1874.9	849	1954.9
		100	18700	1860	700	1940	75	18871	1877.1	871	1957.1
	100+100	100	18700	1860	700	1940	100	18898	1879.8	898	1959.8
Mid	25+100	25	18808	1870.8	808	1950.8	100	18925	1882.5	925	1962.5
		100	18875	1877.5	875	1957.5	25	18992	1889.2	992	1969.2
	50+75	50	18829	1872.9	829	1952.9	75	18949	1884.9	949	1964.9
		75	18851	1875.1	851	1955.1	50	18971	1887.1	971	1967.1
	50+100	50	18806	1870.6	806	1950.6	100	18950	1885	950	1965
		100	18851	1875.1	851	1955.1	50	18995	1889.5	995	1969.5
	75+75	75	18825	1872.5	825	1952.5	75	18975	1887.5	975	1967.5
	75+100	75	18803	1870.3	803	1950.3	100	18974	1887.4	974	1967.4
		100	18826	1872.6	826	1952.6	75	18997	1889.7	997	1969.7
	100+100	100	18801	1870.1	801	1950.1	100	18999	1889.9	999	1969.9
High	25+100	25	18983	1888.3	983	1968.3	100	19100	1900	1100	1980
		100	19050	1895	1050	1975	25	19167	1906.7	1167	1986.7
	50+75	50	19005	1890.5	1005	1970.5	75	19125	1902.5	1125	1982.5
		75	19027	1892.7	1027	1972.7	50	19147	1904.7	1147	1984.7
	50+100	50	18956	1885.6	956	1965.6	100	19100	1900	1100	1980
		100	19001	1890.1	1001	1970.1	50	19145	1904.5	1145	1984.5
	75+75	75	18975	1887.5	975	1967.5	75	19125	1902.5	1125	1982.5
	75+100	75	18929	1882.9	929	1962.9	100	19100	1900	1100	1980
		100	18951	1885.1	951	1965.1	75	19122	1902.2	1122	1982.2
	100+100	100	18902	1880.2	902	1960.2	100	19100	1900	1100	1980
Note 1: Carriers in increasing frequency order.											

Test frequencies for CA_5B

Range	CC-Combo / N _{RB_agg} [RB]	CC1 Note1					CC2 Note1				
		BW [RB]	N _{UL}	f _{UL} [MHz]	N _{DL}	f _{DL} [MHz]	BW [RB]	N _{UL}	f _{UL} [MHz]	N _{DL}	f _{DL} [MHz]
Low	25+50	25	20428	826.8	2428	871.8	50	20500	834	2500	879
	50+25	50	20450	829	2450	874	25	20522	836.2	2522	881.2
	50+50	50	20450	829	2450	874	50	20549	838.9	2549	883.9
Mid	25+50	25	20478	831.8	2478	876.8	50	20550	839	2550	884
	50+25	50	20500	834	2500	879	25	20572	841.2	2572	886.2
	50+50	50	20476	831.6	2476	876.6	50	20575	841.5	2575	886.5
High	25+50	25	20528	836.8	2528	881.8	50	20600	844	2600	889
	50+25	50	20550	839	2550	884	25	20622	846.2	2622	891.2
	50+50	50	20501	834.1	2501	879.1	50	20600	844	2600	889
Note 1: Carriers in increasing frequency order.											

Test frequencies for CA_7C

Range	CC-Combo / N _{RB_agg} [RB]	CC1 Note1					CC2 Note1				
		BW [RB]	N _{UL}	f _{UL} [MHz]	N _{DL}	f _{DL} [MHz]	BW [RB]	N _{UL}	f _{UL} [MHz]	N _{DL}	f _{DL} [MHz]
Low	50+100	50	20805	2505.5	2805	2625.5	100	20949	2519.9	2949	2639.9
		100	20850	2510	2850	2630	50	20994	2524.4	2994	2644.4
	75+75	75	20825	2507.5	2825	2627.5	75	20975	2522.5	2975	2642.5
	75+100	75	20828	2507.8	2828	2627.8	100	20999	2524.9	2999	2644.9
		100	20850	2510	2850	2630	75	21021	2527.1	3021	2647.1
	100+100	100	20850	2510	2850	2630	100	21048	2529.8	3048	2649.8
Mid	50+100	50	21006	2525.6	3006	2645.6	100	21150	2540	3150	2660
		100	21051	2530.1	3051	2650.1	50	21195	2544.5	3195	2664.5
	75+75	75	21025	2527.5	3025	2647.5	75	21175	2542.5	3175	2662.5
	75+100	75	21003	2525.3	3003	2645.3	100	21174	2542.4	3174	2662.4
		100	21026	2527.6	3026	2647.6	75	21197	2544.7	3197	2664.7
	100+100	100	21001	2525.1	3001	2645.1	100	21199	2544.9	3199	2664.9
High	50+100	50	21206	2545.6	3206	2665.6	100	21350	2560	3350	2680
		100	21251	2550.1	3251	2670.1	50	21395	2564.5	3395	2684.5
	75+75	75	21225	2547.5	3225	2667.5	75	21375	2562.5	3375	2682.5
	75+100	75	21179	2542.9	3179	2662.9	100	21350	2560	3350	2680
		100	21201	2545.1	3201	2665.1	75	21372	2562.2	3372	2682.2
	100+100	100	21152	2540.2	3152	2660.2	100	21350	2560	3350	2680
Note 1: Carriers in increasing frequency order.											

Test frequencies for CA_12B

Range	CC-Combo / N _{RB_agg} [RB]	CC1 Note1					CC2 Note1				
		BW [RB]	N _{UL}	f _{UL} [MHz]	N _{DL}	f _{DL} [MHz]	BW [RB]	N _{UL}	f _{UL} [MHz]	N _{DL}	f _{DL} [MHz]
Low	25+25	25	23035	701.5	5035	731.5	25	23083	706.3	5083	736.3
	25+50	25	23035	701.5	5035	731.5	50	23107	708.7	5107	738.7
Mid	25+25	25	23070	705	5070	735	25	23118	709.8	5118	739.8
	25+50	25	23045	702.5	5045	732.5	50	23117	709.7	5117	739.7
High	25+25	25	23107	708.7	5107	738.7	25	23155	713.5	5155	743.5
	25+50	25	23058	703.8	5058	733.8	50	23130	711	5130	741
Note 1: Carriers in increasing frequency order.											

1) Carrier Aggregation power test results (Full Power)

E-UTRA CA configuration		CC-Combo	PCC							SCC				Tune-up For TX Power With DL CA	Power		
			Band	Bandwidth [MHZ]	Modulation	RB Size/Offset	Channel (UL)	Frequency [MHZ]	Channel (DL)	Frequency [MHZ]	Band	Bandwidth [MHZ]	Channel (DL)		Frequency [MHZ]	TX Power With DL CA	TX Power Single Carrier
CA_2C	Low	5M+20M	LTE B2	5	QPSK	1/0	18633	1853.3	633	1933.3	LTE B2	20	750	1945	24	23.27	23.33
		20M+5M	LTE B2	20	QPSK	1/0	18700	1860	700	1940	LTE B2	5	817	1951.7	24	23.78	23.89
		10M+15M	LTE B2	10	QPSK	1/0	18653	1855.3	653	1935.3	LTE B2	15	773	1947.3	24	23.31	23.39
		15M+10M	LTE B2	15	QPSK	1/0	18675	1857.5	675	1937.5	LTE B2	10	795	1949.5	24	23.15	23.22
		10M+20M	LTE B2	10	QPSK	1/0	18655	1855.5	655	1935.5	LTE B2	20	799	1949.9	24	23.31	23.40
		20M+10M	LTE B2	20	QPSK	1/0	18700	1860	700	1940	LTE B2	10	844	1954.4	24	23.84	23.89
		15M+15M	LTE B2	15	QPSK	1/0	18675	1857.5	675	1937.5	LTE B2	15	825	1952.5	24	23.18	23.22
		15M+20M	LTE B2	15	QPSK	1/0	18678	1857.8	678	1937.8	LTE B2	20	849	1954.9	24	23.13	23.21
		20M+15M	LTE B2	20	QPSK	1/0	18700	1860	700	1940	LTE B2	15	871	1957.1	24	23.83	23.89
		20M+20M	LTE B2	20	QPSK	1/0	18700	1860	700	1940	LTE B2	20	898	1959.8	24	23.84	23.89
	Mid	5M+20M	LTE B2	5	QPSK	1/0	18808	1870.8	808	1950.8	LTE B2	20	925	1962.5	24	23.41	23.47
		20M+5M	LTE B2	20	QPSK	1/0	18875	1877.5	875	1957.5	LTE B2	5	992	1969.2	24	22.72	22.76
		10M+15M	LTE B2	10	QPSK	1/0	18829	1872.9	829	1952.9	LTE B2	15	949	1964.9	24	22.52	22.63
		15M+10M	LTE B2	15	QPSK	1/0	18851	1875.1	851	1955.1	LTE B2	10	971	1967.1	24	22.45	22.51
		10M+20M	LTE B2	10	QPSK	1/0	18806	1870.6	806	1950.6	LTE B2	20	950	1965	24	22.49	22.59
		20M+10M	LTE B2	20	QPSK	1/0	18851	1875.1	851	1955.1	LTE B2	10	995	1969.5	24	22.67	22.72
		15M+15M	LTE B2	15	QPSK	1/0	18825	1872.5	825	1952.5	LTE B2	15	975	1967.5	24	22.41	22.55
		15M+20M	LTE B2	15	QPSK	1/0	18803	1870.3	803	1950.3	LTE B2	20	974	1967.4	24	22.38	22.47
		20M+15M	LTE B2	20	QPSK	1/0	18826	1872.6	826	1952.6	LTE B2	15	997	1969.7	24	22.67	22.78
		20M+20M	LTE B2	20	QPSK	1/0	18801	1870.1	801	1950.1	LTE B2	20	999	1969.9	24	22.61	22.69
	High	5M+20M	LTE B2	5	QPSK	1/0	18983	1888.3	983	1968.3	LTE B2	20	1100	1980	24	22.63	22.71
		20M+5M	LTE B2	20	QPSK	1/0	19050	1895	1050	1975	LTE B2	5	1167	1986.7	24	22.59	23.75
		10M+15M	LTE B2	10	QPSK	1/0	19005	1890.5	1005	1970.5	LTE B2	15	1125	1982.5	24	22.73	22.81
		15M+10M	LTE B2	15	QPSK	1/0	19027	1892.7	1027	1972.7	LTE B2	10	1147	1984.7	24	22.86	22.97
		10M+20M	LTE B2	10	QPSK	1/0	18956	1885.6	956	1965.6	LTE B2	20	1100	1980	24	22.78	22.85
		20M+10M	LTE B2	20	QPSK	1/0	19001	1890.1	1001	1970.1	LTE B2	10	1145	1984.5	24	22.64	23.69
		15M+15M	LTE B2	15	QPSK	1/0	18975	1887.5	975	1967.5	LTE B2	15	1125	1982.5	24	22.8	22.88
		15M+20M	LTE B2	15	QPSK	1/0	18929	1882.9	929	1962.9	LTE B2	20	1100	1980	24	22.83	22.91
		20M+15M	LTE B2	20	QPSK	1/0	18951	1885.1	951	1965.1	LTE B2	15	1122	1982.2	24	23.04	23.11
		20M+20M	LTE B2	20	QPSK	1/0	18902	1880.2	902	1960.2	LTE B2	20	1100	1980	24	22.69	22.84
CA_5B	Low	5M+10M	LTE B5	5	QPSK	1/0	20428	826.8	2428	871.8	LTE B5	10	2500	879	25.5	24.57	24.66
		10M+5M	LTE B5	10	QPSK	1/0	20450	829	2450	874	LTE B5	5	2522	881.2	25.5	24.62	24.68
		10M+10M	LTE B5	10	QPSK	1/0	20450	829	2450	874	LTE B5	10	2549	883.9	25.5	24.61	24.68
	Mid	5M+10M	LTE B5	5	QPSK	1/0	20478	831.8	2478	876.8	LTE B5	10	2550	884	25.5	24.82	24.89
		10M+5M	LTE B5	10	QPSK	1/0	20500	834	2500	879	LTE B5	5	2572	886.2	25.5	24.94	25.01
		10M+10M	LTE B5	10	QPSK	1/0	20476	831.6	2476	876.6	LTE B5	10	2575	886.5	25.5	24.88	24.91
	High	5M+10M	LTE B5	5	QPSK	1/0	20528	836.8	2528	881.8	LTE B5	10	2600	889	25.5	24.93	25.04
		10M+5M	LTE B5	10	QPSK	1/0	20550	839	2550	884	LTE B5	5	2622	891.2	25.5	24.97	25.11
		10M+10M	LTE B5	10	QPSK	1/0	20501	834.1	2501	879.1	LTE B5	10	2600	889	25.5	24.97	25.08

E-UTRA CA configuration		CC-Combo	PCC								SCC				Tune-up For TX Power With DL CA	Power	
			Band	Bandwidth [MHZ]	Modulation	RB Size/Offset	Channel (UL)	Frequency [MHZ]	Channel (DL)	Frequency [MHZ]	Band	Bandwidth [MHZ]	Channel (DL)	Frequency [MHZ]		TX Power With DL CA	TX Power Single Carrier
CA_7C	Low	10M+20M	LTE B7	10	QPSK	1/0	20805	2505.5	2805	2625.5	LTE B7	20	2949	2639.9	24	22.79	22.86
		20M+10M	LTE B7	20	QPSK	1/0	20850	2510	2850	2630	LTE B7	10	2994	2644.4	24	22.82	22.89
		15M+15M	LTE B7	15	QPSK	1/0	20825	2507.5	2825	2627.5	LTE B7	15	2975	2642.5	24	22.71	22.74
		15M+20M	LTE B7	15	QPSK	1/0	20828	2507.8	2828	2627.8	LTE B7	20	2999	2644.9	24	22.69	22.75
		20M+15M	LTE B7	20	QPSK	1/0	20850	2510	2850	2630	LTE B7	15	3021	2647.1	24	22.78	22.89
		20M+20M	LTE B7	20	QPSK	1/0	20850	2510	2850	2630	LTE B7	20	3048	2649.8	24	22.79	22.89
	Mid	10M+20M	LTE B7	10	QPSK	1/0	21006	2525.6	3006	2645.6	LTE B7	20	3150	2660	24	22.66	22.75
		20M+10M	LTE B7	20	QPSK	1/0	21051	2530.1	3051	2650.1	LTE B7	10	3195	2664.5	24	22.6	22.67
		15M+15M	LTE B7	15	QPSK	1/0	21025	2527.5	3025	2647.5	LTE B7	15	3175	2662.5	24	22.58	22.64
		15M+20M	LTE B7	15	QPSK	1/0	21003	2525.3	3003	2645.3	LTE B7	20	3174	2662.4	24	22.53	22.61
		20M+15M	LTE B7	20	QPSK	1/0	21026	2527.6	3026	2647.6	LTE B7	15	3197	2664.7	24	22.52	22.59
		20M+20M	LTE B7	20	QPSK	1/0	21001	2525.1	3001	2645.1	LTE B7	20	3199	2664.9	24	22.63	22.73
	High	10M+20M	LTE B7	10	QPSK	1/0	21206	2545.6	3206	2665.6	LTE B7	20	3350	2680	24	22.52	22.59
		20M+10M	LTE B7	20	QPSK	1/0	21251	2550.1	3251	2670.1	LTE B7	10	3395	2684.5	24	22.87	22.97
		15M+15M	LTE B7	15	QPSK	1/0	21225	2547.5	3225	2667.5	LTE B7	15	3375	2682.5	24	22.76	22.84
		15M+20M	LTE B7	15	QPSK	1/0	21179	2542.9	3179	2662.9	LTE B7	20	3350	2680	24	22.62	22.69
		20M+15M	LTE B7	20	QPSK	1/0	21201	2545.1	3201	2665.1	LTE B7	15	3372	2682.2	24	22.94	23.03
		20M+20M	LTE B7	20	QPSK	1/0	21152	2540.2	3152	2660.2	LTE B7	20	3350	2680	24	22.67	22.73
CA_12B	Low	5M+5M	LTE B12	5	QPSK	1/0	23035	701.5	5035	731.5	LTE B12	5	5083	736.3	25.5	24.48	24.53
		5M+10M	LTE B12	5	QPSK	1/0	23035	701.5	5035	731.5	LTE B12	10	5107	738.7	25.5	24.44	24.53
	Mid	5M+5M	LTE B12	5	QPSK	1/0	23070	705	5070	735	LTE B12	5	5118	739.8	25.5	24.42	24.47
		5M+10M	LTE B12	5	QPSK	1/0	23045	702.5	5045	732.5	LTE B12	10	5117	739.7	25.5	24.49	24.53
	High	5M+5M	LTE B12	5	QPSK	1/0	23107	708.7	5107	738.7	LTE B12	5	5155	743.5	25.5	24.64	24.77
		5M+10M	LTE B12	5	QPSK	1/0	23058	703.8	5058	733.8	LTE B12	10	5130	741	25.5	24.55	24.68

2) Carrier Aggregation power test results (Sensor on power)

E-UTRA CA configuration		CC-Combo	PCC								SCC				Tune-up For TX Power With DL CA	Power	
			Band	Bandwidth [MHZ]	Modulation	RB Size/Offset	Channel (UL)	Frequency [MHZ]	Channel (DL)	Frequency [MHZ]	Band	Bandwidth [MHZ]	Channel (DL)	Frequency [MHZ]		TX power with DL CA	TX Power Single Carrier
CA_2C	Low	5M+20M	LTE B2	5	QPSK	1/0	18633	1853.3	633	1933.3	LTE B2	20	750	1945	9	8.22	8.27
		20M+5M	LTE B2	5	QPSK	1/0	18700	1860	700	1940	LTE B2	5	817	1951.7	9	8.17	8.22
		10M+15M	LTE B2	10	QPSK	1/0	18653	1855.3	653	1935.3	LTE B2	15	773	1947.3	9	7.96	8.03
		15M+10M	LTE B2	10	QPSK	1/0	18675	1857.5	675	1937.5	LTE B2	10	795	1949.5	9	7.76	7.79
		10M+20M	LTE B2	10	QPSK	1/0	18655	1855.5	655	1935.5	LTE B2	20	799	1949.9	9	8.01	8.04
		20M+10M	LTE B2	10	QPSK	1/0	18700	1860	700	1940	LTE B2	10	844	1954.4	9	8.18	8.22
		15M+15M	LTE B2	15	QPSK	1/0	18675	1857.5	675	1937.5	LTE B2	15	825	1952.5	9	7.74	7.79
		15M+20M	LTE B2	15	QPSK	1/0	18678	1857.8	678	1937.8	LTE B2	20	849	1954.9	9	7.73	7.78
		20M+15M	LTE B2	15	QPSK	1/0	18700	1860	700	1940	LTE B2	15	871	1957.1	9	8.14	8.22
		20M+20M	LTE B2	20	QPSK	1/0	18700	1860	700	1940	LTE B2	20	898	1959.8	9	8.15	8.22
	Mid	5M+20M	LTE B2	5	QPSK	1/0	18808	1870.8	808	1950.8	LTE B2	20	925	1962.5	9	7.87	7.99
		20M+5M	LTE B2	5	QPSK	1/0	18875	1877.5	875	1957.5	LTE B2	5	992	1969.2	9	7.51	7.58
		10M+15M	LTE B2	10	QPSK	1/0	18829	1872.9	829	1952.9	LTE B2	15	949	1964.9	9	7.68	7.73
		15M+10M	LTE B2	10	QPSK	1/0	18851	1875.1	851	1955.1	LTE B2	10	971	1967.1	9	7.32	7.42
		10M+20M	LTE B2	10	QPSK	1/0	18806	1870.6	806	1950.6	LTE B2	20	950	1965	9	7.44	7.53
		20M+10M	LTE B2	10	QPSK	1/0	18851	1875.1	851	1955.1	LTE B2	10	995	1969.5	9	7.39	7.44
		15M+15M	LTE B2	15	QPSK	1/0	18825	1872.5	825	1952.5	LTE B2	15	975	1967.5	9	7.42	7.48
		15M+20M	LTE B2	15	QPSK	1/0	18803	1870.3	803	1950.3	LTE B2	20	974	1967.4	9	7.35	7.41
		20M+15M	LTE B2	15	QPSK	1/0	18826	1872.6	826	1952.6	LTE B2	15	997	1969.7	9	7.52	7.57
		20M+20M	LTE B2	20	QPSK	1/0	18801	1870.1	801	1950.1	LTE B2	20	999	1969.9	9	7.49	7.55
	High	5M+20M	LTE B2	5	QPSK	1/0	18983	1888.3	983	1968.3	LTE B2	20	1100	1980	9	7.84	7.91
		20M+5M	LTE B2	5	QPSK	1/0	19050	1895	1050	1975	LTE B2	5	1167	1986.7	9	7.86	7.93
		10M+15M	LTE B2	10	QPSK	1/0	19005	1890.5	1005	1970.5	LTE B2	15	1125	1982.5	9	7.84	7.88
		15M+10M	LTE B2	10	QPSK	1/0	19027	1892.7	1027	1972.7	LTE B2	10	1147	1984.7	9	7.91	7.95
		10M+20M	LTE B2	10	QPSK	1/0	18956	1885.6	956	1965.6	LTE B2	20	1100	1980	9	7.79	7.91
		20M+10M	LTE B2	10	QPSK	1/0	19001	1890.1	1001	1970.1	LTE B2	10	1145	1984.5	9	7.75	7.88
		15M+15M	LTE B2	15	QPSK	1/0	18975	1887.5	975	1967.5	LTE B2	15	1125	1982.5	9	7.43	7.51
		15M+20M	LTE B2	15	QPSK	1/0	18929	1882.9	929	1962.9	LTE B2	20	1100	1980	9	7.39	7.44
		20M+15M	LTE B2	15	QPSK	1/0	18951	1885.1	951	1965.1	LTE B2	15	1122	1982.2	9	7.74	7.81
		20M+20M	LTE B2	20	QPSK	1/0	18902	1880.2	902	1960.2	LTE B2	20	1100	1980	9	7.66	7.72
CA_5B	Low	5M+10M	LTE B5	5	QPSK	1/0	20428	826.8	2428	871.8	LTE B5	10	2500	879	15.5	14.32	14.40
		10M+5M	LTE B5	10	QPSK	1/0	20450	829	2450	874	LTE B5	5	2522	881.2	15.5	14.45	14.50
		10M+10M	LTE B5	10	QPSK	1/0	20450	829	2450	874	LTE B5	10	2549	883.9	15.5	14.43	14.50
	Mid	5M+10M	LTE B5	5	QPSK	1/0	20478	831.8	2478	876.8	LTE B5	10	2550	884	15.5	14.54	14.61
		10M+5M	LTE B5	10	QPSK	1/0	20500	834	2500	879	LTE B5	5	2572	886.2	15.5	14.69	14.73
		10M+10M	LTE B5	10	QPSK	1/0	20476	831.6	2476	876.6	LTE B5	10	2575	886.5	15.5	14.57	14.65
	High	5M+10M	LTE B5	5	QPSK	1/0	20528	836.8	2528	881.8	LTE B5	10	2600	889	15.5	14.76	14.82
		10M+5M	LTE B5	10	QPSK	1/0	20550	839	2550	884	LTE B5	5	2622	891.2	15.5	14.74	14.83
		10M+10M	LTE B5	10	QPSK	1/0	20501	834.1	2501	879.1	LTE B5	10	2600	889	15.5	14.63	14.69

