FCC SAR Test Report

Product	:	WCDMA Digital Mobile Phone
Trade mark	:	RugGear
Model/Type reference	:	RG310, RG310EX, RG320EX
Serial Number	:	IV6DUCFIJVYTWKB6
Report Number	:	EED32I00185906
FCC ID	:	ZLE-RG310
Date of Issue:	:	Jul. 29, 2016
Test Standards	:	Refer to Section 1.5
Test result	:	PASS

Prepared for:

Power Idea Technology Limited.

4th Floor, A Section, Languang Science&technology Xinxi RD,

Hi-Tech Industrial Park North, Nanshan, ShenZhen, China

Prepared by:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China

TEL: +86-755-3368 3668

FAX: +86-755-3368 3385

Compiled by: Kevin lan Reviewed by: Tom Tang

Approved by: Sheek Luo Date: Jul. 29, 2016

Sheek Luo

Lab supervisor

Check No.: 2384307786

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Modified History

REV.	Modification Description	Issued Date	Remark
REV.1.0	Initial Test Report Relesse	Jul. 29, 2016	

1 General information

1.1 Notes

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

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1.2 Application details

Date of receipt of test item:	2016-07-04
Start of test:	2016-07-04
End of test:	2016-07-12

1.3 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Power Idea Technology Limited. Model Name: RG310, RG310EX, RG320EX are as below:

Band	MAX Reported SAR (W/kg)		
	1-g Head	1-g Body-worn Accessory(15mm)	1-g Hotspot (10mm)
GSM850	0.415	0.493	1.160
GSM1900	0.389	0.471	0.910
UMTS Band V	0.355	0.487	0.619
UMTS Band II	0.424	0.648	0.968
WiFi 2.4G	0.153	0.026	0.045
The highest simultaneous SAR is 1.205W/kg per KDB 690783 D01			

Note:

For body worn 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 the handset 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:	WCDMA Digital Mobile Phone
Model:	RG310, RG310EX, RG320EX
Model Difference:	Only the model RG310 was tested, the PCB, Schematic, Hardware etc were identical for the above models, Only different model name due to difference agent and marketing purposes.
FCC ID:	ZLE-RG310
SN:	IV6DUCFIJVYTWKB6
Device Type:	Portable device
Exposure Category:	uncontrolled environment / general population
Hardware version:	N/A
Software version :	N/A
Antenna Type :	internal antenna
Device Operating Configurations:	
Supporting Mode(s) :	GSM850/1900,UMTS Band V/II,WiFi 2.4G(tested), BT,NFC
Duty Cycle used for SAR testing	WiFi: 100%
Modulation:	GMSK, 8PSK, QPSK, DSSS,OFDM, GFSK, π/4DQPSK, 8DPSK, ASK

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 II	1850-1910	1930-1990
	WIFI 2.4G	2412~2462	
	BT	2402~2480	
	NFC	13.56	

HSPA+:	HSPA+ supported Down Link only
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)
	4132-4182-4233 (UMTS Band V)

	9262-9400-9538 (UMTS Band II)
	1-6-11 (WiFi 2.4G)
	0-39-78 (BT)
Power Source:	Li-ion 3.7V/3600mAh

Remark: The tested samples and the sample information are provided by the client.

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	Handset 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 D06	Hotspot Mode 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

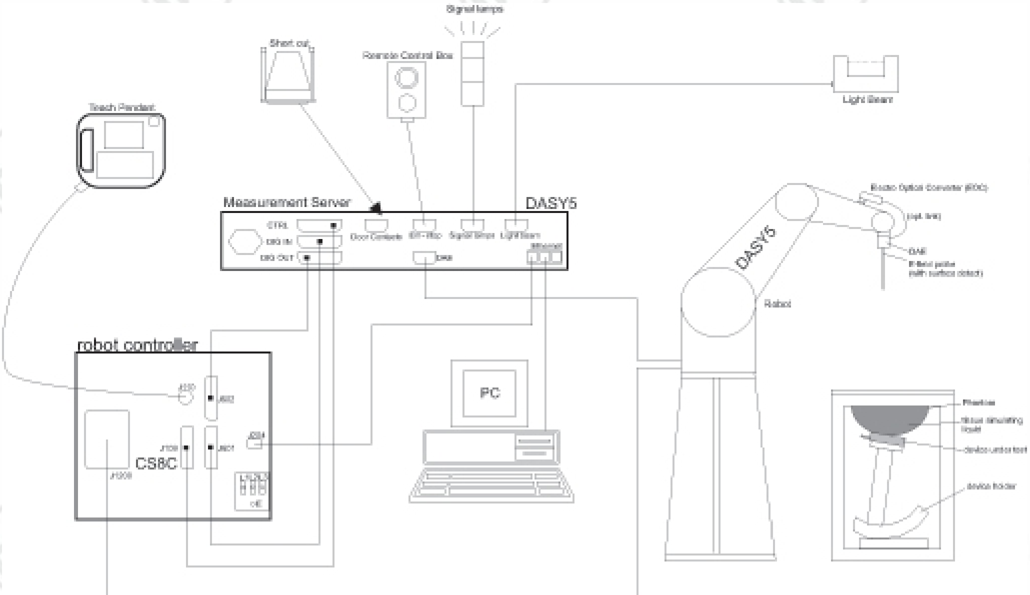
	Required	Actual
Ambient temperature:	18 – 25 °C	21.5 ± 2.0 °C
Tissue Simulating liquid:	18 – 25 °C	21.5 ± 2.0 °C
Relative humidity content:	30 – 70 %	30 – 70 %

1.10 Applicant and Manufacturer

Applicant/Client Name	Power Idea Technology Limited.
Applicant Address	4th Floor, A Section, Languang Science&technology Xinxi RD, Hi-Tech Industrial Park North, Nanshan, ShenZhen, China
Manufacturer Name	Power Idea Technology Limited.
Manufacturer Address	4th Floor, A Section, Languang Science&technology Xinxi RD, Hi-Tech Industrial Park North, Nanshan, 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.

