SAR TEST REPORT

For

NFC Android Reader

Model Number: FX105F

FCC ID: 2AGQIFX105F

HVIN : FX105F

Report Number: WT208000773

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection National Digital Electronic Product Testing Center
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Test report declaration

Applicant	:	FAMOCO SAS
Address	:	59 avenue Victor Hugo, Paris, France
Manufacturer	:	FAMOCO SAS
Address	:	59 avenue Victor Hugo, Paris, France
EUT Description	:	NFC Android Reader
Model No	:	FX105F
Trade mark	:	FAMOCO

FCC ID: 2AGQIFX105F; HVIN: FX105F

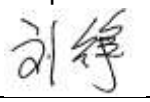
Test Standards:

IEEE Std 1528-2013, KDB941225 D01, KDB941225 D05, KDB941225 D06, KDB447498 D01,KDB648474 D04,KDB248227 D01,KDB 865664 D01,KDB865664 D02,KDB690783 D01

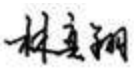
The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the compliance of the applicable standards stated above. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results.

The results documented in this report only apply to the tested sample, under the conditions and modes of operation as described herein.

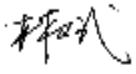
The test report shall not be reproduced in part without written approval of the laboratory.

Project Engineer:  Date: May.25,2020

(Liu Zheng)

Checked by:  Date: May.25,2020

(Lin Yixiang)

Approved by:  Date: May.25,2020

(Lin Bin)

TABLE OF CONTENTS

1. REPORTED SAR SUMMARY

1.1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing are as follows.

Band	Max Reported SAR(W/kg)	Max Reported SAR(W/kg)	Max Reported SAR(W/kg)
	1-g head	1-g Hotspot Body	1-g Body Worn(15mm)
GSM850	**0.456**	0.868	**0.540**
PCS1900	0.139	0.877	0.476
WCDMA Band II	0.299	**1.020**	0.528
WCDMA Band V	0.455	0.603	0.439
LTE Band 2	0.248	0.947	0.508
LTE Band 4	0.372	0.720	0.468
LTE Band 5	0.357	0.457	0.330
LTE Band 7	0.223	0.570	0.495
LTE Band 12	0.161	0.444	0.168
LTE Band 13	0.041	0.108	0.081
LTE Band 17	0.124	0.325	0.153
LTE Band 38	0.167	0.439	0.214
LTE Band 41	0.038	0.297	0.075
Wi-Fi 2.4G	0.314	0.110	0.025
Wi-Fi 5G	0.182	0.239	0.037

Table 1: Summary of test result

Note:

*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/ uncontrolled exposure limits according to the FCC rule 2.1093 , the ANSI/IEEE C95.1:1992, the NCRP Report Number 86 for uncontrolled environment, according to the Industry Canada Radio Standards Specification RSS-102 for General Population/ Uncontrolled exposure, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013& IEEE Std 1528a-2005.

1.2. RF exposure limits (ICNIRP Guidelines)

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR*(Brain/Body)	**1.60mW/g**	8.00mW/g
Spatial Average SAR** (Whole Body)	0.08mW/g	0.40mW/g
Spatial Peak SAR***(Limbs)	4.00mW/g	20.00mW/g

Table 2: RF exposure limits

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

Notes:

* The Spatial Peak value of the SAR averaged over any 1 grams 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 1 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 if employment or occupation.)

1.3 Ratings and System Details

Product Name:	NFC Android Reader
Model No.(EUT):	FX105F
Trade mark:	FAMOCO
EUT Supports Radios application:	BT4.2, 2.1+EDR: 2402MHz to 2480MHz WiFi : IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz

	IEEE 802.11n(HT40): 2422MHz to 2452MHz IEEE 802.11ac(VHT20), IEEE 802.11ac(VHT40) IEEE 802.11ac(VHT80) GPS: 1559MHz to 1610MHz GSM/GPRS/EDGE 850: Tx:824.20 -848.80MHz; Rx: 869.20 – 893.80MHz GSM/GPRS/EDGE 1900: Tx:1850.20 – 1909.80MHz; Rx:1930.20 – 1989.80MHz WCDMA/HSDPA/HSUPA/HSPA+(Down Link) Band V: Tx:826.40 -846.60MHz; Rx: 871.40 – 891.60MHz WCDMA/HSDPA/HSUPA/HSPA+(Down Link) Band II: Tx:1852.40 – 1907.60MHz; Rx:1932.40 – 1987.60MHz LTE Band 2:TX:1850MHz to 1910MHz RX:1930MHz to 1990MHz. LTE Band 4:TX:1710MHz to 1755MHz RX:2110MHz to 2155MHz. LTE Band 5:TX:824MHz to 849MHz RX:869MHz to 894MHz. LTE Band 7:TX:2500MHz to 2570MHz RX: 2620MHz to 2690MHz. LTE Band 12:TX:698MHz to 716MHz RX:729MHz to 746MHz. LTE Band 13: TX:777MHz to 787MHz RX:746MHz to 756MHz. LTE Band 17:TX:704MHz to 716MHz RX:734MHz to 746MHz. LTE Band 38: TX:2575MHz to 2620MHz RX: 2575MHz to 2620MHz LTE Band 41:TX:2555MHz to 2655 MHz RX: 2555MHz to 2655 MHz
Battery Specification	FX105 Series /3.8V 7.4Wh 2000mA/
Battery Applicant	Zhuhai Greaton Electronic Technology Co.,Ltd.
Hardware version:	FX105_MB_V2.0
Software version:	MOLY.LR12A.R2.MP.V44.1
Remark:	EUT, adaptor, Docking Station and USB Cable all come in two colors, white and black.

1.4 Product Function and Intended Use

IO Pro is subscriber equipment in the GSM/UMTS/LTE system.

The GSM frequency band is 850MHz, 900MHz,1800MHz and 1900MHz , only 850MHz and

1900MHz can be used in this report. The UMTS frequency band is Band1, Band2, Band5 and Band 8 , only Band2 and Band5 can be used in this report. The LTE frequency band is Band 2, Band 3, Band 4, Band 5, Band 7, Band 8, Band 12, Band 13, Band 17, Band 38, Band 41, only Band 2,4,5,7,12,13,17,38,41can be used in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSUPA/HSDPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and Micro USIM card interface.

1.5 Test specification(s)

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 SAR test for 3G devices v03r01	3G SAR MEAUREMENT PROCEDURES
KDB941225 D05 SAR for LTE Devices v02r05	SAR Evaluation Considerations for LTE Devices
KDB941225 D06 Hotspot Mode v02r01	SAR Evaluation Procedures for portable Devices with Wireless Router Capabilities
KDB447498 D01 General RF Exposure Guidance v06	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
KDB 648474 D04 Handset SAR v01r03	SAR Evaluation Considerations for Wireless Handsets.
KDB 248227 D01 802 11 Wi-Fi SAR v02r02	SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04	SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting v01r02	RF Exposure Compliance Reporting and Documentation Considerations
KDB 690783 D01 SAR Listings on Grants v01r03	SAR Listings on Equipment Authorization Grants

1.6 List of Test and Measurement Instruments

	Equipment	Model No.	Serial No.	Manufacturer	Last Calibration Date	Period
☒	SAR test system	NCR	NCR	SATIMO	NCR	NCR
☒	E-Field Probe	SSE2	SN 08/16 EPGO0286	MVG	2019.12.19	1year
☒	Dielectric Probe Kit	SCLMP	SN 27/16 OCPG 77	MVG	NCR	NCR
☒	System Validation Dipole,750MHz	D750V3	1103	SPEAG	2020.01.06	3year
☒	System Validation Dipole,835MHz	D835V2	4d141	SPEAG	2018.09.06	3year
☐	System Validation Dipole,900MHz	D900V2	1d077	SPEAG	2018.09.07	3year
☐	System Validation Dipole,1800MHz	D1800V2	2d171	SPEAG	2018.09.12	3year
☒	System Validation Dipole,1900MHz	D1900V2	5d162	SPEAG	2018.09.11	3year
☒	System Validation Dipole,2300MHz	D2300V2	1034	SPEAG	2020.01.02	3year
☒	System Validation Dipole,2450MHz	D2450V2	818	SPEAG	2018.08.31	3year
☒	System Validation Dipole,2600MHz	D2600V2	1074	SPEAG	2020.01.02	3year
☒	System Validation Dipole,1750MHz	D1750V2	1108	SPEAG	2020.01.03	3year
☒	System Validation Dipole,5GHz	D5GzV2	1185	SPEAG	2019.12.31	3year
☒	Dielectric Probe Kit	85070E	MY44300455	Agilent	NCR	NCR
☒	Dual-directional coupler,0.10-2.0GHz	778D	MY48220198	Agilent	NCR	NCR
☒	Dual-directional coupler,2.00-18GHz	772D	MY46151160	Agilent	NCR	NCR
☒	Power Amplifier	ZVE-8G	SC280800926	MINI-CIRCUITS	NCR	NCR

☒	Power Amplifier	ZHL42W	81709	MINI-CIRCUITS	NCR	NCR
☒	Signal Generator	SMR20	100047	R&S	2020.02.20	1year
☒	Power Sensor	NRP-Z21	102626	R&S	2019.06.05	1year
☒	Power Sensor	NRP-Z21	102627	R&S	2019.06.05	1year
☒	Call Tester	CMU 200	100110	R&S	2019.12.02	1year
☒	Network Analyzer	E5071C	MY46109550	Agilent	2020.02.20	1Year
☒	Flat Phantom	ELI4.0	TP-1904	SPEAG	NCR	NCR
☒	Twin Phantom	SAM	TP-1504	SPEAG	NCR	NCR
☒	Wideband Radio Communication Tester	CMW500	125469	R&S	2019.10.24	1Year
☒	Precision Thermometer	--	--	--	2019.08.08	1Year

Table 3: List of Test and Measurement Equipment

Note: All the test equipments are calibrated once a year, except the dipoles, which are calibrated every three years. Moreover, we have self-calibration every year to the dipoles.

2. GENERAL INFORMATION

2.1. Report information

This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

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2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China. At the time of testing, Laboratory is accredited by the following organizations:

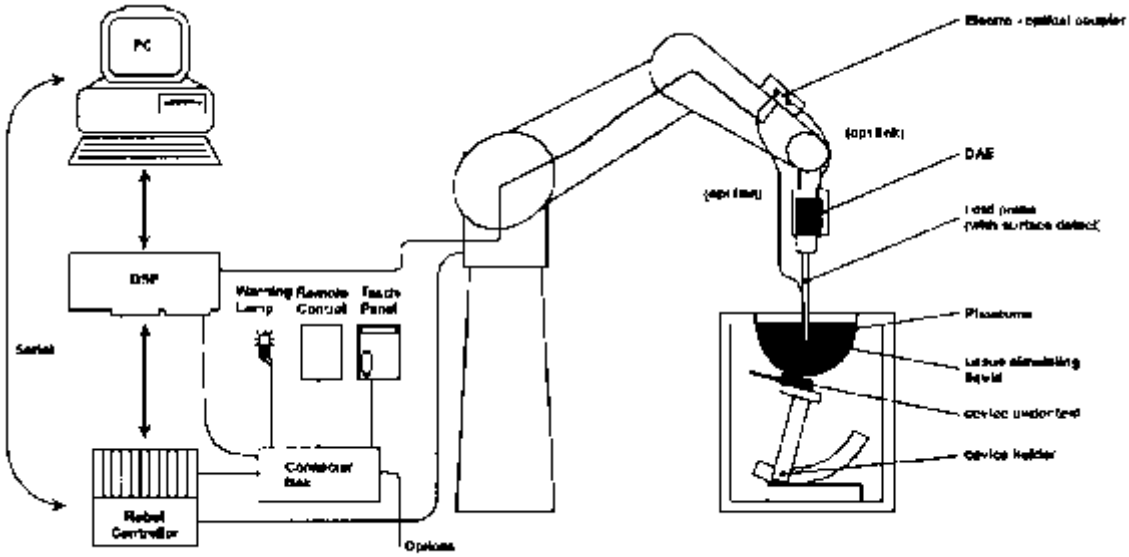
China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is Accredited Testing Laboratory of FCC with Designation number CN1165 and Site registration number 582918.

The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is 11177A.

3. SAR MEASUREMENT SYSTEM CONFIGURATION

3.1. SAR Measurement Set-up



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

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing,
- AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
- The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. • A computer operating Windows XP.
- DASY5 software and SEMCAD data evaluation software.

Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System checks dipoles allowing validating the proper functioning of the system.
- Test environment
- The DASY5 measurement system is placed at the head end of a room with dimensions:

4.5 x 4 x 3 m³, the SAM phantom is placed in a distance of 1.3 m from the side walls and 1.1m from the rear wall.

Picture 1 of the photo documentation shows a complete view of the test environment.

3.2. Probe description

Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements

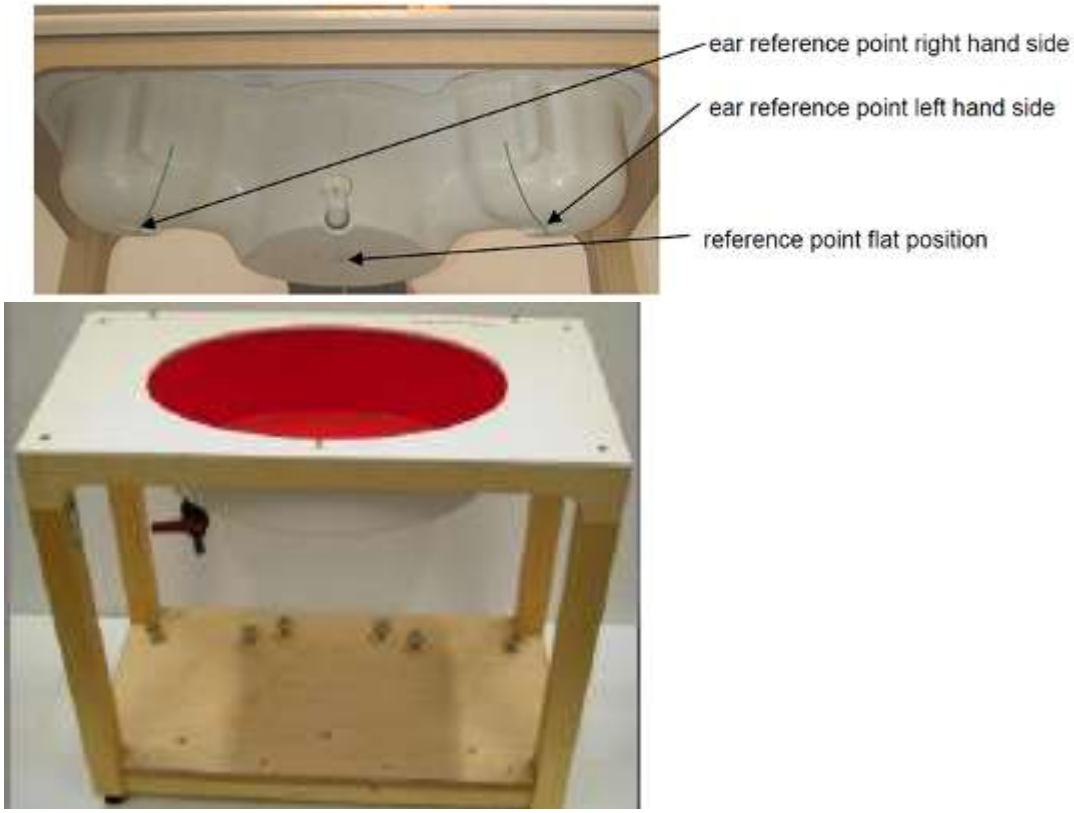
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to >6 GHz (dosimetry); Linearity: ± 0.2 dB (30 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<1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20mm) Tip length: 2.5 mm (Body: 12mm) 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%.	

