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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 06/01 ~ 06/27
Test Site : ESTECH Co., Ltd. Korea

Test Device :

Models : MD120

FCC ID : UE2MD120

TYPE : SINGLE BAND CDMA MOBILE PHONE (Prototype)

Test report no :	ESTSAR0606-011
Number of page :	22
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)
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 : 2006/06/27
Report Prepared By : Engineer/ K.H.Kang
(Signature)
Manager Engineer/ Jay Kim
(Signature)

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1. SUMMARY FOR TEST REPORT

FCC ID	UE2MD120
Date of test	2006/06/01 ~ 2006/06/27
Responsible test engineer	Jay Kim
Measurement performed by	K.H.Kang
EUT Type	SINGLE BAND CDMA MOBILE PHONE (Prototype)
Tx Frequency	824.70 ~ 848.31 MHz
Rx Frequency	869.70 ~ 893.31 MHz
Max. RF Output Power	CDMA (23 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			
848.31	777	CDMA	23	Standard	Right Touch	-	0.963

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			
848.31	777	CDMA	23	Standard	1.5cm [w/o Holster]	-	0.653

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/m^3)

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 : UE2MD120
Serial numbers	–
Exposure environment	Uncontrolled exposure
Device category	Portable device
Mode(s) of Operation	CDMA
Modulation Mode(s)	CDMA
Duty Cycle	1
Transmitting FreQuency Range(s)	824.70 ~ 848.31 MHz (CDMA)
test signal method	☐ Base station simulator ■ Internal test code

2.3 Battery Options

There is only one battery option available for tested device,

4. TEST CONDITIONS

4.1 Ambient Conditions

Ambient Temperature (˚C)	22
Tissue simulating liquid temperature (˚C)	22
Humidity (%)	45

4.2 RF Characteristics of The Test Site

Tests were performed in a fully enclosed RF Shielded environment

4.3 Test Signal, Frequencies, And Output Power

The handset was placed into simulated call mode (800MHz CDMA modes) using manufacturers test codes.

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

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

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

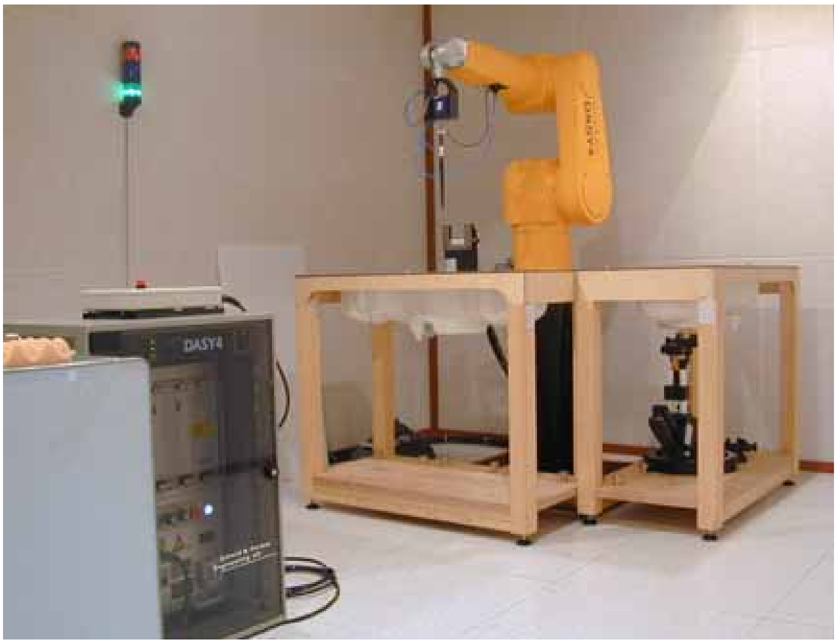


Fig. 4.1 SAR Measurement System

5. DESCRIPTION OF THE TEST EQUIPMENT

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

5.1 Test System Specifications

Test Equipment	Model	Serial Number	Cal. date
DAE	DAE4	551	2006-04-27
E-Field Probe	ET3DV6	1750	2006-01-24
Dipole validation kit	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	3318A90368	2005-10-05
Dielectric Probe	85070D	US01440154	-

5.2 SAR Measurement Setup

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

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

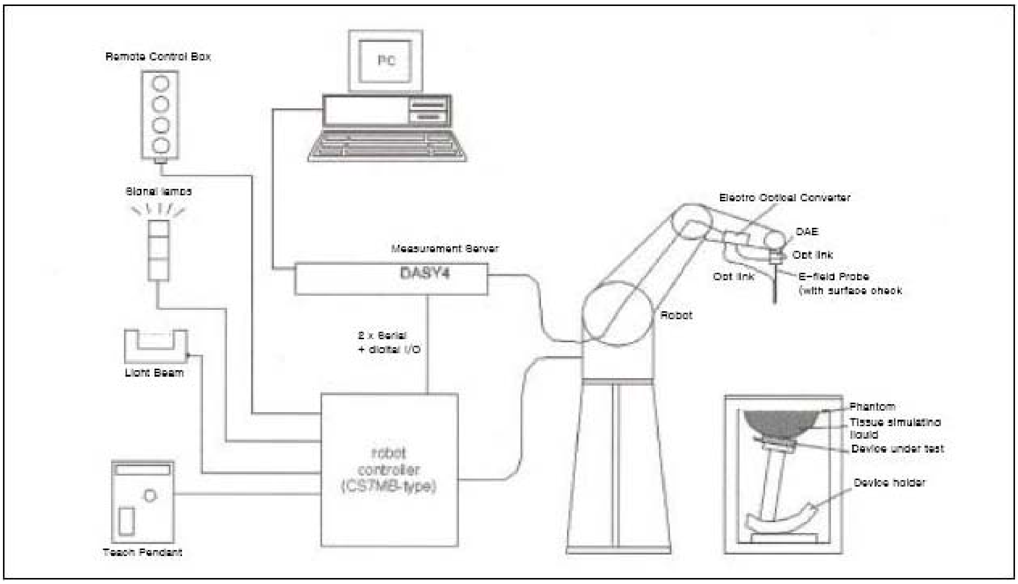


Fig. 5.1 SAR Measurement System Setup

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

5.3 DASY4 E-Field Probe System

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

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

Isotropic E-Field Probe

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

Fig. 5.2 Probe Specifications

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

5.4 Phantom & Equivalent Tissues

SAM Phantom

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

Head & Muscle simulation Mixture Characterization

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

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

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

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

Fig. 5.4 Composition of the Tissue Equivalent Matter

Device Holder for Transmitters

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

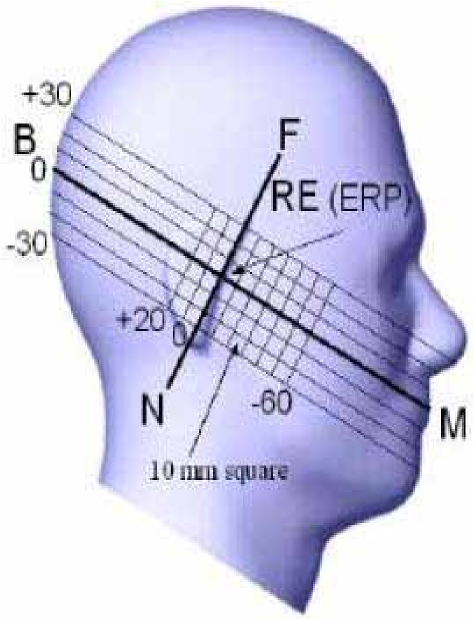
Note : A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produce infinite number of configurations [12]. To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

6. DESCRIPTION OF THE TEST PROCEDURE

6.1 Definition of Reference Point

EAR Reference point

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



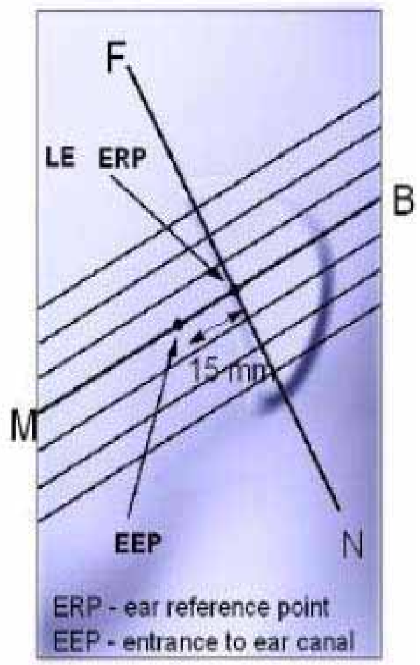


Figure 6.1 Close–up side view of ERP

Handset Reference Points

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

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

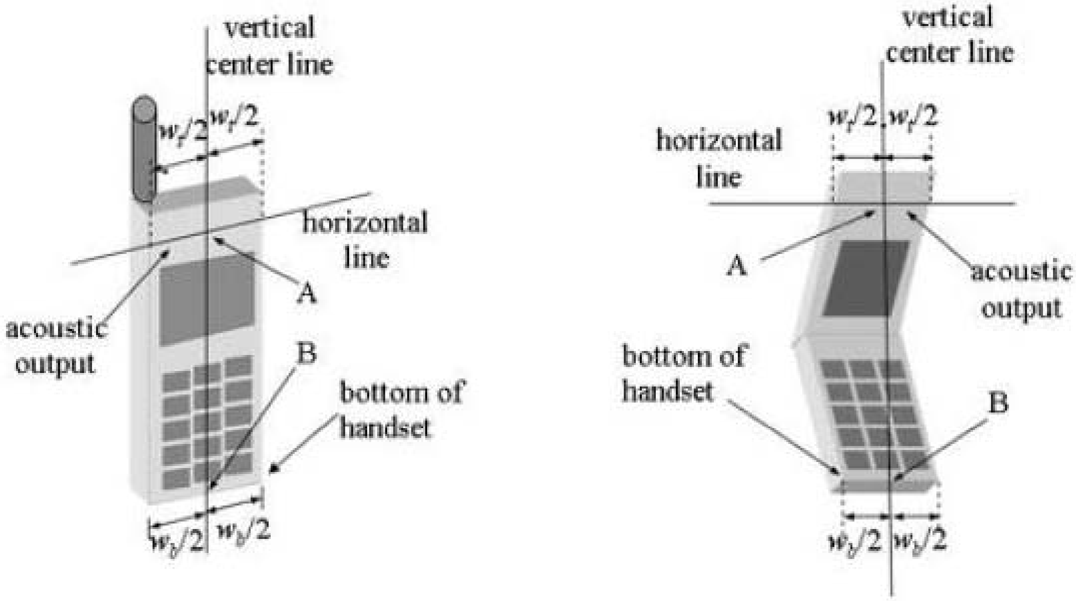


Figure 6.2 Handset Vertical Center & Horizontal Line Reference Points

6.2 Test Configuration Positions
Positioning for Cheek/Touch

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

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

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

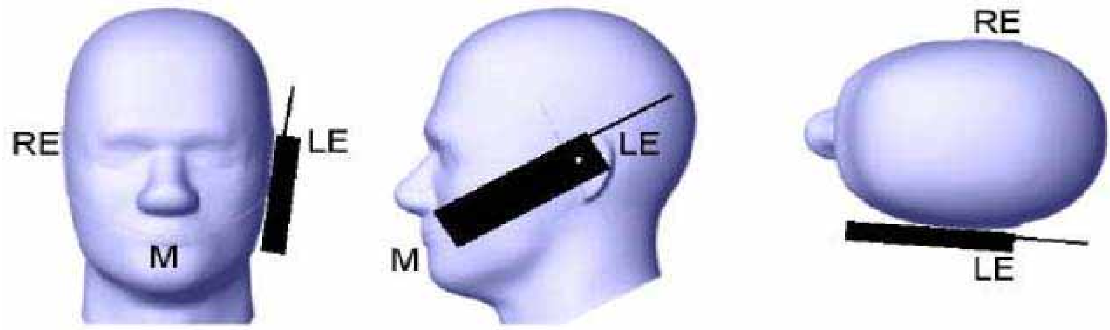


Figure 6.3 “Cheek” or “Touch” Position.

