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SAR Compliace Test Report

APPLICANT NAME & ADDRESS :	DATA & LOCATION OF TESTING
POINTMOBILE CO.,LTD	Dates of testing : 05 Jun 2009 ~ 13 Aug 2009
301, World Meridian Venture Center-1,60-24, Gasan-dong, Geumcheon-gu, Seoul, Korea	Test Site : ESTECH Co., Ltd. 97-1, Hoeok-Ri, Majang-Myun, Icheon-City, Kyonggi-Do, 467-811, Korea

Test Device :

Model : PM250, CHD SiX

FCC ID : V2X-PM250

TYPE : Mobile Computer

Test report no :	ESTSAR0908-002	Number of page :	21
Contact person :	W.S.Park	Responsible test Engineer :	H. H. Lee
Testing has been Carried out in Accordance with :	IEEE 1528(Dec.2003) Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate(SAR) in the Human Body Due to Wireless Communications Device : Experimental Techniques		
Applicant Type :	Certification		
FCC CLASSIFICATION :	DSS-Part 15 Spread Spectrum Transmitter		
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 : 13 Aug 2009

Report Prepared By : Engineer/ H. H. Lee

(Signature)

Engineering Manager/ J. M. Yang

(Signature)

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1. SUMMARY FOR TEST REPORT

FCC ID	V2X-PM250
Date of test	05 Jun 2009 ~ 13 Aug 2009
Responsible test engineer	J. M. Yang
Measurement performed by	H. H. Lee
EUT Type	Mobile Computer
Tx Frequency	802.11b/802.11g : 2412~2462 MHz
Rx Frequency	802.11b/802.11g : 2412~2462 MHz
Max. RF Output Power	802.11b (13.2 dBm), 802.11g (13.4 dBm)

1.1 Body Worn Configuration

Max. SAR Measurement

FREQUENCY		Modulation	Conducted Power(dBm)		Separation test position	SAR (W/kg)
MHz	Ch		dBm	Battery		
2437	6	DSSS	13.3	Standard	1.5 cm [w/o Holster]	0.00691
2462	11	OFDM	13.4	Standard	1.5 cm [w/o Holster]	0.00764
2437	1	DSSS	13.3	Extended	1.5 cm [w/o Holster]	0.0138
2462	1	OFDM	13.4	Extended	1.5 cm [w/o Holster]	0.0113

1.2 Measurement Uncertainty

Combine Standard Uncertainty	± 11.00 (k=1)
Extended Standard Uncertainty	± 22.00 (k=2, 95% CONFIDENCE LEVEL)

2. INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential 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 (IC NIRP) in Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields," IC NIRP Report No. 86 (c) IC NIRP, 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. 2.1.).

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

Figure 2.1 SAR Mathematical Equation

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

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

Where:

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

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 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

Serial numbers	NONE
Exposure environment	Uncontrolled exposure
Device category	Portable device
Mode(s) of Operation	DSSS,OFDM
Modulation Mode(s)	DSSS,OFDM
Duty Cycle	1
Transmitting FreQuency Range(s)	802.11b/802.11g : 2412~2462 MHz
test signal method	☐ Base station simulator ■ Internal test code

2.3 Battery Options

Standard / Extended

4. TEST CONDITIONS

4.1 Ambient Conditions

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

4.2 RF Characteristics of The Test Site

Tests were performed in a fully enclosed RF Shielded environment

4.3 Test Signal, Frequencies, And Output Power

The handset was placed into simulated call mode

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	2009-04-28
E-Field Probe	ET3DV3	3123	2009-01-20
Dipole validation kit	D2450V2	741	2009-02-17
Network analyzer	8753ES	MY40000609	2008-10-14
Signal generator	83620B	3722A00463	2008-09-12
RF Power meter	EPM-442A	GB37170412	2008-10-13
Power Sensor	8481A	3318A96476	2008-10-13
Power Sensor	8481A	2702A59566	2008-10-20
Dielectric Probe	85070D	US01440154	-
Power Amplifier	BBS3Q7ECK	NONE	2009-02-10
LP Filter	LA-30N	NONE	2008-10-30
Attenuator	8491B	21828	2009-02-11
Dual Directional Coupler	778D	17575	2009-04-27

5.2 SAR Measurement Setup

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

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

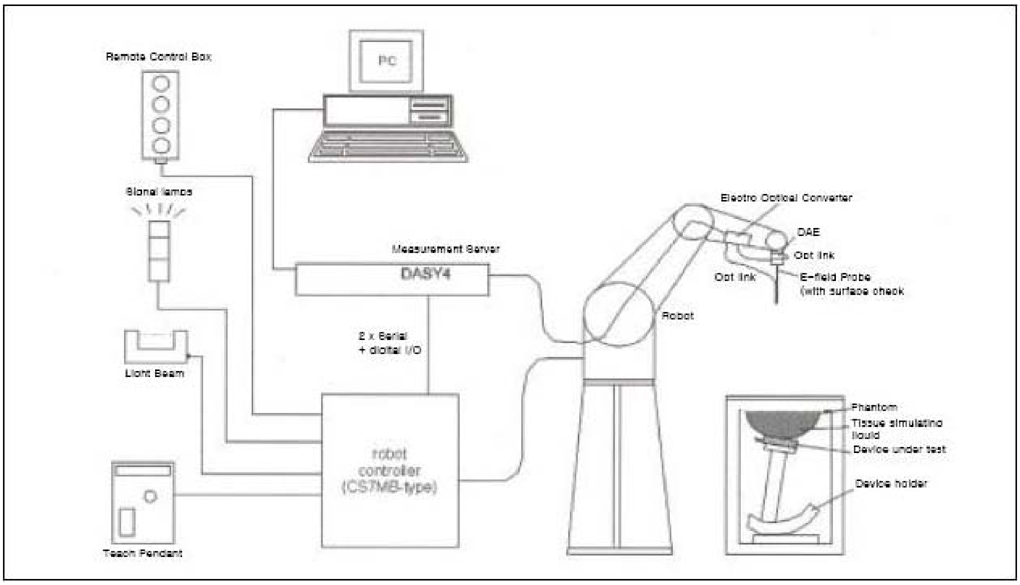


Fig. 5.1 SAR Measurement System Setup

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gainswitching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the Ethernet Card is accomplished through an optical downlink for data and status
information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in [7].

5.3 DASY4 E-Field Probe System

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

5. DESCRIPTION OF THE TEST EQUIPMENT(continued)

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

	Isotropic E-Field Probe for Dosimetric Measurements	
 **Isotropic E-Field Probe**	**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 Fig 5.3). Preservation with a bactericide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been specified in 1528(Dec.2003) are derived from the issue dielectric parameters computed from
the 4-Cole-Cole equations The mixture characterizations used for the brain and muscle tissue simulation liquids are according to the data by C. Gabriel and G. Hartagrove [13]. (see Fig. 5.3)

Frequency	Head		Body	
(MHz)	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)

2450 MHz					
	Head	Body			
DGBE(diethyene Glycol buty Ether)		26.70%			
Deionized water	62.70%	73.20%			
Salt	0.50%	0.04%			
Triton X-100	36.80%				
ε	39.2±5%	52.7±5%			
σ	1.8±10%	1.95±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].

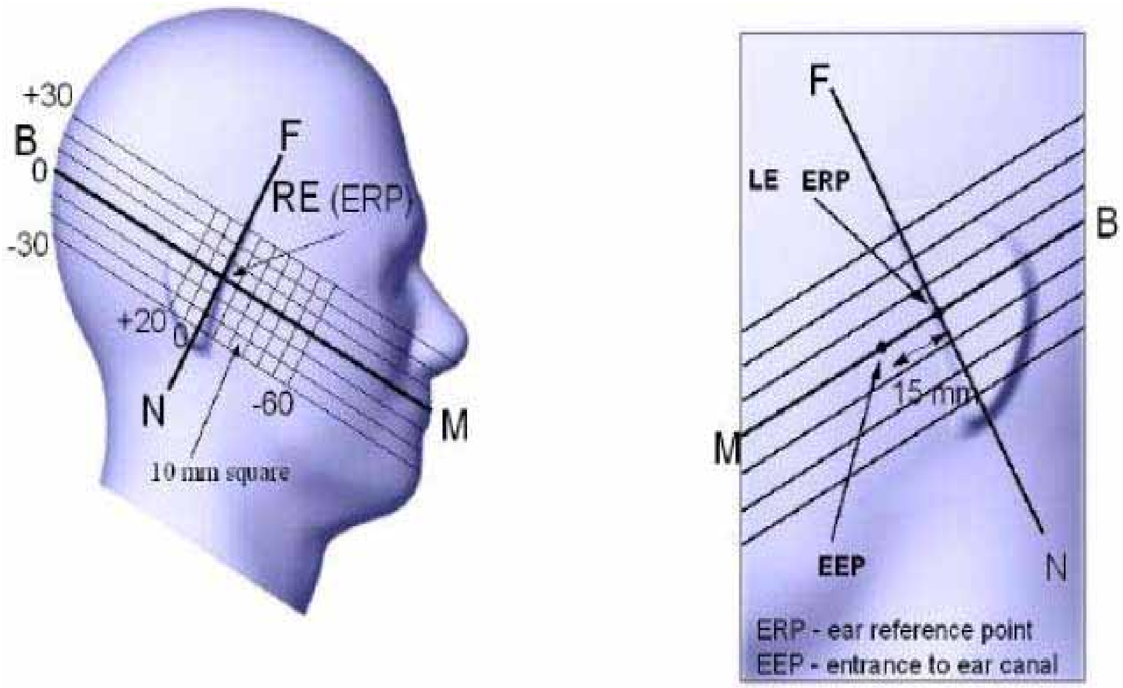


Figure 6.1 Close-up side view of ERP

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)

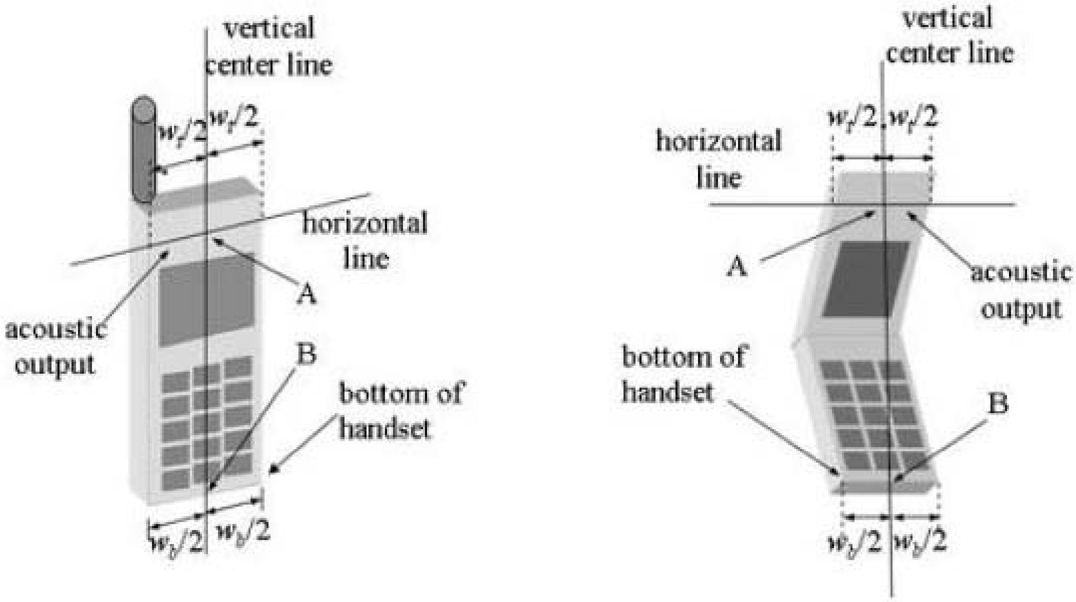


Figure 6.2 Handset Vertical Center & Horizontal Line Reference Points

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

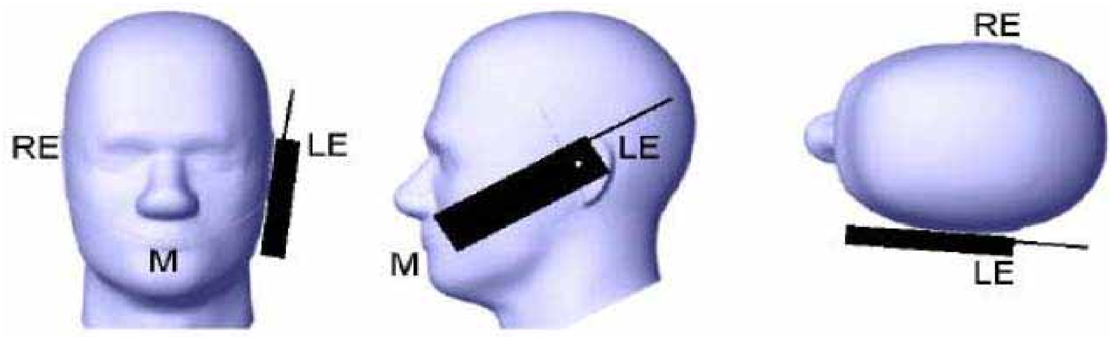


Figure 6.3 “Cheek” or “Touch” Position.

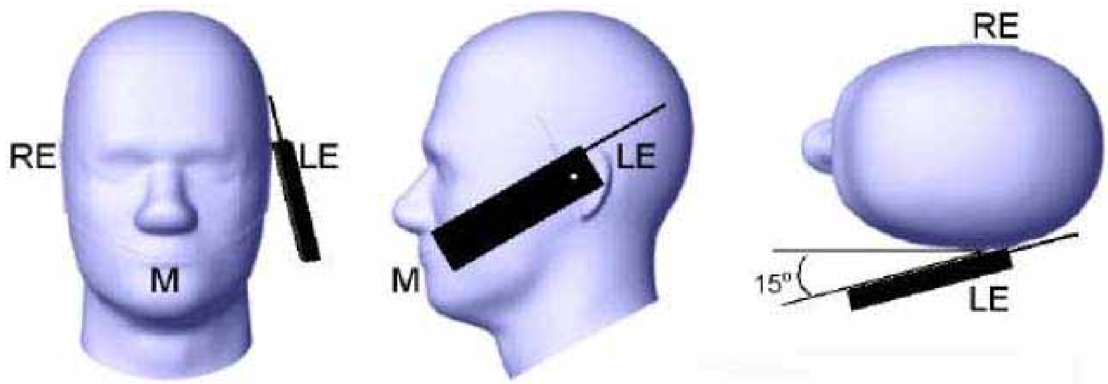


Figure 6.4 “Tilted” Position.

