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ilac-MRA CNAS TESTING No. L0310

Accredited testing laboratory

CNAS Registration number: L0310

Report On SAR Test of HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth M/N: HUAWEI U8500/U8500/HUAWEI U8500-6/U8500-6

Test report no.	:	**SYBH(Z-SAR)003032011-2**
Type identification	:	**HUAWEI U8500/U8500/ HUAWEI U8500-6/U8500-6**
FCC ID	:	**QISU8500-6**
Test specification	:	**IEEE 1528-2003**
	:	**ANSI C95.1-1999**
	:	**RSS-102 issue 4 (2010)**
	:	**OET Bulletin 65 Supplement C**

Table of Contents

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 U8500/U8500/HUAWEI U8500-6/U8500-6 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:

2011-04-25	**Gao Weiqiang**	Gao Weiqiang
Date	Name	Signature
2011-04-25	**Alvin Way**	Alvinway
Date	Name	Signature

Approved by:

2011-04-25	**Liu Chunlin**	Liu Chunlin
Date	Name	Signature

1.2 Testing laboratory

Lab Name: Global Compliance & Testing Center (GCTC) of Huawei Technologies Co., Ltd.
Sub-lab Name: SAR Lab of Terminal Reliability Lab
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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 Applicant and Manufacturer

Name: HUAWEI TECHNOLOGIES CO., LTD

Street: Huawei Base, Bantian, Longgang District
Town: Shenzhen
Country: P.R.China

1.4 Application details

Date of receipt of application:	2011-03-08
Date of receipt of test item:	2011-03-08
Start/Date of test:	2011-03-09
End of test:	2011-04-23

1.5 Test item

Device Information:			
DUT Name:	HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth		
Type Identification:	HUAWEI U8500/U8500/HUAWEI U8500-6/U8500-6		
FCC ID :	QISU8500-6		
IMEI No:	356859040000647		
Device Type :	portable device		
Exposure Category:	uncontrolled environment / general population		
Test device Production Information	production unit		
Device Operating Configurations:			
Operating Mode(s)	GSM850/1900,WCDMA850/1900 (Tested); Bluetooth, WiFi		
Test Modulation	GSM(GMSK), WCDMA(QPSK)		
Device Class	B		
(E)GPRS Multislot Class (10)	Max Number of Timeslots in Uplink		2
	Max Number of Timeslots in Downlink		4
	Max Total Timeslot		5
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM 1900	1850.2 ~1909.8	1930.2 ~1989.8
	GSM850	824.2 ~ 848.8	869.2 ~893.8
	WCDMA Band II	1852.4 ~1907.6	1932.4 ~1987.6
	WCDMA Band V	826.4 ~ 846.6	871.4 ~ 891.6
Power Class :	1,tested with power level 0 (GSM 1900)		
	4,tested with power level 5 (GSM 850)		
	3, tested with power control all up bits(WCDMA Band II)		
	3, tested with power control all up bits(WCDMA Band V)		
Test Channels (low-mid-high) :	512-661-810 (GSM 1900)		
	128-190-251(GSM 850)		
	9262-9400-9538(WCDMA Band II)		
	4132-4182-4233(WCDMA Band V)		
Hardware Version :	HD1U850M		
Software Version :	HUAWEI U8500 V100R001C54B710		
Antenna Type :	Integrated antenna		
Accessories/Body-worn Configurations:	Stereo headset		
Battery Options :	Huawei Technologies Co., Ltd. Rechargeable Li-ion Battery Model: HB5A2H ; Rated capacity: 1150mAh Nominal Voltage: ⎓ +3.7V; Charging Voltage: ⎓ +4.2V S/N: YACA501HI1828342		
Charger Options:	Manufacturer: Huawei Technologies Co., Ltd. AC/DC Adapter Model: HW-050100U1W Input Voltage: ~100-240V 50/60Hz 0.2A Output Voltage: ⎓ +5.0V，1A ; Rated Power: 5W S/N: HKAA51555782		

Table 1: Device information and operating configurations

1.6 EUT Description

HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth-HUAWEI U8500/ U8500/HUAWEI U8500-6/U8500-6 is subscriber equipment in the WCDMA/GSM system. The HSDPA frequency bands are Band I and Band II and Band V, but only Band II and Band V test data included in this report. The GSM/GPRS/EDGE frequency bands include 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, HSDPA and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, GPS, and WIFI 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.

1.7 Test specification(s)

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

IEEE 1528-2003 (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

Supplement C, Edition 01-01 to OET Bulletin 65,Edition 97-01 June 2001: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions.

RSS-102: Radio Frequency Exposure Compliance of Radiocommunication Apparatus
(All Frequency Bands (Issue 4 of March 2010).

941225 D01 SAR test for 3G devices v02 ,Published on Nov 13 2009.

941225 D03 SAR Test Reduction GSM GPRS EDGE vo1 ,Published on Nov 13 2009.

941225 D06 Hot Spot SAR v01, Published on Apr 4 2011.

648474 D01 SAR Evaluation Considerations for Mobile Phones with Multiple Transmitters and Antennas.

1.7.1 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 2: RF exposure limits

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

Notes:

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

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

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

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

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

1.8 Operating conditions during test

1.8.1 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 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.

1.8.2 GSM Test Configurations

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a base station by air link. Using CMU200 the power lever is set to “5”and “0” in SAR of GSM 850 and GSM 1900. The tests in the band of GSM 850 and GSM 1900 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 10 for this EUT, it has at most 2 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. The EGPRS class is 10 for this EUT, it has at most 2 timeslots in uplink, and at most 4 timeslots in downlink, the maximum total timeslot is 5.

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

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot. The allowed power reduction in the multi-slot configuration is as following:

GSM1900	Reduction of maximum output power, (dB)		
Number of timeslots in uplink assignment	GPRS (GMSK）	EGPRS (8PSK)	EGPRS (GMSK)
1	0	0	0
2	0	0	0

Table 3: The allowed power reduction in the multi-slot configuration of GSM1900

GSM850	Reduction of maximum output power, (dB)		
Number of timeslots in uplink assignment	GPRS (GMSK）	EGPRS (8PSK)	EGPRS (GMSK)
1	0	0	0
2	3	0	3

Table 4: The allowed power reduction in the multi-slot configuration of GSM850

1.8.3 WCDMA Test Configurations

1) WCDMA

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

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

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

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

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

2) HSDPA

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

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

Sub-test	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: Δ ACK, Δ NACK and Δ CQI = 8 , A_{hs} = β_{hs}/β_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

Table 5: Sub-tests for UMTS Release 5 HSDPA

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

Table 6: settings of required H-Set 1 QPSK acc. to 3GPP 34.121

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

Table 7: HSDPA UE category

HSDPA	Reduction of maximum output power, (dB)			
	Sub—test 1	Sub—test 2	Sub—test 3	Sub—test 4
WCDMA 850	0.5	0.5	1	1
WCDMA1900	0	1	1	1

Table 8: The allowed power reduction in HSDPA mode of W850 and W1900

2 Technical test

2.1 Summary of test results

Band	SAR_{1g} (W/kg)			Test Result
	Head	Body-worn accessory(10mm)	Mobile hotspot device use(10mm)	
GSM 1900	0.488	1.090	1.090	PASS
GSM 850	**1.040**	**1.160**	**1.160**	
WCDMA Band II	0.754	0.807	0.807	
WCDMA Band V	0.654	0.748	0.748	

Table 9: The Maximum SAR1g Values for Head and Body position

Band		Maximum Conducted Power (dBm)	Maximum Average Power (dBm)
GSM 1900	GSM	30.11	21.11
	GPRS,2TS	30.10	24.10
	EGPRS (GMSK), 2TS	30.10	24.10
	EGPRS (8PSK), 2TS	26.71	20.71
GSM850	GSM	33.23	24.23
	GPRS,2TS	30.73	24.73
	EGPRS (GMSK) ,2TS	30.69	24.69
	EGPRS (8PSK) ,2TS	27.81	21.81
WCDMA1900	RMC (QPSK)	22.85	/
WCDMA1900 HSDPA	RMC (QPSK)	22.82	/
WCDMA850	RMC (QPSK)	22.80	/
WCDMA850 HSDPA	RMC (QPSK)	22.80	/

Table 10: The Maximum Conducted Power and Average Power

2.2 Test environment

General Environment conditions in the test area are as follows:

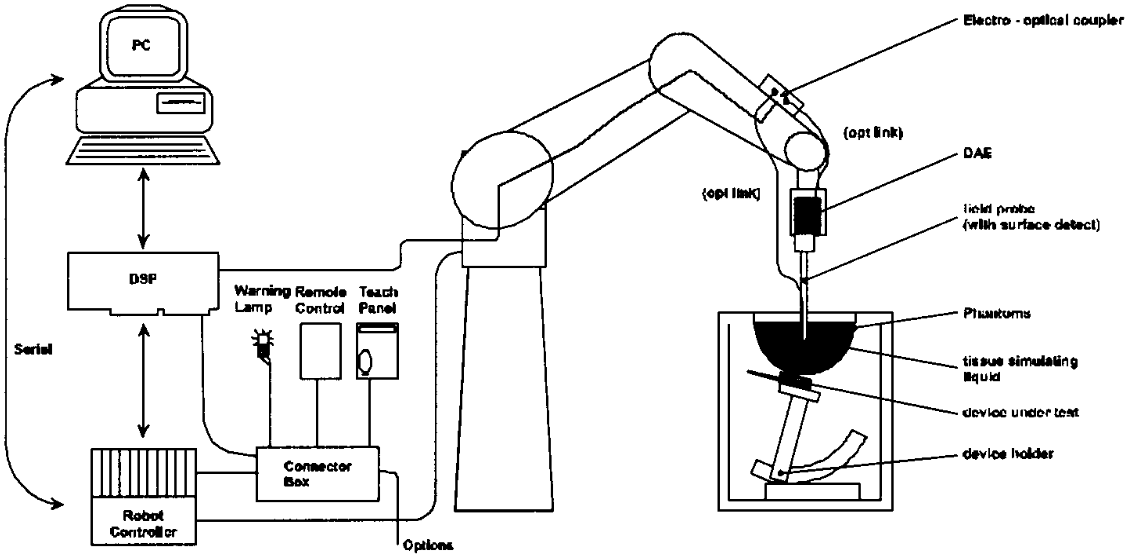
Ambient temperature: 20°C – 24°C
Tissue simulating liquid: 20°C – 24°C
Humidity: 30% – 70%
Exact temperature values for each test are shown in the table(s) under 2.5. and/or on the measurement plots.

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

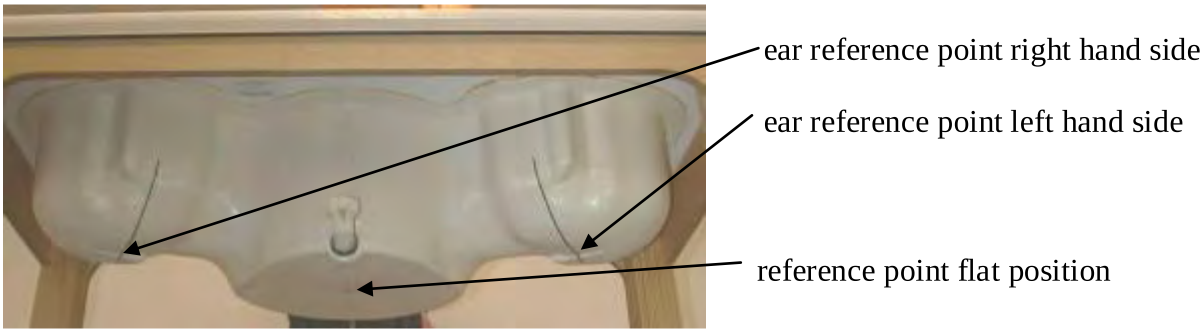
Technical data according to manufacturer information	
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)
Calibration	In air from 10 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.



