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SAR Compliance Test Report

APPLICANT NAME & ADDRESS :

LG Electronics Inc.
459-9, Kasan-dong, Keumchun-ku,
Seoul 153-023, Korea

DATA & LOCATION OF TESTING

Dates of testing : 2005 12/01 ~ 12/16
Test Site : ESTECH Co., Ltd. Korea

Test Device :

Models : S5300

FCC ID : BEJS5300

TYPE : GSM Phone with Bluetooth (Prototype)

Test report no :

ESTSAR0512-009

Number of page :

24

Contact person :

Cheol-Goo Lee

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 Portable Transmitter Held to Ear (PCE)

FCC Rule Part(s)

§2.1093; FCC/OET Bulletin 65 Supplement C (July 2001)

Test results :

The Tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced receipt in full, without written approval of the laboratory.

Date and Signatures : 2005/12/16

Report Prepared By : Engineer/ K.H.Kang

(Signature)

Manager Engineer/ Jay Kim

(Signature)

Test report no : ESTSAR0512-009

FCC ID : BEJS5300

Web : www. estech. co. kr

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1. SUMMARY FOR TEST REPORT

FCC ID	BEJS5300
Date of test	2005/12/01 ~ 2005/12/16
Responsible test engineer	Jay Kim
Measurement performed by	K.H.Kang
EUT Type	GSM Phone with Bluetooth (Prototype)
Tx Frequency	1850.2 ~ 1909.8 MHz
Rx Frequency	1930.2 ~ 1989.8 MHz
Max. RF Output Power	GSM (30 dBm)

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

1.1 Head Configuration

Max. SAR Measurement

FREQUENCY		Modulation	Conducted Power(dBm)		Device test position	Antenna position	SAR (W/kg)
MHz	Ch		dBm	Battery			
1880	661	GSM	30	Standard	Right Touch	-	0.122

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			
1850.2	512	GSM	30	Standard	1.5cm [w/o Holster]	-	0.486

1.3 Measurement Uncertainty

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



2. INTRODUCTION

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

The safety limits used for the environmental evaluation measurements are the criteria published by the based on American National Standards Institute (ANSI) For localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for safety Levels with Respect to Human Exposure to Radio Frequency Electronic Fields, 3 kHz to 300 GHz. (c) 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017.[2] The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave[3] is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields,” NCRP Report No. 86 (c) NCRP, 1986, Bethesda, MD 20814.[6] SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

SAR Definition

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

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

Figure 2.1 SAR Mathematical Equation

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

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

Where:

σ = conductivity of the tissue-simulant material (S/m)

E = mass density of the tissue-simulant material (kg/m³)

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

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3. DESCRIPTION OF THE DEVICE UNDER TEST

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

2.1 Antenna Description

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

2.2 Device Description

FCC ID	FCC ID : BEJS5300
Serial numbers	505KPQC001324-CHN-P40
Exposure environment	Uncontrolled exposure
Device category	Portable device
Mode(s) of Operation	GSM
Modulation Mode(s)	GSM
Duty Cycle	8.3
Transmitting	1850.2 ~ 1909.8 MHz (GSM)
Frequency Range(s)	
test signal method	☒ Base station simulator ☐ Internal test code

2.3 Battery Options

There is only one battery option available for tested device,



4. TEST CONDITIONS

4.1 Ambient Conditions

Ambient Temperature (°C)	21
Tissue simulating liquid temperature (°C)	21
Humidity (%)	47

4.2 RF Characteristics of The Test Site

Tests were performed in a fully enclosed RF Shielded environment

4.3 Test Signal, Frequencies, And Output Power

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

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

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

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

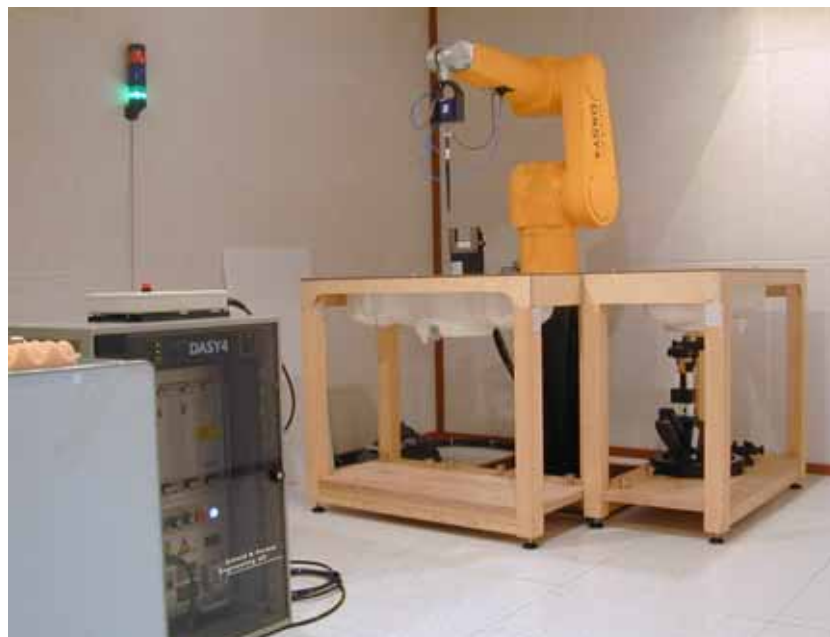


Fig. 4.1 SAR Measurement System



5. DESCRIPTION OF THE TEST EQUIPMENT

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

5.1 Test System Specifications

Test Equipment	Model	Serial Number	Cal. date
DAE	DAE3	551	2004-04-28
E-Field Probe	ET3DV6	1748	2005-01-21
Dipole validation kit	D1900V2	5d058	2005-01-27
Network analyzer	8753ES	NONE	2005-10-17
Signal generator	E4421B	GB40052295	2005-03-03
RF Power meter	EPM-442A	GB37170412	2005-10-05
Power Sensor	8481A	3318A90368	2005-10-05
RF Power meter	E4418A	GB38272722	2005-03-03
Power Sensor	8481A	3318A96478	2005-03-03
Dielectric Probe	85070D	US01440154	-

5.2 SAR Measurement Setup

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



5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

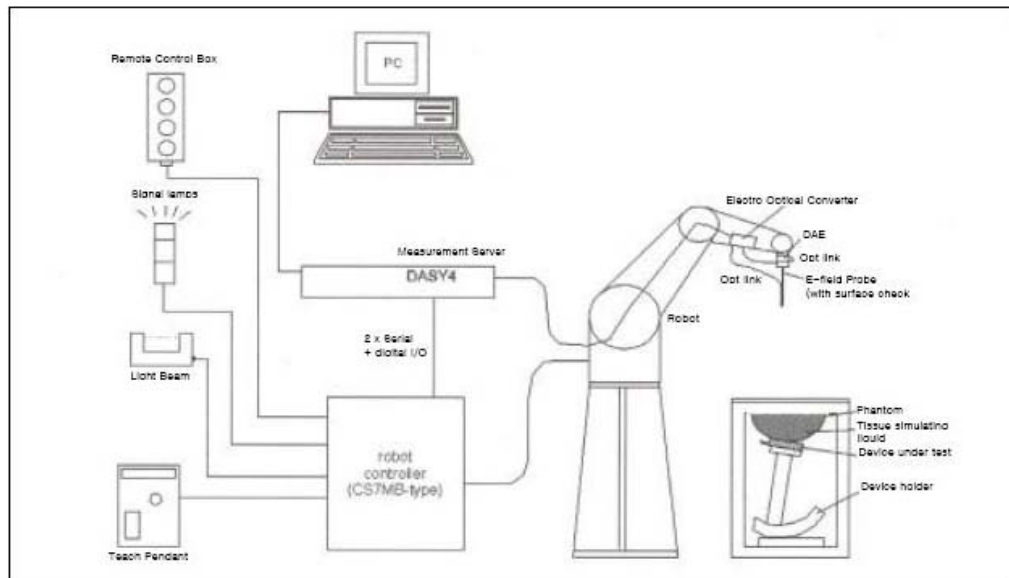


Fig. 5.1 SAR Measurement System Setup

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

5.3 DASY4 E-Field Probe System

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



5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

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

Fig. 5.2 Probe Specifications



5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

5.4 Phantom & Equivalent Tissues

SAM Phantom

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

Head & Muscle simulation Mixture Characterization

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

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

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



5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

Fig. 5.4 Composition of the Tissue Equivalent Matter

Device Holder for Transmitters

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

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



6. DESCRIPTION OF THE TEST PROCEDURE

6.1 Definition of Reference Point

EAR Reference point

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

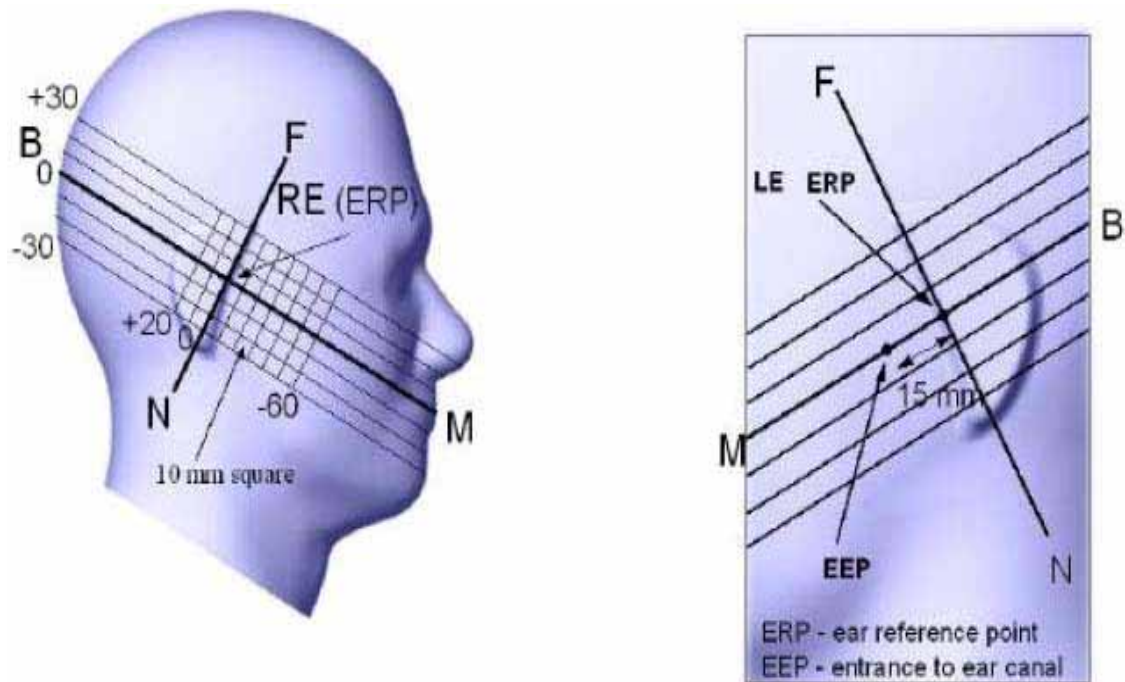


Figure 6.1 Close-up side view of ERP

Handset Reference Points

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (see Fig. 6.2). The "test device reference point" was then located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at 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