E-UTRA CA configuration		CC-Combo	PCC							SCC				Tune-up For TX Power With DL CA	Power		
			Band	Bandwidth [MHZ]	Modulation	RB Size/Offset	Channel (UL)	Frequency [MHZ]	Channel (DL)	Frequency [MHZ]	Band	Bandwidth [MHZ]	Channel (DL)		Frequency [MHZ]	TX power with DL CA	TX Power Single Carrier
CA_7C	Low	10M+20M	LTE B7	10	QPSK	1/0	20805	2505.5	2805	2625.5	LTE B7	20	2949	2639.9	8	7.34	7.38
		20M+10M	LTE B7	20	QPSK	1/0	20850	2510	2850	2630	LTE B7	10	2994	2644.4	8	7.47	7.55
		15M+15M	LTE B7	15	QPSK	1/0	20825	2507.5	2825	2627.5	LTE B7	15	2975	2642.5	8	7.14	7.22
		15M+20M	LTE B7	15	QPSK	1/0	20828	2507.8	2828	2627.8	LTE B7	20	2999	2644.9	8	7.16	7.22
		20M+15M	LTE B7	20	QPSK	1/0	20850	2510	2850	2630	LTE B7	15	3021	2647.1	8	7.39	7.55
		20M+20M	LTE B7	20	QPSK	1/0	20850	2510	2850	2630	LTE B7	20	3048	2649.8	8	7.43	7.55
	Mid	10M+20M	LTE B7	10	QPSK	1/0	21006	2525.6	3006	2645.6	LTE B7	20	3150	2660	8	7.26	7.31
		20M+10M	LTE B7	20	QPSK	1/0	21051	2530.1	3051	2650.1	LTE B7	10	3195	2664.5	8	7.29	7.35
		15M+15M	LTE B7	15	QPSK	1/0	21025	2527.5	3025	2647.5	LTE B7	15	3175	2662.5	8	6.93	7.02
		15M+20M	LTE B7	15	QPSK	1/0	21003	2525.3	3003	2645.3	LTE B7	20	3174	2662.4	8	6.97	7.07
		20M+15M	LTE B7	20	QPSK	1/0	21026	2527.6	3026	2647.6	LTE B7	15	3197	2664.7	8	7.21	7.29
		20M+20M	LTE B7	20	QPSK	1/0	21001	2525.1	3001	2645.1	LTE B7	20	3199	2664.9	8	7.14	7.17
	High	10M+20M	LTE B7	10	QPSK	1/0	21206	2545.6	3206	2665.6	LTE B7	20	3350	2680	8	7.18	7.28
		20M+10M	LTE B7	20	QPSK	1/0	21251	2550.1	3251	2670.1	LTE B7	10	3395	2684.5	8	7.38	7.48
		15M+15M	LTE B7	15	QPSK	1/0	21225	2547.5	3225	2667.5	LTE B7	15	3375	2682.5	8	6.84	6.87
		15M+20M	LTE B7	15	QPSK	1/0	21179	2542.9	3179	2662.9	LTE B7	20	3350	2680	8	6.82	6.91
		20M+15M	LTE B7	20	QPSK	1/0	21201	2545.1	3201	2665.1	LTE B7	15	3372	2682.2	8	7.42	7.53
		20M+20M	LTE B7	20	QPSK	1/0	21152	2540.2	3152	2660.2	LTE B7	20	3350	2680	8	7.41	7.50
CA_12B	Low	5M+5M	LTE B12	5	QPSK	1/0	23035	701.5	5035	731.5	LTE B12	5	5083	736.3	14	12.97	13.05
		5M+10M	LTE B12	5	QPSK	1/0	23035	701.5	5035	731.5	LTE B12	10	5107	738.7	14	12.95	13.05
	Mid	5M+5M	LTE B12	5	QPSK	1/0	23070	705	5070	735	LTE B12	5	5118	739.8	14	13.38	13.47
		5M+10M	LTE B12	5	QPSK	1/0	23045	702.5	5045	732.5	LTE B12	10	5117	739.7	14	13.04	13.14
	High	5M+5M	LTE B12	5	QPSK	1/0	23107	708.7	5107	738.7	LTE B12	5	5155	743.5	14	13.79	13.86
		5M+10M	LTE B12	5	QPSK	1/0	23058	703.8	5058	733.8	LTE B12	10	5130	741	14	13.15	13.26

7.1.5 WIFI TEST CONFIGURATION

For WLAN SAR testing, WLAN engineering testing software installed on the DUT can provide continuous transmitting RF signal.

2.4G

Mode	802.11b	802.11g	802.11n HT20	802.11n HT40
Duty cycle	100%			
Crest factor	1			

5G

Mode	802.11a	802.11n HT20	802.11n HT40	802.11ac HT20	802.11ac HT40	802.11ac VH80
Duty cycle	97.36%	97.17%	92.46%	97.18%	92.14%	91.62%
Crest factor	1.027	1.029	1.082	1.029	1.085	1.091

For WiFi SAR testing, a communication link is set up with the test mode 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 248227 D01 are applied.

7.1.5.1 2.4G SAR Test Requirements

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 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.

2.4 GHz 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. 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.

SAR Test Requirements for OFDM configurations

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, each standalone And frequency aggregated band is considered separately for SAR test reduction. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

7.1.5.2 5G SAR Test Requirements

✧ U-NII-1 and U-NII-2A Band

For devices that operate in both U-NII-1 and U-NII-2A bands, 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. 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.

✧ U-NII-2C, U-NII-3 Bands

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.

Unless band gap channels are permanently disabled, they must be considered for SAR testing. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels.¹¹ When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

7.1.5.3 OFDM transmission mode and SAR test channel selection

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

7.1.5.4 Initial test configuration procedure

For OFDM, in both 2.4GHz and 5GHz bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output powers is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurement.

7.2 TEST POSITION

7.2.1 BODY

The overall diagonal dimension of the display section of a tablet is 29.303cm>20cm, per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the Tablet touching the phantom. SAR evaluation for the front surface of tablet display screens are generally not necessary. The SAR Exclusion Threshold in KDB 447498 D01 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned adjacent the phantom and the edge containing the antenna positioned perpendicular to the phantom.

SAR test reduction and exclusion guidance

(1) The SAR exclusion threshold for distances < 50 mm is defined by the following equation:

$$\frac{(\text{max. power of channel, including tune-up tolerance, mW})}{(\text{min. test separation distance, mm})} \sqrt{\text{Frequency (GHz)}} \leq 3.0$$

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

(2) The SAR exclusion threshold for distances > 50 mm is defined by the following equation, as illustrated in KDB 447498 D01 Appendix B:

a) at 100 MHz to 1500 MHz

$$[\text{Power allowed at numeric Threshold at 50 mm in step 1}) + (\text{test separation distance} - 50 \text{ mm}) \cdot (f_{\text{(MHz)}}/150)] \text{ mW}$$

b) at > 1500 MHz and ≤ 6 GHz

$$[\text{Power allowed at numeric Threshold at 50 mm in step 1}) + (\text{test separation distance} - 50 \text{ mm}) \cdot 10] \text{ mW}$$

The location of the antenna inside EUT is as below.

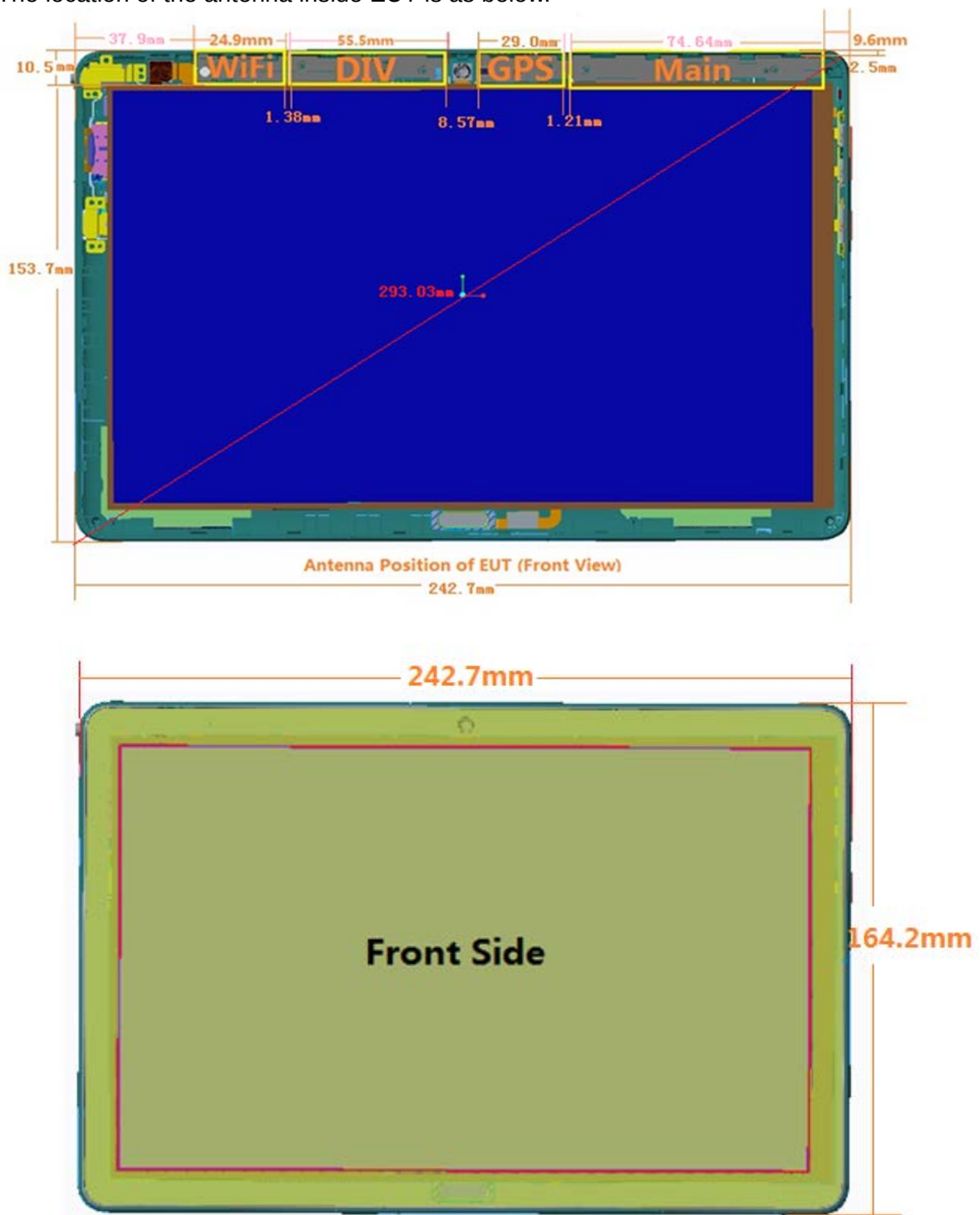


Figure1: The location of the antennas & the SAR sensor

Note: The proximity sensor and Main antenna use same metallic electrode, so the location is same.

	Antenna/Sensor-to- DUT sides separation distances					
Tx Antenna	Front side	Back side	Left side	Right side	Top side	Bottom side
Main Antenna	1.98mm	1.98mm	158.46mm	9.6mm	2.5mm	153.7mm
WiFi Antenna	1.98mm	1.98mm	37.9mm	179.9mm	2.5mm	153.7mm
DIV Ant & GPS Ant	Only receive signal, so it was not figured out in the following pictures					

In the sensor triggering power measurement tests, Main power controlling logic for Main non signaling mode is the same as Main signaling mode. The Specific external test software and chipset based internal test modes only make sure that proximity sensor logic can be triggered in Main non signaling mode, and do not modify any settings in the phone. It can be ensured that the unmodified settings in production units, including maximum output power, amplifier gain and other RF performance or tuning parameters, are used for SAR measurement per KDB248227.

The distance <50mm

Mode	Position	Distance (mm)	Pmax (dBm)	Pmax (mW)	f (GHz)	Calculation Result	SAR Exclusion threshold	Test Requirement (Yes/No)
GSM850	Rear/Top	5	32.5	1778.28	0.8488	327.67	3	Yes
	Right	9.6	32.5	1778.28	0.8488	170.66	3	Yes
GSM1900	Rear/Top	5	29.5	891.25	1.9098	246.33	3	Yes
	Right	9.6	29.5	891.25	1.9098	128.30	3	Yes
UMTS B2	Rear/Top	5	25	316.23	1.9076	87.35	3	Yes
	Right	9.6	25	316.23	1.9076	45.50	3	Yes
UMTS B4	Rear/Top	5	25	316.23	1.7526	83.73	3	Yes
	Right	9.6	25	316.23	1.7526	43.61	3	Yes
UMTS B5	Rear/Top	5	25.5	354.81	0.8466	65.29	3	Yes
	Right	9.6	25.5	354.81	0.8466	34.01	3	Yes
LTE B2	Rear/Top	5	24	251.19	1.9	69.25	3	Yes
	Right	9.6	24	251.19	1.9	36.07	3	Yes
LTE B4	Rear/Top	5	25	316.23	1.7450	83.55	3	Yes
	Right	9.6	25	316.23	1.7450	43.51	3	Yes
LTE B5	Rear/Top	5	25.5	354.81	0.8440	65.19	3	Yes
	Right	9.6	25.5	354.81	0.8440	33.95	3	Yes
LTE B7	Rear/Top	5	24	251.19	2.56	80.38	3	Yes
	Right	9.6	24	251.19	2.56	41.86	3	Yes
LTE B12	Rear/Top	5	25.5	354.81	0.711	59.84	3	Yes
	Right	9.6	25.5	354.81	0.711	31.16	3	Yes
LTE B17	Rear/Top	5	25.5	354.81	0.711	59.84	3	Yes
	Right	9.6	25.5	354.81	0.711	31.16	3	Yes
BT	Rear/Top	5	9.5	8.91	2.48	2.81	3	No
	Left	37.9	9.5	8.91	2.48	0.37	3	No
2.4G WiFi	Rear/Top	5	17.5	56.23	2.462	17.65	3	Yes
	Left	37.9	17.5	56.23	2.462	2.33	3	No
5.2G WiFi	Rear/Top	5	17	50.12	5.24	22.95	3	Yes
	Left	37.9	17	50.12	5.24	3.03	3	Yes
5.3G WiFi	Rear/Top	5	17	50.12	5.32	23.12	3	Yes
	Left	37.9	17	50.12	5.32	3.05	3	Yes
5.5G WiFi	Rear/Top	5	17	50.12	5.7	23.93	3	Yes
	Left	37.9	17	50.12	5.7	3.16	3	Yes
5.8G WiFi	Rear/Top	5	17	50.12	5.825	24.19	3	Yes
	Left	37.9	17	50.12	5.825	3.19	3	Yes

The distance >50mm

Mode	Position	Distance (mm)	Pmax (dBm)	Pmax (mW)	f (GHz)	Power allowed at numeric Threshold at 50mm	SAR Exclusion Result	Test Requirement (Yes/No)
GSM850	Left	158.46	32.5	1778.28	0.8488	162.81	776.55	Yes
	Bottom	153.7	32.5	1778.28	0.8488	162.81	749.62	Yes
GSM1900	Left	158.46	29.5	891.25	1.9098	108.54	1193.14	No
	Bottom	153.7	29.5	891.25	1.9098	108.54	1145.54	No
UMTS B2	Left	158.46	25	316.23	1.9076	108.60	1193.20	No
	Bottom	153.7	25	316.23	1.9076	108.60	1145.60	No
UMTS B4	Left	158.46	25	316.23	1.7526	113.31	1197.91	No
	Bottom	153.7	25	316.23	1.7526	113.31	1150.31	No
UMTS B5	Left	158.46	25.5	354.81	0.8466	163.02	775.17	No
	Bottom	153.7	25.5	354.81	0.8466	163.02	748.31	No
LTE B2	Left	158.46	24	251.19	1.9	108.82	1193.42	No
	Bottom	153.7	24	251.19	1.9	108.82	1145.82	No
LTE B4	Left	158.46	25	316.23	1.745	113.55	1198.15	No
	Bottom	153.7	25	316.23	1.745	113.55	1150.55	No
LTE B5	Left	158.46	25.5	354.81	0.844	163.28	773.54	No
	Bottom	153.7	25.5	354.81	0.844	163.28	746.76	No
LTE B7	Left	158.46	24	251.19	2.56	93.75	1178.35	No
	Bottom	153.7	24	251.19	2.56	93.75	1130.75	No
LTE B12	Left	158.46	25.5	354.81	0.711	177.89	691.99	No
	Bottom	153.7	25.5	354.81	0.711	177.89	669.43	No
LTE B17	Left	158.46	25.5	354.81	0.711	177.89	691.99	No
	Bottom	153.7	25.5	354.81	0.711	177.89	669.43	No
BT	Right	179.9	9.5	8.91	2.48	95.25	1394.25	No
	Bottom	153.7	9.5	8.91	2.48	95.25	1132.25	No
2.4G WiFi	Right	179.9	17.5	56.23	2.462	95.60	1394.60	No
	Bottom	153.7	17.5	56.23	2.462	95.60	1132.60	No
5.2G WiFi	Right	179.9	17	50.12	5.24	65.53	1364.53	No
	Bottom	153.7	17	50.12	5.24	65.53	1102.53	No
5.3G WiFi	Right	179.9	17	50.12	5.32	65.03	1364.03	No
	Bottom	153.7	17	50.12	5.32	65.03	1102.03	No
5.5G WiFi	Right	179.9	17	50.12	5.7	62.83	1361.83	No
	Bottom	153.7	17	50.12	5.7	62.83	1099.83	No
5.8G WiFi	Right	179.9	17	50.12	5.825	62.15	1361.15	No
	Bottom	153.7	17	50.12	5.825	62.15	1099.15	No

7.3 PROXIMITY SENSOR POWER REDUCTION INFORMATION

In this section, the following list is used to prepare an inquiry seeking SAR test guidance for proximity sensor power reduction. The procedures in KDB616217 is applied for SAR testing.

7.3.1 GENERAL PROXIMITY SENSOR IMPLEMENTATION DESCRIPTION

This device uses a proximity sensor that share the same metallic electrode as the transmitting antenna to facilitate triggering in typical user interactivity with the device.

Due to the operating configurations and exposure conditions required by the device, the proximity sensor is used to indicate when the tablet is held close to a user's body exposure condition. It utilizes the proximity sensor to reduce the output power in specific wireless and operating modes to ensure SAR compliance for the following scenarios: To reduce the output power of main antennas during body operating configurations.