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	2010-12-23
☒	Schmid & Partner Engineering AG	835 MHz System Validation Dipole	D835V2	4d095	2011-02-23
☐	Schmid & Partner Engineering AG	900 MHz System Validation Dipole	D900V2	1d063	2011-02-23
☐	Schmid & Partner Engineering AG	1800 MHz System Validation Dipole	D1800V2	2d157	2011-02-23
☒	Schmid & Partner Engineering AG	1900 MHz System Validation Dipole	D1900V2	5d091	2011-02-23
☐	Schmid & Partner Engineering AG	2000 MHz System Validation Dipole	D2000V2	1036	2011-02-23
☐	Schmid & Partner Engineering AG	2300 MHz System Validation Dipole	D2300V2	1016	2010-09-21
☐	Schmid & Partner Engineering AG	Data acquisition electronics	DAE4	851	2010-06-30
☒	Schmid & Partner Engineering AG	Data acquisition electronics	DAE4	852	2010-12-24
☒	Schmid & Partner Engineering AG	Software	DASY 5	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	2010-08-11
☒	Agilent)*	Network Analyser 300 kHz to 8.5 GHz	E5071B	MY42404956	2011-02-22
☒	Agilent	Dielectric Probe Kit	85070E	2484	N/A
☒	Agilent	Signal Generator	N5181A	MY47420989	2011-02-22
☒	MINI-CIRCUITS	Amplifier	ZHL-42W	QA0746001	N/A
☒	Agilent	Power Meter	E4417A	MY45101339	2011-02-22
☒	Agilent	Power Meter Sensor	E9321A	MY44420359	2011-02-22

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

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

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

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

Table 11: 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

Table 12: 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	39.36	1.401	2011-03-11
835	41.5	0.90	41.37	0.876	2011-03-09
835	41.5	0.90	42.69	0.889	2011-03-15
835	41.5	0.90	42.07	0.881	2011-04-21

Table 13: 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	51.27	1.514	2011-03-09
1900	53.3	1.52	53.94	1.531	2011-04-23
835	55.2	0.97	52.45	0.960	2011-03-13
835	55.2	0.97	52.50	0.961	2011-03-14
835	55.2	0.97	53.60	0.966	2011-04-21
835	55.2	0.97	53.27	0.957	2011-04-22

Table 14:Parameter of the body tissue simulating liquid

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

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 Uncertainty 10g	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%**	

Table 15: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 Uncertainty 10g	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%**	

Table 16: Measurement uncertainties

2.4.14 System check

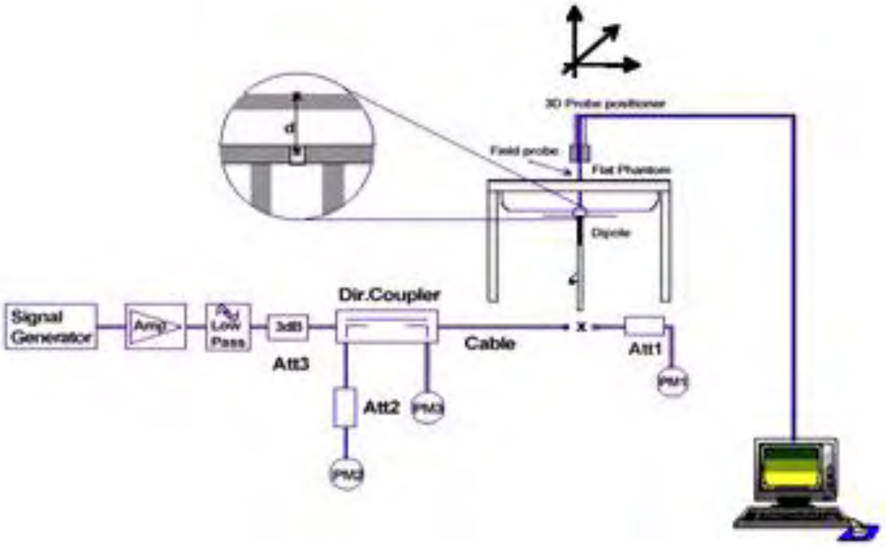
The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system validation is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows validation results for all frequency bands and tissue liquids used during the tests 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	9.90mW/g	5.10mW/g	9.88mW/g	5.08mW/g	2011-03-11
D1900V2 S/N: 5d091	1900 MHz Body	10.2mW/g	5.24mW/g	10.2mW/g	5.27mW/g	2011-03-09
D1900V2 S/N: 5d091	1900 MHz Body	10.2mW/g	5.24mW/g	10.0mW/g	5.17mW/g	2011-04-23
D835V2 S/N: 4d095	835 MHz Head	2.39mW/g	1.54mW/g	2.50mW/g	1.64mW/g	2011-03-09
D835V2 S/N: 4d095	835 MHz Head	2.39mW/g	1.54mW/g	2.53mW/g	1.65mW/g	2011-04-21
D835V2 S/N: 4d095	835 MHz Body	2.47mW/g	1.61mW/g	2.57mW/g	1.70mW/g	2011-03-13
D835V2 S/N: 4d095	835 MHz Head	2.39mW/g	1.54mW/g	2.57mW/g	1.69mW/g	2011-03-11
D835V2 S/N: 4d095	835 MHz Body	2.47mW/g	1.61mW/g	2.68mW/g	1.76mW/g	2011-03-14
D835V2 S/N: 4d095	835 MHz Body	2.47mW/g	1.61mW/g	2.58mW/g	1.70mW/g	2011-04-21
D835V2 S/N: 4d095	835 MHz Body	2.47mW/g	1.61mW/g	2.55mW/g	1.68mW/g	2011-04-22

Table 17:Results system Check

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		Conducted power (dBm)			Averaged power(dBm)		
		Channel 512	Channel 661	Channel 810	Channel 512	Channel 661	Channel 810
Before test		29.95	30.11	30.04	20.95	**21.11**	21.04
After test		29.97	30.10	30.00	20.97	21.10	21.00
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	29.95	30.11	30.02	20.95	21.11	21.02
	After test	29.97	30.08	30.00	20.97	21.08	21.00
2 TX slots	Before test	29.91	30.10	30.01	23.91	**24.10**	24.01
	After test	29.87	30.07	29.97	23.87	24.07	23.97
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	29.96	30.12	30.06	20.96	21.12	21.06
	After test	29.95	30.15	30.10	20.95	21.15	21.10
2 TX slots	Before test	29.92	30.09	30.02	23.92	24.09	24.02
	After test	29.90	30.07	30.10	23.90	24.07	**24.10**
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	26.57	26.72	26.66	17.57	17.72	17.66
	After test	26.59	26.70	26.70	17.59	17.70	17.70
2 TX slots	Before test	26.53	26.68	26.69	20.53	20.68	20.69
	After test	26.50	26.70	26.71	20.50	20.70	**20.71**

Table 18: Test results conducted power measurement GSM1900MHz

GSM 850 MHz

GSM850		Conducted power (dBm)			Averaged power(dBm)		
		Channel 128	Channel 190	Channel 251	Channel 128	Channel 190	Channel 251
Before test		33.23	33.01	32.90	**24.23**	24.01	23.90
After test		33.21	33.03	32.92	24.21	24.03	23.92
GSM850 GPRS (GMSK)		Conducted power (dBm)			Averaged power(dBm)		
		Channel 128	Channel 190	Channel 251	Channel 128	Channel 190	Channel 251
1TX slot	Before test	33.25	32.99	32.88	24.25	23.99	23.88
	After test	33.23	32.97	32.86	24.23	23.97	23.86
2 TX slots	Before test	30.73	30.53	30.31	**24.73**	24.53	24.31
	After test	30.71	30.55	30.33	24.71	24.55	24.33
GSM850 EGPRS (GMSK)		Conducted power (dBm)			Averaged power(dBm)		
		Channel 128	Channel 190	Channel 251	Channel 128	Channel 190	Channel 251
1TX slot	Before test	33.19	32.98	32.87	24.19	23.98	23.87
	After test	33.18	32.99	32.84	24.18	23.99	23.84
2 TX slots	Before test	30.69	30.49	30.29	**24.69**	24.49	24.29
	After test	30.66	30.51	30.33	24.66	24.51	24.33
GSM850 EGPRS (8PSK)		Conducted power (dBm)			Averaged power(dBm)		
		Channel 128	Channel 190	Channel 251	Channel 128	Channel 190	Channel 251
1TX slot	Before test	27.85	27.71	27.56	18.85	18.71	18.56
	After test	27.84	27.73	27.55	18.84	18.73	18.55
2 TX slots	Before test	27.81	27.65	27.49	**21.81**	21.65	21.49
	After test	27.80	27.66	27.51	21.80	21.66	21.51

Table 19: Test results conducted power measurement GSM850MHz

WCDMA Band II

WCDMA Band II		Conducted Power (dBm)		
		Channel 9262	Channel 9400	Channel 9538
12.2kbps RMC	Before test	22.83	22.58	22.63
	After test	**22.85**	22.59	22.67
64kbps RMC	Before test	22.78	22.72	22.68
	After test	22.76	22.70	22.69
144kbps RMC	Before test	22.77	22.66	22.67
	After test	22.70	22.60	22.69
384kbps RMC	Before test	22.79	22.68	22.70
	After test	22.80	22.65	22.72
WCDMA Band II+HSDPA		Conducted Power (dBm)		
		Channel 9262	Channel 9400	Channel 9538
Sub Test - 1	Before test	**22.82**	22.59	22.62

	After test	22.80	22.63	22.67
Sub Test - 2	Before test	21.74	21.75	21.80
	After test	21.78	21.80	21.76
Sub Test - 3	Before test	21.95	21.81	21.82
	After test	21.91	21.87	21.80
Sub Test - 4	Before test	21.87	21.77	21.72
	After test	21.82	21.73	21.78

Table 20: Conducted power measurement result (WCDMA 1900)

WCDMA Band V

WCDMA Band V		Conducted Power (dBm)		
		Channel 4132	Channel 4182	Channel 4233
12.2kbps RMC	Before test	22.79	22.46	22.59
	After test	**22.80**	22.49	22.64
64kbps RMC	Before test	22.73	22.43	22.58
	After test	22.78	22.49	22.61
144kbps RMC	Before test	22.78	22.39	22.57
	After test	22.79	22.37	22.61
384kbps RMC	Before test	22.73	22.42	22.59
	After test	22.79	22.48	22.61
WCDMA Band V+HSDPA		Conducted Power (dBm)		
		Channel 4132	Channel 4182	Channel 4233
Sub Test - 1	Before test	22.33	21.97	21.96
	After test	**22.37**	22.01	21.98
Sub Test - 2	Before test	22.31	21.91	21.98
	After test	22.37	21.98	22.04
Sub Test - 3	Before test	22.03	21.68	21.82
	After test	22.08	21.74	21.90
Sub Test - 4	Before test	21.98	21.64	21.79
	After test	21.90	21.70	21.83

Table 21:Conducted power measurement result (WCDMA 850)

Note: 1) The maximum average power numbers are marks in bold.