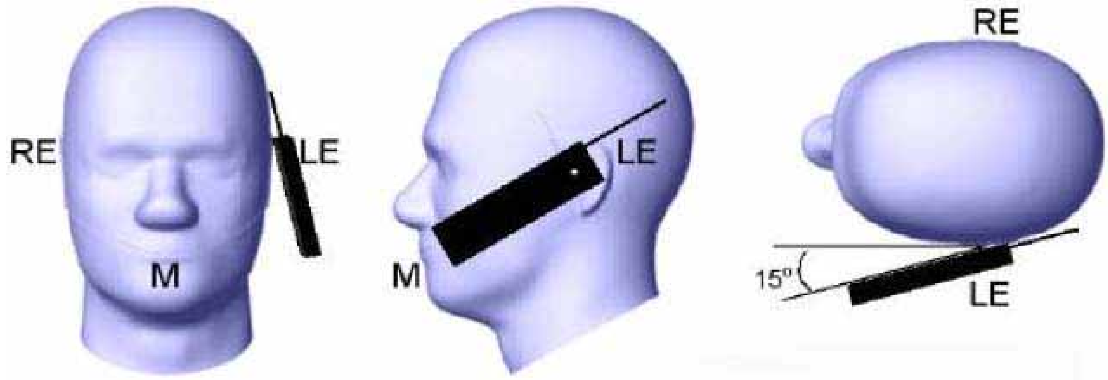


Figure 6.4 “Tilted” Position.

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

Positioning for Ear / 15˚ Tilted

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

Body Holder / Belt Clip Configurations

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

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

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

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

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

6.3 Scan Procedures

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

6.4 SAR Averaging Methods

The maximum SAR value is averaged over its volume using interpolation and extrapolation.
The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a Knot" ?condition [W.Gander, 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 %	

8. SYSTEM VERIFICATION

Tissue Verification

Table 8.1 Simulated Tissue Verification [5]

MEASURED TISSUE PARAMETERS										
Liquid Temperature (°C)			22		Liquid Depth(mm)		150			
Date	2006-06-26		2006-06-26				/ /			
Tissue	835MHz Brain		835MHz Muscle							
	Target	Measured	Target	Measured						
Dielectric Constant: ε	41.5	41.1	55.2	53.6						
Conductivity: σ	0.9	0.904	0.97	0.956						
Deviation (%)	ε : -0.96% σ : 0.44%		ε : -2.90% σ : -1.44%							

Test System Validation

- Prior to assessment, the system is verified to the ±10% of the specifications at 835MHz (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
835MHz Brain	D835V2(S/N :475)	1.0	9.5	9.2	3.16%	2006-06-26

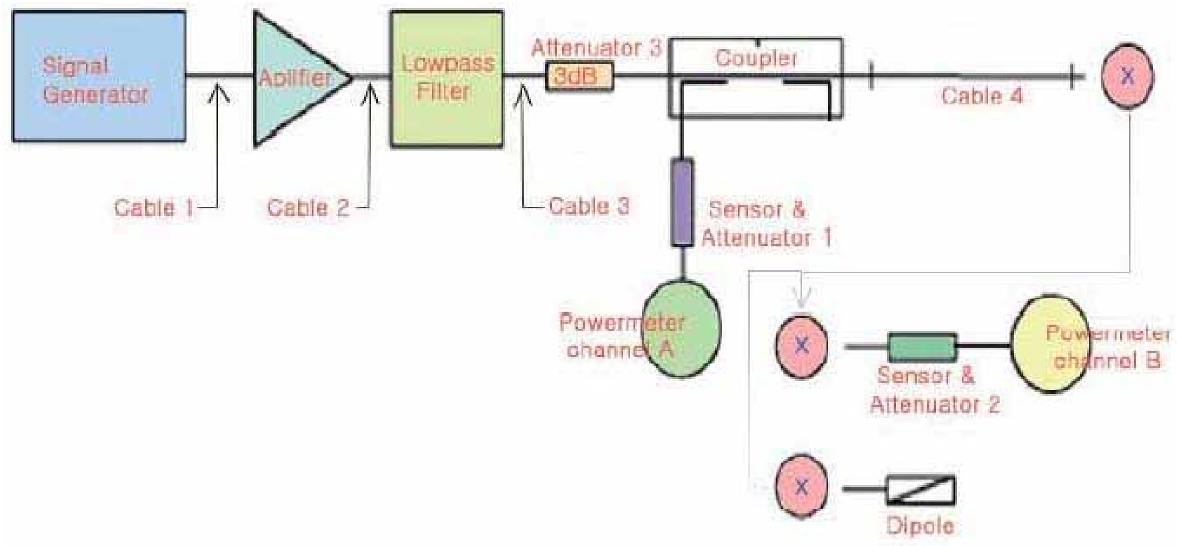


Figure 12.1 Dipole Validation Test Setup

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22
Relative HUMIDITY (%) : 45
Mixture Type : 835MHz Brain
Dielectric Constant : 41.1
Conductivity: 0.904

Measurement Results (CDMA Head SAR-Touch)

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

MEASUREMENT RESULTS (CDMA Left Head SAR – Touch)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.70	1013	CDMA	23.00	22.94	Standard	Cheek Touch	-	0.437
835.89	363	CDMA	23.00	22.90	Standard	Cheek Touch	-	0.484
848.31	777	CDMA	23.00	22.97	Standard	Cheek Touch	-	0.851

MEASUREMENT RESULTS (CDMA Right Head SAR – Touch)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.70	1013	CDMA	23.00	22.97	Standard	Cheek Touch	-	0.470
835.89	363	CDMA	23.00	22.93	Standard	Cheek Touch	-	0.498
848.31	777	CDMA	23.00	22.91	Standard	Cheek Touch	-	0.963

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)

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

9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22
Relative HUMIDITY (%) : 45
Mixture Type : 835MHz Brain
Dielectric Constant : 41.1
Conductivity: 0.904

Measurement Results (CDMA Head SAR-Tilt)

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

MEASUREMENT RESULTS (CDMA Left Head SAR – Tlit)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
835.89	363	CDMA	23.00	22.98	Standard	Tilt	–	0.135

MEASUREMENT RESULTS (CDMA Right Head SAR – Tilt)

Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
835.89	363	CDMA	23.00	22.88	Standard	Tilt	–	0.129

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

Engineer K.H.Kang (Signature)

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22
Relative HUMIDITY (%) : 48
Mixture Type : 835MHz Body
Dielectric Constant : 53.6
Conductivity: 0.966

Measurement Results (CDMA 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 (CDMA Body SAR Without Holster)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
824.70	1013	CDMA	23.00	22.85	Standard	1.5[w/o Holster]	–	0.342
835.89	363	CDMA	23.00	22.95	Standard	1.5[w/o Holster]	–	0.348
848.31	777	CDMA	23.00	22.95	Standard	1.5[w/o Holster]	–	0.653

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

Engineer K.H.Kang (Signature)

10. REFERENCE

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APPENDIX A : Validation Test Data of Tissue

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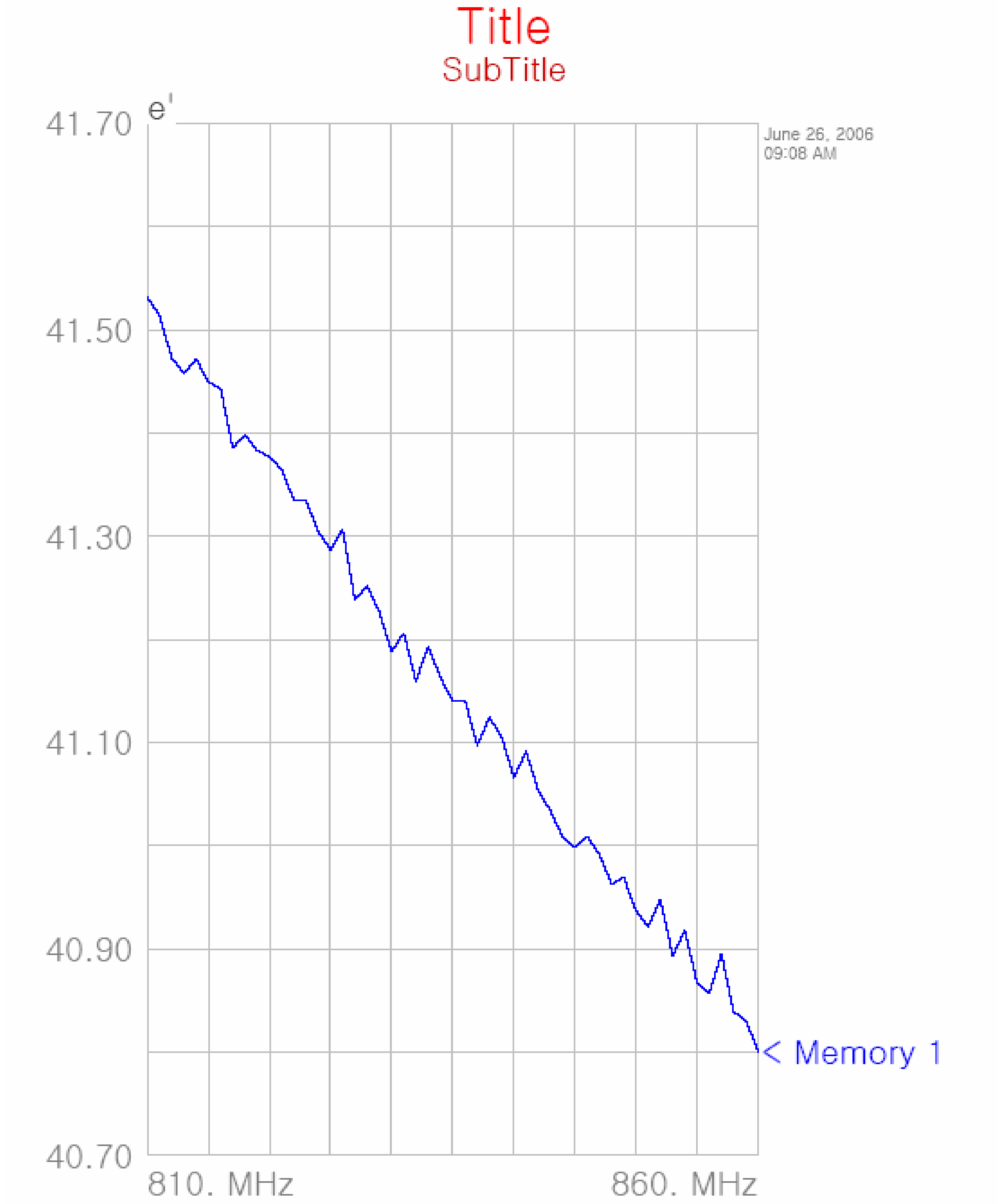
– Head Tissue



