FCC SAR Compliance Test Report

Product Name:	Smart Phone
Model:	ANE-LX1
Report No.:	SYBH(Z-SAR) 20171223014005-2
FCC ID:	QISANE-LX1

	APPROVED (Lab Manager)	PREPARED (Test Engineer)
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DATE	2018-02-08	2018-02-08

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※ ※ Modified History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release.	2018-01-28	He Peng
Rev.1.1	Delete the antenna location picture in section 7.3 and add the antenna location picture in Appendix D Photo documentation.	2018-02-08	He Peng

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1 General Information

1.1 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for ANE-LX1 is as below Table 1.

Band	Max Reported SAR(W/kg)		
	1-g Head SAR	1-g Body-worn SAR(15mm) *	1-g Hotspot SAR(10mm)
GSM850	0.56	0.30	0.34
GSM1900	0.71	0.39	0.75
UMTS Band 2	0.67	**1.08**	**0.87**
UMTS Band 5	1.14	0.29	0.32
LTE Band 7	**1.21**	0.66	0.68
WiFi 2.4G	0.55	0.07	0.18
WiFi 5G	0.18	0.06	0.45
BT	0.18	/	/
The highest reported SAR for head, body-worn, hotspot, simultaneous transmission exposure conditions are 1.21W/kg, 1.08W/kg, 0.87W/kg, and 1.37 W/kg respectively per KDB690783 D01.			

Table 1:Summary of test result

Note:

1)* For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and that positions the handset a minimum of 15mm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

The device is in compliance with Specific Absorption Rate（SAR）for general population/uncontraolled exposure limits according to the FCC rule §2.1093, the ANSI C95.1:1992/IEEE C95.1:1991, the NCRP Report Number 86 for uncontrolled environment, according to the Industry Canada Radio Standards Specification RSS-102 for General Population/Uncontrolled exposure, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013.

1.2 RF exposure limits

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

Table 2: RF exposure limits

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

Notes:

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

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

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

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

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation.

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1.3 EUT Description

Device Information：			
Product Name:	Smart Phone		
Model:	ANE-LX1		
FCC ID :	QISANE-LX1		
SN.:	1#:9WV7N17C21000081 2#:9WV7N17C21000180 3#:9WV7N17C21000053 4#:9WV7N17C21000091 5#:9WV7N17C21000171 6#:9WV7N17C21000198		
Device Type :	Portable device		
Device Phase:	Identical Prototype		
Exposure Category:	Uncontrolled environment / general population		
Hardware Version :	HL2ANNEM		
Software Version :	ANE-LX1 8.0.0.41(SP1C900)		
Antenna Type :	Internal antenna		
Others Accessories	Headset		
Device Operating Configurations:			
Supporting Mode(s)	GSM 850/1900, UMTS Band 2/5, LTE Band 7, WiFi 2.4G/5G; BT		
Test Modulation	GSM(GMSK/8PSK), UMTS(QPSK), LTE(QPSK/16QAM), WiFi(DSSS/OFDM), BT(GFSK)		
Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM850	824-849	869-894
	PCS1900	1850-1910	1930-1990
	UMTS Band 2	1850-1910	1930-1990
	UMTS Band 5	824-849	869-894
	LTE Band 7	2500-2570	2620-2690
	BT	2400-2483.5	
	WiFi 2.4G	2400-2472	
	WiFi 5G	5150- 5350 5470-5725	
	NFC	13.56	
GPRS Multislot Class(12)	Max Number of Timeslots in Uplink:		4
	Max Number of Timeslots in Downlink:		4
	Max Total Timeslot:		5
EGPRS Multislot Class(12)	Max Number of Timeslots in Uplink:		4
	Max Number of Timeslots in Downlink:		4
	Max Total Timeslot:		5
HSDPA UE Category	14		
HSUPA UE Category	6		
DC-HSDPA UE 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)		
	3, tested with power control “all 1”(UMTS Band 5)		
	3, tested with power control all Max.(LTE Band 7)		
	128-190-251(GSM850)		

Test Channels (low-mid-high):	512-661-810(GSM1900)
	9262-9400-9538(UMTS Band 2)
	4132-4182-4233(UMTS Band 5)
	20775-21100-21425(LTE Band 7 BW=5MHz)
	20800-21100-21400(LTE Band 7 BW=10MHz)
	20825-21100-21375(LTE Band 7 BW=15MHz)
	20850-21100-21350(LTE Band 7 BW=20MHz)
	802.11b/g/n :1-3-6-9-11(WiFi 2.4G)
	802.11a/n/ac 20M: 36-40-44-48-52-56-60-64-100-104-108-112-116-120-124-128-132-136-140-144 802.11n/ac 40M: 38-46-54-62-102-110-118-126-134-142 802.11ac 80M: 42-58-106-122-138 (WiFi 5G)
	BT: 0-19-39-78

Table 3:Device information and operating configuration

1.3.1 General Description

ANE-LX1 is subscriber equipment in the GSM/WCDMA/LTE system. The GSM frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900. The UMTS frequency band is B1 and B2 and B5 and B8. The LTE frequency band is B1 and B3 and B7 and B8 and B20. But only GSM850 and GSM1900，UMTS frequency B2 and B5，LTE frequency B7 bands test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, LTE/HSPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS, AGPS, NFC and WIFI etc. Externally it provides one micro SD card (it can also used as SIM card interface), earphone port (to provide voice service) and one SIM card interface. ANE-LX1 is dual SIM smart phone. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

Battery information：

Name	Manufacture*	Description
Rechargeable Li-ion	SCUD	Battery Model: HB366481ECW Rated capacity: 2900mAh Nominal Voltage: ⎓ +3.82V Charging Voltage: ⎓ +4.40V
	Sunwoda	
	Desay	

Note:* These optional batteries are noted as battery 1#, 2# and 3# in the test report below.

1.3.2 Dynamic antenna switching specification

The device has two 2G/3G/4G Tx antennas (Main Antenna and Second Antenna). It can transmit from either Main Antenna or Second Antenna, but they can not transmit simultaneously.

SAR test procedure for dynamic antenna switching is as below:
During the SAR test, the Main Antenna (Ant 1) and Second Antenna (Ant2) are set to the MAX transmit power level respectively and test the SAR respectively in all applicable RF exposure conditions. Some AT commands are supplied to fix the operation state and choose the antenna, and some test scripts are supplied to fix the modem state so that only one TX antenna and one modem is chosen and tested at a time. We can ensure that all independent antennas and modem are completely covered by the appropriate SAR measurements and all simultaneous transmission possibilities are fully considered.

1.3.3 Power reduction specification

1) Power reduction triggered by specific use conditions(2G&3G&4G Second Antenna)

a) This device uses the receiver to indicate whether the user is making a voice call in head scenario or not. The selection between head and body power levels is based on the receiver detection mechanism.

b) A fixed level power reduction is applied for some frequency bands when hotspot mode becomes active. When the hotspot is disabled, the power value will be recovered.

The following tables summarize the key power reduction information triggered by specific use conditions. The detailed full power and reduced conducted power measurement results are provided in Section 7 of this report:

Band	Power Reduction Level Amount (dB)		
	Second Antenna		
	Receiver on(Head)	Receiver off	
		Hotspot active	Hotspot disable
GSM850	2.0	2.0	0
UMTS Band 2	5.0	5.0	0
LTE Band 7	3.5	3.5	0

Note: For Head SAR test of 2G/3G/4G Second Antenna, Standalone Head SAR should be evaluated at with audio receiver on. As the audio receiver only works in voice mode when the user is making a call in head scenario, and the lack of the third-party VoIP server and the unstandardized VOIP operating characteristics, so a test script is used to trigger the receiver on during the test. The test scripts function is only used to trigger audio receiver on and simulate voice and VOIP usage scene. 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.

2) Power reduction triggered by proximity sensor and hotspot (2G&3G&4G Main antenna)

This device uses a capacitive proximity sensor that share the same metallic electrode as the transmitting antenna to facilitate triggering in typical user interactivity with the device per KDB616217.
Due to the operating configurations and exposure conditions required by the device, the proximity sensor is used to indicate when the device 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.
A fixed level power reduction is also applied for some frequency bands when hotspot mode becomes active. When the hotspot is disabled, the power value will be recovered.

Band	Power Reduction Level Amount (dB)			
	Main Antenna			
	Full power (Other conditions)	Hotspot on	Receiver off, proximity sensor on	Receiver off, proximity sensor on, hotspot on
GSM 1900	0	2.0	0	2.0
UMTS Band 2	0	6.5	1.0	7.5
LTE Band 7	0	3.0	3.0	6.0

3) Power reduction triggered by infrared proximity sensor(WiFI antenna)
The device uses an infrared proximity sensor to reduce the output power of WiFi antenna when VoWiFi or WiFi + 2G&3G&4G antenna voice mode transmit simultaneously in held-to-ear scenario.

The following tables summarize the key power reduction information. The detailed full power and reduced tune-up specifications and conducted power measurement results are provided in Section 6.8 and Section 7 of this report.

Band	Power Reduction Level Amount (dB)			
	infrared proximity sensor on		infrared proximity sensor off	
	WiFi Antenna and 2G&3G&4G antenna (Voice mode) simultaneous transmission	infrared proximity sensor On VoWIFI (Voice mode)	WiFi Antenna and 2G&3G&4G antenna simultaneous transmission	Full Power (Other conditions)
WiFi 2.4G 802.11b	3.0	3.0	0	0
WiFi 2.4G 802.11g	1.0	1.0	0	0
WiFi 5G 802.11a(20M)	4.4	4.4	2.0	0
WiFi 5G 802.11n(20M)	3.0	3.0	1.0	0
WiFi 5G 802.11n(40M)	2.0	2.0	0	0
WiFi 5G 802.11ac(20M)	3.0	3.0	1.0	0
WiFi 5G 802.11ac(40M)	2.0	2.0	0	0
WiFi 5G 802.11ac(80M)	2.0	2.0	0	0

1.3.4 Downlink LTE CA specification

The device supports downlink LTE Carrier Aggregation (CA) only. Other Release 10 or higer features are not supported, including Uplink Carrier Aggregation, Enhanced SC-FDMA and Uplink MIMO or other antenna diversity configurations etc. All uplink communications are identical to the Release 8 Specifications.

The possible downlink LTE CA combinations supported by this device are as below tables. The conducted power measurement results of downlink LTE CA are provided in Section 7 of this report per 3GPP TS 36.521-1 V13.2.0. According to KDB 941225 D05A, the downlink LTE CA SAR test is not required and PAG requirements can be excluded.

Table: contiguous intra-band CA

E-UTRA CA configuration / Bandwidth combination set						
E-UTRA CA configuration	**Uplink CA configurations (NOTE 3)**	**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]**	**Channel bandwidths for carrier [MHz]**		
CA_7C	NA	15	15		40	0
		20	20			
		10	20		40	1
		15	15, 20			
		20	10, 15, 20			
		20	5, 10, 15, 20			

Table: Test frequencies for CA_7C

Range	CC-Combo / NRB_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.											

Note:

1) The channel spacing and aggregated channel bandwidth for CA are identical to the associated specification in 3GPP TS 36.101 V13.2.0.
2) The reference test frequencies for CA refers to 3GPP TS 36.508 V13.1.0

1.4 Test specification(s)

ANSI C95.1:1992 /IEEE C95.1:1991	Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
IEEE Std 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
KDB941225 D06	Hotspot SAR v02r01
KDB447498 D01	General RF Exposure Guidance v06
KDB648474 D04	Handsets SAR v01r03
KDB248227 D01	SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r02
KDB865664 D01	SAR measurement 100 MHz to 6 GHz v01r04
KDB865664 D02	RF Exposure Reporting v01r02
KDB690783 D01	SAR Listings on Grants v01r03
KDB616217 D04	SAR for laptop and tablets v01r02

1.5 Testing laboratory

Test Site	The Reliability Laboratory of Huawei Technologies Co., Ltd.
Test Location	Section G1,Huawei Base Bantian, Longgang District, Shenzhen 518129, P.R. China
Telephone	+86 755 28780808
Fax	+86 755 89652518
State of accreditation	The Test laboratory (area of testing) is accredited according to ISO/IEC 17025. CNAS Registration number: L0310 A2LA TESTING CERT #2174.01 & 2174.02 & 2174.03

1.6 Applicant and Manufacturer

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

1.7 Application details

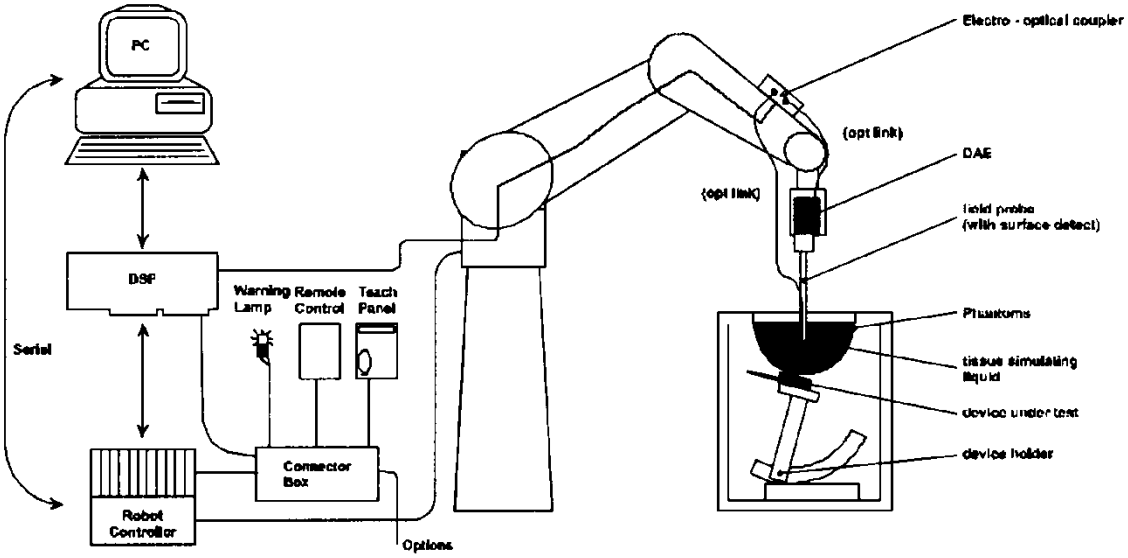
Start Date of test	2018-01-15
End Date of test	2018-01-25

1.8 Ambient Condition

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

2 SAR Measurement System

2.1 SAR Measurement Set-up



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

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

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

- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5/6 measurement server.
- The DASY measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 7.
- DASY software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System check dipoles allowing to validate the proper functioning of the system.

2.2 Test environment

The DASY measurement system is placed at the head end of a room with dimensions:
5 x 2.5 x 3 m³, the SAM phantom is placed in a distance of 75 cm from the side walls and 1.1m from the rear wall. Above the test system a 1.5 x 1.5 m² array of pyramid absorbers is installed to reduce reflections from the ceiling.
Picture 1 of the photo documentation shows a complete view of the test environment.
The system allows the measurement of SAR values larger than 0.005 mW/g.

2.3 Data Acquisition Electronics description

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

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

DAE4

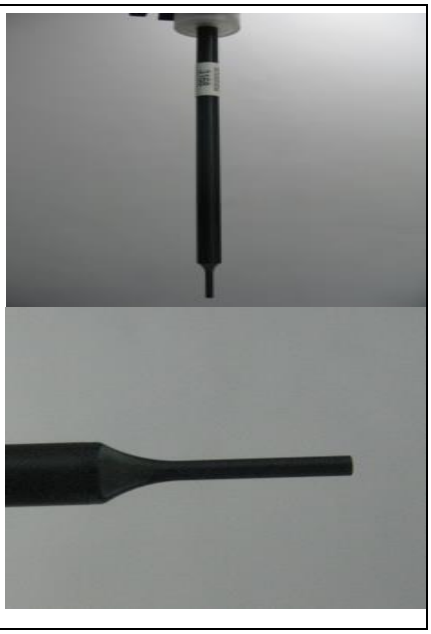
Input Impedance	200MOhm
The Inputs	symmetrical and floating
Common mode rejection	above 80 dB

2.4 Probe description

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

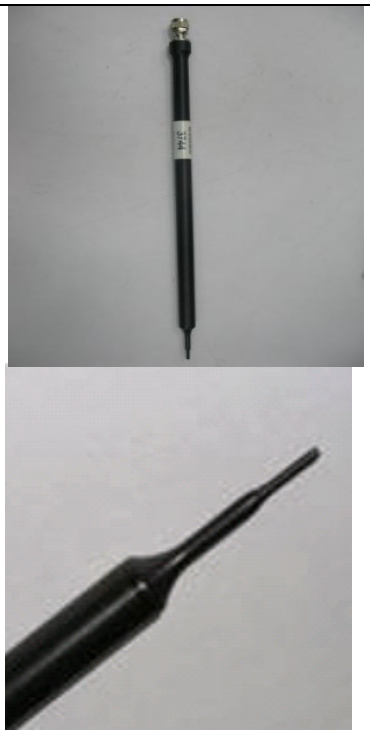
Isotropic E-Field Probe ES3DV3 for Dosimetric Measurements

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones



Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to >6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic range	10 µW/g to > 100 mW/g; Linearity: ± 0.2 dB(noise:typically<1µW/g)
Dimensions	Overall length: 337 mm (Tip:20 mm) Tip diameter:2.5 mm (Body:12 mm) Typical distance from probe tip to dipole centers: 1mm
Application	High precision dosimetric measurements in any exposure scenario(e.g.,very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%

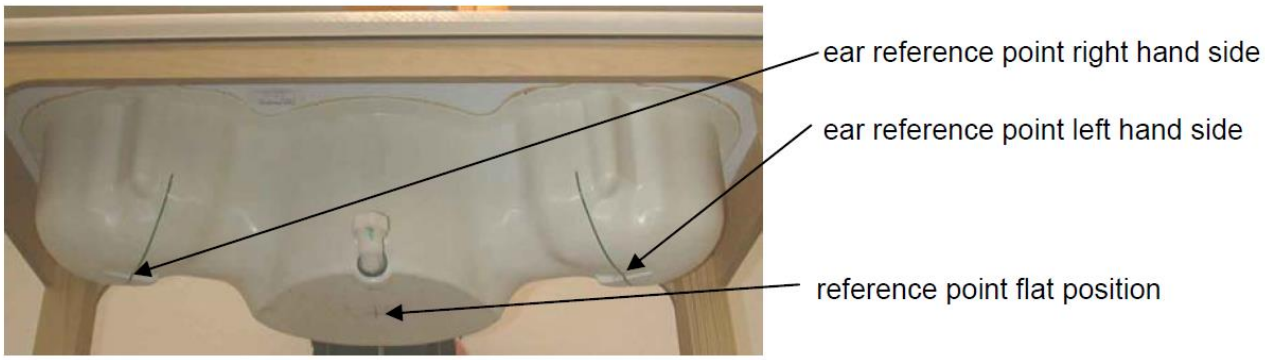


2.5 Phantom description

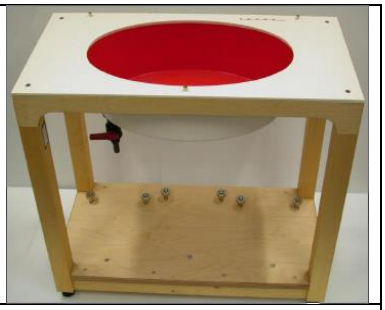
SAM Twin Phantom

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

The following figure shows the definition of reference point:



ELI4 Phantom

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

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

2.6 Device holder description

The DASY device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. This device holder is used for standard mobile phones or PDA's only. If necessary an additional support of polystyrene material is used.

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

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

2.7 Test Equipment List

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

	Manufacturer	Device	Type	Serial number	Date of last calibration*	Valid period
☒	SPEAG	Dosimetric E-Field Probe	EX3DV4	3744	2017-07-24	One year
☒	SPEAG	Dosimetric E-Field Probe	ES3DV3	3168	2017-09-28	One year
☒	SPEAG	Dosimetric E-Field Probe	EX3DV4	3736	2017-04-27	One year
☒	SPEAG	835MHz Dipole	D835V2	4d059	2016-04-20	Three years
☒	SPEAG	1900MHz Dipole	D1900V2	5d143	2017-09-20	Three years
☒	SPEAG	2450MHz Dipole	D2450V2	860	2017-11-15	Three years
☒	SPEAG	2600MHz Dipole	D2600V2	1021	2017-07-21	Three years
☒	SPEAG	5GHz Dipole	D5GHzV2	1155	2017-04-26	Three years
☒	SPEAG	Data acquisition electronics	DAE4	852	2017-04-27	One year
☒	SPEAG	Data acquisition electronics	DAE4	1236	2017-07-21	One year
☒	SPEAG	Software	DASY5	N/A	NCR	NCR
☒	SPEAG	Twin Phantom	SAM1	TP-1475	NCR	NCR
☒	SPEAG	Twin Phantom	SAM2	TP-1474	NCR	NCR
☒	SPEAG	Twin Phantom	SAM3	TP-1597	NCR	NCR
☒	SPEAG	Twin Phantom	SAM4	TP-1620	NCR	NCR
☐	SPEAG	Twin Phantom	SAM5	TP-1894	NCR	NCR
☐	SPEAG	Twin Phantom	SAM6	TP-1892	NCR	NCR
☒	R & S	Universal Radio Communication Tester	CMU 200	111379	2017-12-30	One year
☒	R & S	WideBand Radio Communication Tester	CMW 500	115625	2017-02-17	One year
☒	Anritsu	Radio Communication Analyser	MT8821C	6201735100	2017-06-01	One year
☒	Agilent	Network Analyser	E5071C	MY46213349	2017-12-31	One year
☒	Agilent	Dielectric Probe Kit	85070E	2484	NCR	NCR
☒	Agilent	Signal Generator	E8257D	MY49281095	2017-02-15	One year
☒	MINI-CIRCUITS	Amplifier	ZHL-42W	QA1402001	NCR	NCR
☒	MINI-CIRCUITS	Amplifier	ZVE-8G	188163	NCR	NCR
☒	Keysight	Directional Coupler	772D	MY52180295	2017-05-24	One year
☒	AR	Directional Coupler	DC7144M1	0423264	2017-04-12	One year
☒	R & S	Power Meter	NRP	100740	2017-07-17	One year
☒	R & S	Power Meter Sensor	NRP-Z11	106288	2017-07-07	One year
☒	Agilent	Power Meter	E4417A	MY57150002	2017-04-20	One year
☒	Agilent	Power Meter Sensor	E9321A	MY54130007	2017-04-10	One year
☒	Anritsu	Signal Analyzer	MS2690A	6261767335	2017-10-24	One year

Note: 1) Per KDB865664D01 requirements for dipole calibration, the test laboratory has adopted three-year extended calibration interval. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

a) There is no physical damage on the dipole;
b) System check with specific dipole is within 10% of calibrated value;
c) The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement.
d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.
3) *All the equipments are within the valid period when the tests are performed.

3 SAR Measurement Procedure

3.1 Scanning procedure

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

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

- The “surface check” measurement tests the optical surface detection system of the DASY5/6 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

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

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

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

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

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

3.2 Spatial Peak SAR Evaluation

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

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

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

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

Extrapolation

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

Interpolation

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

Volume Averaging

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

Advanced Extrapolation

DASY5/6 uses the advanced extrapolation option which is able to compansate boundary effects on E-field probes.

