

SAR TEST REPORT

HCT CO., LTD

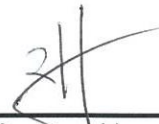
EUT Type:	850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE Rx Only
FCC ID:	A3LGTS6810M
Model:	GT-S6810M
Date of Issue:	Jan.21, 2013
Test report No.:	HCTA1301FS05
Test Laboratory:	HCT CO., LTD. 105-1, Jangam-ri, Majang-myeon, Icheon-si, Gyeonggi-do, Korea 467-811 TEL: +82 31 645 6300 FAX: +82 31 645 6401
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.
Signature	<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <hr style="width: 100%; border: 0.5px solid black;"/> <p>Report prepared by : Young-Soo Jang Test Engineer of SAR Part</p> </div> <div style="text-align: center;">  <hr style="width: 100%; border: 0.5px solid black;"/> <p>Approved by : Jae-Sang So Manager of SAR Part</p> </div> </div>

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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. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C 01-01, IEEE Standard 1528-2003 & IEEE 1528a-2005 and the following published KDB procedures.

- . 447498 D01 General RF Exposure Guidance v05
- . 450824 D01 SAR Prob Cal and Ver Meas v01r01
- . 450824 D02 Dipole SAR Validation Verification v01
- . 648474 D04 SAR Handsets Multi Xmitter and Ant v01
- . 865664 D01 SAR measurement 100 MHz to 6 GHz v01
- . 865664 D02 SAR Reporting v01
- . 941225 D01 SAR test for 3G devices v02
- . 941225 D02 Guidance for 3GPP R6 and R7 HSPA v02v01

3. 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/WCDMA Phone with Bluetooth(LE). 802.11b/g/n, NFC and EDGE Rx Only					
FCC ID:	A3LGTS6810M	Model:	GT-S6810M			
Trade Name	SAMSUNG Electronics Co., Ltd.					
Application Type	Certification					
Mode(s) of Operation	GSM850/GSM1900/WCDMA850/WCDMA1900/802.11b/g/n					
Tx Frequency	824.20 - 848.80 MHz (GSM850) / 1 850.20 – 1 909.80 MHz (GSM1900) 826.4 - 846.6 MHz (WCDMA850)/ 1 852.4 – 1 907.6 MHz (WCDMA1900) 2 412- 2 462 MHz (802.11b/g/n)					
Rx Frequency	869.20 - 893.80 MHz (GSM850)/ 1 930.20 – 1 989.80 MHz (GSM1900) 871.4 - 891.6 MHz (WCDMA850)/ 1 932.4 – 1 987.6 MHz (WCDMA1900) 2 412- 2 462 MHz (802.11b/g/n)					
Production Unit or Identical Prototype	Prototype					
Max SAR	Band	Tx Frequency (MHz)	Equipment Class	Reported 1g SAR (W/kg)		
				Head	Body-worn	Hotspot
	GSM850	824.20 - 848.80	PCE	0.475	0.650	0.747
	GSM1900	1 850.20 - 1 909.80	PCE	0.781	0.477	0.591
	WCDMA850	826.4 - 846.6	PCE	0.217	0.349	0.349
	WCDMA1900	1 852.4 – 1 907.6	PCE	1.065	0.637	0.659
	802.11b	2 412- 2 462	DTS	0.257	0.047	0.048
Bluetooth	2 402 - 2 480	DSS	-			
Simultaneous SAR per KDB 690783 D01				1.460	0.847	0.944
Date(s) of Tests	Jan. 15, 2013 ~ Jan. 17, 2012					
Antenna Type	Integral Antenna					
GPRS	Multislot Class: 12, Mode Class: B					
Key Feature(s)	This device support Mobile Hotspot.					

4. DESCRIPTION OF TEST EQUIPMENT

4.1 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.4.1).

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.

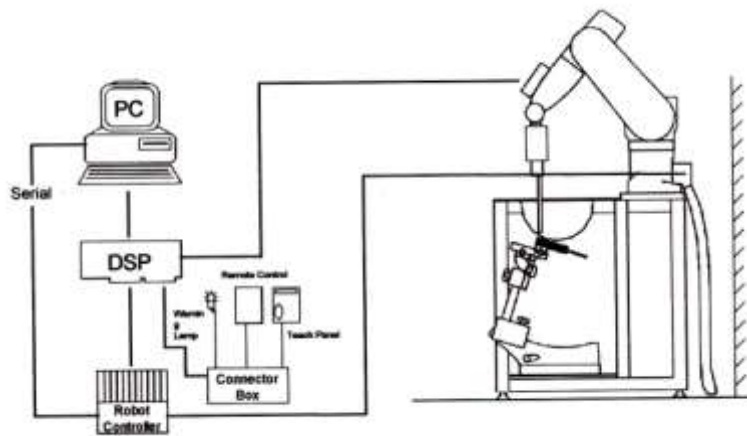


Figure 4.1 HCT SAR Lab. Test Measurement Set-up

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.

4.2 DASYS4 E-FIELD PROBE SYSTEM

4.2.1 ET3DV6 Probe Specification

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 900 and HSL 1810 Additional CF for other liquids and frequencies upon request
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones



Figure 4.2 Photograph of the probe and the Phantom

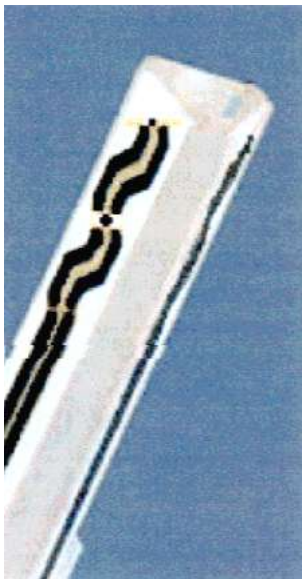


Figure 4.3 ET3DV6 E-field Probe

The SAR measurements were conducted with the dosimetric probe ET3DV6, designed in the classical triangular configuration [5] 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 mortifier 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 DASYS4 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.

4.3 PROBE CALIBRATION PROCESS

4.3.1 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 bellow 1 GHz, and in a waveguide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

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

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

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)

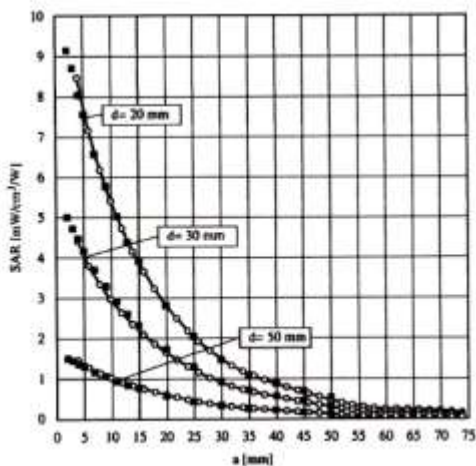


Figure 4.4 E-Field and Temperature measurements at 900 MHz

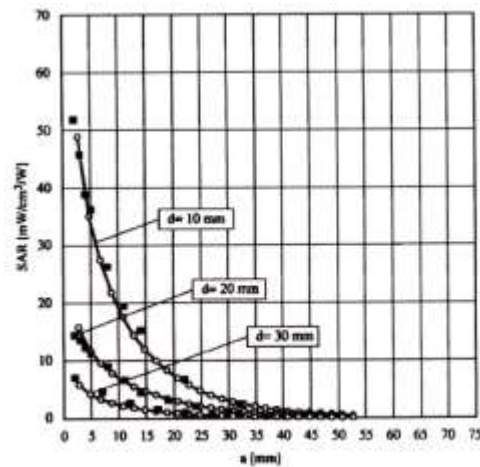


Figure 4.5 E-Field and temperature measurements at 1.8 GHz

4.3.2 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.

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

with P_{free} = equivalent power density of a plane wave in W/cm²
 E_{tot} = total electric field strength in V/m

4.4 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 4.6 SAM Phantom

Shell Thickness	2.0 mm ± 0.2 mm (6 ± 0.2 mm at ear point)
Filling Volume	about 25 L
Dimensions	810 mm x 1 000 mm x 500 mm (H x L x W)

Triple Modular Phantom consists of three identical modules which can be installed and removed separately without emptying the liquid. It includes three reference points for phantom installation. Covers prevent evaporation of the liquid. Phantom material is resistant to DGBE based tissue simulating liquids. The MFP V5.1 will be delivered including wooden support only (**non-standard** SPEAG support).

Applicable for system performance check from 700 MHz to 6 GHz (MFP V5.1C) or 800 MHz - 6 GHz (MFP V5.1A) as well as dosimetric evaluations for body-worn operation.

Figure 3.6 MFP V5.1 Triple Modular Phantom



Shell Thickness	2.0 mm ± 0.2 mm
Filling Volume	approx. 9.2 L
Dimensions	830 mm x 500 mm (L x W)

4.5 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 4.7 Device Holder

4.6 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)											
	750		835		915		1 900		2 450		5200-5800	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	41.2	51.7	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2	65.52	78.66
Salt (NaCl)	1.4	1.0	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04	0.0	0.0
Sugar	57	47.2	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0	0.0	0.0
HEC	0.2	0.0	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0	0.0	0.0
Bactericide	0.2	0.1	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0	0.0	0.0
Triton X-100	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0	17.24	10.67
DGBE	0.00	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7	0.0	0.0
Diethylene glycol hexyl ether	-	-	-	-	-	-	-	-	-	-	17.24	10.67

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 4.1 Composition of the Tissue Equivalent Matter

4.7 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	DAE4	648	Apr. 27, 2012	Annual	Apr. 27, 2013
SPEAG	E-Field Probe EX3DV4	3797	Nov. 22, 2012	Annual	Nov. 22, 2013
SPEAG	Validation Dipole D835V2	441	May 16, 2012	Annual	May 16, 2013
SPEAG	Validation Dipole D1900V2	5d032	July 20, 2012	Annual	July 20, 2013
SPEAG	Validation Dipole D2450V2	743	Aug. 23, 2012	Annual	Aug. 23, 2013
Agilent	Power Meter(F) E4419B	MY41291386	Nov. 04, 2011	Annual	Nov. 02, 2013
Agilent	Power Sensor(G) 8481	MY41090870	Nov. 04, 2011	Annual	Nov. 02, 2013
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler 778D	16072	Nov. 02, 2012	Annual	Nov. 02, 2013
Agilent	Base Station CMU200	110740	July 23, 2012	Annual	July 23, 2013
HP	Base Station E5515C	GB44400269	Feb. 10, 2012	Annual	Feb. 10, 2013
HP	Signal Generator 8664A	3744A02069	Nov. 02, 2012	Annual	Nov. 02, 2013
TESCOM	TC-3000C / BLUETOOTH	3000C000276	Jul. 11, 2012	Annual	Jul. 11, 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/body 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/body-equivalent material.

5. 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.

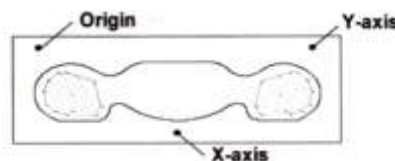


Figure 5.1 SAR Measurement Point in Area Scan

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extend, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SASR-distribution over 10g.

Area scan and zoom scan resolution setting follow KDB 865664 D01v01 quoted below

		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}		≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be \leq the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom} , Δy_{Zoom}		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the <i>reported</i> SAR from the area scan based <i>1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.			

6. DESCRIPTION OF TEST POSITION

6.1 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.

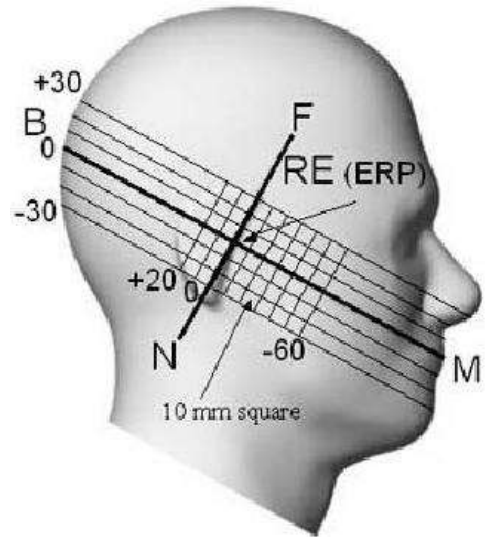


Figure 6.1 Side view of the phantom

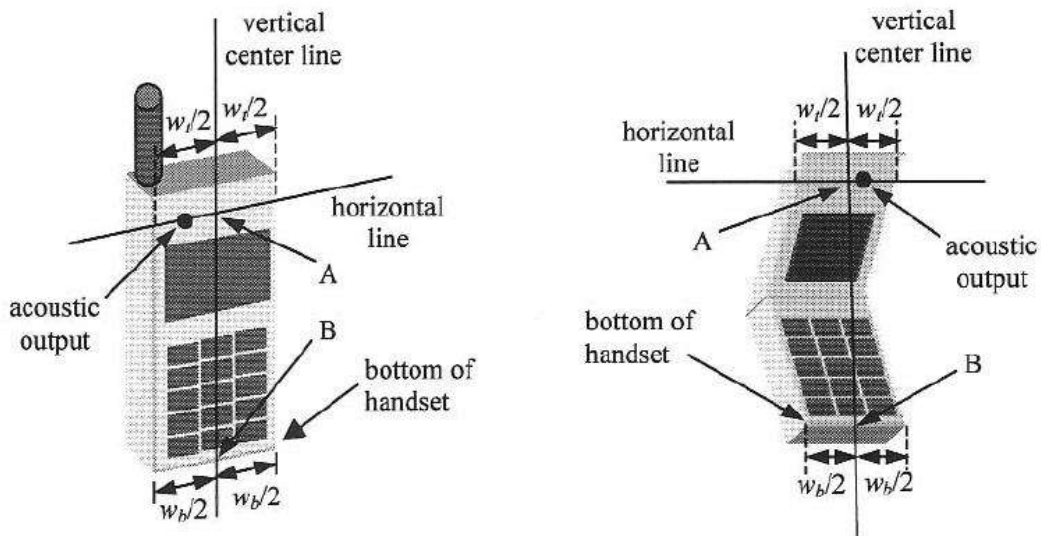


Figure 6.2 Handset vertical and horizontal reference lines

6.2 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.

7. 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 7.1 Uncertainty (800 MHz- 2450 MHz)

8. 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 8.1 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).

9. SYSTEM VERIFICATION

9.1 Tissue Verification

Freq. [MHz]	Date	Liquid	Liquid Temp.[°C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
835	Jan.15,2013	Head	21.0	ϵ_r	41.5	40.4	- 2.65	± 5
				σ	0.90	0.919	+ 2.11	± 5
Body		ϵ_r		55.2	57.1	+ 3.44	± 5	
		σ		0.97	0.984	+ 1.44	± 5	
1 900	Jan.16,2013	Head	21.3	ϵ_r	40.0	40.8	+ 2.00	± 5
				σ	1.40	1.37	- 2.14	± 5
Body		ϵ_r		53.3	52	- 2.44	± 5	
		σ		1.52	1.55	+ 1.97	± 5	
2 450	Jan.17,2013	Head	21.2	ϵ_r	39.2	38.4	- 2.04	± 5
				σ	1.80	1.85	+ 2.78	± 5
Body		ϵ_r		52.7	53.5	+1.52	± 5	
		σ		1.95	1.94	- 0.51	± 5	

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

9.2 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)	Dipole (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	Jan.15,2013	3797	441	Head	21.2	21.0	9.43	0.951	9.51	+ 0.85	± 10
835				Body			9.50	0.963	9.63	+ 1.37	± 10
1 900	Jan.16,2013		5d032	Head	21.5	21.3	39.0	3.84	38.4	- 1.54	± 10
1 900				Body			39.9	3.88	38.8	- 2.76	± 10
2 450	Jan.17,2013		743	Head	21.4	21.2	52.7	5.39	53.9	+ 2.28	± 10
2 450				Body			51.2	5.28	52.8	+ 3.12	± 10

9.3 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.

10. 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.

10.1 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 : Body SAR with GPRS Multi-slot Class12 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.

GSM850

Target Power : 32.5 dBm

Tune-up Tolerance : -1.5dB/ +0.5dB

GSM1900

Target Power : 29.5 dBm

Tune-up Tolerance : -1.5dB/ +0.5dB

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	32.50	32.50	29.99	27.99	26.97
	190	32.65	32.65	30.12	28.11	27.08
	251	32.32	32.32	29.81	27.80	26.78
GSM 1900	512	28.56	28.52	25.99	23.94	22.90
	661	29.30	29.26	26.75	24.74	23.72
	810	28.47	28.42	25.98	24.03	23.02

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	23.47	23.47	23.97	23.73	23.96
	190	23.62	23.62	24.1	23.85	24.07
	251	23.29	23.29	23.79	23.54	23.77
GSM 1900	512	19.53	19.49	19.97	19.68	19.89
	661	20.27	20.23	20.73	20.48	20.71
	810	19.44	19.39	19.96	19.77	20.01

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

10.2 WCDMA

Body SAR is not required for handsets with HSDPA capabilities when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is $\leq 75\%$ of the SAR limit. Otherwise, SAR is Measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.

10.2.1 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3 GPP TS 34.121, using the appropriate RMC or AMR with TPC(transmit power control) set to all “1s”.

10.2.2 Head SAR Measurements

SAR for head exposure configurations is measured using the 12.2 kbps RMC with TPC bits configured to all “1s”. SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than ¼ dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 AMR with a 3.4 kbps SRB (signaling radio bearer using the exposure configuration that results in the highest SAR for that RF channel in 12.2 RMC.

10.2.3 Body SAR Measurement

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all "1s".

10.2.4 Handsets with Release 5 HSDPA

Body SAR is not required for handsets with HSDPA capabilities when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Otherwise, SAR is Measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.

Sub-Test 1 Setup for Release 5 HSDPA

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	$\beta_{hs}^{(2)}$	CM (dB) ⁽²⁾
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 ⁽³⁾	15/15 ⁽³⁾	64	12/15 ⁽³⁾	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$
 Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$.
 Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$.

10.2.5 Handsets with Release 6 HSPA (HSDPA/HSUPA)

Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.1 kbps RMC without HSPA. When VOIP is applicable for head exposure, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurement should be used to test for head exposure.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	$\beta_{hs}^{(1)}$	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM ⁽²⁾ (dB)	MPR (dB)	AG ⁽⁴⁾ Index	E- TFCI
1	11/15 ⁽³⁾	15/15 ⁽³⁾	64	11/15 ⁽³⁾	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 ⁽⁴⁾	15/15 ⁽⁴⁾	64	15/15 ⁽⁴⁾	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.
 Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
 Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.
 Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.
 Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
 Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

WCDMA850

Target Power : 22.5 dBm

Tune-up Tolerance : -1.5dB/ +0.5dB

WCDMA1900

Target Power : 22.0 dBm

Tune-up Tolerance : -1.5dB/ +0.5dB

WCDMA Average Conducted output powers

3GPP Release	WCDMA850 Mode	3GPP 34.121	Cellular Band [dBm]						MPR Target
		Subtest	UL 4132 DL 4357	Power reduction (dB)	UL 4183 DL 4408	Power reduction (dB)	UL 4233 DL 4458	Power reduction (dB)	
99	WCDMA	12.2 kbps RMC	22.08		22.09		22.08		-
99	WCDMA	12.2 kbps AMR	21.96		21.97		22.00		
5	HSDPA	Subtest 1	21.94	0.00	21.89	0.00	21.96	0.00	0
5		Subtest 2	21.82	-0.12	21.87	-0.02	21.86	-0.10	0
5		Subtest 3	21.76	-0.18	21.81	-0.08	21.81	-0.15	-0.5
5		Subtest 4	21.73	-0.21	21.80	-0.09	21.80	-0.16	-0.5
6	HSUPA	Subtest 1	19.90	0.00	19.85	0.00	19.95	0.00	0
6		Subtest 2	17.93	-1.97	17.96	-1.89	17.96	-1.99	-2
6		Subtest 3	18.60	-1.30	18.59	-1.26	18.62	-1.33	-1
6		Subtest 4	18.14	-1.76	18.21	-1.64	18.28	-1.67	-2
6		Subtest 5	20.86	0.96	20.85	1.00	20.86	0.91	0

3GPP Release	WCDMA1900 Mode	3GPP 34.121	PCS Band [dBm]						MPR Target
		Subtest	UL 9262 DL 9662	Power reduction (dB)	UL 9400 DL 9800	Power reduction (dB)	UL 9538 DL 9938	Power reduction (dB)	
99	WCDMA	12.2 kbps RMC	21.73		21.69		21.40		-
99	WCDMA	12.2 kbps AMR	21.70		21.67		21.30		
5	HSDPA	Subtest 1	21.70	-0.24	21.66	-0.23	21.35	-0.61	0
5		Subtest 2	21.67	-0.27	21.58	-0.31	21.22	-0.74	0
5		Subtest 3	21.65	-0.29	21.52	-0.37	20.99	-0.97	-0.5
5		Subtest 4	21.68	-0.26	21.64	-0.25	21.27	-0.69	-0.5
6	HSUPA	Subtest 1	20.06	0.16	20.10	0.25	19.79	-0.16	0
6		Subtest 2	18.02	-1.88	17.94	-1.91	17.71	-2.24	-2
6		Subtest 3	18.78	-1.12	18.73	-1.12	18.44	-1.51	-1
6		Subtest 4	18.08	-1.82	18.00	-1.85	17.76	-2.19	-2
6		Subtest 5	20.95	1.05	20.81	0.96	20.45	0.50	0

10.3 WiFi

10.3.1 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

802.11 a/b/g and 4.9 GHz operating modes are tested independently according to the service requirements in each frequency band. 802.11 b/g modes are tested on channels 1, 6 and 11. 802.11a is tested for UNII operations on channels 36 and 48 in the 5.15-5.25 GHz band; channels 52 and 64 in the 5.25-5.35 GHz band; Channels 104, 116, 124 and 136 in the 5.470-5.725 GHz band; and channels 149 and 161 in the 5.8 GHz band. When 5.8 GHz § 15.247 is also available, channels 149, 157 and 165 should be tested instead of the UNII channels. 4.9 GHz is tested on channels 1, 10 and 5 or 6, whichever has the higher output power, for 5 MHz channels; channels 11,15 and 19 for 10 MHz channels; and channels 21 and 25 for 20 MHz channels.