Power Reduction operation table

ANT	Test Position	Active distance (mm)
Main Antenna	Rear Face	28mm
	Top Side	38mm
WIFI	Rear Face	12mm
	Top Side	15mm

Band	Full power level (dBm)	Reduced power level(dBm)
GSM 850	34.5	24.5
GSM 1900	31.5	19.5
UMTS Band 2	25	9.5
UMTS Band 4	25	12.5
UMTS Band 5	25.5	15.5
LTE Band 2	24	11
LTE Band 4	25	12.5
LTE Band 5	25.5	15.5
LTE Band 7	24	8
LTE Band 12	25.5	14
LTE Band 17	25.5	14
2.4G WIFI	17.5	9.5
5G WIFI	17	7

Note:

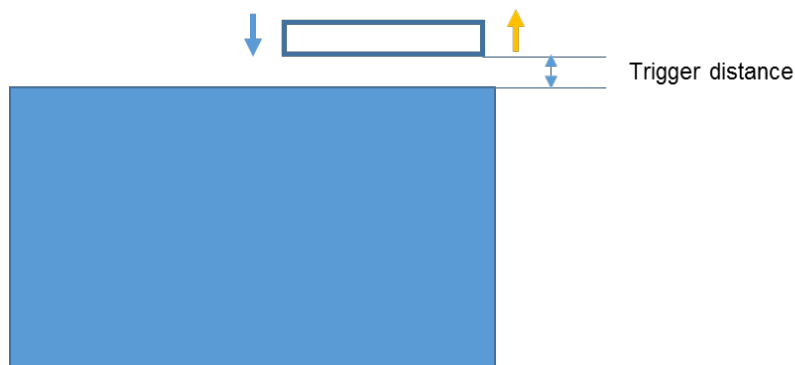
- 1) Since the capacitive proximity sensor triggering distance for the rear face and top side is N mm , a conservative distance of N-1 mm was required for additional SAR test at maximum power level with sensor off.
- 2) SAR tests with proximity sensor power reduction are only required for the sides of frequency bands in the table above. For the other sides or other frequency bands of the device, SAR is still tested at the maximum power level with sensor off.

7.3.2 PROXIMITY SENSOR COVERAGE, DISTANCE AND ANGLE

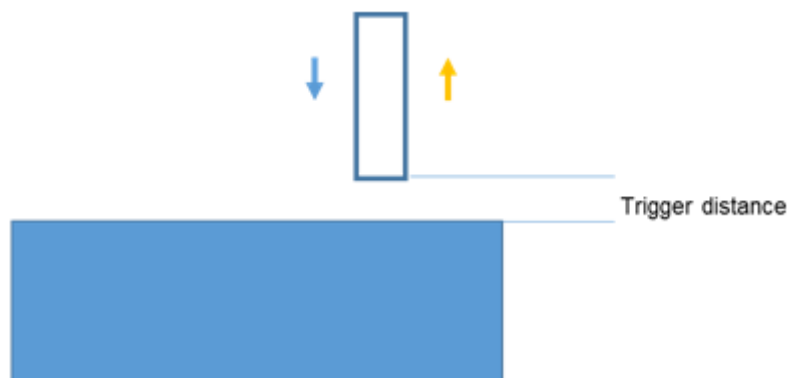
7.3.2.1 Procedures for determining proximity sensor triggering distances(Per KDB616217§6.2)

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

the proximity sensor triggering distance measurement method are as below:



Picture:Proximity sensor triggering distances assessment Back Side



Picture:Proximity sensor triggering distances assessment Top Side

Table: Summary of Trigger Distances

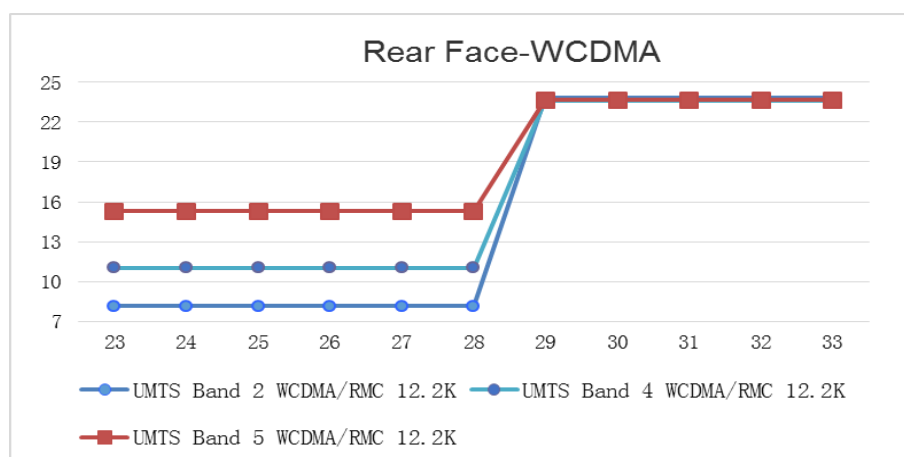
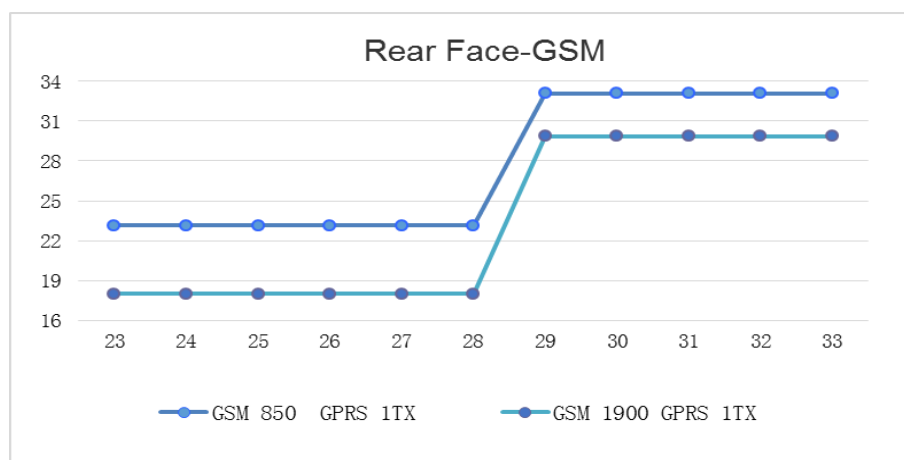
Band(MHz)	Trigger distance-Back Side		Trigger distance-Top Side	
	Moving toward phantom	Moving away from phantom	Moving toward phantom	Moving away from phantom
Main Antenna	28mm	28mm	38mm	38mm
WiFi Antenna	12mm	12mm	15mm	15mm

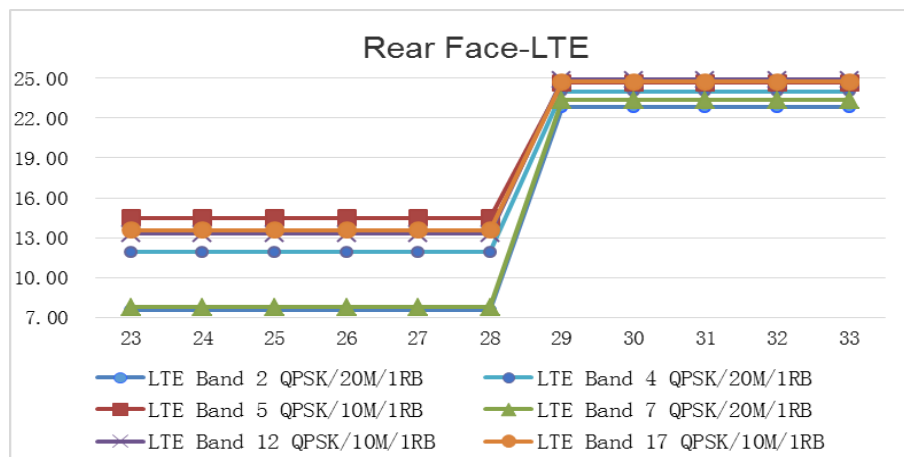
7.3.2.2 Procedures for determining antenna and proximity sensor coverage(Per KDB616217 §6.3)

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

1) Rear Face of GSM & UMTS & LTE

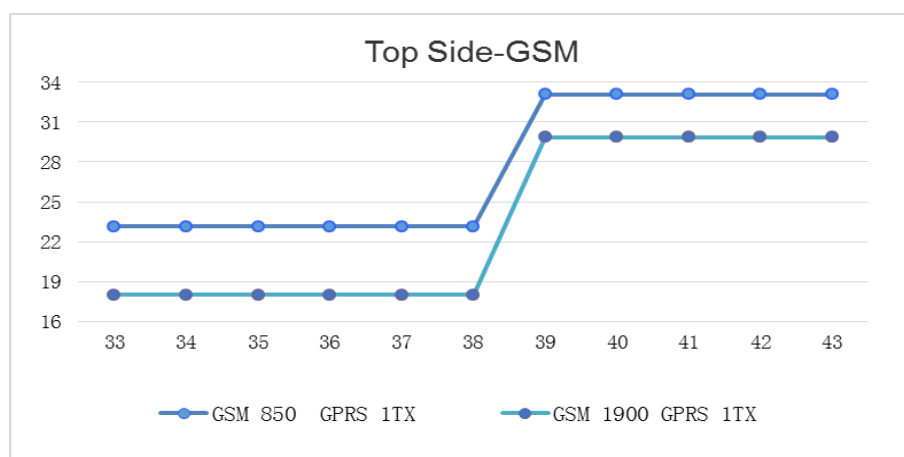
mode		distance(mm)										
		Rear Face										
		Sensor on						Sensor off				
		23	24	25	26	27	28	29	30	31	32	33
GSM 850	GPRS 1TX	23.14	23.14	23.14	23.14	23.14	23.14	33.1	33.1	33.1	33.1	33.1
GSM 1900	GPRS 1TX	17.98	17.98	17.98	17.98	17.98	17.98	29.88	29.88	29.88	29.88	29.88
UMTS Band 2	WCDMA/RMC 12.2K	8.15	8.15	8.15	8.15	8.15	8.15	23.84	23.84	23.84	23.84	23.84
UMTS Band 4	WCDMA/RMC 12.2K	11.03	11.03	11.03	11.03	11.03	11.03	23.65	23.65	23.65	23.65	23.65
UMTS Band 5	WCDMA/RMC 12.2K	15.3	15.3	15.3	15.3	15.3	15.3	23.68	23.68	23.68	23.68	23.68
LTE Band 2	QPSK/20M/1RB	7.52	7.52	7.52	7.52	7.52	7.52	22.82	22.82	22.82	22.82	22.82
LTE Band 4	QPSK/20M/1RB	11.89	11.89	11.89	11.89	11.89	11.89	24.02	24.02	24.02	24.02	24.02
LTE Band 5	QPSK/10M/1RB	14.50	14.50	14.50	14.50	14.50	14.50	24.68	24.68	24.68	24.68	24.68
LTE Band 7	QPSK/20M/1RB	7.76	7.76	7.76	7.76	7.76	7.76	23.36	23.36	23.36	23.36	23.36
LTE Band 12	QPSK/10M/1RB	13.31	13.31	13.31	13.31	13.31	13.31	24.91	24.91	24.91	24.91	24.91
LTE Band 17	QPSK/10M/1RB	13.57	13.57	13.57	13.57	13.57	13.57	24.75	24.75	24.75	24.75	24.75

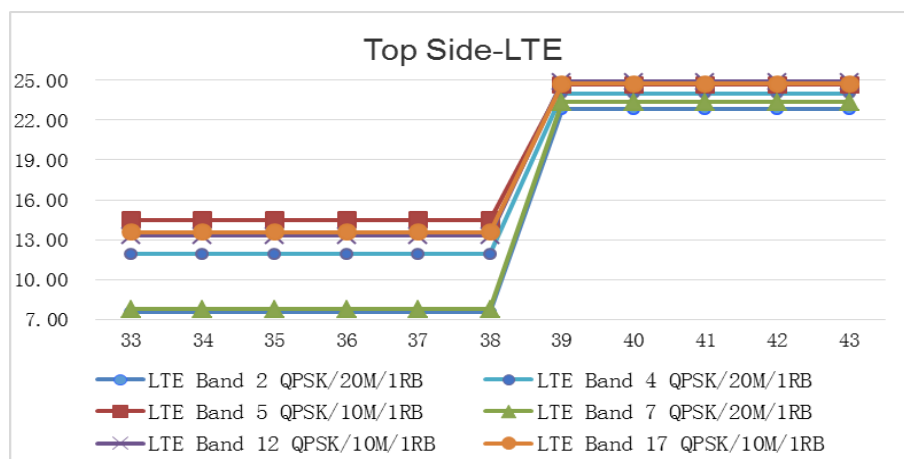
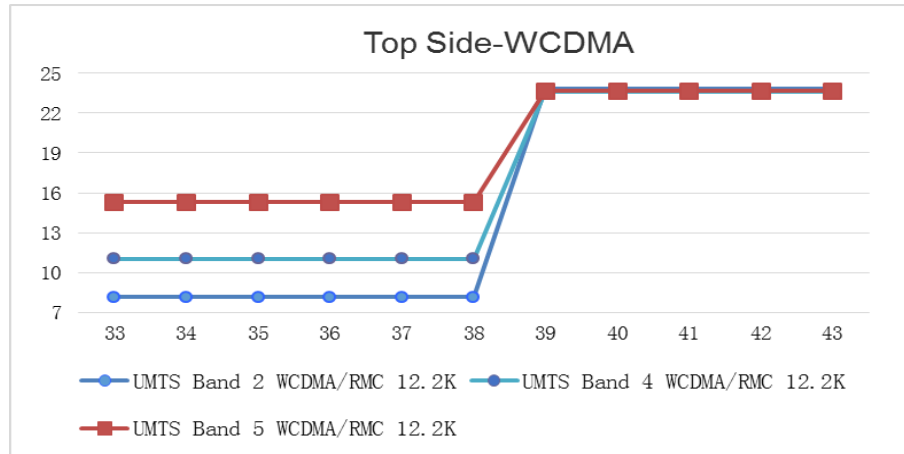




2) Top Side of GSM & UMTS & LTE

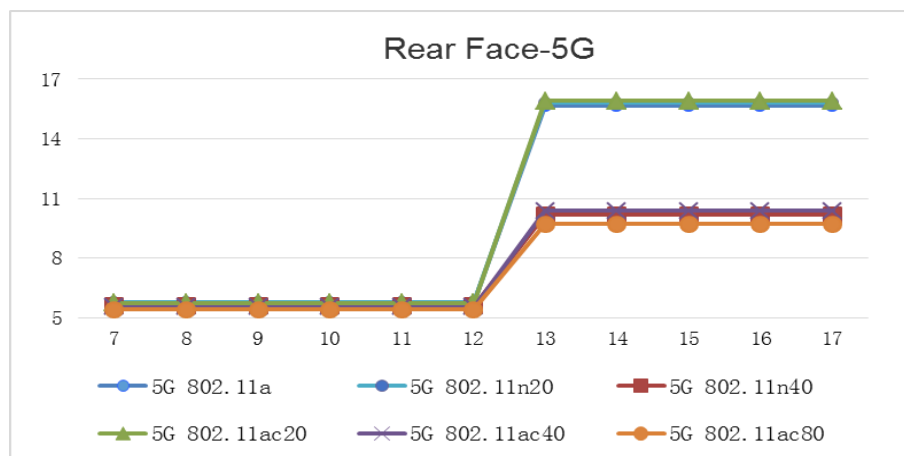
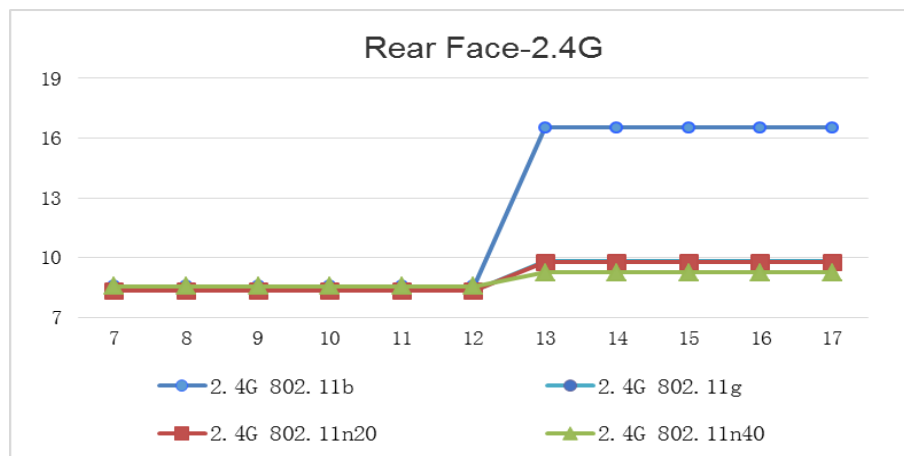
mode		distance(mm)										
		Top Side										
		Sensor on						Sensor off				
		33	34	35	36	37	38	39	40	41	42	43
GSM 850	GPRS 1TX	23.14	23.14	23.14	23.14	23.14	23.14	33.1	33.1	33.1	33.1	33.1
GSM 1900	GPRS 1TX	17.98	17.98	17.98	17.98	17.98	17.98	29.88	29.88	29.88	29.88	29.88
UMTS Band 2	WCDMA/RMC 12.2K	8.15	8.15	8.15	8.15	8.15	8.15	23.84	23.84	23.84	23.84	23.84
UMTS Band 4	WCDMA/RMC 12.2K	11.03	11.03	11.03	11.03	11.03	11.03	23.65	23.65	23.65	23.65	23.65
UMTS Band 5	WCDMA/RMC 12.2K	15.3	15.3	15.3	15.3	15.3	15.3	23.68	23.68	23.68	23.68	23.68
LTE Band 2	QPSK/20M/1RB	7.52	7.52	7.52	7.52	7.52	7.52	22.82	22.82	22.82	22.82	22.82
LTE Band 4	QPSK/20M/1RB	11.89	11.89	11.89	11.89	11.89	11.89	24.02	24.02	24.02	24.02	24.02
LTE Band 5	QPSK/10M/1RB	14.50	14.50	14.50	14.50	14.50	14.50	24.68	24.68	24.68	24.68	24.68
LTE Band 7	QPSK/20M/1RB	7.76	7.76	7.76	7.76	7.76	7.76	23.36	23.36	23.36	23.36	23.36
LTE Band 12	QPSK/10M/1RB	13.31	13.31	13.31	13.31	13.31	13.31	24.91	24.91	24.91	24.91	24.91
LTE Band 17	QPSK/10M/1RB	13.57	13.57	13.57	13.57	13.57	13.57	24.75	24.75	24.75	24.75	24.75





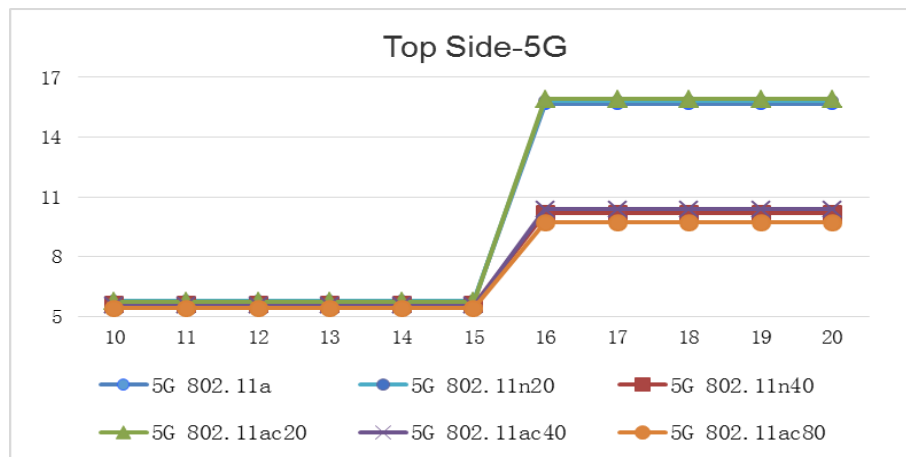
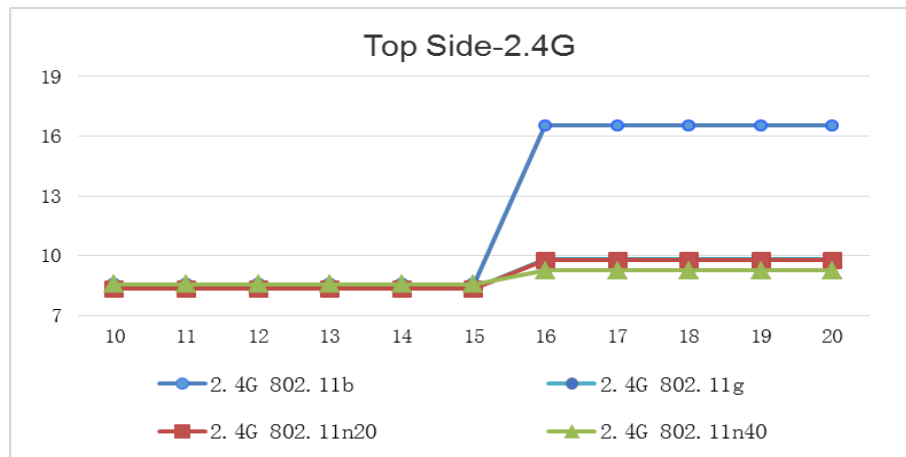
3) Rear Face of WIFI

mode		distance(mm)										
		Rear Face										
		Sensor on						Sensor off				
		7	8	9	10	11	12	13	14	15	16	17
2.4G	802.11b	8.55	8.55	8.55	8.55	8.55	8.55	16.52	16.52	16.52	16.52	16.52
	802.11g	8.32	8.32	8.32	8.32	8.32	8.32	9.84	9.84	9.84	9.84	9.84
	802.11n20	8.33	8.33	8.33	8.33	8.33	8.33	9.75	9.75	9.75	9.75	9.75
	802.11n40	8.55	8.55	8.55	8.55	8.55	8.55	9.26	9.26	9.26	9.26	9.26
5G	802.11a	5.76	5.76	5.76	5.76	5.76	5.76	15.65	15.65	15.65	15.65	15.65
	802.11n20	5.75	5.75	5.75	5.75	5.75	5.75	15.81	15.81	15.81	15.81	15.81
	802.11n40	5.57	5.57	5.57	5.57	5.57	5.57	10.18	10.18	10.18	10.18	10.18
	802.11ac20	5.73	5.73	5.73	5.73	5.73	5.73	15.92	15.92	15.92	15.92	15.92
	802.11ac40	5.52	5.52	5.52	5.52	5.52	5.52	10.37	10.37	10.37	10.37	10.37
	802.11ac80	5.39	5.39	5.39	5.39	5.39	5.39	9.72	9.72	9.72	9.72	9.72



4) Top Side of WIFI

mode		distance(mm)										
		Top Side										
		Sensor on						Sensor off				
		10	11	12	13	14	15	16	17	18	19	20
2.4G	802.11b	8.55	8.55	8.55	8.55	8.55	8.55	16.52	16.52	16.52	16.52	16.52
	802.11g	8.32	8.32	8.32	8.32	8.32	8.32	9.84	9.84	9.84	9.84	9.84
	802.11n20	8.33	8.33	8.33	8.33	8.33	8.33	9.75	9.75	9.75	9.75	9.75
	802.11n40	8.55	8.55	8.55	8.55	8.55	8.55	9.26	9.26	9.26	9.26	9.26
5G	802.11a	5.76	5.76	5.76	5.76	5.76	5.76	15.65	15.65	15.65	15.65	15.65
	802.11n20	5.75	5.75	5.75	5.75	5.75	5.75	15.81	15.81	15.81	15.81	15.81
	802.11n40	5.57	5.57	5.57	5.57	5.57	5.57	10.18	10.18	10.18	10.18	10.18
	802.11ac20	5.73	5.73	5.73	5.73	5.73	5.73	15.92	15.92	15.92	15.92	15.92
	802.11ac40	5.52	5.52	5.52	5.52	5.52	5.52	10.37	10.37	10.37	10.37	10.37
	802.11ac80	5.39	5.39	5.39	5.39	5.39	5.39	9.72	9.72	9.72	9.72	9.72



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

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

The EUT was rotated about Top side for angles up to $\pm 45^\circ$. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to $\pm 45^\circ$.

