

SAR Test Report

Product Name : GSM Mobile

Model No. : S02

FCC ID : RFOV19

Prepared By: : Inventec Appliances(Pudong) Corporation

Address: : No.789 Pu Xing Road,Shanghai,PRC

Date of Receipt : 2012.12.10

Date of Test : 2012.12.17-2013.01.14

Report No. : 20121210SAR-FCC



Test Report Certification

Date of Issue : Jan.14.2012

Report No. : 20121210SAR

Product Name : GSM Mobile

Model No. : S02

Trade Name : TRX

Applicant : HK TIANRUIXIANG COMMUNICATION EQUIPMENT
LIMITEDAddress : RM5C Shuisong Building,tairan Eight Road,Chegongmiao,Futian
District,Standard : FCC 47 CFR Part2 (2.1093)
IEEE C95.1-1999
IEEE 1528-2003
FCC OET Bulletin 65 supplement C
FCC KDB 648474 D01 v01r05
FCC KDB 447498 D01 v05
FCC KDB 941225 D03 v01
FCC KDB 248227 D01 v01r02

Test Result : Complied

The Test Results relate only to the samples tested.

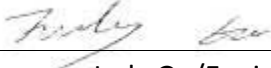
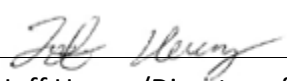
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Inventec Appliances(Pudong) CorporationDocumented By :  , Jan.14.2012
Judy Ge/EngineerTested By :  , Jan.14.2012
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1. GENERAL INFORMATION**1.1. Applicant**

Company Name: HK TIANRUIXIANG COMMUNICATION EQUIPMENT LIMITED

Address: RM5C Shuisong Building,tairan Eight Road,Chegongmiao,Futian District,

1.2. Manufacturer

Company Name: HK TIANRUIXIANG COMMUNICATION EQUIPMENT LIMITED

Address: RM5C Shuisong Building,tairan Eight Road,Chegongmiao,Futian District,

1.3. Test Environment

Ambient conditions in the laboratory:

Items	Required	Actural
Temperature(℃)	15~30	21.4
Humidity(%RH)	30~70	46

2. SAR Measurement System

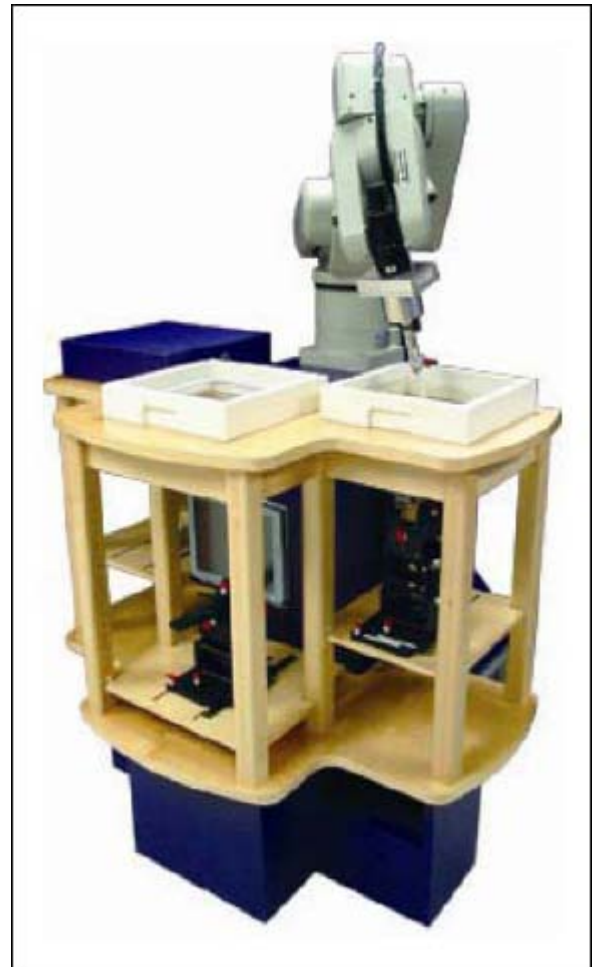
2.1. ALSAS-10U System Description

ALSAS-10-U is fully compliant with the technical and scientific requirements of IEEE 1528, IEC 62209, CENELEC, ARIB, ACA, and the Federal Communications Commission. The system comprises of a six axes articulated robot which utilizes a dedicated controller.

ALSAS-10U uses the latest methodologies and FDTD order to provide a platform which is repeatable with minimum uncertainty.

2.1.1. Applications

Predefined measurement procedures compliant with the guidelines of CENELEC, IEEE, IEC, FCC, etc are utilized during the assessment for the device. Automatic detection for all SAR maxima are embedded within the core architecture for the system, ensuring that peak locations used for centering the zoom scan are within a 1mm resolution and a 0.05mm repeatable position. System operation range currently is available up to 6 GHz in simulated tissue.



2.1.2. Area Scans

Area Scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 10mm² step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.

Where the system identifies multiple SAR peaks (which are within 25% of peak value) the system will provide the user with the option of assessing each peak location individually for zoom scan averaging.

2.1.3. Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the ALSAS-10U software is in the shape of a cube and the side dimension of a 1g or 10g mass is dependent on the density of the liquid representing the simulated tissue. A density of 1000Kg/m³ is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1g cube is 10mm, with the side length of the 10g cube 21.5mm.

When the cube intersects with the surFront of the phantom, it is oriented so that 3 vertices touch the surFront of the shell or the center of a Front is tangent to the surFront.

The zoom Scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 5 × 5 × 8 (8mm × 8mm × 5mm) providing a volume of 32mm in the X & Y axis, and 35mm in the Z axis.

2.1.4. ALSAS-10U Interpolation and Extrapolation Uncertainty

The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

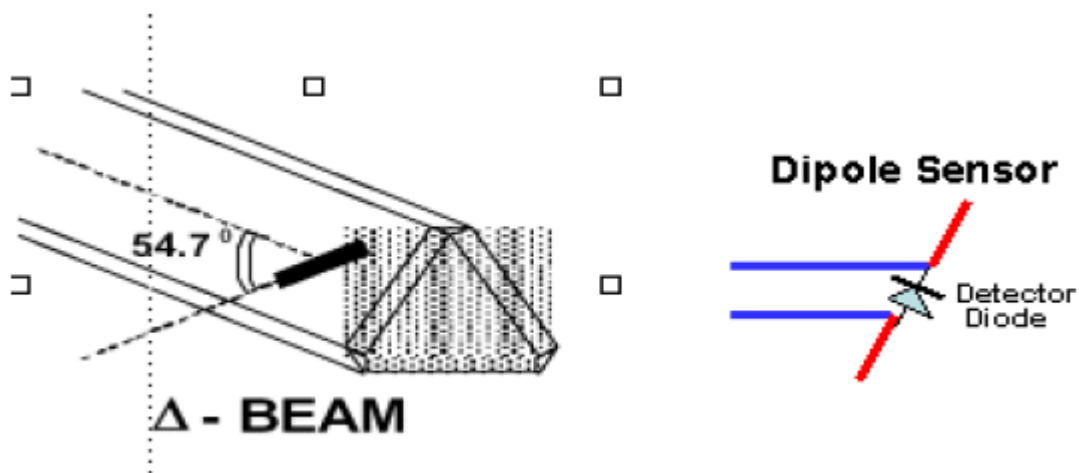
$$f_3(x, y, z) = A \frac{a^2}{\frac{a^2}{4} + x'^2 + y'^2} \cdot \left(e^{-\frac{2z}{a}} + \frac{a^2}{2(a + 2z)^2} \right)$$

2.2. Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropic, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change. A number of methods is used for calibrating probes, and these are outlined in the table below:

Calibration Frequency	Air Calibration	Tissue Calibration
900MHz	TEM Cell	Temperature
1800MHz	TEM Cell	Temperature

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



SAR is assessed with a calibrated probe which moves at a default height of 5mm from the center of the diode, which is mounted to the sensor, to the phantom surFront (in the Z Axis). The 5mm offset height has been selected so as to minimize any resultant boundary effect due to the probe being in close proximity to the phantom surFront.

The following algorithm is an example of the function used by the system for linearization of the output from the probe when measuring complex modulation schemes.

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

2.2.1. Isotropic E-Field Probe Specification

Calibration in Air	Frequency Dependent Below 2GHz Calibration in air performed in a TEM Cell Above 2GHz Calibration in air performed in waveguide
Sensitivity	$0.70 \mu\text{V}/(\text{V/m})^2$ to $0.85 \mu\text{V}/(\text{V/m})^2$
Dynamic Range	0.0005 W/kg to 100W/kg
Isotropic Response	Better than 0.2dB
Diode Compression point (DCP)	Calibration for Specific Frequency
Probe Tip Radius	< 5mm
Sensor Offset	1.56 (+/- 0.02mm)
Probe Length	290mm
Video Bandwidth	@ 500 Hz: 1dB @1.02 KHz: 3dB
Boundary Effect	Less than 2% for distance greater than 2.4mm
Spatial Resolution	Diameter less than 5mm Compliant with Standards

Probe model no: ALS-E-020, S/N:500-00273

2.3. Boundary detection Unit and Probe Mounting Device

ALSAS-10U incorporates a boundary detection unit with a sensitivity of 0.05mm for detecting all types of surFronts. The robust design allows for detecting during probe tilt (probe normalize) exercises, and utilizes a second stage emergency sTop. The signal electronics are directly into the robot controller for high accuracy surFront detection in lateral and axial detection modes (X, Y, &Z).

The probe is mounted directly onto the Boundary Detection unit for accurate tooling and displacement calculations controlled by the robot kinematics. The probe is connected to an isolated probe interconnect where the output stage of the probe is fed directly into the amplifier stage of the Daq-Paq.

2.4. Daq-Paq (Analog to Digital Electronics)

ALSAS-10U incorporates a fully calibrated Daq-Paq (analog to digital conversion system) which has a 4 channel input stage, sent via a 2 stage auto-set amplifier module. The input signal is amplified accordingly so as to offer a dynamic range from 5 μ V to 800mV. Integration of the fields measured is carried out at board level utilizing a Co-Processor which then sends the measured fields down into the main computational module in digitized form via a RS232 communications port. Probe linearity and duty cycle compensation is carried out within the main Daq-Paq module.

ADC	12 Bit
Amplifier Range	20mV to 200mV and 150mV to 800mV
Field Integration	Local Co-Processor utilizing proprietary integration algorithms
Number of Input Channels	4 in total 3 dedicated and 1 spare
Communication	Packet data via RS232

2.5. Axis Articulated Robot

ALSAS-10U utilizes a six articulated robot, which is controlled using a Pentium based real-time movement controller. The movement kinematics engine utilizes proprietary (Thermo CRS) interpolation and extrapolation algorithms, which allow full freedom of movement for each of the six joints within the working envelop. Utilization of joint 6 allows for full probe rotation with a tolerance better than 0.05mm around the central axis.



Robot/Controller Manufacturer	Thermo CRS
Number of Axis	Six independently controlled axis
Positioning Repeatability	0.05mm
Controller Type	Single phase Pentium based C500C
Robot Reach	710mm
Communication	RS232 and LAN compatible

2.6. ALSAS Universal Workstation

ALSAS Universal workstation allows for repeatability and fast adaptability. It allows users to do calibration, testing and measurement using different types of phantoms with one set up, which significantly speeds up the measurement process.

2.7. Universal Device Positioner

The universal device positioner allows complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales which form the design used to indicate positioning for any given test scenario in all major axes. A 15° tilt movements for head SAR analysis. Overall uncertainty for measurements has been reduced due to the design of the Universal device positioner, which allows positioning of a device in as near to a free-space scenario as possible, and by providing the means for complete repeatability.

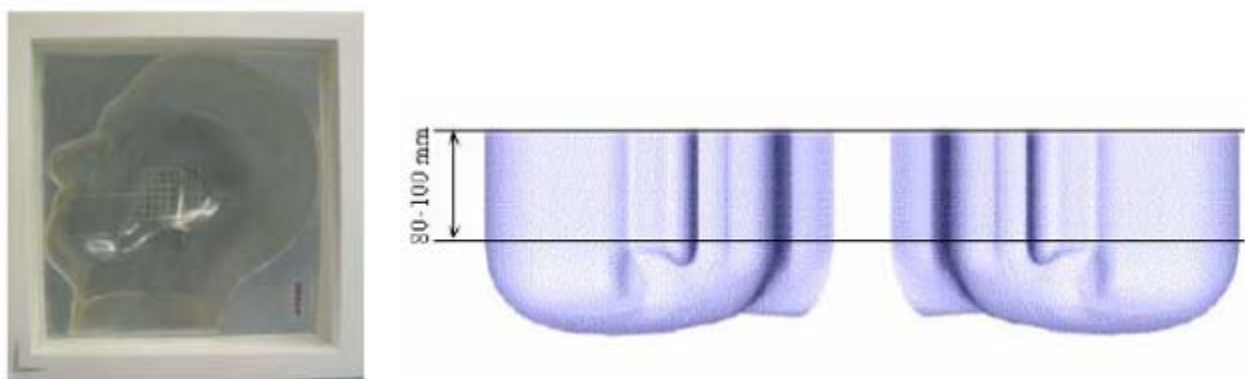


2.8. Phantom Types

The ALSAS-10U allows the integration of multiple phantom types. SAM Phantoms fully compliant with IEEE 1528, Universal Phantom, and Universal Flat.

2.8.1. APREL SAM Phantoms

The SAM phantoms developed using the IEEE SAM CAD file. They are fully compliant with the requirements for both IEEE 1528 and FCC Supplement C. Both the left and right SAM phantoms are interchangeable, transparent and include the IEEE 1528 grid with visible NF and MB lines.



2.8.2. APREL Laboratories Universal Phantom

The Universal Phantom is used on the ALSAS-10U as a system validation phantom. The Universal Phantom has been fully validated both experimentally from 800MHz to 6GHz and numerically using XFDTD numerical software. The shell thickness is 2mm overall, with a 4mm spacer located at the NF/MB intersection providing an overall thickness of 6mm in line with the requirements of IEEE-1528.



The design allows for fast and accurate measurements, of handsets, by allowing the conservative SAR to be evaluated at on frequency for both left and right head experiments in one measurement.

3. Tissue Simulating Liquid

3.1. The composition of the tissue simulating liquid

INGREDIENT (% Weight)	850MHz	1900MHZ	850MHZ	1900MHz	2450MHz	2450MHz
	Head	Head	Body	Body	Head	Body
Water	40.45%	54.9%	45.0%	70.17%	55%	73.2%
Salt	1.45%	0.18%	52.4%	0.39%	0%	0%
Sugar	57.6%	0%	1.4%	0%	0%	0%
HEC	0.4%	0%	1.0%	0%	0%	0%
Preventol	0.1%	0%	0.1%	0%	0%	0%
DGBE	0%	44.92%	0%	29.44%	45%	26.76%

3.2. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to SAR evaluation using APREL Dielectric Probe Kit and Agilent E5071B Vector Network Analyzer.

