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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 : 21 August 2006 ~ 19 September 2006
Test Site : ESTECH Co., Ltd. Korea

Test Device :

Models : KE850

FCC ID : BEJKE850

TYPE : GSM/GPRS Phone with Bluetooth (Prototype)

Test report no :

ESTSAR0609-003

Number of page :

24

Contact person :

Bong Hyo, Han

Responsible test Engineer :

K.H.Kang

Testing has been
Carried out in
Accordance with :

IEEE 1528(Dec.2003)
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 receipt in full, without written approval of the laboratory.

Date and Signatures : 19 September 2006

Report Prepared By : Engineer/ K.H.Kang

(Signature)

Engineering Manager/ Jay Kim

(Signature)

Test report no : ESTSAR0609-003

FCC ID : BEJKE850

Web : www. estech. co. kr

Page 1 of 25



Table of Contents

1. SUMMARY FOR SAR TET REPORT	3
1.1 Head Configuration	3
1.2 Body Worn Configuration	3
1.3 Measurement Uncertainty	3
2. INTRODUCTION	4
3. DESCRIPTION OF THE DEVICE UNDER TEST	5
3.1 Antenna Description	5
3.2 Device Description	5
3.3 Battery Option	5
4. TEST CONDITIONS	6
4.1 Ambient Conditions	6
4.2 RF Characteristics of The Test Site	6
4.3 Test Signal, Frequencies, And Output Power	6
5. DESCRIPTION OF THE TEST EQUIPMENT	7
5.1 Test System Specifications	7
5.2 SAR Measurement Setup	7
5.3 DASY 4 E-Field Probe System	8
5.4 Phantom & Equivalent Tissues	10
6. DESCRIPTION OF THE TEST PROCEDURE	12
6.1 Definition of Reference Point	12
6.2 Test Configuration Positions	13
6.3 Scan Procedures	16
6.4 SAR Averaging Methods	16
7. MEASUREMENT UNCERTAINTY	17
8. SYSTEM VERIFICATION	18
8.1 Tissue Verification	18
8.2 Test System Validation	18
9. RESULTS	19
10. REFERENCES	25
APPENDIX A : Validation Test Data of Tissue	
APPENDIX B : Validation Test Data	
APPENDIX C : SAR Test Data	
APPENDIX D : Calibration Certificates	



1. SUMMARY FOR TEST REPORT

FCC ID	BEJKE850
Date of test	21 August 2006 ~ 19 September 2006
Responsible test engineer	Jay Kim
Measurement performed by	K.H.Kang
EUT Type	GSM/GPRS Phone with Bluetooth (Prototype)
Tx Frequency	1850.2 ~ 1909.8 MHz
Rx Frequency	1930.2 ~ 1989.8 MHz
Max. RF Output Power	GSM (30 dBm) GPRS (30 dBm)

Maximum Results Found During SAR Evaluation under phone call and bluetooth function enable

1.1 Head Configuration

Max. SAR Measurement

FREQUENCY		Modulation	Conducted Power(dBm)		Device test position	SAR (W/kg)
MHz	Ch		dBm	Battery		
1880	661	GSM	30	Standard	Right tilt bt	1.29

1.2 Body Worn Configuration

Max. SAR Measurement

FREQUENCY		Modulation	Conducted Power(dBm)		Separation test position	SAR (W/kg)
MHz	Ch		dBm	Battery		
1880	661	GSM	30	Standard	1.5cm [w/o Holster]	0.564

1.3 Measurement Uncertainty

Combine Standard Uncertainty	± 11.00 (k=1)
Extended Standard Uncertainty	± 22.00 (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 (IC NRP) in Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields,” IC NRP Report No. 86 (c) IC NRP, 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. 2.1.).

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

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 : BEJKE850
Serial numbers	—
Exposure environment	Uncontrolled exposure
Device category	Portable device
Mode(s) of Operation	GSM / GPRS
Modulation Mode(s)	GSM
Duty Cycle	8.3 / 4.15
Transmitting	1850.2 ~ 1909.8 MHz (GSM)
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)	21
Tissue simulating liquid temperature (°C)	21
Humidity (%)	43

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)

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.

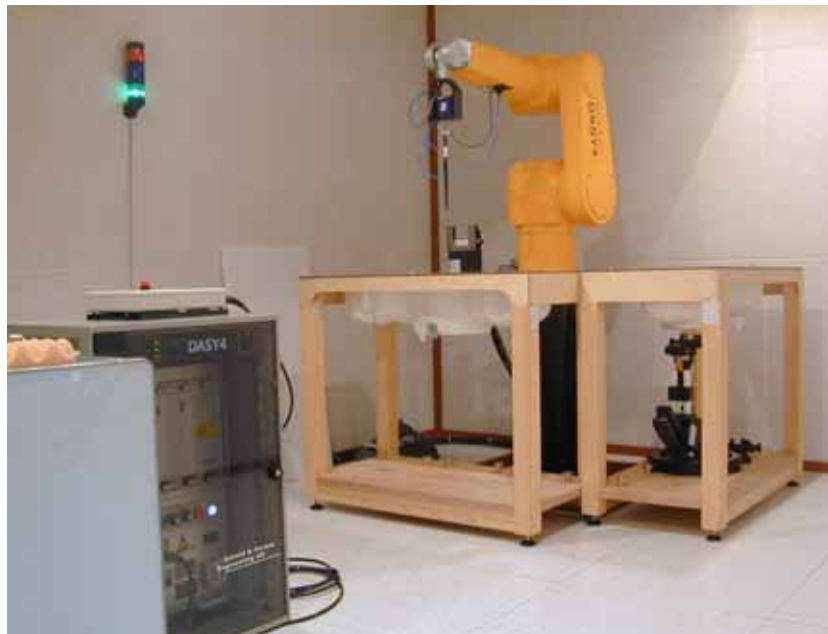


Fig. 4.1 SAR Measurement System



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.Due Date
DAE	DAE4	551	2007-04-27
E-Field Probe	ET3DV6	1750	2007-01-24
Dipole validation kit	D1900V2	5d058	2007-01-27
Network analyzer	8753ES	MY40000609	2007-10-09
Signal generator	E4432B	GB40050840	2007-03-03
RF Power meter	EPM-442A	GB37170412	2007-10-11
Power Sensor	8481A	3318A90368	2007-03-08
RF Power meter	E4418A	GB38272722	2007-03-03
Power Sensor	8481A	3318A90368	2007-03-08
Dielectric Probe	85070D	US01440154	-
Power Amplifier	BBS3Q7ECK	NONE	2006-12-06
LP Filter			
	LA-30N	NONE	2006-10-13
Attenuator	8491B	21828	2007-06-03
Dual Directional Coupler	778D	17575	2007-05-02
Wireless Communications Test Set	E5515C	GB42230119	2007-02-06

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 WindowsXP 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.

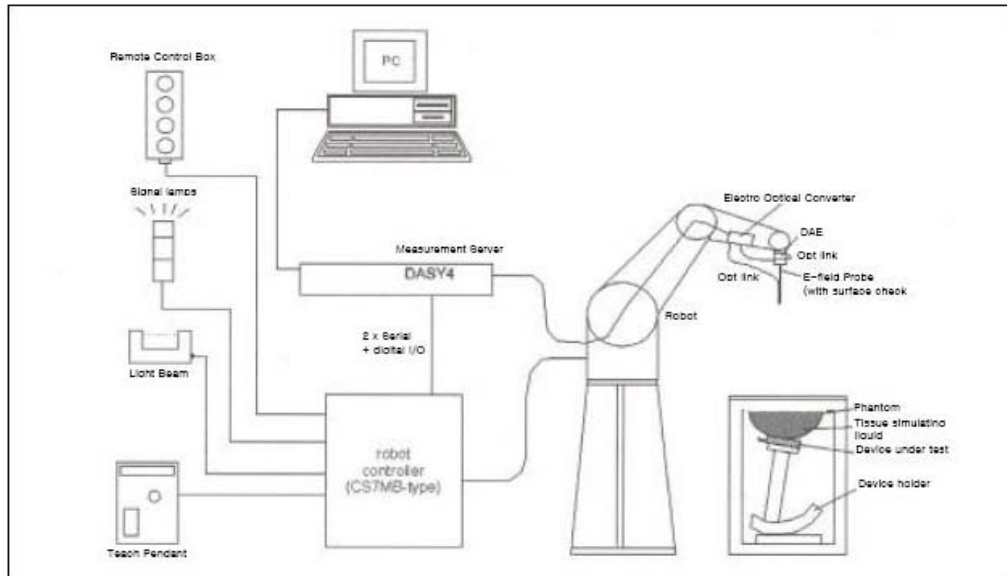


Fig. 5.1 SAR Measurement System Setup

The DAE4 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 Ethernet 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 Fig. 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 Fig 5.3). 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 1528(Dec.2003) 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



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 (hydroxyethy 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].

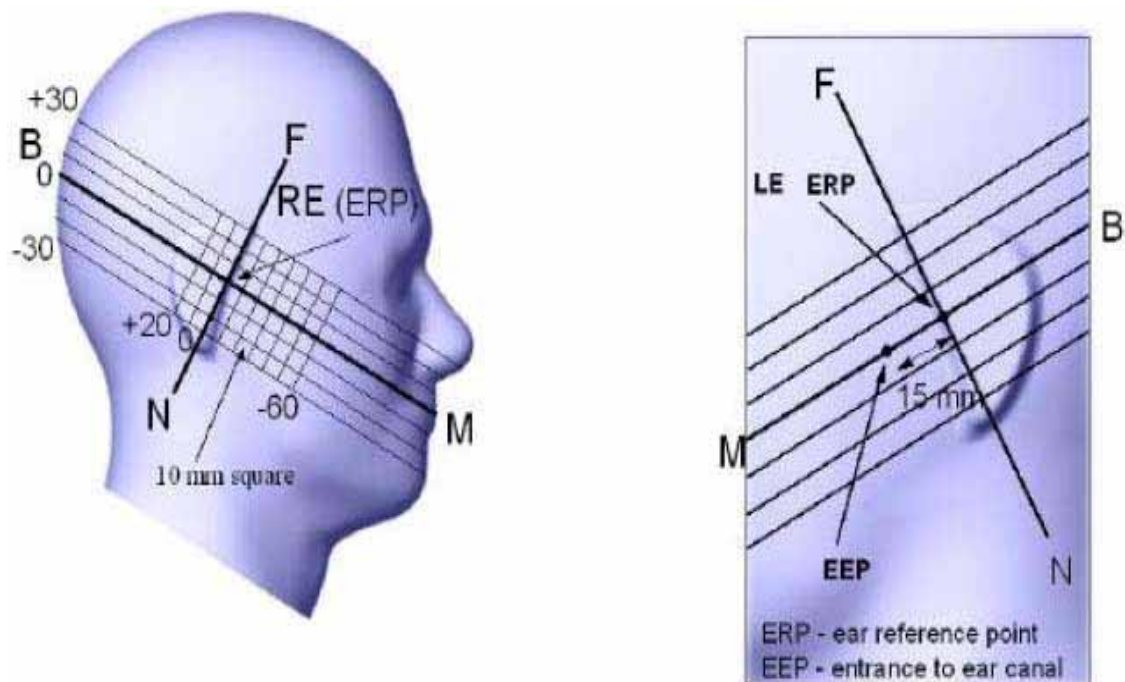


Figure 6.1 Close-up side view of ERP

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 its 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.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

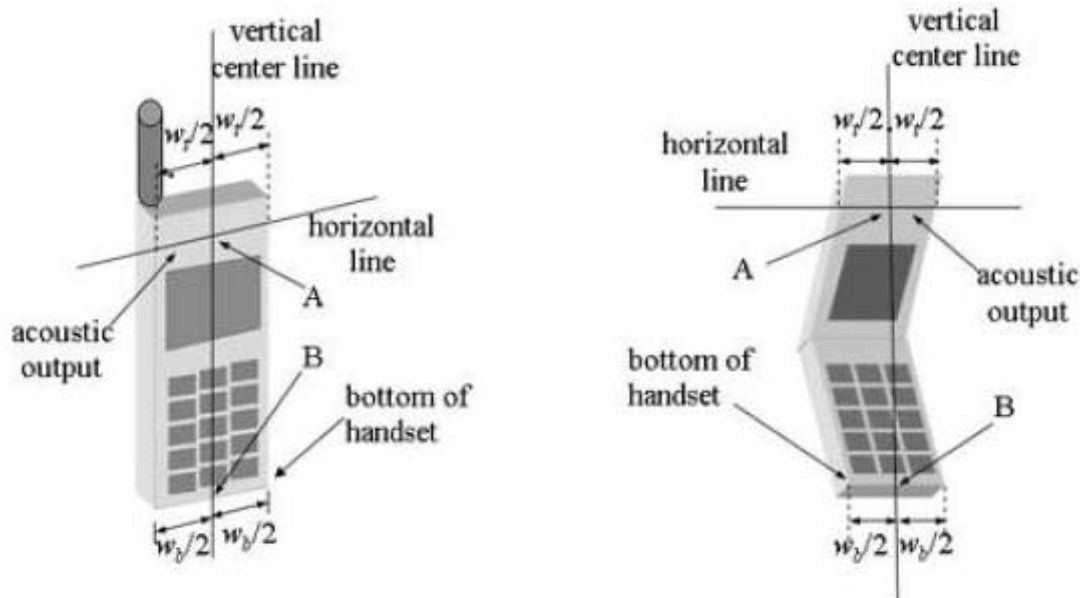


Figure 6.2 Handset Vertical Center & Horizontal Line Reference Points

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

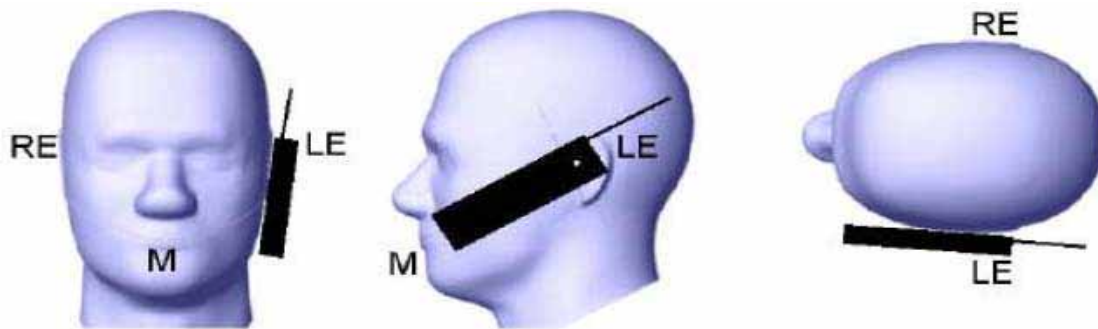


Figure 6.3 "Cheek" or "Touch" Position.

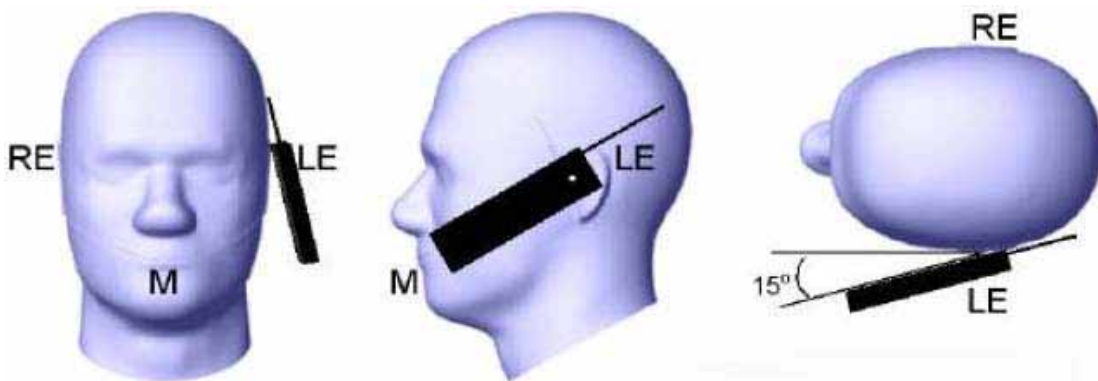


Figure 6.4 "Tilted" Position.



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, 5x5x7 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	± 5.0	normal	1	0.64	± 3.2%	∞
Liquid permittivity Target – tolerance	± 5.0	rectangular	√3	0.6	± 1.7%	∞
Liquid Permittivity – measurement uncertainty	± 5.0	normal	1	0.6	± 3.0%	∞
Combined Standard Uncertainty					±11.00 %	330
Coverage Factor for 95%				K = 2		
Expanded Standard Uncertainty					± 22.00 %	



8. SYSTEM VERIFICATION

Tissue Verification

Table 8.1 Simulated Tissue Verification [5]

MEASURED TISSUE PARAMETERS										
Liquid Temperature (°C)			21		Liquid Depth(mm)		150			
Date	2006-09-18		2006-09-18		2006-11-01		2006-11-07		2006-11-07	
Tissue	1900MHz Brain		1900MHz Muscle		1900MHz Brain		1900MHz Brain		1900MHz Muscle	
	Target	Measured	Target	Measured	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ϵ	40	39.6	53.3	54.8	40	39.7	40	39.5	53.3	54.8
Conductivity: σ	1.45	1.44	1.52	1.51	1.45	1.44	1.45	1.45	1.52	1.45
Deviation (%)	ϵ : -1.00%		ϵ : 2.81%		ϵ : -0.75%		ϵ : -1.25%		ϵ : 2.81%	
	σ : -0.69%		σ : -0.66%		σ : -0.69%		σ : 0.00%		σ : -1.31%	

Test System Validation

- Prior to assessment, the system is verified to the $\pm 10\%$ of the specifications at 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	39.7	37.92	-4.48%	2006-09-18
1900MHz Brain	D1900V2(S/N :5d058)	1.0	39.7	38.44	-3.17%	2006-11-01
1900MHz Brain	D1900V2(S/N :5d058)	1.0	39.7	38.00	-4.28%	2006-11-07

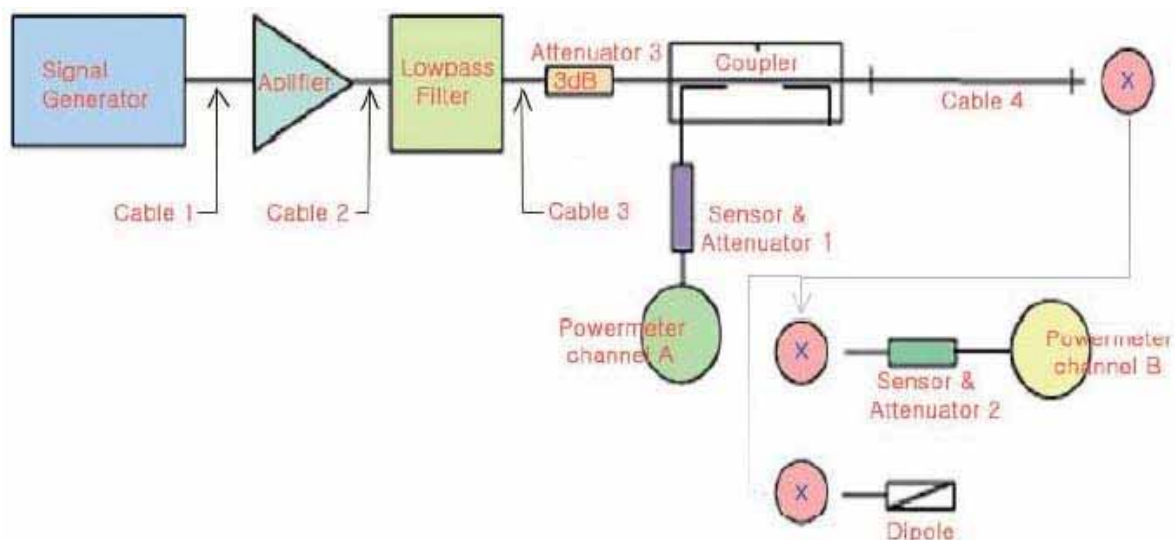


Figure 12.1 Dipole Validation Test Setup



8. SYSTEM VERIFICATION

Tissue Verification

Table 8.1 Simulated Tissue Verification [5]

