信息产业部通信计量中心 TMC
Telecommunication Metrology Center of MII

Deutscher Akkreditierungs Rat DAR

No. DAT-P-114/01-01

ilac-MRA CNAS 检测 CNAS L0442

TEST REPORT

No. 2007EEE02846

FCC ID	QIST7200
Test Name	Electromagnetic Field (Specific Absorption Rate)
Product Name	GPRS/GSM/EDGE Mobile Phone with Bluetooth
Model	T7200
Client	HUAWEI Technologies Co., Ltd.
Classification of test	Non Type Approval

信息产业部通信计量中心 检验报告专用章

Telecommunication Metrology Center

of Ministry of Information Industry

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TABLE OF CONTENT

Product Name	GPRS/GSM/EDGE Mobile Phone with Bluetooth	Sample Model	T7200
Client	HUAWEI Technologies Co., Ltd.	Type of test	Non Type Approval
Factory	HUAWEI Technologies Co., Ltd.	Sampling arrival date	September 29th, 2007
Manufacturer	HUAWEI Technologies Co., Ltd.		
Sampling/ Sending sample	Sending sample	Sample sent by	Xie Yan
Sampling location	/	Sampling person	/
Sample quantity	1	Sample matrix	/
Series number of the Sample	357960010002172		
Test basis	**EN 50360–2001**: Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones. **EN 50361–2001**: Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones. **ANSI C95.1–1999**: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. **IEEE 1528–2003**: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques. **OET Bulletin 65 (Edition 97-01) and Supplement C(Edition 01-01):** Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. **IEC 62209-1-2005**: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1:Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz) **IEC 62209-2 (Draft)**: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the Specific Absorption Rate (SAR)in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the Body.		
Test conclusion	Localized Specific Absorption Rate (SAR) of this portable wireless equipment has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report. General Judgment: **Pass** (Stamp) **Date of issue: October 24th, 2007**		
Note	The test results relate only to the items tested of the sample(s).		

信息产业部通信计量中心 检验报告专用章

Approved by ________ (Lu Bingsong) **Reviewed by** ________ (Qi Dianyuuan) **Tested by** ________ (Sun Qian)

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3 DESCRIPTION OF EUT

3.1 Addressing Information Related to EUT

Table 1: Applicant (The Client)

Name or Company	HUAWEI Technologies Co., Ltd.
Address/Post	Bantian, Longgang District, Shenzhen, Guangdong
City	Shenzhen
Postal Code	518129
Country	China
Telephone	0755-28780808
Fax	0755-28780808

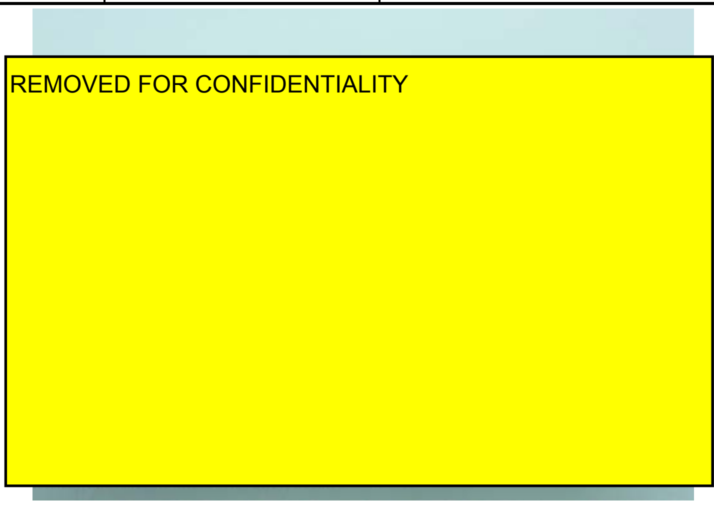
Table 2: Manufacturer

Name or Company	HUAWEI Technologies Co., Ltd.
Address/Post	Bantian, Longgang District, Shenzhen, Guangdong
City	Shenzhen
Postal Code	518129
Country	China
Telephone	0755-28780808
Fax	0755-28780808

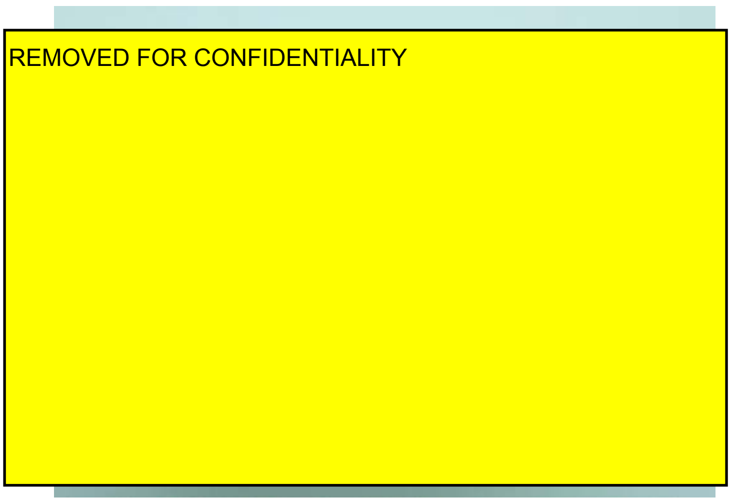
3.2 Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
Handset	T7200	357960010002172	HUAWEI Technologies Co., Ltd
Lithium Battery	HBU86	FMT751103810V	Shenzhen FMT Co., Ltd.
AC/DC Adapter	TPI	UEP750400356	TECH-POWER Electronics（Shenzhen）Co., Ltd.



Picture 1.1: EUT with Slide down



Picture 1.2: EUT with Slide up

Picture 1: Constituents of the sample (Lithium Battery is in the Handset)

3.3 General Description

Equipment Under Test (EUT) is a model of GPRS/GSM/EDGE portable Mobile Station (MS) with integrated antenna. It consists of Handset and normal options: Lithium Battery and AC/DC Adapter as Table 3 and Picture 1. With the request of the client, SAR is tested respectively for two bands, 850 MHz and 1900MHz. The EUT supports Bluetooth function and its GPRS class is 10.

The sample undergoing test was selected by the Client.
Components list please refer to documents of the manufacturer

4 OPERATIONAL CONDITIONS DURING TEST

4.1 Schematic Test Configuration

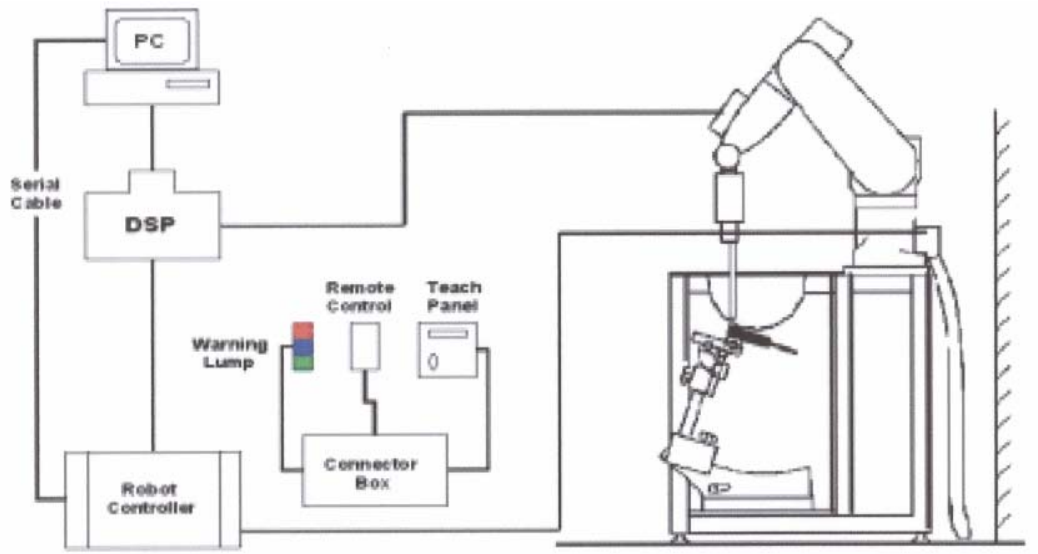
During SAR test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. A communication link is set up with a System Simulator (SS) by air link, and a call is established. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 128, 190 and 251 respectively in the case of GSM 850 MHz, or to 512, 661 and 810 respectively in the case of PCS 1900 MHz. The EUT is commanded to operate at maximum transmitting power.

The EUT shall use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the manufacturer. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. If a wireless link is used, the antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the handset. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the handset by at least 30 dB.

4.2 SAR Measurement Set-up

These measurements were performed with the automated near-field scanning system DASY4 Professional from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m) which positions the probes with a positional repeatability of better than ± 0.02mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length =300mm) to the data acquisition unit.

A cell controller system contains the power supply, robot controller, teaches pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the Micron Pentium III 800 MHz computer with Windows 2000 system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.



Picture 2: SAR Lab Test Measurement Set-up

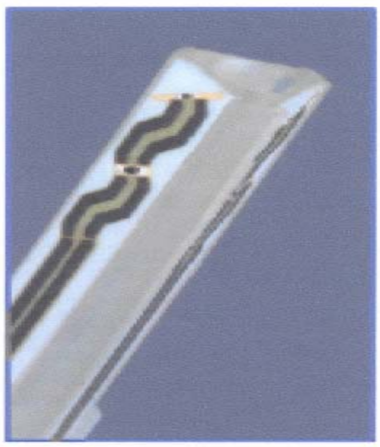
The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

4.3 Dasy4 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ET3DV6 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the standard procedure with an accuracy of better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB.

ET3DV6 Probe Specification

Construction	Symmetrical design with triangular core Built-in optical fiber *for* surface detection System(ET3DV6 only) Built-in shielding against static charges PEEK enclosure material(resistant to organic solvents, e.q., glycol)
Calibration	In air from 10 MHz to 2.5 GHz In brain and muscle simulating tissue at frequencies of 450MHz, 900MHz and 1.8GHz (accuracy±8%) Calibration for other liquids and frequencies upon request
Frequency	l 0 MHz to > 6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)



Picture 3: ET3DV6 E-field Probe

Directivity	±0.2 dB in brain tissue (rotation around probe axis)
	±0.4 dB in brain tissue (rotation normal probe axis)
Dynamic Range	5u W/g to > 100mW/g; Linearity: ±0.2dB
Surface Detection	±0.2 mm repeatability in air and clear liquids
	over diffuse reflecting surface(ET3DV6 only)
Dimensions	Overall length: 330mm
	Tip length: 16mm
	Body diameter: 12mm
	Tip diarneter: 6.8mm
	Distance from probe tip to dipole centers: 2.7mm
Application	General dosimetry up to 3GHz
	Compliance tests of mobile phones
	Fast automatic scanning in arbitrary phantoms

Picture4:ET3DV6 E-field probe

4.4 E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\mathbf{SAR} = \mathbf{C}\frac{\Delta \mathrm{T}}{\Delta \mathrm{t}}$$

Where: Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

Or

$$\mathbf{SAR} = \frac{|E|^2 \sigma}{\rho}$$

Where: σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m3).

Note: Please see Annex E to check the probe calibration certificate.

Picture 5:Device Holder

4.5 Other Test Equipment

4.5.1 Device Holder for Transmitters

In combination with the Generic Twin Phantom V3.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeat ably positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

4.5.2 Phantom

The Generic Twin Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow all predefined phantom positions and measurement grids by the complete setup of manually teaching three points in the robot.

Shell Thickness 2±0. l mm
Filling Volume Approx. 20 liters
Dimensions 810 x l000 x 500 mm (H x L x W)
Available Special

Picture6:Generic Twin Phantom

4.6 Equivalent Tissues

The liquid used for the frequency range of 800-2000 MHz consisted of water, sugar, salt and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 4 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and OET Bulletin 65 (Edition 97-01) and Supplement C (Edition 01-01).

