

SAR Test Report

Product Name : GSM 850/1900
GPRS\WIFI\BT Mobile Phone

Model No. : A1650
FCC ID : T38PCD1650

Prepared By : Inventec Appliances(Pudong) Corporation
Address: : No.789 Pu Xing Road,Shanghai,PRC
Date of Receipt : 2012.06.29
Date of Test : 2012.06.29-2012.07.04
Report No. : 20120629SAR



Test Report Certification

Date of Issue : Jul .10.2012

Report No. : 20120629SAR

Product Name : GSM 850/1900
GPRS\WIFI\BT Mobile Phone

Model No. : A1650

Trade Name : Claro; PCD

Applicant : Cellon Communications Technology (Shenzhen) Co.,Ltd.

Address : 13/F, Skyworth C Building, Gaoxin S.Ave1, Hi-Tech Industrial Park,
Nanshan District,

Standard : FCC 47 CFR Part2 (2.1093)
IEEE C95.1-1999
IEEE 1528-2003
FCC OET Bulletin 65 supplement C
FCC KDB 648474 D01 v01r05
FCC KDB 941225 D01 v02,FCC KDB 941225 D03 v01
FCC KDB 941225 D04 v01

Test Result : Head: 1.317W/kg(1g); 0.870W/kg(10g)
Body: 1.055W/kg(1g); 0.679W/kg(10g)

The Test Results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of
Inventec Appliances(Pudong) Corporation

Documented By :  , Jul.10.2012
Judy Ge/Engineer

Tested By :  , Jul.10.2012
Alice Lee/Engineer

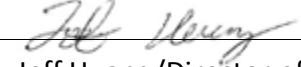
Approved By :  , Jul.10.2012
Jeff Huang/Director of Operations

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SAR TEST PHOTOGRAPHS	错误！未定义书签。

1. GENERAL INFORMATION

1.1. Applicant

Company Name: Cellon Communications Technology (Shenzhen) Co.,Ltd.

Address: 13/F, Skyworth C Building, Gaoxin S.Ave1, Hi-Tech Industrial Park, Nanshan District,

1.2. Manufacturer

Company Name: Cellon Communications Technology (Shenzhen) Co.,Ltd.

Address: 13/F, Skyworth C Building, Gaoxin S.Ave1, Hi-Tech Industrial Park, Nanshan District,

1.3. Test Environment

Ambient conditions in the laboratory:

Items	Required	Actual
Temperature(°C)	15~30	21.4
Humidity(%RH)	30~70	46

2. SAR Measurement System

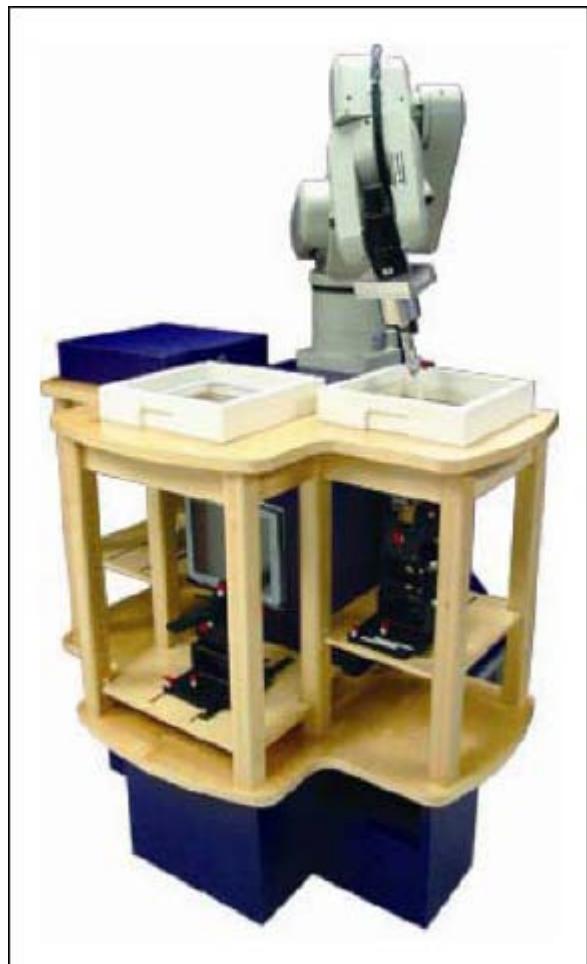
2.1. ALSAS-10U System Description

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

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

2.1.1. Applications

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



2.1.2. Area Scans

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

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

2.1.3. Zoom Scan (Cube Scan Averaging)

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

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

The zoom Scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 5x5x8 (8mmx8mmx5mm) providing a volume of 32mm in the X & Y axis, and 35mm in the Z axis.

2.1.4. ALSAS-10U Interpolation and Extrapolation Uncertainty

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

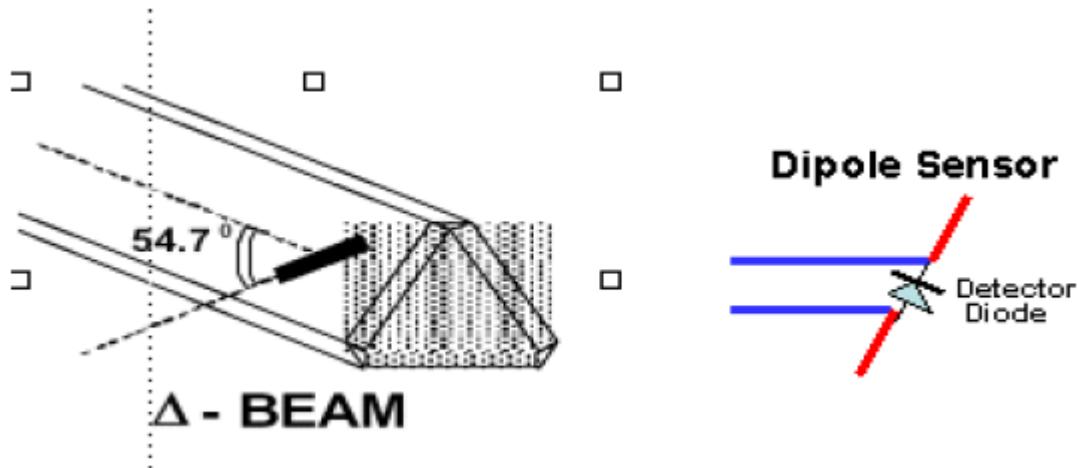
$$f_3(x, y, z) = A \frac{a^2}{\frac{a^2}{4} + x'^2 + y'^2} \cdot \left(e^{-\frac{2z}{a}} + \frac{a^2}{2(a + 2z)^2} \right)$$

2.2. Isotropic E-Field Probe

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

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

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



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

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

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

2.2.1. Isotropic E-Field Probe Specification

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

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

2.3. Boundary detection Unit and Probe Mounting Device

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

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

2.4. Daq-Paq (Analog to Digital Electronics)

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

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

2.5. Axis Articulated Robot

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



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

2.6. ALSAS Universal Workstation

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

2.7. Universal Device Positioner

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

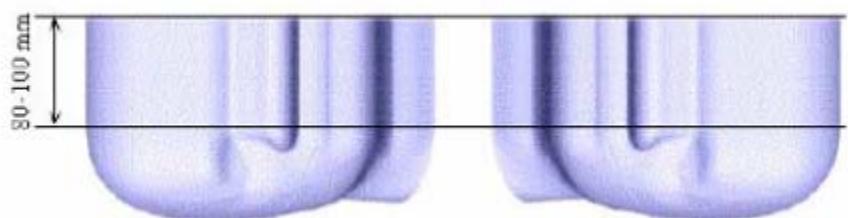


2.8. Phantom Types

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

2.8.1. APREL SAM Phantoms

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



2.8.2. APREL Laboratories Universal Phantom

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

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



3. Tissue Simulating Liquid

3.1. The composition of the tissue simulating liquid

INGREDIENT (% Weight)	850MHz	1900MHz	2450MHz	850MHz	1900MHz	2450MHz
	Head	Head	Head	Body	Body	Body
Water	40.45%	54.9%	55%	45.0%	70.17%	73.2%
Salt	1.45%	0.18%	0%	52.4%	0.39%	0%
Sugar	57.6%	0%	0%	1.4%	0%	0%
HEC	0.4%	0%	0%	1.0%	0%	0%
Preventol	0.1%	0%	0%	0.1%	0%	0%
DGBE	0%	44.92%	45%	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.(°C)
		ϵ_r	σ (s/m)	
850MHz	Reference result	41.5	0.90	NA
	+/-5% window	39.425to43.575	0.855to0.945	
	02-Jul-12	40.25	0.92	20.7
1900MHz	Reference result	40.0	1.40	NA
	+/-5% window	38to42	1.33 to 1.47	
	02-Jul-12	41.53	1.44	20.7
2450MHz	Reference result	39.2	1.80	NA
	+/-5% window	37.24to41.16	1.71to1.89	
	04-Jul-12	40.32	1.84	20.7

Body Tissue Simulate Measurement				
Frequency (MHz)	Description	Dielectric Parameters		Tissue Temp.(°C)
		ϵ_r	σ (s/m)	
850MHz	Reference result	55.2	0.97	NA
	+/-5% window	52.44to57.96	0.922to1.019	
	02-Jul-12	53.45	0.94	20.7
1900MHz	Reference result	53.3	1.52	NA
	+/-5% window	50.635to55.965	1.444to1.596	
	02-Jul-12	52.91	1.49	20.7
2450MHz	Reference result	52.7	1.95	NA
	+/-5% window	50.065to55.335	1.852to2.0475	
	04-Jul-12	53.41	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.

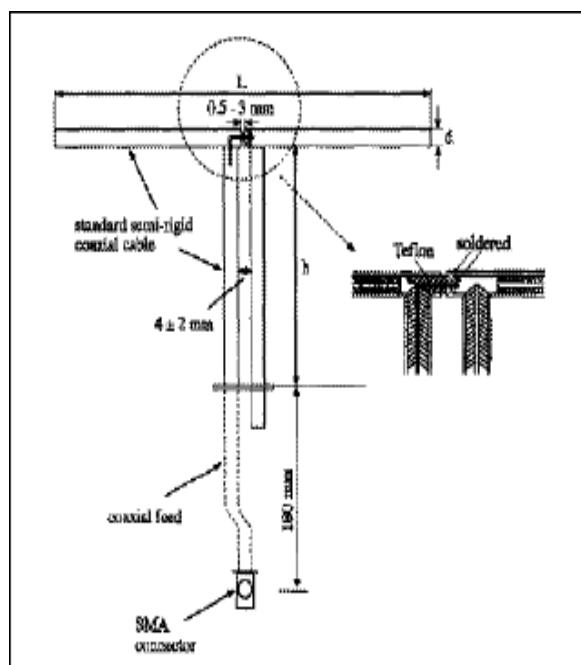
Target Frequency (MHz)	Head		Body	
	ϵ_r	σ (S/m)	ϵ_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	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 $\rho = 1000 \text{ Kg/m}^3$)

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&2450MHz				
Validation Kit: ASL-D-850-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
850MHz	Reference result	9.590	6.003	N/A
	+/-5%window	9.110to10.07	5.702to6.303	
	02-Jul-12 (1W)	9.475	5.863	20.7
Validation Kit: ASL-D-1900-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
1900MHz	Reference result	39.378	19.668	N/A
	+/-5%window	37.409to41.347	18.685to20.651	
	02-Jul-12 (1W)	38.638	19.278	20.7
Validation Kit: ASL-D-2450-S-2				
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
2450MHz	Reference result	52.456	23.603	N/A
	+/-5%window	49.833to55.078	22.423to24.783	
	04-Jul-12 (1W)	51.894	22.731	20.7
Note: All SAR values are normalized to 1 W forward power.				

Body System Performance Check at 850MHZ&1900MHz&2450MHz

Validation Kit: ASL-D-850-S-2

Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
850MHz	Reference result	9.981	6.006	N/A
	+/-5%window	9.482to10.48	5.706to6.306	
	02-Jul-12 (1W)	9.541	5.842	20.7

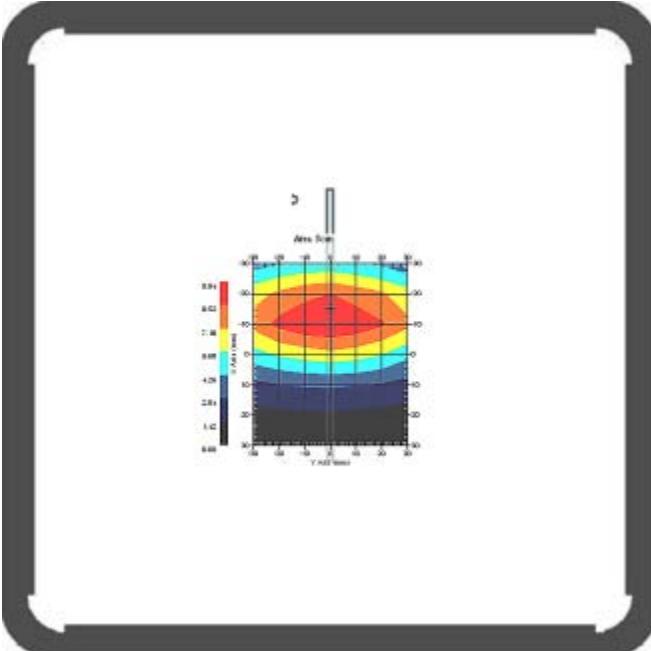
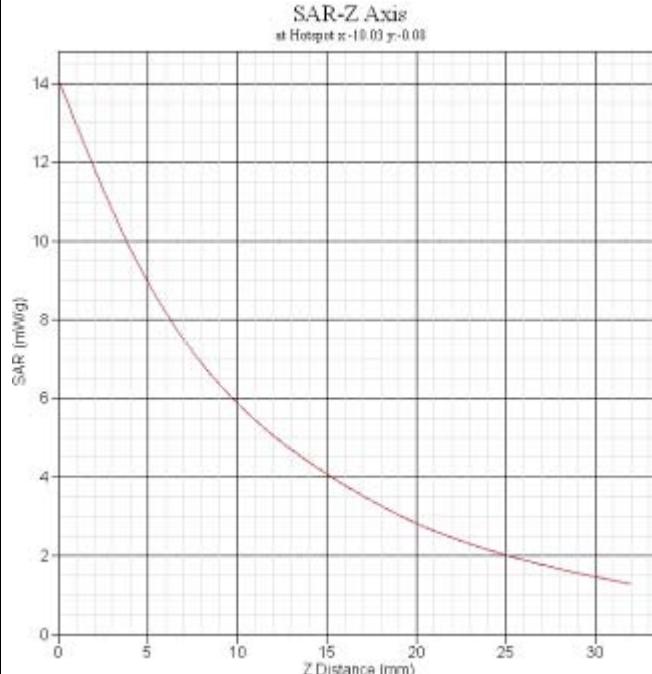
Validation Kit: ASL-D-1900-S-2

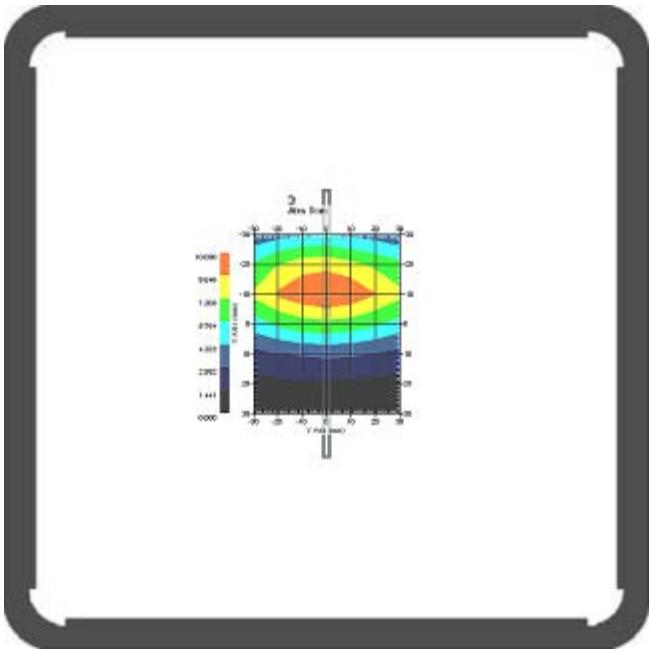
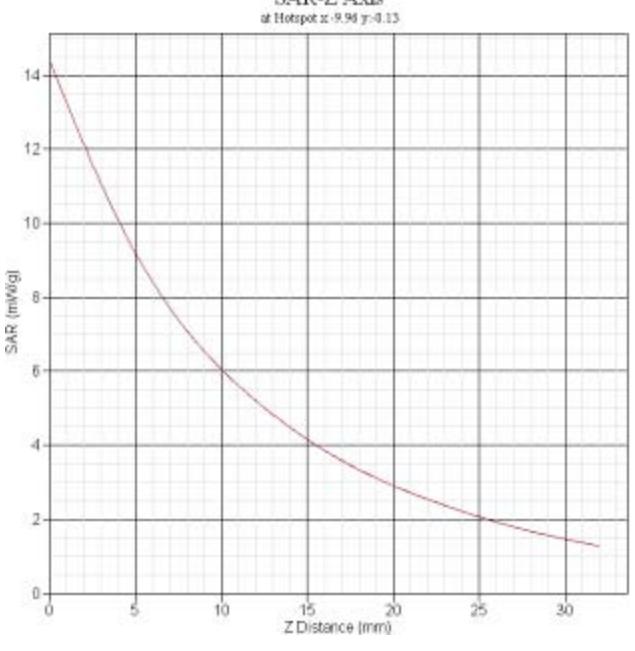
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
1900MHz	Reference result	39.654	19.668	N/A
	+/-5%window	37.671to41.637	18.685to20.651	
	02-Jul-12 (1W)	39.634	19.719	20.7

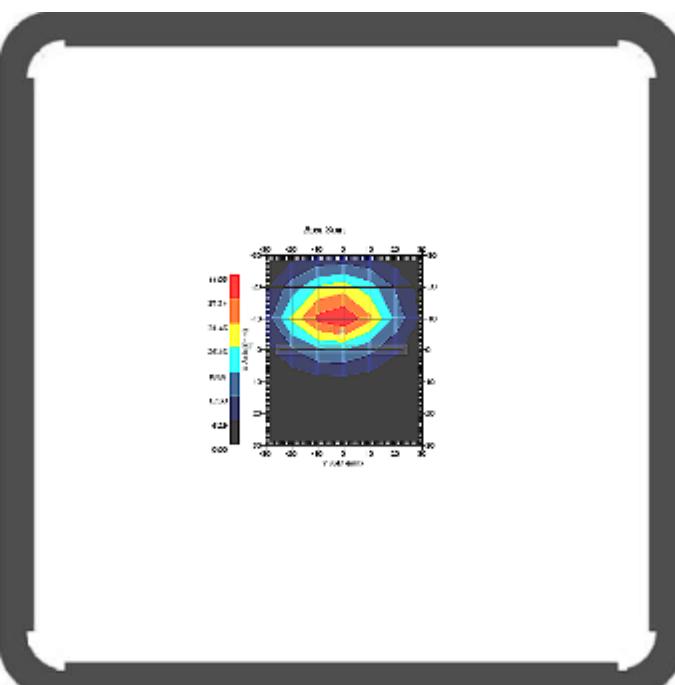
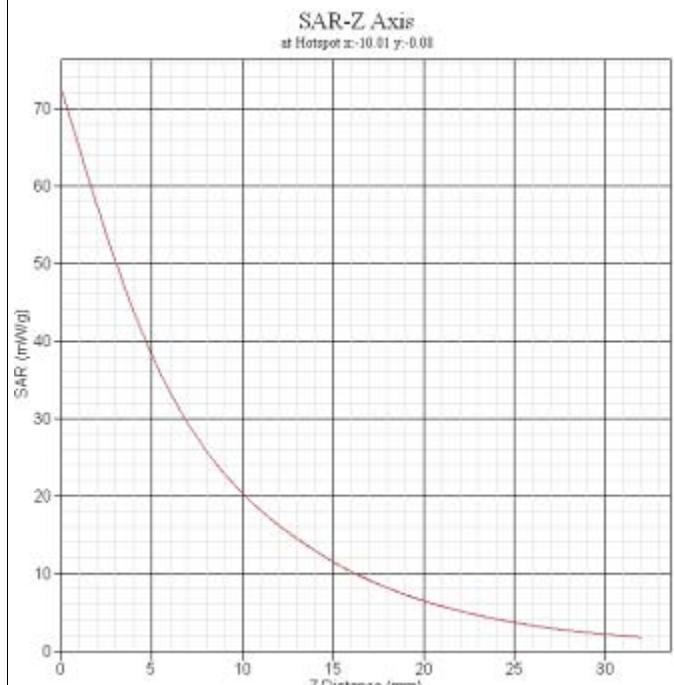
Validation Kit: ASL-D-2450-S-2

