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SAR Compliance 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 : 2006 2/20 ~ 3/15
Test Site : ESTECH Co., Ltd. Korea

Test Device :

Models : MG220

FCC ID : BEJMG220

TYPE : GSM Phone (Prototype)

Test report no :

ESTSAR0603-005

Number of page :

25

Contact person :

Bong Hyo, Han

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 Non-Broadcast Transmitter Held to Ear (TNE)
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 receipt in full,
without written approval of the laboratory.

Date and Signatures : 2006/3/15

Report Prepared By : Engineer/ K.H.Kang

(Signature)

Manager Engineer/ Jay Kim

(Signature)

Test report no : ESTSAR0603-005

FCC ID : BEJMG220

Web : www. estech. co. kr

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1. SUMMARY FOR TEST REPORT

FCC ID	BEJMG220
Date of test	2006/2/20 ~ 2006/3/15
Responsible test engineer	Jay Kim
Measurement performed by	K.H.Kang
EUT Type	GSM Phone (Prototype)
Tx Frequency	824.2 ~ 848.8MHz(GSM850), 1850.2 ~ 1909.8 MHz(PCS1900)
Rx Frequency	869.2 ~ 893.8MHz(GSM850), 1930.2 ~ 1989.8 MHz(PCS1900)
Max. RF Output Power	GSM (33 dBm) PCS (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			
836.6	190	GSM	33	Standard	Right Touch	—	1.37
1850.2	512	GSM	30	Standard	Right Touch	—	1.04

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			
836.6	190	GSM	33	Standard	1.5cm [w/o Holster]	—	0.666
1850.2	512	GSM	30	Standard	1.5cm [w/o Holster]	—	0.281

1.3 Measurement Uncertainty

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



2. INTRODUCTION

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 hazards of RF emissions due to FCC-regulated portable device.[1]

The safety limits used for the environmental evaluation measurements are the 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/ANSI C95.3-1992 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 radiation exposure 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, MD 20814.[6] SAR is a measure 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/m³)

ρ = Total RMS electric field strength (V/m)

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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 devices 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	the top of the device
Radiator Material	Copper

2.2 Device Description

FCC ID	FCC ID : BEJMG220
Serial numbers	—
Exposure environment	Uncontrolled exposure
Device category	Portable device
Mode(s) of Operation	GSM / GPRS
Modulation Mode(s)	GSM
Duty Cycle	8.3
Transmitting	824.2 ~ 848.8MHz(GSM850), 1850.2 ~ 1909.8 MHz(PCS1900)
Frequency Range(s)	
test signal method	☒ Base station simulator ☐ Internal test code

2.3 Battery Options

There is only one battery option available for tested device,



4. TEST CONDITIONS

4.1 Ambient Conditions

Ambient Temperature (°C)	22
Tissue simulating liquid temperature (°C)	22
Humidity (%)	39

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 (850MHz GSM, 1900MHz PCS 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.

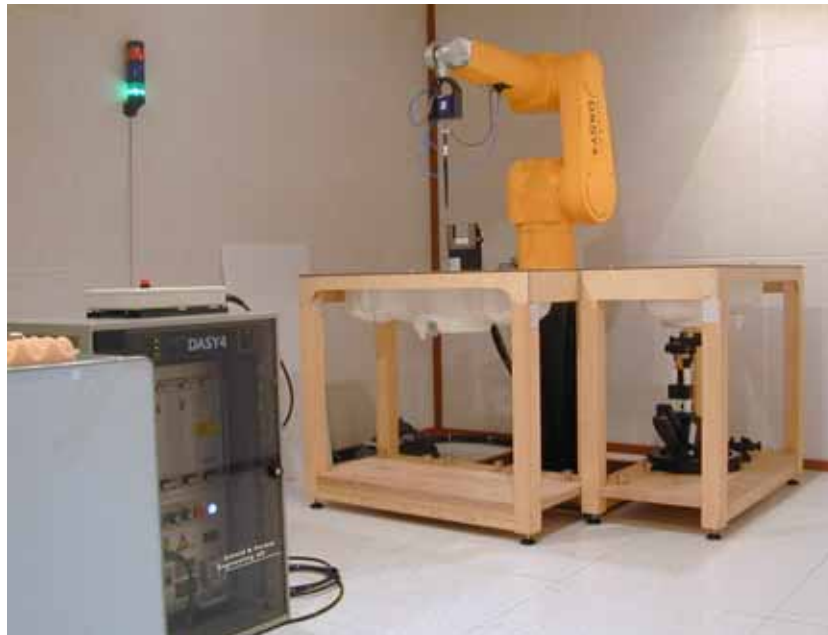


Fig. 4.1 SAR Measurement System



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	1750	2006-01-24
Dipole validation kit	D1900V2	5d058	2005-01-27
	D835V2	475	2005-02-24
Network analyzer	8753ES	NONE	2005-10-17
Signal generator	E4432B	GB40050840	2006-03-03
RF Power meter	EPM-442A	GB37170412	2005-10-05
Power Sensor	8481A	3318A90368	2005-10-05
RF Power meter	E4418A	GB38272722	2006-03-03
Power Sensor	8481A	3318A96478	2006-03-08
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.

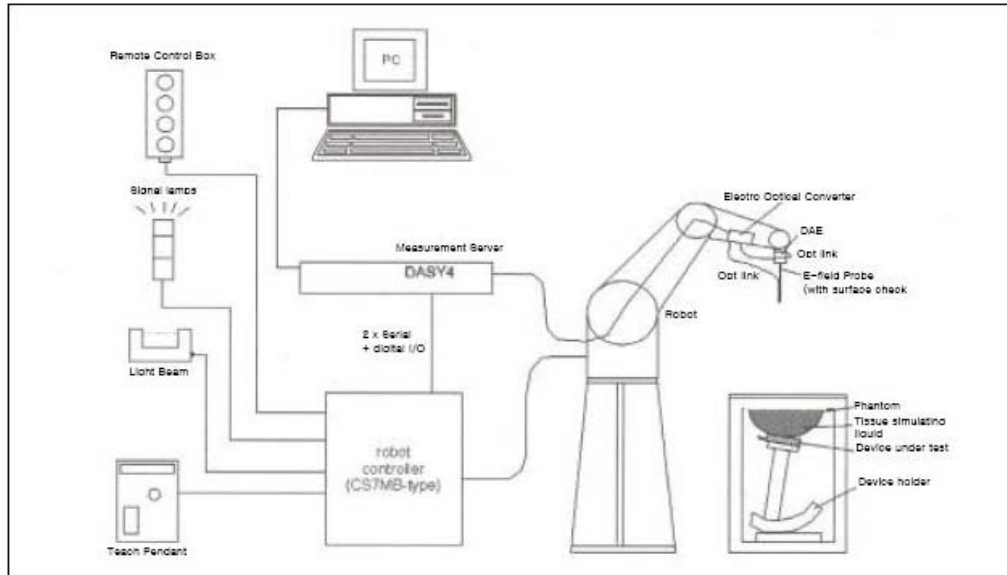


Fig. 5.1 SAR Measurement System Setup

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 $\pm 8\%$) 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 μ W/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 hydroxethylcellulose(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)	ϵ_r	σ (S/m)	ϵ_r	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

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426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, KoreaTEL: 82-2-867-3201
FAX: 82-2-867-3204**5. DESCRIPTION OF THE TEST EQUIPMENT(continued)**

835MHz			1900MHz		
	Head	Body		Head	Body
Sugar	47.31%	34.31%	DGBE(diethylene Glycol buty 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	$41.0 \pm 5\%$	$55.2 \pm 5\%$	ϵ	$40.0 \pm 5\%$	$53.3 \pm 5\%$
σ	$0.89 \pm 10\%$	$0.97 \pm 10\%$	σ	$1.45 \pm 10\%$	$1.52 \pm 10\%$

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].

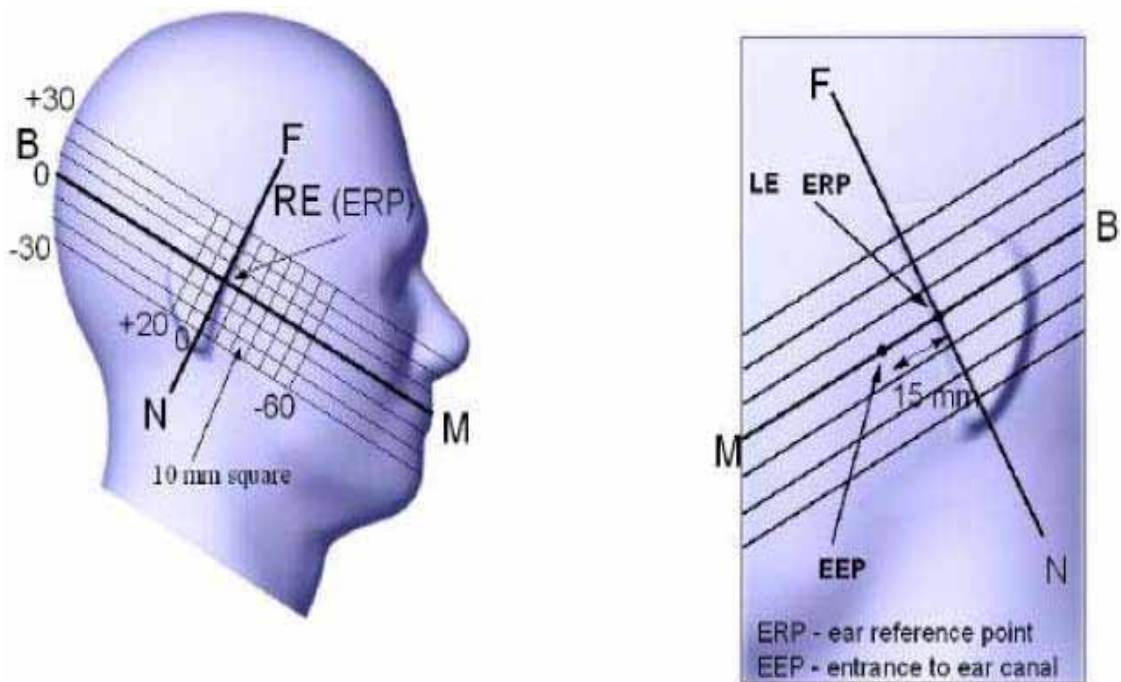


Figure 6.1 Close-up side view of ERP

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 then 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)

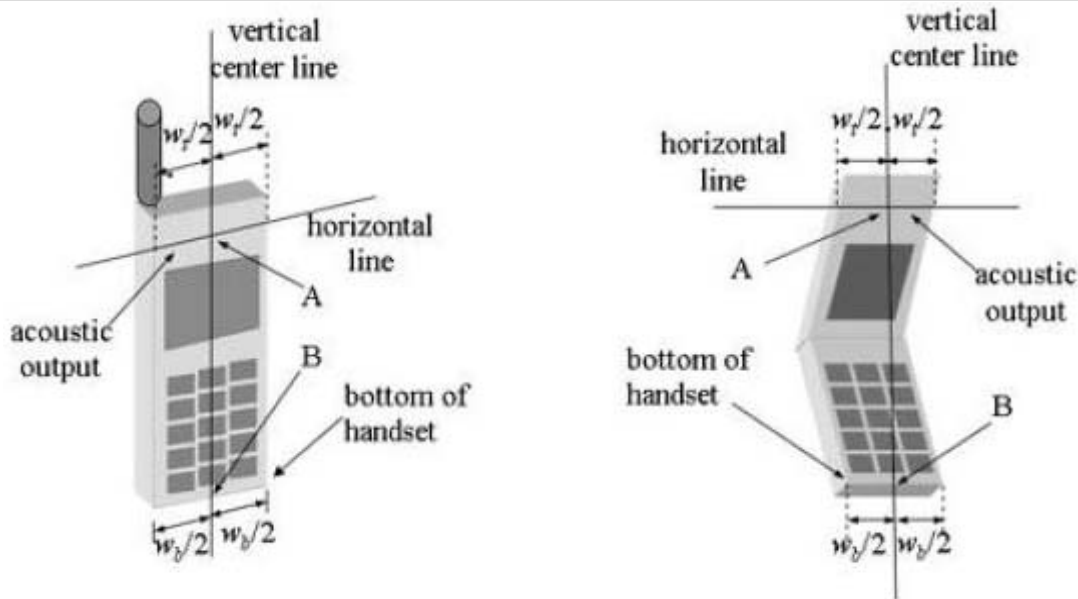


Figure 6.2 Handset Vertical Center & Horizontal Line Reference Points

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 w_t of the handset at the level of the acoustic output (point A on Figures 6.2), and the midpoint of the width w_b 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 necessarily 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

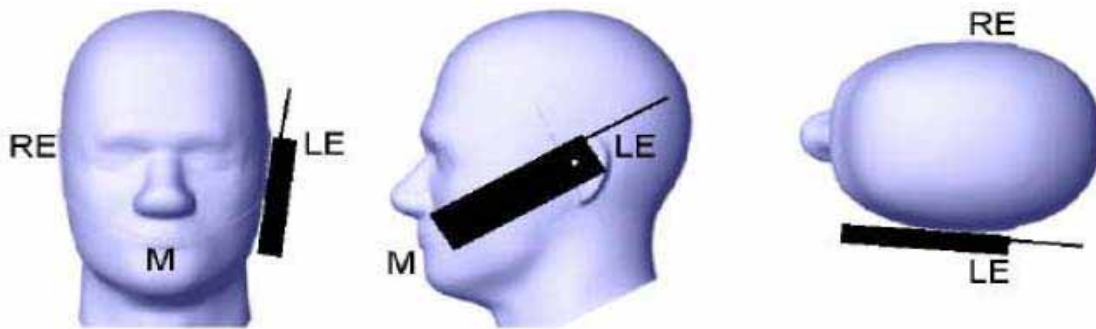


Figure 6.3 "Cheek" or "Touch" Position.