Table 4. Composition of the Head Tissue Equivalent Matter

MIXTURE %	FREQUENCY 850MHz
Water	41.45
Sugar	56.0
Salt	1.45
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=850MHz ε=41.5 σ=0.90
MIXTURE %	FREQUENCY 1900MHz
Water	55.242
Glycol monobutyl	44.452
Salt	0.306
Dielectric Parameters Target Value	f=1900MHz ε=40.0 σ=1.40

Table 5. Composition of the Body Tissue Equivalent Matter

MIXTURE %	FREQUENCY 850MHz
Water	52.5
Sugar	45.0
Salt	1.4
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=850MHz ε=55.2 σ=0.97
MIXTURE %	FREQUENCY 1900MHz
Water	69.91
Glycol monobutyl	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1900MHz ε=53.3 σ=1.52

4.7 System Specifications

4.7.1 Robotic System Specifications

Specifications

Positioner: Stäubli Unimation Corp. Robot Model: RX90L
Repeatability: ±0.02 mm
No. of Axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller
Processor: Pentium III
Clock Speed: 800 MHz
Operating System: Windows 2000
Data Converter
Features: Signal Amplifier, multiplexer, A/D converter, and control logic
Software: DASY4 software
Connecting Lines: Optical downlink for data and status info.

Optical uplink for commands and clock

5 CHARACTERISTICS OF THE TEST

5.1 Applicable Limit Regulations

EN 50360–2001: Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.

It specifies the maximum exposure limit of **2.0 W/kg** as averaged over any 10 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

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

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

EN 50361–2001: Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.

IEEE 1528–2003: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.

OET Bulletin 65 (Edition 97-01) and Supplement C (Edition 01-01): Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits.

IEC 62209-1-2005: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)

IEC 62209-2 (Draft): Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR)in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the body.

They specify the measurement method for demonstration of compliance with the SAR limits for such equipments.

6 LABORATORY ENVIRONMENT

Table 6: The Ambient Conditions during EMF Test

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

7 CONDUCTED OUTPUT POWER MEASUREMENT

7.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMU-200) to ensure the maximum power transmission and proper modulation. This result contains conducted output power and ERP for the EUT. In all cases, the measured peak output power should be greater and within 5% than EMI measurement.

7.2 Conducted Power

7.2.1 Measurement Methods

The EUT was set up for the maximum output power. The channel power was measured with Agilent Spectrum Analyzer E4440A. These measurements were done at low, middle and high channels for each band before SAR test and after SAR test.

7.2.2 Measurement result

Table 7: Conducted Power Measurement Results

850MHZ		**Conducted Power**		
		Channel 251 (848.8MHz)	**Channel 190 (836.6MHz)**	**Channel 128 (824.2MHz)**
GSM	Before SAR Test (dBm)	31.69	31.77	31.71
	After SAR Test (dBm)	31.68	31.78	31.73
GPRS	Before SAR Test (dBm)	31.68	31.72	31.73
	After SAR Test (dBm)	31.66	31.71	31.74
EGPRS	Before SAR Test (dBm)	27.01	26.95	26.87
	After SAR Test (dBm)	27.03	26.97	26.88
1900MHZ		**Conducted Power**		
		Channel 810 (1909.8MHz)	**Channel 661 (1880MHz)**	**Channel 512 (1850.2MHz)**
PCS	Before SAR Test (dBm)	29.39	29.35	29.44
	After SAR Test (dBm)	29.38	29.36	29.42
GPRS	Before SAR Test (dBm)	29.38	29.33	29.41
	After SAR Test (dBm)	29.37	29.31	29.43
EGPRS	Before SAR Test (dBm)	26.24	26.28	26.32
	After SAR Test (dBm)	26.26	26.30	26.33

7.2.3 Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in Table 11 to Table 22 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

8 TEST RESULTS

8.1 Dielectric Performance

Table 8: Dielectric Performance of Head Tissue Simulating Liquid

Measurement is made at temperature 22.5 °C and relative humidity 40%.			
/	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	850 MHz	41.5	0.90
	1900 MHz	40.0	1.40
Measurement value (Average of 10 tests)	850 MHz	43.5	0.92
	1900 MHz	40.9	1.38

Table 9: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 23.3 °C and relative humidity 49%. Liquid temperature during the test: 22.5°C			
/	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	850 MHz	55.2	0.97
	1900 MHz	53.3	1.52
Measurement value (Average of 10 tests)	850 MHz	55.0	0.98
	1900 MHz	52.2	1.49

8.2 System Validation

Table 10: System Validation

Measurement is made at temperature 23.3 °C, relative humidity 49%, input power 250 mW. Liquid temperature during the test: 22.5°C							
Liquid parameters		**Frequency**		**Permittivity ε**		**Conductivity σ (S/m)**	
		835 MHz		41.7		0.88	
		1900 MHz		40.9		1.38	
Verification results	**Frequency**	**Target value (W/kg)**		**Measured value (W/kg)**		**Deviation**	
		10 g Average	**1 g Average**	**10 g Average**	**1 g Average**	**10 g Average**	**1 g Average**
	835 MHz	1.60	2.48	1.62	2.50	1.25%	0.81%
	1900 MHz	5.09	9.73	5.27	9.91	3.3%	1.9%

Note：Target values are the data of the dipole validation results, please check Annex F for the Dipole Calibration Certificate.

8.3 Summary of Measurement Results (PCS1900MHz)

Table 11: SAR Values (Head, 850 MHz Band-slide down)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Left hand, Touch cheek, Top frequency(See Fig.1)	0.088	0.128	0.036
Left hand, Touch cheek, Mid frequency(See Fig.3)	0.122	0.179	-0.105
Left hand, Touch cheek, Bottom frequency(See Fig.5)	0.196	0.283	-0.070
Left hand, Tilt 15 Degree, Top frequency(See Fig.7)	0.059	0.097	-0.175
Left hand, Tilt 15 Degree, Mid frequency(See Fig.9)	0.076	0.125	-0.034
Left hand, Tilt 15 Degree, Bottom frequency(See Fig.11)	0.114	0.189	-0.003
Right hand, Touch cheek, Top frequency(See Fig.13)	0.049	0.071	0.020
Right hand, Touch cheek, Mid frequency(See Fig.15)	0.068	0.096	0.128
Right hand, Touch cheek, Bottom frequency(See Fig.17)	0.125	0.173	0.164
Right hand, Tilt 15 Degree, Top frequency(See Fig.19)	0.046	0.083	0.012
Right hand, Tilt 15 Degree, Mid frequency(See Fig.21)	0.061	0.109	0.083
Right hand, Tilt 15 Degree, Bottom frequency(See Fig.23)	0.097	0.171	-0.079

Table 12: SAR Values (Head, 850 MHz Band-slide up)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Left hand, Touch cheek, Top frequency(See Fig.25)	0.320	0.435	-0.157
Left hand, Touch cheek, Mid frequency(See Fig.27)	0.397	0.532	0.022
Left hand, Touch cheek, Bottom frequency(See Fig.29)	0.424	0.565	-0.090
Left hand, Tilt 15 Degree, Top frequency(See Fig.31)	0.151	0.221	0.080
Left hand, Tilt 15 Degree, Mid frequency(See Fig.33)	0.162	0.235	-0.028
Left hand, Tilt 15 Degree, Bottom frequency(See Fig.35)	0.168	0.244	0.012
Right hand, Touch cheek, Top frequency(See Fig.37)	0.299	0.400	0.041
Right hand, Touch cheek, Mid frequency(See Fig.39)	0.362	0.486	-0.188
Right hand, Touch cheek, Bottom frequency(See Fig.41)	0.404	0.547	0.029
Right hand, Tilt 15 Degree, Top frequency(See Fig.43)	0.190	0.251	-0.200
Right hand, Tilt 15 Degree, Mid frequency(See Fig.45)	0.217	0.286	-0.037
Right hand, Tilt 15 Degree, Bottom frequency(See Fig.47)	0.220	0.290	-0.139

Table 13: SAR Values (Head, 1900 MHz Band-slide down)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Left hand, Touch cheek, Top frequency(See Fig.49)	0.201	0.424	0.031
Left hand, Touch cheek, Mid frequency(See Fig.51)	0.225	0.492	-0.016
Left hand, Touch cheek, Bottom frequency(See Fig.53)	0.291	0.619	-0.038
Left hand, Tilt 15 Degree, Top frequency(See Fig.55)	0.152	0.318	0.047
Left hand, Tilt 15 Degree, Mid frequency(See Fig.57)	0.175	0.365	0.028
Left hand, Tilt 15 Degree, Bottom frequency(See Fig.59)	0.226	0.469	-0.027
Right hand, Touch cheek, Top frequency(See Fig.61)	0.233	0.483	0.000
Right hand, Touch cheek, Mid frequency(See Fig.63)	0.258	0.541	-0.069
Right hand, Touch cheek, Bottom frequency(See Fig.65)	0.331	0.696	-0.149
Right hand, Tilt 15 Degree, Top frequency(See Fig.67)	0.210	0.441	0.006
Right hand, Tilt 15 Degree, Mid frequency(See Fig.69)	0.231	0.496	0.082
Right hand, Tilt 15 Degree, Bottom frequency(See Fig.71)	0.268	0.573	0.105

Table 14: SAR Values (Head, 1900 MHz Band-slide up)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Left hand, Touch cheek, Top frequency(See Fig.73)	0.128	0.260	0.200
Left hand, Touch cheek, Mid frequency(See Fig.75)	0.159	0.347	-0.146
Left hand, Touch cheek, Bottom frequency(See Fig.77)	0.163	0.353	0.132
Left hand, Tilt 15 Degree, Top frequency(See Fig.79)	0.070	0.137	-0.008
Left hand, Tilt 15 Degree, Mid frequency(See Fig.81)	0.118	0.238	0.023
Left hand, Tilt 15 Degree, Bottom frequency(See Fig.83)	0.139	0.274	0.079
Right hand, Touch cheek, Top frequency(See Fig.85)	0.106	0.206	-0.035
Right hand, Touch cheek, Mid frequency(See Fig.87)	0.127	0.245	0.160
Right hand, Touch cheek, Bottom frequency(See Fig.89)	0.161	0.309	-0.200
Right hand, Tilt 15 Degree, Top frequency(See Fig.91)	0.085	0.178	-0.019
Right hand, Tilt 15 Degree, Mid frequency(See Fig.93)	0.126	0.274	-0.066
Right hand, Tilt 15 Degree, Bottom frequency(See Fig.95)	0.137	0.291	0.054

Table 15: SAR Values (850 MHz GPRS-slide down)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
	10 g Average	1 g Average	
Body Towards Phantom, Top frequency(See Fig.97)	0.065	0.088	-0.112
Body Towards Phantom, Mid frequency(See Fig.99)	0.082	0.112	0.142
Body Towards Phantom, Bottom frequency(See Fig.101)	0.118	0.160	0.001
Body Towards Ground, Top frequency(See Fig.103)	0.429	0.647	-0.128
Body Towards Ground, Mid frequency(See Fig.105)	0.513	0.770	-0.138
Body Towards Ground, Bottom frequency(See Fig.107)	0.759	1.15	-0.195

Table 16: SAR Values (850 MHz GPRS-slide up)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
	10 g Average	1 g Average	
Body Towards Phantom, Top frequency(See Fig.109)	0.378	0.511	-0.200
Body Towards Phantom, Mid frequency(See Fig.111)	0.473	0.636	-0.200
Body Towards Phantom, Bottom frequency(See Fig.113)	0.579	0.776	-0.131
Body Towards Ground, Top frequency(See Fig.115)	0.533	0.773	0.046
Body Towards Ground, Mid frequency(See Fig.117)	0.661	0.956	-0.088
Body Towards Ground, Bottom frequency(See Fig.119)	0.840	1.22	-0.176

Table 17: SAR Values (850 MHZ EGPRS-slide up)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
	10 g Average	1 g Average	
Body Towards Ground, Bottom frequency(See Fig.121)	0.315	0.454	-0.151

Table 18: SAR Values (1900 MHZ GPRS-slide down)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
	10 g Average	1 g Average	
Body Towards Phantom, Top frequency(See Fig.123)	0.00171	0.00524	0.200
Body Towards Phantom, Mid frequency(See Fig.125)	0.00555	0.017	0.192
Body Towards Phantom, Bottom frequency(See Fig.127)	0.015	0.025	0.185
Body Towards Ground, Top frequency(See Fig.129)	0.020	0.040	-0.200
Body Towards Ground, Mid frequency(See Fig.131)	0.026	0.049	-0.044
Body Towards Ground, Bottom frequency(See Fig.133)	0.031	0.057	-0.037

Table 19: SAR Values (1900 MHZ GPRS-slide up)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
	10 g Average	1 g Average	
Body Towards Phantom, Top frequency(See Fig.135)	0.00946	0.016	0.176
Body Towards Phantom, Mid frequency(See Fig.137)	0.015	0.020	-0.200
Body Towards Phantom, Bottom frequency(See Fig.139)	0.016	0.022	-0.188
Body Towards Ground, Top frequency(See Fig.141)	0.032	0.055	0.200
Body Towards Ground, Mid frequency(See Fig.143)	0.035	0.062	-0.113
Body Towards Ground, Bottom frequency(See Fig.145)	0.037	0.064	-0.090

Table 20: SAR Values (1900 MHZ EGPRS-slide up)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
	10 g Average	1 g Average	
Body Towards Ground, Bottom frequency(See Fig.147)	0.032	0.056	-0.177

8.4 Summary of Measurement Results (with Bluetooth function)

Since the EUT is tested in body position with the dominant transmitter ON and co-located Bluetooth transmitter OFF first, with the results in section 8.3 Table 16 and 19. After that, the worst case can be derived, and the test is repeated with dominant transmitter and co-located Bluetooth transmitter both ON under the same conditions. The following result is derived from the EUT with its Bluetooth function under the same conditions with the worst cases.

