



# SAR TEST REPORT

HCT CO., LTD

EUT Type:	Industrial PDA		
FCC ID:	YY3-NAUTIZX3		
Model:	NAUTIZ X3	Trade Name	HANDHELD GROUP AB
Date of Issue:	Dec. 15, 2010		
Test report No.:	HCTA1012FS04		
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Testing has been carried out in accordance with:	47CFR §2.1093 FCC OET Bulletin 65(Edition 97-01), Supplement C (Edition 01-01) ANSI/ IEEE C95.1 – 1992 IEEE 1528-2003		
Test result:	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 except in full, without written approval of the laboratory.		
Signature	 Report prepared by : Young-Soo Jang Test Engineer of SAR Part		
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## Table of Contents

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1. INTRODUCTION .....	3
2. DESCRIPTION OF DEVICE.....	4
3. DESCRIPTION OF TEST EQUIPMENT .....	5
4. SAR MEASUREMENT PROCEDURE .....	1 2
5. DESCRIPTION OF TEST POSITION.....	1 3
6. MEASUREMENT UNCERTAINTY .....	1 5
7. ANSI/ IEEE C95.1 - 1992 RF EXPOSURE LIMITS.....	1 6
8. SYSTEM VERIFICATION .....	1 7
9. TEST CONFIGURATIONS .....	2 0
10. RF CONDUCTED POWER .....	1 9
11. SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas .....	2 1
12. SAR TEST DATA SUMMARY.....	2 2
12.1 Measurement Results (GSM850 Head SAR Touch) .....	2 2
12.2 Measurement Results (GSM850 Head SAR Tilt).....	2 3
12.3 Measurement Results (GSM1900 Head SAR Touch) .....	2 4
12.4 Measurement Results (GSM1900 Head SAR Tilt) .....	2 5
12.5 Measurement Results (WCDMA850 Head SAR Touch).....	2 6
12.6 Measurement Results (WCDMA850 Head SAR Tilt) .....	2 7
12.7 Measurement Results (WCDMA1900 Head SAR Touch).....	2 8
12.8 Measurement Results (WCDMA1900 Head SAR Tilt).....	2 9
12.9 Measurement Results (GSM850 Body SAR).....	3 0
12.10 Measurement Results (GSM1900 Body SAR).....	3 1
12.11 Measurement Results (WCDMA850 Body SAR) .....	3 2
12.12 Measurement Results (WCDMA1900 Body SAR) .....	3 3
12.13 Measurement Results (802.11b/g Module Body SAR) .....	3 4
13. CONCLUSION .....	3 5
14. REFERENCES .....	3 6
Attachment 1. – SAR Test Plots.....	3 7
Attachment 2. – Dipole Validation Plots.....	8 3
Attachment 3. – Probe Calibration Data .....	1 0 1
Attachment 4. – Dipole Calibration Data .....	1 1 5

## 1. 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.

The safety limits used for the environmental evaluation measurements are based on the criteria published by the 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 Electromagnetic Fields, 3 kHz to 300 GHz. 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave 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 NCRP, 1986, Bethesda, MD 20814. 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 of the incremental electromagnetic energy ( $dW$ ) absorbed by (dissipated in) an incremental mass ( $dm$ ) contained in a volume element ( $dV$ ) of a given density ( $\rho$ ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body.

$$S A R = \frac{d}{d t} \left( \frac{d U}{d m} \right) = \frac{d}{d t} \left( \frac{d U}{\rho d v} \right)$$

**Figure 2. SAR Mathematical Equation**

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

$$S A R = \sigma E^2 / \rho$$

where:

$\sigma$  = conductivity of the tissue-simulant material (S/m)

$\rho$  = mass density of the tissue-simulant material (kg/m<sup>3</sup>)

$E$  = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.

## 2. DESCRIPTION OF DEVICE

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

EUT Type	Industrial PDA
FCC ID	YY3-NAUTIZX3
Model(s)	NAUTIZ X3
Trade Name	HANDHELD GROUP AB
Serial Number(s)	#1
Application Type	Certification
Modulation(s)	GSM850/GSM1900/WCDMA850/WCDMA1900/WLAN
Tx Frequency	824.20 - 848.80 MHz (GSM850) 1 850.20 – 1 909.80 MHz (GSM1900) 826.4~846.6 MHz (WCDMA850) 1 852.4 – 1 907.6 MHz (WCDMA1900) 2 412- 2 462 MHz (DSSS/ OFDM)
Rx Frequency	869.20 - 893.80 MHz (GSM850) 1 930.20 – 1 989.80 MHz (GSM1900) 871.4 - 891.6 MHz (WCDMA850) 1 932.4 – 1 987.6 MHz (WCDMA1900) 2 412- 2 462 MHz (DSSS/ OFDM)
FCC Classification	Licensed Portable Transmitter Held to Ear (PCE)
Production Unit or Identical Prototype	Prototype
Max SAR	0.155 W/kg GSM850 Head SAR / 0.181 W/kg GSM850 Body SAR 0.428 W/kg GSM1900 Head SAR / 0.222 W/kg GSM1900 Body SAR 0.377 W/kg WCDMA850 Head SAR / 0.257 W/kg WCDMA850 Body SAR 1.12 W/kg WCDMA1900 Head SAR / 0.457 W/kg WCDMA1900 Body SAR 0.026 W/kg Wi-Fi 802.11b
Date(s) of Tests	Dec. 13, 2010 ~ Dec. 14, 2010
Antenna Type	Intenna

### **3. DESCRIPTION OF TEST EQUIPMENT**

#### **3.1 SAR MEASUREMENT SETUP**

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic 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 Figure.3.1).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the HP Pentium IV 3.0 GHz computer with Windows XP system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. 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.

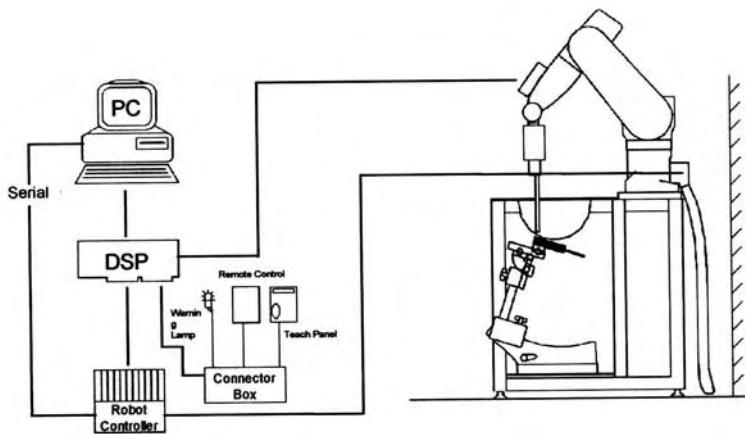


Figure 3.1 HCT SAR Lab. Test Measurement Set-up

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching 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.

## **3.2 DASY E-FIELD PROBE SYSTEM**

### **3.2.1 ET3DV6 Probe Specification**

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection System Built-in shielding against static charges
Calibration	In air from 10 MHz to 2.5 GHz In brain and muscle simulating tissue at Frequencies of 450 MHz, 900 MHz and 1.8 GHz (accuracy: 8 %)
Frequency	10 MHz to > 6 GHz; Linearity: $\pm 0.2$ dB (30 MHz to 3 GHz)
Directivity	$\pm 0.2$ dB in brain tissue (rotation around probe axis) $\pm 0.4$ dB in brain tissue (rotation normal probe axis)
Dynamic	5 $\mu\text{W/g}$ to > 100 mW/g;
Range Linearity:	$\pm 0.2$ dB
Surface Detection	$\pm 0.2$ mm repeatability in air and clear liquids over diffuse reflecting surfaces.
Dimensions	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application	General dissymmetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms



Figure 3.2 Photograph of the probe and the Phantom



Figure 3.3 ET3DV6 E-field Probe

The SAR measurements were conducted with the dosimetric probe ET3DV6, designed in the classical triangular configuration 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 on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches 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 a maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2<sup>nd</sup> order fitting. The approach is stopped at reaching the maximum.

### 3.3 PROBE CALIBRATION PROCESS

#### 3.3.1 E-Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with an accuracy better than  $\pm 10\%$ . The spherical isotropy was evaluated with the proper procedure and found to be better than  $\pm 0.25$  dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe is tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a waveguide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\text{SAR} = C \frac{\Delta T}{\Delta t}$$

where:

$\Delta t$  = exposure time (30 seconds),

$C$  = heat capacity of tissue (brain or muscle),

$\Delta T$  = temperature increase due to RF exposure.

SAR is proportional to  $\Delta T / \Delta t$ , the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E-field;

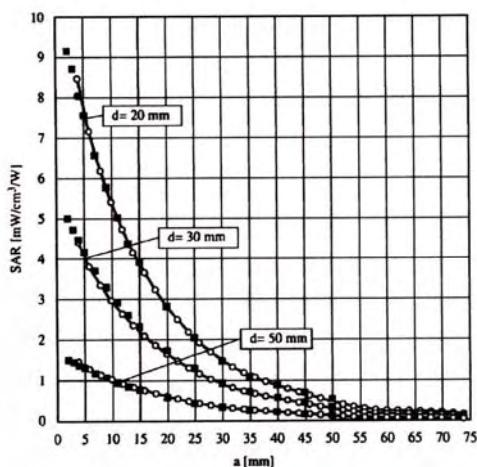


Figure 3.4 E-Field and Temperature measurements at 900 MHz

$$\text{SAR} = \frac{|E|^2 \cdot \sigma}{\rho}$$

where:

$\sigma$  = simulated tissue conductivity,

$\rho$  = Tissue density (1.25 g/cm<sup>3</sup> for brain tissue)

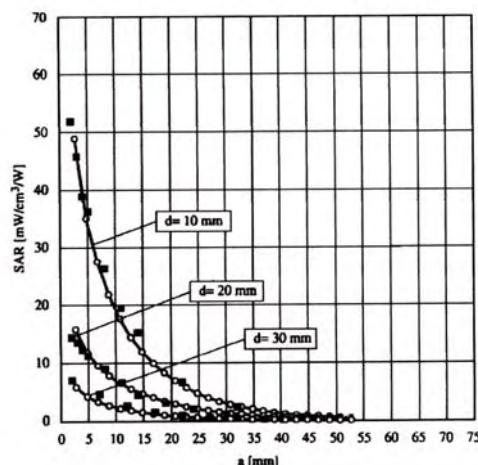


Figure 3.5 E-Field and temperature measurements at 1.8 GHz

### 3.3.2 Data Extrapolation

The DASY4 software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given like below;

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

with       $V_i$  = compensated signal of channel i    ( $i=x,y,z$ )  
 $U_i$  = input signal of channel i                         ( $i=x,y,z$ )  
 $cf$  = crest factor of exciting field                         (DASY parameter)  
 $dcp_i$  = diode compression point                             (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:    with       $V_i$  = compensated signal of channel i ( $i = x,y,z$ )  
 $Norm_i$  = sensor sensitivity of channel i    ( $i = x,y,z$ )  
 $\mu\text{V}/(\text{V}/\text{m})^2$  for E-field probes  
 $ConvF$  = sensitivity of enhancement in solution  
 $E_i$  = electric field strength of channel i in  $\text{V}/\text{m}$

$$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

The RSS value of the field components gives the total field strength (Hermetian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with      SAR = local specific absorption rate in  $\text{W}/\text{g}$   
 $E_{tot}$  = total field strength in  $\text{V}/\text{m}$   
 $\sigma$  = conductivity in [mho/m] or [Siemens/m]  
 $\rho$  = equivalent tissue density in  $\text{g}/\text{cm}^3$

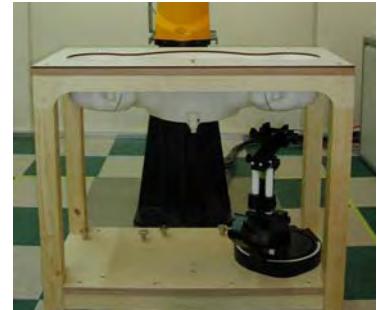
The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770}$$

with       $P_{pwe}$  = equivalent power density of a plane wave in  $\text{W}/\text{cm}^2$   
 $E_{tot}$  = total electric field strength in  $\text{V}/\text{m}$

### 3.4 SAM Phantom

The SAM Phantom is constructed of a 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. 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.



Shell Thickness	2.0 mm
Filling Volume	about 30 L
Dimensions	810 mm x 1 000 mm x 500 mm (H x L x W)

Figure 3.6 SAM Phantom

### 3.5 Device Holder for Transmitters

In combination with the SAM Phantom V 4.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatable positioned according to the FCC and CENELEC 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. To produce the Worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.



Figure 3.7 Device Holder

### 3.6 Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bacteriacide 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 mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrove.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1 900		2 450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7

Salt: 99 % Pure Sodium Chloride      Sugar: 98 % Pure Sucrose  
 Water: De-ionized, 16M resistivity      HEC: Hydroxyethyl Cellulose  
 DGBE: 99 % Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy) ethanol]  
 Triton X-100(ultra pure): Polyethylene glycol mono[4-(1,1,3,3-tetramethylbutyl)phenyl] ether

Table 3.1 Composition of the Tissue Equivalent Matter

### **3.7 SAR TEST EQUIPMENT**

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	SAM Phantom	-	N/A	N/A	N/A
Staubli	Robot RX90L	F01/5K09A1/A/01	N/A	N/A	N/A
Staubli	Robot ControllerCS7MB	F99/5A82A1/C/01	N/A	N/A	N/A
HP	Pavilion t000_puffer	KRJ51201TV	N/A	N/A	N/A
SPEAG	Light Alignment Sensor	265	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D221340.01	N/A	N/A	N/A
SPEAG	DAE3	446	May 19, 2010	Annual	May 19, 2011
SPEAG	E-Field Probe ET3DV6	1630	May 25, 2010	Annual	May 25, 2011
SPEAG	Validation Dipole D835V2	441	May 21, 2010	Annual	May 21, 2011
SPEAG	Validation Dipole D1900V2	5d032	July 16, 2010	Annual	July 16, 2011
SPEAG	Validation Dipole D2450V2	743	Aug. 25, 2010	Biennial	Aug. 27, 2012
Agilent	Power Meter(F) E4419B	MY41291386	Nov. 05, 2010	Annual	Nov. 05, 2011
Agilent	Power Sensor(G) 8481	MY41090870	Nov. 05, 2010	Annual	Nov. 05, 2011
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler	16072	Nov. 05, 2010	Annual	Nov. 05, 2011
R&S	Base Station CMU200	110740	July 26, 2010	Annual	July 26, 2011
Agilent	Base Station E5515C	GB44400269	Feb. 10, 2010	Annual	Feb. 10, 2011
HP	Signal Generator E4438C	MY42082646	Dec. 24, 2009	Annual	Dec. 24, 2010
HP	Network Analyzer 8753ES	MY4000025	Sep. 02, 2010	Annual	Sep. 02, 2011

## NOTE:

The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Validation measurement is performed by HCT Lab. before each test. The brain simulating material is calibrated by HCT using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the brain-equivalent material.

## 4. SAR MEASUREMENT PROCEDURE

The evaluation was performed with the following procedure:

1. The SAR value at a fixed location above the ear point was measured and was used as a reference value for assessing the power drop.
2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.
3. Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:
  - a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
  - b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
  - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR value, at the same location as procedure #1, was re-measured. If the value changed by more than 5 %, the evaluation is repeated.

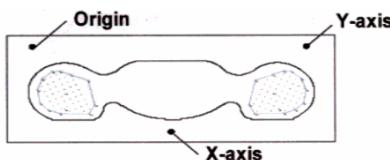


Figure 4.1 SAR Measurement Point in Area Scan

## 5. DESCRIPTION OF TEST POSITION

### 5.1 HEAD POSITION

The device was placed in a normal operating position with the Point A on the device, as illustrated in following drawing, aligned with the location of the RE(ERP) on the phantom. With the ear-piece pressed against the head, the vertical center line of the body of the handset was aligned with an imaginary plane consisting of the RE, LE and M. While maintaining these alignments, the body of the handset was gradually moved towards the cheek until any point on the mouth-piece or keypad contacted the cheek. This is a cheek/touch position. For ear/tilt position, while maintain the device aligned with the BM and FN lines, the device was pivot against ERP back for 15° or until the device antenna touch the phantom. Please refer to IEEE 1528-2003 illustration below.

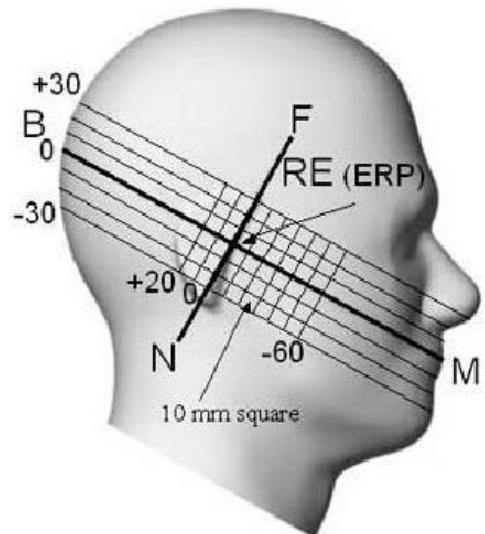


Figure 5.1 Side view of the phantom

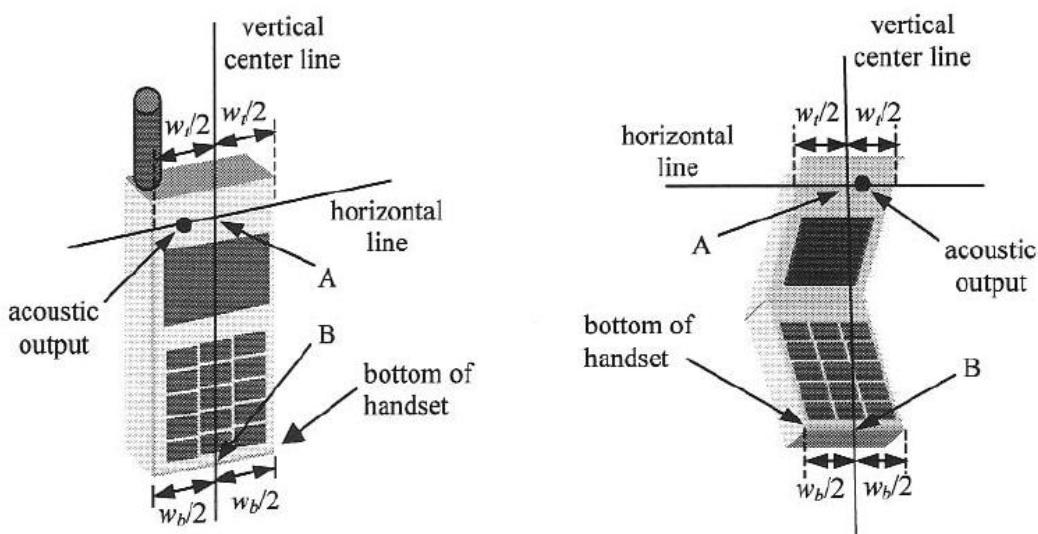


Figure 5.2 Handset vertical and horizontal reference lines

## **5.2 Body Holster/Belt Clip Configurations**

Body-worn operating 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 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 tested with each accessory. If multiple accessory 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 or available as options for some Devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used.

Since this EUT does not supply any body worn accessory to the end user a distance of 1.5 cm from the EUT back surface to the liquid interface is configured for the generic test.

"See the Test SET-UP Photo"

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, 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 cases SAR measurements are performed to investigate the worst-case positioning. Worstcase positioning is then documented and used to perform Body SAR testing.

## 6. MEASUREMENT UNCERTAINTY

Error Description	Tol (± %)	Prob. dist.	Div.	c <sub>i</sub>	Standard Uncertainty (± %)	v <sub>eff</sub>
<b>1. Measurement System</b>						
Probe Calibration	5.50	N	1	1	5.50	∞
Axial Isotropy	4.70	R	1.73	0.7	1.90	∞
Hemispherical Isotropy	9.60	R	1.73	0.7	3.88	∞
Boundary Effects	1.00	R	1.73	1	0.58	∞
Linearity	4.70	R	1.73	1	2.71	∞
System Detection Limits	1.00	R	1.73	1	0.58	∞
Readout Electronics	0.30	N	1.00	1	0.30	∞
Response Time	0.8	R	1.73	1	0.46	∞
Integration Time	2.6	R	1.73	1	1.50	∞
RF Ambient Noise	3.00	R	1.73	1	1.73	∞
RF Ambient Reflection	3.00	R	1.73	1	1.73	∞
Probe Positioner	0.40	R	1.73	1	0.23	∞
Probe Positioning	2.90	R	1.73	1	1.67	∞
Max SAR Eval	1.00	R	1.73	1	0.58	∞
<b>2. Test Sample Related</b>						
Device Positioning	1.80	N	1.00	1	1.80	9
Device Holder	3.60	N	1.00	1	3.60	5
Power Drift	5.00	R	1.73	1	2.89	∞
<b>3. Phantom and Setup</b>						
Phantom Uncertainty	4.00	R	1.73	1	2.31	∞
Liquid Conductivity(target)	5.00	R	1.73	0.64	1.85	∞
Liquid Conductivity(meas.)	2.07	N	1	0.64	1.32	9
Liquid Permitivity(target)	5.00	R	1.73	0.6	1.73	∞
Liquid Permitivity(meas.)	5.02	N	1	0.6	3.01	9
<b>Combind Standard Uncertainty</b>						10.76
<b>Coverage Factor for 95 %</b>						k=2
<b>Expanded STD Uncertainty</b>						21.53

**Table 6.1 Breakdown of Errors**

## 7. ANSI/ IEEE C95.1 - 1992 RF EXPOSURE LIMITS

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/kg) or (mW/g)
SPATIAL PEAK SAR * (Brain)	1.60	8.00
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.40
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.00	20.00

Table 7.1 Safety Limits for Partial Body Exposure

**NOTES:**

\* The Spatial Peak value of the SAR averaged over any 1 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

\*\* The Spatial Average value of the SAR averaged over the whole-body.

\*\*\* The Spatial Peak value of the SAR averaged over any 10 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

**Uncontrolled Environments** are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

**Controlled Environments** are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

## 8. SYSTEM VERIFICATION

### 8.1 Tissue Verification

Freq. [MHz]	Date	Liquid	Liquid Temp.[°C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
835	Dec.13, 2010	Head	21.1	$\epsilon_r$	41.5	42.9	+ 3.37	$\pm 5$
				$\sigma$	0.90	0.919	+ 2.11	$\pm 5$
835	Dec.13, 2010	Body	21.1	$\epsilon_r$	55.2	56.84	+ 2.97	$\pm 5$
				$\sigma$	0.97	0.97	0.00	$\pm 5$
1 900	Dec.14, 2010	Head	21.2	$\epsilon_r$	40.0	39.7	- 0.75	$\pm 5$
				$\sigma$	1.40	1.45	+ 3.57	$\pm 5$
1 900	Dec.14, 2010	Body	21.2	$\epsilon_r$	53.3	52.85	- 0.84	$\pm 5$
				$\sigma$	1.52	1.49	- 1.97	$\pm 5$
2 450	Dec.14, 2010	Body	21.2	$\epsilon_r$	52.7	51.8	- 1.71	$\pm 5$
				$\sigma$	1.95	2.02	+ 3.59	$\pm 5$

### 8.2 System Validation

Prior to assessment, the system is verified to the  $\pm 10\%$  of the specifications at 835 MHz/1900 MHz/ 2 450 MHz by using the system validation kit. (Graphic Plots Attached)

\* Input Power: 1 W

Freq. [MHz]	Date	Liquid	Liquid Temp. [°C]	SAR Average	Target Value (SPEAG) (mW/g)	Measured Value (mW/g)	Deviation [%]	Limit [%]
835	Dec.13, 2010	Head	21.1	1 g	9.66	0.985	+ 1.97	$\pm 10$
1 900	Dec.14, 2010	Head	21.2	1 g	39.9	3.97	- 0.50	$\pm 10$
2 450	Dec.14, 2010	Head	21.2	1 g	52.7	5.36	+ 1.71	$\pm 10$

## 9. TEST CONFIGURATIONS

### SAR Testing with IEEE 802.11 a/b/g Transmitters

Normal Network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable.

#### 9.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

#### 9.2 Frequency Channel Configurations

80.11 a/b/g and 4.9 GHz operating modes are tested independently according to the service requirements in each frequency band. 80.211 b/g modes are tested on channels 1, 6 and 11. 80.11a is tested for UNII operations on channels 36 and 48 in the 5.15-5.25 GHz band; channels 52 and 64 in the 5.25-5.35 GHz band; Channels 104, 116, 124 and 136 in the 5.470-5.725 GHz band; and channels 149 and 161 in the 5.8 GHz band. When 5.8 GHz § 15.247 is also available, channels 149, 157 and 165 should be tested instead of the UNII channels. 4.9 GHz is tested on channels 1, 10 and 5 or 6, whichever has the higher output power, for 5 MHz channels; channels 11,15 and 19 for 10 MHz channels; and channels 21 and 25 for 20 MHz channels.

These are referred to as the "default test channels". 802.11g mode was evaluated only if the output power was 0.25 dB higher than the 802.11b mode.

Mode	GHz	Channel	Turbo Channel	"Default Test Channels"		
				§15.247		UNII
				802.11b	802.11g	
802.11 b/g	2.412	1	6	✓	▽	
	2.437	6		✓	▽	
	2.462	11		✓	▽	
802.11a	5.18	36	Unknown		✓	
	5.20	40				*
	5.22	44				*
	5.24	48			✓	
	5.26	52			✓	
	5.28	56				*
	5.30	60				*
	5.32	64			✓	
	5.500	100				*
	5.520	104			✓	
	5.540	108				*
	5.560	112				*
	5.580	116			✓	
	5.600	120				*
	5.620	124			✓	
	5.640	128				*
	5.660	132				*
	5.680	136			✓	
	5.700	140				*
UNII or §15.247	5.745	149	152 (5.76 GHz)	✓	-	✓
	5.765	153		-		*
	5.785	157		✓		*
	5.805	161		-	✓	
§15.247	5.825	165		✓		

802.11 Test Channels per FCC Requirements

## 10. RF CONDUCTED POWER

Power measurements were performed using a base station simulator under digital average power.

### 10.1 Procedures Used to Establish RF Signal for SAR

The handset was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluation SAR[4] SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement Software calculates a reference point at the start and end of the test to check for power drifts. If conducted Power deviations of more than 5 % occurred, the tests were repeated.