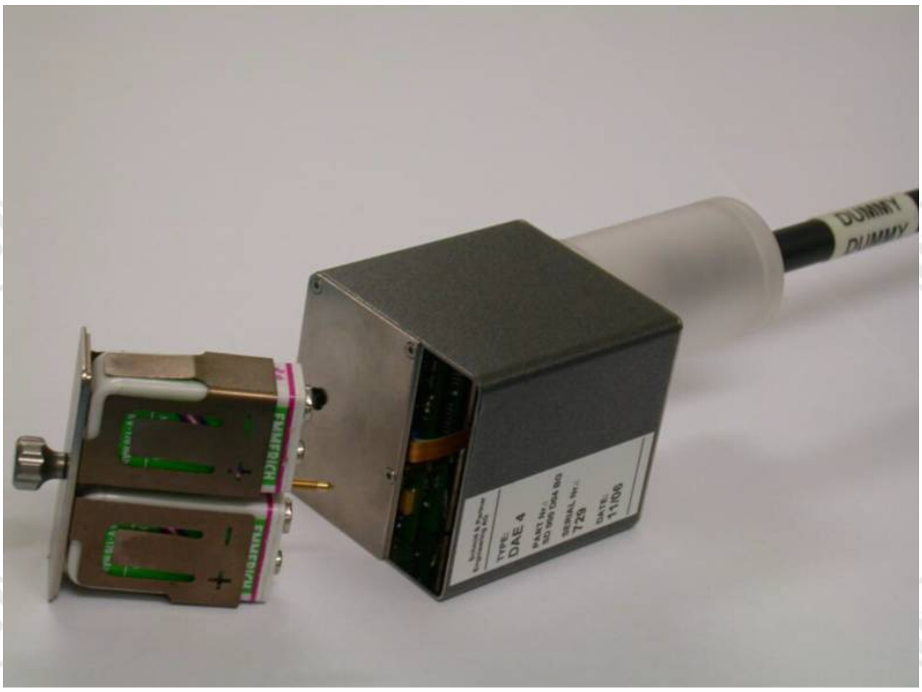
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB
Probe Overall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

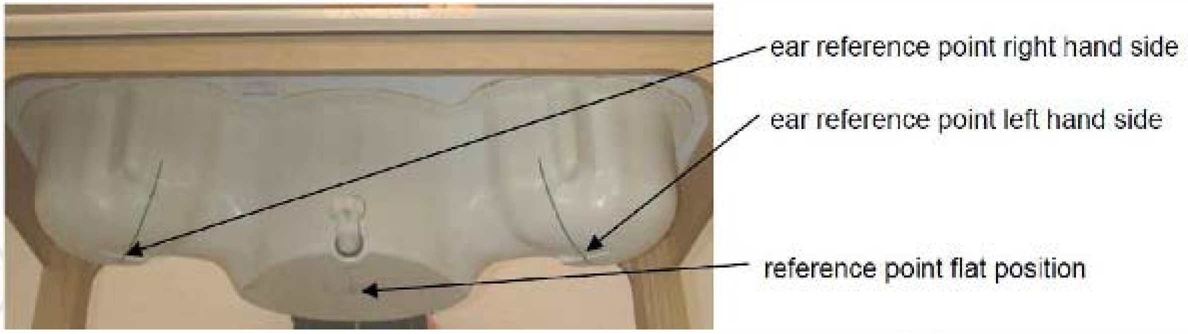
Batteries: The DAE works with either two standard 9V batteries or two 9V (actually 8.4V or 9.6 V) rechargeable batteries. Because the electronics automatically power-down unused components during braking or between measurements, the battery lifetime depends on system usage. Typical lifetimes are >20 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.

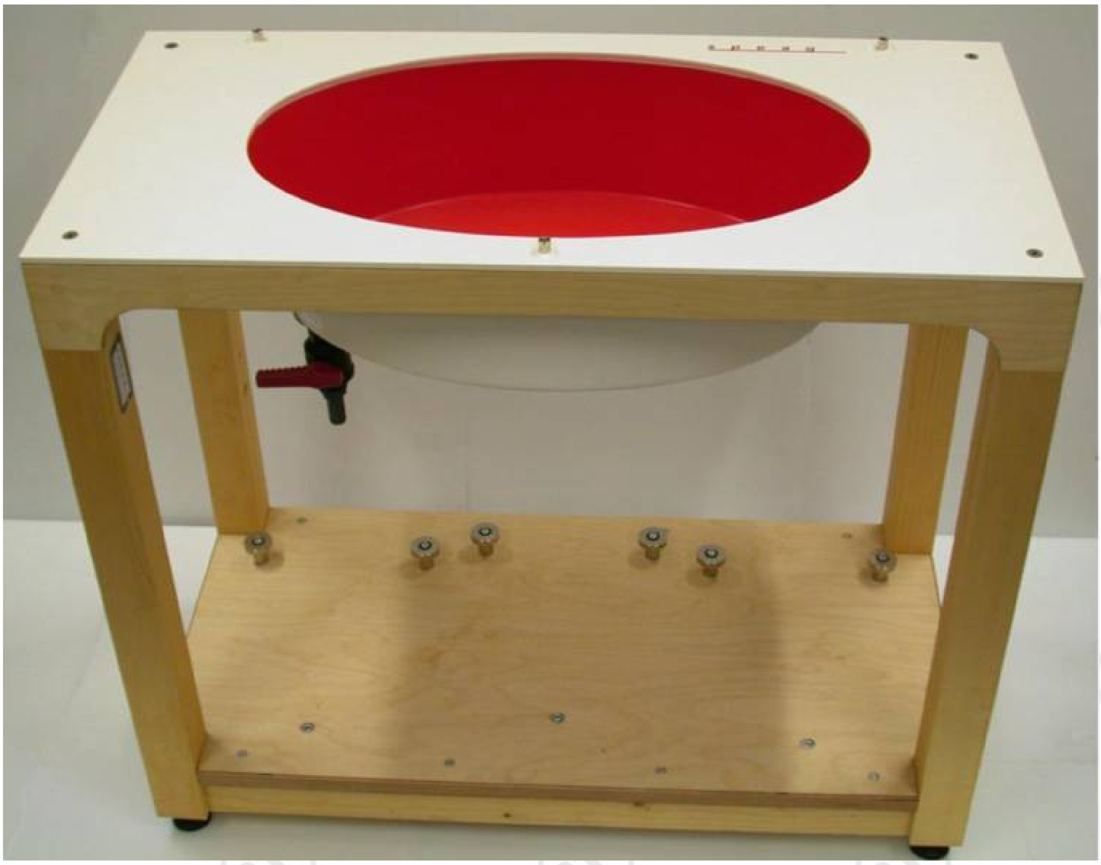
A white cover is provided to cover the phantom during off-periods to prevent water evaporation and changes in the liquid parameters.

