Accredited testing laboratory

CNAS Registration number: L0310

Report On SAR Test of WCDMA/GPRS/GSM/EDGE Mobile Phone with Bluetooth

M/N: HUAWEI U1250-9/U1250-9

Test report no.	**: SYBH(Z-SAR)026032010**
Type identification	**: HUAWEI U1250-9/U1250-9**
FCC-ID	**: QISU1250-9**
Test specification	**: IEEE 1528-2003**
	: ANSI C95.1-1999
	: RSS-102 issue 2 (2005)
	: OET Bulletin 65 Supplement C
	: IEC 62209-2:2008(106/162/CDV)

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 U1250-9/U1250-9are below the maximum recommended levels of 1.6 W/Kg as averaged over any 1 g tissue according to the FCC rule §2.1093, the ANSI/IEEE C 95.1:1999, the NCRP Report Number 86 for uncontrolled environment, according to the Health Canada's Safety Code 6 and the Industry Canada Radio Standards Specification RSS-102 for General Population/Uncontrolled exposure.
For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and that positions the handset a minimum of 15 mm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.
The measurement together with the test system set-up is described in chapter 2.3 of this test report. A detailed description of the equipment under test can be found in chapter 1.5.

Test engineer:

2010-03-16	**Pan Lifang**	Pan Lifang
Date	Name	Signature

Reviewed by:

2010-03-16	**Hu Zhongxun**	Hu Zhongxun
Date	Name	Signature

Approved by:

2010-03-16	**Liu Chunlin**	Liu Chunlin
Date	Name	Signature

1.2 Testing laboratory

Huawei Technologies Co.,Ltd.
Street: Bantian, Longgang District, Shenzhen
Country: P.R.China

Telephone: +86-755-28785278
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State of accreditation: The Test laboratory (area of testing) is accredited according to ISO/IEC 17025.
CNAS Registration number: L0310

1.3 Details of applicant

Name: HUAWEI TECHNOLOGIES CO., LTD

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

Contact: Mr. Qiu Wei
Telephone: +86-10-82836236

1.4 Application details

Date of receipt of application:	2010-03-05
Date of receipt of test item:	2010-03-08
Start/Date of test:	2010-03-10
End/Date of test:	2010-03-16

Person(s) present during the test: ---

1.5 Test item

Description of the test item:	WCDMA/GPRS/GSM/EDGE Mobile Phone with Bluetooth
Type identification:	HUAWEI U1250-9/U1250-9
FCC-ID :	QISU1250-9
Serial number:	DM2AA11021100093
Manufacturer:	Huawei Technologies Co.,Ltd.
Name:	Huawei Technologies Co.,Ltd.
Street:	Huawei Base, Bantian
Town:	Longgang District, Shenzhen
Country:	P.R.China

additional information on the DUT:		
device type :	portable device	
IMEI No :	359839030000937	
exposure category:	uncontrolled environment / general population	
test device production information	production unit	
operating mode(s)	GSM, PCS,UMTS/WCDMA ,Bluetooth	
modulation	GMSK,QPSK	
GPRS mobile station class :	B	
GPRS multislot class :	10	voice mode : ---
maximum no. of timeslots in uplink:	2	
operating frequency range(s)	transmitter frequency range	receiver frequency range
GSM850 (tested):	824.2 MHz ~ 848.8 MHz	869.2 MHz ~ 893.8 MHz
PCS 1900 (tested):	1850.2 MHz ~ 1909.8 MHz	1930.2 MHz ~ 1989.8 MHz
UMTS/WCDMA AWS (tested):	1712.4 MHz ~ 1752.6 MHz	2112.4 MHz ~ 2156.6 MHz
Power class :	4,tested with power level 5 (850 MHz band)	
	1,tested with power level 0 (1900 MHz band)	
	3,tested with maximum output power (1700 MHz band)	
measured peak output power (conducted):	850 MHz band:33.66dBm (GMSK)	
	1900 MHz band:29.94dBm (GMSK)	
	1700 MHz band:23.48dBm (QPSK)	
test channels (low-mid-high) :	128-190-251 (850 MHz band)	
	512-661-810 (1900 MHz band)	
	1312-1412-1513(1700 MHz band)	
hardware version :	HD6U125M Ver.A	
software version :	U1259V100R001ENGC01B723	
antenna type :	Integrated antenna	
accessories/body-worn configurations:	Stereo headset	
battery options :	Huawei Battery HBU83S Li-Polymer 3.7V,900mAh S/N: GAG9B13XC4614301	
charger options :	Huawei AC/DC Adapter Model: HS-050040U1， S/N: HKAA11816752	