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

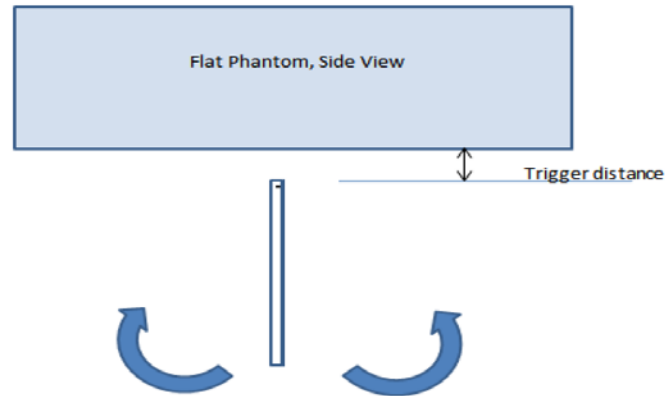


Table: Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering

Mode	Minimum distance at which power reduction was maintained over $\pm 45^\circ$		Power reduction status(ON/OFF)										
			-45°	-40°	-30°	-20°	-10°	-0°	10°	20°	30°	40°	45°
	Rear Face	Top Side											
GSM 850	28mm	38mm	on	on	on	on	on	on	on	on	on	on	on
GSM 1900	28mm	38mm	on	on	on	on	on	on	on	on	on	on	on
UMTS B2	28mm	38mm	on	on	on	on	on	on	on	on	on	on	on
UMTS B5	28mm	38mm	on	on	on	on	on	on	on	on	on	on	on
UMTS B8	28mm	38mm	on	on	on	on	on	on	on	on	on	on	on
LTE B2	28mm	38mm	on	on	on	on	on	on	on	on	on	on	on
LTE B4	28mm	38mm	on	on	on	on	on	on	on	on	on	on	on
LTE B5	28mm	38mm	on	on	on	on	on	on	on	on	on	on	on
LTE B7	28mm	38mm	on	on	on	on	on	on	on	on	on	on	on
LTE B12	28mm	38mm	on	on	on	on	on	on	on	on	on	on	on
LTE B17	28mm	38mm	on	on	on	on	on	on	on	on	on	on	on
2.4G WIFI	12mm	15mm	on	on	on	on	on	on	on	on	on	on	on
5G WIFI	12mm	15mm	on	on	on	on	on	on	on	on	on	on	on

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

8. TEST RESULT

8.1 CONDUCTED POWER RESULTS

8.1.1 CONDUCTED POWER MEASUREMENTS OF GSM850 AND GSM1900

1) Conducted power measurement results of GSM (Sensor off)

GSM850		Tune-up	Max Burst Average Power (dBm)			Tune-up	Max Frame Average Power (dBm)		
			128CH	190CH	251CH		128CH	190CH	251CH
			824.2 MHz	836.6 MHz	848.8 MHz		824.2 MHz	836.6 MHz	848.8 MHz
GSM (CS)		34.50	33.07	33.10	33.13	25.31	23.88	23.91	23.94
GPRS/EDGE (GMSK)	1 Tx Slot	34.50	33.07	33.10	33.13	25.31	23.88	23.91	23.94
	2 Tx Slot	32.50	31.53	31.50	31.52	26.37	25.40	25.37	25.39
	3 Tx Slot	30.50	29.28	29.28	29.29	26.08	24.86	24.86	24.87
	4 Tx Slot	29.50	28.32	28.32	28.33	26.32	25.14	25.14	25.15
EDGE (8PSK)	1 Tx Slot	27.50	26.82	26.61	26.58	18.31	17.63	17.42	17.39
	2 Tx Slot	25.50	25.24	25.01	24.92	19.37	19.11	18.88	18.79
	3 Tx Slot	23.50	22.98	23.01	23.05	19.08	18.56	18.59	18.63
	4 Tx Slot	22.50	21.94	21.85	22.04	19.32	18.76	18.67	18.86
GSM1900		Tune-up	Max Burst Average Power (dBm)			Tune-up	Max Frame Average Power (dBm)		
			512CH	661CH	810CH		512CH	661CH	810CH
			1850.2 MHz	1880 MHz	1909.8 MHz		1850.2 MHz	1880 MHz	1909.8 MHz
GSM (CS)		31.50	29.89	29.89	29.73	22.31	20.70	20.70	20.54
GPRS/EDGE (GMSK)	1 Tx Slot	31.50	29.89	29.88	29.72	22.31	20.70	20.69	20.53
	2 Tx Slot	29.50	27.75	27.91	27.81	23.37	21.62	21.78	21.68
	3 Tx Slot	27.50	25.72	25.86	25.80	23.08	21.30	21.44	21.38
	4 Tx Slot	26.50	24.71	24.88	24.80	23.32	21.53	21.70	21.62
EDGE (8PSK)	1 Tx Slot	27.00	25.50	25.55	25.70	17.81	16.31	16.36	16.51
	2 Tx Slot	25.00	23.26	23.35	23.46	18.87	17.13	17.22	17.33
	3 Tx Slot	23.00	21.56	21.62	21.46	18.58	17.14	17.20	17.04
	4 Tx Slot	22.00	20.56	20.52	20.96	18.82	17.38	17.34	17.78

Note:

- 1) The conducted power of GSM850 and GSM1900 are measured with RMS detector.
- 2) Frame-averaged output power was calculated from the measured burst-averaged output power by converting the slot powers into linear units and calculating the energy over 8 time slots.
- 3) The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:
Frame-averaged power=10 x log(Burst-averaged power mW x Slot used/8)
- 4) The tested channels are marks in bold.

2) Conducted power measurement results of GSM (Sensor on)

GSM850		Tune-up	Max Burst Average Power (dBm)			Tune-up	Max Frame Average Power (dBm)		
			128CH	190CH	251CH		128CH	190CH	251CH
			824.2 MHz	836.6 MHz	848.8 MHz		824.2 MHz	836.6 MHz	848.8 MHz
GSM (CS)		24.50	23.14	23.14	23.15	15.31	13.95	13.95	13.96
GPRS/EDGE (GMSK)	1 Tx Slot	24.50	23.14	23.14	23.15	15.31	13.95	13.95	13.96
	2 Tx Slot	22.50	21.10	21.10	21.10	16.37	14.97	14.97	14.97
	3 Tx Slot	20.50	19.13	19.13	19.16	16.08	14.71	14.71	14.74
	4 Tx Slot	19.50	18.10	18.11	18.13	16.32	14.92	14.93	14.95
EDGE (8PSK)	1 Tx Slot	16.00	14.58	14.71	14.72	6.81	5.39	5.52	5.53
	2 Tx Slot	15.00	13.39	13.62	13.59	8.87	7.26	7.49	7.46
	3 Tx Slot	13.00	12.22	12.11	12.31	8.58	7.80	7.69	7.89
	4 Tx Slot	12.00	11.43	11.51	11.61	8.82	8.25	8.33	8.43
GSM1900		Tune-up	Max Burst Average Power (dBm)			Tune-up	Max Frame Average Power (dBm)		
			512CH	661CH	810CH		512CH	661CH	810CH
			1850.2 MHz	1880 MHz	1909.8 MHz		1850.2 MHz	1880 MHz	1909.8 MHz
GSM (CS)		19.50	17.87	17.98	18.22	10.31	8.68	8.79	9.03
GPRS/EDGE (GMSK)	1 Tx Slot	19.50	17.87	17.98	18.22	10.31	8.68	8.79	9.03
	2 Tx Slot	17.50	15.94	16.03	16.20	11.37	9.81	9.90	10.07
	3 Tx Slot	15.50	14.18	14.20	14.35	11.08	9.76	9.78	9.93
	4 Tx Slot	14.50	13.41	13.39	13.46	11.32	10.23	10.21	10.28
EDGE (8PSK)	1 Tx Slot	13.00	12.52	12.43	12.61	3.81	3.33	3.24	3.42
	2 Tx Slot	12.00	11.33	11.28	11.53	5.87	5.20	5.15	5.40
	3 Tx Slot	11.00	10.25	10.32	10.36	6.58	5.83	5.90	5.94
	4 Tx Slot	10.00	9.81	9.72	9.68	6.82	6.63	6.54	6.50

Note:

- 1) The conducted power of GSM850 and GSM1900 are measured with RMS detector.
- 2) Frame-averaged output power was calculated from the measured burst-averaged output power by converting the slot powers into linear units and calculating the energy over 8 time slots.
- 3) The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:

$$\text{Frame-averaged power} = 10 \times \log(\text{Burst-averaged power mW} \times \text{Slot used}/8)$$
- 4) The tested channels are marks in bold.

8.1.2 CONDUCTED POWER MEASUREMENTS OF UMTS BAND 2

1) Conducted power measurement results of UMTS Band 2 (Sensor off)

Band	UMTS II			
Tx Channel	Max. Tune-up	9262	9400	9538
Frequency	Power	1852.4MHz	1880MHz	1907.6MHz
AMR Voice	25.00	23.67	23.73	23.84
RMC 12.2K	25.00	23.67	23.73	23.84
RMC 64K	25.00	23.64	23.70	23.82
RMC 144K	25.00	23.62	23.71	23.72
RMC 384K	25.00	23.65	23.70	23.81
HSDPA Subtest-1	25.00	23.59	23.61	23.72
HSDPA Subtest-2	23.50	22.00	21.97	21.92
HSDPA Subtest-3	23.50	21.98	21.87	21.98
HSDPA Subtest-4	23.50	22.01	21.94	21.95
HSUPA Subtest-1	22.50	21.25	20.84	20.95
HSUPA Subtest-2	21.50	19.76	19.81	20.12
HSUPA Subtest-3	22.50	21.18	21.23	21.24
HSUPA Subtest-4	21.50	20.30	19.86	19.95
HSUPA Subtest-5	24.50	23.15	23.11	23.20
DC-HSDPA Subtest-1	25.00	23.59	23.61	23.72
DC-HSDPA Subtest-2	23.50	22.00	21.97	21.92
DC-HSDPA Subtest-3	23.50	21.98	21.87	21.98
DC-HSDPA Subtest-4	23.50	22.01	21.94	21.95

Note:

- 1) The conducted power of UMTS Band 2 is measured with RMS detector.
- 2) Note: Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq 1/4$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.
- 3) The tested channels are marks in bold.

2) Conducted power measurement results of UMTS Band 2 (Sensor on)

Band	UMTS II			
Tx Channel	Max. Tune-up	9262	9400	9538
Frequency	Power	1852.4MHz	1880MHz	1907.6MHz
AMR Voice	9.50	8.70	8.48	8.15
RMC 12.2K	9.50	8.70	8.48	8.15
RMC 64K	9.50	8.68	8.47	8.13
RMC 144K	9.50	8.69	8.45	8.13
RMC 384K	9.50	8.66	8.46	8.12
HSDPA Subtest-1	9.50	8.44	8.18	7.87
HSDPA Subtest-2	8.50	7.45	7.05	6.89
HSDPA Subtest-3	8.50	7.40	6.89	6.71
HSDPA Subtest-4	8.50	7.31	6.91	6.75
HSUPA Subtest-1	8.00	7.47	7.54	7.32
HSUPA Subtest-2	6.00	4.82	4.50	4.33
HSUPA Subtest-3	7.00	5.92	6.05	5.85
HSUPA Subtest-4	6.00	4.33	4.03	4.06
HSUPA Subtest-5	9.00	8.68	8.31	8.11
DC-HSDPA Subtest-1	9.50	8.44	8.18	7.87
DC-HSDPA Subtest-2	8.50	7.45	7.05	6.89
DC-HSDPA Subtest-3	8.50	7.40	6.89	6.71
DC-HSDPA Subtest-4	8.50	7.31	6.91	6.75

Note:

- 1) The conducted power of UMTS Band 2 is measured with RMS detector.
- 2) Note: Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq 1/4$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.
- 3) The tested channels are marks in bold.

8.1.3 CONDUCTED POWER MEASUREMENTS OF UMTS BAND 4

1) Conducted power measurement results of UMTS Band 4 (Sensor off)

Band	UMTS IV			
Tx Channel	Max. Tune-up	1312	1413	1513
Frequency	Power	1712.4MHz	1732.6MHz	1752.6MHz
AMR Voice	25.00	23.56	23.65	23.75
RMC 12.2K	25.00	23.56	23.65	23.75
RMC 64K	25.00	23.47	23.50	23.52
RMC 144K	25.00	23.48	23.54	23.53
RMC 384K	25.00	23.46	23.53	23.51
HSDPA Subtest-1	25.00	23.48	23.58	23.65
HSDPA Subtest-2	23.50	21.85	21.88	21.96
HSDPA Subtest-3	23.50	21.88	21.93	22.02
HSDPA Subtest-4	23.50	21.87	21.94	21.99
HSUPA Subtest-1	22.50	21.40	20.96	20.94
HSUPA Subtest-2	21.50	19.72	19.75	20.04
HSUPA Subtest-3	22.50	21.10	21.12	20.83
HSUPA Subtest-4	21.50	20.13	19.52	19.61
HSUPA Subtest-5	24.50	22.97	23.05	23.13
DC-HSDPA Subtest-1	25.00	23.48	23.58	23.65
DC-HSDPA Subtest-2	23.50	21.85	21.88	21.96
DC-HSDPA Subtest-3	23.50	21.88	21.93	22.02
DC-HSDPA Subtest-4	23.50	21.87	21.94	21.99

Note:

- 1) The conducted power of UMTS Band 4 is measured with RMS detector.
- 2) Note: Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.
- 3) The tested channels are marks in bold.

2) Conducted power measurement results of UMTS Band 4 (Sensor on)

Band	UMTS IV			
Tx Channel	Max. Tune-up	1312	1413	1513
Frequency	Power	1712.4MHz	1732.6MHz	1752.6MHz
AMR Voice	12.50	11.15	11.03	11.62
RMC 12.2K	12.50	11.15	11.03	11.62
RMC 64K	12.50	11.13	11.01	11.61
RMC 144K	12.50	11.14	11.00	11.58
RMC 384K	12.50	11.11	11.02	11.60
HSDPA Subtest-1	12.50	11.05	10.87	11.52
HSDPA Subtest-2	11.50	9.88	9.63	10.34
HSDPA Subtest-3	11.50	9.78	9.53	10.23
HSDPA Subtest-4	11.50	9.80	9.64	10.32
HSUPA Subtest-1	12.00	10.35	10.27	10.82
HSUPA Subtest-2	9.00	7.33	7.17	7.77
HSUPA Subtest-3	10.00	8.97	8.81	9.33
HSUPA Subtest-4	9.00	7.05	7.02	7.28
HSUPA Subtest-5	12.00	11.13	11.01	11.60
DC-HSDPA Subtest-1	12.50	11.05	10.87	11.52
DC-HSDPA Subtest-2	11.50	9.88	9.63	10.34
DC-HSDPA Subtest-3	11.50	9.78	9.53	10.23
DC-HSDPA Subtest-4	11.50	9.80	9.64	10.32

Note:

- 1) The conducted power of UMTS Band 4 is measured with RMS detector.
- 2) Note: Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq 1/4$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.
- 3) The tested channels are marks in bold.

8.1.4 CONDUCTED POWER MEASUREMENTS OF UMTS BAND 5

1) Conducted power measurement results of UMTS Band 5 (Sensor off)

Band	UMTS V			
Tx Channel	Max. Tune-up	4132	4182	4233
Frequency	Power	826.4MHz	836.4MHz	846.6MHz
AMR Voice	25.50	23.68	23.78	23.89
RMC 12.2K	25.50	23.68	23.78	23.89
RMC 64K	25.50	23.64	23.75	23.76
RMC 144K	25.50	23.67	23.77	23.77
RMC 384K	25.50	23.64	23.73	23.75
HSDPA Subtest-1	25.50	23.67	23.73	23.77
HSDPA Subtest-2	23.50	21.78	21.77	21.88
HSDPA Subtest-3	23.50	21.70	21.84	21.89
HSDPA Subtest-4	23.50	21.81	21.79	21.84
HSUPA Subtest-1	23.50	21.53	21.56	21.56
HSUPA Subtest-2	22.00	21.01	20.95	21.03
HSUPA Subtest-3	23.50	21.57	21.53	21.58
HSUPA Subtest-4	22.00	20.74	20.88	20.97
HSUPA Subtest-5	25.50	23.72	23.76	23.76
DC-HSDPA Subtest-1	25.50	23.67	23.73	23.77
DC-HSDPA Subtest-2	23.50	21.78	21.77	21.88
DC-HSDPA Subtest-3	23.50	21.70	21.84	21.89
DC-HSDPA Subtest-4	23.50	21.81	21.79	21.84

Note:

- 1) The conducted power of UMTS Band 5 is measured with RMS detector.
- 2) Note: Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.
- 3) The tested channels are marks in bold.

2) Conducted power measurement results of UMTS Band 5 (Sensor on)

Band	UMTS V			
Tx Channel	Max. Tune-up	4132	4182	4233
Frequency	Power	826.4MHz	836.4MHz	846.6MHz
AMR Voice	15.50	15.03	14.96	15.04
RMC 12.2K	15.50	15.03	14.96	15.04
RMC 64K	15.50	15.01	14.93	15.02
RMC 144K	15.50	14.98	14.95	15.03
RMC 384K	15.50	15.02	14.94	15.01
HSDPA Subtest-1	15.50	14.89	14.82	14.97
HSDPA Subtest-2	14.50	13.06	12.98	13.11
HSDPA Subtest-3	14.50	13.08	13.10	13.26
HSDPA Subtest-4	14.50	13.22	12.97	13.15
HSUPA Subtest-1	14.50	14.00	14.07	14.08
HSUPA Subtest-2	12.00	11.06	11.54	11.31
HSUPA Subtest-3	13.50	12.47	13.03	12.66
HSUPA Subtest-4	12.00	10.35	10.83	10.47
HSUPA Subtest-5	15.50	14.87	14.91	15.02
DC-HSDPA Subtest-1	15.50	14.89	14.82	14.97
DC-HSDPA Subtest-2	14.50	13.06	12.98	13.11
DC-HSDPA Subtest-3	14.50	13.08	13.10	13.26
DC-HSDPA Subtest-4	14.50	13.22	12.97	13.15

Note:

- 1) The conducted power of UMTS Band 5 is measured with RMS detector.
- 2) Note: Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq 1/4$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.
- 3) The tested channels are marks in bold.