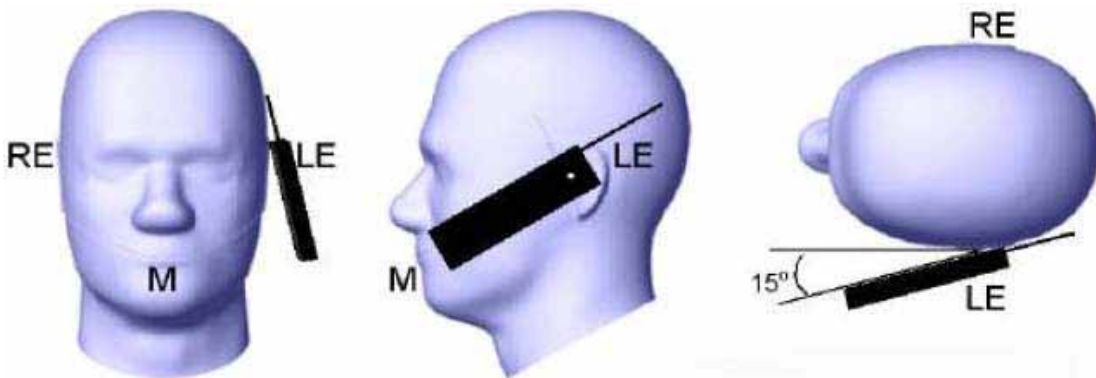


Figure 6.4 "Tilted" Position.



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, Computermathematik, 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	Probability	Divisor	ci 1	Standard unc.	vi or
	value ±%	Distribution		1g	(1g)	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)		22		Liquid Depth(mm)		150				
Date	2006-3-14	2006-3-14		2006-3-13		2006-3-13				
Tissue	1900MHz Brain	1900MHz Muscle		835MHz Brain		835MHz Muscle				
	Target	Measured	Target	Measured	Target	Measured	Target	Measured		
Dielectric Constant: ϵ	40	39.3	53.3	51.4	41.5	41.0	55.2	52.5		
Conductivity: σ	1.45	1.39	1.52	1.55	0.9	0.919	0.97	0.96		
Deviation (%)	ϵ : -1.75%		ϵ : -3.56%		ϵ : -1.20%		ϵ : -4.89%			
	σ : -4.14%		σ : 1.97%		σ : 2.11%		σ : -1.03%			

Test System Validation

- Prior to assessment, the system is verified to the $\pm 10\%$ of the specifications at 835MHz,1900MHz (Graphic Plots Attached)
- The results are nominalized to 1W input power

Table 8.2 System Validation [5]

SYSTEM DIPOLE VALIDATION TARGET & MEASURED						
Tissue	System Validation Kit:	Forward Power (W)	Targeted SAR1g (mW/g)	Measured SAR1g (mW/g)	Deviation (%)	Test Date
1900MHz Brain	D1900V2(S/N :5d058)	1.0	39.2	40	-2.04%	2006-3-14
835MHz Brain	D835V2(S/N :475)	1.0	9.5	9.6	-1.05%	2006-3-13

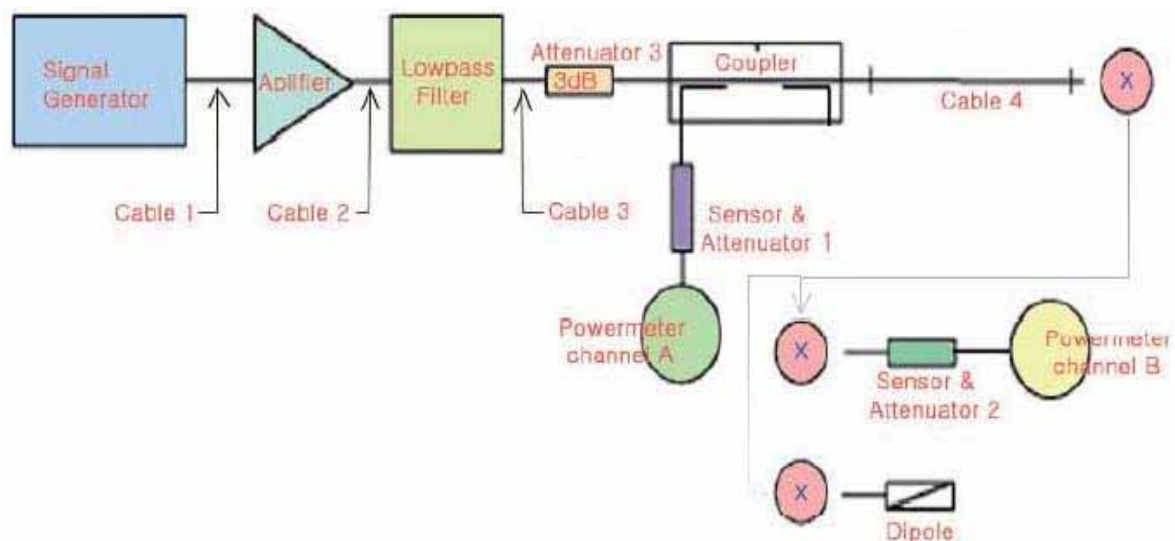


Figure 12.1 Dipole Validation Test Setup

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22.0Relative HUMIDITY (%) : 39Mixture Type : 835MHz BrainDielectric Constant : 41.0Conductivity: 0.919

Measurement Results (GSM Head SAR-Touch)

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)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.20	128	GSM	33.00	33.09	Standard	Cheek Touch	–	1.200
836.60	190	GSM	33.00	33.07	Standard	Cheek Touch	–	1.210
848.80	251	GSM	33.00	32.86	Standard	Cheek Touch	–	1.080

MEASUREMENT RESULTS (GSM Right Head SAR – Touch)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.20	128	GSM	33.00	32.87	Standard	Cheek Touch	–	1.340
836.60	190	GSM	33.00	32.94	Standard	Cheek Touch	–	1.370
848.80	251	GSM	33.00	32.96	Standard	Cheek Touch	–	1.220

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)

Test report no : ESTSAR0603-005

FCC ID : BEJMG220

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22.0

Relative HUMIDITY (%) : 39

Mixture Type : 835MHz Brain

Dielectric Constant : 41.0

Conductivity: 0.919

Measurement Results (GSM Head SAR-Tilt)

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)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
836.60	190	GSM	33.00	33.12	Standard	Tilt	–	0.384

MEASUREMENT RESULTS (GSM Right Head SAR – Tilt)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
836.60	190	GSM	33.00	32.94	Standard	Tilt	–	0.383

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

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : 23

Relative HUMIDITY (%) : 40

Mixture Type : 835MHz Body

Dielectric Constant : 52.5

Conductivity: 0.96

Measurement Results (GSM BODY SAR without Holster)

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

MEASUREMENT RESULTS (GSM Body SAR Without Holster)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.20	128	GSM	33.00	32.92	Standard	1.5[w/o Holster]	—	0.618
836.60	190	GSM	33.00	32.97	Standard	1.5[w/o Holster]	—	0.666
848.80	251	GSM	33.00	32.91	Standard	1.5[w/o Holster]	—	0.569

MEASUREMENT RESULTS (GSM Body SAR Without Holster – GPRS)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.20	128	GSM	33.00	32.92	Standard	1.5[w/o Holster]	—	0.533

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, GPRS mode

Engineer K.H.Kang

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22.0Relative HUMIDITY (%) : 37Mixture Type : 1900MHz BrainDielectric Constant : 39.3Conductivity: 1.39

Measurement Results (PCS Head SAR–Touch)

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 (PCS Left Head SAR – Touch)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	29.91	Standard	Cheek Touch	–	1.000
1880.00	661	GSM	30.00	29.90	Standard	Cheek Touch	–	0.680
1909.80	810	GSM	30.00	30.04	Standard	Cheek Touch	–	0.604

MEASUREMENT RESULTS (PCS Right Head SAR – Touch)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	29.94	Standard	Cheek Touch	–	1.040
1880.00	661	GSM	30.00	29.97	Standard	Cheek Touch	–	0.862
1909.80	810	GSM	30.00	29.99	Standard	Cheek Touch	–	0.734

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) 

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Seoul, 153-803, KoreaTEL: 82-2-867-3201
FAX: 82-2-867-3204**9. RESULTS(continued)**Ambient TEMPERATURE (C) : **22.0**Relative HUMIDITY (%) : **37**Mixture Type : **1900MHz Brain**Dielectric Constant : **39.3**Conductivity: **1.39****Measurement Results (PCS Head SAR-Tilt)**

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 (PCS Left Head SAR – Tilt)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	29.96	Standard	Tilt	–	0.196

MEASUREMENT RESULTS (PCS Right Head SAR – Tilt)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	30.01	Standard	Tilt	–	0.231

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**

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22

Relative HUMIDITY (%) : 41

Mixture Type : 1900MHz Body

Dielectric Constant : 51.4

Conductivity: 1.55

Measurement Results (PCS BODY SAR without Holster)

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

MEASUREMENT RESULTS (PCS Body SAR Without Holster)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	30.11	Standard	1.5[w/o Holster]	—	0.281
1880.00	661	GSM	30.00	29.93	Standard	1.5[w/o Holster]	—	0.261
1909.80	810	GSM	30.00	30.01	Standard	1.5[w/o Holster]	—	0.213

MEASUREMENT RESULTS (PCS Body SAR Without Holster – GPRS)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	29.98	Standard	1.5[w/o Holster]	—	0.263

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, GPRS mode

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FCC ID : BEJMG220

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10. REFERENCE

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APPENDIX A : Validation Test Data of Tissue



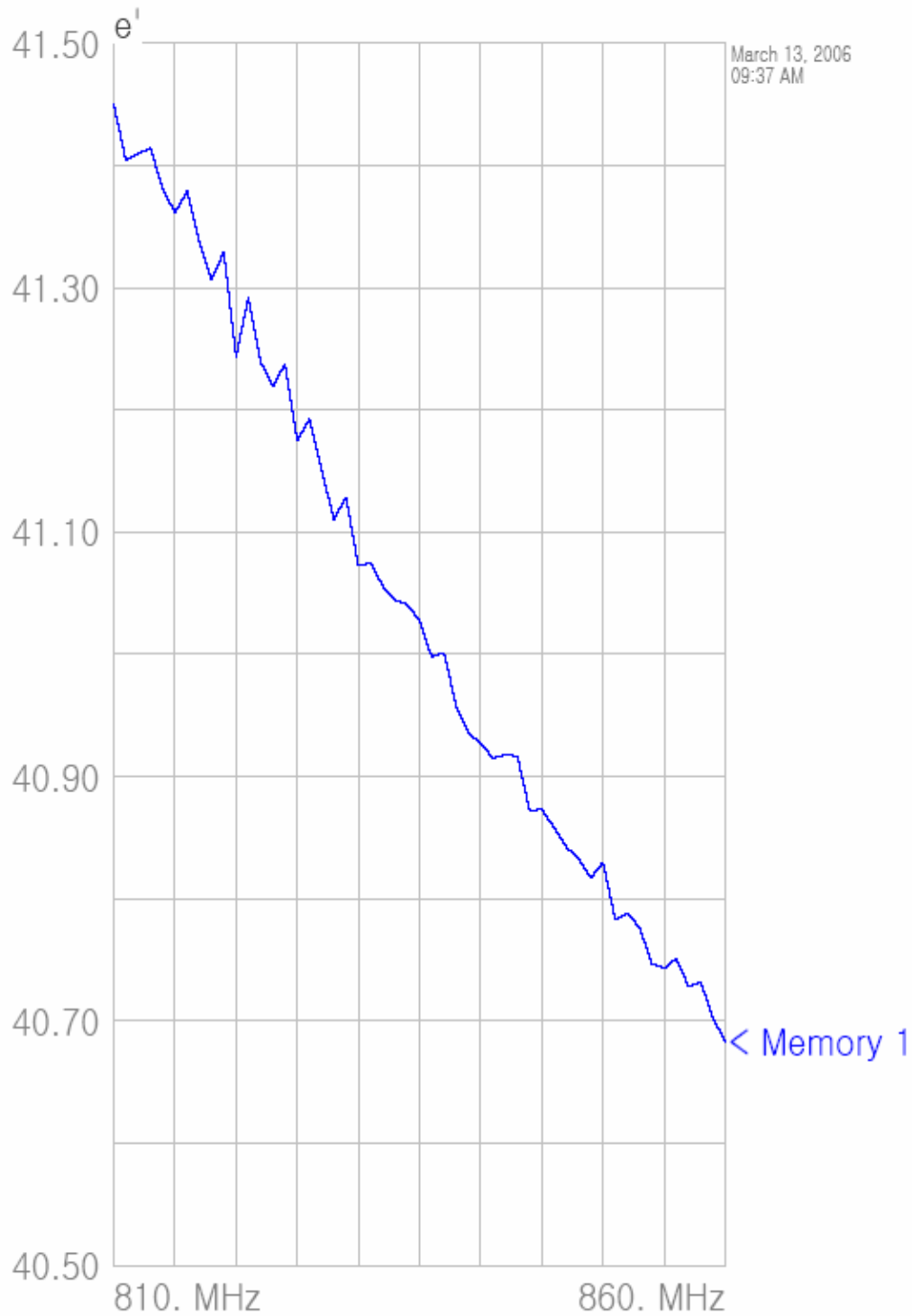
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- GSM850 Head Tissue