1.5.1 EUT Description

HUAWEI WCDMA/GPRS/GSM/EDGE Mobile Phone with Bluetooth - HUAWEI U1250-9/U1250-9 is subscriber equipment in the WCDMA/GSM system. The WCDMA frequency band is Band I and AWS,but only AWS band test data included in this report. The GSM/GPRS frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only GSM850 and PCS1900MHz band test data included in this report. The Mobile Phone implements such functions as RF signal receiving /Transmitting, WCDMA and GSM/GPRS protocol processing, voice, video and MMS service etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and USIM card interface .It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

1.6 Test specification(s)

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

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

RSS-102: Radio Frequency Exposure Compliance of Radiocommunication Apparatus
(All Frequency Bands (Issue 2 of November 2005)

Canada's Safety Code 6: Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz (99-EHD-237)

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

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

IEC 62209-2:2008(106/162/CDV), Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices – Human models, Instrumentation, and Procedures Part 2: Procedure to determine the specific absorption rate (SAR) for mobile wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)

1.6.1 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain)	**1.60 mW/g**	8.00 mW/g
Spatial Average SAR** (Whole Body)	0.08 mW/g	0.40 mW/g
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	4.00 mW/g	20.00 mW/g

Table 1: RF exposure limits

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

Notes:

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

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

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

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

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

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.	☒
The deviations as specified in 2.5 were ascertained in the course of the tests performed.	☐

The maximum SAR of HUAWEI U1250-9 head position is 1.17W/kg.
The maximum SAR of HUAWEI U1250-9 body position is 1.16W/kg.

2.2 Test environment

General Environment conditions in the test area are as follows:

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

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

2.3 Measurement and test set-up

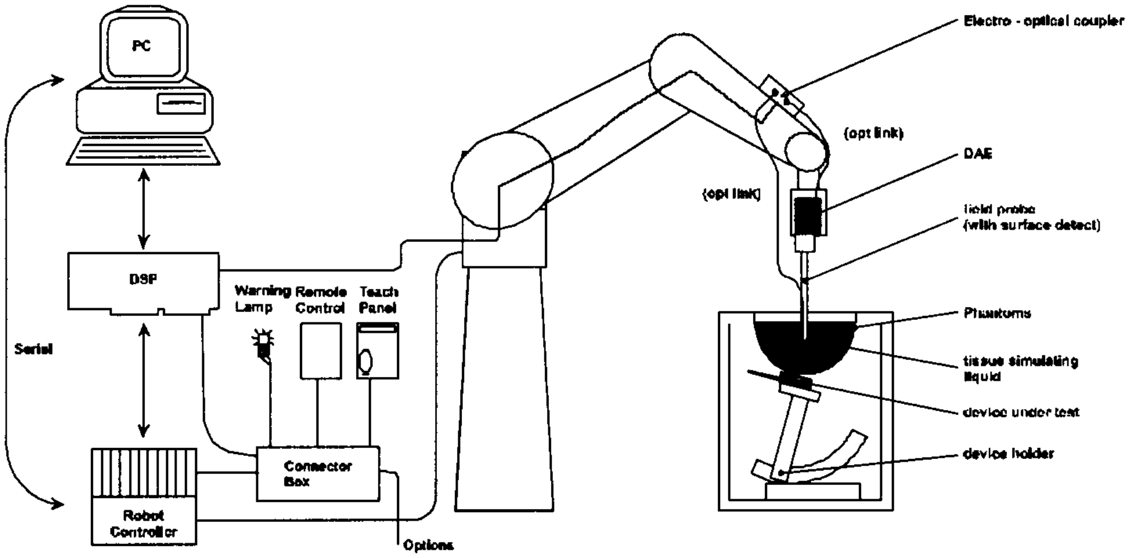
The measurement system is described in chapter 2.4.