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, 5x5x7 points; spacing between each point 5x5x5 mm, is performed around the highest E-field value to determine the averaged SAR-distribution over 1g.

6.4 SAR Averaging Methods

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

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

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

7. MEASUREMENT UNCERTAINTY

According to CENELEC [17], typical worst-case uncertainty of field measurements is 5 dB.
For well-defined modulation characteristics the uncertainty can be reduced to 3 dB.

ERROR Description	Uncertainty 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	$(1\text{-cp})^{1/2}$	± 1.9%	∞
Hemispherical Isotropy	± 9.6	rectangular	√3	$(cp)^{1/2}$	± 3.9%	∞
Boundary Effects	± 1.0	rectangular	√3	1	± 0.6%	∞
Linearity	± 4.7	rectangular	√3	1	± 2.7%	∞
System Detection Limits	± 1.0	rectangular	√3	1	± 0.6%	∞
Readout Electronics	± 1.0	normal	1	1	± 1.0%	∞
Response time	± 0.8	rectangular	√3	1	± 0.5%	∞
Integration time	± 2.6	rectangular	√3	1	± 1.5%	∞
RF Amnient Conditions	± 3.0	rectangular	√3	1	± 1.7%	∞
Probe Positioner Mechanical Tolerance	± 0.4	rectangular	√3	1	± 0.2%	∞
Probe Positioning with respect to Phantom Shell	± 2.9	rectangular	√3	1	± 1.7%	∞
Extrapolation, Interpolation and Integration Algorithms for Max. SAR Evaluation	± 1.0	rectangular	√3	1	± 0.6%	∞
Test Sample Related						
Test Sample Positioning	± 2.9	normal	1	1	± 2.97%	145
Device Holder Uncertainty	± 3.6	normal	0.84	1	± 3.69%	5
Output Power Validation - SAR drift measurement	± 5.0	rectangular	√3	1	± 2.9%	∞
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	± 4.0	rectangular	√3	1	± 2.3%	∞
Liquid conductivity Target - tolerance	± 5.0	rectangular	√3	0.64	± 1.8%	∞
Liquid Conductivity - measurement uncertainty	± 5.0	normal	1	0.64	± 3.2%	∞
Liquid permittivity Target - tolerance	± 5.0	rectangular	√3	0.6	± 1.7%	∞
Liquid Permittivity - measurement uncertainty	± 5.0	normal	1	0.6	± 3.0%	∞
Combined Standard Uncertainty					±11.00 %	330
Coverage Factor for 95%				K = 2		
Expanded Standard Uncertainty					± 22.00 %	

8. SYSTEM VERIFICATION

Tissue Verification

Table 8.1 Simulated Tissue Verification [5]

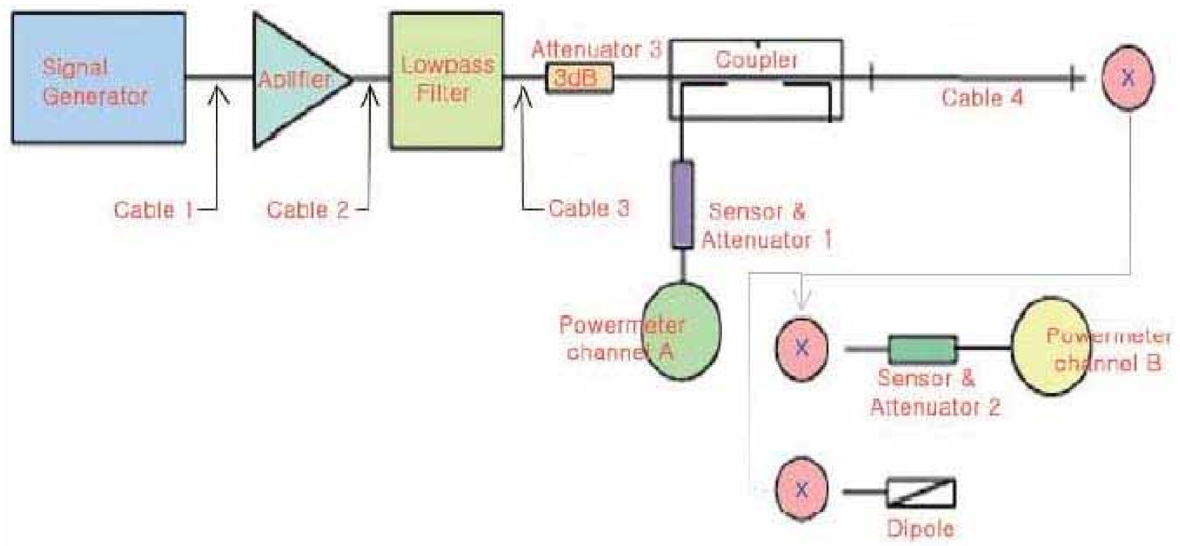
MEASURED TISSUE PARAMETERS										
Liquid Temperature (°C)		22		Liquid Depth(mm)		150				
Date	2009-06-05		2009-06-05							
Tissue	2450MHz Brain		2450MHz Muscle		835MHz Brain		835MHz Muscle			
	Target	Measured	Target	Measured	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε	39.2	37.4	52.7	52.0						
Conductivity: σ	1.8	1.83	1.95	1.91						
Deviation (%)	ε : -4.59% σ : 1.67%		ε : -1.33% σ : -2.05%							

Test System Validation

- Prior to assessment, the system is verified to the ±10% of the specifications at 2450Hz (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
2450MHz Brain	D2450V2(S/N :741)	1.0	52.4	52.8	0.76%	2009-06-5



9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22.0
Relative HUMIDITY (%) : 48
Mixture Type : 2450MHz Body
Dielectric Constant : 52
Conductivity: 1.91

Measurement Results (802.11b BODY SAR without Holster)

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

MEASUREMENT RESULTS (802.11b Body SAR Without Holster)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Slider	BT	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End						
2412.0	1	DSSS	13.3	12.96	Standard	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0053
2437.0	6	DSSS	13.3	14.09	Standard	Front-1.5cm [w/o Holster]	-	-	Fixed	0.0013
2437.0	6	DSSS	13.3	13.70	Standard	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0069
2462.0	11	DSSS	13.3	13.57	Standard	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0068
2412.0	1	DSSS	13.3	13.61	Extended	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0138
2437.0	6	DSSS	13.3	13.66	Extended	Front-1.5cm [w/o Holster]	-	-	Fixed	0.0054
2437.0	6	DSSS	13.3	13.52	Extended	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0125
2462.0	11	DSSS	13.3	13.31	Extended	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0089

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 / Extened
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the high and low channels is optional for such test configration(s).
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Body

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9. RESULTS(continued)

Ambient TEMPERATURE (C) : 22.0
Relative HUMIDITY (%) : 48
Mixture Type : 2450MHz Body
Dielectric Constant : 52
Conductivity: 1.91

Measurement Results (802.11g BODY SAR without Holster)

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

MEASUREMENT RESULTS (802.11g Body SAR Without Holster)

Frequency		Mod	Conducted Power(dBm)		battery	Device Test position	Slider	BT	Antenna Position	SAR (W/kg)
MHz	Ch.		Begin	End						
2412.0	1	OFDM	13.4	13.61	Standard	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0074
2437.0	6	OFDM	13.4	13.81	Standard	Front-1.5cm [w/o Holster]	-	-	Fixed	0.0041
2437.0	6	OFDM	13.4	13.42	Standard	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0066
2462.0	11	OFDM	13.4	13.67	Standard	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0076
2412.0	1	OFDM	13.4	13.31	Extended	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0113
2437.0	6	OFDM	13.4	13.64	Extended	Front-1.5cm [w/o Holster]	-	-	Fixed	0.0045
2437.0	6	OFDM	13.4	13.33	Extended	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0095
2462.0	11	OFDM	13.4	13.57	Extended	Rear-1.5cm [w/o Holster]	-	-	Fixed	0.0069

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 / Extended
Justification for reduced test configuration: Per FCC/OET Bulletin 65 Supplement C[July 2001], if the SAR measured at the middle channel for each test configuration (left,light,cheek/touch,tilt/ear, extended and retracted)is at least 3.0dB lower than the SAR limit, testing at the high and low channels is optional for such test configration(s).
4. Power Measured : Conducted
5. SAR Measurement System : SPEAG
6. SAR Configuration : Body

10. REFERENCE

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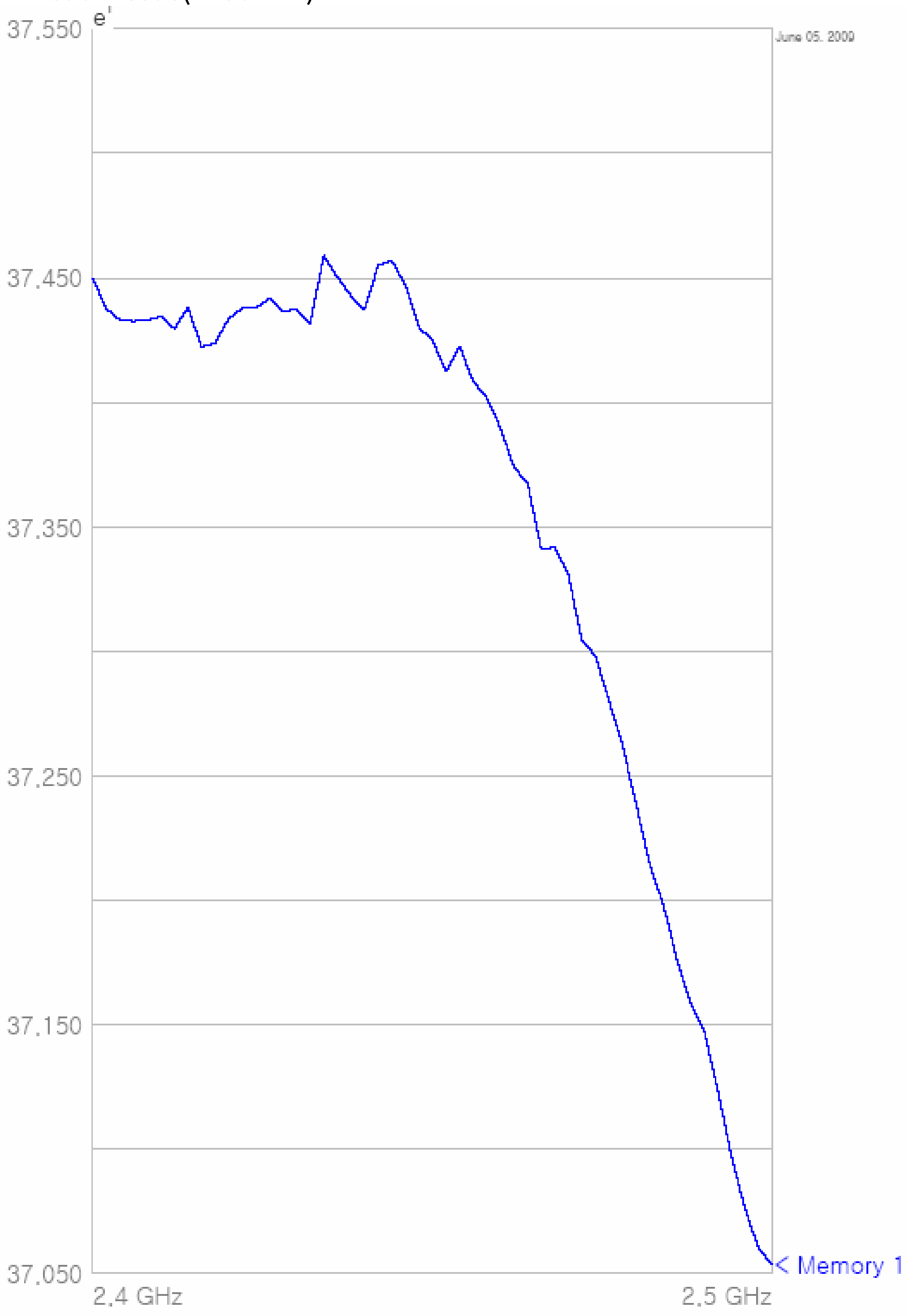
APPENDIX A : Validation Test Data of Tissue

- Head Tissue(2450MHz)