6. DESCRIPTION OF THE TEST PROCEDURE(continued)

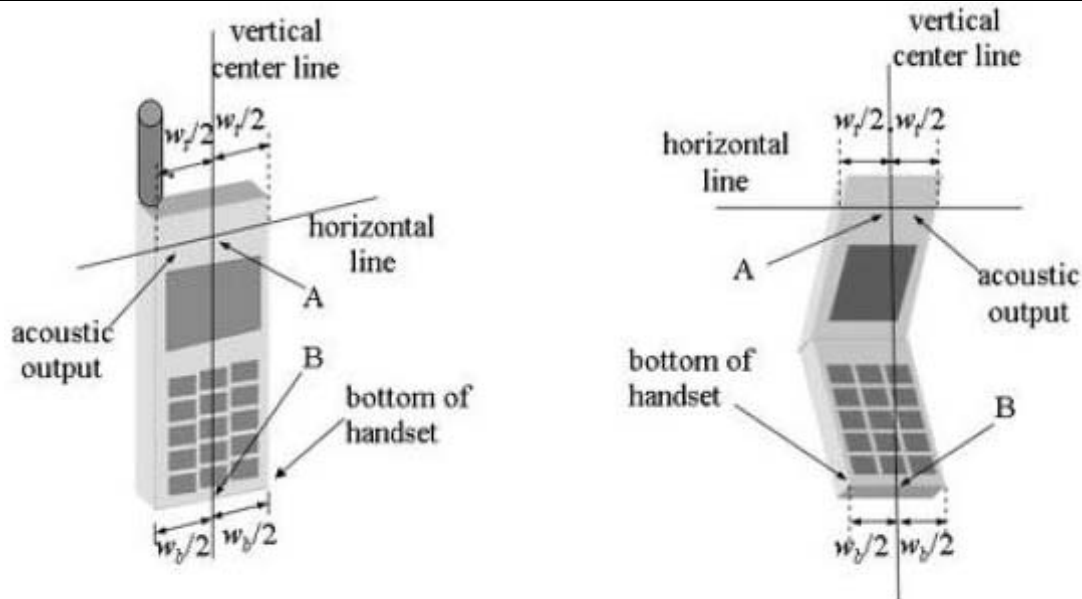


Figure 6.2 Handset Vertical Center & Horizontal Line Reference Points

6.2 Test Configuration Positions

Positioning for Cheek/Touch

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



6. DESCRIPTION OF THE TEST PROCEDURE(continued)

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

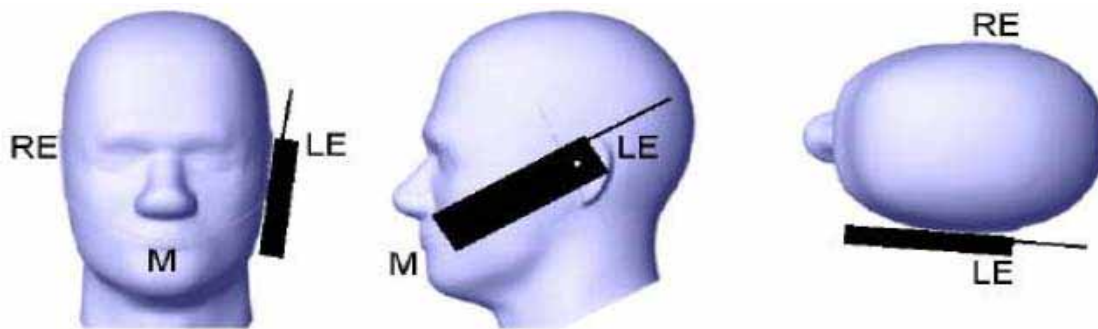


Figure 6.3 "Cheek" or "Touch" Position.

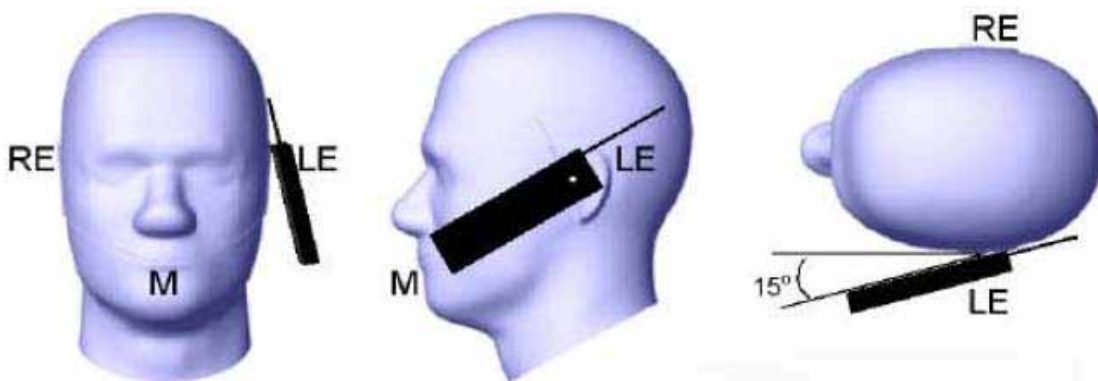


Figure 6.4 "Tilted" Position.



6. DESCRIPTION OF THE TEST PROCEDURE(continued)

Positioning for Ear / 15° Tilted

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

Body Holder / Belt Clip Configurations

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

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

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

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



6. DESCRIPTION OF THE TEST PROCEDURE(continued)

6.3 Scan Procedures

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

6.4 SAR Averaging Methods

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

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a Knot" condition [W.Gander, Computermathematik, p. 141-150](x, y and z directions) [Numerical Recipes in C, Second Edition, p 123].

The extrapolation is based on least square algorithm [W.Gander, Computermathematik, p. 168-180]. Through the points in the first 30 mm in all z-axis, polynomials of order four are calculated. This polynomial is then used to evaluate the points between the surface and the probe tip. The points calculated from the surface, have a distance of 1mm from one another.



7. MEASUREMENT UNCERTAINTY

According to CENELEC [17], typical worst-case uncertainty of field measurements is 5 dB.

For well-defined modulation characteristics the uncertainty can be reduced to 3 dB.

ERROR Description	Uncertainty	Probability	Divisor	ci 1	Standard unc.	vi or
	value ±%	Distribution		1g	(1g)	Veff
MEASUREMENT SYSTEM						
Probe Calibration	± 11.7 %	normal	1	1	± 4.8 %	∞
Axial Isotropy	± 4.7	rectangular	√ 3	(1-cp) ^{1/2}	± 1.9%	∞
Hemispherical Isotropy	± 9.6	rectangular	√ 3	(cp) ^{1/2}	± 3.9%	∞
Boundary Effects	± 1.0	rectangular	√ 3	1	± 0.6%	∞
Linearity	± 4.7	rectangular	√ 3	1	± 2.7%	∞
System Detection Limits	± 1.0	rectangular	√ 3	1	± 0.6%	∞
Readout Electronics	± 1.0	normal	1	1	± 1.0%	∞
Response time	± 0.8	rectangular	√ 3	1	± 0.5%	∞
Integration time	± 2.6	rectangular	√ 3	1	± 1.5%	∞
RF Amnient Conditions	± 3.0	rectangular	√ 3	1	± 1.7%	∞
Probe Positioner Mechanical Tolerance	± 0.4	rectangular	√ 3	1	± 0.2%	∞
Probe Positioning with respect to Phantom Shell	± 2.9	rectangular	√ 3	1	± 1.7%	∞
Extrapolation, Interpolation and Integration Algorithms for Max. SAR Evaluation	± 1.0	rectangular	√ 3	1	± 0.6%	∞
Test Sample Related						
Test Sample Positioning	± 2.9	normal	1	1	± 2.97%	145
Device Holder Uncertainty	± 3.6	normal	0.84	1	± 3.69%	5
Output Power Validation - SAR drift measurement	± 5.0	rectangular	√ 3	1	± 2.9%	∞
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	± 4.0	rectangular	√ 3	1	± 2.3%	∞
Liquid conductivity Target - tolerance	± 5.0	rectangular	√ 3	0.64	± 1.8%	∞
Liquid Conductivity - measurement uncertainty	± 2.5	normal	1	0.64	± 1.6%	∞
Liquid permittivity Target - tolerance	± 5.0	rectangular	√ 3	0.6	± 1.7%	∞
Liquid Permittivity - measurement uncertainty	± 2.5	normal	1	0.6	± 1.5%	∞
Combined Standard Uncertainty					± 11.32 %	330
Coverage Factor for 95%				K = 2		
Expanded Standard Uncertainty					± 22.64 %	



8. SYSTEM VERIFICATION

Tissue Verification

Table 8.1 Simulated Tissue Verification [5]

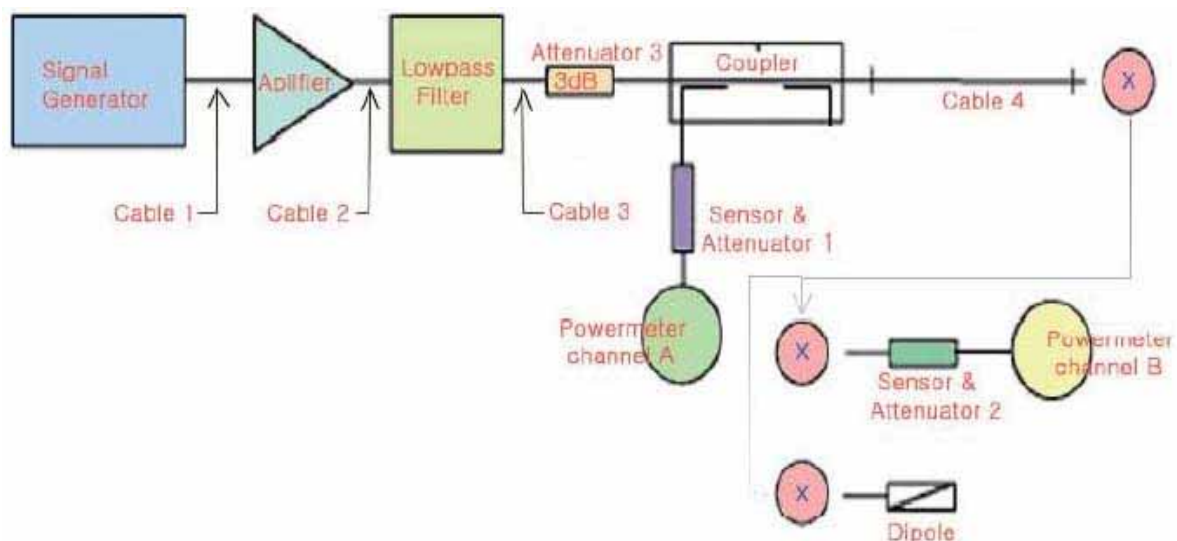
MEASURED TISSUE PARAMETERS										
Liquid Temperature (°C)			21		Liquid Depth(mm)		150			
Date	2005-12-15		2005-12-15				/ /			
Tissue	1900MHz Brain		1900MHz Muscle							
	Target	Measured	Target	Measured						
Dielectric Constant: ϵ	40	38.7	53.3	52.6						
Conductivity: σ	1.45	1.44	1.52	1.47						
Deviation (%)	ϵ : -3.25%		ϵ : -1.69%							
	σ : -0.69%		σ : -3.29%							