3.3. Phantom description

The used SAM Phantom meets the requirements specified in Edition 01-01 of Supplement C to OET Bulletin 65 for Specific Absorption Rate (SAR) measurements.

The phantom consists of a fibreglass shell integrated in a wooden table. It allows left-hand and right-hand head as well as body-worn measurements with a maximum liquid depth of 18 cm in head position and 22 cm in planar position (body measurements). The thickness of the Phantom shell is 2 mm +/- 0.1 mm.



ELI4 Phantom

Shell Thickness	2mm+/- 0.2mm
Filling Volume	Approximately 30 liters

Measurement Areas	Flat phantom
The ELI4 phantom is in 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 lastest 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≤5 and a loss tangent ≤0.05.

3.4. Device holder description

The DASY5 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. This device holder is used for standard mobile phones or PDA's only. If necessary an additional support of polystyrene material is used.

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.

4. SAR MEASUREMENT PROCEDURE

4.1. Scanning procedure

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

process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT's output power and should vary max. +/- 5 %.

- The surface check measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)
- The area scan measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strenth 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: Δxzoom, Δyzoom ≤2GHZ≤ 8 mm, 2-4GHz - ≤ 5 mm and 4-6 GHz-≤ 4 mm; Δzzoom ≤ 3GHz - ≤ 5 mm, 3-4 GHz- ≤ 4 mm and 4-6GHz-≤2mm where the robot additionally moves the probe along the z-axis away from the bottom of the Phantom. DASY5 is also able to perform repeated zoom scans if more than 1 peak is found during area scan. Test results relevant for the specified standard (see chapter 1.5.) are shown in table form in chapter 3.2.

- 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 2mm 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	Maximum Area Scan resolution (Δxarea, Δ yarea)	Maximum Zoom Scan spatial resolution(Δ xzoom Δ yzoom)	Maximum Zoom Scan spatial resolution			Minimum zoom scan volume (x,y,z)
			Uniform Grid	Graded Grad		
			Δ zzoom(n)	Δ zzoom(1)	Δzzoom(n>1)	
≤2GHz	≤15mm	≤8mm	≤5mm	≤4mm	≤ 1.5* Δ zzoom(n-1)	≥30mm
2-3GHz	≤12mm	≤5mm	≤5mm	≤4mm	≤ 1.5* Δ zzoom(n-1)	≥30mm
3-4GHz	≤10mm	≤5mm	≤4mm	≤3mm	≤ 1.5* Δ zzoom(n-1)	≥28mm
4-5GHz	≤10mm	≤4mm	≤3mm	≤2.5mm	≤ 1.5* Δ zzoom(n-1)	≥25mm
5-6GHz	≤10mm	≤4mm	≤2mm	≤2mm	≤ 1.5* Δ zzoom(n-1)	≥22mm

Spatial Peak SAR Evaluation

- The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The bases 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).
- 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 neigh boring volume with a higher average value is found.
- Extrapolation
- The extrapolation is based on a least square algorithm [W. Gander, Computermathematik, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

Interpolation

- The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computermathematik, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff].
- Volume Averaging
- At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.
- Advanced Extrapolation
- DASY5 uses the advanced extrapolation option which is able to compansate boundary effects on E-field probes.

4.1.1. 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	Normi, ai0, ai1, ai2
	- Conversion factor	ConvFi
	- 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 Vi = compensated signal of channel i (i = x, y, z)
Ui = input signal of channel i (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcpi = diode compression point (DASY parameter)

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

E-field probes: $Ei = (Vi / Normi \bullet ConvF)1/2$

H-field probes: $Hi = (Vi)1/2 \bullet (ai0 + ai1f + ai2f2)/f$

with Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel i (i = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel i in V/m
Hi = 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 = (Etot2 • σ) / (ρ • 1000)

with SAR = local specific absorption rate in mW/g

Etot = total field strength in V/m

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

ρ = equivalent tissue density in g/cm3

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

Ppwe = Etot2 / 3770 or Ppwe = Htot2 • 37.7

with Ppwe = equivalent power density of a plane wave in mW/cm2

Etot = total electric field strength in V/m

Htot = total magnetic field strength in A/m

5. SYSTEM VERIFICATION PROCEDURE

5.1. Tissue Verification

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric 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

Ingredient (% by weight)	Head Tissue					
	835	1750	1900	2450	2600	5G
Water	41.45	52.64	55.24	62.7	55.242	56
Salt(NaCl)	1.45	0.36	0.306	0.5	0.306	0.0
Sugar	56.0	0.0	0.0	0.0	0.0	0.0
HEC	1.0	0.0	0.0	0.0	0.0	0.0
Bactericide	0.1	0.0	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	17.24
DGBE	0.0	47.0	44.54	36.8	44.452	0.0

Ingredient (% by weight)	Body Tissue					
	835	1750	1900	2450	2600	5G
Water	52.4	69.91	69.91	73.20	64.50	65.53
Salt(NaCl)	1.40	0.13	0.13	0.04	0.02	0.0
Sugar	45.0	0.0	0.0	0.0	0.0	0.0
HEC	1.0	0.0	0.0	0.0	0.0	0.0
Bactericide	0.1	0.0	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	17.24
DGBE	0.0	29.96	22.96	26.76	35.48	0.0

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

Head & Body Tissue-equivalent liquid measurements:

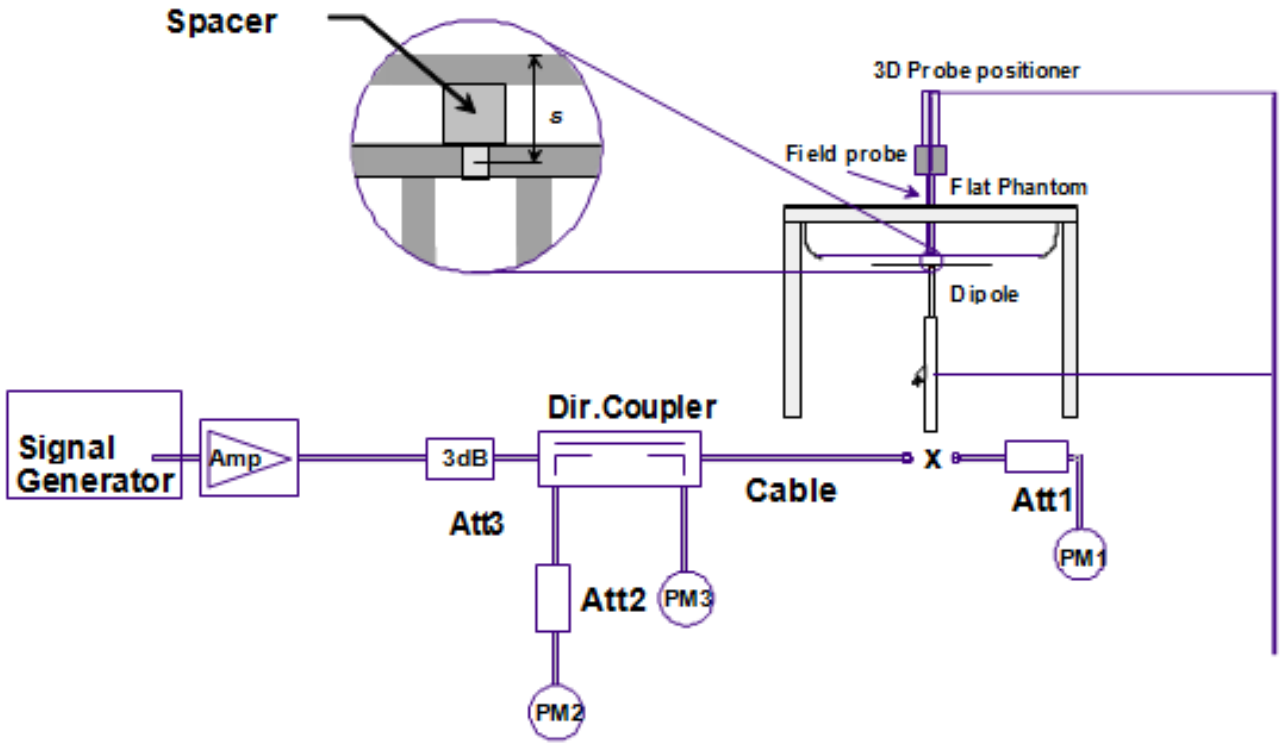
Used Target Frequency	Target Tissue		Measured Tissue		Liquid Temp	Test Date
	εr (+/-5%)	σ(S/m) (+/-5%)	εr	σ (S/m)		
750MHz Head	43.19 (41.03~45.35)	0.89 (0.85~0.93)	41.4	0.89	22°C	2020.05.11
835MHz Head	42.77 (40.63~44.91)	0.93 (0.88~0.98)	42.81	0.92	21°C	2020.05.12
1750MHz Head	39.31 (37.34~41.28)	1.35 (1.28~1.42)	40.11	1.41	21°C	2020.05.13
1900MHz Head	38.81 (36.87~40.75)	1.39 (1.32~1.46)	39.75	1.45	22°C	2020.05.14
2300MHz Head	38.91 (36.87~40.75)	1.62 (1.46~1.78)	38.45	1.48	22°C	2020.05.14
2450MHz Head	39.60 (37.62~41.58)	1.75 (1.66~1.84)	37.97	1.75	21°C	2020.05.15
2600MHz Head	40.40 (38.38~42.42)	2.04 (1.94~2.14)	37.70	1.88	21°C	2020.05.16
5.25GHz Head	35.85 (34.06~37.64)	4.84 (4.47~4.95)	36.69	4.64	22°C	2020.05.17
5.6GHz Head	36.92 (35.07~38.77)	4.95 (4.70~5.20)	36.70	5.10	22°C	2020.05.17
5.8GHz Head	36.23 (34.42~38.04)	5.34 (5.07~5.61)	35.19	5.21	22°C	2020.05.17
ε_r= Relative permittivity, σ= Conductivity						

System checking, Head & Body Tissue-equivalent liquid:

System Check	Target SAR (1W) (+/-10%)		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (W/kg)	10-g (W/kg)	1-g (W/kg)	10-g (W/kg)		
D750V2 Head	8.66 (7.79~9.53)	5.83 (5.25~6.41)	9.11	5.32	22°C	2020.05.11
D835V2 Head	9.31 (8.38~10.24)	6.13 (5.52~6.74)	10.32	6.12	21°C	2020.05.12
D1750V2 Head	35.7 (33.13~39.27)	18.8 (16.92~20.68)	36.04	18.80	21°C	2020.05.13
D1900V2 Head	39.8 (35.82~43.78)	21.1 (18.99~23.21)	36.92	19.28	22°C	2020.05.14
D2300V2 Head	47.5 (42.75~52.25)	22.4 (20.16~24.64)	42.90	20.48	22°C	2020.05.14
D2450V2 Head	53.1 (47.79~58.41)	24.7 (22.23~27.17)	49.20	24.48	21°C	2020.05.15
D2600V3 Head	56.9 (51.21~62.59)	25.2 (22.68~27.72)	54.82	25.00	21°C	2020.05.16
5.25GHz Head	76.5 (68.85~84.15)	21.8 (19.62~23.98)	80.47	22.20	22°C	2020.05.17
5.6GHz Head	80.2 (72.18~88.22)	22.8 (20.52~25.08)	80.50	23.15	22°C	2020.05.17
5.75GHz Head	78.2 (70.38~86.02)	22.2 (19.98~24.42)	84.22	23.29	22°C	2020.05.17

System Checking

The manufacturer calibrates the probes annually. A system check measurement was made following the determination of the dielectric parameters of the tissue-equivalent liquid, using the dipole validation kit. A power level of 250mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom.



The system checking results (dielectric parameters and SAR values) are given in the table below.

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

6. SAR MEASUREMENT VARIABILITY AND UNCERTAINTY

6.1. SAR measurement variability

Per KDB865664 D01 SAR measurement 100MHz to 6GHz 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 measurement 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; step2) through 4) do not apply.
2) When the original highest measured SAR is ≥0.8 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 ≥1.5W/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.

6.2. SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100MHz to 6GHz v01r03, when the highest measured 1-g SAR within a frequency band is <1.5W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2003 is not required in SAR reports submitted for equipment approval. The equivalent ratio(1.5/1.6) is applied to

extremity and occupational exposure conditions.

7. Test Configuration

The DUT is tested using a CMU 200 or E5515C communications tester as controller unit to set test channels and maximum output power to the DUT, as well as for measuring the conducted peak power.

Test positions as described in the tables above are in accordance with the specified test standard.

GSM Test Configuration

The tests for GSM850 and GSM1900, a communication link is set up with a System Simulator by air link. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 975, 37 and 124 respectively in the case of GSM900, to 512, 698 and 885 respectively in the case of GSM1900. The tests in the band of GSM850 and GSM1900 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 10 for this EUT, it has at most 2 timeslots in Up antenna and at most 4 timeslots in Down antenna, the maximum total timeslot is 5. The EGPRS class is 10 for this EUT, it has at most 2 timeslots in Up antenna, and at most 4 timeslots in Down antenna, the maximum total timeslot is 5. The device output power was set to maximum power level for all tests. Using CMU200 the power control level is set to “5”for GSM850, set to “0”for GSM1900.

WCDMA Test Configuration

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

	Mode	Rel99
	Subtest	---
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c / β_d	8/15

Handsets with Release 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSDPA using the HSDPA body SAR procedures in the “Release 5 HSDPA Data Devices” section of this document, for the highest reported SAR body-worn accessory exposure configuration in 12.2 kbps RMC. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

HSDPA should be configured according to the UE category of a test device.The number of HSDSCH/HS-PDSCHs, HARQ 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 conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors(βc, βd), and HS-DPCCH power offset parameters (ΔACK, ΔNACK, ΔCQI) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (note 1, note 2)	CM(dB) (note 3)	MPR(dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (note 4)	15/15 (note 4)	64	12/15 (note 4)	24/15	1.0	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

Note1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI}= 8 $\Leftrightarrow A_{hs} = \beta_{hs}/\beta_c$=30/15 $\Leftrightarrow \beta_{hs}$=30/15*$\beta_c$

Note2: CM=1 for β_c/β_d =12/15, β_{hs}/β_c=24/15.

