SAR Test Report

Product Name	:	GSM/WCDMA MOBILE PHONE
Model No.	:	M4TEL SS330
FCC ID	:	CLNSS330

Prepared By:	:	Inventec Appliances(Pudong) Corporation
Address:	:	No.789 Pu Xing Road,Shanghai,PRC
Date of Receipt	:	2012.03.23
Date of Test	:	2012.03.29-2012.04.11
Report No.	:	20120323SAR

Test Report Certification

Date of Issue : Mar.23.2012

Report No. : 20120323SAR

Product Name	:	GSM/WCDMA MOBILE PHONE
Model No.	:	M4TEL SS330
Trade Name	:	M4TEL
Applicant	:	MFOURTEL MEXICO S.A. DE C.V.
Address	:	Montecito 38, Piso 23, Oficina 15. Colonia Nápoles. C.P. 03810 Mexico
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 941225 D01 v02 FCC KDB 941225 D03 v01 FCC KDB 941225 D04 v01 FCC KDB 941225 D06 v01 FCC KDB 248227 D01 v01r02
Test Result	:	Complied

The Test Results relate only to the samples tested.
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Documented By : Kelly Lin Apr. 11.2012
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Approved By : Jeff Huang Apr. 11.2012
Jeff Huang/Director of Operations

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1. GENERAL INFORMATION

1.1. Applicant

Company Name: MFOURTEL MEXICO S.A. DE C.V.

Address: Montecito 38, Piso 23, Oficina 15. Colonia Nápoles. C.P. 03810 Mexico

1.2. Manufacturer

Company Name: CK Telecom Limited

Address: Technology Road.High-Tech Development Zone. Heyuan, Guangdong,P.R.China.

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 $10mm^2$ 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 $1000Kg/m^3$ 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 surface of the phantom, it is oriented so that 3 vertices touch the surface of the shell or the center of a face is tangent to the surface.

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:

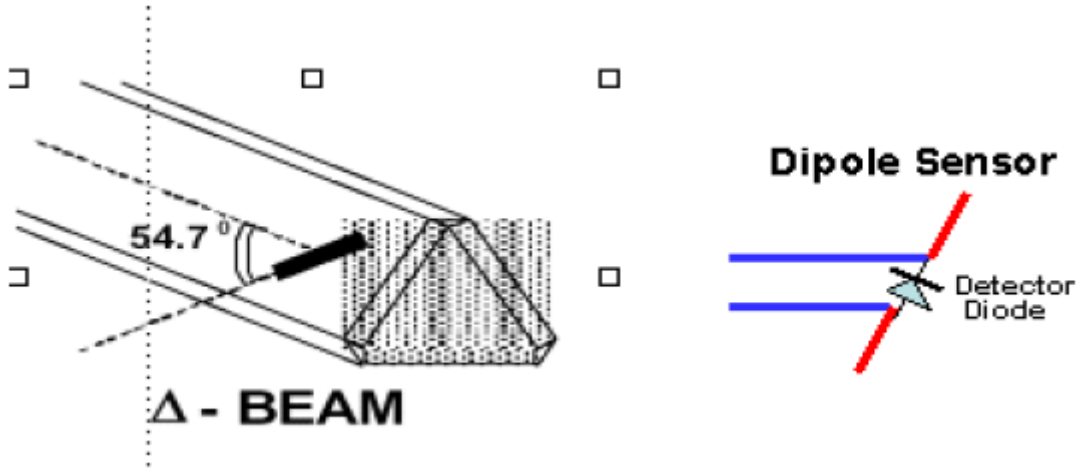
$$f_3(x, y, z) = A \frac{a^2}{\frac{a^2}{4} + x'^2 + y'^2} \cdot \left(e^{-\frac{2z}{a}} + \frac{a^2}{2(a + 2z)^2} \right)$$

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 surface (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 surface.

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 μV/(V/m)^2 to 0.85 μV/(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 surfaces. 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 surface 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 μV 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

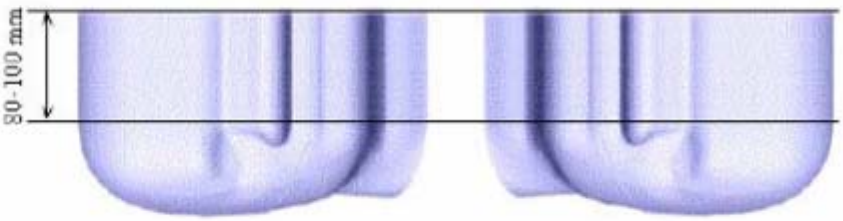
The universal device positioner allows complete freedom of movement of the EUT. Developed to hold a EUT in a free-space scenario any additional loading attributable to the material used in the construction of the positioner has been eliminated. Repeatability has been enhanced through the linear scales 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 Phontom 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 Head	1900MHZ Head	850MHZ Body	1900MHz Body	2450MHz Body
Water	40.45%	54.9%	45.0%	70.17%	73.2%
Salt	1.45%	0.18%	52.4%	0.39%	0%
Sugar	57.6%	0%	1.4%	0%	0%
HEC	0.4%	0%	1.0%	0%	0%
Preventol	0.1%	0%	0.1%	0%	0%
DGBE	0%	44.92%	0%	29.44%	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.(℃)
		ε_r	σ (s/m)	
850MHz	Reference result	41.5	0.90	NA
	+/-5% window	39.425to43.575	0.855to0.945	
	13-Mra-12	40.35	0.91	20.7
1900MHz	Reference result	40.0	1.40	NA
	+/-5% window	38to42	1.33 to 1.47	
	13-Mra-12	40.19	1.43	20.7
2450MHz	Reference result	39.2	1.80	NA
	+/-5% window	37.24to41.16	1.71to1.89	
	13-Mar-12	40.12	1.85	20.7

Body Tissue Simulate Measurement				
Frequency (MHz)	Description	Dielectric Parameters		Tissue Temp.(℃)
		ε_r	σ (s/m)	
850MHz	Reference result	55.2	0.97	NA
	+/-5% window	52.44to57.96	0.922to1.019	
	13-Mar-12	54.92	0.96	20.7
1900MHz	Reference result	53.3	1.52	NA
	+/-5% window	50.635to55.965	1.444to1.596	
	13-Mar-12	52.84	1.55	20.7
2450MHz	Reference result	52.7	1.95	NA
	+/-5% window	50.065to55.335	1.852to2.0475	
	13-Mra-12	52.23	1.94	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.

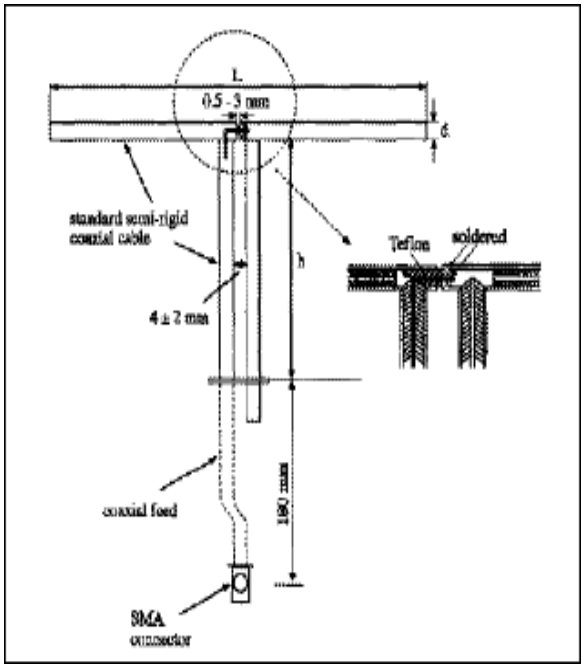
Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	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/m^3)

4. SAR Measurement Procedure

4.1. SAR System Validation

4.1.1. Validation Dipoles



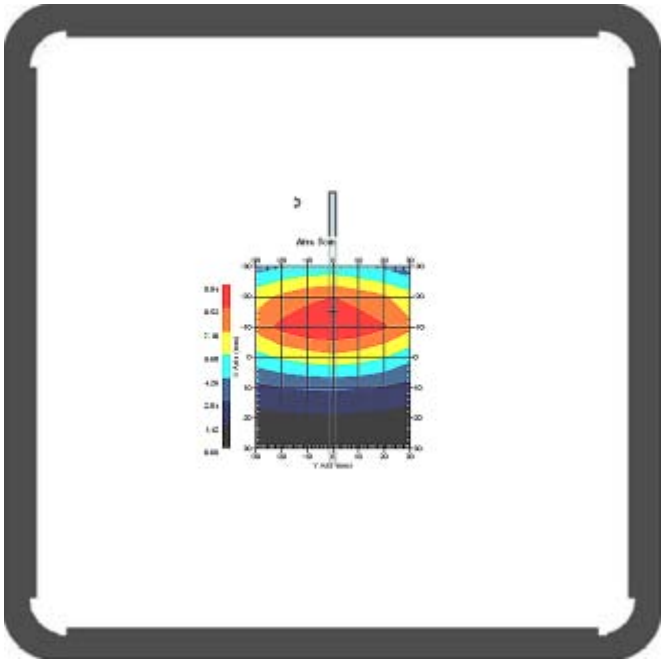
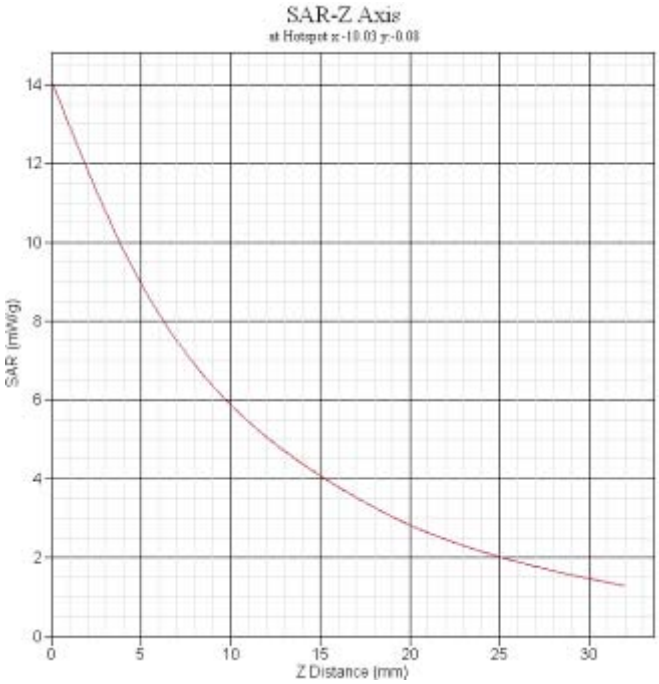
The dipoles used are based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of both IEEE and FCC Supplement C. The table below provides details for the mechanical and electrical specifications for the dipoles.

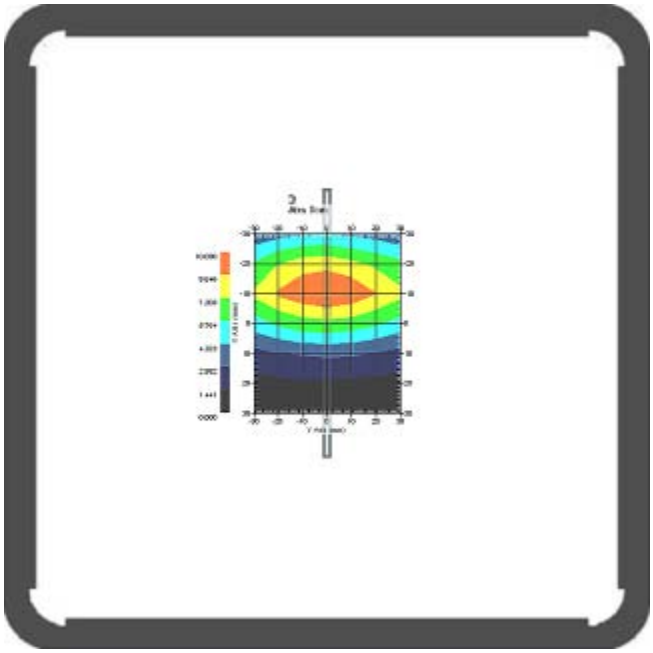
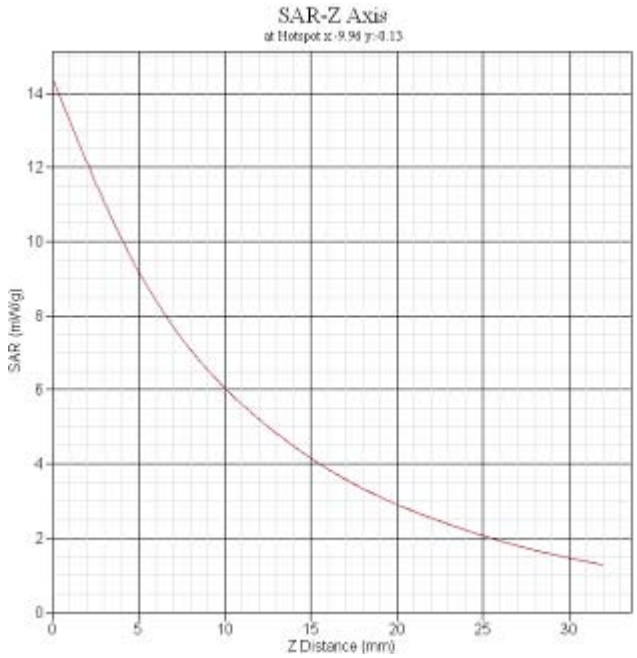
Frequency	L(mm)	h(mm)	d(mm)
850MHz	161	89.8	3.6
1900MHz	67.1	38.9	3.6
2450MHz	51.5	30.4	3.6

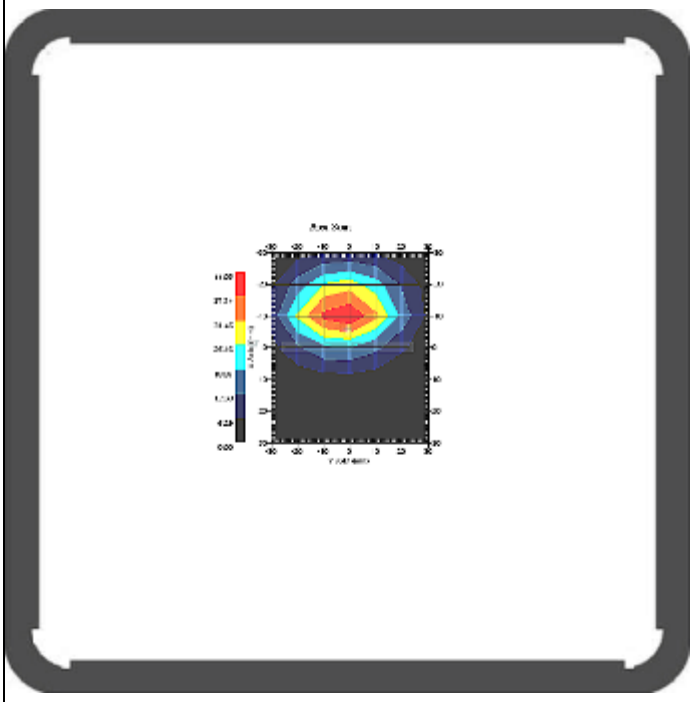
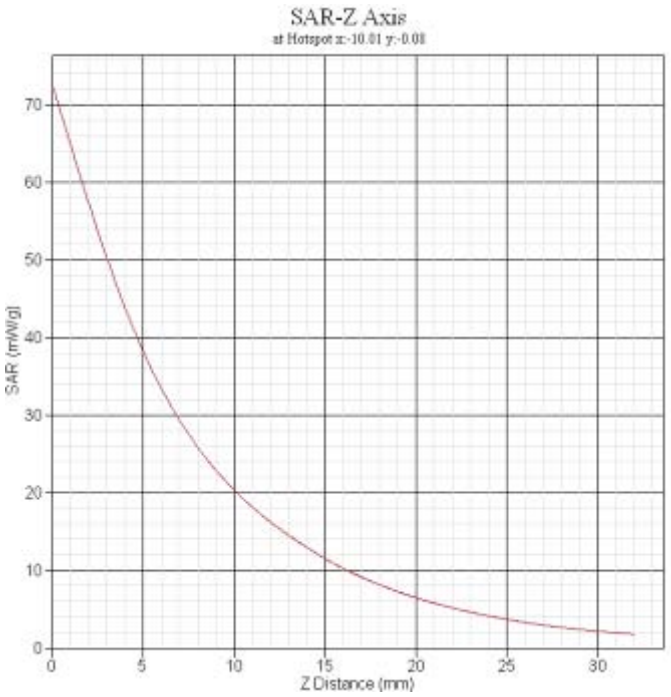
4.1.2. Validation Result

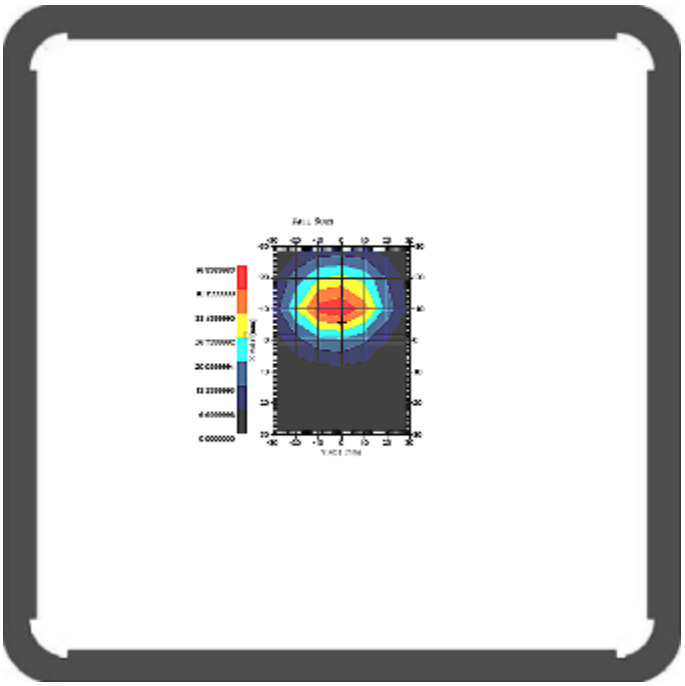
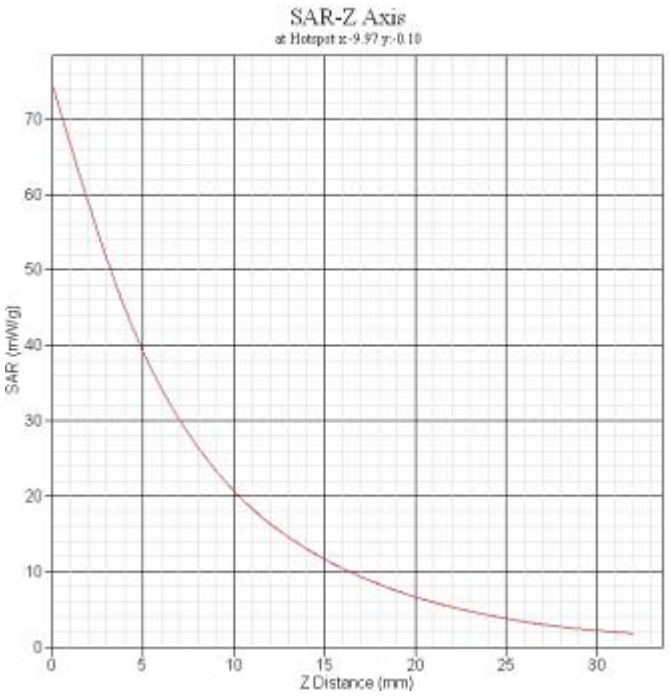
Head System Performance Check at 850MHZ&1900MHz				
Validation Kit: ASL-D-850-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(℃)
850MHz	Reference result	9.590	6.003	N/A
	+/-5%window	9.110to10.07	5.702to6.303	
	28-Mar-12(1W)	9.432	5.820	20.7
Validation Kit: ASL-D-1900-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(℃)
1900MHz	Reference result	39.387	19.668	N/A
	+/-5%window	37.418to41.356	18.685to20.651	
	28-Mar-12(1W)	38.929	19.043	20.7
Validation Kit: ASL-D-2450-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(℃)
24500MHz	Reference result	52.456	23.603	N/A
	+/-5%window	49.833to55.078	22.423to24.783	
	28-Mar-12(1W)	51.852	22.876	20.7
Note: All SAR values are normalized to 1 W forward power.				

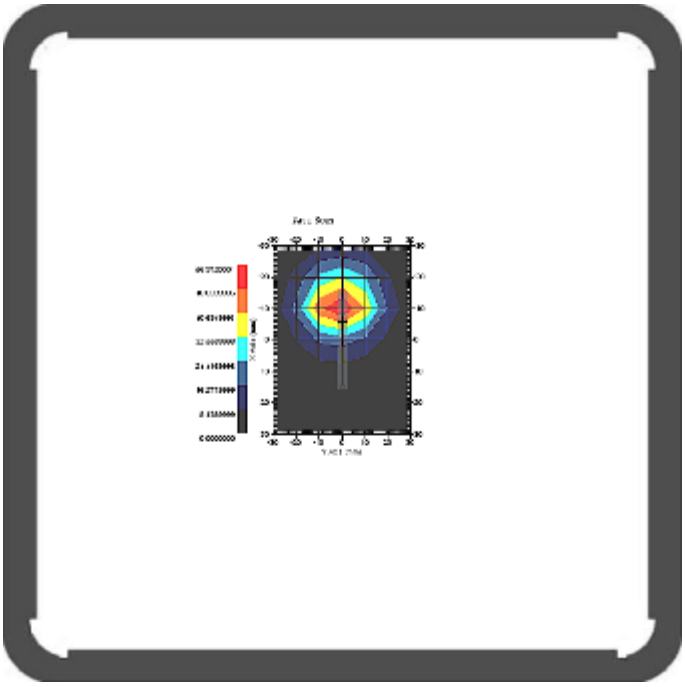
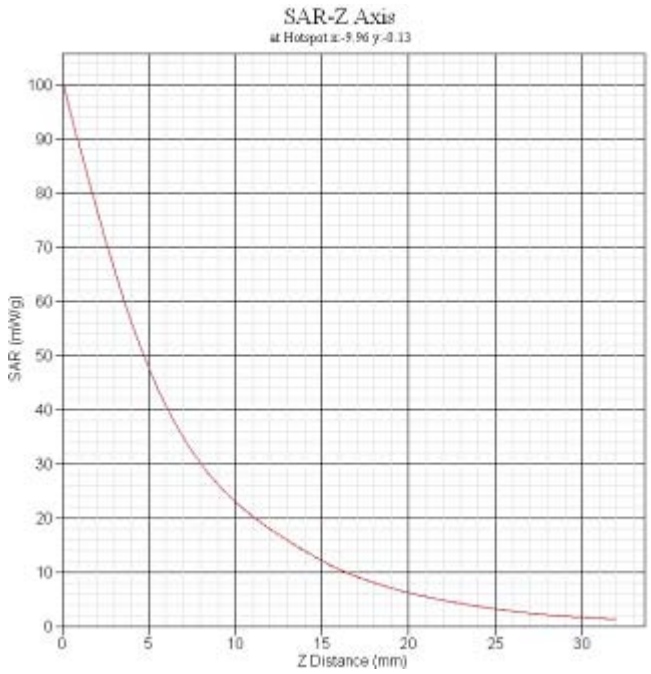
Body System Performance Check at 850MHZ&1900MHz&2450MHz				
Validation Kit: ASL-D-850-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(℃)
850MHz	Reference result	9.981	6.006	N/A
	+/-5%window	9.482to10.48	5.706to6.306	
	28-Mar-12(1W)	9.956	5.832	20.7
Validation Kit: ASL-D-1900-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(℃)
1900MHz	Reference result	39.654	19.668	N/A
	+/-5%window	37.671to41.637	18.685to20.651	
	28-Mar-12(1W)	39.734	19.692	20.7
Validation Kit: ASL-D-2450-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(℃)
2450MHz	Reference result	52.592	24.461	N/A
	+/-5%window	49.962to55.222	23.238to25.684	
	28-Mar-12(1W)	51.254	24.167	20.7
Note: All SAR values are normalized to 1W forward power.				

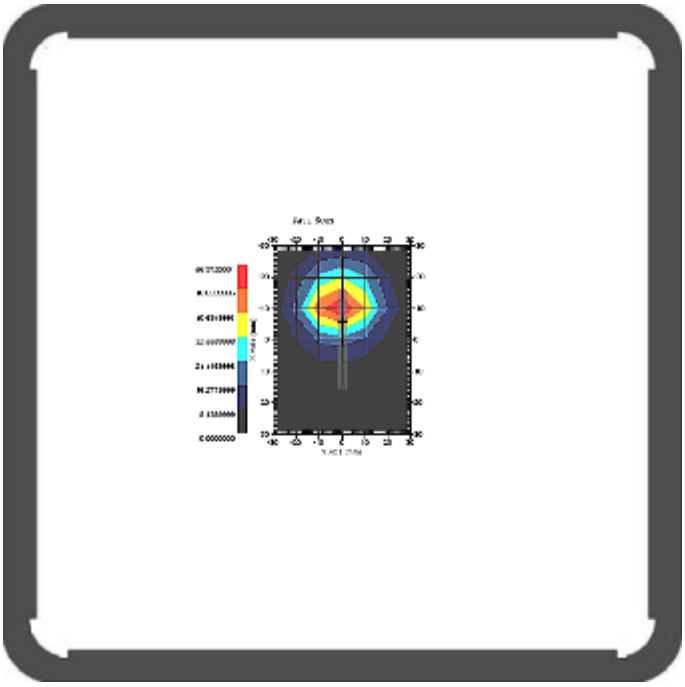
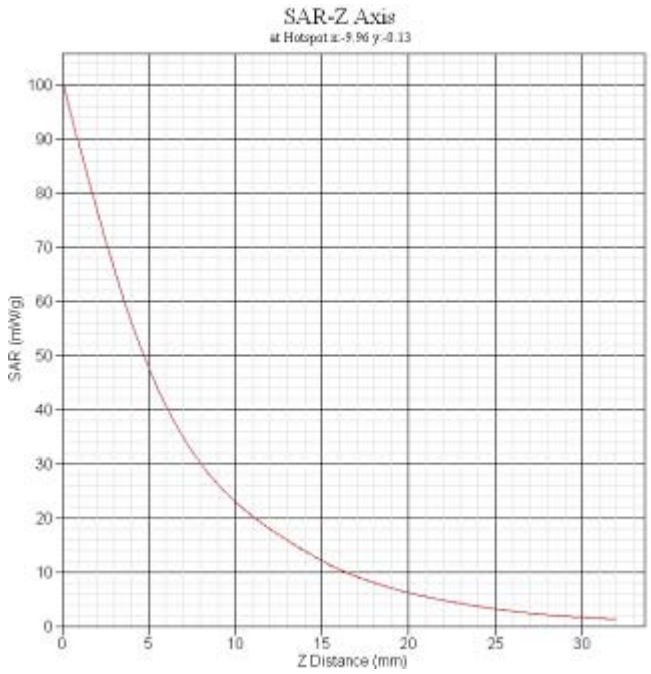
Frequency(MHz)	850
Relative permittivity(real part)	40.35
Conductivity(S/m)	0.91
Variation(%)	-0.212
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-28
	
SAR 1g(W/Kg)	9.432
SAR 10g(W/Kg)	5.820

Frequency(MHz)	850
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	0.726
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-28
	
SAR 1g(W/Kg)	9.956
SAR 10g(W/Kg)	5.832

Frequency(MHz)	1900
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	-0.150
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-28
	
SAR 1g(W/Kg)	38.929
SAR 10g(W/Kg)	19.043

Frequency(MHz)	1900
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	0.224
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-28
	
SAR 1g(W/Kg)	39.734
SAR 10g(W/Kg)	19.692

Frequency(MHz)	2450
Relative permittivity(real part)	40.12
Conductivity(S/m)	1.85
Variation(%)	-0.978
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-28
	
SAR 1g(W/Kg)	51.852
SAR 10g(W/Kg)	22.876

Frequency(MHz)	2450
Relative permittivity(real part)	52.23
Conductivity(S/m)	1.94
Variation(%)	1.067
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-28
	
SAR 1g(W/Kg)	51.254
SAR 10g(W/Kg)	24.167

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.

