

SAR TEST REPORT

HCT CO., LTD

EUT Type:	Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN	
FCC ID:	WCKCD02	
Model:	CD02	
Date of Issue:	Aug. 9, 2011	
Test report No.:	HCTA1108FS04	
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Testing has been carried out in accordance with:	RSS-102 Issue 4; Health Canada Safety Code 6 47CFR §2.1093 FCC OET Bulletin 65(Edition 97-01), Supplement C (Edition 01-01) ANSI/ IEEE C95.1 – 1992 IEEE Std 1528	
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	 Approved by : Jae-Sang So Manager of SAR Part

Table of Contents

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
5.1 HEAD POSITION	1 3
5.2 Body Holster/Belt Clip Configurations	1 4
6. MEASUREMENT UNCERTAINTY	1 5
7. ANSI/ IEEE C95.1 - 1992 RF EXPOSURE LIMITS	1 7
8. SYSTEM VERIFICATION.....	1 8
8.1 Tissue Verification	1 8
8.2 System Validation.....	1 8
9. SAR Testing with IEEE 802.11 a/b/g Transmitters	1 9
10. RF CONDUCTED POWER	2 0
10.1 Procedures Used to Establish RF Signal for SAR	2 0
11. SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas	2 2
12. SAR TEST DATA SUMMARY	2 4
12.1 Measurement Results (GSM850 Head SAR).....	2 4
12.2 Measurement Results (GSM1900 Head SAR).....	2 5
12.3 Measurement Results (802.11b/g/n Head)	2 6
12.4 Measurement Results (GSM1900 Body SAR)	2 8
12.5 Measurement Results (802.11b/g/n Body SAR)	2 9
13. CONCLUSION.....	3 0
14. REFERENCES	3 1
Attachment 1. – SAR Test Plots	3 2
Attachment 2. – Dipole Validation Plots.....	5 8
Attachment 3. – Probe Calibration Data.....	7 3
Attachment 4. – Dipole Calibration Data	1 0 0

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 C95.1-2005 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 (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body.

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

Figure 2. SAR Mathematical Equation

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

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

where:

σ	=	conductivity of the tissue-simulant material (S/m)
ρ	=	mass density of the tissue-simulant material (kg/m ³)
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	Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN		
FCC ID:	WCKCD02		
Model:	CD02		
Trade Name	ModeLabs Manufacture SAS.	Serial Number(s)	#1
Application Type	Certification		
Mode(s)of Operation	GSM850/GSM1900/802.11b/g/n		
Tx Frequency	824.20 - 848.80 MHz (GSM850) 1 850.20 – 1 909.80 MHz (GSM1900) 2 412- 2 462 MHz (WLAN)		
Rx Frequency	824.20 - 848.80 MHz (GSM850) 1 850.20 – 1 909.80 MHz (GSM1900) 2 412- 2 462 MHz (WLAN)		
FCC Classification	Licensed Portable Transmitter Held to Ear (PCE)		
Production Unit or Identical Prototype	Prototype		
Max SAR	0.594 W/kg GSM850 Head SAR / 0.717 W/kg GSM850 Body SAR 1.23 W/kg GSM1900 Head SAR / 0.266 W/kg GSM1900 Body SAR 0.323 W/kg WLAN Head SAR / 0.1 W/kg WLAN Body SAR		
Date(s) of Tests	Aug. 8, 2011, Sep. 7,2011		
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.

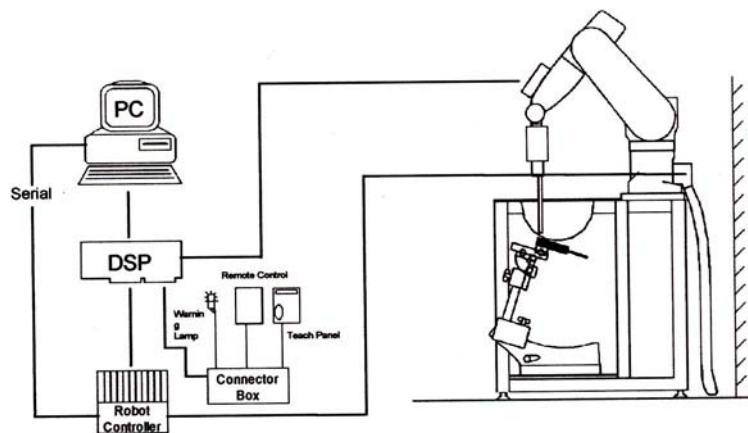


Figure 3.1 HCT SAR Lab. Test Measurement Set-up

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 DASY4 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: ± 0.2 dB (30 MHz to 3 GHz)
Directivity	± 0.2 dB in brain tissue (rotation around probe axis) ± 0.4 dB in brain tissue (rotation normal probe axis)
Dynamic	5 μ W/g to > 100 mW/g;
Range Linearity:	± 0.2 dB
Surface Detection	± 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

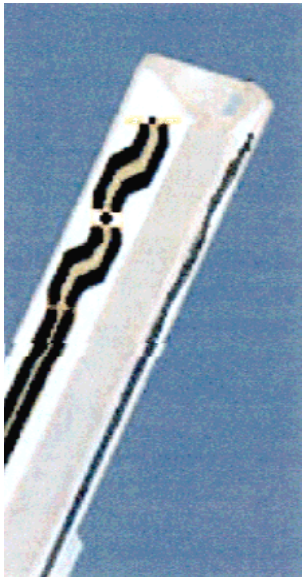


Figure 3.3 ET3DV6 E-field Probe

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 2nd 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 ± 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 below 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.

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

where:

Δt = exposure time (30 seconds),

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

ΔT = 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;

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

where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm^3 for brain tissue)

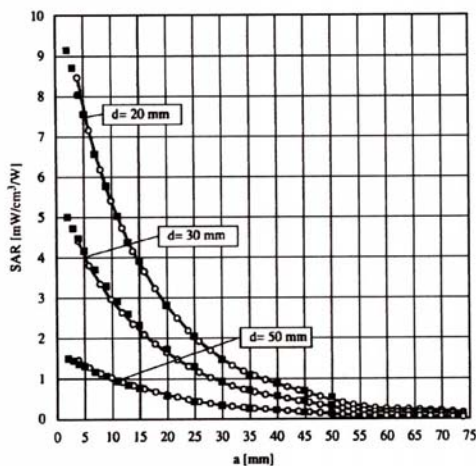


Figure 3.4 E-Field and Temperature measurements at 900 MHz

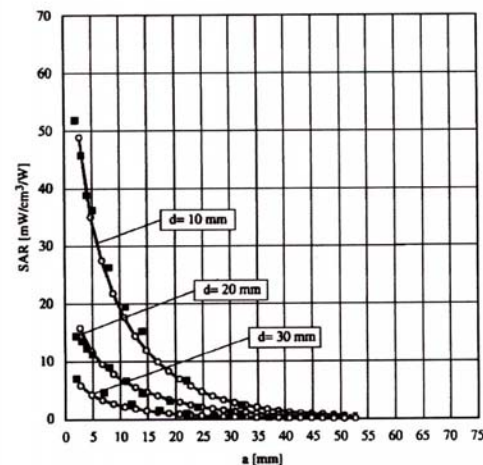


Figure 3.5 E-Field and temperature measurements at 1.8 GHz

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:

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

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

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 W/g
 E_{tot} = total field strength in V/m
 σ = conductivity in [mho/m] or [Siemens/m]
 ρ = equivalent tissue density in g/cm³

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 W/cm²
 E_{tot} = total electric field strength in V/m

3.4 SAM Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. 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 evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.



Figure 3.6 SAM Phantom

Shell Thickness	2.0 mm
Filling Volume	about 25 L
Dimensions	1 000 mm x 500 mm (L x W)

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 repeatably 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 produced 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 bactericide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrrove.

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	466	Mar. 1, 2011	Annual	Mar. 1, 2012
SPEAG	DAE4	869	Sep 21, 2010	Annual	Sep 21, 2011
SPEAG	E-Field Probe ET3DV6	1609	Nov. 24, 2010	Annual	Nov. 24, 2011
SPEAG	E-Field Probe ET3DV6	1798	Apr. 14, 2011	Annual	Apr. 14, 2012
SPEAG	Validation Dipole D835V2	441	May 16, 2011	Annual	May 16, 2012
SPEAG	Validation Dipole D1900V2	5d032	July 22, 2011	Annual	July 22, 2012
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, 2011	Annual	July 26, 2012
Agilent	Base Station E5515C	GB44400269	Feb. 10, 2011	Annual	Feb. 10, 2012
HP	Signal Generator E4438C	MY42082646	Nov. 11, 2010	Annual	Nov. 11, 2011
HP	Network Analyzer 8753ES	JP39240221	Mar. 30, 2011	Annual	Mar. 30, 2012

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 30 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.

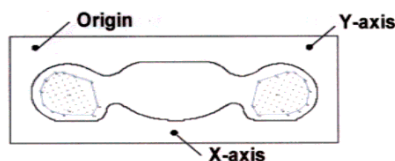


Figure 4.1 SAR Measurement Point in Area Scan

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.

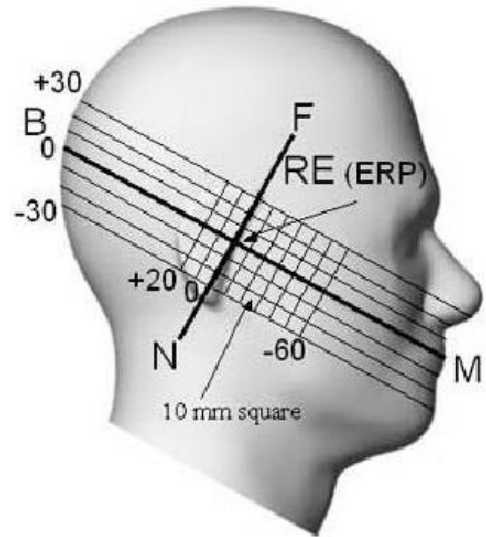


Figure 5.1 Side view of the phantom

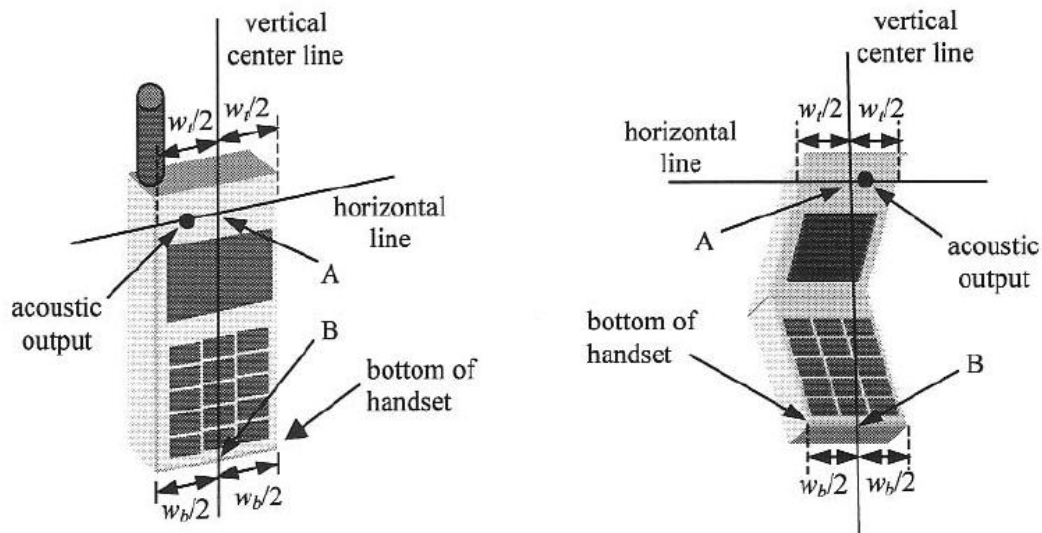


Figure 5.2 Handset vertical and horizontal reference lines

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 2.0 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_i	Standard Uncertainty (± %)	V_{eff}
1. Measurement System						
Probe Calibration	6.00	N	1	1	6.00	∞
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 Conditions	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	∞
2. Test Sample Related						
Device Positioning	2.90	N	1.00	1	2.90	145
Device Holder	3.60	N	1.00	1	3.60	5
Power Drift	5.00	R	1.73	1	2.89	∞
3. Phantom and Setup						
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 Permittivity(target)	5.00	R	1.73	0.6	1.73	∞
Liquid Permittivity(meas.)	5.02	N	1	0.6	3.01	9
Combine Standard Uncertainty					11.13	
Coverage Factor for 95 %					$k = 2$	
Expanded STD Uncertainty					22.25	

Table 6.1 Uncertainty (800 MHz- 2450 MHz)

Error Description	Tol (± %)	Prob. dist.	Div.	c _i	Standard Uncertainty (± %)	V _{eff}
1. Measurement System						
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 Conditions	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	∞
2. Test Sample Related						
Device Positioning	2.90	N	1.00	1	2.90	145
Device Holder	3.60	N	1.00	1	3.60	5
Power Drift	5.00	R	1.73	1	2.89	∞
3. Phantom and Setup						
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	8
Liquid Permittivity(target)	5.00	R	1.73	0.6	1.73	∞
Liquid Permittivity(meas.)	5.02	N	1	0.6	3.01	8
Combined Standard Uncertainty					10.86	
Coverage Factor for 95 %					k = 2	
Expanded STD Uncertainty					21.73	

Table 6.2 Uncertainty (800 MHz- 2450 MHz)

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	Aug. 8, 2011	Head	21.2	ϵ_r	41.5	43.1	+ 3.86	± 5
				σ	0.90	0.903	+ 0.33	± 5
835	Aug. 8, 2011	Body	21.2	ϵ_r	55.2	55.9	+ 1.27	± 5
				σ	0.97	0.95	- 2.06	± 5
1 900	Aug. 8, 2011	Head	21.2	ϵ_r	40.0	39.4	- 1.50	± 5
				σ	1.40	1.4	0.00	± 5
1 900	Aug. 8, 2011	Body	21.2	ϵ_r	53.3	54.5	+ 2.25	± 5
				σ	1.52	1.46	- 3.95	± 5
2 450	Aug. 8, 2011	Head	21.2	ϵ_r	39.2	38.5	- 1.79	± 5
				σ	1.80	1.73	- 3.89	± 5
2 450	Aug. 8, 2011	Body	21.2	ϵ_r	52.7	51.9	- 1.52	± 5
				σ	1.95	1.94	- 0.51	± 5
1 900	Sep. 7, 2011	Head	21.1	ϵ_r	40.0	41	+ 2.50	± 5
				σ	1.40	1.4	0.00	± 5

8.2 System Validation

Prior to assessment, the system is verified to the $\pm 10\%$ of the specifications at 835 MHz / 1 900 MHz/ 2 450 MHz by using the system validation kit. (Graphic Plots Attached)

* Input Power: 100 m W

Freq. [MHz]	Date	Liquid	Liquid Temp. [°C]	SAR Average	Target Value (SPEAG) (mW/g)	*Measured Value (mW/g)	Deviation [%]	Limit [%]
835	Aug. 8, 2011	Head	21.2	1 g	9.34	0.940	+ 0.64	± 10
835	Aug. 8, 2011	Body	21.2	1 g	9.45	0.972	+ 2.86	± 10
1 900	Aug. 8, 2011	Head	21.2	1 g	39.9	4.05	+ 1.50	± 10
1 900	Aug. 8, 2011	Body	21.2	1 g	40.9	4.17	+ 1.96	± 10
2 450	Aug. 8, 2011	Head	21.2	1 g	54	5.50	+ 1.85	± 10
2 450	Aug. 8, 2011	Body	21.2	1 g	54	5.54	+ 2.59	± 10
1 900	Sep. 7, 2011	Head	21.1	1 g	39.9	4.09	+ 2.51	± 10

9. 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. 802.11a 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		√	▽		
	2.437	6	6	√	▽		
	2.462	11		√	▽		
802.11a	5.18	36				√	
	5.20	40	42 (5.21 GHz)				*
	5.22	44					*
	5.24	48	50 (5.25 GHz)			√	
	5.26	52	58 (5.29 GHz)			√	
	5.28	56					*
	5.30	60					*
	5.32	64				√	
	5.500	100	Unknown				*
	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		√		√	
	5.765	153	152 (5.76 GHz)		*		*
	5.785	157		√			*
	5.805	161	160 (5.80 GHz)		*	√	
	§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.