Note3: For subtest 2 the $\beta_c\beta_d$ ratio of 12/15 for the TFC during the measurement period(TF1,TF0) is achieved by setting the signaled gain factors for the reference TFC (TFC1,TF1) to β_c=11/15 and β_d=15/15.

HSUPA Test Configuration

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures in the “Release 6 HSPA Data Devices” section of this document, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When VOIP is applicable for next to the ear head exposure in HSPA, the 3G SAR test reduction procedure is applied to HSPA with 12.2 kbps RMC as the

primary mode; otherwise, the same HSPA configuration used for body-worn accessory measurements is tested for next to the ear head exposure.

Due to inner loop power control requirements in HSPA, a communication test set is required for output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA are configured according to the β values indicated in Table 2 and other applicable procedures described in the 'WCDMA Handset' and 'Release 5 HSDPA Data Devices' sections of this document

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	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}, ΔNACK and Δ_{CQI} = 8 $\Leftrightarrow$ $A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.

Note 2: CM = 1 for βc/βd =12/15, β_{hs}/β_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 βc/βd ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to βc = 10/15 and βd = 15/15.

Note 4: For subtest 5 the βc/βd ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to βc = 14/15 and βd = 15/15.

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Figure 5.1g.

Note 6: βed can not be set directly; it is set by Absolute Grant Value.

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI (ms)	Minimum Spreading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	11484	5.76
	4	4	10		20000	2.00
7 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	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 supports QPSK only. UE Category 7 supports QPSK and 16QAM. (TS25.306-7.3.0)						

HSPA, HSPA+ and DC-HSDPA Test Configuration

measurement is required for HSPA, HSPA+ or DC-HSDPA, a KDB inquiry is required to confirm that the wireless mode configurations in the test setup have remained stable throughout the SAR measurements.35 Without prior KDB confirmation to determine the SAR results are acceptable, a PBA is required for TCB approval. SAR test exclusion for HSPA, HSPA+ and DC-HSDPA is determined according to the following:

1) The HSPA procedures are applied to configure 3GPP Rel. 6 HSPA devices in the required Sub-test mode(s) to determine SAR test exclusion.

2) SAR is required for Rel. 7 HSPA+ when SAR is required for Rel. 6 HSPA; otherwise, the 3G SAR test reduction procedure is applied to (Up antenna) HSPA+ with 12.2 kbps RMC as the primary mode.36 Power is measured for HSPA+ that supports Up antenna 16 QAM according to configurations in Table C.11.1.4 of 3GPP TS 34.121-1 to determine SAR test reduction.

3) 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 secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be

acceptable.

4) Regardless of whether a PBA is required, the following information must be verified and included in the SAR report for devices supporting HSPA, HSPA+ or DC-HSDPA: a) The output power measurement results and applicable release version(s) of 3GPP TS 34.121.

i) Power measurement difficulties due to test equipment setup or availability must be resolved between the grantee and its test lab.

b) The power measurement results are in agreement with the individual device implementation and specifications. When Enhanced MPR (E-MPR) applies, the normal MPR targets may be modified according to the Cubic Metric (CM) measured by the device, which must be taken into consideration.

c) The UE category, operating parameters, such as the β and Δ values used to configure the device for testing, power setback procedures described in 3GGPP TS 34.121 for the power measurements, and HSPA/HSPA+ channel conditions (active and stable) for the entire duration of the measurement according to the required E-TFCI and AG index values.

5) When SAR measurement is required, the test configurations, procedures and power measurement results must be clearly described to confirm that the required test parameters are used, including E-TFCI and AG index stability and output power conditions.

HS-DSCH category	Maximum number of HS-DSCH codes received	Minimum inter-TTI interval	Maximum number of bits of an HS-DSCH transport block received within an HS-DSCH TTI NOTE 1	Total number of soft channel bits	Supported modulations without MIMO operation or dual cell operation	Supported modulations with MIMO operation and without dual cell operation	Supported modulations with dual cell operation
Category 1	5	3	7298	19200	QPSK, 16QAM	Not applicable (MIMO not supported)	Not applicable (dual cell operation not supported)
Category 2	5	3	7298	28800			
Category 3	5	2	7298	28800			
Category 4	5	2	7298	38400			
Category 5	5	1	7298	57600			
Category 6	5	1	7298	67200			
Category 7	10	1	14411	115200			
Category 8	10	1	14411	134400			
Category 9	15	1	20251	172800			
Category 10	15	1	27952	172800			
Category 11	5	2	3630	14400	QPSK		
Category 12	5	1	3630	28800			
Category 13	15	1	35280	259200	QPSK, 16QAM, 64QAM		
Category 14	15	1	42192	259200			
Category 15	15	1	23370	345600	QPSK, 16QAM		
Category 16	15	1	27952	345600			
Category 17 NOTE 2	15	1	35280	259200	QPSK, 16QAM, 64QAM	-	
			23370	345600	-	QPSK, 16QAM	
Category 18 NOTE 3	15	1	42192	259200	QPSK, 16QAM, 64QAM	-	
			27952	345600	-	QPSK, 16QAM	
Category 19	15	1	35280	518400	QPSK, 16QAM, 64QAM		
Category 20	15	1	42192	518400			
Category 21	15	1	23370	345600	-	-	QPSK, 16QAM
Category 22	15	1	27952	345600			
Category 23	15	1	35280	518400			QPSK, 16QAM, 64QAM
Category 24	15	1	42192	518400			

LTE Test Configuration

SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02r05. 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:

Maximun Power Reduction(MRP) for Power Class 3

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

Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		rmal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	6592 T_S	2192 T_S	2560 T_S	7680 T_S	2192 T_S	2560 T_S
1	19760 T_S			20480 T_S		
2	21952 T_S			23040 T_S		
3	24144 T_S			25600 T_S		
4	26336 T_S			7680 T_S	4384 T_S	5120 T_S
5	6592 T_S	4384 T_S	5120 T_S	20480 T_S		
6	19760 T_S			23040 T_S		
7	21952 T_S			12800 T_S		

8	24144 T_S			-	-	-
9	13168 T_S			-	-	-

Uplink-downlink configurations

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

Calculated Duty Cycle = Extended cyclic prefix in uplink x (Ts) x # of S + # of U

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:

Calculated Duty Cycle = 5120 x [1/(15000 x 2048)] x 2 + 6 ms = 63.33%

Where Ts = 1/(15000 x 2048) seconds

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 ≤ 0.8W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1RB 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.

8. TUNE-UP LIMIT

The GSM850 power adjust procedure

GSM (CS): 31dBm [-1.0dB~+0.9dB]

GPRS/GSM (GMSK, 1 Tx slot): 31dBm [-1.0dB~+0.9dB]

GPRS/GSM (GMSK, 2 Tx slot): 29dBm [-1.0dB~+0.9dB]

GPRS/GSM (GMSK, 3Tx slot): 25Bm [-2.0dB~+1.0dB]

GPRS/GSM (GMSK, 4Tx slot): 24dBm [-2.0dB~+0.2dB]

EDGE (8PSK, 1 Tx slot) : 24dBm [-2.0dB~+2.0dB]

EDGE (8PSK, 2 Tx slot) : 22dBm [-2.0dB~+2.0dB]

EDGE (8PSK, 3 Tx slot) : 20dBm [-2.0dB~+2.0dB]

EDGE (8PSK, 4 Tx slot) : 20dBm [-2.0dB~+2.0dB]

The PCS1900 power adjust procedure

GSM (CS): 29dBm [-1.0dB~+0.4dB]

GPRS/GSM (GMSK, 1 Tx slot): 29dBm [-1.0dB~+0.4dB]

GPRS/GSM (GMSK, 2 Tx slot): 27dBm [-1.0dB~+0.4dB]

GPRS/GSM (GMSK, 3Tx slot): 25dBm [-2.0dB~+0.4dB]

GPRS/GSM (GMSK, 4Tx slot): 25dBm [-2.0dB~+2.0dB]

EDGE (8PSK, 1 Tx slot) : 25dBm [-2.0dB~+2.0dB]

EDGE (8PSK, 2 Tx slot) : 24dBm [-2.0dB~+2.0dB]

EDGE (8PSK, 3 Tx slot) : 21dBm [-2.0dB~+2.0dB]

EDGE (8PSK, 4 Tx slot) : 20dBm [-2.0dB~+2.0dB]

The WCDMA Band 2 power adjust procedure

RMC: 22dBm [-2.0dB~~+0.2dB]

HSDPA: 22dBm [-2.0dB~~+0.2dB]

HSUPA: 22dBm [-2.0dB~~+0.2dB]

The WCDMA Band 5 power adjust procedure

RMC: 22dBm [-2.0dB~~+0.6dB]

HSDPA: 22dBm [-2.0dB~~+0.6dB]

HSUPA: 22dBm [-2.0dB~~+0.6dB]

The LTE Band 2power adjust procedure

1.4 MHz QPSK/16QAM: 22dBm [-3.0dB~~+0.9dB]

3 MHz QPSK/16QAM: 22dBm [-3.0dB~~+0.9dB]

5 MHz QPSK/16QAM: 22dBm [-3.0dB~~+0.9dB]

10 MHz QPSK/16QAM: 22dBm [-3.0dB~~+0.9dB]

15 MHz QPSK/16QAM: 22dBm [-3.0dB~~+0.9dB]

20 MHz QPSK/16QAM: 22dBm [-3.0dB~~+0.9dB]

The LTE Band 4power adjust procedure

1.4 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.3dB]

3 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.3dB]

5 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.3dB]

10 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.3dB]

15 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.3dB]

20 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.3dB]

The LTE Band 5power adjust procedure

1.4 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.2dB]

3 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.2dB]

5 MHz QPSK/16QAM: 23dBm [-3.0dB~~+1.0dB]

10 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.2dB]

The LTE Band 7power adjust procedure

5 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.2dB]

10 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.2dB]

15 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.2dB]

20 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.2dB]

The LTE Band 12power adjust procedure

1.4 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.6dB]

3 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.6dB]

5 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.6dB]

10 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.6dB]

The LTE Band 13power adjust procedure

5 MHz QPSK/16QAM: 22dBm [-3.0dB~~+1.0dB]

10 MHz QPSK/16QAM: 22dBm [-3.0dB~~+1.0dB]

The LTE Band 17power adjust procedure

5 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.6dB]

10 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.6dB]

The LTE Band 38power adjust procedure

5 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.4dB]

10 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.4dB]

15 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.4dB]

20 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.4dB]

The LTE Band 41power adjust procedure

5 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.5dB]

10 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.5dB]

15 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.5dB]

20 MHz QPSK/16QAM: 23dBm [-3.0dB~~+0.5dB]

The Wi-Fi 2.4Gpower adjust procedure

802.11b: 13dBm [-3.0dB~~+0.4dB]

802.11g 12dBm [-3.0dB~~+0.8dB]

802.11n-HT20: 12dBm [-3.0dB~~+0.5dB]

802.11n-HT40: 11dBm [-3.0dB~~+0.5dB]

The Wi-Fi 5Gpower adjust procedure

802.11a: 13dBm [-3.0dB~~+0.8dB]

802.11n-HT20: 13dBm [-3.0dB~~+0.8dB]

802.11n-HT40: 13dBm [-3.0dB~~+0.8dB]

802.11ac-HT80: 13dBm [-3.0dB~~+0.8dB]

The BT power adjust procedure

BT: 8dBm [-1dB~~+0.1dB]

BLE: 7dBm[-1dB~~+0.2dB]

9. MEASUREMENT RESULTS

Result: Passed

Date of testing	:	2020.05.11~2018.05.17;
Ambient temperature	:	20℃~22℃
Relative humidity	:	50~68%

9.1. Conducted Power

For the measurements a Rohde & Schwarz Radio Communication Tester CMU 200 was used.
SAR drift measured at the same position in liquid before and after each SAR test.
Note: CMU200 measures GSM peak and average output power for active timeslots. For SAR the time based 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
Time based avg. power compared to slotted avg. power	-9.00dB	-6.00 dB	-4.26dB	-3.00dB

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.

GSM Conducted Power Measurement Results

Band: GSM850	Burst Average Power (dBm)			Frame Average Power (dBm)		
Channel	128	190	251	128	190	251
GSM(CS)	**31.81**	**31.82**	**31.83**	**22.81**	**22.82**	**22.83**
GPRS/EDGE (GMSK, 1 Tx slot)	31.69	31.75	31.78	22.69	22.75	22.78
GPRS/EDGE (GMSK, 2 Tx slots)	**29.88**	**29.87**	**29.88**	**23.88**	**23.87**	**23.88**
GPRS/EDGE (GMSK, 3 Tx slots)	25.87	25.77	25.90	21.61	21.51	21.64
GPRS/EDGE (GMSK, 4 Tx slots)	24.18	24.04	24.22	21.18	21.04	21.22
EDGE (8PSK, 1 Tx slot)	24.69	24.81	24.93	15.50	15.62	15.74
EDGE (8PSK, 2 Tx slots)	22.66	22.84	23.00	16.53	16.71	16.87
EDGE (8PSK, 3 Tx slots)	20.62	20.87	21.07	16.20	16.45	16.65
EDGE (8PSK, 4 Tx slots)	20.59	20.91	20.14	17.41	17.73	16.96

Remark:

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 timeslots.
3) The bolded GPRS 2 Tx mode was selected as the primary mode for SAR testing according to the highest frame- averaged output power table.

GSM Conducted Power Measurement Results

Band: DCS1900	Burst Average Power (dBm)			Frame Average Power (dBm)		
Channel	513	661	810	513	661	810
GSM1900(CS)	**29.34**	**29.32**	**29.33**	**20.34**	**20.32**	**20.33**
GPRS/EDGE (GMSK, 1 Tx slot)	29.31	29.41	29.31	20.31	20.41	20.31
GPRS/EDGE (GMSK, 2 Tx slots)	**27.34**	**27.38**	**27.38**	**21.34**	**21.38**	**21.38**
GPRS/EDGE (GMSK, 3 Tx slots)	25.36	25.16	25.11	21.10	20.90	20.85
GPRS/EDGE (GMSK, 4 Tx slots)	23.17	23.32	23.06	20.17	20.32	20.06
EGPRS (8PSK, 1 Tx slot)	26.53	26.81	26.83	17.34	17.62	17.64
EGPRS (8PSK, 2 Tx slots)	23.99	24.36	24.34	17.86	18.23	18.21
EGPRS (8PSK, 3 Tx slots)	21.86	22.16	22.14	17.44	17.74	17.72
EGPRS (8PSK, 4 Tx slots)	20.67	20.98	20.94	17.49	17.80	17.76

Remark:

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 timeslots.

The bolded GPRS 2 Tx mode was selected as the primary mode for SAR testing according to the highest frame- averaged output power table.