3.3 Data Storage and Evaluation

Data Storage

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

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

Data Evaluation by SEMCAD

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

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

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

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

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

$Vi = Ui + Ui2 \bullet cf/dcpi$

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:

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

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

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

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

ConvF = sensitivity enhancement in solution

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

f = carrier frequency [GHz]

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

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

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

Etot = (Ex2 + EY2 + Ez2)1/2

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

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

with SAR = local specific absorption rate in mW/g

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

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

ρ = equivalent tissue density in g/cm^3

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

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

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

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

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

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4 System Verification Procedure

4.1 Tissue Verification

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

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

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

☒**Simulating Head Liquid (HBBL600-6000MHz), Manufactured by SPEAG:**

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

☒**Simulating Body Liquid(MBBL600-6000MHz),Manufactured by SPEAG:**

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

Table 4: Tissue Dielectric Properties

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

Tissue Type	Target Frequency	Target Tissue		Measured Tissue		Deviation (Within +/-5%)		Liquid Temp.	Test Date
		Permit-tivity	Conduc-tivity [S/m]	Permit-tivity	Conduc-tivity [S/m]	$\Delta\varepsilon_r$	$\Delta\sigma$		
835MHz Head	825	41.60	0.90	43.39	0.904	4.30%	0.49%	22.1°C	2018/01/17
	835	41.50	0.90	43.36	0.907	4.47%	0.79%		
	850	41.50	0.92	43.29	0.913	4.31%	-0.73%		
1900MHz Head	1850	40.00	1.40	39.15	1.431	-2.13%	2.21%	22.5°C	2018/01/17
	1880	40.00	1.40	39.12	1.450	-2.20%	3.57%		
	1900	40.00	1.40	39.10	1.462	-2.25%	4.43%		
	1910	40.00	1.40	39.09	1.467	-2.27%	4.79%		
1900MHz Head	1850	40.00	1.40	40.26	1.433	0.65%	2.36%	21.5°C	2018/01/18
	1880	40.00	1.40	40.20	1.452	0.50%	3.71%		
	1900	40.00	1.40	40.17	1.462	0.43%	4.43%		
	1910	40.00	1.40	40.14	1.468	0.35%	4.86%		
1900MHz Head	1850	40.00	1.40	40.10	1.438	0.25%	2.71%	21.6°C	2018/01/23
	1880	40.00	1.40	40.06	1.454	0.15%	3.86%		
	1900	40.00	1.40	40.03	1.463	0.08%	4.50%		
	1910	40.00	1.40	40.01	1.469	0.02%	4.93%		
2450MHz Head	2410	39.30	1.76	39.28	1.813	-0.05%	3.01%	21.6°C	2018/01/23
	2435	39.20	1.79	39.29	1.831	0.23%	2.29%		
	2450	39.20	1.80	39.27	1.844	0.18%	2.44%		
	2460	39.20	1.81	39.25	1.853	0.13%	2.38%		
2450MHz Head	2410	39.30	1.76	38.22	1.816	-2.75%	3.18%	21.8°C	2018/01/25
	2435	39.20	1.79	38.20	1.837	-2.55%	2.63%		
	2450	39.20	1.80	38.19	1.847	-2.59%	2.61%		
	2460	39.20	1.81	38.18	1.855	-2.60%	2.49%		
2600MHz Head	2510	39.12	1.86	39.27	1.882	0.38%	1.18%	21.5°C	2018/01/15
	2535	39.10	1.89	39.23	1.903	0.33%	0.69%		
	2560	39.00	1.92	39.19	1.924	0.49%	0.37%		
	2600	39.00	1.96	39.14	1.957	0.36%	-0.15%		
2600MHz Head	2510	39.12	1.86	39.62	1.880	1.28%	1.08%	22.5°C	2018/01/15
	2535	39.10	1.89	39.58	1.898	1.23%	0.42%		
	2560	39.00	1.92	39.54	1.918	1.38%	0.05%		
	2600	39.00	1.96	39.49	1.948	1.26%	-0.61%		
5GHz Head	5250	35.90	4.71	34.91	4.664	-2.76%	-0.98%	21.8°C	2018/01/24
	5600	35.50	5.07	36.07	5.189	1.61%	2.35%		
	5750	35.40	5.22	36.64	5.377	3.50%	3.01%		

835MHz Body	825	55.20	0.97	56.99	0.997	3.24%	2.81%	22.0°C	2018/01/19
	835	55.20	0.97	56.91	0.998	3.10%	2.90%		
	850	55.20	0.99	56.73	1.005	2.77%	1.52%		
1900MHz Body	1850	53.30	1.52	52.58	1.487	-1.35%	-2.17%	21.8°C	2018/01/19
	1880	53.30	1.52	52.53	1.509	-1.44%	-0.72%		
	1900	53.30	1.52	52.51	1.524	-1.48%	0.26%		
	1910	53.30	1.52	52.51	1.532	-1.48%	0.79%		
1900MHz Body	1850	53.30	1.52	52.01	1.451	-2.42%	-4.54%	21.6°C	2018/01/22
	1880	53.30	1.52	51.99	1.476	-2.46%	-2.89%		
	1900	53.30	1.52	51.96	1.491	-2.51%	-1.91%		
	1910	53.30	1.52	51.94	1.498	-2.55%	-1.45%		
2450MHz Body	2410	52.80	1.91	53.25	1.845	0.85%	-3.40%	21.6°C	2018/01/21
	2435	52.70	1.94	53.12	1.867	0.80%	-3.76%		
	2450	52.70	1.95	53.06	1.881	0.68%	-3.54%		
	2460	52.70	1.96	53.02	1.892	0.61%	-3.47%		
2600MHz Body	2510	52.62	2.03	51.27	1.998	-2.57%	-1.58%	21.8°C	2018/01/22
	2535	52.59	2.07	51.25	2.019	-2.55%	-2.46%		
	2560	52.57	2.09	51.22	2.041	-2.57%	-2.34%		
	2600	52.50	2.16	51.11	2.080	-2.65%	-3.70%		
5GHz Body	5250	48.90	5.36	47.63	5.373	-2.60%	0.24%	21.8°C	2018/01/23
	5600	48.50	5.77	47.85	5.783	-1.35%	0.23%		
	5750	48.30	5.94	47.60	6.060	-1.45%	2.02%		

Table 5:Measured Tissue Parameter

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

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

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

4.2 System Check

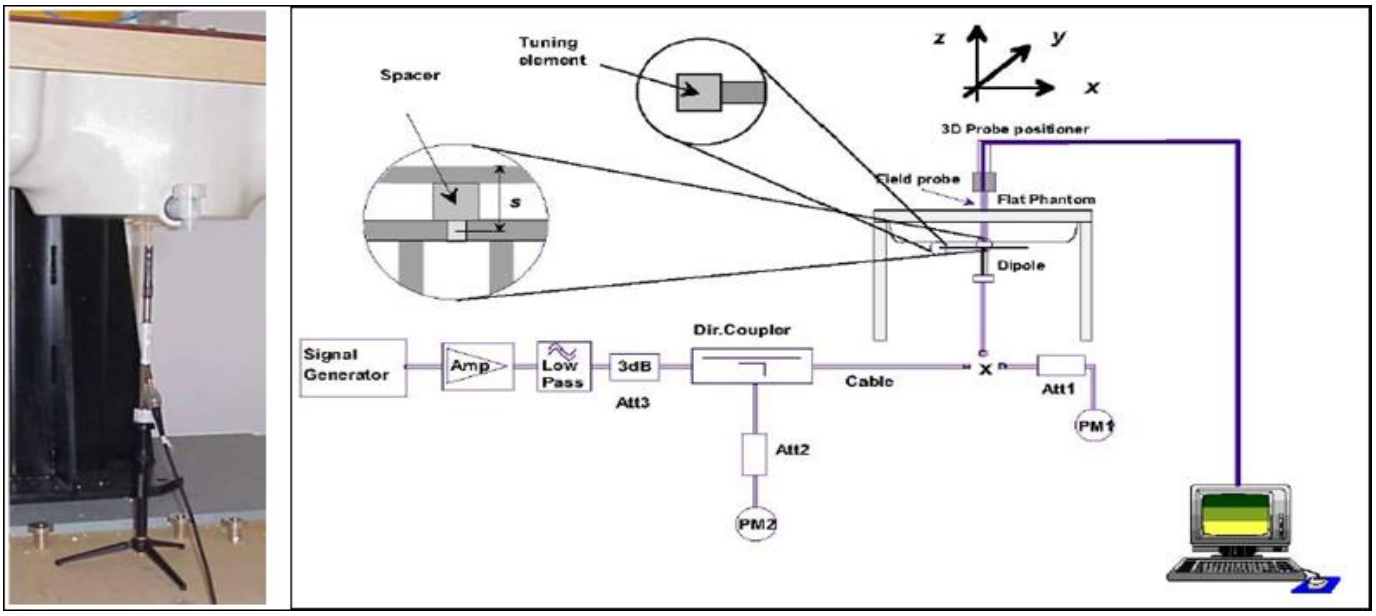
The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEEE 1528 (described above). The following table shows system check results for all frequency bands and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

System Check	Target SAR (Normalized to 1W)		Measured SAR (Normalized to 1W)		Deviation (Within +/-10%)		Liquid Temp.	Test Date
	1-g (mW/g)	10-g (mW/g)	1-g (mW/g)	10-g (mW/g)	Δ1-g	Δ10-g		
835MHz Head	9.30	6.05	9.56	6.24	2.80%	3.14%	22.1°C	2018/01/17
1900MHz Head	39.10	20.50	41.20	21.32	5.37%	4.00%	22.5°C	2018/01/17
1900MHz Head	39.10	20.50	42.00	21.72	7.42%	5.95%	21.5°C	2018/01/18
1900MHz Head	39.10	20.50	40.80	21.08	4.35%	2.83%	21.6°C	2018/01/23
2450MHz Head	51.20	23.90	52.40	24.56	2.34%	2.76%	21.6°C	2018/01/23
2450MHz Head	51.20	23.90	52.40	24.24	2.34%	1.42%	21.8°C	2018/01/25
2600MHz Head	58.70	26.10	55.20	24.88	-5.96%	-4.67%	21.5°C	2018/01/15
2600MHz Head	58.70	26.10	56.40	25.28	-3.92%	-3.14%	22.5°C	2018/01/15
5250MHz Head	78.10	22.20	74.00	20.60	-5.25%	-7.21%	21.8°C	2018/01/24
5600MHz Head	81.10	23.00	81.90	22.70	0.99%	-1.30%	21.8°C	2018/01/24
835MHz Body	9.41	6.20	10.00	6.52	6.27%	5.16%	22.0°C	2018/01/19
1900MHz Body	39.40	20.80	40.40	21.88	2.54%	5.19%	21.8°C	2018/01/19
1900MHz Body	39.40	20.80	39.24	21.44	-0.41%	3.08%	21.6°C	2018/01/22
2450MHz Body	50.10	23.50	50.40	23.12	0.60%	-1.62%	21.6°C	2018/01/21
2600MHz Body	55.90	24.90	53.60	23.44	-4.11%	-5.86%	21.8°C	2018/01/22
5250MHz Body	74.80	20.90	78.80	22.20	5.35%	6.22%	21.8°C	2018/01/23
5600MHz Body	78.70	22.10	81.60	22.60	3.68%	2.26%	21.8°C	2018/01/23

Table 6:System Check Results

4.3 System check Procedure

The system check is performed by using a system check dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 250 mW(below 3GHz) or 100mW(3-6GHz). To adjust this power a power meter is used. The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system check to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).
System check results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system.



5 SAR measurement variability and uncertainty

5.1 SAR measurement variability

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

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

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

The detailed repeated measurement results are shown in Section 7.2.

5.2 SAR measurement uncertainty

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

6 SAR Test Configuration

6.1 Test Positions Configuration

6.1.1 General considerations

Per IEEE 1528-2013, two imaginary lines on the handset were established: the vertical centerline and the horizontal line (See Figure 1).

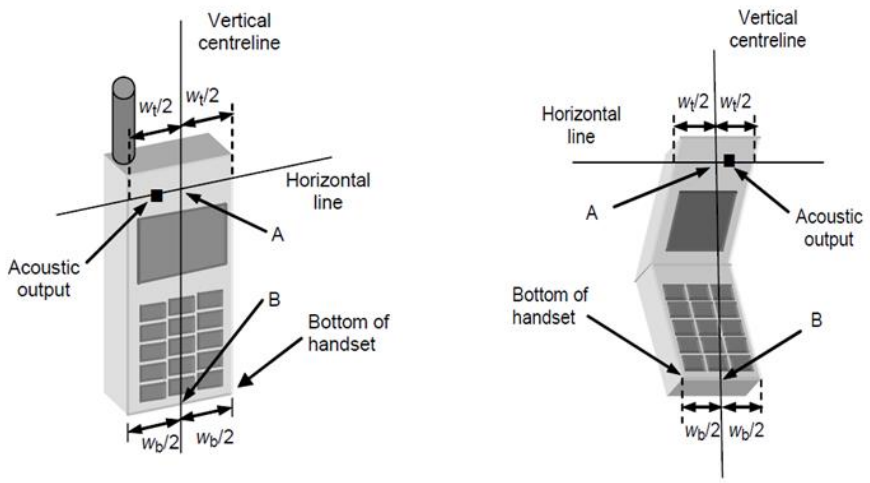


Figure 1 Hand Vertical Center & Horizontal Line Reference Points

6.1.2 Head Exposure Condition

Per IEEE 1528-2013, Head SAR measurements were made in the “cheek” position (See Figure 2) and the “tilt” position (See Figure 3). The device should be tested in both positions on left and right sides of the SAM phantom.

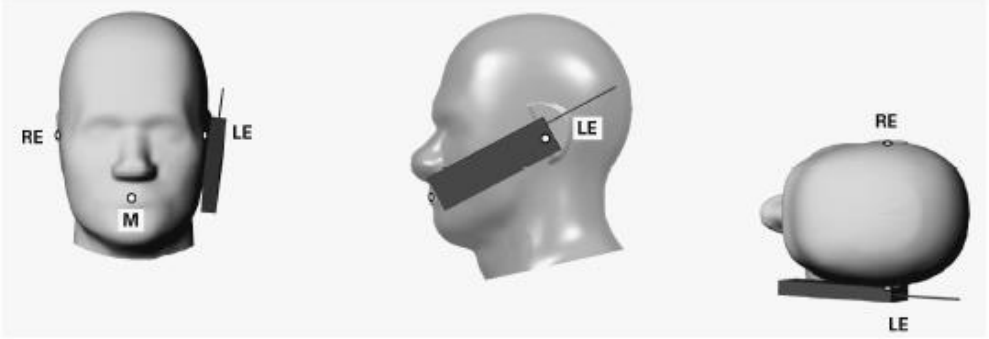


Figure 2 Front, Side and Top View of Cheek Position

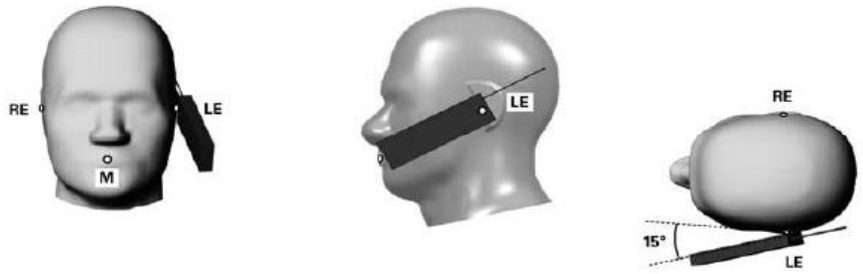


Figure 3 Front, Side and Top View of Tilt 15° Position

Note:

M Mouth reference point

LE Left ear reference point (ERP)

RE Right ear reference point(ERP)

6.1.3 Body-worn Exposure Condition

Body-worn operating configurations are tested with the holder attached to the device and positioned against a flat phantom with test separation distance of 15mm in a normal use configuration (See Figure 4). Per FCC KDB648474 D04v01, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

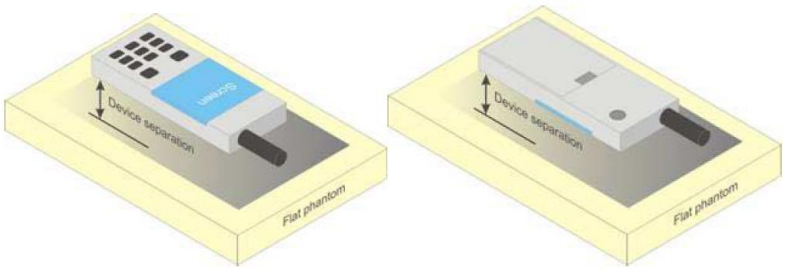


Figure 4 Test position for Body-Worn device

6.1.4 Hotspot Exposure Condition

Per FCC KDB 941225D06, The SAR test separation distance for hotspot mode is determined according to device form factor. When the overall length and width of a device is > 9 cm x 5 cm, a test separation distance of 10 mm is required for hotspot mode SAR measurements. A test separation distance of 5 mm or less is required for smaller devices. Hotspot mode SAR is measured for all edges and surfaces of the device with a transmitting antenna located within 25 mm from that surface or edge; for the data modes, wireless technologies and frequency bands supporting hotspot mode. The SAR results are used to determine simultaneous transmission SAR test exclusion for hotspot mode; otherwise, simultaneous transmission SAR measurement is required.

6.2 3G SAR Test Reduction Procedure

Per KDB941225 D01v03, in the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ 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.

6.3 GSM Test Configuration

SAR tests for GSM850 and GSM1900, a communication link is set up with a base station by air link. Using CMU200 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 8-PSK.

6.4 UMTS Test Configuration

1) Output Power Verification

Maximum output power is verified on the high, middle and low channels according to procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all “1’s” for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) are requied in the SAR report. All configurations that are not supported by the handset or cannot be measured due to technical or equipment limitations must be clearly identified.

2) WCDMA

a. Head SAR Measurements

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode.

b. Body SAR Measurements-

SAR for body-worn accessory configurations is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the 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 ≤ ¼ 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 D01v03, 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, ΔNACK, ΔCQI = 8. The variation of the β_c /β_d ratio causes a power reduction at sub-tests 2 - 4.

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

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

Note 2 : CM=1 for β_c/β_d= 12/15, β_{hs}/β_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.

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 β_c = 11/15 and β_d = 15/15

Table 7: Sub-tests for UMTS Release 5 HSDPA

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

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

Table 8:settings of required H-Set 1 QPSK acc. to 3GPP 34.121

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

Table 9:HSDPA UE category

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 ≤ ¼ 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.

Per KDB941225 D01v03, the 3G SAR test reduction procedure 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 HSDPA, 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.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}(1)	β_{ec}	β_{ed}	β_{ec} (SF)	β_{ed} (code)	CM(2) (dB)	MPR (dB)	AG(4) Index	E-TFCI
1	11/15(3)	15/15(3)	64	11/15(3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15(4)	15/15(4)	64	15/15(4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ ACK, Δ NACK and Δ 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.

Table 10:Subtests for UMTS Release 6 HSUPA

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI(ms)	Minimum Speading 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).						

Table 11:HSUPA UE category

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

Table 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

Table 12:settings of required H-Set 12 QPSK acc. to 3GPP 34.121

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.

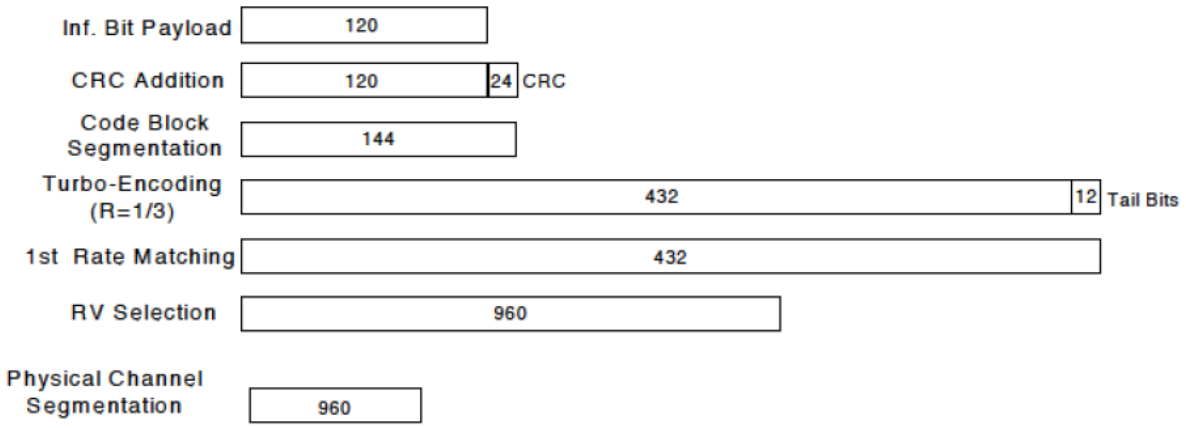


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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

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

Note 1: Δ ACK, Δ NACK and Δ 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.

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 $\beta_d = 15/15$

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.

6.5 LTE Test Configuration

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

1) Spectrum Plots for RB configurations

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

2) MPR

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

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

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

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

3) A-MPR

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

4) LTE procedures for SAR testing

A) Largest channel bandwidth standalone SAR test requirements

i) QPSK with 1 RB allocation

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

ii) QPSK with 50% RB allocation

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

iii) QPSK with 100% RB allocation

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

iv) Higher order modulations

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

B) Other channel bandwidth standalone SAR test requirements

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

6.6 WiFi Test Configuration

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

6.6.1 Initial Test Position Procedure

For exposure condition with multiple test position, such as handsets operating next to the ear, devices with hotspot mode or UMPC mini-tablet , procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all position in an exposure condition. The test position with the highest extrapolated(peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4W/kg, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8W/kg or all test position are measured. For all positions/configurations tested using the initial test position and subsequent test positions, when the *reported* SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.

6.6.2 Initial Test Configuration Procedure

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

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

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

6.6.3 Sub Test Configuration Procedure

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

When the highest reported SAR for the initial test configuration, according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is

not required for that subsequent test configuration.

6.6.4 WiFi 2.4G SAR Test Procedures

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

A) 802.11b DSSS SAR Test Requirements

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

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

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

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

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3 of of KDB 248227D01). SAR is not required for the following 2.4 GHz OFDM conditions.

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

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

C) SAR Test Requirements for OFDM configurations

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

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

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

1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest *reported* SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR.
2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest *reported* SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.
3) The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50. Without additional testing, the maximum output power for this is limited to the lower of the maximum output power certified for the two bands. When SAR measurement is required for at least one of the bands and the highest *reported* SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is > 1.2 W/kg, SAR is required for the 160 MHz channel. This procedure does not apply to an aggregated band with maximum output higher than the standalone band(s); the aggregated band must be tested independently for SAR. SAR is not required when the 160 MHz channel is operating at a reduced maximum power and also qualifies for SAR test exclusion.

6.6.6 U-NII-2C Bands

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. when Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification to avoid SAR requirements.10 TDWR restriction does not apply under the new rules; all channels that operate at 5.60 – 5.65 GHz must be included to apply the SAR test reduction and measurement procedures.

When the same transmitter and antenna(s) are used for U-NII-2C band of §15.247, the bands may be aggregated to enable additional channels with 20, 40 or 80 MHz bandwidth to span across the band gap, as illustrated in Appendix B. The maximum output power for the additional band gap channels is limited to the lower of those certified for the bands. Unless band gap channels are permanently disabled, they must be considered for SAR testing. The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels.11 When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

6.6.7 OFDM Transmission Mode SAR Test Channel Selection Requirements

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

6.7 BT Test Configuration

For BT SAR testing, the is set to the DUT continuous transmitting with maximum output power using the WideBand Radio Communication Tester CMW500. Per October 2016 TCB Worksop Notes, the BT SAR was scaled to the 100% transmission duty cycle to determine compliance. Refer to section 7.1 for the time-domain plot and calculation for the duty cylce of the device.

6.8 Power Reduction Specification

6.8.1 Capacitive proximity sensor power reduction test configurations

This device uses a proximity sensor that shares the same metallic electrode as the main 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 device is held close to a user’s body/hotspot exposure condition. It utilizes the proximity sensor to reduce the output power in specific wireless and operating modes of main antenna to ensure SAR compliance.
The following tables summerize the key power reduction information for proximity sensor. The test procedures in KDB 616217 should be applied to determine proximity sensor triggering distances, and sensor coverage for normal and tilt positions. To ensure all production units are compliant, it is generally necessary to reduce the triggering distance determined from the triggering tests by 1 mm, or more if it is necessary, and use the smallest distance for movements to and from the phantom, minus 1 mm, as the sensor triggering distance for determining the SAR measurement distance.

Band	Power Reduction Level Amount (dB)			
	Main Antenna			
	Full power (Other conditions)	Hotspot on	Receiver off, proximity sensor on	Receiver off, proximity sensor on, hotspot on
GSM 1900	0	2.0	0	2.0
UMTS Band 2	0	6.5	1.0	7.5
LTE Band 7	0	3.0	3.0	6.0

Band	Sensor Trigger Distance
UMTS Band 2	Front side:10mm Back side: 11mm Bottom side: 15mm
LTE Band 7	Front side:10mm Back side: 11mm Bottom side: 15mm

Note:

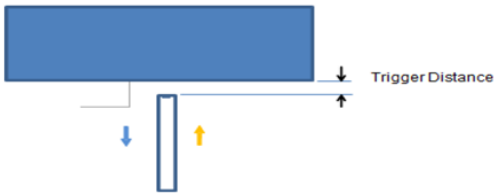
1) Since the capacitive proximity sensor triggering distance for the bottom side is 15mm, a conservative distance of 14mm was requried for addtional hotspot SAR test with sensor off.

2) For the other sides or other frequency bands of the device, hotspot/body SAR is still tested at the conservative power level with sensor off in this report. A test script may be used to make sensor off and make sure that SAR is tesed at the stable DUT status with sensor off . 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.

1) Procedures for determining proximity sensor triggering distances

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

the proximity sensor triggering distance measurement method are as below:



Picture: Proximity sensor triggering distances assessment Bottom Side

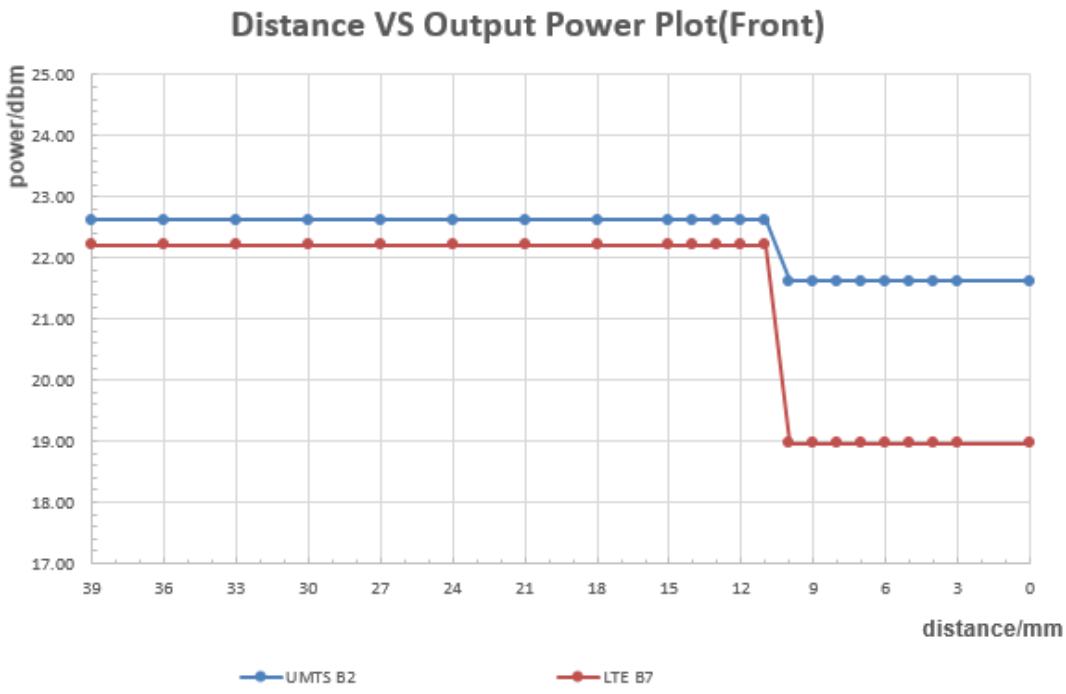
Picture: Proximity sensor triggering distances assessment Front Side and Back side

Table: Summary of Trigger Distances

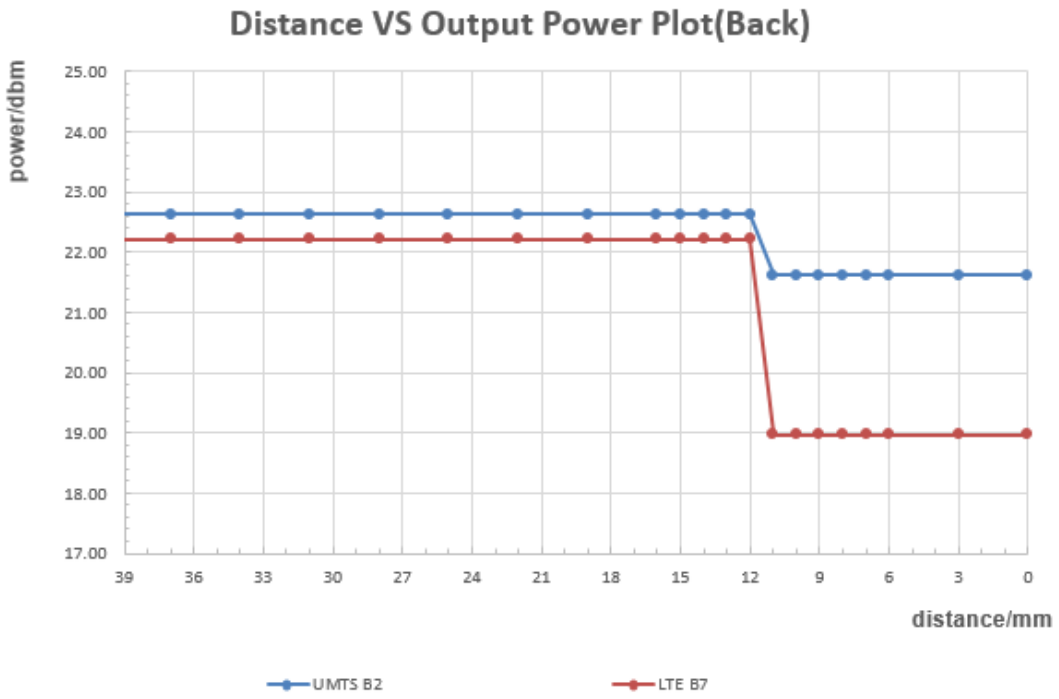
Band(MHz)	Trigger distance-Front Side		Trigger distance-Back Side		Trigger distance-Bottom Side	
	Moving toward phantom	Moving away from phantom	Moving toward phantom	Moving away from phantom	Moving toward phantom	Moving away from phantom
UMTS Band 2	10mm	10mm	11mm	11mm	15mm	15mm
LTE Band 7	10mm	10mm	11mm	11mm	15mm	15mm