Average Output Power Measurement for FCC ID: YY3-NAUTIZX3

Band	Channel	Voice	GPRS Data					EDGE Data			
			GSM	GPRS	GPRS	GPRS	GPRS	EDGE	EDGE	EDGE	EDGE
			(dBm)	1 TX	2 TX	3 TX	4 TX Slot	1 TX	2 TX	3 TX	4 TX
GSM	128	32.50	32.50	30.46	28.91	27.86	27.61	24.58	23.58	22.73	
	190	32.51	32.51	30.46	28.90	27.86	27.61	24.59	23.58	22.62	
	251	32.46	32.46	30.43	28.85	27.84	27.56	24.55	23.54	22.53	
GSM	512	29.87	29.87	27.75	26.15	25.07	26.87	23.78	22.72	21.70	
	661	29.91	29.91	27.82	26.20	25.12	26.92	23.83	22.76	21.74	
	810	29.85	29.85	27.78	26.15	25.09	26.85	23.78	22.71	21.69	

Table 10.1 GSM Conducted output powers

			850 MHz (V)			1900 MHz (II)		
3GPP Release version	Mode	3GPP 34.121 Sutest	[dBm]			[dBm]		
			4132	4183	4233	9262	9400	9538
99	WCDMA	12.2kbps (RMC)	24.03	23.97	23.85	24.12	24.17	24.17
99	WCDMA	12.2kbps (AMR)	24.01	23.97	23.84	24.10	24.16	24.16
5	HSDPA	Subtest1	23.92	23.77	23.65	24.09	24.05	24.19

Table 10.2 WCDMA Conducted output powers

Band	Channel	Mbps			
		1	2	5.5	11
IEEE 802.11b	1	5.79	5.80	5.71	5.90
	6	6.34	6.51	6.53	6.58
	11	6.29	6.44	6.49	6.51

Table 10.3 IEEE 802.11b Conducted output power

Band	Channel	Mbps							
		6	9	12	18	24	36	48	58
IEEE 802.11g	1	2.91	2.98	2.92	3.12	3.15	3.02	2.94	3.00
	6	3.48	3.58	3.42	3.68	3.60	3.69	3.50	3.57
	11	3.91	3.94	3.85	4.04	3.93	3.96	4.00	3.88

Table 10.4 IEEE 802.11g Conducted output power

# 11. SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas

## 11.1 SAR Evaluation Considerations

These procedures were followed according to FCC "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas", May 2008. The procedures are applicable to phones with built-in unlicensed transmitters, such as 802.11 a/b/g and Bluetooth devices.

	2.45	5.15 - 5.35	5.47 - 5.85	GHz
P <sub>Ref</sub>	12	6	5	mW
Device output power should be rounded to the nearest mW to compare with values specified in this				

Table. 11.1 Output Power Thresholds for Unlicensed Transmitters

Licensed Transmitters	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	Routine evaluation required	<u>SAR not required:</u> <u>Unlicensed only</u> <ul style="list-style-type: none"> <li>○ when stand-alone 1-g SAR is not required and antenna is <math>\geq 5</math> cm from other antennas</li> </ul> <u>Licensed &amp; Unlicensed</u> <ul style="list-style-type: none"> <li>○ when the sum of the 1-g SAR is <math>&lt; 1.6</math> W/kg for all simultaneous transmitting antennas</li> <li>○ when SAR to peak location separation ratio of simultaneous transmitting antenna pair is <math>&lt; 0.3</math></li> </ul> <u>SAR required:</u> <u>Licensed &amp; Unlicensed</u> <p>antenna pairs with SAR to peak location separation ratio <math>\geq 0.3</math>; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition</p> <p><b>Note:</b> simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply</p>
Unlicensed Transmitters	<u>When there is no simultaneous transmission –</u> <ul style="list-style-type: none"> <li>○ output <math>\leq 60/f</math>: SAR not required</li> <li>○ output <math>&gt; 60/f</math>: stand-alone SAR required</li> </ul> <u>When there is simultaneous transmission – Stand-alone SAR not required when</u> <ul style="list-style-type: none"> <li>○ output <math>\leq 2 \cdot P_{Ref}</math> and antenna is <math>\geq 5.0</math> cm from other antennas</li> <li>○ output <math>\leq P_{Ref}</math> and antenna is <math>\geq 2.5</math> cm from other antennas</li> <li>○ output <math>\leq P_{Ref}</math> and antenna is <math>&lt; 2.5</math> cm from other antennas, each with either output power <math>\leq P_{Ref}</math> or 1-g SAR <math>&lt; 1.2</math> W/kg</li> </ul> <u>Otherwise stand-alone SAR is required</u> <p><u>When stand-alone SAR is required</u></p> <ul style="list-style-type: none"> <li>○ test SAR on highest output channel for each wireless mode and exposure condition</li> <li>○ if SAR for highest output channel is <math>&gt; 50\%</math> of SAR limit, evaluate all channels according to normal procedures</li> </ul>	
Jaw, Mouth and Nose	<u>Flat phantom SAR required</u> <ul style="list-style-type: none"> <li>○ when measurement is required in tight regions of SAM and it is not feasible or the results can be questionable due to probe tilt, calibration, positioning and orientation issues</li> <li>○ position rectangular and clam-shell phones according to flat phantom procedures and conduct SAR measurements for these specific locations</li> </ul>	When simultaneous transmission SAR testing is required, contact the FCC Laboratory for interim guidance.

Table. 11.2 SAR Evaluation Requirements for Cellphones with Multiple Transmitters

BT Max. RF output power: -3.31 dBm (0.47 mW), Antenna distance between Main and BT: 1.01 cm  
Based on the output power, stand-alone BT SAR is not required for the EUT.

Antenna Pair	Justification	Simultaneous SAR required
Wifi / BT	The sum of WLAN and BT SAR is $0.026 + 0 < 1.6$ mW/g	No
Wifi / WWAN	WiFi can not transmit simultaneously with WWAN	No
BT / WWAN	Antenna separation is $< 2.5$ cm, WWAN SAR is less than 1.2W/kg	No

## 12. SAR TEST DATA SUMMARY

### 12.1 Measurement Results (GSM850 Head SAR Touch)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.6	190 (Mid)	GSM850	32.51	32.57	Standard	Left Ear	Intenna	0.148
836.6	190 (Mid)	GSM850	32.51	32.54	Standard	Right Ear	Intenna	0.155
<b>ANSI/ IEEE C95.1 1992 – Safety Limit</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/ General Population</b>						<b>Head</b> <b>1.6 W/kg (mW/g)</b> <small>Averaged over 1 gram</small>		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 12.2 Measurement Results (GSM850 Head SAR Tilt)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.6	190 (Mid)	GSM850	32.51	32.32	Standard	Left Tilt 15°	Intenna	0.084
836.6	190 (Mid)	GSM850	32.51	32.33	Standard	Right Tilt 15°	Intenna	0.115
<b>ANSI/ IEEE C95.1 1992 – Safety Limit</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/ General Population</b>						<b>Head</b> <b>1.6 W/kg (mW/g)</b> Averaged over 1 gram		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 12.3 Measurement Results (GSM1900 Head SAR Touch)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 880.0	661 (Mid)	GSM1900	29.91	29.97	Standard	Left Ear	Intenna	0.289
1 880.0	661 (Mid)	GSM1900	29.91	29.94	Standard	Right Ear	Intenna	0.428
<b>ANSI/ IEEE C95.1 1992 – Safety Limit</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/ General Population</b>						<b>Head</b> <b>1.6 W/kg (mW/g)</b> Averaged over 1 gram		

### NOTES:

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 12.4 Measurement Results (GSM1900 Head SAR Tilt)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 880.0	661 (Mid)	GSM1900	29.91	29.92	Standard	Left Tilt 15°	Intenna	0.276
1 880.0	661 (Mid)	GSM1900	29.91	29.92	Standard	Right Tilt 15°	Intenna	0.330
<b>ANSI/ IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population</b>						<b>Head</b> <b>1.6 W/kg (mW/g)</b> <small>Averaged over 1 gram</small>		

### NOTES:

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 12.5 Measurement Results (WCDMA850 Head SAR Touch)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.6	4183 (Mid)	WCDMA850	23.97	23.94	Standard	Left Ear	Intenna	0.263
826.4	4132 (Low)	WCDMA850	24.03	24.01	Standard	Right Ear	Intenna	0.318
836.6	4183 (Mid)	WCDMA850	23.97	23.82	Standard	Right Ear	Intenna	0.336
846.6	4233 (High)	WCDMA850	23.85	23.92	Standard	Right Ear	Intenna	0.377
<b>ANSI/ IEEE C95.1 1992 – Safety Limit</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/ General Population</b>						<b>Head</b> <b>1.6 W/kg (mW/g)</b> <small>Averaged over 1 gram</small>		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
- 8 WCDMA Mode was tested under RMC 12.2 kbps and HSDPA Inactive.

## 12.6 Measurement Results (WCDMA850 Head SAR Tilt)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.6	4183 (Mid)	WCDMA850	23.97	24.12	Standard	Left Tilt 15°	Intenna	0.185
836.6	4183 (Mid)	WCDMA850	23.97	23.90	Standard	Right Tilt 15°	Intenna	0.246
<b>ANSI/ IEEE C95.1 1992 – Safety Limit</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/ General Population</b>						<b>Head</b> <b>1.6 W/kg (mW/g)</b> <small>Averaged over 1 gram</small>		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
- 8 WCDMA Mode was tested under RMC 12.2 kbps and HSDPA Inactive.

## 12.7 Measurement Results (WCDMA1900 Head SAR Touch)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 852.4	9262 (Low)	WCDMA1900	24.12	24.06	Standard	Left Ear	Intenna	0.568
1 880.0	9400 (Mid)	WCDMA1900	24.17	24.24	Standard	Left Ear	Intenna	0.848
1 907.6	9538 (High)	WCDMA1900	24.17	24.03	Standard	Left Ear	Intenna	0.770
1 852.4	9262 (Low)	WCDMA1900	24.12	24.12	Standard	Right Ear	Intenna	0.859
1 880.0	9400 (Mid)	WCDMA1900	24.17	24.12	Standard	Right Ear	Intenna	1.12
1 907.6	9538 (High)	WCDMA1900	24.17	24.05	Standard	Right Ear	Intenna	0.931
<b>ANSI/ IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population</b>						<b>Head</b> <b>1.6 W/kg (mW/g)</b> <small>Averaged over 1 gram</small>		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 WCDMA Mode was tested under RMC 12.2 kbps and HSDPA Inactive.

## 12.8 Measurement Results (WCDMA1900 Head SAR Tilt)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 852.4	9262 (Low)	WCDMA1900	24.12	24.06	Standard	Left Tilt 15°	Intenna	0.578
1 880.0	9400 (Mid)	WCDMA1900	24.17	24.20	Standard	Left Tilt 15°	Intenna	0.856
1 907.6	9538 (High)	WCDMA1900	24.17	24.06	Standard	Left Tilt 15°	Intenna	0.763
1 852.4	9262 (Low)	WCDMA1900	24.12	24.22	Standard	Right Tilt 15°	Intenna	0.660
1 880.0	9400 (Mid)	WCDMA1900	24.17	24.30	Standard	Right Tilt 15°	Intenna	0.902
1 907.6	9538 (High)	WCDMA1900	24.17	24.22	Standard	Right Tilt 15°	Intenna	0.757
<b>ANSI/ IEEE C95.1 1992 – Safety Limit</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/ General Population</b>						<b>Head</b> <b>1.6 W/kg (mW/g)</b> Averaged over 1 gram		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
- 8 WCDMA Mode was tested under RMC 12.2 kbps and HSDPA Inactive.

## 12.9 Measurement Results (GSM850 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.6	190 (Mid)	GPRS 4Tx	27.86	27.73	Rear	1.5 cm without Holster	Intenna	0.180
836.6	190 (Mid)	GPRS 3Tx	28.90	28.92	Rear	1.5 cm without Holster	Intenna	0.170
836.6	190 (Mid)	GPRS 2Tx	30.46	30.50	Rear	1.5 cm without Holster	Intenna	0.181
836.6	190 (Mid)	GPRS 1Tx	32.51	32.55	Rear	1.5 cm without Holster	Intenna	0.092
836.6	190 (Mid)	GSM850	32.50	32.46	Rear	1.5 cm without Holster	Intenna	0.087
836.6	190 (Mid)	GPRS 2Tx	30.46	30.41	front	1.5 cm without Holster	Intenna	0.123
<b>ANSI/ IEEE C95.1 1992 – Safety Limit</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/ General Population</b>						<b>Body</b> <b>1.6 W/kg (mW/g)</b> Averaged over 1 gram		

### NOTES:

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm  $\pm$  0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 Both side of the phone were tested and the worst-case side is reported.
- 8 Test Configuration       With Holster       Without Holster
- 9 HEADSET was connected.
- 10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 12.10 Measurement Results (GSM1900 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 880.0	661 (Mid)	GPRS 4Tx	25.12	25.00	Rear	1.5 cm without Holster	Intenna	0.205
1 880.0	661 (Mid)	GPRS 3Tx	26.20	26.17	Rear	1.5 cm without Holster	Intenna	0.202
1 880.0	661 (Mid)	GPRS 2Tx	27.82	27.85	Rear	1.5 cm without Holster	Intenna	0.222
1 880.0	661 (Mid)	GPRS 1Tx	29.91	29.98	Rear	1.5 cm without Holster	Intenna	0.119
1 880.0	661 (Mid)	GSM1900	29.91	29.83	Rear	1.5 cm without Holster	Intenna	0.113
1 880.0	661 (Mid)	GPRS 2Tx	27.82	27.83	Front	1.5 cm without Holster	Intenna	0.165
<b>ANSI/ IEEE C95.1 1992 – Safety Limit</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/ General Population</b>						<b>Body</b> <b>1.6 W/kg (mW/g)</b> <small>Averaged over 1 gram</small>		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 Both side of the phone were tested and the worst-case side is reported.
- 8 Test Configuration       With Holster       Without Holster
- 9 HEADSET was connected.
- 10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 12.11 Measurement Results (WCDMA850 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.6	4183 (Mid)	WCDMA850	23.97	24.04	Rear	1.5 cm without Holster	Intenna	0.257
836.6	4183 (Mid)	WCDMA850	23.97	23.86	Front	1.5 cm without Holster	Intenna	0.130
<b>ANSI/ IEEE C95.1 1992 – Safety Limit</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/ General Population</b>						<b>Body</b> <b>1.6 W/kg (mW/g)</b> <small>Averaged over 1 gram</small>		

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 Both side of the phone were tested and the worst-case side is reported.
- 8 HEADSET was connected.
- 9 Test Configuration       With Holster       Without Holster
- 10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
- 11 WCDMA Mode was tested under RMC 12.2 kbps and HSDPA Inactive.

## 12.12 Measurement Results (WCDMA1900 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 880.0	9400 (Mid)	WCDMA1900	23.97	24.04	Rear	1.5 cm without Holster	Intenna	0.457
1 880.0	9400 (Mid)	WCDMA1900	23.97	23.97	Front	1.5 cm without Holster	Intenna	0.220
<b>ANSI/ IEEE C95.1 1992 – Safety Limit</b> <b>Spatial Peak</b> <b>Uncontrolled Exposure/ General Population</b>						<b>Body</b> <b>1.6 W/kg (mW/g)</b> <small>Averaged over 1 gram</small>		

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type       Standard       Extended       Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode       Manual Test cord       Base Station Simulator
- 7 Both side of the phone were tested and the worst-case side is reported.
- 8 HEADSET was connected.
- 9 Test Configuration       With Holster       Without Holster
- 10 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
- 11 WCDMA Mode was tested under RMC 12.2 kbps and HSDPA Inactive.

**12.13 Measurement Results (802.11b/g Module Body SAR)**

Frequency		Modulation	Conducted Power (dBm)		Configuration	Separation Distance	Data Rate	SAR(mW/g)
MHz	Channel		Begin	End				
2412	1 (Low)	802.11b	5.79	5.75	Rear	1.5 cm	1 Mbps	0.024
2437	6 (Mid)	802.11b	6.34	6.28	Rear	1.5 cm	1 Mbps	0.018
2462	11 (High)	802.11b	6.29	6.21	Rear	1.5 cm	1 Mbps	0.026

**ANSI/ IEEE C95.1 1992 – Safety Limit**  
**Spatial Peak**  
**Uncontrolled Exposure/ General Population**

**Body**  
**1.6 W/kg (mW/g)**  
Averaged over 1 gram

**NOTES:**

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- All modes of operation were investigated and the worst-case are reported.
- Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- Tissue parameters and temperatures are listed on the SAR plot.
- Battery Type       Standard       Extended       Slim  
 Batteries are fully charged for all readings.
- Test Signal Call Mode       Manual Test code       Base Station Simulator

## **13. CONCLUSION**

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The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1 1992.

These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests.

## 14. REFERENCES

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## Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.921 \text{ mho/m}$ ;  $\epsilon_r = 42.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Left touch 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.155 mW/g

**Left touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

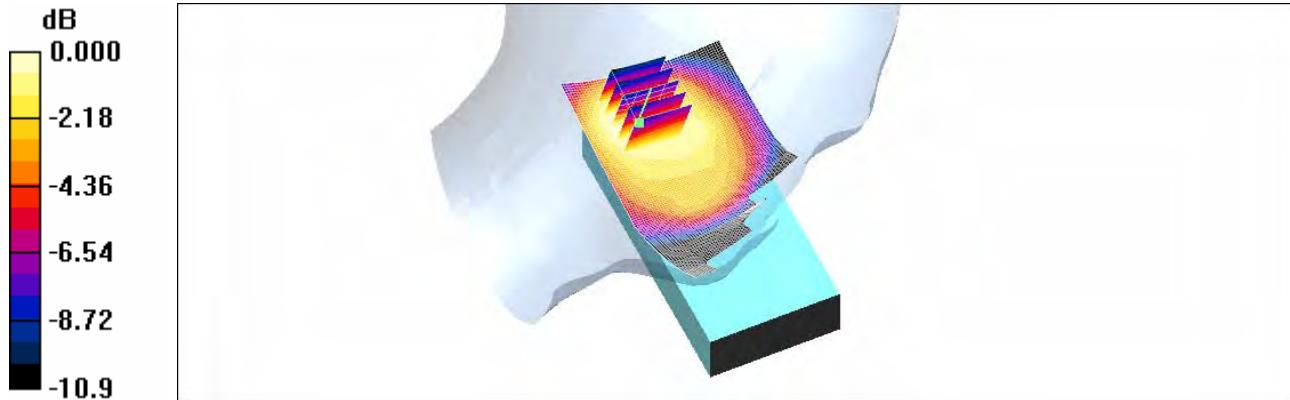
Reference Value = 11.4 V/m; Power Drift = 0.058 dB

Peak SAR (extrapolated) = 0.209 W/kg

SAR(1 g) = 0.148 mW/g; SAR(10 g) = 0.102 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.157 mW/g



0 dB = 0.157mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.921 \text{ mho/m}$ ;  $\epsilon_r = 42.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right touch 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.175 mW/g

**Right touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

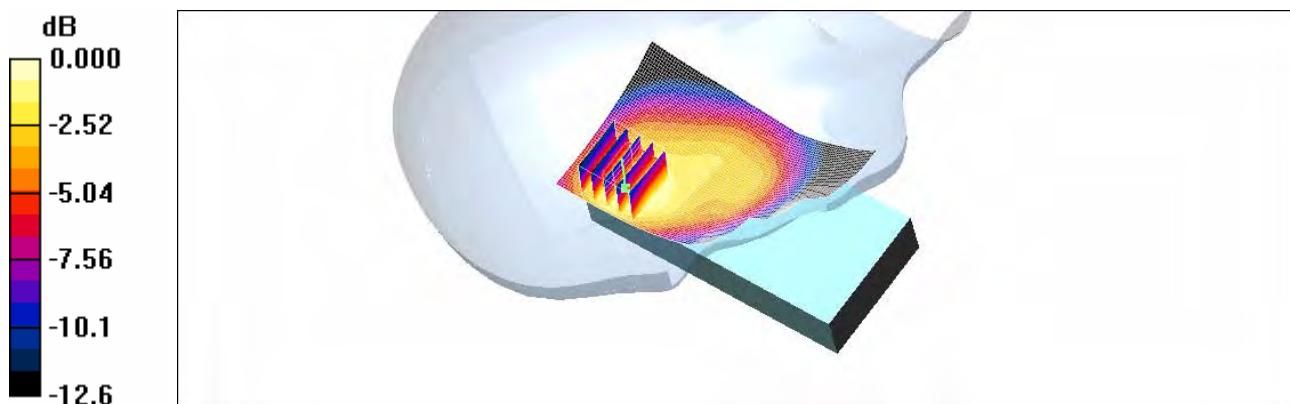
Reference Value = 9.19 V/m; Power Drift = 0.032 dB

Peak SAR (extrapolated) = 0.241 W/kg

SAR(1 g) = 0.155 mW/g; SAR(10 g) = 0.099 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.167 mW/g



0 dB = 0.167mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.921 \text{ mho/m}$ ;  $\epsilon_r = 42.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Left tilt 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

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

**Left tilt 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

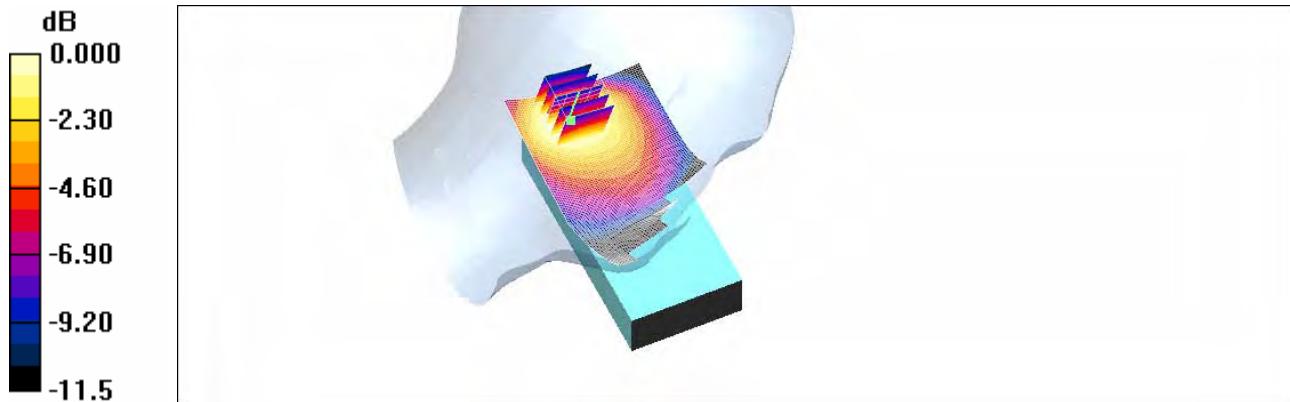
Reference Value = 9.79 V/m; Power Drift = -0.186 dB

Peak SAR (extrapolated) = 0.118 W/kg

SAR(1 g) = 0.084 mW/g; SAR(10 g) = 0.058 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.090 mW/g



0 dB = 0.090mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.921 \text{ mho/m}$ ;  $\epsilon_r = 42.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right tilt 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info:** Interpolated medium parameters used for SAR evaluation.  
Maximum value of SAR (interpolated) = 0.139 mW/g

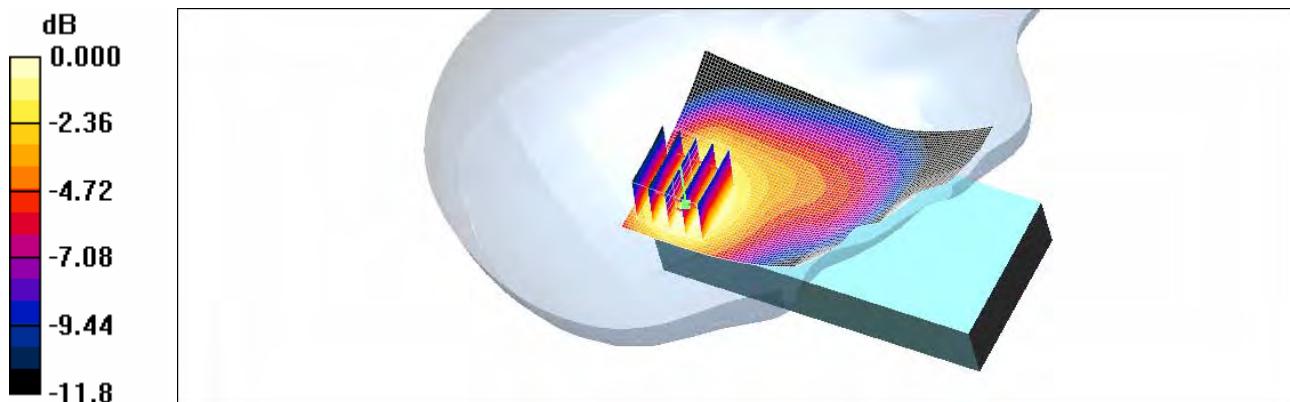
**Right tilt 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.92 V/m; Power Drift = -0.182 dB

Peak SAR (extrapolated) = 0.175 W/kg

SAR(1 g) = 0.115 mW/g; SAR(10 g) = 0.074 mW/g

**Info:** Interpolated medium parameters used for SAR evaluation.  
Maximum value of SAR (measured) = 0.123 mW/g



0 dB = 0.123mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2°C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

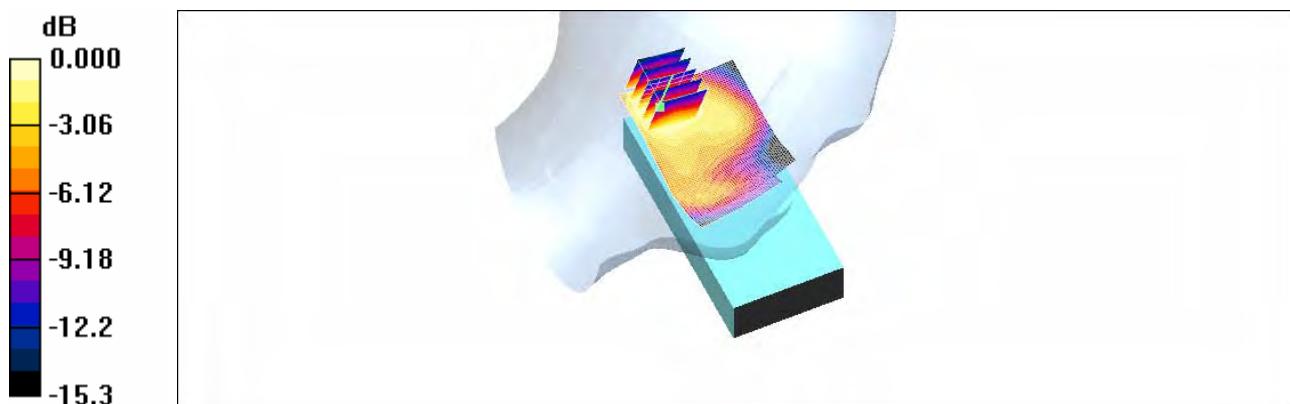
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.42 \text{ mho/m}$ ;  $\epsilon_r = 39.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Left touch 661/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.317 mW/g

**Left touch 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 12.8 V/m; Power Drift = 0.061 dB  
Peak SAR (extrapolated) = 0.429 W/kg  
**SAR(1 g) = 0.289 mW/g; SAR(10 g) = 0.179 mW/g**  
Maximum value of SAR (measured) = 0.311 mW/g



0 dB = 0.311mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2°C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