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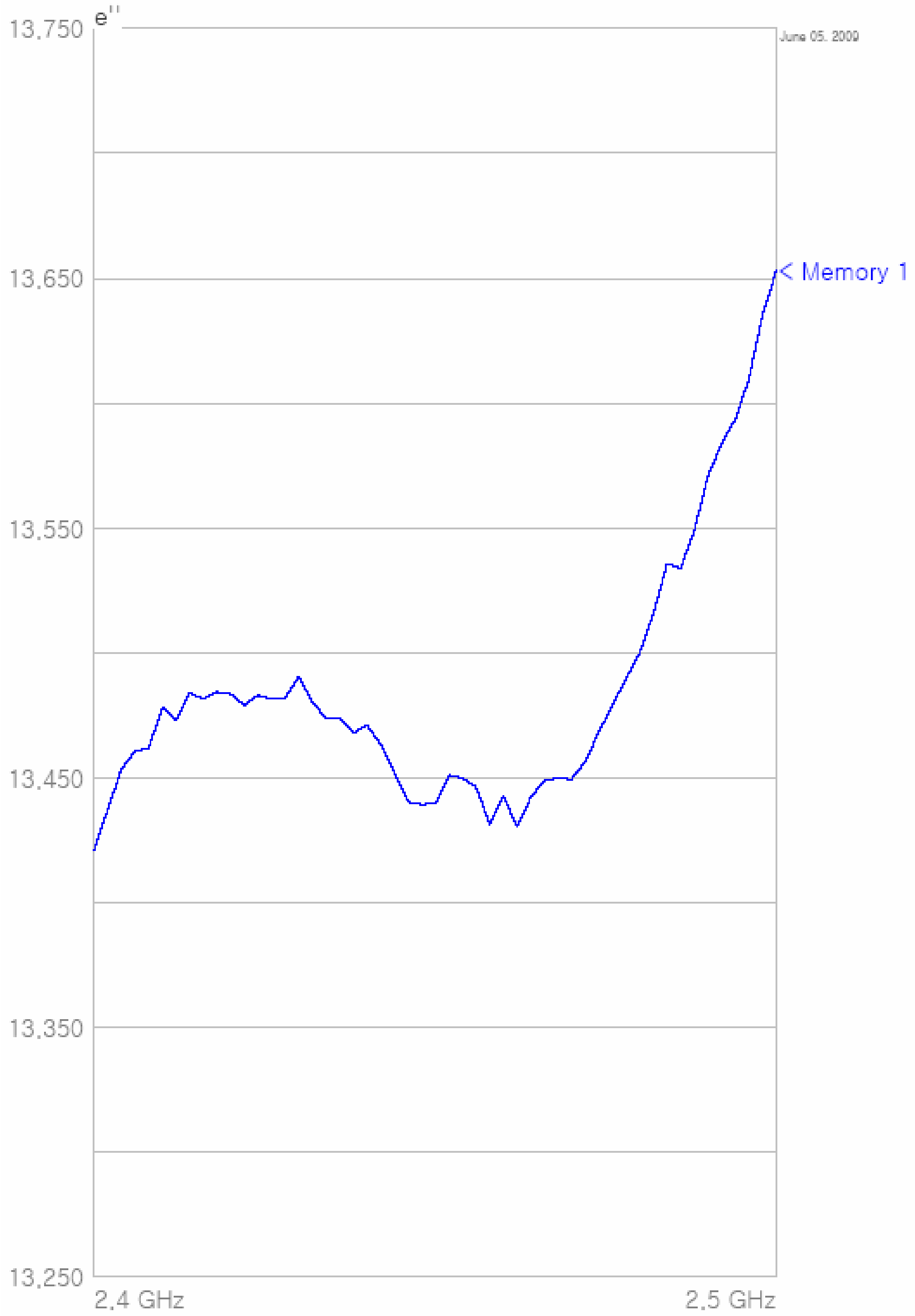

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SubTitle
June 05, 2009

Frequency	e'	e''
2.400000000 GHz	37.4497	13.4212
2.401963461 GHz	37.4375	13.4376
2.403926921 GHz	37.4330	13.4534
2.405890382 GHz	37.4326	13.4606
2.407853843 GHz	37.4330	13.4618
2.409817303 GHz	37.4345	13.4783
2.411788795 GHz	37.4296	13.4728
2.413760288 GHz	37.4380	13.4839
2.415731780 GHz	37.4221	13.4816
2.417703272 GHz	37.4239	13.4844
2.419674764 GHz	37.4336	13.4836
2.421654321 GHz	37.4378	13.4791
2.423633878 GHz	37.4379	13.4831
2.425613435 GHz	37.4417	13.4815
2.427592991 GHz	37.4363	13.4819
2.429572548 GHz	37.4375	13.4906
2.431560202 GHz	37.4318	13.4803
2.433547856 GHz	37.4588	13.4738
2.435535511 GHz	37.4504	13.4738
2.437523165 GHz	37.4428	13.4678
2.439510819 GHz	37.4371	13.4711
2.441506604 GHz	37.4552	13.4635
2.443502388 GHz	37.4571	13.4526
2.445498173 GHz	37.4472	13.4404
2.447493958 GHz	37.4301	13.4394
2.449489743 GHz	37.4248	13.4396
2.451493691 GHz	37.4124	13.4511
2.453497640 GHz	37.4223	13.4500
2.455501589 GHz	37.4085	13.4464
2.457505537 GHz	37.4020	13.4315
2.459509486 GHz	37.3897	13.4429
2.461521632 GHz	37.3740	13.4301
2.463533778 GHz	37.3676	13.4422
2.465545923 GHz	37.3410	13.4491
2.467558069 GHz	37.3418	13.4499
2.469570215 GHz	37.3309	13.4495
2.471590592 GHz	37.3043	13.4564
2.473610968 GHz	37.2981	13.4683
2.475631345 GHz	37.2801	13.4791
2.477651722 GHz	37.2622	13.4898
2.479672098 GHz	37.2384	13.4999
2.481700739 GHz	37.2141	13.5158
2.483729380 GHz	37.1983	13.5356
2.485758021 GHz	37.1759	13.5339
2.487786662 GHz	37.1591	13.5491
2.489815303 GHz	37.1477	13.5708
2.491852243 GHz	37.1239	13.5838
2.493889182 GHz	37.0974	13.5935
2.495926121 GHz	37.0763	13.6097
2.497963061 GHz	37.0602	13.6352
2.500000000 GHz	37.0537	13.6529

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- 2450MHz Body Tissue

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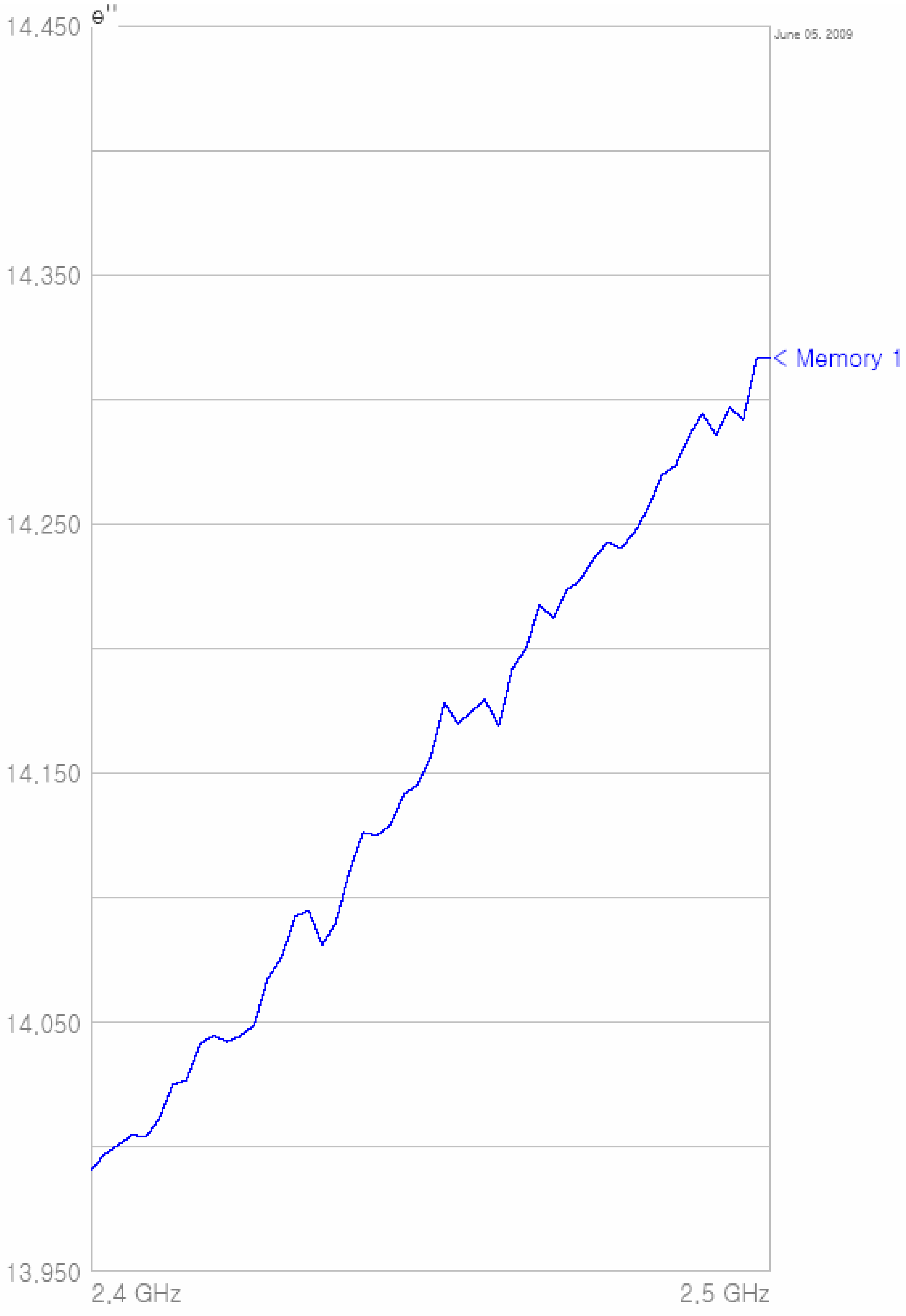

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FAX: 82-2-867-3204

SubTitle
June 05, 2009

Frequency	e'	e''
2.400000000 GHz	52.1859	13.9910
2.401963461 GHz	52.1987	13.9971
2.403926921 GHz	52.1862	14.0010
2.405890382 GHz	52.1739	14.0049
2.407853843 GHz	52.1444	14.0040
2.409817303 GHz	52.1441	14.0114
2.411788795 GHz	52.1330	14.0251
2.413760288 GHz	52.1255	14.0268
2.415731780 GHz	52.1196	14.0415
2.417703272 GHz	52.1107	14.0449
2.419674764 GHz	52.1095	14.0424
2.421654321 GHz	52.0956	14.0447
2.423633878 GHz	52.0770	14.0492
2.425613435 GHz	52.0651	14.0678
2.427592991 GHz	52.0703	14.0761
2.429572548 GHz	52.0632	14.0925
2.431560202 GHz	52.0611	14.0950
2.433547856 GHz	52.0306	14.0811
2.435535511 GHz	52.0295	14.0900
2.437523165 GHz	52.0131	14.1108
2.439510819 GHz	52.0128	14.1262
2.441506604 GHz	52.0137	14.1250
2.443502388 GHz	51.9989	14.1290
2.445498173 GHz	51.9950	14.1415
2.447493958 GHz	51.9802	14.1455
2.449489743 GHz	51.9597	14.1567
2.451493691 GHz	51.9604	14.1785
2.453497640 GHz	51.9672	14.1699
2.455501589 GHz	51.9693	14.1750
2.457505537 GHz	51.9482	14.1797
2.459509486 GHz	51.9449	14.1689
2.461521632 GHz	51.9329	14.1922
2.463533778 GHz	51.9387	14.2001
2.465545923 GHz	51.9194	14.2177
2.467558069 GHz	51.9235	14.2125
2.469570215 GHz	51.9035	14.2236
2.471590592 GHz	51.9123	14.2277
2.473610968 GHz	51.9118	14.2363
2.475631345 GHz	51.9012	14.2428
2.477651722 GHz	51.9092	14.2404
2.479672098 GHz	51.8987	14.2469
2.481700739 GHz	51.8886	14.2566
2.483729380 GHz	51.8790	14.2696
2.485758021 GHz	51.8764	14.2734
2.487786662 GHz	51.8733	14.2854
2.489815303 GHz	51.8551	14.2946
2.491852243 GHz	51.8592	14.2859
2.493889182 GHz	51.8627	14.2970
2.495926121 GHz	51.8378	14.2922
2.497963061 GHz	51.8367	14.3170
2.500000000 GHz	51.8256	14.3169

APPENDIX B : Validation Test Data

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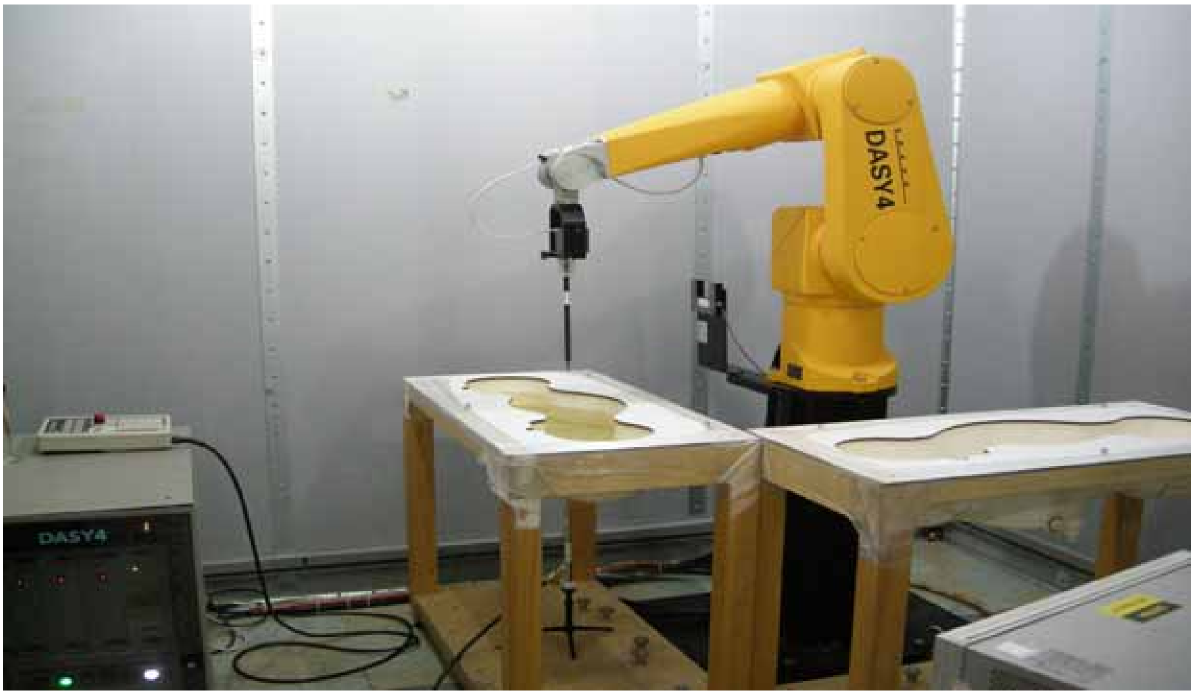
Dipole Validation