2) 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 2.5.3.

3) For SAR testing, the EUT was set to multislot class based on the maximum averaged conducted power.

2.5.3 SAR Test results

GSM 1900

Test Position of Head	Test channel /Frequency	Test Mode	1-g SAR Value (W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Left hand cheek	810 / 1909.8 MHz	GSM	0.488	0.008	1.6	21.6°C
	661 /1880.0 MHz	GSM	0.481	-0.127	1.6	21.6°C
	512 / 1850.2 MHz	GSM	0.395	-0.007	1.6	21.6°C
Left hand tilted15°	661 /1880.0 MHz	GSM	0.240	-0.088	1.6	21.6°C
Right hand cheek	661 /1880.0 MHz	GSM	0.387	0.128	1.6	21.6°C
Right hand tilted15°	661 /1880.0 MHz	GSM	0.230	0.130	1.6	21.6°C

Table 22:Test results (Head SAR)

Test Position of Body (15mm)	Test channel /Frequency	Test Mode	1-g SAR Value (W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Towords Phantom	661 / 1880.0 MHz	GPRS 1TS	0.246	0.131	1.6	21.8°C
Towords Ground	661 / 1880.0 MHz	GPRS 1TS	0.341	0.046	1.6	21.8°C
Towords Ground	810 / 1909.8 MHz	GPRS 2TS	0.709	-0.018	1.6	21.8°C
	661 / 1880.0 MHz		0.646	-0.078	1.6	21.8°C
	512 / 1850.2 MHz		0.527	-0.099	1.6	21.8°C
Towords Ground	661 / 1880.0 MHz	EDGE 1TS	0.339	0.107	1.6	21.8°C
Towords Ground	810 / 1909.8 MHz	EDGE 2TS	0.728	-0.080	1.6	21.8°C
	661 / 1880.0 MHz		0.660	-0.080	1.6	21.8°C
	512 / 1850.2 MHz		0.273	-0.055	1.6	21.8°C
Towords Ground with Headset	810 / 1909.8 MHz	GSM	0.402	-0.058	1.6	21.8°C
Towords Ground with BT Headset	810 / 1909.8 MHz	GSM	0.386	0.100	1.6	21.8°C

Table 23:Test results (Body-worn accessory with 15mm separation distance)

Test Position of Body (10mm)	Test channel /Frequency	Test Mode	1-g SAR Value (W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Towords Phantom	661/1880 MHz	GPRS 2TS	0.738	0.045	1.6	21.5°C
Towords Ground	810/1909.8 MHz	GPRS 2TS	1.090	0.054	1.6	21.5°C
	661/1880 MHz		0.963	-0.035	1.6	21.5°C
	512/1850.2 MHz		0.871	0.064	1.6	21.5°C
Left edge	661/1880 MHz	GPRS 2TS	0.306	-0.072	1.6	21.5°C
Right edge	661/1880 MHz	GPRS 2TS	0.338	-0.007	1.6	21.5°C
Bottom edge	661/1880 MHz	GPRS 2TS	0.764	-0.015	1.6	21.5°C
Towords Ground	810/1909.8 MHz	EGPRS 2TS	1.090	0.046	1.6	21.5°C

Table 24:Test results (Body SAR for Mobile hotspot device use with 10mm separation distance)

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) Per KDB941225 D06 Hot Spot SAR v01, WiFi antenna is located at top edge;antenna-to-top edge distance is more than 2.5cm,when the antenna-to-edge distance is greater than 2.5,such position does not need to be tested. Top Edge with 1cm separation distance is excluded from SAR evaluation.

GSM 850

Test Position of Head	Test channel /Frequency	Test Mode	1-g SAR Value (W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Left hand cheek	251 / 848.8MHz	GSM	1.040	-0.058	1.6	21.7°C
	190 / 836.6 MHz	GSM	0.891	-0.168	1.6	21.7°C
	128 / 824.2MHz	GSM	0.628	0.024	1.6	21.7°C
Left hand tilted15°	190 / 836.6 MHz	GSM	0.499	0.000	1.6	21.7°C
Right hand cheek	190 / 836.6 MHz	GSM	0.748	0.071	1.6	21.7°C
Right hand tilted15°	190 / 836.6 MHz	GSM	0.453	-0.053	1.6	21.7°C

Table 25:Test results (Head SAR)

Test Position of Body (15mm)	Test channel /Frequency	Test Mode	1-g SAR Value(W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Towords Phantom	190/836.6 MHz	GPRS 1TS	0.631	-0.078	1.6	21.7°C
Towords Ground	251/848.8 MHz	GPRS 1TS	0.774	0.026	1.6	21.7°C
	190/836.6 MHz		0.843	0.031	1.6	21.7°C
	128/824.2 MHz		0.737	0.090	1.6	21.7°C
Towords Ground	251/848.8 MHz	GPRS 2TS	0.827	0.069	1.6	21.7°C
	190/836.6 MHz		0.910	-0.072	1.6	21.7°C
	128/824.2 MHz		0.806	-0.049	1.6	21.7°C
Towords Ground	251/848.8 MHz	EGPRS 1TS	0.779	0.046	1.6	21.7°C
	190/836.6 MHz		0.851	-0.009	1.6	21.7°C
	128/824.2 MHz		0.741	0.043	1.6	21.7°C
Towords Ground	251/848.8 MHz	EGPRS 2TS	0.851	0.029	1.6	21.7°C
	190/836.6 MHz		0.921	-0.026	1.6	21.7°C
	128/824.2 MHz		0.804	-0.087	1.6	21.7°C
Towords Ground with Headset	190/836.6 MHz	GSM	0.658	0.039	1.6	21.7°C
Towords Ground with BT Headset	190/836.6 MHz	GSM	0.868	0.032	1.6	21.7°C

Table 26:Test results (Body-worn accessory with 15mm separation distance)

Test Position of Body (10mm)	Test channel /Frequency	Test Mode	1-g SAR Value (W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Towords Phantom	251/848.8 MHz	GPRS 2TS	0.687	-0.136	1.6	21.7°C
	190/836.6 MHz		0.824	-0.040	1.6	21.7°C
	128/824.4 MHz		0.504	-0.040	1.6	21.7°C
Towords Ground	251/848.8 MHz	GPRS 2TS	1.040	0.057	1.6	21.7°C
	190/836.6 MHz		1.160	0.025	1.6	21.7°C
	128/824.4 MHz		1.080	0.013	1.6	21.7°C
Left edge	190/836.6 MHz	GPRS 2TS	0.784	0.042	1.6	21.7°C
Right edge	190/836.6 MHz	GPRS 2TS	0.726	-0.015	1.6	21.7°C
Bottom edge	190/836.6 MHz	GPRS 2TS	0.138	0.039	1.6	21.7°C
Towords Ground	190/836.6 MHz	EGPRS 2TS	1.150	-0.056	1.6	21.7°C

Table 27: Test results (Body SAR for Mobile hotspot device use with 10mm separation distance)

Note: 1) The value with blue colour is the maximum SAR value of each test band.

2) 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.

3) Per KDB941225 D06 Hot Spot SAR v01, WiFi antenna is located at top edge;antenna-to-top edge distance is more than 2.5cm,when the antenna-to-edge distance is greater than 2.5,such position does not need to be tested. Top Edge with 1cm separation distance is excluded from SAR evaluation.

WCDMA 1900

Test Position of Head	Test channel /Frequency	Test Mode	1-g SAR Value (W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Left hand cheek	9538 /1907.6 MHz	RMC	0.733	-0.180	1.6	21.7°C
	9400 /1880 MHz	RMC	0.754	0.016	1.6	21.7°C
	9262 /1852.4 MHz	RMC	0.693	-0.054	1.6	21.7°C
Left hand tilted15°	9400 /1880 MHz	RMC	0.374	-0.025	1.6	21.7°C
Right hand cheek	9400 /1880 MHz	RMC	0.657	-0.040	1.6	21.7°C
Right hand tilted15°	9400 /1880 MHz	RMC	0.373	-0.079	1.6	21.7°C

Table 28:Test results (Head SAR)

Test Position of Body (15mm)	Test channel /Frequency	Test Mode	1-g SAR Value(W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Towords Phantom	9400 /1880 MHz	RMC	0.415	0.051	1.6	21.6°C
Towords Ground	9538 /1907.6 MHz	RMC	0.615	-0.037	1.6	21.6°C
	9400 /1880 MHz		0.570	-0.088	1.6	21.6°C
	9262 /1852.4 MHz		0.479	-0.042	1.6	21.6°C
Towords Ground	9538 /1907.6 MHz	HSDPA	0.604	0.104	1.6	21.6°C
Towords Ground with Headset	9538 /1907.6 MHz	RMC	0.542	-0.042	1.6	21.6°C
Towords Ground with BT Headset	9538 /1907.6 MHz	RMC	0.596	0.037	1.6	21.6°C

Table 29:Test results (Body-worn accessory with 15mm separation distance)

Test Position of Body(10mm)	Test channel /Frequency	Test Mode	1-g SAR Value (W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Towords Phantom	9400/1880 MHz	RMC	0.563	0.085	1.6	21.5°C
Towords Ground	9538/1907.6 MHz	RMC	0.807	0.025	1.6	21.5°C
	9400/1880 MHz		0.749	0.020	1.6	21.5°C
	9262/1852.4 MHz		0.752	-0.051	1.6	21.5°C
Left edge	9400/1880 MHz	RMC	0.262	0.041	1.6	21.5°C
Right edge	9400/1880 MHz	RMC	0.281	-0.008	1.6	21.5°C
Bottom edge	9400/1880 MHz	RMC	0.631	-0.087	1.6	21.5°C
Towords Ground	9538/1907.6 MHz	HSDPA	0.784	0.050	1.6	21.5°C

Table 30:Test results (Body SAR for Mobile hotspot device use with 10mm separation distance)

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) Per KDB941225 D06 Hot Spot SAR v01, WiFi antenna is located at top edge;antenna-to-top edge distance is more than 2.5cm,when the antenna-to-edge distance is greater than 2.5,such position does not need to be tested. Top Edge with 1cm separation distance is excluded from SAR evaluation.

