Huawei Technologies Co.,Ltd.
Huawei Base, Bantian, Longgang District, Shenzhen, P.R.China Phone: +86-755-28785513
SAR-Laboratory Fax: +86-755-36834474 .

Accredited testing laboratory

CNAS Registration number: L0310

Report On SAR Test of HUAWEI IDEOS X1; HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; IDEOS X1;GAGA;Gaga M/N: HUAWEI U8180-7/U8180-7

Test report no. : SYBH(Z-SAR)035052011-2
Type identification : HUAWEI U8180-7/U8180-7
FCC ID : QISU8180-7
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

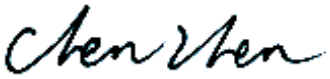
1.1 Notes

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 U8180-7/U8180-7 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 10 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:

2011-05-11	**Chen Zhen**	
Date	Name	Signature
2011-05-11	**Alvin Way**	
Date	Name	Signature

Approved by:

2011-05-11	**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
Street: Section K3,Bantian, Longgang District, Shenzhen
Country: P.R.China

Telephone: +86-755-28785513
Fax: +86-755-36834474

E-mail: weihuanbin@huawei.com
Internet: www.huawei.com

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

1.3 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:	2011-05-04
Date of receipt of test item:	2011-05-05
Start/Date of test:	2011-05-05
End of test:	2011-05-10

1.5 Test item

Device Information：			
DUT Name:	HUAWEI IDEOS X1; HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; IDEOS X1;GAGA;Gaga		
Type Identification:	HUAWEI U8180-7/U8180-7		
FCC ID :	QISU8180-7		
IMEI No:	357233040001816		
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;WiFi (Tested); Bluetooth,		
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
	GSM 850	824.2 ~ 848.8	869.2 ~893.8
	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 V)		
Test Channels (low-mid-high) :	512-661-810 (GSM 1900)		
	128-190-251(GSM 850)		
	4132-4182-4233(WCDMA Band V)		
Hardware Version :	HD1U813M		
Software Version :	U8180V100R001C56B615		
Antenna Type :	Integrated antenna		
Accessories/Body-worn Configurations:	Stereo headset		
Battery Options :	Huawei Technologies Co., Ltd. Rechargeable Li-ion Battery Model: HB4J1H ; Rated capacity: 1200mAh Nominal Voltage: ⎓ +3.7V; Charging Voltage: ⎓ +4.2V S/N: LACB429HI1800285/UNHB508XA1922984		

Table 1: Device information and operating configurations

1.6 EUT Description

HUAWEI U8180-7/U8180-7 is subscriber equipment in the WCDMA/GSM system. The HSDPA/UMTS frequency band is Band I and Band V, but only Band V test data included in this report. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only GSM850 and PCS1900 bands test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSDPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, GPS, AGPS 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	1.5	0	1.5

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	1.5	0	1.5

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 , $A_{hs} = \beta_{hs}/\beta_c = 30/15$, $\beta_{hs} = 30/15 * \beta_c$

Note 2 : CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$

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 $\beta_c = 11/15$ and $\beta_d = 15/15$

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	0	0.5	0.5

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

1.8.4 WiFi Test Configurations

For the 802.11b/g SAR tests, a communication link is set up with the test mode software for WiFi mode test. The Absolute Radio Frequency Channel Number(ARFCN) is allocated to 1,6and 11 respectively in the case of 2450 MHz.During the test,at the each test frequency channel, theEUT is operated at the RF continuous emission mode.Each channel should be tested at the lowest data rate.

802.11b/g operating modes are tested independently according to the service requirements in each frquency band.802.11b/g/n modes are tested on channel 1,6,11;however,if output power reduction is necessary for channels 1 and/or 11 to meet restricted band requirements the highest output channel closest to each of these channels must be tested instead.

SAR is not required for 802.11g channels when the maximum average output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels.

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	**1.280**	0.919	0.919	PASS
GSM 850	0.848	**1.200**	**1.200**	
WCDMA Band V	0.828	1.100	1.100	
WiFi	0.125	0.098	0.098	

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

Band		Maximum Conducted Power (dBm)	Maximum Average Power (dBm)
GSM 1900	GSM	29.88	20.88
	GPRS,2TS	28.78	22.78
	EGPRS (GMSK), 2TS	28.74	22.74
	EGPRS (8PSK), 2TS	26.52	20.52
GSM850	GSM	32.73	23.73
	GPRS,2TS	31.15	**25.15**
	EGPRS (GMSK) ,2TS	31.14	25.14
	EGPRS (8PSK) ,2TS	27.06	21.06
WCDMA850	RMC (QPSK)	23.77	/
WCDMA850 HSDPA	RMC (QPSK)	23.72	/

Table 10: The Maximum Conducted Power and Average Power

2.2 Test environment

General Environment conditions in the test area are as follows:

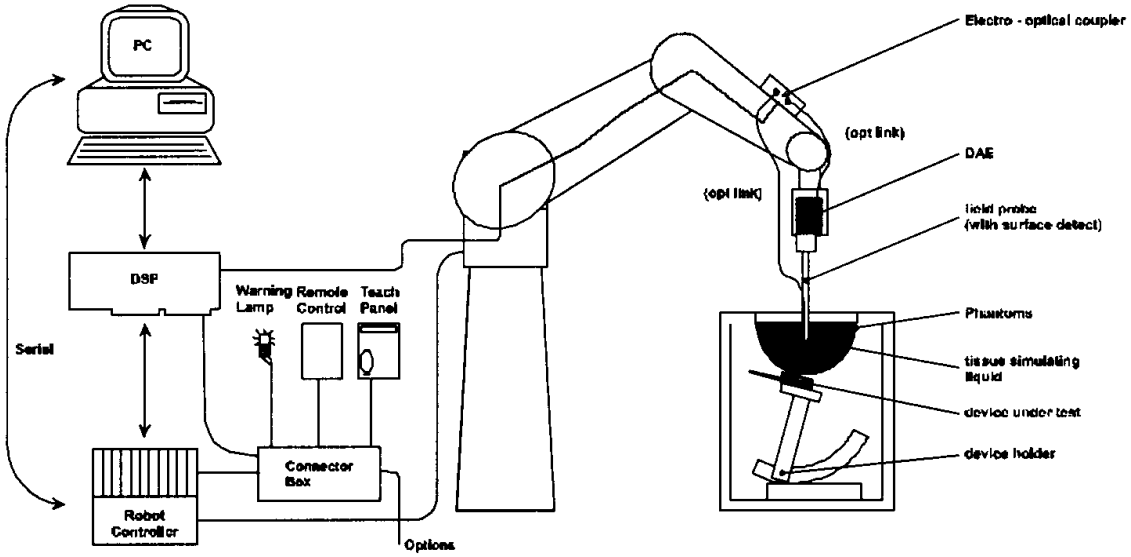
Ambient temperature: 20°C – 24°C
Tissue simulating liquid: 20°C – 24°C
Humidity: 30% – 70%
Exact temperature values for each test are shown in the table(s) under 2.5. and/or on the measurement plots.

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

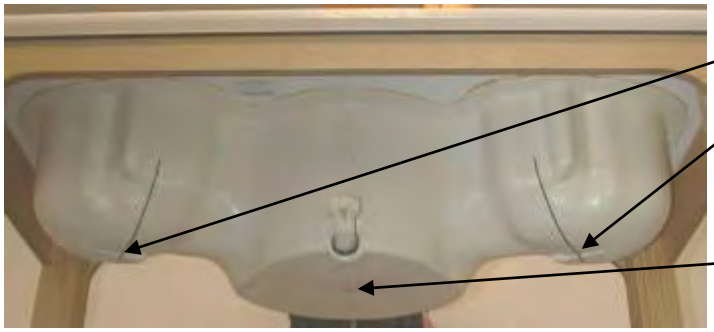
Technical data according to manufacturer information	
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)
Calibration	In air from 10 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 [mV/(V/m)^2] for E-field Probes (i = x, y, z)
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.

