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TESTING
No. L0310

Accredited testing laboratory

CNAS Registration number: L0310

Report On SAR Test of HUAWEI HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth M/N: HUAWEI U3200-9/U3200-9/HUAWEI U3200/U3200

Test report no.	**: SYBH(Z-SAR)010072010**
Type identification	**: HUAWEI U3200-9/U3200-9/HUAWEI U3200/U3200**
FCC ID	**: QISU3200-9**
IC	**: 6369A-U32009**
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)

Table of Contents

Revision History

Date	Revision	Description	Author
2010-07-26	1.0	Initial report release	Luo Yusheng
2010-09-19	2.0	1) Identify device class 2) Identify measured maximum burst averaged conducted output power for each operating mode 3) Provide test-reduction descriptions and justification for all test combinations 4)Update antenna separation distances for each mode and clarify simultaneous transmission issues 5) Identify tune-up information and extrapolated SAR values	Luo Yusheng

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 U3200-9/U3200-9/HUAWEI U3200/U3200 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:

2010-07-26	**Luo Yusheng**	Luo Yusheng
Date	Name	Signature

Reviewed by:

2010-09-19	**Hu Zhongxun**	Hu Zhongxun
Date	Name	Signature

Approved by:

2010-09-19	**Liu Chunlin**	Liu Chunlin
Date	Name	Signature

1.2 Testing laboratory

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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

Name: HUAWEI TECHNOLOGIES CO., LTD

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1.4 Application details

Date of receipt of application:	2010-07-07
Date of receipt of test item:	2010-07-14
Start/Date of test:	2010-07-14
End of test:	2010-07-23

1.5 Test item

Description of the test item:	HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth
Type identification:	HUAWEI U3200-9/U3200-9/HUAWEI U3200/U3200
FCC ID :	QISU3200-9
IC :	6369A-U32009
Serial number:	6S2AA11061400040
Manufacturer name:	Huawei Technologies Co.,Ltd.
Street:	Huawei Base, Bantian,Longgang District
Town:	Shenzhen
Country:	P.R.China

additional information on the EUT:		
device type :	portable device	
IMEI No :	353370040000390	
exposure category:	uncontrolled environment / general population	
test device production information	production unit	
operating mode(s)	GSM850 (Tested); GSM1900(Tested); WCDMA Band IV(Tested); BT.	
modulation	(GSM)GMSK, (WCDMA)QPSK	
GPRS/EGPRS mobile station class	B	
GPRS/EGPRS multislot class	10	
Maximum number slots	Downlink (MS RX): 4; Uplink(MS TX):2; Sum:5	
(E)GPRS voice mode or DTM	No support	
operating frequency range(s)	transmitter frequency range	receiver frequency range
GSM1900 (tested):	1850.2 MHz ~ 1909.8 MHz	1930.2 MHz ~ 1989.8 MHz
GSM850 (tested):	824.2 MHz ~ 848.8 MHz	869.2 MHz ~ 893.8 MHz
WCDMA Band IV (tested):	1712.4 MHz ~1752.6 MHz	2112.4 MHz ~2152.6 MHz
Power class :	1,tested with power level 0 (1900 MHz band)	
	4,tested with power level 5 (850 MHz band)	
	3, tested with power control all up bits(WCDMA Band IV)	
test channels (low-mid-high) :	512-661-810 (1900 MHz band)	
	128-190-251 (850 MHz band)	
	1312-1412-1513 (WCDMA Band IV)	
hardware version :	U3200-9 Ver. A	
software version :	U3209V100R001CANC119B125	
antenna type :	Integrated antenna	
accessories/body-worn configurations:	Stereo headset	
battery options :	Huawei Technologies Co., Ltd Battery Model: HBU86 Rated capacity: 930mAh Nominal Voltage: ⎓ +3.7V Charging Voltage: ⎓ +4.2V S/N: YACA413HI1679804	
charger options :	Huawei Technologies Co., Ltd Model: HS-050040U5 Input Voltage :100-240V ~50/60Hz, 0.2A Output voltage: ⎓ +5.0V，400mA Rated Power: 2W S/N: BYAA11512549	

1.5.1 EUT Description

HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth - HUAWEI U3200-9/ U3200-9/HUAWEI U3200/U3200 is subscriber equipment in the WCDMA/GSM system. The HSDPA/UMTS frequency band is Band I and AWS, but only AWS band test data included in this report. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only GSM850 and PCS1900MHz band test data included in this report. The Mobile phone implements such functions as RF signal receiving /Transmitting, WCDMA and GSM/GPRS protocol processing, voice, video and MMS service etc. Externally it provides micro SD card interface, earphone port(to provide voice service) and USIM card interface .It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

1.5.2 General description of test procedures

The DUT is tested using a CMU200 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.
Conducted output power was measured using an integrated RF connector and attached RF cable.

1.5.3 Test-set-up information for GSM/GPRS/EGPRS

For the body SAR test for GSM, a communication link is set up with a System Simulator (SS) by air link. The EUT is commanded to operate maximum transmitting power. The test consists of Head and Body test. Head mode is tested with voice mode and both left/right cheek and tilt 15°is required. Body mode is tested with data mode which is GPRS and EGPRS mode. 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.

1.5.4 Test-set-up information for WCDMA / HSPDA

a) RMC

In RMC (reference measurement channel) mode the conducted power at 4 different bit rates was measured. They correspond with the used spreading factors as follows:

Bit rate	12.2 kbit/s	64 kbit/s	144 kbit/s	384 kbit/s
Spreading factor (SF)	64	16	8	4

In RMC mode only DPCCH and DPDCH are active. As bit rate changes do not influence the relative power of any code channel the measured RMS output power remains on the same level which is set to maximum by TPC (Transmit power control) pattern type 'All 1'.

b) HSDPA

HSDPA adds the HS-DPCCH in uplink as a control channel for high speed data transfer in downlink. In HSDPA mode 4 sub-tests are defined by 3GPP 34.121 according to the following table:

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs} (1)	CM(dB)(2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

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

Note 2 : CM = 1 for β_c / β_d = 12/15, β_{hs} / β_c = 24/15

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

Table1: Sub-tests for UMTS Release 5 HSDPA

The β_c and β_d gain factors for DPCCH and DPDCH were set according to the values in the above table, β_{hs} for HS-DPCCH is set automatically to the correct value when ΔACK, ΔNACK, ΔCQI = 8. The variation of the β_c /β_d ratio causes a power reduction at sub-tests 2 - 4.

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

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

Table2: settings of required H-Set 1 QPSK acc. to 3GPP 34.121

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

Table3: 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

Band	SAR_{1g} (W/kg)	
	Head	Body
GSM 850	**0.807**	**0.978**
GSM 1900	0.592	0.660
WCDMA Band IV	0.623	0.518

Table4: The Maximum SAR_{1g} Values for Head and Body position

Band	Maximum Average Power (dBm)
GSM 850	23.68
GSM 850 GPRS	24.75
GSM 850 EGPRS (8PSK)	19.06
GSM 850 EGPRS (GMSK)	24.89
GSM 1900	21.34
GSM 1900 GPRS	22.29
GSM 1900 EGPRS(8PSK)	18.65
GSM 1900 EGPRS(GMSK)	22.32
WCDMA Band IV	23.47
WCDMA Band IV HSDPA	22.41

Table5: The Maximum Average Power of each tested band

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

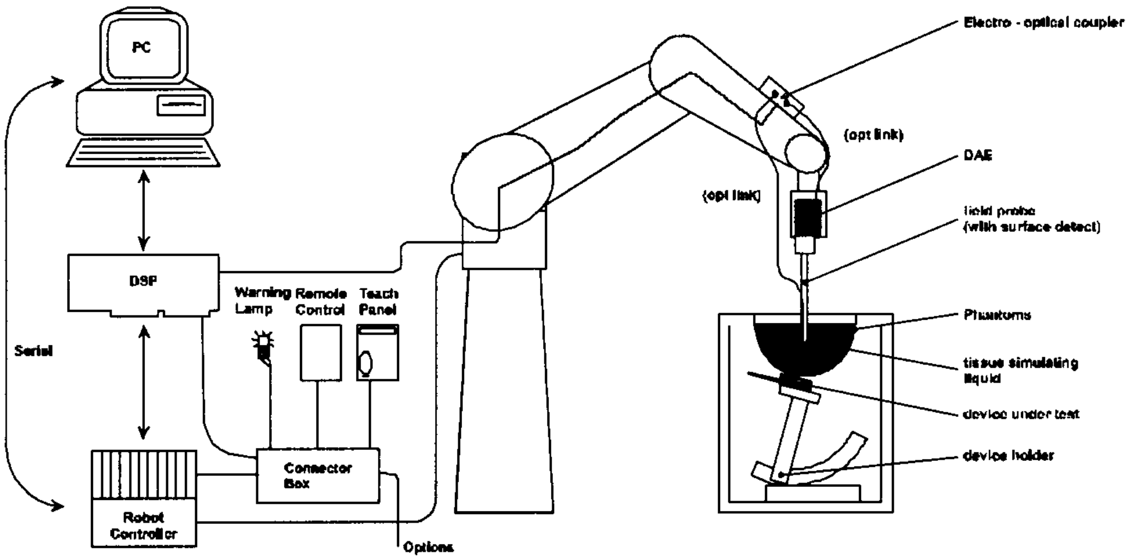
The measurement system is described in chapter 2.4.

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 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.

2.4.2 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

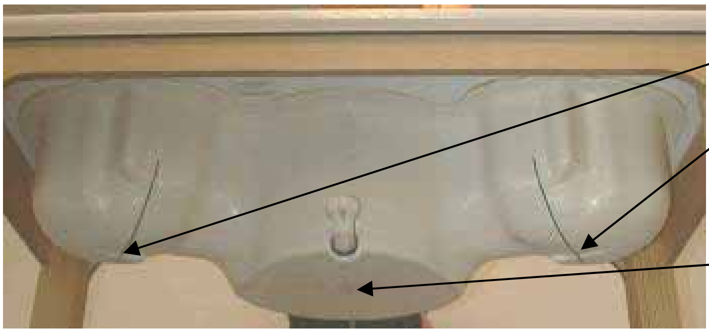
Technical data according to manufacturer information	
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)
Calibration	In air from 10 MHz to 2.5 GHz In head tissue simulating liquid (HSL) at 900 (800-1000) MHz and 1.8 GHz (1700-1910 MHz) (accuracy ± 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 µW/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 µW/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.



ear reference point right hand side

ear reference point left hand side

reference point flat position

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 ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- The „area scan“ measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field 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 compansate 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/cm^3

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/cm^2
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)**					
frequency band	☐ 450	☒ 835	☐ 900	☒ 1800	☒ 1900	☐ 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

Table6: Head tissue dielectric properties

Ingredients (% of weight)	**Frequency (MHz)**					
frequency band	☐ 450	☒ 835	☐ 900	☒ 1800	☒ 1900	☐ 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

Table7: 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	Target Head Tissue		Measured Head Tissue		Measured Date
[MHz]	Permittivity (+/-5%)	Conductivity [S/m] (+/-5%)	Permittivity	Conductivity [S/m]	
1900	40.0	1.40	41.6	1.39	2010-07-19
1800	40.0	1.40	39.8	1.37	2010-07-20
835	41.5	0.90	43.4	0.933	2010-07-21

Table8: Parameter of the head tissue simulating liquid

Used Target Frequency	Target Body Tissue		Measured Body Tissue		Measured Date
[MHz]	Permittivity (+/-5%)	Conductivity [S/m] (+/-5%)	Permittivity	Conductivity [S/m]	
1900	53.3	1.52	52.0	1.48	2010-07-13
1800	53.3	1.52	52.4	1.55	2010-07-16
835	55.2	0.97	55.1	1.00	2010-07-14

Table9: 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 ± 10.7% (K=1).
The expanded uncertainty (k=2) is assessed to be ± 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	Divi-sor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	± 5.9%	Normal	1	1	1	± 5.9%	± 5.9%	∞
Axial isotropy	± 4.7%	Rectangular	√3	0.7	0.7	± 1.9%	± 1.9%	∞
Hemispherical isotropy	± 9.6%	Rectangular	√3	0.7	0.7	± 3.9%	± 3.9%	∞
Spatial resolution	± 0.0%	Rectangular	√3	1	1	± 0.0%	± 0.0%	∞
Boundary effects	± 1.0%	Rectangular	√3	1	1	± 0.6%	± 0.6%	∞
Probe linearity	± 4.7%	Rectangular	√3	1	1	± 2.7%	± 2.7%	∞
System detection limits	± 1.0%	Rectangular	√3	1	1	± 0.6%	± 0.6%	∞
Readout electronics	± 0.3%	Normal	1	1	1	± 0.3%	± 0.3%	∞
Response time	± 0.8%	Rectangular	√3	1	1	± 0.5%	± 0.5%	∞
Integration time	± 2.6%	Rectangular	√3	1	1	± 1.5%	± 1.5%	∞
RF ambient conditions	± 3.0%	Rectangular	√3	1	1	± 1.7%	± 1.7%	∞
Probe positioner	± 0.4%	Rectangular	√3	1	1	± 0.2%	± 0.2%	∞
Probe positioning	± 2.9%	Rectangular	√3	1	1	± 1.7%	± 1.7%	∞
Max. SAR evaluation	± 1.0%	Rectangular	√3	1	1	± 0.6%	± 0.6%	∞
Test Sample Related								
Device positioning	± 2.9%	Normal	1	1	1	± 2.9%	± 2.9%	145
Device holder uncertainty	± 3.6%	Normal	1	1	1	± 3.6%	± 3.6%	5
Power drift	± 5.0%	Rectangular	√3	1	1	± 2.9%	± 2.9%	∞
Phantom and Set-up								
Phantom uncertainty	± 4.0%	Rectangular	√3	1	1	± 2.3%	± 2.3%	∞
Liquid conductivity (target)	± 5.0%	Rectangular	√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	√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%**	