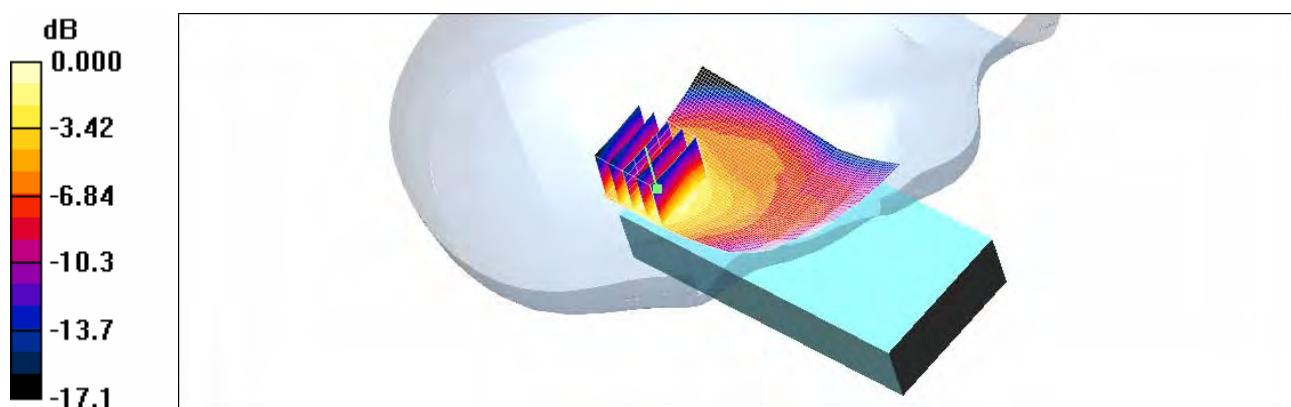
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.42 \text{ mho/m}$ ;  $\epsilon_r = 39.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Right touch 661/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.480 mW/g

**Right touch 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 13.1 V/m; Power Drift = 0.031 dB  
Peak SAR (extrapolated) = 0.730 W/kg  
**SAR(1 g) = 0.428 mW/g; SAR(10 g) = 0.246 mW/g**  
Maximum value of SAR (measured) = 0.474 mW/g



0 dB = 0.474mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2°C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

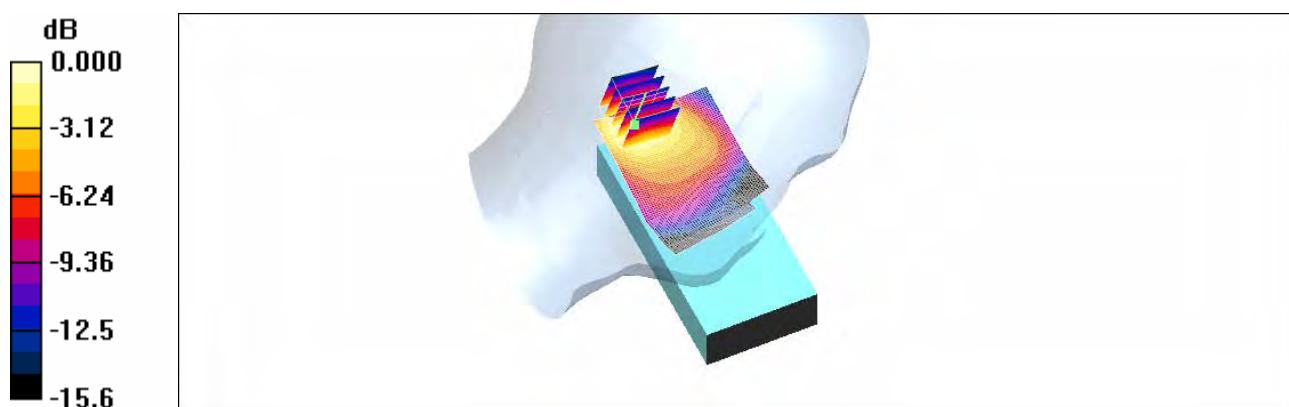
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.42 \text{ mho/m}$ ;  $\epsilon_r = 39.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Left tilt 661/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.299 mW/g

**Left tilt 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 12.8 V/m; Power Drift = 0.006 dB  
Peak SAR (extrapolated) = 0.420 W/kg  
**SAR(1 g) = 0.276 mW/g; SAR(10 g) = 0.168 mW/g**  
Maximum value of SAR (measured) = 0.302 mW/g



0 dB = 0.302mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2°C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

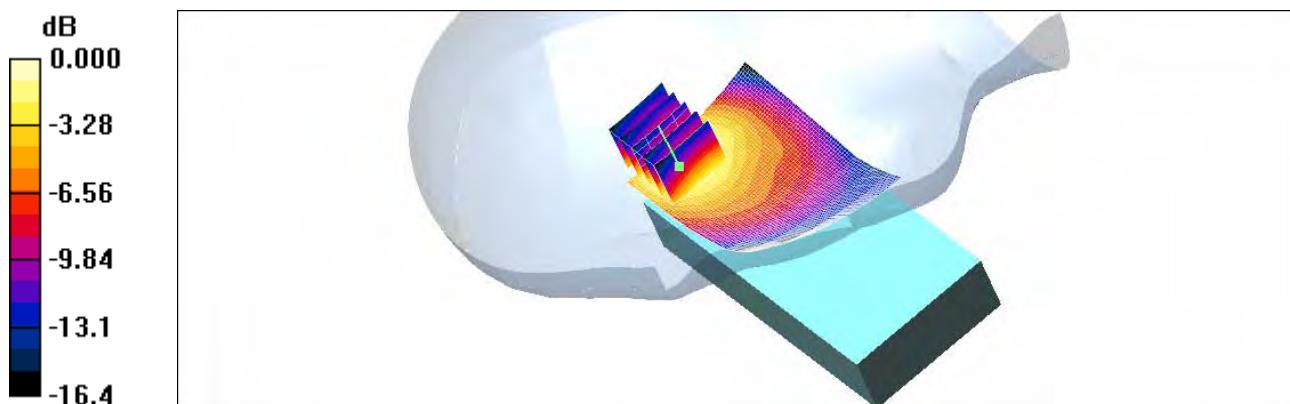
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.42 \text{ mho/m}$ ;  $\epsilon_r = 39.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Right tilt 661/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.365 mW/g

**Right tilt 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 14.4 V/m; Power Drift = 0.005 dB  
Peak SAR (extrapolated) = 0.536 W/kg  
**SAR(1 g) = 0.330 mW/g; SAR(10 g) = 0.196 mW/g**  
Maximum value of SAR (measured) = 0.359 mW/g



0 dB = 0.359mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.921 \text{ mho/m}$ ;  $\epsilon_r = 42.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Left touch 4183/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info:** Interpolated medium parameters used for SAR evaluation.  
Maximum value of SAR (interpolated) = 0.288 mW/g

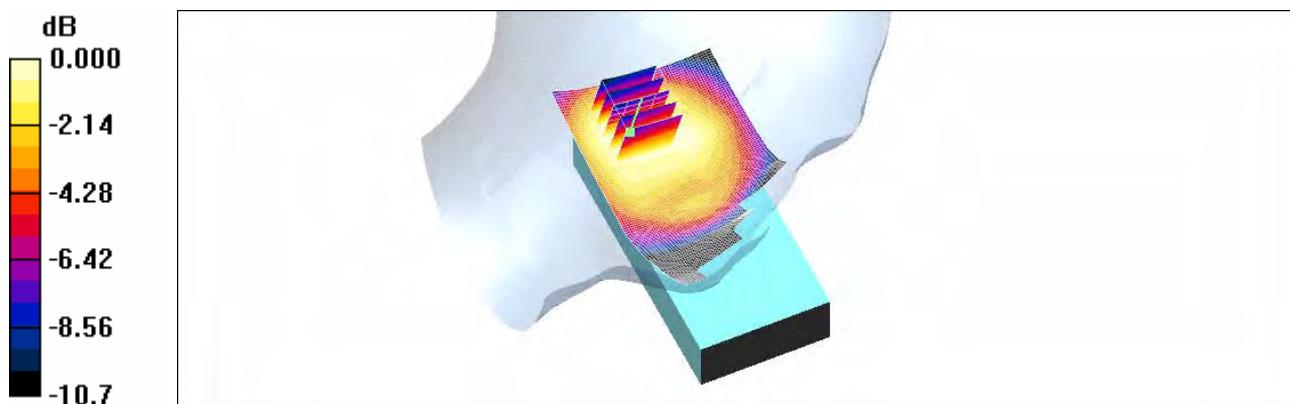
**Left touch 4183/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.6 V/m; Power Drift = -0.033 dB

Peak SAR (extrapolated) = 0.367 W/kg

SAR(1 g) = 0.263 mW/g; SAR(10 g) = 0.186 mW/g

**Info:** Interpolated medium parameters used for SAR evaluation.  
Maximum value of SAR (measured) = 0.279 mW/g



0 dB = 0.279mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA850; Frequency: 826.4 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 826.4 \text{ MHz}$ ;  $\sigma = 0.911 \text{ mho/m}$ ;  $\epsilon_r = 43$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right touch 4132/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.338 mW/g

**Right touch 4132/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

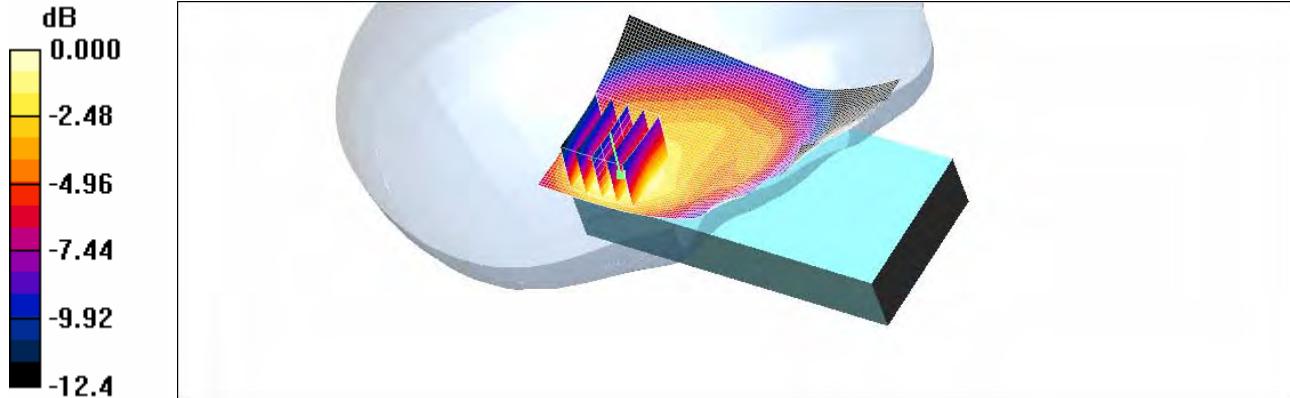
Reference Value = 13.9 V/m; Power Drift = -0.217 dB

Peak SAR (extrapolated) = 0.506 W/kg

SAR(1 g) = 0.318 mW/g; SAR(10 g) = 0.199 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.351 mW/g



0 dB = 0.351mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.921 \text{ mho/m}$ ;  $\epsilon_r = 42.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right touch 4183/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.355 mW/g

**Right touch 4183/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

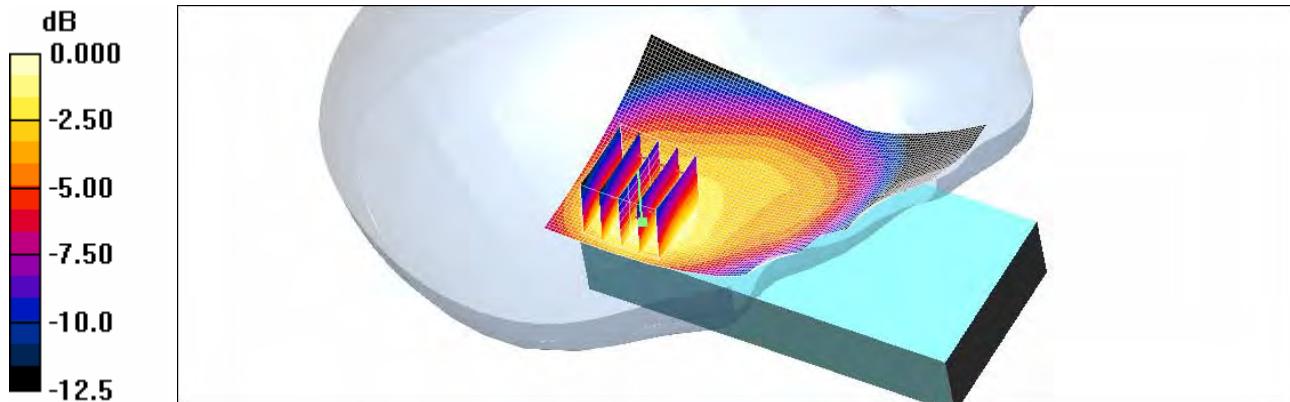
Reference Value = 14.8 V/m; Power Drift = -0.153 dB

Peak SAR (extrapolated) = 0.541 W/kg

SAR(1 g) = 0.336 mW/g; SAR(10 g) = 0.212 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.365 mW/g



0 dB = 0.365mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA850; Frequency: 846.6 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 846.6 \text{ MHz}$ ;  $\sigma = 0.931 \text{ mho/m}$ ;  $\epsilon_r = 42.7$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right touch 4233/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

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

**Right touch 4233/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

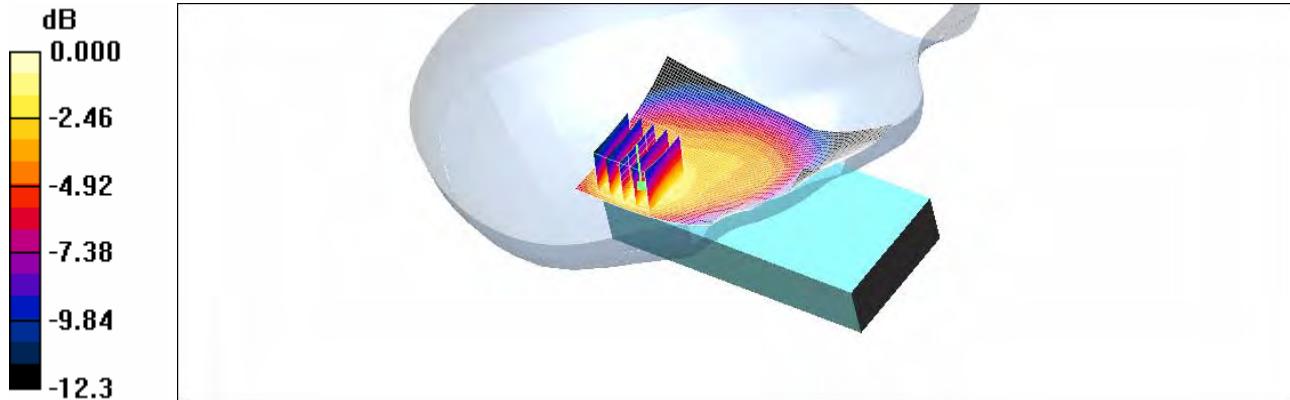
Reference Value = 15.2 V/m; Power Drift = 0.066 dB

Peak SAR (extrapolated) = 0.588 W/kg

SAR(1 g) = 0.377 mW/g; SAR(10 g) = 0.240 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.409 mW/g



0 dB = 0.409mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.921 \text{ mho/m}$ ;  $\epsilon_r = 42.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Left tilt 4183/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.206 mW/g

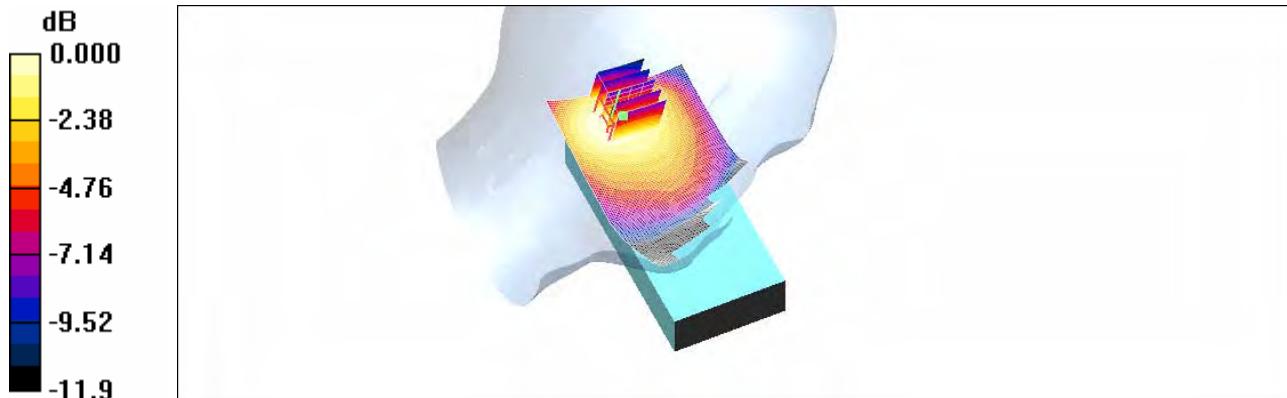
**Left tilt 4183/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.3 V/m; Power Drift = 0.148 dB

Peak SAR (extrapolated) = 0.257 W/kg

SAR(1 g) = 0.185 mW/g; SAR(10 g) = 0.129 mW/g

Maximum value of SAR (measured) = 0.195 mW/g



0 dB = 0.195mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.921 \text{ mho/m}$ ;  $\epsilon_r = 42.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right tilt 4183/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.267 mW/g

**Right tilt 4183/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

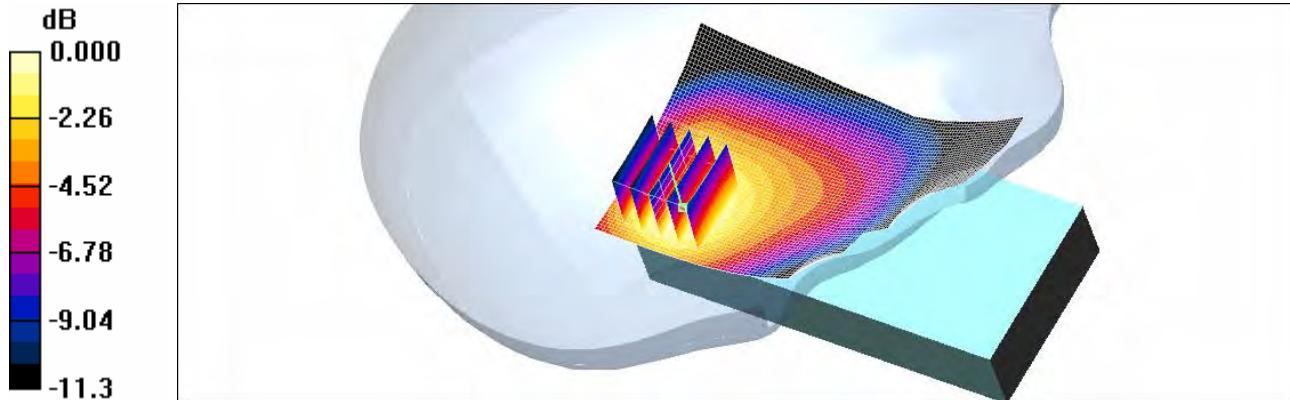
Reference Value = 14.1 V/m; Power Drift = -0.074 dB

Peak SAR (extrapolated) = 0.368 W/kg

SAR(1 g) = 0.246 mW/g; SAR(10 g) = 0.162 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.265 mW/g



0 dB = 0.265mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA1900; Frequency: 1852.4 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Left touch 9262/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.637 mW/g

**Left touch 9262/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

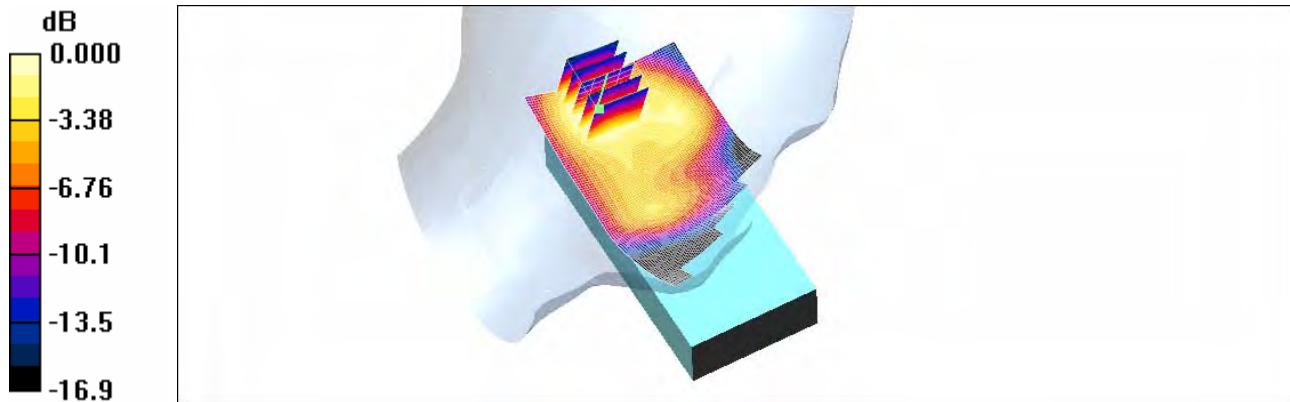
Reference Value = 20.5 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 0.883 W/kg

SAR(1 g) = 0.568 mW/g; SAR(10 g) = 0.340 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.616 mW/g



0 dB = 0.616mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

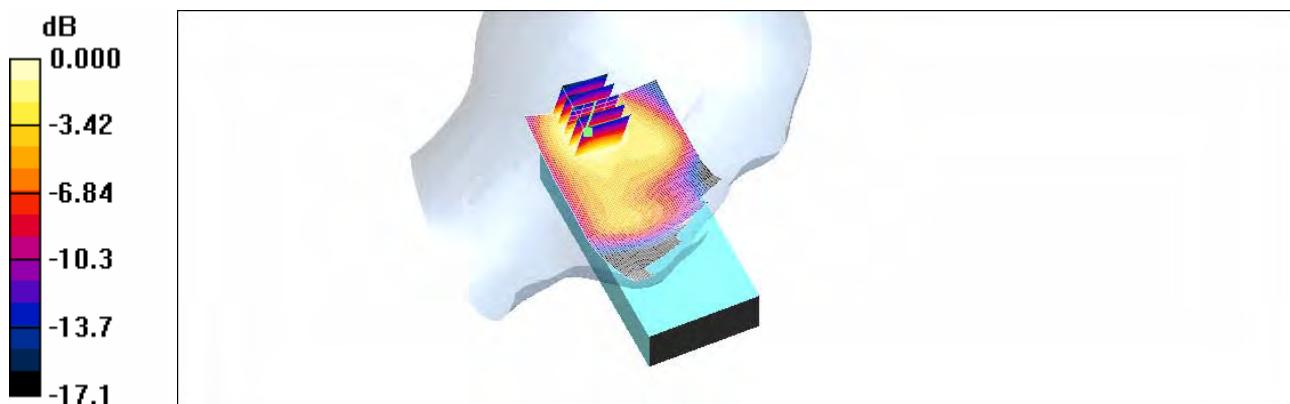
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.42 \text{ mho/m}$ ;  $\epsilon_r = 39.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Left touch 9400/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.938 mW/g

**Left touch 9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 24.7 V/m; Power Drift = 0.070 dB  
Peak SAR (extrapolated) = 1.33 W/kg  
**SAR(1 g) = 0.848 mW/g; SAR(10 g) = 0.510 mW/g**  
Maximum value of SAR (measured) = 0.917 mW/g



0 dB = 0.917mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA1900; Frequency: 1907.6 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1907.6 \text{ MHz}$ ;  $\sigma = 1.46 \text{ mho/m}$ ;  $\epsilon_r = 39.7$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Left touch 9938/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.913 mW/g

**Left touch 9938/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

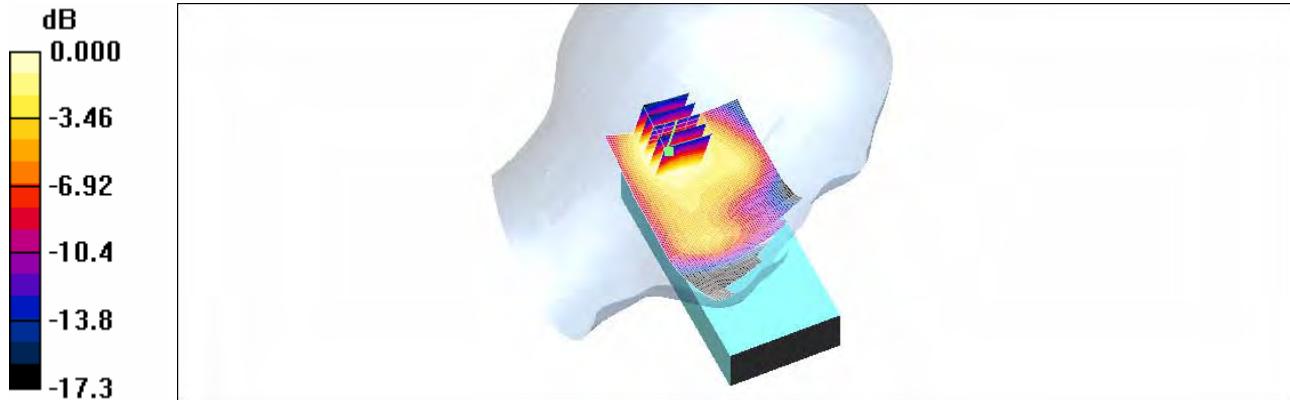
Reference Value = 24.2 V/m; Power Drift = -0.145 dB

Peak SAR (extrapolated) = 1.21 W/kg

SAR(1 g) = 0.770 mW/g; SAR(10 g) = 0.461 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.833 mW/g



0 dB = 0.833mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA1900; Frequency: 1852.4 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Right touch 9262/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.932 mW/g

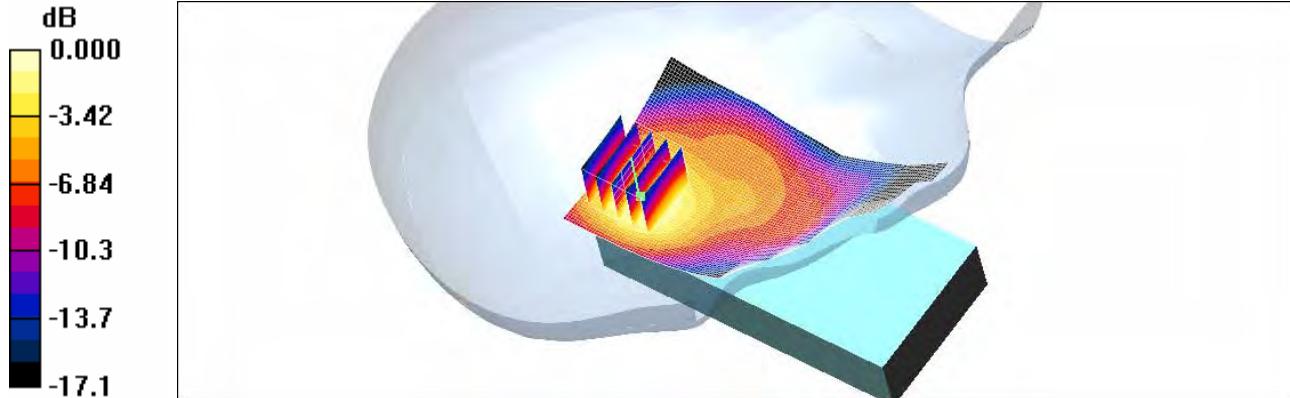
**Right touch 9262/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 20.9 V/m; Power Drift = -0.001 dB

