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SAR Compliace Test Report

APPLICANT NAME & ADDRESS :
Langchao LG Digital Mobile Communication Co.,LTD.
228 Changjjang Road, Yantai Development Zone,
PRC Postal Code : 264006

DATA & LOCATION OF TESTING
Dates of testing : 2006 6/1 ~ 7/6
Test Site : ESTECH Co., Ltd. Korea

Test Device :

Models : MG120, MG120a, MG120b, MG125

FCC ID : BEJMG120

TYPE : GSM Phone (Prototype)

Test report no :	ESTSAR0607-001	Number of page :	25
Contact person :	Lee Man Soo	Responsible test Engineer :	K.H.Kang

Testing has been Carried out in Accordance with :	IEEE P1528-200X Draft 6.4 Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate(SAR) in the Human Body Due to Wireless Communications Device : Experimental Techniques
Applicant Type :	Certification
FCC CLASSIFICATION :	Licensed Non-Broadcast Transmitter Held to Ear (TNE) Licensed Portable Transmitter Held to Ear (PCE)
FCC Rule Part(s)	§2.1093; FCC/OET Bulletin 65 Supplement C (July 2001)
Test results :	The Tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced recept in full, without written approval of the laboratory.

Date and Signatures : 2006/7/6
Report Prepared By : Engineer/ K.H.Kang
(Signature)
Manager Engineer/ Jay Kim
(Signature)

Table of Contents

1. SUMMARY FOR TEST REPORT

FCC ID	BEJMG120
Date of test	2006/6/1 ~ 2006/7/6
Responsible test engineer	Jay Kim
Measurement performed by	K.H.Kang
EUT Type	GSM Phone (Prototype)
Tx Frequency	824.2 ~ 848.8MHz(GSM850), 1850.2 ~ 1909.8 MHz(PCS1900)
Rx Frequency	869.2 ~ 893.8MHz(GSM850), 1930.2 ~ 1989.8 MHz(PCS1900)
Max. RF Output Power	GSM (33 dBm) PCS (30 dBm)

Maximum Results Found During SAR Evaluation

1.1 Head Configuration

Max. SAR Measurement

FREQUENCY		Modulation	Conducted Power(dBm)		Device test position	Antenna position	SAR (W/kg)
MHz	Ch		dBm	Battery			
848.8	251	GSM	33	Standard	Right Touch	–	0.796
1850.2	512	GSM	30	Standard	Right Touch	–	1.03

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			
848.8	251	GSM	33	Standard	1.5cm [w/o Holster]	–	0.447
1850.2	512	GSM	30	Standard	1.5cm [w/o Holster]	–	0.254

1.3 Measurement Uncertainty

Combine Standard Uncertainty	± 11.32 (k=1)
Extended Standard Uncertainty	± 22.64 (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	the top of the device
Radiator Material	Copper

2.2 Device Description

FCC ID	FCC ID : BEJMG120
Serial numbers	–
Exposure environment	Uncontrolled exposure
Device category	Portable device
Mode(s) of Operation	GSM / GPRS
Modulation Mode(s)	GSM
Duty Cycle	8.3
Transmitting FreQuency Range(s)	824.2 ~ 848.8MHz(GSM850), 1850.2 ~ 1909.8 MHz(PCS1900)
test signal method	■ Base station simulator □ Internal test code

2.3 Battery Options

There is only one battery option available for tested device,

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4. TEST CONDITIONS

4.1 Ambient Conditions

Ambient Temperature (˚C)	22
Tissue simulating liquid temperature (˚C)	22
Humidity (%)	48

4.2 RF Characteristics of The Test Site

Tests were performed in a fully enclosed RF Shielded environment

4.3 Test Signal, Frequencies, And Output Power

The handset was placed into simulated call mode (850MHz GSM, 1900MHz PCS modes) using manufacturers test codes.

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

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

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

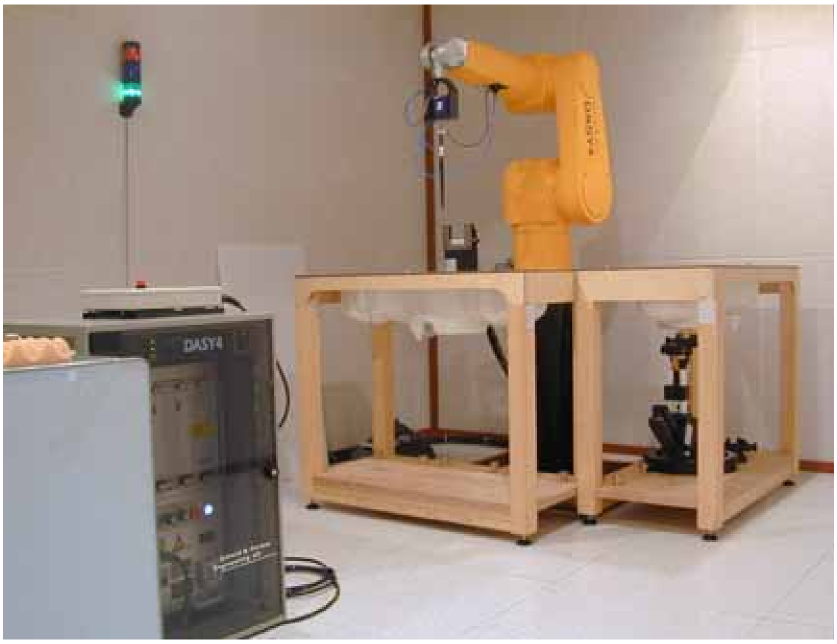

Fig. 4.1 SAR Measurement System

5. DESCRIPTION OF THE TEST EQUIPMENT

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

5.1 Test System Specifications

Test Equipment	Model	Serial Number	Cal. date
DAE	DAE4	551	2006-04-27
E-Field Probe	ET3DV6	1750	2006-01-24
Dipole validation kit	D1900V2	5d058	2005-01-27
	D835V2	475	2005-02-24
Network analyzer	8753ES	NONE	2005-10-17
Signal generator	E4432B	GB40050840	2006-03-03
RF Power meter	EPM-442A	GB37170412	2005-10-05
Power Sensor	8481A	3318A90368	2005-10-05
RF Power meter	E4418A	GB38272722	2006-03-03
Power Sensor	8481A	3318A96478	2006-03-08
Dielectric Probe	85070D	US01440154	-

5.2 SAR Measurement Setup

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

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

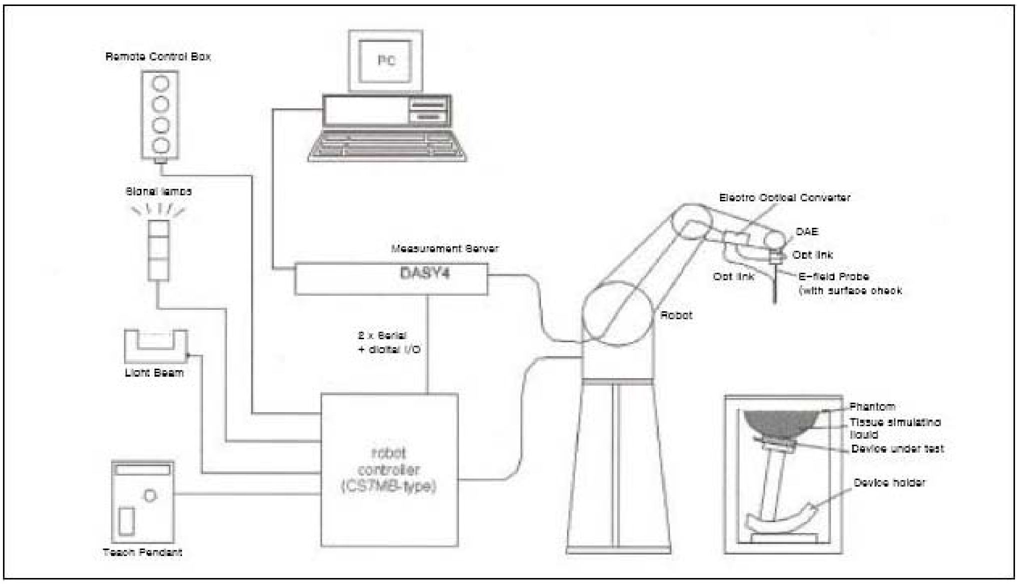

Fig. 5.1 SAR Measurement System Setup

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

5.3 DASY4 E-Field Probe System

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

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

Isotropic E-Field Probe

Isotropic E-Field Probe for Dosimetric Measurements	
Construction	Symmetrical design with triangular core Interleafed sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycol)
Calibration	In air from 10 MHz to 3 GHz In brain and muscle simulating tissue at frequencies of 450 MHz, 900 MHz and 1.8 GHz (accuracy ± 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 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±5%	55.2±5%	ε	40.0±5%	53.3±5%
σ	0.89±10%	0.97±10%	σ	1.45±10%	1.52±10%

Fig. 5.4 Composition of the Tissue Equivalent Matter

Device Holder for Transmitters

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

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

6. DESCRIPTION OF THE TEST PROCEDURE

6.1 Definition of Reference Point

EAR Reference point

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

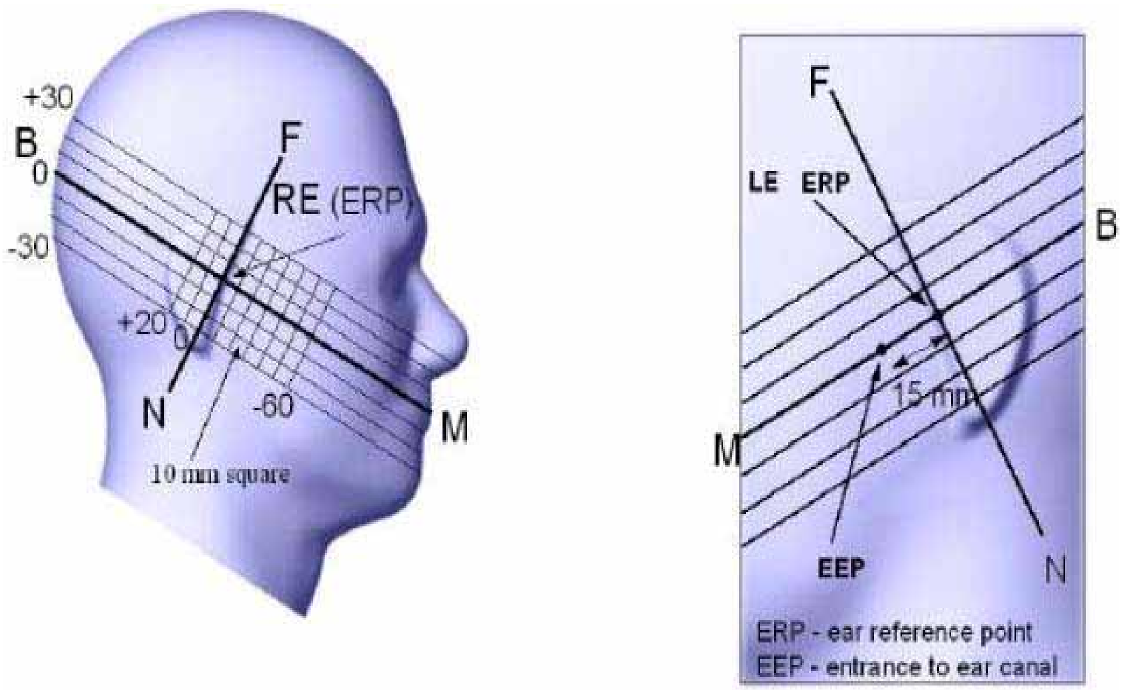

Figure 6.1 Close-up side view of ERP

Handset Reference Points

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

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

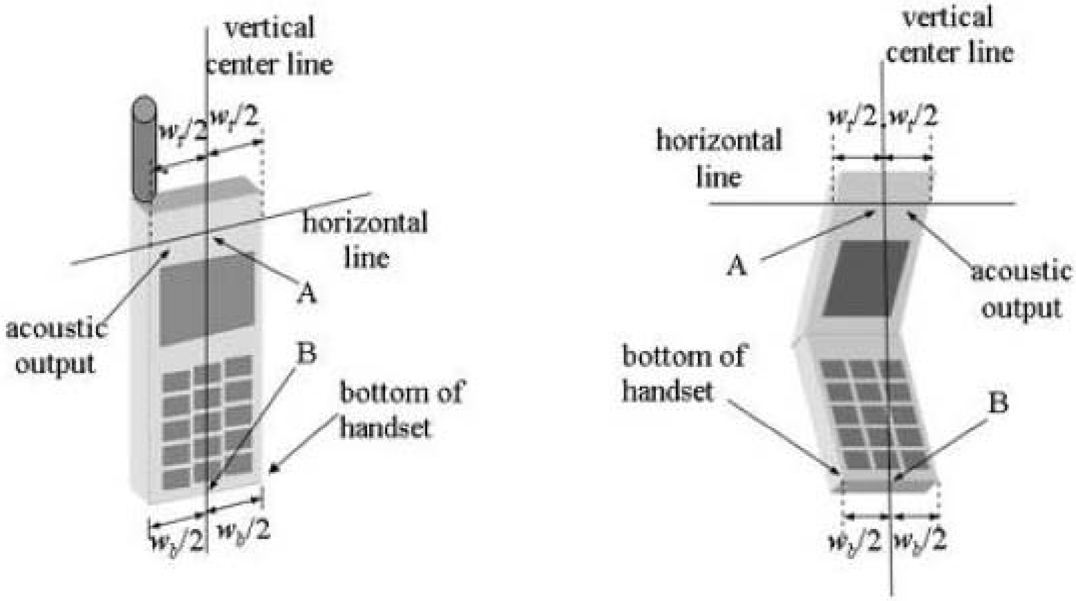

Figure 6.2 Handset Vertical Center & Horizontal Line Reference Points

6.2 Test Configuration Positions
Positioning for Cheek/Touch

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

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

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

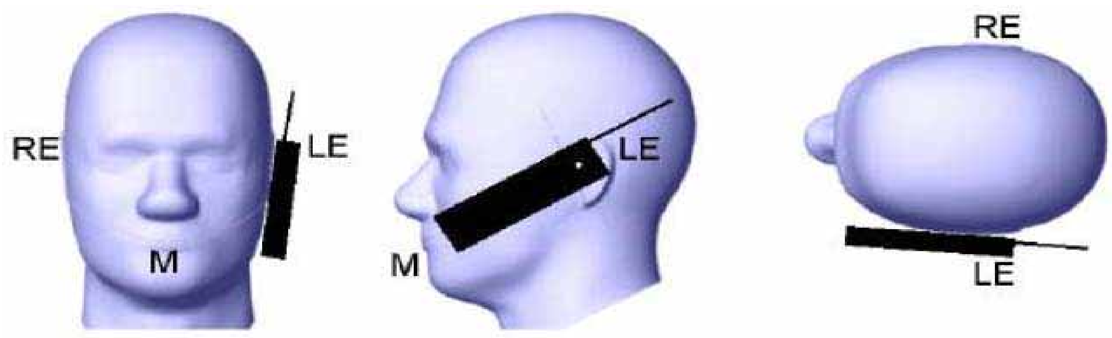

Figure 6.3 “Cheek” or “Touch” Position.