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

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

2.4 Measurement system

2.4.1 System Description



The 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

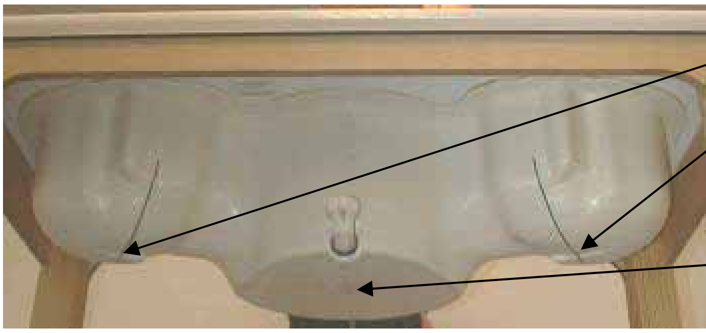
Technical data according to manufacturer information	
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)
Calibration	In air from 10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

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

with	P_{pwe}	= equivalent power density of a plane wave in mW/cm^2
	E_{tot}	= total electric field strength in V/m
	H_{tot}	= total magnetic field strength in A/m

2.4.9 Test equipment utilized

This table gives a complete overview of the SAR measurement equipment

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

	Manufacturer	Device	Type	Serial number	Date of last calibration
☐					
☒	Schmid & Partner Engineering AG	Dosimetric E-Field Probe	ES3DV3	3168	2009-12-18
☒	Schmid & Partner Engineering AG	835 MHz System Validation Dipole	D835V2	4d095	2009-05-25
☐	Schmid & Partner Engineering AG	900 MHz System Validation Dipole	D900V2	1d063	2009-05-26
☒	Schmid & Partner Engineering AG	1800 MHz System Validation Dipole	D1800V2	2d157	2009-05-27
☒	Schmid & Partner Engineering AG	1900 MHz System Validation Dipole	D1900V2	5d091	2009-05-28
☐	Schmid & Partner Engineering AG	2000 MHz System Validation Dipole	D2000V2	1036	2009-05-29
☒	Schmid & Partner Engineering AG	Data acquisition electronics	DAE4	851	2009-05-14
☐	Schmid & Partner Engineering AG	Data acquisition electronics	DAE4	852	2009-12-18
☒	Schmid & Partner Engineering AG	Software	DASY 5 V5.0	N/A	N/A
☒	Schmid & Partner Engineering AG	Twin Phantom	SAM1	TP-1475	N/A
☒	Schmid & Partner Engineering AG	Twin Phantom	SAM2	TP-1474	N/A
☒	Rohde & Schwarz	Universal Radio Communication Tester	CMU 200	111379	2009-09-26
☒	Agilent)*	Network Analyser 300 kHz to 8.5 GHz	E5071B	MY42404956	2010-03-08
☒	Agilent	Dielectric Probe Kit	85070E	2484	N/A
☒	Agilent	Signal Generator	N5181A	MY47420989	2010-03-08
☒	MINI-CIRCUITS	Amplifier	ZHL-42W	QA0746001	N/A
☒	Agilent	Power Meter	E4417A	MY45101339	2009-05-24
☒	Agilent	Power Meter Sensor	E9321A	MY44420359	2009-05-24

)* : 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 2: 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 3: Body tissue dielectric properties

Salt: 99+% Pure Sodium Chloride
Sugar: 98+% Pure Sucrose
Water: De-ionized, 16MΩ+ resistivity
HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

Note : Due to their availability body tissue simulating liquids as defined by FCC OET Bulletin 65 Supplement C are generally used for body worn SAR testing according to European standards.