UMTS Band II		Conducted Power (dBm)		
		9262CH	9400CH	9538CH
WCDMA	12.2kbpsRMC	**22.17**	**22.20**	**22.14**
	64kbps RMC	22.10	22.05	22.09
	144kbps RMC	22.12	21.97	22.14
	384kbps RMC	22.15	22.09	22.14
HSDPA	Subtest 1	22.15	22.02	22.09
	Subtest 2	21.37	21.26	21.27
	Subtest 3	20.79	20.65	20.70
	Subtest 4	20.48	20.38	20.41
HSUPA	Subtest 1	21.20	21.07	21.09
	Subtest 2	19.12	19.01	19.04
	Subtest 3	20.05	19.94	19.99
	Subtest 4	19.84	19.71	19.79
	Subtest 5	21.29	21.20	21.21

UMTS Band V		Conducted Power (dBm)		
		4132CH	4182CH	4233CH
WCDMA	12.2kbpsRMC	**22.56**	**22.51**	**22.54**
	64kbpsRMC	22.49	22.46	22.49
	144kbpsRMC	22.51	22.38	22.54
	384kbpsRMC	22.54	22.50	22.54
HSDPA	Subtest 1	22.54	22.43	22.49
	Subtest 2	21.76	21.67	21.67
	Subtest 3	21.18	21.06	21.10
	Subtest 4	20.87	20.79	20.81
HSUPA	Subtest 1	21.59	21.48	21.49
	Subtest 2	19.51	19.42	19.44
	Subtest 3	20.44	20.35	20.39
	Subtest 4	20.23	20.12	20.19
	Subtest 5	21.68	21.61	21.61

Conducted power measurements of LTE Band 2

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				18607	18900	19193
1.4MHz	QPSK	1	0	22.59	22.44	22.40
		1	3	22.81	22.58	22.36
		1	5	22.61	22.45	22.51
		3	0	22.62	22.50	22.46
		3	2	22.63	22.55	22.46
		3	3	22.65	22.53	22.49
		6	0	21.59	21.49	21.48
	16QAM	1	0	21.35	21.25	21.32
		1	3	21.37	21.30	21.28
		1	5	21.53	21.18	21.43
		3	0	21.45	21.28	21.24
		3	2	21.45	21.25	21.25
		3	3	21.44	21.28	21.26
		6	0	20.47	20.51	20.53

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				18615	18900	19185
3MHz	QPSK	1	0	22.89	22.76	22.68
		1	7	22.87	22.79	22.73
		1	14	22.87	22.81	22.68
		8	0	21.88	21.71	21.67
		8	4	21.87	21.71	21.68
		8	7	21.88	21.67	21.68
		15	0	21.83	21.67	21.61
	16QAM	1	0	21.80	21.50	21.42
		1	7	21.83	21.57	21.40
		1	14	21.82	21.56	21.38
		8	0	20.88	20.69	20.66
		8	4	20.89	20.67	20.67
		8	7	20.87	20.71	20.66
		15	0	20.87	20.59	20.55

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				18625	18900	19175
5MHz	QPSK	1	0	22.83	22.70	22.70
		1	12	22.67	22.77	22.68
		1	24	22.82	22.67	22.78
		12	0	21.85	21.62	21.63
		12	6	21.82	21.67	21.66
		12	13	21.81	21.66	21.59
		25	0	21.84	21.67	21.64
	16QAM	1	0	21.79	21.50	21.61
		1	13	21.89	21.62	21.50
		1	24	21.77	21.54	21.52
		12	0	20.92	20.70	20.64
		12	6	20.92	20.70	20.66
		12	13	20.92	20.72	20.63
		25	0	20.86	20.70	20.70

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				18650	18900	19150
10MHz	QPSK	1	0	22.94	22.71	22.67
		1	24	22.82	22.78	22.85
		1	49	22.95	22.87	22.73
		25	0	21.90	21.74	21.71
		25	12	21.94	21.77	21.75
		25	25	21.90	21.69	21.72
		50	0	21.92	21.67	21.72
	16QAM	1	0	21.81	21.46	21.67
		1	24	21.65	21.55	21.75
		1	49	21.67	21.42	21.64
		25	0	20.98	20.82	20.74
		25	12	20.99	20.73	20.71
		25	25	20.97	20.83	20.73
		50	0	20.94	20.73	20.71

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				18675	18900	19125
15MHz	QPSK	1	0	22.83	22.71	22.67
		1	24	22.69	22.83	22.78
		1	49	22.76	22.66	22.62
		25	0	21.81	21.51	21.71
		25	12	21.92	21.34	21.57
		25	25	21.80	21.42	21.64
		50	0	21.94	21.78	21.81
	16QAM	1	0	21.91	21.34	21.53
		1	24	21.77	21.53	21.63
		1	49	21.79	21.41	21.72
		25	0	21.92	21.38	21.52
		25	12	21.80	21.50	21.69
		25	25	21.80	21.35	21.61
		50	0	20.95	20.80	20.75

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				18700	18900	19100
20MHz	QPSK	1	0	23.00	22.47	22.52
		1	24	**22.85**	**22.82**	**22.90**
		1	49	22.63	22.84	22.51
		25	0	21.79	21.76	21.72
		25	12	21.81	21.66	21.72
		25	25	21.91	21.77	21.68
		50	0	21.83	21.70	21.70
	16QAM	1	0	22.09	21.21	21.30
		1	24	21.65	21.68	21.65
		1	49	21.64	21.29	21.32
		25	0	20.83	20.84	20.70
		25	12	20.82	20.82	20.72
		25	25	20.94	20.71	20.72
		50	0	20.87	20.72	20.72

Conducted power measurements of LTE Band 4

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				19957	20175	20393
1.4MHz	QPSK	1	0	23.27	23.02	23.10
		1	3	23.11	23.00	23.08
		1	5	23.11	23.16	23.22
		3	0	23.12	23.08	23.10
		3	2	23.16	23.06	23.09
		3	3	23.15	23.12	23.11
		6	0	22.13	22.10	22.09
	16QAM	1	0	21.79	21.86	21.85
		1	3	21.99	21.90	21.85
		1	5	21.80	22.06	21.97
		3	0	21.89	21.87	21.90
		3	2	21.89	21.84	21.92
		3	3	21.92	21.88	21.91
		6	0	21.13	21.11	20.99

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				19965	20175	20385
3MHz	QPSK	1	0	23.18	23.08	23.06
		1	7	23.18	23.08	23.06
		1	14	23.14	23.10	23.07
		8	0	22.06	22.04	22.07
		8	4	22.05	22.07	22.03
		8	7	22.06	22.06	22.04
		15	0	22.03	22.00	22.00
	16QAM	1	0	21.95	21.82	22.01
		1	7	21.92	21.80	22.02
		1	14	21.93	21.77	22.04
		8	0	21.07	21.05	21.12
		8	4	21.08	21.06	21.11
		8	7	21.11	21.08	21.08
		15	0	21.01	20.95	21.09

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				19975	20175	20375
5MHz	QPSK	1	0	23.04	23.03	23.16
		1	12	23.16	23.17	23.06
		1	24	23.04	23.03	23.06
		12	0	22.04	21.99	22.03
		12	6	22.08	22.00	21.98
		12	13	22.03	22.04	22.03
		25	0	22.09	22.06	22.07
	16QAM	1	0	22.03	22.01	21.99
		1	13	22.15	21.86	21.91
		1	24	22.05	21.87	21.92
		12	0	21.11	21.10	21.06
		12	6	21.14	21.12	21.06
		12	13	21.20	21.09	21.09
		25	0	21.09	21.12	21.09

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20000	20175	20350
10MHz	QPSK	1	0	23.13	23.20	23.01
		1	24	23.24	23.07	23.08
		1	49	23.14	23.05	23.22
		25	0	22.10	22.14	22.12
		25	12	22.17	22.09	22.13
		25	25	22.13	22.12	22.06
		50	0	22.15	22.09	22.09
	16QAM	1	0	21.90	21.78	21.99
		1	24	22.04	21.88	22.15
		1	49	21.93	21.79	21.99
		25	0	21.18	21.24	21.08
		25	12	21.25	21.13	21.15
		25	25	21.19	21.22	21.16
		50	0	21.22	21.12	21.09

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20025	20175	20325
15MHz	QPSK	1	0	23.13	23.04	23.00
		1	24	22.94	23.05	23.15
		1	49	22.97	23.17	22.99
		25	0	22.05	21.86	22.09
		25	12	22.05	21.74	21.93
		25	25	22.19	21.74	21.94
		50	0	22.18	22.14	22.14
	16QAM	1	0	22.04	21.72	22.09
		1	24	22.18	21.73	21.98
		1	49	22.07	21.84	21.90
		25	0	22.08	21.71	22.07
		25	12	22.21	21.80	21.96
		25	25	22.08	21.72	21.92
		50	0	21.19	21.14	21.12

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20050	20175	20050
20MHz	QPSK	1	0	23.26	22.78	22.80
		1	24	**23.22**	**23.27**	**23.23**
		1	49	22.85	22.85	22.89
		25	0	22.11	22.09	22.07
		25	12	22.03	22.06	22.06
		25	25	22.06	22.06	21.99
		50	0	22.07	22.02	21.98
	16QAM	1	0	22.37	21.57	21.71
		1	24	21.94	21.95	22.09
		1	49	21.97	21.66	21.64
		25	0	21.13	21.21	21.04
		25	12	21.18	21.19	21.10
		25	25	21.13	21.14	21.11
		50	0	21.14	21.11	21.04

Conducted power measurements of LTE Band 5

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20407	20525	20643
1.4MHz	QPSK	1	0	22.87	22.83	22.80
		1	3	22.89	22.93	22.73
		1	5	22.99	22.82	22.93
		3	0	22.91	22.87	22.90
		3	2	22.91	22.87	22.87
		3	3	22.91	22.94	22.85
		6	0	21.86	21.84	21.86
	16QAM	1	0	21.67	21.63	21.61
		1	3	21.87	21.50	21.80
		1	5	21.70	21.55	21.66
		3	0	21.70	21.63	21.67
		3	2	21.68	21.65	21.65
		3	3	21.69	21.62	21.65
		6	0	20.75	20.87	20.86

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20415	20525	20635
3MHz	QPSK	1	0	23.02	22.96	22.91
		1	7	23.05	22.98	22.98
		1	14	23.06	23.03	22.93
		8	0	22.00	21.86	21.93
		8	4	22.00	21.88	21.90
		8	7	21.99	21.90	21.95
		15	0	21.96	21.90	21.86
	16QAM	1	0	21.95	21.77	21.72
		1	7	21.99	21.77	21.61
		1	14	22.01	21.79	21.64
		8	0	21.08	20.94	20.96
		8	4	21.07	20.93	20.96
		8	7	21.06	20.93	20.96
		15	0	21.03	20.88	20.83

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20425	20525	20625
5MHz	QPSK	1	0	23.02	22.91	22.94
		1	12	22.87	22.86	22.84
		1	24	22.94	22.93	22.91
		12	0	21.86	21.83	21.84
		12	6	21.95	21.81	21.83
		12	13	21.86	21.83	21.65
		25	0	21.95	21.88	21.79
	16QAM	1	0	21.93	21.73	21.72
		1	13	22.07	21.71	21.85
		1	24	21.98	21.79	21.82
		12	0	21.01	20.89	20.87
		12	6	21.02	20.98	20.75
		12	13	21.09	20.90	20.88
		25	0	20.98	20.95	20.86

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20450	20525	20600
10MHz	QPSK	1	0	22.89	22.92	22.87
		1	24	**23.05**	**23.04**	**23.10**
		1	49	22.91	23.03	22.84
		25	0	21.89	21.94	21.59
		25	12	21.91	21.89	21.82
		25	25	21.98	21.94	21.83
		50	0	21.91	21.90	21.72
	16QAM	1	0	21.89	21.64	21.83
		1	24	21.70	21.67	21.90
		1	49	21.69	21.61	21.80
		25	0	21.09	21.01	20.89
		25	12	20.96	21.07	20.86
		25	25	20.93	20.96	20.64
		50	0	20.99	20.98	20.75

Conducted power measurements of LTE Band 7

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20775	21100	21425
5MHz	QPSK	1	0	22.56	22.69	22.76
		1	12	22.62	22.55	22.62
		1	24	22.69	22.62	22.63
		12	0	21.70	21.66	21.60
		12	6	21.73	21.66	21.61
		12	13	21.75	21.68	21.58
		25	0	21.74	21.61	21.63
	16QAM	1	0	21.77	21.50	21.43
		1	13	21.65	21.61	21.48
		1	24	21.65	21.54	21.60
		12	0	20.77	20.65	20.54
		12	6	20.73	20.69	20.54
		12	13	20.75	20.66	20.53
		25	0	20.66	20.69	20.55

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20800	21100	21400
10MHz	QPSK	1	0	22.69	22.60	22.64
		1	24	22.67	22.64	22.75
		1	49	22.70	22.76	22.60
		25	0	21.78	21.70	21.70
		25	12	21.79	21.73	21.62
		25	25	21.77	21.74	21.58
		50	0	21.77	21.71	21.63
	16QAM	1	0	21.51	21.52	21.55
		1	24	21.65	21.44	21.65
		1	49	21.50	21.37	21.55
		25	0	20.72	20.71	20.59
		25	12	20.72	20.73	20.51
		25	25	20.68	20.71	20.51
		50	0	20.75	20.67	20.53

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20825	21100	21375
15MHz	QPSK	1	0	22.63	22.63	22.63
		1	24	22.53	22.53	22.53
		1	49	21.75	21.75	21.75
		25	0	21.69	21.69	21.69
		25	12	21.71	21.71	21.71
		25	25	21.82	21.82	21.82
		50	0	21.87	21.87	21.87
	16QAM	1	0	22.55	22.55	22.55
		1	24	22.64	22.64	22.64
		1	49	22.51	22.51	22.51
		25	0	21.33	21.33	21.33
		25	12	21.47	21.47	21.47
		25	25	21.31	21.31	21.31
		50	0	21.75	21.75	21.75

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20850	21100	21350
20MHz	QPSK	1	0	22.36	22.30	22.84
		1	24	**23.15**	**23.17**	**23.15**
		1	49	22.84	22.31	22.47
		25	0	21.68	21.59	21.58
		25	12	21.65	21.64	21.66
		25	25	21.74	21.61	21.57
		50	0	21.67	21.61	21.61
	16QAM	1	0	21.52	21.19	21.26
		1	24	21.55	21.57	21.25
		1	49	21.91	21.17	21.54
		25	0	20.72	20.63	20.51
		25	12	20.66	20.67	20.45
		25	25	20.64	20.64	20.54
		50	0	20.64	20.56	20.51

Conducted power measurements of LTE Band 12

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23017	23095	23173
1.4MHz	QPSK	1	0	23.44	23.48	23.24
		1	3	23.54	23.29	23.41
		1	5	23.41	23.32	23.30
		3	0	23.44	23.42	23.34
		3	2	23.41	23.42	23.35
		3	3	23.46	23.40	23.38
		6	0	22.48	22.46	22.47
	16QAM	1	0	22.40	22.24	22.22
		1	3	22.25	22.13	22.43
		1	5	22.21	22.16	22.21
		3	0	22.36	22.22	22.20
		3	2	22.34	22.27	22.28
		3	3	22.34	22.21	22.25
		6	0	21.33	21.39	21.37