Test System Validation

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

Table 8.2 System Validation [5]

SYSTEM DIPOLE VALIDATION TARGET & MEASURED						
Tissue	System Validation Kit:	Forward Power (W)	Targeted SAR1g (mW/g)	Measured SAR1g (mW/g)	Deviation (%)	Test Date
1900MHz Brain	D1900V2(S/N :5d058)	1.0	39.2	40.4	-3.06%	2005-12-15

**Figure 12.1 Dipole Validation Test Setup**

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : **22.0**Relative HUMIDITY (%) : **48**Mixture Type : **1900MHz Brain**Dielectric Constant : **38.7**Conductivity: **1.44**

Measurement Results (GSM Head SAR–Touch–Slide IN)

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 – Slide IN)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	30.04	Standard	Cheek Touch	–	0.098
1880.00	661	GSM	30.00	30.03	Standard	Cheek Touch	–	0.114
1909.80	810	GSM	30.00	29.94	Standard	Cheek Touch	–	0.090

MEASUREMENT RESULTS (GSM Right Head SAR – Touch – Slide IN)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	30.03	Standard	Cheek Touch	–	0.114
1880.00	661	GSM	30.00	30.04	Standard	Cheek Touch	–	0.122
1909.80	810	GSM	30.00	30.00	Standard	Cheek Touch	–	0.097

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, Bluetooth function enable**

Engineer K.H.Kang

(Signature)

Test report no : ESTSAR0512-009

FCC ID : BEJS5300

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : **22.0**

Relative HUMIDITY (%) : **48**

Mixture Type : **1900MHz Brain**

Dielectric Constant : **38.7**

Conductivity: **1.44**

Measurement Results (GSM Head SAR-Tilt-Slide IN)

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

MEASUREMENT RESULTS (GSM Left Head SAR – Tilt – Slide IN)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	29.93	Standard	Tilt	–	0.087

MEASUREMENT RESULTS (GSM Right Head SAR – Tilt – Slide IN)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	30.06	Standard	Tilt	–	0.06

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, Bluetooth function enable**

Engineer K.H.Kang

(Signature)

Test report no : ESTSAR0512-009

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : **22.0**Relative HUMIDITY (%) : **48**Mixture Type : **1900MHz Brain**Dielectric Constant : **38.7**Conductivity: **1.44**

Measurement Results (GSM Head SAR–Touch–Slide UP)

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 – Slide UP)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	30.09	Standard	Cheek Touch	–	0.081

MEASUREMENT RESULTS (GSM Right Head SAR – Touch – Slide UP)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	30.12	Standard	Cheek Touch	–	0.057

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, Bluetooth function enable**

Engineer K.H.Kang

(Signature)

Test report no : ESTSAR0512-009

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : **22.0**

Relative HUMIDITY (%) : **48**

Mixture Type : **1900MHz Brain**

Dielectric Constant : **38.7**

Conductivity: **1.44**

Measurement Results (GSM Head SAR-Tilt-Slide UP)

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

MEASUREMENT RESULTS (GSM Left Head SAR – Tilt – Slide UP)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	30.06	Standard	Tilt	—	0.060

MEASUREMENT RESULTS (GSM Right Head SAR – Tilt – Slide UP)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	30.11	Standard	Tilt	—	0.0654

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, Bluetooth function enable**

Engineer K.H.Kang

(Signature)

Test report no : ESTSAR0512-009

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22

Relative HUMIDITY (%) : 49

Mixture Type : 1900MHz Body

Dielectric Constant : 52.6

Conductivity: 1.47

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 – Slide IN)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1880.00	661	GSM	30.00	29.97	Standard	1.5[w/o Holster]	—	0.190
MEASUREMENT RESULTS (GSM Body SAR Without Holster – Slide UP)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	30.02	Standard	1.5[w/o Holster]	—	0.486
1880.00	661	GSM	30.00	29.99	Standard	1.5[w/o Holster]	—	0.478
1909.80	810	GSM	30.00	29.94	Standard	1.5[w/o Holster]	—	0.353
MEASUREMENT RESULTS (GSM Body SAR Without Holster – Slide UP – BT disable)								
Frequency		Moudulation	Conducted Power(dBm)		battery	Device Test position	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End				
1850.20	512	GSM	30.00	29.96	Standard	1.5[w/o Holster]	—	0.358
MEASUREMENT RESULTS (GSM Body SAR Without Holster – Slide UP – 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	30.15	Standard	1.5[w/o Holster]	—	0.240

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, Bluetooth function enable and disable, GPRS mode

Engineer K.H.Kang

(Signature)

Test report no : ESTSAR0512-009

FCC ID : BEJS5300

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10. REFERENCE

- [1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radio Frequency Radiation, Aug. 1996.
- [2] ANSI/IEEE C95.1 - 1991, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300kHz to 100GHz, New York: IEEE, Aug. 1992
- [3] ANSI/IEEE C95.3 - 1991, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, 1992.
- [4] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.
- [5] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.
- [6] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 120-124.
- [7] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.
- [8] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.
- [9] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.
- [10] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.
- [11] G. Hartsgrrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.
- [12] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.
- [13] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.
- [14] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.
- [15] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to RadioFrequency Electromagnetic Fields. Supplement C, Dec. 1997.
- [16] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.
- [17] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.
- [18] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hochschule Zürich, Dosimetric Evaluation of the Cellular Phone.



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APPENDIX A : Validation Test Data of Tissue



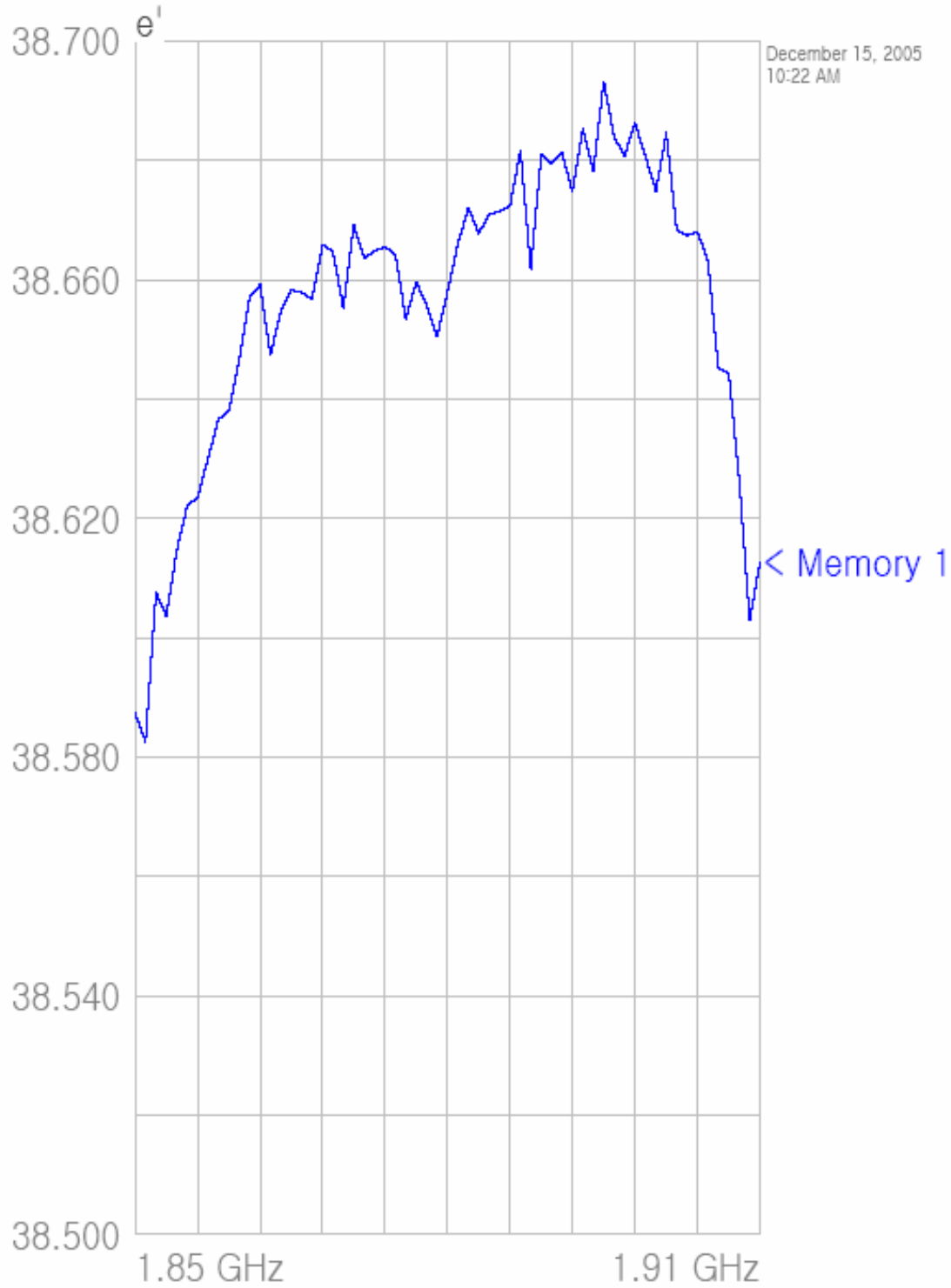
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- Head Tissue

Title
SubTitle





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Title
SubTitle

December 15, 2005 18:02 AM

Frequency	e'	e''
1.85000000 GHz	38.5874	13.7402
1.85100000 GHz	38.5826	13.7347
1.85200000 GHz	38.6076	13.7292
1.85300000 GHz	38.6037	13.7351
1.85400000 GHz	38.6146	13.7112
1.85500000 GHz	38.6221	13.7162
1.85600000 GHz	38.6235	13.7160
1.85700000 GHz	38.6300	13.7096
1.85800000 GHz	38.6366	13.7032
1.85900000 GHz	38.6390	13.7030
1.86000000 GHz	38.6467	13.6953
1.86100000 GHz	38.6572	13.6954
1.86200000 GHz	38.6591	13.7008
1.86300000 GHz	38.6473	13.6936
1.86400000 GHz	38.6548	13.6985
1.86500000 GHz	38.6583	13.6821
1.86600000 GHz	38.6579	13.6888
1.86700000 GHz	38.6567	13.6842
1.86800000 GHz	38.6659	13.6821
1.86900000 GHz	38.6647	13.6923
1.87000000 GHz	38.6552	13.6838
1.87100000 GHz	38.6692	13.6847
1.87200000 GHz	38.6635	13.6679
1.87300000 GHz	38.6649	13.6676
1.87400000 GHz	38.6655	13.6708
1.87500000 GHz	38.6642	13.6661
1.87600000 GHz	38.6534	13.6555
1.87700000 GHz	38.6596	13.6582
1.87800000 GHz	38.6557	13.6492
1.87900000 GHz	38.6505	13.6381
1.88000000 GHz	38.6579	13.6282
1.88100000 GHz	38.6660	13.6386
1.88200000 GHz	38.6720	13.6265
1.88300000 GHz	38.6678	13.6267
1.88400000 GHz	38.6709	13.6194
1.88500000 GHz	38.6715	13.6225
1.88600000 GHz	38.6723	13.6019
1.88700000 GHz	38.6817	13.6144
1.88800000 GHz	38.6619	13.5798
1.88900000 GHz	38.6811	13.6128
1.89000000 GHz	38.6795	13.5788
1.89100000 GHz	38.6812	13.5931
1.89200000 GHz	38.6747	13.5799
1.89300000 GHz	38.6854	13.5945
1.89400000 GHz	38.6781	13.5848
1.89500000 GHz	38.6933	13.6113
1.89600000 GHz	38.6839	13.6029
1.89700000 GHz	38.6908	13.6141
1.89800000 GHz	38.6863	13.6201
1.89900000 GHz	38.6906	13.6271
1.90000000 GHz	38.6749	13.6341
1.90100000 GHz	38.6846	13.6374
1.90200000 GHz	38.6683	13.6746
1.90300000 GHz	38.6674	13.6609
1.90400000 GHz	38.6681	13.6875
1.90500000 GHz	38.6630	13.6764
1.90600000 GHz	38.6452	13.7205
1.90700000 GHz	38.6443	13.7067
1.90800000 GHz	38.6266	13.7508
1.90900000 GHz	38.6029	13.7571
1.91000000 GHz	38.6127	13.7603



