ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

SAR Compliace Test Report

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

DATA & LOCATION OF TESTING
Dates of testing : 2005 01/28 ~ 02/03
Test Site : ESTECH Co., Ltd. Korea

Test Device :

Models : LG-AD6335

FCC ID : BEJAD6335

TYPE : SINGLE BAND, SINGLE MODE CDMA MOBILE PHONE

Test report no :	ESTSAR0502-001
Number of page :	22
Contact person :	Cheol-Goo Lee
Responsible test Engineer :	M.J.Song
Testing has been Carried out in Accordance with :	IEEE P1528-200X Draft 6.4 Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate(SAR) in the Human Body Due to Wireless Communications Device : Experimental Techniques
Applicant Type :	Certification
FCC CLASSIFICATION :	Licensed Portable Transmitter held to ear (PCE)
FCC Rule Part(s)	§2.1093; FCC/OET Bulletin 65 Supplement C (July 2001)
Test results :	The Tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced recept in full, without written approval of the laboratory.

Date and Signatures : 2005-2-3
Report Prepared By : Engineer/ M.J.Song
(Signature)
Manager Engineer/ Jay Kim
(Signature)

Table of Contents

1. SUMMARY FOR TEST REPORT

FCC ID	BEJAD6335
Date of test	2005/01/28 ~ 2005/02/03
Responsible test engineer	Jay Kim
Measurement performed by	M.J.Song
EUT Type	SINGLE BAND, SINGLE MODE CDMA MOBILE PHONE
Tx Frequency	824.82 ~ 848.19 MHz (CDMA)
Rx Frequency	869.82 ~ 893.19 MHz (CDMA)
Max. RF Output Power	CDMA (24.00 dBm)

Maximum Results Found During SAR Evaluation

1.1 Head Configuration

Max. SAR Measurement

FREQUENCY		Modulation	Conducted Power(dBm)		Device test position	Antenna position	SAR (W/kg)
MHz	Ch		dBm	Battery			
836.49	383	CDMA	24	Standard	Right Cheek Touch	–	1.22

1.2 Body Worn Configuration

Max. SAR Measurement

FREQUENCY		Modulation	Conducted Power(dBm)		Separation test position	Antenna position	SAR (W/kg)
MHz	Ch		dBm	Battery			
848.19	772	CDMA	24	Standard	1.5Cm [w/o Holster] Folder Open	–	0.651

1.3 Measurement Uncertainty

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

2. INTRODUCATION

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

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

SAR Definition

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

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

Figure 2.1 SAR Mathematical Equation

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

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

Where:

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

3. DESCRIPTION OF THE DEVICE UNDER TEST

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

2.1 Antenna Description

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

2.2 Device Description

FCC ID	FCC ID : BEJAD6335
Serial numbers	NONE
Exposure environment	Uncontrolled exposure
Device category	Portable device
Mode(s) of Operation	CDMA
Modulation Mode(s)	CDMA
Duty Cycle	1
Transmitting FreQuency Range(s)	824.82 ~ 848.19 MHz (CDMA)

2.3 Battery Options

There is only one battery option available for tested device,

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

4. TEST CONDITIONS

4.1 Ambient Conditions

Ambient Temperature (°C)	22
Tissue simulating liquid temperature (°C)	22
Humidity (%)	46

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 (AMPS & PCS CDMA modes) using manufacturers test codes.

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

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

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

Fig. 4.1 SAR Measurement System

5. DESCRIPTION OF THE TEST EQUIPMENT

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

5.1 Test System Specifications

Test Equipment	Model	Serial Number	Cal. date
DAE	DAE3	551	2004-04-11
E-Field Probe	ET3DV6	1748	2005-01-21
Dipole validation kit	D835V2	475	2003-02-03
Network analyzer	8753ES	NONE	2004-10-12
Signal generator	E4421B	GB40052295	2004-10-12
RF Power meter	EPM-442A	GB37170412	2004-10-12
Power Sensor	8481A	3318A90368	2004-10-14
Dielectric Probe	85070D	US01440154	-

5.2 SAR Measurement Setup

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

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

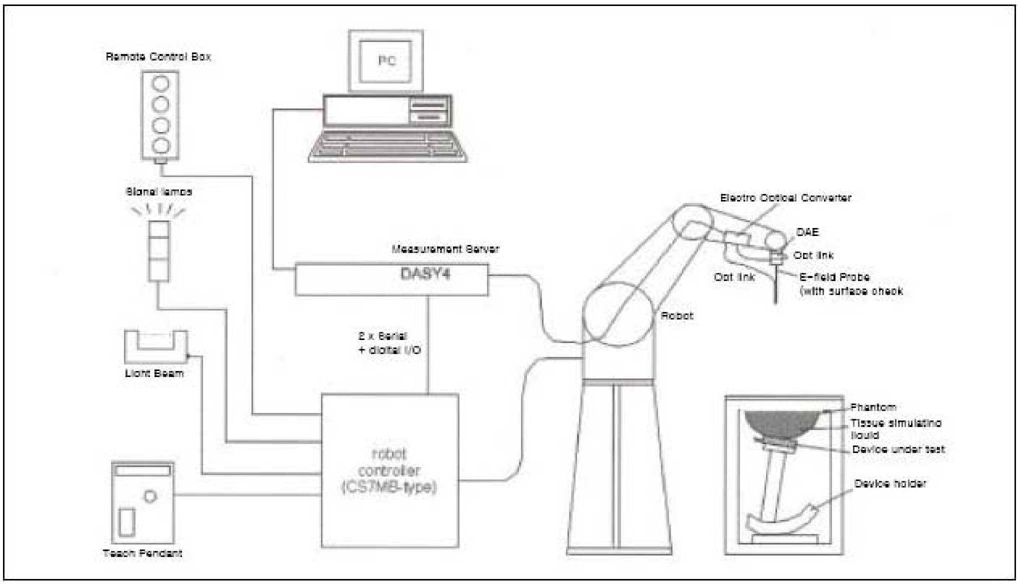


Fig. 5.1 SAR Measurement System Setup

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

5.3 DASY4 E-Field Probe System

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

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

Isotropic E-Field Probe

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

Fig. 5.2 Probe Specifications

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

5.4 Phantom & Equivalent Tissues

SAM Phantom

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

Head & Muscle simulation Mixture Characterization

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

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

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

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

Fig. 5.4 Composition of the Tissue Equivalent Matter

Device Holder for Transmitters

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

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

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

6. DESCRIPTION OF THE TEST PROCEDURE

6.1 Definition of Reference Point

EAR Reference point

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

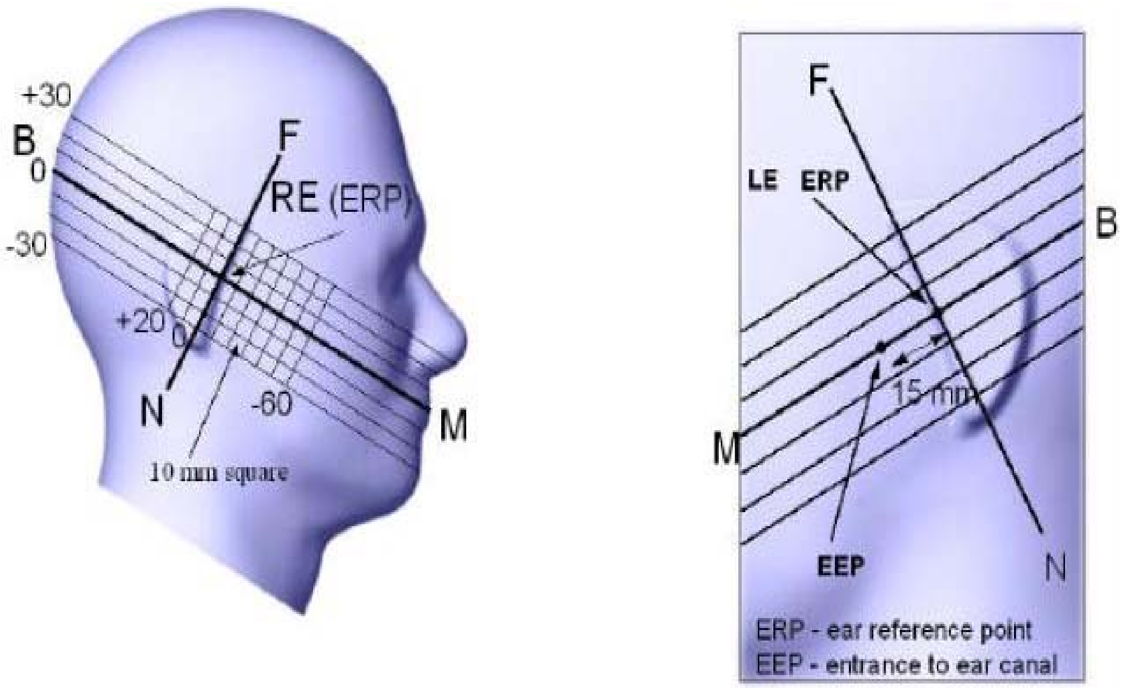


Figure 6.1 Close-up side view of ERP

Handset Reference Points

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

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

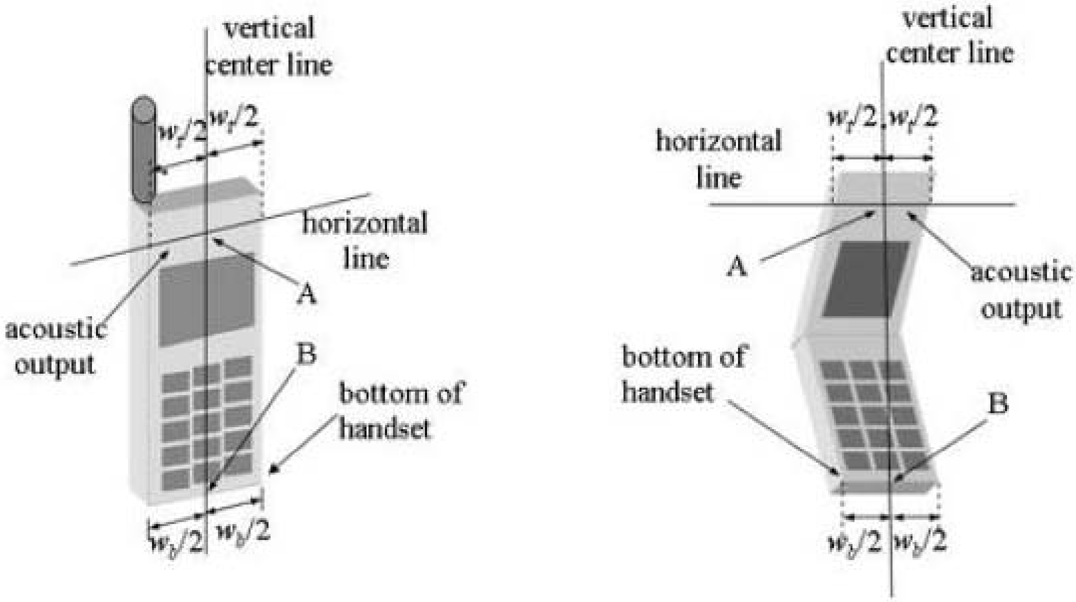


Figure 6.2 Handset Vertical Center & Horizontal Line Reference Points

6.2 Test Configuration Positions

Positioning for Cheek/Touch

1) Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece, open the cover . (If the phone can also be used with the cover closed ,both configurations must be tested.)
2) Define two imaginary lines on the handset: the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset: the midpoint of the width wt of the handset at the level of the acoustic output (point A on Figures 6.2), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 6.2). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not ecessarily parallel to the front face of the handset (see Figure 6.2), especially for clamshell handsets, handsets with lip pieces, and other irregularly-shaped handsets.
3) Position the handset close to the surface of the phantom touch that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6.3), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

