FCC SAR Test Report

Product	:	MOBILE PHONE
Trade mark	:	ROKiT
Model/Type reference	:	IO PRO 3D
Serial Number	:	N/A
Report Number	:	EED32M00238611
FCC ID	:	2AQNZ-IOPRO3D
Date of Issue:	:	Aug. 13, 2020
Test Standards	:	Refer to Section 1.5
Test result	:	PASS

Prepared for:

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Date: Aug.13, 2020

Check No.:3096381507

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Modified History

REV.	Modification Description	Issued Date	Remark
REV.1.0	Initial Test Report Release	Aug.13, 2020	

1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in this test report.

Centre Testing International Group Co., Ltd. does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report is not to be reproduced or published in full without the prior written permission.

1.2 Application details

Date of receipt of test item:	2018-08-08
Start of test:	2018-08-21
End of test:	2018-09-04

1.3 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for ROKIT Corp Limited. Model Name:IO PRO 3D are as below:

Frequency Band	MAX Reported SAR (W/kg)			
	1-g SAR Head	1-g SAR Body-worn (15mm)	1-g SAR Hotspot (10mm)	10-g SAR Product Specific (0mm)
GSM850	0.237	0.281	0.675	/
GSM1900	0.187	0.315	0.734	/
UMTS Band II	0.430	0.451	0.832	/
UMTS Band IV	0.264	0.313	0.618	/
UMTS Band V	0.247	0.294	0.365	/
CDMA BC0 #	0.207	0.169	0.231	0.392
CDMA BC1 #	0.362	0.396	**1.167**	**1.514**
CDMA BC10 #	0.528	**0.554**	0.679	0.388
LTE Band II	0.373	0.426	0.852	/
LTE Band IV	0.193	0.257	0.568	/
LTE Band V	0.206	0.232	0.355	/
LTE Band XII #	0.155	0.150	0.169	0.470
LTE Band XVII #	0.121	0.159	0.171	0.512
WiFi 2.4G	**1.043**	0.187	0.342	/
The highest simultaneous SAR is 1.571W/kg per KDB 690783 D01				

Note:

"#" indicates the testing items were fulfilled by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory. The tested data come from Report No.:WT188005125

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

1.4 EUT Information

Device Information:	
Product Name:	MOBILE PHONE
Model:	IO PRO 3D
FCC ID:	2AQNZ-IOPRO3D
SN:	N/A
Device Type:	Portable device
Exposure Category:	uncontrolled environment / general population
Firmware version:	MOLY.LR12A.R2.MP.V36.9(manufacturer declare)
Hardware version:	V0(manufacturer declare)
Antenna Type :	MONOPOLE Antenna
Antenna Gain:	GSM/WCDMA/CDMA/LTE:-5dBi; BT/WiFi:-3dBi
Device Operating Configurations:	
Supporting Modes :	GSM850/1900; WCDMA Band II/IV/V; CDMA BC0/BC1/BC10;WiFi 2.4G;BT; LTE Band II/IV/V/XII/XVII;
Duty Cycle used for SAR testing	Max WiFi duty cycle: 99.61%
Modulation:	GSM(GMSK/8PSK); WCDMA(QPSK); LTE(QPSK/16QAM); WiFi(DSSS/OFDM); BT(GFSK/π/4DQPSK/8DPSK)

Operating Frequency Range(s)

Band	TX(MHz)	RX(MHz)
GSM850	824~849	869~894
GSM1900	1850~1910	1930~1990
UMTS Band V	824~849	869~894
UMTS Band IV	1710~1755	2110~2155
UMTS Band II	1850~1910	1930~1990
CDMA BC0	824~849	869~894
CDMA BC1	1850~1910	1930~1990
CDMA BC10	817~824	862~869
LTE Band II	1850~1910	1930~1990
LTE Band IV	1710~1755	2110~2155
LTE Band V	824~849	869~894
LTE Band XII	699~716	729~746
LTE Band XVII	704~716	734~746

	WIFI 2.4G	2412~2462
	BT	2402~2480
GPRS class level:	GPRS class 12	
EGPRS class level:	EGPRS class 12	
Test Channels (low-mid-high):	128-190-251 (GSM850)	
	512-661-810 (GSM1900)	
	9262-9400-9538 (UMTS Band II)	
	1312-1413-1513(UMTS Band IV)	
	4132-4182-4233 (UMTS Band V)	
	1013-384-777(CDMA BC0)	
	25-600-1175(CDMA BC1)	
	476-580-684(CDMA BC10)	
	18700-18900-19100(LTE Band II)	
	20050-20176-20300(LTE Band IV)	
	20450-20525-20600(LTE Band V)	
	23060-23095-23130(LTE Band XII)	
	23780-23790-23800(LTE Band XVII)	
	1-6-11 (WiFi 2.4G)	
	0-39-78 (BT)	
Power Source:	Li-ion Battery 3.85V, 3850mAh, 14.822Wh	

Remark: The tested samples and the sample information are provided by the client.
All test data come from the report of No. EED32K00215411, only the product model and FCC ID has been modified.

1.5 Test standard/s

ANSI Std C95.1-1992	Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
IEEE Std 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
RSS-102	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands (Issue 5 of March 2015)
KDB 248227 D01	SAR guidance for IEEE 802.11(Wi-Fi) transmitters v02r02
KDB 447498 D01	General RF Exposure Guidance v06
KDB 648474 D04	Handsets SAR v01r03
KDB 690783 D01	SAR Listings on Grants v01r03
KDB 865664 D01	SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02	RF Exposure Reporting v01r02
KDB 941225 D01	3G SAR Procedures v03r01
KDB 941225 D05	SAR for LTE Devices v02r05
KDB 941225 D06	Hotspot SAR v02r01

1.6 RF exposure limits

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

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

Notes:

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

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

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

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

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

1.7 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dW) absorbed by(dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ).

$$SAR = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dV}\right)$$

SAR is expressed in units of watts per kilogram (W/kg). SAR can be related to the electric field at a point by

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

where:

σ = conductivity of the tissue (S/m)
ρ = mass density of the tissue (kg/m^3)
E = rms electric field strength (V/m)

1.8 Testing laboratory

Test Site	Centre Testing International Group Co., Ltd.
Test Location	Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China
Telephone	+86 (0) 755 3368 3668
Fax	+86 (0) 755 3368 3385

1.9 Test Environment

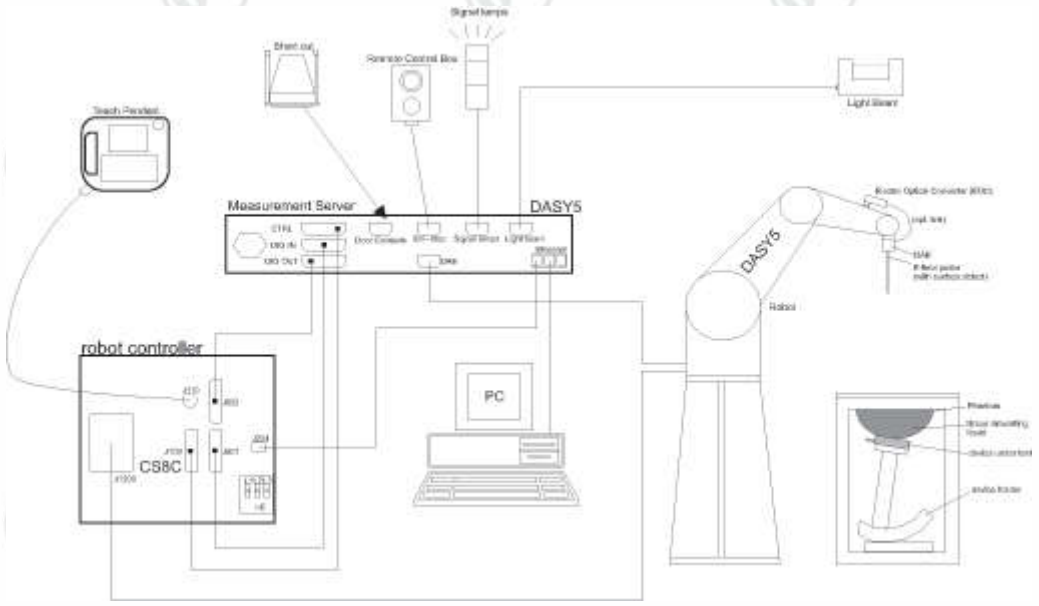
	Required	Actual
Ambient temperature:	18 – 25 °C	21.5 ± 2.0 °C
Tissue Simulating liquid:	18 – 25 °C	21.5 ± 2.0 °C
Relative humidity content:	30 – 70 %	30 – 70 %

1.10 Applicant and Manufacturer

Applicant/Client :	ROKIT Corp Limited
Applicant Address:	ROK House, Kingswood Business Park, Holyhead Road, Albrighton, Wolverhampton, United Kingdom, WV73AU
Manufacturer Name:	ROKIT Corp Limited
Manufacturer Address:	ROK House, Kingswood Business Park, Holyhead Road, Albrighton, Wolverhampton, United Kingdom, WV73AU
Factory:	Shenzhen Newsun Technology Co., Ltd
Address of Factory:	5th Floor, A1 Building, Zhongtai Information Technology Industrial Park, No. 2 Dezheng Road, Shilong Community, Shiyan Street, Baoan District, Shenzhen, China

2 SAR Measurement System Description and Setup

2.1 The Measurement System Description



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

- A standard high precision 6-axis robot (Stäubli TX/RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (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.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 profesional operating system and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

2.2 Probe description

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

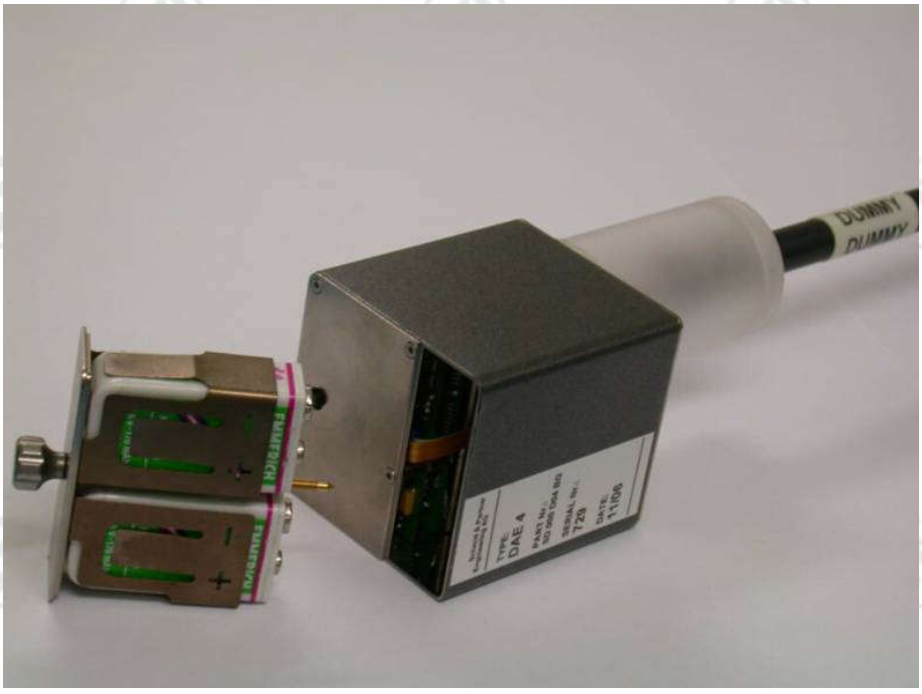
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Dynamic range	5 μW/g to 100 mW/g; Linearity: ± 0.2 dB

2.3 Data Acquisition Electronics description

The data acquisition electronics (DAE4) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of the DAE4 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Batteries: The DAE works with either two standard 9V batteries or two 9V (actually 8.4V or 9.6 V) rechargeable batteries. Because the electronics automatically power-down unused components during braking or between measurements, the battery lifetime depends on system usage. Typical lifetimes are >20 hours for batteries and >10 hours for accus. Remove the batteries if you do not plan to use the DAE for a long period of time.