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

Mode	GHz	Channel	Turbo Channel	"Default Test Channels"		
				§15.247	UNII	
				802.11b	802.11g	
802.11 b/g	2.412	1		√	√	
	2.437	6	6	√	√	
	2.462	11		√	√	
802.11a	5.18	36				√
	5.20	40	43 (5.21 GHz)			*
	5.22	44				*
	5.24	48	50 (5.25 GHz)			√
	5.26	52				√
	5.28	56	58 (5.29 GHz)			*
	5.30	60				*
	5.32	64				√
	5.500	100				*
	5.520	104				√
	5.540	108				*
	5.560	112				*
	5.580	116				√
	5.600	120	Unknown			*
	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

2.4GHz

802.11b : 14.00 dBm

802.11g : 11.00 dBm

802.11n : 11.00 dBm

Tune-up Tolerance : - 1.0dB/ + 1.0dB

Conducted Output Power Measurements (802.11b Mode)

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	1 Mbps	13.86	30
		2 Mbps	13.73	30
		5.5 Mbps	13.69	30
		11 Mbps	13.45	30
2437	6	1 Mbps	13.79	30
		2 Mbps	13.77	30
		5.5 Mbps	13.67	30
		11 Mbps	13.43	30
2462	11	1 Mbps	13.70	30
		2 Mbps	13.58	30
		5.5 Mbps	13.52	30
		11 Mbps	13.33	30

Conducted Output Power Measurements (802.11g Mode)

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6 Mbps	11.97	30
		9 Mbps	11.95	30
		12 Mbps	11.77	30
		18 Mbps	11.50	30
		24 Mbps	11.27	30
		36 Mbps	10.82	30
		48 Mbps	10.45	30
		54 Mbps	10.37	30
2437	6	6 Mbps	11.97	30
		9 Mbps	11.89	30
		12 Mbps	11.73	30
		18 Mbps	11.50	30
		24 Mbps	11.25	30
		36 Mbps	10.80	30
		48 Mbps	10.46	30
		54 Mbps	10.32	30
2462	11	6 Mbps	11.85	30
		9 Mbps	11.73	30
		12 Mbps	11.57	30
		18 Mbps	11.35	30
		24 Mbps	11.04	30
		36 Mbps	10.68	30
		48 Mbps	10.27	30
		54 Mbps	10.16	30

Conducted Output Power Measurements (802.11n Mode)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6.5 Mbps	10.89	30
		13 Mbps	10.56	30
		19.5 Mbps	10.34	30
		26 Mbps	10.11	30
		39 Mbps	9.81	30
		52 Mbps	9.35	30
		58.5 Mbps	9.27	30
		65 Mbps	9.07	30
2437	6	6.5 Mbps	10.92	30
		13 Mbps	10.55	30
		19.5 Mbps	10.32	30
		26 Mbps	10.14	30
		39 Mbps	9.71	30
		52 Mbps	9.37	30
		58.5 Mbps	9.22	30
		65 Mbps	9.08	30
2462	11	6.5 Mbps	10.77	30
		13 Mbps	10.44	30
		19.5 Mbps	10.22	30
		26 Mbps	9.98	30
		39 Mbps	9.61	30
		52 Mbps	9.29	30
		58.5 Mbps	9.10	30
		65 Mbps	8.91	30

10.3 Bluetooth

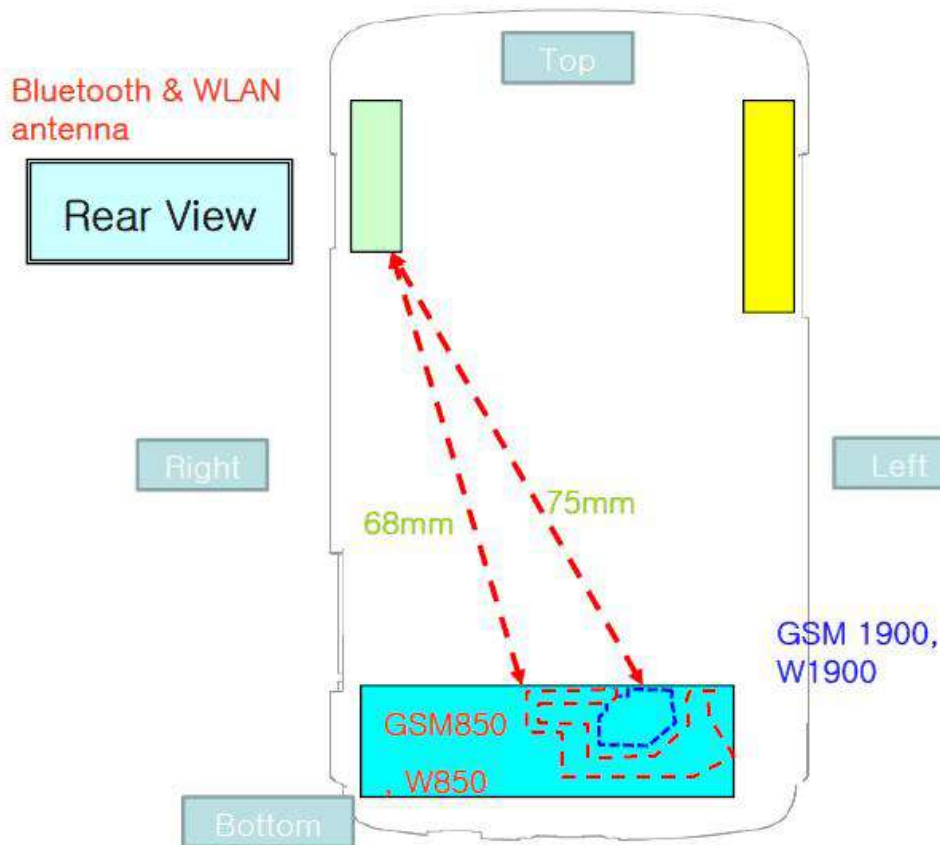
Band	Channel	Frequency (MHz)	Conducted Average Power (dBm)		
			Mode		
			GFSK	8DPSK	$\pi/4$ DQPSK
Bluetooth	0	2402	9.80	7.35	7.34
	39	2441	9.41	6.50	6.48
	78	2480	8.47	6.68	7.66

11. SAR Test configuration & Antenna Information

11.1 SAR Test configurations

Mode	Back	Front	Left	Right	Bottom	Top
850 GPRS	Yes	Yes	Yes	No	Yes	No
1900 GPRS	Yes	Yes	Yes	No	Yes	No
WCDMA850	Yes	Yes	Yes	No	Yes	No
2.4 GHz WLAN	Yes	Yes	No	Yes	No	Yes

11.2 Antenna and Device Information



[Back 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.

12. SAR TEST DATA SUMMARY

12.1 Measurement Results (GSM850 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	Measured SAR(mW/g)	Scaled SAR(mW/g)	Plot No.
MHz	Channel								
836.6	190 (Mid)	GSM850	32.65	0.063	Standard	Left Ear	0.438	0.475	1
			32.65	0.054	Standard	Left Tilt 15°	0.266	0.288	2
			32.65	- 0.012	Standard	Right Ear	0.352	0.382	3
			32.65	0.006	Standard	Right Tilt 15°	0.251	0.272	4
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
- According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.

12.2 Measurement Results (GSM1900 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	Measured SAR(mW/g)	Scaled SAR(mW/g)	Plot No.
MHz	Channel								
1 880.0	661 (Mid)	GSM1900	29.3	-0.011	Standard	Left Ear	0.665	0.781	5
			29.3	0.091	Standard	Left Tilt 15°	0.139	0.163	6
			29.3	0.145	Standard	Right Ear	0.435	0.511	7
			29.3	0.058	Standard	Right Tilt 15°	0.149	0.175	8
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
- According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.

12.3 Measurement Results (WCDMA850 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	Measured SAR(mW/g)	Scaled SAR(mW/g)	Plot No.
MHz	Channel								
836.6	4183 (Mid)	WCDMA850	22.09	-0.005	Standard	Left Ear	0.176	0.217	9
			22.09	-0.004	Standard	Left Tilt 15°	0.175	0.216	10
			22.09	-0.032	Standard	Right Ear	0.136	0.168	11
			22.09	0.096	Standard	Right Tilt 15°	0.092	0.113	12
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
- According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.
- WCDMA Mode was tested under RMC 12.2 kbps and HSPA Inactive.

12.4 Measurement Results (WCDMA1900 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	Measured SAR(mW/g)	Scaled SAR(mW/g)	Plot No.
MHz	Channel								
1852.4	9262(Low)	WCDMA1900	21.69	0.081	Standard	Left Ear	0.892	1.065	13
1 880	9400 (Mid)	WCDMA1900	21.69	0.100	Standard	Left Ear	0.714	0.860	14
1907.6	9538(High)	WCDMA1900	21.69	- 0.151	Standard	Left Ear	0.667	0.859	15
1 880	9400 (Mid)	WCDMA1900	21.69	0.094	Standard	Left Tilt 15°	0.192	0.231	16
1 880	9400 (Mid)	WCDMA1900	21.69	0.09	Standard	Right Ear	0.590	0.711	17
1 880	9400 (Mid)	WCDMA1900	21.69	0.095	Standard	Right Tilt 15°	0.196	0.236	18

**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:

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type Standard Extended Slim
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode Manual Test cord Base Station Simulator
- 7 According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.
- 8 WCDMA Mode was tested under RMC 12.2 kbps and HSPA Inactive.

12.5 Measurement Results (802.11b/g/n Head)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	Data Rate	Measured SAR(mW/g)	Scaled SAR(mW/g)	Plot No.
MHz	Channel									
2 412	1 (Low)	802.11b	13.86	0.073	Standard	Left Ear	1Mbps	0.198	0.257	19
			13.86	-0.19	Standard	Left Tilt 15°	1Mbps	0.059	0.077	20
			13.86	0.103	Standard	Right Ear	1Mbps	0.073	0.095	21
			13.86	-0.151	Standard	Right Tilt 15	1Mbps	0.07	0.091	22
ANSI/ IEEE C95.1 - 1992– Safety Limit						Head				
Spatial Peak						1.6 W/kg (mW/g)				
Uncontrolled Exposure/ General Population						<small>Averaged over 1 gram</small>				

NOTES:

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type Standard Extended Slim
 Batteries are fully charged for all readings.
- 6 Test Signal Call Mode Manual Test cord Base Station Simulator
- 7 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.
- 8 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.

12.6 Measurement Results (GSM850 Hotspot/ Body-Worn SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	Measured SAR(mW/g)	Scaled SAR(mW/g)	Plot No.
MHz	Channel								
836.6	190 (Mid)	GPRS 2Tx	30.12	0.038	Rear	1.0 cm	0.684	0.747	23
			30.12	-0.002	Front	1.0 cm	0.461	0.503	24
			30.12	-0.007	Left	1.0 cm	0.338	0.369	25
			30.12	0.034	Right	1.0 cm	0.221	0.241	26
			30.12	-0.098	Bottom	1.0 cm	0.114	0.124	27
836.6	190 (Mid)	GSM850	32.65	- 0.002	Rear	1.0 cm	0.600	0.650	28
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-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 ± 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
- According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.
- For body SAR testing, the EUT was set in GPRS multi-slot class12 with 2uplink 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.

12.7 Measurement Results (GSM1900 Hotspot/Body-Worn SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	Measured SAR(mW/g)	Scaled SAR(mW/g)	Plot No.
MHz	Channel								
1 880	661 (Mid)	GPRS 2Tx	26.75	0.096	Rear	1.0 cm	0.437	0.519	29
			26.75	0.157	Front	1.0 cm	0.497	0.591	30
			26.75	0.061	Left	1.0 cm	0.144	0.171	31
			26.75	-0.011	Right	1.0 cm	0.072	0.086	32
			26.75	0.032	Bottom	1.0 cm	0.391	0.465	33
1 880	661 (Mid)	GSM1900	29.30	- 0.012	Rear	1.0 cm	0.406	0.477	34
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-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 ± 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
- According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.
- For body SAR testing, the EUT was set in GPRS multi-slot class12 with 2uplink 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.

12.8 Measurement Results (WCDMA850 Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	Measured SAR(mW/g)	Scaled SAR(mW/g)	Plot No.
MHz	Channel								
836.6	4183 (Mid)	WCDMA850	22.09	-0.008	Rear	1.0 cm	0.283	0.349	35
			22.09	0.005	Front	1.0 cm	0.169	0.208	36
			22.09	0.036	Left	1.0 cm	0.134	0.165	37
			22.09	-0.109	Right	1.0 cm	0.09	0.111	38
			22.09	-0.108	Bottom	1.0 cm	0.044	0.054	39
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-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 ± 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
- According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.
- WCDMA Mode was tested under RMC 12.2 kbps and HSPA Inactive.

12.9 Measurement Results (WCDMA1900 Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	Measured SAR(mW/g)	Scaled SAR(mW/g)	Plot No.
MHz	Channel								
1 880	9400 (Mid)	WCDMA1900	21.69	-0.135	Rear	1.0 cm	0.529	0.637	40
			21.69	0.089	Front	1.0 cm	0.547	0.659	41
			21.69	0.014	Left	1.0 cm	0.198	0.239	42
			21.69	0.049	Right	1.0 cm	0.199	0.240	43
			21.69	0.006	Bottom	1.0 cm	0.648	0.781	44
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-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 ± 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
- According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.
- WCDMA Mode was tested under RMC 12.2 kbps and HSPA Inactive.

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

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Data Rate	Measured SAR(mW/g)	Scaled SAR(mW/g)	Plot No.
MHz	Channel								
2 412	1 (Low)	802.11b	13.86	0.095	Rear	1Mbps	0.036	0.047	45
			13.86	0.148	Front	1Mbps	0.018	0.023	46
			13.86	0.121	Right	1Mbps	0.037	0.048	47
			13.86	-0.139	Top	1Mbps	0.013	0.018	48
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:

- 1 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].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type Standard Extended Slim
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode Manual Test code Base Station Simulator
- 7 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.
- 8 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. SAR Summation Scenario

	Position	Applicable Combination
Simultaneous Transmission	Head	GSM850 Voice + 2.4 GHz WiFi
		GSM1900 Voice + 2.4 GHz WiFi
		WCDMA850 Voice + 2.4 GHz WiFi
		WCDMA1900 Voice + 2.4 GHz WiFi
		GSM850 Voice + 2.4 GHz Bluetooth
		GSM1900 Voice + 2.4 GHz Bluetooth
		WCDMA850 Voice + 2.4 GHz Bluetooth
		WCDMA1900 Voice + 2.4 GHz Bluetooth
		GPRS850 Data + 2.4 GHz WiFi
		GPRS1900 Data + 2.4 GHz WiFi
		WCDMA850 Data + 2.4 GHz WiFi
		WCDMA1900 Data + 2.4 GHz WiFi
		GPRS850 Data + 2.4 GHz Bluetooth
		GPRS1900 Data + 2.4 GHz Bluetooth
	WCDMA850 Data + 2.4 GHz Bluetooth	
	WCDMA1900 Data + 2.4 GHz Bluetooth	
	Hotspot	GSM850 Voice + 2.4 GHz WiFi
		GSM1900 Voice + 2.4 GHz WiFi
		WCDMA850 Voice + 2.4 GHz WiFi
		WCDMA1900 Voice + 2.4 GHz WiFi
		GSM850 Voice + 2.4 GHz Bluetooth
		GSM1900 Voice + 2.4 GHz Bluetooth
		WCDMA850 Voice + 2.4 GHz Bluetooth
		WCDMA1900 Voice + 2.4 GHz Bluetooth
		GPRS850 Data + 2.4 GHz WiFi
		GPRS1900 Data + 2.4 GHz WiFi
		WCDMA850 Data + 2.4 GHz WiFi
		WCDMA1900 Data + 2.4 GHz WiFi
GPRS850 Data + 2.4 GHz Bluetooth		
GPRS1900 Data + 2.4 GHz Bluetooth		
WCDMA850 Data + 2.4 GHz Bluetooth		
WCDMA1900 Data + 2.4 GHz Bluetooth		
Body-worn	GSM850 Voice + 2.4 GHz WiFi	
	GSM1900 Voice + 2.4 GHz WiFi	
	WCDMA850 Voice + 2.4 GHz WiFi	
	WCDMA1900 Voice + 2.4 GHz WiFi	
	GSM850 Voice + 2.4 GHz Bluetooth	
	GSM1900 Voice + 2.4 GHz Bluetooth	
	WCDMA850 Voice + 2.4 GHz Bluetooth	
	WCDMA1900 Voice + 2.4 GHz Bluetooth	

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05 IV.C.1iii, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is $\leq 1.6\text{W/kg}$. when standalone SAR is not required to be measured per FCC KDB 447498 D01v05 4.3.22, the following equation must be used to estimate the standalone 1-g SAR for simultaneous transmission assessment involving that transmitter

$$\text{Estimated SAR} = \frac{\sqrt{f(\text{GHz})}}{7.5} * \frac{(\text{Max Power of channel,mW})}{\text{Min.Separation Distance}}$$

Mode	Frequency	Maximum Allowed Power	Separatuin Distance	Estimated SAR
	[MHz]	[mW]	[mm]	[W/kg]
Bluetooth(Head)	2402	9.55	0	0.395
Bluetooth(Body)	2402	9.55	10	0.197

Simultaneous Transmission Summation for Held to Ear

Simultaneous TX	configuration	GSM850 Scaled SAR(W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	GSM850 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Left Cheek	0.475	0.257	0.732	Head SAR	Left Cheek	0.475	0.395	0.870
	Left Tilt	0.288	0.077	0.365		Left Tilt	0.288	0.395	0.683
	Right Cheek	0.382	0.095	0.477		Right Cheek	0.382	0.395	0.777
	Right Tilt	0.272	0.091	0.363		Right Tilt	0.272	0.395	0.667
Simultaneous TX	configuration	GSM1900 Scaled SAR(W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	GSM1900 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Left Cheek	0.781	0.257	1.038	Head SAR	Left Cheek	0.781	0.395	1.176
	Left Tilt	0.163	0.077	0.240		Left Tilt	0.163	0.395	0.558
	Right Cheek	0.511	0.095	0.606		Right Cheek	0.511	0.395	0.906
	Right Tilt	0.175	0.091	0.266		Right Tilt	0.175	0.395	0.570
Simultaneous TX	configuration	WCDMA850 Scaled SAR(W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	WCDMA850 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Left Cheek	0.217	0.257	0.474	Head SAR	Left Cheek	0.217	0.395	0.612
	Left Tilt	0.216	0.077	0.293		Left Tilt	0.216	0.395	0.611
	Right Cheek	0.168	0.095	0.263		Right Cheek	0.168	0.395	0.563
	Right Tilt	0.113	0.091	0.204		Right Tilt	0.113	0.395	0.508
Simultaneous TX	configuration	WCDMA1900 Scaled SAR(W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	WCDMA1900 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Left Cheek	1.065	0.257	1.322	Head SAR	Left Cheek	1.065	0.395	1.460
	Left Tilt	0.231	0.077	0.308		Left Tilt	0.231	0.395	0.626
	Right Cheek	0.711	0.095	0.806		Right Cheek	0.711	0.395	1.106
	Right Tilt	0.236	0.091	0.327		Right Tilt	0.236	0.395	0.631

