



FCC SAR Compliance Test Report

Project Name: LTE Multi-mode USB Rotator
Model : E397u-53
FCC ID : QISE397U-53
Report No. : SYBH (Z-SAR) 012112011-2

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DATE	2011-11-28	2011-11-28	2011-11-28

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※ ※ Modified History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev. 1.0	Initial Release	2011-11-28	Luchaogan

1 General Information

1.1 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for HUAWEI E397u-53 are as below Table 1.

Band		Position	Channel	Measured MAX SAR _{1g} (W/kg)	MAX Conducted Power (dBm)	Tune-up Power (dBm)	Extrapolated Result (W/kg)
EVDO AWS	Rev.0	Righ side	450	1.050	24.31	25.0	1.23
	Rev.A	5mm	450	1.060	24.38	25.0	1.22
CDMA AWS	1xRTT	Righ side	450	0.888	24.07	25.0	1.10
EVDO 1900	Rev.0	Front side	1175	1.020	24.41	25.0	1.17
	Rev.A	5mm	1175	0.955	24.36	25.0	1.11
CDMA 1900	1xRTT	Front side	1175	0.911	24.16	25.0	1.11
LTE 1700	QPSK	Righ side	20175	0.960	21.43	22.5	1.23
	16QAM	5mm	20175	1.190	20.80	21.5	1.40
LTE 1900	QPSK	Righ side	18650	1.090	21.94	22.5	1.24
	16QAM	Front side	19150	1.040	20.26	21.5	1.38

Table 1: Summary of test result

The device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits of 1.6 W/Kg as averaged over any 1 g tissue according to the FCC rule §2.1093, the ANSI/IEEE C 95.1:1999, the NCRP Report Number 86 for uncontrolled environment, according to the Health Canada's Safety Code 6 and 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 1528-2003 and FCC OET Bulletin 65 Supplement.

1.2 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain)	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

Table 2: RF exposure limits

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

Notes:

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

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

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

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

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

1.3 EUT Description

Device Information:			
DUT Name:	LTE Multi-mode USB Rotator		
Type Identification:	E397u-53		
FCC ID :	QISE397U-53		
IMEI No:	99000079001291		
Device Type :	portable device		
Exposure Category:	uncontrolled environment / general population		
Hardware Version :	CD1E397UM		
Software Version :	11.337.03.01.644		
Antenna Type :	internal antenna		
Tested with host laptop:	Lenovo ThinkPad T61 Lenovo ThinkPad X301		
Device Operating Configurations:			
Supporting Mode(s)	CDMA AWS/PCS,LTE Band II/IV,		
Test Modulation	QPSK,16QAM		
Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	CDMA AWS	1710-1755	2110-2155
	CDMA PCS	1850-1910	1930-1990
	LTE Band II	1850-1910	1930-1990
	LTE Band IV	1710-1755	2110-2155
Power Class :	Tested with power control all up bits (CDMA AWS)		
	Tested with power control all up bits (CDMA PCS)		
	3, tested with power control all Max.(LTE Band II)		
	3, tested with power control all Max.(LTE Band IV)		
Test Channels (low-mid-high) :	25-450-850 (CDMA AWS)		
	25-600-1175 (CDMA PCS)		
	18607-18900-19193(LTE Band II BW=1.4MHz)		
	18615-18900-19185(LTE Band II BW=3MHz)		
	18625-18900-19175(LTE Band II BW=5MHz)		
	18650-18900-19150(LTE Band II BW=10MHz)		
	19957-20175-20393(LTE Band IV BW=1.4MHz)		
	19965-20175-20385(LTE Band IV BW=3MHz)		
	19975-20175-20375(LTE Band IV BW=5MHz)		
20000-20175-20350(LTE Band IV BW=10MHz)			

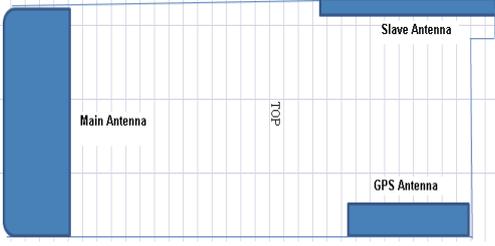
Table 3: Device information and operating configuration

1.3.1 General Description

E397u-53 LTE/CDMA dual mode USB Rotator is subscriber equipment in the LTE/CDMA system. E397u-53 implement such functions as RF signal receiving/transmitting, LTE, CDMA2000 1x and the CDMA2000 1x EV-DO Rev.A/Rev.0 protocol processing, data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface and Micro SD card interface. E397u-53 has three internal antennas as default.

Note:

1. No proximity sensors are used in the device.
2. The three antennas used in the EUT are listed as below table:

Antenna Type	Function	Antenna Location
Main antenna	Can transmit and receive signal for all bands (LTE/AWS band, LTE/PCS band, CDMA /PCS band ,CDMA / AWS band).	
Slave antenna	Only receive signal from base station.	
GPS antenna	Only receive GPS signal from satellite.	

The difference of E397u-53 new and old version:

Old E397u-53 E397u-53 LTE/CDMA dual mode USB Rotator The LTE supports Band IV, The CDMA supports BC1 and BC15.

New E397u-53 added the LTE Band II through software based on Old E397u-53. The PCB is the same.

The followed table is show the different between the 2 Modules.

	E397u-53 (NEW)	E397u-53 (OLD)	The photo of the USB Stick:
LTE AWS band	support	support	
LTE PCS band	support	No	
CDMA AWS band	support	support	
CDMA PCS band	support	support	
FLASH	the same	the same	
PCB	the same	the same	
Appearance	Common Appearance	Common Appearance	

1.4 Test specification(s)

IEEE Std C95.1 – 1999	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
IEEE 1528-2003	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
OET Bulletin No. 65, Supplement C– 2001	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields---Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions
Canada's Safety Code 6	Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz (99-EHD-237)
RSS-102	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands (Issue 4 of March 2010)
KDB941225 D01	SAR test for 3G devices v02 ,Published on Nov 13 2009
KDB941225 D05	SAR for LTE Devices v01, Published on Dec 15 2010
KDB447489 D02	SAR Procedures for Dongle Xmtr v02, Published on Nov 16 2009
KDB Tracking number	789536

1.5 Testing laboratory

Test Site	Reliability Laboratory of Huawei Technologies Co., Ltd.
Test Location	Section K3,Bantian, Longgang District, Shenzhen, P.R.China
Telephone	+86-755-28785513
Fax	+86-755-36834474
State of accreditation	The Test laboratory (area of testing) is accredited according to ISO/IEC 17025. CNAS Registration number: L0310

1.6 Applicant and Manufacturer

Company Name	HUAWEI TECHNOLOGIES CO., LTD
Address	Huawei Base, Bantian, Longgang District, Shenzhen, P.R.China