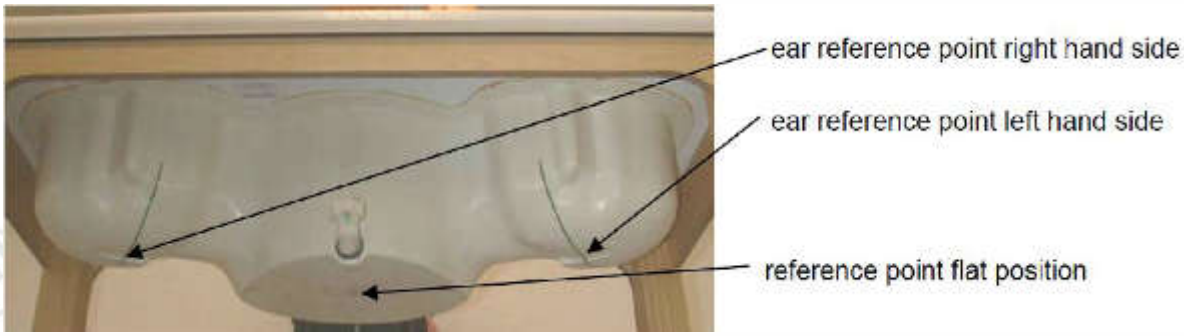
2.4 SAM Twin Phantom description

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6 mm). The phantom has three measurement areas:

♦ Left hand

♦ Right hand

♦ Flat phantom



The phantom table for the DASY systems have the size of 100 x 50 x 85 cm (L xWx H). these tables are reinforced for mounting of the robot onto the table. For easy dislocation these tables have fork lift cut outs at the bottom.

The bottom plate contains three pairs of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.

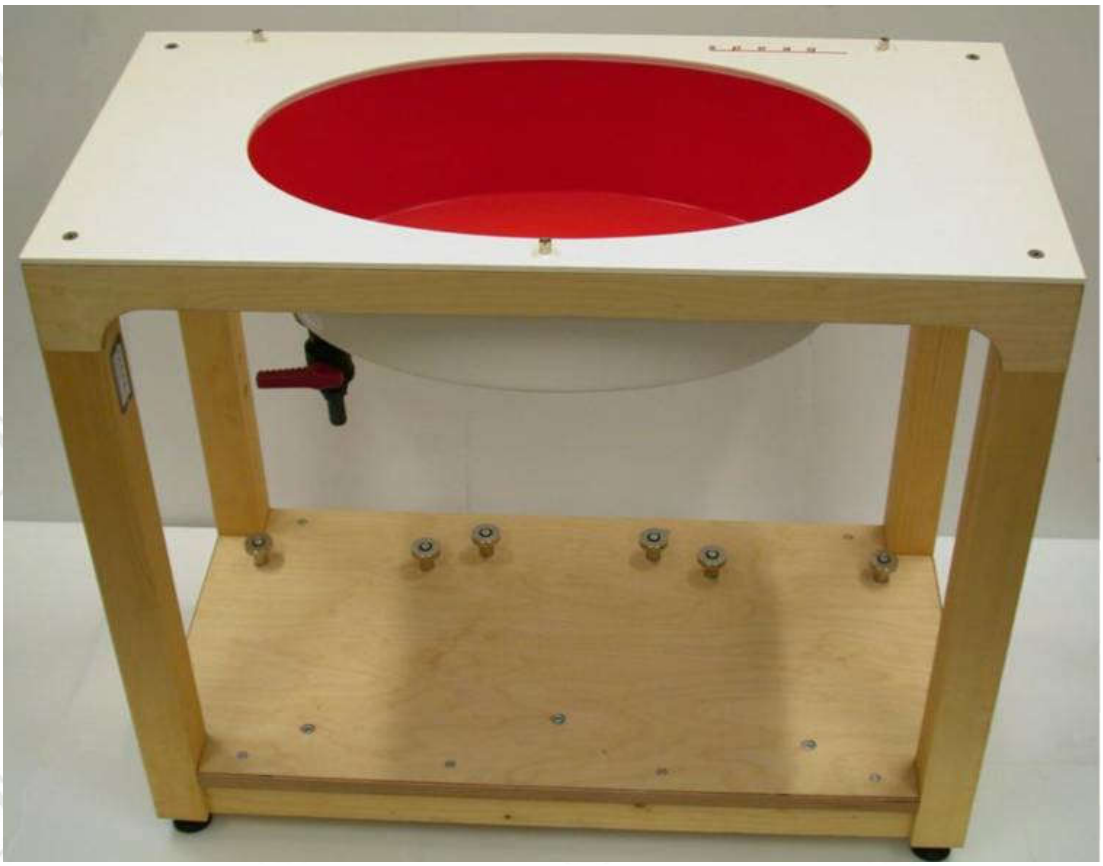
A white cover is provided to cover the phantom during off-periods to prevent water evaporation and changes in the liquid parameters.

Three reference marks are provided on the phantom counter. These reference marks are used to teach the absolute phantom position relative to the robot.

2.5 ELI4 Phantom description

The ELI4 phantom is intended for compliance testing of handheld and body mounted wireless devices in the frequency range of 30MHz to 6 GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209-2 and all known tissue simulating liquids.

ELI4 has been optimized regarding its performance and can be integrated into a SPEAG standard phantom table. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points



2.6 Device Holder description

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of ±0.5mm would produce a SAR uncertainty of ±20%. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP).Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ =0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

3 SAR Test Equipment List

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

	Manufacturer	Device Type	Type(Model)	Serial number	Date of last calibration	Valid period
☒	SPEAG	E-Field Probe	EX3DV4	7328	2018-02-23	One year
☒	SPEAG	Data acquisition electronics	DAE4	1458	2018-02-16	One year
☒	SPEAG	835 MHz Dipole	D835V2	4d193	2018-02-19	Three years
☒	SPEAG	1750 MHz Dipole	D1750V2	1134	2018-02-22	Three years
☒	SPEAG	1900 MHz Dipole	D1900V2	5d198	2018-02-22	Three years
☐	SPEAG	2000 MHz Dipole	D2000V2	1078	2018-02-22	Three years
☐	SPEAG	2300 MHz Dipole	D2300V2	1082	2017-01-25	Three years
☒	SPEAG	2450 MHz Dipole	D2450V2	959	2018-02-16	Three years
☐	SPEAG	2600 MHz Dipole	D2600V2	1101	2018-02-16	Three years
☐	SPEAG	5 GHz Dipole	D5GHzV2	1208	2018-02-21	Three years
☒	SPEAG	Software	DASY 5	NA	NCR	NCR
☒	SPEAG	Twin Phantom	SAM V5.0	1875	NCR	NCR
☐	SPEAG	Flat Phantom	ELI V6.0	2024	NCR	NCR
☒	SPEAG	DAKS probe	DAKS-3.5	1052	2018-02-20	Three years
☒	SPEAG	Planar R140 Vector Reflectometer	DAKS-VNA R140	0200514	2018-02-20	Three years
☒	R & S	Universal Radio Communication Tester	CMU200	101553	2018-03-16	One year
☒	R & S	Universal Radio Communication Tester	CMW500	102898	2018-02-05	One year
☒	Agilent	Signal Generator	N5181A	MY50142334	2018-03-13	One year
☒	BONN	Power Amplifier and directional coupler	SU319W	BL-SZ1550140	2018-02-05	One year
☒	KEITHLEY	RF Power Meter	3500	1128079	2018-08-01	One year
☒	KEITHLEY	RF Power Meter	3500	1128081	2018-08-01	One year

Note:

a) There is no physical damage on the dipole;

b) System check with specific dipole is within 10% of calibrated value;

c) The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement.

d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.

4 SAR Measurement Procedures

4.1 Spatial Peak SAR Evaluation

The DASY5 software includes all numerical procedures necessary to evaluate the spatial peak SAR values.The base for the evaluation is a "cube" measurement in a volume of 30mm^3 (7x7x7 points). The measured volume must include the 1 g and 10 g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan. If the 10g cube or both cubes are not entirely inside the measured volumes,the system issues a warning regarding the evaluated spatial peak values within the Postprocessing engine (SEMCAD X). This means that if the measured volume is shifted, higher values might be possible. To get the correct values you can use a finer measurement grid for the area scan. In complicated field distributions, a large grid spacing for the area scan might miss some details and give an incorrectly interpolated peak location. The entire evaluation of the spatial peak values is performed within the Postprocessing engine (SEMCAD X). The system always gives the maximum values for the 1 g and 10 g cubes.

The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. extraction of the measured data (grid and values) from the Zoom Scan
2. calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. generation of a high-resolution mesh within the measured volume
4. interpolation of all measured values from the measurement grid to the high-resolution grid
5. extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. calculation of the averaged SAR within masses of 1 g and 10 g

4.2 Data Storage and Evaluation

Data Storage

The DASY5 software stores the measured voltage acquired by the Data Acquisition Electronics (DAE) as raw data together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and communication system parameters) in measurement files with the extension .da5x. The postprocessing software evaluates the data every time the data is visualized or exported. This allows the verification and modification of the setup after completion of the measurement. For example, if a measurement has been performed with an incorrect crest factor, the parameter can be corrected afterwards and the data can be reevaluated.

To avoid unintentional parameter changes or data manipulations, the parameters in measured files are locked. In the administrator access mode of the software, the parameters can be unlocked. After changing the parameters, the measured scans can be reevaluated in the postprocessing engine.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., E-field, H-field, SAR). Some of these units are not available in certain situations or give 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

The fields and SAR are calculated from the measured voltage (probe voltage acquired by the DAE) and the following parameters:

Probe parameters:	- Sensitivity	$norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion Factor	$convF_i$
	- Diode Compression Point	dcp_i
	- Probe Modulation Response Factors	a_i, b_i, c_i, d
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Relative Permittivity	ρ

This parameters are stored in the DASY5 V52 measurement file.

These parameters must be correctly set in the DASY5 V52 software setup. They are available as configuration file and can be imported into the measurement file. The values displayed in the multimeter window are assessed using the parameters of the actual system setup. In the scan visualization and export modes, the parameters stored in the measurement file are used.

The measured voltage is not proportional to the exciting. It must be first linearized.

Approximated Probe Response Linearization using Crest Factor.

This linearization method is enabled when a custom defined communication system is measured. The compensation applied is a function of the measured voltage, the detector diode compression point and the crest factor of the measured signal.

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

with V_i = linearized voltage of channel i (uV) (i = x,y,z)

U_i = measured voltage of channel i (uV) (i = x,y,z)

cf = crest factor of exciting field (DASY parameter)

dcp_i = diode compression point of channel i (uV) (Probe parameter, i = x,y,z)

Field and SAR Calculation

The primary field data for each channel are calculated using the linearized voltage:

E - fieldprobes : $$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

H - fieldprobes : $$H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$$

with V_i = linearized voltage of channel i (i = x,y,z)

$Norm_i$ = sensor sensitivity of channel i (i = x,y,z)

uV/(V/m)^2 for E-field Probes

ConvF = sensitivity enhancement in solution

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

f = carrier frequency [GHz]

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

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

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

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

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

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

with SAR = local specific absorption rate in mW/g

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

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

ρ = equivalent tissue density in g/cm^3

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

Spatial Peak SAR for 1 g and 10 g

The DASY5 software includes all numerical procedures necessary to evaluate the spatial peak SAR values.The base for the evaluation is a "cube" measurement at the points of the fine cube grid consisting of 5 x 5 x 7 points(with 8mm horizontal resolution) or 7 x 7 x 7 points(with 5mm horizontal resolution) or 8 x 8 x 7 points(with 4mm horizontal resolution)..The entire evaluation of the spatial peak values is performed within the Postprocessing engine (SEMCAD X).The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. extraction of the measured data (grid and values) from the Zoom Scan.
2. calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters).
3. generation of a high-resolution mesh within the measured volume.
4. interpolation of all measured values from the measurement grid to the high-resolution grid
5. extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface.
6. calculation of the averaged SAR within masses of 1 g and 10 g.

4.3 Data Storage and Evaluation

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. 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.