Table 21: SAR Values (Body, 850 MHz Band with Bluetooth-slide up)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Body, Towards Ground, Bottom frequency (See Fig.149)	0.517	0.748	-0.075

Table 22: SAR Values (Body, 1900 MHz Band with Bluetooth-slide up)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Body, Towards Ground, Bottom frequency (See Fig.151)	0.115	0.177	0.065

8.5 Conclusion

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.

The maximum SAR values are obtained at the case of **850 MHz GPRS with slide up, Body Towards Ground, Bottom frequency (Table 16),** and the value are: **0840 (10g) 1.22 (1g).**

9 Measurement Uncertainty

SN	a	Type	c	d	e = f(d,k)	f	h = c x f / e	k
	Uncertainty Component		Tol. (± %)	Prob. Dist.	Div.	c_i (1 g)	1 g u_i	v_i

							(±%)	
1	System repetivity	A	0.5	N	1	1	0.5	9
	Measurement System							
2	Probe Calibration	B	5	N	2	1	2.5	∞
3	Axial Isotropy	B	4.7	R	√3	$(1-cp)^{1/2}$	4.3	∞
4	Hemispherical Isotropy	B	9.4	R	√3	$\sqrt{c_p}$		∞
5	Boundary Effect	B	0.4	R	√3	1	0.23	∞
6	Linearity	B	4.7	R	√3	1	2.7	∞
7	System Detection Limits	B	1.0	R	√3	1	0.6	∞
8	Readout Electronics	B	1.0	N	1	1	1.0	∞
9	RF Ambient Conditions	B	3.0	R	√3	1	1.73	∞
10	Probe Positioner Mechanical Tolerance	B	0.4	R	√3	1	0.2	∞
11	Probe Positioning with respect to Phantom Shell	B	2.9	R	√3	1	1.7	∞
12	Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	√3	1	2.3	∞
	Test sample Related							
13	Test Sample Positioning	A	4.9	N	1	1	4.9	N-1
14	Device Holder Uncertainty	A	6.1	N	1	1	6.1	N-1
15	Output Power Variation - SAR drift measurement	B	5.0	R	√3	1	2.9	∞
	Phantom and Tissue Parameters							
16	Phantom Uncertainty (shape and thickness tolerances)	B	1.0	R	√3	1	0.6	∞
17	Liquid Conductivity - deviation from target values	B	5.0	R	√3	0.64	1.7	∞
18	Liquid Conductivity - measurement uncertainty	B	5.0	N	1	0.64	1.7	M
19	Liquid Permittivity - deviation from target values	B	5.0	R	√3	0.6	1.7	∞
20	Liquid Permittivity - measurement uncertainty	B	5.0	N	1	0.6	1.7	M
	Combined Standard Uncertainty			RSS			11.25	
	Expanded Uncertainty (95% CONFIDENCE INTERVAL)			K=2			22.5	

10 MAIN TEST INSTRUMENTS

Table15: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	HP 8753E	US38433212	August 31,2007	One year
02	Power meter	NRVD	101253	June 21, 2007	One year
03	Power sensor	NRV-Z5	100333		
04	Power sensor	NRV-Z6	100011	September 3, 2007	One year
05	Signal Generator	E4433B	US37230472	September 5, 2007	One Year
06	Amplifier	VTL5400	0505	No Calibration Requested	
07	BTS	CMU 200	105948	August 16, 2007	One year
08	E-field Probe	SPEAG ET3DV6	1736	December 1, 2006	One year
09	DAE	SPEAG DAE4	777	September 7, 2007	One year
10	Dipole Validation Kit	SPEAG D835V2	443	February 19, 2007	Two years
11	Dipole Validation Kit	SPEAG D1900V2	541	February 20, 2007	Two years

11 TEST PERIOD

The test is performed from October 19th to October 20th, 2007.

12 TEST LOCATION

The test is performed at Radio Communication & Electromagnetic Compatibility Laboratory of Telecommunication Metrology Center

END OF REPORT BODY

ANNEX A MEASUREMENT PROCESS

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the reference point was measured and was used as a reference value for assessing the power drop.

Step 2: The SAR distribution at the exposed side of the phantom was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the flat phantom and the horizontal grid spacing was 10 mm x 10 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

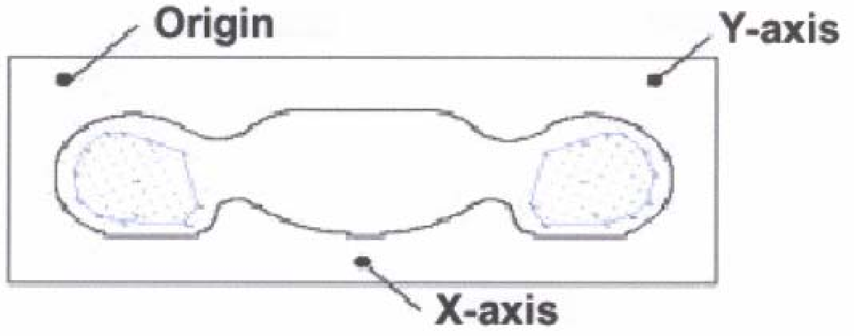
Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7 x 7x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

b. The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot"-condition (in x ~ y and z-directions). The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

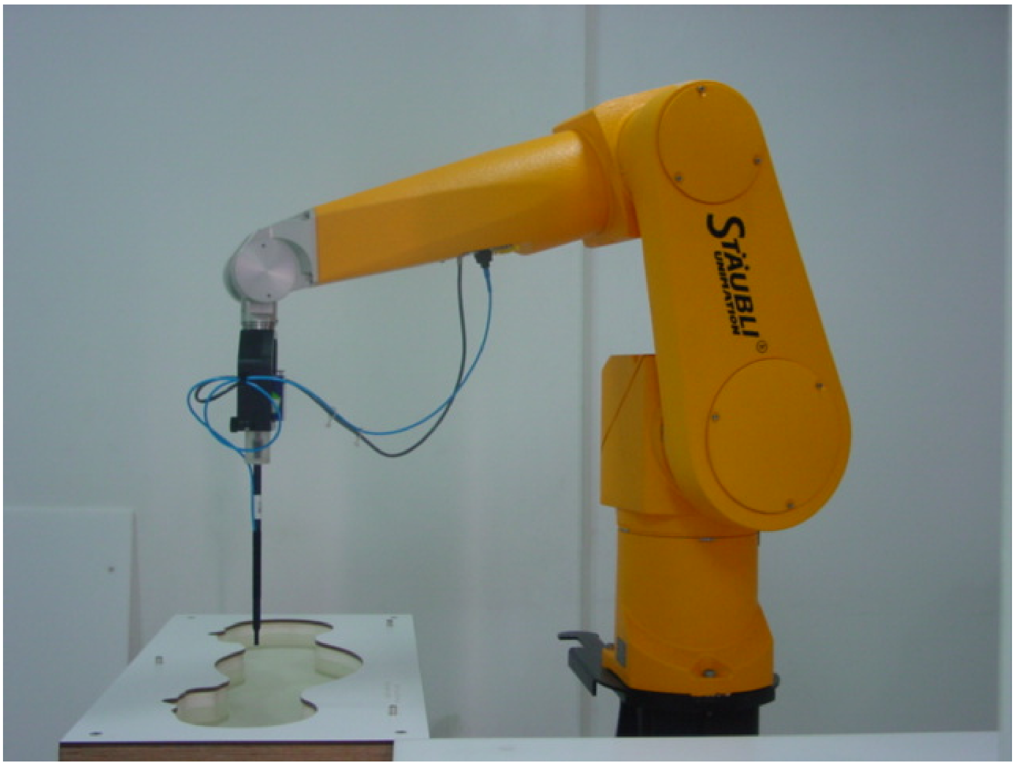
c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation is repeated.