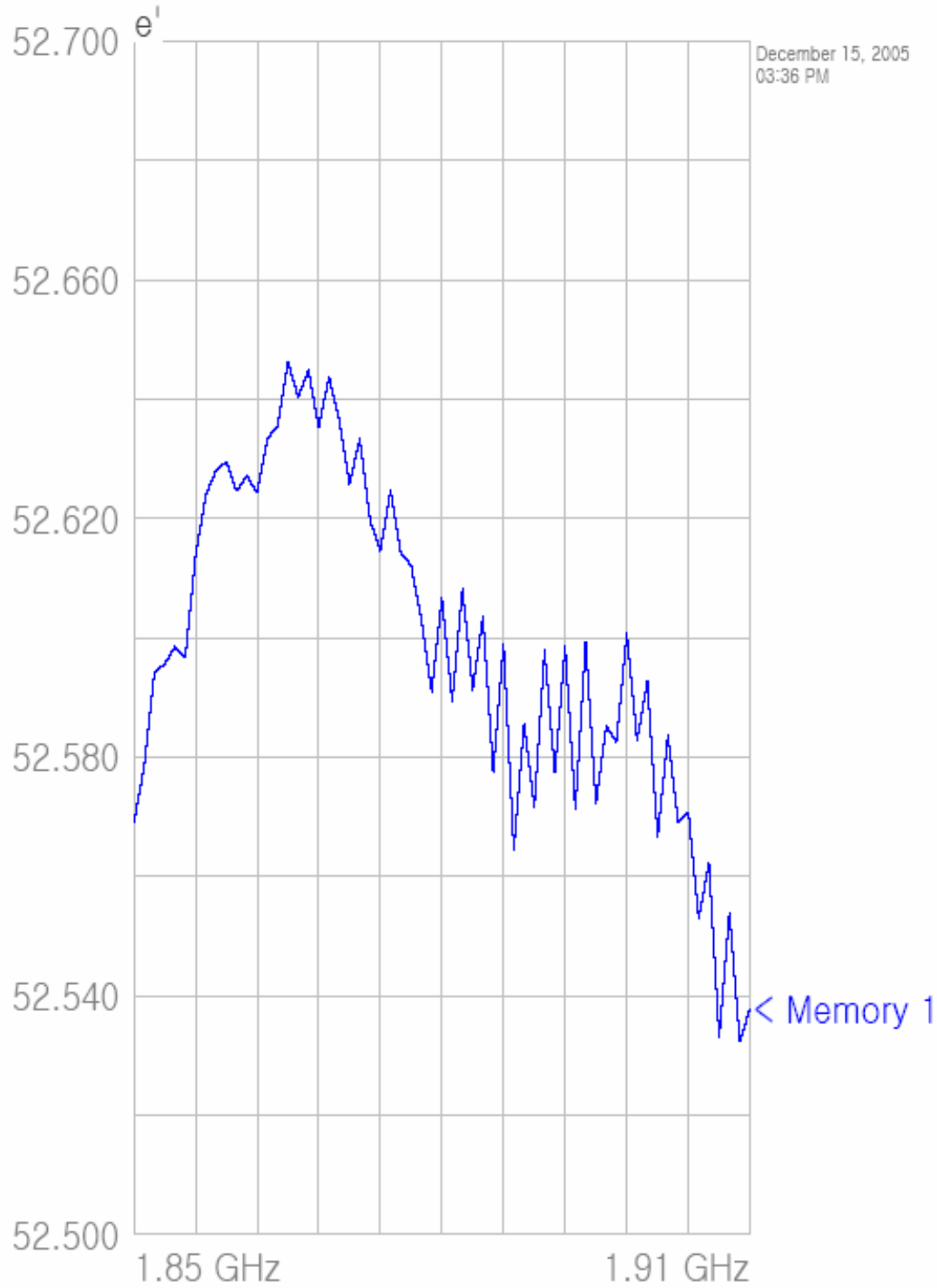
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- Body Tissue

Title
SubTitle





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Title**SubTitle**

December 15, 2015 02:26 PM

Frequency	e'	e''
1.850000000 GHz	52.5690	14.0413
1.851000000 GHz	52.5784	14.0358
1.852000000 GHz	52.5943	14.0498
1.853000000 GHz	52.5956	14.0514
1.854000000 GHz	52.5985	14.0588
1.855000000 GHz	52.5967	14.0488
1.856000000 GHz	52.6137	14.0436
1.857000000 GHz	52.6238	14.0591
1.858000000 GHz	52.6281	14.0436
1.859000000 GHz	52.6295	14.0451
1.860000000 GHz	52.6246	14.0558
1.861000000 GHz	52.6271	14.0708
1.862000000 GHz	52.6244	14.0759
1.863000000 GHz	52.6334	14.0778
1.864000000 GHz	52.6355	14.0678
1.865000000 GHz	52.6463	14.0717
1.866000000 GHz	52.6403	14.0690
1.867000000 GHz	52.6449	14.0820
1.868000000 GHz	52.6352	14.0790
1.869000000 GHz	52.6438	14.0884
1.870000000 GHz	52.6365	14.0761
1.871000000 GHz	52.6258	14.0920
1.872000000 GHz	52.6334	14.0842
1.873000000 GHz	52.6197	14.0848
1.874000000 GHz	52.6145	14.0706
1.875000000 GHz	52.6247	14.0857
1.876000000 GHz	52.6143	14.0618
1.877000000 GHz	52.6121	14.0990
1.878000000 GHz	52.6030	14.0846
1.879000000 GHz	52.5910	14.0909
1.880000000 GHz	52.6067	14.0759
1.881000000 GHz	52.5893	14.0763
1.882000000 GHz	52.6082	14.0728
1.883000000 GHz	52.5913	14.0656
1.884000000 GHz	52.6035	14.0428
1.885000000 GHz	52.5774	14.0692
1.886000000 GHz	52.5991	14.0450
1.887000000 GHz	52.5644	14.0539
1.888000000 GHz	52.5856	14.0410
1.889000000 GHz	52.5716	14.0529
1.890000000 GHz	52.5979	14.0534
1.891000000 GHz	52.5774	14.0423
1.892000000 GHz	52.5986	14.0293
1.893000000 GHz	52.5712	14.0462
1.894000000 GHz	52.5994	14.0448
1.895000000 GHz	52.5721	14.0617
1.896000000 GHz	52.5852	14.0596
1.897000000 GHz	52.5826	14.0720
1.898000000 GHz	52.6007	14.0437
1.899000000 GHz	52.5828	14.0629
1.900000000 GHz	52.5927	14.0493
1.901000000 GHz	52.5666	14.0831
1.902000000 GHz	52.5836	14.0774
1.903000000 GHz	52.5690	14.1079
1.904000000 GHz	52.5708	14.1090
1.905000000 GHz	52.5529	14.1281
1.906000000 GHz	52.5622	14.1295
1.907000000 GHz	52.5330	14.1518
1.908000000 GHz	52.5540	14.1424
1.909000000 GHz	52.5324	14.1651
1.910000000 GHz	52.5378	14.1700



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APPENDIX B : Validation Test Data

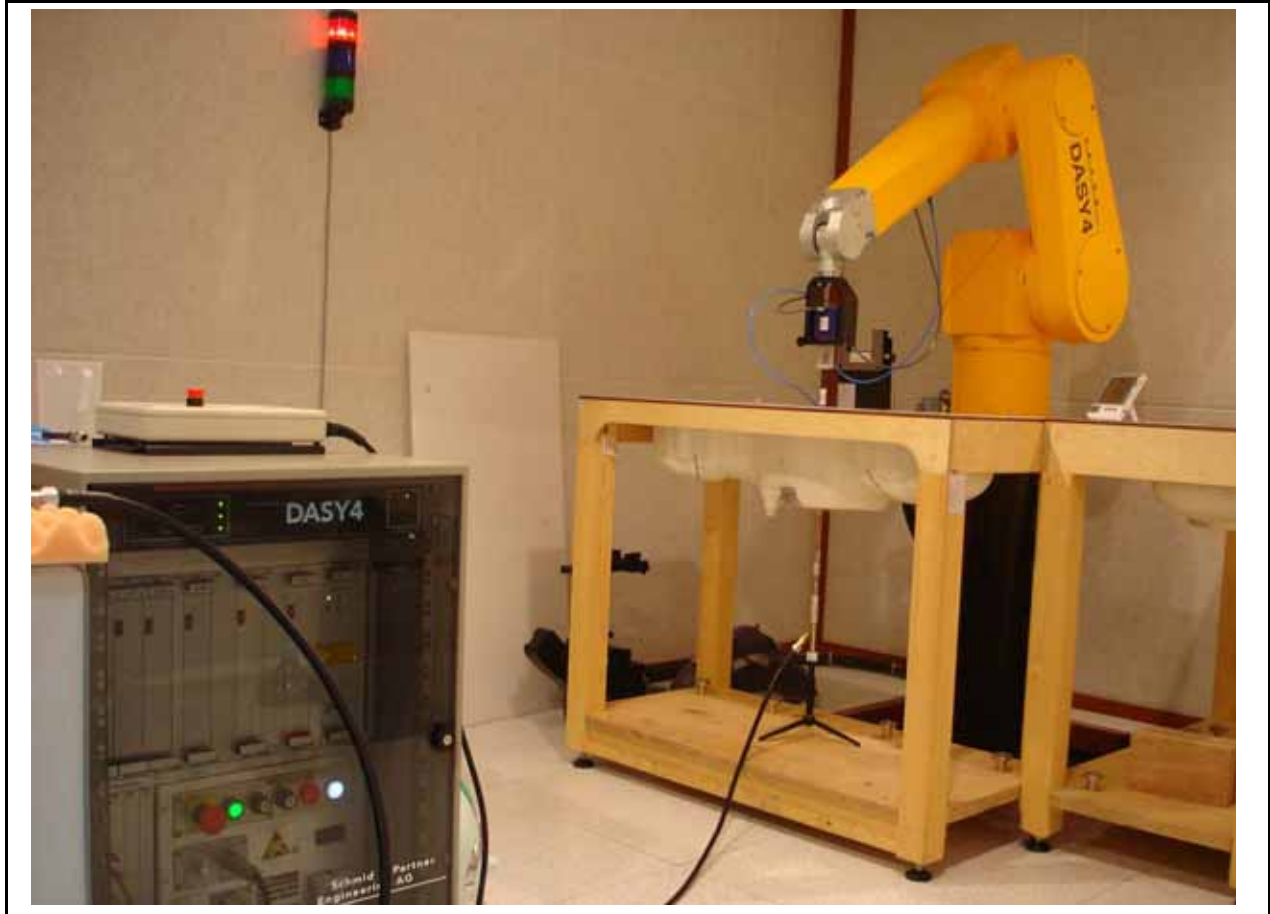


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1900MHz Dipole Validation



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FAX: 82-2-867-3204

Date/Time: 12/15/05 10:59:05

Test Laboratory: ESTECH

validation-1215

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

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

Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 38.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 47%