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

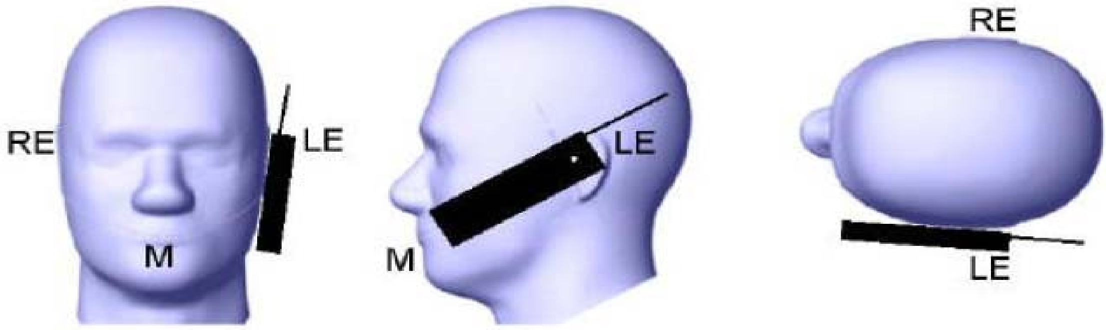


Figure 6.3 "Cheek" or "Touch" Position.

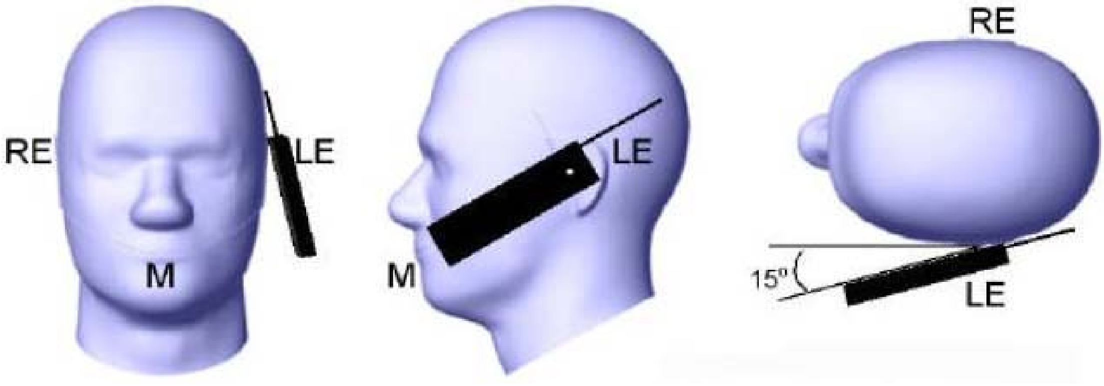


Figure 6.4 "Tilted" Position.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

Positioning for Ear / 15˚ Tilted

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

Body Holder / Belt Clip Configurations

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

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

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

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

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

6.3 Scan Procedures

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

6.4 SAR Averaging Methods

The maximum SAR value is averaged over its volume using interpolation and extrapolation.

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the “Not a Knot” ?condition [W.Gander, 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 value ±%	Probability Distribution	Divisor	ci 1 1g	Standard unc. (1g)	vi or Veff
MEASUREMENT SYSTEM						
Probe Calibration	± 11 %	normal	1	1	± 11 %	∞
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		± 1.0%	
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	± 2.9%	145
Device Holder Uncertainty	± 3.6	normal	1	1	± 3.6%	5
Output Power Validation - SAR drift measurement	± 5.0	rectangular	√3	1	± 2.9%	∞
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	± 4.0	rectangular	√3	1	± 2.3%	∞
Liquid conductivity Target - tolerance	± 5.0	rectangular	√3	0.64	± 1.8%	∞
Liquid Conductivity - measurement uncertainty	± 2.5	normal	1	0.64	± 1.6%	∞
Liquid permittivity Target - tolerance	± 5.0	rectangular	√3	0.6	± 1.7%	∞
Liquid Permittivity - measurement uncertainty	± 2.5	normal	1	0.6	± 1.5%	∞
Combined Standard Uncertainty					±10.81 %	330
Coverage Factor for 95%				K = 2		
Expanded Standard Uncertainty					± 21.62 %	

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

8. SYSTEM VERIFICATION

Tissue Verification

Table 8.1 Simulated Tissue Verification [5]

MEASURED TISSUE PARAMETERS										
Liquid Temperature (°C)		21		Liquid Depth(mm)		150				
Date	2005-02-01		2005-02-01				/ /			
Tissue	835MHz Brain		835MHz Muscle							
	Target	Measured	Target	Measured						
Dielectric Constant: ε	41.5	40.7	55.2	54.6						
Conductivity: σ	0.9	0.879	0.97	0.95						
Deviation (%)	ε : -1.9% σ : -2.3%		ε : -0.1% σ : -2 %							

Test System Validation

Prior to assessment, the system is verified to the ±10% of the specifications at 835MHz (Graphic Plots Attached)

Table 8.2 System Validation [5]

SYSTEM DIPOLE VALIDATION TARGET & MEASURED						
Tissue	System Validation Kit:	Forward Power (mW)	Targeted SAR1g (mW/g)	Measured SAR1g (mW/g)	Deviation (%)	Test Date
835MHz Brain	D835V2(S/N :475)	250	2.42	2.45	1.20%	2005-02-01

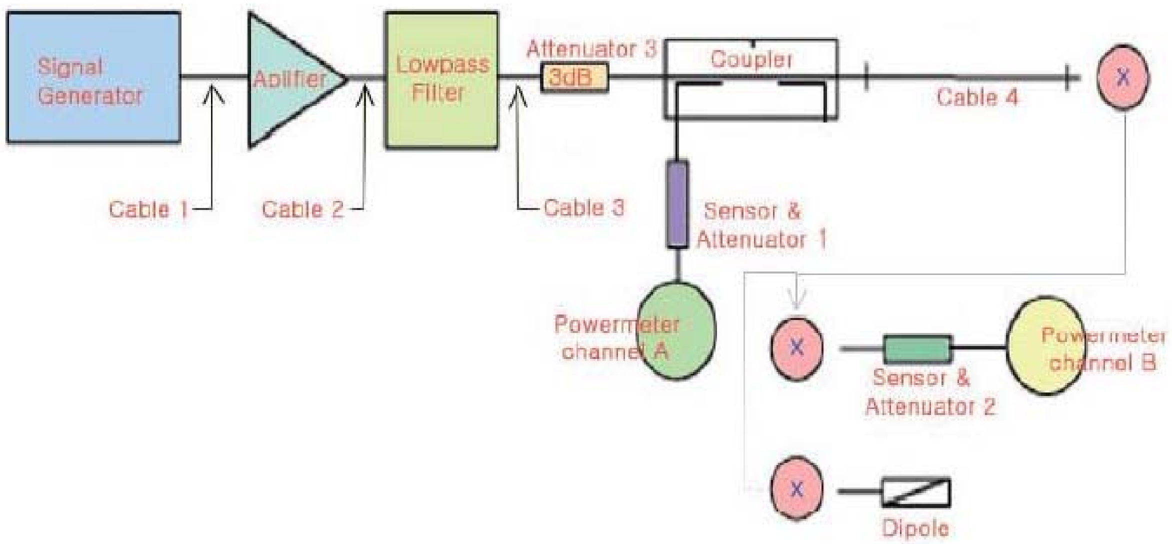


Figure 12.1 Dipole Validation Test Setup

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22.0
Relative HUMIDITY (%) : 41
Mixture Type : 835MHz Brain
Dielectric Constant : 40.7
Conductivity: 0.879

Measurement Results (CDMA Head SAR-Touch)

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

MEASUREMENT RESULTS (CDMA Left Head SAR – Touch)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.82	1017	CDMA	24.00	24.00	Standard	Cheek Touch	–	0.692
836.49	383	CDMA	24.00	23.81	Standard	Cheek Touch	–	1.040
848.19	772	CDMA	24.00	23.82	Standard	Cheek Touch	–	0.800

MEASUREMENT RESULTS (CDMA Right Head SAR – Touch)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.82	1017	CDMA	24.00	24.00	Standard	Cheek Touch	–	0.768
836.49	383	CDMA	24.00	23.94	Standard	Cheek Touch	–	1.220
848.19	772	CDMA	24.00	23.92	Standard	Cheek Touch	–	1.080

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

Engineer M.J.Song
(Signature)

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22.0
Relative HUMIDITY (%) : 41
Mixture Type : 835MHz Brain
Dielectric Constant : 40.7
Conductivity: 0.879

Measurement Results (CDMA 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 (CDMA Left Head SAR – Tlit)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
836.49	383	CDMA	24.00	24.00	Standard	Tilt	–	0.317

MEASUREMENT RESULTS (CDMA Right Head SAR – Tilt)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
836.49	383	CDMA	24.00	23.95	Standard	Tilt	–	0.318

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

Engineer M.J.Song
(Signature)

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22
Relative HUMIDITY (%) : 44
Mixture Type : 835MHz Body
Dielectric Constant : 54.6
Conductivity: 0.95

Measurement Results (CDMA BODY SAR w/o Holster)

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 (CDMA Body SAR Without Holster Folder open)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.82	1017	CDMA	24.00	24.00	Standard	1.5 [w/o Holster]	–	0.450
836.49	383	CDMA	24.00	23.92	Standard	1.5 [w/o Holster]	–	0.642
848.19	772	CDMA	24.00	24.00	Standard	1.5 [w/o Holster]	–	0.651

MEASUREMENT RESULTS (CDMA Body SAR Without Holster Folder Close)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
836.49	383	CDMA	24.00	23.82	Standard	1.5 [w/o Holster]	–	0.388

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

Engineer M.J.Song
(Signature)

10. REFERENCE

[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radio Frequency Radiation, Aug. 1996.

[2] ANSI/IEEE C95.1 – 1991, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300kHz to 100GHz, New York: IEEE, Aug. 1992

[3] ANSI/IEEE C95.3 – 1991, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave, New York: IEEE, 1992.