Head Tissue Simulate Measurement				
Frequency (MHz)	Description	Dielectric Parameters		Tissue Temp.(°C)
		ϵ_r	σ (s/m)	
850MHz	Reference result	41.5	0.90	NA
	+/-5% window	39.425to43.575	0.855to0.945	
	17-Dec-12	40.26	0.93	20.7
1900MHz	Reference result	40.0	1.40	NA
	+/-5% window	38to42	1.33 to 1.47	
	17-Dec -12	41.52	1.43	20.7
2450MHz	Reference result	39.2	1.80	NA
	+/-5% window	37.24to41.16	1.71to1.89	
	17-Dec -12	40.27	1.85	20.7

Body Tissue Simulate Measurement				
Frequency (MHz)	Description	Dielectric Parameters		Tissue Temp.(°C)
		ϵ_r	σ (s/m)	
850MHz	Reference result	55.2	0.97	NA
	+/-5% window	52.44to57.96	0.922to1.019	
	17-Dec -12	53.34	0.92	20.7
1900MHz	Reference result	53.3	1.52	NA
	+/-5% window	50.635to55.965	1.444to1.596	
	17-Dec -12	52.93	1.53	20.7
2450MHz	Reference result	52.7	1.95	NA
	+/-5% window	50.065to55.335	1.852to2.0475	
	17-Dec -12	53.36	1.90	20.7

3.3. Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in PP1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1428 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

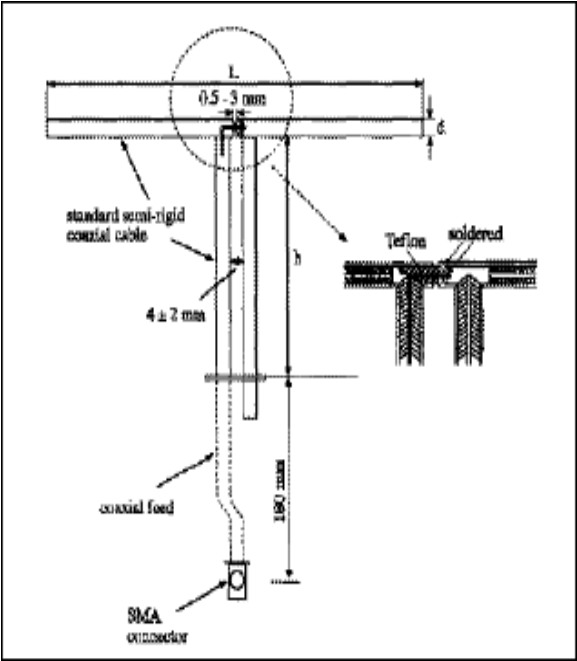
Target Frequency	Head		Body	
(MHz)	ϵ_r	σ (S/m)	ϵ_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ϵ_r =relative permittivity, σ =conductivity and ρ =1000 Kg/m³)

4. SAR Measurement Procedure

4.1. SAR System Validation

4.1.1. Validation Dipoles



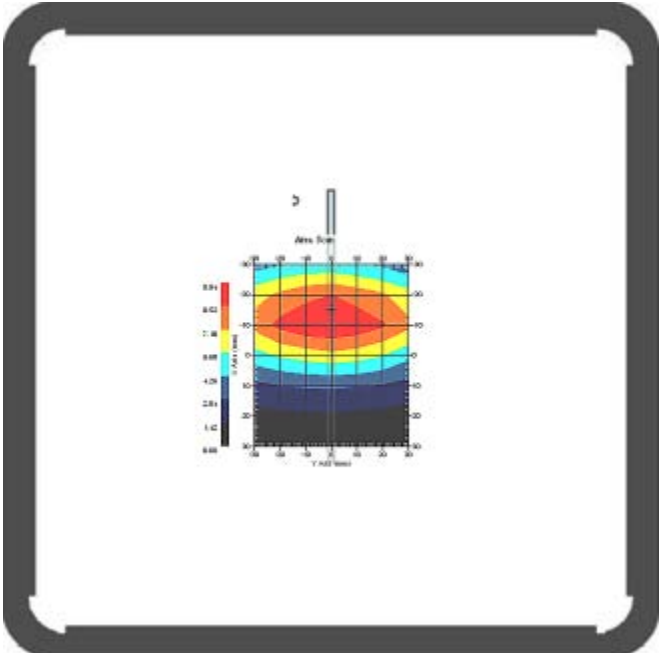
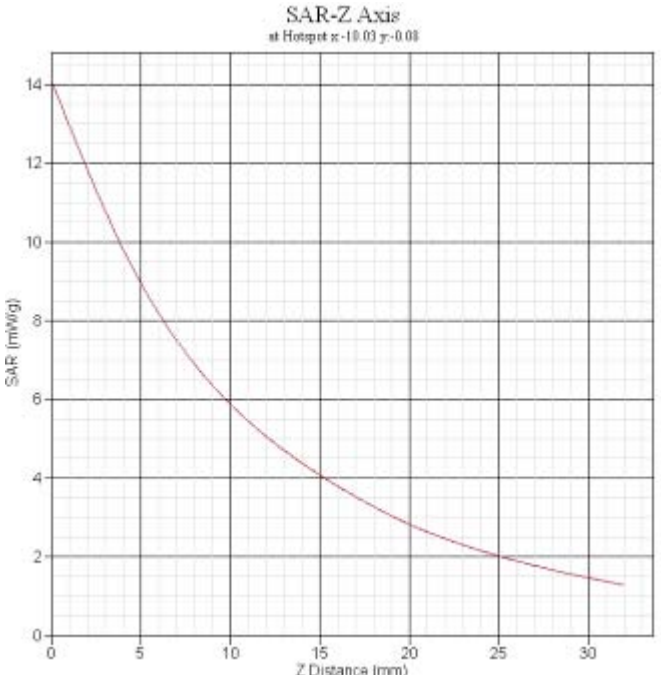
The dipoles used are based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of both IEEE and FCC Supplement C. The table below provides details for the mechanical and electrical specifications for the dipoles.

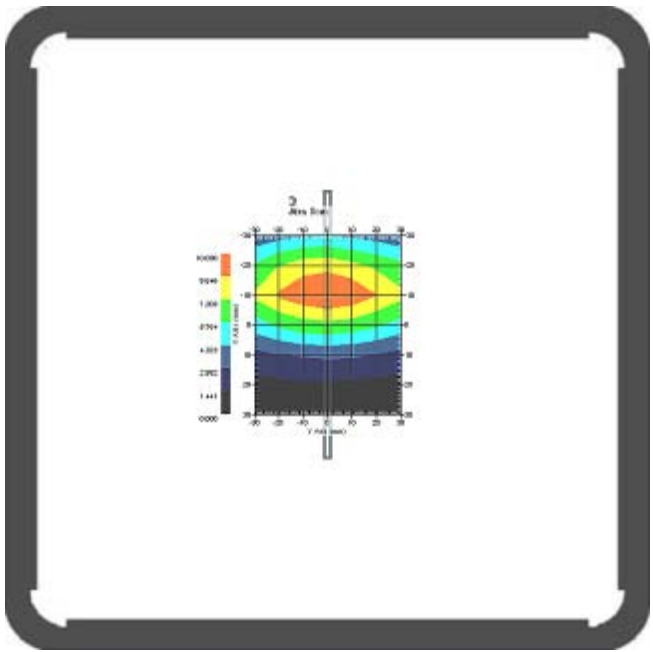
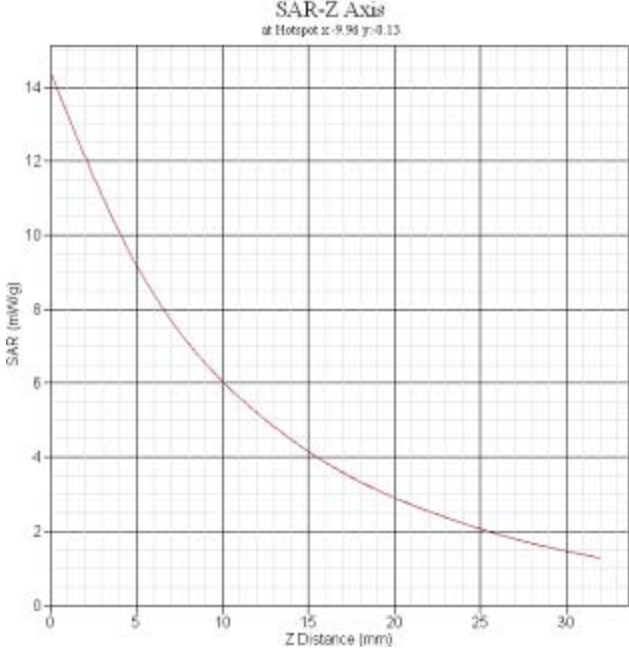
Frequency	L(mm)	h(mm)	d(mm)
850MHz	161	89.8	3.6
1900MHz	67.1	38.9	3.6
2450MHz	51.5	30.4	3.6

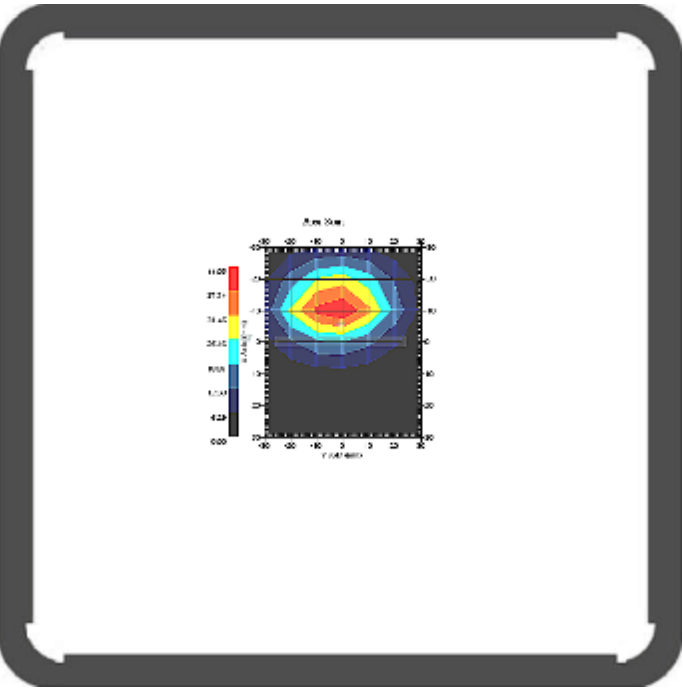
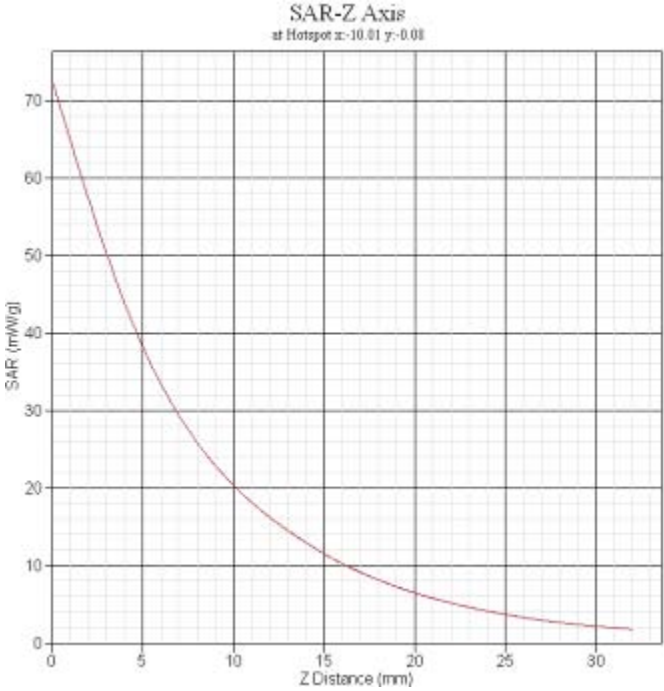
4.1.2. Validation Result

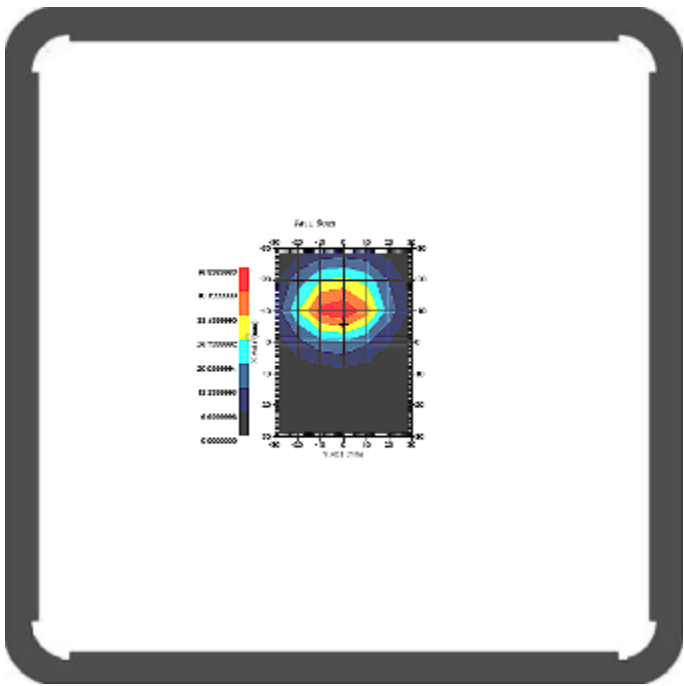
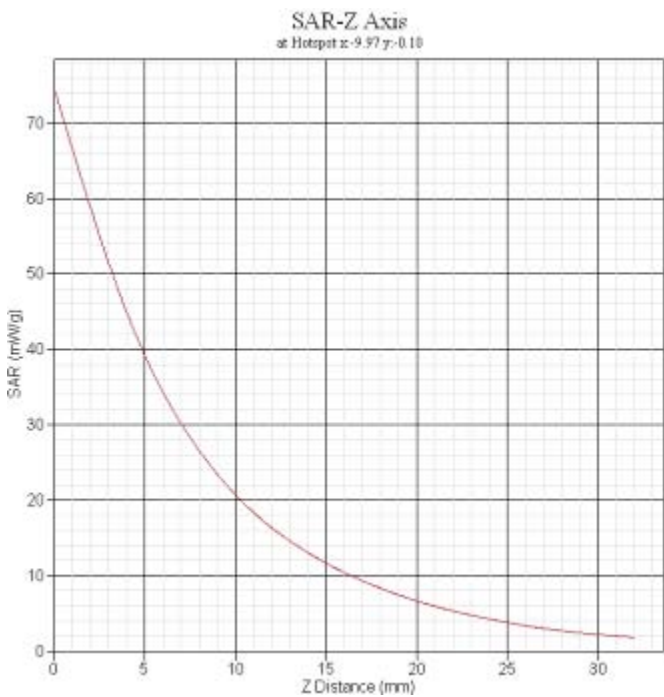
Head System Performance Check at 850MHZ&1900MHZ&2450				
Validation Kit: ASL-D-850-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
850MHz	Reference result	9.590	6.003	N/A
	+/-5%window	9.110to10.07	5.702to6.303	
	17-Dec-12(1W)	9.457	5.852	20.7
Validation Kit: ASL-D-1900-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
1900MHz	Reference result	39.378	19.668	N/A
	+/-5%window	37.418to41.356	18.685to20.651	
	17-Dec-12 (1W)	38.672	19.228	20.7
Validation Kit: ASL-D-2450-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
2450MHz	Reference result	52.456	23.603	N/A
	+/-5%window	49.833to55.078	22.423to24.783	
	17-Dec-12 (1W)	51.874	22.731	20.7
Note: All SAR values are normalized to 1 W forward power.				