Simultaneous Transmission Summation for Body-Worn (1cm)

Simultaneous TX	configuration	GSM850 Scaled SAR(W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	WCDMA850 Scaled SAR(W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.65	0.047	0.697	Body SAR	Back	0.349	0.047	0.396
Simultaneous TX	configuration	GSM1900 Scaled SAR(W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	WCDMA1900 Scaled SAR(W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.477	0.047	0.524	Body SAR	Back	0.637	0.047	0.684
Simultaneous TX	configuration	GSM850 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	WCDMA850 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.65	0.197	0.847	Body SAR	Back	0.349	0.197	0.546
Simultaneous TX	configuration	GSM1900 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	WCDMA1900 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.477	0.197	0.674	Body SAR	Back	0.637	0.197	0.834

Simultaneous Transmission Summation for Hotspot (1cm)

Simultaneous TX	configuration	GSM850 Scaled SAR(W/kg)	2.4GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	WCDMA850 Scaled SAR(W/kg)	2.4GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.747	0.047	0.794	Body SAR	Back	0.349	0.047	0.396
	Front	0.503	0.023	0.526		Front	0.208	0.023	0.231
	Left	0.338	-	0.338		Left	0.165	-	0.165
	Right	0.241	0.048	0.289		Right	0.111	0.048	0.159
	Bottom	0.114	-	0.114		Bottom	0.054	-	0.054
	Top	-	0.018	0.018		Top	-	0.018	0.018
Simultaneous TX	configuration	GSM1900 Scaled SAR(W/kg)	2.4GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	WCDMA1900 Scaled SAR(W/kg)	2.4GHz WIFI Scaled SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.519	0.047	0.566	Body SAR	Back	0.637	0.047	0.684
	Front	0.591	0.023	0.614		Front	0.659	0.023	0.682
	Left	0.171	-	0.171		Left	0.239	-	0.239
	Right	0.086	0.048	0.134		Right	0.24	0.048	0.288
	Bottom	0.465	-	0.465		Bottom	0.781	-	0.781
	Top	-	0.018	0.018		Top	-	0.018	0.018
Simultaneous TX	configuration	GSM850 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	WCDMA850 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.747	0.197	0.944	Body SAR	Back	0.349	0.197	0.546
	Front	0.503	0.197	0.700		Front	0.208	0.197	0.405
	Left	0.338	0.197	0.535		Left	0.165	0.197	0.362
	Right	0.241	0.197	0.438		Right	0.111	0.197	0.308
	Bottom	0.114	0.197	0.311		Bottom	0.054	0.197	0.251
	Top	-	0.197	0.197		Top	-	0.197	0.197
Simultaneous TX	configuration	GSM1900 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	WCDMA1900 Scaled SAR(W/kg)	BT SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.519	0.197	0.716	Body SAR	Back	0.637	0.197	0.834
	Front	0.591	0.197	0.788		Front	0.659	0.197	0.856
	Left	0.171	0.197	0.368		Left	0.239	0.197	0.436
	Right	0.086	0.197	0.283		Right	0.24	0.197	0.437
	Bottom	0.465	0.197	0.662		Bottom	0.781	0.197	0.978
	Top	-	0.197	0.197		Top	-	0.197	0.197

Note;

- **Body-Worn 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.
- The EUT front body-worn configuration is provided to cover any potential accessory that will position the EUT in this manner.

13.1 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.

Per FCC KDB 447498 D01v05, Bluetooth Body SAR was not required based on the maximum conducted power and the Bluetooth antenna to user separation distance.

$$\frac{\text{Max Power of Channel(mW)}}{\text{Test Separation Dist(mm)}} * \sqrt{\text{Frequency(GHz)}} \leq 3.0$$

Mode	Frequency	Maximum Allowed Power	Separatuin Distance	≤ 3.0
	[MHz]	[mW]	[mm]	
Bluetooth(Head)	2402	9.55	0	2.96
Bluetooth(Body)	2402	9.55	10	1.48

14. SAR Measurement Variability and Uncertainty

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01.

These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Frequency		Modulation	Battery	Phantom Position	Original SAR(mW/g)	Repeated SAR(mW/g)	Largest to Smallest SAR Ratio	Plot No.
MHz	Channel							
1 852.4	9262 (low)	WCDMA1900	Standard	Left Ear	0.892	0.888	1.005	49

Note(s):

1. Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.
2. Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg.

15. 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.

16. REFERENCES

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Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Plot NO. 1

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.94, 8.94, 8.94); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 835/900 MHz; Type: SAM

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

Maximum value of SAR (interpolated) = 0.472 mW/g

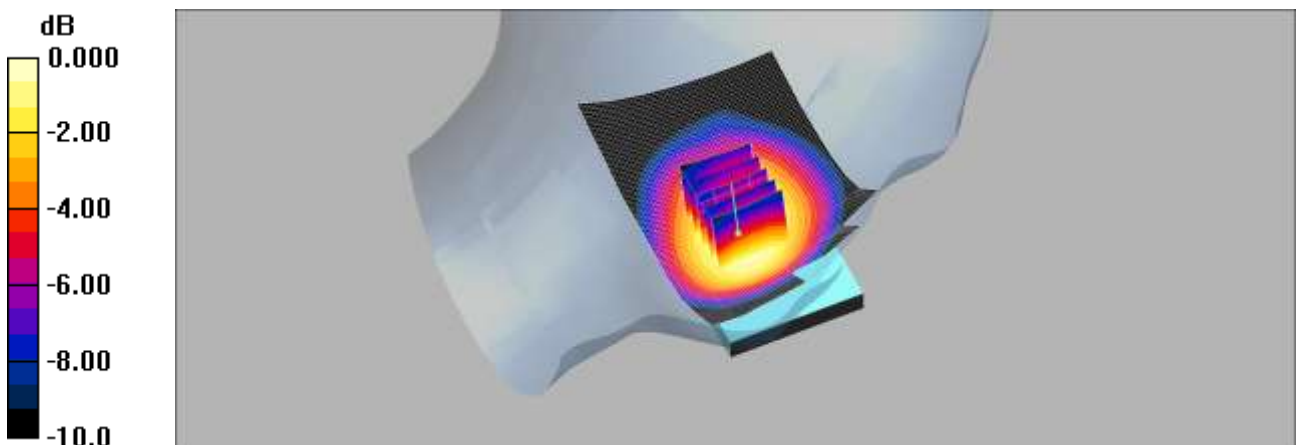
Left Touch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.1 V/m; Power Drift = 0.063 dB

Peak SAR (extrapolated) = 0.569 W/kg

SAR(1 g) = 0.438 mW/g; SAR(10 g) = 0.321 mW/g

Maximum value of SAR (measured) = 0.467 mW/g



0 dB = 0.467mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Plot NO. 2

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.94, 8.94, 8.94); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 835/900 MHz; Type: SAM

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

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

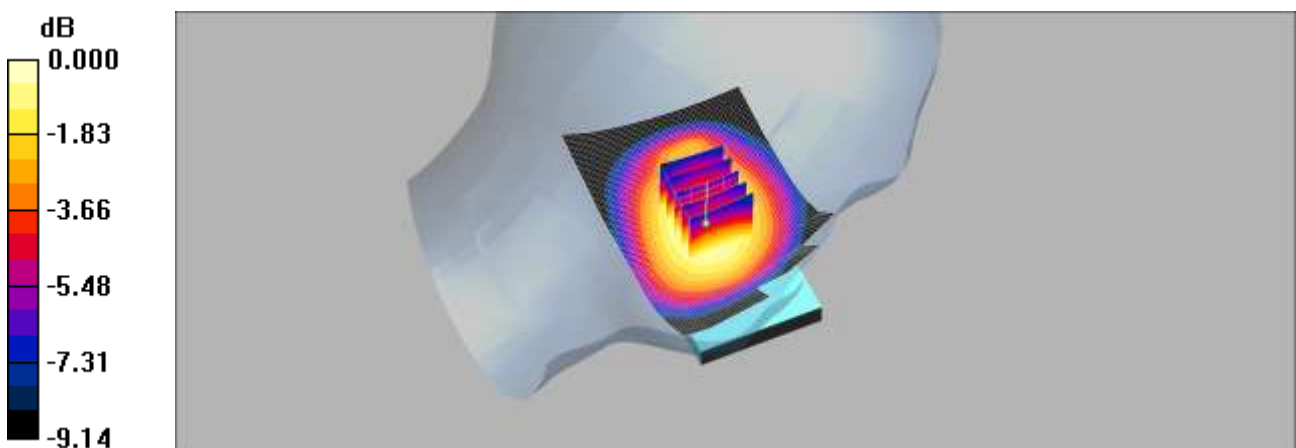
Left Tilt 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.0 V/m; Power Drift = 0.054 dB

Peak SAR (extrapolated) = 0.328 W/kg

SAR(1 g) = 0.266 mW/g; SAR(10 g) = 0.201 mW/g

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



0 dB = 0.278mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Plot NO. 3

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.94, 8.94, 8.94); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 835/900 MHz; Type: SAM

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

Maximum value of SAR (interpolated) = 0.378 mW/g

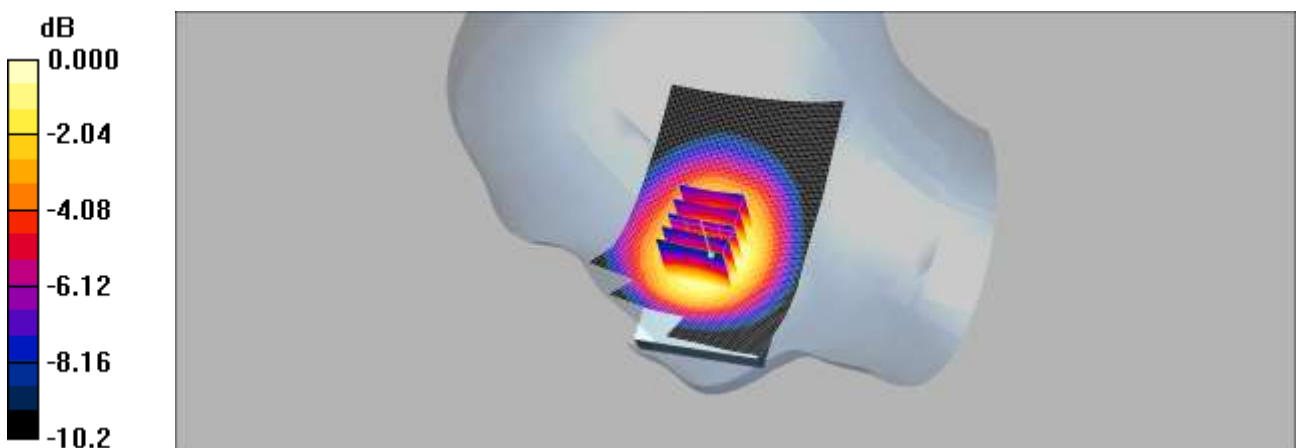
Right Touch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.2 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 0.443 W/kg

SAR(1 g) = 0.352 mW/g; SAR(10 g) = 0.258 mW/g

Maximum value of SAR (measured) = 0.368 mW/g



0 dB = 0.368mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Plot NO. 4

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.94, 8.94, 8.94); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 835/900 MHz; Type: SAM

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

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

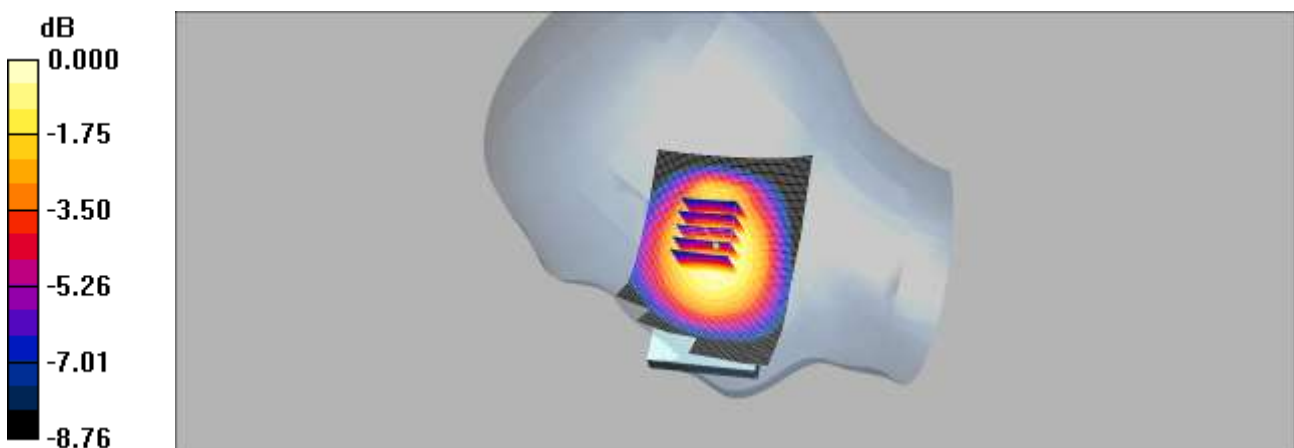
Right Tilt 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.8 V/m; Power Drift = 0.006 dB

Peak SAR (extrapolated) = 0.312 W/kg

SAR(1 g) = 0.251 mW/g; SAR(10 g) = 0.188 mW/g

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



0 dB = 0.265mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Plot NO. 5

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

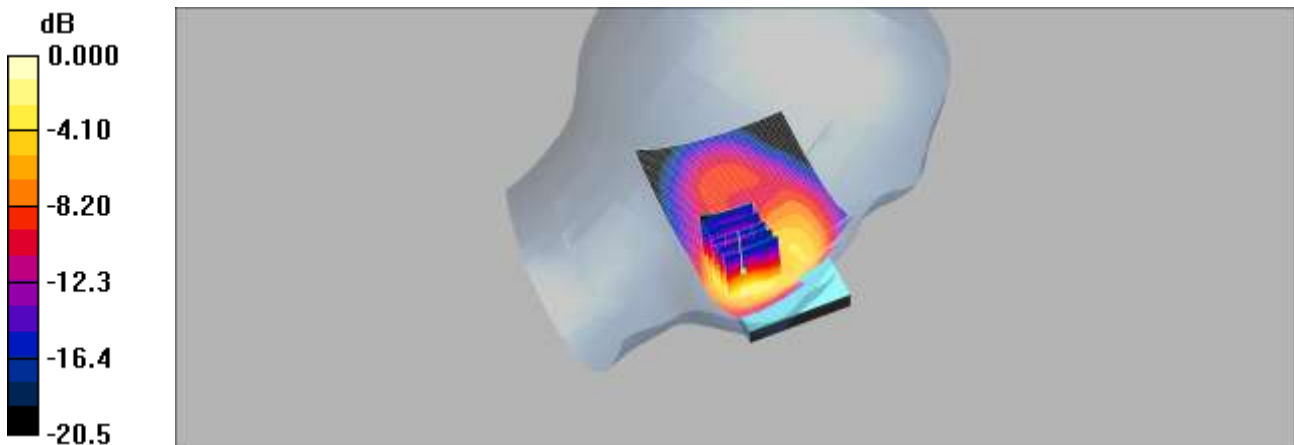
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.35$ mho/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Fix Surface)Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left Touch 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.622 mW/g

Left Touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.9 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 1.31 W/kg
SAR(1 g) = 0.665 mW/g; SAR(10 g) = 0.338 mW/g
Maximum value of SAR (measured) = 0.740 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Plot NO. 6

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

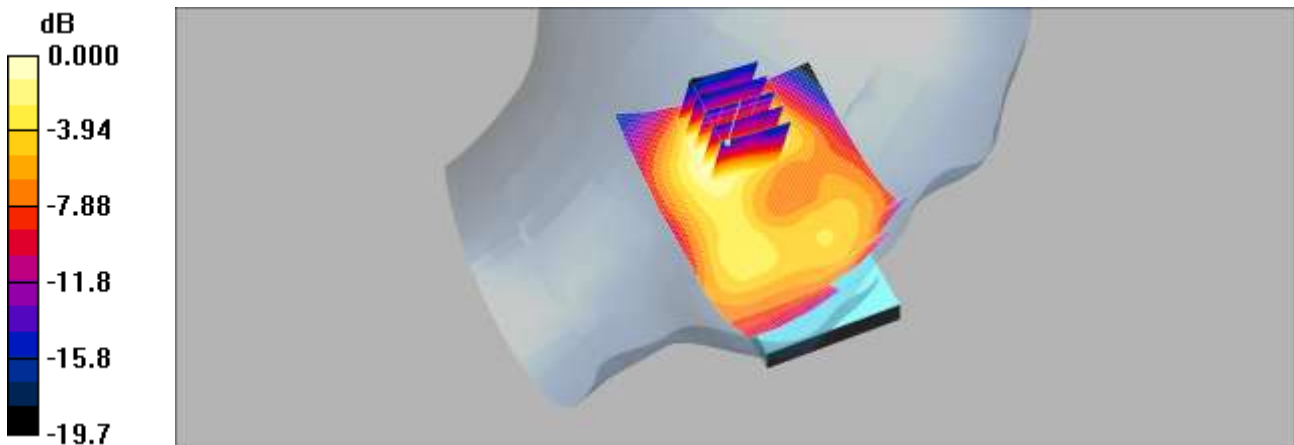
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.35$ mho/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Fix Surface)Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left Tilt 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.172 mW/g

Left Tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.79 V/m; Power Drift = 0.091 dB
Peak SAR (extrapolated) = 0.252 W/kg
SAR(1 g) = 0.139 mW/g; SAR(10 g) = 0.076 mW/g
Maximum value of SAR (measured) = 0.152 mW/g



0 dB = 0.152mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Plot NO. 7

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.35$ mho/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

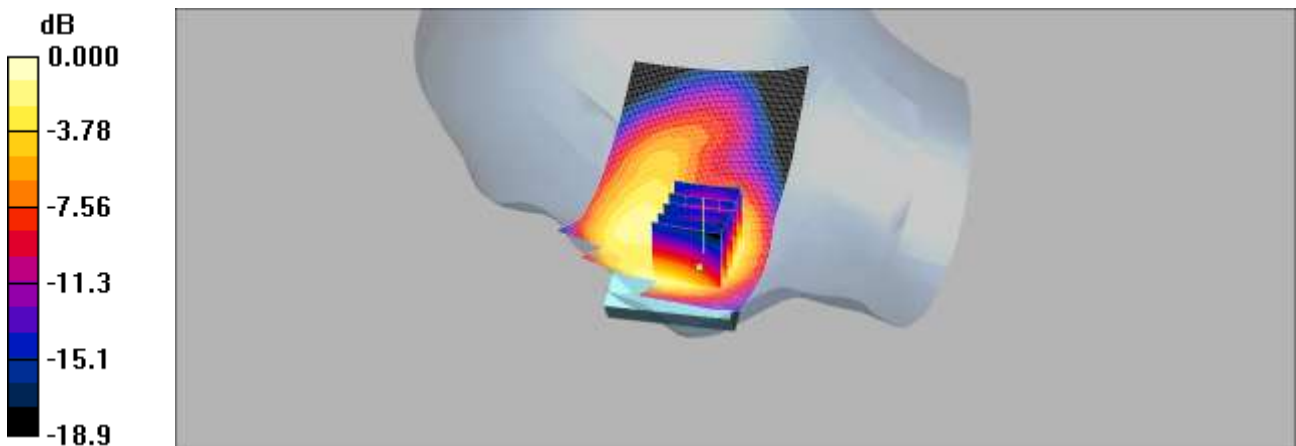
DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right Touch 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.457 mW/g

Right Touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.2 V/m; Power Drift = 0.145 dB
Peak SAR (extrapolated) = 0.739 W/kg
SAR(1 g) = 0.435 mW/g; SAR(10 g) = 0.240 mW/g