1.7 Application details

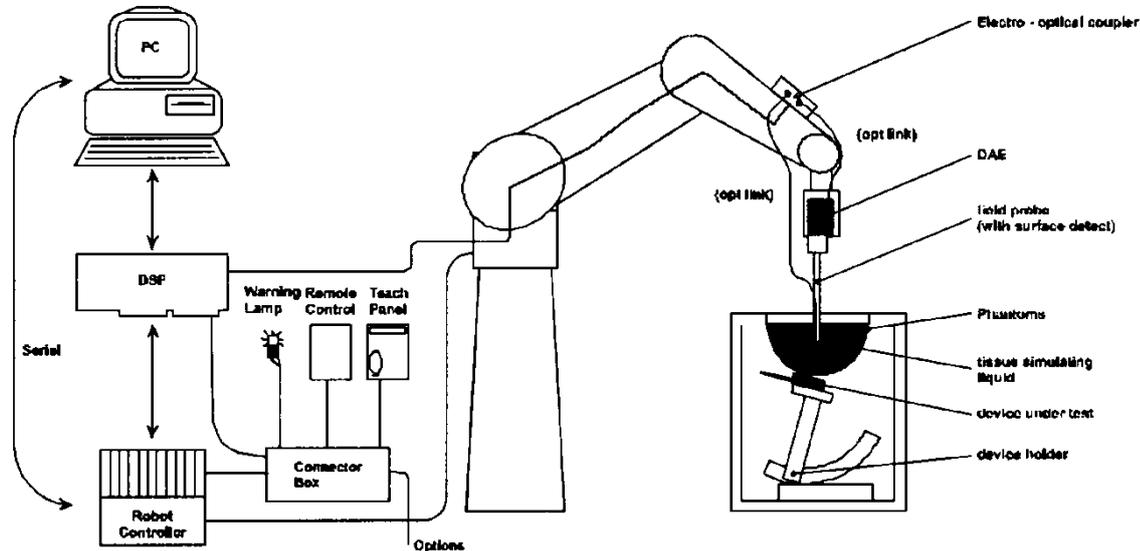
Start Date of test	2011-11-15
End Date of test	2011-11-16

1.8 Ambient Condition

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

2 SAR Measurement System

2.1 SAR Measurement Set-up



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

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
- The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows XP.
- DASY5 software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.

2.2 Test environment

The DASY4 measurement system is placed at the head end of a room with dimensions: 5 x 2.5 x 3 m³, the SAM phantom is placed in a distance of 75 cm from the side walls and 1.1m from the rear wall. Above the test system a 1.5 x 1.5 m² array of pyramid absorbers is installed to reduce reflections from the ceiling.

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

The system allows the measurement of SAR values larger than 0.005 mW/g.

2.3 Data Acquisition Electronics description

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

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

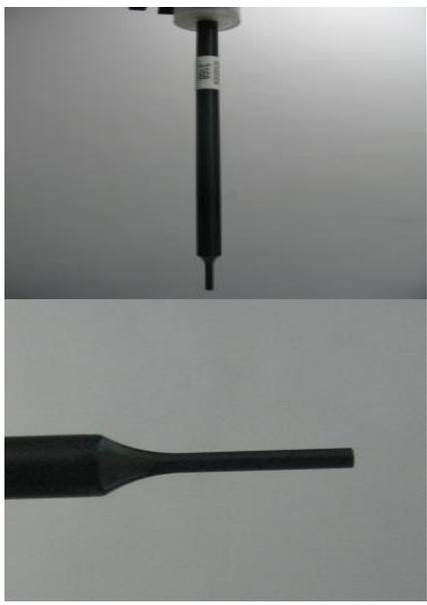
DAE4

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

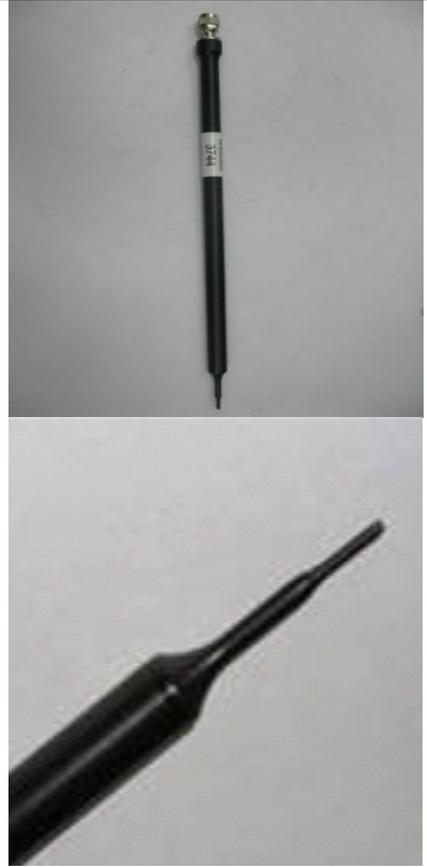
2.4 Probe description

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

Isotropic E-Field Probe ES3DV3 for Dosimetric Measurements

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	ISO/IEC 17025 calibration service available.	
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)	
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)	
Dynamic range	5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB	
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm	
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones	

Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)	
Calibration	In air from 10 MHz to 2.5 GHz In head tissue simulating liquid (HSL) at 900 (800-1000) MHz and 1.8 GHz (1700-1910 MHz) (accuracy $\pm 11\%$; $k=2$) Calibration for other liquids and frequencies upon request	
Frequency	10 MHz to 3 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 3 GHz)	
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)	
Dynamic range	5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB	
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces (EX3DV4 only)	
Dimensions	Overall length: 337 mm Tip length: 9 mm Body diameter: 10 mm Tip diameter: 2.5 mm Distance from probe tip to dipole centers: 1.0 mm	
Application	General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms (EX3DV4)	

2.5 Phantom description

SAM Twin Phantom

Shell Thickness	2mm +/- 0.2 mm; The ear region: 6mm	
Filling Volume	Approximately 30 liters	
Dimensions	Length:1000mm; Width:500mm; Height: adjustable feet	
Measurement Areas	Left hand Right hand Flat phantom	

The bottom plate contains three pairs of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to cover the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. Free space scans of devices on top of this phantom cover are possible. Three reference marks are provided on the phantom counter. These reference marks are used to teach the absolute phantom position relative to the robot.

ELI4 Phantom

Shell Thickness	2mm +/- 0.2 mm	
Filling Volume	Approximately 30 liters	
Dimensions	Length:1000mm; Width:500mm; Height: adjustable feet	
Measurement Areas	Flat phantom	

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

2.6 Device holder description

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



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

Therefore those devices are normally only tested at the flat part of the SAM.

2.7 Test Equipment List

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

	Manufacturer	Device	Type	Serial number	Date of last calibration)*
<input type="checkbox"/>	SPEAG	Dosimetric E-Field Probe	ES3DV3	3254	2011-03-11
<input type="checkbox"/>	SPEAG	Dosimetric E-Field Probe	EX3DV4	3736	2010-11-16
<input checked="" type="checkbox"/>	SPEAG	Dosimetric E-Field Probe	EX3DV4	3753	2010-12-13
<input checked="" type="checkbox"/>	SPEAG	1800 MHz Validation Dipole	D1800V2	2d184	2011-03-08
<input checked="" type="checkbox"/>	SPEAG	1900 MHz Validation Dipole	D1900V2	5d143	2011-09-26
<input checked="" type="checkbox"/>	SPEAG	Data acquisition electronics	DAE4	913	2010-11-18
<input type="checkbox"/>	SPEAG	Data acquisition electronics	DAE4	852	2010-12-24
<input type="checkbox"/>	SPEAG	Data acquisition electronics	DAE4	1236	2010-10-26
<input checked="" type="checkbox"/>	SPEAG	Software	DASY 5	N/A	N/A
<input type="checkbox"/>	SPEAG	Twin Phantom	SAM1	TP-1475	N/A
<input type="checkbox"/>	SPEAG	Twin Phantom	SAM2	TP-1474	N/A
<input checked="" type="checkbox"/>	SPEAG	Twin Phantom	SAM3	TP-1597	N/A
<input checked="" type="checkbox"/>	SPEAG	Twin Phantom	SAM4	TP-1620	N/A
<input type="checkbox"/>	SPEAG	Flat Phantom	ELI 4.0	TP-1038	N/A
<input type="checkbox"/>	SPEAG	Flat Phantom	ELI 4.0	TP-1111	N/A
<input checked="" type="checkbox"/>	ANRITSU	Universal Radio Communication Tester	MT8820C	6200971028	2011-03-31
<input checked="" type="checkbox"/>	R & S	Universal Radio Communication Tester	CMU 200	113989	2011-06-02
<input checked="" type="checkbox"/>	Agilent)*	Network Analyser	E5071B	MY42404956	2011-02-22
<input checked="" type="checkbox"/>	Agilent	Dielectric Probe Kit	85070E	2484	N/A
<input checked="" type="checkbox"/>	Agilent	Signal Generator	N5181A	MY47420989	2011-02-22
<input checked="" type="checkbox"/>	MINI-CIRCUITS	Amplifier	ZHL-42W	QA0746001	N/A
<input checked="" type="checkbox"/>	Agilent	Power Meter	E4417A	MY45101339	2011-02-22
<input checked="" type="checkbox"/>	Agilent	Power Meter Sensor	E9321A	MY44420359	2011-02-22