Body System Performance Check at 850MHz&1900MHz&2450MHz				
Validation Kit: ASL-D-850-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
850MHz	Reference result	9.981	6.006	N/A
	+/-5%window	9.482to10.48	5.706to6.306	
	17-Dec-12(1W)	9.534	5.861	20.7
Validation Kit: ASL-D-1900-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
1900MHz	Reference result	39.654	19.668	N/A
	+/-5%window	37.671to41.637	18.685to20.651	
	17-Dec -12(1W)	39.615	19.712	20.7
Validation Kit: ASL-D-2450-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
2450MHz	Reference result	52.592	24.461	N/A
	+/-5%window	49.962to55.222	23.238to25.684	
	17-Dec-12(1W)	51.279	24.321	20.7
Note: All SAR values are normalized to 1W forward power.				

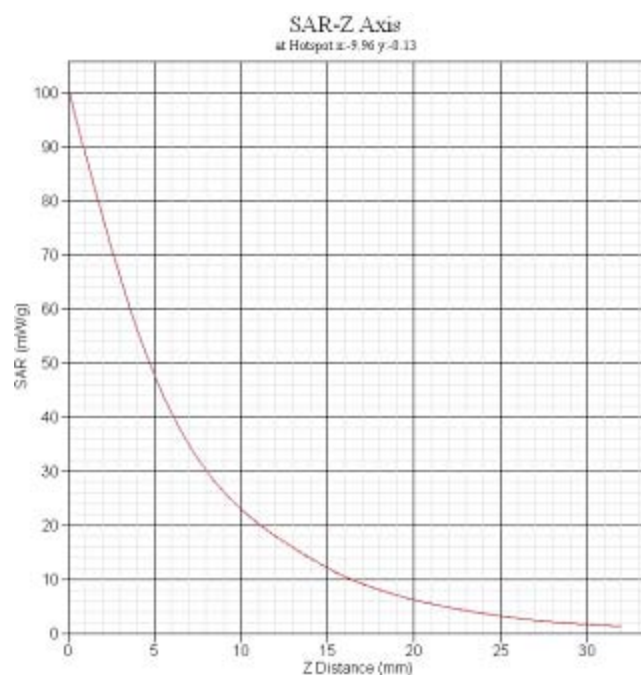
Frequency(MHz)	850
Relative permittivity(real part)	40.26
Conductivity(S/m)	0.93
Variation(%)	-0.983
Duty Cycle Factor	1
Crest factor	1
Conversion Factor	6.5
Probe Sensitivity	1.20 1.20 1.20 $\mu V/(V/m)^2$
Data	2012-12-17
	
	SAR 1g(W/Kg)
	SAR 10g(W/Kg)
	9.457
	5.852

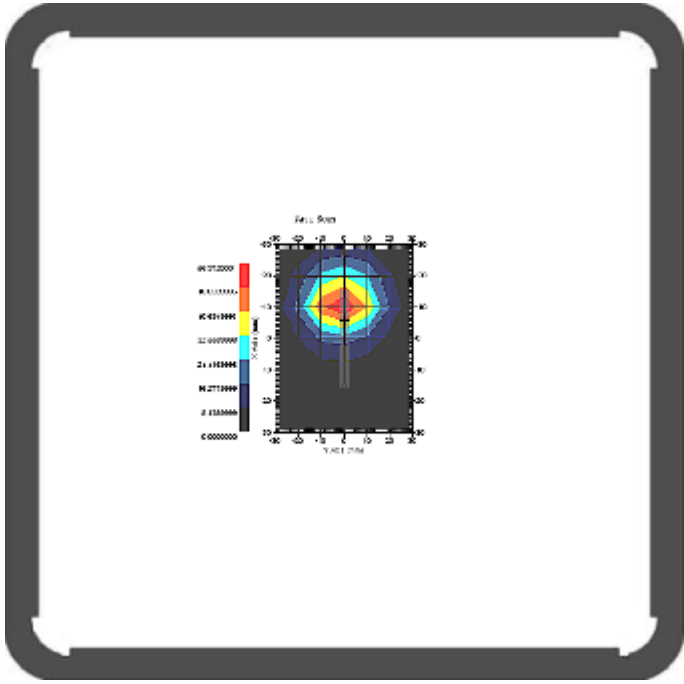
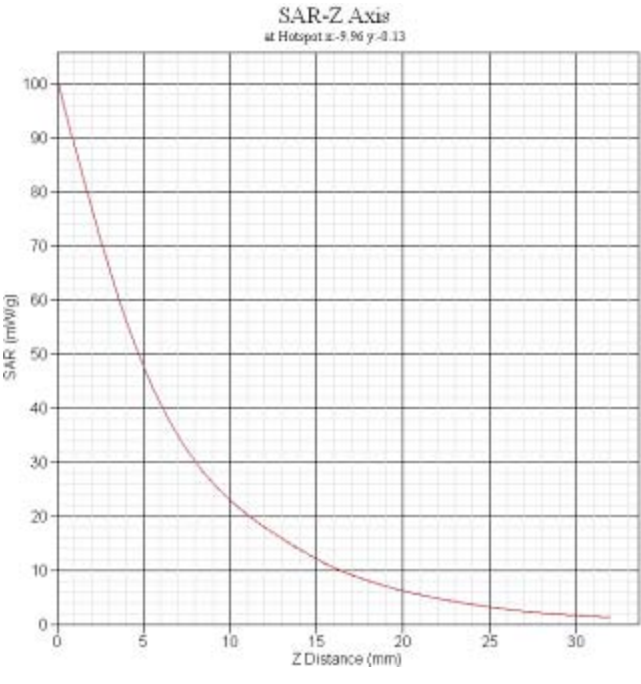
Frequency(MHz)	850
Relative permittivity(real part)	53.34
Conductivity(S/m)	0.92
Variation(%)	-0.543
Duty Cycle Factor	1
Crest factor	1
Conversion Factor	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-17
	
SAR 1g(W/Kg)	9.534
SAR 10g(W/Kg)	5.861

Frequency(MHz)	1900
Relative permittivity(real part)	41.52
Conductivity(S/m)	1.43
Variation(%)	0.724
Duty Cycle Factor	1
Crest factor	1
Conversion Factor	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-12-17
	
SAR 1g(W/Kg)	38.672
SAR 10g(W/Kg)	19.228

Frequency(MHz)	1900
Relative permittivity(real part)	52.93
Conductivity(S/m)	1.53
Variation(%)	0.983
Duty Cycle Factor	1
Crest factor	1
Conversion Factor	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-17
	
SAR 1g(W/Kg)	39.615
SAR 10g(W/Kg)	19.712

Frequency(MHz)	2450
Relative permittivity(real part)	40.27
Conductivity(S/m)	1.85
Variation(%)	1.421
Duty Cycle Factor	1
Crest factor	1
Conversion Factor	4.4
Probe Sensitivity	1.20 1.20 1.20 $\mu V/(V/m)^2$
Data	2012-12-17
SAR 1g(W/Kg)	51.874
SAR 10g(W/Kg)	22.731



Frequency(MHz)	2450
Relative permittivity(real part)	53.36
Conductivity(S/m)	1.90
Variation(%)	0.321
Duty Cycle Factor	1
Crest factor	1
Conversion Factor	4.4
Probe Sensitivity	1.20 1.20 1.20 $\mu V/(V/m)^2$
Data	2012-12-17
<div style="display: flex; justify-content: space-around; align-items: center;">   </div>	
SAR 1g(W/Kg)	51.279
SAR 10g(W/Kg)	24.321

4.2. Arrangement Assessment Setup

4.2.1. Test Positions of Device Relative to Head

This specifies exactly two test positions for the handset against the head phantom, the “cheek” position and the “tilted” position. The handset should be tested in both positions on the left and right sides of the SAM phantom. If the handset construction is such that it cannot be positioned using the handset positioning procedures described in 4.2.2.1 and 4.2.2.2 to represent normal use conditions (e.g. asymmetric handset), alternative alignment procedures should be considered with details provided in the test report.

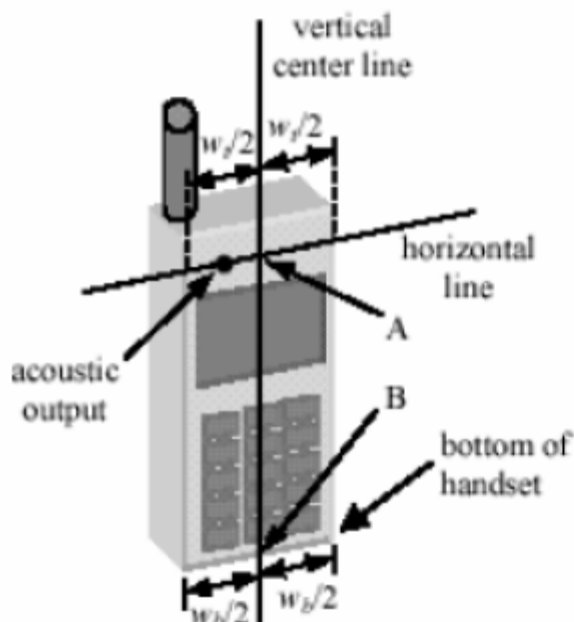


Figure 4.1a Internal Case

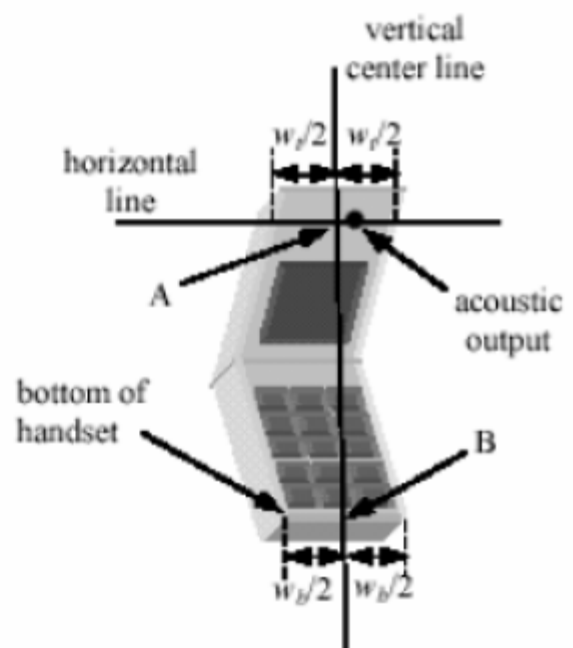


Figure 4.1b Clam Shell

4.2.2.1. Definition of the “Cheek” Position

The “cheek” position is defined as follows:

- Ready the handset for talk operation, if necessary. For example, for hand sets with a cover piece, open the cover. (If the handset can also be used with the cover closed both configurations must be tested.)
- Define two imaginary lines on the handset: the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset: the midpoint of the width w_t of the handset at the level of the acoustic output (point A on Figures 4.1 a and 4.1 b), and the midpoint of the width w_b of the Back of the handset through the center of the acoustic output (see Figure 4.1 a). The

two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front of the handset (see Figure 4.1 b), especially for clamshell handsets, handsets with flip pieces, and other irregularly-shaped handsets.

- c. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see 4.2), such that the plan defined by the vertical center line and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
- d. Translate the handset towards the phantom along the line passing through RE and LE until the handset touches the pinna.
- e. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to MB-NF including the line MB (called the reference plane).
- f. Rotate the handset around the vertical centerline until the handset (horizontal line) is symmetrical with respect to the line NF.

While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE and maintaining the handset contact with the pinna, rotate the handset about the line NF until any point on the handset is in contact with a phantom point below the pinna (cheek). See Figure 4.2 the physical angles of rotation should be noted.

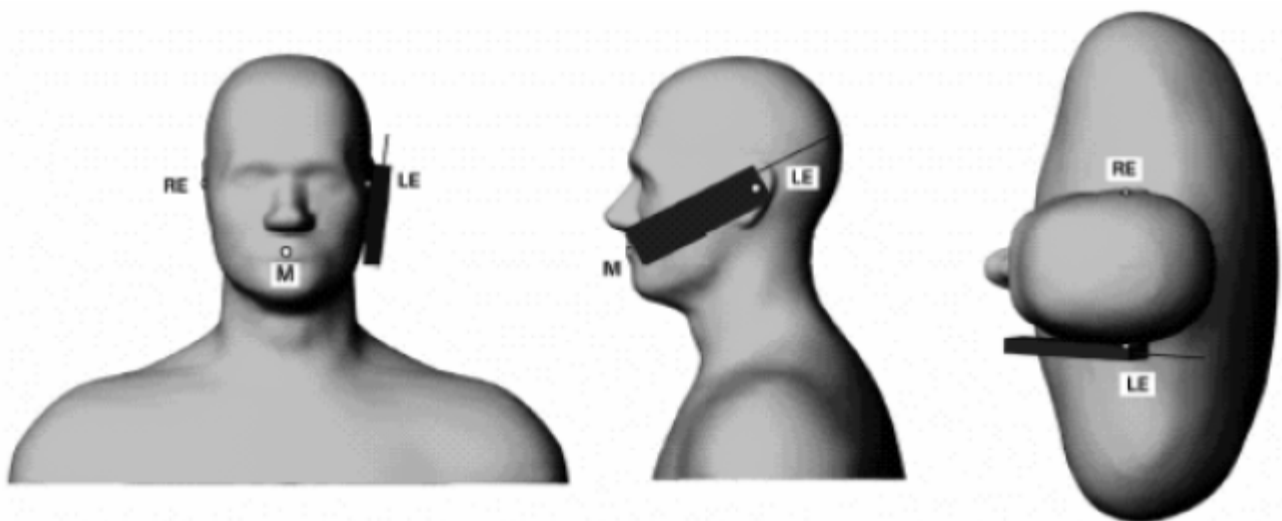


Figure 4.2 – Phone position 1, “cheek” or “touch” position.

4.2.1.2 Definition of the “Tilted” Position

The “tilted” position is defined as follows:

- a. Repeat steps (a) – (g) of 4.2.1.1 to place the device in the “cheek position”.
- b. While maintaining the orientation of the handset move the handset away from the pinna along the line passing through RE and LE in order to enable a rotation of the

handset by 15 degrees.

c. Rotate the handset around the horizontal line by 15 degrees.

d. While maintaining the orientation of the handset, move the handset towards the phantom on a line passing through RE and LE until any part of the handset touches the ear. The tilted position is obtained when the contact is on the pinna. If the contact is at any location other than the pinna (e.g. the antenna with the Back of the phantom head), the angle of the handset should be reduced. In this case, the tilted position is obtained if any part of the handset is in contact with the pinna as well as a second part of the handset is contact with the phantom (e.g. the antenna with Back of the head).