Liquid depth

- 2450MHz Validation

Date: 2009-06-05

Test Laboratory: ESTECH

validation

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:xxx

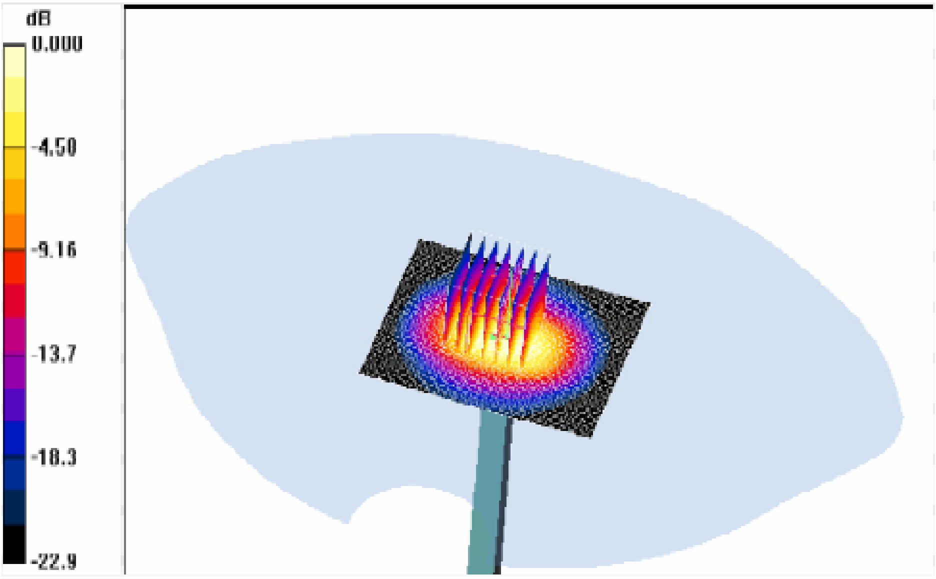
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.83 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.44, 4.44, 4.44); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22 ℃, Humidity : 48%

Area Scan (51x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 17.6 mW/g

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.6 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 27.6 W/kg
SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.03 mW/g
Maximum value of SAR (measured) = 15.1 mW/g



0 dB = 15.1mW/g

APPENDIX C : SAR Test Data

- 2450MHz 802.11b Battery : Standard

Date: 2009-06-05

Test Laboratory: ESTECH

BODY FRONT 11b

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

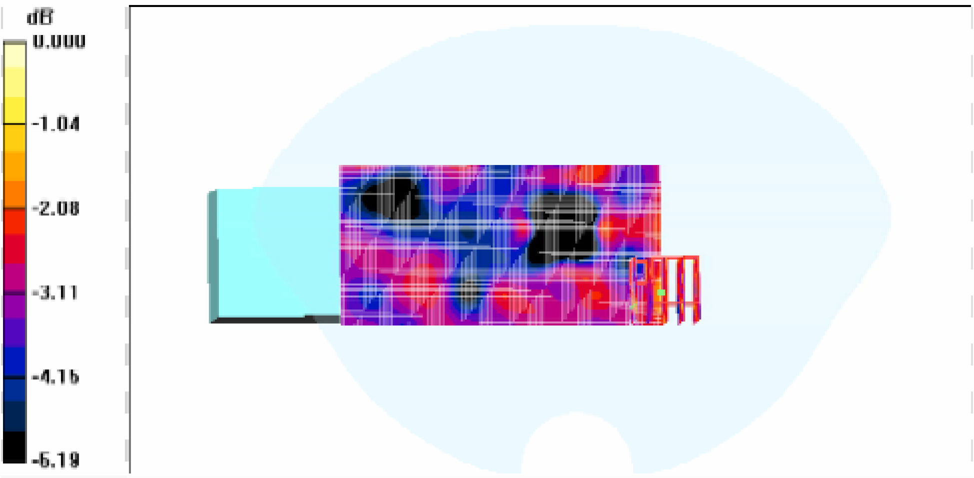
Communication System: Wirless; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.91 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.001 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 0.647 V/m; Power Drift = 0.790 dB
Peak SAR (extrapolated) = 0.002 W/kg
SAR(1 g) = 0.00128 mW/g; SAR(10 g) = 0.00112 mW/g
Maximum value of SAR (measured) = 0.002 mW/g



0 dB = 0.002mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

BODY REAR 11b

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

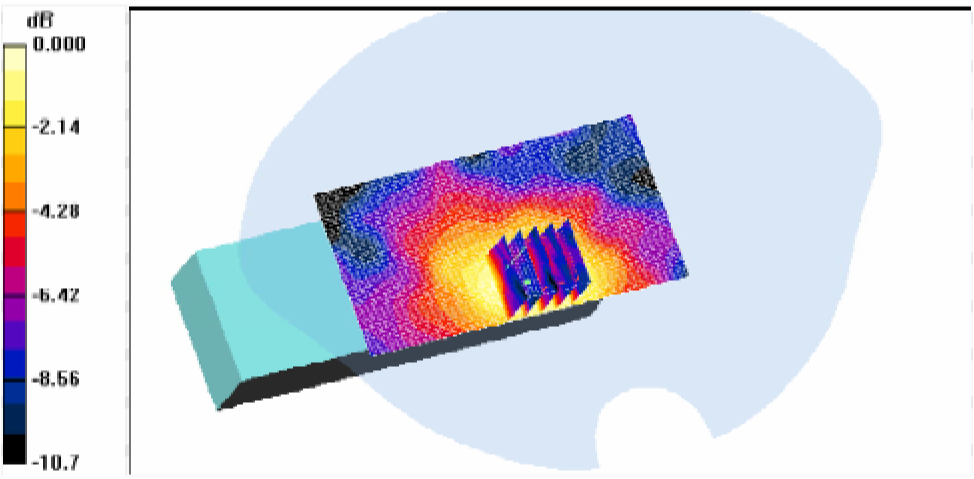
Communication System: Wirless; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.91 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22 ℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.007 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 1.10 V/m; Power Drift = 0.401 dB
Peak SAR (extrapolated) = 0.018 W/kg
SAR(1 g) = 0.00691 mW/g; SAR(10 g) = 0.00404 mW/g
Maximum value of SAR (measured) = 0.007 mW/g



0 dB = 0.007mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

BODY REAR 11b LOW

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

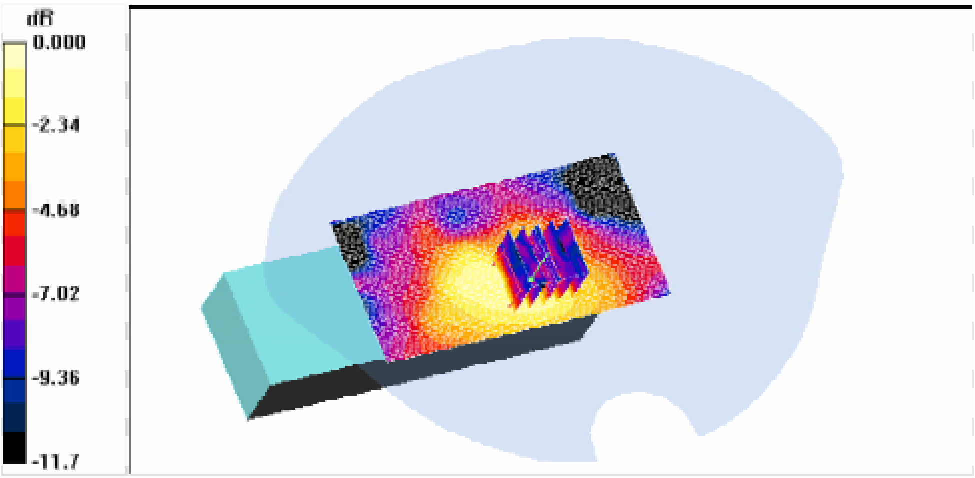
Communication System: Wirless; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.88 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22 ℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.006 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 1.15 V/m; Power Drift = -0.339 dB
Peak SAR (extrapolated) = 0.012 W/kg
SAR(1 g) = 0.00525 mW/g; SAR(10 g) = 0.0031 mW/g
Maximum value of SAR (measured) = 0.006 mW/g



0 dB = 0.006mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

BODY REAR 11b HI

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

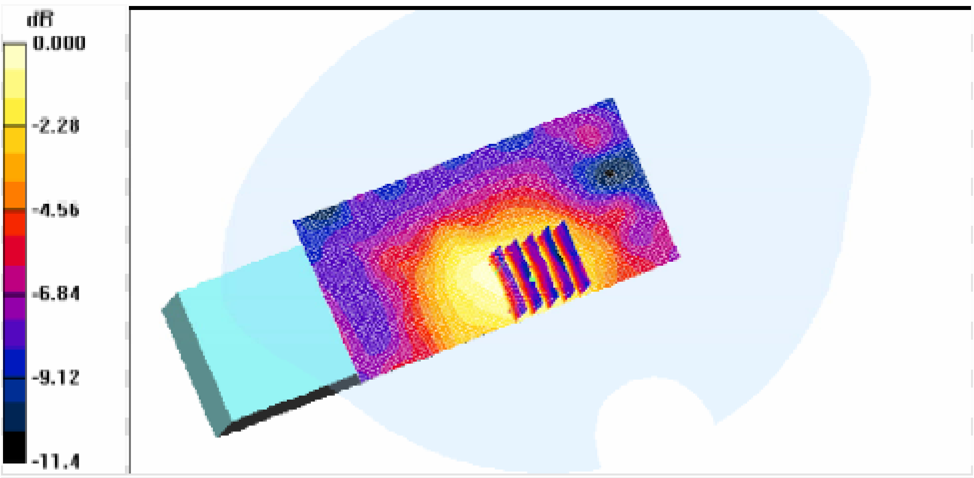
Communication System: Wirless; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; σ = 1.94 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.007 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 1.15 V/m; Power Drift = 0.265 dB
Peak SAR (extrapolated) = 0.018 W/kg
SAR(1 g) = 0.00682 mW/g; SAR(10 g) = 0.004 mW/g
Maximum value of SAR (measured) = 0.007 mW/g



0 dB = 0.007mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

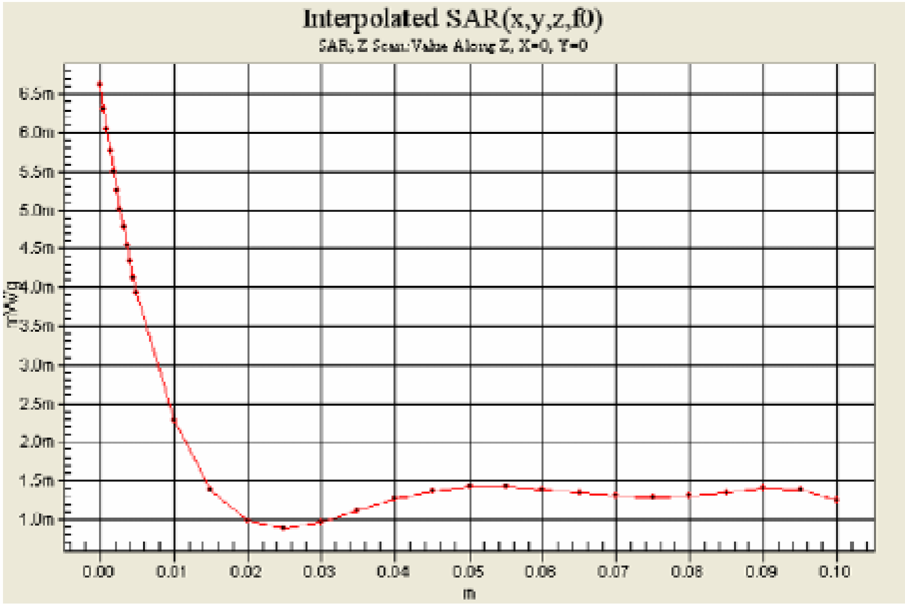
BODY REAR 11b

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

Communication System: Wirless; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.91 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%



- 2450MHz 802.11g

Date: 2009-06-05

Test Laboratory: ESTECH

BODY FRONT 11g

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

Communication System: Wirless; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.91 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

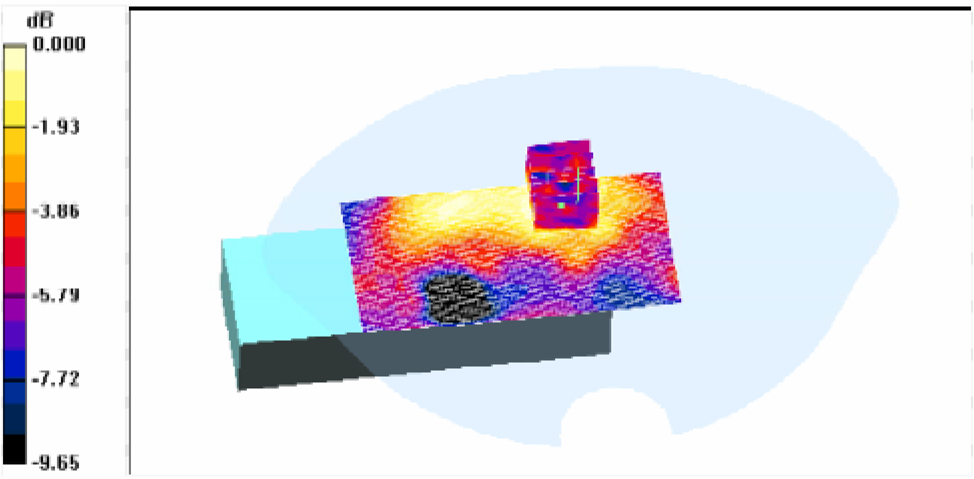
DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22 ℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.004 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 0.875 V/m; Power Drift = 0.409 dB
Peak SAR (extrapolated) = 0.007 W/kg
SAR(1 g) = 0.00405 mW/g; SAR(10 g) = 0.00257 mW/g