Note: The calibration interval of validation dipoles is 3 years.

1) Per KDB 450824 D02 requirements for dipole calibration, Reliability Laboratory of Huawei SAR lab has adopted three years calibration interval. But each measured dipole is expected to evaluate with the following criteria at least on annual interval.

- a) There is no physical damage on the dipole;
- b) System validation with specific dipole is within 10% of calibrated value;
- c) Return-loss is within 10% of calibrated measurement;
- d) Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

3 SAR Measurement Procedure

3.1 Scanning procedure

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

- The „reference“ and „drift“ measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT's output power and should vary max. +/- 5 %.
- The „surface check“ measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above $\pm 0.1\text{mm}$). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within $\pm 30^\circ$.)
- The „area scan “measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The standard scan uses large grid spacing for faster measurement. Standard grid spacing for head measurements is 15 mm in x- and y- dimension. If a finer resolution is needed, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation. Results of this coarse scan are shown in Appendix B.
- A „7x7x7 zoom scan“ measures the field in a volume around the 2D peak SAR value acquired in the previous „coarse“ scan. This is a fine 7x7 grid where the robot additionally moves the probe in 7 steps along the z-axis away from the bottom of the Phantom. Grid spacing for the cube measurement is 5 mm in x and y-direction and 5 mm in z-direction. DASY5 is also able to perform repeated zoom scans if more than 1 peak is found during area scan. In this document, the evaluated peak 1g and 10g averaged SAR values are shown in the 2D-graphics in Appendix B. Test results relevant for the specified standard (see chapter 1.4.) are shown in table form in chapter 7.2.
- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2mm steps. This measurement shows the continuity of the liquid and can - depending in the field strength – also show the liquid depth. A z-axis scan of the measurement with maximum SAR value is shown in Appendix B.

3.2 Spatial Peak SAR Evaluation

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

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

Extrapolation

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

Interpolation

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

Volume Averaging

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

Advanced Extrapolation

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

3.3 Data Storage and Evaluation

Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

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

Data Evaluation by SEMCAD

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

Probe parameters:	- Sensitivity	Norm _i , a ₀ , a ₁ , a ₂
	- Conversion factor	ConvF _i
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

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

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

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

$$V_i = U_i + U_i^2 \cdot cf/dcp_i$$

with	V _i	= compensated signal of channel i	(i = x, y, z)
	U _i	= input signal of channel i	(i = x, y, z)
	cf	= crest factor of exciting field (DASY parameter)	
	dcp _i	= diode compression point	(DASY parameter)

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

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

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

with V_i = compensated signal of channel i (i = x, y, z)
 $Norm_i$ = sensor sensitivity of channel i (i = x, y, z)
 [mV/(V/m)²] for E-field Probes
 $ConvF$ = sensitivity enhancement in solution
 a_{ij} = sensor sensitivity factors for H-field probes
 f = carrier frequency [GHz]
 E_i = electric field strength of channel i in V/m
 H_i = magnetic field strength of channel i in A/m

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

$$E_{tot} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

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

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

with SAR = local specific absorption rate in mW/g
 E_{tot} = total field strength in V/m
 σ = conductivity in [mho/m] or [Siemens/m]
 ρ = equivalent tissue density in g/cm³

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

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

with P_{pwe} = equivalent power density of a plane wave in mW/cm²
 E_{tot} = total electric field strength in V/m
 H_{tot} = total magnetic field strength in A/m

4 System Verification Procedure

4.1 Tissue Verification

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

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

Ingredients (% of weight)	Body Tissue					
	450	835	900	1800	1950	2450
Frequency Band (MHz)	450	835	900	1800	1950	2450
Water	51.16	52.4	56.0	69.91	69.91	73.2
Salt (NaCl)	1.49	1.40	0.76	0.13	0.13	0.04
Sugar	46.78	45.0	41.76	0.0	0.0	0.0
HEC	0.52	1.0	1.21	0.0	0.0	0.0
Bactericide	0.05	0.1	0.27	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0
DGBE	0.0	0.0	0.0	29.96	29.96	26.7

Table 4: Tissue Dielectric Properties

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

Used Target Frequency	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
	ϵ_r (+/-5%)	σ (S/m) (+/-5%)	ϵ_r	σ (S/m)		
1850MHz Body	53.3 (50.64~55.97)	1.52 (1.44~1.60)	52.00	1.474	21.4°C	2011-11-15
1880MHz Body	53.3 (50.64~55.97)	1.52 (1.44~1.60)	52.00	1.500		
1910MHz Body	53.3 (50.64~55.97)	1.52 (1.44~1.60)	51.83	1.551		
1900MHz Body	53.3 (50.64~55.97)	1.52 (1.44~1.60)	51.90	1.520		

ϵ_r = Relative permittivity, σ = Conductivity

Table 5: Measured Tissue Parameter

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

Note: 1) KDB 450824 was ensured to be applied for probe calibration frequencies greater than or equal to 50MHz of the EUT frequencies.

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

4.2 System Check

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

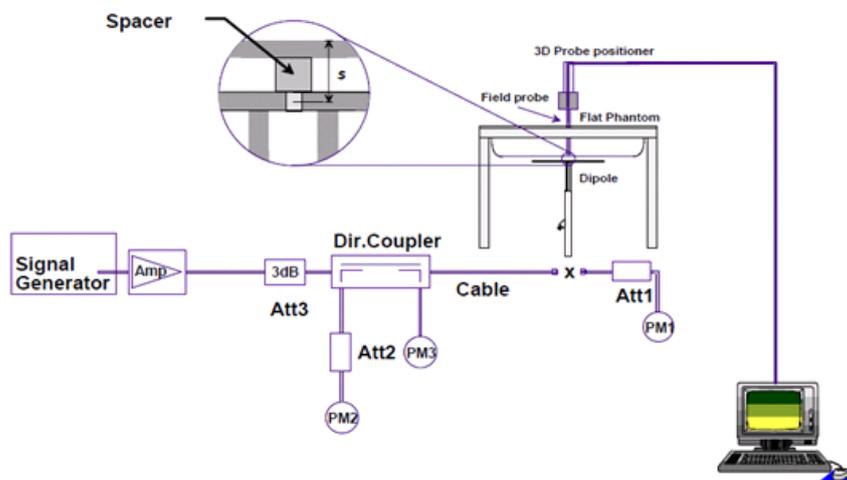
System Check	Target SAR (1W) (+/-10%)		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (mW/g)	10-g (mW/g)	1-g (mW/g)	10-g (mW/g)		
D1900V2 Body	41.4 (37.62~45.98)	21.8 (19.62~23.98)	41.60	21.60	21.4°C	2011-11-15