Peak SAR (extrapolated) = 1.47 W/kg

SAR(1 g) = 0.859 mW/g; SAR(10 g) = 0.488 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.945 mW/g



0 dB = 0.945mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

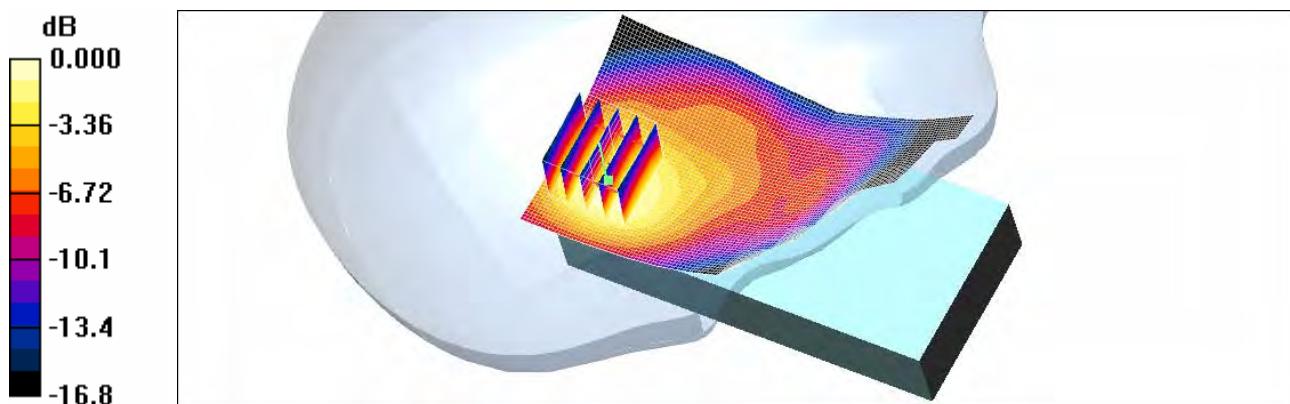
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.42 \text{ mho/m}$ ;  $\epsilon_r = 39.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Right touch 9400/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.24 mW/g

**Right touch 9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 24.3 V/m; Power Drift = -0.052 dB  
Peak SAR (extrapolated) = 1.91 W/kg  
**SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.641 mW/g**  
Maximum value of SAR (measured) = 1.21 mW/g



0 dB = 1.21mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA1900; Frequency: 1907.6 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1907.6 \text{ MHz}$ ;  $\sigma = 1.46 \text{ mho/m}$ ;  $\epsilon_r = 39.7$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Right touch 9538/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 1.02 mW/g

**Right touch 9538/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

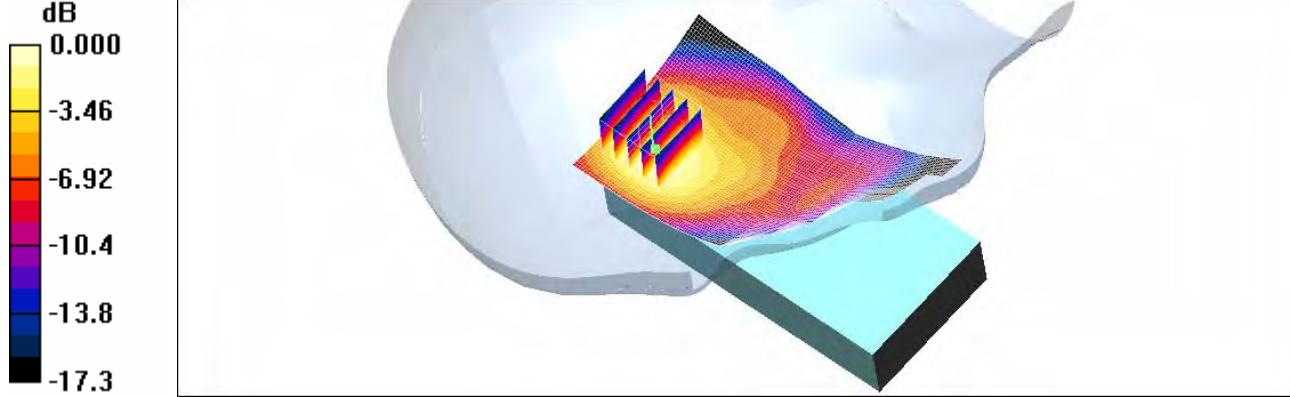
Reference Value = 22.6 V/m; Power Drift = -0.125 dB

Peak SAR (extrapolated) = 1.63 W/kg

SAR(1 g) = 0.931 mW/g; SAR(10 g) = 0.530 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 1.00 mW/g



0 dB = 1.00mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA1900; Frequency: 1852.4 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Left tilt 9262/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.649 mW/g

**Left tilt 9262/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

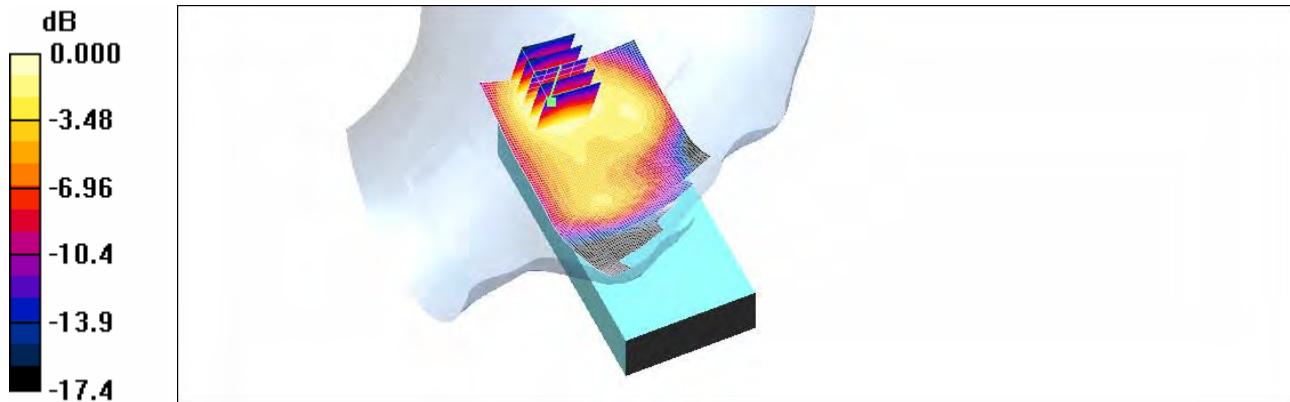
Reference Value = 20.4 V/m; Power Drift = -0.062 dB

Peak SAR (extrapolated) = 0.902 W/kg

SAR(1 g) = 0.578 mW/g; SAR(10 g) = 0.345 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.629 mW/g



0 dB = 0.629mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

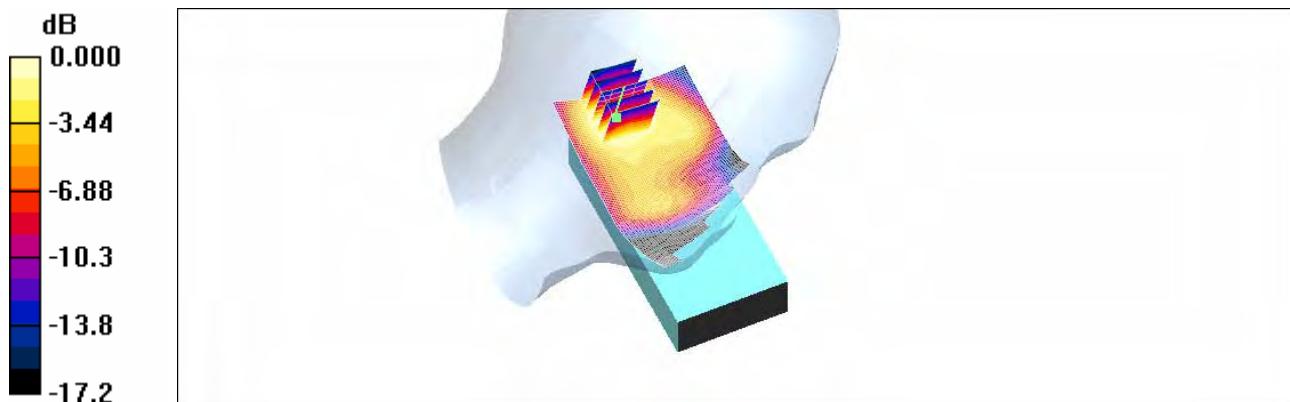
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.42 \text{ mho/m}$ ;  $\epsilon_r = 39.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Left tilt 9400/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.974 mW/g

**Left tilt 9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 25.0 V/m; Power Drift = 0.027 dB  
Peak SAR (extrapolated) = 1.34 W/kg  
**SAR(1 g) = 0.856 mW/g; SAR(10 g) = 0.512 mW/g**  
Maximum value of SAR (measured) = 0.932 mW/g



0 dB = 0.932mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA1900; Frequency: 1907.6 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1907.6 \text{ MHz}$ ;  $\sigma = 1.46 \text{ mho/m}$ ;  $\epsilon_r = 39.7$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Left tilt 9538/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**  
Maximum value of SAR (interpolated) = 0.872 mW/g

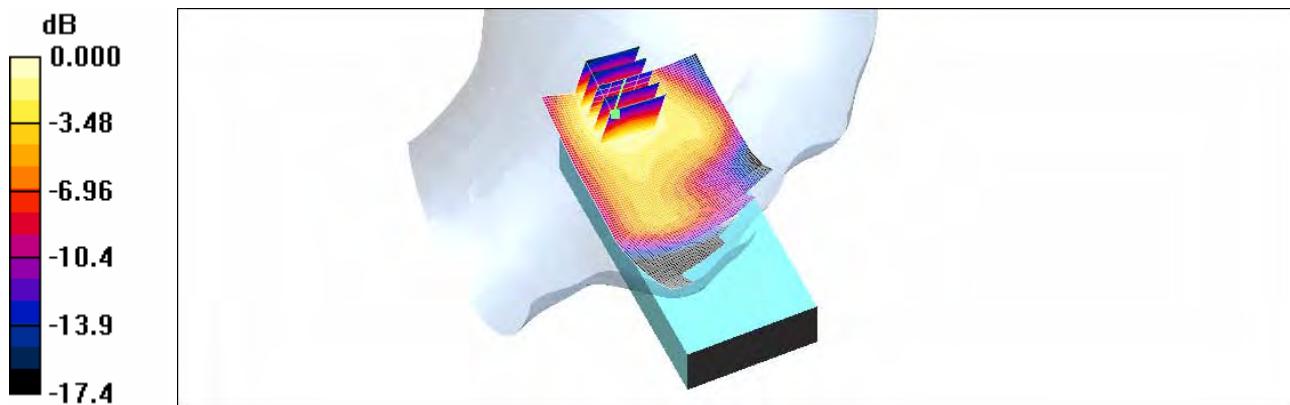
**Left tilt 9538/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 24.3 V/m; Power Drift = -0.107 dB

Peak SAR (extrapolated) = 1.21 W/kg

SAR(1 g) = 0.763 mW/g; SAR(10 g) = 0.456 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**  
Maximum value of SAR (measured) = 0.829 mW/g



0 dB = 0.829mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA1900; Frequency: 1852.4 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Right tilt 9262/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.752 mW/g

**Right tilt 9262/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

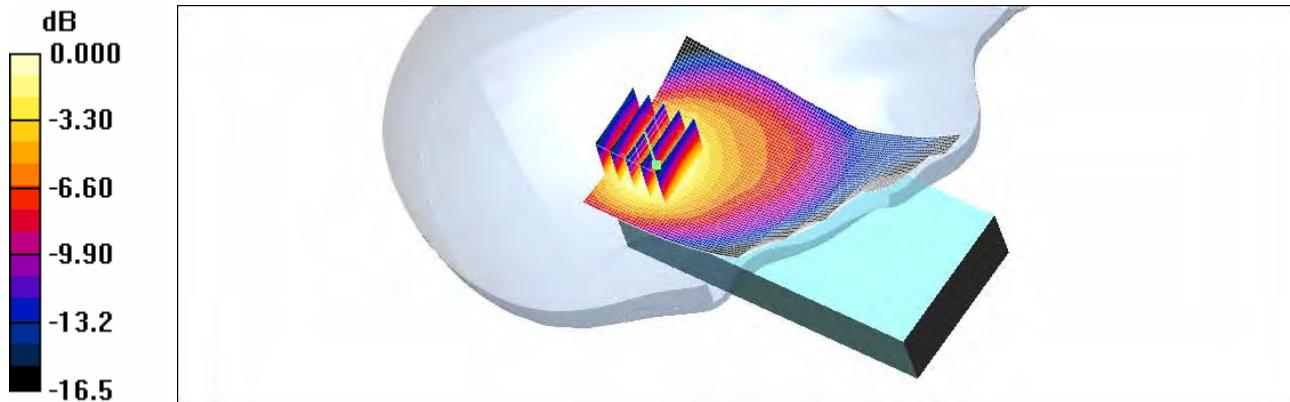
Reference Value = 21.9 V/m; Power Drift = 0.104 dB

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.660 mW/g; SAR(10 g) = 0.390 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.713 mW/g



0 dB = 0.713mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

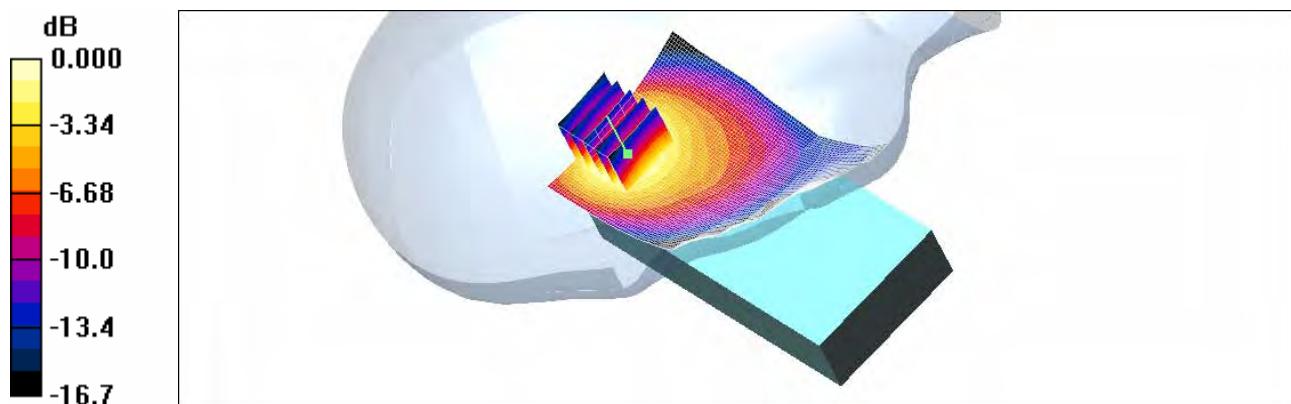
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.42 \text{ mho/m}$ ;  $\epsilon_r = 39.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Right tilt 9400/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.00 mW/g

**Right tilt 9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 25.4 V/m; Power Drift = 0.128 dB  
Peak SAR (extrapolated) = 1.49 W/kg  
 $\text{SAR}(1 \text{ g}) = 0.902 \text{ mW/g}$ ;  $\text{SAR}(10 \text{ g}) = 0.527 \text{ mW/g}$   
Maximum value of SAR (measured) = 0.982 mW/g



0 dB = 0.982mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA1900; Frequency: 1907.6 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1907.6 \text{ MHz}$ ;  $\sigma = 1.46 \text{ mho/m}$ ;  $\epsilon_r = 39.7$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

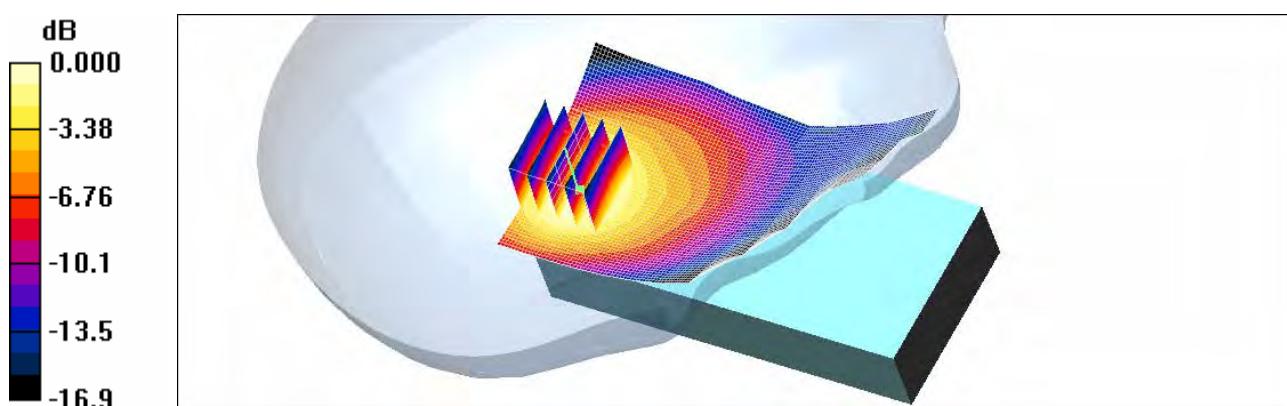
- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Right tilt 9538/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info:** Interpolated medium parameters used for SAR evaluation.  
Maximum value of SAR (interpolated) = 0.874 mW/g

**Right tilt 9538/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 24.1 V/m; Power Drift = 0.047 dB  
Peak SAR (extrapolated) = 1.27 W/kg  
 $\text{SAR}(1 \text{ g}) = 0.757 \text{ mW/g}$ ;  $\text{SAR}(10 \text{ g}) = 0.445 \text{ mW/g}$

**Info:** Interpolated medium parameters used for SAR evaluation.  
Maximum value of SAR (measured) = 0.818 mW/g



0 dB = 0.818mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2.075  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.982 \text{ mho/m}$ ;  $\epsilon_r = 56.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.17, 6.17, 6.17); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Body 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

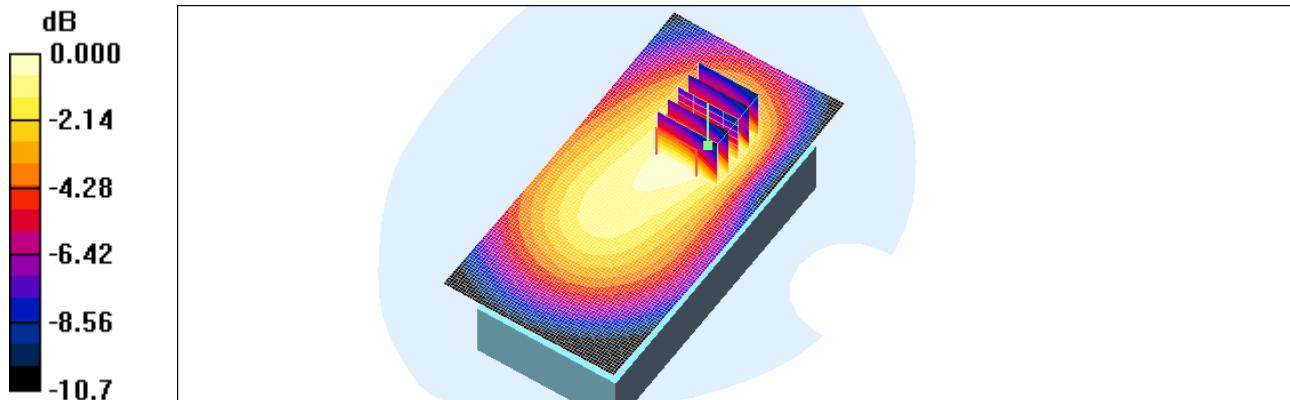
Maximum value of SAR (interpolated) = 0.191 mW/g

**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 13.7 V/m; Power Drift = -0.135 dB

Peak SAR (extrapolated) = 0.233 W/kg

SAR(1 g) = 0.180 mW/g; SAR(10 g) = 0.130 mW/g

Maximum value of SAR (measured) = 0.189 mW/g



0 dB = 0.189mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2.77  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.982 \text{ mho/m}$ ;  $\epsilon_r = 56.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.17, 6.17, 6.17); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Body 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.180 mW/g

**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

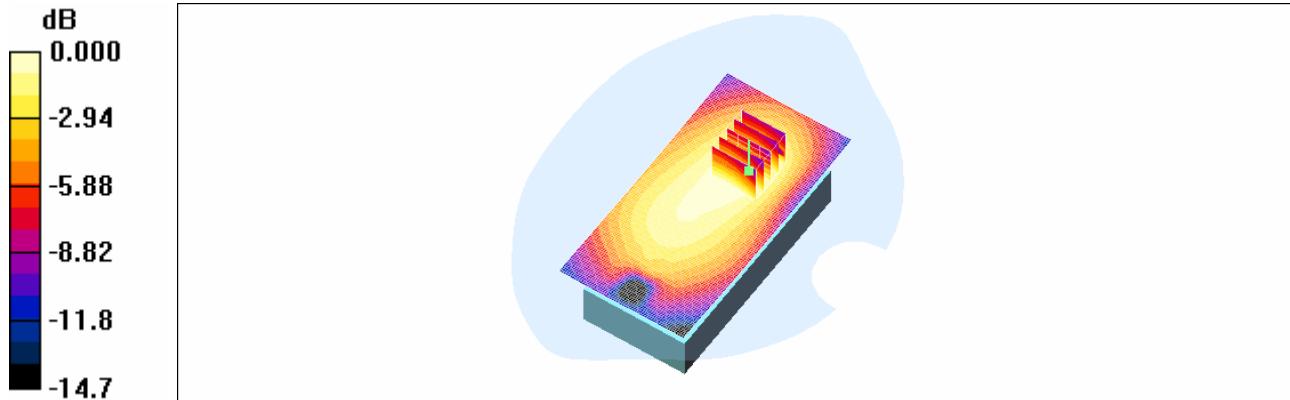
Reference Value = 13.1 V/m; Power Drift = 0.016 dB

Peak SAR (extrapolated) = 0.220 W/kg

SAR(1 g) = 0.170 mW/g; SAR(10 g) = 0.123 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.179 mW/g



0 dB = 0.179mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.982 \text{ mho/m}$ ;  $\epsilon_r = 56.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1630; ConvF(6.17, 6.17, 6.17); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Body 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.191 mW/g

**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

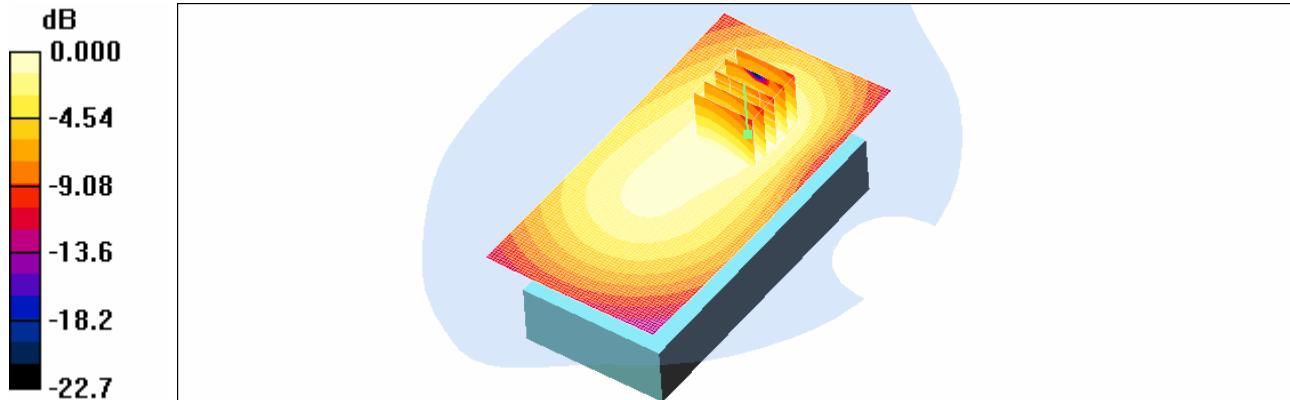
Reference Value = 13.5 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 0.238 W/kg

SAR(1 g) = 0.181 mW/g; SAR(10 g) = 0.131 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.192 mW/g



0 dB = 0.192mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.982 \text{ mho/m}$ ;  $\epsilon_r = 56.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.17, 6.17, 6.17); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Body 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.097 mW/g

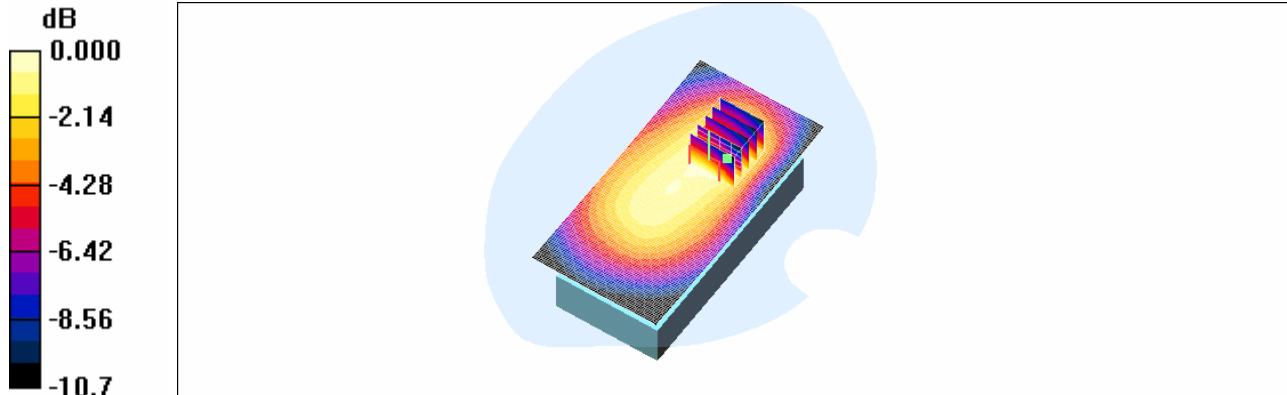
**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.50 V/m; Power Drift = 0.039 dB

Peak SAR (extrapolated) = 0.118 W/kg

SAR(1 g) = 0.092 mW/g; SAR(10 g) = 0.066 mW/g

Maximum value of SAR (measured) = 0.097 mW/g



0 dB = 0.097mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.982 \text{ mho/m}$ ;  $\epsilon_r = 56.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.17, 6.17, 6.17); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Body 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.093 mW/g