MEASURED TISSUE PARAMETERS										
Liquid Temperature (°C)		21		Liquid Depth(mm)		150				
Date	2006-11-14		2006-11-14							
Tissue	1900MHz Brain		1900MHz Muscle		1900MHz Muscle		1900MHz Brain		1900MHz Muscle	
	Target	Measured	Target	Measured	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ϵ	40	39.65	53.3	54.82						
Conductivity: σ	1.45	1.45	1.52	1.52						
Deviation (%)	ϵ : -0.88% σ : 0.00%		ϵ : 2.85% σ : 0.00%							

Test System Validation

- Prior to assessment, the system is verified to the $\pm 10\%$ of the specifications at 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	39.7	38.64	-2.67%	2006-11-14

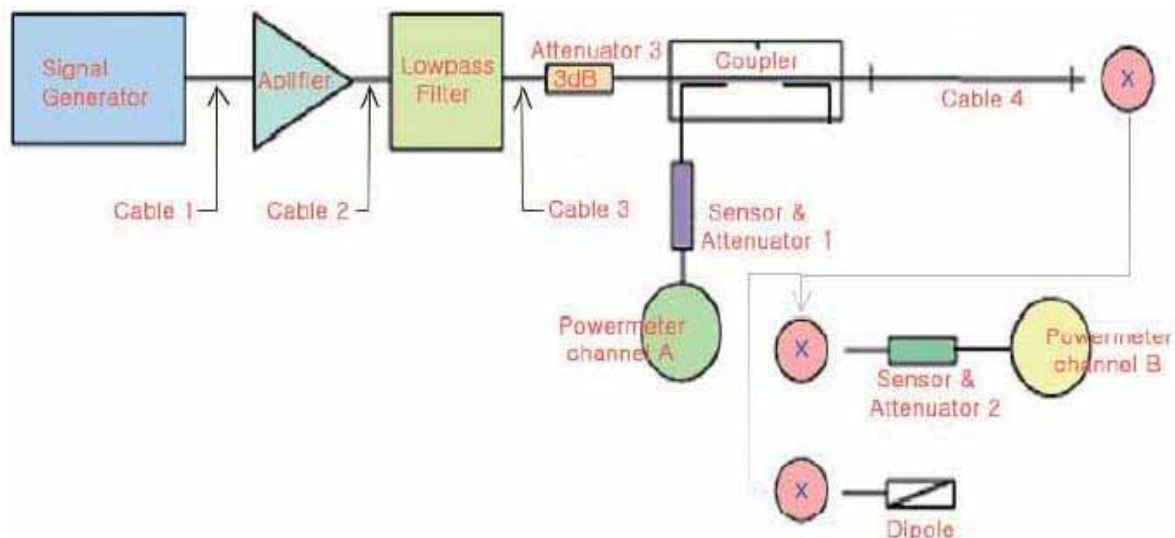


Figure 12.1 Dipole Validation Test Setup

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : **21.0**Relative HUMIDITY (%) : **46**Mixture Type : **1900MHz Brain**Dielectric Constant : **39.6**Conductivity: **1.44**

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
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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				
1880.00	661	GSM	30.00	29.96	Standard	Cheek Touch	—	0.915
1850.20	512	GSM	30.00	29.91	Standard	Cheek Touch	—	0.925
1909.80	810	GSM	30.00	30.06	Standard	Cheek Touch	—	1.000

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				
1880.00	661	GSM	30.00	30.02	Standard	Cheek Touch	—	1.130
1850.20	512	GSM	30.00	30.02	Standard	Cheek Touch	—	1.190
1909.80	810	GSM	30.00	30.03	Standard	Cheek Touch	—	1.230

MEASUREMENT RESULTS (GSM Right Head SAR – Touch – BT ON)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1909.80	810	GSM	30.00	29.96	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 Standard–life battery produces lower ERP and EIRP, therefore the Standard–life battery is used in SAR testing also.

4. Power Measured : **Conducted**

5. SAR Measurement System : **SPEAG**

6. SAR Configuration : **Head**

Engineer K.H.Kang

(Signature)

Test report no : ESTSAR0609–003

FCC ID : BEJKE850

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Page 20 of 25

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FAX: 82-2-867-3204**9. RESULTS(continued)**Ambient TEMPERATURE (C) : **21.0**Relative HUMIDITY (%) : **43**Mixture Type : **1900MHz Brain**Dielectric Constant : **39.6**Conductivity: **1.45****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				
1880.00	661	GSM	30.00	29.96	Standard	Tilt	–	0.937

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				
1880.00	661	GSM	30.00	29.99	Standard	Tilt	–	1.21

MEASUREMENT RESULTS (GSM Right Head SAR-Tilt-BT ON)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	29.98	Standard	Tilt	–	1.29

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 Standard-life battery produces lower ERP and EIRP, therefore the Standard-life battery is used in SAR testing also.
4. Power Measured : **Conducted**
5. SAR Measurement System : **SPEAG**
6. SAR Configuration : **Head and Bluetooth function enable**

Engineer K.H.Kang

(Signature)

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : **21.0**Relative HUMIDITY (%) : **44**Mixture Type : **1900MHz Brain**Dielectric Constant : **39.5**Conductivity: **1.43**

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				
1850.20	512	GSM	30.00	29.90	Standard	Tilt	—	0.949

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				
1850.20	512	GSM	30.00	29.98	Standard	Tilt	—	1.14

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 Standard-life battery produces lower ERP and EIRP, therefore the Standard-life battery is used in SAR testing also.
4. Power Measured : **Conducted**
 5. SAR Measurement System : **SPEAG**
 6. SAR Configuration : **Head**

Engineer K.H.Kang


(Signature)

Test report no : ESTSAR0609-003

FCC ID : BEJKE850

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Page 22 of 25

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : **21.0**Relative HUMIDITY (%) : **43**Mixture Type : **1900MHz Brain**Dielectric Constant : **39.6**Conductivity: **1.44**

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		
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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				
1909.80	810	GSM	30.00	29.88	Standard	Tilt	—	0.986

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				
1909.80	810	GSM	30.00	30.05	Standard	Tilt	—	1.18

MEASUREMENT RESULTS (GSM Right Head SAR-Tilt-BT ON)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1909.80	810	GSM	30.00	29.94	Standard	Tilt	—	1.21

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 Standard-life battery produces lower ERP and EIRP, therefore the Standard-life battery is used in SAR testing also.
4. Power Measured : **Conducted**
5. SAR Measurement System : **SPEAG**
6. SAR Configuration : **Head and Bluetooth function enable**

Engineer K.H.Kang
(Signature)

Test report no : ESTSAR0609-003

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Page 23 of 25

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : 20Relative HUMIDITY (%) : 46Mixture Type : 1900MHz BodyDielectric Constant : 55.0Conductivity: 1.52

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				
1880.00	661	GSM	30.00	29.86	Standard	1.5[w/o Holster],Rear	—	0.251
1850.20	512	GSM	30.00	30.04	Standard	1.5[w/o Holster],Rear	—	0.245
1909.80	810	GSM	30.00	30.00	Standard	1.5[w/o Holster],Rear	—	0.242
1880.00	661	GSM	30.00	30.04	Standard	1.5[w/o Holster],Front	—	0.214

MEASUREMENT RESULTS (GSM Body SAR Without Holster-GPRS-BT ON)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	29.95	Standard	1.5[w/o Holster],Rear	—	0.564

NOTES:

1. The test data were reported the worst-case SAR value with the antenna-head position set in a typical configuration.

The output level of EDGE mode was lower than GPRS and GSM mode one , So we didn't measure the EUT with EDGE mode.

2. All modes of operation were investigated and the worst-case are reported.

3. Battery Type : Standard

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

4. Power Measured : Conducted

5. SAR Measurement System : SPEAG

6. SAR Configuration : Body, GPRS mode and Bluetooth function enable, Class 10 (multi slot mode)

Engineer K.H.Kang

(Signature )

Test report no : ESTSAR0609-003

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Page 24 of 25



10. REFERENCE

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APPENDIX A : Validation Test Data of Tissue

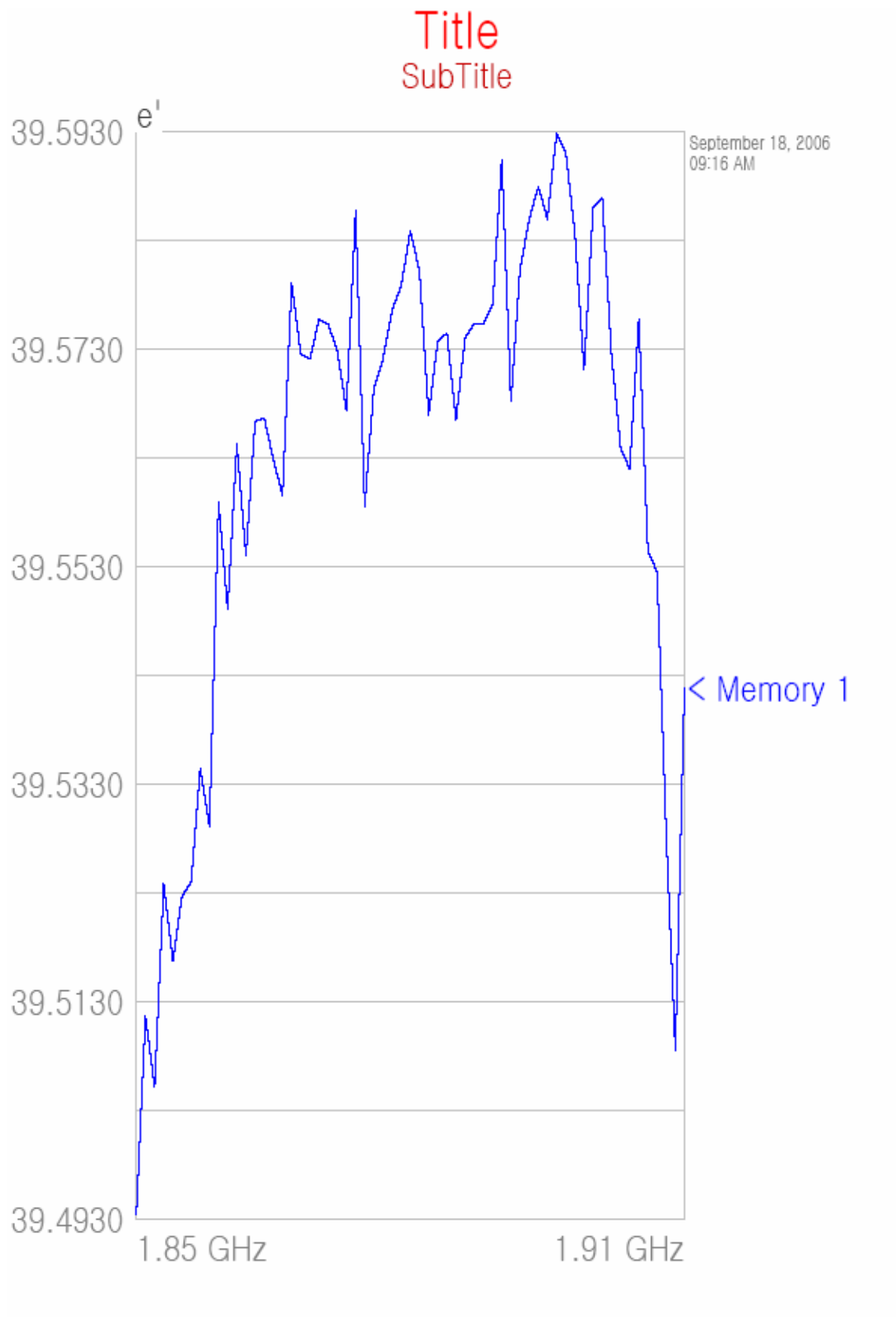


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– Head Tissue



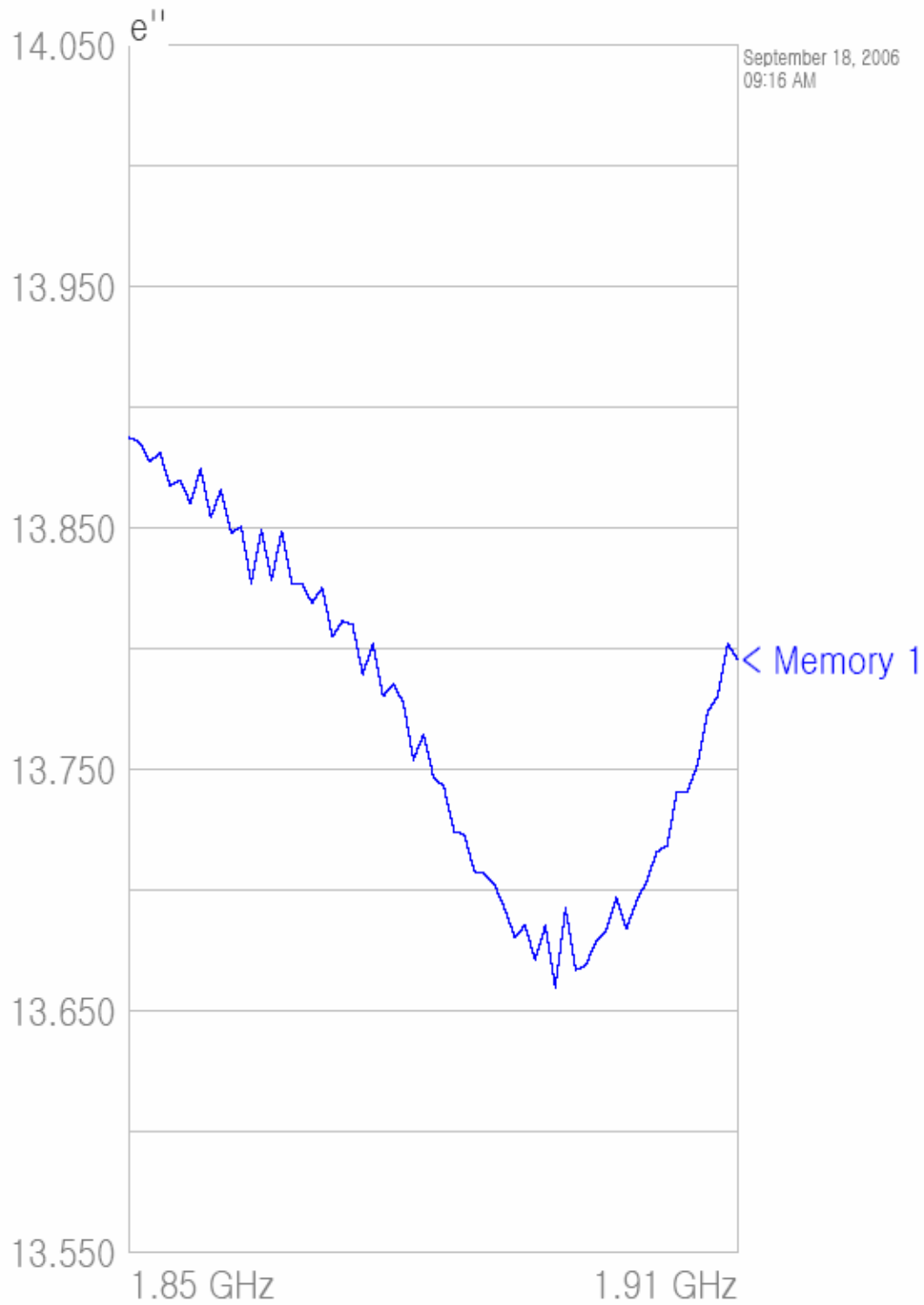


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Title

SubTitle

September 18, 2006 02:15 AM

Frequency	e'	e''
1.850000000 GHz	39.4934	13.8875
1.850985698 GHz	39.5116	13.8854
1.851971397 GHz	39.5051	13.8775
1.852957095 GHz	39.5238	13.8811
1.853942793 GHz	39.5167	13.8675
1.854928492 GHz	39.5227	13.8699
1.855914190 GHz	39.5240	13.8602
1.856900000 GHz	39.5345	13.8748
1.857891889 GHz	39.5291	13.8542
1.858880738 GHz	39.5589	13.8659
1.859869588 GHz	39.5491	13.8479
1.860858437 GHz	39.5643	13.8506
1.861847287 GHz	39.5540	13.8270
1.862836137 GHz	39.5664	13.8494
1.863825000 GHz	39.5667	13.8283
1.864813819 GHz	39.5629	13.8488
1.865802629 GHz	39.5596	13.8268
1.866791440 GHz	39.5791	13.8268
1.867780251 GHz	39.5726	13.8189
1.868769063 GHz	39.5721	13.8253
1.869757875 GHz	39.5758	13.8050
1.870746686 GHz	39.5753	13.8114
1.871735497 GHz	39.5729	13.8099
1.872724308 GHz	39.5674	13.7894
1.873713119 GHz	39.5858	13.8019
1.874701930 GHz	39.5586	13.7801
1.875690741 GHz	39.5694	13.7853
1.876679553 GHz	39.5721	13.7777
1.877668364 GHz	39.5766	13.7539
1.878657176 GHz	39.5789	13.7646
1.879645987 GHz	39.5839	13.7464
1.880634798 GHz	39.5802	13.7429
1.881623609 GHz	39.5670	13.7243
1.882612420 GHz	39.5738	13.7231
1.883601231 GHz	39.5745	13.7077
1.884590042 GHz	39.5665	13.7068
1.885578853 GHz	39.5741	13.7021
1.886567664 GHz	39.5754	13.6923
1.887556475 GHz	39.5754	13.6804
1.888545286 GHz	39.5771	13.6854
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1.890522908 GHz	39.5882	13.6852
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1.892500530 GHz	39.5850	13.6926
1.893489341 GHz	39.5880	13.6668
1.894478152 GHz	39.5850	13.6688
1.895466963 GHz	39.5929	13.6787
1.896455774 GHz	39.5912	13.6829
1.897444585 GHz	39.5837	13.6967
1.898433396 GHz	39.5711	13.6838
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1.902388793 GHz	39.5640	13.7184
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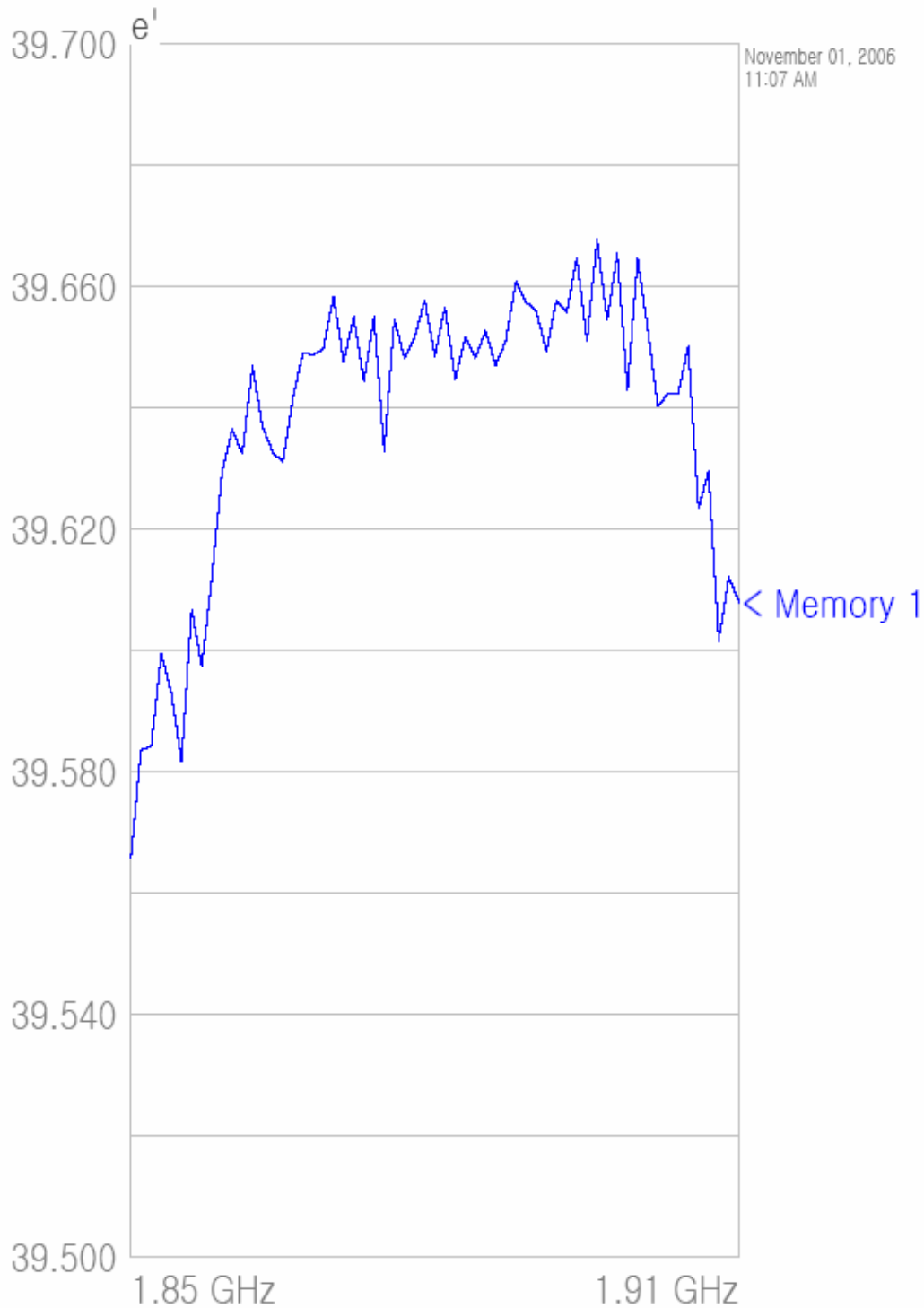
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– Head Tissue