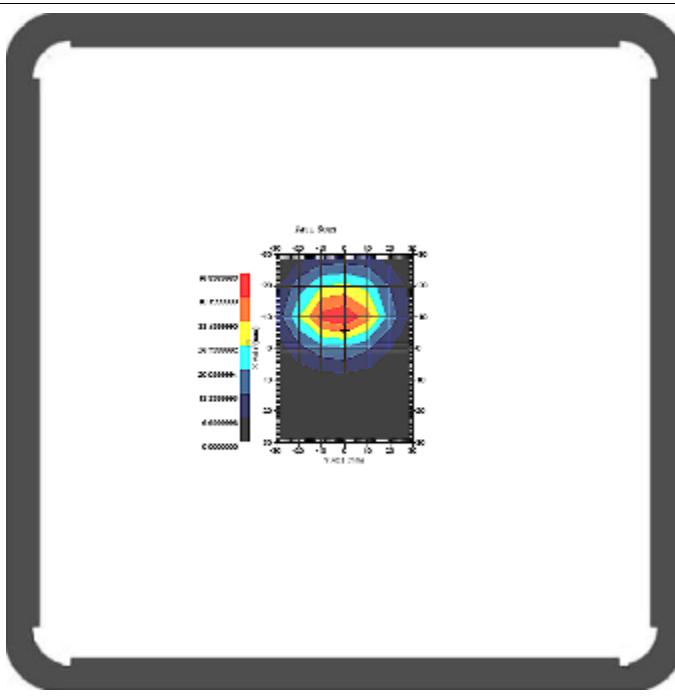
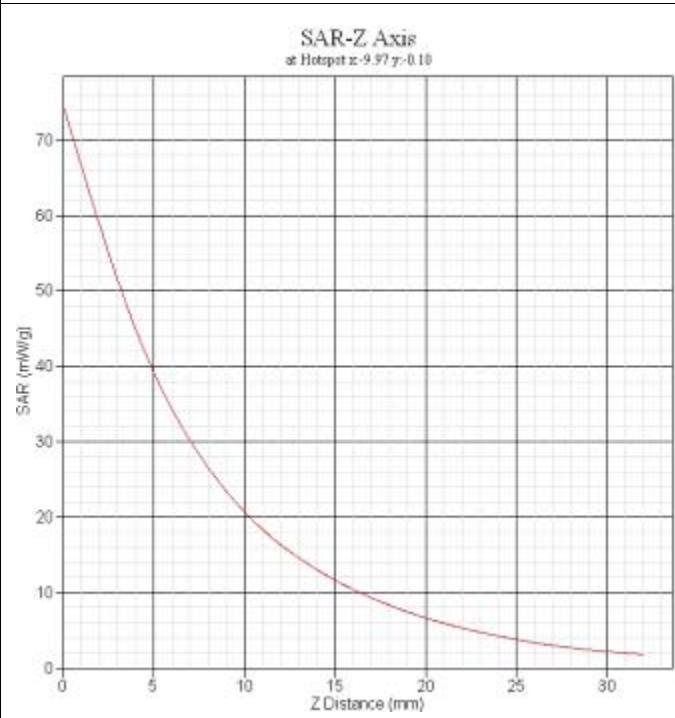
Frequency(MHz)	Description	SAR(W/Kg) 1g	SAR(W/Kg) 10g	Tissue Temp.(°C)
2450MHz	Reference result	52.592	24.461	N/A
	+/-5%window	49.962to55.222	23.238to25.684	
	02-Jul-12 (1W)	51.286	24.332	20.7

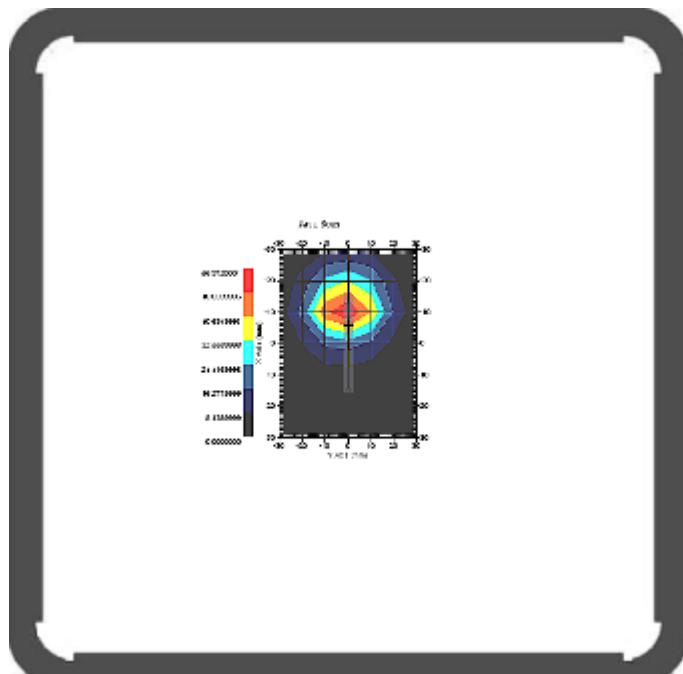
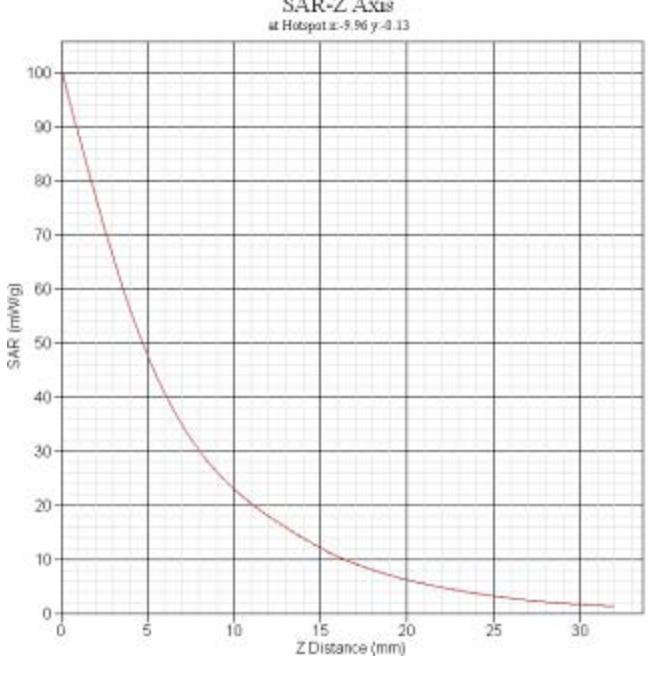
Note: All SAR values are normalized to 1W forward power.

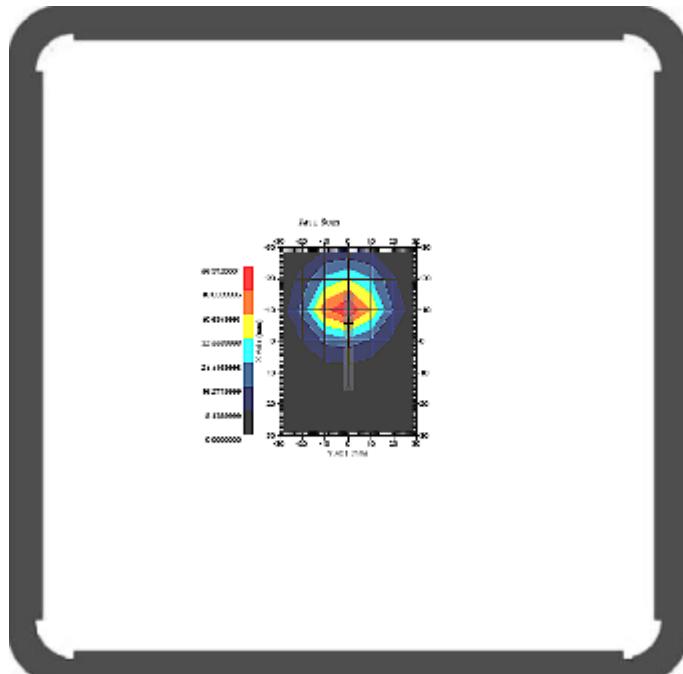
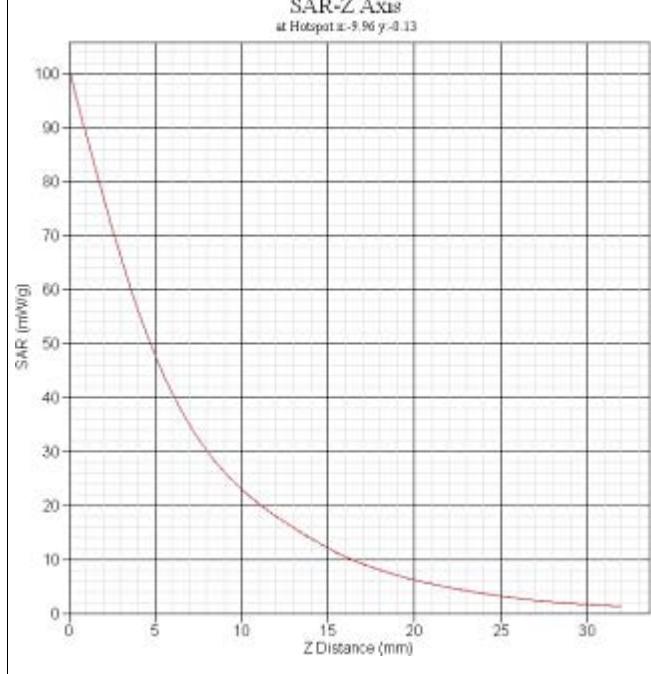
Frequency(MHz)	850
Relative permittivity(real part)	40.25
Conductivity(S/m)	0.92
Variation(%)	1.092
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-02
	
	
SAR 1g(W/Kg)	9.475
SAR 10g(W/Kg)	5.863

Frequency(MHz)	850
Relative permittivity(real part)	53.45
Conductivity(S/m)	0.94
Variation(%)	-1.543
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	2012-07-02
	<p>SAR-Z Axis at Hotspot x:-9.96 y:-0.13</p> 
SAR 1g(W/Kg)	9.541
SAR 10g(W/Kg)	5.842

Frequency(MHz)	1900
Relative permittivity(real part)	41.53
Conductivity(S/m)	1.44
Variation(%)	0.967
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	2012-07-02
	
	
SAR 1g(W/Kg)	38.638
SAR 10g(W/Kg)	19.278

Frequency(MHz)	1900
Relative permittivity(real part)	52.91
Conductivity(S/m)	1.49
Variation(%)	0.134
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	2012-07-02
	
	
SAR 1g(W/Kg)	39.634
SAR 10g(W/Kg)	19.719

Frequency(MHz)	2450
Relative permittivity(real part)	40.32
Conductivity(S/m)	1.84
Variation(%)	-0.092
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	2012-07-04
	
	
SAR 1g(W/Kg)	51.894
SAR 10g(W/Kg)	22.731

Frequency(MHz)	2450
Relative permittivity(real part)	53.41
Conductivity(S/m)	1.94
Variation(%)	-0.543
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	2012-07-04
	
	
SAR 1g(W/Kg)	51.286
SAR 10g(W/Kg)	24.332

4.2. Arrangement Assessment Setup

4.2.1. Test Positions of Device Relative to Head

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

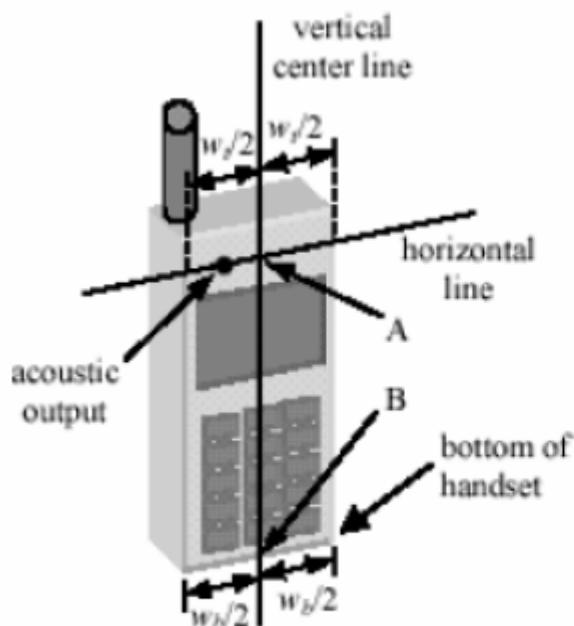


Figure 4.1a Internal Case

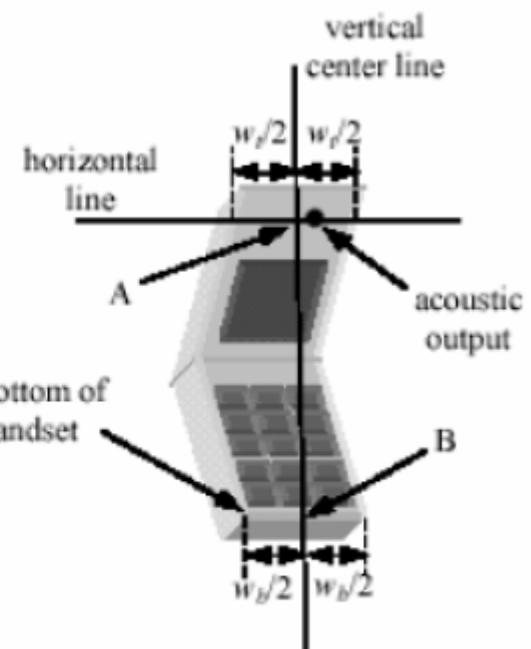


Figure 4.1b Clam Shell

4.2.2.1. Definition of the “Cheek” Position

The “cheek” position is defined as follows:

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

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

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

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

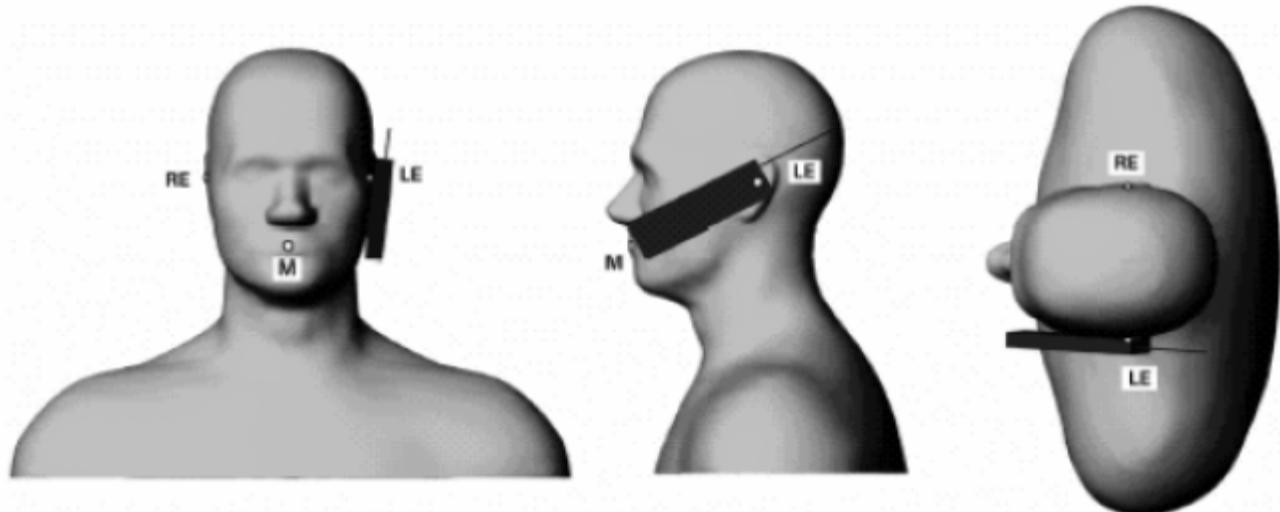


Figure 4.2 – Phone position 1, “cheek” or “touch” position.

4.2.1.2 Definition of the “Tilted” Position

The “tilted” position is defined as follows:

- a. Repeat steps (a) – (g) of 4.2.1.1 to place the device in the “cheek position”.
- b. While maintaining the orientation of the handset move the handset away from the

pinna along the line passing through RE and LE in order to enable a rotation of the handset by 15 degrees.

- c. Rotate the handset around the horizontal line by 15 degrees.
- d. While maintaining the orientation of the handset, move the handset towards the phantom on a line passing through RE and LE until any part of the handset touches the ear. The tilted position is obtained when the contact is on the pinna. If the contact is at any location other than the pinna (e.g. the antenna with the Back of the phantom head), the angle of the handset should be reduced. In this case, the tilted position is obtained if any part of the handset is in contact with the pinna as well as a second part of the handset is contact with the phantom (e.g. the antenna with Back of the head).

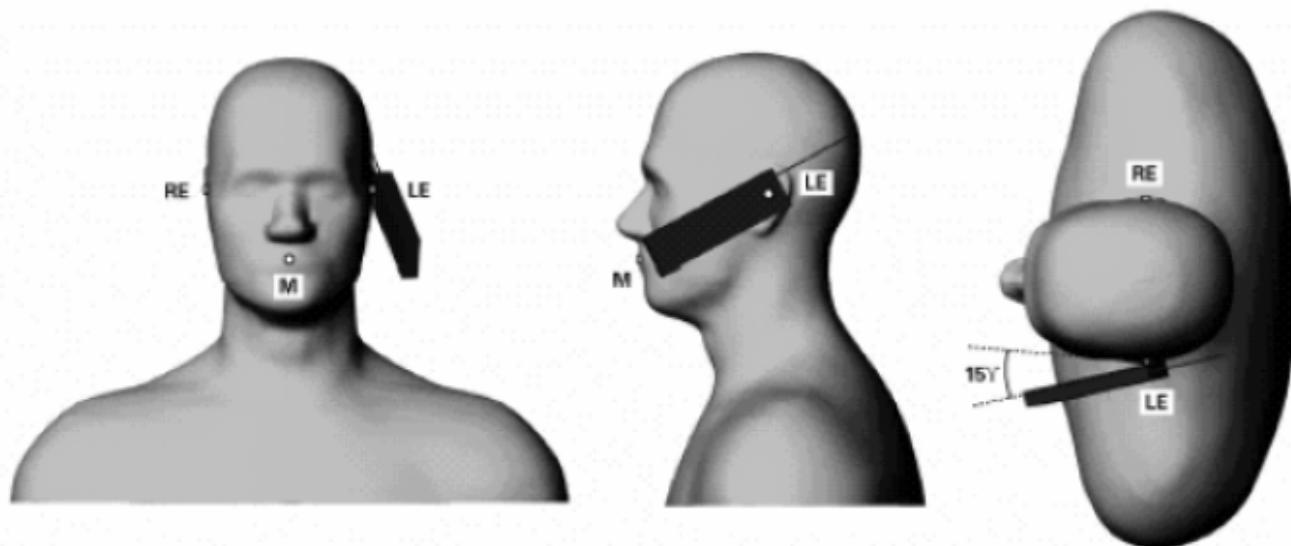


Figure 4.3 – Phone position 2, “tilted” position.

4.2.2. Test Positions for body-worn

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

4.3. SAR Measurement Procedure

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

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

σ :represents the simulated tissue conductivity

ρ :represents the tissue density

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

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

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

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

5. SAR Exposure Limits

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

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

6. Test Equipment List

Instrument	Manufacture	Model No.	Serial No.	Last Calibration
Universal Work Station	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-1900-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, except validation dipole antenna of every 3 years.

7. Measurement Uncertainty

Exposure Assessment Measurement Uncertainty

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

Liquid Conductivity(meas.)	0.0	normal	1	0.7	0.5	0.0	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7	1.4
Liquid Permittivity(meas.)	2.4	normal	1	0.6	0.5	1.4	1.2
Combined Uncertainty		RSS				9.3	9.2
Combined Uncertainty (coverage factor=2)		Normal(k=2)				18.7	18.3

8. 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 Mobile Phone								
Test Mode: GSM850								
Test Position Head	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)			
		Channel	MHz					
Left-Cheek	Internal	189	836.4	1.246	1.6			
Left-Tilted	Internal	189	836.4	0.567	1.6			
Right- Cheek	Internal	189	836.4	1.301	1.6			
Right -Tilted	Internal	189	836.4	0.593	1.6			
Left-Cheek	Internal	128	824.2	1.199	1.6			
Left-Cheek	Internal	251	848.8	1.028	1.6			
Right- Cheek	Internal	128	824.2	1.317	1.6			
Right- Cheek	Internal	251	848.8	1.264	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 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	0.697	1.6			
Left- Tilted	Internal	661	1880.0	0.232	1.6			
Right-Cheek	Internal	661	1880.0	0.976	1.6			
Right -Tilted	Internal	661	1880.0	0.176	1.6			
Right-Cheek	Internal	512	1850.2	1.109	1.6			
Right-Cheek	Internal	810	1909.8	1.104	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 Mobile Phone								
Test Mode: 802.11b								
Test Position Head	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)			
		Channel	MHz					
Left-Cheek	Internal	11	2462	0.022	1.6			
Left-Tilted	Internal	11	2462	0.034	1.6			
Right- Cheek	Internal	11	2462	0.032	1.6			
Right -Tilted	Internal	11	2462	0.048	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: GPRS850+earphone								
Test Position Body	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)			
		Channel	MHz					
Body face	Internal	189	836.4	0.731	1.6			
Body back	Internal	189	836.4	1.055	1.6			
Body back	Internal	128	824.2	0.769	1.6			
Body back	Internal	251	848.8	0.891	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: GPRS 1900+earphone								
Test Position Body	Antenna Position	Frequency		SAR 10g (W/kg)	Limit (W/kg)			
		Channel	MHz					
Body face	Internal	661	1880.0	0.363	1.6			
Body back	Internal	661	1880.0	0.553	1.6			
Body back	Internal	512	1850.2	0.627	1.6			
Body back	Internal	810	1909.8	0.426	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: 802.11b								
Test Position Body	Antenna Position	Frequency		SAR 1g (W/kg)	Limit (W/kg)			
		Channel	MHz					
Body face	Internal	11	2462	0.011	1.6			
Body back	Internal	11	2462	0.101	1.6			

Note:

1. Per KDB 648474, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary
2. Per KDB 248227, 11G output power is less than 1/4 dB, also less than 11B mode, thus the SAR can be excluded.

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	31.21	31.26	31.17	27.46	27.49	27.45

Band	Conducted Power (dBm)			Factor (dB)	Average Power (dBm)		
	128	189	251		128	189	251
Frequency(MHz)	824.2	836.4	848.8		824.2	836.4	848.8
GPRS8(1up)	31.01	31.18	31.15	-9.03	21.98	22.15	22.12
GPRS10(2up)	29.33	29.38	29.30	-6.02	23.31	23.36	23.28
GPRS12(4up)	28.41	28.47	28.43	-3.01	25.40	25.46	25.42

Band	Conducted Power (dBm)			Factor (dB)	Average Power (dBm)		
	512	661	810		512	661	810
Frequency(MHz)	1850.2	1880.0	1909.8		1850.2	1880.0	1909.8
GPRS8(1up)	27.39	27.43	27.40	-9.03	18.36	18.40	18.37
GPRS10(2up)	25.78	25.90	25.73	-6.02	19.76	19.88	19.71
GPRS12(4up)	24.91	24.97	24.89	-3.01	21.90	21.96	21.88

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

Bluetooth Function:

The distance between BT antenna and GSM antenna is 6.2cm.