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

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	2450 MHz System Validation Dipole	D2450V2	860	2011-03-08
☒	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
☒	Schmid & Partner Engineering AG	Flat Phantom	ELI 4.0	TP-1111	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	0
DGBE	0.0	0.0	0.0	47.0	44.92	36.8

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 Tissue		Measured Tissue		Liquid Temp.	Test Date
	Permittivity (+/-5%)	Conductivity [S/m] (+/-5%)	Permittivity(e')	Conductivity [S/m]		
835MHz Head	41.5 (39.43~43.58)	0.90 (0.86~0.95)	40.33	0.880	21.1°C	2011-5-6
1900MHz Head	40.0 (38.00~42.00)	1.40 (1.33~1.47)	38.69	1.389	21.3°C	2011-5-9
2450MHz Head	39.2 (37.24~41.16)	1.80 (1.71~1.89)	38.46	1.804	21.4°C	2011-5-5
835MHz Body	55.2 (52.44~57.96)	0.97 (0.92~1.02)	52.72	0.968	21.3°C	2011-5-7
1900MHz Body	53.3 (50.64~55.97)	1.52 (1.44~1.60)	52.54	1.514	21.1°C	2011-5-8
2450MHz Body	52.7 (50.07~55.34)	1.95 (1.85~2.05)	52.31	1.992	21.5°C	2011-5-10

Table 13: Parameter of the head and 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	Divisor	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%**	

Table 14: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	Divisor	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%**	

Table 15: Measurement uncertainties

2.4.14 System check

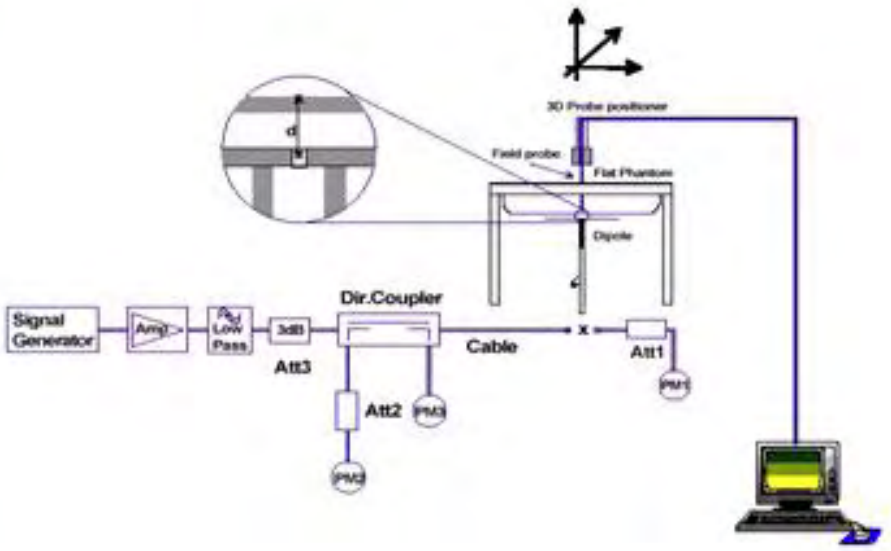
The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system validation is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows validation results for all frequency bands and tissue liquids used during the tests of the test item described in chapter 1.5.
(graphic plot(s) see annex 1).

System Check	Target SAR (250 mW) (+/-10%)		Measured SAR(250mW)		Liquid Temp.	Test Date
	1-g (mW/g)	10-g (mW/g)	1-g (mW/g)	10-g (mW/g)		
D835V2 Head	2.39 (2.15~2.63)	1.54 (1.39~1.69)	2.46	1.610	21.1°C	2011-5-6
D1900V2 Head	9.90 (8.91~10.89)	5.10 (4.59~5.61)	10.00	5.170	21.3°C	2011-5-9
D2450V2 Head	13.20 (11.88~14.52)	6.19 (5.57~6.81)	14.20	6.460	21.4°C	2011-5-5
D835V2 Body	2.47 (2.22~2.72)	1.61 (1.45~1.77)	2.55	1.670	21.3°C	2011-5-7
D1900V2 Body	10.20 (9.18~11.22)	5.24 (4.72~5.76)	10.10	5.230	21.1°C	2011-5-8
D2450V2 Body	13.20 (11.88~14.52)	6.13 (5.52~6.74)	11.90	5.740	21.5°C	2011-5-10

Table 16: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		29.87	29.88	29.75	**20.87**	**20.88**	**20.75**
After test		29.85	29.81	29.72	20.85	20.81	20.72
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	29.88	29.85	29.76	20.88	20.85	20.76
	After test	29.81	29.82	29.73	20.81	20.82	20.73
2 TX slots	Before test	28.72	28.78	28.62	**22.72**	**22.78**	**22.62**
	After test	28.68	28.75	28.59	22.68	22.75	22.59
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	29.86	29.85	29.74	20.86	20.85	20.74
	After test	29.84	29.81	29.71	20.84	20.81	20.71
2 TX slots	Before test	28.69	28.74	28.63	**22.69**	**22.74**	**22.63**
	After test	28.62	28.71	28.59	22.62	22.71	22.59
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	26.52	26.54	26.43	17.52	17.54	17.43
	After test	26.49	26.50	26.41	17.49	17.50	17.41
2 TX slots	Before test	26.48	26.52	26.38	**20.48**	**20.52**	**20.38**
	After test	26.45	26.48	26.37	20.45	20.48	20.37

Table 17: 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		32.65	32.73	32.71	**23.65**	**23.73**	**23.71**
After test		32.61	32.68	32.65	23.61	23.68	23.65
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	32.68	32.75	32.73	23.68	23.75	23.73
	After test	32.64	32.68	32.67	23.64	23.68	23.67
2 TX slots	Before test	31.08	31.15	31.15	**25.08**	**25.15**	**25.15**
	After test	31.05	31.11	31.09	25.05	25.11	25.09

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	32.67	32.73	32.72	23.67	23.73	23.72
	After test	32.61	32.69	32.67	23.61	23.69	23.67
2 TX slots	Before test	31.06	31.14	31.13	**25.06**	**25.14**	**25.13**
	After test	31.01	31.09	31.08	25.01	25.09	25.08
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	27.25	27.32	27.31	18.25	18.32	18.31
	After test	27.21	27.31	27.27	18.21	18.31	18.27
2 TX slots	Before test	26.97	27.04	27.06	**20.97**	**21.04**	**21.06**
	After test	26.91	26.97	27.01	20.91	20.97	21.01

Table 18: Test results conducted power measurement GSM850MHz

WCDMA Band V

WCDMA Band V		Conducted Power (dBm)		
		Channel 4132	Channel 4182	Channel 4233
12.2kbps RMC	Before test	**23.71**	**23.63**	**23.77**
	After test	23.68	23.59	23.72
64kbps RMC	Before test	23.68	23.59	23.75
	After test	23.65	23.57	23.71
144kbps RMC	Before test	23.63	23.57	23.71
	After test	23.59	23.55	23.68
384kbps RMC	Before test	23.64	23.58	23.73
	After test	23.60	23.54	23.68
WCDMA Band V+HSDPA		Conducted Power (dBm)		
		Channel 4132	Channel 4182	Channel 4233
Sub Test - 1	Before test	**23.65**	**23.56**	**23.72**
	After test	23.61	23.51	23.67
Sub Test - 2	Before test	23.47	23.28	23.53
	After test	23.45	23.24	23.49
Sub Test - 3	Before test	22.97	22.81	23.12
	After test	22.92	22.77	23.08
Sub Test - 4	Before test	22.88	22.73	22.95
	After test	22.84	22.67	22.87

Table 19: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	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
with Battery(SN: UNHB508XA1922984)							
Left Hand Touched	661/1880	GSM	0.949	0.576	0.093	1.6	21.3°C
Left Hand Tilted 15°	661/1880	GSM	0.319	0.200	0.123	1.6	21.3°C
Right Hand Touched	661/1880	GSM	1.110	0.642	0.170	1.6	21.3°C
Right Hand Tilted 15°	661/1880	GSM	0.216	0.133	-0.032	1.6	21.3°C
Left Hand Touched	810/1909.8	GSM	0.852	0.517	0.068	1.6	21.3°C
Left Hand Touched	512/1850.2	GSM	1.060	0.648	0.094	1.6	21.3°C
Right Hand Touched	810/1909.8	GSM	1.060	0.613	-0.109	1.6	21.3°C
Right Hand Touched	512/1850.2	GSM	1.260	0.735	-0.127	1.6	21.3°C
with Battery(SN: LACB429HI1800285)							
Right Hand Touched	512/1850.2	GSM	1.280	0.740	0.084	1.6	21.3°C

Test Position of Body with 10mm	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
with Battery(SN: UNHB508XA1922984)							
Towords Phantom	661/1880	GPRS 1TS	0.562	0.344	-0.079	1.6	21.1°C
Towords Ground	661/1880	GPRS 1TS	0.501	0.307	0.088	1.6	21.1°C
Left edge	661/1880	GPRS 1TS	0.155	0.088	0.010	1.6	21.1°C
Right edge	661/1880	GPRS 1TS	0.213	0.127	0.104	1.6	21.1°C
Bottom edge	661/1880	GPRS 1TS	0.450	0.252	0.052	1.6	21.1°C
Towords Phantom	661/1880	GPRS 2TS	0.832	0.513	-0.060	1.6	21.1°C
Towords Phantom	810/1909.8	GPRS 2TS	0.823	0.495	-0.038	1.6	21.1°C
Towords Phantom	512/1850.2	GPRS 2TS	0.875	0.554	-0.055	1.6	21.1°C
Towords Phantom	661/1880	EGPRS 1TS	0.540	0.334	-0.167	1.6	21.1°C
Towords Phantom	661/1880	EGPRS 2TS	0.854	0.528	-0.128	1.6	21.1°C
Towords Phantom	810/1909.8	EGPRS 2TS	0.852	0.509	-0.015	1.6	21.1°C
Towords Phantom	512/1850.2	EGPRS 2TS	0.919	0.583	-0.091	1.6	21.1°C
Towords Ground with Headset	512/1850.2	GSM	0.636	0.395	0.013	1.6	21.1°C
with Battery(SN: LACB429HI1800285)							
Towords Phantom	512/1850.2	EGPRS 2TS	0.870	0.545	-0.199	1.6	21.1°C

Table 20: Test results for GSM 1900 MHz

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) There have two kinds of battery, another battery was tested at the worst case of the other one.