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23025	23095	23165
3MHz	QPSK	1	0	23.41	23.39	23.36
		1	7	23.43	23.37	23.35
		1	14	23.40	23.40	23.41
		8	0	22.47	22.42	22.45
		8	4	22.48	22.43	22.46
		8	7	22.52	22.43	22.45
		15	0	22.48	22.42	22.41
	16QAM	1	0	22.52	22.29	22.20
		1	7	22.49	22.25	22.23
		1	14	22.49	22.34	22.20
		8	0	21.46	21.37	21.40
		8	4	21.48	21.36	21.41
		8	7	21.49	21.33	21.39
		15	0	21.46	21.34	21.31

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23035	23095	23155
5MHz	QPSK	1	0	23.39	23.33	23.34
		1	12	23.40	23.37	23.44
		1	24	23.54	23.31	23.36
		12	0	22.43	22.48	22.48
		12	6	22.57	22.45	22.39
		12	13	22.49	22.47	22.40
		25	0	22.53	22.50	22.49
	16QAM	1	0	22.38	22.41	22.31
		1	13	22.56	22.47	22.38
		1	24	22.37	22.50	22.28
		12	0	21.45	21.42	21.47
		12	6	21.56	21.49	21.42
		12	13	21.42	21.51	21.47
		25	0	21.51	21.40	21.48

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23060	23095	23130
10MHz	QPSK	1	0	23.43	23.36	23.33
		1	24	**23.60**	**23.60**	**23.56**
		1	49	23.53	23.44	23.31
		25	0	22.47	22.41	22.60
		25	12	22.43	22.49	22.58
		25	25	22.44	22.51	22.62
		50	0	22.46	22.42	22.58
	16QAM	1	0	22.35	22.21	22.43
		1	24	22.41	22.28	22.44
		1	49	22.32	22.17	22.59
		25	0	21.43	21.41	21.50
		25	12	21.43	21.48	21.54
		25	25	21.48	21.45	21.54
		50	0	21.46	21.44	21.52

Conducted power measurements of LTE Band 13

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23205	23230	23255
5MHz	QPSK	1	0	23.08	22.98	23.00
		1	12	**22.97**	**23.00**	**22.97**
		1	24	22.97	22.95	22.87
		12	0	21.88	21.93	21.96
		12	6	21.83	21.91	21.93
		12	13	22.04	21.87	21.86
		25	0	21.97	21.92	21.93
	16QAM	1	0	22.06	22.09	22.05
		1	13	21.80	21.83	21.87
		1	24	21.93	21.88	21.98
		12	0	20.98	20.93	21.02
		12	6	21.02	20.93	21.00
		12	13	21.08	20.98	21.02
		25	0	21.10	21.02	20.96

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				--	23230	--
10MHz	QPSK	1	0	--	23.07	--
		1	24	--	22.99	--
		1	49	--	23.13	--
		25	0	--	21.99	--
		25	12	--	22.01	--
		25	25	--	21.98	--
		50	0	--	21.92	--
	16QAM	1	0	--	21.79	--
		1	24	--	21.88	--
		1	49	--	21.73	--
		25	0	--	21.02	--
		25	12	--	21.06	--
		25	25	--	21.05	--
		50	0	--	21.01	--

Conducted power measurements of LTE Band 17

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23755	23790	23825
5MHz	QPSK	1	0	23.44	23.43	23.30
		1	12	23.55	23.37	23.42
		1	24	23.46	23.30	23.45
		12	0	22.53	22.47	22.47
		12	6	22.54	22.47	22.44
		12	13	22.49	22.55	22.52
		25	0	22.50	22.51	22.53
	16QAM	1	0	22.45	22.53	22.42
		1	13	22.56	22.59	22.31
		1	24	22.39	22.45	22.34
		12	0	21.46	21.57	21.50
		12	6	21.49	21.55	21.48
		12	13	21.48	21.55	21.44
		25	0	21.53	21.43	21.51

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23790	23790	23790
10MHz	QPSK	1	0	23.54	23.44	23.56
		1	24	**23.60**	**23.55**	**23.52**
		1	49	23.46	23.37	23.38
		25	0	22.70	22.62	22.67
		25	12	22.57	22.58	22.63
		25	25	22.69	22.59	22.64
		50	0	22.66	22.63	22.65
	16QAM	1	0	22.51	22.24	22.61
		1	24	22.41	22.38	22.43
		1	49	22.36	22.27	22.53
		25	0	21.66	21.60	21.62
		25	12	21.58	21.60	21.56
		25	25	21.64	21.61	21.60
		50	0	21.60	21.58	21.58

Conducted power measurements of LTE Band 38

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				37775	38000	38225
5MHz	QPSK	1	0	23.03	23.18	23.11
		1	12	23.16	23.04	23.21
		1	24	23.08	23.05	23.01
		12	0	22.14	22.14	22.03
		12	6	22.16	22.09	22.03
		12	13	22.13	22.08	22.06
		25	0	22.18	22.11	22.11
	16QAM	1	0	22.13	21.95	21.97
		1	13	22.23	21.97	21.89
		1	24	22.15	22.11	22.06
		12	0	21.13	21.08	21.11
		12	6	21.15	21.08	21.04
		12	13	21.14	21.07	21.05
		25	0	21.07	21.06	21.12

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				37800	38000	38200
10MHz	QPSK	1	0	23.43	23.10	23.10
		1	24	23.20	23.10	23.34
		1	49	23.20	23.39	23.16
		25	0	22.18	22.18	22.19
		25	12	22.18	22.19	22.11
		25	25	22.26	22.19	22.12
		50	0	22.18	22.17	22.14
	16QAM	1	0	22.27	22.16	22.38
		1	24	22.01	21.90	22.06
		1	49	22.04	21.90	22.08
		25	0	21.12	21.13	21.17
		25	12	21.22	21.16	21.12
		25	25	21.11	21.14	21.11
		50	0	21.15	21.11	21.17

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				37825	38000	38175
15MHz	QPSK	1	0	23.10	22.89	23.13
		1	24	22.04	23.05	23.08
		1	49	23.00	22.95	23.06
		25	0	22.09	22.11	21.83
		25	12	22.01	22.23	21.86
		25	25	22.03	22.10	21.78
		50	0	22.16	22.18	22.13
	16QAM	1	0	22.00	22.11	21.88
		1	24	22.02	22.21	21.81
		1	49	22.13	22.13	21.81
		25	0	22.01	22.10	21.84
		25	12	22.00	22.10	21.88
		25	25	22.11	22.23	21.76
		50	0	21.03	21.13	21.14

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				37850	38000	38150
20MHz	QPSK	1	0	22.92	22.88	22.99
		1	24	**23.33**	**23.37**	**23.38**
		1	49	22.87	22.81	22.88
		25	0	22.03	22.12	22.12
		25	12	22.12	22.11	22.09
		25	25	22.02	22.11	22.10
		50	0	22.05	22.12	22.08
	16QAM	1	0	22.03	21.72	21.78
		1	24	22.50	22.18	22.19
		1	49	22.00	21.65	21.78
		25	0	20.97	21.08	21.14
		25	12	20.97	21.07	21.02
		25	25	21.08	21.07	21.06
		50	0	21.02	21.08	21.09

Conducted power measurements of LTE Band 41

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				40265	40740	41215
5MHz	QPSK	1	0	23.10	23.13	23.24
		1	12	23.06	23.26	23.11
		1	24	23.21	23.11	23.12
		12	0	22.18	22.09	22.05
		12	6	22.14	22.11	22.08
		12	13	22.17	22.04	22.04
		25	0	22.24	22.11	22.09
	16QAM	1	0	22.21	21.96	22.06
		1	13	22.31	21.93	21.94
		1	24	22.14	22.05	21.94
		12	0	21.13	21.12	21.10
		12	6	21.12	21.17	21.07
		12	13	21.18	21.10	21.10
		25	0	21.11	21.16	21.08

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				40290	40740	41190
10MHz	QPSK	1	0	23.15	23.45	23.11
		1	24	23.47	23.10	23.13
		1	49	23.19	23.19	23.41
		25	0	22.17	22.12	22.14
		25	12	22.15	22.13	22.11
		25	25	22.28	22.11	22.14
		50	0	22.17	22.15	22.09
	16QAM	1	0	22.03	21.88	22.06
		1	24	22.02	22.13	22.02
		1	49	22.31	21.87	22.31
		25	0	21.09	21.21	21.13
		25	12	21.08	21.19	21.07
		25	25	21.21	21.20	21.08
		50	0	21.14	21.15	21.11

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				40315	40740	41165
15MHz	QPSK	1	0	23.06	23.11	23.07
		1	24	22.98	23.24	23.09
		1	49	23.14	23.01	23.19
		25	0	22.20	21.94	22.00
		25	12	22.15	21.79	22.14
		25	25	22.32	21.82	22.01
		50	0	22.28	22.20	22.26
	16QAM	1	0	22.17	21.79	22.00
		1	24	22.33	21.89	22.01
		1	49	22.20	21.79	22.13
		25	0	22.33	21.82	22.01
		25	12	22.15	21.94	22.03
		25	25	22.20	21.83	22.11
		50	0	21.18	21.14	21.18

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				40340	40740	41140
20MHz	QPSK	1	0	22.91	22.83	23.50
		1	24	**23.46**	**23.50**	**23.45**
		1	49	23.41	22.94	22.96
		25	0	22.01	22.18	22.07
		25	12	22.23	22.09	22.06
		25	25	22.01	22.15	22.20
		50	0	22.13	22.09	22.11
	16QAM	1	0	22.05	21.69	21.80
		1	24	22.02	22.15	22.32
		1	49	22.56	21.67	21.80
		25	0	20.97	21.13	21.07
		25	12	20.99	21.13	21.05
		25	25	21.22	21.14	21.19
		50	0	21.07	21.10	21.10

802.11b Average power (dBm)					
Channel	Frequency (MHz)	Data Rate (bps)			
		1M	2M	5.5M	11M
CH 01	2,412	**13.36**	13.24	13.19	13.08
CH 06	2,437	**13.39**	13.05	13.02	13.08
CH 11	2,462	**13.38**	13.08	12.74	12.72

802.11g Average power (dBm)									
Channel	Frequency (MHz)	Data Rate (bps)							
		6M	9M	12M	18M	24M	36M	48M	54M
CH 01	2,412	11.68	10.93	10.98	10.9	10.82	10.7	10.48	10.36
CH 06	2,437	12.62	12.43	12.4	12.46	12.51	12.18	11.9	11.75
CH 11	2,462	12.47	12.3	12.25	12.05	12.1	12	11.62	11.48

802.11n-HT20 Average power (dBm)									
Channel	Frequency (MHz)	Data Rate (bps)							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2,412	11.50	10.77	10.74	10.68	10.55	10.33	10.21	9.85
CH 06	2,437	12.35	12.23	12.24	12.08	11.98	11.62	11.53	11.34
CH 11	2,462	12.25	12.04	11.81	11.93	11.80	11.47	11.25	10.88

802.11n-HT40 Average power (dBm)									
Channel	Frequency (MHz)	Data Rate (bps)							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2,422	10.65	10.6	10.17	9.98	9.14	8.59	8.24	7.99
CH 06	2,437	10.96	10.92	10.65	10.5	9.66	9.19	8.87	8.59
CH 09	2,452	10.90	10.91	10.67	10.08	9.31	8.76	8.47	8.33

Band (GHz)	Mode	Data Rate	CH#	Freq (MHz)	Average power (dBm)
5.3	802.11a	6Mbps	52	5260	13.75
			56	5280	13.66
			60	5300	13.61
			64	5320	13.66
	802.11n (HT20)	MCS0	52	5260	13.66
			56	5280	13.04
			60	5300	13.04
			64	5320	13.69
	802.11n (HT40)	MCS0	54	5270	13.65
			62	5310	13.66
	802.11AC (HT80)	MCS0	58	5290	12.74

Power measurements to determine worst-case data rates

Average power (dBm)											
Band	Mode	CH#	Freq (MHz)	Data Rate (bps)							
				6M	9M	12M	18M	24M	36M	48M	54M
5.2G	802.11a	36	5180	**13.75**	13.67	13.72	13.64	13.56	13.44	13.22	13.10

Average power (dBm)											
Band	Mode	CH#	Freq (MHz)	Data Rate (bps)							
				MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
5.2G	802.11n (HT20)	40	5200	13.66	13.63	13.60	13.66	13.51	13.38	13.10	12.95

Average power (dBm)											
Band	Mode	CH#	Freq (MHz)	Data Rate (bps)							
				MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
5.2G	802.11n (HT40)	42	5210	13.69	13.16	13.11	12.91	12.96	12.86	12.48	12.34

Average power (dBm)											
Band	Mode	CH#	Freq (MHz)	Data Rate (bps)							
				MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
5.2G	802.11ac (HT80)	42	5210	13.66	13.11	13.16	13.08	13.00	12.88	12.66	12.54

Bluetooth 2.4GHz Band Conducted Power		
Channel	Frequency(MHz)	Average Power (dBm)
CH 0	2,402	8.10
CH 39	2,441	8.04
CH 78	2,480	8.06

BLE2.4GHz Band Conducted Power		
Channel	Frequency(MHz)	Average Power (dBm)
CH 0	2,402	7.12
CH 19	2,440	7.04
CH 39	2,480	7.06

9.2. SAR measurement Results

General Notes:

1) Per KDB447498 D01v06, all measurement SAR results are scaled to the maximum tune-up tolerance limit to demonstrate compliant.
2) Per KDB447498 D01v06, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is :≤0.8 W/kg or 2.0W/kg, for 1-g or 10-g respectively, when the transmission band is ≤100MHz. When the maximum output power variation across the required test channels is >1/2 dB, instead of the middle channel, the highest output power channel must be used.
3) Per KDB865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measure 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 KDB 941225 D06 Hotspot Mode SAR v02:r01, the DUT dimension is bigger than 9cm*5cm, 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 D04v01r03, SAR is evaluated without a headset connected to the device. When the standalone reported body-worn SAR is ≤1.2W/kg, no additional SAR evaluations using a headset are required.
6) Per KDB865664 D02v01r02, 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 >1.5W/kg, or >7.0W/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 plots-processing (refer to appendix B for details).

9.3. WLAN Notes

Per KDB 248227 D01v02r02, 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.

Per KDB 248227 D01v02r02, for 802.11g/n SAR testing is required. 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.

Per KDB 248227 D01v02r02, for OFDM transmission configurations in the 2.4 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11g/n mode is used for SAR measurement, on the highest measured output power channel for each frequency band.