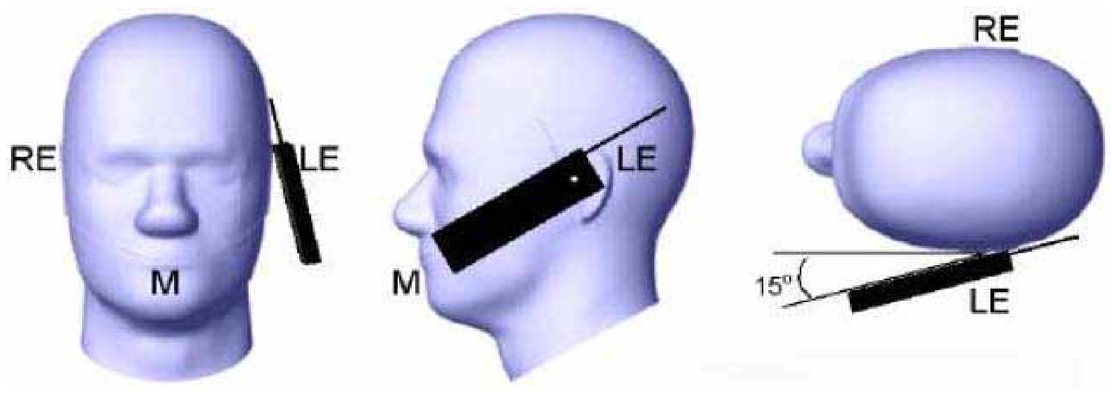

Figure 6.4 “Tilted” Position.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

Positioning for Ear / 15˚ Tilted

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

Body Holder / Belt Clip Configurations

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

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

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

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

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

6.3 Scan Procedures

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

6.4 SAR Averaging Methods

The maximum SAR value is averaged over its volume using interpolation and extrapolation.
The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the “Not a Knot” ?condition [W.Gander, 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	± 11.7 %	normal	1	1	± 4.8 %	∞
Axial Isotropy	± 4.7	rectangular	√3	$(1-cp)^{1/2}$	± 1.9%	∞
Hemispherical Isotropy	± 9.6	rectangular	√3	$(cp)^{1/2}$	± 3.9%	∞
Boundary Effects	± 1.0	rectangular	√3	1	± 0.6%	∞
Linearity	± 4.7	rectangular	√3	1	± 2.7%	∞
System Detection Limits	± 1.0	rectangular	√3	1	± 0.6%	∞
Readout Electronics	± 1.0	normal	1	1	± 1.0%	∞
Response time	± 0.8	rectangular	√3	1	± 0.5%	∞
Integration time	± 2.6	rectangular	√3	1	± 1.5%	∞
RF Amnient Conditions	± 3.0	rectangular	√3	1	± 1.7%	∞
Probe Positioner Mechanical Tolerance	± 0.4	rectangular	√3	1	± 0.2%	∞
Probe Positioning with respect to Phantom Shell	± 2.9	rectangular	√3	1	± 1.7%	∞
Extrapolation, Interpolation and Integration Algorithms for Max. SAR Evaluation	± 1.0	rectangular	√3	1	± 0.6%	∞
Test Sample Related						
Test Sample Positioning	± 2.9	normal	1	1	± 2.97%	145
Device Holder Uncertainty	± 3.6	normal	0.84	1	± 3.69%	5
Output Power Validation - SAR drift measurement	± 5.0	rectangular	√3	1	± 2.9%	∞
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	± 4.0	rectangular	√3	1	± 2.3%	∞
Liquid conductivity Target - tolerance	± 5.0	rectangular	√3	0.64	± 1.8%	∞
Liquid Conductivity - measurement uncertainty	± 2.5	normal	1	0.64	± 1.6%	∞
Liquid permittivity Target - tolerance	± 5.0	rectangular	√3	0.6	± 1.7%	∞
Liquid Permittivity - measurement uncertainty	± 2.5	normal	1	0.6	± 1.5%	∞
Combined Standard Uncertainty					±11.32 %	330
Coverage Factor for 95%				K = 2		
Expanded Standard Uncertainty					± 22.64 %	

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8. SYSTEM VERIFICATION

Tissue Verification

Table 8.1 Simulated Tissue Verification [5]

MEASURED TISSUE PARAMETERS										
Liquid Temperature (°C)			22		Liquid Depth(mm)		150			
Date	2006-7-5		2006-7-5		2006-7-4		2006-7-4			
Tissue	1900MHz Brain		1900MHz Muscle		835MHz Brain		835MHz Muscle			
	Target	Measured	Target	Measured	Target	Measured	Target	Measured		
Dielectric Constant: ε	40	39.9	53.3	51.5	41.5	40.3	55.2	53.6		
Conductivity: σ	1.45	1.43	1.52	1.56	0.9	0.899	0.97	0.957		
Deviation (%)	ε : -0.25% σ : -1.38%		ε : -3.38% σ : 2.63%		ε : -2.89% σ : -0.11%		ε : -2.90% σ : -1.34%			

Test System Validation

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

Table 8.2 System Validation [5]

SYSTEM DIPOLE VALIDATION TARGET & MEASURED						
Tissue	System Validation Kit:	Forward Power (W)	Targeted SAR1g (mW/g)	Measured SAR1g (mW/g)	Deviation (%)	Test Date
1900MHz Brain	D1900V2(S/N :5d058)	1.0	39.2	38.36	2.14%	2006-7-5
835MHz Brain	D835V2(S/N :475)	1.0	9.5	9.12	4.00%	2006-7-4

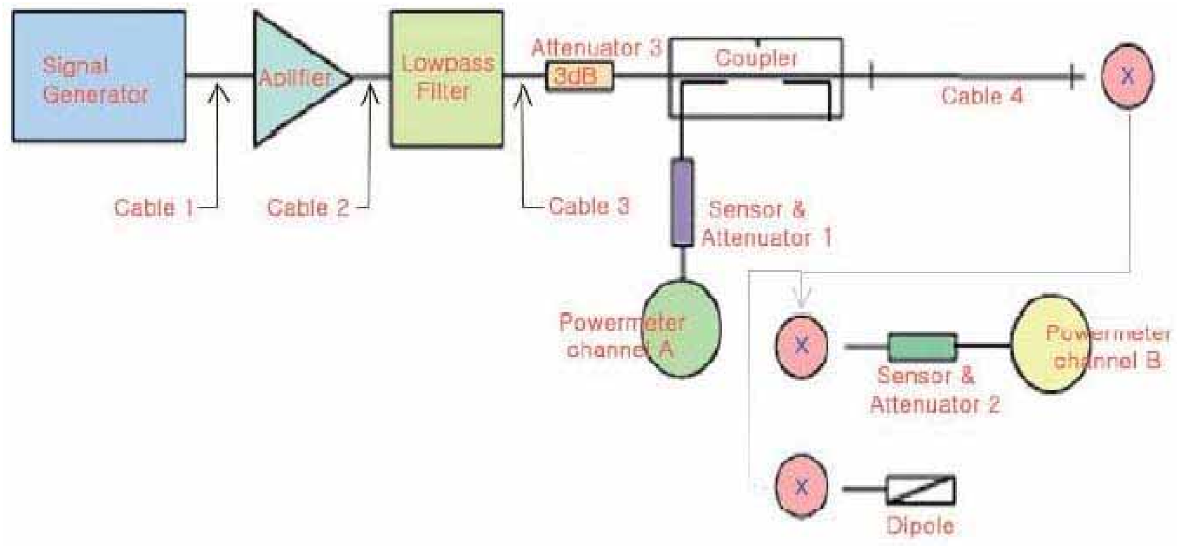

Figure 12.1 Dipole Validation Test Setup

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22.0
Relative HUMIDITY (%) : 48
Mixture Type : 835MHz Brain
Dielectric Constant : 40.3
Conductivity: 0.899

Measurement Results (GSM Head SAR-Touch)

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

MEASUREMENT RESULTS (GSM Left Head SAR – Touch)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.20	128	GSM	33.00	33.02	Standard	Cheek Touch	–	0.434
836.60	190	GSM	33.00	32.91	Standard	Cheek Touch	–	0.553
848.80	251	GSM	33.00	32.97	Standard	Cheek Touch	–	0.704

MEASUREMENT RESULTS (GSM Right Head SAR – Touch)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.20	128	GSM	33.00	32.95	Standard	Cheek Touch	–	0.500
836.60	190	GSM	33.00	32.91	Standard	Cheek Touch	–	0.628
848.80	251	GSM	33.00	32.92	Standard	Cheek Touch	–	0.796

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

Engineer K.H.Kang
(Signature)

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22.0
Relative HUMIDITY (%) : 48
Mixture Type : 835MHz Brain
Dielectric Constant : 40.3
Conductivity: 0.899

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 – Tlit)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
836.60	190	GSM	33.00	32.93	Standard	Tilt	–	0.146

MEASUREMENT RESULTS (GSM Right Head SAR – Tilt)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
836.60	190	GSM	33.00	32.89	Standard	Tilt	–	0.152

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

Engineer K.H.Kang
(Signature)

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 23
Relative HUMIDITY (%) : 45
Mixture Type : 835MHz Body
Dielectric Constant : 53.6
Conductivity: 0.957

Measurement Results (GSM BODY SAR without Holster)

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

MEASUREMENT RESULTS (GSM Body SAR Without Holster)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.20	128	GSM	33.00	32.97	Standard	1.5[w/o Holster]	–	0.277
836.60	190	GSM	33.00	32.89	Standard	1.5[w/o Holster]	–	0.360
848.80	251	GSM	33.00	32.93	Standard	1.5[w/o Holster]	–	0.447

MEASUREMENT RESULTS (GSM Body SAR Without Holster – GPRS)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
848.80	251	GSM	33.00	32.95	Standard	1.5[w/o Holster]	–	0.393

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

Engineer K.H.Kang (Signature)

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22.0
Relative HUMIDITY (%) : 49
Mixture Type : 1900MHz Brain
Dielectric Constant : 39.9
Conductivity: 1.43

Measurement Results (PCS Head SAR-Touch)

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

MEASUREMENT RESULTS (PCS Left Head SAR – Touch)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	29.93	Standard	Cheek Touch	–	0.975
1880.00	661	GSM	30.00	29.97	Standard	Cheek Touch	–	0.702
1909.80	810	GSM	30.00	29.96	Standard	Cheek Touch	–	0.524

MEASUREMENT RESULTS (PCS Right Head SAR – Touch)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	29.97	Standard	Cheek Touch	–	1.030
1880.00	661	GSM	30.00	30.06	Standard	Cheek Touch	–	0.783
1909.80	810	GSM	30.00	29.96	Standard	Cheek Touch	–	0.586

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

Engineer K.H.Kang
(Signature)

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22.0
Relative HUMIDITY (%) : 49
Mixture Type : 1900MHz Brain
Dielectric Constant : 39.9
Conductivity: 1.43

Measurement Results (PCS Head SAR-Tilt)

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

MEASUREMENT RESULTS (PCS Left Head SAR – Tlit)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	30.00	Standard	Tilt	–	0.123

MEASUREMENT RESULTS (PCS Right Head SAR – Tilt)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	30.01	Standard	Tilt	–	0.131

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

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : 21
Relative HUMIDITY (%) : 43
Mixture Type : 1900MHz Body
Dielectric Constant : 51.5
Conductivity: 1.56

Measurement Results (PCS BODY SAR without Holster)

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

MEASUREMENT RESULTS (PCS Body SAR Without Holster)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	29.98	Standard	1.5[w/o Holster]	–	–0.016
1880.00	661	GSM	30.00	29.99	Standard	1.5[w/o Holster]	–	–0.009
1909.80	810	GSM	30.00	29.98	Standard	1.5[w/o Holster]	–	–0.021

MEASUREMENT RESULTS (PCS Body SAR Without Holster – GPRS)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	29.97	Standard	1.5[w/o Holster]	–	–0.034

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

Engineer K.H.Kang
(Signature)

10. REFERENCE

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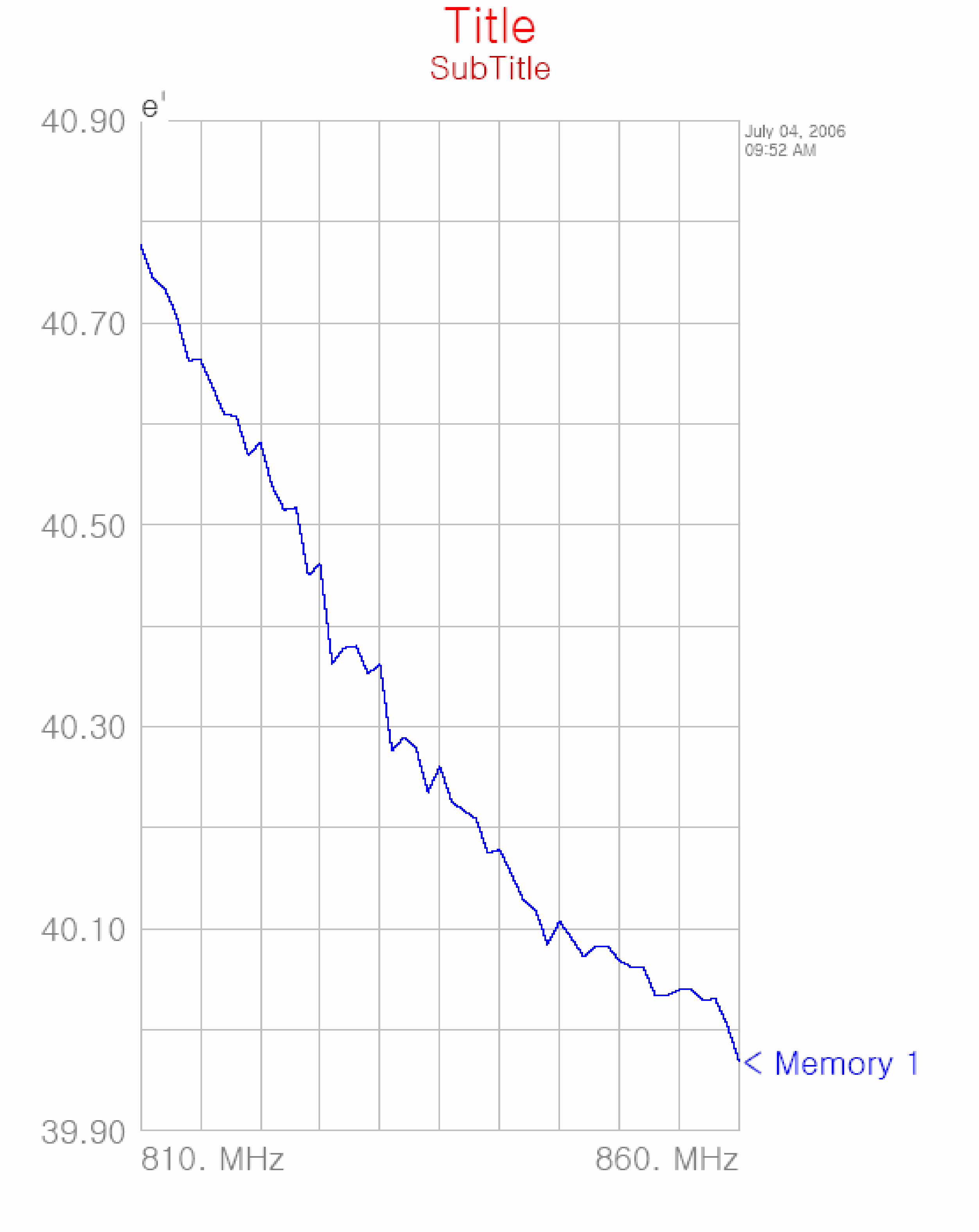
APPENDIX A : Validation Test Data of Tissue