Table 6: System Check Results

4.3 Validation Procedure

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

Validation 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 Measurement Uncertainty Evaluation

5.1 Measurement uncertainty evaluation for SAR test

The overall combined measurement uncertainty of the measurement system is $\pm 10.9\%$ ($K=1$).
The expanded uncertainty ($k=2$) is assessed to be $\pm 21.9\%$

This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divisor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty 10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	$\pm 6.0\%$	Normal	1	1	1	$\pm 6.0\%$	$\pm 6.0\%$	∞
Axial isotropy	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 1.9\%$	$\pm 1.9\%$	∞
Hemispherical isotropy	$\pm 9.6\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 3.9\%$	$\pm 3.9\%$	∞
Spatial resolution	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
Boundary effects	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Probe linearity	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
System detection limits	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Readout electronics	$\pm 0.3\%$	Normal	1	1	1	$\pm 0.3\%$	$\pm 0.3\%$	∞
Response time	$\pm 0.8\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.5\%$	$\pm 0.5\%$	∞
Integration time	$\pm 2.6\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.5\%$	$\pm 1.5\%$	∞
RF ambient conditions	$\pm 3.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Probe positioner	$\pm 0.4\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.2\%$	$\pm 0.2\%$	∞
Probe positioning	$\pm 2.9\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Max. SAR evaluation	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Test Sample Related								
Device positioning	$\pm 2.9\%$	Normal	1	1	1	$\pm 2.9\%$	$\pm 2.9\%$	145
Device holder uncertainty	$\pm 3.6\%$	Normal	1	1	1	$\pm 3.6\%$	$\pm 3.6\%$	5
Power drift	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.9\%$	$\pm 2.9\%$	∞
Phantom and Set-up								
Phantom uncertainty	$\pm 4.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.3\%$	$\pm 2.3\%$	∞
Liquid conductivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.64	0.43	$\pm 1.8\%$	$\pm 1.2\%$	∞
Liquid conductivity (meas.)	$\pm 2.5\%$	Normal	1	0.64	0.43	$\pm 1.6\%$	$\pm 1.1\%$	∞
Liquid permittivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.6	0.49	$\pm 1.7\%$	$\pm 1.4\%$	∞
Liquid permittivity (meas.)	$\pm 2.5\%$	Normal	1	0.6	0.49	$\pm 1.5\%$	$\pm 1.2\%$	∞
Combined Uncertainty						$\pm 10.9\%$	$\pm 10.7\%$	387
Expanded Std. Uncertainty						$\pm 21.9\%$	$\pm 21.4\%$	

Table 7: Measurement uncertainties

5.2 Measurement uncertainty evaluation for system validation

The overall combined measurement uncertainty of the measurement system is $\pm 9.5\%$ ($K=1$).

The expanded uncertainty ($k=2$) is assessed to be $\pm 18.9\%$

This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divisor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty 10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	$\pm 6.0\%$	Normal	1	1	1	$\pm 6.0\%$	$\pm 6.0\%$	∞
Axial isotropy	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
Hemispherical isotropy	$\pm 9.6\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 0.0\%$	$\pm 0.0\%$	∞
Boundary effects	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Probe linearity	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
System detection limits	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Readout electronics	$\pm 0.3\%$	Normal	1	1	1	$\pm 0.3\%$	$\pm 0.3\%$	∞
Response time	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
Integration time	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
RF ambient conditions	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Probe positioner	$\pm 0.4\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.2\%$	$\pm 0.2\%$	∞
Probe positioning	$\pm 2.9\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Max. SAR evaluation	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Dipole								
Deviation of experimental dipole	$\pm 5.5\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 3.2\%$	$\pm 3.2\%$	∞
Dipole axis to liquid distance	$\pm 2.0\%$	Rectangular	1	1	1	$\pm 1.2\%$	$\pm 1.2\%$	∞
Power drift	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
Phantom and Set-up								
Phantom uncertainty	$\pm 4.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.3\%$	$\pm 2.3\%$	∞
Liquid conductivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.64	0.43	$\pm 1.8\%$	$\pm 1.2\%$	∞
Liquid conductivity (meas.)	$\pm 2.5\%$	Normal	1	0.64	0.43	$\pm 1.6\%$	$\pm 1.1\%$	∞
Liquid permittivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.6	0.49	$\pm 1.7\%$	$\pm 1.4\%$	∞
Liquid permittivity (meas.)	$\pm 2.5\%$	Normal	1	0.6	0.49	$\pm 1.5\%$	$\pm 1.2\%$	∞
Combined Uncertainty						$\pm 9.5\%$	$\pm 9.2\%$	
Expanded Std. Uncertainty						$\pm 18.9\%$	$\pm 18.4\%$	

Table 8: Measurement uncertainties

6 SAR Test Configuration

6.1 CDMA 1x EVDO Test Configurations

1) Output Power Verification for EVDO

Maximum output power is verified on the High, Middle, Low channel according to procedures in section 3.1.1.3.4 of 3GPP2 C.S0033-0TIA-866 for Rev.0 and section 4.3.4 of 3GPP2 C.S0033-A for Rev. A, maximum output power for both Subtype 0/1 and Subtype 2 Physical Layer configurations should be measured.

2) SAR measurement

SAR is measured using FTAP/RTAP and FETA/RETA respectively for Rev.0 and Rev. A devices. The AT is tested with a Reverse Data Channel rate of 153.6kbps IN Subtype 0/1 Physical Layer configuration; and a Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slot in Subtype 2 Physical Layer configurations. Both FTAP and FETAP are configured with a Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2kbps with the ACK channel transmitting in all slots. AT power control should be in "All Bits Up" conditions for TAP/ETAP.

Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev.0. SAR for Subtype 2 Physical Layer configurations is not required for Rev. A when the maximum average output of each RF channel is less than that measured in Subtype 0/1 Physical Layer configurations. Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure configuration that results in the highest SAR for that RF channels in Rev.014.

For EVDO devices that also support 1x RTT voice and/or data operations, SAR is not required for 1x RTT when the maximum average output of each channel is less than 1/4 dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev.0. Otherwise, the 'Body SAR Measurements' procedures in the 'CDMA-2000 1x Handsets' section should be applied.

6.2 LTE Test Configurations

SAR for body exposure configurations is measured according to the "Body SAR Measurements" Procedures of KDB941225 D05 SAR for LTE.

1) The procedures shall be applied independently to the device and exposure configurations required for body, USB dongle orientations and antenna diversity conditions etc. applying the test positions in KDB 447498 for USB dongles.

2) When MPR is implemented permanently within the UE, regardless of network requirements, only those RB configurations allowed (see 3GPP standards) for the channel bandwidth and modulation combinations may be tested with MPR. Configurations with RB allocations below the required RB thresholds must be tested without MPR. A-MPR must always be disabled.