9.4. GSM850 SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
GSM Voice	**Left Cheek**	**190**	**836.6**	**31.82**	**31.90**	**1.019**	**0.448**	**0.456**
GSM Voice	Left Tilted	190	836.6	31.82	31.90	1.019	0.076	0.077
GSM Voice	Right Cheek	190	836.6	31.82	31.90	1.019	0.448	0.457
GSM Voice	Right Tilted	190	836.6	31.82	31.90	1.019	0.083	0.085

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
GPRS (GMSK, 2 Tx slots)	Front Side	190	836.6	29.87	29.90	1.007	0.317	0.319
GPRS (GMSK, 2 Tx slots)	**Back Side**	**190**	**836.6**	**29.87**	**29.90**	**1.007**	**0.862**	**0.868**
GPRS (GMSK, 2 Tx slots)	Left Side	190	836.6	29.87	29.90	1.007	0.039	0.039
GPRS (GMSK, 2 Tx slots)	Right Side	190	836.6	29.87	29.90	1.007	0.058	0.058
GPRS (GMSK, 2 Tx slots ,SIM2)	BottomSide	251	848.8	29.87	29.90	1.007	0.198	0.199
GPRS (GMSK, 2 Tx slots)	Back Side	128	824.2	29.88	29.90	1.005	0.819	0.823
GPRS (GMSK, 2 Tx slots)	Back Side	251	848.8	29.88	29.90	1.005	0.804	0.808

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average	Tune-Up	Scaling	Measured	Reported

				Power (dBm)	Limit (dBm)	Factor	SAR (W/kg)	SAR (W/kg)
GSM Voice	Front Side	384	190	31.82	31.90	1.019	0.276	0.281
GSM Voice	**Back Side**	**384**	**190**	31.82	31.90	1.019	**0.530**	**0.540**

9.5. PCS1900 SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
GSM Voice	Left Cheek	661	1880	29.32	29.40	1.019	0.127	0.129
GSM Voice	Left Tilted	661	1880	29.32	29.40	1.019	0.042	0.043
GSM Voice	**Right Cheek**	**661**	**1880**	**29.32**	**29.40**	**1.019**	**0.136**	**0.139**
GSM Voice	Right Tilted	661	1880	29.32	29.40	1.019	0.051	0.052

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
GPRS (GMSK, 2 Tx slots)	Front Side	661	1880	27.38	27.40	1.005	0.396	0.398
GPRS (GMSK, 2 Tx slots)	**Back Side**	**661**	**1880**	**27.38**	**27.40**	**1.005**	**0.873**	**0.877**
GPRS (GMSK, 2 Tx slots)	Left Side	661	1880	27.38	27.40	1.005	0.045	0.045
GPRS (GMSK, 2 Tx slots)	Right Side	661	1880	27.38	27.40	1.005	0.057	0.057
GPRS (GMSK, 2 Tx slots,SIM2)	Bottom Side	513	1850.4	27.34	27.40	1.014	0.217	0.220
GPRS (GMSK, 2 Tx slots,SIM2)	Back Side	513	1850.4	27.34	27.40	1.014	0.805	0.816
GPRS (GMSK, 2 Tx slots,SIM2)	**Back Side**	810	1909.8	27.38	27.40	1.005	0.811	0.815

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
GSM Voice	Front Side	661	1880	29.32	29.40	1.019	0.178	0.181
GSM Voice	**Back Side**	**661**	**1880**	29.32	29.40	1.019	**0.467**	**0.476**

9.6. WCDMA II SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
RMC12.2	Left Cheek	9400	1880	22.20	22.20	1.000	0.103	0.103
RMC12.2	Left Tilted	9400	1880	22.20	22.20	1.000	0.031	0.031
RMC12.2	**Right Cheek**	**9400**	**1880**	**22.20**	**22.20**	**1.000**	**0.299**	**0.299**
RMC12.2	Right Tilted	9400	1880	22.20	22.20	1.000	0.04	0.040

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
RMC12.2	Front Side	9400	1880	22.20	22.20	1.000	0.579	0.579
RMC12.2	**Back Side**	**9400**	**1880**	**22.20**	**22.20**	**1.000**	**1.02**	**1.020**
RMC12.2	Left Side	9400	1880	22.20	22.20	1.000	0.176	0.176
RMC12.2	Right Side	9400	1880	22.20	22.20	1.000	0.233	0.233
RMC12.2	Bottom Side	9400	1880	22.20	22.20	1.000	0.062	0.062
RMC12.2	Bottom Side	9262	1852.4	22.17	22.20	1.007	0.97	0.977
RMC12.2	Bottom Side	9538	1907.6	22.14	22.20	1.014	0.88	0.892

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
RMC12.2	Front Side	9400	1880	22.20	22.20	1.000	0.315	0.315

RMC12.2	Back Side	9400	1880	22.20	22.20	1.000	0.528	0.528

9.7. WCDMA V SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
RMC12.2	Left Cheek	4182	836.4	22.51	22.60	1.021	0.415	0.424
RMC12.2	Left Tilted	4182	836.4	22.51	22.60	1.021	0.076	0.078
RMC12.2	**Right Cheek**	**4182**	**836.4**	**22.51**	**22.60**	**1.021**	**0.446**	**0.455**
RMC12.2	Right Tilted	4182	836.4	22.51	22.60	1.021	0.082	0.084

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
RMC12.2	Front Side	4182	836.4	22.51	22.60	1.021	0.198	0.202
RMC12.2	**Back Side**	**4182**	**836.4**	**22.51**	**22.60**	**1.021**	**0.591**	**0.603**
RMC12.2	Left Side	4182	836.4	22.51	22.60	1.021	0.023	0.023
RMC12.2	Right Side	4182	836.4	22.51	22.60	1.021	0.041	0.042
RMC12.2	Bottom Side	4182	836.4	22.51	22.60	1.021	0.078	0.080

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
RMC12.2	Front Side	4182	836.4	22.51	22.60	1.021	0.217	0.222
RMC12.2	**Back Side**	**4182**	**836.4**	**22.51**	**22.60**	**1.021**	**0.439**	**0.448**

9.8. LTE Band 2 SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
20M QPSK (1#25)	Left Cheek	18900	1880	22.82	22.90	1.019	0.204	0.208
20M QPSK (1#25)	Left Tilted	18900	1880	22.82	22.90	1.019	0.051	0.052
20M QPSK (1#25)	**Right Cheek**	**18900**	**1880**	**22.82**	**22.90**	**1.019**	**0.243**	**0.248**
20M QPSK (1#25)	Right Tilted	18900	1880	22.82	22.90	1.019	0.078	0.079
50%RB								
20M QPSK (1#12)	Right Cheek	18900	1880	22.82	22.90	1.019	0.229	0.233

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	**Test Position**	**Ch.**	**Freq. (MHz)**	**Burst Average Power (dBm)**	**Tune-Up Limit (dBm)**	**Scaling Factor**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
20M QPSK (1#25)	Front Side	18900	1880	22.82	22.90	1.019	0.598	0.609
20M QPSK (1#25)	**Back Side**	**18900**	**1880**	**22.82**	**22.90**	**1.019**	**0.93**	**0.947**

20M QPSK (1#25)	Left Side	18900	1880	22.82	22.90	1.019	0.089	0.091
20M QPSK (1#25)	Right Side	18900	1880	22.82	22.90	1.019	0.105	0.107
20M QPSK (1#25)	Bottom Side	18900	1880	22.82	22.90	1.019	0.466	0.475
20M QPSK (1#25)	Back Side	18700	1860	22.85	22.90	1.012	0.917	0.928
20M QPSK (1#25)	Back Side	19100	1900	22.90	22.90	1.000	0.89	0.890
50%RB								
20M QPSK (1#12)	Back Side	18900	1880	22.82	22.90	1.019	0.925	0.942

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
20M QPSK (1#25)	Front Side	18900	1880	22.82	22.90	1.019	0.304	0.310
20M QPSK (1#25)	**Back Side**	**18900**	**1880**	**22.82**	**22.90**	**1.019**	**0.499**	**0.508**
50%RB								
20M QPSK (1#12)	Back Side	18900	1880	22.82	22.90	1.019	0.438	0.446

9.9. LTE Band 4 SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
20M QPSK (1#25)	Left Cheek	20175	1732.5	23.27	23.30	1.007	0.176	0.177
20M QPSK (1#25)	Left Tilted	20175	1732.5	23.27	23.30	1.007	0.045	0.045
20M QPSK (1#25)	**Right Cheek**	**20175**	**1732.5**	**23.27**	**23.30**	**1.007**	**0.369**	**0.372**
20M QPSK (1#25)	Right Tilted	20175	1732.5	23.27	23.30	1.007	0.067	0.067
50%RB								
20M QPSK (1#25)	Right Cheek	20175	1732.5	23.27	23.30	1.007	0.355	0.357

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	**Test Position**	**Ch.**	**Freq. (MHz)**	**Burst Average Power (dBm)**	**Tune-Up Limit (dBm)**	**Scaling Factor**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
20M QPSK (1#25)	Front Side	20175	1732.5	23.27	23.30	1.007	0.304	0.306
20M QPSK (1#25)	**Back Side**	**20175**	**1732.5**	**23.27**	**23.30**	**1.007**	**0.715**	**0.720**

20M QPSK (1#25)	Left Side	20175	1732.5	23.27	23.30	1.007	0.071	0.071
20M QPSK (1#25)	Right Side	20175	1732.5	23.27	23.30	1.007	0.085	0.086
20M QPSK (1#25)	Bottom Side	20175	1732.5	23.27	23.30	1.007	0.296	0.298
50%RB								
20M QPSK (1#25)	Bottom Side	20175	1732.5	23.27	23.30	1.007	0.711	0.716

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
20M QPSK (1#25)	Front Side	20175	1732.5	23.27	23.30	1.007	0.205	0.206
20M QPSK (1#25)	Back Side	20175	1732.5	23.27	23.30	1.007	0.465	0.468
50%RB								
20M QPSK (1#25)	Back Side	20175	1732.5	23.27	23.30	1.007	0.451	0.454

9.10. LTE Band 5 SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
5M QPSK (1#25)	Left Cheek	20525	836.5	23.04	23.10	1.014	0.318	0.322
5M QPSK (1#25)	Left Tilted	20525	836.5	23.04	23.10	1.014	0.053	0.054
5M QPSK (1#25)	**Right Cheek**	**20525**	**836.5**	**23.04**	**23.10**	**1.014**	**0.352**	**0.357**
5M QPSK (1#25)	Right Tilted	20525	836.5	23.04	23.10	1.014	0.068	0.069
50%RB								
5M QPSK (1#25)	Right Cheek	20525	836.5	23.04	23.10	1.014	0.346	0.351

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	**Test Position**	**Ch.**	**Freq. (MHz)**	**Burst Average Power (dBm)**	**Tune-Up Limit (dBm)**	**Scaling Factor**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
5M QPSK (1#25)	Front Side	20525	836.5	23.04	23.10	1.014	0.109	0.111
5M QPSK (1#25)	**Back Side**	**20525**	**836.5**	**23.04**	**23.10**	**1.014**	**0.451**	**0.457**
5M QPSK (1#25)	Left Side	20525	836.5	23.04	23.10	1.014	0.023	0.023
5M QPSK (1#25)	Right Side	20525	836.5	23.04	23.10	1.014	0.037	0.038

5M QPSK (1#25)	Bottom Side	20525	836.5	23.04	23.10	1.014	0.059	0.060
50%RB								
5M QPSK (1#25)	Back Side	20525	836.5	23.04	23.10	1.014	0.426	0.432

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
5M QPSK (1#25)	Front Side	20525	836.5	23.04	23.10	1.014	0.102	0.103
5M QPSK (1#25)	**Back Side**	**20525**	**836.5**	**23.04**	**23.10**	**1.014**	**0.325**	**0.330**
50%RB								
5M QPSK (1#25)	Back Side	20525	836.5	23.04	23.10	1.014	0.321	0.325

9.11. LTE Band 7 SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
20M QPSK (1#25)	Left Cheek	21100	2535	23.17	23.20	1.007	0.119	0.120
20M QPSK (1#25)	Left Tilted	21100	2535	23.17	23.20	1.007	0.023	0.023
20M QPSK (1#25)	**Right Cheek**	**21100**	**2535**	**23.17**	**23.20**	**1.007**	**0.221**	**0.223**
20M QPSK (1#25)	Right Tilted	21100	2535	23.17	23.20	1.007	0.048	0.048
50%RB								
20M QPSK (1#25)	Right Cheek	21100	2535	23.17	23.20	1.007	0.209	0.210

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	**Test Position**	**Ch.**	**Freq. (MHz)**	**Burst Average Power (dBm)**	**Tune-Up Limit (dBm)**	**Scaling Factor**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
20M QPSK (1#25)	Front Side	21100	2535	23.17	23.20	1.007	0.217	0.219
20M QPSK (1#25)	**Back Side**	**21100**	**2535**	**23.17**	**23.20**	**1.007**	**0.566**	**0.570**

20M QPSK (1#25)	Left Side	21100	2535	23.17	23.20	1.007	0.028	0.028
20M QPSK (1#25)	Right Side	21100	2535	23.17	23.20	1.007	0.037	0.037
20M QPSK (1#25)	Bottom Side	21100	2535	23.17	23.20	1.007	0.104	0.105
50%RB								
20M QPSK (1#25)	Back Side	21100	2535	23.17	23.20	1.007	0.558	0.562

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
20M QPSK (1#25)	Front Side	21100	2535	23.17	23.20	1.007	0.107	0.108
20M QPSK (1#25)	**Back Side**	**21100**	**2535**	**23.17**	**23.20**	**1.007**	**0.492**	**0.495**
50%RB								
20M QPSK (1#25)	Back Side	21100	2535	23.17	23.20	1.007	0.481	0.484

9.12. LTE Band12 SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
5M QPSK (1#12)	Left Cheek	23095	707.5	23.60	23.60	1.000	0.114	0.114
5M QPSK (1#12)	Left Tilted	23095	707.5	23.60	23.60	1.000	0.001	0.001
5M QPSK (1#12)	**Right Cheek**	**23095**	**707.5**	**23.60**	**23.60**	**1.000**	**0.161**	**0.161**
5M QPSK (1#12)	Right Tilted	23095	707.5	23.60	23.60	1.000	0.057	0.057
50%RB								
5M QPSK (1#12)	Right Cheek	23095	707.5	23.60	23.60	1.000	0.157	0.157

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
5M QPSK (1#12)	Front Side	23095	707.5	23.60	23.60	1.000	0.147	0.147
5M QPSK (1#12)	**Back Side**	**23095**	**707.5**	**23.60**	**23.60**	**1.000**	**0.444**	**0.444**
5M QPSK (1#12)	Left Side	23095	707.5	23.60	23.60	1.000	0.044	0.044
5M QPSK	Right Side	23095	707.5	23.60	23.60	1.000	0.086	0.086

(1#12)								
5M QPSK (1#12)	Bottom Side	23095	707.5	23.60	23.60	1.000	0.073	0.073
50%RB								
5M QPSK (1#12)	Back Side	23095	707.5	23.60	23.60	1.000	0.432	0.432