– GSM850 Head Tissue



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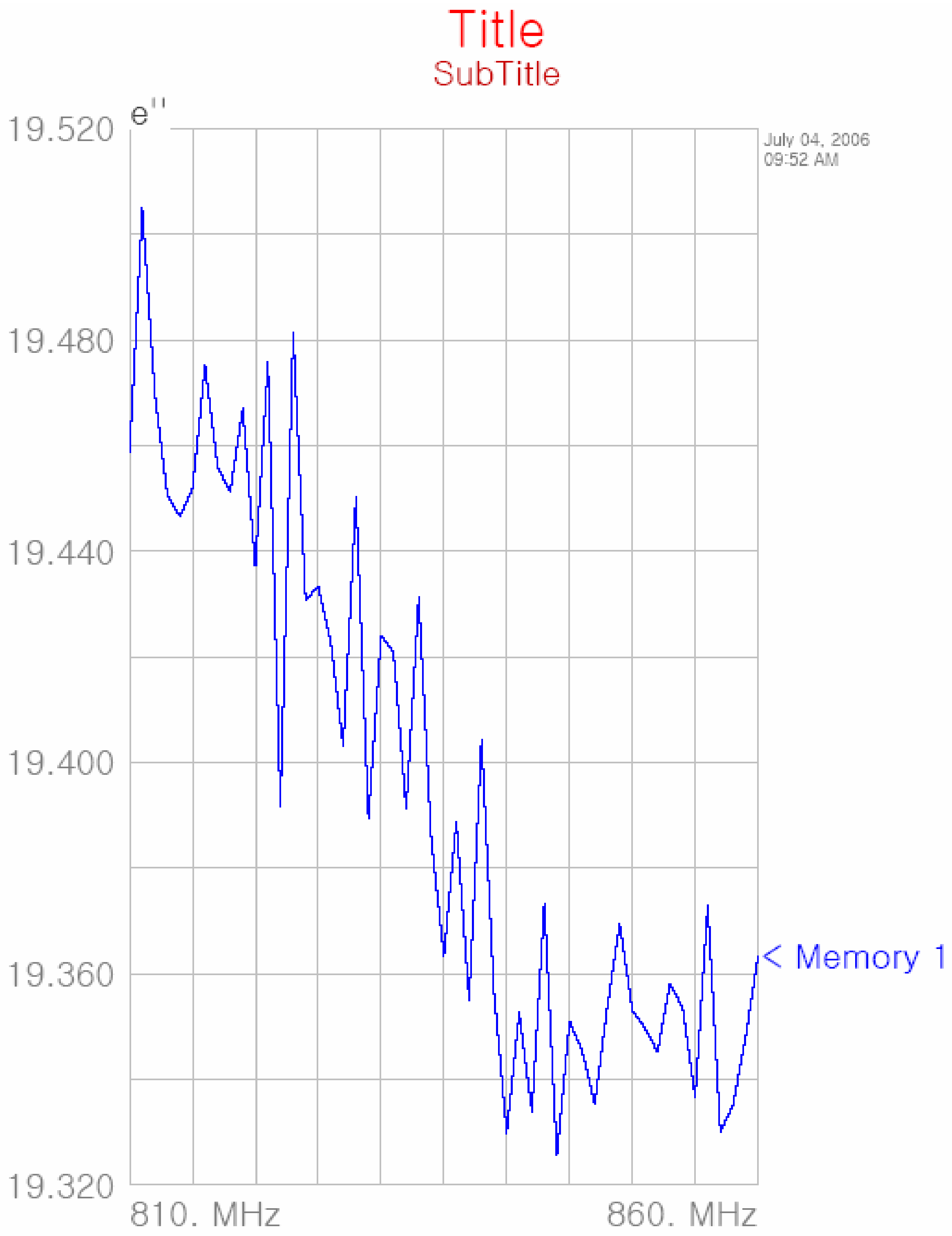

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Title

SubTitle

July 04, [illegible]

Frequency	e'	e''
810.000000 MHz	40.7767	19.4587
811.000000 MHz	40.7450	19.5049
812.000000 MHz	40.7348	19.4700
813.000000 MHz	40.7074	19.4506
814.000000 MHz	40.6626	19.4466
815.000000 MHz	40.6633	19.4519
816.000000 MHz	40.6367	19.4752
817.000000 MHz	40.6094	19.4559
818.000000 MHz	40.6075	19.4512
819.000000 MHz	40.5685	19.4671
820.000000 MHz	40.5812	19.4372
821.000000 MHz	40.5378	19.4757
822.000000 MHz	40.5147	19.3917
823.000000 MHz	40.5171	19.4815
824.000000 MHz	40.4500	19.4307
825.000000 MHz	40.4609	19.4333
826.000000 MHz	40.3625	19.4229
827.000000 MHz	40.3781	19.4031
828.000000 MHz	40.3800	19.4504
829.000000 MHz	40.3527	19.3893
830.000000 MHz	40.3619	19.4240
831.000000 MHz	40.2766	19.4209
832.000000 MHz	40.2896	19.3914
833.000000 MHz	40.2793	19.4313
834.000000 MHz	40.2354	19.3856
835.000000 MHz	40.2608	19.3633
836.000000 MHz	40.2258	19.3889
837.000000 MHz	40.2166	19.3550
838.000000 MHz	40.2092	19.4044
839.000000 MHz	40.1753	19.3564
840.000000 MHz	40.1786	19.3298
841.000000 MHz	40.1537	19.3526
842.000000 MHz	40.1279	19.3339
843.000000 MHz	40.1181	19.3733
844.000000 MHz	40.0845	19.3256
845.000000 MHz	40.1073	19.3510
846.000000 MHz	40.0905	19.3455
847.000000 MHz	40.0725	19.3353
848.000000 MHz	40.0830	19.3535
849.000000 MHz	40.0826	19.3694
850.000000 MHz	40.0681	19.3530
851.000000 MHz	40.0625	19.3498
852.000000 MHz	40.0616	19.3452
853.000000 MHz	40.0347	19.3581
854.000000 MHz	40.0339	19.3535
855.000000 MHz	40.0401	19.3367
856.000000 MHz	40.0403	19.3729
857.000000 MHz	40.0290	19.3301
858.000000 MHz	40.0310	19.3350
859.000000 MHz	40.0043	19.3478
860.000000 MHz	39.9683	19.3633

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– GSM850 Body Tissue

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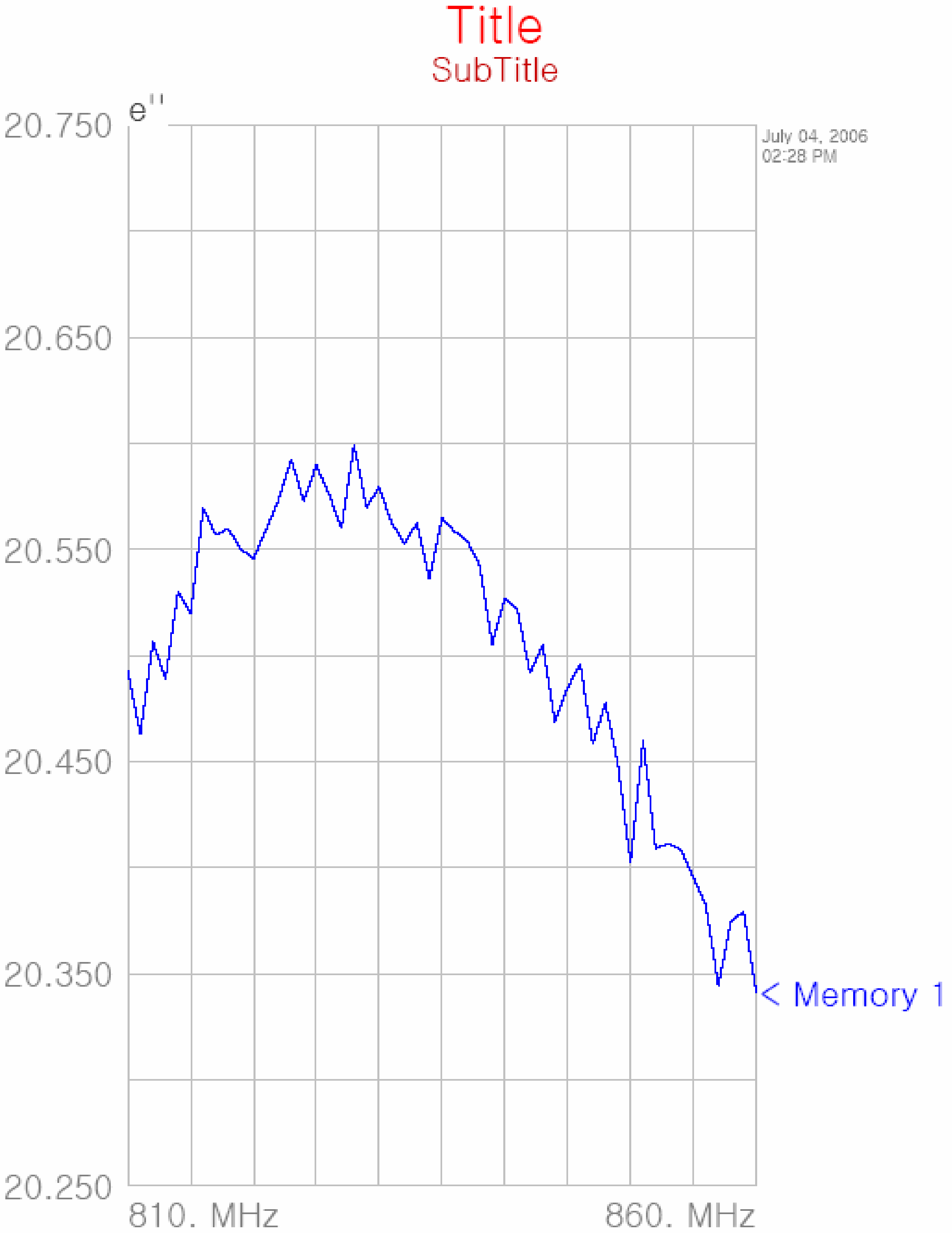

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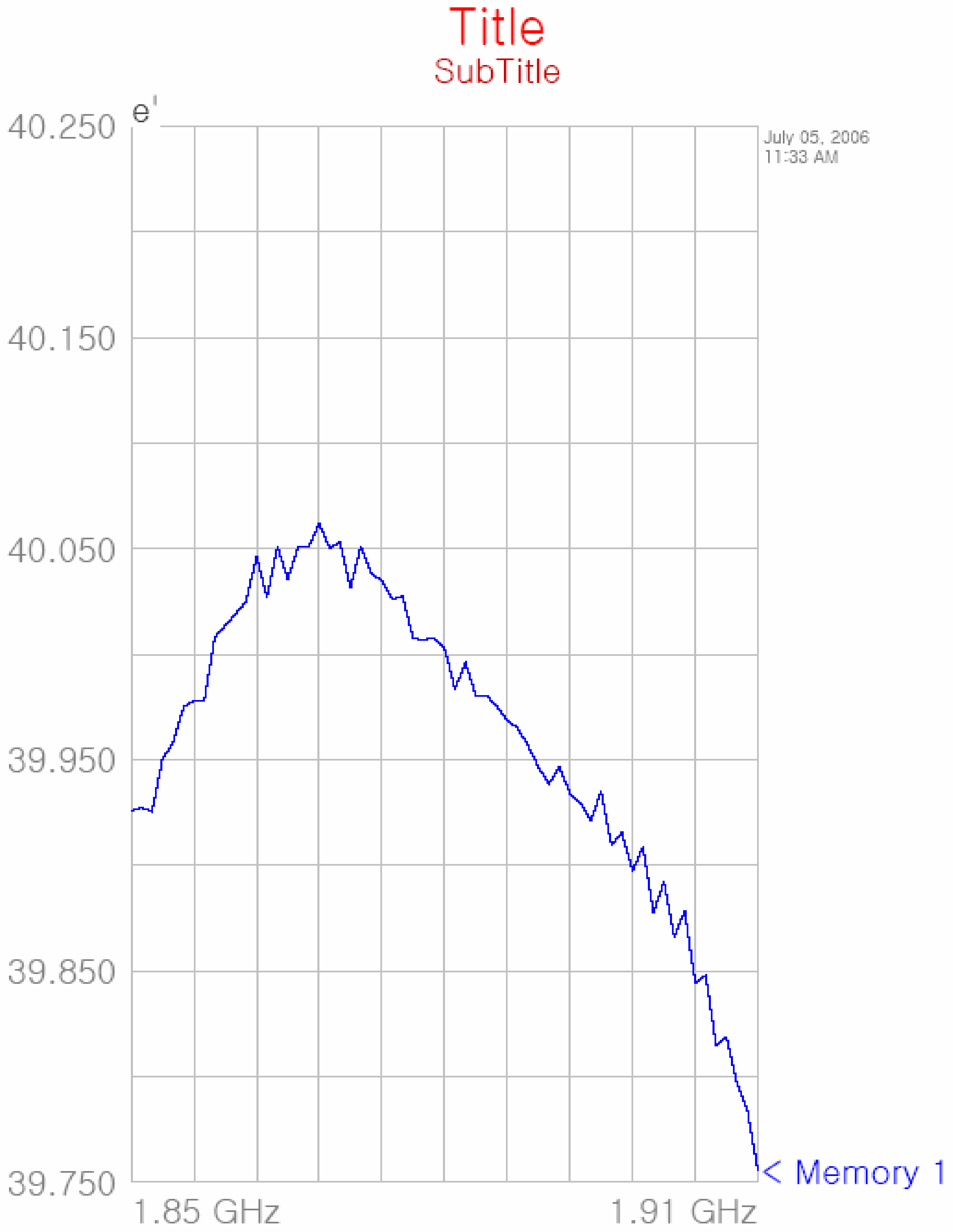
Title

SubTitle

July 04, [illegible] PM

Frequency	e'	e''
810.000000 MHz	53.8555	20.4924
811.000000 MHz	53.8323	20.4628
812.000000 MHz	53.8239	20.5064
813.000000 MHz	53.8611	20.4890
814.000000 MHz	53.7961	20.5303
815.000000 MHz	53.8135	20.5198
816.000000 MHz	53.8188	20.5695
817.000000 MHz	53.7796	20.5569
818.000000 MHz	53.7907	20.5598
819.000000 MHz	53.7749	20.5500
820.000000 MHz	53.8057	20.5458
821.000000 MHz	53.7872	20.5593
822.000000 MHz	53.7358	20.5735
823.000000 MHz	53.7638	20.5924
824.000000 MHz	53.7448	20.5727
825.000000 MHz	53.7167	20.5896
826.000000 MHz	53.7111	20.5762
827.000000 MHz	53.6824	20.5601
828.000000 MHz	53.6847	20.5992
829.000000 MHz	53.6624	20.5698
830.000000 MHz	53.6542	20.5795
831.000000 MHz	53.6585	20.5626
832.000000 MHz	53.6434	20.5528
833.000000 MHz	53.6353	20.5625
834.000000 MHz	53.6361	20.5359
835.000000 MHz	53.6352	20.5649
836.000000 MHz	53.6105	20.5586
837.000000 MHz	53.6414	20.5540
838.000000 MHz	53.5710	20.5425
839.000000 MHz	53.6009	20.5054
840.000000 MHz	53.6195	20.5271
841.000000 MHz	53.5626	20.5218
842.000000 MHz	53.5732	20.4918
843.000000 MHz	53.5560	20.5048
844.000000 MHz	53.5534	20.4688
845.000000 MHz	53.5428	20.4847
846.000000 MHz	53.5305	20.4959
847.000000 MHz	53.5328	20.4582
848.000000 MHz	53.5128	20.4776
849.000000 MHz	53.4913	20.4488
850.000000 MHz	53.5175	20.4024
851.000000 MHz	53.4957	20.4603
852.000000 MHz	53.4767	20.4090
853.000000 MHz	53.4884	20.4113
854.000000 MHz	53.4552	20.4086
855.000000 MHz	53.4504	20.3954
856.000000 MHz	53.4457	20.3822
857.000000 MHz	53.4210	20.3442
858.000000 MHz	53.4434	20.3747
859.000000 MHz	53.3915	20.3791
860.000000 MHz	53.3670	20.3411