Table10: Measurement uncertainties

2.4.13 Measurement uncertainty evaluation for system validation

The overall combined measurement uncertainty of the measurement system is ± 9.2% (K=1).
The expanded uncertainty (k=2) is assessed to be ± 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	Divi-sor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	± 5.9%	Normal	1	1	1	± 5.9%	± 5.9%	∞
Axial isotropy	± 4.7%	Rectangular	√3	1	1	± 2.7%	± 2.7%	∞
Hemispherical isotropy	± 9.6%	Rectangular	√3	0.7	0.7	± 0.0%	± 0.0%	∞
Boundary effects	± 1.0%	Rectangular	√3	1	1	± 0.6%	± 0.6%	∞
Probe linearity	± 4.7%	Rectangular	√3	1	1	± 2.7%	± 2.7%	∞
System detection limits	± 1.0%	Rectangular	√3	1	1	± 0.6%	± 0.6%	∞
Readout electronics	± 0.3%	Normal	1	1	1	± 0.3%	± 0.3%	∞
Response time	± 0.0%	Rectangular	√3	1	1	± 0.0%	± 0.0%	∞
Integration time	± 0.0%	Rectangular	√3	1	1	± 0.0%	± 0.0%	∞
RF ambient conditions	± 1.0%	Rectangular	√3	1	1	± 0.6%	± 0.6%	∞
Probe positioner	± 0.4%	Rectangular	√3	1	1	± 0.2%	± 0.2%	∞
Probe positioning	± 2.9%	Rectangular	√3	1	1	± 1.7%	± 1.7%	∞
Max. SAR evaluation	± 1.0%	Rectangular	√3	1	1	± 0.6%	± 0.6%	∞
Dipole								
Deviation of experimental dipole	± 5.5%	Rectangular	√3	1	1	± 3.2%	± 3.2%	∞
Dipole axis to liquid distance	± 2.0%	Rectangular	1	1	1	± 1.2%	± 1.2%	∞
Power drift	± 4.7%	Rectangular	√3	1	1	± 2.7%	± 2.7%	∞
Phantom and Set-up								
Phantom uncertainty	± 4.0%	Rectangular	√3	1	1	± 2.3%	± 2.3%	∞
Liquid conductivity (target)	± 5.0%	Rectangular	√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	√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%**	

Table11: Measurement uncertainties

2.4.14 System validation

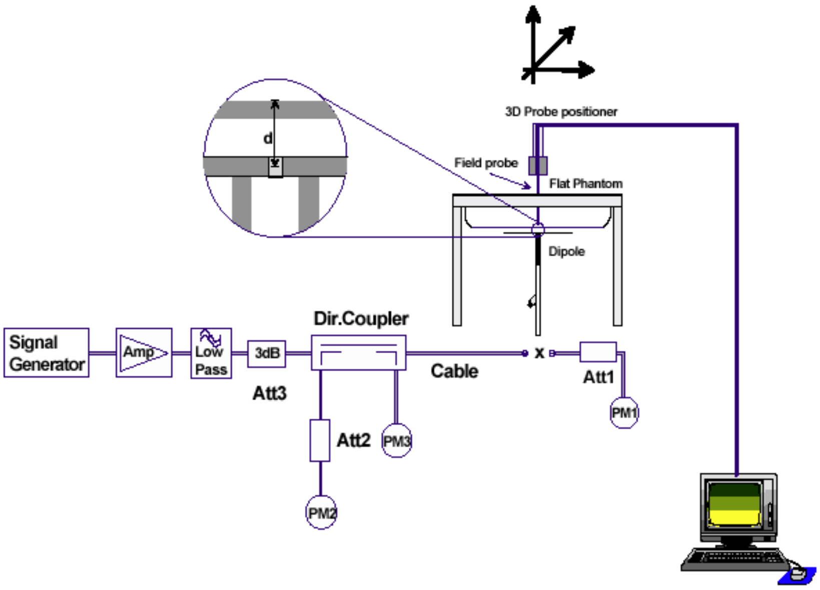
The system validation is performed for verifying the accuracy of the complete measurement system and performance of the software. The system validation is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows validation results for all frequency 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
D1900V2 S/N: 5d091	1900 MHz head	9.60mW/g	5.10mW/g	10.1mW/g	5.24mW/g	2010-07-19
D1900V2 S/N: 5d091	1900 MHz body	10.1mW/g	5.27mW/g	10.2mW/g	5.34mW/g	2010-07-13
D1800V2 S/N: 2d157	1800 MHz head	9.23mW/g	4.9mW/g	9.73mW/g	5.1mW/g	2010-07-20
D1800V2 S/N: 2d157	1800 MHz body	9.60mW/g	5.13mW/g	10.1mW/g	5.24mW/g	2010-07-16
D835V2 S/N: 4d095	835 MHz head	2.29mW/g	1.50mW/g	2.49mW/g	1.64W/g	2010-07-21
D835V2 S/N: 4d095	835 MHz body	2.49mW/g	1.62mW/g	2.55mW/g	1.67mW/g	2010-07-14

Table12: 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

The signalling modes differ as follows :

mode	coding scheme	modulation
GPRS	CS1 to CS4	GMSK
EDGE	MCS1 to MCS4	GMSK
EDGE	MCS5 to MCS9	8PSK

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

2.5.2 Conducted power results

GSM 1900 MHz

GSM1900 (CS)		Conducted power (dBm)			Averaged power(dBm)		
		Channel 512	Channel 661	Channel 810	Channel 512	Channel 661	Channel 810
Before test		30.09	30.12	30.34	21.09	21.12	**21.34**
After test		30.07	30.13	30.33	21.07	21.13	21.33
GSM1900 GPRS (GMSK)		Conducted power (dBm)			Averaged power(dBm)		
		Channel 512	Channel 661	Channel 810	Channel 512	Channel 661	Channel 810
1TX slot	Before test	30.07	30.09	30.33	21.07	21.09	21.33
	After test	30.08	30.07	30.35	21.08	21.07	21.35
2 TX slots	Before test	28.04	28.06	28.29	22.04	22.06	**22.29**
	After test	28.05	28.04	28.28	22.05	22.04	22.28
GSM1900 EGPRS (8PSK)		Conducted power (dBm)			Averaged power(dBm)		
		Channel 512	Channel 661	Channel 810	Channel 512	Channel 661	Channel 810
1TX slot	Before test	26.36	26.42	26.62	17.36	17.42	17.62
	After test	26.38	26.40	26.63	17.38	17.4	17.63
2 TX slots	Before test	24.38	24.42	24.65	18.38	18.42	**18.65**
	After test	24.38	24.40	24.64	18.38	18.4	18.64
GSM1900 EGPRS (GMSK)		Conducted power (dBm)			Averaged power(dBm)		
		Channel 512	Channel 661	Channel 810	Channel 512	Channel 661	Channel 810
1TX slot	Before test	30.05	30.11	30.32	21.05	21.11	21.32
	After test	30.04	30.12	30.34	21.04	21.12	21.34
2TX slots	Before test	28.05	28.08	28.31	22.05	22.08	22.31
	After test	28.06	28.08	28.32	22.06	22.08	**22.32**

Table13: Test results conducted power measurement GSM1900 MHz

GSM 850 MHz

GSM850 (CS)		Conducted power (dBm)			Averaged power(dBm)		
		Channel 128	Channel 192	Channel 251	Channel 128	Channel 192	Channel 251
Before test		32.65	32.64	32.68	23.65	23.64	**23.68**
After test		32.69	32.60	32.63	23.69	23.60	23.63
GSM850 GPRS (GMSK)		Conducted power (dBm)			Averaged power(dBm)		
		Channel 128	Channel 192	Channel 251	Channel 128	Channel 192	Channel 251
1 TX slot	Before test	32.46	32.68	32.67	23.46	23.68	23.67
	After test	32.45	32.68	32.68	23.45	23.68	23.68
2TX slots	Before test	30.57	30.74	30.53	24.57	24.74	24.53
	After test	30.56	30.75	30.54	24.56	**24.75**	24.54
GSM850 EGPRS (8PSK)		Conducted power (dBm)			Averaged power(dBm)		
		Channel 128	Channel 192	Channel 251	Channel 128	Channel 192	Channel 251
1TX slot	Before test	27.04	26.19	26.20	18.04	17.19	17.20
	After test	27.05	26.20	26.22	18.05	17.20	17.22
2 TX slots	Before test	25.06	24.22	24.17	**19.06**	18.22	18.17
	After test	25.04	24.24	24.18	19.04	18.24	18.18
GSM850 EGPRS (GMSK)		Conducted power (dBm)			Averaged power(dBm)		
		Channel 128	Channel 192	Channel 251	Channel 128	Channel 192	Channel 251
1 TX slot	Before test	32.67	32.62	32.66	23.67	23.62	23.66
	After test	32.66	32.64	32.65	23.66	23.64	23.65
2 TX slots	Before test	30.84	30.81	30.89	24.84	24.81	**24.89**
	After test	30.84	30.82	30.88	24.84	24.82	24.88

Table14: Test results conducted power measurement GSM850MHz.

WCDMA Band IV

WCDMA Band IV (RMC)		Conducted Power (dBm)		
		Channel 1312	Channel1412	Channel 1513
12.2kbps RMC	Before test	23.38	23.17	**23.47**
	After test	23.39	23.20	23.46
64kbps RMC	Before test	23.40	23.45	23.40
	After test	23.37	23.44	23.41
144kbps RMC	Before test	23.34	23.41	23.28
	After test	23.38	23.38	23.27
384kbps RMC	Before test	23.40	23.38	23.39
	After test	23.42	23.41	23.36
WCDMA Band IV HSDPA		Conducted Power (dBm)		
		Channel 1312	Channel1412	Channel 1513
Sub Test - 1	Before test	22.32	22.40	**22.41**
	After test	22.36	22.43	22.37
Sub Test - 2	Before test	21.89	21.86	21.91
	After test	21.86	21.84	21.87
Sub Test - 3	Before test	21.90	21.94	21.90
	After test	21.94	21.90	21.87
Sub Test - 4	Before test	21.55	21.36	21.42
	After test	21.56	21.39	21.46

Table15: Test results conducted power measurement UMTS (WCDMA) AWS 1700MHz

Note:
1) 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) Average power numbers: The maximum power numbers are marks in bold.
3) For SAR testing the EUT was set to multislot class based on the maximum averaged conducted power.

2.5.3 Power Reduction

GSM1900:

GPRS（GMSK）:

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2

EGPRS(8PSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2

EGPRS(GMSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2

GSM850:

GPRS（GMSK）:

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2

EGPRS(8PSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2

EGPRS(GMSK):

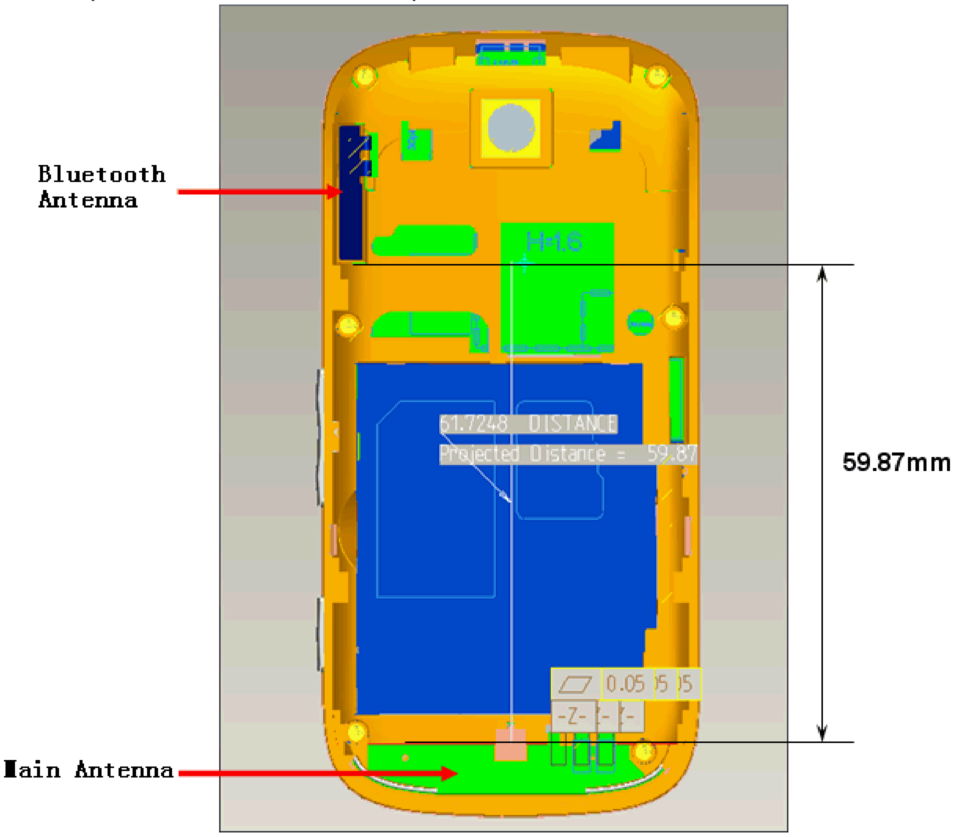
Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2

2.5.4 Justification of SAR measurements in GSM mode

SAR measurements were performed in GPRS mode with 2 active timeslots because highest timebased averaged output power was calculated for that configuration.
For comparison an additional delta measurement was performed with 1 timeslot in speech mode.

