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SAR Compliace Test Report

APPLICANT NAME & ADDRESS :
LG Electronics Inc.
459-9, Kasan-dong, Keumchun-ku,
Seoul 153-023, Korea

DATA & LOCATION OF TESTING
Dates of testing : 2005 8/19 ~ 9/7
Test Site : ESTECH Co., Ltd. Korea

Test Device :

Models : P7200,LG-G912,ME540c

FCC ID : BEJP7200

TYPE : Single-Band PCS GSM Phone (GSM)

Test report no :	ESTSAR0509-002	Number of page :	26
Contact person :	Cheol-Goo Lee	Responsible test Engineer :	K.H.Kang
Testing has been Carried out in Accordance with :	IEEE P1528-200X Draft 6.4 Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate(SAR) in the Human Body Due to Wireless Communications Device : Experimental Techniques		
Applicant Type :	Certification		
FCC CLASSIFICATION :	Licensed Portable Transmitter Held to Ear (PCE)		
FCC Rule Part(s)	§2.1093; FCC/OET Bulletin 65 Supplement C (July 2001)		
Test results :	The Tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced recept in full, without written approval of the laboratory.		

Date and Signatures : 2005/9/7
Report Prepared By : Engineer/ K.H.Kang
(Signature)
Manager Engineer/ Jay Kim
(Signature)

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1. SUMMARY FOR TEST REPORT

FCC ID	BEJP7200
Date of test	2005/8/19 ~ 2005/9/7
Responsible test engineer	Jay Kim
Measurement performed by	K.H.Kang
EUT Type	Single-Band PCS GSM Phone (GSM)
Tx Frequency	1850.2 ~ 1909.8 MHz (GSM)
Rx Frequency	1930.2 ~ 1989.8 MHz (GSM)
Max. RF Output Power	GSM (30 dBm)

Maximum Results Found During SAR Evaluation

1.1 Head Configuration

Max. SAR Measurement

FREQUENCY		Modulation	Conducted Power(dBm)		Device test position	Antenna position	SAR (W/kg)
MHz	Ch		dBm	Battery			
1909.8	810	GSM	30	Standard	Right Tilt	-	1.35

1.2 Body Worn Configuration

Max. SAR Measurement

FREQUENCY		Modulation	Conducted Power(dBm)		Separation test position	Antenna position	SAR (W/kg)
MHz	Ch		dBm	Battery			
1909.8	810	GSM	30	Standard	1.5cm [w/o Holster]	-	0.165

1.3 Measurement Uncertainty

Combine Standard Uncertainty	± 10.81 (k=1)
Extended Standard Uncertainty	± 21.62 (k=2, 95% CONFIDENCE LEVEL)

2. INTRODUCATION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential azards of RF emissions due to FCC-regulated portable device.[1]

The safety limits used for the environmental evaluation measurements arethe criteria published by the based on American National Standards Institute (ANSI) For localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for safety Levels with Respect to Human Exposure to Radio Frequency Electronic Fields, 3 kHz to 300 GHz. (c) 1992 by the institute of Electrical and Electronics Engineers, Inc., New York, New York 10017.[2] The measurement procedure described in IEEE/ANSIC95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave[3] is used for guidance in measuring SAR due to the RF radiationexposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields," NCRP Report No. 86 (c) NCRP, 1986, Bethesda, MD20814.[6] SAR is ameasure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). it is also defined as the rate of rf energy absorption per unit mass at a point in an absorbing body (see Fig. 3.1.).

$$SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right) = \frac{d}{dt}\left(\frac{dU}{\rho\, dv}\right)$$

Figure 2.1 SAR Mathematical Equation

SAR is expressed in units of Watts per Kilogram (W/kg).

$$SAR = \sigma E^2 / \rho$$

Where:

σ = conductivity of the tissue-simulant material (S/m)
E = mass density of the tissue-simulant material (kg/㎥)
ρ = Total RMS electric field strength (V/m)

3. DESCRIPTION OF THE DEVICE UNDER TEST

The FCC rules for evaluating portable devices for RF exposure compliance are contained in 47 CFR §2.1093. For purposes of RF exposure evaluation, a portable device is defined as a transmitting device designed to be used with any part of its radiating structure in direct contact with the user's body or within 20 centimeters of the body of a user or bystanders under normal operating conditions. This category of devices would include hand-held cellular and PCS telephones that incorporate the radiating antenna into the hand-piece and wireless transmitters that are carried next to the body. Portable sevices are evaluated with respect to SAR limits for RF exposure. The applicable SAR limit for portable transmitters used by consumers is 1.6 watts/kg, which is averaged over any one gram of tissue defined as a tissue volume in the shape of a cube.

2.1 Antenna Description

Type	Internal Antenna
Location	Internal, the bottom of the device
Radiator Material	Copper

2.2 Device Description

FCC ID	FCC ID : BEJP7200
Serial numbers	-
Exposure environment	Uncontrolled exposure
Device category	Portable device
Mode(s) of Operation	GSM
Modulation Mode(s)	GSM
Duty Cycle	8.3
Transmitting FreQuency Range(s)	1850.2 ~ 1909.8 MHz (GSM)

2.3 Battery Options

There is only one battery option available for tested device,

4. TEST CONDITIONS

4.1 Ambient Conditions

Ambient Temperature (°C)	21
Tissue simulating liquid temperature (°C)	21
Humidity (%)	45

4.2 RF Characteristics of The Test Site

Tests were performed in a fully enclosed RF Shielded environment

4.3 Test Signal, Frequencies, And Output Power

The handset was placed into simulated call mode (1900MHz GSM modes) using manufacturers test codes.

In all operation bands the measurements were performed on lowest, middle and highest channels.

The phone was set to maximum power level during the all tests and at the beginning of the each test the battery was fully charged.

DASY4 system measures power drift during SAR testing by comparing e-field in the same location at the beginning and at the end of measurement. These records were used to monitor stability of power output.

Fig. 4.1 SAR Measurement System

5. DESCRIPTION OF THE TEST EQUIPMENT

An SAR measurement system usually consists of a small diameter isotropic electric field probe, a multiple axis probe positioning system, a test device holder, one or more phantom models, the field probe instrumentation, a computer and other electronic equipment for controlling the probe and making the measurements. Other supporting equipment, such as a network analyzer, power meters and RF signal generators, are also required to measure the dielectric parameters of the simulated tissue media and to verify the measurement accuracy of the SAR system.

5.1 Test System Specifications

Test Equipment	Model	Serial Number	Cal. date
DAE	DAE3	551	2004-04-28
E-Field Probe	ET3DV6	1748	2005-01-21
Dipole validation kit	D1900V2	5d058	2005-01-27
Network analyzer	8753ES	NONE	2004-10-12
Signal generator	E4421B	GB40052295	2004-10-12
RF Power meter	EPM-442A	GB37170412	2004-10-12
Power Sensor	8481A	3318A90368	2004-10-14
RF Power meter	E4418A	GB38272722	2005-03-03
Power Sensor	8481A	3318A96478	2005-03-03
Dielectric Probe	85070D	US01440154	-

5.2 SAR Measurement Setup

Measurement are performed using the DASY4 dosimetric assessment system. The DASY4 is made by Schmid & Partner Engineering AG(SPEAG) in Zurich, Switzerland and consists of high precision robotics system (Staubli), robot controller, Pentium IV computer, near-field probe, probe alignment sensor, and the SAM twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field(EMF) (see Fig. 5.1) A cell controller system contains the power supply, robot controller, teach pendant(Joystick), and a remote control used to drive the robot motors. The pc consists of the Intel Pentium IV 2.4 GHz computer with Windows2000 system and SAR measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing,
AD-conversion, offset measurements, mechanical surface detection, collision detection, etc.

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

Is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

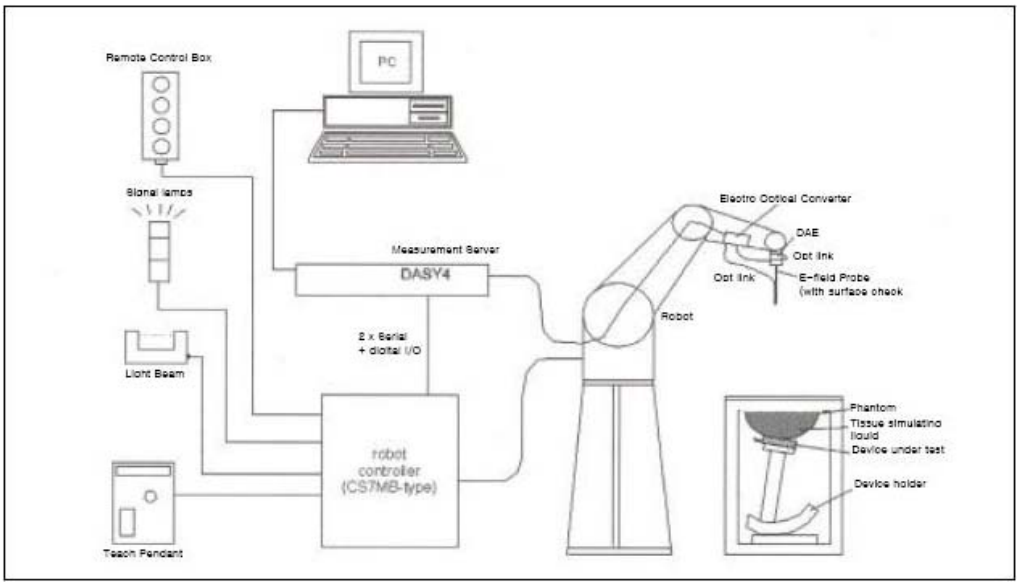

Fig. 5.1 SAR Measurement System Setup

The DAE3 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gainswitching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in [7].

5.3 DASY4 E-Field Probe System

The SAR measurements were conducted with the dosimetric probe ET3DV6, designed in the classical triangular configuration [7] (see Fig.5.2) and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box in the robot arm and provides an automatic detection transmitter, the other half to a synchronized receiver.

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

As the probe approach the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches coupling is zero. The distance of the coupling maximum to the surface is probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting (see Table. 5.2). The approach is stopped at reaching the maximum.

Isotropic E-Field Probe

Isotropic E-Field Probe for Dosimetric Measurements	
Construction	Symmetrical design with triangular core Interleafed sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycol)
Calibration	In air from 10 MHz to 3 GHz In brain and muscle simulating tissue at frequencies of 450 MHz, 900 MHz and 1.8 GHz (accuracy ± 8%) Calibration for other liquids and frequencies upon request
Frequency	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity	± 0.2 dB in brain tissue (rotation around probe axis) ± 0.3 dB in brain tissue (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 20 mm Body diameter: 12 mm Tip diameter: 3.9 mm Distance from probe tip to dipole centers: 2.7 mm

Fig. 5.2 Probe Specifications

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

5.4 Phantom & Equivalent Tissues

SAM Phantom

The SAM Twin Phantom V4.0 is constructed of the fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users [11][12]. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

Head & Muscle simulation Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydroxethlcellullose(HEC) gelling agent and saline solution (see Table 5.1). Preservation with a bactericide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been specified in P1528 are derived from the issue dielectric parameters computed from the 4-Cole-Cole equations The mixture characterizations used for the brain and muscle tissue simulation liquids are according to the data by C. Gabriel and G. Hartagrove [13]. (see Fig. 5.3)

Frequency	Head		Body	
(MHz)	εr	σ (S/m)	εr	σ (S/m)
150	52.3	0.76	61.9	0.8
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.9	55.2	0.97
900	41.5	0.97	55	1.05
915	41.5	0.98	55	1.06
1450	40.5	1.2	54	1.3
1610	40.3	1.29	53.8	1.4
1800-2000	40	1.4	53.3	1.52
2450	39.2	1.8	52.7	1.95
3000	38.5	2.4	52	2.73
5800	35.3	5.27	48.2	6

Fig.5.3 Head and body tissue parameters by the IEEE SCC-34/SC-2 in P1528

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

835MHz			1900MHz		
	Head	Body		Head	Body
Sugar	47.31%	34.31%	DGBE(diethyene Glycol butyl Ether)	44.91%	29.96%
Deionized water	51.07%	65.45%	Deionized water	54.88%	69.91%
Salt	1.15%	0.62%	Salt	0.21%	0.13%
HEC (hydroxyethyl cellulose)	0.24%				
Preventol	0.24%	0.10%			
ε	41.0±5%	55.2±5%	ε	40.0±5%	53.3±5%
σ	0.89±10%	0.97±10%	σ	1.45±10%	1.52±10%

Fig. 5.4 Composition of the Tissue Equivalent Matter

Device Holder for Transmitters

In combination with the SAM Twin Phantom V4.0, the Mounting Device enables the rotation of the accurately, and repeatably be positioned according to the FCC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Note : A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produce infinite number of configurations [12]. To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

6. DESCRIPTION OF THE TEST PROCEDURE

6.1 Definition of Reference Point

EAR Reference point

The point "M" is the reference point for the center of the mouth, "ERP" is the ear reference point. The ERP are 15mm posterior to the entrance to the ear canal(EEC) along the B-M line (Back-Mouth), as shown is figure 6.1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front) is perpendicular to the reference plane and passing through the ERP is called the Reference Pivoting Line (see Figure 6.1) B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning [5].