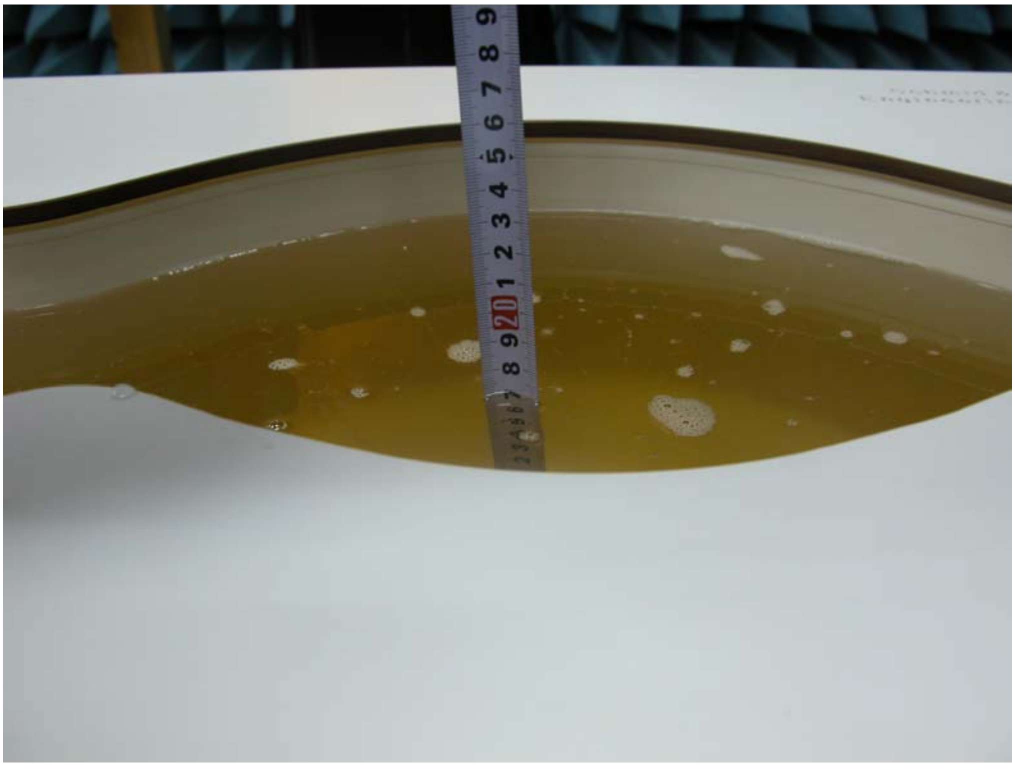


Picture A: SAR Measurement Points in Area Scan

ANNEX B TEST LAYOUT

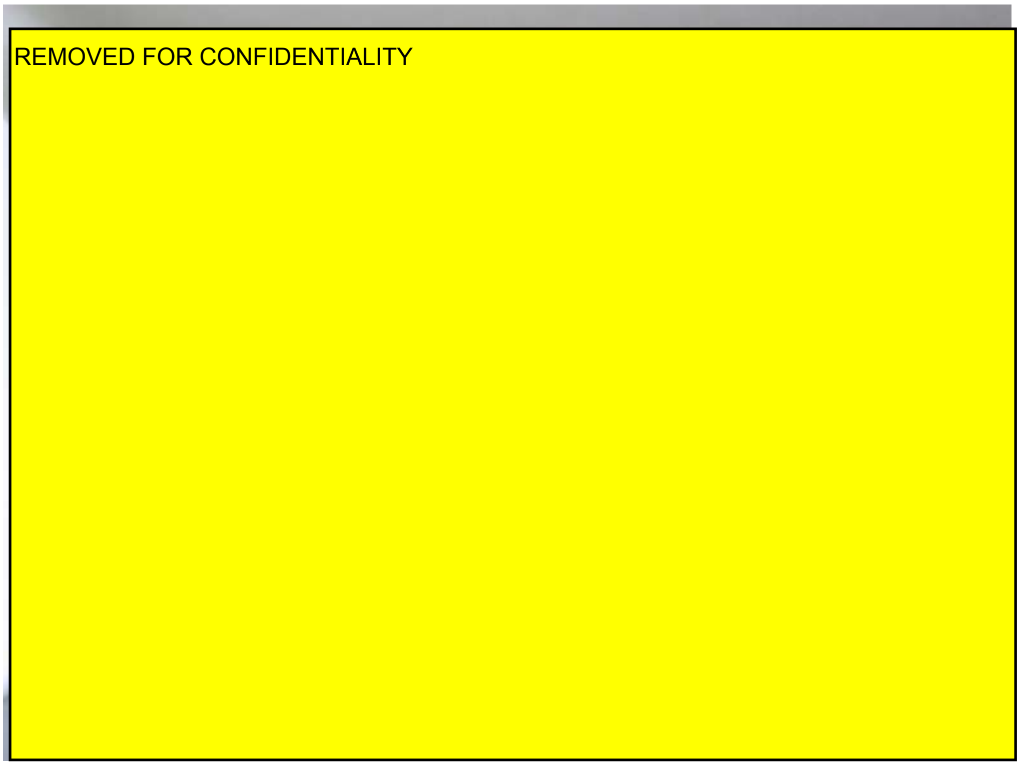


Picture B1: Specific Absorption Rate Test Layout

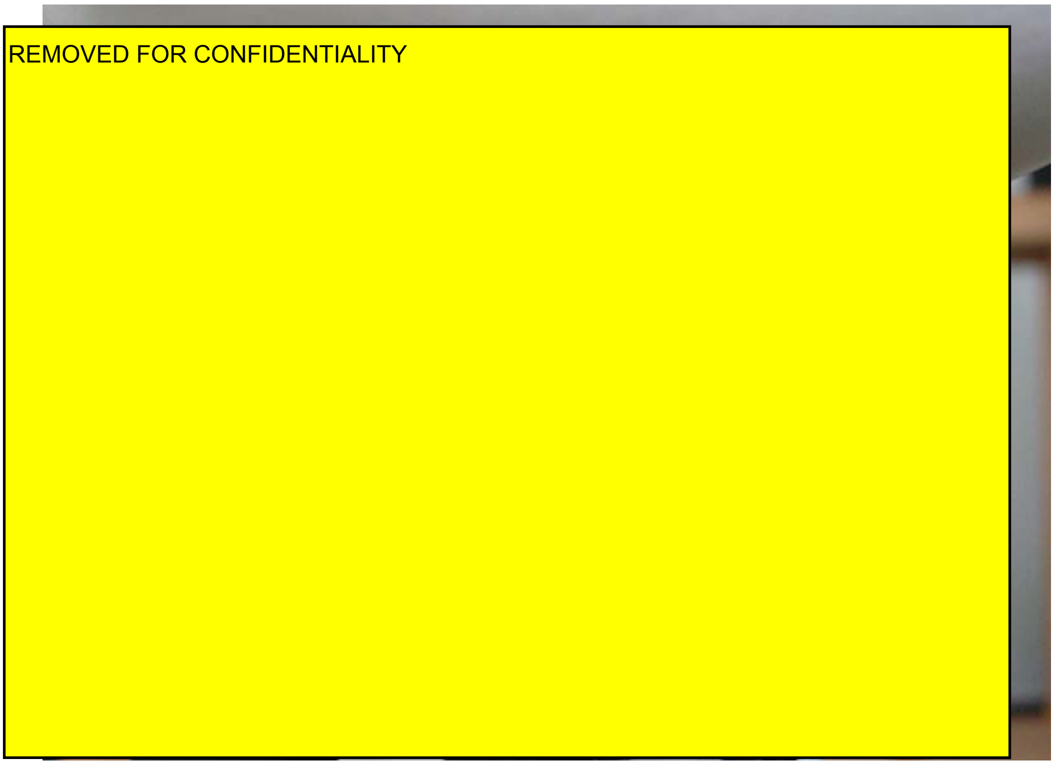


Picture B2: Liquid depth in the Flat Phantom (GSM 850 MHz)

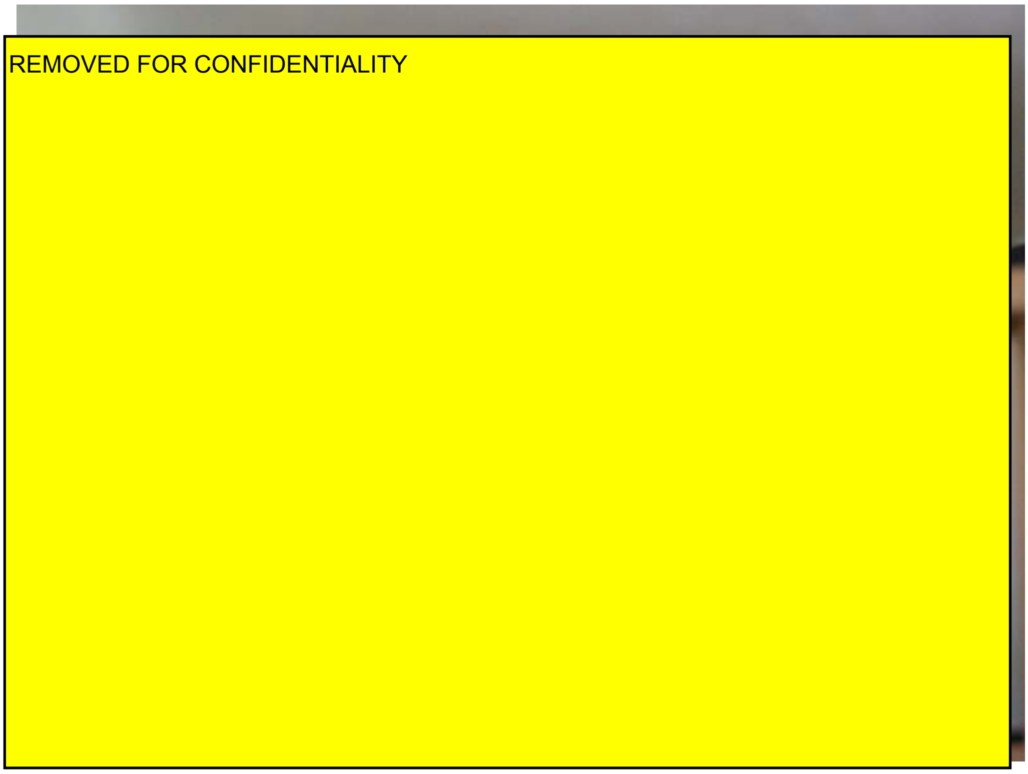
Picture B3 Liquid depth in the Flat Phantom (PCS 1900MHz)



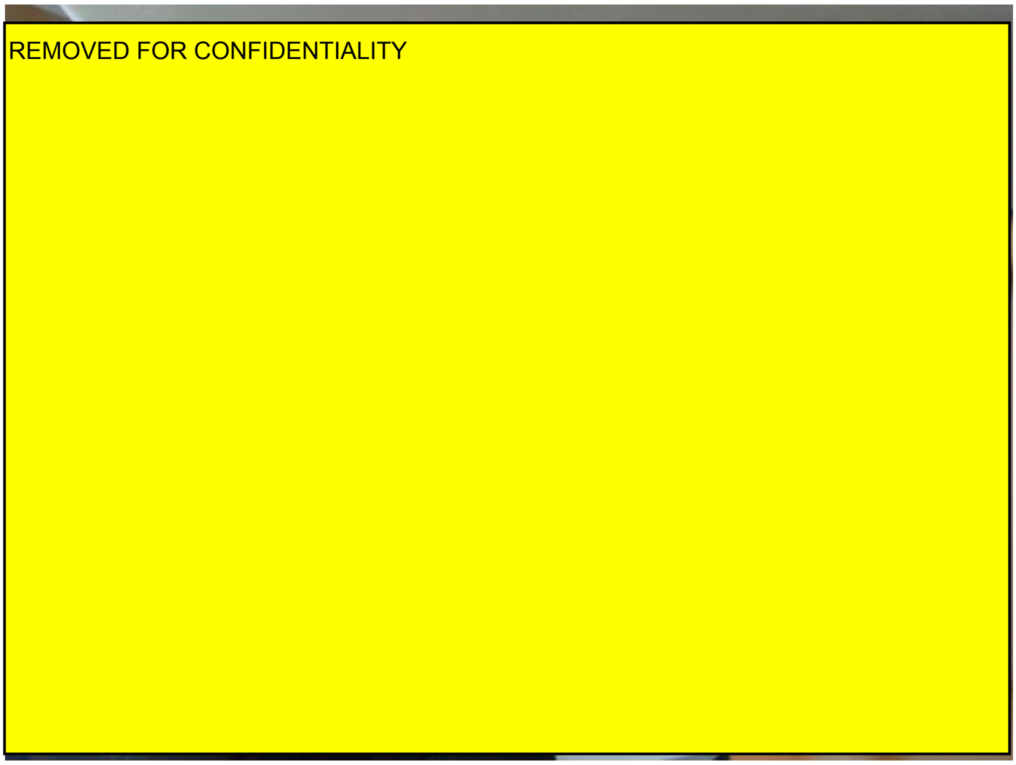
Picture B4: Left Hand Touch Cheek Position-slide down



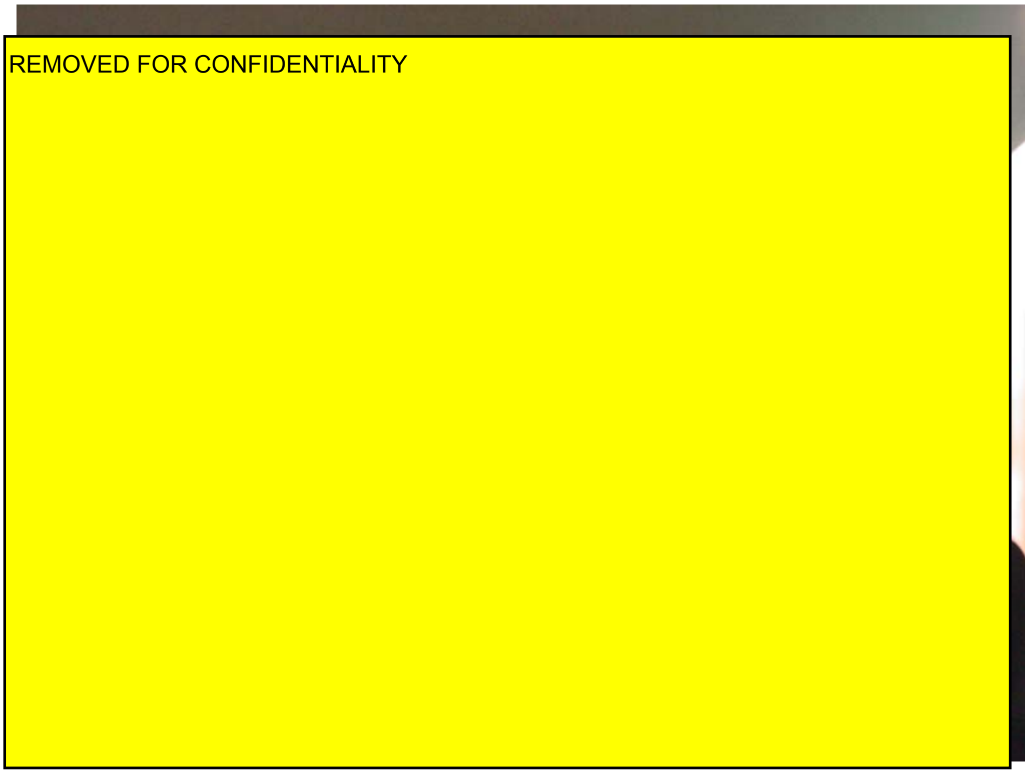
Picture B5: Left Hand Tilt 15° Position-slide down