Band	Channel	GSM	GPRS Data				EDGE Data			
		Voice (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)	EDGE 3 TX Slot (dBm)	EDGE 4 TX Slot (dBm)
GSM 850	128	32.65	32.67	31.48	29.2	28.47	27.1	25.63	23.78	22.6
	190	32.62	32.64	31.39	29.21	28.38	27.02	25.55	23.69	22.62
	251	32.61	32.62	31.34	29.25	28.34	26.97	25.49	23.64	22.51
GSM 1900	512	29.75	29.76	28.66	26.55	25.7	26.27	24.78	22.92	21.8
	661	29.79	29.8	28.69	26.53	25.72	26.3	24.81	22.95	21.83
	810	29.82	29.84	28.73	26.54	25.76	26.34	24.84	22.98	21.87

Table 1. GSM Conducted output powers(Burst-Average)

Band	Channel	GSM	GPRS Data				EDGE Data			
		Voice (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)	EDGE 3 TX Slot (dBm)	EDGE 4 TX Slot (dBm)
GSM 850	128	23.62	23.64	25.46	24.94	25.46	18.07	19.61	19.52	19.59
	190	23.59	23.61	25.37	24.95	25.37	17.99	19.53	19.43	19.61
	251	23.58	23.59	25.32	24.99	25.33	17.94	19.47	19.38	19.5
GSM 1900	512	20.72	20.73	22.64	22.29	22.69	17.24	18.76	18.66	18.79
	661	20.76	20.77	22.67	22.27	22.71	17.27	18.79	18.69	18.82
	810	20.79	20.81	22.71	22.28	22.75	17.31	18.82	18.72	18.86

Table 2. GSM Conducted output powers powers (Frame-Average)

Mode	Channel#	Freq.(MHz)	Conducted Avg Power
			(dBm)
802.11b	1	2412	16.19
	6	2437	16.59
	11	2462	15.86
802.11g	1	2412	12.04
	6	2437	12.17
	11	2462	11.43

Table 3. Average IEEE 802.11 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_{Ref}	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

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	<u>Routine evaluation required</u>	<u>SAR not required:</u> <u>Unlicensed only</u> - when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas <u>Licensed & Unlicensed</u> - when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas - when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3 <u>SAR required:</u> <u>Licensed & Unlicensed</u> antenna pairs with SAR to peak location separation ratio ≥ 0.3 ; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition <u>Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply</u>
Unlicensed Transmitters	<u>When there is no simultaneous transmission –</u> - output ≤ 60/f: SAR not required - output > 60/f: stand-alone SAR required <u>When there is simultaneous transmission –</u> <u>Stand-alone SAR not required when</u> - output $\leq 2 \cdot P_{Ref}$ and antenna is ≥ 5.0 cm from other antennas - output $\leq P_{Ref}$ and antenna is ≥ 2.5 cm from other antennas - output $\leq P_{Ref}$ and antenna is < 2.5 cm from other antennas, each with either output power $\leq P_{Ref}$ or 1-g SAR < 1.2 W/kg <u>Otherwise stand-alone SAR is required</u> <u>When stand-alone SAR is required</u> - test SAR on highest output channel for each wireless mode and exposure condition - if SAR for highest output channel is $> 50\%$ of SAR limit, evaluate all channels according to normal procedures	
Jaw, Mouth and Nose	<u>Flat phantom SAR required</u> - 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 - position rectangular and clam-shell phones according to flat phantom procedures and conduct SAR measurements for these specific locations	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

FCC ID: WCKCD02/ BT Max. RF output power: 2.77 mW

Antenna separation distance between Main and BT/ WLAN: 7 Cm

WLAN Max. RF output power: 45.6 mW

11.2 Simultaneous Transmission

- Main antenna can transmit simultaneously with BT antenna.
- Main antenna can transmit simultaneously with WLAN antenna
- WiFi can not transmit simultaneously with BT.

Test Position	Highest 1g SAR (W/kg)		Σ SAR(W/kg)
	2G	WiFi	
Head	1.23	0.323	1.553
Body	0.717	0.100	0.817

11.3 Conclusion

Because the conducted output power level of the BT transmitter is less than $2 \cdot P_{\text{ref}}$, and the BT antenna is more than 5 cm from the Main antenna, neither simultaneous SAR nor stand-alone BT SAR are required for the EUT. Based on the output power and antenna separation distance, a stand-alone WLAN SAR test is required.

Antenna Pair	Justification	Simultaneous SAR required
Wifi / BT	BT SAR is not required.	No
Wifi / WWAN	The sum of WLAN and 2G SAR is less than 1.6 mW/g	No
BT / WWAN	Antenna separation is ≥ 5 cm, BT transmitter is less than $2 \cdot P_{\text{ref}}$	No

12. SAR TEST DATA SUMMARY

12.1 Measurement Results (GSM850 Head SAR)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.6	190 (Mid)	GSM850	32.62	32.57	Standard	Left Ear	Intenna	0.590
836.6	190 (Mid)	GSM850	32.62	32.54	Standard	Left Tilt 15°	Intenna	0.251
836.6	190 (Mid)	GSM850	32.62	32.57	Standard	Right Ear	Intenna	0.594
836.6	190 (Mid)	GSM850	32.62	32.45	Standard	Right Tilt 15°	Intenna	0.311
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 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 cord ☒ Base Station Simulator
- 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 (GSM1900 Head SAR)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 850.2	512 (low)	GSM1900	29.75	29.67	Standard	Left Ear	Intenna	0.856
1 880.0	661 (Mid)	GSM1900	29.79	29.75	Standard	Left Ear	Intenna	1.05
1 909.8	810(High)	GSM1900	29.82	29.89	Standard	Left Ear	Intenna	1.23
1 880.0	661 (Mid)	GSM1900	29.79	29.59	Standard	Left Tilt 15°	Intenna	0.399
1 880.0	661 (Mid)	GSM1900	29.79	29.67	Standard	Right Ear	Intenna	0.618
1 880.0	661 (Mid)	GSM1900	29.79	29.73	Standard	Right Tilt 15°	Intenna	0.310
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 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 cord ☒ Base Station Simulator
- 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 (802.11b/g/n Head)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
2 437	6 (Mid)	802.11b	16.59	16.55	Standard	Left Ear	Intenna	0.101
2 437	6 (Mid)	802.11b	16.59	16.50	Standard	Left Tilt 15°	Intenna	0.063
2 437	6 (Mid)	802.11b	16.59	16.65	Standard	Right Ear	Intenna	0.323
2 437	6 (Mid)	802.11b	16.59	16.45	Standard	Right Tilt 15	Intenna	0.203
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 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 cord ☐ Base Station Simulator
- IEEE 802.11g(including 802.11n) SAR testing is required when the conducted powers are equal to or greater than 0.25 dB than the conducted powers in IEEE 802.11b.
- Other IEEE 802.11 modes were not investigated since the average output power were not greater than 0.25 dB than that of the corresponding channel in the lowest data rate IEEE 802.11b mode.

12.4 Measurement Results (GSM850 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Separation Distance	SAR(mW/g)
MHz	Channel		Begin	End			
836.6	190 (Mid)	GPRS 4Tx	28.38	28.34	Back	2.0 cm	0.717
836.6	190 (Mid)	GPRS 2Tx	31.39	31.31	Back	2.0 cm	0.713
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 cord ☒ Base Station Simulator
- Test Configuration ☐ With Holster ☒ Without Holster
- 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 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Separation Distance	SAR(mW/g)
MHz	Channel		Begin	End			
1 880.0	661 (Mid)	GPRS 4Tx	25.72	25.55	Back	2.0 cm	0.266
1 880.0	661 (Mid)	GPRS 2Tx	28.69	28.69	Back	2.0 cm	0.266
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 $\pm$ 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 cord ☒ Base Station Simulator
- Test Configuration ☐ With Holster ☒ Without Holster
- 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 (802.11b/g/n Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Separation Distance	Data Rate	SAR(mW/g)
MHz	Channel		Begin	End				
2 437	6 (Mid)	802.11b	16.57	16.54	Back	2.0 cm	1 Mbps	0.1
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 $\pm$ 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
- IEEE 802.11g(including 802.11n) SAR testing is required when the conducted powers are equal to or greater than 0.25 dB Than the conducted powers in IEEE 802.11b.

13. CONCLUSION

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.

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Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.905 \text{ mho/m}$; $\epsilon_r = 43.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.72, 6.72, 6.72); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 190/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.645 mW/g

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

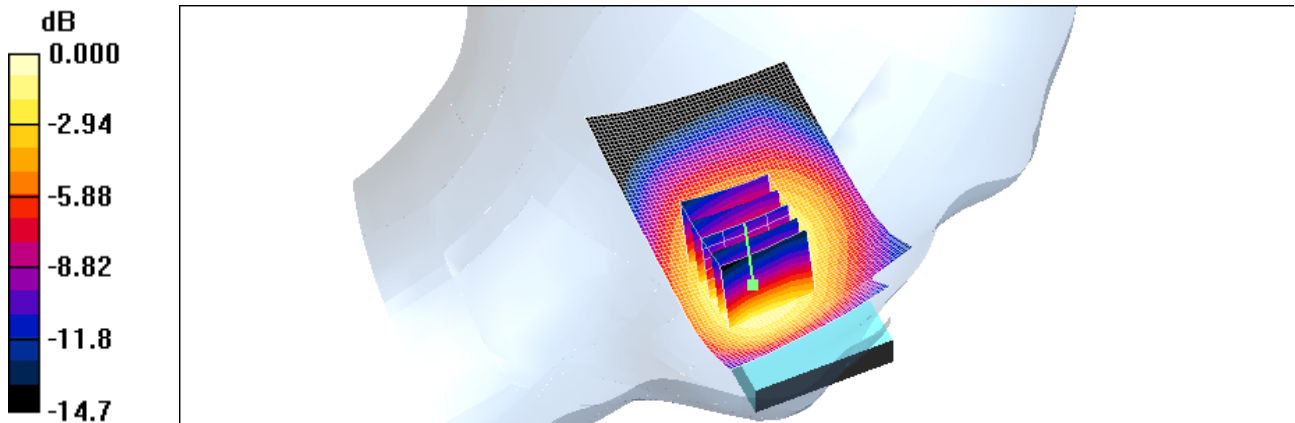
Reference Value = 7.21 V/m; Power Drift = -0.051 dB

Peak SAR (extrapolated) = 0.922 W/kg

SAR(1 g) = 0.590 mW/g; SAR(10 g) = 0.371 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.643 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.905$ mho/m; $\epsilon_r = 43.1$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.72, 6.72, 6.72); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Left tilt 190/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.277 mW/g

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

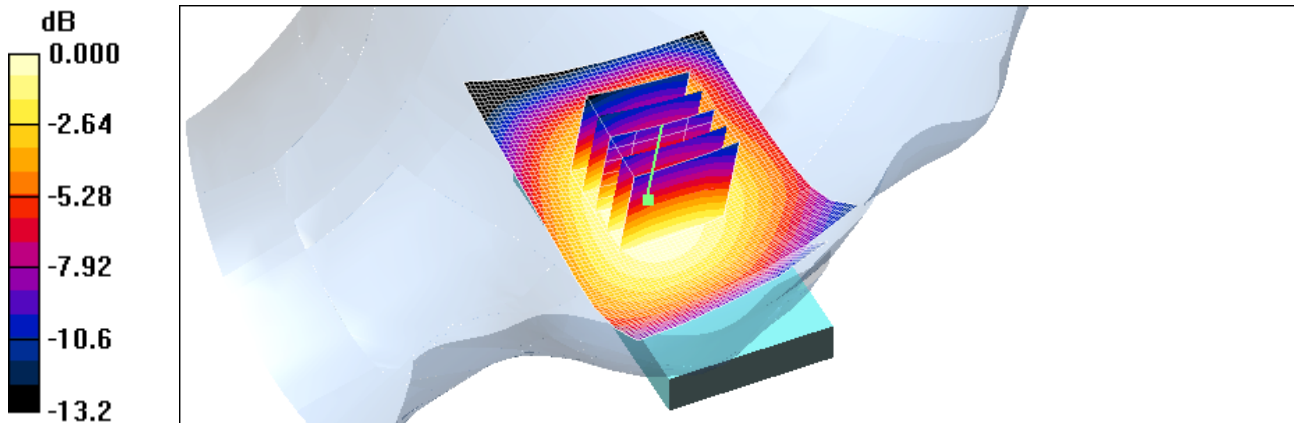
Reference Value = 10.9 V/m; Power Drift = -0.076 dB

Peak SAR (extrapolated) = 0.349 W/kg

SAR(1 g) = 0.251 mW/g; SAR(10 g) = 0.172 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.269 mW/g



0 dB = 0.269mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.905$ mho/m; $\epsilon_r = 43.1$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.72, 6.72, 6.72); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 190/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.651 mW/g