– PCS1900 Head Tissue



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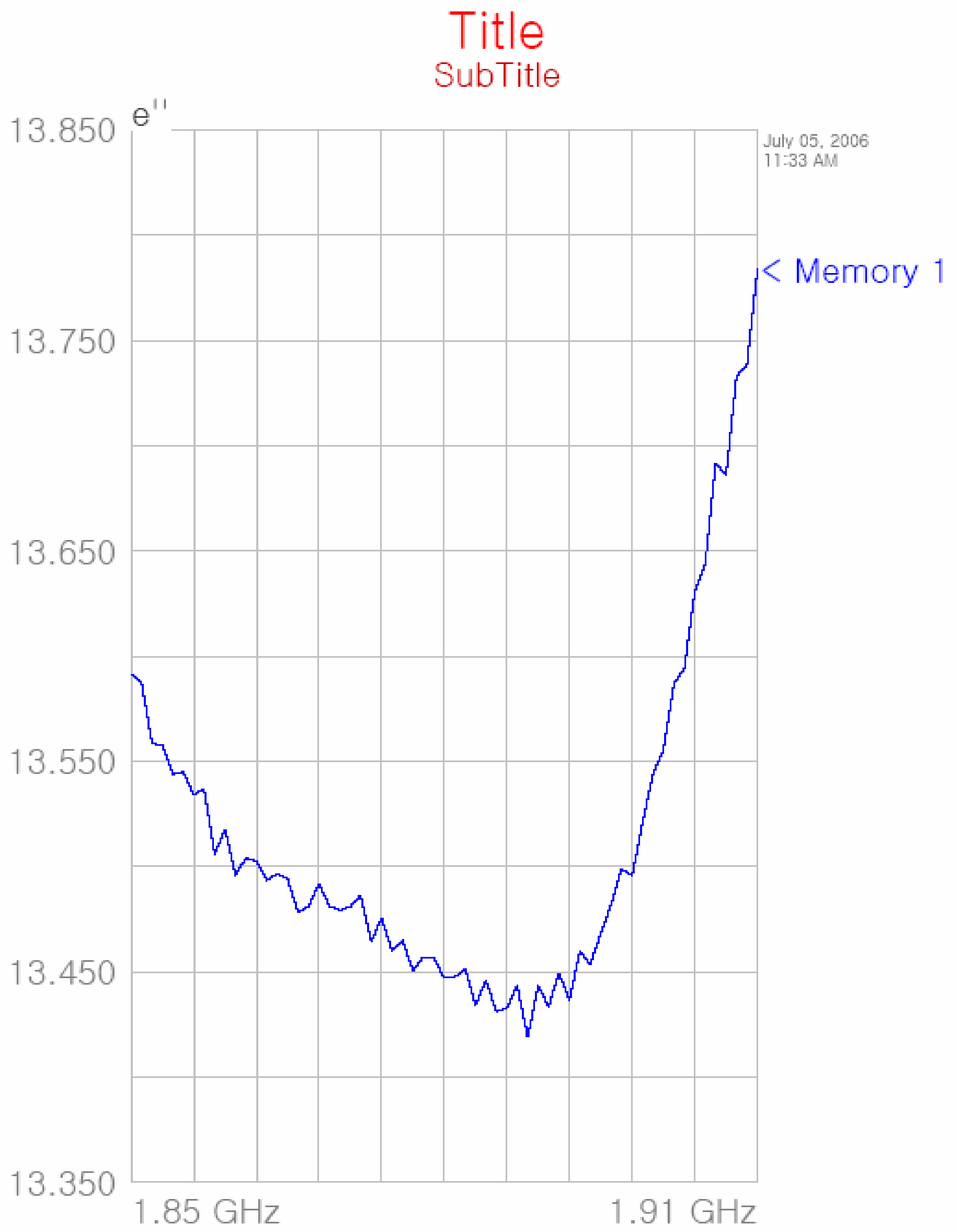

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Title

SubTitle

July 05, 2006 [illegible] AM

Frequency	e'	e''
1.850000000 GHz	39.9258	13.5914
1.851000000 GHz	39.9274	13.5874
1.852000000 GHz	39.9254	13.5584
1.853000000 GHz	39.9503	13.5577
1.854000000 GHz	39.9578	13.5439
1.855000000 GHz	39.9749	13.5452
1.856000000 GHz	39.9781	13.5341
1.857000000 GHz	39.9781	13.5370
1.858000000 GHz	40.0079	13.5060
1.859000000 GHz	40.0134	13.5176
1.860000000 GHz	40.0189	13.4959
1.861000000 GHz	40.0252	13.5040
1.862000000 GHz	40.0465	13.5024
1.863000000 GHz	40.0269	13.4936
1.864000000 GHz	40.0510	13.4964
1.865000000 GHz	40.0356	13.4940
1.866000000 GHz	40.0508	13.4782
1.867000000 GHz	40.0508	13.4811
1.868000000 GHz	40.0620	13.4920
1.869000000 GHz	40.0503	13.4813
1.870000000 GHz	40.0532	13.4793
1.871000000 GHz	40.0314	13.4810
1.872000000 GHz	40.0512	13.4864
1.873000000 GHz	40.0383	13.4644
1.874000000 GHz	40.0347	13.4756
1.875000000 GHz	40.0260	13.4600
1.876000000 GHz	40.0274	13.4650
1.877000000 GHz	40.0074	13.4506
1.878000000 GHz	40.0068	13.4569
1.879000000 GHz	40.0076	13.4563
1.880000000 GHz	40.0030	13.4471
1.881000000 GHz	39.9835	13.4475
1.882000000 GHz	39.9962	13.4513
1.883000000 GHz	39.9806	13.4342
1.884000000 GHz	39.9806	13.4461
1.885000000 GHz	39.9754	13.4314
1.886000000 GHz	39.9686	13.4327
1.887000000 GHz	39.9651	13.4438
1.888000000 GHz	39.9566	13.4192
1.889000000 GHz	39.9466	13.4435
1.890000000 GHz	39.9386	13.4336
1.891000000 GHz	39.9470	13.4491
1.892000000 GHz	39.9341	13.4364
1.893000000 GHz	39.9298	13.4600
1.894000000 GHz	39.9211	13.4536
1.895000000 GHz	39.9351	13.4684
1.896000000 GHz	39.9093	13.4820
1.897000000 GHz	39.9156	13.4988
1.898000000 GHz	39.8971	13.4957
1.899000000 GHz	39.9089	13.5209
1.900000000 GHz	39.8775	13.5441
1.901000000 GHz	39.8923	13.5554
1.902000000 GHz	39.8664	13.5870
1.903000000 GHz	39.8785	13.5940
1.904000000 GHz	39.8442	13.6311
1.905000000 GHz	39.8478	13.6436
1.906000000 GHz	39.8148	13.6917
1.907000000 GHz	39.8187	13.6861
1.908000000 GHz	39.7969	13.7330
1.909000000 GHz	39.7840	13.7382
1.910000000 GHz	39.7553	13.7836

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

– PCS1900 Body Tissue

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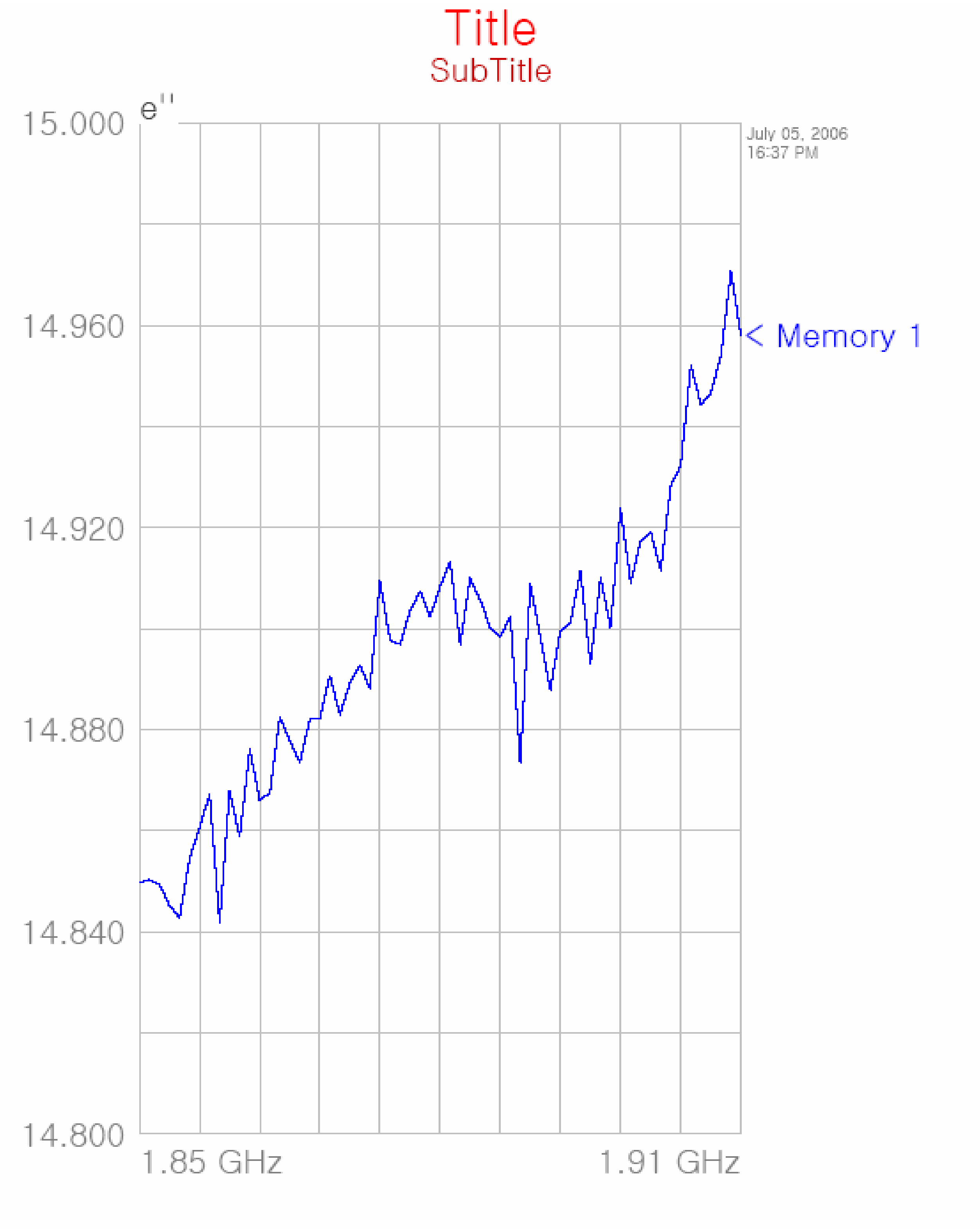

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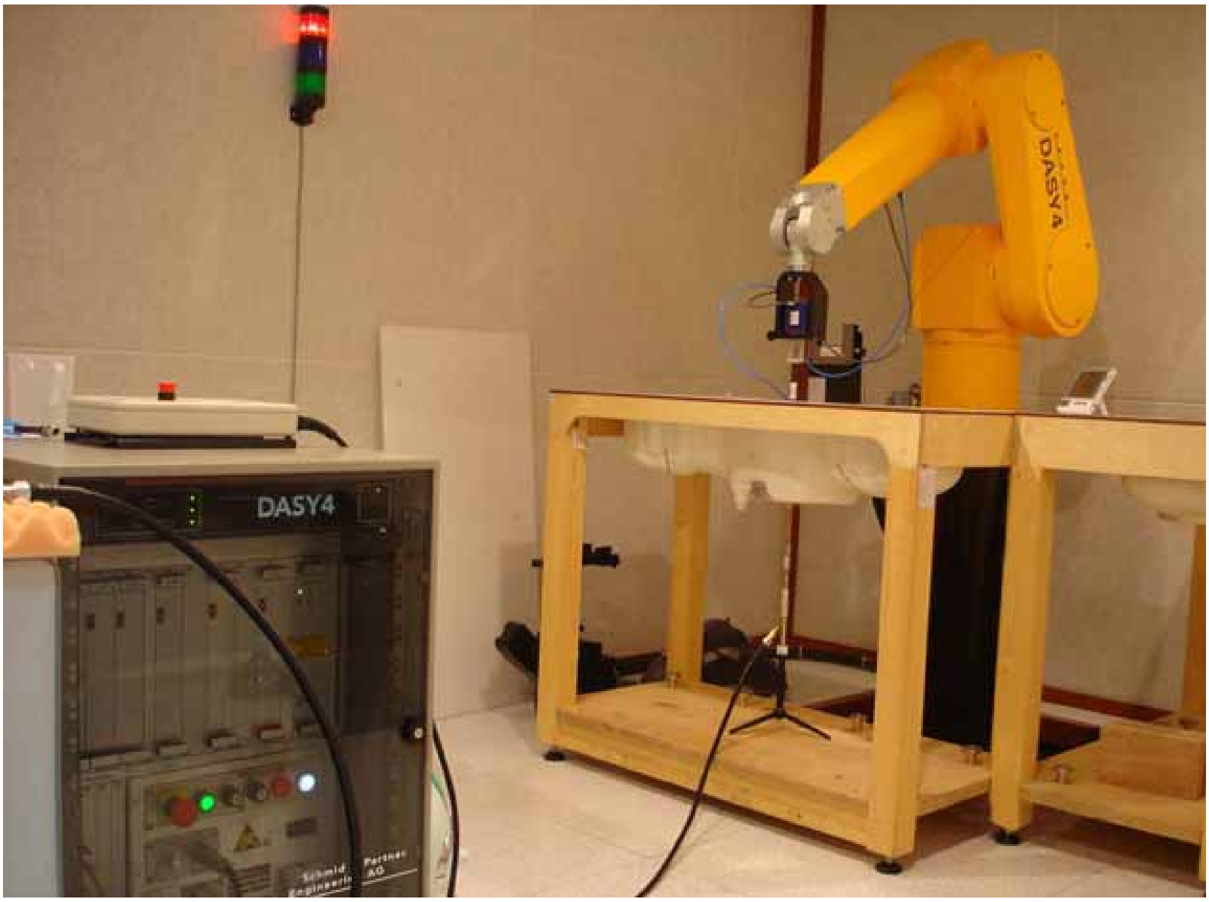
Title
SubTitle
July 05, [illegible] PM

Frequency	e'	e''
1.850000000 GHz	51.5789	14.8498
1.851000000 GHz	51.5905	14.8503
1.852000000 GHz	51.5830	14.8494
1.853000000 GHz	51.5834	14.8452
1.854000000 GHz	51.5818	14.8428
1.855000000 GHz	51.5887	14.8545
1.856000000 GHz	51.5730	14.8606
1.857000000 GHz	51.5899	14.8672
1.858000000 GHz	51.5901	14.8418
1.859000000 GHz	51.5844	14.8679
1.860000000 GHz	51.5699	14.8587
1.861000000 GHz	51.5784	14.8762
1.862000000 GHz	51.5774	14.8661
1.863000000 GHz	51.5756	14.8674
1.864000000 GHz	51.5785	14.8825
1.865000000 GHz	51.5752	14.8779
1.866000000 GHz	51.5757	14.8736
1.867000000 GHz	51.5657	14.8820
1.868000000 GHz	51.5736	14.8821
1.869000000 GHz	51.5675	14.8907
1.870000000 GHz	51.5721	14.8829
1.871000000 GHz	51.5605	14.8892
1.872000000 GHz	51.5643	14.8927
1.873000000 GHz	51.5611	14.8881
1.874000000 GHz	51.5446	14.9094
1.875000000 GHz	51.5495	14.8977
1.876000000 GHz	51.5461	14.8969
1.877000000 GHz	51.5383	14.9034
1.878000000 GHz	51.5498	14.9074
1.879000000 GHz	51.5390	14.9023
1.880000000 GHz	51.5237	14.9083
1.881000000 GHz	51.5218	14.9132
1.882000000 GHz	51.5156	14.8969
1.883000000 GHz	51.5208	14.9100
1.884000000 GHz	51.5215	14.9056
1.885000000 GHz	51.5070	14.9002
1.886000000 GHz	51.5171	14.8983
1.887000000 GHz	51.5039	14.9025
1.888000000 GHz	51.5081	14.8736
1.889000000 GHz	51.5043	14.9088
1.890000000 GHz	51.4959	14.8981
1.891000000 GHz	51.4951	14.8879
1.892000000 GHz	51.4815	14.8996
1.893000000 GHz	51.4875	14.9012
1.894000000 GHz	51.4797	14.9114
1.895000000 GHz	51.4719	14.8931
1.896000000 GHz	51.4808	14.9100
1.897000000 GHz	51.4876	14.9003
1.898000000 GHz	51.4809	14.9238
1.899000000 GHz	51.4691	14.9090
1.900000000 GHz	51.4634	14.9174
1.901000000 GHz	51.4733	14.9192
1.902000000 GHz	51.4534	14.9115
1.903000000 GHz	51.4624	14.9283
1.904000000 GHz	51.4457	14.9322
1.905000000 GHz	51.4431	14.9521
1.906000000 GHz	51.4233	14.9444
1.907000000 GHz	51.4408	14.9465
1.908000000 GHz	51.4202	14.9540
1.909000000 GHz	51.4292	14.9707
1.910000000 GHz	51.3909	14.9581