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

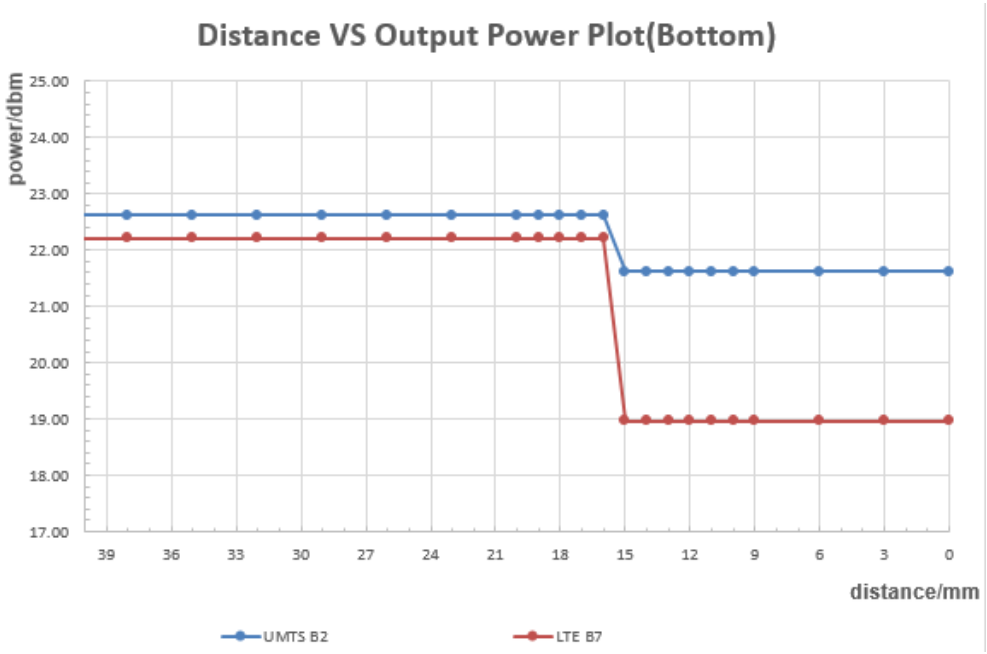
The DUT(Front side) is moved towards the flat phantom(hotspot off):



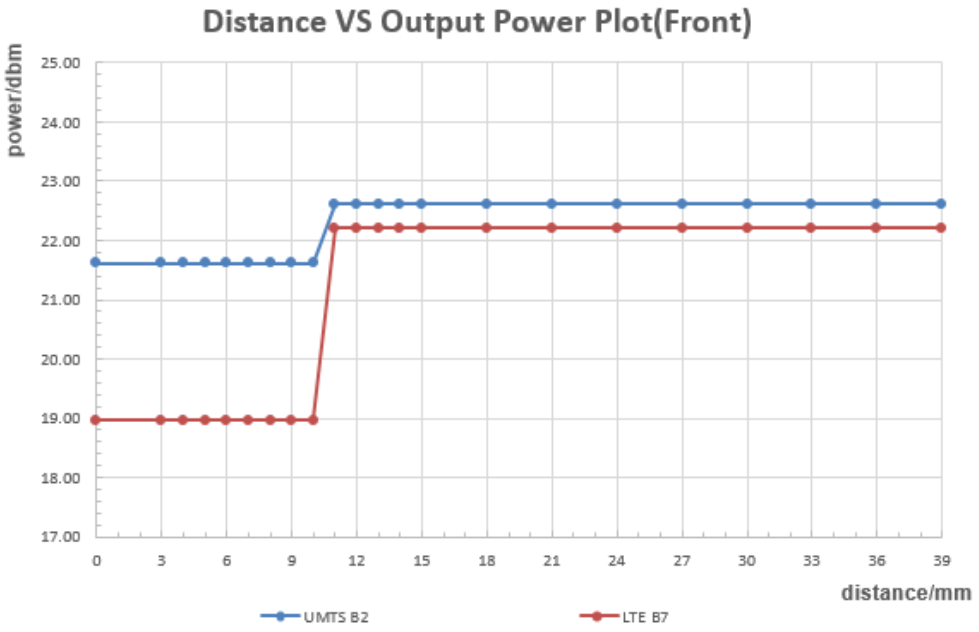
The DUT(Back side) is moved towards the flat phantom(hotspot off):



The DUT(Bottom side) is moved towards the flat phantom(hotspot off):



The DUT(Front side) is moved away from the flat phantom(hotspot off):



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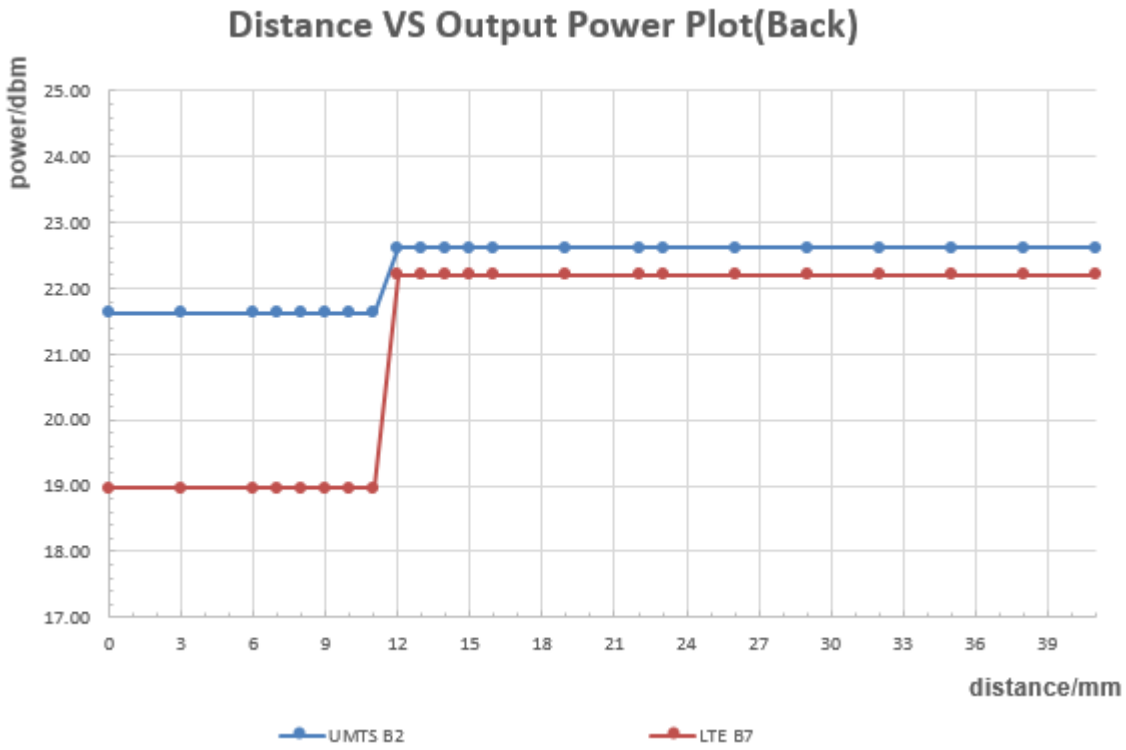
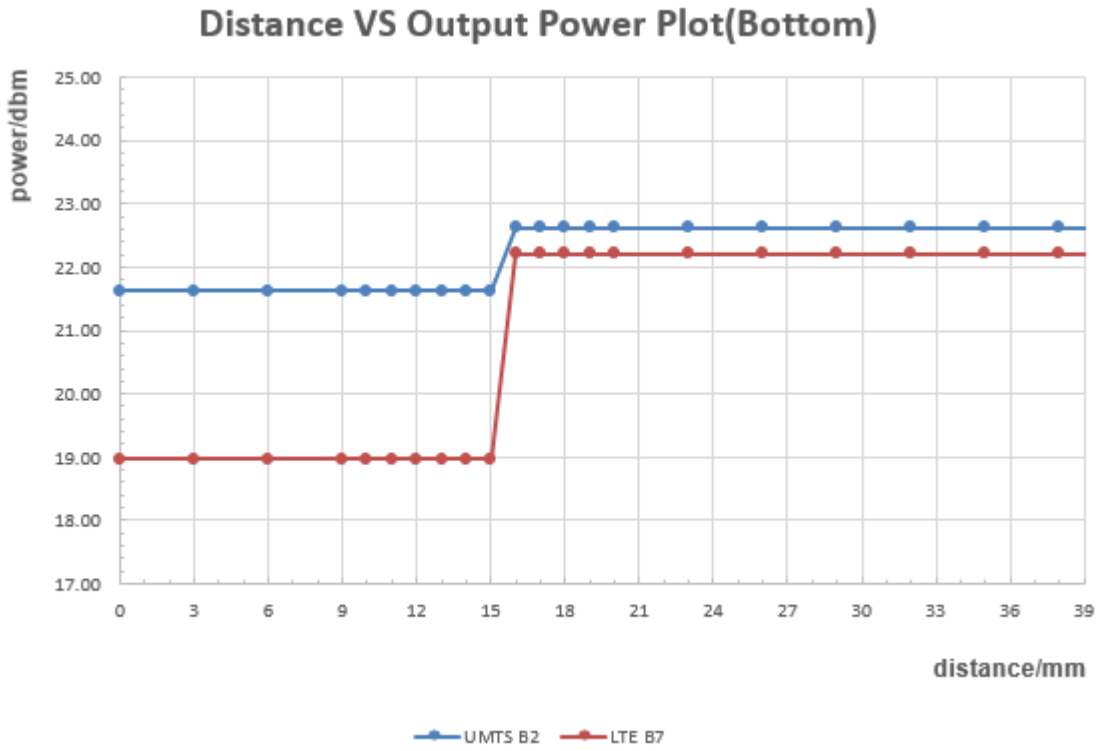
The DUT(Back side) is moved away from the flat phantom(hotspot off):



The DUT(Bottom side) is moved away from the flat phantom(hotspot off):



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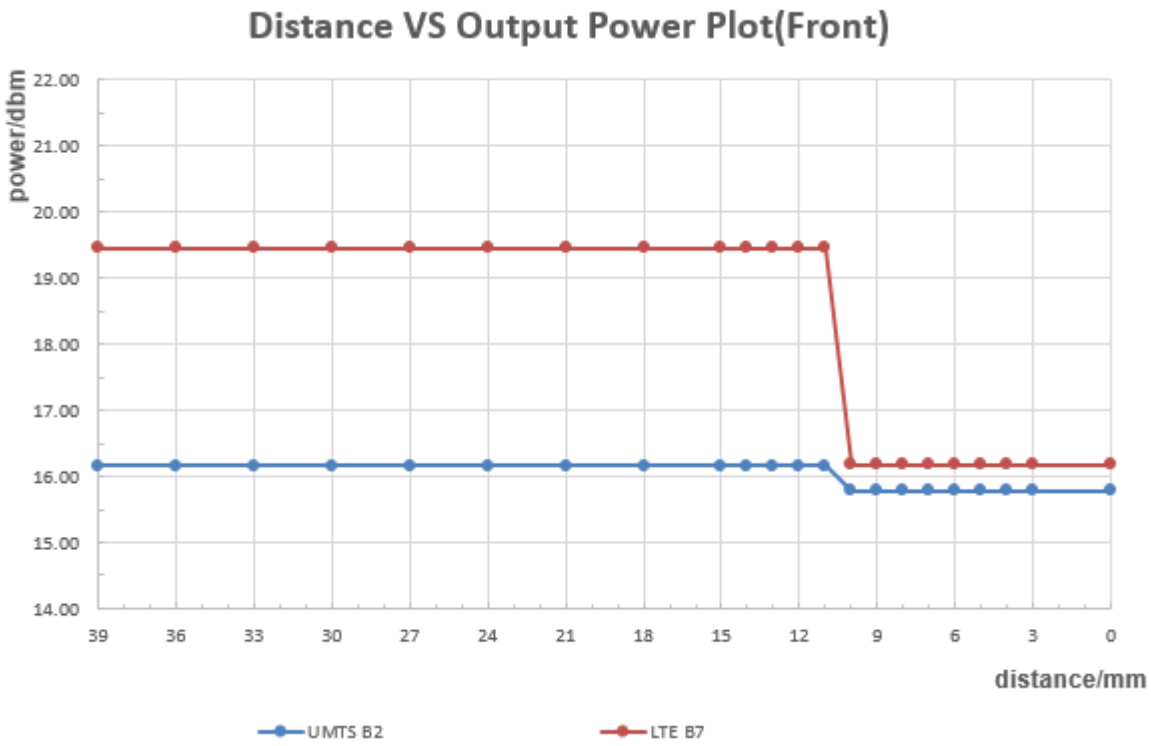
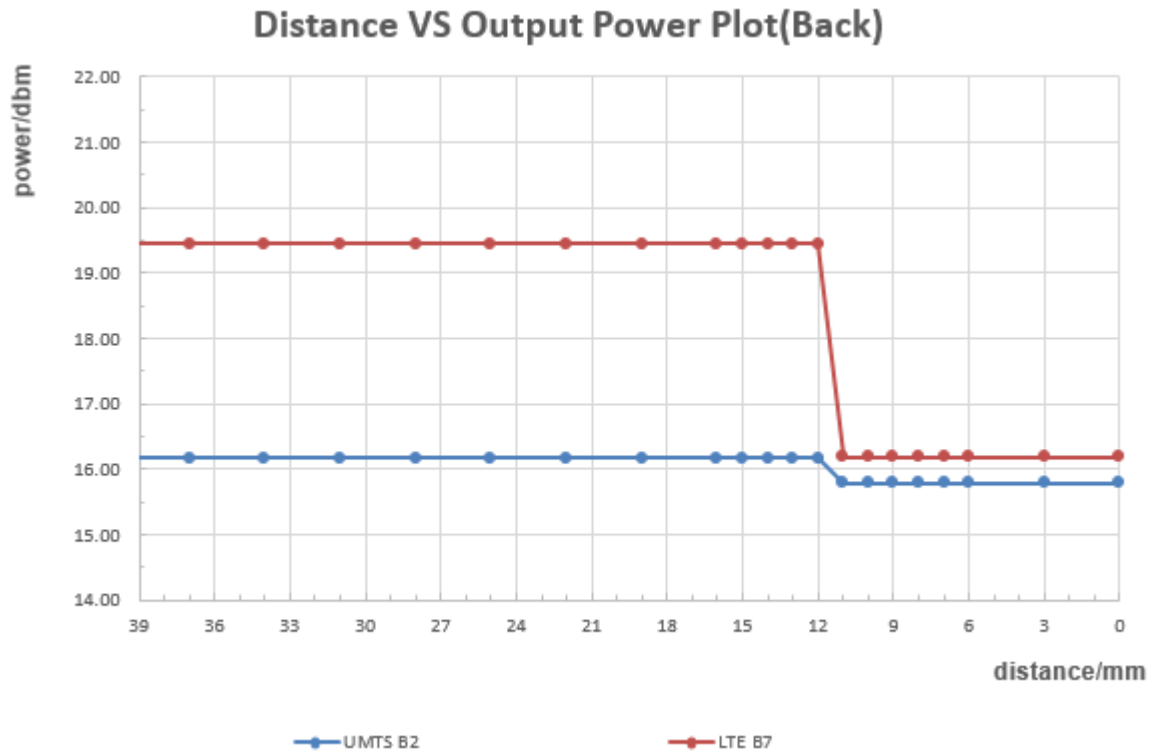
The DUT(Front side) is moved towards the flat phantom(hotspot on):



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



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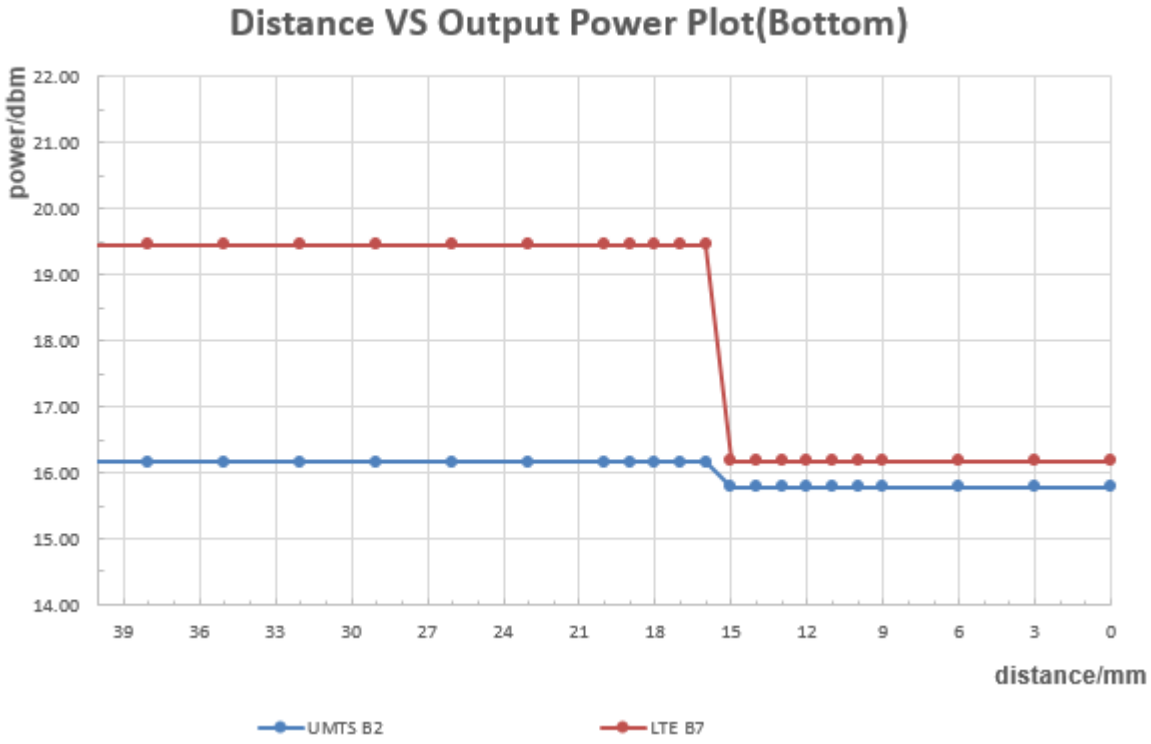
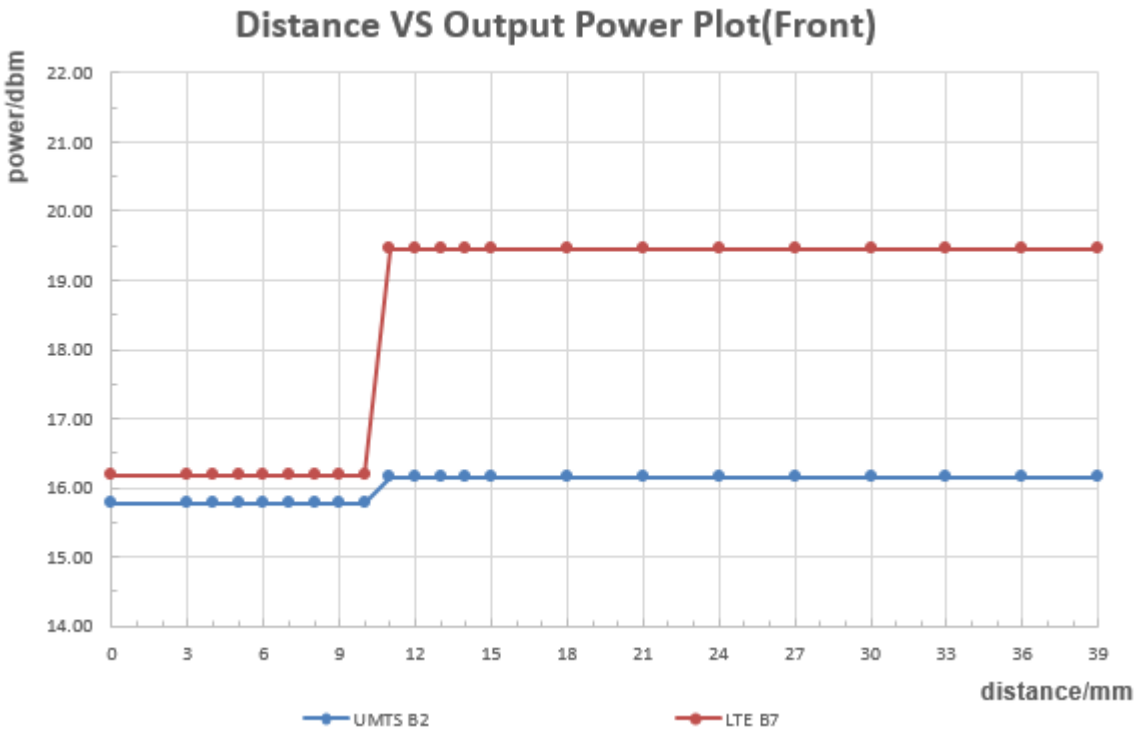
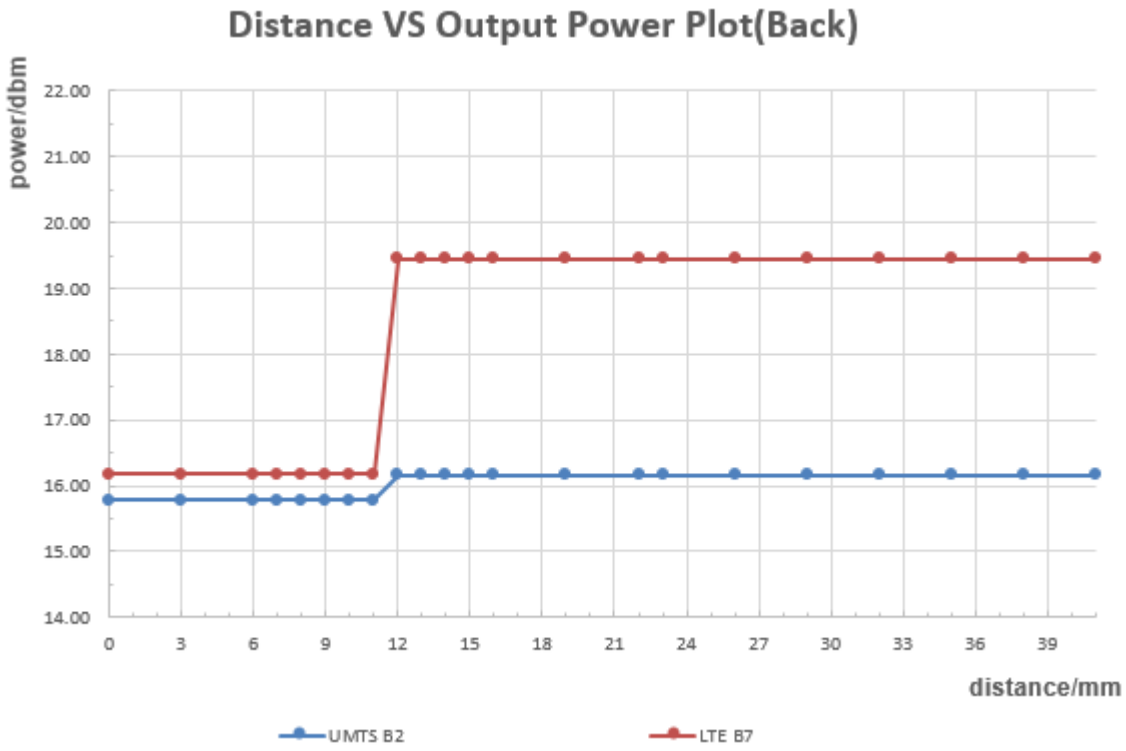
The DUT(Bottom side) is moved towards the flat phantom(hotspot on):



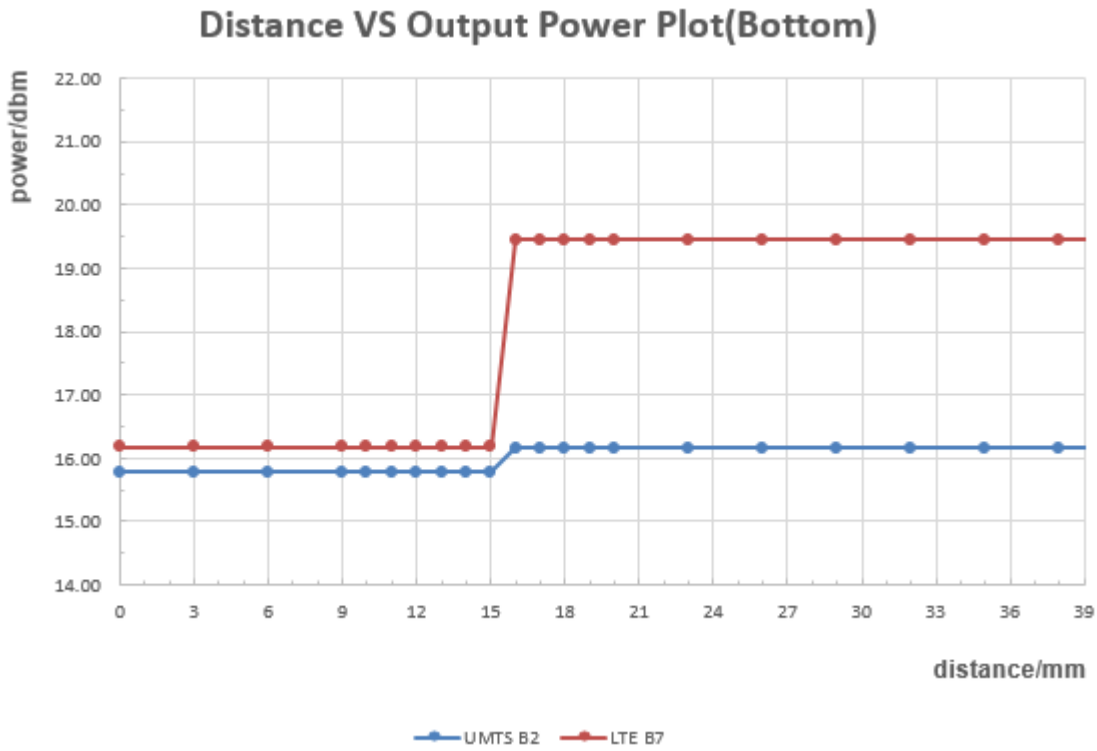
The DUT(Front side) is moved away from the flat phantom(hotspot on):



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



The DUT(Bottom side) is moved away from the flat phantom(hotspot on):



Conclusion: It can be ensured that the proximity sensor can be valid triggered.