Title
SubTitle



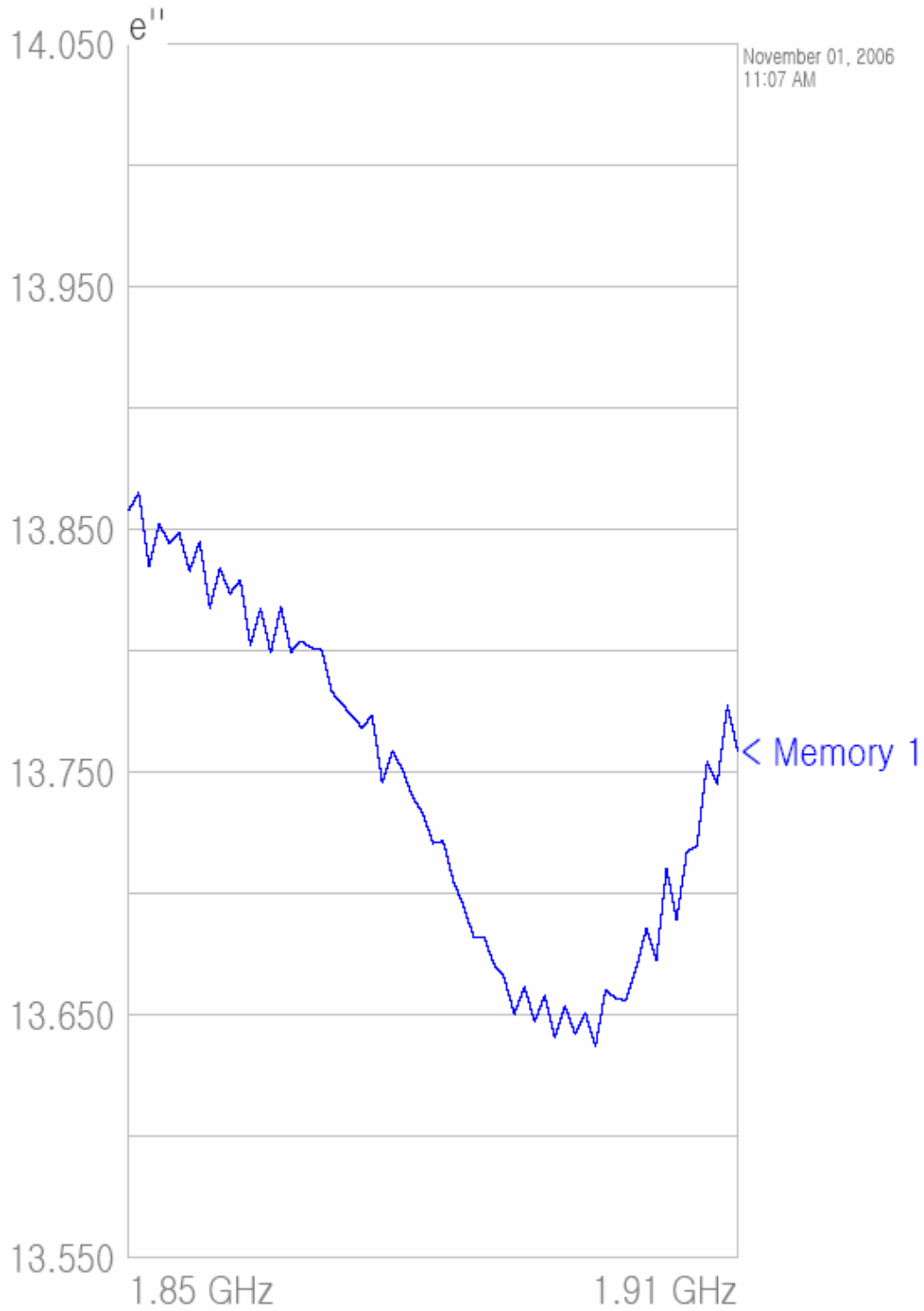


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Title

SubTitle

November 01, 2006 11:07 AM

Frequency	e'	e''
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1.850985698 GHz	39.5836	13.8650
1.851971397 GHz	39.5841	13.8346
1.852957095 GHz	39.5995	13.8523
1.853942793 GHz	39.5929	13.8444
1.854928492 GHz	39.5817	13.8484
1.855914190 GHz	39.6067	13.8329
1.856903039 GHz	39.5974	13.8449
1.857891889 GHz	39.6120	13.8177
1.858880738 GHz	39.6295	13.8340
1.859869588 GHz	39.6385	13.8236
1.860858437 GHz	39.6324	13.8293
1.861847287 GHz	39.6469	13.8021
1.862836137 GHz	39.6369	13.8175
1.863831308 GHz	39.6327	13.7991
1.864823319 GHz	39.6311	13.8182
1.865815329 GHz	39.6418	13.7995
1.866807340 GHz	39.6491	13.8040
1.867799351 GHz	39.6488	13.8012
1.868794533 GHz	39.6498	13.8006
1.869789715 GHz	39.6584	13.7832
1.870784896 GHz	39.6476	13.7780
1.871780078 GHz	39.6551	13.7733
1.872775260 GHz	39.6443	13.7681
1.873770442 GHz	39.6551	13.7734
1.874768806 GHz	39.6328	13.7454
1.875767169 GHz	39.6547	13.7586
1.876765533 GHz	39.6482	13.7508
1.877763896 GHz	39.6517	13.7396
1.878762260 GHz	39.6578	13.7327
1.879760623 GHz	39.6486	13.7206
1.880762178 GHz	39.6567	13.7215
1.881763733 GHz	39.6448	13.7051
1.882765288 GHz	39.6517	13.6947
1.883766843 GHz	39.6482	13.6820
1.884768398 GHz	39.6527	13.6821
1.885769953 GHz	39.6471	13.6708
1.886774710 GHz	39.6511	13.6653
1.887779467 GHz	39.6809	13.6501
1.888784224 GHz	39.6575	13.6613
1.889788981 GHz	39.6561	13.6472
1.890793738 GHz	39.6493	13.6576
1.891798495 GHz	39.6577	13.6403
1.892806464 GHz	39.6568	13.6535
1.893814433 GHz	39.6648	13.6418
1.894822402 GHz	39.6511	13.6506
1.895830371 GHz	39.6678	13.6369
1.896838340 GHz	39.6545	13.6604
1.897846309 GHz	39.6655	13.6564
1.898857500 GHz	39.6429	13.6559
1.899868691 GHz	39.6647	13.6688
1.900879883 GHz	39.6530	13.6853
1.901891074 GHz	39.6404	13.6725
1.902902265 GHz	39.6423	13.7101
1.903913456 GHz	39.6424	13.6891
1.904927880 GHz	39.6501	13.7170
1.905942304 GHz	39.6234	13.7193
1.906956728 GHz	39.6296	13.7541
1.907971152 GHz	39.6016	13.7452
1.908985576 GHz	39.6121	13.7773
1.910000000 GHz	39.6080	13.7590



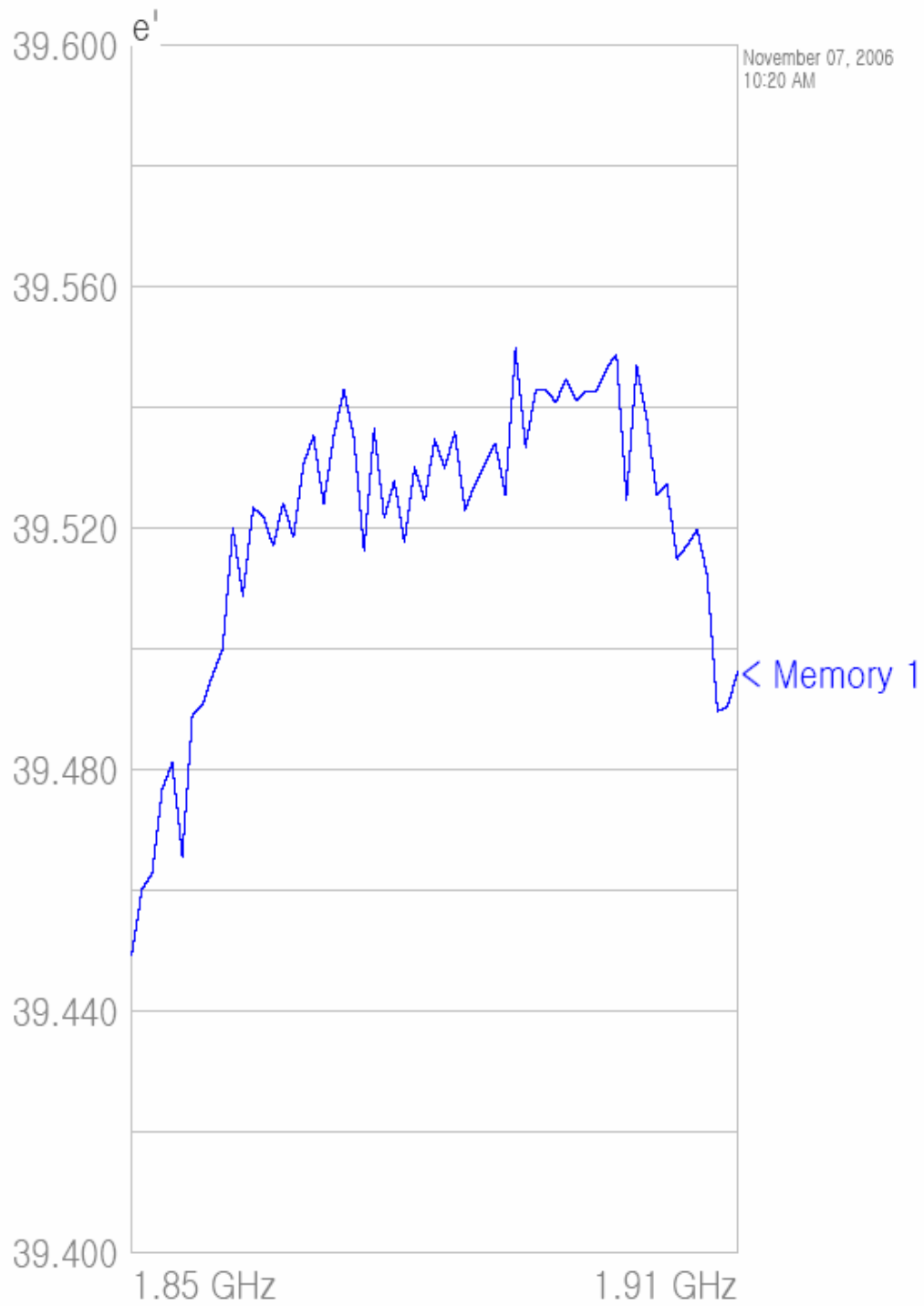
ESTECH Co., Ltd.

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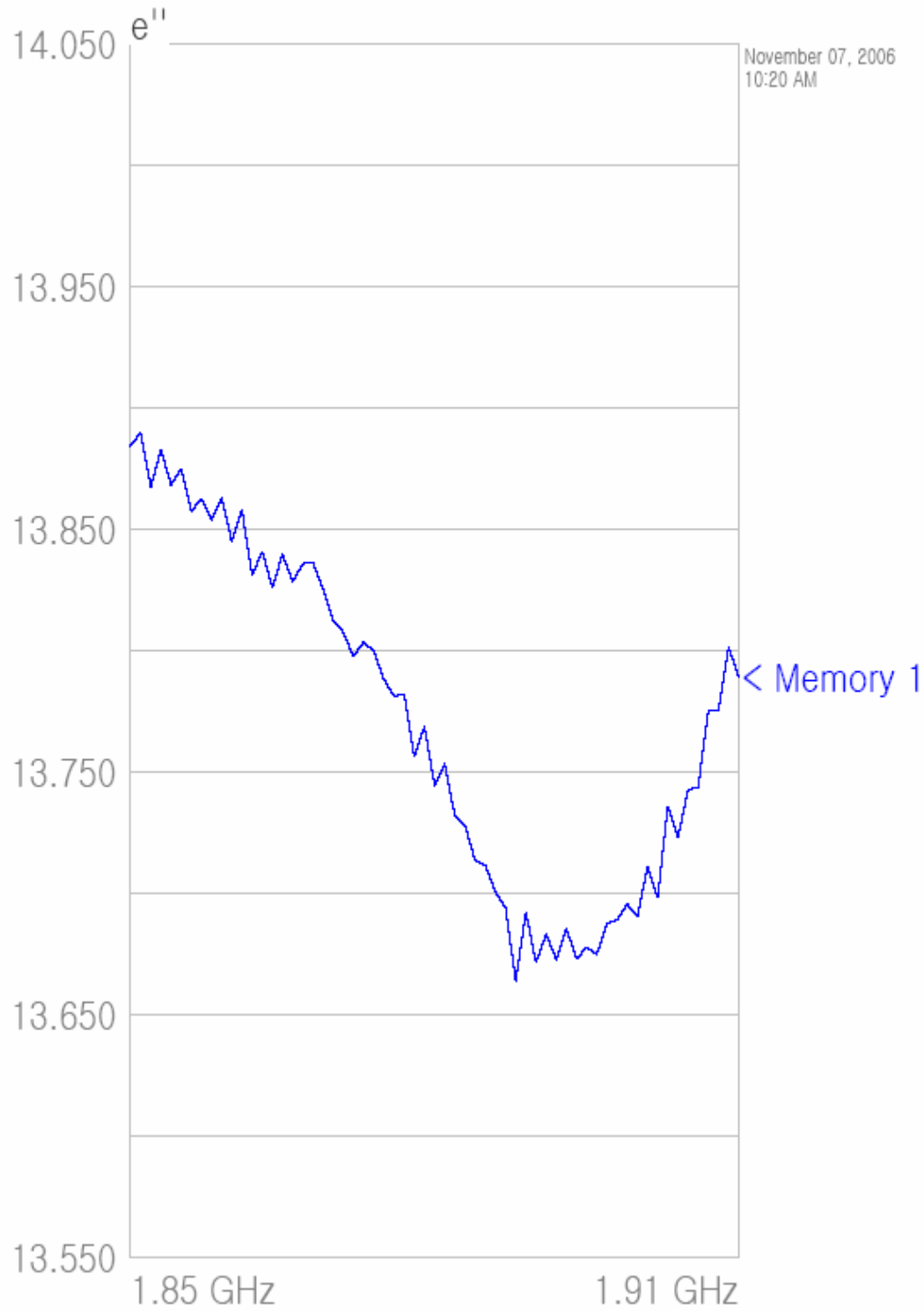