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	2016-02-29	One year
☒	SPEAG	835 MHz Dipole	D835V2	4d193	2015-02-02	Three years
☐	SPEAG	1750 MHz Dipole	D1750V2	1134	2015-02-05	Three years
☒	SPEAG	1900 MHz Dipole	D1900V2	5d198	2015-02-06	Three years
☐	SPEAG	2000 MHz Dipole	D2000V2	1078	2015-02-05	Three years
☒	SPEAG	2450 MHz Dipole	D2450V2	959	2015-02-05	Three years
☐	SPEAG	2600 MHz Dipole	D2600V2	1101	2015-02-05	Three years
☐	SPEAG	5 GHz Dipole	D5GHzV2	1208	2015-02-03	Three years
☒	SPEAG	DAKS probe	DAKS-3.5	1052	2015-01-27	Three years
☒	SPEAG	Planar R140 Vector Reflectometer	DAKS-VNA R140	0200514	2015-01-27	Three years
☒	SPEAG	Data acquisition electronics	DAE4	1458	2016-02-26	One year
☒	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
☒	BALUN	Power Amplifier and directional coupler	SU319W	BLSZ1550140	NCR	NCR
☒	R & S	Universal Radio Communication Tester	CMU200	101553	2016-04-01	One year
☒	Agilent	Signal Generator	E4438C	MY45095744	2016-04-01	One year
☒	Agilent	Power Meter	E4418B	MY45104044	2015-12-01	One year
☒	Agilent	Power Meter Sensor	E9300A	MY41496140	2015-12-01	One year
☒	Agilent	Power Meter	PM2002	312901	2015-12-31	One year
☒	Agilent	Power Meter Sensor	51011A-EMC	36252	2015-12-31	One year

Note:

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

a) There is no physical damage on the dipole;

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

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

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

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)	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

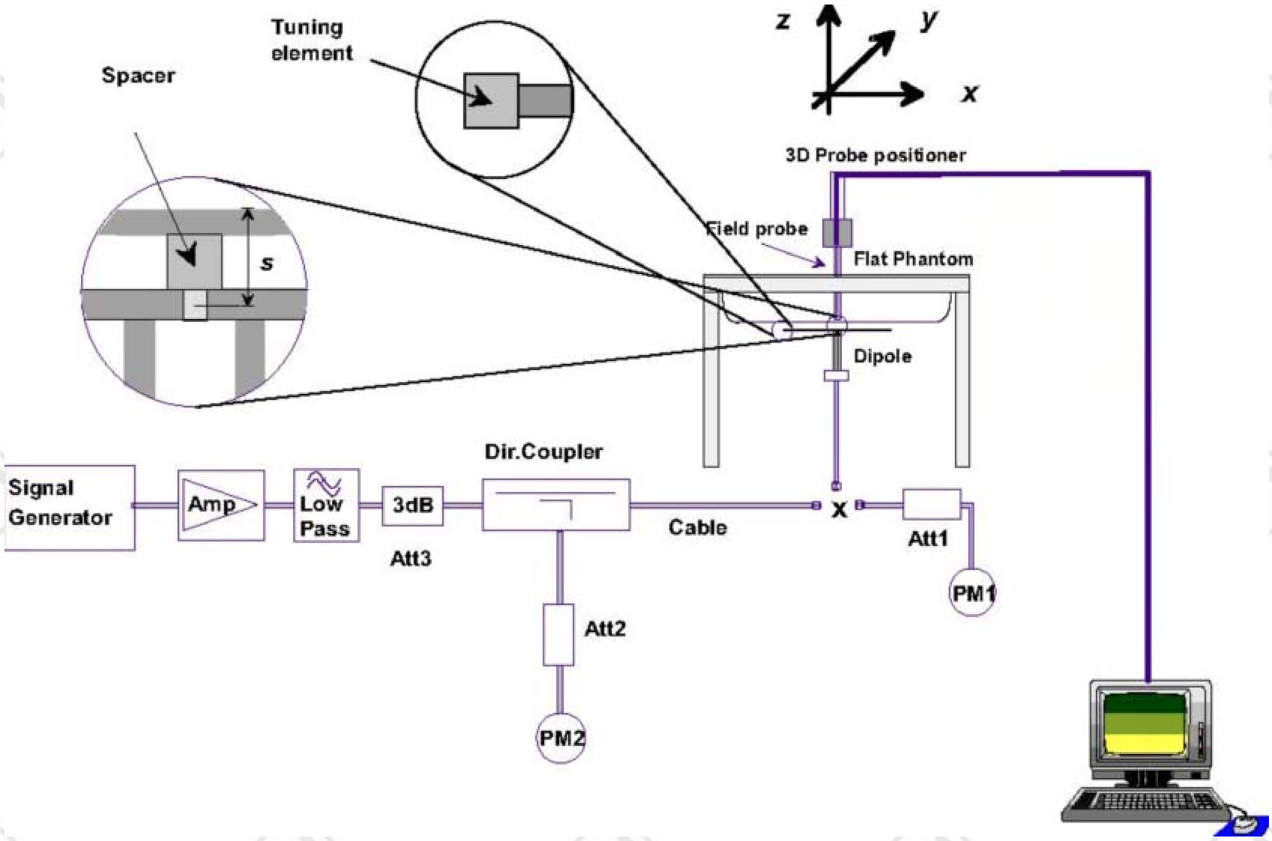
Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether
Tissue simulating 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)	40.91	0.914	21.15°C	2016/07/04
	835	41.50 (39.43~43.58)	0.90 (0.86~0.95)	40.84	0.920		
	850	41.50 (39.43~43.58)	0.92 (0.87~0.96)	40.71	0.930		
835 Body	825	55.20 (52.44~57.96)	0.97 (0.92~1.02)	54.32	0.960	21.49°C	2016/07/06
	835	55.20 (52.44~57.96)	0.97 (0.92~1.02)	55.22	0.966		
	850	55.20 (52.44~57.96)	0.99 (0.94~1.04)	54.14	0.978		
1900 Head	1850	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.81	1.369	21.43°C	2016/07/05
	1880	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.71	1.40		
	1900	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.63	1.422		
	1910	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.61	1.423		