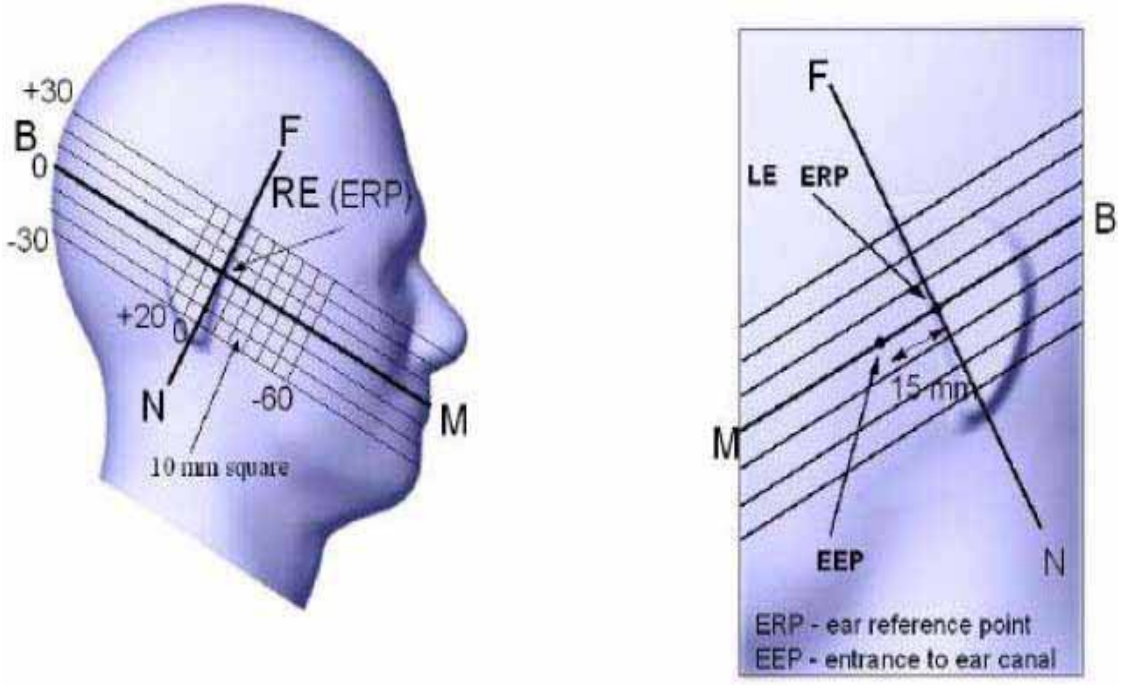

Figure 6.1 Close-up side view of ERP

Handset Reference Points

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (see Fig. 6.2). The "test device reference point" was than located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at it's top and bottom edges, positioning the "ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

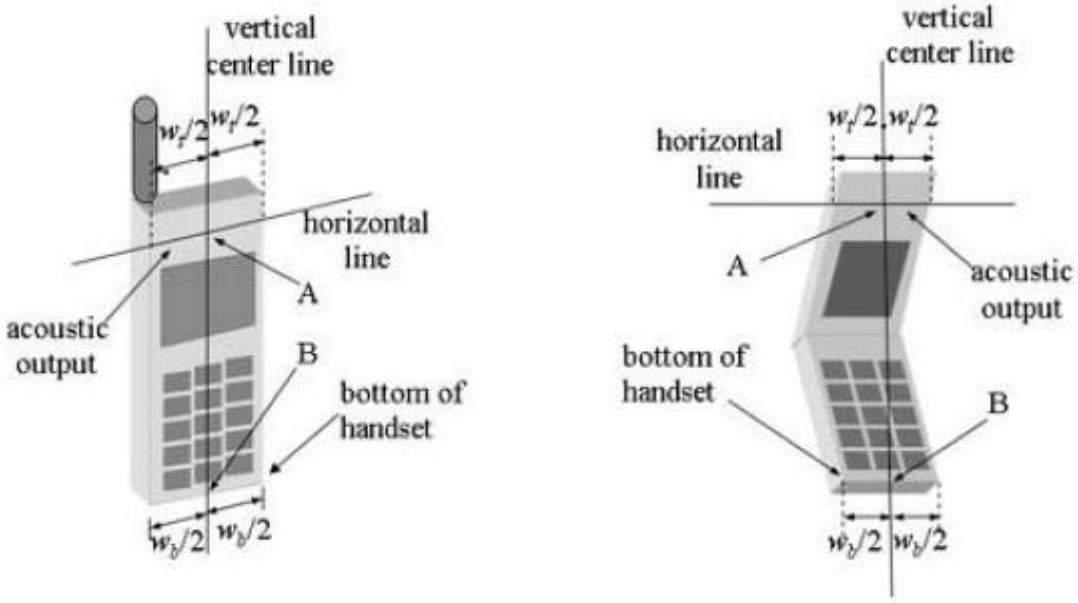

Figure 6.2 Handset Vertical Center & Horizontal Line Reference Points

6.2 Test Configuration Positions
Positioning for Cheek/Touch

1) Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece, open the cover . (If the phone can also be used with the cover closed ,both configurations must be tested.)
2) 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 6.2), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 6.2). 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 ecessarily parallel to the front face of the handset (see Figure 6.2), especially for clamshell handsets, handsets with lip pieces, and other irregularly-shaped handsets.
3) Position the handset close to the surface of the phantom touch that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6.3), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

4) Translate the handset towards the phantom along the line passing through RE and LE until the handset touches the ear.
5) 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).
6) Rotate the phone around the vertical centerline until the phone (horizontal line) is symmetrical with respect to the line NF.
7) While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, rotate the handset about the line NF until any point on the handset is in contact with a phantom point

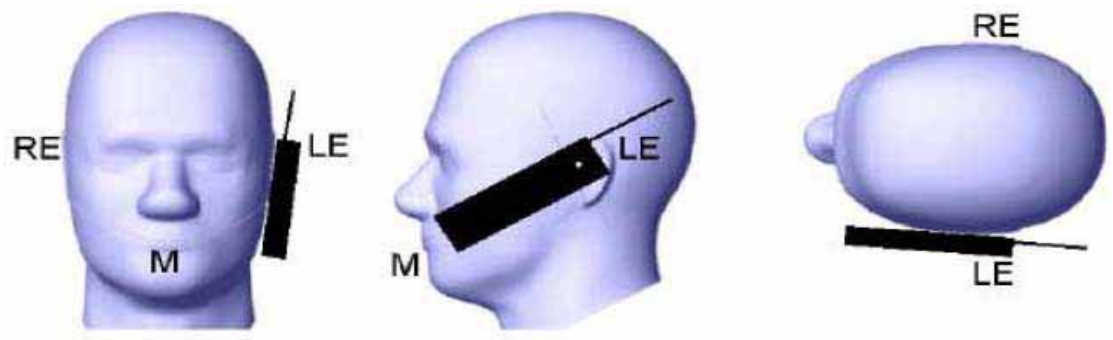

Figure 6.3 “Cheek” or “Touch” Position.

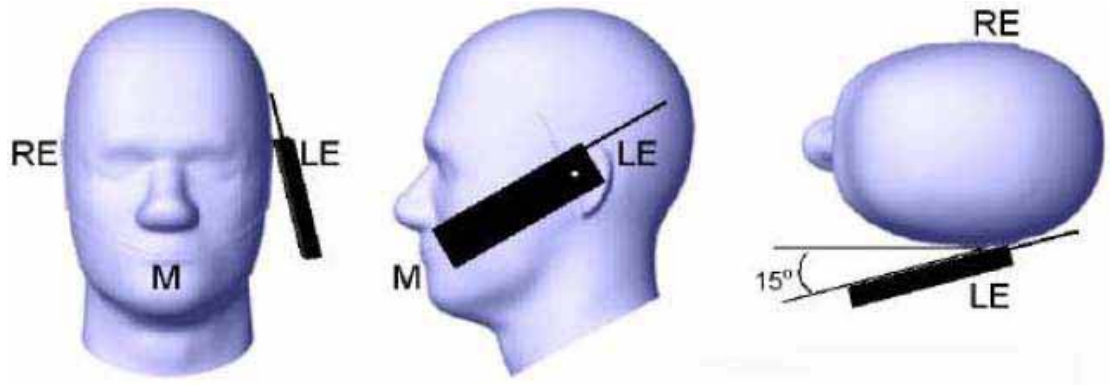

Figure 6.4 “Tilted” Position.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

Positioning for Ear / 15° Tilted

1) Repeat steps 1 to 7 of 6.2(Positioning for Cheek/Touch) to place the device in the "cheek position."
2) While maintaining the orientation of the phone retract the phone parallel to the reference plane far enough to enable a rotation of the phone by 15 degree.
3) Rotate the phone around the horizontal line by 15 degree.
4) While maintaining the orientation of the phone, move the phone parallel to the reference plane until any part of the phone touches the head. (In this position, point A will be located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact is at any location other than the pinna, the angle of the phone shall be reduced. The tilted position is obtained if any part of the phone is in contact of the ear as well as a second part of the phone is contact with the head.

Body Holder / Belt Clip Configurations

Body-worn operation configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. A device with a headset output is tested with a headset connected to the device. Body dielectric parameters are used.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are supplied with the device, the device is tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied of available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration where a separation distance between the back of the device and the flat phantom is used. All test position spacings are documented. Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance is tested with the accessory(ies), including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration. In all case SAR measurements are performed to investigate the worst case positioning. Worst-case positioning is then documented and used to perform Body SAR testing.

In order for users to be aware of the body-worn operation requirements for meeting RF exposure compliance, operation instructing instructions and cautions statements are included in the user's manual.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

6.3 Scan Procedures

First coarse scans are used for quick determination of the field distribution. Nest cube scan, 7x7x7 points; spacing between each point 5x5x5 mm, is performed around the highest E-field value to determine the averaged SAR-distribution over 1g.

6.4 SAR Averaging Methods

The maximum SAR value is averaged over its volume using interpolation and extrapolation.
The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the “Not a Knot” ?condition [W.Gander, Computerma-thematik, p. 141-150](x, y and z ?directions) [Numerical Recipes in C, Second Edition, p 123].
The extrapolation is based on least square algorithm [W.Gander, Computermathematik, p. 168-180]. Through the points in the first 30 mm in all z-axis, polynomials of order four are calculated₩. This polynomial is then used to evaluate the points between the surface and the probe tip. The points calculated from the surface, have a distance of 1mm from one another.

7. MEASUREMENT UNCERTAINTY

According to CENELEC [17], typical worst-case uncertainty of field measurements is 5 dB.
For well-defined modulation characteristics the uncertainty can be reduced to 3 dB.

ERROR Description	Uncertainty value ±%	Probability Distribution	Divisor	ci 1g	Standard unc. (1g)	vi or Veff
MEASUREMENT SYSTEM						
Probe Calibration	± 11.7 %	normal	1	1	± 4.8 %	∞
Axial Isotropy	± 4.7	rectangular	√3	$(1-cp)^{1/2}$	± 1.9%	∞
Hemispherical Isotropy	± 9.6	rectangular	√3	$(cp)^{1/2}$	± 3.9%	∞
Boundary Effects	± 1.0	rectangular	√3	1	± 0.6%	∞
Linearity	± 4.7	rectangular	√3	1	± 2.7%	∞
System Detection Limits	± 1.0	rectangular	√3	1	± 0.6%	∞
Readout Electronics	± 1.0	normal	1	1	± 1.0%	∞
Response time	± 0.8	rectangular	√3	1	± 0.5%	∞
Integration time	± 2.6	rectangular	√3	1	± 1.5%	∞
RF Amnient Conditions	± 3.0	rectangular	√3	1	± 1.7%	∞
Probe Positioner Mechanical Tolerance	± 0.4	rectangular	√3	1	± 0.2%	∞
Probe Positioning with respect to Phantom Shell	± 2.9	rectangular	√3	1	± 1.7%	∞
Extrapolation, Interpolation and Integration Algorithms for Max. SAR Evaluation	± 1.0	rectangular	√3	1	± 0.6%	∞
Test Sample Related						
Test Sample Positioning	± 2.9	normal	1	1	± 2.97%	145
Device Holder Uncertainty	± 3.6	normal	0.84	1	± 3.69%	5
Output Power Validation - SAR drift measurement	± 5.0	rectangular	√3	1	± 2.9%	∞
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	± 4.0	rectangular	√3	1	± 2.3%	∞
Liquid conductivity Target - tolerance	± 5.0	rectangular	√3	0.64	± 1.8%	∞
Liquid Conductivity - measurement uncertainty	± 2.5	normal	1	0.64	± 1.6%	∞
Liquid permittivity Target - tolerance	± 5.0	rectangular	√3	0.6	± 1.7%	∞
Liquid Permittivity - measurement uncertainty	± 2.5	normal	1	0.6	± 1.5%	∞
Combined Standard Uncertainty					±11.32 %	330
Coverage Factor for 95%				K = 2		
Expanded Standard Uncertainty					± 22.64 %	

8. SYSTEM VERIFICATION

Tissue Verification

Table 8.1 Simulated Tissue Verification [5]

MEASURED TISSUE PARAMETERS										
Liquid Temperature (°C)			21		Liquid Depth(mm)		150			
Date	2005-08-31		2005-08-31		2005-09-07		2005-09-07			
Tissue	1900MHz Brain		1900MHz Muscle		1900MHz Brain		1900MHz Muscle			
	Target	Measured	Target	Measured	Target	Measured	Target	Measured		
Dielectric Constant: ε	40	39.8	53.3	51.3	40	40.3	53.3	51.1		
Conductivity: σ	1.45	1.45	1.52	1.52	1.45	1.41	1.52	1.53		
Deviation (%)	ε : −0.5% σ : −0.0%		ε : −3.75% σ : −0.00%		ε : 0.75% σ : −2.76%		ε : −4.13% σ : 0.66%			

Test System Validation

Prior to assessment, the system is verified to the ±10% of the specifications at 1900MHz (Graphic Plots Attached)

Table 8.2 System Validation [5]

SYSTEM DIPOLE VALIDATION TARGET & MEASURED						
Tissue	System Validation Kit:	Forward Power (mW)	Targeted SAR1g (mW/g)	Measured SAR1g (mW/g)	Deviation (%)	Test Date
1900MHz Brain	D1900V2(S/N :5d058)	250	9.81	9.87	0.61%	2005-08-31
1900MHz Brain	D1900V2(S/N :5d058)	250	9.81	9.39	-4.28%	2005-09-07

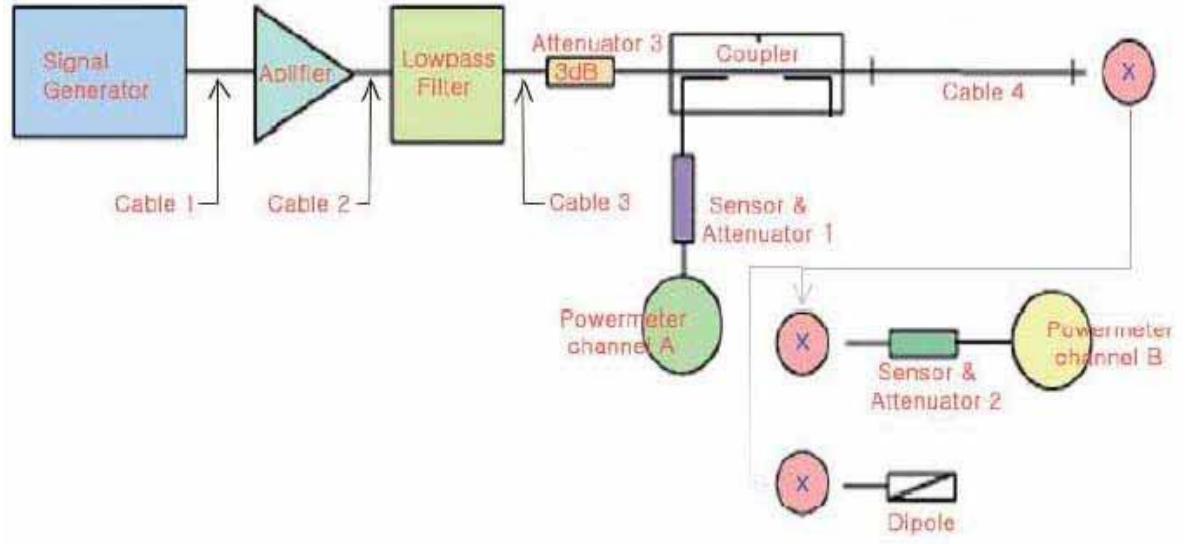

Figure 12.1 Dipole Validation Test Setup

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 21.0
Relative HUMIDITY (%) : 45
Mixture Type : 1900MHz Brain
Dielectric Constant : 39.8
Conductivity: 1.45

Measurement Results (GSM Head SAR-Touch-Folder Down)

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (GSM Left Head SAR - Touch - Folder Down)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	31.32	31.26	Standard	Cheek Touch	-	0.680

MEASUREMENT RESULTS (GSM Right Head SAR - Touch - Folder Down)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	31.32	31.28	Standard	Cheek Touch	-	0.823

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Radiated measurements indicate that the Extended-life battery produces lower ERP and EIRP, therefore the Standard-life battery is used in SAR testing.
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Head

Engineer K.H.Kang (Signature)

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 21.0
Relative HUMIDITY (%) : 45
Mixture Type : 1900MHz Brain
Dielectric Constant : 39.8
Conductivity: 1.45

Measurement Results (GSM Head SAR-Tilt-Folder Down)

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (GSM Left Head SAR - Tlit - Folder Down)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	31.32	31.31	Standard	Tilt	-	0.865
1880.00	661	GSM	31.33	31.32	Standard	Tilt	-	1.070
1909.80	810	GSM	31.28	31.29	Standard	Tilt	-	1.300

MEASUREMENT RESULTS (GSM Right Head SAR - Tilt - Folder Down)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	31.24	31.23	Standard	Tilt	-	0.931
1880.00	661	GSM	31.25	31.28	Standard	Tilt	-	1.14
1909.80	810	GSM	31.40	31.42	Standard	Tilt	-	1.35

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard

Radiated measurements indicate that the Extended-life battery produces lower ERP and EIRP, therefore the Standard-life battery is used in SAR testing.