Maximum value of SAR (measured) = 0.471 mW/g



0 dB = 0.471mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Plot NO. 8

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

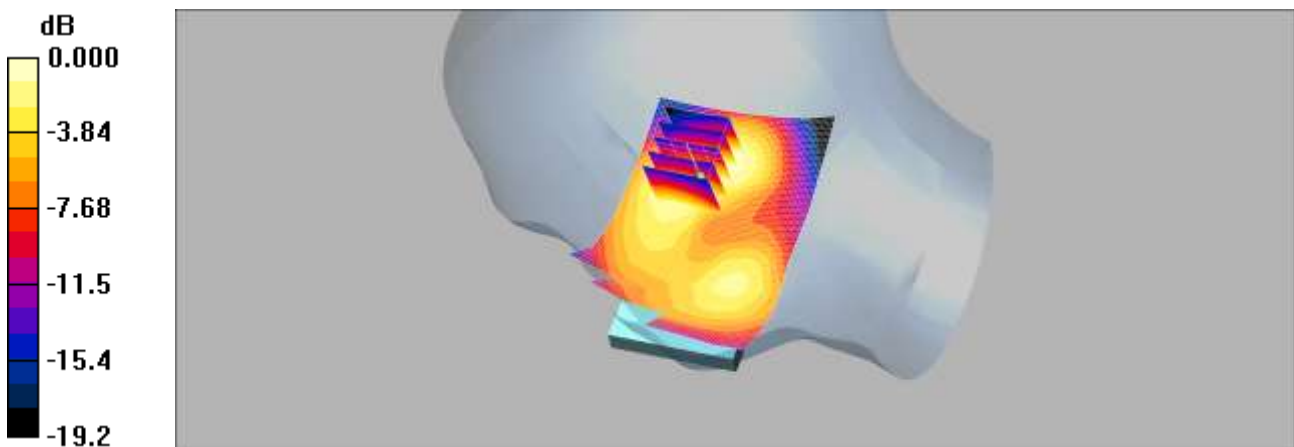
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.35$ mho/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right Tilt 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.172 mW/g

Right Tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.19 V/m; Power Drift = 0.058 dB
Peak SAR (extrapolated) = 0.250 W/kg
SAR(1 g) = 0.149 mW/g; SAR(10 g) = 0.086 mW/g
Maximum value of SAR (measured) = 0.160 mW/g



0 dB = 0.160mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Plot NO. 9

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.94, 8.94, 8.94); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 835/900 MHz; Type: SAM

Left Touch 4183/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

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

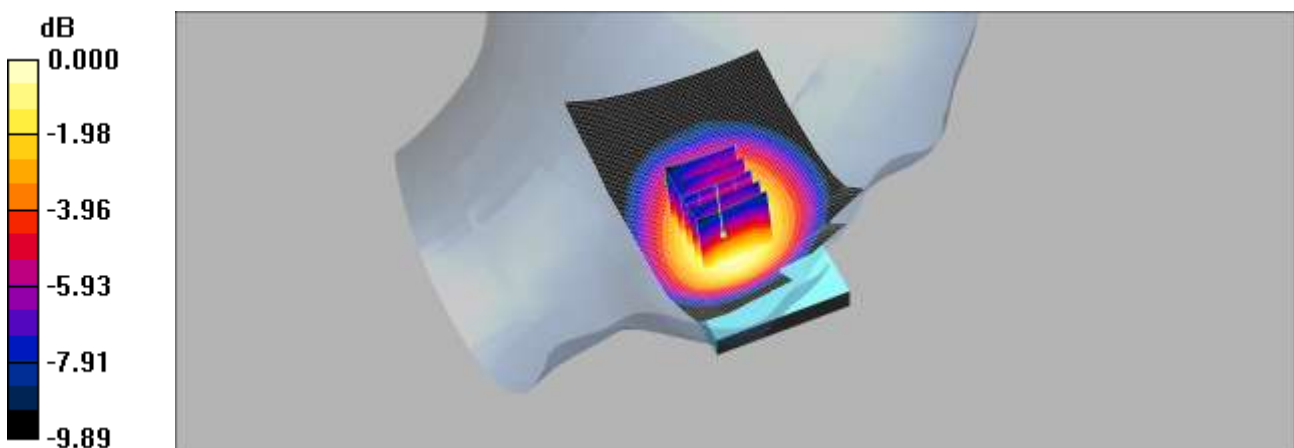
Left Touch 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.0 V/m; Power Drift = -0.005 dB

Peak SAR (extrapolated) = 0.236 W/kg

SAR(1 g) = 0.176 mW/g; SAR(10 g) = 0.128 mW/g

Maximum value of SAR (measured) = 0.187 mW/g



0 dB = 0.187mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Plot NO. 10

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.94, 8.94, 8.94); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 835/900 MHz; Type: SAM

Left Tilt 4183/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.188 mW/g

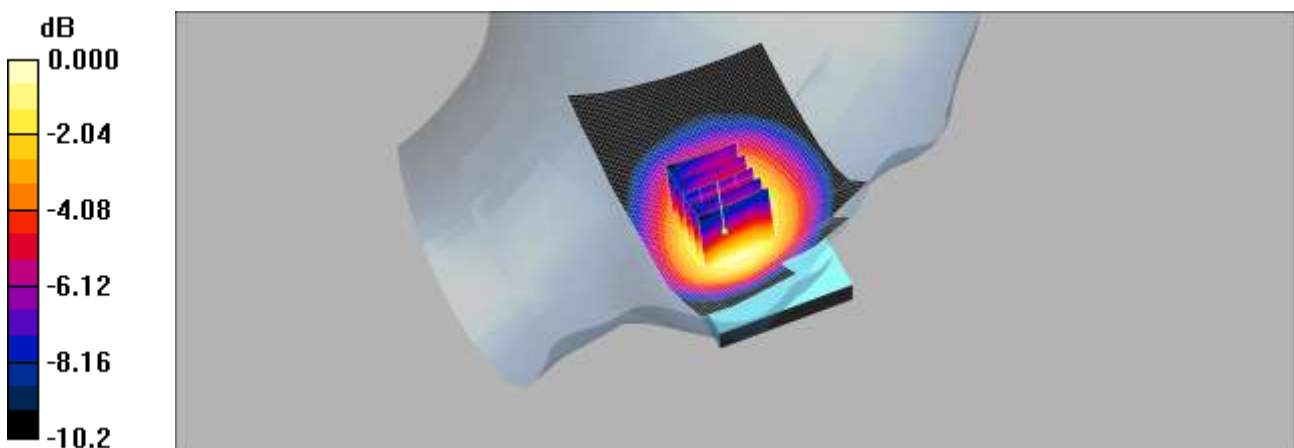
Left Tilt 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.0 V/m; Power Drift = -0.004 dB

Peak SAR (extrapolated) = 0.237 W/kg

SAR(1 g) = 0.175 mW/g; SAR(10 g) = 0.127 mW/g

Maximum value of SAR (measured) = 0.185 mW/g



0 dB = 0.185mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Plot NO. 11

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.94, 8.94, 8.94); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 835/900 MHz; Type: SAM

Right Touch 4183/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.148 mW/g

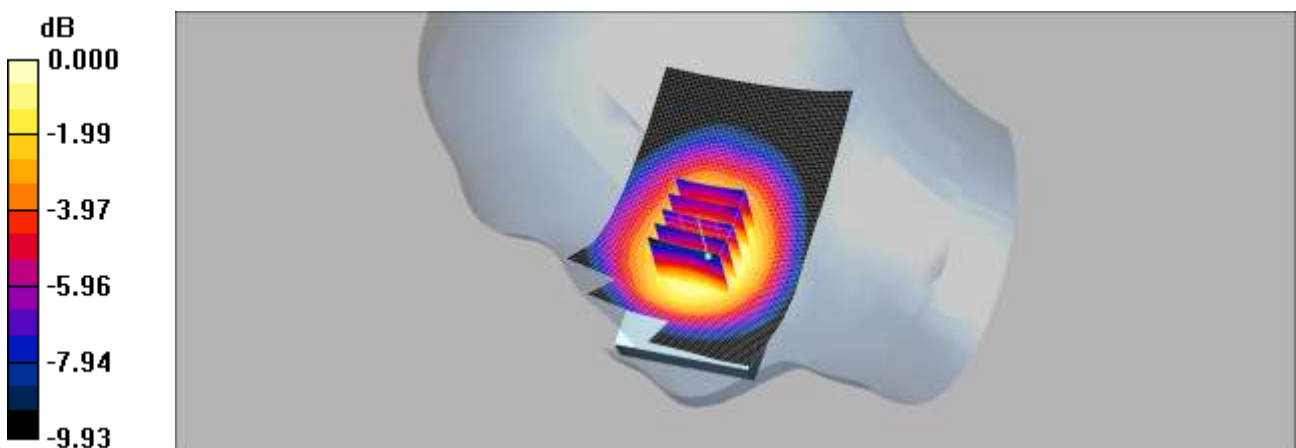
Right Touch 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.6 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 0.171 W/kg

SAR(1 g) = 0.136 mW/g; SAR(10 g) = 0.100 mW/g

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



0 dB = 0.143mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Plot NO. 12

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.94, 8.94, 8.94); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 835/900 MHz; Type: SAM

Right Tilt 4183/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

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

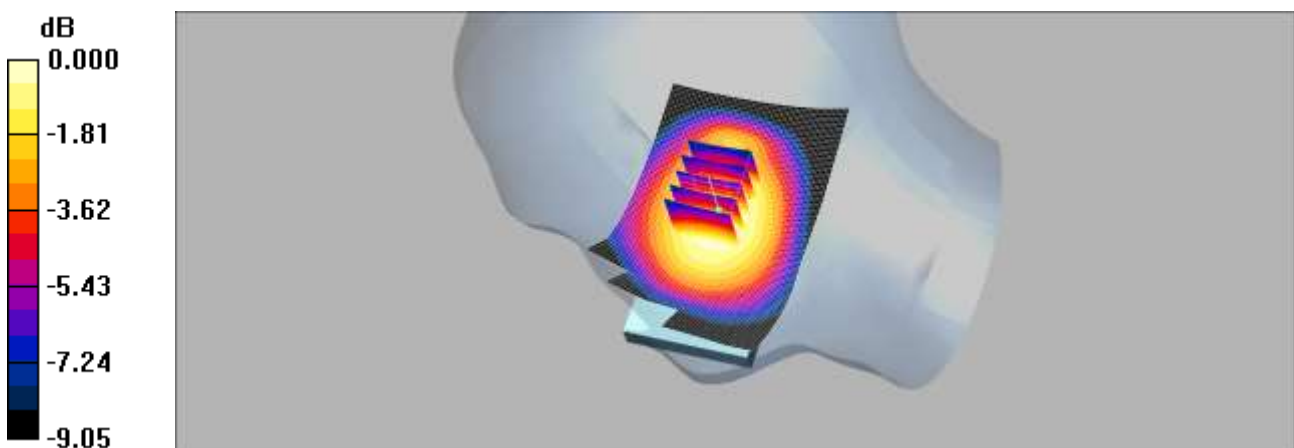
Right Tilt 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.15 V/m; Power Drift = 0.096 dB

Peak SAR (extrapolated) = 0.114 W/kg

SAR(1 g) = 0.092 mW/g; SAR(10 g) = 0.069 mW/g

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



0 dB = 0.096mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Plot NO. 13

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA1900; Frequency: 1852.4 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.32$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left Touch 9262/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.981 mW/g

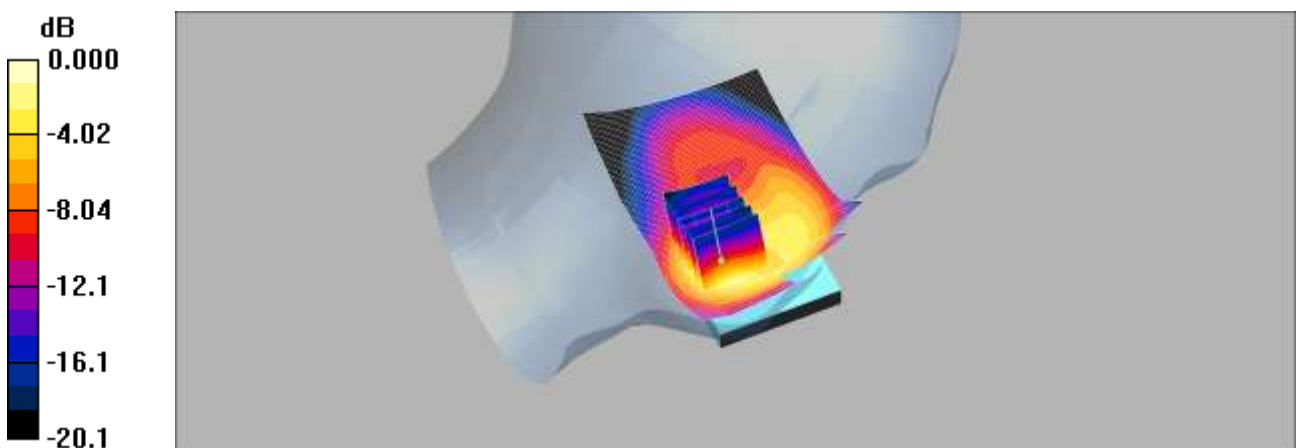
Left Touch 9262/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.5 V/m; Power Drift = 0.081 dB

Peak SAR (extrapolated) = 1.72 W/kg

SAR(1 g) = 0.892 mW/g; SAR(10 g) = 0.452 mW/g

Maximum value of SAR (measured) = 1.000 mW/g



0 dB = 1.00mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Plot NO. 14

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

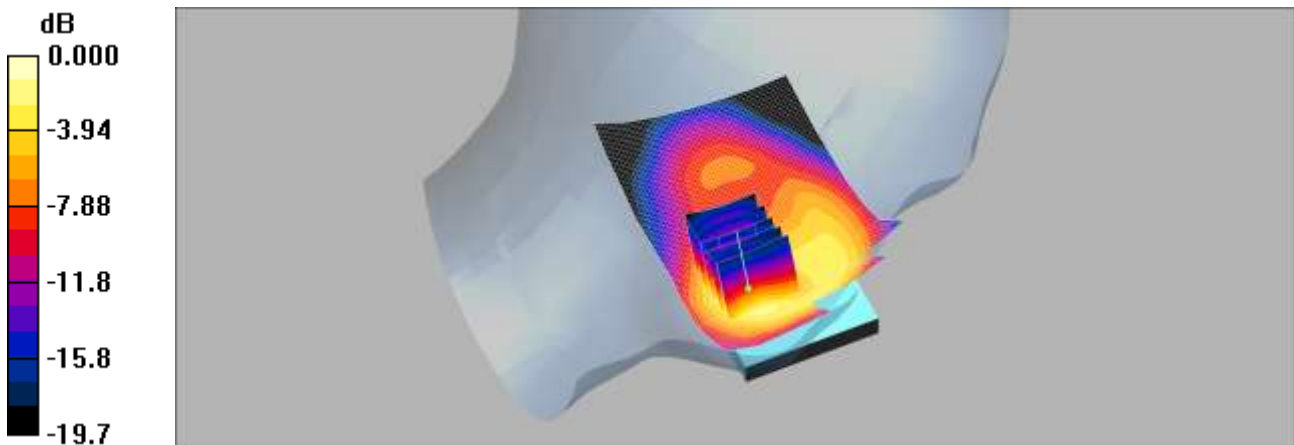
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.35$ mho/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left Touch 9400/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.799 mW/g

Left Touch 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.5 V/m; Power Drift = 0.100 dB
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.714 mW/g; SAR(10 g) = 0.366 mW/g
Maximum value of SAR (measured) = 0.792 mW/g



0 dB = 0.792mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Plot NO. 15

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA1900; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1907.6$ MHz; $\sigma = 1.38$ 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: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left Touch 9538/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.751 mW/g

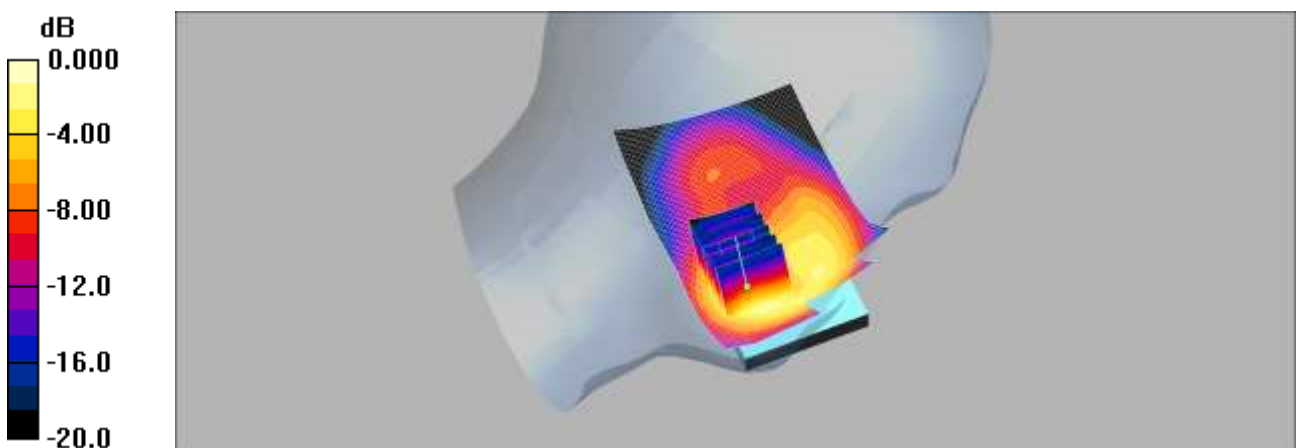
Left Touch 9538/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.2 V/m; Power Drift = -0.151 dB

Peak SAR (extrapolated) = 1.31 W/kg

SAR(1 g) = 0.667 mW/g; SAR(10 g) = 0.335 mW/g

Maximum value of SAR (measured) = 0.750 mW/g



0 dB = 0.750mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Plot NO. 16

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

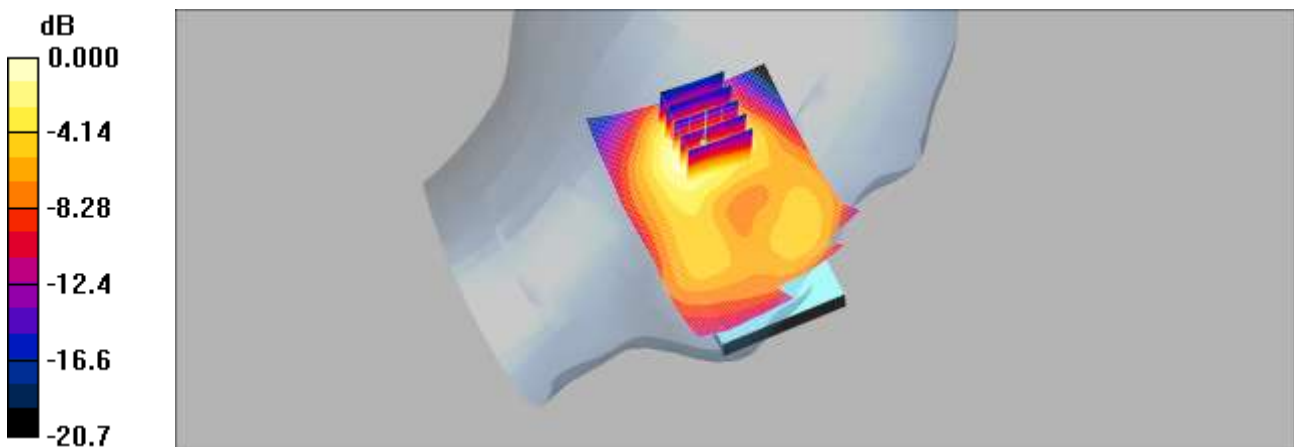
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.35$ mho/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left Tilt 9400/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.214 mW/g

Left Tilt 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.77 V/m; Power Drift = 0.094 dB
Peak SAR (extrapolated) = 0.347 W/kg
SAR(1 g) = 0.192 mW/g; SAR(10 g) = 0.105 mW/g
Maximum value of SAR (measured) = 0.206 mW/g



0 dB = 0.206mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Plot NO. 17

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.35$ mho/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

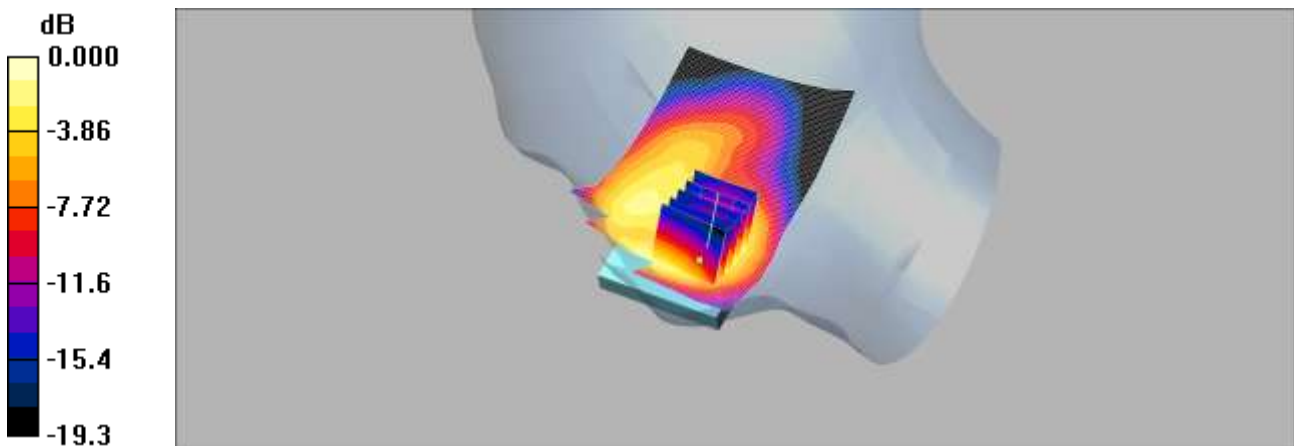
DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right Touch 9400/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.604 mW/g