Title
SubTitle



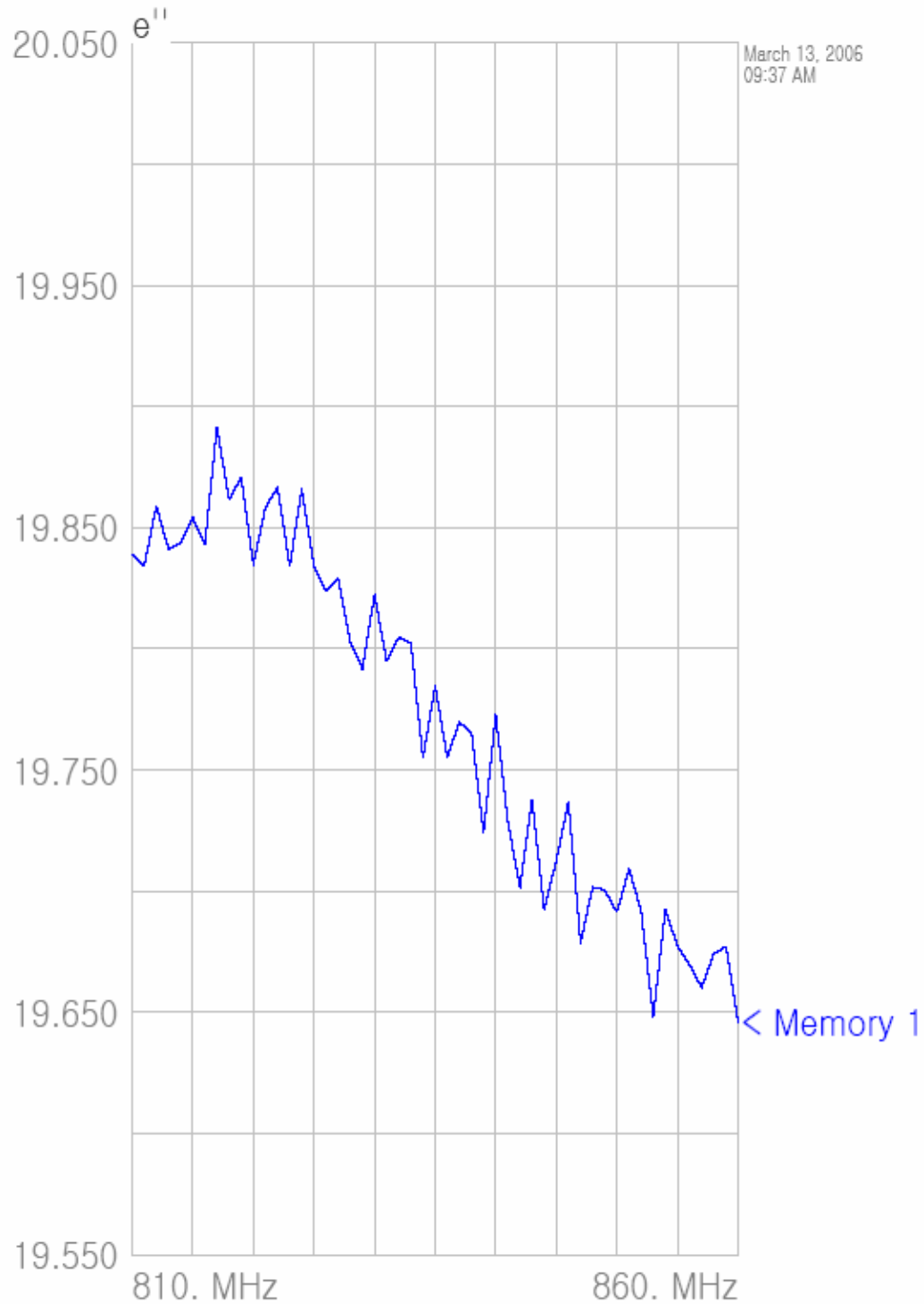


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Title SubTitle

March 12, 2006 09:13 AM

Frequency	e'	e''
810.000000 MHz	41.4500	19.8388
811.000000 MHz	41.4042	19.8343
812.000000 MHz	41.4096	19.8591
813.000000 MHz	41.4142	19.8411
814.000000 MHz	41.3814	19.8439
815.000000 MHz	41.3614	19.8541
816.000000 MHz	41.3788	19.8433
817.000000 MHz	41.3371	19.8915
818.000000 MHz	41.3064	19.8617
819.000000 MHz	41.3293	19.8708
820.000000 MHz	41.2435	19.8347
821.000000 MHz	41.2917	19.8583
822.000000 MHz	41.2396	19.8666
823.000000 MHz	41.2191	19.8342
824.000000 MHz	41.2376	19.8658
825.000000 MHz	41.1749	19.8344
826.000000 MHz	41.1924	19.8237
827.000000 MHz	41.1506	19.8292
828.000000 MHz	41.1107	19.8025
829.000000 MHz	41.1283	19.7918
830.000000 MHz	41.0725	19.8224
831.000000 MHz	41.0748	19.7948
832.000000 MHz	41.0558	19.8048
833.000000 MHz	41.0440	19.8022
834.000000 MHz	41.0410	19.7550
835.000000 MHz	41.0275	19.7846
836.000000 MHz	40.9979	19.7554
837.000000 MHz	41.0014	19.7697
838.000000 MHz	40.9577	19.7655
839.000000 MHz	40.9354	19.7240
840.000000 MHz	40.9276	19.7729
841.000000 MHz	40.9150	19.7288
842.000000 MHz	40.9176	19.7015
843.000000 MHz	40.9169	19.7378
844.000000 MHz	40.8727	19.6922
845.000000 MHz	40.8729	19.7126
846.000000 MHz	40.8586	19.7370
847.000000 MHz	40.8422	19.6787
848.000000 MHz	40.8329	19.7017
849.000000 MHz	40.8168	19.7005
850.000000 MHz	40.8298	19.6913
851.000000 MHz	40.7828	19.7092
852.000000 MHz	40.7883	19.6917
853.000000 MHz	40.7761	19.6482
854.000000 MHz	40.7470	19.6922
855.000000 MHz	40.7430	19.6774
856.000000 MHz	40.7511	19.6696
857.000000 MHz	40.7280	19.6602
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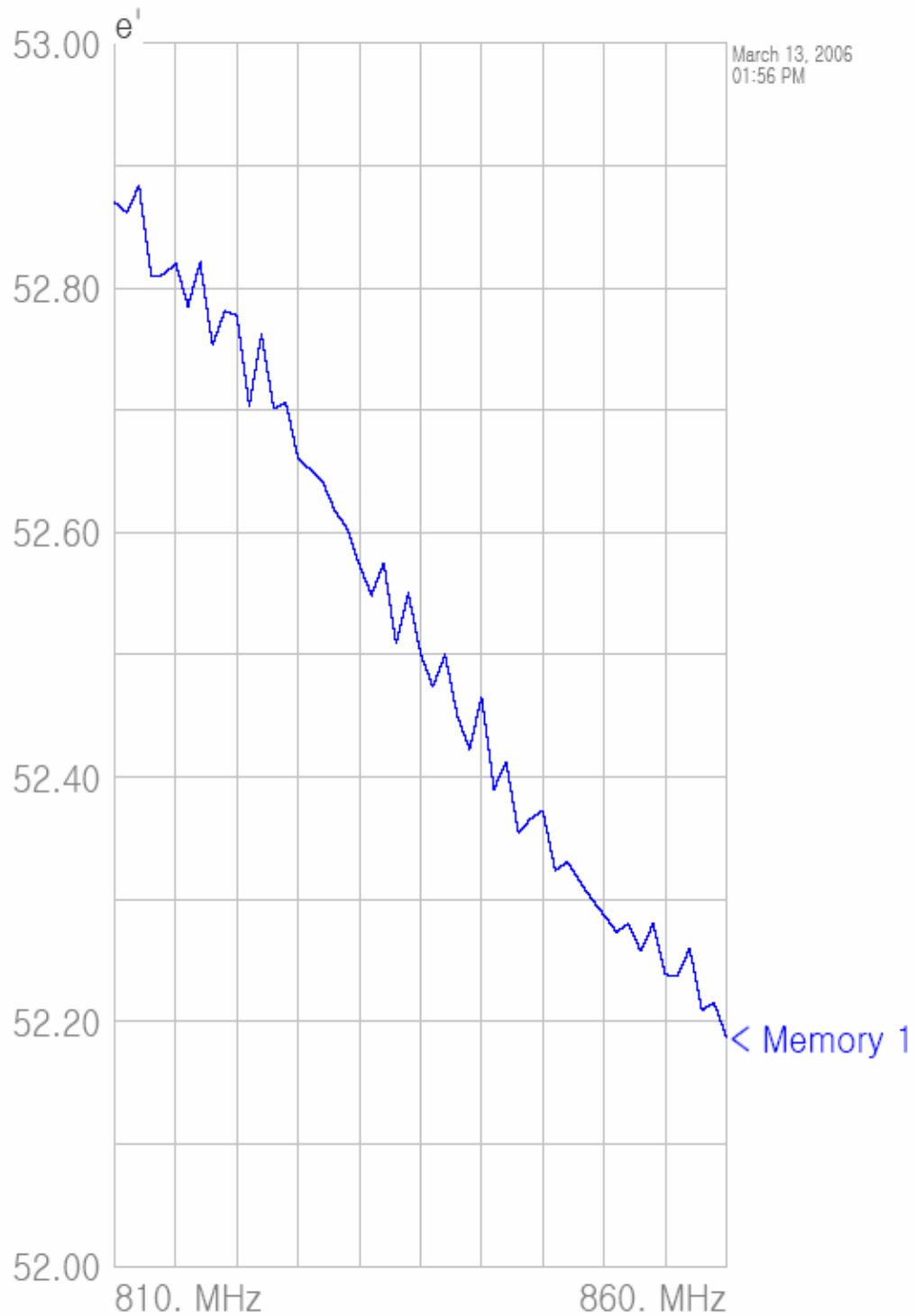
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- GSM850 Body Tissue

Title
SubTitle





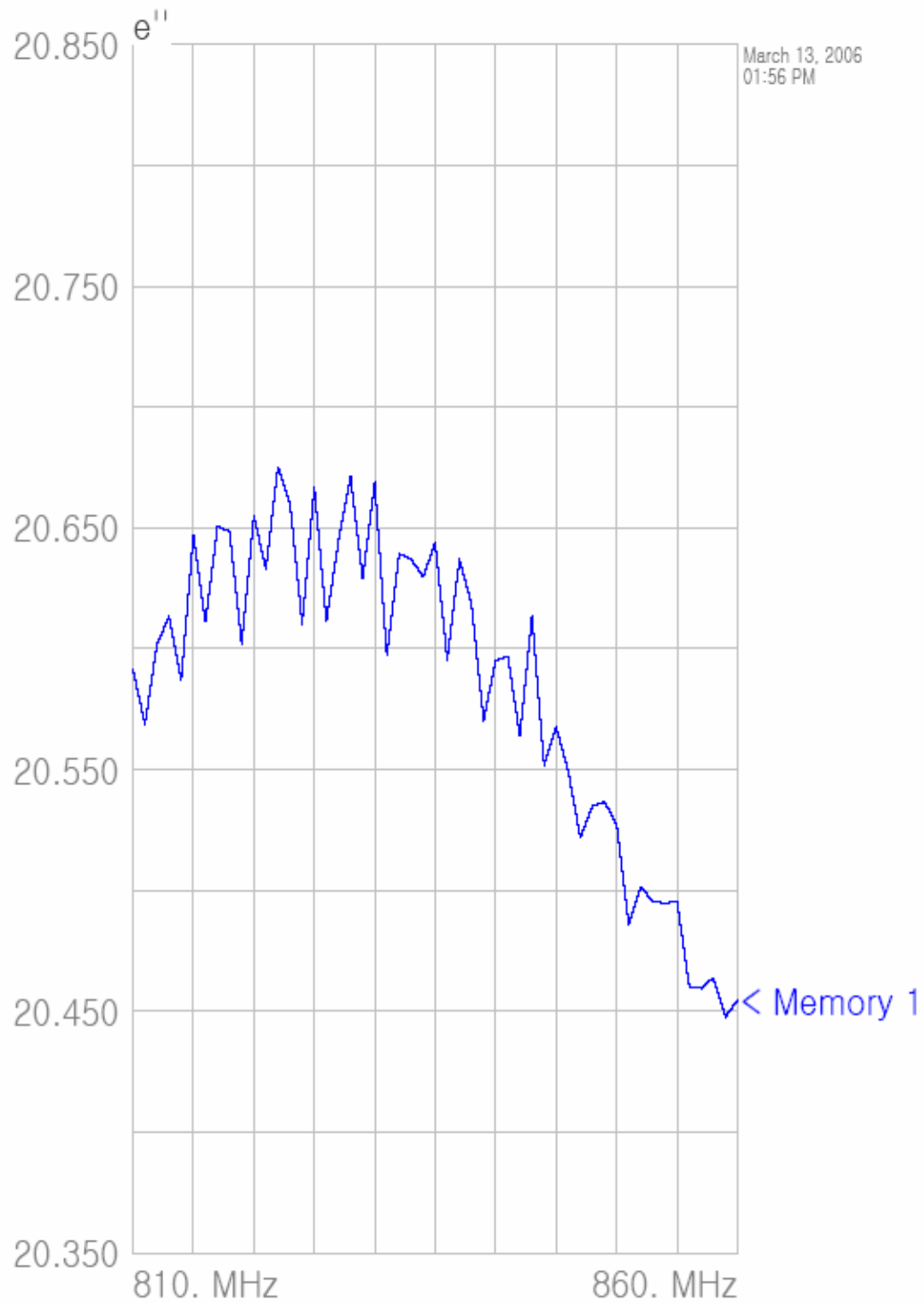
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Title
SubTitle

March 10, 2006 01:36 PM

Frequency	e'	e''
810.000000 MHz	52.8701	20.5916
811.000000 MHz	52.8616	20.5887
812.000000 MHz	52.8839	20.6020
813.000000 MHz	52.8092	20.6134
814.000000 MHz	52.8108	20.5869
815.000000 MHz	52.8202	20.6470
816.000000 MHz	52.7851	20.6111
817.000000 MHz	52.8210	20.6506
818.000000 MHz	52.7533	20.6485
819.000000 MHz	52.7811	20.6018
820.000000 MHz	52.7775	20.6550
821.000000 MHz	52.7032	20.6331
822.000000 MHz	52.7623	20.6752
823.000000 MHz	52.7015	20.6598
824.000000 MHz	52.7062	20.6103
825.000000 MHz	52.6601	20.6672
826.000000 MHz	52.6516	20.6114
827.000000 MHz	52.6414	20.6445
828.000000 MHz	52.6180	20.6713
829.000000 MHz	52.6033	20.6289
830.000000 MHz	52.5737	20.6688
831.000000 MHz	52.5487	20.5972
832.000000 MHz	52.5750	20.6392
833.000000 MHz	52.5089	20.6372
834.000000 MHz	52.5506	20.6298
835.000000 MHz	52.5014	20.6438
836.000000 MHz	52.4738	20.5954
837.000000 MHz	52.5002	20.6371
838.000000 MHz	52.4505	20.6186
839.000000 MHz	52.4230	20.5703
840.000000 MHz	52.4654	20.5953
841.000000 MHz	52.3904	20.5969
842.000000 MHz	52.4121	20.5639
843.000000 MHz	52.3546	20.6136
844.000000 MHz	52.3659	20.5518
845.000000 MHz	52.3725	20.5677
846.000000 MHz	52.3235	20.5494
847.000000 MHz	52.3307	20.5217
848.000000 MHz	52.3148	20.5349
849.000000 MHz	52.3003	20.5367
850.000000 MHz	52.2871	20.5272
851.000000 MHz	52.2732	20.4857
852.000000 MHz	52.2800	20.5014
853.000000 MHz	52.2575	20.4955
854.000000 MHz	52.2799	20.4947
855.000000 MHz	52.2384	20.4956
856.000000 MHz	52.2376	20.4603
857.000000 MHz	52.2600	20.4595
858.000000 MHz	52.2093	20.4639
859.000000 MHz	52.2154	20.4476
860.000000 MHz	52.1872	20.4546