4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Head

Engineer K.H.Kang (Signature)

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 21.0
Relative HUMIDITY (%) : 45
Mixture Type : 1900MHz Brain
Dielectric Constant : 39.8
Conductivity: 1.45

Measurement Results (GSM Head SAR-Touch-Folder UP)

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (GSM Left Head SAR - Touch - Folder UP)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	31.54	31.41	Standard	Cheek Touch	-	0.097

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Radiated measurements indicate that the Extended-life battery produces lower ERP and EIRP, therefore the Standard-life battery is used in SAR testing.
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Head

Engineer K.H.Kang (Signature)

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 21.0
Relative HUMIDITY (%) : 45
Mixture Type : 1900MHz Brain
Dielectric Constant : 39.8
Conductivity: 1.45

Measurement Results (GSM Head SAR-Tilt-Folder UP)

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (GSM Right Head SAR - Tilt - Folder UP)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	31.38	31.26	Standard	Tilt	-	0.056

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Radiated measurements indicate that the Extended-life battery produces lower ERP and EIRP, therefore the Standard-life battery is used in SAR testing.
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Head

Engineer K.H.Kang (Signature)

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 21
Relative HUMIDITY (%) : 48
Mixture Type : 1900MHz Body
Dielectric Constant : 51.3
Conductivity: 1.52

Measurement Results (GSM BODY SAR without Holster Folder Down)

ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (GSM Body SAR Without Holster Folder Down)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	31.36	31.37	Standard	1.5[w/o Holster]	–	0.124
1880.00	661	GSM	31.28	31.28	Standard	1.5[w/o Holster]	–	0.134
1909.80	810	GSM	31.35	31.36	Standard	1.5[w/o Holster]	–	0.165

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Radiated measurements indicate that the Extended-life battery produces lower ERP and EIRP, therefore the Standard-life battery is used in SAR testing.
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Body

Engineer K.H.Kang (Signature)

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 21.0
Relative HUMIDITY (%) : 44
Mixture Type : 1900MHz Brain
Dielectric Constant : 40.3
Conductivity: 1.41

Measurement Results (GSM Head SAR-Tilt/Touch-Folder UP)

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (GSM Left Head SAR - Tilt - Folder UP)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.94	30.93	Standard	Cheek Touch	-	0.043

MEASUREMENT RESULTS (GSM Right Head SAR - Touch - Folder UP)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.77	30.75	Standard	Cheek Touch	-	0.139

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Radiated measurements indicate that the Extended-life battery produces lower ERP and EIRP, therefore the Standard-life battery is used in SAR testing.
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Head

Engineer K.H.Kang (Signature)

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 21
Relative HUMIDITY (%) : 48
Mixture Type : 1900MHz Body
Dielectric Constant : 51.3
Conductivity: 1.52

Measurement Results (GSM BODY SAR without Holster Folder UP)

ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Brain 1.6 W/kg (mW/g) averaged over 1 gram

MEASUREMENT RESULTS (GSM Body SAR Without Holster Folder UP)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.86	30.97	Standard	1.5[w/o Holster]	–	0.130

NOTES:
1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration.
2. All modes of operation were investigated and the worst-case are reported.
3. Battery Type : Standard
Radiated measurements indicate that the Extended-life battery produces lower ERP and EIRP, therefore the Standard-life battery is used in SAR testing.
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Body

Engineer K.H.Kang (Signature)

10. REFERENCE

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APPENDIX A : Validation Test Data of Tissue

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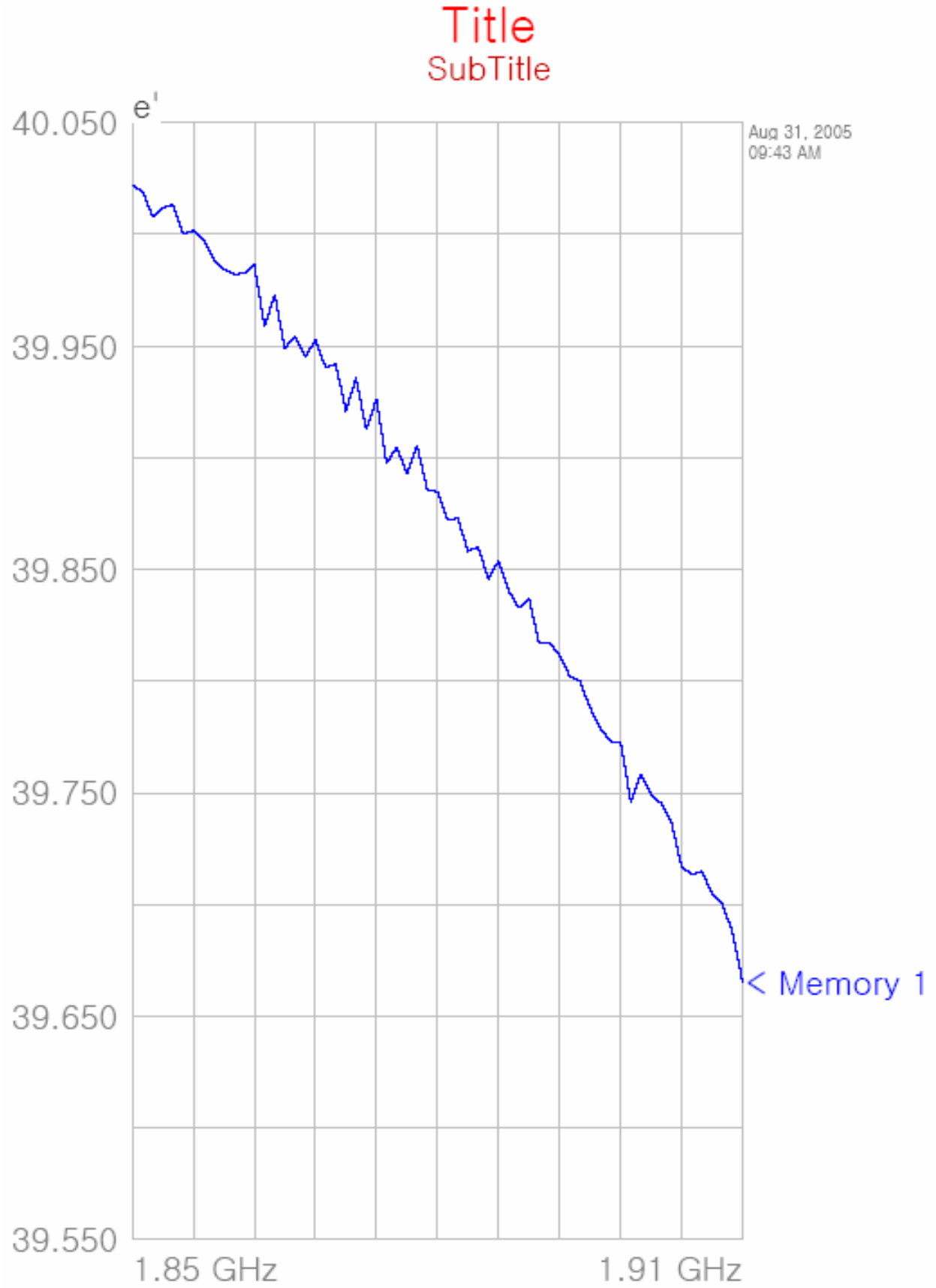
- Head Tissue



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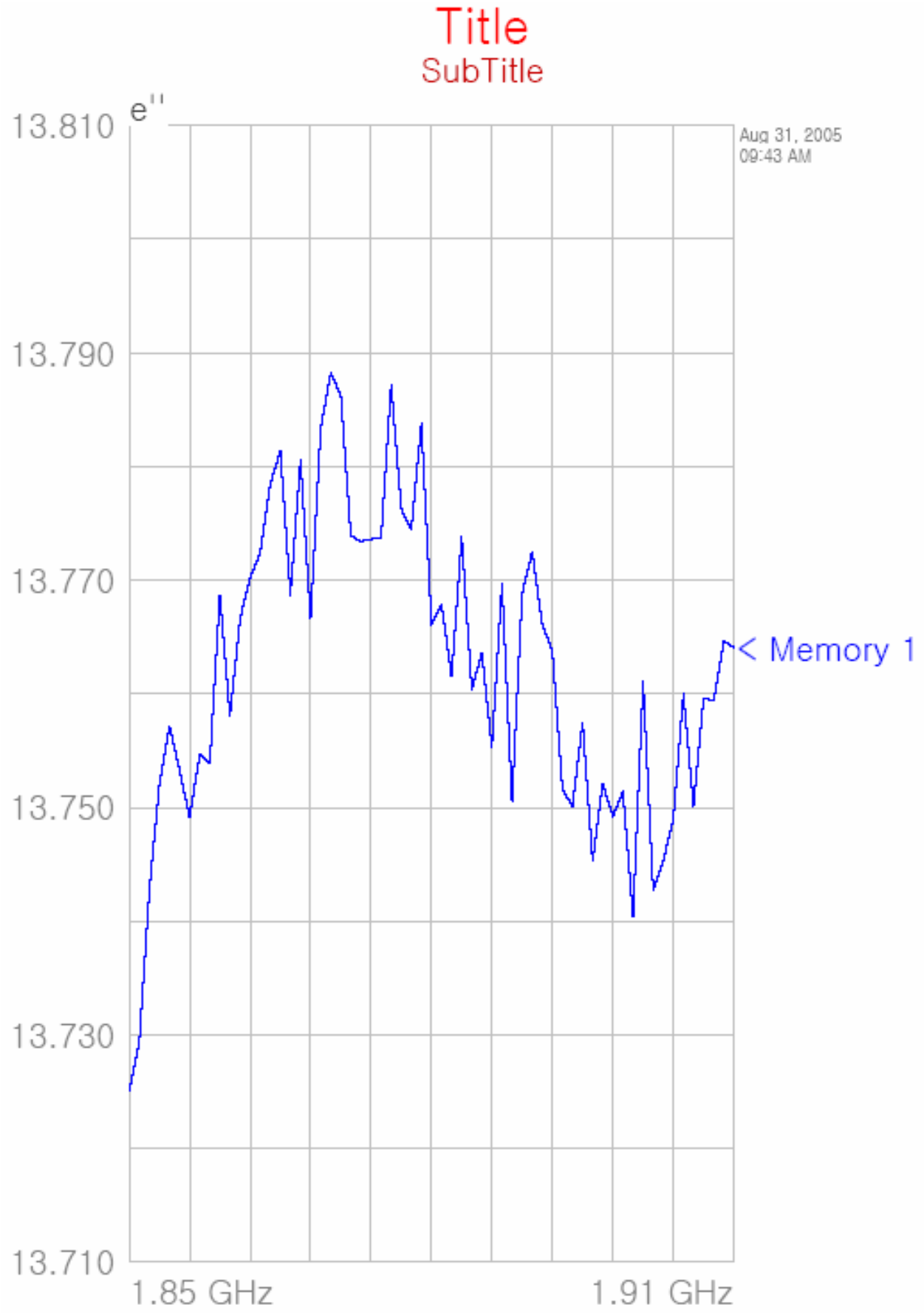

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Title

SubTitle

Frequency	e'	e''
1.850000000 GHz	40.0217	13.7251
1.851000000 GHz	40.0195	13.7294
1.852000000 GHz	40.0078	13.7427
1.853000000 GHz	40.0119	13.7521
1.854000000 GHz	40.0133	13.7572
1.855000000 GHz	40.0000	13.7533
1.856000000 GHz	40.0016	13.7491
1.857000000 GHz	39.9973	13.7547
1.858000000 GHz	39.9889	13.7539
1.859000000 GHz	39.9844	13.7687
1.860000000 GHz	39.9820	13.7580
1.861000000 GHz	39.9826	13.7666
1.862000000 GHz	39.9862	13.7702
1.863000000 GHz	39.9587	13.7724
1.864000000 GHz	39.9729	13.7784
1.865000000 GHz	39.9489	13.7814
1.866000000 GHz	39.9543	13.7687
1.867000000 GHz	39.9450	13.7806
1.868000000 GHz	39.9526	13.7666
1.869000000 GHz	39.9404	13.7833
1.870000000 GHz	39.9419	13.7882
1.871000000 GHz	39.9209	13.7863
1.872000000 GHz	39.9356	13.7739
1.873000000 GHz	39.9125	13.7734
1.874000000 GHz	39.9262	13.7736
1.875000000 GHz	39.8975	13.7737
1.876000000 GHz	39.9045	13.7872
1.877000000 GHz	39.8930	13.7763
1.878000000 GHz	39.9053	13.7744
1.879000000 GHz	39.8856	13.7838
1.880000000 GHz	39.8848	13.7661
1.881000000 GHz	39.8724	13.7679
1.882000000 GHz	39.8728	13.7615
1.883000000 GHz	39.8581	13.7738
1.884000000 GHz	39.8601	13.7604
1.885000000 GHz	39.8456	13.7636
1.886000000 GHz	39.8538	13.7553
1.887000000 GHz	39.8405	13.7697
1.888000000 GHz	39.8328	13.7505
1.889000000 GHz	39.8370	13.7688
1.890000000 GHz	39.8169	13.7725
1.891000000 GHz	39.8174	13.7661
1.892000000 GHz	39.8115	13.7638
1.893000000 GHz	39.8023	13.7516
1.894000000 GHz	39.7999	13.7501
1.895000000 GHz	39.7882	13.7575
1.896000000 GHz	39.7790	13.7453
1.897000000 GHz	39.7730	13.7521
1.898000000 GHz	39.7728	13.7492
1.899000000 GHz	39.7459	13.7514
1.900000000 GHz	39.7584	13.7404
1.901000000 GHz	39.7494	13.7611
1.902000000 GHz	39.7452	13.7427
1.903000000 GHz	39.7366	13.7453
1.904000000 GHz	39.7167	13.7490
1.905000000 GHz	39.7135	13.7600
1.906000000 GHz	39.7148	13.7501
1.907000000 GHz	39.7047	13.7596
1.908000000 GHz	39.7003	13.7594
1.909000000 GHz	39.6875	13.7646
1.910000000 GHz	39.6650	13.7641