2.5.5 Multiple Transmitter Information

The distance between BT antenna and GSM/WCDMA antenna is 5.987cm> 5cm， The location of the antennas inside mobile phone is shown as below picture:



The output power of BT antenna is as following:

Channel	Ch 0 2402 MHz	Ch 39 2441 Mhz	Ch 78 2480 MHz
Peak Conducted Output Power(dBm)	6.35	6.26	6.72

So Max Peak Conducted Output Power is 6.72dBm equivalent to 4.70mW, which is ≤2PRef (24mW).

The following tables' list information which is relevant for the decision if a simultaneous transmit evaluation is necessary according to KDB 648474.

Important abbreviations:
SPLSR: Antenna pair SAR to Peak Location Separation Ratio $(SAR_x + SAR_y)/d_{xy}$

a) head position

Tx No.	Communcation system and frequency band	P_{avg} (mW)	single SAR (W/kg) (see ch. 2.6)	remarks
1a	GSM850	250	0.807	
1b	GSM1900	125	0.592	
1c	WCDMA AWS	250	0.623	routine evaluation
2	Bluetooth 2450 MHz	5	:=0	P_{ref} = 12 mW at 2.4 GHz
Sum of all 1g-SAR values			n/a	

Table16: Communication systems and SAR values in head position

antenna pair (x,y)	antenna distance d_{xy} (cm)	L_{xy} (cm)	$SPLSR_{xy}$	sim.-Tx SAR	remarks
(1a,2)	5.987cm	n/a	0.14	N	$SPLSR_{xy} < 0.3$
(1b,2)	5.987cm	n/a	0.10	N	$SPLSR_{xy} < 0.3$
(1c,2)	5.987cm	n/a	0.10	N	$SPLSR_{xy} < 0.3$

Table17: Antenna distances and SPLSR evaluation in head position

b) body position

Tx No.	Communcation system and frequency band	P_{avg} (mW)	single SAR (W/kg) (see ch. 2.6)	remarks
1a	GSM850	250	0.978	
1b	GSM1900	125	0.660	
1c	WCDMA AWS	250	0.518	routine evaluation
2	Bluetooth 2450 MHz	5	:=0	P_{ref} = 12 mW at 2.4 GHz
Sum of all 1g-SAR values			n/a	

Table18: Communication systems and SAR values in body position

antenna pair (x,y)	antenna distance d_{xy} (cm)	L_{xy} (cm)	$SPLSR_{xy}$	sim.-Tx SAR	remarks
(1a,2)	5.987 cm	n/a	0.16	N	$SPLSR_{xy} < 0.3$
(1b,2)	5.987cm	n/a	0.11	N	$SPLSR_{xy} < 0.3$
(1c,2)	5.987cm	n/a	0.08	N	$SPLSR_{xy} < 0.3$

Table19: Antenna distances and SPLSR evaluation in body position

Stand-alone SAR

According to the output power measurement result and the distance between BT antenna and main antenna we can draw the conclusion that:

1) Stand-alone SAR are not required for BT, because the output power of BT transmitter is $\leq 2P_{Ref}$ and its antenna is $\geq$5cm from other antenna.

Simultaneous SAR

Because the distance of the GSM/WCDMA antenna to Bluetooth antenna is > 5cm, the sum of the SAR values is below 1.6 W/kg and Antenna pair SAR to Peak Location Separation Ratio < 0.3, no simultaneous SAR are required for GSM/ WCDMA and BT.

2.5.6 Test results (Head and Body SAR)

GSM 1900 (GSM/GPRS/EGPRS)

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
EUT Slide close						
661 /1880.0 MHz	cheek	0.535 W/kg	0.509 W/kg	0.025/0.068	1.6 W/kg	21.5/21.5 °C
661 / 1880.0 MHz	tilted15°	0.287 W/kg	0.27 W/kg	-0.040/-0.004	1.6 W/kg	21.5/21.5 °C
EUT Slide open						
661 /1880.0 MHz	cheek	0.299 W/kg	0.304 W/kg	0.045/0.090	1.6 W/kg	21.5/21.5 °C
661 / 1880.0 MHz	tilted15°	0.162 W/kg	0.122 W/kg	-0.140/0.021	1.6 W/kg	21.5/21.5 °C
EUT Slide close						
810 / 1909.8 MHz	cheek	0.592 W/kg	--- W/kg	-0.073/---	1.6 W/kg	21.5/--- °C
512 / 1850.2 MHz	cheek	0.502 W/kg	--- W/kg	0.004/---	1.6 W/kg	21.5/--- °C

Table20: Test results (Head SAR GSM1900MH)

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
GPRS, 2 Time Slots ,EUT Slide open					
661 / 1880.0 MHz	front 2TS	0.371 W/kg	0.014	1.6 W/kg	21.5 °C
661 / 1880.0 MHz	rear 2TS	0.561 W/kg	0.085	1.6 W/kg	21.5 °C
GPRS, 2 Time Slots, EUT Slide close					
661 / 1880.0 MHz	front 2TS	0.153 W/kg	0.016	1.6 W/kg	21.5 °C
661 / 1880.0 MHz	rear 2TS	0.493 W/kg	-0.020	1.6 W/kg	21.5 °C
GPRS, 2 Time Slots, EUT Slide open					
810 / 1909.8 MHz	rear 2TS	0.634 W/kg	0.097	1.6 W/kg	21.5 °C
512 / 1850.2 MHz	rear 2TS	0.464 W/kg	0.075	1.6 W/kg	21.5 °C
EGPRS, 2 Time Slots, EUT Slide open					
810 / 1909.8 MHz	rear 2TS	0.660 W/kg	-0.047	1.6 W/kg	21.5 °C
Speech mode, EUT with Headset Slide open					
810 / 1909.8 MHz	rear	0.428 W/kg	0.065	1.6 W/kg	21.5 °C
Speech mode, EUT with Bluetooth Headset Slide open					
810 / 1909.8 MHz	rear	0.451 W/kg	0.047	1.6 W/kg	21.5 °C

Table21: Test results (Body SAR GSM1900MHz)

Note:
1) The value with blue colour is the maximum SAR value of each test band.
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 15 mm air gap between DUT and SAM to simulate the use of a non-metallic belt-clip or holster.
5) The addition body test was performed at worst case.
6) When SAR tests for EDGE or EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

GSM 850 (GSM/GPRS/EGPRS)

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
EUT Slide close						
190 / 836.6MHz	cheek	0.52 W/kg	0.512 W/kg	0.056/0.034	1.6 W/kg	21.5/21.5 °C
190 / 836.6MHz	tilted15°	0.394 W/kg	0.397 W/kg	0.029/-0.159	1.6 W/kg	21.5/21.5 °C
EUT Slide open						
190 / 836.6MHz	cheek	0.533 W/kg	0.541 W/kg	0.048/0.044	1.6 W/kg	21.5/21.5 °C
190 / 836.6MHz	tilted15°	0.346 W/kg	0.362 W/kg	-0.047/0.012	1.6 W/kg	21.5/21.5 °C
EUT Slide open						
251 / 848.8MHz	cheek	--- W/kg	0.807 W/kg	---/0.012	1.6 W/kg	---/21.5 °C
128 / 824.2MHz	cheek	--- W/kg	0.406 W/kg	---/0.051	1.6 W/kg	---/21.5 °C

Table22: Test results (Head SAR GSM 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
GPRS, 2 Time Slots, EUT Slide open					
190 / 836.6 MHz	front 2TS	0.652 W/kg	0.043	1.6 W/kg	21.5 °C
190 / 836.6 MHz	rear 2TS	0.93 W/kg	0.037	1.6 W/kg	21.5 °C
GPRS, 2 Time Slots，EUT Slide close					
190 / 836.6 MHz	front 2TS	0.428 W/kg	-0.129	1.6 W/kg	21.5 °C
190 / 836.6 MHz	rear 2TS	0.956 W/kg	-0.131	1.6 W/kg	21.5 °C
GPRS, 2 Time Slots, EUT Slide close					
251 / 848.8 MHz	rear 2TS	0.832 W/kg	-0.14	1.6 W/kg	21.5 °C
128 / 824.2 MHz	rear 2TS	0.821 W/kg	-0.067	1.6 W/kg	21.5 °C
GPRS, 2 Time Slots, EUT Slide open					
251 / 848.8 MHz	rear 2TS	0.968 W/kg	0.004	1.6 W/kg	21.5 °C
128 / 824.2 MHz	rear 2TS	0.792 W/kg	0.005	1.6 W/kg	21.5 °C
EGPRS, 2 Time Slots, EUT Slide open					
251 / 848.8 MHz	rear 2TS	0.978 W/kg	-0.026	1.6 W/kg	21.5 °C
Speech mode, EUT with Headset Slide open					
251 / 848.8 MHz	rear	0.655 W/kg	0.006	1.6 W/kg	21.5 °C
Speech mode, EUT with Bluetooth Headset Slide open					
251 / 848.8 MHz	rear	0.821 W/kg	0.007	1.6 W/kg	21.5 °C

Table23: Test results (Body SAR GSM 850MHz)

Note:
1) The value with blue colour is the maximum SAR value of each test band.
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 15 mm air gap between DUT and SAM to simulate the use of a non-metallic belt-clip or holster.
5) The addition body test was performed at worst case.
6) When SAR tests for EDGE or EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

WCDMA Band IV (WCDMA/HSDPA)

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
EUT Slide close						
1412 / 1732.4MHz	cheek	0.51 W/kg	0.53 W/kg	-0.156/-0.034	1.6 W/kg	21.5/21.5 °C
1412 / 1732.4MHz	tilted15°	0.241 W/kg	0.213 W/kg	0.113/-0.001	1.6 W/kg	21.5/21.5 °C
EUT Slide open						
1412 / 1732.4MHz	cheek	0.51 W/kg	0.623 W/kg	-0.108/-0.156	1.6 W/kg	21.5/21.5 °C
1412 / 1732.4MHz	tilted15°	0.17 W/kg	0.152 W/kg	0.032/0.005	1.6 W/kg	21.5/21.5 °C
EUT Slide open						
1513 / 1752.6MHz	cheek	--- W/kg	0.593 W/kg	---/0.135	1.6 W/kg	---/21.5 °C
1312 / 1712.4MHz	cheek	--- W/kg	0.59 W/kg	---/-0.087	1.6 W/kg	---/21.5 °C

Table24: Test results (Head SAR AWS 1700MHz)

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
EUT Slide open					
1412 / 1732.4 MHz	front	0.326 W/kg	-0.018	1.6 W/kg	21.5 °C
1412 / 1732.4 MHz	rear	0.471 W/kg	0.068	1.6 W/kg	21.5 °C
EUT Slide close					
1412 / 1732.4 MHz	front	0.105 W/kg	0.073	1.6 W/kg	21.5 °C
1412 / 1732.4 MHz	rear	0.216 W/kg	0.088	1.6 W/kg	21.5 °C
EUT Slide open					
1513 / 1752.6 MHz	rear	0.518 W/kg	-0.030	1.6 W/kg	21.5 °C
1312 / 1712.4 MHz	rear	0.436 W/kg	0.070	1.6 W/kg	21.5 °C
EUT with Headset Slide open					
1513 / 1752.6 MHz	rear	0.439 W/kg	-0.003	1.6 W/kg	21.5 °C
EUT with Bluetooth Headset Slide open					
1513 / 1752.6 MHz	rear	0.42 W/kg	0.125	1.6 W/kg	21.5 °C

Table25: Test results (Body SAR AWS 1700MHz)

Note: 1) The value with blue colour is the maximum SAR value of each test band.
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 15 mm air gap between DUT and SAM to simulate the use of a non-metallic belt-clip or holster.
5) Body SAR is not required for handsets with HSDPA capabilities, when the maximum average output of each RF channel with HSDPA active is less than 1/4 dB higher than that measured in 12.2 kbps RMC without HSDPA.