1900 Body	1850	53.30 (50.64~55.97)	1.52 (1.44~1.60)	51.39	1.469	21.30°C	2016/07/07
	1880	53.30 (50.64~55.97)	1.52 (1.44~1.60)	51.33	1.495		
	1900	53.30 (50.64~55.97)	1.52 (1.44~1.60)	51.26	1.518		
	1910	53.30 (50.64~55.97)	1.52 (1.44~1.60)	51.18	1.518		
2450 Head	2410	39.30 (37.34~41.26)	1.76 (1.67~1.85)	38.44	1.760	20.09°C	2016/07/12
	2435	39.20 (37.24~41.16)	1.79 (1.70~1.88)	38.37	1.774		
	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	38.31	1.792		
	2460	39.20 (37.24~41.16)	1.81 (1.72~1.90)	38.25	1.793		
2450 Body	2410	52.80 (50.16~55.44)	1.91 (1.814~2.005)	51.69	1.936	21.12°C	2016/07/11
	2435	52.70 (50.07~55.34)	1.94 (1.843~2.037)	51.66	1.952		
	2450	52.70 (50.07~55.34)	1.95 (1.852~2.047)	51.59	1.968		
	2460	52.70 (50.07~55.34)	1.96 (1.862~2.058)	51.57	1.980		
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	9.13 (8.22~10.04)	5.96 (5.36~6.56)	9.200	6.04	21.15°C	2016/7/4
D1900V2 Head	40.60 (36.54~44.66)	21.40 (19.26~23.54)	37.64	19.76	21.43°C	2016/7/5
D2450V2 Head	53.70 (48.33~59.07)	25.00 (22.50~27.50)	53.60	25.08	20.09°C	2016/7/12
D835V2 Body	9.30 (8.37~10.23)	6.10 (5.49~6.71)	9.56	6.36	21.49°C	2016/7/6
D1900V2 Body	41.00 (36.90~45.10)	21.70 (19.53~23.87)	40.00	21.04	21.30°C	2016/7/7
D2450V2 Body	51.20 (46.08~56.32)	23.70 (21.33~26.07)	49.60	23.40	21.12°C	2016/7/11
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.

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

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	bβ_c	bβ_d	bβ_d (SF)	bβ_c /β_d	bβ_{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} = β_{hs}/β_c = 30/15Þ β_{hs} = 30/15 * β_c

Note 2 : CM=1 for $\beta_c/\beta_{d=}$ 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	bβ_c	bβ_d	β_d (SF)	bβ_c/β_d	bβ_{hs}(1)	bβ_{ec}	bβ_{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: ΔACK, ΔNACK and ΔCQI = 8Þ A_{hs} = β_{hs}/β_c = 30/15Þ β_{hs} = 30/15 * β_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, 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 β_c = 10/15 and β_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 β_c = 14/15 and β_d = 15/15

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

TS 25.306 Table 5.1g

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

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

7.3 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(SIM1)		Burst-Averaged output Power (dBm)			Division Factors	Source Based time Average Power(dBm)		
		128CH	190CH	251CH		128CH	190CH	251CH
GSM(CS)		33.13	33.51	33.48	-9.19	23.94	24.32	24.29
GPRS/ EDGE (GMSK)	1 Tx Slot	33.12	33.50	33.49	-9.19	23.93	24.31	24.30
	2 Tx Slots	32.65	32.73	32.71	-6.13	26.52	26.60	26.58
	3 Tx Slots	30.87	30.92	30.90	-4.42	26.45	26.50	26.48
	4 Tx Slots	29.77	29.80	29.77	-3.18	**26.59**	**26.62**	**26.59**
EDGE (8PSK)	1 Tx Slot	28.14	28.49	28.47	-9.19	18.95	19.30	19.28
	2 Tx Slots	26.62	26.70	26.68	-6.13	20.49	20.57	20.55
	3 Tx Slots	23.86	23.90	23.87	-4.42	19.44	19.48	19.45
	4 Tx Slots	21.72	21.78	21.74	-3.18	18.54	18.60	18.56

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

GSM850(SIM2)		Burst-Averaged output Power (dBm)			Division Factors	Source Based time Average Power(dBm)		
		128CH	190CH	251CH		128CH	190CH	251CH
GSM(CS)		33.08	33.38	33.45	-9.19	23.89	24.19	24.26
GPRS/ EDGE (GMSK)	1 Tx Slot	33.05	33.35	33.40	-9.19	23.86	24.16	24.21
	2 Tx Slots	32.66	32.62	32.68	-6.13	26.53	26.49	26.55
	3 Tx Slots	30.81	30.90	30.88	-4.42	26.39	26.48	26.46
	4 Tx Slots	29.78	29.75	29.79	-3.18	**26.60**	**26.57**	**26.61**
EDGE (8PSK)	1 Tx Slot	28.01	28.38	28.33	-9.19	18.82	19.19	19.14
	2 Tx Slots	26.45	26.59	26.63	-6.13	20.32	20.46	20.50
	3 Tx Slots	23.72	23.69	23.90	-4.42	19.30	19.27	19.48
	4 Tx Slots	21.70	21.85	21.59	-3.18	18.52	18.67	18.41

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(SIM1)		Burst-Averaged output Power (dBm)			Division Factors	Source Based time Average Power(dBm)		
		512CH	661CH	810CH		512CH	661CH	810CH
GSM(CS)		30.53	30.11	30.20	-9.19	21.34	20.92	21.01
GPRS/ EDGE (GMSK)	1 Tx Slot	30.64	30.12	30.29	-9.19	21.45	20.93	21.10
	2 Tx Slots	29.60	29.63	29.30	-6.13	**23.47**	**23.50**	**23.17**
	3 Tx Slots	27.45	27.50	27.24	-4.42	23.03	23.08	22.82
	4 Tx Slots	26.34	26.38	26.09	-3.18	23.16	23.20	22.91
EDGE (8PSK)	1 Tx Slot	28.60	28.57	28.24	-9.19	19.41	19.38	19.05
	2 Tx Slots	26.58	26.60	26.28	-6.13	20.45	20.47	20.15
	3 Tx Slots	23.39	23.48	23.23	-4.42	18.97	19.06	18.81
	4 Tx Slots	21.29	21.37	21.80	-3.18	18.11	18.19	18.62