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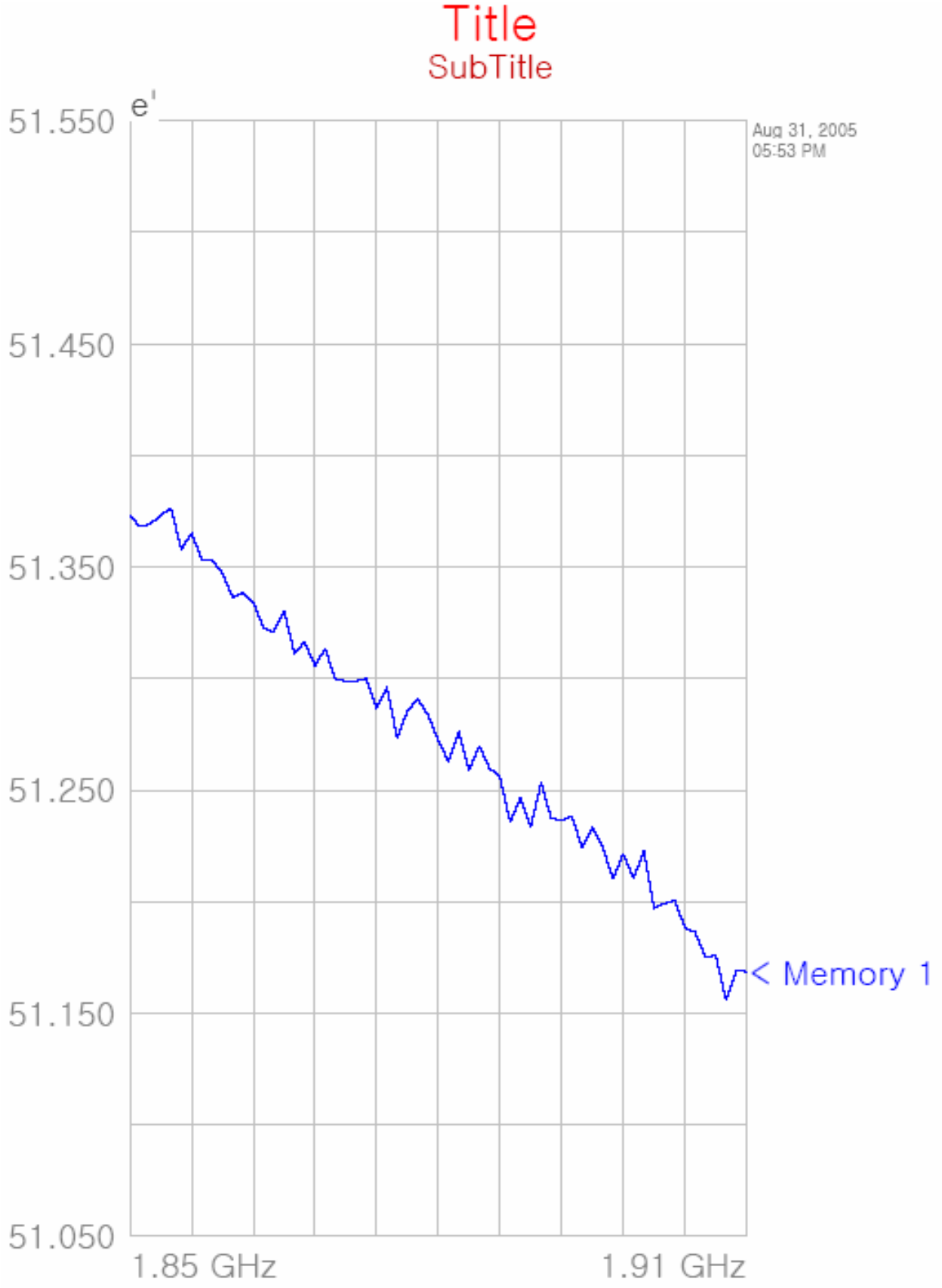
- Body Tissue



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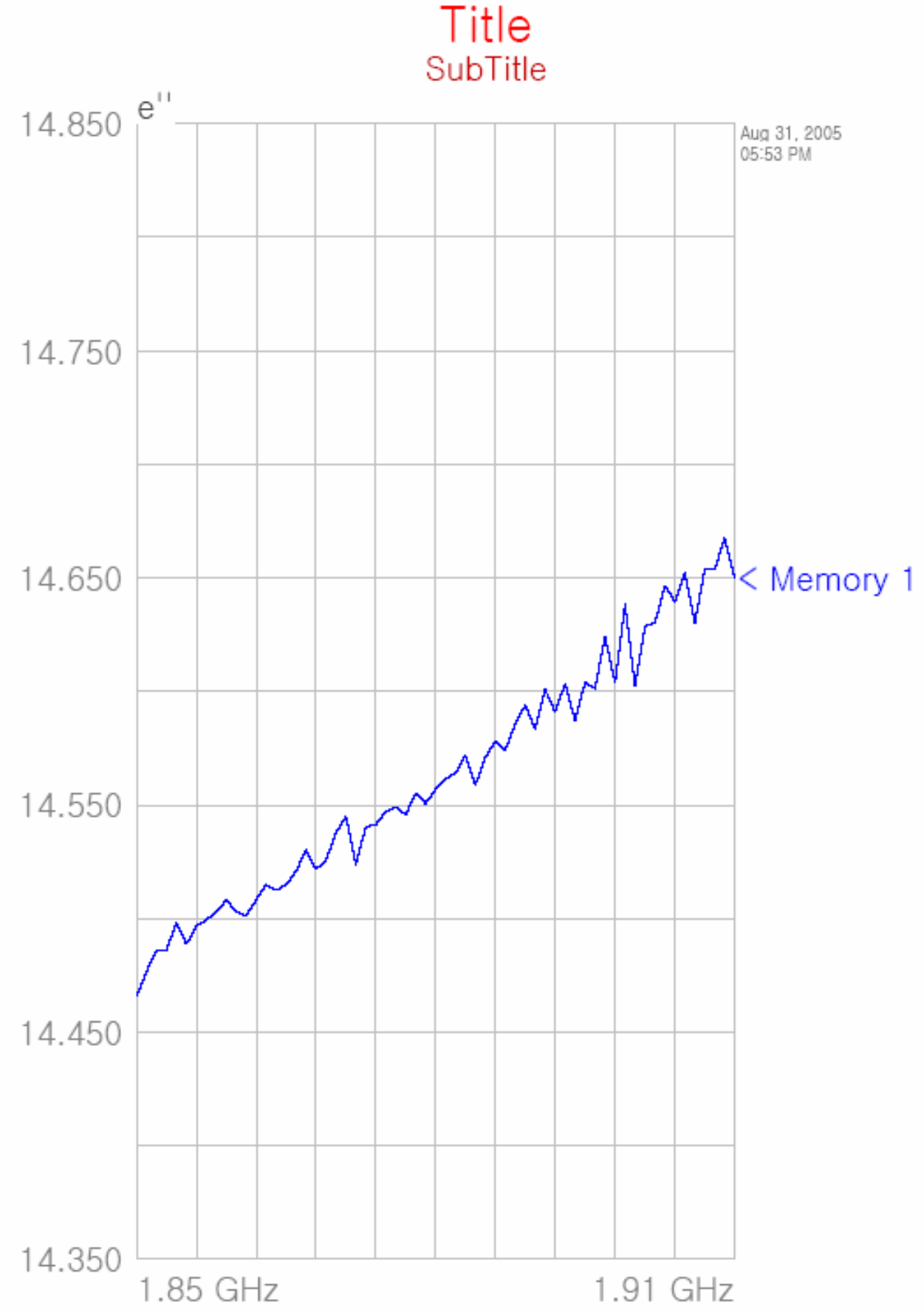

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Title
SubTitle
Mon 31, 2005 05:53 PM

Frequency	e'	e''
1.850000000 GHz	51.3728	14.4658
1.851000000 GHz	51.3681	14.4768
1.852000000 GHz	51.3693	14.4863
1.853000000 GHz	51.3732	14.4864
1.854000000 GHz	51.3762	14.4980
1.855000000 GHz	51.3579	14.4887
1.856000000 GHz	51.3650	14.4967
1.857000000 GHz	51.3534	14.4994
1.858000000 GHz	51.3532	14.5030
1.859000000 GHz	51.3472	14.5081
1.860000000 GHz	51.3363	14.5032
1.861000000 GHz	51.3385	14.5012
1.862000000 GHz	51.3343	14.5083
1.863000000 GHz	51.3225	14.5148
1.864000000 GHz	51.3209	14.5125
1.865000000 GHz	51.3305	14.5148
1.866000000 GHz	51.3112	14.5208
1.867000000 GHz	51.3164	14.5304
1.868000000 GHz	51.3058	14.5217
1.869000000 GHz	51.3133	14.5257
1.870000000 GHz	51.2993	14.5377
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1.872000000 GHz	51.2989	14.5237
1.873000000 GHz	51.2999	14.5406
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1.886000000 GHz	51.2559	14.5779
1.887000000 GHz	51.2357	14.5742
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1.896000000 GHz	51.2245	14.6012
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1.908000000 GHz	51.1559	14.6539
1.909000000 GHz	51.1689	14.6673
1.910000000 GHz	51.1687	14.6497

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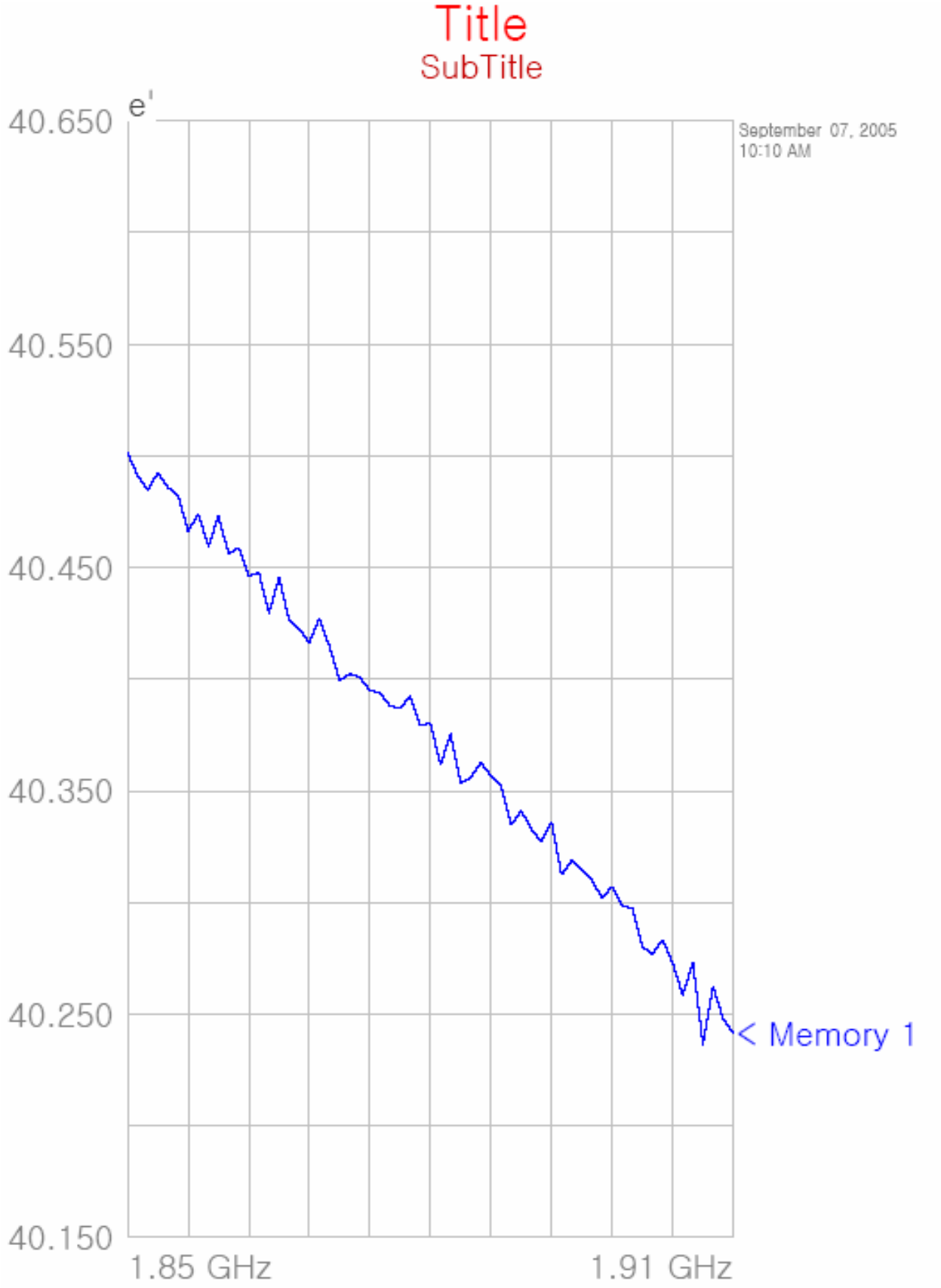
- Head Tissue