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

Reference Value = 92.7 V/m; Power Drift = 0.007 dB

Maximum value of SAR (interpolated) = 12.1 mW/g

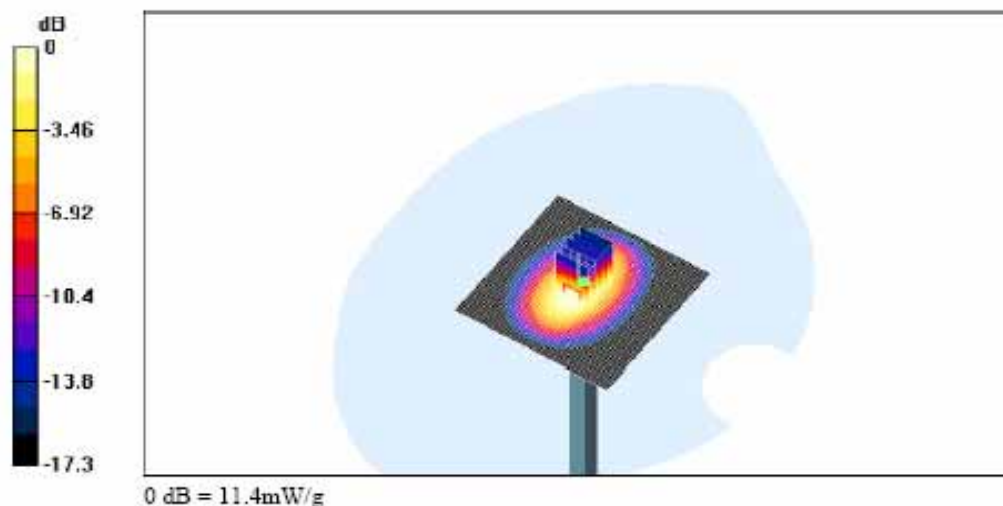
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 92.7 V/m; Power Drift = 0.007 dB

Maximum value of SAR (measured) = 11.4 mW/g

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 10.1 mW/g





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FAX: 82-2-867-3204

APPENDIX C : SAR Test Data

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

Date/Time: 12/15/05 13:51:48

Test Laboratory: ESTECH

CH512 LEFT TOUCH SLIDE IN

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used (interpolated): $f = 1850.2 \text{ MHz}$; $\sigma = 1.41 \text{ mho/m}$; $\epsilon_r =$

38.6 ; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21 °C, Humidity : 50%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 6.46 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.112 mW/g

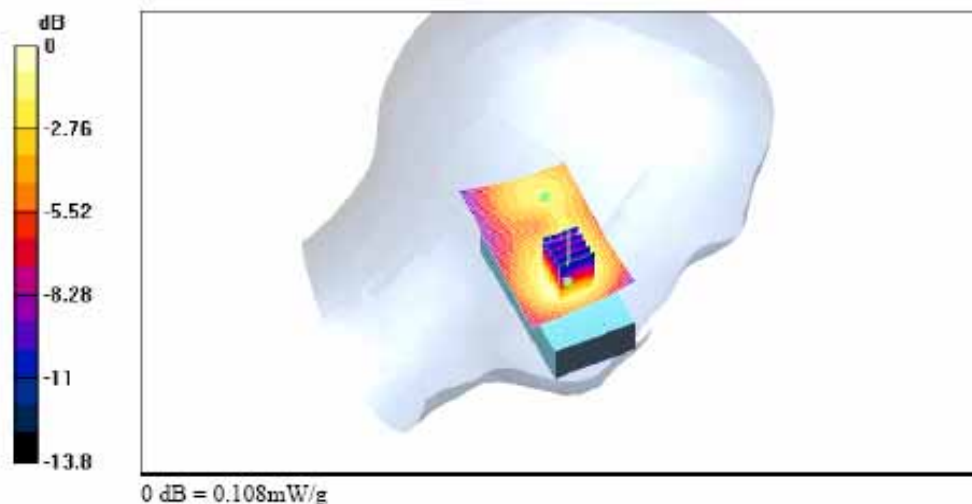
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 6.46 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 0.108 mW/g

Peak SAR (extrapolated) = 0.132 W/kg

SAR(1 g) = 0.098 mW/g



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Seoul, 153-803, Korea

Date/Time: 12/15/05 11:27:44

Test Laboratory: ESTECH

CH661 LEFT TOUCH SLIDE IN

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 38.7$; $\rho = 1000$

kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21 °C, Humidity : 47%

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

Reference Value = 6.32 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.123 mW/g

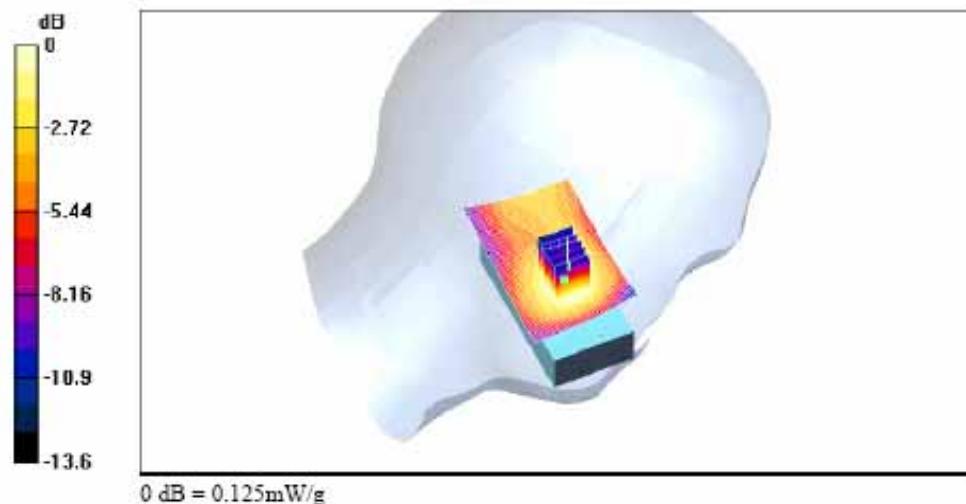
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.32 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 0.125 mW/g

Peak SAR (extrapolated) = 0.158 W/kg

SAR(1 g) = 0.114 mW/g



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FAX: 82-2-867-3204

Date/Time: 12/15/05 14:47:55

Test Laboratory: ESTECH

CH810 LEFT TOUCH SLIDE IN

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used (interpolated): $f = 1909.8$ MHz; $\sigma = 1.46$ mho/m; $\epsilon_r =$

38.6; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21 °C, Humidity : 49%

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

Reference Value = 5.46 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 0.102 mW/g

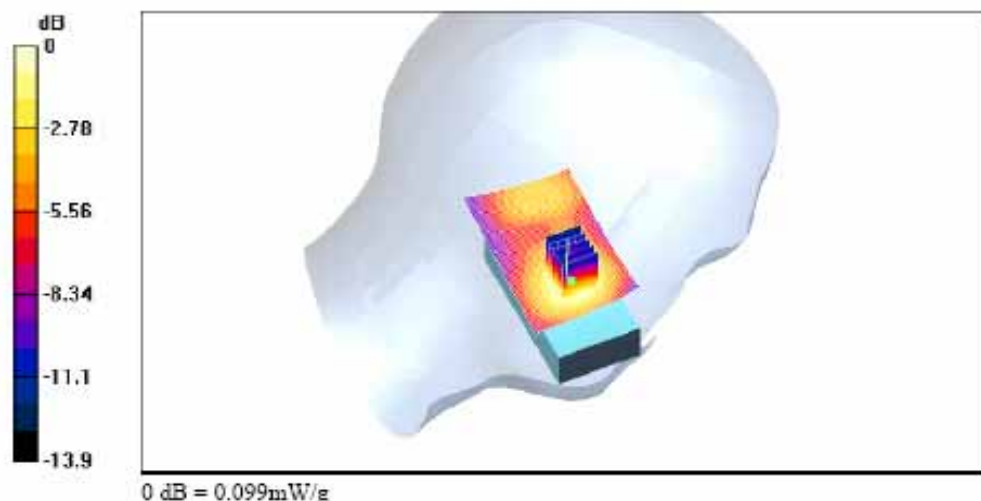
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.46 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 0.099 mW/g

Peak SAR (extrapolated) = 0.127 W/kg

SAR(1 g) = 0.090 mW/g



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Seoul, 153-803, Korea

Date/Time: 12/15/05 14:23:37

Test Laboratory: ESTECH

CH512 RIGHT TOUCH SLIDE IN

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r =$

38.6; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 48%

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

Reference Value = 7.83 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.124 mW/g

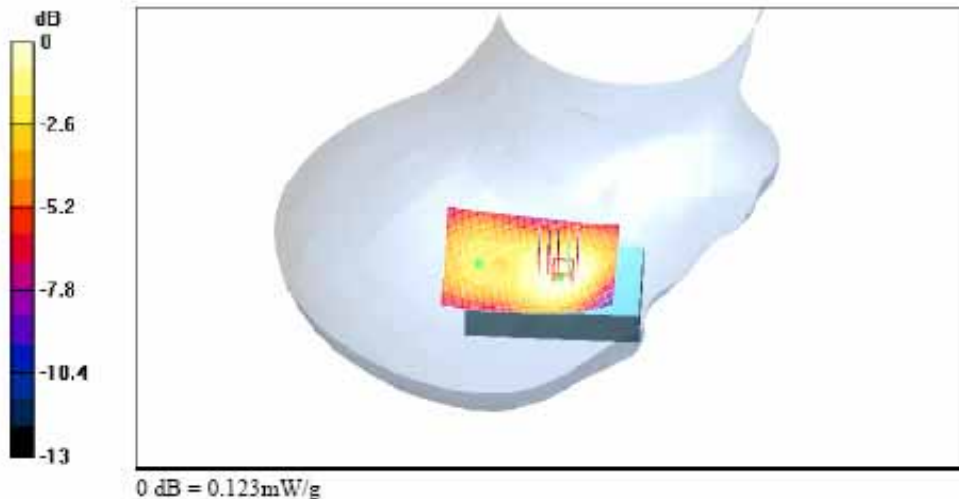
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.83 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 0.123 mW/g

Peak SAR (extrapolated) = 0.156 W/kg

SAR(1 g) = 0.114 mW/g



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Seoul, 153-803, Korea

Date/Time: 12/15/05 11:45:02

Test Laboratory: ESTECH

CH661 RIGHT TOUCH SLIDE IN

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 38.7$; $\rho = 1000$

kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 48%

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

Reference Value = 8.1 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.132 mW/g