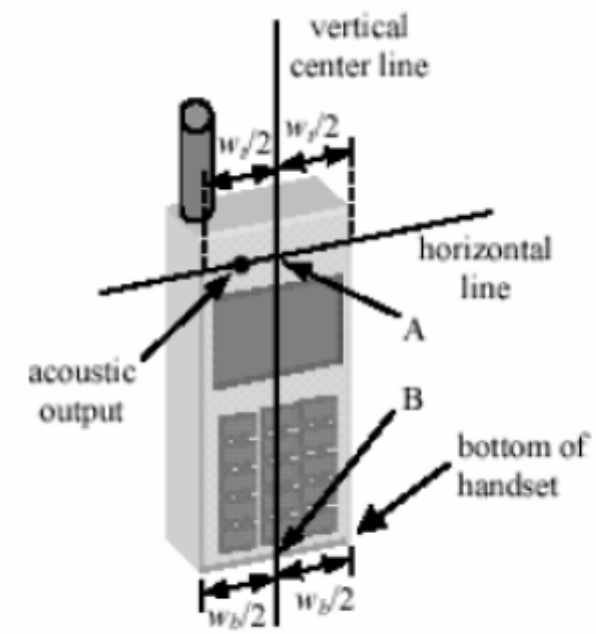


Figure 4.1a Internal Case

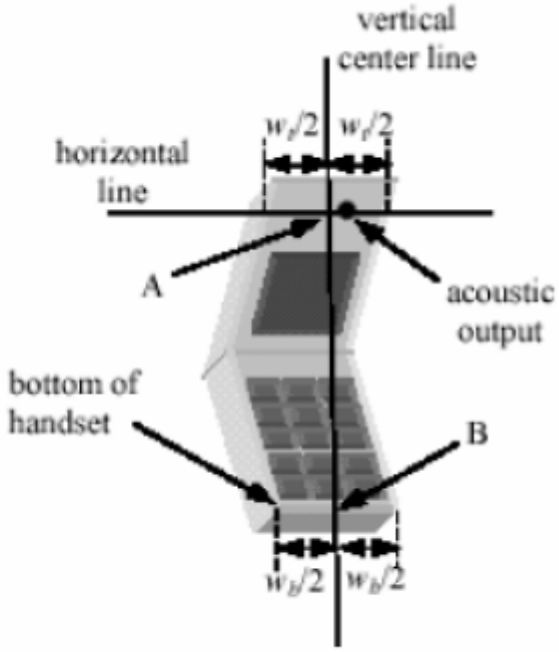


Figure4.1b Clam Shell

4.2.2.1. Definition of the "Cheek" Position

The "cheek" position is defined as follows:

a. 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.)
b. 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 wt 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 wb of the bottom 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 face 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.

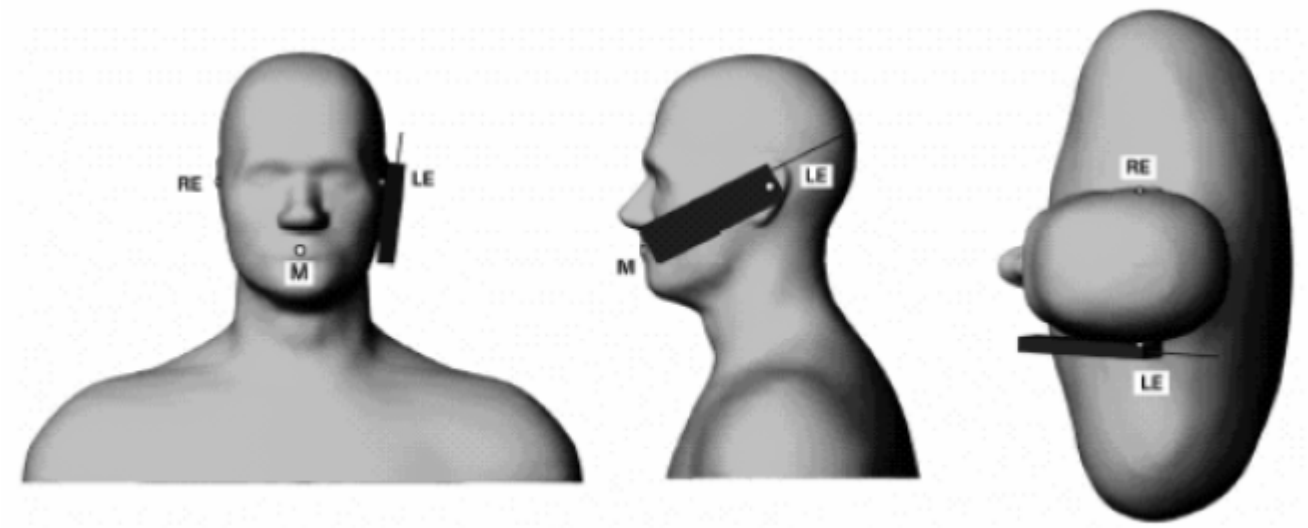


Figure 4.2 – Phone position 1, “cheek” or “touch” position.

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 bottom 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 bottom of the head).

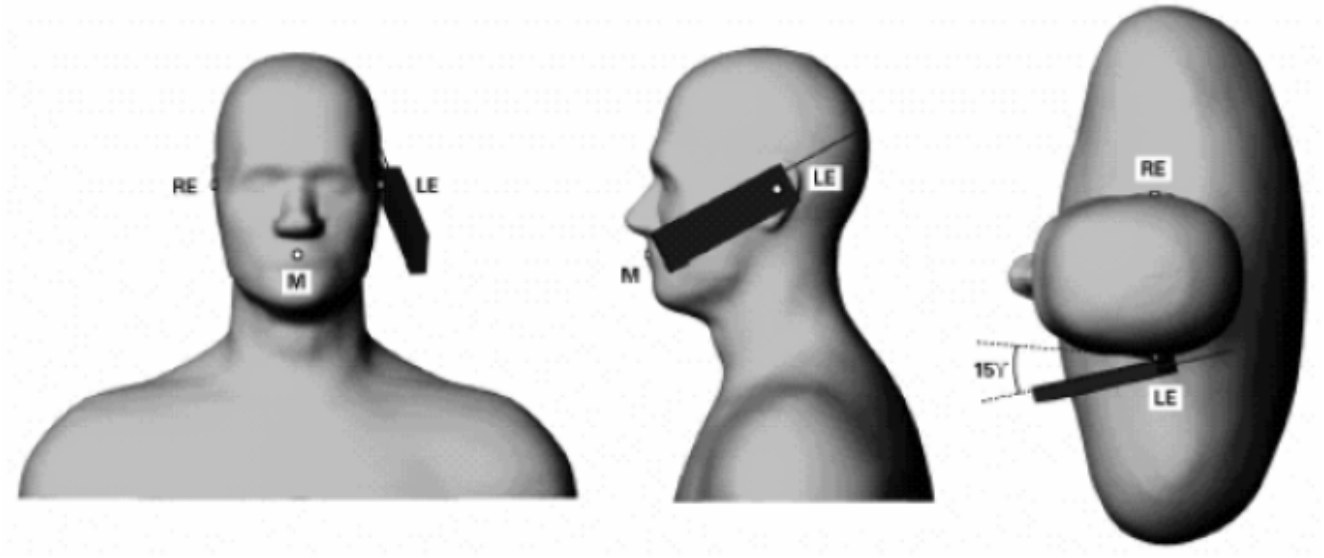


Figure 4.3 – Phone position 2, “tilted” position.

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 bottom 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 mm^2) 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 mm^3).

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	Aprel	ALS-UWS	100-00154	NCR
Data Acquisition Package	Aprel	ALS-DAQ-PAQ-3	110-00215	NCR
Probe Mounting Device and Boundary Detection Sensor System	Aprel	ALS-PMDPS-3	120-00265	NCR
Miniature E-Field Probe	Aprel	ALS-E-020	500-00282	Oct.01,2011
Left ear SAM Phantom	Aprel	ALS-P-SAM-L	130-00312	NCR
Right ear SAM Phantom	Aprel	ALS-P-SAM-R	140-00362	NCR
Universal SAM Phantom	Aprel	ALS-P-SU-1	150-00410	NCR
Reference Validation Dipole 850MHz	Aprel	ALS-D-850-S-2	180-00556	May.19,2011
Reference Validation Dipole 1900MHz	Aprel	ALS-D-1900-S-2	210-00707	May.16,2011
Reference Validation Dipole 2450MHz	Aprel	ALS-D-2450-S-2	220-00755	May.19,2011
Dielectric Probe Kit	Aprel	ALS-PR-DIEL	260-00955	NCR
Device Holder 2.0	Aprel	ALS-H-E-SET-2	170-00506	NCR
SAR software	Aprel	ALS-SAR-AL-10	Ver.2.3.8	NCR
CRS C500C Controller	Thermo	ALS-C500	RCF0504291	NCR
CRS F3 Robot	Aprel	ALS-F3-SW	N/A	NCR
Power Amplifier	Mini-Circuit	ZHL- 42	040306	Jul.13,2011
Directional Coupler	Agilent	778D-012	51011	Jul.13,2011
Universal Radio Communication Tester	Agilent	E5515C	104845	Mar.1,2012
Vector Network	Agilent	E5071B	MY4230146	Jul.18,2011
Signal Generator	Agilent	E8257D	N/A	Dec.05,2011
Power Meter	Rohde&Schwarz	NRP	N/A	Dec.05,2011

Note: All equipment upon which need to be calibrated are with calibration period of 1 year.

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	√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. 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: GSM/WCDMA 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	0.920	1.6
Left-Tilted	Internal	190	836.6	0.414	1.6
Right- Cheek	Internal	190	836.6	0.816	1.6
Right -Tilted	Internal	190	836.6	0.502	1.6
Right- Cheek	Internal	128	824.2	0.496	1.6
Right- Cheek	Internal	251	848.8	0.525	1.6
Left-Cheek	Internal	128	824.2	0.288	1.6
Left-Cheek	Internal	251	848.8	0.796	1.6

SAR MEASUREMENT					
Ambient Temperature (°C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (°C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product:GSM/WCDMA MOBILE PHONE					
Test Mode: PCS 1900					
Test Position Head	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Left-Cheek	Internal	661	1880.0	0.844	1.6
Left- Tilted	Internal	661	1880.0	0.583	1.6
Right-Cheek	Internal	661	1880.0	0.505	1.6
Right -Tilted	Internal	661	1880.0	0.085	1.6
Left-Cheek	Internal	512	1850.2	0.789	1.6
Left-Cheek	Internal	810	1909.8	0.972	1.6

SAR MEASUREMENT					
Ambient Temperature (°C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (°C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: GSM/WCDMA MOBILE PHONE					
Test Mode: WCDMA band II					
Test Position Head	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Left-Cheek	Internal	9400	1880.0	1.192	1.6
Left- Tilted	Internal	9400	1880.0	0.574	1.6
Right-Cheek	Internal	9400	1880.0	1.089	1.6
Right -Tilted	Internal	9400	1880.0	0.395	1.6
Right-Cheek	Internal	9262	1852.4	0.869	1.6
Right-Cheek	Internal	9538	1907.6	0.836	1.6
Left-Cheek	Internal	9262	1852.4	1.337	1.6
Left-Cheek	Internal	9538	1907.6	1.129	1.6

SAR MEASUREMENT					
Ambient Temperature (˚C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (˚C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: GSM/WCDMA MOBILE PHONE					
Test Mode: WCDMA band V					
Test Position Head	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Left-Cheek	Internal	4182	836.6	0.702	1.6
Left- Tilted	Internal	4182	836.6	0.433	1.6
Right-Cheek	Internal	4182	836.6	0.698	1.6
Right -Tilted	Internal	4182	836.6	0.386	1.6
Left-Cheek	Internal	4132	826.4	0.909	1.6
Left-Cheek	Internal	4233	846.6	1.002	1.6

SAR MEASUREMENT					
Ambient Temperature (˚C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (˚C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: GSM/WCDMA MOBILE PHONE					
Test Mode: 802.11b					
Test Position Head	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Left-Cheek	Internal	6	2437	0.022	1.6
Left- Tilted	Internal	6	2437	0.014	1.6
Right-Cheek	Internal	6	2437	0.068	1.6
Right -Tilted	Internal	6	2437	0.028	1.6

SAR MEASUREMENT					
Ambient Temperature (˚C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (˚C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: GSM/WCDMA MOBILE PHONE					
Test Mode: 802.11g					
Test Position Head	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Left-Cheek	Internal	6	2437	0.008	1.6
Left- Tilted	Internal	6	2437	0.005	1.6
Right-Cheek	Internal	6	2437	0.027	1.6
Right -Tilted	Internal	6	2437	0.015	1.6

DUT with Flat Phantom 1.5cm Gap

SAR MEASUREMENT					
Ambient Temperature (˚C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (˚C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: GSM/WCDMA Mobile Phone					
Test Mode: GPRS850					
Test Position Body	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Body face	Internal	190	826.6	0.706	1.6
Body bottom	Internal	190	826.6	0.927	1.6
Body bottom	Internal	128	824.2	1.060	1.6
Body bottom	Internal	251	848.8	1.125	1.6
Body bottom GSM850	Internal	251	848.8	0.853	1.6
GSM+ earphone	Internal	251	848.8	0.828	1.6

DUT with Flat Phantom 1.5cm Gap

SAR MEASUREMENT					
Ambient Temperature (˚C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (˚C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: GSM/WCDMA Mobile Phone					
Test Mode: GPRS 1900					
Test Position Body	Antenna Position	Frequency		SAR 10g (W/kg)	Limit (W/kg)
		Channel	MHz		
Body face	Internal	661	1880.0	0.483	1.6
Body bottom	Internal	661	1880.0	0.471	1.6
Body face	Internal	512	1850.2	0.422	1.6
Body face	Internal	810	1909.8	0.464	1.6
Body face GSM1900	Internal	661	1880.0	0.267	1.6
GSM + earphone	Internal	661	1880.0	0.256	1.6

DUT with Flat Phantom 1.5cm Gap

SAR MEASUREMENT					
Ambient Temperature (˚C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (˚C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: GSM Mobile Phone					
Test Mode: WCDMA band II					
Test Position Body	Antenna Position	Frequency		SAR 10g (W/kg)	Limit (W/kg)
		Channel	MHz		
Body face	Internal	9400	1880.0	0.606	1.6
Body bottom	Internal	9400	1880.0	0.585	1.6
Body face	Internal	9262	1852.4	0.596	1.6
Body face	Internal	9538	1907.6	0.603	1.6
Body face + earphone	Internal	9400	1880.0	0.570	1.6

DUT with Flat Phantom 1.5cm Gap

SAR MEASUREMENT					
Ambient Temperature (˚C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (˚C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: GSM Mobile Phone					
Test Mode: WCDMA band Ⅴ					
Test Position Body	Antenna Position	Frequency		SAR 10g (W/kg)	Limit (W/kg)
		Channel	MHz		
Body face	Internal	4182	836.6	0.380	1.6
Body bottom	Internal	4182	836.6	0.674	1.6
Body bottom	Internal	4132	826.4	0.823	1.6
Body bottom	Internal	4233	846.6	0.934	1.6
Body bottom + earphone	Internal	4233	846.6	0.826	1.6

DUT with Flat Phantom 1.5cm Gap

SAR MEASUREMENT					
Ambient Temperature (˚C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (˚C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: GSM/WCDMA MOBILE PHONE					
Test Mode: 802.11b					
Test Position Body	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Body face	Internal	6	2437	0.046	1.6
Body bottom	Internal	6	2437	0.408	1.6

DUT with Flat Phantom 1.5cm Gap

SAR MEASUREMENT					
Ambient Temperature (°C): 21.2 ± 2				Relative Humidity (%): 46	
Liquid Temperature (°C): 20.5 ± 2				Depth of Liquid (cm):>15	
Product: GSM/WCDMA MOBILE PHONE					
Test Mode: 802.11g					
Test Position Body	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)
		Channel	MHz		
Body face	Internal	6	2437	0.080	1.6
Body bottom	Internal	6	2437	0.216	1.6

Note:

According to the above tables：

Summation SAR=1.125（GPRS Body bottom,ch251）+0.408(bottom,802.11b,Ch6）=1.533

According to KDB 648474, the sum of SAR values for GPRS、BT and WiFi ＜1.6W/kg, so the simultaneous transmission SAR was not required.

8.2 Conducted Power(Unit:dBm)

Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency(MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM	31.49	31.60	31.73	29.28	29.32	29.20
Band	WCDMA band Ⅱ			WCDMA band Ⅴ		
Channel	9262	9400	9538	4132	4182	4233
Frequency(MHz)	1852.4	1880.0	1907.6	826.4	836.4	846.6
WCDMA	21.50	21.34	21.15	22.30	22.05	22.32

Band	Conducted Power (dBm)			Factor (dB)	Average Power (dBm)		
Channel	128	189	251		128	189	251
Frequency(MHz)	824.2	836.4	848.8		824.2	836.4	848.8
GPRS8(1up)	31.45	31.58	31.72	-9.03	22.42	22.55	22.69
GPRS10(2up)	31.39	31.52	31.40	-6.02	25.37	25.5	25.38
GPRS12(4up)	30.92	30.98	30.89	-3.01	27.91	28.97	27.88

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)	29.22	29.28	29.16	-9.03	20.19	20.25	20.13
GPRS10(2up)	28.34	28.24	28.23	-6.02	22.32	22.22	22.21
GPRS12(4up)	28.13	28.07	27.96	-3.01	25.12	25.06	24.95

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

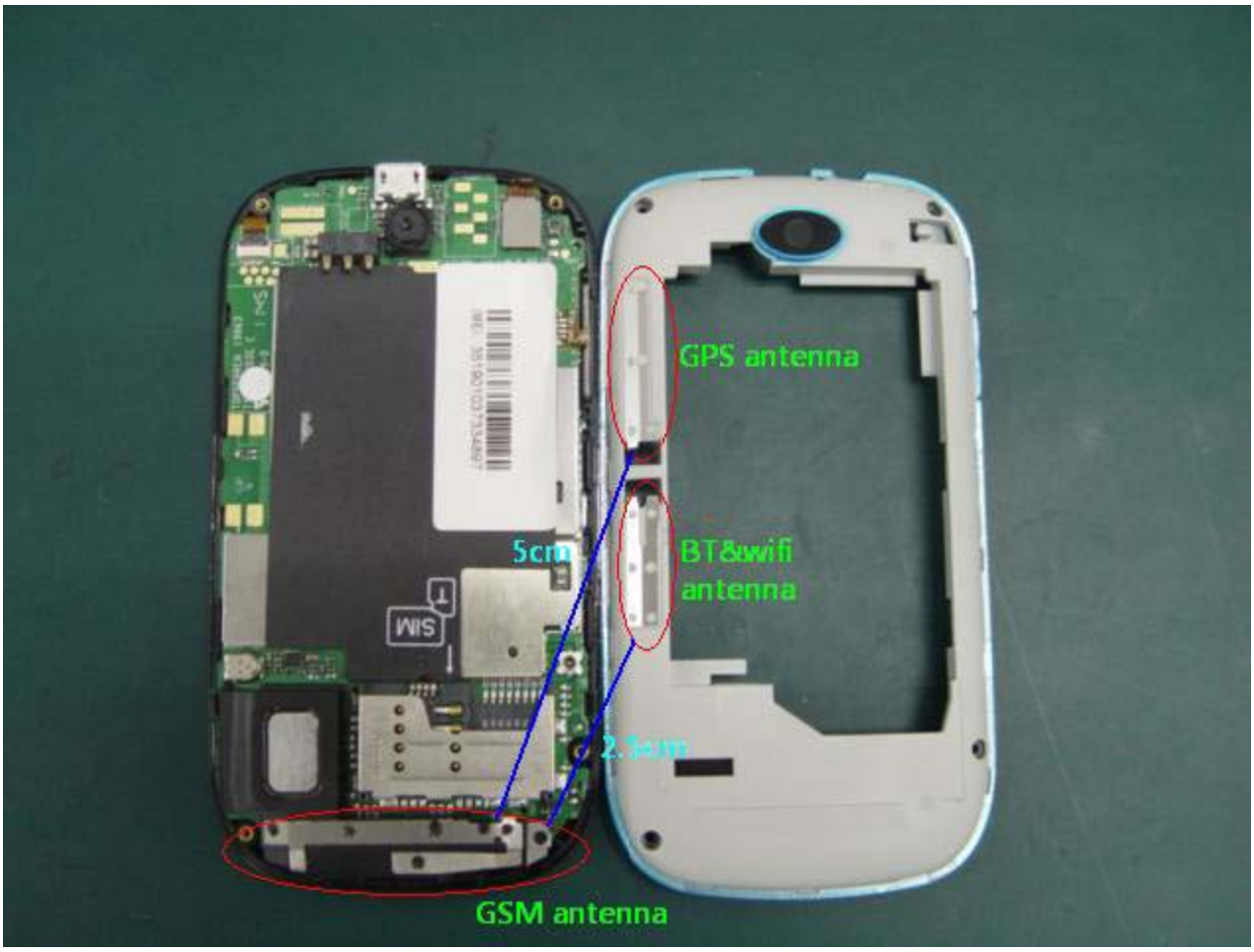
4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

According to the conducted power as above, the body measurements are performed with

WIFI and Bluetooth Function:

The distance between BT antenna and GSM antenna is 25.4mm.

The distance between WLAN antenna and GSM antenna is 25.4mm. The location of the antennas inside mobile phone is shown below:



The conducted power for BT antenna is as following:

Channel	Frequency	Bluetooth RF Output Power (dBm)		
		Data Rate / Modulation		
		GFSK	π /4-DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	10.20	10.12	10.10
Ch39	2441MHz	10.26	10.21	10.22
Ch78	2480MHz	**10.68**	10.65	10.59

The conducted power for WiFi is as following:

Channel	Frequency	2.4GHz 802.11b RF Power (dBm)			
		At DSSS Data Rate			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
CH 01	2412 MHz	14.48	14.53	14.78	14.47
CH 06	2437 MHz	**14.92**	14.87	14.63	14.69
CH 11	2462 MHz	14.83	14.73	14.87	14.77

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	13.07	13.14	13.19	13.01	12.98	13.19	13.21	13.2
CH06	2437MHz	13.47	13.59	13.58	13.38	13.54	13.47	13.62	13.53
CH11	2462MHz	**13.63**	13.66	13.49	13.58	13.59	13.56	13.42	13.58

The BT Max conduct Power is 10.68dB< 10.8dB(PRef) and its antenna is >2. 5 cm from other GSM antenna. According to KDB 648474, stand-alone SAR evaluation is also not required for BT transmitter.

References：

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

[2] IEEE Std. C95.1-1999, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, 1999

[3] IEEE Std. 1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, December 2003

[4] FCC OET Bulletin 65 (Edition 97-01) Supplement C (Edition 01-01), “Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields”, June 2001

[5] SPEAG DASY System Handbook

[6] FCC KDB 248227 D01 v01r02, “SAR Measurement Procedures for 802.11 a/b/g Transmitters”, May 2007

[7] FCC KDB 447498 D01 v04, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, November 2009

[8] FCC KDB 447498 D02 v02, “SAR Measurement Procedures for USB Dongle Transmitters”, November 2009

[9] FCC KDB 616217 D01 v01r01, “SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens”, November 2009

[10] FCC KDB 616217 D03 v01, “SAR Evaluation Considerations for Laptop/Notebook/Netbook and Tablet Computers”, November 2009

[11] FCC KDB 648474 D01 v01r05, “SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas”, September 2008

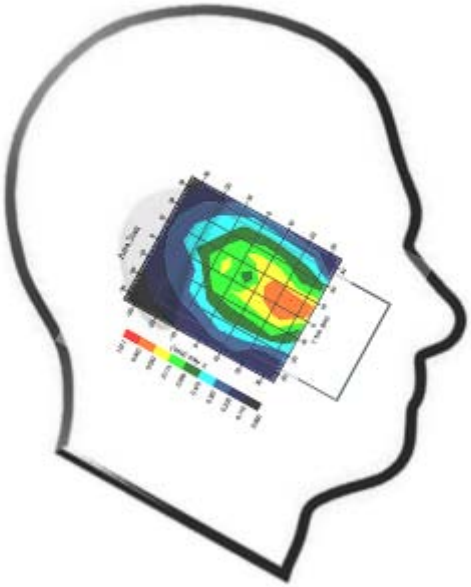
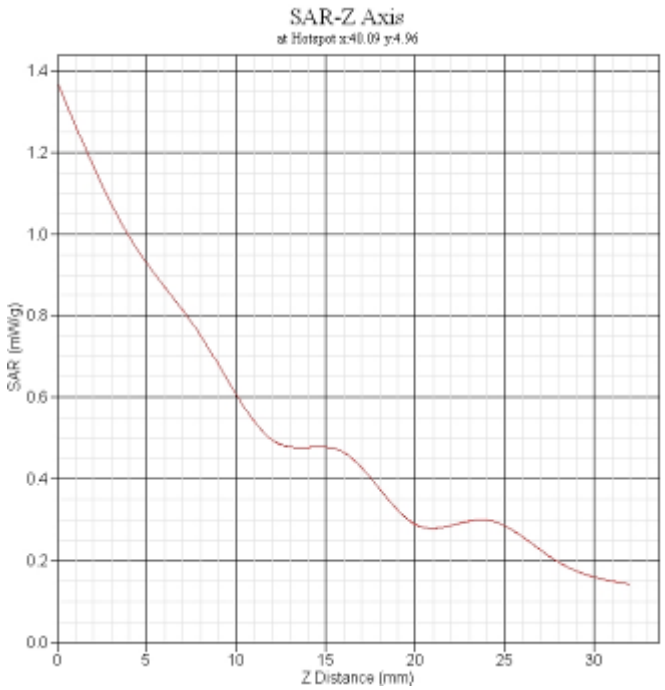
[12] FCC KDB 941225 D01 v02, “SAR Measurement Procedures for 3G Devices – CDMA 2000 / Ev-Do / WCDMA / HSDPA / HSPA”, October 2007

[13] FCC KDB 941225 D03 v01, “Recommended SAR Test Reduction Procedures for GSM / GPRS /EDGE”, December 2008

[14] KDB 941225 D04 SAR for GSM E GPRS Dual Xfer Mode v01

[15] 941225 D06 Hot Spot SAR v01

8.3. SAR Measurement Data

GSM850 left cheek ch189	
Frequency(MHz)	836.4
Relative permittivity(real part)	40.35
Conductivity(S/m)	0.91
Variation(%)	-3.177
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-28
	
SAR 1g(W/Kg)	0.920
SAR 10g(W/Kg)	0.601

GSM850 left tilt ch189	
Frequency(MHz)	836.4
Relative permittivity(real part)	40.35
Conductivity(S/m)	0.91
Variation(%)	-2.475
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
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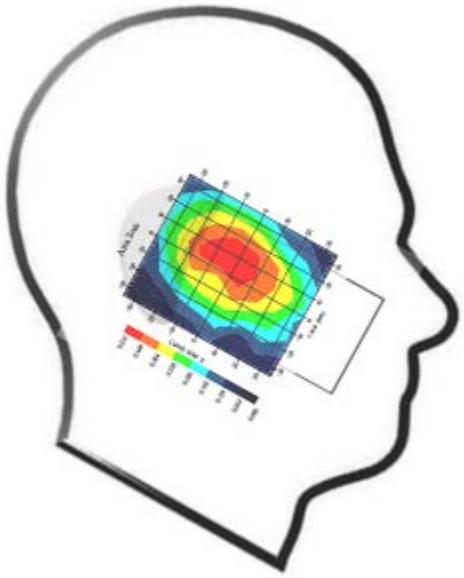	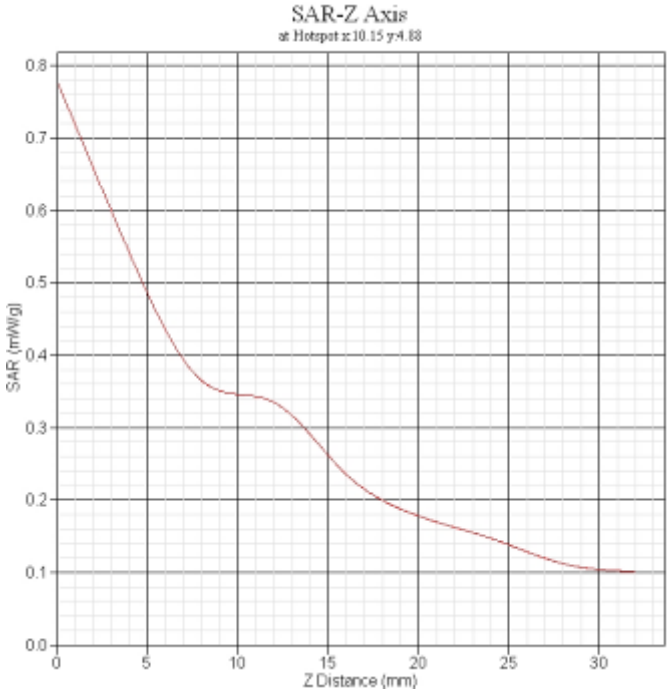
SAR 1g(W/Kg)	0.414
SAR 10g(W/Kg)	0.264