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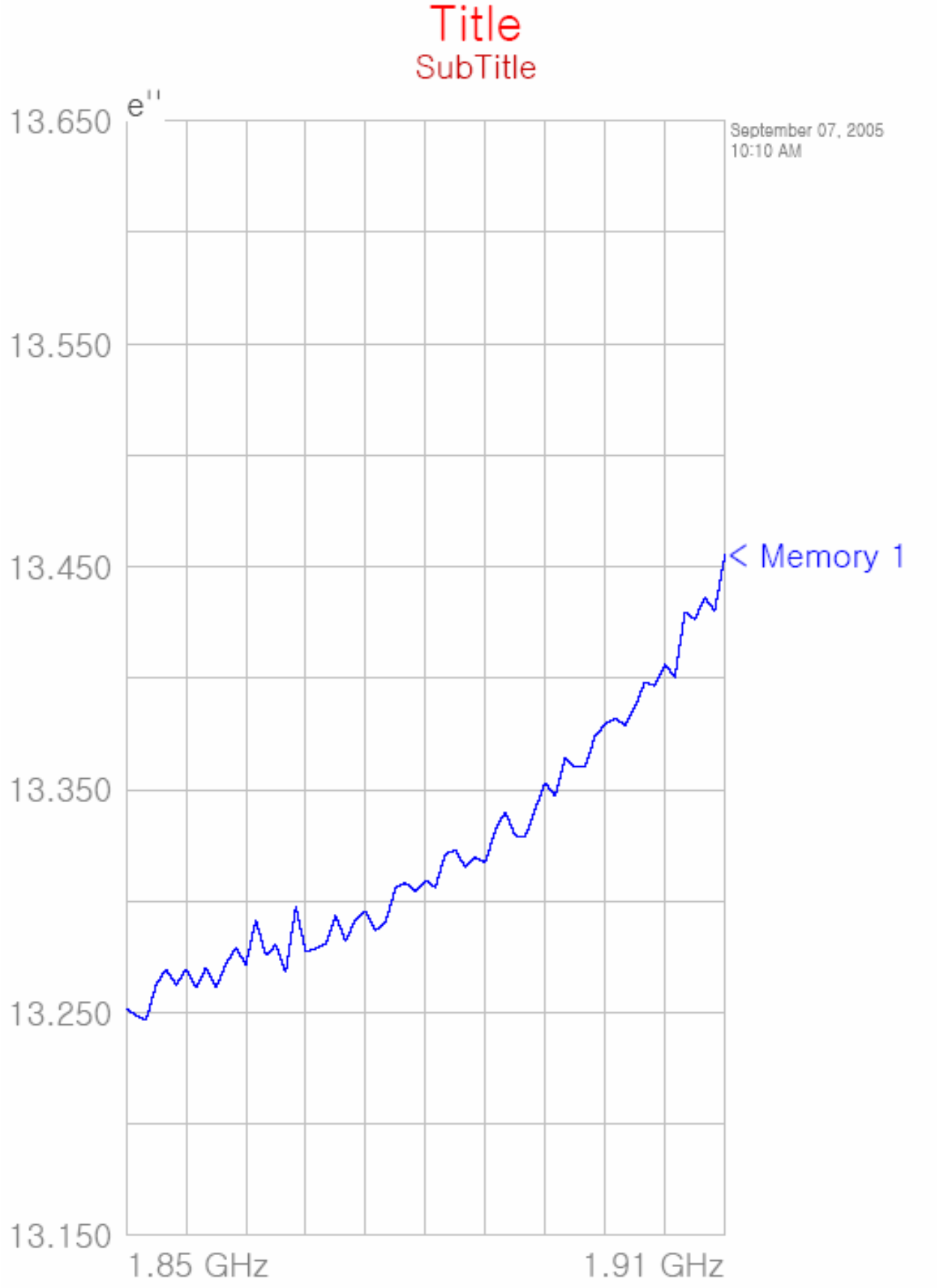

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Title

SubTitle

September 07, 2005 10:10 AM

Frequency	e'	e''
1.850000000 GHz	40.5012	13.2516
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1.852000000 GHz	40.4845	13.2466
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1.855000000 GHz	40.4821	13.2625
1.856000000 GHz	40.4663	13.2694
1.857000000 GHz	40.4740	13.2611
1.858000000 GHz	40.4595	13.2702
1.859000000 GHz	40.4729	13.2613
1.860000000 GHz	40.4563	13.2717
1.861000000 GHz	40.4588	13.2789
1.862000000 GHz	40.4461	13.2717
1.863000000 GHz	40.4477	13.2915
1.864000000 GHz	40.4295	13.2758
1.865000000 GHz	40.4455	13.2803
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1.867000000 GHz	40.4224	13.2977
1.868000000 GHz	40.4162	13.2772
1.869000000 GHz	40.4274	13.2788
1.870000000 GHz	40.4146	13.2808
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1.878000000 GHz	40.3925	13.3081
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1.881000000 GHz	40.3616	13.3062
1.882000000 GHz	40.3754	13.3211
1.883000000 GHz	40.3537	13.3229
1.884000000 GHz	40.3559	13.3152
1.885000000 GHz	40.3628	13.3195
1.886000000 GHz	40.3566	13.3173
1.887000000 GHz	40.3522	13.3319
1.888000000 GHz	40.3347	13.3400
1.889000000 GHz	40.3411	13.3295
1.890000000 GHz	40.3328	13.3287
1.891000000 GHz	40.3271	13.3411
1.892000000 GHz	40.3362	13.3530
1.893000000 GHz	40.3125	13.3472
1.894000000 GHz	40.3187	13.3639
1.895000000 GHz	40.3147	13.3603
1.896000000 GHz	40.3099	13.3601
1.897000000 GHz	40.3022	13.3739
1.898000000 GHz	40.3071	13.3794
1.899000000 GHz	40.2982	13.3820
1.900000000 GHz	40.2976	13.3791
1.901000000 GHz	40.2903	13.3872
1.902000000 GHz	40.2768	13.3982
1.903000000 GHz	40.2833	13.3967
1.904000000 GHz	40.2729	13.4062
1.905000000 GHz	40.2585	13.4004
1.906000000 GHz	40.2731	13.4296
1.907000000 GHz	40.2364	13.4264
1.908000000 GHz	40.2623	13.4361
1.909000000 GHz	40.2479	13.4303
1.910000000 GHz	40.2417	13.4551

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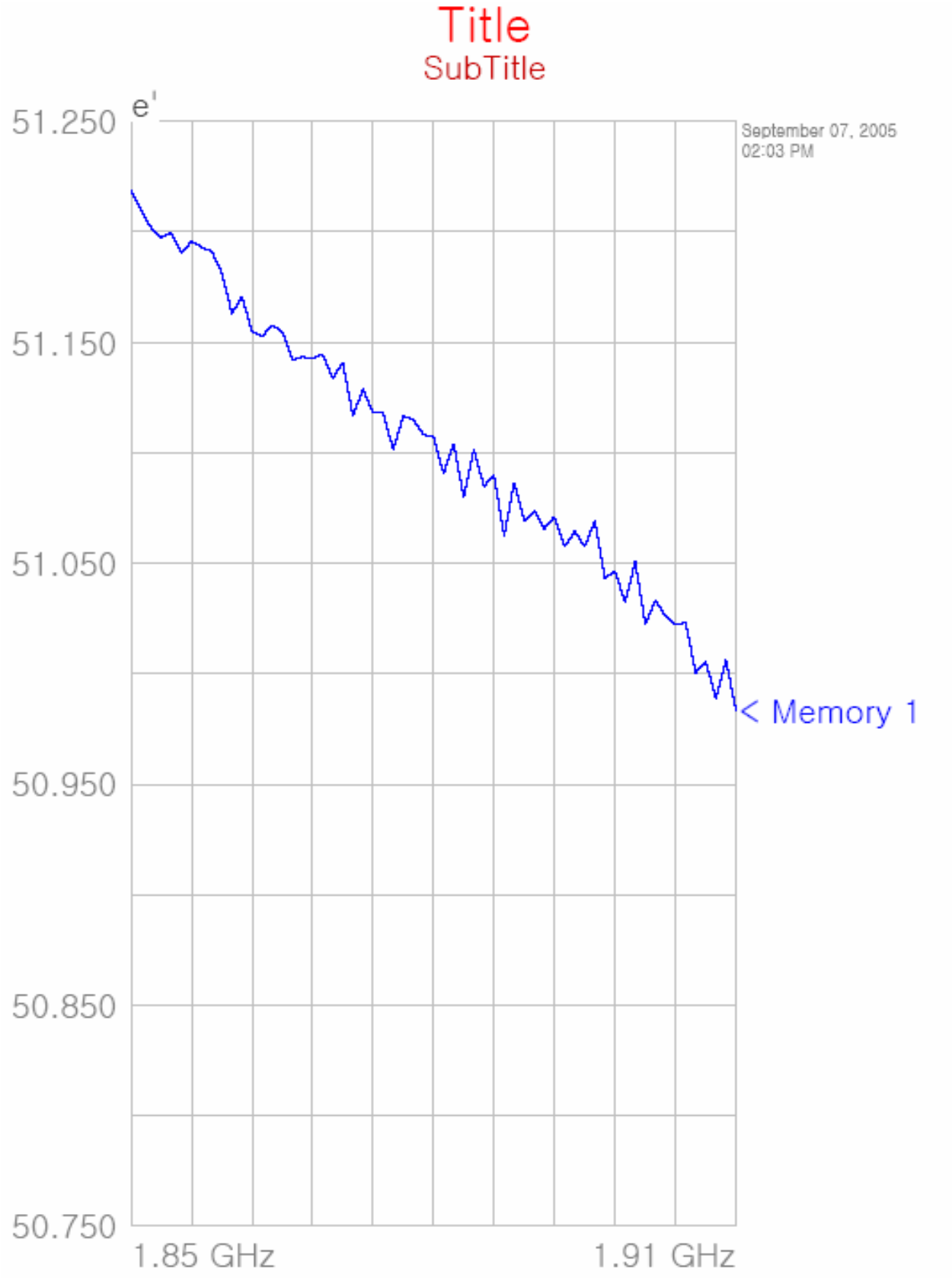
- Body Tissue



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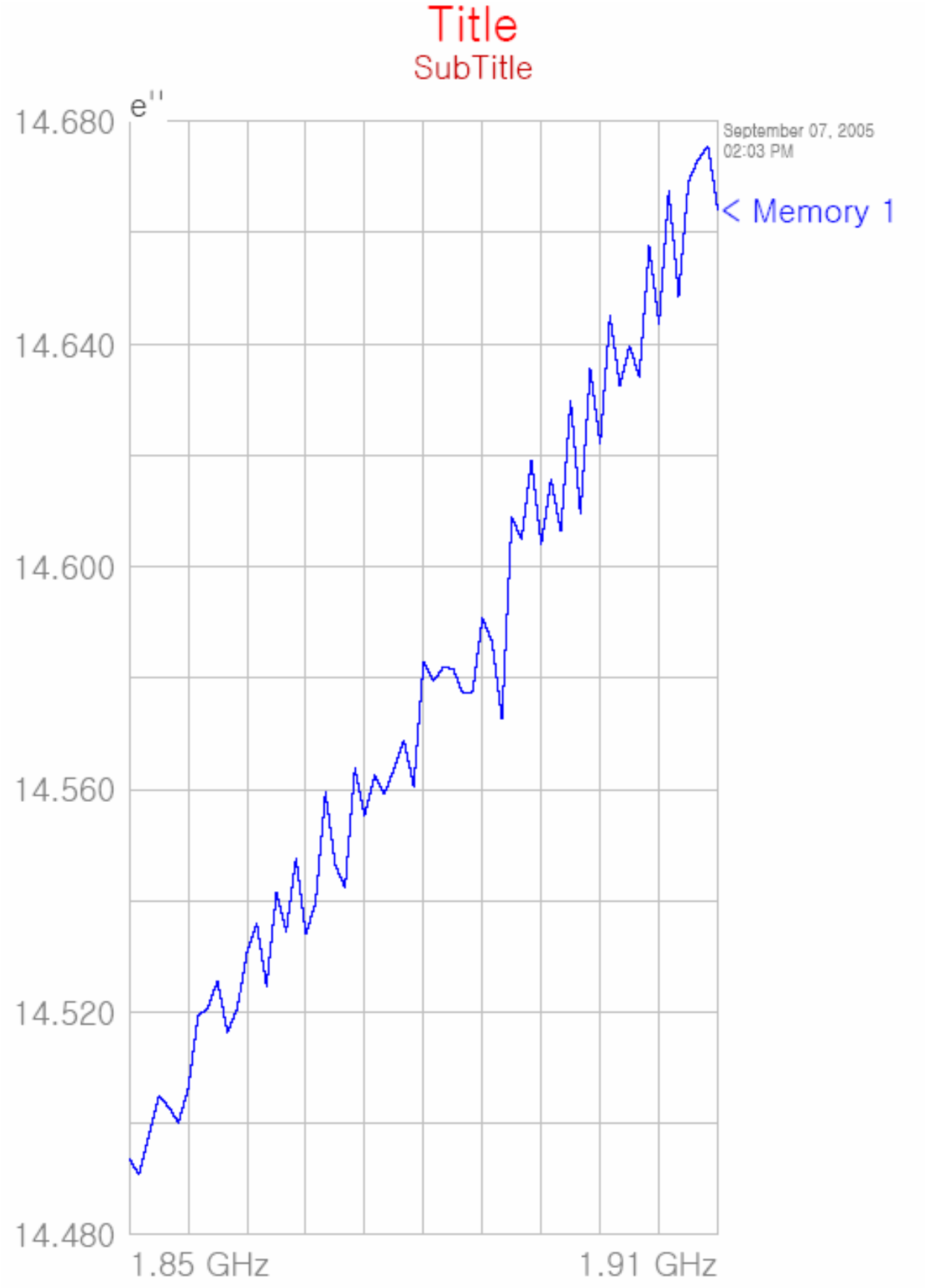

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FAX: 82-2-867-3204

Title

SubTitle

September 07, 2005 02:33 PM

Frequency	e'	e''
1.850000000 GHz	51.2189	14.4936
1.851000000 GHz	51.2096	14.4908
1.852000000 GHz	51.2016	14.4977
1.853000000 GHz	51.1973	14.5049
1.854000000 GHz	51.1995	14.5030
1.855000000 GHz	51.1903	14.5002
1.856000000 GHz	51.1957	14.5062
1.857000000 GHz	51.1929	14.5192
1.858000000 GHz	51.1911	14.5208
1.859000000 GHz	51.1813	14.5256
1.860000000 GHz	51.1631	14.5164
1.861000000 GHz	51.1706	14.5206
1.862000000 GHz	51.1548	14.5306
1.863000000 GHz	51.1527	14.5359
1.864000000 GHz	51.1576	14.5247
1.865000000 GHz	51.1547	14.5414
1.866000000 GHz	51.1421	14.5345
1.867000000 GHz	51.1433	14.5477
1.868000000 GHz	51.1427	14.5340
1.869000000 GHz	51.1445	14.5396
1.870000000 GHz	51.1337	14.5595
1.871000000 GHz	51.1407	14.5464
1.872000000 GHz	51.1166	14.5424
1.873000000 GHz	51.1296	14.5639
1.874000000 GHz	51.1182	14.5553
1.875000000 GHz	51.1180	14.5625
1.876000000 GHz	51.1015	14.5591
1.877000000 GHz	51.1167	14.5637
1.878000000 GHz	51.1148	14.5689
1.879000000 GHz	51.1082	14.5605
1.880000000 GHz	51.1070	14.5829
1.881000000 GHz	51.0905	14.5794
1.882000000 GHz	51.1040	14.5819
1.883000000 GHz	51.0796	14.5817
1.884000000 GHz	51.1014	14.5772
1.885000000 GHz	51.0848	14.5775
1.886000000 GHz	51.0899	14.5907
1.887000000 GHz	51.0623	14.5865
1.888000000 GHz	51.0864	14.5726
1.889000000 GHz	51.0692	14.6088
1.890000000 GHz	51.0737	14.6049
1.891000000 GHz	51.0657	14.6191
1.892000000 GHz	51.0710	14.6039
1.893000000 GHz	51.0575	14.6157
1.894000000 GHz	51.0643	14.6063
1.895000000 GHz	51.0576	14.6299
1.896000000 GHz	51.0689	14.6094
1.897000000 GHz	51.0432	14.6355
1.898000000 GHz	51.0465	14.6220
1.899000000 GHz	51.0323	14.6451
1.900000000 GHz	51.0507	14.6326
1.901000000 GHz	51.0225	14.6396
1.902000000 GHz	51.0329	14.6341
1.903000000 GHz	51.0263	14.6576
1.904000000 GHz	51.0222	14.6436
1.905000000 GHz	51.0231	14.6676
1.906000000 GHz	51.0005	14.6486
1.907000000 GHz	51.0055	14.6691
1.908000000 GHz	50.9899	14.6731
1.909000000 GHz	51.0063	14.6755
1.910000000 GHz	50.9833	14.6640