8.1.5 CONDUCTED POWER MEASUREMENTS OF LTE BAND 2

1) Conducted power measurement results of LTE Band 2 (Sensor off)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH18607	CH18900	CH19193	Band / BW	Modulation	RB Size/Offset	Tune-up	CH18615	CH18900	CH19185
				1850.7MHz	1880MHz	1909.3MHz					1851.5MHz	1880MHz	1908.5MHz
2 / 1.4M	QPSK	1/0	24.00	23.26	22.69	22.48	2 / 3M	QPSK	1/0	24.00	23.14	22.57	22.27
		1/2	24.00	23.30	22.76	22.53			1/7	24.00	23.33	22.87	22.54
		1/5	24.00	23.19	22.75	22.44			1/14	24.00	23.00	22.65	22.33
		3/0	24.00	23.25	22.72	22.57			8/0	24.00	23.03	22.46	22.15
		3/1	24.00	23.25	22.72	22.55			8/3	24.00	23.05	22.49	22.18
		3/3	24.00	23.23	22.81	22.56			8/7	24.00	22.94	22.43	22.15
		6/0	24.00	22.98	22.50	22.22			15/0	24.00	23.02	22.49	22.18
	16QAM	1/0	24.00	22.96	22.58	22.11		16QAM	1/0	24.00	22.96	22.37	22.08
		1/2	24.00	23.01	22.59	22.12			1/7	24.00	23.14	22.57	22.22
		1/5	24.00	22.91	22.54	22.10			1/14	24.00	22.82	22.43	22.07
		3/0	24.00	22.87	22.48	22.19			8/0	23.00	22.04	21.38	21.19
		3/1	24.00	22.88	22.47	22.16			8/3	23.00	22.06	21.36	21.22
		3/3	24.00	22.86	22.51	22.24			8/7	23.00	21.96	21.30	21.27
		6/0	23.00	21.96	21.37	21.31			15/0	23.00	21.94	21.42	21.20
Band / BW	Modulation	RB Size/Offset	Tune-up	CH18625	CH18900	CH19175	Band / BW	Modulation	RB Size/Offset	Tune-up	CH18650	CH18900	CH19150
				1852.5MHz	1880MHz	1907.5MHz					1855MHz	1880MHz	1905MHz
2 / 5M	QPSK	1/0	24.00	23.29	22.66	22.30	2 / 10M	QPSK	1/0	24.00	23.39	22.75	22.62
		1/12	24.00	23.40	22.99	22.59			1/24	24.00	23.20	22.92	22.37
		1/24	24.00	23.12	22.98	22.52			1/49	24.00	23.30	23.42	22.89
		12/0	24.00	23.23	22.66	22.21			25/0	24.00	22.97	22.39	22.06
		12/6	24.00	23.21	22.74	22.37			25/12	24.00	22.86	22.59	22.02
		12/13	24.00	23.12	22.71	22.31			25/25	24.00	22.73	22.64	22.11
		25/0	24.00	23.09	22.71	22.27			50/0	24.00	22.94	22.47	22.06
	16QAM	1/0	24.00	23.02	22.60	22.11		16QAM	1/0	24.00	23.31	22.52	22.31
		1/12	24.00	23.16	22.93	22.40			1/24	24.00	23.13	22.70	22.03
		1/24	24.00	22.90	22.91	22.26			1/49	24.00	23.21	23.20	22.54
		12/0	23.00	22.27	21.62	21.20			25/0	23.00	21.94	21.35	21.05
		12/6	23.00	22.24	21.71	21.39			25/12	23.00	21.81	21.50	21.01
		12/13	23.00	22.12	21.68	21.32			25/25	23.00	21.65	21.53	21.10
		25/0	23.00	22.01	21.67	21.26			50/0	23.00	21.79	21.38	21.01
Band / BW	Modulation	RB Size/Offset	Tune-up	CH18675	CH18900	CH19125	Band / BW	Modulation	RB Size/Offset	Tune-up	CH18700	CH18900	CH19100
				1857.5MHz	1880MHz	1902.5MHz					1860MHz	1880MHz	1900MHz
2 / 15M	QPSK	1/0	24.00	23.22	22.41	23.04	2 / 20M	QPSK	1/0	24.00	23.89	22.82	23.81
		1/37	24.00	23.11	22.92	22.37			1/50	24.00	23.03	22.24	22.71
		1/74	24.00	23.00	23.67	22.88			1/99	24.00	22.93	23.68	22.74
		36/0	24.00	22.84	23.67	22.35			50/0	24.00	22.81	22.35	22.76
		36/19	24.00	22.83	22.59	22.08			50/25	24.00	22.69	22.59	22.45
		36/39	24.00	22.23	22.61	22.06			50/50	24.00	22.24	22.67	22.02
		75/0	24.00	22.60	22.48	22.34			100/0	24.00	22.59	22.45	22.62
	16QAM	1/0	24.00	23.02	22.27	22.83		16QAM	1/0	24.00	23.52	22.76	23.65
		1/37	24.00	22.94	22.68	22.13			1/50	24.00	22.90	22.22	22.73
		1/74	24.00	22.82	23.47	22.72			1/99	24.00	22.83	23.62	22.96
		36/0	23.00	21.78	21.47	21.34			50/0	23.00	21.73	21.29	21.73
		36/19	23.00	21.71	21.50	21.04			50/25	23.00	21.61	21.51	21.39
		36/39	23.00	21.22	21.49	21.02			50/50	23.00	21.22	21.58	21.08
		75/0	23.00	21.56	21.41	21.28			100/0	23.00	21.50	21.37	21.57

2) Conducted power measurement results of LTE Band 2 (Sensor on)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH18607	CH18900	CH19193	Band / BW	Modulation	RB Size/Offset	Tune-up	CH18615	CH18900	CH19185
				1850.7MHz	1880MHz	1909.3MHz					1851.5MHz	1880MHz	1908.5MHz
2 / 1.4M	QPSK	1/0	9.00	8.02	7.74	8.21	2 / 3M	QPSK	1/0	9.00	7.74	7.58	7.81
		1/2	9.00	8.07	7.75	8.35			1/7	9.00	8.13	7.81	8.28
		1/5	9.00	7.94	7.68	8.28			1/14	9.00	7.61	7.63	8.03
		3/0	9.00	7.98	7.74	8.28			8/0	9.00	7.68	7.48	7.80
		3/1	9.00	8.01	7.74	8.30			8/3	9.00	7.78	7.51	7.93
		3/3	9.00	8.02	7.77	8.34			8/7	9.00	7.67	7.45	7.93
		6/0	9.00	7.69	7.52	8.04			15/0	9.00	7.68	7.50	7.86
	16QAM	1/0	9.00	7.87	7.70	8.14		16QAM	1/0	9.00	7.79	7.48	7.67
		1/2	9.00	7.96	7.71	8.27			1/7	9.00	8.18	7.71	8.18
		1/5	9.00	7.83	7.64	8.14			1/14	9.00	7.68	7.54	7.84
		3/0	9.00	7.81	7.60	8.14			8/0	8.00	6.73	6.45	6.86
		3/1	9.00	7.84	7.59	8.16			8/3	8.00	6.75	6.50	6.89
		3/3	9.00	7.85	7.62	8.13			8/7	8.00	6.66	6.42	6.93
		6/0	8.00	6.64	6.48	6.94			15/0	8.00	6.69	6.48	6.85
Band / BW	Modulation	RB Size/Offset	Tune-up	CH18625	CH18900	CH19175	Band / BW	Modulation	RB Size/Offset	Tune-up	CH18650	CH18900	CH19150
				1852.5MHz	1880MHz	1907.5MHz					1855MHz	1880MHz	1905MHz
2 / 5M	QPSK	1/0	9.00	8.22	7.72	8.01	2 / 10M	QPSK	1/0	9.00	8.03	7.68	7.97
		1/12	9.00	8.50	8.20	8.48			1/24	9.00	7.90	7.93	7.98
		1/24	9.00	8.07	8.13	8.48			1/49	9.00	7.97	8.34	8.52
		12/0	9.00	8.14	7.84	8.00			25/0	9.00	7.66	7.33	7.53
		12/6	9.00	8.14	7.95	8.23			25/12	9.00	7.54	7.57	7.58
		12/13	9.00	8.01	7.91	8.13			25/25	9.00	7.42	7.63	7.72
		25/0	9.00	7.93	7.89	8.10			50/0	9.00	7.60	7.44	7.58
	16QAM	1/0	9.00	8.23	7.87	8.11		16QAM	1/0	9.00	8.06	7.58	7.90
		1/12	9.00	8.32	8.32	8.37			1/24	9.00	7.89	7.82	7.72
		1/24	9.00	8.10	8.21	8.38			1/49	9.00	8.02	8.30	8.46
		12/0	8.00	7.22	6.82	7.05			25/0	8.00	6.65	6.32	6.42
		12/6	8.00	7.22	6.93	7.24			25/12	8.00	6.51	6.56	6.57
		12/13	8.00	7.09	6.91	7.17			25/25	8.00	6.39	6.61	6.74
		25/0	8.00	6.96	6.87	7.14			50/0	8.00	6.53	6.38	6.55
Band / BW	Modulation	RB Size/Offset	Tune-up	CH18675	CH18900	CH19125	Band / BW	Modulation	RB Size/Offset	Tune-up	CH18700	CH18900	CH19100
				1857.5MHz	1880MHz	1902.5MHz					1860MHz	1880MHz	1900MHz
2 / 15M	QPSK	1/0	9.00	7.79	7.39	8.22	2 / 20M	QPSK	1/0	9.00	8.22	7.52	8.76
		1/37	9.00	7.86	7.95	7.93			1/50	9.00	7.86	7.06	8.25
		1/74	9.00	7.64	8.63	8.72			1/99	9.00	7.56	8.74	8.70
		36/0	9.00	7.56	8.63	7.81			50/0	9.00	7.55	7.32	8.12
		36/19	9.00	7.59	7.63	7.62			50/25	9.00	7.46	7.63	7.89
		36/39	9.00	7.06	7.66	7.47			50/50	9.00	7.06	7.75	7.43
		75/0	9.00	7.40	7.51	7.75			100/0	9.00	7.37	7.47	7.93
	16QAM	1/0	9.00	7.73	7.26	8.20		16QAM	1/0	9.00	8.21	7.79	8.66
		1/37	9.00	7.76	7.81	7.90			1/50	9.00	7.82	8.05	8.41
		1/74	9.00	7.58	8.54	8.67			1/99	9.00	7.57	8.70	8.63
		36/0	8.00	6.42	6.40	6.68			50/0	8.00	6.44	6.20	7.01
		36/19	8.00	6.47	6.50	6.50			50/25	8.00	6.36	6.51	6.80
		36/39	8.00	6.05	6.53	6.51			50/50	8.00	6.10	6.62	6.54
		75/0	8.00	6.29	6.39	6.75			100/0	8.00	6.25	6.34	7.01

Note: The tested channels are marks in bold.

8.1.6 CONDUCTED POWER MEASUREMENTS OF LTE BAND 4

1) Conducted power measurement results of LTE Band 4 (Sensor off)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH19957	CH20175	CH20393	Band / BW	Modulation	RB Size/Offset	Tune-up	CH19965	CH20175	CH20385
				1710.7MHz	1732.5MHz	1754.3MHz					1711.5MHz	1732.5MHz	1753.5MHz
4 / 1.4M	QPSK	1/0	25.00	23.64	23.34	24.02	4 / 3M	QPSK	1/0	25.00	23.44	23.23	23.92
		1/2	25.00	23.75	23.36	24.06			1/7	25.00	23.78	23.31	24.11
		1/5	25.00	23.65	23.30	23.93			1/14	25.00	23.45	23.10	23.80
		3/0	25.00	23.72	23.38	24.05			8/0	24.00	22.46	22.10	22.77
		3/1	25.00	23.76	23.38	24.07			8/3	24.00	22.49	22.02	22.76
		3/3	25.00	23.75	23.36	24.05			8/7	24.00	22.36	22.05	22.64
		6/0	24.00	22.45	22.02	22.77			15/0	24.00	22.50	22.09	22.71
	16QAM	1/0	24.00	22.99	22.85	23.13		16QAM	1/0	24.00	23.01	22.49	23.23
		1/2	24.00	23.04	22.89	23.18			1/7	24.00	23.27	22.65	23.38
		1/5	24.00	23.00	22.77	23.06			1/14	24.00	23.01	22.34	23.11
		3/0	24.00	22.86	22.46	23.18			8/0	23.00	21.93	21.56	22.22
		3/1	24.00	22.88	22.47	23.18			8/3	23.00	21.96	21.50	22.22
		3/3	24.00	22.87	22.45	23.17			8/7	23.00	21.84	21.43	22.15
		6/0	23.00	21.99	21.46	22.29			15/0	23.00	21.88	21.45	22.18
Band / BW	Modulation	RB Size/Offset	Tune-up	CH19975	CH20175	CH20375	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20000	CH20175	CH20350
				1712.5MHz	1732.5MHz	1752.5MHz					1715MHz	1732.5MHz	1750MHz
4 / 5M	QPSK	1/0	25.00	23.66	23.44	23.98	4 / 10M	QPSK	1/0	25.00	23.56	23.32	23.57
		1/12	25.00	23.93	23.58	24.10			1/24	25.00	23.90	23.48	24.03
		1/24	25.00	23.53	23.22	23.81			1/49	25.00	23.90	23.70	24.18
		12/0	24.00	22.65	22.28	22.93			25/0	24.00	22.63	22.19	22.73
		12/6	24.00	22.72	22.26	22.99			25/12	24.00	22.62	22.22	22.86
		12/13	24.00	22.63	22.18	22.89			25/25	24.00	22.46	22.16	22.77
		25/0	24.00	22.60	22.16	22.88			50/0	24.00	22.50	22.15	22.73
	16QAM	1/0	24.00	22.99	22.70	23.47		16QAM	1/0	24.00	22.99	22.78	22.88
		1/12	24.00	23.26	22.78	23.68			1/24	24.00	23.32	22.90	23.35
		1/24	24.00	22.88	22.42	23.29			1/49	24.00	23.30	23.13	23.54
		12/0	23.00	22.08	21.74	22.36			25/0	23.00	22.02	21.60	22.15
		12/6	23.00	22.09	21.72	22.42			25/12	23.00	22.02	21.63	22.26
		12/13	23.00	22.00	21.64	22.32			25/25	23.00	21.87	21.57	22.17
		25/0	23.00	21.98	21.55	22.26			50/0	23.00	21.94	21.53	22.09
Band / BW	Modulation	RB Size/Offset	Tune-up	CH20025	CH20175	CH20325	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20050	CH20175	CH20300
				1717.5MHz	1732.5MHz	1747.5MHz					1720MHz	1732.5MHz	1745MHz
4 / 15M	QPSK	1/0	25.00	23.61	23.49	23.47	4 / 20M	QPSK	1/0	25.00	24.00	23.85	23.69
		1/37	25.00	23.80	23.45	23.94			1/50	25.00	24.02	23.19	24.07
		1/74	25.00	23.81	23.65	24.18			1/99	25.00	23.61	23.70	24.19
		36/0	24.00	22.61	23.75	22.57			50/0	24.00	22.77	22.42	22.55
		36/19	24.00	22.59	22.23	22.74			50/25	24.00	22.71	22.41	22.80
		36/39	24.00	22.48	22.19	22.83			50/50	24.00	22.49	22.38	22.91
		75/0	24.00	22.53	22.19	22.68			100/0	24.00	22.64	22.39	22.77
	16QAM	1/0	24.00	23.09	22.94	22.67		16QAM	1/0	24.00	23.46	23.11	23.25
		1/37	24.00	23.32	22.92	23.20			1/50	24.00	23.50	22.25	23.62
		1/74	24.00	23.29	23.15	23.46			1/99	24.00	23.11	22.98	23.72
		36/0	23.00	22.03	22.85	22.02			50/0	23.00	22.22	21.89	22.01
		36/19	23.00	22.02	21.63	22.12			50/25	23.00	22.16	21.87	22.26
		36/39	23.00	21.86	21.59	22.22			50/50	23.00	21.95	21.83	22.36
		75/0	23.00	21.92	21.59	22.07			100/0	23.00	22.08	21.84	22.18

2) Conducted power measurement results of LTE Band 4 (Sensor on)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH19957 1710.7MHz	CH20175 1732.5MHz	CH20393 1754.3MHz	Band / BW	Modulation	RB Size/Offset	Tune-up	CH19965 1711.5MHz	CH20175 1732.5MHz	CH20385 1753.5MHz
4 / 1.4M	QPSK	1/0	12.50	11.32	11.03	11.71	4 / 3M	QPSK	1/0	12.50	11.17	10.98	11.49
		1/2	12.50	11.45	11.12	11.79			1/7	12.50	11.68	11.20	11.79
		1/5	12.50	11.38	10.96	11.63			1/14	12.50	11.30	10.80	11.38
		3/0	12.50	11.37	11.09	11.70			8/0	11.50	9.87	9.52	10.04
		3/1	12.50	11.41	11.11	11.73			8/3	11.50	9.98	9.72	10.08
		3/3	12.50	11.43	11.08	11.71			8/7	11.50	9.86	9.61	9.98
		6/0	11.50	9.79	9.59	10.08			15/0	11.50	9.89	9.64	10.00
	16QAM	1/0	11.50	10.46	10.30	10.72		16QAM	1/0	11.50	10.38	10.13	10.43
		1/2	11.50	10.66	10.38	10.80			1/7	11.50	10.89	10.38	10.74
		1/5	11.50	10.57	10.20	10.65			1/14	11.50	10.52	9.96	10.36
		3/0	11.50	10.45	10.06	10.67			8/0	10.50	9.36	8.95	9.55
		3/1	11.50	10.50	10.06	10.70			8/3	10.50	9.48	8.92	9.60
		3/3	11.50	10.51	10.04	10.68			8/7	10.50	9.35	8.81	9.50
		6/0	10.50	9.36	8.97	9.58			15/0	10.50	9.33	8.84	9.44
Band / BW	Modulation	RB Size/Offset	Tune-up	CH19975 1712.5MHz	CH20175 1732.5MHz	CH20375 1752.5MHz	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20000 1715MHz	CH20175 1732.5MHz	CH20350 1750MHz
4 / 5M	QPSK	1/0	12.50	11.31	11.04	11.53	4 / 10M	QPSK	1/0	12.50	11.25	11.13	11.27
		1/12	12.50	11.75	11.22	11.77			1/24	12.50	11.72	11.29	11.69
		1/24	12.50	11.23	10.79	11.40			1/49	12.50	11.72	11.40	11.86
		12/0	11.50	10.01	9.58	10.16			25/0	11.50	10.02	9.55	9.98
		12/6	11.50	10.09	9.59	10.23			25/12	11.50	10.07	9.57	10.12
		12/13	11.50	10.01	9.60	10.13			25/25	11.50	9.92	9.59	10.00
		25/0	11.50	9.93	9.57	10.09			50/0	11.50	9.93	9.59	9.95
	16QAM	1/0	11.50	10.57	10.27	10.70		16QAM	1/0	11.50	10.46	10.32	10.19
		1/12	11.50	11.00	10.49	10.99			1/24	11.50	10.98	10.50	10.87
		1/24	11.50	10.49	10.05	10.51			1/49	11.50	11.10	10.71	11.09
		12/0	10.50	9.50	9.07	9.66			25/0	10.50	9.44	8.99	9.42
		12/6	10.50	9.58	9.08	9.74			25/12	10.50	9.49	9.02	9.55
		12/13	10.50	9.49	8.97	9.64			25/25	10.50	9.34	8.92	9.43
		25/0	10.50	9.38	8.91	9.54			50/0	10.50	9.36	8.89	9.36
Band / BW	Modulation	RB Size/Offset	Tune-up	CH20025 1717.5MHz	CH20175 1732.5MHz	CH20325 1747.5MHz	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20050 1720MHz	CH20175 1732.5MHz	CH20300 1745MHz
4 / 15M	QPSK	1/0	12.50	11.38	11.33	11.10	4 / 20M	QPSK	1/0	12.50	11.57	11.50	11.21
		1/37	12.50	11.72	11.26	11.70			1/50	12.50	11.89	11.32	11.62
		1/74	12.50	11.65	11.34	11.73			1/99	12.50	11.22	11.20	11.60
		36/0	11.50	9.99	11.34	9.84			50/0	11.50	10.10	9.75	9.72
		36/19	11.50	10.04	9.62	10.01			50/25	11.50	10.07	9.75	9.96
		36/39	11.50	9.92	9.52	10.08			50/50	11.50	9.81	9.60	10.03
		75/0	11.50	9.95	9.56	9.92			100/0	11.50	9.96	9.64	9.90
	16QAM	1/0	11.50	10.54	10.59	10.05		16QAM	1/0	11.50	11.09	10.73	10.48
		1/37	11.50	10.87	10.57	10.76			1/50	11.50	11.27	10.66	10.91
		1/74	11.50	10.93	10.73	11.05			1/99	11.50	10.71	10.31	10.99
		36/0	10.50	9.45	9.07	9.26			50/0	10.50	9.52	9.18	9.14
		36/19	10.50	9.49	9.03	9.44			50/25	10.50	9.49	9.13	9.39
		36/39	10.50	9.32	8.95	9.50			50/50	10.50	9.23	9.03	9.45
		75/0	10.50	9.36	8.96	9.31			100/0	10.50	9.38	9.04	9.33

Note: The tested channels are marks in bold.