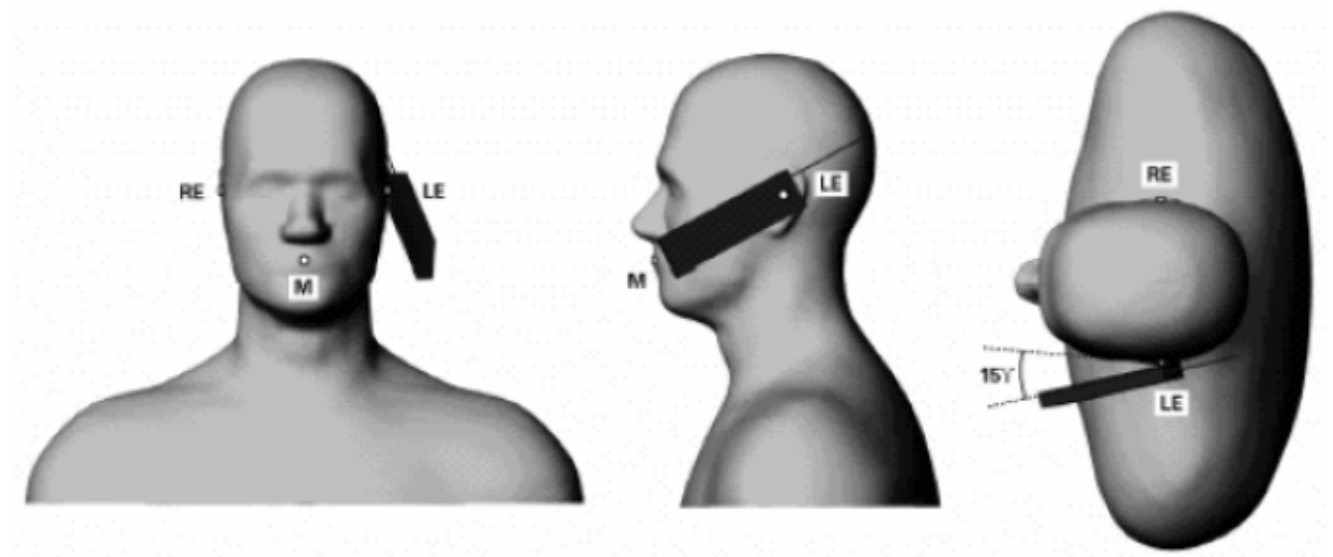


Figure 4.3 – Phone position 2, "tilted" position.

4.2.2. Test Positions for body-worn

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. A separation distance of 1.5 cm between the Back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distance may be use, but not exceed 2.5cm.

4.3. SAR Measurement Procedure

The ALSAS-10U calculates SAR using the following equation,

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

σ :represents the simulated tissue conductivity

ρ :represents the tissue density

The EUT is set to transmit at the required power in line with product specification, at each frequency relating to the LOW, MID, and HIGH channel settings.

Pre-scans are made on the device to establish the location for the transmitting antenna, using a large area scan in either air or tissue simulation fluid.

The EUT is placed against the Universal Phantom where the maximum area scan dimensions are large than the physical size of the resonating antenna. When the scan size is not large enough to cover the peak SAR distribution, it is modified by either extending the area scan size in both the X and Y directions, or the device is shifted within the predefined area.

The area scan is then run to establish the peak SAR location (interpolated resolution set at 1 mm²) which is then used to orient the center of the zoom scan. The zoom scan is then executed and the 1g and 10g averages are derived from the zoom scan volume (interpolated resolution set at 1 mm³).

5. SAR Exposure Limits

SAR assessments have been made in line with the requirements of IEEE C95.1-1999, IEEE 1528-2003 , FCC OET Bulletin 65 supplement C.

Type Exposure (W/kg)	Uncontrolled Environment Limit
Spatial Peak SAR (10g cube tissue for head and trunk)	1.60 W/kg
Spatial Average SAR (whole body)	0.08 W/kg
Spatial Peak SAR (10g for limb)	4.00 W/kg

6. Test Equipment List

Instrument	Manufacture	Model No.	Serial No.	Last Calibration
Universal Work Station	Apriel	ALS-UWS	100-00154	NCR
Data Acquisition Package	Apriel	ALS-DAQ-PAQ-3	110-00215	NCR
Probe Mounting Device and Boundary Detection Sensor System	Apriel	ALS-PMDPS-3	120-00265	NCR
Miniature E-Field Probe	Apriel	ALS-E-020	500-00282	Oct.01,2012
Left ear SAM Phantom	Apriel	ALS-P-SAM-L	130-00312	NCR
Right ear SAM Phantom	Apriel	ALS-P-SAM-R	140-00362	NCR
Universal SAM Phantom	Apriel	ALS-P-SU-1	150-00410	NCR
Reference Validation Dipole 850MHz	Apriel	ALS-D-850-S-2	180-00556	May.19,2011
Reference Validation Dipole 1900MHz	Apriel	ALS-D-1900-S-2	210-00707	May.16,2011
Reference Validation Dipole 2450MHz	Apriel	ALS-D-2450-S-2	220-00755	May.19,2011
Dielectric Probe Kit	Apriel	ALS-PR-DIEL	260-00955	NCR
Device Holder 2.0	Apriel	ALS-H-E-SET-2	170-00506	NCR
SAR software	Apriel	ALS-SAR-AL-10	Ver.2.3.8	NCR
CRS C500C Controller	Thermo	ALS-C500	RCF0504291	NCR
CRS F3 Robot	Apriel	ALS-F3-SW	N/A	NCR
Power Amplifier	Mini-Circuit	ZHL- 42	040306	Jul.17,2012
Directional Coupler	Agilent	778D-012	51011	Jul.17,2012
Universal Radio Communication Tester	Agilent	E5515C	104845	Mar.1,2012
Vector Network	Agilent	E5071B	MY4230146	Jul.19,2012
Signal Generator	Agilent	E8257D	N/A	Dec.10,2012
Power Meter	Rohde&Schwarz	NRP	N/A	Dec.10,2012

Note: All equipment upon which need to be calibrated are with calibration period of 1 year, except validation dipole antenna of every 3 years.

7. Measurement Uncertainty

Exposure Assessment Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_i^1 (1-g)	c_i^1 (10-g)	Standard Uncertainty (1-g) %	Standard Uncertainty (10-g) %
Measurement System							
Probe Calibration	3.5	normal	1	1	1	3.5	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	\sqrt{cp}	\sqrt{cp}	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	0.6	rectangular	$\sqrt{3}$	1	1	0.3	0.3
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.0	normal	1	0.7	0.5	0.0	0.0

Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7	1.4
Liquid Permittivity(meas.)	2.4	normal	1	0.6	0.5	1.4	1.2
Combined Uncertainty		RSS				9.3	9.2
Combined Uncertainty (coverage factor=2)		Normal(k=2)				18.7	18.3

8. SAR Test Results

8.1. SAR Test Results Summary

SAR MEASUREMENT					
Ambient Temperature (°C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (°C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: Mobile Phone					
Test Mode: GSM850					
Test Position Head	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Left-Cheek	Internal	190	836.6	0.171	1.6
Left-Tilted	Internal	190	836.6	0.129	1.6
Right- Cheek	Internal	190	836.6	0.134	1.6
Right -Tilted	Internal	190	836.6	0.127	1.6
Note: when the 1g SAR≤0.8W/kg, testing for low and high channel is optional.					

SAR MEASUREMENT					
Ambient Temperature (°C): 21.2 ± 2			Relative Humidity (%): 46		
Liquid Temperature (°C): 20.5 ± 2			Depth of Liquid (cm):>15		
Product: Mobile Phone					
Test Mode: GSM1900					
Test Position Head	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Left-Cheek	Internal	661	1880.0	0.416	1.6
Left-Tilted	Internal	661	1880.0	0.163	1.6
Right- Cheek	Internal	661	1880.0	0.470	1.6
Right -Tilted	Internal	661	1880.0	0.193	1.6
Note: when the 1g SAR≤0.8W/kg, testing for low and high channel is optional.					

SAR MEASUREMENT					
Ambient Temperature (°C): 21.2 ± 2			Relative Humidity (%): 46		
Liquid Temperature (°C): 20.5 ± 2			Depth of Liquid (cm):>15		
Product: Mobile Phone					
Test Mode: 802.11b					
Test Position Head	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Left-Cheek	Internal	11	2472	0.071	1.6
Left-Tilted	Internal	11	2472	0.110	1.6
Right- Cheek	Internal	11	2472	0.293	1.6
Right -Tilted	Internal	11	2472	0.155	1.6
Note: when the 1g SAR≤0.8W/kg, testing for low and high channel is optional.					

DUT with Flat Phantom 15mm Gap

SAR MEASUREMENT					
Ambient Temperature (°C): 21.2 ± 2			Relative Humidity (%): 46		
Liquid Temperature (°C): 20.5 ± 2			Depth of Liquid (cm):>15		
Product: Mobile Phone					
Test Mode: GPRS850					
Test Position Body	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Body Front	Internal	190	836.6	0.245	1.6
Body Back	Internal	190	836.6	0.420	1.6
Note: when the 1g SAR≤0.8W/kg, testing for low and high channel is optional.					

DUT with Flat Phantom 15mm Gap

SAR MEASUREMENT					
Ambient Temperature (°C): 21.2 ± 2			Relative Humidity (%): 46		
Liquid Temperature (°C): 20.5 ± 2			Depth of Liquid (cm):>15		
Product: Mobile Phone					
Test Mode: GPRS1900					
Test Position Body	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Body Front	Internal	661	1880.0	0.128	1.6
Body Back	Internal	661	1880.0	0.514	1.6
Note: when the 1g SAR≤0.8W/kg, testing for low and high channel is optional.					

DUT with Flat Phantom 15mm Gap

SAR MEASUREMENT					
Ambient Temperature (°C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (°C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: Mobile Phone					
Test Mode: 802.11b					
Test Position Body	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Body Front	Internal	11	2472	0.049	1.6
Body Back	Internal	11	2472	0.167	1.6
Note: when the 1g SAR≤0.8W/kg, testing for low and high channel is optional.					

8.2. Conducted Power(Unit:dBm)

8.2.1 GSM Conducted Power

Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	190	251	512	661	810
Frequency	824.2	836.6	848.8	1850.2	1880.0	1909.8
GSM	32.34	32.41	32.10	29.36	29.42	29.37

Band	Conducted Power (dBm)			Factor (dB)	Average Power (dBm)		
Channel	128	190	251		128	190	251
Frequency(MHz)	824.2	836.6	848.8		824.2	836.6	848.8
GPRS8(1up)	32.33	32.39	32.09	-9.03	23.30	23.36	23.06
GPRS10(2up)	30.71	30.74	30.72	-6.02	24.69	24.72	24.70
GPRS12(4up)	28.94	28.96	28.87	-3.01	25.93	25.95	25.86

Band	Conducted Power (dBm)			Factor (dB)	Average Power (dBm)		
Channel	512	661	810		512	661	810
Frequency(MHz)	1850.2	1880.0	1909.8		1850.2	1880.0	1909.8
GPRS8(1up)	29.35	29.40	29.35	-9.03	20.32	20.37	20.32
GPRS10(2up)	27.54	27.62	27.61	-6.02	21.52	21.60	21.59
GPRS12(4up)	25.57	25.63	25.54	-3.01	22.56	22.62	22.53

NOTES:

Division Factors:

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

WIFI and Bluetooth Function:

The distance between BT antenna and GSM antenna is 2.5cm, WiFi antenna and GSM antenna is 7.8cm. The location of the antennas inside mobile phone is shown below:



8.2.2 BT conducted power

Channel	Frequency	Bluetooth RF Output Power (dBm)		
		Data Rate / Modulation		
		GFSK	π /4-DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	6.92	7.64	7.77
Ch39	2441MHz	7.90	8.16	8.31
Ch78	2480MHz	6.79	6.96	7.10

According to the formula of KDB 447498 Section 4.3.1 1) to determine standalone SAR test exclusion for Bluetooth:

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f_{\text{GHz}}}] \leq 3.0$$
 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,¹⁶ where

$8.913\text{mw}(9.5\text{db})/5\text{mm} \cdot \sqrt{2.48} = 2.81 < 3.0$, So standalone Bluetooth SAR test is omitted.

In addition 648474 D04 section 3 states the following:

3. Standalone and Simultaneous Transmission SAR Test Requirements

Each transmitter should be evaluated independently for standalone use according to the applicable rules and policies to determine RF exposure compliance regardless of the simultaneous transmission modes of a handset. The SAR test reduction and exclusion provisions in KDB 447498 are applied to the transmitters in a phone to determine standalone and simultaneous transmission test requirements, according to the maximum output power, antenna-to-antenna and antenna-to-user separation distances. When the separation distance is ≤ 5 mm, a test separation distance of 5 mm is used to determine SAR test exclusion. When simultaneous transmission SAR measurements are necessary, the enlarged zoom scan measurement and volume scan post-processing procedures in KDB 865664 are required. The RF exposure reporting procedures in KDB 865664 (D02) should be applied to document compliance.

According to the formula of KDB 447498 standalone SAR test can be omitted for BT with a separation distance of 5mm. Please also see Annex A of KDB 447498. The SAR threshold for 5mm distance at 2450MHz is 10mW. The power of the BT transmitter is below 10mW. Therefore standalone SAR does not apply.

8.2.3 WiFi conducted power

Channel	Frequency	2.4GHz 802.11b RF Power (dBm)			
		At DSSS Data Rate			
		1Mbps	2 Mbps	5.5 Mbps	11 Mbps
CH 01	2412 MHz	13.06	13.62	14.45	15.35
CH 06	2437 MHz	13.26	13.81	14.62	15.38
CH 11	2462 MHz	12.97	13.77	14.57	15.21

Channel	Frequency	2.4GHz 802.11g RF Power (dBm)							
		At OFDM Data Rate							
		6	9	12	18	24	36	48	54
		Mbps	Mbps	Mbps	Mbps	Mbps	Mbps	Mbps	Mbps
CH01	2412MHz	12.65	12.47	12.46	12.38	12.33	12.25	12.04	11.92
CH06	2437MHz	12.68	12.42	12.61	12.34	12.33	12.29	12.13	12.03
CH11	2462MHz	12.54	12.36	12.46	12.43	12.36	12.24	12.12	11.79

Channel	Frequency	2.4GHz 802.11n RF Power (dBm)							
		At OFDM Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		6.5Mbps	13Mbps	19.5Mbps	26Mbps	39Mbps	52Mbps	58.5Mbps	65Mbps
CH01	2412MHz	12.51	12.36	12.32	12.29	12.24	12.17	12.02	11.87
CH06	2437MHz	12.64	12.37	12.36	12.27	12.26	12.24	12.05	11.91
CH11	2462MHz	12.52	12.27	12.31	12.21	12.23	12.21	12.04	11.82

Note:

1. Per KDB 248227, 11g output power is less than 1/4 dB higher than 11b mode, thus the SAR can be excluded.
2. Per 2010/4 TCB workshop, choose the highest output power channel to test SAR and determine further SAR exclusion, and CH 6 is chosen here.