Step 1: Power reference measurement

The Power Reference Measurement and Power Drift Measurement are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. By default, the Minimum distance of probe sensors to surface is 4 mm. This distance can be modified by the user, but cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties. The SAR measurement was taken at a selected spatial reference point to monitor power variations during testing. This fixed location point was measured and used as a reference value.

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hotspot. The sophisticated interpolation routines implemented in DASY5 software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maxima found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE 1528-2003 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Step 3: Zoom Scan

The Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The default Zoom Scan is defined in the following table. DASY5 is also able to perform repeated zoom scans if more than 1 peak is found during area scan. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Area scan and Zoom scan resolutions per FCC KDB Publication 865664 D01:

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

Step 4: Power Drift Monitoring

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. If the value changed by more than 5%, the evaluation should be retested.

5 SAR Verification Procedure

5.1 Tissue Verification

The following materials are used for producing the tissue-equivalent materials.
(Liquids used for tests are marked with☒):

Ingredients (% of weight)	**Head Tissue**				
frequency band	☒ 835	☒ 1750	☒ 1900	☒ 2450	☐ 2600
Water	41.45	52.64	55.242	62.7	55.242
Salt (NaCl)	1.45	0.36	0.306	0.5	0.306
Sugar	56.0	0.0	0.0	0.0	0.0
HEC	1.0	0.0	0.0	0.0	0.0
Bactericide	0.1	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	47.0	44.542	0.0	44.452
Ingredients (% of weight)	**Body Tissue**				
frequency band	☒ 835	☒ 1750	☒ 1900	☒ 2450	☐ 2600
Water	52.5	69.91	69.91	73.20	64.50
Salt (NaCl)	1.40	0.13	0.13	0.04	0.02
Sugar	45.0	0.0	0.0	0.0	0.0
HEC	1.0	0.0	0.0	0.0	0.0
Bactericide	0.1	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0
DGBE	0.0	29.96	29.96	26.76	35.48

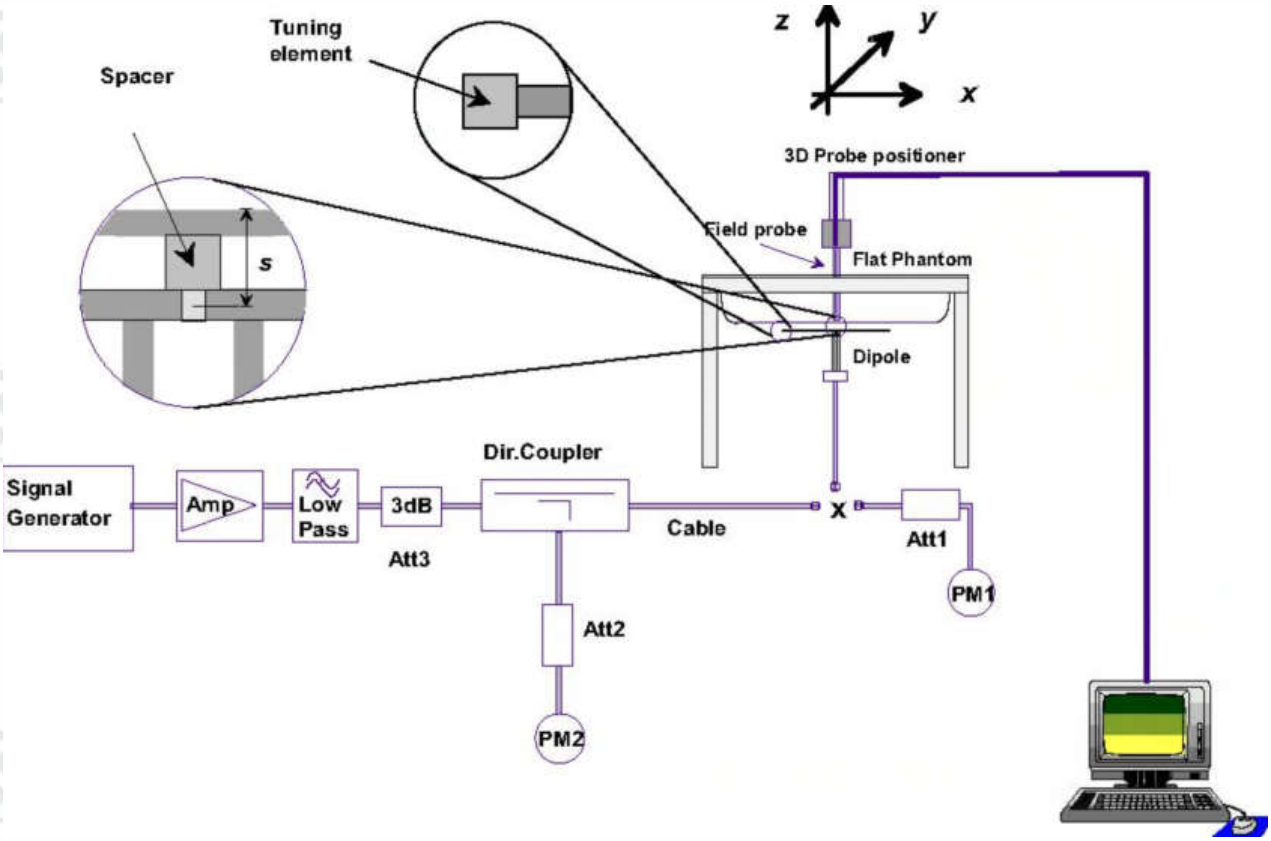
Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether
Tissue simulating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

Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
		ε_r (+/-5%)	σ (S/m) (+/-5%)	ε_r	σ (S/m)		
835 Head	825	41.60 (39.52~43.68)	0.90 (0.86~0.95)	40.90	0.913	21.86°C	2018/8/21
	835	41.50 (39.43~43.58)	0.90 (0.86~0.95)	40.86	0.920		
	850	41.50 (39.43~43.58)	0.92 (0.87~0.96)	40.73	0.934		
835 Body	825	55.20 (52.44~57.96)	0.97 (0.92~1.02)	54.55	0.959	22.35°C	2018/8/23
	835	55.20 (52.44~57.96)	0.97 (0.92~1.02)	54.37	0.963		
	850	55.20 (52.44~57.96)	0.99 (0.94~1.04)	54.33	0.971		
835 Body	825	55.20 (52.44~57.96)	0.97 (0.92~1.02)	53.50	0.975	22.04°C	2018/8/24
	835	55.20 (52.44~57.96)	0.97 (0.92~1.02)	53.47	0.982		
	850	55.20 (52.44~57.96)	0.99 (0.94~1.04)	53.42	0.989		
1800 Head	1710	40.10 (38.10~42.10)	1.35 (1.28~1.42)	39.43	1.299	22.31°C	2018/8/28
	1730	40.10 (38.10~42.10)	1.35 (1.29~1.43)	39.38	1.315		
	1750	40.10 (38.10~42.10)	1.37 (1.31~1.43)	39.25	1.334		
	1800	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.24	1.378		
1800 Body	1710	53.50 (50.83~56.18)	1.46 (1.39~1.53)	53.19	1.430	22.70°C	2018/8/29
	1730	53.50 (50.83~56.18)	1.48 (1.41~1.55)	53.14	1.442		
	1750	53.40 (50.73~56.07)	1.49 (1.42~1.56)	53.08	1.466		
	1800	53.30 (50.64~55.97)	1.52 (1.44~1.60)	52.99	1.505		

1900 Head	1850	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.56	1.345	22.26°C	2018/8/30
	1880	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.40	1.375		
	1900	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.27	1.404		
	1910	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.29	1.409		
1900 Body	1850	53.30 (50.64~55.97)	1.52 (1.44~1.60)	52.69	1.484	22.63°C	2018/8/31
	1880	53.30 (50.64~55.97)	1.52 (1.44~1.60)	52.59	1.525		
	1900	53.30 (50.64~55.97)	1.52 (1.44~1.60)	52.51	1.550		
	1910	53.30 (50.64~55.97)	1.52 (1.44~1.60)	52.47	1.561		
2450 Head	2410	39.30 (37.34~41.26)	1.76 (1.67~1.85)	39.25	1.794	22.18°C	2018/8/23
	2435	39.20 (37.24~41.16)	1.79 (1.70~1.88)	39.09	1.833		
	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	39.20	1.838		
	2460	39.20 (37.24~41.16)	1.81 (1.72~1.90)	39.14	1.861		
2450 Body	2410	52.80 (50.16~55.44)	1.91 (1.81~2.00)	51.94	1.911	21.70°C	2018/9/4
	2435	52.70 (50.07~55.34)	1.94 (1.84~2.04)	52.09	1.947		
	2450	52.70 (50.07~55.34)	1.95 (1.85~2.05)	52.02	1.965		
	2460	52.70 (50.07~55.34)	1.96 (1.86~2.06)	52.05	1.975		
ε_r= Relative permittivity, σ= Conductivity							

5.2 System check procedure

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



5.3 System check results

The system Check is performed for verifying the accuracy of the complete measurement system and performance of the software. The following table shows System check results for all frequency bands and tissue liquids used during the tests (plot(s) see annex A).

System Check (MHz)	Target SAR (1W) (+/-10%)		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (mW/g)	10-g (mW/g)	1-g (mW/g)	10-g (mW/g)		
D835V2 Head	9.51 (8.559~10.461)	6.19 (5.571~6.809)	9.36	6.20	21.86°C	2018/8/21
D1750V2 Head	36.50 (32.85~40.15)	19.30 (17.37~21.23)	35.88	19.44	22.31°C	2018/8/28
D1900V2 Head	40.3 (36.27~44.33)	21.1 (18.99~23.21)	40.40	21.56	22.26°C	2018/8/30
D2450V2 Head	51.50 (46.35~56.65)	24.10 (21.69~26.51)	52.00	24.76	22.18°C	2018/8/23
System Check (MHz)	Target SAR (1W) (+/-10%)		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (mW/g)	10-g (mW/g)	1-g (mW/g)	10-g (mW/g)		
D835V2 Body	9.64 (8.676~10.604)	6.32 (5.688~6.952)	9.44	6.36	22.35°C	2018/8/23
D835V2 Body	9.64 (8.676~10.604)	6.32 (5.688~6.952)	9.76	6.56	22.04°C	2018/8/24
D1750V2 Body	36.4 (32.76~40.04)	19.3 (17.37~21.23)	36.48	19.80	22.70°C	2018/8/29
D1900V2 Body	39.8 (35.82~43.78)	21.00 (18.9~23.1)	40.40	21.64	22.63°C	2018/8/31
D2450V2 Body	50.60 (45.54~55.66)	23.70 (21.33~26.07)	50.00	24.08	21.70°C	2018/9/4
Note: All SAR values are normalized to 1W forward power.						

6 SAR Measurement variability and uncertainty

6.1 SAR measurement variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.The same procedures should be adapted for measurements according to extremity exposure limits by applying a factor of 2.5 for extremity exposure.

1) Repeated measurement is not required when the original highest measured SAR is < 2.0 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 2.0 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 > 3.0 or when the original or repeated measurement is ≥ 3.6 W/kg (~ 10% from the 10-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥3.75 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

6.2 SAR measurement uncertainty

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

7 SAR Test Configuration

7.1 GSM Test Configurations

SAR tests for GSM850 and GSM1900, a communication link is set up with a base station by air link. Using CMU200 the power lever is set to “5”and “0” in SAR of GSM850 and GSM1900. The tests in the band of GSM850 and GSM1900 are performed in the mode of GPRS/EGPRS function. Since the GPRS/EGPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5.

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

7.2 UMTS Test Configurations

1) RMC

As the SAR body tests for WCDMA Band II/V, we established the radio link through call processing. The maximum output power were verified on high, middle and low channels for each test band according to 3GPP TS 34.121 with the following configuration:

1) 12.2kbps RMC, 64,144,384 kbps RMC with TPC set to ‘all 1’.
2) Test loop Mode 1.