[4] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.

[5] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[6] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 120-124.

[7]K. Pokovi æ , T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.

[8] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[9] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.

[10] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.

[11] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.

[12] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[13] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.

[14] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recepies in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[15] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to RadioFrequency Electromagnetic Fields. Supplement C, Dec. 1997.

[16] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

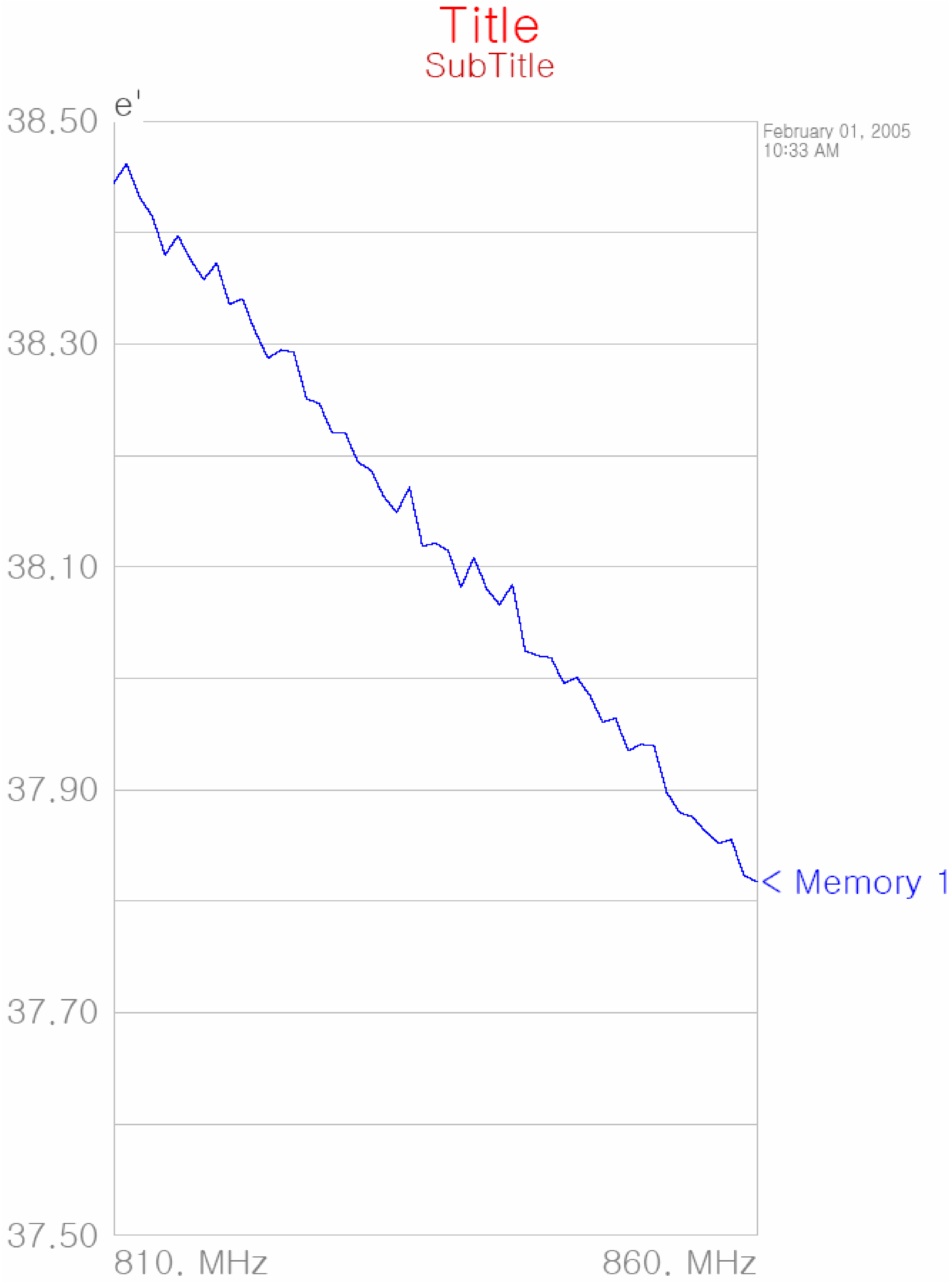
[17] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.

[18] Prof. Dr. Niels Kuster, ETH, Eidgen o ssische Technische Hoschschule Z u rich, Dosimetric Evaluation of the Cellular Phone.

APPENDIX A : Validation Test Data of Tissue

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

– Head Tissue



ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Title

SubTitle

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

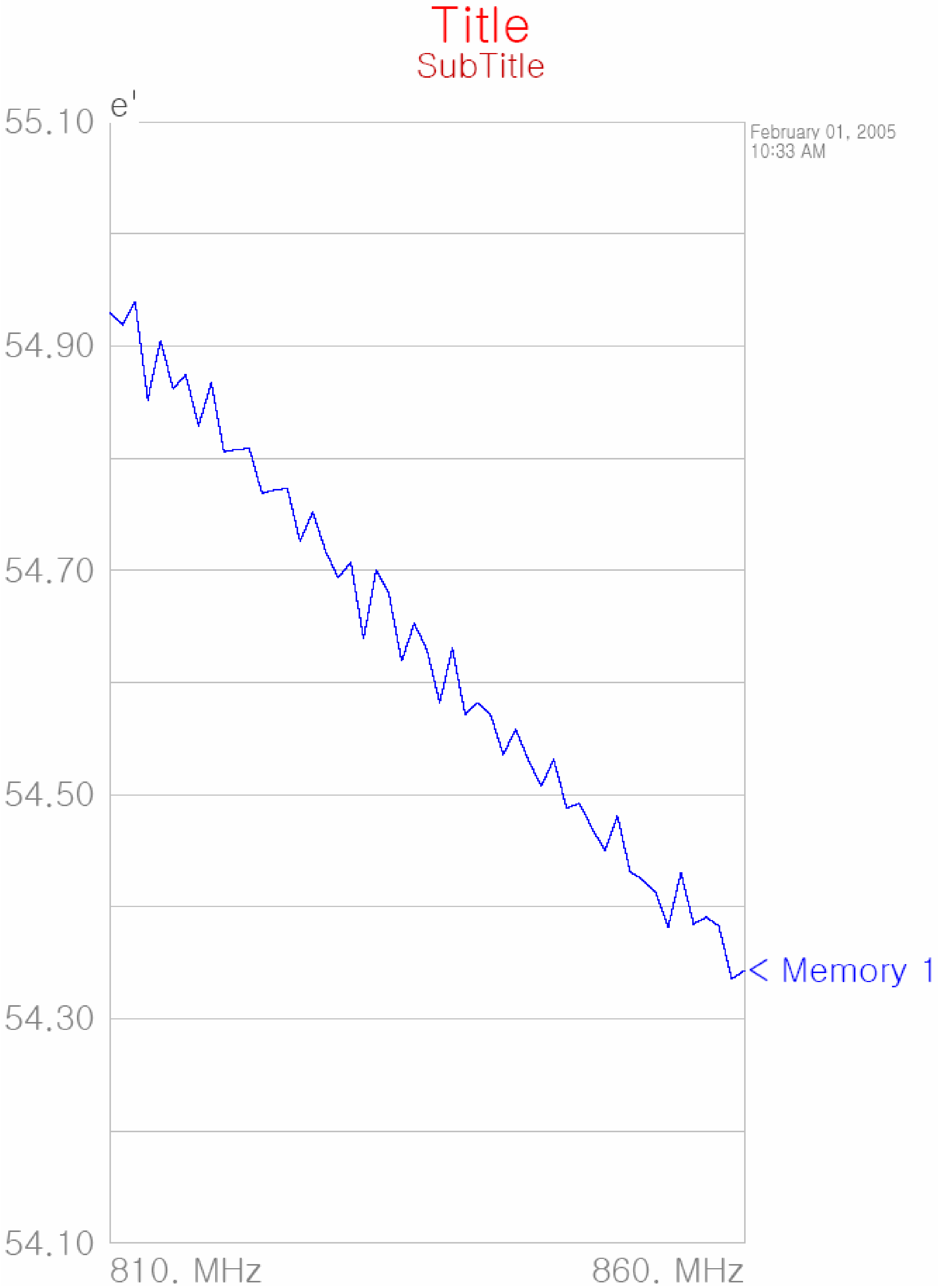
Title

SubTitle

February 01, 2005 10:33 AM

Frequency	e'	e''
810.000000 MHz	38.4446	18.1701
810.973262 MHz	38.4620	18.1524
811.946524 MHz	38.4321	18.1574
812.919785 MHz	38.4146	18.1274
813.893047 MHz	38.3799	18.1547
814.866309 MHz	38.3973	18.1371
815.845418 MHz	38.3751	18.1718
816.824527 MHz	38.3578	18.1419
817.803636 MHz	38.3728	18.1566
818.782745 MHz	38.3359	18.1739
819.761854 MHz	38.3409	18.1490
820.746845 MHz	38.3115	18.1538
821.731836 MHz	38.2871	18.1365
822.716828 MHz	38.2948	18.1634
823.701819 MHz	38.2926	18.1509
824.686810 MHz	38.2511	18.1484
825.677719 MHz	38.2465	18.1261
826.668628 MHz	38.2199	18.1408
827.659537 MHz	38.2203	18.1381
828.650446 MHz	38.1937	18.1112
829.641354 MHz	38.1871	18.1623
830.638216 MHz	38.1629	18.1036
831.635078 MHz	38.1489	18.1255
832.631941 MHz	38.1714	18.1276
833.628803 MHz	38.1183	18.1179
834.625665 MHz	38.1214	18.1250
835.628516 MHz	38.1145	18.0932
836.631367 MHz	38.0814	18.1200
837.634218 MHz	38.1086	18.1001
838.637068 MHz	38.0802	18.1050
839.639919 MHz	38.0663	18.0855
840.648795 MHz	38.0841	18.1093
841.657671 MHz	38.0245	18.1119
842.666547 MHz	38.0203	18.0900
843.675423 MHz	38.0186	18.0777
844.684299 MHz	37.9954	18.0813
845.699236 MHz	38.0010	18.0774
846.714173 MHz	37.9850	18.0689
847.729110 MHz	37.9607	18.0677
848.744047 MHz	37.9641	18.0746
849.758984 MHz	37.9350	18.0543
850.780018 MHz	37.9407	18.0504
851.801053 MHz	37.9396	18.0788
852.822087 MHz	37.8975	18.0670
853.843122 MHz	37.8795	18.0693
854.864157 MHz	37.8756	18.0477
855.891325 MHz	37.8627	18.0690
856.918494 MHz	37.8518	18.0593
857.945663 MHz	37.8554	18.0661
858.972831 MHz	37.8232	18.0519
860.000000 MHz	37.8174	18.0612

