



Accredited testing laboratory

CNAS Registration number: L0310

**Report On SAR Test of HUAWEI
WCDMA Mobile Phone
M/N: HUAWEI U1000-5/U1000-5**

Test report no.	: SYBH(Z-SAR) 022072010EB
Type identification	: HUAWEI U1000-5/U1000-5
FCC ID	: QISU1000-5S
Test specification	: IEEE 1528-2003
	: ANSI C95.1-1999
	: RSS-102 issue 4 (2010)
	: OET Bulletin 65 Supplement C
	: IEC 62209-2:Ed1.0(2010-3)

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1 General Information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The HUAWEI does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of HUAWEI.

1.1.1 Statement of Compliance

The SAR values found for the HUAWEI U1000-5/U1000-5 are below the maximum recommended levels 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.

For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and that positions the handset a minimum of 15 mm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines. The measurement together with the test system set-up is described in chapter 2.3 of this test report. A detailed description of the equipment under test can be found in chapter 1.5.

Test engineer:

2010-08-04

Luo Yusheng

Date

Name

Signature

Reviewed by:

2010-08-04

Hu Zhongxun

Date

Name

Signature

Approved by:

2010-08-04

Liu Chunlin

Date

Name

Signature



1.2 Testing laboratory

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Internet: www.huawei.com

State of accreditation: The Test laboratory (area of testing) is accredited according to
ISO/IEC 17025.
CNAS Registration number: L0310

1.3 Details of applicant

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Street: Huawei Base, Bantian, Longgang District
Town: Shenzhen
Country: P.R.China
Contact: Ms. Wang Wei
Telephone: +86-10-82836234

1.4 Application details

Date of receipt of application:	2010-07-22
Date of receipt of test item:	2010-07-22
Start/Date of test:	2010-07-30
End of test:	2010-08-01



1.5 Test item

Description of the test item: WCDMA Mobile Phone
 Type identification: HUAWEI U1000-5/U1000-5
 FCC-ID : QISU1000-5S
 Serial number: 020UGW9M06000159
 Manufacturer name: Huawei Technologies Co.,Ltd.
 Street: Huawei Base, Bantian,Longgang District
 Town: Shenzhen
 Country: P.R.China

additional information on the DUT:		
device type :	portable device	
IMEI No :	020UVJ9M0700042	
exposure category:	uncontrolled environment / general population	
test device production information	production unit	
operating mode(s)	UMTS	
modulation	QPSK	
operating frequency range(s)	transmitter frequency range	receiver frequency range
WCDMA850 (tested):	826.4 MHz ~ 846.6 MHz	871.4 MHz ~ 891.6 MHz
Power class :	3, tested with power level 5 (850 MHz band)	
measured peak output power (conducted):	850 MHz band:23.76dBm (QPSK)	
test channels (low-mid-high) :	4132-4183-4233(850 MHz band)	
hardware version :	HD3U100M	
software version :	U1000V100R001CRIC106B116	
antenna type :	Integrated antenna	
accessories/body-worn configurations:	Stereo headset	
battery options :	Huawei Technologies Co., Ltd Battery Model: HBU83S Rated capacity: 800mAh Nominal Voltage: --- +3.7V Charging Voltage: --- +4.2V S/N: HGY920104350	
charger options :	Huawei Technologies Co., Ltd Model: HS-050040U6 Input Voltage :100-240V ~50/60Hz, 0.2A Output voltage: --- +5.0V , 400mA Rated Power: 2W S/N: HKA9A1060543	

1.5.1 EUT Description

WCDMA Mobile Phone-HUAWEI U1000-5/U1000-5 is subscriber equipment in the WCDMA system. The WCDMA frequency band is Band V, they can be used in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, WCDMA protocol processing, voice etc. Externally it provides earphone port(to provide voice service) and USIM card interface.

1.6 Test specification(s)

Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01)

IEEE 1528-2003 (April 21, 2003): Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

RSS-104: Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands (Issue 4 of March 2010)

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)

IEEE Std C95.3 – 1991, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave.

IEEE Std C95.1 – 1999, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.

IEC 62209-2:Ed1.0(2010-3)Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)

1.6.1 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 1: 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).



2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.	<input checked="" type="checkbox"/>
The deviations as specified in 2.5 were ascertained in the course of the tests performed.	<input type="checkbox"/>

The maximum SAR of HUAWEI U1000-5/U1000-5 head position is 1.04 W/kg.
The maximum SAR of HUAWEI U1000-5/U1000-5 body position is 0.836W/kg.

2.2 Test environment

General Environment conditions in the test area are as follows:

Ambient temperature: 20°C – 24°C
Tissue simulating liquid: 20°C – 24°C
Humidity: 30% – 70%

Exact temperature values for each test are shown in the table(s) under 2.5. and/or on the measurement plots.

2.3 Measurement and test set-up

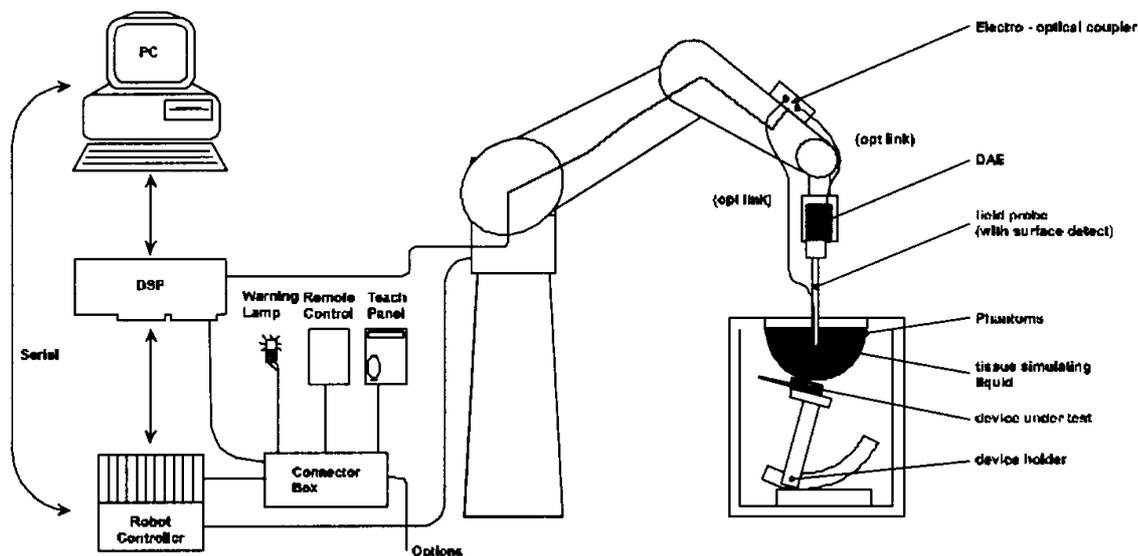
The measurement system is described in chapter 2.4.

The test setup for the system validation can be found in chapter 2.4.14.

A description of positioning and test signal control can be found in chapter 2.5 together with the test results.

2.4 Measurement system

2.4.1 System Description



The DASYS5 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 DASYS5 measurement server.
- The DASYS5 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.
- DASYS5 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.

2.4.2 Test environment

The DASY5 measurement system is placed at the head end of a room with dimensions: 4.5 x 4 x 3 m³, the SAM phantom is placed in a distance of 1.3 m from the side walls and 1.1m from the rear wall.

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

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

2.4.3 Probe description

Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements

Technical data according to manufacturer information	
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., glycoether)
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)



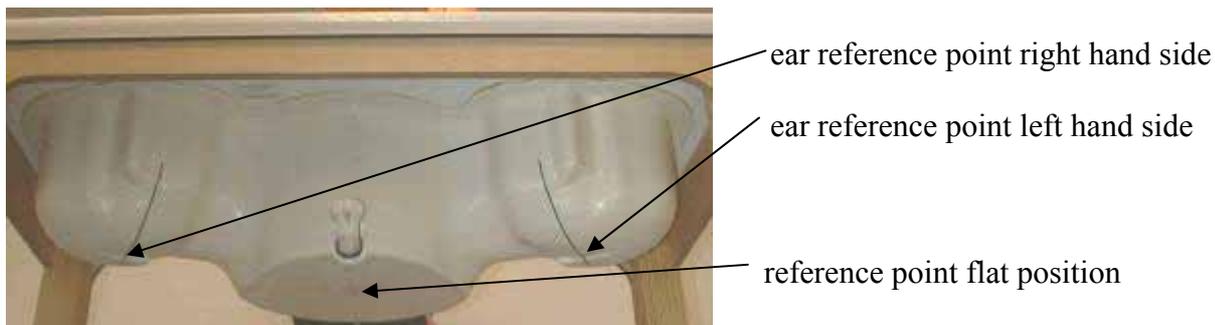
Isotropic E-Field Probe ES3DV3 for Dosimetric Measurements

Technical data according to manufacturer information	
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

2.4.4 Phantom description

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

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



2.4.5 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.

2.4.6 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 annex 2.
- 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 annex 2. Test results relevant for the specified standard (see chapter 1.6.) are shown in table form in chapter 2.5.
- 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 annex 2.

2.4.7 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.



2.4.8 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 _{i0} , a _{i1} , a _{i2}
	- Conversion factor		ConvF _i
	- Diode compression point		Dcpi
Device parameters:	- Frequency		f
	- Crest factor		cf
Media parameters:	- Conductivity	σ	
	- Density		ρ

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

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

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

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

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

2.4.9 Test equipment utilized

This table gives a complete overview of the SAR measurement equipment

Devices used during the test described in chapter 2.5. are marked ☒

	Manufacturer	Device	Type	Serial number	Date of last calibration)*
☒	Schmid & Partner Engineering AG	Dosimetric E-Field Probe	ES3DV3	3168	2009-12-18
☒	Schmid & Partner Engineering AG	835 MHz System Validation Dipole	D835V2	4d095	2009-05-25
☐	Schmid & Partner Engineering AG	900 MHz System Validation Dipole	D900V2	1d063	2009-05-26
☐	Schmid & Partner Engineering AG	1800 MHz System Validation Dipole	D1800V2	2d157	2009-05-27
☐	Schmid & Partner Engineering AG	1900 MHz System Validation Dipole	D1900V2	5d091	2009-05-28
☐	Schmid & Partner Engineering AG	2000 MHz System Validation Dipole	D2000V2	1036	2009-05-29
☐	Schmid & Partner Engineering AG	Data acquisition electronics	DAE4	851	2010-06-30
☒	Schmid & Partner Engineering AG	Data acquisition electronics	DAE4	852	2009-12-18
☒	Schmid & Partner Engineering AG	Software	DASY 5 V5.0	N/A	N/A
☒	Schmid & Partner Engineering AG	Twin Phantom	SAM1	TP-1475	N/A
☒	Schmid & Partner Engineering AG	Twin Phantom	SAM2	TP-1474	N/A
☒	Rohde & Schwarz	Universal Radio Communication Tester	CMU 200	111379	2009-09-26
☒	Agilent)*	Network Analyser 300 kHz to 8.5 GHz	E5071B	MY42404956	2010-03-08
☒	Agilent	Dielectric Probe Kit	85070E	2484	N/A
☒	Agilent	Signal Generator	N5181A	MY47420989	2010-03-08
☒	MINI-CIRCUITS	Amplifier	ZHL-42W	QA0746001	N/A
☒	Agilent	Power Meter	E4417A	MY45101339	2010-05-19
☒	Agilent	Power Meter Sensor	E9321A	MY44420359	2010-05-19

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

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

2.4.10 Tissue simulating liquids: dielectric properties

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

(liquids used for tests described in chapter 2.5. are marked with ☒) :

Ingredients (% of weight)	Frequency (MHz)					
	<input type="checkbox"/> 450	<input checked="" type="checkbox"/> 835	<input type="checkbox"/> 900	<input type="checkbox"/> 1800	<input type="checkbox"/> 1900	<input type="checkbox"/> 2450
frequency band	<input type="checkbox"/> 450	<input checked="" type="checkbox"/> 835	<input type="checkbox"/> 900	<input type="checkbox"/> 1800	<input type="checkbox"/> 1900	<input type="checkbox"/> 2450
Tissue Type	Head	Head	Head	Head	Head	Head
Water	38.56	41.45	40.92	52.64	54.9	62.7
Salt (NaCl)	3.95	1.45	1.48	0.36	0.18	0.5
Sugar	56.32	56.0	56.5	0.0	0.0	0.0
HEC	0.98	1.0	1.0	0.0	0.0	0.0
Bactericide	0.19	0.1	0.1	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	36.8
DGBE	0.0	0.0	0.0	47.0	44.92	0.0

Table 2: Head tissue dielectric properties

Ingredients (% of weight)	Frequency (MHz)					
	<input type="checkbox"/> 450	<input checked="" type="checkbox"/> 835	<input type="checkbox"/> 900	<input type="checkbox"/> 1800	<input type="checkbox"/> 1900	<input type="checkbox"/> 2450
frequency band	<input type="checkbox"/> 450	<input checked="" type="checkbox"/> 835	<input type="checkbox"/> 900	<input type="checkbox"/> 1800	<input type="checkbox"/> 1900	<input type="checkbox"/> 2450
Tissue Type	Body	Body	Body	Body	Body	Body
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 3: Body tissue dielectric properties

Salt: 99+% Pure Sodium Chloride

Sugar: 98+% Pure Sucrose

Water: De-ionized, 16MΩ+ resistivity

HEC: Hydroxyethyl Cellulose

DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

Note : Due to their availability body tissue simulating liquids as defined by FCC OET

Bulletin 65 Supplement C are generally used for body worn SAR testing according to European standards.

2.4.11 Tissue simulating liquids: parameters

Used Target Frequency [MHz]	Target Head Tissue		Measured Head Tissue		Measured Date
	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
835	41.5	0.90	41	0.93	2010-07-31

Table 4: Parameter of the head tissue simulating liquid

Used Target Frequency [MHz]	Target Body Tissue		Measured Body Tissue		Measured Date
	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
835	55.2	0.97	55.1	1.01	2010-07-30

Table 4: Parameter of the body tissue simulating liquid

Note: The dielectric properties have been measured using the contact probe method at 22°C.

2.4.12 Measurement uncertainty evaluation for SAR test

The overall combined measurement uncertainty of the measurement system is $\pm 10.7\%$ ($K=1$).

The expanded uncertainty ($k=2$) is assessed to be $\pm 21.4\%$

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	$\pm 5.9\%$	Normal	1	1	1	$\pm 5.9\%$	$\pm 5.9\%$	∞
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	± 4.0%	Rectangular	$\sqrt{3}$	1	1	± 2.3%	± 2.3%	∞
Liquid conductivity (target)	± 5.0%	Rectangular	$\sqrt{3}$	0.64	0.43	± 1.8%	± 1.2%	∞
Liquid conductivity (meas.)	± 2.5%	Normal	1	0.64	0.43	± 1.6%	± 1.1%	∞
Liquid permittivity (target)	± 5.0%	Rectangular	$\sqrt{3}$	0.6	0.49	± 1.7%	± 1.4%	∞
Liquid permittivity (meas.)	± 2.5%	Normal	1	0.6	0.49	± 1.5%	± 1.2%	∞
Combined Uncertainty						± 10.9%	± 10.7%	387
Expanded Std. Uncertainty						± 21.9%	± 21.4%	

Table 6: Measurement uncertainties

2.4.13 Measurement uncertainty evaluation for system validation

The overall combined measurement uncertainty of the measurement system is $\pm 9.2\%$ ($K=1$).
 The expanded uncertainty ($k=2$) is assessed to be $\pm 18.4\%$
 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	$\pm 5.9\%$	Normal	1	1	1	$\pm 5.9\%$	$\pm 5.9\%$	∞
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	± 4.0%	Rectangular	$\sqrt{3}$	1	1	± 2.3%	± 2.3%	∞
Liquid conductivity (target)	± 5.0%	Rectangular	$\sqrt{3}$	0.64	0.43	± 1.8%	± 1.2%	∞
Liquid conductivity (meas.)	± 2.5%	Normal	1	0.64	0.43	± 1.6%	± 1.1%	∞
Liquid permittivity (target)	± 5.0%	Rectangular	$\sqrt{3}$	0.6	0.49	± 1.7%	± 1.4%	∞
Liquid permittivity (meas.)	± 2.5%	Normal	1	0.6	0.49	± 1.5%	± 1.2%	∞
Combined Uncertainty						± 9.5%	± 9.2%	
Expanded Std. Uncertainty						± 18.9%	± 18.4%	

Table 7: Measurement uncertainties

2.4.14 System validation

The system validation 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 of the test item described in chapter 1.5. (graphic plot(s) see annex 1).