**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

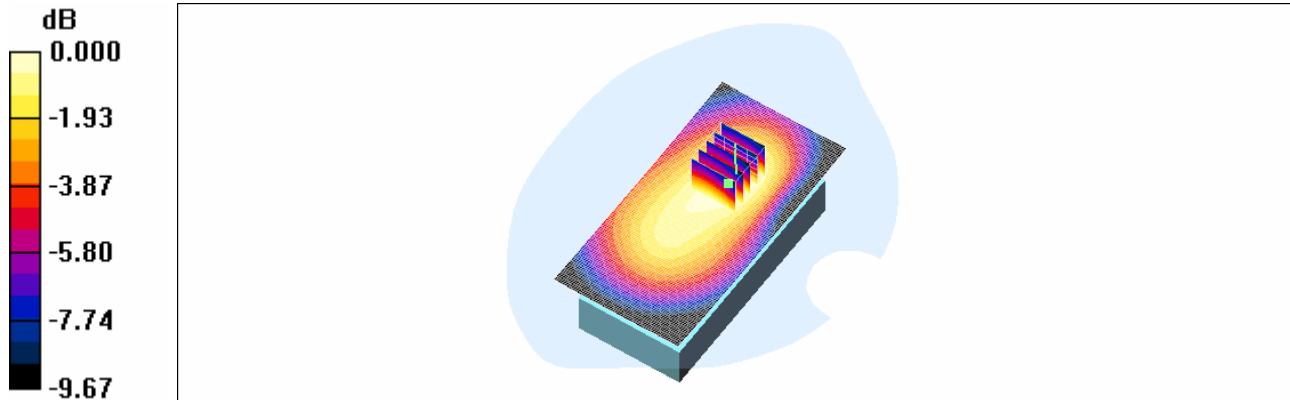
Reference Value = 9.55 V/m; Power Drift = -0.036 dB

Peak SAR (extrapolated) = 0.113 W/kg

SAR(1 g) = 0.087 mW/g; SAR(10 g) = 0.063 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.092 mW/g



0 dB = 0.092mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.982 \text{ mho/m}$ ;  $\epsilon_r = 56.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.17, 6.17, 6.17); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Body 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

## Info: Interpolated medium parameters used for SAR evaluation.

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

**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

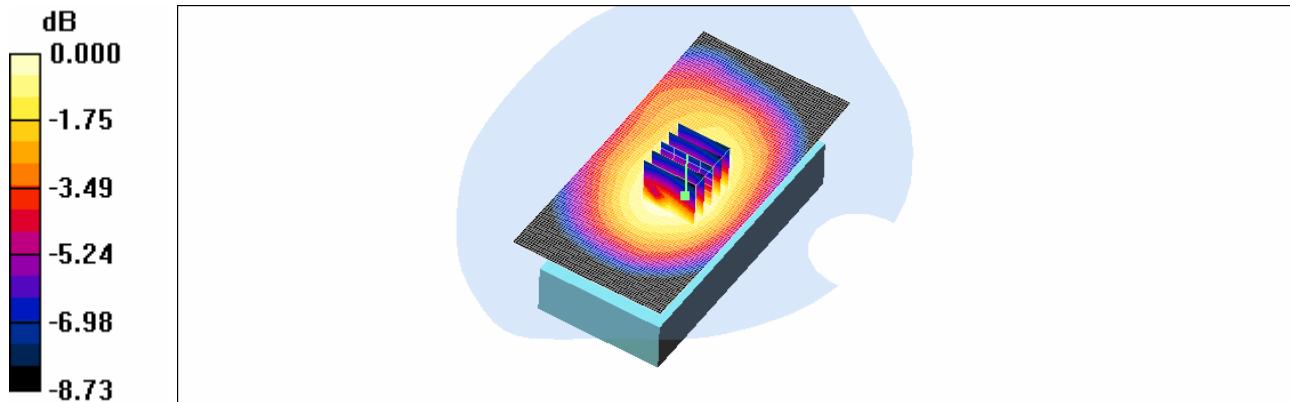
Reference Value = 11.9 V/m; Power Drift = -0.055 dB

Peak SAR (extrapolated) = 0.205 W/kg

SAR(1 g) = 0.123 mW/g; SAR(10 g) = 0.090 mW/g

## Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.128 mW/g



0 dB = 0.128mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

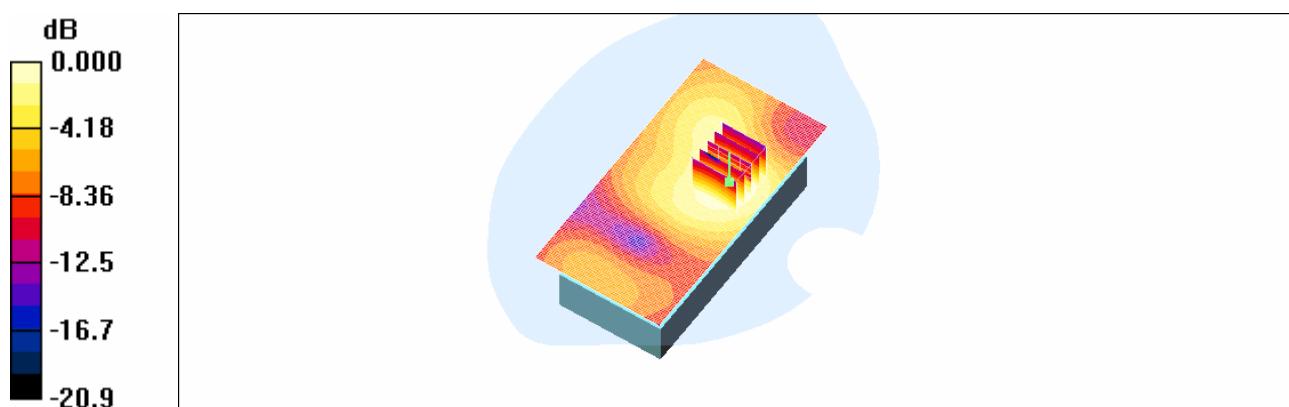
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:2.075  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.48 \text{ mho/m}$ ;  $\epsilon_r = 52.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.55, 4.55, 4.55); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Body 661/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.225 mW/g

**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 10.9 V/m; Power Drift = -0.124 dB  
Peak SAR (extrapolated) = 0.293 W/kg  
**SAR(1 g) = 0.205 mW/g; SAR(10 g) = 0.133 mW/g**  
Maximum value of SAR (measured) = 0.219 mW/g



0 dB = 0.219mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

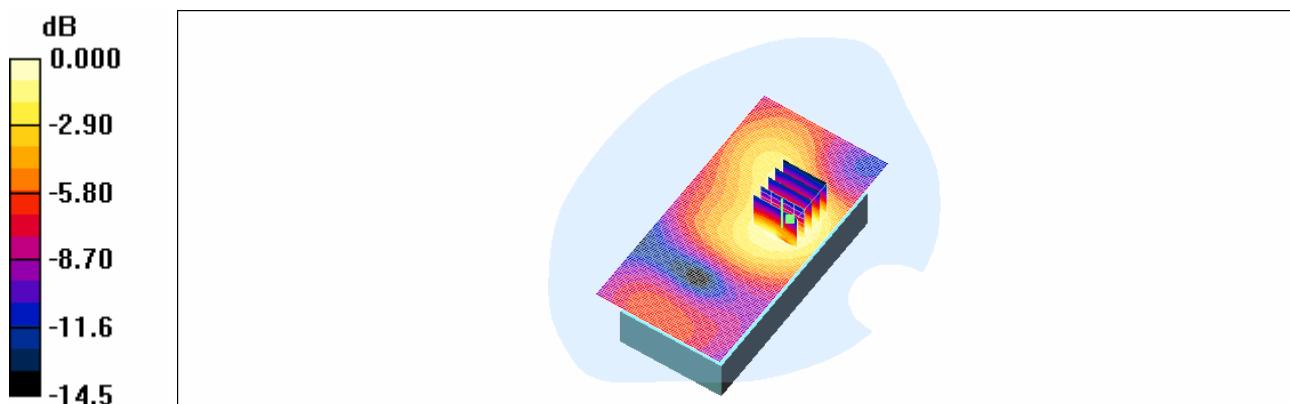
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:2.77  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.48 \text{ mho/m}$ ;  $\epsilon_r = 52.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.55, 4.55, 4.55); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 10.7 V/m; Power Drift = -0.027 dB  
Peak SAR (extrapolated) = 0.290 W/kg  
**SAR(1 g) = 0.202 mW/g; SAR(10 g) = 0.128 mW/g**  
Maximum value of SAR (measured) = 0.213 mW/g

**Body 661/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.216 mW/g



0 dB = 0.216mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

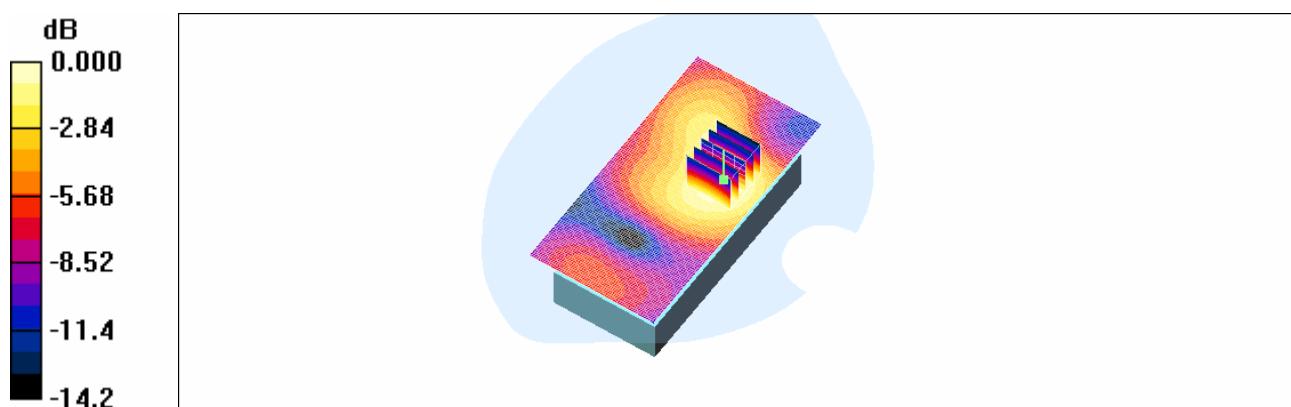
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.48 \text{ mho/m}$ ;  $\epsilon_r = 52.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.55, 4.55, 4.55); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Body 661/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.241 mW/g

**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 11.2 V/m; Power Drift = 0.029 dB  
Peak SAR (extrapolated) = 0.315 W/kg  
**SAR(1 g) = 0.222 mW/g; SAR(10 g) = 0.143 mW/g**  
Maximum value of SAR (measured) = 0.239 mW/g



0 dB = 0.239mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

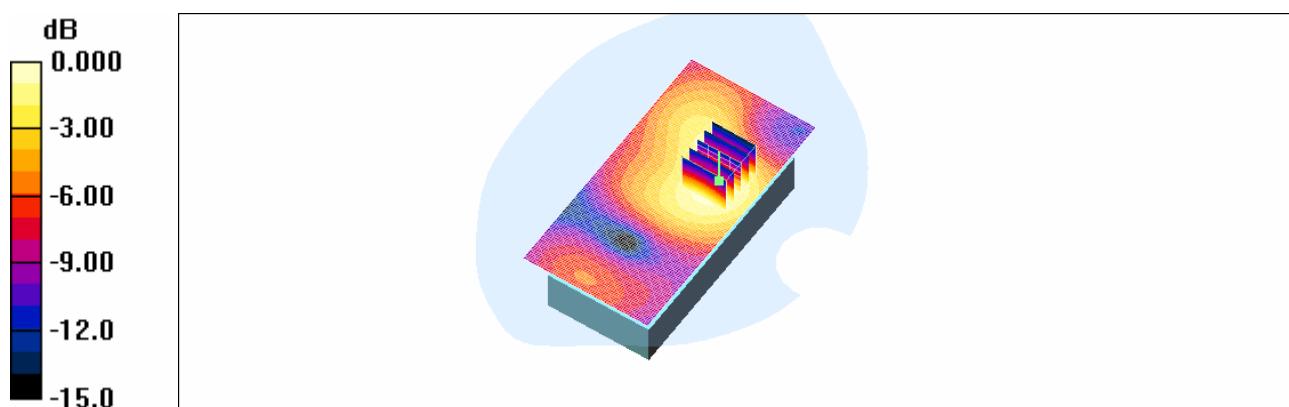
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.48 \text{ mho/m}$ ;  $\epsilon_r = 52.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.55, 4.55, 4.55); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Body 661/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.128 mW/g

**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 8.06 V/m; Power Drift = 0.073 dB  
Peak SAR (extrapolated) = 0.170 W/kg  
**SAR(1 g) = 0.119 mW/g; SAR(10 g) = 0.075 mW/g**  
Maximum value of SAR (measured) = 0.129 mW/g



0 dB = 0.129mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

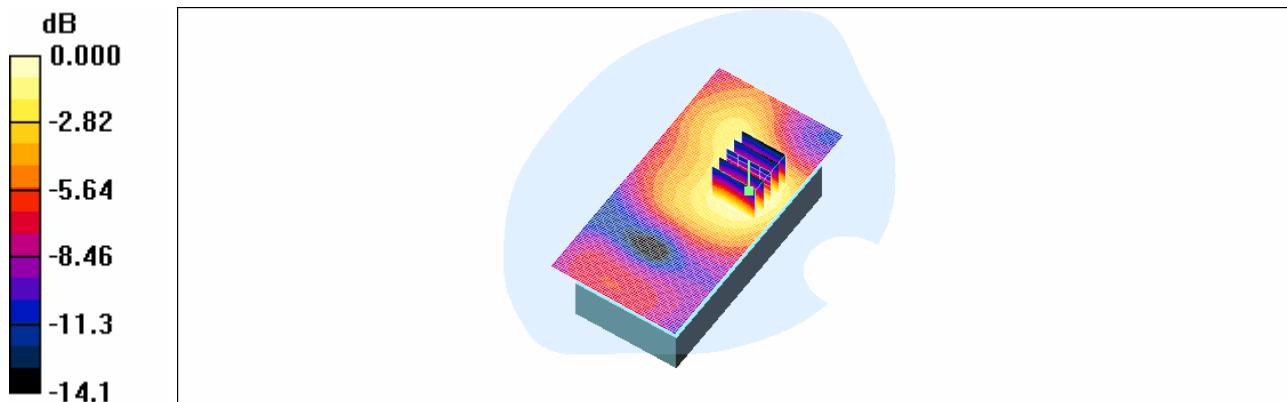
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.48 \text{ mho/m}$ ;  $\epsilon_r = 52.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.55, 4.55, 4.55); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Body 661/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.126 mW/g

**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 8.23 V/m; Power Drift = -0.085 dB  
Peak SAR (extrapolated) = 0.161 W/kg  
**SAR(1 g) = 0.113 mW/g; SAR(10 g) = 0.072 mW/g**  
Maximum value of SAR (measured) = 0.121 mW/g



0 dB = 0.121mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

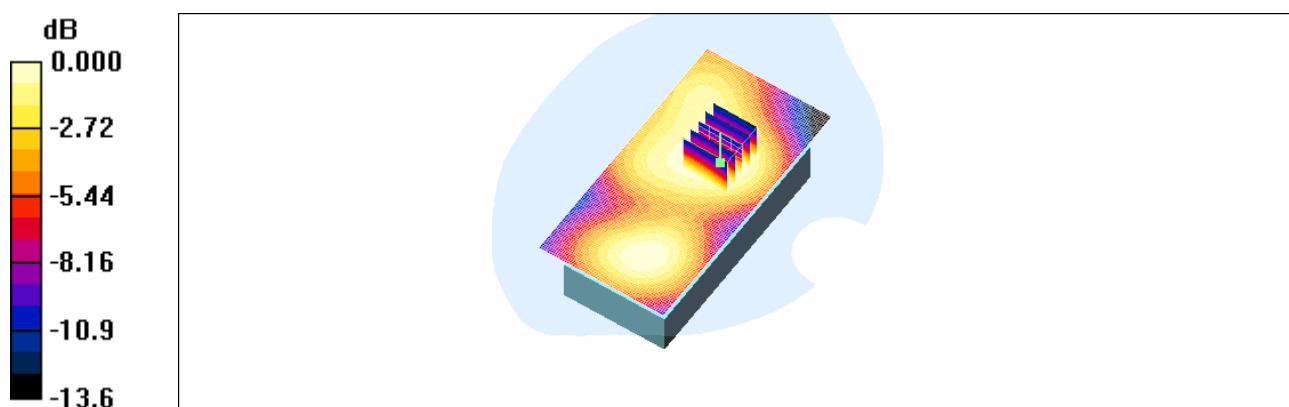
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.48 \text{ mho/m}$ ;  $\epsilon_r = 52.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.55, 4.55, 4.55); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Body 661/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.180 mW/g

**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 11.5 V/m; Power Drift = 0.009 dB  
Peak SAR (extrapolated) = 0.224 W/kg  
**SAR(1 g) = 0.165 mW/g; SAR(10 g) = 0.111 mW/g**  
Maximum value of SAR (measured) = 0.176 mW/g



Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.982 \text{ mho/m}$ ;  $\epsilon_r = 56.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.17, 6.17, 6.17); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Body 4183/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

## Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.278 mW/g

**Body 4183/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

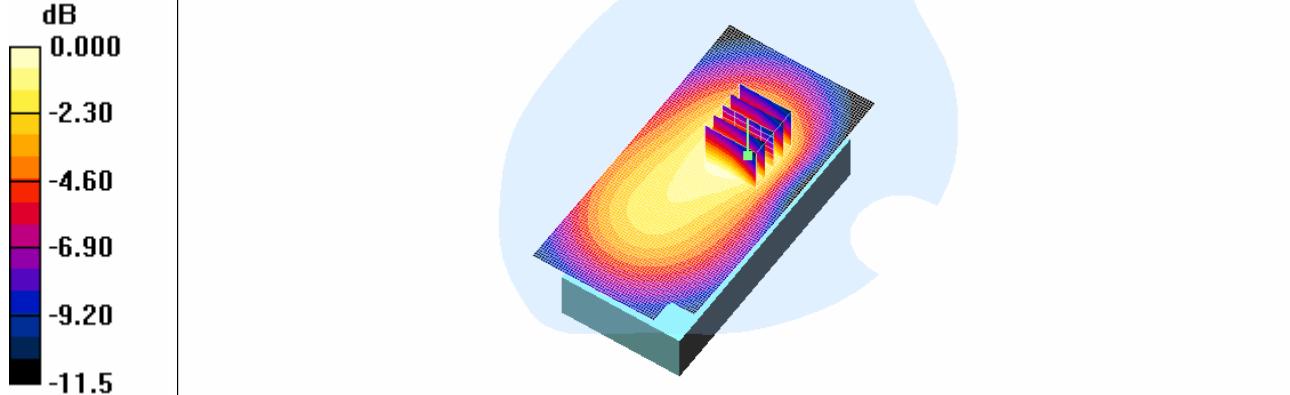
Reference Value = 16.8 V/m; Power Drift = 0.069 dB

Peak SAR (extrapolated) = 0.347 W/kg

SAR(1 g) = 0.257 mW/g; SAR(10 g) = 0.182 mW/g

## Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.272 mW/g



0 dB = 0.272mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.1 °C  
Ambient Temperature: 21.3 °C  
Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.982 \text{ mho/m}$ ;  $\epsilon_r = 56.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1630; ConvF(6.17, 6.17, 6.17); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Body 4183/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (interpolated) = 0.143 mW/g

**Body 4183/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

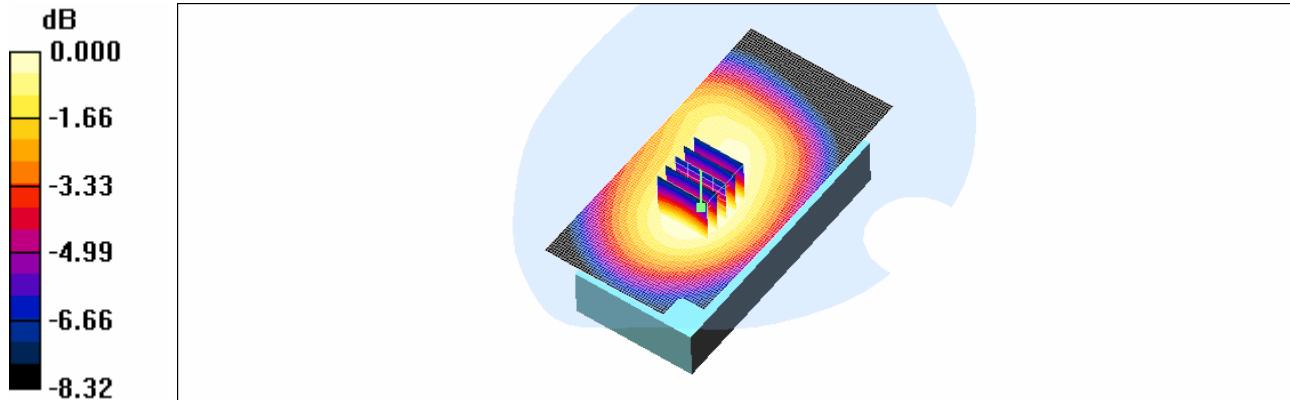
Reference Value = 11.3 V/m; Power Drift = -0.114 dB

Peak SAR (extrapolated) = 0.164 W/kg

SAR(1 g) = 0.130 mW/g; SAR(10 g) = 0.097 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.137 mW/g



0 dB = 0.137mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

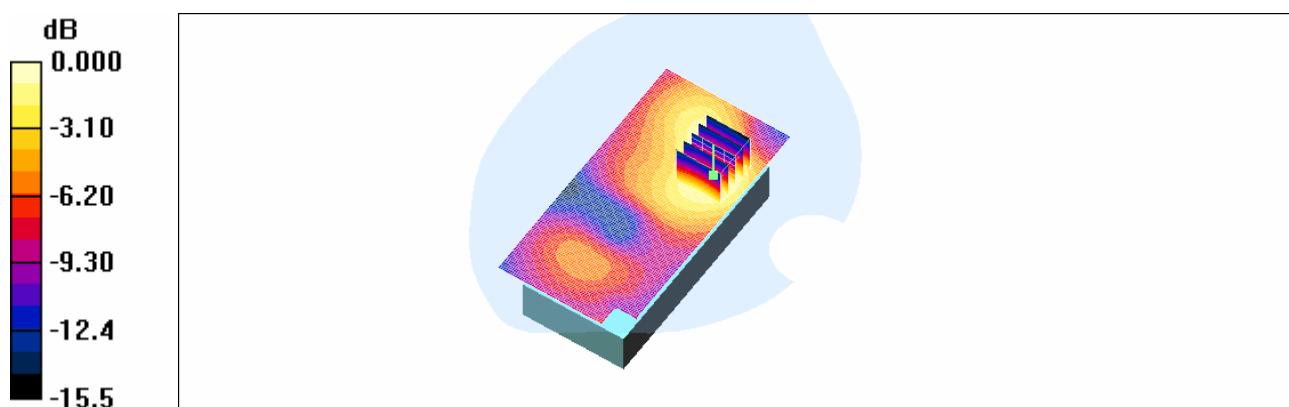
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.48 \text{ mho/m}$ ;  $\epsilon_r = 52.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.55, 4.55, 4.55); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Body 9400/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.510 mW/g

**Body 9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 14.2 V/m; Power Drift = 0.066 dB  
Peak SAR (extrapolated) = 0.680 W/kg  
**SAR(1 g) = 0.457 mW/g; SAR(10 g) = 0.279 mW/g**  
Maximum value of SAR (measured) = 0.503 mW/g



Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

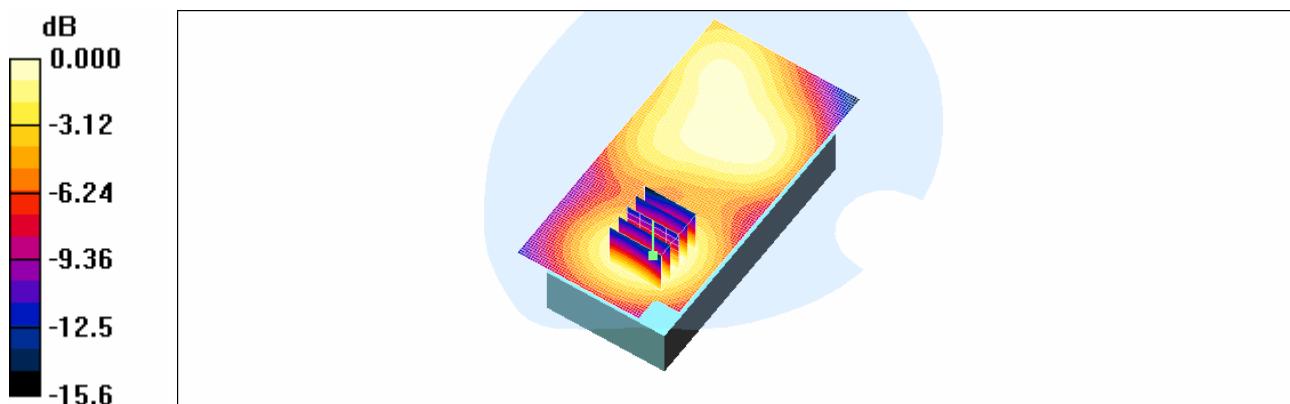
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.48 \text{ mho/m}$ ;  $\epsilon_r = 52.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.55, 4.55, 4.55); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Body 9400/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.245 mW/g

**Body 9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 13.6 V/m; Power Drift = -0.004 dB  
Peak SAR (extrapolated) = 0.307 W/kg  
**SAR(1 g) = 0.220 mW/g; SAR(10 g) = 0.139 mW/g**  
Maximum value of SAR (measured) = 0.238 mW/g



0 dB = 0.238mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT:** Nautiz X3; **Type:** Bar; **Serial:** #1

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.96 \text{ mho/m}$ ;  $\epsilon_r = 52.1$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.15, 4.15, 4.15); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**2450 ch1/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

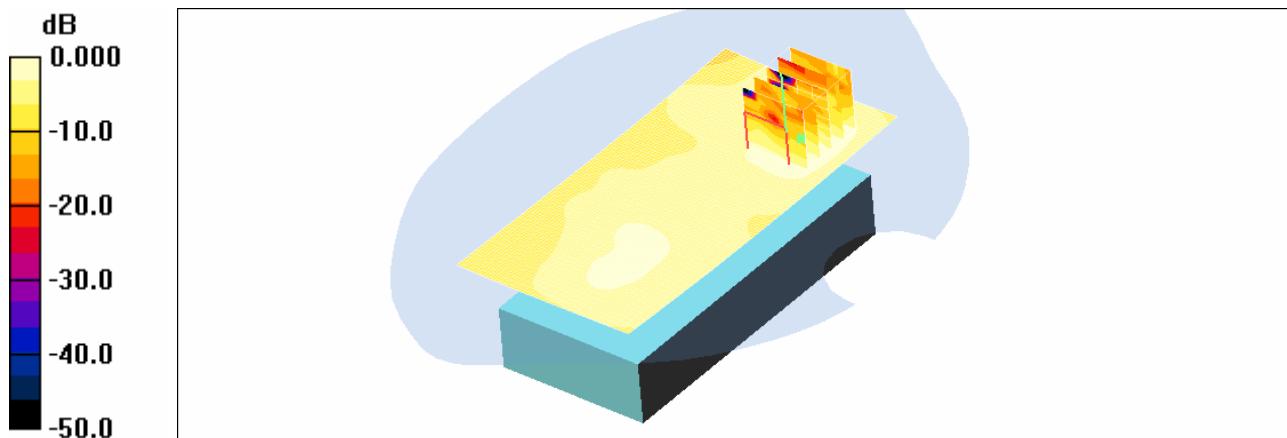
**Info:** Interpolated medium parameters used for SAR evaluation.  
Maximum value of SAR (interpolated) = 0.029 mW/g