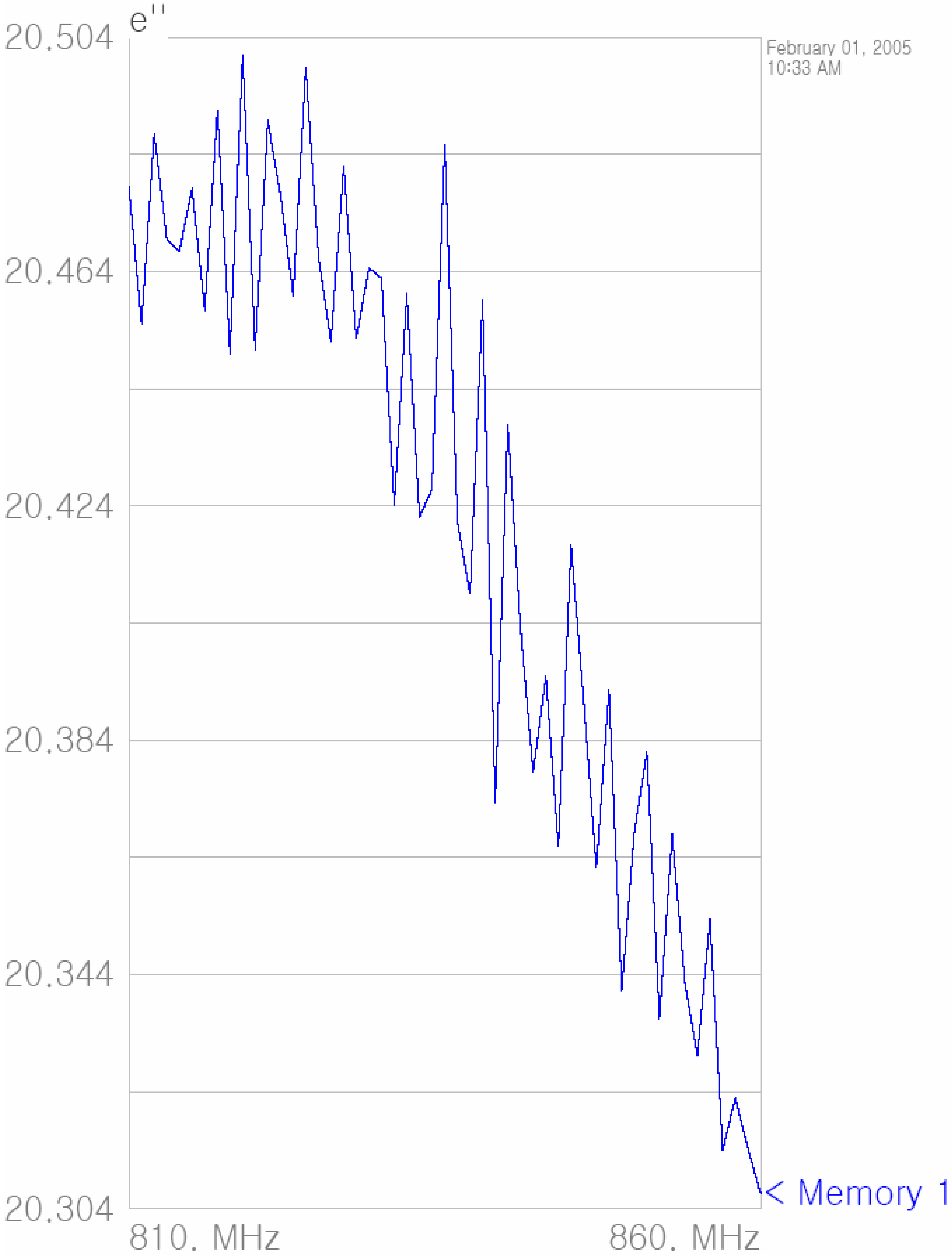
– Body Tissue


Title
SubTitle
e'
55.10
54.90
54.70
54.50
54.30
54.10
February 01, 2005
10:33 AM
< Memory 1
810. MHz
860. MHz

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Title

SubTitle



ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Title

SubTitle

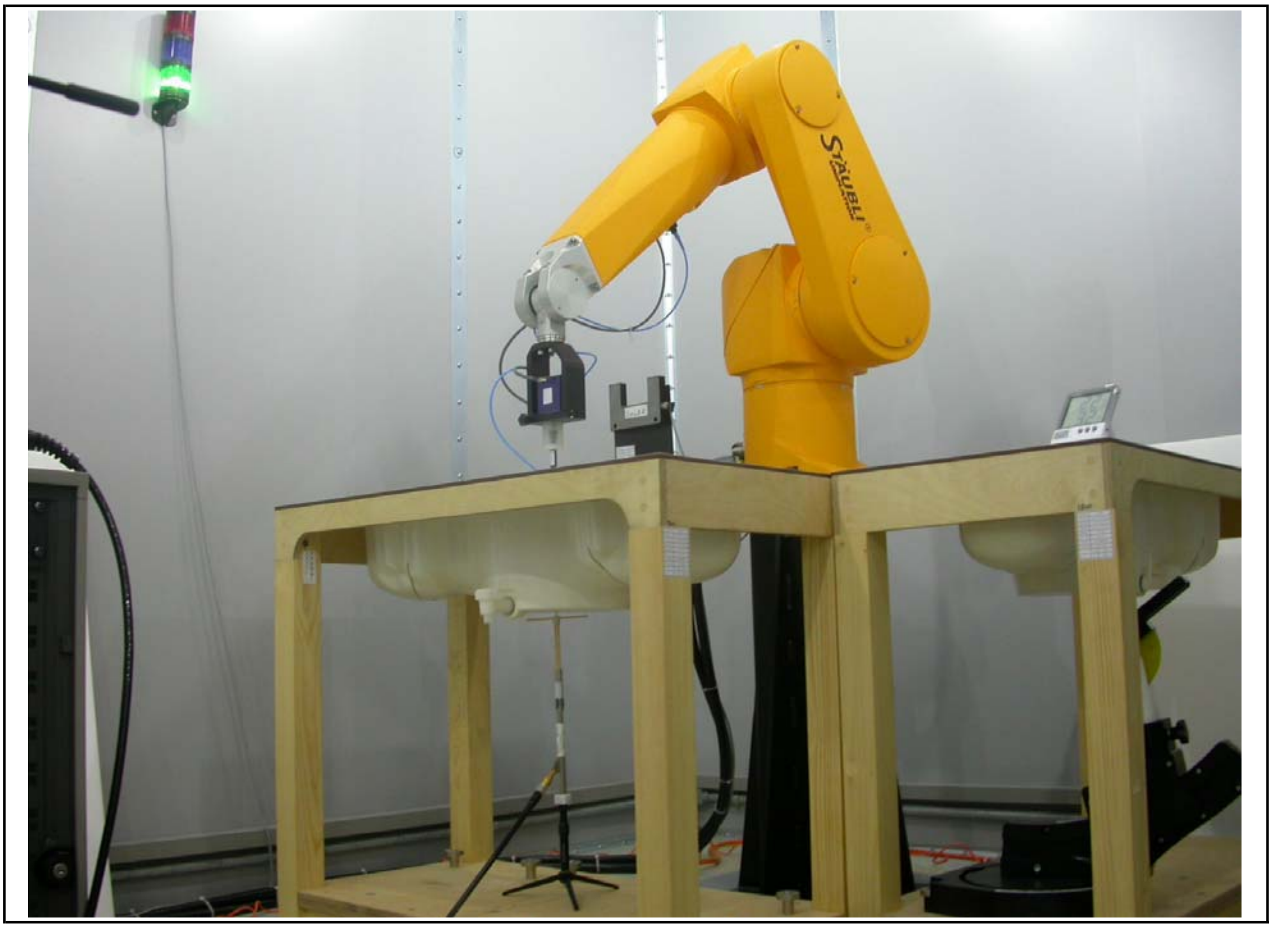
February 01, 2005 10:33 AM

Frequency	e'	e''
810.000000 MHz	54.9299	20.4786
810.973262 MHz	54.9189	20.4551
811.946524 MHz	54.9395	20.4876
812.919785 MHz	54.8520	20.4694
813.893047 MHz	54.9051	20.4675
814.866309 MHz	54.8619	20.4782
815.845418 MHz	54.8745	20.4574
816.824527 MHz	54.8287	20.4914
817.803636 MHz	54.8674	20.4499
818.782745 MHz	54.8057	20.5010
819.761854 MHz	54.8076	20.4506
820.746845 MHz	54.8088	20.4898
821.731836 MHz	54.7688	20.4771
822.716828 MHz	54.7717	20.4599
823.701819 MHz	54.7730	20.4989
824.686810 MHz	54.7260	20.4667
825.677719 MHz	54.7522	20.4521
826.668628 MHz	54.7172	20.4821
827.659537 MHz	54.6935	20.4526
828.650446 MHz	54.7074	20.4646
829.641354 MHz	54.6388	20.4629
830.638216 MHz	54.7002	20.4241
831.635078 MHz	54.6789	20.4602
832.631941 MHz	54.6192	20.4221
833.628803 MHz	54.6526	20.4268
834.625665 MHz	54.6290	20.4857
835.628516 MHz	54.5817	20.4213
836.631367 MHz	54.6308	20.4090
837.634218 MHz	54.5713	20.4592
838.637068 MHz	54.5819	20.3734
839.639919 MHz	54.5719	20.4380
840.648795 MHz	54.5357	20.4028
841.657671 MHz	54.5583	20.3785
842.666547 MHz	54.5305	20.3949
843.675423 MHz	54.5076	20.3658
844.684299 MHz	54.5314	20.4174
845.699236 MHz	54.4877	20.3907
846.714173 MHz	54.4924	20.3622
847.729110 MHz	54.4703	20.3928
848.744047 MHz	54.4500	20.3412
849.758984 MHz	54.4811	20.3681
850.780018 MHz	54.4312	20.3820
851.801053 MHz	54.4241	20.3364
852.822087 MHz	54.4136	20.3680
853.843122 MHz	54.3817	20.3427
854.864157 MHz	54.4304	20.3302
855.891325 MHz	54.3846	20.3535
856.918494 MHz	54.3906	20.3140
857.945663 MHz	54.3827	20.3229
858.972831 MHz	54.3357	20.3143
860.000000 MHz	54.3431	20.3067