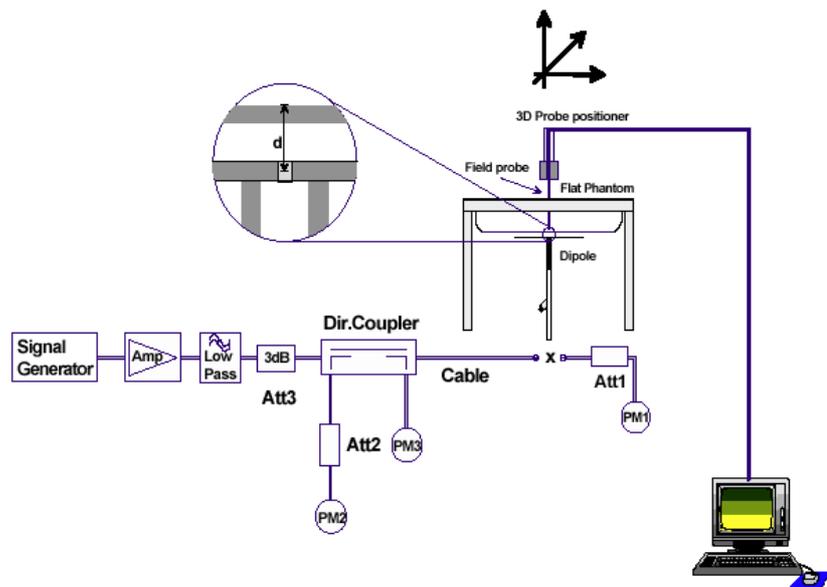
Validation Kit	Frequency	Target SAR _{1g} (250 mW) (+/- 10%)	Target SAR _{10g} (250 mW) (+/- 10%)	Measured SAR _{1g}	Measured SAR _{10g}	Measured date
D835V2 S/N: 4d095	835 MHz head	2.29mW/g	1.50mW/g	2.38mW/g	1.56W/g	2010-07-31
D835V2 S/N: 4d095	835 MHz body	2.49mW/g	1.62mW/g	2.56mW/g	1.67mW/g	2010-07-30

Table 8: Results system validation

2.4.15 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.



2.5 Test Results

2.5.1 Conducted power measurements

For the measurements a Rohde & Schwarz Radio Communication Tester CMU 200 was used. The output power was measured using an integrated RF connector and attached RF cable. The conducted output power was also checked before and after each SAR measurement. The resulting power values were within a 0.2 dB tolerance of the values shown below.

Note : CMU200 measures GSM peak and average output power for active timeslots.
For SAR the timebased average power is relevant. The difference in between depends on the duty cycle of the TDMA signal :

No. of timeslots	1	2	3	4
Duty Cycle	1 : 8	1: 4	1 : 2.66	1 : 2
timebased avg. power compared to slotted avg. power	- 9 dB	- 6 dB	- 4.25 dB	- 3 dB

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

2.5.2 Conducted power results

WCDMA 850 MHz

WCDMA 850 MHz		Conducted Power (dBm)		
		Channel 4132	Channel 4182	Channel 4233
12.2kbps RMC	Before test	23.23	23.56	23.65
	After test	23.28	23.57	23.69
64kbps RMC	Before test	23.35	23.67	23.75
	After test	23.37	23.69	23.68
144kbps RMC	Before test	23.35	23.65	23.73
	After test	23.37	23.68	23.75
384kbps RMC	Before test	23.36	23.71	23.76
	After test	23.38	23.73	23.75

Table 10: Test results conducted power measurement WCDMA 850MHz

To verify if the output changes within the tolerance before and after each SAR test, please see the power drift of each test in chapter 2.6.



2.6 Test results (Head and Body SAR)

WCDMA 850

The table contains the measured SAR values averaged over a mass of 1 g

Channel / frequency	Position	Left hand position	Right hand position	Power Drift (dB)	Limit	Liquid temperature
4183 / 836.6MHz	cheek	0.826 W/kg	0.867 W/kg	0.056/0.012	1.6 W/kg	21.5/21.5 °C
4183 / 836.6MHz	tilted15°	0.507 W/kg	0.511 W/kg	0.052/-0.055	1.6 W/kg	21.5/21.5 °C
4233 / 846.6MHz	cheek	1.01 W/kg	1.04 W/kg	-0.181/-0.065	1.6 W/kg	---/21.5 °C
4132 / 826.4MHz	cheek	0.73 W/kg	0.771 W/kg	-0.062/0.048	1.6 W/kg	---/21.5 °C

Extrapolated SAR Values of highest measured SAR (WCDMA 850)

Limit of SAR (W/kg)		Conducted Power	1g Average	Tune-up procedures maximum Power(dBm)	1g Average
Worst Case			1.6		1.6
Test Position	Channel / frequency	Measurement Result(dBm)	Measurement Result(W/kg)		Extrapolated Result(W/kg)
Right hand, cheek	4233 / 846.6MHz	23.65	1.04	24.00	1.127

Table 13: Test results (Head SAR WCDMA 850MHz)



The table contains the measured SAR values averaged over a mass of 1 g

Channel / frequency	Position	Body worn	Power Drift (dB)	Limit	Liquid temperature
4183 / 836.6MHz	front	0.389 W/kg	0.043	1.6 W/kg	21.5 °C
4183 / 836.6MHz	rear	0.672 W/kg	-0.003	1.6 W/kg	21.5 °C
4233 / 846.6MHz	rear	0.681 W/kg	-0.055	1.6 W/kg	21.5 °C
4132 / 826.4MHz	rear	0.836 W/kg	0.072	1.6 W/kg	21.5 °C
Speech mode, with Headset					
4132 / 826.4MHz	rear	0.481 W/kg	0.072	1.6 W/kg	21.5 °C

Extrapolated SAR Values of highest measured SAR (WCDMA 850)

Limit of SAR (W/kg)		Conducted Power	1g Average		Tune-up procedures maximum Power(dBm)	1g Average
Worst Case			1.6			1.6
Test Position	Channel / frequency	Measurement Result(dBm)	Measurement Result(W/kg)	Extrapolated Result(W/kg)		
Body, rear	4132 / 826.4MHz	23.65	0.836	24.00	0.906	

Table 14: Test results (Body SAR WCDMA 850 MHz)

Note: 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.

Tests in body position were performed with 15 mm air gap between DUT and SAM to simulate the use of a non-metallic belt-clip or holster.

2.6.1 General description of test procedures

The DUT is tested using a CMU 200 communications tester as controller unit to set test channels and maximum output power to the DUT, as well as for measuring the conducted peak power. Test positions as described in the tables above are in accordance with the specified test standard. Tests in body position are performed with the maximum number of timeslots in uplink. Tests in head position are performed in voice mode with 1 timeslot unless GPRS/EGPRS function allows parallel voice and data traffic on 2 or more timeslots (see chapter 1.5 for details). Conducted output power was measured using an integrated RF connector and attached RF cable.

Annex 1 System performance verification

Date/Time: 2010-7-31 22:14:12

SystemPerformanceCheck-D835 head

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.93 \text{ mho/m}$; $\epsilon_r = 41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(6.06, 6.06, 6.06); Calibrated: 12/18/2009

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn852; Calibrated: 12/18/2009

- Phantom: SAM1; Type: SAM; Serial: TP-1475

- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=15mm, Pin=250mW/Area Scan (6x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.41 mW/g

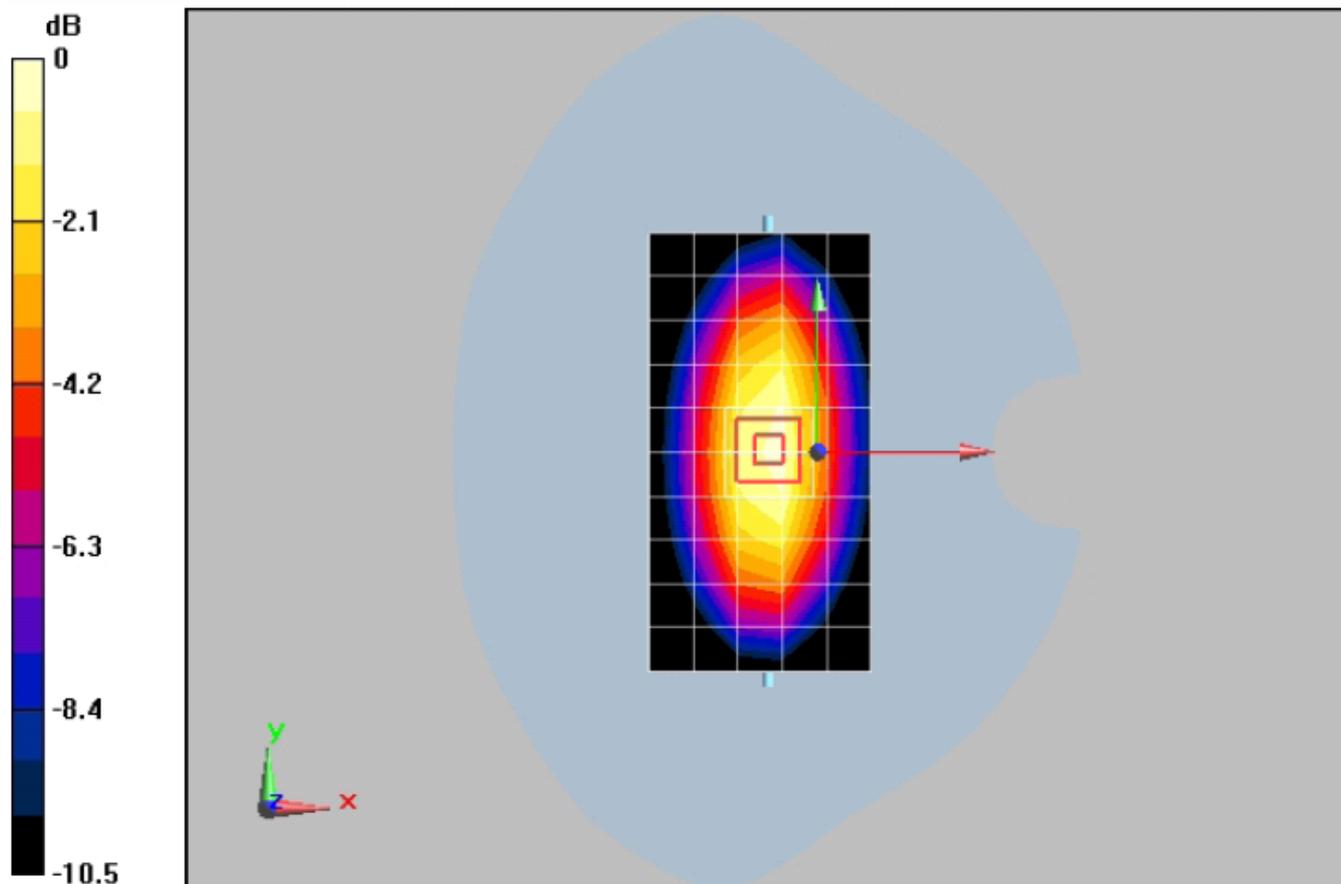
d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 55.1 V/m; Power Drift = 0.026 dB

Peak SAR (extrapolated) = 3.47 W/kg

SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.56 mW/g

Maximum value of SAR (measured) = 2.58 mW/g



0 dB = 2.58mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) :

ambient temperature: 23.0°C; liquid temperature: 22.2°C

SystemPerformanceCheck-D835 body

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 55.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.97, 5.97, 5.97); Calibrated: 12/18/2009

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn852; Calibrated: 12/18/2009

- Phantom: SAM1; Type: SAM; Serial: TP-1475

- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=15mm, Pin=250mW/Area Scan (6x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.68 mW/g

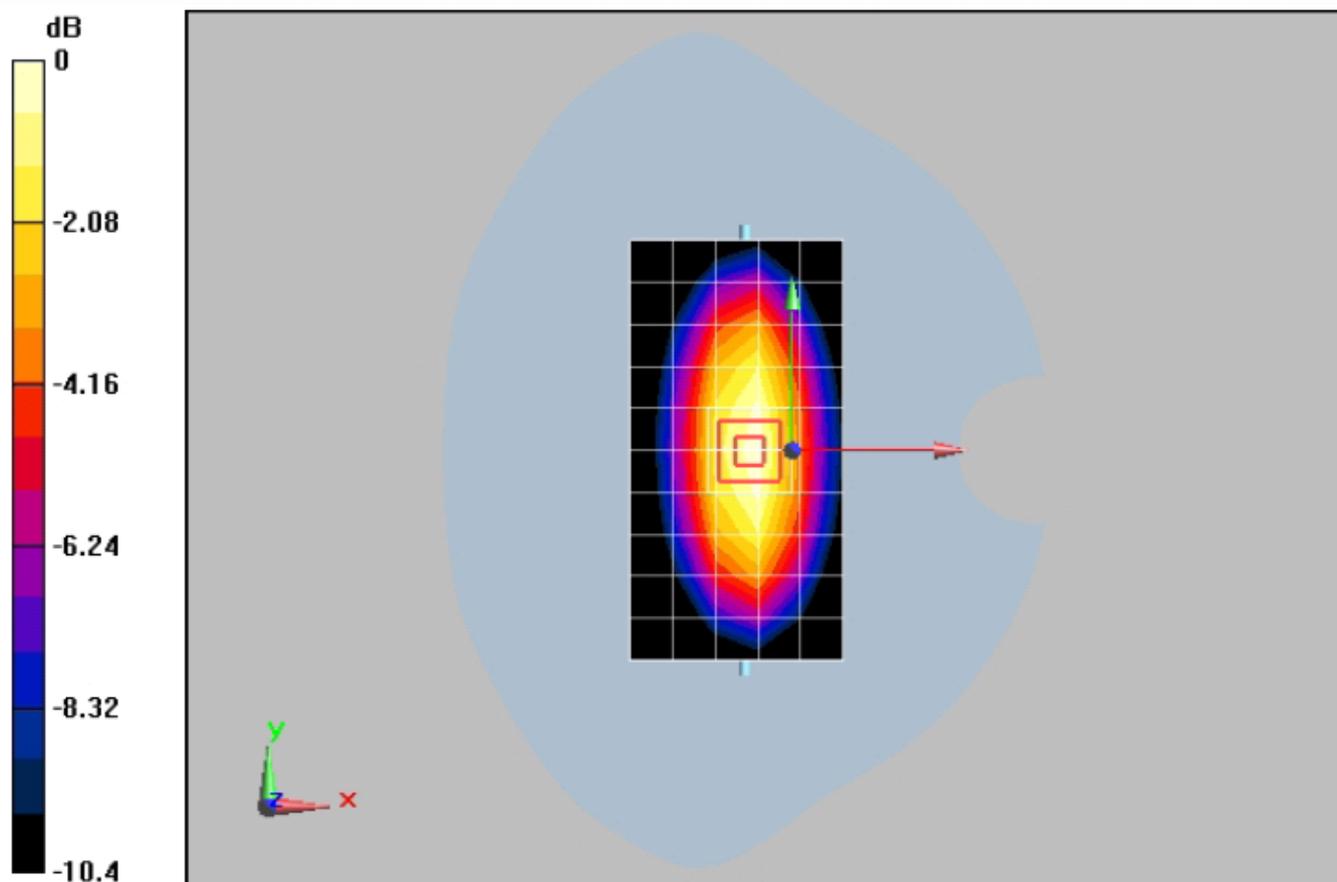
d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 53.2 V/m; Power Drift = -0.035 dB

Peak SAR (extrapolated) = 3.73 W/kg

SAR(1 g) = 2.56 mW/g; SAR(10 g) = 1.67 mW/g

Maximum value of SAR (measured) = 2.78 mW/g



0 dB = 2.78mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) :

ambient temperature: 23.0°C; liquid temperature: 22.2°C

Annex 2 Measurement results (printout from DASY TM)