Right Touch 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.8 V/m; Power Drift = 0.090 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.590 mW/g; SAR(10 g) = 0.322 mW/g

Maximum value of SAR (measured) = 0.647 mW/g



0 dB = 0.647mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
 Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Jan.16, 2013
 Plot NO. 18

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

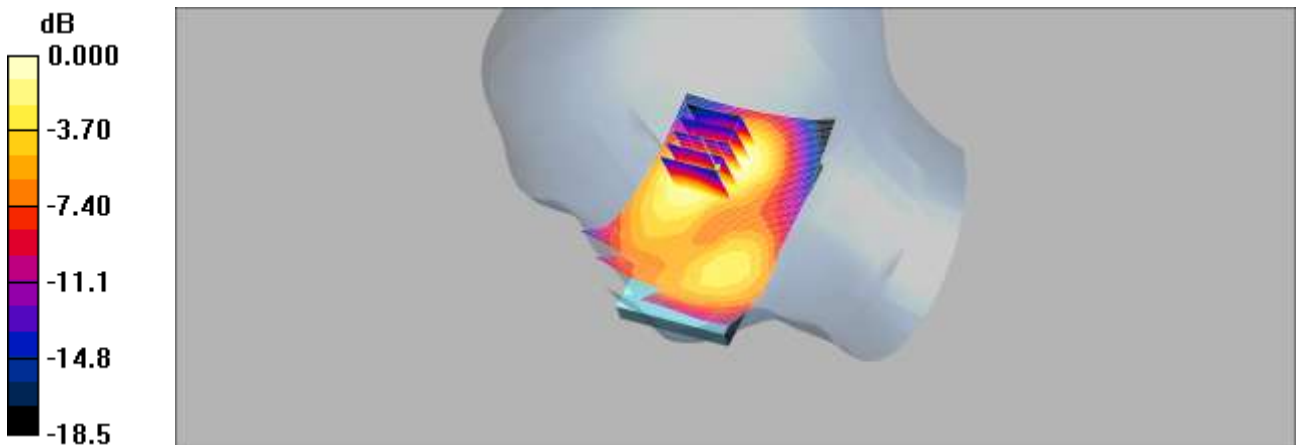
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.35$ mho/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³
 Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right Tilt 9400/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.235 mW/g

Right Tilt 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 6.29 V/m; Power Drift = 0.095 dB
 Peak SAR (extrapolated) = 0.333 W/kg
SAR(1 g) = 0.196 mW/g; SAR(10 g) = 0.114 mW/g
 Maximum value of SAR (measured) = 0.211 mW/g



0 dB = 0.211mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Jan.17, 2013
Plot NO. 19

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.8$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.76, 6.76, 6.76); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: 835/900 Phantom ; Type: SAM

WiFi2450MHz Left touch 1Mbps 1ch/Area Scan (81x121x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.221 mW/g

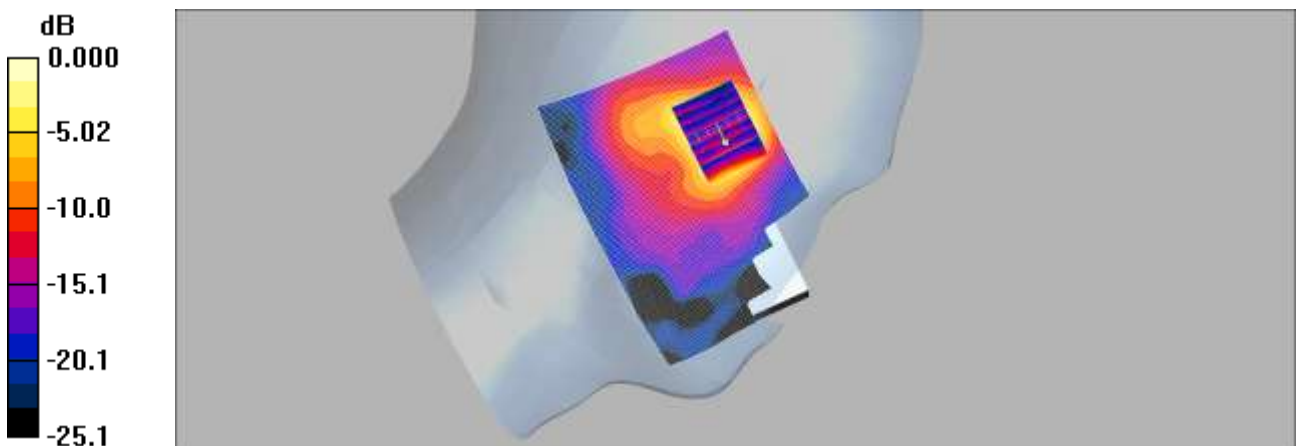
WiFi2450MHz Left touch 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.24 V/m; Power Drift = 0.073 dB

Peak SAR (extrapolated) = 0.543 W/kg

SAR(1 g) = 0.198 mW/g; SAR(10 g) = 0.081 mW/g

Maximum value of SAR (measured) = 0.221 mW/g



0 dB = 0.221mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Jan.17, 2013
Plot NO. 20

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.8$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.76, 6.76, 6.76); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: 835/900 Phantom ; Type: SAM

WiFi2450MHz Left tilt 1Mbps 1ch/Area Scan (81x121x1): Measurement grid: dx=12mm, dy=12mm

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

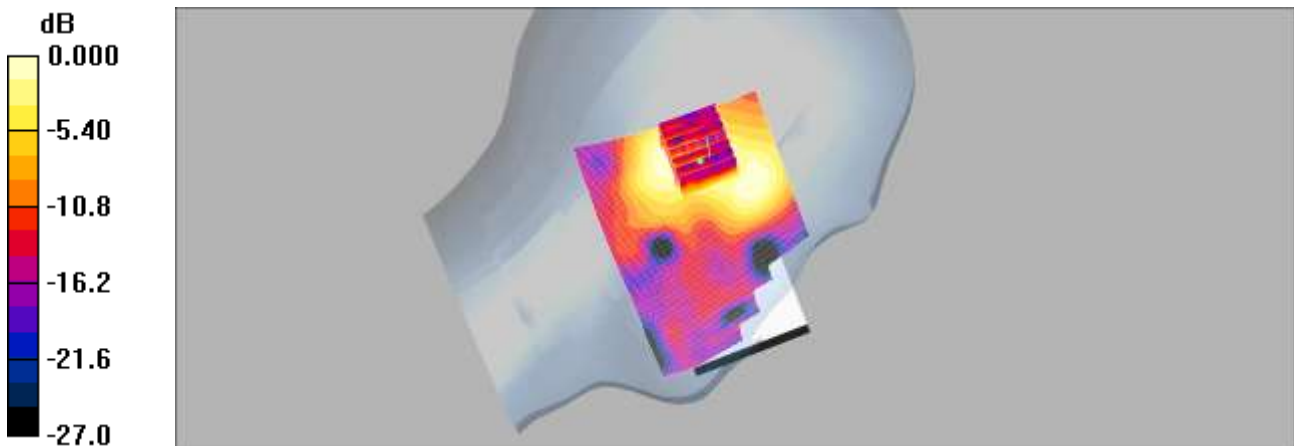
WiFi2450MHz Left tilt 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.76 V/m; Power Drift = -0.190 dB

Peak SAR (extrapolated) = 0.121 W/kg

SAR(1 g) = 0.059 mW/g; SAR(10 g) = 0.030 mW/g

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



0 dB = 0.065mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Jan.17, 2013
Plot NO. 21

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.8$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.76, 6.76, 6.76); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: 835/900 Phantom ; Type: SAM

WiFi2450MHz Right touch 1Mbps 1ch/Area Scan (81x121x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.082 mW/g

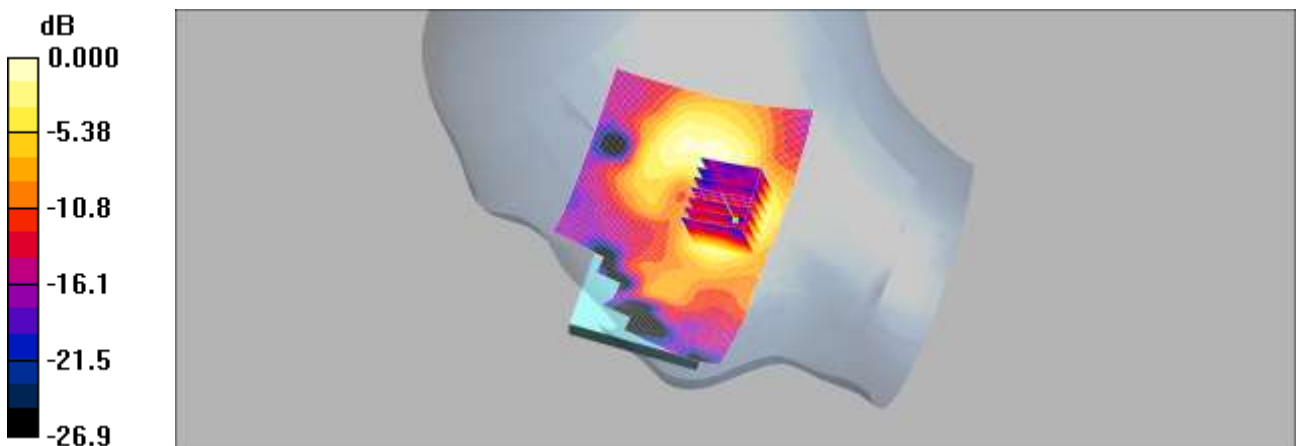
WiFi2450MHz Right touch 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.11 V/m; Power Drift = 0.103 dB

Peak SAR (extrapolated) = 0.162 W/kg

SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.034 mW/g

Maximum value of SAR (measured) = 0.081 mW/g



0 dB = 0.081mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Jan.17, 2013
Plot NO. 22

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.8$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.76, 6.76, 6.76); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: 835/900 Phantom ; Type: SAM

WiFi2450MHz Right tilt 1Mbps 1ch/Area Scan (81x121x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.079 mW/g

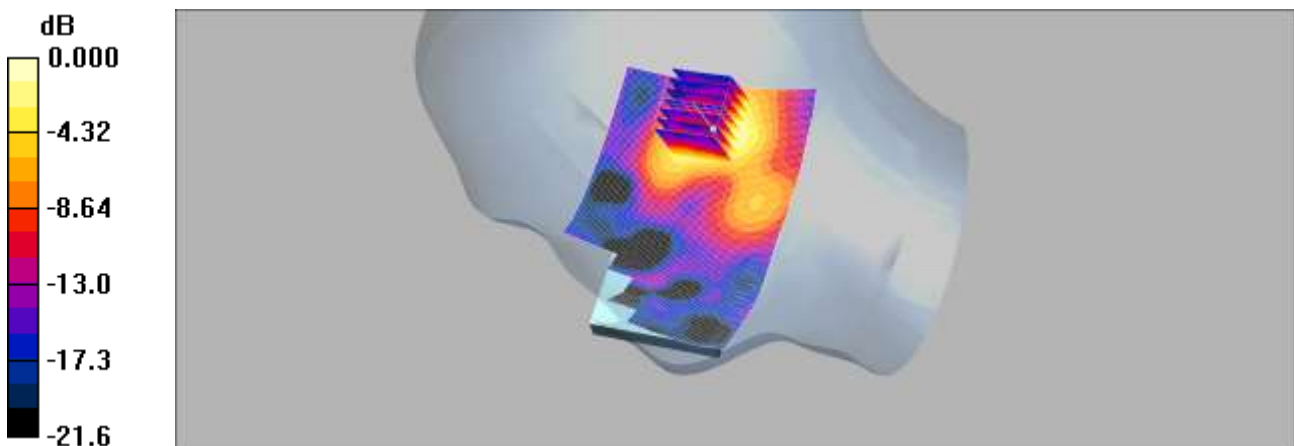
WiFi2450MHz Right tilt 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.51 V/m; Power Drift = -0.151 dB

Peak SAR (extrapolated) = 0.146 W/kg

SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.035 mW/g

Maximum value of SAR (measured) = 0.077 mW/g



0 dB = 0.077mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm
Plot NO. 23

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

GSM850 Body rear GPRS 2Tx 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.726 mW/g

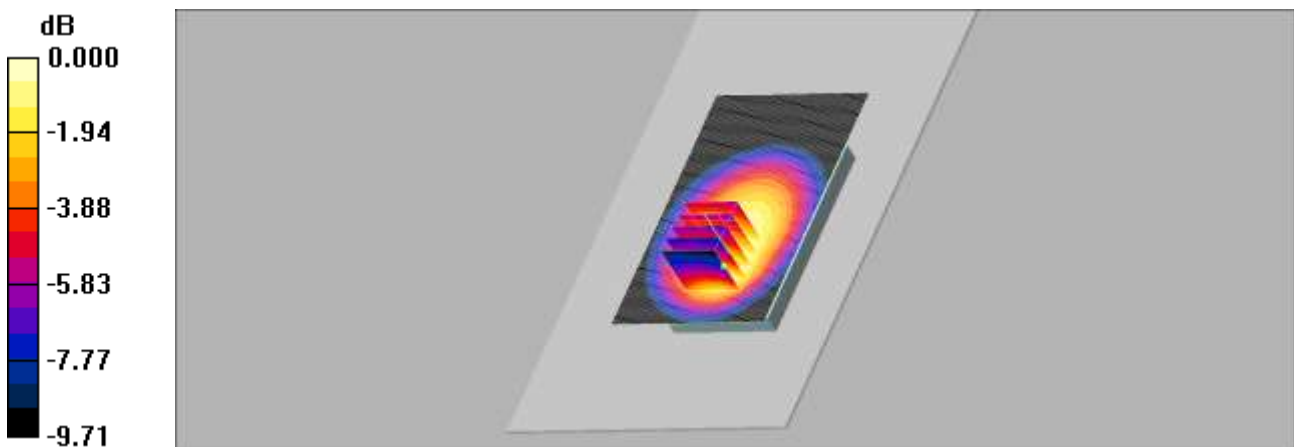
GSM850 Body rear GPRS 2Tx 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.6 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 0.852 W/kg

SAR(1 g) = 0.684 mW/g; SAR(10 g) = 0.521 mW/g

Maximum value of SAR (measured) = 0.711 mW/g



0 dB = 0.711mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm
Plot NO. 24

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

GSM850 Body front GPRS 2Tx 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.481 mW/g

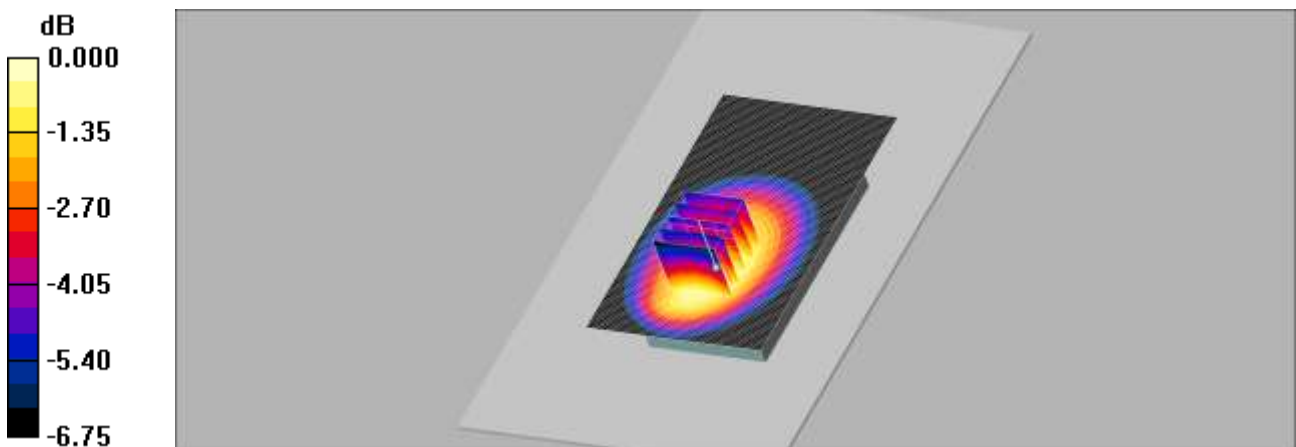
GSM850 Body front GPRS 2Tx 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.1 V/m; Power Drift = -0.002 dB

Peak SAR (extrapolated) = 0.545 W/kg

SAR(1 g) = 0.461 mW/g; SAR(10 g) = 0.367 mW/g

Maximum value of SAR (measured) = 0.484 mW/g



0 dB = 0.484mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm
Plot NO. 25

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

GSM850 Body Left side GPRS 2Tx 190/Area Scan (41x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.361 mW/g

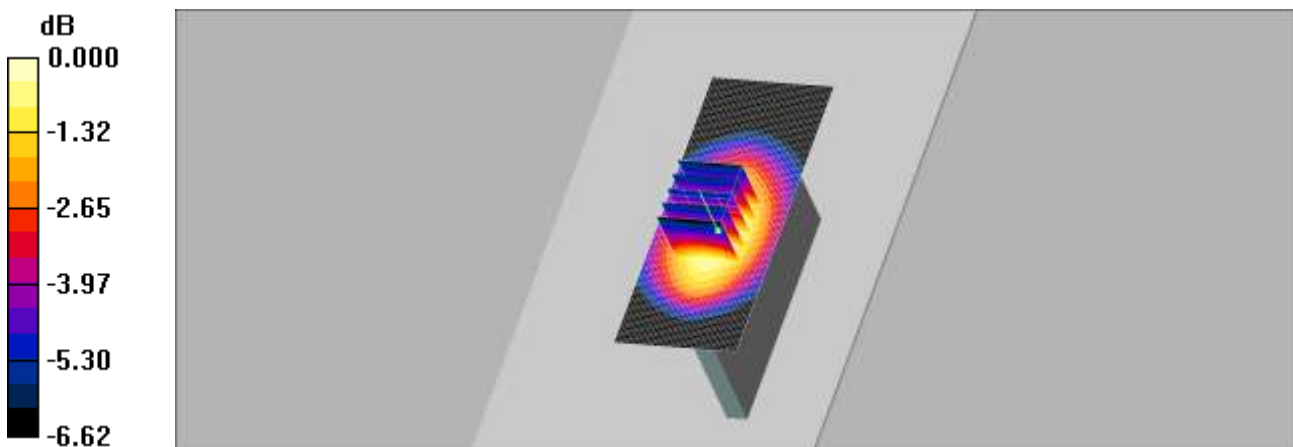
GSM850 Body Left side GPRS 2Tx 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.8 V/m; Power Drift = -0.007 dB

Peak SAR (extrapolated) = 0.429 W/kg

SAR(1 g) = 0.338 mW/g; SAR(10 g) = 0.250 mW/g

Maximum value of SAR (measured) = 0.356 mW/g



0 dB = 0.356mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm
Plot NO. 26

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

GSM850 Body Right side GPRS 2Tx 190/Area Scan (41x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.238 mW/g