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November 07, 2006 10:23 AM

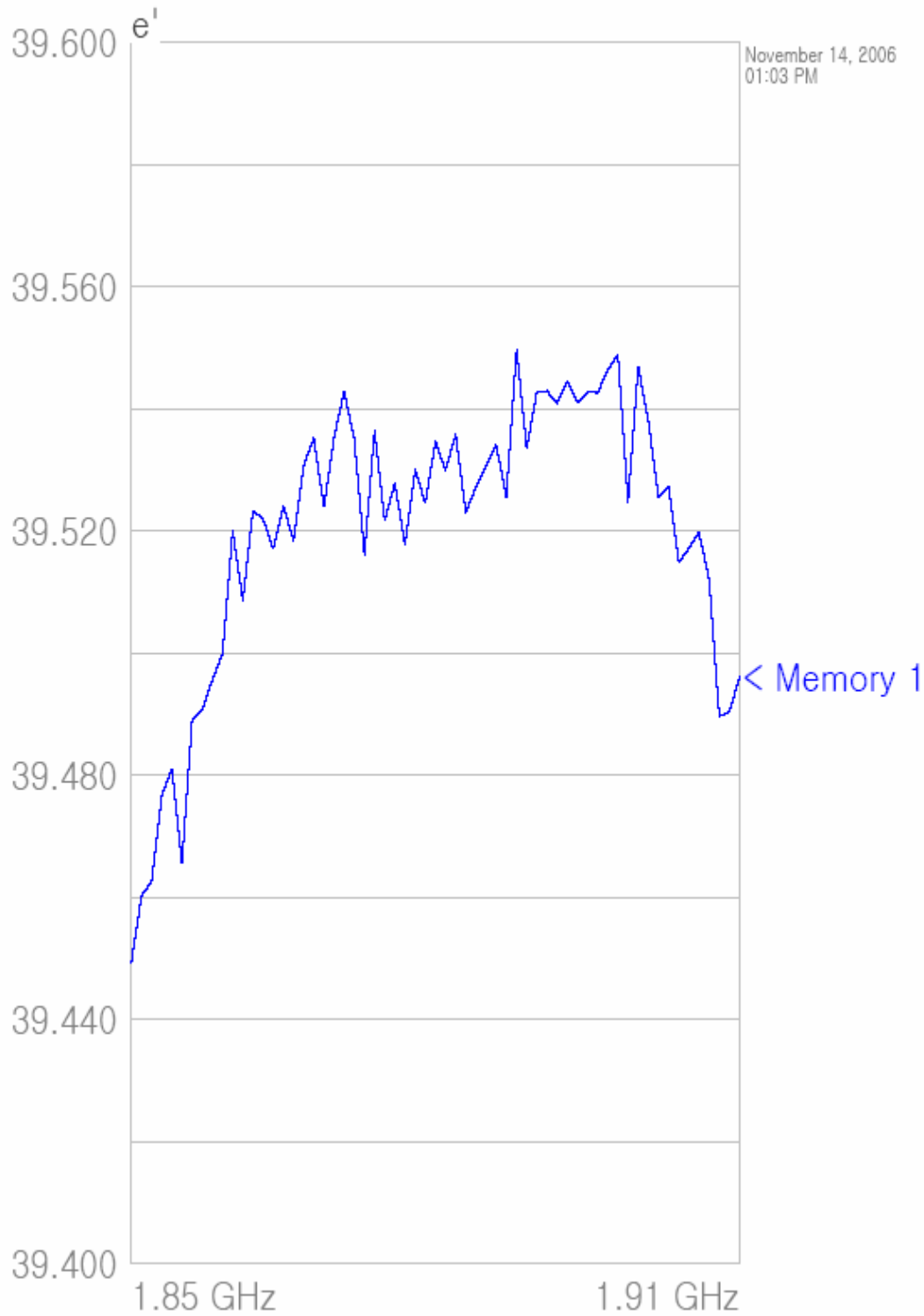
Frequency	e ⁱ	e ⁱⁱ
1.850000000 GHz	39.4493	13.8845
1.850985698 GHz	39.4602	13.8900
1.851971397 GHz	39.4627	13.8675
1.852957095 GHz	39.4767	13.8830
1.853942793 GHz	39.4811	13.8664
1.854928492 GHz	39.4656	13.8751
1.855914190 GHz	39.4892	13.8576
1.856903039 GHz	39.4908	13.8627
1.857891889 GHz	39.4957	13.8538
1.858880738 GHz	39.5000	13.8633
1.859869588 GHz	39.5201	13.8449
1.860858437 GHz	39.5087	13.8561
1.861847287 GHz	39.5234	13.8310
1.862836137 GHz	39.5220	13.8410
1.863831308 GHz	39.5171	13.8261
1.864823319 GHz	39.5242	13.8398
1.865815329 GHz	39.5185	13.8284
1.866807340 GHz	39.5307	13.8359
1.867799351 GHz	39.5353	13.8362
1.868794533 GHz	39.5240	13.8253
1.869789715 GHz	39.5353	13.8123
1.870784896 GHz	39.5429	13.8076
1.871780078 GHz	39.5351	13.7976
1.872775260 GHz	39.5162	13.8035
1.873770442 GHz	39.5365	13.7998
1.874768806 GHz	39.5217	13.7882
1.875767169 GHz	39.5279	13.7814
1.876765533 GHz	39.5177	13.7819
1.877763896 GHz	39.5301	13.7562
1.878762260 GHz	39.5246	13.7688
1.879760623 GHz	39.5347	13.7445
1.880758987 GHz	39.5300	13.7535
1.881757350 GHz	39.5359	13.7319
1.882755713 GHz	39.5230	13.7281
1.883754076 GHz	39.5273	13.7135
1.884752439 GHz	39.5306	13.7115
1.885750802 GHz	39.5341	13.7004
1.886749165 GHz	39.5256	13.6940
1.887747528 GHz	39.5498	13.6637
1.888745891 GHz	39.5335	13.6921
1.889744254 GHz	39.5428	13.6713
1.890742617 GHz	39.5430	13.6833
1.891740980 GHz	39.5409	13.6727
1.892739343 GHz	39.5446	13.6854
1.893737706 GHz	39.5411	13.6728
1.894736069 GHz	39.5428	13.6777
1.895734432 GHz	39.5427	13.6749
1.896732795 GHz	39.5464	13.6875
1.897731158 GHz	39.5489	13.6890
1.898729521 GHz	39.5248	13.6955
1.899727884 GHz	39.5470	13.6903
1.900726247 GHz	39.5381	13.7110
1.901724610 GHz	39.5255	13.6982
1.902722973 GHz	39.5274	13.7358
1.903721336 GHz	39.5149	13.7230
1.904719699 GHz	39.5172	13.7425
1.905718062 GHz	39.5198	13.7438
1.906716425 GHz	39.5121	13.7757
1.907714788 GHz	39.4897	13.7752
1.908713151 GHz	39.4904	13.8015
1.910000000 GHz	39.4961	13.7890

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FAX: 82-2-867-3204

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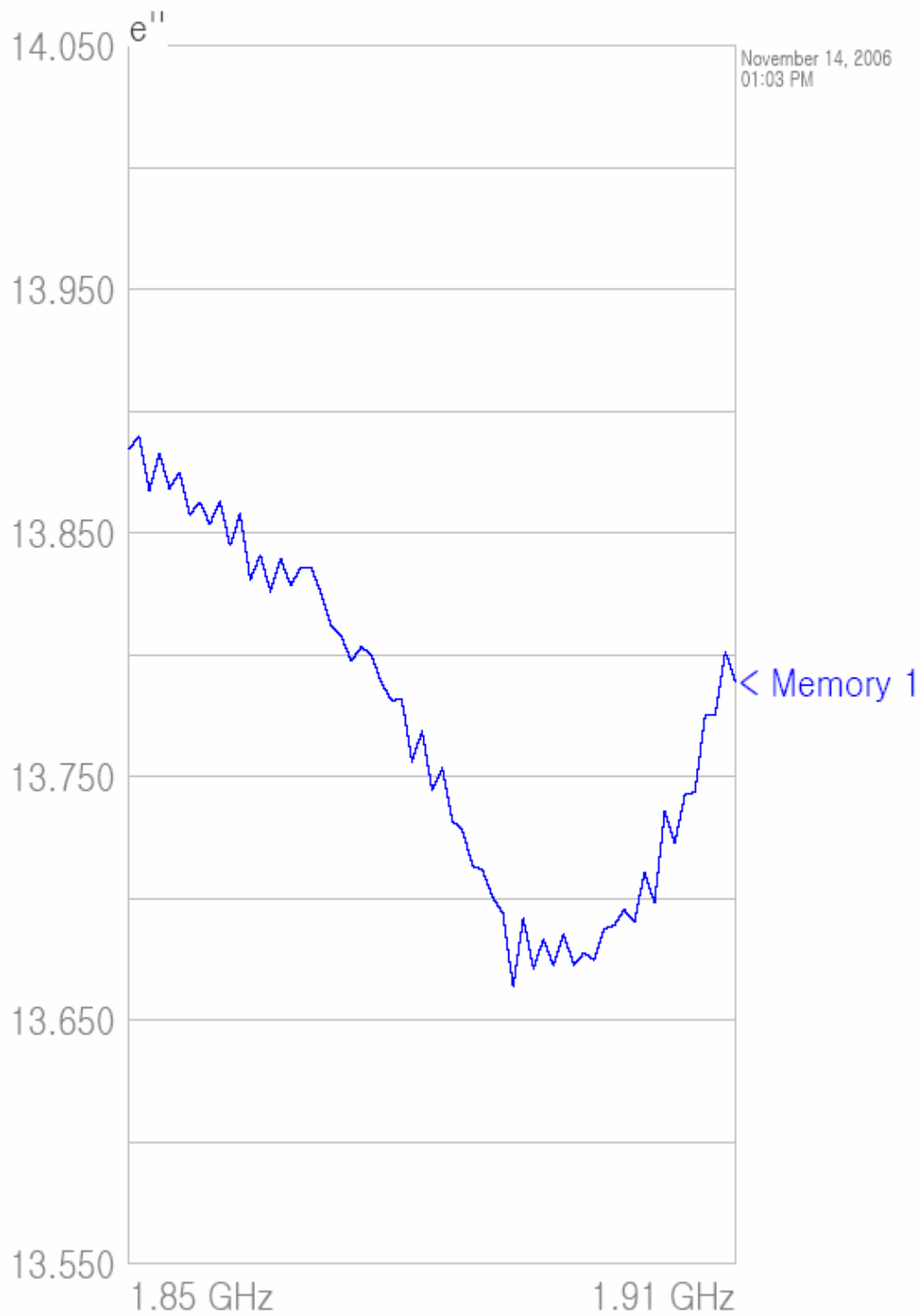
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November 14, 2016 07:03 PM

Frequency	e ⁱ	e ⁱⁱ
1.850000000 GHz	39.4493	13.8845
1.850985698 GHz	39.4602	13.8900
1.851971397 GHz	39.4627	13.8675
1.852957095 GHz	39.4767	13.8830
1.853942793 GHz	39.4811	13.8684
1.854928492 GHz	39.4856	13.8751
1.855914190 GHz	39.4892	13.8576
1.856903039 GHz	39.4908	13.8627
1.857891889 GHz	39.4957	13.8538
1.858880738 GHz	39.5000	13.8633
1.859869588 GHz	39.5201	13.8449
1.860858437 GHz	39.5087	13.8581
1.861847287 GHz	39.5234	13.8310
1.862836137 GHz	39.5220	13.8410
1.863825008 GHz	39.5171	13.8261
1.864813819 GHz	39.5242	13.8398
1.865802629 GHz	39.5185	13.8284
1.866791440 GHz	39.5307	13.8359
1.867780251 GHz	39.5353	13.8362
1.868769062 GHz	39.5240	13.8253
1.869757873 GHz	39.5353	13.8123
1.870746684 GHz	39.5429	13.8076
1.871735495 GHz	39.5351	13.7976
1.872724306 GHz	39.5162	13.8035
1.873713117 GHz	39.5365	13.7998
1.874701928 GHz	39.5217	13.7882
1.875690739 GHz	39.5279	13.7814
1.876679549 GHz	39.5177	13.7819
1.877668360 GHz	39.5301	13.7562
1.878657171 GHz	39.5246	13.7688
1.879645982 GHz	39.5347	13.7445
1.880634793 GHz	39.5300	13.7535
1.881623604 GHz	39.5359	13.7319
1.882612415 GHz	39.5230	13.7281
1.883601226 GHz	39.5273	13.7135
1.884590037 GHz	39.5306	13.7115
1.885578848 GHz	39.5341	13.7004
1.886567659 GHz	39.5256	13.6940
1.887556470 GHz	39.5498	13.6637
1.888545281 GHz	39.5335	13.6921
1.889534092 GHz	39.5428	13.6713
1.890522903 GHz	39.5430	13.6833
1.891511714 GHz	39.5409	13.6727
1.892500525 GHz	39.5446	13.6854
1.893489336 GHz	39.5411	13.6728
1.894478147 GHz	39.5428	13.6777
1.895466958 GHz	39.5427	13.6749
1.896455769 GHz	39.5464	13.6875
1.897444580 GHz	39.5489	13.6890
1.898433391 GHz	39.5248	13.6955
1.899422202 GHz	39.5470	13.6903
1.900411013 GHz	39.5381	13.7110
1.901400024 GHz	39.5255	13.6982
1.902389035 GHz	39.5274	13.7358
1.903378046 GHz	39.5149	13.7230
1.904367057 GHz	39.5172	13.7425
1.905356068 GHz	39.5198	13.7438
1.906345079 GHz	39.5121	13.7757
1.907334090 GHz	39.4897	13.7752
1.908323101 GHz	39.4904	13.8015
1.909312112 GHz	39.4961	13.7890



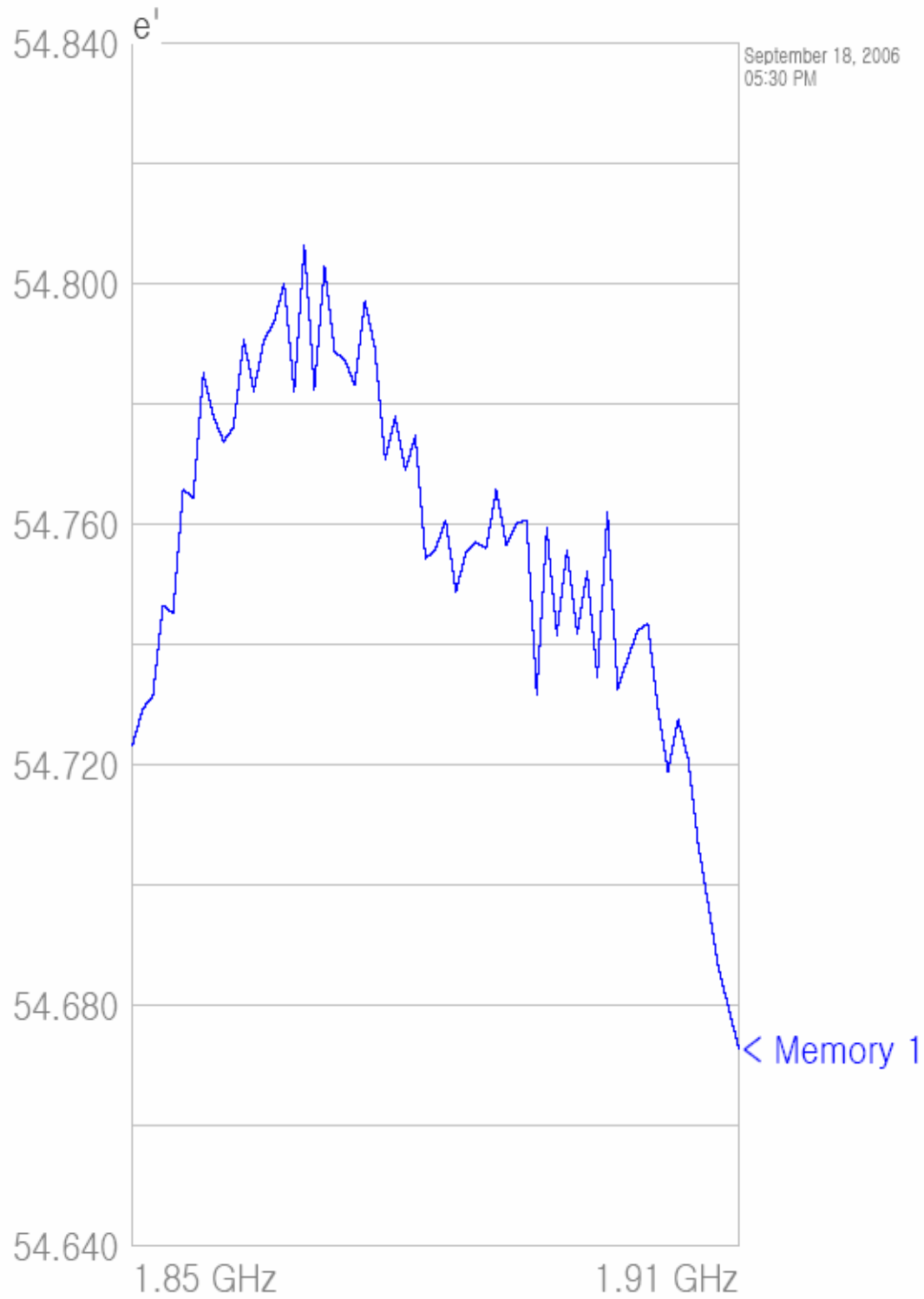
ESTECH Co., Ltd.

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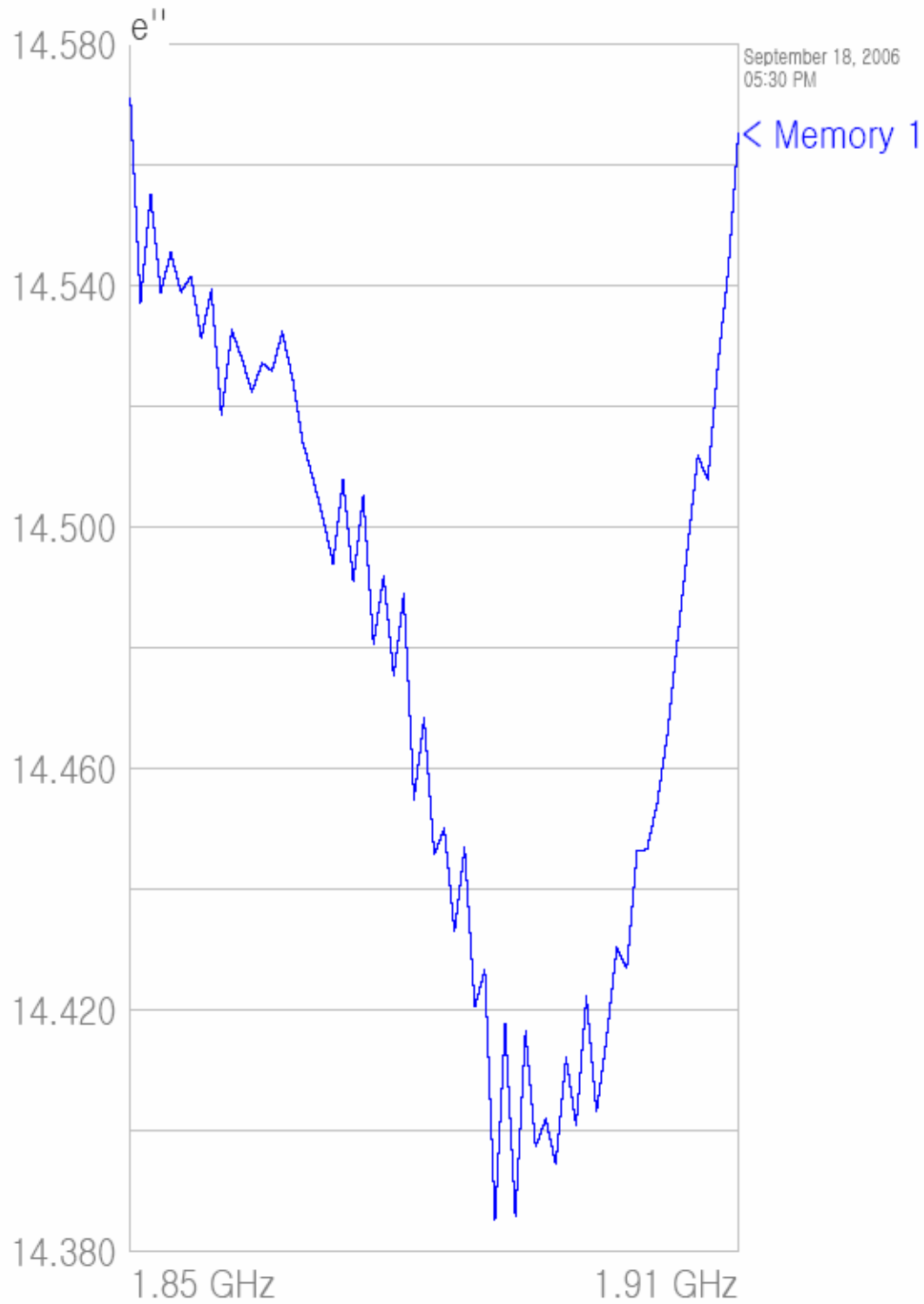