2) Procedures for determining antenna and proximity sensor coverage

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 per KDB616217.

3) Procedures for determining device tilt angle influences to proximity sensor triggering

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

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

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

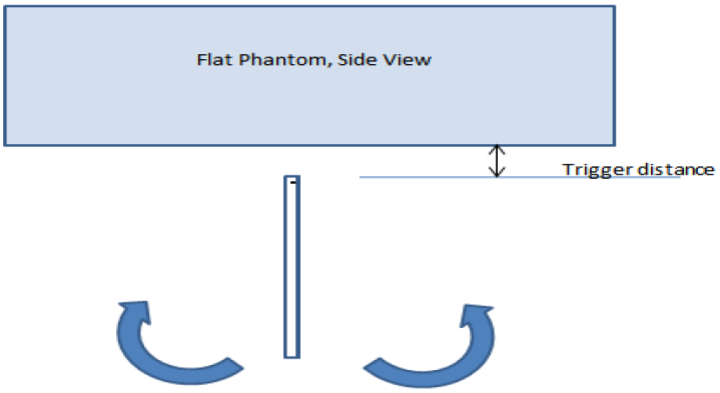


Table: Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering(Bottom side)

Band(MHz)	Minimum trigger distance at which power reduction was maintained over ±45°	Power Reduction Status										
		-45°	-35°	-25°	-15°	-5°	0°	5°	15°	25°	35°	45°
UMTS Band 2	15mm	on	on	on	on	on	on	on	on	on	on	on
LTE Band 7	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 (UMTS Band 2,LTE Band 7 of Main Antenna)

6.8.2 Infrared proximity sensor power reduction test Configuration

The device uses an infrared proximity sensor to reduce the output power of WiFi antenna when VoWiFi or WiFi + 2G&3G&4G antenna voice mode transmit simultaneously in held-to-ear scenario or body front side scenario.

A specific external test software and chipset based internal test modes are used in sensor triggering power measurement validation tests. 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.

In this section, the following procedure is used to determine the triggering distances, coverage and tilt angle influences per FCC KDB 616217 D04 §6.

1) Procedures for determining proximity sensor triggering distances

The procedure per FCC KDB 616217 D04 §6.2 is used to determine the triggering distances. As the proximity sensor locates on the front face of the device and detects objects approaching only from the front side, so triggering distance only need to be checked for the front side when device is under voice mode(VoWiFi or WiFi + 2G&3G&4G antenna voice mode transmit simultaneously in held-to-ear scenario or body front side scenario).

FCC KDB 616217 D04v01§6.2, the proximity sensor triggering distance measurement results are as below:

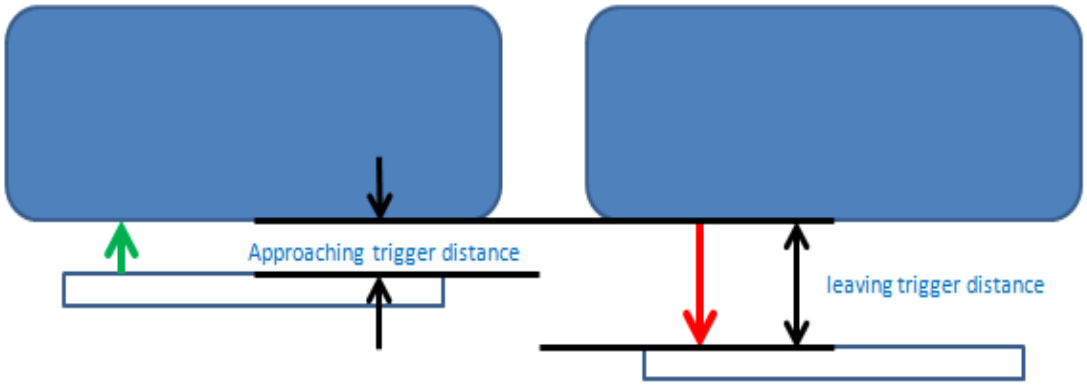
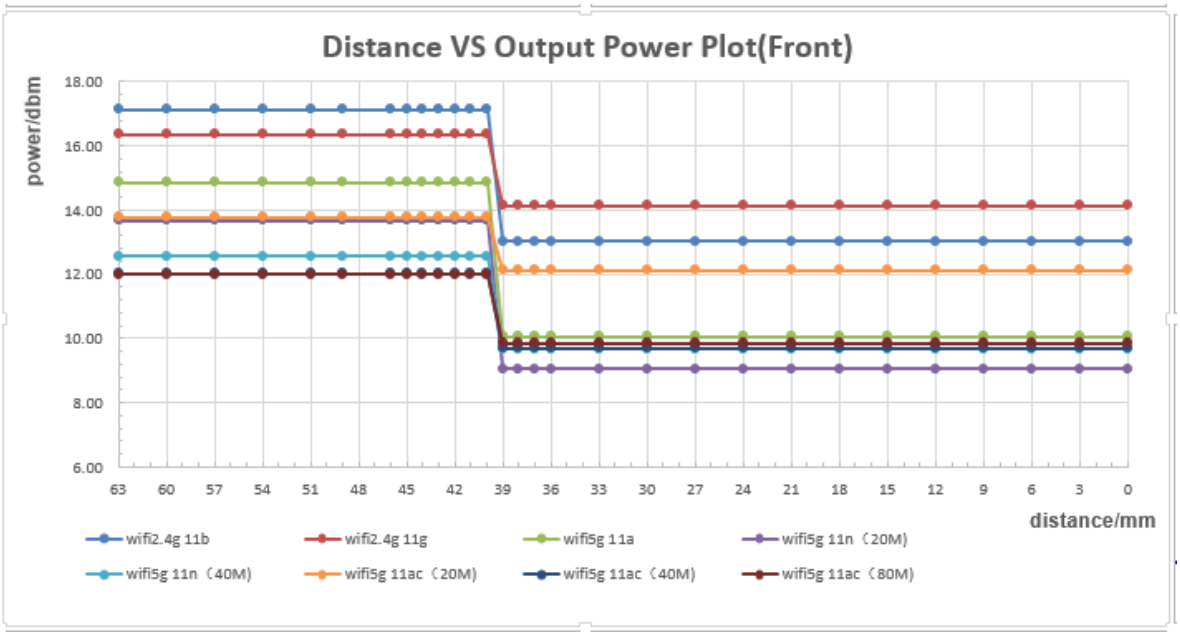
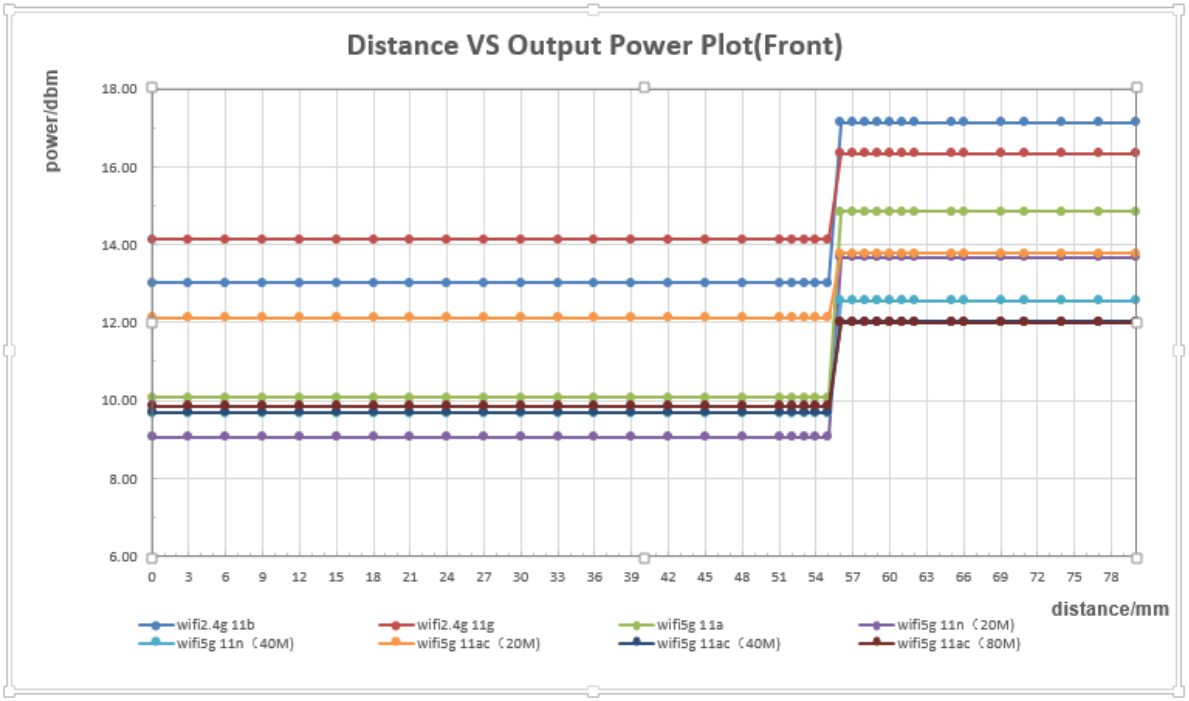


Figure : Proximity sensor triggering distances assessment (Front side only)

The DUT is moved towards from the flat phantom (VoWIFI or WiFi + 2G&3G&4G antenna voice mode simultaneous transmission):



The DUT is moved away from the flat phantom(VoWIFI or WiFi + 2G&3G&4G antenna voice mode simultaneous transmission):



2) Procedures for determining antenna and proximity sensor coverage

The IR proximity sensor triggering power reduction is only applicable for the front side, not including the edges. For front side view, there is no spatial offset between the WiFi antenna and the proximity sensor element. The scene does not exist when the antenna is next to the user but the sensor is laterally further away, so procedures for determining the proximity sensor coverage per FCC KDB 616217§6.3 does not need to be assessed.

3) Procedures for determining device tilt angle influences to proximity sensor triggering

The following procedure is used to determine the triggering angle. Distance need to be check when device under voice mode so that sensor is working.
For Head exposure condition, device tilt angle influences to proximity sensor triggering is determined as below:
Firstly, the DUT was positioned directly touch the Head SAM phantom (Left&Right hand touch cheek position). Rotate the DUT around the ear reference point of the phantom in 5° increments until the DUT is 15° tilted or more away from the touch cheek position at 0° .
Secondly, the DUT is positioned at 15° or more away from the touch cheek position and moved towards the SAM phantom in 5°increments until the DUT directly touch the SAM phantom at 0°(Left & Right hand touch cheek position).

The DUT is moved towards and away from SAM phantom:

Angle between phantom to DUT in degree	0°	5°	10°	15°	20°	25°	30°
Condition of Sensor power reduction (VoWIFI or Wi-Fi + 2G&3G&4G antenna voice)	on	on	on	on	on	on	on

Conclusion: Based on the validation results above, angle tilt coverage can ensure that the proximity sensor is valid triggered for all required Head test positions(Left/Right Hand Touched cheek and Left/Right Hand tiled 15 °).

4) Summary SAR test Plan for Infrared Proximity sensor power reduction scenarios
a) For Head SAR compliance: The device supports VoWIFI function. Head SAR for Wi-Fi antenna is evaluated at reduced power levels according to the real usage scenarios.
b) For other scenarios: Standalone SAR compliance for Wi-Fi antenna is still tested at the maximum output power level without any power reduction. The more conservative SAR results are used to ensure Body SAR compliance for both standalone and simultaneous transmission scenarios. So additional SAR test at the sensor triggering distance minus 1mm with the maximum output power level per KDB 616217D04 is not required.

7 SAR Measurement Results

7.1 Conducted power measurements

For the measurements a Rohde & Schwarz Radio Communication Tester CMU 200&CMW500 was used.
SAR drift measured at the same position in liquid before and after each SAR test as below 7.2 chapter.
Note: CMU200 measures GSM peak and average output power for active timeslots.For SAR the timebased average power is relevant. The difference in between depends on the duty cycle of the TDMA signal :

No. of timeslots	1	2	3	4
Duty Cycle	1:8.3	1:4.1	1:2.77	1:2.08
timebased avg. power compared to slotted avg. power	-9.19dB	-6.13dB	-4.42dB	-3.18dB

The signalling modes differ as follows:

mode	coding scheme	modulation
GPRS	CS1 to CS4	GMSK
EDGE	MCS1 to MCS4	GMSK
EDGE	MCS5 to MCS9	8PSK

Apart from modulation change (GMSK/8PSK) coding schemes differ in code rate without influence on the RF signal. Therefore one coding scheme per mode was selected for conducted power measurements.

7.1.1 Conducted power measurements of GSM850 (Second Antenna)

GSM850		Burst-Averaged output Power (dBm)				Division Factors	Frame-Averaged output Power (dBm)			
		Tune-up	128CH	190CH	251CH		Tune-up	128CH	190CH	251CH
GSM (CS)		33.00	32.09	**31.97**	31.84	-9.19	23.81	22.90	22.78	22.65
GPRS /EDGE (GMSK)	1 Tx Slot	33.00	32.08	31.94	31.84	-9.19	23.81	22.89	22.75	22.65
	2 Tx Slots	30.00	29.16	29.01	28.91	-6.13	23.87	23.03	22.88	22.78
	3 Tx Slots	28.20	27.30	27.14	27.03	-4.42	23.78	22.88	22.72	22.61
	4 Tx Slots	27.00	26.05	25.94	25.84	-3.18	23.82	22.87	22.76	22.66
EDGE (8PSK)	1 Tx Slot	27.50	26.10	26.21	26.32	-9.19	18.31	16.91	17.02	17.13
	2 Tx Slots	25.50	23.94	23.96	24.04	-6.13	19.37	17.81	17.83	17.91
	3 Tx Slots	23.50	21.86	21.83	21.80	-4.42	19.08	17.44	17.41	17.38
	4 Tx Slots	21.50	19.61	19.65	19.73	-3.18	18.32	16.43	16.47	16.55

Table 13:Conducted power measurement results of GSM850 (Full power)

GSM850		Burst-Averaged output Power (dBm)				Division Factors	Frame-Averaged output Power (dBm)			
		Tune-up	128CH	190CH	251CH		Tune-up	128CH	190CH	251CH
GSM (CS)		31.00	30.09	29.98	29.87	-9.19	21.81	20.90	20.79	20.68
GPRS /EDGE (GMSK)	1 Tx Slot	31.00	30.09	29.96	29.86	-9.19	21.81	20.90	20.77	20.67
	2 Tx Slots	**28.00**	**27.08**	**26.95**	**26.85**	**-6.13**	**21.87**	**20.95**	**20.82**	**20.72**
	3 Tx Slots	26.20	25.27	25.13	25.00	-4.42	21.78	20.85	20.71	20.58
	4 Tx Slots	25.00	23.99	23.87	23.76	-3.18	21.82	20.81	20.69	20.58
EDGE (8PSK)	1 Tx Slot	27.50	26.10	26.21	26.32	-9.19	18.31	16.91	17.02	17.13
	2 Tx Slots	25.50	23.94	23.96	24.04	-6.13	19.37	17.81	17.83	17.91
	3 Tx Slots	23.50	21.86	21.83	21.80	-4.42	19.08	17.44	17.41	17.38
	4 Tx Slots	21.50	19.61	19.65	19.73	-3.18	18.32	16.43	16.47	16.55

Table 14:Conducted power measurement results of GSM850 (Receiver on/ Hotspot active)

Note:

1) The conducted power of GSM850 is 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 timesolts.

3) Per KDB941225 D01, SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

7.1.2 Conducted power measurements of GSM1900 (Second Antenna)

GSM1900		Burst-Averaged output Power (dBm)				Division Factors	Frame-Averaged output Power (dBm)			
		Tune-up	512CH	661CH	810CH		Tune-up	512CH	661CH	810CH
GSM (CS)		**30.80**	29.89	**29.62**	29.55	-9.19	21.61	20.70	20.43	20.36
GPRS /EDGE (GMSK)	1 Tx Slot	30.80	29.79	29.59	29.52	-9.19	21.61	20.60	20.40	20.33
	2 Tx Slots	**27.80**	**26.76**	**26.54**	**26.49**	**-6.13**	**21.67**	**20.63**	**20.41**	**20.36**
	3 Tx Slots	26.00	24.62	24.42	24.48	-4.42	21.58	20.20	20.00	20.06
	4 Tx Slots	24.80	23.32	23.19	23.25	-3.18	21.62	20.14	20.01	20.07
EDGE (8PSK)	1 Tx Slot	26.50	24.75	24.66	24.74	-9.19	17.31	15.56	15.47	15.55
	2 Tx Slots	24.50	22.67	22.54	22.66	-6.13	18.37	16.54	16.41	16.53
	3 Tx Slots	22.50	20.69	20.68	20.72	-4.42	18.08	16.27	16.26	16.30
	4 Tx Slots	20.50	18.18	18.14	18.18	-3.18	17.32	15.00	14.96	15.00

Table 15:Conducted power measurement results of GSM1900

Note:

1) The conducted power of GSM1900 is 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 timesolts.

3) Per KDB941225 D01, SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

7.1.3 Conducted power measurements of UMTS Band 2 (Second Antenna)

UMTS Band 2		Tune-up	Average Power (dBm)		
			9262CH	9400CH	9538CH
WCDMA	12.2kbps RMC	**19.00**	17.71	**17.55**	17.49
	12.2kbps AMR	19.00	17.65	17.53	17.42
HSDPA	Subtest 1	18.00	16.72	16.59	16.44
	Subtest 2	18.00	16.70	16.52	16.31
	Subtest 3	17.30	16.01	15.82	15.77
	Subtest 4	17.30	16.00	15.82	15.73
HSUPA	Subtest 1	17.00	14.10	14.16	14.09
	Subtest 2	16.00	12.98	12.76	12.69
	Subtest 3	17.50	14.86	14.97	14.80
	Subtest 4	16.00	13.86	13.86	13.96
	Subtest 5	17.50	16.23	16.06	15.93
DC-HSDPA	Subtest 1	18.00	16.64	16.69	16.35
	Subtest 2	18.00	16.61	16.43	16.19
	Subtest 3	17.30	15.89	15.72	15.65
	Subtest 4	17.30	15.89	15.72	15.63

Table 16: Conducted power measurement results of UMTS Band 2 (Receiver on/ Hotspot active)

UMTS Band 2		Tune-up	Average Power (dBm)		
			9262CH	9400CH	9538CH
WCDMA	12.2kbps RMC	**24.00**	22.55	**22.35**	22.32
	12.2kbps AMR	24.00	22.52	22.38	22.31
HSDPA	Subtest 1	23.00	21.76	21.55	21.42
	Subtest 2	23.00	21.74	21.49	21.40
	Subtest 3	22.30	21.06	20.81	20.64
	Subtest 4	22.30	21.12	20.87	20.65
HSUPA	Subtest 1	22.00	20.10	20.16	19.85
	Subtest 2	21.00	18.14	17.78	17.96
	Subtest 3	22.50	20.04	20.00	19.81
	Subtest 4	21.00	18.55	18.21	18.66
	Subtest 5	22.50	21.25	21.05	20.91
DC-HSDPA	Subtest 1	23.00	21.68	21.66	21.37
	Subtest 2	23.00	21.66	21.41	21.27
	Subtest 3	22.30	20.97	20.70	20.52
	Subtest 4	22.30	20.99	20.74	20.53

Table 17: Conducted power measurement results of UMTS Band 2 (Full power)

Note:

1) The conducted power of UMTS Band 2 is measured with RMS detector.

2) The bolded 12.2kbps RMC mode was selected for SAR testing(the primary mode).

3) Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a Second mode is ≤ ¼ 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 Second to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the Second mode.

7.1.4 Conducted power measurements of UMTS Band 5 (Second Antenna)

UMTS Band 5		Tune-up	Average Power (dBm)		
			4132CH	4182CH	4233CH
WCDMA	12.2kbps RMC	**24.00**	**22.95**	**22.93**	**22.93**
	12.2kbps AMR	24.00	22.98	22.91	22.94
HSDPA	Subtest 1	23.00	22.93	22.89	22.86
	Subtest 2	23.00	21.95	21.91	21.95
	Subtest 3	22.30	21.24	21.23	21.26
	Subtest 4	22.30	21.27	21.25	21.29
HSUPA	Subtest 1	22.00	20.43	20.54	20.68
	Subtest 2	21.00	19.34	19.11	19.06
	Subtest 3	22.50	20.44	20.38	20.42
	Subtest 4	21.00	18.55	18.60	18.62
	Subtest 5	22.50	21.53	21.52	21.45
DC-HSDPA	Subtest 1	23.00	22.82	22.79	22.76
	Subtest 2	23.00	21.85	21.84	21.84
	Subtest 3	22.30	21.14	21.16	21.16
	Subtest 4	22.30	21.18	21.16	21.22

Table 18: Conducted power measurement results of UMTS Band 5

Note:

1) The conducted power of UMTS Band 5 is measured with RMS detector.

2) The bolded 12.2kbps RMC mode was selected for SAR testing(the primary mode).

3) Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a Second mode is ≤ ¼ 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 Second to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the Second mode.

7.1.5 Conducted power measurements of LTE Band 7 (Second Antenna)

LTE Band 7					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20775CH	Channel 21100CH	Channel 21425CH
5MHz	QPSK	1	0	18.50	17.41	17.20	16.75
		1	13	18.50	17.71	17.59	17.16
		1	24	18.50	17.51	17.56	17.04
		12	0	18.50	17.68	17.51	17.11
		12	6	18.50	17.73	17.63	17.15
		12	13	18.50	17.45	17.39	17.02
		25	0	18.50	17.51	17.39	17.08
	16QAM	1	0	18.50	17.61	17.84	17.27
		1	13	18.50	17.86	17.85	17.64
		1	24	18.50	17.78	17.86	17.53
		12	0	18.50	17.77	17.56	17.22
		12	6	18.50	17.82	17.67	17.25
		12	13	18.50	17.53	17.44	17.12
		25	0	18.50	17.61	17.44	17.11
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20800CH	Channel 21100CH	Channel 21400CH
10MHz	QPSK	1	0	18.50	17.27	17.09	16.80
		1	25	18.50	17.68	17.65	17.26
		1	49	18.50	17.24	17.67	17.19
		25	0	18.50	17.56	17.40	17.05
		25	13	18.50	17.53	17.52	17.05
		25	25	18.50	17.28	17.51	17.07
		50	0	18.50	17.63	17.38	17.01
	16QAM	1	0	18.50	17.36	17.14	16.95
		1	25	18.50	17.76	17.73	17.25
		1	49	18.50	17.48	17.81	17.25
		25	0	18.50	17.60	17.46	17.04
		25	13	18.50	17.56	17.58	17.09
		25	25	18.50	17.31	17.56	17.05
		50	0	18.50	17.69	17.44	17.04

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Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					20825CH	21100CH	21375CH
15MHz	QPSK	1	0	18.50	17.29	16.91	16.91
		1	38	18.50	17.34	17.47	17.06
		1	74	18.50	16.76	17.55	16.99
		36	0	18.50	17.41	17.14	16.96
		36	18	18.50	17.27	17.43	16.97
		36	39	18.50	17.00	17.36	16.85
		75	0	18.50	17.29	17.18	16.86
	16QAM	1	0	18.50	17.66	17.11	17.10
		1	38	18.50	17.63	17.62	17.23
		1	74	18.50	17.07	17.73	17.21
		36	0	18.50	17.53	17.19	17.01
		36	18	18.50	17.31	17.49	17.01
		36	39	18.50	16.98	17.41	16.89
		75	0	18.50	17.31	17.21	16.86
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					20850CH	21100CH	21350CH
20MHz	QPSK	1	0	18.50	17.15	16.70	16.93
		1	50	18.50	17.19	**17.46**	17.00
		1	99	18.50	16.67	17.42	16.90
		50	0	18.50	**17.22**	16.98	**16.94**
		50	25	18.50	17.09	17.25	16.83
		50	50	18.50	16.82	**17.26**	16.78
		100	0	18.50	**17.15**	17.10	16.85
	16QAM	1	0	18.50	17.57	17.04	17.28
		1	50	18.50	17.61	17.87	17.34
		1	99	18.50	17.02	17.75	17.30
		50	0	18.50	17.30	17.04	16.96
		50	25	18.50	17.18	17.31	16.84
		50	50	18.50	16.89	17.29	16.81
		100	0	18.50	17.16	17.17	16.86

Table 19: Conducted power measurement results of LTE Band 7 (Receiver on/ Hotspot active)

LTE Band 7					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					20775CH	21100CH	21425CH
5MHz	QPSK	1	0	22.00	21.13	20.95	20.35
		1	13	22.00	21.44	21.24	20.63
		1	24	22.00	21.25	21.19	20.59
		12	0	22.00	21.45	21.20	20.52
		12	6	22.00	21.43	21.28	20.55
		12	13	22.00	21.25	21.04	20.42
		25	0	22.00	21.33	21.07	20.48
	16QAM	1	0	22.00	21.45	21.19	20.35
		1	13	22.00	21.47	21.44	20.61
		1	24	22.00	21.45	21.40	20.57
		12	0	22.00	21.49	21.10	20.34
		12	6	22.00	21.49	21.15	20.38
		12	13	22.00	21.13	20.91	20.24
		25	0	22.00	21.17	20.95	20.32
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					20800CH	21100CH	21400CH
10MHz	QPSK	1	0	22.00	21.25	20.81	20.37
		1	25	22.00	21.36	21.28	20.62
		1	49	22.00	21.01	21.25	20.67
		25	0	22.00	21.33	21.07	20.47
		25	13	22.00	21.26	21.16	20.44
		25	25	22.00	21.02	21.12	20.43
		50	0	22.00	21.36	21.03	20.42
	16QAM	1	0	22.00	21.12	21.25	20.21
		1	25	22.00	21.21	21.49	20.64
		1	49	22.00	21.00	21.46	20.62
		25	0	22.00	21.25	20.93	20.35
		25	13	22.00	21.18	21.02	20.34
		25	25	22.00	20.93	20.98	20.31
		50	0	22.00	21.21	20.88	20.29

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Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20825CH	Channel 21100CH	Channel 21375CH
15MHz	QPSK	1	0	22.00	21.23	20.64	20.48
		1	38	22.00	21.06	21.13	20.46
		1	74	22.00	20.60	21.14	20.51
		36	0	22.00	21.20	20.82	20.34
		36	18	22.00	20.97	21.06	20.31
		36	39	22.00	20.57	20.97	20.19
		75	0	22.00	21.00	20.83	20.23
	16QAM	1	0	22.00	21.14	20.77	20.46
		1	38	22.00	20.91	21.27	20.43
		1	74	22.00	20.45	21.27	20.51
		36	0	22.00	21.05	20.70	20.26
		36	18	22.00	20.81	20.93	20.24
		36	39	22.00	20.42	20.84	20.10
		75	0	22.00	20.84	20.70	20.14
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20850CH	Channel 21100CH	Channel 21350CH
20MHz	QPSK	1	0	22.00	**21.04**	20.33	20.34
		1	50	22.00	20.74	21.01	20.35
		1	99	22.00	20.30	20.85	20.22
		50	0	22.00	**20.95**	20.63	20.31
		50	25	22.00	20.65	20.86	20.19
		50	50	22.00	20.41	20.81	20.12
		100	0	22.00	20.79	20.73	20.20
	16QAM	1	0	22.00	21.25	20.45	20.40
		1	50	22.00	20.94	21.15	20.38
		1	99	22.00	20.51	20.92	20.32
		50	0	22.00	20.84	20.50	20.24
		50	25	22.00	20.53	20.71	20.14
		50	50	22.00	20.29	20.66	20.06
		100	0	22.00	20.67	20.58	20.12

Table 20: Conducted power measurement results of LTE Band 7 (Full power)

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7.1.6 Conducted power measurements of GSM850 (Main Antenna)

GSM850		Burst-Averaged output Power (dBm)				Division Factors	Frame-Averaged output Power (dBm)			
		Tune-up	128CH	190CH	251CH		Tune-up	128CH	190CH	251CH
GSM (CS)		**33.0**	32.03	**31.91**	31.78	-9.19	23.81	22.84	22.72	22.59
GPRS /EDGE (GMSK)	1 Tx Slot	33.0	32.04	31.90	31.81	-9.19	23.81	22.85	22.71	22.62
	2 Tx Slots	**30.0**	**29.06**	**28.94**	**28.83**	**-6.13**	**23.87**	**22.93**	**22.81**	**22.70**
	3 Tx Slots	28.2	27.23	27.06	26.97	-4.42	23.78	22.81	22.64	22.55
	4 Tx Slots	27.0	25.99	25.87	25.76	-3.18	23.82	22.81	22.69	22.58
EDGE (8PSK)	1 Tx Slot	27.5	26.16	26.30	26.44	-9.19	18.31	16.97	17.11	17.25
	2 Tx Slots	25.5	23.87	23.91	24.00	-6.13	19.37	17.74	17.78	17.87
	3 Tx Slots	23.5	21.64	21.69	21.67	-4.42	19.08	17.22	17.27	17.25
	4 Tx Slots	21.5	19.66	19.54	19.62	-3.18	18.32	16.48	16.36	16.44

Table 21: Conducted power measurement results of GSM850

Note:

1) The conducted power of GSM850 is 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 timesolts.

