

SAR TEST REPORT

HCT CO., LTD

EUT Type:	850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only			
FCC ID:	A3LGTS6352			
Model:	GT-S6352			
Date of Issue:	Apr.25, 2012			
Test report No.:	HCTA1204FS08			
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Applicant :	SAMSUNG Electronics Co., Ltd. 416 Maetan3-Dong, YeongTong-Gu, Suwon-Si, Gyeonggi-Do, Korea, 443-742			
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 1528-2003			
Test result:	The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.			
Max SAR	Band	1g SAR (W/kg)		
		Head	Body	Hotspot
	GSM850	0.073	0.171	0.171
	GSM1900	0.589	0.664	0.664
	802.11b	0.042	0.00903	0.018
Simultaneous SAR per KDB 690783 D01		0.631	0.673	0.673
Signature	 Report prepared by : Young-Soo Jang Test Engineer of SAR Part  Approved by : Jae-Sang So Manager of SAR Part			

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1. INTRODUCTION

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

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

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative of the incremental electromagnetic energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (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).

where:

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

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	850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
FCC ID:	A3LGTS6352
Model:	GT-S6352
Trade Name	SAMSUNG Electronics Co., Ltd.
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	869.20 - 893.80 MHz (GSM850)/ 1 930.20 – 1 989.80 MHz (GSM1900) 2 412- 2 462 MHz (WLAN)
FCC Classification	Licensed Portable Transmitter Held to Ear (PCE)
Production Unit or Identical Prototype	Prototype
Date(s) of Tests	Apr. 12, 2012 ~ Apr. 24, 2012
Antenna Type	Integral Antenna
GPRS	Multislot Class: 12, Mode Class: B
Key Feature(s)	Mobile Hotspot support

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.

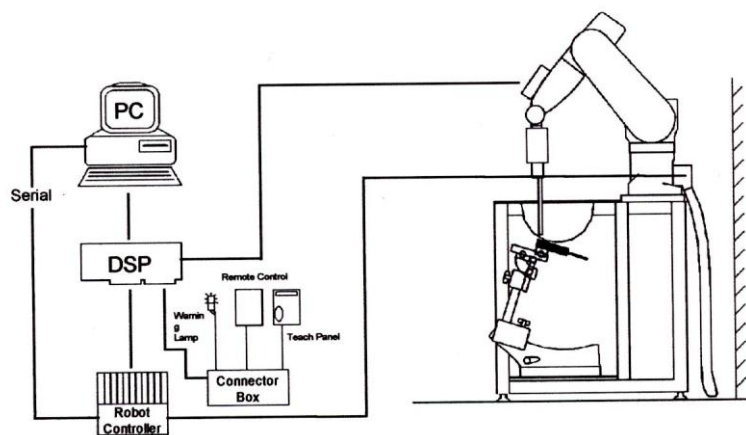


Figure 3.1 HCT SAR Lab. Test Measurement Set-up

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

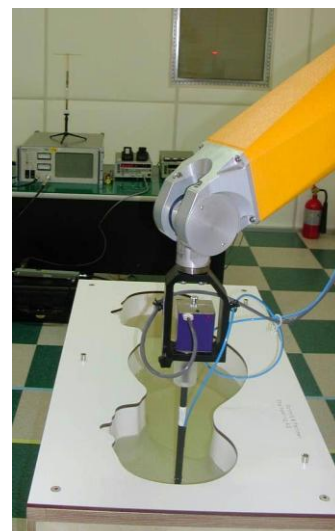


Figure 3.2 Photograph of the probe and the Phantom



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/cm³ for brain tissue)

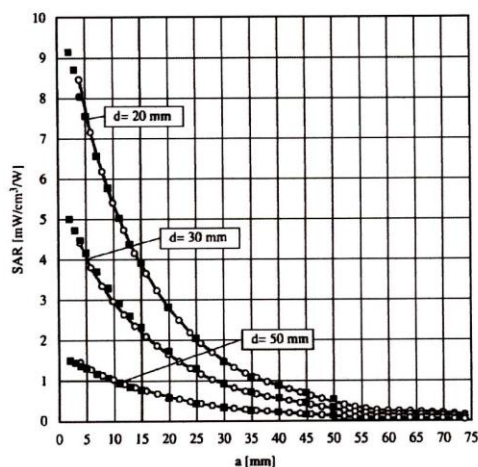


Figure 3.4 E-Field and Temperature measurements at 900 MHz

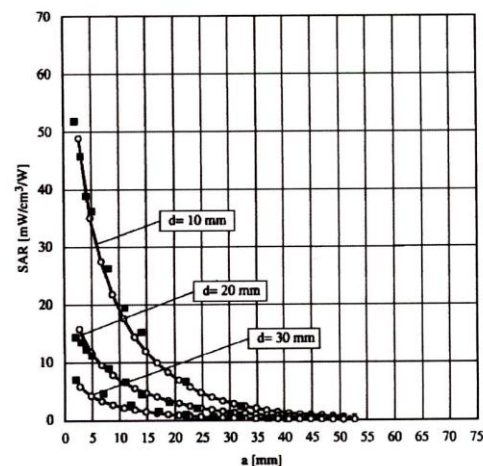


Figure 3.5 E-Field and temperature measurements at 1.8 GHz

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 $\pm$ 0.2 mm (6 $\pm$ 0.2 mm at ear point)
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. Hartsgrove.

Ingredients (% by weight)	Frequency (MHz)											
	450		750		835		915		1 900		2 450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.2	51.7	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.4	1.0	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	57	47.2	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	0.2	0.0	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.2	0.1	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.00	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	Feb. 21, 2012	Annual	Feb. 21, 2013
SPEAG	DAE3	446	Sep. 27, 2011	Annual	Sep. 27, 2012
SPEAG	E-Field Probe ET3DV6	1609	Mar 19, 2012	Annual	Mar 19, 2013
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. 29, 2011	Annual	Aug. 29, 2012
Agilent	Power Meter(F) E4419B	MY41291386	Nov. 04, 2011	Annual	Nov. 04, 2012
Agilent	Power Sensor(G) 8481	MY41090870	Nov. 04, 2011	Annual	Nov. 04, 2012
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler	16072	Nov. 04, 2011	Annual	Nov. 04, 2012
R&S	Base Station CMU200	110740	July 26, 2011	Annual	July 26, 2012
Agilent	Base Station E5515C	GB44400269	Feb. 10, 2012	Annual	Feb. 10, 2013
HP	Signal Generator E4438C	MY42082646	Nov. 11, 2011	Annual	Nov. 11, 2012
HP	Network Analyzer 8753ES	JP39240221	Apr. 3, 2012	Annual	Apr. 3, 2013

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 15 mm x 15 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.

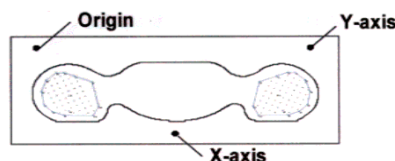


Figure 4.1 SAR Measurement Point in Area Scan

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.

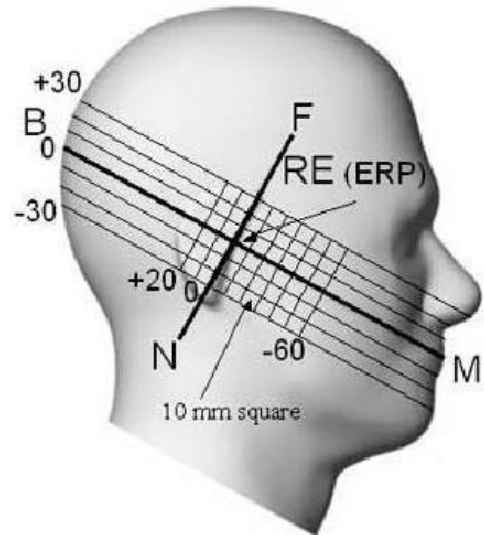


Figure 5.1 Side view of the phantom

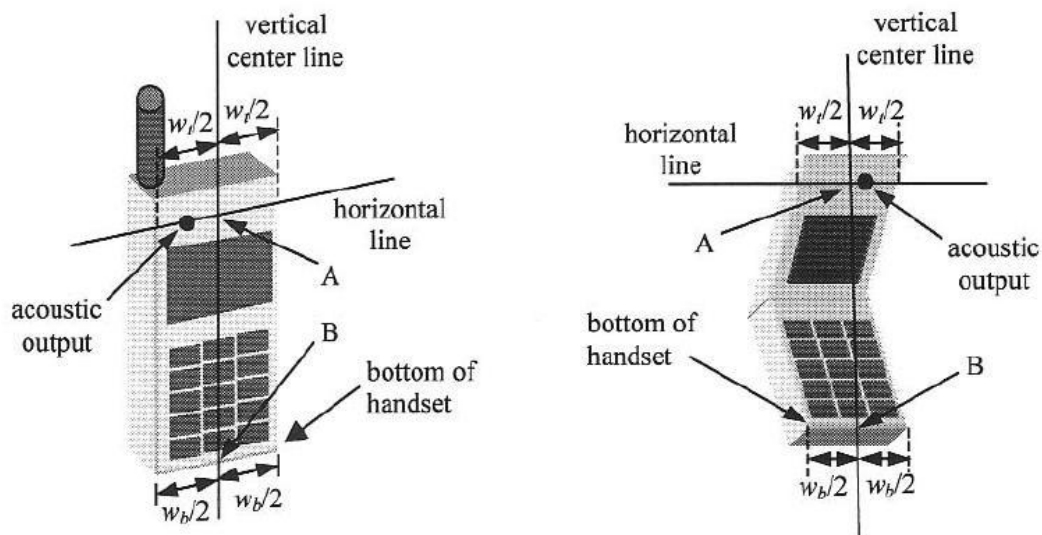


Figure 5.2 Handset vertical and horizontal reference lines

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 1.0 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)

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	Apr.12, 2012	Head	21.1	ϵ_r	41.5	40.8	- 1.69	± 5
σ				0.90	0.876	- 2.67	± 5	
835		Body		ϵ_r	55.2	53.8	- 2.54	± 5
				σ	0.97	0.970	0.00	± 5
1 900	Apr.13, 2012	Head	21.2	ϵ_r	40.0	39.1	- 2.25	± 5
σ				1.40	1.39	- 0.71	± 5	
1 900		Body		ϵ_r	53.3	53.6	+ 0.56	± 5
				σ	1.52	1.5	- 1.32	± 5
2 450	Apr.24, 2012	Head	21.3	ϵ_r	39.2	40.1	+ 2.30	± 5
σ				1.80	1.85	+ 2.77	± 5	
2 450		Body		ϵ_r	52.7	51.5	- 2.28	± 5
				σ	1.95	1.86	- 4.62	± 5

The Tissue dielectronic parameters were measured prior to the SAR evaluation using an Agilent 85070C Dielectronic Probe Kit and Agilent Network Analyzer.

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)

Freq. [MHz]	Date	Probe (SN)	Liquid	Amb. Temp. [°C]	Liquid Temp. [°C]	1 W Target SAR _{1g} (SPEAG) (mW/g)	Measured SAR _{1g} (mW/g)	1 W Normalized SAR _{1g} (mW/g)	Deviation [%]	Limit [%]
835	Apr.12, 2012	1798	Head	21.1	21.3	9.34	0.931	9.31	- 0.32	± 10
835			Body			9.45	0.970	9.70	+ 2.65	± 10
1 900	Apr.13, 2012		Head	21.2	21.4	39.9	4.11	41.1	+ 3.01	± 10
1 900			Body			40.9	4.12	41.2	+ 0.73	± 10
2 450	Apr.24, 2012	1609	Head	21.3	21.5	53.8	5.26	52.6	- 2.59	± 10
2 450			Body			51.7	5.39	53.9	+ 4.26	± 10

8.3 System Validation Procedure

SAR measurement was prior to assessment, the system is verified to the $\pm 10\%$ of the specifications at each frequency band by using the system validation kit. (Graphic Plots Attached)

- Cabling the system, using the validation kit equipments.
- Generate about 100 mW Input Level from the Signal generator to the Dipole Antenna.
- Dipole Antenna was placed below the Flat phantom.
- The measured one-gram SAR at the surface of the phantom above the dipole feed-point should be within 10 % of the target reference value.
- The results are normalized to 1 W input power.

Note;

SAR Verification was performed according to the FCC KDB 450824.

9. RF CONDUCTED POWER MEASUREMENT

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

9.1 GSM

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



SAR Test for WWAN were performed with a base station simulator Agilent E5515C. Communication between the device and the emulator was established by air link. Set base station emulator to allow DUT to radiate maximum output power during all tests. Please refer to the below worst case SAR operation setup.

- GSM voice: Head SAR
- GPRS Multi-slots : GPRS850/1900 Body SAR with GPRS Multi-slot Class12, 3Tx with CS 1 (GMSK)

Note;

CS1/MCS7 coding scheme was used in GPRS/EDGE output power measurements and SAR Testing, as a condition where GMSK/8PSK modulation was ensured. Investigation has shown that CS1 - CS4/ MCS5 – MCS9 settings do not have any impact on the output levels in the GPRS/EDGE modes.

GSM Conducted output powers (Burst-Average)

Band	Channel	Voice	GPRS(GMSK) Data – CS1			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)
GSM 850	128	32.51	32.51	30.98	28.95	26.93
	190	32.44	32.44	30.93	28.9	26.91
	251	32.47	32.47	30.95	28.92	26.97
GSM 1900	512	29.59	29.57	28.03	26.05	24.06
	661	29.77	29.77	28.27	26.28	24.28
	810	29.51	29.5	28.00	26.01	24.04

GSM Conducted output powers (Frame-Average)

Band	Channel	Voice	GPRS(GMSK) Data – CS1			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)
GSM 850	128	23.48	23.48	24.96	24.69	23.92
	190	23.41	23.41	24.91	24.64	23.9
	251	23.44	23.44	24.93	24.66	23.96
GSM 1900	512	20.56	20.54	22.01	21.79	21.05
	661	20.74	20.74	22.25	22.02	21.27
	810	20.48	20.47	21.98	21.75	21.03

Note:

Time slot average factor is as follows:

1 Tx slot = 9.03 dB, Frame-Average output power = Burst-Average output power – 9.03 dB

2 Tx slot = 6.02 dB, Frame-Average output power = Burst-Average output power – 6.02 dB

3 Tx slot = 4.26 dB, Frame-Average output power = Burst-Average output power – 4.26 dB

4 Tx slot = 3.01 dB, Frame-Average output power = Burst-Average output power – 3.01 dB

9.2 WiFi

9.2.1 SAR Testing for 802.11a/b/g/n modes

General Device Setup

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.

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.