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

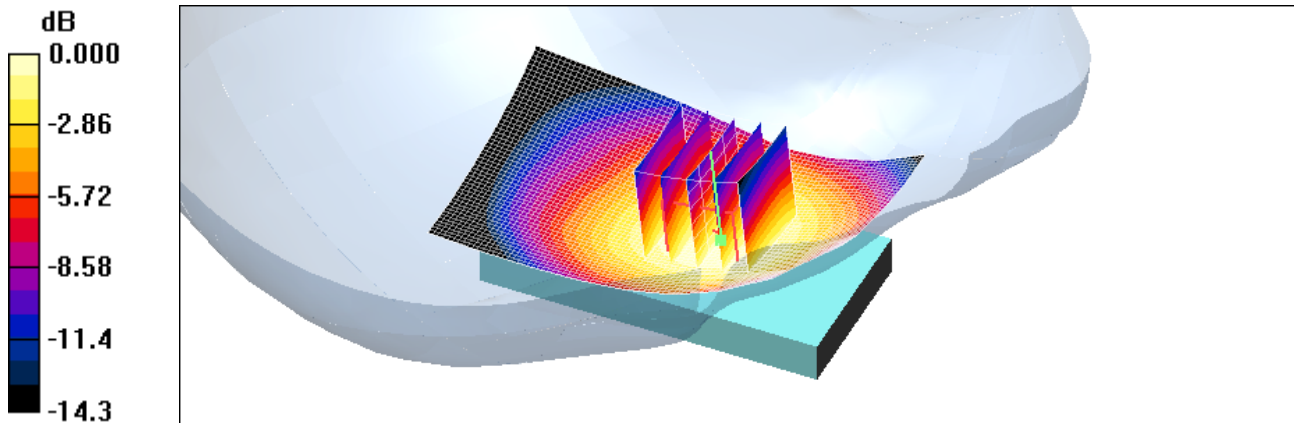
Reference Value = 8.39 V/m; Power Drift = -0.050 dB

Peak SAR (extrapolated) = 0.827 W/kg

SAR(1 g) = 0.594 mW/g; SAR(10 g) = 0.404 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.638 mW/g



0 dB = 0.638mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.905 \text{ mho/m}$; $\epsilon_r = 43.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.72, 6.72, 6.72); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Right tilt 190/Area Scan (51x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.340 mW/g

Right tilt 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

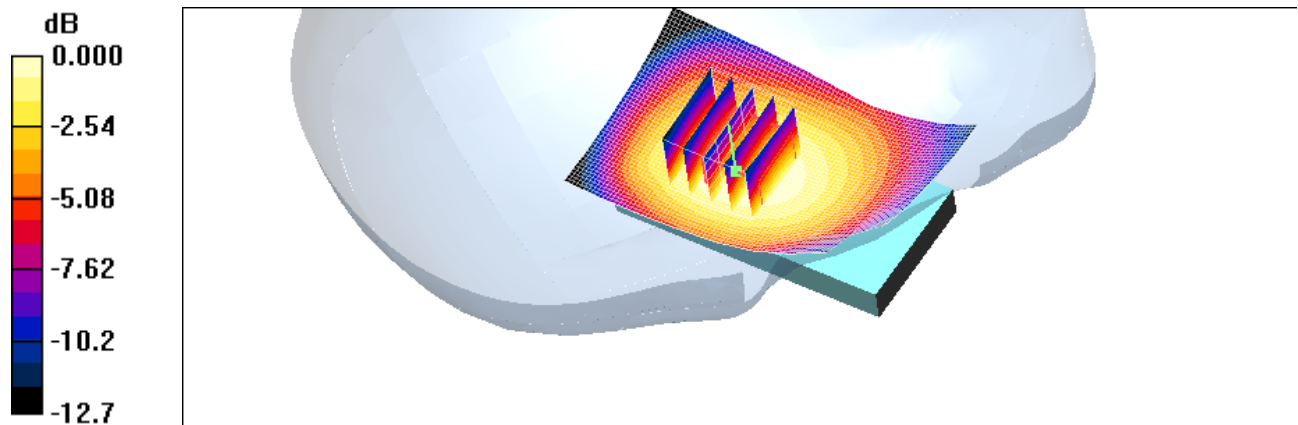
Reference Value = 12.9 V/m; Power Drift = -0.167 dB

Peak SAR (extrapolated) = 0.428 W/kg

SAR(1 g) = 0.311 mW/g; SAR(10 g) = 0.212 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.332 mW/g



0 dB = 0.332mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Sep.07, 2011

DUT: CD02; Type: bar; Serial: #1

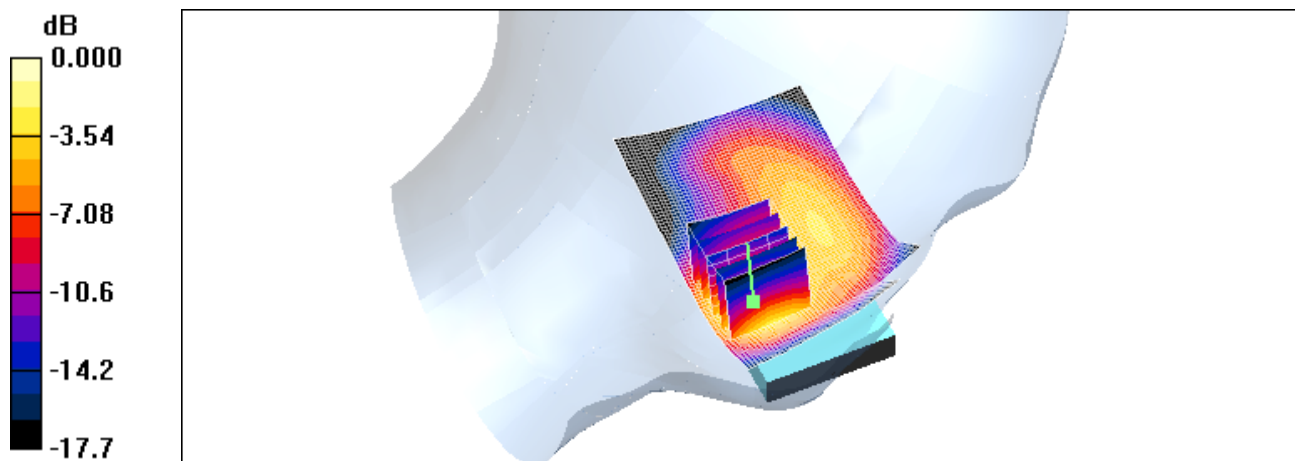
Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 1850.2 \text{ MHz}$; $\sigma = 1.36 \text{ mho/m}$; $\epsilon_r = 41.3$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(5.26, 5.26, 5.26); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2010-09-21
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 512/Area Scan (51x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 0.982 mW/g

Left touch 512/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 9.44 V/m; Power Drift = -0.079 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.856 mW/g; SAR(10 g) = 0.488 mW/g
Maximum value of SAR (measured) = 0.959 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

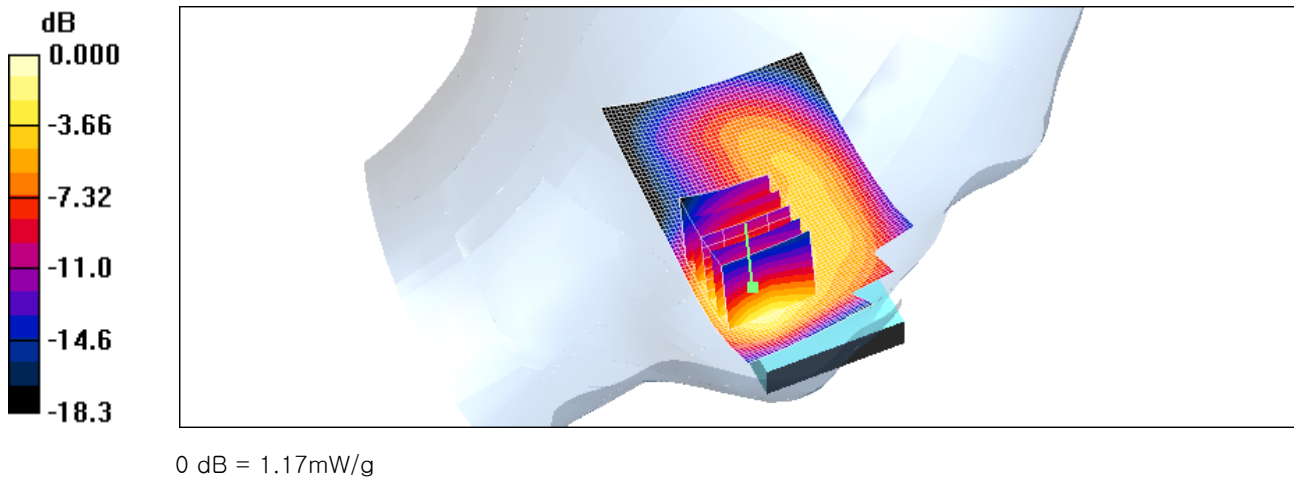
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.36 \text{ mho/m}$; $\epsilon_r = 39.4$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Left touch 661/Area Scan (51x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 1.25 mW/g

Left touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 10.1 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 1.57 W/kg
SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.633 mW/g
Maximum value of SAR (measured) = 1.17 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

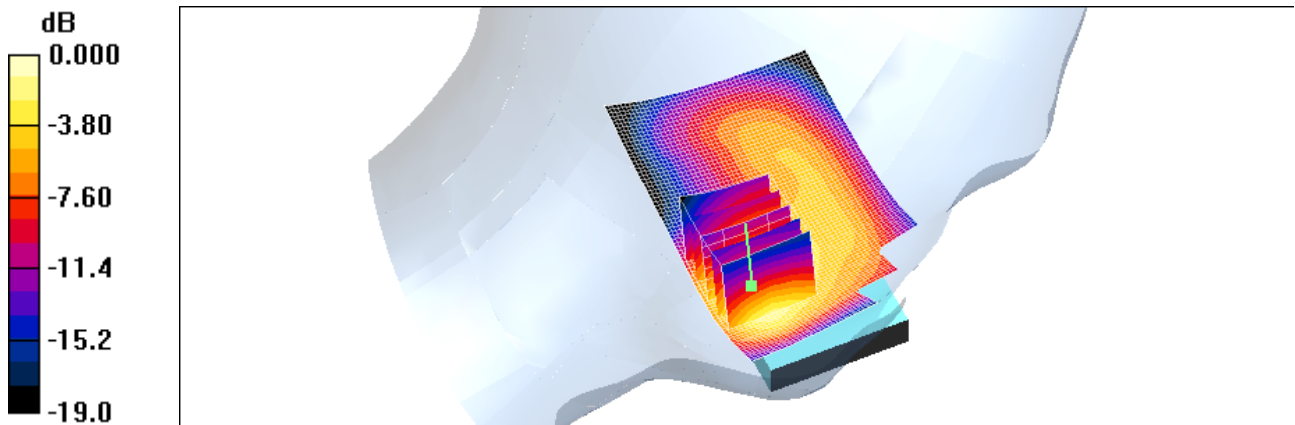
Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1910$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Left touch 810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.47 mW/g

Left touch 810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.5 V/m; Power Drift = -0.065 dB
Peak SAR (extrapolated) = 1.86 W/kg
SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.736 mW/g
Maximum value of SAR (measured) = 1.39 mW/g



0 dB = 1.39mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

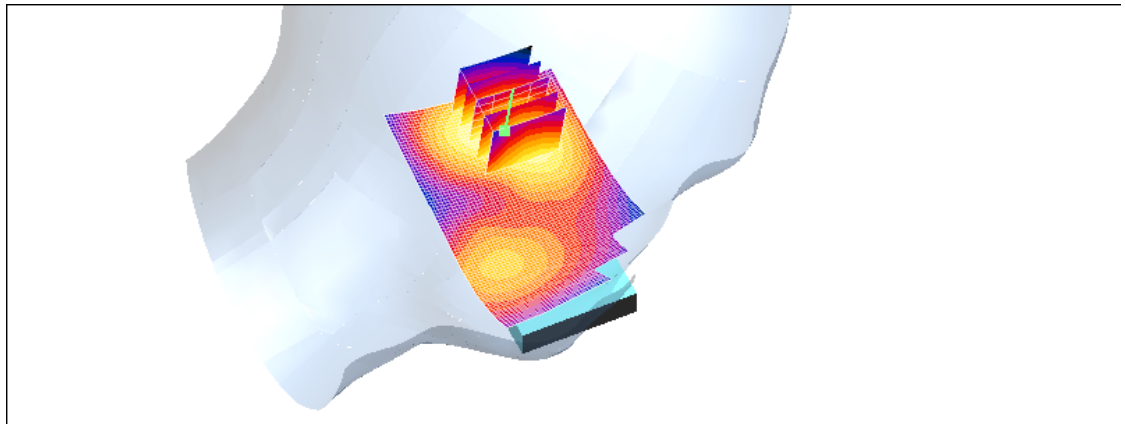
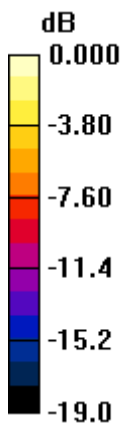
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.36$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Left tilt 661/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.453 mW/g

Left tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.3 V/m; Power Drift = -0.196 dB
Peak SAR (extrapolated) = 0.551 W/kg
SAR(1 g) = 0.399 mW/g; SAR(10 g) = 0.247 mW/g
Maximum value of SAR (measured) = 0.434 mW/g



0 dB = 0.434mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

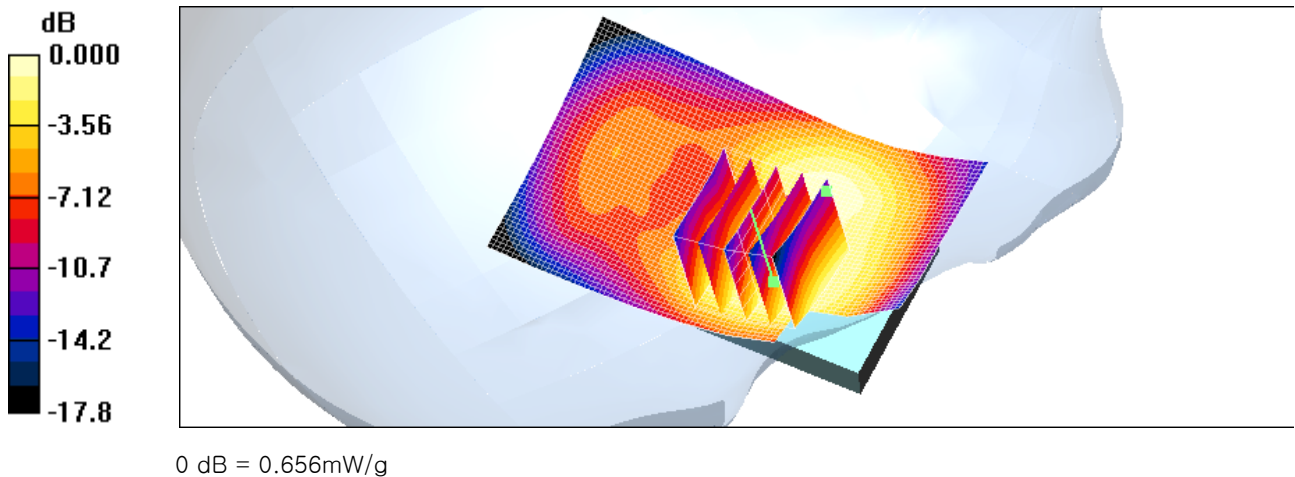
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.36 \text{ mho/m}$; $\epsilon_r = 39.4$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 661/Area Scan (51x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 0.658 mW/g