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
5M QPSK (1#12)	Front Side	23095	707.5	23.60	23.60	1.000	0.086	0.086
5M QPSK (1#12)	**Back Side**	**23095**	**707.5**	**23.60**	**23.60**	**1.000**	**0.168**	**0.168**
50%RB								
5M QPSK (1#12)	Back Side	23095	707.5	23.60	23.60	1.000	0.162	0.162

9.13. LTE Band13 SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
5M QPSK (1#12)	Left Cheek	23230	782.0	23.00	23.00	1.000	0.032	0.032
5M QPSK (1#12)	Left Tilted	23230	782.0	23.00	23.00	1.000	0.025	0.025
5M QPSK (1#12)	**Right Cheek**	**23230**	**782.0**	**23.00**	**23.00**	**1.000**	**0.041**	**0.041**
5M QPSK (1#12)	Right Tilted	23230	782.0	23.00	23.00	1.000	0.025	0.025
50%RB								
5M QPSK (1#12)	Right Cheek	23230	782.0	23.00	23.00	1.000	0.04	0.040

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	**Test Position**	**Ch.**	**Freq. (MHz)**	**Burst Average Power (dBm)**	**Tune-Up Limit (dBm)**	**Scaling Factor**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
5M QPSK (1#12)	Front Side	23230	782.0	23.00	23.00	1.000	0.042	0.042
5M QPSK (1#12)	**Back Side**	**23230**	**782.0**	**23.00**	**23.00**	**1.000**	**0.108**	**0.108**
5M QPSK (1#12)	Left Side	23230	782.0	23.00	23.00	1.000	0.023	0.023
5M QPSK	Right Side	23230	782.0	23.00	23.00	1.000	0.064	0.064

(1#12)								
5M QPSK (1#12)	Bottom Side	23230	782.0	23.00	23.00	1.000	0.008	0.008
50%RB								
5M QPSK (1#12)	Back Side	23230	782.0	23.00	23.00	1.000	0.099	0.099

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
5M QPSK (1#12)	Front Side	23230	782.0	23.00	23.00	1.000	0.037	0.037
5M QPSK (1#12)	**Back Side**	**23230**	**782.0**	**23.00**	**23.00**	**1.000**	**0.081**	**0.081**
50%RB								
5M QPSK (1#12)	Back Side	23230	782.0	23.00	23.00	1.000	0.078	0.078

9.14. LTE Band17 SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
5M QPSK (1#12)	Left Cheek	23790	710	23.55	23.60	1.012	0.078	0.079
5M QPSK (1#12)	Left Tilted	23790	710	23.55	23.60	1.012	0.016	0.016
5M QPSK (1#12)	**Right Cheek**	**23790**	**710**	**23.55**	**23.60**	**1.012**	**0.123**	**0.124**
5M QPSK (1#12)	Right Tilted	23790	710	23.55	23.60	1.012	0.025	0.025
50%RB								
5M QPSK (1#12)	Right Cheek	23790	710	23.55	23.60	1.012	0.119	0.120

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
5M QPSK (1#12)	Front Side	23790	710	23.55	23.60	1.012	0.104	0.105
5M QPSK (1#12)	**Back Side**	**23790**	**710**	**23.55**	**23.60**	**1.012**	**0.321**	**0.325**
5M QPSK (1#12)	Left Side	23790	710	23.55	23.60	1.012	0.022	0.022

5M QPSK (1#12)	Right Side	23790	710	23.55	23.60	1.012	0.031	0.031
5M QPSK (1#12)	Bottom Side	23790	710	23.55	23.60	1.012	0.059	0.060
50%RB								
5M QPSK (1#12)	Back Side	23790	710	23.55	23.60	1.012	0.311	0.315

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
5M QPSK (1#12)	Front Side	23790	710	23.55	23.60	1.012	0.064	0.065
5M QPSK (1#12)	**Back Side**	**23790**	**710**	**23.55**	**23.60**	**1.012**	**0.151**	**0.153**
50%RB								
5M QPSK (1#12)	Back Side	23790	710	23.55	23.60	1.012	0.147	0.149

9.15. LTE Band 38 SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
20M QPSK(1#50)	Left Cheek	38000	2595	23.37	23.40	1.007	0.117	0.118
20M QPSK(1#50)	Left Tilted	38000	2595	23.37	23.40	1.007	0.023	0.023
20M QPSK(1#50)	**Right Cheek**	**38000**	**2595**	**23.37**	**23.40**	**1.007**	**0.166**	**0.167**
20M QPSK(1#50)	Right Tilted	38000	2595	23.37	23.40	1.007	0.037	0.037
50%RB								
20M QPSK(1#50)	Right Cheek	38000	2595	23.37	23.40	1.007	0.159	0.160

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	**Test Position**	**Ch.**	**Freq. (MHz)**	**Burst Average Power (dBm)**	**Tune-Up Limit (dBm)**	**Scaling Factor**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
20M QPSK(1#50)	Front Side	38000	2595	23.37	23.40	1.007	0.176	0.177
20M QPSK(1#50)	**Back Side**	**38000**	**2595**	**23.37**	**23.40**	**1.007**	**0.436**	**0.439**
20M QPSK(1#50)	Left Side	38000	2595	23.37	23.40	1.007	0.021	0.021
20M QPSK(1#50)	Right Side	38000	2595	23.37	23.40	1.007	0.035	0.035
20M QPSK(1#50)	Bottom Side	38000	2595	23.37	23.40	1.007	0.095	0.096
50%RB								

20M QPSK(1#50)	Front Side	38000	2595	23.37	23.40	1.007	0.423	0.426

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
20M QPSK(1#50)	Front Side	38000	2595	23.37	23.40	1.007	0.105	0.106
20M QPSK(1#50)	**Back Side**	**38000**	**2595**	**23.37**	**23.40**	**1.007**	**0.213**	**0.214**
50%RB								
20M QPSK(1#50)	Back Side	38000	2595	23.37	23.40	1.007	0.211	0.212

9.16. LTE Band 41 SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
20M QPSK(1#50)	Left Cheek	40620	2593.0	23.50	23.50	1.000	0.017	0.017
20M QPSK(1#50)	Left Tilted	40620	2593.0	23.50	23.50	1.000	0.006	0.006
20M QPSK(1#50)	**Right Cheek**	**40620**	**2593.0**	**23.50**	**23.50**	**1.000**	**0.038**	**0.038**
20M QPSK(1#50)	Right Tilted	40620	2593.0	23.50	23.50	1.000	0.011	0.011
50%RB								
20M QPSK(1#50)	Right Cheek	40620	2593.0	23.50	23.50	1.000	0.035	0.035

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	**Test Position**	**Ch.**	**Freq. (MHz)**	**Burst Average Power (dBm)**	**Tune-Up Limit (dBm)**	**Scaling Factor**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
20M QPSK(1#50)	Front Side	40620	2593.0	23.50	23.50	1.000	0.098	0.098
20M QPSK(1#50)	**Back Side**	**40620**	**2593.0**	**23.50**	**23.50**	**1.000**	**0.297**	**0.297**
20M QPSK(1#50)	Left Side	40620	2593.0	23.50	23.50	1.000	0.011	0.011
20M QPSK(1#50)	Right Side	40620	2593.0	23.50	23.50	1.000	0.014	0.014
20M QPSK(1#50)	Bottom Side	40620	2593.0	23.50	23.50	1.000	0.058	0.058

50%RB								
20M QPSK(1#50)	Back Side	40620	2593.0	23.50	23.50	1.000	0.283	0.283

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
20M QPSK(1#50)	**Front Side**	**40620**	**2593.0**	**23.50**	**23.50**	**1.000**	**0.162**	**0.162**
20M QPSK(1#50)	Back Side	40620	2593.0	23.50	23.50	1.000	0.075	0.075
50%RB								
20M QPSK(1#50)	Back Side	40620	2593.0	23.50	23.50	1.000	0.157	0.157

9.17. Wi-Fi 2.4G SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
802.11b	Left Cheek	6	2437	13.39	13.40	1.002	0.098	0.098
802.11b	Left Tilted	6	2437	13.39	13.40	1.002	0.064	0.064
802.11b	**Right Cheek**	**6**	**2437**	**13.39**	**13.40**	**1.002**	**0.313**	**0.314**
802.11b	Right Tilted	6	2437	13.39	13.40	1.002	0.218	0.218

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
802.11b	Front Side	6	2437	13.39	13.40	1.002	0.069	0.069
802.11b	**Back Side**	**6**	**2437**	**13.39**	**13.40**	**1.002**	**0.110**	**0.110**
802.11b	Right Side	6	2437	13.39	13.40	1.002	0.033	0.033
802.11b	Top Side	6	2437	13.39	13.40	1.002	0.078	0.078

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
802.11b	**Front Side**	**6**	**2437**	**13.39**	**13.40**	**1.002**	**0.070**	**0.070**
802.11b	Back Side	6	2437	13.39	13.40	1.002	0.025	0.025

9.18. Wi-Fi 5.2G SAR results

Head Exposure Condition

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
802.11a	Left Cheek	36	5180	13.75	13.80	1.012	0.044	0.045
802.11a	Left Tilted	36	5180	13.75	13.80	1.012	0.025	0.025
802.11a	**Right Cheek**	**36**	**5180**	**13.75**	**13.80**	**1.012**	**0.180**	**0.182**
802.11a	Right Tilted	36	5180	13.75	13.80	1.012	0.079	0.080

Body Hotspot Exposure Condition (Separation Distance is 1.0 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
802.11a	Front Side	36	5180	13.75	13.80	1.012	0.104	0.105
802.11a	**Back Side**	**36**	**5180**	**13.75**	**13.80**	**1.012**	**0.236**	**0.239**
802.11a	Right Side	36	5180	13.75	13.80	1.012	0.029	0.029
802.11a	Top Side	36	5180	13.75	13.80	1.012	0.078	0.079

Body-worn Exposure Condition (Separation Distance is 1.5 cm)

Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
802.11a	Front Side	36	5180	13.75	13.80	1.012	0.068	0.069
802.11a	**Back Side**	**36**	**5180**	**13.75**	**13.80**	**1.012**	**0.037**	**0.037**

9.19. Repeated SAR results

Remark:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ⩾0.8W/kg.

2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ⩽ 1.2 and the measured SAR<1.45W/kg, only one repeated measurement is required.

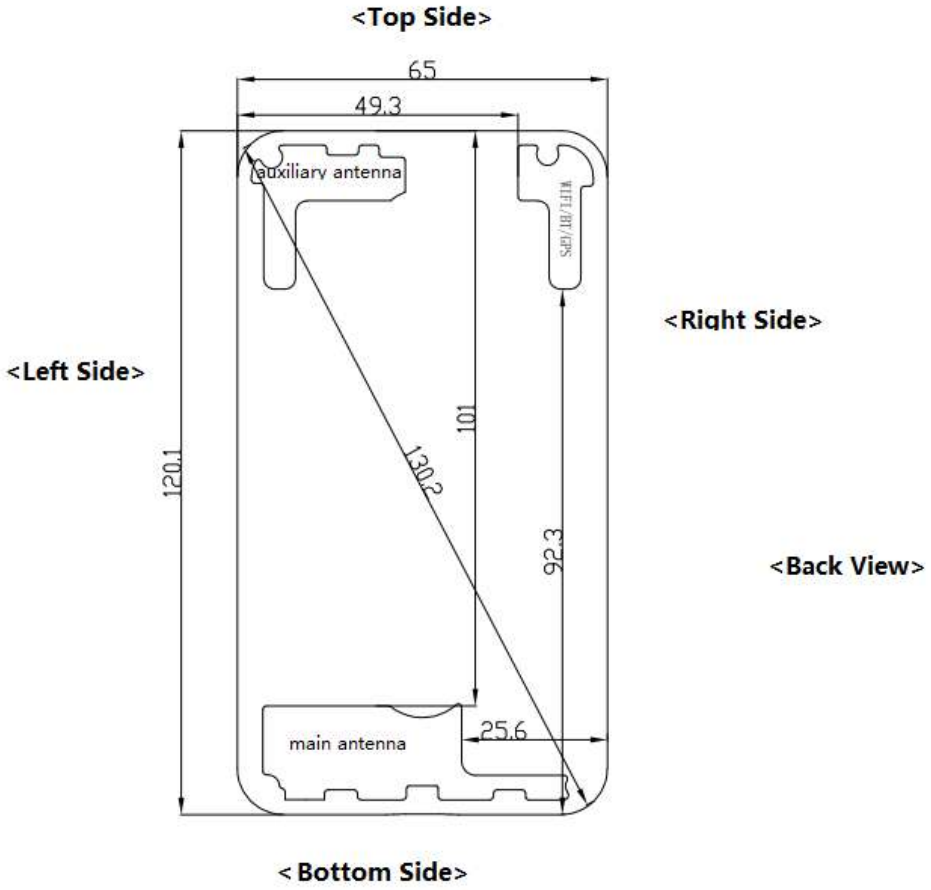
3. The ratio is the difference in percentage between original and repeated measured SAR.

4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

Band	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
/	/	/	/	/	/	/	/	/	/

10. EXPOSURE POSITIONS CONSIDERATION

10.1. Multiple Transmitter Evaluation



Mode	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
Main Antenna	YES	YES	YES	YES	NO	YES
Wi-Fi Antenna	YES	YES	NO	YES	YES	NO

10.2. Stand-alone SAR test exclusion

Per FCC KDB447498D01v06, the 1-g SAR and 10-g SAR test exclusion thresholds for 100MHz to 6GHz 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:

1) f(GHz) is the RF channel transmit frequency in GHz
2) Power and distance are rounded to the nearest mW and mm before calculation
3) The result is rounded to one decimal place for comparison
   When the minimum test separation distance is <5mm, a distance of 5 mm is applied to determine SAR test exclusion.

Mode	Position	Pmax (dBm)	Pmax (mW)	Distance (mm)	f(GHz)	Calculation result	SAR Exclusion threshold	SAR Test exclusion
BT	Body-worn	8.10	6.46	5	2.402	1.860	6	YES

Table 5 standalone SAR test exclusion for BT

Note:

1) *- maximum possible output power declared by manufacturer

2) Held to ear configurations are not applicable to Bluetooth for this device.

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≤ 50mm,where x=7.5 for 1-g SAR and x=18.75 for 10-g SAR.

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

Mode	Position	Pmax (dBm)	Pmax (mW)	Distance (mm)	f(GHz)	X	Estimated SAR(W/Kg)*
BT	Body-worn	8.10	6.46	5	2.402	7.5	0.267

Table 6： Estimated SAR calculation for BT

1) *- maximum possible output power declared by manufacturer

2) Held to ear configurations are not applicable to Bluetooth and therefore were not considered for simultaneous transmission.