Picture B6: Left Hand Touch Cheek Position-slide up

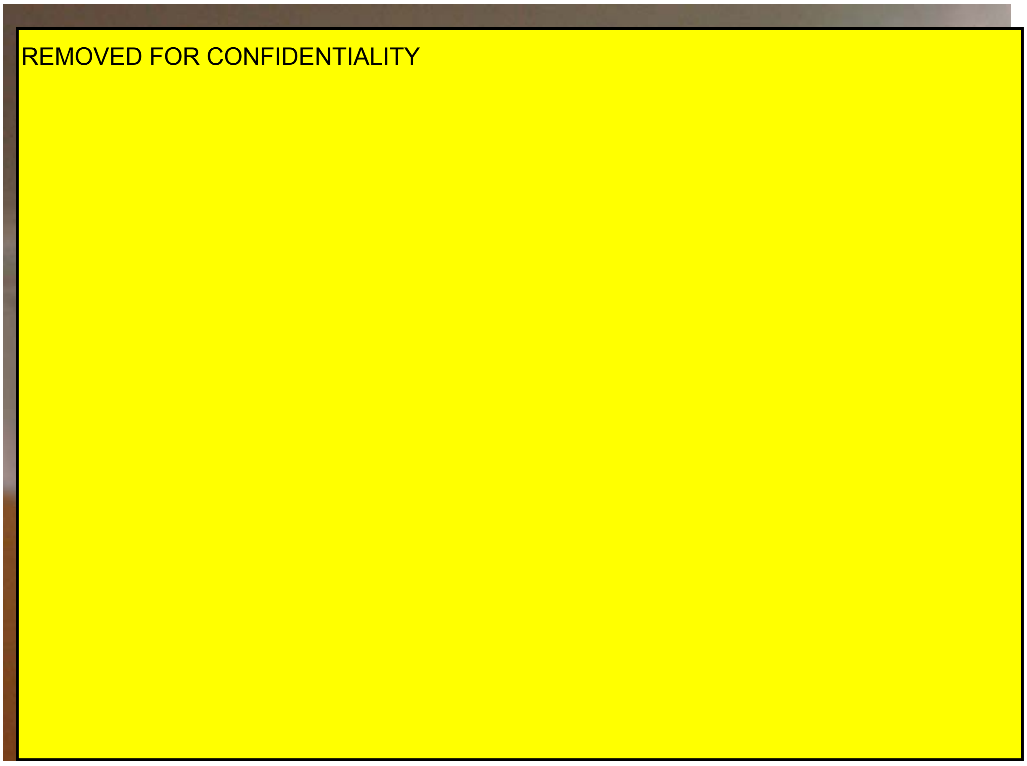


Picture B7: Left Hand Tilt 15° Position-slide up



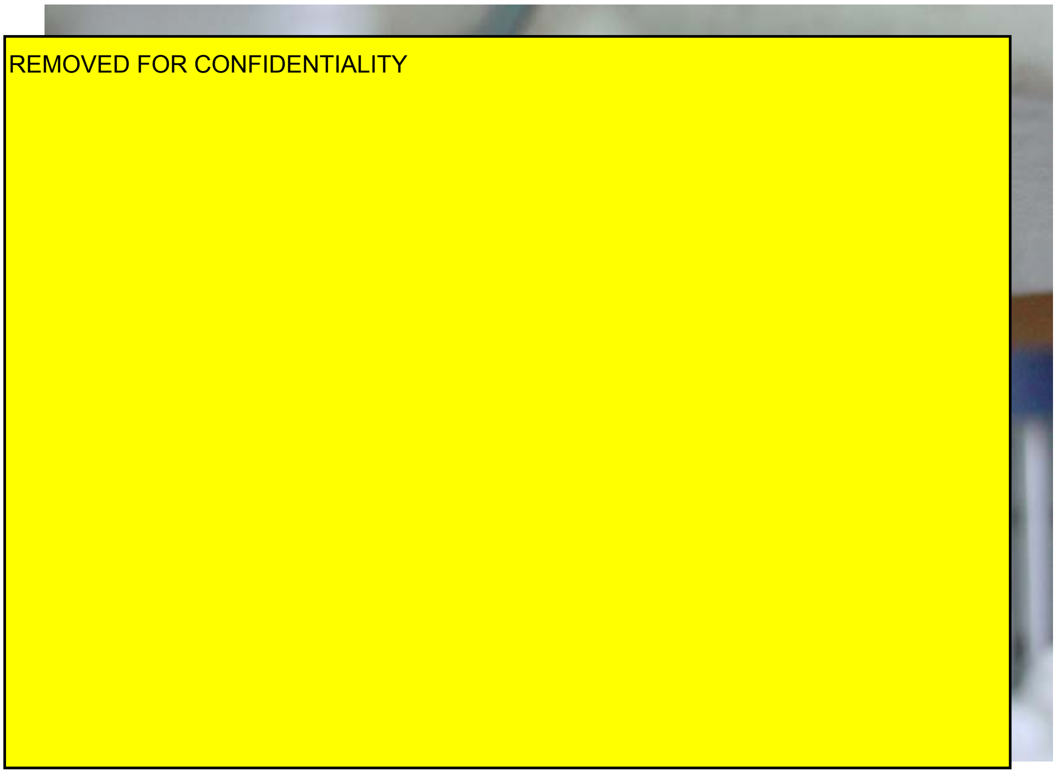
Picture B8: Right Hand Touch Cheek Position-slide down

Picture B9: Right Hand Tilt 15° Position-slide down

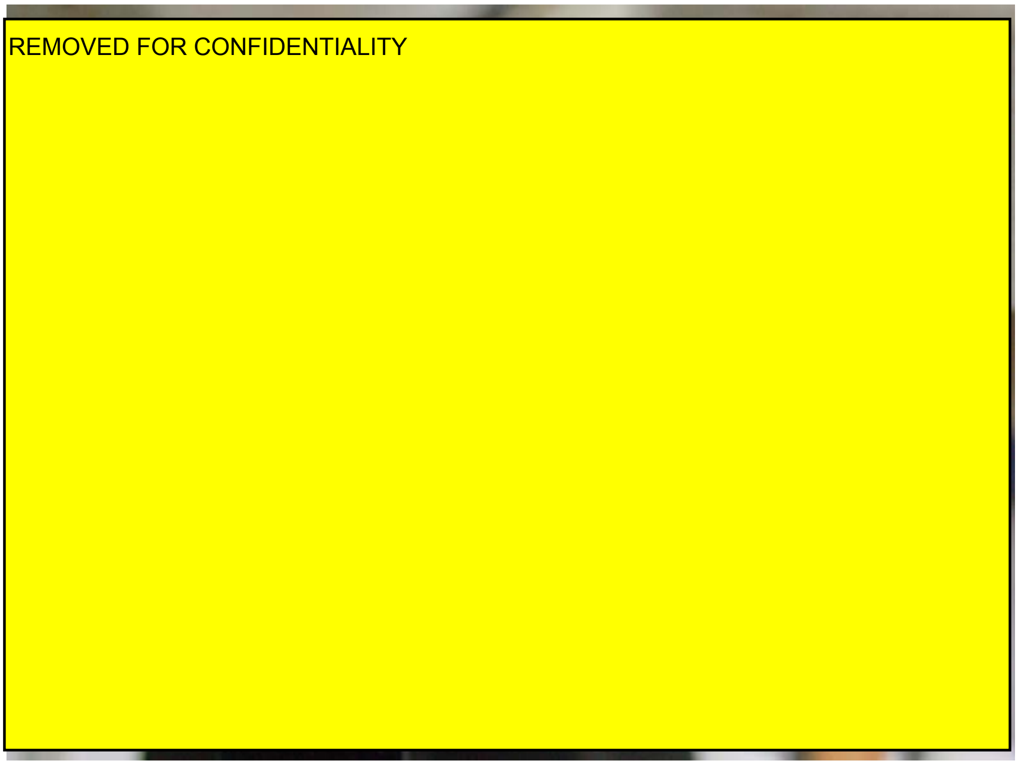


Picture B10: Right Hand Touch Cheek Position-slide up

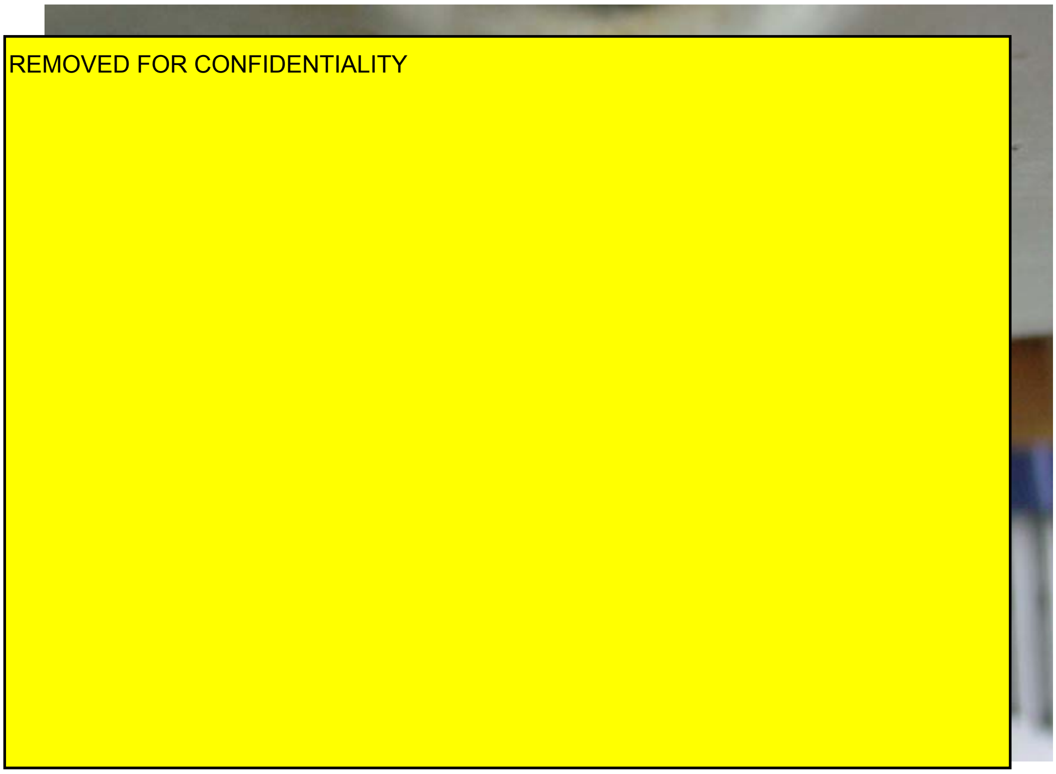
Picture B11: Right Hand Tilt 15° Position-slide up