Right touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 10.0 V/m; Power Drift = -0.118 dB
Peak SAR (extrapolated) = 0.847 W/kg
SAR(1 g) = 0.618 mW/g; SAR(10 g) = 0.407 mW/g
Maximum value of SAR (measured) = 0.656 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

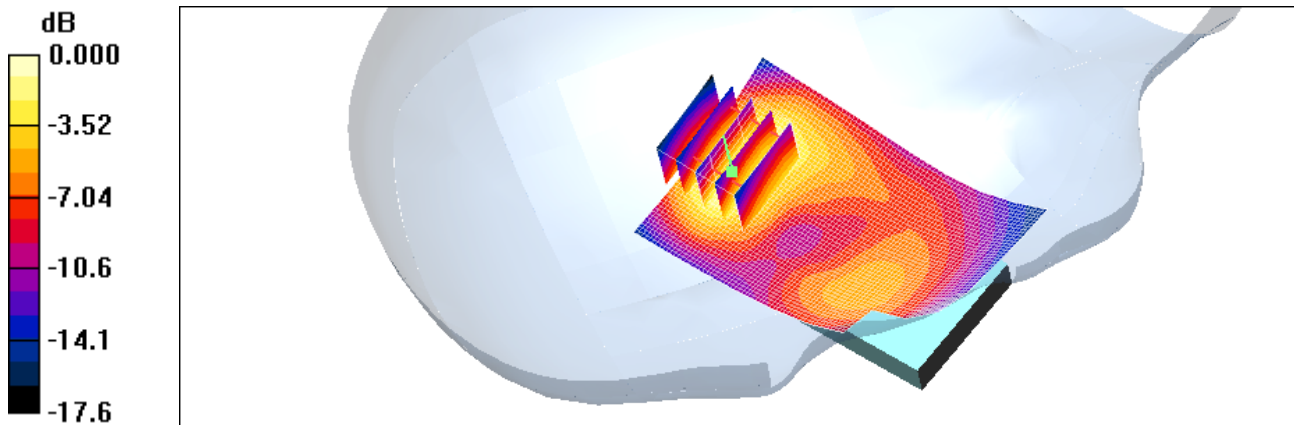
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.36$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Right tilt 661/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.351 mW/g

Right tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.3 V/m; Power Drift = -0.057 dB
Peak SAR (extrapolated) = 0.447 W/kg
SAR(1 g) = 0.310 mW/g; SAR(10 g) = 0.184 mW/g
Maximum value of SAR (measured) = 0.346 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.72$ mho/m; $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.56, 4.56, 4.56); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left touch 6/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.130 mW/g

Left touch 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

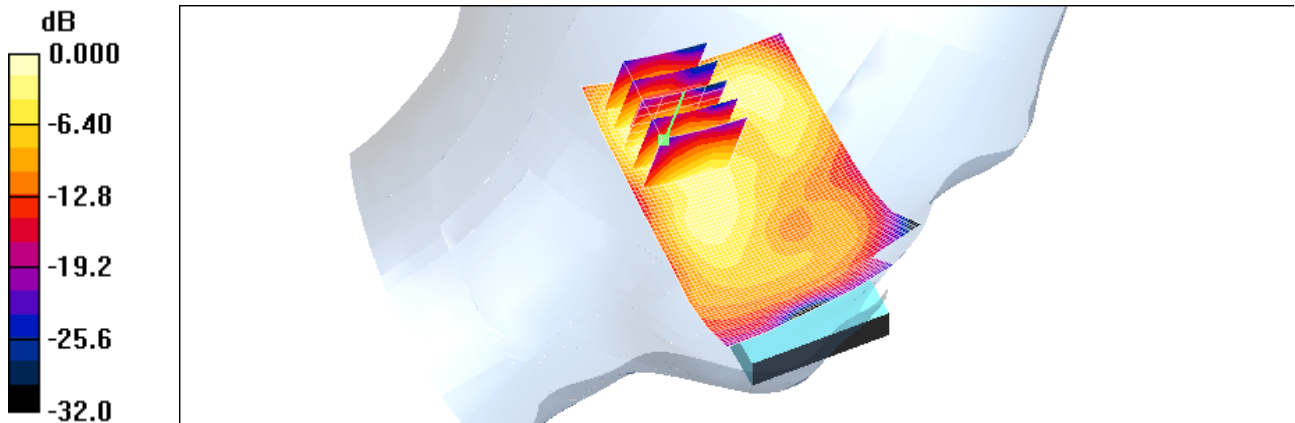
Reference Value = 5.80 V/m; Power Drift = -0.038 dB

Peak SAR (extrapolated) = 0.210 W/kg

SAR(1 g) = 0.101 mW/g; SAR(10 g) = 0.049 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.111 mW/g



0 dB = 0.111mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.72$ mho/m; $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.56, 4.56, 4.56); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left tilt 6/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.084 mW/g

Left tilt 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

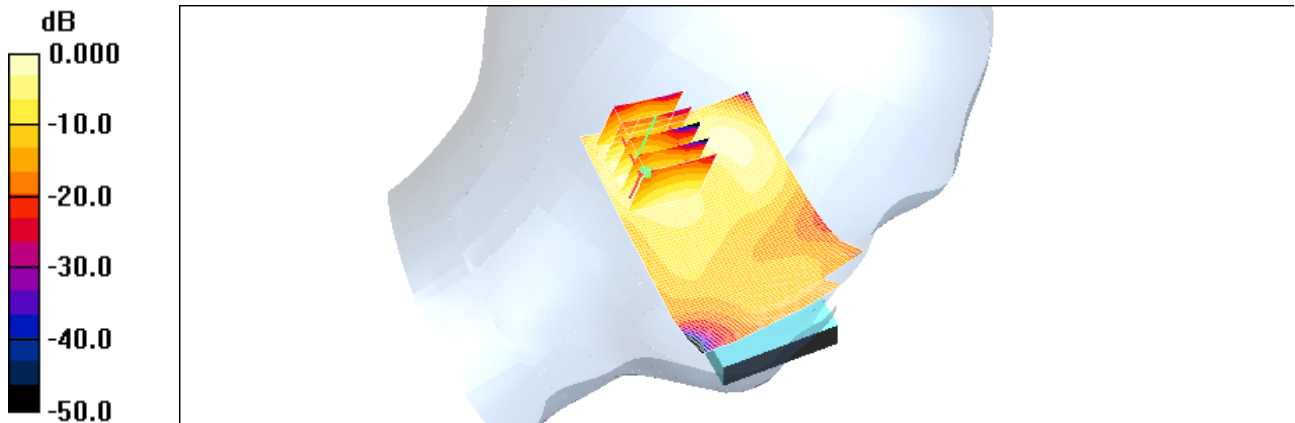
Reference Value = 5.02 V/m; Power Drift = -0.090 dB

Peak SAR (extrapolated) = 0.153 W/kg

SAR(1 g) = 0.063 mW/g; SAR(10 g) = 0.031 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

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



0 dB = 0.073mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2437 \text{ MHz}$; $\sigma = 1.72 \text{ mho/m}$; $\epsilon_r = 38.6$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.56, 4.56, 4.56); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 6/Area Scan (51x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.605 mW/g

Right touch 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

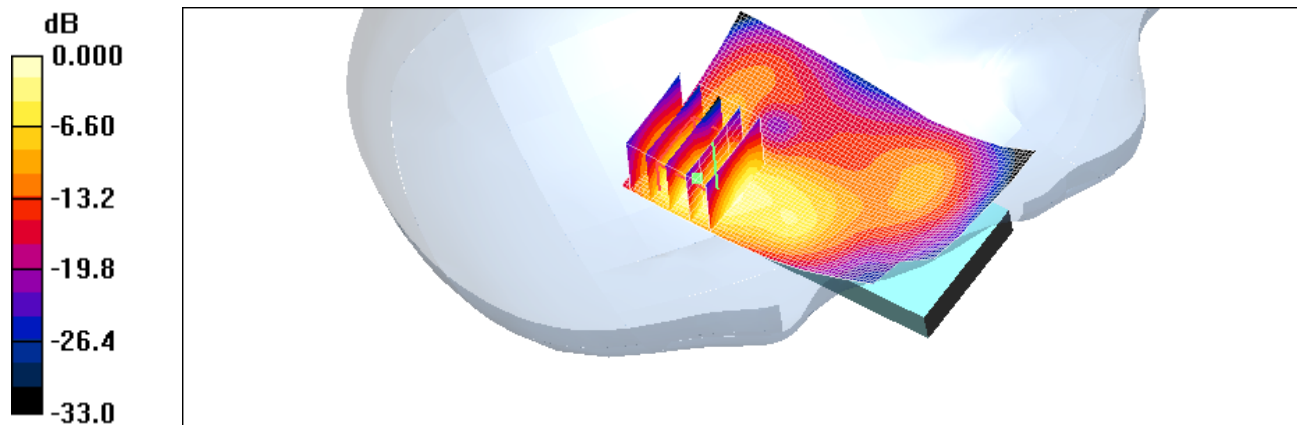
Reference Value = 8.37 V/m; Power Drift = 0.059 dB

Peak SAR (extrapolated) = 0.857 W/kg

SAR(1 g) = 0.323 mW/g; SAR(10 g) = 0.146 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.402 mW/g



0 dB = 0.402mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.72$ mho/m; $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.56, 4.56, 4.56); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right tilt 6/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

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

Right tilt 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

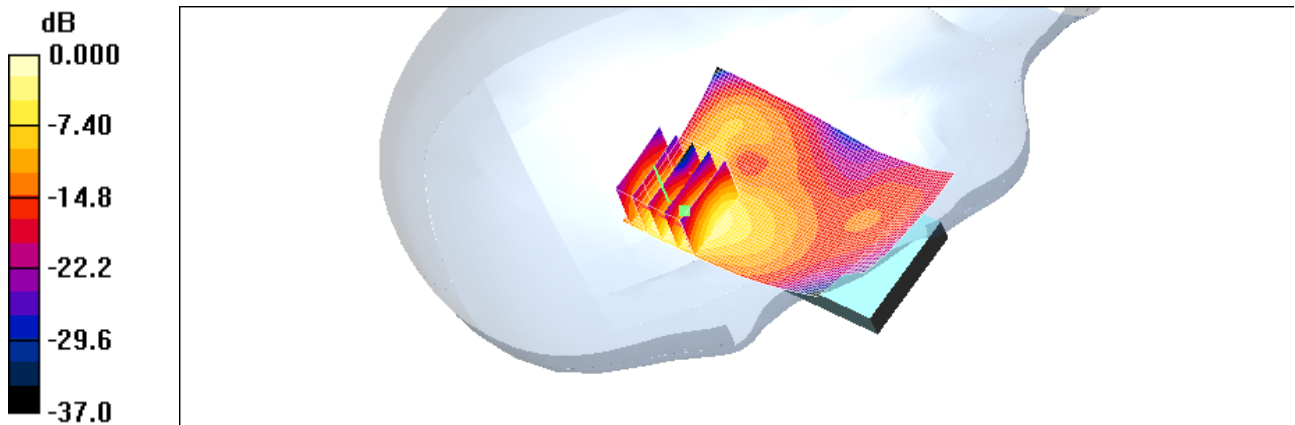
Reference Value = 6.62 V/m; Power Drift = -0.145 dB

Peak SAR (extrapolated) = 0.552 W/kg

SAR(1 g) = 0.203 mW/g; SAR(10 g) = 0.089 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.258 mW/g



0 dB = 0.258mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2.075
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.951$ mho/m; $\epsilon_r = 55.9$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Body back 190/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.788 mW/g

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

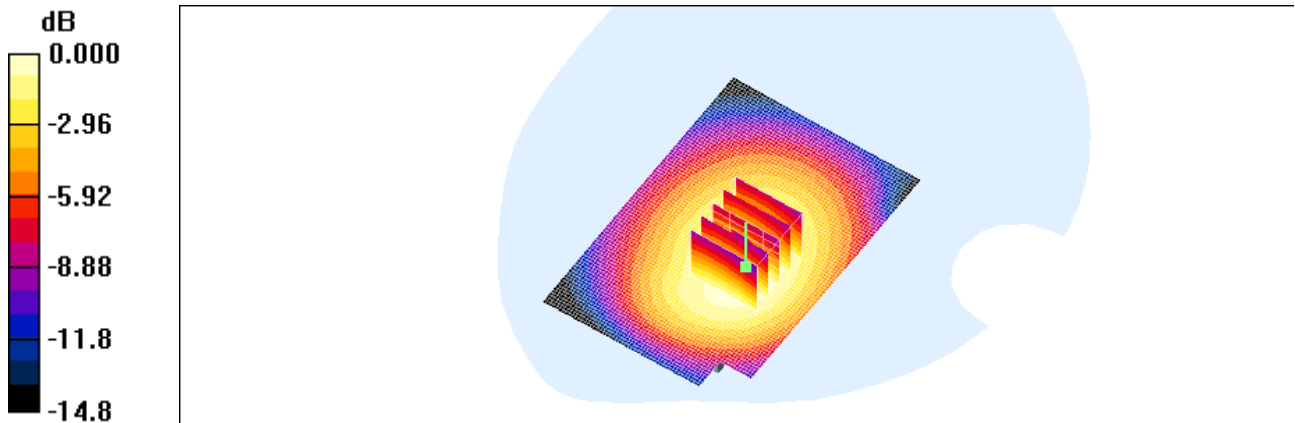
Reference Value = 13.5 V/m; Power Drift = -0.039 dB

Peak SAR (extrapolated) = 0.936 W/kg

SAR(1 g) = 0.717 mW/g; SAR(10 g) = 0.495 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.760 mW/g