GSM850 Right cheek ch189	
Frequency(MHz)	836.4
Relative permittivity(real part)	40.35
Conductivity(S/m)	0.91
Variation(%)	-0.310
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
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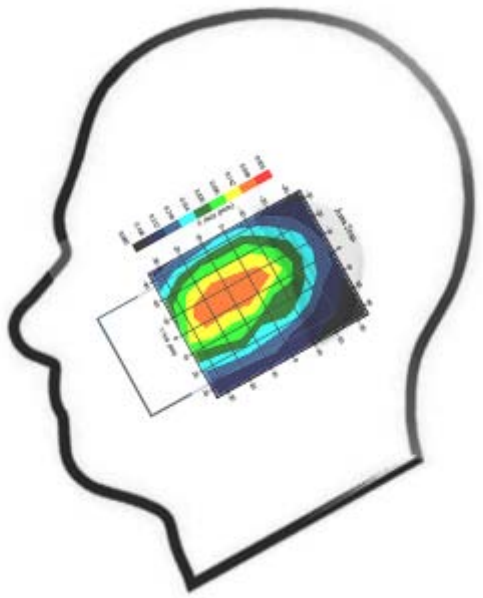	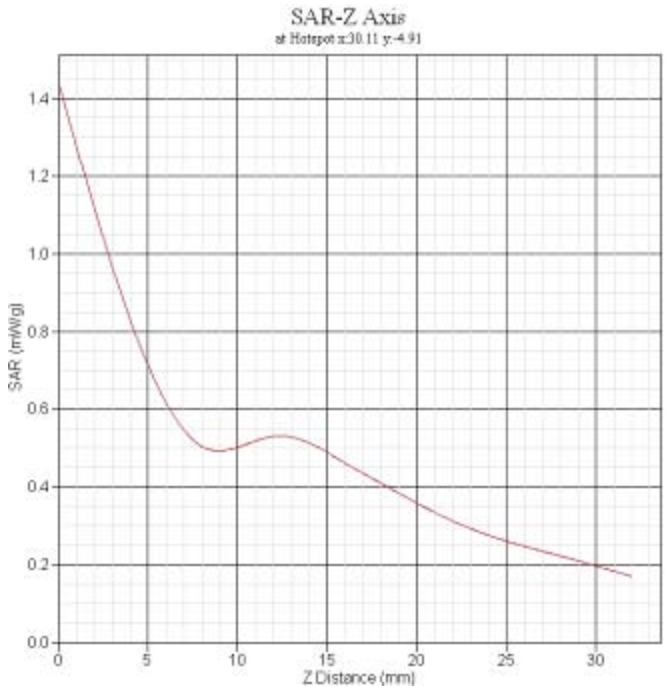
SAR 1g(W/Kg)	0.816
SAR 10g(W/Kg)	0.549

GSM850 Right tilt CH189	
Frequency(MHz)	836.4
Relative permittivity(real part)	40.35
Conductivity(S/m)	0.91
Variation(%)	-0.037
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
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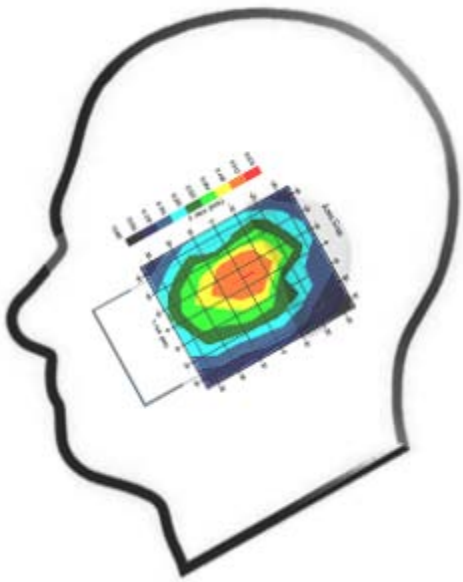
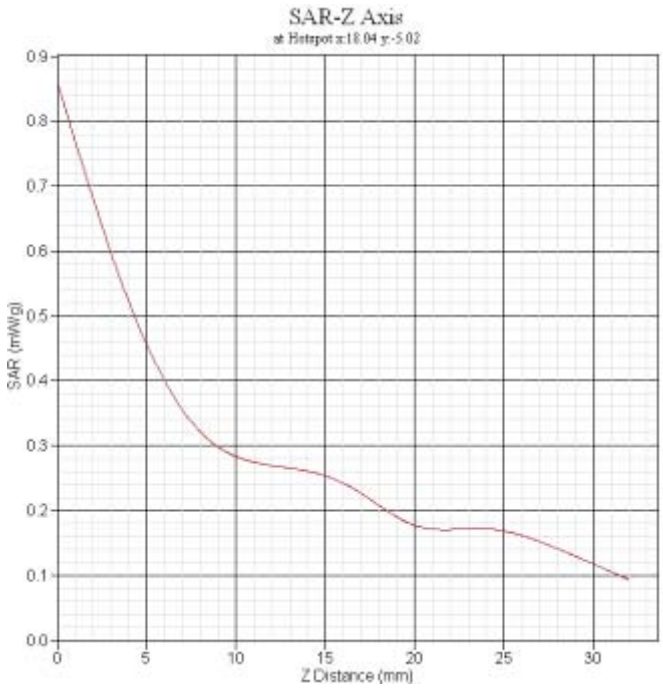
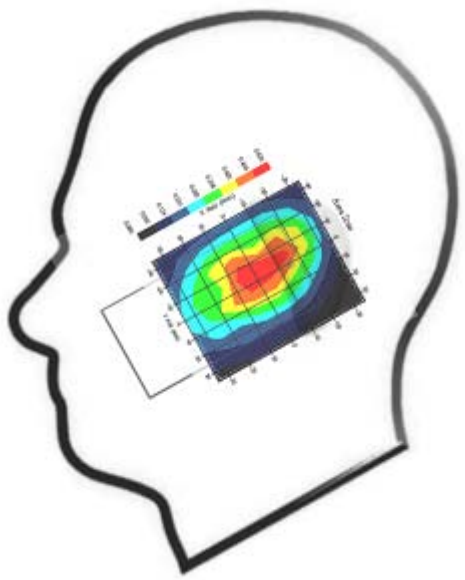
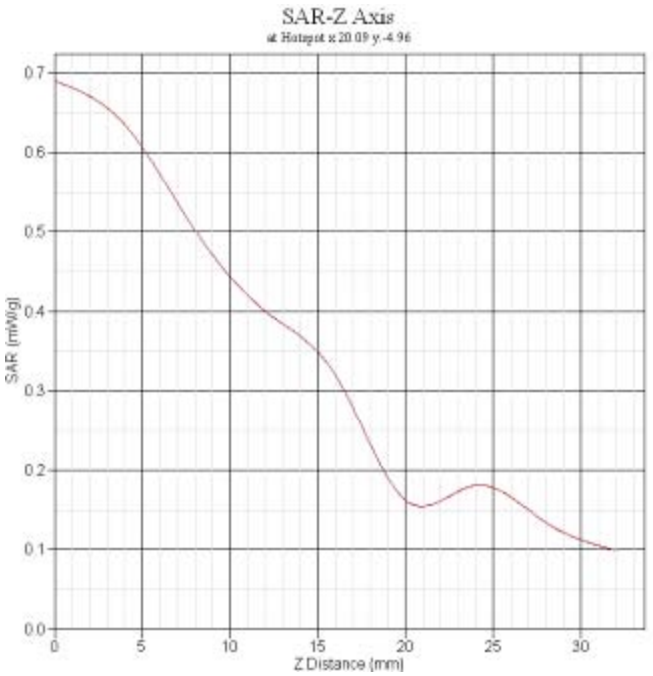
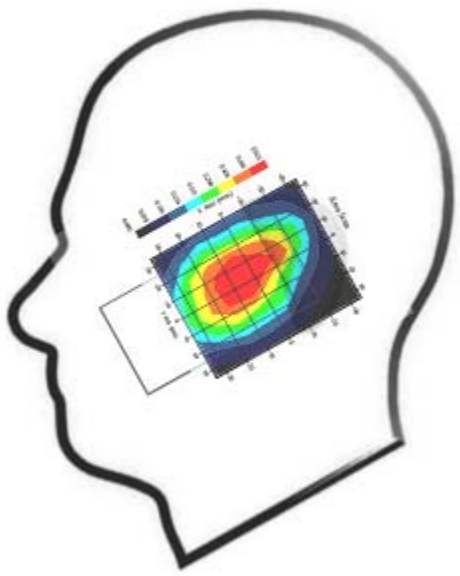
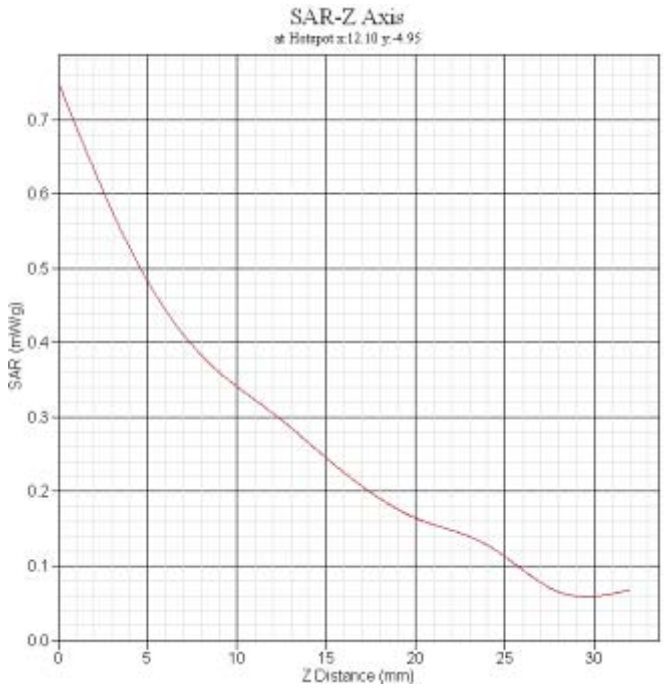
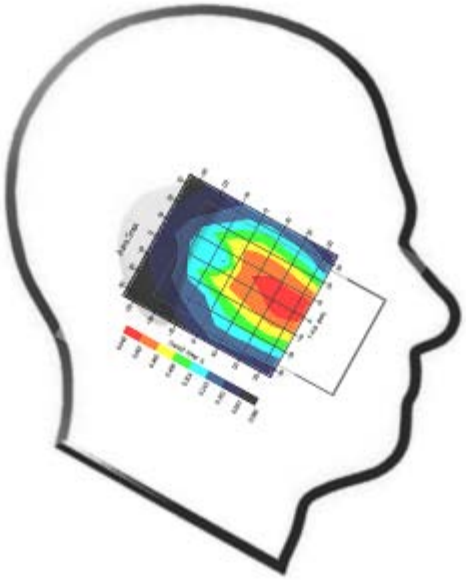
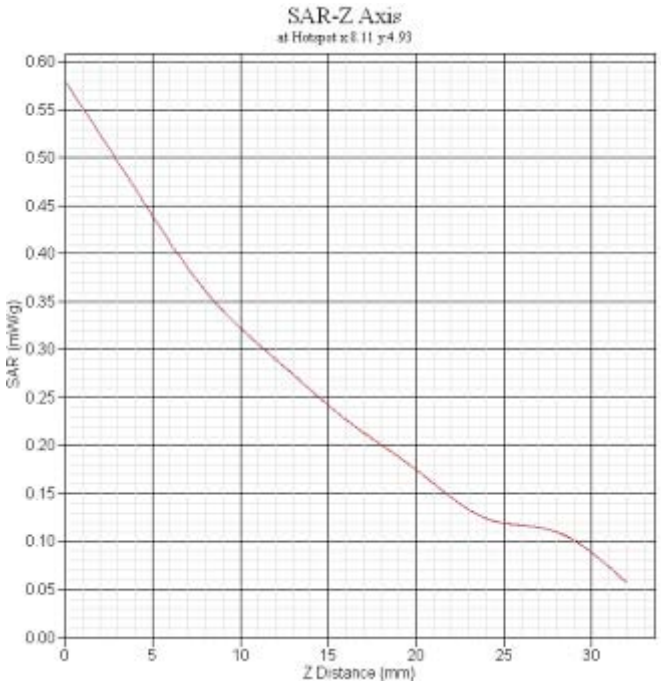
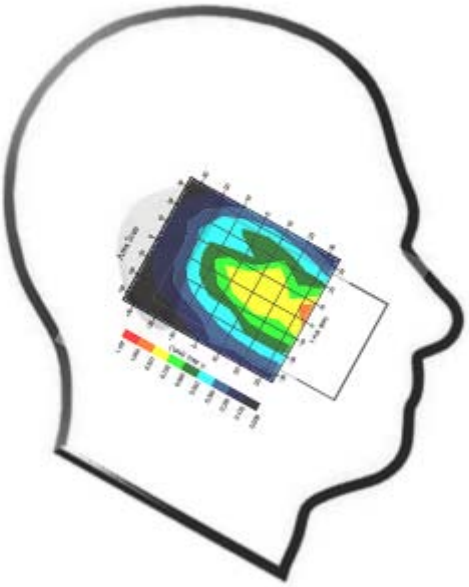
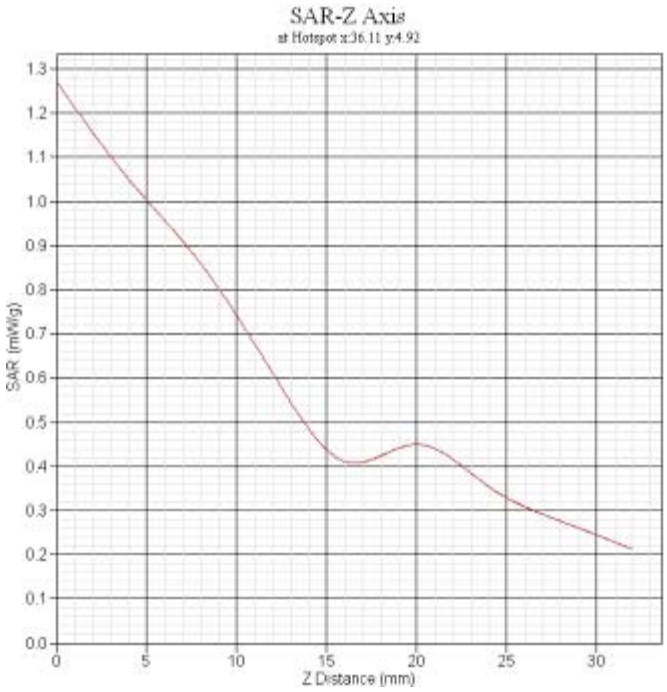
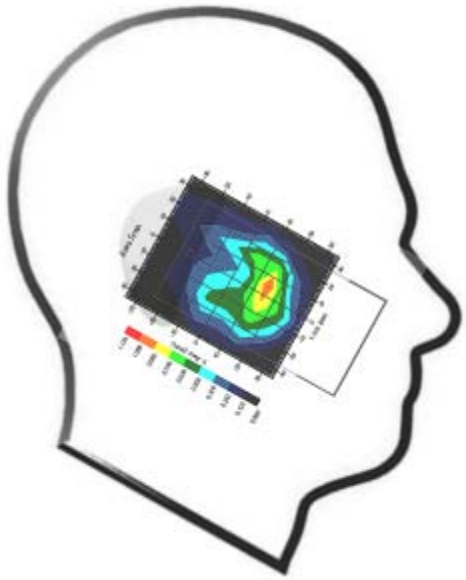
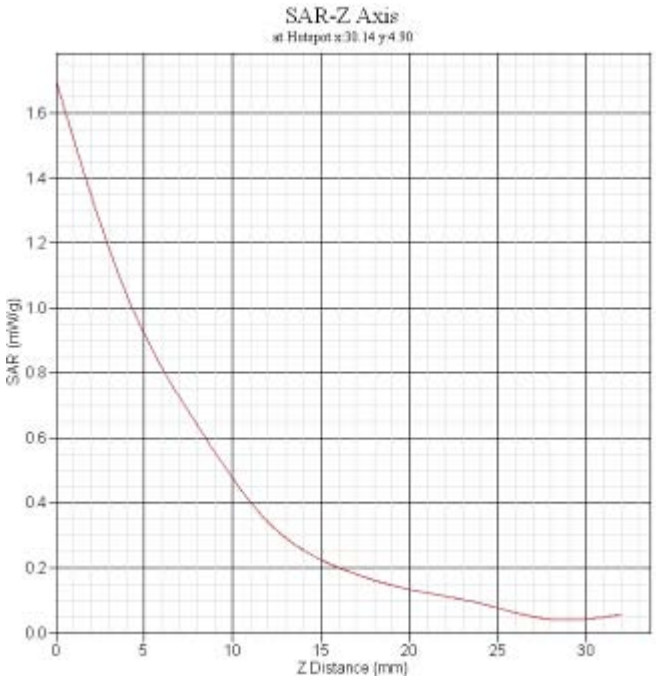
	
SAR 1g(W/Kg)	0.502
SAR 10g(W/Kg)	0.327

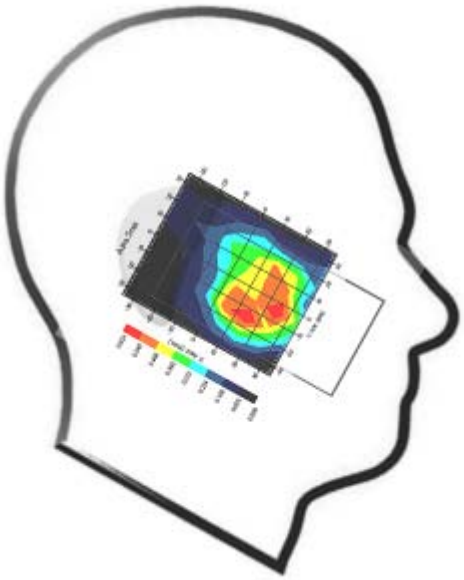
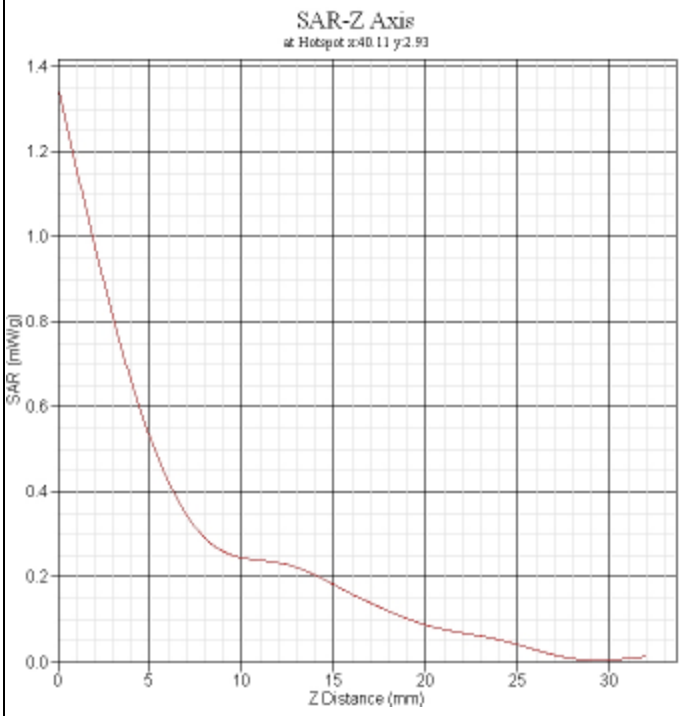
GSM850 Right cheek ch128	
Frequency(MHz)	824.2
Relative permittivity(real part)	40.35
Conductivity(S/m)	0.91
Variation(%)	-2.127
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-28
	
SAR 1g(W/Kg)	0.496
SAR 10g(W/Kg)	0.310

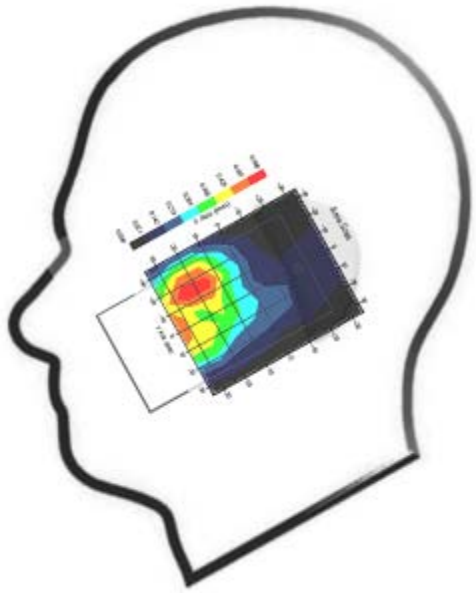
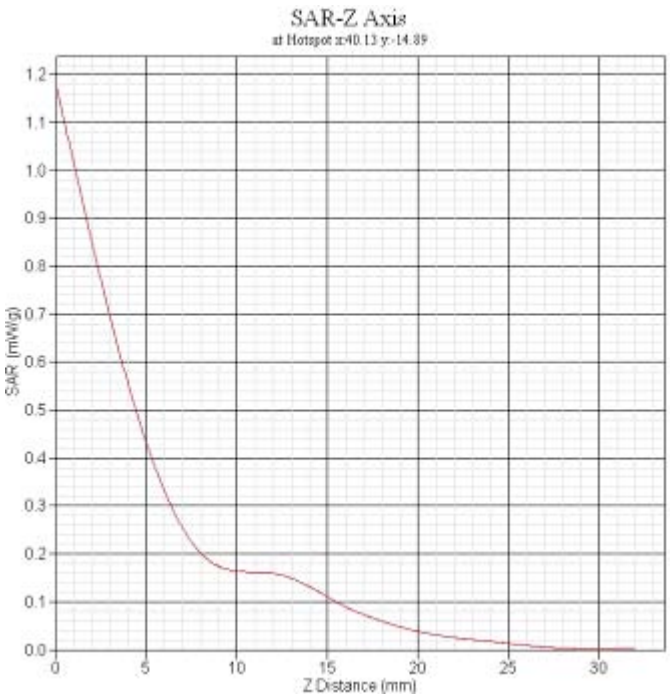
GSM850 Right cheek ch251	
Frequency(MHz)	848.8
Relative permittivity(real part)	40.35
Conductivity(S/m)	0.91
Variation(%)	1.327
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-28
	
SAR 1g(W/Kg)	0.525
SAR 10g(W/Kg)	0.340

GSM850 left cheek ch128	
Frequency(MHz)	824.2
Relative permittivity(real part)	40.35
Conductivity(S/m)	0.91
Variation(%)	2.198
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-28
	
SAR 1g(W/Kg)	0.288
SAR 10g(W/Kg)	0.385

GSM850 left cheek ch251	
Frequency(MHz)	848.8
Relative permittivity(real part)	40.35
Conductivity(S/m)	0.91
Variation(%)	-0.015
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-28
	
SAR 1g(W/Kg)	0.796
SAR 10g(W/Kg)	0.547

GSM1900 Left cheek CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	-1.492
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-29
	
SAR 1g(W/Kg)	0.844
SAR 10g(W/Kg)	0.406

GSM1900 Left tilt CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	-2.060
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-29
	
SAR 1g(W/Kg)	0.583
SAR 10g(W/Kg)	0.291

GSM1900 Right cheek CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	-1.608
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-29
	
SAR 1g(W/Kg)	0.505
SAR 10g(W/Kg)	0.251

GSM1900 Right tilt CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	-1.275
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
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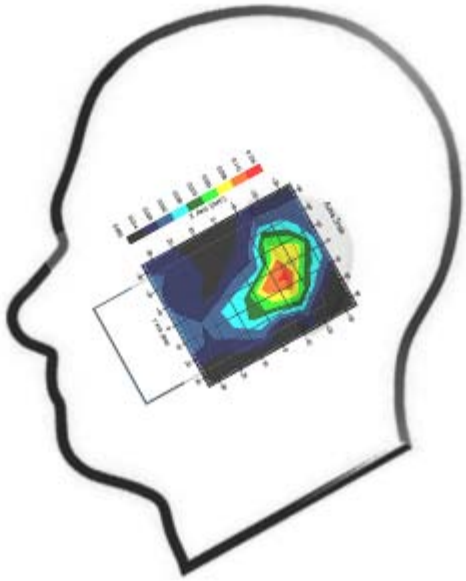	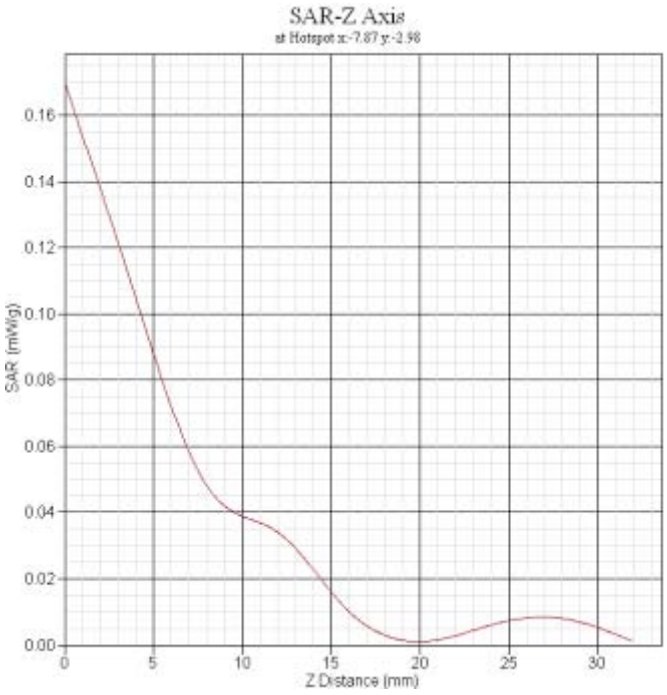
SAR 1g(W/Kg)	0.085
SAR 10g(W/Kg)	0.034