Band	Chanel	Maximum Target(MT)		Measured Power(MP)		EUT measure SAR 1g	Scaled SAR 1g
		dBm	mW	dBm	mW	W/Kg	(MT/MP)*EUT SAR
GSM850	190	34.00	2511.89	32.41	1741.80	0.171	0.246 (Head)
GPRS850	190	34.00	2511.89	32.39	1733.80	0.420	0.608 (Body)
GSM1900	661	31.00	1258.93	29.42	874.98	0.470	0.676(Head)
GPRS1900	661	31.00	1258.93	29.40	870.96	0.514	0.743(Body)
802.11b	11	17	50.119	15.38	34.514	0.293	0.425(Head)
802.11b	11	17	50.119	15.38	34.514	0.167	0.242(Body)

Note:

Per KDB 447498,all of Scale-up value $\leq 0.8\text{W/kg}$, testing for low and high channel is optional

8.3. Simultaneous Transmitting Configurations

Simultaneous Transmitting Configuration	Applicable Combination
Simultaneous Transmission	WWAN+BT
	WWAN+WiFi

8.4. Simultaneous Multi-band Transmission

Maximum SAR list for each band and position

	GSM850	GSM1900	802.11b/g	BT	Max.SAR Summation	Result
Left-Cheek	0.246	0.539	0.103	0.370	0.909	pass
Left- Tilted	0.186	0.262	0.160	0.370	0.632	pass
Right-Cheek	0.193	0.609	0.425	0.370	0.979	pass
Right -Tilted	0.183	0.250	0.225	0.370	0.475	pass
Body Front	0.394	0.185	0.071	0.370	0.764	pass
Body Back	0.676	0.743	0.242	0.370	1.046	pass

1. WLAN and BT use their own antenna, they cannot transmit simultaneously ,and the device does not support hotspot mode
2. EUT will choose either WiFi/2.4G according to the network signal condition, therefore, BT and WiFi will not transmit simultaneously
3. According to KDB 447498 Section 4.3.2 2) to estimate the standalone SAR value for Bluetooth:

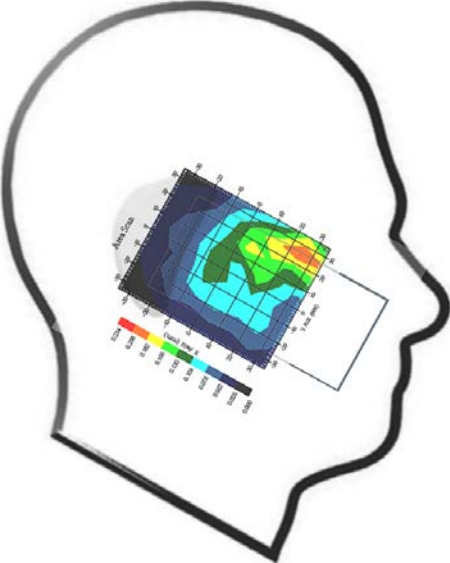
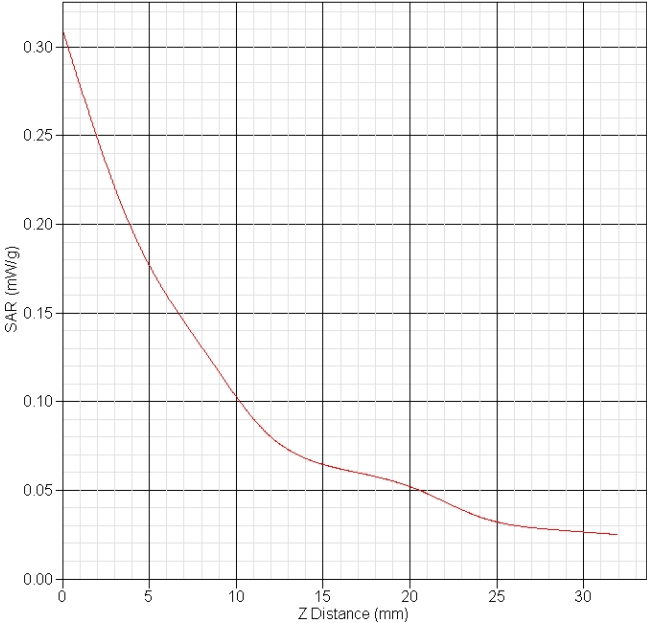
- $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot [\sqrt{f_{\text{GHz}}/x}] \text{ W/kg}$ for test separation distances $\leq 50 \text{ mm}$;
where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.

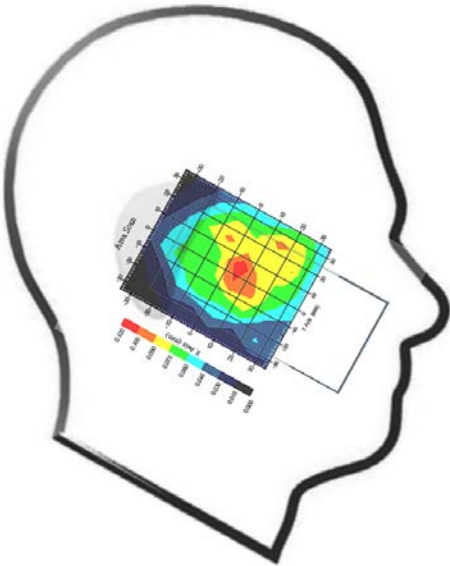
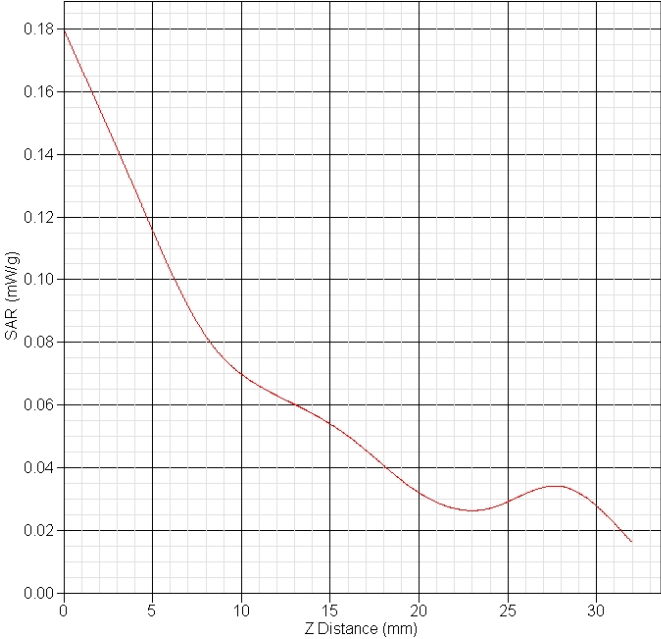
$$8.913\text{mw}(9.5\text{db})/5\text{mm} \cdot \sqrt{2.48/7.5} = 0.37\text{w/kg}$$

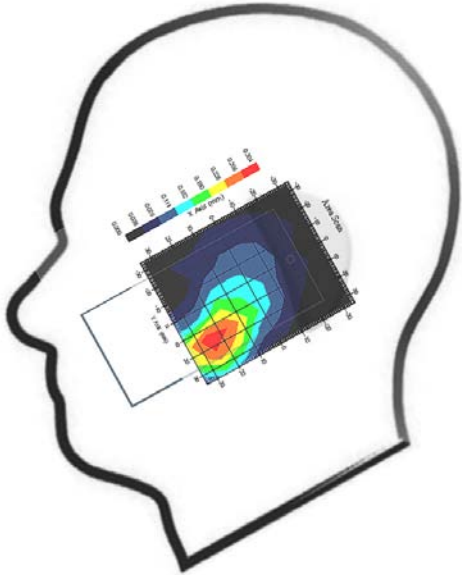
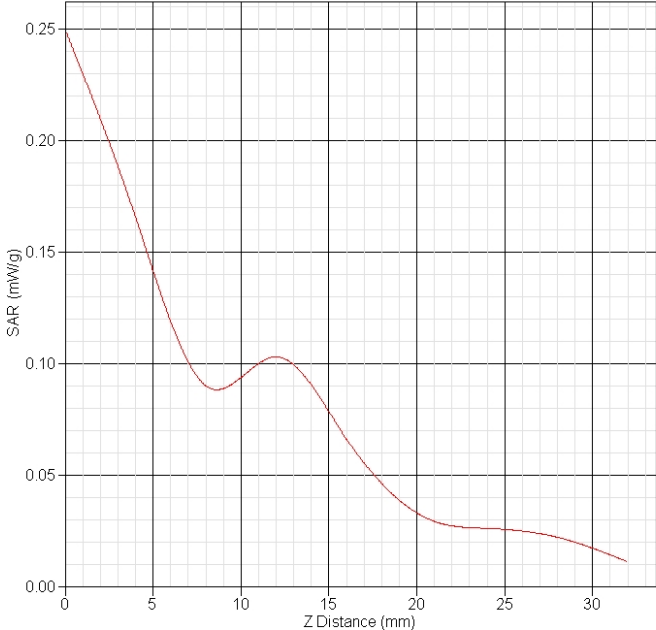
This results in an estimated SAR of 0.37W/kg for the BT transmitter at 5mm distance. The highest reported (scaled) SAR values for WWAN and BT in head and body configurations. the sum is below the 1g SAR limit, simultaneous SAR test is not required.

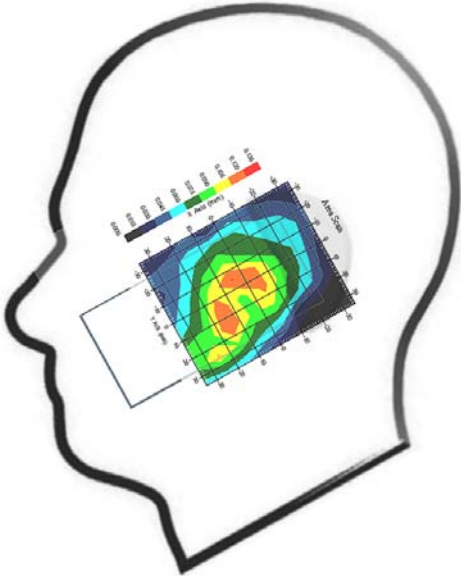
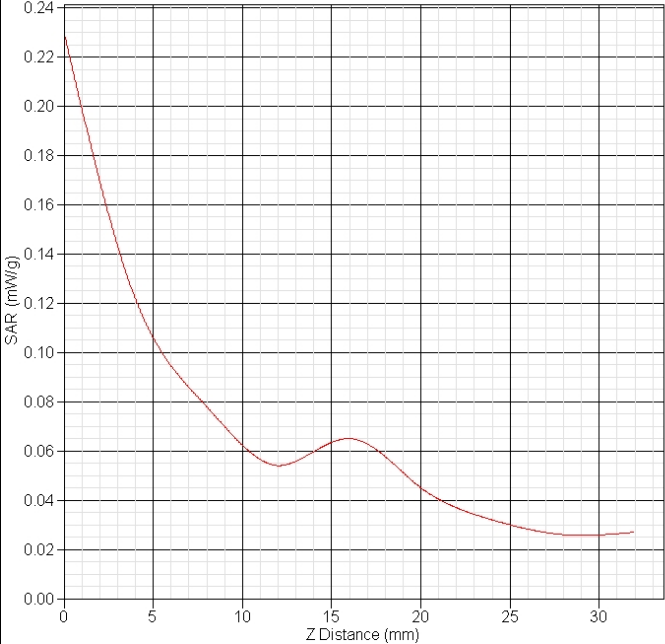
4. The highest reported (scaled) SAR values for WWAN and WiFi in head and body configuration. the sum is below the 1g SAR limit, simultaneous SAR test is not required.

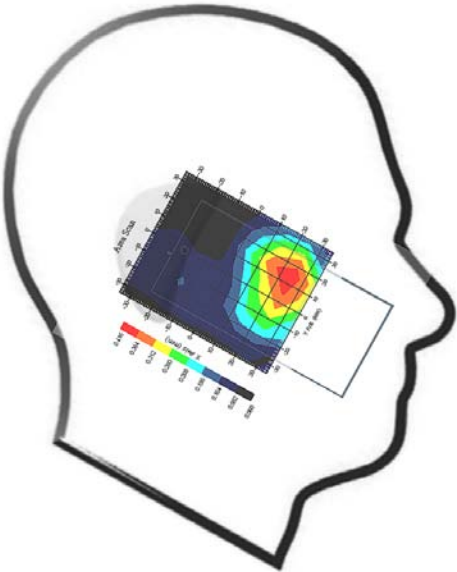
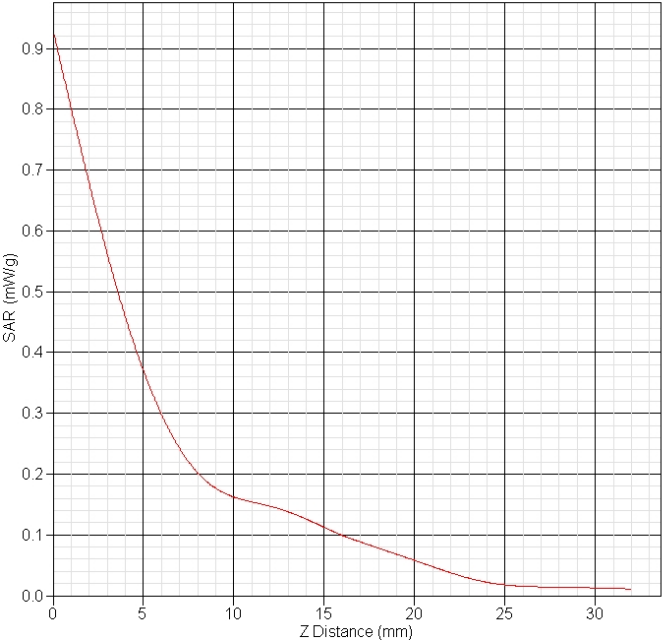
8.5. SAR Measurement Data