0 dB = 0.760mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.951$ mho/m; $\epsilon_r = 55.9$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Body back 190/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.780 mW/g

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

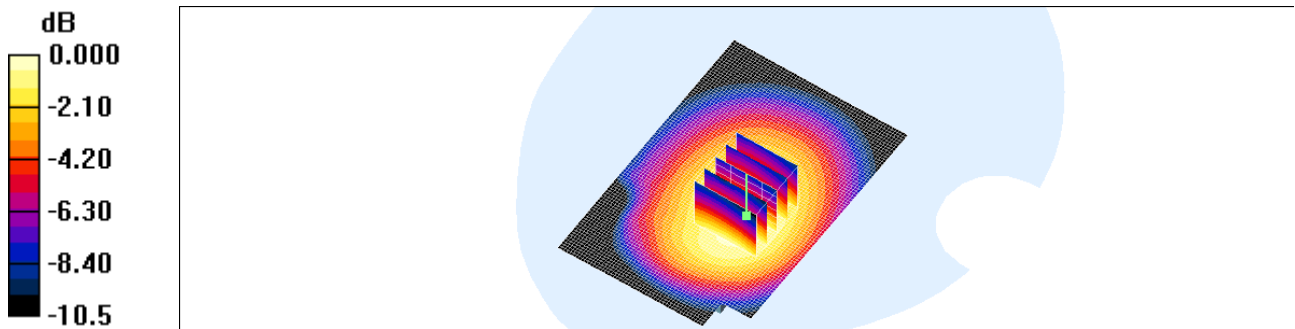
Reference Value = 13.6 V/m; Power Drift = -0.078 dB

Peak SAR (extrapolated) = 0.938 W/kg

SAR(1 g) = 0.713 mW/g; SAR(10 g) = 0.508 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.758 mW/g



0 dB = 0.758mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

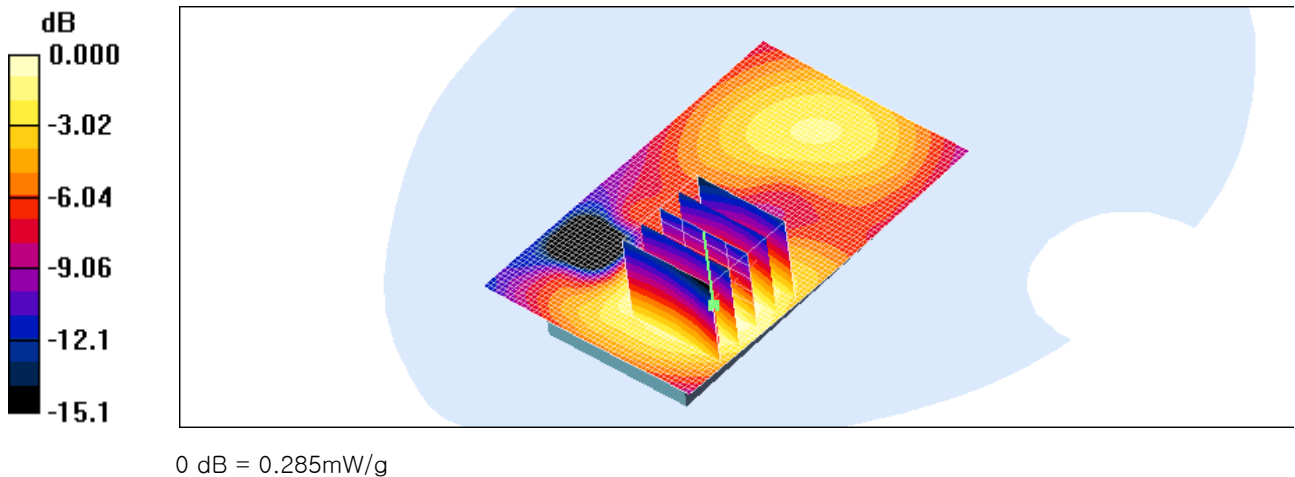
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:2.075
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.46$ mho/m; $\epsilon_r = 55.3$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

GSM1900 Body Rear 661/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.297 mW/g

GSM1900 Body Rear 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.9 V/m; Power Drift = -0.174 dB
Peak SAR (extrapolated) = 0.409 W/kg
SAR(1 g) = 0.266 mW/g; SAR(10 g) = 0.167 mW/g
Maximum value of SAR (measured) = 0.285 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

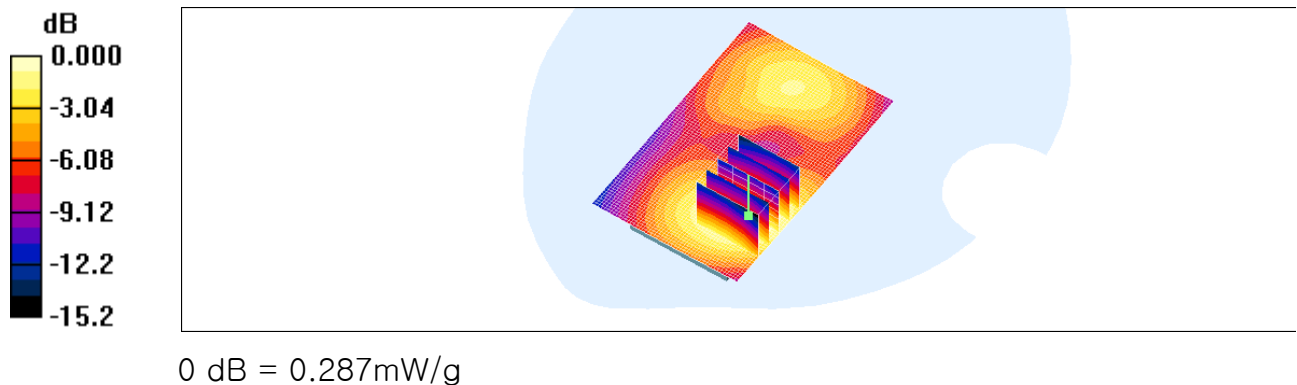
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.5
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.46 \text{ mho/m}$; $\epsilon_r = 55.3$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

GSM1900 Body Rear 661/Area Scan (51x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 0.298 mW/g

GSM1900 Body Rear 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 11.7 V/m; Power Drift = -0.002 dB
Peak SAR (extrapolated) = 0.410 W/kg
SAR(1 g) = 0.266 mW/g; SAR(10 g) = 0.166 mW/g
Maximum value of SAR (measured) = 0.287 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.88$ mho/m; $\epsilon_r = 51.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.21, 4.21, 4.21); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

WiFi2450 Body Rear 6/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

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

WiFi2450 Body Rear 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

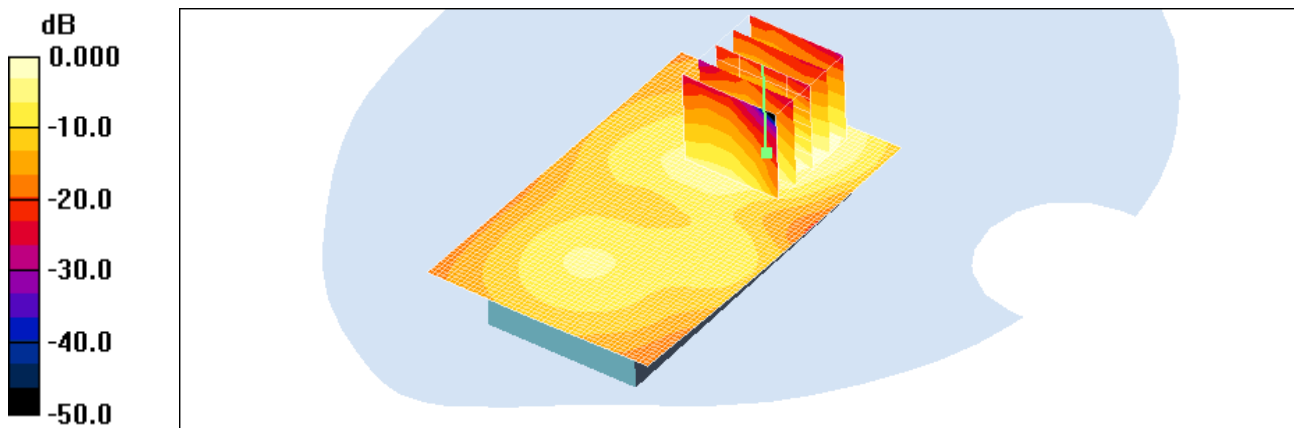
Reference Value = 6.89 V/m; Power Drift = 0.032 dB

Peak SAR (extrapolated) = 0.266 W/kg

SAR(1 g) = 0.100 mW/g; SAR(10 g) = 0.047 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.110 mW/g



0 dB = 0.110mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.905$ mho/m; $\epsilon_r = 43.1$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.72, 6.72, 6.72); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 190/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.651 mW/g

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

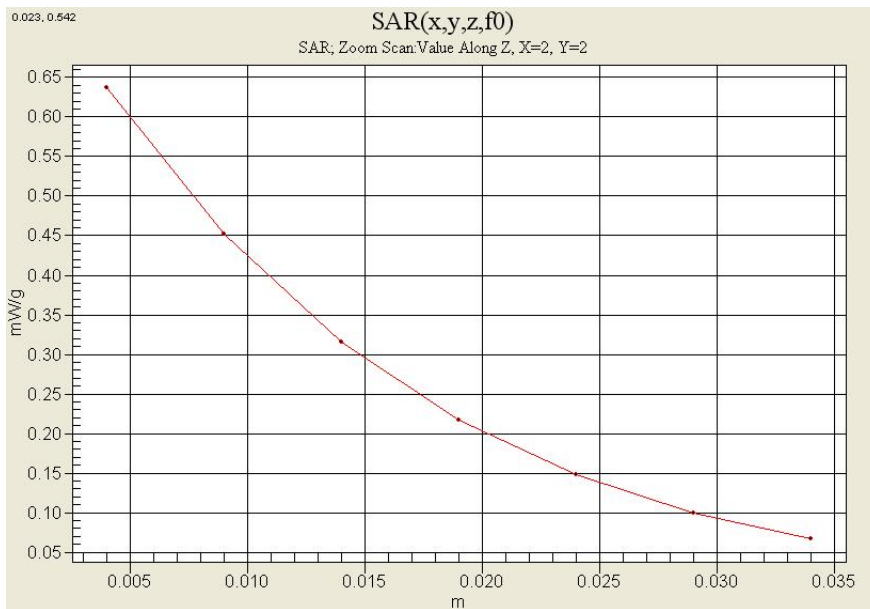
Reference Value = 8.39 V/m; Power Drift = -0.050 dB

Peak SAR (extrapolated) = 0.827 W/kg

SAR(1 g) = 0.594 mW/g; SAR(10 g) = 0.404 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.638 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2.075
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.951$ mho/m; $\epsilon_r = 55.9$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Body back 190/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.788 mW/g

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

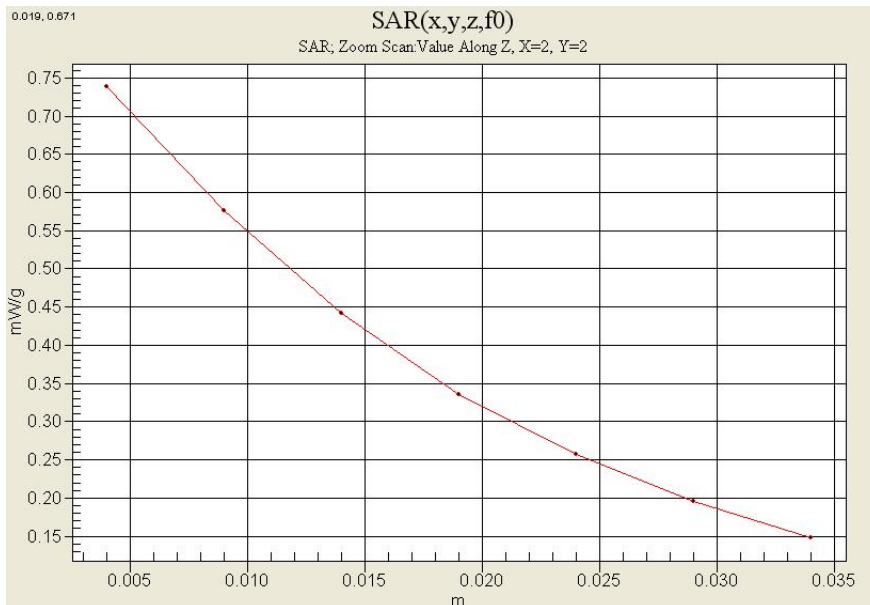
Reference Value = 13.5 V/m; Power Drift = -0.039 dB

Peak SAR (extrapolated) = 0.936 W/kg

SAR(1 g) = 0.717 mW/g; SAR(10 g) = 0.495 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.760 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

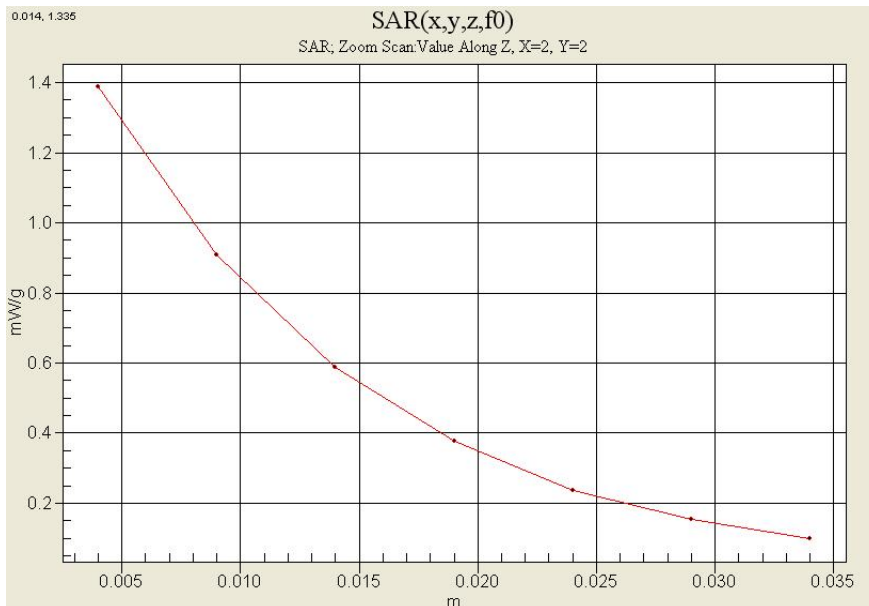
Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1910$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Left touch 810/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.47 mW/g