8.1.7 CONDUCTED POWER MEASUREMENTS OF LTE BAND 5

1) Conducted power measurement results of LTE Band 5 (Sensor off)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH20407	CH20525	CH20643	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20415	CH20525	CH20635
				824.7MHz	836.5MHz	848.3MHz					825.5MHz	836.5MHz	847.5MHz
5 / 1.4M	QPSK	1/0	25.50	23.77	24.04	24.28	5 / 3M	QPSK	1/0	25.50	23.60	23.96	23.83
		1/2	25.50	23.87	24.12	24.39			1/7	25.50	23.85	24.08	24.23
		1/5	25.50	23.70	23.94	24.29			1/14	25.50	23.60	23.71	24.04
		3/0	25.50	23.77	24.07	24.31			8/0	24.50	22.66	23.14	23.19
		3/1	25.50	23.79	24.09	24.35			8/3	24.50	22.69	23.05	23.29
		3/3	25.50	23.78	24.03	24.35			8/7	24.50	22.52	22.93	23.24
		6/0	24.50	22.73	23.09	23.34			15/0	24.50	22.62	22.98	23.24
	16QAM	1/0	24.50	22.63	23.32	23.33		16QAM	1/0	24.50	22.73	23.35	22.96
		1/2	24.50	22.70	23.41	23.46			1/7	24.50	23.03	23.52	23.38
		1/5	24.50	22.56	23.29	23.39			1/14	24.50	22.54	23.05	23.15
		3/0	24.50	22.71	23.20	23.25			8/0	23.50	21.62	22.15	22.12
		3/1	24.50	22.74	23.23	23.30			8/3	23.50	21.66	22.07	22.24
		3/3	24.50	22.72	23.17	23.30			8/7	23.50	21.53	21.94	22.17
		6/0	23.50	21.56	22.01	22.20			15/0	23.50	21.52	21.97	22.12
Band / BW	Modulation	RB Size/Offset	Tune-up	CH20425	CH20525	CH20625	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20450	CH20525	CH20600
				826.5MHz	836.5MHz	846.5MHz					829MHz	836.5MHz	844MHz
5 / 5M	QPSK	1/0	25.50	24.65	25.02	24.72	5 / 10M	QPSK	1/0	25.50	24.68	25.16	24.76
		1/12	25.50	23.67	23.97	24.19			1/24	25.50	24.50	24.84	24.56
		1/24	25.50	24.61	24.84	25.15			1/49	25.50	24.84	24.49	25.13
		12/0	24.50	22.61	23.09	22.95			25/0	24.50	23.36	23.76	23.30
		12/6	24.50	22.60	23.14	23.14			25/12	24.50	23.48	23.75	23.68
		12/13	24.50	22.57	22.91	23.16			25/25	24.50	23.46	23.46	23.60
		25/0	24.50	22.50	22.89	22.99			50/0	24.50	23.42	23.58	23.59
	16QAM	1/0	24.50	23.86	24.39	24.02		16QAM	1/0	24.50	23.85	24.43	23.77
		1/12	24.50	22.78	23.35	23.54			1/24	24.50	23.81	24.32	23.68
		1/24	24.50	23.80	24.19	24.13			1/49	24.50	24.09	23.87	24.16
		12/0	23.50	21.58	22.12	21.90			25/0	23.50	22.27	22.78	22.23
		12/6	23.50	21.52	22.11	22.11			25/12	23.50	22.42	22.71	22.61
		12/13	23.50	21.51	21.90	22.11			25/25	23.50	22.40	22.38	22.62
		25/0	23.50	21.51	21.83	21.86			50/0	23.50	22.27	22.48	22.53

2) Conducted power measurement results of LTE Band 5 (Sensor on)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH20407 824.7MHz	CH20525 836.5MHz	CH20643 848.3MHz	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20415 825.5MHz	CH20525 836.5MHz	CH20635 847.5MHz
5 / 1.4M	QPSK	1/0	15.50	13.70	13.87	13.96	5 / 3M	QPSK	1/0	15.50	13.59	13.77	13.88
		1/2	15.50	13.73	13.93	14.03			1/7	15.50	13.74	13.84	14.08
		1/5	15.50	13.66	13.79	13.93			1/14	15.50	13.52	13.75	13.81
		3/0	15.50	13.67	13.92	13.96			8/0	14.50	12.67	13.04	12.92
		3/1	15.50	13.65	13.93	13.99			8/3	14.50	12.71	12.99	13.01
		3/3	15.50	13.63	13.88	13.98			8/7	14.50	12.56	12.87	12.95
		6/0	14.50	12.71	12.97	13.03			15/0	14.50	12.65	12.93	12.96
	16QAM	1/0	14.50	12.74	13.22	13.07		16QAM	1/0	14.50	12.62	13.09	13.09
		1/2	14.50	12.74	13.28	13.12			1/7	14.50	12.93	13.27	13.46
		1/5	14.50	12.72	13.19	13.02			1/14	14.50	12.53	12.84	13.15
		3/0	14.50	12.66	13.09	13.04			8/0	13.50	11.67	12.08	11.89
		3/1	14.50	12.68	13.10	13.06			8/3	13.50	11.71	11.99	11.99
		3/3	14.50	12.67	13.04	13.06			8/7	13.50	11.55	11.87	11.92
		6/0	13.50	11.68	11.87	12.06			15/0	13.50	11.61	11.90	11.91
Band / BW	Modulation	RB Size/Offset	Tune-up	CH20425 826.5MHz	CH20525 836.5MHz	CH20625 846.5MHz	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20450 829MHz	CH20525 836.5MHz	CH20600 844MHz
5 / 5M	QPSK	1/0	15.50	14.39	14.81	14.53	5 / 10M	QPSK	1/0	15.50	14.50	14.80	14.70
		1/12	15.50	13.59	13.87	13.91			1/24	15.50	14.34	14.70	14.35
		1/24	15.50	14.53	14.76	14.85			1/49	15.50	14.79	14.36	14.86
		12/0	14.50	12.66	13.03	12.79			25/0	14.50	13.15	13.63	13.19
		12/6	14.50	12.65	13.03	12.92			25/12	14.50	13.27	13.60	13.44
		12/13	14.50	12.53	12.82	12.91			25/25	14.50	13.32	13.29	13.37
		25/0	14.50	12.57	12.81	12.77			50/0	14.50	13.22	13.40	13.36
	16QAM	1/0	14.50	13.58	14.03	13.78		16QAM	1/0	14.50	13.59	14.06	13.61
		1/12	14.50	12.79	13.05	13.19			1/24	14.50	13.55	13.99	13.34
		1/24	14.50	13.73	13.83	14.28			1/49	14.50	13.95	13.63	13.76
		12/0	13.50	11.63	12.06	11.78			25/0	13.50	12.14	12.65	12.11
		12/6	13.50	11.62	12.07	11.91			25/12	13.50	12.28	12.63	12.40
		12/13	13.50	11.50	11.81	11.90			25/25	13.50	12.32	12.27	12.39
		25/0	13.50	11.52	11.73	11.72			50/0	13.50	12.17	12.37	12.39

Note: The tested channels are marks in bold.

8.1.8 CONDUCTED POWER MEASUREMENTS OF LTE BAND 7

1) Conducted power measurement results of LTE Band 7 (Sensor off)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH20775	CH21100	CH21425	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20800	CH21100	CH21400
				2502.5MHz	2535MHz	2567.5MHz					2505MHz	2535MHz	2565MHz
7 / 5M	QPSK	1/0	24.00	22.74	22.84	22.84	7 / 10M	QPSK	1/0	24.00	22.86	22.84	22.75
		1/12	24.00	23.10	23.11	22.96			1/24	24.00	22.54	22.22	22.10
		1/24	24.00	23.23	23.08	22.85			1/49	24.00	23.32	23.25	22.86
		12/0	23.00	22.27	22.33	22.26			25/0	23.00	21.28	21.19	21.15
		12/6	23.00	22.38	22.43	22.23			25/12	23.00	21.51	21.35	21.12
		12/13	23.00	22.34	22.38	22.14			25/25	23.00	21.45	21.27	21.15
		25/0	23.00	22.26	22.35	22.16			50/0	23.00	21.45	21.29	21.22
	16QAM	1/0	23.00	22.16	22.37	22.22		16QAM	1/0	23.00	22.19	22.18	21.95
		1/12	23.00	22.53	22.62	22.31			1/24	23.00	21.68	21.53	21.27
		1/24	23.00	22.62	22.60	22.21			1/49	23.00	22.88	22.63	22.09
		12/0	23.00	22.17	22.24	22.15			25/0	23.00	21.16	21.10	21.07
		12/6	23.00	22.31	22.33	22.11			25/12	23.00	21.40	21.25	21.04
		12/13	23.00	22.27	22.24	21.96			25/25	23.00	21.31	21.18	21.07
		25/0	23.00	22.19	22.22	22.02			50/0	23.00	21.33	21.20	21.10
Band / BW	Modulation	RB Size/Offset	Tune-up	CH20825	CH21100	CH21375	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20850	CH21100	CH21350
				2507.5MHz	2535MHz	2562.5MHz					2510MHz	2535MHz	2560MHz
7 / 15M	QPSK	1/0	24.00	22.74	22.58	22.75	7 / 20M	QPSK	1/0	24.00	22.89	22.68	23.11
		1/37	24.00	23.31	23.19	23.03			1/50	24.00	22.69	22.23	22.19
		1/74	24.00	23.25	23.19	22.72			1/99	24.00	23.00	23.36	23.04
		36/0	23.00	22.54	22.21	22.11			50/0	23.00	21.29	21.25	21.10
		36/19	23.00	22.75	22.48	22.19			50/25	23.00	21.41	21.28	21.07
		36/39	23.00	22.66	22.47	22.14			50/50	23.00	21.33	21.41	21.03
		75/0	23.00	22.76	22.31	22.31			100/0	23.00	21.45	21.18	21.14
	16QAM	1/0	23.00	22.18	21.86	22.14		16QAM	1/0	23.00	22.27	21.99	22.44
		1/37	23.00	22.87	22.50	22.50			1/50	23.00	21.88	21.52	21.30
		1/74	23.00	22.74	22.48	22.20			1/99	23.00	22.32	22.65	22.26
		36/0	23.00	22.38	22.10	22.02			50/0	23.00	21.17	21.16	21.09
		36/19	23.00	22.64	22.36	22.12			50/25	23.00	21.41	21.20	21.11
		36/39	23.00	22.54	22.34	22.04			50/50	23.00	21.33	21.11	21.01
		75/0	23.00	22.66	22.21	22.17			100/0	23.00	21.34	21.05	21.03

2) Conducted power measurement results of LTE Band 7 (Sensor on)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH20775	CH21100	CH21425	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20800	CH21100	CH21400
				2502.5MHz	2535MHz	2567.5MHz					2505MHz	2535MHz	2565MHz
7 / 5M	QPSK	1/0	8.00	7.13	7.37	7.28	7 / 10M	QPSK	1/0	8.00	7.38	7.42	7.17
		1/12	8.00	7.38	7.65	7.56			1/24	8.00	6.57	6.69	6.54
		1/24	8.00	7.46	7.56	7.60			1/49	8.00	7.60	7.74	7.72
		12/0	7.00	6.44	6.55	6.58			25/0	7.00	5.29	5.34	5.13
		12/6	7.00	6.50	6.64	6.65			25/12	7.00	5.49	5.55	5.36
		12/13	7.00	6.42	6.50	6.52			25/25	7.00	5.37	5.38	5.38
		25/0	7.00	6.38	6.55	6.51			50/0	7.00	5.42	5.48	5.44
	16QAM	1/0	7.00	6.43	6.72	6.54		16QAM	1/0	7.00	6.46	6.68	6.50
		1/12	7.00	6.69	6.87	6.82			1/24	7.00	5.65	5.85	5.76
		1/24	7.00	6.66	6.80	6.73			1/49	7.00	6.83	6.98	7.00
		12/0	7.00	6.39	6.49	6.50			25/0	7.00	5.21	5.26	5.02
		12/6	7.00	6.45	6.56	6.56			25/12	7.00	5.41	5.47	5.26
		12/13	7.00	6.36	6.43	6.43			25/25	7.00	5.29	5.30	5.27
		25/0	7.00	6.26	6.47	6.42			50/0	7.00	5.33	5.38	5.34
Band / BW	Modulation	RB Size/Offset	Tune-up	CH20825	CH21100	CH21375	Band / BW	Modulation	RB Size/Offset	Tune-up	CH20850	CH21100	CH21350
				2507.5MHz	2535MHz	2562.5MHz					2510MHz	2535MHz	2560MHz
7 / 15M	QPSK	1/0	8.00	7.22	6.89	6.76	7 / 20M	QPSK	1/0	8.00	7.55	7.32	7.44
		1/37	8.00	7.75	7.70	7.38			1/50	8.00	6.65	6.73	6.17
		1/74	8.00	7.36	7.53	7.52			1/99	8.00	7.38	7.76	7.72
		36/0	7.00	6.43	6.39	6.03			50/0	7.00	5.30	5.47	5.09
		36/19	7.00	6.66	6.70	6.32			50/25	7.00	5.45	5.50	5.03
		36/39	7.00	6.52	6.49	6.46			50/50	7.00	5.32	5.31	5.15
		75/0	7.00	6.69	6.50	6.46			100/0	7.00	5.41	5.36	5.15
	16QAM	1/0	7.00	6.35	6.22	5.92		16QAM	1/0	7.00	6.86	6.37	6.69
		1/37	7.00	7.00	6.97	6.59			1/50	7.00	5.93	5.78	5.30
		1/74	7.00	6.61	6.71	6.62			1/99	7.00	6.62	6.97	6.92
		36/0	7.00	6.33	6.28	5.99			50/0	7.00	5.21	5.42	5.07
		36/19	7.00	6.56	6.60	6.27			50/25	7.00	5.34	5.45	5.06
		36/39	7.00	6.41	6.43	6.40			50/50	7.00	5.21	5.25	5.08
		75/0	7.00	6.58	6.44	6.39			100/0	7.00	5.29	5.26	5.07

Note: The tested channels are marks in bold.

8.1.9 CONDUCTED POWER MEASUREMENTS OF LTE BAND 12

1) Conducted power measurement results of LTE Band 12 (Sensor off)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH23017	CH23095	CH23173	Band / BW	Modulation	RB Size/Offset	Tune-up	CH23025	CH23095	CH23165
				699.7MHz	707.5MHz	715.3MHz					700.5MHz	707.5MHz	714.5MHz
12 / 1.4M	QPSK	1/0	25.50	23.70	24.18	24.25	12 / 3M	QPSK	1/0	25.50	23.60	24.29	23.83
		1/2	25.50	23.71	24.15	24.31			1/7	25.50	23.77	24.18	24.30
		1/5	25.50	23.57	23.83	24.08			1/14	25.50	23.74	23.67	24.00
		3/0	25.50	23.60	24.18	24.26			8/0	23.00	21.76	22.56	22.07
		3/1	25.50	23.61	24.15	24.29			8/3	23.00	21.80	22.36	22.23
		3/3	25.50	23.61	24.08	24.24			8/7	23.00	21.83	22.13	22.21
		6/0	23.00	21.77	22.35	22.30			15/0	23.00	21.82	22.30	22.13
	16QAM	1/0	24.50	22.76	23.46	23.25		16QAM	1/0	24.50	22.89	23.48	22.76
		1/2	24.50	22.76	23.46	23.33			1/7	24.50	23.10	23.41	23.24
		1/5	24.50	22.63	23.15	23.11			1/14	24.50	22.84	22.75	22.97
		3/0	24.50	22.71	23.24	23.19			8/0	23.50	21.63	22.39	21.92
		3/1	24.50	22.79	23.21	23.24			8/3	23.50	21.67	22.14	22.07
		3/3	24.50	22.78	23.16	23.24			8/7	23.50	21.72	21.97	22.05
		6/0	23.50	21.65	22.22	22.26			15/0	23.50	21.65	22.06	21.96
Band / BW	Modulation	RB Size/Offset	Tune-up	CH23035	CH23095	CH23155	Band / BW	Modulation	RB Size/Offset	Tune-up	CH23060	CH23095	CH23130
				701.5MHz	707.5MHz	713.5MHz					704MHz	707.5MHz	711MHz
12 / 5M	QPSK	1/0	25.50	24.53	24.96	24.46	12 / 10M	QPSK	1/0	25.50	24.43	24.91	24.97
		1/12	25.50	23.94	23.99	24.03			1/24	25.50	24.56	24.15	23.69
		1/24	25.50	24.91	24.67	24.87			1/49	25.50	24.70	24.37	24.87
		12/0	23.00	21.74	22.53	21.68			25/0	23.00	21.69	22.40	21.88
		12/6	23.00	21.84	22.40	21.93			25/12	23.00	22.37	22.23	21.66
		12/13	23.00	21.93	22.06	22.03			25/25	23.00	22.21	21.58	21.57
		25/0	23.00	21.68	22.20	21.87			50/0	23.00	21.83	22.00	21.70
	16QAM	1/0	24.50	23.86	24.39	23.76		16QAM	1/0	24.50	23.64	24.49	24.34
		1/12	24.50	23.06	23.27	23.09			1/24	24.50	23.62	23.38	22.72
		1/24	24.50	24.41	24.04	24.35			1/49	24.50	24.14	23.93	24.34
		12/0	23.50	21.67	22.30	21.55			25/0	23.50	21.56	22.31	21.81
		12/6	23.50	21.76	22.18	21.87			25/12	23.50	22.24	22.15	21.57
		12/13	23.50	21.84	21.95	21.97			25/25	23.50	22.13	21.56	21.50
		25/0	23.50	21.53	22.06	21.72			50/0	23.50	21.68	21.84	21.54

2) Conducted power measurement results of LTE Band 12 (Sensor on)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH23017 699.7MHz	CH23095 707.5MHz	CH23173 715.3MHz	Band / BW	Modulation	RB Size/Offset	Tune-up	CH23025 700.5MHz	CH23095 707.5MHz	CH23165 714.5MHz
12 / 1.4M	QPSK	1/0	14.00	12.07	12.77	12.72	12 / 3M	QPSK	1/0	14.00	12.07	12.79	12.15
		1/2	14.00	12.04	12.76	12.85			1/7	14.00	12.23	12.82	12.72
		1/5	14.00	12.06	12.47	12.81			1/14	14.00	12.13	12.20	12.67
		3/0	14.00	12.02	12.80	12.77			8/0	11.50	10.13	11.09	10.60
		3/1	14.00	12.03	12.78	12.90			8/3	11.50	10.10	10.93	10.82
		3/3	14.00	12.01	12.72	12.90			8/7	11.50	10.10	10.73	10.87
		6/0	11.50	10.09	10.91	11.03			15/0	11.50	10.10	10.86	10.71
	16QAM	1/0	13.00	11.14	11.89	12.01		16QAM	1/0	13.00	11.08	12.01	11.20
		1/2	13.00	11.04	11.88	12.13			1/7	13.00	11.16	12.07	11.78
		1/5	13.00	11.05	11.59	12.08			1/14	13.00	11.10	11.41	11.69
		3/0	13.00	11.09	11.88	11.75			8/0	12.00	10.15	10.99	10.51
		3/1	13.00	11.10	11.85	11.83			8/3	12.00	10.12	10.82	10.73
		3/3	13.00	11.09	11.80	11.83			8/7	12.00	10.12	10.62	10.78
		6/0	12.00	10.07	10.88	10.91			15/0	12.00	10.07	10.73	10.58
Band / BW	Modulation	RB Size/Offset	Tune-up	CH23035 701.5MHz	CH23095 707.5MHz	CH23155 713.5MHz	Band / BW	Modulation	RB Size/Offset	Tune-up	CH23060 704MHz	CH23095 707.5MHz	CH23130 711MHz
12 / 5M	QPSK	1/0	14.00	13.05	13.84	12.93	12 / 10M	QPSK	1/0	14.00	12.87	13.31	13.88
		1/12	14.00	12.07	12.73	12.36			1/24	14.00	12.85	12.80	12.24
		1/24	14.00	13.68	13.30	13.78			1/49	14.00	13.49	13.03	13.88
		12/0	11.50	10.11	11.03	10.25			25/0	11.50	10.05	10.72	10.51
		12/6	11.50	10.17	10.96	10.47			25/12	11.50	10.79	10.77	10.31
		12/13	11.50	10.33	10.72	10.60			25/25	11.50	10.72	10.22	10.19
		25/0	11.50	10.03	10.78	10.45			50/0	11.50	10.35	10.53	10.33
	16QAM	1/0	13.00	12.20	12.95	12.17		16QAM	1/0	13.00	11.93	12.69	12.89
		1/12	13.00	11.29	11.94	11.55			1/24	13.00	11.95	12.08	11.24
		1/24	13.00	12.88	12.48	12.98			1/49	13.00	12.72	12.34	13.00
		12/0	12.00	10.02	10.96	10.14			25/0	12.00	10.09	10.71	10.40
		12/6	12.00	10.13	10.90	10.37			25/12	12.00	10.61	10.67	10.19
		12/13	12.00	10.29	10.65	10.49			25/25	12.00	10.57	10.11	10.07
		25/0	12.00	10.02	10.68	10.33			50/0	12.00	10.20	10.40	10.20

Note: The tested channels are marks in bold.