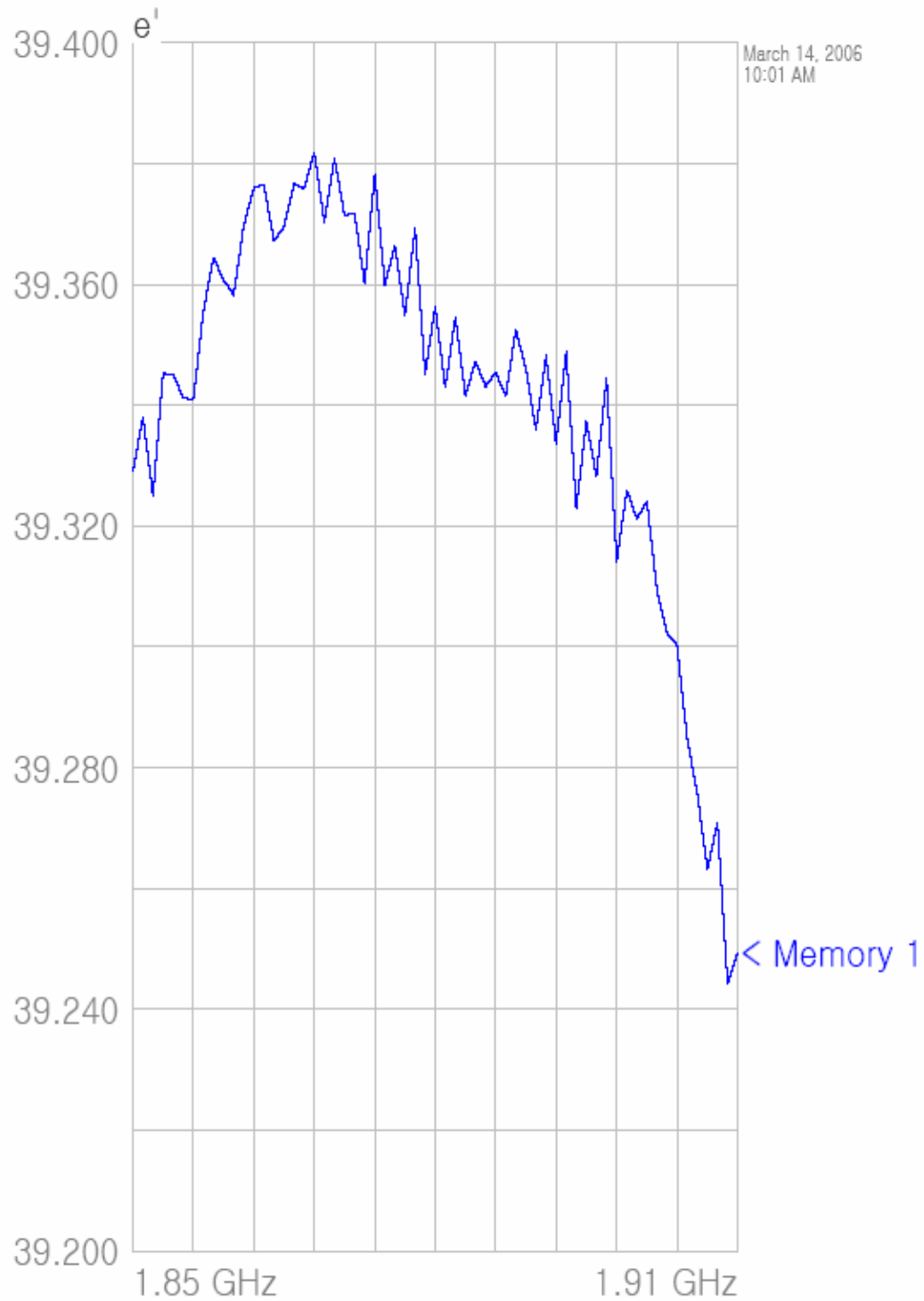
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– PCS1900 Head Tissue

Title
SubTitle



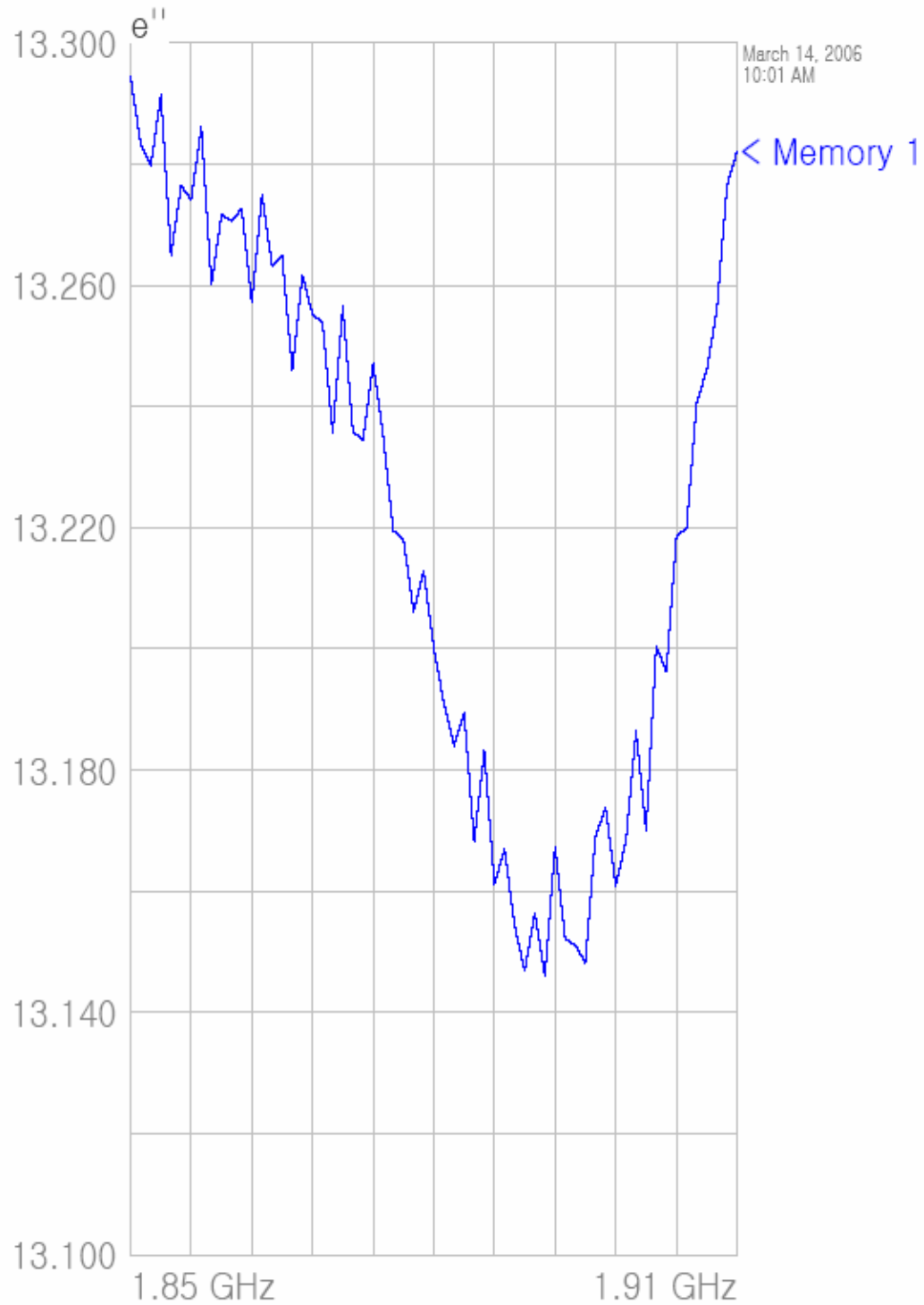


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Title
SubTitle

March 14, 2006 10:00 AM

Frequency	e'	e''
1.850000000 GHz	39.3290	13.2945
1.851000000 GHz	39.3381	13.2832
1.852000000 GHz	39.3250	13.2797
1.853000000 GHz	39.3453	13.2914
1.854000000 GHz	39.3450	13.2650
1.855000000 GHz	39.3413	13.2765
1.856000000 GHz	39.3409	13.2741
1.857000000 GHz	39.3556	13.2862
1.858000000 GHz	39.3644	13.2601
1.859000000 GHz	39.3608	13.2717
1.860000000 GHz	39.3582	13.2706
1.861000000 GHz	39.3697	13.2727
1.862000000 GHz	39.3760	13.2571
1.863000000 GHz	39.3765	13.2750
1.864000000 GHz	39.3672	13.2632
1.865000000 GHz	39.3696	13.2650
1.866000000 GHz	39.3767	13.2459
1.867000000 GHz	39.3758	13.2617
1.868000000 GHz	39.3819	13.2552
1.869000000 GHz	39.3703	13.2538
1.870000000 GHz	39.3809	13.2355
1.871000000 GHz	39.3715	13.2565
1.872000000 GHz	39.3717	13.2359
1.873000000 GHz	39.3601	13.2344
1.874000000 GHz	39.3783	13.2471
1.875000000 GHz	39.3600	13.2351
1.876000000 GHz	39.3664	13.2195
1.877000000 GHz	39.3548	13.2181
1.878000000 GHz	39.3694	13.2062
1.879000000 GHz	39.3452	13.2128
1.880000000 GHz	39.3563	13.2002
1.881000000 GHz	39.3429	13.1910
1.882000000 GHz	39.3546	13.1840
1.883000000 GHz	39.3416	13.1895
1.884000000 GHz	39.3473	13.1683
1.885000000 GHz	39.3431	13.1832
1.886000000 GHz	39.3454	13.1612
1.887000000 GHz	39.3415	13.1670
1.888000000 GHz	39.3525	13.1543
1.889000000 GHz	39.3461	13.1468
1.890000000 GHz	39.3359	13.1565
1.891000000 GHz	39.3483	13.1460
1.892000000 GHz	39.3336	13.1674
1.893000000 GHz	39.3489	13.1521
1.894000000 GHz	39.3230	13.1511
1.895000000 GHz	39.3373	13.1482
1.896000000 GHz	39.3282	13.1690
1.897000000 GHz	39.3445	13.1738
1.898000000 GHz	39.3140	13.1609
1.899000000 GHz	39.3260	13.1683
1.900000000 GHz	39.3212	13.1864
1.901000000 GHz	39.3241	13.1701
1.902000000 GHz	39.3094	13.2004
1.903000000 GHz	39.3023	13.1963
1.904000000 GHz	39.3002	13.2186
1.905000000 GHz	39.2847	13.2199
1.906000000 GHz	39.2758	13.2406
1.907000000 GHz	39.2631	13.2460
1.908000000 GHz	39.2710	13.2560
1.909000000 GHz	39.2441	13.2764
1.910000000 GHz	39.2494	13.2822



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– PCS1900 Body Tissue

Title
SubTitle





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Title
SubTitle

March 14, 2006 02:12 PM

Frequency	e'	e''
1.850000000 GHz	51.4604	14.7401
1.851000000 GHz	51.4629	14.7342
1.852000000 GHz	51.4645	14.7398
1.853000000 GHz	51.4611	14.7354
1.854000000 GHz	51.4668	14.7375
1.855000000 GHz	51.4778	14.7457
1.856000000 GHz	51.4589	14.7440
1.857000000 GHz	51.4737	14.7524
1.858000000 GHz	51.4792	14.7333
1.859000000 GHz	51.4691	14.7418
1.860000000 GHz	51.4655	14.7412
1.861000000 GHz	51.4737	14.7625
1.862000000 GHz	51.4680	14.7637
1.863000000 GHz	51.4670	14.7536
1.864000000 GHz	51.4673	14.7532
1.865000000 GHz	51.4678	14.7740
1.866000000 GHz	51.4669	14.7639
1.867000000 GHz	51.4590	14.7706
1.868000000 GHz	51.4692	14.7651
1.869000000 GHz	51.4616	14.7680
1.870000000 GHz	51.4499	14.7743
1.871000000 GHz	51.4522	14.7721
1.872000000 GHz	51.4476	14.7866
1.873000000 GHz	51.4520	14.7827
1.874000000 GHz	51.4290	14.7882
1.875000000 GHz	51.4384	14.7941
1.876000000 GHz	51.4215	14.7943
1.877000000 GHz	51.4371	14.7949
1.878000000 GHz	51.4255	14.8012
1.879000000 GHz	51.4269	14.7855
1.880000000 GHz	51.4187	14.7997
1.881000000 GHz	51.4054	14.8039
1.882000000 GHz	51.4028	14.7918
1.883000000 GHz	51.4022	14.8064
1.884000000 GHz	51.4094	14.7892
1.885000000 GHz	51.3917	14.8046
1.886000000 GHz	51.4103	14.7881
1.887000000 GHz	51.3840	14.7896
1.888000000 GHz	51.4004	14.7787
1.889000000 GHz	51.3711	14.7971
1.890000000 GHz	51.3967	14.7887
1.891000000 GHz	51.3725	14.7884
1.892000000 GHz	51.3818	14.7694
1.893000000 GHz	51.3738	14.8119
1.894000000 GHz	51.3675	14.7995
1.895000000 GHz	51.3524	14.8054
1.896000000 GHz	51.3708	14.7927
1.897000000 GHz	51.3641	14.8163
1.898000000 GHz	51.3784	14.8071
1.899000000 GHz	51.3647	14.8226
1.900000000 GHz	51.3640	14.8124
1.901000000 GHz	51.3493	14.8429
1.902000000 GHz	51.3531	14.8217
1.903000000 GHz	51.3571	14.8572
1.904000000 GHz	51.3383	14.8345
1.905000000 GHz	51.3468	14.8588
1.906000000 GHz	51.3230	14.8548
1.907000000 GHz	51.3320	14.8716
1.908000000 GHz	51.3163	14.8604
1.909000000 GHz	51.3320	14.8927
1.910000000 GHz	51.2977	14.8767