GSM1900 Left cheek CH512	
Frequency(MHz)	1850.2
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	0.153
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
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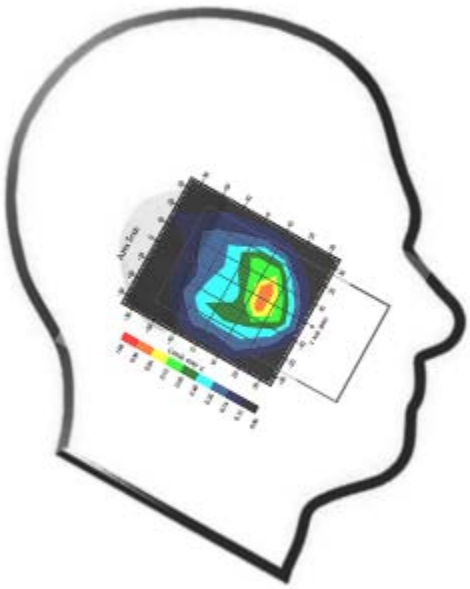
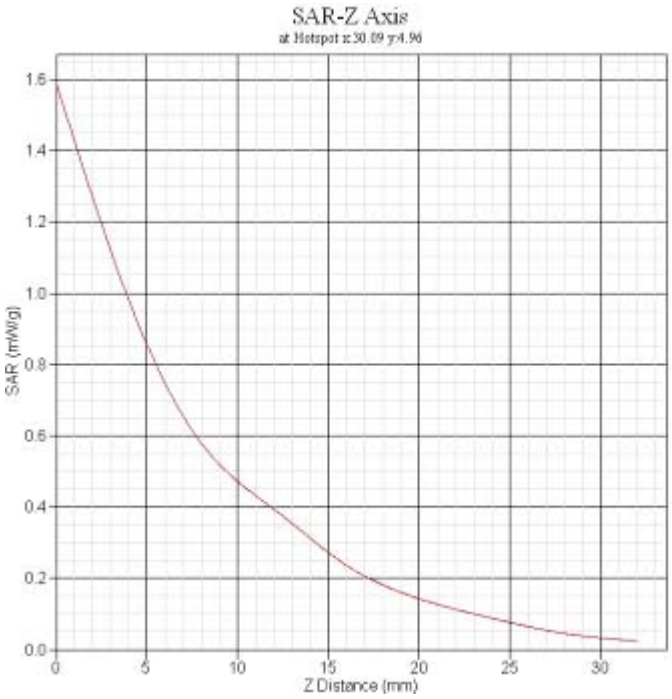
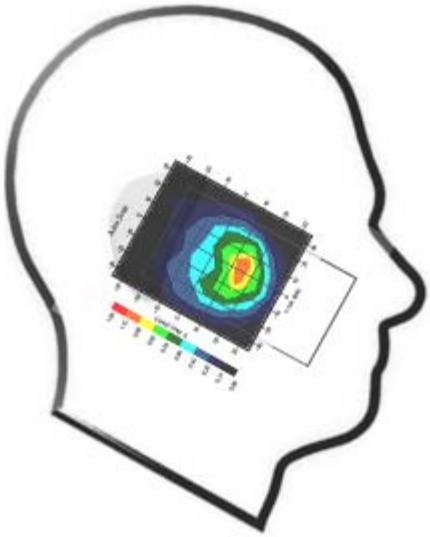
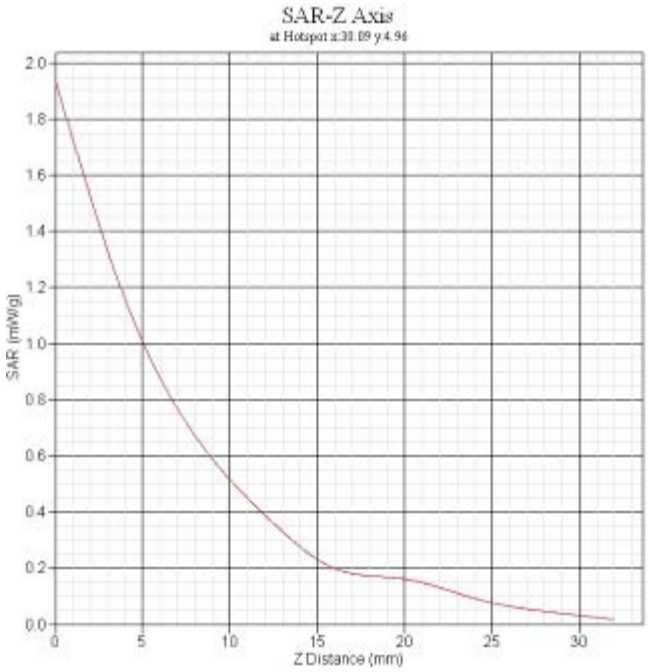
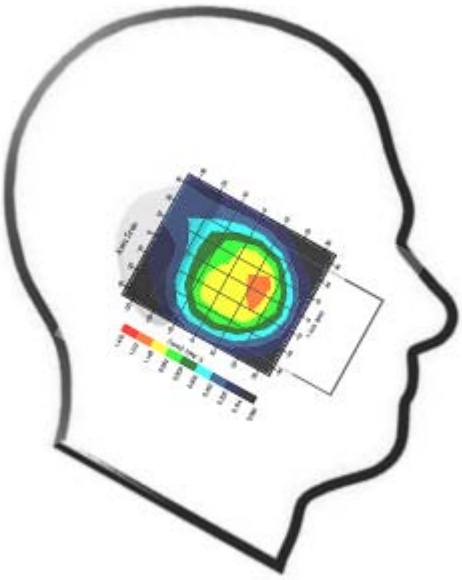
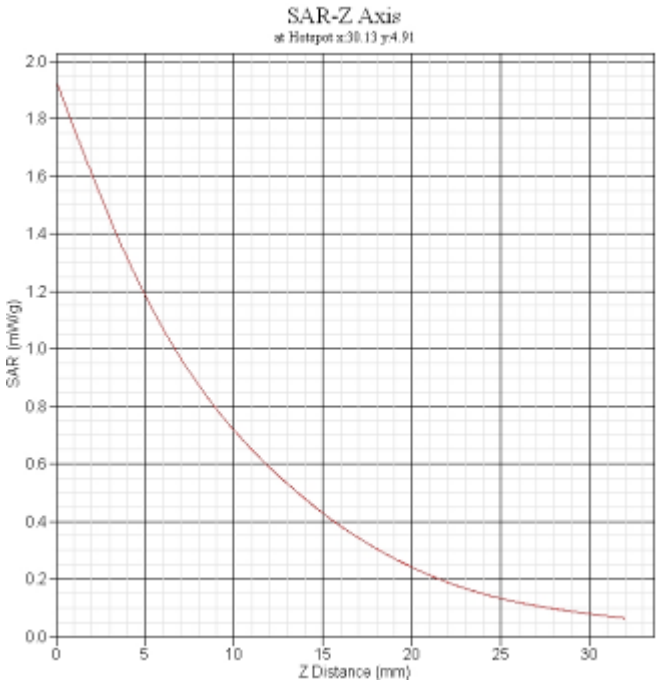
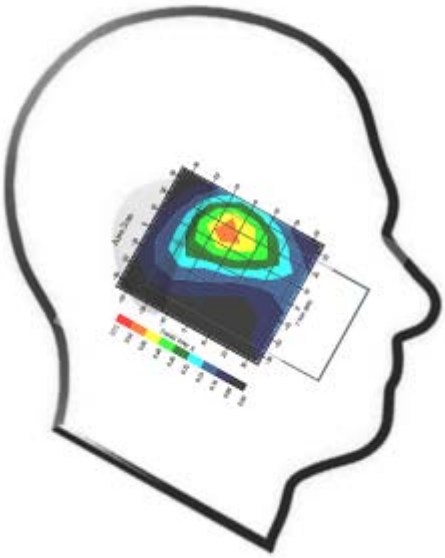
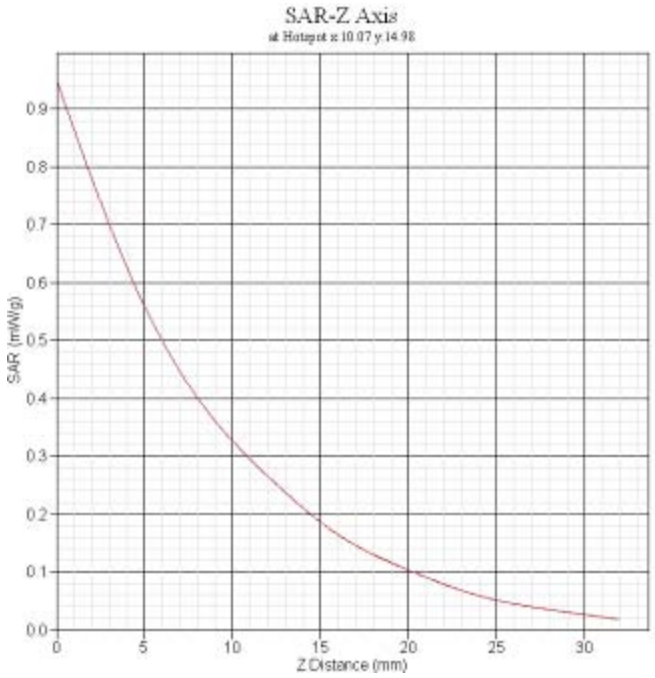
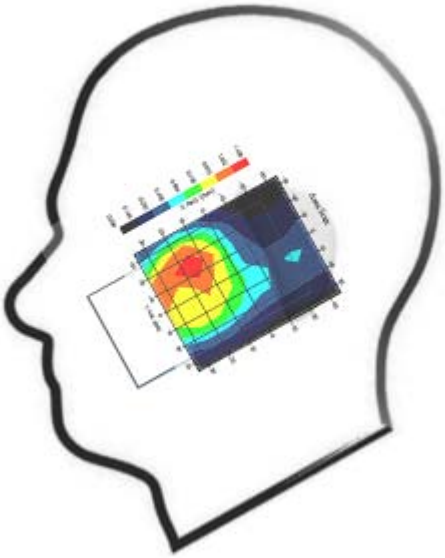
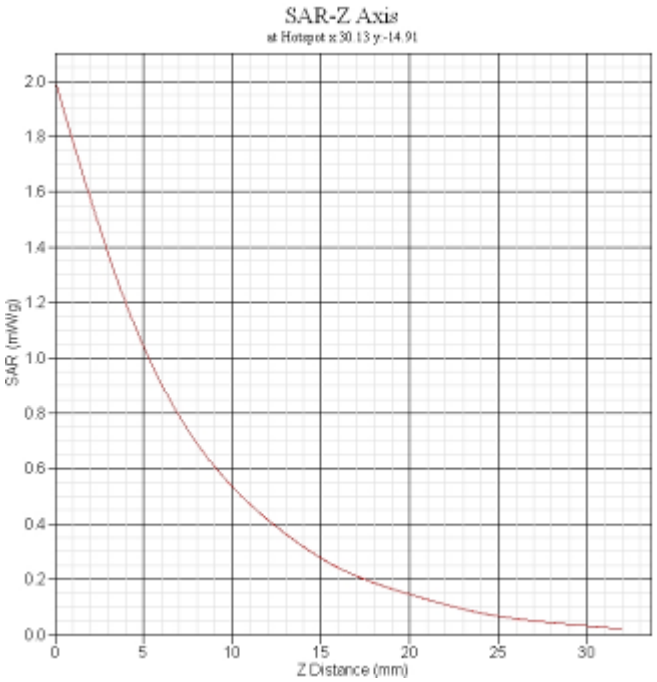
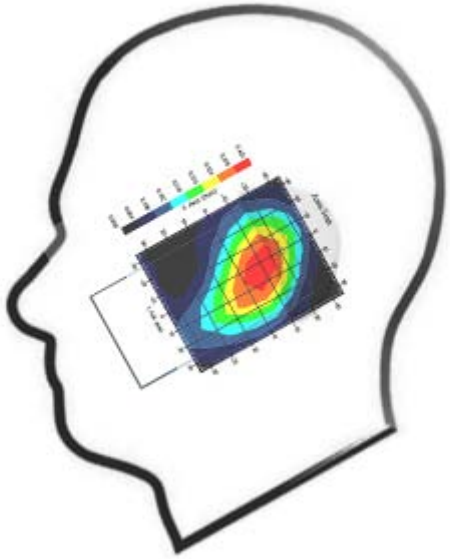
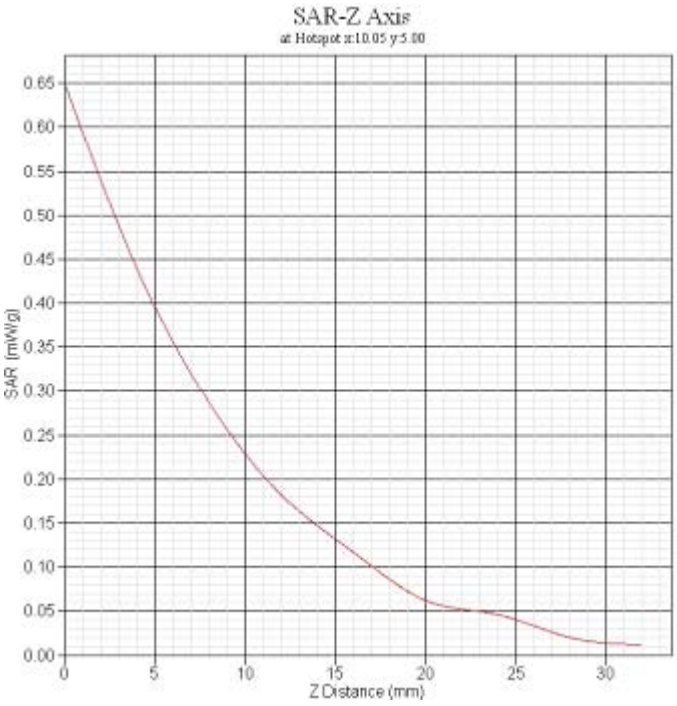
	
SAR 1g(W/Kg)	0.789
SAR 10g(W/Kg)	0.389

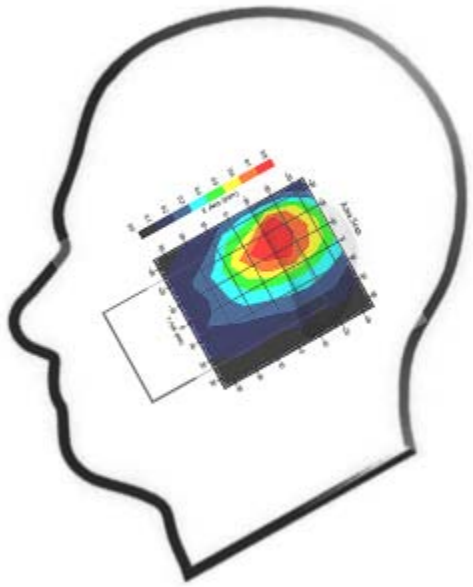
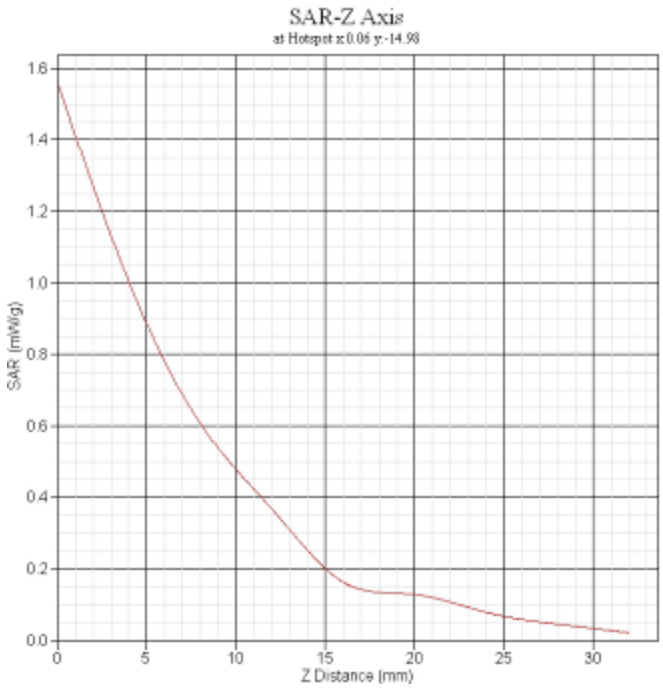
GSM1900 Left cheek CH810	
Frequency(MHz)	1909.8
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	0.802
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-29
	
SAR 1g(W/Kg)	0.972
SAR 10g(W/Kg)	0.458

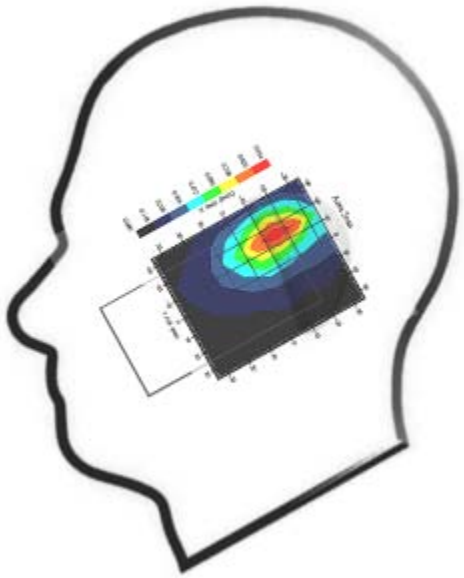
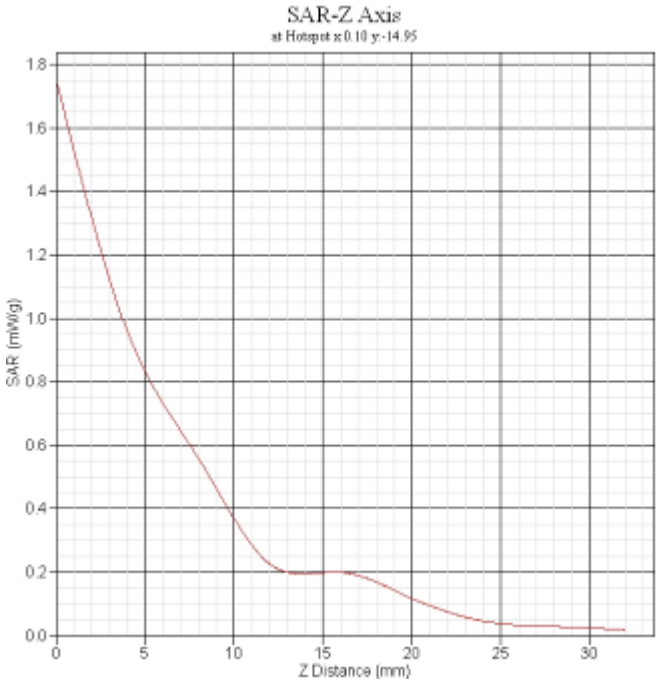
WCDMA Band Ⅱ Left cheek CH9400	
Frequency(MHz)	1880.0
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	0.768
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-30
	
SAR 1g(W/Kg)	1.192
SAR 10g(W/Kg)	0.698

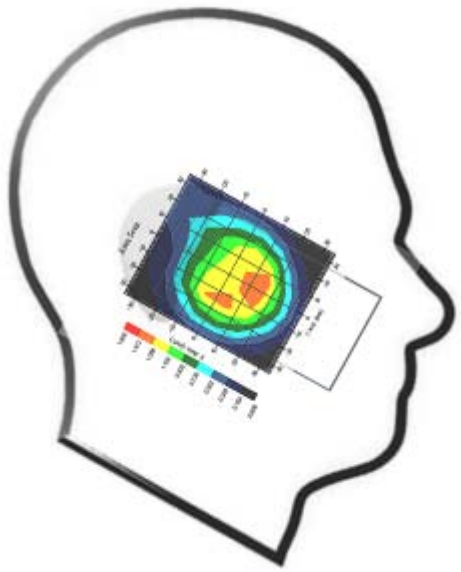
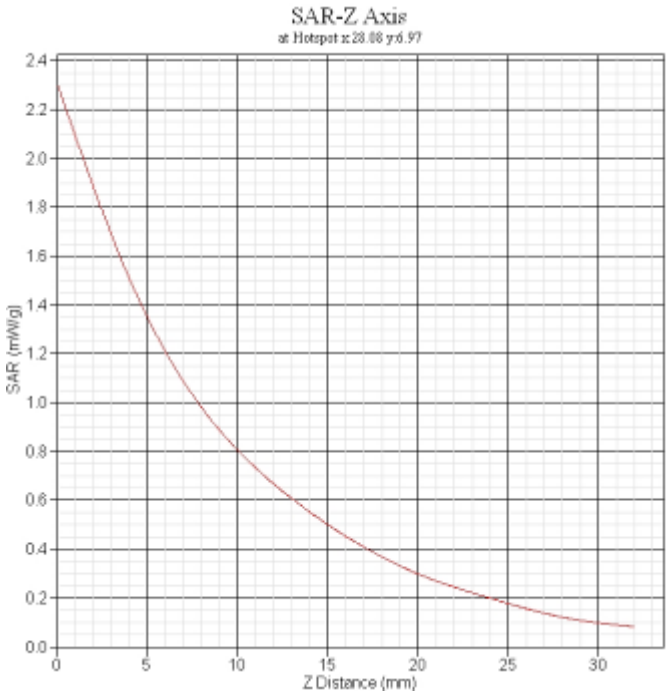
WCDMA Band Ⅱ Left tilt CH9400	
Frequency(MHz)	1880.0
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	1.567
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-30
	
SAR 1g(W/Kg)	0.574
SAR 10g(W/Kg)	0.310

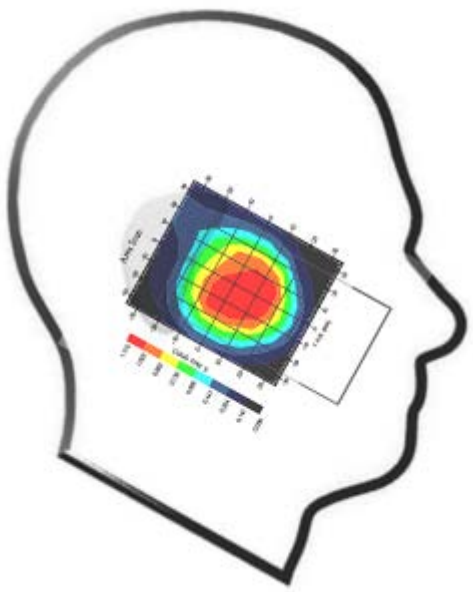
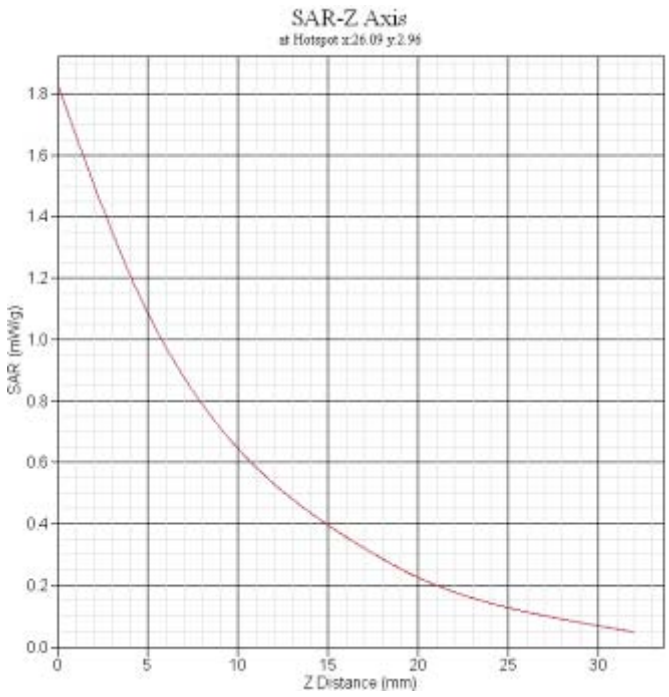
WCDMA Band Ⅱ Right cheek CH9400	
Frequency(MHz)	1880.0
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	-3.452
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-30
	
SAR 1g(W/Kg)	1.089
SAR 10g(W/Kg)	0.573

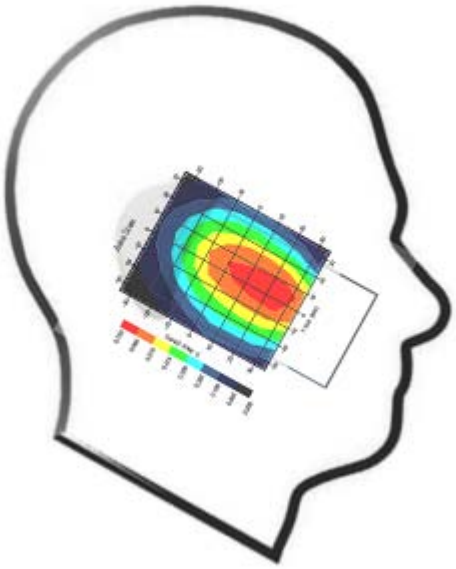
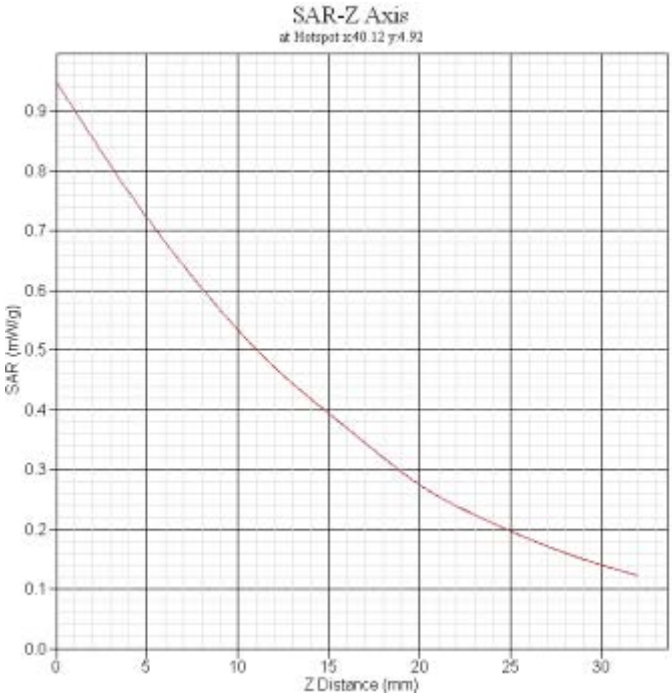
WCDMA Band Ⅱ Right tilt CH9400	
Frequency(MHz)	1880.0
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	-4.721
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-30
	
SAR 1g(W/Kg)	0.395
SAR 10g(W/Kg)	0.216

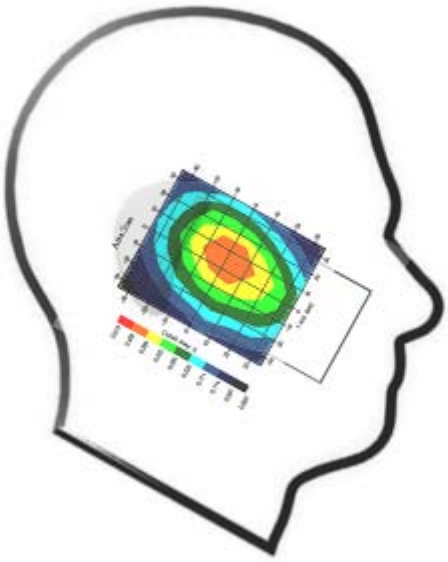
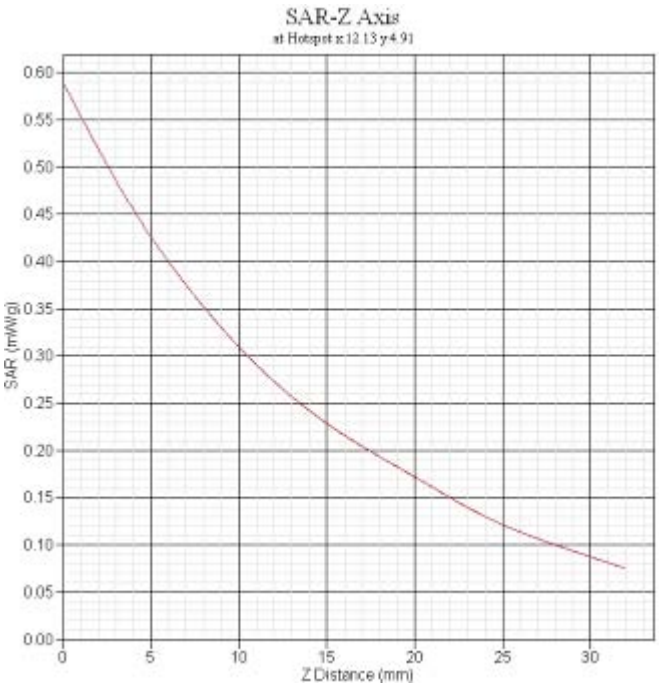
WCDMA Band Ⅱ Right cheek CH9262	
Frequency(MHz)	1852.4
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	-1.569
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-30
	