LTE MPR as follows:

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]				MPR
	1.4	3	5	10	
	MHz	MHz	MHz	MHz	
QPSK	1	1	1	1	0
QPSK	≤ 5	≤ 4	≤ 8	≤ 12	0
QPSK	> 5	> 4	> 8	> 12	1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	1
16 QAM	> 5	> 4	> 8	> 12	2

3) For new additional LTE frequency band, detail reduce test information is referred to section 7.2.4 and final test summary is as follows:

Bandwidth	Modulation Type	RB Size and Allocation	Test Channel	SAR Test
10MHz	QPSK	50% Centered	High Channel	No Test*
			Middle Channel	Tested*
			Low Channel	No Test*
		1RB Lower EDGE	High Channel	No Test
			Middle Channel	No Test
			Low Channel	Tested
		1RB Upper EDGE	High Channel	No Test
			Middle Channel	Tested
			Low Channel	No Test
	16QAM	50% Centered	High Channel	Tested
			Middle Channel	No Test
			Low Channel	No Test
		1RB Lower EDGE	High Channel	Tested
			Middle Channel	No Test
			Low Channel	No Test
		1RB Upper EDGE	High Channel	No Test
			Middle Channel	Tested
			Low Channel	No Test

*Please check SAR test result table of middle channel is <0.8W/kg, other channels are not required.

7 SAR Measurement Results

7.1 Conducted power measurements

For the measurements a Rohde & Schwarz Radio Communication Tester CMU 200 and an Anritsu Communication Tester MT8820c were used.

The output power was measured using an integrated RF connector and attached RF cable.

SAR drift measured at same position in liquid before and after each SAR test as below 7.2 chapter.

7.1.1 Conducted power measurements CDMA1700 MHz

CDMA2000 AWS (1xRTT)		Conducted Power (dBm)		
		25CH	450CH	850CH
RC1	SO55	24.11	24.02	24.06
RC3	SO55	24.02	24.17	24.09
	TDSO32 (FCH)	24.15	24.16	24.08
	TDSO32 (FCH+SCH)	24.12	24.07	24.15
CDMA2000 AWS (1xEV-DO)		Conducted Power (dBm)		
		25CH	450CH	850CH
Rev 0	RTAP 153.6	24.19	24.31	24.22
Rev A	RETAP 4096	24.08	24.38	24.27

Table 9: Test results conducted power measurement CDMA1700 MHz

7.1.2 Conducted power measurements CDMA 1900 MHz

CDMA1900(1xRTT)		Conducted Power (dBm)		
		25CH	600CH	1175CH
RC1	SO55	24.42	24.02	24.16
RC3	SO55	24.34	24.18	24.07
	TDSO32 (FCH)	24.34	24.19	24.16
	TDSO32 (FCH+SCH)	24.35	24.13	24.15
CDMA1900 (1xEV-DO)		Conducted Power (dBm)		
		25CH	600CH	1175CH
Rev 0	RTAP 153.6	24.42	24.32	24.41
Rev A	RETAP 4096	24.42	24.35	24.36

Table 10: Test results conducted power measurement CDMA 1900 MHz

Note: RC1+SO55/RC3+SO55 are supported from protocol aspect, but voice calls of the product aren't supported from function aspect.

7.1.3 Conducted power measurements LTE FDD IV (1700 MHz) Low Channel

LTE AWS Band	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Conducted Power (dBm)	
Low Channel	19957	1.4	1	0	QPSK	20.92	
			1	5	QPSK	21.21	
			3	2	QPSK	21.00	
			6	0	QPSK	19.97	
			1	0	16-QAM	19.99	
			1	5	16-QAM	20.09	
			3	2	16-QAM	20.18	
			6	0	16-QAM	19.20	
	19965	3	3	1	0	QPSK	21.00
				1	14	QPSK	21.22
				8	4	QPSK	20.06
				15	0	QPSK	20.00
				1	0	16-QAM	19.92
				1	14	16-QAM	20.12
				8	4	16-QAM	19.31
				15	0	16-QAM	18.98
	19975	5	5	1	0	QPSK	20.90
				1	24	QPSK	21.23
				12	6	QPSK	20.18
				25	0	QPSK	20.11
				1	0	16-QAM	20.03
				1	24	16-QAM	20.22
				12	6	16-QAM	19.17
				25	0	16-QAM	19.57
	20000	10	10	1	0	QPSK	21.04
				1	49	QPSK	21.30
				25	13	QPSK	20.28
				50	0	QPSK	20.08
				1	0	16-QAM	20.11
				1	49	16-QAM	20.30
				25	13	16-QAM	19.67
				50	0	16-QAM	19.18

Table 11: Test results conducted power measurement LTE1700 Low Channel

7.1.4 Conducted power measurements LTE FDD IV (1700 MHz) Mid Channel

LTE AWS Band	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Conducted Power (dBm)
Mid Channel	20175	1.4	1	0	QPSK	20.96
			1	5	QPSK	21.07
			3	2	QPSK	20.88
			6	0	QPSK	19.96
			1	0	16-QAM	20.26
			1	5	16-QAM	20.34
			3	2	16-QAM	20.13
			6	0	16-QAM	19.14
		3	1	0	QPSK	20.87
			1	14	QPSK	20.80
			8	4	QPSK	19.77
			15	0	QPSK	19.78
			1	0	16-QAM	20.19
			1	14	16-QAM	19.97
			8	4	16-QAM	19.04
			15	0	16-QAM	18.79
		5	1	0	QPSK	21.00
			1	24	QPSK	20.87
			12	6	QPSK	19.81
			25	0	QPSK	19.83
			1	0	16-QAM	20.05
			1	24	16-QAM	19.86
			12	6	16-QAM	18.89
			25	0	16-QAM	19.27
		10	1	0	QPSK	21.43
			1	49	QPSK	20.69
			25	13	QPSK	19.76
			50	0	QPSK	19.78
			1	0	16-QAM	20.80
			1	49	16-QAM	20.13
			25	13	16-QAM	19.23
			50	0	16-QAM	19.00

Table 12: Test results conducted power measurement LTE 1700 Mid Channel

7.1.5 Conducted power measurements LTE FDD IV (1700 MHz) High Channel

LTE AWS Band	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Conducted Power (dBm)	
High Channel	20393	1.4	1	0	QPSK	21.30	
			1	5	QPSK	21.42	
			3	2	QPSK	21.34	
			6	0	QPSK	20.36	
			1	0	16-QAM	20.58	
			1	5	16-QAM	20.50	
			3	2	16-QAM	20.62	
			6	0	16-QAM	19.60	
	20385	3	3	1	0	QPSK	21.43
				1	14	QPSK	21.46
				8	4	QPSK	20.40
				15	0	QPSK	20.32
				1	0	16-QAM	20.78
				1	14	16-QAM	20.69
				8	4	16-QAM	19.51
				15	0	16-QAM	19.40
	20375	5	5	1	0	QPSK	21.29
				1	24	QPSK	21.32
				12	6	QPSK	20.31
				25	0	QPSK	20.31
				1	0	16-QAM	20.78
				1	24	16-QAM	20.42
				12	6	16-QAM	19.35
				25	0	16-QAM	19.61
	20350	10	10	1	0	QPSK	20.71
				1	49	QPSK	21.43
				25	13	QPSK	20.39
				50	0	QPSK	20.52
				1	0	16-QAM	19.87
				1	49	16-QAM	20.52
				25	13	16-QAM	19.82
				50	0	16-QAM	19.56