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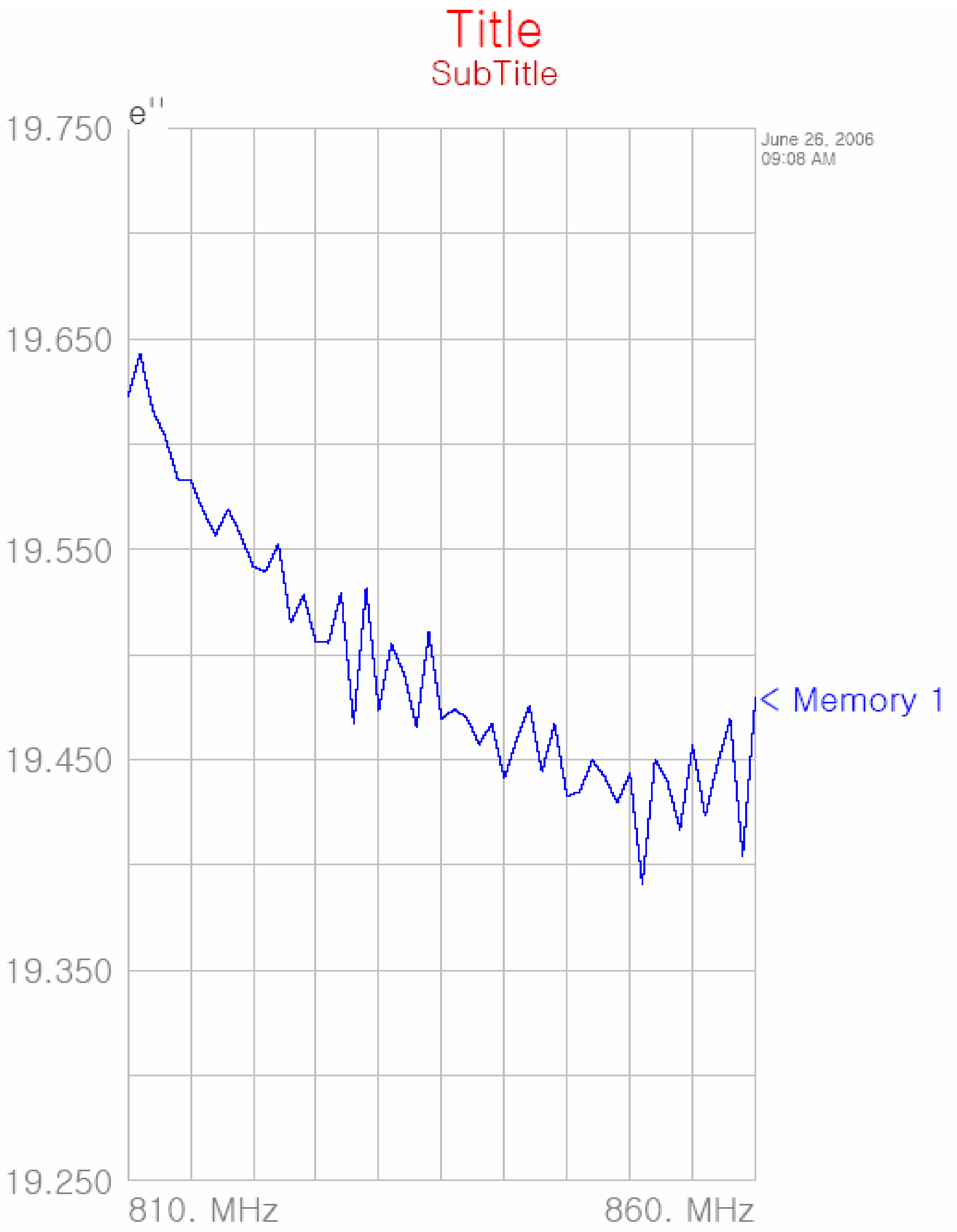
FAX: 82-2-867-3204



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FAX: 82-2-867-3204

Title
SubTitle
June 26, 2006 [illegible]

Frequency	e'	e''
810.000000 MHz	41.5317	19.6223
811.000000 MHz	41.5141	19.6428
812.000000 MHz	41.4729	19.6157
813.000000 MHz	41.4573	19.6034
814.000000 MHz	41.4718	19.5828
815.000000 MHz	41.4490	19.5832
816.000000 MHz	41.4434	19.5682
817.000000 MHz	41.3854	19.5568
818.000000 MHz	41.3981	19.5690
819.000000 MHz	41.3827	19.5567
820.000000 MHz	41.3773	19.5417
821.000000 MHz	41.3647	19.5394
822.000000 MHz	41.3351	19.5525
823.000000 MHz	41.3343	19.5150
824.000000 MHz	41.3048	19.5281
825.000000 MHz	41.2870	19.5060
826.000000 MHz	41.3069	19.5055
827.000000 MHz	41.2382	19.5293
828.000000 MHz	41.2518	19.4670
829.000000 MHz	41.2263	19.5319
830.000000 MHz	41.1881	19.4733
831.000000 MHz	41.2064	19.5049
832.000000 MHz	41.1595	19.4912
833.000000 MHz	41.1937	19.4656
834.000000 MHz	41.1632	19.5106
835.000000 MHz	41.1404	19.4692
836.000000 MHz	41.1409	19.4740
837.000000 MHz	41.0971	19.4701
838.000000 MHz	41.1242	19.4571
839.000000 MHz	41.1054	19.4673
840.000000 MHz	41.0661	19.4413
841.000000 MHz	41.0916	19.4600
842.000000 MHz	41.0535	19.4756
843.000000 MHz	41.0337	19.4443
844.000000 MHz	41.0082	19.4667
845.000000 MHz	40.9982	19.4328
846.000000 MHz	41.0087	19.4348
847.000000 MHz	40.9916	19.4498
848.000000 MHz	40.9630	19.4419
849.000000 MHz	40.9695	19.4295
850.000000 MHz	40.9368	19.4436
851.000000 MHz	40.9216	19.3906
852.000000 MHz	40.9484	19.4502
853.000000 MHz	40.8934	19.4395
854.000000 MHz	40.9178	19.4169
855.000000 MHz	40.8669	19.4568
856.000000 MHz	40.8572	19.4232
857.000000 MHz	40.8951	19.4483
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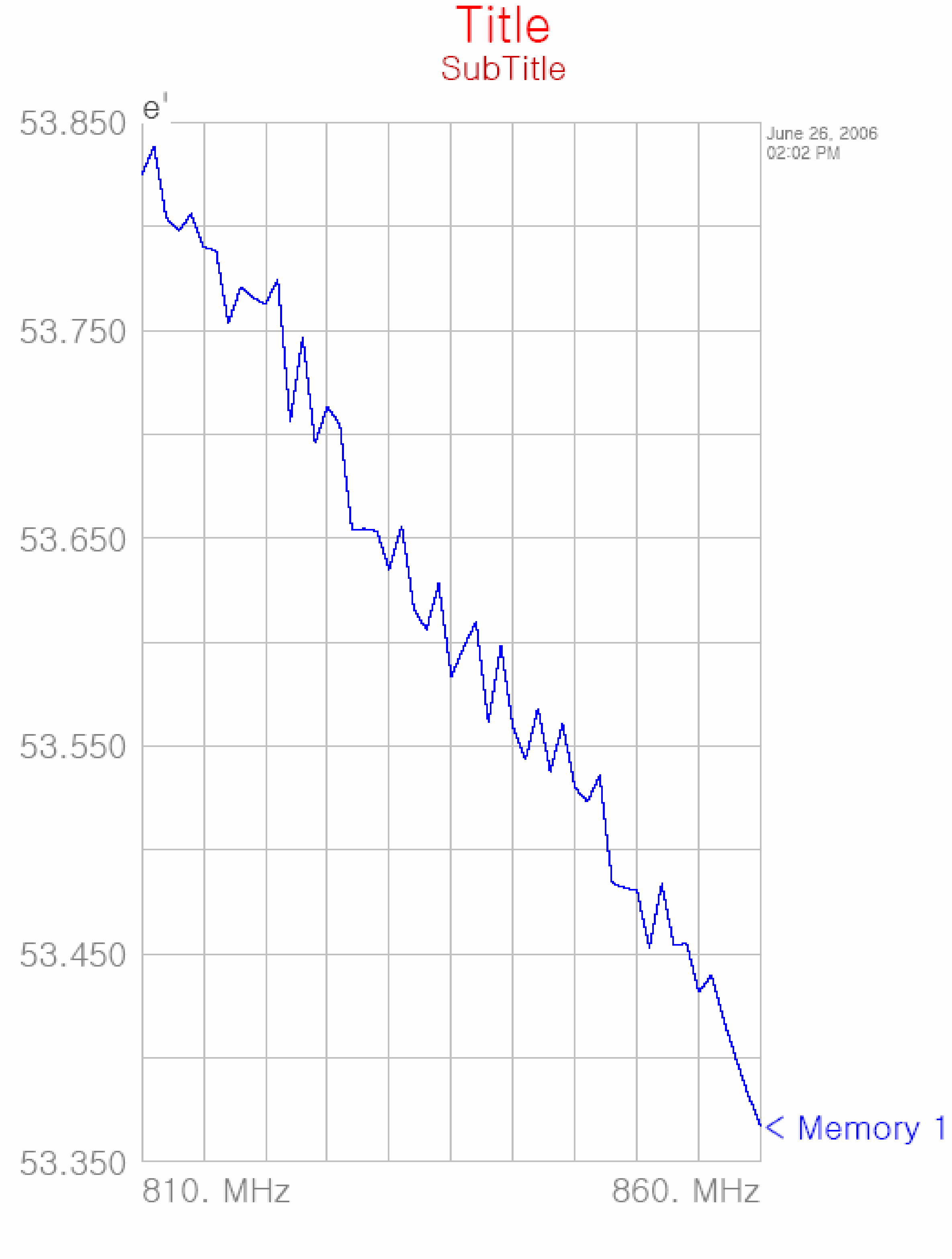
859.000000 MHz	40.8309	19.4043
860.000000 MHz	40.8007	19.4794

– Body Tissue


Title
SubTitle
e'
53.850
53.750
53.650
53.550
53.450
53.350
June 26, 2006
02:02 PM
< Memory 1
810. MHz
860. MHz