Left touch 810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.5 V/m; Power Drift = -0.065 dB
Peak SAR (extrapolated) = 1.86 W/kg
SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.736 mW/g
Maximum value of SAR (measured) = 1.39 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

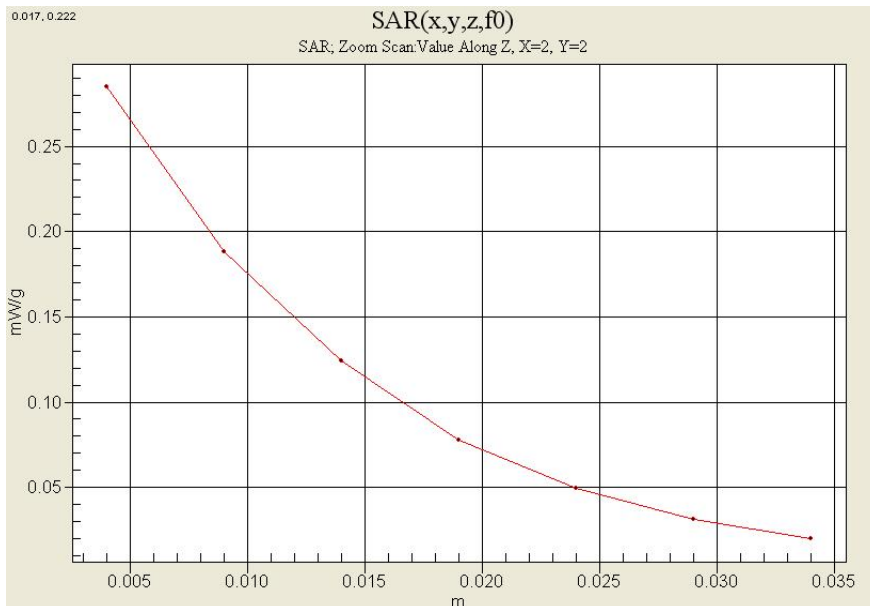
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:2.075
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.46 \text{ mho/m}$; $\epsilon_r = 55.3$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

GSM1900 Body Rear 661/Area Scan (51x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 0.297 mW/g

GSM1900 Body Rear 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 11.9 V/m; Power Drift = -0.174 dB
Peak SAR (extrapolated) = 0.409 W/kg
SAR(1 g) = 0.266 mW/g; SAR(10 g) = 0.167 mW/g
Maximum value of SAR (measured) = 0.285 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.72$ mho/m; $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.56, 4.56, 4.56); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 6/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.605 mW/g

Right touch 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

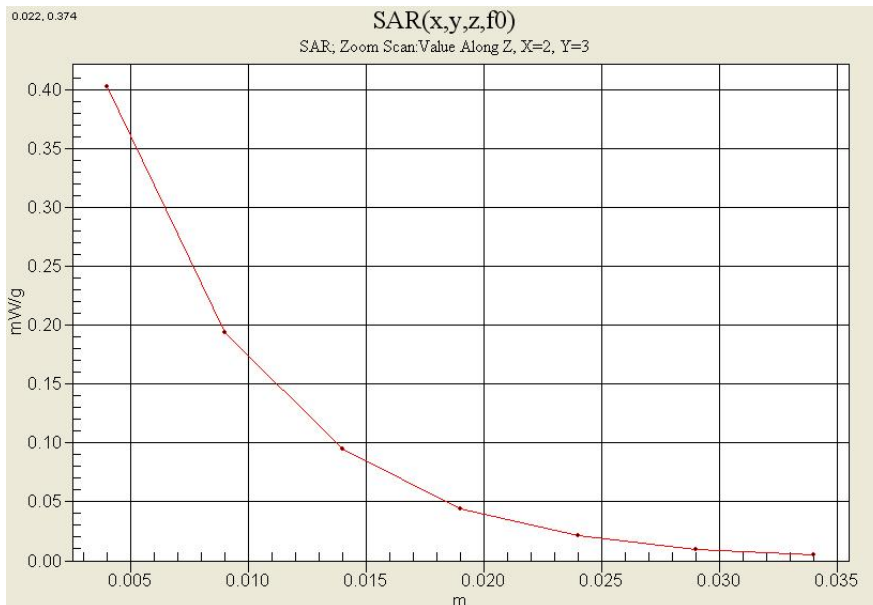
Reference Value = 8.37 V/m; Power Drift = 0.059 dB

Peak SAR (extrapolated) = 0.857 W/kg

SAR(1 g) = 0.323 mW/g; SAR(10 g) = 0.146 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.402 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Phone with Bluetooth and WLAN
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Aug.08, 2011

DUT: CD02; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.88$ mho/m; $\epsilon_r = 51.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.21, 4.21, 4.21); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

WiFi2450 Body Rear 6/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

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

WiFi2450 Body Rear 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

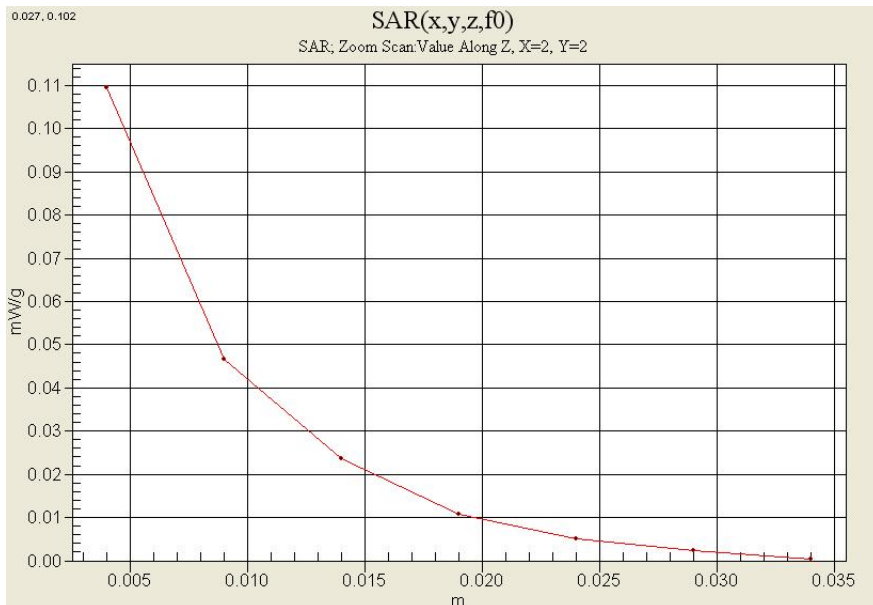
Reference Value = 6.89 V/m; Power Drift = 0.032 dB

Peak SAR (extrapolated) = 0.266 W/kg

SAR(1 g) = 0.100 mW/g; SAR(10 g) = 0.047 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.110 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: 21.2 °C
Test Date: Aug.08, 2011

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

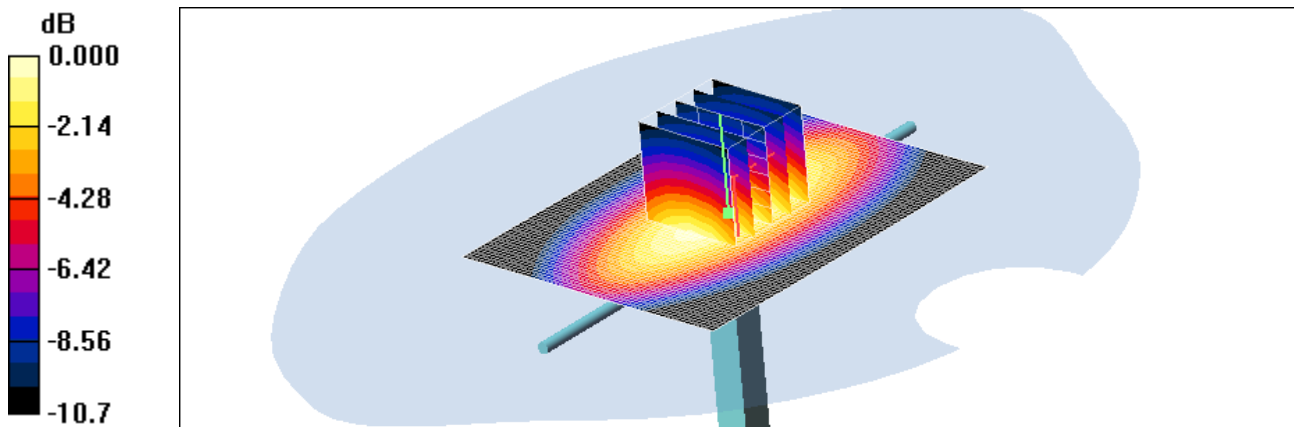
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.903 \text{ mho/m}$; $\epsilon_r = 43.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1798; ConvF(6.72, 6.72, 6.72); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Validation 835 MHz/Area Scan (61x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 1.02 mW/g

Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 35.4 V/m; Power Drift = -0.060 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.940 mW/g; SAR(10 g) = 0.617 mW/g
Maximum value of SAR (measured) = 1.01 mW/g



0 dB = 1.01mW/g

■ Validation Data (835 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power: 100 mW (20 dBm)
Liquid Temp: 21.2 °C
Test Date: Aug.08, 2011

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

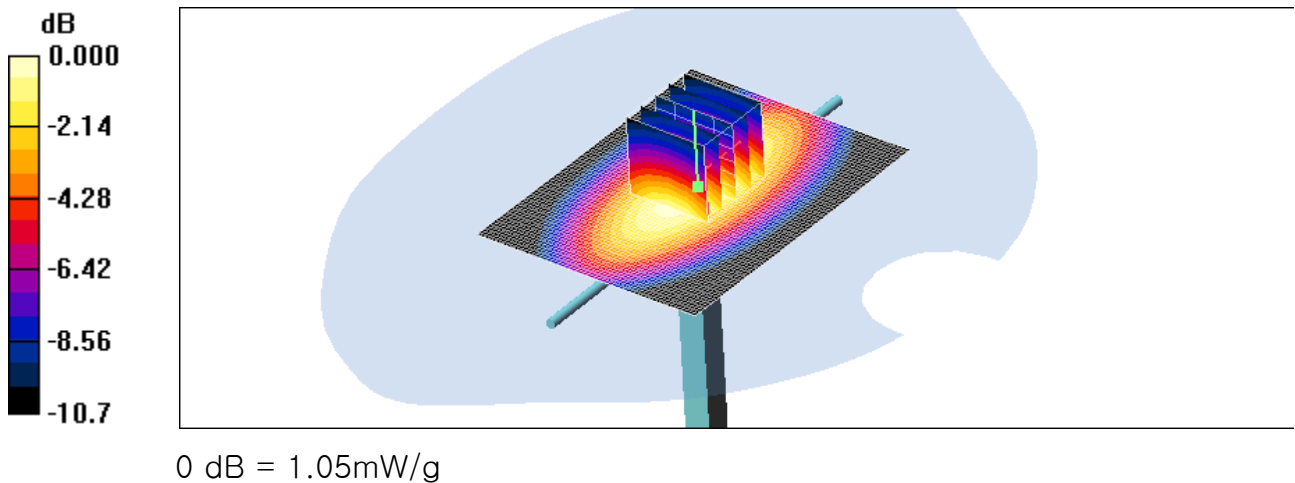
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 55.9$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1798; ConvF(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Validation 835 MHz/Area Scan (61x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 1.04 mW/g

Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 34.5 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.972 mW/g; SAR(10 g) = 0.641 mW/g
Maximum value of SAR (measured) = 1.05 mW/g



■ Validation Data (1900 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power: 100 mW (20 dBm)
Liquid Temp: 21.2 °C
Test Date: Aug.08, 2011

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

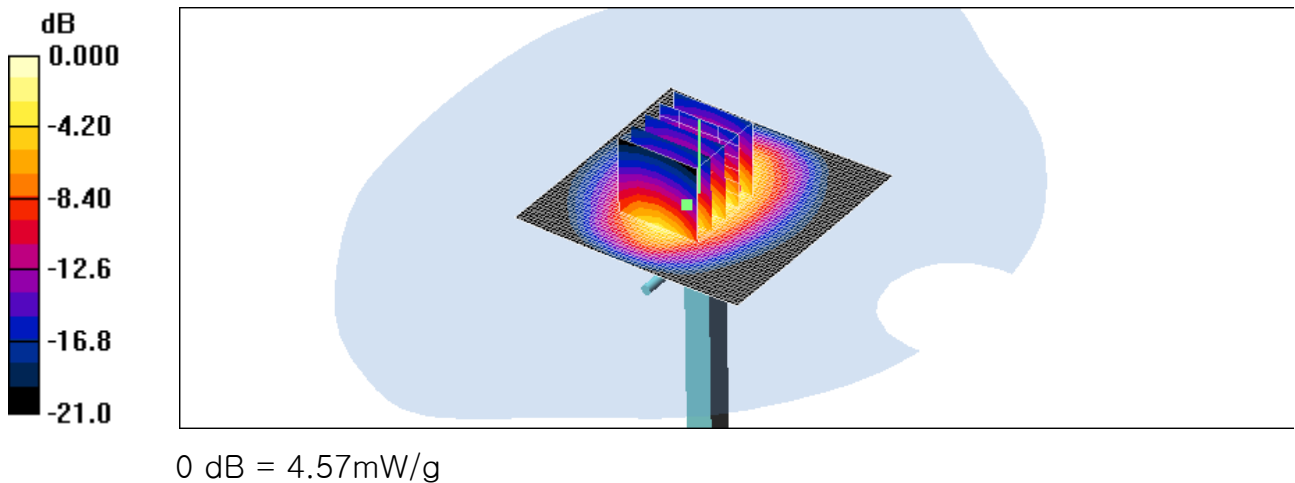
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.4 \text{ mho/m}$; $\epsilon_r = 39.4$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 4.73 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 59.2 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 7.31 W/kg
SAR(1 g) = 4.05 mW/g; SAR(10 g) = 2.07 mW/g.
Maximum value of SAR (measured) = 4.57 mW/g



■ Validation Data (1900 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power: 100 mW (20 dBm)
Liquid Temp: 21.2 °C
Test Date: Aug.08, 2011

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.46 \text{ mho/m}$; $\epsilon_r = 54.5$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