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September 10, 2006 05:30 PM

Frequency	e ⁱ	e ⁱⁱ
1.850000000 GHz	54.7233	14.5711
1.850985698 GHz	54.7293	14.5371
1.851971397 GHz	54.7315	14.5553
1.852957095 GHz	54.7465	14.5390
1.853942793 GHz	54.7452	14.5455
1.854928492 GHz	54.7657	14.5390
1.855914190 GHz	54.7645	14.5416
1.856903039 GHz	54.7852	14.5313
1.857891889 GHz	54.7780	14.5394
1.858880738 GHz	54.7738	14.5185
1.859869588 GHz	54.7762	14.5327
1.860858437 GHz	54.7908	14.5280
1.861847287 GHz	54.7822	14.5225
1.862839297 GHz	54.7907	14.5272
1.863831308 GHz	54.7936	14.5259
1.864823319 GHz	54.8002	14.5324
1.865815329 GHz	54.7820	14.5247
1.866807340 GHz	54.8065	14.5143
1.867799351 GHz	54.7825	14.5083
1.868794533 GHz	54.8030	14.5017
1.869789715 GHz	54.7887	14.4940
1.870784896 GHz	54.7874	14.5080
1.871780078 GHz	54.7831	14.4910
1.872775260 GHz	54.7972	14.5053
1.873770442 GHz	54.7892	14.4805
1.874768806 GHz	54.7707	14.4920
1.875767169 GHz	54.7779	14.4753
1.876765533 GHz	54.7690	14.4890
1.877763896 GHz	54.7747	14.4549
1.878762260 GHz	54.7543	14.4683
1.879760623 GHz	54.7559	14.4457
1.880762178 GHz	54.7607	14.4500
1.881763733 GHz	54.7488	14.4329
1.882765288 GHz	54.7553	14.4469
1.883766843 GHz	54.7570	14.4204
1.884768398 GHz	54.7560	14.4266
1.885769953 GHz	54.7657	14.3850
1.886774710 GHz	54.7566	14.4177
1.887779467 GHz	54.7602	14.3856
1.888784224 GHz	54.7607	14.4166
1.889788981 GHz	54.7316	14.3972
1.890793738 GHz	54.7594	14.4019
1.891798495 GHz	54.7416	14.3943
1.892806464 GHz	54.7557	14.4121
1.893814433 GHz	54.7418	14.4007
1.894822402 GHz	54.7521	14.4222
1.895830371 GHz	54.7345	14.4030
1.896838340 GHz	54.7622	14.4153
1.897846309 GHz	54.7326	14.4303
1.898857500 GHz	54.7376	14.4268
1.899868691 GHz	54.7423	14.4463
1.900879883 GHz	54.7435	14.4466
1.901891074 GHz	54.7293	14.4542
1.902902265 GHz	54.7189	14.4656
1.903913456 GHz	54.7275	14.4813
1.904927860 GHz	54.7209	14.4966
1.905942304 GHz	54.7066	14.5118
1.906956728 GHz	54.6965	14.5080
1.907971152 GHz	54.6861	14.5271
1.908985576 GHz	54.6795	14.5424
1.910000000 GHz	54.6728	14.5653



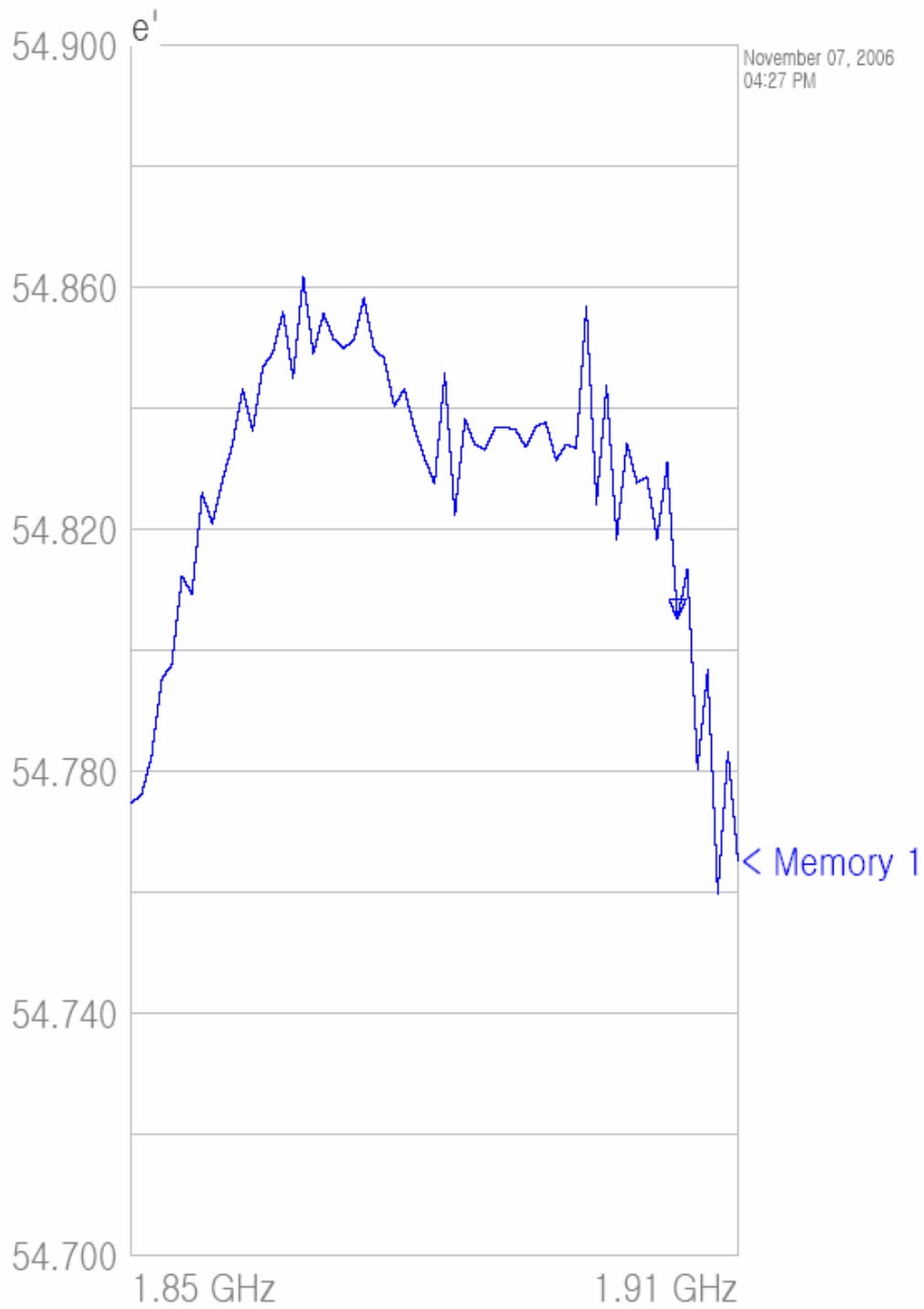
ESTECH Co., Ltd.

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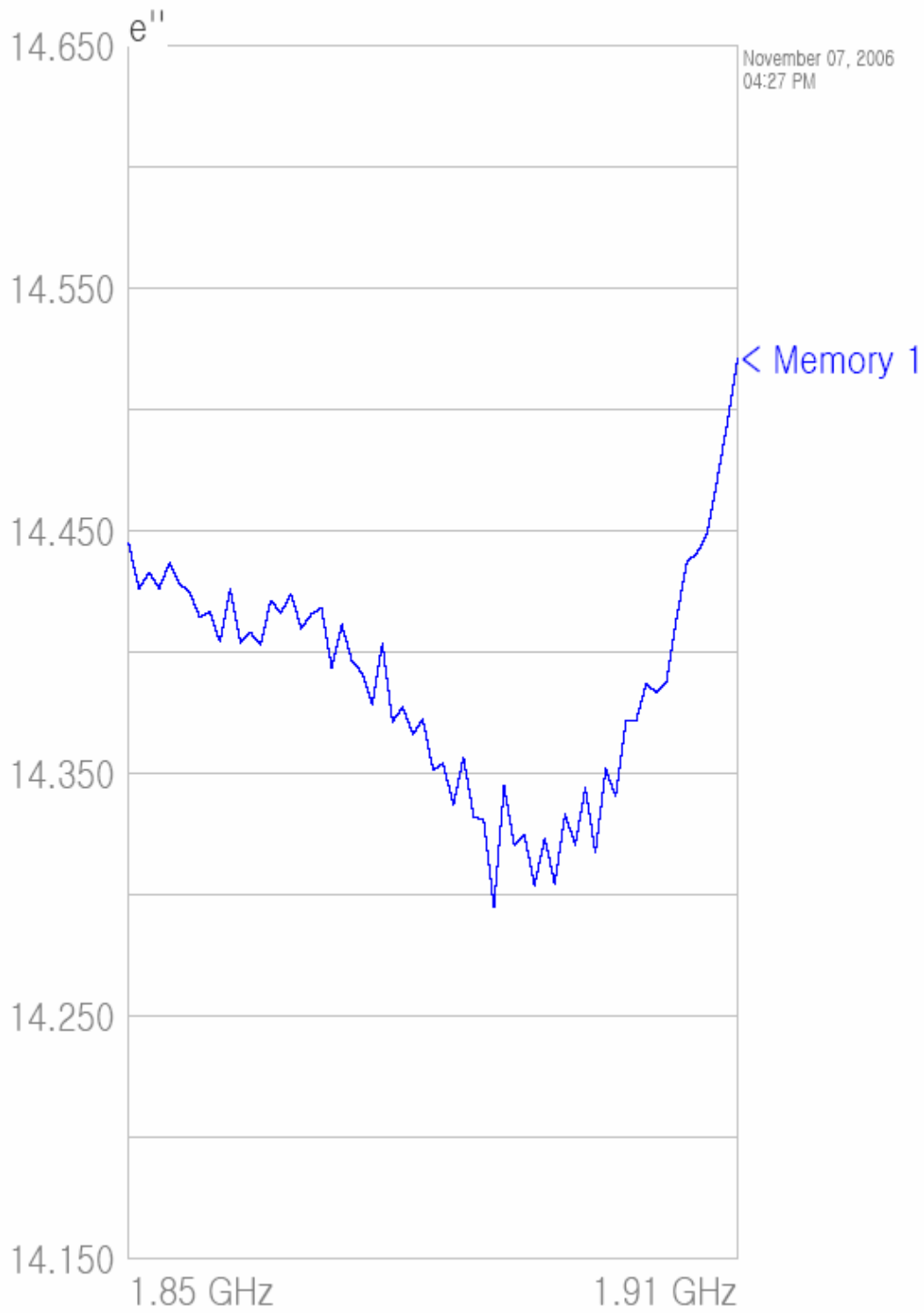


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November 07, 2006 04:21 PM

Frequency	e ⁱ	e ⁱⁱ
1.850000000 GHz	54.7747	14.4448
1.850985698 GHz	54.7761	14.4262
1.851971397 GHz	54.7825	14.4329
1.852957095 GHz	54.7952	14.4263
1.853942793 GHz	54.7976	14.4367
1.854928492 GHz	54.8123	14.4282
1.855914190 GHz	54.8093	14.4249
1.856903039 GHz	54.8260	14.4144
1.857891889 GHz	54.8210	14.4168
1.858880738 GHz	54.8280	14.4041
1.859869588 GHz	54.8340	14.4262
1.860858437 GHz	54.8432	14.4039
1.861847287 GHz	54.8362	14.4081
1.862836297 GHz	54.8469	14.4032
1.863831308 GHz	54.8492	14.4213
1.864823319 GHz	54.8560	14.4162
1.865815329 GHz	54.8451	14.4242
1.866807340 GHz	54.8618	14.4097
1.867799351 GHz	54.8491	14.4157
1.868794533 GHz	54.8557	14.4183
1.869789715 GHz	54.8515	14.3936
1.870784896 GHz	54.8500	14.4114
1.871780078 GHz	54.8513	14.3965
1.872775260 GHz	54.8582	14.3914
1.873770442 GHz	54.8499	14.3782
1.874768806 GHz	54.8483	14.4036
1.875767169 GHz	54.8404	14.3712
1.876765533 GHz	54.8432	14.3774
1.877763896 GHz	54.8367	14.3662
1.878762260 GHz	54.8318	14.3722
1.879760623 GHz	54.8276	14.3514
1.880752178 GHz	54.8458	14.3542
1.881763733 GHz	54.8223	14.3368
1.882765288 GHz	54.8382	14.3567
1.883766843 GHz	54.8340	14.3321
1.884768398 GHz	54.8332	14.3306
1.885769953 GHz	54.8369	14.2947
1.886774710 GHz	54.8369	14.3448
1.887779467 GHz	54.8385	14.3203
1.888784224 GHz	54.8336	14.3244
1.889788981 GHz	54.8370	14.3038
1.890793738 GHz	54.8377	14.3233
1.891798495 GHz	54.8315	14.3044
1.892806464 GHz	54.8340	14.3334
1.893814433 GHz	54.8334	14.3203
1.894822402 GHz	54.8570	14.3440
1.895830371 GHz	54.8242	14.3170
1.896838340 GHz	54.8438	14.3519
1.897846309 GHz	54.8184	14.3403
1.898857500 GHz	54.8343	14.3714
1.899868691 GHz	54.8277	14.3716
1.900879883 GHz	54.8287	14.3871
1.901891074 GHz	54.8184	14.3833
1.902902265 GHz	54.8310	14.3875
1.903913456 GHz	54.8051	14.4140
1.904927880 GHz	54.8135	14.4372
1.905942304 GHz	54.7804	14.4407
1.906956728 GHz	54.7967	14.4487
1.907971152 GHz	54.7596	14.4712
1.908985576 GHz	54.7833	14.4945
1.910000000 GHz	54.7851	14.5211

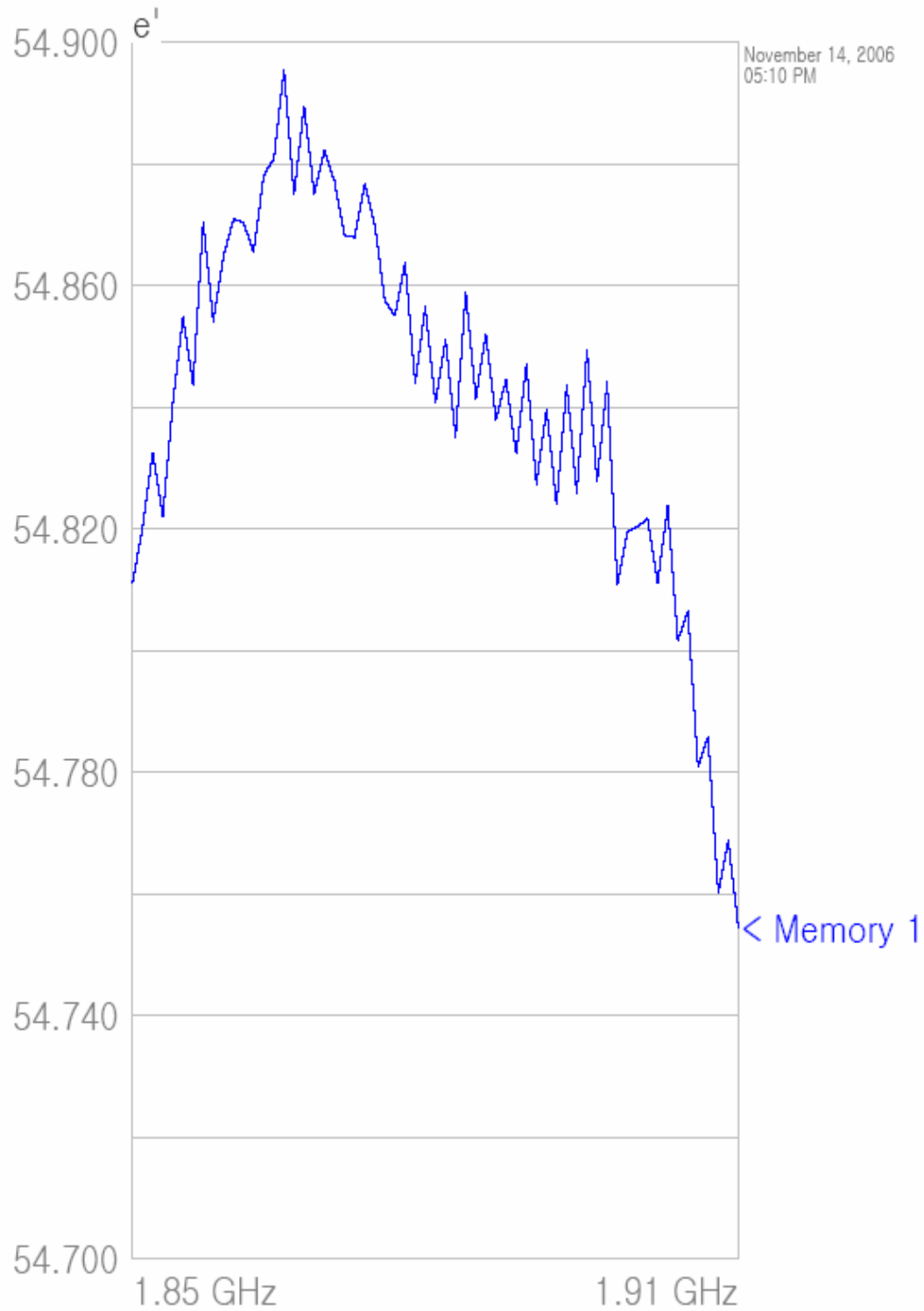


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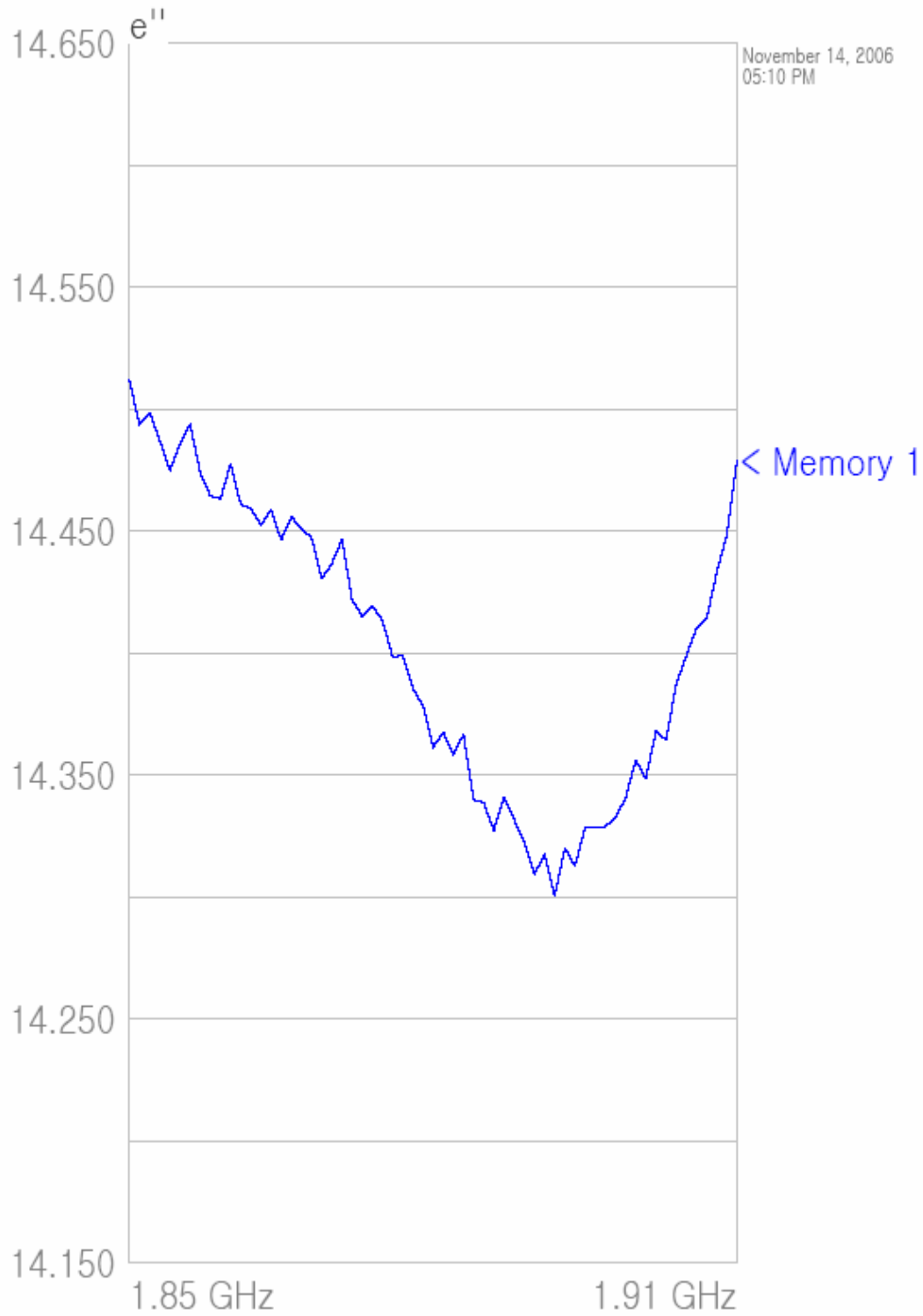