WCDMA 850

Test Position of Head	Test channel /Frequency	Test Mode	1-g SAR Value (W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Left hand cheek	4233 / 846.4 MHz	RMC	0.654	0.067	1.6	21.6°C
	4182 / 836.4 MHz	RMC	0.623	-0.017	1.6	21.6°C
	4132 / 826.4 MHz	RMC	0.558	0.173	1.6	21.6°C
Left hand tilted15°	4182 / 836.4 MHz	RMC	0.375	0.018	1.6	21.6°C
Right hand cheek	4182 / 836.4 MHz	RMC	0.531	-0.103	1.6	21.6°C
Right hand tilted15°	4182 / 836.4 MHz	RMC	0.359	0.017	1.6	21.6°C

Table 31:Test results (Head SAR)

Test Position of Body (15mm)	Test channel /Frequency	Test Mode	1-g SAR Value(W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Towords Phantom	4182 / 836.4 MHz	RMC	0.504	0.003	1.6	21.6°C
Towords Ground	4233 / 846.4 MHz	RMC	0.639	-0.075	1.6	21.6°C
	4182 / 836.4 MHz		0.669	0.060	1.6	21.6°C
	4132 / 826.4 MHz		0.682	-0.087	1.6	21.6°C
Towords Ground	4233 / 846.4 MHz	HSDPA	0.595	-0.125	1.6	21.6°C
Towords Ground with Headset	4233 / 846.4 MHz	RMC	0.240	0.022	1.6	21.6°C
Towords Ground with BT Headset	4233 / 846.4 MHz	RMC	0.657	0.012	1.6	21.6°C

Table 32:Test results (Body-worn accessory with 15mm separation distance)

Test Position of Body (10mm)	Test channel /Frequency	Test Mode	1-g SAR Value (W/kg)	Power Drift (dB)	Limit (W/kg)	Liquid Temp.
Towords Phantom	4182/836.4 MHz	RMC	0.535	0.002	1.6	21.7°C
Towords Ground	4233/846.6 MHz	RMC	0.712	0.040	1.6	21.7°C
	4182/836.4 MHz		0.748	0.013	1.6	21.7°C
	4132/826.4 MHz		0.512	-0.013	1.6	21.7°C
Left edge	4182/836.4 MHz	RMC	0.523	0.032	1.6	21.7°C
Right edge	4182/836.4 MHz	RMC	0.488	0.057	1.6	21.7°C
Bottom edge	4182/836.4 MHz	RMC	0.117	0.179	1.6	21.7°C
Towords Ground	4182/836.4 MHz	HSDPA	0.717	-0.156	1.6	21.7°C

Table 33:Test results (Body SAR for Mobile hotspot device use with 10mm separation distance)

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) Per KDB941225 D06 Hot Spot SAR v01, WiFi antenna is located at top edge;antenna-to-top edge distance is more than 2.5cm,when the antenna-to-edge distance is greater than 2.5,such position does not need to be tested. Top Edge with 1cm separation distance is excluded from SAR evaluation.

2.5.4 Extrapolated SAR Values

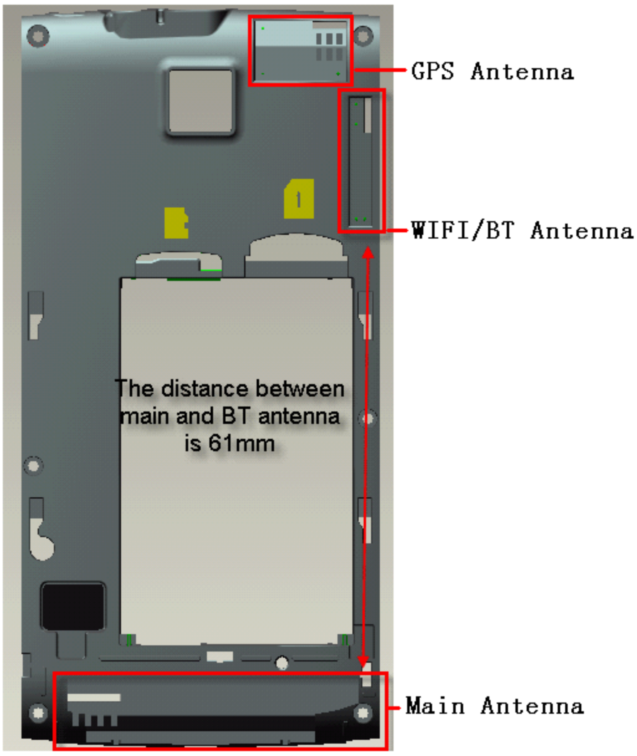
Limit of SAR (W/kg)		Conducted Power	1g Average 1.6	Tune-up procedures maximum Power(dBm)	1g Average 1.6
Worst Case		Measurement Result(dBm)	Measurement Result(W/kg)		Extrapolated Result (W/kg)
Test Position	Channel				
Head GSM1900					
Left hand touched	High	30.04	0.488	30.5	0.543
Body GPRS1900 (2 timeslots uplink)					
Rear	High	30.01	1.090	30.5	1.220
Body EGPRS1900 (2 timeslots uplink)					
Rear	High	30.10	1.090	30.5	1.195
Head GSM850					
Left hand touched	High	32.92	1.040	33.5	1.189
Body GPRS850 (2 timeslots uplink)					
Rear	Middle	30.55	1.160	31.2	1.347
Body EGPRS850 (2 timeslots uplink)					
Rear	Middle	30.51	1.150	31.2	**1.348**
Head WCDMA1900 (RMC)					
Left hand touched	Middle	22.59	0.754	23.5	0.930
Body WCDMA1900 (RMC)					
Rear	High	22.67	0.807	23.5	0.977
Body WCDMA1900 (HSDPA)					
Rear	High	22.67	0.784	23.5	0.949
Head WCDMA850 (RMC)					
Left hand touched	High	22.64	0.654	23.5	0.797
Body WCDMA850 (RMC)					
Rear	Middle	22.49	0.748	23.5	0.879
Body WCDMA850 (HSDPA)					
Rear	Middle	22.01	0.717	23.5	1.010

Table 34: Extrapolated SAR Values of highest measured SAR (UMTS/GPRS/GSM)

2.5.5 Multiple Transmitter Information

BT Function

The closest distance between BT antenna and main antenna is 6.1cm>5cm， and 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
Average Power(dBm)	6.65	8.21	8.68

The output power of WiFi antenna is as following:

Wi-Fi 2450MHz	Channel	Conducted Power (dBm) for Data Rates							
		1Mbps	2Mbps	5.5Mbps	11Mbps	/	/	/	/
802.11b	1	13.28	13.39	13.24	13.48				
	6	12.56	12.71	12.91	12.75				
	11	13.32	13.44	13.35	13.24				
802.11g	Channel	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
	1	9.28	9.16	9.21	9.24	9.18	9.25	9.18	9.12
	6	7.29	7.31	7.45	7.41	7.2	7.29	7.38	7.26
	11	9.4	7.21	9.1	9.68	9.24	9.19	9.38	9.21
802.11n (20MHz CH, 800ns Guard interval)	Channel	6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps
	1	6.24	6.38	6.45	6.58	6.39	6.43	6.33	6.67
	6	7.16	7.33	7.28	7.46	7.44	7.28	7.26	7.36
	11	8.19	8.21	8.12	8.24	8.16	8.26	8.19	8.34

Table 35:Conducted power measurement result (BT/WiFi)

Stand-alone SAR

According to the output power measurement results and the distance between BT antenna and GSM/WCDMA antenna, we can draw the conclusion that:

Stand-alone SAR evaluation is not required for BT, because the output power of BT is ≤ 2·PRef (24mW=13.8dBm) and its antenna(s) is ≥ 5.0 cm from other antennas.

Stand-alone SAR evaluation is not required for WiFi, because the output power of WiFi is ≤ 2·PRef (24mW=13.8dBm) and its antenna(s) is ≥ 5.0 cm from other antennas.

Simultaneous SAR

Simultaneous Transmission SAR evaluation is not required for GSM/WCDMA & BT, because stand-alone SAR are not required for BT and its antenna(s) is ≥ 5.0 cm from other antennas.

Simultaneous Transmission SAR evaluation is not required for GSM/WCDMA & WiFi, because the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas.

Simultaneous Transmission SAR evaluation is not required for BT and WiFi, because BT antenna is <2.5cm from WiFi antennas and stand-alone SAR are not required for BT.

Annex 1 System performance verification

Date/Time: 3/11/2011 9:32:51 PM, Date/Time: 3/11/2011 9:36:52 PM

SystemPerformanceCheck-D1900-ES-Head

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

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(4.97, 4.97, 4.97); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

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

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

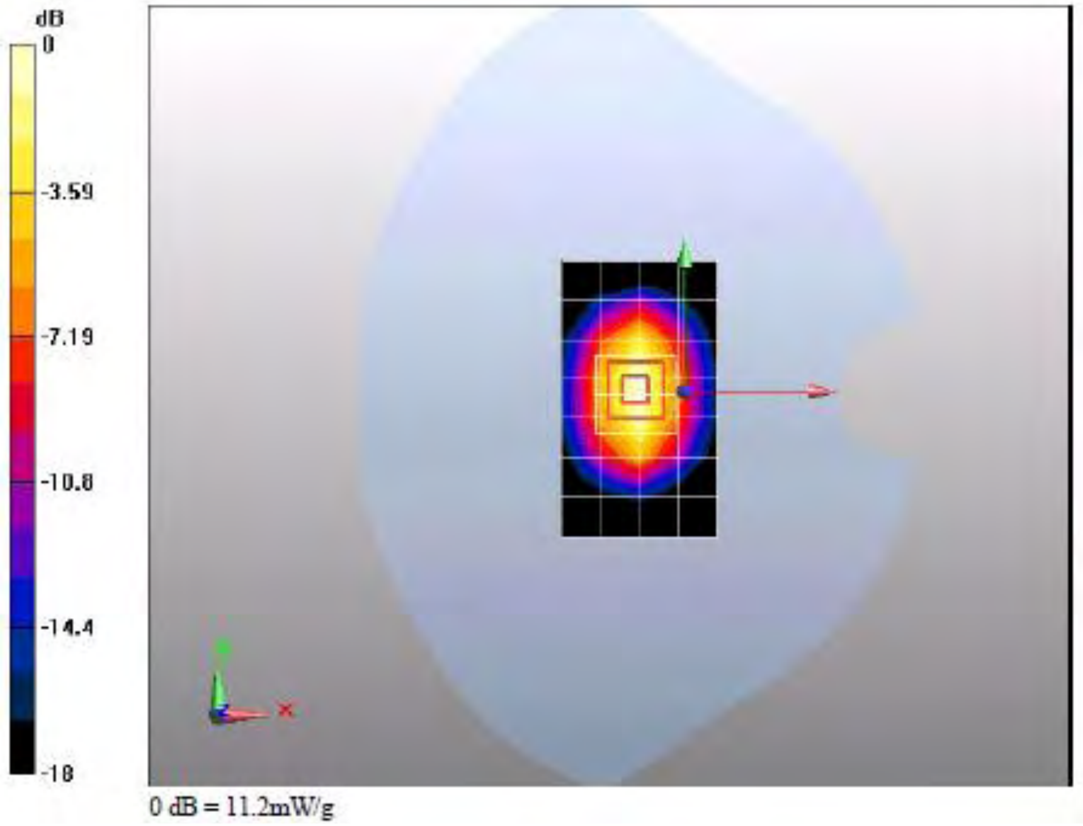
Configuration/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm

Reference Value = 91.3 V/m; Power Drift = 0.00226 dB

Peak SAR (extrapolated) = 18.3 W/kg

SAR(1 g) = 9.88 mW/g; SAR(10 g) = 5.08 mW/g

Maximum value of SAR (measured) = 11.2 mW/g



Date/Time: 3/9/2011 6:55:42 PM, Date/Time: 3/9/2011 6:59:45 PM

SystemPerformanceCheck-D1900-ES-Body

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

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz; σ = 1.51 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(4.61, 4.61, 4.61); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