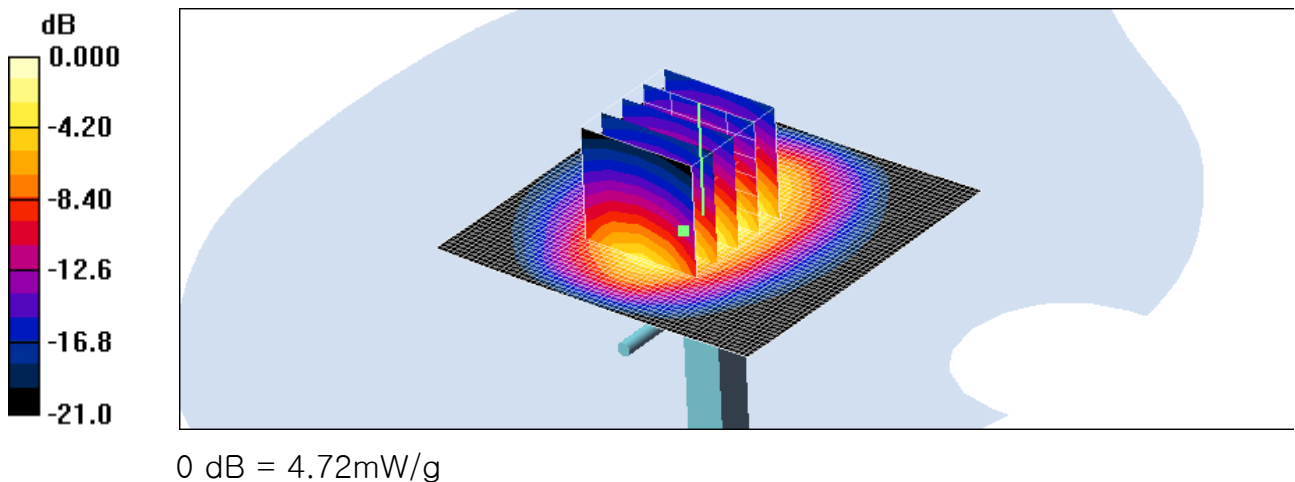
DASY4 Configuration:

- Probe: ET3DV6 – SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 4.87 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 59.2 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 7.43 W/kg
SAR(1 g) = 4.17 mW/g; SAR(10 g) = 2.13 mW/g

Maximum value of SAR (measured) = 4.72 mW/g



■ Validation Data (1900 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.1 °C
Test Date: Sep.07, 2011

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

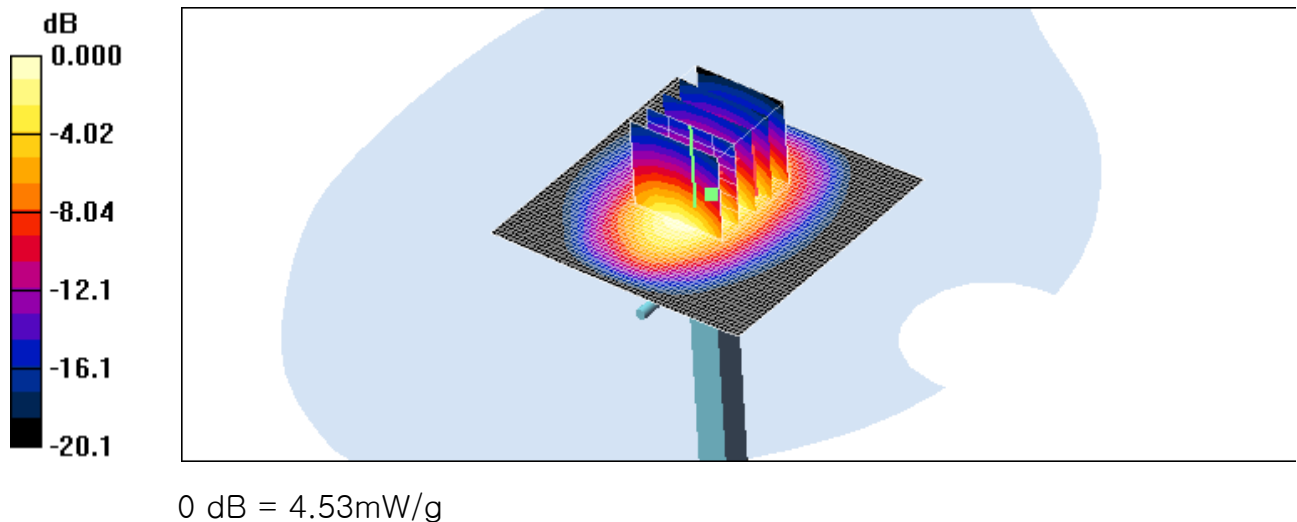
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900$ MHz; $\sigma = 1.4$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1609; ConvF(5.26, 5.26, 5.26); Calibrated: 2010-11-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; 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) = 4.89 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 = -0.008 dB
Peak SAR (extrapolated) = 7.36 W/kg
SAR(1 g) = 4.09 mW/g; SAR(10 g) = 2.1 mW/g
Maximum value of SAR (measured) = 4.53 mW/g



■ Validation Data (2450 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power: 100 mW (20 dBm)
Liquid Temp: 21.2 °C
Test Date: Aug.08, 2011

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

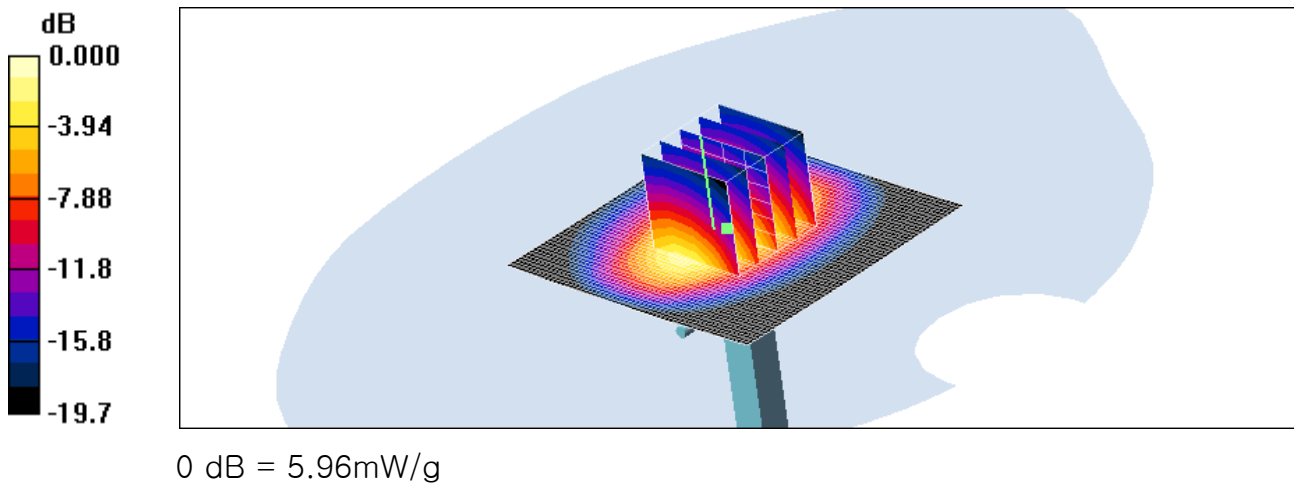
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2450$ MHz; $\sigma = 1.73$ mho/m; $\epsilon_r = 38.5$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1798; ConvF(4.56, 4.56, 4.56); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Dipole 2450MHz Validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 6.35 mW/g

Dipole 2450MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.7 V/m; Power Drift = -0.001 dB
Peak SAR (extrapolated) = 10.1 W/kg
SAR(1 g) = 5.5 mW/g; SAR(10 g) = 2.84 mW/g
Maximum value of SAR (measured) = 5.96 mW/g



■ Validation Data (2450 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power: 100 mW (20 dBm)
Liquid Temp: 21.2 °C
Test Date: Aug.08, 2011

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

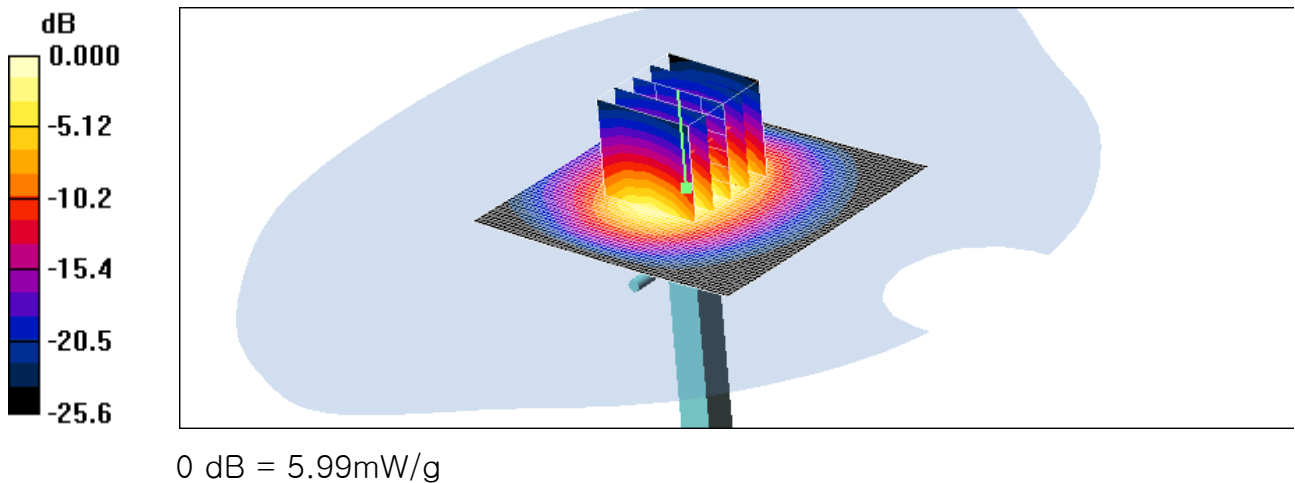
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2450$ MHz; $\sigma = 1.94$ mho/m; $\epsilon_r = 51.9$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1798; ConvF(4.21, 4.21, 4.21); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Validation 2450MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 6.67 mW/g

Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 56.1 V/m; Power Drift = -0.052 dB
Peak SAR (extrapolated) = 13.8 W/kg
SAR(1 g) = 5.54 mW/g; SAR(10 g) = 2.47 mW/g
Maximum value of SAR (measured) = 5.99 mW/g



■ Dielectric Parameter (835 MHz Head)

Title CD02
SubTitle GSM850(Head)
Test Date Aug.08, 2011

Frequency	e'	e''
800000000.0000	43.5329	19.5695
805000000.0000	43.4918	19.5676
810000000.0000	43.4588	19.5526
815000000.0000	43.3539	19.5475
820000000.0000	43.3000	19.4906
825000000.0000	43.2218	19.4948
830000000.0000	43.1699	19.4757
835000000.0000	43.0841	19.4455
840000000.0000	43.0467	19.4334
845000000.0000	42.9534	19.4064
850000000.0000	42.8851	19.4248
855000000.0000	42.8086	19.3937
860000000.0000	42.7327	19.3785
865000000.0000	42.6720	19.3591
870000000.0000	42.5902	19.3515
875000000.0000	42.5740	19.3551
880000000.0000	42.5035	19.3446
885000000.0000	42.4562	19.3072
890000000.0000	42.4300	19.3040
895000000.0000	42.3781	19.2637
900000000.0000	42.2854	19.2662

■ Dielectric Parameter (835 MHz Body)

Title CD02
SubTitle GSM850(Body)
Test Date Aug.08, 2011

Frequency	e'	e''
800000000.0000	56.2492	20.6429
805000000.0000	56.2048	20.6082
810000000.0000	56.1738	20.5622
815000000.0000	56.0899	20.5086
820000000.0000	56.0428	20.5040
825000000.0000	56.0277	20.4642
830000000.0000	55.9565	20.4598
835000000.0000	55.9250	20.4430
840000000.0000	55.8777	20.4441
845000000.0000	55.8409	20.4129
850000000.0000	55.7814	20.3947
855000000.0000	55.7311	20.3983
860000000.0000	55.6909	20.3700
865000000.0000	55.6264	20.3823
870000000.0000	55.5936	20.3857
875000000.0000	55.5647	20.3782
880000000.0000	55.5116	20.3717
885000000.0000	55.4727	20.3573
890000000.0000	55.4684	20.3405
895000000.0000	55.4377	20.2915
900000000.0000	55.3750	20.2747

■ Dielectric Parameter (1900 MHz Head)

Title CD02
SubTitle GSM1900(Head)
Test Date Aug.08, 2011

Frequency	e'	e''
1850000000.0000	40.2194	12.6858
1855000000.0000	40.0510	12.7123
1860000000.0000	39.8661	12.7379
1865000000.0000	39.6813	12.7977
1870000000.0000	39.5400	12.8553
1875000000.0000	39.4336	12.9138
1880000000.0000	39.3503	12.9812
1885000000.0000	39.3216	13.0529
1890000000.0000	39.3103	13.1277
1895000000.0000	39.3434	13.2076
1900000000.0000	39.4044	13.2722
1905000000.0000	39.5020	13.3099
1910000000.0000	39.6173	13.3244
1915000000.0000	39.7244	13.3124
1920000000.0000	39.8472	13.2842
1925000000.0000	39.9782	13.2524
1930000000.0000	40.1033	13.2198
1935000000.0000	40.1826	13.1697
1940000000.0000	40.2335	13.1363
1945000000.0000	40.2307	13.1229
1950000000.0000	40.1717	13.1099

■ Dielectric Parameter (1900 MHz Body)

Title CD02
 SubTitle GSM1900(Body)
 Test Date Aug.08, 2011

Frequency	e'	e''
1850000000.0000	54.6259	13.6431
1855000000.0000	54.6088	13.6519
1860000000.0000	54.5984	13.6590
1865000000.0000	54.5694	13.6701
1870000000.0000	54.5457	13.6732
1875000000.0000	54.5406	13.6986
1880000000.0000	54.5355	13.7073
1885000000.0000	54.5299	13.7259
1890000000.0000	54.5159	13.7494
1895000000.0000	54.5203	13.7653
1900000000.0000	54.5151	13.7800
1905000000.0000	54.5053	13.8153
1910000000.0000	54.5214	13.8262
1915000000.0000	54.5078	13.8210
1920000000.0000	54.5020	13.8121
1925000000.0000	54.4964	13.8161
1930000000.0000	54.4879	13.8339
1935000000.0000	54.4907	13.8422
1940000000.0000	54.4721	13.8424
1945000000.0000	54.4617	13.8208
1950000000.0000	54.4345	13.8100

■ Dielectric Parameter (1900 MHz Head)