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		
802.11 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

Band	Channel	Conducted Power (dBm)			
		Data Rate (Mbps)			
		1	2	5.5	11
IEEE 802.11b	1	16.20	16.21	16.23	15.90
	6	16.18	16.17	16.22	15.96
	11	16.20	16.19	16.21	15.99

Average IEEE 802.11b Conducted output power

Band	Channel	Conducted Power (dBm)							
		Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
IEEE 802.11g	1	14.15	14.09	13.94	13.68	13.45	12.99	12.66	12.53
	6	14.19	13.99	13.87	13.63	12.40	12.99	12.62	12.50
	11	14.24	14.14	14.00	13.69	13.46	13.14	12.68	12.54

Average IEEE 802.11g Conducted output power

Band	Channel	Conducted Power (dBm)							
		Data Rate (Mbps)							
		6.5	13	20	26	39	52	58	65
IEEE 802.11n (HT-20)	1	14.06	13.80	13.58	13.26	12.90	12.60	12.46	12.29
	6	14.06	13.72	13.49	13.28	12.92	12.52	12.43	12.27
	11	14.09	13.79	13.57	13.36	12.91	12.57	112.48	12.33

Average IEEE 802.11n Conducted output power

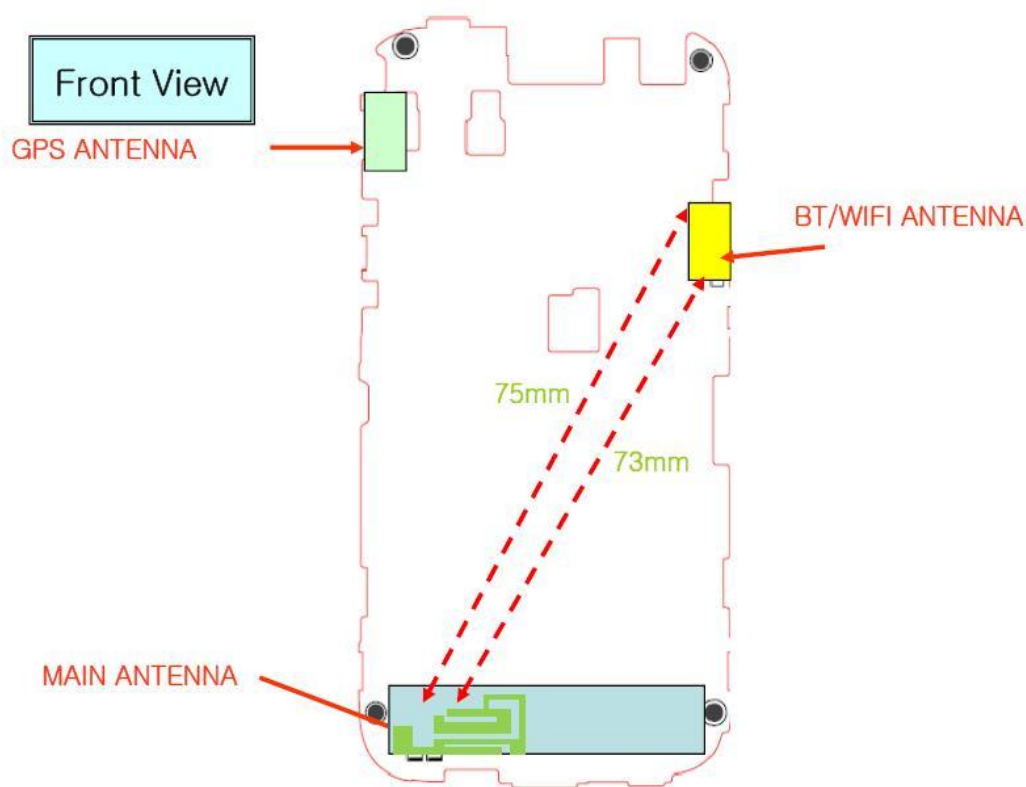
Note;
SAR testing was performed according to the FCC KDB 248227.

10. SAR Test configuration & Antenna Information

10.1 SAR Test configurations

Mode	Back	Front	Left	Right	Bottom	Top
850 GPRS	Yes	Yes	Yes	Yes	Yes	No
1900 GPRS	Yes	Yes	Yes	Yes	Yes	No
WLAN	Yes	Yes	No	Yes	No	No

10.2 Antenna and Device Information



[Front side View]

Note;

Per FCC KDB Publication 941225 D06, we performed the SAR testing at 1 cm from the top & bottom surfaces and also from side edges with a transmitting antenna ≤ 2.5 cm from an edge.

Distance between the Main antennas and the BT/WIFI antenna: 73 mm

Please see the separate Antenna distance document.

11. SAR Considerations for 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>	SAR not required: <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 SAR required: <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 Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply
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.

SAR Evaluation Requirements for Multiple Transmitters Handsets

FCC ID: A3LGTS6352

BT Max. RF output power: 13.74 mW

11.2 SAR Summation Scenario

Simultaneous Transmission Summation for Held to Ear

Simultaneous TX	configuration	850 GSM SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	1900 GSM SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Left Cheek	0.073	0.041	0.114	Head SAR	Left Cheek	0.589	0.041	0.630
	Left Tilt	0.039	0.013	0.052		Left Tilt	0.172	0.013	0.185
	Right Cheek	0.053	0.016	0.069		Right Cheek	0.356	0.016	0.372
	Right Tilt	0.039	0.013	0.052		Right Tilt	0.139	0.013	0.152

The above tables represent a held to ear voice call with 2.4 GHz WLAN.

Simultaneous Transmission Summation for Body-Worn (1cm)

Simultaneous TX	configuration	850 GPRS SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	1900 GPRS SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.171	0.00903	0.180	Body SAR	Back	0.664	0.00903	0.673

The above tables represent a body-worn call with 2.4 GHz WLAN.

Simultaneous Transmission Summation for Hotspot

Simultaneous TX	configuration	850 GPRS SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	1900 GPRS SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.171	0.00903	0.180	Body SAR	Back	0.664	0.00903	0.673
	Front	0.1	0.0071	0.107		Front	0.3	0.0071	0.307
	Left	0.097	-	0.097		Left	0.147	-	0.147
	Right	0.046	0.018	0.064		Right	0.094	0.018	0.112
	Bottom	0.037	-	0.037		Bottom	0.46	-	0.460
	Top	-	-	0.000		Top	-	-	0.000

The above tables represent a portable hotspot condition.

Note;

Body-Worn SAR : The Rear side hotspot SAR test configurations can be considered for body-worn accessory SAR. Although body-worn accessory conditions are typically for voice configurations, the GPRS slot frame averaged output power was more conservative and was included for the body-worn accessory SAR assessment.

11.3 Simultaneous Transmission Conclusion

The above numerical summed SAR was below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit.No volumetric SAR summation is required per FCC KDB Publication 648474.

The above tables represent the worst-case simultaneous transmission scenarios possibility with this device.

The conducted output power level of the BT transmitter is less than $2 \cdot P_{ref}$, the BT antenna is more than 5 cm from the other antenna, therefore, a stand-alone BT SAR evaluation is not required.

12. SAR TEST DATA SUMMARY

12.1 Measurement Results (GSM850 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	SAR(mW/g)
MHz	Channel						
836.6	190 (Mid)	GSM850	32.44	-0.093	Standard	Left Ear	0.073
			32.44	0.040	Standard	Left Tilt 15°	0.039
			32.44	0.005	Standard	Right Ear	0.053
			32.44	0.043	Standard	Right Tilt 15°	0.039
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)	Power Drift (dB)	Battery	Phantom Position	SAR(mW/g)
MHz	Channel						
1 880.0	661 (Mid)	GSM1900	29.77	0.011	Standard	Left Ear	0.589
1 880.0	661 (Mid)	GSM1900	29.77	-0.018	Standard	Left Tilt 15°	0.172
1 880.0	661 (Mid)	GSM1900	29.77	-0.043	Standard	Right Ear	0.356
1 880.0	661 (Mid)	GSM1900	29.77	0.019	Standard	Right Tilt 15°	0.139
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)	Power Drift (dB)	Battery	Phantom Position	Data Rate (Mbps)	SAR(mW/g)
MHz	Channel							
2 412	1 (Low)	802.11b	16.20	-0.038	Standard	Left Ear	1	0.041
			16.20	-0.027	Standard	Left Tilt 15°	1	0.013
			16.20	-0.03	Standard	Right Ear	1	0.016
			16.20	-0.043	Standard	Right Tilt 15	1	0.013
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.
- For 2.4GHz WLAN, Highest average power channel for the lowest data rate was selected for SAR evaluation based on KDB 248227. Other channels are not necessary because 1g-average SAR < 0.8 W/Kg and peak SAR < 1.6W/Kg per KDB 248227.

12.4 Measurement Results (GSM850 Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	SAR(mW/g)
MHz	Channel						
836.6	190 (Mid)	GPRS 2Tx	30.93	0.038	Rear	1.0 cm	0.171
836.6	190 (Mid)	GPRS 3Tx	28.90	0.099	Rear	1.0 cm	0.158
836.6	190 (Mid)	GPRS 2Tx	30.93	0.004	Front	1.0 cm	0.1
836.6	190 (Mid)	GPRS 2Tx	30.93	0.042	Left	1.0 cm	0.097
836.6	190 (Mid)	GPRS 2Tx	30.93	0.066	Right	1.0 cm	0.046
836.6	190 (Mid)	GPRS 2Tx	30.93	-0.063	Bottom	1.0 cm	0.037
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-body 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).
- For body SAR testing, the EUT was set in GPRS multi-slot class12 with 3uplink slots for GSM850 due to maximum source-based time-averaged output power.
According to the KDB 941225 D03 SAR test reduction GSM/GPRS/EDGE, the maximum output power configuration were chosen for Body SAR testing.

12.5 Measurement Results (GSM1900 Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	SAR(mW/g)
MHz	Channel						
1 880.0	661 (Mid)	GPRS 2Tx	28.27	-0.044	Rear	1.0 cm	0.664
1 880.0	661 (Mid)	GPRS 3Tx	26.28	0.056	Rear	1.0 cm	0.642
1 880.0	661 (Mid)	GPRS 2Tx	28.27	-0.010	Front	1.0 cm	0.3
1 880.0	661 (Mid)	GPRS 2Tx	28.27	-0.003	Left	1.0 cm	0.147
1 880.0	661 (Mid)	GPRS 2Tx	28.27	-0.058	Right	1.0 cm	0.094
1 880.0	661 (Mid)	GPRS 2Tx	28.27	0.004	Bottom	1.0 cm	0.46
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-body 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).
- For body SAR testing, the EUT was set in GPRS multi-slot class12 with 3uplink slots for GSM1900 due to maximum source-based time-averaged output power.
According to the KDB 941225 D03 SAR test reduction GSM/GPRS/EDGE, the maximum output power configuration were chosen for Body SAR testing.

12.6 Measurement Results (802.11b/g/n Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	Data Rate	SAR(mW/g)
MHz	Channel							
2 412	1 (Low)	802.11b	16.20	-0.044	Rear	1.0 cm	1 Mbps	0.00903
		802.11b	16.20	0.071	Front	1.0 cm	1 Mbps	0.0071
		802.11b	16.20	-0.080	Right	1.0 cm	1 Mbps	0.018
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-body 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.
- For 2.4GHz WLAN, Highest average power channel for the lowest data rate was selected for SAR evaluation based on KDB 248227. Other channels are not necessary because 1g-average SAR < 0.8 W/Kg and peak SAR < 1.6W/Kg per KDB 248227.

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.

14. REFERENCES

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Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 40.8$; $\rho = 1000$ 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 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

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

Reference Value = 2.90 V/m; Power Drift = -0.093 dB

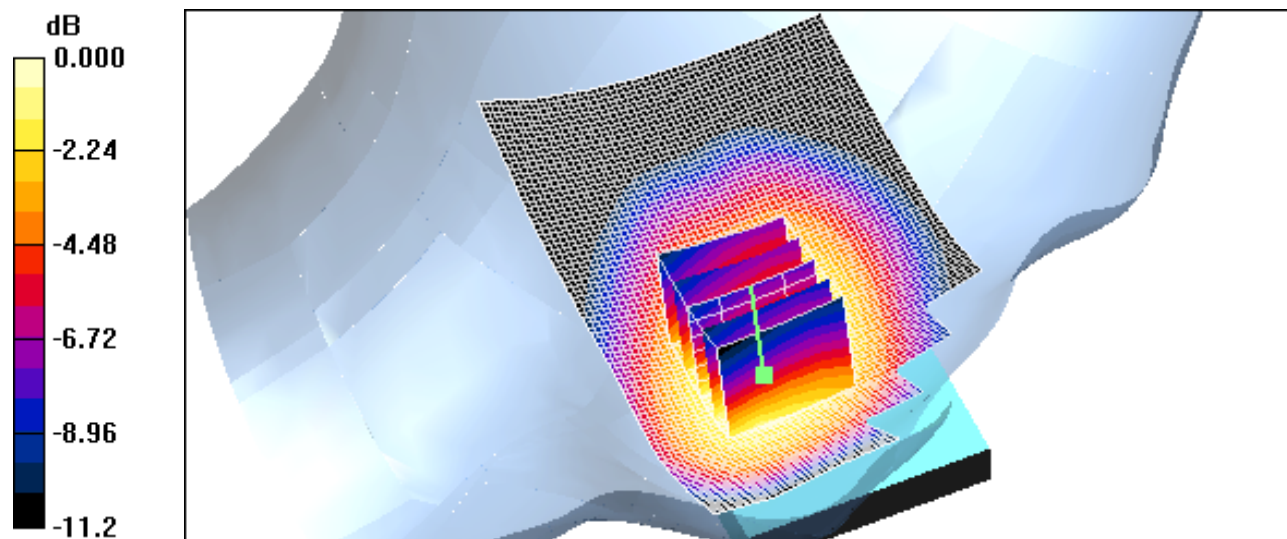
Peak SAR (extrapolated) = 0.102 W/kg

SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.052 mW/g

Maximum value of SAR (measured) = 0.078 mW/g

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

Maximum value of SAR (interpolated) = 0.080 mW/g



0 dB = 0.078mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 40.8$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

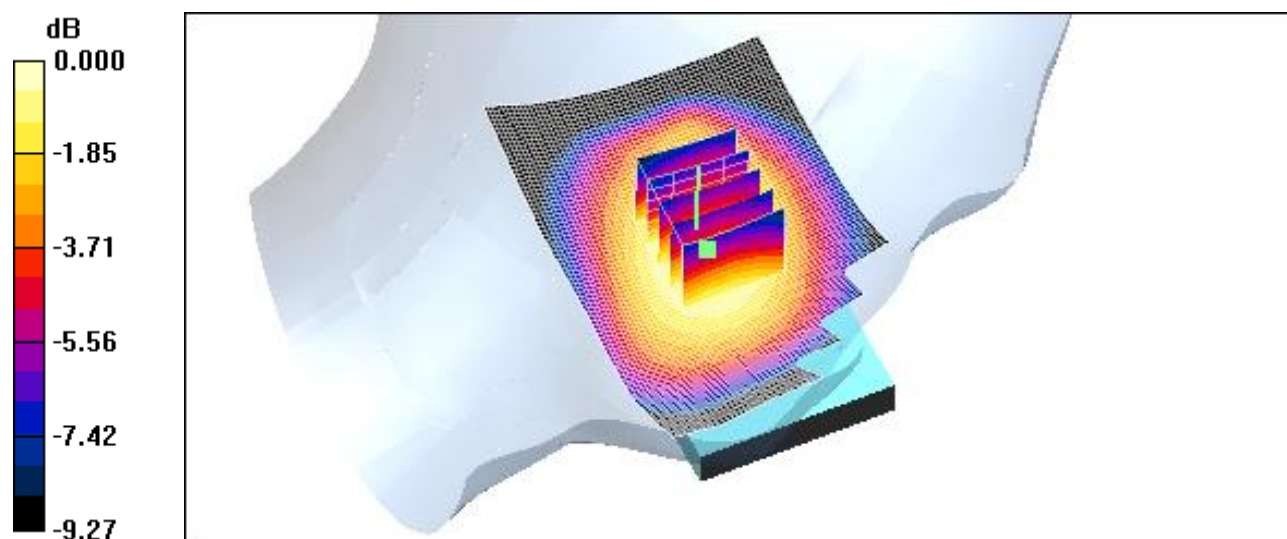
DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.72, 6.72, 6.72); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Left tilt 190/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.040 mW/g