2.4.11 Tissue simulating liquids: parameters

Used Target Frequency	Target Head Tissue		Measured Head Tissue		Measured Date
[MHz]	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
835	41.5	0.90	41.4	0.925	2010-03-10
1900	40.0	1.40	39.7	1.37	2010-03-12
1800	40.0	1.40	39.9	1.38	2010-03-14

Table 4: Parameter of the head tissue simulating liquid

Used Target Frequency	Target Body Tissue		Measured Body Tissue		Measured Date
[MHz]	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
835	55.2	0.97	54.2	0.967	2010-03-11
1900	53.3	1.52	53.2	1.49	2010-03-13
1800	53.3	1.52	53.3	1.53	2010-03-15

Table 5: Parameter of the body tissue simulating liquid

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

2.4.12 Measurement uncertainty evaluation for SAR test

The overall combined measurement uncertainty of the measurement system is ± 10.7% (K=1).
The expanded uncertainty (k=2) is assessed to be ± 21.4%
This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divi-sor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard 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 6: 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 7: Measurement uncertainties

2.4.14 System validation

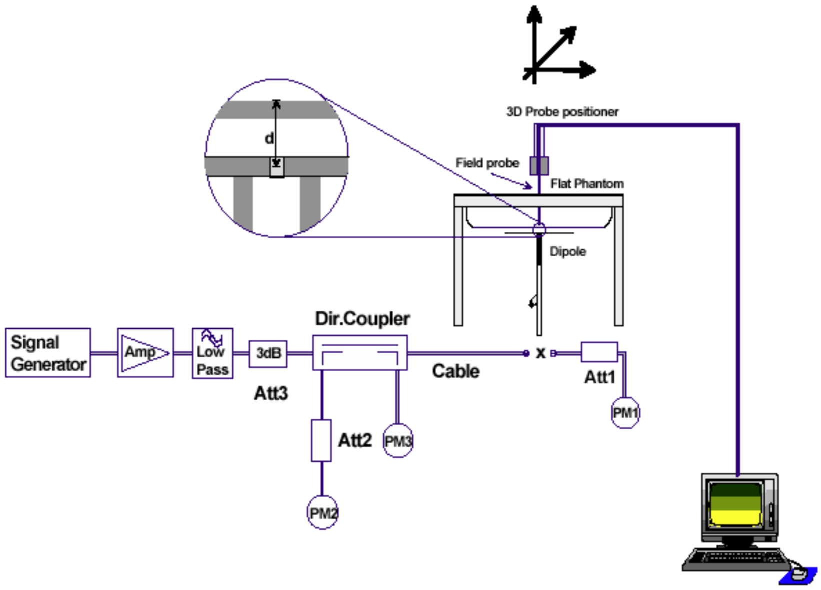
The system validation is performed for verifying the accuracy of the complete measurement system and performance of the software. The system validation is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows validation results for all frequency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

Validation Kit	Frequency	Target SAR_{1g} (250 mW) (+/- 10%)	Target SAR_{10g} (250 mW) (+/- 10%)	Measured SAR_{1g}	Measured SAR_{10g}	Measured date
D835V2 S/N: 4d095	835 MHz head	2.29mW/g	1.5mW/g	2.35mW/g	1.54mW/g	2010-03-10
D835V2 S/N: 4d095	835 MHz body	2.49mW/g	1.62mW/g	2.6mW/g	1.7mW/g	2010-03-11
D1900V2 S/N: 5d091	1900 MHz head	9.6mW/g	5.1mW/g	10.1mW/g	5.21mW/g	2010-03-12
D1900V2 S/N: 5d091	1900 MHz body	10.1mW/g	5.27mW/g	10.2mW/g	5.28mW/g	2010-03-13
D1800V2 S/N: 2d157	1800 MHz head	9.23 mW/g	4.90 mW/g	9.57mW/g	4.98mW/g	2010-03-14
D1800V2 S/N: 2d157	1800 MHz body	9.60mW/g	5.13mW/g	9.76mW/g	5..05mW/g	2010-03-15

Table 8: Results system validation

2.4.15 Validation procedure

The validation is performed by using a validation dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 250 mW. To adjust this power a power meter is used. The power sensor is connected to the cable before the validation to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the validation to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).
Validation results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system.