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APPENDIX B : Validation Test Data

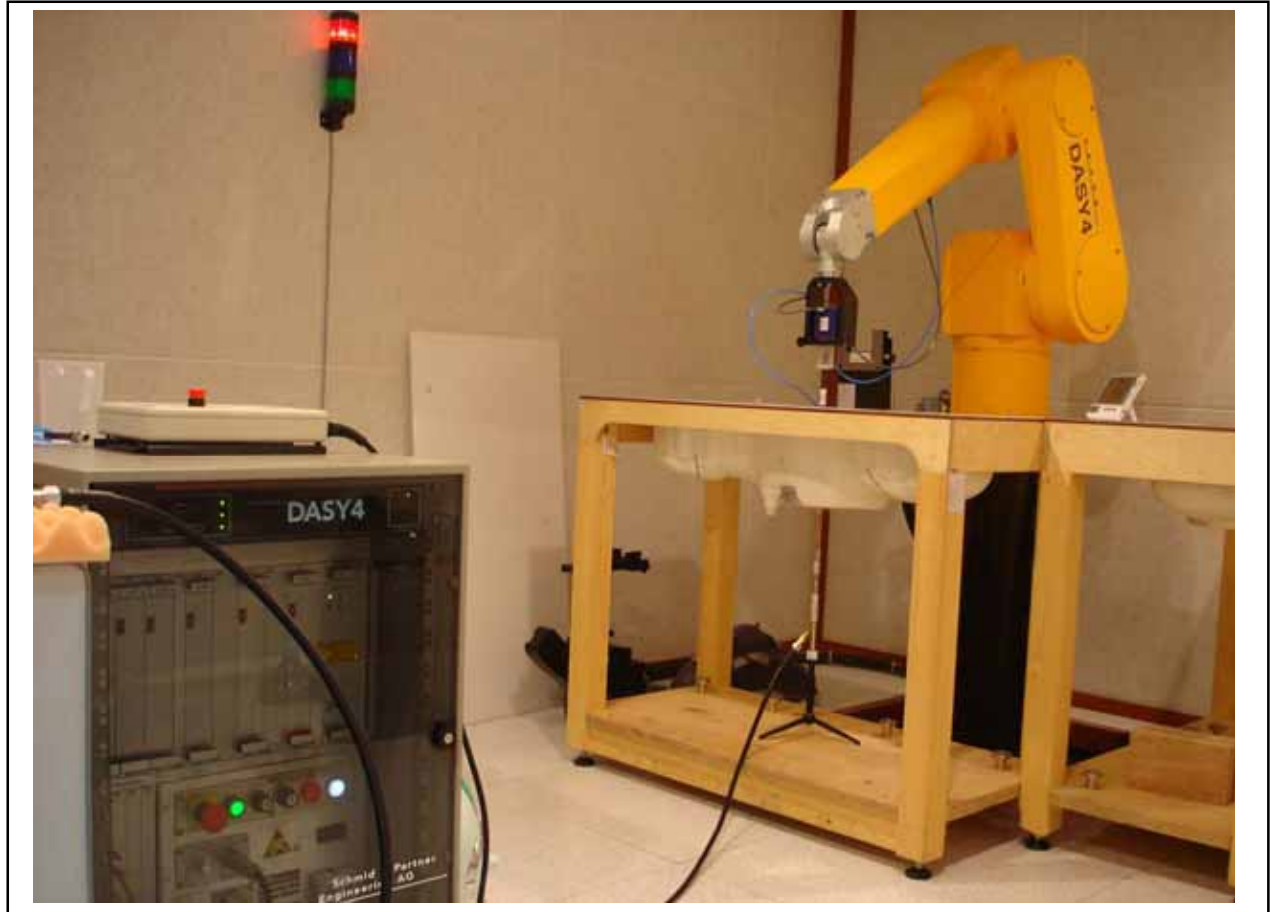


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Dipole Validation





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- GSM850 Validation

Date/Time: 03/13/06 10:12:36

Test Laboratory: ESTECH

validation0313

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:xxx

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.919 \text{ mho/m}$; $\epsilon_r = 41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 39%

Area Scan (61x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 54.8 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 2.59 mW/g

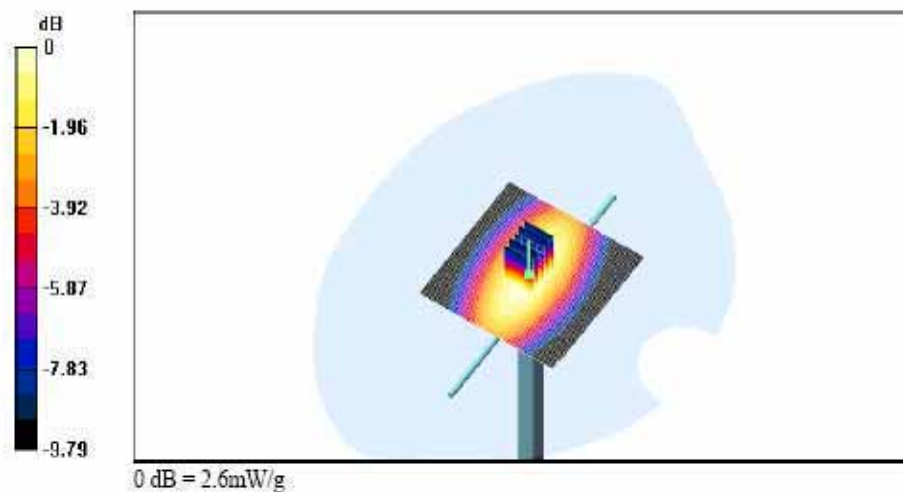
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.8 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 2.6 mW/g

Peak SAR (extrapolated) = 3.58 W/kg

SAR(1 g) = 2.4 mW/g





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- PCS1900 Validation

Date/Time: 03/14/06 10:43:09

Test Laboratory: ESTECH

validation0314

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:xxx

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 39.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Su551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 37%

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 91.7 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 12 mW/g

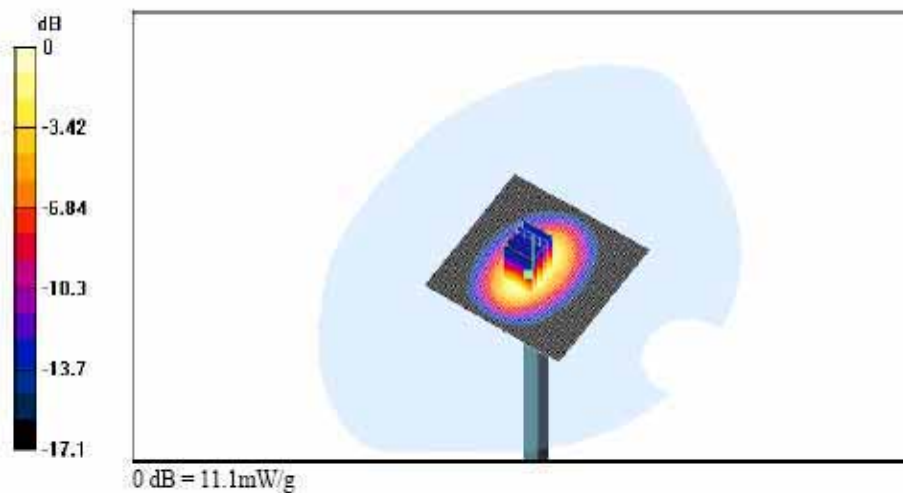
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 91.7 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 11.1 mW/g

Peak SAR (extrapolated) = 19.9 W/kg

SAR(1 g) = 10 mW/g





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APPENDIX C : SAR Test Data

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TEL: 82-2-867-3201
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- GSM850

Date/Time: 03/13/06 12:00:21

Test Laboratory: ESTECH

CH128 LEFT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.91$ mho/m; $\epsilon_r = 41.2$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22 °C, Humidity : 39%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 10.9 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 1.34 mW/g

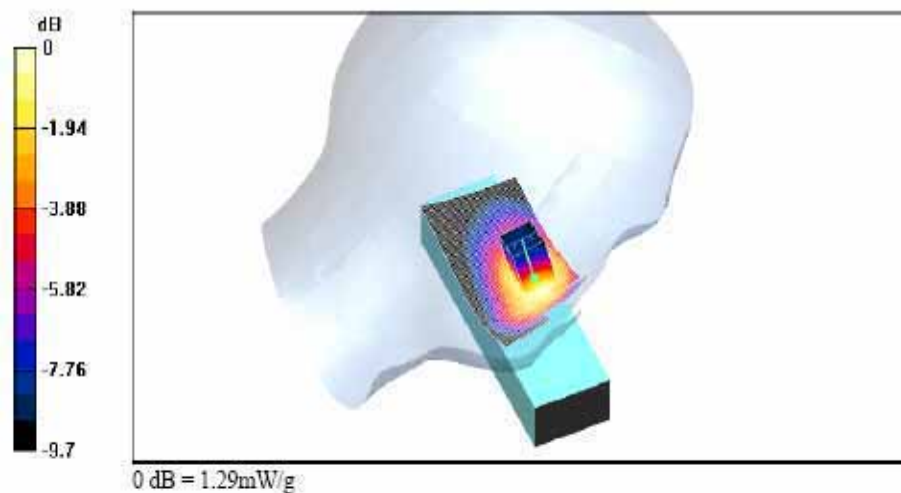
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.9 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 1.29 mW/g

Peak SAR (extrapolated) = 1.79 W/kg

SAR(1 g) = 1.2 mW/g



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Date/Time: 03/13/06 10:39:00

Test Laboratory: ESTECH

CH190 LEFT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.92 \text{ mho/m}$; $\epsilon_r = 41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22 °C, Humidity : 39%

Area Scan (41x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 11.3 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 1.36 mW/g

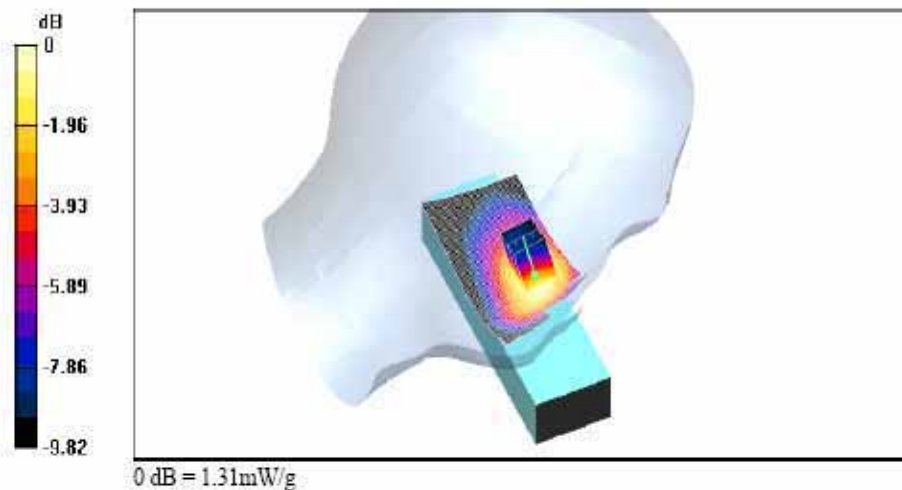
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.3 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 1.31 mW/g

Peak SAR (extrapolated) = 1.82 W/kg

SAR(1 g) = 1.21 mW/g



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Date/Time: 03/13/06 12:41:58

Test Laboratory: ESTECH

CH251 LEFT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 848.8 \text{ MHz}$; $\sigma = 0.93 \text{ mho/m}$; $\epsilon_r = 40.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 39%

Area Scan (41x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 10.5 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 1.22 mW/g

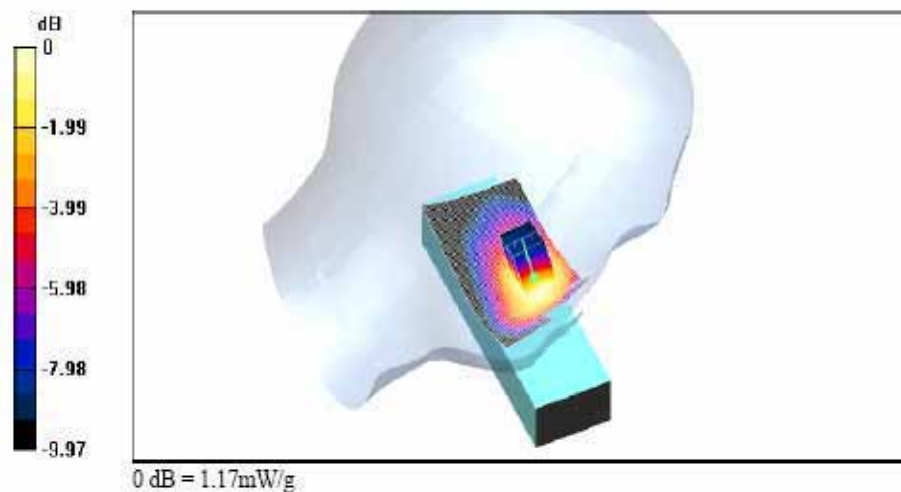
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.5 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 1.17 mW/g

Peak SAR (extrapolated) = 1.61 W/kg

SAR(1 g) = 1.08 mW/g



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Date/Time: 03/13/06 12:23:54

Test Laboratory: ESTECH

CH128 RIGHT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.91$ mho/m; $\epsilon_r = 41.2$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23°C, Humidity : 39%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 11 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 1.45 mW/g