Annex 2.1 WCDMA 850MHz head

Date/Time: 2010-07-31 22:55:52

P1528_OET65_EN62209-LeftHandSide touched – WCDMA 850

DUT: HUAWEI U1000-5/U1000-5

Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.938$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(6.06, 6.06, 6.06); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.824 mW/g

head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

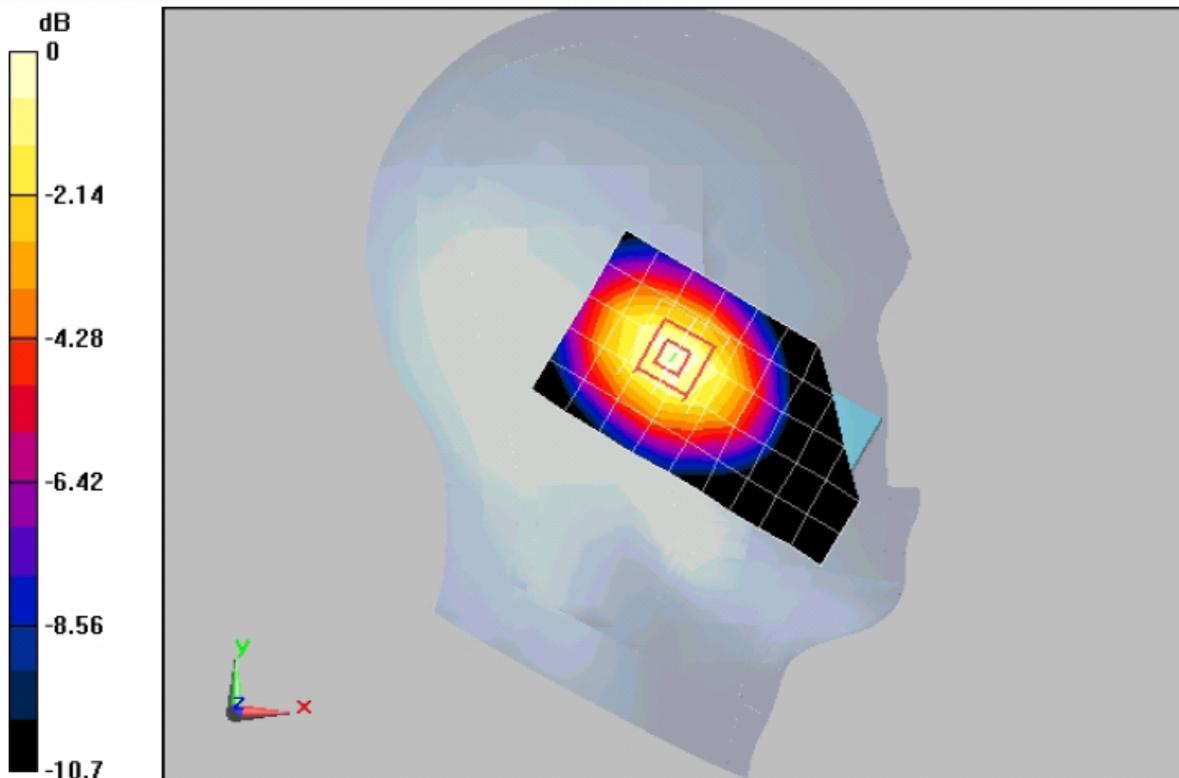
Reference Value = 25.1 V/m; Power Drift = 0.056 dB

Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.826 mW/g; SAR(10 g) = 0.573 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.884 mW/g



0 dB = 0.884mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : 15 mm

ambient temperature: 23.0°C; liquid temperature: 22.2°C

P1528_OET65_EN62209-LeftHandSide tilted 15° - WCDMA 850

DUT: HUAWEI U1000-5/U1000-5

Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.938$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(6.06, 6.06, 6.06); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.528 mW/g

head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

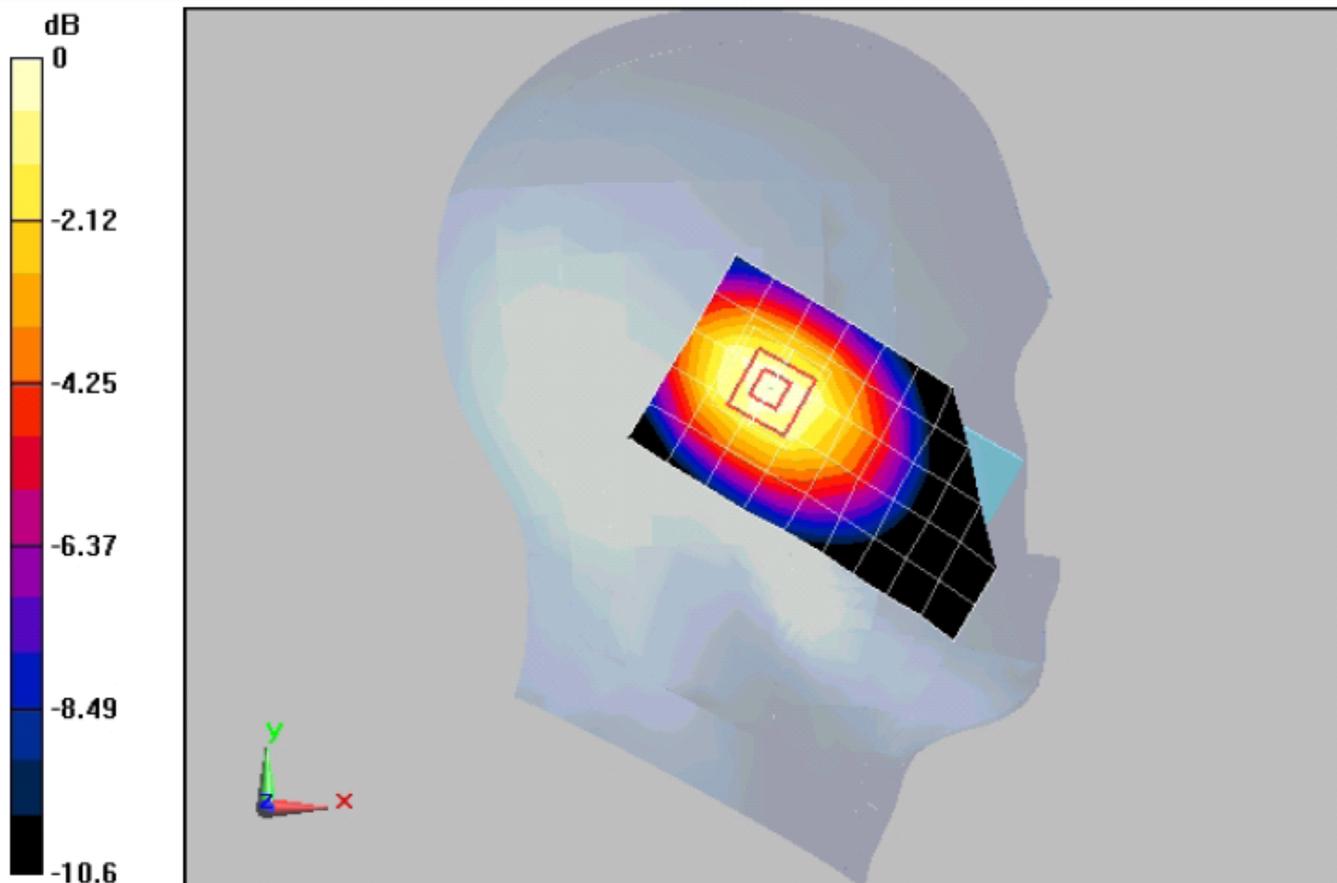
Reference Value = 22.6 V/m; Power Drift = 0.052 dB

Peak SAR (extrapolated) = 0.681 W/kg

SAR(1 g) = 0.507 mW/g; SAR(10 g) = 0.350 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.545 mW/g



0 dB = 0.545mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : 15 mm

ambient temperature: 23.0°C; liquid temperature: 22.2°C

Date/Time: 2010-08-01 00:45:21

P1528_OET65_EN62209-RightHandSide touched - WCDMA 850**DUT: HUAWEI U1000-5/U1000-5**

Communication System: WCDMA850; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 0.937$ mho/m; $\epsilon_r = 41.1$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(6.06, 6.06, 6.06); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.812 mW/g

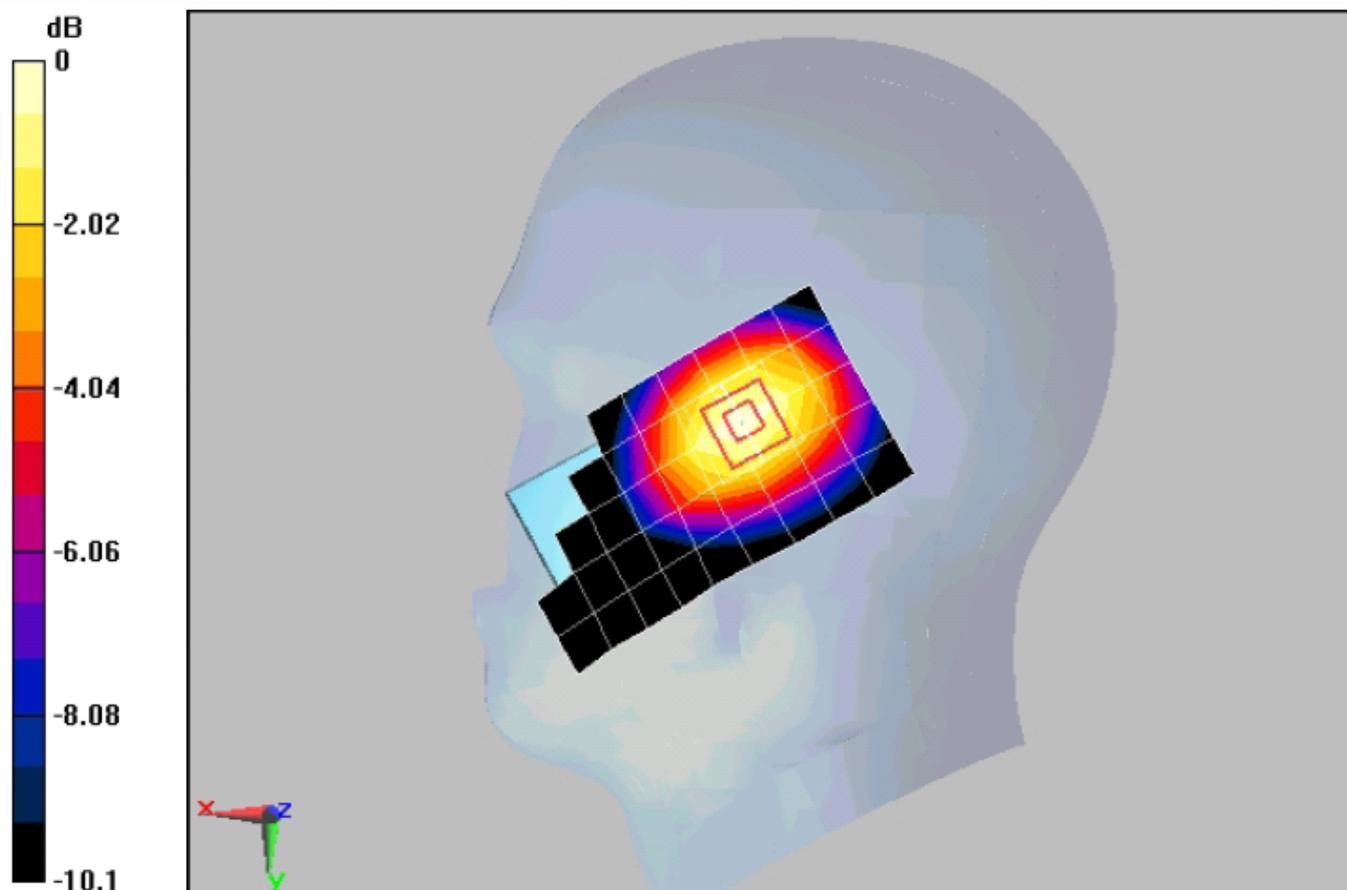
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.5 V/m; Power Drift = 0.048 dB

Peak SAR (extrapolated) = 1.01 W/kg

SAR(1 g) = 0.771 mW/g; SAR(10 g) = 0.535 mW/g[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.833 mW/g

**Additional information:**

position or distance of DUT to SAM (if not standard head positions) : 15 mm

ambient temperature: 23.0°C; liquid temperature: 22.2°C

P1528_OET65_EN62209-RightHandSide touched - WCDMA 850**DUT: HUAWEI U1000-5/U1000-5**

Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.937$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(6.06, 6.06, 6.06); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.929 mW/g

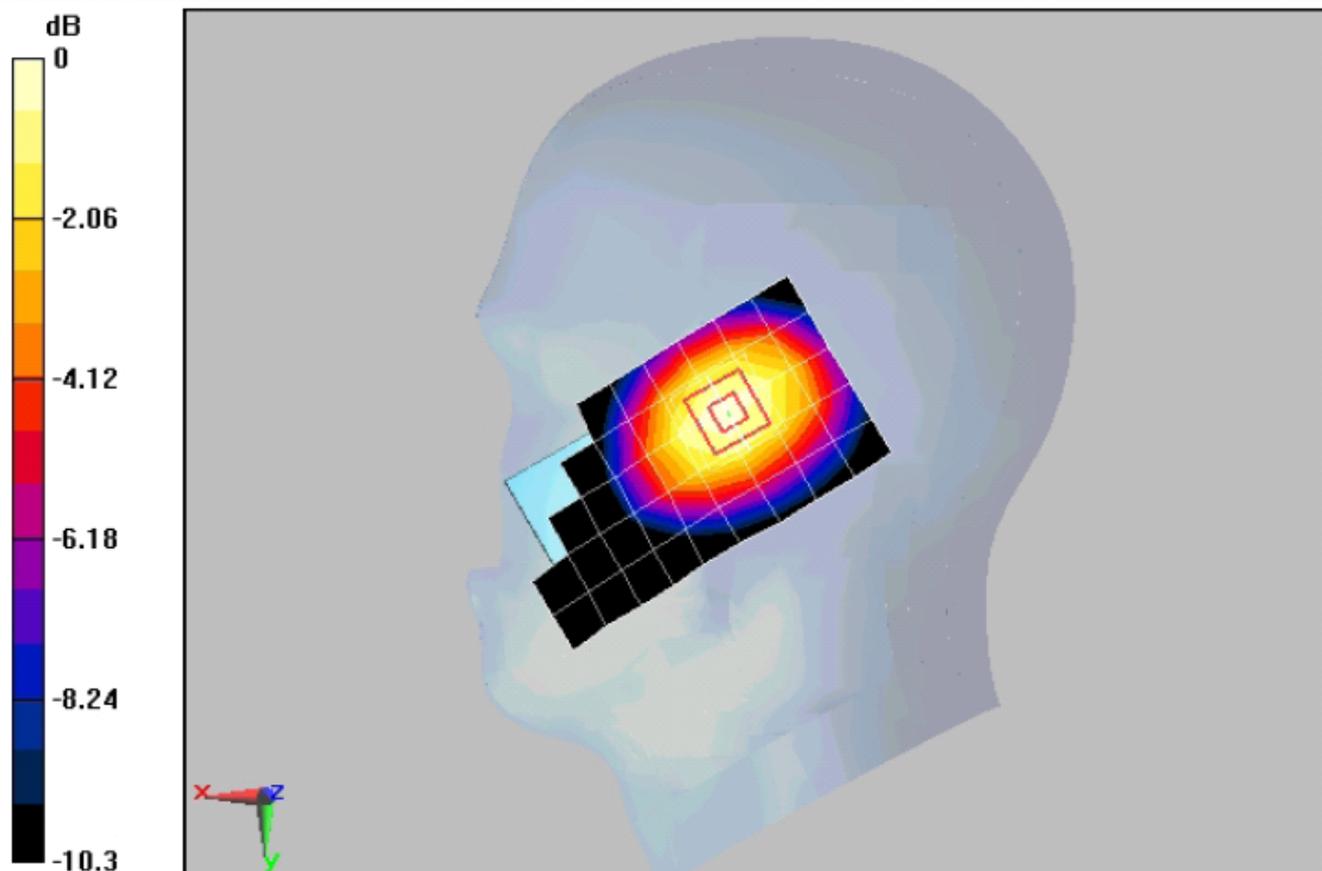
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25 V/m; Power Drift = 0.012 dB

Peak SAR (extrapolated) = 1.13 W/kg

SAR(1 g) = 0.867 mW/g; SAR(10 g) = 0.605 mW/g[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.930 mW/g



0 dB = 0.930mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) :

ambient temperature: 23.0°C; liquid temperature: 22.2°C

P1528_OET65_EN62209-RightHandSide tilted 15°- WCDMA 850**DUT: HUAWEI U1000-5/U1000-5**

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.937$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(6.06, 6.06, 6.06); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mmInfo: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.528 mW/g