SAR 1g(W/Kg)	0.869
SAR 10g(W/Kg)	0.445

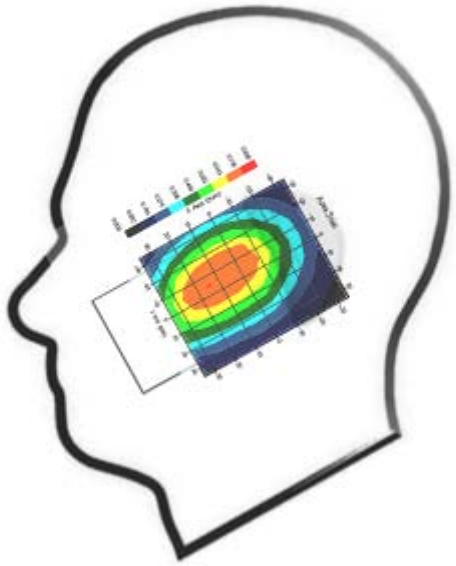
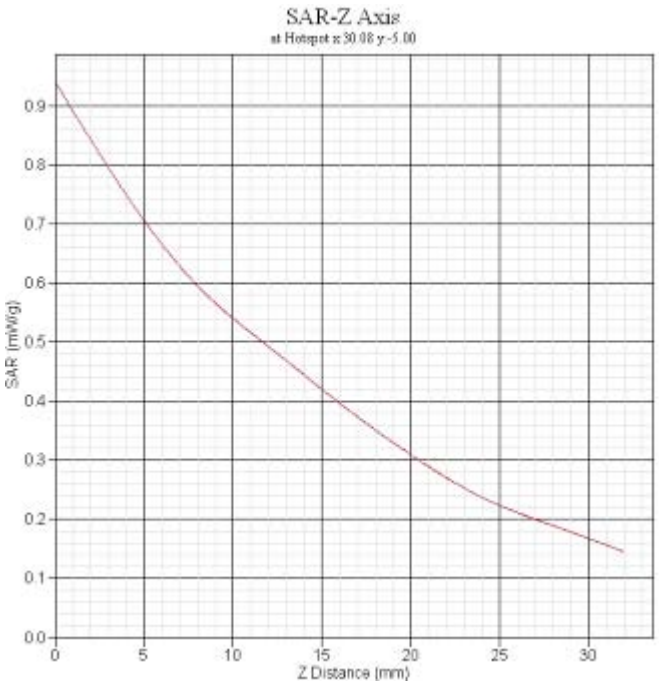
WCDMA Band Ⅱ Right cheek CH9538	
Frequency(MHz)	1907.6
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	-1.066
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-30
	
SAR 1g(W/Kg)	0.836
SAR 10g(W/Kg)	0.402

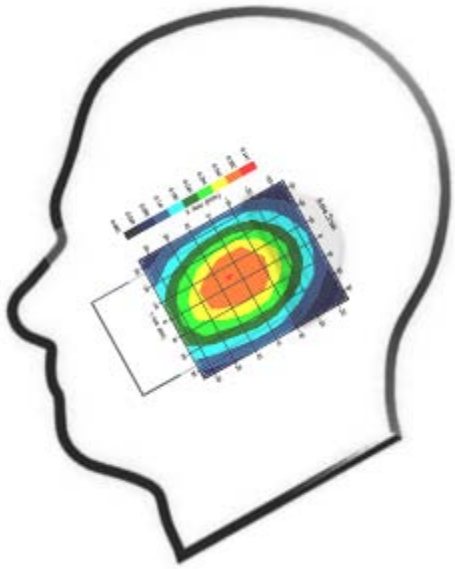
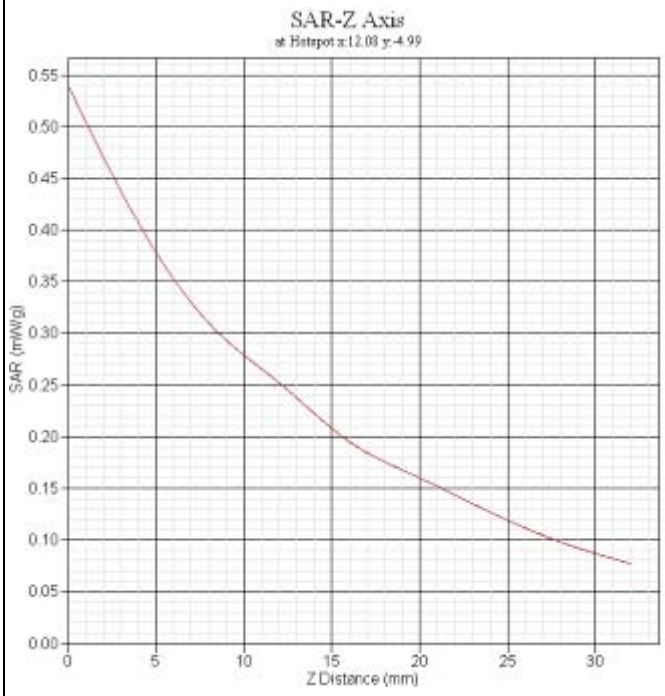
WCDMA Band Ⅱ Left cheek CH9262	
Frequency(MHz)	1852.4
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	-4.482
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-03-30
	
SAR 1g(W/Kg)	1.337
SAR 10g(W/Kg)	0.709

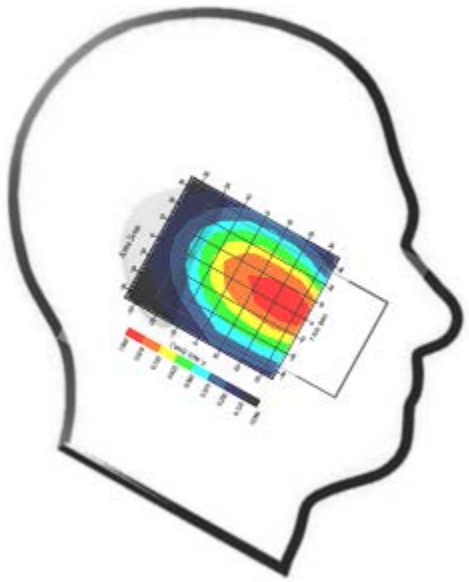
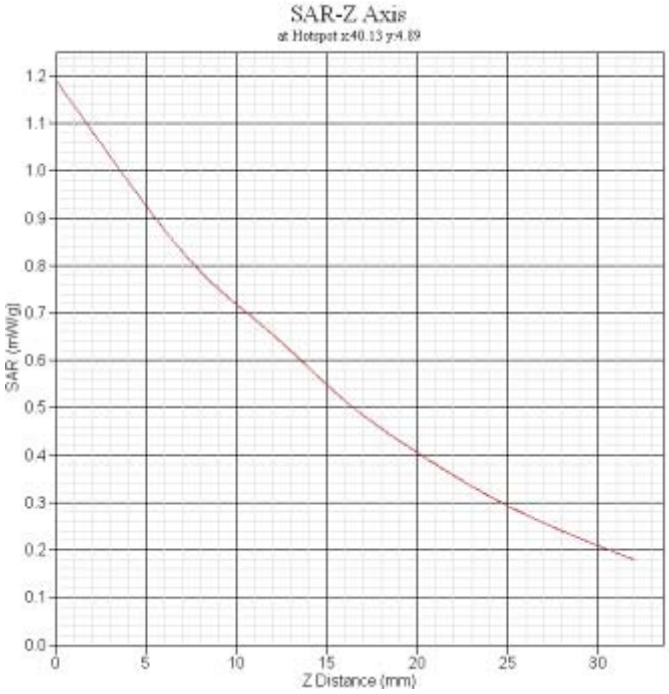
WCDMA Band Ⅱ Left cheek CH9538	
Frequency(MHz)	1907.6
Relative permittivity(real part)	40.19
Conductivity(S/m)	1.43
Variation(%)	-2.860
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-03-30
	
SAR 1g(W/Kg)	1.129
SAR 10g(W/Kg)	0.664

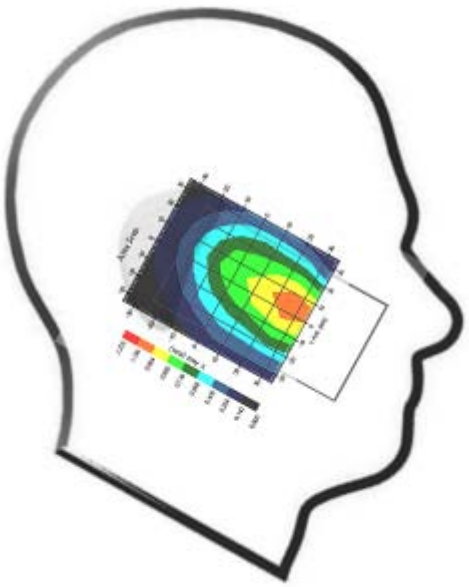
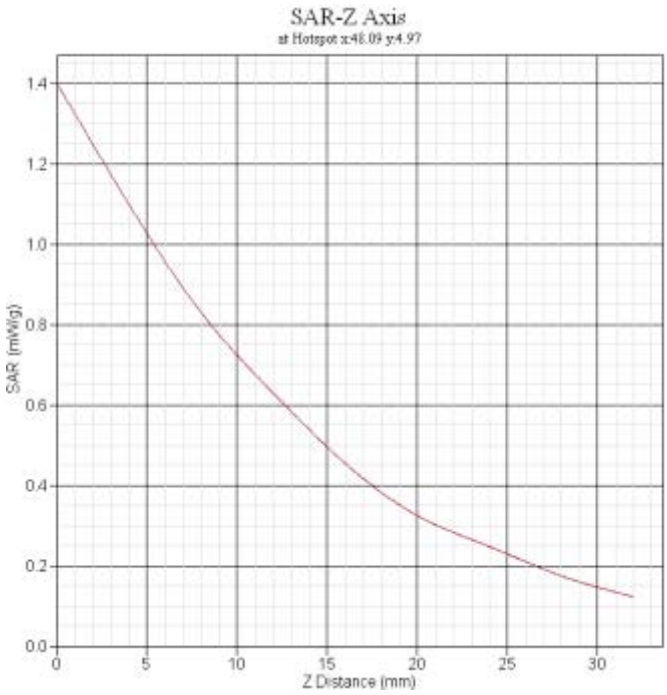
WCDMA Band Ⅴ Left cheek CH4182	
Frequency(MHz)	836.4
Relative permittivity(real part)	40.19
Conductivity(S/m)	0.43
Variation(%)	2.417
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-03-30
	
SAR 1g(W/Kg)	0.702
SAR 10g(W/Kg)	0.470

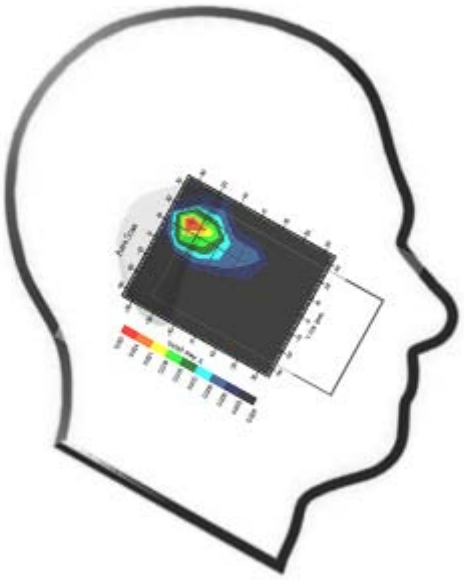
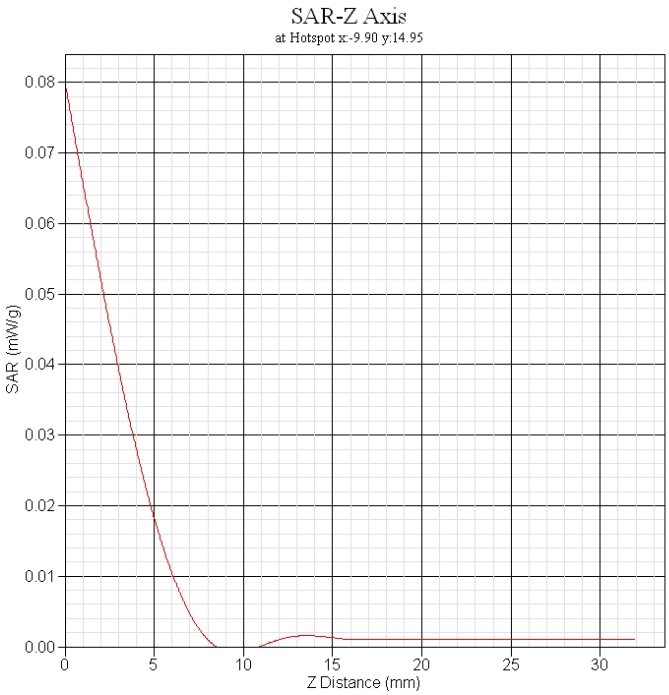
WCDMA Band Ⅴ Left tilt CH4182	
Frequency(MHz)	836.4
Relative permittivity(real part)	40.19
Conductivity(S/m)	0.43
Variation(%)	0.955
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-03-30
	
SAR 1g(W/Kg)	0.433
SAR 10g(W/Kg)	0.300

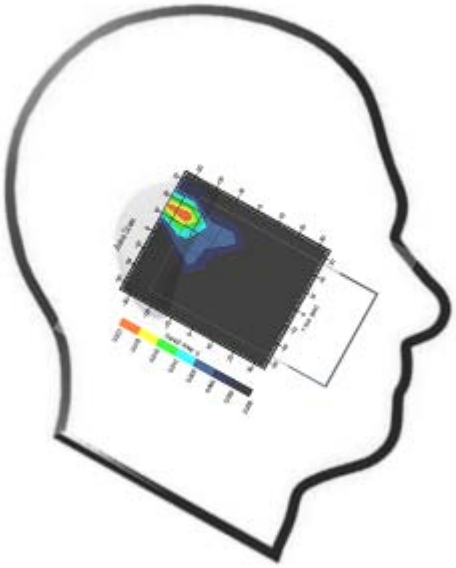
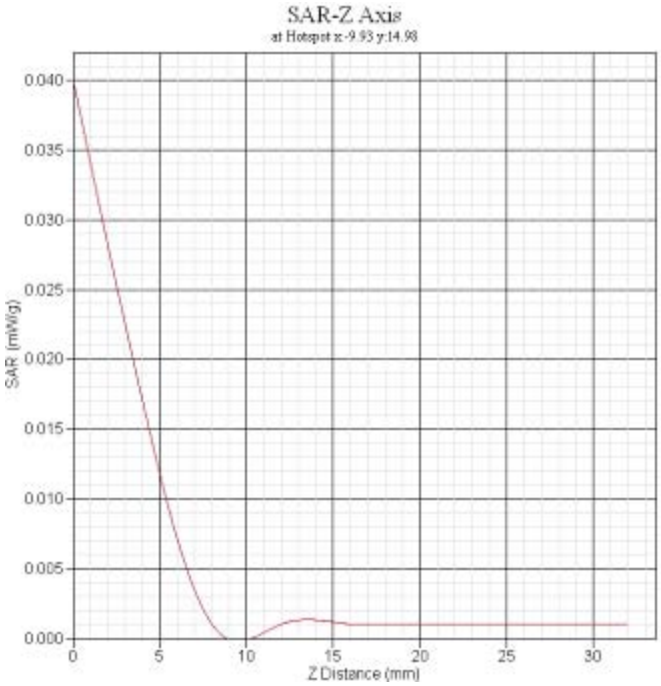
WCDMA Band Ⅴ Right cheek CH4182	
Frequency(MHz)	836.4
Relative permittivity(real part)	40.19
Conductivity(S/m)	0.43
Variation(%)	-2.056
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	0.698
SAR 10g(W/Kg)	0.492

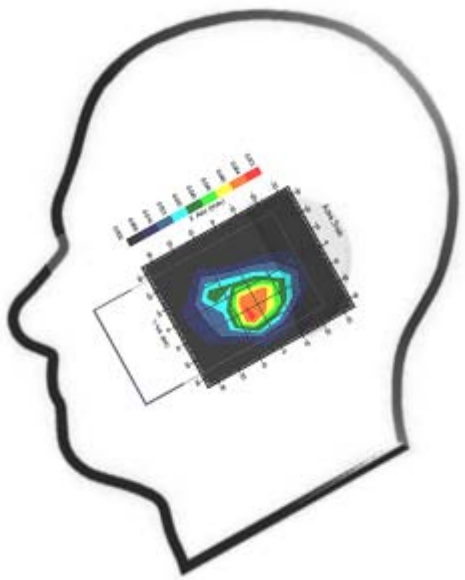
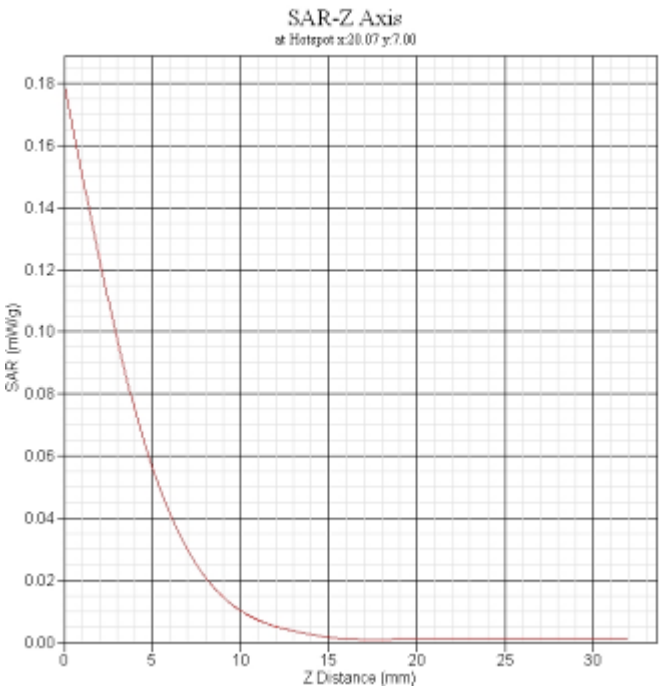
WCDMA Band Ⅴ Right tilt CH4182	
Frequency(MHz)	836.4
Relative permittivity(real part)	40.19
Conductivity(S/m)	0.43
Variation(%)	0.536
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	0.386
SAR 10g(W/Kg)	0.268

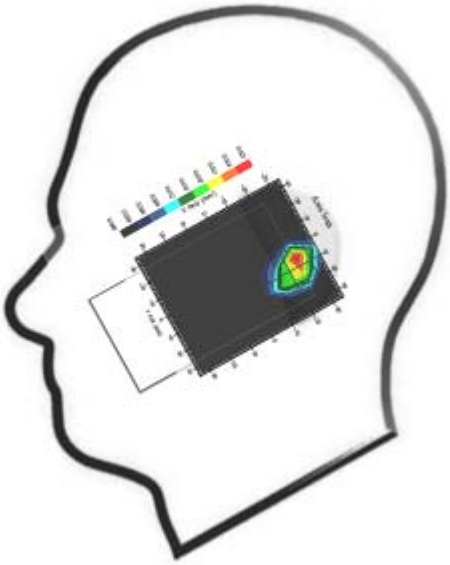
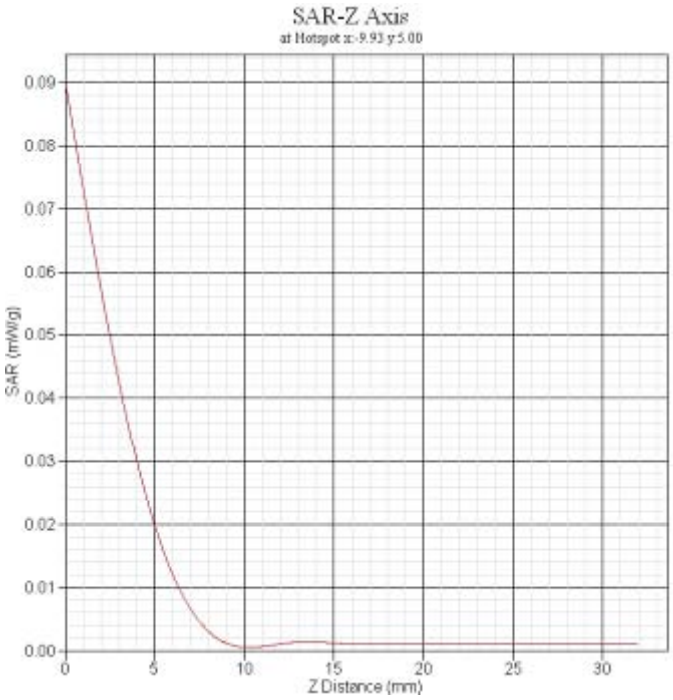
WCDMA Band Ⅴ Left cheek CH4132	
Frequency(MHz)	826.4
Relative permittivity(real part)	40.19
Conductivity(S/m)	0.43
Variation(%)	0.676
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	0.909
SAR 10g(W/Kg)	0.631

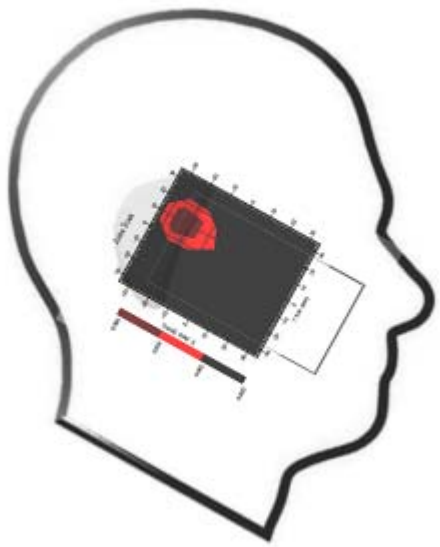
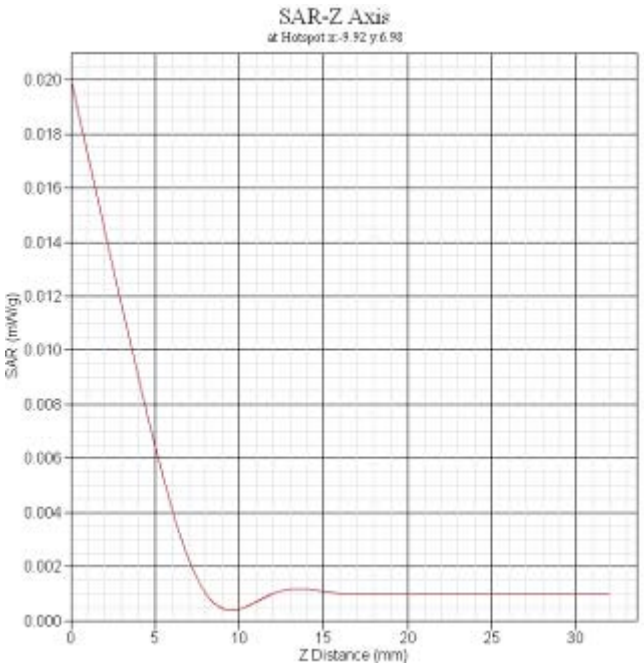
WCDMA Band Ⅴ Left cheek CH4233	
Frequency(MHz)	846.6
Relative permittivity(real part)	40.19
Conductivity(S/m)	0.43
Variation(%)	2.146
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	1.002
SAR 10g(W/Kg)	0.616

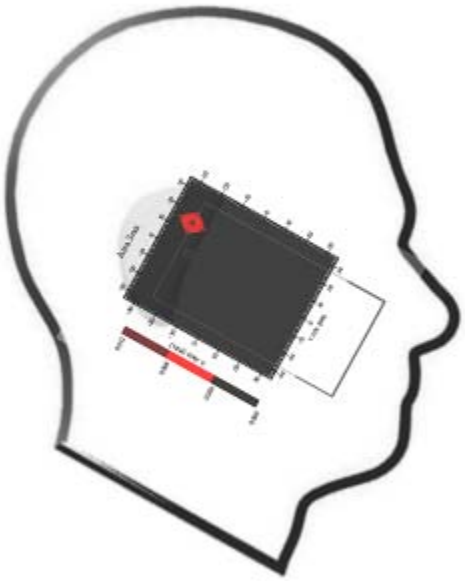
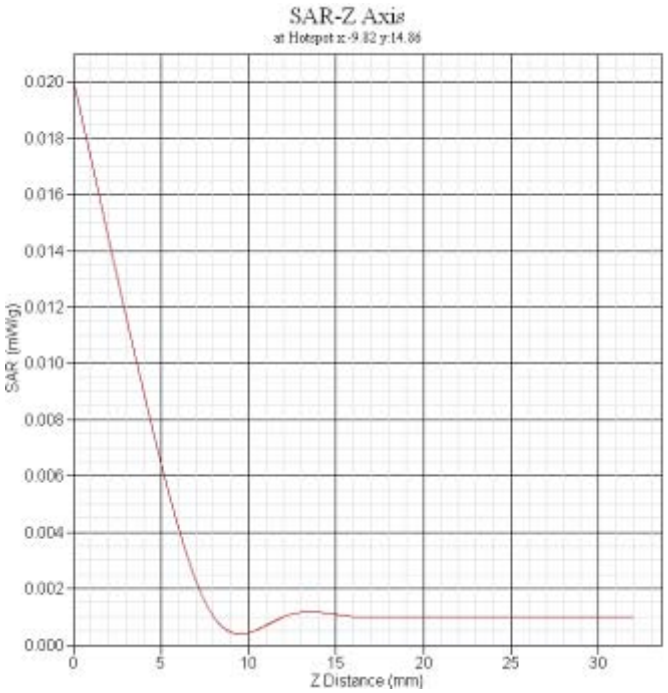
802.11b Left cheek CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	40.01
Conductivity(S/m)	1.83
Variation(%)	-0.750
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	0.022
SAR 10g(W/Kg)	0.007

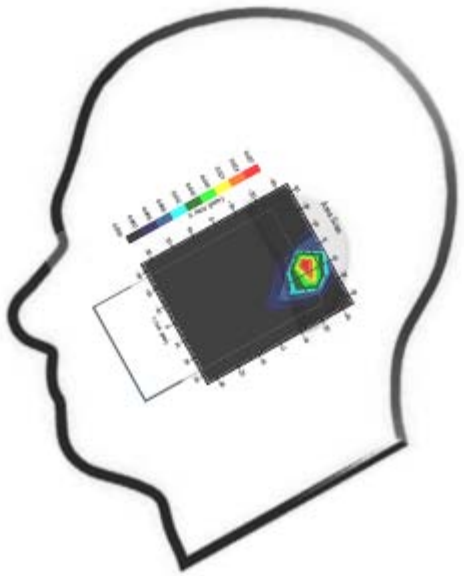
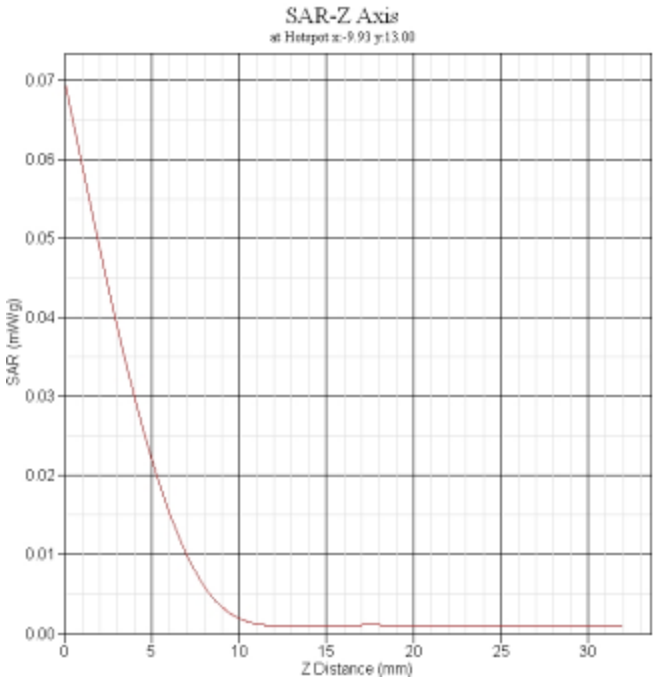
802.11b Left tilt CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	40.01
Conductivity(S/m)	1.83
Variation(%)	-4.305
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	0.014
SAR 10g(W/Kg)	0.005