2.5.7 Extrapolated SAR Values

Limit of SAR (W/kg)		Conducted Power	1g Average 1.6	Tune-up procedures maximum Power(dBm)	1g Average 1.6
Worst Case		Measurement Result(dBm)	Measurement Result(W/kg)		Extrapolated Result (W/kg)
Test Position	Channel				
GSM 1900					
left hand touched EUT Slide close	High	30.34	0.592	31.00	0.689
GSM 1900 [GPRS (2 timeslots uplink)]					
body worn rear EUT slide open	High	28.29	0.634	29.00	0.747
GSM 1900 [EGPRS(GMSK) (2 timeslots uplink)]					
body worn rear EUT slide open	High	28.31	0.660	29.00	0.774
GSM 850					
right hand touched EUT Slide open	High	32.68	0.807	34.00	1.094
GSM 850 [GPRS (2 timeslots uplink)]					
body worn rear EUT side open	**High**	**30.53**	**0.968**	**32.00**	**1.358**
GSM 850 [EGPRS(GMSK) (2 timeslots uplink)]					
body worn rear EUT side open	High	30.89	0.978	32.00	1.263
WCDMA Band IV/HSDPA					
right hand touched EUT side open	Middle	23.17	0.623	24.00	0.754
body worn rear EUT side open	High	23.47	0.518	24.00	0.585

Table26: Extrapolated SAR Values of highest measured SAR (GSM/ WCDMA Band IV/HSDPA):

Annex 1 System performance verification

Date/Time: 2010-07-19 21:45:21

SystemPerformanceCheck-D1900 head

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d091

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.39 mho/m; εr = 41.6; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(4.99, 4.99, 4.99); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=10mm, Pin=250mW/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 10.6 mW/g

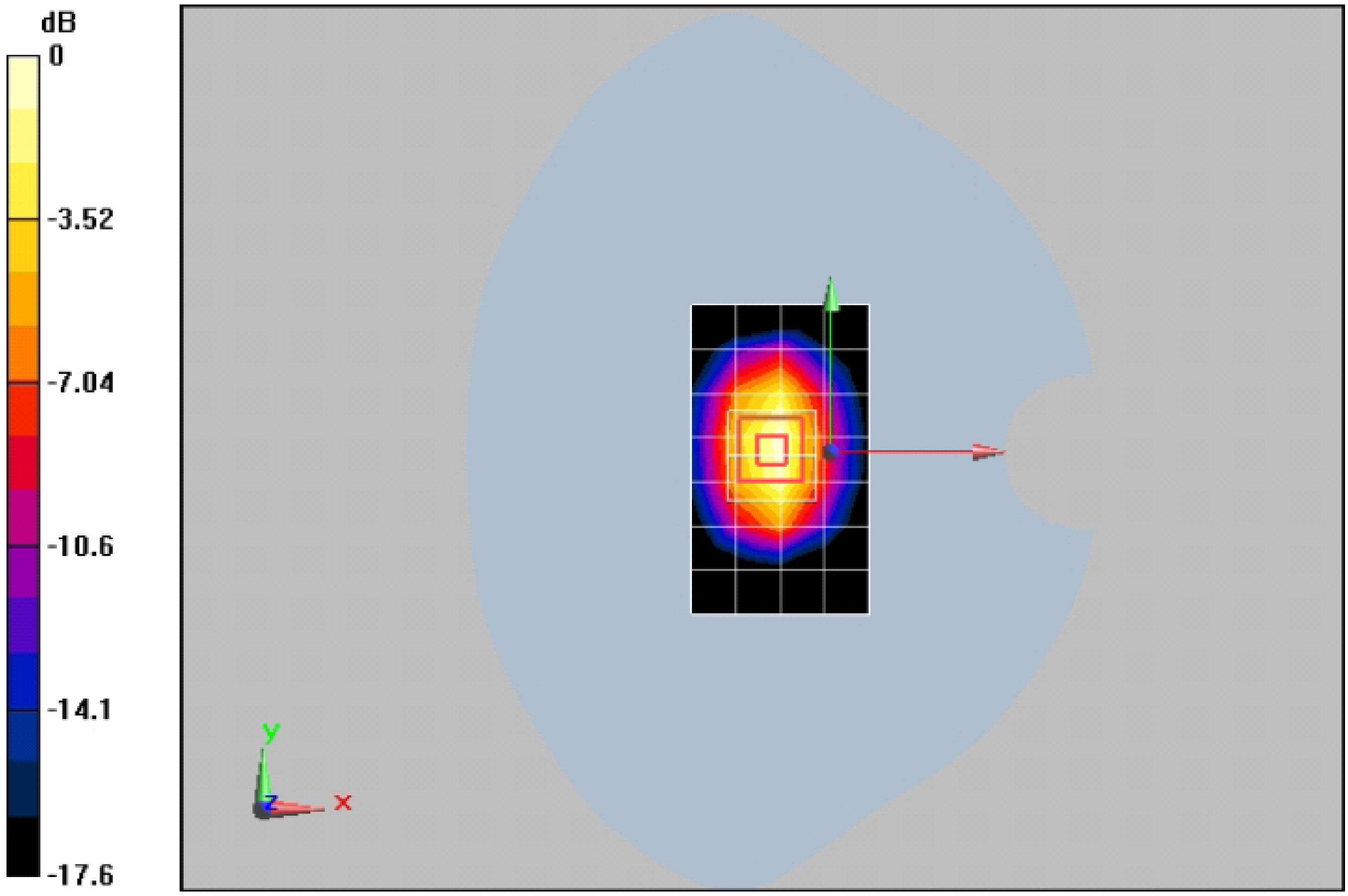
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.2 V/m; Power Drift = 0.060 dB

Peak SAR (extrapolated) = 18.5 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.24 mW/g

Maximum value of SAR (measured) = 11.4 mW/g



0 dB = 11.4mW/g

Additional information:

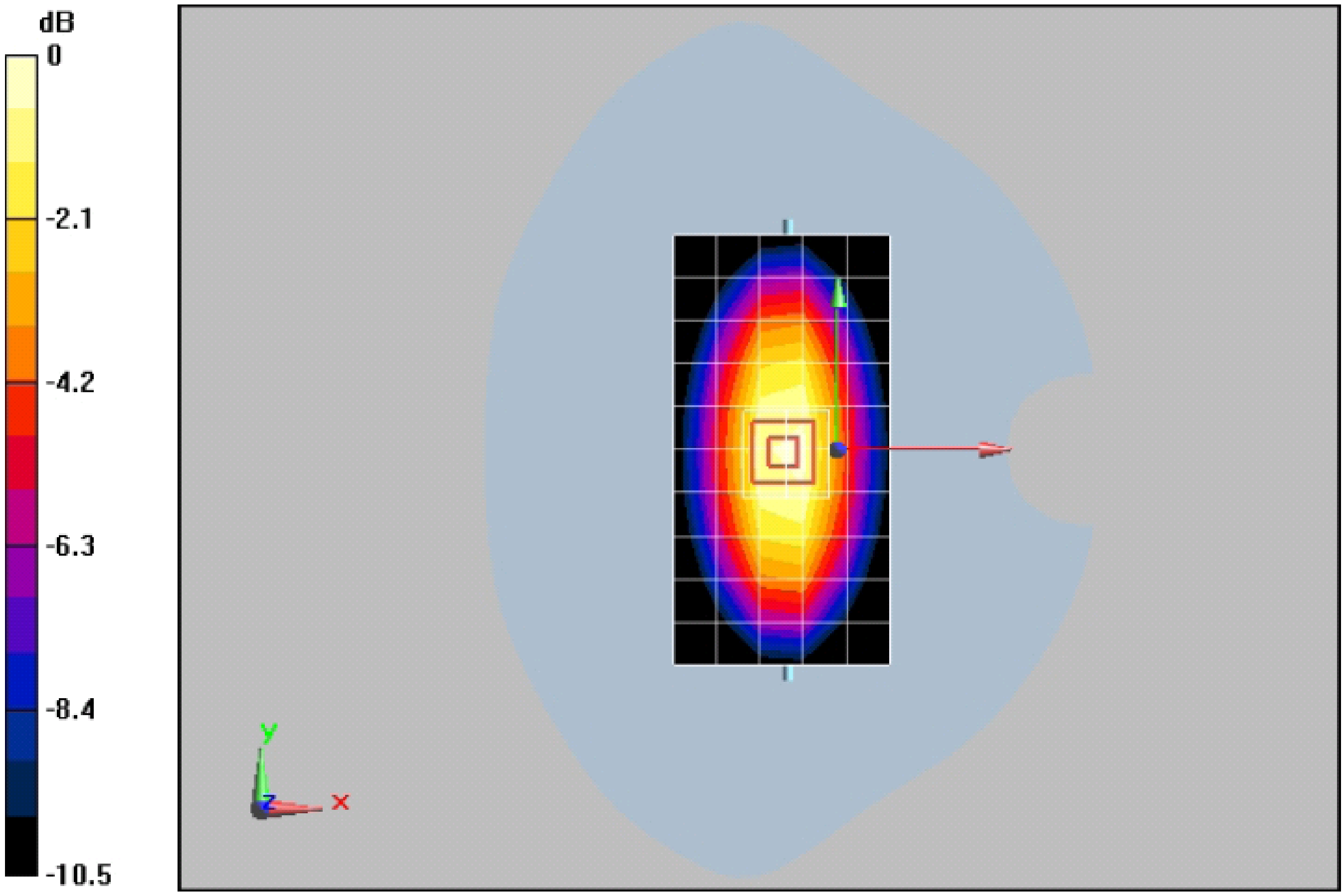
position or distance of DUT to SAM (if not standard head positions) :

ambient temperature: 23.0°C; liquid temperature: 22.1°C

Date/Time: 2010-07-21 22:14:12

SystemPerformanceCheck-D835 head
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d059
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.933 mho/m; εr = 43.4; ρ = 1000 kg/m3
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: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=15mm, Pin=250mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.41 mW/g
d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.8 V/m; Power Drift = 0.062 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.49 mW/g; SAR(10 g) = 1.64 mW/g
Maximum value of SAR (measured) = 2.68 mW/g



0 dB = 2.68mW/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

Date/Time: 2010-07-20 21:37:41

SystemPerformanceCheck-D1800 head

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d157

Communication System: CW; Frequency: 1800 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1800 MHz; σ = 1.37 mho/m; εr = 39.8; ρ = 1000 kg/m3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.06, 5.06, 5.06); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=10mm, Pin=250mW/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 10.3 mW/g

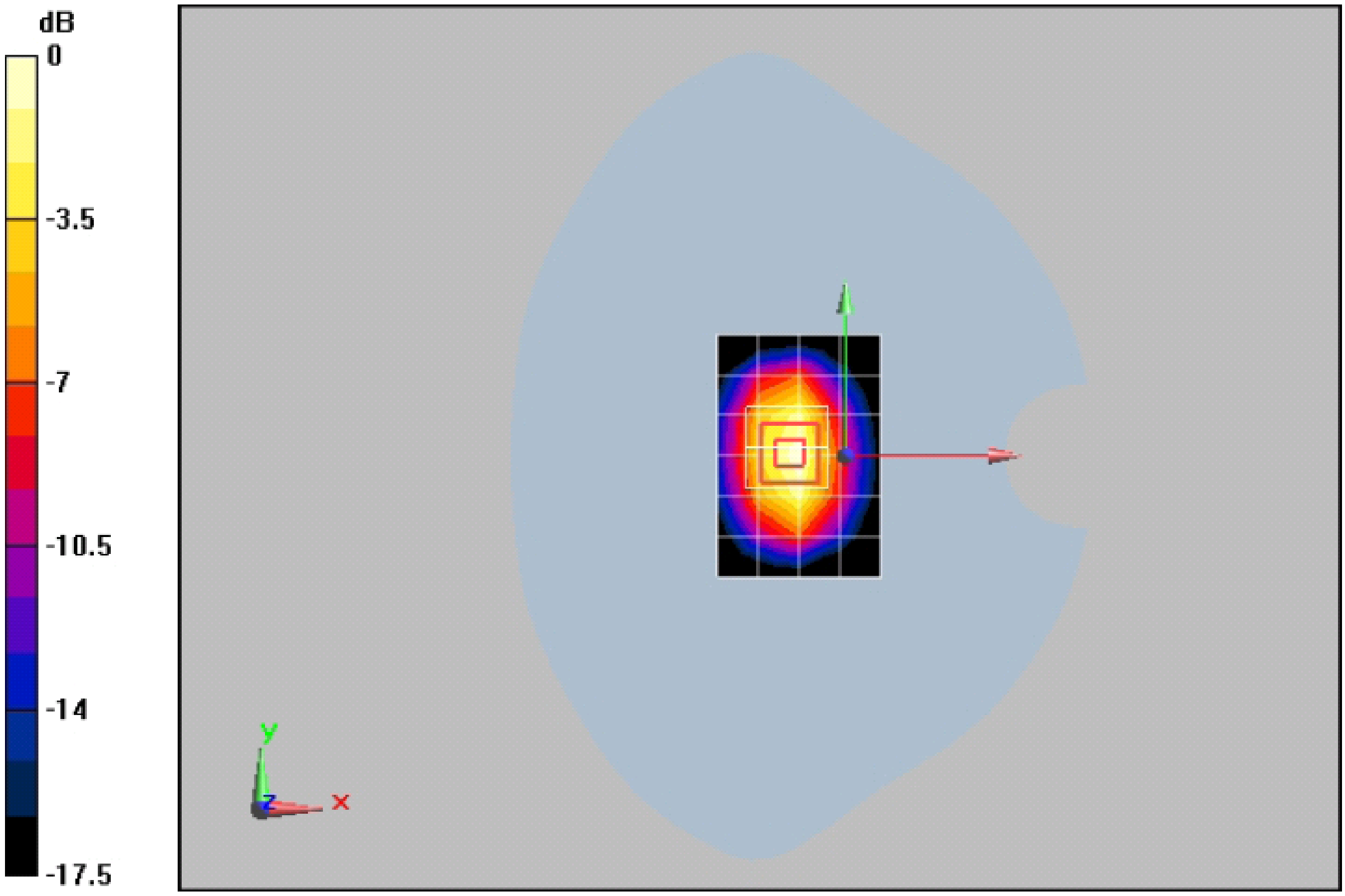
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.4 V/m; Power Drift = 0.063 dB