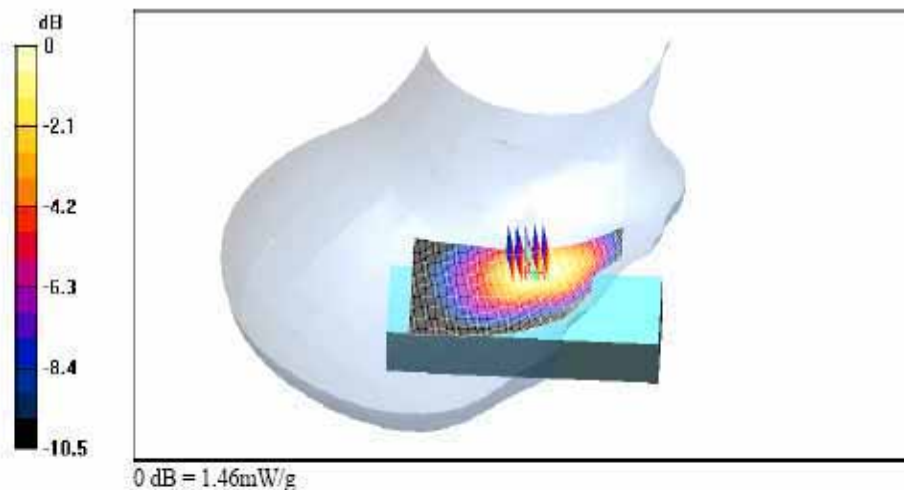
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 1.46 mW/g

Peak SAR (extrapolated) = 2.14 W/kg

SAR(1 g) = 1.34 mW/g



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Date/Time: 03/13/06 10:57:13

Test Laboratory: ESTECH

CH190 RIGHT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.92$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22 °C, Humidity : 39%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 10.7 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 1.5 mW/g

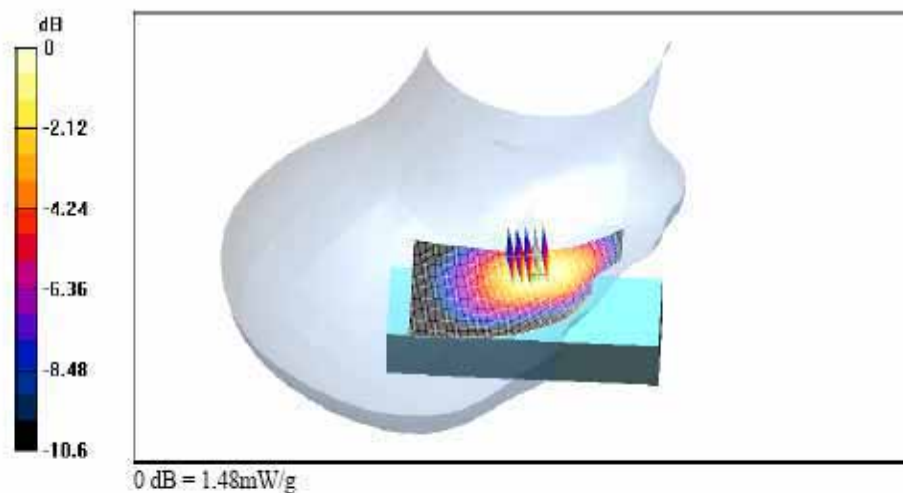
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.7 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 1.48 mW/g

Peak SAR (extrapolated) = 2.14 W/kg

SAR(1 g) = 1.37 mW/g



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Date/Time: 03/13/06 13:02:03

Test Laboratory: ESTECH

CH251 RIGHT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 0.93$ mho/m; $\epsilon_r = 40.8$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Su551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 39%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 10.1 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 1.34 mW/g

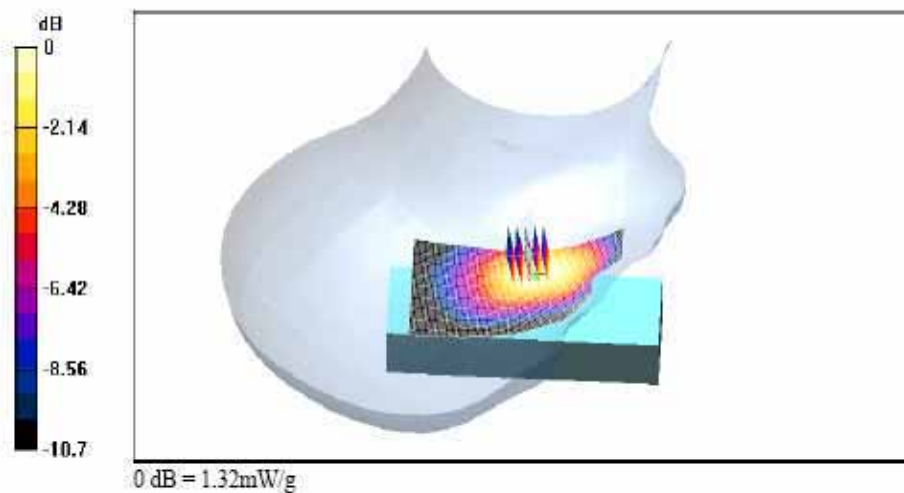
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.1 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 1.32 mW/g

Peak SAR (extrapolated) = 1.93 W/kg

SAR(1 g) = 1.22 mW/g



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Date/Time: 03/13/06 11:18:50

Test Laboratory: ESTECH

CH190 LEFT TILT

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.92 \text{ mho/m}$; $\epsilon_r = 41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 39%

Area Scan (41x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 15.4 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.400 mW/g

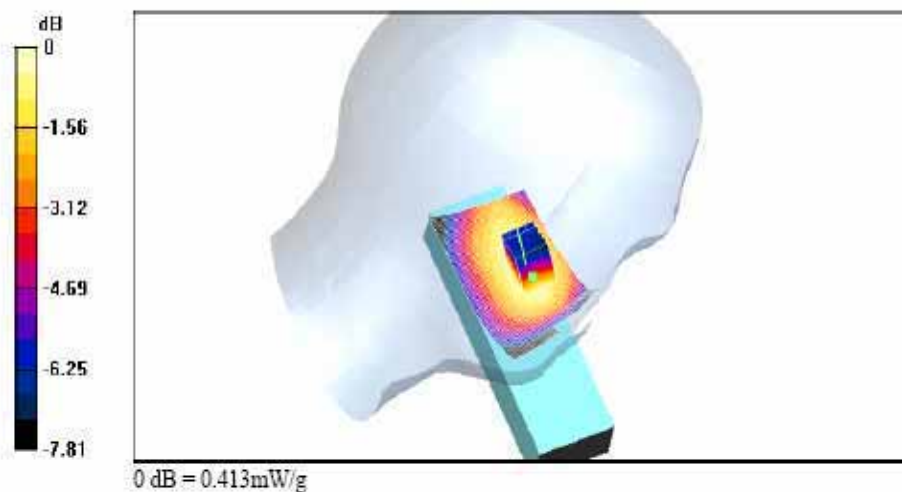
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 15.4 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.413 mW/g

Peak SAR (extrapolated) = 0.507 W/kg

SAR(1 g) = 0.384 mW/g



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Test Laboratory: ESTECH

CH190 RIGHT TILT

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.92$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22 °C, Humidity : 39%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 14.8 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 0.408 mW/g

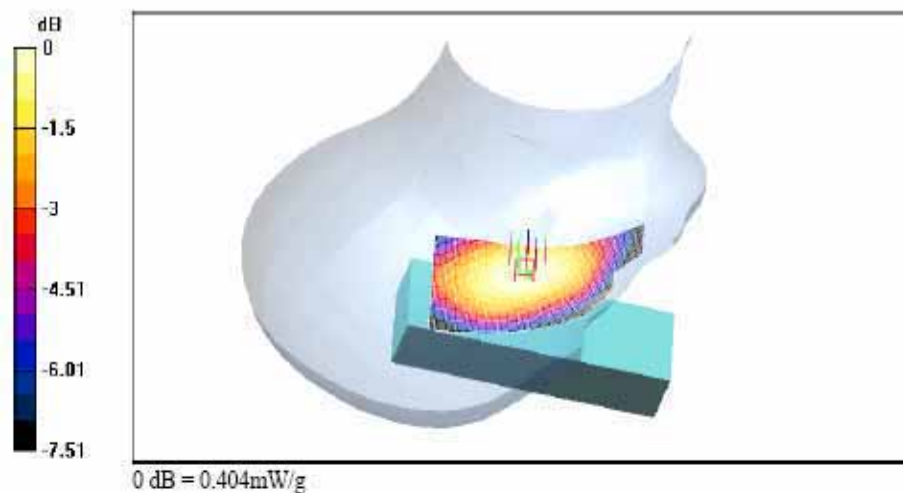
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.8 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 0.404 mW/g

Peak SAR (extrapolated) = 0.488 W/kg

SAR(1 g) = 0.383 mW/g



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CH190 RIGHT TOUCH-ZSCAN

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

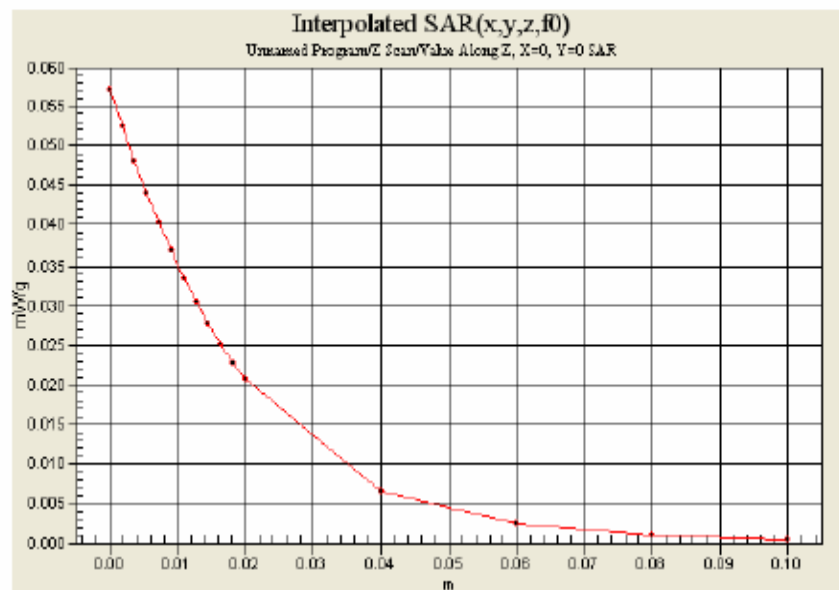
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.92$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 39%



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Test Laboratory: ESTECH

CH128 BODY

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.948$ mho/m; $\epsilon_r = 52.7$; $\rho = 1000$
kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.17, 6.17, 6.17); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 40%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 21.8 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 0.672 mW/g

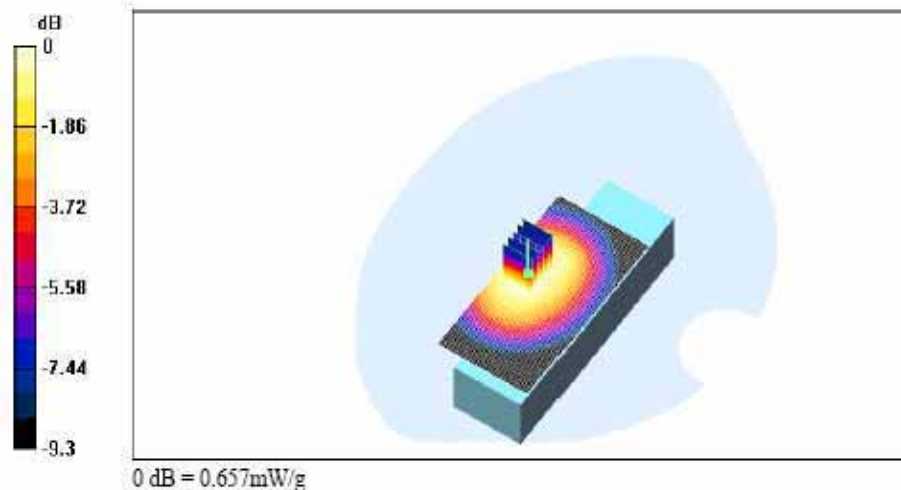
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.8 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 0.657 mW/g

Peak SAR (extrapolated) = 0.843 W/kg

SAR(1 g) = 0.618 mW/g



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Test Laboratory: ESTECH

CHI90 BODY

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.96 \text{ mho/m}$; $\epsilon_r = 52.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.17, 6.17, 6.17); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 40%

Area Scan (41x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 22 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 0.724 mW/g

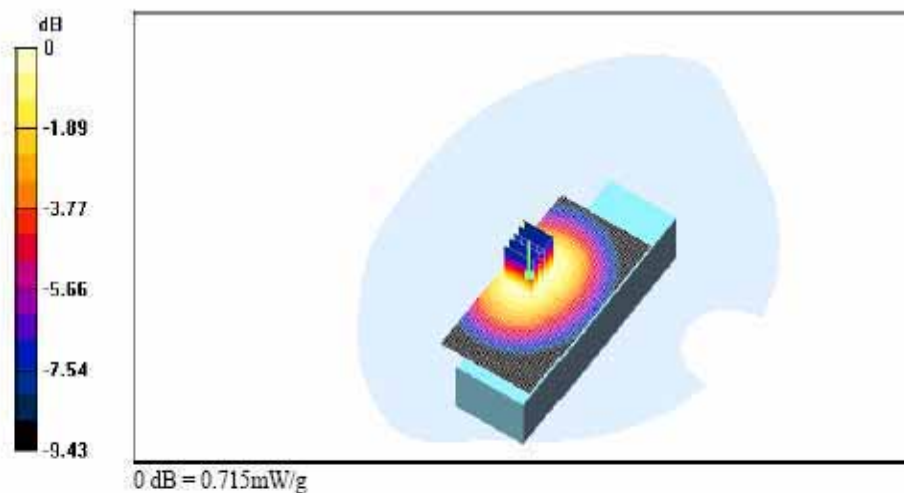
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 22 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 0.715 mW/g

Peak SAR (extrapolated) = 0.919 W/kg

SAR(1 g) = 0.666 mW/g



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Test Laboratory: ESTECH

CH251 BODY

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 848.8 \text{ MHz}$; $\sigma = 0.97 \text{ mho/m}$; $\epsilon_r = 52.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.17, 6.17, 6.17); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23°C, Humidity : 40%

Area Scan (41x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 20.1 V/m; Power Drift = -0.009 dB