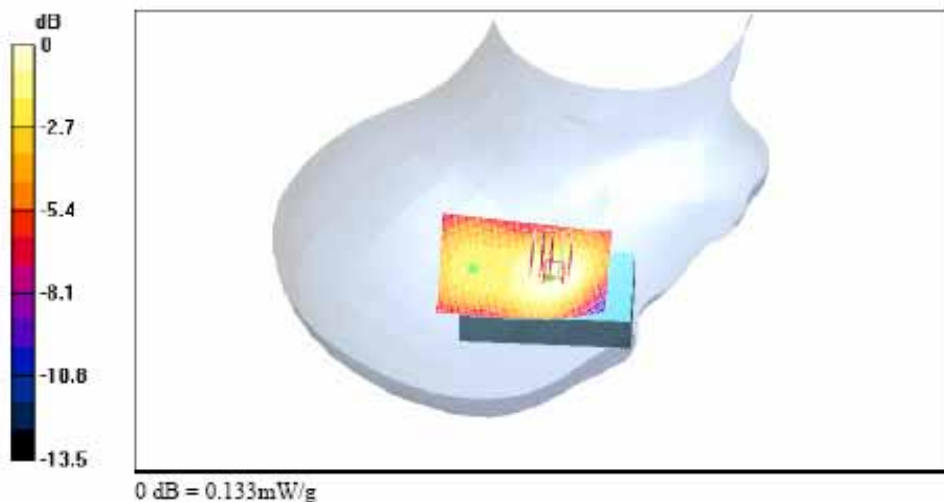
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.1 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 0.133 mW/g

Peak SAR (extrapolated) = 0.169 W/kg

SAR(1 g) = 0.122 mW/g



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FAX: 82-2-867-3204

Date/Time: 12/15/05 15:03:49

Test Laboratory: ESTECH

CH810 RIGHT TOUCH SLIDE IN

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used (interpolated): $f = 1909.8 \text{ MHz}$; $\sigma = 1.46 \text{ mho/m}$; $\epsilon_r =$

38.6 ; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21 °C, Humidity : 47%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 6.55 V/m; Power Drift = -0.002 dB

Maximum value of SAR (interpolated) = 0.106 mW/g

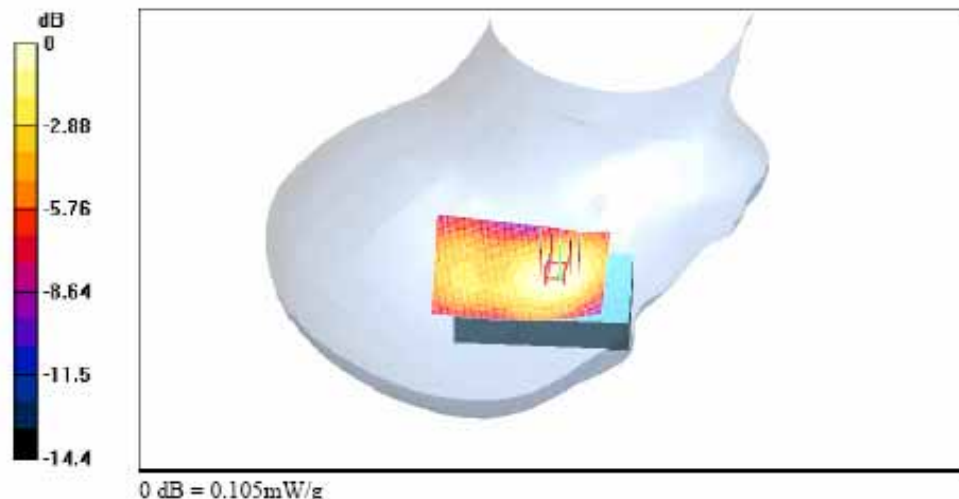
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 6.55 V/m; Power Drift = -0.002 dB

Maximum value of SAR (measured) = 0.105 mW/g

Peak SAR (extrapolated) = 0.134 W/kg

SAR(1 g) = 0.097 mW/g



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Date/Time: 12/15/05 12:02:19

Test Laboratory: ESTECH

CH661 LEFT TILT SLIDE IN

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 38.7$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21℃, Humidity : 49%

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

Reference Value = 6.72 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 0.098 mW/g

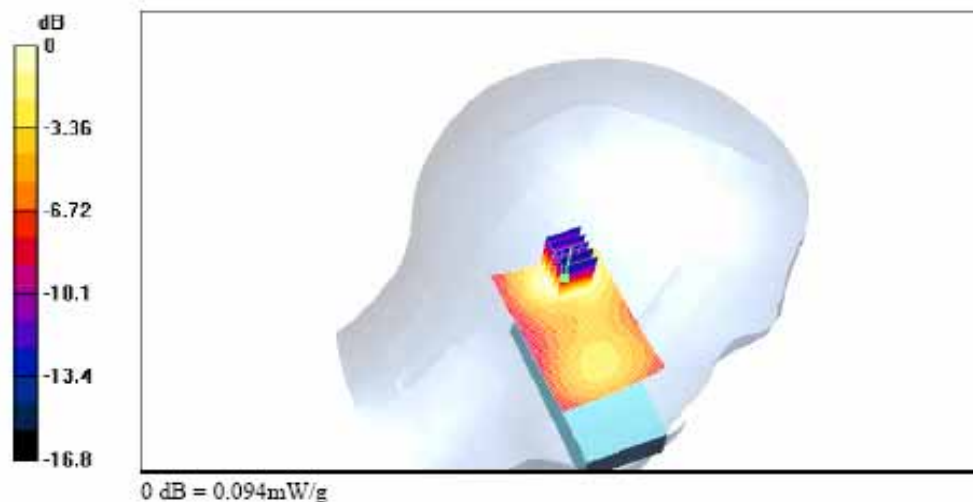
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.72 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 0.094 mW/g

Peak SAR (extrapolated) = 0.151 W/kg

SAR(1 g) = 0.087 mW/g



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FAX: 82-2-867-3204

Date/Time: 12/15/05 12:19:16

Test Laboratory: ESTECH

CH661 RIGHT TILT SLIDE IN

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.43 \text{ mho/m}$; $\epsilon_r = 38.7$; $\rho = 1000$

kg/m^3

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21 °C, Humidity : 47%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 7.75 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.096 mW/g

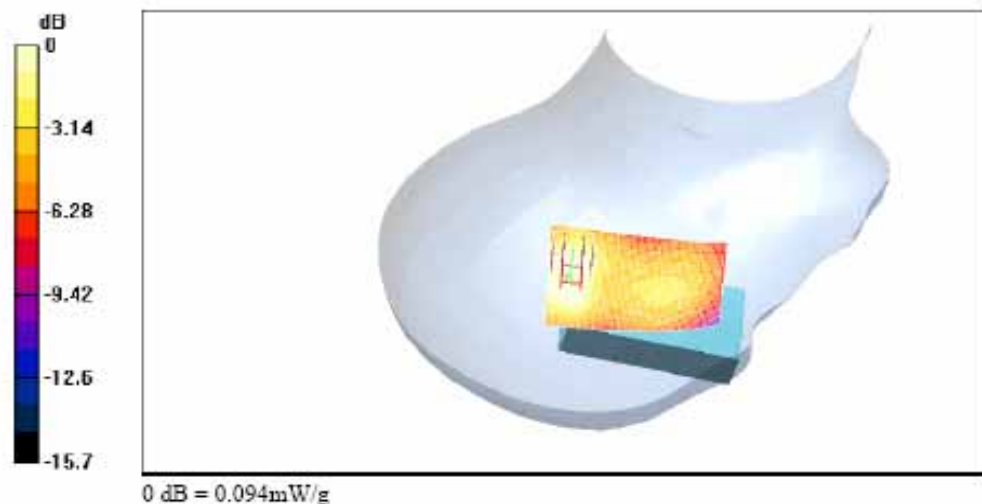
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 7.75 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.094 mW/g

Peak SAR (extrapolated) = 0.155 W/kg

SAR(1 g) = 0.087 mW/g



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FAX: 82-2-867-3204

Date/Time: 12/15/05 12:36:54

Test Laboratory: ESTECH

CH661 LEFT TOUCH SLIDE UP

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.43 \text{ mho/m}$; $\epsilon_r = 38.7$; $\rho = 1000$

kg/m^3

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21 °C, Humidity : 48%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 4.33 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.088 mW/g

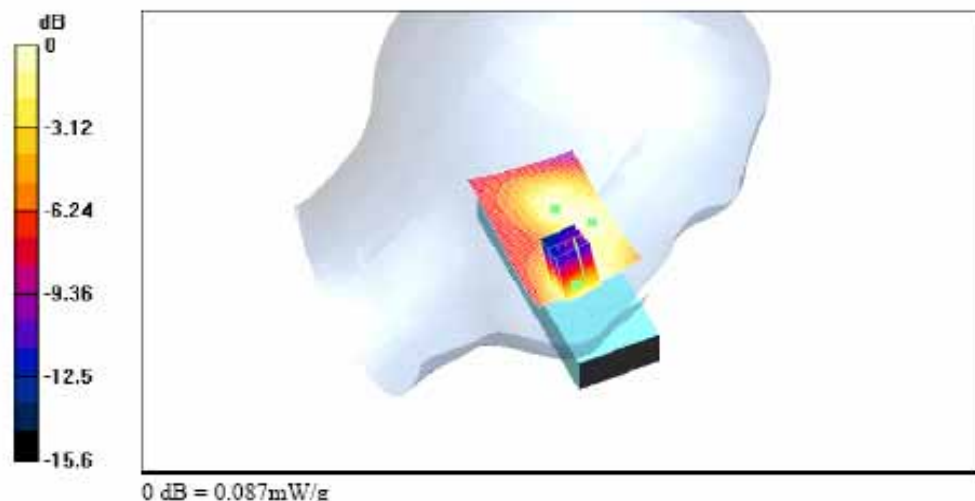
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 4.33 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.087 mW/g

Peak SAR (extrapolated) = 0.120 W/kg

SAR(1 g) = 0.081 mW/g



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FAX: 82-2-867-3204

Date/Time: 12/15/05 12:53:24

Test Laboratory: ESTECH

CH661 RIGHT TOUCH SLIDE UP

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.43 \text{ mho/m}$; $\epsilon_r = 38.7$; $\rho = 1000$

kg/m^3

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21 °C, Humidity : 49%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 3.66 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.064 mW/g