Left tilt 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.54 V/m; Power Drift = 0.040 dB
Peak SAR (extrapolated) = 0.048 W/kg
SAR(1 g) = 0.039 mW/g; SAR(10 g) = 0.029 mW/g

Maximum value of SAR (measured) = 0.040 mW/g



0 dB = 0.040mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

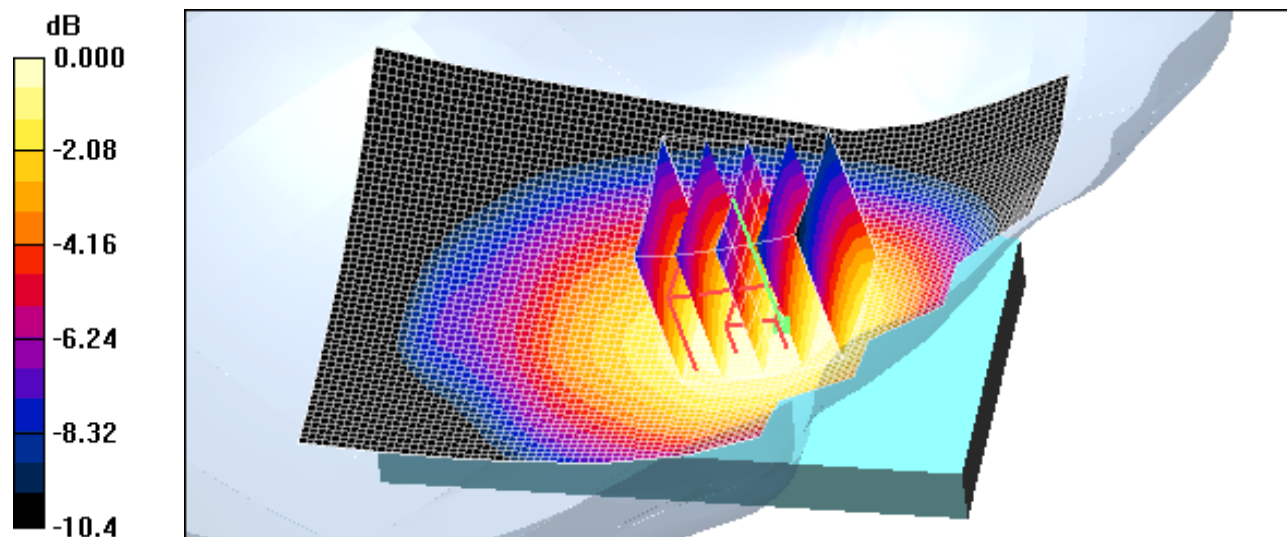
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Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.878 \text{ mho/m}$; $\epsilon_r = 40.8$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.72, 6.72, 6.72); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 190/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 0.057 mW/g

Right touch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 3.02 V/m; Power Drift = 0.005 dB
Peak SAR (extrapolated) = 0.066 W/kg
SAR(1 g) = 0.053 mW/g; SAR(10 g) = 0.040 mW/g
Maximum value of SAR (measured) = 0.056 mW/g



0 dB = 0.056mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

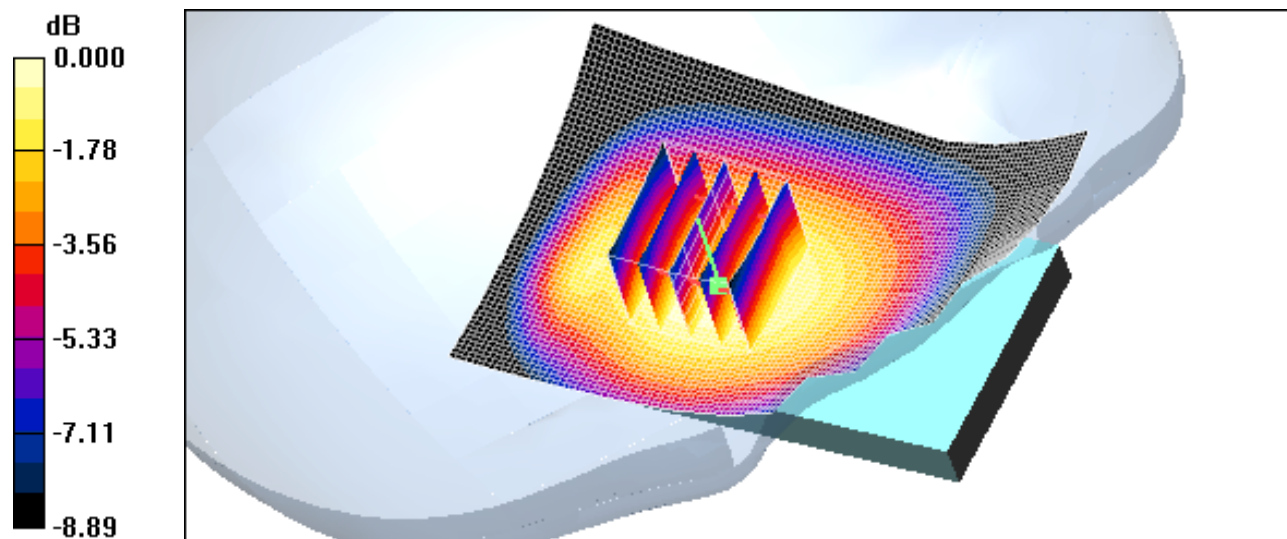
Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 40.8$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 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 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Right tilt 190/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.041 mW/g

Right tilt 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.23 V/m; Power Drift = 0.043 dB
Peak SAR (extrapolated) = 0.048 W/kg
SAR(1 g) = 0.039 mW/g; SAR(10 g) = 0.029 mW/g
Maximum value of SAR (measured) = 0.041 mW/g



0 dB = 0.041mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

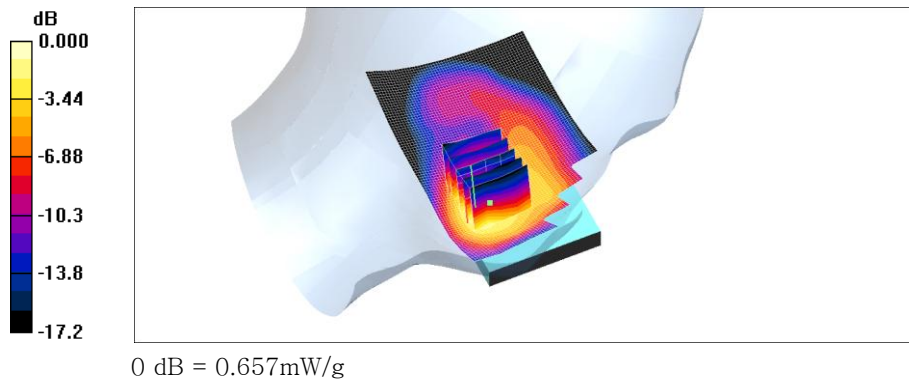
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Left touch 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.586 mW/g

Left touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.48 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.589 mW/g; SAR(10 g) = 0.315 mW/g
Maximum value of SAR (measured) = 0.657 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

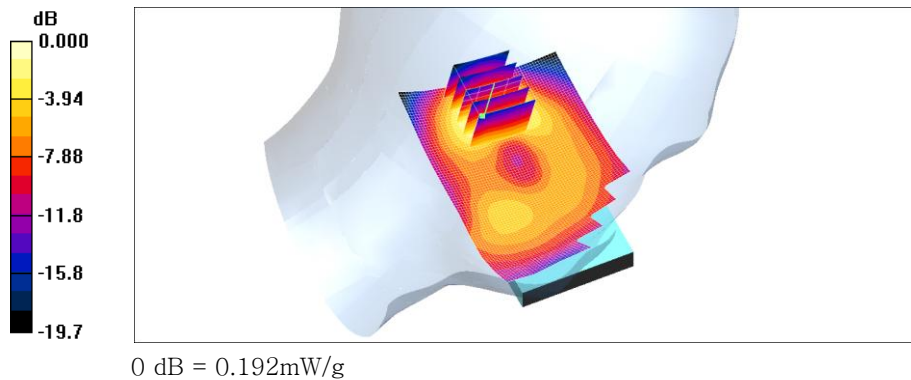
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Left tilt 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.200 mW/g

Left tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.2 V/m; Power Drift = -0.018 dB
Peak SAR (extrapolated) = 0.275 W/kg
SAR(1 g) = 0.172 mW/g; SAR(10 g) = 0.096 mW/g
Maximum value of SAR (measured) = 0.192 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

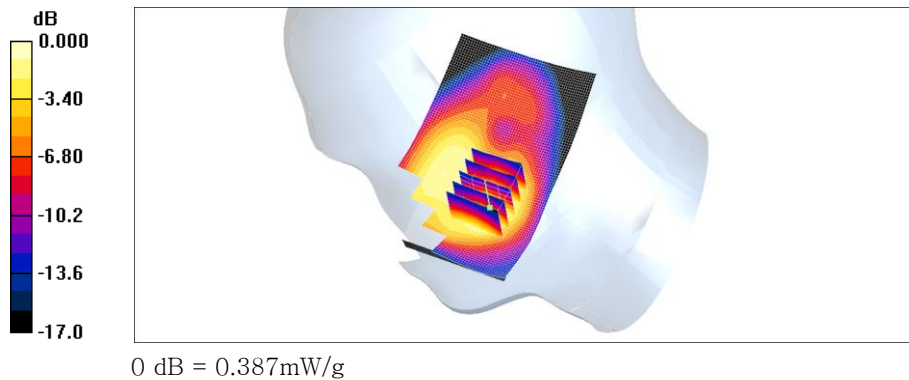
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.401 mW/g

Right touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.35 V/m; Power Drift = -0.043 dB
Peak SAR (extrapolated) = 0.509 W/kg
SAR(1 g) = 0.356 mW/g; SAR(10 g) = 0.212 mW/g
Maximum value of SAR (measured) = 0.387 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

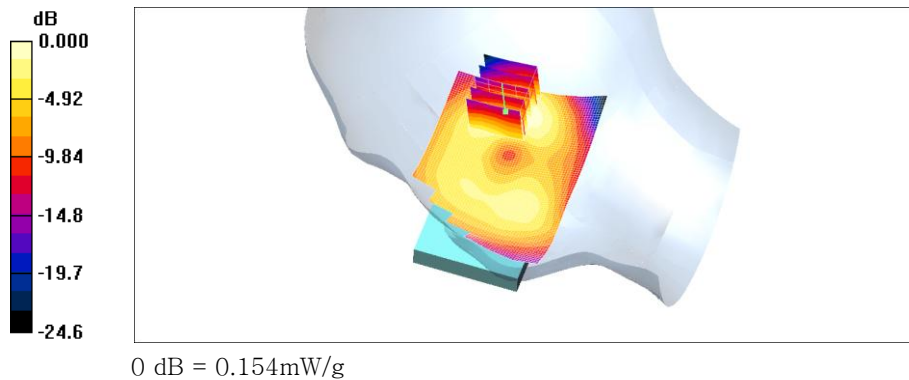
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Right tilt 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.174 mW/g

Right tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.0 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 0.240 W/kg
SAR(1 g) = 0.139 mW/g; SAR(10 g) = 0.077 mW/g
Maximum value of SAR (measured) = 0.154 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Apr.24, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

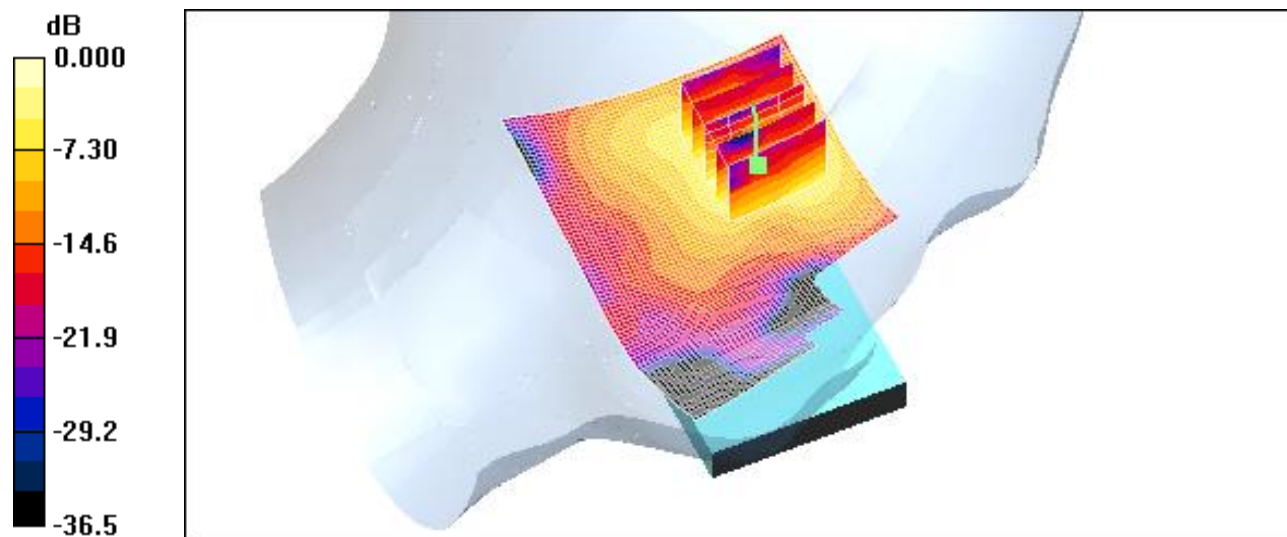
Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.8$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.52, 4.52, 4.52); Calibrated: 2012-03-19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 835/900 Phantom ; Type: SAM

Left touch 1ch 1Mbps/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.047 mW/g

Left touch 1ch 1Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.53 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 0.109 W/kg
SAR(1 g) = 0.041 mW/g; SAR(10 g) = 0.018 mW/g
Maximum value of SAR (measured) = 0.046 mW/g



0 dB = 0.046mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Apr.24, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

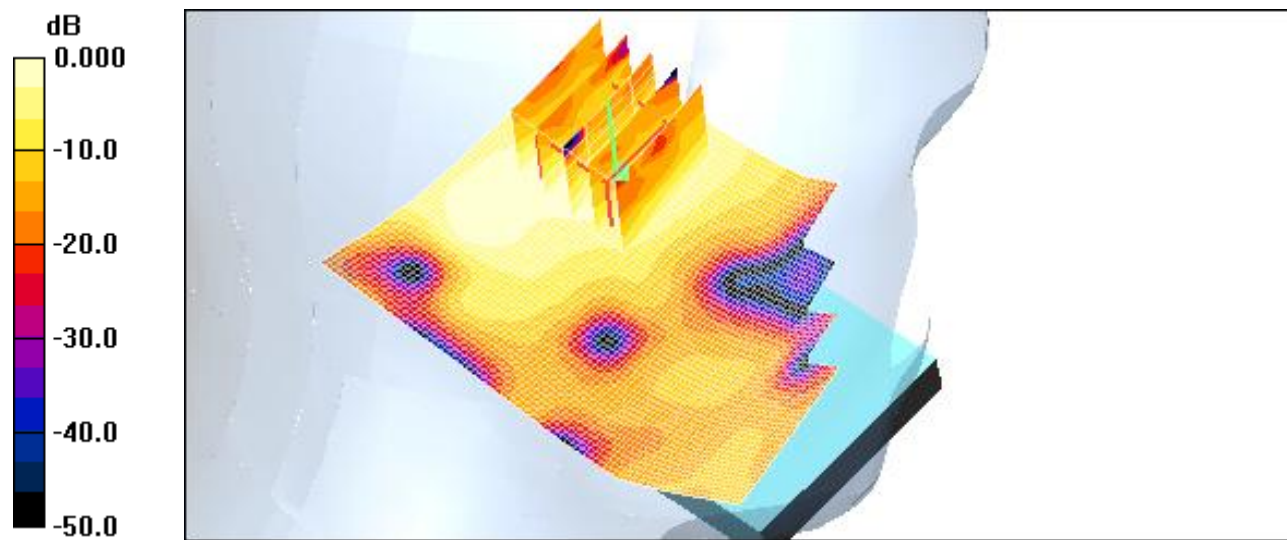
Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.8$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.52, 4.52, 4.52); Calibrated: 2012-03-19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 835/900 Phantom ; Type: SAM