APPENDIX B : Validation Test Data

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

835MHz Dipole Validation



ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 11:21:31

Test Laboratory: ESTECH

validation 835MHz -0201

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

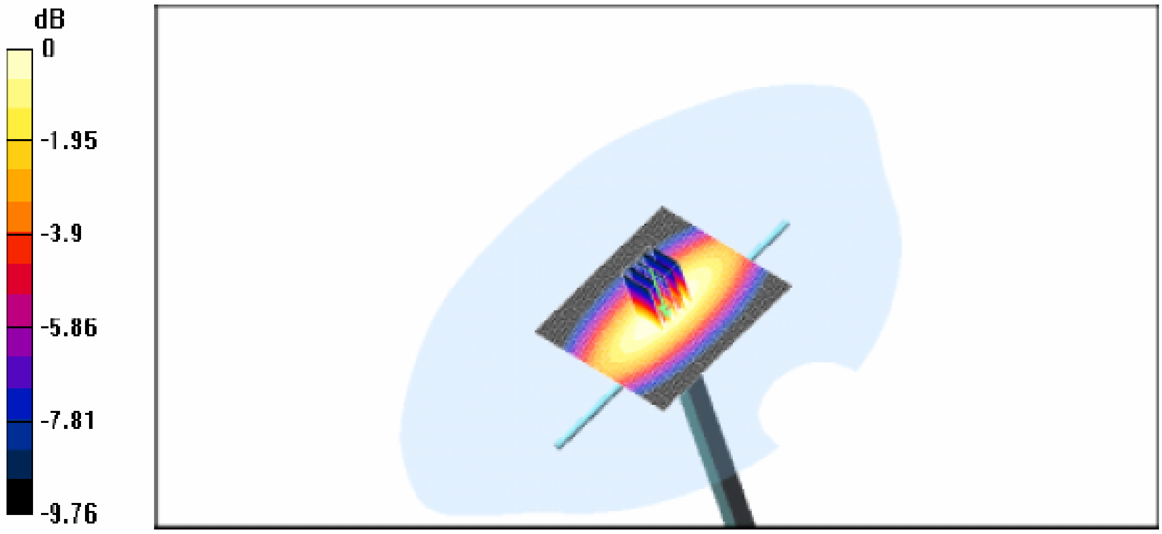
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used: f = 835 MHz; σ = 0.879 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.57, 6.57, 6.57); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 45%

Unnamed procedure/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.64 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.6 V/m; Power Drift = -0.0 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 2.45 mW/g
Maximum value of SAR (measured) = 2.65 mW/g



0 dB = 2.65mW/g

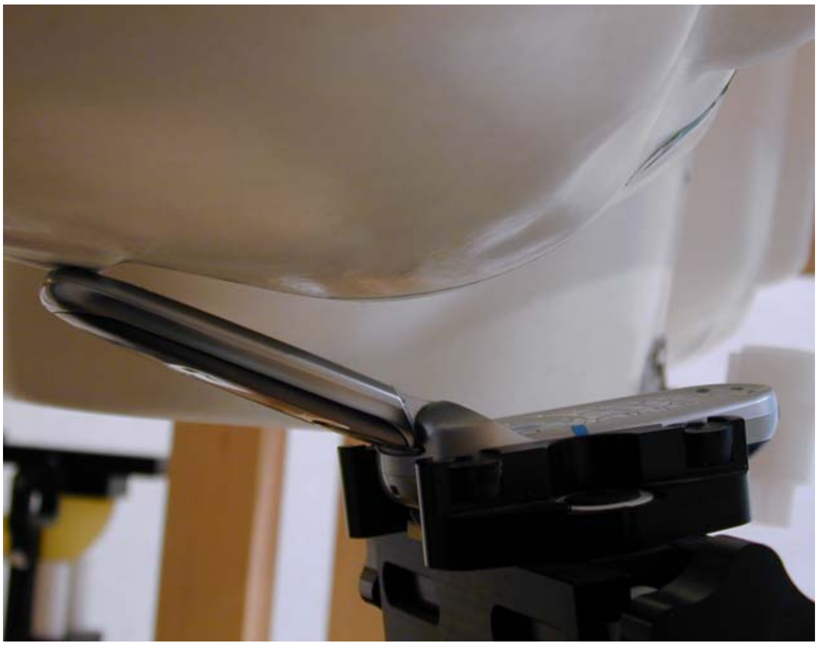
APPENDIX C : SAR Test Setup Photographs

Left Hand –Touch Position

Right Hand –Touch Position

Left Hand –Tlit Position

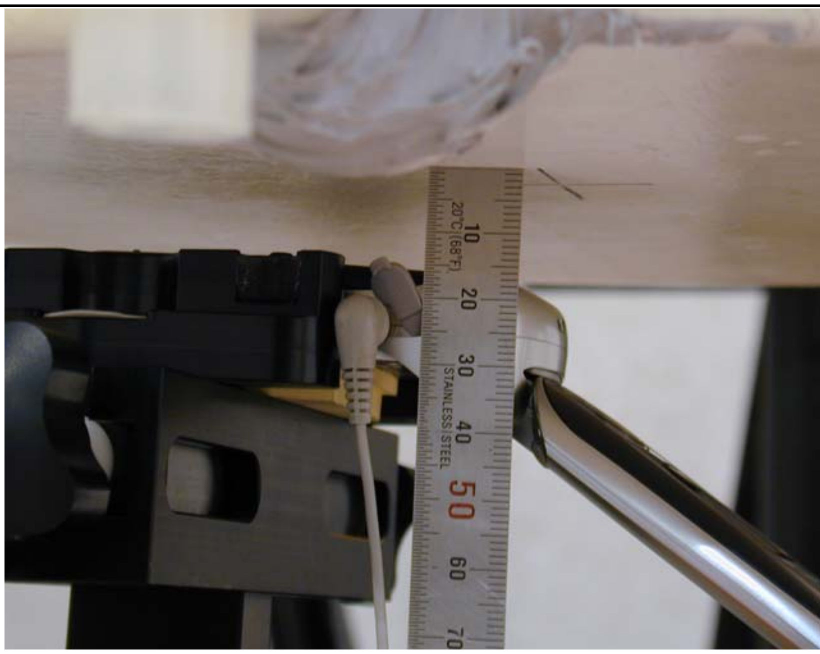
Right Hand –Tilt Position



ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Flat – Body Side Configuration (Folder Close)

Flat – Body Front Configuration (Folder Open)



APPENDIX D : SAR Test Data

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 17:12:45

Test Laboratory: ESTECH

CH 1017-LEFT TOUCH

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 824.82 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 824.82 MHz; $\sigma = 0.87$ mho/m; $\varepsilon_r = 40.9$; $\rho = 1000$ kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

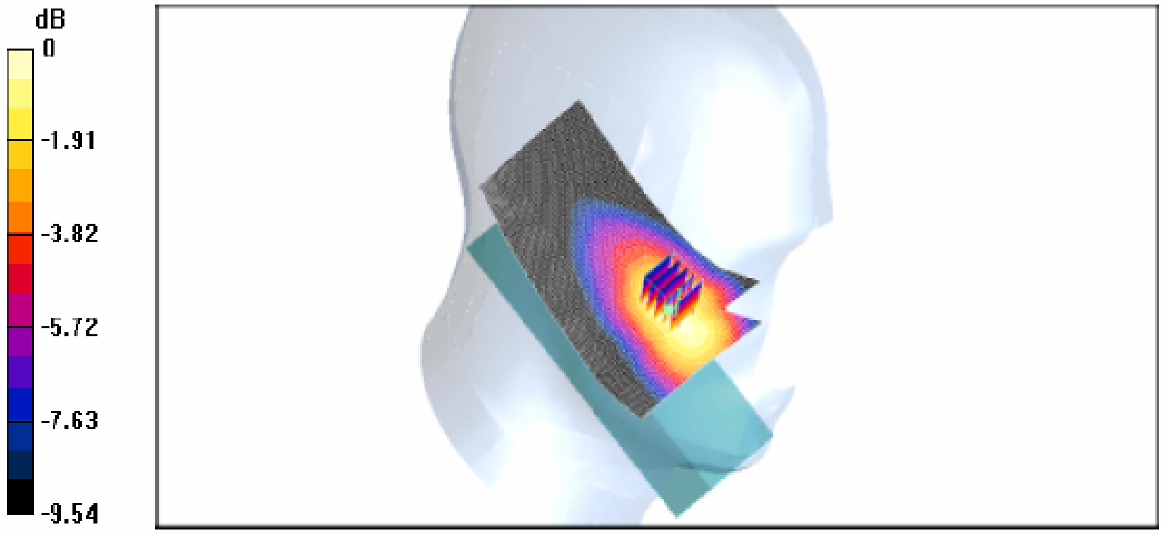
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.57, 6.57, 6.57); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22 ℃, Humidity : 41%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.763 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.25 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 0.980 W/kg
SAR(1 g) = 0.692 mW/g
Maximum value of SAR (measured) = 0.740 mW/g



0 dB = 0.740mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II, 426-5, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 14:25:39

Test Laboratory: ESTECH

CH 383-LEFT TOUCH

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 836.49 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 836.49 MHz; σ = 0.881 mho/m; $\varepsilon_r = 40.7$; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

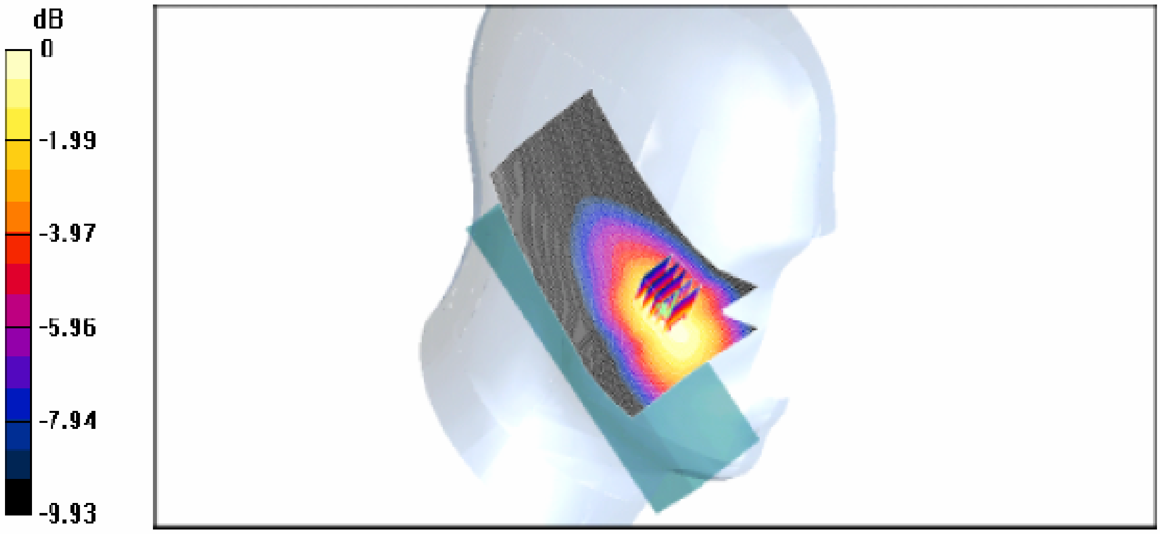
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.57, 6.57, 6.57); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 41%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 1.18 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.78 V/m; Power Drift = -0.2 dB
Peak SAR (extrapolated) = 1.52 W/kg
SAR(1 g) = 1.04 mW/g
Maximum value of SAR (measured) = 1.11 mW/g