For the output power, the configurations for the DPCCH and $DPDCH_1$ are as followed (EUT do not support the $DPDCH_{2-n}$)

	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	Spreading Factor	Spreading Code Number	Bits/Slot
DPCCH	15	15	256	0	10
$DPDCH_1$	15	15	256	64	10
	30	30	128	32	20
	60	60	64	16	40
	120	120	32	8	80
	240	240	16	4	160
	480	480	8	2	320
	960	960	4	1	640
$DPDCH_n$	960	960	4	1, 2, 3	640

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits configured to all “1s”. SAR for other spreading codes and multiple DPDCHn, when supported by the EUT, are not required when the maximum average outputs of each RF channel, for each spreading code and DPDCHn configuration, are less than ¼ dB higher than those measured in 12.2 kbps RMC.

2) HSDPA

SAR for body exposure configurations is measured according to the ''Body SAR Measurements'' procedures of 3G device. In addition, body SAR is also measured for HSDPA when the maximum average outputs of each RF channel with HSDPA active is at ¼ dB higher than that measured without HSDPA using 12.2kbps RMC or the maximum SAR 12.2kbps RMC is above 75% of the SAR limit. Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA.

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

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

Note 1: ΔACK, ΔNACK and ΔCQI = 8Þ $A_{hs} = \beta_{hs}/\beta_c = 30/15$Þ $\beta_{hs} = 30/15 * \beta_c$

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

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

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

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

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

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

3) HSUPA

Body SAR is also measured for HSDPA when the maximum average outputs of each RF channel with HSDPA active is at ¼ dB higher than that measured without HSDPA using 12.2kbps RMC or the maximum SAR 12.2kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-set 1 and QPSK for FRC and 12.2kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.2 kbps RMC without HSPA.

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

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

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

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference

Note 3 : For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$

Note 4 : For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$

Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to

TS 25.306 Table 5.1g

Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

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

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

7.3 LTE Test Configuration

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

1) Spectrum Plots for RB configurations

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

2) MPR

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

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

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

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

3) A-MPR

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

4) LTE procedures for SAR testing

4.1) Largest channel bandwidth standalone SAR test requirements

4.1.1)QPSK with 1 RB allocation

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

4.1.2)QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 4.1.1) are applied to measure the SAR for QPSK with 50% RB allocation.

4.1.3)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 4.1.1) and 4.1.2) 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.

4.1.4)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.

4.2) 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 4.1) 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.

7.4 WIFI 2.4G Test Configurations

For WiFi SAR testing, a communication link is set up with the testing software for WiFi mode test. During the test,at the each test frequency channel, the EUT is operated at the RF continuous emission mode. The RF signal utilized in SAR measurement has 100% duty cycle and its crest factor is 1. The test procedures in KDB 248227D01 v02r02 are applied.

Per KDB 248227 D01 802.11 Wi-Fi SAR v02r02,SAR Test Reduction criteria are as follows:

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the *initial test position(s)* by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The relative SAR levels of multiple exposure test positions can be established by area scan measurements on the highest measured output power channel to determine the initial test position. The area scans must be measured using the same SAR measurement configurations, including test channel, maximum output power, probe tip to phantom distance, scan resolution etc.

When the *reported* SAR for the *initial test position* is:

1) ≤0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.

2) > 0.4 W/kg, SAR is repeated using the same wireless mode test configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions are tested.

3) For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required test channels are considered.

SAR is not required for the following 2.4 GHz OFDM conditions.

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

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

8 SAR Test Results

8.1 Conducted Power Measurements

1.For the measurements a Rohde & Schwarz Radio Communication Tester CMU200 was used.
2.Establish communication link between emulator and EUT and set EUT to operate at maximum output power all the time.
3.Source-based Time Averaged Burst Power Calculation:
For TDMA,the following duty cycle factor was used to calculate the Source-based Time Averaged power.

Number of Time slot	1	2	3	4
Duty cycle	1:8.3	1:4.1	1:2.77	1:2.08
Duty cycle factor	-9.19	-6.13	-4.42	-3.18

8.1.1 Conducted Power of GSM850

GSM850		Burst-Averaged output Power (dBm)			Division Factors	Source Based time Average Power(dBm)		
		128CH	190CH	251CH		128CH	190CH	251CH
GSM(CS)		32.79	33.26	33.38	-9.19	23.60	24.07	24.19
GPRS/ EDGE (GMSK)	1 Tx Slot	32.74	33.22	33.34	-9.19	23.55	24.03	24.15
	2 Tx Slots	32.11	32.57	32.68	-6.13	25.98	26.44	26.55
	3 Tx Slots	30.51	30.95	31.11	-4.42	26.09	26.53	26.69
	4 Tx Slots	29.38	29.86	30.01	-3.18	26.20	26.68	**26.83**
EDGE (8PSK)	1 Tx Slot	27.46	27.85	27.95	-9.19	18.27	18.66	18.76
	2 Tx Slots	25.64	25.93	26.09	-6.13	19.51	19.80	19.96
	3 Tx Slots	23.02	23.45	23.53	-4.42	18.60	19.03	19.11
	4 Tx Slots	21.64	22.03	22.18	-3.18	18.46	18.85	19.00

Note: 1) The conducted power of GSM850 is measured with RMS detector.
2) Source Based time Average 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 4Tx slots mode was selected for SAR testing according the highest Source Based time Average Power table.
4) channel/Frequency: 128/824.2,190/836.6,251/848.8

8.1.2 Conducted Power of GSM1900

GSM1900		Burst-Averaged output Power (dBm)			Division Factors	Source Based time Average Power(dBm)		
		512CH	661CH	810CH		512CH	661CH	810CH
GSM(CS)		31.11	30.74	31.23	-9.19	21.92	21.55	22.04
GPRS/ EDGE (GMSK)	1 Tx Slot	31.08	30.74	31.23	-9.19	21.89	21.55	22.04
	2 Tx Slots	30.36	29.99	30.46	-6.13	24.23	23.86	24.33
	3 Tx Slots	28.59	28.23	28.72	-4.42	24.17	23.81	24.30
	4 Tx Slots	27.47	27.13	27.66	-3.18	24.29	23.95	**24.48**
EDGE (8PSK)	1 Tx Slot	27.96	27.17	27.44	-9.19	18.77	17.98	18.25
	2 Tx Slots	26.86	26.10	26.33	-6.13	20.73	19.97	20.20
	3 Tx Slots	24.86	24.05	24.21	-4.42	20.44	19.63	19.79
	4 Tx Slots	23.63	22.74	22.89	-3.18	20.45	19.56	19.71

Note: 1) The conducted power of GSM1900 is measured with RMS detector.

2) Source Based time Average 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 4Tx slots mode was selected for SAR testing according the highest Source Based time Average Power table.

4) channel/Frequency: 512/1850.2,661/1880,810/1909.8

8.1.3 Conducted Power of UMTS Band II

UMTS Band II		Conducted Power (dBm)		
		9262CH	9400CH	9538CH
WCDMA	12.2kbps RMC	25.00	24.55	24.88
	64kbps RMC	24.48	24.52	24.86
	144kbps RMC	24.36	24.53	24.80
	384kbps RMC	24.26	24.50	24.85
HSDPA	Subtest 1	23.97	23.63	23.92
	Subtest 2	23.16	22.80	23.08
	Subtest 3	23.12	22.75	23.05
	Subtest 4	23.01	22.72	22.96
HSUPA	Subtest 1	21.81	21.40	21.68
	Subtest 2	21.85	21.47	21.73
	Subtest 3	22.83	22.42	22.65
	Subtest 4	21.19	20.83	21.13
	Subtest 5	22.79	22.42	22.70

Note: channel /Frequency: 9262/1852.4,9400/1880,9538/1907.6

8.1.4 Conducted Power of UMTS Band IV

UMTS Band II		Conducted Power (dBm)		
		1312CH	1413CH	1513CH
WCDMA	12.2kbps RMC	23.94	24.54	23.99
	64kbps RMC	23.85	24.50	23.95
	144kbps RMC	23.82	24.48	23.96
	384kbps RMC	23.80	24.43	23.92
HSDPA	Subtest 1	23.29	23.82	23.15
	Subtest 2	22.42	22.97	22.21
	Subtest 3	22.44	22.97	22.19
	Subtest 4	22.44	22.96	22.27
HSUPA	Subtest 1	21.10	21.53	20.81
	Subtest 2	21.13	21.55	20.82
	Subtest 3	22.12	22.56	21.87
	Subtest 4	20.51	20.96	20.23
	Subtest 5	22.11	22.41	21.69

Note: channel /Frequency: 1312/1712.4,1413/1732.6,1513/1752.6

8.1.5 Conducted Power of UMTS Band V

UMTS Band V		Conducted Power (dBm)		
		4132CH	4182CH	4233CH
WCDMA	12.2kbps RMC	24.26	24.36	24.46
	64kbps RMC	24.25	24.33	24.42
	144kbps RMC	24.22	24.35	24.45
	384kbps RMC	24.20	24.30	24.40
HSDPA	Subtest 1	23.24	23.42	23.51
	Subtest 2	22.37	22.66	22.72
	Subtest 3	22.51	22.65	22.68
	Subtest 4	22.30	22.65	22.70
HSUPA	Subtest 1	21.04	21.07	21.17
	Subtest 2	21.05	21.12	21.24
	Subtest 3	22.08	22.12	22.23
	Subtest 4	20.52	20.59	20.74
	Subtest 5	21.98	21.99	22.23

Note: channel /Frequency: 4132/826.4,4182/836.4,4233/846.6

8.1.6 Conducted Power of LTE Band II

Bandwidth	Modulation	RB size	RB offset	Channel 18607	Channel 18900	Channel 19193
1.4MHz	QPSK	1	0	23.79	23.81	23.56
		1	3	23.89	23.94	23.68
		1	5	23.79	23.82	23.53
		3	0	23.85	23.90	23.60
		3	2	23.84	23.89	23.58
		3	3	23.84	23.88	23.60
		6	0	22.76	22.83	22.59
	16QAM	1	0	22.89	22.92	22.66
		1	3	22.72	22.76	22.77
		1	5	22.89	22.87	22.60
		3	0	22.83	22.91	22.61
		3	2	22.85	22.91	22.59
		3	3	22.84	22.91	22.60
		6	0	21.89	21.94	21.62
Bandwidth	Modulation	RB size	RB offset	Channel 18615	Channel 18900	Channel 19185
3MHz	QPSK	1	0	23.71	23.83	23.56
		1	7	23.77	23.81	23.57
		1	14	23.71	23.83	23.56
		8	0	23.74	23.78	23.55
		8	4	23.74	23.81	23.55
		8	7	23.73	23.83	23.52
		15	0	22.74	22.81	22.57
	16QAM	1	0	22.98	22.74	22.71
		1	7	22.91	22.95	22.72
		1	14	22.85	22.94	22.66
		8	0	22.73	22.83	22.54
		8	4	22.74	22.83	22.52
		8	7	22.77	22.82	22.51
		15	0	21.84	21.86	21.61

Bandwidth	Modulation	RB size	RB offset	Channel 18625	Channel 18900	Channel 19175
5MHz	QPSK	1	0	23.71	23.78	23.60
		1	13	23.76	23.91	23.62
		1	24	23.65	23.74	23.46
		12	0	23.77	23.80	23.57
		12	6	23.75	23.81	23.57
		12	13	23.64	23.77	23.50
		25	0	22.71	22.82	22.58
	16QAM	1	0	22.63	22.73	22.52
		1	13	22.76	22.83	22.60
		1	24	22.62	22.74	22.43
		12	0	22.76	22.81	22.59
		12	6	22.76	22.81	22.60
		12	13	22.63	22.74	22.48
		25	0	21.82	21.89	21.59
Bandwidth	Modulation	RB size	RB offset	Channel 18650	Channel 18900	Channel 19150
10MHz	QPSK	1	0	23.68	23.71	23.56
		1	24	23.74	23.79	23.60
		1	49	23.60	23.67	23.44
		25	0	23.76	23.88	23.74
		25	12	23.77	23.86	23.70
		25	25	23.72	23.77	23.47
		50	0	22.67	22.77	22.57
	16QAM	1	0	22.87	22.90	22.76
		1	24	22.92	22.86	22.81
		1	49	22.77	22.87	22.60
		25	0	22.74	22.85	22.71
		25	12	22.78	22.87	22.72
		25	25	22.74	22.77	22.45
		50	0	21.73	21.81	21.59