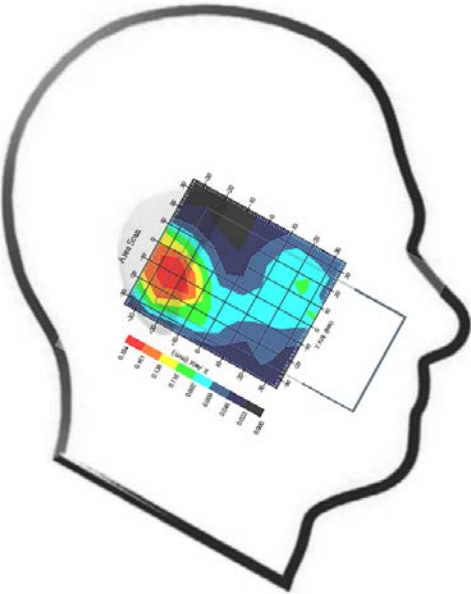
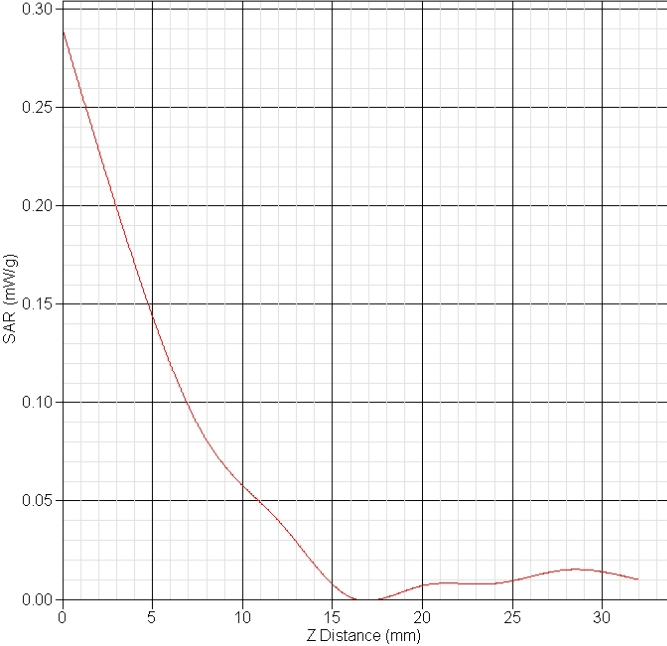
GSM850 left cheek ch190	
Frequency(MHz)	836.6
Relative permittivity(real part)	40.26
Conductivity(S/m)	0.93
Variation(%)	1.053
Duty Cycle Factor	8
Crest factor	8
4Conversion Factor	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-12-17
	<p>SAR-Z Axis at Hotspot x:48.13 y:24.90</p> 
SAR 1g(W/Kg)	0.171
SAR 10g(W/Kg)	0.095

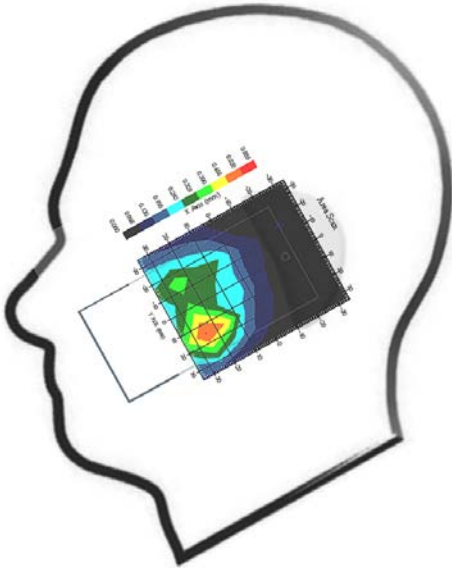
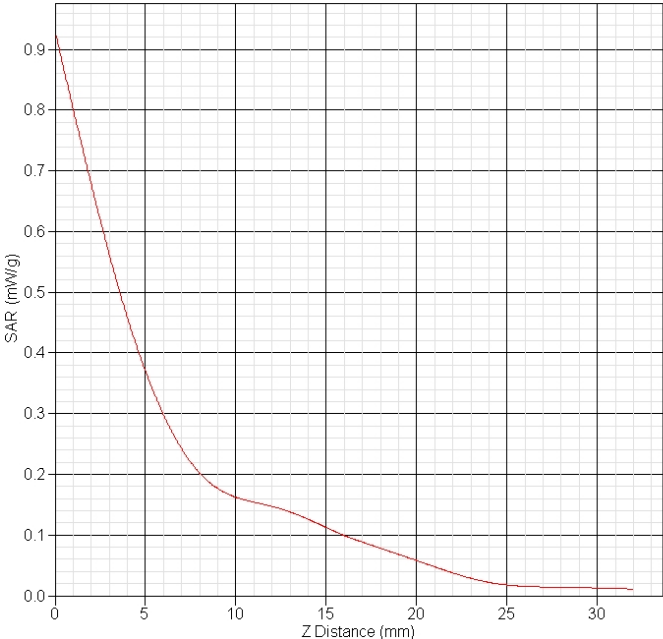
GSM850 left tilt ch190	
Frequency(MHz)	836.6
Relative permittivity(real part)	40.26
Conductivity(S/m)	0.93
Variation(%)	-1.436
Duty Cycle Factor	8
Crest factor	8
Conversion Factor	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-17
	<p>SAR-Z Axis at Hotspot x:18.13 y:14.91</p> 
SAR 1g(W/Kg)	0.129
SAR 10g(W/Kg)	0.090

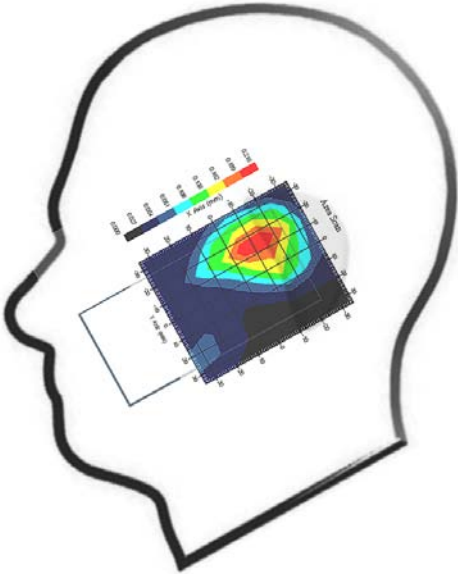
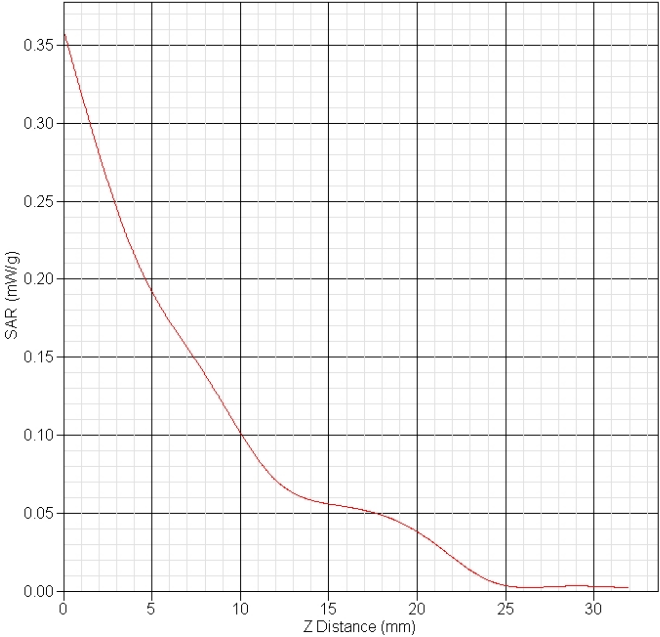
GSM850 Right cheek ch190	
Frequency(MHz)	836.6
Relative permittivity(real part)	40.26
Conductivity(S/m)	0.93
Variation(%)	-2.359
Duty Cycle Factor	8
Crest factor	8
Conversion Factor	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-17
	<p>SAR-Z Axis at Hotspot x:24.11 y:7.08</p> 
SAR 1g(W/Kg)	0.134
SAR 10g(W/Kg)	0.082

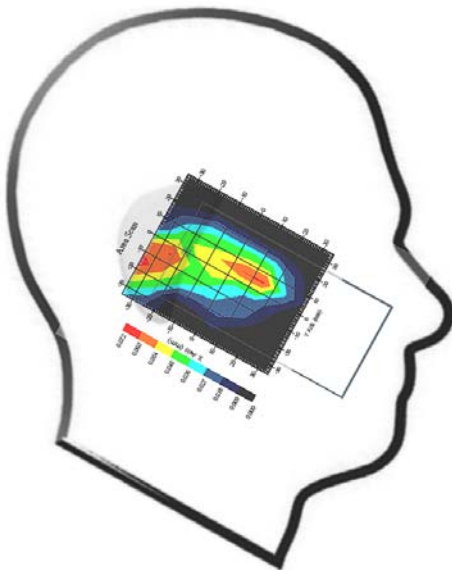
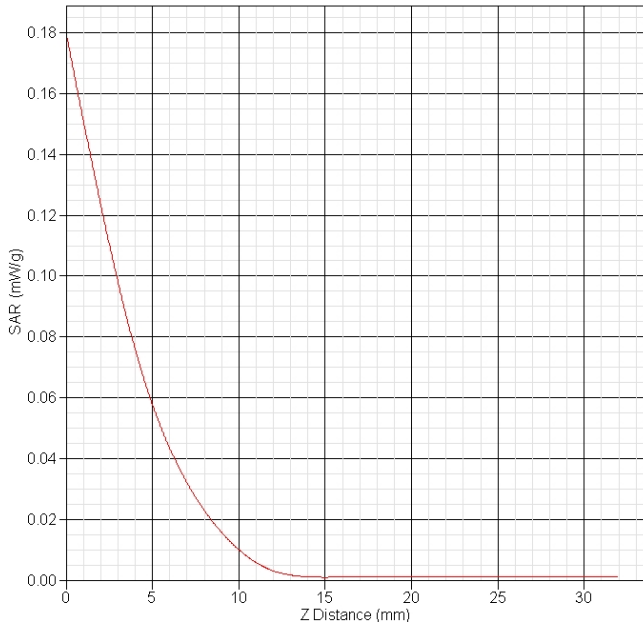
GSM850 Right tilt CH190	
Frequency(MHz)	836.6
Relative permittivity(real part)	40.26
Conductivity(S/m)	0.93
Variation(%)	4.563
Duty Cycle Factor	8
Crest factor	8
Conversion Factor	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-17
	<p>SAR-Z Axis at Hotspot x:24.08 y:9.01</p> 
SAR 1g(W/Kg)	0.127
SAR 10g(W/Kg)	0.082

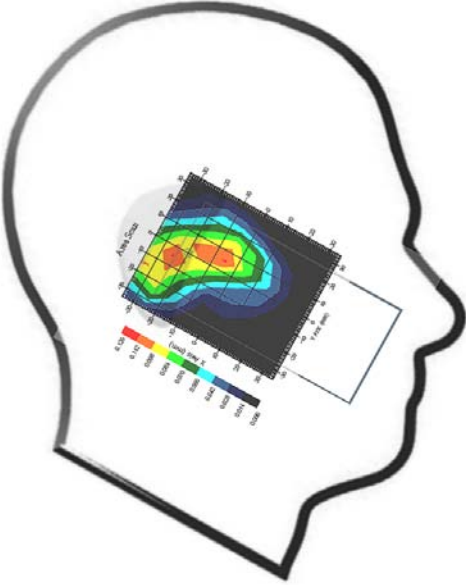
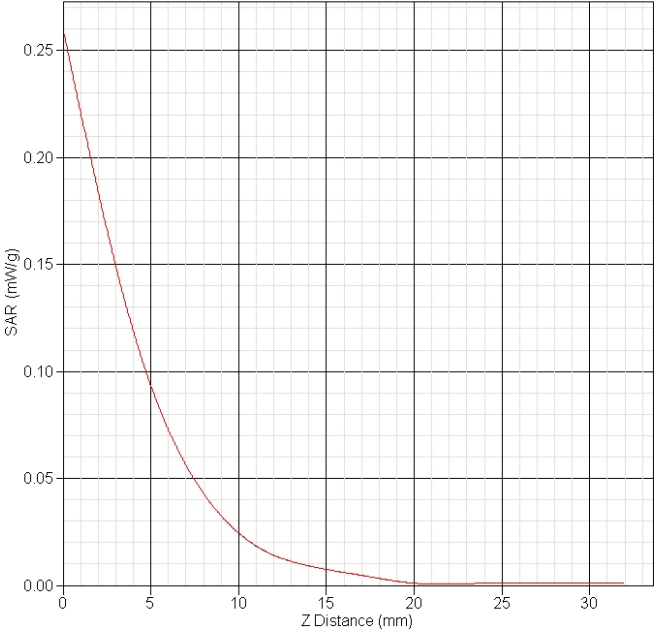
GSM1900 Left cheek CH661																	
Frequency(MHz)	1880.0																
Relative permittivity(real part)	41.52																
Conductivity(S/m)	1.43																
Variation(%)	-2.548																
Duty Cycle Factor	8																
Crest factor	8																
Conversion Factor	5.7																
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²																
Data	2012-12-17																
	<p>SAR-Z Axis at Hotspot x:40.10 y:14.95</p>  <table border="1"><caption>SAR-Z Axis Data (Estimated)</caption><thead><tr><th>Z Distance (mm)</th><th>SAR (mW/kg)</th></tr></thead><tbody><tr><td>0</td><td>0.90</td></tr><tr><td>5</td><td>0.40</td></tr><tr><td>10</td><td>0.18</td></tr><tr><td>15</td><td>0.10</td></tr><tr><td>20</td><td>0.05</td></tr><tr><td>25</td><td>0.02</td></tr><tr><td>30</td><td>0.01</td></tr></tbody></table>	Z Distance (mm)	SAR (mW/kg)	0	0.90	5	0.40	10	0.18	15	0.10	20	0.05	25	0.02	30	0.01
Z Distance (mm)	SAR (mW/kg)																
0	0.90																
5	0.40																
10	0.18																
15	0.10																
20	0.05																
25	0.02																
30	0.01																
SAR 1g(W/Kg)	0.416																
SAR 10g(W/Kg)	0.201																

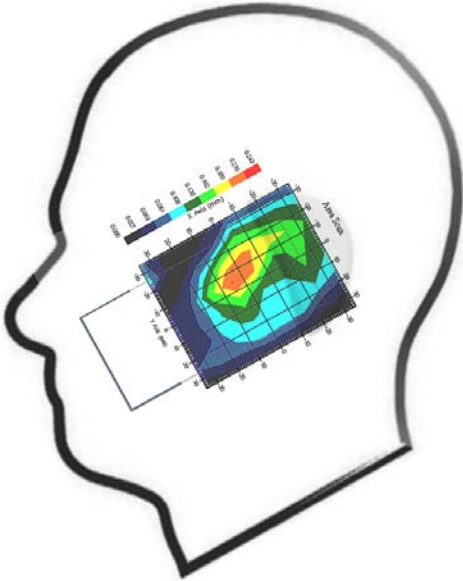
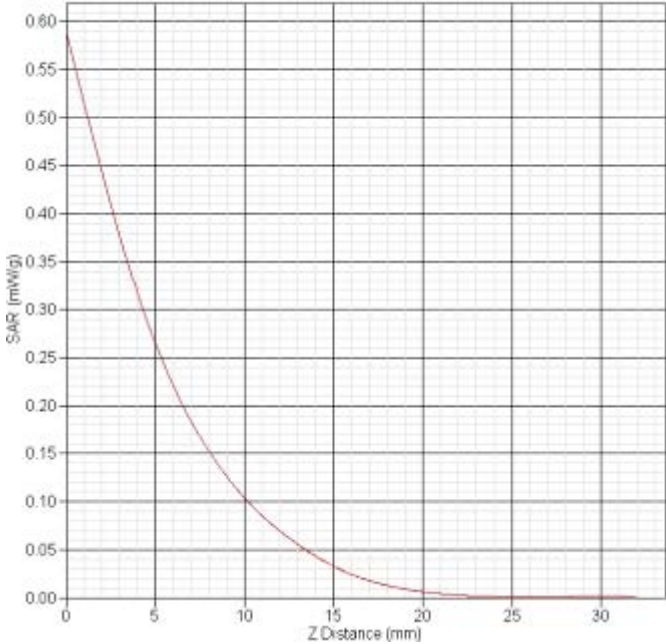
GSM1900 Left tilt CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	41.52
Conductivity(S/m)	1.43
Variation(%)	0.125
Duty Cycle Factor	8
Crest factor	8
Conversion Factor	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-17
	<p>SAR-Z Axis at Hotspot x:-9.85 y:-13.13</p> 
SAR 1g(W/Kg)	0.163
SAR 10g(W/Kg)	0.086