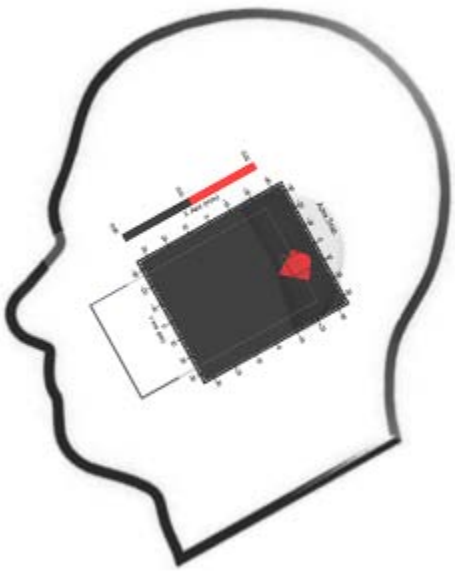
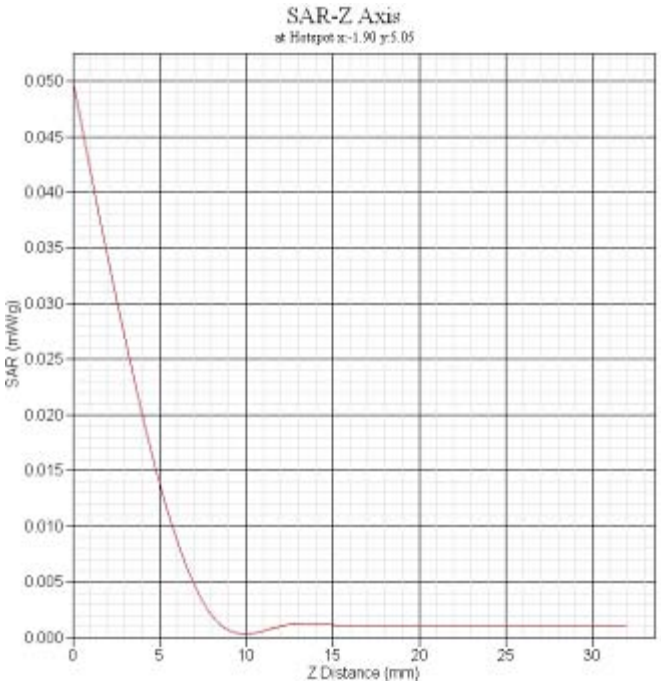
802.11b Right cheek CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	40.01
Conductivity(S/m)	1.83
Variation(%)	2.176
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	0.068
SAR 10g(W/Kg)	0.026

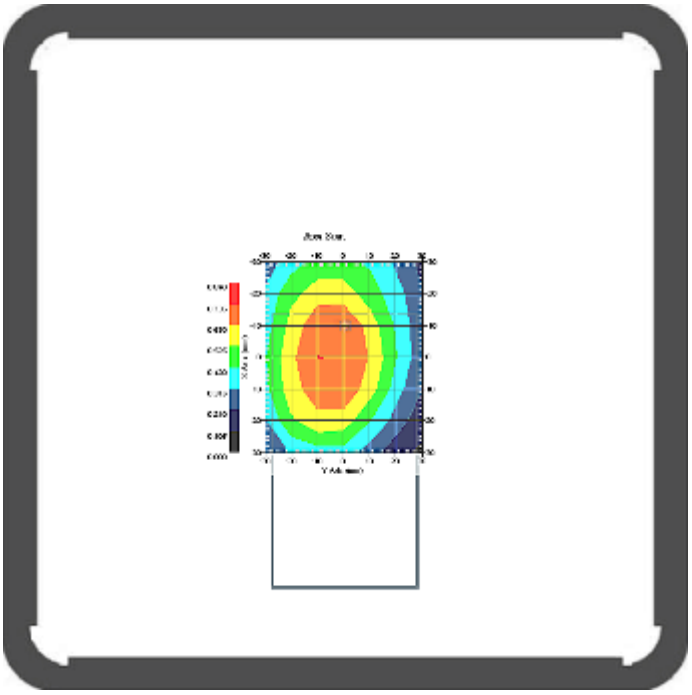
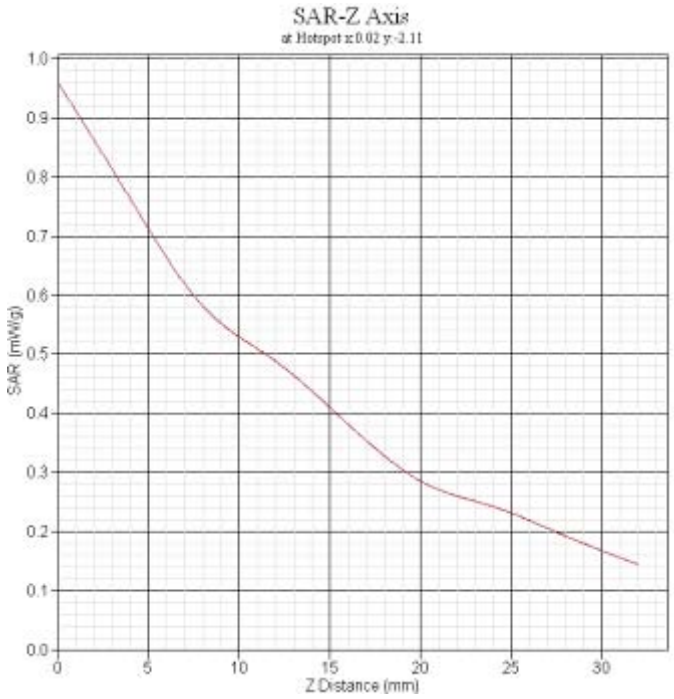
802.11b Right tilt CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	40.01
Conductivity(S/m)	1.83
Variation(%)	-1.350
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	0.028
SAR 10g(W/Kg)	0.009

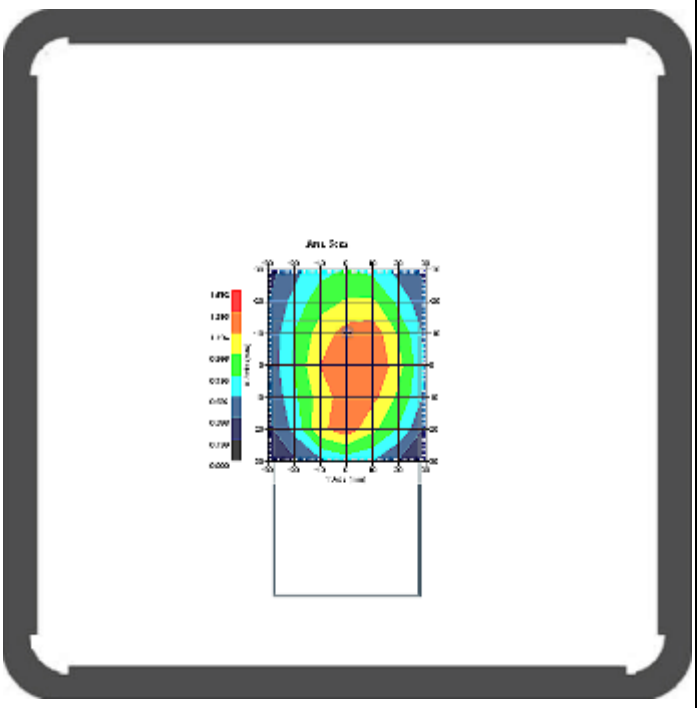
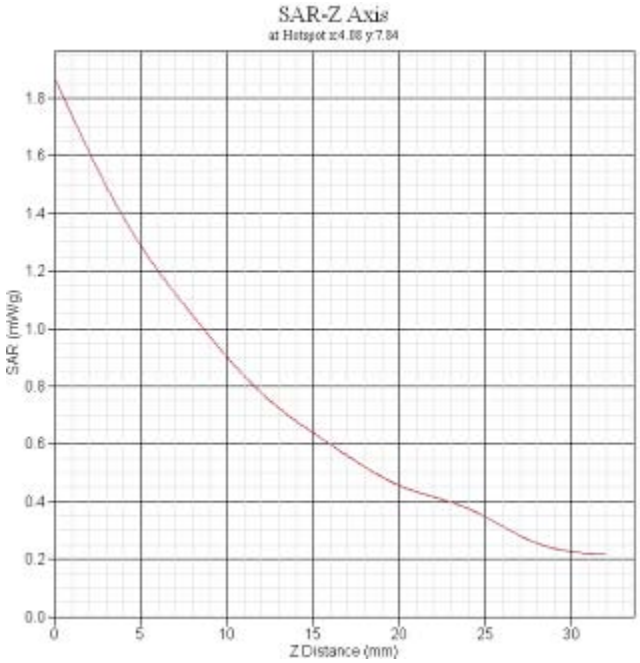
802.11g Left cheek CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	40.01
Conductivity(S/m)	1.83
Variation(%)	-1.076
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	0.008
SAR 10g(W/Kg)	0.003

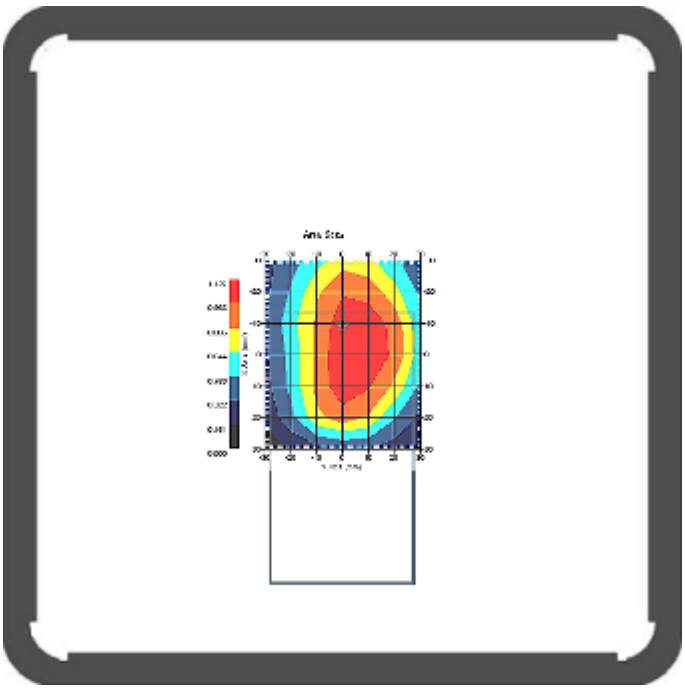
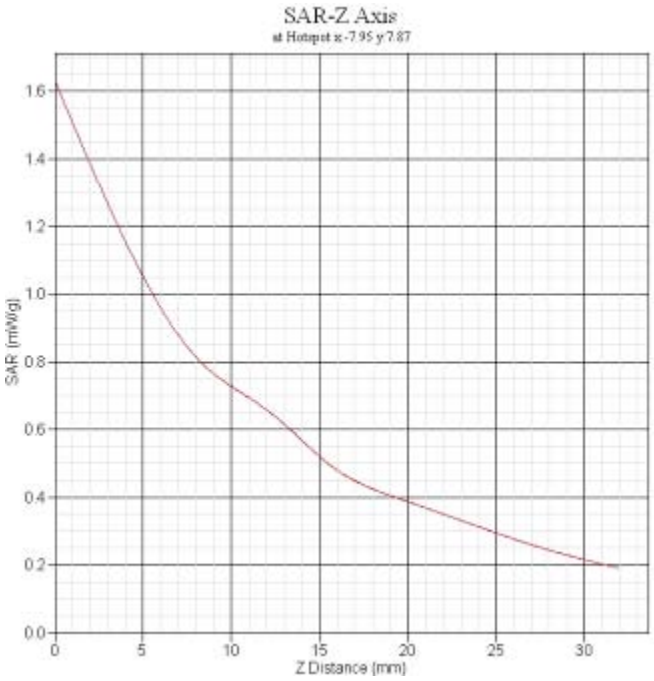
802.11g Left tilt CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	40.01
Conductivity(S/m)	1.83
Variation(%)	-3.981
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	0.005
SAR 10g(W/Kg)	0.002

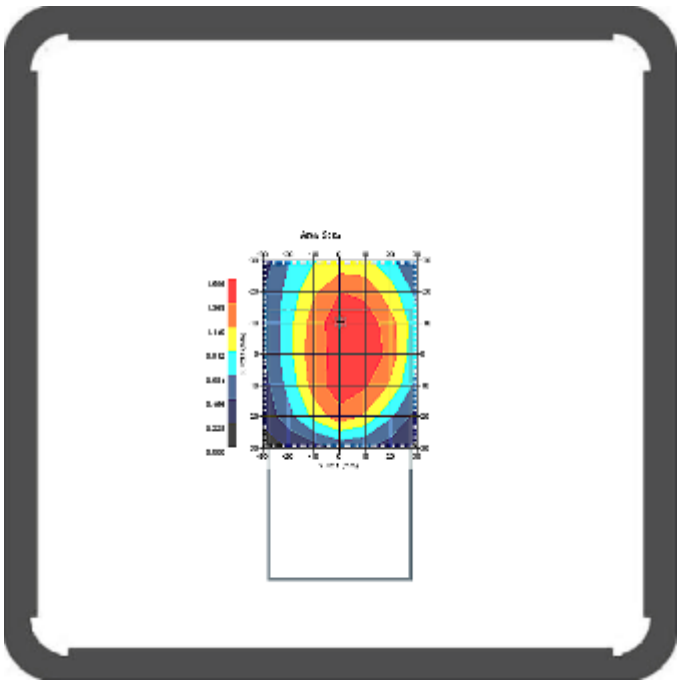
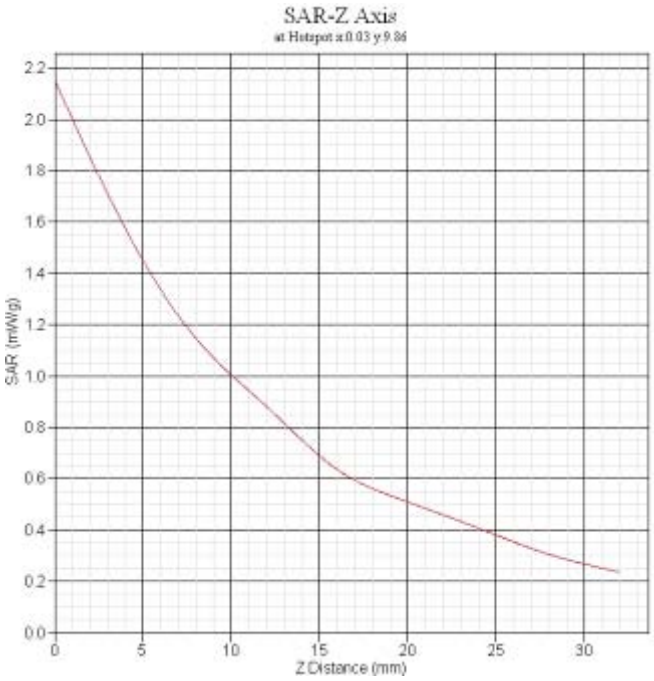
802.11g Right cheek CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	40.01
Conductivity(S/m)	1.83
Variation(%)	1.135
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	0.027
SAR 10g(W/Kg)	0.010

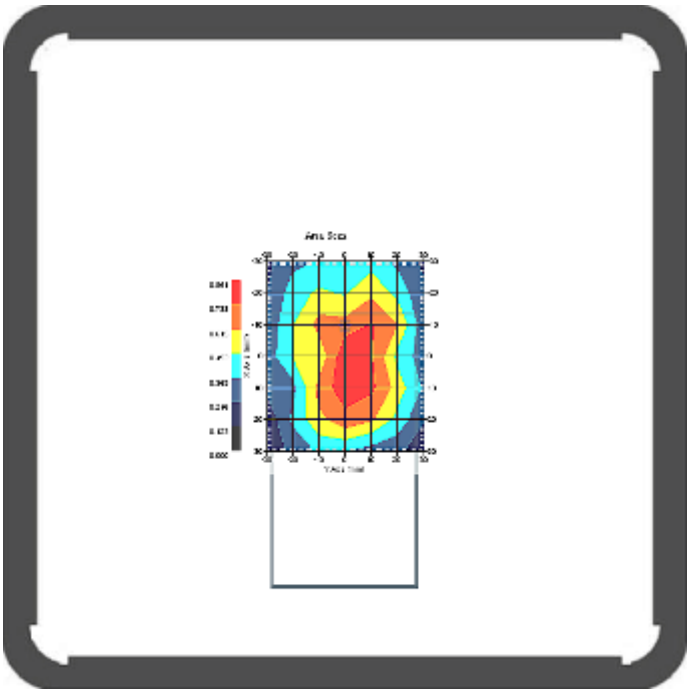
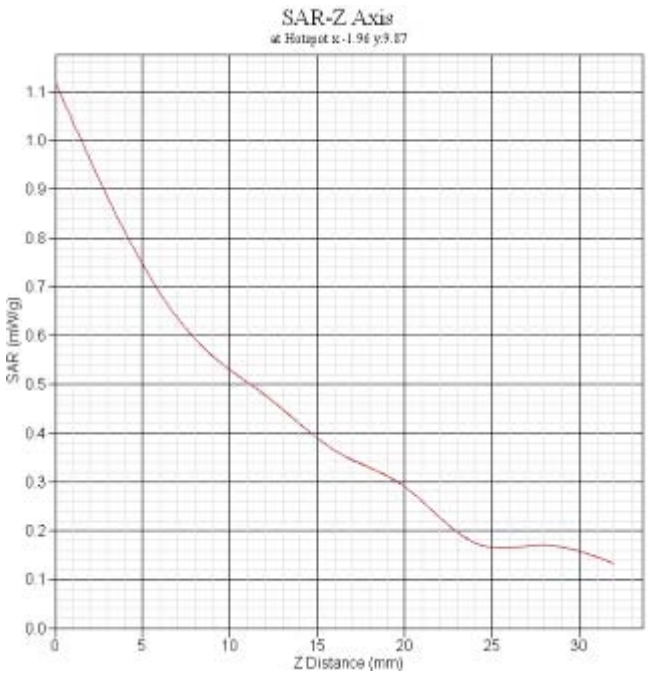
802.11g Right tilt CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	40.01
Conductivity(S/m)	1.83
Variation(%)	-3.755
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-03-31
	
SAR 1g(W/Kg)	0.015
SAR 10g(W/Kg)	0.005

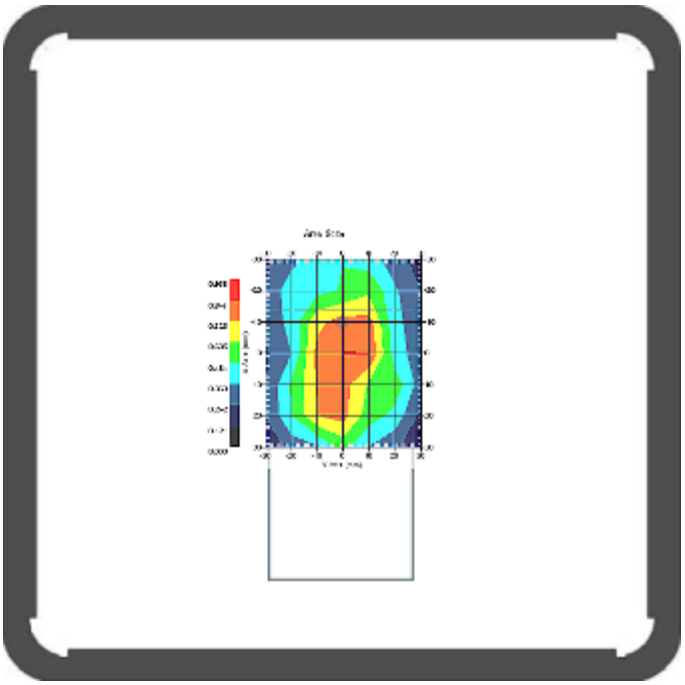
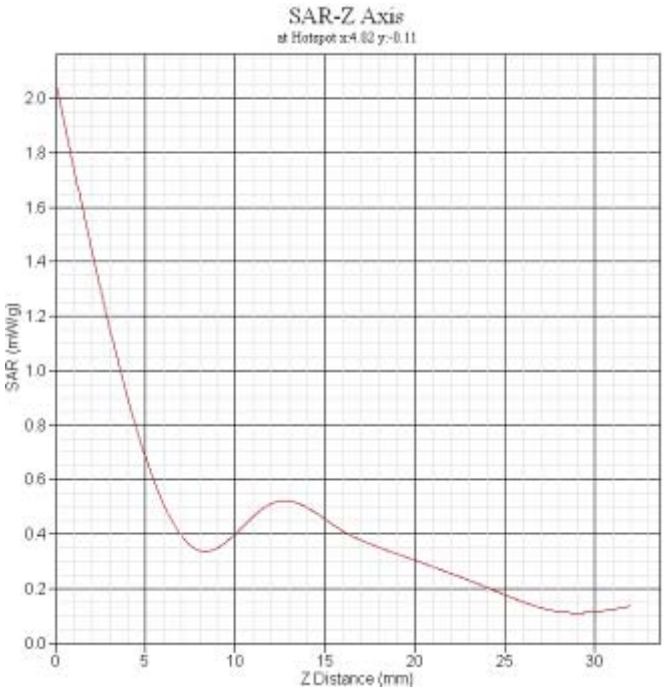
GPRS850 body face CH189	
Frequency(MHz)	836.4
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	-0.381
Duty Cycle Factor	4
Crest factor	4
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	0.706
SAR 10g(W/Kg)	0.467

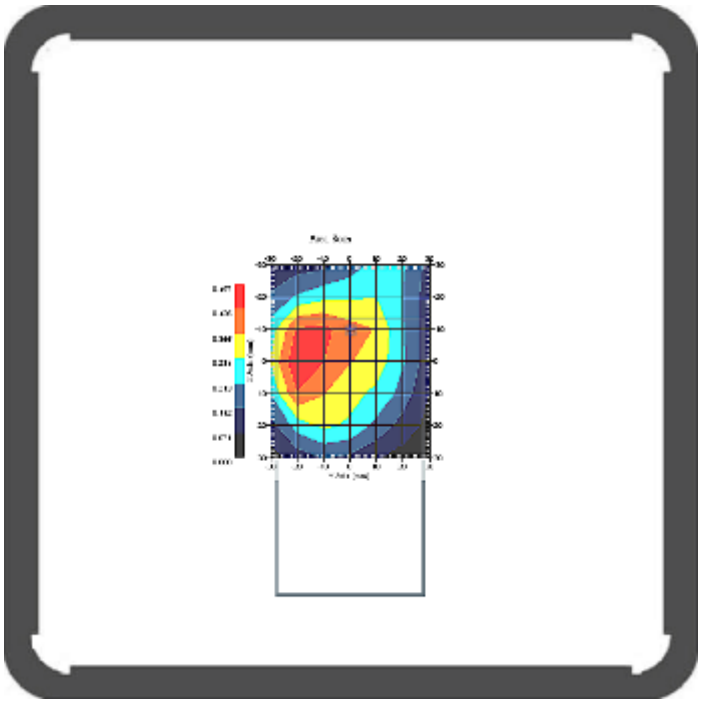
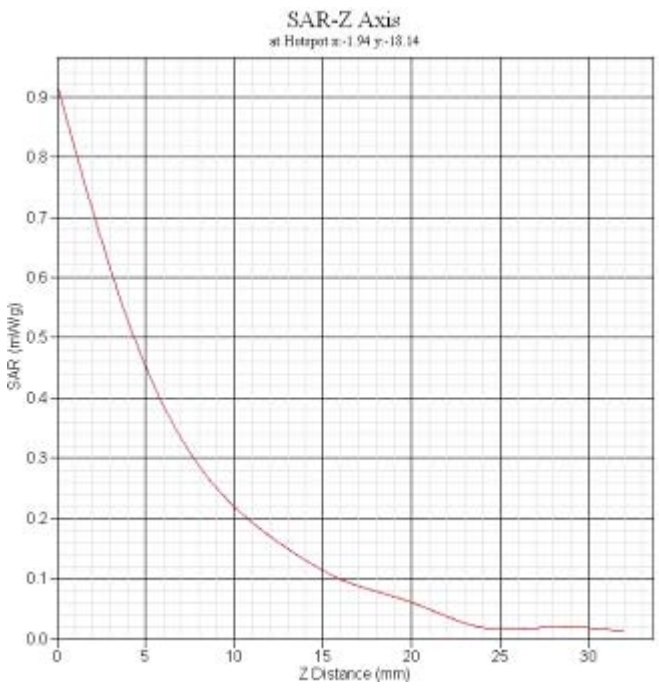
GPRS850 body bottom CH189	
Frequency(MHz)	836.4
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	-0.921
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	0.927
SAR 10g(W/Kg)	0.734

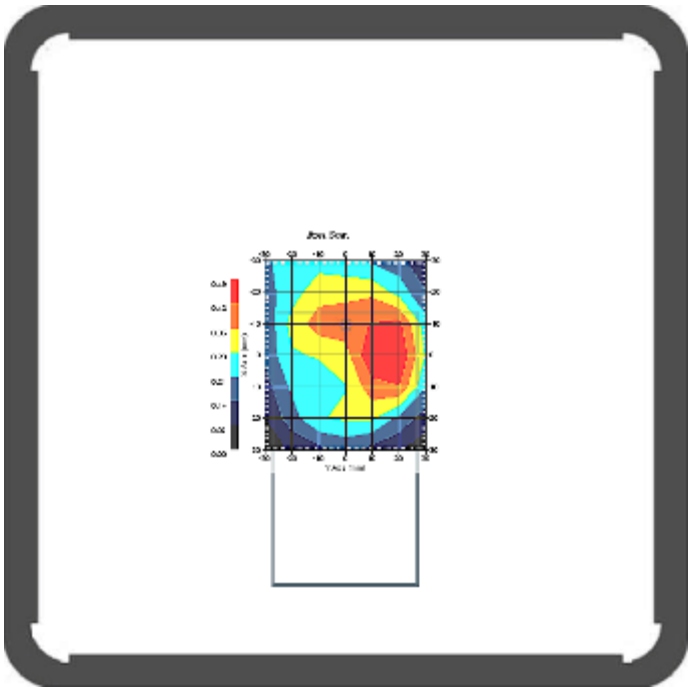
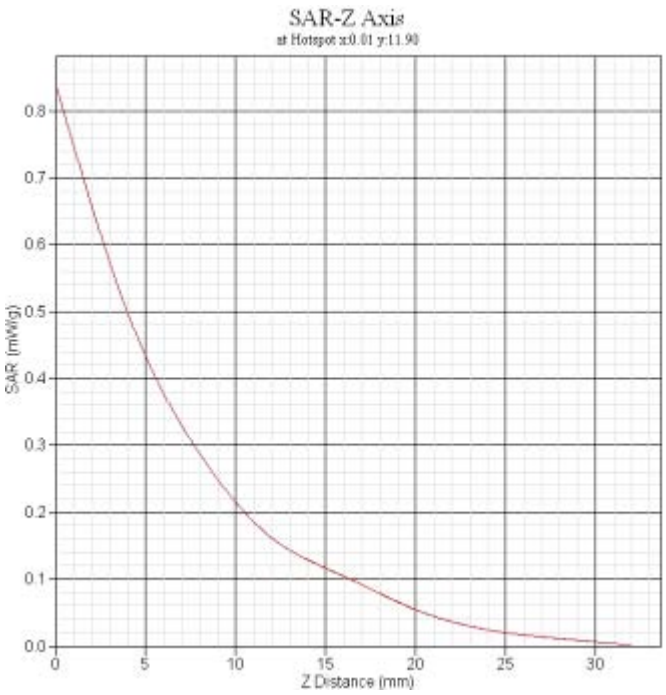
GPRS850 body bottom CH128	
Frequency(MHz)	824.2
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	-1.810
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	1.060
SAR 10g(W/Kg)	0.697