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APPENDIX B : Validation Test Data

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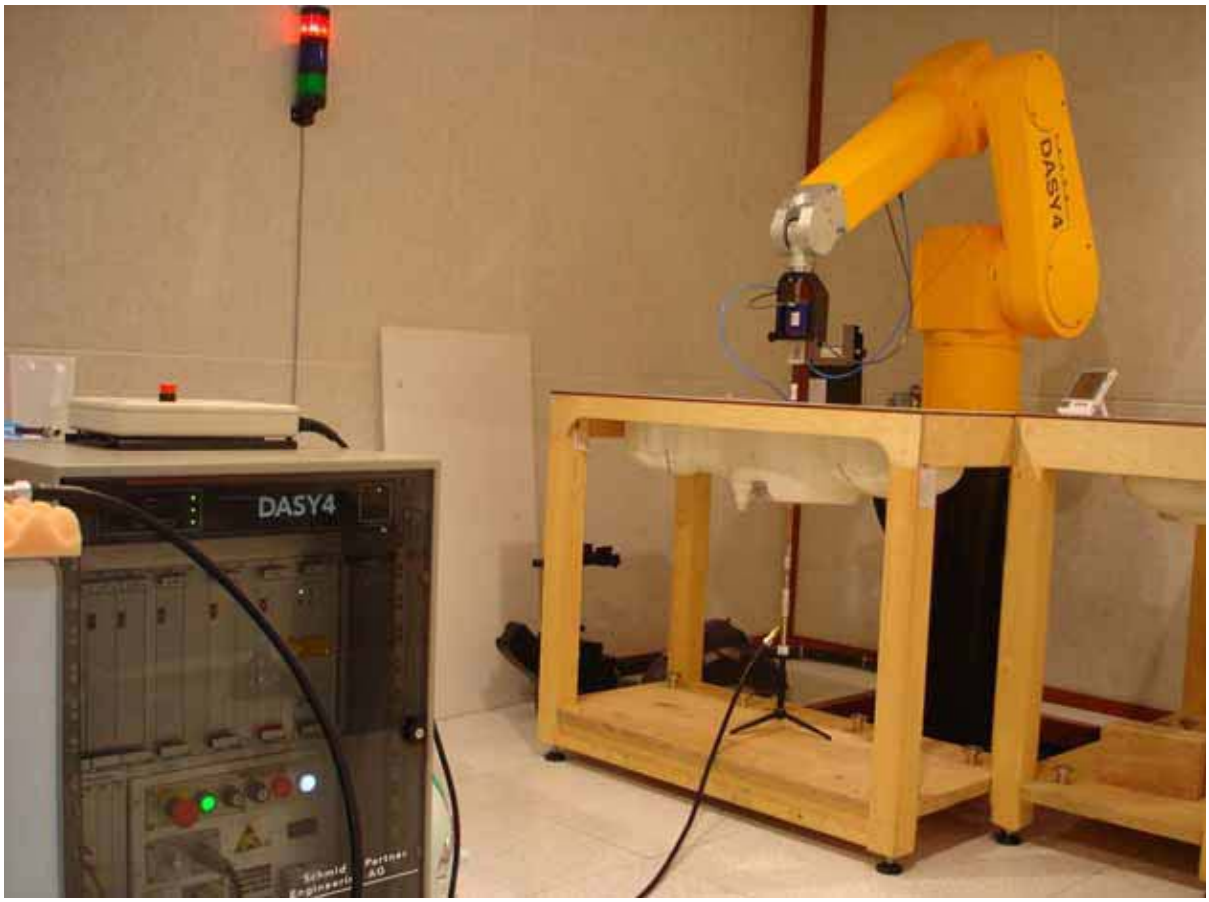
1900MHz Dipole Validation



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Seoul, 153-803, Korea
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FAX: 82-2-867-3204

Date/Time: 08/31/05 10:36:40

Test Laboratory: ESTECH

validation0831

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN5d058

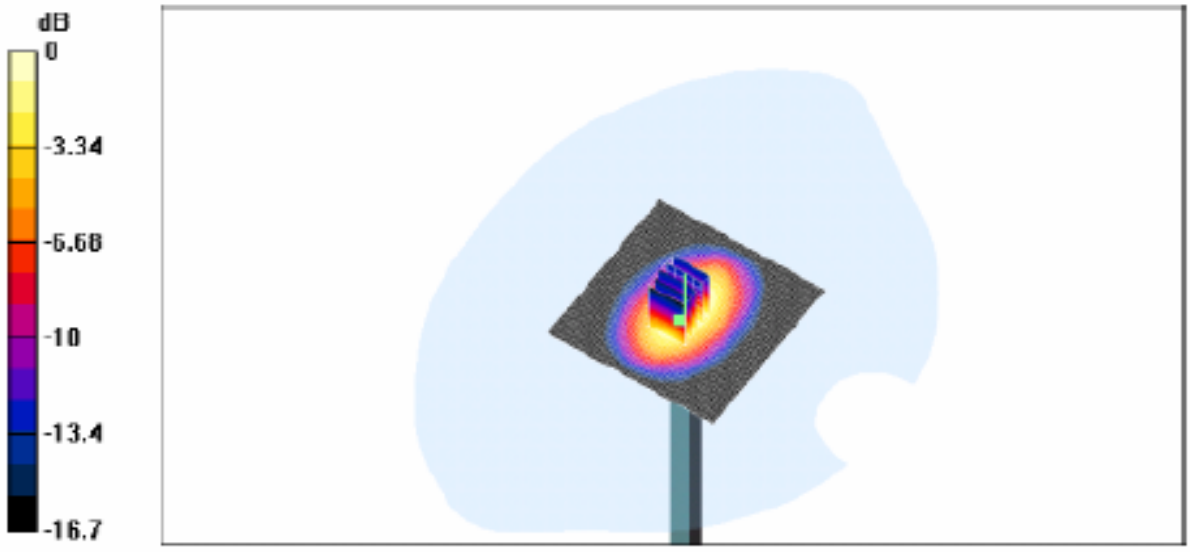
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL1900 Medium parameters used: f = 1900 MHz; σ = 1.45 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 45%

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.6 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.4 V/m; Power Drift = 0.0009 dB
Peak SAR (extrapolated) = 17.1 W/kg
SAR(1 g) = 9.87 mW/g
Maximum value of SAR (measured) = 11.2 mW/g



0 dB = 11.2mW/g

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Date/Time: 09/07/05 11:38:42

Test Laboratory: ESTECH

validation0907

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN5d058

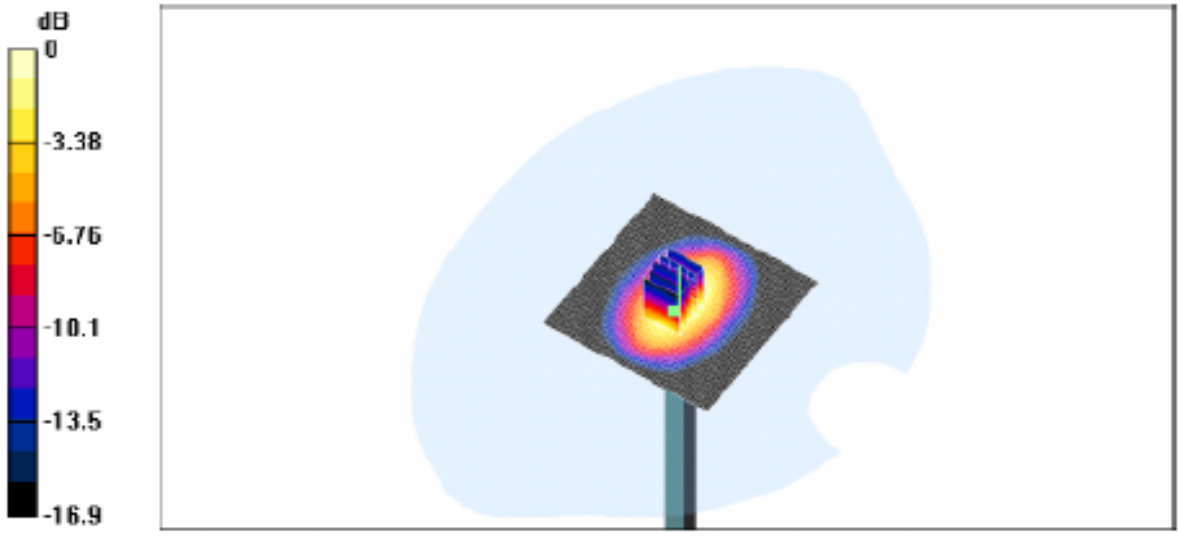
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL1900 Medium parameters used: f = 1900 MHz; σ = 1.41 mho/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 47%

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.4 V/m; Power Drift = -0.0002 dB
Peak SAR (extrapolated) = 16.5 W/kg
SAR(1 g) = 9.39 mW/g
Maximum value of SAR (measured) = 10.8 mW/g



0 dB = 10.8mW/g

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APPENDIX C : SAR Test Setup Photographs

Left Hand –Touch Position–Folder up

Right Hand –Touch Position–Folder up

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Left Hand –Tlit Position–Folder up

Right Hand –Tilt Position–Folder up

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Left Hand –Touch Position–Folder Down

Right Hand –Touch Position–Folder Down

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Left Hand –Tlit Position–Folder Down

Right Hand –Tilt Position–Folder Down

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Flat – Body Side Configuration – Folder up (Without Holster)

Flat – Body Side Configuration – Folder Down (Without Holster)

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APPENDIX D : SAR Test Data

ESTECH Co., Ltd.
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TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 08/31/05 11:04:01

Test Laboratory: ESTECH

CH661 - LEFT TOUCH FOLDER DOWN

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

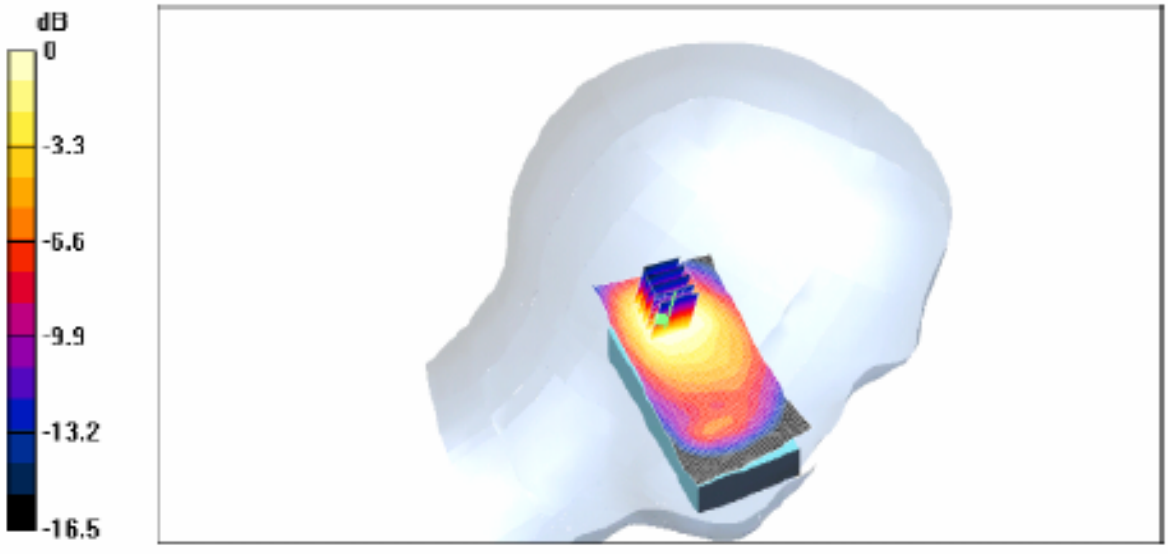
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 48%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.782 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.6 V/m; Power Drift = -0.0 dB
Peak SAR (extrapolated) = 1.12 W/kg
SAR(1 g) = 0.680 mW/g
Maximum value of SAR (measured) = 0.750 mW/g



0 dB = 0.750mW/g

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Date/Time: 08/31/05 11:32:26

Test Laboratory: ESTECH

CH661 - RIGHT TOUCH FOLDER DOWN

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

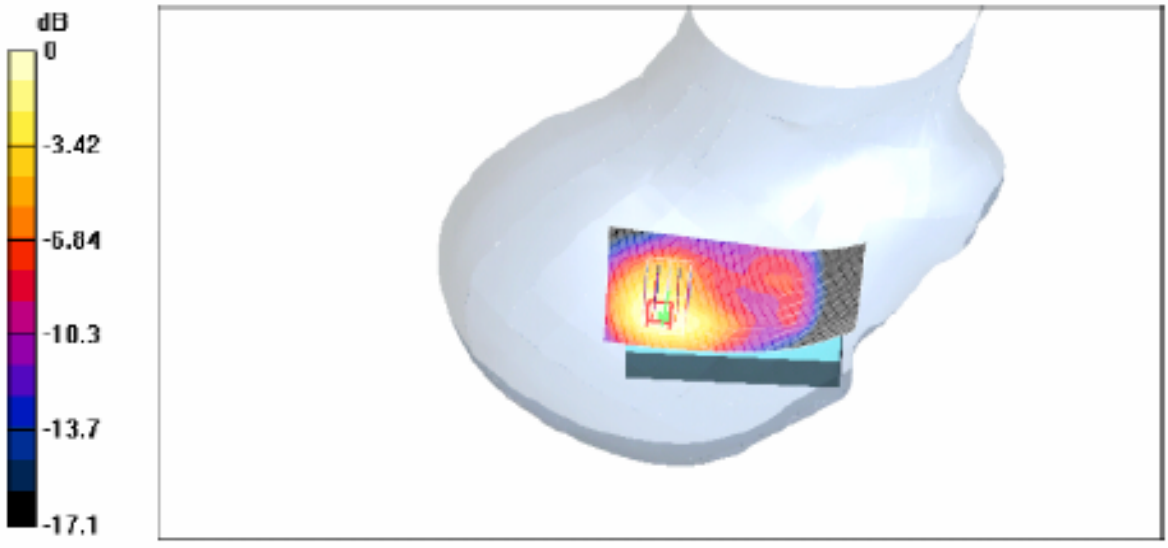
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 45%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.911 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.4 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 1.57 W/kg
SAR(1 g) = 0.823 mW/g
Maximum value of SAR (measured) = 0.904 mW/g