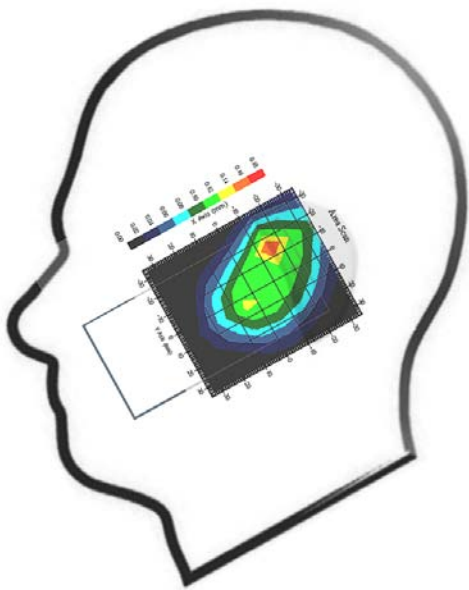
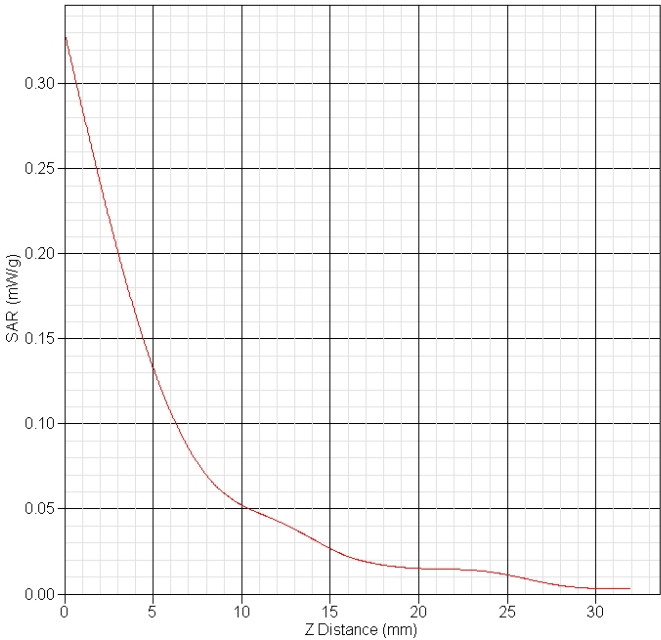
GSM1900 Right cheek CH661																	
Frequency(MHz)	1880.0																
Relative permittivity(real part)	41.52																
Conductivity(S/m)	1.43																
Variation(%)	1.669																
Duty Cycle Factor	8																
Crest factor	8																
Conversion Factor	5.7																
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²																
Data	2012-12-17																
	<p>SAR-Z Axis at Hotspot x:40.10 y:14.95</p>  <table border="1"><caption>SAR-Z Axis Data (Estimated)</caption><thead><tr><th>Z Distance (mm)</th><th>SAR (mW/g)</th></tr></thead><tbody><tr><td>0</td><td>0.90</td></tr><tr><td>5</td><td>0.40</td></tr><tr><td>10</td><td>0.18</td></tr><tr><td>15</td><td>0.12</td></tr><tr><td>20</td><td>0.08</td></tr><tr><td>25</td><td>0.05</td></tr><tr><td>30</td><td>0.05</td></tr></tbody></table>	Z Distance (mm)	SAR (mW/g)	0	0.90	5	0.40	10	0.18	15	0.12	20	0.08	25	0.05	30	0.05
Z Distance (mm)	SAR (mW/g)																
0	0.90																
5	0.40																
10	0.18																
15	0.12																
20	0.08																
25	0.05																
30	0.05																
SAR 1g(W/Kg)	0.470																
SAR 10g(W/Kg)	0.225																

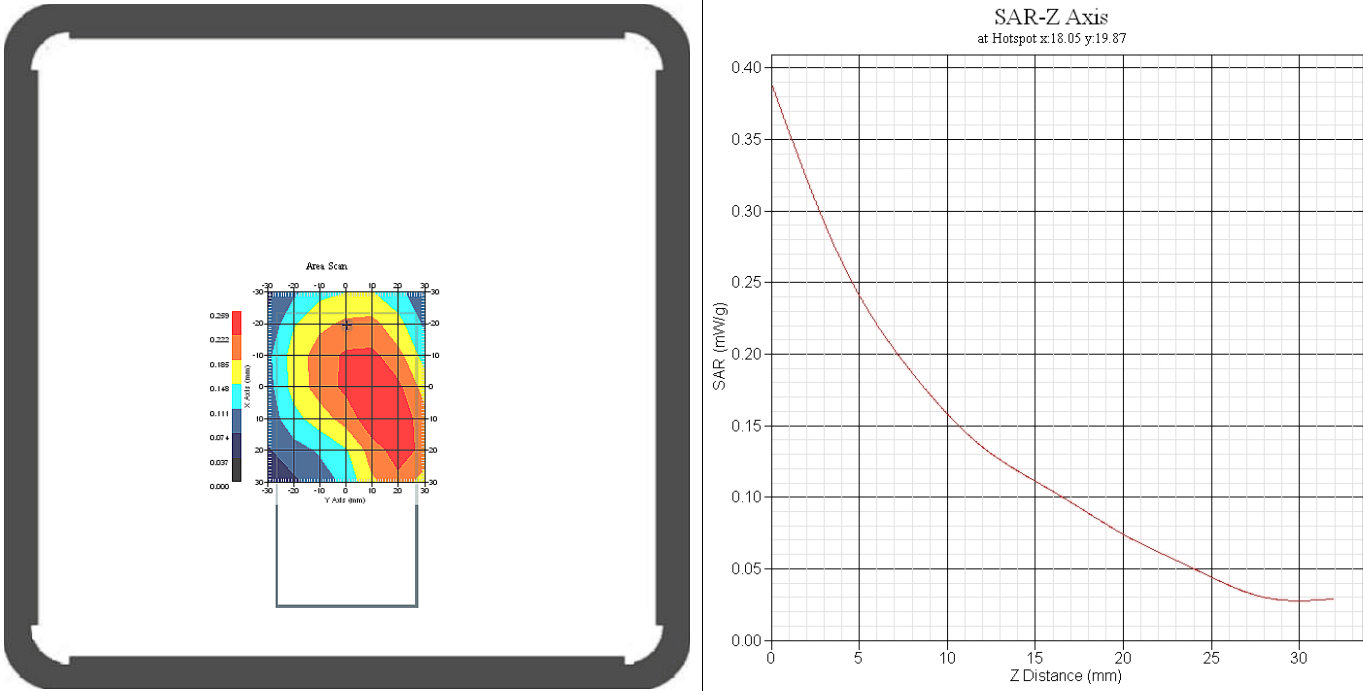
GSM1900 Right tilt CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	41.52
Conductivity(S/m)	1.43
Variation(%)	3.282
Duty Cycle Factor	8
Crest factor	8
Conversion Factor	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-17
	<p>SAR-Z Axis at Hotspot x:0.08 y:-15.00</p> 
SAR 1g(W/Kg)	0.193
SAR 10g(W/Kg)	0.097

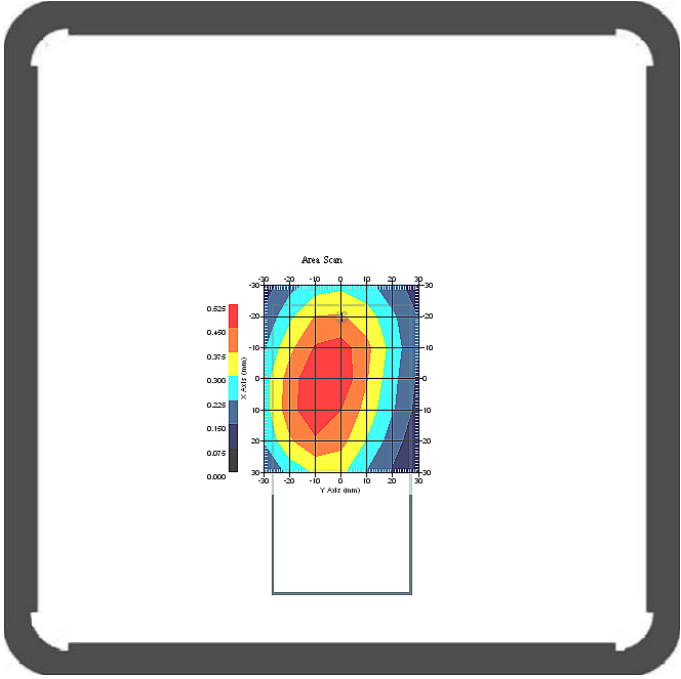
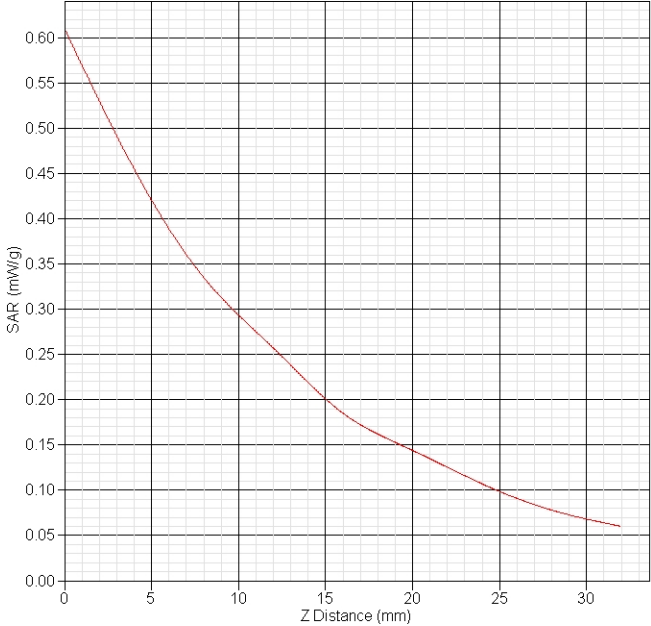
802.11b Left cheek CH11																	
Frequency(MHz)	2472																
Relative permittivity(real part)	40.27																
Conductivity(S/m)	1.85																
Variation(%)	-3.940																
Duty Cycle Factor	1																
Crest factor	1																
Conversion Factor	4.65																
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²																
Data	2012-12-18																
	<div>SAR-Z Axis at Hotspot x:-17.85 y:-13.10</div>  <table border="1"><caption>SAR-Z Axis Data (Estimated)</caption><thead><tr><th>Z Distance (mm)</th><th>SAR (mW/g)</th></tr></thead><tbody><tr><td>0</td><td>0.175</td></tr><tr><td>5</td><td>0.060</td></tr><tr><td>10</td><td>0.010</td></tr><tr><td>15</td><td>0.002</td></tr><tr><td>20</td><td>0.001</td></tr><tr><td>25</td><td>0.001</td></tr><tr><td>30</td><td>0.001</td></tr></tbody></table>	Z Distance (mm)	SAR (mW/g)	0	0.175	5	0.060	10	0.010	15	0.002	20	0.001	25	0.001	30	0.001
Z Distance (mm)	SAR (mW/g)																
0	0.175																
5	0.060																
10	0.010																
15	0.002																
20	0.001																
25	0.001																
30	0.001																
SAR 1g(W/Kg)	0.071																
SAR 10g(W/Kg)	0.027																

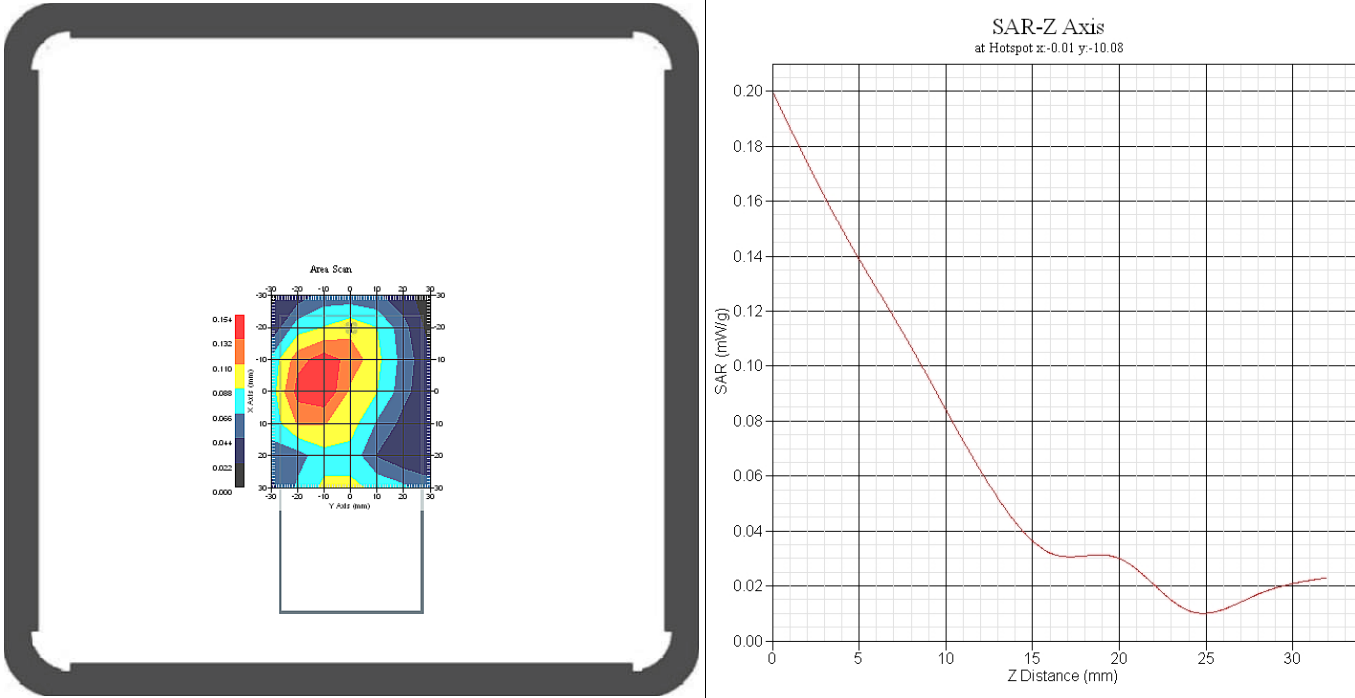
802.11b Left tilt CH11	
Frequency(MHz)	2472
Relative permittivity(real part)	40.27
Conductivity(S/m)	1.85
Variation(%)	-1.023
Duty Cycle Factor	1
Crest factor	1
Conversion Factor	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-18
	<p>SAR-Z Axis at Hotspot x:10.10 y:4.95</p> 
SAR 1g(W/Kg)	0.110
SAR 10g(W/Kg)	0.048