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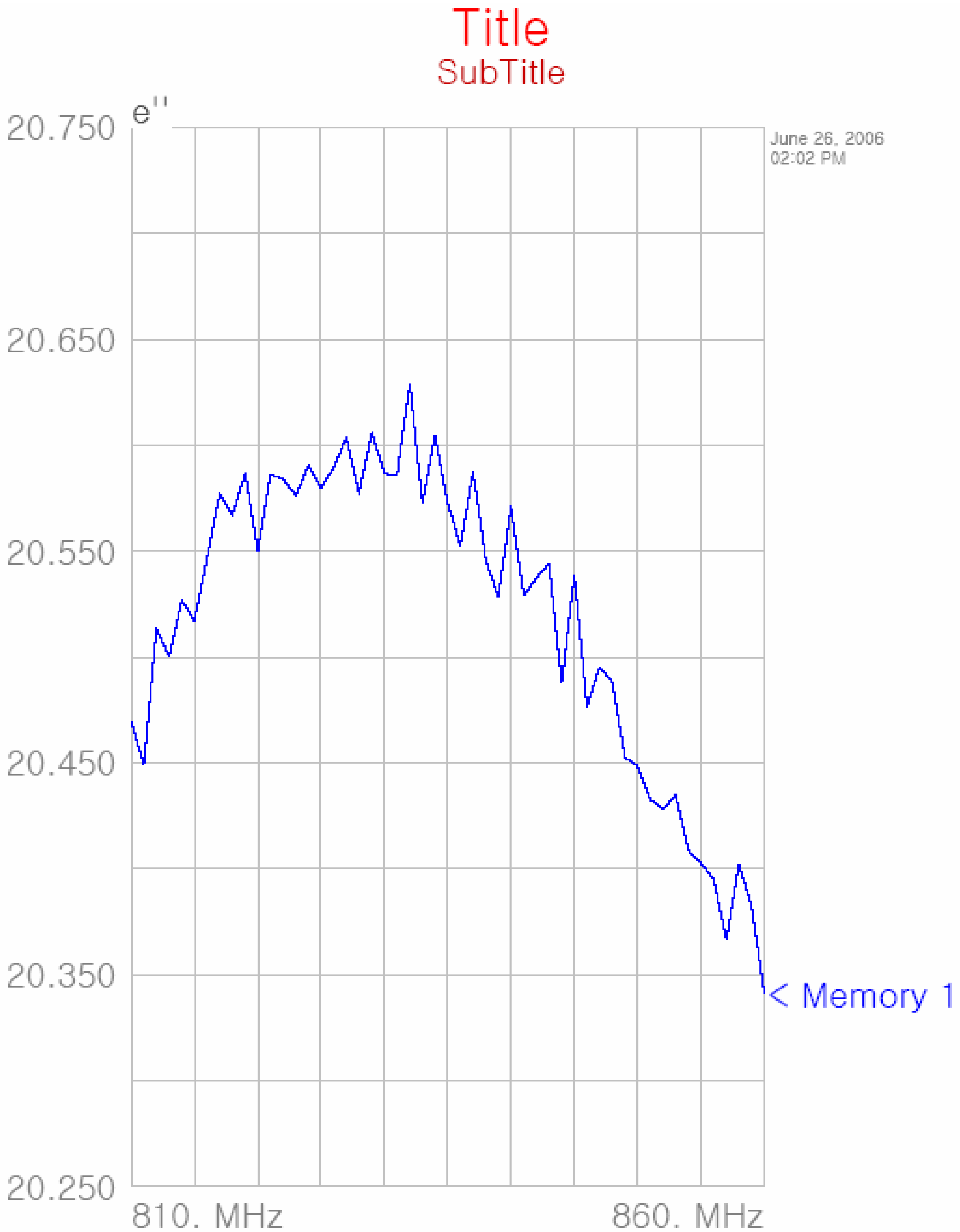

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Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Title

SubTitle

June 05, 2006 08:08 PM

Frequency	e'	e''
810.000000 MHz	53.8249	20.4696
811.000000 MHz	53.8387	20.4493
812.000000 MHz	53.8040	20.5135
813.000000 MHz	53.7979	20.5003
814.000000 MHz	53.8061	20.5267
815.000000 MHz	53.7901	20.5170
816.000000 MHz	53.7884	20.5469
817.000000 MHz	53.7535	20.5774
818.000000 MHz	53.7709	20.5669
819.000000 MHz	53.7658	20.5867
820.000000 MHz	53.7627	20.5501
821.000000 MHz	53.7746	20.5861
822.000000 MHz	53.7062	20.5841
823.000000 MHz	53.7469	20.5762
824.000000 MHz	53.6957	20.5904
825.000000 MHz	53.7132	20.5798
826.000000 MHz	53.7048	20.5895
827.000000 MHz	53.6538	20.6036
828.000000 MHz	53.6546	20.5769
829.000000 MHz	53.6535	20.6062
830.000000 MHz	53.6347	20.5866
831.000000 MHz	53.6558	20.5857
832.000000 MHz	53.6159	20.6289
833.000000 MHz	53.6061	20.5731
834.000000 MHz	53.6282	20.6047
835.000000 MHz	53.5832	20.5728
836.000000 MHz	53.5973	20.5524
837.000000 MHz	53.6097	20.5875
838.000000 MHz	53.5614	20.5460
839.000000 MHz	53.5983	20.5282
840.000000 MHz	53.5591	20.5711
841.000000 MHz	53.5434	20.5289
842.000000 MHz	53.5681	20.5373
843.000000 MHz	53.5377	20.5442
844.000000 MHz	53.5605	20.4880
845.000000 MHz	53.5299	20.5385
846.000000 MHz	53.5234	20.4767
847.000000 MHz	53.5356	20.4952
848.000000 MHz	53.4841	20.4882
849.000000 MHz	53.4817	20.4523
850.000000 MHz	53.4804	20.4486
851.000000 MHz	53.4530	20.4328
852.000000 MHz	53.4837	20.4280
853.000000 MHz	53.4540	20.4349
854.000000 MHz	53.4552	20.4086
855.000000 MHz	53.4315	20.4024
856.000000 MHz	53.4398	20.3952
857.000000 MHz	53.4186	20.3666
858.000000 MHz	53.3997	20.4017
859.000000 MHz	53.3821	20.3826
860.000000 MHz	53.3670	20.3411

APPENDIX B : Validation Test Data

ESTECH Co., Ltd.
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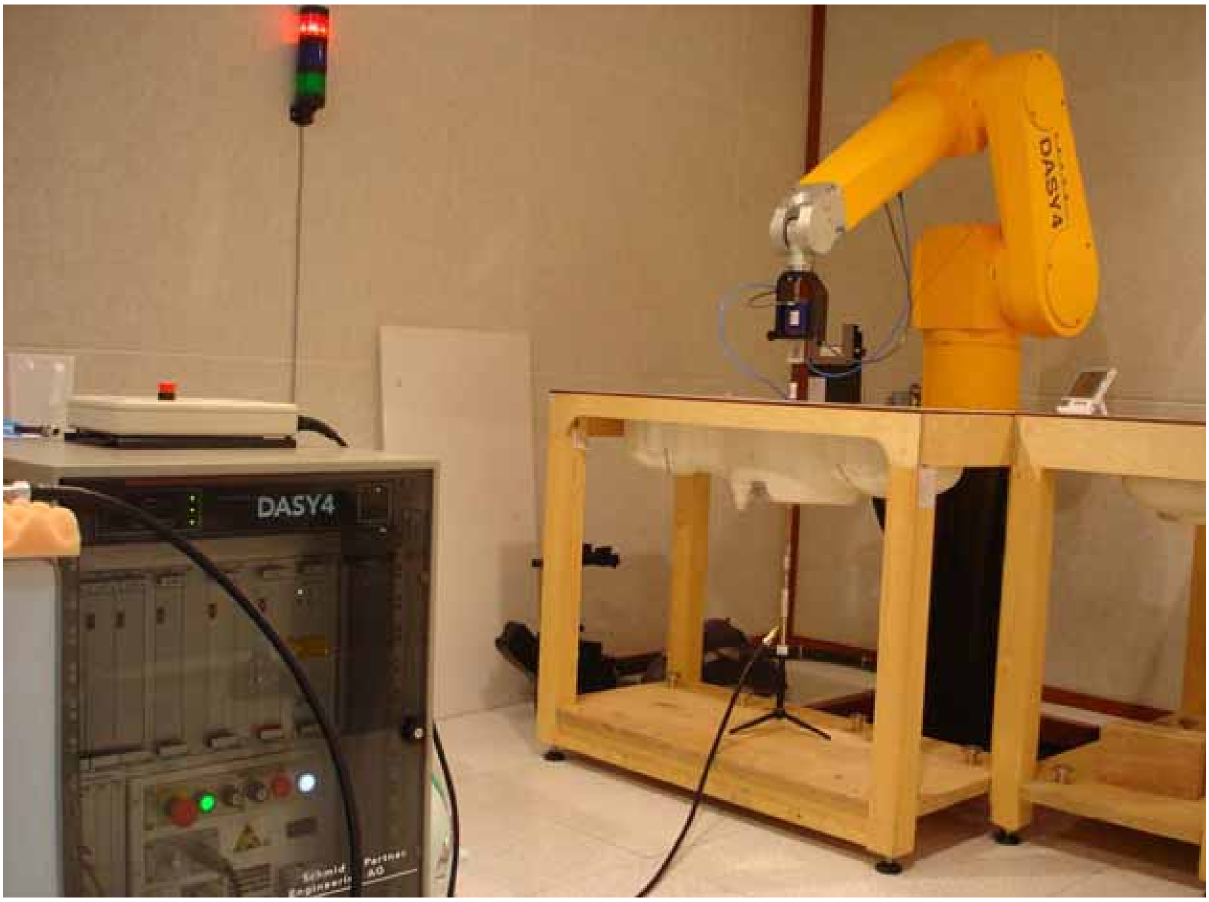
835MHz Dipole Validation



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Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 2006-06-26 10:57:10

Test Laboratory: ESTECH

validation 0626

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

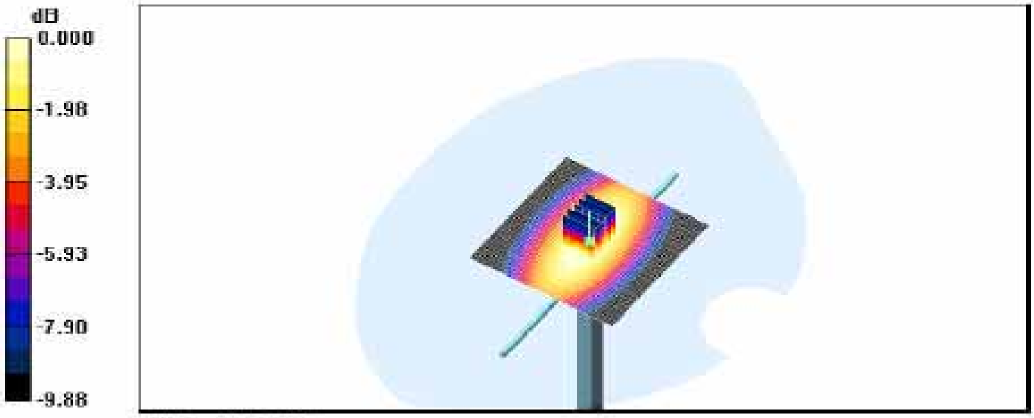
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.904 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

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 : 23 ℃, Humidity : 43%

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.49 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.0 V/m; Power Drift = 0.002 dB
Peak SAR (extrapolated) = 3.45 W/kg
SAR(1 g) = 2.3 mW/g
Maximum value of SAR (measured) = 2.49 mW/g



0 dB = 2.49mW/g

APPENDIX C : SAR Test Data

Date/Time: 2006-06-26 11:55:25

Test Laboratory: ESTECH

CH1013 LEFT TOUCH

DUT: MD120; Type: BAR; Serial: NONE

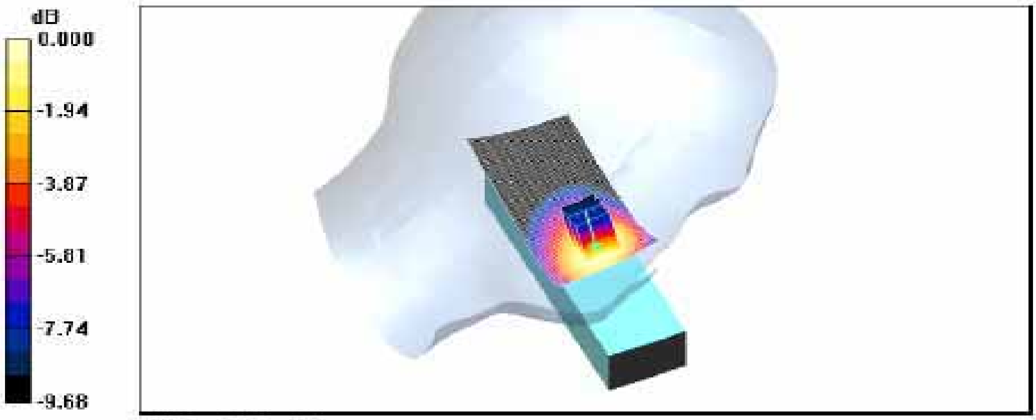
Communication System: CDMA FCC; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.895 mho/m; ε_r = 41.3; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