3) Per KDB941225 D01, SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

7.1.7 Conducted power measurements of GSM1900 (Main Antenna)

GSM1900		Burst-Averaged output Power (dBm)				Division Factors	Frame-Averaged output Power (dBm)			
		Tune-up	512CH	661CH	810CH		Tune-up	512CH	661CH	810CH
GSM (CS)		**30.80**	29.94	**29.76**	29.71	-9.19	21.61	20.75	20.57	20.52
GPRS /EDGE (GMSK)	1 Tx Slot	30.80	29.98	29.78	29.72	-9.19	21.61	20.79	20.59	20.53
	2 Tx Slots	27.80	26.67	26.51	26.56	-6.13	21.67	20.54	20.38	20.43
	3 Tx Slots	26.00	24.92	24.75	24.81	-4.42	21.58	20.50	20.33	20.39
	4 Tx Slots	24.80	23.60	23.51	23.58	-3.18	21.62	20.42	20.33	20.40
EDGE (8PSK)	1 Tx Slot	26.50	24.93	24.85	24.95	-9.19	17.31	15.74	15.66	15.76
	2 Tx Slots	24.50	22.89	22.81	22.69	-6.13	18.37	16.76	16.68	16.56
	3 Tx Slots	22.50	20.52	20.76	20.82	-4.42	18.08	16.10	16.34	16.40
	4 Tx Slots	20.50	18.35	18.33	18.47	-3.18	17.32	15.17	15.15	15.29

Table 22: Conducted power measurement results of GSM1900 (Full power)

GSM1900		Burst-Averaged output Power (dBm)				Division Factors	Frame-Averaged output Power (dBm)			
		Tune-up	512CH	661CH	810CH		Tune-up	512CH	661CH	810CH
GSM (CS)		28.80	27.82	27.69	27.64	-9.19	19.61	18.63	18.50	18.45
GPRS /EDGE (GMSK)	1 Tx Slot	28.80	27.80	27.67	27.66	-9.19	19.61	18.61	18.48	18.47
	2 Tx Slots	**25.80**	**24.76**	**24.62**	**24.61**	**-6.13**	**19.67**	**18.63**	**18.49**	**18.48**
	3 Tx Slots	24.00	22.79	22.65	22.75	-4.42	19.58	18.37	18.23	18.33
	4 Tx Slots	22.80	21.52	21.47	21.55	-3.18	19.62	18.34	18.29	18.37
EDGE (8PSK)	1 Tx Slot	26.50	24.93	24.85	24.95	-9.19	17.31	15.74	15.66	15.76
	2 Tx Slots	24.50	22.89	22.81	22.69	-6.13	18.37	16.76	16.68	16.56
	3 Tx Slots	22.50	20.53	20.76	20.82	-4.42	18.08	16.11	16.34	16.40
	4 Tx Slots	20.50	18.35	18.33	18.47	-3.18	17.32	15.17	15.15	15.29

Table 23: Conducted power measurement results of GSM1900 (Hotspot active)

Note:

1) The conducted power of GSM1900 is 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 timesolts.

3) Per KDB941225 D01, SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

7.1.8 Conducted power measurements of UMTS Band 2 (Main Antenna)

UMTS Band 2		Tune-up	Average Power (dBm)		
			9262CH	9400CH	9538CH
WCDMA	12.2kbps RMC	**24.00**	**22.77**	**22.62**	**22.50**
	12.2kbps AMR	24.00	22.71	22.59	22.46
HSDPA	Subtest 1	23.00	21.34	21.22	21.21
	Subtest 2	23.00	21.02	21.05	21.00
	Subtest 3	22.30	20.34	20.36	20.34
	Subtest 4	22.30	20.37	20.36	20.35
HSUPA	Subtest 1	22.00	19.62	19.77	19.41
	Subtest 2	21.00	18.23	18.16	18.09
	Subtest 3	22.50	19.54	19.36	19.14
	Subtest 4	21.00	18.65	17.86	18.50
	Subtest 5	22.50	21.91	21.73	21.01
DC-HSDPA	Subtest 1	23.00	21.24	21.16	21.15
	Subtest 2	23.00	21.07	21.06	21.04
	Subtest 3	22.30	20.31	20.38	20.33
	Subtest 4	22.30	20.36	20.32	20.37

Table 24: Conducted power measurement results of UMTS Band 2 (Full power)

UMTS Band 2		Tune-up	Average Power (dBm)		
			9262CH	9400CH	9538CH
WCDMA	12.2kbps RMC	**17.50**	16.30	**16.16**	15.94
	12.2kbps AMR	17.50	16.24	16.11	15.91
HSDPA	Subtest 1	16.50	14.77	14.77	14.69
	Subtest 2	16.50	14.53	14.55	14.66
	Subtest 3	15.80	14.06	14.00	14.04
	Subtest 4	15.80	13.85	14.15	13.88
HSUPA	Subtest 1	15.50	14.04	14.17	14.35
	Subtest 2	14.50	11.43	11.24	11.34
	Subtest 3	16.00	12.71	12.63	12.61
	Subtest 4	14.50	11.59	11.62	11.49
	Subtest 5	16.00	15.29	15.64	15.43
DC-HSDPA	Subtest 1	16.50	14.80	14.83	14.75
	Subtest 2	16.50	14.99	14.75	14.96
	Subtest 3	15.80	13.97	13.93	14.11
	Subtest 4	15.80	13.94	13.89	14.09

Table 25: Conducted power measurement results of UMTS Band 2 (Hotspot active)

UMTS Band 2		Tune-up	Average Power (dBm)		
			9262CH	9400CH	9538CH
WCDMA	12.2kbps RMC	23.00	21.75	21.62	21.53
	12.2kbps AMR	23.00	21.70	21.58	21.46
HSDPA	Subtest 1	22.00	20.34	20.20	20.20
	Subtest 2	22.00	20.04	20.06	20.01
	Subtest 3	21.30	19.34	19.34	19.35
	Subtest 4	21.30	19.33	19.39	19.31
HSUPA	Subtest 1	21.00	18.55	18.51	18.65
	Subtest 2	20.00	17.43	16.97	16.74
	Subtest 3	21.50	18.97	18.50	18.30
	Subtest 4	20.00	18.07	17.60	17.72
	Subtest 5	21.50	19.96	19.91	19.78
DC-HSDPA	Subtest 1	22.00	20.25	20.09	20.14
	Subtest 2	22.00	20.07	20.02	20.04
	Subtest 3	21.30	19.38	19.32	19.32
	Subtest 4	21.30	19.39	19.34	19.30

Table 26: Conducted power measurement results of UMTS Band 2 (Proximity sensor on+ hotspot disable)

UMTS Band 2		Tune-up	Average Power (dBm)		
			9262CH	9400CH	9538CH
WCDMA	12.2kbps RMC	**16.50**	**15.75**	**15.78**	**15.73**
	12.2kbps AMR	16.50	15.70	15.73	15.71
HSDPA	Subtest 1	15.50	14.84	14.81	14.80
	Subtest 2	15.50	13.89	13.94	13.79
	Subtest 3	14.80	13.01	12.96	12.91
	Subtest 4	14.80	13.21	13.15	13.10
HSUPA	Subtest 1	14.50	12.16	12.28	12.19
	Subtest 2	13.50	11.46	11.22	11.28
	Subtest 3	15.00	12.09	12.18	12.11
	Subtest 4	13.50	10.54	10.61	10.59
	Subtest 5	16.00	15.35	15.45	15.72
DC-HSDPA	Subtest 1	15.50	14.78	14.75	14.73
	Subtest 2	15.50	13.96	13.89	13.71
	Subtest 3	14.80	13.06	13.04	13.14
	Subtest 4	14.80	13.10	13.09	13.00

Table 27: Conducted power measurement results of UMTS Band 2 (Proximity sensor on+hotspot active)

Note:

1) The conducted power of UMTS Band 2 is measured with RMS detector.

2) The bolded 12.2kbps RMC mode was selected for SAR testing(the primary mode).

3) Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a Second mode is ≤ ¼ 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 Second to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the Second mode.

7.1.9 Conducted power measurements of UMTS Band 5 (Main Antenna)

UMTS Band 5		Tune-up	Average Power (dBm)		
			4132CH	4182CH	4233CH
WCDMA	12.2kbps RMC	**24.00**	23.28	**23.31**	23.29
	12.2kbps AMR	24.00	23.25	23.34	23.28
HSDPA	Subtest 1	23.00	21.76	21.65	21.54
	Subtest 2	23.00	21.57	21.41	21.33
	Subtest 3	22.30	20.80	20.67	20.56
	Subtest 4	22.30	20.80	20.66	20.57
HSUPA	Subtest 1	22.00	20.53	19.86	19.80
	Subtest 2	21.00	18.81	18.58	18.57
	Subtest 3	22.50	20.20	19.90	19.42
	Subtest 4	21.00	19.23	19.14	19.02
	Subtest 5	22.50	21.69	21.49	21.63
DC-HSDPA	Subtest 1	23.00	21.68	21.56	21.44
	Subtest 2	23.00	21.51	21.31	21.27
	Subtest 3	22.30	20.70	20.56	20.48
	Subtest 4	22.30	20.72	20.59	20.44

Table 28: Conducted power measurement results of UMTS Band 5

Note:

1) The conducted power of UMTS Band 5 is measured with RMS detector.

2) The bolded 12.2kbps RMC mode was selected for SAR testing(the primary mode).

3) Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a Second mode is ≤ ¼ 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 Second to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the Second mode.

7.1.10 Conducted power measurements of LTE Band 7 (Main Antenna)

LTE Band 7					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20775CH	Channel 21100CH	Channel 21425CH
5MHz	QPSK	1	0	23.50	22.48	22.38	21.79
		1	13	23.50	22.47	22.49	21.89
		1	24	23.50	22.43	22.41	21.63
		12	0	22.50	21.78	21.59	21.04
		12	6	22.50	21.82	21.60	21.02
		12	13	22.50	21.57	21.32	20.79
		25	0	22.50	21.61	21.41	20.92
	16QAM	1	0	22.50	21.51	21.40	20.80
		1	13	22.50	21.75	21.53	20.96
		1	24	22.50	21.62	21.48	20.81
		12	0	22.50	21.72	21.50	20.89
		12	6	22.50	21.70	21.60	20.88
		12	13	22.50	21.50	21.24	20.69
		25	0	22.50	21.52	21.28	20.83
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20800CH	Channel 21100CH	Channel 21400CH
10MHz	QPSK	1	0	23.50	22.31	22.24	21.84
		1	25	23.50	22.51	22.54	21.95
		1	49	23.50	22.36	22.34	21.71
		25	0	22.50	21.58	21.44	21.04
		25	13	22.50	21.57	21.42	20.97
		25	25	22.50	21.40	21.30	20.87
		50	0	22.50	21.68	21.31	20.92
	16QAM	1	0	22.50	21.53	21.29	20.87
		1	25	22.50	21.78	21.55	21.01
		1	49	22.50	21.60	21.46	20.90
		25	0	22.50	21.48	21.35	20.94
		25	13	22.50	21.47	21.32	20.87
		25	25	22.50	21.31	21.22	20.78
		50	0	22.50	21.55	21.19	20.84

Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					20825CH	21100CH	21375CH
15MHz	QPSK	1	0	23.50	22.33	22.18	21.80
		1	38	23.50	22.34	22.31	21.93
		1	74	23.50	22.07	22.25	21.69
		36	0	22.50	21.47	21.24	20.87
		36	18	22.50	21.35	21.35	20.90
		36	39	22.50	21.03	21.12	20.71
		75	0	22.50	21.39	21.13	20.76
	16QAM	1	0	22.50	21.66	21.48	21.02
		1	38	22.50	21.43	21.32	21.07
		1	74	22.50	21.14	21.46	20.92
		36	0	22.50	21.42	21.13	20.77
		36	18	22.50	21.29	21.23	20.80
		36	39	22.50	20.95	21.04	20.63
		75	0	22.50	21.26	21.01	20.65
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					20850CH	21100CH	21350CH
20MHz	QPSK	1	0	23.50	**22.21**	21.89	21.56
		1	50	23.50	22.12	22.17	21.91
		1	99	23.50	21.91	21.91	21.54
		50	0	22.50	**21.34**	21.12	20.76
		50	25	22.50	21.12	21.17	20.78
		50	50	22.50	21.02	20.99	20.72
		100	0	22.50	21.25	21.06	20.74
	16QAM	1	0	22.50	21.29	20.93	20.87
		1	50	22.50	21.15	21.08	21.12
		1	99	22.50	20.84	20.99	20.81
		50	0	22.50	21.22	21.02	20.68
		50	25	22.50	21.01	21.07	20.70
		50	50	22.50	20.91	20.90	20.65
		100	0	22.50	21.13	20.94	20.64

Table 29: Conducted power measurement results of LTE Band 7 (Full power)

LTE Band 7					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20775CH	Channel 21100CH	Channel 21425CH
5MHz	QPSK	1	0	20.50	19.20	19.31	19.09
		1	13	20.50	19.54	19.52	19.31
		1	24	20.50	19.41	19.43	19.11
		12	0	19.50	18.62	18.57	18.35
		12	6	19.50	18.66	18.63	18.35
		12	13	19.50	18.46	18.35	18.21
		25	0	19.50	18.52	18.41	18.32
	16QAM	1	0	19.50	18.39	18.34	18.22
		1	13	19.50	18.80	18.53	18.49
		1	24	19.50	18.62	18.43	18.31
		12	0	19.50	18.61	18.50	18.37
		12	6	19.50	18.53	18.62	18.29
		12	13	19.50	18.40	18.34	18.28
		25	0	19.50	18.43	18.39	18.28
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20800CH	Channel 21100CH	Channel 21400CH
10MHz	QPSK	1	0	20.50	19.16	19.27	19.01
		1	25	20.50	19.51	19.59	19.35
		1	49	20.50	19.33	19.49	19.25
		25	0	19.50	18.45	18.50	18.30
		25	13	19.50	18.47	18.52	18.31
		25	25	19.50	18.31	18.42	18.25
		50	0	19.50	18.65	18.33	18.24
	16QAM	1	0	19.50	18.44	18.42	18.17
		1	25	19.50	18.82	18.80	18.50
		1	49	19.50	18.68	18.67	18.40
		25	0	19.50	18.38	18.46	18.27
		25	13	19.50	18.46	18.43	18.26
		25	25	19.50	18.31	18.32	18.21
		50	0	19.50	18.54	18.24	18.12

Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					20825CH	21100CH	21375CH
15MHz	QPSK	1	0	20.50	19.19	19.13	18.92
		1	38	20.50	19.34	19.44	19.19
		1	74	20.50	19.03	19.23	19.11
		36	0	19.50	18.41	18.27	18.08
		36	18	19.50	18.29	18.42	18.15
		36	39	19.50	18.11	18.22	18.03
		75	0	19.50	18.35	18.18	18.02
	16QAM	1	0	19.50	18.25	18.25	17.97
		1	38	19.50	18.78	18.49	18.15
		1	74	19.50	18.52	18.39	18.22
		36	0	19.50	18.36	18.18	17.98
		36	18	19.50	18.25	18.33	18.06
		36	39	19.50	18.07	18.16	17.94
		75	0	19.50	18.23	18.10	17.91
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					20850CH	21100CH	21350CH
20MHz	QPSK	1	0	20.50	18.97	18.84	18.65
		1	50	20.50	19.13	19.35	18.99
		1	99	20.50	18.89	19.05	18.90
		50	0	19.50	18.22	18.12	17.92
		50	25	19.50	18.15	18.20	17.96
		50	50	19.50	18.04	18.05	17.97
		100	0	19.50	18.22	18.09	17.93
	16QAM	1	0	19.50	18.03	18.04	17.90
		1	50	19.50	18.28	18.46	18.59
		1	99	19.50	17.98	18.29	18.29
		50	0	19.50	18.16	18.05	17.84
		50	25	19.50	18.09	18.14	17.88
		50	50	19.50	17.99	18.00	17.89
		100	0	19.50	18.14	18.00	17.85

Table 30: Conducted power measurement results of LTE Band 7 (Proximity sensor on+ hotspot disable)

LTE Band 7					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20775CH	Channel 21100CH	Channel 21425CH
5MHz	QPSK	1	0	20.50	19.36	19.19	19.02
		1	13	20.50	19.40	19.50	19.34
		1	24	20.50	19.12	19.19	19.11
		12	0	20.50	19.44	19.42	19.15
		12	6	20.50	19.37	19.54	19.22
		12	13	20.50	19.29	19.31	19.13
		25	0	20.50	19.45	19.43	19.16
	16QAM	1	0	20.50	19.65	19.48	19.36
		1	13	20.50	19.76	19.86	19.58
		1	24	20.50	19.51	19.58	19.35
		12	0	20.50	19.35	19.35	19.10
		12	6	20.50	19.25	19.40	19.19
		12	13	20.50	19.18	19.25	19.07
		25	0	20.50	19.42	19.34	19.08
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20800CH	Channel 21100CH	Channel 21400CH
10MHz	QPSK	1	0	20.50	19.30	19.25	19.05
		1	25	20.50	19.44	19.52	19.32
		1	49	20.50	19.15	19.24	19.06
		25	0	20.50	19.41	19.42	19.13
		25	13	20.50	19.42	19.51	19.18
		25	25	20.50	19.26	19.31	19.10
		50	0	20.50	19.44	19.45	19.13
	16QAM	1	0	20.50	19.66	19.46	19.30
		1	25	20.50	19.72	19.87	19.61
		1	49	20.50	19.46	19.51	19.32
		25	0	20.50	19.30	19.36	19.08
		25	13	20.50	19.26	19.39	19.16
		25	25	20.50	19.13	19.22	19.09
		50	0	20.50	19.42	19.26	19.08

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Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20825CH	Channel 21100CH	Channel 21375CH
15MHz	QPSK	1	0	20.50	19.35	19.20	19.05
		1	38	20.50	19.39	19.45	19.34
		1	74	20.50	19.11	19.23	19.08
		36	0	20.50	19.44	19.46	19.11
		36	18	20.50	19.37	19.54	19.15
		36	39	20.50	19.26	19.29	19.10
		75	0	20.50	19.49	19.46	19.16
	16QAM	1	0	20.50	19.67	19.48	19.35
		1	38	20.50	19.75	19.85	19.62
		1	74	20.50	19.49	19.56	19.28
		36	0	20.50	19.33	19.33	19.07
		36	18	20.50	19.23	19.38	19.19
		36	39	20.50	19.14	19.27	19.06
		75	0	20.50	19.38	19.34	19.09
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20850CH	Channel 21100CH	Channel 21350CH
20MHz	QPSK	1	0	20.50	19.45	19.32	19.13
		1	50	20.50	19.52	**19.59**	19.42
		1	99	20.50	19.25	19.32	19.18
		50	0	20.50	**19.65**	19.55	19.24
		50	25	20.50	19.49	19.64	19.30
		50	50	20.50	19.40	19.44	19.23
		100	0	20.50	19.57	19.54	19.26
	16QAM	1	0	20.50	19.78	19.58	19.43
		1	50	20.50	19.87	19.88	19.71
		1	99	20.50	19.59	19.65	19.43
		50	0	20.50	19.43	19.45	19.20
		50	25	20.50	19.38	19.49	19.28
		50	50	20.50	19.26	19.34	19.17
		100	0	20.50	19.50	19.41	19.17

Table 31: Conducted power measurement results of LTE Band 7 (Hotspot active)

LTE Band 7					Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20775CH	Channel 21100CH	Channel 21425CH
5MHz	QPSK	1	0	17.50	16.48	16.60	16.43
		1	13	17.50	16.74	16.79	16.57
		1	24	17.50	16.55	16.63	16.33
		12	0	17.50	16.66	16.79	16.55
		12	6	17.50	16.67	16.84	16.51
		12	13	17.50	16.44	16.53	16.27
		25	0	17.50	16.54	16.62	16.43
	16QAM	1	0	17.50	16.74	16.98	16.83
		1	13	17.50	16.97	16.98	16.96
		1	24	17.50	16.81	16.96	16.67
		12	0	17.50	16.70	16.80	16.53
		12	6	17.50	16.71	16.86	16.50
		12	13	17.50	16.47	16.48	16.26
		25	0	17.50	16.54	16.57	16.42
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel 20800CH	Channel 21100CH	Channel 21400CH
10MHz	QPSK	1	0	17.50	16.39	16.52	16.30
		1	25	17.50	16.66	16.85	16.72
		1	49	17.50	16.40	16.60	16.46
		25	0	17.50	16.49	16.74	16.58
		25	13	17.50	16.53	16.72	16.58
		25	25	17.50	16.41	16.58	16.42
		50	0	17.50	16.61	16.59	16.42
	16QAM	1	0	17.50	16.46	16.81	16.40
		1	25	17.50	16.83	16.87	16.78
		1	49	17.50	16.52	16.99	16.39
		25	0	17.50	16.41	16.71	16.54
		25	13	17.50	16.52	16.63	16.55
		25	25	17.50	16.40	16.49	16.40
		50	0	17.50	16.57	16.52	16.40

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Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					20825CH	21100CH	21375CH
15MHz	QPSK	1	0	17.50	16.42	16.39	16.22
		1	38	17.50	16.56	16.66	16.53
		1	74	17.50	16.46	16.38	16.25
		36	0	17.50	16.58	16.43	16.24
		36	18	17.50	16.26	16.59	16.38
		36	39	17.50	16.06	16.32	16.16
		75	0	17.50	16.29	16.34	16.16
	16QAM	1	0	17.50	16.61	16.74	16.46
		1	38	17.50	16.70	16.96	16.80
		1	74	17.50	16.49	16.76	16.59
		36	0	17.50	16.32	16.43	16.28
		36	18	17.50	16.26	16.59	16.44
		36	39	17.50	16.07	16.31	16.21
		75	0	17.50	16.37	16.33	16.20
Bandwidth	Modulation	RB size	RB offset	Tune-up	Channel	Channel	Channel
					20850CH	21100CH	21350CH
20MHz	QPSK	1	0	17.50	16.18	16.22	16.04
		1	50	17.50	16.15	**16.63**	16.39
		1	99	17.50	16.02	16.30	16.15
		50	0	17.50	16.23	16.33	16.10
		50	25	17.50	16.05	**16.42**	16.17
		50	50	17.50	16.03	16.26	16.17
		100	0	17.50	16.24	16.29	16.12
	16QAM	1	0	17.50	16.18	16.43	15.95
		1	50	17.50	16.18	16.83	16.34
		1	99	17.50	16.09	16.48	16.10
		50	0	17.50	16.26	16.30	16.09
		50	25	17.50	16.07	16.40	16.20
		50	50	17.50	16.12	16.23	16.20
		100	0	17.50	16.26	16.26	16.07

Table 32: Conducted power measurement results of LTE Band 7 (Proximity sensor on+Hotspot active)

7.1.11 Conducted power measurements of Downlink LTE CA

In this section, the following conducted power measurement results of downlink LTE carrier aggregation are provided to quantify downlink only carrier aggregation SAR test exclusion per KDB 941225 D05A.
Uplink maximum output power is measured with downlink carrier aggregation active, using the channel with highest measured maximum output power when downlink carrier aggregation is inactive, to confirm that when downlink carrier aggregation is active uplink maximum output power remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output power measured when downlink carrier aggregation inactive.
Power test equipment: R&S Radio Communication Tester CMW500 and Anritsu Radio Communication Analyzer MT8821C were used.

A) The conducted power measurement results of downlink LTE CA are as below(Second antenna):

DL LTE CA Class	PCC									SCC			Power		
	PCC Band	PCC Bandwidth (MHz)	Modulation	PCC UL RB size	PCC UL RB offset	PCC DL RB size	PCC DL RB offset	PCC UL Channel	PCC DL Channel	SCC Band	SCC Bandwidth (MHz)	SCC DL Channel	Rel 8 LTE Tx Power (dBm)	DL LTE CA Tx Power (dBm)	Tune-up
CA_7C	7	10	16-QAM	1	25	50	0	21100	3100	7	20	3298	21.49	21.24	22.00

Note: Testing is not required in bands or modes not intended/allowed for US operation. (Full power)

DL LTE CA Class	PCC									SCC			Power		
	PCC Band	PCC Bandwidth (MHz)	Modulation	PCC UL RB size	PCC UL RB offset	PCC DL RB size	PCC DL RB offset	PCC UL Channel	PCC DL Channel	SCC Band	SCC Bandwidth (MHz)	SCC DL Channel	Rel 8 LTE Tx Power (dBm)	DL LTE CA Tx Power (dBm)	Tune-up
CA_7C	7	20	16-QAM	1	50	100	0	21100	3100	7	20	3298	17.87	17.59	18.50

Note: Testing is not required in bands or modes not intended/allowed for US operation. (Receiver on/ Hotspot active)

According to KDB 941225 D05A, the downlink LTE CA SAR test is not required and PAG requirements can be excluded.