4) 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.

5) Per KDB941225 D06 Hot Spot SAR v01,SAR must measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge,for the data modes,wireless technologies and frequency bands supporting hotspot mode.

GSM 850

Test Position of Head	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
with Battery(SN: UNHB508XA1922984)							
Left Hand Touched	190/836.6	GSM	0.533	0.406	0.135	1.6	21.1°C
Left Hand Tilted 15°	190/836.6	GSM	0.369	0.279	-0.055	1.6	21.1°C
Right Hand Touched	190/836.6	GSM	0.687	0.505	-0.162	1.6	21.1°C
Right Hand Tilted 15°	190/836.6	GSM	0.357	0.270	0.002	1.6	21.1°C
Right Hand Touched	251/848.8	GSM	0.533	0.391	0.045	1.6	21.1°C
Right Hand Touched	128/824.2	GSM	0.848	0.630	-0.171	1.6	21.1°C
with Battery(SN: LACB429HI1800285)							
Right Hand Touched	128/824.2	GSM	0.775	0.584	-0.134	1.6	21.1°C

Test Position of Body with 10mm	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
with Battery(SN: UNHB508XA1922984)							
Towords Phantom	190/836.6	GPRS 1TS	0.428	0.308	-0.039	1.6	21.3°C
Towords Ground	190/836.6	GPRS 1TS	0.697	0.489	0.033	1.6	21.3°C
Left edge	190/836.6	GPRS 1TS	0.300	0.203	-0.031	1.6	21.3°C
Right edge	190/836.6	GPRS 1TS	0.408	0.285	0.016	1.6	21.3°C
Bottom edge	190/836.6	GPRS 1TS	0.118	0.075	0.068	1.6	21.3°C
Towords Ground	190/836.6	GPRS 2TS	0.932	0.658	-0.060	1.6	21.3°C
Towords Ground	251/848.8	GPRS 2TS	0.742	0.522	-0.033	1.6	21.3°C
Towords Ground	128/824.2	GPRS 2TS	1.200	0.844	-0.094	1.6	21.3°C
Towords Ground	190/836.6	EGPRS 1TS	0.744	0.519	-0.021	1.6	21.3°C
Towords Ground	190/836.6	EGPRS 2TS	1.010	0.709	-0.065	1.6	21.3°C
Towords Ground	251/848.8	EGPRS 2TS	0.810	0.567	0.036	1.6	21.3°C
Towords Ground	128/824.2	EGPRS 2TS	1.190	0.839	-0.075	1.6	21.3°C
Towords Ground with Headset	128/824.2	GSM	0.818	0.487	0.007	1.6	21.3°C
with Battery(SN: LACB429HI1800285)							
Towords Ground	128/824.2	GPRS 2TS	1.190	0.836	-0.005	1.6	21.3°C

Table 21: Test results for GSM 850 MHz

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) There have two kinds of battery, another battery was tested at the worst case of the other one.

4) 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.

5) Per KDB941225 D06 Hot Spot SAR v01,SAR must measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge,for the data modes,wireless technologies and frequency bands supporting hotspot mode.

WCDMA 850

Test Position of Head	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
with Battery(SN: UNHB508XA1922984)							
Left Hand Touched	4182/836.4	RMC	0.629	0.455	0.121	1.6	21.1°C
Left Hand Tilted 15°	4182/836.4	RMC	0.361	0.272	0.054	1.6	21.1°C
Right Hand Touched	4182/836.4	RMC	0.828	0.608	0.001	1.6	21.1°C
Right Hand Tilted 15°	4182/836.4	RMC	0.374	0.285	-0.098	1.6	21.1°C
Right Hand Touched	4233/846.6	RMC	0.818	0.597	0.098	1.6	21.1°C
Right Hand Touched	4132/826.4	RMC	0.712	0.525	0.004	1.6	21.1°C
with Battery(SN: LACB429HI1800285)							
Right Hand Touched	4233/846.6	RMC	0.802	0.587	-0.017	1.6	21.1°C

Test Position of Body with 10mm	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
with Battery(SN: UNHB508XA1922984)							
Towords Phantom	4182/836.4	RMC	0.590	0.427	0.059	1.6	21.3°C
Towords Ground	4182/836.4	RMC	1.100	0.771	0.014	1.6	21.3°C
Left edge	4182/836.4	RMC	0.406	0.274	-0.055	1.6	21.3°C
Right edge	4182/836.4	RMC	0.595	0.416	-0.080	1.6	21.3°C
Bottom edge	4182/836.4	RMC	0.139	0.088	0.037	1.6	21.3°C
Towords Ground	4233/846.6	RMC	0.939	0.655	-0.062	1.6	21.3°C
Towords Ground	4132/826.4	RMC	0.957	0.667	0.034	1.6	21.3°C
Towords Ground with HSDPA	4182/836.4	HSDPA	1.060	0.739	0.014	1.6	21.3°C
Towords Ground with Headset	4182/836.4	RMC	0.788	0.479	-0.065	1.6	21.3°C
with Battery(SN: LACB429HI1800285)							
Towords Ground	4182/836.4	RMC	1.060	0.744	-0.017	1.6	21.3°C

Table 22: Test results for WCDMA 850 MHz

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) There have two kinds of battery, another battery was tested at the worst case of the other one.

4) 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.

5) Per KDB941225 D06 Hot Spot SAR v01,SAR must measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge,for the data modes,wireless technologies and frequency bands supporting hotspot mode.

WiFi 2450 MHz

Test Position of Head	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
with Battery(SN: UNHB508XA1922984)							
Left Hand Touched	6/2437	802.11b	0.074	0.042	-0.168	1.6	21.4°C
Left Hand Tilted 15°	6/2437	802.11b	0.101	0.053	0.184	1.6	21.4°C
Right Hand Touched	6/2437	802.11b	0.088	0.050	-0.155	1.6	21.4°C
Right Hand Tilted 15°	6/2437	802.11b	0.095	0.048	0.074	1.6	21.4°C
Left Hand Tilted 15°	11/2462	802.11b	0.123	0.061	0.093	1.6	21.4°C
Left Hand Tilted 15°	1/2412	802.11b	0.082	0.042	-0.003	1.6	21.4°C
with Battery(SN: LACB429HI1800285)							
Left Hand Tilted 15°	11/2462	802.11b	0.125	0.063	-0.006	1.6	21.4°C

Test Position of Body with 10mm	Test channel /Frequency	Test Mode	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
with Battery(SN: UNHB508XA1922984)							
Towords Phantom	6/2437	802.11b	0.040	0.023	0.114	1.6	21.5°C
Towords Ground	6/2437	802.11b	0.086	0.051	-0.005	1.6	21.5°C
Right edge	6/2437	802.11b	0.055	0.029	0.097	1.6	21.5°C
Top edge	6/2437	802.11b	0.033	0.018	-0.167	1.6	21.5°C
Towords Ground	11/2462	802.11b	0.098	0.058	-0.156	1.6	21.5°C
Towords Ground	1/2412	802.11b	0.071	0.043	0.173	1.6	21.5°C
with Battery(SN: LACB429HI1800285)							
Towords Ground	11/2462	802.11b	0.076	0.045	0.116	1.6	21.5°C

Table 23: Test results for WiFi 2450 MHz

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) There have two kinds of battery, another battery was tested at the worst case of the other one.

4) 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.

5) Per KDB941225 D06 Hot Spot SAR v01,SAR must measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge,for the data modes,wireless technologies and frequency bands supporting hotspot mode.