The conducted power for BT antenna is as following:

Channel	Frequency	Bluetooth RF Output Power (dBm)		
		Data Rate / Modulation		
		GFSK	$\pi/4$ -DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	-2.11	-2.88	-2.93
Ch39	2441MHz	0.18	-0.54	-0.61
Ch78	2480MHz	0.77	0.08	0.10

The BT conduct Power is 1.19mW <12mW(PRef) and its antenna is >5 cm from other antenna. we can draw the conclusion that: SAR for BT is not required.

WIFI Function:

The distance between wifi antenna and GSM antenna is 6.2cm.



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	14.97	14.96	14.98	14.85
CH 06	2437 MHz	15.23	15.20	15.42	15.53
CH 11	2462 MHz	15.60	15.62	15.82	15.76

Channel	Frequency	2.4GHz 802.11g RF Power (dBm)							
		At OFDM Data Rate							
		6	9	12	18	24	36	48	54
		Mbps	Mbps	Mbps	Mbps	Mbps	Mbps	Mbps	Mbps
CH01	2412MHz	12.29	12.25	12.28	12.32	12.18	11.97	11.99	11.98
CH06	2437MHz	12.11	12.15	12.15	12.40	12.32	12.26	12.32	12.29
CH11	2462MHz	12.45	12.40	12.43	12.41	12.15	12.12	12.14	12.06

Note:

1. Per 2010/4 TCB workshop, choose the highest output power channel to test SAR and determine further SAR exclusion, 11B power is bigger than 11G, so we choose 11B CH11 here. (Data rate: 5.5Mbps is the biggest)
2. Per KDB 248227, 11G output power is less than 1/4 dB, also less than 11B mode, thus the SAR can be excluded.

8.3. Simultaneous Multi-band Transmission

Maximum SAR list for each band and position

	GSM 850	GSM 1900	802.11 b/g	Max.SAR Summation	Result
Left-Cheek	1.246	0.697	0.022	1.268	pass
Left- Tilted	0.567	0.232	0.034	0.061	pass
Right-Cheek	1.301	0.976	0.032	1.333	pass
Right -Tilted	0.593	0.176	0.048	0.641	pass
Left-Cheek	1.199				pass
Left-Cheek	1.028				pass
Right-Cheek	1.317	1.109			pass
Right-Cheek	1.264	1.104			pass
Body Front	0.731	0.363	0.011	0.742	pass
Body Back	1.055	0.627	0.101	1.156	pass

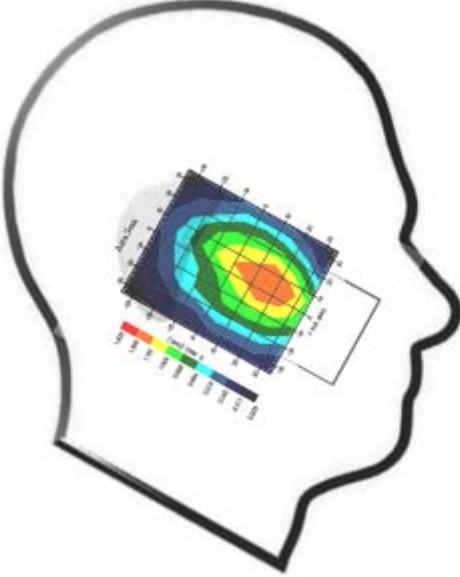
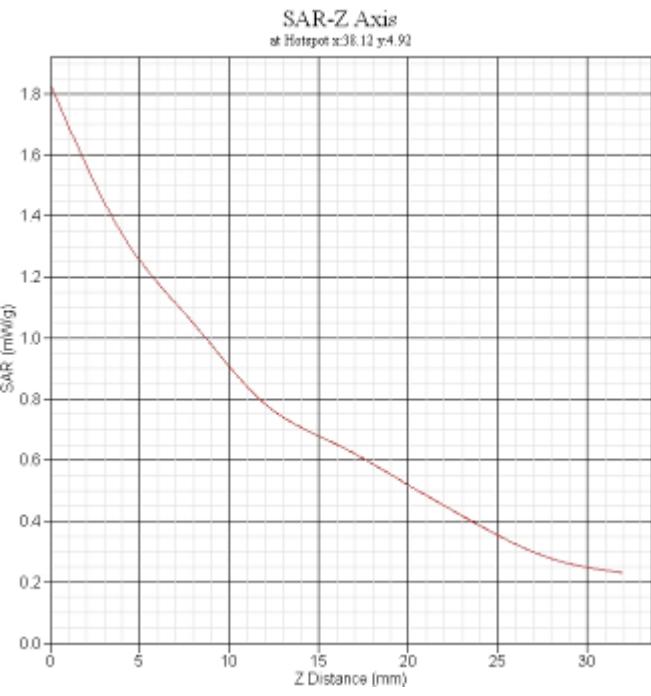
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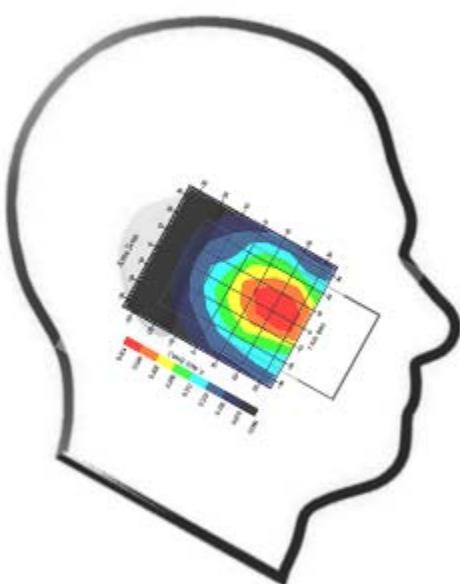
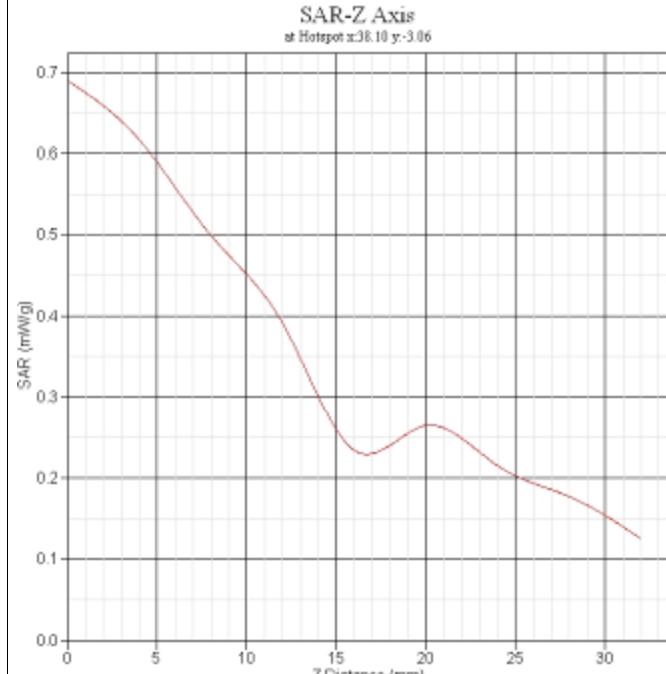
1. The maximum SAR summation is calculated based on the same configuration and test position.
2. According to KDB 648474, for 1-g SAR scalar summation <1.6W/kg, simultaneous SAR measurement is not necessary.

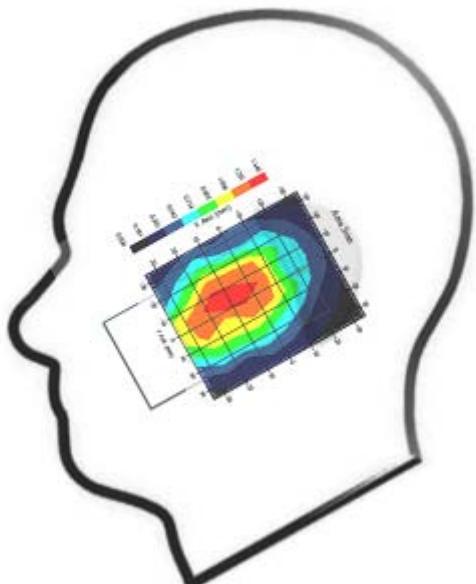
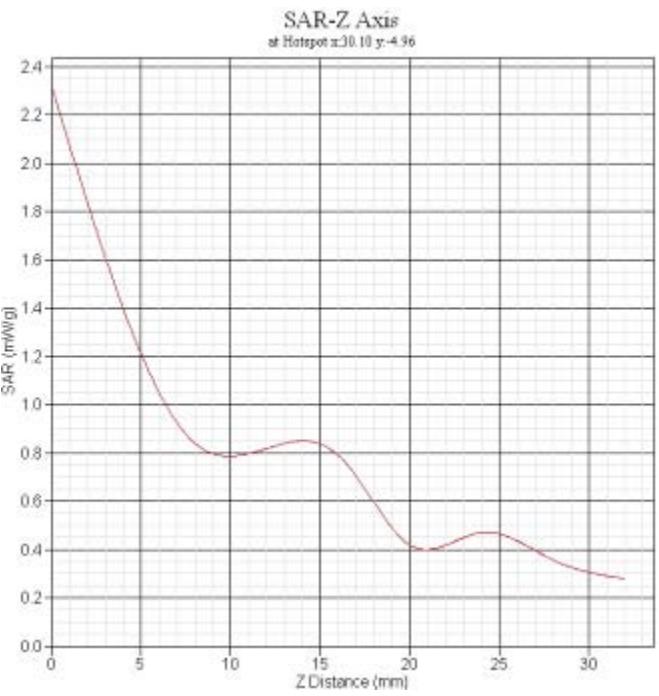
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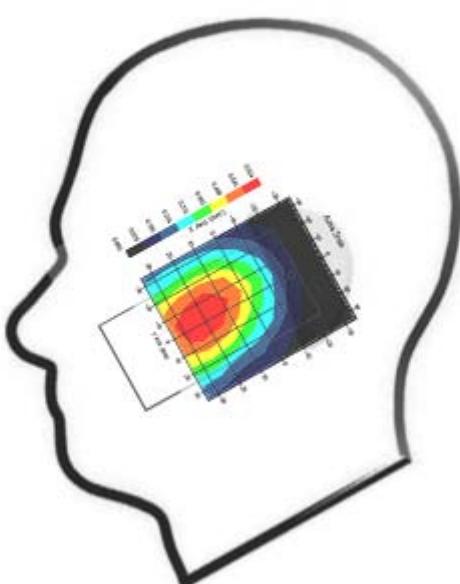
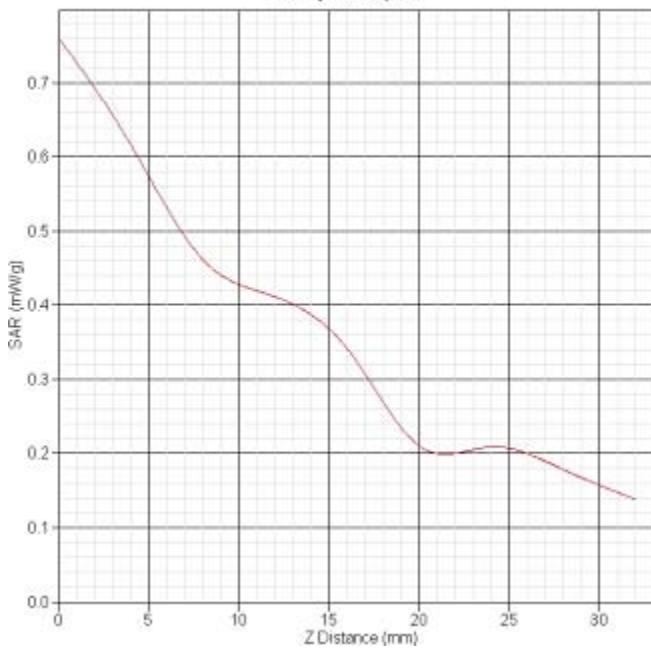
- [1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”
- [2] IEEE Std. C95.1-1999, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, 1999
- [3] IEEE Std. 1528-2003, “Recommended 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

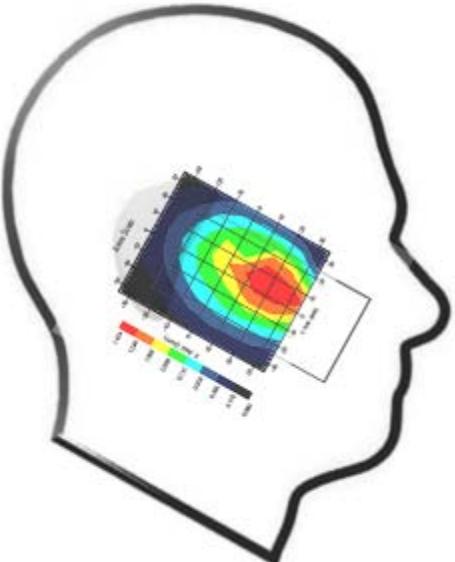
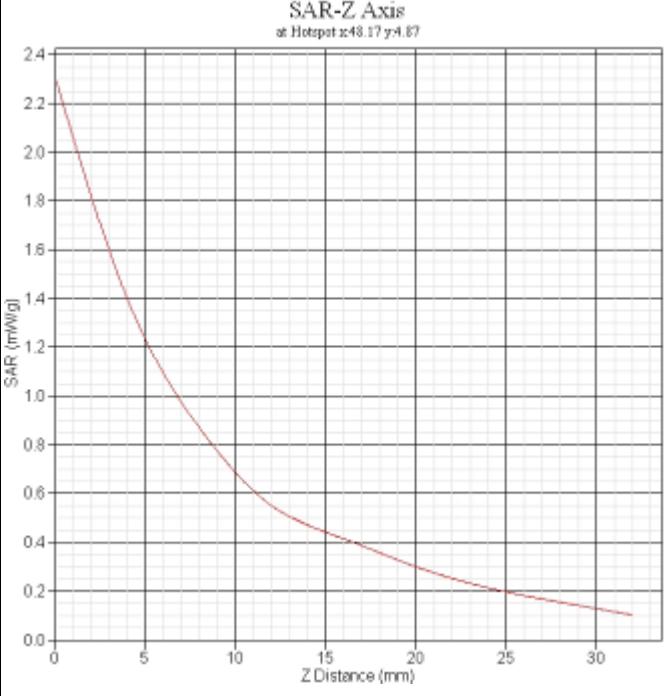
8.4. SAR Measurement Data

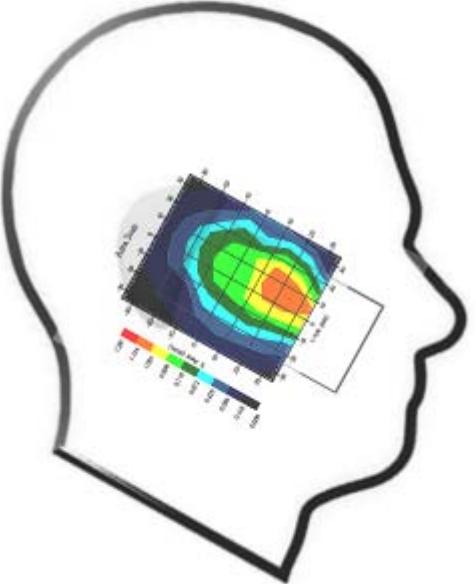
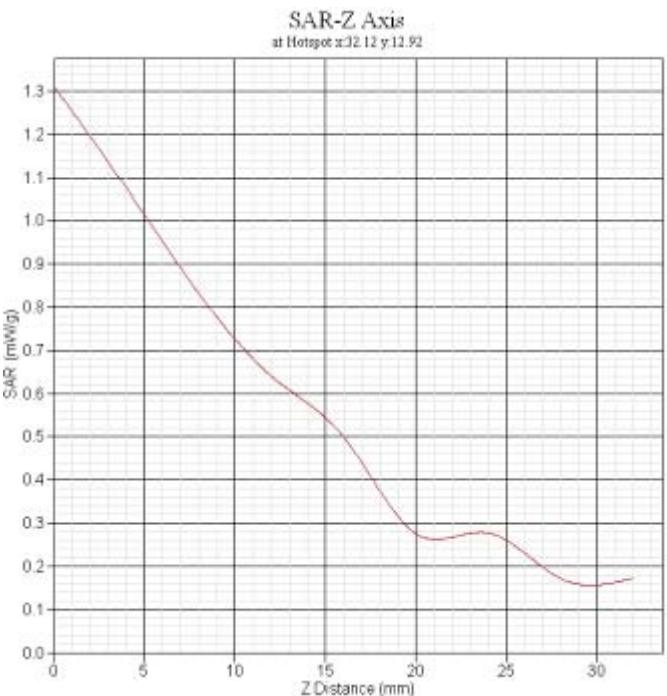
GSM850 left cheek ch189	
Frequency(MHz)	836.4
Relative permittivity(real part)	40.25
Conductivity(S/m)	0.92
Variation(%)	-2.404
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-02
	
	
SAR 1g(W/Kg)	1.246
SAR 10g(W/Kg)	0.826

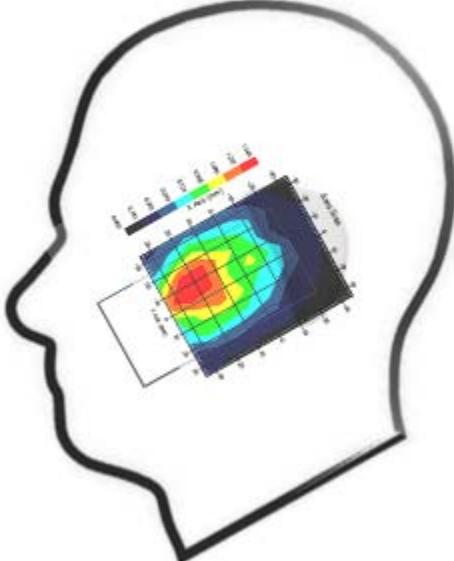
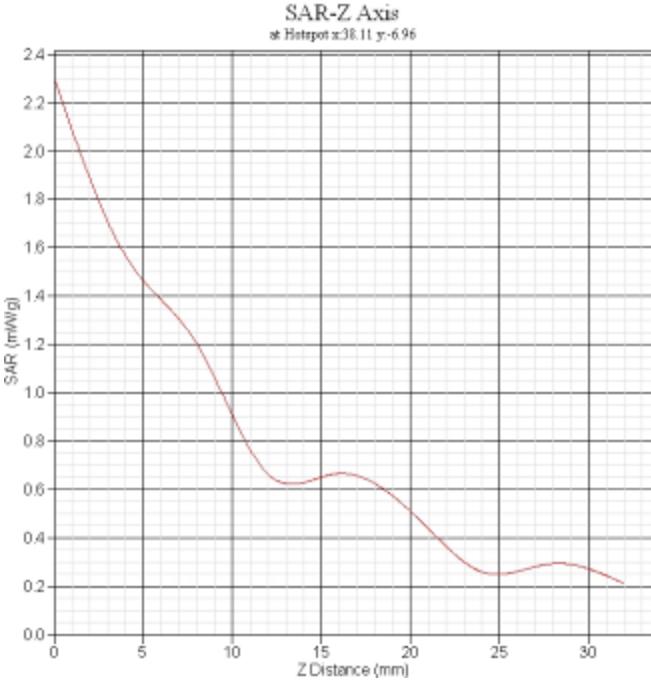
GSM850 left tilt ch189	
Frequency(MHz)	836.4
Relative permittivity(real part)	40.25
Conductivity(S/m)	0.92
Variation(%)	-0.828
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-02
	
SAR 1g(W/Kg)	0.567
SAR 10g(W/Kg)	0.464

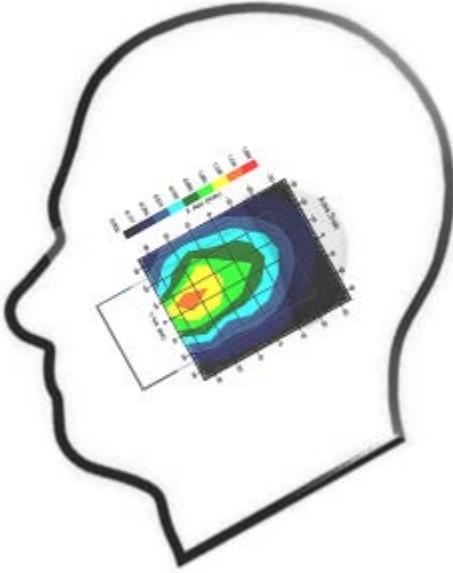
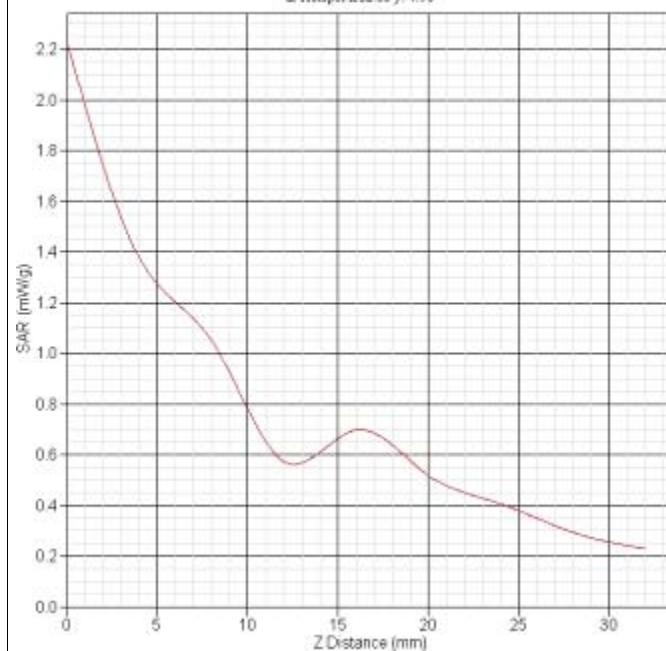
GSM850 Right cheek ch189	
Frequency(MHz)	836.4
Relative permittivity(real part)	40.25
Conductivity(S/m)	0.92
Variation(%)	-2.875
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-02
	 <p>SAR-Z Axis at Hotspot x:30.10 y:-4.96</p>
SAR 1g(W/Kg)	1.301
SAR 10g(W/Kg)	0.890