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Frequency	e ⁱ	e ⁱⁱ
1.850000000 GHz	54.8111	14.5122
1.850985688 GHz	54.8203	14.4938
1.851971397 GHz	54.8326	14.4988
1.852957095 GHz	54.8221	14.4874
1.853942793 GHz	54.8408	14.4751
1.854928492 GHz	54.8549	14.4859
1.855914190 GHz	54.8438	14.4939
1.856903039 GHz	54.8705	14.4741
1.857891889 GHz	54.8542	14.4645
1.858880738 GHz	54.8648	14.4634
1.859869588 GHz	54.8710	14.4778
1.860858437 GHz	54.8704	14.4609
1.861847287 GHz	54.8856	14.4594
1.862836297 GHz	54.8782	14.4525
1.863831308 GHz	54.8809	14.4590
1.864823319 GHz	54.8956	14.4464
1.865815329 GHz	54.8750	14.4560
1.866807340 GHz	54.8896	14.4511
1.867799351 GHz	54.8751	14.4474
1.868794533 GHz	54.8823	14.4307
1.869789715 GHz	54.8773	14.4368
1.870784896 GHz	54.8683	14.4467
1.871780078 GHz	54.8680	14.4221
1.872775260 GHz	54.8768	14.4150
1.873770442 GHz	54.8700	14.4192
1.874768806 GHz	54.8576	14.4135
1.875767169 GHz	54.8551	14.3985
1.876765533 GHz	54.8638	14.3991
1.877763896 GHz	54.8439	14.3856
1.878762260 GHz	54.8566	14.3786
1.879760623 GHz	54.8408	14.3614
1.880762178 GHz	54.8512	14.3678
1.881763733 GHz	54.8352	14.3582
1.882765288 GHz	54.8590	14.3668
1.883766843 GHz	54.8415	14.3400
1.884768398 GHz	54.8521	14.3387
1.885769953 GHz	54.8381	14.3273
1.886774710 GHz	54.8446	14.3412
1.887779467 GHz	54.8324	14.3317
1.888784224 GHz	54.8471	14.3228
1.889788981 GHz	54.8274	14.3094
1.890793738 GHz	54.8398	14.3176
1.891798495 GHz	54.8240	14.3004
1.892806464 GHz	54.8438	14.3202
1.893814433 GHz	54.8259	14.3126
1.894822402 GHz	54.8496	14.3286
1.895830371 GHz	54.8278	14.3285
1.896838340 GHz	54.8442	14.3290
1.897846309 GHz	54.8109	14.3326
1.898857500 GHz	54.8195	14.3406
1.899868691 GHz	54.8204	14.3561
1.900879883 GHz	54.8217	14.3488
1.901891074 GHz	54.8111	14.3679
1.902902265 GHz	54.8238	14.3645
1.903913456 GHz	54.8017	14.3873
1.904927880 GHz	54.8065	14.3990
1.905942304 GHz	54.7809	14.4102
1.906956728 GHz	54.7859	14.4142
1.907971152 GHz	54.7802	14.4331
1.908985576 GHz	54.7688	14.4486
1.910000000 GHz	54.7544	14.4790



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APPENDIX B : Validation Test Data

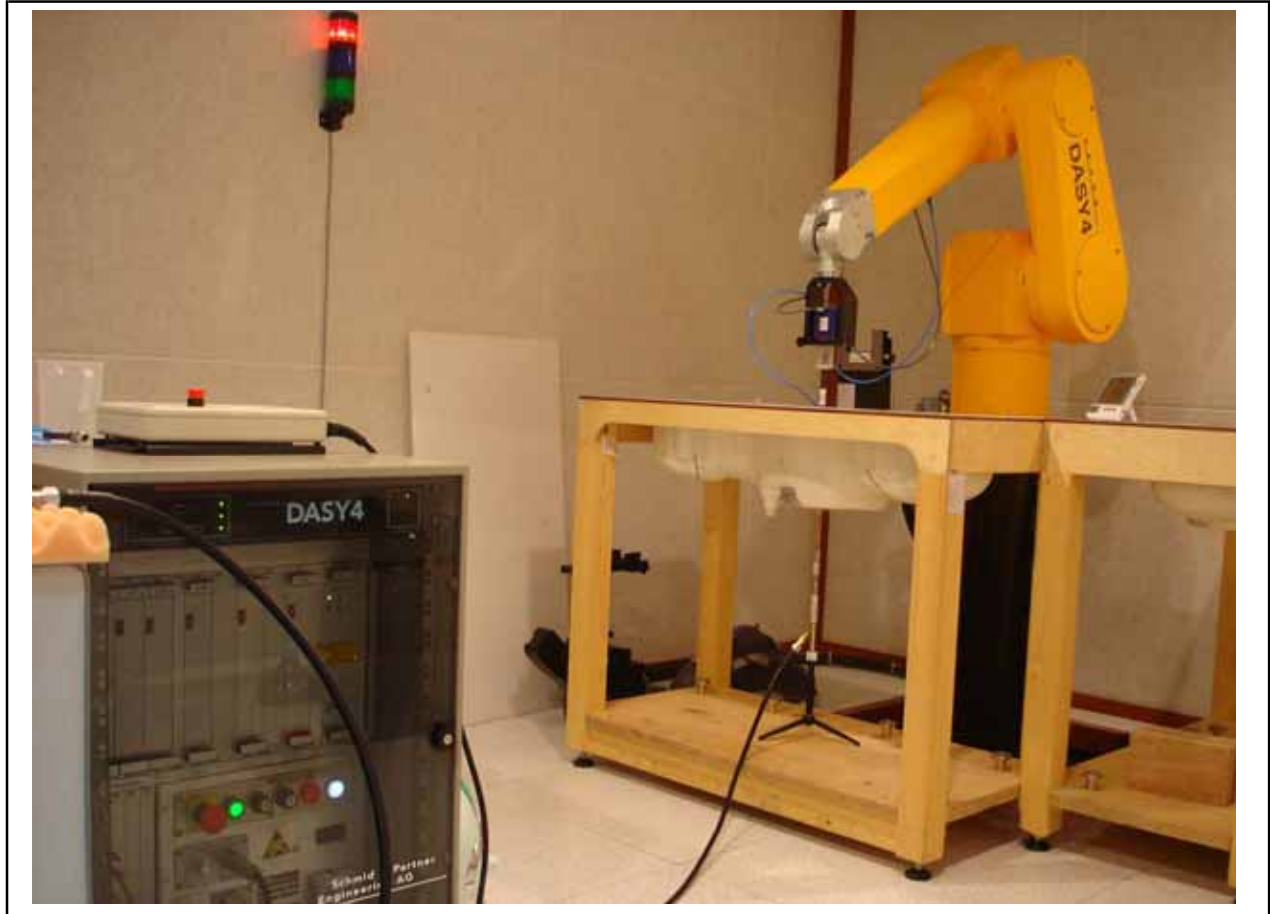


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1900MHz Dipole Validation



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FAX: 82-2-867-3204

Date/Time: 2006-09-18 10:17:58

Test Laboratory: ESTECH

VALIDATION 0904

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; $\sigma = 1.45$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 43%

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

Maximum value of SAR (interpolated) = 11.7 mW/g

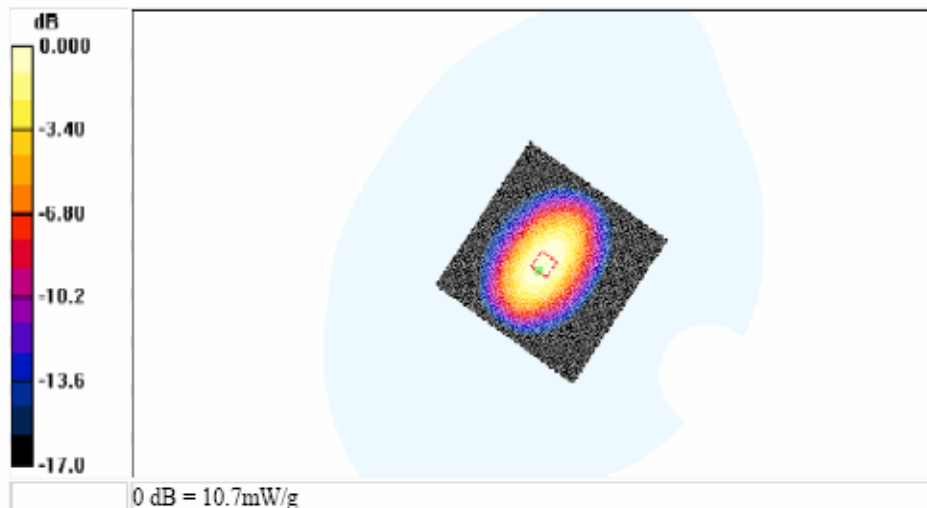
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.8 V/m; Power Drift = 0.020 dB

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.48 mW/g;

Maximum value of SAR (measured) = 10.7 mW/g



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FAX: 82-2-867-3204

Date/Time: 2006-11-01 12:06:27

Test Laboratory: ESTECH

VALIDATION

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; $\sigma = 1.44$ mho/m; $\epsilon_r = 39.7$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 42%

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

Maximum value of SAR (interpolated) = 11.5 mW/g

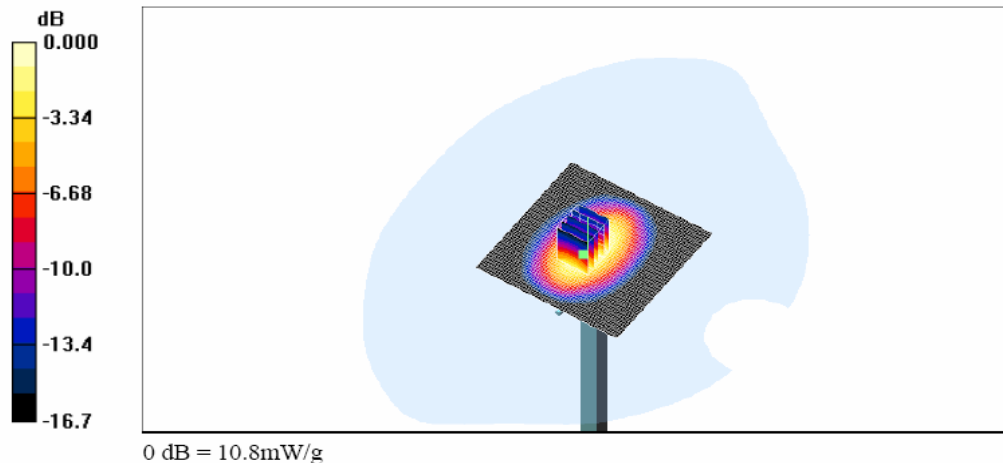
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.6 V/m; Power Drift = -0.011 dB

Peak SAR (extrapolated) = 16.9 W/kg

SAR(1 g) = 9.61 mW/g;

Maximum value of SAR (measured) = 10.8 mW/g



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Date/Time: 2006-11-07 11:35:08

Test Laboratory: ESTECH

VALIDATION

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; $\sigma = 1.45$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 41%

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

Maximum value of SAR (interpolated) = 11.3 mW/g

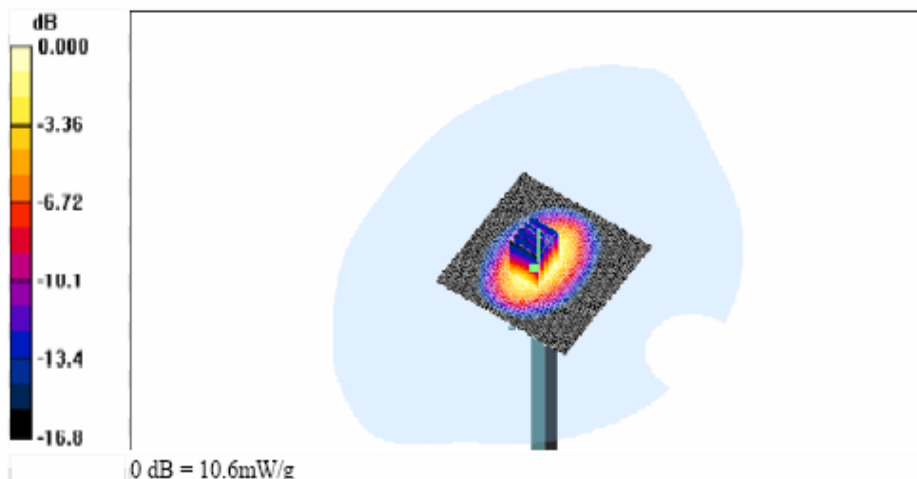
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.5 V/m; Power Drift = -0.036 dB

Peak SAR (extrapolated) = 16.7 W/kg

SAR(1 g) = 9.5 mW/g

Maximum value of SAR (measured) = 10.6 mW/g



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Date/Time: 2006-11-14 13:31:53

Test Laboratory: ESTECH

VALIDATION

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; $\sigma = 1.45$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 20 °C , Humidity : 42%

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

Maximum value of SAR (interpolated) = 11.6 mW/g

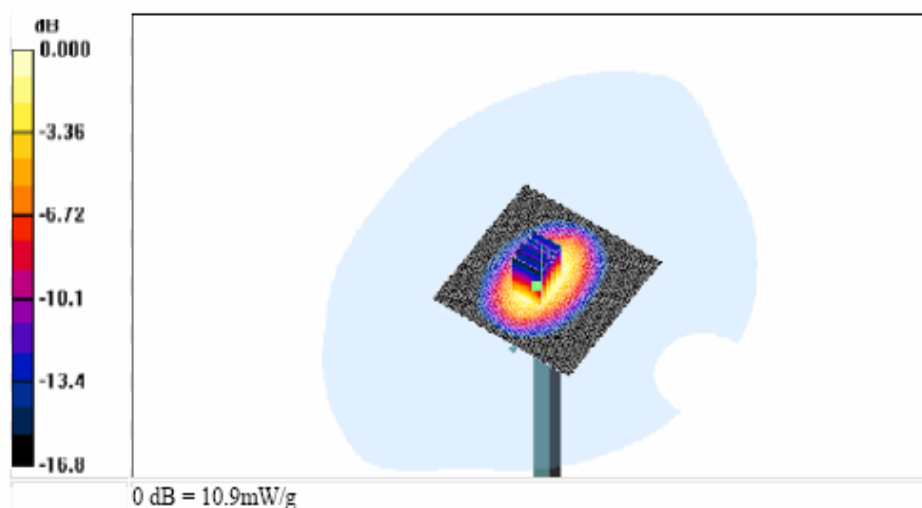
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 91.0 V/m; Power Drift = 0.007 dB

Peak SAR (extrapolated) = 17.1 W/kg

SAR(1 g) = 9.66 mW/g

Maximum value of SAR (measured) = 10.9 mW/g





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APPENDIX C : SAR Test Data

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TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 2006-09-18 11:08:00

Test Laboratory: ESTECH

CH661 LEFT TOUCH

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 42%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.988 mW/g

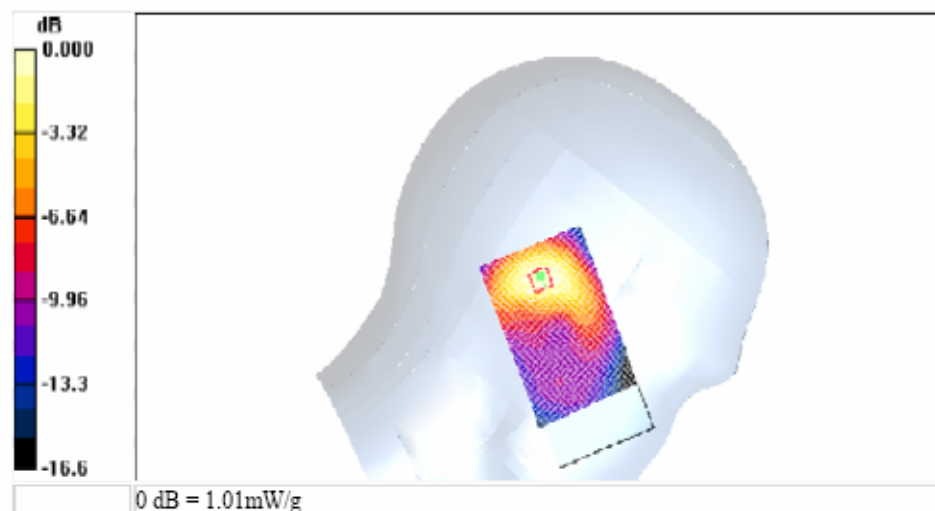
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.5 V/m; Power Drift = -0.038 dB

Peak SAR (extrapolated) = 1.64 W/kg

SAR(1 g) = 0.915 mW/g;

Maximum value of SAR (measured) = 1.01 mW/g



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TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 2006-09-18 12:10:00

Test Laboratory: ESTECH

CH661 RIGHT TOUCH

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.23 mW/g

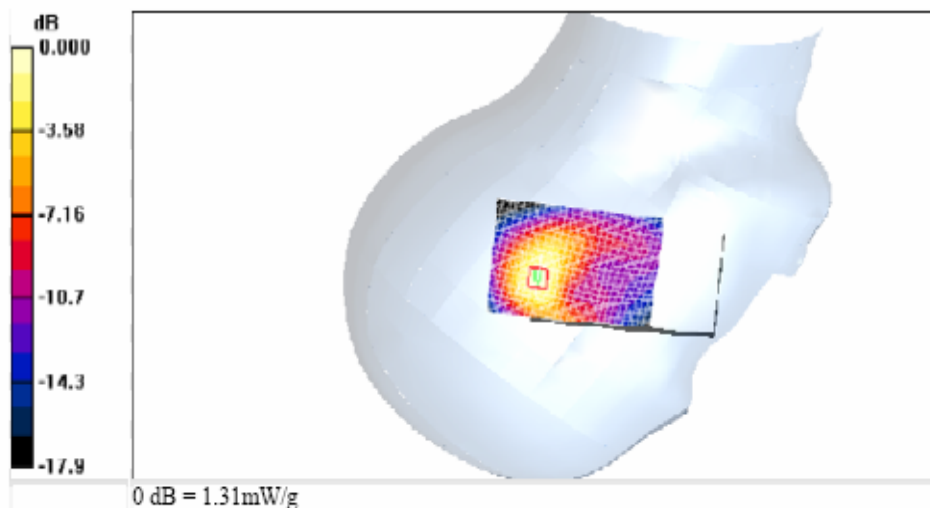
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.3 V/m; Power Drift = 0.020 dB

Peak SAR (extrapolated) = 2.26 W/kg

SAR(1 g) = 1.13 mW/g;

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



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Date/Time: 2006-11-07 13:20:24

Test Laboratory: ESTECH

CH512 LEFT TOUCH

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 41%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.01 mW/g

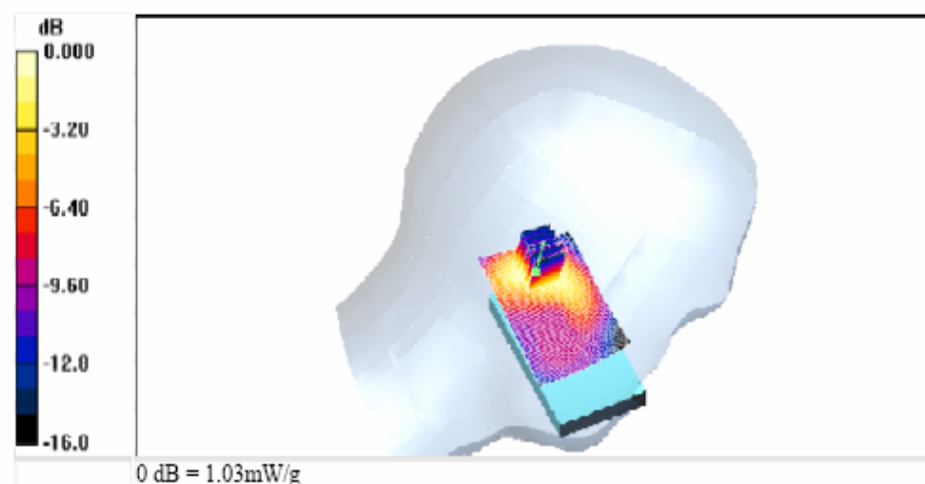
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.9 V/m; Power Drift = -0.095 dB