2.5.4 Extrapolated SAR Values

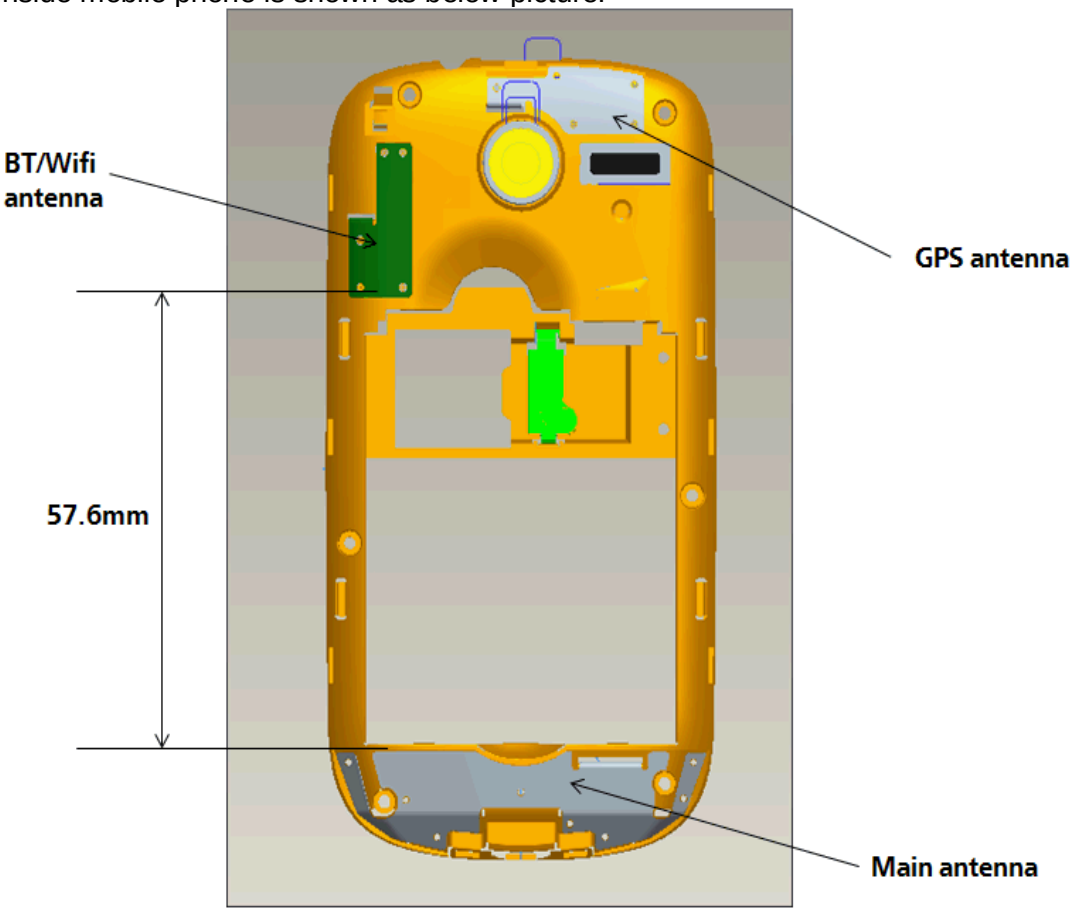
Limit of SAR (W/kg)		Conducted Power	1g Average 1.6	Tune-up procedures maximum Power(dBm)	1g Average 1.6
Worst Case		Measurement Result(dBm)	Measurement Result(W/kg)		Extrapolated Result (W/kg)
Test Position	Channel				
Head GSM1900					
Right hand touched	Low	29.87	1.280	30.2	1.381
Body GPRS1900 (2 timeslots uplink)					
Towords Phantom	Low	28.72	0.875	29.2	0.977
Body EGPRS1900 (2 timeslots uplink)					
Towords Phantom	Low	28.69	0.919	29.2	1.034
Head GSM850					
Right hand touched	Low	32.65	0.848	33.2	0.962
Body GPRS850 (2 timeslots uplink)					
Towords Ground	Low	31.08	1.200	31.7	**1.384**
Body EGPRS850 (2 timeslots uplink)					
Towords Ground	Low	31.06	1.190	31.7	1.379
Head WCDMA850 (RMC)					
Right hand touched	Middle	23.63	0.828	24.2	0.944
Body WCDMA850 (RMC)					
Towords Ground	Middle	23.63	1.100	24.2	1.254
Body WCDMA850 (HSDPA)					
Towords Ground	Middle	23.56	1.060	24.2	1.228

Table 24: 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 5.76cm>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)	6.34	6.11	8.19

Table 25:Conducted power measurement result (BT)

WiFi Function

The output power of WiFi antenna is as following:

Wi-Fi 2450MHz	Channel	Average Power (dBm) for Data Rates							
		1Mbps	2Mbps	5.5Mbps	11Mbps	/	/	/	/
802.11b	1	14.28	14.25	14.21	14.23	/	/	/	/
	6	14.58	14.53	14.49	14.46	/	/	/	/
	11	14.82	14.79	14.78	14.75	/	/	/	/
802.11g	Channel	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
	1	9.33	9.28	9.24	9.25	9.21	9.27	9.22	9.29
	6	9.66	9.64	9.59	9.57	9.62	9.61	9.57	9.63
	11	10.15	10.12	10.14	10.15	10.13	10.08	10.09	10.10
802.11n (HT20)	Channel	6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps
	1	5.07	5.01	5.05	4.99	5.03	4.97	5.06	5.04
	6	5.35	5.29	5.33	5.31	5.28	5.25	5.21	5.30
	11	6.25	6.24	6.21	6.23	6.19	6.18	6.2	6.22

Table 26:Conducted power measurement result (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 ≤ $2P_{Ref}$ (24mW=13.8dBm) and its antenna(s) is ≥ 5.0 cm from other antennas.

Stand-alone SAR evaluation is required for WiFi, because the output power of WiFi is ≥$2P_{Ref}$ (24mW=13.8dBm)

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 SAR Measurement Plots

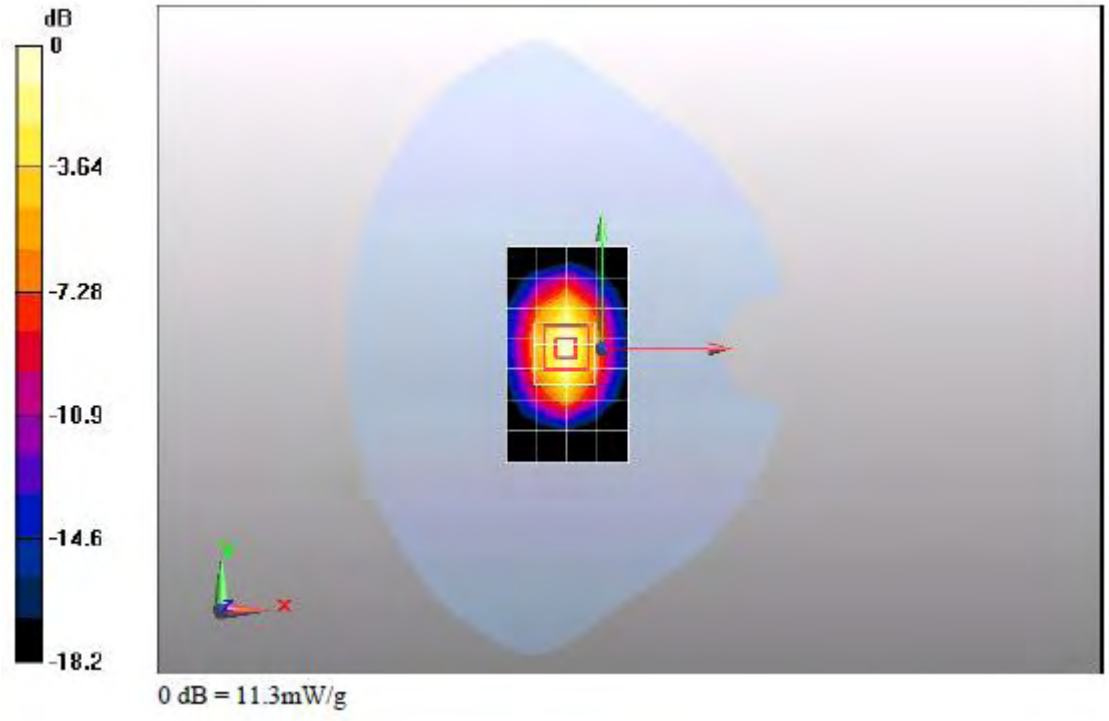
Annex 1.1 System performance verification

Date/Time: 5/9/2011 0:55:37, Date/Time: 5/9/2011 0:59:41
Test Laboratory: Huawei GCTC Lab

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 = 1.39 mho/m; ε_r = 38.7; ρ = 1000 kg/m3
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) = 11 mW/g

Configuration/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm
Reference Value = 92.5 V/m; Power Drift = 0.00489 dB
Peak SAR (extrapolated) = 18.5 W/kg
SAR(1 g) = 10 mW/g; SAR(10 g) = 5.17 mW/g
Maximum value of SAR (measured) = 11.3 mW/g



Date/Time: 5/8/2011 10:39:52, Date/Time: 5/8/2011 10:43:57
Test Laboratory: Huawei GCTC Lab