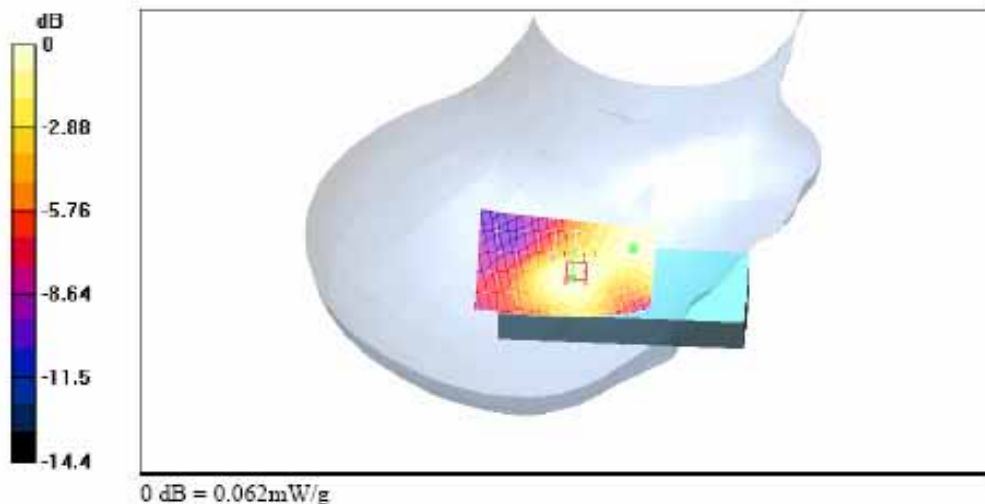
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 3.66 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.062 mW/g

Peak SAR (extrapolated) = 0.079 W/kg

SAR(1 g) = 0.057 mW/g



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FAX: 82-2-867-3204

Date/Time: 12/15/05 13:17:07

Test Laboratory: ESTECH

CH661 LEFT TILT SLIDE UP

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 38.7$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21°C, Humidity : 48%

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

Reference Value = 5.73 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.069 mW/g

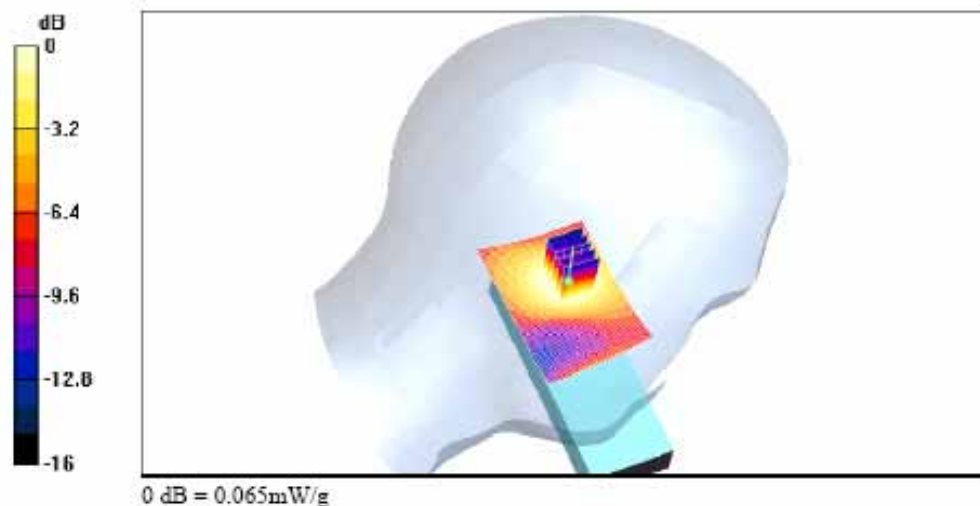
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.73 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.065 mW/g

Peak SAR (extrapolated) = 0.090 W/kg

SAR(1 g) = 0.060 mW/g



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FAX: 82-2-867-3204

Date/Time: 12/15/05 13:38:39

Test Laboratory: ESTECH

CH661 RIGHT TILT SLIDE UP

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 38.7$; $\rho = 1000$

kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21 °C, Humidity : 49%

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

Reference Value = 5.72 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.083 mW/g

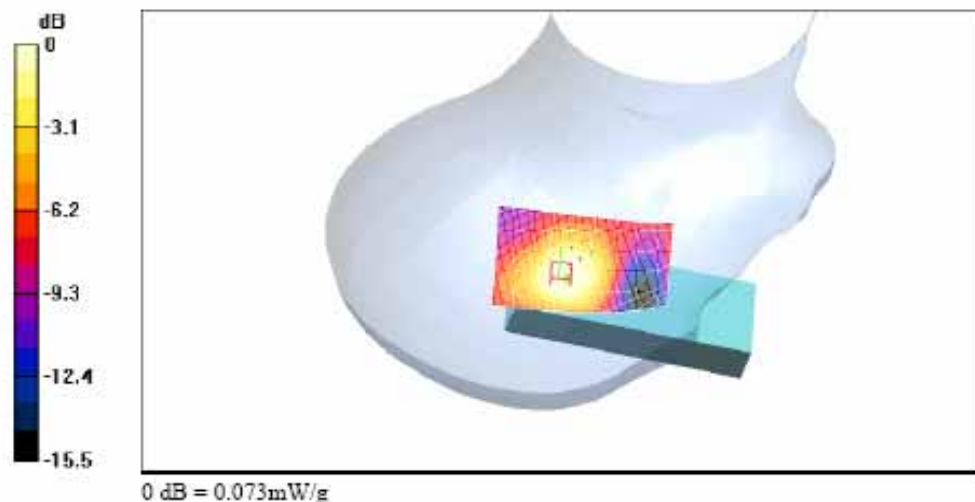
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.72 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.073 mW/g

Peak SAR (extrapolated) = 0.097 W/kg

SAR(1 g) = 0.065 mW/g



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Date/Time: 12/15/05 11:45:02

Test Laboratory: ESTECH

CH661 RIGHT TOUCH SLIDE IN-ZSCAN

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: HSL1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 38.7$; $\rho = 1000$

kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

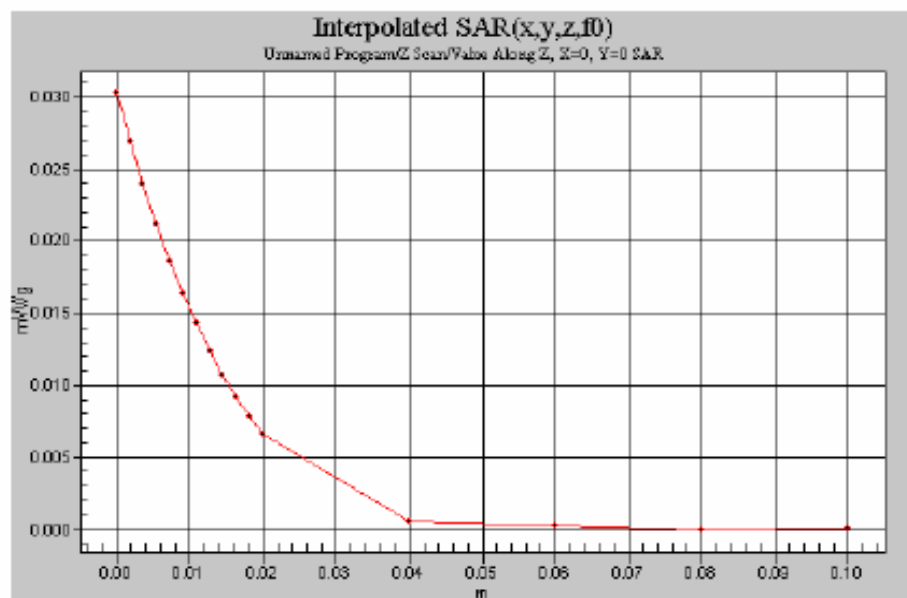
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(5.13, 5.13, 5.13); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22℃, Humidity : 48%

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

Reference Value = 8.1 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.132 mW/g



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Date/Time: 12/15/05 15:51:01

Test Laboratory: ESTECH

CH661 BODY SLIDE IN

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: M1900; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$

kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(4.45, 4.45, 4.45); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 47%

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

Reference Value = 6.41 V/m; Power Drift = -0.0 dB

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

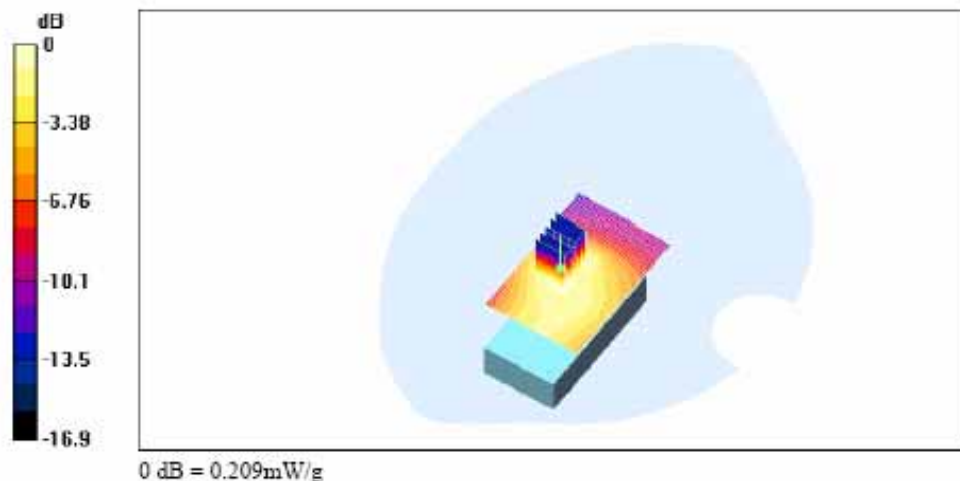
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.41 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 0.209 mW/g

Peak SAR (extrapolated) = 0.321 W/kg

SAR(1 g) = 0.190 mW/g



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Date/Time: 12/15/05 16:45:01

Test Laboratory: ESTECH

CH512 BODY SLIDE UP

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: M1900; Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.45$ mho/m; $\epsilon_r =$

52.6; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(4.45, 4.45, 4.45); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 49%

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

Reference Value = 8.43 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.524 mW/g

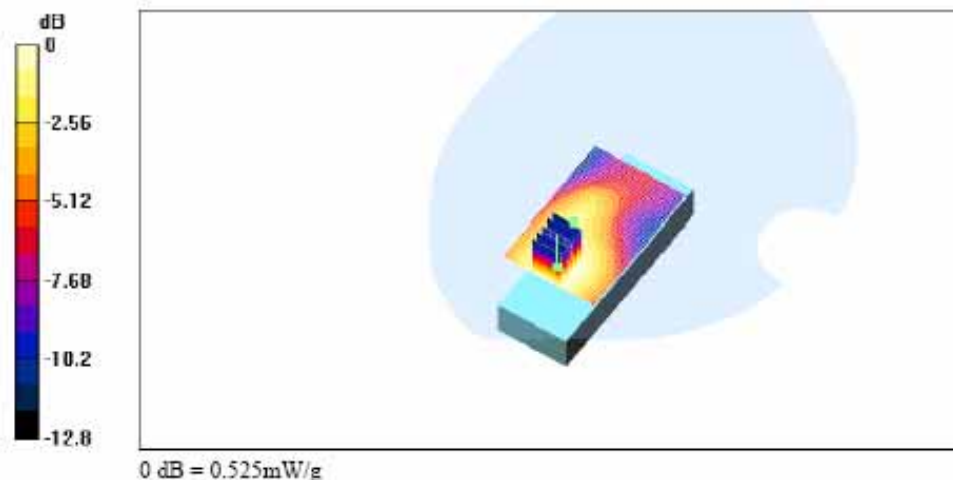
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.43 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 0.525 mW/g

Peak SAR (extrapolated) = 0.702 W/kg

SAR(1 g) = 0.486 mW/g



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Date/Time: 12/15/05 16:28:01