Peak SAR (extrapolated) = 17.7 W/kg

SAR(1 g) = 9.73 mW/g; SAR(10 g) = 5.1 mW/g

Maximum value of SAR (measured) = 10.8 mW/g



0 dB = 10.8mW/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

Date/Time: 2010-07-13 21:41:21

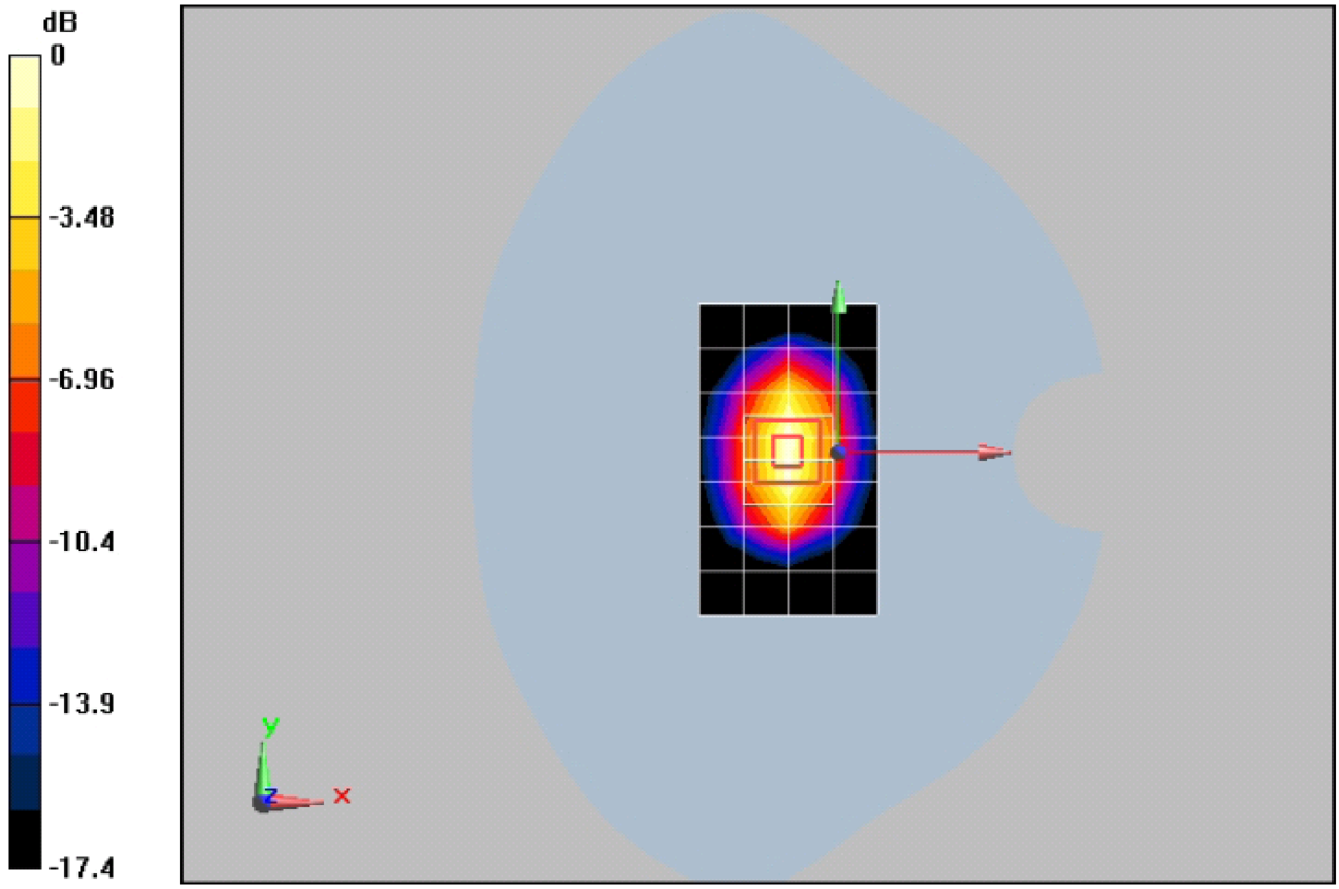
SystemPerformanceCheck-D1900 body

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d091

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.48 mho/m; εr = 52; ρ = 1000 kg/m3
Phantom section: Flat Section
DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(4.62, 4.62, 4.62); 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=10mm, Pin=250mW/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 11.2 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.8 V/m; Power Drift = -0.00486 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.34 mW/g
Maximum value of SAR (measured) = 11.6 mW/g



0 dB = 11.6mW/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

Date/Time: 2010-07-14 21:51:12

SystemPerformanceCheck-D835 body

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d059

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

Medium parameters used: f = 835 MHz; σ = 1 mho/m; εr = 55.1; ρ = 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

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

Maximum value of SAR (measured) = 2.52 mW/g

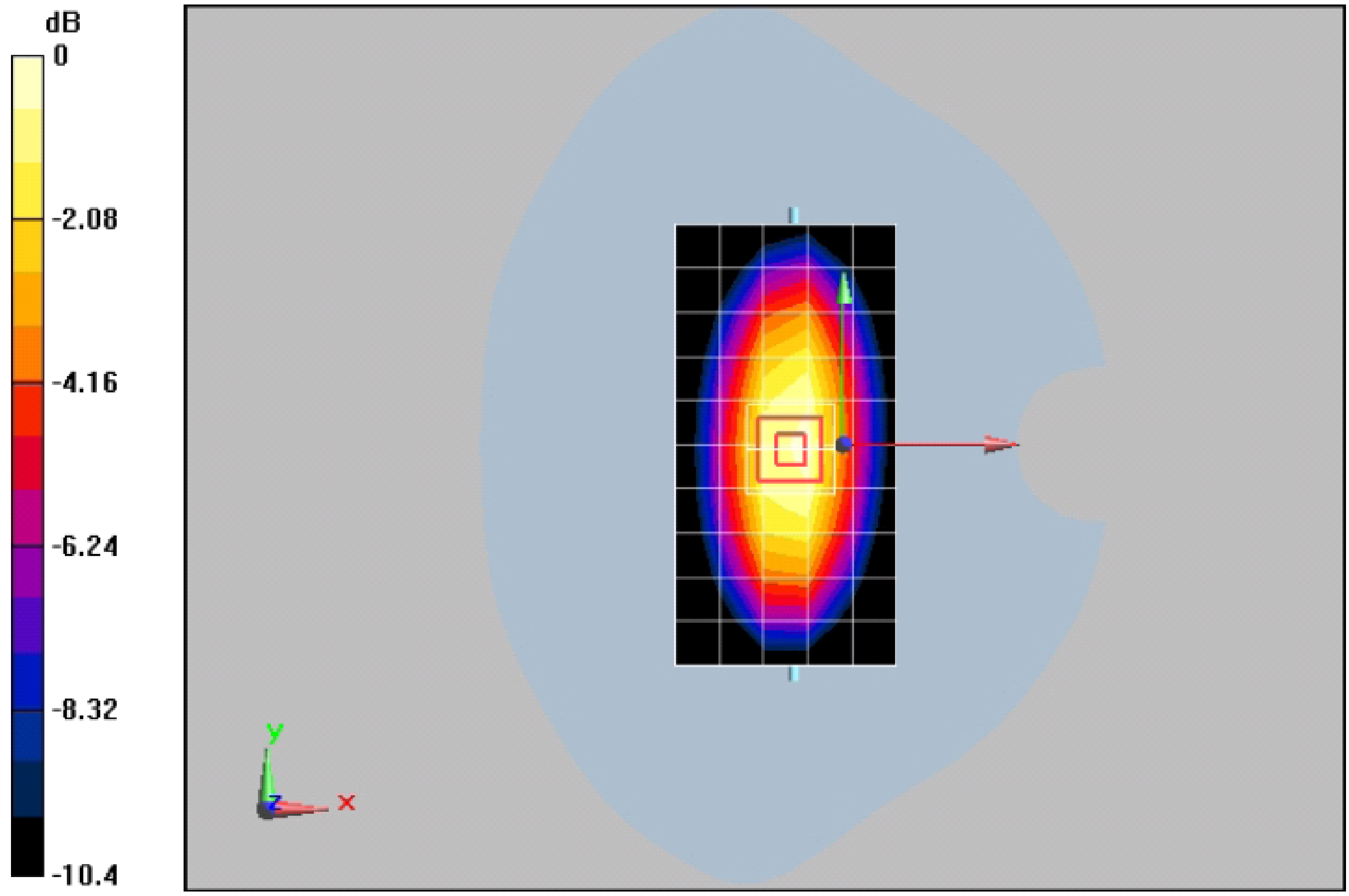
d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.5 V/m; Power Drift = 0.00814 dB

Peak SAR (extrapolated) = 3.72 W/kg

SAR(1 g) = 2.55 mW/g; SAR(10 g) = 1.67 mW/g

Maximum value of SAR (measured) = 2.77 mW/g



0 dB = 2.77mW/g

Additional information:

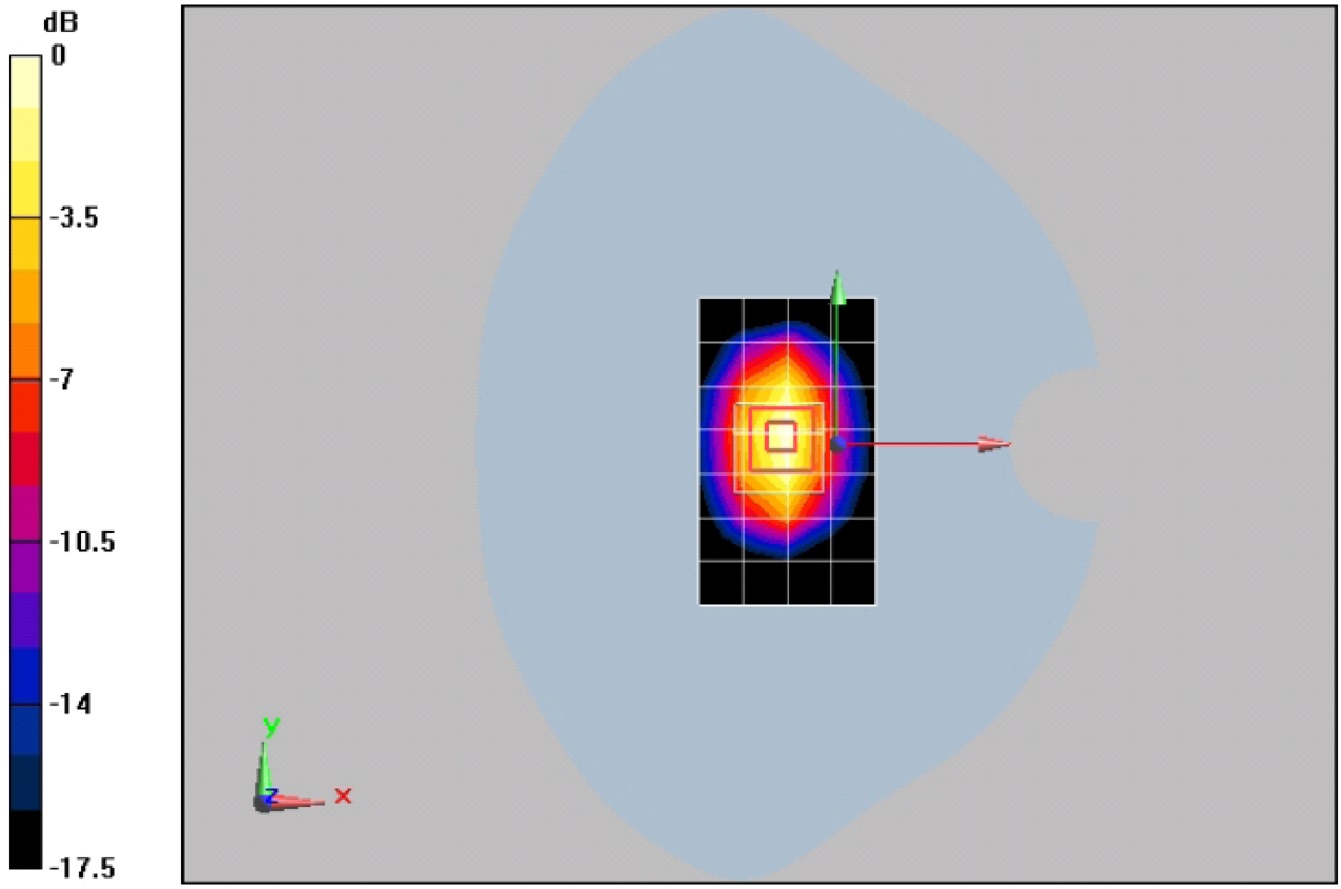
position or distance of DUT to SAM (if not standard head positions) :