Left tilt 1ch 1Mbps/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.014 mW/g

Left tilt 1ch 1Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.58 V/m; Power Drift = -0.027 dB
Peak SAR (extrapolated) = 0.024 W/kg
SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00585 mW/g
Maximum value of SAR (measured) = 0.015 mW/g



0 dB = 0.015mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Apr.24, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

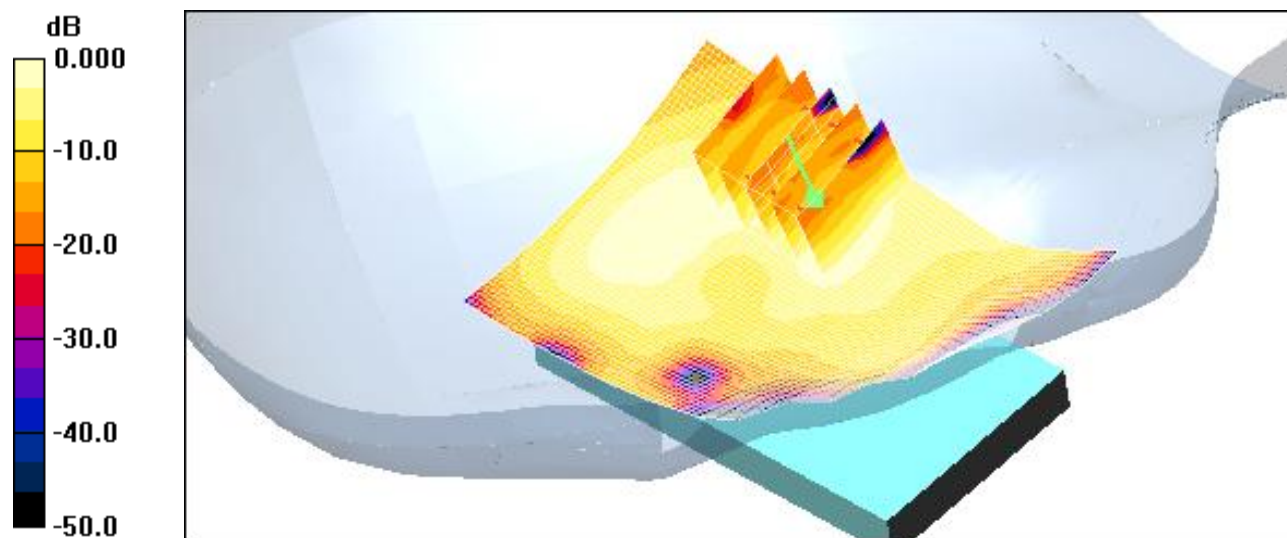
Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.8$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.52, 4.52, 4.52); Calibrated: 2012-03-19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 835/900 Phantom ; Type: SAM

Right touch 1ch 1Mbps/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.017 mW/g

Right touch 1ch 1Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.91 V/m; Power Drift = -0.046 dB
Peak SAR (extrapolated) = 0.037 W/kg
SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.00745 mW/g
Maximum value of SAR (measured) = 0.017 mW/g



0 dB = 0.017mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Apr.24, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

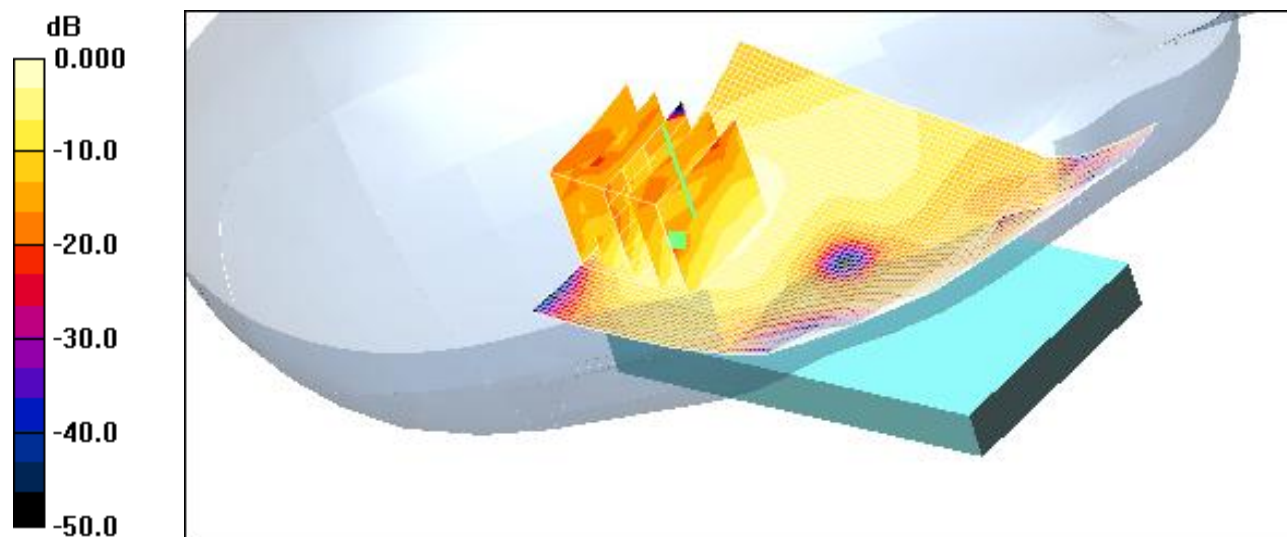
Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.8$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.52, 4.52, 4.52); Calibrated: 2012-03-19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 835/900 Phantom ; Type: SAM

Right tilt 1ch 1Mbps/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.017 mW/g

Right tilt 1ch 1Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.12 V/m; Power Drift = -0.043 dB
Peak SAR (extrapolated) = 0.024 W/kg
SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00634 mW/g
Maximum value of SAR (measured) = 0.014 mW/g



0 dB = 0.014mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ 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(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 835/900 Phantom ; Type: SAM

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

Maximum value of SAR (interpolated) = 0.181 mW/g

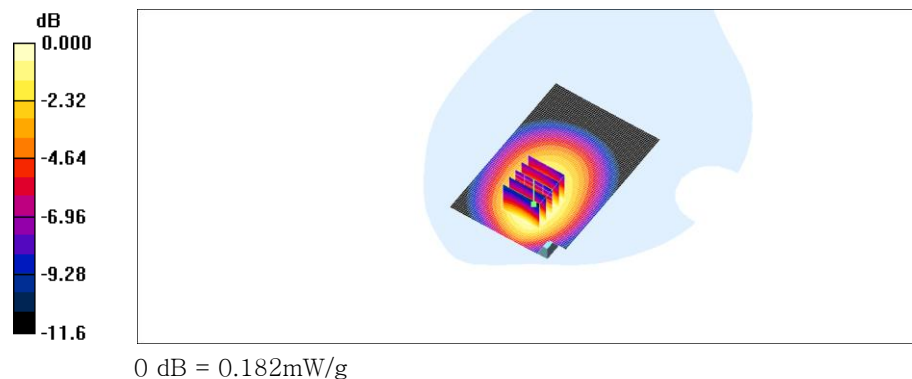
Body rear 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.99 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 0.222 W/kg

SAR(1 g) = 0.171 mW/g; SAR(10 g) = 0.123 mW/g

Maximum value of SAR (measured) = 0.182 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2.77
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ 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(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 800/900 Phantom; Type: SAM

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

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

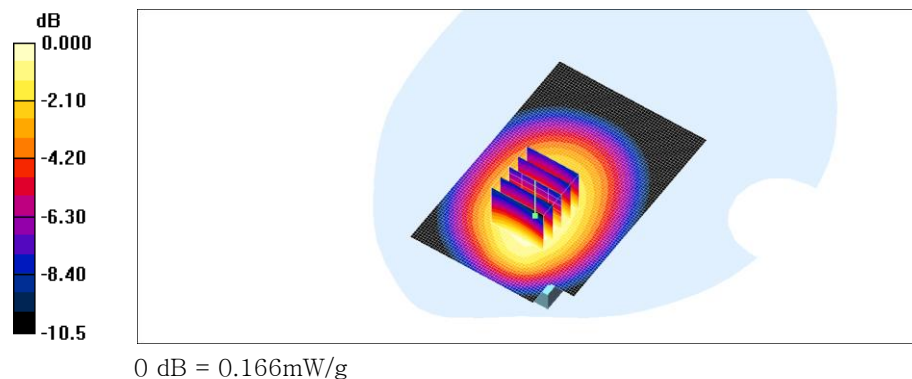
Body rear 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.50 V/m; Power Drift = 0.099 dB

Peak SAR (extrapolated) = 0.206 W/kg

SAR(1 g) = 0.158 mW/g; SAR(10 g) = 0.113 mW/g

Maximum value of SAR (measured) = 0.166 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ 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(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 835/900 Phantom ; Type: SAM

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

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

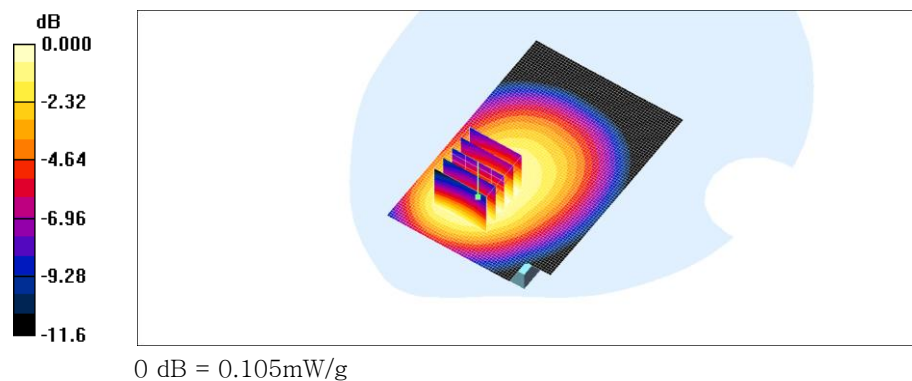
Body front 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.28 V/m; Power Drift = 0.004 dB

Peak SAR (extrapolated) = 0.128 W/kg

SAR(1 g) = 0.100 mW/g; SAR(10 g) = 0.073 mW/g

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



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012
Separation Distance 1.0 cm

DUT: GT-S6352(side); Type: bar; Serial: FJ-102-A

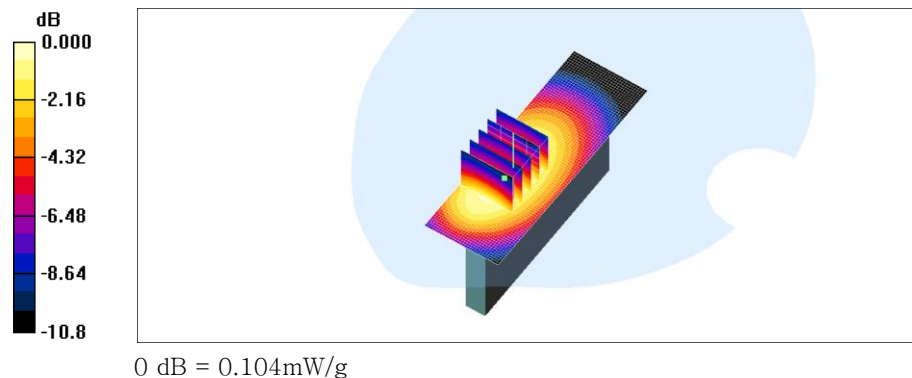
Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 835/900 Phantom ; Type: SAM

Body left 190/Area Scan (31x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.105 mW/g

Body left 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.11 V/m; Power Drift = 0.042 dB
Peak SAR (extrapolated) = 0.130 W/kg
SAR(1 g) = 0.097 mW/g; SAR(10 g) = 0.067 mW/g
Maximum value of SAR (measured) = 0.104 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012
Separation Distance 1.0 cm

DUT: GT-S6352(side); Type: bar; Serial: FJ-102-A

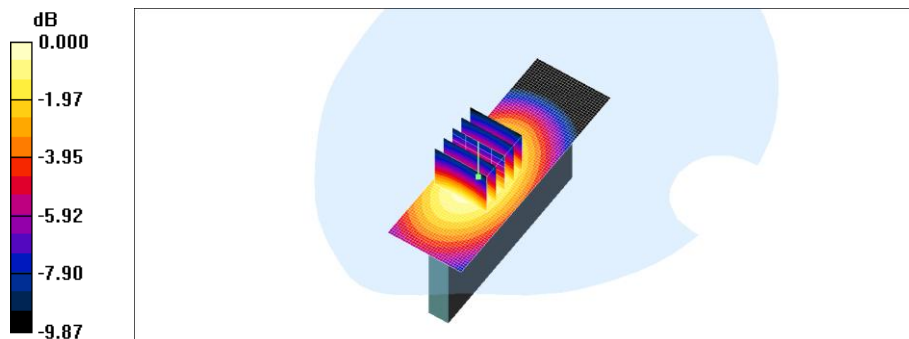
Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 835/900 Phantom ; Type: SAM

Body right 190/Area Scan (31x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.049 mW/g

Body right 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.55 V/m; Power Drift = 0.066 dB
Peak SAR (extrapolated) = 0.063 W/kg
SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.032 mW/g
Maximum value of SAR (measured) = 0.050 mW/g



0 dB = 0.050mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012
Separation Distance 1.0 cm

DUT: GT-S6352(bottom); Type: bar; Serial: FJ-102-A

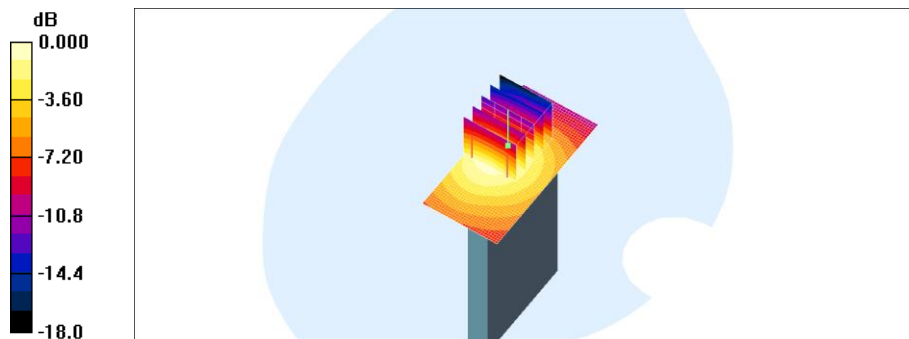
Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 835/900 Phantom ; Type: SAM

Body bottom 190/Area Scan (31x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.044 mW/g

Body bottom 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.31 V/m; Power Drift = -0.063 dB
Peak SAR (extrapolated) = 0.075 W/kg
SAR(1 g) = 0.037 mW/g; SAR(10 g) = 0.022 mW/g
Maximum value of SAR (measured) = 0.041 mW/g