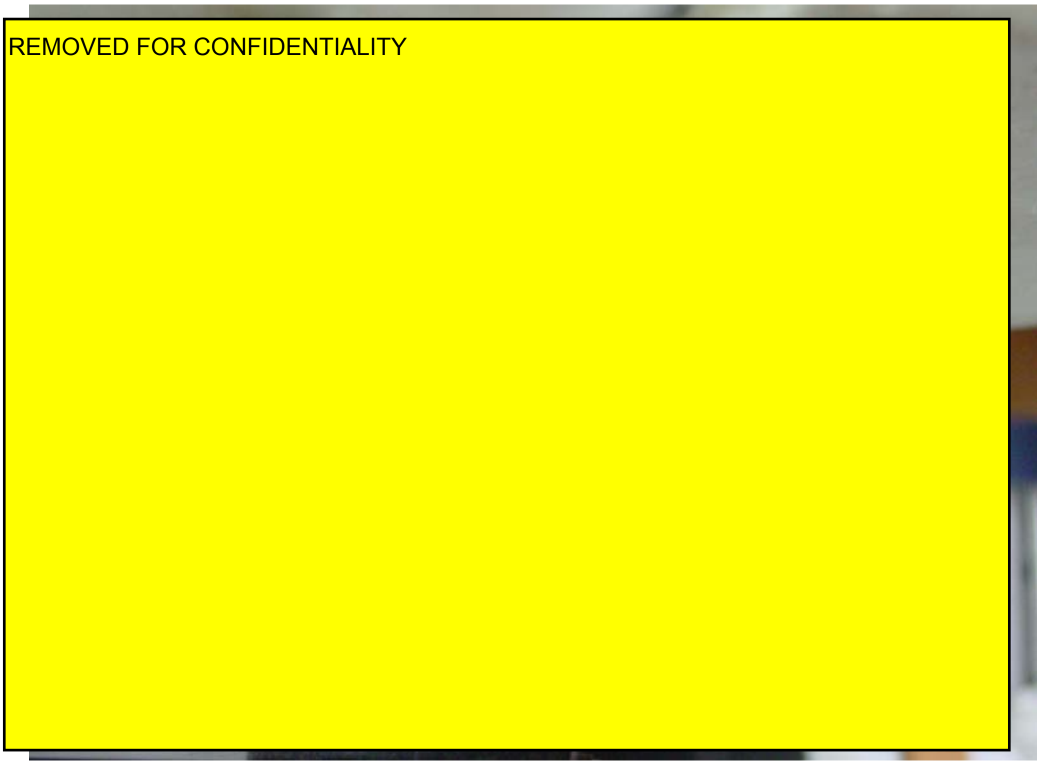
Picture B12: Body-worn Position (towards phantom, the distance from handset to the bottom of the Phantom is 1.5cm)-slide down



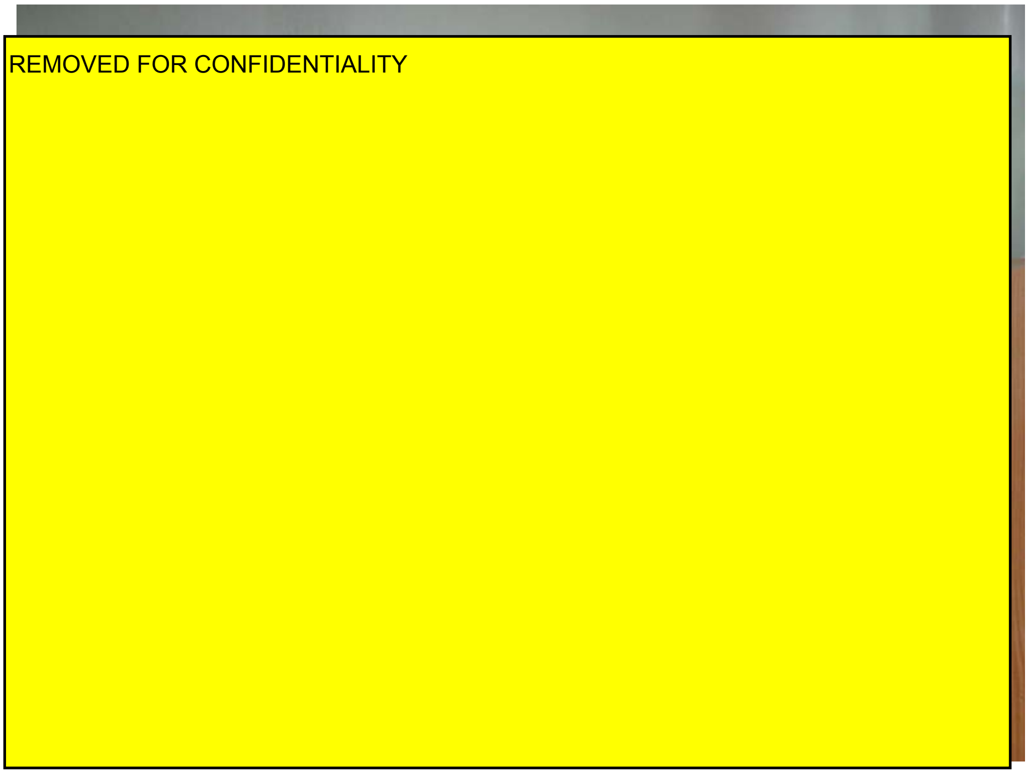
Picture B13: Body-worn Position (towards ground, the distance from handset to the bottom of the Phantom is 1.5cm)-slide down



Picture B14: Body-worn Position (towards phantom, the distance from handset to the bottom of the Phantom is 1.5cm)-slide up



Picture B15: Body-worn Position (towards ground, the distance from handset to the bottom of the Phantom is 1.5cm)-slide up



Picture B16: Body-worn Position with Bluetooth transmitter on, towards ground (the distance from handset to the bottom of the Phantom is 1.5cm)-slide up

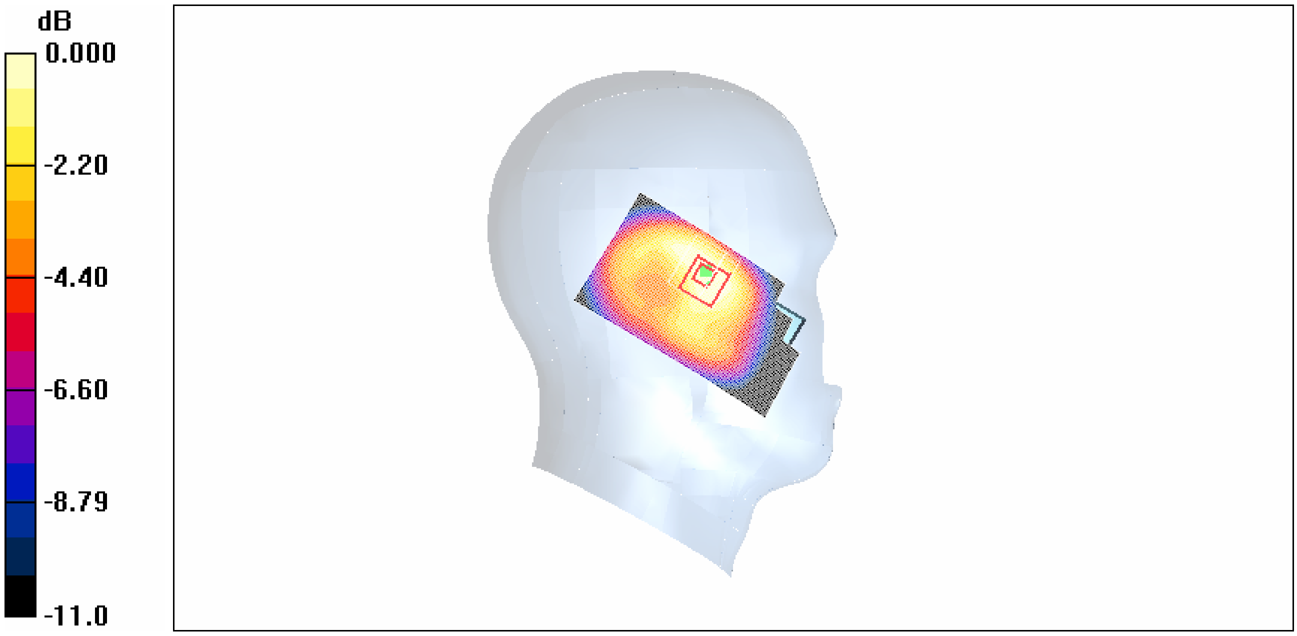
ANNEX C GRAPH RESULTS

850 Left Cheek High-slide down

Electronics: DAE4 Sn777
Medium: Head GSM850
Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.917 mho/m; ε_r = 43.7; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 850 Frequency: 848.8 MHz Duty Cycle: 1:8.3
Probe: ET3DV6 - SN1736 ConvF(6.51, 6.51, 6.51)

Cheek High/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.145 mW/g

Cheek High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.35 V/m; Power Drift = 0.036 dB
Peak SAR (extrapolated) = 0.187 W/kg
SAR(1 g) = 0.128 mW/g; SAR(10 g) = 0.088 mW/g
Maximum value of SAR (measured) = 0.133 mW/g



0 dB = 0.133mW/g

Fig. 1 Left Hand Touch Cheek GSM 850MHz CH251

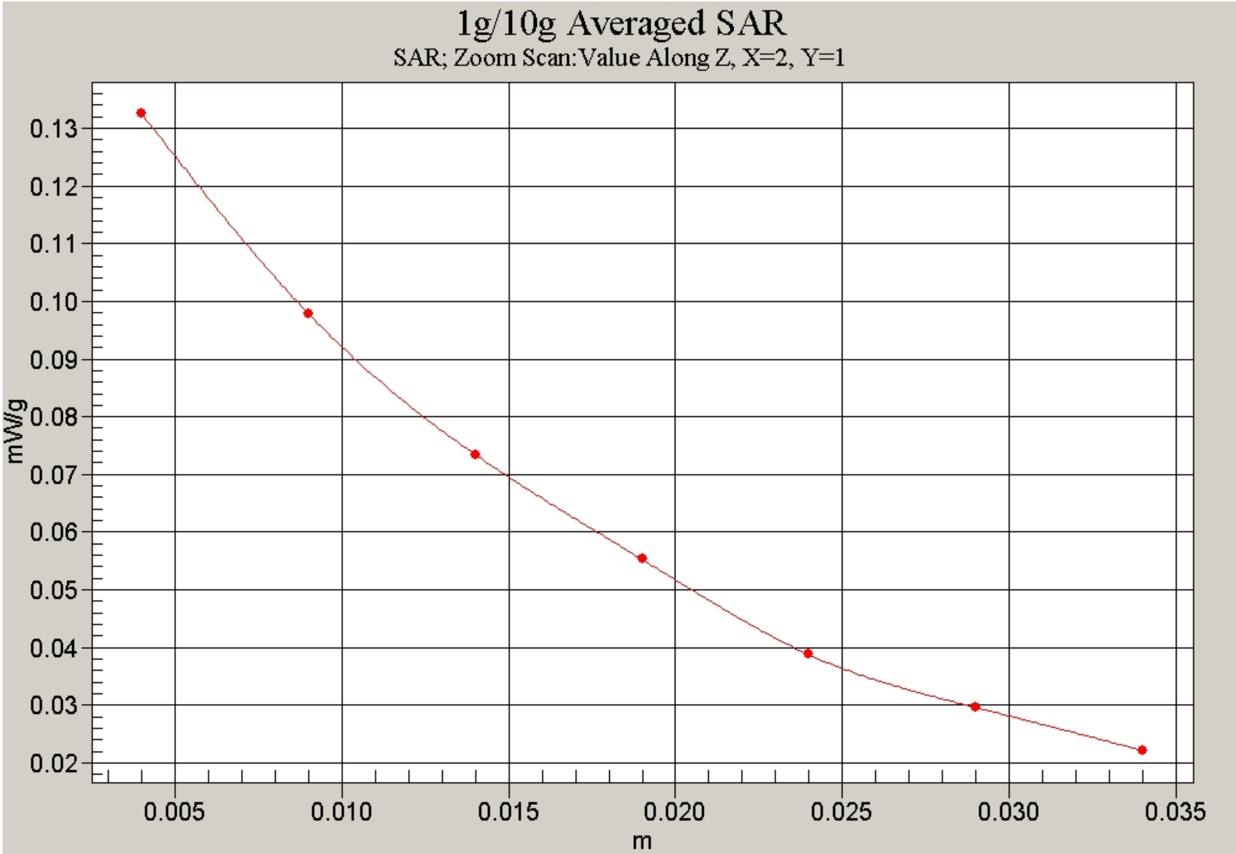


Fig. 2 Z-Scan at power reference point (GSM 850MHz CH251)