2.5 Test Results

2.5.1 Conducted power measurements

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

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

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

The signalling modes differ as follows :

mode	**coding scheme**	**modulation**
GPRS	CS1 to CS4	GMSK

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 measurements

Channel / frequency	modulation	timeslots	slotted avg. power(before test)	timebased avg. power (calculated)	slotted avg. power(after test)
128/ 824.2 MHz	GMSK	1	33.17dBm	24.17dBm	33.19dBm
190/ 836.6MHz	GMSK	1	33.65dBm	24.65dBm	33.66dBm
251/ 848.8 MHz	GMSK	1	33.62dBm	24.62dBm	33.64dBm
128/ 824.2 MHz	GMSK	2	32.23dBm	26.23dBm	32.26dBm
190/ 836.6MHz	GMSK	2	32.74dBm	26.74dBm	32.76dBm
251/ 848.8 MHz	GMSK	2	32.61dBm	26.61dBm	32.64dBm
128/ 824.2 MHz	GMSK	2	28.66dBm	22.66dBm	28.64dBm
190/ 836.6MHz	GMSK	2	28.13dBm	22.13dBm	28.16dBm
251/ 848.8 MHz	GMSK	2	28.61dBm	22.61dBm	28.64dBm

Table 9: Test results conducted power measurement GSM 850 MHz

Channel / frequency	modulation	timeslots	slotted avg. power(before test)	timebased avg. power (calculated)	slotted avg. power(after test)
512 / 1850.2 MHz	GMSK	1	29.70dBm	20.71dBm	29.73dBm
661 / 1880.0 MHz	GMSK	1	29.90dBm	20.90dBm	29.94dBm
810 / 1909.8 MHz	GMSK	1	29.62dBm	20.62dBm	29.61dBm
512 / 1850.2 MHz	GMSK	2	29.54dBm	23.54dBm	29.53dBm
661 / 1880.0 MHz	GMSK	2	29.81dBm	23.81dBm	29.79dBm
810 / 1909.8 MHz	GMSK	2	29.53dBm	23.53dBm	29.55dBm
512 / 1850.2 MHz	GMSK	2	25.34dBm	19.34dBm	25.36dBm
661 / 1880.0 MHz	GMSK	2	25.59dBm	19.59dBm	25.56dBm
810 / 1909.8 MHz	GMSK	2	25.26dBm	19.26dBm	25.23dBm

Table 10: Test results conducted power measurement PCS 1900 MHz

Max. RMS output power, WCDMA AWS / dBm				
		Channel / frequency		
mode		1312/ 1712.4 MHz	1412 / 1732.4MHz	1513 / 1752.6MHz
RMC 12.2 kbit/s	Before Test	23.26	23.34	23.43
	After Test	23.29	23.33	23.48
RMC 64 kbit/s	Before Test	23.22	23.20	23.26
	After Test	23.23	23.17	23.26
RMC 144 kbit/s	Before Test	23.29	23.30	23.40
	After Test	23.26	23.27	23.42
RMC 384 kbit/s	Before Test	23.23	23.21	23.43
	After Test	23.26	23.23	23.39

Table 11: Test results conducted power measurement UMTS (WCDMA) AWS 1700MHz

2.5.3 Justification of SAR measurements in GSM mode

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

2.5.4 Multiple Transmitter Information

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

important abbreviations :

SPLSR : Antenna pair SAR to Peak Location Separation Ratio $(SAR_x + SAR_y)/d_{xy}$
P_{ref} : 12 mW at 2.4 GHz

a) head position

Tx No.	Communcation system and frequency band	P_{avg} (mW)	single SAR (W/kg) (see ch. 2.6)	remarks
1a	GSM850	250	0.922	
1b	GSM1900	125	0.991	
1c	WCDMA AWS	250	1.17	routine evaluation
2	Bluetooth 2450 MHz	5	:=0	$P_2 < P_{ref}$
Sum of all 1g-SAR values			n/a	