0 dB = 0.041mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

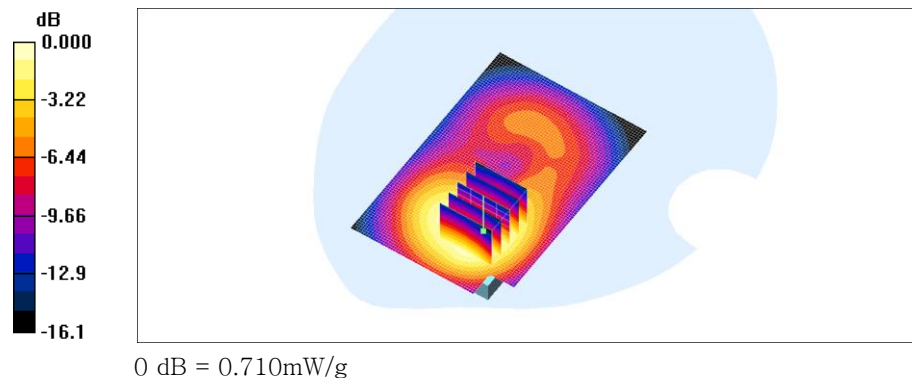
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Body rear 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.743 mW/g

Body rear 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.5 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.664 mW/g; SAR(10 g) = 0.403 mW/g
Maximum value of SAR (measured) = 0.710 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

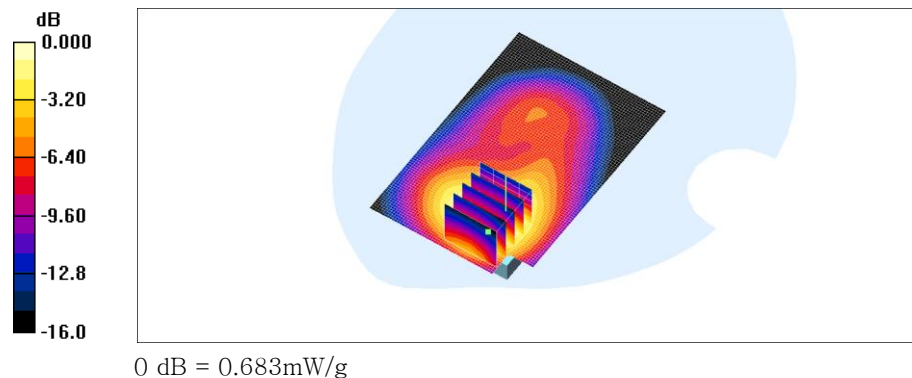
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:2.77
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Body rear 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.809 mW/g

Body rear 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.20 V/m; Power Drift = 0.056 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.642 mW/g; SAR(10 g) = 0.381 mW/g
Maximum value of SAR (measured) = 0.683 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

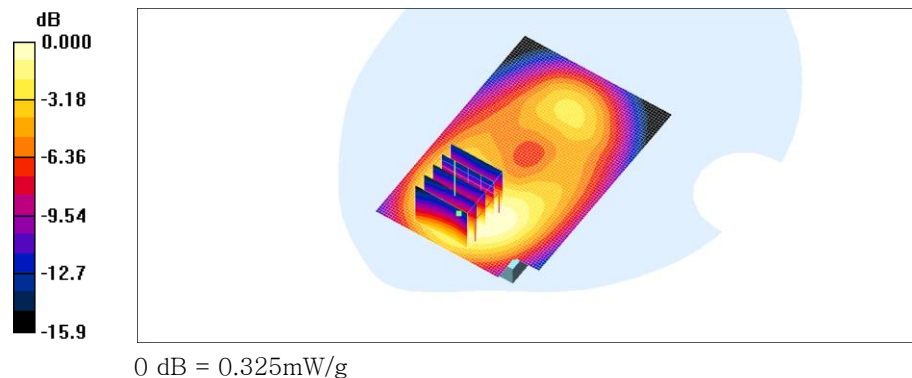
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Body front 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.327 mW/g

Body front 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.5 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 0.540 W/kg
SAR(1 g) = 0.300 mW/g; SAR(10 g) = 0.176 mW/g
Maximum value of SAR (measured) = 0.325 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012
Separation Distance 1.0 cm

DUT: GT-S6352(side); Type: bar; Serial: FJ-102-A

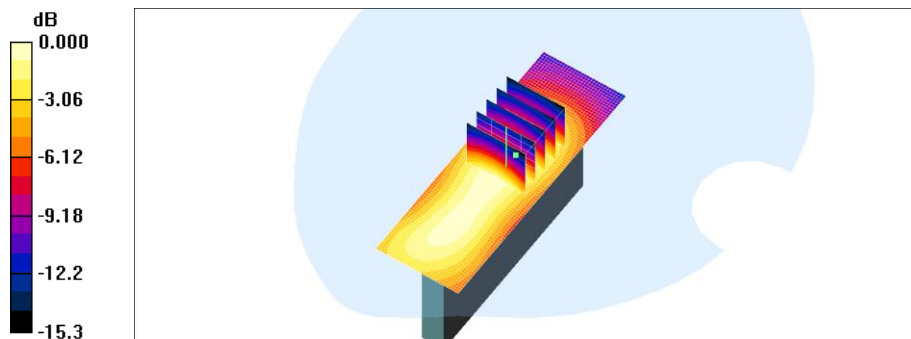
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Body left 661/Area Scan (31x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.161 mW/g

Body left 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.36 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 0.236 W/kg
SAR(1 g) = 0.147 mW/g; SAR(10 g) = 0.089 mW/g
Maximum value of SAR (measured) = 0.159 mW/g



0 dB = 0.159mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012
Separation Distance 1.0 cm

DUT: GT-S6352(side); Type: bar; Serial: FJ-102-A

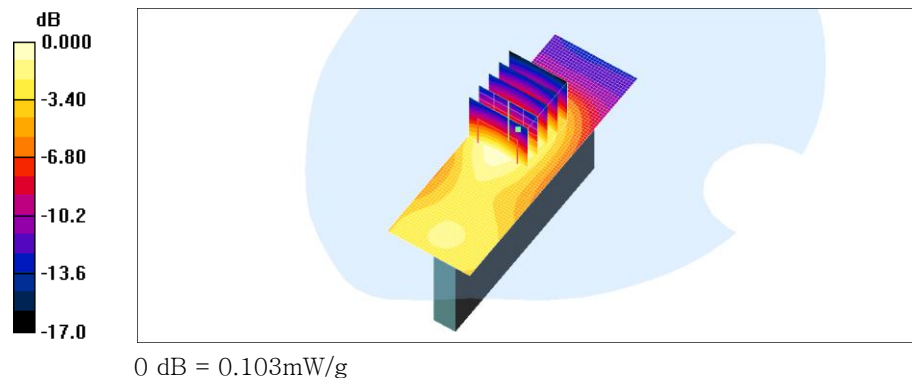
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Body right 661/Area Scan (31x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.104 mW/g

Body right 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.97 V/m; Power Drift = -0.058 dB
Peak SAR (extrapolated) = 0.155 W/kg
SAR(1 g) = 0.094 mW/g; SAR(10 g) = 0.056 mW/g
Maximum value of SAR (measured) = 0.103 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012
Separation Distance 1.0 cm

DUT: GT-S6352(bottom); Type: bar; Serial: FJ-102-A

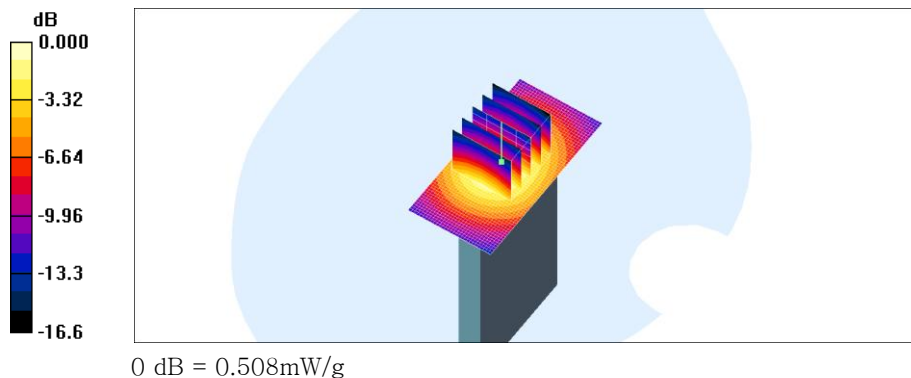
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Body bottom 661/Area Scan (31x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.506 mW/g

Body bottom 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.7 V/m; Power Drift = 0.004 dB
Peak SAR (extrapolated) = 0.783 W/kg
SAR(1 g) = 0.460 mW/g; SAR(10 g) = 0.264 mW/g
Maximum value of SAR (measured) = 0.508 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Apr.24, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

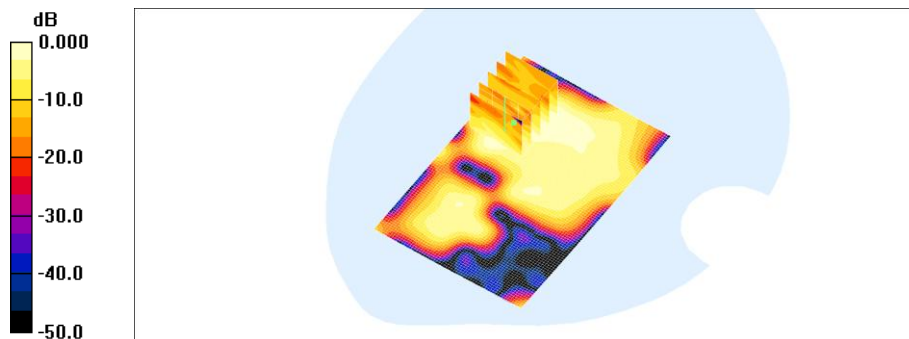
Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412 \text{ MHz}$; $\sigma = 1.81 \text{ mho/m}$; $\epsilon_r = 51.7$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.01, 4.01, 4.01); Calibrated: 2012-03-19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

Body rear 1ch 1Mbps/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 0.016 mW/g

Body rear 1ch 1Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 2.06 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 0.014 W/kg
SAR(1 g) = 0.00903 mW/g; SAR(10 g) = 0.00388 mW/g
Maximum value of SAR (measured) = 0.011 mW/g



0 dB = 0.011mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Apr.24, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

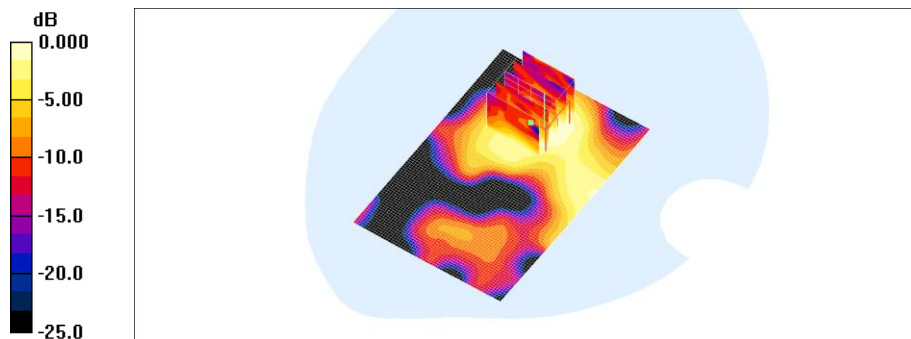
Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.81$ mho/m; $\epsilon_r = 51.7$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.01, 4.01, 4.01); Calibrated: 2012-03-19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

Body front 1ch 1Mbps/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.009 mW/g

Body front 1ch 1Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.15 V/m; Power Drift = 0.071 dB
Peak SAR (extrapolated) = 0.013 W/kg
SAR(1 g) = 0.0071 mW/g; SAR(10 g) = 0.00385 mW/g
Maximum value of SAR (measured) = 0.008 mW/g



0 dB = 0.008mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Apr.24, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412 \text{ MHz}$; $\sigma = 1.81 \text{ mho/m}$; $\epsilon_r = 51.7$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

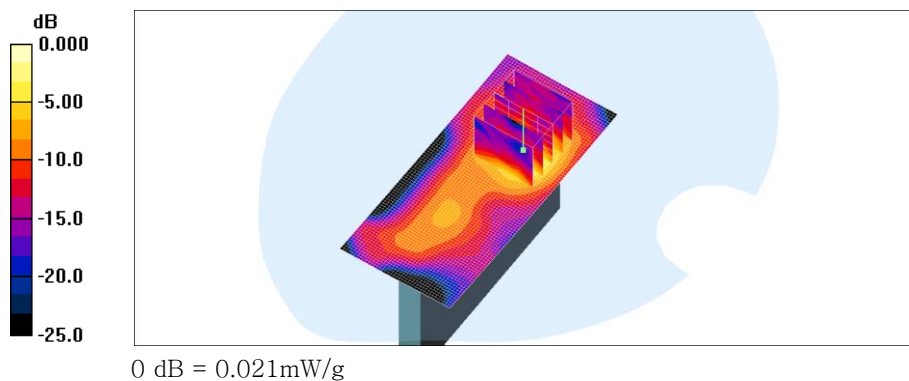
DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.01, 4.01, 4.01); Calibrated: 2012-03-19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

Body right 1ch 1Mbps/Area Scan (41x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 0.018 mW/g

Body right 1ch 1Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 2.51 V/m; Power Drift = -0.080 dB
Peak SAR (extrapolated) = 0.047 W/kg
SAR(1 g) = 0.018 mW/g; SAR(10 g) = 0.00773 mW/g

Maximum value of SAR (measured) = 0.021 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 40.8$; $\rho = 1000$ 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 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

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

Reference Value = 2.90 V/m; Power Drift = -0.093 dB

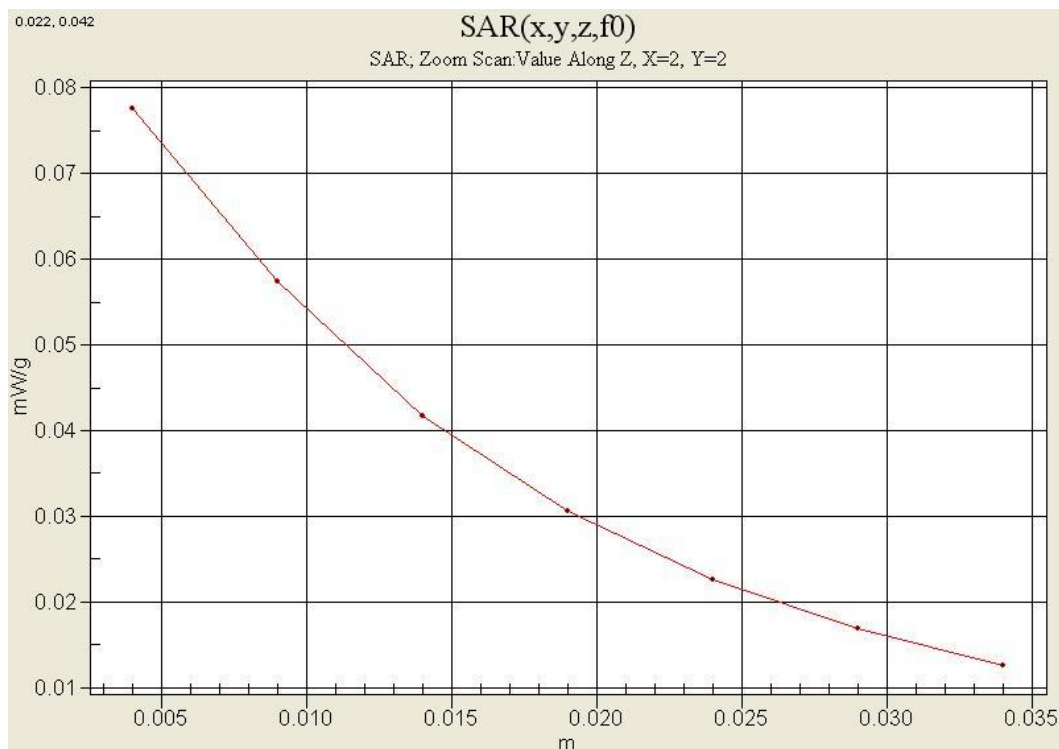
Peak SAR (extrapolated) = 0.102 W/kg

SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.052 mW/g

Maximum value of SAR (measured) = 0.078 mW/g

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

Maximum value of SAR (interpolated) = 0.080 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.1 °C
Ambient Temperature: 21.3 °C
Test Date: Apr.12, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ 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(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 835/900 Phantom ; Type: SAM