APPENDIX B：Validation Test Data

Dipole Validation



– GSM850 Validation

Date/Time: 2006-07-04 10:43:54

Test Laboratory: ESTECH

VALIDATION 0704

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

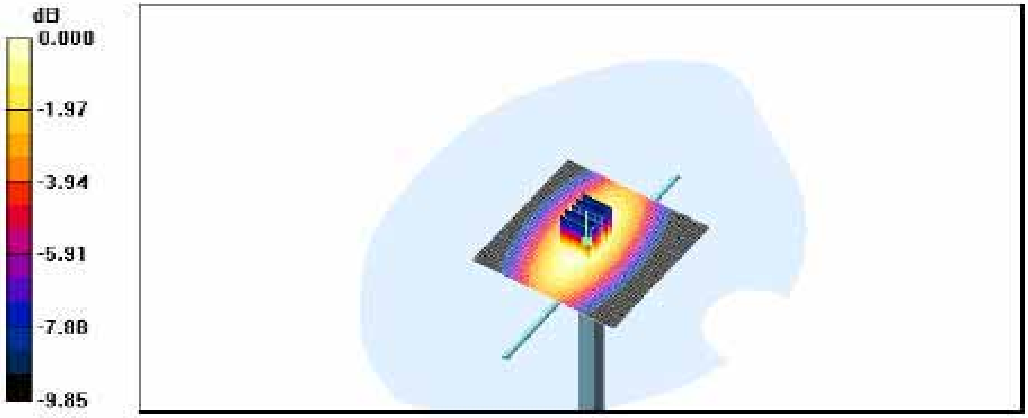
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.899 mho/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 22℃, Humidity : 48%

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.45 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.2 V/m; Power Drift = 0.001 dB
Peak SAR (extrapolated) = 3.41 W/kg
SAR(1 g) = 2.28 mW/g
Maximum value of SAR (measured) = 2.46 mW/g



0 dB = 2.46mW/g

– PCS1900 Validation

Date/Time: 2006-07-05 14:02:27

Test Laboratory: ESTECH

VALIDATION 0713

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

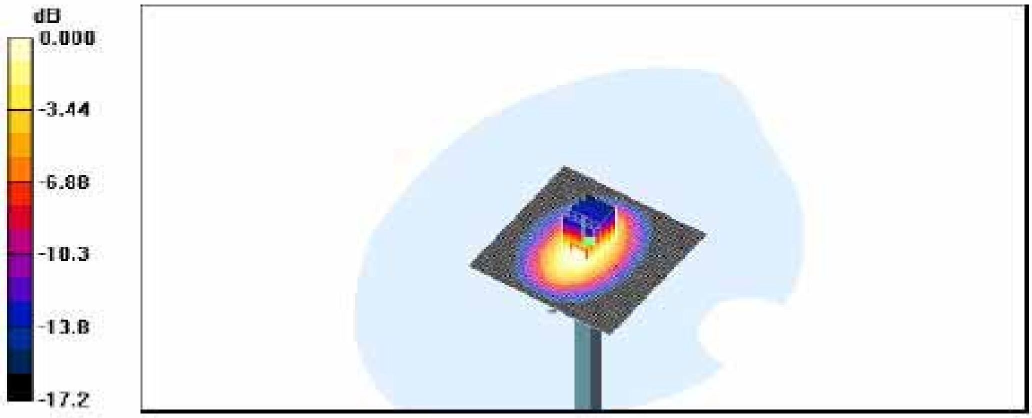
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.43 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

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 : 22℃, Humidity : 49%

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 = 91.1 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 16.9 W/kg
SAR(1 g) = 9.59 mW/g
Maximum value of SAR (measured) = 10.7 mW/g



0 dB = 10.7mW/g

APPENDIX C : SAR Test Data

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FAX: 82-2-867-3204

– GSM850

Date/Time: 2006-07-04 13:04:26

Test Laboratory: ESTECH

CH128 LEFT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

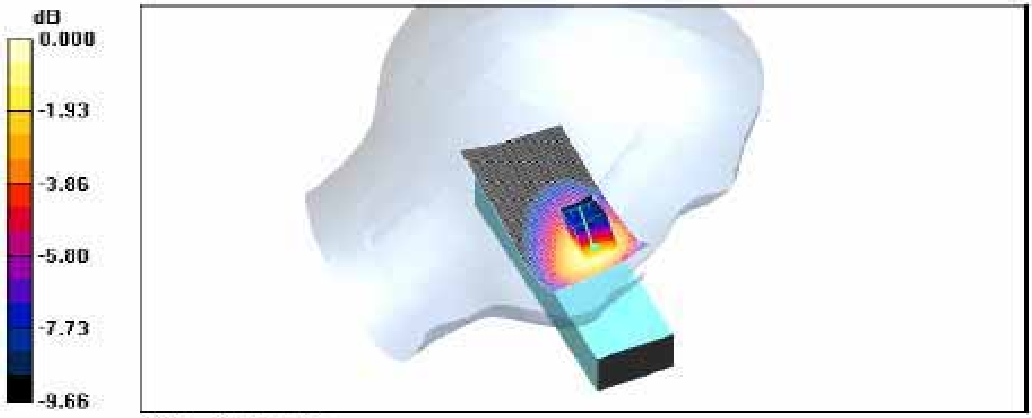
Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.891 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23℃, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.475 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.60 V/m; Power Drift = 0.023 dB
Peak SAR (extrapolated) = 0.651 W/kg
SAR(1 g) = 0.434 mW/g
Maximum value of SAR (measured) = 0.474 mW/g



0 dB = 0.474mW/g

Date/Time: 2006-07-04 11:16:11

Test Laboratory: ESTECH

CH190 LEFT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

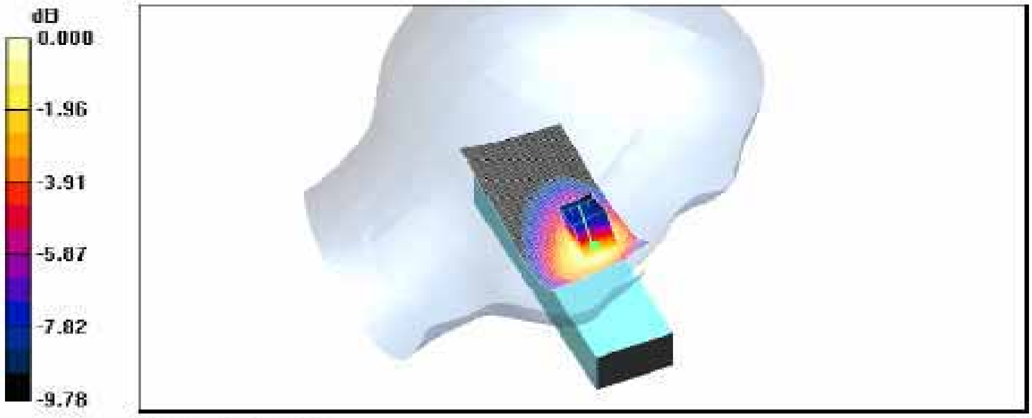
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; σ = 0.901 mho/m; ε_r = 40.2; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 22℃, Humidity : 47%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.608 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.34 V/m; Power Drift = -0.087 dB
Peak SAR (extrapolated) = 0.818 W/kg
SAR(1 g) = 0.553 mW/g
Maximum value of SAR (measured) = 0.598 mW/g



0 dB = 0.598mW/g

Date/Time: 2006-07-04 13:41:39

Test Laboratory: ESTECH

CH251 LEFT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

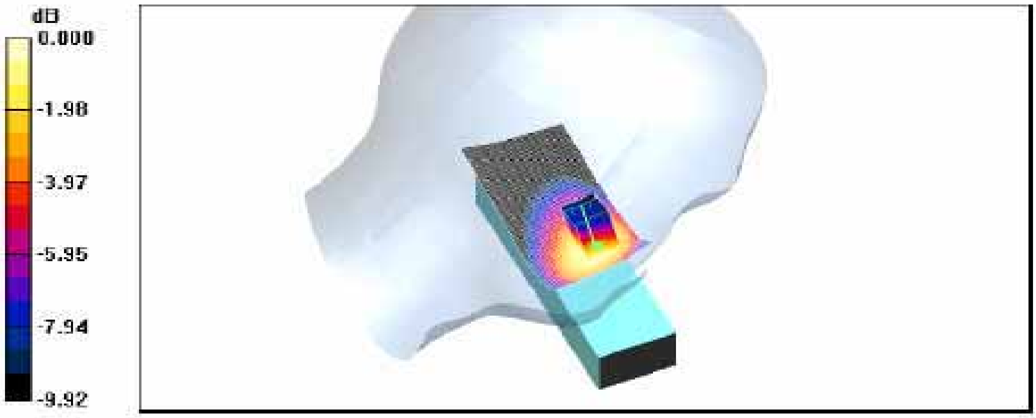
Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 849 MHz; σ = 0.915 mho/m; ε_r = 40.1; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 ℃, Humidity : 45%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.766 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.99 V/m; Power Drift = -0.031 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.704 mW/g
Maximum value of SAR (measured) = 0.764 mW/g



0 dB = 0.764mW/g

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Date/Time: 2006-07-04 13:26:15

Test Laboratory: ESTECH

CH128 RIGHT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

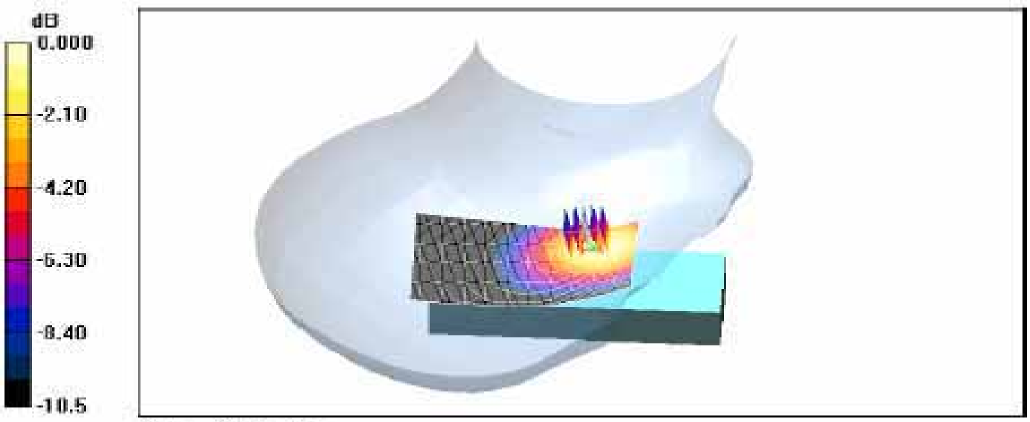
Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.891 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 22 ℃, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.561 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.25 V/m; Power Drift = -0.049 dB
Peak SAR (extrapolated) = 0.793 W/kg
SAR(1 g) = 0.500 mW/g
Maximum value of SAR (measured) = 0.543 mW/g



0 dB = 0.543mW/g

Date/Time: 2006-07-04 11:39:21

Test Laboratory: ESTECH

CH190 RIGHT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

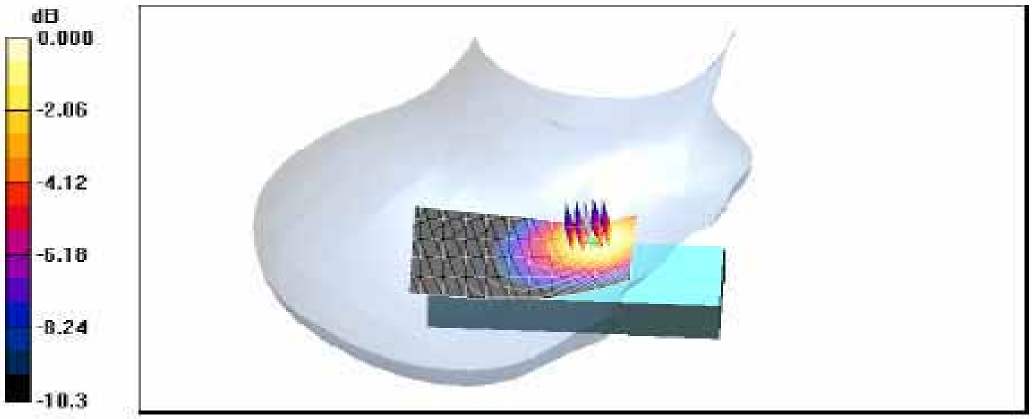
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; $\sigma = 0.901$ mho/m; $\varepsilon_r = 40.2$; $\rho = 1000$ kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23℃, Humidity : 45%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.698 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.70 V/m; Power Drift = -0.094 dB
Peak SAR (extrapolated) = 0.992 W/kg
SAR(1 g) = 0.628 mW/g
Maximum value of SAR (measured) = 0.677 mW/g



0 dB = 0.677mW/g

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Date/Time: 2006-07-04 13:58:07

Test Laboratory: ESTECH

CH251 RIGHT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

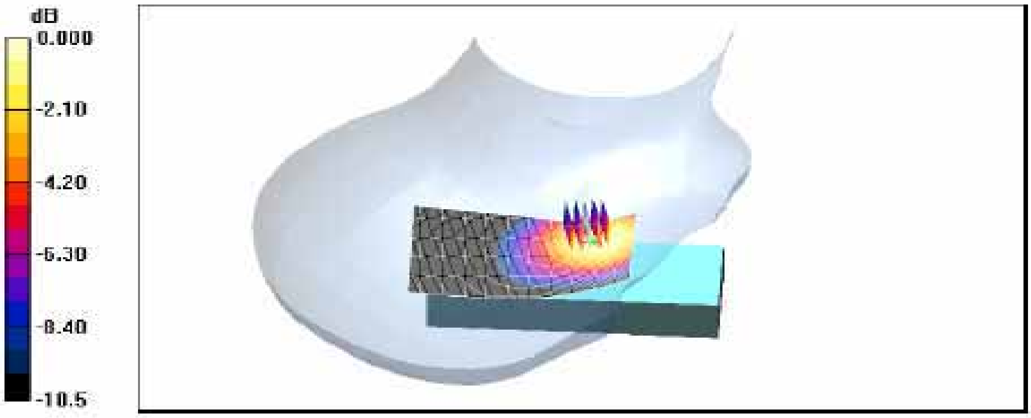
Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 849 MHz; $\sigma = 0.915$ mho/m; $\varepsilon_r = 40.1$; $\rho = 1000$ kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 22℃, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.884 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.33 V/m; Power Drift = -0.075 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.796 mW/g
Maximum value of SAR (measured) = 0.863 mW/g



0 dB = 0.863mW/g

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Date/Time: 2006-07-04 12:00:14

Test Laboratory: ESTECH

CH190 LEFT TILT

DUT: MG120; Type: FOLDER; Serial: NONE

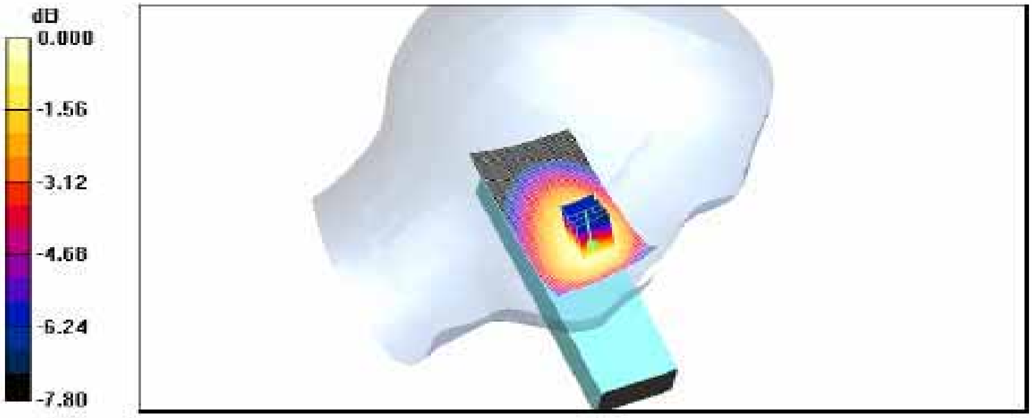
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; σ = 0.901 mho/m; ε_r = 40.2; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 22℃, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.153 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.91 V/m; Power Drift = -0.071 dB
Peak SAR (extrapolated) = 0.190 W/kg
SAR(1 g) = 0.146 mW/g
Maximum value of SAR (measured) = 0.155 mW/g