Maximum value of SAR (measured) = 0.004 mW/g



0 dB = 0.004mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

BODY REAR 11g

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

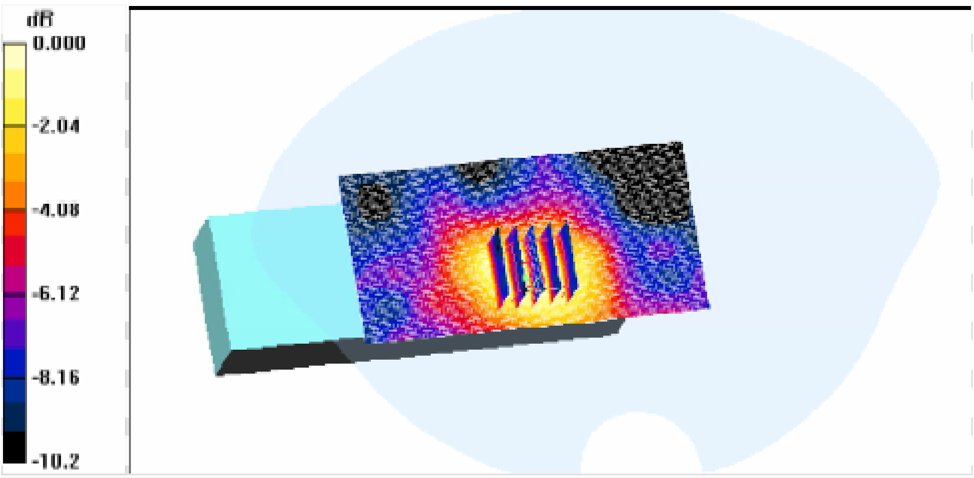
Communication System: Wirless; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.91 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22 ℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.007 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 1.02 V/m; Power Drift = 0.160 dB
Peak SAR (extrapolated) = 0.016 W/kg
SAR(1 g) = 0.00662 mW/g; SAR(10 g) = 0.00394 mW/g
Maximum value of SAR (measured) = 0.007 mW/g



0 dB = 0.007mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

BODY REAR 11g LOW

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

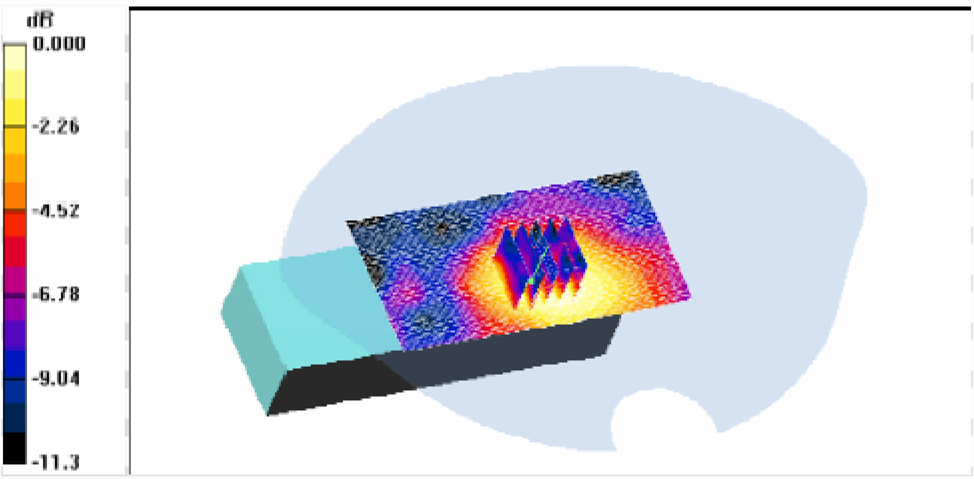
Communication System: Wirless; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.88 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.008 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 1.59 V/m; Power Drift = 0.290 dB
Peak SAR (extrapolated) = 0.013 W/kg
SAR(1 g) = 0.00744 mW/g; SAR(10 g) = 0.00445 mW/g
Maximum value of SAR (measured) = 0.008 mW/g



0 dB = 0.008mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

BODY REAR 11g HI

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

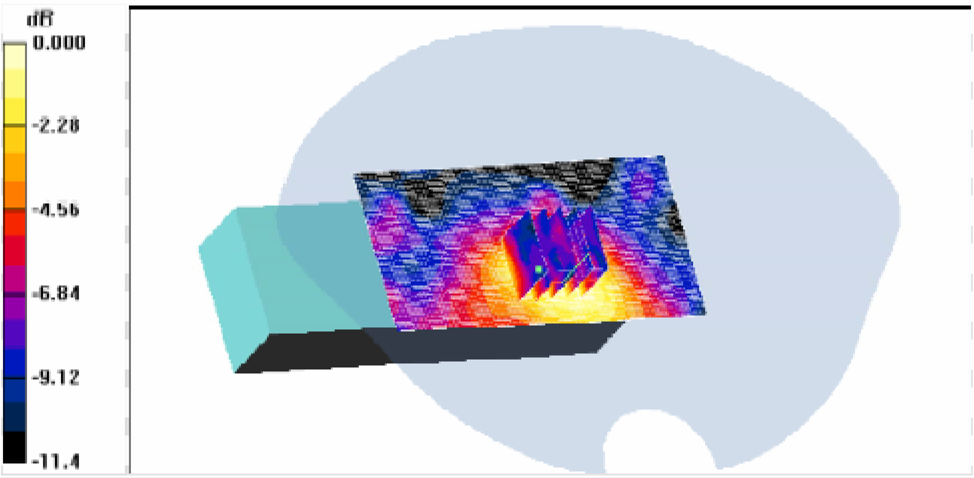
Communication System: Wirless; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; σ = 1.94 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22 ℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.008 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 1.15 V/m; Power Drift = 0.267 dB
Peak SAR (extrapolated) = 0.015 W/kg
SAR(1 g) = 0.00764 mW/g; SAR(10 g) = 0.00439 mW/g
Maximum value of SAR (measured) = 0.008 mW/g



0 dB = 0.008mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

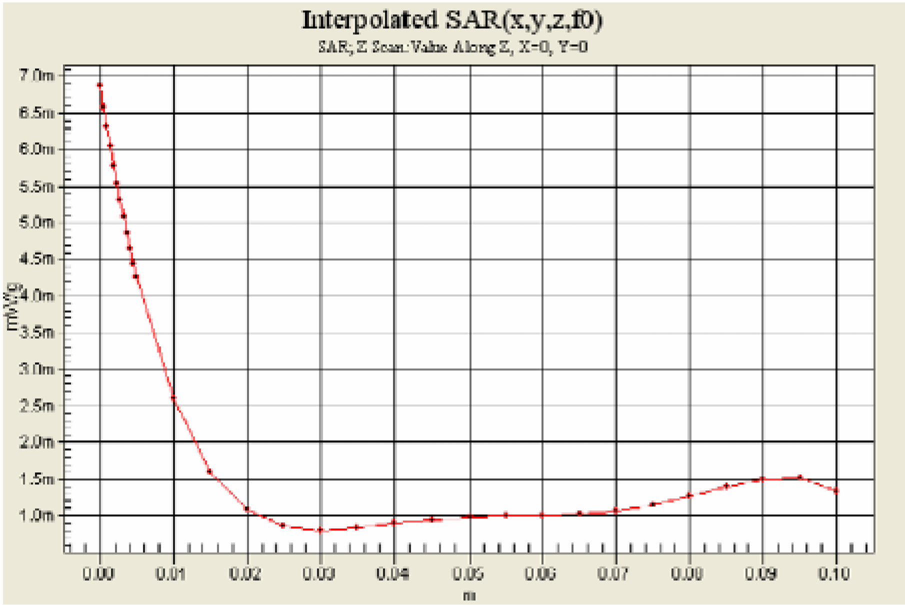
BODY REAR 11g HI

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

Communication System: Wirless; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; σ = 1.94 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186



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- 2450MHz 802.11b Battery : Extended

Date: 2009-06-05

Test Laboratory: ESTECH

BODY FRONT 11b

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

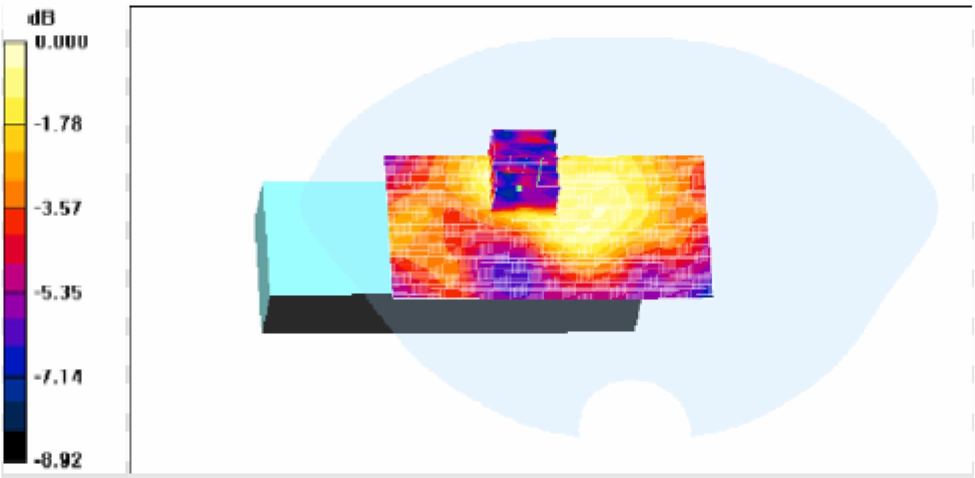
Communication System: Wirless; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.91 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.006 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 1.48 V/m; Power Drift = 0.357 dB
Peak SAR (extrapolated) = 0.009 W/kg
SAR(1 g) = 0.00539 mW/g; SAR(10 g) = 0.00362 mW/g
Maximum value of SAR (measured) = 0.006 mW/g



0 dB = 0.006mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

BODY REAR 11b

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

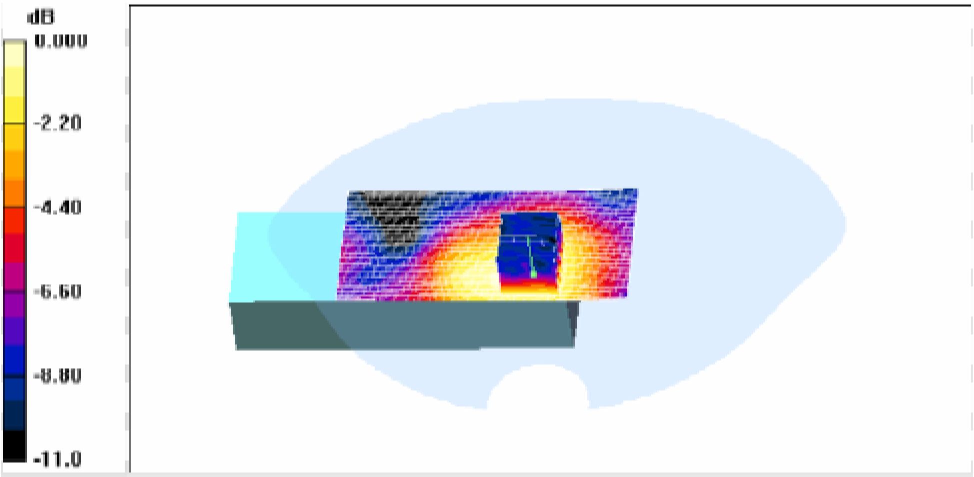
Communication System: Wirless; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.91 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.013 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 2.27 V/m; Power Drift = 0.215 dB
Peak SAR (extrapolated) = 0.023 W/kg
SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00748 mW/g
Maximum value of SAR (measured) = 0.013 mW/g



0 dB = 0.013mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

BODY REAR 11b-LOW

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

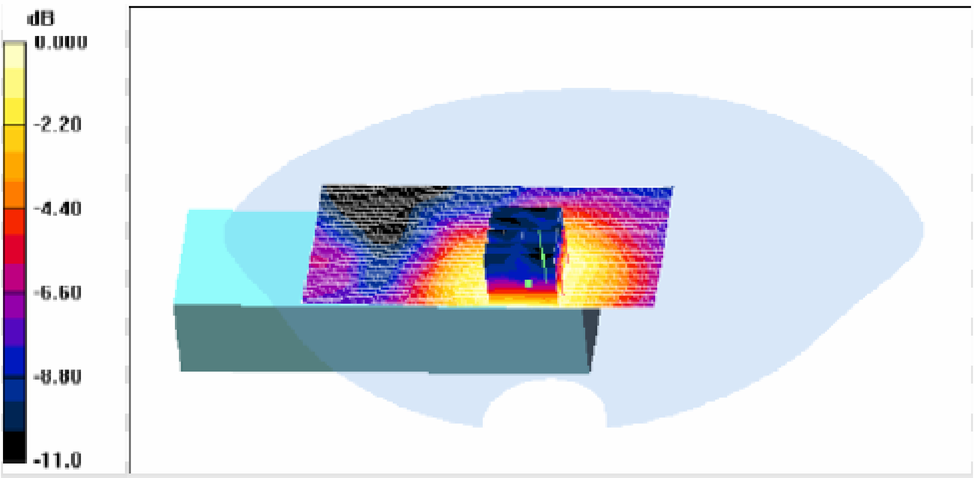
Communication System: Wirless; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.88 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.015 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 2.43 V/m; Power Drift = 0.309 dB
Peak SAR (extrapolated) = 0.025 W/kg
SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00844 mW/g
Maximum value of SAR (measured) = 0.015 mW/g