8.1.10 CONDUCTED POWER MEASUREMENTS OF LTE BAND 17

1) Conducted power measurement results of LTE Band 17 (Sensor off)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH23755	CH23790	CH23825	Band / BW	Modulation	RB Size/Offset	Tune-up	CH23780	CH23790	CH23800
				706.5MHz	710MHz	713.5MHz					709MHz	710MHz	711MHz
17 / 5M	QPSK	1/0	25.50	24.66	24.41	23.92	17 / 10M	QPSK	1/0	25.50	24.75	24.55	24.57
		1/12	25.50	23.11	22.48	22.77			1/24	25.50	23.73	23.52	23.48
		1/24	25.50	24.09	24.00	24.41			1/49	25.50	24.47	24.60	24.73
		12/0	23.00	22.42	21.80	21.61			25/0	23.00	22.94	22.82	22.62
		12/6	23.00	22.51	21.72	21.86			25/12	23.00	22.59	22.52	22.39
		12/13	23.00	22.26	21.51	21.96			25/25	23.00	22.15	22.23	22.39
		25/0	23.00	22.31	21.67	21.80			50/0	23.00	22.55	22.43	22.42
	16QAM	1/0	24.50	24.38	24.34	24.23		16QAM	1/0	24.50	24.35	24.37	24.40
		1/12	24.50	23.30	22.71	23.10			1/24	24.50	23.80	23.75	23.44
		1/24	24.50	24.21	24.22	24.35			1/49	24.50	24.34	24.32	24.36
		12/0	23.50	22.35	21.76	21.51			25/0	23.50	22.90	22.82	22.57
		12/6	23.50	22.44	21.68	21.76			25/12	23.50	22.56	22.43	22.40
		12/13	23.50	22.20	21.58	21.86			25/25	23.50	22.12	22.23	22.37
		25/0	23.50	22.23	21.60	21.70			50/0	23.50	22.49	22.38	22.37

2) Conducted power measurement results of LTE Band 17 (Sensor on)

Band / BW	Modulation	RB Size/Offset	Tune-up	CH23755	CH23790	CH23825	Band / BW	Modulation	RB Size/Offset	Tune-up	CH23780	CH23790	CH23800
				706.5MHz	710MHz	713.5MHz					709MHz	710MHz	711MHz
17 / 5M	QPSK	1/0	14.00	13.77	13.80	13.48	17 / 10M	QPSK	1/0	14.00	13.57	13.66	13.66
		1/12	14.00	12.71	12.01	12.18			1/24	14.00	12.77	12.62	12.48
		1/24	14.00	13.86	13.53	13.86			1/49	14.00	13.30	13.58	13.87
		12/0	11.50	10.84	10.43	10.12			25/0	11.50	11.18	11.03	11.09
		12/6	11.50	11.02	10.27	10.35			25/12	11.50	10.96	10.70	10.62
		12/13	11.50	10.81	10.10	10.47			25/25	11.50	10.41	10.44	10.57
		25/0	11.50	10.81	10.21	10.32			50/0	11.50	10.85	10.73	10.71
	16QAM	1/0	13.00	12.83	12.82	12.76		16QAM	1/0	13.00	12.70	12.89	12.64
		1/12	13.00	12.06	11.24	11.47			1/24	13.00	11.99	11.91	11.52
		1/24	13.00	12.86	12.74	12.85			1/49	13.00	12.52	12.86	12.90
		12/0	12.00	10.67	10.28	10.03			25/0	12.00	11.03	10.93	10.67
		12/6	12.00	10.82	10.12	10.26			25/12	12.00	10.71	10.50	10.40
		12/13	12.00	10.62	10.05	10.38			25/25	12.00	10.16	10.23	10.35
		25/0	12.00	10.60	10.08	10.23			50/0	12.00	10.59	10.51	10.47

8.1.11 CONDUCTED POWER MEASUREMENTS OF BT

BT	Tune up	Average Conducted Power(dBm)		
		CH0	CH39	CH78
		2402MHz	2441MHz	2480MHz
DH5	9.50	7.13	7.22	7.11
2DH5	9.50	5.08	5.26	5.02
3DH5	9.50	5.18	5.10	5.25

BT	Tune up	Average Conducted Power(dBm)		
		CH0	CH19	CH39
		2402MHz	2441MHz	2480MHz
BLE	9.50	5.50	5.37	4.71

Note:

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

8.1.12 CONDUCTED POWER MEASUREMENTS OF WIFI 2.4G

1) Conducted power measurement results of WiFi 2.4G (sensor off)

	Mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Tune up	Average Power(dBm)	SAR Test(Yes/No)
2.4G	802.11b	1	2412	1	17.50	16.94	Yes
		6	2437		17.50	16.52	No
		11	2462		17.50	16.46	No
	802.11g	1	2412	6	11.00	Not Required	No
		6	2437		11.00	Not Required	No
		11	2462		11.00	Not Required	No
	802.11n HT20	1	2412	6.5	11.00	Not Required	No
		6	2437		11.00	Not Required	No
		11	2462		11.00	Not Required	No
	802.11n HT40	3	2422	13.5	10.00	Not Required	No
		6	2437		10.00	Not Required	No
		9	2452		10.00	Not Required	No

2) Conducted power measurement results of WiFi 2.4G (wifi with sensor on)

	Mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Tune up	Average Power(dBm)	SAR Test(Yes/No)
2.4G	802.11b	1	2412	1	9.50	8.46	No
		6	2437		9.50	8.55	No
		11	2462		9.50	9.19	Yes
	802.11g	1	2412	6	9.50	8.25	No
		6	2437		9.50	8.32	No
		11	2462		9.50	8.78	No
	802.11n HT20	1	2412	6.5	9.50	8.26	No
		6	2437		9.50	8.33	No
		11	2462		9.50	8.74	No
	802.11n HT40	3	2422	13.5	9.50	8.55	No
		6	2437		9.50	9.04	No
		9	2452		9.50	8.98	No

Note:

- 1) The Average conducted power of WiFi is measured with RMS detector.
- 2) Per KDB248227 D01, for WiFi 2.4GHz, the highest measured maximum output power Channel for DSSS modes(802.11b)was selected for SAR measurement. SAR for OFDM modes(2.4GHz 802.11g/n) was not required When the highest reported SAR for DSSS is adjusted by the ratio of OFDM modes(802.11g/n)to DSSS modes(802.11b)specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
- 3) The tested channels are marks in bold.

8.1.13 CONDUCTED POWER MEASUREMENTS OF WIFI 5G

1) Conducted power measurement results of WiFi 5G (sensor off)

Band	Mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Tune-up	Average Power(dBm)	SAR Test(Yes/No)
5.2G	802.11a	36	5180	6	17.00	15.79	No
		40	5200		17.00	15.58	No
		44	5220		17.00	15.61	No
		48	5240		17.00	15.64	No
	802.11n HT20	36	5180	6.5	17.00	15.98	No
		40	5200		17.00	15.86	No
		44	5220		17.00	15.78	No
		48	5240		17.00	15.81	No
	802.11n HT40	38	5190	13.5	12.00	Not Required	No
		46	5230		12.00	Not Required	No
	802.11ac HT20	36	5180	6.5	17.00	15.93	No
		40	5200		17.00	15.88	No
		44	5220		17.00	15.87	No
		48	5240		17.00	15.92	No
	802.11ac HT40	38	5190	13.5	12.00	Not Required	No
		46	5230		12.00	Not Required	No
	802.11ac VH80	42	5210	29.3	11.00	Not Required	No
5.3G	802.11a	52	5260	6	17.00	15.36	No
		56	5280		17.00	15.51	No
		60	5300		17.00	15.57	No
		64	5320		17.00	15.61	Yes
	802.11n HT20	52	5260	6.5	17.00	15.76	No
		56	5280		17.00	15.75	No
		60	5300		17.00	15.84	No
		64	5320		17.00	15.62	No
	802.11n HT40	54	5270	13.5	12.00	Not Required	No
		62	5310		12.00	Not Required	No
	802.11ac HT20	52	5180	6.5	17.00	15.57	No
		56	5200		17.00	15.87	No
		60	5220		17.00	15.91	No
		64	5240		17.00	15.63	No
	802.11ac HT40	54	5270	13.5	12.00	Not Required	No
		62	5310		12.00	Not Required	No
	802.11ac VH80	58	5290	29.3	11.00	Not Required	No

5.5G	802.11a	100	5500	6	17.00	15.67	No
		104	5520		17.00	15.61	No
		108	5540		17.00	15.58	No
		112	5560		17.00	15.53	No
		116	5580		17.00	15.62	No
		132	5660		17.00	15.66	No
		136	5680		17.00	15.71	No
		140	5700		17.00	15.95	Yes
	802.11n HT20	100	5500	6.5	17.00	15.73	No
		104	5520		17.00	15.68	No
		108	5540		17.00	15.63	No
		112	5560		17.00	15.71	No
		116	5580		17.00	15.66	No
		132	5660		17.00	15.75	No
		136	5680		17.00	15.78	No
		140	5700		17.00	16.02	No
	802.11n HT40	102	5510	13.5	12.00	Not Required	No
		134	5670		12.00	Not Required	No
	802.11ac HT20	100	5500	6.5	17.00	15.76	No
		104	5520		17.00	15.65	No
		108	5540		17.00	15.63	No
		112	5560		17.00	15.71	No
		116	5580		17.00	15.66	No
		132	5660		17.00	15.74	No
		136	5680		17.00	15.59	No
		140	5700		17.00	15.44	No
	802.11ac HT40	102	5510	13.5	12.00	Not Required	No
		134	5670		12.00	Not Required	No
	802.11ac VH80	106	5530	29.3	11.00	Not Required	No
		138	5690		11.00	Not Required	No

5.8G	802.11a	149	5745	6	17.00	15.86	No
		153	5765		17.00	15.81	No
		157	5785		17.00	15.91	Yes
		161	5805		17.00	15.67	No
		165	5825		17.00	15.45	No
	802.11n HT20	149	5745	6.5	17.00	15.91	No
		153	5765		17.00	15.82	No
		157	5785		17.00	15.96	No
		161	5805		17.00	15.76	No
		165	5825		17.00	15.52	No
	802.11n HT40	151	5755	13.5	12.00	Not Required	No
		159	5795		12.00	Not Required	No
	802.11ac HT20	149	5745	6.5	17.00	15.36	No
		153	5765		17.00	15.32	No
		157	5785		17.00	15.41	No
		161	5805		17.00	15.45	No
		165	5825		17.00	15.55	No
	802.11ac HT40	151	5755	13.5	12.00	Not Required	No
		159	5795		12.00	Not Required	No
	802.11ac VH80	155	5775	29.3	11.00	Not Required	No

Note:

- 1) The Average conducted power of WiFi is measured with RMS detector.
- 2) The tested channels are marks in bold.

2) Conducted power measurement results of WiFi 5G (wifi with sensor on)

Band	Mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Tune-up	Average Power(dBm)	SAR Test(Yes/No)
5.2G	802.11a	36	5180	6	7.00	5.95	No
		40	5200		7.00	5.84	No
		44	5220		7.00	5.76	No
		48	5240		7.00	5.71	No
	802.11n HT20	36	5180	6.5	7.00	5.91	No
		40	5200		7.00	5.90	No
		44	5220		7.00	5.93	No
		48	5240		7.00	5.75	No
	802.11n HT40	38	5190	13.5	7.00	5.76	No
		46	5230		7.00	5.57	No
	802.11ac HT20	36	5180	6.5	7.00	5.91	No
		40	5200		7.00	5.86	No
		44	5220		7.00	5.83	No
		48	5240		7.00	5.73	No
	802.11ac HT40	38	5190	13.5	7.00	5.73	No
		46	5230		7.00	5.52	No
	802.11ac VH80	42	5210	29.3	7.00	5.39	No
5.3G	802.11a	52	5260	6	7.00	5.93	No
		56	5280		7.00	6.01	No
		60	5300		7.00	6.22	No
		64	5320		7.00	6.43	No
	802.11n HT20	52	5260	6.5	7.00	5.83	No
		56	5280		7.00	5.94	No
		60	5300		7.00	6.15	No
		64	5320		7.00	6.39	No
	802.11n HT40	54	5270	13.5	7.00	5.48	No
		62	5310		7.00	5.75	No
	802.11ac HT20	52	5180	6.5	7.00	5.81	No
		56	5200		7.00	5.92	No
		60	5220		7.00	6.09	No
		64	5240		7.00	6.37	No
	802.11ac HT40	54	5270	13.5	7.00	5.46	No
		62	5310		7.00	5.77	No
	802.11ac VH80	58	5290	29.3	7.00	5.39	Yes

5.5G	802.11a	100	5500	6	7.00	6.08	No
		104	5520		7.00	6.18	No
		108	5540		7.00	6.29	No
		112	5560		7.00	6.46	No
		116	5580		7.00	5.71	No
		132	5660		7.00	5.51	No
		136	5680		7.00	5.87	No
		140	5700		7.00	6.19	No
	802.11n HT20	100	5500	6.5	7.00	5.96	No
		104	5520		7.00	6.08	No
		108	5540		7.00	6.21	No
		112	5560		7.00	6.39	No
		116	5580		7.00	5.64	No
		132	5660		7.00	5.43	No
		136	5680		7.00	5.83	No
		140	5700		7.00	6.14	No
	802.11n HT40	102	5510	13.5	7.00	6.02	No
		134	5670		7.00	5.74	No
	802.11ac HT20	100	5500	6.5	7.00	5.92	No
		104	5520		7.00	6.05	No
		108	5540		7.00	6.18	No
		112	5560		7.00	6.36	No
		116	5580		7.00	5.63	No
		132	5660		7.00	5.41	No
		136	5680		7.00	5.81	No
		140	5700		7.00	6.12	No
	802.11ac HT40	102	5510	13.5	7.00	6.01	No
		134	5670		7.00	5.72	No
	802.11ac VH80	106	5530	29.3	7.00	5.45	Yes
		138	5690		7.00	5.22	No

5.8G	802.11a	149	5745	6	7.00	5.87	No
		153	5765		7.00	5.38	No
		157	5785		7.00	5.82	No
		161	5805		7.00	6.18	No
		165	5825		7.00	6.37	No
	802.11n HT20	149	5745	6.5	7.00	5.84	No
		153	5765		7.00	5.37	No
		157	5785		7.00	5.78	No
		161	5805		7.00	6.15	No
		165	5825		7.00	6.34	No
	802.11n HT40	151	5755	13.5	7.00	5.51	No
		159	5795		7.00	5.75	No
	802.11ac HT20	149	5745	6.5	7.00	5.81	No
		153	5765		7.00	5.33	No
		157	5785		7.00	5.74	No
		161	5805		7.00	6.12	No
		165	5825		7.00	6.33	No
	802.11ac HT40	151	5755	13.5	7.00	5.48	No
		159	5795		7.00	5.73	No
	802.11ac VH80	155	5775	29.3	7.00	5.46	Yes

Note:

- 1) The Average conducted power of WiFi is measured with RMS detector.
- 2) The tested channels are marks in bold.

8.2 SAR TEST RESULTS

General Notes:

- 1) Per KDB447498 D01, all measurement SAR results are scaled to the maximum tune-up tolerance limit to demonstrate compliant.
- 2) Per KDB447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is: ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz. When the maximum output power variation across the required test channels is $> \frac{1}{2}$ dB, instead of the middle channel, the highest output power channel must be used.
- 3) Per KDB865664 D01, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8 W/kg; if the deviation among the repeated measurement is $\leq 20\%$, and the measured SAR < 1.45 W/kg, only one repeated measurement is required.
- 4) Per KDB865664 D02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing.

WLAN Notes:

1. For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode, 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 positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 for 2.4GHz WIFI single transmission chain operations, the highest measured maximum output power Channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 7.1.5 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 for 5GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed power. Other transmission mode were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2W/kg. See Section 7.1.5 for more information.

8.2.1 SAR MEASUREMENT RESULT

1. Test results of GSM

Test No.	Band	Mode	Channel	Test Position	Separation Distance (cm)	Sensor	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift	SAR 1g	SAR 10g	Reported 1g SAR
T100	GSM 850	GPRS 2TX	190	Rear Face	0	on	22.5	21.1	0.17	0.367	0.173	0.507
T101	GSM 850	GPRS 2TX	190	Top Side	0	on	22.5	21.1	0.03	0.165	0.0737	0.228
T103	GSM 850	GPRS 2TX	190	Rear Face	2.7	off	32.5	31.5	0.06	0.102	0.069	0.128
T104	GSM 850	GPRS 2TX	190	Left Side	0	off	32.5	31.5	0.04	0.039	0.025	0.049
T105	GSM 850	GPRS 2TX	190	Right Side	0	off	32.5	31.5	0.1	0.205	0.130	0.258
T106	GSM 850	GPRS 2TX	190	Top Side	3.7	off	32.5	31.5	-0.09	0.031	0.021	0.039
T107	GSM 850	GPRS 2TX	190	Bottom Side	0	off	32.5	31.5	-0.09	0.061	0.037	0.076
T109	GSM 1900	GPRS 2TX	661	Rear Face	0	on	17.5	16.03	0	0.251	0.11	0.352
T110	GSM 1900	GPRS 2TX	661	Top Side	0	on	17.5	16.03	0.02	0.161	0.065	0.226
T112	GSM 1900	GPRS 2TX	661	Rear Face	2.7	off	29.5	27.91	-0.09	0.079	0.048	0.114
T113	GSM 1900	GPRS 2TX	661	Right Side	0	off	29.5	27.91	0.18	0.279	0.149	0.402
T114	GSM 1900	GPRS 2TX	661	Top Side	3.7	off	29.5	27.91	-0.03	0.033	0.021	0.048

Note: The maximum SAR Values are marks in bold.

2. Test results of UMTS

Test No.	Band	Mode	Channel	Test Position	Separation Distance (cm)	Sensor	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift	SAR 1g	SAR 10g	Reported 1g SAR
T116	UMTS B2	RMC12.2K	9400	Rear Face	0	on	9.5	8.48	0	0.155	0.066	0.196
T117	UMTS B2	RMC12.2K	9400	Top Side	0	on	9.5	8.48	0.16	0.047	0.018	0.059
T119	UMTS B2	RMC12.2K	9400	Rear Face	2.7	off	25	23.73	-0.08	0.103	0.061	0.138
T120	UMTS B2	RMC12.2K	9400	Right Side	0	off	25	23.73	0.03	0.344	0.183	0.461
T121	UMTS B2	RMC12.2K	9400	Top Side	3.7	off	25	23.73	0	0.051	0.032	0.068
T123	UMTS B4	RMC12.2K	1413	Rear Face	0	on	12.5	11.03	0.09	0.273	0.123	0.383
T124	UMTS B4	RMC12.2K	1413	Top Side	0	on	12.5	11.03	0.08	0.102	0.041	0.143
T126	UMTS B4	RMC12.2K	1413	Rear Face	2.7	off	25	23.65	0.04	0.073	0.045	0.099
T127	UMTS B4	RMC12.2K	1413	Right Side	0	off	25	23.65	0.06	0.379	0.201	0.517
T128	UMTS B4	RMC12.2K	1413	Top Side	3.7	off	25	23.65	0.14	0.026	0.017	0.036
T130	UMTS B5	RMC12.2K	4182	Rear Face	0	on	15.5	14.96	0.03	0.167	0.075	0.189
T131	UMTS B5	RMC12.2K	4182	Top Side	0	on	15.5	14.96	-0.02	0.141	0.069	0.160
T133	UMTS B5	RMC12.2K	4182	Rear Face	2.7	off	25.5	23.78	-0.01	0.117	0.082	0.174
T134	UMTS B5	RMC12.2K	4182	Right Side	0	off	25.5	23.78	0.08	0.166	0.108	0.247
T135	UMTS B5	RMC12.2K	4182	Top Side	3.7	off	25.5	23.78	0	0.020	0.014	0.029

Note: The maximum SAR Values are marks in bold.

3. Test results of LTE B2

Test No.	Band	Mode	Channel	RB	offset	Test Position	Separation Distance (cm)	Sensor	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift	SAR 1g	SAR 10g	Reported 1g SAR
T01	LTE B2	QPSK20M	19100	1	0	Rear Face	0	on	9	8.76	-0.09	0.276	0.115	0.292
T02	LTE B2	QPSK20M	19100	1	0	Top Side	0	on	9	8.76	0.04	0.088	0.032	0.092
T03	LTE B2	QPSK20M	19100	50	0	Rear Face	0	on	9	8.12	-0.09	0.203	0.085	0.249
T04	LTE B2	QPSK20M	19100	50	0	Top Side	0	on	9	8.12	0.04	0.065	0.023	0.080
T06	LTE B2	QPSK20M	18700	1	0	Rear Face	2.7	off	24	23.89	-0.05	0.117	0.071	0.120
T07	LTE B2	QPSK20M	18700	1	0	Right Side	0	off	24	23.89	0.08	0.416	0.227	0.426
T08	LTE B2	QPSK20M	18700	1	0	Top Side	3.7	off	24	23.89	0.02	0.051	0.032	0.052
T09	LTE B2	QPSK20M	18700	50	0	Rear Face	2.7	off	24	22.81	0.01	0.085	0.051	0.111
T10	LTE B2	QPSK20M	18700	50	0	Right Side	0	off	24	22.81	-0.04	0.314	0.173	0.413
T11	LTE B2	QPSK20M	18700	50	0	Top Side	3.7	off	24	22.81	0.09	0.039	0.024	0.051

Note: The maximum SAR Values are marks in bold.