0 dB = 0.155mW/g

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Date/Time: 2006-07-04 12:21:23

Test Laboratory: ESTECH

CH190 RIGHT TILT

DUT: MG120; Type: FOLDER; Serial: NONE

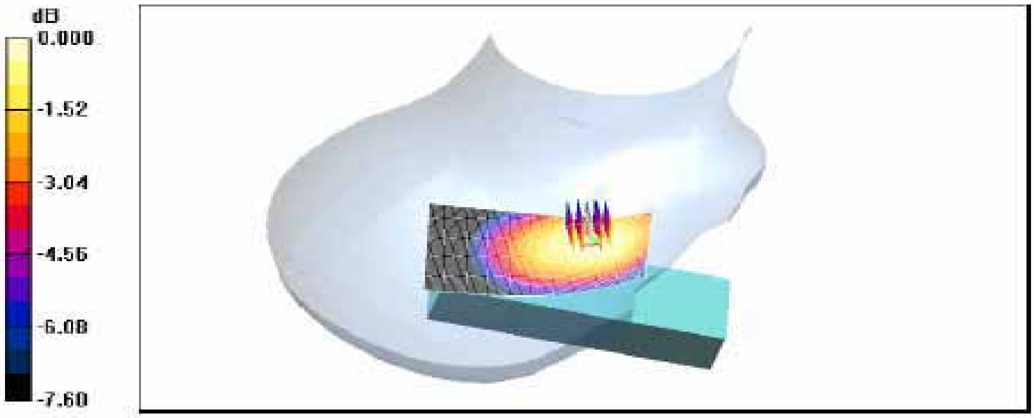
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; $\sigma = 0.901$ mho/m; $\varepsilon_r = 40.2$; $\rho = 1000$ kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 22℃, Humidity : 44%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.162 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.82 V/m; Power Drift = -0.115 dB
Peak SAR (extrapolated) = 0.195 W/kg
SAR(1 g) = 0.152 mW/g
Maximum value of SAR (measured) = 0.161 mW/g



0 dB = 0.161mW/g

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

Date/Time: 2006-07-04 13:58:07

Test Laboratory: ESTECH

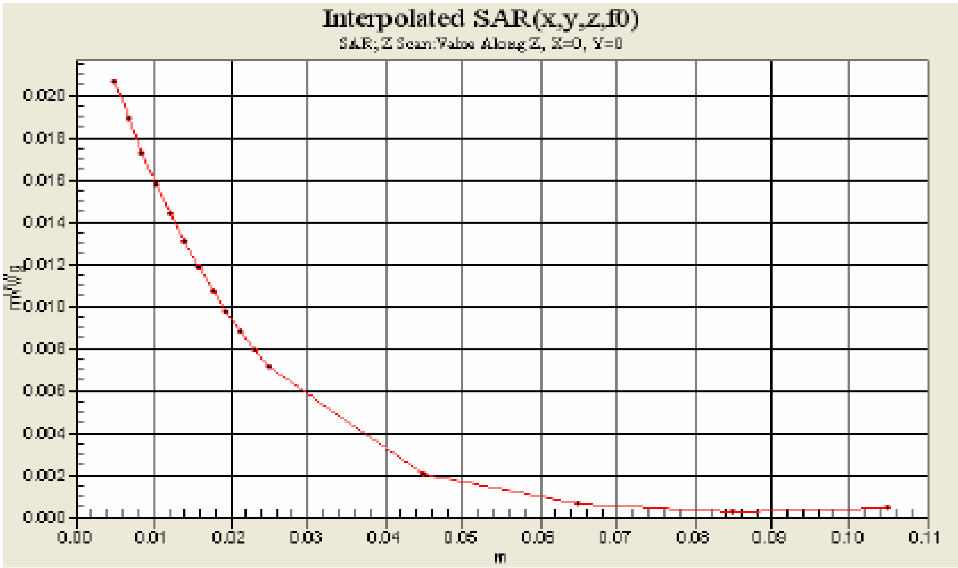
CH251 RIGHT TOUCH-ZSCAN

DUT: MG120; Type: FOLDER; Serial: NONE

Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 849 MHz; σ = 0.915 mho/m; ε_r = 40.1; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 22℃, Humidity : 46%



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

Date/Time: 2006-07-04 15:25:26

Test Laboratory: ESTECH

CH128 BODY

DUT: MG120; Type: FOLDER; Serial: NONE

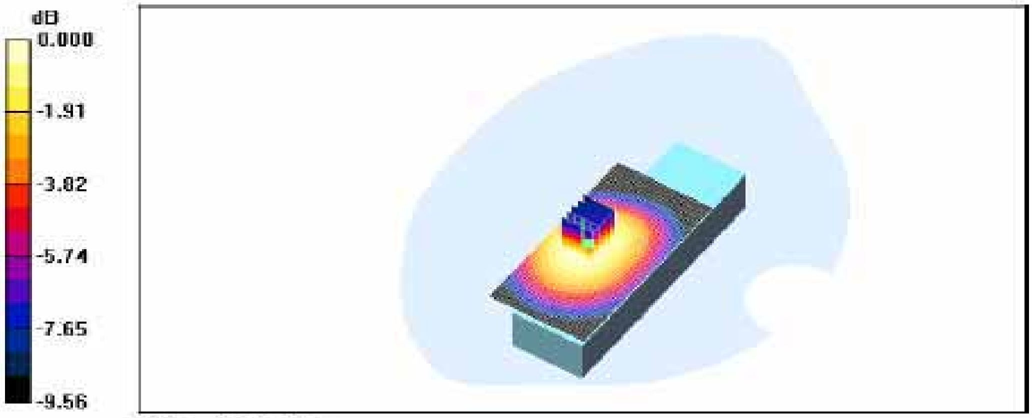
Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.943 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.17, 6.17, 6.17); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 ℃, Humidity : 45%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.301 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.7 V/m; Power Drift = -0.031 dB
Peak SAR (extrapolated) = 0.378 W/kg
SAR(1 g) = 0.277 mW/g
Maximum value of SAR (measured) = 0.295 mW/g



0 dB = 0.295mW/g

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Date/Time: 2006-07-04 14:51:59

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CH190 BODY

DUT: MG120; Type: FOLDER; Serial: NONE

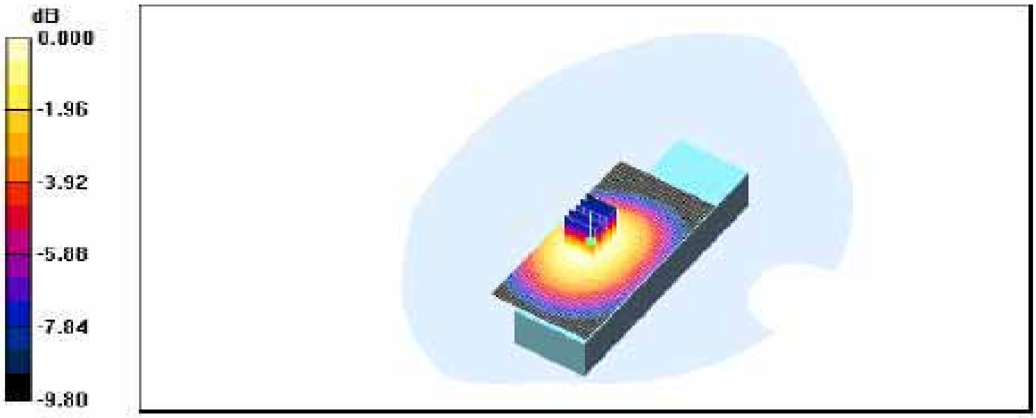
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; $\sigma = 0.957$ mho/m; $\varepsilon_r = 53.6$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.17, 6.17, 6.17); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 ℃, Humidity : 44%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.393 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.1 V/m; Power Drift = -0.110 dB
Peak SAR (extrapolated) = 0.496 W/kg
SAR(1 g) = 0.360 mW/g
Maximum value of SAR (measured) = 0.387 mW/g



0 dB = 0.387mW/g

Date/Time: 2006-07-04 15:43:02

Test Laboratory: ESTECH

CH251 BODY

DUT: MG120; Type: FOLDER; Serial: NONE

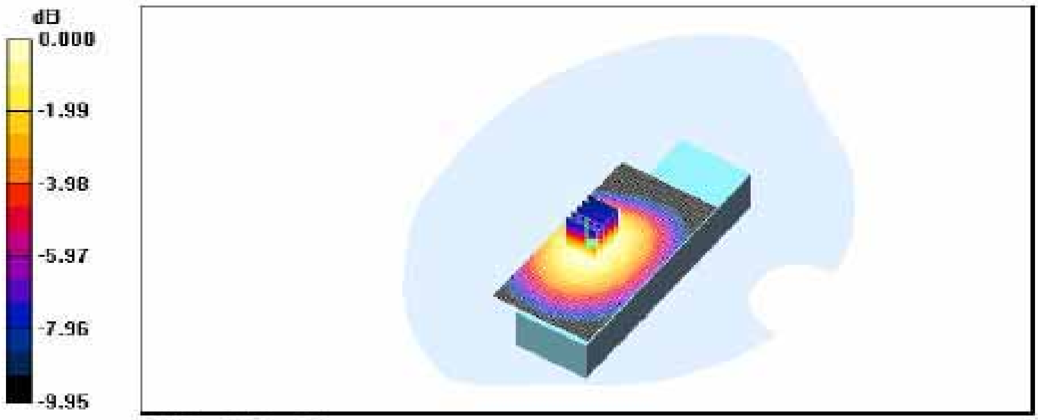
Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 849 MHz; σ = 0.966 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.17, 6.17, 6.17); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 ℃, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.487 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.5 V/m; Power Drift = -0.074 dB
Peak SAR (extrapolated) = 0.614 W/kg
SAR(1 g) = 0.447 mW/g
Maximum value of SAR (measured) = 0.478 mW/g



0 dB = 0.478mW/g

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CH251 BODY-GPRS

DUT: MG120; Type: FOLDER; Serial: NONE

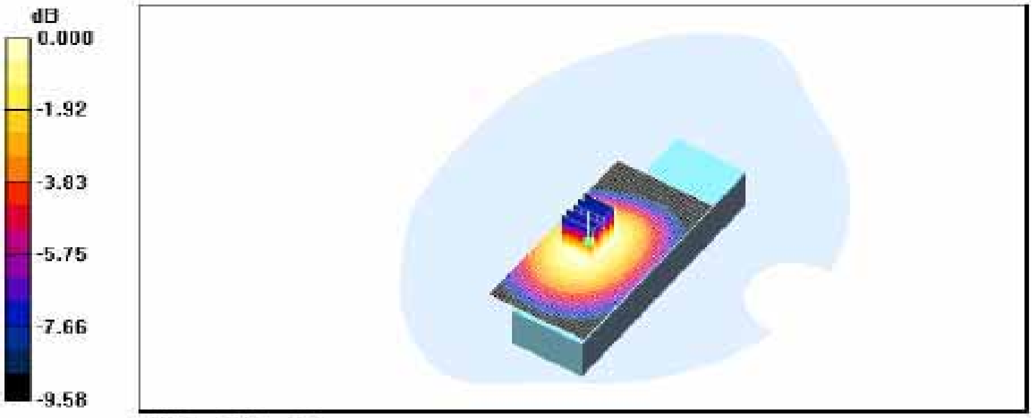
Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 849 MHz; σ = 0.966 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.17, 6.17, 6.17); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23 ℃, Humidity : 44%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.429 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.9 V/m; Power Drift = -0.054 dB
Peak SAR (extrapolated) = 0.519 W/kg
SAR(1 g) = 0.393 mW/g
Maximum value of SAR (measured) = 0.418 mW/g



0 dB = 0.418mW/g

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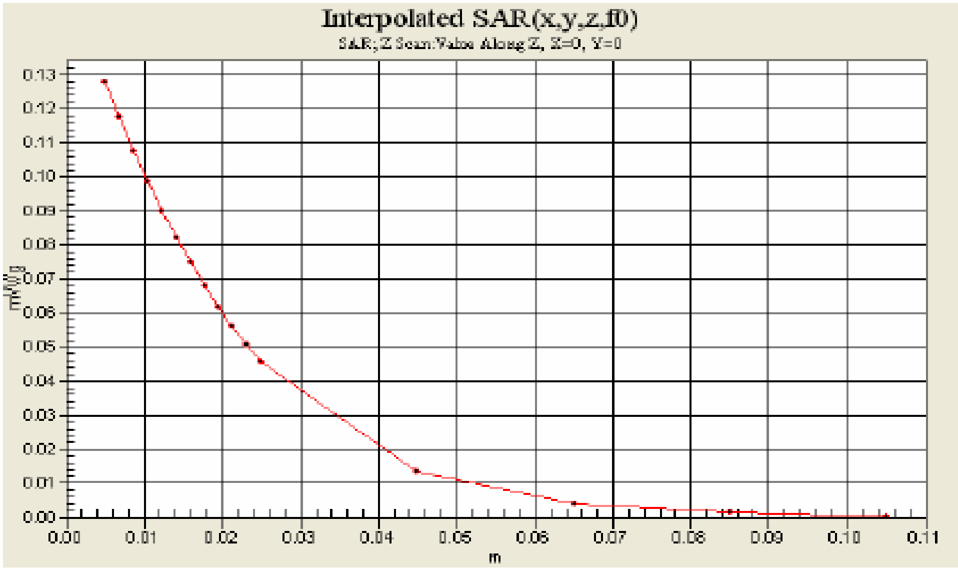
CH251 BODY-ZSCAN

DUT: MG120; Type: FOLDER; Serial: NONE

Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 849 MHz; σ = 0.966 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.17, 6.17, 6.17); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn551; Calibrated: 2006-04-27
- Phantom: SAM 835MHz; Type: SAM 835MHz; Serial: TP-1262
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161
- Temperature : 23℃, Humidity : 46%



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–PCS1900

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Test Laboratory: ESTECH

CH512 LEFT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

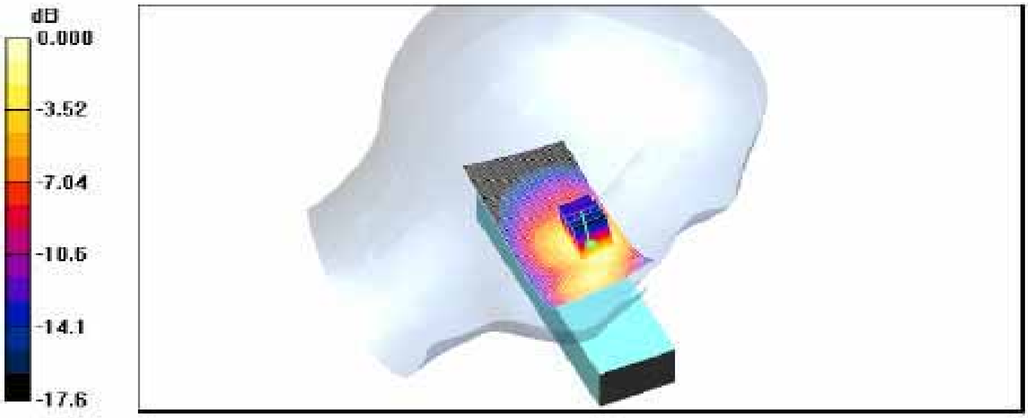
Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.4 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - 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℃, Humidity : 47%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.14 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.99 V/m; Power Drift = -0.067 dB
Peak SAR (extrapolated) = 1.78 W/kg
SAR(1 g) = 0.975 mW/g
Maximum value of SAR (measured) = 1.11 mW/g