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 2Tx 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

<table>
<tr><th colspan="2" rowspan="2">GSM1900(SIM2)</th><th colspan="3">Burst-Averaged output Power (dBm)</th><th rowspan="2">Division Factors</th><th colspan="3">Source Based time Average Power(dBm)</th></tr>
<tr><th>512CH</th><th>661CH</th><th>810CH</th><th>512CH</th><th>661CH</th><th>810CH</th></tr>
<tr><td colspan="2">GSM(CS)</td><td>30.46</td><td>30.02</td><td>30.21</td><td>-9.19</td><td>21.27</td><td>20.83</td><td>21.02</td></tr>
<tr><td rowspan="4">GPRS/ EDGE (GMSK)</td><td>1 Tx Slot</td><td>30.51</td><td>30.55</td><td>30.18</td><td>-9.19</td><td>21.32</td><td>21.36</td><td>20.99</td></tr>
<tr><td>2 Tx Slots</td><td>29.48</td><td>29.62</td><td>29.18</td><td>-6.13</td><td>23.35</td><td>23.49</td><td>23.05</td></tr>
<tr><td>3 Tx Slots</td><td>27.42</td><td>27.49</td><td>27.28</td><td>-4.42</td><td>23.00</td><td>23.07</td><td>22.86</td></tr>
<tr><td>4 Tx Slots</td><td>26.35</td><td>26.40</td><td>26.19</td><td>-3.18</td><td>23.17</td><td>23.22</td><td>23.01</td></tr>
<tr><td rowspan="4">EDGE (8PSK)</td><td>1 Tx Slot</td><td>28.65</td><td>28.43</td><td>28.21</td><td>-9.19</td><td>19.46</td><td>19.24</td><td>19.02</td></tr>
<tr><td>2 Tx Slots</td><td>26.59</td><td>26.55</td><td>26.13</td><td>-6.13</td><td>20.46</td><td>20.42</td><td>20.00</td></tr>
<tr><td>3 Tx Slots</td><td>23.35</td><td>23.42</td><td>23.17</td><td>-4.42</td><td>18.93</td><td>19.00</td><td>18.75</td></tr>
<tr><td>4 Tx Slots</td><td>21.21</td><td>21.33</td><td>21.85</td><td>-3.18</td><td>18.03</td><td>18.15</td><td>18.67</td></tr>
</table>

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 2Tx 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

<table>
<tr><th colspan="2" rowspan="2">UMTS Band II(SIM1)</th><th colspan="3">Conducted Power (dBm)</th></tr>
<tr><th>9262CH</th><th>9400CH</th><th>9538CH</th></tr>
<tr><td>WCDMA</td><td>12.2kbps RMC</td><td>24.50</td><td>24.55</td><td>24.85</td></tr>
<tr><td rowspan="4">HSDPA</td><td>Subtest 1</td><td>23.43</td><td>23.65</td><td>24.00</td></tr>
<tr><td>Subtest 2</td><td>22.78</td><td>22.97</td><td>23.34</td></tr>
<tr><td>Subtest 3</td><td>22.76</td><td>22.95</td><td>23.33</td></tr>
<tr><td>Subtest 4</td><td>22.85</td><td>22.92</td><td>23.31</td></tr>
<tr><td rowspan="5">HSUPA</td><td>Subtest 1</td><td>21.41</td><td>21.45</td><td>21.81</td></tr>
<tr><td>Subtest 2</td><td>21.40</td><td>21.43</td><td>21.80</td></tr>
<tr><td>Subtest 3</td><td>22.37</td><td>22.46</td><td>22.76</td></tr>
<tr><td>Subtest 4</td><td>20.73</td><td>20.76</td><td>21.15</td></tr>
<tr><td>Subtest 5</td><td>22.80</td><td>22.75</td><td>23.12</td></tr>
</table>

Note: 1) channel /Frequency: 9262/1852.4,9400/1800,9538/1907.6

UMTS Band II(SIM2)		Conducted Power (dBm)		
		9262CH	9400CH	9538CH
WCDMA	12.2kbps RMC	24.48	24.50	24.80
HSDPA	Subtest 1	23.42	23.60	23.97
	Subtest 2	22.72	22.95	23.35
	Subtest 3	22.70	22.93	23.32
	Subtest 4	22.86	22.88	23.27
HSUPA	Subtest 1	21.40	21.43	21.80
	Subtest 2	21.33	21.41	21.81
	Subtest 3	22.40	22.37	22.72
	Subtest 4	20.75	20.77	21.13
	Subtest 5	22.78	22.74	23.10

Note: 1) channel /Frequency: 9262/1852.4,9400/1800,9538/1907.6

8.1.4 Conducted Power of UMTS Band V

UMTS Band V(SIM1)		Conducted Power (dBm)		
		4132CH	4182CH	4233CH
WCDMA	12.2kbps RMC	23.90	23.75	23.77
HSDPA	Subtest 1	22.90	22.85	22.86
	Subtest 2	22.22	22.01	22.16
	Subtest 3	22.20	22.02	22.15
	Subtest 4	22.16	22.00	22.18
HSUPA	Subtest 1	20.70	20.58	20.69
	Subtest 2	20.70	20.58	20.68
	Subtest 3	21.69	21.58	21.66
	Subtest 4	20.14	20.03	20.06
	Subtest 5	22.15	22.13	22.11

Note: 1) channel /Frequency: 4132/826.4,4182/836.4,4233/846.6

UMTS Band V(SIM2)		Conducted Power (dBm)		
		4132CH	4182CH	4233CH
WCDMA	12.2kbps RMC	23.87	23.76	23.72
HSDPA	Subtest 1	22.78	22.82	22.85
	Subtest 2	22.23	22.02	22.08
	Subtest 3	22.21	22.00	22.12
	Subtest 4	22.13	22.08	22.13
HSUPA	Subtest 1	20.71	20.55	20.64
	Subtest 2	20.69	20.52	20.60
	Subtest 3	21.58	21.54	21.61
	Subtest 4	20.11	20.10	20.08
	Subtest 5	22.13	22.05	22.08