0 dB = 0.015mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

BODY REAR 11b-HI

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

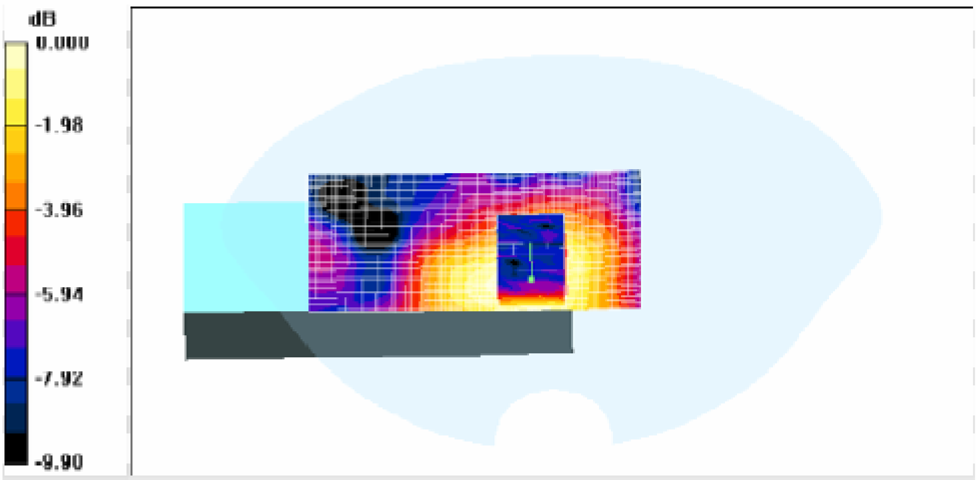
Communication System: Wirless; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; σ = 1.94 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.009 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 1.98 V/m; Power Drift = 0.009 dB
Peak SAR (extrapolated) = 0.016 W/kg
SAR(1 g) = 0.00888 mW/g; SAR(10 g) = 0.00538 mW/g
Maximum value of SAR (measured) = 0.009 mW/g



0 dB = 0.009mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

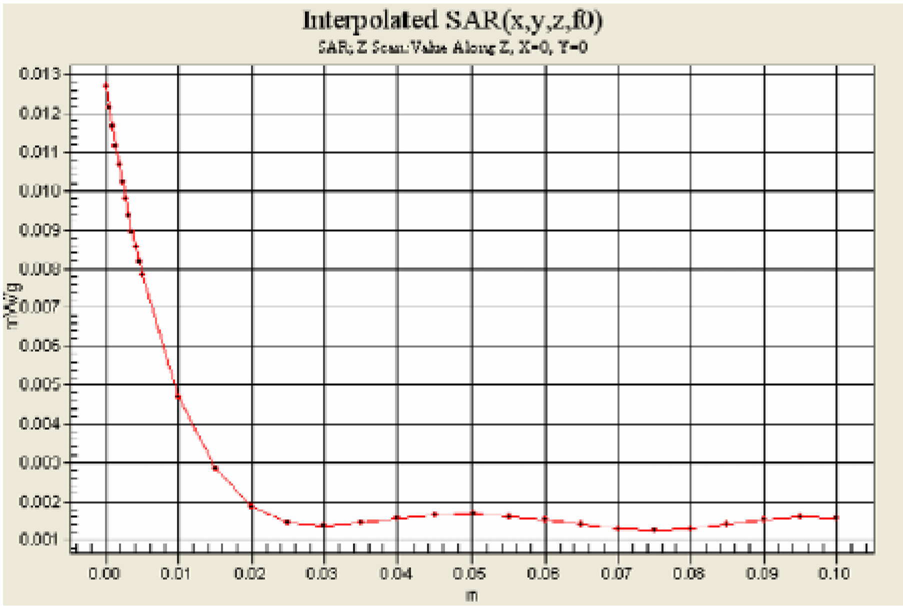
BODY REAR 11b-LOW

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

Communication System: Wirless; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.88 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%



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- 2450MHz 802.11g

Date: 2009-06-05

Test Laboratory: ESTECH

BODY FRONT 11g

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

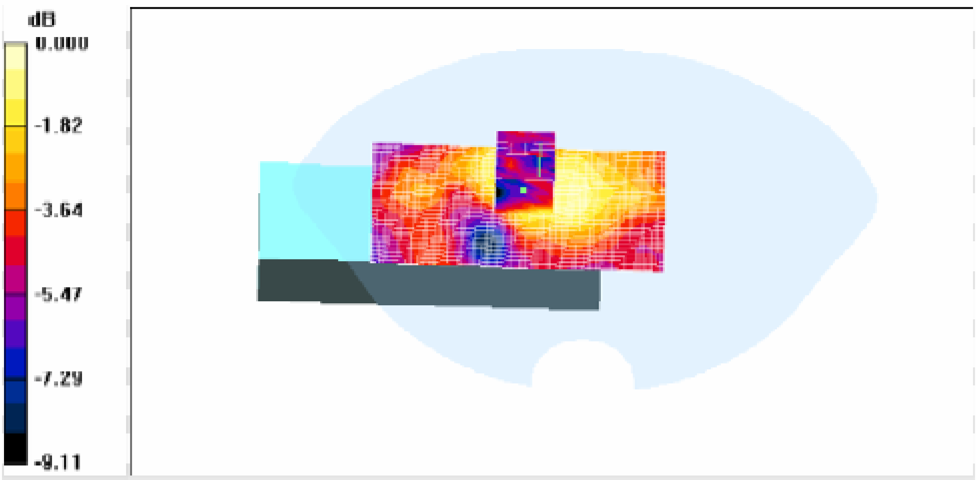
Communication System: Wirless; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.91 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.004 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 1.44 V/m; Power Drift = 0.241 dB
Peak SAR (extrapolated) = 0.010 W/kg
SAR(1 g) = 0.0045 mW/g; SAR(10 g) = 0.00305 mW/g
Maximum value of SAR (measured) = 0.005 mW/g



0 dB = 0.005mW/g

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Test Laboratory: ESTECH

BODY REAR 11g

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

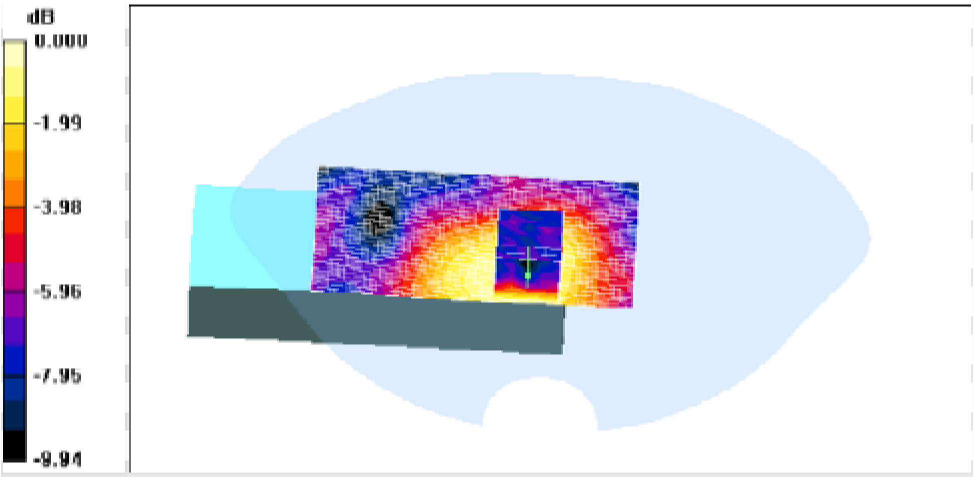
Communication System: Wirless; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.91 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.010 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 2.11 V/m; Power Drift = -0.074 dB
Peak SAR (extrapolated) = 0.019 W/kg
SAR(1 g) = 0.00947 mW/g; SAR(10 g) = 0.00585 mW/g
Maximum value of SAR (measured) = 0.010 mW/g



0 dB = 0.010mW/g

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Date: 2009-06-05

Test Laboratory: ESTECH

BODY REAR 11g-LOW

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

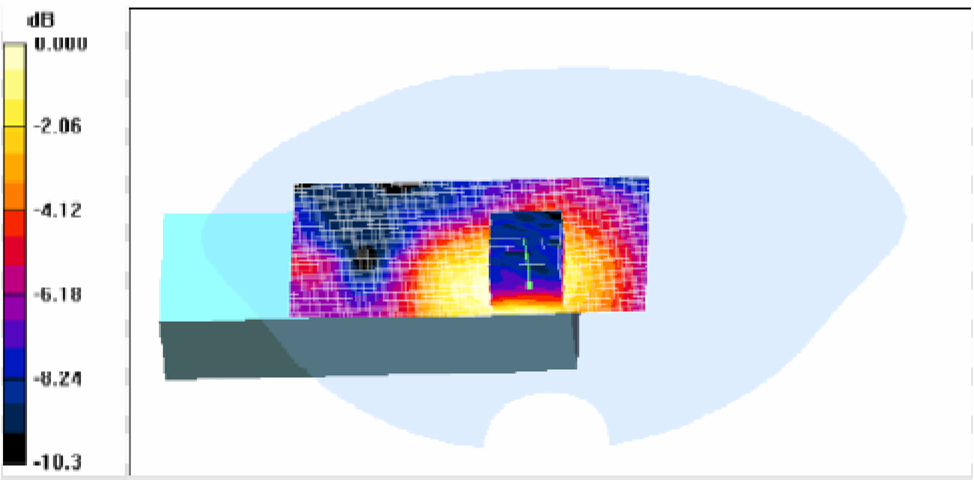
Communication System: Wirless; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.88 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.012 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 2.26 V/m; Power Drift = -0.089 dB
Peak SAR (extrapolated) = 0.022 W/kg
SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.00693 mW/g
Maximum value of SAR (measured) = 0.012 mW/g



0 dB = 0.012mW/g

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

Date: 2009-06-05

Test Laboratory: ESTECH

BODY REAR 11g-HI

DUT: PM250; Type: BAR TYPE; Serial: XXXX

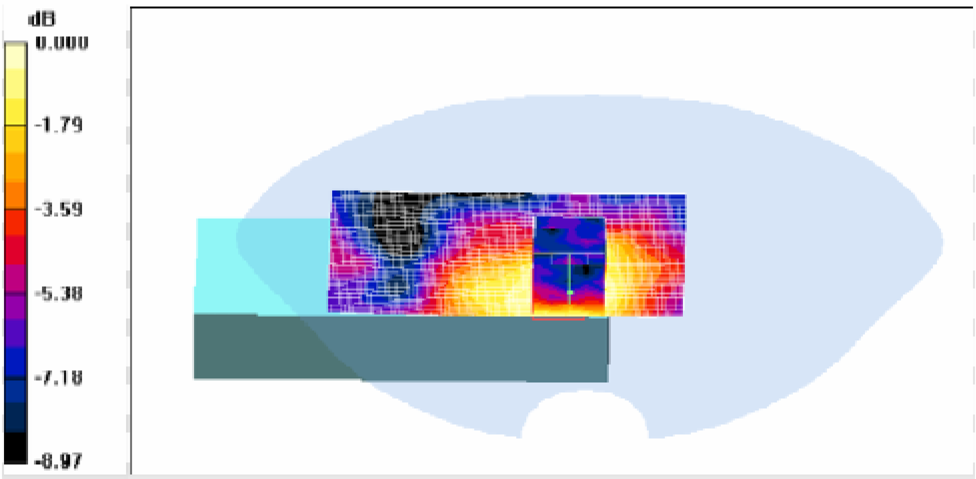
Communication System: Wirless; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; σ = 1.94 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%

Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.007 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 1.71 V/m; Power Drift = 0.165 dB
Peak SAR (extrapolated) = 0.022 W/kg
SAR(1 g) = 0.00691 mW/g; SAR(10 g) = 0.0044 mW/g
Maximum value of SAR (measured) = 0.007 mW/g



0 dB = 0.007mW/g

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

Date: 2009-06-05

Test Laboratory: ESTECH

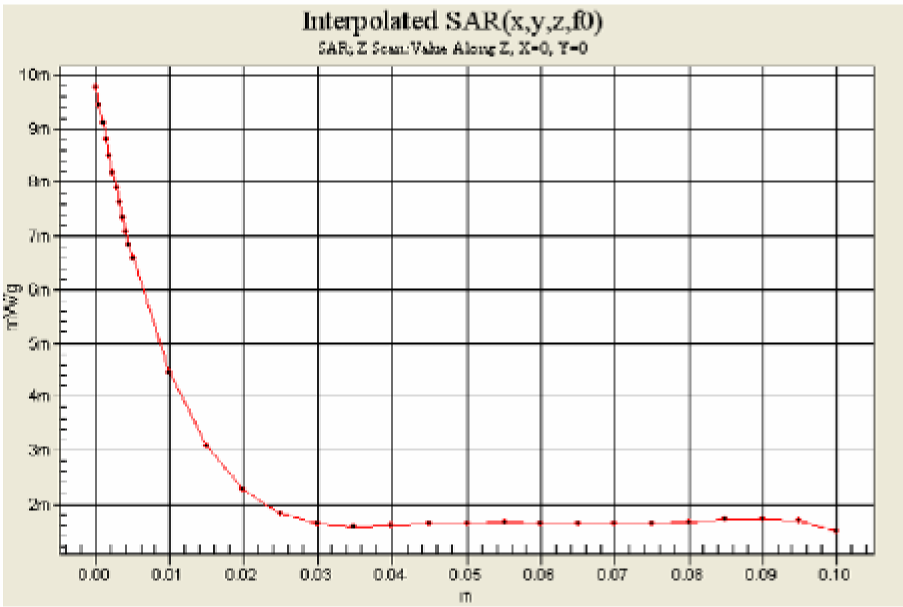
BODY REAR 11g-LOW

DUT: PM250 ; Type: BAR TYPE; Serial: XXXX

Communication System: Wirless; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.88 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3123; ConvF(4.16, 4.16, 4.16); Calibrated: 2009-01-20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn551; Calibrated: 2009-04-28
- Phantom: SAM 1800; Type: SAM; Serial: TP 1263
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
- Temperature : 22℃, Humidity : 48%



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

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 Accreditation Service (SAS)
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: ES3-3123_Jan09

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3123
Calibration procedure(s)	QA CAL-01.v6 and QA CAL-23.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	January 20, 2009
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 (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