0 dB = 1.11mW/g

Date/Time: 2006-07-05 14:34:40

Test Laboratory: ESTECH

CH661 LEFT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

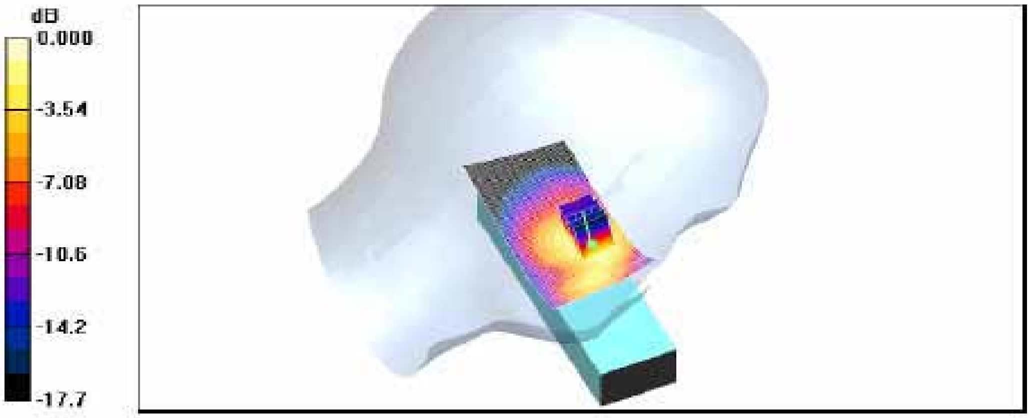
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.41 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - 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 : 22℃, Humidity : 46%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.827 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.00 V/m; Power Drift = -0.031 dB
Peak SAR (extrapolated) = 1.28 W/kg
SAR(1 g) = 0.702 mW/g
Maximum value of SAR (measured) = 0.803 mW/g



0 dB = 0.803mW/g

Date/Time: 2006-07-05 16:07:58

Test Laboratory: ESTECH

CH810 LEFT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

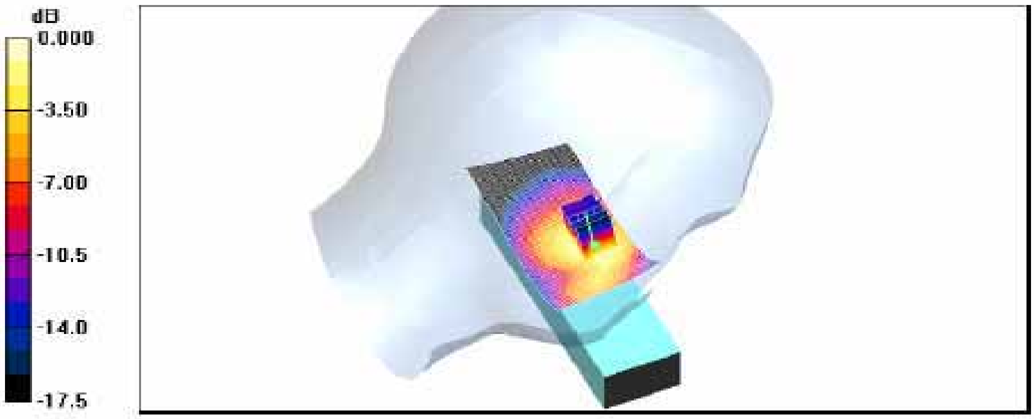
Communication System: GSM1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1910 MHz; σ = 1.46 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical 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℃, Humidity : 43%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.613 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.16 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 0.974 W/kg
SAR(1 g) = 0.524 mW/g
Maximum value of SAR (measured) = 0.592 mW/g



0 dB = 0.592mW/g

Date/Time: 2006-07-05 15:23:45

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CH512 RIGHT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

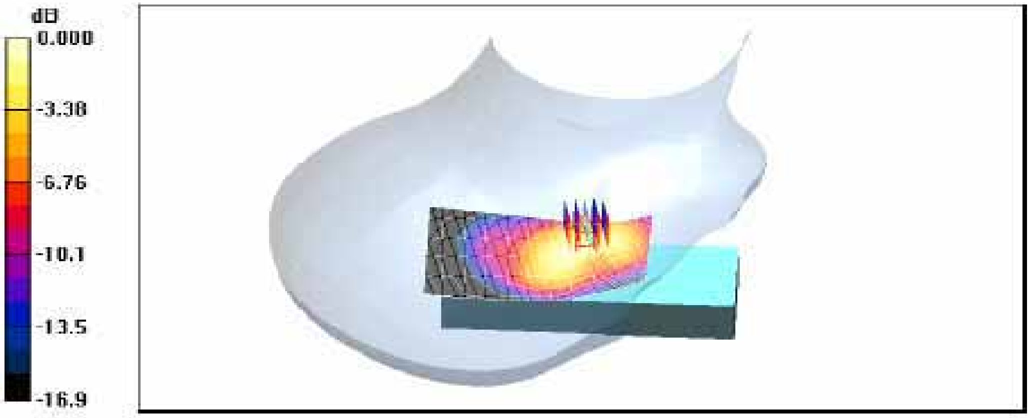
Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.4 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - 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℃, Humidity : 42%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.14 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.82 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 2.00 W/kg
SAR(1 g) = 1.03 mW/g
Maximum value of SAR (measured) = 1.15 mW/g



0 dB = 1.15mW/g

Date/Time: 2006-07-05 14:59:25

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CH661 RIGHT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

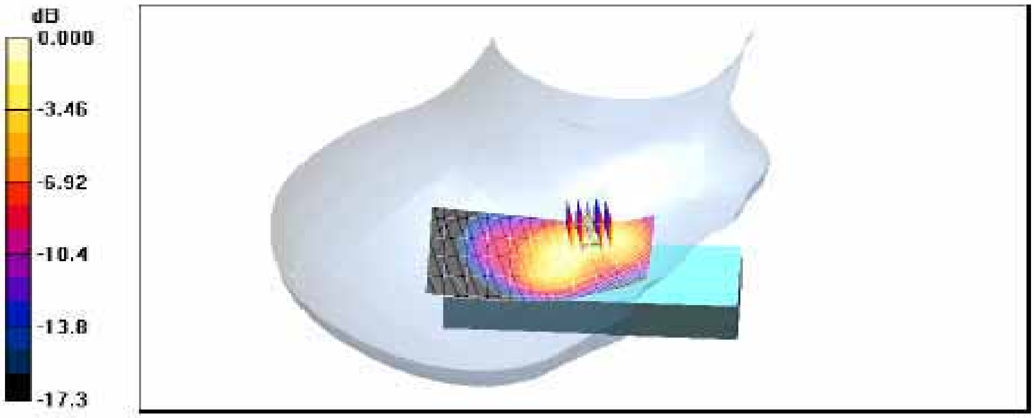
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.41 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - 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℃, Humidity : 43%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.875 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.77 V/m; Power Drift = 0.059 dB
Peak SAR (extrapolated) = 1.53 W/kg
SAR(1 g) = 0.783 mW/g
Maximum value of SAR (measured) = 0.870 mW/g



0 dB = 0.870mW/g

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CH810 RIGHT TOUCH

DUT: MG120; Type: FOLDER; Serial: NONE

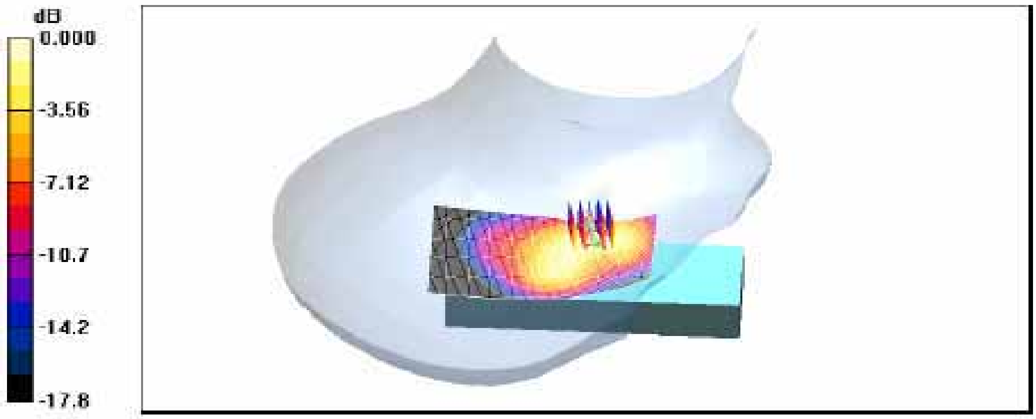
Communication System: GSM1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1910 MHz; σ = 1.46 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

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 ℃, Humidity : 42%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.661 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.75 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.586 mW/g
Maximum value of SAR (measured) = 0.657 mW/g



0 dB = 0.657mW/g

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CH661 LEFT TILT

DUT: MG120; Type: FOLDER; Serial: NONE

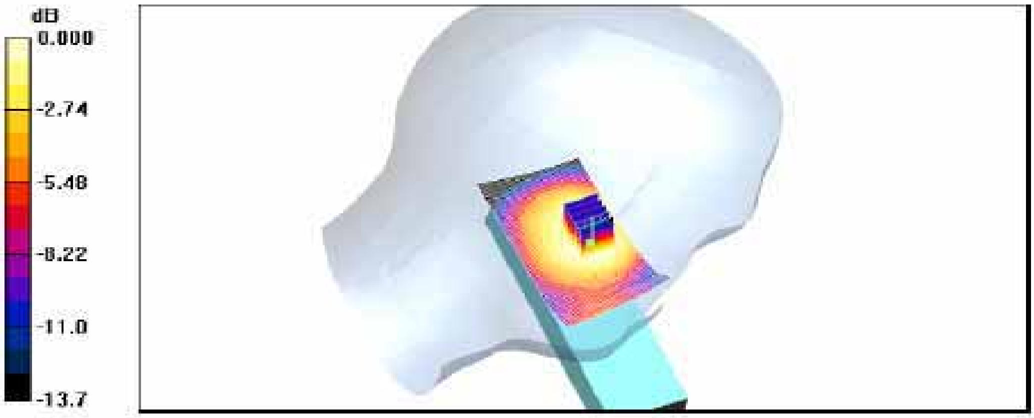
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.41 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - 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 ℃, Humidity : 44%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.140 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.66 V/m; Power Drift = -0.002 dB
Peak SAR (extrapolated) = 0.180 W/kg
SAR(1 g) = 0.123 mW/g
Maximum value of SAR (measured) = 0.134 mW/g



0 dB = 0.134mW/g

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CH661 RIGHT TILT

DUT: MG120; Type: FOLDER; Serial: NONE

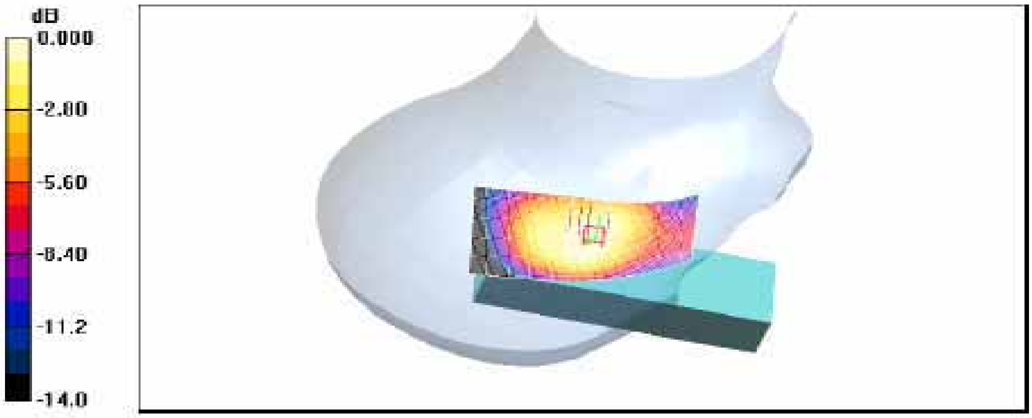
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.41 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - 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 ℃, Humidity : 43%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.142 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.84 V/m; Power Drift = 0.013 dB
Peak SAR (extrapolated) = 0.201 W/kg
SAR(1 g) = 0.131 mW/g
Maximum value of SAR (measured) = 0.143 mW/g



0 dB = 0.143mW/g

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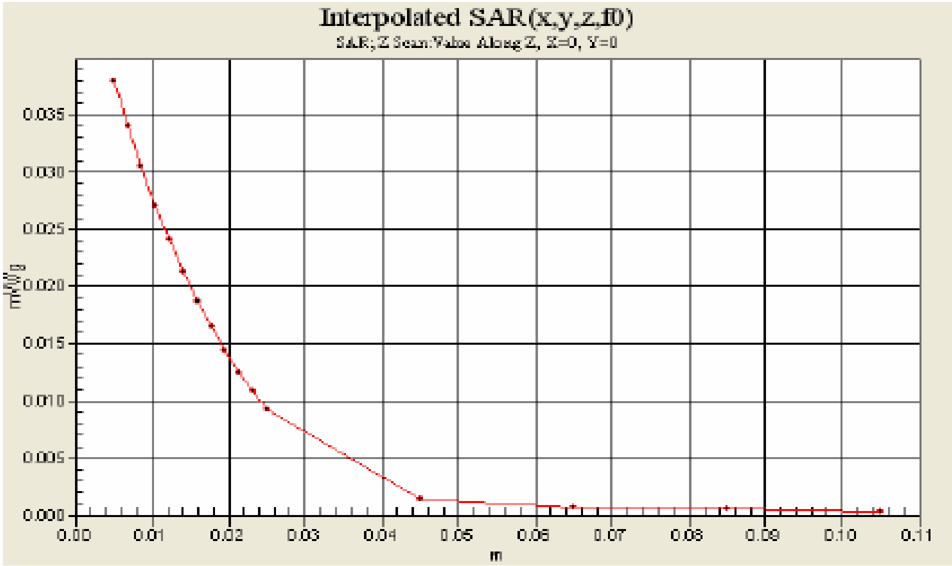
CH512 RIGHT TOUCH-ZSCAN

DUT: MG120; Type: FOLDER; Serial: NONE

Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.4 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(5.14, 5.14, 5.14); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- 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℃, Humidity : 42%



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Date/Time: 2006-07-05 17:35:05

Test Laboratory: ESTECH

CH512 BODY

DUT: MG120; Type: FOLDER; Serial: NONE

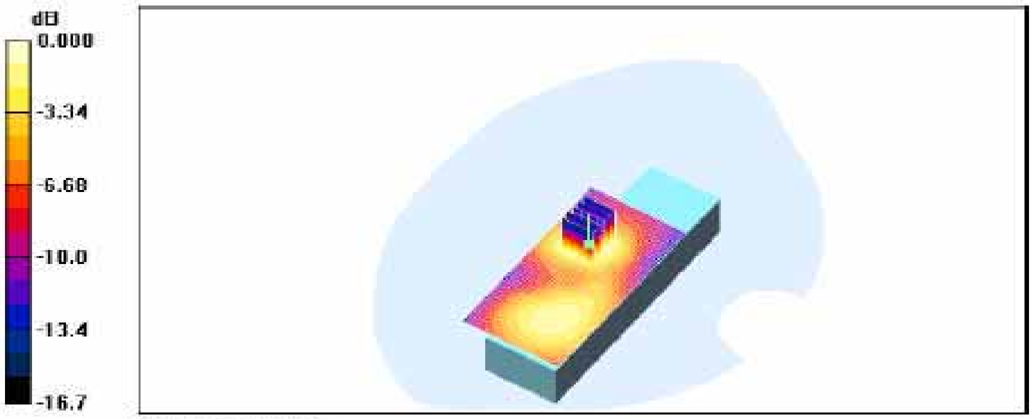
Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.53 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