Note: 1) channel /Frequency: 4132/826.4,4182/836.4,4233/846.6

8.1.5 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	18.0	16.16	Yes
	6	2437		18.0	16.44	Yes
	11	2462		18.0	16.44	Yes
802.11g	1	2412	6	16.5	Not Required	No
	6	2437		16.5	Not Required	No
	11	2462		16.5	Not Required	No
802.11n (HT20)	1	2412	6.5	16.5	Not Required	No
	6	2437		16.5	Not Required	No
	11	2462		16.5	Not Required	No
802.11n (HT40)	3	2422	13.5	16.5	Not Required	No
	6	2437		16.5	Not Required	No
	9	2452		16.5	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.

8.1.6 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	2.81	0.02	1.90
π/4DQPSK	-4.34	-0.010	1.81
8DPSK	-4.15	0.03	1.75

Note: 1) channel /Frequency: 0/2402, 39/2441, 78/2480

For BT 4.0:

Average Conducted Power(dBm)			
Channel	0CH	19CH	39CH
BT	-1.35	-0.89	-1.23

Note: 1) 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 KDB941225 D06v02r01, 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.

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

4) 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.

5) 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 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).

6) Per KDB648474 D04v01r03, 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

7) The NFC antenna is integrated onto the Battery. The SAR tests were performed with the Battery. Per KDB 648474 D04 Phones with built-in NFC functions do not require separate SAR testing and can generally be tested according to the SAR measurement procedures normally required for the phone. Influences of the hardware introduced by the built-in NFC functions are inherently considered through testing of the other transmitters that require SAR.

8) The Conducted Power of SIM1 was worse than the Conducted Power of SIM2, tested with SIM1 at all the position, then tested with SIM2 at the worst position of SIM1.

8.2.1 Results overview of GSM850

Test Position of Head	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (%)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR_{1-g} (W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	190/836.6	GSM	0.294	0.220	0.080	33.510	34.000	0.329	21.15°C
Left Hand Tilted 15°	190/836.6	GSM	0.254	0.190	-0.010	33.510	34.000	0.284	21.15°C
Right Hand Touched	190/836.6	GSM	0.371	0.271	-0.040	33.510	34.000	0.415	21.15°C
Right Hand Tilted 15°	190/836.6	GSM	0.254	0.190	-0.040	33.510	34.000	0.284	21.15°C
Tested with SIM2 at the worst position									
Right Hand Touched	190/836.6	GSM	0.327	0.244	-0.100	33.380	34.000	0.377	21.15°C
Test Position of Body With 15 mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (%)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR_{1-g} (W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	190/836.6	GSM	0.358	0.271	0.030	33.510	34.000	0.401	21.49°C
Back Side	190/836.6	GSM	0.440	0.329	0.000	33.510	34.000	0.493	21.49°C
Tested with SIM2 at the worst position									
Back Side	190/836.6	GSM	0.402	0.304	0.020	33.380	34.000	0.464	21.49°C
Test Position of Hotspot with 10mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (%)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR_{1-g} (W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	190/836.6	GPRS 4TS	0.642	0.483	0.060	29.800	30.500	0.754	21.49°C
Back Side	190/836.6	GPRS 4TS	0.852	0.638	0.040	29.800	30.500	1.001	21.49°C
Left Side	190/836.6	GPRS 4TS	0.596	0.428	0.010	29.800	30.500	0.700	21.49°C
Right Side	190/836.6	GPRS 4TS	0.623	0.449	-0.010	29.800	30.500	0.732	21.49°C
Bottom Side	190/836.6	GPRS 4TS	0.194	0.109	0.000	29.800	30.500	0.228	21.49°C
Back Side	251/848.8	GPRS 4TS	0.728	0.544	-0.040	29.800	30.500	0.855	21.49°C

Back Side	128/824.2	GPRS 4TS	0.932	0.699	0.000	29.800	30.500	1.095	21.49°C
Back Side-Repeated	128/824.2	GPRS 4TS	0.987	0.739	0.01	29.800	30.500	1.160	21.49°C
Tested with SIM2 at the worst position									
Back Side	128/824.2	GPRS 4TS	0.937	0.703	0.06	29.750	30.500	1.114	21.49°C

8.2.2 Results overview of GSM1900

Test Position of Head	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (%)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR_{1-g} (W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	661/1880	GSM	0.211	0.138	0.060	30.110	31.000	0.259	21.43°C
Left Hand Tilted 15°	661/1880	GSM	0.160	0.103	-0.040	30.110	31.000	0.196	21.43°C
Right Hand Touched	661/1880	GSM	0.251	0.161	-0.180	30.110	31.000	0.308	21.43°C
Right Hand Tilted 15°	661/1880	GSM	0.161	0.098	-0.030	30.110	31.000	0.198	21.43°C
Tested with SIM2 at the worst position									
Right Hand Touched	661/1880	GSM	0.236	0.148	-0.090	30.020	31.000	0.296	21.43°C
Test Position of Body With 15 mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (%)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR_{1-g} (W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	661/1880	GSM	0.182	0.119	-0.130	30.110	31.000	0.223	21.30°C
Back Side	661/1880	GSM	0.384	0.252	0.180	30.110	31.000	0.471	21.30°C
Tested with SIM2 at the worst position									
Back Side	661/1880	GSM	0.368	0.242	0.100	30.020	31.000	0.461	21.30°C
Test Position of Hotspot with 10mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (%)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR_{1-g} (W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	661/1880	GPRS 2TS	0.413	0.270	0.000	29.630	30.000	0.450	21.30°C
Back Side	661/1880	GPRS 2TS	0.836	0.552	0.000	29.630	30.000	0.910	21.30°C
Left Side	661/1880	GPRS 2TS	0.263	0.167	-0.010	29.630	30.000	0.286	21.30°C
Right Side	661/1880	GPRS 2TS	0.337	0.212	0.050	29.630	30.000	0.367	21.30°C
Bottom Side	661/1880	GPRS 2TS	0.441	0.269	-0.010	29.630	30.000	0.480	21.30°C
Back Side	810/1909.8	GPRS 2TS	0.744	0.485	0.060	29.630	30.000	0.810	21.30°C