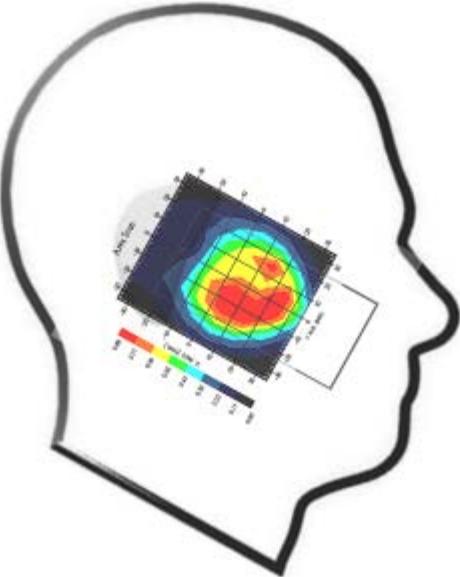
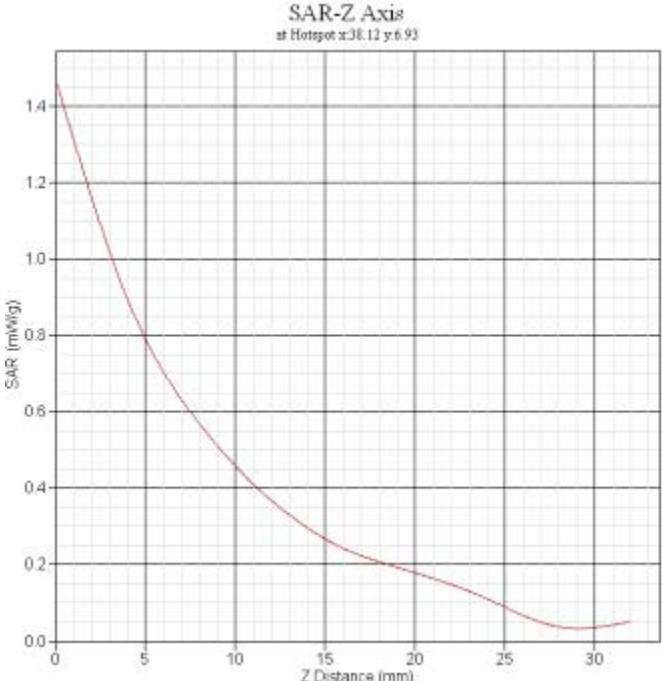
GSM850 Right tilt CH189																			
Frequency(MHz)	836.4																		
Relative permittivity(real part)	40.25																		
Conductivity(S/m)	0.92																		
Variation(%)	-1.324																		
Duty Cycle Factor	8																		
Crest factor	8																		
Conversion Fator	6.5																		
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2																		
Data	2012-07-02																		
	<p style="text-align: center;">SAR-Z Axis at Hotspot x:18.09 y:-4.97</p>  <table border="1"> <caption>Data points estimated from SAR-Z Axis graph</caption> <thead> <tr> <th>Z Distance (mm)</th> <th>SAR (mW/g)</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.75</td></tr> <tr><td>2</td><td>0.65</td></tr> <tr><td>5</td><td>0.55</td></tr> <tr><td>10</td><td>0.42</td></tr> <tr><td>15</td><td>0.35</td></tr> <tr><td>20</td><td>0.22</td></tr> <tr><td>25</td><td>0.20</td></tr> <tr><td>30</td><td>0.15</td></tr> </tbody> </table>	Z Distance (mm)	SAR (mW/g)	0	0.75	2	0.65	5	0.55	10	0.42	15	0.35	20	0.22	25	0.20	30	0.15
Z Distance (mm)	SAR (mW/g)																		
0	0.75																		
2	0.65																		
5	0.55																		
10	0.42																		
15	0.35																		
20	0.22																		
25	0.20																		
30	0.15																		
SAR 1g(W/Kg)	0.593																		
SAR 10g(W/Kg)	0.395																		

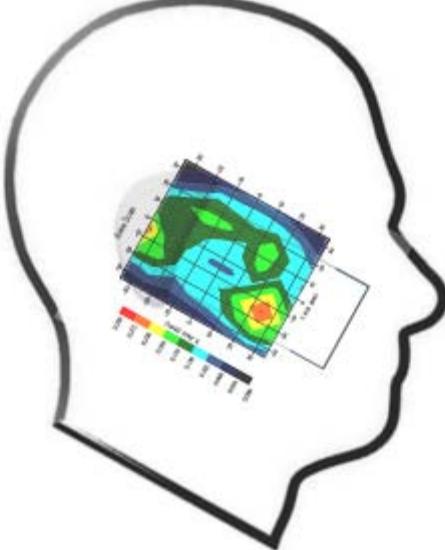
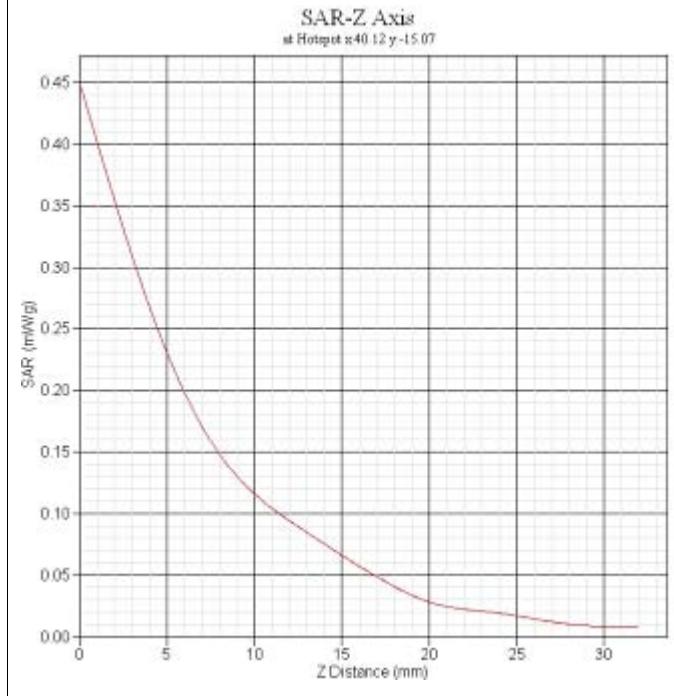
GSM850 left cheek ch128	
Frequency(MHz)	824.2
Relative permittivity(real part)	40.25
Conductivity(S/m)	0.92
Variation(%)	-1.312
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-02
	
SAR 1g(W/Kg)	1.199
SAR 10g(W/Kg)	0.613

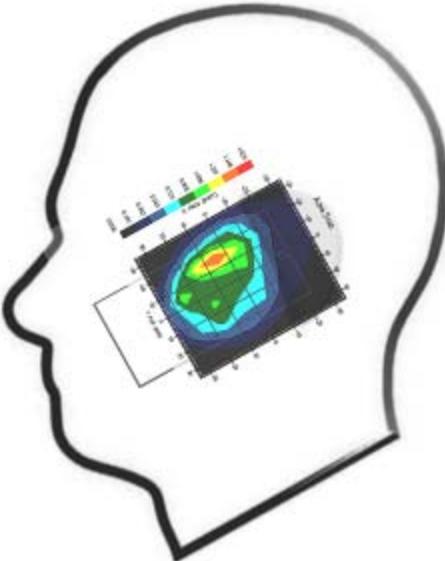
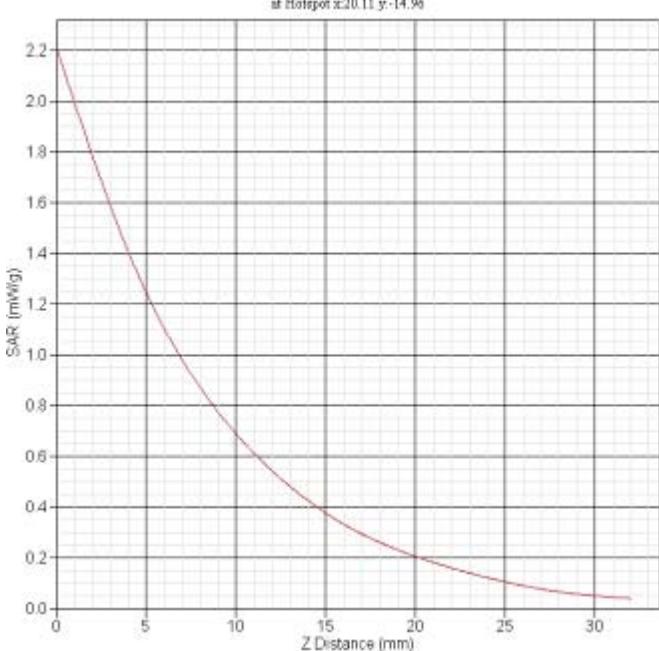
GSM850 left cheek ch251																			
Frequency(MHz)	848.8																		
Relative permittivity(real part)	40.25																		
Conductivity(S/m)	0.92																		
Variation(%)	-0.761																		
Duty Cycle Factor	8																		
Crest factor	8																		
Conversion Fator	6.5																		
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2																		
Data	2012-07-02																		
	 <p>SAR-Z Axis at Hotspot x:12.12 y:12.92</p> <table border="1"> <caption>Data points estimated from the SAR-Z Axis graph</caption> <thead> <tr> <th>Z Distance (mm)</th> <th>SAR (mW/g)</th> </tr> </thead> <tbody> <tr><td>0</td><td>1.30</td></tr> <tr><td>5</td><td>1.00</td></tr> <tr><td>10</td><td>0.70</td></tr> <tr><td>15</td><td>0.55</td></tr> <tr><td>20</td><td>0.30</td></tr> <tr><td>22</td><td>0.28</td></tr> <tr><td>25</td><td>0.25</td></tr> <tr><td>30</td><td>0.18</td></tr> </tbody> </table>	Z Distance (mm)	SAR (mW/g)	0	1.30	5	1.00	10	0.70	15	0.55	20	0.30	22	0.28	25	0.25	30	0.18
Z Distance (mm)	SAR (mW/g)																		
0	1.30																		
5	1.00																		
10	0.70																		
15	0.55																		
20	0.30																		
22	0.28																		
25	0.25																		
30	0.18																		
SAR 1g(W/Kg)	1.028																		
SAR 10g(W/Kg)	0.695																		

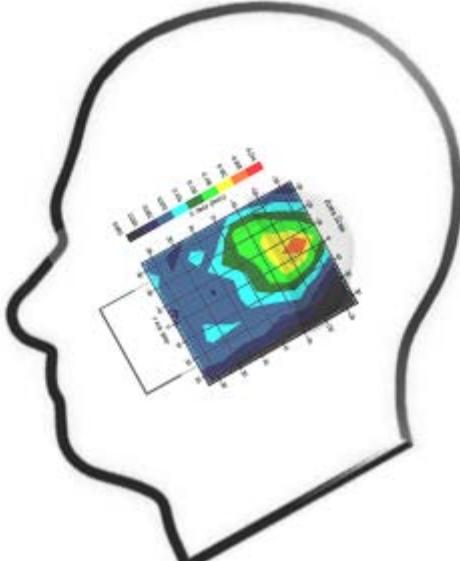
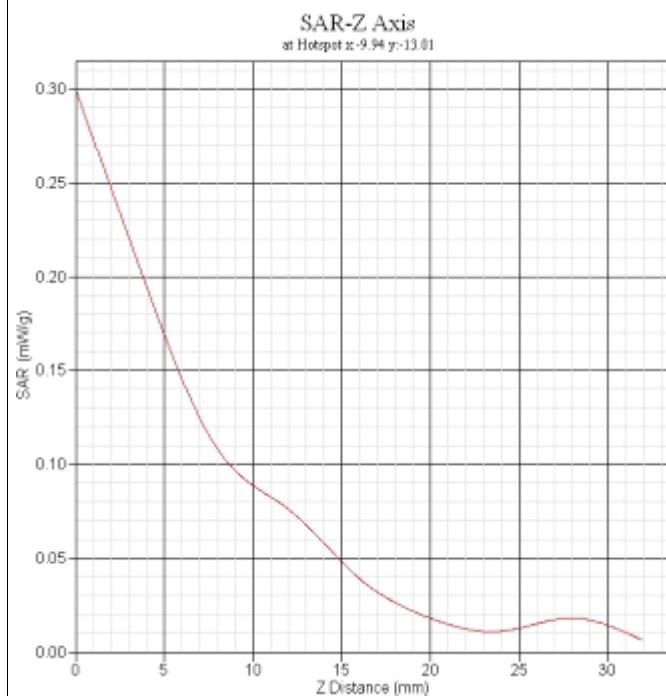
GSM850 Right cheek ch128																			
Frequency(MHz)	824.2																		
Relative permittivity(real part)	40.25																		
Conductivity(S/m)	0.92																		
Variation(%)	0.195																		
Duty Cycle Factor	8																		
Crest factor	8																		
Conversion Fator	6.5																		
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2																		
Data	2012-07-02																		
	 <p>SAR-Z Axis at Hotspot x:38.11 y:-6.96</p> <table border="1"> <caption>Approximate SAR data from graph</caption> <thead> <tr> <th>Z Distance (mm)</th> <th>SAR (mW/g)</th> </tr> </thead> <tbody> <tr><td>0</td><td>2.3</td></tr> <tr><td>2</td><td>1.8</td></tr> <tr><td>5</td><td>1.4</td></tr> <tr><td>10</td><td>0.8</td></tr> <tr><td>15</td><td>0.65</td></tr> <tr><td>20</td><td>0.4</td></tr> <tr><td>25</td><td>0.25</td></tr> <tr><td>30</td><td>0.3</td></tr> </tbody> </table>	Z Distance (mm)	SAR (mW/g)	0	2.3	2	1.8	5	1.4	10	0.8	15	0.65	20	0.4	25	0.25	30	0.3
Z Distance (mm)	SAR (mW/g)																		
0	2.3																		
2	1.8																		
5	1.4																		
10	0.8																		
15	0.65																		
20	0.4																		
25	0.25																		
30	0.3																		
SAR 1g(W/Kg)	1.317																		
SAR 10g(W/Kg)	0.870																		

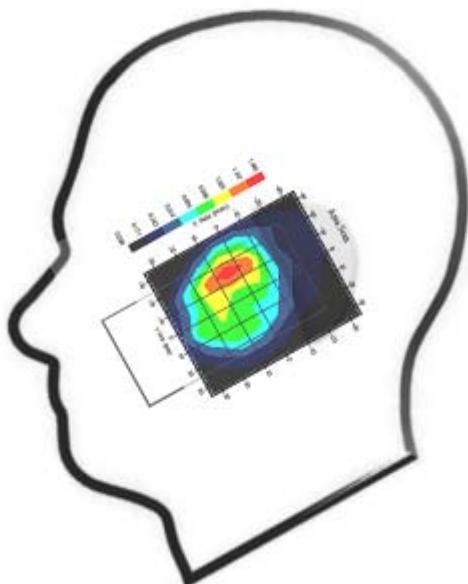
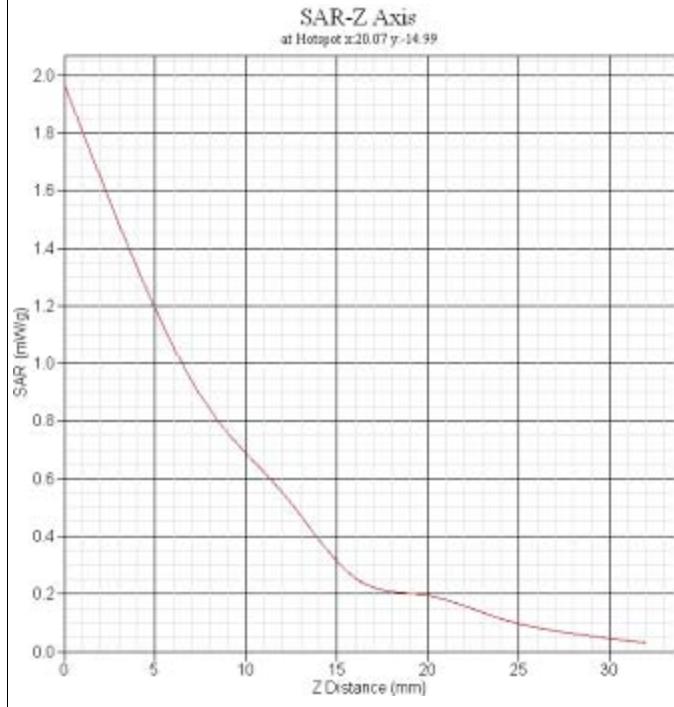
GSM850 Right cheek ch251	
Frequency(MHz)	848.8
Relative permittivity(real part)	40.25
Conductivity(S/m)	0.92
Variation(%)	1.003
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	6.5
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-02
	<p style="text-align: center;">SAR-Z Axis at Hotspot x:32.08 y:-4.96</p> 
SAR 1g(W/Kg)	1.264
SAR 10g(W/Kg)	0.821

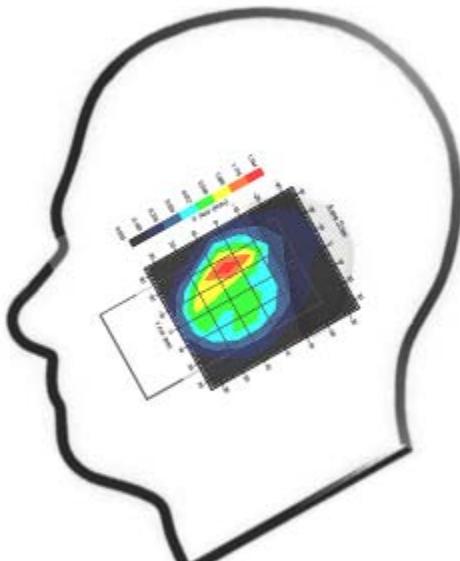
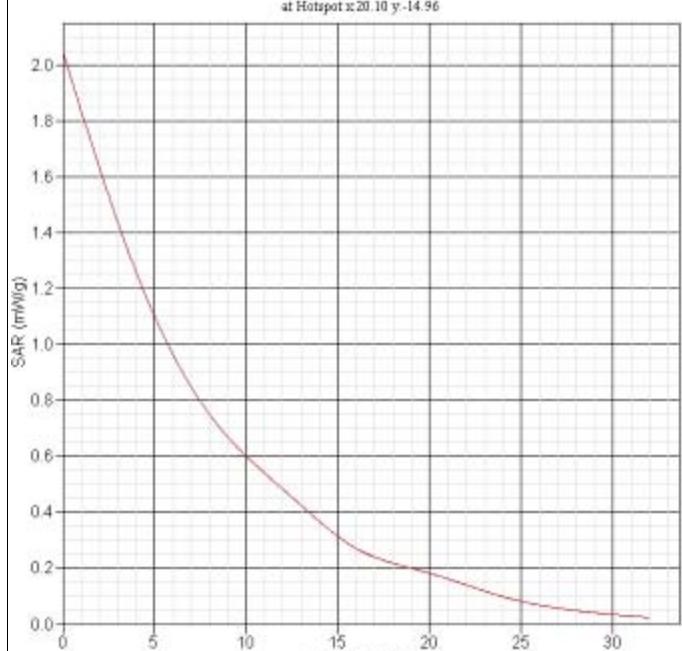
GSM1900 Left cheek CH661																	
Frequency(MHz)	1880.0																
Relative permittivity(real part)	41.53																
Conductivity(S/m)	1.44																
Variation(%)	1.508																
Duty Cycle Factor	8																
Crest factor	8																
Conversion Fator	5.7																
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2																
Data	2012-07-02																
	 <p>SAR-Z Axis at Hotspot x:38.12 y:6.93</p> <table border="1"> <caption>Data points estimated from the SAR-Z Axis graph</caption> <thead> <tr> <th>Z Distance (mm)</th> <th>SAR (mW/g)</th> </tr> </thead> <tbody> <tr><td>0</td><td>1.40</td></tr> <tr><td>5</td><td>0.80</td></tr> <tr><td>10</td><td>0.45</td></tr> <tr><td>15</td><td>0.30</td></tr> <tr><td>20</td><td>0.20</td></tr> <tr><td>25</td><td>0.10</td></tr> <tr><td>30</td><td>0.05</td></tr> </tbody> </table>	Z Distance (mm)	SAR (mW/g)	0	1.40	5	0.80	10	0.45	15	0.30	20	0.20	25	0.10	30	0.05
Z Distance (mm)	SAR (mW/g)																
0	1.40																
5	0.80																
10	0.45																
15	0.30																
20	0.20																
25	0.10																
30	0.05																
SAR 1g(W/Kg)	0.697																
SAR 10g(W/Kg)	0.333																

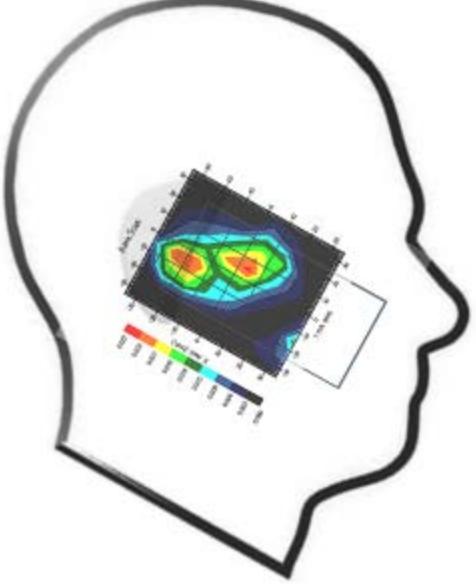
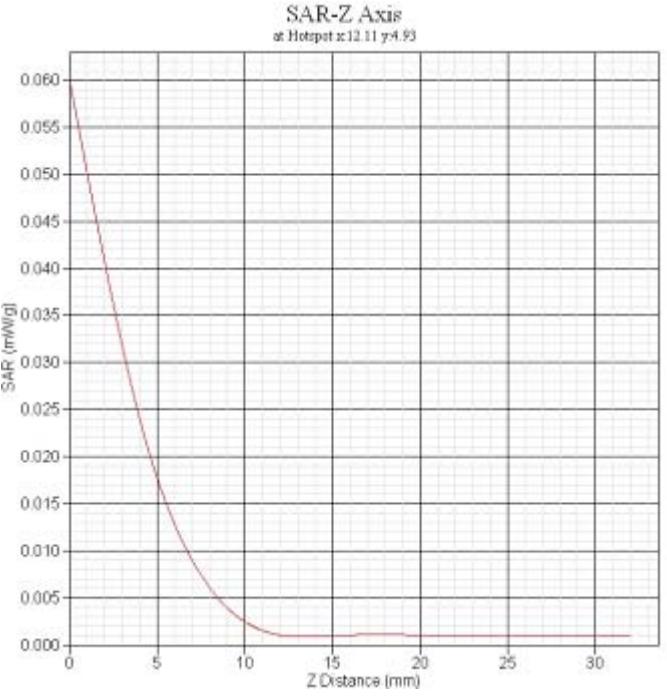
GSM1900 Left tilt CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	41.53
Conductivity(S/m)	1.44
Variation(%)	-2.704
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-02
	