0 dB = 0.904mW/g

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Date/Time: 08/31/05 16:09:08

Test Laboratory: ESTECH

CH512 - LEFT TILT FOLDER DOWN

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

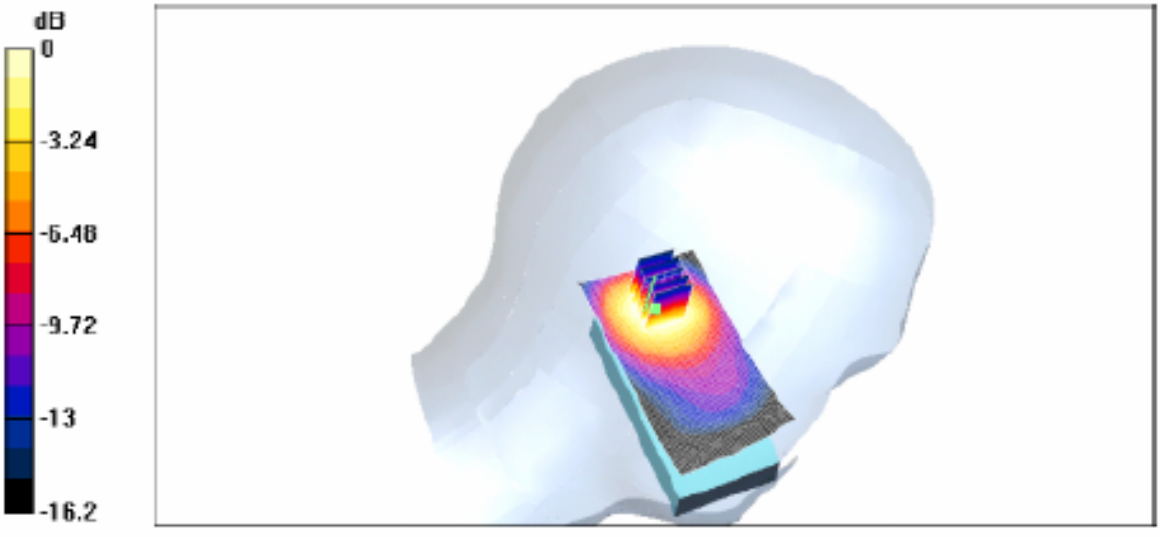
Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.41 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 47%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.09 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 26.6 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.865 mW/g
Maximum value of SAR (measured) = 0.946 mW/g



0 dB = 0.946mW/g

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Date/Time: 08/31/05 11:57:21

Test Laboratory: ESTECH

CH661 - LEFT TILT FOLDER DOWN

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

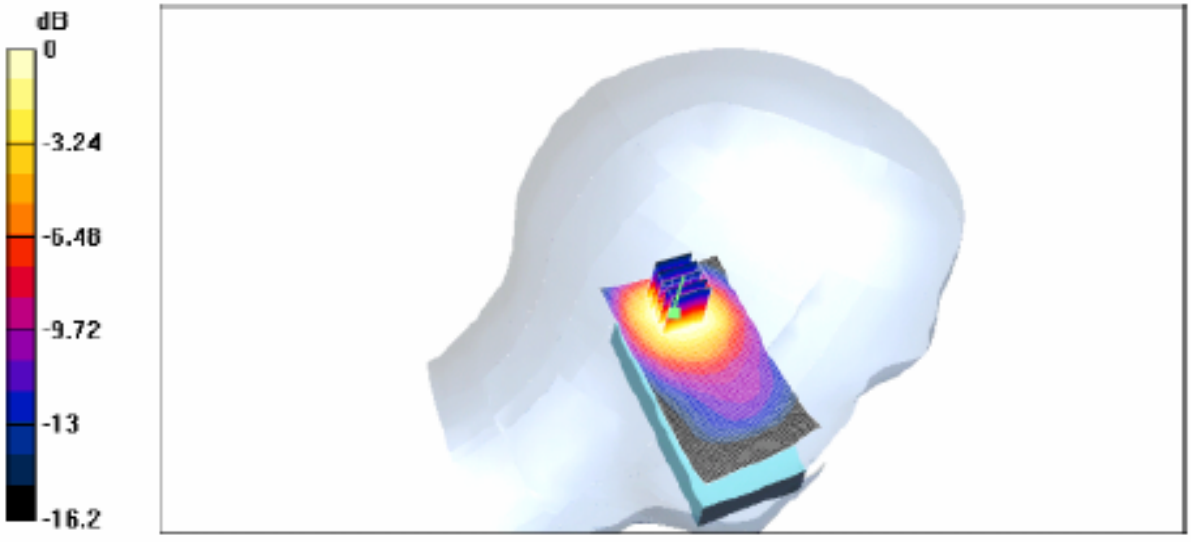
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.35 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 28.8 V/m; Power Drift = -0.0008 dB
Peak SAR (extrapolated) = 1.68 W/kg
SAR(1 g) = 1.07 mW/g
Maximum value of SAR (measured) = 1.17 mW/g



0 dB = 1.17mW/g

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FAX: 82-2-867-3204

Date/Time: 08/31/05 16:59:53

Test Laboratory: ESTECH

CH810 - LEFT TILT FOLDER DOWN

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

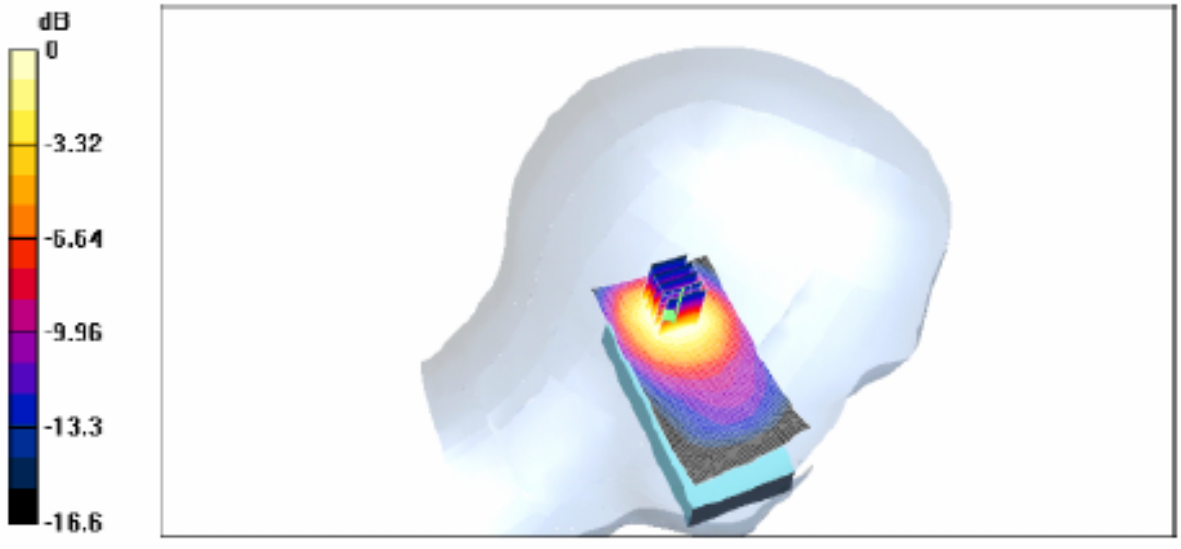
Communication System: GSM1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used (interpolated): f = 1909.8 MHz; σ = 1.46 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 45%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.62 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 32.5 V/m; Power Drift = 0.004 dB
Peak SAR (extrapolated) = 2.07 W/kg
SAR(1 g) = 1.3 mW/g
Maximum value of SAR (measured) = 1.42 mW/g



0 dB = 1.42mW/g

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FAX: 82-2-867-3204

Date/Time: 08/31/05 16:35:43

Test Laboratory: ESTECH

CH512 - RIGHT TILT FOLDER DOWN

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

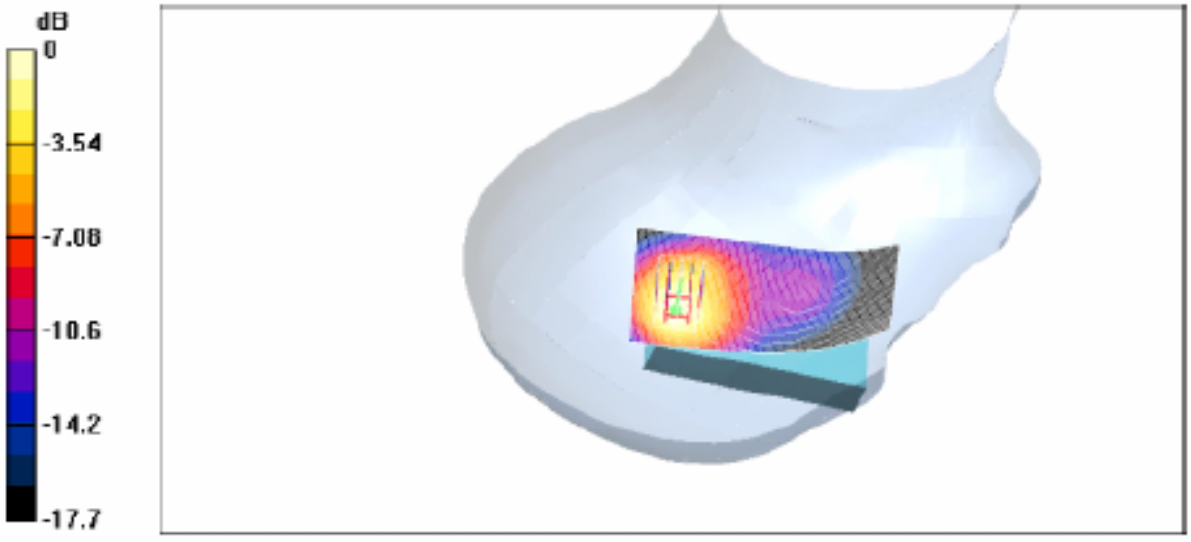
Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.41 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.1 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.9 V/m; Power Drift = -0.0 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 0.931 mW/g
Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.05mW/g

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Test Laboratory: ESTECH

CH661 - RIGHT TILT FOLDER DOWN

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

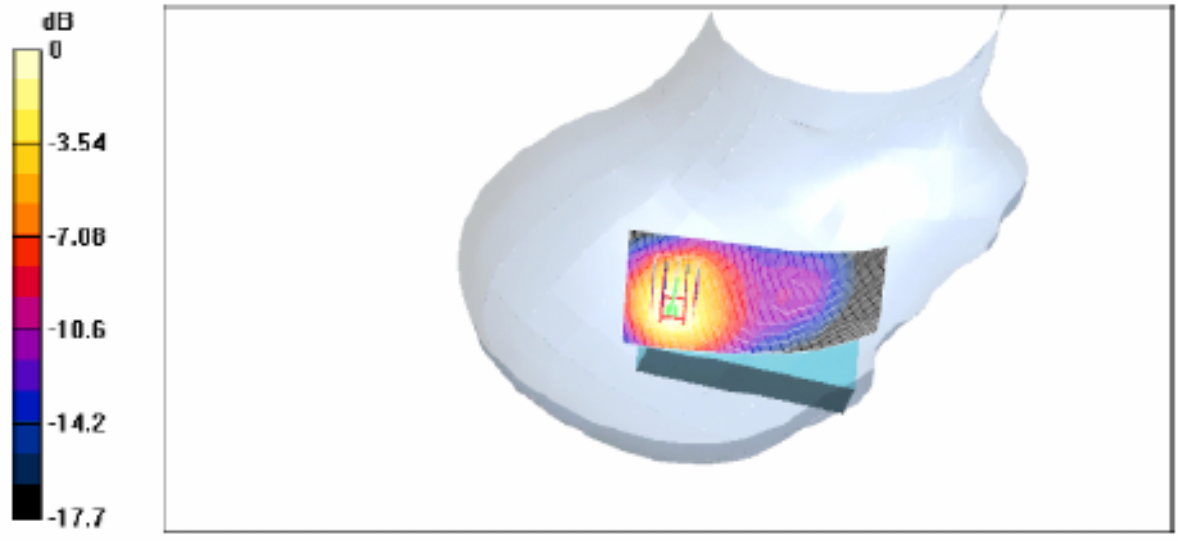
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 20℃, Humidity : 44%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.36 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.8 V/m; Power Drift = 0.006 dB
Peak SAR (extrapolated) = 2.17 W/kg
SAR(1 g) = 1.14 mW/g
Maximum value of SAR (measured) = 1.28 mW/g



0 dB = 1.28mW/g

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Test Laboratory: ESTECH

CH810 - RIGHT TILT FOLDER DOWN

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

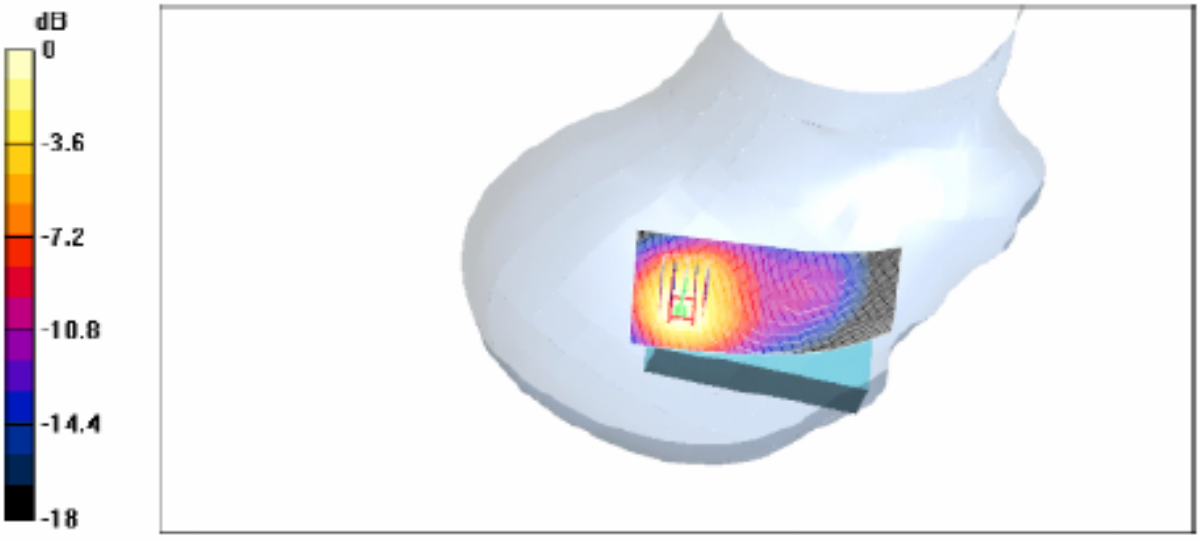
Communication System: GSM1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used (interpolated): f = 1909.8 MHz; σ = 1.46 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 49%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.62 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 26.5 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 2.53 W/kg
SAR(1 g) = 1.35 mW/g
Maximum value of SAR (measured) = 1.52 mW/g