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

Maximum value of SAR (interpolated) = 0.181 mW/g

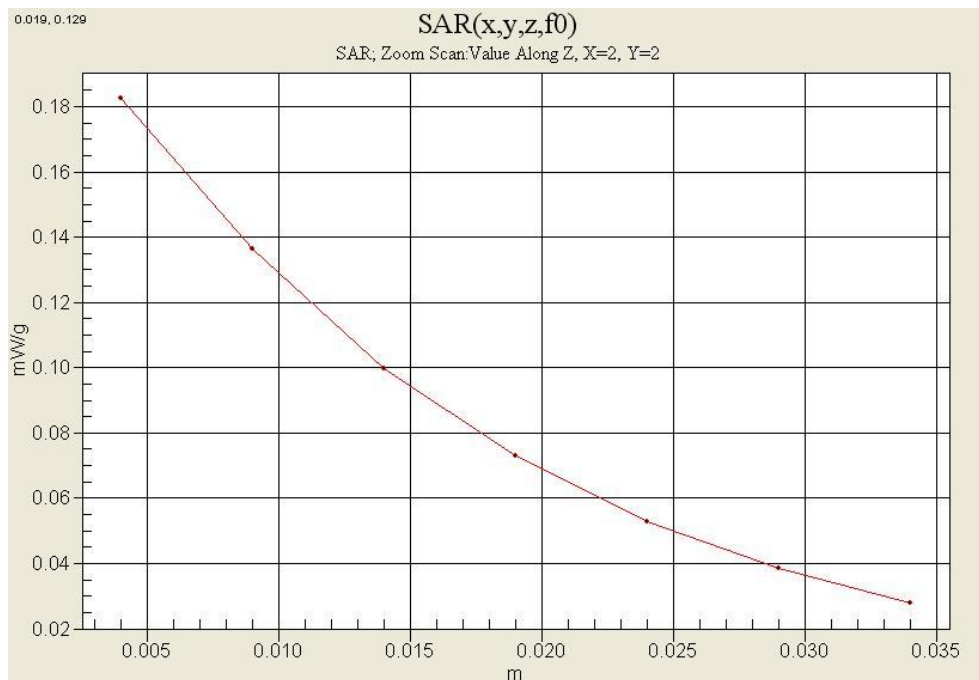
Body rear 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.99 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 0.222 W/kg

SAR(1 g) = 0.171 mW/g; SAR(10 g) = 0.123 mW/g

Maximum value of SAR (measured) = 0.182 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

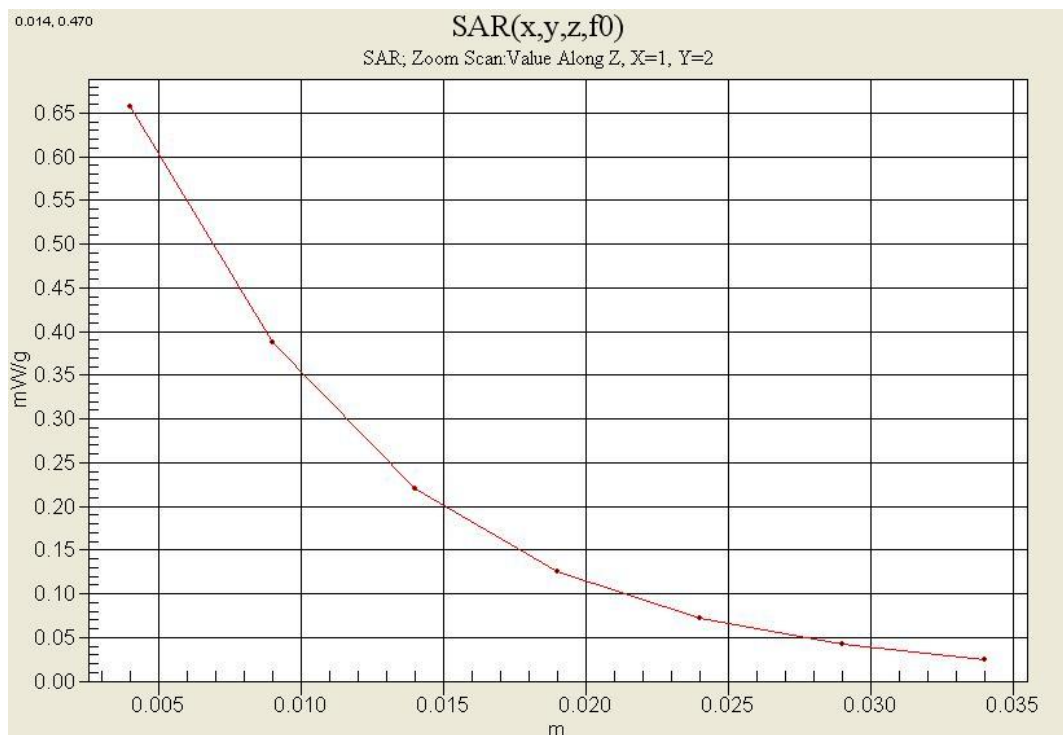
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Left touch 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.586 mW/g

Left touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.48 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.589 mW/g; SAR(10 g) = 0.315 mW/g
Maximum value of SAR (measured) = 0.657 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Apr.13, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

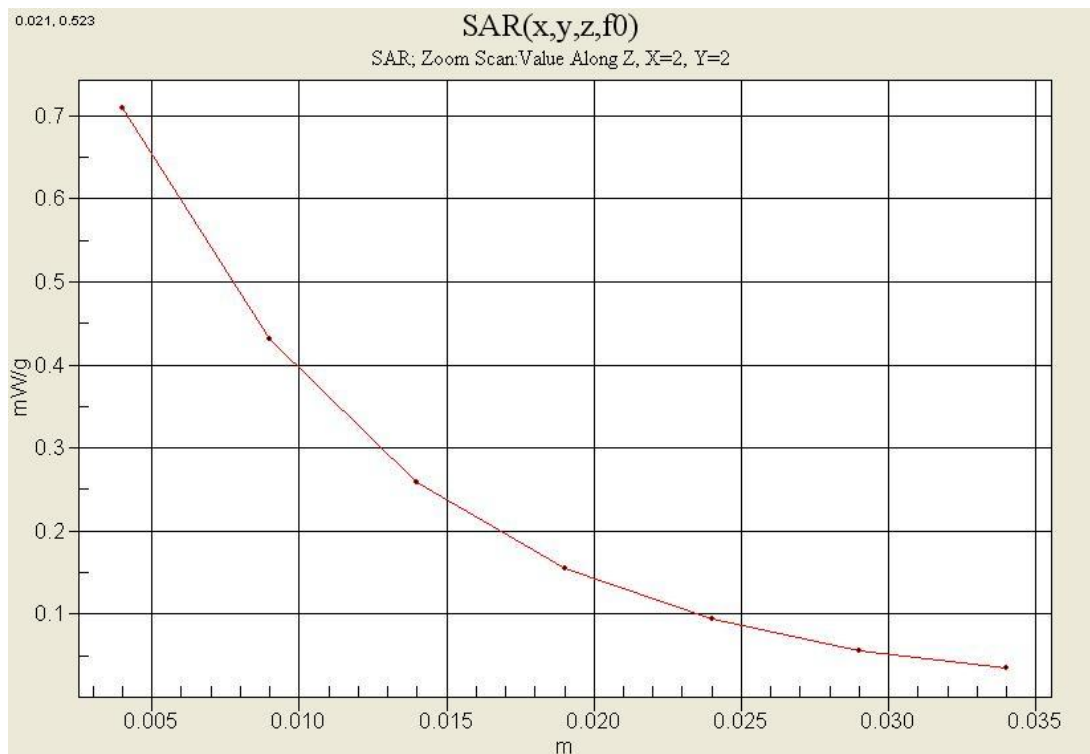
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: 1800/1900 Phantom; Type: SAM

Body rear 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.743 mW/g

Body rear 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.5 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.664 mW/g; SAR(10 g) = 0.403 mW/g
Maximum value of SAR (measured) = 0.710 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Apr.24, 2012

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

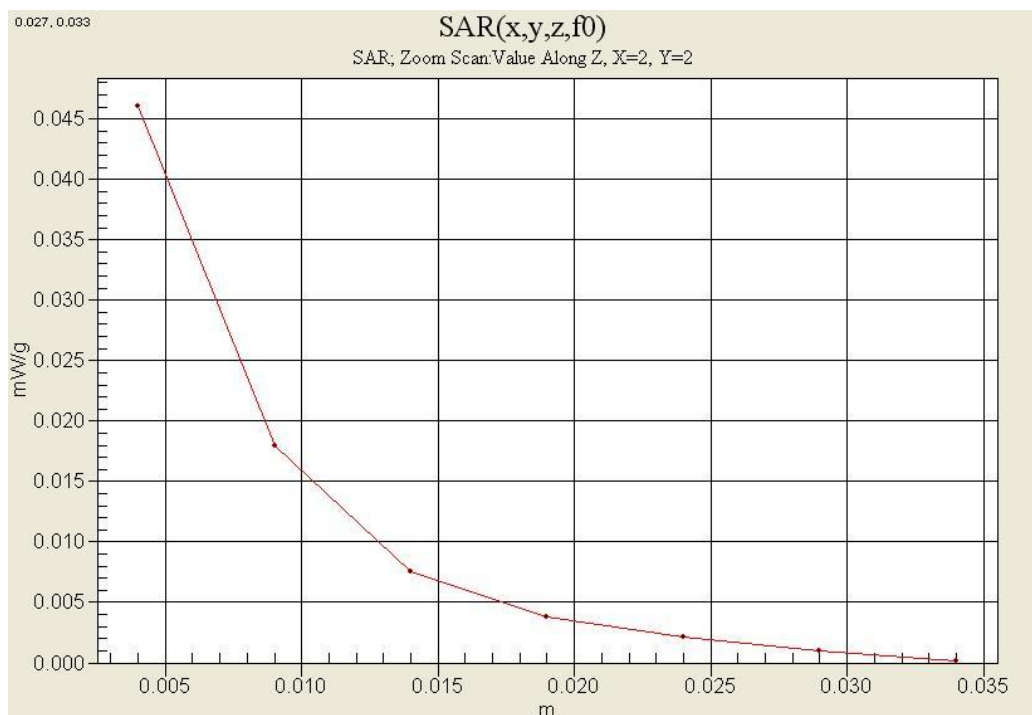
Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412 \text{ MHz}$; $\sigma = 1.8 \text{ mho/m}$; $\epsilon_r = 40.2$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.52, 4.52, 4.52); Calibrated: 2012-03-19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 835/900 Phantom ; Type: SAM

Left touch 1ch 1Mbps/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 0.047 mW/g

Left touch 1ch 1Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 2.53 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 0.109 W/kg
SAR(1 g) = 0.041 mW/g; SAR(10 g) = 0.018 mW/g
Maximum value of SAR (measured) = 0.046 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS Phone with Bluetooth/WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Apr.24, 2012
Separation Distance 1.0 cm

DUT: GT-S6352; Type: bar; Serial: FJ-102-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.81$ mho/m; $\epsilon_r = 51.7$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

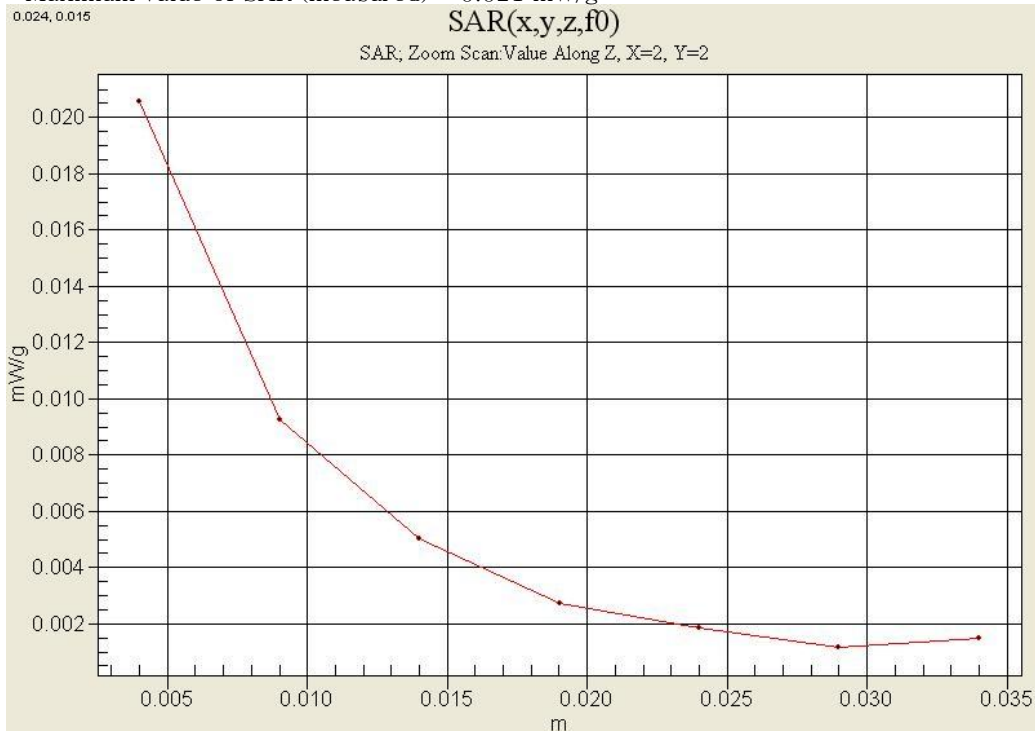
DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.01, 4.01, 4.01); Calibrated: 2012-03-19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

Body right 1ch 1Mbps/Area Scan (41x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.018 mW/g

Body right 1ch 1Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.51 V/m; Power Drift = -0.080 dB
Peak SAR (extrapolated) = 0.047 W/kg
SAR(1 g) = 0.018 mW/g; SAR(10 g) = 0.00773 mW/g

Maximum value of SAR (measured) = 0.021 mW/g



Attachment 2. – Dipole Validation Plots

Validation Data (835 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.1 °C
Test Date: Apr.12, 2012