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

Date/Time: 2010-07-16 21:42:41

SystemPerformanceCheck-D1800 body
DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d157
Communication System: CW; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1800 MHz; σ = 1.55 mho/m; εr = 52.4; ρ = 1000 kg/m3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3168; ConvF(4.88, 4.88, 4.88); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=10mm, Pin=250mW/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 10.8 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 85.3 V/m; Power Drift = 0.118 dB
Peak SAR (extrapolated) = 18.2 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.24 mW/g
Maximum value of SAR (measured) = 11.3 mW/g



0 dB = 11.3mW/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

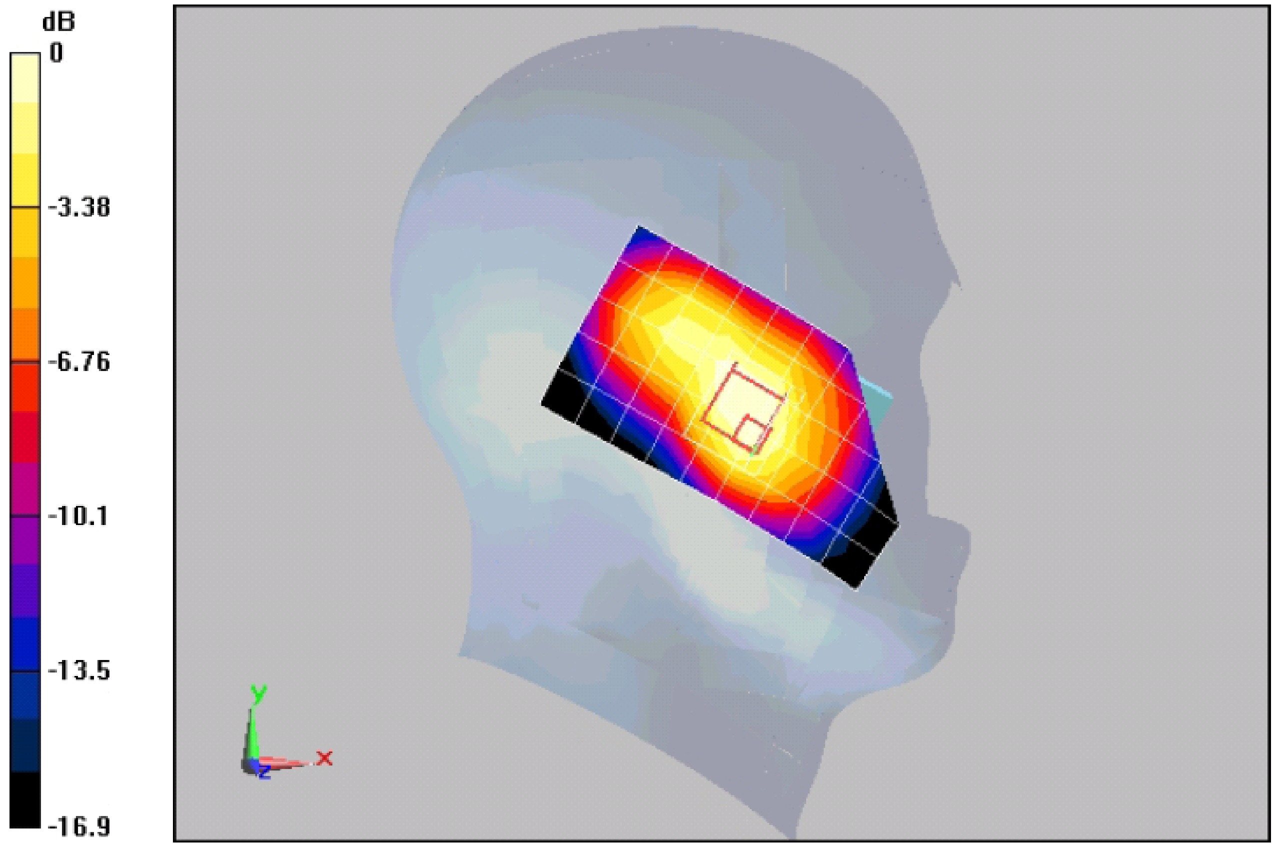
Annex 2 Measurement results (printout from DASY TM)

Annex 2.1 PCS 1900 MHz head

Date/Time: 2010-07-19 22:30:48

P1528_OET65_EN62209- LeftHandSide touched –GSM1900
DUT: HUAWEI U3200-9/U3200-9/HUAWEI U3200/U3200
Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; εr = 41.6; ρ = 1000 kg/m3
Phantom section: Left Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3168; ConvF(4.99, 4.99, 4.99); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.575 mW/g
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.6 V/m; Power Drift = 0.025 dB
Peak SAR (extrapolated) = 0.895 W/kg
SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.343 mW/g
Maximum value of SAR (measured) = 0.587 mW/g



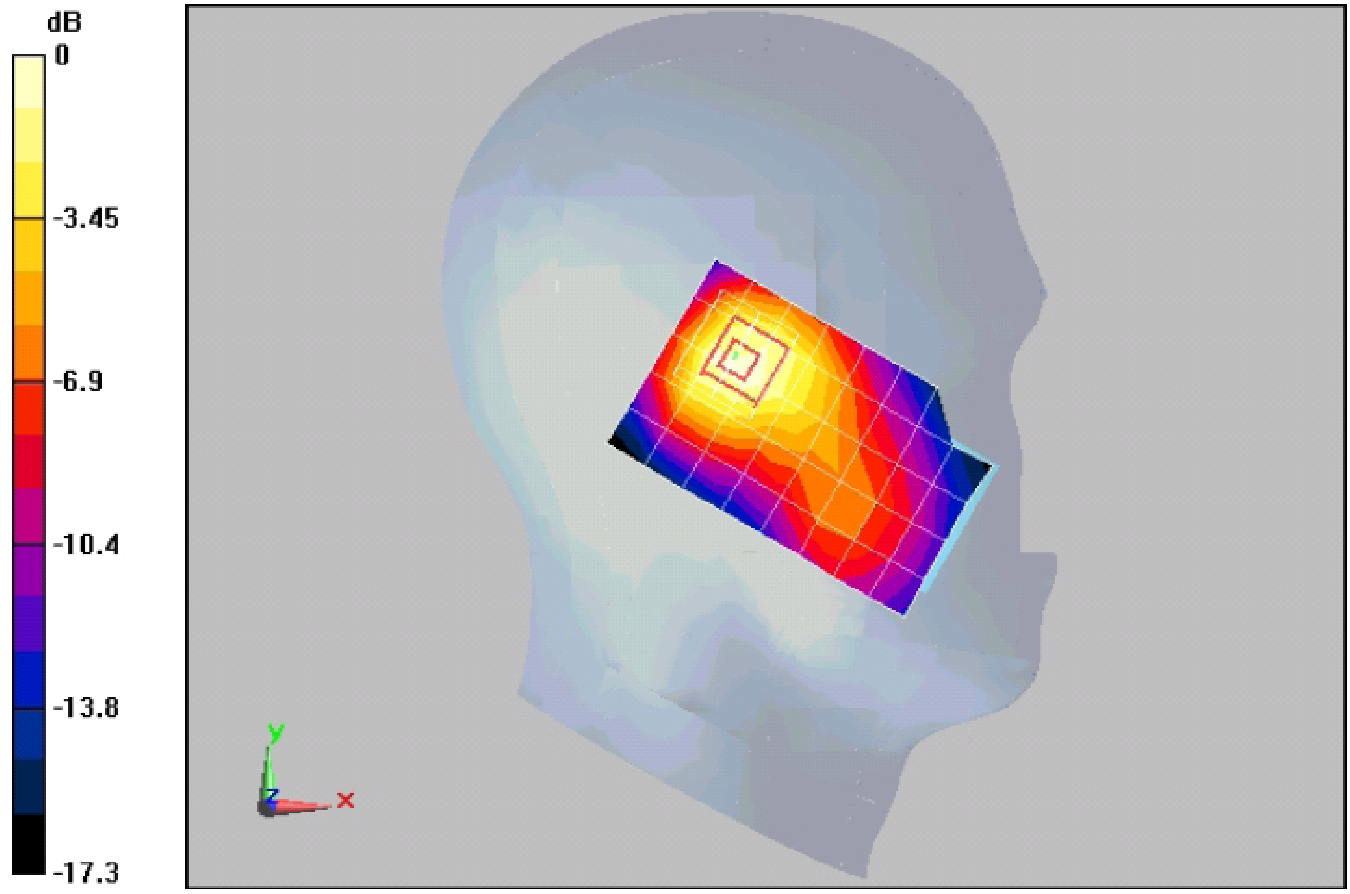
0 dB = 0.587mW/g

Additional information:
position or distance of DUT to SAM (if not standard head positions) :
ambient temperature: 22.0°C; liquid temperature: 21.5°C

Date/Time: 2010-07-19 23:05:23

P1528_OET65_EN62209- LeftHandSide tilted 15° –GSM1900
DUT: HUAWEI U3200-9/U3200-9/HUAWEI U3200/U3200
Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; εr = 41.6; ρ = 1000 kg/m3
Phantom section: Left Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3168; ConvF(4.99, 4.99, 4.99); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.288 mW/g
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.1 V/m; Power Drift = -0.040 dB
Peak SAR (extrapolated) = 0.430 W/kg
SAR(1 g) = 0.287 mW/g; SAR(10 g) = 0.176 mW/g
Maximum value of SAR (measured) = 0.311 mW/g