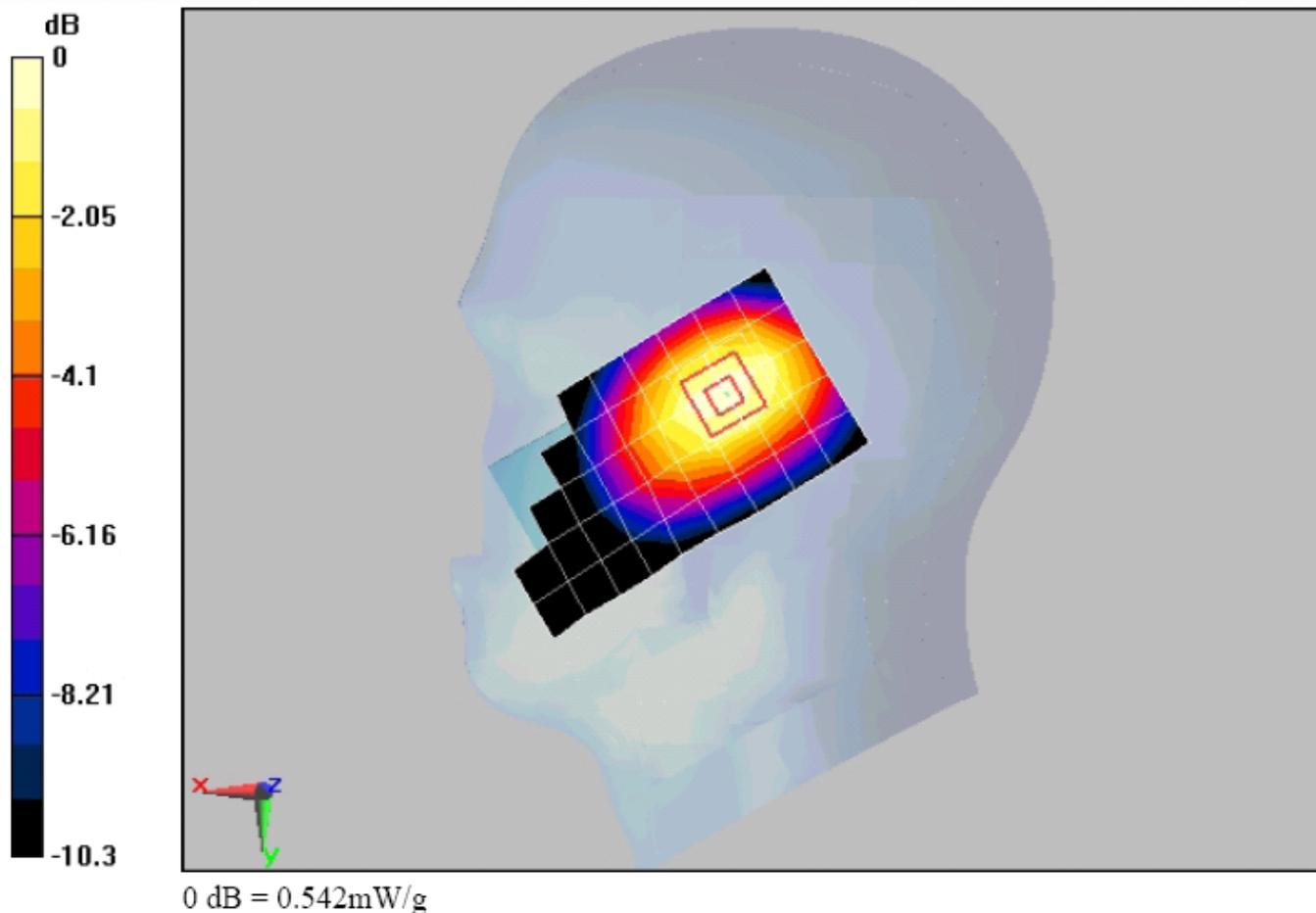
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.4 V/m; Power Drift = -0.055 dB

Peak SAR (extrapolated) = 0.661 W/kg

SAR(1 g) = 0.511 mW/g; SAR(10 g) = 0.360 mW/gInfo: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.542 mW/g

**Additional information:**

position or distance of DUT to SAM (if not standard head positions) :

ambient temperature: 23.0°C; liquid temperature: 22.2°C

P1528_OET65_EN62209-RightHandSide touched - WCDMA 850

DUT: HUAWEI U1000-5/U1000-5

Communication System: WCDMA850; Frequency: 846.6 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 846.6$ MHz; $\sigma = 0.94$ mho/m; $\epsilon_r = 41.1$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(6.06, 6.06, 6.06); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.11 mW/g

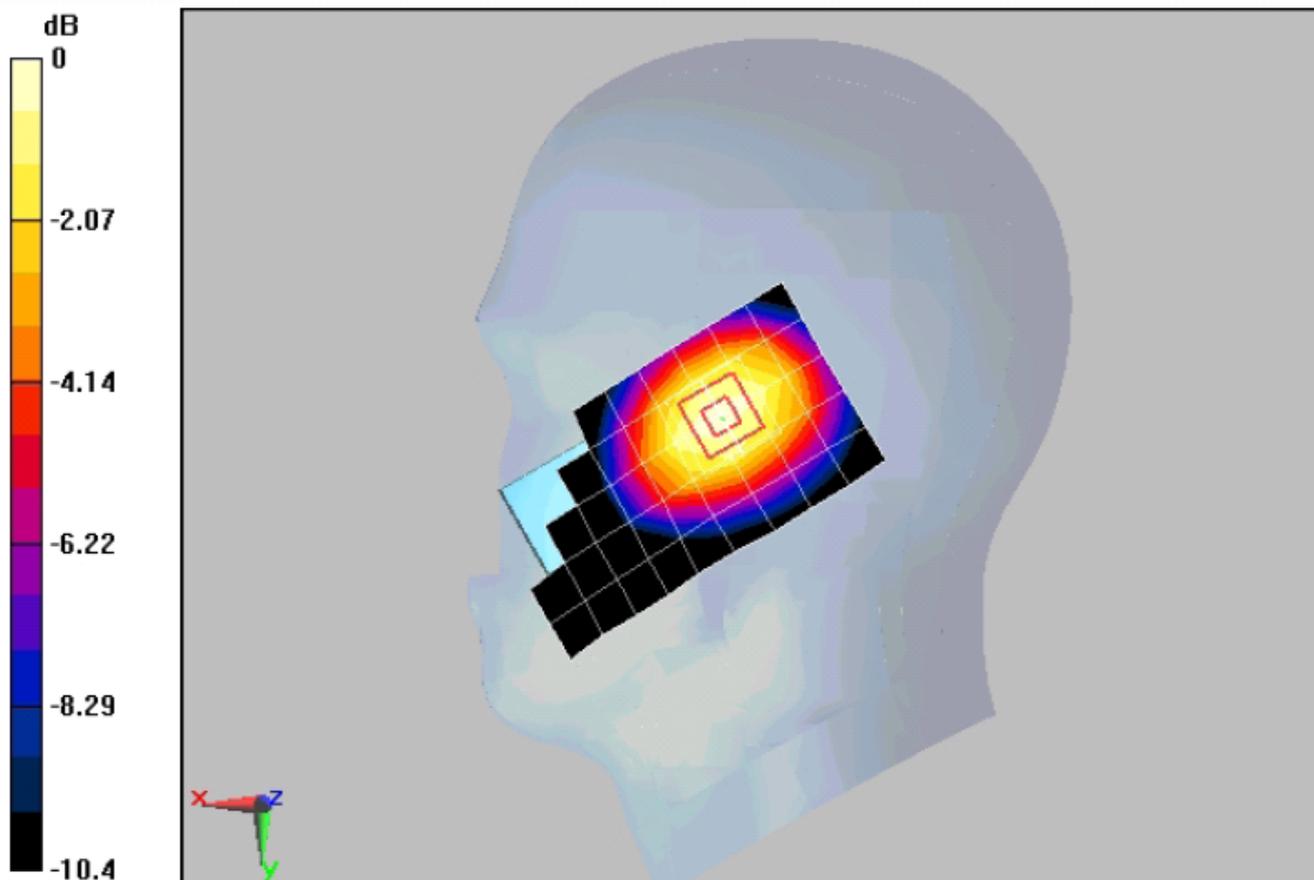
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26.9 V/m; Power Drift = -0.065 dB

Peak SAR (extrapolated) = 1.35 W/kg

SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.726 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)



0 dB = 1.11mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) :

ambient temperature: 23.0°C; liquid temperature: 22.2°C

P1528_OET65_EN62209-LeftHandSide touched - WCDMA 850**DUT: HUAWEI U1000-5/U1000-5**

Communication System: WCDMA850; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 846.6$ MHz; $\sigma = 0.916$ mho/m; $\epsilon_r = 42.6$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(6.06, 6.06, 6.06); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.01 mW/g

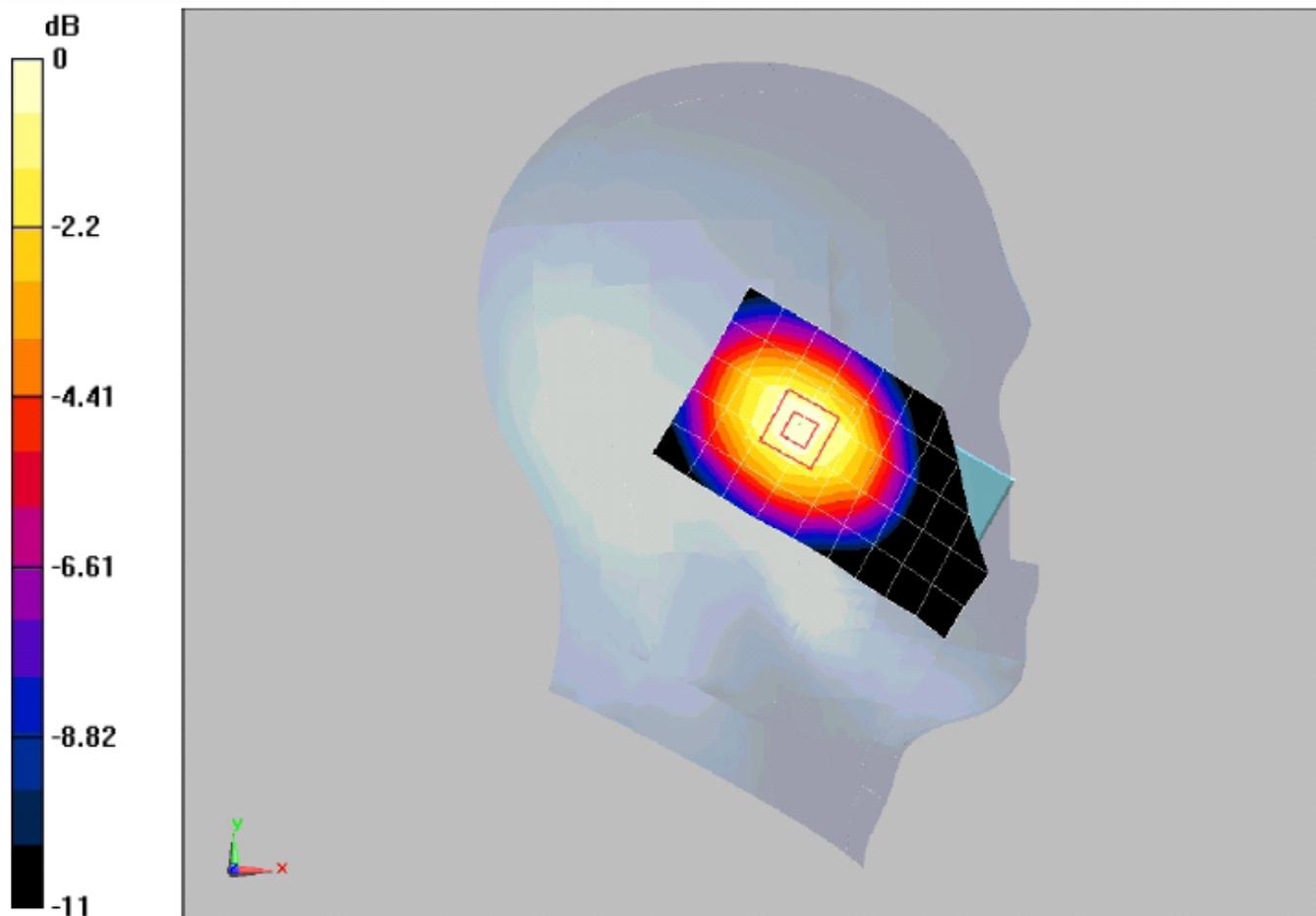
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27 V/m; Power Drift = -0.181 dB

Peak SAR (extrapolated) = 1.33 W/kg

SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.699 mW/g[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.07 mW/g



0 dB = 1.07mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) :

ambient temperature: 23.0°C; liquid temperature: 22.2°C

P1528_OET65_EN62209-LeftHandSide touched - WCDMA 850

DUT: HUAWEI U1000-5/U1000-5

Communication System: WCDMA850; Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 0.887$ mho/m; $\epsilon_r = 42.7$; $\rho = 1000$ kg/m³
Phantom section: Left Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(6.06, 6.06, 6.06); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.718 mW/g

head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

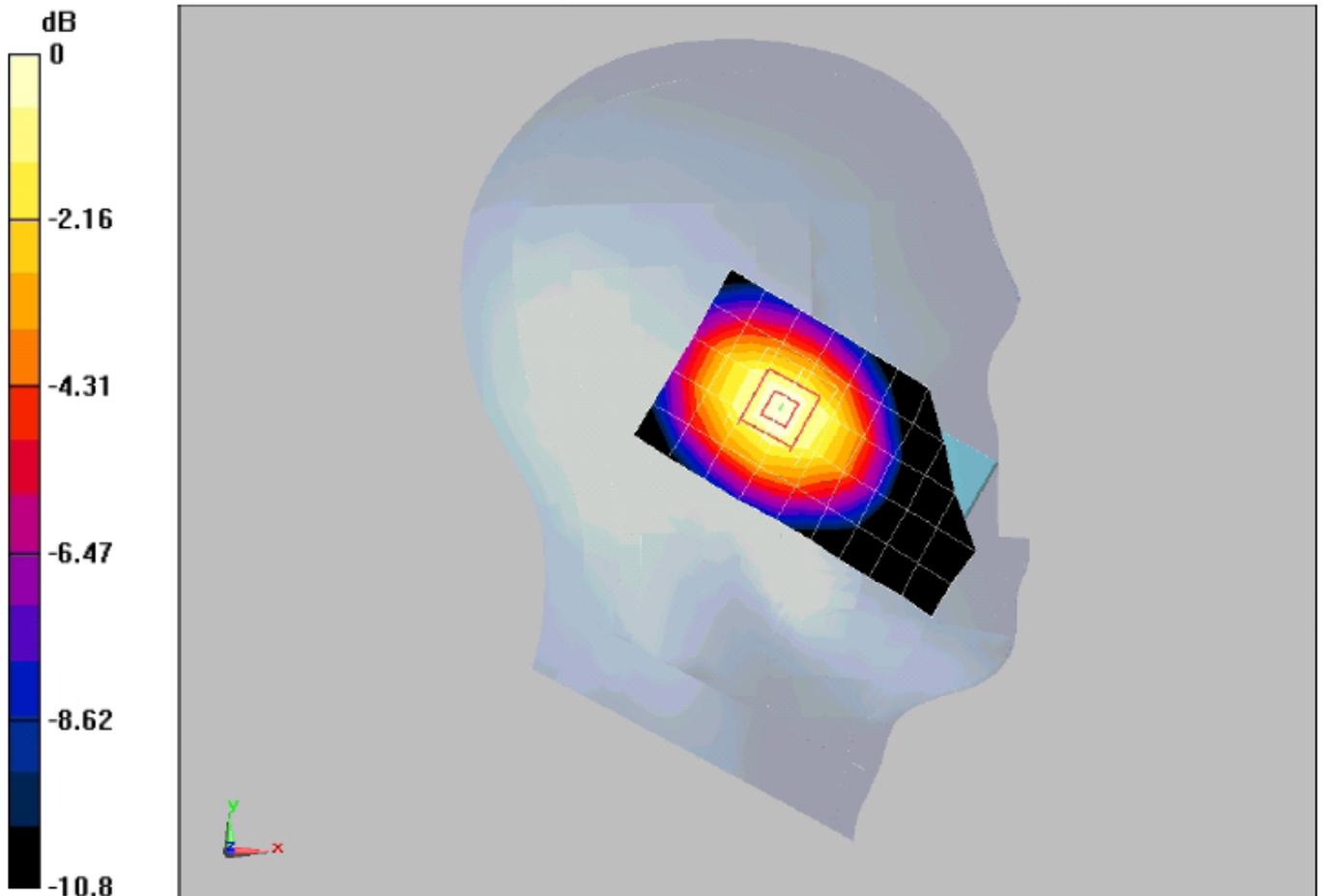
Reference Value = 23.5 V/m; Power Drift = -0.062 dB

Peak SAR (extrapolated) = 0.967 W/kg

SAR(1 g) = 0.730 mW/g; SAR(10 g) = 0.506 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.781 mW/g