**2450 ch1/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 2.83 V/m; Power Drift = -0.040 dB

Peak SAR (extrapolated) = 0.035 W/kg

**SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.012 mW/g**

Maximum value of SAR (measured) = 0.034 mW/g



0 dB = 0.034mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: 2450MHz FCC; Frequency: 2437 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 2437 \text{ MHz}$ ;  $\sigma = 2 \text{ mho/m}$ ;  $\epsilon_r = 51.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.15, 4.15, 4.15); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**2450 ch6/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

## Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.018 mW/g

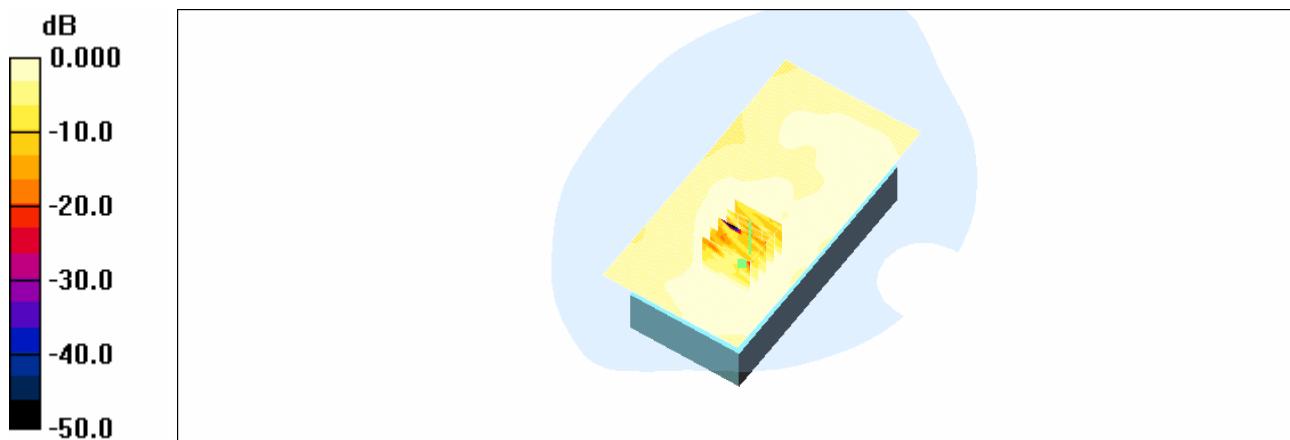
**2450 ch6/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.40 V/m; Power Drift = -0.063 dB

Peak SAR (extrapolated) = 0.067 W/kg

SAR(1 g) = 0.018 mW/g; SAR(10 g) = 0.00925 mW/g

Info: Interpolated medium parameters used for SAR evaluation.  
Maximum value of SAR (measured) = 0.019 mW/g



0 dB = 0.019mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: 2450MHz FCC; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 2462 \text{ MHz}$ ;  $\sigma = 2.03 \text{ mho/m}$ ;  $\epsilon_r = 51.7$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.15, 4.15, 4.15); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**ch11/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

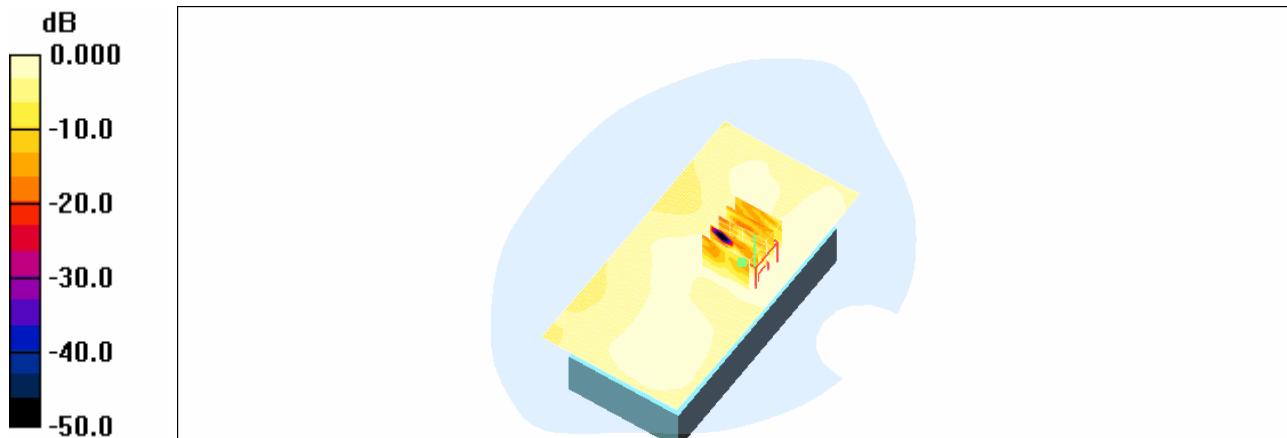
**Info: Interpolated medium parameters used for SAR evaluation.**  
Maximum value of SAR (interpolated) = 0.029 mW/g

**ch11/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 3.12 V/m; Power Drift = -0.085 dB

Peak SAR (extrapolated) = 0.038 W/kg

**SAR(1 g) = 0.026 mW/g; SAR(10 g) = 0.012 mW/g**

Maximum value of SAR (measured) = 0.029 mW/g



0 dB = 0.029mW/g

Test Laboratory: HCT CO., LTD  
 EUT Type: Industrial PDA  
 Liquid Temperature: 21.1 °C  
 Ambient Temperature: 21.3 °C  
 Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
 Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.921 \text{ mho/m}$ ;  $\epsilon_r = 42.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right touch 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

## Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.175 mW/g

**Right touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

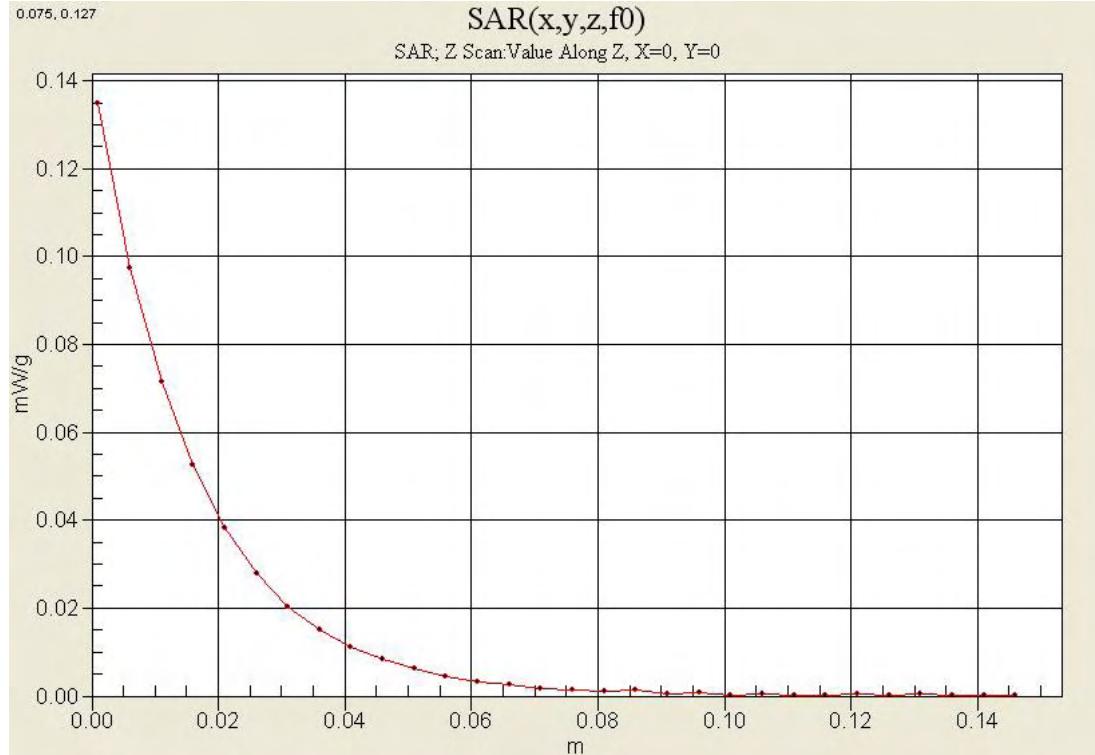
Reference Value = 9.19 V/m; Power Drift = 0.032 dB

Peak SAR (extrapolated) = 0.241 W/kg

SAR(1 g) = 0.155 mW/g; SAR(10 g) = 0.099 mW/g

## Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.167 mW/g



Test Laboratory: HCT CO., LTD  
 EUT Type: Industrial PDA  
 Liquid Temperature: 21.1 °C  
 Ambient Temperature: 21.3 °C  
 Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15  
 Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.982 \text{ mho/m}$ ;  $\epsilon_r = 56.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

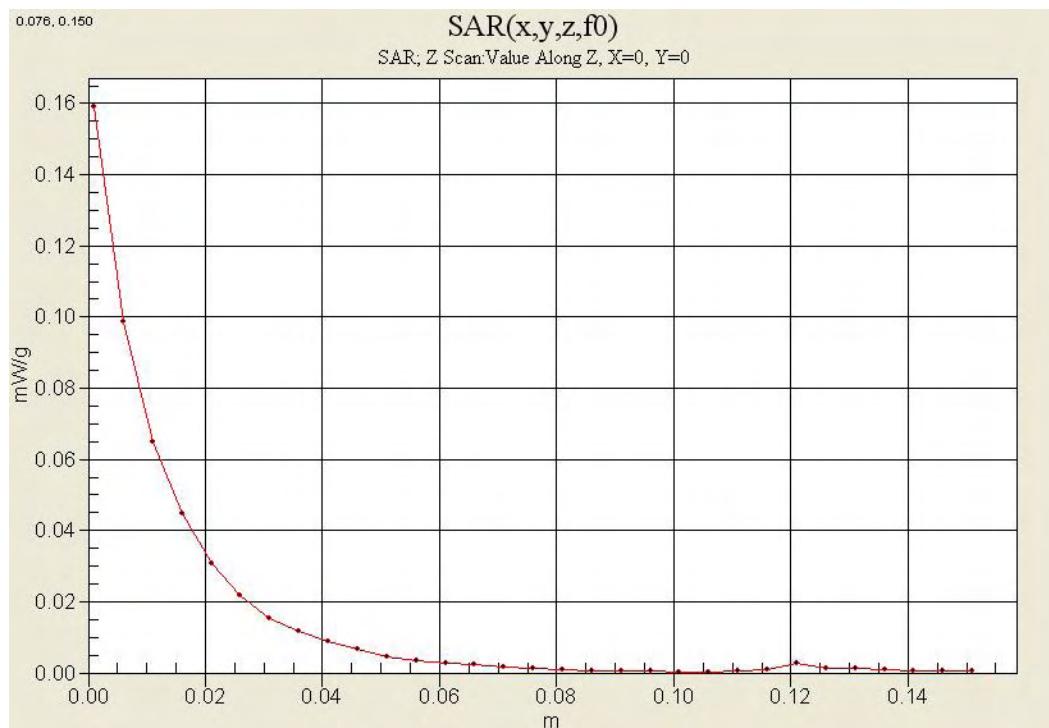
- Probe: ET3DV6 - SN1630; ConvF(6.17, 6.17, 6.17); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Body 190/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**  
 Maximum value of SAR (interpolated) = 0.191 mW/g

**Body 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 13.5 V/m; Power Drift = 0.038 dB  
 Peak SAR (extrapolated) = 0.238 W/kg  
 $\text{SAR}(1 \text{ g}) = 0.181 \text{ mW/g}$ ;  $\text{SAR}(10 \text{ g}) = 0.131 \text{ mW/g}$

**Info: Interpolated medium parameters used for SAR evaluation.**  
 Maximum value of SAR (measured) = 0.192 mW/g



Test Laboratory: HCT CO., LTD  
 EUT Type: Industrial PDA  
 Liquid Temperature: 21.2°C  
 Ambient Temperature: 21.4 °C  
 Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

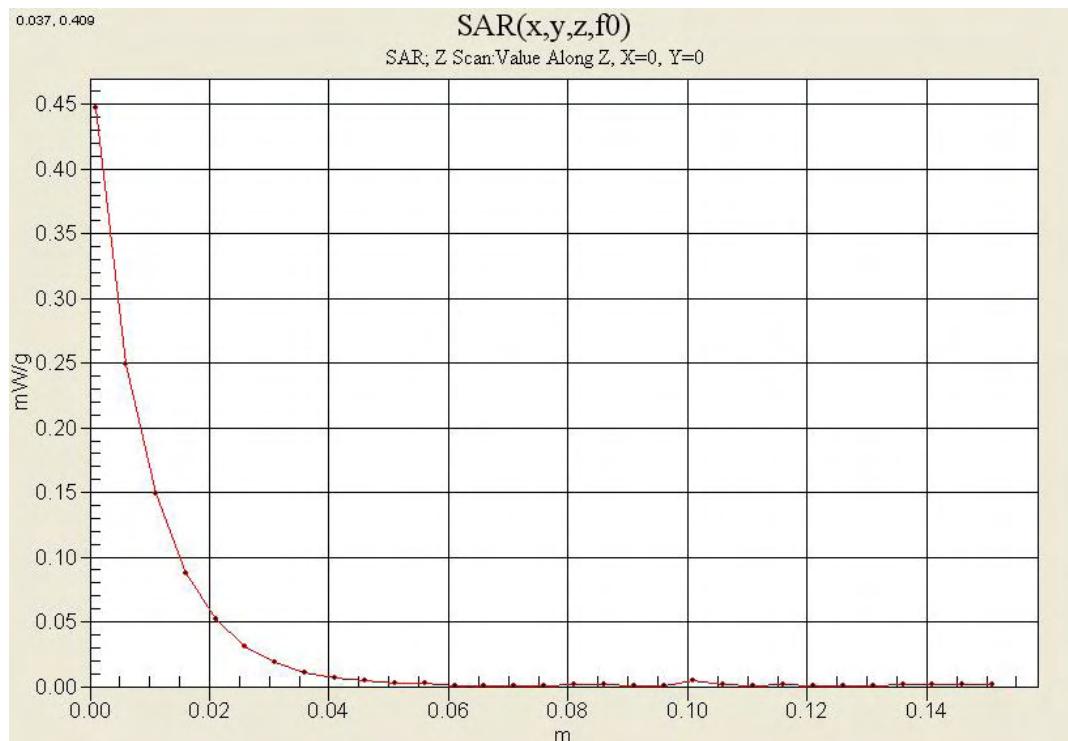
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3  
 Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.42 \text{ mho/m}$ ;  $\epsilon_r = 39.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Right touch 661/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (interpolated) = 0.480 mW/g

**Right touch 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 13.1 V/m; Power Drift = 0.031 dB  
 Peak SAR (extrapolated) = 0.730 W/kg  
**SAR(1 g) = 0.428 mW/g; SAR(10 g) = 0.246 mW/g**  
 Maximum value of SAR (measured) = 0.474 mW/g



Test Laboratory: HCT CO., LTD  
 EUT Type: Industrial PDA  
 Liquid Temperature: 21.2 °C  
 Ambient Temperature: 21.4 °C  
 Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

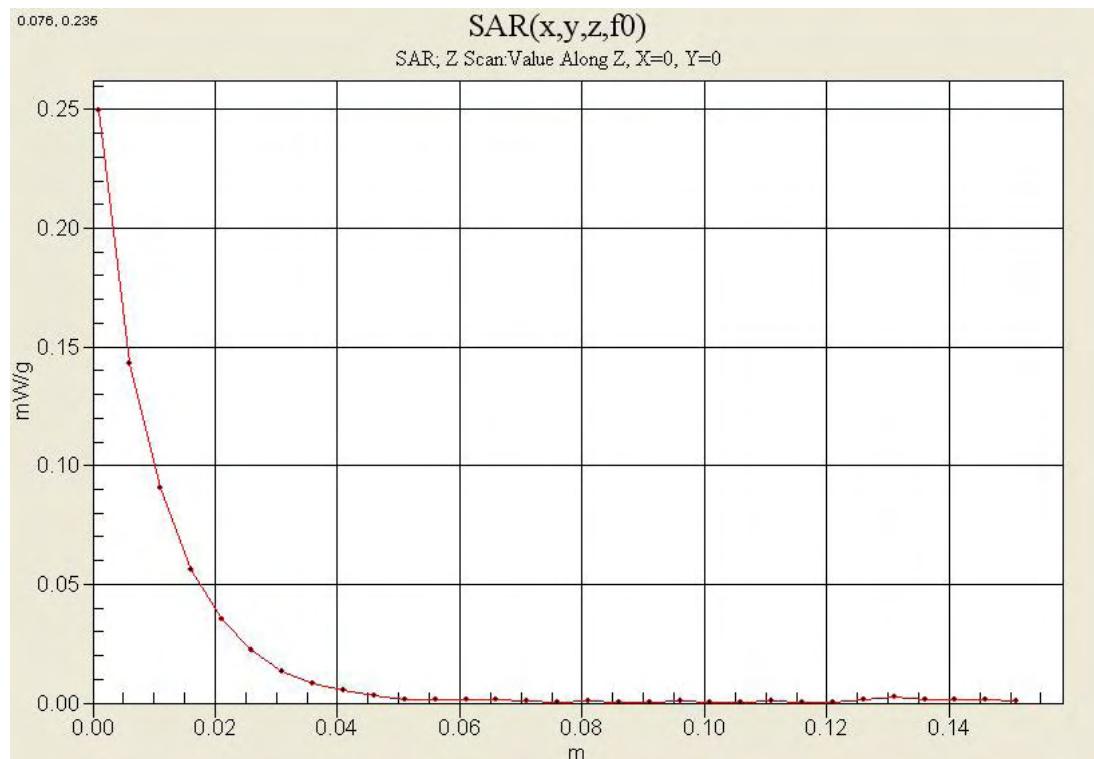
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15  
 Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.48 \text{ mho/m}$ ;  $\epsilon_r = 52.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.55, 4.55, 4.55); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Body 661/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (interpolated) = 0.241 mW/g

**Body 661/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 11.2 V/m; Power Drift = 0.029 dB  
 Peak SAR (extrapolated) = 0.315 W/kg  
 $\text{SAR}(1 \text{ g}) = 0.222 \text{ mW/g}$ ;  $\text{SAR}(10 \text{ g}) = 0.143 \text{ mW/g}$   
 Maximum value of SAR (measured) = 0.239 mW/g



Test Laboratory: HCT CO., LTD  
 EUT Type: Industrial PDA  
 Liquid Temperature: 21.1 °C  
 Ambient Temperature: 21.3 °C  
 Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA850; Frequency: 846.6 MHz; Duty Cycle: 1:1  
 Medium parameters used (interpolated):  $f = 846.6 \text{ MHz}$ ;  $\sigma = 0.931 \text{ mho/m}$ ;  $\epsilon_r = 42.7$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Right touch 4233/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

## Info: Interpolated medium parameters used for SAR evaluation.

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

**Right touch 4233/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

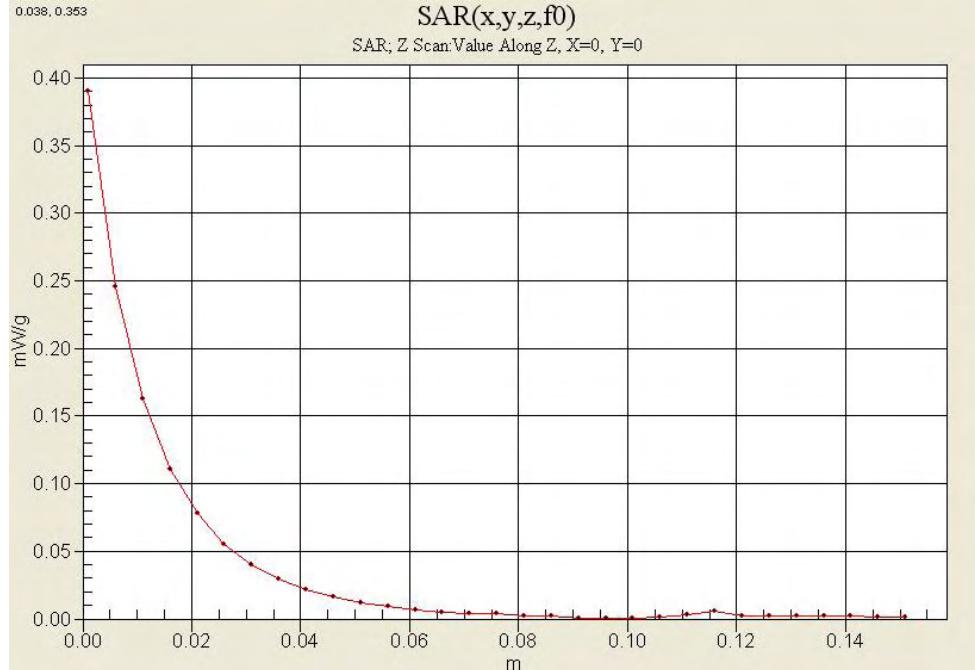
Reference Value = 15.2 V/m; Power Drift = 0.066 dB

Peak SAR (extrapolated) = 0.588 W/kg

SAR(1 g) = 0.377 mW/g; SAR(10 g) = 0.240 mW/g

## Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.409 mW/g



Test Laboratory: HCT CO., LTD  
 EUT Type: Industrial PDA  
 Liquid Temperature: 21.1 °C  
 Ambient Temperature: 21.3 °C  
 Test Date: Dec.13, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1  
 Medium parameters used (interpolated):  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.982 \text{ mho/m}$ ;  $\epsilon_r = 56.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.17, 6.17, 6.17); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Body 4183/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

**Info: Interpolated medium parameters used for SAR evaluation.**  
 Maximum value of SAR (interpolated) = 0.278 mW/g

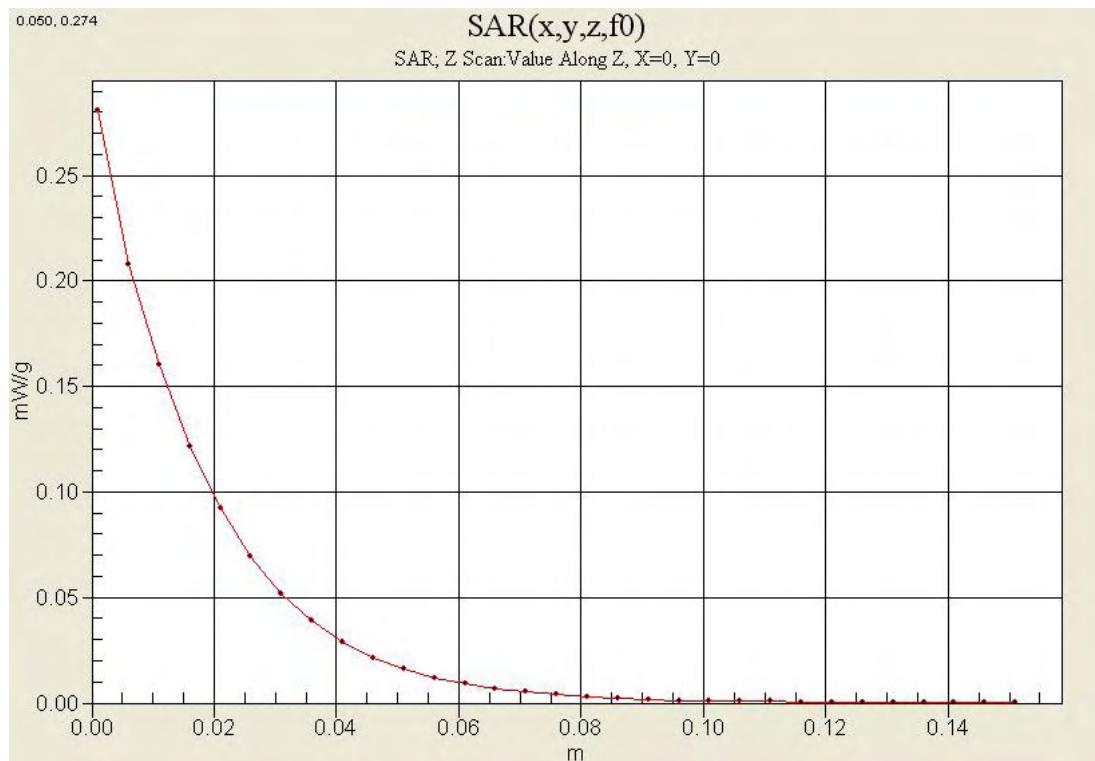
**Body 4183/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.8 V/m; Power Drift = 0.069 dB

Peak SAR (extrapolated) = 0.347 W/kg

SAR(1 g) = 0.257 mW/g; SAR(10 g) = 0.182 mW/g

**Info: Interpolated medium parameters used for SAR evaluation.**  
 Maximum value of SAR (measured) = 0.272 mW/g



Test Laboratory: HCT CO., LTD  
EUT Type: Industrial PDA  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

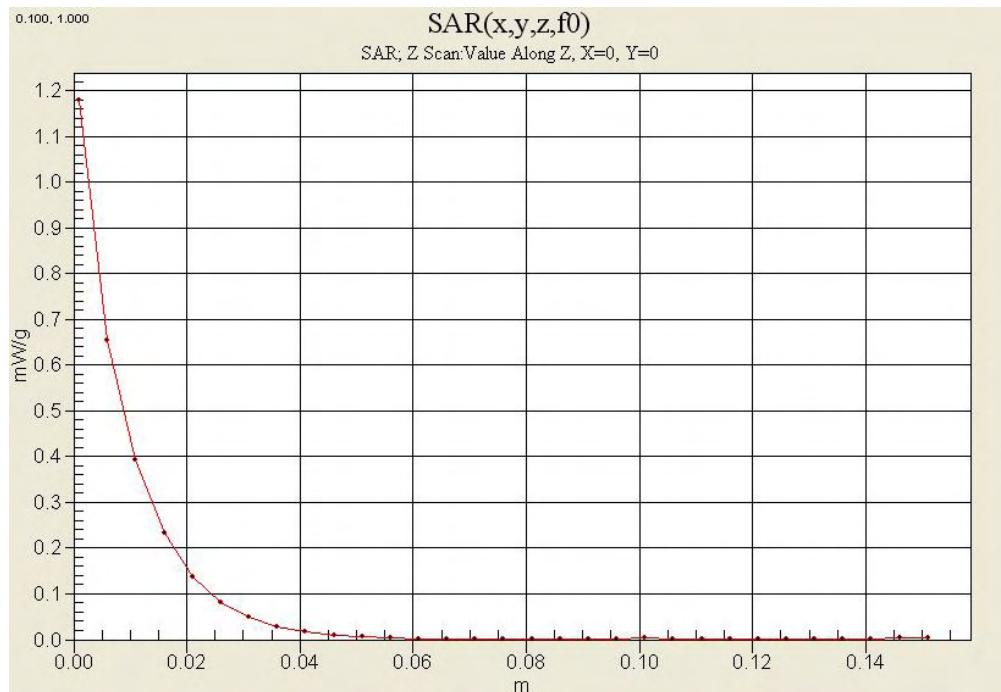
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.42 \text{ mho/m}$ ;  $\epsilon_r = 39.8$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Right touch 9400/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.24 mW/g