Table 12: Communication systems and SAR values in head position

antenna pair (x,y)	antenna distance d_{xy} (cm)	L_{xy} (cm)	$SPLSR_{xy}$	sim.-Tx SAR	remarks
(1a,2)	7.2 cm	n/a	0.13	N	$SPLSR_{xy} < 0.3$
(1b,2)	7.2 cm	n/a	0.14	N	$SPLSR_{xy} < 0.3$
(1c,2)	7.2 cm	n/a	0.16	N	$SPLSR_{xy} < 0.3$

Table 13: Antenna distances and SPLSR evaluation in head position

a) body position

Tx No.	Communcation system and frequency band	P_{avg} (mW)	single SAR (W/kg) (see ch. 2.6)	remarks
1a	GSM850	250	1.16	
1b	GSM1900	125	0.759	
1c	WCDMA AWS	250	0.522	routine evaluation
2	Bluetooth 2450 MHz	5	:=0	$P_2 < P_{ref}$
Sum of all 1g-SAR values			n/a	

Table 14: Communication systems and SAR values in body position

antenna pair (x,y)	antenna distance d_{xy} (cm)	L_{xy} (cm)	$SPLSR_{xy}$	sim.-Tx SAR	remarks
(1a,2)	7.2 cm	n/a	0.16	N	$SPLSR_{xy} < 0.3$
(1b,2)	7.2 cm	n/a	0.11	N	$SPLSR_{xy} < 0.3$
(1c,2)	7.2 cm	n/a	0.07	N	$SPLSR_{xy} < 0.3$

Table 15: Antenna distances and SPLSR evaluation in body position

In simple word:
The distance of the GSM antenna at the bottom end of the DUT to the Bluetooth antenna at the middle of the DUT is about 7.2 cm and the sum of the SAR values is < 1.6 W/kg.
No simultaneous transmission SAR evaluation is necessary with GSM.
The Bluetooth output power is below P_{ref}. So standalone SAR for BT is not necessary.

2.6 Test results (Head and Body SAR)

GSM850

The table contains the measured SAR values averaged over a mass of 1 g					
Channel / frequency	Position	Left hand position	Right hand position	Limit	Liquid temperature
U1250-9					
190 / 836.6 MHz	cheek	0.822 W/kg	0.870 W/kg	1.6 W/kg	21.5/21.5 °C
190 / 836.6 MHz	tilted 15°	0.524 W/kg	0.488 W/kg	1.6 W/kg	21.5/21.5 °C
251/ 848.8 MHz	cheek	--- W/kg	0.922 W/kg	1.6 W/kg	---/21.5 °C
128 / 824.2 MHz	cheek	--- W/kg	0.665 W/kg	1.6 W/kg	---/21.5 °C

Table 16: Test results (Head SAR GSM850 MHz)

The table contains the measured SAR values averaged over a mass of 1 g				
Channel / frequency	Position	Body worn	Limit	Liquid temperature
U1250-9 GPRS, 2 Time Slots				
190 / 836.6 MHz	front	0.769 W/kg	1.6 W/kg	21.5 °C
190 / 836.6 MHz	rear	1.07 W/kg	1.6 W/kg	21.5 °C
251/ 848.8 MHz	rear	1.13 W/kg	1.6 W/kg	21.5 °C
128 / 824.2 MHz	rear	0.724 W/kg	1.6 W/kg	21.5 °C
U1250-9 EGPRS, 2 Time Slots				
251/ 848.8 MHz	rear	1.16 W/kg	1.6 W/kg	21.5 °C
U1250-9 Speech mode, with Headset				
251/ 848.8 MHz	rear	0.595 W/kg	1.6 W/kg	21.5 °C
U1250-9 Speech mode, with Bluetooth Headset				
251/ 848.8 MHz	rear	0.897 W/kg	1.6 W/kg	21.5 °C

Table 17: Test results (Body SAR GSM850 MHz)

Note: The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.
Tests in body position were performed with 15 mm air gap between DUT and SAM to simulate the use of a non-metallic belt-clip or holster.
The addition body test was performed at worst case with 1 time slot in uplink.