	
SAR 1g(W/Kg)	0.232
SAR 10g(W/Kg)	0.115

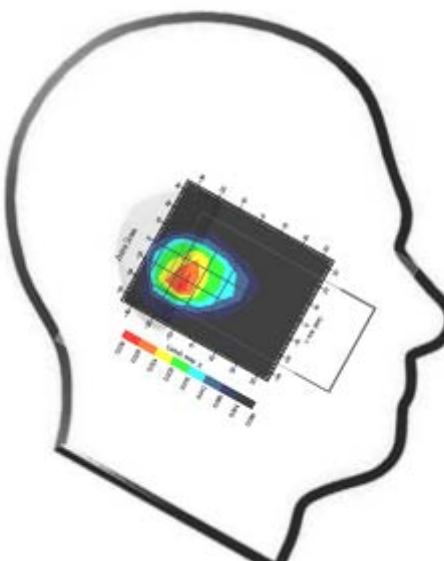
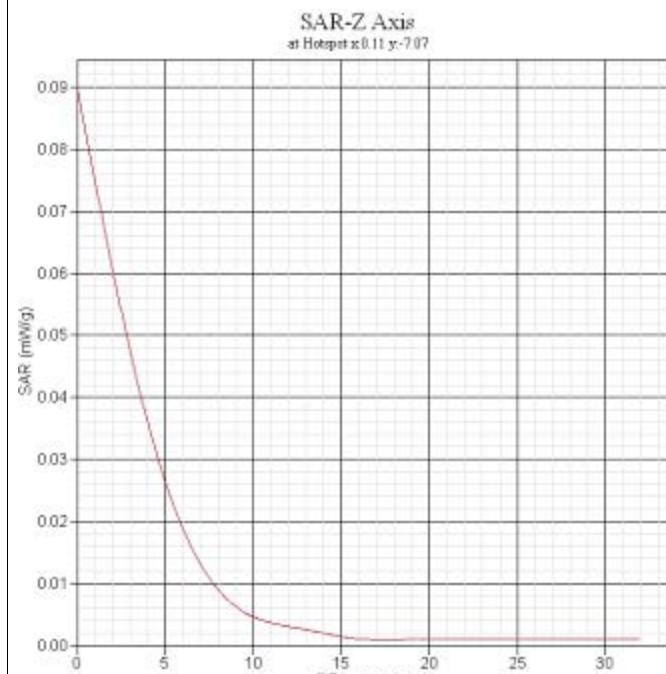
GSM1900 Right cheek CH661															
Frequency(MHz)	1880.0														
Relative permittivity(real part)	41.53														
Conductivity(S/m)	1.44														
Variation(%)	-0.922														
Duty Cycle Factor	8														
Crest factor	8														
Conversion Fator	5.7														
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2														
Data	2012-07-02														
	<p>SAR-Z Axis at Hotspot x:20.11 y:-14.96</p>  <p>The graph plots SAR (mW/g) on the y-axis (0.0 to 2.2) against Z Distance (mm) on the x-axis (0 to 30). The curve starts at approximately (0, 2.2) and decays rapidly, reaching about 0.2 at 30 mm.</p> <table border="1"><caption>Estimated data points from SAR-Z Axis graph</caption><thead><tr><th>Z Distance (mm)</th><th>SAR (mW/g)</th></tr></thead><tbody><tr><td>0</td><td>2.2</td></tr><tr><td>2</td><td>1.4</td></tr><tr><td>5</td><td>0.8</td></tr><tr><td>10</td><td>0.4</td></tr><tr><td>20</td><td>0.2</td></tr><tr><td>30</td><td>0.1</td></tr></tbody></table>	Z Distance (mm)	SAR (mW/g)	0	2.2	2	1.4	5	0.8	10	0.4	20	0.2	30	0.1
Z Distance (mm)	SAR (mW/g)														
0	2.2														
2	1.4														
5	0.8														
10	0.4														
20	0.2														
30	0.1														
SAR 1g(W/Kg)	0.976														
SAR 10g(W/Kg)	0.460														

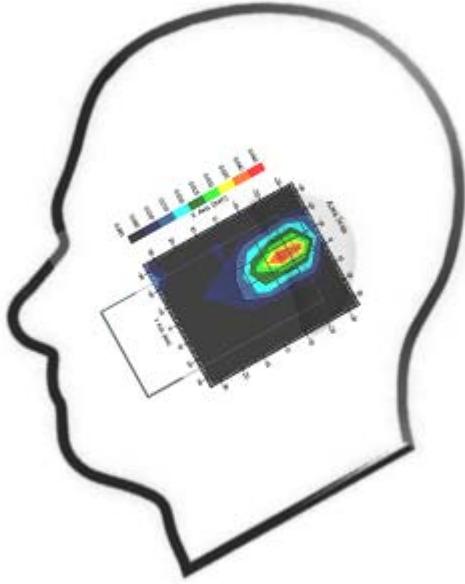
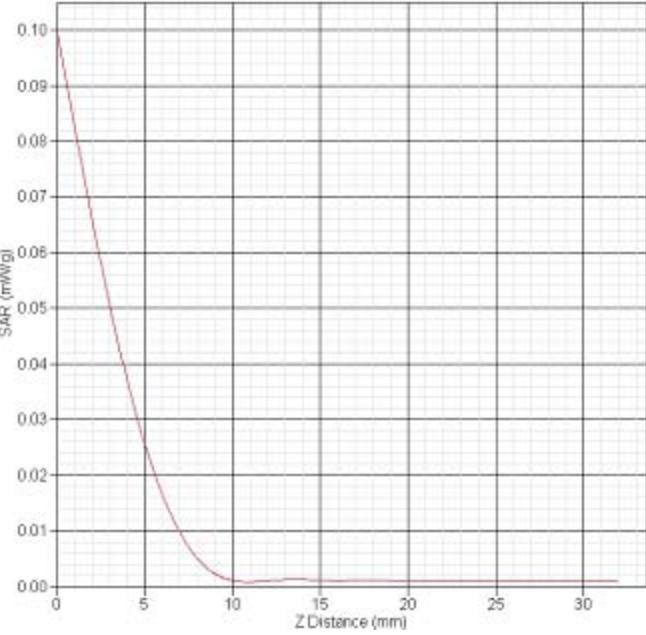
GSM1900 Right tilt CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	41.53
Conductivity(S/m)	1.44
Variation(%)	1.760
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-02
	 <p>SAR-Z Axis at Hotspot x:-9.94 y:-13.01</p>
SAR 1g(W/Kg)	0.176
SAR 10g(W/Kg)	0.094

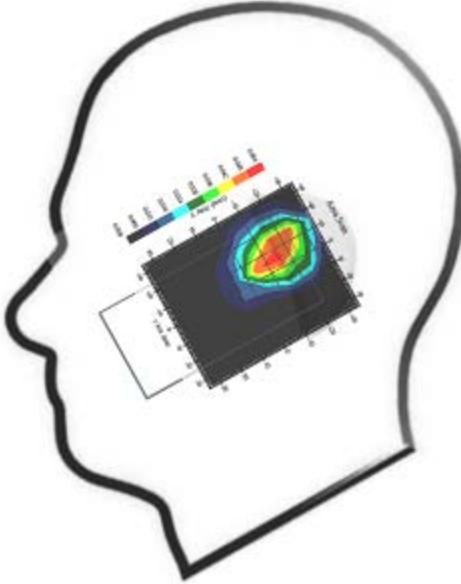
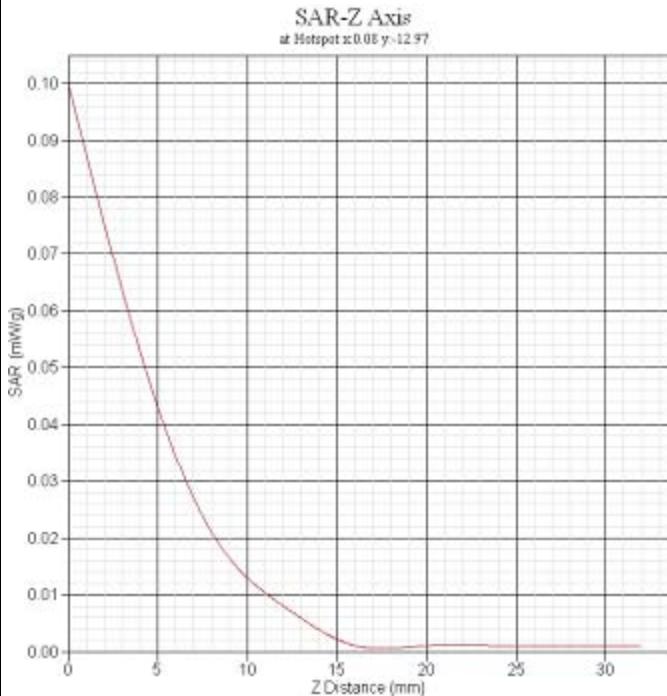
GSM1900 Right cheek CH512	
Frequency(MHz)	1850.2
Relative permittivity(real part)	41.53
Conductivity(S/m)	1.44
Variation(%)	2.362
Duty Cycle Factor	8
Crest factor	8
Conversion Fator	5.7
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-02
	
	
SAR 1g(W/Kg)	1.109
SAR 10g(W/Kg)	0.548

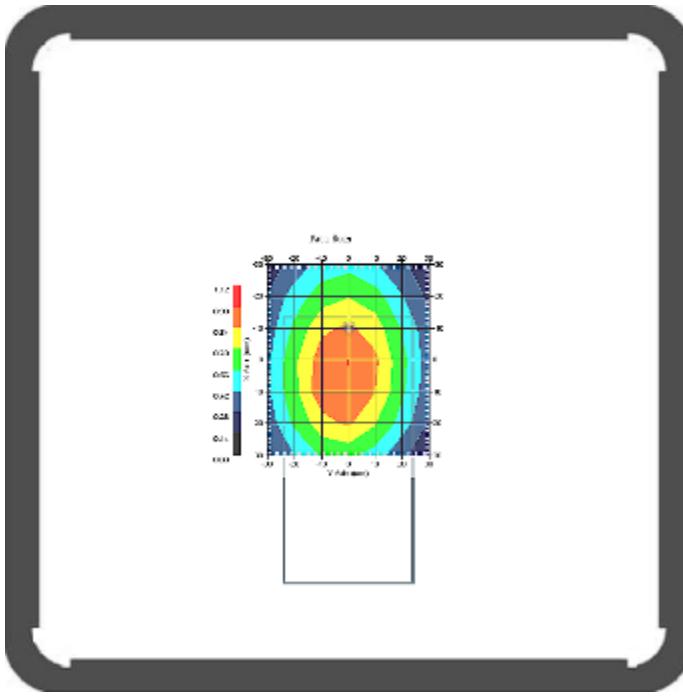
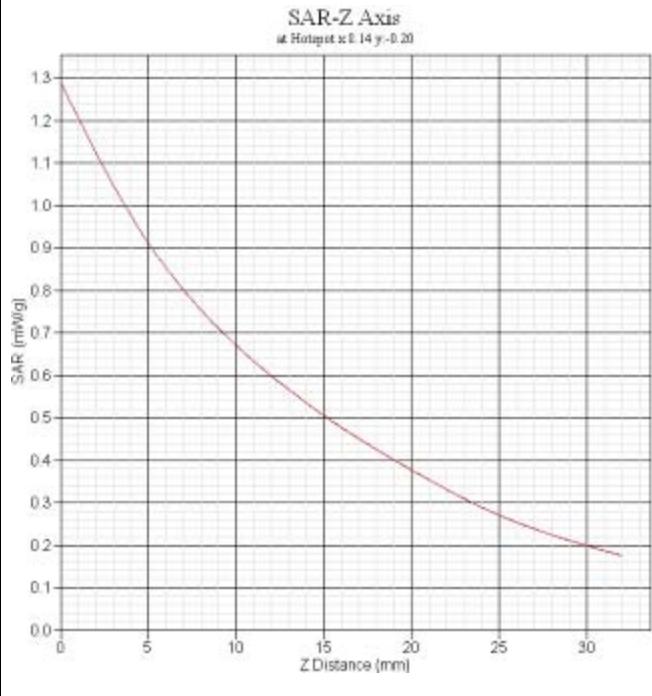
GSM1900 Right cheek CH810																			
Frequency(MHz)	1909.8																		
Relative permittivity(real part)	41.53																		
Conductivity(S/m)	1.44																		
Variation(%)	-1.127																		
Duty Cycle Factor	8																		
Crest factor	8																		
Conversion Fator	5.7																		
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2																		
Data	2012-07-02																		
	<p style="text-align: center;">SAR-Z Axis at Hotspot x20.10 y:-14.96</p>  <table border="1"> <caption>Data points estimated from the SAR-Z Axis graph</caption> <thead> <tr> <th>Z Distance [mm]</th> <th>SAR [mW/g]</th> </tr> </thead> <tbody> <tr><td>0</td><td>2.0</td></tr> <tr><td>2</td><td>1.4</td></tr> <tr><td>5</td><td>1.0</td></tr> <tr><td>10</td><td>0.6</td></tr> <tr><td>15</td><td>0.35</td></tr> <tr><td>20</td><td>0.2</td></tr> <tr><td>25</td><td>0.1</td></tr> <tr><td>30</td><td>0.05</td></tr> </tbody> </table>	Z Distance [mm]	SAR [mW/g]	0	2.0	2	1.4	5	1.0	10	0.6	15	0.35	20	0.2	25	0.1	30	0.05
Z Distance [mm]	SAR [mW/g]																		
0	2.0																		
2	1.4																		
5	1.0																		
10	0.6																		
15	0.35																		
20	0.2																		
25	0.1																		
30	0.05																		
SAR 1g(W/Kg)	1.104																		
SAR 10g(W/Kg)	0.553																		

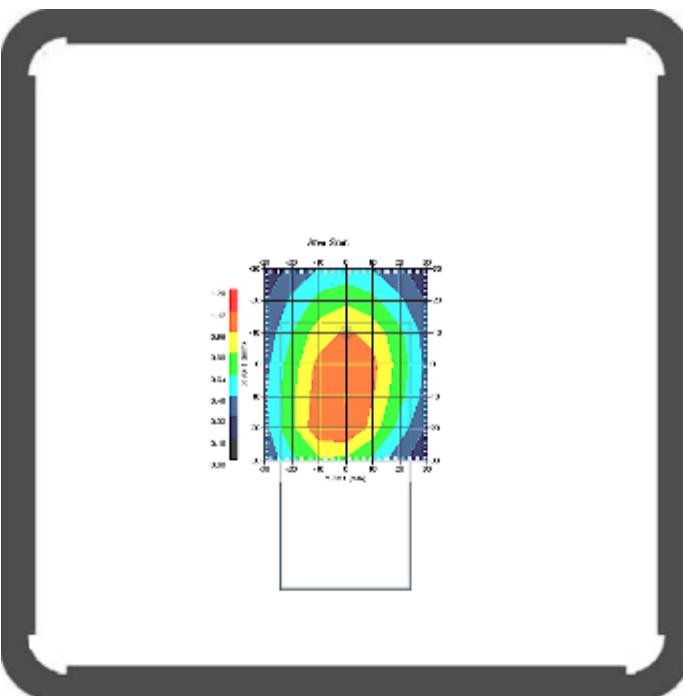
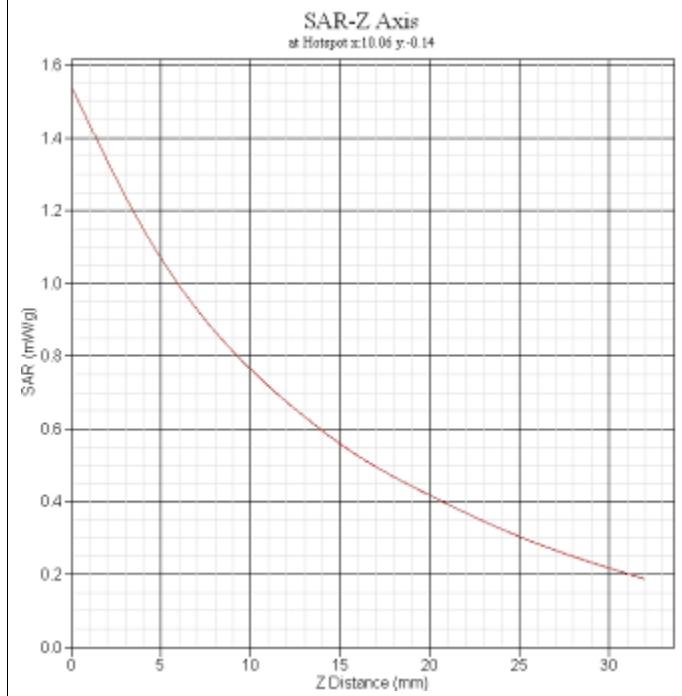
802.11b Left cheek CH11	
Frequency(MHz)	2462
Relative permittivity(real part)	40.32
Conductivity(S/m)	1.84
Variation(%)	-1.079
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-04
 	
SAR 1g(W/Kg)	0.022
SAR 10g(W/Kg)	0.009

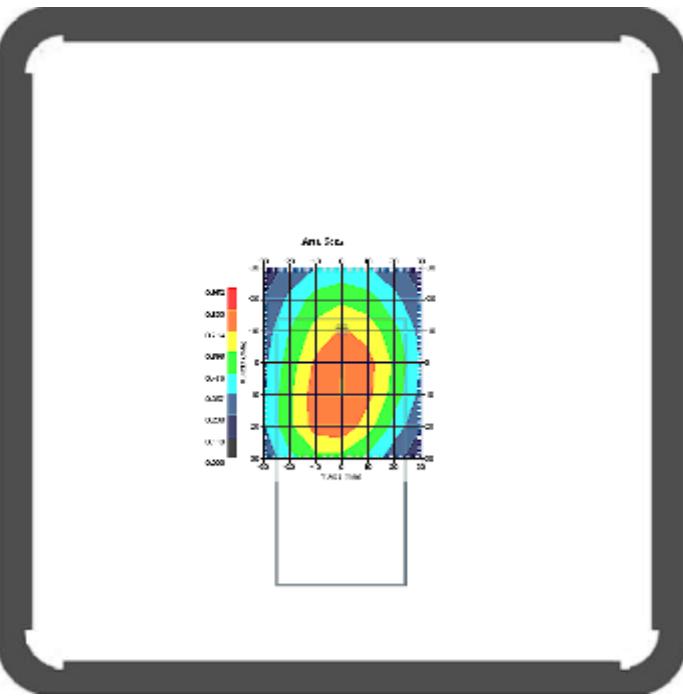
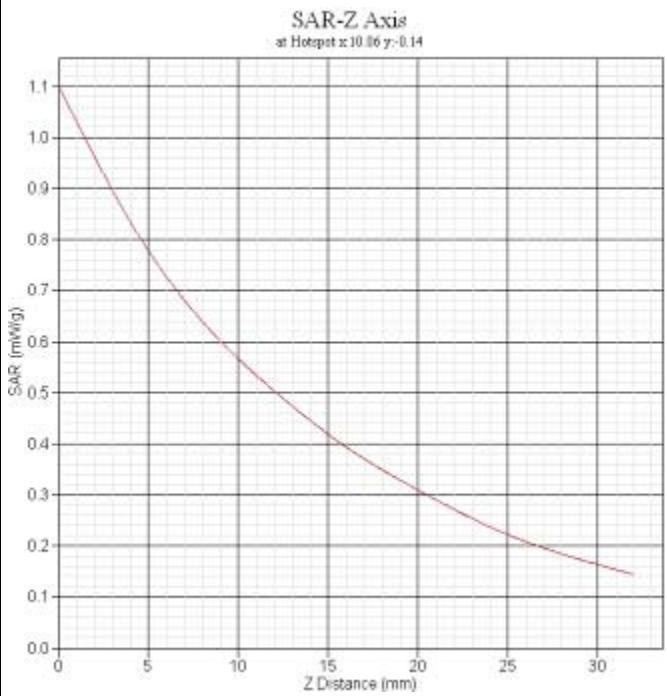
802.11b Left tilt CH11	
Frequency(MHz)	2462
Relative permittivity(real part)	40.32
Conductivity(S/m)	1.84
Variation(%)	-2.239
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-02
	