0 dB = 1.11mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 16:46:30

Test Laboratory: ESTECH

CH 772-LEFT TOUCH

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 848.19 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 848.19 MHz; σ = 0.889 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

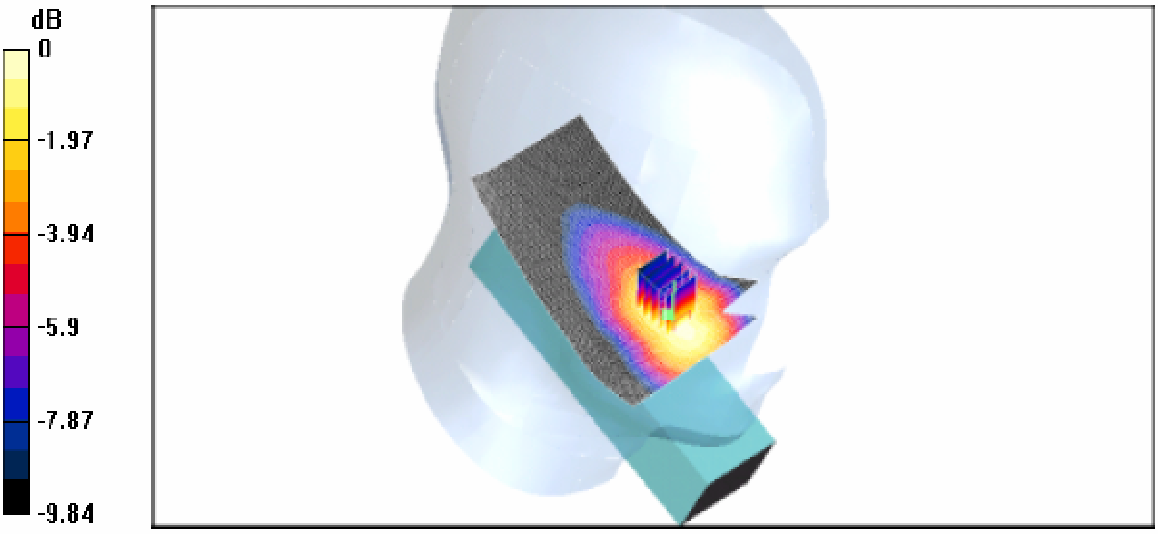
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.57, 6.57, 6.57); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 41%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.920 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.37 V/m; Power Drift = -0.3 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.800 mW/g
Maximum value of SAR (measured) = 0.857 mW/g



0 dB = 0.857mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II, 426-5, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 17:42:32

Test Laboratory: ESTECH

CH 1017-RIGHT TOUCH

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 824.82 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 824.82 MHz; σ = 0.87 mho/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

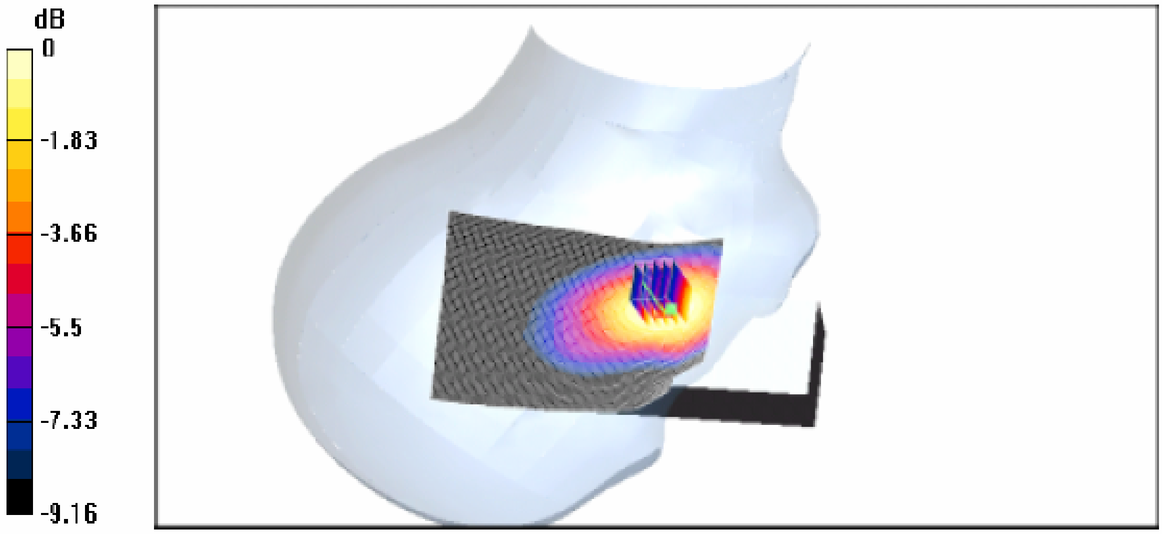
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.57, 6.57, 6.57); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 41%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.801 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.54 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 1.1 W/kg
SAR(1 g) = 0.768 mW/g
Maximum value of SAR (measured) = 0.832 mW/g



0 dB = 0.832mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 15:23:42

Test Laboratory: ESTECH

CH 383-RIGHT TOUCH

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 836.49 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 836.49 MHz; σ = 0.881 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

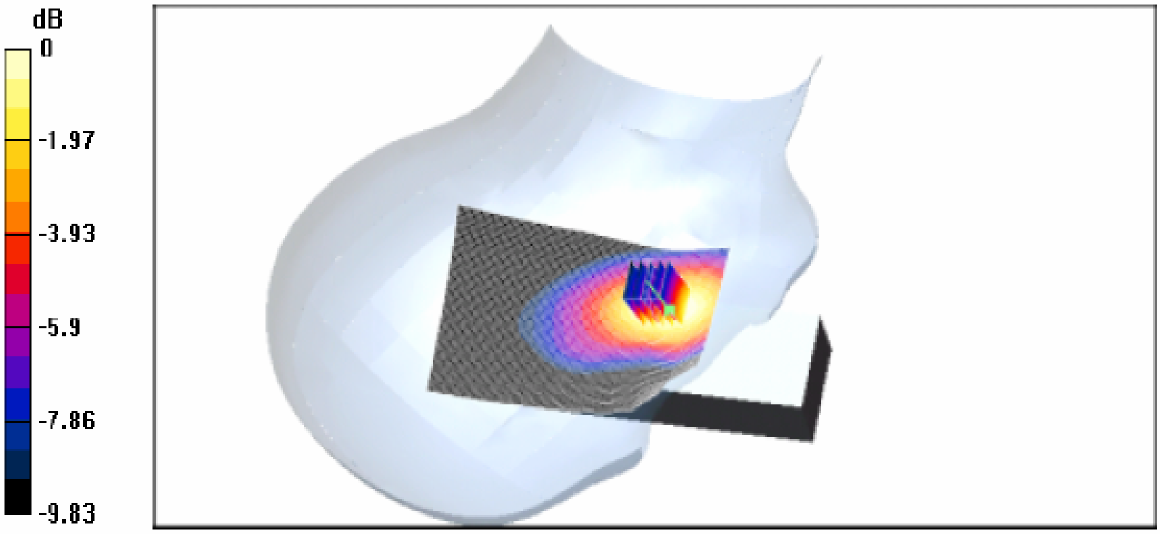
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.57, 6.57, 6.57); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 41%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 1.3 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.8 V/m; Power Drift = -0.2 dB
Peak SAR (extrapolated) = 1.82 W/kg
SAR(1 g) = 1.22 mW/g
Maximum value of SAR (measured) = 1.32 mW/g



0 dB = 1.32mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 16:18:00

Test Laboratory: ESTECH

CH 772-RIGHT TOUCH

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 848.19 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 848.19 MHz; σ = 0.889 mho/m; $\varepsilon_r = 40.5$; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

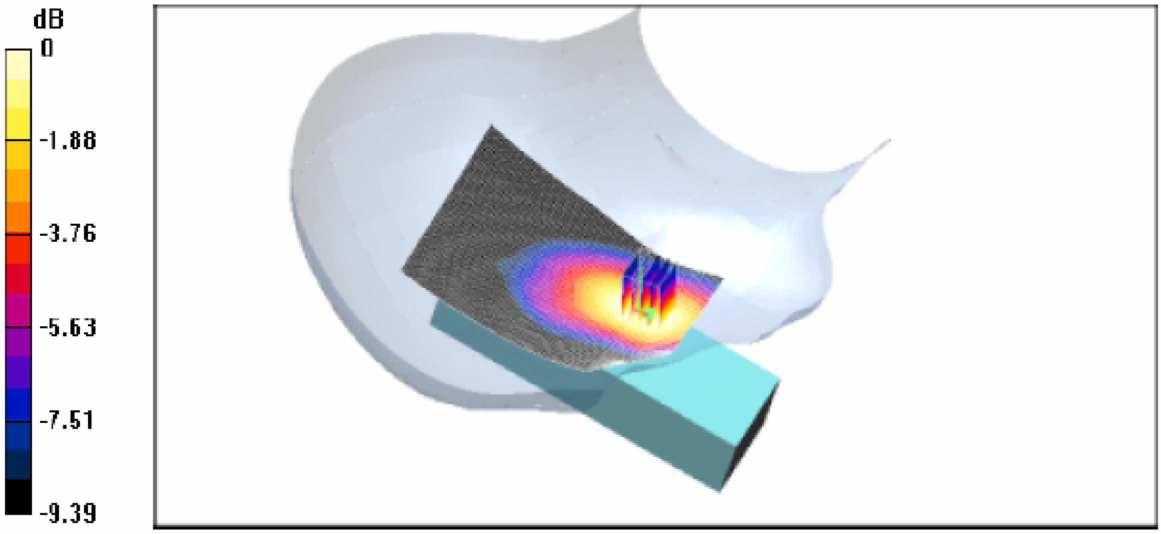
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.57, 6.57, 6.57); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 41%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 1.13 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.7 V/m; Power Drift = -0.2 dB
Peak SAR (extrapolated) = 1.58 W/kg
SAR(1 g) = 1.08 mW/g
Maximum value of SAR (measured) = 1.15 mW/g



0 dB = 1.15mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 14:53:59

Test Laboratory: ESTECH

CH 383-LEFT TILT

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 836.49 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 836.49 MHz; σ = 0.881 mho/m; $\varepsilon_r = 40.7$; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