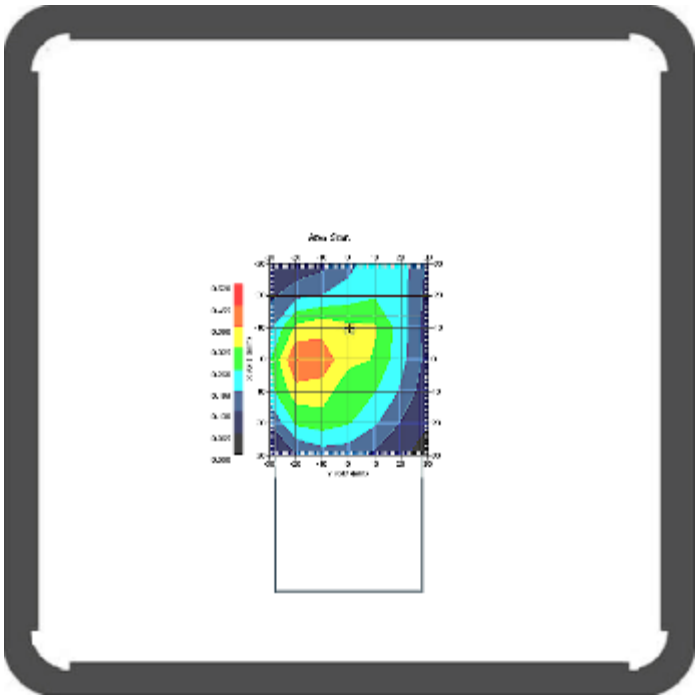
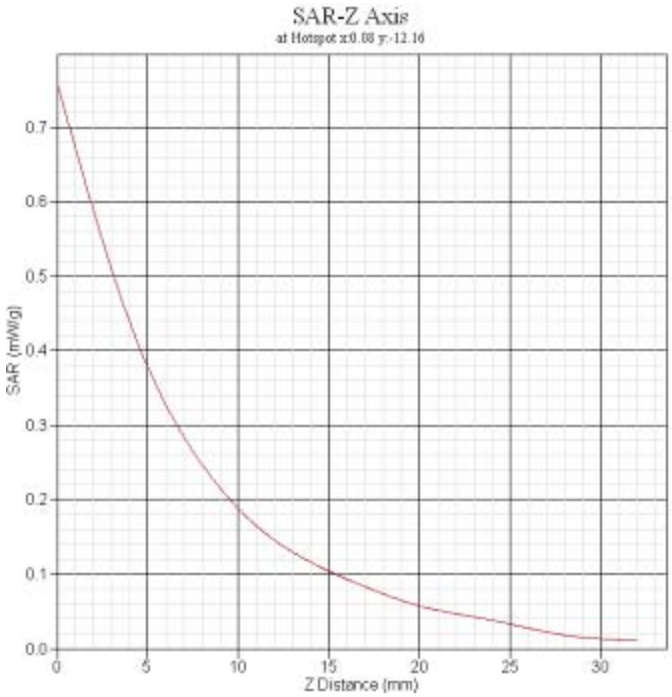
GPRS850 body bottom CH251	
Frequency(MHz)	848.8
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	1.996
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	1.125
SAR 10g(W/Kg)	1.012

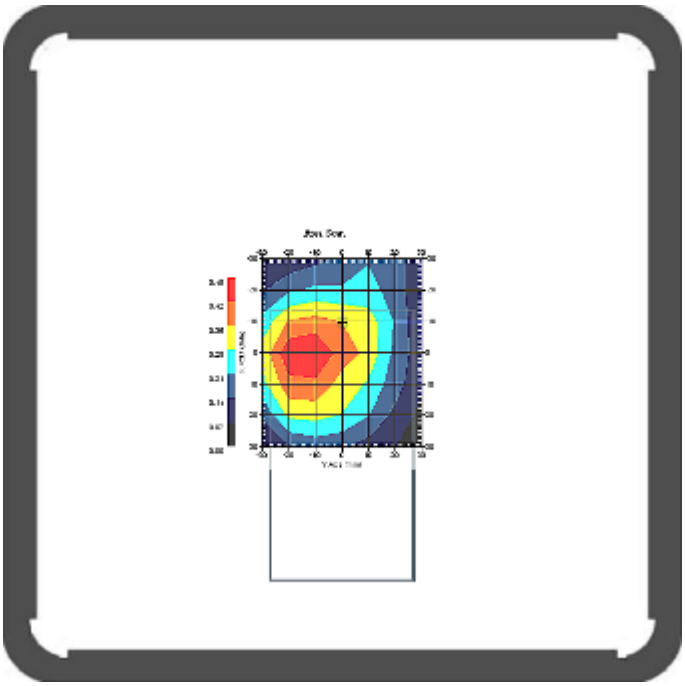
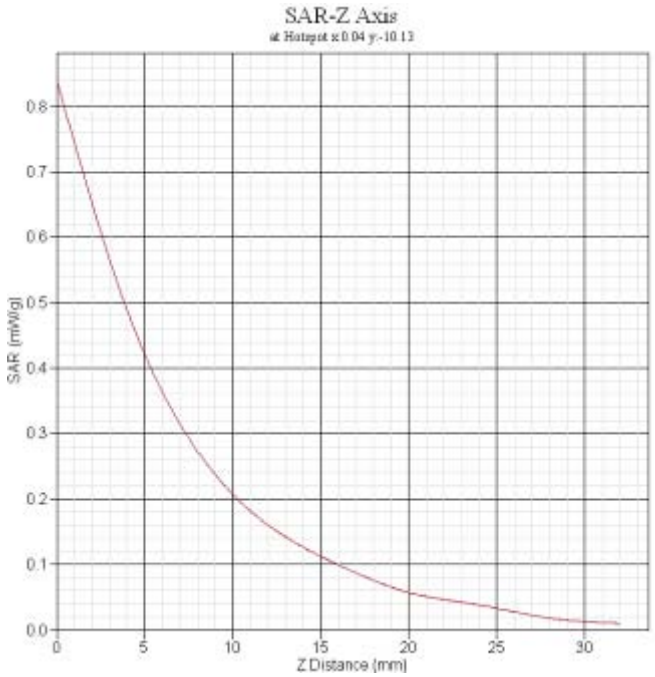
GSM850 body bottom CH251	
Frequency(MHz)	848.8
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	-2.206
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	0.853
SAR 10g(W/Kg)	0.711

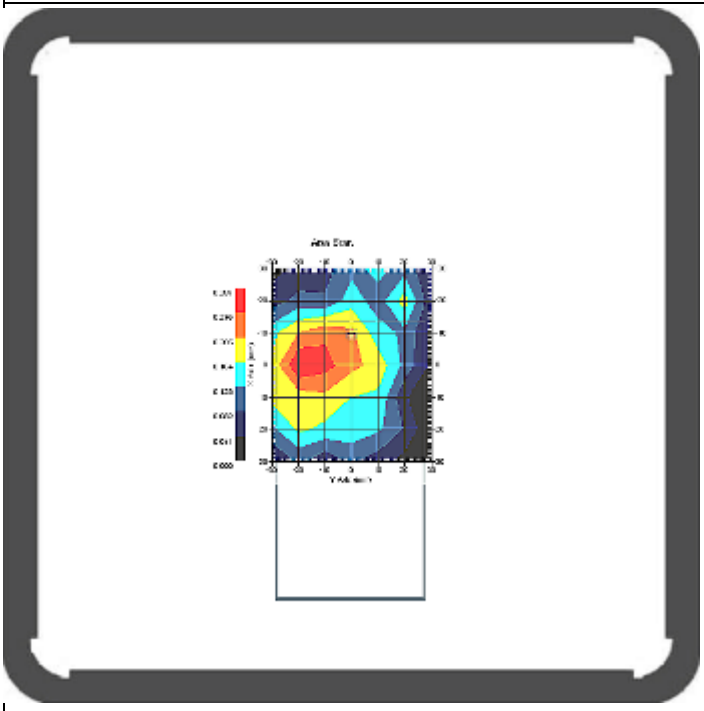
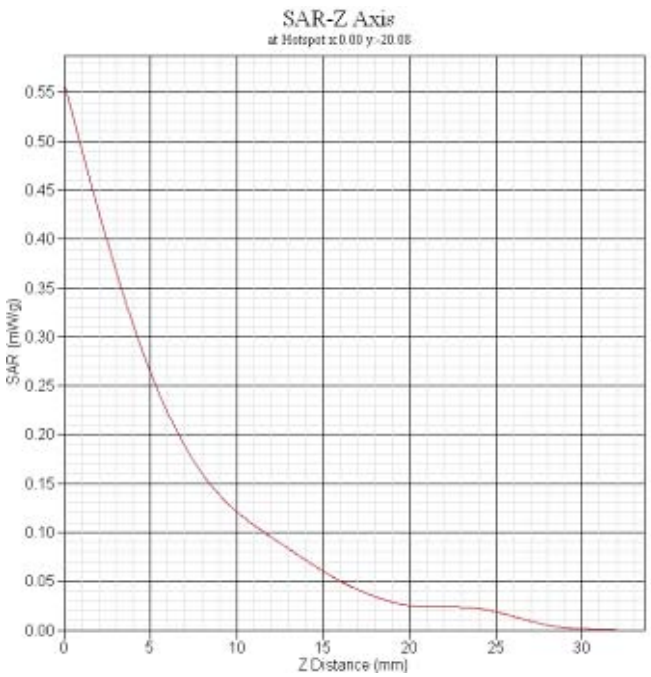
GSM850 body bottom CH251+earphone	
Frequency(MHz)	848.8
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	-1.647
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	0.828
SAR 10g(W/Kg)	0.581

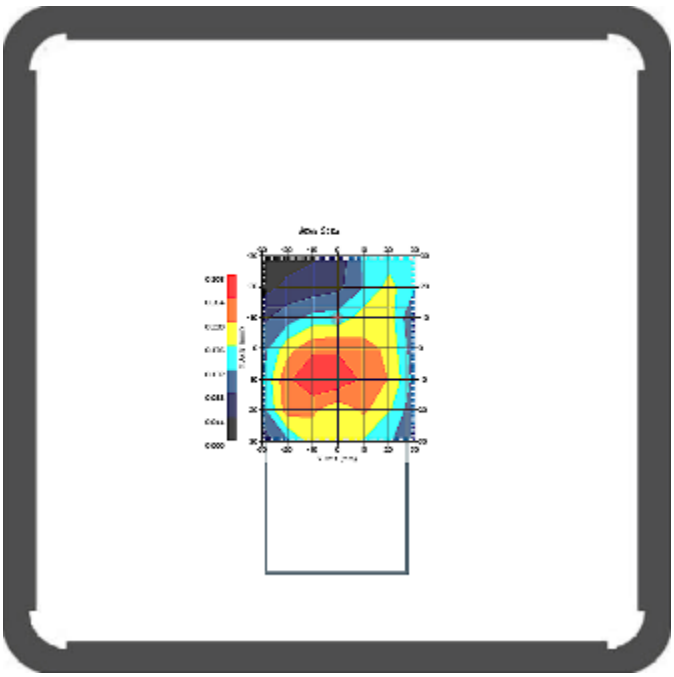
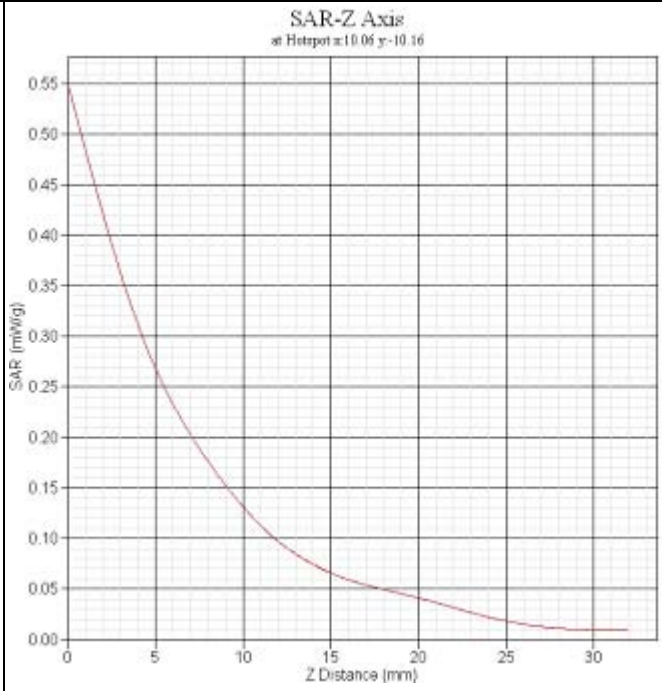
GPRS1900 body face CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	0.194
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	0.483
SAR 10g(W/Kg)	0.242

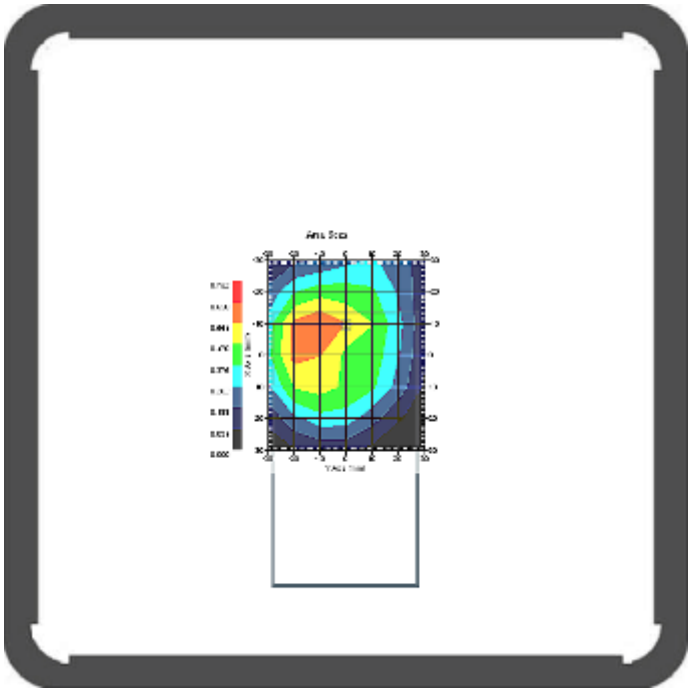
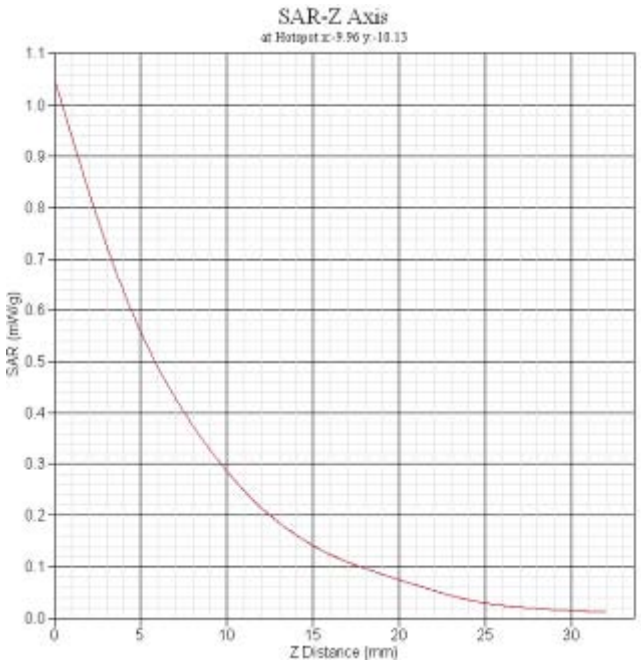
GPRS1900 body bottom CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	4.288
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	0.471
SAR 10g(W/Kg)	0.250

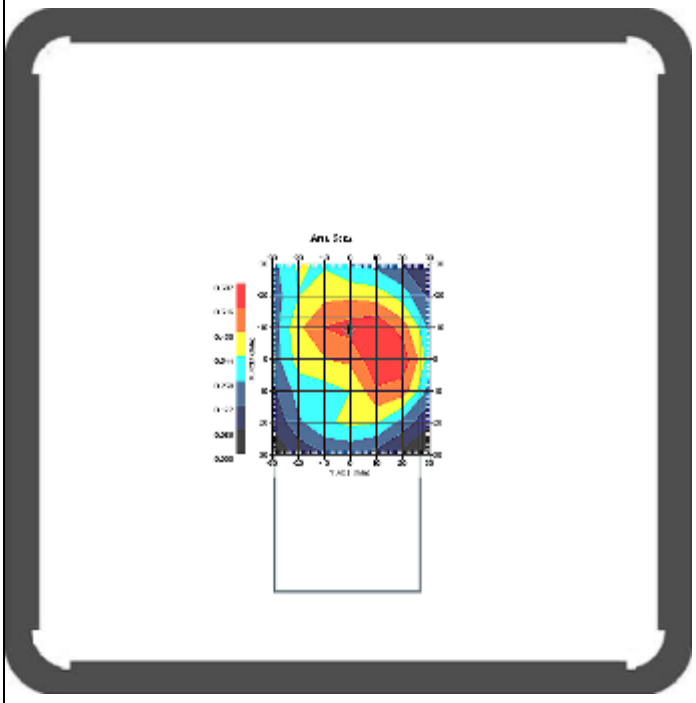
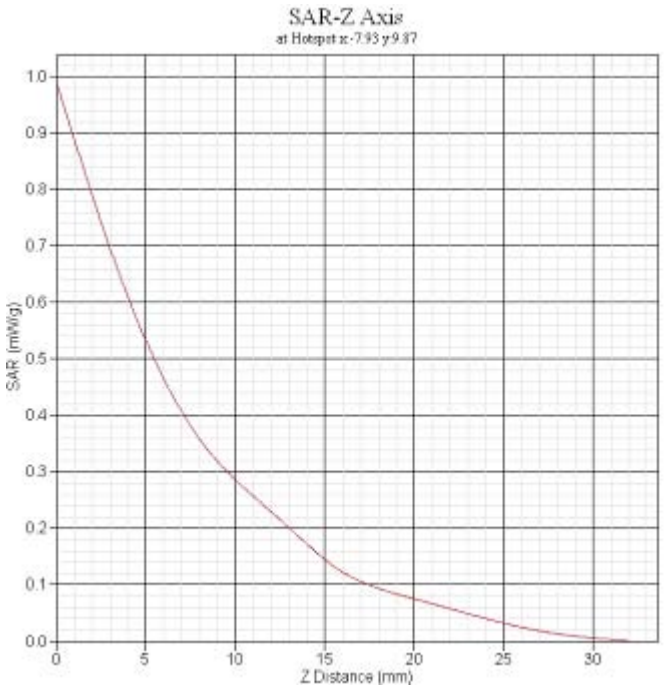
GPRS1900 body face CH512	
Frequency(MHz)	1850.2
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	-2.744
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	0.422
SAR 10g(W/Kg)	0.226

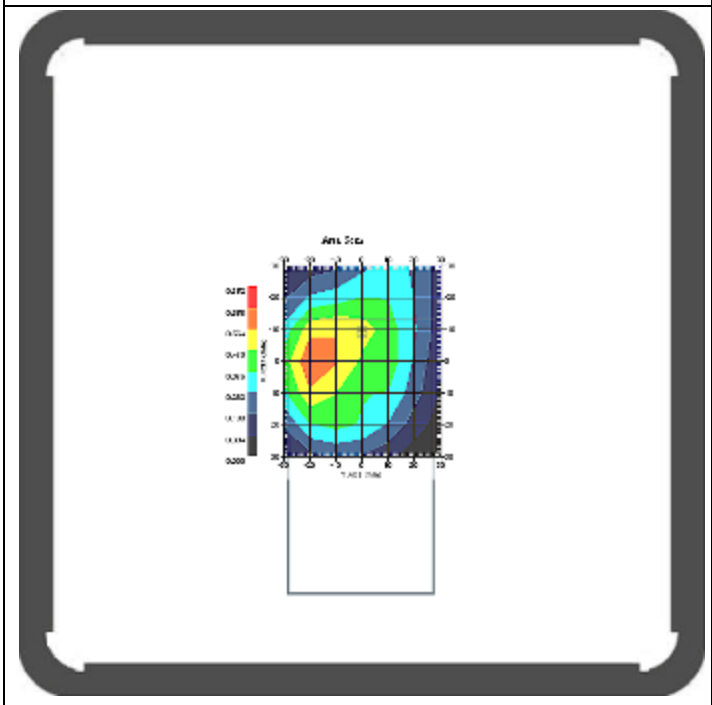
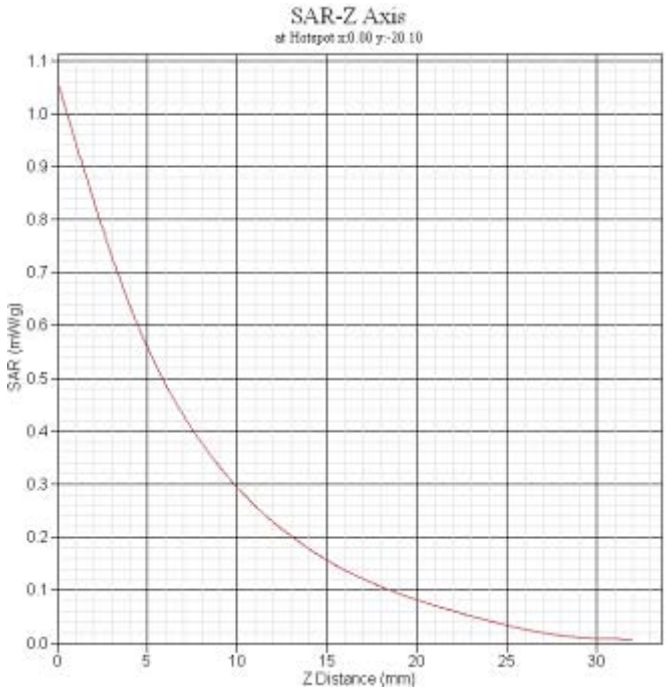
GPRS1900 body face CH810	
Frequency(MHz)	1909.8
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	-2.611
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	0.464
SAR 10g(W/Kg)	0.247

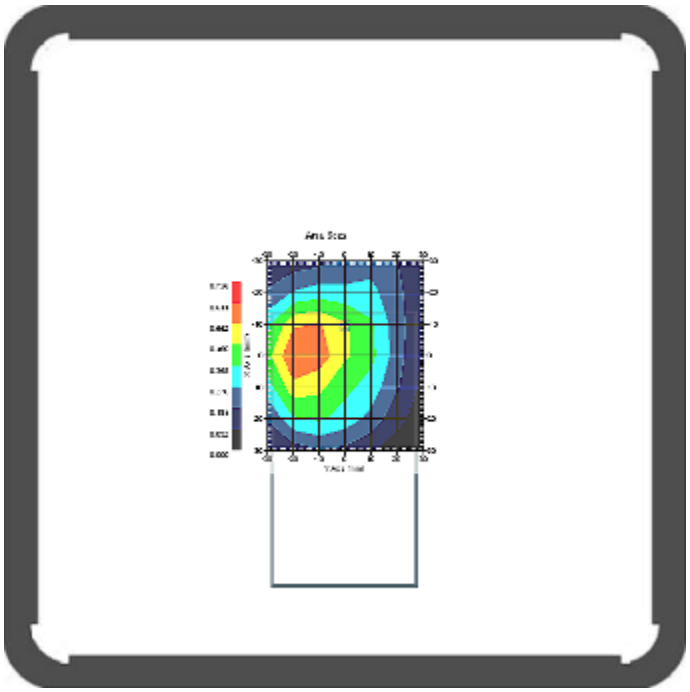
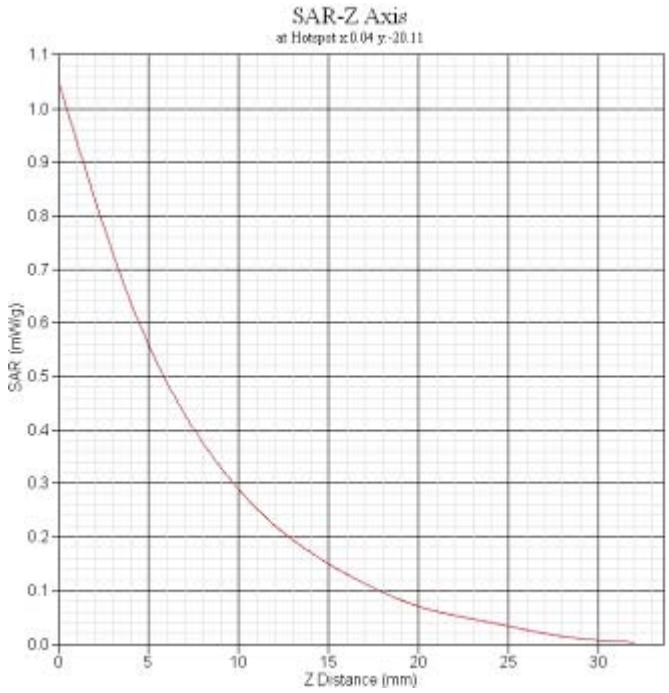
GSM1900 body face CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	0.191
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	0.267
SAR 10g(W/Kg)	0.129

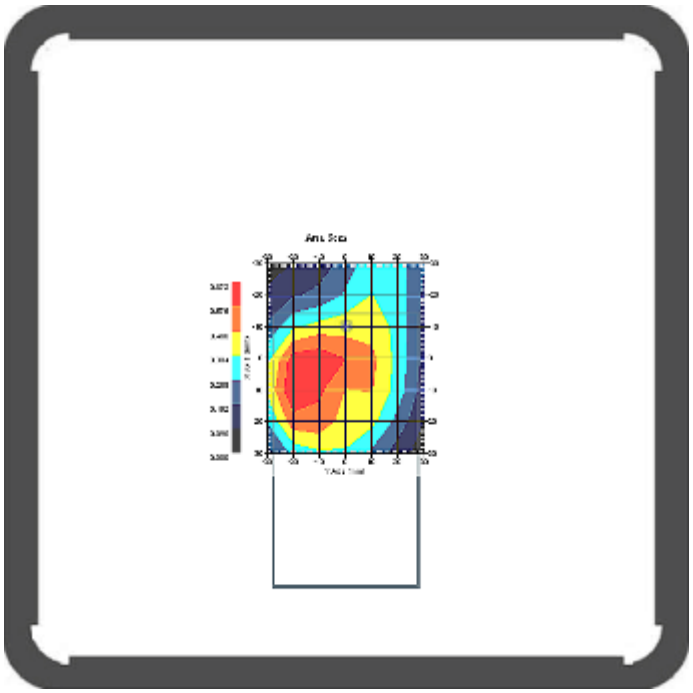
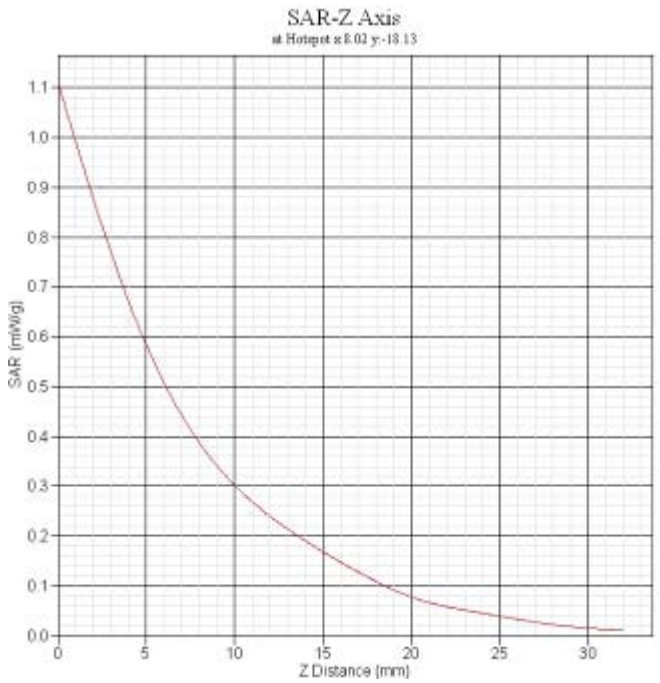
GSM1900 body face CH661+earphone	
Frequency(MHz)	1880.0
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	2.782
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-09
	