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

Maximum value of SAR (measured) = 11.1 mW/g

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

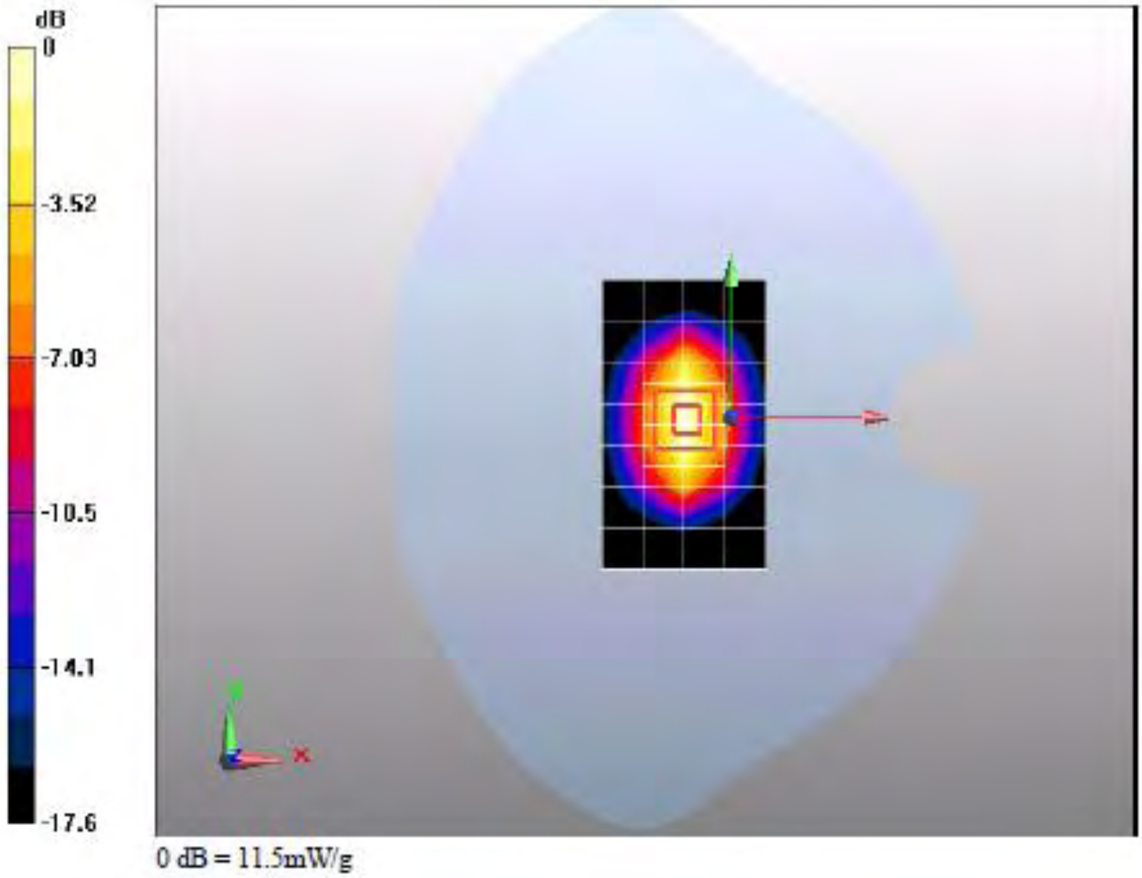
dy=5mm, dz=5mm

Reference Value = 89.6 V/m; Power Drift = -0.041 dB

Peak SAR (extrapolated) = 18.6 W/kg

SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.27 mW/g

Maximum value of SAR (measured) = 11.5 mW/g



Date/Time: 3/15/2011 1:55:13 AM, Date/Time: 3/15/2011 2:01:53 AM

SystemPerformanceCheck-D835-ES-Head

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

Communication System: CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 42.7; ρ = 1000 kg/m^3

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.98, 5.98, 5.98); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

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

Maximum value of SAR (measured) = 2.38 mW/g

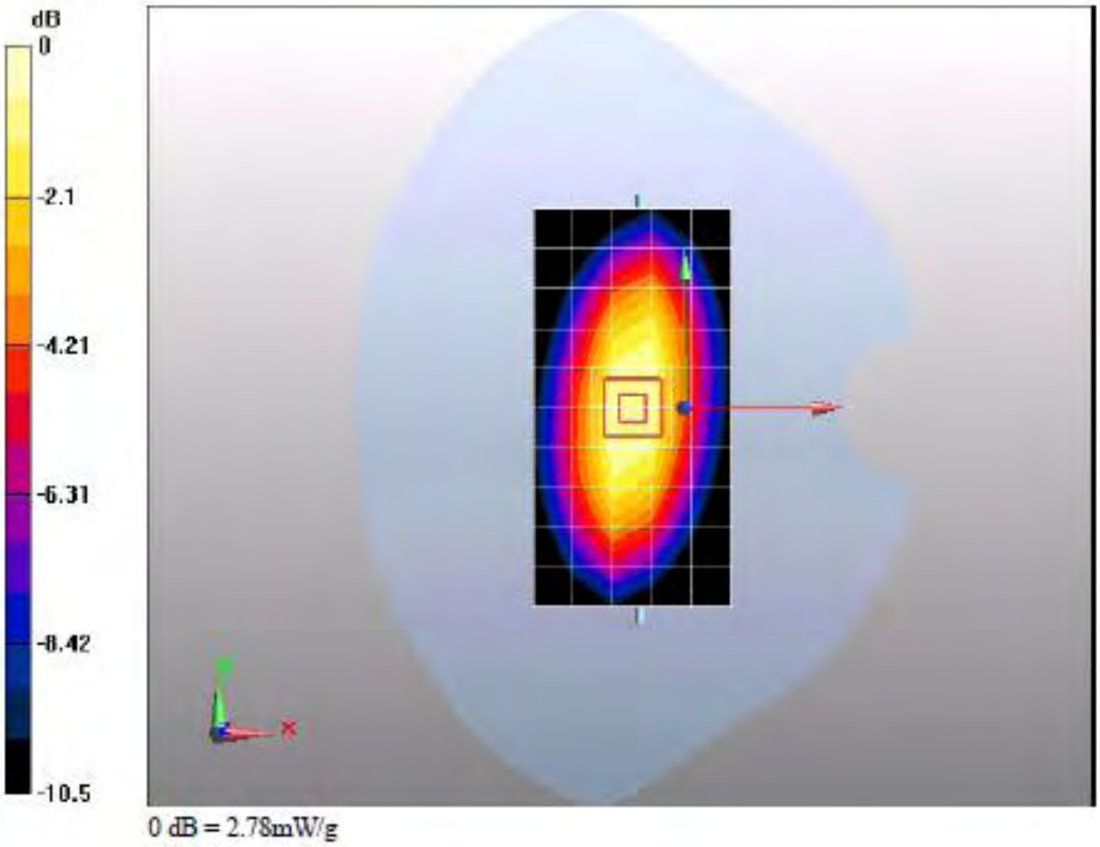
Configuration/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm

Reference Value = 56 V/m; Power Drift = 0.075 dB

Peak SAR (extrapolated) = 3.76 W/kg

SAR(1 g) = 2.57 mW/g; SAR(10 g) = 1.69 mW/g

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



Date/Time: 3/13/2011 10:23:28 AM, Date/Time: 3/13/2011 10:30:02 AM

SystemPerformanceCheck-D835-ES-Body

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

Communication System: CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz; σ = 0.96 mho/m; ε_r = 52.4; ρ = 1000 kg/m3

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.92, 5.92, 5.92); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

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

Maximum value of SAR (measured) = 2.55 mW/g

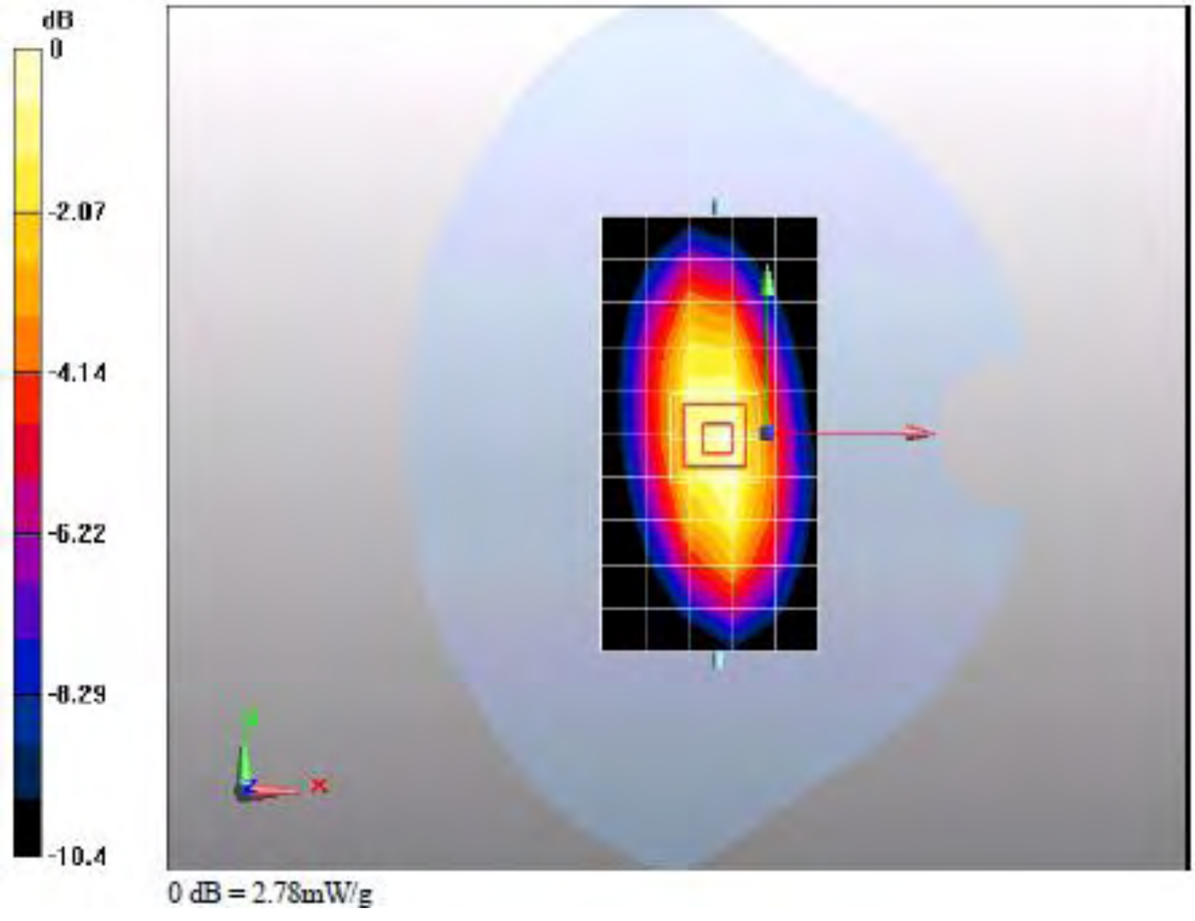
Configuration/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm

Reference Value = 54.8 V/m; Power Drift = 0.062 dB

Peak SAR (extrapolated) = 3.72 W/kg

SAR(1 g) = 2.57 mW/g; SAR(10 g) = 1.7 mW/g

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



Date/Time: 3/9/2011 11:27:56 AM, Date/Time: 3/9/2011 11:34:40 AM
Test Laboratory: The name of your organization