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 : 43%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.470 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.90 V/m; Power Drift = -0.055 dB
Peak SAR (extrapolated) = 0.641 W/kg
SAR(1 g) = 0.437 mW/g
Maximum value of SAR (measured) = 0.474 mW/g



0 dB = 0.474mW/g

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

Date/Time: 2006-06-26 10:21:38

Test Laboratory: ESTECH

CH363 LEFT TOUCH

DUT: MD120; Type: BAR; Serial: NONE

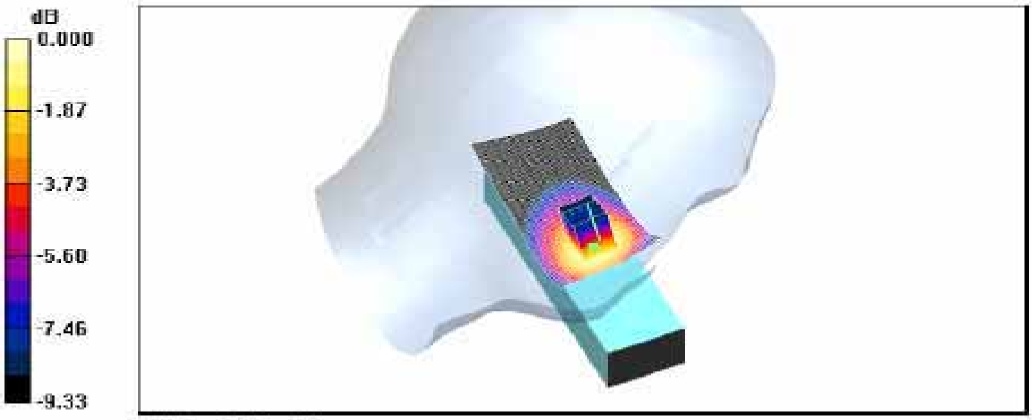
Communication System: CDMA FCC; Frequency: 835.89 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836 MHz; σ = 0.906 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

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 : 22℃, Humidity : 43%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.521 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.25 V/m; Power Drift = -0.096 dB
Peak SAR (extrapolated) = 0.716 W/kg
SAR(1 g) = 0.484 mW/g
Maximum value of SAR (measured) = 0.518 mW/g



0 dB = 0.518mW/g

Date/Time: 2006-06-26 13:05:32

Test Laboratory: ESTECH

CH777 LEFT TOUCH

DUT: MD120; Type: BAR; Serial: NONE

Communication System: CDMA FCC; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.917 mho/m; ε_r = 41; ρ = 1000 kg/m^3

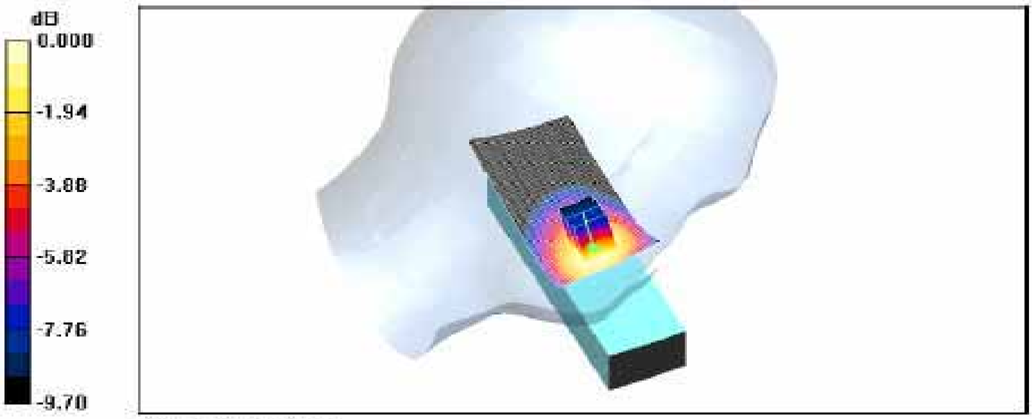
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

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) = 0.929 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.83 V/m; Power Drift = -0.027 dB
Peak SAR (extrapolated) = 1.23 W/kg
SAR(1 g) = 0.851 mW/g
Maximum value of SAR (measured) = 0.920 mW/g



0 dB = 0.920mW/g

Date/Time: 2006-06-26 12:19:04

Test Laboratory: ESTECH

CH1013 RIGHT TOUCH

DUT: MD120; Type: BAR; Serial: NONE

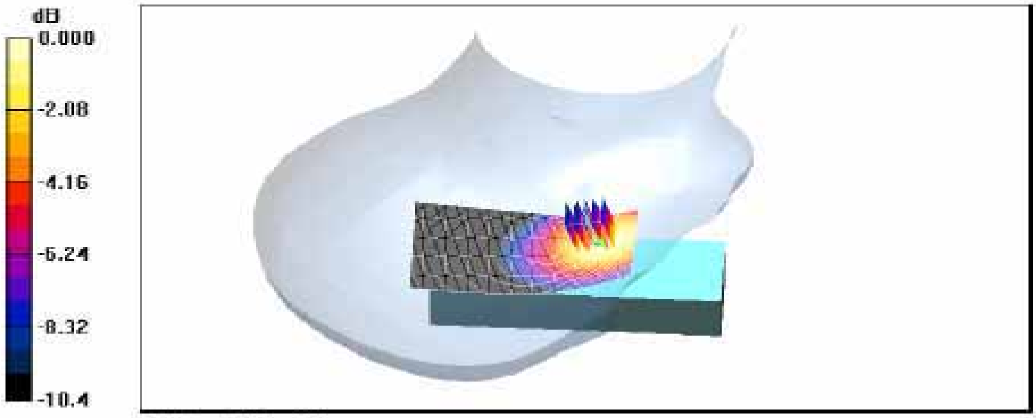
Communication System: CDMA FCC; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.895 mho/m; ε_r = 41.3; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

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 : 44%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.503 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.03 V/m; Power Drift = -0.028 dB
Peak SAR (extrapolated) = 0.709 W/kg
SAR(1 g) = 0.470 mW/g
Maximum value of SAR (measured) = 0.513 mW/g



0 dB = 0.513mW/g

Date/Time: 2006-06-26 10:45:24

Test Laboratory: ESTECH

CH363 RIGHT TOUCH

DUT: MD120; Type: BAR; Serial: NONE

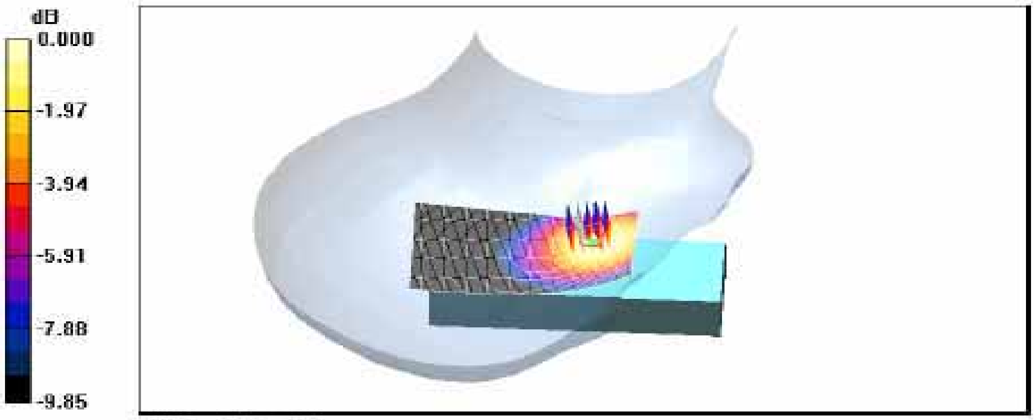
Communication System: CDMA FCC; Frequency: 835.89 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836 MHz; σ = 0.906 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- 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) = 0.535 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.04 V/m; Power Drift = -0.069 dB
Peak SAR (extrapolated) = 0.753 W/kg
SAR(1 g) = 0.498 mW/g
Maximum value of SAR (measured) = 0.536 mW/g



0 dB = 0.536mW/g

Date/Time: 2006-06-26 13:29:16

Test Laboratory: ESTECH

CH777 RIGHT TOUCH

DUT: MD120; Type: BAR; Serial: NONE

Communication System: CDMA FCC; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.917 mho/m; ε_r = 41; ρ = 1000 kg/m^3

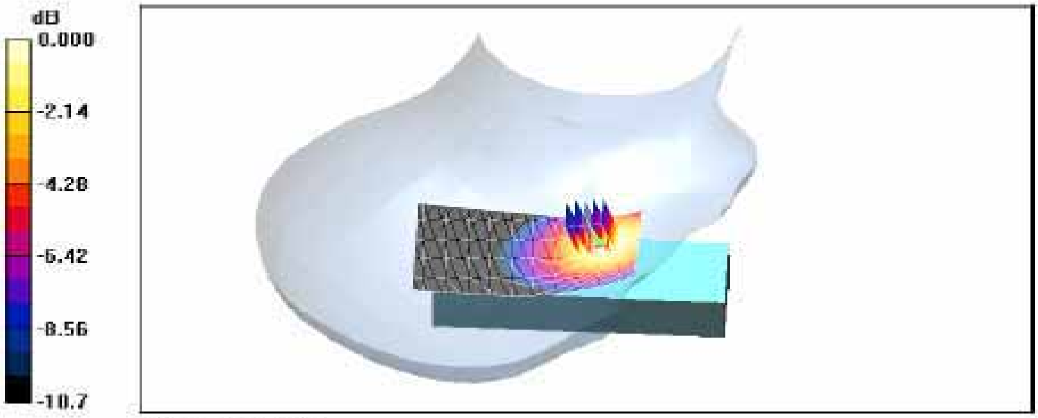
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

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 : 49%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.03 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.95 V/m; Power Drift = -0.095 dB
Peak SAR (extrapolated) = 1.47 W/kg
SAR(1 g) = 0.963 mW/g
Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.05mW/g

Date/Time: 2006-06-26 11:07:11

Test Laboratory: ESTECH

CH363 LEFT TILT

DUT: MD120; Type: BAR; Serial: NONE

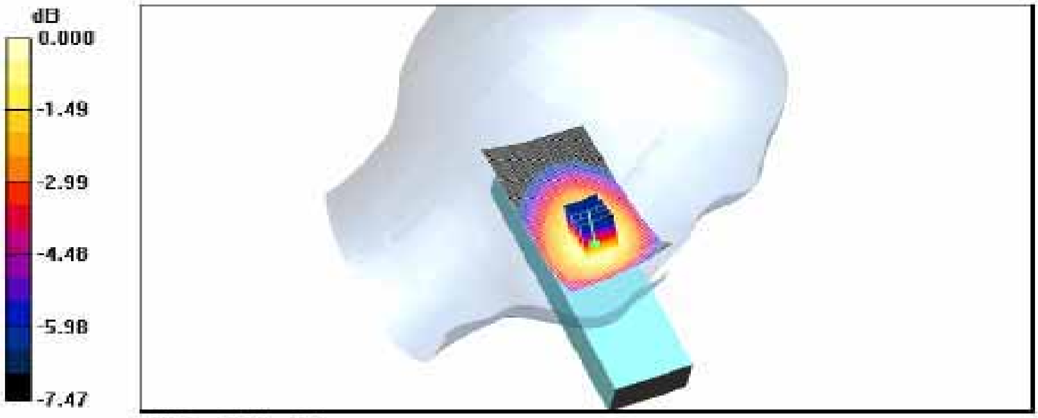
Communication System: CDMA FCC; Frequency: 835.89 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836 MHz; $\sigma = 0.906$ mho/m; $\varepsilon_r = 41.1$; $\rho = 1000$ kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