SystemPerformanceCheck-D1900-ES-Body

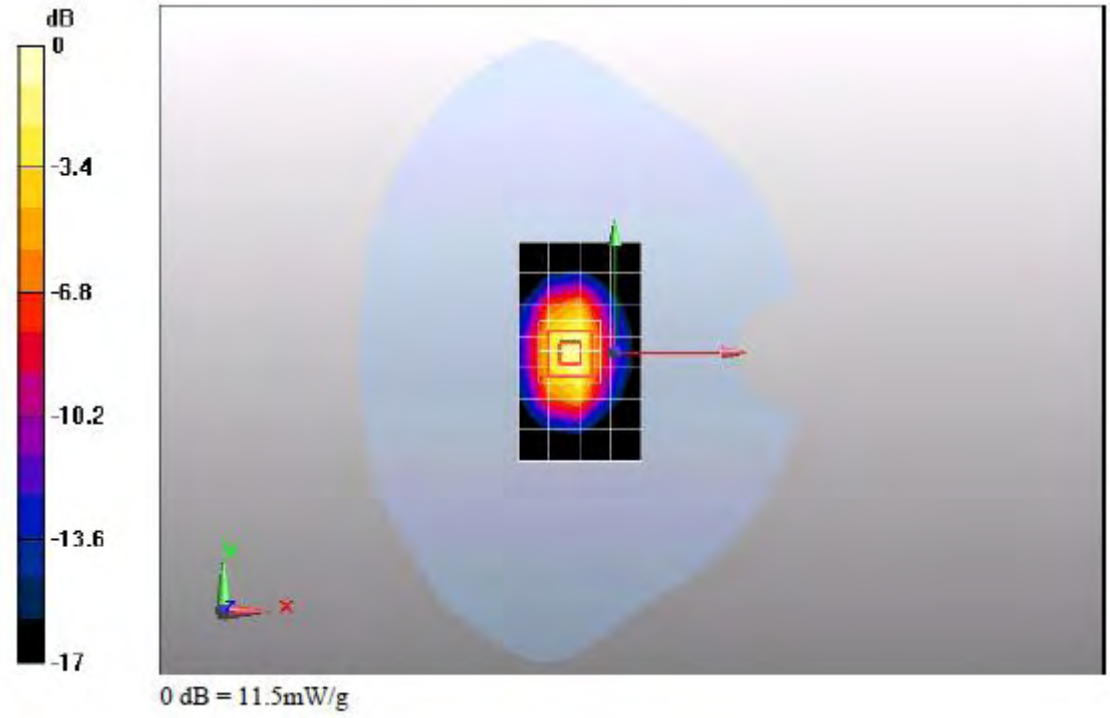
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d091

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.51 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(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) = 9.16 mW/g

Configuration/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm
Reference Value = 82.3 V/m; Power Drift = 0.121 dB
Peak SAR (extrapolated) = 18.3 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.23 mW/g
Maximum value of SAR (measured) = 11.5 mW/g



Date/Time: 5/6/2011 16:56:29, Date/Time: 5/6/2011 17:04:30
Test Laboratory: Huawei GCTC Lab

SystemPerformanceCheck-D835-ES-Head

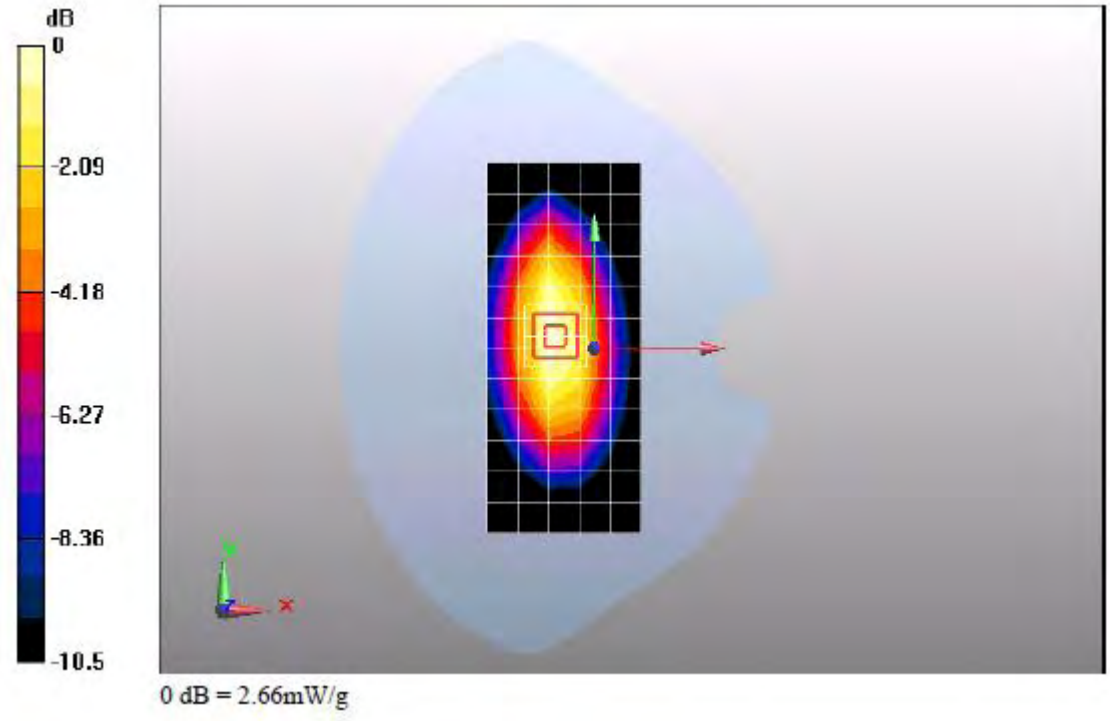
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:4d059

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.88 mho/m; ε_r = 40.3; 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 (6x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.54 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 = -0.016 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.46 mW/g; SAR(10 g) = 1.61 mW/g
Maximum value of SAR (measured) = 2.66 mW/g



Date/Time: 5/7/2011 11:44:33, Date/Time: 5/7/2011 11:52:31
Test Laboratory: Huawei GCTC Lab

SystemPerformanceCheck-D835-ES-Body

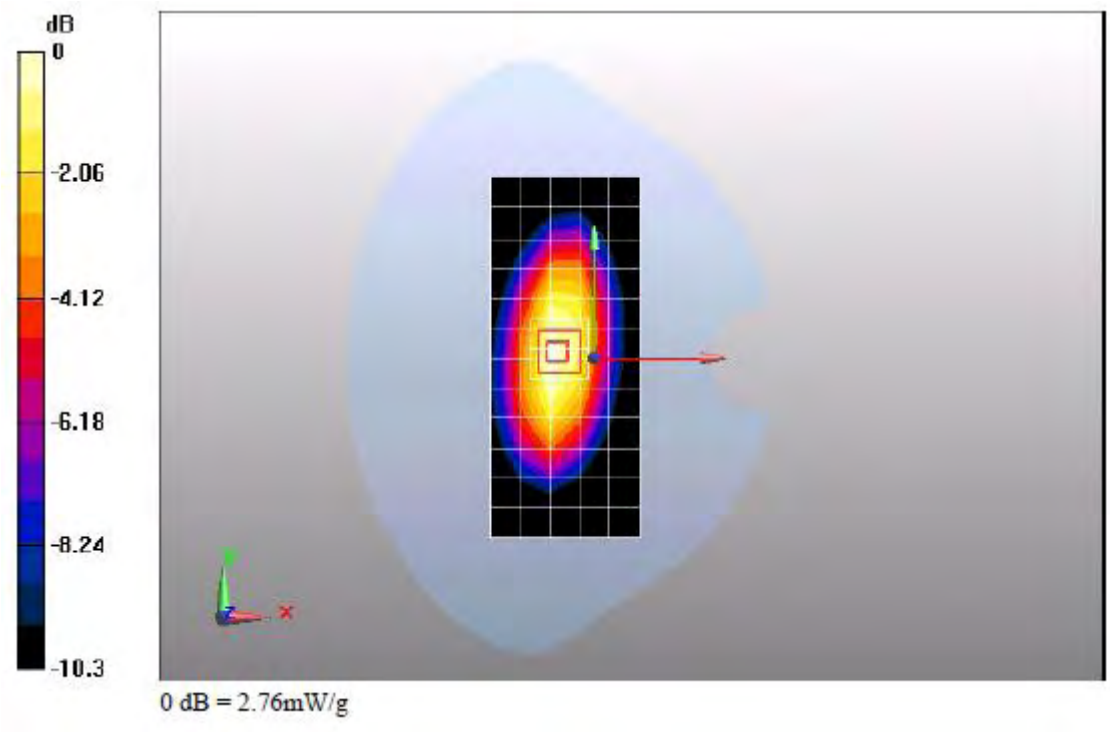
DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:4d059

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.968 mho/m; ε_r = 52.7; 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 (6x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.62 mW/g

Configuration/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm
Reference Value = 54.6 V/m; Power Drift = -0.055 dB
Peak SAR (extrapolated) = 3.69 W/kg
SAR(1 g) = 2.55 mW/g; SAR(10 g) = 1.67 mW/g
Maximum value of SAR (measured) = 2.76 mW/g



Date/Time: 5/5/2011 16:18:21, Date/Time: 5/5/2011 16:21:05
Test Laboratory: Huawei GCTC Lab