SystemPerformanceCheck-D835-ES-Head

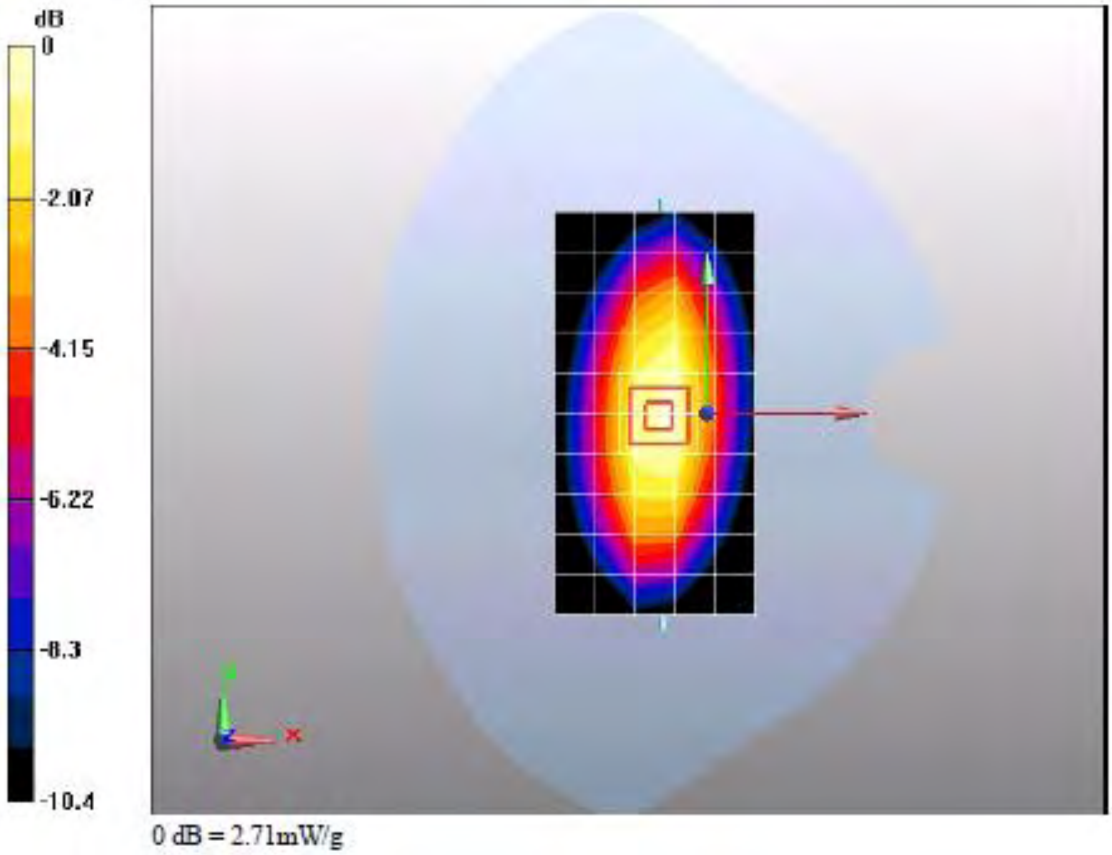
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:xxx

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.876 mho/m; ε_r = 41.4; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.98, 5.98, 5.98); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/d=15mm, Pin=250mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.48 mW/g

Configuration/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm
Reference Value = 56.7 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 3.65 W/kg
SAR(1 g) = 2.5 mW/g; SAR(10 g) = 1.64 mW/g
Maximum value of SAR (measured) = 2.71 mW/g



Date/Time: 3/14/2011 10:02:35 AM, Date/Time: 3/14/2011 10:09:10 AM
Test Laboratory: The name of your organization

SystemPerformanceCheck-D835-ES-Body-2

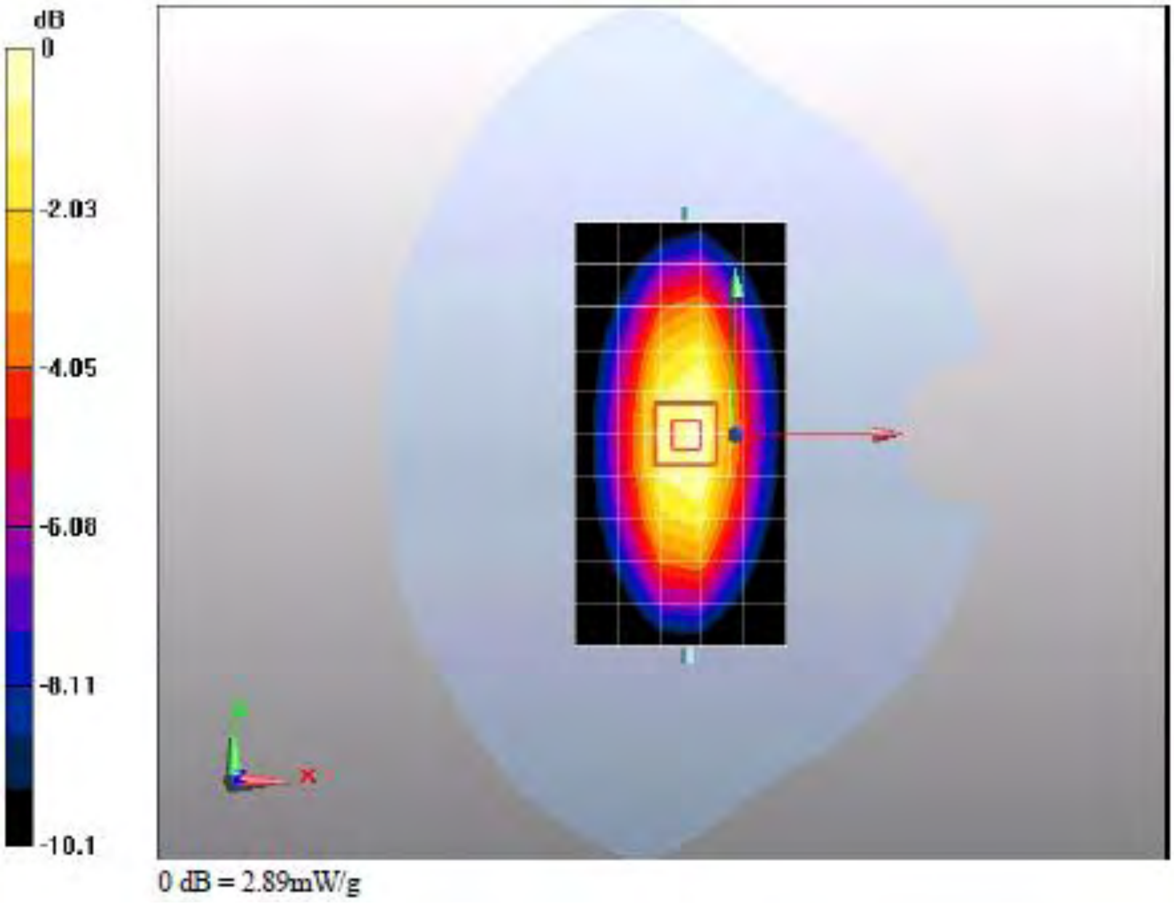
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:4d059

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.96 mho/m; ε_r = 52.5; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.92, 5.92, 5.92); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/d=15mm, Pin=250mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.66 mW/g

Configuration/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm
Reference Value = 55.7 V/m; Power Drift = 0.021 dB
Peak SAR (extrapolated) = 3.88 W/kg
SAR(1 g) = 2.68 mW/g; SAR(10 g) = 1.76 mW/g
Maximum value of SAR (measured) = 2.89 mW/g



Date/Time: 4/21/2011 08:52:42, Date/Time: 4/21/2011 08:59:26
Test Laboratory: Huawei GCTC Lab

SystemPerformanceCheck-D835-ES-Head

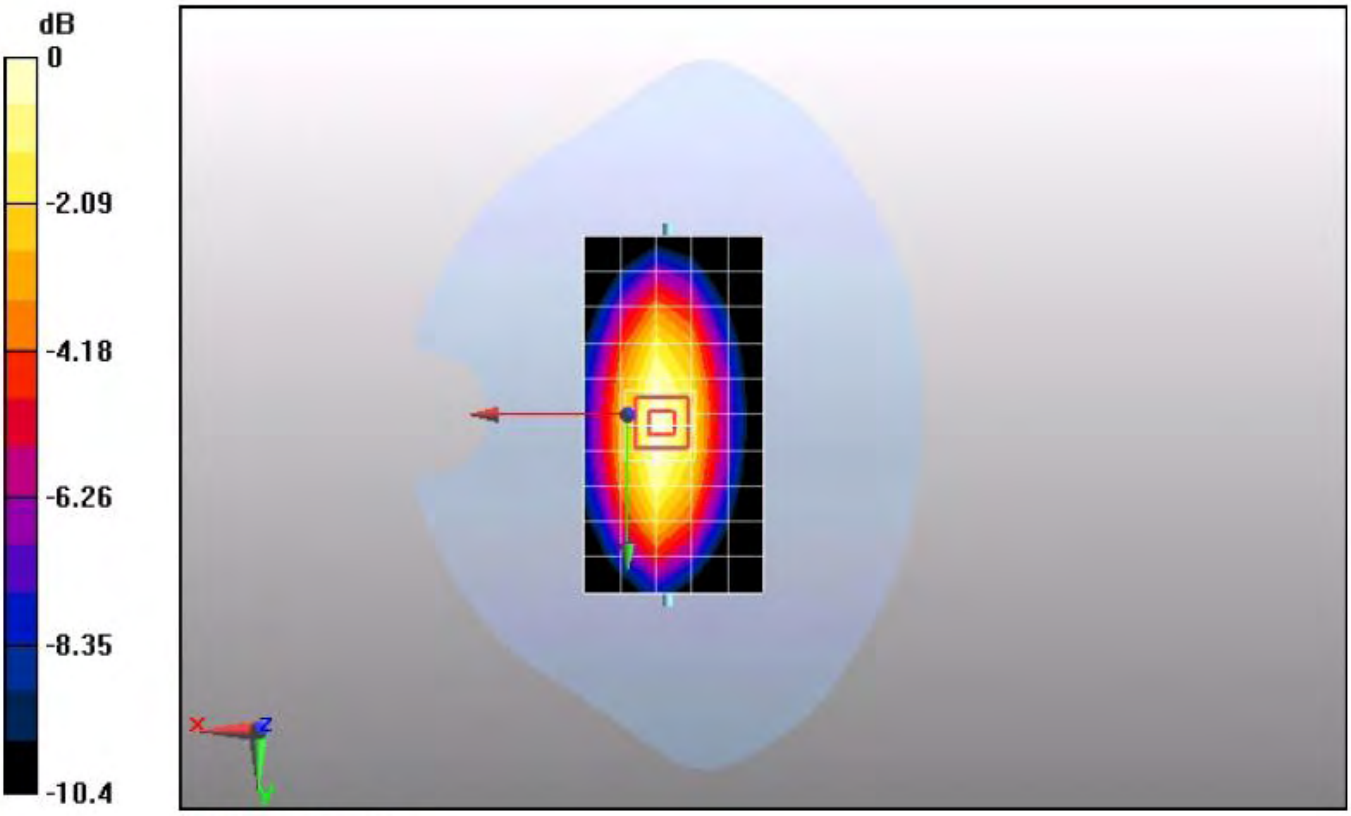
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:4d059