Table 13: Test results conducted power measurement LTE 1700 High Channel

7.1.6 Conducted power measurements LTE FDD II (1900 MHz) Low Channel

LTE band II	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power [dBm]
Low Channel	18607	1.4	1	0	QPSK	21.80
			1	5	QPSK	21.73
			3	2	QPSK	21.85
			6	0	QPSK	20.90
			1	0	16-QAM	21.36
			1	5	16-QAM	21.37
			3	2	16-QAM	20.82
			6	0	16-QAM	20.05
	18615	3	1	0	QPSK	21.87
			1	14	QPSK	21.62
			8	4	QPSK	20.70
			15	0	QPSK	20.87
			1	0	16-QAM	20.56
			1	14	16-QAM	20.50
			8	4	16-QAM	20.10
			15	0	16-QAM	19.95
	18625	5	1	0	QPSK	21.88
			1	24	QPSK	21.87
			12	6	QPSK	20.88
			25	0	QPSK	21.02
			1	0	16-QAM	21.21
			1	24	16-QAM	20.89
			12	6	16-QAM	19.26
			25	0	16-QAM	20.30
	18650	10	1	0	QPSK	21.94
			1	49	QPSK	21.62
			25	13	QPSK	20.84
			50	0	QPSK	20.79
			1	0	16-QAM	20.55
			1	49	16-QAM	20.35
			25	13	16-QAM	20.06
			50	0	16-QAM	20.09

Table 14: Test results conducted power measurement LTE 1900 Low Channel

7.1.7 Conducted power measurements LTE FDD II (1900 MHz) Mid Channel

LTE band II	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power [dBm]
Mid Channel	18900	1.4	1	0	QPSK	21.75
			1	5	QPSK	21.82
			3	2	QPSK	21.62
			6	0	QPSK	20.75
			1	0	16-QAM	20.85
			1	5	16-QAM	20.91
			3	2	16-QAM	20.49
			6	0	16-QAM	19.87
		3	1	0	QPSK	21.66
			1	14	QPSK	21.75
			8	4	QPSK	20.68
			15	0	QPSK	20.65
			1	0	16-QAM	20.32
			1	14	16-QAM	20.38
			8	4	16-QAM	20.15
			15	0	16-QAM	19.79
		5	1	0	QPSK	21.90
			1	24	QPSK	21.81
			12	6	QPSK	20.74
			25	0	QPSK	20.80
			1	0	16-QAM	21.03
			1	24	16-QAM	20.99
			12	6	16-QAM	19.78
			25	0	16-QAM	20.10
		10	1	0	QPSK	21.66
			1	49	QPSK	21.72
			25	13	QPSK	20.79
			50	0	QPSK	20.62
			1	0	16-QAM	20.44
			1	49	16-QAM	20.63
			25	13	16-QAM	19.97
			50	0	16-QAM	19.98

Table 15: Test results conducted power measurement LTE 1900 Middle Channel

7.1.8 Conducted power measurements LTE FDD II (1900 MHz) High Channel

LTE band II	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power [dBm]
High Channel	19193	1.4	1	0	QPSK	21.67
			1	5	QPSK	21.62
			3	2	QPSK	21.50
			6	0	QPSK	20.52
			1	0	16-QAM	20.58
			1	5	16-QAM	20.49
			3	2	16-QAM	20.52
			6	0	16-QAM	19.78
	19185	3	1	0	QPSK	21.68
			1	14	QPSK	21.36
			8	4	QPSK	20.69
			15	0	QPSK	20.65
			1	0	16-QAM	20.47
			1	14	16-QAM	20.32
			8	4	16-QAM	20.05
			15	0	16-QAM	19.85
	19175	5	1	0	QPSK	21.71
			1	24	QPSK	21.65
			12	6	QPSK	20.68
			25	0	QPSK	20.55
			1	0	16-QAM	20.78
			1	24	16-QAM	20.85
			12	6	16-QAM	19.68
			25	0	16-QAM	20.19
	19150	10	1	0	QPSK	21.64
			1	49	QPSK	21.52
			25	13	QPSK	20.76
			50	0	QPSK	20.67
			1	0	16-QAM	20.26
			1	49	16-QAM	20.29
			25	13	16-QAM	19.90
			50	0	16-QAM	19.98

Table 16: Test results conducted power measurement LTE 1900 High Channel

7.2 SAR measurement Result

Connection to the EUT is established via air interface with CMU200, and the EUT is set to maximum output power by CMU200. The antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the EUT. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the EUT by at least 30 dB.

The EUT is tested using an Anritsu MT8820c communications tester as controller unit to set test channels and EUT transmits with maximum output power for LTE.

The measurements were performed in combination with two host laptops (Lenovo ThinkPad X301 and Lenovo ThinkPad T61). Lenovo ThinkPad T61 laptop has horizontal and vertical USB slot, Lenovo ThinkPad X301 Laptop has horizontal USB slot.

7.2.1 SAR measurement Result of CDMA AWS Band

Test Position	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
E397u-53 Test Data from Report: SYBH (Z-SAR) 039052011-2							
1x EV-DO Rev.0							
Front Side 5mm	450/1732.5	RTAP 153.6	0.790	0.476	-0.002	1.60	21.5°C
Rear Side 5mm	450/1732.5		0.784	0.467	0.135	1.60	21.5°C
Left Side 5mm	450/1732.5		0.613	0.342	0.063	1.60	21.5°C
Right Side 5mm	850/1752.5		0.991	0.556	0.108	1.60	21.5°C
	450/1732.5		1.050	0.579	0.174	1.60	21.5°C
	25/1711.25		0.982	0.560	0.157	1.60	21.5°C
Top Side 5mm	450/1732.5		0.058	0.036	0.042	1.60	21.5°C
1x EV-DO Rev.A							
Right Side 5mm	450/1732.5	RETAP 4096	1.060	0.588	-0.114	1.60	21.5°C
CDMA 1xRTT							
Right Side 5mm	450/1732.5	RC3+SO32	0.888	0.500	0.186	1.60	21.5°C

Table 17: Test results body SAR CDMA1700 MHz

Note: 1) The maximum SAR value are marks in **bold**.

2) Upper and lower frequencies were measured at the worst position.

3) The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.

4) Tests in body position were performed with 5 mm air gap between DUT and SAM.

5) The addition body test was performed at worst case.

7.2.2 SAR measurement Result of CDMA PCS Band

Test Position	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
E397u-53 Test Data from Report: SYBH (Z-SAR) 039052011-2							
1x EV-DO Rev.0							
Front Side 5mm	1175/1908.75	RTAP 153.6	1.020	0.611	0.105	1.60	21.5°C
	600/1880		0.999	0.596	-0.019	1.60	21.5°C
	25/1851.25		0.768	0.469	0.028	1.60	21.5°C
Rear Side 5mm	600/1880		0.653	0.416	0.197	1.60	21.5°C
Left Side 5mm	600/1880		0.666	0.370	0.005	1.60	21.5°C
Right Side 5mm	600/1880		0.712	0.398	0.147	1.60	21.5°C
Top Side 5mm	600/1880		0.060	0.036	0.040	1.60	21.5°C
1x EV-DO Rev.A							
Front Side 5mm	1175/1908.75	RETAP 4096	0.955	0.560	0.107	1.60	21.5°C
CDMA 1x RTT							
Front Side 5mm	1175/1908.75	RC3+SO32	0.911	0.549	-0.091	1.60	21.5°C

Table 18: Test results body SAR CDMA 1900 MHz

Note: 1) The maximum SAR value are marks in **bold**.

2) Upper and lower frequencies were measured at the worst position.

3) The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.

4) Tests in body position were performed with 5 mm air gap between DUT and SAM.

5) The addition body test was performed at worst case.