SystemPerformanceCheck-D2450-ES-Head

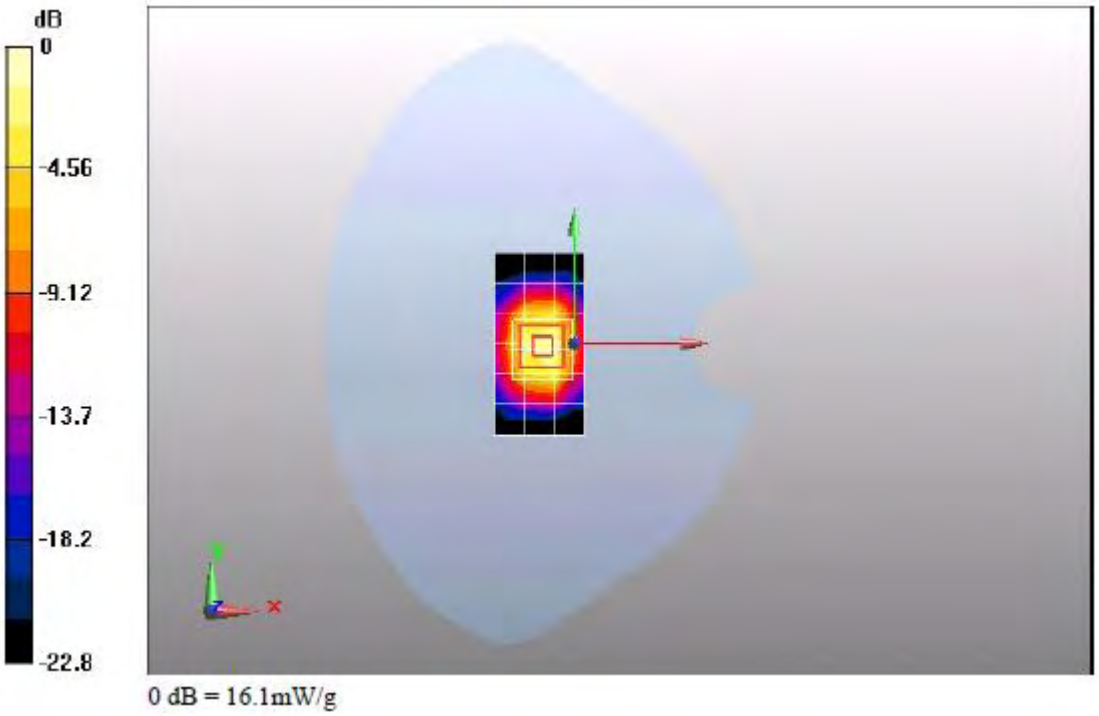
DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:860

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.8 mho/m; ε_r = 38.5; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(4.45, 4.45, 4.45); 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 (4x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 11.9 mW/g

Configuration/d=10mm,pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm,
dz=5mm
Reference Value = 95.5 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 30.4 W/kg
SAR(1 g) = 14.2 mW/g; SAR(10 g) = 6.46 mW/g
Maximum value of SAR (measured) = 16.1 mW/g



Date/Time: 5/10/2011 14:55:27, Date/Time: 5/10/2011 14:58:18
Test Laboratory: Huawei GCTC Lab

SystemPerformanceCheck-D2450-ES-Body

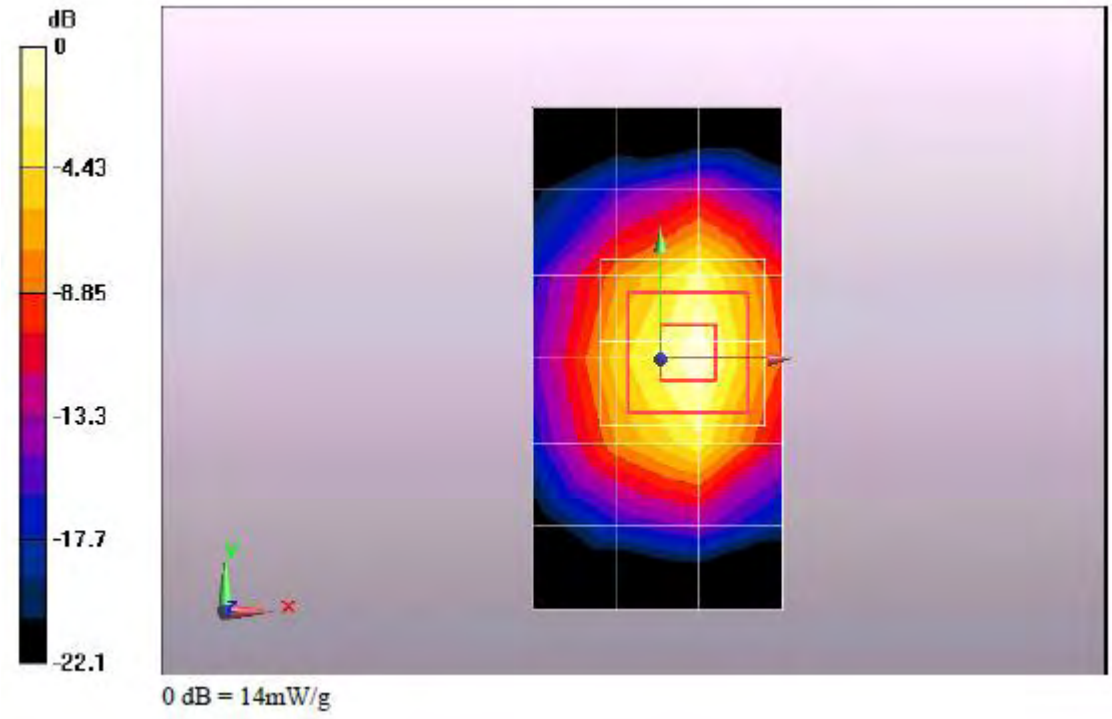
DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:860

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 52.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: ES3DV3 - SN3168; ConvF(4.24, 4.24, 4.24); Calibrated: 12/23/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn852; Calibrated: 12/24/2010
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1038
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/d=10mm,pin=250mW/Area Scan (4x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 13.5 mW/g

Configuration/d=10mm,pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm,
dz=5mm
Reference Value = 84.8 V/m; Power Drift = -0.101 dB
Peak SAR (extrapolated) = 19.4 W/kg
SAR(1 g) = 11.9 mW/g; SAR(10 g) = 5.74 mW/g
Maximum value of SAR (measured) = 14 mW/g



Annex 1.2 PCS 1900 MHz Head

Date/Time: 5/9/2011 1:50:01, Date/Time: 5/9/2011 1:57:14
Test Laboratory: Huawei GCTC Lab

U8180-7 GSM1900 661CH Left hand touch cheek with battery SN-UNHB508XA1922984

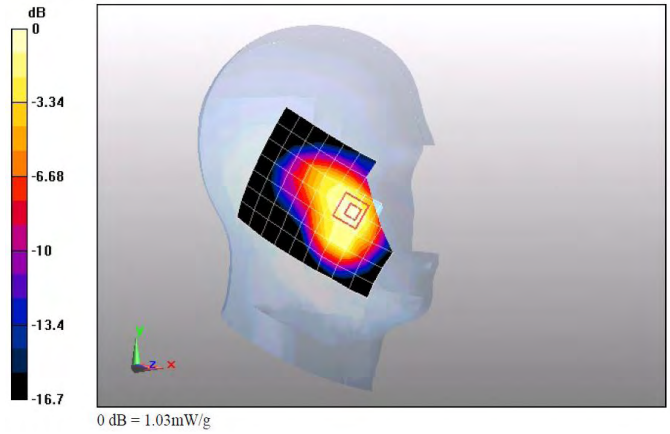
DUT: U8180-7; Type: Handset; Serial: Q8Z7NA1132200065

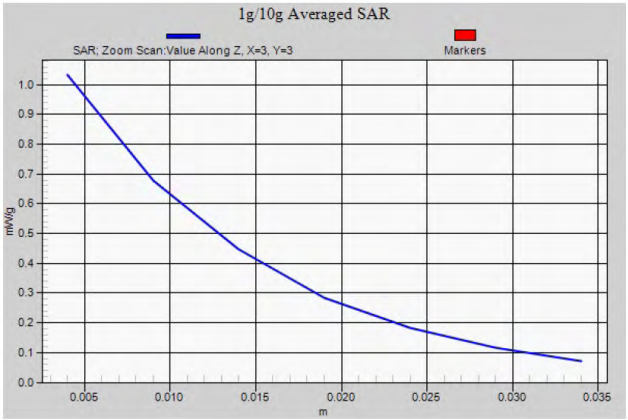
Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; ε_r = 38.8; ρ = 1000 kg/m3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- 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 (8x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.01 mW/g

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.8 V/m; Power Drift = 0.093 dB
Peak SAR (extrapolated) = 1.46 W/kg
SAR(1 g) = 0.949 mW/g; SAR(10 g) = 0.576 mW/g
Maximum value of SAR (measured) = 1.03 mW/g





Date/Time: 5/9/2011 6:06:51, Date/Time: 5/9/2011 6:40:13
Test Laboratory: Huawei GCTC Lab