0 dB = 0.781mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) :

ambient temperature: 23.0°C; liquid temperature: 22.2°C

Annex 2.2 WCDMA 850MHz body

Date/Time: 2010-07-30 22:55:47

P1528_OET65_EN62209- WCDMA 850 towards phantom

DUT: HUAWEI U1000-5/U1000-5

Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.97, 5.97, 5.97); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.380 mW/g

body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

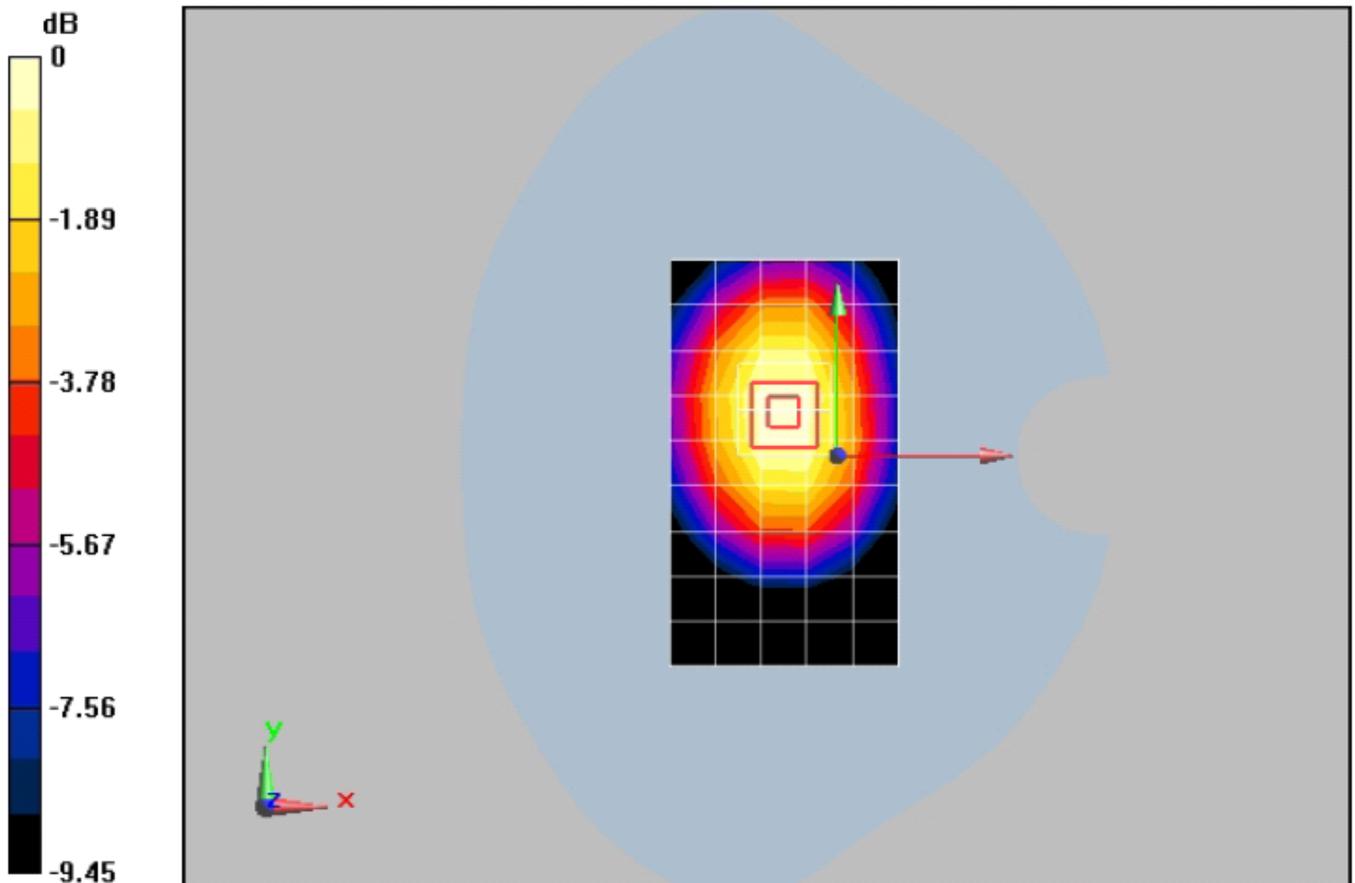
Reference Value = 19.5 V/m; Power Drift = 0.043 dB

Peak SAR (extrapolated) = 0.506 W/kg

SAR(1 g) = 0.389 mW/g; SAR(10 g) = 0.279 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.414 mW/g



0 dB = 0.414mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : 15 mm

ambient temperature: 23.0°C; liquid temperature: 22.2°C

P1528_OET65_EN62209- WCDMA 850 towards ground**DUT: HUAWEI U1000-5/U1000-5**

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.97, 5.97, 5.97); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.712 mW/g

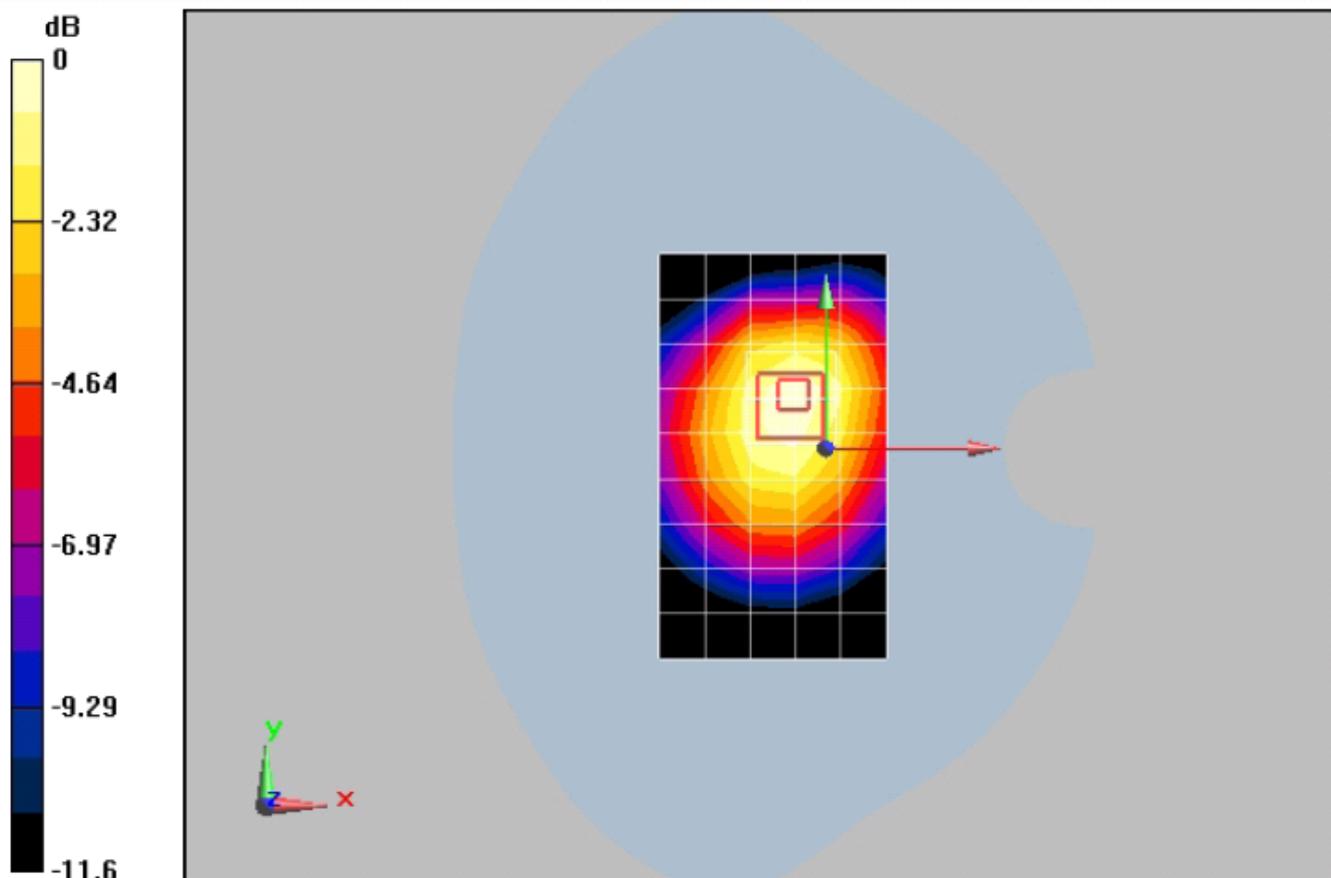
body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.1 V/m; Power Drift = -0.00348 dB

Peak SAR (extrapolated) = 0.915 W/kg

SAR(1 g) = 0.672 mW/g; SAR(10 g) = 0.471 mW/g[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.715 mW/g



0 dB = 0.715mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : 15 mm

ambient temperature: 23.0°C; liquid temperature: 22.2°C

P1528_OET65_EN62209- WCDMA 850 towards ground

DUT: HUAWEI U1000-5/U1000-5

Communication System: WCDMA850; Frequency: 846.6 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 846.6$ MHz; $\sigma = 1.02$ mho/m; $\epsilon_r = 55.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.97, 5.97, 5.97); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.718 mW/g

body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

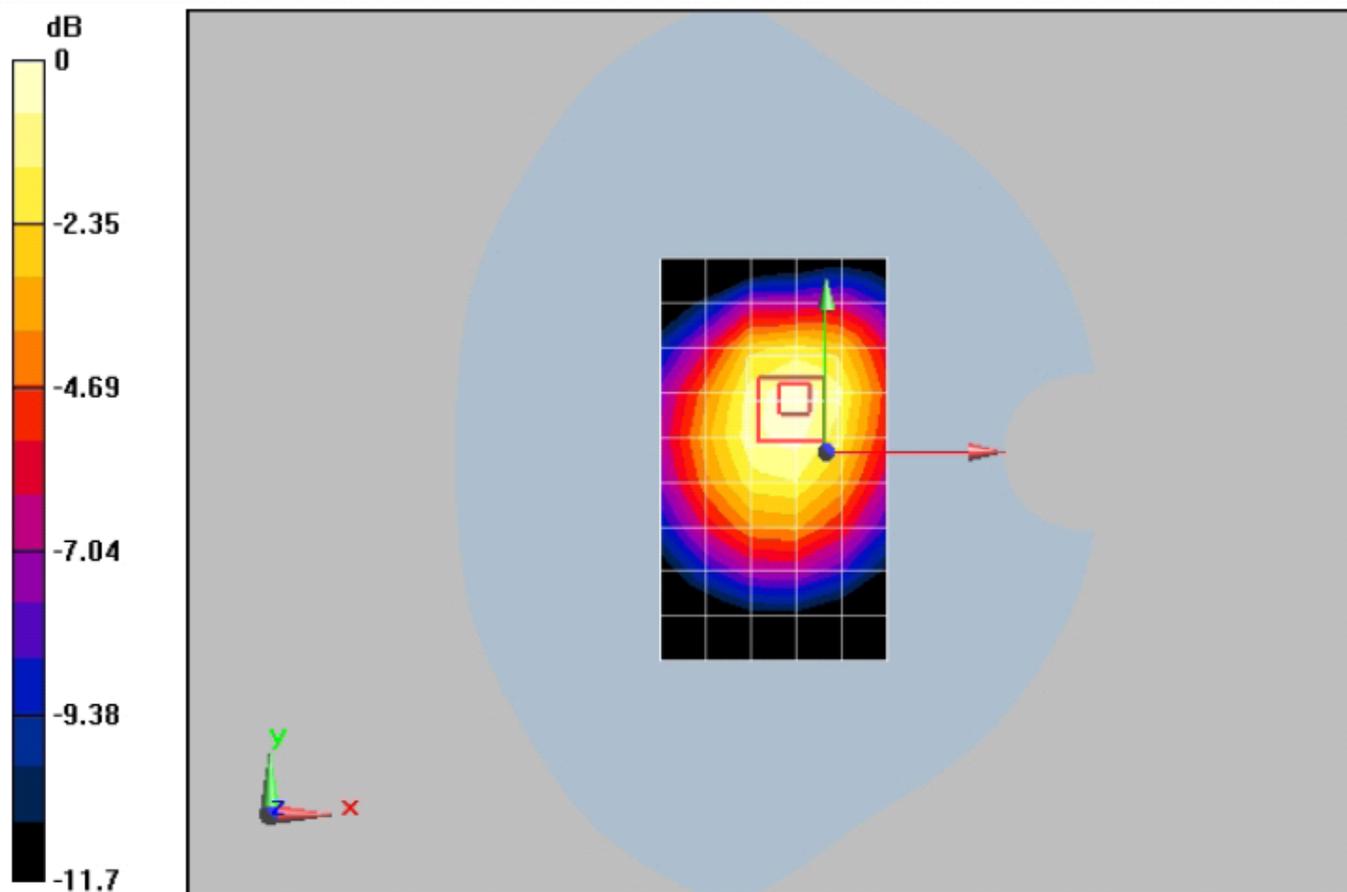
Reference Value = 25.2 V/m; Power Drift = -0.055 dB

Peak SAR (extrapolated) = 0.931 W/kg

SAR(1 g) = 0.681 mW/g; SAR(10 g) = 0.476 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.726 mW/g



0 dB = 0.726mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : 15 mm

ambient temperature: 23.0°C; liquid temperature: 22.2°C

Date/Time: 2010-07-31 03:55:52

P1528_OET65_EN62209- WCDMA 850 towards ground

DUT: HUAWEI U1000-5/U1000-5

Communication System: WCDMA850; Frequency: 826.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.97, 5.97, 5.97); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.870 mW/g

body/Zoom Scan (6x6x6)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=8mm

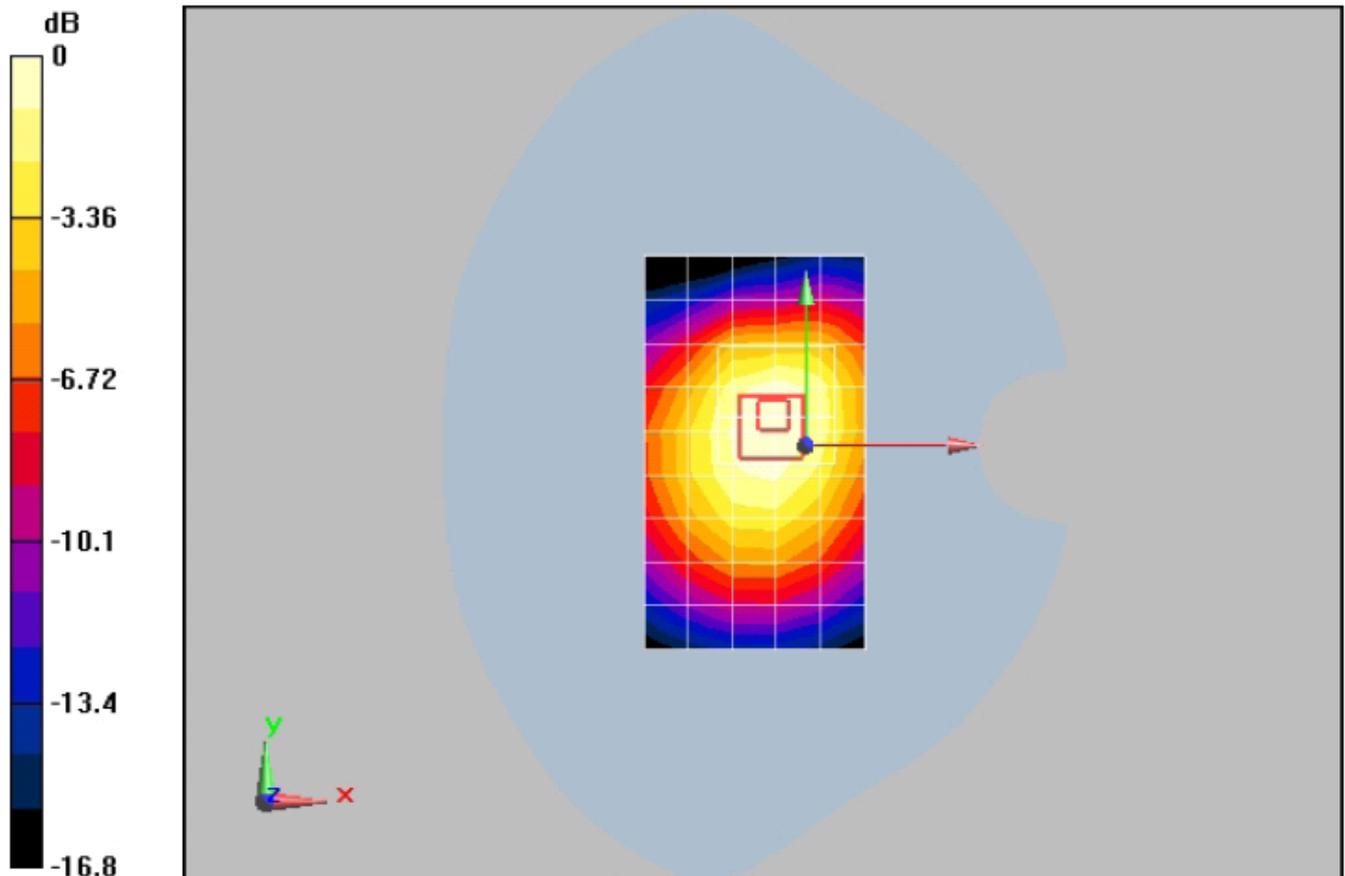
Reference Value = 29 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 1.16 W/kg

SAR(1 g) = 0.836 mW/g; SAR(10 g) = 0.585 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.878 mW/g