SAR 1g(W/Kg)	0.034
SAR 10g(W/Kg)	0.016

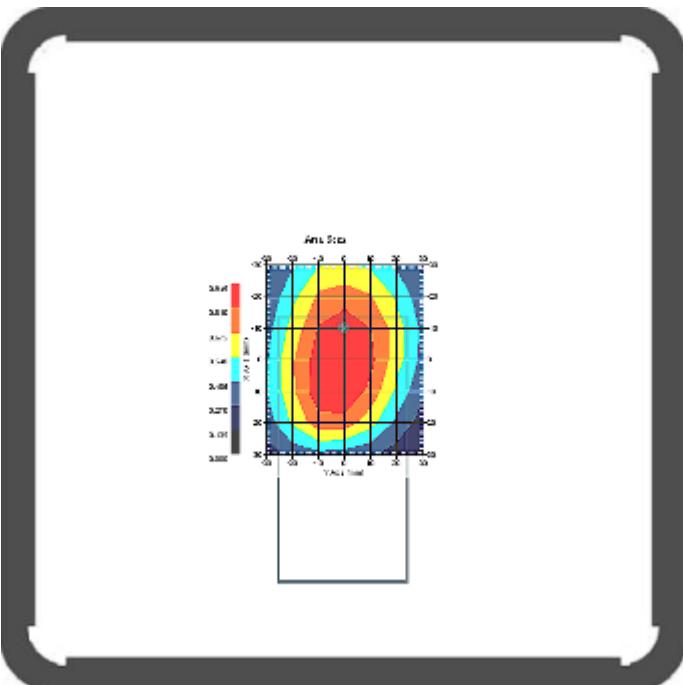
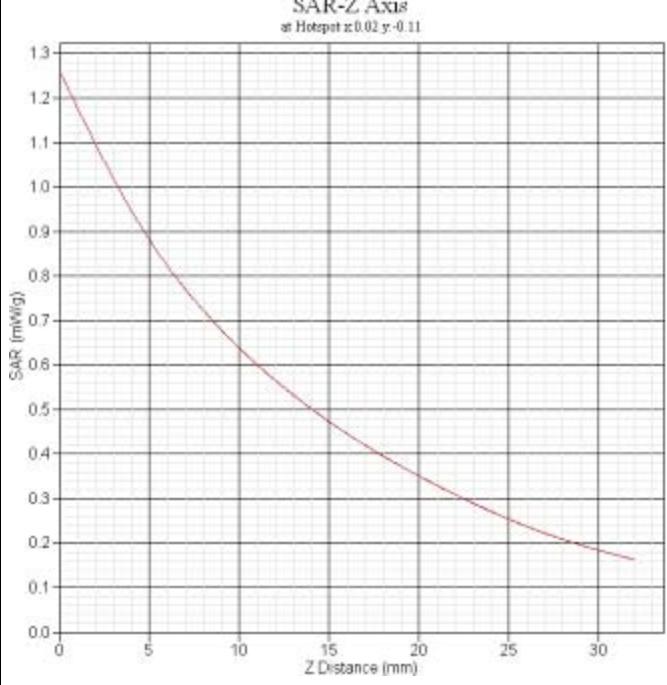
802.11b Right cheek CH11																															
Frequency(MHz)	2462																														
Relative permittivity(real part)	40.32																														
Conductivity(S/m)	1.84																														
Variation(%)	-1.964																														
Duty Cycle Factor	1																														
Crest factor	1																														
Conversion Fator	4.65																														
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2																														
Data	2012-07-04																														
	<p style="text-align: center;">SAR-Z Axis at Hotspot x:0 y:-4.98</p>  <table border="1"> <caption>Data points estimated from SAR-Z Axis graph</caption> <thead> <tr> <th>Z Distance (mm)</th> <th>SAR (W/Kg)</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.10</td></tr> <tr><td>1</td><td>0.08</td></tr> <tr><td>2</td><td>0.06</td></tr> <tr><td>3</td><td>0.04</td></tr> <tr><td>4</td><td>0.025</td></tr> <tr><td>5</td><td>0.015</td></tr> <tr><td>6</td><td>0.008</td></tr> <tr><td>7</td><td>0.004</td></tr> <tr><td>8</td><td>0.002</td></tr> <tr><td>9</td><td>0.001</td></tr> <tr><td>10</td><td>0.0005</td></tr> <tr><td>15</td><td>0.0001</td></tr> <tr><td>20</td><td>0.0001</td></tr> <tr><td>30</td><td>0.0001</td></tr> </tbody> </table>	Z Distance (mm)	SAR (W/Kg)	0	0.10	1	0.08	2	0.06	3	0.04	4	0.025	5	0.015	6	0.008	7	0.004	8	0.002	9	0.001	10	0.0005	15	0.0001	20	0.0001	30	0.0001
Z Distance (mm)	SAR (W/Kg)																														
0	0.10																														
1	0.08																														
2	0.06																														
3	0.04																														
4	0.025																														
5	0.015																														
6	0.008																														
7	0.004																														
8	0.002																														
9	0.001																														
10	0.0005																														
15	0.0001																														
20	0.0001																														
30	0.0001																														
SAR 1g(W/Kg)	0.032																														
SAR 10g(W/Kg)	0.013																														

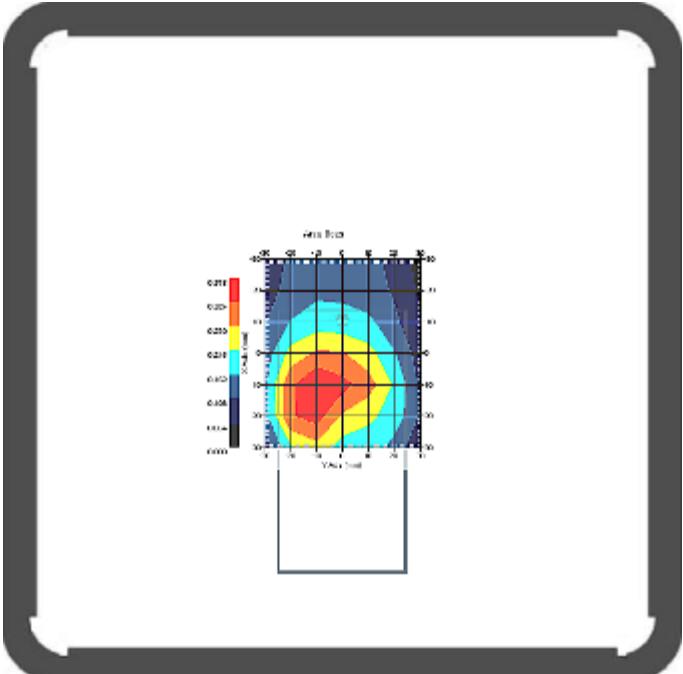
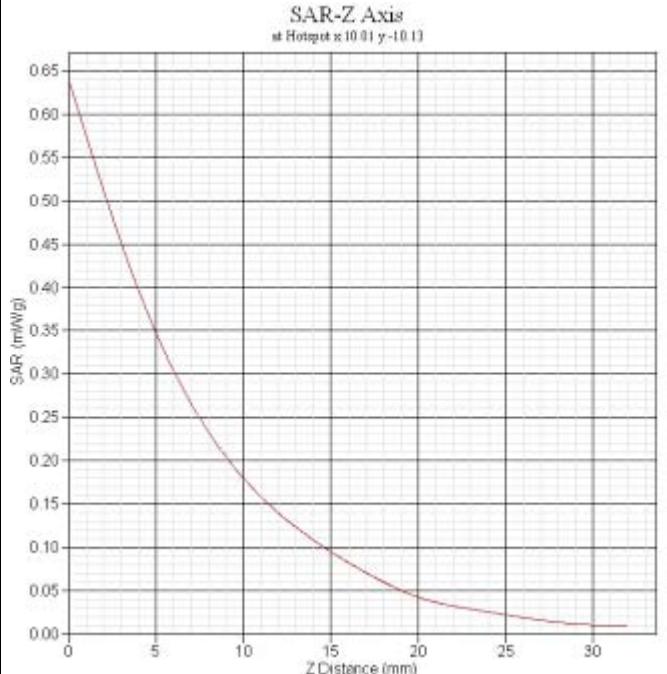
802.11b Right tilt CH11	
Frequency(MHz)	2462
Relative permittivity(real part)	40.32
Conductivity(S/m)	1.84
Variation(%)	-2.152
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.65
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-04
	
SAR 1g(W/Kg)	0.048
SAR 10g(W/Kg)	0.020

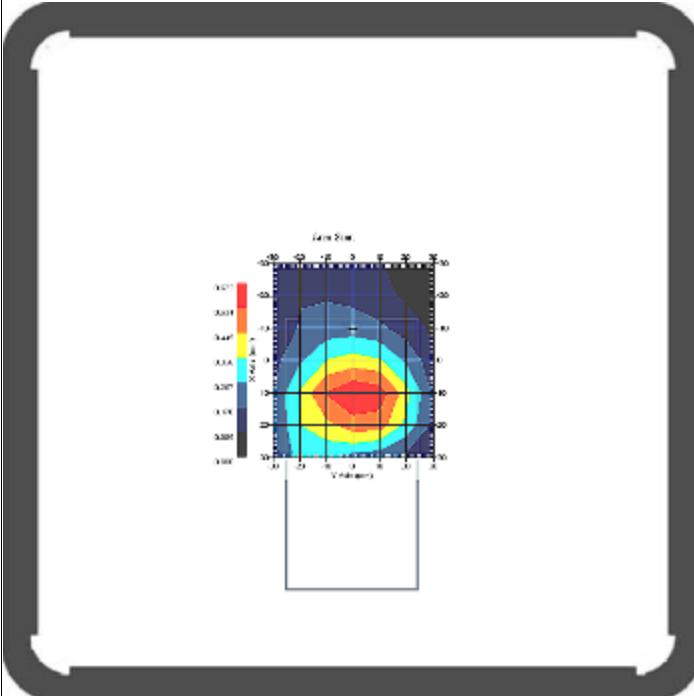
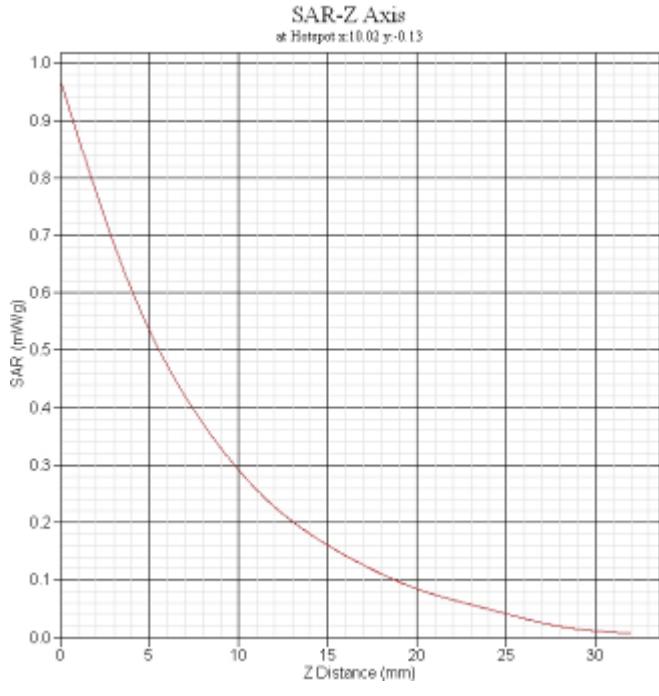
GPRS850 body face CH189	
Frequency(MHz)	836.4
Relative permittivity(real part)	53.45
Conductivity(S/m)	0.94
Variation(%)	0.060
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-03
	
SAR 1g(W/Kg)	0.731
SAR 10g(W/Kg)	0.439

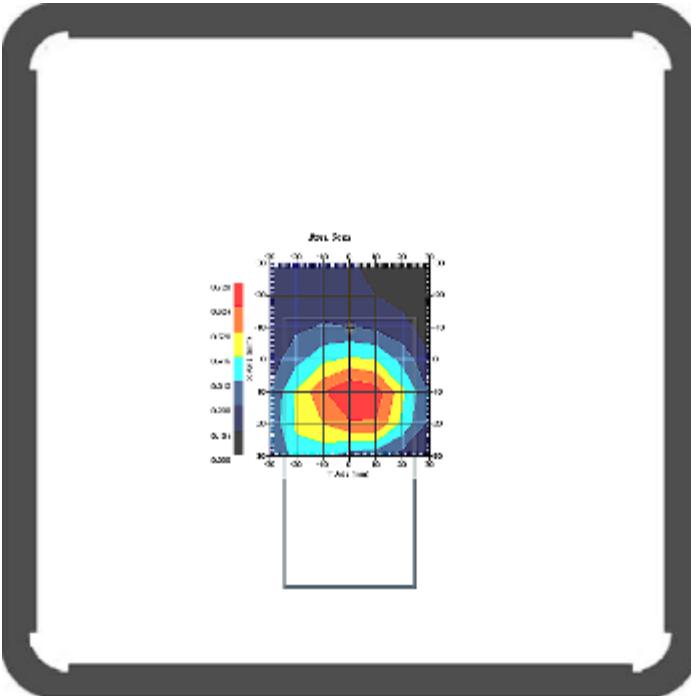
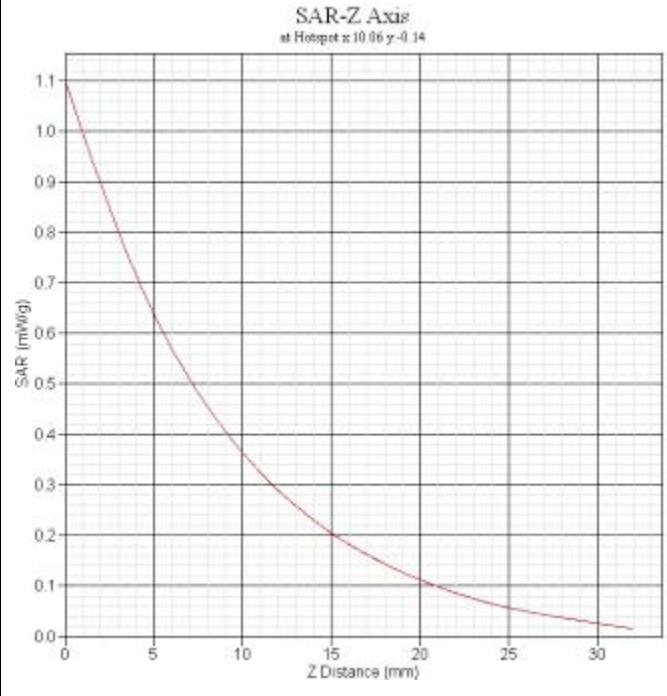
GPRS850 body back CH189	
Frequency(MHz)	836.4
Relative permittivity(real part)	53.45
Conductivity(S/m)	0.94
Variation(%)	4.035
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-03
	
SAR 1g(W/Kg)	1.055
SAR 10g(W/Kg)	0.679

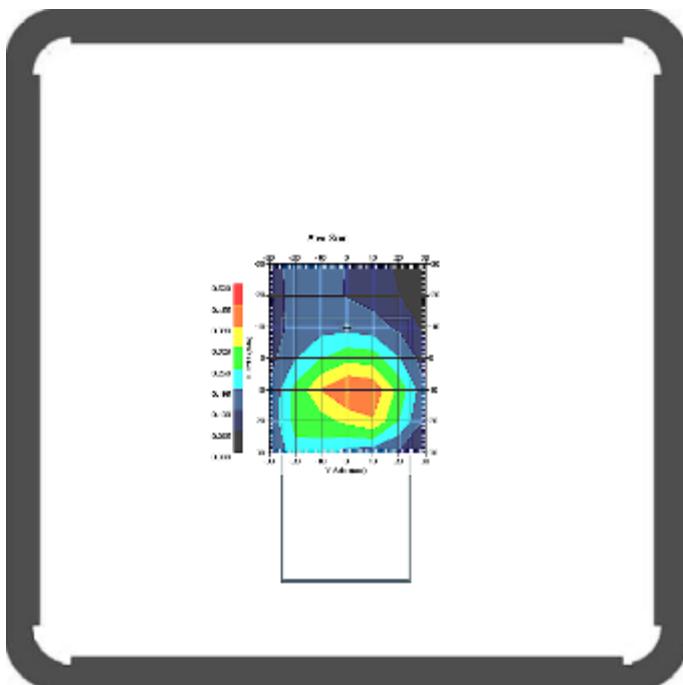
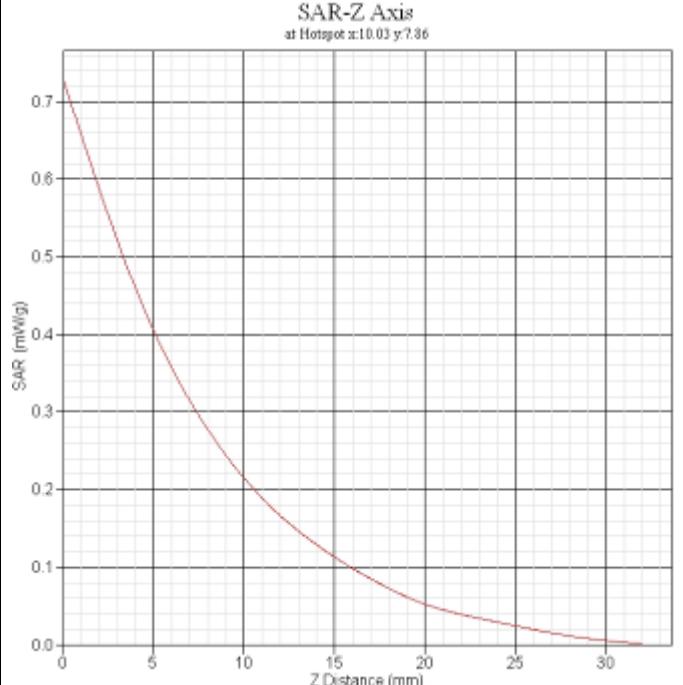
GPRS850 body back CH128	
Frequency(MHz)	824.2
Relative permittivity(real part)	53.45
Conductivity(S/m)	0.94
Variation(%)	-2.227
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-03
	
SAR 1g(W/Kg)	0.769
SAR 10g(W/Kg)	0.502

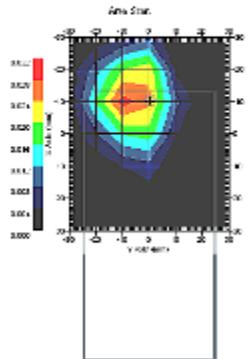
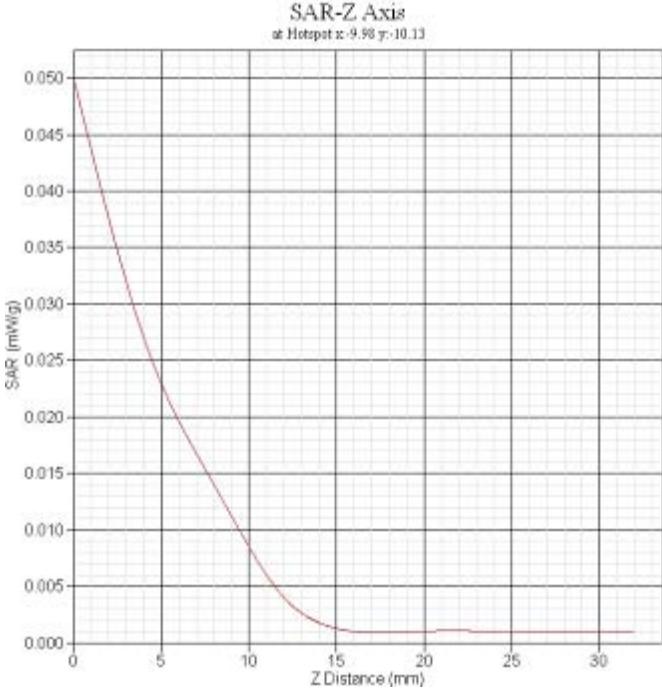
GPRS850 body back CH251	
Frequency(MHz)	848.8
Relative permittivity(real part)	53.45
Conductivity(S/m)	0.94
Variation(%)	0.211
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	6.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-03
	
SAR 1g(W/Kg)	0.891
SAR 10g(W/Kg)	0.594

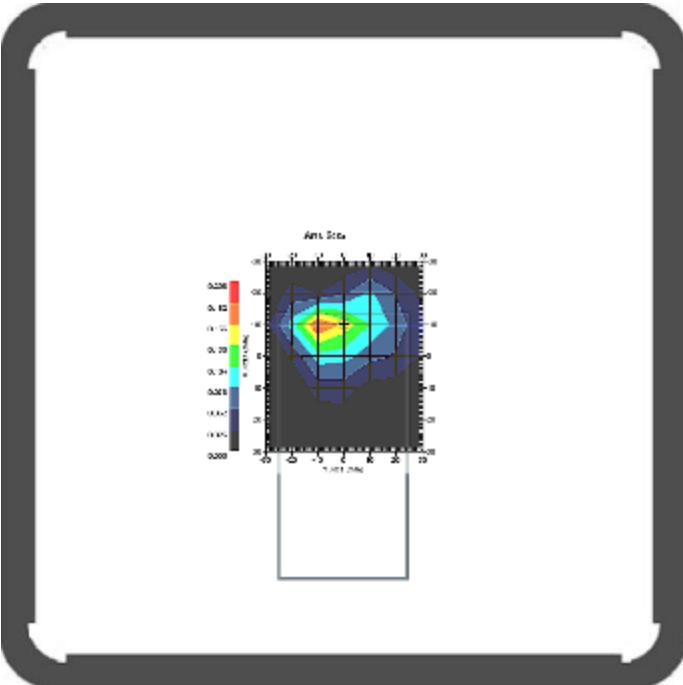
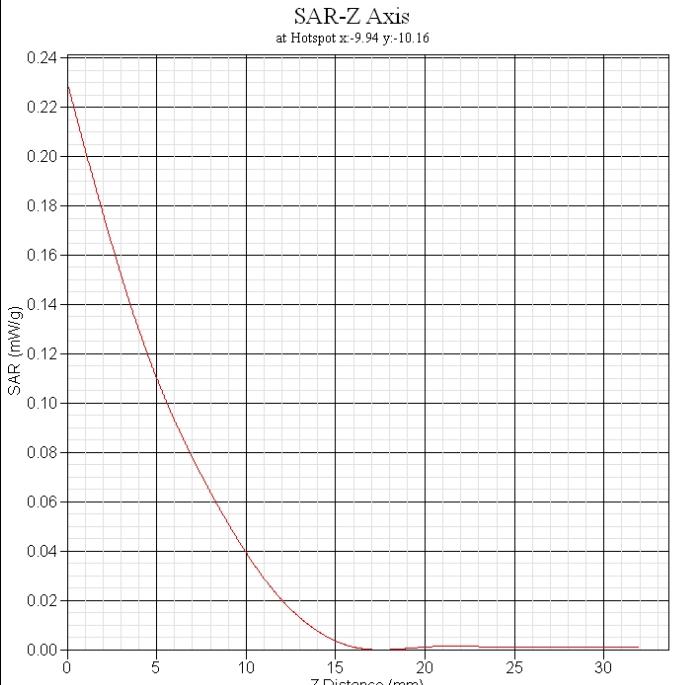
GPRS1900 body face CH661	
Frequency(MHz)	1880.0
Relative permittivity(real part)	52.91
Conductivity(S/m)	1.49
Variation(%)	2.982
Duty Cycle Factor	2
Crest factor	2
Conversion Fator	5.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-03
	