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) = 0.140 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.11 V/m; Power Drift = -0.024 dB
Peak SAR (extrapolated) = 0.176 W/kg
SAR(1 g) = 0.135 mW/g
Maximum value of SAR (measured) = 0.144 mW/g



0 dB = 0.144mW/g

Date/Time: 2006-06-26 11:36:41

Test Laboratory: ESTECH

CH363 RIGHT TILT

DUT: MD120; Type: BAR; Serial: NONE

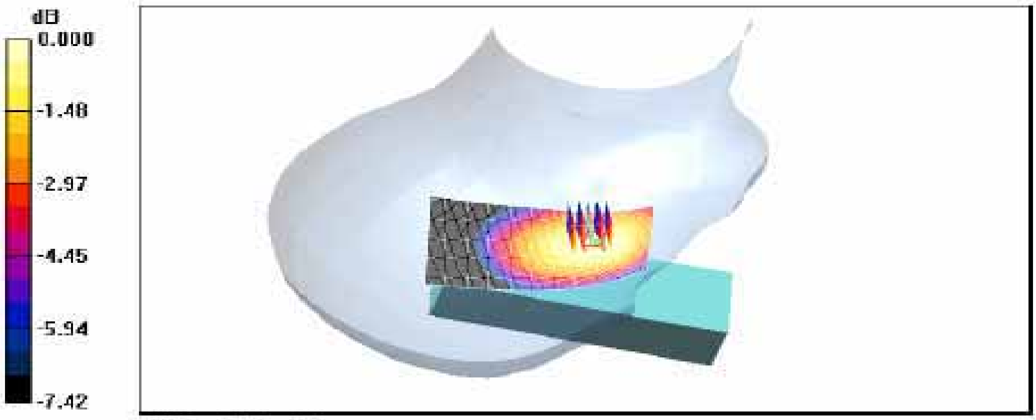
Communication System: CDMA FCC; Frequency: 835.89 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836 MHz; σ = 0.906 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1750; ConvF(6.57, 6.57, 6.57); Calibrated: 2006-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- 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) = 0.136 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.10 V/m; Power Drift = -0.121 dB
Peak SAR (extrapolated) = 0.168 W/kg
SAR(1 g) = 0.129 mW/g
Maximum value of SAR (measured) = 0.138 mW/g



0 dB = 0.138mW/g

ESTECH Co., Ltd.
Rm.1015, World Venture Center II,
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Seoul, 153-803, Korea
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FAX: 82-2-867-3204

Date/Time: 2006-06-26 13:29:16

Test Laboratory: ESTECH

CH777 RIGHT TOUCH-ZSCAN

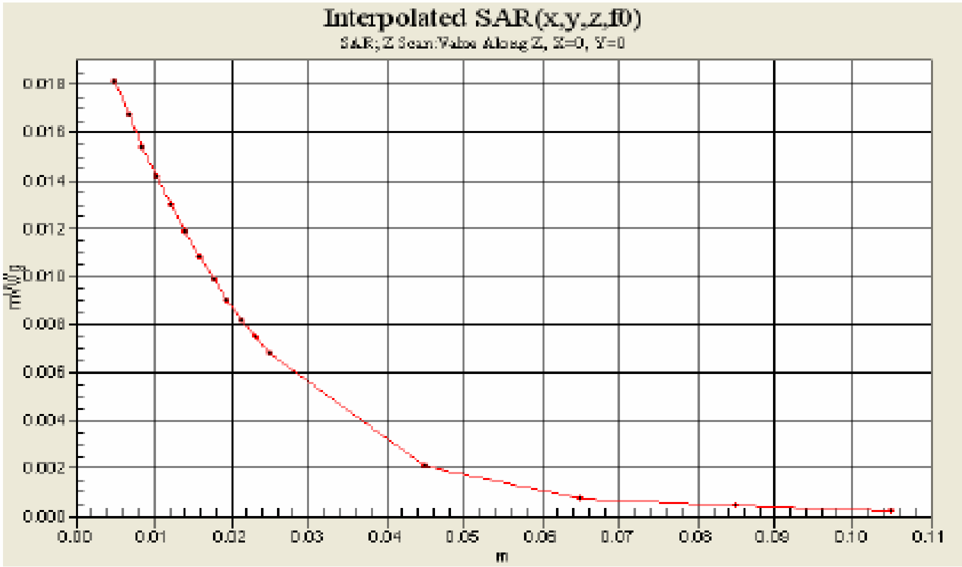
DUT: MD120; Type: BAR; Serial: NONE

Communication System: CDMA FCC; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.917 mho/m; ε_r = 41; 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 : 49%



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Date/Time: 2006-06-26 15:17:17

Test Laboratory: ESTECH

CH1013 BODY

DUT: MD120; Type: BAR; Serial: NONE

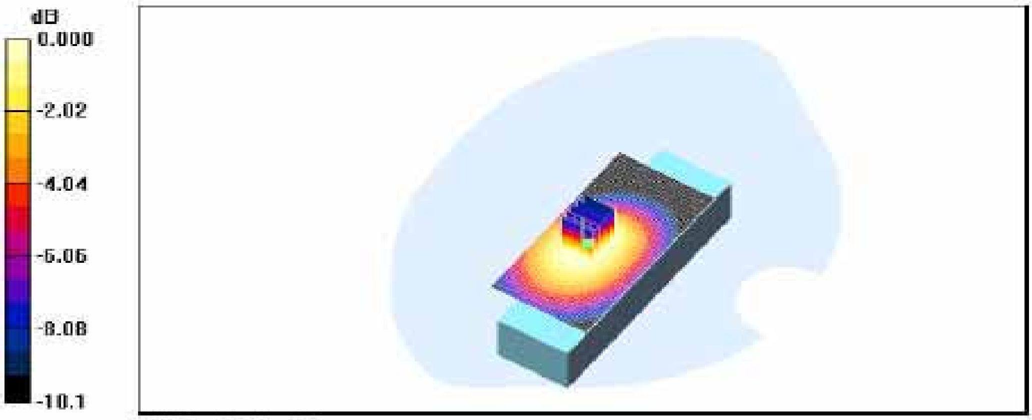
Communication System: CDMA FCC; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.945 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

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 : 22 ℃, Humidity : 48%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.379 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.7 V/m; Power Drift = -0.150 dB
Peak SAR (extrapolated) = 0.464 W/kg
SAR(1 g) = 0.342 mW/g
Maximum value of SAR (measured) = 0.364 mW/g



0 dB = 0.364mW/g

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Date/Time: 2006-06-26 14:35:08

Test Laboratory: ESTECH

CH363 BODY

DUT: MD120; Type: BAR; Serial: NONE

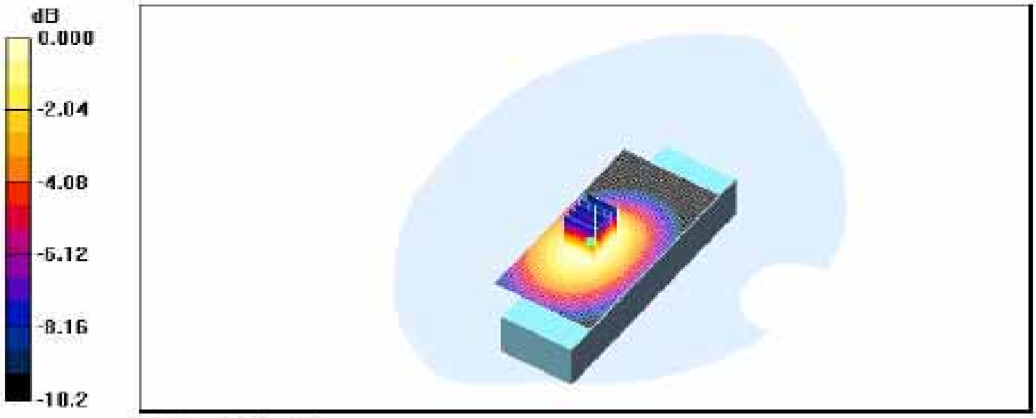
Communication System: CDMA FCC; Frequency: 835.89 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836 MHz; σ = 0.956 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

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 : 22℃, Humidity : 45%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.380 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.0 V/m; Power Drift = -0.051 dB
Peak SAR (extrapolated) = 0.483 W/kg
SAR(1 g) = 0.348 mW/g
Maximum value of SAR (measured) = 0.371 mW/g



0 dB = 0.371mW/g

Date/Time: 2006-06-26 15:48:41

Test Laboratory: ESTECH

CH777 BODY

DUT: MD120; Type: BAR; Serial: NONE

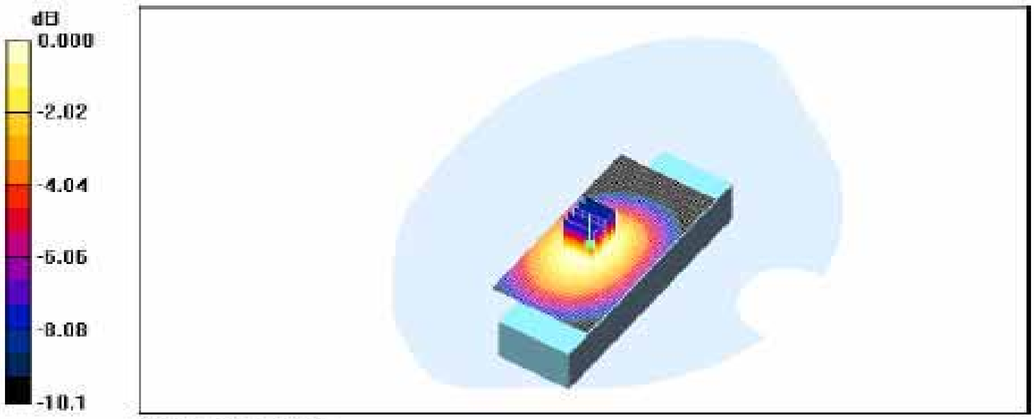
Communication System: CDMA FCC; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.966 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

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 : 22℃, Humidity : 48%

Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.708 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.7 V/m; Power Drift = -0.047 dB
Peak SAR (extrapolated) = 0.884 W/kg
SAR(1 g) = 0.653 mW/g
Maximum value of SAR (measured) = 0.697 mW/g



0 dB = 0.697mW/g

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426-5, Gasan-dong, Geumcheon-gu,
Seoul, 153-803, Korea
TEL: 82-2-867-3201
FAX: 82-2-867-3204