0 dB = 0.878mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : 15 mm

ambient temperature: 23.0°C; liquid temperature: 22.2°C

P1528_OET65_EN62209- WCDMA 850 towards ground with Headset

DUT: HUAWEI U1000-5/U1000-5

Communication System: WCDMA850; Frequency: 826.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.97, 5.97, 5.97); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.488 mW/g

body/Zoom Scan (6x6x6)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=8mm

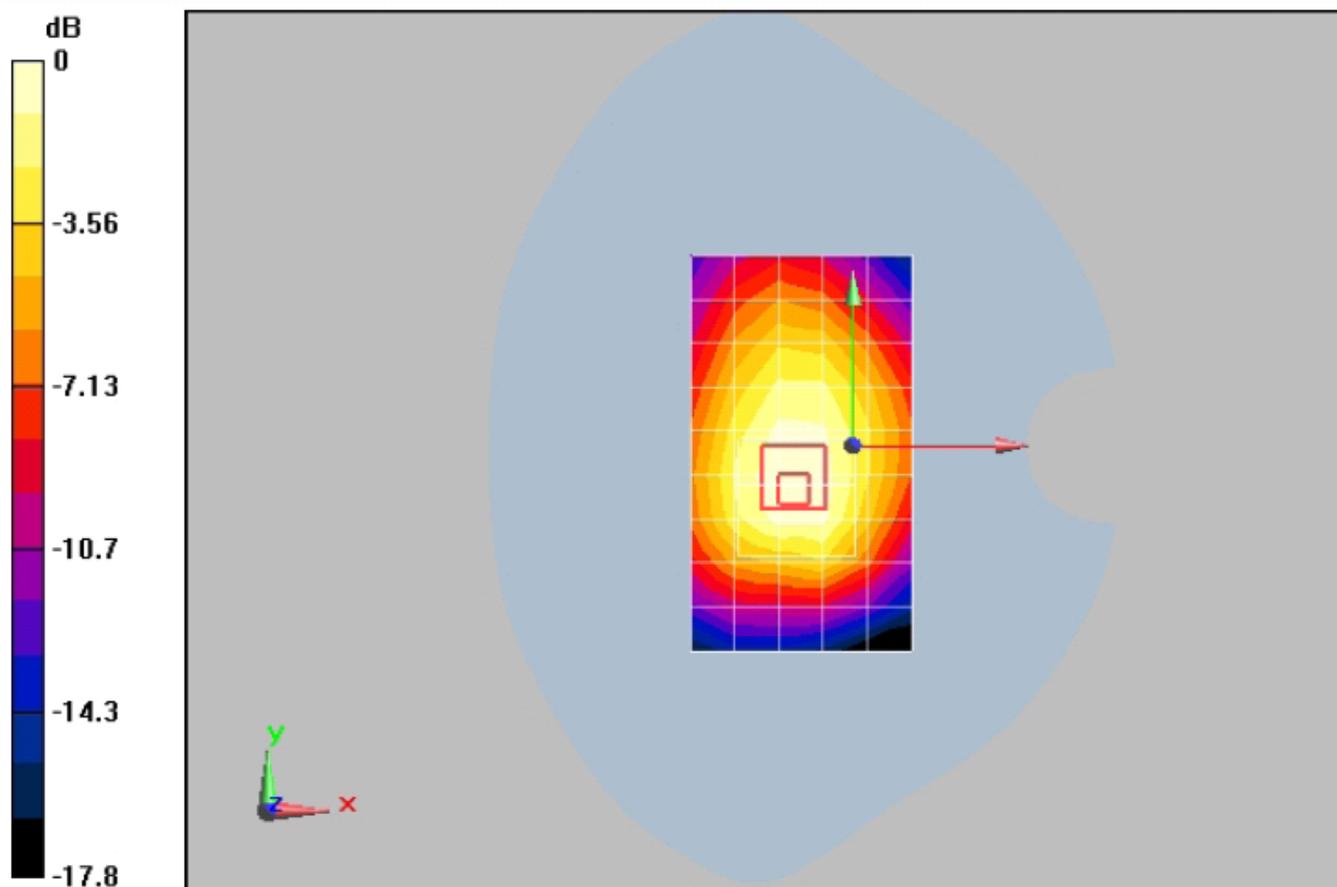
Reference Value = 21.7 V/m; Power Drift = 0.072 dB

Peak SAR (extrapolated) = 0.676 W/kg

SAR(1 g) = 0.481 mW/g; SAR(10 g) = 0.335 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.505 mW/g



0 dB = 0.505mW/g

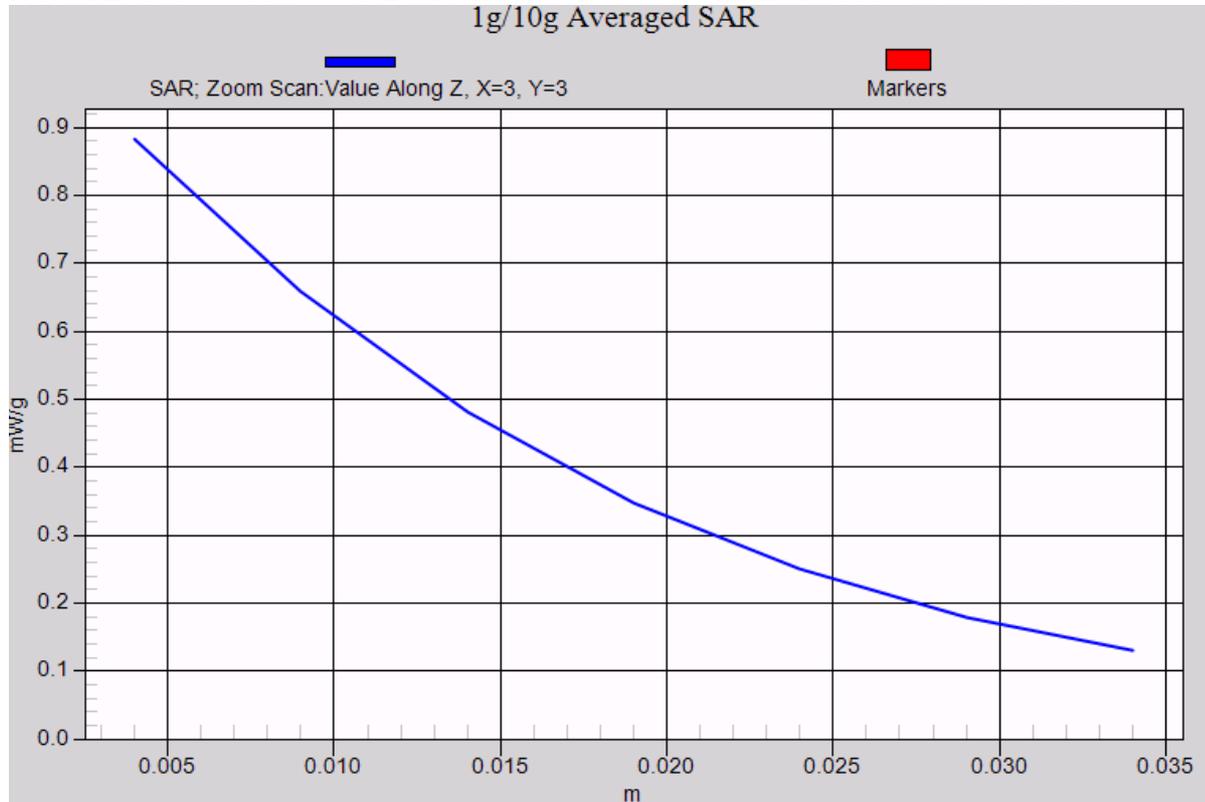
Additional information:

position or distance of DUT to SAM (if not standard head positions) : 15 mm

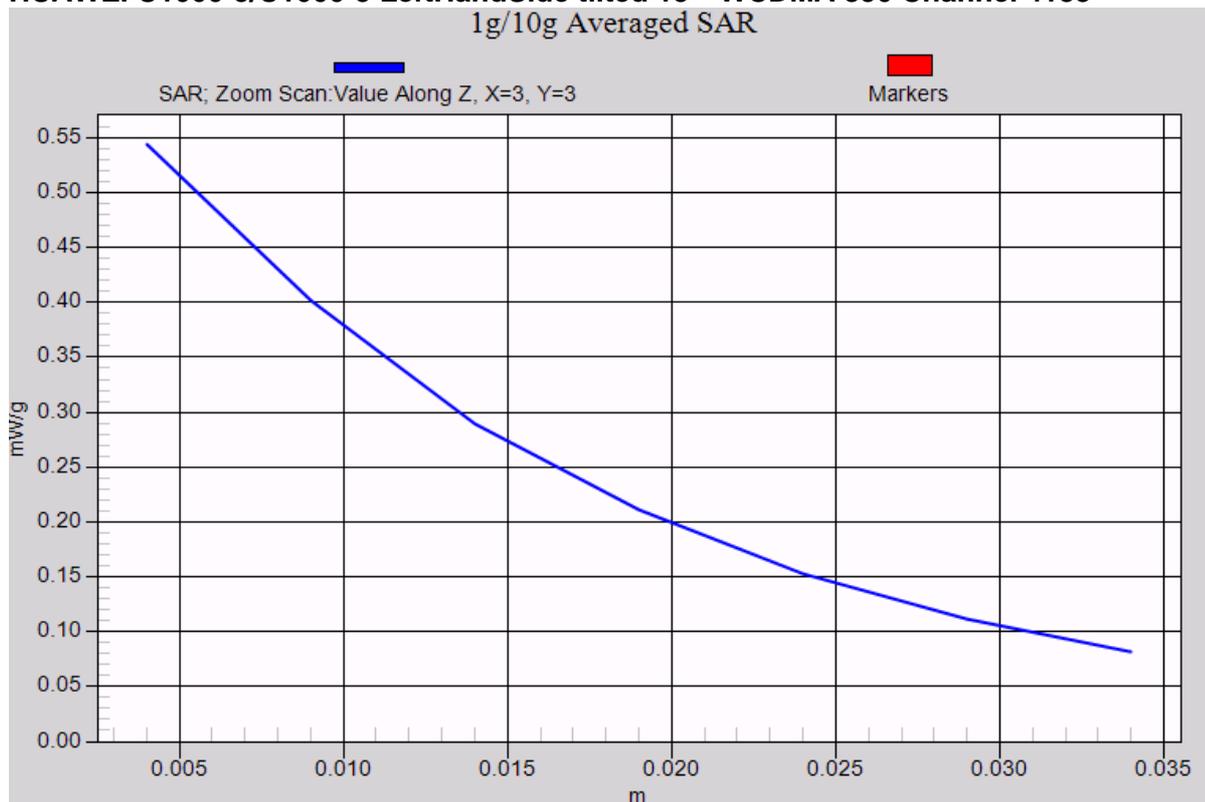
ambient temperature: 23.0°C; liquid temperature: 22.2°C

Annex 2.3 Z-axis scans
WCDMA 850 head:

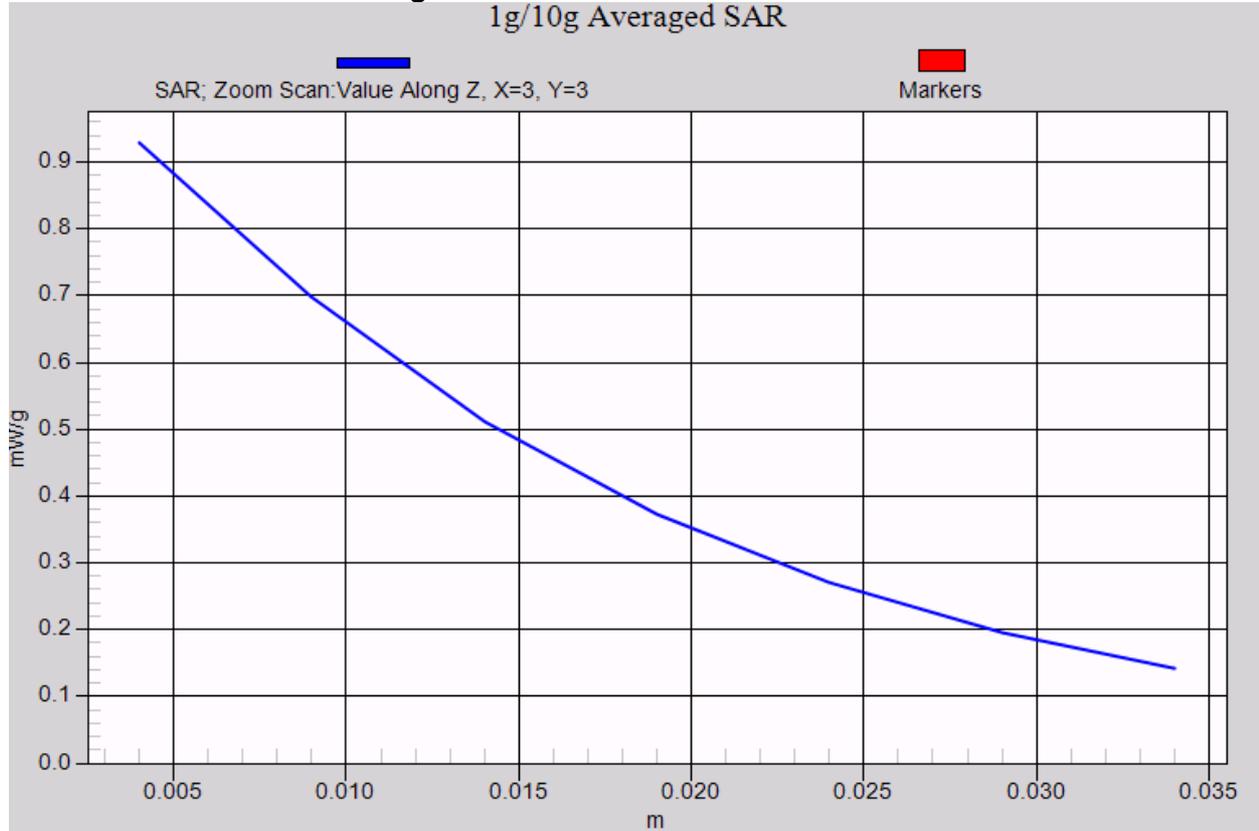
HUAWEI U1000-5/U1000-5 LeftHandSide touched- WCDMA 850 Channel 4183



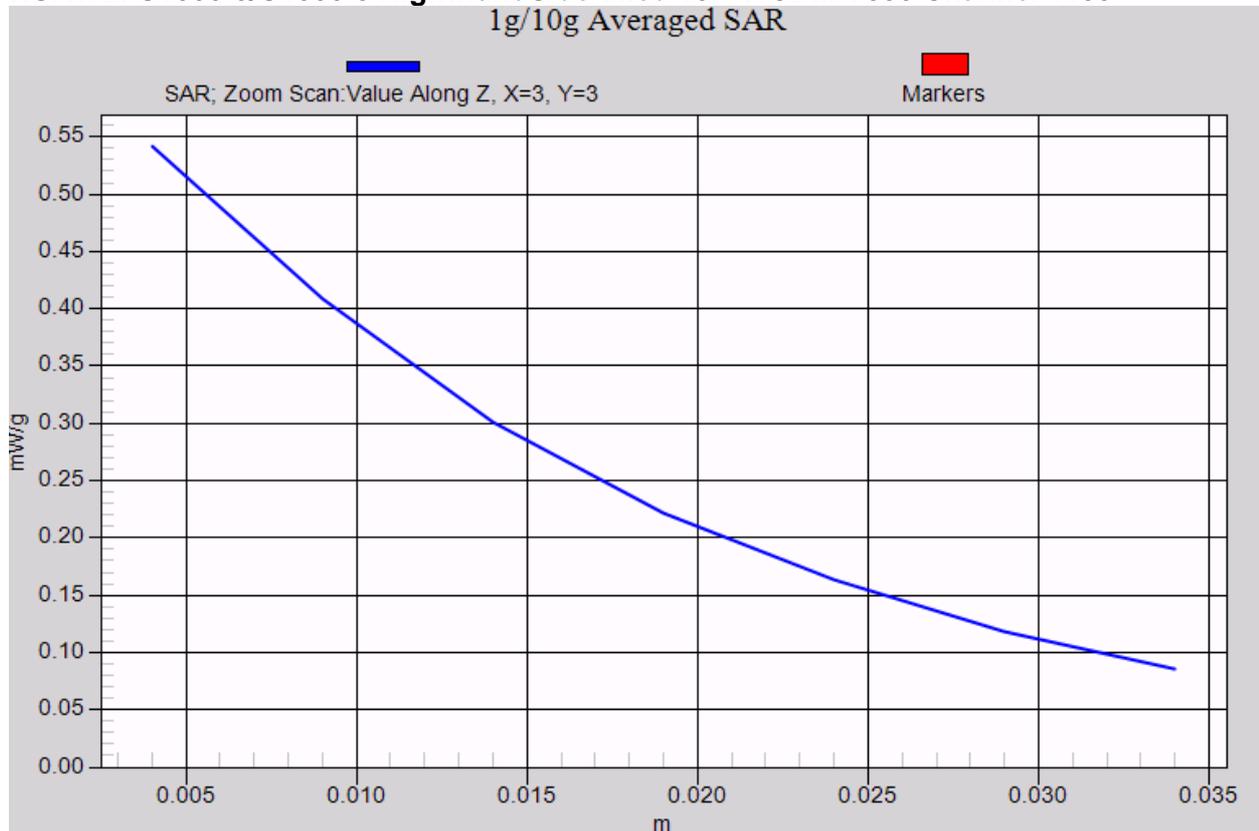
HUAWEI U1000-5/U1000-5 LeftHandSide tilted 15°- WCDMA 850 Channel 4183