7.2.3 SAR measurement Result of LTE AWS Band

Bandwidth: 10MHz / Modulation: QPSK

Test Position	Test channel /Frequency	LTE Configuration	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
E397u-53 Test Data from Report: SYBH (Z-SAR) 039052011-2							
10M/QPSK							
Front Side 5mm	20175/1732.5	50%RB/#13	0.756	0.468	0.093	1.60	21.5°C
Rear Side 5mm	20175/1732.5		0.644	0.395	0.115	1.60	21.5°C
Left Side 5mm	20175/1732.5		0.544	0.303	0.143	1.60	21.5°C
Right Side 5mm	20350/1750		0.673	0.372	0.195	1.60	21.5°C
	20175/1732.5		0.867	0.483	0.093	1.60	21.5°C
	20000/1715		0.779	0.438	-0.025	1.60	21.5°C
Top Side 5mm	20175/1732.5		0.048	0.029	0.168	1.60	21.5°C
10M/QPSK							
Front Side 5mm	20175/1732.5	1RB/#0	0.856	0.528	0.086	1.60	21.5°C
Rear Side 5mm	20175/1732.5		0.744	0.457	0.121	1.60	21.5°C
Left Side 5mm	20175/1732.5		0.626	0.348	0.120	1.60	21.5°C
Right Side 5mm	20175/1732.5		0.960	0.538	0.006	1.60	21.5°C
Top Side 5mm	20175/1732.5		0.053	0.033	0.112	1.60	21.5°C
10M/QPSK							
Front Side 5mm	20350/1750	1RB/#49	0.917	0.562	0.165	1.60	21.5°C
Rear Side 5mm	20350/1750		0.589	0.366	0.138	1.60	21.5°C
Left Side 5mm	20350/1750		0.688	0.385	0.038	1.60	21.5°C
Right Side 5mm	20350/1750		0.925	0.511	0.090	1.60	21.5°C
Top Side 5mm	20350/1750		0.068	0.043	-0.113	1.60	21.5°C

Bandwidth: 10MHz / Modulation: 16QAM

Test Position	Test channel /Frequency	LTE Configuration	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
E397u-53 Test Data from Report: SYBH (Z-SAR) 039052011-2							
10M/16QAM							
Front Side 5mm	20175/1732.5	50%RB/#13	0.735	0.452	0.160	1.60	21.5°C
Rear Side 5mm	20175/1732.5		0.758	0.470	0.153	1.60	21.5°C
Left Side 5mm	20175/1732.5		0.636	0.354	0.107	1.60	21.5°C
Right Side 5mm	20175/1732.5		0.943	0.527	0.126	1.60	21.5°C
Top Side 5mm	20175/1732.5		0.047	0.030	0.194	1.60	21.5°C
10M/16QAM							
Front Side 5mm	20175/1732.5	1RB/#0	0.882	0.545	0.111	1.60	21.5°C
Rear Side 5mm	20175/1732.5		0.856	0.531	0.057	1.60	21.5°C
Left Side 5mm	20175/1732.5		0.719	0.402	0.126	1.60	21.5°C
Right Side 5mm	20175/1732.5		1.190	0.666	0.188	1.60	21.5°C
Top Side 5mm	20175/1732.5		0.053	0.033	0.036	1.60	21.5°C
10M/16QAM							
Front Side 5mm	20350/1750	1RB/#49	0.943	0.579	0.128	1.60	21.5°C
Rear Side 5mm	20350/1750		0.612	0.382	0.086	1.60	21.5°C
Left Side 5mm	20350/1750		0.691	0.387	0.173	1.60	21.5°C
Right Side 5mm	20350/1750		0.951	0.527	0.180	1.60	21.5°C
Top Side 5mm	20350/1750		0.069	0.044	-0.023	1.60	21.5°C

Table19: Test results body SAR LTE 1700 MHz

Note:

- 1) The maximum SAR value are marks in **bold**.
- 2) A-MPR was disabled by Radio Communication Tester;
- 3) Per KDB447498 D02:
 - a) The closest distance from Top side to main antenna is less than 1cm, so Top side SAR is required.
 - b) For antennas located more than 2.5 cm from the USB connector, so no SAR test in one or more of these configurations need to be considered in the position of rotator 45° to 90°. (pls see Appendix D)
- 4) Tests in body position were performed with 5 mm air gap between DUT and SAM.

7.2.4 SAR measurement Result of LTE PCS Band

Bandwidth: 10MHz / Modulation: QPSK

Test Position	Test channel /Frequency	LTE Configuration	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
10M/QPSK							
Front Side 5mm	19150/1905	50%RB/#13	0.987	0.618	-0.028	1.6	21.4°C
	18900/1880		0.902	0.572	0.044	1.6	21.4°C
	18650/1855		0.945	0.593	-0.025	1.6	21.4°C
Rear Side 5mm	18900/1880		0.788	0.522	0.004	1.6	21.4°C
Left Side 5mm	18900/1880		0.732	0.445	0.001	1.6	21.4°C
Right Side 5mm	18900/1880		0.713	0.418	0.094	1.6	21.4°C
Top Side 5mm	18900/1880		0.055	0.037	-0.036	1.6	21.4°C
10M/QPSK							
Front Side 5mm	18650/1855	1RB/#0	1.050	0.671	-0.026	1.6	21.4°C
Rear Side 5mm	18650/1855		0.898	0.595	0.004	1.6	21.4°C
Left Side 5mm	18650/1855		0.881	0.530	-0.032	1.6	21.4°C
Right Side 5mm	18650/1855		1.090	0.618	-0.097	1.6	21.4°C
Top Side 5mm	18650/1855		0.065	0.044	0.040	1.6	21.4°C
10M/QPSK							
Front Side 5mm	18900/1880	1RB/#49	1.010	0.634	-0.003	1.6	21.4°C
Rear Side 5mm	18900/1880		0.857	0.567	0.049	1.6	21.4°C
Left Side 5mm	18900/1880		0.810	0.488	0.000	1.6	21.4°C
Right Side 5mm	18900/1880		0.796	0.466	0.048	1.6	21.4°C
Top Side 5mm	18900/1880		0.051	0.036	-0.190	1.6	21.4°C

Bandwidth: 10MHz / Modulation: 16QAM

Test Position	Test channel /Frequency	LTE Configuration	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
10M/16QAM							
Front Side 5mm	19150/1905	50%RB/#13	0.895	0.572	-0.091	1.6	21.4°C
Rear Side 5mm	19150/1905		0.664	0.442	-0.137	1.6	21.4°C
Left Side 5mm	19150/1905		0.677	0.433	0.023	1.6	21.4°C
Right Side 5mm	19150/1905		0.615	0.376	0.027	1.6	21.4°C
Top Side 5mm	19150/1905		0.043	0.031	-0.035	1.6	21.4°C
10M/16QAM							
Front Side 5mm	19150/1905	1RB/#0	1.040	0.662	0.019	1.6	21.4°C
Rear Side 5mm	19150/1905		0.849	0.558	0.093	1.6	21.4°C
Left Side 5mm	19150/1905		0.885	0.552	-0.007	1.6	21.4°C
Right Side 5mm	19150/1905		0.623	0.380	0.129	1.6	21.4°C
Top Side 5mm	19150/1905		0.056	0.037	0.169	1.6	21.4°C
10M/16QAM							
Front Side 5mm	18900/1880	1RB/#49	1.030	0.644	0.032	1.6	21.4°C
Rear Side 5mm	18900/1880		0.861	0.573	0.048	1.6	21.4°C
Left Side 5mm	18900/1880		0.814	0.490	-0.015	1.6	21.4°C
Right Side 5mm	18900/1880		0.792	0.462	-0.011	1.6	21.4°C
Top Side 5mm	18900/1880		0.065	0.041	0.153	1.6	21.4°C