Title CD02
SubTitle GSM1900(Head)
Test Date Sep.07, 2011

Frequency	e'	e''
1800000000.0000	41.4291	12.9904
1810000000.0000	41.3850	13.0064
1820000000.0000	41.3740	13.0718
1830000000.0000	41.3649	13.1142
1840000000.0000	41.3254	13.1548
1850000000.0000	41.2992	13.1713
1860000000.0000	41.1826	13.1924
1870000000.0000	41.1554	13.2313
1880000000.0000	41.0844	13.2204
1890000000.0000	41.0130	13.2344
1900000000.0000	40.9629	13.2286
1910000000.0000	40.8971	13.2248
1920000000.0000	40.8876	13.2405
1930000000.0000	40.8806	13.2936
1940000000.0000	40.8522	13.3310
1950000000.0000	40.8445	13.3573
1960000000.0000	40.8711	13.3926
1970000000.0000	40.8521	13.4382
1980000000.0000	40.8573	13.4609
1990000000.0000	40.7580	13.5328
2000000000.0000	40.7432	13.5278

■ Dielectric Parameter (2 450 MHz Head)

Title CD02
SubTitle 2450MHz (Head)
Test Date Aug.08, 2011

Frequency	e'	e''
2400000000.0000	38.6688	12.5832
2405000000.0000	38.6374	12.6120
2410000000.0000	38.6310	12.6374
2415000000.0000	38.6169	12.6500
2420000000.0000	38.6058	12.6646
2425000000.0000	38.6056	12.6650
2430000000.0000	38.5779	12.6754
2435000000.0000	38.5576	12.6823
2440000000.0000	38.5497	12.6962
2445000000.0000	38.5445	12.7009
2450000000.0000	38.5070	12.7076
2455000000.0000	38.4811	12.7050
2460000000.0000	38.4409	12.7070
2465000000.0000	38.4199	12.7188
2470000000.0000	38.4053	12.7222
2475000000.0000	38.3953	12.7374
2480000000.0000	38.3811	12.7406
2485000000.0000	38.3637	12.7719
2490000000.0000	38.3564	12.8191
2495000000.0000	38.3324	12.8537
2500000000.0000	38.3207	12.9014

■ Dielectric Parameter (2450 MHz Body)

Title CD02
SubTitle 2450MHz (Body)
Test Date Aug.08, 2011

Frequency	e'	e''
2400000000.0000	52.1286	13.9391
2405000000.0000	52.0984	13.9422
2410000000.0000	52.0504	13.9905
2415000000.0000	52.0098	13.9847
2420000000.0000	51.9973	14.0187
2425000000.0000	51.9516	14.0500
2430000000.0000	51.9265	14.0853
2435000000.0000	51.8966	14.1194
2440000000.0000	51.9129	14.1629
2445000000.0000	51.8406	14.2252
2450000000.0000	51.8692	14.2568
2455000000.0000	51.8381	14.2710
2460000000.0000	51.8197	14.2652
2465000000.0000	51.7981	14.3242
2470000000.0000	51.8182	14.3333
2475000000.0000	51.7831	14.3459
2480000000.0000	51.7847	14.3867
2485000000.0000	51.7417	14.3986
2490000000.0000	51.7727	14.4205
2495000000.0000	51.7500	14.4329
2500000000.0000	51.7460	14.4476

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: **ET3-1798_Apr11**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1798**

Calibration procedure(s) **QA CAL-01.v7, QA CAL-23.v4, QA CAL-25.v3**
Calibration procedure for dosimetric E-field probes

Calibration date: **April 14, 2011**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3 °C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41495277	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	23-Apr-10 (No. DAE4-654_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-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			
Issued: April 14, 2011			

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)

Accreditation No.: **SCS 108**

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

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 φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- 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
- 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 $\vartheta = 0$ ($f \leq 900$ 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 affect the E^2 -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.
- DCP_{x,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.
- PAR:** PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}:** are numerical linearization parameters in dB assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media.
- VR:** VR is the validity range of the calibration related to the average diode voltage or DAE voltage in mV.
- 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 ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy):** in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset:** The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

ET3DV6 – SN:1798

April 14, 2011

Probe ET3DV6

SN:1798

Manufactured: August 14, 2003
Calibrated: April 14, 2011

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

ET3DV6- SN:1798

April 14, 2011

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1798

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	2.02	1.82	2.06	± 10.1 %
DCP (mV) ^B	98.8	96.3	98.2	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	113.1	±3.0 %
			Y	0.00	0.00	1.00	145.9	
			Z	0.00	0.00	1.00	114.8	

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

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

ET3DV6- SN:1798

April 14, 2011

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1798

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	7.63	7.63	7.63	0.22	2.25	± 13.4 %
835	41.5	0.90	6.72	6.72	6.72	0.78	1.68	± 12.0 %
900	41.5	0.97	6.61	6.61	6.61	0.74	1.74	± 12.0 %
1750	40.1	1.37	5.46	5.46	5.46	0.52	2.60	± 12.0 %
1900	40.0	1.40	5.24	5.24	5.24	0.54	2.52	± 12.0 %
1950	40.0	1.40	5.08	5.08	5.08	0.53	2.57	± 12.0 %
2450	39.2	1.80	4.56	4.56	4.56	0.70	1.97	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

ET3DV6- SN:1798

April 14, 2011

DASY/EASY - Parameters of Probe: ET3DV6- SN:1798

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	8.09	8.09	8.09	0.15	2.17	± 13.4 %
835	55.2	0.97	6.50	6.50	6.50	0.73	1.84	± 12.0 %
900	55.0	1.05	6.40	6.40	6.40	0.71	1.90	± 12.0 %
1750	53.4	1.49	4.84	4.84	4.84	0.55	2.94	± 12.0 %
1900	53.3	1.52	4.63	4.63	4.63	0.57	2.70	± 12.0 %
1950	53.3	1.52	4.76	4.76	4.76	0.59	2.49	± 12.0 %
2450	52.7	1.95	4.21	4.21	4.21	0.97	1.24	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

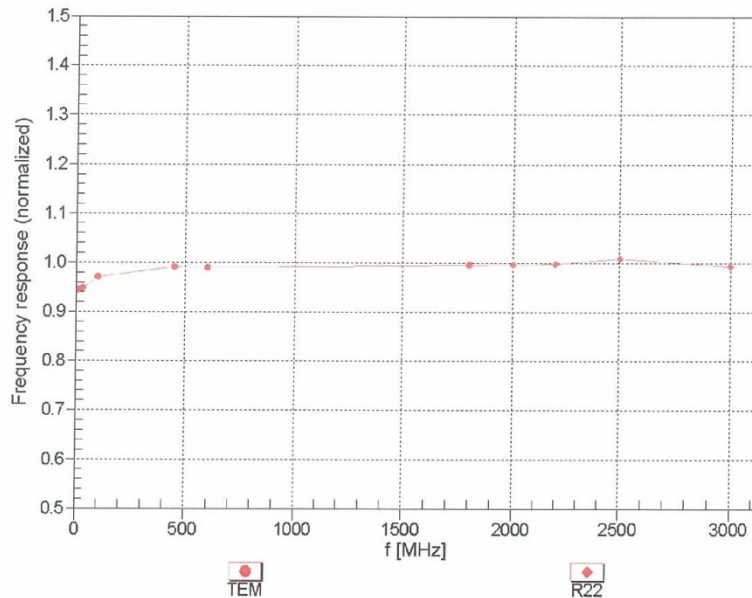
^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

ET3DV6-SN:1798

April 14, 2011

Frequency Response of E-Field

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



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

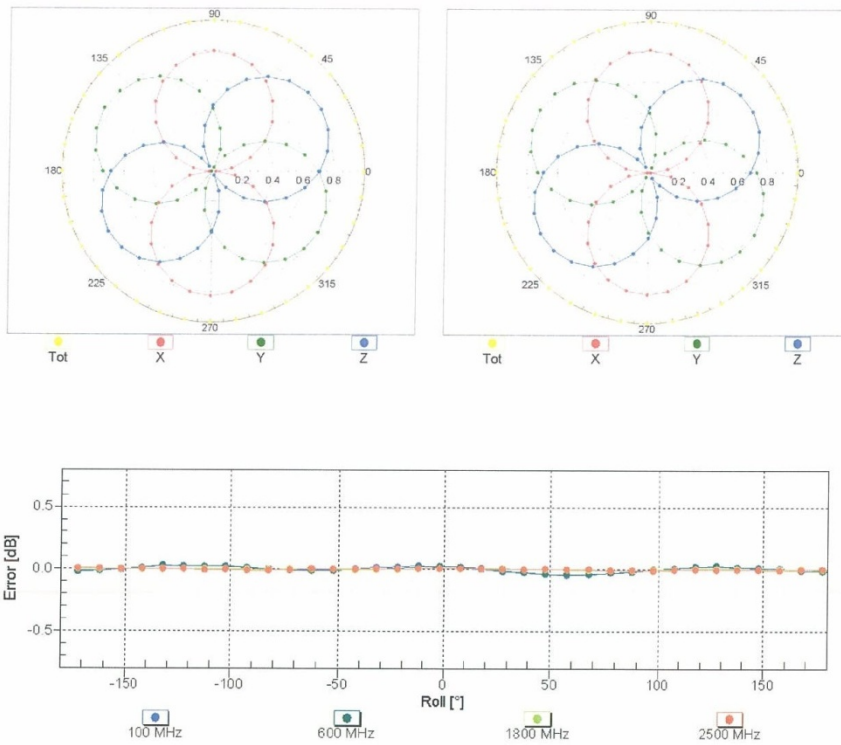
ET3DV6-SN:1798

April 14, 2011

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz, TEM

f=1800 MHz, R22

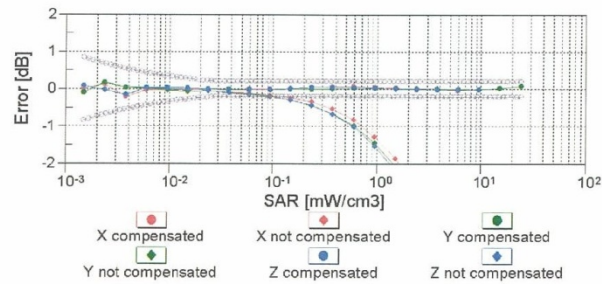
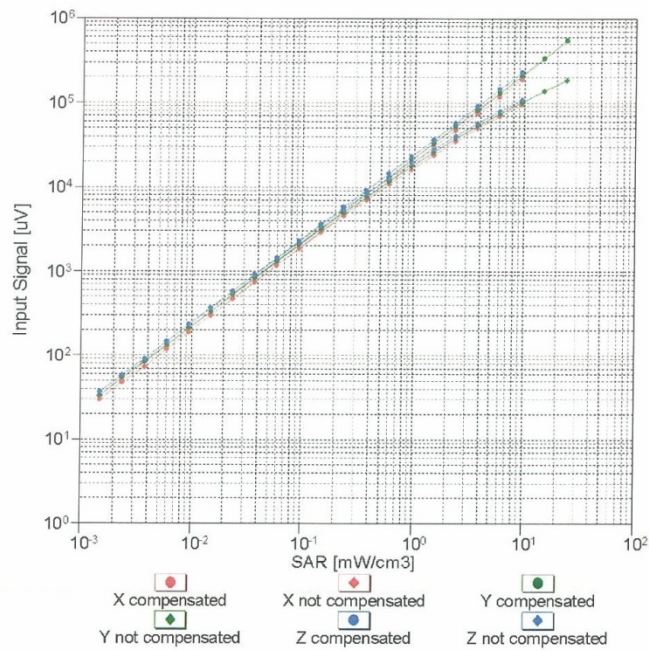


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

ET3DV6- SN:1798

April 14, 2011

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f = 900 \text{ MHz}$)

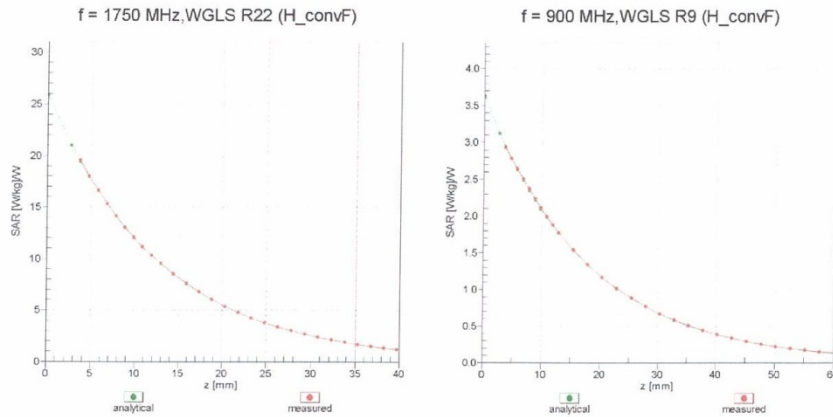


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

ET3DV6- SN:1798

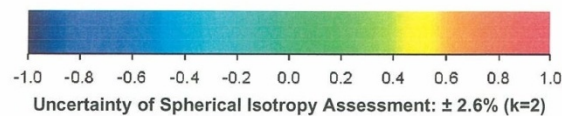
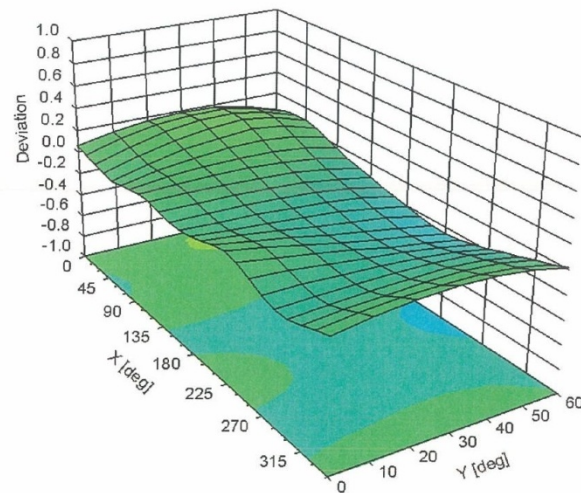
April 14, 2011

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ (k=2)

ET3DV6- SN:1798

April 14, 2011

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1798**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

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Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	ET3DV6
Serial Number:	1798
Place of Assessment:	Zurich
Date of Assessment:	July 13, 2011
Probe Calibration Date:	April 14, 2011

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 recalibration 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:

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Dosimetric E-Field Probe ET3DV6 - SN:1798

Conversion factor ($\pm$ standard deviation)

750 $\pm$ 50 MHz *ConvF* 6.94 $\pm$ 7%

$\epsilon_r = 41.9 \pm 5\%$
 $\sigma = 0.89 \pm 5\%$ mho/m
(head tissue)

750 $\pm$ 50 MHz *ConvF* 6.79 $\pm$ 7%

$\epsilon_r = 55.5 \pm 5\%$
 $\sigma = 0.96 \pm 5\%$ 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.