Test Laboratory: ESTECH

CH661 BODY SLIDE UP

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: M1900; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_1 = 52.6$; $\rho = 1000$

kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(4.45, 4.45, 4.45); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 49%

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

Reference Value = 7.81 V/m; Power Drift = -0.009 dB

Maximum value of SAR (interpolated) = 0.522 mW/g

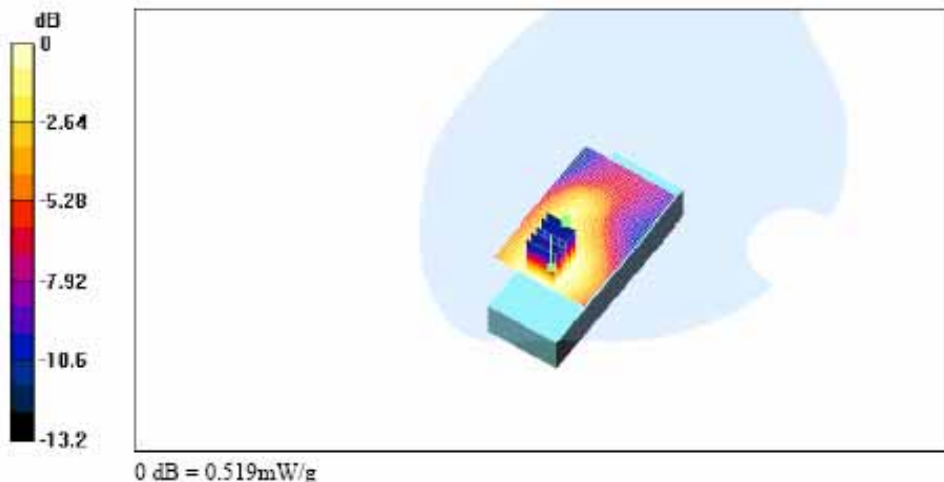
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.81 V/m; Power Drift = -0.009 dB

Maximum value of SAR (measured) = 0.519 mW/g

Peak SAR (extrapolated) = 0.699 W/kg

SAR(1 g) = 0.478 mW/g



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Date/Time: 12/15/05 17:01:02

Test Laboratory: ESTECH

CH810 BODY SLIDE UP

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: M1900; Medium parameters used (interpolated): $f = 1909.8$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r =$

52.5; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(4.45, 4.45, 4.45); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 49%

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

Reference Value = 6.38 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 0.383 mW/g

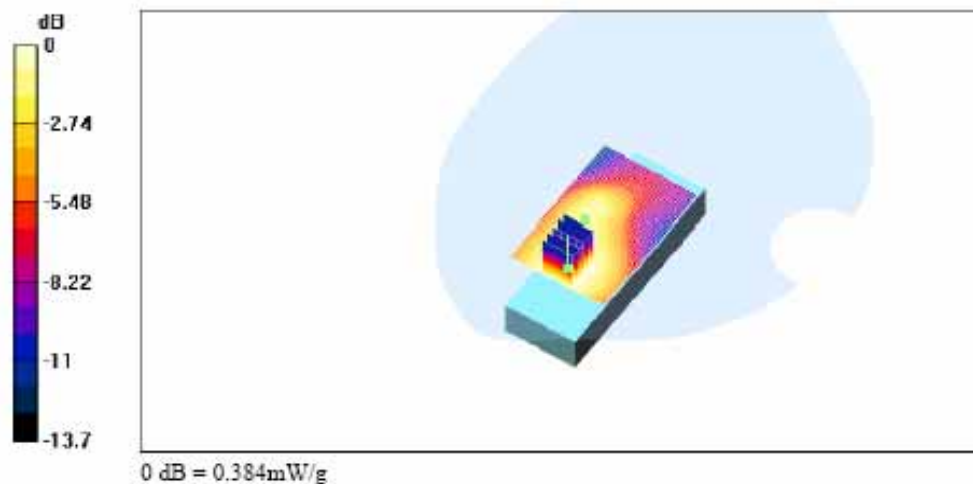
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.38 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 0.384 mW/g

Peak SAR (extrapolated) = 0.521 W/kg

SAR(1 g) = 0.353 mW/g



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Date/Time: 12/15/05 16:45:01

Test Laboratory: ESTECH

CH512 BODY SLIDE UP-ZSCAN

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: M1900; Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.45$ mho/m; $\epsilon_r =$

52.6; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

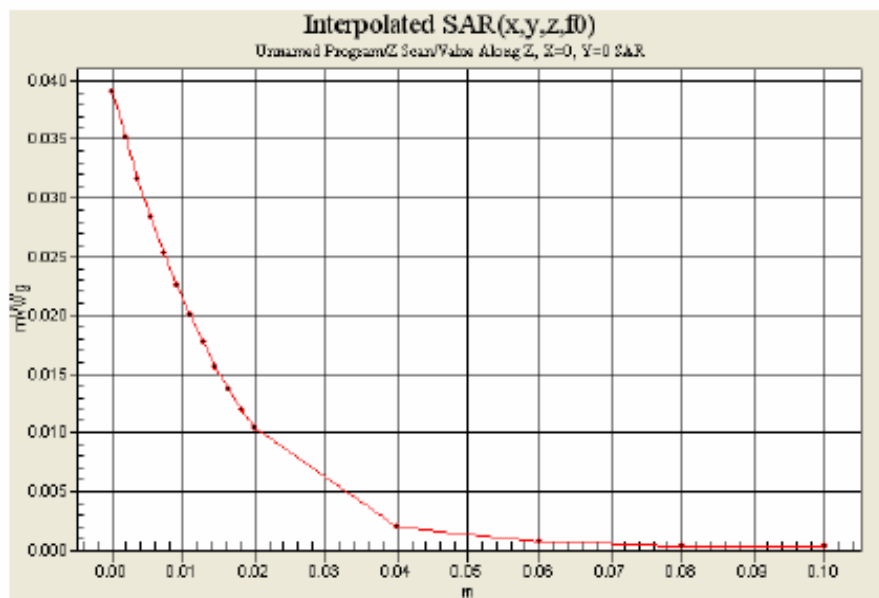
DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(4.45, 4.45, 4.45); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 23 °C, Humidity : 49%

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

Reference Value = 8.43 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.524 mW/g



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Date/Time: 12/15/05 17:37:43

Test Laboratory: ESTECH

CH512 BODY SLIDE UP-BT disable

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium: M1900; Medium parameters used (interpolated): $f = 1850.2 \text{ MHz}$; $\sigma = 1.45 \text{ mho/m}$; $\epsilon_r =$

52.6; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(4.45, 4.45, 4.45); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800Mhz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 22°C, Humidity : 48%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 8.3 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 0.390 mW/g

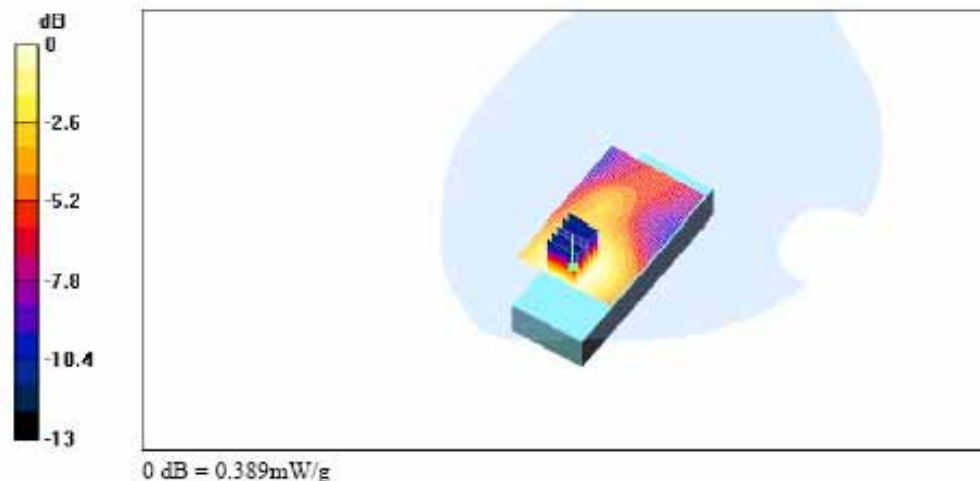
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 8.3 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 0.389 mW/g

Peak SAR (extrapolated) = 0.524 W/kg

SAR(1 g) = 0.358 mW/g



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Date/Time: 12/15/05 17:59:41

Test Laboratory: ESTECH

CH512 BODY SLIDE UP GPRS

DUT: S5300; Type: SLIDE TYPE; Serial: XXXX

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

Medium parameters used (interpolated): $f = 1850.2 \text{ MHz}$; $\sigma = 1.45 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DAS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1748; ConvF(4.45, 4.45, 4.45); Calibrated: 2005-01-21
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn551; Calibrated: 2004-04-28
- Phantom: SAM MIC 1800MHz; Type: SAM MIC 1800MHz; Serial: TP-1263
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112
- Temperature : 21 °C, Humidity : 48%

Area Scan (41x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 6.34 V/m; Power Drift = 0.2 dB

Maximum value of SAR (interpolated) = 0.262 mW/g

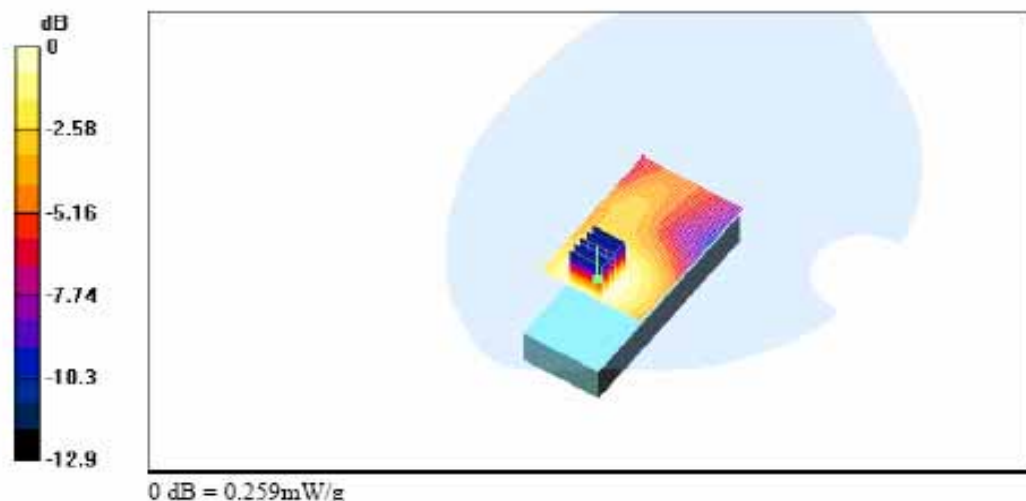
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 6.34 V/m; Power Drift = 0.2 dB

Maximum value of SAR (measured) = 0.259 mW/g

Peak SAR (extrapolated) = 0.341 W/kg

SAR(1 g) = 0.240 mW/g





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APPENDIX D : Calibration Certificates

IMPORTANT NOTICE

USAGE OF PROBES IN ORGANIC SOLVENTS

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

Compatible Probes:

- ET3DV6
- ET3DV6R
- ES3DVx
- ER3DV6
- H3DV6

Important Note for ET3DV6 Probes:

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

s p e a g

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