850 Left Cheek Middle-slide down

Electronics: DAE4 Sn777

Medium: Head GSM850

Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.907 mho/m; ε_r = 43.8; ρ = 1000 kg/m^3

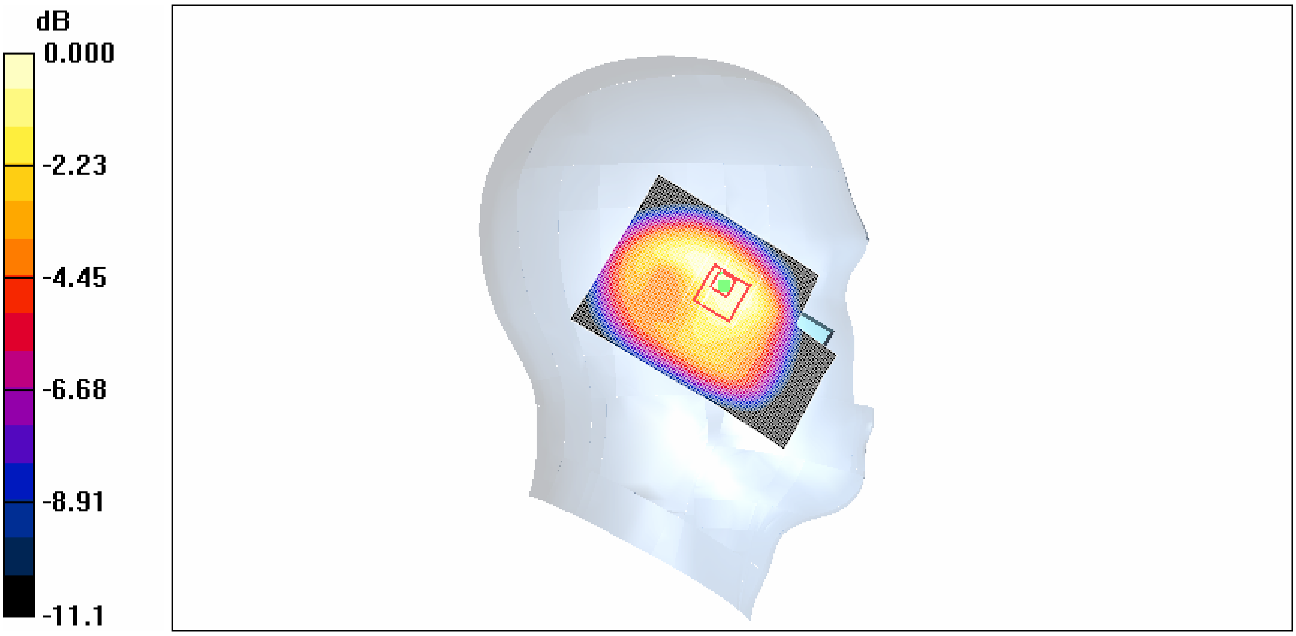
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C

Communication System: GSM 850 Frequency: 836.6 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1736 ConvF(6.51, 6.51, 6.51)

Cheek Middle/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.203 mW/g

Cheek Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.67 V/m; Power Drift = -0.105 dB
Peak SAR (extrapolated) = 0.254 W/kg
SAR(1 g) = 0.179 mW/g; SAR(10 g) = 0.122 mW/g
Maximum value of SAR (measured) = 0.188 mW/g



0 dB = 0.188mW/g

Fig. 3 Left Hand Touch Cheek GSM 850MHz CH190

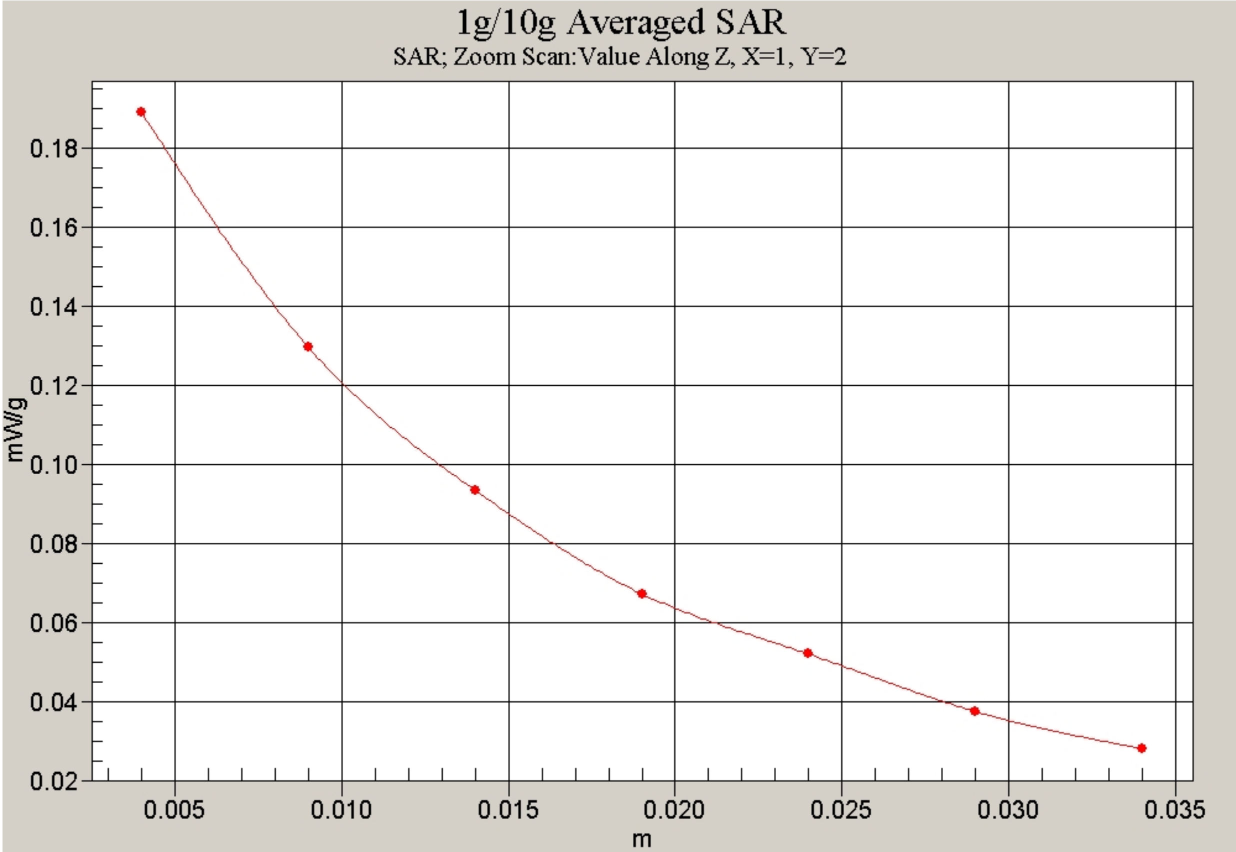


Fig. 4 Z-Scan at power reference point (GSM 850MHz CH190)

850 Left Cheek Low-slide down

Electronics: DAE4 Sn777

Medium: Head GSM850

Medium parameters used: f = 825 MHz; σ = 0.896 mho/m; ε_r = 43.9; ρ = 1000 kg/m^3

Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C

Communication System: GSM 850 Frequency: 824.2 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1736 ConvF(6.51, 6.51, 6.51)

Cheek Low/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.296 mW/g

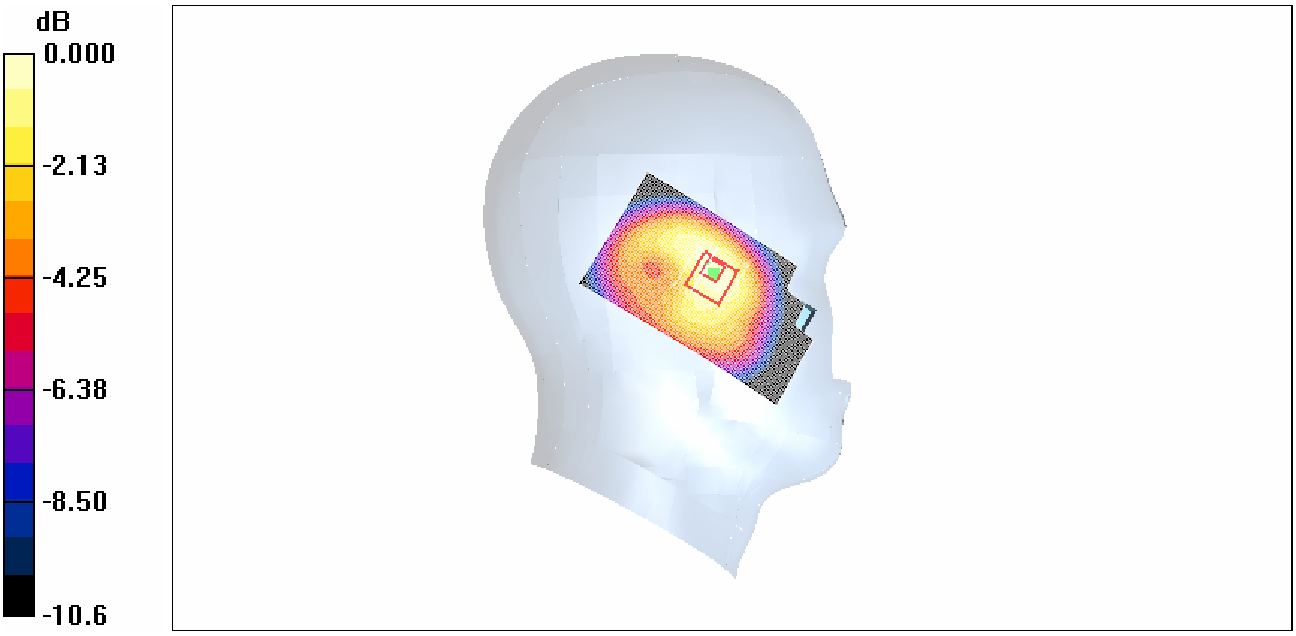
Cheek Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.3 V/m; Power Drift = -0.070 dB

Peak SAR (extrapolated) = 0.387 W/kg

SAR(1 g) = 0.283 mW/g; SAR(10 g) = 0.196 mW/g

Maximum value of SAR (measured) = 0.304 mW/g



0 dB = 0.304mW/g

Fig. 5 Left Hand Touch Cheek GSM 850MHz CH128

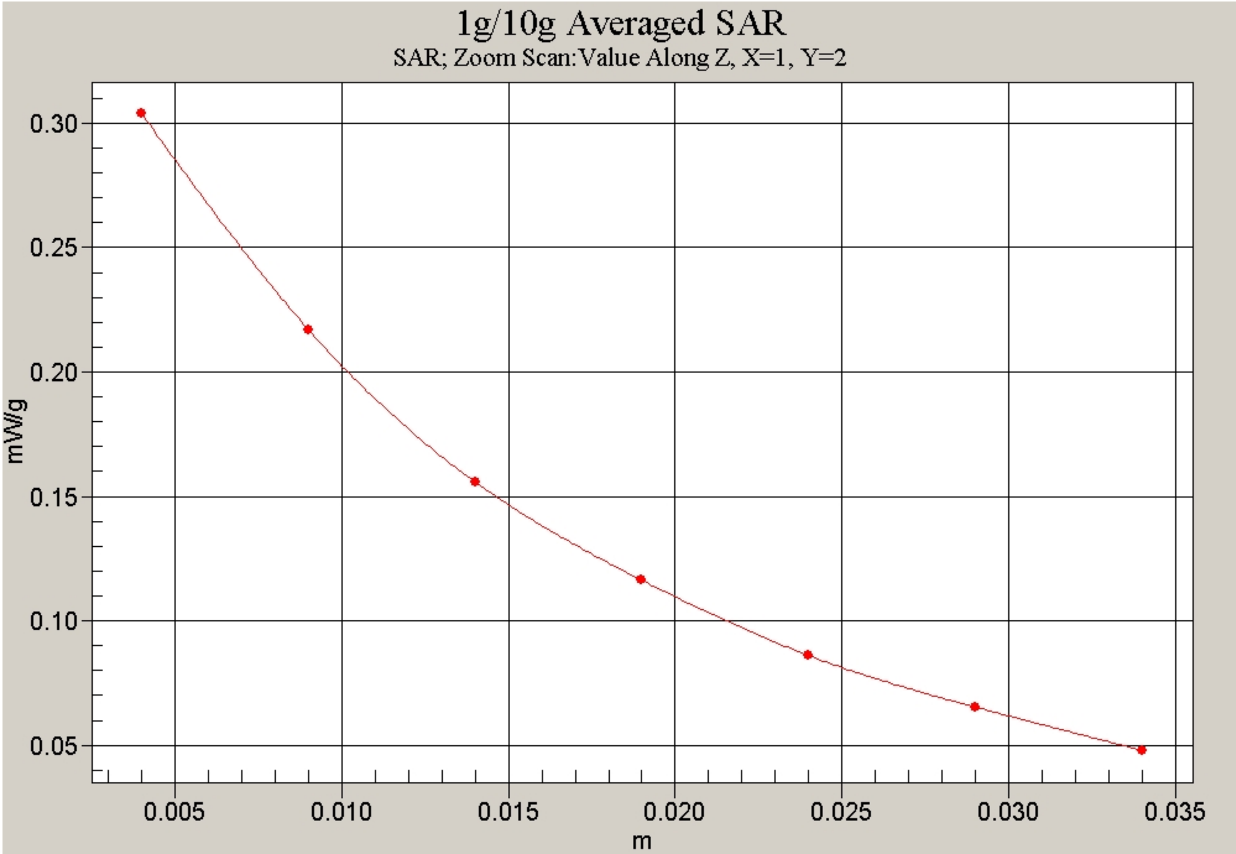


Fig. 6 Z-Scan at power reference point (GSM 850MHz CH128)