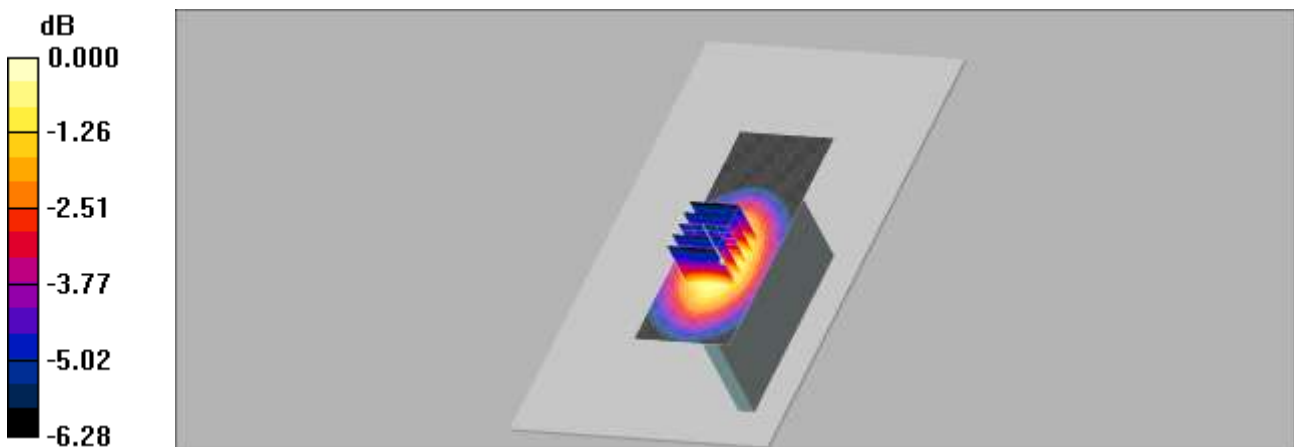
GSM850 Body Right side GPRS 2Tx 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.7 V/m; Power Drift = 0.034 dB

Peak SAR (extrapolated) = 0.283 W/kg

SAR(1 g) = 0.221 mW/g; SAR(10 g) = 0.163 mW/g

Maximum value of SAR (measured) = 0.236 mW/g



0 dB = 0.236mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm
Plot NO. 27

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

GSM850 Body Bottom GPRS 2Tx 190/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.129 mW/g

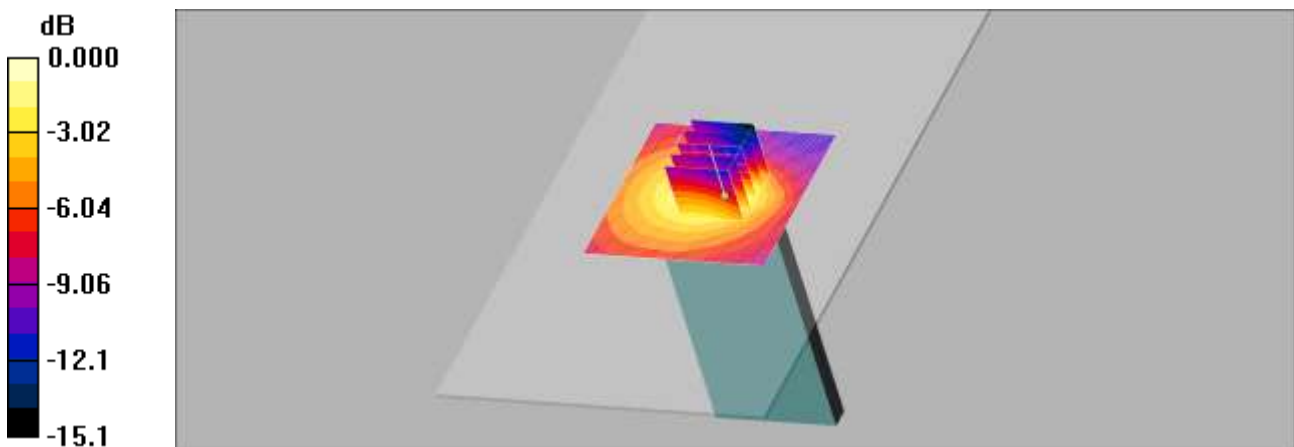
GSM850 Body Bottom GPRS 2Tx 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.2 V/m; Power Drift = -0.098 dB

Peak SAR (extrapolated) = 0.181 W/kg

SAR(1 g) = 0.114 mW/g; SAR(10 g) = 0.072 mW/g

Maximum value of SAR (measured) = 0.121 mW/g



0 dB = 0.121mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm
Plot NO. 28

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

GSM850 Body Rear voice 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.651 mW/g

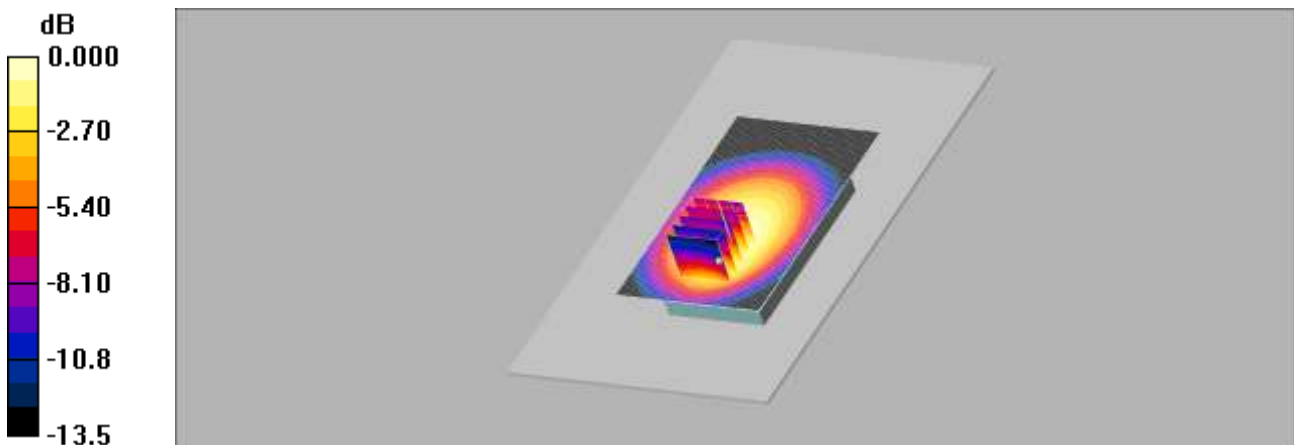
GSM850 Body Rear voice 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.2 V/m; Power Drift = -0.002 dB

Peak SAR (extrapolated) = 0.829 W/kg

SAR(1 g) = 0.600 mW/g; SAR(10 g) = 0.413 mW/g

Maximum value of SAR (measured) = 0.635 mW/g



0 dB = 0.635mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm
Plot NO. 29

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

GSM1900 Body rear GPRS 2Tx 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.487 mW/g

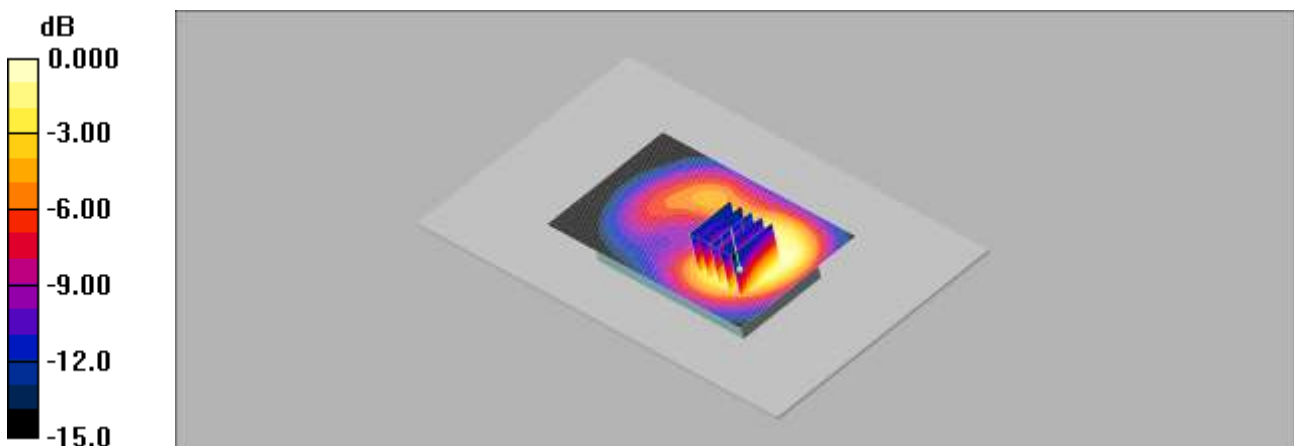
GSM1900 Body rear GPRS 2Tx 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.12 V/m; Power Drift = 0.096 dB

Peak SAR (extrapolated) = 0.710 W/kg

SAR(1 g) = 0.437 mW/g; SAR(10 g) = 0.263 mW/g

Maximum value of SAR (measured) = 0.478 mW/g



0 dB = 0.478mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm
Plot NO. 30

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

GSM1900 Body front GPRS 2Tx 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.542 mW/g

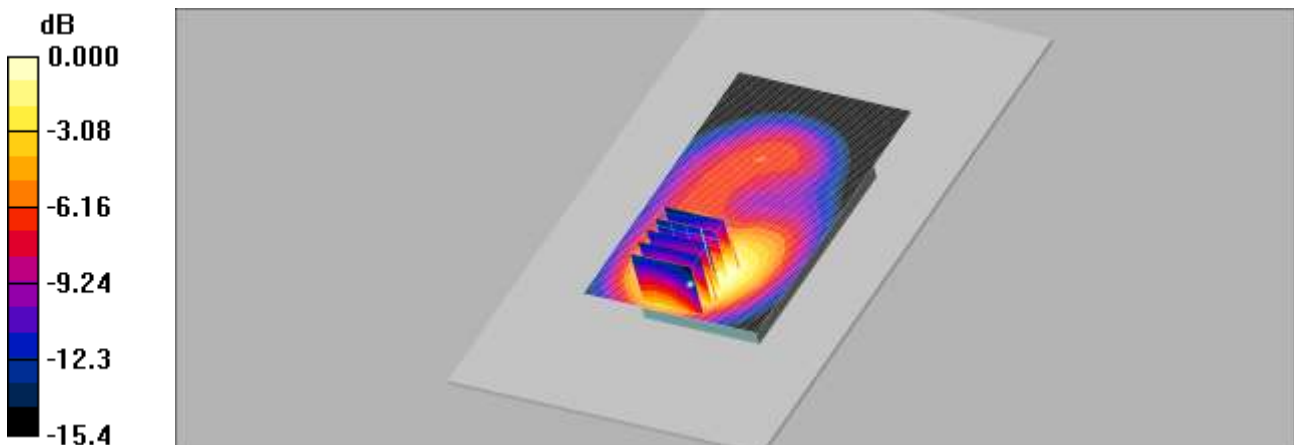
GSM1900 Body front GPRS 2Tx 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.53 V/m; Power Drift = 0.157 dB

Peak SAR (extrapolated) = 0.804 W/kg

SAR(1 g) = 0.497 mW/g; SAR(10 g) = 0.296 mW/g

Maximum value of SAR (measured) = 0.541 mW/g



0 dB = 0.541mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm
Plot NO. 31

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

GSM1900 Body Left side GPRS 2Tx 661/Area Scan (41x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.158 mW/g

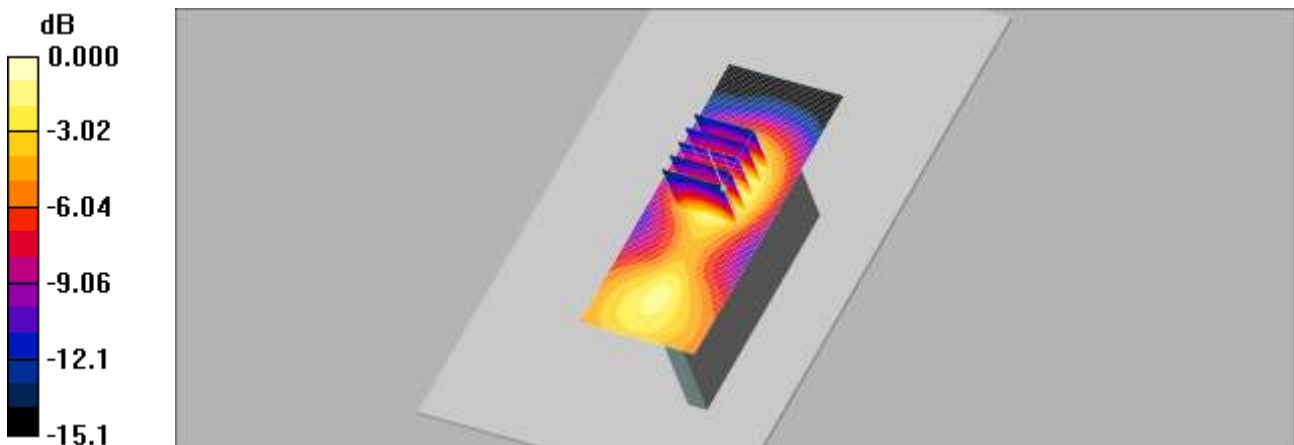
GSM1900 Body Left side GPRS 2Tx 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.00 V/m; Power Drift = 0.061 dB

Peak SAR (extrapolated) = 0.230 W/kg

SAR(1 g) = 0.144 mW/g; SAR(10 g) = 0.086 mW/g

Maximum value of SAR (measured) = 0.158 mW/g



0 dB = 0.158mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm
Plot NO. 32

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

GSM1900 Body Right side GPRS 2Tx 661/Area Scan (41x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.079 mW/g

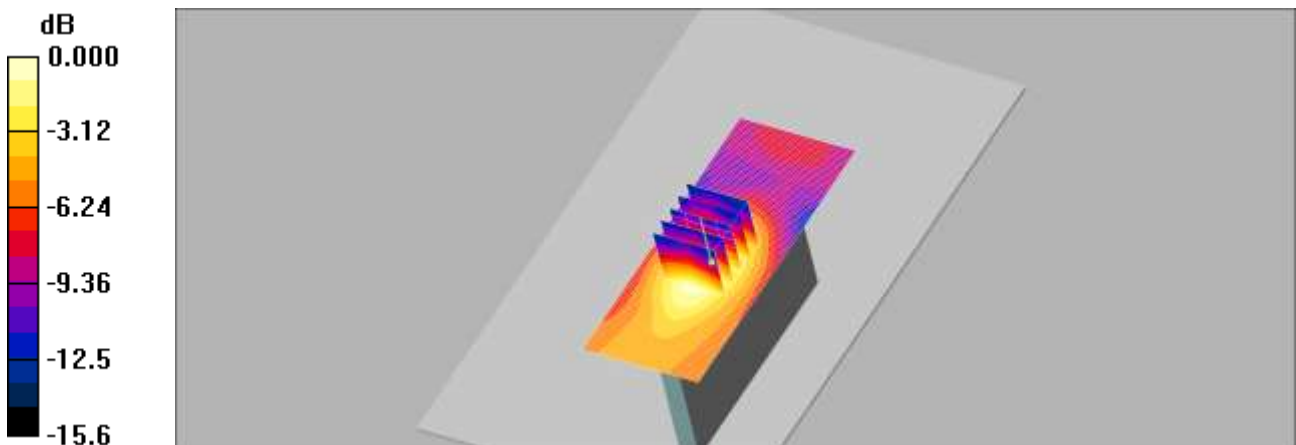
GSM1900 Body Right side GPRS 2Tx 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.83 V/m; Power Drift = -0.011 dB

Peak SAR (extrapolated) = 0.115 W/kg

SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.043 mW/g

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



0 dB = 0.078mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm
Plot NO. 33

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

GSM1900 GPRS Body Bottom side 661 2Tx/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.437 mW/g

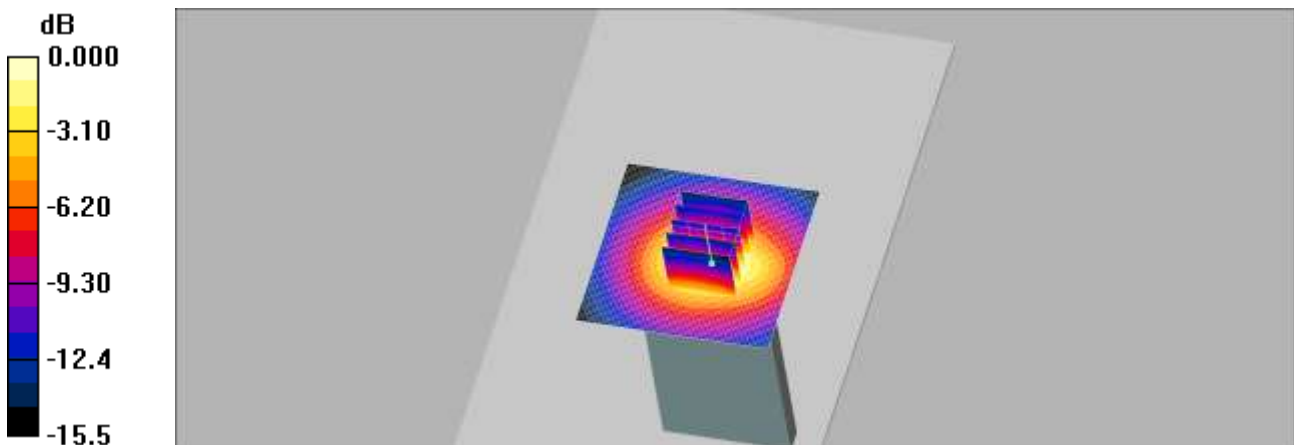
GSM1900 GPRS Body Bottom side 661 2Tx/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.7 V/m; Power Drift = 0.032 dB

Peak SAR (extrapolated) = 0.635 W/kg

SAR(1 g) = 0.391 mW/g; SAR(10 g) = 0.228 mW/g

Maximum value of SAR (measured) = 0.429 mW/g



0 dB = 0.429mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm
Plot NO. 34

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

GSM1900 Body rear Voice 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.452 mW/g

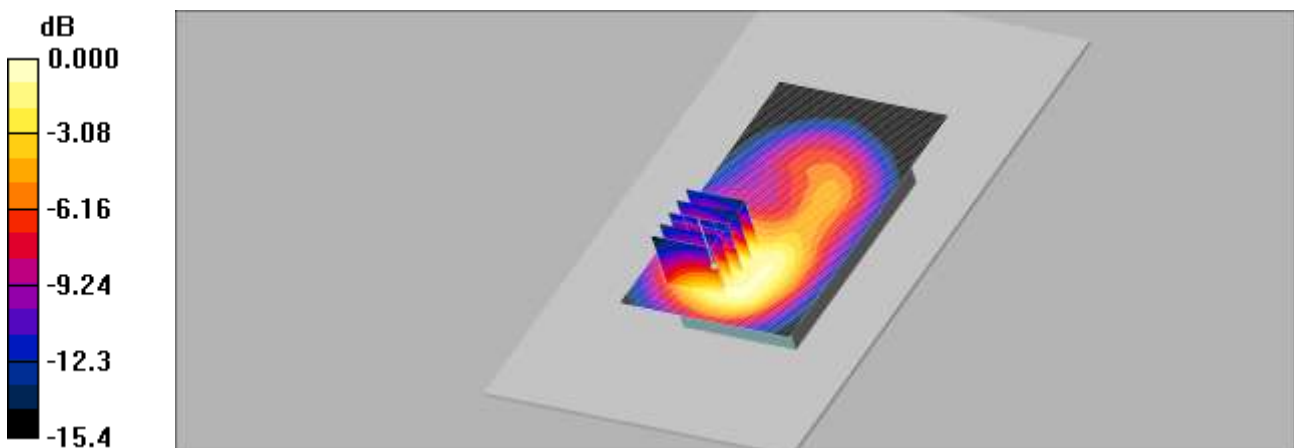
GSM1900 Body rear Voice 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.44 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 0.662 W/kg

SAR(1 g) = 0.406 mW/g; SAR(10 g) = 0.241 mW/g

Maximum value of SAR (measured) = 0.446 mW/g



0 dB = 0.446mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm
Plot NO. 35

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

WCDMA850 Body rear 4183/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.309 mW/g

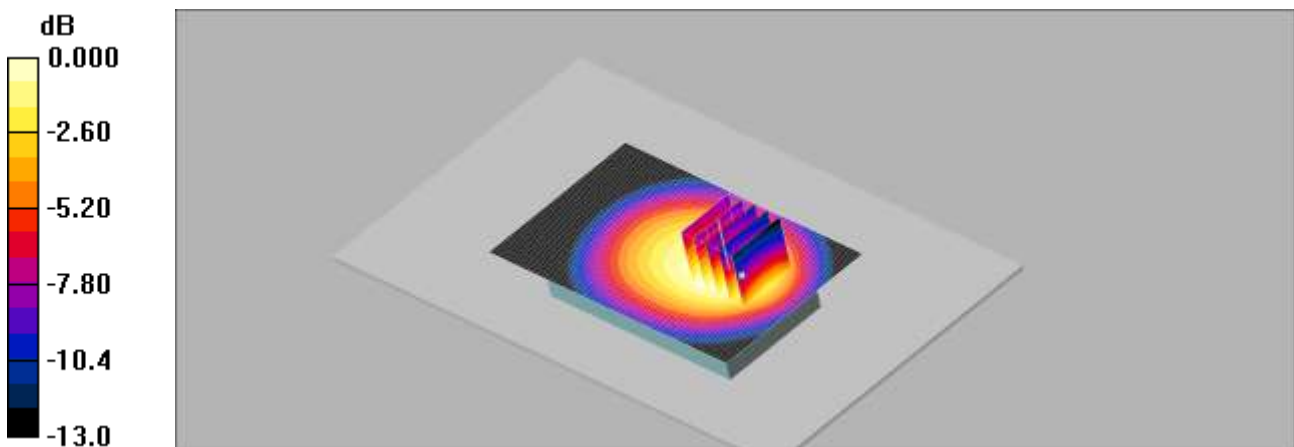
WCDMA850 Body rear 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.0 V/m; Power Drift = -0.008 dB