Peak SAR (extrapolated) = 1.60 W/kg

SAR(1 g) = 0.925 mW/g

Maximum value of SAR (measured) = 1.03 mW/g



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Seoul, 153-803, Korea

Date/Time: 2006-11-07 13:49:05

Test Laboratory: ESTECH

CH512 RIGHT TOUCH

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 41%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.28 mW/g

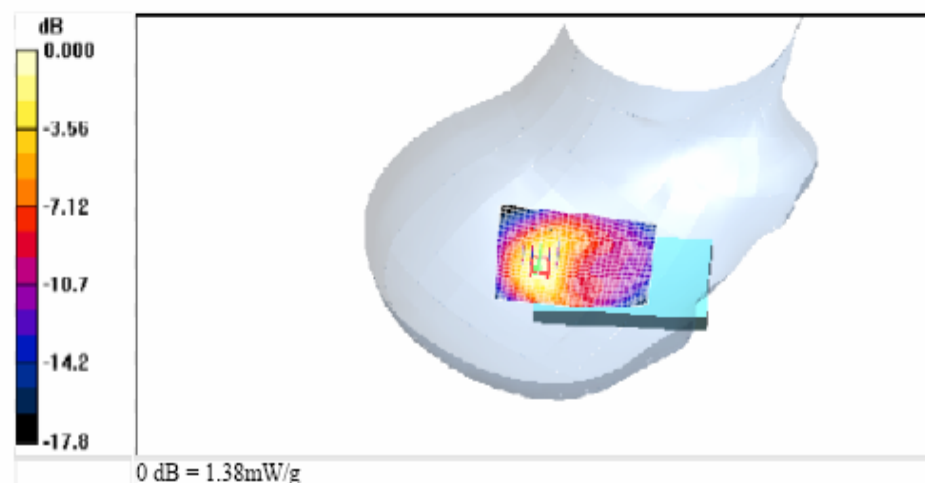
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.7 V/m; Power Drift = 0.019 dB

Peak SAR (extrapolated) = 2.37 W/kg

SAR(1 g) = 1.19 mW/g

Maximum value of SAR (measured) = 1.38 mW/g



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Date/Time: 2006-11-07 15:02:05

Test Laboratory: ESTECH

CH810 LEFT TOUCH

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 41%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.04 mW/g

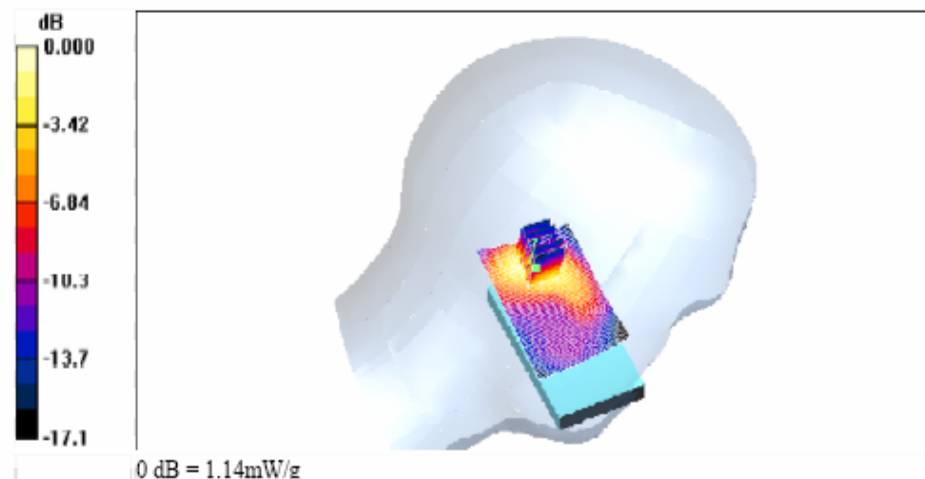
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 29.1 V/m; Power Drift = 0.062 dB

Peak SAR (extrapolated) = 1.84 W/kg

SAR(1 g) = 1 mW/g

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



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Seoul, 153-803, Korea

Date/Time: 2006-11-07 14:23:08

Test Laboratory: ESTECH

CH810 RIGHT TOUCH

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 41%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.35 mW/g

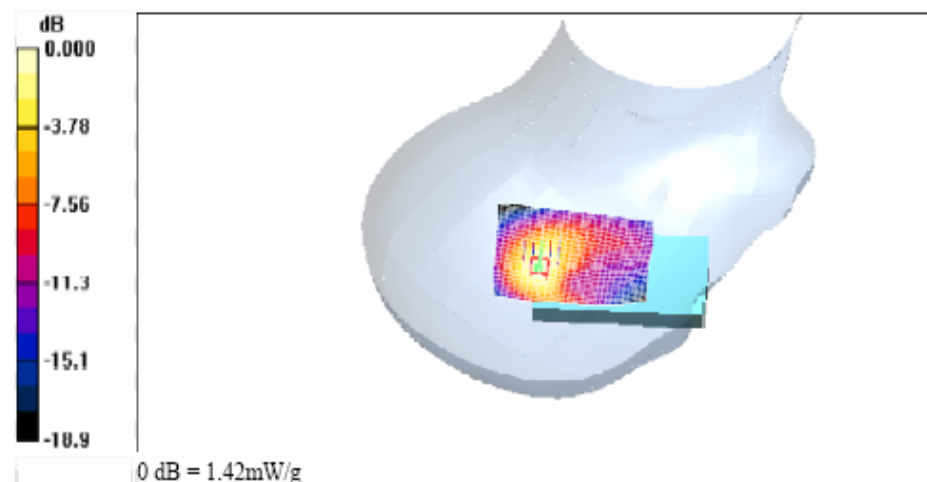
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.3 V/m; Power Drift = 0.032 dB

Peak SAR (extrapolated) = 2.48 W/kg

SAR(1 g) = 1.23 mW/g

Maximum value of SAR (measured) = 1.42 mW/g



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Seoul, 153-803, Korea

Date/Time: 2006-11-14 14:39:17

Test Laboratory: ESTECH

CH810 RIGHT TOUCH-BT ON

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.46$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 20 °C, Humidity : 42%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.35 mW/g

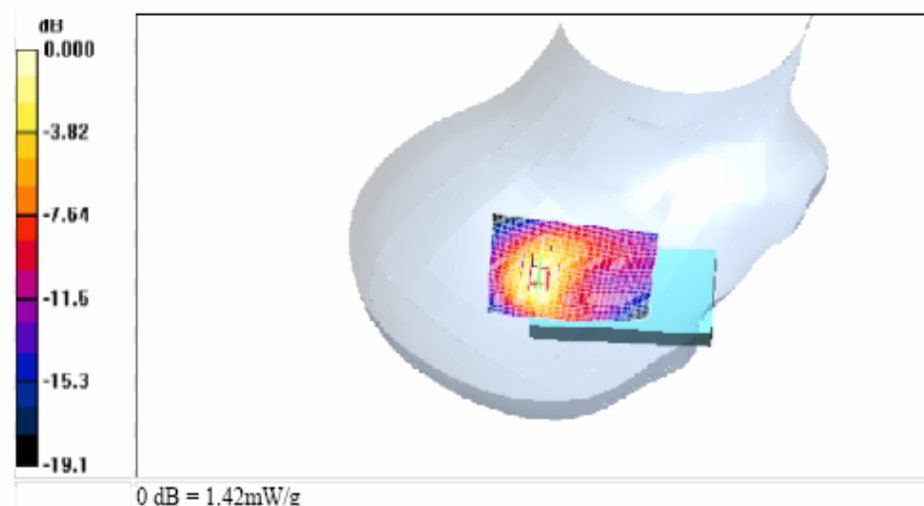
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 30.1 V/m; Power Drift = -0.037 dB

Peak SAR (extrapolated) = 2.42 W/kg

SAR(1 g) = 1.22 mW/g

Maximum value of SAR (measured) = 1.42 mW/g



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FAX: 82-2-867-3204

Date/Time: 2006-09-18 11:37:33

Test Laboratory: ESTECH

CH661 LEFT TILT

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 43%
-

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.05 mW/g

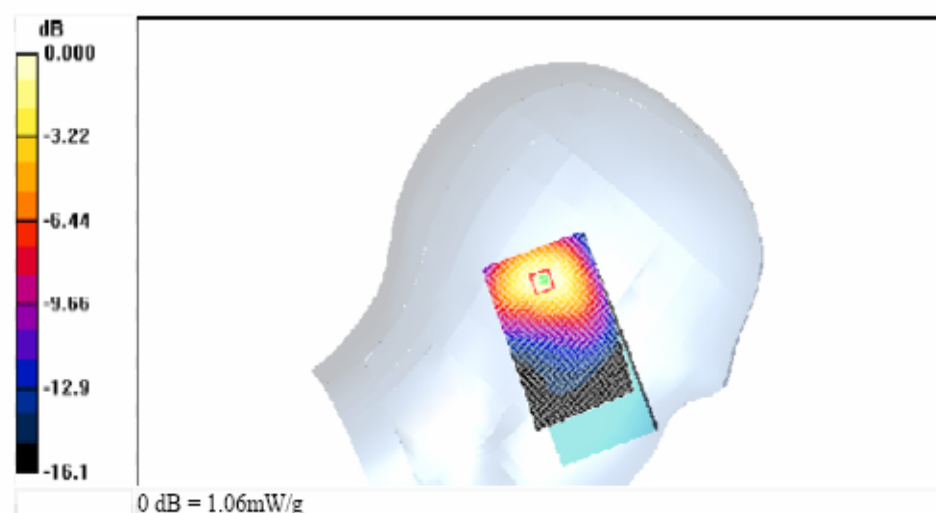
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.5 V/m; Power Drift = -0.044 dB

Peak SAR (extrapolated) = 1.61 W/kg

SAR(1 g) = 0.937 mW/g;

Maximum value of SAR (measured) = 1.06 mW/g



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TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 2006-09-18 13:37:39

Test Laboratory: ESTECH

CH661 RIGHT Tilt

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C , Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.43 mW/g

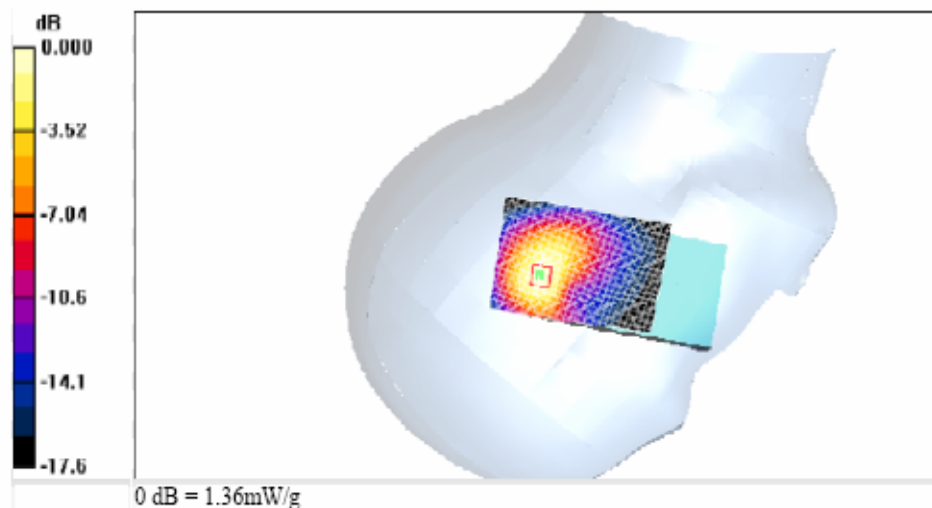
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.9 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 2.28 W/kg

SAR(1 g) = 1.21 mW/g;

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



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CH661 RIGHT Tilt-BT on

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39.7$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 20 °C, Humidity : 42%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.44 mW/g

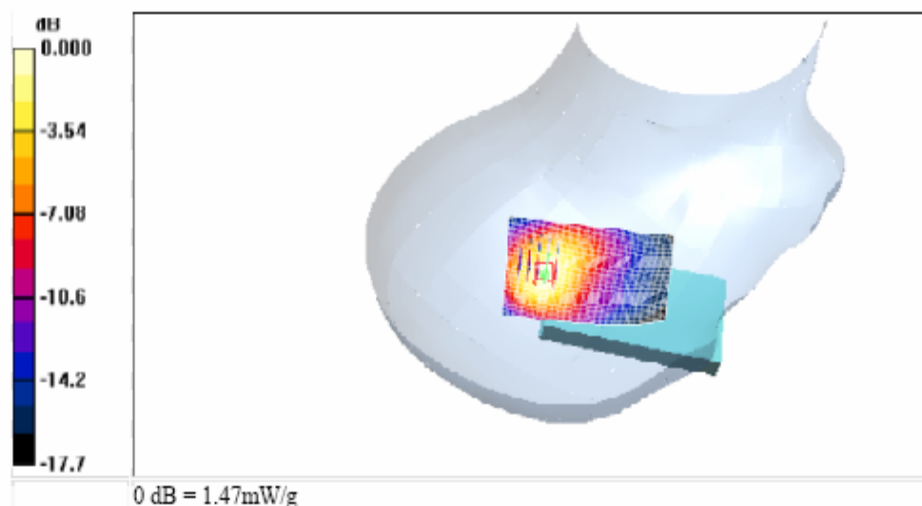
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.6 V/m; Power Drift = -0.022 dB

Peak SAR (extrapolated) = 2.32 W/kg

SAR(1 g) = 1.29 mW/g

Maximum value of SAR (measured) = 1.47 mW/g



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CH661 RIGHT Tilt-BT on

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

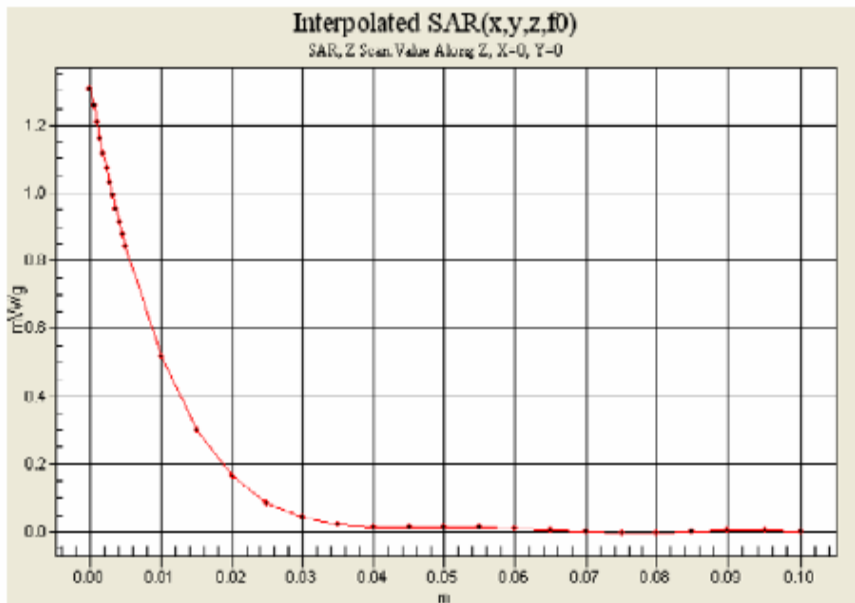
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39.7$; $\rho = 1000$ kg/m³

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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 20 °C, Humidity : 42%



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Test Laboratory: ESTECH

CH512 LEFT TILT

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 44%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.06 mW/g

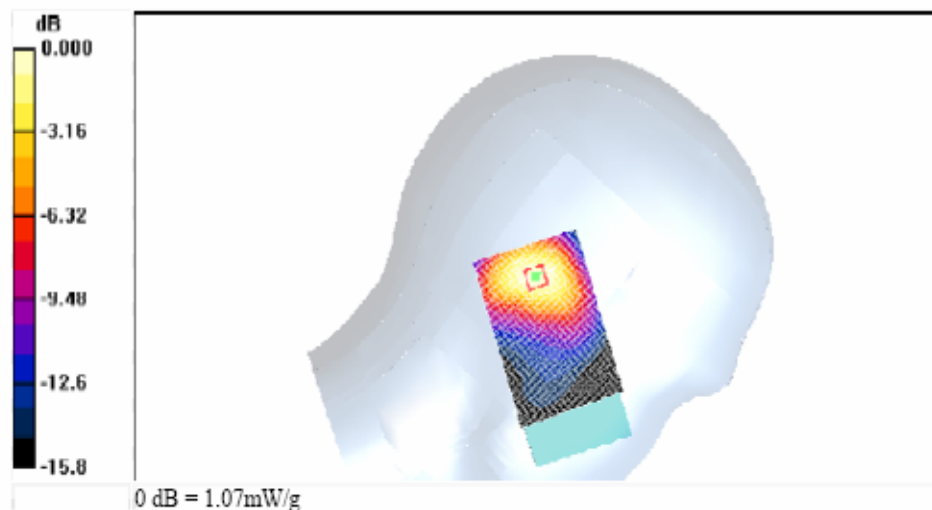
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.8 V/m; Power Drift = -0.096 dB

Peak SAR (extrapolated) = 1.59 W/kg

SAR(1 g) = 0.949 mW/g;

Maximum value of SAR (measured) = 1.07 mW/g



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CH512 RIGHT TILT

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 44%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

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

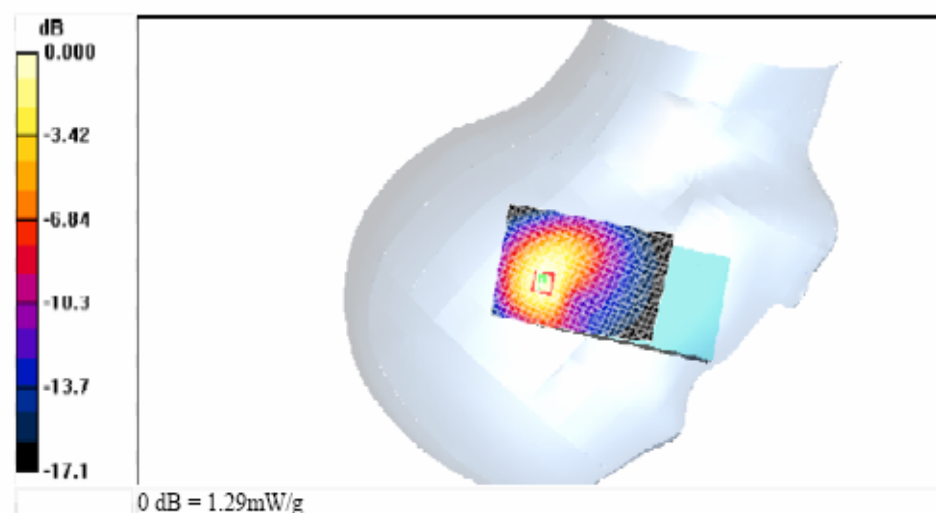
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 29.0 V/m; Power Drift = -0.019 dB

Peak SAR (extrapolated) = 2.13 W/kg

SAR(1 g) = 1.14 mW/g;