U8180-7 GSM1900 661CH Left hand tilt 15 degree with battery SN-UNHB508XA1922984

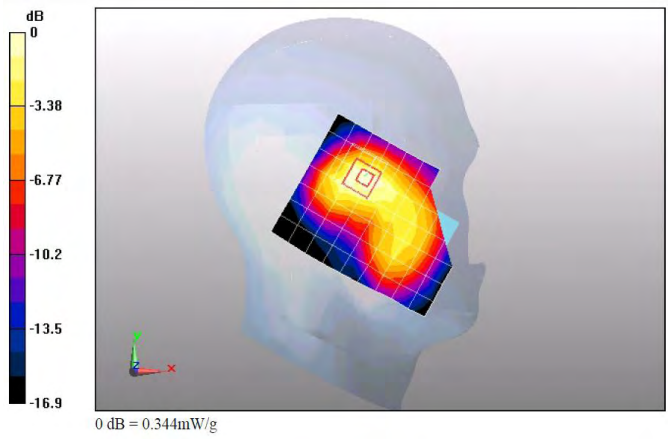
DUT: U8180-7; Type: Handset; Serial: Q8Z7NA1132200065

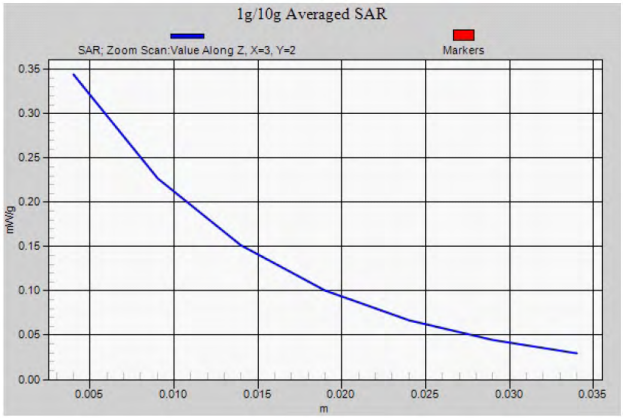
Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; ε_r = 38.8; ρ = 1000 kg/m3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- 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 (8x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.332 mW/g

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12 V/m; Power Drift = 0.123 dB
Peak SAR (extrapolated) = 0.481 W/kg
SAR(1 g) = 0.319 mW/g; SAR(10 g) = 0.200 mW/g
Maximum value of SAR (measured) = 0.344 mW/g





Date/Time: 5/9/2011 20:18:19, Date/Time: 5/9/2011 20:25:26
Test Laboratory: Huawei GCTC Lab

U8180-7 GSM1900 661CH Right hand touch cheek with battery SN-UNHB508XA1922984

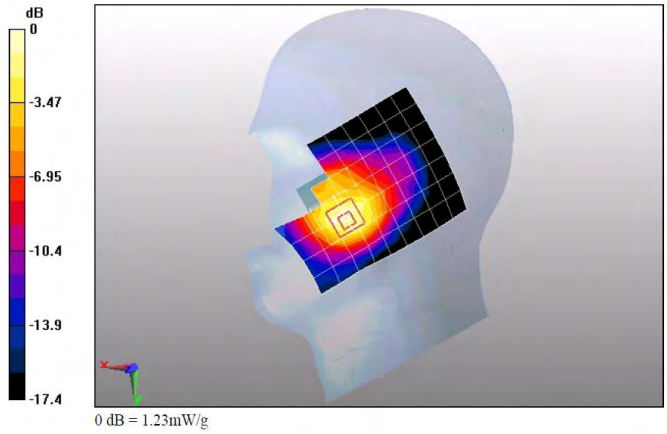
DUT: U8180-7; Type: Handset; Serial: Q8Z7NA1132200065

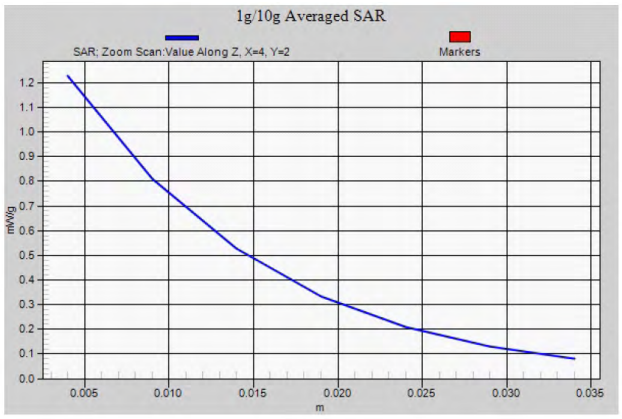
Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; ε_r = 38.8; ρ = 1000 kg/m3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- 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 (8x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.09 mW/g

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.22 V/m; Power Drift = 0.170 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.642 mW/g
Maximum value of SAR (measured) = 1.23 mW/g





Date/Time: 5/10/2011 9:02:52, Date/Time: 5/10/2011 9:18:36
Test Laboratory: Huawei GCTC Lab

U8180-7 GSM1900 661CH Right hand tilt 15 degree with battery SN-UNHB508XA1922984

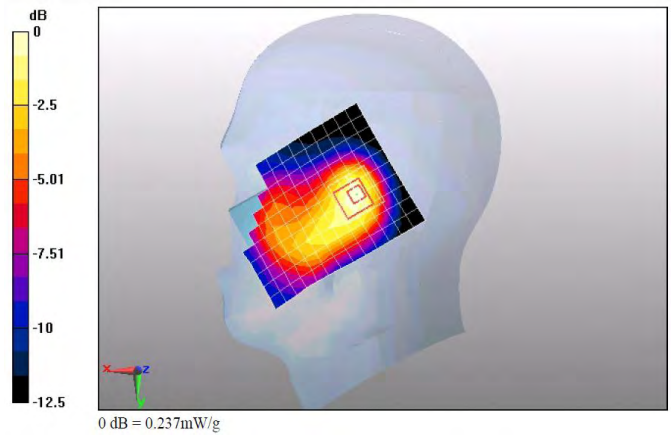
DUT: U8180-7; Type: Handset; Serial: Q8Z7NA1132200065

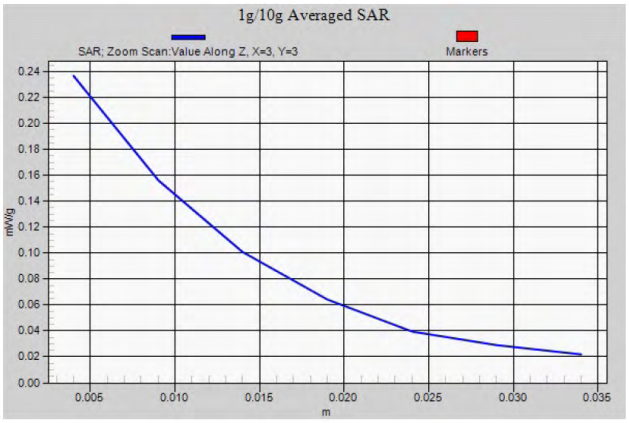
Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.37 mho/m; ε_r = 38.8; ρ = 1000 kg/m3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- 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 (11x14x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.228 mW/g

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.1 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 0.328 W/kg
SAR(1 g) = 0.216 mW/g; SAR(10 g) = 0.133 mW/g
Maximum value of SAR (measured) = 0.237 mW/g





Date/Time: 5/9/2011 2:20:15, Date/Time: 5/9/2011 2:27:28
Test Laboratory: Huawei GCTC Lab

U8180-7 GSM1900 810CH Left hand touch cheek with battery SN-UNHB508XA1922984

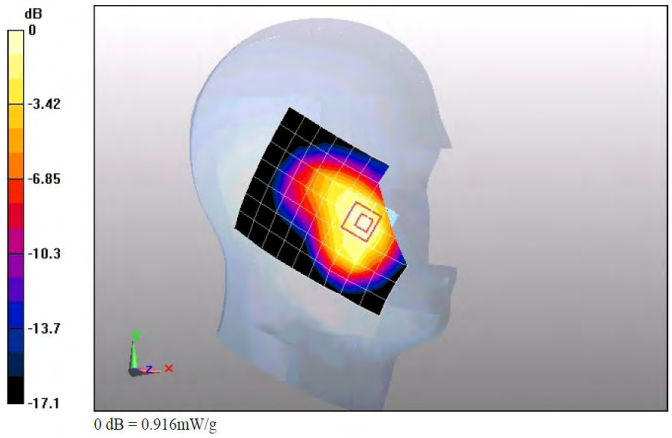
DUT: U8180-7; Type: Handset; Serial: Q8Z7NA1132200065