B) The conducted power measurement results of downlink LTE CA are as below (Main antenna):

DL LTE CA Class	PCC									SCC			Power		
	PCC Band	PCC Bandwidth (MHz)	Modulation	PCC UL RB size	PCC UL RB offset	PCC DL RB size	PCC DL RB offset	PCC UL Channel	PCC DL Channel	SCC Band	SCC Bandwidth (MHz)	SCC DL Channel	Rel 8 LTE Tx Power (dBm)	DL LTE CA Tx Power (dBm)	Tune-up
CA_7C	7	10	QPSK	1	25	50	0	21100	3100	7	20	3298	22.54	22.02	23.50

Note: Testing is not required in bands or modes not intended/allowed for US operation. (Full power)

DL LTE CA Class	PCC									SCC			Power		
	PCC Band	PCC Bandwidth (MHz)	Modulation	PCC UL RB size	PCC UL RB offset	PCC DL RB size	PCC DL RB offset	PCC UL Channel	PCC DL Channel	SCC Band	SCC Bandwidth (MHz)	SCC DL Channel	Rel 8 LTE Tx Power (dBm)	DL LTE CA Tx Power (dBm)	Tune-up
CA_7C	7	10	QPSK	1	25	50	0	21100	3100	7	20	3298	19.59	19.43	20.50

Note: Testing is not required in bands or modes not intended/allowed for US operation. (Proximity sensor on+Hotspot disable)

DL LTE CA Class	PCC									SCC			Power		
	PCC Band	PCC Bandwidth (MHz)	Modulation	PCC UL RB size	PCC UL RB offset	PCC DL RB size	PCC DL RB offset	PCC UL Channel	PCC DL Channel	SCC Band	SCC Bandwidth (MHz)	SCC DL Channel	Rel 8 LTE Tx Power (dBm)	DL LTE CA Tx Power (dBm)	Tune-up
CA_7C	7	20	16-QAM	1	50	100	0	21100	3100	7	20	3298	19.88	19.62	20.50

Note: Testing is not required in bands or modes not intended/allowed for US operation. (Hotspot active)

DL LTE CA Class	PCC									SCC			Power		
	PCC Band	PCC Bandwidth (MHz)	Modulation	PCC UL RB size	PCC UL RB offset	PCC DL RB size	PCC DL RB offset	PCC UL Channel	PCC DL Channel	SCC Band	SCC Bandwidth (MHz)	SCC DL Channel	Rel 8 LTE Tx Power (dBm)	DL LTE CA Tx Power (dBm)	Tune-up
CA_7C	7	10	16-QAM	1	49	50	0	21100	3100	7	20	3298	16.99	16.74	17.50

Note: Testing is not required in bands or modes not intended/allowed for US operation. (Proximity sensor on+ Hotspot active)

According to KDB 941225 D05A, the downlink LTE CA SAR test is not required and PAG requirements can be excluded.

7.1.12 Conducted power measurements of WiFi 2.4G

The output power of WiFi antenna is as following:

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11b	1	2412	1	18.50	**17.25**	Yes
	6	2437		18.50	16.95	No
	11	2462		18.50	17.15	No
802.11g	1	2412	6	17.00	15.81	No
	6	2437		17.00	15.28	No
	11	2462		15.50	15.98	No
802.11n-20M	1	2412	6.5	15.50	14.55	No
	6	2437		15.50	14.57	No
	11	2462		15.50	15.08	No
802.11n-40M	3	2422	13.5	15.50	14.54	No
	6	2437		18.50	14.30	No
	9	2452		18.50	14.20	No

Table 33: Conducted power measurement results of WiFi 2.4G(Full power level).

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

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11b	1	2412	1	15.50	13.87	No
	6	2437		15.50	13.62	No
	11	2462		15.50	**14.03**	Yes
802.11g	1	2412	6	16.00	14.59	No
	6	2437		16.00	14.57	No
	11	2462		16.00	14.85	No
802.11n-20M	1	2412	6.5	15.50	14.56	No
	6	2437		15.50	14.54	No
	11	2462		15.50	14.80	No
802.11n-40M	3	2422	13.5	15.50	14.26	No
	6	2437		15.50	13.96	No
	9	2452		15.50	13.84	No

Table 34: Conducted power measurement results of WiFi 2.4G (infrared proximity sensor on, reduced power level).

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

7.1.13 Conducted power measurements of WiFi 5G

The output power of WiFi antenna is as following:

Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11a SISO	Ant1	CH 36	5180	6	11.60	9.84	No
		CH 40	5200		11.60	9.86	No
		CH 44	5220		11.60	9.98	No
		CH 48	5240		11.60	9.99	No
		CH 52	5260		11.60	**9.97**	Yes
		CH 56	5280		11.60	9.70	No
		CH 60	5300		11.60	9.86	No
		CH 64	5320		11.60	9.91	No
		CH 100	5500		11.60	10.08	No
		CH 104	5520		11.60	9.80	No
		CH 108	5540		11.60	10.15	No
		CH 112	5560		11.60	10.16	No
		CH 116	5580		11.60	9.88	No
		CH 120	5600		11.60	10.00	No
		CH 124	5620		11.60	10.11	No
		CH 128	5640		11.60	**10.37**	Yes
		CH 132	5660		11.60	10.15	No
		CH 136	5680		11.60	10.27	No
		CH 140	5700		11.60	10.36	No
		CH 144	5720		11.60	10.23	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11n SISO HT20 (5GHz)	Ant1	CH 36	5180	MCS0	11.50	9.48	No
		CH 40	5200		11.50	9.56	No
		CH 44	5220		11.50	9.59	No
		CH 48	5240		11.50	9.66	No
		CH 52	5260		11.50	8.98	No
		CH 56	5280		11.50	9.21	No
		CH 60	5300		11.50	9.33	No
		CH 64	5320		11.50	9.52	No
		CH 100	5500		11.50	9.84	No
		CH 104	5520		11.50	9.82	No
		CH 108	5540		11.50	9.84	No
		CH 112	5560		11.50	9.78	No
		CH 116	5580		11.50	9.69	No
		CH 120	5600		11.50	9.79	No
		CH 124	5620		11.50	9.57	No
		CH 128	5640		11.50	9.92	No
		CH 132	5660		11.50	9.98	No
		CH 136	5680		11.50	9.88	No
		CH 140	5700		11.50	9.96	No
		CH 144	5720		11.50	9.91	No

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Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11n SISO HT40 (5GHz)	Ant1	CH 38	5190	MCS0	11.50	9.43	No
		CH 46	5230		11.50	9.53	No
		CH 54	5270		11.50	9.56	No
		CH 62	5310		11.50	9.27	No
		CH 102	5510		11.50	9.56	No
		CH 110	5550		11.50	9.44	No
		CH 118	5590		11.50	9.60	No
		CH 126	5630		11.50	9.71	No
		CH 134	5670		11.50	9.55	No
		CH 142	5710		11.50	9.43	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac SISO HT20 (5GHz)	Ant1	CH 36	5180	MCS0	11.50	9.43	No
		CH 40	5200		11.50	9.45	No
		CH 44	5220		11.50	9.41	No
		CH 48	5240		11.50	9.46	No
		CH 52	5260		11.50	8.78	No
		CH 56	5280		11.50	9.02	No
		CH 60	5300		11.50	9.12	No
		CH 64	5320		11.50	9.30	No
		CH 100	5500		11.50	9.49	No
		CH 104	5520		11.50	9.24	No
		CH 108	5540		11.50	9.29	No
		CH 112	5560		11.50	9.27	No
		CH 116	5580		11.50	9.71	No
		CH 120	5600		11.50	9.86	No
		CH 124	5620		11.50	9.98	No
		CH 128	5640		11.50	9.61	No
		CH 132	5660		11.50	9.60	No
		CH 136	5680		11.50	9.38	No
		CH 140	5700		11.50	9.41	No
		CH 144	5720		11.50	9.35	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac SISO HT40 (5GHz)	Ant1	CH 38	5190	MCS0	11.50	9.67	No
		CH 46	5230		11.50	9.49	No
		CH 54	5270		11.50	9.55	No
		CH 62	5310		11.50	9.61	No
		CH 102	5510		11.50	9.67	No
		CH 110	5550		11.50	9.78	No
		CH 118	5590		11.50	9.77	No

		CH 126	5630		11.50	9.91	No
		CH 134	5670		11.50	9.64	No
		CH 142	5710		11.50	9.50	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac SISO HT80 (5GHz)	Ant1	CH 42	5210	MCS0	11.50	9.86	No
		CH 58	5290		11.50	9.76	No
		CH 106	5530		11.50	9.81	No
		CH 122	5610		11.50	9.91	No
		CH 138	5690		11.50	9.56	No

Table 35: Conducted power measurement results of WiFi 5G(infrared proximity sensor on, reduced power level)

Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11a SISO	Ant1	CH 36	5180	rate6	14.00	12.14	No
		CH 40	5200		14.00	12.22	No
		CH 44	5220		14.00	12.18	No
		CH 48	5240		14.00	12.12	No
		CH 52	5260		14.00	12.46	No
		CH 56	5280		14.00	12.65	No
		CH 60	5300		14.00	12.63	No
		CH 64	5320		14.00	12.77	No
		CH 100	5500		14.00	12.43	No
		CH 104	5520		14.00	12.42	No
		CH 108	5540		14.00	12.51	No
		CH 112	5560		14.00	12.45	No
		CH 116	5580		14.00	12.57	No
		CH 120	5600		14.00	12.68	No
		CH 124	5620		14.00	12.77	No
		CH 128	5640		14.00	12.78	No
		CH 132	5660		14.00	12.76	No
		CH 136	5680		14.00	12.72	No
		CH 140	5700		14.00	12.81	No
		CH 144	5720		14.00	12.80	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11n SISO HT20 (5GHz)	Ant1	CH 36	5180	MCS0	13.50	11.56	No
		CH 40	5200		13.50	11.61	No
		CH 44	5220		13.50	11.64	No
		CH 48	5240		13.50	11.61	No
		CH 52	5260		13.50	11.65	No
		CH 56	5280		13.50	11.75	No
		CH 60	5300		13.50	11.62	No
		CH 64	5320		13.50	11.69	No

		CH 100	5500		13.50	12.10	No
		CH 104	5520		13.50	12.11	No
		CH 108	5540		13.50	11.90	No
		CH 112	5560		13.50	11.63	No
		CH 116	5580		13.50	12.15	No
		CH 120	5600		13.50	12.21	No
		CH 124	5620		13.50	12.28	No
		CH 128	5640		13.50	12.11	No
		CH 132	5660		13.50	11.94	No
		CH 136	5680		13.50	12.06	No
		CH 140	5700		13.50	11.66	No
		CH 144	5720		13.50	11.90	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11n SISO HT40 (5GHz)	Ant1	CH 38	5190	MCS0	13.50	11.43	No
		CH 46	5230		13.50	11.26	No
		CH 54	5270		13.50	11.37	No
		CH 62	5310		13.50	11.60	No
		CH 102	5510		13.50	11.53	No
		CH 110	5550		13.50	11.61	No
		CH 118	5590		13.50	11.61	No
		CH 126	5630		13.50	11.56	No
		CH 134	5670		13.50	11.61	No
		CH 142	5710		13.50	11.58	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac SISO HT20 (5GHz)	Ant1	CH 36	5180	MCS0	13.50	11.20	No
		CH 40	5200		13.50	11.42	No
		CH 44	5220		13.50	11.50	No
		CH 48	5240		13.50	11.63	No
		CH 52	5260		13.50	11.51	No
		CH 56	5280		13.50	11.52	No
		CH 60	5300		13.50	11.56	No
		CH 64	5320		13.50	11.51	No
		CH 100	5500		13.50	11.82	No
		CH 104	5520		13.50	11.78	No
		CH 108	5540		13.50	11.76	No
		CH 112	5560		13.50	11.69	No
		CH 116	5580		13.50	11.93	No
		CH 120	5600		13.50	12.05	No
		CH 124	5620		13.50	12.09	No
		CH 128	5640		13.50	12.28	No
		CH 132	5660		13.50	12.03	No
		CH 136	5680		13.50	11.70	No
		CH 140	5700		13.50	12.03	No

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		CH 144	5720		13.50	11.91	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac SISO HT40 (5GHz)	Ant1	CH 38	5190	MCS0	13.50	11.56	No
		CH 46	5230		13.50	11.62	No
		CH 54	5270		13.50	11.49	No
		CH 62	5310		13.50	11.56	No
		CH 102	5510		13.50	11.67	No
		CH 110	5550		13.50	11.73	No
		CH 118	5590		13.50	11.89	No
		CH 126	5630		13.50	11.61	No
		CH 134	5670		13.50	11.67	No
		CH 142	5710		13.50	11.55	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac SISO HT80 (5GHz)	Ant1	CH 42	5210	MCS0	13.50	11.60	No
		CH 58	5290		13.50	11.81	No
		CH 106	5530		13.50	11.89	No
		CH 122	5610		13.50	11.67	No
		CH 138	5690		13.50	11.78	No

Table 36: Conducted power measurement results of WiFi 5G(infrared proximity sensor off, WiFi Antenna and 2G&3G&4G antenna simultaneous transmission)

Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11a SISO	Ant1	CH 36	5180	rate6	16.00	15.14	No
		CH 40	5200		16.00	14.74	No
		CH 44	5220		16.00	**15.30**	Yes
		CH 48	5240		16.00	15.16	No
		CH 52	5260		16.00	14.99	No
		CH 56	5280		16.00	15.08	No
		CH 60	5300		16.00	15.26	No
		CH 64	5320		16.00	**15.31**	Yes
		CH 100	5500		16.00	**15.84**	Yes
		CH 104	5520		16.00	15.34	No
		CH 108	5540		16.00	15.20	No
		CH 112	5560		16.00	15.06	No
		CH 116	5580		16.00	15.43	No
		CH 120	5600		16.00	15.49	No
		CH 124	5620		16.00	15.61	No
		CH 128	5640		16.00	15.45	No
		CH 132	5660		16.00	15.38	No
		CH 136	5680		16.00	15.32	No
		CH 140	5700		16.00	15.18	No
		CH 144	5720		16.00	15.22	No

Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11n SISO HT20 (5GHz)	Ant1	CH 36	5180	MCS0	14.50	13.36	No
		CH 40	5200		14.50	13.30	No
		CH 44	5220		14.50	13.22	No
		CH 48	5240		14.50	13.14	No
		CH 52	5260		14.50	13.05	No
		CH 56	5280		14.50	13.20	No
		CH 60	5300		14.50	13.29	No
		CH 64	5320		14.50	13.30	No
		CH 100	5500		14.50	13.79	No
		CH 104	5520		14.50	13.69	No
		CH 108	5540		14.50	13.72	No
		CH 112	5560		14.50	13.64	No
		CH 116	5580		14.50	13.96	No
		CH 120	5600		14.50	14.04	No
		CH 124	5620		14.50	14.01	No
		CH 128	5640		14.50	13.83	No
		CH 132	5660		14.50	13.84	No
		CH 136	5680		14.50	13.45	No
		CH 140	5700		14.50	13.33	No
		CH 144	5720		14.50	13.36	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11n SISO HT40 (5GHz)	Ant1	CH 38	5190	MCS0	13.50	12.24	No
		CH 46	5230		13.50	12.13	No
		CH 54	5270		13.50	11.99	No
		CH 62	5310		13.50	12.17	No
		CH 102	5510		13.50	12.53	No
		CH 110	5550		13.50	12.27	No
		CH 118	5590		13.50	12.65	No
		CH 126	5630		13.50	12.63	No
		CH 134	5670		13.50	12.38	No
		CH 142	5710		13.50	12.12	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac SISO HT20 (5GHz)	Ant1	CH 36	5180	MCS0	14.50	12.83	No
		CH 40	5200		14.50	13.18	No
		CH 44	5220		14.50	12.86	No
		CH 48	5240		14.50	12.72	No
		CH 52	5260		14.50	12.80	No
		CH 56	5280		14.50	13.05	No
		CH 60	5300		14.50	12.92	No
		CH 64	5320		14.50	13.53	No

		CH 100	5500		14.50	13.77	No
		CH 104	5520		14.50	13.75	No
		CH 108	5540		14.50	13.47	No
		CH 112	5560		14.50	13.45	No
		CH 116	5580		14.50	13.61	No
		CH 120	5600		14.50	13.63	No
		CH 124	5620		14.50	13.71	No
		CH 128	5640		14.50	13.64	No
		CH 132	5660		14.50	13.62	No
		CH 136	5680		14.50	13.54	No
		CH 140	5700		14.50	13.36	No
		CH 144	5720		14.50	13.25	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac SISO HT40 (5GHz)	Ant1	CH 38	5190	MCS0	13.50	12.09	No
		CH 46	5230		13.50	11.92	No
		CH 54	5270		13.50	12.28	No
		CH 62	5310		13.50	11.98	No
		CH 102	5510		13.50	12.41	No
		CH 110	5550		13.50	12.46	No
		CH 118	5590		13.50	12.81	No
		CH 126	5630		13.50	12.73	No
		CH 134	5670		13.50	12.53	No
		CH 142	5710		13.50	12.28	No
Mode	Antenna	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power (dBm)	SAR Test (Yes/No)
802.11ac SISO HT80 (5GHz)	Ant1	CH 42	5210	MCS0	13.50	11.88	No
		CH 58	5290		13.50	11.57	No
		CH 106	5530		13.50	11.62	No
		CH 122	5610		13.50	12.44	No
		CH 138	5690		13.50	12.38	No

Table 37: Conducted power measurement results of WiFi 5G(Full power level)

7.1.14 Conducted power measurements of BT

The output power of BT antenna is as following:

BT 2450	Tune-up	Average Conducted Power (dBm)		
		0CH	39CH	78CH
DH5	**10.5**	7.03	8.03	**8.57**
2DH5	10.5	6.94	8.01	8.47
3DH5	10.5	6.95	7.94	8.56

BT 2450	Tune-up	Average Conducted Power (dBm)		
		0CH	19CH	39CH
BT BLE	6.0	4.50	4.68	5.45

Table 38: Conducted power measurement results of BT.

Note:

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

2) The bolded mode was selected for SAR testing.

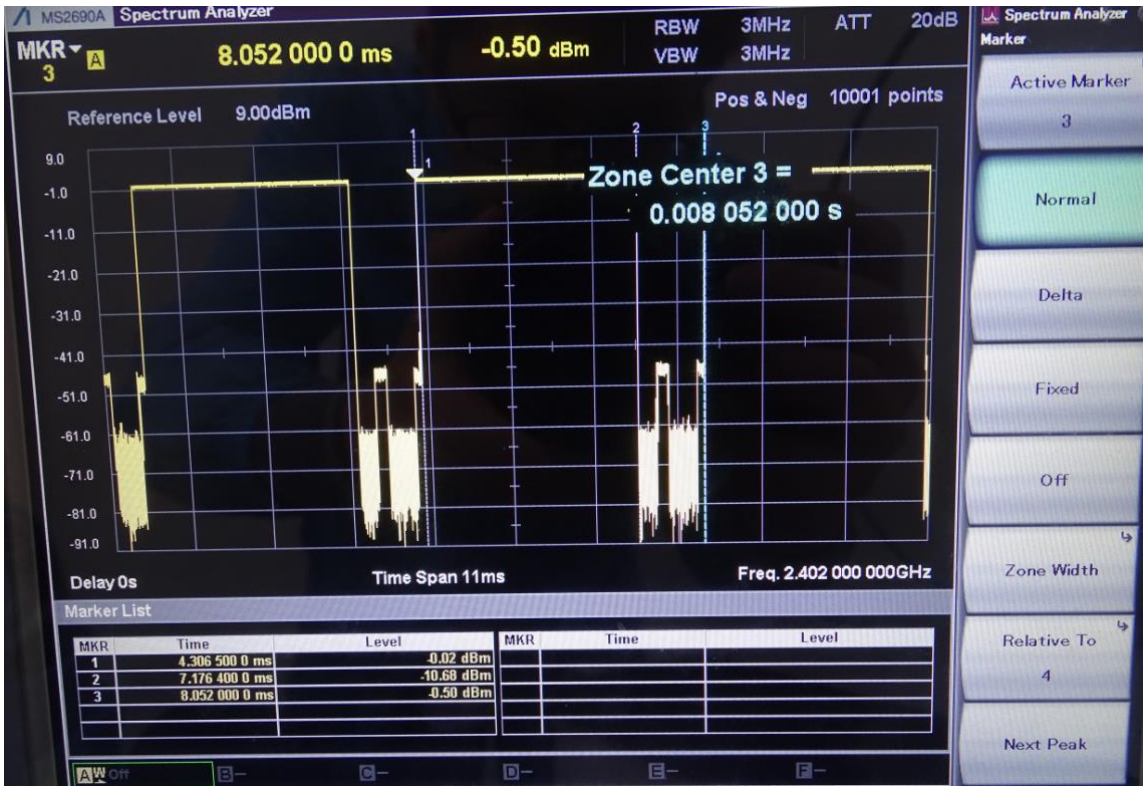

Figure: Bluetooth Transmission Plot

So the bluetooth duty cycle is calculated as below:

$$\text{Dutycycle} = \text{pulse}\frac{width}{period} * 100\% = \frac{2.8699ms}{3.7455ms} * 100\% = 76.6\%$$

7.2 SAR measurement Results

General Notes:

1) Per KDB447498 D01, all SAR measurement results are scaled to the maximum tune-up tolerance limit to demonstrate SAR compliance.

2) Per 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:

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

● ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz.

● ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz.

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

3) Per KDB865664 D01,for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg; if the deviation among the repeated measurement is ≤20%, and the measured SAR <1.45W/Kg, only one repeated measurement is required.

4) Per KDB941225 D06, the DUT Dimension is bigger than 9 cm x 5 cm, so 10mm is chosen as the test separation distance for Hotspot mode. When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.

5) Per KDB648474 D04, SAR is evaluated without a headset connected to the device. When the standalone reported body-worn SAR is ≤1.2 W/kg, no additional SAR evaluations using a headset are required.

6) Per KDB865664 D02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing(Refer to appendix B for details).

7) Per KDB 648474D04, for handsets with additional batteries, the highest reported SAR for each wireless technology, frequency band, operating mode and applicable exposure condition (head, body-worn accessory, hotspot mode, etc.) must be repeated with the specific accessory attached. In addition, for test cases where the measured SAR for a handset is greater than 1.2 W/kg, these tests should also be repeated with the additional batteries.

GSM Notes:

1) Per KDB941225 D01, SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

2) Per KDB648474 D04, the device does not support DTM function. Body-worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.

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UMTS Notes:

1) Per KDB941225 D01, When the maximum output power and tune-up tolerance specified for production units in a Second mode is ≤ ¼ 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 Second to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the Second mode.

LTE Notes:

1) The LTE test configurations are determined according to KDB941225 D05 SAR for LTE Devices.The general test procedures used for SAR testing can be found in Section 6.5.

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

3) The device only supports downlink LTE-CA. The Uplink maximum output power with and without downlink carrier aggregation active is the same.So additional SAR test for downlink LTE-CA is not required.

WiFi Notes:

Per KDB248227D01:

1) When reported SAR for the initial test position is ≤ 0.4W/kg, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8W/kg or all test position are measured. For all positions/configurations tested using the initial test position and subsequent test positions, when the *reported* SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the *reported* SAR is ≤ 1.2 W/kg or all required channels are tested..

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

3) The device not supports VoWIFI function. Head SAR for Wi-Fi antenna is evaluated at reduced power levels according to the real usage scenarios.