4. Test results of LTE B4

Test No.	Band	Mode	Channel	RB	offset	Test Position	Separation Distance (cm)	Sensor	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift	SAR 1g	SAR 10g	Reported 1g SAR
T13	LTE B4	QPSK20M	20050	1	50	Rear Face	0	on	12.5	11.89	0	0.184	0.084	0.212
T14	LTE B4	QPSK20M	20050	1	50	Top Side	0	on	12.5	11.89	0.04	0.065	0.030	0.075
T15	LTE B4	QPSK20M	20050	50	0	Rear Face	0	on	11.5	10.10	0	0.152	0.068	0.210
T16	LTE B4	QPSK20M	20050	50	0	Top Side	0	on	11.5	10.10	-0.03	0.053	0.024	0.073
T18	LTE B4	QPSK20M	20300	1	99	Rear Face	2.7	off	25	24.19	-0.01	0.090	0.056	0.108
T19	LTE B4	QPSK20M	20300	1	99	Right Side	0	off	25	24.19	-0.17	0.327	0.175	0.394
T20	LTE B4	QPSK20M	20300	1	99	Top Side	3.7	off	25	24.19	0.04	0.031	0.020	0.037
T21	LTE B4	QPSK20M	20300	50	50	Rear Face	2.7	off	24	22.91	0.03	0.094	0.059	0.121
T22	LTE B4	QPSK20M	20300	50	50	Right Side	0	off	24	22.91	-0.13	0.332	0.178	0.427
T23	LTE B4	QPSK20M	20300	50	50	Top Side	3.7	off	24	22.91	0.04	0.033	0.021	0.042

Note: The maximum SAR Values are marks in bold.

5. Test results of LTE B5

Test No.	Band	Mode	Channel	RB	offset	Test Position	Separation Distance (cm)	Sensor	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift	SAR 1g	SAR 10g	Reported 1g SAR
T25	LTE B5	QPSK10M	20600	1	49	Rear Face	0	on	15.5	14.86	0.01	0.133	0.069	0.154
T26	LTE B5	QPSK10M	20600	1	49	Top Side	0	on	15.5	14.86	-0.06	0.061	0.039	0.070
T27	LTE B5	QPSK10M	20525	25	0	Rear Face	0	on	14.5	13.63	0.02	0.117	0.066	0.143
T28	LTE B5	QPSK10M	20525	25	0	Top Side	0	on	14.5	13.63	0.02	0.042	0.027	0.051
T30	LTE B5	QPSK10M	20525	1	0	Rear Face	2.7	off	25.5	25.16	0.12	0.082	0.055	0.088
T31	LTE B5	QPSK10M	20525	1	0	Right Side	0	off	25.5	25.16	0.14	0.199	0.127	0.215
T32	LTE B5	QPSK10M	20525	1	0	Top Side	3.7	off	25.5	25.16	-0.12	0.020	0.013	0.022
T33	LTE B5	QPSK10M	20525	25	0	Rear Face	2.7	off	24.5	23.76	0.03	0.084	0.060	0.099
T34	LTE B5	QPSK10M	20525	25	0	Right Side	0	off	24.5	23.76	0.02	0.203	0.129	0.241
T35	LTE B5	QPSK10M	20525	25	0	Top Side	3.7	off	24.5	23.76	-0.03	0.021	0.013	0.025

Note: The maximum SAR Values are marks in bold.

6. Test results of LTE B7

Test No.	Band	Mode	Channel	RB	offset	Test Position	Separation Distance (cm)	Sensor	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift	SAR 1g	SAR 10g	Reported 1g SAR
T37	LTE B7	QPKS20M	21100	1	99	Rear Face	0	on	8	7.76	0	0.332	0.109	0.351
T38	LTE B7	QPKS20M	21100	1	99	Top Side	0	on	8	7.76	0.09	0.219	0.064	0.231
T39	LTE B7	QPKS20M	21100	50	25	Rear Face	0	on	7	5.50	0	0.139	0.040	0.196
T40	LTE B7	QPKS20M	21100	50	25	Top Side	0	on	7	5.50	0.09	0.127	0.036	0.179
T42	LTE B7	QPSK20M	21100	1	99	Rear Face	2.7	off	24	23.36	0.04	0.137	0.076	0.159
T43	LTE B7	QPSK20M	21100	1	99	Right Side	0	off	24	23.36	0.09	0.267	0.125	0.309
T44	LTE B7	QPSK20M	21100	1	99	Top Side	3.7	off	24	23.36	-0.07	0.178	0.100	0.206
T45	LTE B7	QPSK20M	21100	50	50	Rear Face	2.7	off	23	21.41	-0.09	0.103	0.057	0.149
T46	LTE B7	QPSK20M	21100	50	50	Right Side	0	off	23	21.41	0.04	0.190	0.088	0.274
T47	LTE B7	QPSK20M	21100	50	50	Top Side	3.7	off	23	21.41	0.13	0.135	0.075	0.195

Note: The maximum SAR Values are marks in bold.

7. Test results of LTE B12

Test No.	Band	Mode	Channel	RB	offset	Test Position	Separation Distance (cm)	Sensor	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift	SAR 1g	SAR 10g	Reported 1g SAR
T49	LTE B12	QPSK10M	23130	1	0	Rear Face	0	on	14	13.88	-0.05	0.121	0.058	0.124
T50	LTE B12	QPSK10M	23130	1	0	Top Side	0	on	14	13.88	-0.04	0.055	0.026	0.057
T51	LTE B12	QPSK10M	23060	25	12	Rear Face	0	on	11.5	10.79	0.06	0.094	0.044	0.111
T52	LTE B12	QPSK10M	23060	25	12	Top Side	0	on	11.5	10.79	-0.18	0.038	0.019	0.045
T54	LTE B12	QPSK10M	23130	1	0	Rear Face	2.7	off	25.5	24.97	-0.15	0.036	0.025	0.040
T55	LTE B12	QPSK10M	23130	1	0	Right Side	0	off	25.5	24.97	0.14	0.067	0.042	0.076
T56	LTE B12	QPSK10M	23130	1	0	Top Side	3.7	off	25.5	24.97	-0.1	0.009	0.006	0.010
T57	LTE B12	QPSK10M	23060	25	12	Rear Face	2.7	off	23	22.37	-0.08	0.040	0.029	0.046
T58	LTE B12	QPSK10M	23060	25	12	Right Side	0	off	23	22.37	0.08	0.076	0.048	0.088
T59	LTE B12	QPSK10M	23060	25	12	Top Side	3.7	off	23	22.37	0.02	0.009	0.007	0.011

Note: The maximum SAR Values are marks in bold.

8. Test results of WIFI

Test No.	Band	Channel	Test Position	Separation Distance (cm)	Sensor	Data Rate	Duty Cycle	Maximum Tune-up (dBm)	Conducted Power (dBm)	Power Drift	SAR 1g	SAR 10g	Reported 1g SAR
T70	802.11b	11	Rear Face	0	on	1	100%	9.5	9.19	0	0.277	0.106	0.297
T71	802.11b	11	Top Side	0	on	1	100%	9.5	9.19	0	0.59	0.281	0.634
T73	802.11b	1	Rear Face	1.1	off	1	100%	17.5	16.94	-0.05	0.109	0.055	0.124
T74	802.11b	1	Top Side	1.4	off	1	100%	17.5	16.94	0.01	0.049	0.026	0.055
T76	802.11ac80	58	Rear Face	0	on	6	92%	7	5.39	-0.03	0.207	0.068	0.327
T77	802.11ac80	58	Top Side	0	on	6	92%	7	5.39	0.05	0.468	0.115	0.740
T79	802.11a	64	Rear Face	1.1	off	6	97%	17	15.61	0	0.206	0.078	0.291
T80	802.11a	64	Left Side	0	off	6	97%	17	15.61	0.08	0.225	0.085	0.318
T81	802.11a	64	Top Side	1.4	off	6	97%	17	15.61	0.05	0.419	0.165	0.593
T83	802.11ac80	106	Rear Face	0	on	6	92%	7	5.45	0.02	0.207	0.053	0.323
T84	802.11ac80	106	Top Side	0	on	6	92%	7	5.45	0.04	0.279	0.080	0.435
T86	802.11a	140	Rear Face	1.1	off	6	97%	17	15.95	0	0.163	0.061	0.213
T87	802.11a	140	Left Side	0	off	6	97%	17	15.95	0.03	0.279	0.086	0.365
T88	802.11a	140	Top Side	1.4	off	6	97%	17	15.95	-0.09	0.19	0.068	0.249
T90	802.11ac80	155	Rear Face	0	on	6	92%	7	5.46	0	0.118	0.027	0.184
T91	802.11ac80	155	Top Side	0	on	6	92%	7	5.46	0.01	0.112	0.024	0.174
T93	802.11a	157	Rear Face	1.1	off	6	97%	17	15.91	0	0.134	0.050	0.177
T94	802.11a	157	Left Side	0	off	6	97%	17	15.91	0.09	0.189	0.060	0.250
T95	802.11a	157	Top Side	1.4	off	6	97%	17	15.91	-0.06	0.165	0.069	0.218

Note: The maximum SAR Values are marks in bold.

8.3 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 v06.

The location of the antennas is shown as below picture:

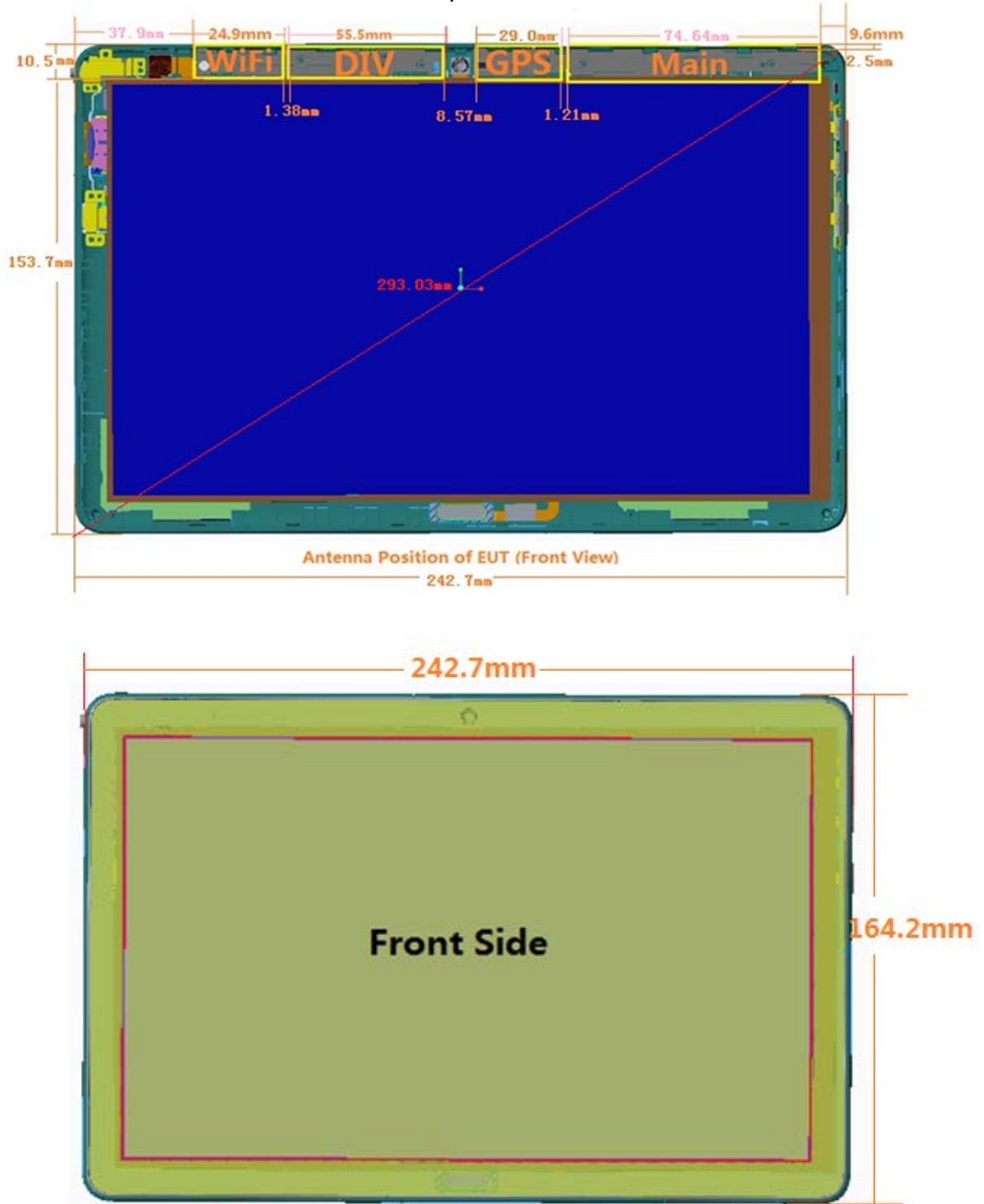


Figure1: The location of the antennas & the SAR sensor

Note: The proximity sensor and Main antenna use same metallic electrode, so the location is same.

8.3.1 STAND-ALONE SAR TEST EXCLUSION

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

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

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

According to KDB 447498 D01, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR was estimated according to following formula to result in substantially conservative SAR values of ≤ 0.4 W/kg to determine simultaneous transmission SAR test exclusion.

$$\text{Estimated SAR} = \frac{\text{Max. Tune up Power}_{(\text{mW})}}{\text{Min. Test Separation Distance}_{(\text{mm})}} \times \frac{\sqrt{f_{(\text{GHz})}}}{7.5}$$

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

Estimated SAR calculation

Mode	Position	P _{max} (dBm)*	P _{max} (mW)	Distance (mm)	f (GHz)	X	Estimated SAR (W/kg)*
BT	Rear/Top	9.5	8.913	5	2.480	7.5	0.374

Mode	Position	P _{max} (dBm)*	P _{max} (mW)	Distance (mm)	f (GHz)	X	Estimated SAR (W/kg)*
BT	Left	9.5	8.913	37.9	2.480	7.5	0.049

Mode	Position	P _{max} (dBm)*	P _{max} (mW)	Distance (mm)	f (GHz)	X	Estimated SAR (W/kg)*
2.4G WiFi	Left	17.5	56.234	37.9	2.462	7.5	0.310

Note: * - maximum possible output power declared by manufacturer.

8.3.2 SIMULTANEOUS TRANSMISSION CONDITIONS

Per FCC KDB 447498 D01, SAR compliance for simultaneous transmission must be considered when the maximum duration of overlapping transmissions, including network hand-offs, is greater than 30 seconds. 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.	Simultaneous Tx Combination	Body
1	GSM + BT	Yes
2	GSM + WiFi	Yes
3	UMTS + BT	Yes
4	UMTS + WiFi	Yes
5	LTE + BT	Yes
6	LTE + WiFi	Yes
7	GSM + LTE + BT+ WiFi	No
8	UMTS + LTE + BT+ WiFi	No

Note:

- 1) Wi-Fi and Bluetooth share the same Tx antenna and can't transmit simultaneously.
- 2) The device does not support DTM function.

8.3.3 SAR SUMMATION SCENARIO

1) Summation scenario without Estimated SAR

Position	Body					
	Front Face	Rear Face	Left Side	Right Side	Top Side	Bottom Side
GSM 850	/	0.507	0.049	0.258	0.228	0.076
GSM 1900	/	0.352	/	0.402	0.226	/
UMTS B2	/	0.196	/	0.461	0.068	/
UMTS B4	/	0.383	/	0.517	0.143	/
UMTS B5	/	0.189	/	0.247	0.160	/
LTE B2	/	0.292	/	0.426	0.092	/
LTE B4	/	0.212	/	0.427	0.075	/
LTE B5	/	0.154	/	0.241	0.070	/
LTE B7	/	0.351	/	0.309	0.231	/
LTE B12	/	0.124	/	0.088	0.057	/
802.11b/g	/	0.297	/	/	0.634	/
5.3G	/	0.327	0.318	/	0.740	/
5.6G	/	0.323	0.365	/	0.435	/
5.8G	/	0.184	0.250	/	0.218	/
Bluetooth	/	/	/	/	/	/
Max. SAR Summation	/	0.834	0.414	0.517	0.971	0.076

Note: 1. For summation scenario without Estimated SAR, $\text{MAX. } \sum \text{SAR}_{1g} = 0.971 \text{ W/Kg} < 1.6 \text{ W/Kg}$, so the SAR to peak location separation ratio should not be considered.

2. The maximum SAR summation is calculated based on the same configuration and test position.

2) Summation scenario with Estimated SAR

Position	Body					
	Front Face	Rear Face	Left Side	Right Side	Top Side	Bottom Side
GSM 850	/	0.507	0.049	0.258	0.228	0.076
GSM 1900	/	0.352	0.400	0.402	0.226	0.400
UMTS B2	/	0.196	0.400	0.461	0.068	0.400
UMTS B4	/	0.383	0.400	0.517	0.143	0.400
UMTS B5	/	0.189	0.400	0.247	0.160	0.400
LTE B2	/	0.292	0.400	0.426	0.092	0.400
LTE B4	/	0.212	0.400	0.427	0.075	0.400
LTE B5	/	0.154	0.400	0.241	0.070	0.400
LTE B7	/	0.351	0.400	0.309	0.231	0.400
LTE B12	/	0.124	0.400	0.088	0.057	0.400
802.11b/g	/	0.297	0.310	0.400	0.634	0.400
5.3G	/	0.327	0.318	0.400	0.740	0.400
5.6G	/	0.323	0.365	0.400	0.435	0.400
5.8G	/	0.184	0.250	0.400	0.218	0.400
Bluetooth	/	0.374	0.049	0.400	0.374	0.400
Max. SAR Summation	/	0.881	0.765	0.917	0.971	0.800

Note: 1. For summation scenario with Estimated SAR, MAX. $\sum \text{SAR}_{1g} = 0.971 \text{ W/Kg} < 1.6 \text{ W/Kg}$, so the SAR to peak location separation ratio should not be considered.
 2. The maximum SAR summation is calculated based on the same configuration and test position.

APPENDIX

1. Test Layout

Specific Absorption Rate Test Layout

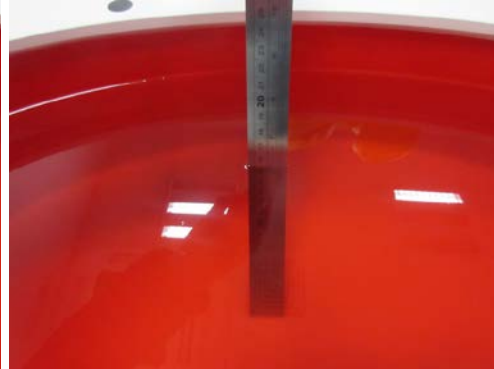


Liquid depth in the flat Phantom ($\geq 15\text{cm}$ depth)

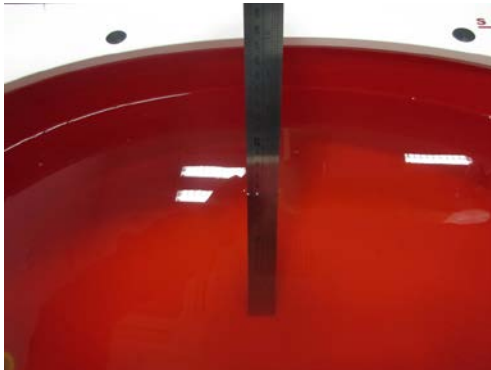
MSL750_15.7cm



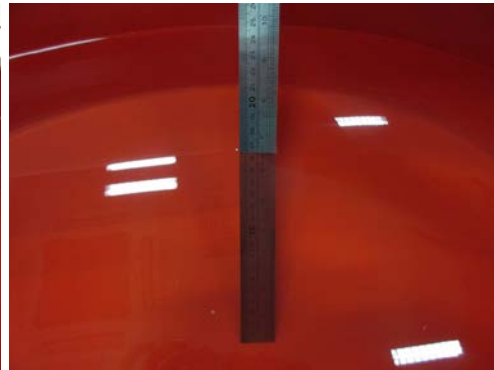
MSL835-900_15.6cm



MSL1750_15.5cm



MSL1900-3800_16.5cm



MSL5G_15.2cm



Appendix A. SAR Plots of System Verification

(Pls See Appendix A.)

Appendix B. SAR Plots of SAR Measurement

(Pls See Appendix B.)

Appendix C. Calibration Certificate for Probe and Dipole

(Pls See Appendix C.)

Appendix D. Photographs of the Test Set-Up

(Pls See Appendix D.)