Bandwidth	Modulation	RB size	RB offset	Channel 18675	Channel 18900	Channel 19125
15MHz	QPSK	1	0	23.69	23.62	23.65
		1	37	23.61	23.74	23.57
		1	74	23.53	23.62	23.37
		36	0	23.76	23.84	23.66
		36	18	23.77	23.83	23.59
		36	38	23.76	23.85	23.66
		75	0	22.78	22.84	22.63
	16QAM	1	0	22.77	22.83	22.84
		1	37	22.77	22.91	22.75
		1	74	22.70	22.80	22.52
		37	0	22.76	22.83	22.67
		37	18	22.77	22.83	22.64
		37	38	22.77	22.85	22.64
		75	0	21.70	21.81	21.64
Bandwidth	Modulation	RB size	RB offset	Channel 18700	Channel 18900	Channel 19100
20MHz	QPSK	1	0	23.64	23.73	23.78
		1	50	23.81	**23.96**	23.80
		1	99	23.64	23.62	23.45
		50	0	23.62	23.75	23.68
		50	25	23.60	23.69	23.72
		50	50	23.71	**23.82**	23.35
		100	0	22.74	22.67	22.55
	16QAM	1	0	22.65	22.68	22.78
		1	50	22.80	22.87	22.79
		1	99	22.66	22.59	22.40
		50	0	22.65	22.77	22.66
		50	25	22.66	22.77	22.69
		50	50	22.81	22.71	22.33
		100	0	21.78	21.71	21.57

8.1.7 Conducted Power of LTE Band IV

Bandwidth	Modulation	RB size	RB offset	Channel 19957	Channel 20175	Channel 20393
1.4MHz	QPSK	1	0	23.00	23.44	22.82
		1	3	23.13	23.53	22.85
		1	5	23.06	23.43	22.84
		3	0	23.16	23.49	22.92
		3	2	23.14	23.48	22.91
		3	3	23.16	23.50	22.91
		6	0	22.10	22.45	22.83
	16QAM	1	0	22.22	22.46	22.93
		1	3	22.31	22.60	22.86
		1	5	22.17	22.50	22.94
		3	0	22.15	22.48	22.91
		3	2	22.14	22.48	22.90
		3	3	22.16	22.52	22.91
		6	0	21.17	21.53	21.91
Bandwidth	Modulation	RB size	RB offset	Channel 19965	Channel 20175	Channel 20385
3MHz	QPSK	1	0	23.11	23.46	22.87
		1	7	23.03	23.45	22.82
		1	14	23.07	23.46	22.85
		8	0	23.10	23.46	22.85
		8	4	23.13	23.45	22.86
		8	7	23.13	23.41	22.85
		15	0	22.10	22.46	22.87
	16QAM	1	0	22.27	22.57	22.90
		1	7	22.22	22.53	22.81
		1	14	22.26	22.59	22.84
		8	0	22.11	22.43	22.87
		8	4	22.12	22.44	22.86
		8	7	22.13	22.44	22.88
		15	0	21.19	21.50	21.95

Bandwidth	Modulation	RB size	RB offset	Channel 19975	Channel 20175	Channel 20375
5MHz	QPSK	1	0	23.14	23.46	22.96
		1	13	23.23	23.55	23.04
		1	24	23.11	23.42	22.85
		12	0	23.15	23.46	22.96
		12	6	23.13	23.43	22.94
		12	13	23.10	23.37	22.90
		25	0	22.12	22.45	22.96
	16QAM	1	0	22.12	22.41	22.96
		1	13	22.18	22.50	22.81
		1	24	22.12	22.41	22.85
		12	0	22.14	22.41	22.96
		12	6	22.14	22.44	22.94
		12	13	22.10	22.43	22.88
		25	0	21.25	21.52	21.02
Bandwidth	Modulation	RB size	RB offset	Channel 20000	Channel 20175	Channel 20350
10MHz	QPSK	1	0	23.11	23.46	23.18
		1	25	23.25	23.60	23.15
		1	49	23.18	23.42	22.90
		25	0	23.27	23.54	22.19
		25	13	23.24	23.55	22.18
		25	25	23.32	23.45	22.47
		50	0	22.24	22.49	22.89
	16QAM	1	0	22.31	22.55	22.61
		1	25	22.43	22.66	22.59
		1	49	22.30	22.58	22.87
		25	0	22.26	22.54	22.51
		25	13	22.25	22.54	22.67
		25	25	22.31	22.47	22.57
		50	0	21.25	21.50	21.13

Bandwidth	Modulation	RB size	RB offset	Channel 20025	Channel 20175	Channel 20325
15MHz	QPSK	1	0	23.07	23.44	23.30
		1	37	23.20	23.51	23.14
		1	74	23.12	23.33	22.74
		36	0	23.40	23.57	22.26
		36	18	23.39	23.56	22.29
		36	38	23.39	23.55	22.26
		75	0	22.39	22.58	22.28
	16QAM	1	0	22.28	22.56	22.50
		1	37	22.39	22.66	22.33
		1	74	22.26	22.47	22.51
		37	0	22.38	22.56	22.29
		37	18	22.39	22.58	22.27
		37	38	22.36	22.59	22.23
		75	0	21.31	21.49	21.22
Bandwidth	Modulation	RB size	RB offset	Channel 20050	Channel 20175	Channel 20300
20MHz	QPSK	1	0	23.06	23.42	23.42
		1	50	23.48	**23.66**	23.42
		1	99	23.25	23.25	22.90
		50	0	23.16	23.39	23.57
		50	25	23.18	**23.58**	23.38
		50	50	23.42	23.26	23.55
		100	0	22.28	22.29	22.33
	16QAM	1	0	22.09	22.42	22.42
		1	50	22.47	22.61	22.39
		1	99	22.18	22.25	22.90
		50	0	22.16	22.40	22.57
		50	25	22.15	22.35	22.56
		50	50	22.41	22.28	22.07
		100	0	21.30	21.29	21.41

8.1.8 Conducted Power of LTE Band V

Bandwidth	Modulation	RB size	RB offset	Channel 20407	Channel 20525	Channel 20643
1.4MHz	QPSK	1	0	24.08	24.04	24.06
		1	3	24.07	24.18	24.15
		1	5	24.09	24.00	24.07
		3	0	24.10	24.17	24.20
		3	2	24.09	24.17	24.22
		3	3	24.12	24.18	24.19
		6	0	23.00	23.08	23.09
	16QAM	1	0	23.09	23.18	23.19
		1	3	23.30	23.35	23.41
		1	5	23.17	23.14	23.18
		3	0	23.11	23.18	23.19
		3	2	23.10	23.16	23.20
		3	3	23.09	23.15	23.20
		6	0	22.06	22.15	22.15
Bandwidth	Modulation	RB size	RB offset	Channel 20415	Channel 20525	Channel 20635
3MHz	QPSK	1	0	24.05	24.13	24.14
		1	7	24.08	24.11	24.12
		1	14	24.04	24.10	24.12
		8	0	24.06	24.15	24.15
		8	4	24.03	24.12	24.17
		8	7	24.04	24.12	24.13
		15	0	23.04	23.14	23.14
	16QAM	1	0	23.23	23.31	23.37
		1	7	23.22	23.26	23.30
		1	14	23.22	23.27	23.30
		7	0	23.07	23.11	23.14
		7	4	23.03	23.17	23.14
		7	7	23.09	23.13	23.17
		15	0	22.10	22.13	22.21

Bandwidth	Modulation	RB size	RB offset	Channel 20425	Channel 20525	Channel 20625
5MHz	QPSK	1	0	24.03	24.11	24.12
		1	13	24.13	24.24	24.20
		1	24	24.04	24.06	24.09
		12	0	24.07	24.13	24.20
		12	6	24.05	24.13	24.20
		12	13	24.02	24.18	24.11
		25	0	23.08	23.18	23.20
	16QAM	1	0	23.08	23.15	23.17
		1	13	23.18	23.21	23.25
		1	24	23.06	23.08	23.08
		12	0	23.07	23.09	23.21
		12	6	23.05	23.10	23.23
		12	13	23.00	23.18	23.11
		25	0	22.15	22.21	22.28
Bandwidth	Modulation	RB size	RB offset	Channel 20450	Channel 20525	Channel 20600
10MHz	QPSK	1	0	24.02	24.12	24.11
		1	24	24.17	**24.26**	24.25
		1	49	24.06	24.06	24.09
		25	0	24.22	24.17	24.22
		25	12	24.22	24.20	24.20
		25	25	23.09	**23.32**	23.10
		50	0	23.12	23.19	23.14
	16QAM	1	0	23.28	23.28	23.28
		1	24	23.57	23.40	23.57
		1	49	23.25	23.27	23.27
		25	0	23.22	23.18	23.27
		25	12	23.21	23.20	23.25
		25	25	23.08	23.28	23.08
		50	0	22.11	22.21	22.14

8.1.9 Conducted Power of WiFi 2.4G

The output power of WiFi 2.4G is as following:

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tune-up	Average Power(dBm)	SAR Test (Yes/No)
802.11b	1	2412	1	19.00	18.30	Yes
	6	2437		19.00	18.55	Yes
	11	2462		19.00	18.35	Yes
802.11g	1	2412	6	18.00	Not Required	No
	6	2437		18.00	Not Required	No
	11	2462		18.00	Not Required	No
802.11n (HT20)	1	2412	6.5	17.00	Not Required	No
	6	2437		17.00	Not Required	No
	11	2462		17.00	Not Required	No
802.11n (HT40)	3	2422	13.5	16.00	Not Required	No
	6	2437		16.00	Not Required	No
	9	2452		16.00	Not Required	No

Note: 1) An entry of “Not Required” means power measurement is not required according to the default power measurement procedures in KDB248227D01.

8.1.10 Conducted Power of BT

The output power of BT antenna is as following:

For BT 3.0:

Average Conducted Power(dBm)			
Channel	0CH	39CH	78CH
GFSK	4.83	5.54	3.96
π/4DQPSK	4.06	4.84	3.07
8DPSK	4.12	4.93	3.18

Note: channel /Frequency: 0/2402, 39/2441, 78/2480

For BT 4.0:

Average Conducted Power(dBm)			
Channel	0CH	19CH	39CH
BT	4.73	5.45	3.80

Note: channel /Frequency: 0/2402, 19/2440, 39/2480.

8.2 SAR test results

Notes:

1) 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 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

2) Per KDB447498 D01v06, All measurement SAR result is scaled-up to account for tune-up tolerance is compliant.

3) Per KDB865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/Kg; if the deviation among the repeated measurement is ≤ 20%, and the measured SAR <1.45W/Kg, only one repeated measurement is required.

4) Per 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 > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The same procedures should be adapted for measurements according to extremity exposure limits by applying a factor of 2.5 for extremity exposure.The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing (Refer to appendix B for details).