Maximum value of SAR (interpolated) = 0.613 mW/g

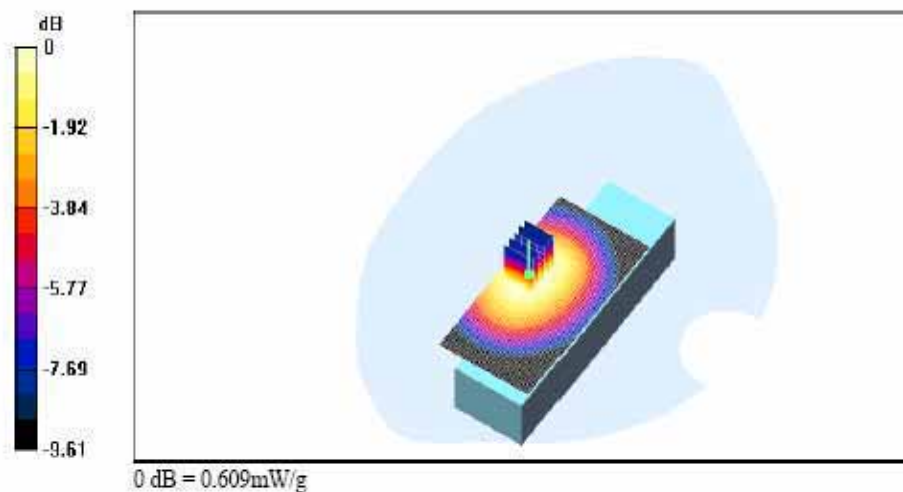
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 20.1 V/m; Power Drift = -0.009 dB

Maximum value of SAR (measured) = 0.609 mW/g

Peak SAR (extrapolated) = 0.790 W/kg

SAR(1 g) = 0.569 mW/g



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CH190 BODY-GPRS

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.96$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.17, 6.17, 6.17); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 39%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 20.3 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 0.574 mW/g

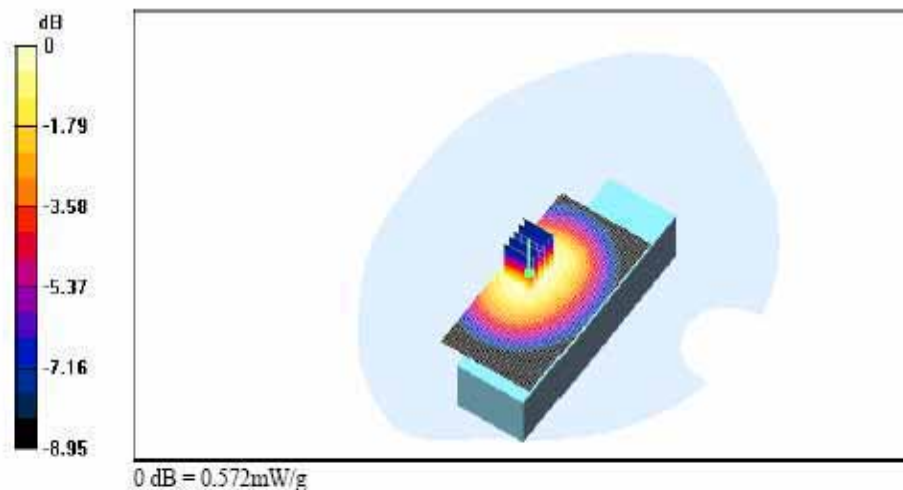
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.3 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 0.572 mW/g

Peak SAR (extrapolated) = 0.706 W/kg

SAR(1 g) = 0.533 mW/g



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CH190 BODY-ZSCAN

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

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

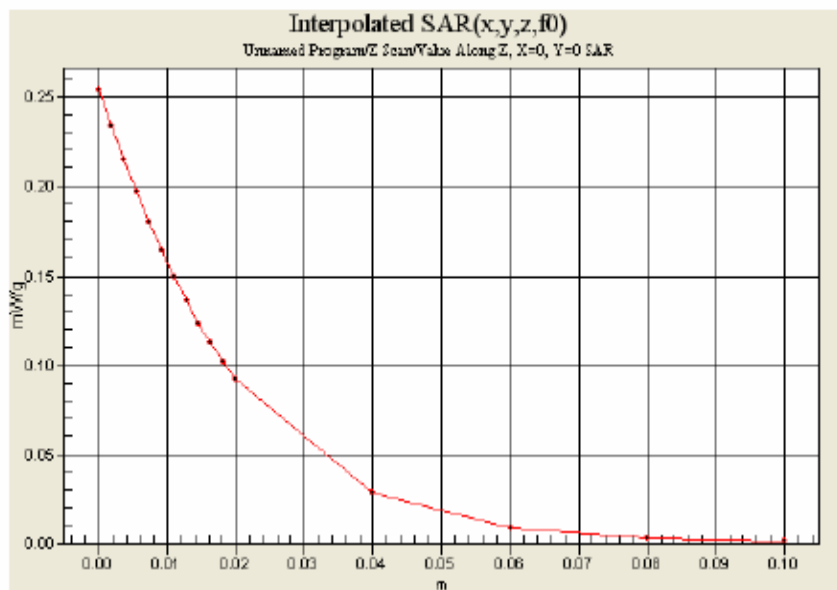
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.96$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.17, 6.17, 6.17); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 40%



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-PCS1900

Date/Time: 03/14/06 12:39:44

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CH512 LEFT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.3$; $\rho = 1000$

kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23°C, Humidity : 38%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 6.15 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 1.14 mW/g

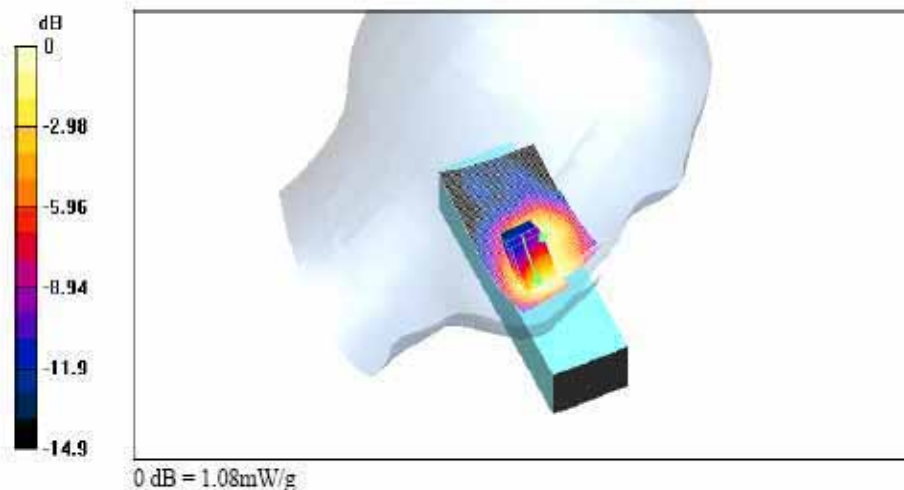
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.15 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 1.08 mW/g

Peak SAR (extrapolated) = 1.57 W/kg

SAR(1 g) = 1 mW/g



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CH661 LEFT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.38 \text{ mho/m}$; $\epsilon_r = 39.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 39%

Area Scan (41x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 5.26 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 0.740 mW/g

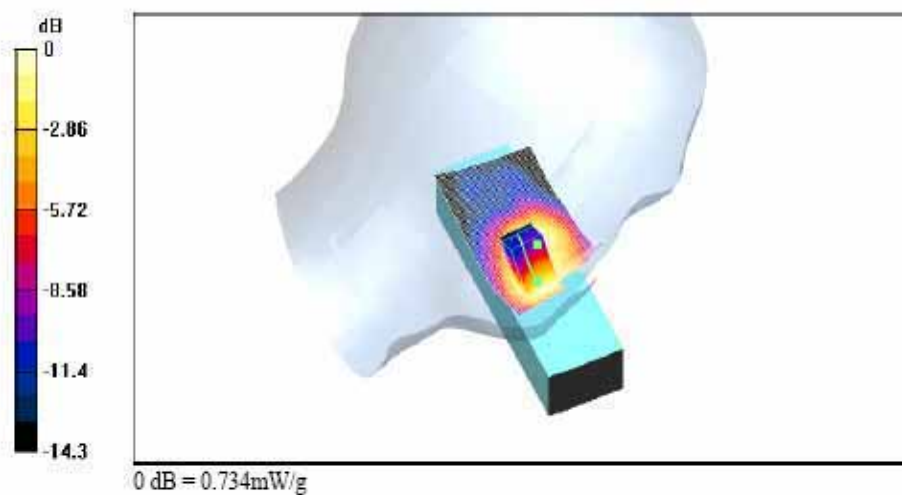
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 5.26 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 0.734 mW/g

Peak SAR (extrapolated) = 1.02 W/kg

SAR(1 g) = 0.680 mW/g



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Test Laboratory: ESTECH

CH810 LEFT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1909.8$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$

kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22 °C, Humidity : 41%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 4.94 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.692 mW/g

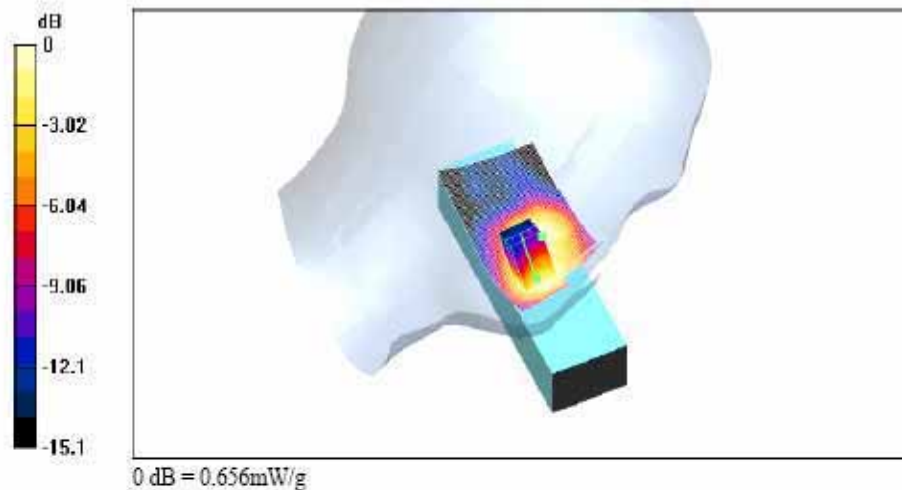
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.94 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 0.656 mW/g

Peak SAR (extrapolated) = 0.963 W/kg

SAR(1 g) = 0.604 mW/g



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CH512 RIGHT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.3$; $\rho = 1000$

kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 38%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 5.67 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 1.11 mW/g

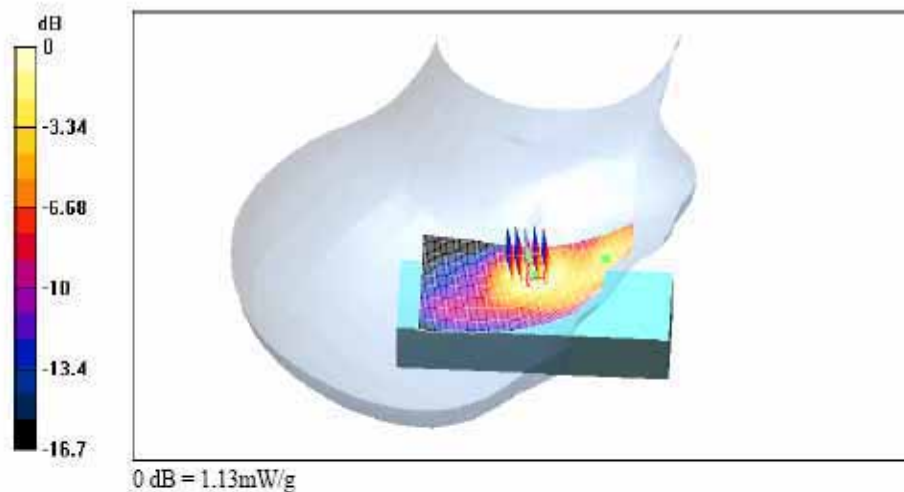
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.67 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 1.13 mW/g

Peak SAR (extrapolated) = 2.01 W/kg

SAR(1 g) = 1.04 mW/g



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CH661 RIGHT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.38$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 38%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 4.94 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 0.932 mW/g

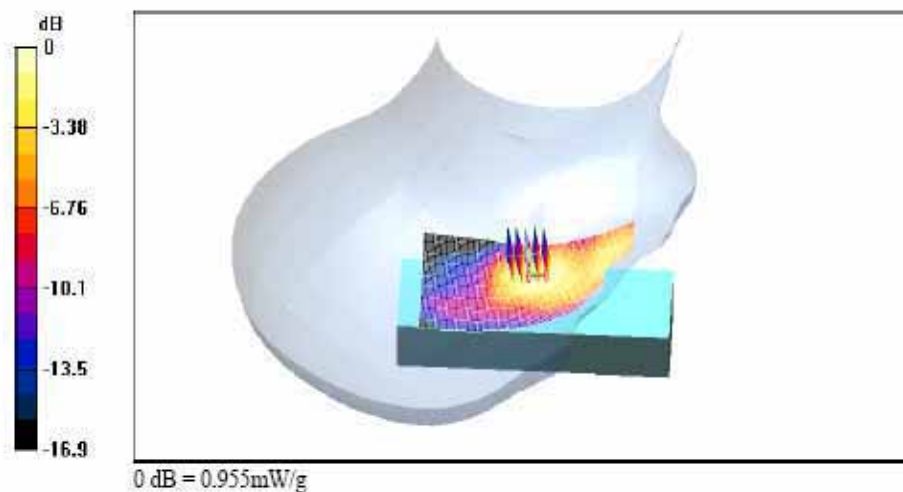
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.94 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 0.955 mW/g

Peak SAR (extrapolated) = 1.68 W/kg

SAR(1 g) = 0.862 mW/g





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Test Laboratory: ESTECH

CH810 RIGHT TOUCH

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1909.8$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$

kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 41%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 4.81 V/m; Power Drift = -0.006 dB