**Right touch 9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 24.3 V/m; Power Drift = -0.052 dB  
Peak SAR (extrapolated) = 1.91 W/kg  
**SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.641 mW/g**  
Maximum value of SAR (measured) = 1.21 mW/g



Test Laboratory: HCT CO., LTD  
 EUT Type: Industrial PDA  
 Liquid Temperature: 21.2 °C  
 Ambient Temperature: 21.4 °C  
 Test Date: Dec.14, 2010

**DUT: Nautiz X3; Type: Bar; Serial: #1**

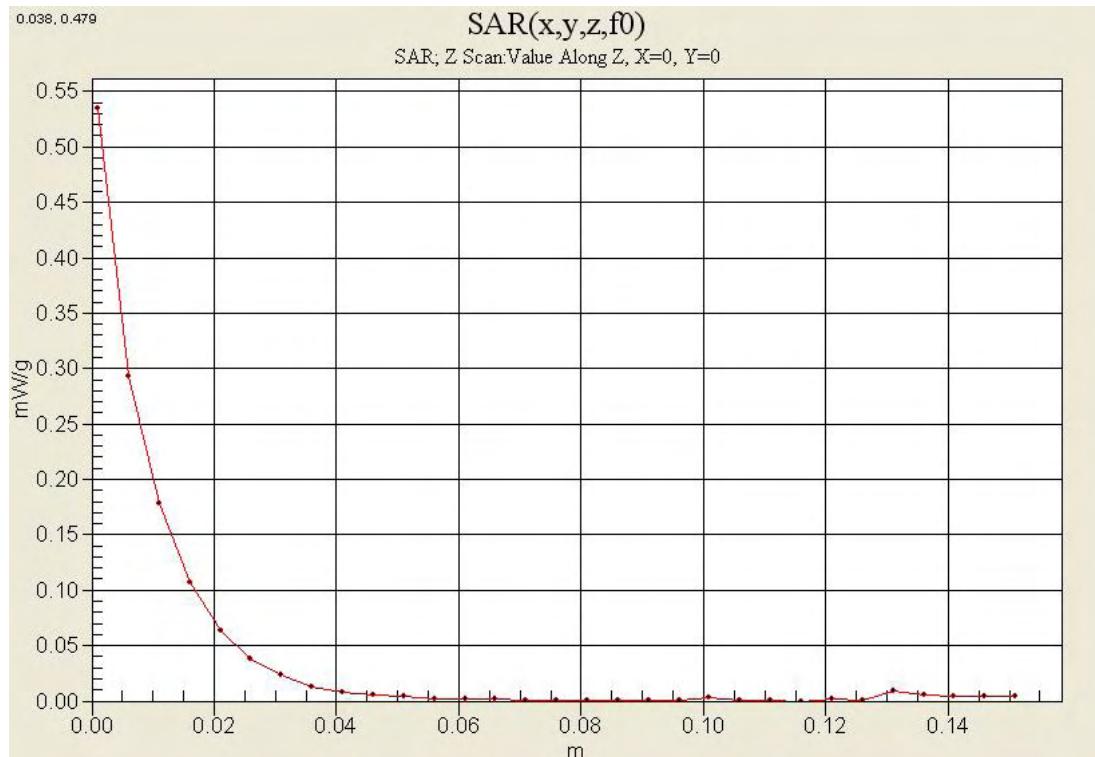
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.48 \text{ mho/m}$ ;  $\epsilon_r = 52.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

## DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(4.55, 4.55, 4.55); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Body 9400/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (interpolated) = 0.510 mW/g

**Body 9400/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 14.2 V/m; Power Drift = 0.066 dB  
 Peak SAR (extrapolated) = 0.680 W/kg  
 $\text{SAR}(1 \text{ g}) = 0.457 \text{ mW/g}$ ;  $\text{SAR}(10 \text{ g}) = 0.279 \text{ mW/g}$   
 Maximum value of SAR (measured) = 0.503 mW/g



## Attachment 2. – Dipole Validation Plots

## ■ Validation Data (835 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.1 °C

Test Date: Dec.13, 2010

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 – SN:441

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.919$  mho/m;  $\epsilon_r = 42.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

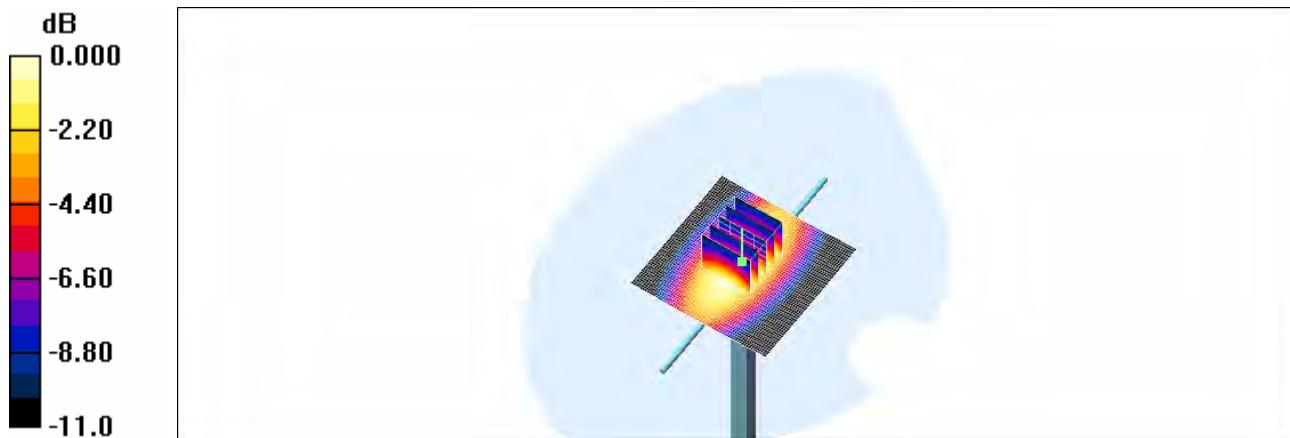
- Probe: ET3DV6 – SN1630; ConvF(6.25, 6.25, 6.25); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Validation 835MHz/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.08 mW/g

**Validation 835MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 35.2 V/m; Power Drift = -0.028 dB

Peak SAR (extrapolated) = 1.46 W/kg

SAR(1 g) = 0.985 mW/g; SAR(10 g) = 0.633 mW/g  
Maximum value of SAR (measured) = 1.07 mW/g



0 dB = 1.07mW/g

## ■ Validation Data (1900 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.1 °C

Test Date: Dec.14, 2010

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 – SN:5d032

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

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.45 \text{ mho/m}$ ;  $\epsilon_r = 39.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1630; ConvF(5.12, 5.12, 5.12); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

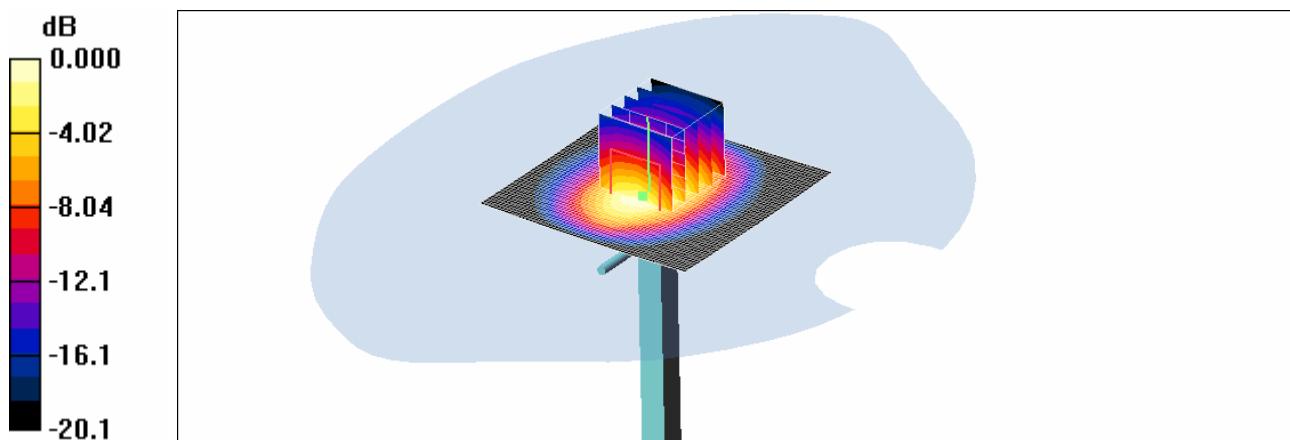
Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 4.65 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 59.7 V/m; Power Drift = -0.103 dB

Peak SAR (extrapolated) = 7.05 W/kg

SAR(1 g) = 3.97 mW/g; SAR(10 g) = 2.06 mW/g

Maximum value of SAR (measured) = 4.47 mW/g



0 dB = 4.47mW/g

## ■ Validation Data (2450 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.1 °C

Test Date: Dec.14, 2010

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 – SN:743

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 2.02 \text{ mho/m}$ ;  $\epsilon_r = 51.8$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

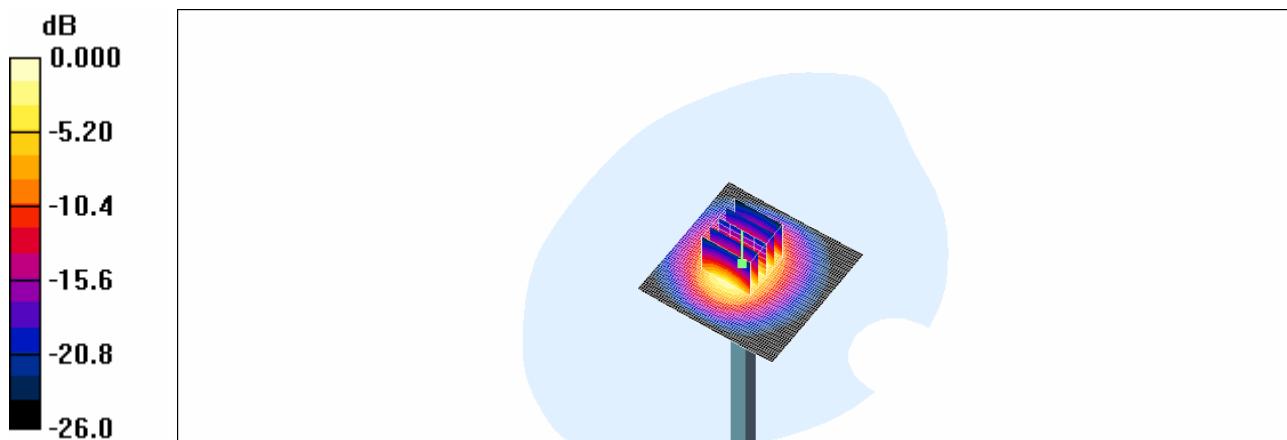
- Probe: ET3DV6 – SN1630; ConvF(4.15, 4.15, 4.15); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Validation 2450MHz/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 6.38 mW/g

**Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 54.9 V/m; Power Drift = -0.024 dB

Peak SAR (extrapolated) = 12.9 W/kg

SAR(1 g) = 5.36 mW/g; SAR(10 g) = 2.38 mW/g  
Maximum value of SAR (measured) = 5.90 mW/g



0 dB = 5.90mW/g

## ■ Validation Data (2450 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.1 °C

Test Date: Dec.14, 2010

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 – SN:743

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 2.02 \text{ mho/m}$ ;  $\epsilon_r = 51.8$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1630; ConvF(4.15, 4.15, 4.15); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2010-09-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

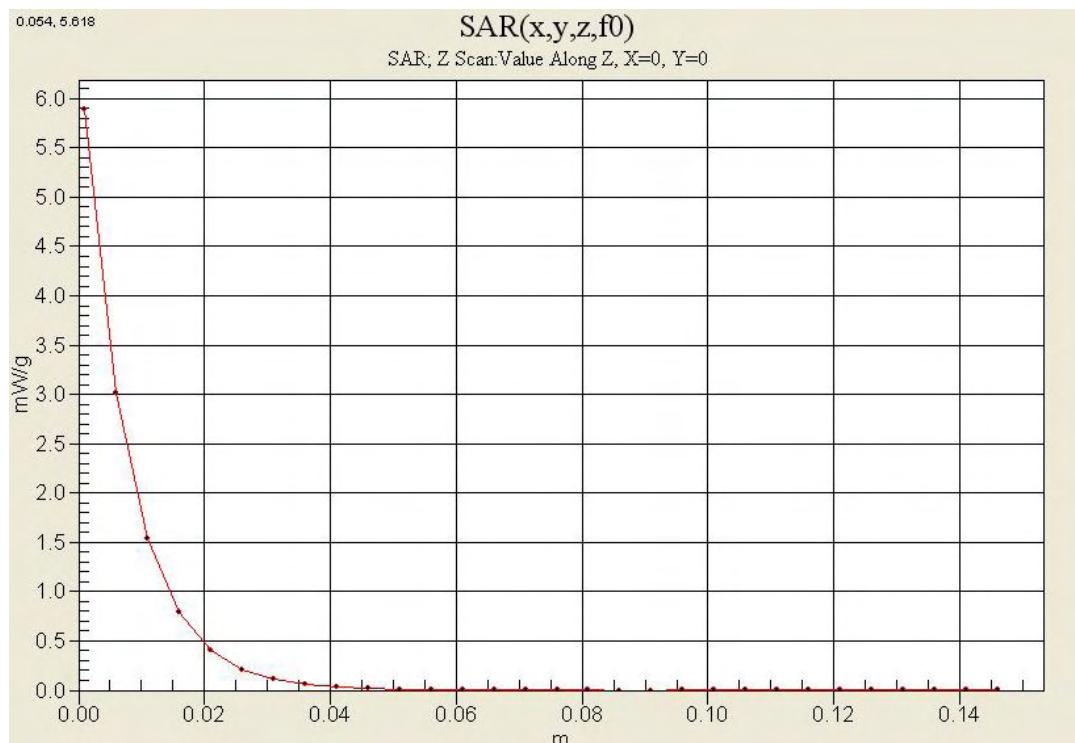
**Validation 2450MHz/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 6.38 mW/g

**Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 54.9 V/m; Power Drift = -0.024 dB

Peak SAR (extrapolated) = 12.9 W/kg

SAR(1 g) = 5.36 mW/g; SAR(10 g) = 2.38 mW/g

Maximum value of SAR (measured) = 5.90mW/g



**■ Dielectric Parameter (835 MHz Head)**

Title NAUTIZ X3  
SubTitle GSM850(Head)  
Test Date Dec.13, 2010

Frequency	$\epsilon'$	$\epsilon''$
800000000.0000	43.3041	19.9319
805000000.0000	43.2462	19.8926
810000000.0000	43.1653	19.8883
815000000.0000	43.1032	19.8644
820000000.0000	43.0270	19.8342
825000000.0000	42.9866	19.8068
830000000.0000	42.8959	19.8168
835000000.0000	42.8674	19.7936
840000000.0000	42.8065	19.7593
845000000.0000	42.7668	19.7742
850000000.0000	42.7082	19.7603
855000000.0000	42.6841	19.7487
860000000.0000	42.6323	19.7366
865000000.0000	42.5699	19.7254
870000000.0000	42.5347	19.7192
875000000.0000	42.5203	19.6843
880000000.0000	42.4381	19.6667
885000000.0000	42.3925	19.6577
890000000.0000	42.3355	19.6382
895000000.0000	42.2881	19.6387
900000000.0000	42.2212	19.6282

**■ Dielectric Parameter (835 MHz Body)**

Title NAUTIZ X3  
SubTitle GSM850(Body)  
Test Date Dec.13, 2010

Frequency	$\epsilon'$	$\epsilon''$
800000000.0000	56.9841	21.3166
805000000.0000	56.9520	21.2692
810000000.0000	56.9485	21.2897
815000000.0000	56.9257	21.1872
820000000.0000	56.9297	21.2081
825000000.0000	56.9107	21.1681
830000000.0000	56.8768	21.1321
835000000.0000	56.8466	21.1170
840000000.0000	56.7899	21.0763
845000000.0000	56.7279	21.0481
850000000.0000	56.7164	20.9875
855000000.0000	56.6161	21.0136
860000000.0000	56.5153	20.9021
865000000.0000	56.4829	20.9085
870000000.0000	56.3581	20.8442
875000000.0000	56.2951	20.7852
880000000.0000	56.2332	20.7793
885000000.0000	56.1915	20.7752
890000000.0000	56.1254	20.7944
895000000.0000	56.0845	20.7423
900000000.0000	56.0636	20.7225

**■ Dielectric Parameter (1900 MHz Head)**

Title NAUTIZ X3  
SubTitle WCDMA1900(Head)  
Test Date Dec.14, 2010

Frequency	$\epsilon'$	$\epsilon''$
1800000000.0000	40.0965	13.4352
1810000000.0000	40.0517	13.4565
1820000000.0000	40.0313	13.4903
1830000000.0000	40.0053	13.5426
1840000000.0000	39.9463	13.5154
1850000000.0000	39.9323	13.5632
1860000000.0000	39.8678	13.5672
1870000000.0000	39.8512	13.5925
1880000000.0000	39.7807	13.6070
1890000000.0000	39.7172	13.6443
1900000000.0000	39.6656	13.6982
1910000000.0000	39.6469	13.7220
1920000000.0000	39.6178	13.7556
1930000000.0000	39.5711	13.7739
1940000000.0000	39.5410	13.8113
1950000000.0000	39.4887	13.8129
1960000000.0000	39.4659	13.8220
1970000000.0000	39.4404	13.8477
1980000000.0000	39.3736	13.8804
1990000000.0000	39.3329	13.9018
2000000000.0000	39.2815	13.9100

**■ Dielectric Parameter (1900 MHz Body)**

Title NAUTIZ X3  
SubTitle WCDMA1900(Body)  
Test Date Dec.14, 2010

Frequency	$\epsilon'$	$\epsilon''$
1800000000.0000	53.1281	13.6446
1810000000.0000	53.1363	13.7170
1820000000.0000	53.1433	13.8266
1830000000.0000	53.0811	13.8918
1840000000.0000	53.0701	13.9300
1850000000.0000	53.0242	13.9633
1860000000.0000	52.9834	14.0322
1870000000.0000	52.9483	14.0528
1880000000.0000	52.8977	14.1059
1890000000.0000	52.8592	14.1303
1900000000.0000	52.8599	14.1479
1910000000.0000	52.8631	14.2249
1920000000.0000	52.8798	14.2712
1930000000.0000	52.8820	14.3382
1940000000.0000	52.9204	14.4181
1950000000.0000	52.9529	14.4853
1960000000.0000	52.9249	14.5553
1970000000.0000	52.9024	14.6021
1980000000.0000	52.8647	14.6310
1990000000.0000	52.7872	14.6882
2000000000.0000	52.7762	14.7067

**■ Dielectric Parameter (2450 MHz Body)**

Title NAUTIZ X3  
SubTitle 2450 MHz (Body)  
Test Date Dec.14, 2010

Frequency	e'	e''
2400000000.0000	52.1714	14.5494
2405000000.0000	52.1271	14.5702
2410000000.0000	52.0967	14.5776
2415000000.0000	52.0390	14.5931
2420000000.0000	51.9912	14.6492
2425000000.0000	51.9113	14.6553
2430000000.0000	51.8875	14.6968
2435000000.0000	51.8520	14.7347
2440000000.0000	51.8206	14.7336
2445000000.0000	51.7557	14.7564
2450000000.0000	51.7550	14.7849
2455000000.0000	51.7221	14.7789
2460000000.0000	51.6933	14.8323
2465000000.0000	51.6888	14.8510
2470000000.0000	51.6861	14.8678
2475000000.0000	51.6449	14.9074
2480000000.0000	51.6458	14.9235
2485000000.0000	51.6030	14.9317
2490000000.0000	51.5989	14.9697
2495000000.0000	51.5956	14.9728
2500000000.0000	51.5415	15.0038

## Attachment 3. – Probe Calibration Data

**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  
**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 **HCT (Dymstec)**Certificate No: **ET3-1630\_May10****CALIBRATION CERTIFICATE**Object **ET3DV6 - SN:1630**Calibration procedure(s) **QA CAL-01.v6, QA CAL-12.v6, QA CAL-23.v3 and QA CAL-25.v2**  
Calibration procedure for dosimetric E-field probesCalibration date: **May 25, 2010**

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  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&amp;TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013 Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

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

Issued: May 25, 2010

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

Certificate No: ET3-1630\_May10

Page 1 of 11

**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  
**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

#### Glossary:

TSL	tissue simulating liquid
NORM $x,y,z$	sensitivity in free space
ConvF	sensitivity in TSL / NORM $x,y,z$
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\theta$	$\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ 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:

- *NORM $x,y,z$* : Assessed for E-field polarization  $\theta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM $x,y,z$  are only intermediate values, i.e., the uncertainties of NORM $x,y,z$  does not effect the E<sup>2</sup>-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORM $x,y,z$  \* 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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z*: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  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 *NORM $x,y,z$  \* 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  $\pm 50$  MHz to  $\pm 100$  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.

ET3DV6 SN:1630

May 25, 2010

# Probe ET3DV6

## SN:1630

Manufactured: October 12, 2001  
Last calibrated: August 25, 2008  
Recalibrated: May 25, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1630

May 25, 2010

**DASY/EASY - Parameters of Probe: ET3DV6 SN:1630****Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	1.65	1.63	1.63	$\pm 10.1\%$
DCP (mV) <sup>B</sup>	93.1	92.2	92.5	

**Modulation Calibration Parameters**

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc <sup>E</sup> (k=2)
10000	CW	0.00	X Y Z	0.00 0.00 0.00	0.00 0.00 0.00	1.00 1.00 1.00	300.0 300.0 300.0	$\pm 1.5\%$

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%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E-field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the maximum deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

ET3DV6 SN:1630

May 25, 2010

**DASY/EASY - Parameters of Probe: ET3DV6 SN:1630****Calibration Parameter Determined in Head Tissue Simulating Media**

f [MHz]	Validity [MHz] <sup>C</sup>	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	43.5 ± 5%	0.87 ± 5%	7.20	7.20	7.20	0.21	2.26 ± 13.3%
835	± 50 / ± 100	41.9 ± 5%	0.89 ± 5%	6.25	6.25	6.25	0.50	2.09 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	6.13	6.13	6.13	0.52	2.09 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.38	5.38	5.38	0.51	2.57 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.12	5.12	5.12	0.72	2.10 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.96	4.96	4.96	0.76	2.02 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.58	4.58	4.58	0.99	1.63 ± 11.0%

<sup>C</sup> 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.