7.2.1 SAR measurement Result of GSM850 (Second Antenna)

Test Position of Head	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Left touch	190/836.6	GSM	0.259	0.112	0.03	29.98	31.00	0.328	Battery 1#	/
Left tilt	190/836.6	GSM	0.191	0.107	0.02	29.98	31.00	0.242	Battery 1#	/
Right touch	190/836.6	GSM	**0.444**	0.255	0.00	29.98	31.00	**0.562**	Battery 1#	Yes
Right tilt	190/836.6	GSM	0.391	0.191	0.00	29.98	31.00	0.495	Battery 1#	/
Right touch	190/836.6	GSM	0.443	0.255	-0.02	29.98	31.00	0.560	Battery 2#	/
Right touch	190/836.6	GSM	0.419	0.239	0.00	29.98	31.00	0.530	Battery 3#	/
Right touch	190/836.6	GSM	0.444	0.253	0.01	29.98	31.00	0.562	With SIM2	/

Table 39: Head SAR test results of GSM850

Test Position of Body-Worn 15mm	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Front Side	190/836.6	GSM	0.139	0.105	0.01	31.97	33.00	0.176	Battery 1#	/
Back Side	190/836.6	GSM	0.180	0.136	0.00	31.97	33.00	0.228	Battery 1#	/
Back Side	190/836.6	GSM	0.138	0.109	0.01	31.97	33.00	0.175	Battery 2#	/
Back Side	190/836.6	GSM	**0.235**	0.182	0.06	31.97	33.00	**0.298**	Battery 3#	Yes
Back Side	190/836.6	GSM	0.125	0.095	-0.02	31.97	33.00	0.158	With SIM2	/

Table 40: Body-Worn SAR test results of GSM850

Test Position of Hotspot 10mm	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Front Side	190/836.6	GPRS 2TS	0.089	0.060	0.04	26.95	28.00	0.113	Battery 1#	/
Back Side	190/836.6	GPRS 2TS	0.103	0.057	-0.02	26.95	28.00	0.131	Battery 1#	/
Left Side	190/836.6	GPRS 2TS	0.169	0.114	0.02	26.95	28.00	0.215	Battery 1#	/
Right Side	190/836.6	GPRS 2TS	0.082	0.055	-0.02	26.95	28.00	0.104	Battery 1#	/
Top Side	190/836.6	GPRS 2TS	0.069	0.033	-0.14	26.95	28.00	0.088	Battery 1#	/
Left Side	190/836.6	GPRS 2TS	0.165	0.111	-0.04	26.95	28.00	0.210	Battery 2#	/
Left Side	190/836.6	GPRS 2TS	**0.171**	0.115	0.07	26.95	28.00	**0.218**	Battery 3#	Yes
Left Side	190/836.6	GPRS 2TS	0.164	0.111	0.02	26.95	28.00	0.209	With SIM2	/

Table 41: Hotspot SAR test results of GSM850

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7.2.2 SAR measurement Result of GSM1900 (Second Antenna)

Test Position of Head	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Left touch	661/1880	GSM	0.125	0.069	0.03	29.62	30.80	0.164	Battery 1#	/
Left tilt	661/1880	GSM	0.160	0.085	0.19	29.62	30.80	0.210	Battery 1#	/
Right touch	661/1880	GSM	0.496	0.243	-0.09	29.62	30.80	0.651	Battery 1#	/
Right tilt	661/1880	GSM	0.498	0.229	0.04	29.62	30.80	0.653	Battery 1#	/
Right tilt	661/1880	GSM	0.460	0.214	-0.12	29.62	30.80	0.604	Battery 2#	/
Right tilt	661/1880	GSM	**0.540**	0.246	-0.15	29.62	30.80	**0.709**	Battery 3#	Yes
Right tilt	661/1880	GSM	0.506	0.232	-0.15	29.62	30.80	0.664	With SIM2	/

Table 42: Head SAR test results of GSM1900

Test Position of Body-Worn 15mm	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Front Side	661/1880	GSM	0.032	0.017	-0.14	29.62	30.80	0.041	Battery 1#	/
Back Side	661/1880	GSM	0.037	0.020	-0.10	29.62	30.80	0.049	Battery 1#	/
Back Side	661/1880	GSM	0.039	0.021	-0.19	29.62	30.80	0.051	Battery 2#	/
Back Side	661/1880	GSM	**0.042**	0.023	-0.14	29.62	30.80	**0.055**	Battery 3#	Yes
Back Side	661/1880	GSM	0.039	0.022	-0.13	29.62	30.80	0.051	With SIM2	/

Table 43: Body-Worn SAR test results of GSM1900

Test Position of Hotspot 10mm	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Front Side	661/1880	GPRS 2TS	0.067	0.034	-0.04	26.54	27.80	0.090	Battery 1#	/
Back Side	661/1880	GPRS 2TS	0.085	0.045	-0.18	26.54	27.80	0.114	Battery 1#	/
Left Side	661/1880	GPRS 2TS	0.104	0.059	-0.16	26.54	27.80	0.139	Battery 1#	/
Right Side	661/1880	GPRS 2TS	0.014	0.007	-0.15	26.54	27.80	0.019	Battery 1#	/
Top Side	661/1880	GPRS 2TS	0.111	0.060	-0.13	26.54	27.80	0.148	Battery 1#	/
Top Side	661/1880	GPRS 2TS	**0.112**	0.060	-0.14	26.54	27.80	**0.150**	Battery 2#	Yes
Top Side	661/1880	GPRS 2TS	0.108	0.059	-0.14	26.54	27.80	0.144	Battery 3#	/
Top Side	661/1880	GPRS 2TS	0.110	0.060	-0.14	26.54	27.80	0.147	With SIM2	/

Table 44: Hotspot SAR test results of GSM1900

7.2.3 SAR measurement Result of UMTS Band 2(Second Antenna)

Test Position of Head	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Left touch	9400/1880	RMC	0.115	0.071	-0.10	17.55	19.00	0.161	Battery 1#	/
Left tilt	9400/1880	RMC	0.151	0.080	-0.18	17.55	19.00	0.211	Battery 1#	/
Right touch	9400/1880	RMC	0.461	0.230	-0.14	17.55	19.00	0.644	Battery 1#	/
Right tilt	9400/1880	RMC	0.462	0.216	0.01	17.55	19.00	0.645	Battery 1#	/
Right tilt	9400/1880	RMC	**0.480**	0.217	-0.06	17.55	19.00	**0.670**	Battery 2#	Yes
Right tilt	9400/1880	RMC	0.474	0.214	-0.09	17.55	19.00	0.662	Battery 3#	/
Right tilt	9400/1880	RMC	0.472	0.214	-0.05	17.55	19.00	0.659	With SIM2	/

Table 45: Head SAR test results of UMTS Band 2

Test Position of Body-Worn 15mm	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Front Side	9400/1880	RMC	0.092	0.053	-0.14	22.35	24.00	0.135	Battery 1#	/
Back Side	9400/1880	RMC	**0.125**	0.071	-0.17	22.35	24.00	**0.183**	Battery 1#	Yes
Back Side	9400/1880	RMC	0.122	0.069	-0.11	22.35	24.00	0.178	Battery 2#	/
Back Side	9400/1880	RMC	0.123	0.070	-0.18	22.35	24.00	0.180	Battery 3#	/
Back Side	9400/1880	RMC	0.116	0.066	-0.19	22.35	24.00	0.170	With SIM2	/

Table 46: Body-Worn SAR test results of UMTS Band 2

Test Position of Hotspot 10mm	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Front Side	9400/1880	RMC	0.065	0.035	-0.17	17.55	19.00	0.091	Battery 1#	/
Back Side	9400/1880	RMC	0.094	0.051	-0.17	17.55	19.00	0.131	Battery 1#	/
Left Side	9400/1880	RMC	0.097	0.058	-0.15	17.55	19.00	0.136	Battery 1#	/
Right Side	9400/1880	RMC	0.016	0.008	-0.13	17.55	19.00	0.022	Battery 1#	/
Top Side	9400/1880	RMC	0.097	0.054	-0.09	17.55	19.00	0.136	Battery 1#	/
Left Side	9400/1880	RMC	0.103	0.061	-0.07	17.55	19.00	0.144	Battery 2#	/
Left Side	9400/1880	RMC	**0.107**	0.063	-0.16	17.55	19.00	**0.149**	Battery 3#	Yes
Left Side	9400/1880	RMC	0.106	0.063	-0.07	17.55	19.00	0.148	With SIM2	/

Table 47: Hotspot SAR test results of UMTS Band 2

7.2.4 SAR measurement Result of UMTS Band 5(Second Antenna)

Test Position of Head	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Left touch	4182/836.4	RMC	0.491	0.282	-0.12	22.93	24.00	0.628	Battery 1#	/
Left tilt	4182/836.4	RMC	0.366	0.205	0.19	22.93	24.00	0.468	Battery 1#	/
Right touch	4182/836.4	RMC	0.775	0.446	-0.06	22.93	24.00	0.992	Battery 1#	/
Right touch	4132/826.4	RMC	0.690	0.384	0.04	22.95	24.00	0.879	Battery 1#	/
Right touch	4233/846.6	RMC	0.816	0.473	-0.01	22.93	24.00	1.044	Battery 1#	/
Right tilt	4182/836.4	RMC	0.660	0.326	0.02	22.93	24.00	0.844	Battery 1#	/
Right tilt	4132/826.4	RMC	0.575	0.279	0.02	22.95	24.00	0.732	Battery 1#	/
Right tilt	4233/846.6	RMC	0.687	0.341	0.03	22.93	24.00	0.879	Battery 1#	/
Right touch	4233/846.6	RMC	**0.891**	0.509	-0.18	22.93	24.00	**1.140**	Battery 2#	Yes
Right touch-Repeated	4233/846.6	RMC	0.852	0.487	0.00	22.93	24.00	1.090	Battery 2#	/
Right touch	4233/846.6	RMC	0.860	0.488	-0.04	22.93	24.00	1.100	Battery 3#	/
Right touch	4233/846.6	RMC	0.821	0.464	0.00	22.93	24.00	1.050	With SIM2	/

Table 48: Head SAR test results of UMTS Band 5

Test Position of Body-Worn 15mm	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Front Side	4182/836.4	RMC	0.099	0.070	-0.01	22.93	24.00	0.126	Battery 1#	/
Back Side	4182/836.4	RMC	0.129	0.099	-0.03	22.93	24.00	0.165	Battery 1#	/
Back Side	4182/836.4	RMC	**0.131**	0.101	-0.04	22.93	24.00	**0.168**	Battery 2#	Yes
Back Side	4182/836.4	RMC	0.126	0.097	-0.02	22.93	24.00	0.161	Battery 3#	/
Back Side	4182/836.4	RMC	0.124	0.095	-0.03	22.93	24.00	0.159	With SIM2	/

Table 49: Body-Worn SAR test results of UMTS Band 5

Test Position of Hotspot 10mm	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Front Side	4182/836.4	RMC	0.154	0.104	0.02	22.93	24.00	0.197	Battery 1#	/
Back Side	4182/836.4	RMC	**0.216**	0.126	0.03	22.93	24.00	**0.276**	Battery 1#	Yes
Left Side	4182/836.4	RMC	0.195	0.132	0.04	22.93	24.00	0.249	Battery 1#	/
Right Side	4182/836.4	RMC	0.091	0.061	0.05	22.93	24.00	0.117	Battery 1#	/
Top Side	4182/836.4	RMC	0.105	0.050	-0.09	22.93	24.00	0.134	Battery 1#	/
Back Side	4182/836.4	RMC	0.213	0.125	-0.01	22.93	24.00	0.273	Battery 2#	/
Back Side	4182/836.4	RMC	0.209	0.123	-0.03	22.93	24.00	0.267	Battery 3#	/
Back Side	4182/836.4	RMC	0.206	0.120	0.01	22.93	24.00	0.264	With SIM2	/

Table 50: Hotspot SAR test results of UMTS Band 5

7.2.5 SAR measurement Result of LTE Band 7(Second Antenna)

Test Position of Head	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Left touch	21100/2535	20M QPSK 1RB#50	0.143	0.065	-0.11	17.46	18.50	0.182	Battery 1#	/
Left tilt	21100/2535	20M QPSK 1RB#50	0.178	0.078	0.11	17.46	18.50	0.226	Battery 1#	/
Right touch	21100/2535	20M QPSK 1RB#50	0.597	0.288	-0.04	17.46	18.50	0.759	Battery 1#	/
Right tilt	21100/2535	20M QPSK 1RB#50	0.610	0.254	0.12	17.46	18.50	0.775	Battery 1#	/
Left touch	21100/2535	20M QPSK 50%RB#50	0.184	0.084	-0.15	17.26	18.50	0.245	Battery 1#	/
Left tilt	21100/2535	20M QPSK 50%RB#50	0.221	0.098	-0.03	17.26	18.50	0.294	Battery 1#	/
Right touch	21100/2535	20M QPSK 50%RB#50	0.769	0.366	-0.17	17.26	18.50	1.023	Battery 1#	/
Right touch	20850/2510	20M QPSK 50%RB#0	0.746	0.360	0.00	17.22	18.50	1.002	Battery 1#	/
Right touch	21350/2560	20M QPSK 50%RB#0	0.779	0.381	-0.10	16.94	18.50	1.116	Battery 1#	/
Right tilt	21100/2535	20M QPSK 50%RB#50	0.803	0.337	-0.09	17.26	18.50	1.068	Battery 1#	/
Right tilt	20850/2510	20M QPSK 50%RB#0	**0.867**	0.368	0.04	17.22	18.50	1.164	Battery 1#	Yes
Right tilt Repeated	20850/2510	20M QPSK 50%RB#0	0.848	0.353	-0.07	17.22	18.50	1.139	Battery 1#	/
Right tilt	21350/2560	20M QPSK 50%RB#0	0.844	0.356	0.00	16.94	18.50	**1.209**	Battery 1#	/
Right tilt-holder perturbation verification	21350/2560	20M QPSK 50%RB#0	0.818	0.343	-0.09	16.94	18.50	1.172	Battery 1#	/
Right touch	20850/2510	20M QPSK 100%RB#0	0.859	0.420	0.10	17.15	18.50	1.172	Battery 1#	/
Right tilt	20850/2510	20M QPSK 100%RB#0	0.797	0.334	-0.13	17.15	18.50	1.088	Battery 1#	/
Right tilt	21350/2560	20M QPSK 50%RB#0	0.839	0.353	-0.02	16.94	18.50	1.202	With SIM2	/
Right tilt	21350/2560	20M QPSK 50%RB#0	0.813	0.339	-0.02	16.94	18.50	1.164	Battery 2#	/
Right tilt	21350/2560	20M QPSK 50%RB#0	0.804	0.335	0.01	16.94	18.50	1.151	Battery 3#	/

Table 51: Head SAR test results of LTE Band 7

Note: According to 201610 FCC TCB workshop RF exposure slides, when the highest reported SAR of an antenna is > 1.2 W/kg, holder perturbation verification is required for each antenna, using the highest SAR configuration among all applicable frequency bands.

Test Position of Body-Worn 15mm	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Front Side	20850/2510	20M QPSK 1RB#0	0.157	0.086	0.13	21.04	22.00	0.196	Battery 1#	/
Back Side	20850/2510	20M QPSK 1RB#0	0.229	0.123	-0.04	21.04	22.00	0.286	Battery 1#	/
Front Side	20850/2510	20M QPSK 50%RB#0	0.162	0.089	0.13	20.95	22.00	0.206	Battery 1#	/
Back Side	20850/2510	20M QPSK 50%RB#0	**0.232**	0.125	-0.09	20.95	22.00	**0.295**	Battery 1#	Yes
Back Side	20850/2510	20M QPSK 50%RB#0	0.179	0.096	0.00	20.95	22.00	0.228	Battery 2#	/
Back Side	20850/2510	20M QPSK 50%RB#0	0.187	0.101	-0.12	20.95	22.00	0.238	Battery 3#	/
Back Side	20850/2510	20M QPSK 50%RB#0	0.183	0.099	-0.12	20.95	22.00	0.233	With SIM2	/

Table 52: Body-Worn SAR test results of LTE Band 7

Test Position of Hotspot 10mm	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g						
Front Side	21100/2535	20M QPSK 1RB#50	0.142	0.073	0.15	17.46	18.50	0.180	Battery 1#	/
Back Side	21100/2535	20M QPSK 1RB#50	**0.218**	0.111	-0.11	17.46	18.50	**0.277**	Battery 1#	Yes
Left Side	21100/2535	20M QPSK 1RB#50	0.171	0.087	0.07	17.46	18.50	0.217	Battery 1#	/
Right Side	21100/2535	20M QPSK 1RB#50	0.016	0.007	-0.11	17.46	18.50	0.020	Battery 1#	/
Top Side	21100/2535	20M QPSK 1RB#50	0.122	0.052	-0.06	17.46	18.50	0.155	Battery 1#	/
Front Side	21100/2535	20M QPSK 50%RB#50	0.132	0.070	-0.02	17.26	18.50	0.176	Battery 1#	/
Back Side	21100/2535	20M QPSK 50%RB#50	0.197	0.101	-0.16	17.26	18.50	0.262	Battery 1#	/
Left Side	21100/2535	20M QPSK 50%RB#50	0.170	0.086	0.06	17.26	18.50	0.226	Battery 1#	/
Right Side	21100/2535	20M QPSK 50%RB#50	0.019	0.009	-0.11	17.26	18.50	0.025	Battery 1#	/
Top Side	21100/2535	20M QPSK 50%RB#50	0.117	0.050	0.06	17.26	18.50	0.156	Battery 1#	/
Back Side	21100/2535	20M QPSK 1RB#50	0.189	0.097	0.19	17.46	18.50	0.240	Battery 2#	/
Back Side	21100/2535	20M QPSK 1RB#50	0.202	0.103	-0.12	17.46	18.50	0.257	Battery 3#	/
Back Side	21100/2535	20M QPSK 1RB#50	0.180	0.093	-0.11	17.46	18.50	0.229	With SIM2	/

Table 53: Hotspot SAR test results of LTE Band 7

7.2.6 SAR measurement Result of GSM850(Main Antenna)

Test Position of Head	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	**10-g**						
Left touch	/	190/836.6	GSM	0.120	0.088	0.00	31.91	33.00	0.154	Battery 1#	/
Left tilt	/	190/836.6	GSM	0.159	0.110	-0.06	31.91	33.00	0.204	Battery 1#	/
Right touch	/	190/836.6	GSM	**0.161**	0.124	-0.02	31.91	33.00	**0.207**	Battery 1#	Yes
Right tilt	/	190/836.6	GSM	0.149	0.105	-0.02	31.91	33.00	0.192	Battery 1#	/
Right touch	/	190/836.6	GSM	0.155	0.119	-0.15	31.91	33.00	0.199	Battery 2#	/
Right touch	/	190/836.6	GSM	0.151	0.117	0.02	31.91	33.00	0.194	Battery 3#	/
Right touch	/	190/836.6	GSM	0.154	0.119	-0.02	31.91	33.00	0.198	With SIM2	/

Table 54: Head SAR test results of GSM850

Test Position of Body-Worn	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	**10-g**						
Front Side	15mm	190/836.6	GSM	0.152	0.114	0.17	31.91	33.00	0.195	Battery 1#	/
Back Side	15mm	190/836.6	GSM	**0.234**	0.173	0.12	31.91	33.00	**0.301**	Battery 1#	Yes
Back Side	15mm	190/836.6	GSM	0.232	0.174	-0.03	31.91	33.00	0.298	Battery 2#	/
Back Side	15mm	190/836.6	GSM	0.232	0.176	-0.02	31.91	33.00	0.298	Battery 3#	/
Back Side	15mm	190/836.6	GSM	0.229	0.172	0.04	31.91	33.00	0.294	With SIM2	/

Table 55: Body-Worn SAR test results of GSM850

Test Position of Hotspot	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Front Side	10mm	190/836.6	GPRS 2TS	0.221	0.133	-0.07	28.94	30.00	0.282	Battery 1#	/
Back Side	10mm	190/836.6	GPRS 2TS	0.252	0.152	-0.02	28.94	30.00	0.322	Battery 1#	/
Left Side	10mm	190/836.6	GPRS 2TS	0.172	0.112	-0.17	28.94	30.00	0.220	Battery 1#	/
Right Side	10mm	190/836.6	GPRS 2TS	0.254	0.176	-0.02	28.94	30.00	0.324	Battery 1#	/
Bottom Side	10mm	190/836.6	GPRS 2TS	0.157	0.080	0.17	28.94	30.00	0.200	Battery 1#	/
Right Side	10mm	190/836.6	GPRS 2TS	**0.269**	0.185	0.08	28.94	30.00	**0.343**	Battery 2#	Yes
Right Side	10mm	190/836.6	GPRS 2TS	0.259	0.178	0.09	28.94	30.00	0.331	Battery 3#	/
Right Side	10mm	190/836.6	GPRS 2TS	0.260	0.177	0.11	28.94	30.00	0.332	With SIM2	/

Table 56: Hotspot SAR test results of GSM850

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7.2.7 SAR measurement Result of GSM1900(Main Antenna)

Test Position of Head	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Left touch	/	661/1880	GSM	0.094	0.060	0.16	29.76	30.80	0.120	Battery 1#	/
Left tilt	/	661/1880	GSM	0.036	0.020	0.04	29.76	30.80	0.045	Battery 1#	/
Right touch	/	661/1880	GSM	0.059	0.038	0.15	29.76	30.80	0.075	Battery 1#	/
Right tilt	/	661/1880	GSM	0.033	0.019	-0.06	29.76	30.80	0.042	Battery 1#	/
Left touch	/	661/1880	GSM	**0.096**	0.060	0.08	29.76	30.80	**0.122**	Battery 2#	Yes
Left touch	/	661/1880	GSM	0.091	0.057	-0.02	29.76	30.80	0.115	Battery 3#	/
Left touch	/	661/1880	GSM	0.095	0.060	0.06	29.76	30.80	0.121	With SIM2	/

Table 57: Head SAR test results of GSM1900

Test Position of Body-Worn	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Front Side	15mm	661/1880	GSM	0.285	0.171	0.02	29.76	30.80	0.362	Battery 1#	/
Back Side	15mm	661/1880	GSM	0.297	0.180	-0.19	29.76	30.80	0.377	Battery 1#	/
Back Side	15mm	661/1880	GSM	0.303	0.184	-0.10	29.76	30.80	0.385	Battery 2#	/
Back Side	15mm	661/1880	GSM	**0.308**	0.185	-0.16	29.76	30.80	**0.391**	Battery 3#	Yes
Back Side	15mm	661/1880	GSM	0.241	0.146	-0.02	29.76	30.80	0.306	With SIM2	/

Table 58: Body-Worn SAR test results of GSM1900

Test Position of Hotspot	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Front Side	10mm	661/1880	GPRS 2TS	0.256	0.145	-0.04	24.62	25.80	0.336	Battery 1#	/
Back Side	10mm	661/1880	GPRS 2TS	0.302	0.170	-0.13	24.62	25.80	0.396	Battery 1#	/
Left Side	10mm	661/1880	GPRS 2TS	0.065	0.037	-0.17	24.62	25.80	0.085	Battery 1#	/
Right Side	10mm	661/1880	GPRS 2TS	0.031	0.017	0.03	24.62	25.80	0.041	Battery 1#	/
Bottom Side	10mm	661/1880	GPRS 2TS	**0.573**	0.311	-0.11	24.62	25.80	**0.752**	Battery 1#	Yes
Bottom Side	10mm	661/1880	GPRS 2TS	0.540	0.293	-0.17	24.62	25.80	0.709	Battery 2#	/
Bottom Side	10mm	661/1880	GPRS 2TS	0.530	0.288	0.16	24.62	25.80	0.695	Battery 3#	/
Bottom Side	10mm	661/1880	GPRS 2TS	0.542	0.293	0.17	24.62	25.80	0.711	With SIM2	/

Table 59: Hotspot SAR test results of GSM1900

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7.2.8 SAR measurement Result of UMTS Band 2(Main Antenna)

Test Position of Head	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Left touch	/	9400/1880	RMC	0.231	0.145	-0.11	22.62	24.00	0.317	Battery 1#	/
Left tilt	/	9400/1880	RMC	0.094	0.051	-0.11	22.62	24.00	0.129	Battery 1#	/
Right touch	/	9400/1880	RMC	0.153	0.097	-0.14	22.62	24.00	0.210	Battery 1#	/
Right tilt	/	9400/1880	RMC	0.077	0.044	-0.09	22.62	24.00	0.106	Battery 1#	/
Left touch	/	9400/1880	RMC	0.231	0.145	-0.01	22.62	24.00	0.317	Battery 2#	/
Left touch	/	9400/1880	RMC	**0.253**	0.156	-0.13	22.62	24.00	**0.348**	Battery 3#	Yes
Left touch	/	9400/1880	RMC	0.237	0.148	-0.11	22.62	24.00	0.326	With SIM2	/

Table 60: Head SAR test results of UMTS Band 2

Test Position of Body-Worn	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Front Side	15mm	9400/1880	RMC	0.607	0.370	-0.17	22.62	24.00	0.834	Battery 1#	/
Front Side	15mm	9262/1852.4	RMC	0.577	0.350	-0.19	22.77	24.00	0.766	Battery 1#	/
Front Side	15mm	9538/1907.6	RMC	0.666	0.401	-0.07	22.50	24.00	0.941	Battery 1#	/
Back Side	15mm	9400/1880	RMC	0.656	0.401	0.16	22.62	24.00	0.901	Battery 1#	/
Back Side	15mm	9262/1852.4	RMC	0.618	0.381	-0.16	22.77	24.00	0.820	Battery 1#	/
Back Side	15mm	9538/1907.6	RMC	0.678	0.416	-0.16	22.50	24.00	0.958	Battery 1#	/
Back Side	15mm	9538/1907.6	RMC	0.694	0.424	-0.16	22.50	24.00	0.980	Battery 2#	/
Back Side	15mm	9538/1907.7	RMC	**0.763**	0.466	-0.10	22.50	24.00	**1.078**	Battery 3#	Yes
Back Side	15mm	9538/1907.8	RMC	0.692	0.425	-0.11	22.50	24.00	0.977	With SIM2	/

Table 61: Body-Worn SAR test results of UMTS Band 2

Test Position of Hotspot	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Front Side	10mm	9400/1880	RMC	0.281	0.158	-0.12	16.16	17.50	0.383	Battery 1#	/
Back Side	10mm	9400/1880	RMC	0.302	0.171	-0.12	16.16	17.50	0.411	Battery 1#	/
Left Side	10mm	9400/1880	RMC	0.074	0.038	-0.16	16.16	17.50	0.101	Battery 1#	/
Right Side	10mm	9400/1880	RMC	0.037	0.019	-0.17	16.16	17.50	0.050	Battery 1#	/
Bottom Side	10mm	9400/1880	RMC	**0.740**	0.401	-0.17	15.78	16.50	**0.873**	Battery 1#	Yes
Bottom Side	10mm	9262/1852.4	RMC	0.647	0.350	-0.18	15.75	16.50	0.769	Battery 1#	/
Bottom Side	10mm	9538/1907.6	RMC	0.680	0.367	-0.11	15.73	16.50	0.812	Battery 1#	/
Bottom Side	10mm	9400/1880	RMC	0.710	0.383	0.06	15.78	16.50	0.838	Battery 2#	/
Bottom Side	10mm	9400/1880	RMC	0.623	0.339	-0.18	15.78	16.50	0.735	Battery 3#	/
Bottom Side	10mm	9400/1880	RMC	0.714	0.385	0.03	15.78	16.50	0.843	With SIM2	/
Additional Body SAR test results with sensor off(hotspot on)											
Bottom Side	14mm	9400/1880	RMC	0.377	0.213	0.00	16.16	17.50	0.513	Battery1#	/

Table 62: Hotspot SAR test results of UMTS Band 2

Note: For front side/back side, hotspot 10mm SAR is tested at Proximity sensor off+ hotspot active power level, so addition SAR test with Proximity sensor off is not required.