850 Left Tilt High-slide down

Electronics: DAE4 Sn777

Medium: Head GSM850

Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.917 mho/m; ε_r = 43.7; ρ = 1000 kg/m^3

Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C

Communication System: GSM 850 Frequency: 848.8 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1736 ConvF(6.51, 6.51, 6.51)

Tilt High/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.118 mW/g

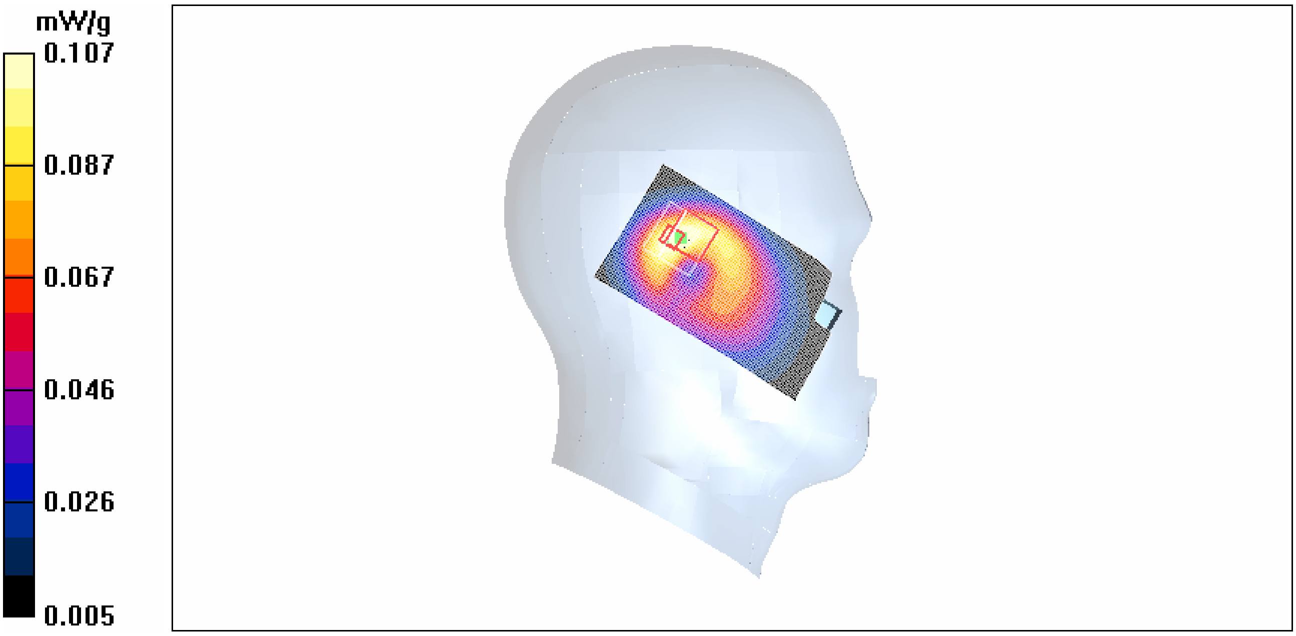
Tilt High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.25 V/m; Power Drift = -0.175 dB

Peak SAR (extrapolated) = 0.164 W/kg

SAR(1 g) = 0.097 mW/g; SAR(10 g) = 0.059 mW/g

Maximum value of SAR (measured) = 0.107 mW/g



0 dB = 0.107mW/g

Fig. 7 Left Hand Tilt 15°GSM 850MHz CH251

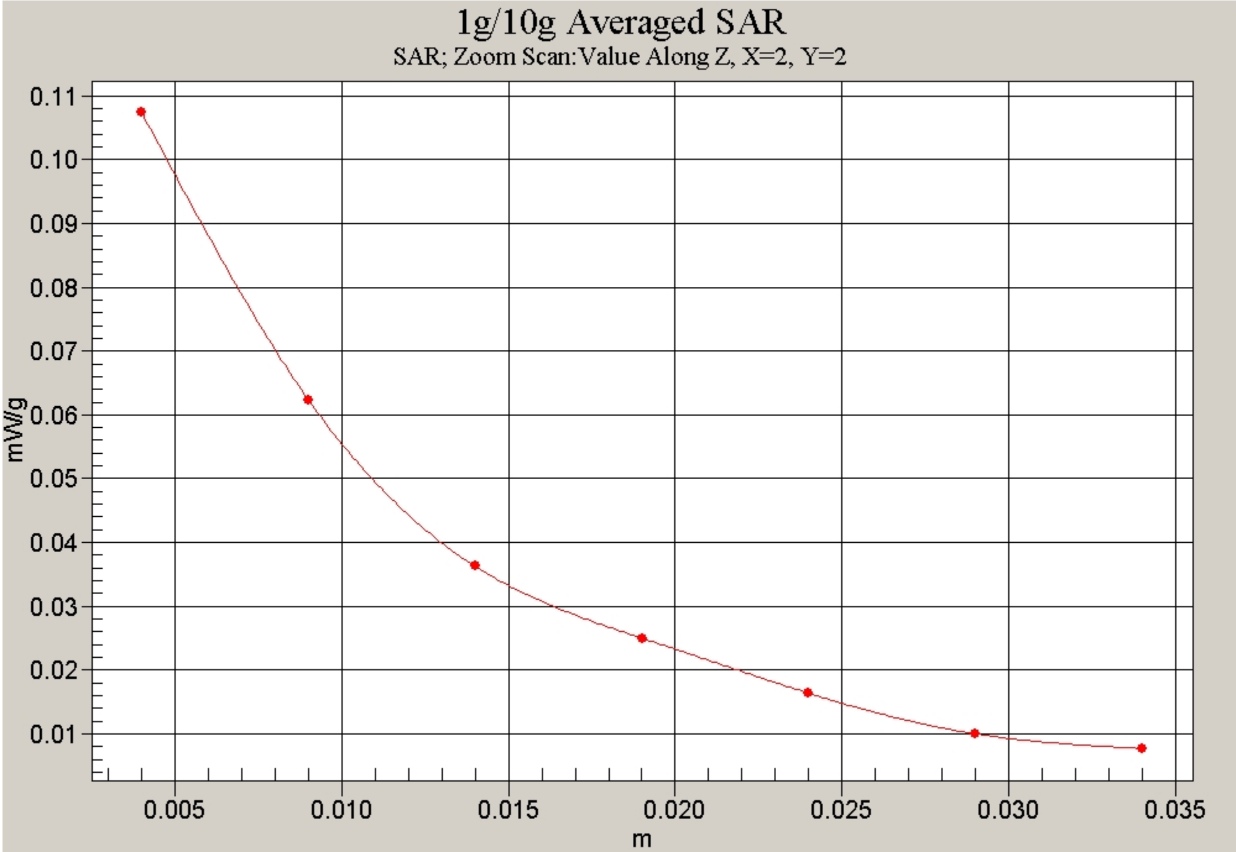


Fig. 8 Z-Scan at power reference point (GSM 850MHz CH251)

850 Left Tilt Middle-slide down

Electronics: DAE4 Sn777

Medium: Head GSM850

Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.907 mho/m; ε_r = 43.8; ρ = 1000 kg/m^3

Ambient Temperature:23.3°C Liqiud Temperature: 22.5°C

Communication System: GSM 850 Frequency: 836.6 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1736 ConvF(6.51, 6.51, 6.51)

Tilt Middle/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.151 mW/g

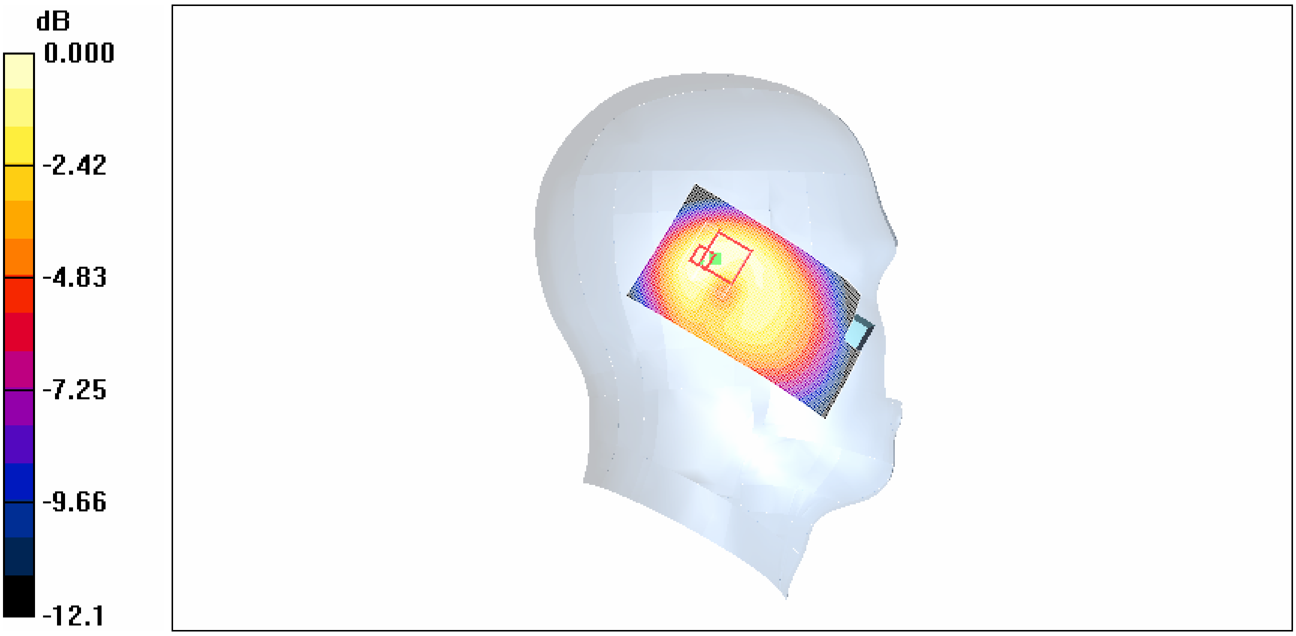
Tilt Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.59 V/m; Power Drift = -0.034 dB

Peak SAR (extrapolated) = 0.222 W/kg

SAR(1 g) = 0.125 mW/g; SAR(10 g) = 0.076 mW/g

Maximum value of SAR (measured) = 0.139 mW/g



0 dB = 0.139mW/g

Fig. 9 Left Hand Tilt 15°GSM 850MHz CH190