0 dB = 1.52mW/g

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Test Laboratory: ESTECH

CH661 - LEFT TOUCH FOLDER UP

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

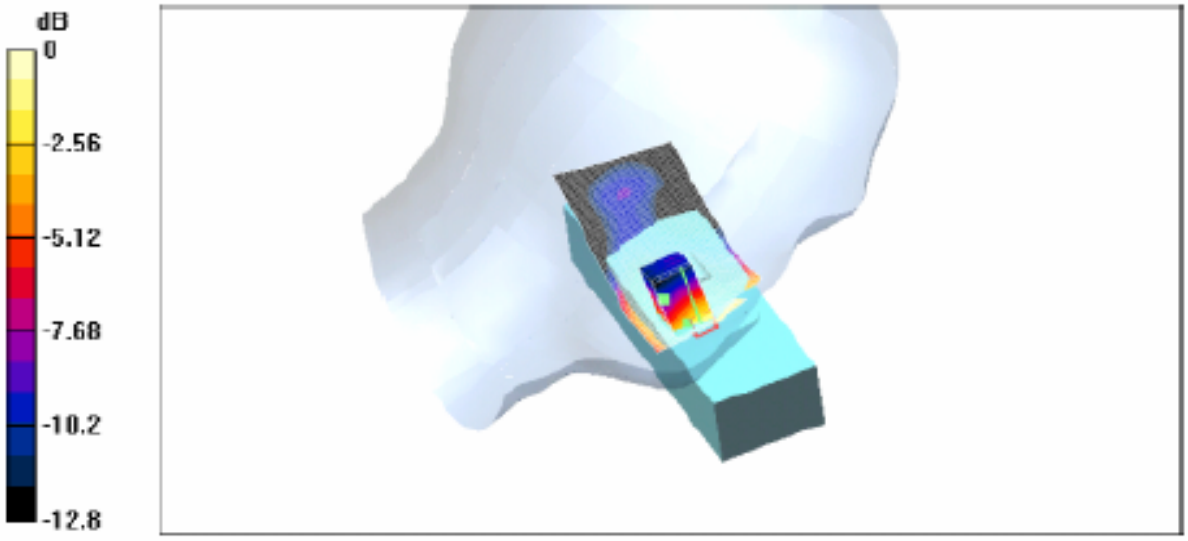
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 20℃, Humidity : 44%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.099 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.86 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 0.141 W/kg
SAR(1 g) = 0.097 mW/g
Maximum value of SAR (measured) = 0.105 mW/g



0 dB = 0.105mW/g

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Test Laboratory: ESTECH

CH661 - RIGHT TILT FOLDER UP

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

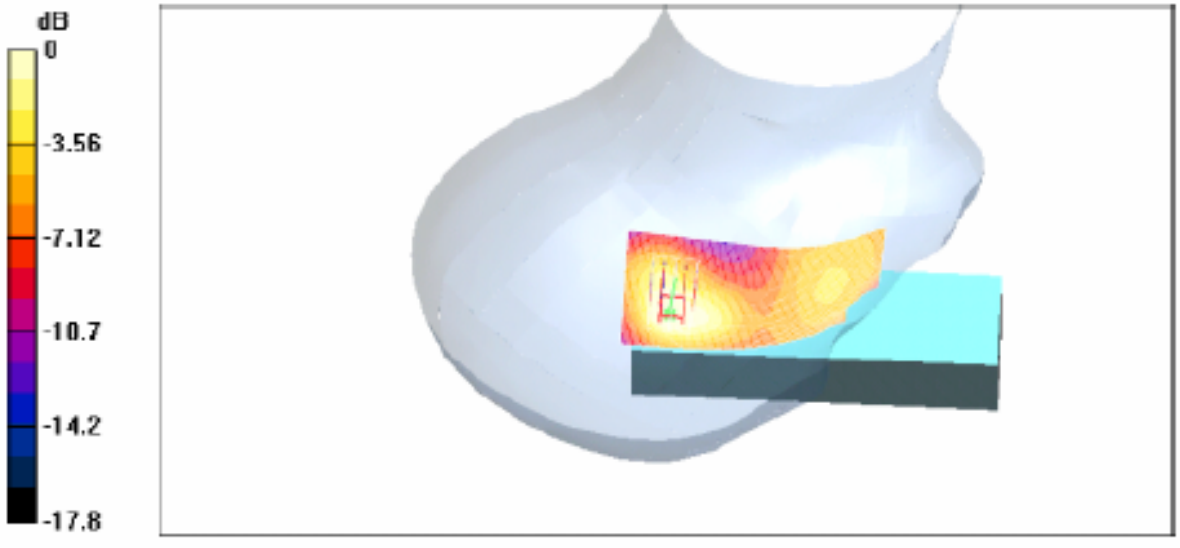
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 20℃, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.074 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.67 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 0.090 W/kg
SAR(1 g) = 0.056 mW/g
Maximum value of SAR (measured) = 0.062 mW/g



0 dB = 0.062mW/g

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Test Laboratory: ESTECH

CH661 - RIGHT TOUCH FOLDER UP

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

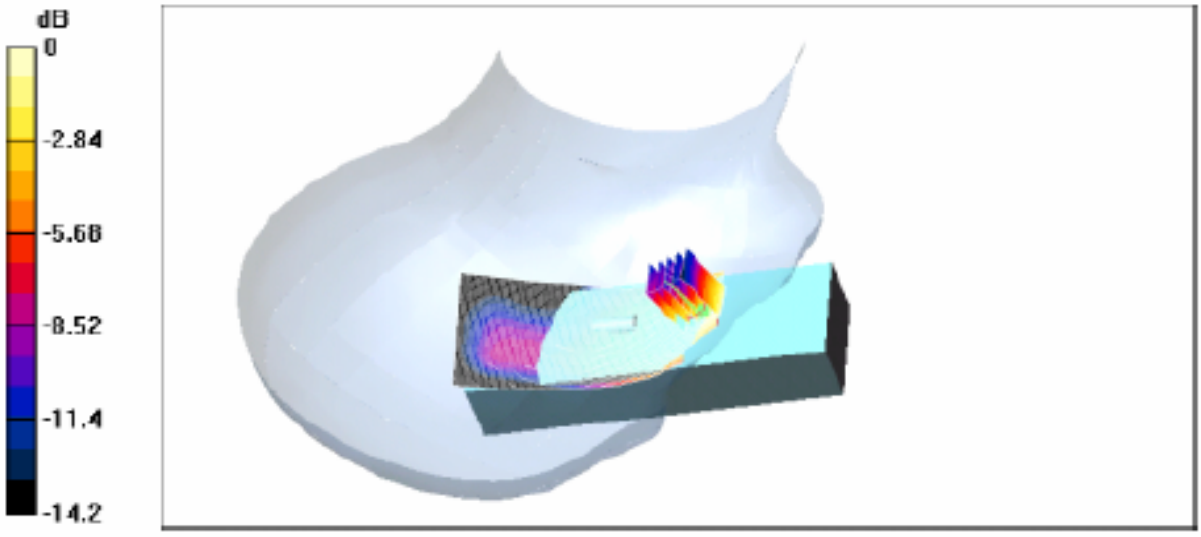
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 44%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.152 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.37 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 0.198 W/kg
SAR(1 g) = 0.139 mW/g
Maximum value of SAR (measured) = 0.150 mW/g



0 dB = 0.150mW/g

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Test Laboratory: ESTECH

CH661 - LEFT TILT FOLDER UP

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

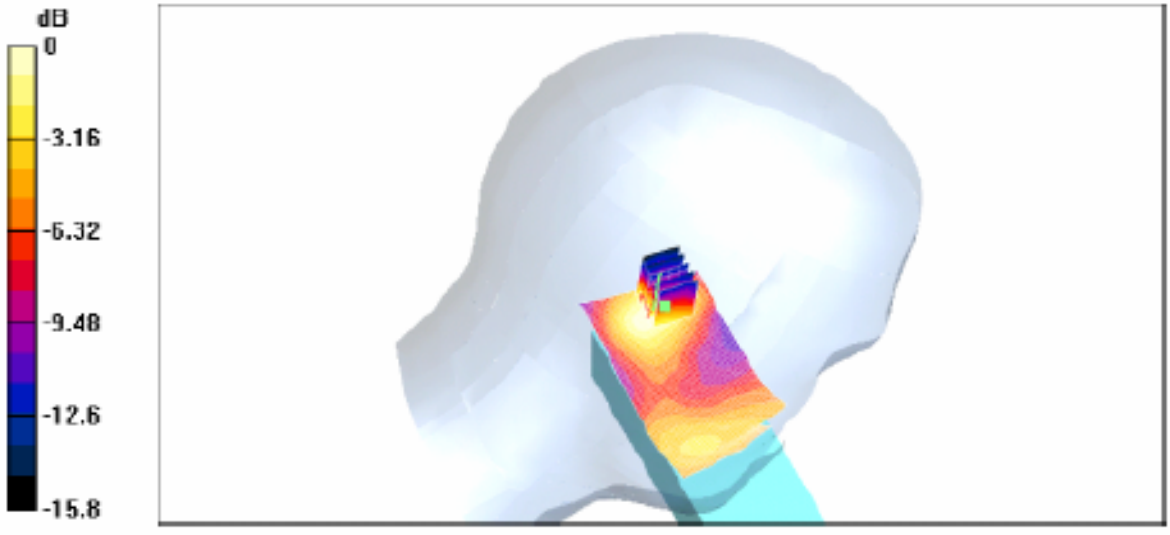
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 42%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.048 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.21 V/m; Power Drift = 0.1 dB
Peak SAR (extrapolated) = 0.071 W/kg
SAR(1 g) = 0.043 mW/g
Maximum value of SAR (measured) = 0.049 mW/g



0 dB = 0.049mW/g

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CH810 - RIGHT TILT FOLDER DOWN - ZSCAN

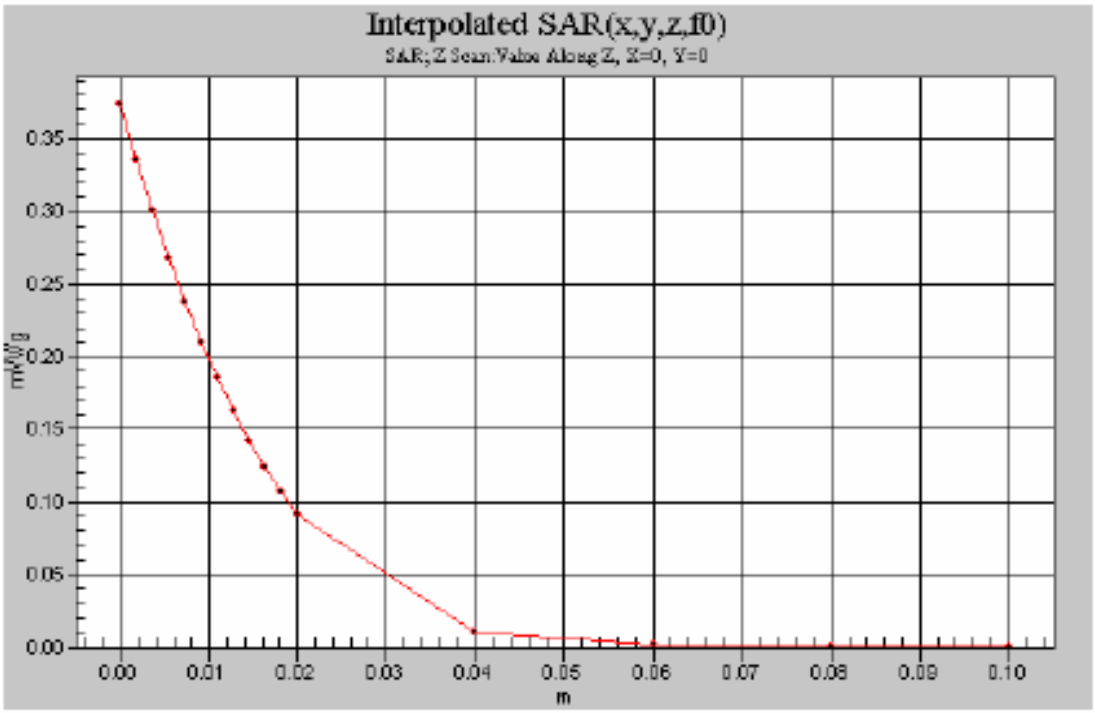
DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used (interpolated): f = 1909.8 MHz; σ = 1.46 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 49%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.62 mW/g



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Test Laboratory: ESTECH

CH512 - BODY FOLDER DOWN

DUT: P7200,LG-G912,ME540c; Type: FOLDER TYPE; Serial: XXXX

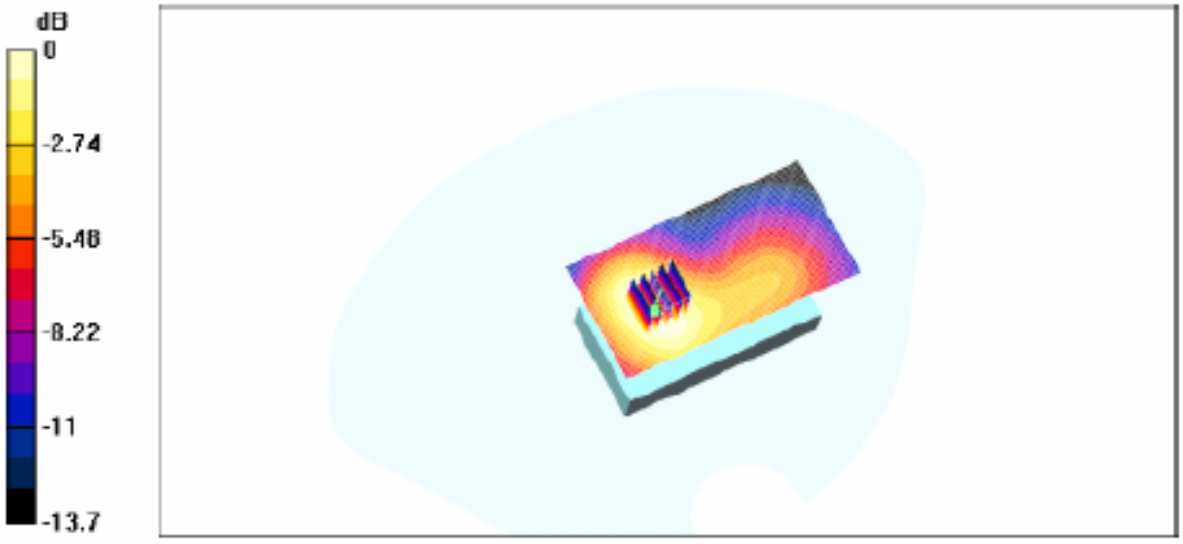
Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: M1900 Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.49 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(4.45, 4.45, 4.45); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 21℃, Humidity : 48%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.139 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.51 V/m; Power Drift = 0.0006 dB
Peak SAR (extrapolated) = 0.208 W/kg
SAR(1 g) = 0.124 mW/g
Maximum value of SAR (measured) = 0.135 mW/g



0 dB = 0.135mW/g