Peak SAR (extrapolated) = 0.397 W/kg

SAR(1 g) = 0.283 mW/g; SAR(10 g) = 0.197 mW/g

Maximum value of SAR (measured) = 0.299 mW/g



0 dB = 0.299mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm
Plot NO. 36

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

WCDMA850 Body front 4183/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

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

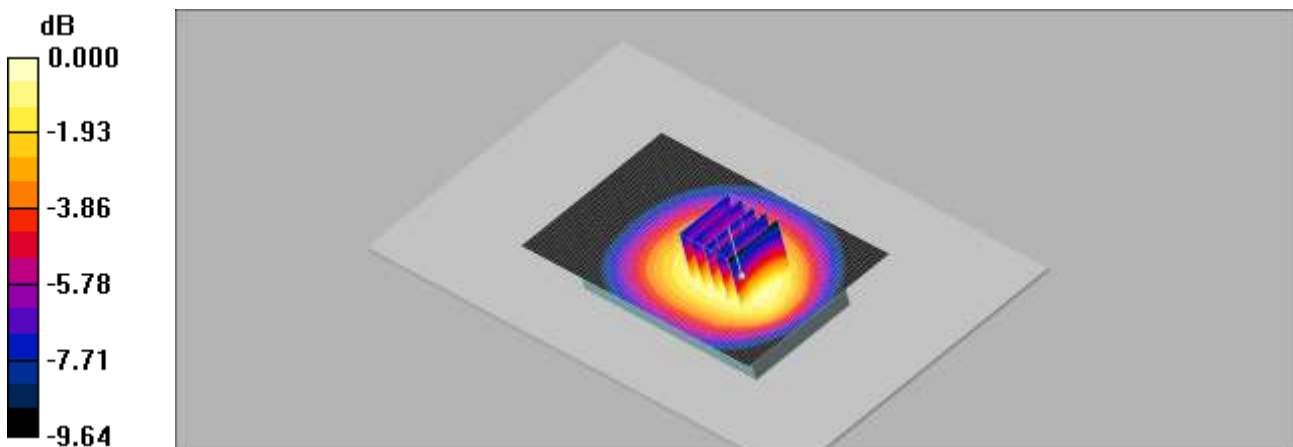
WCDMA850 Body front 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.0 V/m; Power Drift = 0.005 dB

Peak SAR (extrapolated) = 0.219 W/kg

SAR(1 g) = 0.169 mW/g; SAR(10 g) = 0.124 mW/g

Maximum value of SAR (measured) = 0.178 mW/g



0 dB = 0.178mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm
Plot NO. 37

DUT: GT-S6810M Side; Type: Bar; Serial: FK-006-A

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

WCDMA850 Body Left 4183/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.141 mW/g

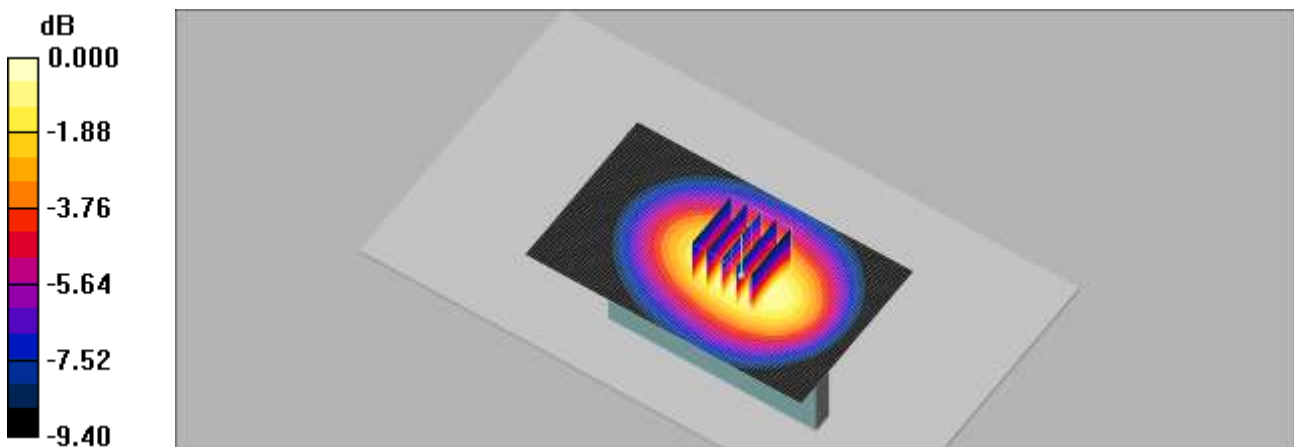
WCDMA850 Body Left 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.6 V/m; Power Drift = 0.036 dB

Peak SAR (extrapolated) = 0.187 W/kg

SAR(1 g) = 0.134 mW/g; SAR(10 g) = 0.092 mW/g

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



0 dB = 0.143mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm
Plot NO. 38

DUT: GT-S6810M Side; Type: Bar; Serial: FK-006-A

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

WCDMA850 Body Right 4183/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

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

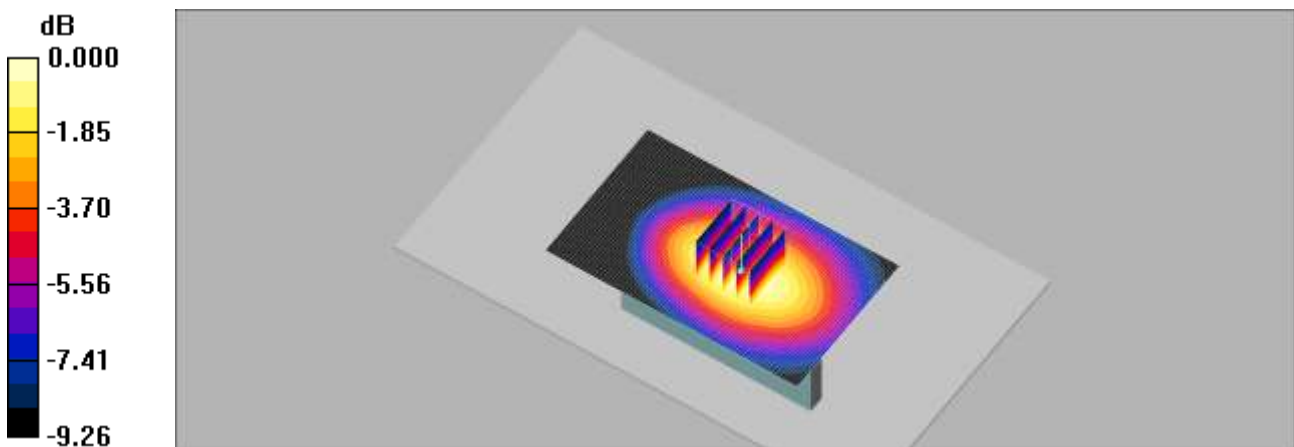
WCDMA850 Body Right 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.73 V/m; Power Drift = -0.109 dB

Peak SAR (extrapolated) = 0.127 W/kg

SAR(1 g) = 0.090 mW/g; SAR(10 g) = 0.063 mW/g

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



0 dB = 0.097mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm
Plot NO. 39

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

WCDMA850 Body Bottom 4183/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.053 mW/g

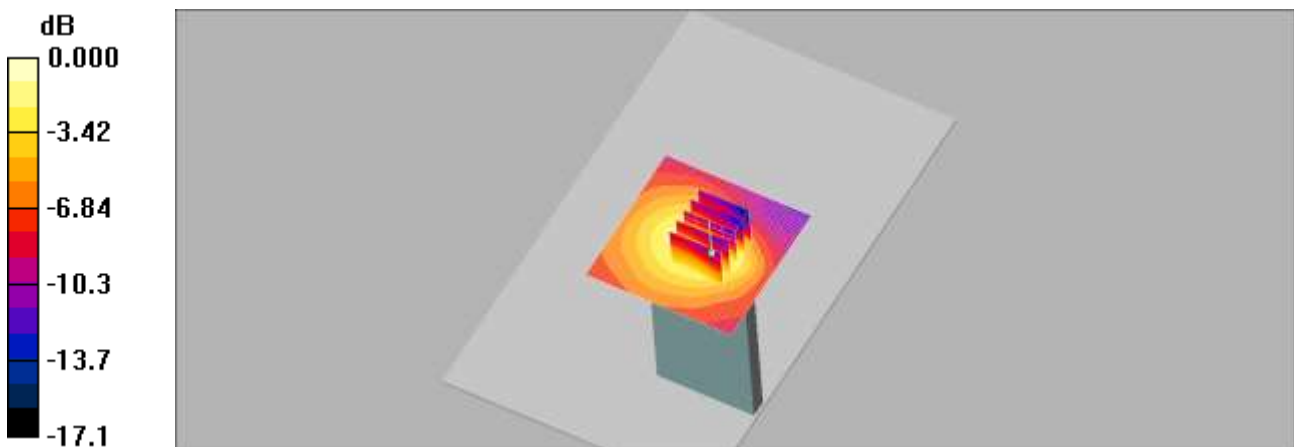
WCDMA850 Body Bottom 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.99 V/m; Power Drift = -0.108 dB

Peak SAR (extrapolated) = 0.071 W/kg

SAR(1 g) = 0.044 mW/g; SAR(10 g) = 0.028 mW/g

Maximum value of SAR (measured) = 0.048 mW/g



0 dB = 0.048mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm
Plot NO. 40

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

WCDMA1900 Body rear 9400/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.628 mW/g

WCDMA1900 Body rear 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.69 V/m; Power Drift = -0.135 dB

Peak SAR (extrapolated) = 0.849 W/kg

SAR(1 g) = 0.500 mW/g; SAR(10 g) = 0.295 mW/g

Maximum value of SAR (measured) = 0.554 mW/g

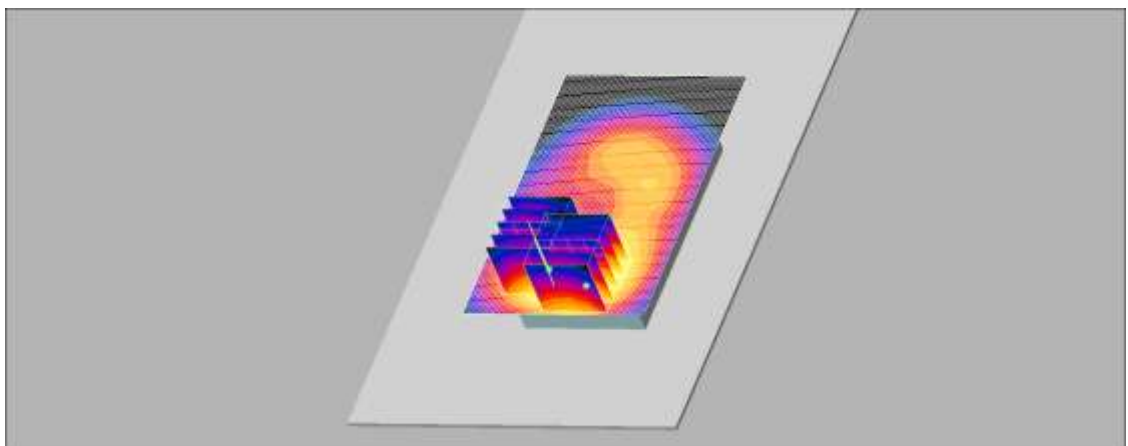
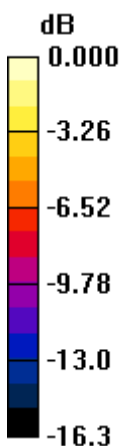
WCDMA1900 Body rear 9400/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.69 V/m; Power Drift = -0.135 dB

Peak SAR (extrapolated) = 0.882 W/kg

SAR(1 g) = 0.529 mW/g; SAR(10 g) = 0.310 mW/g

Maximum value of SAR (measured) = 0.577 mW/g



0 dB = 0.577mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm
Plot NO. 41

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

WCDMA1900 Body Front 9400/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.578 mW/g

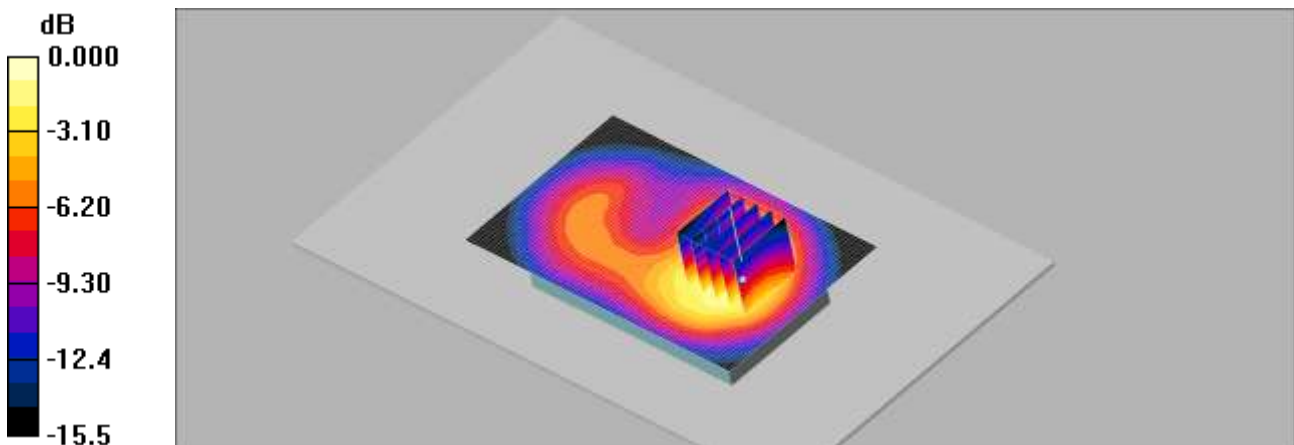
WCDMA1900 Body Front 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.37 V/m; Power Drift = 0.089 dB

Peak SAR (extrapolated) = 0.894 W/kg

SAR(1 g) = 0.547 mW/g; SAR(10 g) = 0.320 mW/g

Maximum value of SAR (measured) = 0.597 mW/g



0 dB = 0.597mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm
Plot NO. 42

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

WCDMA1900 Body Left side 9400/Area Scan (41x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.217 mW/g

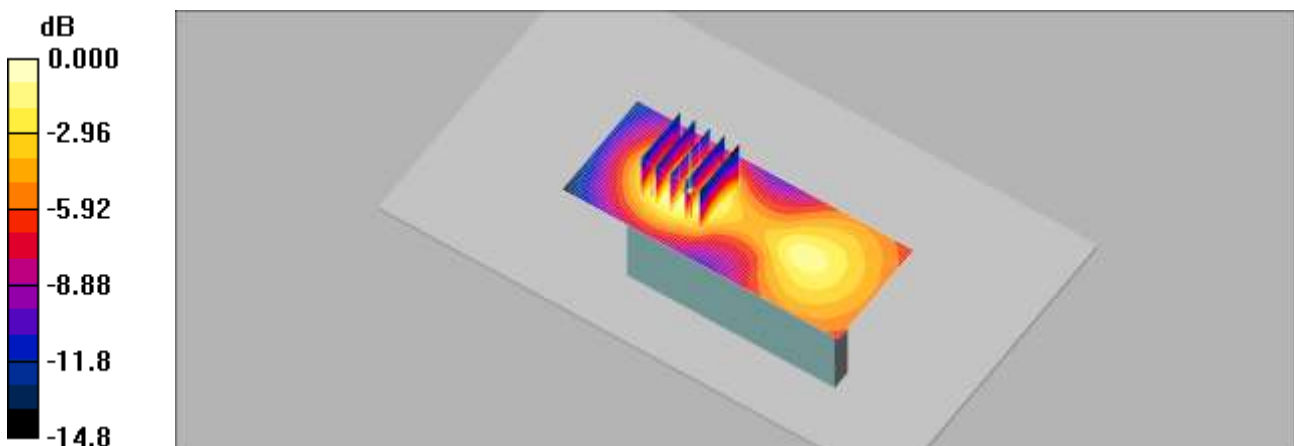
WCDMA1900 Body Left side 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.70 V/m; Power Drift = 0.014 dB

Peak SAR (extrapolated) = 0.317 W/kg

SAR(1 g) = 0.198 mW/g; SAR(10 g) = 0.118 mW/g

Maximum value of SAR (measured) = 0.216 mW/g



0 dB = 0.216mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm
Plot NO. 43

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

WCDMA1900 Body Right side 9400/Area Scan (41x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.216 mW/g

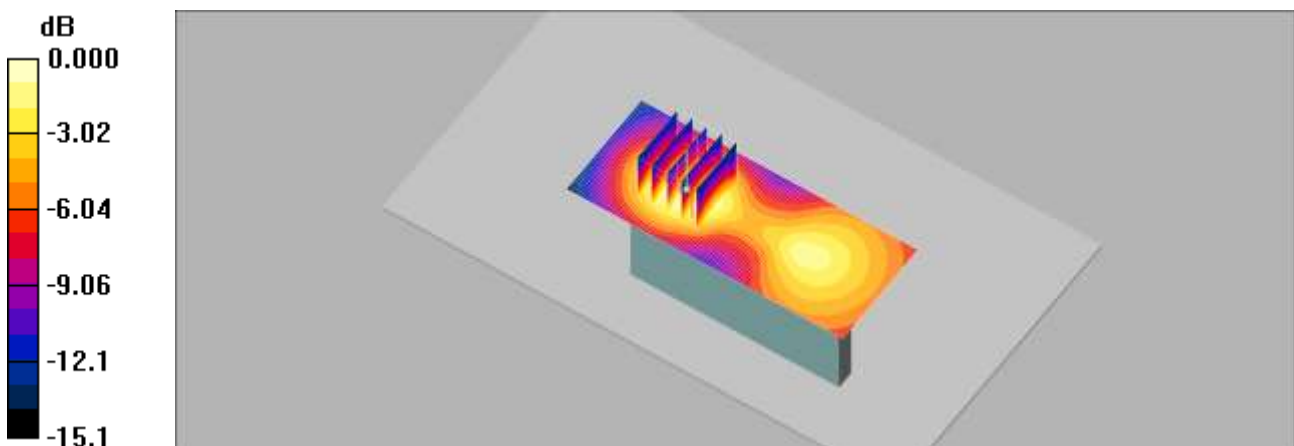
WCDMA1900 Body Right side 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.49 V/m; Power Drift = 0.049 dB

Peak SAR (extrapolated) = 0.320 W/kg

SAR(1 g) = 0.199 mW/g; SAR(10 g) = 0.118 mW/g

Maximum value of SAR (measured) = 0.218 mW/g



0 dB = 0.218mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm
Plot NO. 44

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

WCDMA1900 Body Bottom side 9400/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.710 mW/g

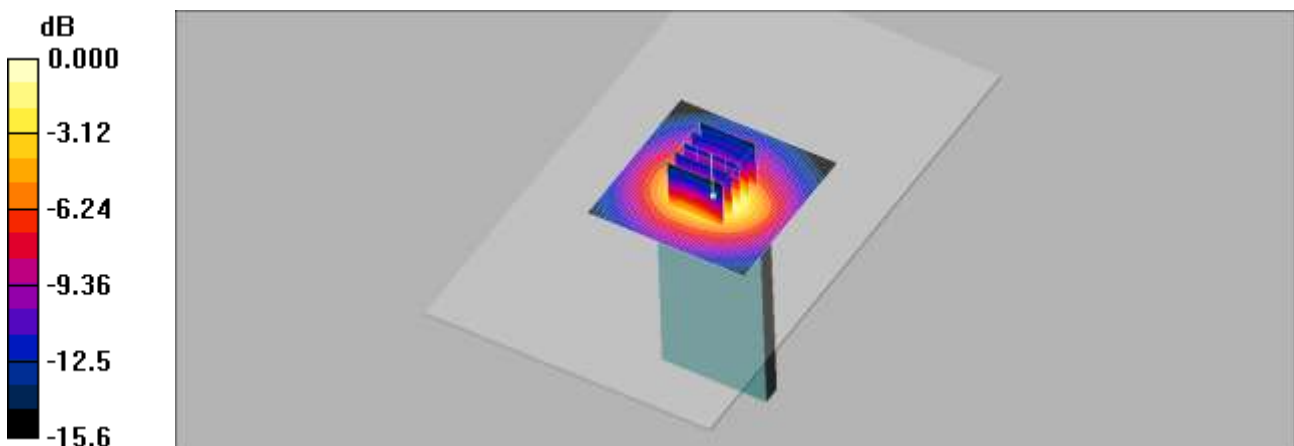
WCDMA1900 Body Bottom side 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.7 V/m; Power Drift = 0.006 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.648 mW/g; SAR(10 g) = 0.370 mW/g