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

Issued: January 20, 2009

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

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 ES3DV3

SN:3123

Manufactured:	July 11, 2006
Last calibrated:	December 18, 2007
Recalibrated:	January 20, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3123

Sensitivity in Free Space[A]

NormX	**1.36** ± 10.1%	$\mu V/(V/m)^2$
NormY	**1.35** ± 10.1%	$\mu V/(V/m)^2$
NormZ	**1.11** ± 10.1%	$\mu V/(V/m)^2$

Diode Compression[B]

DCP X	**92** mV
DCP Y	**93** mV
DCP Z	**93** 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		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	9.5	5.6
SAR_{be} [%]	With Correction Algorithm	0.8	0.6

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	11.1	7.1
SAR_{be} [%]	With Correction Algorithm	0.9	0.6

Sensor Offset

Probe Tip to Sensor Center **2.0** mm

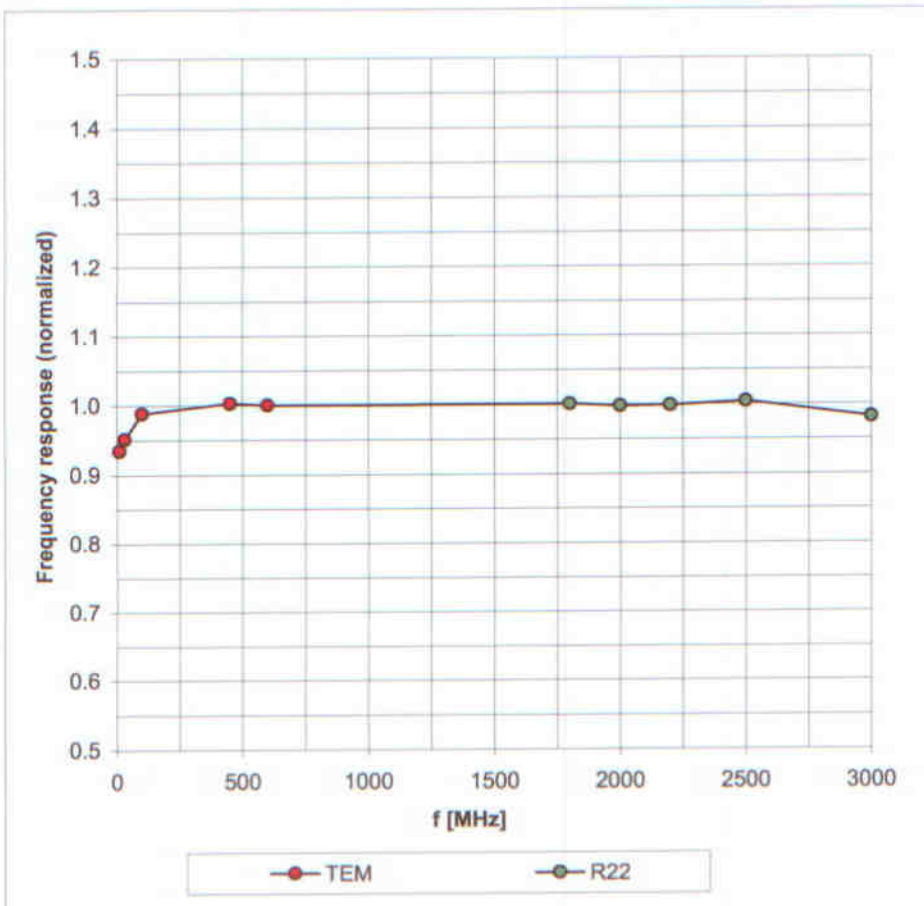
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[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.

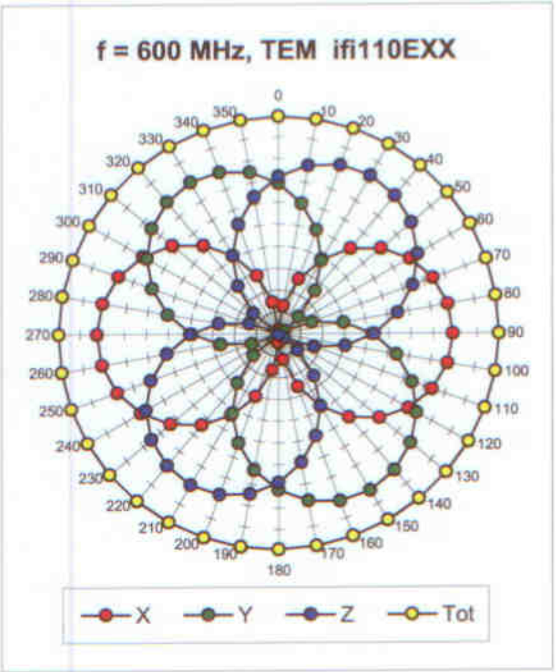
Frequency Response of E-Field

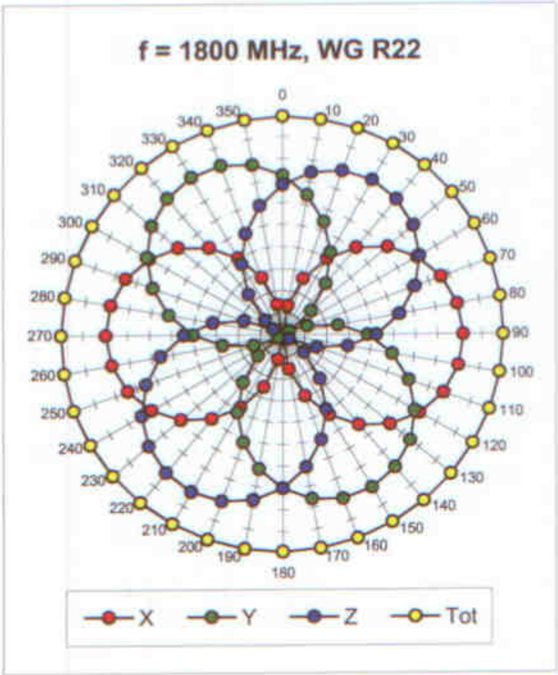
(TEM-Cell:ifi110 EXX, Waveguide: R22)

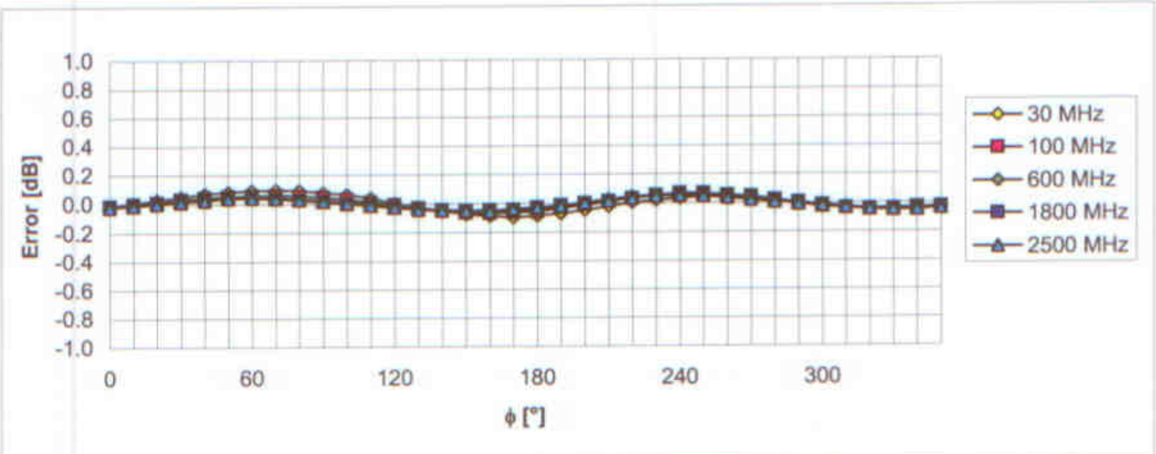


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), $\vartheta = 0°$



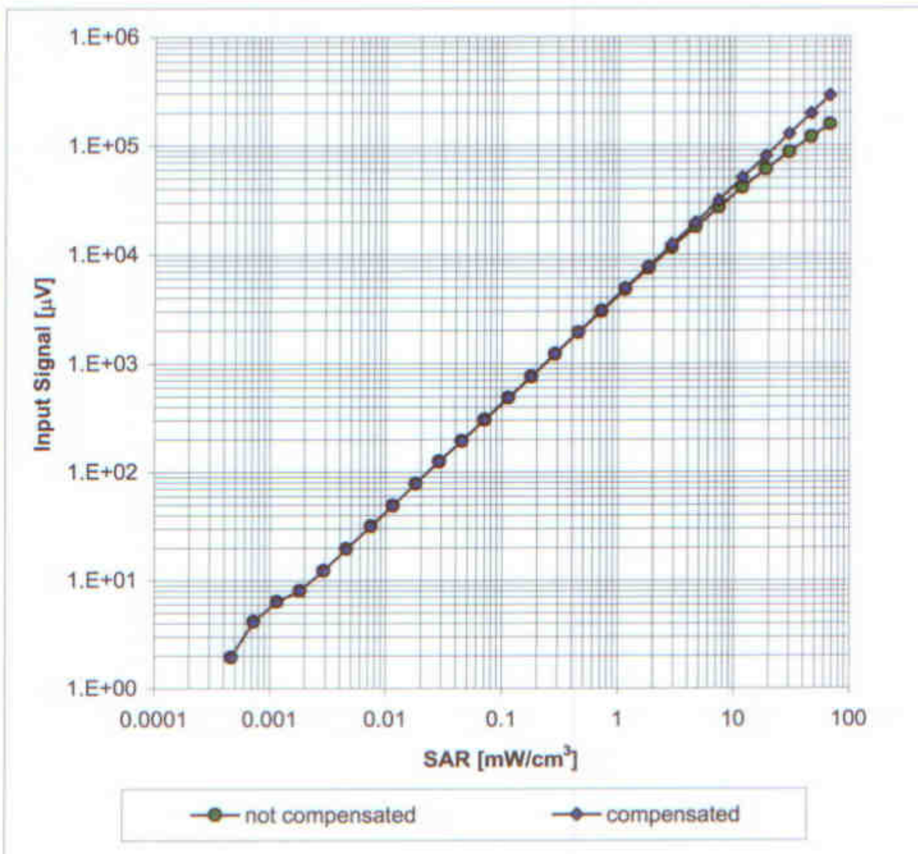


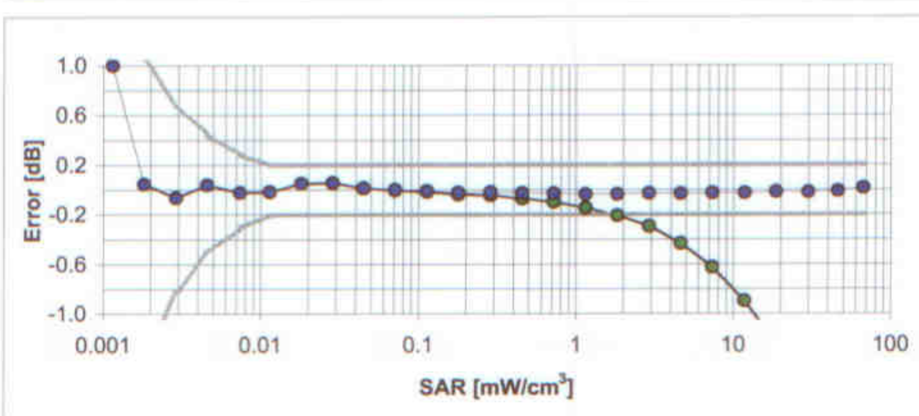


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

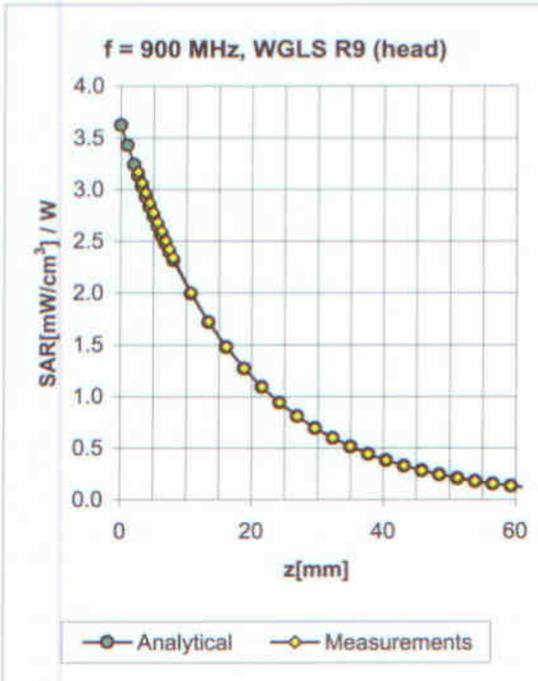
(Waveguide R22, f = 1800 MHz)