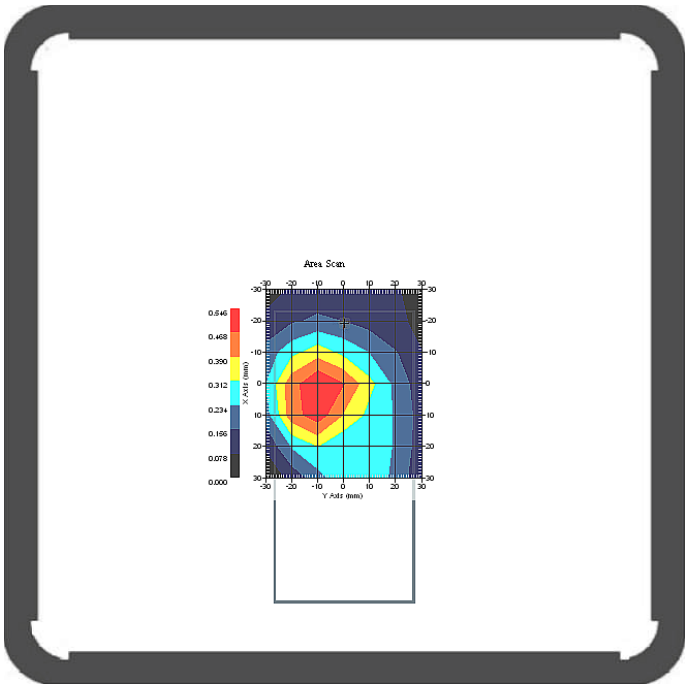
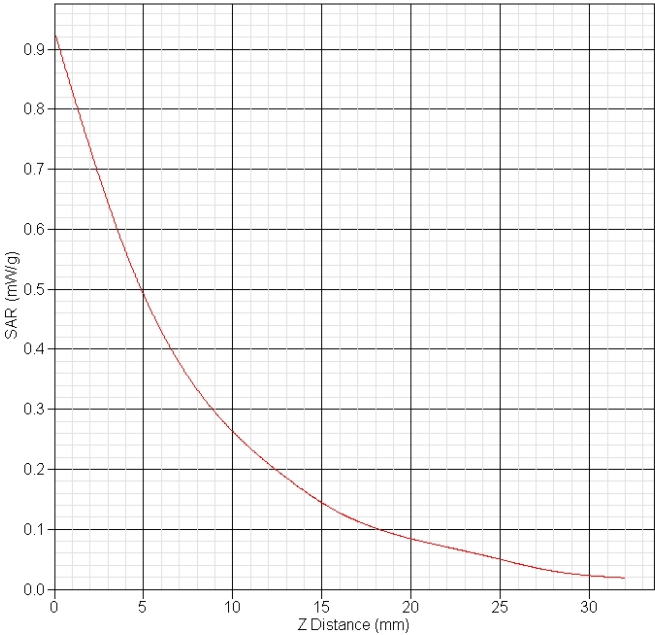
802.11b Right cheek CH11																	
Frequency(MHz)	2472																
Relative permittivity(real part)	40.27																
Conductivity(S/m)	1.85																
Variation(%)	2.085																
Duty Cycle Factor	1																
Crest factor	1																
Conversion Factor	4.65																
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²																
Data	2012-12-18																
<div><div></div><div><p>SAR-Z Axis at Hotspot x:3.08 y:13.00</p><table border="1"><caption>SAR-Z Axis Profile Data (Estimated)</caption><thead><tr><th>Z Distance (mm)</th><th>SAR (mW/kg)</th></tr></thead><tbody><tr><td>0</td><td>0.58</td></tr><tr><td>5</td><td>0.25</td></tr><tr><td>10</td><td>0.10</td></tr><tr><td>15</td><td>0.04</td></tr><tr><td>20</td><td>0.01</td></tr><tr><td>25</td><td>0.005</td></tr><tr><td>30</td><td>0.002</td></tr></tbody></table></div></div>		Z Distance (mm)	SAR (mW/kg)	0	0.58	5	0.25	10	0.10	15	0.04	20	0.01	25	0.005	30	0.002
Z Distance (mm)	SAR (mW/kg)																
0	0.58																
5	0.25																
10	0.10																
15	0.04																
20	0.01																
25	0.005																
30	0.002																
SAR 1g(W/Kg)	0.293																
SAR 10g(W/Kg)	0.191																

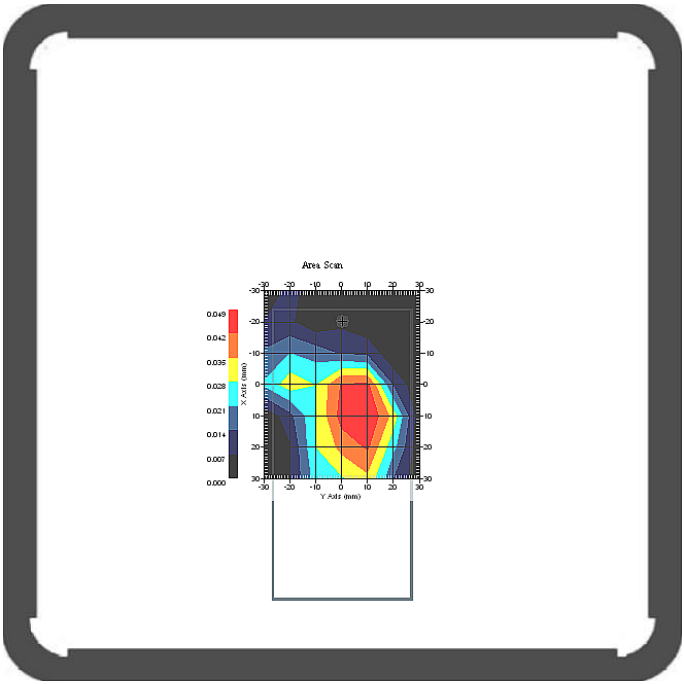
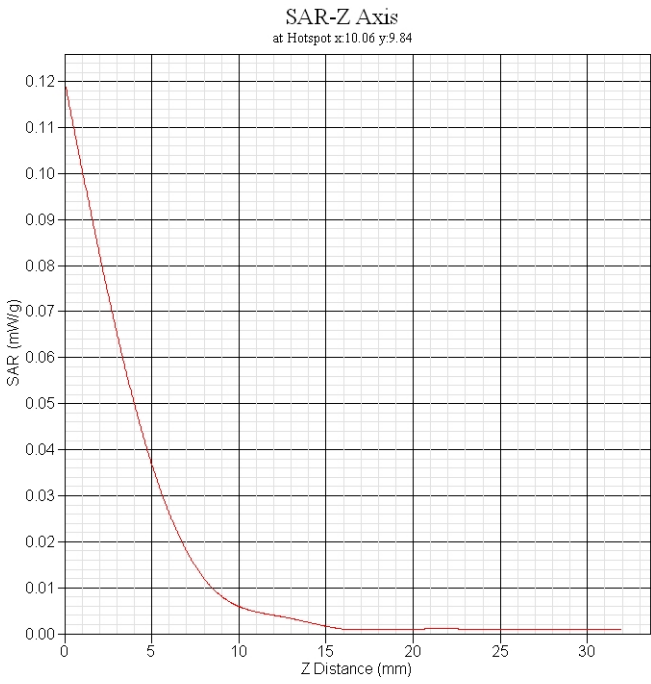
802.11b Right tilt CH11																	
Frequency(MHz)	2472																
Relative permittivity(real part)	40.27																
Conductivity(S/m)	1.85																
Variation(%)	3.545																
Duty Cycle Factor	1																
Crest factor	1																
Conversion Factor	4.65																
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²																
Data	2012-12-18																
	<p>SAR-Z Axis at Hotspot x:4.07 y:13.03</p>  <table border="1"><caption>SAR-Z Axis Data (Estimated from Graph)</caption><thead><tr><th>Z Distance (mm)</th><th>SAR (mW/g)</th></tr></thead><tbody><tr><td>0</td><td>0.32</td></tr><tr><td>5</td><td>0.15</td></tr><tr><td>10</td><td>0.06</td></tr><tr><td>15</td><td>0.03</td></tr><tr><td>20</td><td>0.015</td></tr><tr><td>25</td><td>0.01</td></tr><tr><td>30</td><td>0.005</td></tr></tbody></table>	Z Distance (mm)	SAR (mW/g)	0	0.32	5	0.15	10	0.06	15	0.03	20	0.015	25	0.01	30	0.005
Z Distance (mm)	SAR (mW/g)																
0	0.32																
5	0.15																
10	0.06																
15	0.03																
20	0.015																
25	0.01																
30	0.005																
SAR 1g(W/Kg)	0.155																
SAR 10g(W/Kg)	0.074																

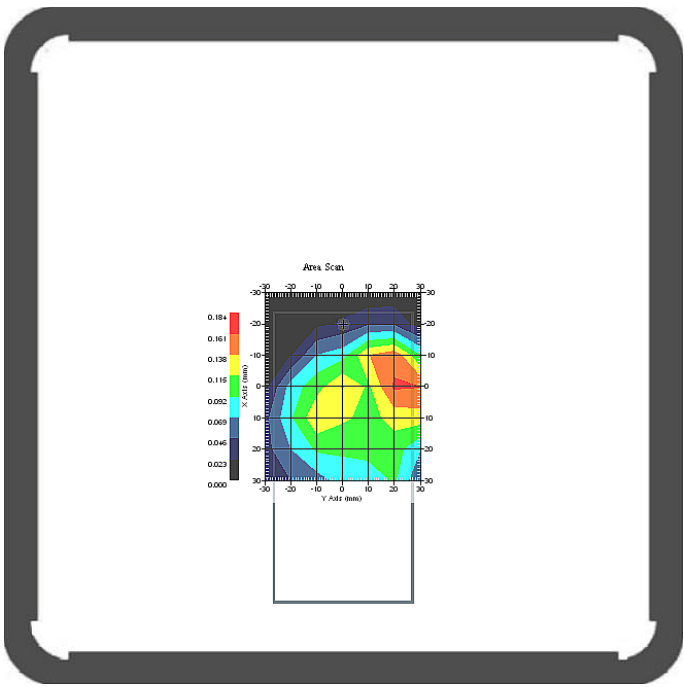
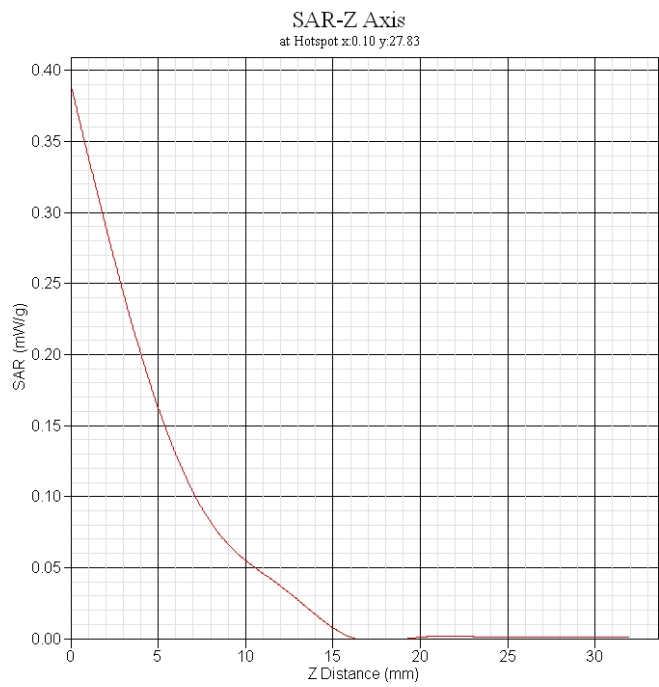
GPRS850 body Front CH190	
Frequency(MHz)	836.6
Relative permittivity(real part)	53.34
Conductivity(S/m)	0.92
Variation(%)	-2.839
Duty Cycle Factor	2
Crest factor	2
Conversion Factor	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-17
	
SAR 1g(W/Kg)	0.245
SAR 10g(W/Kg)	0.152

GPRS850 body Back CH190																			
Frequency(MHz)	836.6																		
Relative permittivity(real part)	53.34																		
Conductivity(S/m)	0.92																		
Variation(%)	-2.391																		
Duty Cycle Factor	2																		
Crest factor	2																		
Conversion Factor	6.4																		
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²																		
Data	2012-12-17																		
	<p>SAR-Z Axis at Hotspot x:0.06 y:-10.13</p>  <table border="1"><caption>SAR-Z Axis Data (Estimated)</caption><thead><tr><th>Z Distance (mm)</th><th>SAR (mW/g)</th></tr></thead><tbody><tr><td>0</td><td>0.60</td></tr><tr><td>5</td><td>0.42</td></tr><tr><td>10</td><td>0.30</td></tr><tr><td>15</td><td>0.20</td></tr><tr><td>20</td><td>0.14</td></tr><tr><td>25</td><td>0.10</td></tr><tr><td>30</td><td>0.07</td></tr><tr><td>32</td><td>0.06</td></tr></tbody></table>	Z Distance (mm)	SAR (mW/g)	0	0.60	5	0.42	10	0.30	15	0.20	20	0.14	25	0.10	30	0.07	32	0.06
Z Distance (mm)	SAR (mW/g)																		
0	0.60																		
5	0.42																		
10	0.30																		
15	0.20																		
20	0.14																		
25	0.10																		
30	0.07																		
32	0.06																		
SAR 1g(W/Kg)	0.420																		
SAR 10g(W/Kg)	0.263																		

GPRS1900 body Front CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	52.93
Conductivity(S/m)	1.53
Variation(%)	-0.570
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-18
	
SAR 1g(W/Kg)	0.128
SAR 10g(W/Kg)	0.070

GPRS1900 body Back CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	52.93
Conductivity(S/m)	1.53
Variation(%)	-2.132
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-18
	<p>SAR-Z Axis at Hotspot x:0.05 y:-10.14</p> 
SAR 1g(W/Kg)	0.514
SAR 10g(W/Kg)	0.268

802.11b body Front CH11	
Frequency(MHz)	2472
Relative permittivity(real part)	53.36
Conductivity(S/m)	1.90
Variation(%)	2.682
Duty Cycle Factor	1
Crest factor	1
Conversion Factor	4.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-12-18
	
SAR 1g(W/Kg)	0.049
SAR 10g(W/Kg)	0.021

802.11b body Back CH11	
Frequency(MHz)	2472
Relative permittivity(real part)	53.36
Conductivity(S/m)	1.90
Variation(%)	2.260
Duty Cycle Factor	1
Crest factor	1
Conversion Factor	4.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m) ²
Data	2012-12-18
	
SAR 1g(W/Kg)	0.167
SAR 10g(W/Kg)	0.063