PCS 1900

The table contains the measured SAR values averaged over a mass of 1 g					
Channel / frequency	Position	Left hand position	Right hand position	Limit	Liquid temperature
U1250-9					
661 / 1880.0 MHz	cheek	0.77 W/kg	0.988 W/kg	1.6 W/kg	21.3/21.3 °C
661 / 1880.0 MHz	tilted 15°	0.502 W/kg	0.403 W/kg	1.6 W/kg	21.3/21.3 °C
810 / 1909.8 MHz	cheek	--- W/kg	0.991 W/kg	1.6 W/kg	---/21.3 °C
512 / 1850.2 MHz	cheek	--- W/kg	0.893 W/kg	1.6 W/kg	---/21.3 °C

Table 18: Test results (Head SAR PCS 1900 MHz)

The table contains the measured SAR values averaged over a mass of 1 g				
Channel / frequency	Position	Body worn	Limit	Liquid temperature
U1250-9 GPRS, 2 Time Slots				
661 / 1880.0 MHz	front 2TS	0.604 W/kg	1.6 W/kg	21.3 °C
661 / 1880.0 MHz	rear 2TS	0.759 W/kg	1.6 W/kg	21.3 °C
810 / 1909.8 MHz	rear 2TS	0.722 W/kg	1.6 W/kg	21.3 °C
512 / 1850.2 MHz	rear 2TS	0.679 W/kg	1.6 W/kg	21.3 °C
U1250-9 EGPRS, 2 Time Slots				
661 / 1880.0 MHz	rear 2TS	0.705 W/kg	1.6 W/kg	21.3 °C
U1250-9 Speech mode, with Headset				
661 / 1880.0 MHz	rear	0.337 W/kg	1.6 W/kg	21.3 °C
U1250-9 Speech mode, with Bluetooth Headset				
661 / 1880.0 MHz	rear 2TS	0.396 W/kg	1.6 W/kg	21.3 °C

Table 19: Test results (Body SAR PCS 1900 MHz)

Note: The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.
Tests in body position were performed with 15 mm air gap between DUT and SAM to simulate the use of a non-metallic belt-clip or holster.
The addition body test was performed at worst case with 1 time slot in uplink.

UMTS (WCDAM) AWS

The table contains the measured SAR values averaged over a mass of 1 g					
Channel / frequency	Position	Left hand position	Right hand position	Limit	Liquid temperature
U1250-9					
1412 / 1732.4 MHz	cheek	0.857 W/kg	1.05 W/kg	1.6 W/kg	21.4/21.4 °C
1412 / 1732.4 MHz	tilted 15°	0.513 W/kg	0.428 W/kg	1.6 W/kg	21.4/21.4 °C
1513 / 1752.6 MHz	cheek	--- W/kg	1.17 W/kg	1.6 W/kg	---/21.4 °C
1312 / 1712.4 MHz	cheek	--- W/kg	1.06 W/kg	1.6 W/kg	---/21.4 °C

Table 20: Test results Test results (Head SAR UMTS (WCDMA) AWS 1700MHz)

The table contains the measured SAR values averaged over a mass of 1 g				
Channel / frequency	Position	Body worn	Limit	Liquid temperature
U1250-9				
1412 / 1732.4 MHz	front	0.296 W/kg	1.6 W/kg	21.4 °C
1412 / 1732.4 MHz	rear	0.451 W/kg	1.6 W/kg	21.4 °C
1513 / 1752.6 MHz	rear	0.522 W/kg	1.6 W/kg	21.4 °C
1312 / 1712.4 MHz	rear	0.411 W/kg	1.6 W/kg	21.4 °C
U1250-9 with Headset				
1513 / 1752.6 MHz	rear	0.372 W/kg	1.6 W/kg	21.4 °C
U1250-9 ,with Bluetooth Headset				
1513 / 1752.6 MHz	rear	0.484 W/kg	1.6 W/kg	21.4 °C

Table 21: Test results (Body SAR UMTS (WCDMA) AWS 1700MHz)

Note: The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.
Tests in body position were performed with 15 mm air gap between DUT and SAM to simulate the use of a non-metallic belt-clip or holster.