Date/Time: 2006-06-26 15:48:41

Test Laboratory: ESTECH

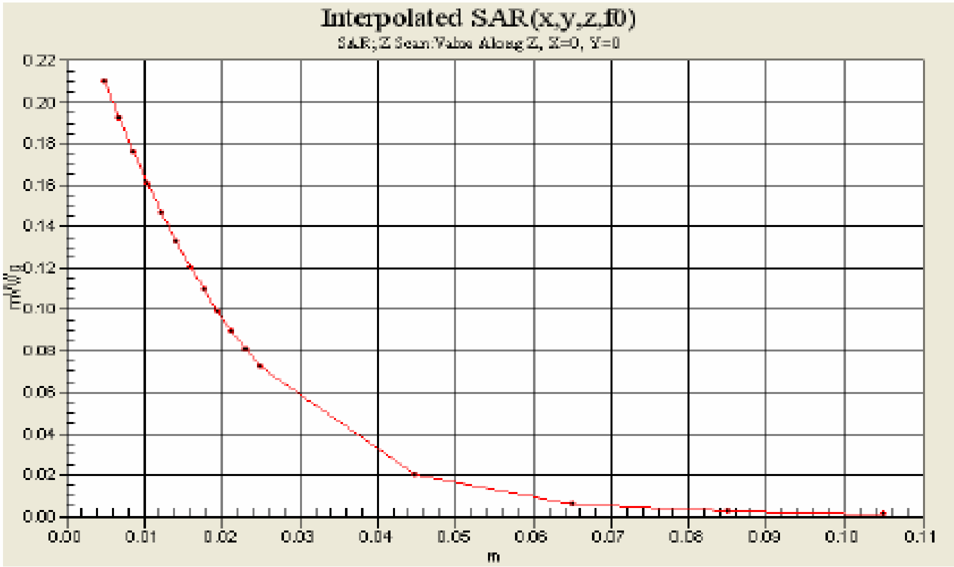
CH777 BODY-ZSCAN

DUT: MD120; Type: BAR; Serial: NONE

Communication System: CDMA FCC; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 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 : 22℃, Humidity : 48%



APPENDIX D : Calibration Certificates

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: 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

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

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	V4.5
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.2 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 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	2.25 mW / g
SAR normalized	normalized to 1W	9.00 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**9.02 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.48 mW / g
SAR normalized	normalized to 1W	5.92 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**5.93 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	52.4 Ω - 2.4 jΩ
Return Loss	- 29.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.384 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	November 15, 2002

DASY4 Validation Report for Head TSL

Date/Time: 24.02.2005 12:21:57

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN475

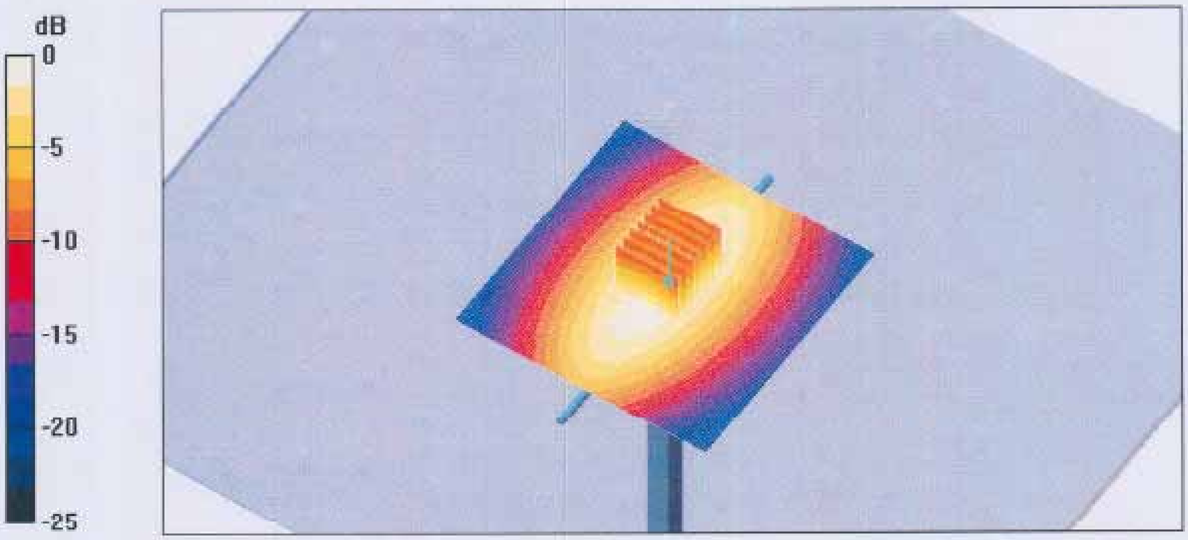
Communication System: CW-835; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL 900 MHz;
Medium parameters used: f = 835 MHz; σ = 0.91 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

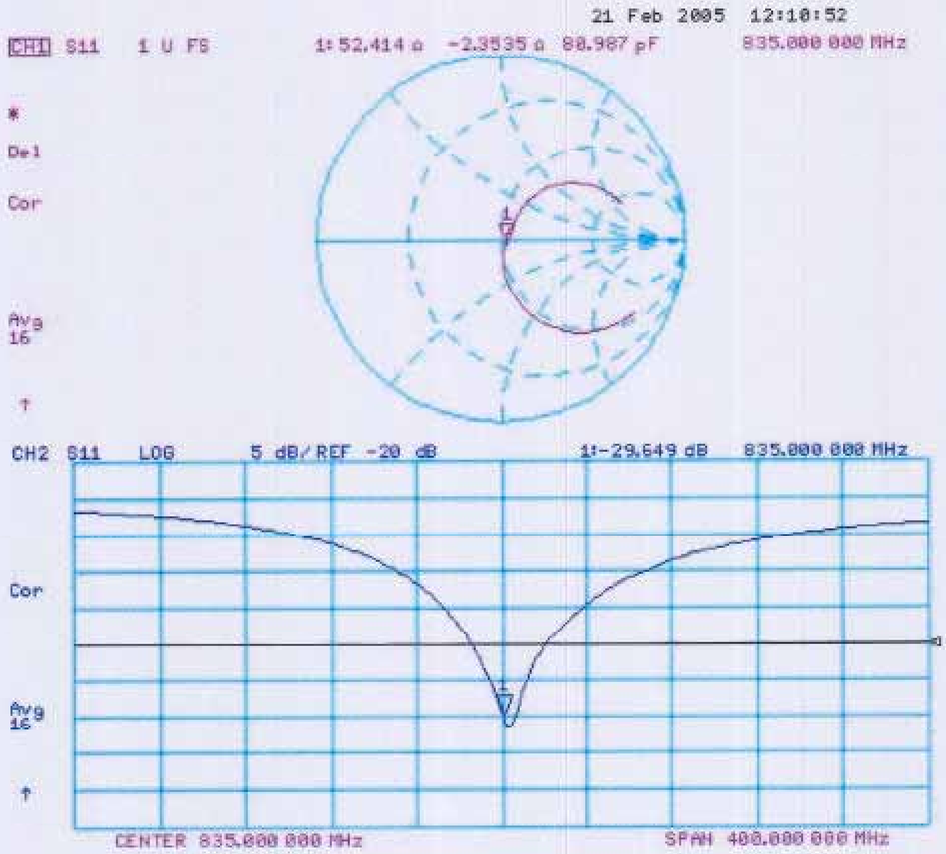
- Probe: ET3DV6 - SN1507; ConvF(6.24, 6.24, 6.24); Calibrated: 26.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.01.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001;
- Measurement SW: DASY4, V4.5 Build 17; Postprocessing SW: SEMCAD, V1.8 Build 144

Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.43 mW/g

Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.1 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 3.27 W/kg
SAR(1 g) = 2.25 mW/g; SAR(10 g) = 1.48 mW/g
Maximum value of SAR (measured) = 2.44 mW/g



0 dB = 2.44 mW/g


21 Feb 2005 12:10:52
CH1 S11 1 U FS 1: 52.414 Ω -2.3535 Ω 80.987 pF 835.000 000 MHz
*
Del
Cor
Avg
16
CH2 S11 LOG 5 dB/ REF -20 dB 1:-29.649 dB 835.000 000 MHz
Cor
Avg
16
CENTER 835.000 000 MHz
SPAN 400.000 000 MHz

Schmid & Partner Engineering AG

s p e a g

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Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

IMPORTANT NOTICE

USAGE OF PROBES IN ORGANIC SOLVENTS

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

Compatible Probes:
- ET3DV6
  ET3DV6R
- ES3DVx
- EX3DVx
- ER3DV6
- H3DV6

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

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Schmid & Partner Engineering AG

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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: **ET3-1750_Jan06**

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1750
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	January 24, 2006
Condition of the calibrated item	In Tolerance

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 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 E4419B	GB41293874	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	27-Oct-05 (SPEAG, No. DAE4-654_Oct05)	Oct-06

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

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

Issued: January 24, 2006

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1750

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

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1750

Sensitivity in Free Space[A]

NormX	**1.69** ± 10.1%	$\mu V/(V/m)^2$
NormY	**1.73** ± 10.1%	$\mu V/(V/m)^2$
NormZ	**1.66** ± 10.1%	$\mu V/(V/m)^2$

Diode Compression[B]

DCP X	**95** mV
DCP Y	**95** mV
DCP Z	**95** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

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

TSL **1750 MHz** **Typical SAR gradient: 10 % per mm**

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

Sensor Offset

Probe Tip to Sensor Center **2.7** mm

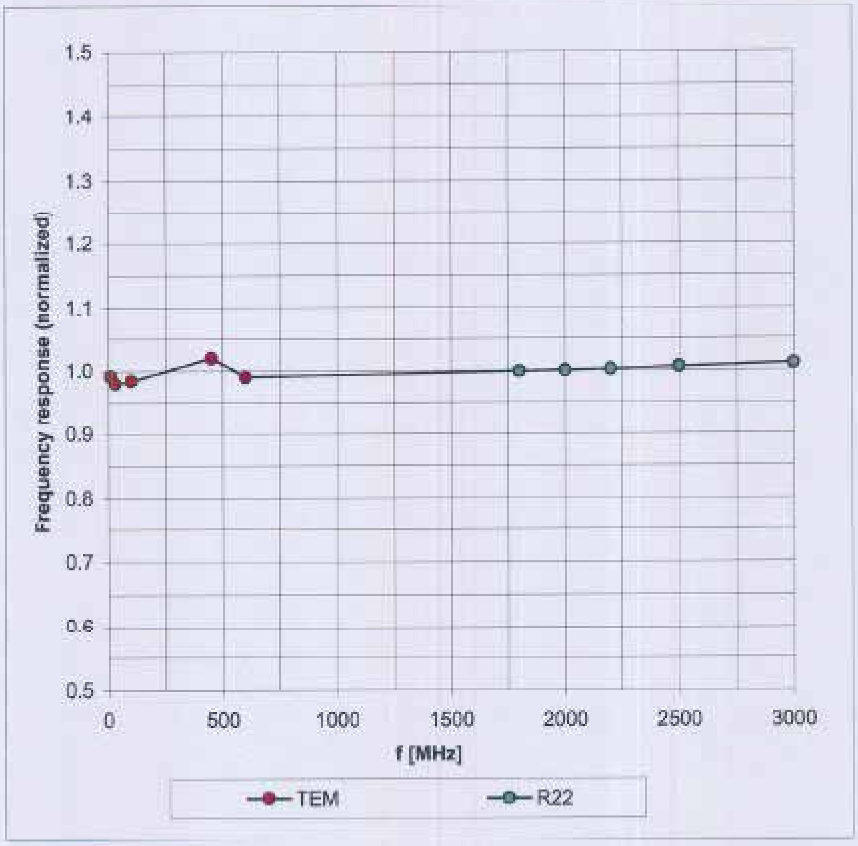
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