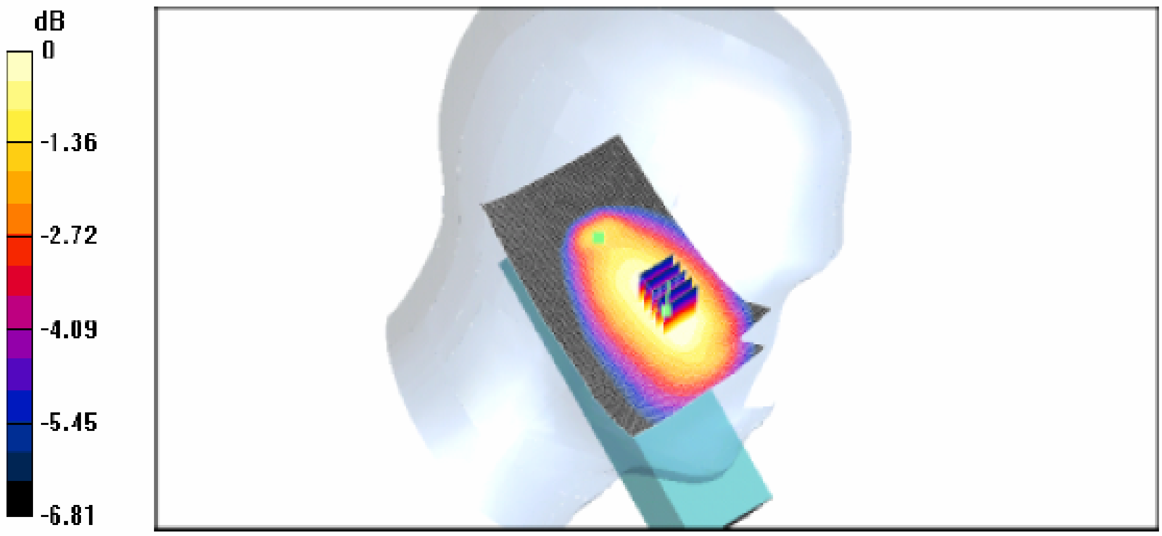
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.57, 6.57, 6.57); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 41%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.338 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.1 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 0.411 W/kg
SAR(1 g) = 0.317 mW/g
Maximum value of SAR (measured) = 0.335 mW/g



0 dB = 0.335mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 15:48:36

Test Laboratory: ESTECH

CH 383-RIGHT TILT

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 836.49 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 836.49 MHz; σ = 0.881 mho/m; $\varepsilon_r = 40.7$; $\rho = 1000$ kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

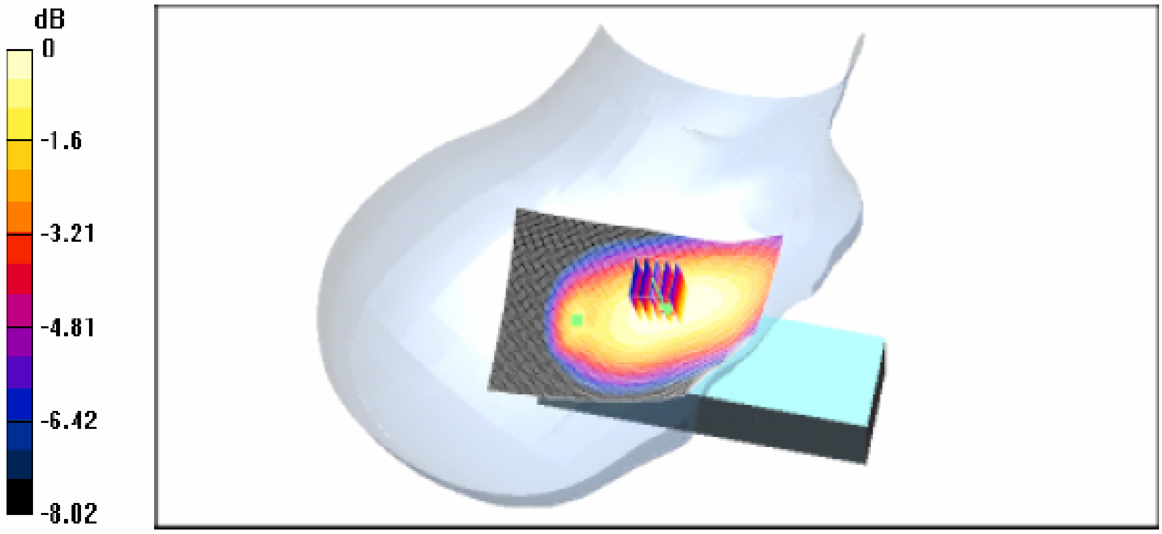
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.57, 6.57, 6.57); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 41%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.337 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.4 V/m; Power Drift = -0.2 dB
Peak SAR (extrapolated) = 0.400 W/kg
SAR(1 g) = 0.318 mW/g
Maximum value of SAR (measured) = 0.336 mW/g



0 dB = 0.336mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 18:14:29

Test Laboratory: ESTECH

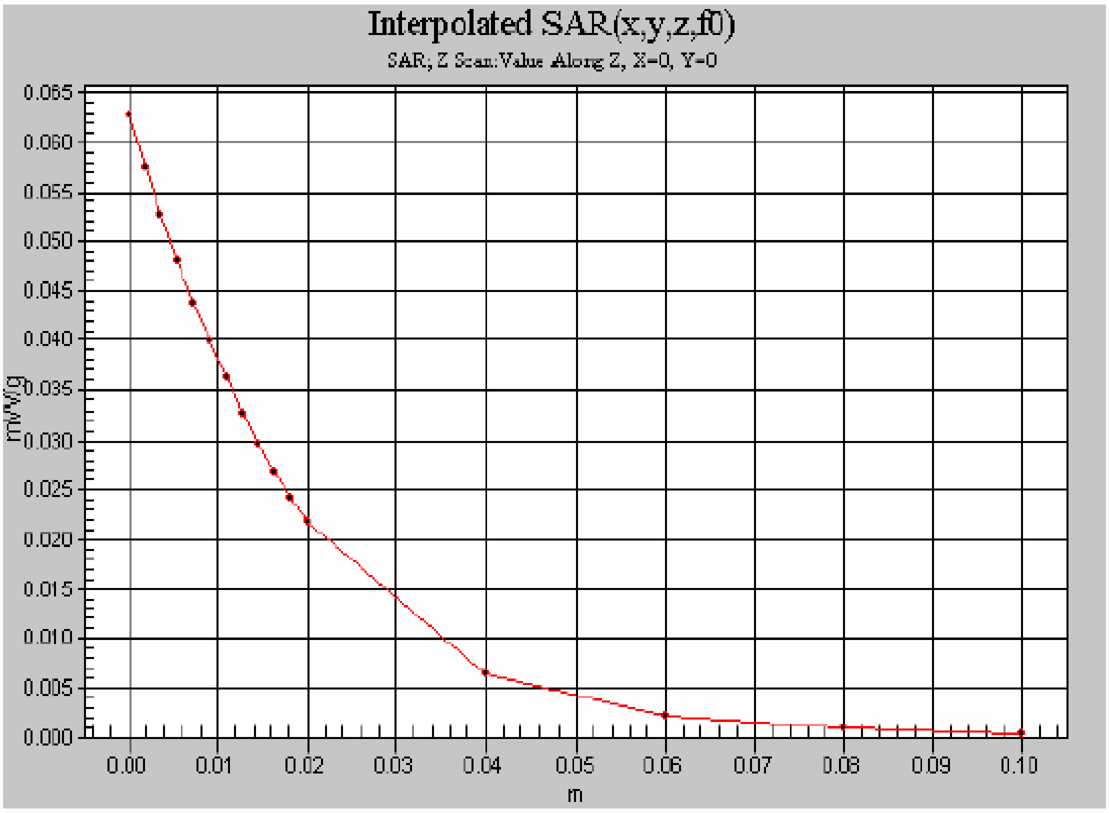
CH 383-RIGHT TOUCH-ZSCAN

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 836.49 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 836.49 MHz; σ = 0.881 mho/m; $\varepsilon_r = 40.7$; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.57, 6.57, 6.57); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 44%



ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 22:00:11

Test Laboratory: ESTECH

CH 1017-BODY OPEN

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 824.82 MHz;Duty Cycle: 1:1
Medium: M900 Medium parameters used (interpolated): f = 824.82 MHz; σ = 0.939 mho/m; ε_r = 54.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

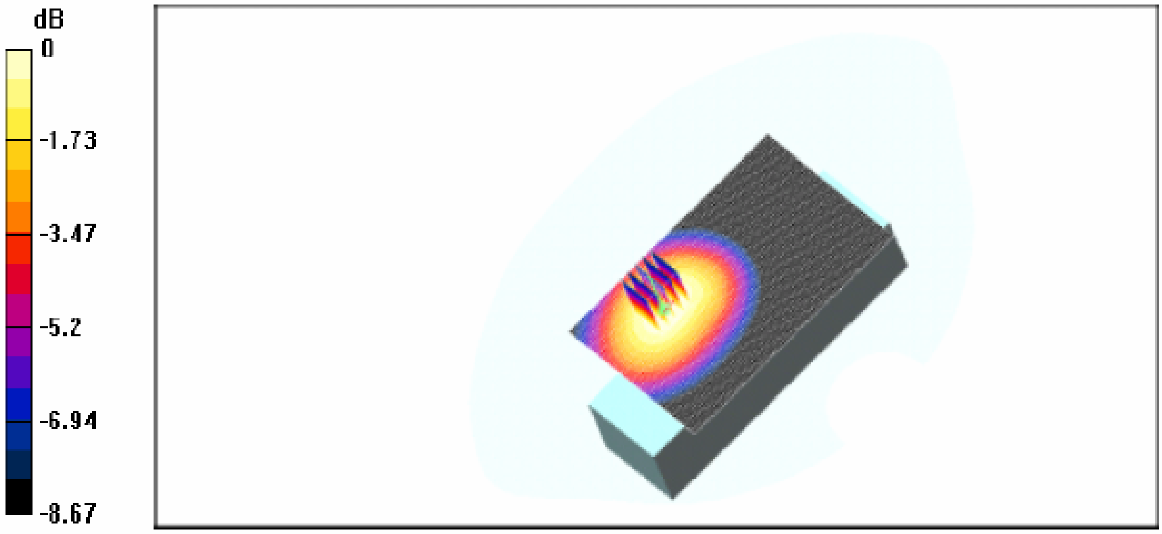
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.03, 6.03, 6.03); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 44%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.481 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.5 V/m; Power Drift = -0.0 dB
Peak SAR (extrapolated) = 0.600 W/kg
SAR(1 g) = 0.450 mW/g
Maximum value of SAR (measured) = 0.478 mW/g



0 dB = 0.478mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 19:42:43

Test Laboratory: ESTECH

CH 383-BODY OPEN

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 836.49 MHz;Duty Cycle: 1:1
Medium: M900 Medium parameters used (interpolated): f = 836.49 MHz; σ = 0.95 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