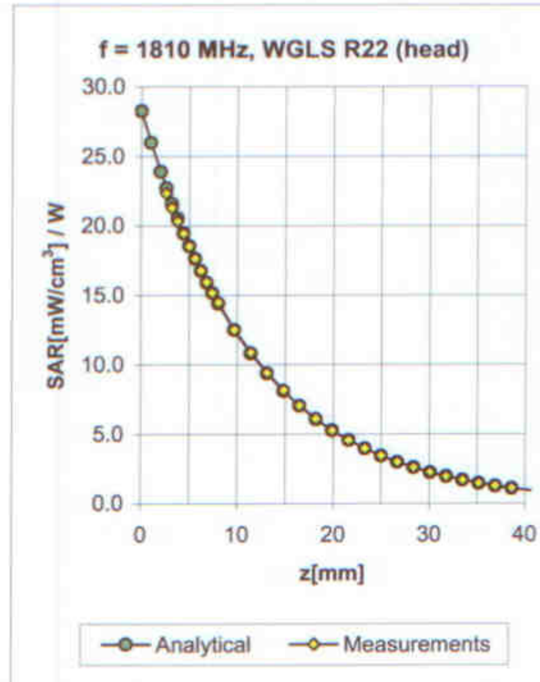




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



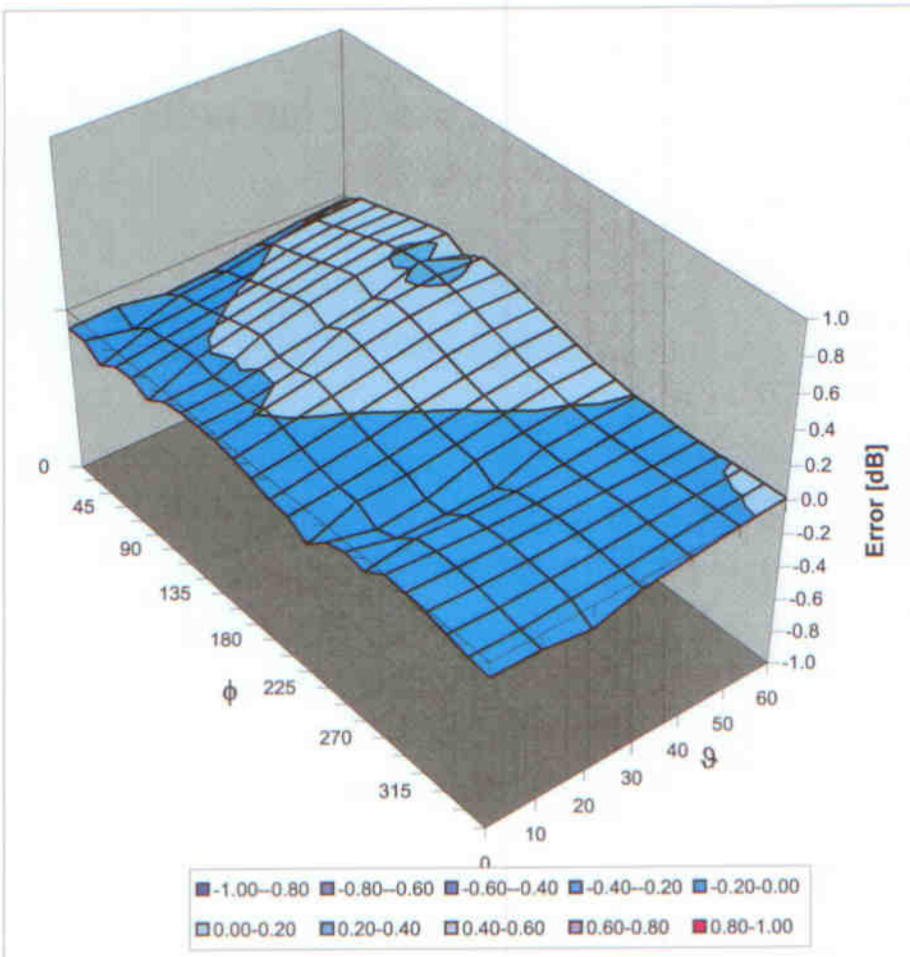


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.93	1.04	5.87	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.45	1.61	4.92	± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.46	1.59	4.84	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.37	1.83	4.44	± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.80	1.19	5.84	± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.42	1.68	4.81	± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.24	2.33	4.66	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.55	1.38	4.16	± 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)

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

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

Accredited by the Swiss Accreditation Service (SAS)
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: **D2450V2-741_Feb09**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 741
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	February 17, 2009
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 (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: S5086 (20g)	01-Jul-08 (No. 217-00864)	Jul-09
Type-N mismatch combination	SN: 5047.2 / 06327	01-Jul-08 (No. 217-00867)	Jul-09
Reference Probe ES3DV2	SN: 3025	28-Apr-08 (No. ES3-3025_Apr08)	Apr-09
DAE4	SN: 601	14-Mar-08 (No. DAE4-601_Mar08)	Mar-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 19, 2009

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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
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) DASY4/5 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	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.0 ± 6 %	1.82 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 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	13.1 mW / g
SAR normalized	normalized to 1W	52.4 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**51.7 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.07 mW / g
SAR normalized	normalized to 1W	24.3 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**24.1 mW /g ± 16.5 % (k=2)**

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

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.9 Ω + 3.6 jΩ
Return Loss	- 24.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.158 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	December 01, 2003

DASY5 Validation Report for Head TSL

Date/Time: 17.02.2009 10:37:08

Test Laboratory: SPEAG, Zurich, Switzerland

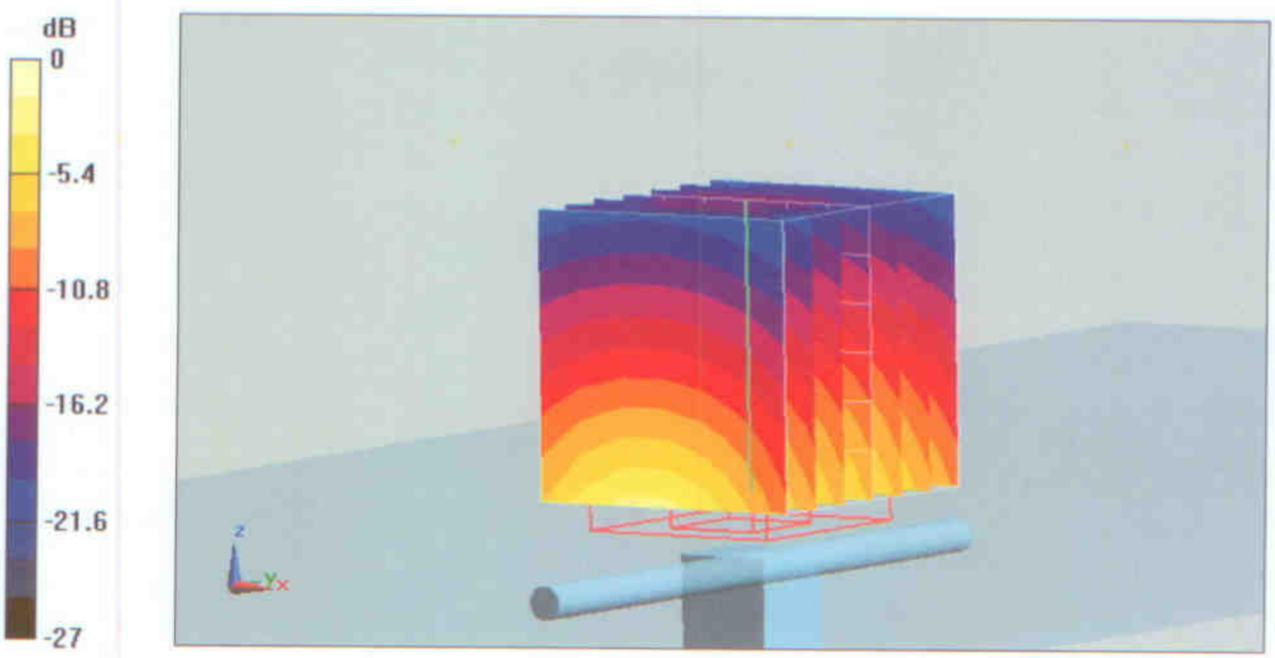
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN741

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL U10 BB
Medium parameters used: f = 2450 MHz; σ = 1.82 mho/m; ε_r = 38; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

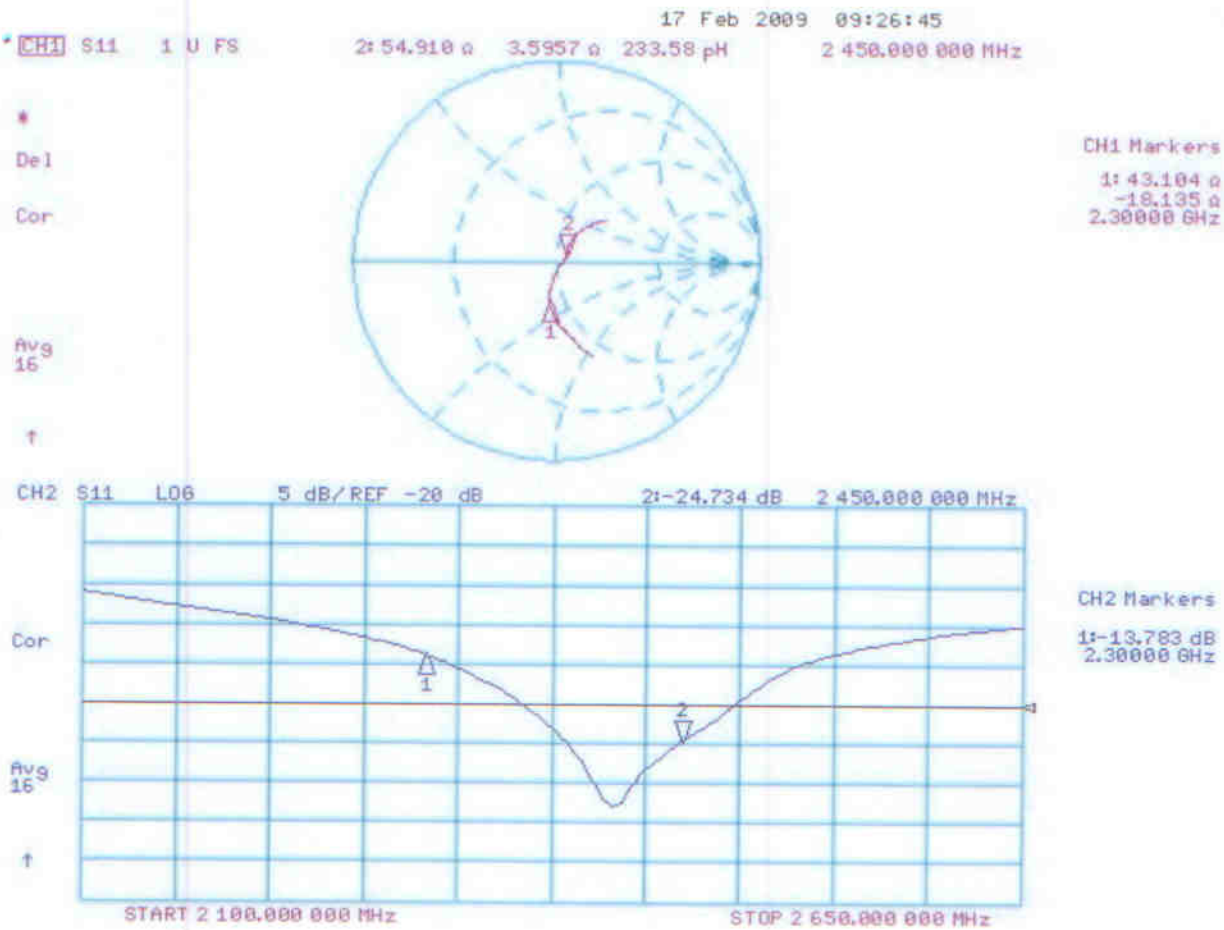
- Probe: ES3DV2 - SN3025; ConvF(4.4, 4.4, 4.4); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.3 V/m; Power Drift = -0.00454 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.07 mW/g
Maximum value of SAR (measured) = 15.8 mW/g



0 dB = 15.8mW/g

Impedance Measurement Plot for Head TSL



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

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

Accredited by the Swiss Accreditation Service (SAS)
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: **DAE4-551_Apr09**

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 551
Calibration procedure(s)	QA CAL-06.v12 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	April 28, 2009
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 (Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	30-Sep-08 (No: 7673)	Sep-09
Keithley Multimeter Type 2001	SN: 0810278	30-Sep-08 (No: 7670)	Sep-09
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	06-Jun-08 (in house check)	In house check: Jun-09

	Name	Function	Signature
Calibrated by:	Andrea Guntli	Technician	[signature]
Approved by:	Fin Bomholt	R&D Director	i.V. [signature]

Issued: April 28, 2009

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	403.998 ± 0.1% (k=2)	404.263 ± 0.1% (k=2)	403.969 ± 0.1% (k=2)
Low Range	3.97341 ± 0.7% (k=2)	3.94946 ± 0.7% (k=2)	3.91775 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	139 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Input (µV)	Reading (µV)	Error (%)
Channel X	+ Input	200000	200000.4	0.00
Channel X	+ Input	20000	20006.78	0.03
Channel X	- Input	20000	-19998.97	-0.01
Channel Y	+ Input	200000	199999.8	0.00
Channel Y	+ Input	20000	20002.88	0.01
Channel Y	- Input	20000	-20002.48	0.01
Channel Z	+ Input	200000	199999.7	0.00
Channel Z	+ Input	20000	19999.66	0.00
Channel Z	- Input	20000	-20004.57	0.02

Low Range		Input (µV)	Reading (µV)	Error (%)
Channel X	+ Input	2000	1999.9	0.00
Channel X	+ Input	200	200.17	0.08
Channel X	- Input	200	-199.69	-0.16
Channel Y	+ Input	2000	2000.1	0.00
Channel Y	+ Input	200	199.53	-0.24
Channel Y	- Input	200	-200.47	0.23
Channel Z	+ Input	2000	1999.9	0.00
Channel Z	+ Input	200	199.43	-0.28
Channel Z	- Input	200	-200.90	0.45

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	3.85	3.16
	- 200	-2.00	-3.11
Channel Y	200	-1.29	-1.09
	- 200	0.16	0.16
Channel Z	200	9.46	9.24
	- 200	-11.38	-11.43

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	-	1.86	-0.08
Channel Y	200	1.66	-	4.58
Channel Z	200	-1.36	0.54	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15900	15026
Channel Y	16697	15562
Channel Z	16542	15582

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.65	-0.21	1.67	0.25
Channel Y	-1.02	-1.68	-0.60	0.22
Channel Z	-0.27	-0.93	0.28	0.23

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2002	200.0
Channel Y	0.2000	202.6
Channel Z	0.2001	201.8

8. Low Battery Alarm Voltage (verified during pre test)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	-0.01	-8	-9

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APPENDIX E : Test Setup Photo

BODY LCD UP-Distance 15 mm

BODY LCD DOWN-Distance 15 mm