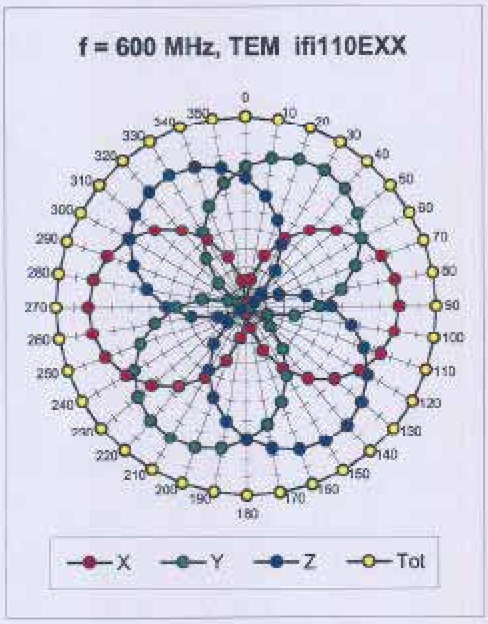
Frequency Response of E-Field

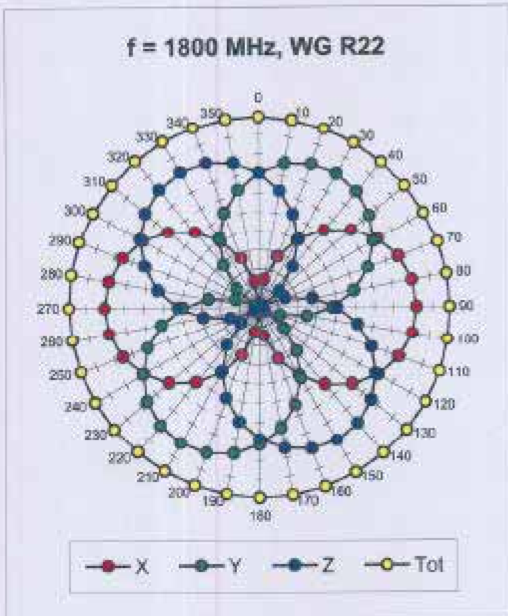
(TEM-Cell:ifi110 EXX, Waveguide: R22)

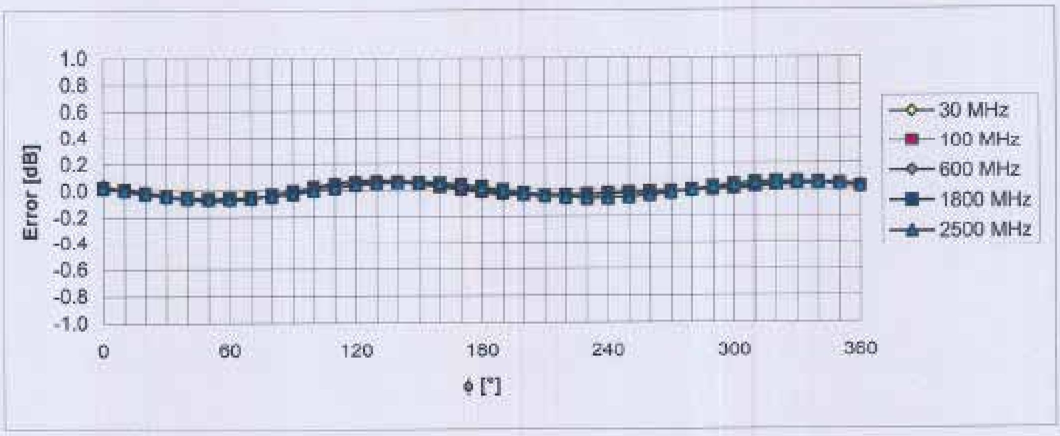


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



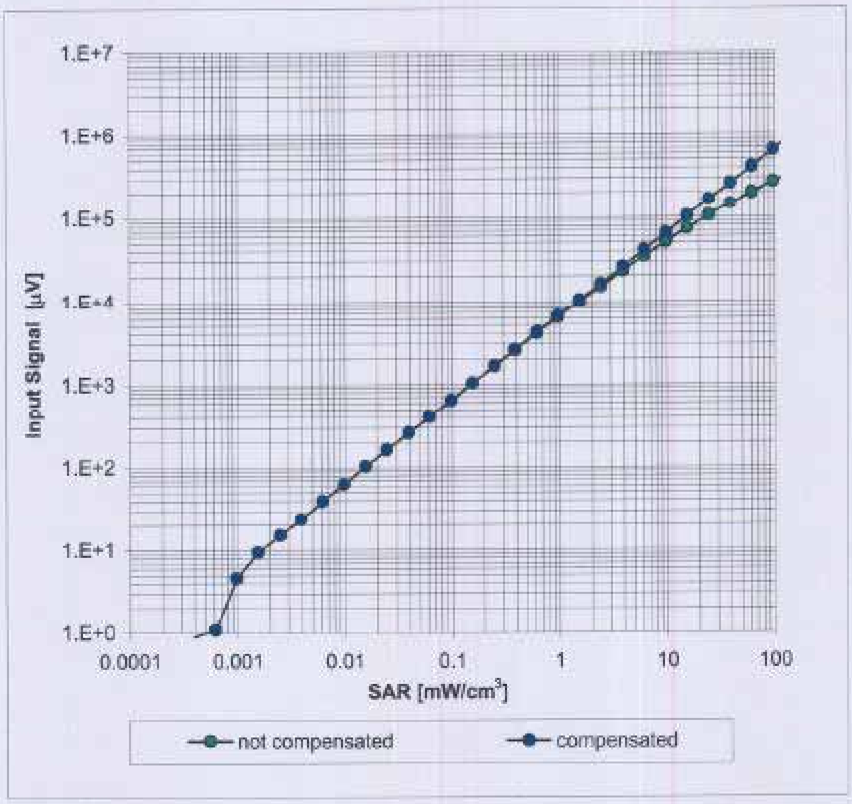


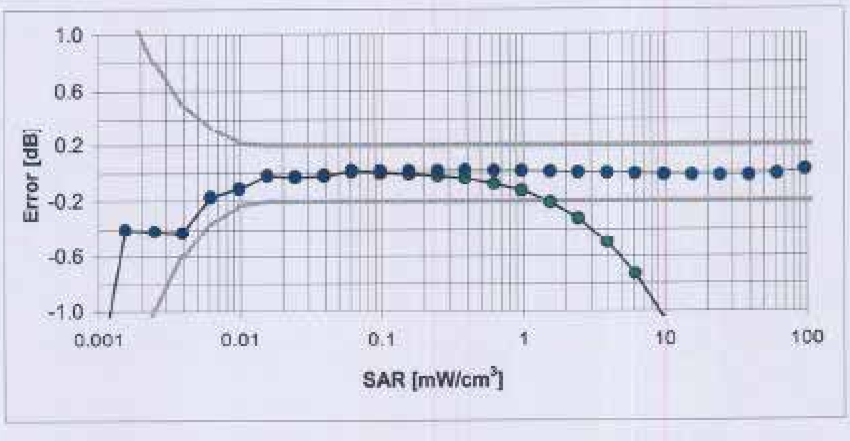


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

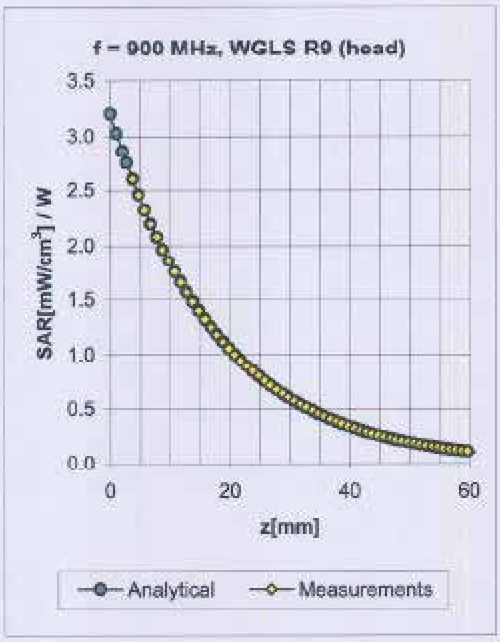
(Waveguide R22, f = 1800 MHz)

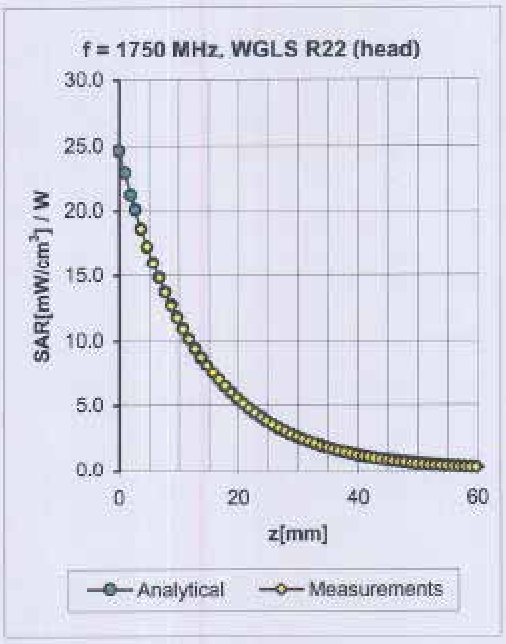




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



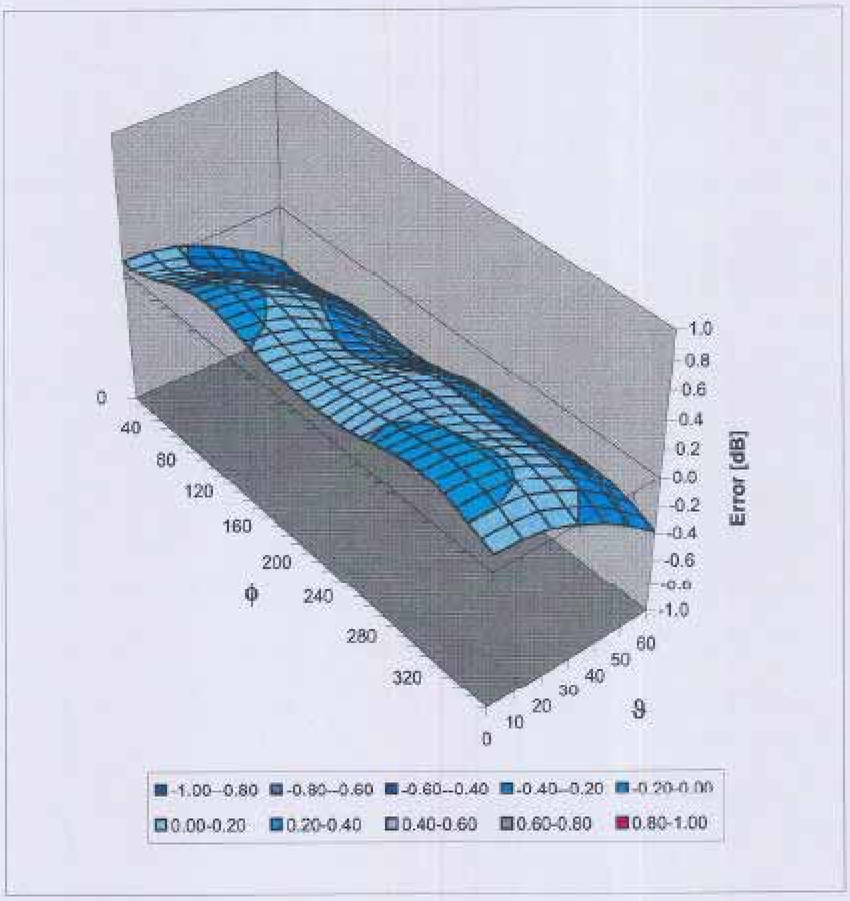


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.59	1.76	6.57 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.54	1.85	6.44 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.58	1.69	5.29 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.60	1.56	5.14 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.68	1.58	5.00 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.46	2.12	6.17 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.64	2.10	4.54 ± 11.0% (k=2)

[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Deviation from Isotropy in HSL

Error (φ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)