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

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

8.2.1 Results overview of GSM850

Test position of Head	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	190/836.6	GSM	0.154	0.121	0.080	33.26	34.00	0.183	21.86°C
Left Hand Tilted 15°	190/836.6	GSM	0.095	0.075	0.150	33.26	34.00	0.113	21.86°C
Right Hand Touched	190/836.6	GSM	0.200	0.154	0.190	33.26	34.00	**0.237**	21.86°C
Right Hand Tilted 15°	190/836.6	GSM	0.097	0.077	0.110	33.26	34.00	0.115	21.86°C
Right Hand Touched	251/848.8	GSM	0.201	0.155	0.090	33.38	34.00	0.232	21.86°C
Right Hand Touched	128/824.2	GSM	0.164	0.126	0.190	32.79	34.00	0.217	21.86°C
Test position of Body-Worn with 15mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (dB)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR1-g(W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	190/836.6	GSM	0.214	0.165	-0.080	33.26	34.00	0.254	22.35°C
Back Side	190/836.6	GSM	0.215	0.166	-0.040	33.26	34.00	0.255	22.35°C
Back Side	251/848.8	GSM	0.218	0.168	-0.140	33.38	34.00	0.251	22.35°C
Back Side	128/824.2	GSM	0.213	0.164	-0.040	32.79	34.00	**0.281**	22.35°C

Test position of Hotspot with 10mm	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Front Side	190/836.6	GPRS 4TS	0.448	0.267	-0.110	29.86	31.00	0.582	22.35°C
Back Side	190/836.6	GPRS 4TS	0.519	0.302	-0.070	29.86	31.00	**0.675**	22.35°C
Left Side	190/836.6	GPRS 4TS	0.157	0.110	-0.090	29.86	31.00	0.204	22.35°C
Right Side	190/836.6	GPRS 4TS	0.392	0.278	-0.150	29.86	31.00	0.510	22.35°C
Bottom Side	190/836.6	GPRS 4TS	0.329	0.175	-0.150	29.86	31.00	0.428	22.35°C
Back Side	251/848.8	GPRS 4TS	0.504	0.292	-0.060	30.01	31.00	0.633	22.35°C
Back Side	128/824.2	GPRS 4TS	0.395	0.228	-0.150	29.38	31.00	0.574	22.35°C

Note: Per KDB 648474 D04, product specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2W/kg.

8.2.2 Results overview of GSM1900

Test position of Head	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	661/1880	GSM	0.132	0.087	-0.080	30.74	32.00	0.176	22.26°C
Left Hand Tilted 15°	661/1880	GSM	0.074	0.049	-0.030	30.74	32.00	0.099	22.26°C
Right Hand Touched	661/1880	GSM	0.074	0.048	0.010	30.74	32.00	0.099	22.26°C
Right Hand Tilted 15°	661/1880	GSM	0.051	0.032	-0.050	30.74	32.00	0.068	22.26°C
Left Hand Touched	810/1909.8	GSM	0.140	0.090	-0.060	31.23	32.00	0.167	22.26°C
Left Hand Touched	512/1850.2	GSM	0.152	0.100	0.050	31.11	32.00	**0.187**	22.26°C
Test position of Body-Worn with 15mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (dB)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR1-g(W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	661/1880	GSM	0.160	0.096	0.010	30.74	32.00	0.214	22.63°C
Back Side	661/1880	GSM	0.236	0.136	-0.130	30.74	32.00	**0.315**	22.63°C
Back Side	810/1909.8	GSM	0.178	0.108	-0.090	31.23	32.00	0.213	22.63°C
Back Side	512/1850.2	GSM	0.167	0.101	-0.030	31.11	32.00	0.205	22.63°C

Test position of Hotspot with 10mm	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Front Side	661/1880	GPRS 4TS	0.559	0.319	0.080	27.13	28.00	0.683	22.63°C
Back Side	661/1880	GPRS 4TS	0.601	0.347	-0.130	27.13	28.00	**0.734**	22.63°C
Left Side	661/1880	GPRS 4TS	0.217	0.137	-0.130	27.13	28.00	0.265	22.63°C
Right Side	661/1880	GPRS 4TS	0.035	0.022	-0.080	27.13	28.00	0.043	22.63°C
Bottom Side	661/1880	GPRS 4TS	0.481	0.282	-0.120	27.13	28.00	0.588	22.63°C
Back Side	810/1909.8	GPRS 4TS	0.620	0.357	-0.150	27.66	28.00	0.670	22.63°C
Back Side	512/1850.2	GPRS 4TS	0.577	0.332	-0.190	27.47	28.00	0.652	22.63°C

Note: Per KDB 648474 D04, product specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2W/kg.

8.2.3 Results overview of UMTS Band V

Test position of Head	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	4182/836.4	RMC	0.127	0.100	-0.120	24.36	25.00	0.147	21.86°C
Left Hand Tilted 15°	4182/836.4	RMC	0.079	0.064	0.130	24.36	25.00	0.092	21.86°C
Right Hand Touched	4182/836.4	RMC	0.181	0.138	0.150	24.36	25.00	0.210	21.86°C
Right Hand Tilted 15°	4182/836.4	RMC	0.088	0.070	0.020	24.36	25.00	0.102	21.86°C
Right Hand Touched	4132/826.4	RMC	0.208	0.160	0.170	24.26	25.00	**0.247**	21.86°C
Right Hand Touched	4233/846.6	RMC	0.151	0.116	0.060	24.46	25.00	0.171	21.86°C
Test position of Body-Worn with 15mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (dB)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR1-g(W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	4132/826.4	RMC	0.188	0.146	-0.080	24.36	25.00	0.218	22.35°C
Back Side	4182/836.4	RMC	0.198	0.152	-0.030	24.36	25.00	0.229	22.35°C
Back Side	4132/826.4	RMC	0.248	0.191	-0.080	24.26	25.00	**0.294**	22.35°C
Back Side	4233/846.6	RMC	0.253	0.196	-0.060	24.46	25.00	0.286	22.35°C

Test position of Hotspot with 10mm	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Front Side	4182/836.4	RMC	0.245	0.144	-0.090	24.36	25.00	0.284	22.35°C
Back Side	4182/836.4	RMC	0.268	0.153	-0.090	24.36	25.00	0.311	22.35°C
Left Side	4182/836.4	RMC	0.088	0.062	-0.160	24.36	25.00	0.102	22.35°C
Right Side	4182/836.4	RMC	0.237	0.167	-0.070	24.36	25.00	0.275	22.35°C
Bottom Side	4182/836.4	RMC	0.177	0.093	-0.160	24.36	25.00	0.205	22.35°C
Back Side	4233/846.6	RMC	0.236	0.136	-0.080	24.46	25.00	0.267	22.35°C
Back Side	4132/826.4	RMC	0.308	0.178	-0.090	24.26	25.00	**0.365**	22.35°C

Note: Per KDB 648474 D04, product specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2W/kg.

8.2.4 Results overview of UMTS Band IV

Test position of Head	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	1413/1732.6	RMC	0.186	0.122	0.050	24.54	25.00	0.207	22.31°C
Left Hand Tilted 15°	1413/1732.6	RMC	0.137	0.089	-0.030	24.54	25.00	0.152	22.31°C
Right Hand Touched	1413/1732.6	RMC	0.137	0.092	0.040	24.54	25.00	0.152	22.31°C
Right Hand Tilted 15°	1413/1732.6	RMC	0.108	0.069	0.060	24.54	25.00	0.120	22.31°C
Left Hand Touched	1312/1712.4	RMC	0.159	0.105	0.160	23.94	25.00	0.203	22.31°C
Left Hand Touched	1513/1752.6	RMC	0.209	0.136	0.080	23.99	25.00	**0.264**	22.31°C
Test position of Body-Worn with 15mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (dB)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR1-g(W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	1413/1732.6	RMC	0.239	0.153	-0.190	24.54	25.00	0.266	22.70°C
Back Side	1413/1732.6	RMC	0.248	0.155	-0.140	24.54	25.00	0.276	22.70°C
Back Side	1312/1712.4	RMC	0.240	0.155	-0.190	23.94	25.00	0.306	22.70°C
Back Side	1513/1752.6	RMC	0.248	0.157	-0.180	23.99	25.00	**0.313**	22.70°C

Test position of Hotspot with 10mm	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Front Side	1413/1732.6	RMC	0.421	0.254	-0.020	24.54	25.00	0.468	22.70°C
Back Side	1413/1732.6	RMC	0.467	0.287	-0.180	24.54	25.00	0.519	22.70°C
Left Side	1413/1732.6	RMC	0.161	0.102	-0.170	24.54	25.00	0.179	22.70°C
Right Side	1413/1732.6	RMC	0.095	0.059	-0.110	24.54	25.00	0.106	22.70°C
Bottom Side	1413/1732.6	RMC	0.365	0.222	0.080	24.54	25.00	0.406	22.70°C
Back Side	1312/1712.4	RMC	0.455	0.280	-0.190	23.94	25.00	0.581	22.70°C
Back Side	1513/1752.6	RMC	0.490	0.298	-0.160	23.99	25.00	**0.618**	22.70°C

Note: Per KDB 648474 D04, product specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2W/kg.

8.2.5 Results overview of UMTS Band II

Test position of Head	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	9400/1880	RMC	0.308	0.200	0.040	24.55	26.00	**0.430**	22.26°C
Left Hand Tilted 15°	9400/1880	RMC	0.144	0.095	0.140	24.55	26.00	0.201	22.26°C
Right Hand Touched	9400/1880	RMC	0.149	0.098	0.120	24.55	26.00	0.208	22.26°C
Right Hand Tilted 15°	9400/1880	RMC	0.101	0.064	0.010	24.55	26.00	0.141	22.26°C
Left Hand Touched	9538/1907.6	RMC	0.311	0.201	0.030	24.88	26.00	0.402	22.26°C
Left Hand Touched	9262/1852.4	RMC	0.293	0.190	0.170	25.00	26.00	0.369	22.26°C
Test position of Body-Worn with 15mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (dB)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR1-g(W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	9400/1880	RMC	0.317	0.189	-0.110	24.55	26.00	0.443	22.63°C
Back Side	9400/1880	RMC	0.323	0.197	-0.180	24.55	26.00	**0.451**	22.63°C
Back Side	9538/1907.6	RMC	0.332	0.203	-0.190	24.88	26.00	0.430	22.63°C
Back Side	9262/1852.4	RMC	0.314	0.191	-0.100	25.00	26.00	0.395	22.63°C

Test position of Hotspot with 10mm	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Front Side	9400/1880	RMC	0.496	0.289	0.020	24.55	26.00	0.693	22.63°C
Back Side	9400/1880	RMC	0.596	0.347	-0.190	24.55	26.00	**0.832**	22.63°C
Left Side	9400/1880	RMC	0.304	0.191	-0.140	24.55	26.00	0.424	22.63°C
Right Side	9400/1880	RMC	0.048	0.029	0.100	24.55	26.00	0.066	22.63°C
Bottom Side	9400/1880	RMC	0.559	0.329	-0.190	24.55	26.00	0.781	22.63°C
Back Side	9538/1907.6	RMC	0.616	0.359	-0.070	24.88	26.00	0.797	22.63°C
Back Side	9262/1852.4	RMC	0.577	0.337	-0.190	25.00	26.00	0.726	22.63°C

Note: Per KDB 648474 D04, product specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2W/kg.