Back Side	512/1850.2	GPRS 2TS	0.730	0.487	0.120	29.630	30.000	0.795	21.30°C
Back Side-Repeated	661/1880	GPRS 2TS	0.820	0.541	0.080	29.630	30.000	0.893	21.30°C
Tested with SIM2 at the worst position									
Back Side	661/1880	GPRS 2TS	0.833	0.549	0.010	29.620	30.000	0.909	21.30°C

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 (%)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR_{1-g} (W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	4182/836.4	RMC	0.233	0.174	0.020	23.750	25.000	0.311	21.15°C
Left Hand Tilted 15°	4182/836.4	RMC	0.192	0.143	0.060	23.750	25.000	0.256	21.15°C
Right Hand Touched	4182/836.4	RMC	0.266	0.199	0.000	23.750	25.000	0.355	21.15°C
Right Hand Tilted 15°	4182/836.4	RMC	0.206	0.154	-0.010	23.750	25.000	0.275	21.15°C
Tested with SIM2 at the worst position									
Right Hand Touched	4182/836.4	RMC	0.264	0.192	0.010	23.760	25.000	0.351	21.15°C
Test Position of Body With 15 mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (%)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR_{1-g} (W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	4182/836.4	RMC	0.324	0.243	-0.070	23.750	25.000	0.432	21.49°C
Back Side	4182/836.4	RMC	0.365	0.273	0.070	23.750	25.000	0.487	21.49°C
Tested with SIM2 at the worst position									
Back Side	4182/836.4	RMC	0.342	0.257	-0.020	23.760	25.000	0.455	21.49°C
Test Position of Hotspot with 10mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (%)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR_{1-g} (W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	4182/836.4	RMC	0.312	0.234	0.030	23.750	25.000	0.416	21.49°C
Back Side	4182/836.4	RMC	0.464	0.347	0.020	23.750	25.000	0.619	21.49°C
Left Side	4182/836.4	RMC	0.360	0.257	0.020	23.750	25.000	0.480	21.49°C
Right Side	4182/836.4	RMC	0.376	0.268	0.040	23.750	25.000	0.501	21.49°C
Bottom Side	4182/836.4	RMC	0.101	0.056	-0.100	23.750	25.000	0.135	21.49°C
Tested with SIM2 at the worst position									
Back Side	4182/836.4	RMC	0.424	0.318	0.050	23.760	25.000	0.564	21.49°C

8.2.4 Results overview of UMTS Band II

Test Position of Head	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (%)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR_{1-g} (W/kg)	Liquid Temp.
			1-g	10-g					
Left Hand Touched	9400/1880	RMC	0.382	0.246	0.170	24.550	25.000	0.424	21.43°C
Left Hand Tilted 15°	9400/1880	RMC	0.290	0.187	0.010	24.550	25.000	0.322	21.43°C
Right Hand Touched	9400/1880	RMC	0.309	0.190	-0.160	24.550	25.000	0.343	21.43°C
Right Hand Tilted 15°	9400/1880	RMC	0.225	0.138	0.020	24.550	25.000	0.250	21.43°C
Tested with SIM2 at the worst position									
Left Hand Touched	9400/1880	RMC	0.353	0.229	-0.140	24.500	25.000	0.396	21.43°C
Test Position of Body With 15 mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (%)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR_{1-g} (W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	9400/1880	RMC	0.247	0.162	-0.040	24.550	25.000	0.274	21.30°C
Back Side	9400/1880	RMC	0.584	0.383	0.060	24.550	25.000	0.648	21.30°C
Tested with SIM2 at the worst position									
Back Side	9400/1880	RMC	0.523	0.344	0.170	24.500	25.000	0.587	21.30°C
Test Position of Hotspot with 10mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (%)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR_{1-g} (W/kg)**	**Liquid Temp.**
			1-g	**10-g**					
Front Side	9400/1880	RMC	0.388	0.252	0.160	24.550	25.000	0.430	21.30°C
Back Side	9400/1880	RMC	0.873	0.576	0.120	24.550	25.000	0.968	21.30°C
Left Side	9400/1880	RMC	0.214	0.137	0.040	24.550	25.000	0.237	21.30°C
Right Side	9400/1880	RMC	0.293	0.183	0.140	24.550	25.000	0.325	21.30°C
Bottom Side	9400/1880	RMC	0.369	0.226	0.020	24.550	25.000	0.409	21.30°C
Back Side	9538/1907.6	RMC	0.777	0.507	0.110	24.550	25.000	0.862	21.30°C
Back Side	9262/1852.4	RMC	0.612	0.406	0.180	24.550	25.000	0.679	21.30°C
Back Side-Repeated	9400/1880	RMC	0.804	0.529	0.150	24.550	25.000	0.892	21.30°C
Tested with SIM2 at the worst position									
Back Side	9400/1880	RMC	0.778	0.514	0.160	24.500	25.000	0.873	21.30°C