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

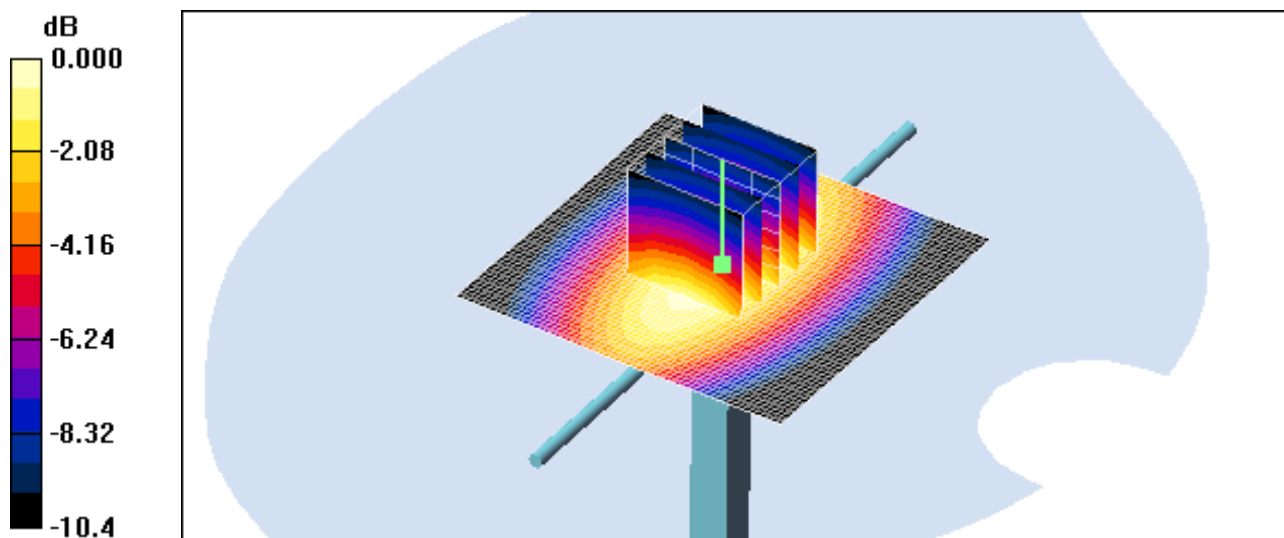
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.876 \text{ mho/m}$; $\epsilon_r = 40.8$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1798; ConvF(6.72, 6.72, 6.72); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: SAM 835/900 MHz; Type: SAM

Validation 835MHz/Area Scan (61x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 1.01 mW/g

Validation 835MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 35.1 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.931 mW/g; SAR(10 g) = 0.614 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: 21.1 °C
Test Date: Apr.12, 2012

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

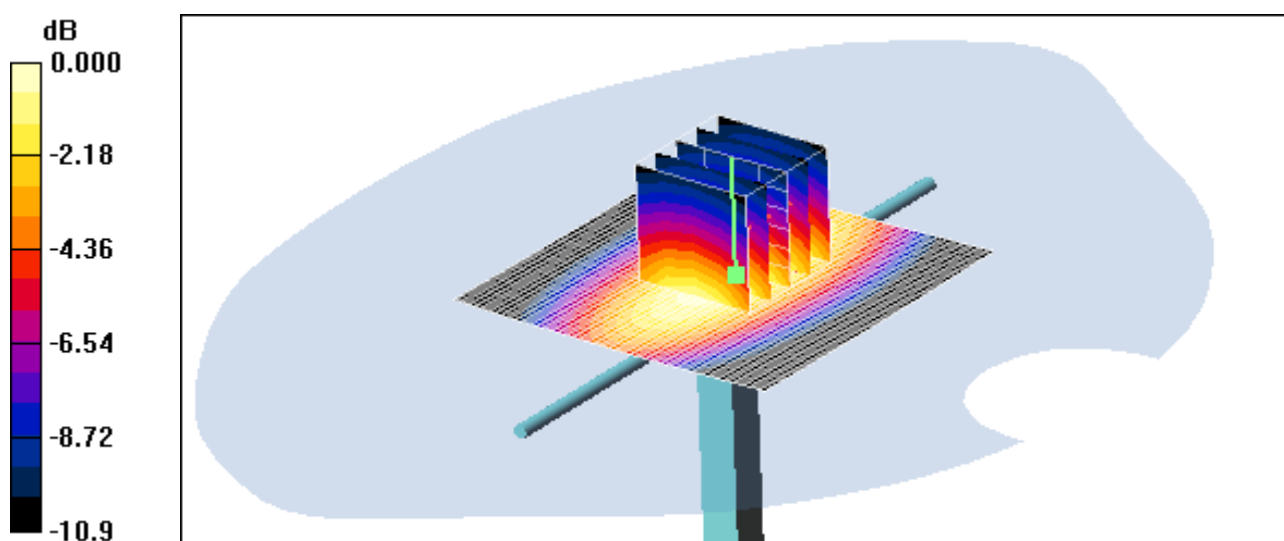
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 835$ MHz; $\sigma = 0.97$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1798; ConvF(6.5, 6.5, 6.5); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Validation 835MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.06 mW/g

Validation 835MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 34.6 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 0.970 mW/g; SAR(10 g) = 0.626 mW/g
Maximum value of SAR (measured) = 1.06 mW/g



0 dB = 1.06mW/g

Validation Data (1 900 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.2 °C
Test Date: Apr.13, 2012

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

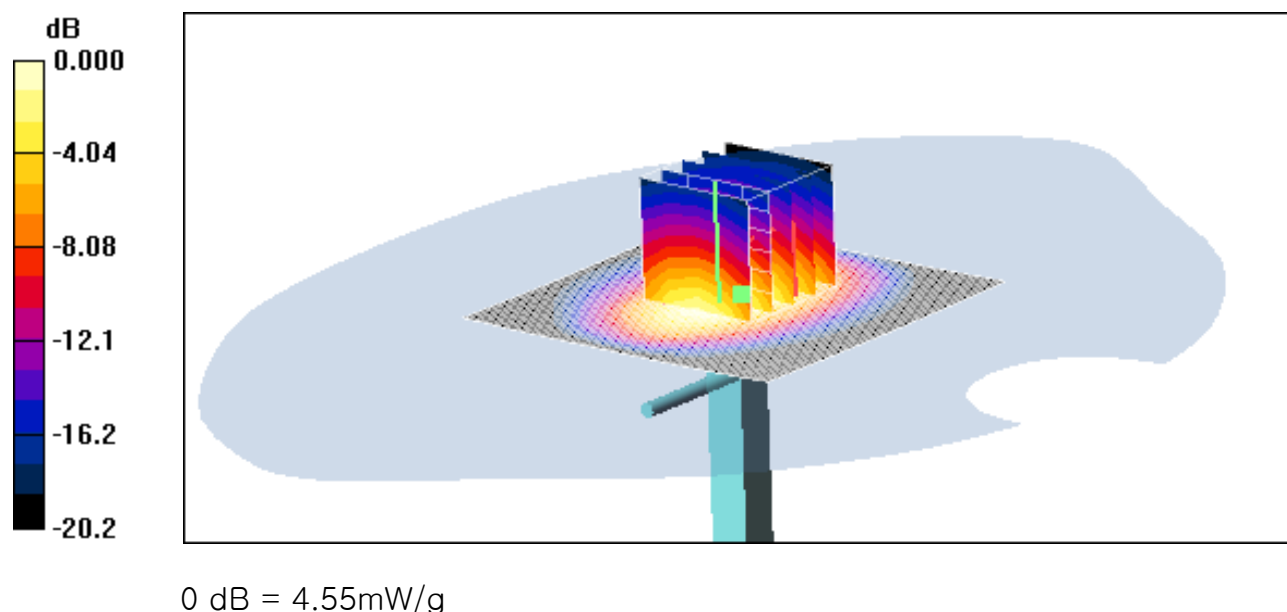
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.39 \text{ mho/m}$; $\epsilon_r = 39.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1798; ConvF(5.24, 5.24, 5.24); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.93 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 60.1 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 7.36 W/kg
SAR(1 g) = 4.11 mW/g; SAR(10 g) = 2.11 mW/g
Maximum value of SAR (measured) = 4.55 mW/g



■ Validation Data (1 900 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.2 °C
Test Date: Apr.13, 2012

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

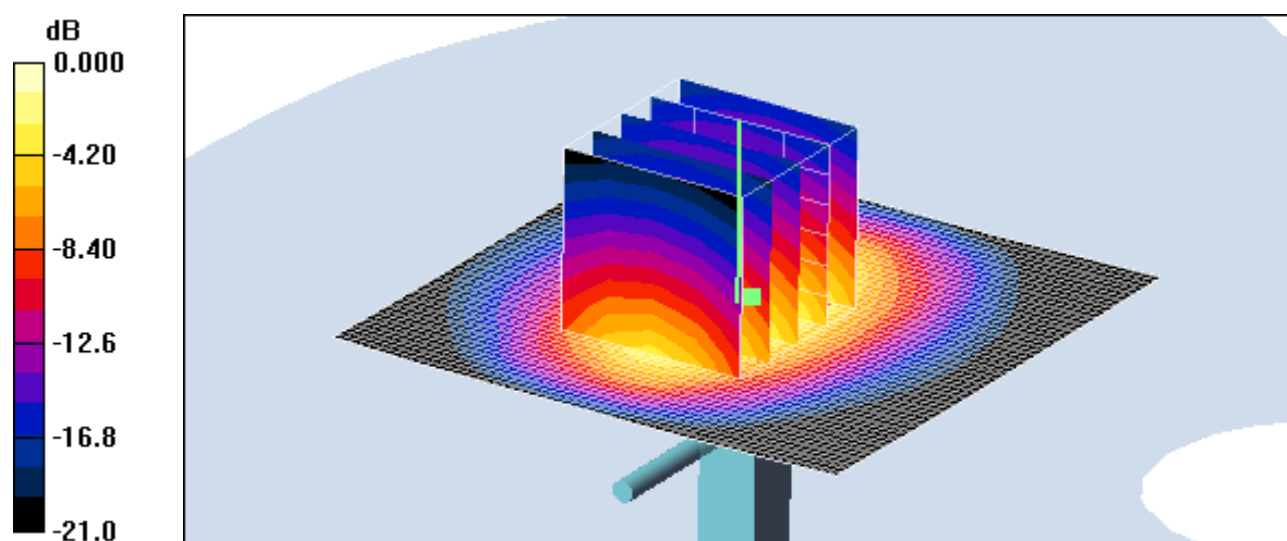
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 53.6$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2011-04-14
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2011-09-27
- 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) = 4.83 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 = 57.9 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 7.36 W/kg
SAR(1 g) = 4.12 mW/g; SAR(10 g) = 2.11 mW/g
Maximum value of SAR (measured) = 4.65 mW/g



0 dB = 4.65mW/g

■ Validation Data (2 450 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.3 °C
Test Date: Apr.24, 2012

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 – SN:742

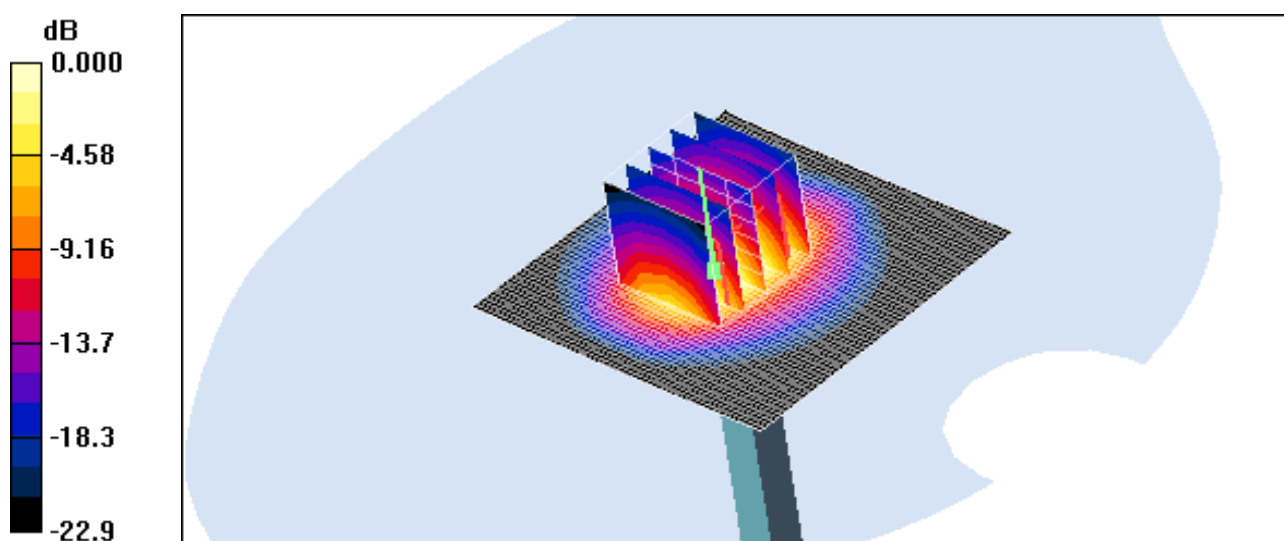
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2450$ MHz; $\sigma = 1.85$ mho/m; $\epsilon_r = 40.1$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1609; ConvF(4.52, 4.52, 4.52); Calibrated: 2012-03-19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

Validation 2450MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 6.37 mW/g

Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 60.0 V/m; Power Drift = -0.123 dB
Peak SAR (extrapolated) = 11.9 W/kg
SAR(1 g) = 5.26 mW/g; SAR(10 g) = 2.42 mW/g
Maximum value of SAR (measured) = 5.75 mW/g



0 dB = 5.75mW/g

■ Validation Data (2 450 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.3 °C
Test Date: Apr.24, 2012

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 – SN:742

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2450$ MHz; $\sigma = 1.86$ mho/m; $\epsilon_r = 51.5$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: ET3DV6 – SN1609; ConvF(4.01, 4.01, 4.01); Calibrated: 2012-03-19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

Validation 2450MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 6.65 mW/g

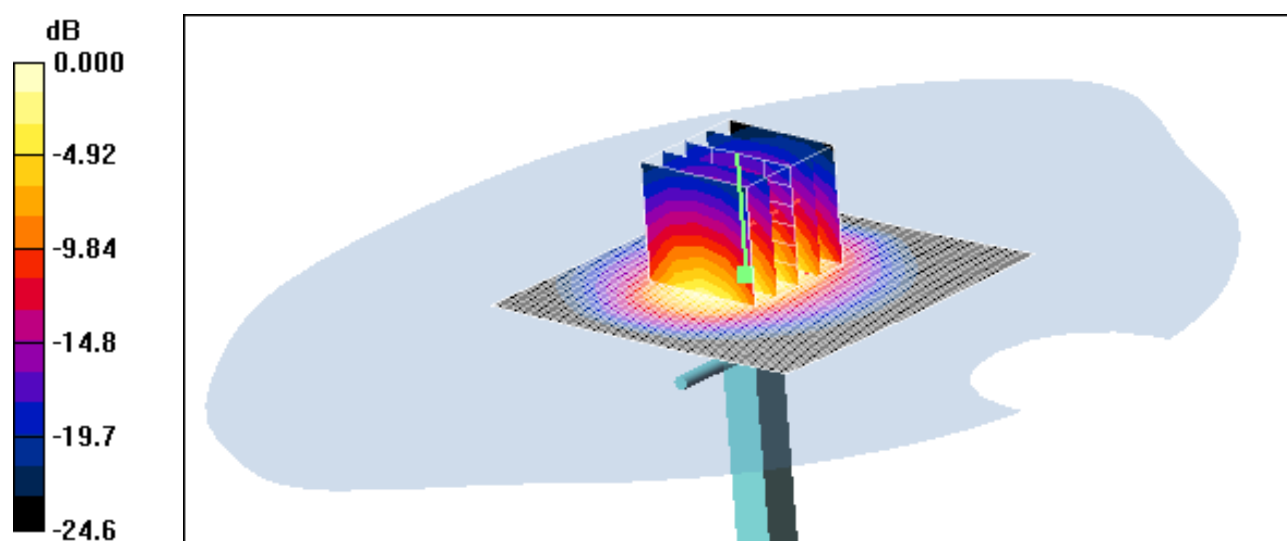
Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 57.0 V/m; Power Drift = -0.056 dB