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.881 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.98, 5.98, 5.98); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/d=15mm, Pin=250mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.68 mW/g

Configuration/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm
Reference Value = 55.8 V/m; Power Drift = -0.021 dB
Peak SAR (extrapolated) = 3.71 W/kg
SAR(1 g) = 2.53 mW/g; SAR(10 g) = 1.65 mW/g
Maximum value of SAR (measured) = 2.73 mW/g



0 dB = 2.73mW/g

Date/Time: 4/21/2011 15:45:58, Date/Time: 4/21/2011 15:52:45
Test Laboratory: Huawei GCTC Lab

SystemPerformanceCheck-D835-ES-Body

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

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.965 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

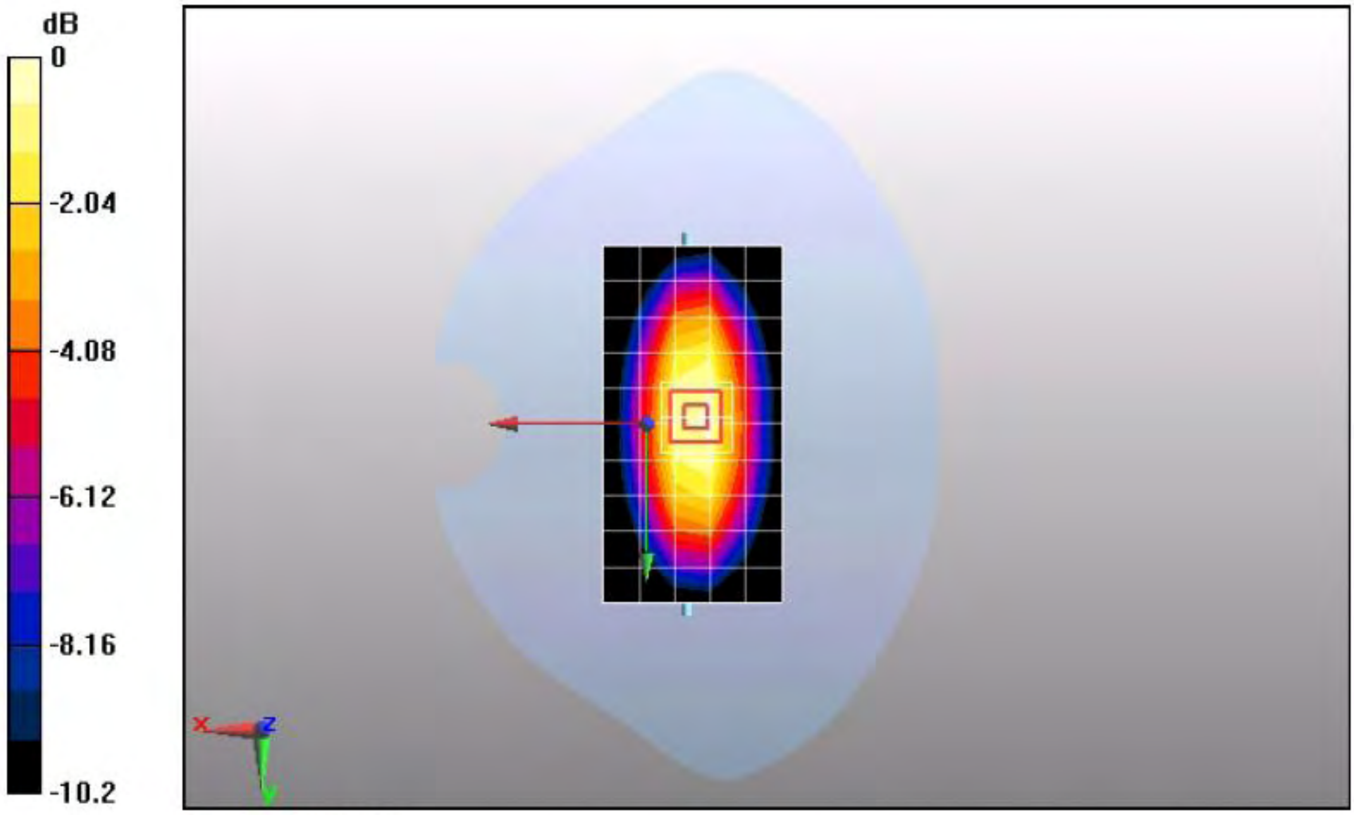
- Probe: ES3DV3 - SN3168; ConvF(5.92, 5.92, 5.92); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/d=15mm, Pin=250mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.52 mW/g

Configuration/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm
Reference Value = 53.6 V/m; Power Drift = 0.038 dB
Peak SAR (extrapolated) = 3.74 W/kg

SAR(1 g) = 2.58 mW/g; SAR(10 g) = 1.7 mW/g

Maximum value of SAR (measured) = 2.8 mW/g



0 dB = 2.8mW/g

Date/Time: 4/22/2011 15:15:22, Date/Time: 4/22/2011 15:22:07
Test Laboratory: Huawei GCTC Lab

SystemPerformanceCheck-D835-ES-Body

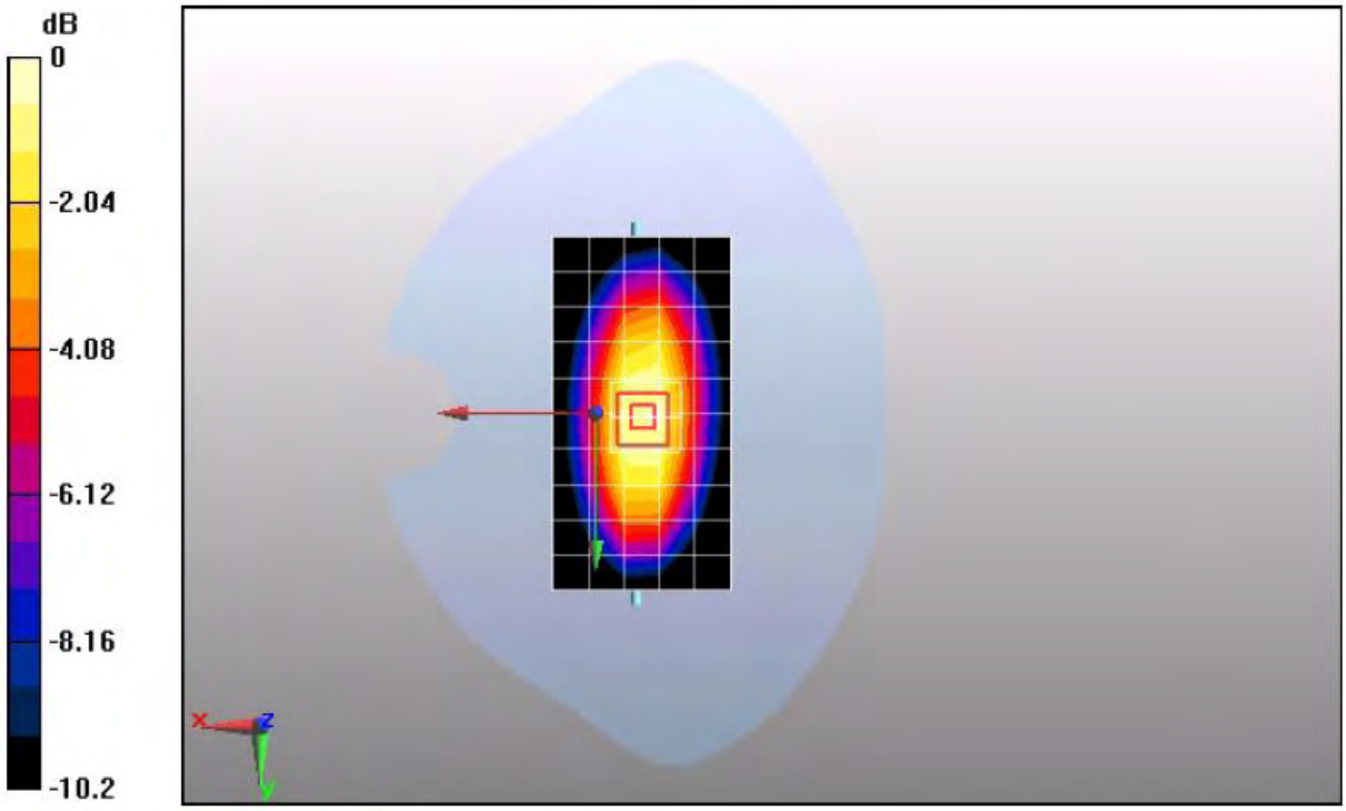
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:4d059

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.957 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(5.92, 5.92, 5.92); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/d=15mm, Pin=250mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.44 mW/g

Configuration/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm
Reference Value = 54 V/m; Power Drift = -0.00209 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 2.55 mW/g; SAR(10 g) = 1.68 mW/g
Maximum value of SAR (measured) = 2.76 mW/g



0 dB = 2.76mW/g

Date/Time: 4/23/2011 15:44:53, Date/Time: 4/23/2011 15:48:58
Test Laboratory: Huawei GCTC Lab

SystemPerformanceCheck-D1900-ES-Body

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

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.53 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

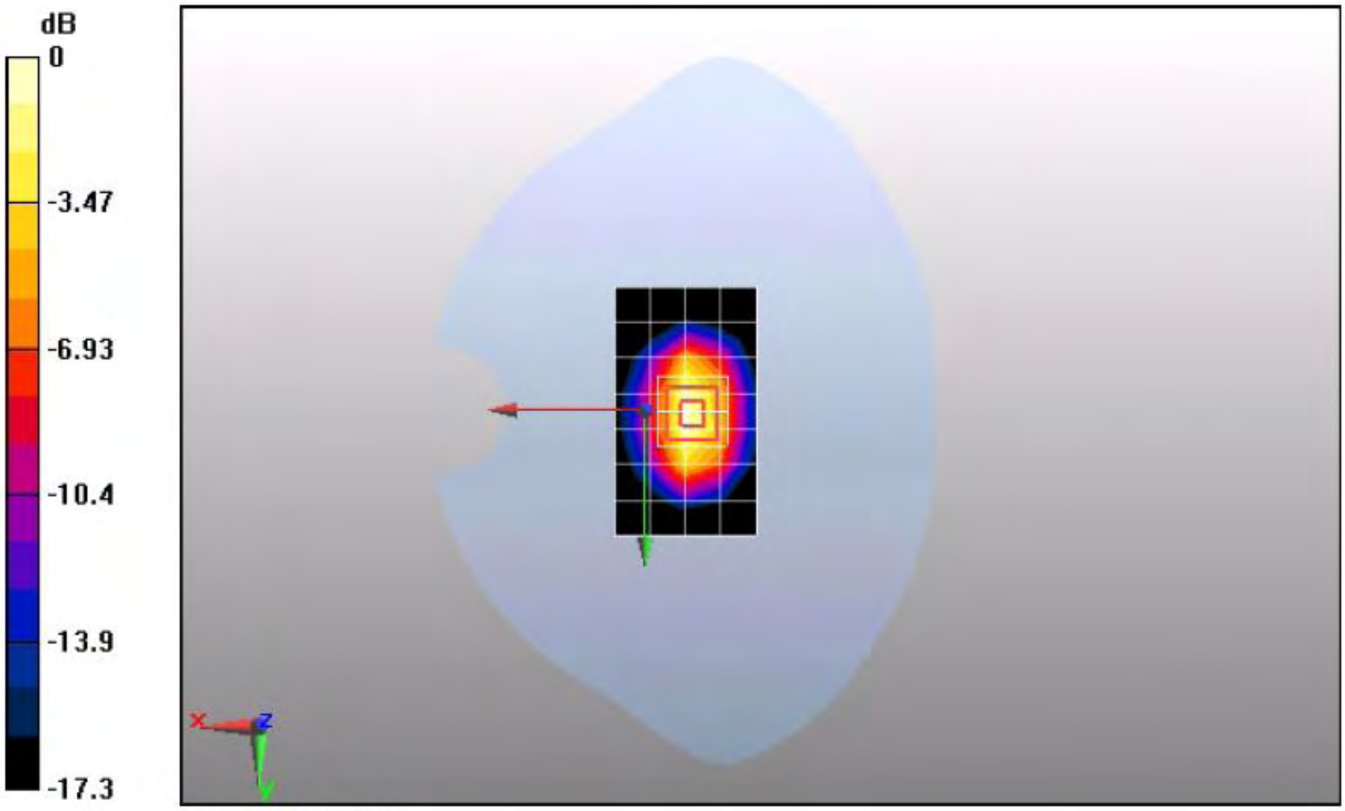
- Probe: ES3DV3 - SN3168; ConvF(4.61, 4.61, 4.61); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/d=10mm, Pin=250mW/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 10 mW/g