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℃, Humidity : 49%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.290 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.2 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 0.391 W/kg
SAR(1 g) = 0.249 mW/g
Maximum value of SAR (measured) = 0.283 mW/g



0 dB = 0.283mW/g

Date/Time: 2006-07-05 17:23:22

Test Laboratory: ESTECH

CH661 BODY

DUT: MG120; Type: FOLDER; Serial: NONE

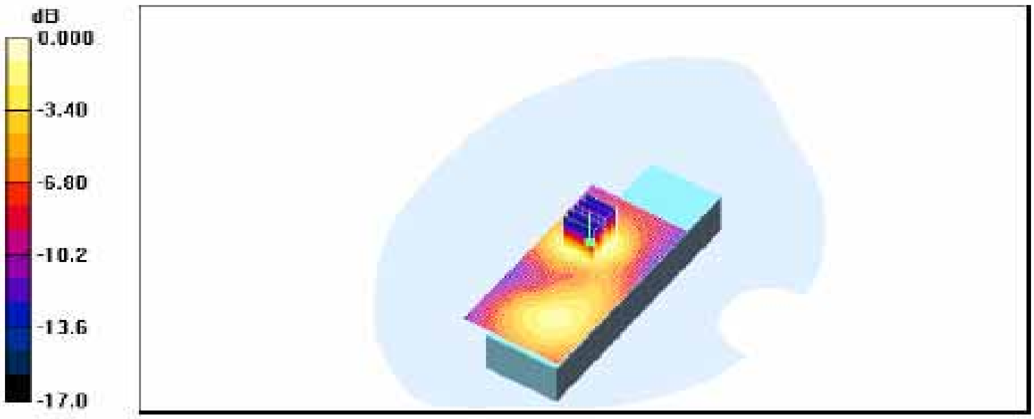
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; $\sigma = 1.56$ mho/m; $\varepsilon_r = 51.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

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℃, Humidity : 42%

Area Scan (41x81x1): 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 = 11.9 V/m; Power Drift = -0.009 dB
Peak SAR (extrapolated) = 0.326 W/kg
SAR(1 g) = 0.204 mW/g
Maximum value of SAR (measured) = 0.231 mW/g



0 dB = 0.231mW/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: 2006-07-05 17:46:47

Test Laboratory: ESTECH

CH810 BODY

DUT: MG120; Type: FOLDER; Serial: NONE

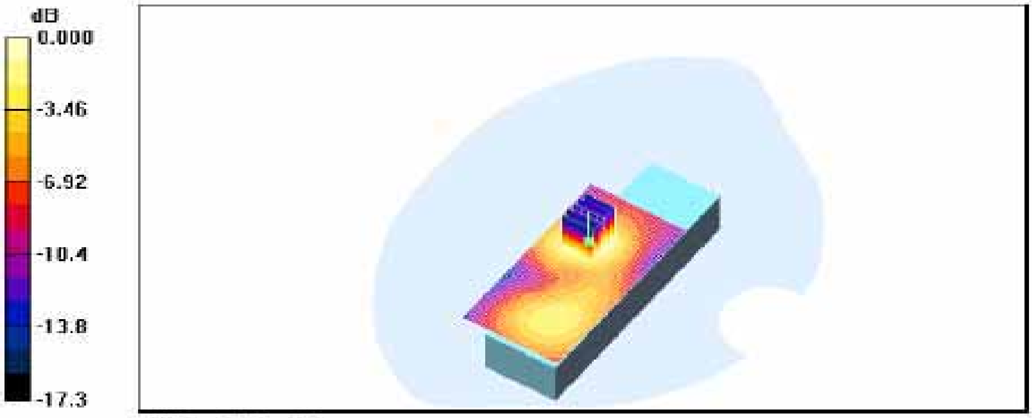
Communication System: GSM1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1910 MHz; σ = 1.59 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - 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 ℃, Humidity : 47%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.185 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.4 V/m; Power Drift = -0.021 dB
Peak SAR (extrapolated) = 0.264 W/kg
SAR(1 g) = 0.162 mW/g
Maximum value of SAR (measured) = 0.183 mW/g



0 dB = 0.183mW/g

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Date/Time: 2006-07-05 17:59:32

Test Laboratory: ESTECH

CH512 BODY-GPRS

DUT: MG120; Type: FOLDER; Serial: NONE

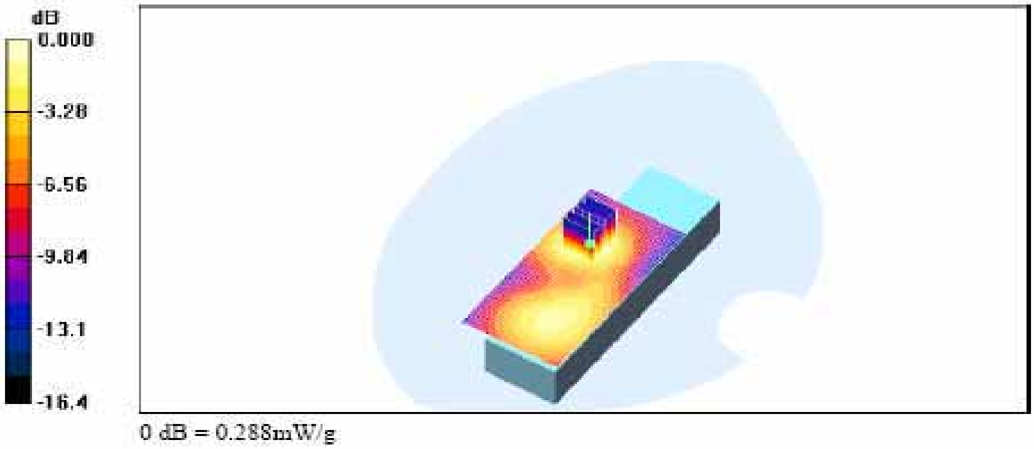
Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.15
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.53 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

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 ℃, Humidity : 43%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.290 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = -0.034 dB
Peak SAR (extrapolated) = 0.399 W/kg
SAR(1 g) = 0.254 mW/g
Maximum value of SAR (measured) = 0.288 mW/g



0 dB = 0.288mW/g

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Date/Time: 2006-07-05 17:59:32

Test Laboratory: ESTECH

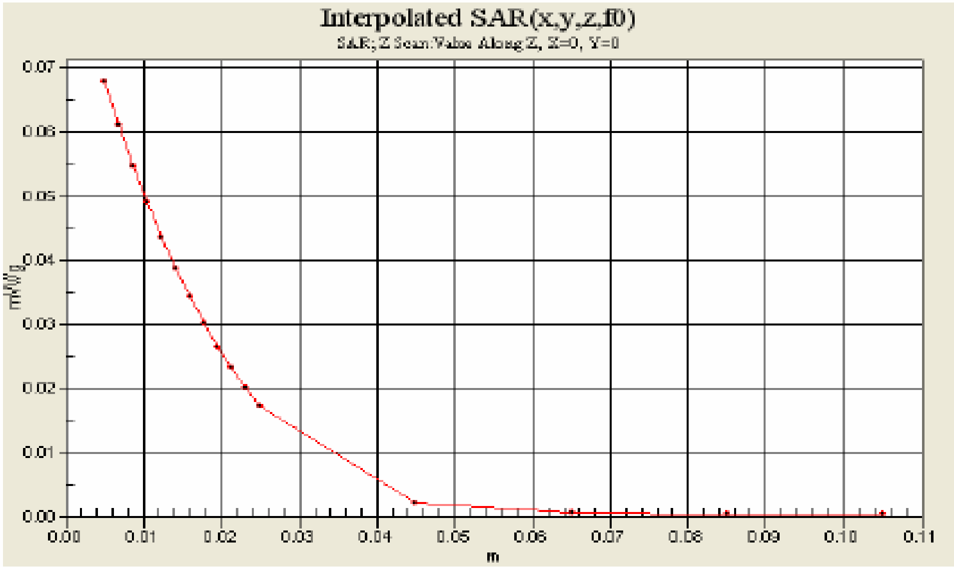
CH512 BODY-GPRS-ZSCAN

DUT: MG120; Type: FOLDER; Serial: NONE

Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.15
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.53 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
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)Sensor-Surface: 0mm (Fix Surface)
- 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 ℃, Humidity : 43%



APPENDIX D : Calibration Certificates

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

IMPORTANT NOTICE

DIPOLE TRANSPORTATION CASE

Important Note:

Please use only this suitcase for any future dipole transportation!

s p e a g

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info@speag.com, http://www.speag.com

Schmid & Partner Engineering AG

June 2003

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S **Schweizerischer Kalibrierdienst**
C **Service suisse d'étalonnage**
S **Servizio svizzero di taratura**
Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **Estech (Dymstec)**

Certificate No: D1900V2-5d058_Jan05

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d058
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	January 27, 2005
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 ± 3)°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 EPM E442	GB37480704	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Power sensor HP 8481A	US37292783	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference Probe ET3DV6	SN 1507	26-Oct-04 (SPEAG, No. ET3-1507_Oct04)	Oct-05
DAE4	SN 601	07-Jan-05 (SPEAG, No. DAE4-601_Jan05)	Jan-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-03)	In house check: Oct-05
RF generator R&S SML-03	100698	27-Mar-02 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

	Name	Function	Signature
Calibrated by:	Judith Müller	Laboratory Technician	J. Müller
Approved by:	Katja Pokovic	Technical Manager	Katja

Issued: January 31, 2005

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

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) 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
b) 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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY4	V4.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.6 ± 6 %	1.45 mho/m ± 6 %
Head TSL temperature during test	(21.8 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	250 mW input power	9.81 mW / g
SAR normalized	normalized to 1W	39.2 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**38.3 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.12 mW / g
SAR normalized	normalized to 1W	20.5 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**20.0 mW / g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.6 Ω + 3.9 jΩ
Return Loss	- 24.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.203 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 19, 2004

DASY4 Validation Report for Head TSL

Date/Time: 01/27/05 13:23:28

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d058

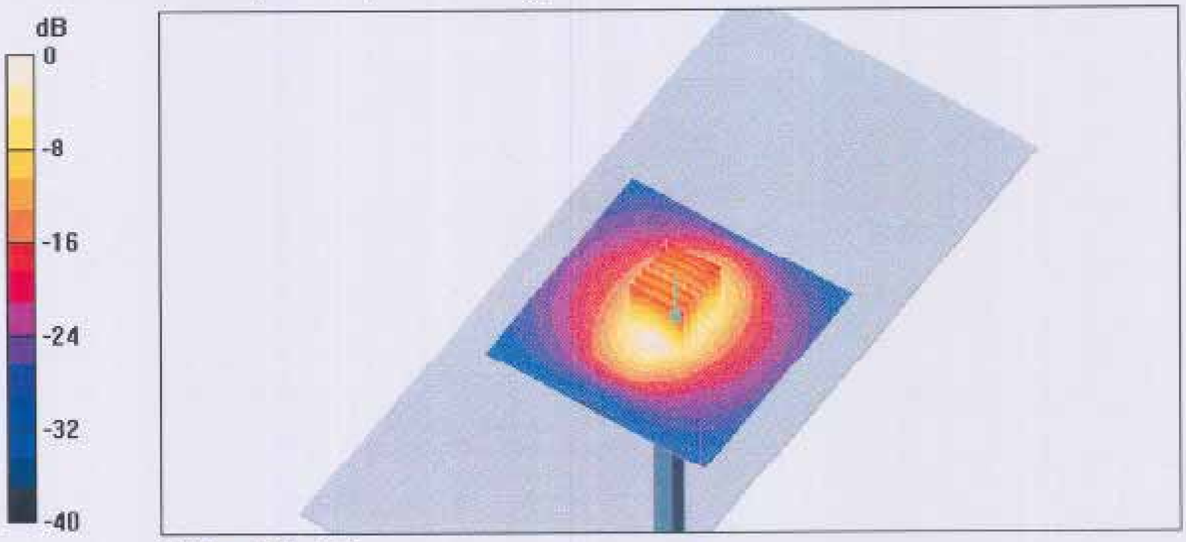
Communication System: CW 1900; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL 1900 MHz;
Medium parameters used: f = 1900 MHz; σ = 1.45 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(5.2, 5.2, 5.2); Calibrated: 24.01.2002
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.01.2005
- Phantom: Flat Phantom 5.0; Type: QD000P50AA; Serial: 1001;
- Measurement SW: DASY4, V4.4 Build 13; Postprocessing SW: SEMCAD, V1.8 Build 133

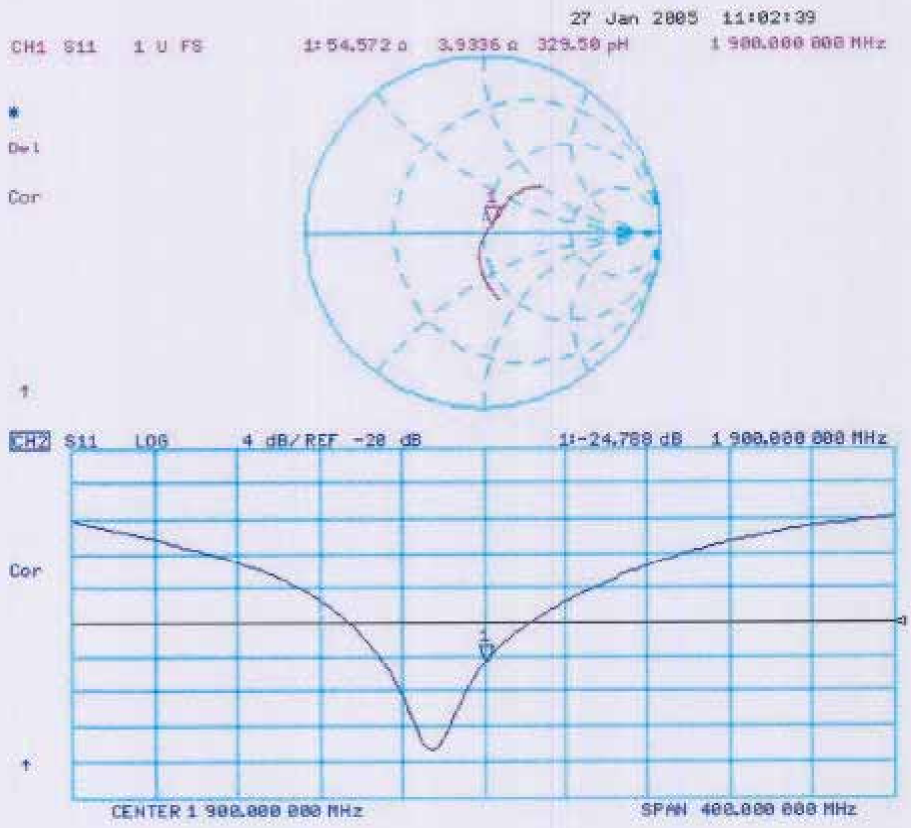
Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.2 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.2 V/m; Power Drift = 0.0 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.81 mW/g; SAR(10 g) = 5.12 mW/g
Maximum value of SAR (measured) = 11.1 mW/g



0 dB = 11.1mW/g

Impedance Measurement Plot for Head TSL



Calibration Laboratory of
Schmid & Partner
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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Swiss Calibration Service

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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **Estech (Dymstec)**

Certificate No: D835V2-475_Feb05

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 475
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	February 24, 2005
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 ± 3)°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 EPM E442	GB37480704	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Power sensor HP 8481A	US37292783	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference Probe ET3DV6	SN 1507	26-Oct-04 (SPEAG, No. ET3-1507_Oct04)	Oct-05
DAE4	SN 601	07-Jan-05 (SPEAG, No. DAE4-601_Jan05)	Jan-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-03)	In house check: Oct-05
RF generator R&S SML-03	100698	27-Mar-02 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov-05

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	Mike Meili
Approved by:	Katja Pokovic	Technical Manager	Katja

Issued: February 25, 2005

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