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



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CH810 LEFT TILT

DUT: KE850; Type: BAR TYPE; Serial: NONE

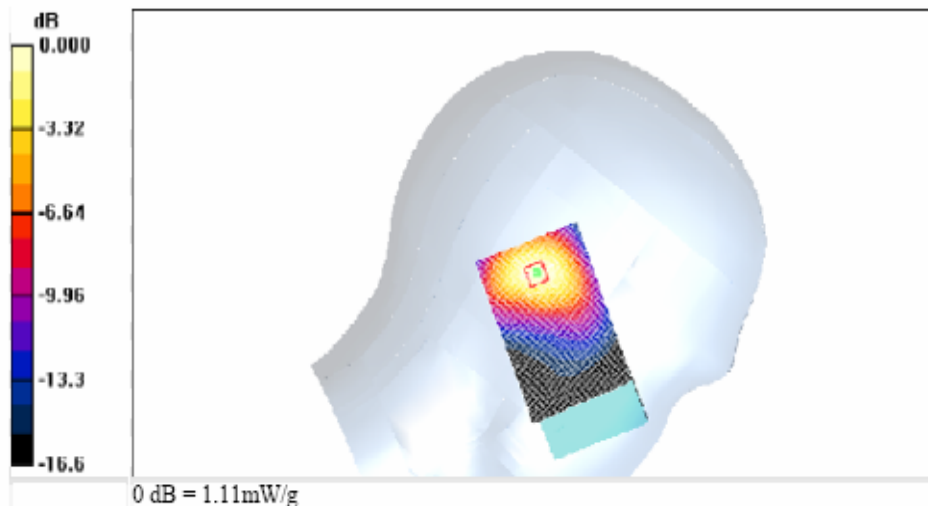
Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1910$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ kg/m³
Phantom section: Left Section
Measurement Standard: DAS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 43%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.11 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.1 V/m; Power Drift = -0.118 dB
Peak SAR (extrapolated) = 1.74 W/kg
SAR(1 g) = 0.986 mW/g;
Maximum value of SAR (measured) = 1.11 mW/g



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CH810 RIGHT TILT

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C , Humidity : 45%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.37 mW/g

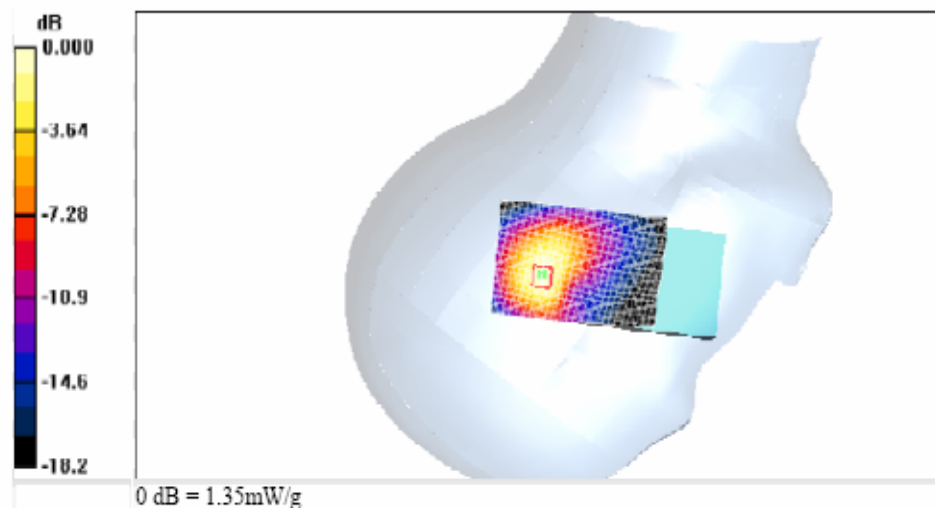
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.9 V/m; Power Drift = 0.053 dB

Peak SAR (extrapolated) = 2.30 W/kg

SAR(1 g) = 1.18 mW/g;

Maximum value of SAR (measured) = 1.35 mW/g



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Test Laboratory: ESTECH

CH810 RIGHT TILT-BT ON

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C , Humidity : 45%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.40 mW/g

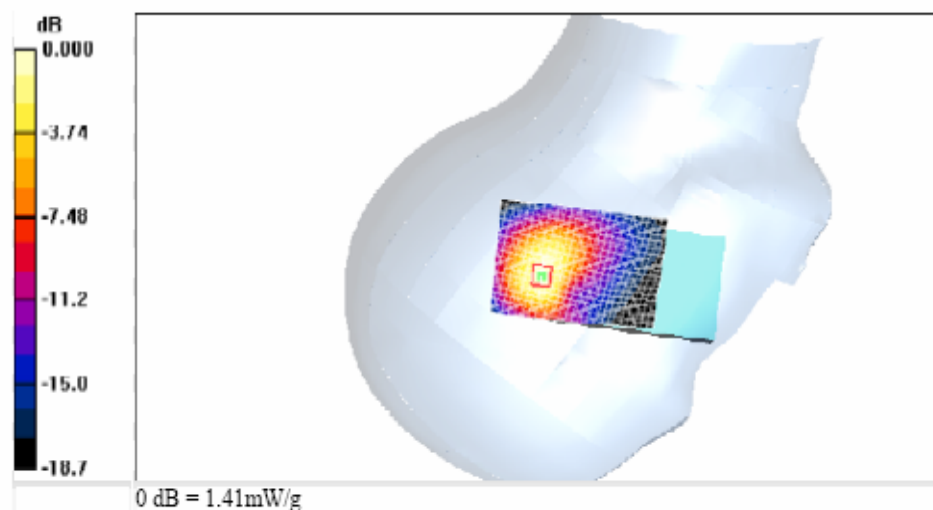
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 29.3 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 2.35 W/kg

SAR(1 g) = 1.21 mW/g;

Maximum value of SAR (measured) = 1.41 mW/g



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CH661 BODY

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 54.8$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 20 °C, Humidity : 46%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.282 mW/g

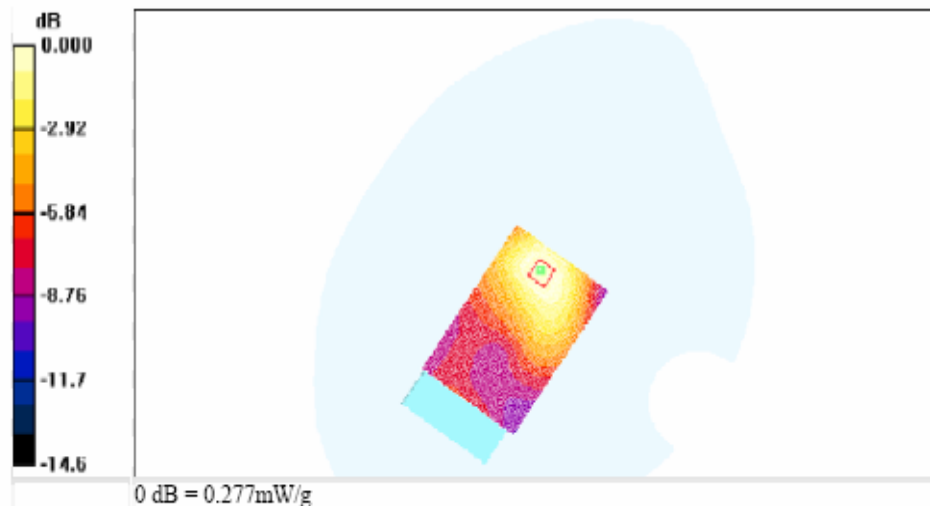
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.0 V/m; Power Drift = -0.138 dB

Peak SAR (extrapolated) = 0.379 W/kg

SAR(1 g) = 0.251 mW/g;

Maximum value of SAR (measured) = 0.277 mW/g



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Test Laboratory: ESTECH

CH512 BODY

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 54.7$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 20 °C, Humidity : 45%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.273 mW/g

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

Reference Value = 13.9 V/m; Power Drift = 0.045 dB

Peak SAR (extrapolated) = 0.363 W/kg

SAR(1 g) = 0.245 mW/g;

Maximum value of SAR (measured) = 0.271 mW/g



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CH810 BODY

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 54.7$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 21 °C, Humidity : 44%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.268 mW/g

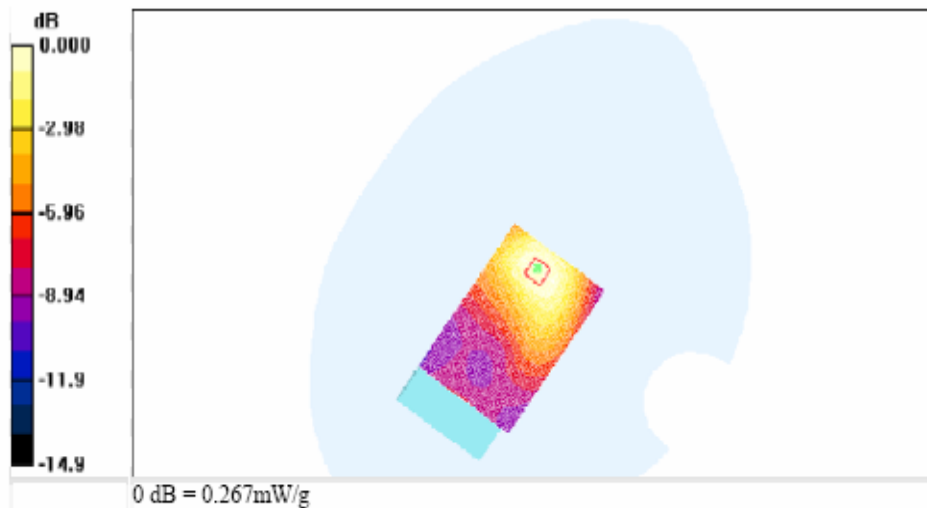
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.2 V/m; Power Drift = -0.005 dB

Peak SAR (extrapolated) = 0.372 W/kg

SAR(1 g) = 0.242 mW/g;

Maximum value of SAR (measured) = 0.267 mW/g



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Test Laboratory: ESTECH

CH661 BODY-REAR

DUT: KE850; Type: BAR TYPE; Serial: NONE

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 54.8$; $\rho = 1000$ 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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 20 °C, Humidity : 40%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.236 mW/g

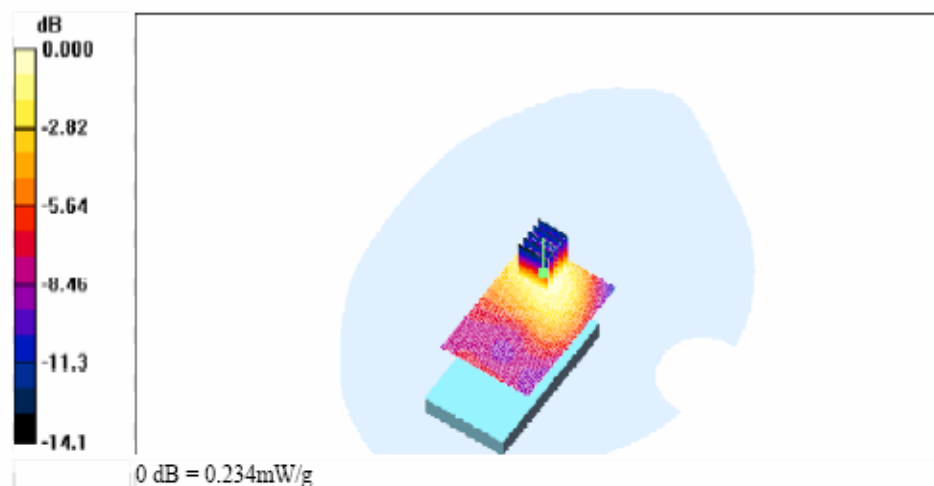
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.8 V/m; Power Drift = 0.036 dB

Peak SAR (extrapolated) = 0.338 W/kg

SAR(1 g) = 0.214 mW/g

Maximum value of SAR (measured) = 0.234 mW/g



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Date/Time: 2006-11-14 17:30:38

Test Laboratory: ESTECH

CH661 BODY-GPRS-BT ON

DUT: KE850; Type: BAR TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 54.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DAS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(4.54, 4.54, 4.54); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 20 °C, Humidity : 42%

Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.642 mW/g

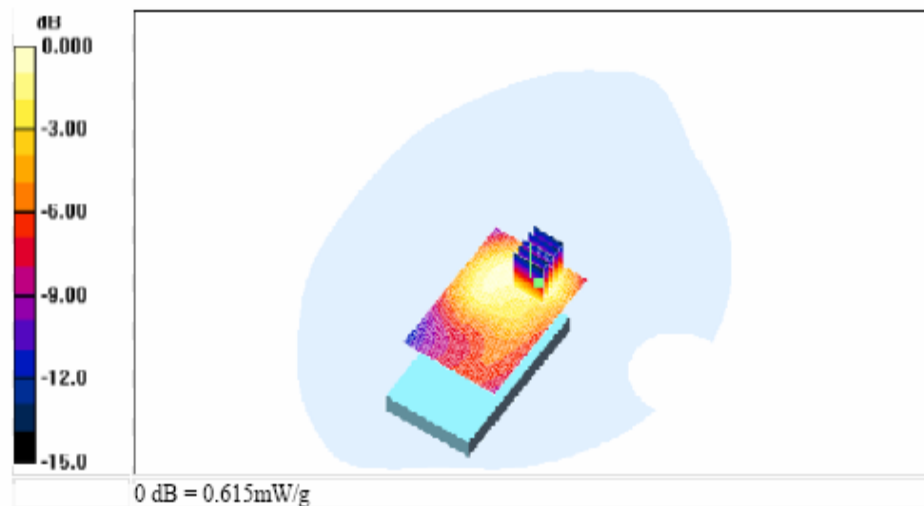
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.0 V/m; Power Drift = -0.007 dB

Peak SAR (extrapolated) = 0.893 W/kg

SAR(1 g) = 0.564 mW/g

Maximum value of SAR (measured) = 0.615 mW/g



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Date/Time: 2006-11-14 17:30:38

Test Laboratory: ESTECH

CH661 BODY-GPRS-BT ON

DUT: KE850; Type: BAR TYPE; Serial: NONE

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15

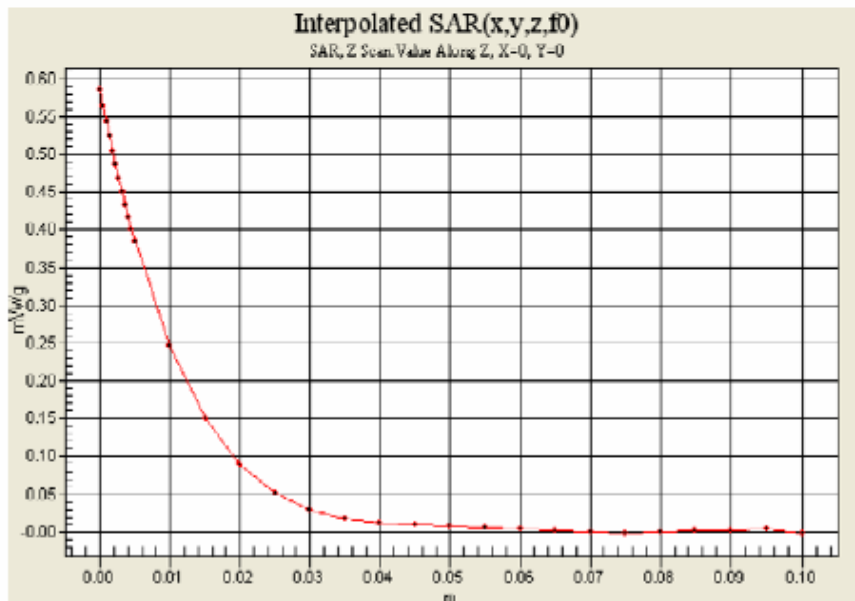
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 54.8$; $\rho = 1000$ kg/m³

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 Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 20 °C, Humidity : 42%





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APPENDIX D : Calibration Certificates

IMPORTANT NOTICE

USAGE OF PROBES IN ORGANIC SOLVENTS

Diethylene Glycol Monobuthy Ether (the basis for liquids above 1 GHz), as many other organic solvents, is a very effective softener for synthetic materials. These solvents can cause irreparable damage to certain SPEAG products, except those which are explicitly declared as compliant with organic solvents.

Compatible Probes:

- ET3DV6
- ET3DV6R
- ES3DVx
- EX3DVx
- ER3DV6
- H3DV6

Important Note for ET3DV6 Probes:

The ET3DV6 probes shall not be exposed to solvents longer than necessary for the measurements and shall be cleaned daily after use with warm water and stored dry.

s p e a g

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S Schweizerischer Kalibrierdienst
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Estech (Dymstec)**

Certificate No: **ET3-1750_Jan06**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1750**

Calibration procedure(s) **QA CAL-01.v5
Calibration procedure for dosimetric E-field probes**

Calibration date: **January 24, 2006**

Condition of the calibrated item **In Tolerance**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	27-Oct-05 (SPEAG, No. DAE4-654_Oct05)	Oct-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov-06

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: January 24, 2006

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

ET3DV6 SN:1750

January 24, 2006

Probe ET3DV6

SN:1750

Manufactured:	September 27, 2002
Last calibrated:	February 24, 2005
Recalibrated:	January 24, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1750**Sensitivity in Free Space^A****Diode Compression^B**

NormX	1.69 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	95 mV
NormY	1.73 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	95 mV
NormZ	1.66 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	95 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect**TSL 900 MHz Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	7.8	4.2
SAR _{be} [%]	With Correction Algorithm	0.0	0.2

TSL 1750 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	7.1	4.1
SAR _{be} [%]	With Correction Algorithm	0.1	0.3

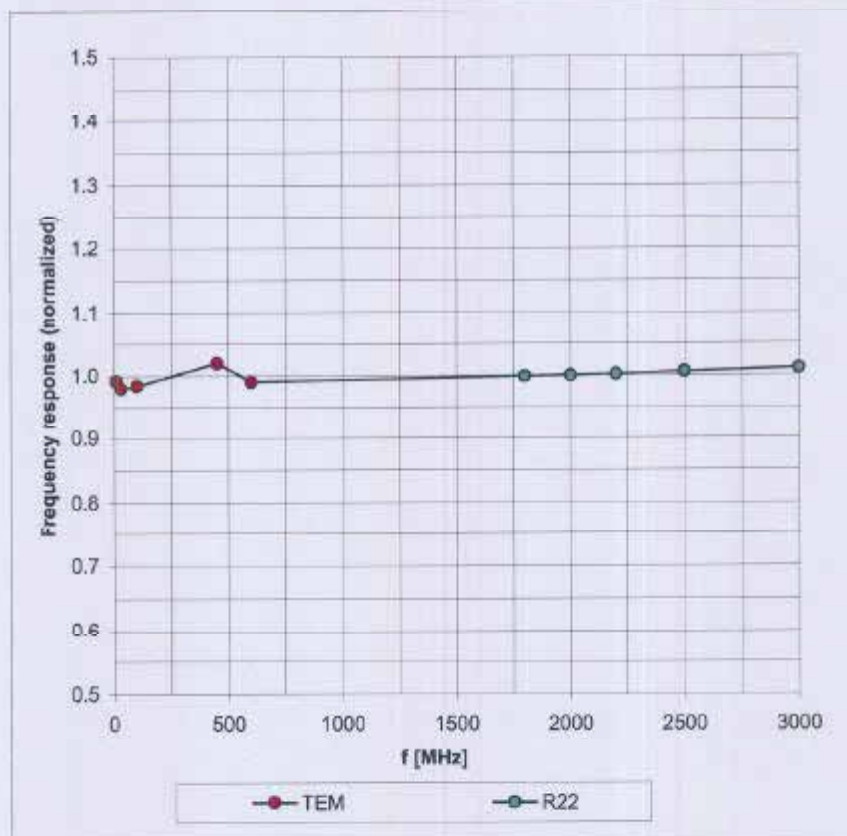
Sensor OffsetProbe Tip to Sensor Center **2.7 mm**

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).^B Numerical linearization parameter: uncertainty not required.

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)