8.2.6 Results overview of LTE Band II

Test position of Head	Test channel /Freq. (MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	18900/ 1880	20M QPSK 1RB#50	0.253	0.163	0.040	23.96	25.00	0.321	22.26°C
Left Hand Tilted 15°	18900/ 1880	20M QPSK 1RB#50	0.128	0.082	0.080	23.96	25.00	0.163	22.26°C
Right Hand Touched	18900/ 1880	20M QPSK 1RB#50	0.142	0.092	0.020	23.96	25.00	0.180	22.26°C
Right Hand Tilted 15°	18900/ 1880	20M QPSK 1RB#50	0.097	0.060	0.170	23.96	25.00	0.123	22.26°C
Left Hand Touched	18900/ 1880	20M QPSK 50%RB#50	0.206	0.132	0.110	23.82	25.00	0.270	22.26°C
Left Hand Tilted 15°	18900/ 1880	20M QPSK 50%RB#50	0.106	0.068	0.020	23.82	25.00	0.139	22.26°C
Right Hand Touched	18900/ 1880	20M QPSK 50%RB#50	0.116	0.075	0.030	23.82	25.00	0.152	22.26°C
Right Hand Tilted 15°	18900/ 1880	20M QPSK 50%RB#50	0.083	0.051	0.000	23.82	25.00	0.109	22.26°C
Left Hand Touched	19100/ 1900	20M QPSK 1RB#50	0.283	0.182	0.030	23.80	25.00	**0.373**	22.26°C
Left Hand Touched	18700/ 1860	20M QPSK 1RB#50	0.224	0.143	0.030	23.81	25.00	0.295	22.26°C

Test position of Body-Worn with 15mm	Test channel /Freq. (MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Front Side	18900/ 1880	20M QPSK 1RB#50	0.281	0.168	0.000	23.96	25.00	0.357	22.63°C
Back Side	18900/ 1880	20M QPSK 1RB#50	0.309	0.189	-0.140	23.96	25.00	0.393	22.63°C
Front Side	18900/ 1880	20M QPSK 50%RB#50	0.214	0.128	-0.010	23.71	25.00	0.288	22.63°C
Back Side	18900/ 1880	20M QPSK 50%RB#50	0.236	0.143	-0.060	23.71	25.00	0.318	22.63°C
Back Side	19100/ 1900	20M QPSK 1RB#50	0.323	0.197	-0.180	23.80	25.00	**0.426**	22.63°C
Back Side	18700/ 1860	20M QPSK 1RB#50	0.270	0.164	-0.130	23.81	25.00	0.355	22.63°C

Test position of Hotspot with 10mm	Test channel /Freq. (MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Front Side	18900/ 1880	20M QPSK 1RB#50	0.576	0.331	0.140	23.96	25.00	0.732	22.63°C
Back Side	18900/ 1880	20M QPSK 1RB#50	0.648	0.374	-0.120	23.96	25.00	0.823	22.63°C
Left Side	18900/ 1880	20M QPSK 1RB#50	0.279	0.176	-0.060	23.96	25.00	0.354	22.63°C
Right Side	18900/ 1880	20M QPSK 1RB#50	0.048	0.030	0.190	23.96	25.00	0.061	22.63°C
Bottom Side	18900/ 1880	20M QPSK 1RB#50	0.572	0.334	-0.190	23.96	25.00	0.727	22.63°C
Front Side	18900/ 1880	20M QPSK 50%RB#50	0.438	0.251	0.090	23.71	25.00	0.589	22.63°C
Back Side	18900/ 1880	20M QPSK 50%RB#50	0.490	0.283	-0.110	23.71	25.00	0.659	22.63°C
Left Side	18900/ 1880	20M QPSK 50%RB#50	0.211	0.133	0.000	23.71	25.00	0.284	22.63°C
Right Side	18900/ 1880	20M QPSK 50%RB#50	0.035	0.022	-0.120	23.71	25.00	0.047	22.63°C
Bottom Side	18900/ 1880	20M QPSK 50%RB#50	0.432	0.251	-0.120	23.71	25.00	0.581	22.63°C
Back Side	19100/ 1900	20M QPSK 1RB#50	0.582	0.338	-0.160	23.80	25.00	0.767	22.63°C
Back Side	18700/ 1860	20M QPSK 1RB#50	0.648	0.375	-0.020	23.81	25.00	**0.852**	22.63°C

Note: Per KDB 648474 D04, product specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2W/kg.

8.2.7 Results overview of LTE Band IV

Test position of Head	Test channel /Freq. (MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	20175/ 1732.5	20M QPSK 1RB#50	0.169	0.110	0.080	23.66	24.00	0.183	22.31°C
Left Hand Tilted 15°	20175/ 1732.5	20M QPSK 1RB#50	0.125	0.081	0.090	23.66	24.00	0.135	22.31°C
Right Hand Touched	20175/ 1732.5	20M QPSK 1RB#50	0.136	0.090	0.000	23.66	24.00	0.147	22.31°C
Right Hand Tilted 15°	20175/ 1732.5	20M QPSK 1RB#50	0.100	0.063	0.130	23.66	24.00	0.108	22.31°C
Left Hand Touched	20175/ 1732.5	20M QPSK 50%RB#25	0.117	0.077	0.080	23.58	24.00	0.129	22.31°C
Left Hand Tilted 15°	20175/ 1732.5	20M QPSK 50%RB#25	0.086	0.056	0.050	23.58	24.00	0.094	22.31°C
Right Hand Touched	20175/ 1732.5	20M QPSK 50%RB#25	0.096	0.063	0.020	23.58	24.00	0.105	22.31°C
Right Hand Tilted 15°	20175/ 1732.5	20M QPSK 50%RB#25	0.068	0.044	0.020	23.58	24.00	0.075	22.31°C
Left Hand Touched	20050/ 1720	20M QPSK 1RB#50	0.148	0.098	-0.090	23.48	24.00	0.167	22.31°C
Left Hand Touched	20300/ 1745	20M QPSK 1RB#50	0.169	0.111	0.020	23.42	24.00	**0.193**	22.31°C

Test position of Body-Worn with 15mm	Test channel /Freq. (MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Front Side	20175/ 1732.5	20M QPSK 1RB#50	0.209	0.131	0.010	23.66	24.00	0.226	22.70°C
Back Side	20175/ 1732.5	20M QPSK 1RB#50	0.235	0.151	-0.180	23.66	24.00	0.254	22.70°C
Front Side	20175/ 1732.5	20M QPSK 50%RB#25	0.151	0.095	0.020	23.58	24.00	0.166	22.70°C
Back Side	20175/ 1732.5	20M QPSK 50%RB#25	0.167	0.107	-0.120	23.58	24.00	0.184	22.70°C
Back Side	20050/ 1720	20M QPSK 1RB#50	0.217	0.139	-0.070	23.48	24.00	0.245	22.70°C
Back Side	20300/ 1745	20M QPSK 1RB#50	0.225	0.143	-0.140	23.42	24.00	**0.257**	22.70°C

Test position of Hotspot with 10mm	Test channel /Freq. (MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Front Side	20175/ 1732.5	20M QPSK 1RB#50	0.438	0.263	-0.030	23.66	24.00	0.474	22.70°C
Back Side	20175/ 1732.5	20M QPSK 1RB#50	0.490	0.296	0.090	23.66	24.00	0.530	22.70°C
Left Side	20175/ 1732.5	20M QPSK 1RB#50	0.142	0.089	-0.120	23.66	24.00	0.154	22.70°C
Right Side	20175/ 1732.5	20M QPSK 1RB#50	0.088	0.054	-0.090	23.66	24.00	0.095	22.70°C
Bottom Side	20175/ 1732.5	20M QPSK 1RB#50	0.398	0.241	0.010	23.66	24.00	0.430	22.70°C
Front Side	20175/ 1732.5	20M QPSK 50%RB#25	0.312	0.188	-0.060	23.58	23.00	0.273	22.70°C
Back Side	20175/ 1732.5	20M QPSK 50%RB#25	0.346	0.211	-0.120	23.58	24.00	0.381	22.70°C
Left Side	20175/ 1732.5	20M QPSK 50%RB#25	0.095	0.060	-0.160	23.58	24.00	0.105	22.70°C
Right Side	20175/ 1732.5	20M QPSK 50%RB#25	0.061	0.037	-0.060	23.58	24.00	0.068	22.70°C
Bottom Side	20175/ 1732.5	20M QPSK 50%RB#25	0.284	0.172	-0.130	23.58	24.00	0.313	22.70°C
Back Side	20050/ 1720	20M QPSK 1RB#50	0.494	0.293	-0.080	23.48	24.00	0.557	22.70°C
Back Side	20300/ 1745	20M QPSK 1RB#50	0.497	0.292	-0.080	23.42	24.00	**0.568**	22.70°C

Note: Per KDB 648474 D04, product specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2W/kg.

8.2.8 Results overview of LTE Band V

Test position of Head	Test channel /Freq. (MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	20525/ 836.5	10M QPSK 1RB#25	0.118	0.093	0.050	24.26	25.00	0.140	21.86°C
Left Hand Tilted 15°	20525/ 836.5	10M QPSK 1RB#25	0.071	0.056	0.030	24.26	25.00	0.084	21.86°C
Right Hand Touched	20525/ 836.5	10M QPSK 1RB#25	0.165	0.126	0.050	24.26	25.00	0.196	21.86°C
Right Hand Tilted 15°	20525/ 836.5	10M QPSK 1RB#25	0.076	0.061	0.040	24.26	25.00	0.090	21.86°C
Left Hand Touched	20525/ 836.5	10M QPSK 25%RB#25	0.082	0.064	0.180	23.32	25.00	0.121	21.86°C
Left Hand Tilted 15°	20525/ 836.5	10M QPSK 25%RB#25	0.047	0.037	0.080	23.32	25.00	0.069	21.86°C
Right Hand Touched	20525/ 836.5	10M QPSK 25%RB#25	0.119	0.091	0.070	23.32	25.00	0.175	21.86°C
Right Hand Tilted 15°	20525/ 836.5	10M QPSK 25%RB#25	0.053	0.042	0.090	23.32	25.00	0.078	21.86°C
Right Hand Touched	20450/ 829	10M QPSK 1RB#25	0.145	0.111	0.070	24.17	25.00	0.176	21.86°C
Right Hand Touched	20600/ 844	10M QPSK 1RB#25	0.173	0.132	0.020	24.25	25.00	**0.206**	21.86°C

Test position of Body-Worn with 15mm	Test channel /Freq. (MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Front Side	20525/ 836.5	10M QPSK 1RB#25	0.174	0.135	-0.050	24.26	25.00	0.206	22.04°C
Back Side	20525/ 836.5	10M QPSK 1RB#25	0.179	0.138	-0.060	24.26	25.00	0.212	22.04°C
Front Side	20525/ 836.5	10M QPSK 25%RB#25	0.122	0.095	-0.160	23.32	25.00	0.180	22.04°C
Back Side	20525/ 836.5	10M QPSK 25%RB#25	0.127	0.097	0.000	23.32	25.00	0.187	22.04°C
Back Side	20450/ 829	10M QPSK 1RB#25	0.192	0.149	0.010	24.17	25.00	**0.232**	22.04°C
Back Side	20600/ 844	10M QPSK 1RB#25	0.153	0.118	-0.150	24.25	25.00	0.182	22.04°C

Test position of Hotspot with 10mm	Test channel /Freq. (MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR1-g(W/kg)	Liquid Temp.
			1-g	10-g					
Front Side	20525/ 836.5	10M QPSK 1RB#25	0.236	0.138	-0.140	24.26	25.00	0.280	22.04°C
Back Side	20525/ 836.5	10M QPSK 1RB#25	0.277	0.161	-0.030	24.26	25.00	0.328	22.04°C
Left Side	20525/ 836.5	10M QPSK 1RB#25	0.070	0.049	-0.060	24.26	25.00	0.083	22.04°C
Right Side	20525/ 836.5	10M QPSK 1RB#25	0.195	0.138	-0.060	24.26	25.00	0.231	22.04°C
Bottom Side	20525/ 836.5	10M QPSK 1RB#25	0.196	0.101	-0.060	24.26	25.00	0.232	22.04°C
Front Side	20525/ 836.5	10M QPSK 25%RB#25	0.171	0.100	-0.010	23.32	25.00	0.252	22.04°C
Back Side	20525/ 836.5	10M QPSK 25%RB#25	0.204	0.118	-0.070	23.32	25.00	0.300	22.04°C
Left Side	20525/ 836.5	10M QPSK 25%RB#25	0.048	0.034	0.030	23.32	25.00	0.071	22.04°C
Right Side	20525/ 836.5	10M QPSK 25%RB#25	0.137	0.097	-0.140	23.32	25.00	0.202	22.04°C
Bottom Side	20525/ 836.5	10M QPSK 25%RB#25	0.140	0.072	-0.170	23.32	25.00	0.206	22.04°C
Back Side	20450/ 829	10M QPSK 1RB#25	0.293	0.169	-0.070	24.17	25.00	**0.355**	22.04°C
Back Side	20600/ 844	10M QPSK 1RB#25	0.265	0.152	-0.160	24.25	25.00	0.315	22.04°C

Note: Per KDB 648474 D04, product specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2W/kg.