8.2.5 Results overview of WiFi 2.4G

Test Position of Head	Test channel /Freq.(MHz)	Test Mode	SAR Value (W/kg)		Power Drift (%)	Conducted Power (dBm)	Tune-up power (dBm)	Scaled SAR_{1-g} (W/kg)	Liquid Temp.
			1-g Area Scan	1-g Zoom Scan					
Left Hand Touched	6/2437	802.11b	0.095	0.106	0.090	16.4	18.0	0.153	20.09°C
Left Hand Tilted 15°	6/2437	802.11b	0.049	/	0.110	16.4	18.0	0.070	20.09°C
Right Hand Touched	6/2437	802.11b	0.055	/	0.170	16.4	18.0	0.079	20.09°C
Right Hand Tilted 15°	6/2437	802.11b	0.045	/	0.000	16.4	18.0	0.065	20.09°C
Test Position of Body With 15 mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (%)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR_{1-g} (W/kg)**	**Liquid Temp.**
			1-g Area Scan	**1-g Zoom Scan**					
Front Side	6/2437	802.11b	0.011	/	0.010	16.4	18.0	0.015	21.12°C
Back Side	6/2437	802.11b	0.015	0.018	-0.060	16.4	18.0	0.026	21.12°C
Test Position of Hotspot with 10mm	**Test channel /Frequency**	**Test Mode**	**SAR Value (W/kg)**		**Power Drift (%)**	**Conducted Power (dBm)**	**Tune-up power (dBm)**	**Scaled SAR_{1-g} (W/kg)**	**Liquid Temp.**
			1-g Area Scan	**1-g Zoom Scan**					
Front Side	6/2437	802.11b	0.020	/	0.010	16.4	18.0	0.028	21.12°C
Back Side	6/2437	802.11b	0.030	0.032	0.160	16.4	18.0	0.045	21.12°C
Left Side	6/2437	802.11b	0.013	/	0.170	16.4	18.0	0.018	21.12°C
Right Side	6/2437	802.11b	0.016	/	-0.110	16.4	18.0	0.023	21.12°C
Top Side	6/2437	802.11b	0.022	/	0.150	16.4	18.0	0.032	21.12°C

Note: Per KDB248227D01:

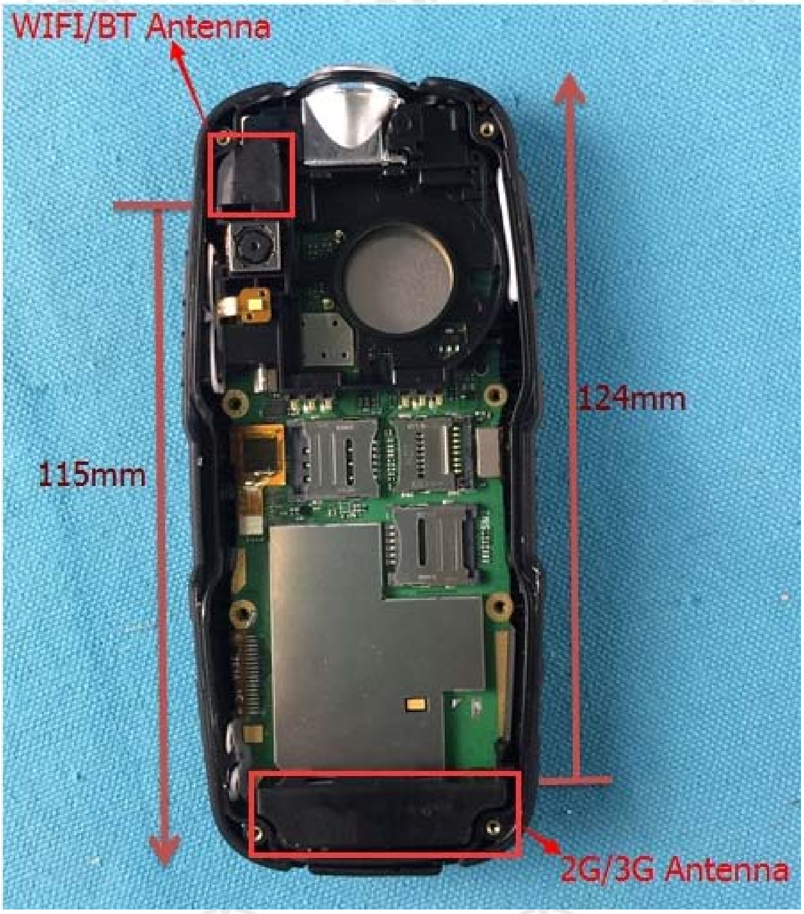
1) SAR is measured for 2.4 GHz 802.11b DSSS using initial test position procedure.

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

8.3 Multiple Transmitter Information

The location of the antennas inside RG310 is shown as below picture:



The SAR measurement positions of each side are as below:

Antenna	Front Side	Rear Side	Left Side	Right Side	Top Side	Bottom Side
GSM / WCDMA	Yes	Yes	Yes	No	No	Yes
WiFi / BT	Yes	Yes	Yes	Yes	Yes	No

1) Per KDB941225 D06v02r01, 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.

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 5 mm 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	3	2.00	15.00	2.45	0.21	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.

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	3	2.00	15.00	2.45	7.50	0.028

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
1	GSM + WiFi 2.4G	Yes	Yes	NA
2	GPRS/EDGE + WiFi 2.4G	NA	NA	Yes
3	GSM + BT	NA	Yes	NA
4	GPRS/EDGE + BT	NA	Yes	NA
5	UMTS (Voice) + WiFi 2.4G	Yes	Yes	NA
6	UMTS (DATA) + WiFi 2.4G	NA	Yes	Yes
7	UMTS (Voice) + BT	NA	Yes	NA
8	UMTS (DATA) + BT	NA	Yes	NA

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 for this device

8.6 SAR Summation Scenario

Test Position		2G/3G Antenna SARmax				WiFi/BT Antenna SARmax		Σ1-g SAR1-g	SPLSP
		GSM850	GSM1900	UMTS Band II	UMTS Band V	WiFi 2.4G	BT		
Head	Left touch	0.329	0.259	0.424	0.311	0.153	/	0.577	NA
	Left tilt	0.284	0.196	0.322	0.256	0.070	/	0.392	NA
	Right touch	0.415	0.308	0.343	0.355	0.079	/	0.494	NA
	Right tilt	0.284	0.198	0.250	0.275	0.065	/	0.349	NA
Body-worn 15mm	Front side	0.401	0.223	0.274	0.432	0.015	0.028	0.460	NA
	Back side	0.493	0.471	0.648	0.487	0.026	0.028	0.674	NA
Hotspot 10mm	Front side	0.754	0.450	0.430	0.416	0.028	/	0.782	NA
	Back side	1.160	0.910	0.968	0.619	0.045	/	1.205	NA
	Left side	0.700	0.286	0.237	0.480	0.018	/	0.718	NA
	Right side	0.732	0.367	0.325	0.501	0.023	/	0.755	NA
	Top side	/	/	/	/	0.032	/	0.032	NA
	Bottom side	0.228	0.480	0.409	0.135	/	/	0.480	NA

Note: Simultaneous Tx Combination of 2G/3G antenna and 2.4G WiFi/BT.

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)

——END OF REPORT——