SAR 1g(W/Kg)	0.363
SAR 10g(W/Kg)	0.193

GPRS1900 body back CH661															
Frequency(MHz)	1880.0														
Relative permittivity(real part)	52.91														
Conductivity(S/m)	1.49														
Variation(%)	3.410														
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	2012-07-03														
	 <p>SAR-Z Axis at Hotspot x:10.02 y:0.13</p> <table border="1"> <caption>Data points estimated from the SAR-Z Axis graph</caption> <thead> <tr> <th>Z Distance (mm)</th> <th>SAR (W/kg)</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.95</td></tr> <tr><td>2</td><td>0.75</td></tr> <tr><td>5</td><td>0.55</td></tr> <tr><td>10</td><td>0.32</td></tr> <tr><td>20</td><td>0.10</td></tr> <tr><td>30</td><td>0.02</td></tr> </tbody> </table>	Z Distance (mm)	SAR (W/kg)	0	0.95	2	0.75	5	0.55	10	0.32	20	0.10	30	0.02
Z Distance (mm)	SAR (W/kg)														
0	0.95														
2	0.75														
5	0.55														
10	0.32														
20	0.10														
30	0.02														
SAR 1g(W/Kg)	0.553														
SAR 10g(W/Kg)	0.281														

GPRS1900 body back CH512																	
Frequency(MHz)	1850.2																
Relative permittivity(real part)	52.91																
Conductivity(S/m)	1.49																
Variation(%)	-3.929																
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	2012-07-03																
	 <p>SAR-Z Axis at Hotspot x 10.06 y-0.14</p> <table border="1"> <caption>Estimated data points from SAR-Z Axis graph</caption> <thead> <tr> <th>Z Distance (mm)</th> <th>SAR (mW/g)</th> </tr> </thead> <tbody> <tr><td>0</td><td>1.10</td></tr> <tr><td>5</td><td>0.65</td></tr> <tr><td>10</td><td>0.35</td></tr> <tr><td>15</td><td>0.20</td></tr> <tr><td>20</td><td>0.12</td></tr> <tr><td>25</td><td>0.08</td></tr> <tr><td>30</td><td>0.05</td></tr> </tbody> </table>	Z Distance (mm)	SAR (mW/g)	0	1.10	5	0.65	10	0.35	15	0.20	20	0.12	25	0.08	30	0.05
Z Distance (mm)	SAR (mW/g)																
0	1.10																
5	0.65																
10	0.35																
15	0.20																
20	0.12																
25	0.08																
30	0.05																
SAR 1g(W/Kg)	0.627																
SAR 10g(W/Kg)	0.295																

GPRS1900 body back CH810	
Frequency(MHz)	1909.8
Relative permittivity(real part)	52.91
Conductivity(S/m)	1.49
Variation(%)	-2.369
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	2012-07-03
	
SAR 1g(W/Kg)	0.426
SAR 10g(W/Kg)	0.224

802.11b body face CH11																							
Frequency(MHz)	2462																						
Relative permittivity(real part)	53.41																						
Conductivity(S/m)	1.94																						
Variation(%)	-1.254																						
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	2012-07-04																						
	 <p>SAR-Z Axis at Hotspot x: 9.98 y: 10.13</p> <table border="1"> <caption>Approximate SAR-Z Axis Data</caption> <thead> <tr> <th>Z Distance (mm)</th> <th>SAR (W/kg)</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.050</td></tr> <tr><td>2</td><td>0.035</td></tr> <tr><td>4</td><td>0.025</td></tr> <tr><td>6</td><td>0.018</td></tr> <tr><td>8</td><td>0.012</td></tr> <tr><td>10</td><td>0.007</td></tr> <tr><td>12</td><td>0.004</td></tr> <tr><td>15</td><td>0.001</td></tr> <tr><td>20</td><td>0.0005</td></tr> <tr><td>30</td><td>0.0002</td></tr> </tbody> </table>	Z Distance (mm)	SAR (W/kg)	0	0.050	2	0.035	4	0.025	6	0.018	8	0.012	10	0.007	12	0.004	15	0.001	20	0.0005	30	0.0002
Z Distance (mm)	SAR (W/kg)																						
0	0.050																						
2	0.035																						
4	0.025																						
6	0.018																						
8	0.012																						
10	0.007																						
12	0.004																						
15	0.001																						
20	0.0005																						
30	0.0002																						
SAR 1g(W/Kg)	0.011																						
SAR 10g(W/Kg)	0.004																						

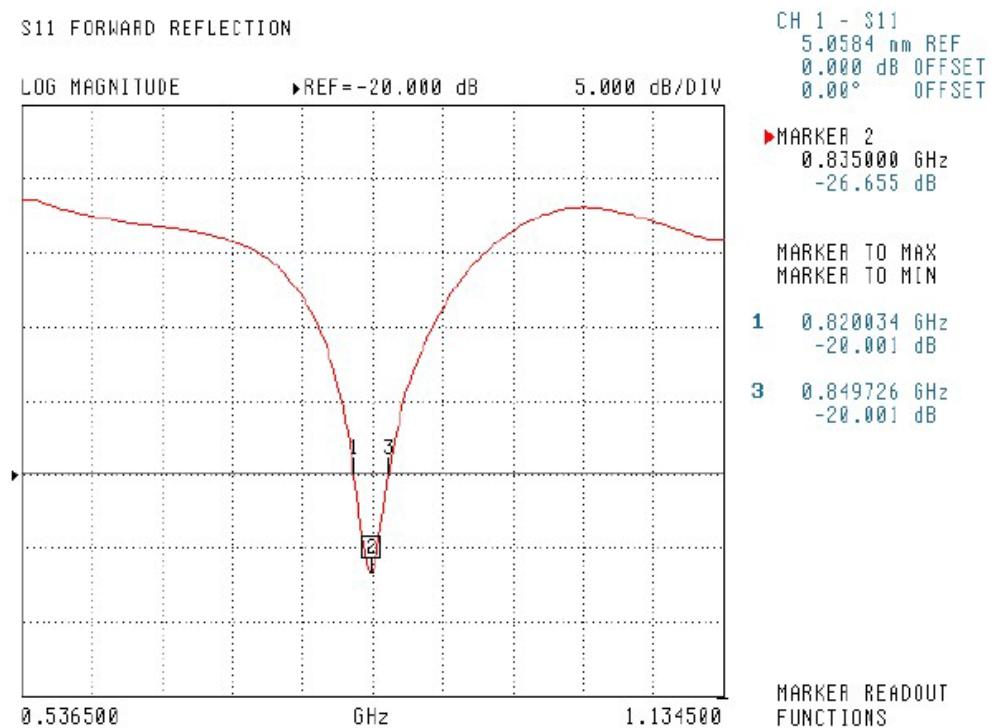
802.11b body back CH11	
Frequency(MHz)	2462
Relative permittivity(real part)	53.41
Conductivity(S/m)	1.94
Variation(%)	0.151
Duty Cycle Factor	1
Crest factor	1
Conversion Fator	4.4
Probe Sensitivity	1.20 1.20 1.20 μ V/(V/m)2
Data	2012-07-04
	
SAR 1g(W/Kg)	0.101
SAR 10g(W/Kg)	0.024

ValidationDipole Calibration

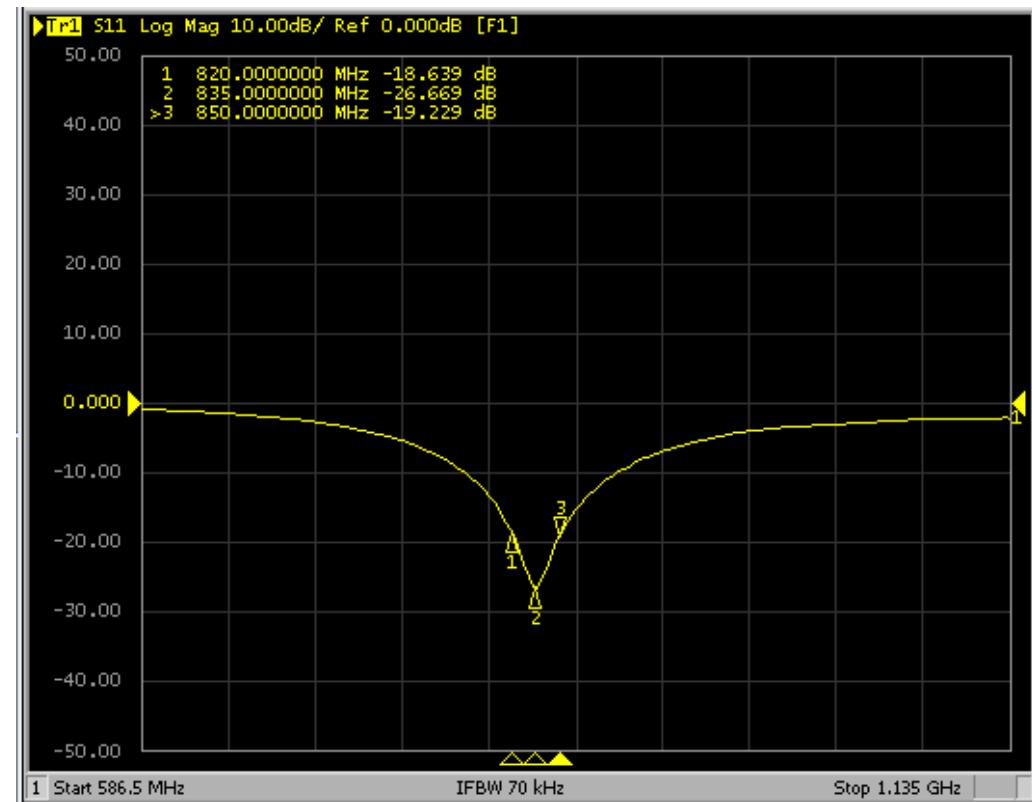
Electrical Specification 835MHz

Tissue Type	Return Loss(dB)	Impedance(ohm)
Head(2011)	-26.655	51.666
Head(2012 recent)	-26.669	52.536
Body(2011)	-22.106	57.482
Body(2012 recent)	-22.595	54.711

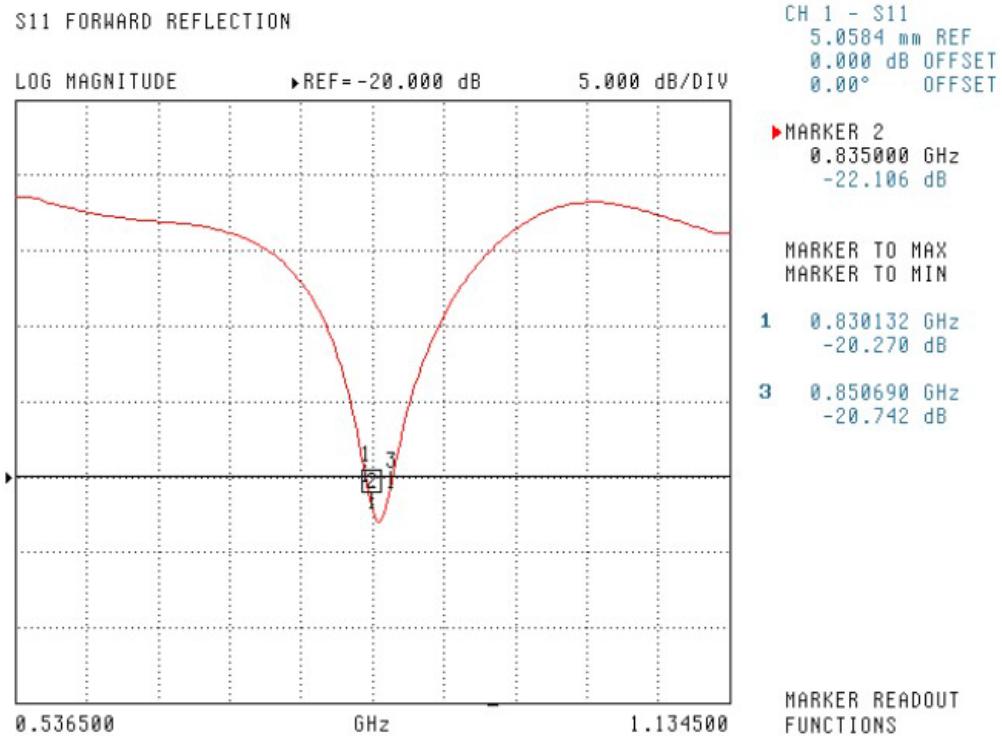
Head Tissue of Return Loss(2011)



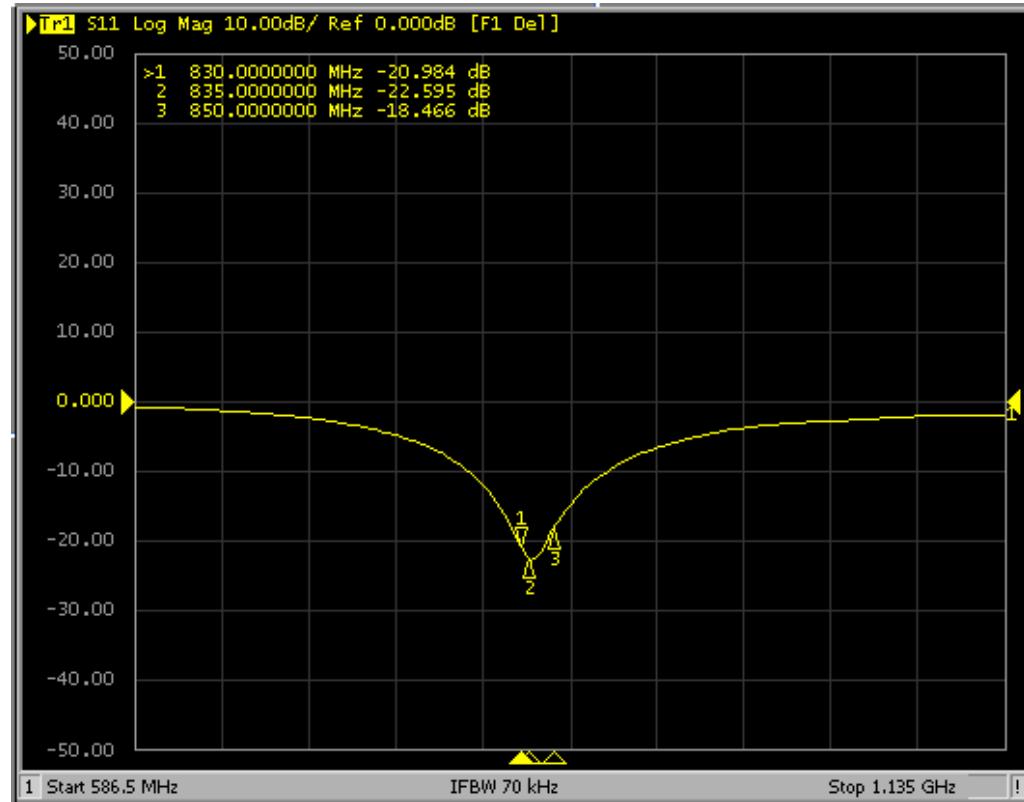
Head Tissue of Return Loss(2012 recent)



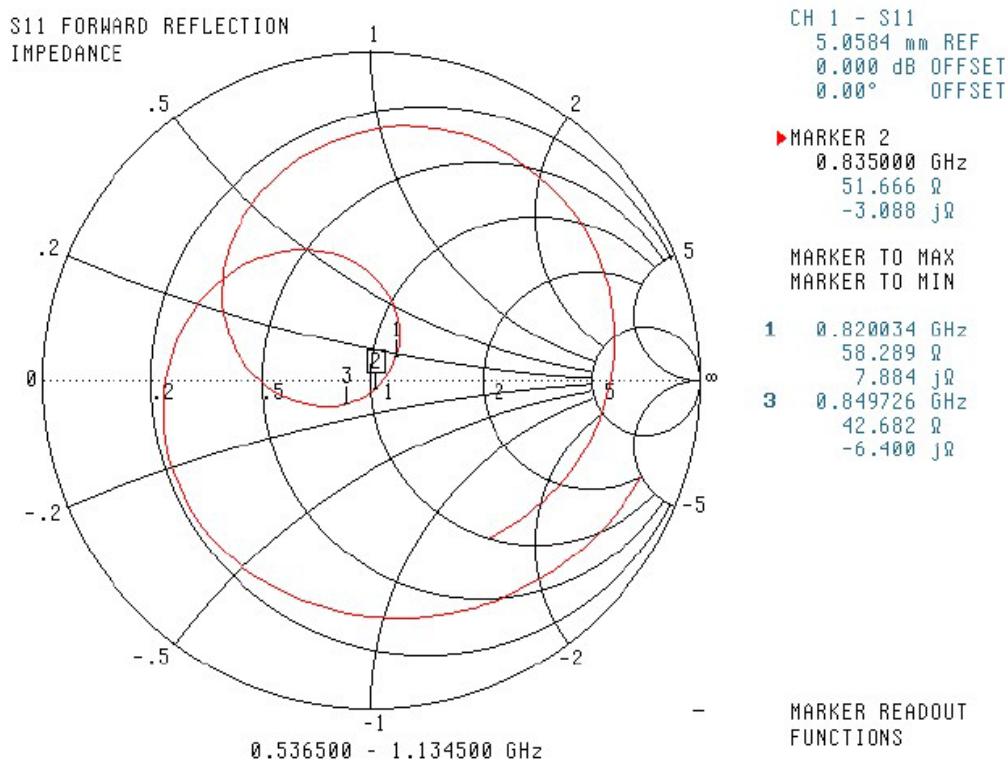
Body Tissue of Return Loss(2011)



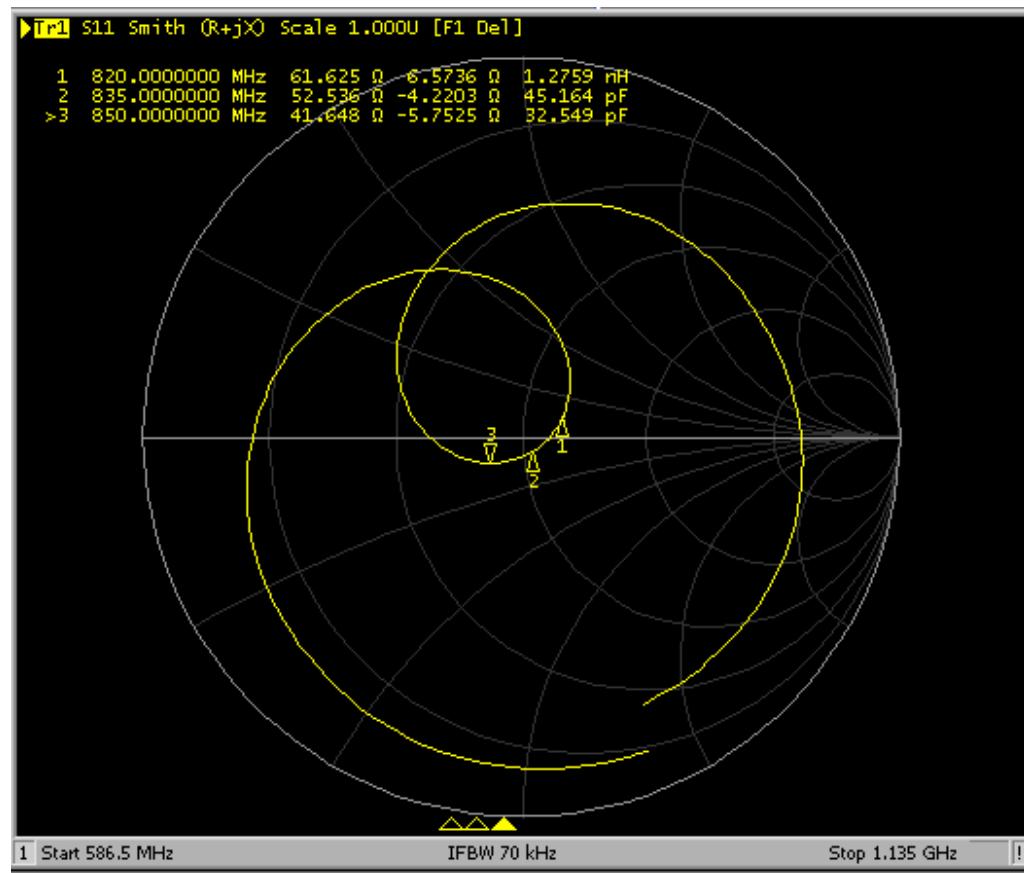
Body Tissue of Return Loss(2012 recent)