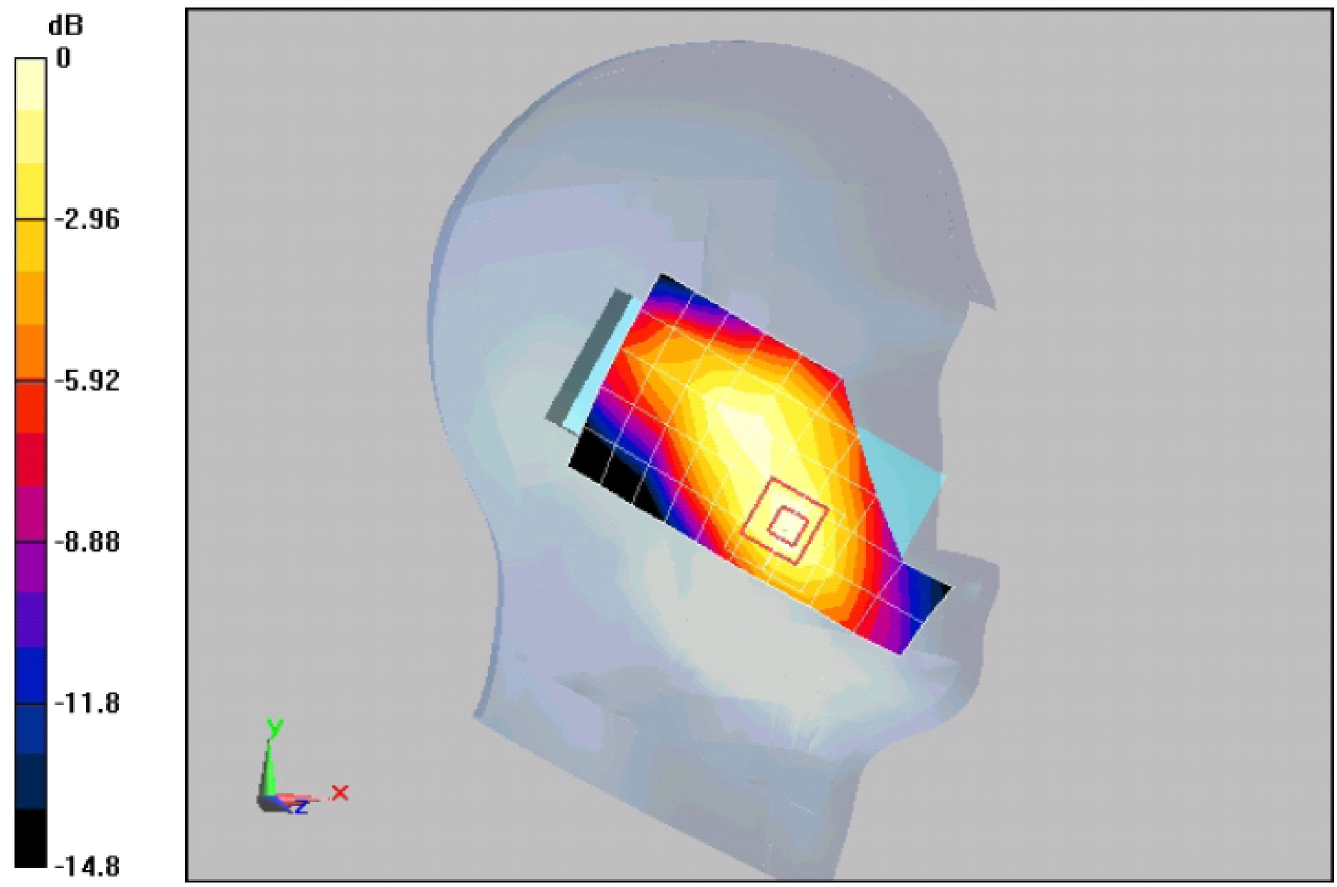
0 dB = 0.311mW/g

Additional information:
position or distance of DUT to SAM (if not standard head positions) :
ambient temperature: 22.0°C; liquid temperature: 21.5°C

Date/Time: 2010-07-19 23:55:48

P1528_OET65_EN62209- LeftHandSide touched –GSM1900
DUT: HUAWEI U3200-9/U3200-9/HUAWEI U3200/U3200
Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; εr = 41.6; ρ = 1000 kg/m3
Phantom section: Left Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3168; ConvF(4.99, 4.99, 4.99); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.298 mW/g
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.22 V/m; Power Drift = 0.045 dB
Peak SAR (extrapolated) = 0.470 W/kg
SAR(1 g) = 0.299 mW/g; SAR(10 g) = 0.180 mW/g
Maximum value of SAR (measured) = 0.323 mW/g



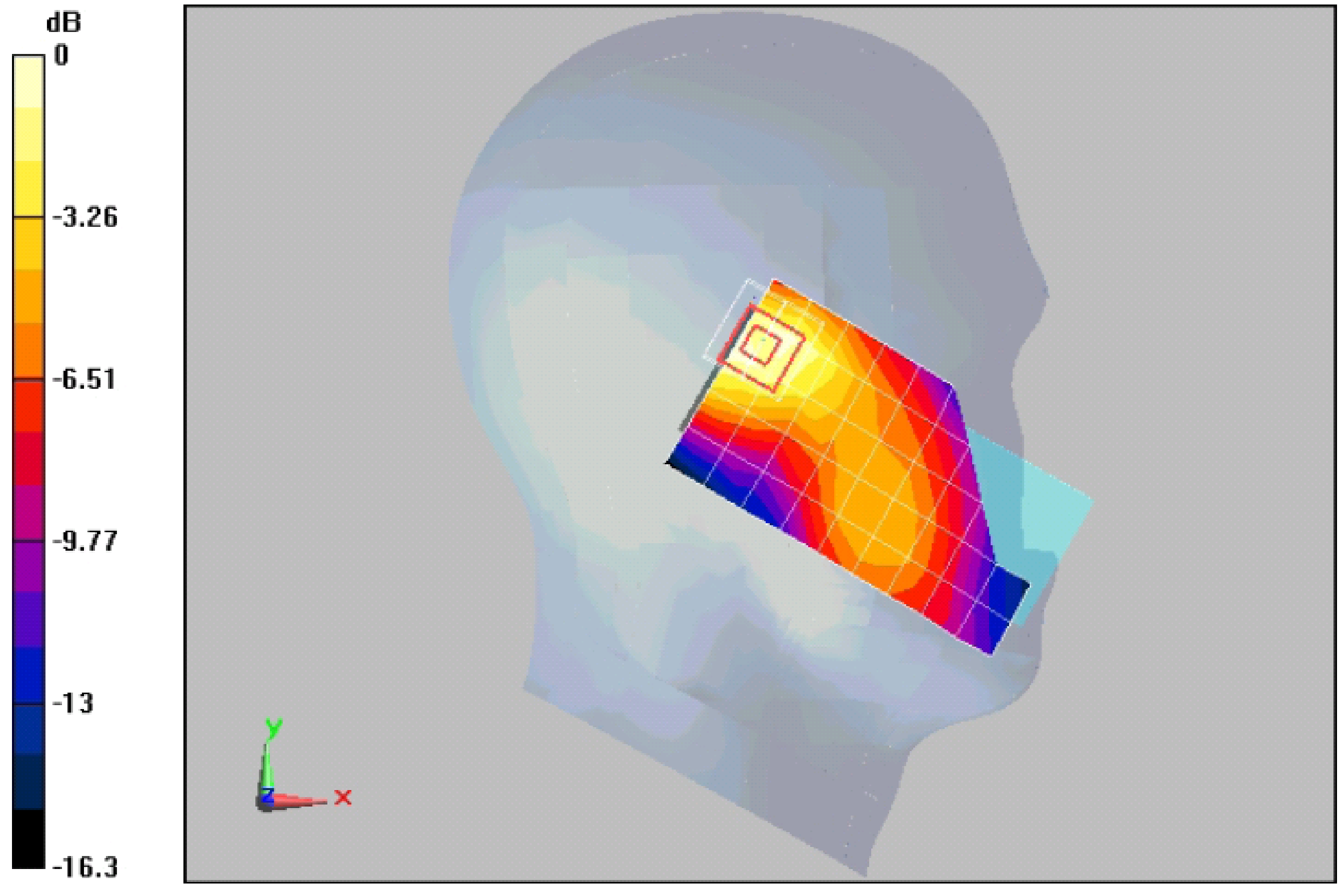
0 dB = 0.323mW/g

Additional information:
position or distance of DUT to SAM (if not standard head positions) :
ambient temperature: 22.0°C; liquid temperature: 21.5°C

Date/Time: 2010-07-20 00:35:23

P1528_OET65_EN62209- LeftHandSide tilted 15° –GSM1900
DUT: HUAWEI U3200-9/U3200-9/HUAWEI U3200/U3200
Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; εr = 41.6; ρ = 1000 kg/m3
Phantom section: Left Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3168; ConvF(4.99, 4.99, 4.99); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.159 mW/g
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10 V/m; Power Drift = -0.140 dB
Peak SAR (extrapolated) = 0.246 W/kg
SAR(1 g) = 0.162 mW/g; SAR(10 g) = 0.098 mW/g
Maximum value of SAR (measured) = 0.178 mW/g



0 dB = 0.178mW/g

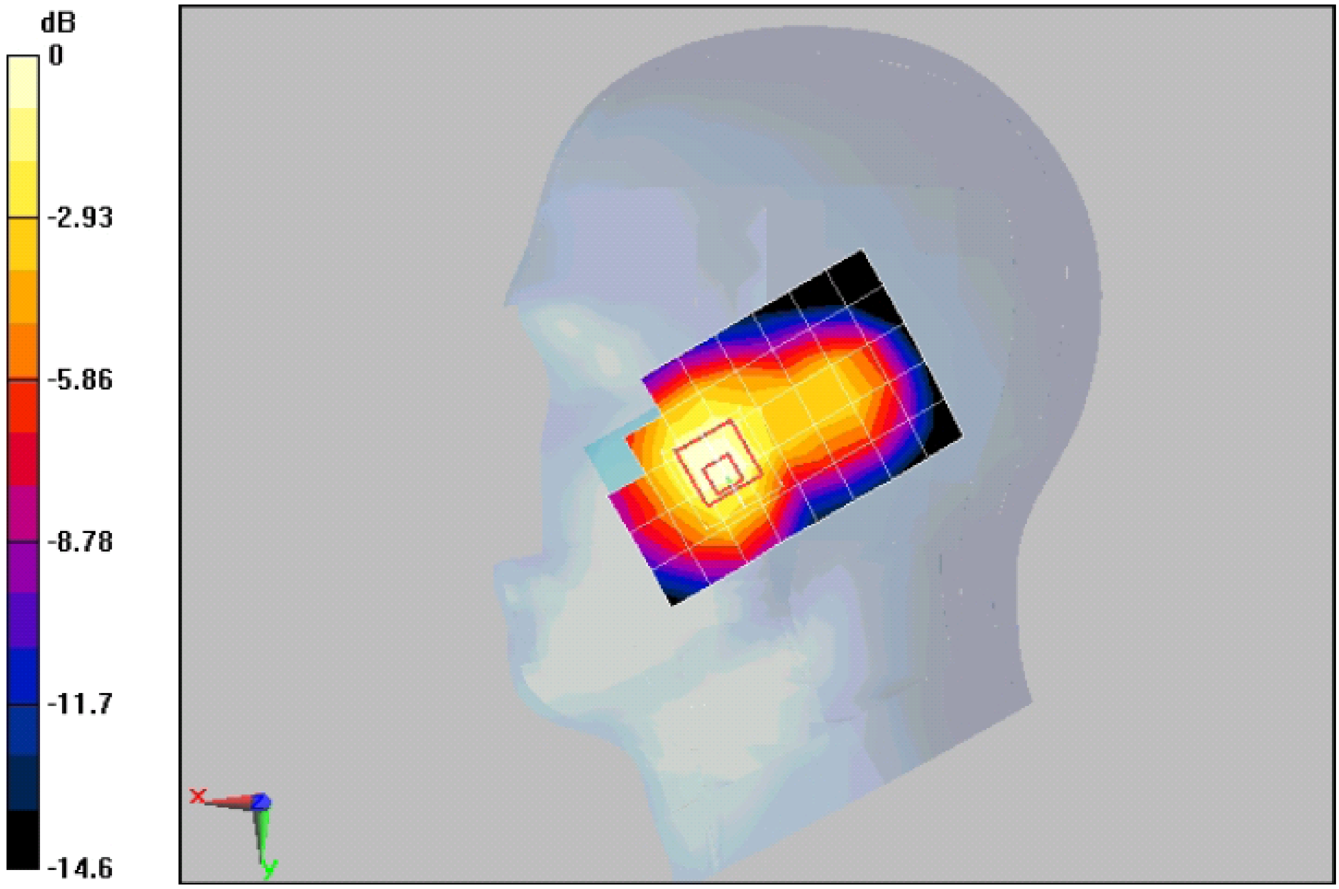
Additional information:
position or distance of DUT to SAM (if not standard head positions) :
ambient temperature: 22.0°C; liquid temperature: 21.5°C

Date/Time: 2010-07-20 01:15:35

P1528_OET65_EN62209- RightHandSide touched –GSM1900
DUT: HUAWEI U3200-9/U3200-9/HUAWEI U3200/U3200

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; εr = 41.6; ρ = 1000 kg/m3
Phantom section: Right Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3168; ConvF(4.99, 4.99, 4.99); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.497 mW/g
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.7 V/m; Power Drift = 0.068 dB
Peak SAR (extrapolated) = 0.781 W/kg
SAR(1 g) = 0.509 mW/g; SAR(10 g) = 0.312 mW/g
Maximum value of SAR (measured) = 0.554 mW/g