Peak SAR (extrapolated) = 14.2 W/kg

SAR(1 g) = 5.39 mW/g; SAR(10 g) = 2.37 mW/g

Maximum value of SAR (measured) = 5.78 mW/g



0 dB = 5.78mW/g

■ Dielectric Parameter (835 MHz Head)

Title GT-S6352
SubTitle 835MHz
Test Date Apr.12, 2012

Frequency	e'	e''
800000000.0000	41.6375	18.7463
805000000.0000	41.4783	18.7198
810000000.0000	41.2964	18.7385
815000000.0000	41.1833	18.7270
820000000.0000	41.0388	18.7306
825000000.0000	40.9585	18.8010
830000000.0000	40.9248	18.7725
835000000.0000	40.8498	18.8515
840000000.0000	40.8028	18.8954
845000000.0000	40.7961	18.8955
850000000.0000	40.8243	18.9058
855000000.0000	40.8119	18.9693
860000000.0000	40.8611	18.9774
865000000.0000	40.8600	18.9385
870000000.0000	40.8877	18.9422
875000000.0000	40.9292	18.8749
880000000.0000	40.9189	18.8696
885000000.0000	40.9086	18.7986
890000000.0000	40.8491	18.7938
895000000.0000	40.7782	18.7029
900000000.0000	40.6831	18.6904

■ Dielectric Parameter (835 MHz Body)

Title GT-S6352
SubTitle 835MHz
Test Date Apr.12, 2012

Frequency	e'	e''
800000000.0000	54.2802	21.1665
805000000.0000	54.2681	21.0867
810000000.0000	54.1650	21.0402
815000000.0000	54.0509	20.9869
820000000.0000	53.9892	20.9886
825000000.0000	53.8896	20.9746
830000000.0000	53.8264	20.9245
835000000.0000	53.7665	20.8868
840000000.0000	53.7152	20.8718
845000000.0000	53.6362	20.8850
850000000.0000	53.6176	20.8930
855000000.0000	53.5891	20.8799
860000000.0000	53.5895	20.8777
865000000.0000	53.5837	20.8700
870000000.0000	53.5811	20.8823
875000000.0000	53.5751	20.8702
880000000.0000	53.5967	20.8904
885000000.0000	53.5815	20.9047
890000000.0000	53.5885	20.8636
895000000.0000	53.5571	20.8826
900000000.0000	53.5153	20.8732

■ Dielectric Parameter (1 900 MHz Head)

Title GT-S6352
SubTitle 1 900MHz
Test Date Apr.13, 2012

Frequency	e'	e''
1800000000.0000	39.4772	12.8604
1810000000.0000	39.4186	12.8852
1820000000.0000	39.3849	12.9191
1830000000.0000	39.3613	12.9527
1840000000.0000	39.3315	12.9693
1850000000.0000	39.2889	13.0116
1860000000.0000	39.2481	13.0260
1870000000.0000	39.2086	13.0546
1880000000.0000	39.1713	13.0849
1890000000.0000	39.1354	13.1202
1900000000.0000	39.0885	13.1361
1910000000.0000	39.0491	13.1620
1920000000.0000	39.0111	13.2019
1930000000.0000	38.9633	13.2246
1940000000.0000	38.9292	13.2622
1950000000.0000	38.8976	13.2747
1960000000.0000	38.8531	13.3105
1970000000.0000	38.8047	13.3430
1980000000.0000	38.7803	13.3570
1990000000.0000	38.7196	13.4067
2000000000.0000	38.7048	13.4407

■ Dielectric Parameter (1 900 MHz Body)

Title GT-S6352
SubTitle 1 900MHz
Test Date Apr.13, 2012

Frequency	e'	e''
1850000000.0000	53.8593	14.0258
1855000000.0000	53.8722	14.0298
1860000000.0000	53.8829	14.0455
1865000000.0000	53.8409	14.1081
1870000000.0000	53.8502	14.0890
1875000000.0000	53.8090	14.1099
1880000000.0000	53.7896	14.1311
1885000000.0000	53.7459	14.1360
1890000000.0000	53.7093	14.1721
1895000000.0000	53.6638	14.1641
1900000000.0000	53.6445	14.1997
1905000000.0000	53.6120	14.2101
1910000000.0000	53.6321	14.2189
1915000000.0000	53.5578	14.2663
1920000000.0000	53.5551	14.2944
1925000000.0000	53.5394	14.3058
1930000000.0000	53.4935	14.2976
1935000000.0000	53.5196	14.3450
1940000000.0000	53.5316	14.3433
1945000000.0000	53.5028	14.3899
1950000000.0000	53.5292	14.3908

■ Dielectric Parameter (2 450 MHz Head)

Title GT-S6352
SubTitle 2 450MHz
Test Date Apr.24, 2012

Frequency	e'	e''
2400000000.0000	40.2757	13.4054
2405000000.0000	40.2702	13.4044
2410000000.0000	40.2373	13.4444
2415000000.0000	40.1712	13.4358
2420000000.0000	40.1881	13.4500
2425000000.0000	40.1527	13.4696
2430000000.0000	40.1297	13.4900
2435000000.0000	40.1251	13.5044
2440000000.0000	40.0916	13.5254
2445000000.0000	40.0692	13.5284
2450000000.0000	40.0611	13.5375
2455000000.0000	40.0546	13.5765
2460000000.0000	40.0115	13.5922
2465000000.0000	40.0079	13.6289
2470000000.0000	39.9690	13.6653
2475000000.0000	39.9357	13.6941
2480000000.0000	39.9501	13.7279
2485000000.0000	39.9069	13.7157
2490000000.0000	39.8920	13.7384
2495000000.0000	39.8929	13.7529
2500000000.0000	39.8647	13.7762

■ Dielectric Parameter (2 450 MHz Body)

Title GT-S6352
SubTitle 2 450MHz
Test Date Apr.24, 2012

Frequency	e'	e''
2400000000.0000	51.7535	13.4882
2405000000.0000	51.7229	13.5038
2410000000.0000	51.6958	13.5041
2415000000.0000	51.6661	13.5080
2420000000.0000	51.6388	13.5312
2425000000.0000	51.6045	13.5486
2430000000.0000	51.5835	13.5643
2435000000.0000	51.5673	13.5778
2440000000.0000	51.5449	13.5920
2445000000.0000	51.5225	13.6175
2450000000.0000	51.5032	13.6393
2455000000.0000	51.4861	13.6509
2460000000.0000	51.4621	13.6567
2465000000.0000	51.4519	13.6673
2470000000.0000	51.4392	13.6814
2475000000.0000	51.4222	13.6861
2480000000.0000	51.3938	13.6760
2485000000.0000	51.3636	13.6758
2490000000.0000	51.3573	13.6822
2495000000.0000	51.3367	13.6774
2500000000.0000	51.3071	13.6770

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

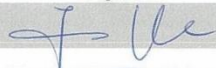
Calibration date: **April 14, 2011**

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	
Issued: April 14, 2011			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

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 E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCPx,y,z**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- 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.

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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 %

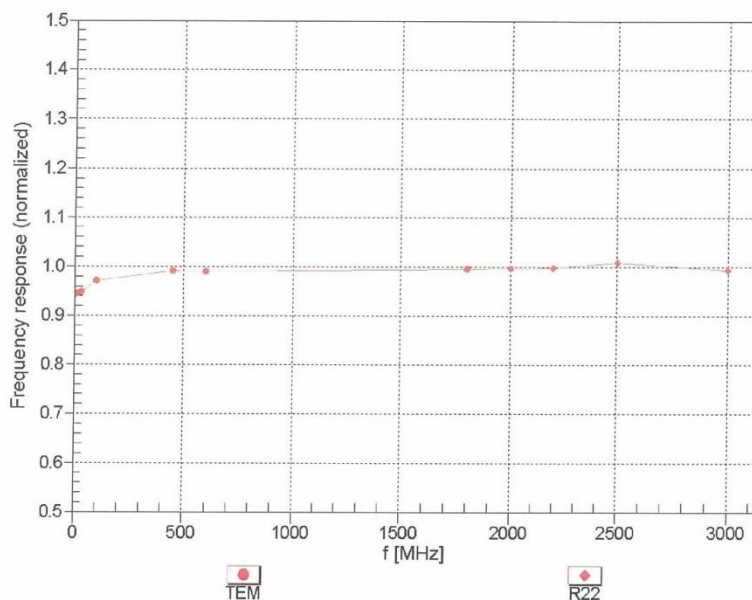
^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^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: $\pm 6.3\%$ ($k=2$)

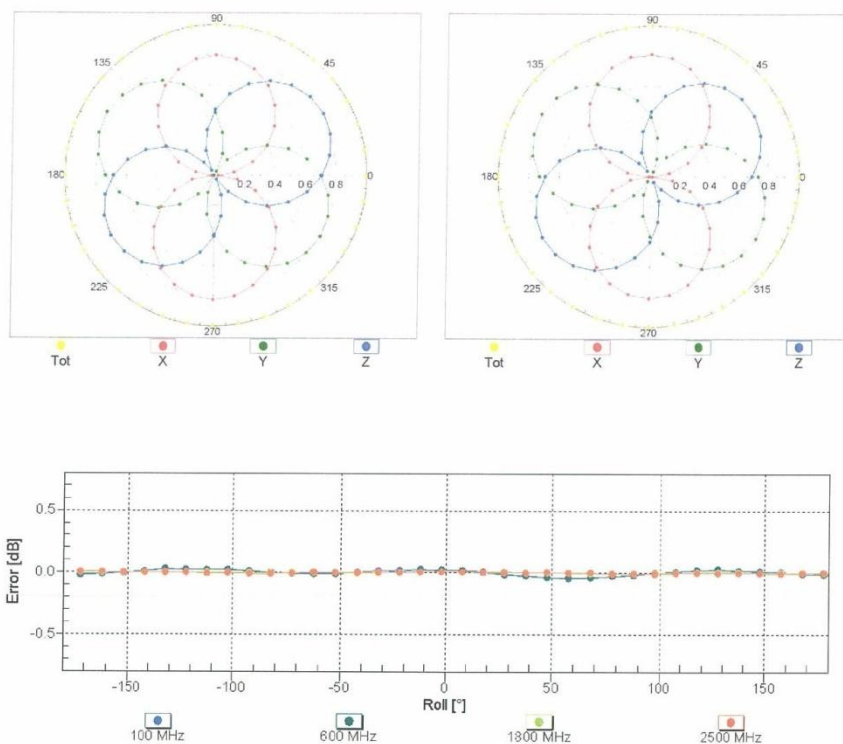
ET3DV6-SN:1798

April 14, 2011

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

f=600 MHz,TEM

f=1800 MHz,R22

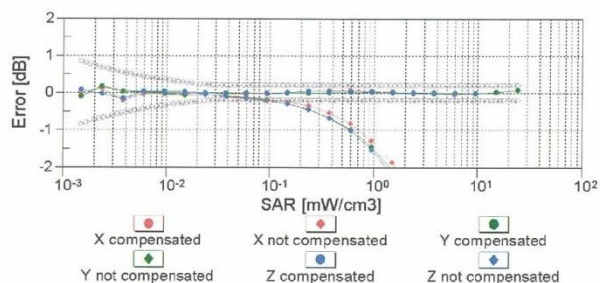
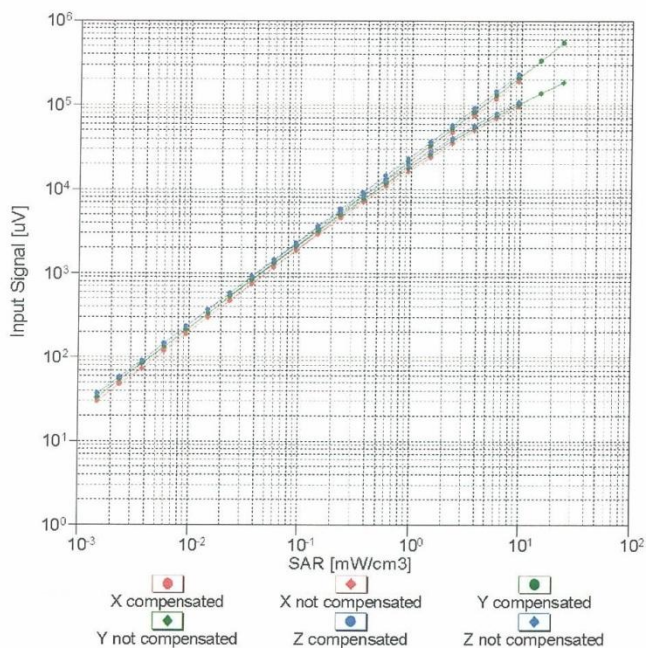


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

ET3DV6- SN:1798

April 14, 2011

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

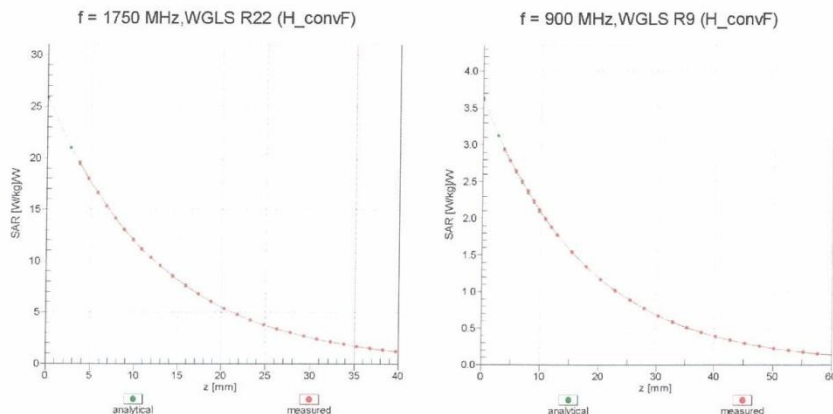


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

ET3DV6- SN:1798

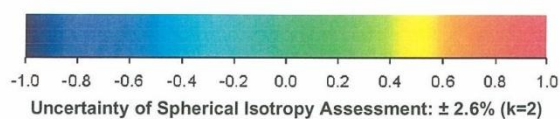
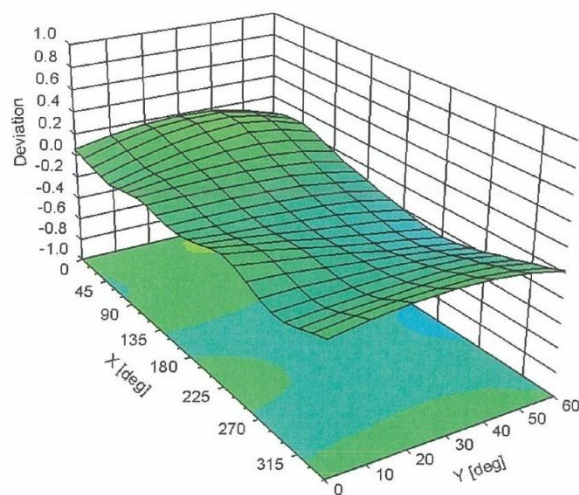
April 14, 2011

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900 \text{ MHz}$



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

Schmid & Partner Engineering AG

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

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:

ET3DV6-SN:1798

Page 1 of 2

July 13, 2011

Schmid & Partner Engineering AG

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Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

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.