Configuration/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm
Reference Value = 85.5 V/m; Power Drift = 0.057 dB
Peak SAR (extrapolated) = 18.1 W/kg

SAR(1 g) = 10 mW/g; SAR(10 g) = 5.17 mW/g

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



0 dB = 11.4mW/g

Measurement results (printout from DASY TM)

Annex 1.1 PCS 1900 MHz Head

Date/Time: 3/11/2011 10:34:00 PM, Date/Time: 3/11/2011 10:42:21 PM

U8500-6 GSM1900 661CH Left hand touch cheek

DUT: U8500-6; Type: Mobile phone; Serial: K2M7NA1111000127

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1880 MHz

Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(4.97, 4.97, 4.97); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Head/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.470 mW/g

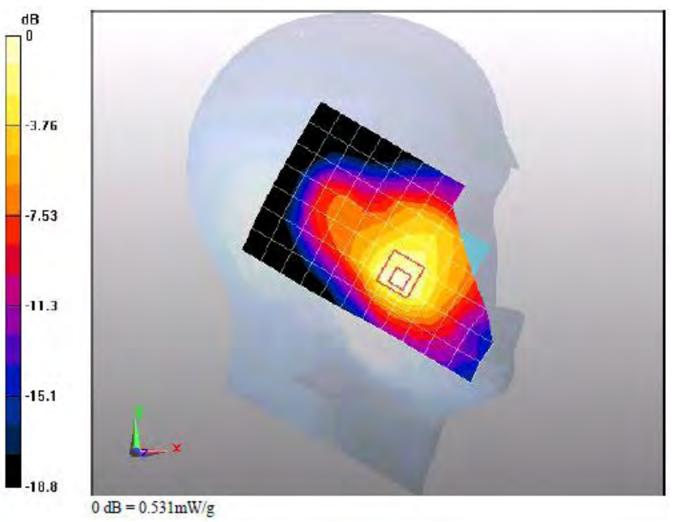
Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

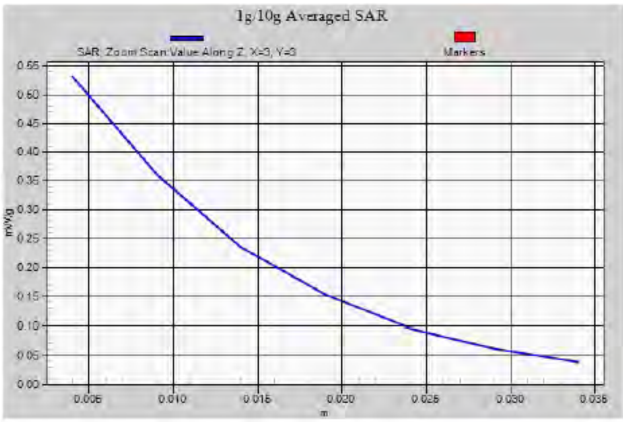
Reference Value = 7.91 V/m; Power Drift = -0.127 dB

Peak SAR (extrapolated) = 0.743 W/kg

SAR(1 g) = 0.481 mW/g; SAR(10 g) = 0.288 mW/g

Maximum value of SAR (measured) = 0.531 mW/g





Date/Time: 3/11/2011 10:58:26 PM, Date/Time: 3/11/2011 11:06:45 PM

U8500-6 GSM1900 661CH Left hand tilt 15 degree

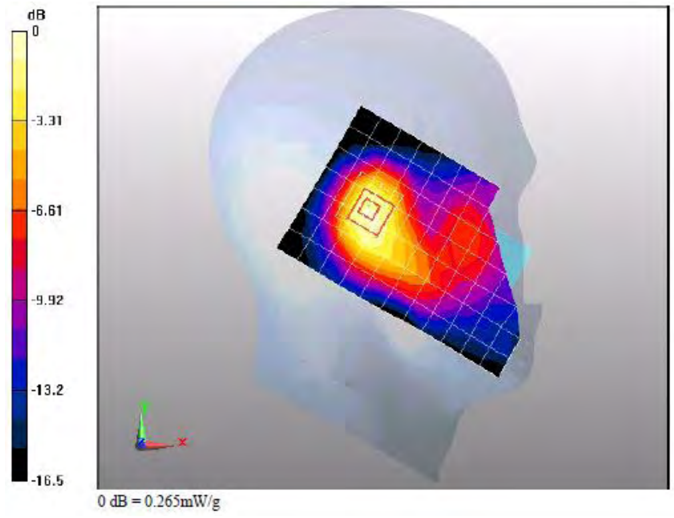
DUT: U8500-6; Type: Mobile phone; Serial: K2M7NA1111000127

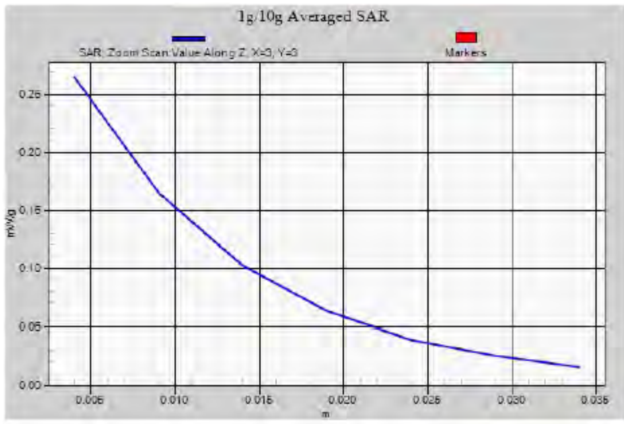
Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(4.97, 4.97, 4.97); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Head/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.223 mW/g

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13 V/m; Power Drift = -0.088 dB
Peak SAR (extrapolated) = 0.386 W/kg
SAR(1 g) = 0.240 mW/g; SAR(10 g) = 0.140 mW/g
Maximum value of SAR (measured) = 0.265 mW/g





Date/Time: 3/11/2011 11:34:03 PM, Date/Time: 3/11/2011 11:41:59 PM, Date/Time: 3/11/2011 11:54:09 PM

U8500-6 GSM1900 661CH Right hand touch cheek

DUT: U8500-6; Type: Mobile phone; Serial: K2M7NA1111000127

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1880 MHz

Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(4.97, 4.97, 4.97); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Head/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.421 mW/g

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

Reference Value = 5.75 V/m; Power Drift = 0.128 dB

Peak SAR (extrapolated) = 0.630 W/kg

SAR(1 g) = 0.387 mW/g; SAR(10 g) = 0.227 mW/g

Maximum value of SAR (measured) = 0.424 mW/g

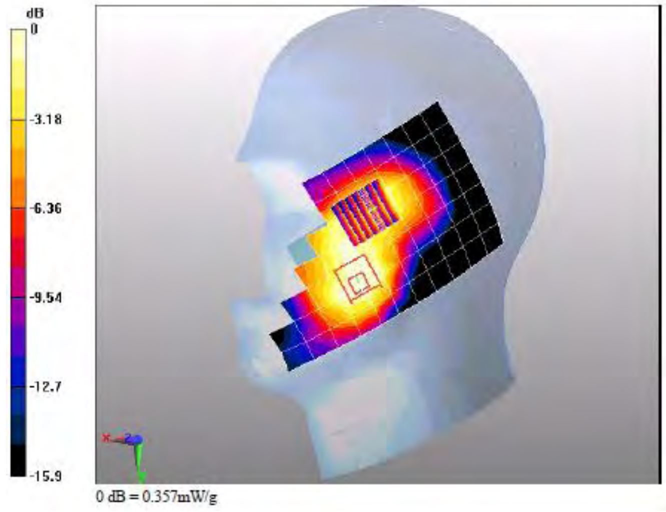
Configuration/Head/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm

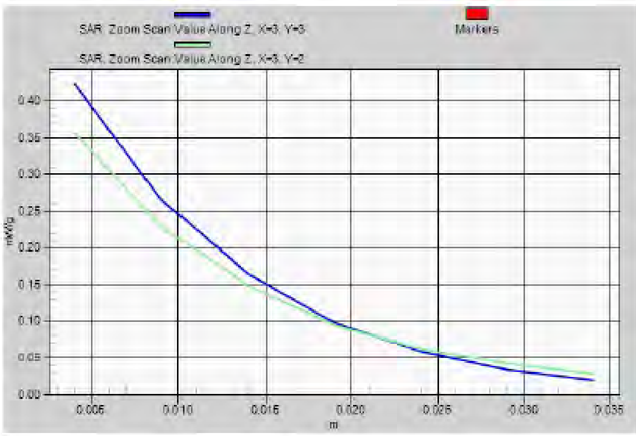
Reference Value = 5.75 V/m; Power Drift = 0.128 dB

Peak SAR (extrapolated) = 0.511 W/kg

SAR(1 g) = 0.323 mW/g; SAR(10 g) = 0.199 mW/g

Maximum value of SAR (measured) = 0.357 mW/g





Date/Time: 3/12/2011 12:34:42 AM, Date/Time: 3/12/2011 12:42:39 AM

U8500-6 GSM1900 661CH Right hand tilt 15 degree

DUT: U8500-6; Type: Mobile phone; Serial: K2M7NA1111000127

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1880 MHz

Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 39.4; ρ = 1000 kg/m3

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(4.97, 4.97, 4.97); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Head/Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.251 mW/g

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

Reference Value = 11 V/m; Power Drift = 0.130 dB

Peak SAR (extrapolated) = 0.345 W/kg

SAR(1 g) = 0.230 mW/g; SAR(10 g) = 0.142 mW/g

Maximum value of SAR (measured) = 0.248 mW/g