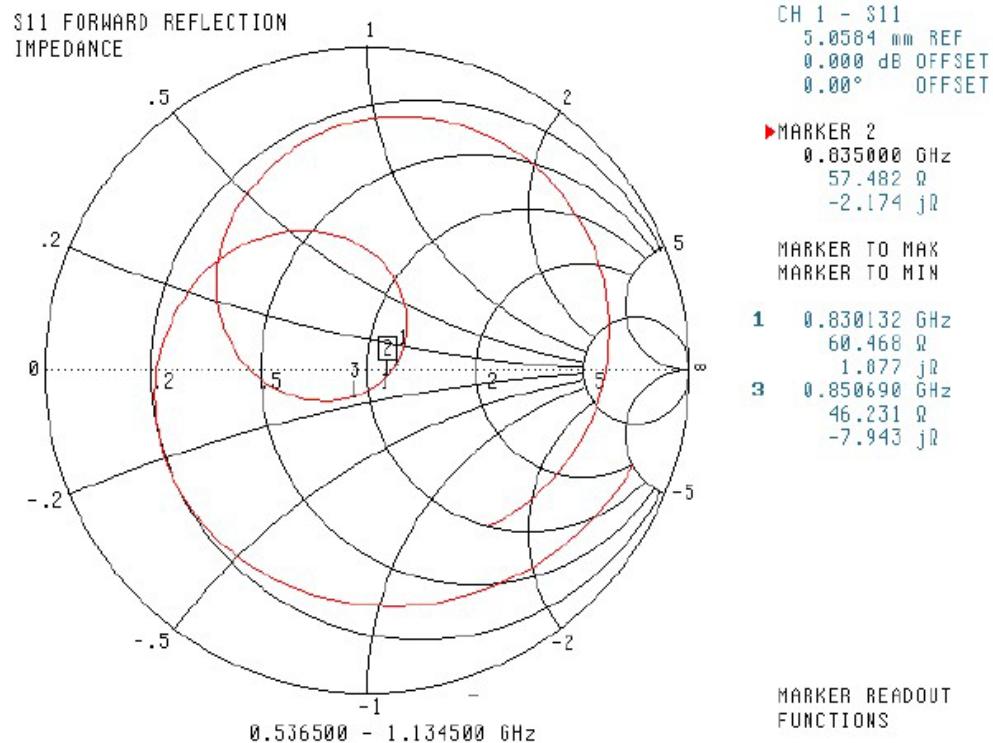
Head Tissue of Impedance(2011)



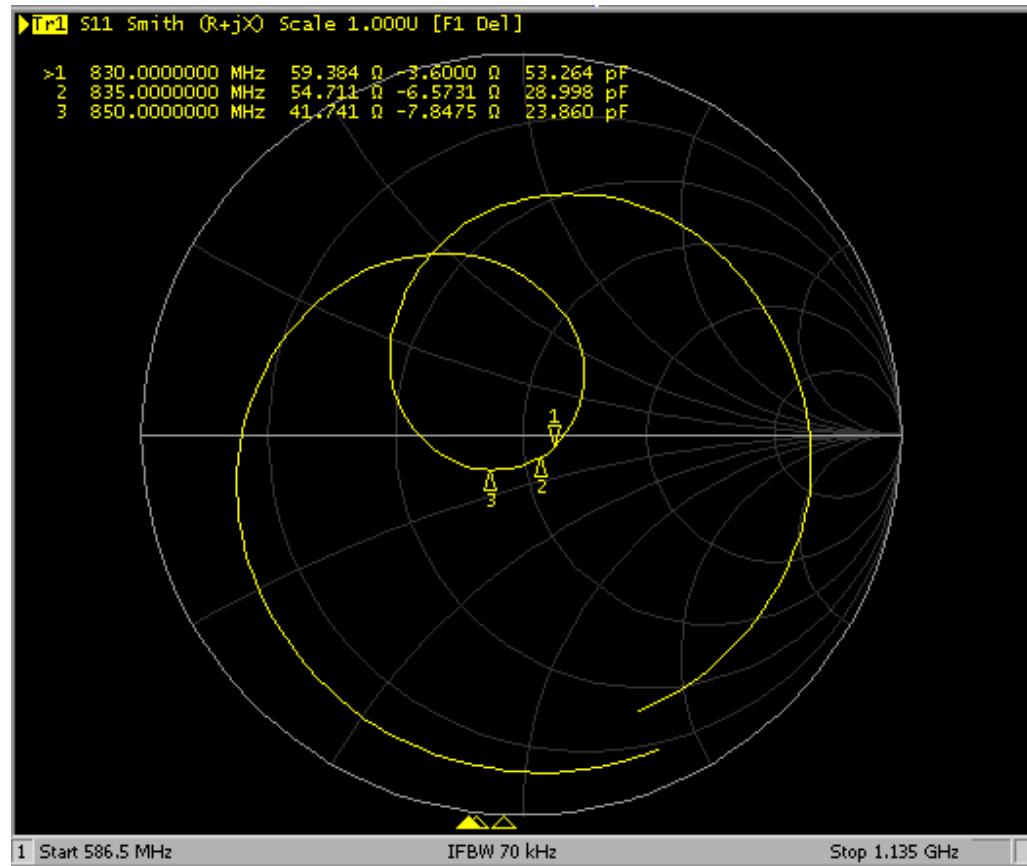
Head Tissue of Impedance(2012 recent)



Body Tissue of Impedance(2011)



Body Tissue of Impedance(2012 recent)

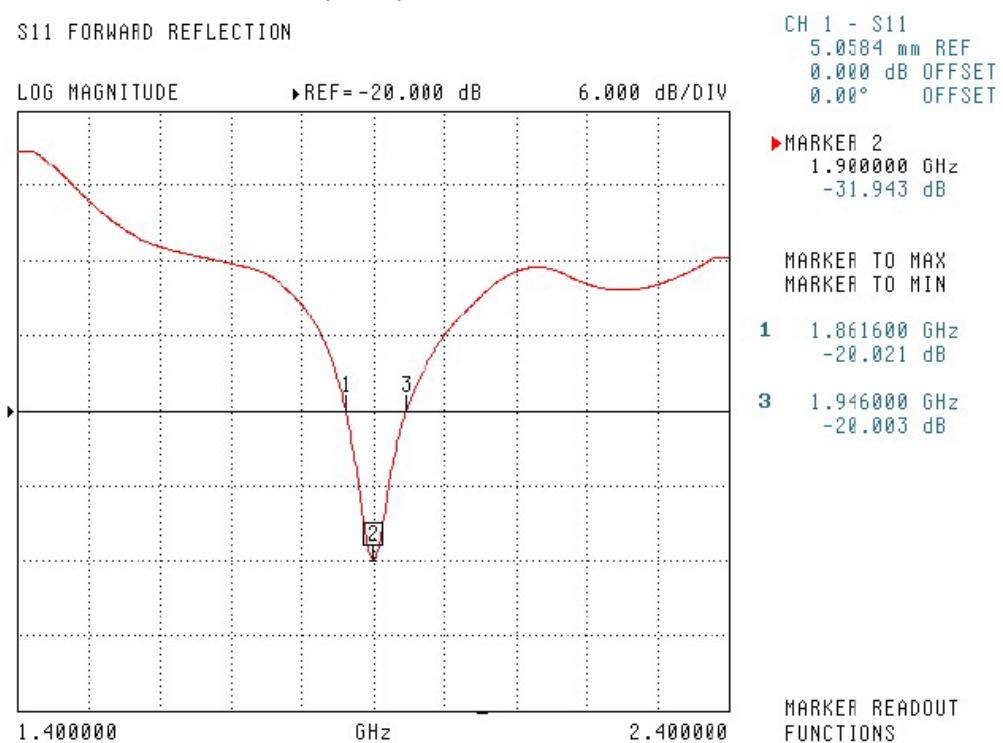


Validation Dipole Calibration

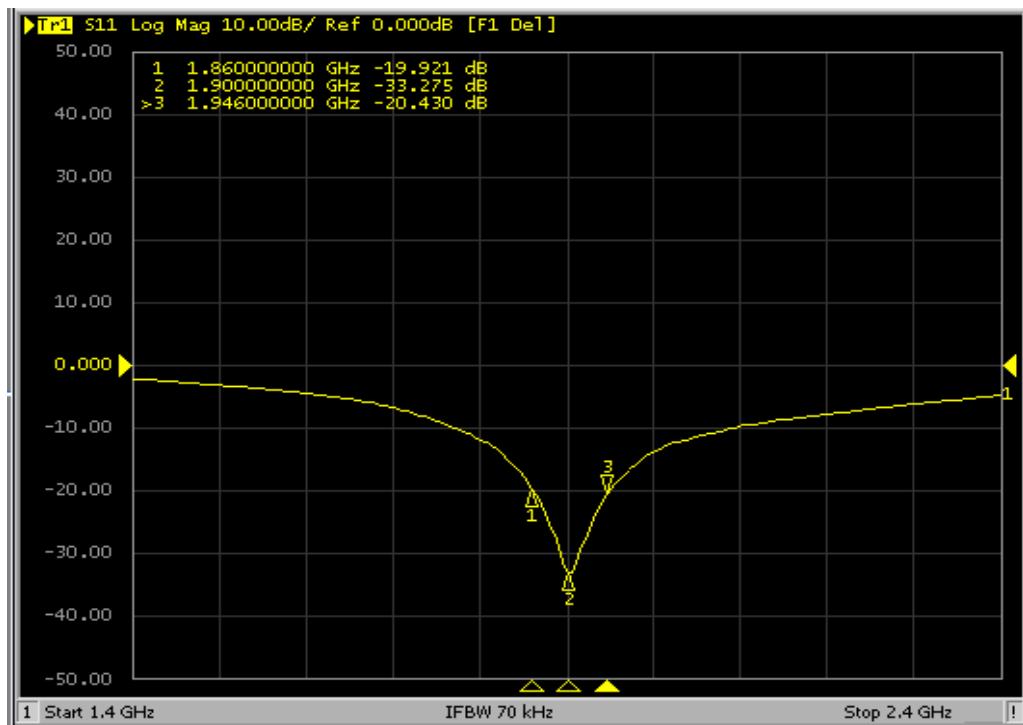
Electrical Specification 1900MHz

Tissue Type	Return Loss(dB)	Impedance(ohm)
Head(2011)	-31.943	51.262
Head(2012 recent)	-33.275	49.302
Body(2011)	-25.099	53.750
Body(2012 recent)	-25.606	50.197

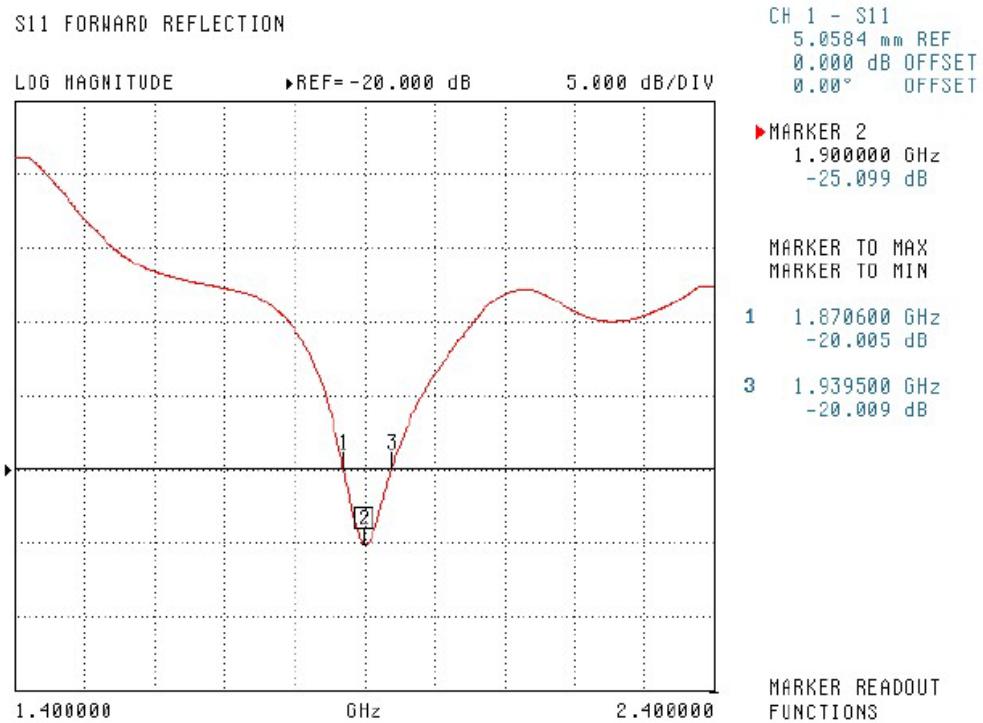
Head Tissue of Return Loss(2011)



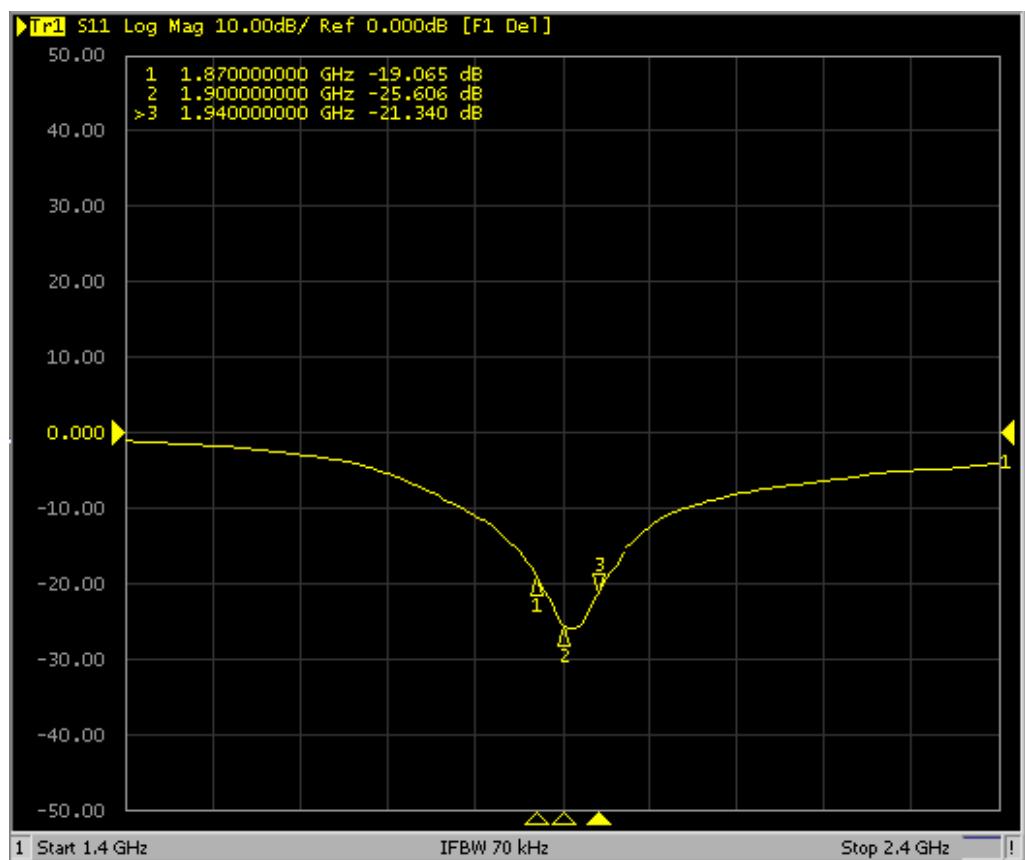
Head Tissue of Return Loss(2012 recent)



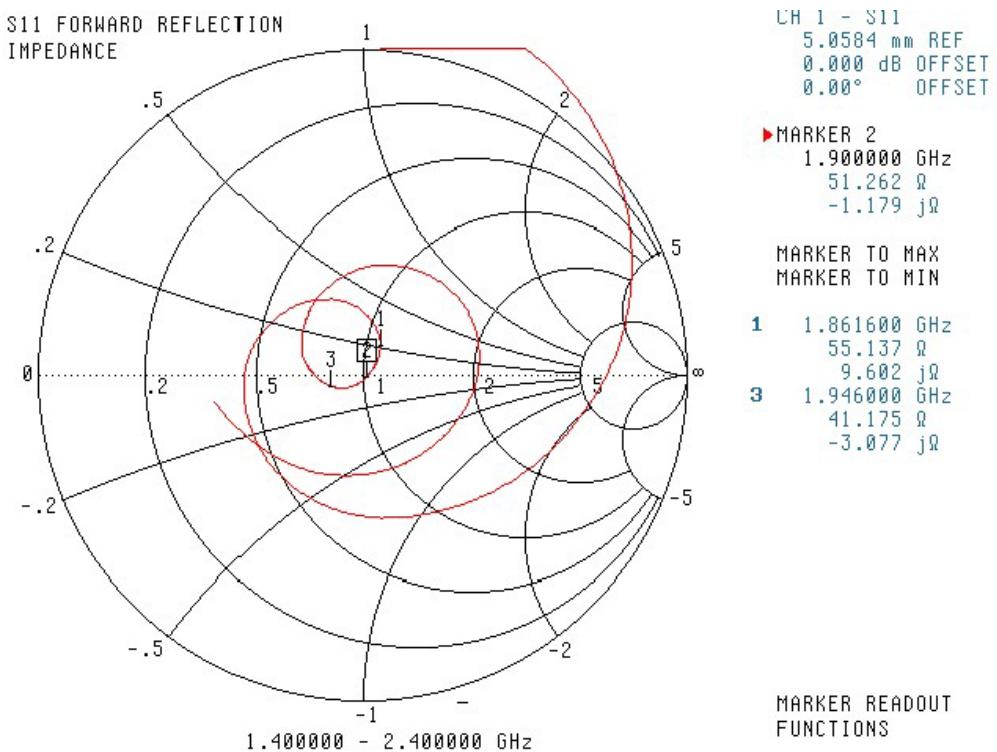
Body Tissue of Return Loss(2011)



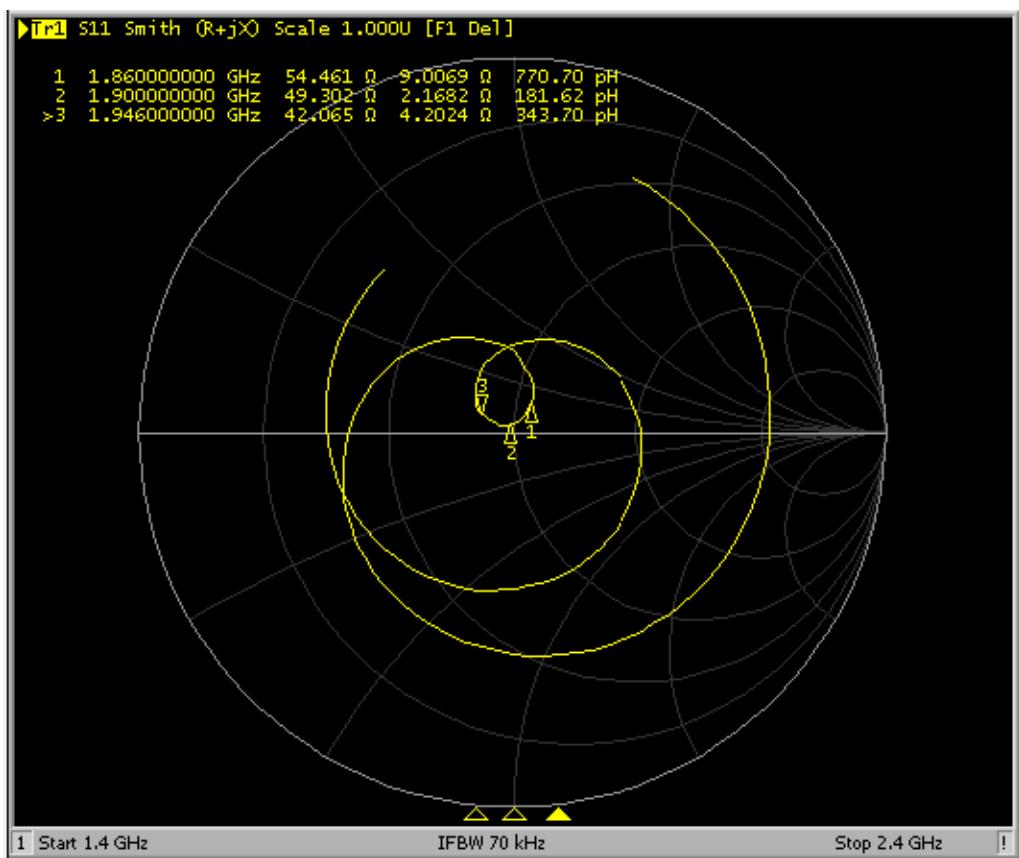
Body Tissue of Return Loss(2012 recent)



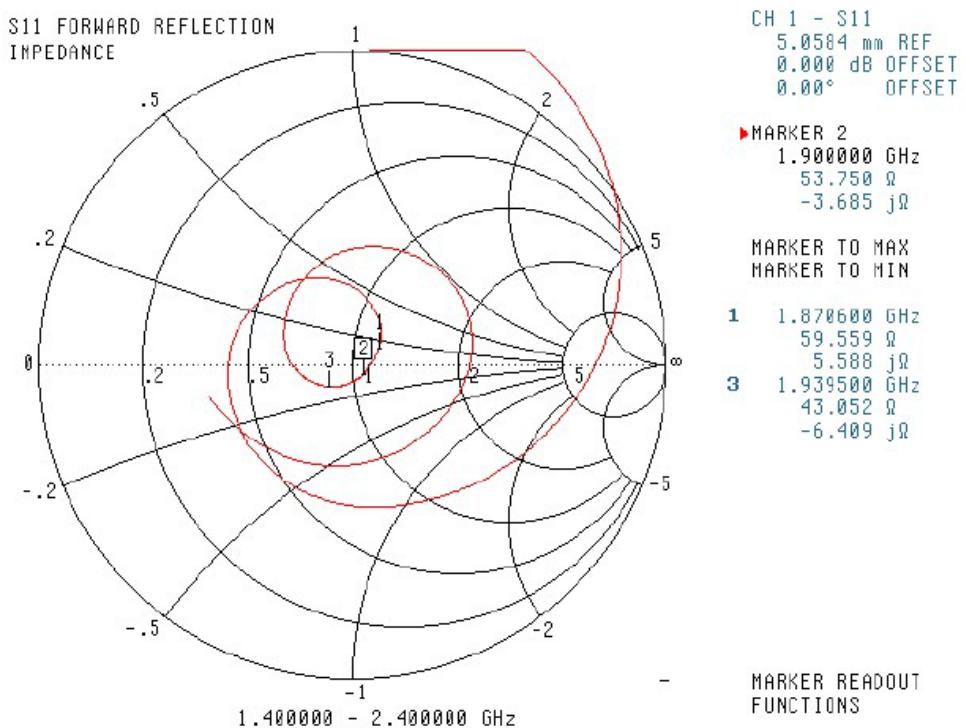
Head Tissue of Impedance(2011)



Head Tissue of Impedance(2012 recent)



Body Tissue of Impedance(2011)



Body Tissue of Impedance(2012 recent)