ET3DV6 SN:1630

May 25, 2010

**DASY/EASY - Parameters of Probe: ET3DV6 SN:1630****Calibration Parameter Determined in Body Tissue Simulating Media**

f [MHz]	Validity [MHz] <sup>c</sup>	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	56.7 ± 5%	0.94 ± 5%	7.48	7.48	7.48	0.15	2.30 ± 13.3%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	6.17	6.17	6.17	0.42	2.43 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.77	4.77	4.77	0.66	2.88 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.55	4.55	4.55	0.87	2.41 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.64	4.64	4.64	0.94	2.32 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.15	4.15	4.15	0.99	1.47 ± 11.0%

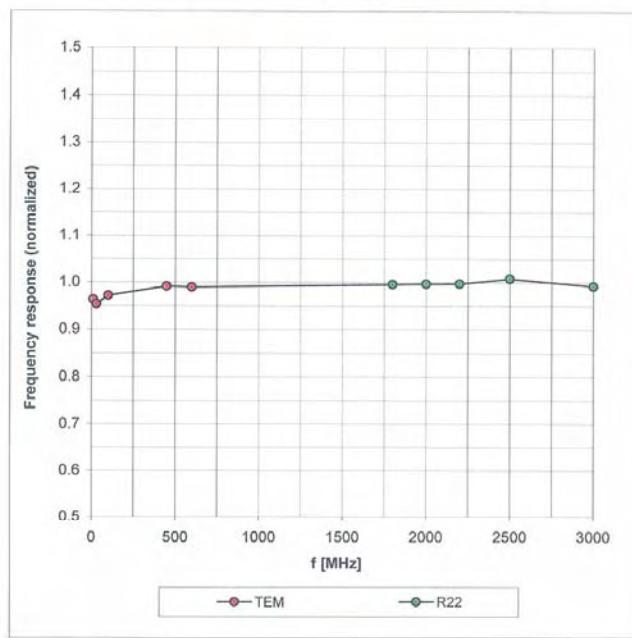
<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ET3DV6 SN:1630

May 25, 2010

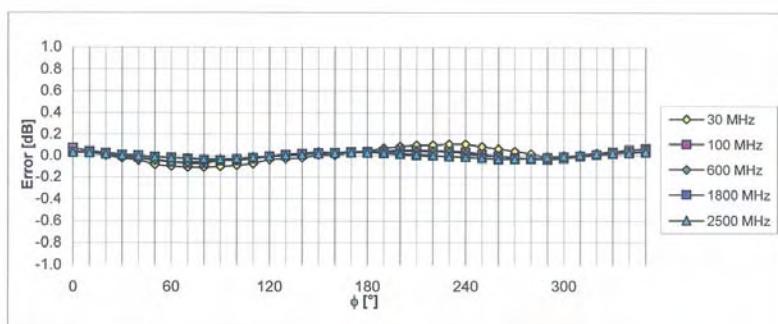
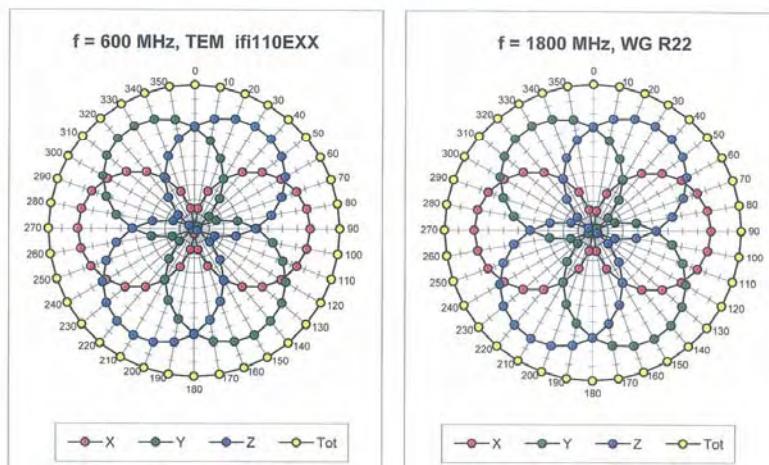
**Frequency Response of E-Field**

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

Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

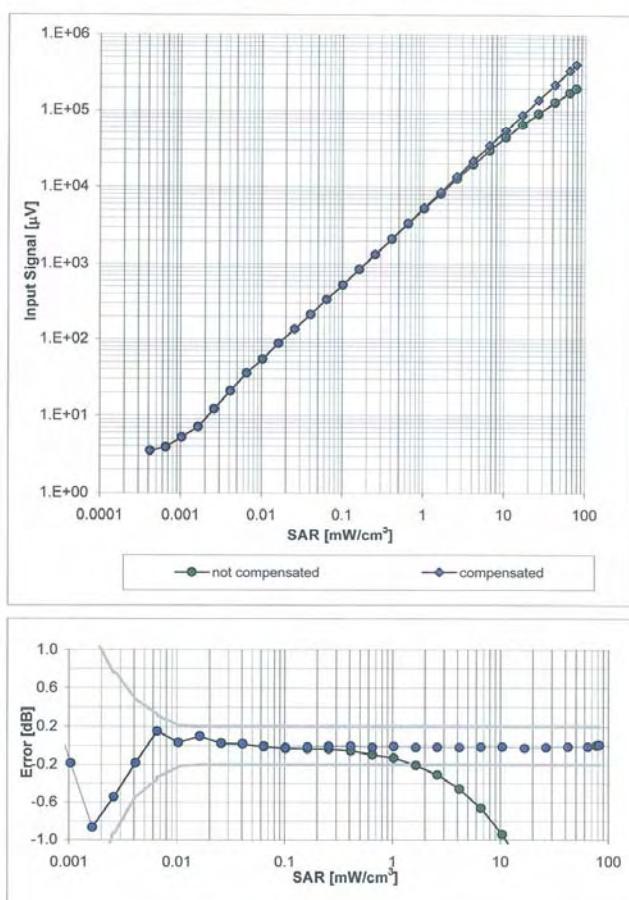
ET3DV6 SN:1630

May 25, 2010

Receiving Pattern ( $\phi$ ),  $\theta = 0^\circ$ Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

ET3DV6 SN:1630

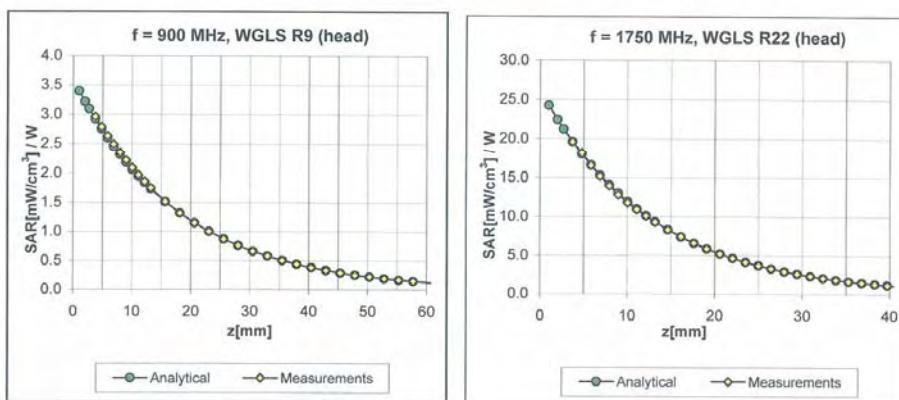
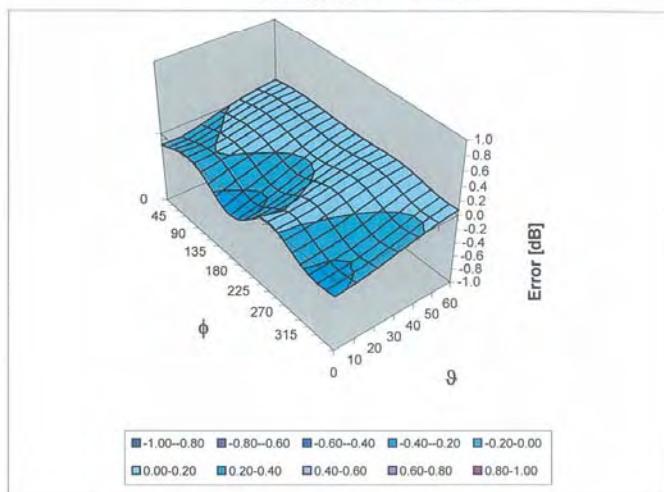
May 25, 2010

**Dynamic Range f(SAR<sub>head</sub>)**  
(Waveguide R22, f = 1800 MHz)

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

ET3DV6 SN:1630

May 25, 2010

**Conversion Factor Assessment****Deviation from Isotropy in HSL**Error ( $\phi, \theta$ ), f = 900 MHzUncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  ( $k=2$ )

ET3DV6 SN:1630

May 25, 2010

**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

Schmid &amp; Partner Engineering AG

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Zeughausstrasse 43, 8004 Zurich, Switzerland  
Phone +41 44 245 9790, Fax +41 44 245 9779  
info@speag.com, http://www.speag.com

**Additional Conversion Factors**

for Dosimetric E-Field Probe

Type: **ET3DV6**Serial Number: **1630**Place of Assessment: **Zurich**Date of Assessment: **July 9, 2010**Probe Calibration Date: **May 25, 2010**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1750 MHz.

Assessed by: 

Schmid &amp; Partner Engineering AG

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

**Dosimetric E-Field Probe ET3DV6 - SN:1630**Conversion factor ( $\pm$  standard deviation)750  $\pm$  50 MHz      ConvF      6.44  $\pm$  7% $\epsilon_r = 41.9 \pm 5\%$  $\sigma = 0.89 \pm 5\% \text{ mho/m}$   
(head tissue)750  $\pm$  50 MHz      ConvF      6.30  $\pm$  7% $\epsilon_r = 55.5 \pm 5\%$  $\sigma = 0.96 \pm 5\% \text{ mho/m}$   
(body tissue)**Important Note:**

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also DASY Manual.

## Attachment 4. – Dipole Calibration Data

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Zeughausstrasse 43, 8004 Zurich, Switzerland



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client HCT (Dymstec)

Certificate No: D835V2-441\_May10

## CALIBRATION CERTIFICATE

Object	D835V2 - SN: 441		
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits		
Calibration date:	May 21, 2010		
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (<math>22 \pm 3</math>)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p>			
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	02-Mar-10 (No. DAE4-601_Mar10)	Mar-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10
Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature 
Approved by:	Katja Pokovic	Technical Manager	
Issued: May 21, 2010			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

#### 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	V5.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.7 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature during test	(22.5 ± 0.2) °C	---	---

**SAR result with Head TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR normalized	normalized to 1W	9.72 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.66 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.58 mW / g
SAR normalized	normalized to 1W	6.32 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.29 mW / g ± 16.5 % (k=2)

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	0.98 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

**SAR result with Body TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.51 mW / g
SAR normalized	normalized to 1W	10.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.92 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.64 mW / g
SAR normalized	normalized to 1W	6.56 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.51 mW / g ± 16.5 % (k=2)

**Appendix****Antenna Parameters with Head TSL**

Impedance, transformed to feed point	55.2 $\Omega$ - 8.2 $j\Omega$
Return Loss	- 20.8 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	45.3 $\Omega$ - 9.4 $j\Omega$
Return Loss	- 19.2 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.375 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

Manufactured by	SPEAG
Manufactured on	March 09, 2001

**DASY5 Validation Report for Head TSL**

Date/Time: 21.05.2010 09:55:07

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:441**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL900

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.91 \text{ mho/m}$ ;  $\epsilon_r = 41.9$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

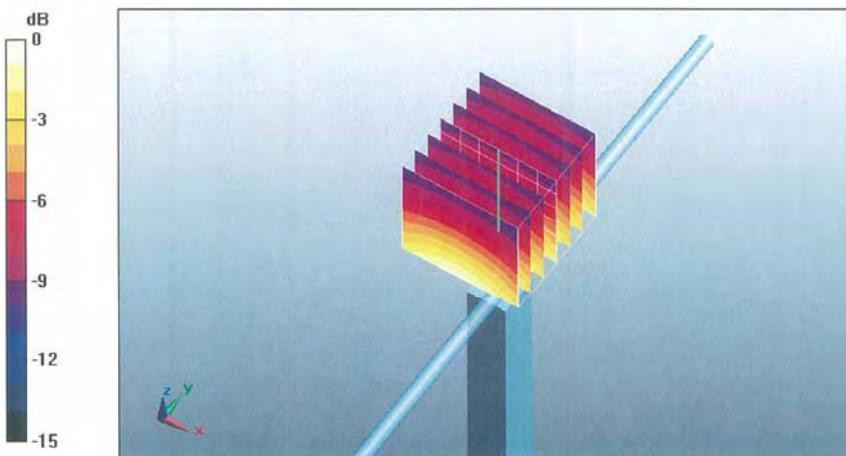
**Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.3 V/m; Power Drift = -0.023 dB

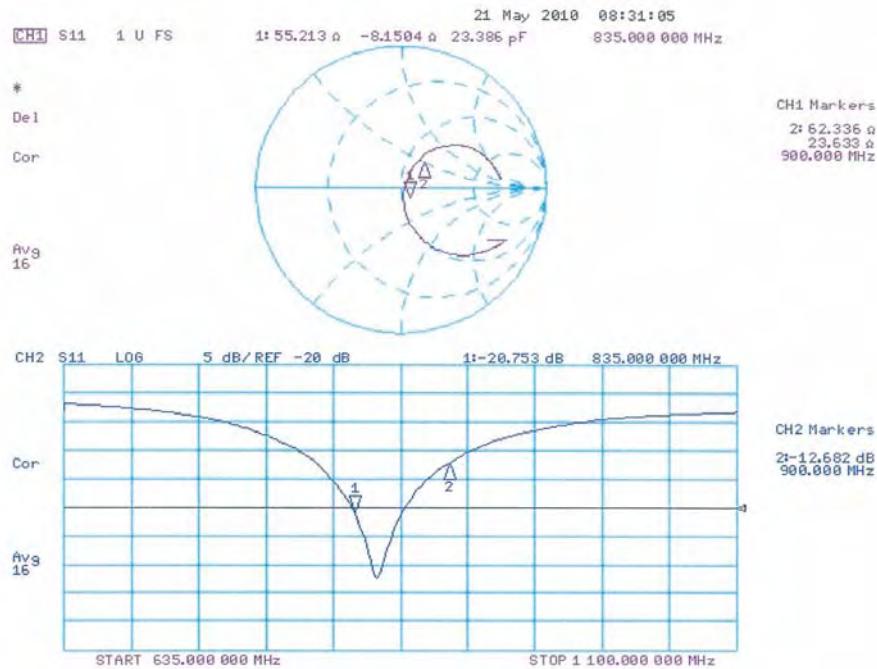
Peak SAR (extrapolated) = 3.63 W/kg

SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.58 mW/g

Maximum value of SAR (measured) = 2.83 mW/g



0 dB = 2.83mW/g

**Impedance Measurement Plot for Head TSL**

**DASY5 Validation Report for Body**

Date/Time: 20.05.2010 09:50:16

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:441**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: MSL900

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.98 \text{ mho/m}$ ;  $\epsilon_r = 54.2$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

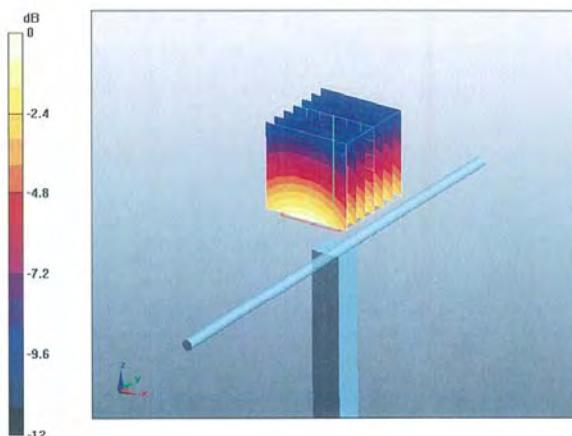
**Pin250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

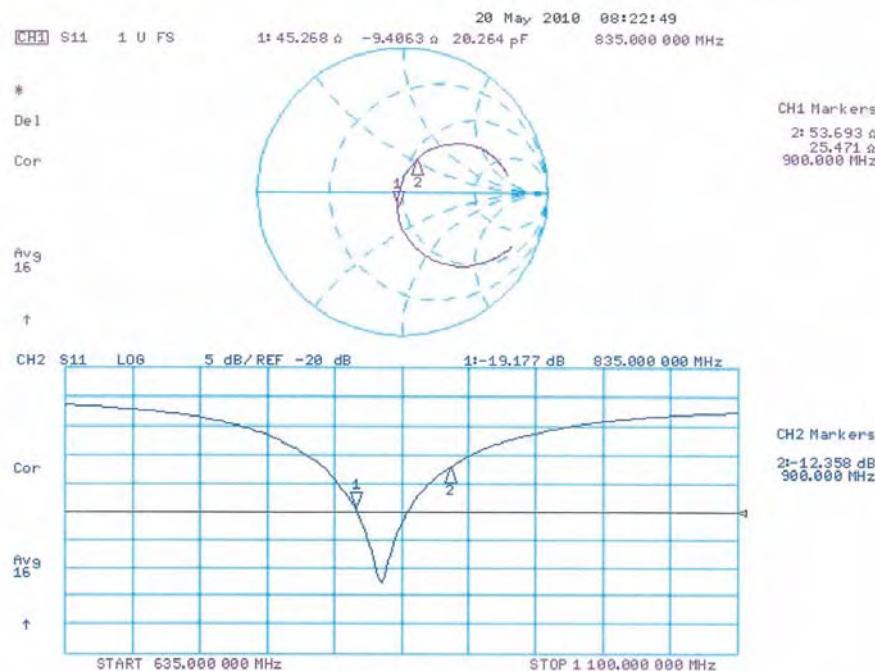
Reference Value = 56.4 V/m; Power Drift = 0.000719 dB

Peak SAR (extrapolated) = 3.69 W/kg

**SAR(1 g) = 2.51 mW/g; SAR(10 g) = 1.64 mW/g**

Maximum value of SAR (measured) = 2.93 mW/g



**Impedance Measurement Plot for Body TSL**

**Calibration Laboratory of**  
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Accreditation No.: SCS 108

Client HCT (Dymstec)

Certificate No: D1900V2-5d032\_Jul10

## CALIBRATION CERTIFICATE

Object D1900V2 - SN: 5d032

Calibration procedure(s) QA CAL-05.v7  
Calibration procedure for dipole validation kits

Calibration date: July 16, 2010

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  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&amp;TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

Calibrated by:	Name	Function	Signature
	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 19, 2010

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Certificate No: D1900V2-5d032\_Jul10

Page 1 of 9

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**Zeughausstrasse 43, 8004 Zurich, Switzerland**



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**C** 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

#### 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	V52.2
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	1900 MHz ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	1.43 mho/m ± 6 %
Head TSL temperature during test	(22.6 ± 0.2) °C	---	---

**SAR result with Head TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	39.9 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.26 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.9 mW / g ± 16.5 % (k=2)

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.3 ± 6 %	1.55 mho/m ± 6 %
Body TSL temperature during test	(22.5 ± 0.2) °C	---	---

**SAR result with Body TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.5 mW / g
SAR normalized	normalized to 1W	42.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	41.5 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.63 mW / g
SAR normalized	normalized to 1W	22.5 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	22.4 mW / g ± 16.5 % (k=2)

**Appendix****Antenna Parameters with Head TSL**

Impedance, transformed to feed point	51.6 $\Omega$ + 6.2 j $\Omega$
Return Loss	- 24.0 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	50.3 $\Omega$ + 7.0 j $\Omega$
Return Loss	- 23.1 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.177 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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

**Additional EUT Data**

Manufactured by	SPEAG
Manufactured on	March 17, 2003

**DASY5 Validation Report for Head TSL**

Date/Time: 16.07.2010 12:15:48

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d032**

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

Medium: HSL U12 BB

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.43 \text{ mho/m}$ ;  $\epsilon_r = 40.2$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

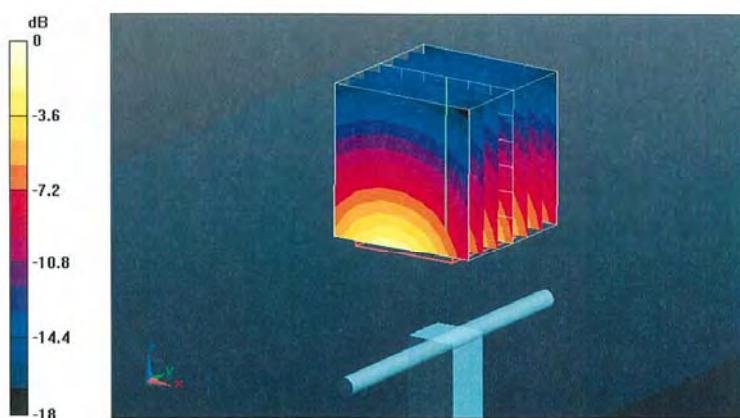
**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.4 V/m; Power Drift = 0.039 dB

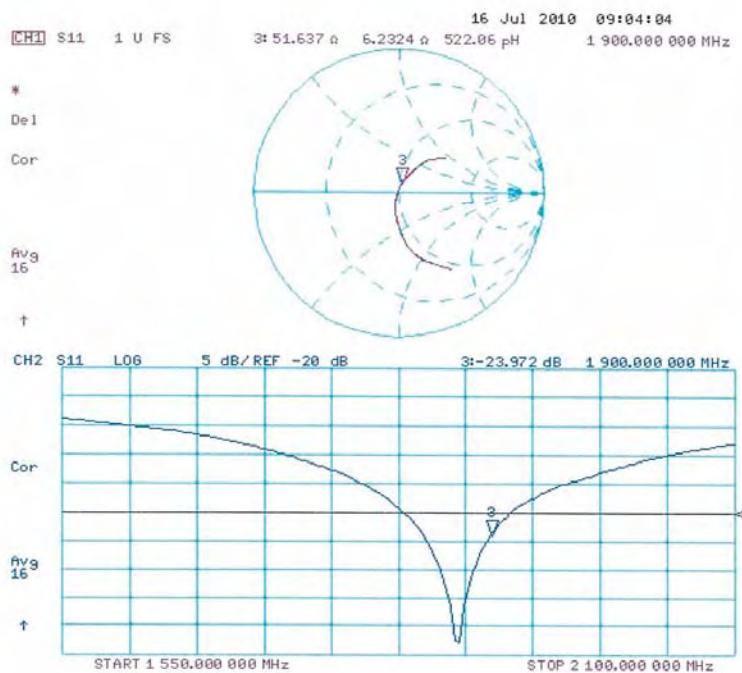
Peak SAR (extrapolated) = 18.3 W/kg

**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.26 mW/g**

Maximum value of SAR (measured) = 12.3 mW/g



0 dB = 12.3mW/g

**Impedance Measurement Plot for Head TSL**

**DASY5 Validation Report for Body**

Date/Time: 13.07.2010 12:14:01

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d032**

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

Medium: MSL U11 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

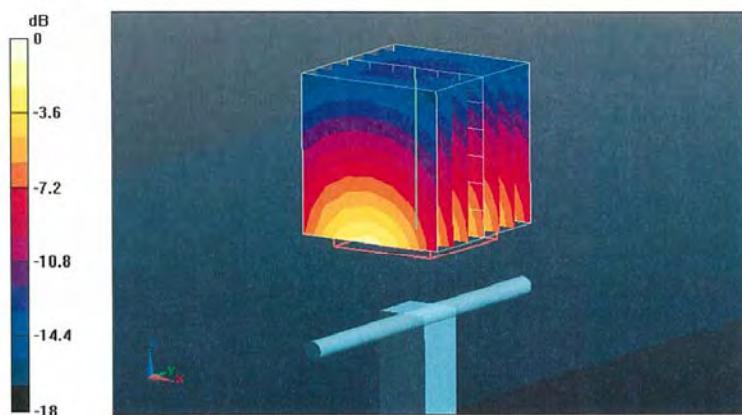
**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.1 V/m; Power Drift = 0.00127 dB

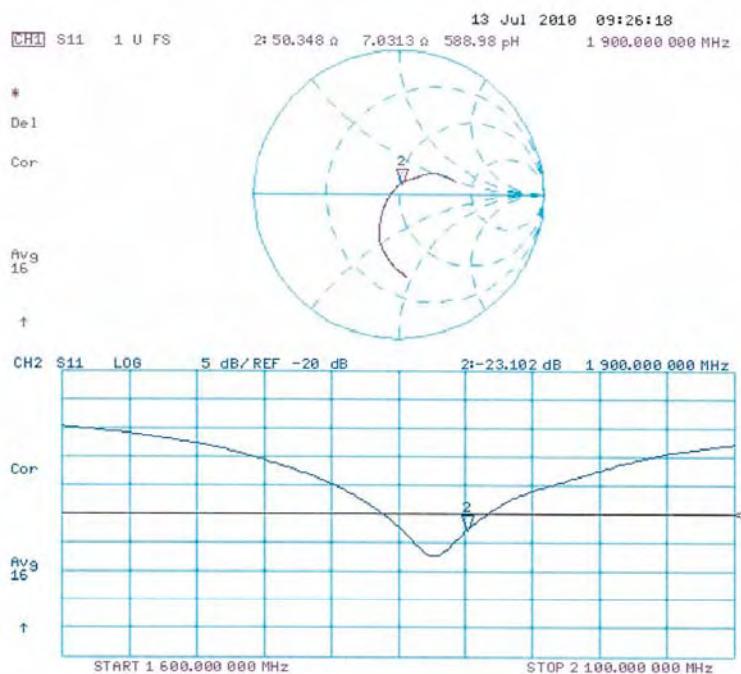
Peak SAR (extrapolated) = 17.6 W/kg

**SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.63 mW/g**

Maximum value of SAR (measured) = 13.2 mW/g



0 dB = 13.2mW/g

**Impedance Measurement Plot for Body TSL**

**Calibration Laboratory of**  
**Schmid & Partner**  
**Engineering AG**  
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Accreditation No.: SCS 108

Client **HCT (Dymstec)**

Certificate No: D2450V2-743\_Aug10

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 743**

Calibration procedure(s) **QA CAL-05.v7**  
Calibration procedure for dipole validation kits

Calibration date: **August 25, 2010**

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  $(22 \pm 3)^\circ\text{C}$  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	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

Calibrated by:	Name	Function	Signature
	Claudio Leubler	Laboratory Technician	

Approved by:	Name	Function	Signature
	Katja Pokovic	Technical Manager	

Issued: August 25, 2010

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

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Accreditation No.: SCS 108

**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	V52.2
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	39.2 ± 6 %	1.77 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	---	---

**SAR result with Head TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.4 mW / g
SAR normalized	normalized to 1W	53.6 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	54.0 mW /g ± 17.0 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.28 mW / g
SAR normalized	normalized to 1W	25.1 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.2 mW /g ± 16.5 % (k=2)

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.4 ± 6 %	1.95 mho/m ± 6 %
Body TSL temperature during test	(22.5 ± 0.2) °C	----	----

**SAR result with Body TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.5 mW / g
SAR normalized	normalized to 1W	54.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	54.0 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.46 mW / g
SAR normalized	normalized to 1W	25.8 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	25.8 mW / g ± 16.5 % (k=2)

**Appendix****Antenna Parameters with Head TSL**

Impedance, transformed to feed point	$53.3 \Omega + 4.2 j\Omega$
Return Loss	- 25.7 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	$50.4 \Omega + 5.5 j\Omega$
Return Loss	- 25.2 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.161 ns
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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: 25.08.2010 10:29:57

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:743**

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL U12 BB

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.77 \text{ mho/m}$ ;  $\epsilon_r = 39.2$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

**Head/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:**Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ 

Reference Value = 98.9 V/m; Power Drift = 0.070 dB

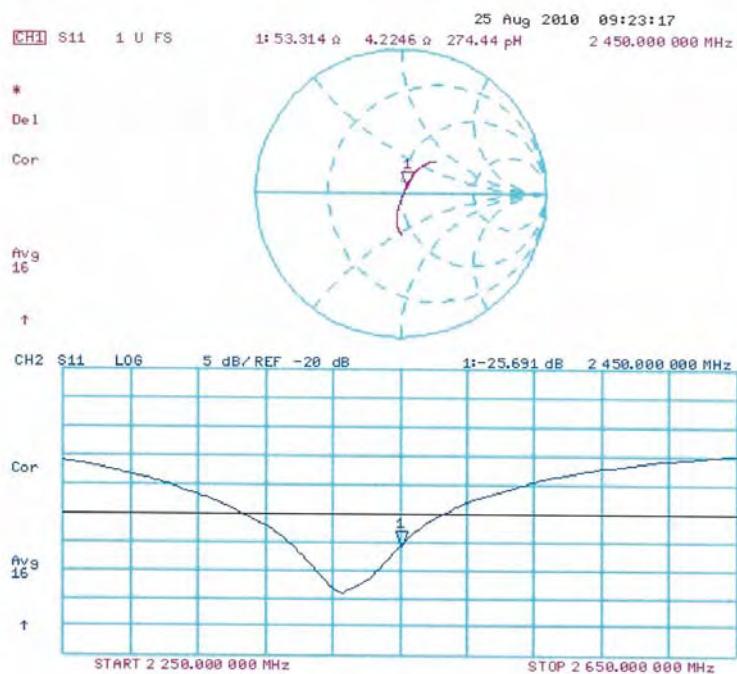
Peak SAR (extrapolated) = 27.1 W/kg

SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.28 mW/g

Maximum value of SAR (measured) = 17 mW/g



0 dB = 17mW/g

**Impedance Measurement Plot for Head TSL**

**Validation Report for Body**

Date/Time: 19.08.2010 11:22:15

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:743**

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: MSL U11 BB

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.94 \text{ mho/m}$ ;  $\epsilon_r = 52.3$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4,31, 4,31, 4,31); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

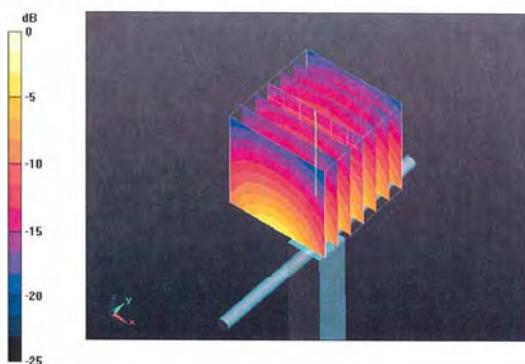
**Body/d=10mm, Pin250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:**Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ 

Reference Value = 98 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 27.3 W/kg

SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.46 mW/g

Maximum value of SAR (measured) = 17.5 mW/g



0 dB = 17.5mW/g

**Impedance Measurement Plot for Body TSL**