SAR 1g(W/Kg)	0.256
SAR 10g(W/Kg)	0.144

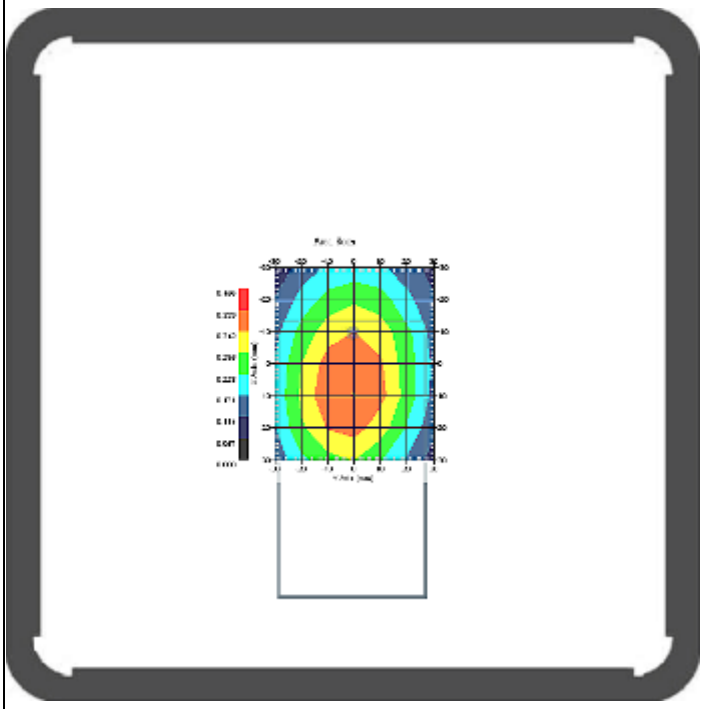
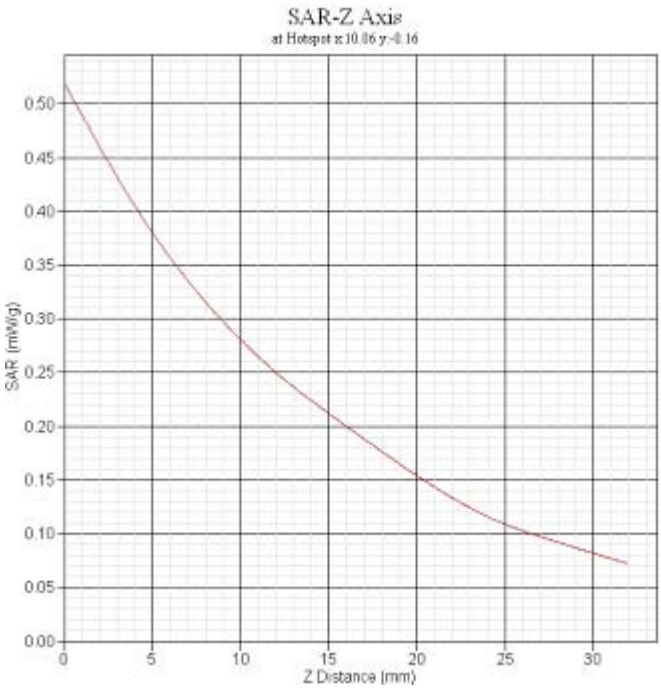
WCDMA Band Ⅱ body face CH9400	
Frequency(MHz)	1880.0
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	-2.226
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.606
SAR 10g(W/Kg)	0.323

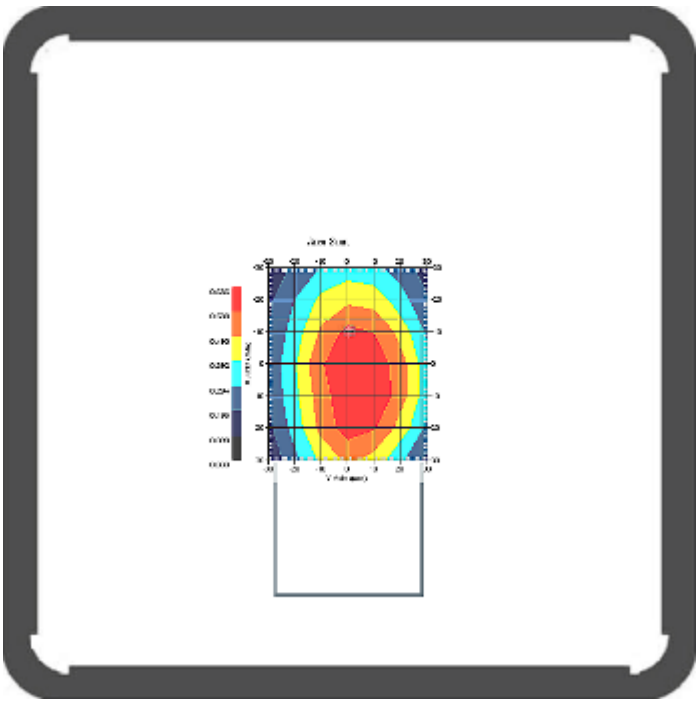
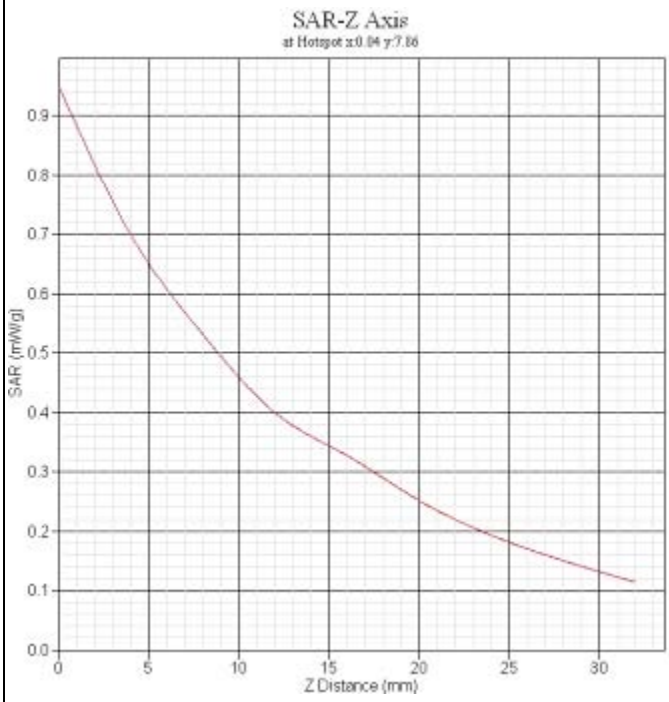
WCDMA Band Ⅱ body bottom CH9400	
Frequency(MHz)	1880.0
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	-2.223
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.585
SAR 10g(W/Kg)	0.315

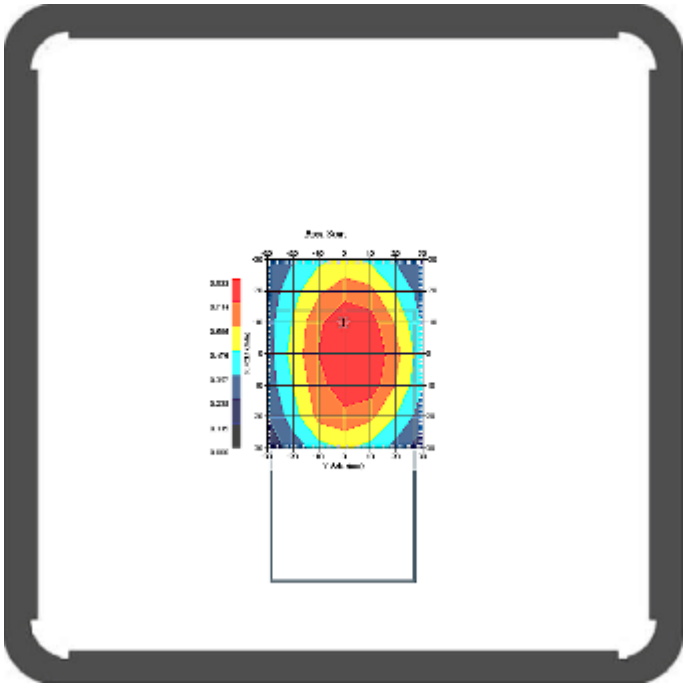
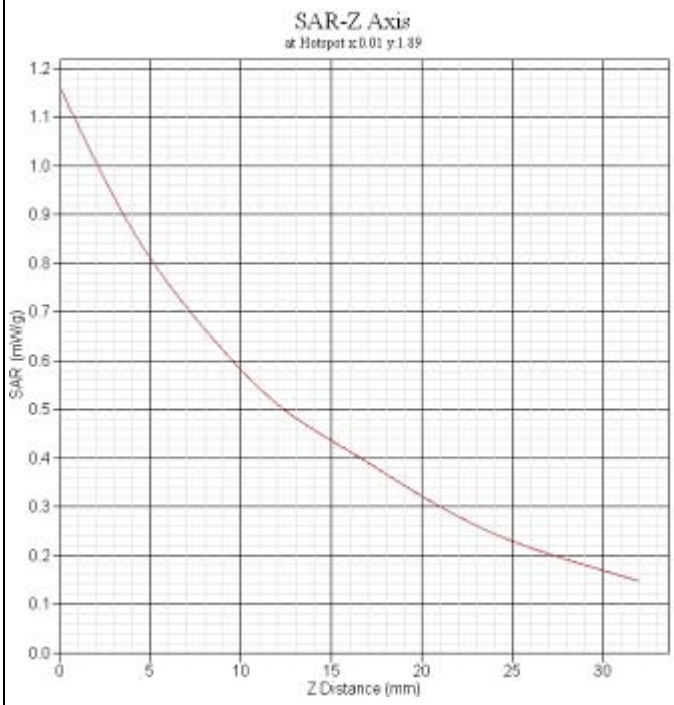
WCDMA Band Ⅱ body face CH9262	
Frequency(MHz)	1852.4
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	0.758
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.596
SAR 10g(W/Kg)	0.313

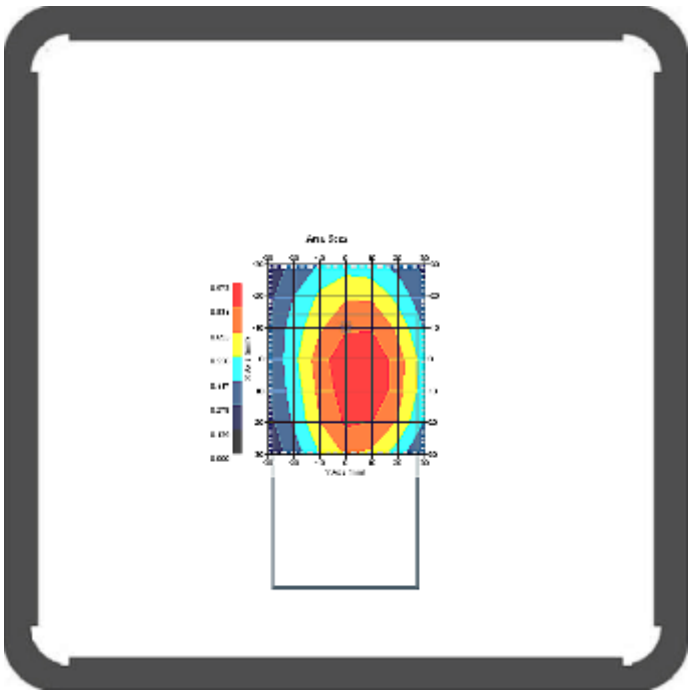
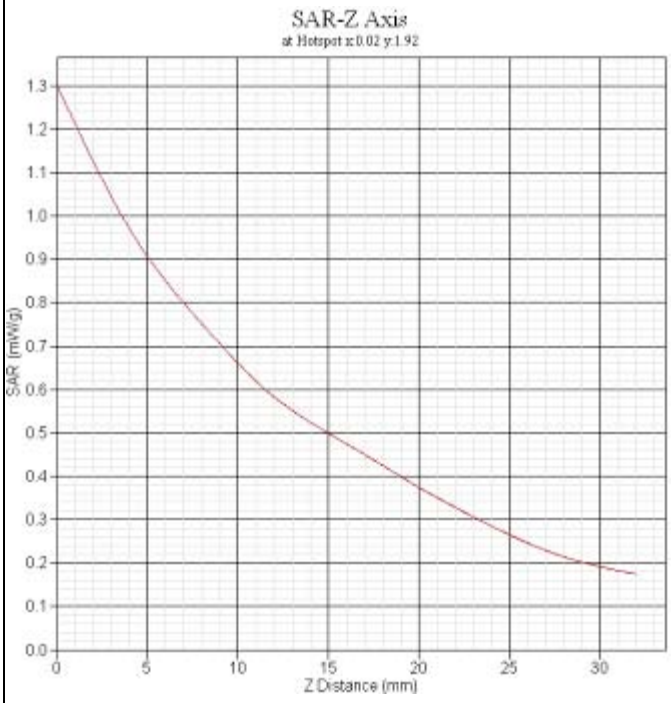
WCDMA Band Ⅱ body face CH9538	
Frequency(MHz)	1907.6
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	-4.494
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.603
SAR 10g(W/Kg)	0.323

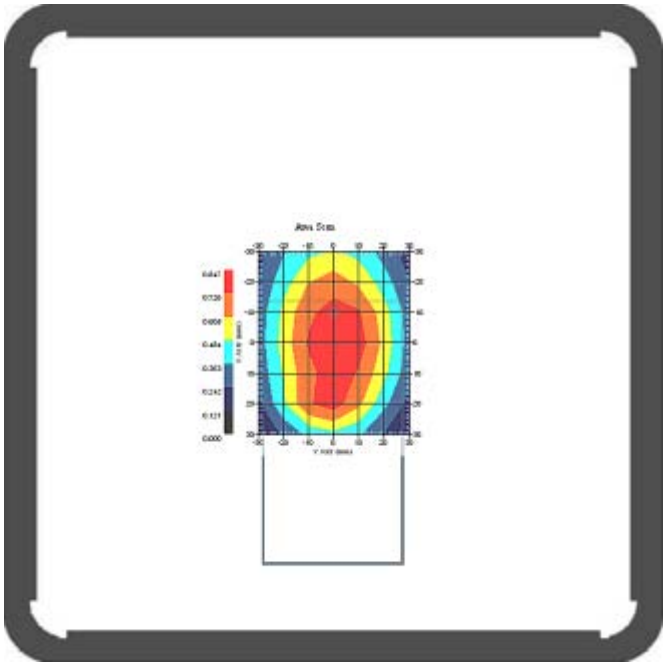
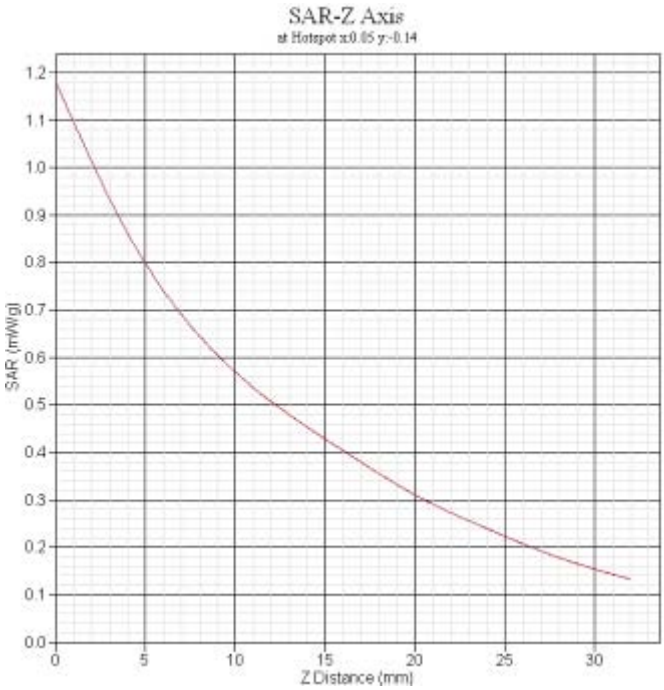
WCDMA Band Ⅱ body face CH9400+earphone	
Frequency(MHz)	1880.0
Relative permittivity(real part)	52.84
Conductivity(S/m)	1.55
Variation(%)	-4.029
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.570
SAR 10g(W/Kg)	0.334

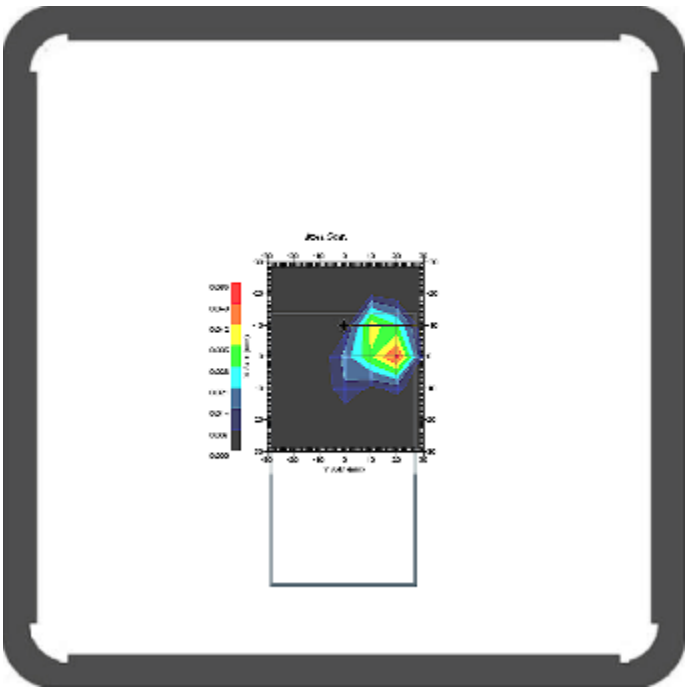
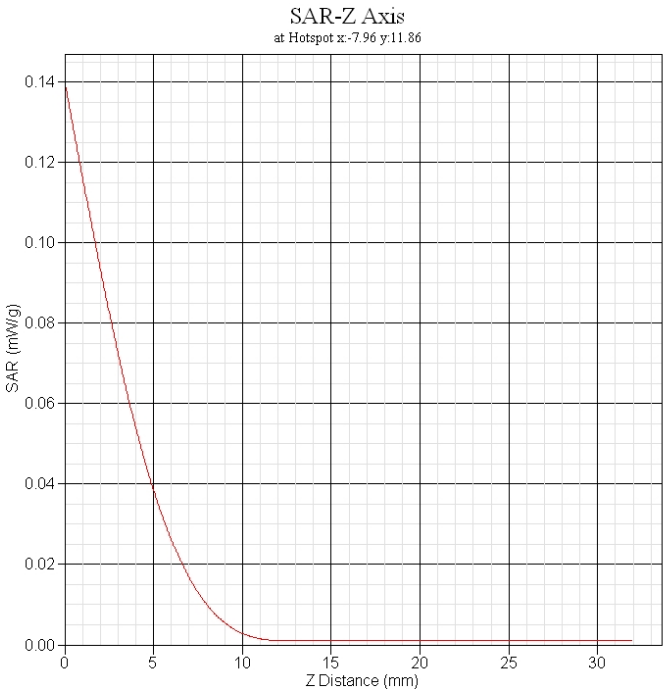
WCDMA Band Ⅴbody face CH4182	
Frequency(MHz)	836.4
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	-1.701
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.380
SAR 10g(W/Kg)	0.263

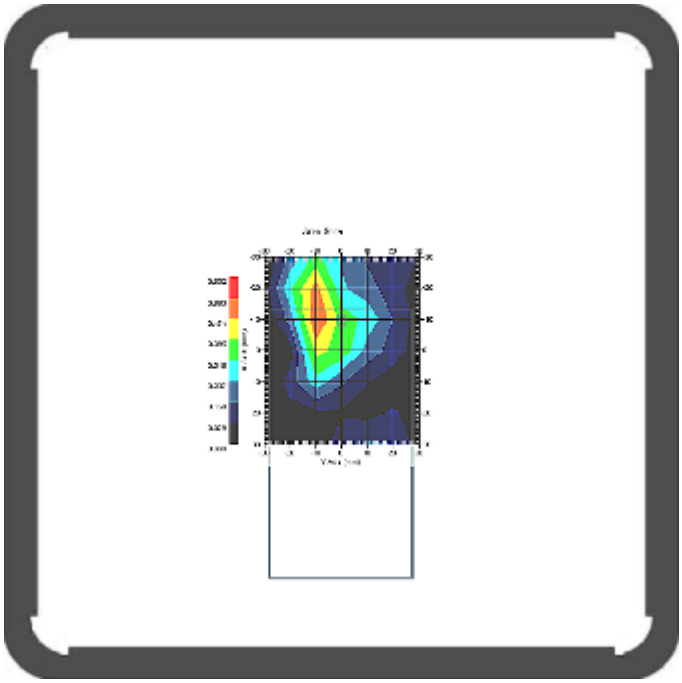
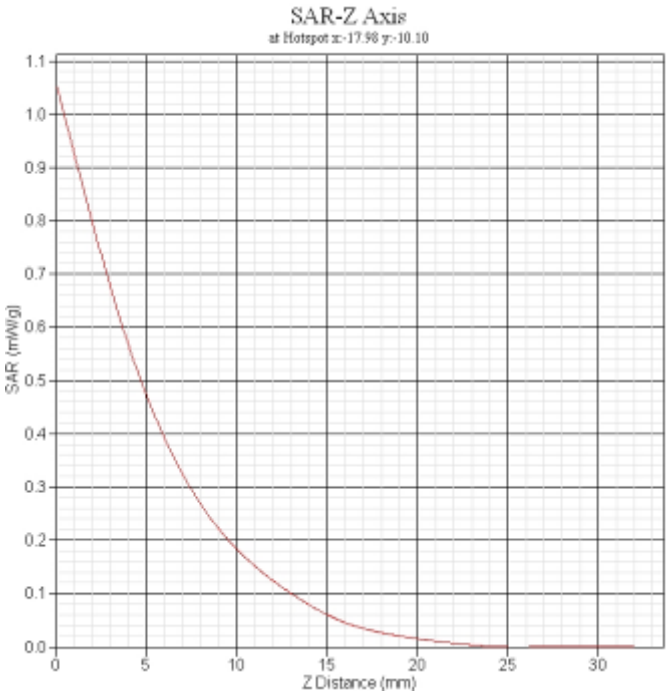
WCDMA Band Ⅴbody bottom CH4182	
Frequency(MHz)	836.4
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	-1.558
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.674
SAR 10g(W/Kg)	0.441

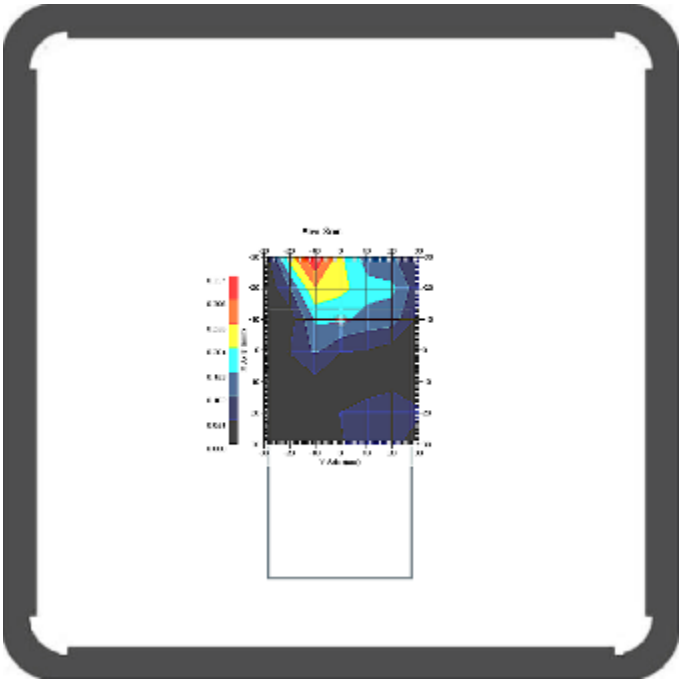
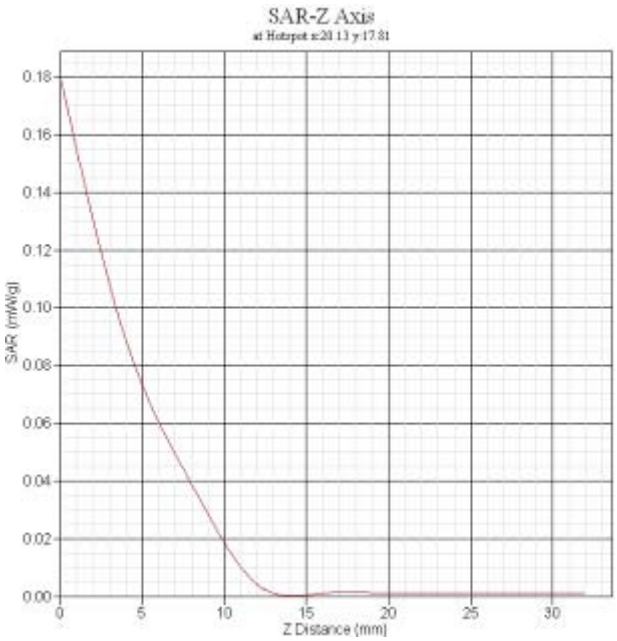
WCDMA Band Ⅴbody bottom CH4132	
Frequency(MHz)	826.4
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	-1.289
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.823
SAR 10g(W/Kg)	0.566

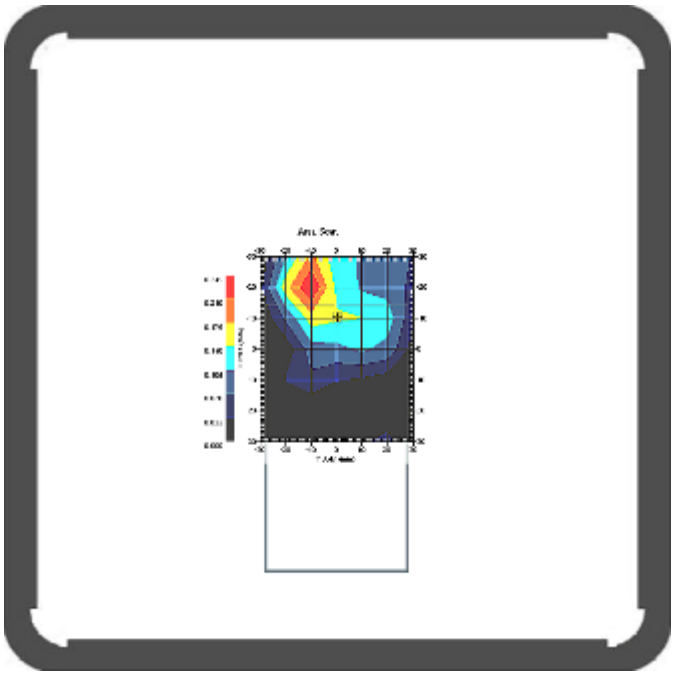
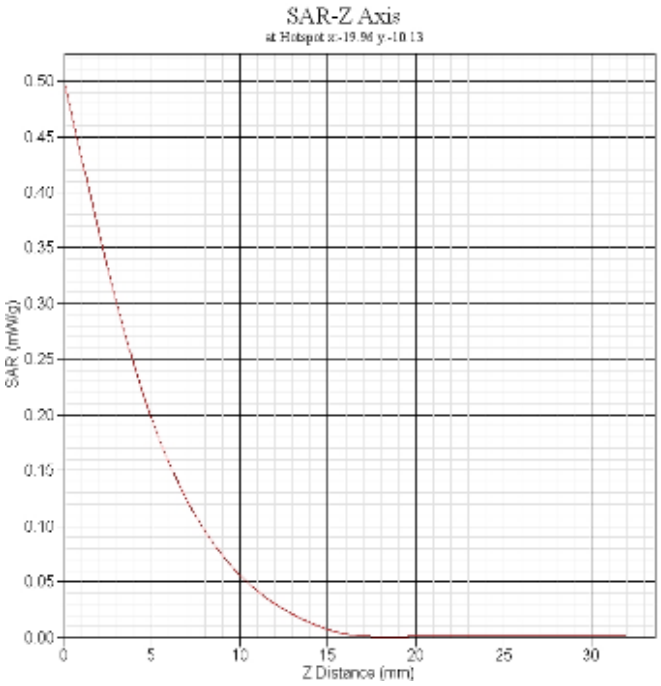
WCDMA Band Ⅴbody bottom CH4233	
Frequency(MHz)	846.6
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	1.636
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.934
SAR 10g(W/Kg)	0.646

WCDMA Band Ⅴbody bottom CH4233+earphone	
Frequency(MHz)	846.6
Relative permittivity(real part)	54.92
Conductivity(S/m)	0.96
Variation(%)	1.830
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μV/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.826
SAR 10g(W/Kg)	0.561

802.11b body face CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	52.09
Conductivity(S/m)	1.92
Variation(%)	2.182
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.046
SAR 10g(W/Kg)	0.015

802.11b body bottom CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	52.09
Conductivity(S/m)	1.92
Variation(%)	2.918
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.408
SAR 10g(W/Kg)	0.201

802.11g body face CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	52.09
Conductivity(S/m)	1.92
Variation(%)	-1.222
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.080
SAR 10g(W/Kg)	0.032

802.11g body bottom CH6	
Frequency(MHz)	2437
Relative permittivity(real part)	52.09
Conductivity(S/m)	1.92
Variation(%)	-0.306
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-04-10
	
SAR 1g(W/Kg)	0.216
SAR 10g(W/Kg)	0.086