Maximum value of SAR (interpolated) = 0.809 mW/g

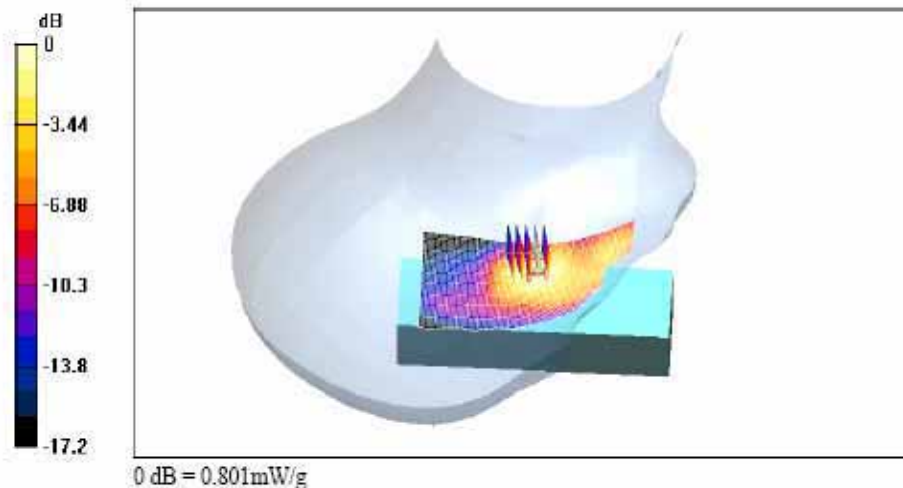
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.81 V/m; Power Drift = -0.006 dB

Maximum value of SAR (measured) = 0.801 mW/g

Peak SAR (extrapolated) = 1.45 W/kg

SAR(1 g) = 0.734 mW/g





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Date/Time: 03/14/06 11:43:37

Test Laboratory: ESTECH

CH661 LEFT TILT

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.38$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 38%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 11.8 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 0.242 mW/g

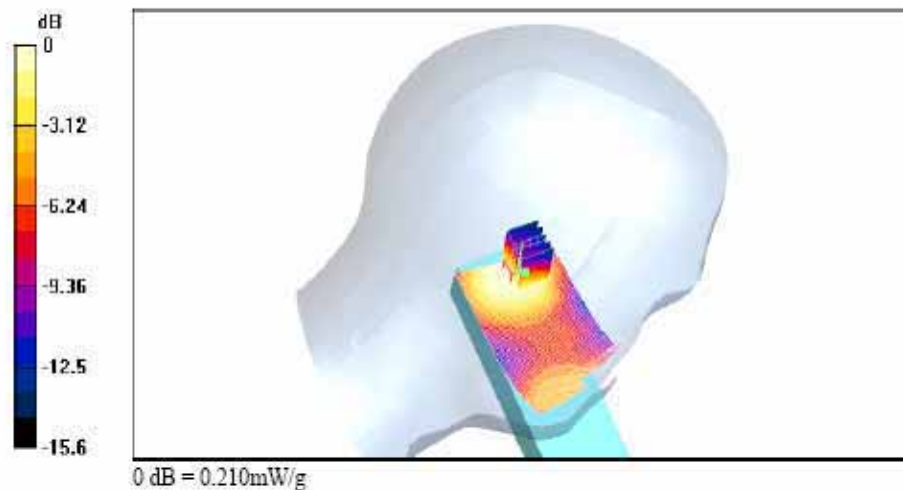
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.8 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 0.210 mW/g

Peak SAR (extrapolated) = 0.322 W/kg

SAR(1 g) = 0.196 mW/g



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Date/Time: 03/14/06 11:59:57

Test Laboratory: ESTECH

CH661 RIGHT TILT

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.38$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23°C, Humidity : 38%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 10.9 V/m; Power Drift = 0.009 dB

Maximum value of SAR (interpolated) = 0.265 mW/g

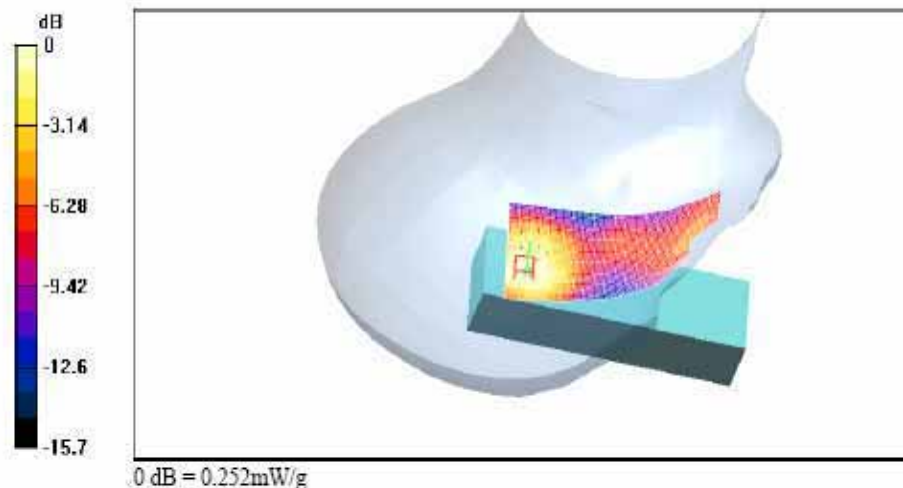
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.9 V/m; Power Drift = 0.009 dB

Maximum value of SAR (measured) = 0.252 mW/g

Peak SAR (extrapolated) = 0.395 W/kg

SAR(1 g) = 0.231 mW/g



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Date/Time: 03/14/06 13:01:50

Test Laboratory: ESTECH

CH512 RIGHT TOUCH-ZSCAN

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.3$; $\rho = 1000$

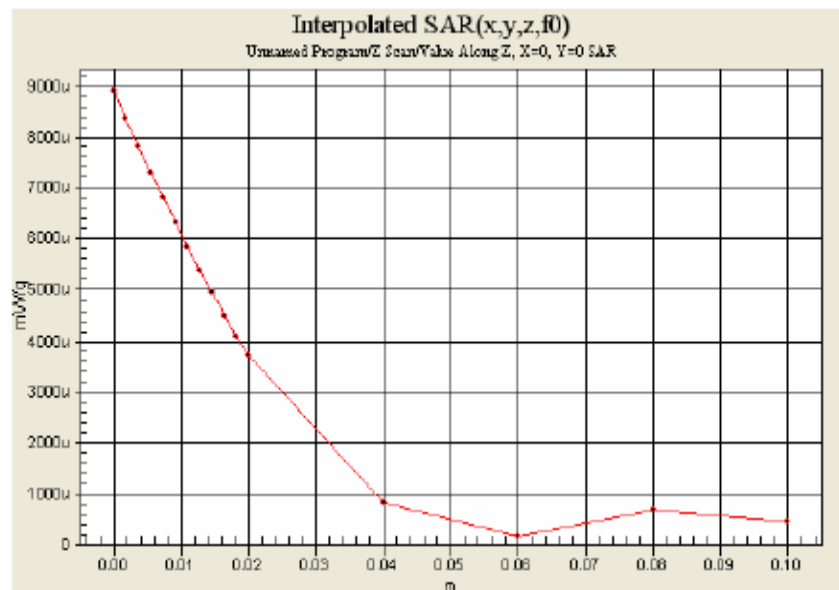
kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 38%





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Test Laboratory: ESTECH

CH512 BODY

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 51.5$; $\rho = 1000$

kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(4.54, 4.54, 4.54); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 41%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 8.83 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.301 mW/g

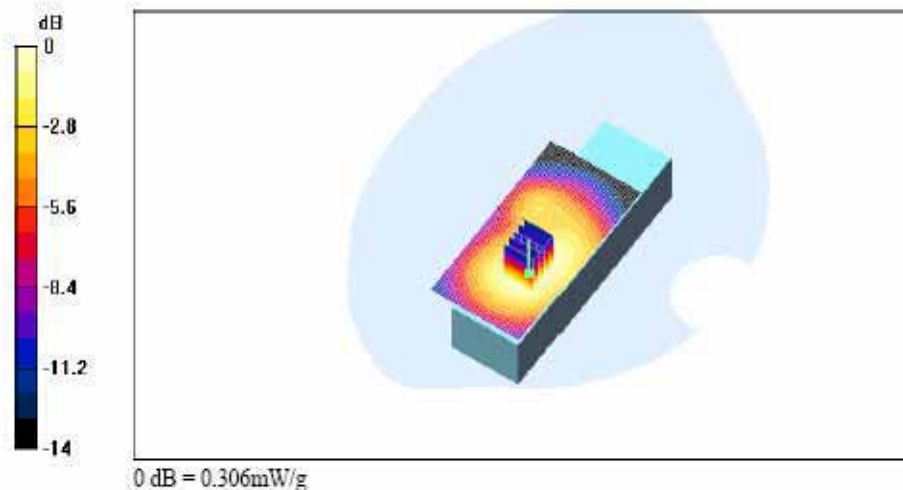
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.83 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.306 mW/g

Peak SAR (extrapolated) = 0.439 W/kg

SAR(1 g) = 0.281 mW/g



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CH661 BODY

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 51.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(4.54, 4.54, 4.54); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 41%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 9.4 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 0.281 mW/g

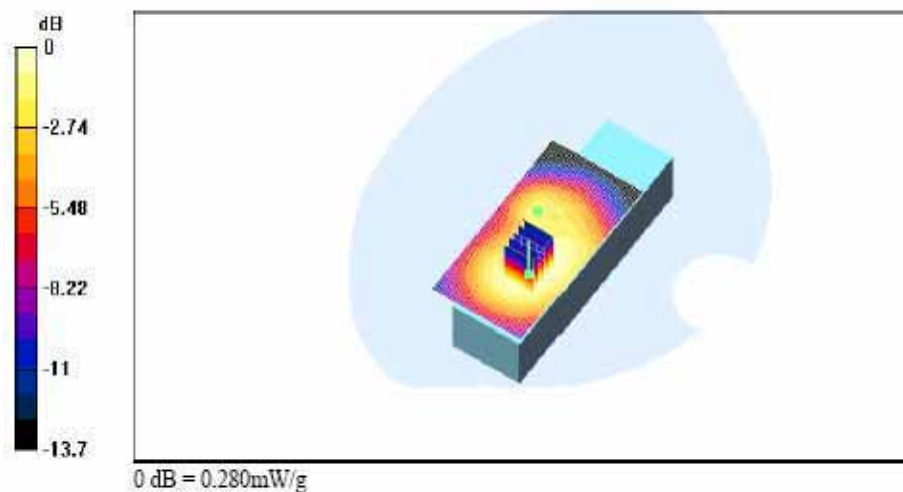
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.4 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 0.280 mW/g

Peak SAR (extrapolated) = 0.413 W/kg

SAR(1 g) = 0.261 mW/g



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Test Laboratory: ESTECH

CH810 BODY

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1909.8$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 51.3$; $\rho = 1000$

kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(4.54, 4.54, 4.54); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22 °C, Humidity : 41%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 9.08 V/m; Power Drift = 0.008 dB

Maximum value of SAR (interpolated) = 0.229 mW/g

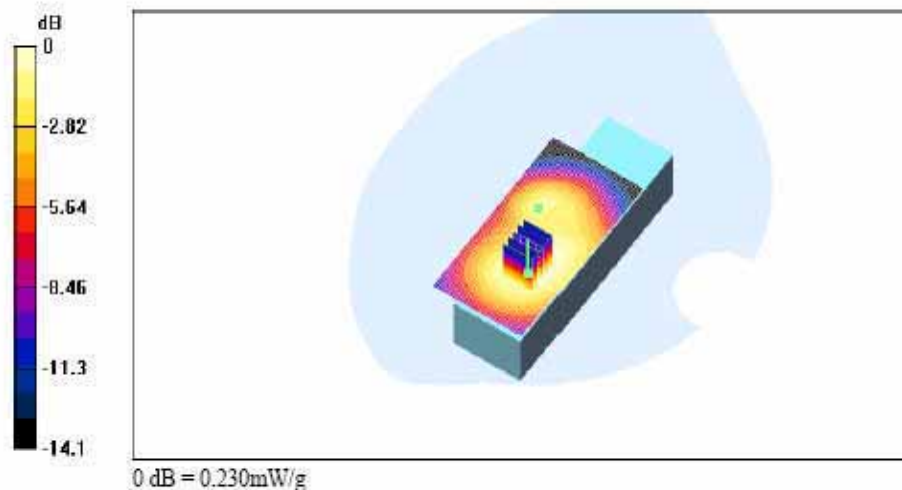
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.08 V/m; Power Drift = 0.008 dB

Maximum value of SAR (measured) = 0.230 mW/g

Peak SAR (extrapolated) = 0.339 W/kg

SAR(1 g) = 0.213 mW/g



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CH512 BODY-GPRS

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:4.15

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 51.5$; $\rho = 1000$

kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(4.54, 4.54, 4.54); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21 °C, Humidity : 42%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 8.71 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 0.285 mW/g

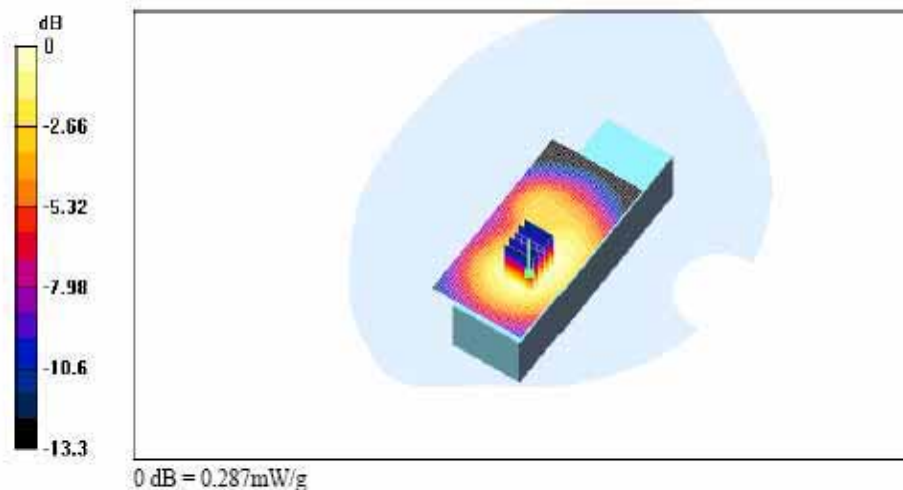
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.71 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 0.287 mW/g

Peak SAR (extrapolated) = 0.411 W/kg

SAR(1 g) = 0.263 mW/g



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Test Laboratory: ESTECH

CH512 BODY-ZSCAN

DUT: MG220; Type: FOLDER TYPE; Serial: XXXX

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 51.5$; $\rho = 1000$

kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(4.54, 4.54, 4.54); Calibrated: 2006-01-24
- 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, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22 °C, Humidity : 41%