8.2.9 Results overview of WiFi 2.4G

Test position of Head	Test channel /Freq. (MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR_{1-g} (W/kg)	Actual duty factor	Reported SAR 1-g (W/kg)
			1-g	10-g						
Left Hand Touched	6/2437	802.11b	0.382	0.219	-0.040	18.55	19.00	0.424	99.61%	0.425
Left Hand Tilted 15°	6/2437	802.11b	0.457	0.235	-0.090	18.55	19.00	0.507	99.61%	0.509
Right Hand Touched	6/2437	802.11b	0.886	0.454	-0.010	18.55	19.00	0.983	99.61%	0.987
Right Hand Tilted 15°	6/2437	802.11b	0.668	0.346	-0.060	18.55	19.00	0.741	99.61%	0.744
Right Hand Touched	1/2412	802.11b	0.852	0.435	-0.070	18.30	19.00	1.001	99.58%	1.005
Right Hand Touched	11/2462	802.11b	0.894	0.458	-0.130	18.35	19.00	1.038	99.58%	**1.043**
Right Hand Touched Repeated	11/2462	802.11b	0.890	0.446	-0.050	18.35	19.00	1.034	99.58%	1.038

Test position of Body-Worn with 15mm	Test channel /Freq. (MHz)	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR_{1-g} (W/kg)	Actual duty factor	Reported SAR 1-g (W/kg)
			1-g	10-g						
Front Side	6/2437	802.11b	0.096	0.057	0.070	18.55	19.00	0.106	99.61%	0.107
Back Side	6/2437	802.11b	0.157	0.083	0.130	18.55	19.00	0.174	99.61%	0.175
Back Side	11/2462	802.11b	0.160	0.084	-0.060	18.35	19.00	0.186	99.61%	**0.187**
Back Side	1/2412	802.11b	0.152	0.080	0.050	18.30	19.00	0.179	99.61%	0.179
Test position of Hotspot with 10mm	**Test channel /Freq. (MHz)**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (dB)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR_{1-g} (W/kg)**	**Actual duty factor**	**Reported SAR 1-g (W/kg)**
			1-g	**10-g**						
Front Side	6/2437	802.11b	0.185	0.100	-0.090	18.55	19.00	0.205	99.61%	0.206
Back Side	6/2437	802.11b	0.277	0.142	-0.090	18.55	19.00	0.307	99.61%	0.308
Right Side	6/2437	802.11b	0.033	0.019	-0.060	18.55	19.00	0.037	99.61%	0.037
Top Side	6/2437	802.11b	0.157	0.082	-0.170	18.55	19.00	0.174	99.61%	0.175
Back Side	11/2462	802.11b	0.293	0.150	-0.090	18.35	19.00	0.340	99.58%	**0.342**
Back Side	1/2412	802.11b	0.274	0.140	-0.070	18.30	19.00	0.322	99.58%	0.323

Note: Per KDB248227D01:

1) SAR is measured for 2.4 GHz 802.11b DSSS using initial test position procedure.

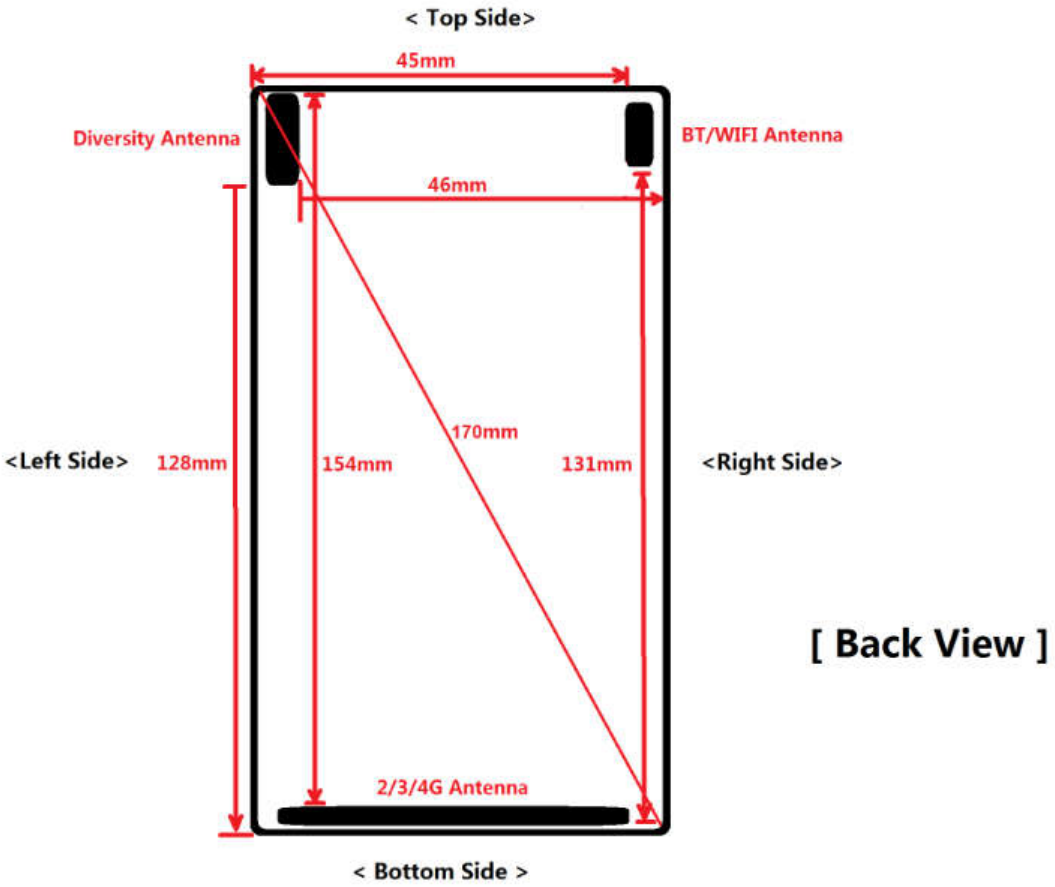
2) As the highest reported SAR for DSSS is adjusted by the ratio of OFDM 802.11g to DSSS specified maximum output power and the adjusted SAR is < 1.2 W/kg, so SAR for OFDM 802.11g is required.

3) As the highest reported SAR for DSSS is adjusted by the ratio of OFDM 802.11n(20MHz and 40MHz) to DSSS specified maximum output power and the adjusted SAR is < 1.2 W/kg, so SAR for OFDM 802.11n(20MHz and 40MHz) is required.

4) Per KDB 648474 D04, product specific 10-g SAR test is not required for this frequency band since hotspot mode 1-g reported SAR < 1.2W/kg.

8.3 Multiple Transmitter Information

The location of the antennas inside IO PRO 3D is shown as below picture:



Note:

1) Per KDB 941225 D06, particular DUT edges were not required to be evaluated for Hotspot SAR if the antenna-to-edge distance is greater than 2.5cm.
2) Per KDB 648474 D04, because the overall diagonal dimension of this device is > 160mm, it is considered a “phablet” device.When hotspot mode applies, product specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2W/kg.

8.4 Stand-alone SAR

Per FCC KDB 447498D01:

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

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

• f(GHz) is the RF channel transmit frequency in GHz

• Power and distance are rounded to the nearest mW and mm before calculation

• The result is rounded to one decimal place for comparison

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

Mode	Position	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	F (GHz)	Calculation Result	SAR test exclusion Threshold	SAR test exclusion
BT	Body-Worn	6.00	3.98	15.00	2.450	0.42	3.00	Yes

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

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

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

Mode	Position	Pmax(dBm)	Pmax(mW)	Distance(mm)	f(GHz)	X	Estimated SAR(W/Kg)
BT	Body-Worn	6	3.98	15.00	2.45	7.50	0.055

Note: 1) maximum possible output power (including tune-up tolerance) declared by manufacturer
2) Held to ear configurations are not applicable to Bluetooth for this device

8.5 Simultaneous Transmission Possibilities

The Simultaneous Transmission Possibilities of this device are as below:

Simultaneous Tx Combination	Configuration	Head	Body-worn	Hotspot	product specific 10-g SAR
1	GSM + WiFi 2.4G	Yes	Yes	Yes	Yes
2	UMTS + WiFi 2.4G	Yes	Yes	Yes	Yes
3	CDMA + WiFi 2.4G	Yes	Yes	Yes	Yes
4	LTE + WiFi 2.4G	Yes	Yes	Yes	Yes
5	GSM + BT	N/A	Yes	N/A	Yes
6	UMTS + BT	N/A	Yes	N/A	Yes
7	CDMA + BT	N/A	Yes	N/A	Yes
8	LTE + BT	N/A	Yes	N/A	Yes

Note:

1) The device does not support simultaneous BT and WiFi 2.4G, because the BT and WiFi 2.4G share the same antenna and can't transmit simultaneously.
2) Held to ear configurations are not applicable to Bluetooth and therefore were not considered for simultaneous transmission.

8.6 SAR Summation Scenario

Test Position		2G/3G/4G Antenna SARmax													WiFi/BT Antenna SARmax	∑SAR	SPLSP
		GSM 850	GSM 1900	UMTS Band II	UMTS Band IV	UMTS Band V	CDMA BC0#	CDMA BC1#	CDMA BC10#	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 12#	LTE Band 17#	BT-WiFi 2.4G		
Head	Left touch	0.183	0.187	0.430	0.264	0.147	0.151	0.362	0.410	0.373	0.193	0.140	0.120	0.083	0.425	0.855	NO
	Left tilt	0.113	0.099	0.201	0.152	0.092	0.047	0.048	0.047	0.163	0.135	0.084	0.027	0.019	0.509	0.710	NO
	Right touch	0.237	0.099	0.208	0.152	0.247	0.207	0.230	0.528	0.180	0.147	0.206	0.155	0.121	1.043	**1.571**	NO
	Right tilt	0.115	0.068	0.141	0.120	0.102	0.058	0.033	0.058	0.123	0.108	0.090	0.033	0.025	0.744	0.885	NO
Body 15mm	Front Side	0.254	0.214	0.443	0.266	0.218	0.169	0.396	0.554	0.357	0.226	0.206	0.116	0.148	0.107	0.661	NO
	Back Side	0.281	0.315	0.451	0.313	0.294	0.157	0.305	0.535	0.426	0.257	0.232	0.150	0.159	0.187	0.722	NO
Hotspot 10mm	Front Side	0.582	0.683	0.693	0.468	0.284	0.231	0.705	0.662	0.732	0.474	0.280	0.137	0.144	0.206	0.938	NO
	Back Side	0.675	0.734	0.832	0.618	0.365	0.222	0.068	0.595	0.852	0.568	0.355	0.169	0.171	0.342	1.194	NO
	Left Side	0.204	0.265	0.424	0.179	0.102	0.032	0.031	0.025	0.354	0.154	0.083	0.019	0.040	\	0.424	NO
	Right Side	0.510	0.043	0.066	0.106	0.275	0.162	1.062	0.343	0.061	0.095	0.231	0.052	0.159	0.037	1.099	NO
	Top Side	\	\	\	\	\	\	\	\	\	\	\	\	\	0.175	0.175	NO
	Bottom Side	0.428	0.588	0.781	0.406	0.205	0.203	1.167	0.679	0.727	0.430	0.232	0.159	0.141	\	1.167	NO
Product Specific 10-g SAR 0mm	Front Side	\	\	\	\	\	0.392	1.047	0.312	\	\	\	0.438	0.448	\	1.047	NO
	Back Side	\	\	\	\	\	0.306	0.352	0.292	\	\	\	0.470	0.512	\	0.512	NO
	Left Side	\	\	\	\	\	0.034	0.168	0.021	\	\	\	0.119	0.234	\	0.234	NO
	Right Side	\	\	\	\	\	0.217	1.358	0.118	\	\	\	0.152	0.356	\	1.358	NO
	Top Side	\	\	\	\	\	\	\	\	\	\	\	\	\	\	\	NO
	Bottom Side	\	\	\	\	\	0.267	1.514	0.388	\	\	\	0.260	0.235	\	1.514	NO

Note: Simultaneous Tx Combination of 2G/3G/4G antenna and WiFi 2.4G /BT.
"#" indicates the testing items were fulfilled by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory. The tested data come from Report No.:WT188005125

8.7 Simultaneous Transmission Conlcusion

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

Annex A: Appendix A: SAR System performance Check Plots

(Please See Appendix A)

Annex B: Appendix B: SAR Measurement results Plots

(Please See Appendix B)

Annex C: Appendix C: Calibration reports

(Please See Appendix C)

Annex D: Appendix D: Photo documentation

(Please See Appendix D)

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.

——END OF REPORT——