Table 20: Test results body SAR LTE 1900 MHz

Note:

- 5) The maximum SAR value are marks in **bold**.
- 6) A-MPR was disabled by Radio Communication Tester;
- 7) Per KDB447498 D02:
 - a) The closest distance from Top side to main antenna is less than 1cm, so Top side SAR is required.
 - b) For antennas located more than 2.5 cm from the USB connector, so no SAR test in one or more of these configurations need to be considered in the position of rotator 45° to 90°. (pls see Appendix D)
- 8) Tests in body position were performed with 5 mm air gap between DUT and SAM.
- 9) The addition body test was performed at worst case.
- 10) Per KDB941225 D05, LTE band test reduce is as below the following:

First step:

Refer to Item 3A): Begin by measuring SAR on the high, middle and low (H, M, L) channels² using the largest channel bandwidth, in QPSK with 50% RB allocation⁴ centered within the channel bandwidth. And Foot note 2: When the maximum output power variation across H, M and L channels is $\leq \frac{1}{2}$ dB, start with the middle channel; otherwise, start with the highest output power channel. When the measured 1-g SAR for the middle or highest output power channel is ≤ 0.8 W/kg, testing of the remaining two channels in that device and exposure configuration is not necessary. Also see footnote 1.

LTE Band II	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Max Conducted Power (dBm)	Max Difference
Low Channel	18650	10	1	0	QPSK	21.94	0.30
Mid Channel	18900	10	1	49	QPSK	21.72	
High Channel	19150	10	1	0	QPSK	21.64	

➔ Middle channel, 10MHz BW, 50%/#13, QPSK has been selected.

Second step:

Refer to Item 3B) : Measure SAR in QPSK with 1 RB allocated at the high end of the channel edge using the highest SAR channel measured in A); and then repeat the measurement at the low end of the channel edge.⁶

And Foot note 6: If the maximum average conducted output power for a 1 RB allocation is > ½ dB higher than the 50% RB allocation, instead of using the highest SAR channel measured for QPSK and 50% RB allocation, measure SAR on the highest output power channel for the 1 RB allocation the maximum average conducted output power should be compared with 1RB/50% RB allocation of the same channel as below the following,

LTE Band II	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Max Conducted Power (dBm)	Difference
Low Channel	18650	10	1	49	QPSK	21.62	0.78
		10	25	13	QPSK	20.84	
Mid Channel	18900	10	1	49	QPSK	21.72	0.93
		10	25	13	QPSK	20.79	
High Channel	19150	10	1	49	QPSK	21.52	0.76
		10	25	13	QPSK	20.76	

➔ Middle channel, 10 MHz BW, 1RB/#49, QPSK has been selected.

LTE Band II	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Max Conducted Power (dBm)	Difference
Low Channel	18650	10	1	0	QPSK	21.94	1.10
		10	25	13	QPSK	20.84	
Mid Channel	18900	10	1	0	QPSK	21.66	0.87
		10	25	13	QPSK	20.79	
High Channel	19150	10	1	0	QPSK	21.64	0.88
		10	25	13	QPSK	20.76	

➔ Low channel, 10 MHz BW, 1RB/#0, QPSK has been selected.

For measured SAR in QPSK with 1 RB is < 1.45 W/kg-> Test 1RB configuration on other channels is not required.

Third step:

Refer to Item 4A): For the largest channel bandwidth in each LTE frequency band⁷: Measure SAR in 16QAM with 50% RB allocation using the highest SAR channel measured in 3) A).⁸

And Foot note 7: If the maximum average conducted output power for 16QAM is more than ¼ dB higher than QPSK, apply the procedures for QPSK in 3) to test 16QAM.

And Foot note 8: If the maximum average conducted output power for 16QAM with 50% RB allocation is > ½ dB higher than QPSK with 50% RB allocation, instead of using the highest SAR channel measured in QPSK measure SAR on the highest output power channel for 16QAM with 50% RB allocation.

LTE Band II	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Max Conducted Power (dBm)	Difference
Low Channel	18650	10	1	0	QPSK	21.94	-1.39
		10	1	0	16QAM	20.55	
Mid Channel	18900	10	1	49	QPSK	21.72	-1.09
		10	1	49	16QAM	20.63	
High Channel	19150	10	1	0	QPSK	21.64	-1.35
		10	1	49	16QAM	20.29	

➔ High channel, 10 MHz BW , 16QAM has been selected.

LTE Band II	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Max Conducted Power (dBm)	Difference
Low Channel	18650	10	25	13	QPSK	20.84	-0.78
		10	25	13	16QAM	20.06	
Mid Channel	18900	10	25	13	QPSK	20.79	-0.82
		10	25	13	16QAM	19.97	
High Channel	19150	10	25	13	QPSK	20.76	-0.86
		10	25	13	16QAM	19.90	

➔ High channel, 10 MHz BW , 50%RB/#13, 16QAM has been selected..

Refer to Item 4B): Measure SAR in 16QAM with 1 RB allocated at the high end of the channel edge using the SAR channel measured in A); and then repeat the measurement at the low end of the channel edge.⁹

And Foot note 9: If the maximum average conducted output power for a 1 RB allocation is > ½ dB higher than the 50% RB allocation, instead of using the highest SAR channel measured for 16QAM and 50% RB measure SAR on the highest output power channel for the 1 RB allocation.

the maximum average conducted output power should be compared with 1RB/50% RB allocation of the same channel as below the following:

LTE Band II	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Max Conducted Power (dBm)	Difference
Low Channel	18650	10	1	0	16QAM	20.55	0.49
		10	25	13	16QAM	20.06	
Mid Channel	18900	10	1	0	16QAM	20.44	0.47
		10	25	13	16QAM	19.97	
High Channel	19150	10	1	0	16QAM	20.26	0.36
		10	25	13	16QAM	19.90	

➔ High channel, 10 MHz BW , 1RB/#0, 16QAM has been selected.

LTE Band II	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Max Conducted Power (dBm)	Difference
Low Channel	18650	10	1	49	16QAM	20.35	0.29
		10	25	13	16QAM	20.06	
Mid Channel	18900	10	1	49	16QAM	20.63	0.66
		10	25	13	16QAM	19.97	
High Channel	19150	10	1	49	16QAM	20.29	0.39
		10	25	13	16QAM	19.90	

➔ Middle channel, 10 MHz BW, 1RB/#49, 16QAM has been selected.

Measured SAR in 16QAM with 1 RB is < 1.45 W/kg-> Test 16QAM on other channels is not required.

Fourth step:

Refer to Item 5) B): For the other channel bandwidths used by the device within a LTE frequency band:

a) Max average conducted power of 5MHz/3MHz/1.4MHz BW is within ½ dB for 10MHzBW:

Bandwidth(MHz)	10 MHz	5 MHz	3 MHz	1.4 MHz
Max Power	21.94	21.90	21.87	21.85
Difference	---	-0.04	-0.07	-0.09

b) SAR of QPSK with 50% RB (10MHz) is < 1.45 W/kg.

Therefore: this cannot be tested in the smaller channel bandwidth of QPSK/16QAM.

7.3 simultaneous transmission SAR

CDMA / LTE mode can not work at the same time. Only one mode can work at a time.No Simultaneous transmission mode is provided for the device. Therefore, simultaneous transmission SAR is not required.

Appendix A. System Check Plots**(Pls See Appendix A.)****Appendix B. SAR Measurement Plots****(Pls See Appendix B.)****Appendix C. Calibration Certificate****(Pls See Appendix C.)****Appendix D. Photo documentation****(Pls See Appendix D.)**