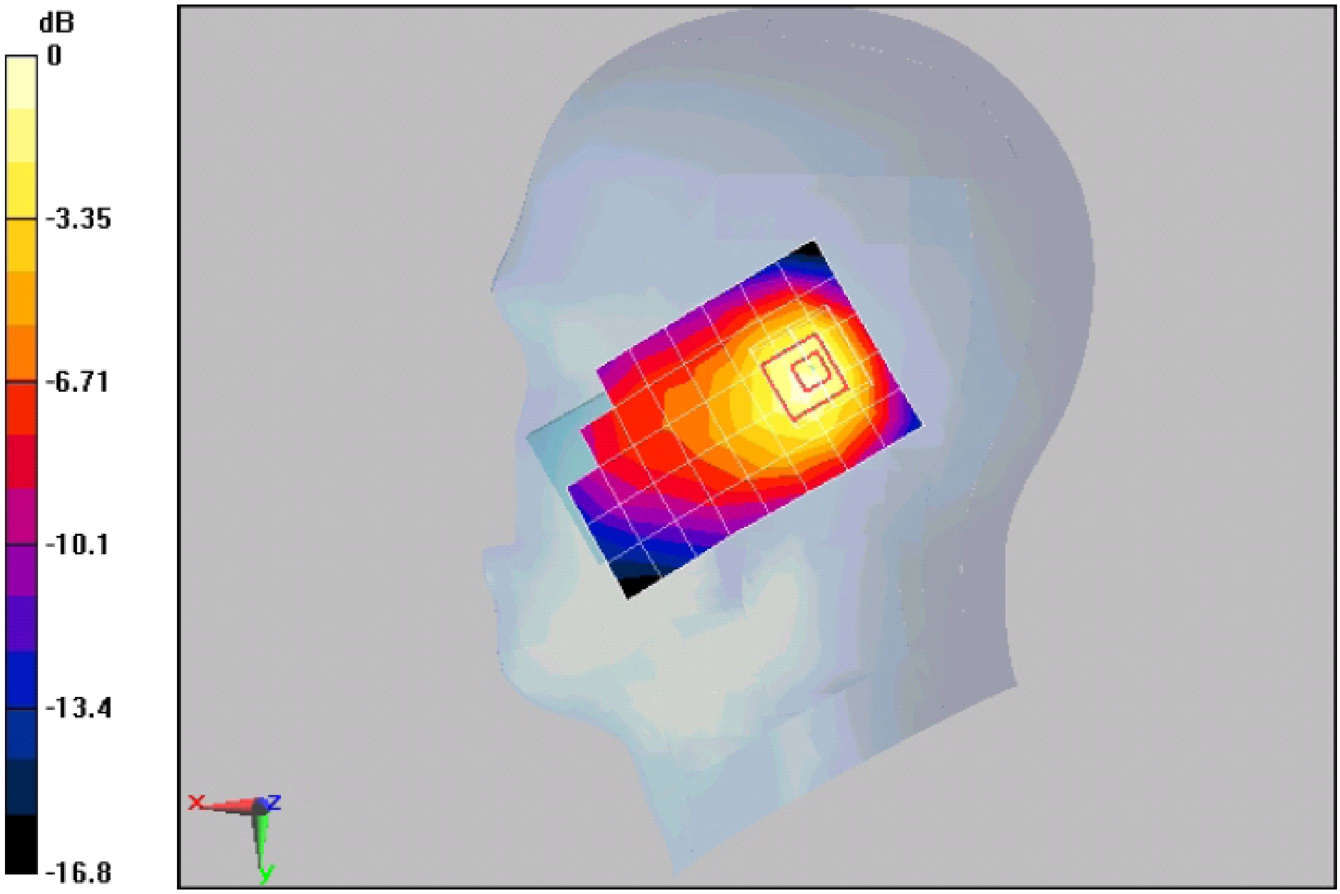
0 dB = 0.554mW/g

Additional information:
position or distance of DUT to SAM (if not standard head positions) :
ambient temperature: 22.0°C; liquid temperature: 21.5°C

Date/Time: 2010-07-20 03:45:23

P1528_OET65_EN62209- RightHandSide tilted 15° –GSM1900
DUT: HUAWEI U3200-9/U3200-9/HUAWEI U3200/U3200
Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; εr = 41.6; ρ = 1000 kg/m3
Phantom section: Right Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3168; ConvF(4.99, 4.99, 4.99); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.263 mW/g
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.7 V/m; Power Drift = -0.00403 dB
Peak SAR (extrapolated) = 0.413 W/kg
SAR(1 g) = 0.270 mW/g; SAR(10 g) = 0.162 mW/g
Maximum value of SAR (measured) = 0.295 mW/g



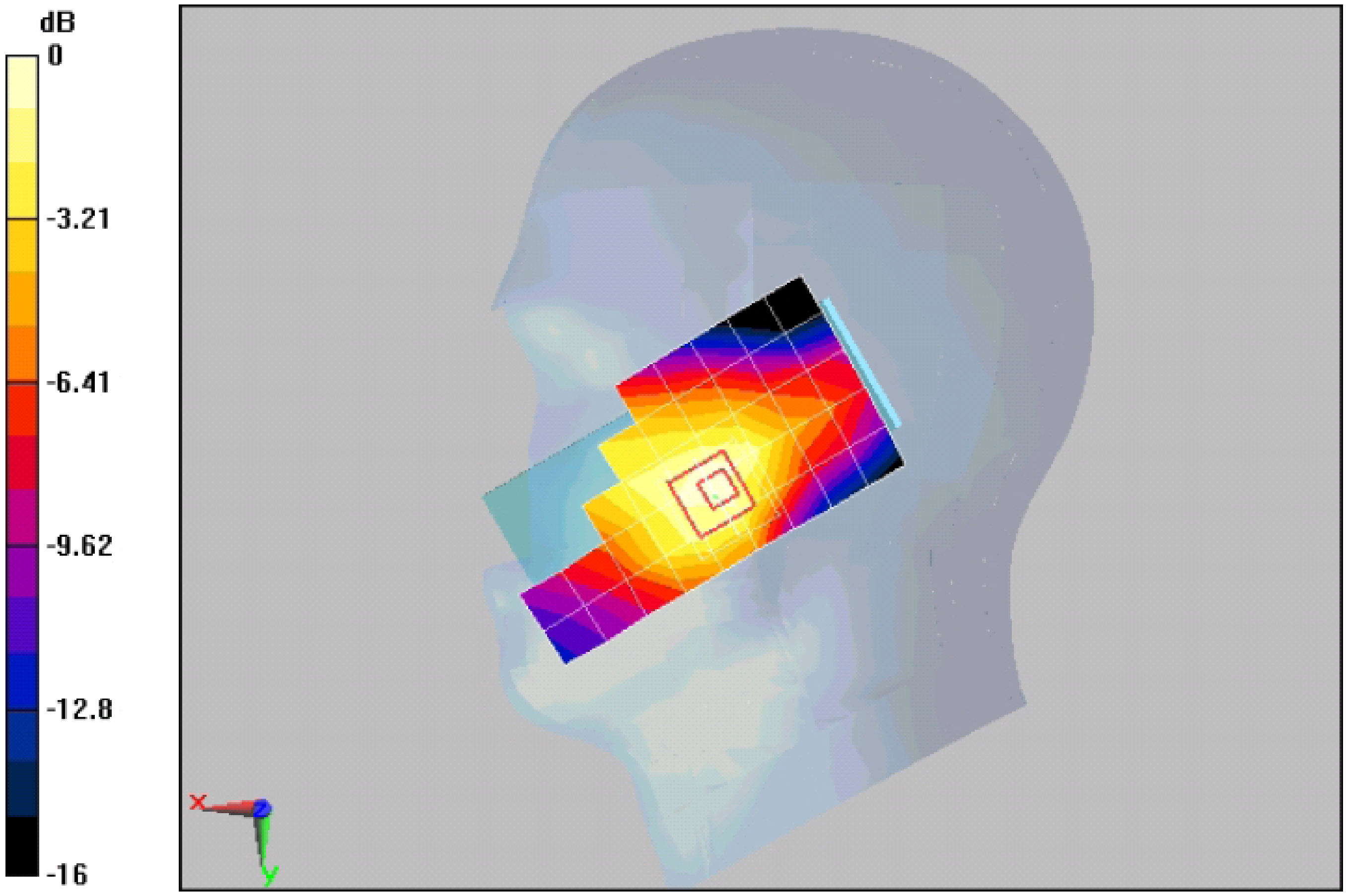
0 dB = 0.295mW/g

Additional information:
position or distance of DUT to SAM (if not standard head positions) :
ambient temperature: 22.0°C; liquid temperature: 21.5°C

Date/Time: 2010-07-20 04:25:35

P1528_OET65_EN62209- RightHandSide touched –GSM1900
DUT: HUAWEI U3200-9/U3200-9/HUAWEI U3200/U3200
Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; εr = 41.6; ρ = 1000 kg/m3
Phantom section: Right Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3168; ConvF(4.99, 4.99, 4.99); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.317 mW/g
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.37 V/m; Power Drift = 0.089 dB
Peak SAR (extrapolated) = 0.450 W/kg
SAR(1 g) = 0.304 mW/g; SAR(10 g) = 0.193 mW/g
Maximum value of SAR (measured) = 0.328 mW/g



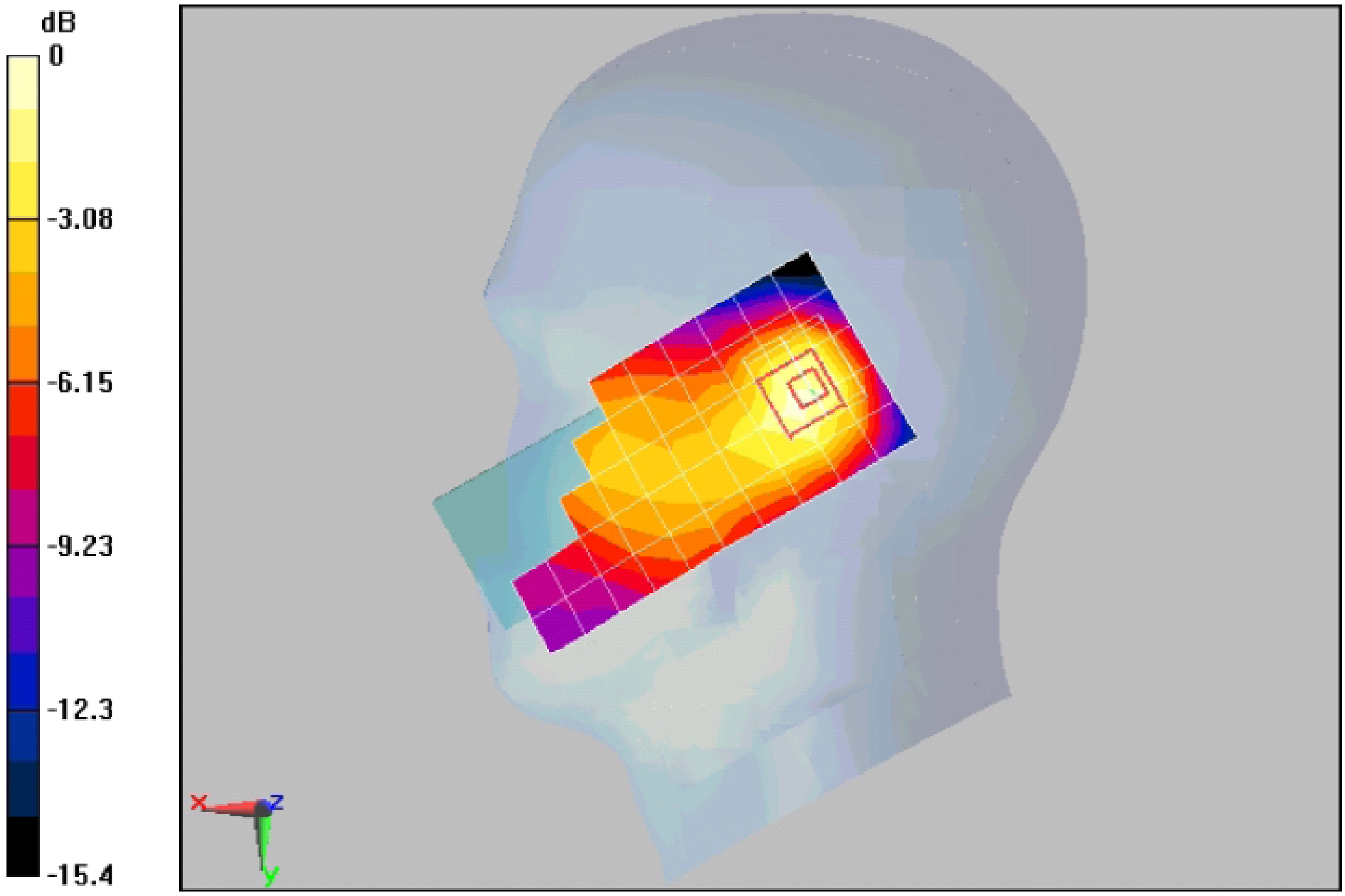
0 dB = 0.328mW/g

Additional information:
position or distance of DUT to SAM (if not standard head positions) :
ambient temperature: 22.0°C; liquid temperature: 21.5°C

Date/Time: 2010-07-20 05:13:23

P1528_OET65_EN62209- RightHandSide tilted 15° –GSM1900
DUT: HUAWEI U3200-9/U3200-9/HUAWEI U3200/U3200
Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; εr = 41.6; ρ = 1000 kg/m3
Phantom section: Right Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3168; ConvF(4.99, 4.99, 4.99); Calibrated: 12/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/18/2009
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

head/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.123 mW/g
head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.81 V/m; Power Drift = 0.022 dB
Peak SAR (extrapolated) = 0.184 W/kg
SAR(1 g) = 0.122 mW/g; SAR(10 g) = 0.075 mW/g
Maximum value of SAR (measured) = 0.132 mW/g



0 dB = 0.132mW/g

Additional information:
position or distance of DUT to SAM (if not standard head positions) :
ambient temperature: 22.0°C; liquid temperature: 21.5°C