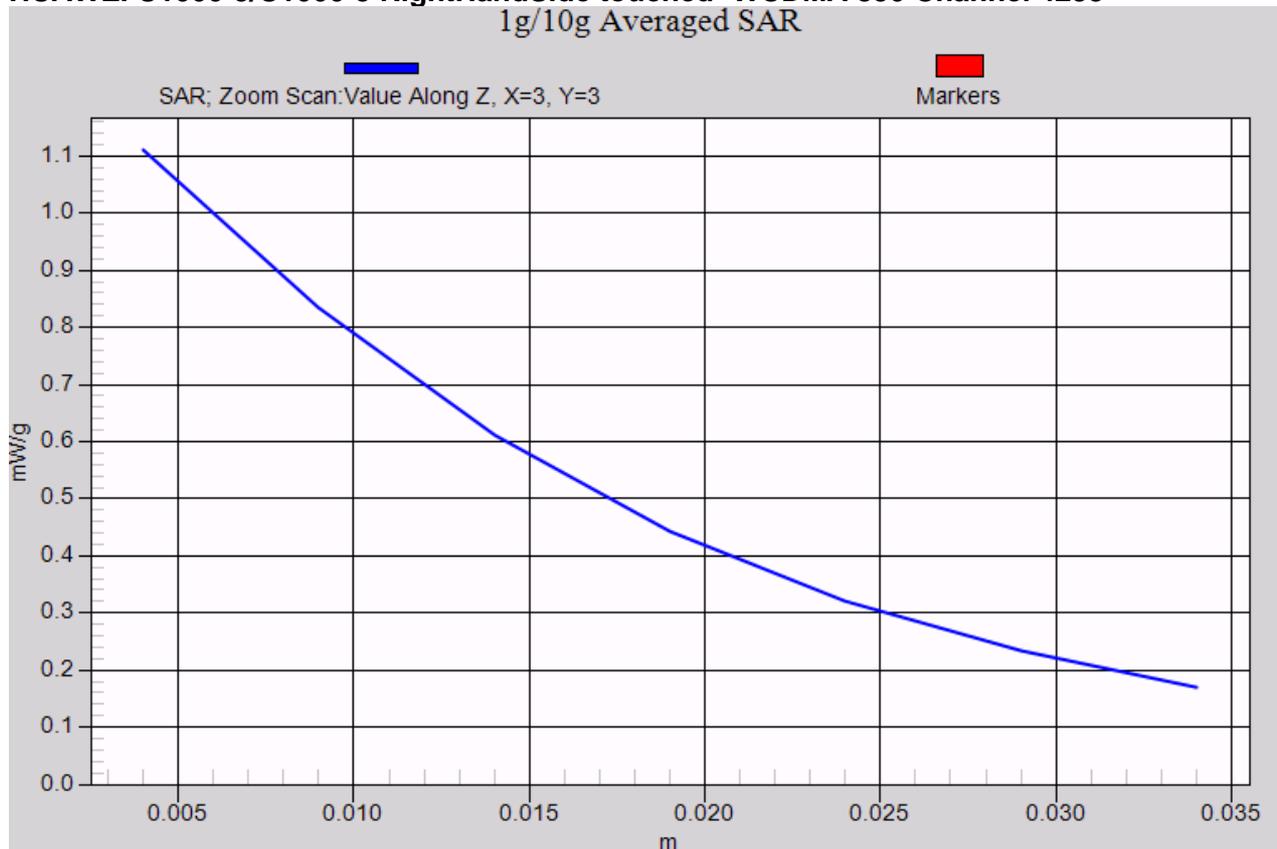
HUAWEI U1000-5/U1000-5 RightHandSide touched- WCDMA 850 Channel 4183



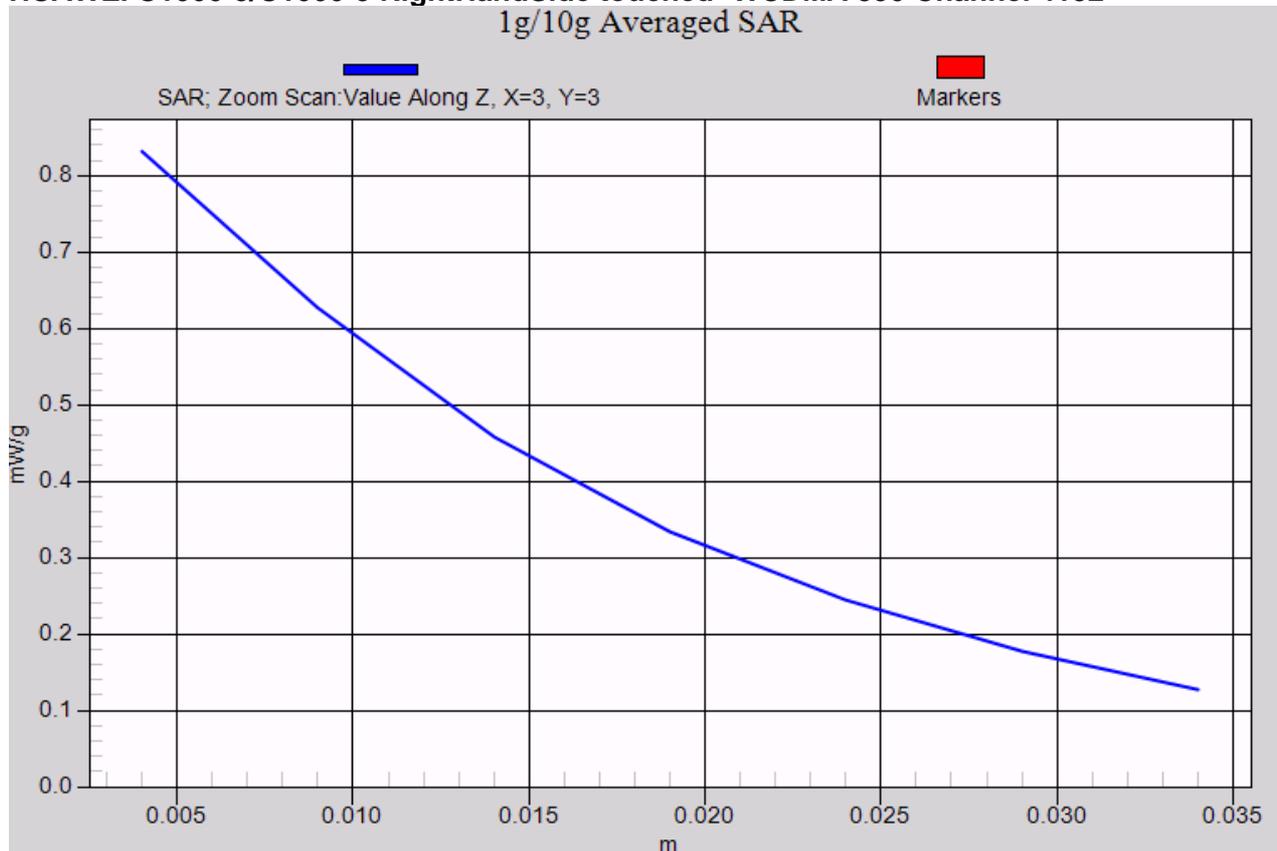
HUAWEI U1000-5/U1000-5 RightHandSide tilted 15°- WCDMA 850 Channel 4183



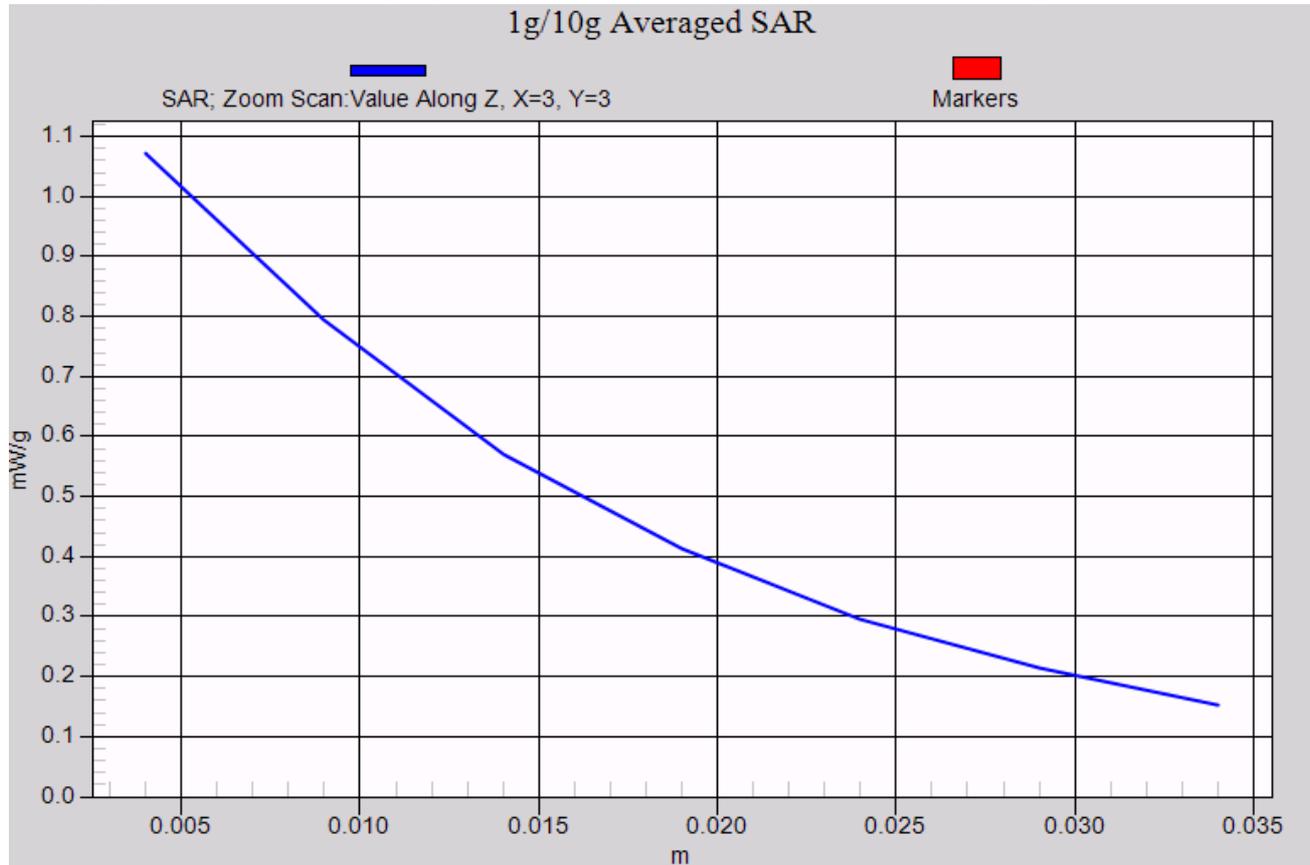
HUAWEI U1000-5/U1000-5 RightHandSide touched- WCDMA 850 Channel 4233



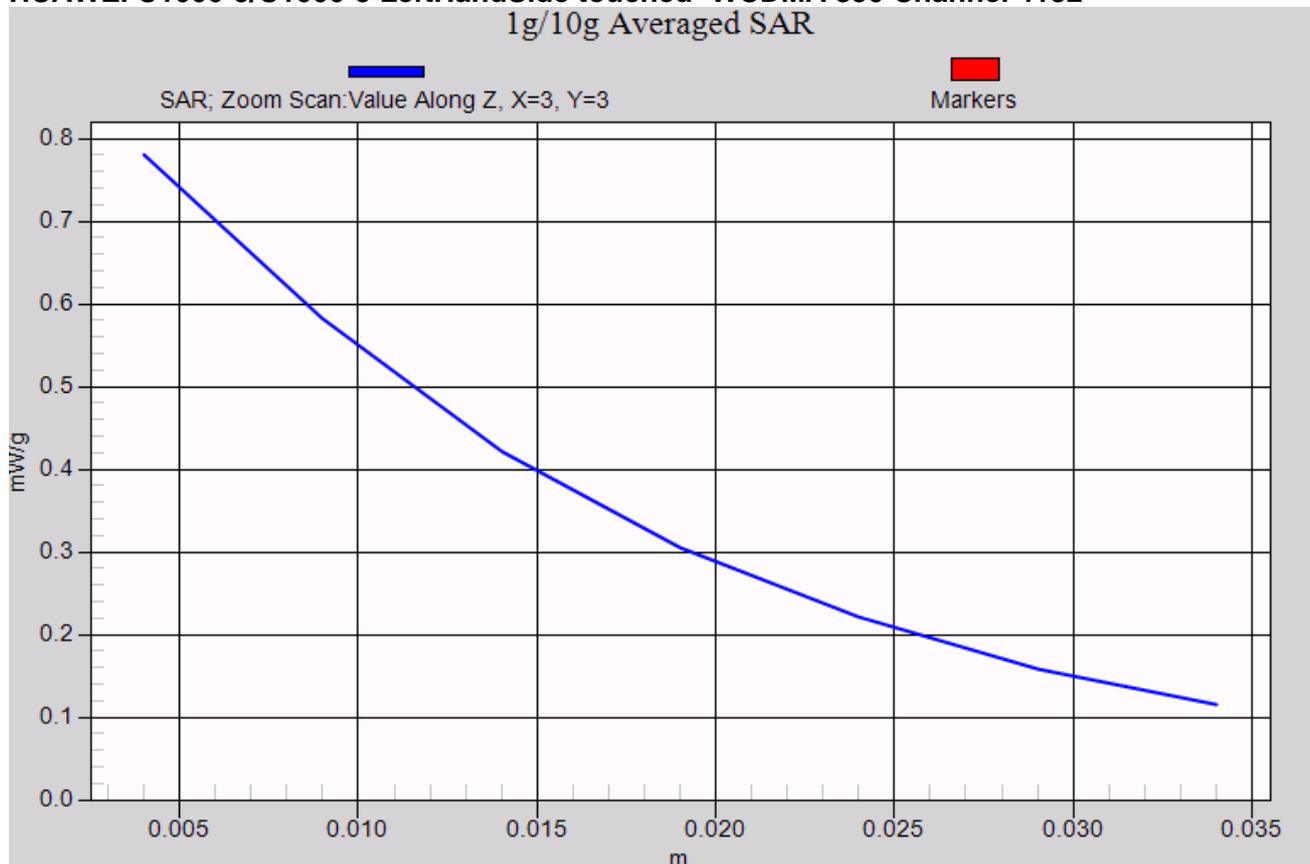
HUAWEI U1000-5/U1000-5 RightHandSide touched- WCDMA 850 Channel 4132



HUAWEI U1000-5/U1000-5 LeftHandSide touched- WCDMA 850 Channel 4233
1g/10g Averaged SAR

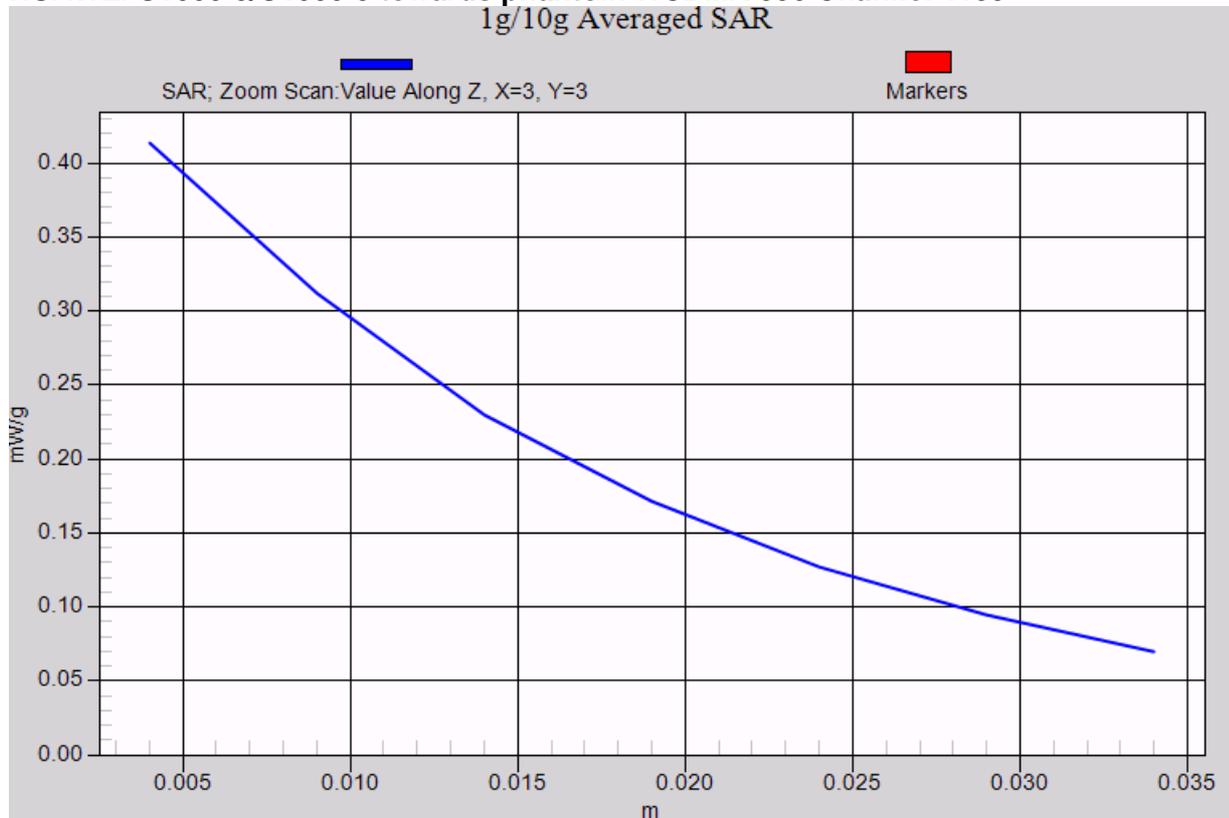


HUAWEI U1000-5/U1000-5 LeftHandSide touched- WCDMA 850 Channel 4132
1g/10g Averaged SAR