7.2.9 SAR measurement Result of UMTS Band 5(Main Antenna)

Test Position of Head	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Left touch	/	4182/836.4	RMC	0.125	0.092	-0.16	23.31	24.00	0.147	Battery 1#	/
Left tilt	/	4182/836.4	RMC	0.145	0.101	0.01	23.31	24.00	0.170	Battery 1#	/
Right touch	/	4182/836.4	RMC	0.159	0.123	-0.08	23.31	24.00	0.186	Battery 1#	/
Right tilt	/	4182/836.4	RMC	0.141	0.099	0.05	23.31	24.00	0.165	Battery 1#	/
Right touch	/	4182/836.4	RMC	0.155	0.119	-0.10	23.31	24.00	0.182	Battery 2#	/
Right touch	/	4182/836.4	RMC	**0.165**	0.126	-0.02	23.31	24.00	**0.193**	Battery 3#	Yes
Right touch	/	4182/836.4	RMC	0.157	0.120	0.02	23.31	24.00	0.184	With SIM2	/

Table 63: Head SAR test results of UMTS Band 5

Test Position of Body-Worn	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Front Side	15mm	4182/836.4	RMC	0.143	0.109	-0.03	23.31	24.00	0.168	Battery 1#	/
Back Side	15mm	4182/836.4	RMC	0.227	0.172	-0.02	23.31	24.00	0.266	Battery 1#	/
Back Side	15mm	4182/836.4	RMC	**0.248**	0.187	0.03	23.31	24.00	**0.291**	Battery 2#	Yes
Back Side	15mm	4182/836.4	RMC	0.246	0.186	0.00	23.31	24.00	0.288	Battery 3#	/
Back Side	15mm	4182/836.4	RMC	0.230	0.172	0.01	23.31	24.00	0.270	With SIM2	/

Table 64: Body-Worn SAR test results of UMTS Band 5

Test Position of Hotspot	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Front Side	10mm	4182/836.4	RMC	0.238	0.152	-0.01	23.31	24.00	0.279	Battery 1#	/
Back Side	10mm	4182/836.4	RMC	0.253	0.149	0.01	23.31	24.00	0.297	Battery 1#	/
Left Side	10mm	4182/836.4	RMC	0.136	0.091	0.04	23.31	24.00	0.159	Battery 1#	/
Right Side	10mm	4182/836.4	RMC	**0.272**	0.182	-0.07	23.31	24.00	**0.319**	Battery 1#	Yes
Bottom Side	10mm	4182/836.4	RMC	0.181	0.087	0.09	23.31	24.00	0.212	Battery 1#	/
Right Side	10mm	4182/836.4	RMC	0.271	0.182	-0.13	23.31	24.00	0.318	Battery 2#	/
Right Side	10mm	4182/836.4	RMC	0.269	0.181	-0.05	23.31	24.00	0.315	Battery 3#	/
Right Side	10mm	4182/836.4	RMC	0.247	0.167	-0.04	23.31	24.00	0.290	With SIM2	/

Table 65: Hotspot SAR test results of UMTS Band 5

7.2.10 SAR measurement Result of LTE Band 7(Main Antenna)

Test Position of Head	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Left touch	/	20850/2510	20M QPSK 1RB#0	0.147	0.079	0.18	22.21	23.50	0.198	Battery 1#	/
Left tilt	/	20850/2510	20M QPSK 1RB#0	0.044	0.022	0.06	22.21	23.50	0.060	Battery 1#	/
Right touch	/	20850/2510	20M QPSK 1RB#0	0.078	0.041	0.14	22.21	23.50	0.105	Battery 1#	/
Right tilt	/	20850/2510	20M QPSK 1RB#0	0.063	0.031	0.19	22.21	23.50	0.085	Battery 1#	/
Left touch	/	20850/2510	20M QPSK 50%RB#0	0.109	0.058	0.17	21.34	22.50	0.142	Battery 1#	/
Left tilt	/	20850/2510	20M QPSK 50%RB#0	0.031	0.016	0.13	21.34	22.50	0.041	Battery 1#	/
Right touch	/	20850/2510	20M QPSK 50%RB#0	0.050	0.028	0.12	21.34	22.50	0.066	Battery 1#	/
Right tilt	/	20850/2510	20M QPSK 50%RB#0	0.044	0.022	0.10	21.34	22.50	0.057	Battery 1#	/
Left touch	/	20850/2510	20M QPSK 1RB#0	0.149	0.080	0.12	22.21	23.50	0.201	Battery 2#	/
Left touch	/	20850/2510	20M QPSK 1RB#0	**0.166**	0.087	0.04	22.21	23.50	**0.223**	Battery 3#	Yes
Left touch	/	20850/2510	20M QPSK 1RB#0	0.152	0.075	0.11	22.21	23.50	0.205	With SIM2	/

Table 66: Head SAR test results of LTE Band 7

Test Position of Body-Worn	Dist.	Channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Front Side	15mm	20850/2510	20M QPSK 1RB#0	0.431	0.232	-0.10	22.21	23.50	0.580	Battery 1#	/
Back Side	15mm	20850/2510	20M QPSK 1RB#0	0.410	0.224	0.10	22.21	23.50	0.552	Battery 1#	/
Front Side	15mm	20850/2510	20M QPSK 50%RB#0	0.311	0.167	-0.13	21.34	22.50	0.406	Battery 1#	/
Back Side	15mm	20850/2510	20M QPSK 50%RB#0	0.298	0.163	-0.17	21.34	22.50	0.389	Battery 1#	/
Front Side	15mm	20850/2510	20M QPSK 1RB#0	**0.488**	0.261	-0.19	22.21	23.50	**0.657**	Battery 2#	Yes
Front Side	15mm	20850/2510	20M QPSK 1RB#0	0.481	0.258	-0.16	22.21	23.50	0.647	Battery 3#	/
Front Side	15mm	20850/2510	20M QPSK 1RB#0	0.476	0.255	-0.15	22.21	23.50	0.641	With SIM2	/

Table 67: Body-Worn SAR test results of LTE Band 7

Test Position of Hotspot	Dist.	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported 1-g SAR (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g						
Front Side	10mm	21100/2535	20M QPSK 1RB#50	**0.547**	0.277	-0.10	19.59	20.50	**0.675**	Battery 1#	Yes
Back Side	10mm	21100/2535	20M QPSK 1RB#50	0.461	0.244	0.05	19.59	20.50	0.568	Battery 1#	/
Left Side	10mm	21100/2535	20M QPSK 1RB#50	0.146	0.068	-0.15	19.59	20.50	0.180	Battery 1#	/
Right Side	10mm	21100/2535	20M QPSK 1RB#50	0.028	0.016	-0.08	19.59	20.50	0.035	Battery 1#	/
Bottom Side	10mm	21100/2535	20M QPSK 1RB#50	0.353	0.169	-0.02	16.63	17.50	0.431	Battery 1#	/
Front Side	10mm	20850/2510	20M QPSK 50%RB#0	0.432	0.229	-0.12	19.65	20.50	0.525	Battery 1#	/
Back Side	10mm	20850/2510	20M QPSK 50%RB#0	0.400	0.225	-0.10	19.65	20.50	0.486	Battery 1#	/
Left Side	10mm	20850/2510	20M QPSK 50%RB#0	0.127	0.061	0.13	19.65	20.50	0.154	Battery 1#	/
Right Side	10mm	20850/2510	20M QPSK 50%RB#0	0.026	0.015	-0.03	19.65	20.50	0.032	Battery 1#	/
Bottom Side	10mm	21100/2535	20M QPSK 50%RB#25	0.332	0.158	0.01	16.42	17.50	0.426	Battery 1#	/
Front Side	10mm	21100/2535	20M QPSK 1RB#50	0.451	0.229	0.03	19.59	20.50	0.556	Battery 2#	/
Front Side	10mm	21100/2535	20M QPSK 1RB#50	0.470	0.238	-0.19	19.59	20.50	0.580	Battery 3#	/
Front Side	10mm	21100/2535	20M QPSK 1RB#50	0.507	0.255	-0.12	19.59	20.50	0.625	With SIM2	/
Additional Body SAR test results with sensor off(hotspot on)											
Bottom Side	14mm	21100/2535	20M QPSK 1RB#50	0.396	0.197	0.04	19.59	20.50	0.488	Battery1#	/
Bottom Side	14mm	20850/2510	20M QPSK 50%RB#0	0.441	0.220	0.03	19.65	20.50	0.536	Battery1#	/

Table 68: Hotspot SAR test results of LTE Band 7

Note: For front side/back side, hotspot 10mm SAR is tested at Proximity sensor off+ hotspot active power level, so addition SAR test with Proximity sensor off is not required.

7.2.11 SAR measurement Result of WiFi 2.4G

Test Position of Head	Test channel /Freq.(MHz)	Test Mode	Area Scan 1-g SAR（W/kg）	SAR Value (W/kg)		Power Drift (dB)	Actual duty factor	Scaled 1-g SAR (W/kg)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported SAR1-g (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g								
Left touch	11/2462	802.11 b	0.391	**0.390**	0.168	0.16	99%	**0.394**	14.03	15.50	**0.553**	Battery 1#	Yes
Left tilt	11/2462	802.11 b	0.164	0.152	0.074	0.17	99%	0.154	14.03	15.50	0.215	Battery 1#	/
Right touch	11/2462	802.11 b	0.102	0.106	0.050	-0.15	99%	0.107	14.03	15.50	0.150	Battery 1#	/
Right tilt	11/2462	802.11 b	0.111	0.114	0.052	-0.07	99%	0.115	14.03	15.50	0.162	Battery 1#	/
Left touch	11/2462	802.11 b	0.289	0.295	0.117	0.14	99%	0.298	14.03	15.50	0.418	Battery 2#	/
Left touch	11/2462	802.11 b	0.376	0.370	0.156	0.19	99%	0.374	14.03	15.50	0.524	Battery 3#	/

Table 69: Head SAR test results of WiFi 2.4G

Mode	Tune-up (dBm)	Tune-up (mW)	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
802.11b	15.50	35.48	0.553	/	Yes
802.11g	16.00	39.81	/	0.620	No
802.11n 20M	15.50	35.48	/	0.553	No
802.11n 40M	15.50	35.48	/	0.553	No

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

Test Position of Body-Worn with 15mm	Test channel /Freq.(MHz)	Test Mode	Area Scan 1-g SAR（W/kg）	SAR Value (W/kg)		Power Drift (dB)	Actual duty factor	Scaled 1-g SAR (W/kg)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported SAR1-g (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g								
Front Side	1/2412	802.11 b	0.038	/	/	-0.10	99%	/	17.25	18.50	/	Battery 1#	/
Back Side	1/2412	802.11 b	0.052	**0.051**	0.026	0.14	99%	**0.052**	17.25	18.50	**0.069**	Battery 1#	Yes
Back Side	1/2412	802.11 b	0.049	0.049	0.025	-0.19	99%	0.050	17.25	18.50	0.066	Battery 2#	/
Back Side	1/2412	802.11 b	0.049	0.050	0.025	-0.18	99%	0.050	17.25	18.50	0.067	Battery 3#	/

Table 70: Body-Worn SAR test results of WiFi 2.4G

Mode	Tune-up (dBm)	Tune-up (mW)	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
802.11b	18.50	70.79	0.069	/	Yes
802.11g	17.00	50.12	/	0.049	No
802.11n 20M	15.50	35.48	/	0.035	No
802.11n 40M	15.50	35.48	/	0.035	No

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

Test Position of Hotspot with 10mm	Test channel /Freq.(MHz)	Test Mode	Area Scan 1-g SAR（W/kg）	SAR Value (W/kg)		Power Drift (dB)	Actual duty factor	Scaled 1-g SAR (W/kg)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported SAR1-g (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g								
Front Side	1/2412	802.11 b	0.072	/	/	-0.16	99%	/	17.25	18.50	/	Battery 1#	/
Back Side	1/2412	802.11 b	0.114	/	/	-0.08	99%	/	17.25	18.50	/	Battery 1#	/
Right Side	1/2412	802.11 b	0.124	0.130	0.060	0.15	99%	0.131	17.25	18.50	0.175	Battery 1#	/
Top Side	1/2412	802.11 b	0.059	/	/	-0.11	99%	/	17.25	18.50	/	Battery 1#	/
Right Side	1/2412	802.11 b	**0.126**	**0.133**	0.061	0.13	99%	**0.134**	17.25	18.50	**0.179**	Battery 2#	Yes
Right Side	1/2412	802.11 b	0.116	0.122	0.058	0.13	99%	0.123	17.25	18.50	0.164	Battery 3#	/

Table 71: Hotspot SAR test results of WiFi 2.4G

Mode	Tune-up (dBm)	Tune-up (mW)	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
802.11b	18.50	70.79	0.179	/	Yes
802.11g	17.00	50.12	/	0.127	No
802.11n 20M	15.50	35.48	/	0.090	No
802.11n 40M	15.50	35.48	/	0.090	No

Table 72: Hotspot SAR test results of WiFi 2.4G

Note:

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

7.2.12 SAR measurement Result of WiFi 5G

Test Position of Head	Test channel /Freq.(MHz)	Test Mode	Area Scan 1-g SAR （W/kg）	SAR Value (W/kg)		Power Drift (dB)	Actual duty factor	Scaled 1-g SAR (W/kg)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported SAR1-g (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g								
Test data of U-NII-1&U-NII-2A band													
Left touch	52/5260	802.11a	0.066	0.055	0.016	0.00	99%	0.056	9.97	11.60	0.081	Battery 1#	/
Left tilt	52/5260	802.11a	0.067	0.053	0.013	0.00	99%	0.053	9.97	11.60	0.077	Battery 1#	/
Right touch	52/5260	802.11a	0.086	0.050	0.015	0.00	99%	0.051	9.97	11.60	0.074	Battery 1#	/
Right tilt	52/5260	802.11a	0.075	0.051	0.015	0.00	99%	0.051	9.97	11.60	0.075	Battery 1#	/
Left touch	52/5260	802.11a	0.090	0.080	0.024	0.00	99%	0.081	9.97	11.60	0.117	Battery 2#	/
Left touch	52/5260	802.11a	0.094	0.085	0.024	0.00	99%	0.086	9.97	11.60	0.126	Battery 3#	/
Test data of U-NII-2C band													
Left touch	128/5640	802.11a	0.128	**0.133**	0.040	-0.01	99%	**0.134**	10.37	11.60	**0.178**	Battery 1#	Yes
Left tilt	128/5640	802.11a	0.080	0.076	0.025	-0.17	99%	0.077	10.37	11.60	0.102	Battery 1#	/
Right touch	128/5640	802.11a	0.058	0.033	0.012	0.00	99%	0.033	10.37	11.60	0.044	Battery 1#	/
Right tilt	128/5640	802.11a	0.041	/	/	/	99%	/	10.37	11.60	/	Battery 1#	/
Left touch	128/5640	802.11a	0.117	0.119	0.033	0.00	99%	0.120	10.37	11.60	0.160	Battery 2#	/
Left touch	128/5640	802.11a	0.120	0.122	0.034	0.00	99%	0.123	10.37	11.60	0.164	Battery 3#	/

Table 73: Head SAR test results of WiFi 5G

Mode	Tune-up (dBm)	Tune-up (mW)	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
802.11a	11.60	14.45	0.178	/	Yes
802.11n 20M	11.50	14.13	/	0.174	No
802.11ac 20M	11.50	14.13	/	0.174	No
802.11n 40M	11.50	14.13	/	0.174	No
802.11ac 40M	11.50	14.13	/	0.174	No
802.11ac 80M	11.50	14.13	/	0.174	No

Note:

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

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

Test Position of Body-Worn with 15mm	Test channel /Freq.(MHz)	Test Mode	Area Scan 1-g SAR（W/kg）	SAR Value (W/kg)		Power Drift (dB)	Actual duty factor	Scaled 1-g SAR (W/kg)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported SAR1-g (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g								
Test data of U-NII-1&U-NII-2A band													
Front Side	64/5320	802.11a	0.034	/	/	0.00	99%	/	15.31	16.00	/	Battery 1#	/
Back Side	64/5320	802.11a	0.035	0.025	0.010	-0.15	99%	0.025	15.31	16.00	0.029	Battery 1#	/
Back Side	64/5320	802.11a	0.059	0.048	0.017	-0.15	99%	0.049	15.31	16.00	0.057	Battery 2#	/
Back Side	64/5320	802.11a	0.063	**0.051**	0.019	-0.14	99%	**0.052**	15.31	16.00	**0.061**	Battery 3#	Yes
Test data of U-NII-2C band													
Front Side	100/5500	802.11a	0.046	0.035	0.013	-0.18	99%	0.035	15.84	16.00	0.036	Battery 1#	/
Back Side	100/5500	802.11a	0.037	/	/	-0.11	99%	/	15.84	16.00	/	Battery 1#	/
Front Side	100/5500	802.11a	0.042	0.031	0.012	0.00	99%	0.031	15.84	16.00	0.032	Battery 2#	/
Front Side	100/5500	802.11a	0.040	0.029	0.011	0.00	99%	0.029	15.84	16.00	0.030	Battery 3#	/

Table 74: Body-Worn SAR test results of WiFi 5G

Mode	Tune-up (dBm)	Tune-up (mW)	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
802.11a	16.00	39.81	0.061	/	Yes
802.11n 20M	14.50	28.18	/	0.043	No
802.11ac 20M	14.50	28.18	/	0.043	No
802.11n 40M	13.50	22.39	/	0.034	No
802.11ac 40M	13.50	22.39	/	0.034	No
802.11ac 80M	13.50	22.39	/	0.034	No

Note:

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

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

Test Position of Hotspot with 10mm	Test channel /Freq.(MHz)	Test Mode	Area Scan 1-g SAR（W/kg）	SAR Value (W/kg)		Power Drift (dB)	Actual duty factor	Scaled 1-g SAR (W/kg)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported SAR1-g (W/kg)	Accessory Information	SAR Plot.
				1-g	10-g								
Test data of U-NII-1 band													
Front Side	44/5220	802.11a	0.117	0.111	0.034	0.16	99%	0.112	15.30	16.00	0.132	Battery 1#	/
Back Side	44/5220	802.11a	0.321	0.356	0.103	-0.18	99%	0.360	15.30	16.00	0.422	Battery 1#	/
Right Side	44/5220	802.11a	0.109	/	/	-0.14	99%	/	15.30	16.00	/	Battery 1#	/
Top Side	44/5220	802.11a	0.022	/	/	0.00	99%	/	15.30	16.00	/	Battery 1#	/
Back Side	44/5220	802.11a	0.325	**0.375**	0.102	-0.16	99%	**0.379**	15.30	16.00	**0.445**	Battery 2#	Yes
Back Side	44/5220	802.11a	0.310	0.354	0.099	-0.17	99%	0.358	15.30	16.00	0.420	Battery 3#	/

Table 75: Hotspot SAR test results of WiFi 5G

Mode	Tune-up (dBm)	Tune-up (mW)	Hightest Reported SAR(W/kg)	Adjusted SAR (W/kg)	SAR test
802.11a	16.00	39.81	0.445	/	Yes
802.11n 20M	14.50	28.18	/	0.315	No
802.11ac 20M	14.50	28.18	/	0.315	No
802.11n 40M	13.50	22.39	/	0.250	No
802.11ac 40M	13.50	22.39	/	0.250	No
802.11ac 80M	13.50	22.39	/	0.250	No

Table 76: Hotspot SAR test results of WiFi 5G

Note:

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

2) The device do not support hotspot function at U-NII-2A & U-NII-2C band

7.2.13 SAR measurement Result of BT

Test Position of Head	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Actual duty factor	Scaled 1-g SAR (W/kg)	Conducted Power (dBm)	Tune-up Power (dBm)	Reported SAR1-g (W/kg)	Accessory Information	SAR Plot.
			1-g	10-g								
Left touch	78/2480	DH5	0.043	0.016	0.15	76.6%	0.057	8.57	10.50	0.088	Battery 1#	/
Left tilt	78/2480	DH5	0.021	0.009	0.11	76.6%	0.028	8.57	10.50	0.043	Battery 1#	/
Right touch	78/2480	DH5	0.012	0.005	-0.15	76.6%	0.015	8.57	10.50	0.024	Battery 1#	/
Right tilt	78/2480	DH5	0.017	0.006	-0.03	76.6%	0.022	8.57	10.50	0.034	Battery 1#	/
Left touch	78/2480	DH5	0.077	0.028	-0.17	76.6%	0.100	8.57	10.50	0.156	Battery 2#	/
Left touch	78/2480	DH5	**0.087**	0.033	-0.17	76.6%	**0.113**	8.57	10.50	**0.176**	Battery 3#	Yes

Table 77: Head SAR test results of BT

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7.3 Multiple Transmitter Evaluation

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

Note:
1) Per KDB 648474 D04, because the diagonal distance of this device is < 160mm and the diagonal dimension of display is <150mm, it is not a phablet .
2) The device has two 2G/3G/4G Tx antennas (Main Antenna and Second Antenna). It can transmit from either Main Antenna or Second Antenna, but they can not transmit simultaneously.

Mode	Exposure Condition	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
Main ant	Hotspot	Yes	Yes	Yes	Yes	No	Yes
Second ant	Hotspot	Yes	Yes	Yes	Yes	Yes	No
WiFi Ant/BT	Hotspot	Yes	Yes	No	Yes	Yes	No

Table 78: Sides for Hotspot testing

Note:
1) Per KDB 941225 D06 and KDB 648474 D04, particular DUT edges were not required to be evaluated for Hotspot SAR if the antenna-to-edge distance is greater than 2.5cm;
2) WiFi 5G hotspot is only supported for U-NII-1, therefore U-NII-2A and U-NII-2C were not evaluated for hotspot condition.

7.3.1 Stand-alone SAR test exclusion

Per FCC KDB 447498D01v06, the 1-g SAR and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where:

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

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

Mode	Position	P_{max} (dBm)*	P_{max} (mW)	Distance (mm)	f (GHz)	Calculation Result	SAR Exclusion threshold	SAR test exclusion
BT	Body-Worn	10.50	11.22	15	2.480	1.18	3.00	Yes
BT	Hotspot	10.50	11.22	10	2.480	1.77	3.00	Yes

Table 79: Standalone SAR test exclusion for BT

Note:

1)* - maximum possible output power declared by manufacturer

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:

(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.

Mode	Position	P_{max} (dBm)*	P_{max} (mW)	Distance (mm)	f (GHz)	X	Estimated SAR (W/kg)*
BT	Body-worn	10.50	11.22	15	2.480	7.50	0.160
BT	Hotspot	10.50	11.22	10	2.480	7.50	0.240

Table 80: Estimated SAR calculation for BT

Note:

1) * - maximum possible output power declared by manufacturer

7.3.2 Simultaneous Transmission Possibilities

The Simultaneous Transmission Possibilities of this device are as below:

NO.	Simultaneous Tx Combination	Head	Body-worn	Hotspot (10mm)
1	GSM Voice(Main ant) + BT	Yes	Yes	NA
2	GSM DATA(Main ant) + BT	N/A	Yes	Yes
3	GSM Voice(Second ant) + BT	Yes	Yes	NA
4	GSM DATA(Second ant)+ BT	N/A	Yes	Yes
5	GSM Voice(Main ant) + WiFi	Yes	Yes	Yes
6	GSM DATA(Main ant) + WiFi	N/A	Yes	Yes
7	GSM Voice(Second ant) + WiFi	Yes	Yes	Yes
8	GSM DATA(Second ant) + WiFi	N/A	Yes	Yes
9	UMTS (Main ant) + BT	Yes	Yes	Yes
10	UMTS (Main ant) + WiFi	Yes	Yes	Yes
11	UMTS (Second ant)+ BT	Yes	Yes	Yes
12	UMTS (Second ant)+ WiFi	Yes*	Yes	Yes
13	LTE(Main ant) + WiFi	Yes*	Yes*	Yes
14	LTE(Main ant) + BT	Yes*	Yes*	Yes
15	LTE (Second ant)+ WiFi	Yes*	Yes*	Yes
16	LTE (Second ant) + BT	Yes*	Yes*	Yes

Table 81: Simultaneous Transmission Possibilities

Note:

1) Wi-Fi 2.4G&5G and Bluetooth share the same Tx antenna and can't transmit simultaneously.
2) The device does not support DTM function.
3) * VOIP 3rd party applications may possibly be installed and used by the user.
4) The Main Antenna and Second Antenna can't transmit simultaneously.
5) The device supports VoWIFI function.
6) U-NII-2A: 5250-5350 MHz、U-NII-2C: 5470-5725 MHz does not support hotspot function

7.3.3 SAR Summation Scenario

Test Position		Main antenna SAR_{Max}					WiFi/BT antenna SARMax			Σ1-g SAR W/kg	SPLSR	Volume scan
		GSM850	GSM1900	UMTS Band 2	UMTS Band 5	LTE Band 7	WiFi 2.4G	WiFi 5G	BT			
Head	Left touch	0.154	0.122	0.348	0.147	0.223	0.553	0.178	0.176	0.901	N/A	N/A
	Left tilt	0.204	0.045	0.129	0.170	0.060	0.215	0.102	0.043	0.419	N/A	N/A
	Right touch	0.207	0.075	0.210	0.193	0.105	0.150	0.074	0.024	0.360	N/A	N/A
	Right tilt	0.192	0.042	0.106	0.165	0.085	0.162	0.075	0.034	0.354	N/A	N/A
Body-worn 15mm	Front side	0.195	0.362	0.941	0.168	0.657	0.069	0.061	0.160	1.101	N/A	N/A
	Back side	0.301	0.391	1.078	0.291	0.552	0.069	0.061	0.160	**1.238**	N/A	N/A
Hotspot 10mm	Front side	0.282	0.336	0.383	0.279	0.675	0.179	0.445	0.240	1.120	N/A	N/A
	Back side	0.322	0.396	0.411	0.297	0.568	0.179	0.445	0.240	1.013	N/A	N/A
	Left side	0.220	0.085	0.101	0.159	0.180	/	/	/	0.220	N/A	N/A
	Right side	0.343	0.041	0.050	0.319	0.035	0.179	0.445	0.240	0.788	N/A	N/A
	Top side	/	/	/	/	/	0.179	0.445	0.240	0.445	N/A	N/A
	Bottom side	0.200	0.752	0.873	0.212	0.536	/	/	0.176	0.901	N/A	N/A

Table 82: SAR Simultaneous Tx Combination of Main antenna and WiFi/BT antenna.

Test Position		Second antenna SAR_{Max}					WiFi/BT antenna SARMax			Σ1-g SAR W/kg	SPLSR	Volume scan
		GSM850	GSM1900	UMTS Band 2	UMTS Band 5	LTE Band 7	WiFi 2.4G	WiFi 5G	BT			
Head	Left touch	0.328	0.164	0.161	0.628	0.245	0.553	0.178	0.176	1.181	N/A	N/A
	Left tilt	0.242	0.210	0.211	0.468	0.294	0.215	0.102	0.043	0.683	N/A	N/A
	Right touch	0.562	0.651	0.644	1.140	1.116	0.150	0.074	0.024	1.290	N/A	N/A
	Right tilt	0.495	0.709	0.670	0.879	1.209	0.162	0.075	0.034	**1.371**	N/A	N/A
Body 15mm	Front side	0.176	0.041	0.135	0.126	0.206	0.069	0.061	0.160	0.366	N/A	N/A
	Back side	0.298	0.055	0.183	0.168	0.295	0.069	0.061	0.160	0.458	N/A	N/A
Hotspot 10mm	Front side	0.113	0.090	0.091	0.197	0.180	0.179	0.445	0.240	0.642	N/A	N/A
	Back side	0.131	0.114	0.131	0.276	0.277	0.179	0.445	0.240	0.722	N/A	N/A
	Left side	0.218	0.139	0.149	0.249	0.226	/	/	/	0.249	N/A	N/A
	Right side	0.104	0.019	0.022	0.117	0.025	0.179	0.445	0.240	0.562	N/A	N/A
	Top side	0.088	0.150	0.136	0.134	0.156	0.179	0.445	0.240	0.601	N/A	N/A
	Bottom side	/	/	/	/	/	/	/	/	/	N/A	N/A

Table 83: SAR Simultaneous Tx Combination of Second antenna and WiFi/BT antenna.

7.3.4 Simultaneous Transmission Conclusion

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

Appendix A. System Check Plots
(Pls See Appendix No.: SYBH(Z-SAR)20171223014005-2A, total: 22 pages)

Appendix B. SAR Measurement Plots
(Pls See Appendix No.: SYBH(Z-SAR) 20171223014005-2B, total: 38 pages)

Appendix C. Calibration Certificate
(Pls See Appendix No.: SYBH(Z-SAR) 20171223014005-2C, total: 92 pages)

Appendix D. Photo documentation
(Pls See Appendix No.: SYBH(Z-SAR) 20171223014005-2D, total: 7 pages)

End

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