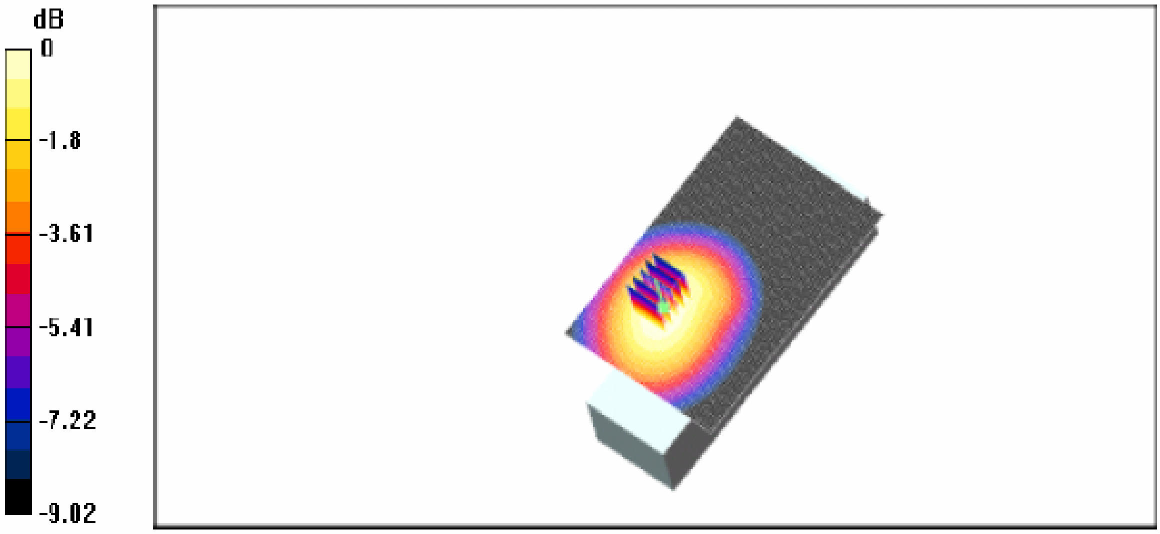
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.03, 6.03, 6.03); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 44%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.697 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.6 V/m; Power Drift = -0.2 dB
Peak SAR (extrapolated) = 0.868 W/kg
SAR(1 g) = 0.642 mW/g
Maximum value of SAR (measured) = 0.683 mW/g



0 dB = 0.683mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 21:29:39

Test Laboratory: ESTECH

CH 772-BODY OPEN

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 848.19 MHz;Duty Cycle: 1:1
Medium: M900 Medium parameters used (interpolated): f = 848.19 MHz; σ = 0.961 mho/m; ε_r = 54.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

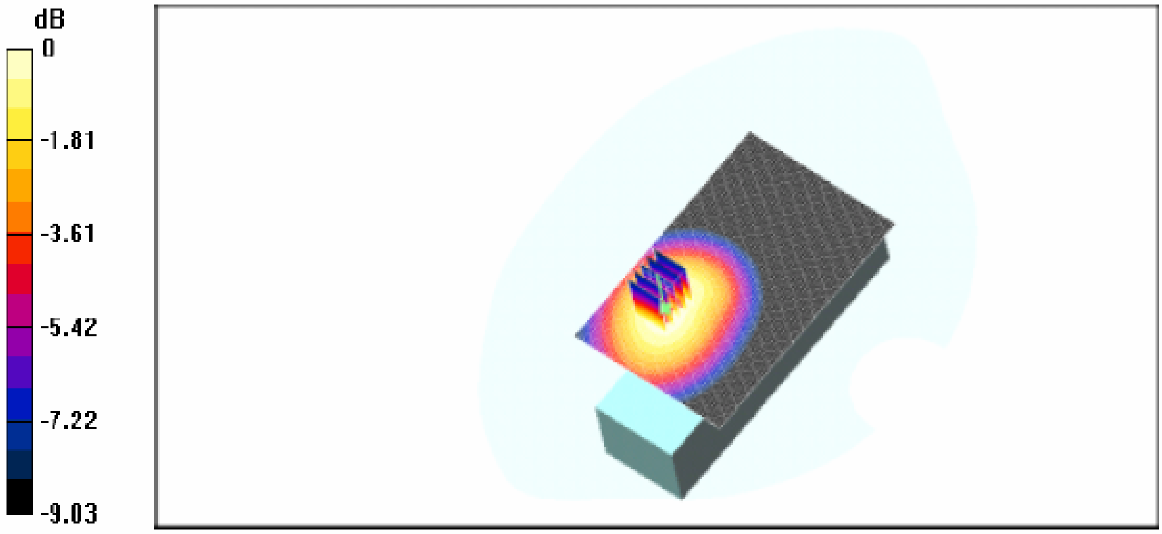
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.03, 6.03, 6.03); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 44%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.695 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.8 V/m; Power Drift = -0.0 dB
Peak SAR (extrapolated) = 0.878 W/kg
SAR(1 g) = 0.651 mW/g
Maximum value of SAR (measured) = 0.695 mW/g



0 dB = 0.695mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 21:03:39

Test Laboratory: ESTECH

CH 383-BODY CLOSE

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 836.49 MHz;Duty Cycle: 1:1
Medium: M900 Medium parameters used (interpolated): f = 836.49 MHz; σ = 0.95 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

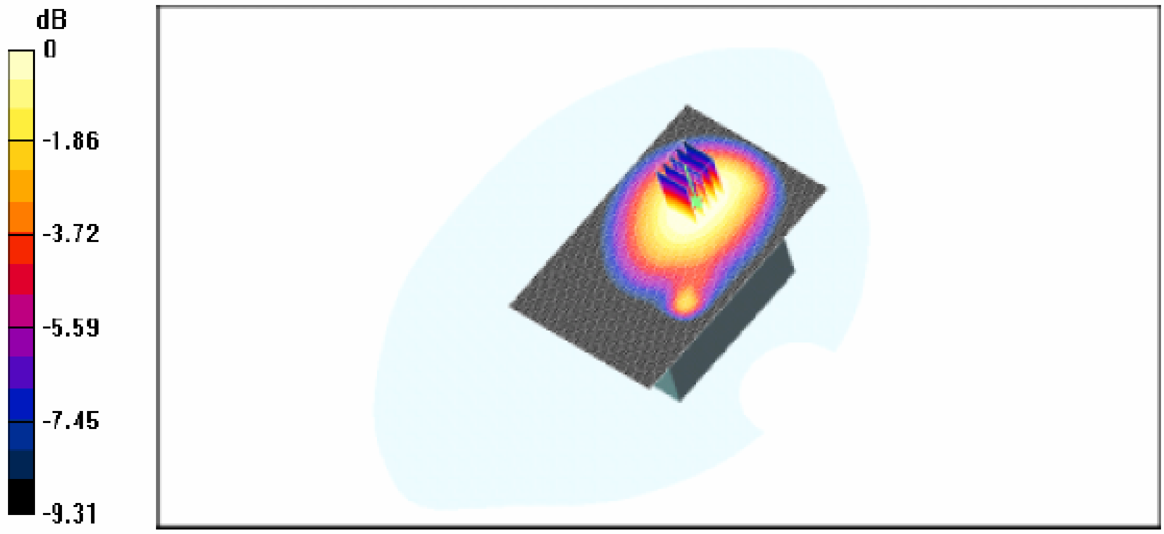
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.03, 6.03, 6.03); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 44%

Unnamed procedure/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.431 mW/g

Unnamed procedure/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.33 V/m; Power Drift = -0.3 dB
Peak SAR (extrapolated) = 0.525 W/kg
SAR(1 g) = 0.388 mW/g
Maximum value of SAR (measured) = 0.410 mW/g



0 dB = 0.410mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II, 426-5, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 02/01/05 22:27:23

Test Laboratory: ESTECH

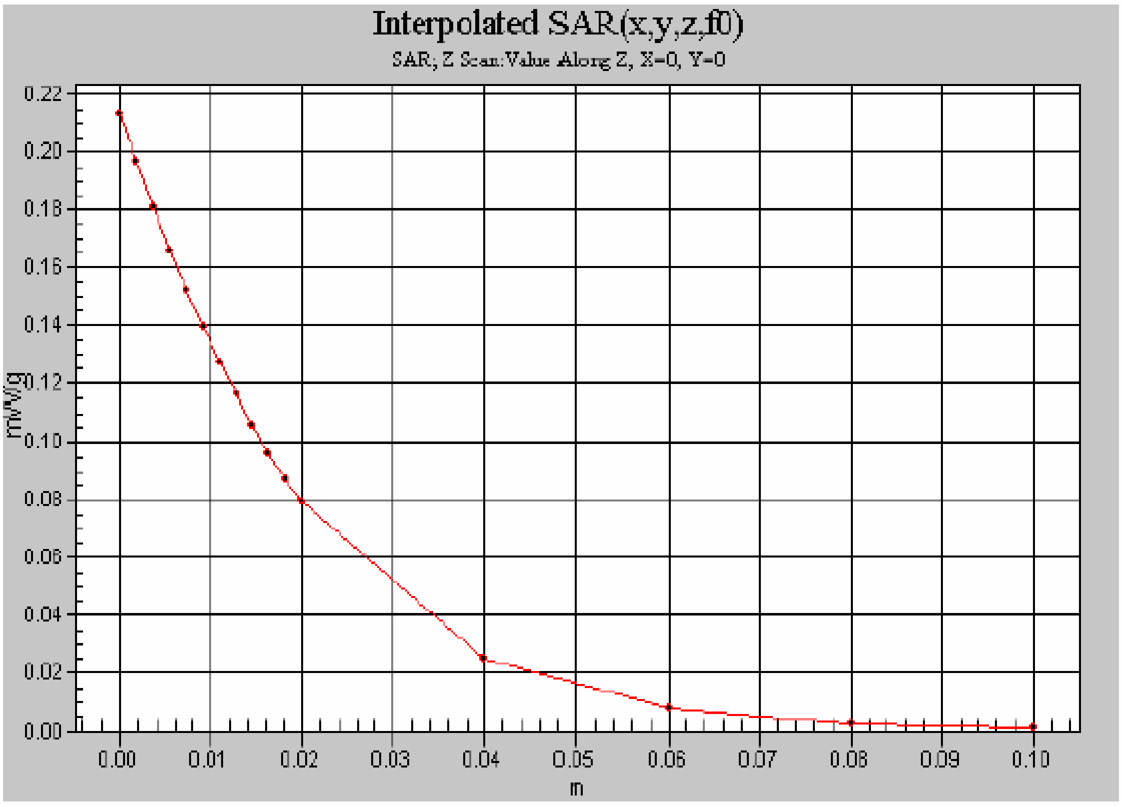
CH 772-BODY OPEN-ZSCAN

DUT: LG-AD6335; Type: FOLDER TYPE; Serial: XXXX

Communication System: CDMA FCC; Frequency: 848.19 MHz;Duty Cycle: 1:1
Medium: M900 Medium parameters used (interpolated): f = 848.19 MHz; σ = 0.961 mho/m; ε_r = 54.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(6.03, 6.03, 6.03); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130
- Temperature : 22℃, Humidity : 44%



APPENDIX E : Calibration Certificates