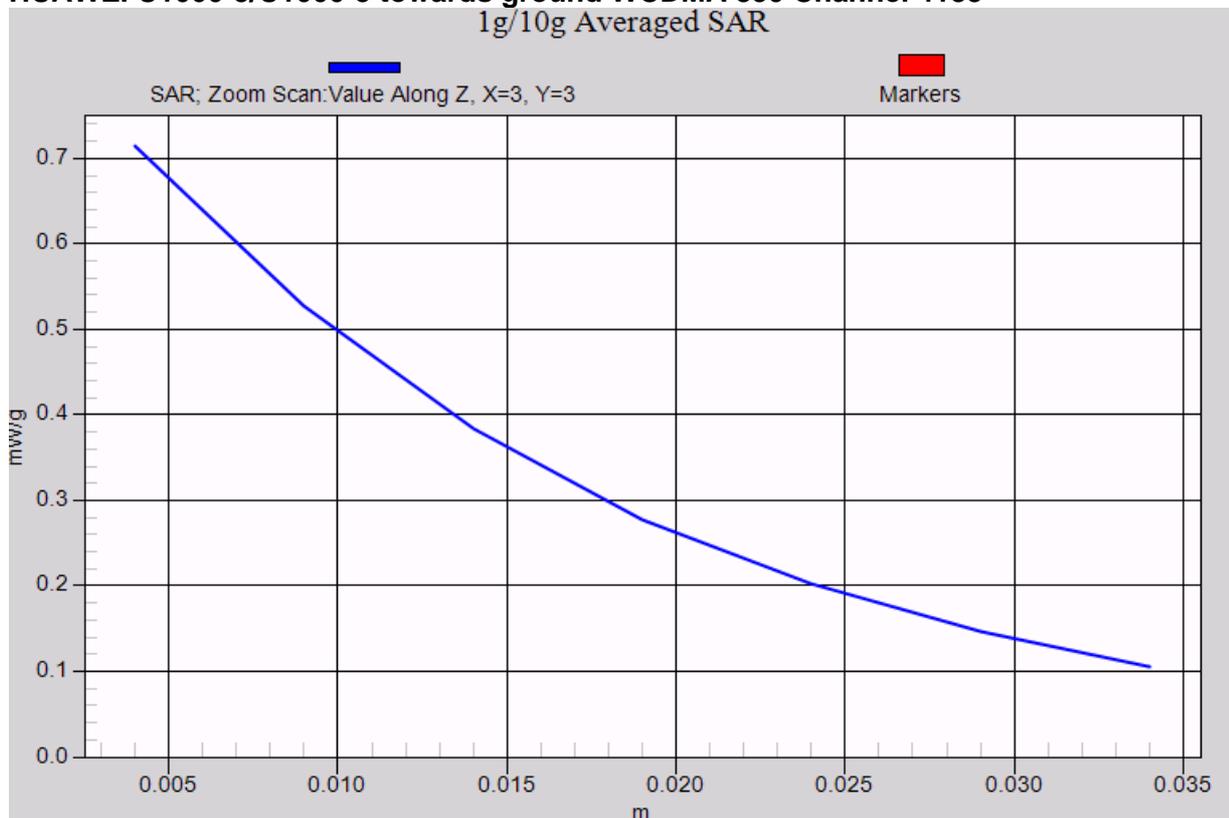


WCDMA 850 body:

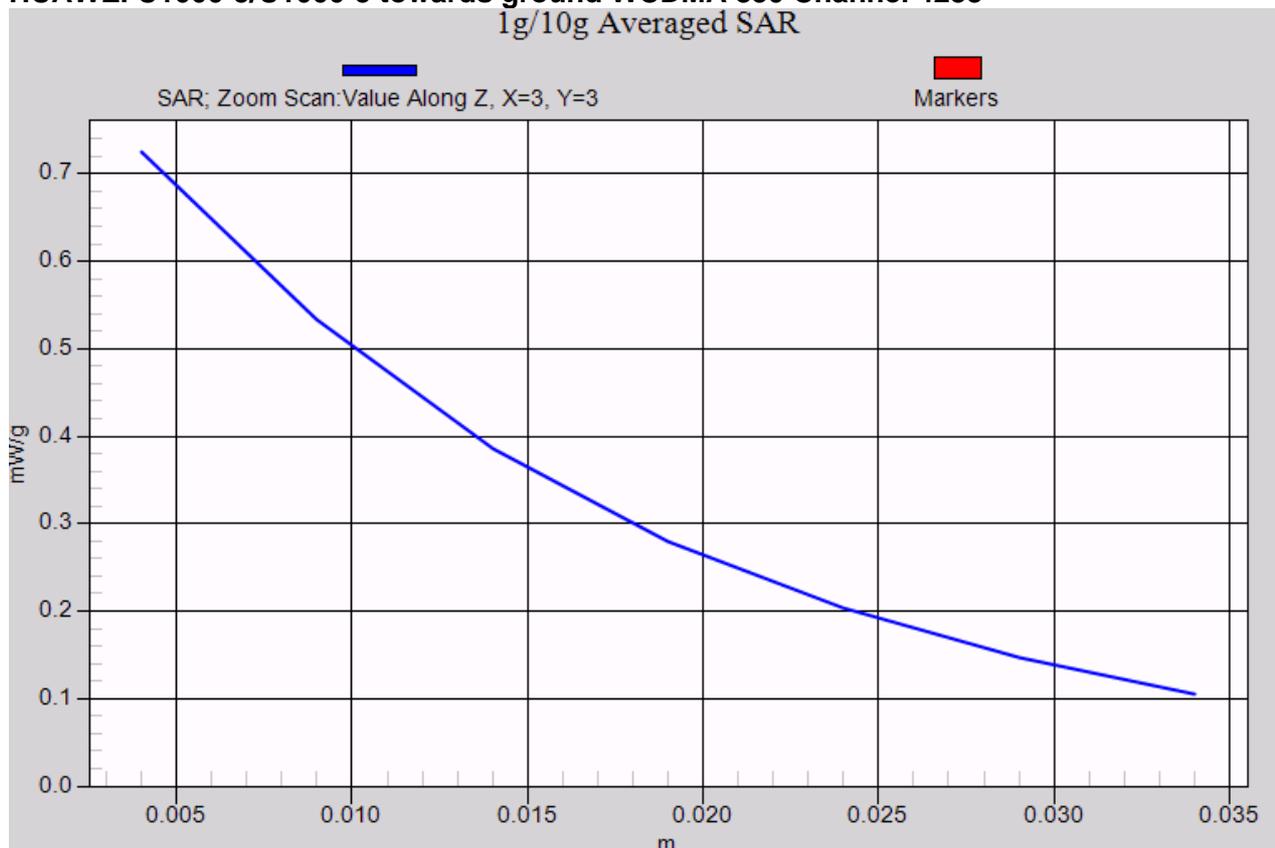
HUAWEI U1000-5/U1000-5 towards phantom WCDMA 850 Channel 4183



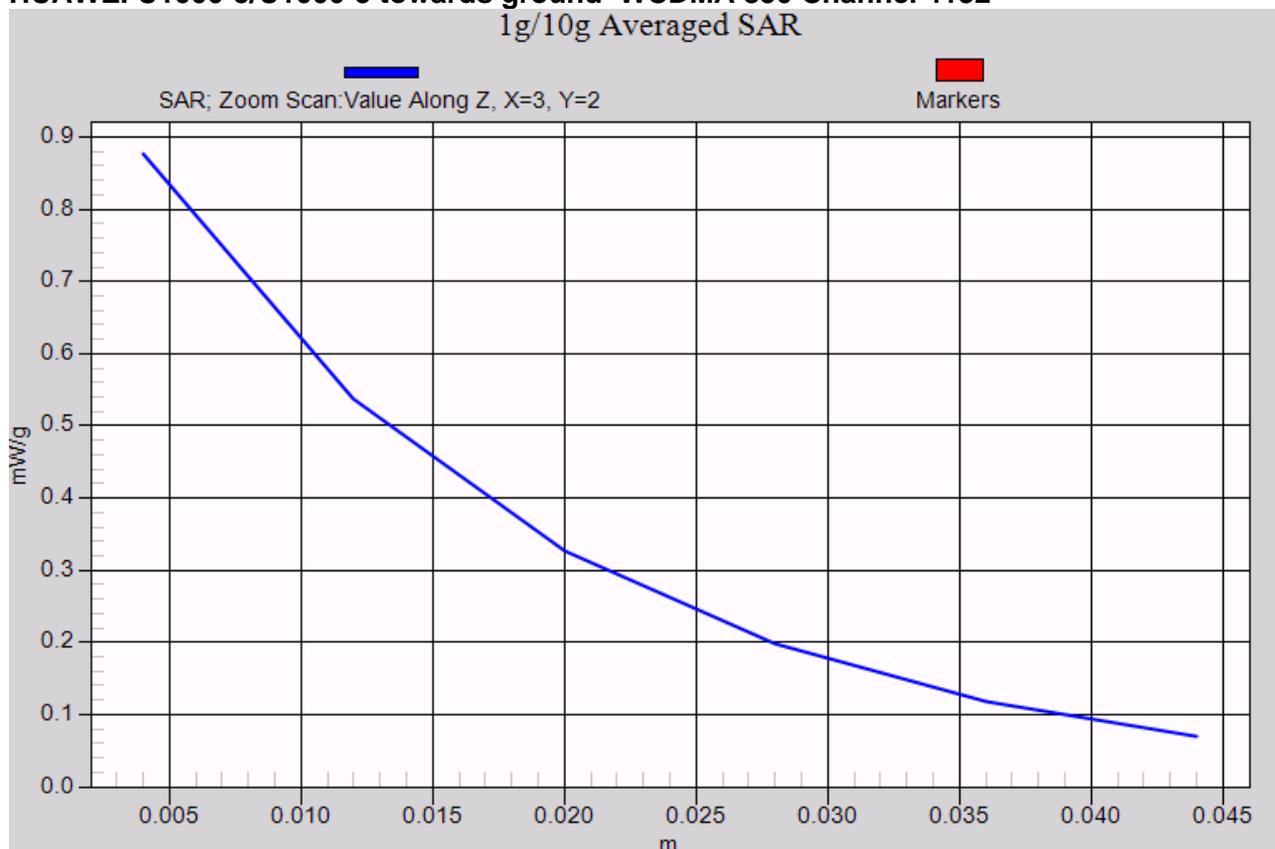
HUAWEI U1000-5/U1000-5 towards ground WCDMA 850 Channel 4183



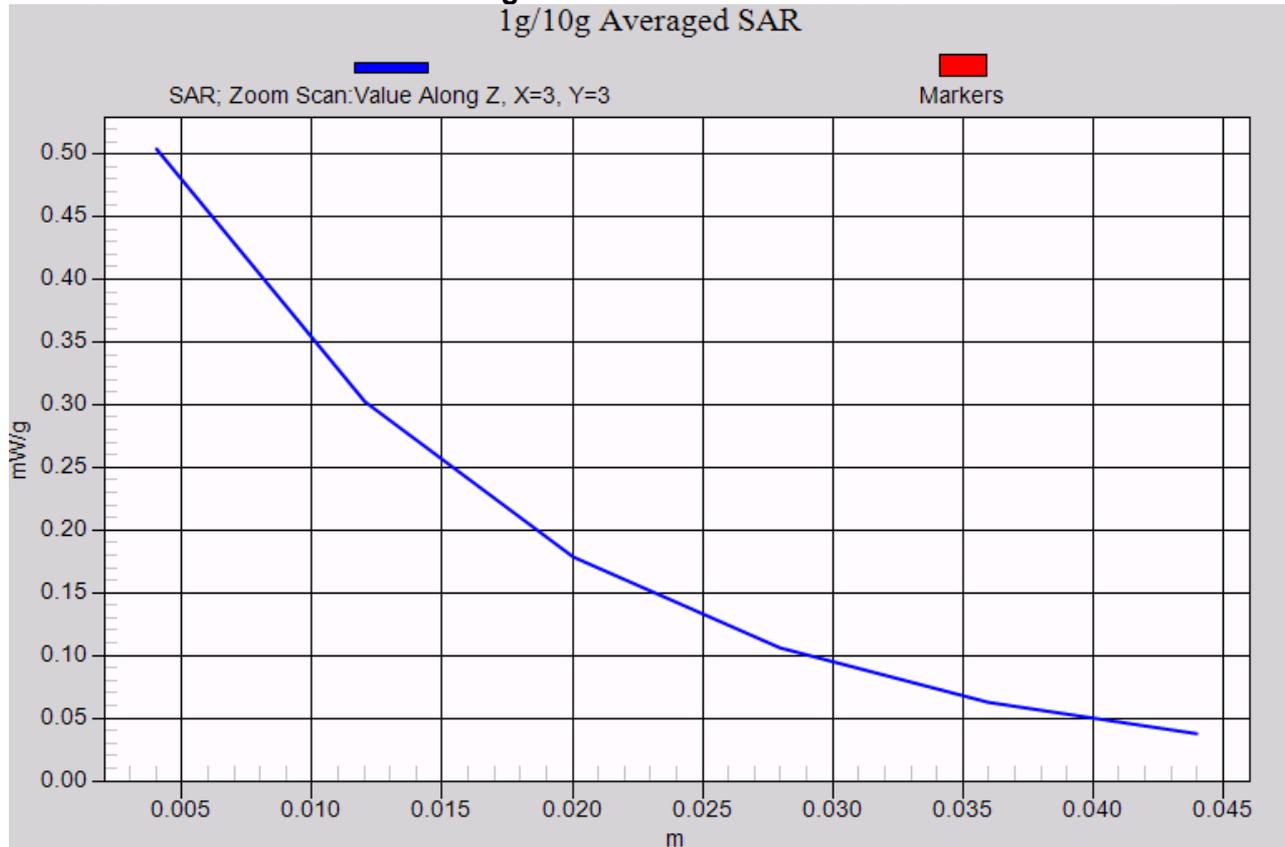
HUAWEI U1000-5/U1000-5 towards ground WCDMA 850 Channel 4233
1g/10g Averaged SAR



HUAWEI U1000-5/U1000-5 towards ground WCDMA 850 Channel 4132
1g/10g Averaged SAR



HUAWEI U1000-5/U1000-5 towards ground with headset WCDMA 850 Channel 4132
1g/10g Averaged SAR



Annex 3 Calibration parameters

Calibration parameters are described in the additional document:

**Appendix to test report no. SYBH(Z-SAR) 022072010
Calibration data, Phantom certificate
and detail information of the DASY5 System**

Annex 4 Photo documentation

Annex 4.1 Test Facility

Photo 1: Measurement System DASY5



Photo 2: Measurement System DASY5



Annex 4.2 Test Positions

Photo 3: HUAWEI U1000-5/U1000-5 front view



Photo 4: HUAWEI U1000-5/U1000-5 rear view



Photo 5: HUAWEI U1000-5/U1000-5 left hand touched



Photo 6: HUAWEI U1000-5/U1000-5 left hand tilted 15°



Photo 7: HUAWEI U1000-5/U1000-5 right hand touched



Photo 8: HUAWEI U1000-5/U1000-5 right hand tilted 15°



Photo 9: HUAWEI U1000-5/U1000-5 body worn front side (15 mm distance)



Photo 10: HUAWEI U1000-5/U1000-5 body worn rear side (15 mm distance)



Photo 10: HUAWEI U1000-5/U1000-5 body worn rear side (15 mm distance) with headset



Annex 4.3 Liquid depth

Photo 12: Liquid depth 835 MHz head simulating liquid



Photo 14: Liquid depth 835 MHz body simulating liquid