10.3. Simultaneous Transmission Possibilities

The Simultaneous Transmission Possibilities of this device are as below:

No.	Configuration	Hotspot
1	GSM(voice)+ WiFi2.4G	Yes
2	GPRS/EDGE(DATA)+ WiFi2.4G	Yes
3	GPRS/EDGE(DATA)+ WiFi5G	Yes
4	GPRS/EDGE(DATA)+ BT	Yes
5	UMTS(Voice)+ WiFi2.4G	Yes
6	UMTS(DATA)+ WiFi2.4G	Yes
7	UMTS(DATA)+ WiFi5G	Yes
8	UMTS(DATA)+ BT	Yes
9	LTE(DATA)+WiFi2.4G	Yes
10	LTE(DATA)+WiFi5G	Yes
11	LTE(DATA)+BT	Yes

Table 7: Simultaneous Transmission Possibilities

Note:

1) Wi-Fi 2.4G and Bluetooth share the same Tx antenna and can't transmit simultaneously.
2) 2G&3G&4G can't transmit simultaneously.
3) Held to ear configurations are not applicable to Bluetooth and therefore were not considered for simultaneous transmission.

10.4. SAR Summation Scenario

Test Position		Left Cheek	Left Tilted	Right Cheek	Right Cheek
MAX 1-g SAR (W/kg)	GSM850	**0.456**	0.077	**0.456**	**0.085**
	GSM1900	0.129	0.043	0.139	0.052
	UMTS Band II	0.103	0.031	0.299	0.040
	UMTS Band V	0.424	**0.078**	0.455	0.084
	LTE Band 2	0.208	0.052	0.248	0.079
	LTE Band 4	0.177	0.045	0.372	0.067
	LTE Band 5	0.322	0.054	0.357	0.069
	LTE Band 7	0.120	0.023	0.223	0.048
	LTE Band 12	0.114	0.001	0.161	0.057
	LTE Band 13	0.032	0.025	0.041	0.025
	LTE Band 17	0.079	0.016	0.124	0.025
	LTE Band 38	0.118	0.023	0.167	0.037
	LTE Band 41	0.017	0.006	0.038	0.011
	2.4G Wi-Fi	**0.098**	**0.064**	**0.314**	**0.218**
	5G Wi-Fi	0.045	0.025	0.182	0.080
Σ1-g SAR(W/kg)		0.554	0.142	0.770	0.303

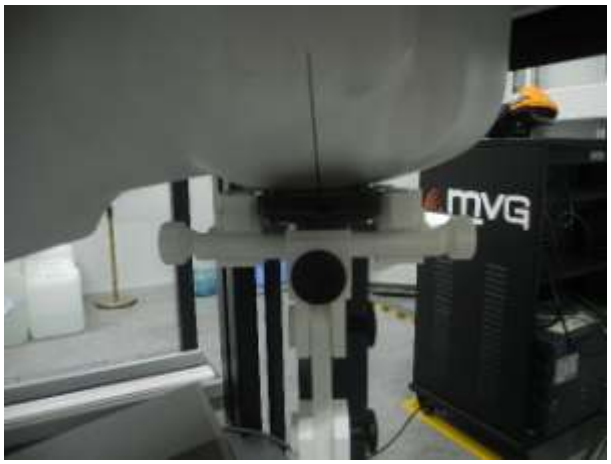
Test Position		Front Side (10mm)	Back Side (10mm)	Left Side (10mm)	Right Side (10mm)	Top Side (10mm)	Bottom Side (10mm)
MAX 1-g SAR (W/kg)	GSM850	0.319	0.868	0.039	0.058	--	0.199
	GSM1900	0.398	0.877	0.045	0.057	--	0.220
	UMTS Band II	0.579	**1.020**	**0.176**	**0.233**	--	0.062
	UMTS Band V	0.202	0.603	0.023	0.042	--	0.078
	LTE Band 2	**0.609**	0.947	0.091	0.107	--	**0.475**
	LTE Band 4	0.306	0.720	0.071	0.086	--	0.298
	LTE Band 5	0.111	0.457	0.023	0.038	--	0.060
	LTE Band 7	0.219	0.570	0.028	0.037	--	0.105
	LTE Band 12	0.147	0.444	0.044	0.086	--	0.073
	LTE Band 13	0.042	0.108	0.023	0.064	--	0.008
	LTE Band 17	0.105	0.325	0.022	0.031	--	0.060
	LTE Band 38	0.177	0.439	0.021	0.035	--	0.096
	LTE Band 41	0.098	0.297	0.011	0.014	--	0.058
	2.4G Wi-Fi	0.069	0.110	--	**0.033**	0.078	--
	5G Wi-Fi	**0.105**	**0.239**	--	0.029	0.079	--
Σ1-g SAR(W/kg)		0.714	1.259	0.176	0.266	0.079	0.475

Test Position		Front Side(15mm)	Back Side(15mm)
MAX 1-g SAR (W/kg)	GSM850	0.281	**0.540**
	GSM1900	0.181	0.476
	UMTS Band II	**0.315**	0.528
	UMTS Band V	0.217	0.439
	LTE Band 2	0.310	0.508
	LTE Band 4	0.206	0.468
	LTE Band 5	0.103	0.330
	LTE Band 7	0.108	0.495
	LTE Band 12	0.086	0.168
	LTE Band 13	0.037	0.081
	LTE Band 17	0.065	0.153
	LTE Band 38	0.106	0.214
	LTE Band 41	0.162	0.075
	2.4G Wi-Fi	**0.070**	0.025
	5G Wi-Fi	0.069	**0.037**
Σ1-g SAR(W/kg)		0.385	0.577

10.5. Simultaneous Transmission Conclusion

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

11. PHOTOGRAPHS OF THE TEST SET-UP

Photo 1: Measurement System Satimo	Photo 2: Left Head Check
	
Photo 3: Left Head Tilted	Photo 4: Right Head Check

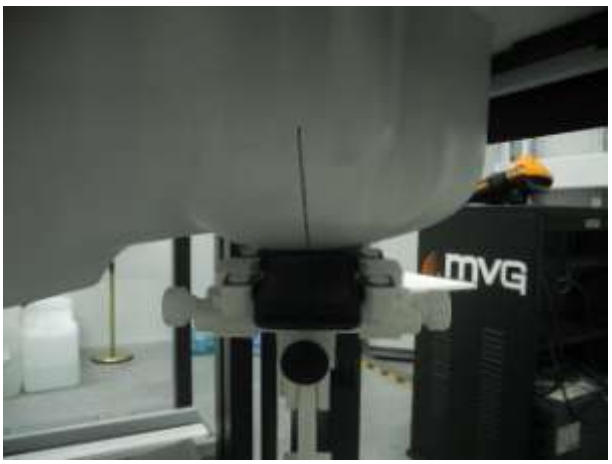
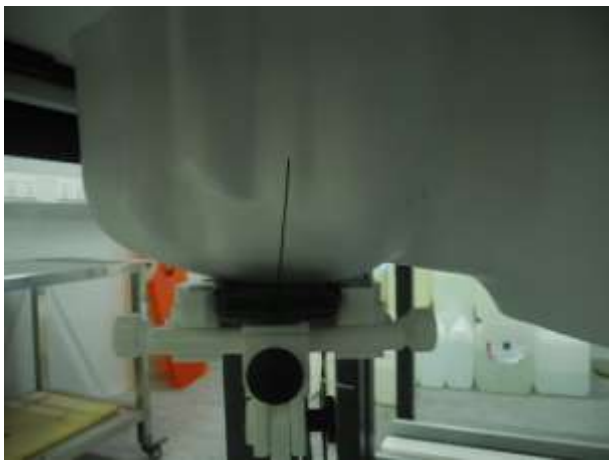

	

Photo 5: Right Head Tilted	Photo 6: Front Side 10mm
	

Photo 7: Rear View 10mm	Photo 8: Left Side 10mm
	
Photo 9: Right Side 10mm	Photo 10: Top Side 10mm

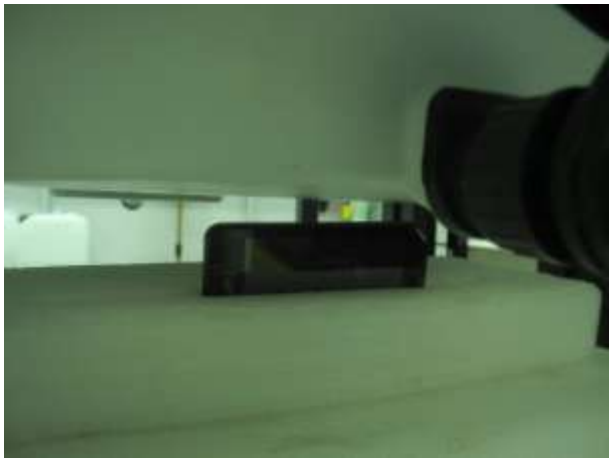
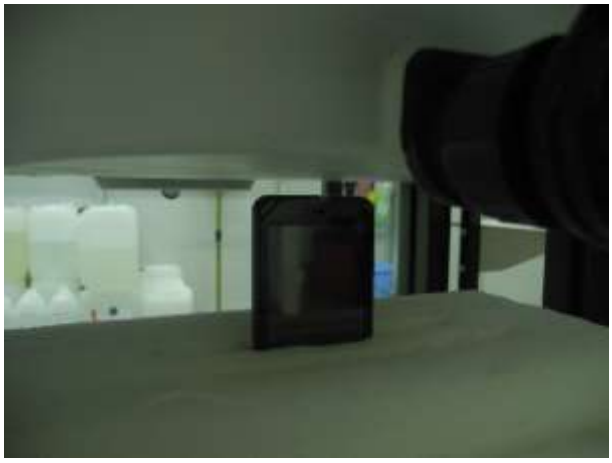

	

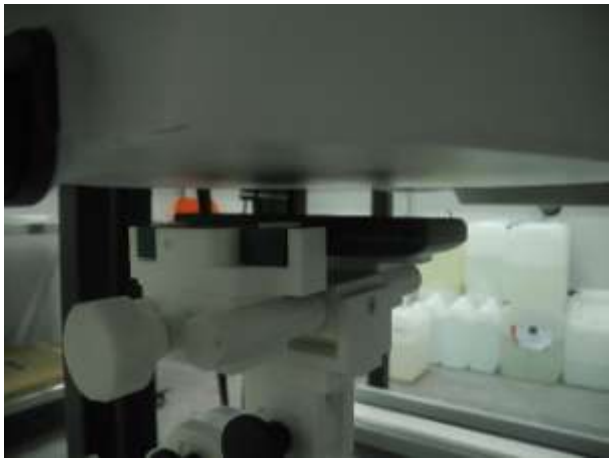
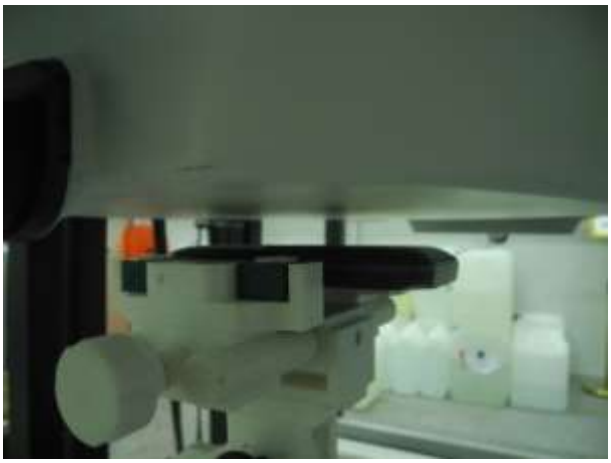
Photo 11: Bottom Side 10mm	Photo 12: Front Side 15mm
	

Photo 13: Rear View 15mm	N/A
	N/A

Photograph: Liquid depth

Photo 14: Body 750 Depth (15.0cm)	Photo 15: Body835 Depth (15.0cm)

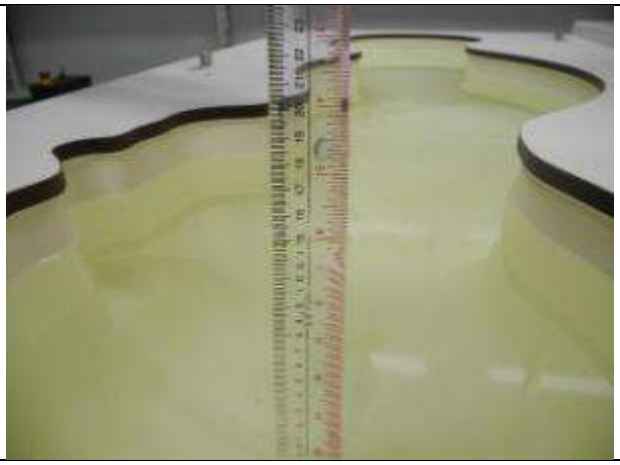
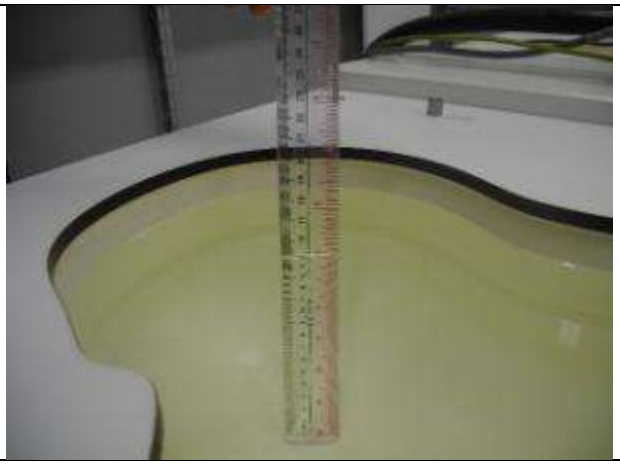
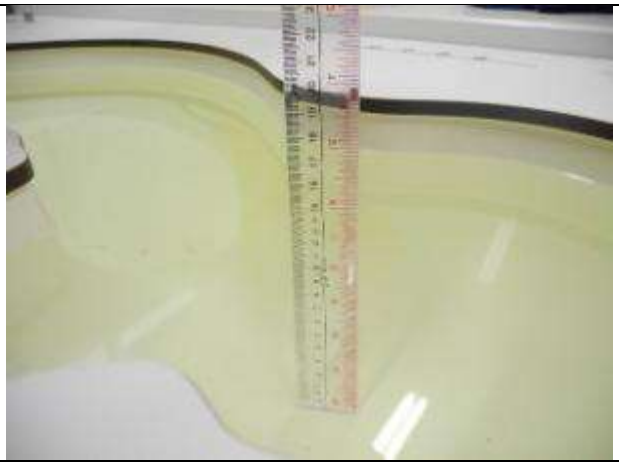

	

Photo 16: Body1900 Depth (15.0cm)	N/A
	N/A

Appendix A. System Check Plots

(Pls see Appendix A)

Appendix B. MEASUREMENT SCANS

(Pls see Appendix B)

AppendixC RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)

(Pls see Appendix C)

Appendix D. RELEVANT PAGES FROM DAE&DIPOLE VALIDATION KIT REPORT(S)

(Pls see Appendix D)