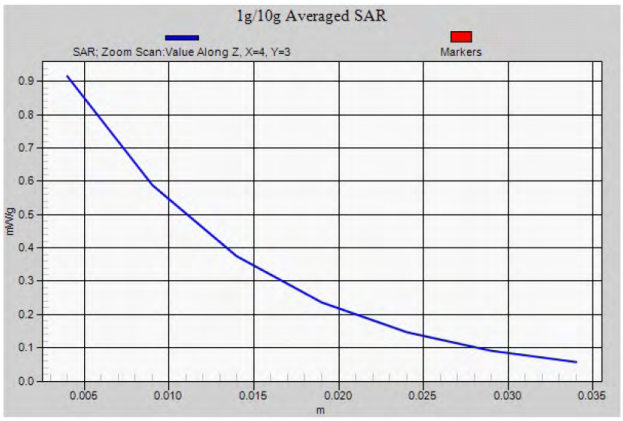
Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.39 mho/m; ε_r = 38.7; ρ = 1000 kg/m3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- 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 (8x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.887 mW/g

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.09 V/m; Power Drift = 0.068 dB
Peak SAR (extrapolated) = 1.31 W/kg
SAR(1 g) = 0.852 mW/g; SAR(10 g) = 0.517 mW/g
Maximum value of SAR (measured) = 0.916 mW/g





Date/Time: 5/9/2011 2:43:41, Date/Time: 5/9/2011 2:50:53
Test Laboratory: Huawei GCTC Lab

U8180-7 GSM1900 512CH Left hand touch cheek with battery SN-UNHB508XA1922984

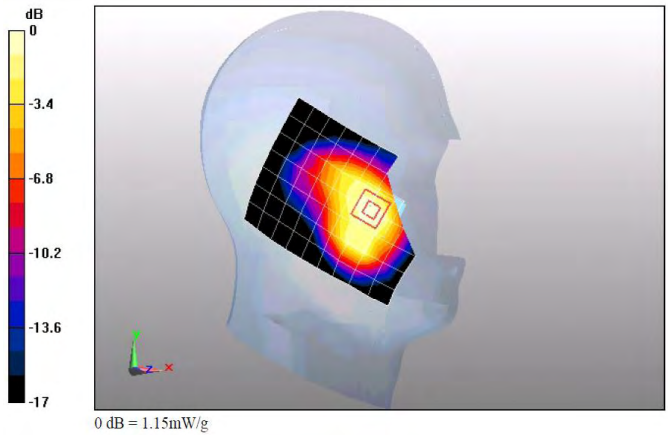
DUT: U8180-7; Type: Handset; Serial: Q8Z7NA1132200065

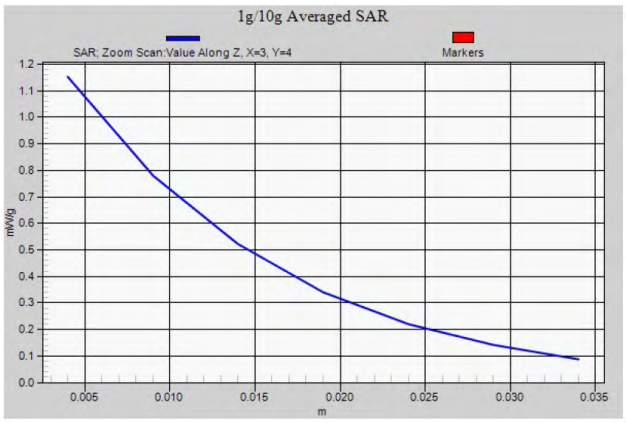
Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1850.2 MHz
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.34 mho/m; ε_r = 38.9; ρ = 1000 kg/m3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- 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 (8x10x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.12 mW/g

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.24 V/m; Power Drift = 0.094 dB
Peak SAR (extrapolated) = 1.62 W/kg
SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.648 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.15 mW/g





Date/Time: 5/10/2011 9:40:45, Date/Time: 5/10/2011 9:47:52
Test Laboratory: Huawei GCTC Lab

U8180-7 GSM1900 810CH Right hand touch cheek with battery SN-UNHB508XA1922984

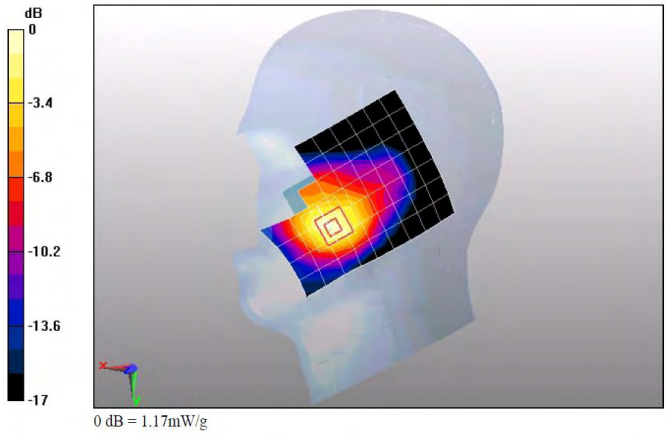
DUT: U8180-7; Type: Handset; Serial: Q8Z7NA1132200065

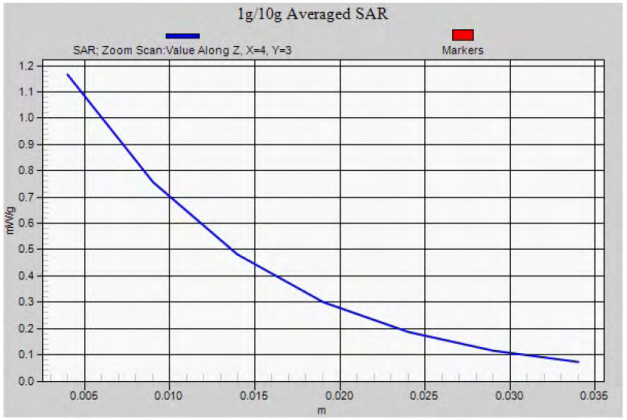
Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.41 mho/m; ε_r = 39.3; ρ = 1000 kg/m3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- 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 (8x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.989 mW/g

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.98 V/m; Power Drift = -0.109 dB
Peak SAR (extrapolated) = 1.62 W/kg
SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.613 mW/g
Maximum value of SAR (measured) = 1.17 mW/g





Date/Time: 5/9/2011 20:40:41, Date/Time: 5/9/2011 20:47:47
Test Laboratory: Huawei GCTC Lab

U8180-7 GSM1900 512CH Right hand touch cheek with battery SN-UNHB508XA1922984

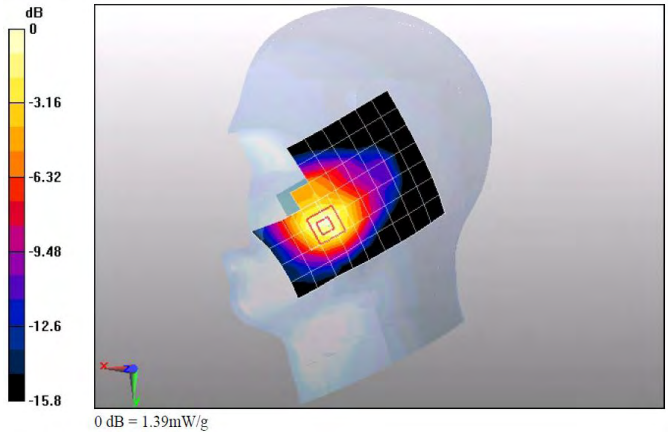
DUT: U8180-7; Type: Handset; Serial: Q8Z7NA1132200065

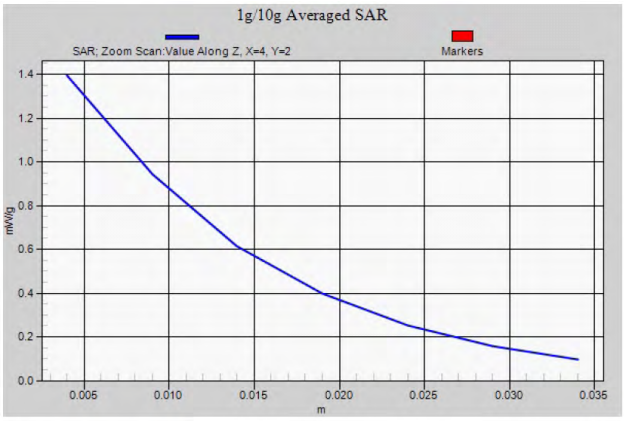
Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1850.2 MHz
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.34 mho/m; ε_r = 38.9; ρ = 1000 kg/m3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- 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 (8x10x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.21 mW/g

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.28 V/m; Power Drift = -0.127 dB
Peak SAR (extrapolated) = 1.9 W/kg
SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.735 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.39 mW/g





Date/Time: 5/10/2011 11:26:52, Date/Time: 5/10/2011 11:34:34
Test Laboratory: Huawei GCTC Lab

U8180-7 GSM1900 512CH Right hand touch cheek with battery SN-LACB429HI1800285

DUT: U8180-7; Type: Handset; Serial: Q8Z7NA1132200065

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1850.2 MHz
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.36 mho/m; ε_r = 39.5; 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 (8x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.28 mW/g

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.49 V/m; Power Drift = 0.084 dB
Peak SAR (extrapolated) = 1.91 W/kg
SAR(1 g) = 1.28 mW/g; SAR(10 g) = 0.740 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.4 mW/g