Maximum value of SAR (measured) = 0.722 mW/g



0 dB = 0.722mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Jan.17, 2013
Separation Distance : 1.0 cm
Plot NO. 45

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.89$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

WiFi2450 Body Rear 1Mbps 1ch/Area Scan (71x121x1): Measurement grid: dx=12mm, dy=12mm

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

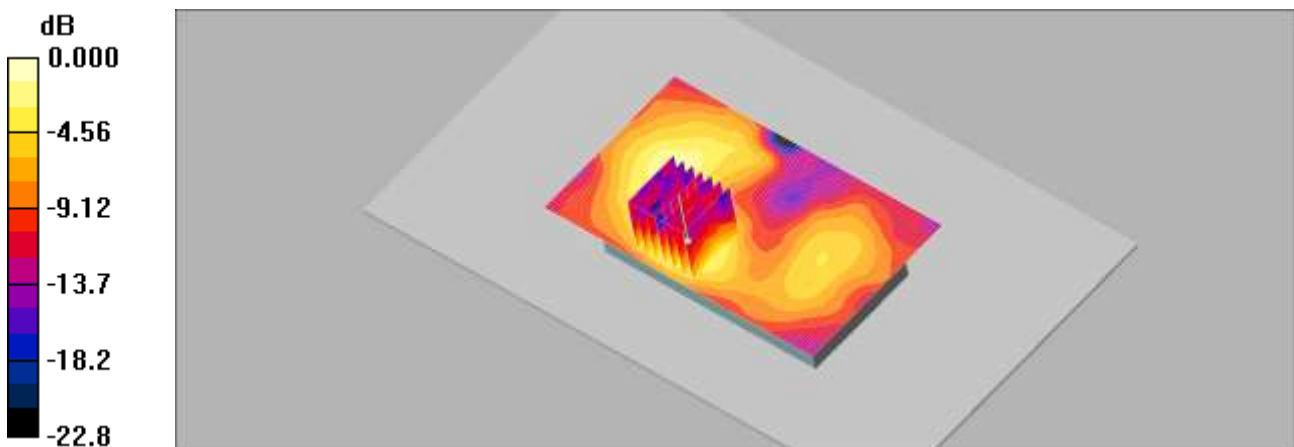
WiFi2450 Body Rear 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.66 V/m; Power Drift = 0.095 dB

Peak SAR (extrapolated) = 0.070 W/kg

SAR(1 g) = 0.036 mW/g; SAR(10 g) = 0.017 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/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Jan.17, 2013
Separation Distance : 1.0 cm
Plot NO. 46

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.89$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

WiFi2450 Body Front 1Mbps 1ch/Area Scan (71x121x1): Measurement grid: dx=12mm, dy=12mm

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

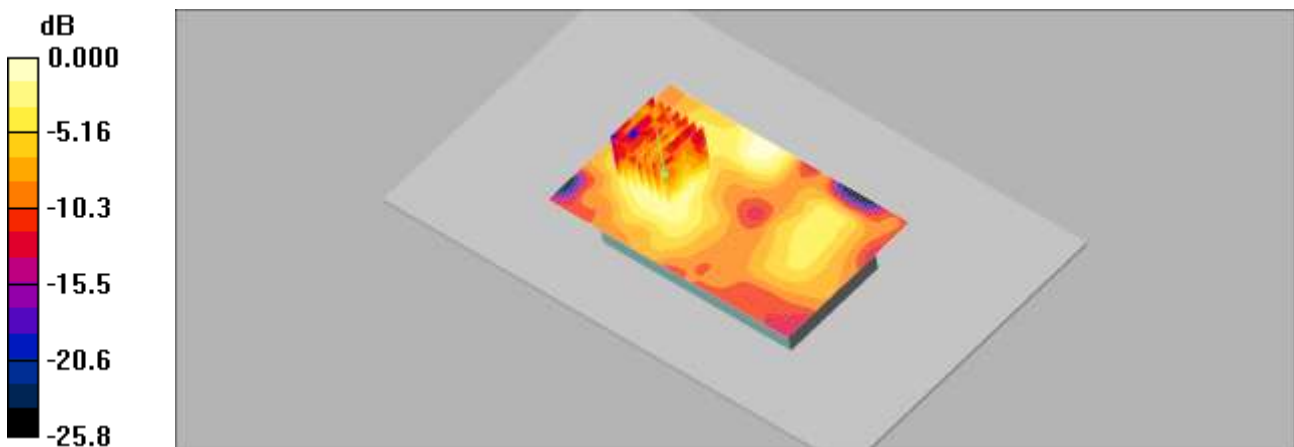
WiFi2450 Body Front 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.17 V/m; Power Drift = 0.148 dB

Peak SAR (extrapolated) = 0.035 W/kg

SAR(1 g) = 0.018 mW/g; SAR(10 g) = 0.0098 mW/g

Maximum value of SAR (measured) = 0.019 mW/g



0 dB = 0.019mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Jan.17, 2013
Separation Distance : 1.0 cm
Plot NO. 47

DUT: GT-S6810M Side; Type: Bar; Serial: FK-006-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.89$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

WiFi2450 Body Right 1Mbps 1ch/Area Scan (51x121x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.042 mW/g

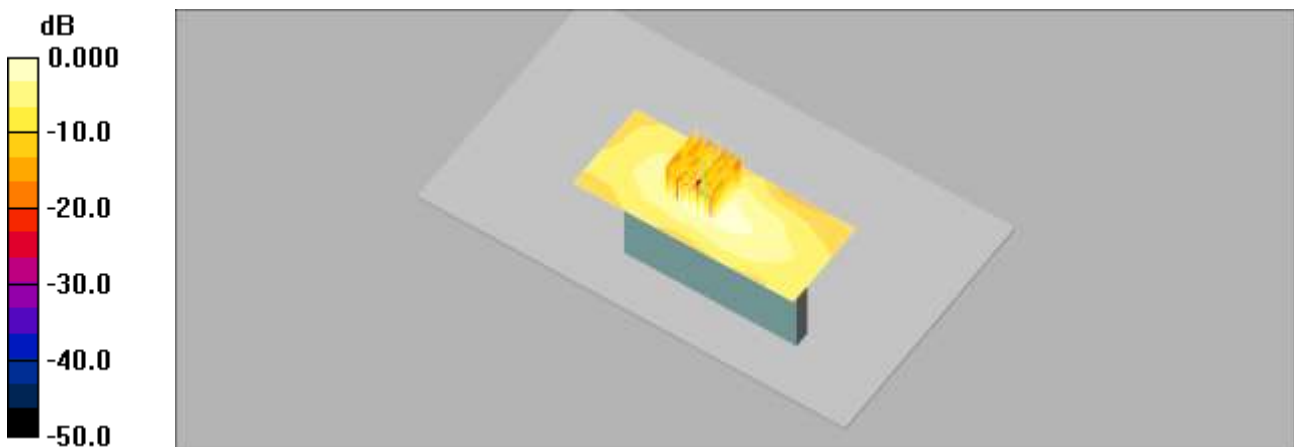
WiFi2450 Body Right 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.95 V/m; Power Drift = 0.121 dB

Peak SAR (extrapolated) = 0.075 W/kg

SAR(1 g) = 0.037 mW/g; SAR(10 g) = 0.018 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/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Jan.17, 2013
Separation Distance : 1.0 cm
Plot NO. 48

DUT: GT-S6810M Top; Type: Bar; Serial: FK-006-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.89$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

WiFi2450 Body Top 1Mbps 1ch/Area Scan (71x71x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.014 mW/g

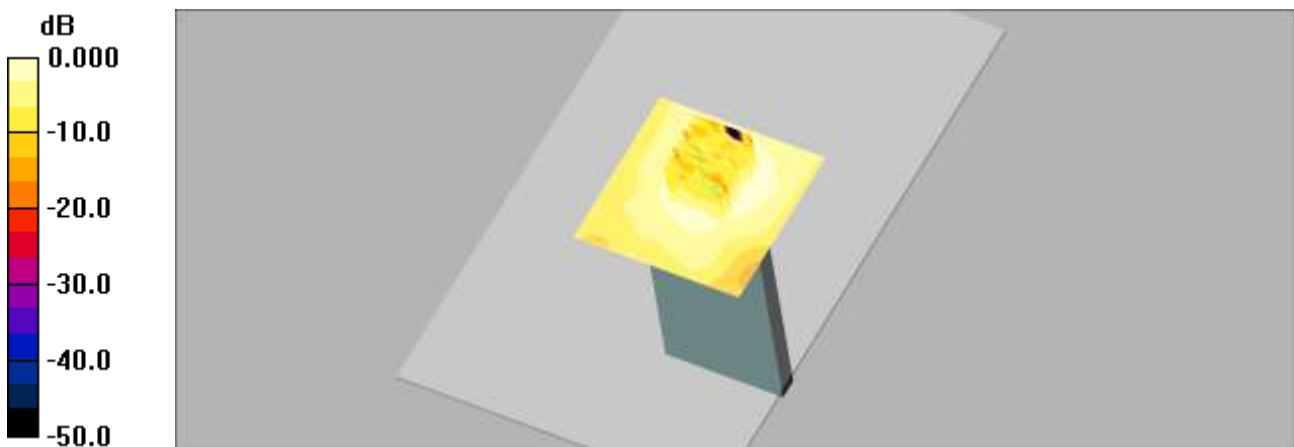
WiFi2450 Body Top 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.67 V/m; Power Drift = -0.139 dB

Peak SAR (extrapolated) = 0.027 W/kg

SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00767 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/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Plot NO. 49

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA1900; Frequency: 1852.4 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.32$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left Touch 9262/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.06 mW/g

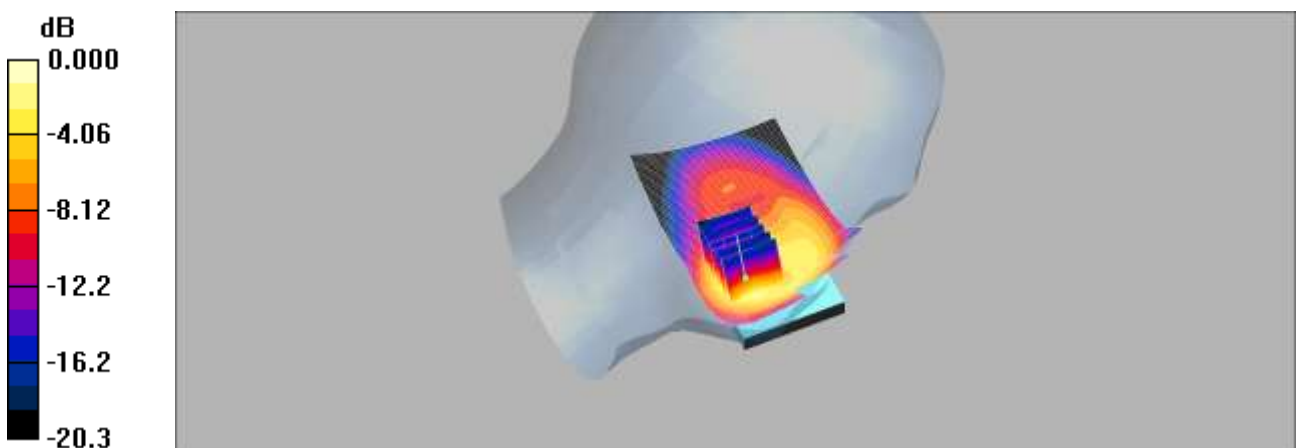
Left Touch 9262/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.4 V/m; Power Drift = -0.165 dB

Peak SAR (extrapolated) = 1.73 W/kg

SAR(1 g) = 0.888 mW/g; SAR(10 g) = 0.447 mW/g

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



0 dB = 1.00mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.94, 8.94, 8.94); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 835/900 MHz; Type: SAM

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

Maximum value of SAR (interpolated) = 0.472 mW/g

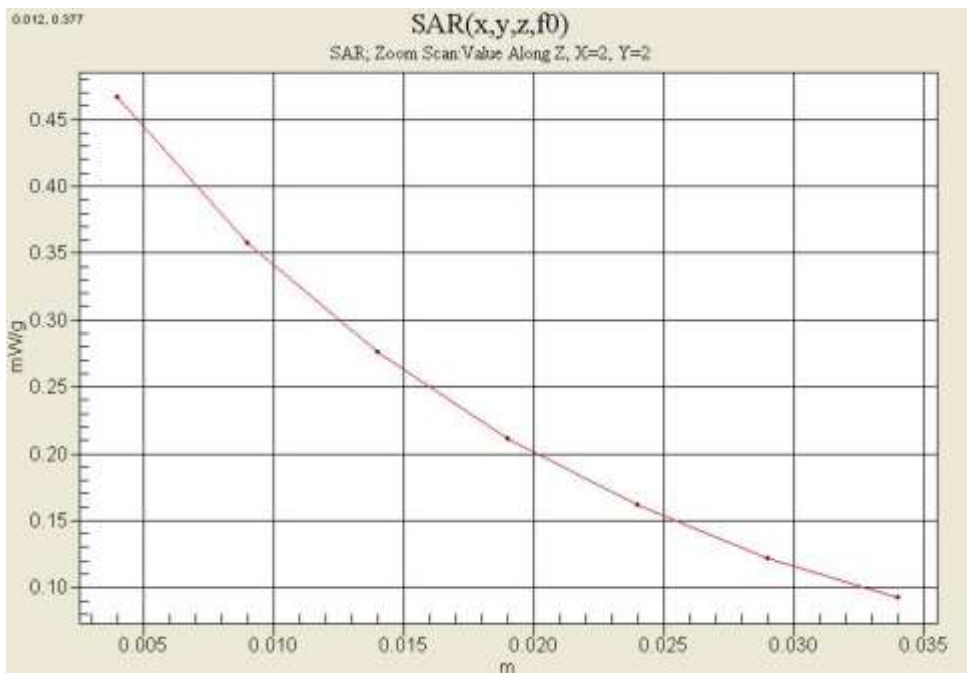
Left Touch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.1 V/m; Power Drift = 0.063 dB

Peak SAR (extrapolated) = 0.569 W/kg

SAR(1 g) = 0.438 mW/g; SAR(10 g) = 0.321 mW/g

Maximum value of SAR (measured) = 0.467 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.0 °C
Ambient Temperature: 21.2 °C
Test Date: Jan.15, 2013
Separation Distance : 1.0 cm

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

GSM850 Body rear GPRS 2Tx 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.726 mW/g

GSM850 Body rear GPRS 2Tx 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.6 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 0.852 W/kg

SAR(1 g) = 0.684 mW/g; SAR(10 g) = 0.521 mW/g

Maximum value of SAR (measured) = 0.711 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

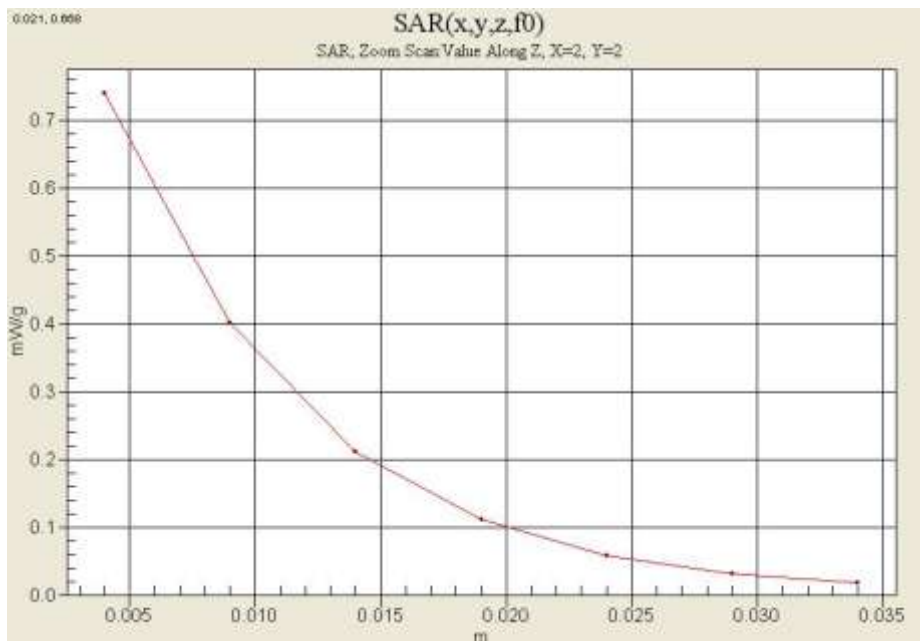
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.35$ mho/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Fix Surface) Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left Touch 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.622 mW/g

Left Touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.9 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 1.31 W/kg
SAR(1 g) = 0.665 mW/g; SAR(10 g) = 0.338 mW/g
Maximum value of SAR (measured) = 0.740 mW/g



Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
 Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Jan.16, 2013
 Separation Distance : 1.0 cm

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
 Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

GSM1900 Body front GPRS 2Tx 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.542 mW/g

GSM1900 Body front GPRS 2Tx 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.53 V/m; Power Drift = 0.157 dB

Peak SAR (extrapolated) = 0.804 W/kg

SAR(1 g) = 0.497 mW/g; SAR(10 g) = 0.296 mW/g

Maximum value of SAR (measured) = 0.541 mW/g



Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
 Rx Only
 Liquid Temperature: 21.0 °C
 Ambient Temperature: 21.2 °C
 Test Date: Jan.15, 2013

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
 Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³
 Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.94, 8.94, 8.94); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 835/900 MHz; Type: SAM

Left Touch 4183/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.191 mW/g

Left Touch 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 14.0 V/m; Power Drift = -0.005 dB
 Peak SAR (extrapolated) = 0.236 W/kg
SAR(1 g) = 0.176 mW/g; SAR(10 g) = 0.128 mW/g

Maximum value of SAR (measured) = 0.187 mW/g



Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
 Rx Only
 Liquid Temperature: 21.0 °C
 Ambient Temperature: 21.2 °C
 Test Date: Jan.15, 2013
 Separation Distance : 1.0 cm

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
 Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
 Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

WCDMA850 Body rear 4183/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.309 mW/g

WCDMA850 Body rear 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 15.0 V/m; Power Drift = -0.008 dB
 Peak SAR (extrapolated) = 0.397 W/kg
SAR(1 g) = 0.283 mW/g; SAR(10 g) = 0.197 mW/g
 Maximum value of SAR (measured) = 0.299 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA1900; Frequency: 1852.4 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.32$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left Touch 9262/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.981 mW/g

Left Touch 9262/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.5 V/m; Power Drift = 0.081 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 0.892 mW/g; SAR(10 g) = 0.452 mW/g

Maximum value of SAR (measured) = 1.000 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Jan.16, 2013
Separation Distance : 1.0 cm

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

WCDMA1900 Body Bottom side 9400/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.710 mW/g

WCDMA1900 Body Bottom side 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.7 V/m; Power Drift = 0.006 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.648 mW/g; SAR(10 g) = 0.370 mW/g

Maximum value of SAR (measured) = 0.722 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Jan.17, 2013

DUT: GT-S6810M; Type: Bar; Serial: FK-006-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.8$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.76, 6.76, 6.76); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: 835/900 Phantom ; Type: SAM

WiFi2450MHz Left touch 1Mbps 1ch/Area Scan (81x121x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.221 mW/g

WiFi2450MHz Left touch 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.24 V/m; Power Drift = 0.073 dB

Peak SAR (extrapolated) = 0.543 W/kg

SAR(1 g) = 0.198 mW/g; SAR(10 g) = 0.081 mW/g

Maximum value of SAR (measured) = 0.221 mW/g



Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth(LE), 802.11b/g/n, NFC and EDGE
 Rx Only
 Liquid Temperature: 21.2 °C
 Ambient Temperature: 21.4 °C
 Test Date: Jan.17, 2013
 Separation Distance : 1.0 cm

DUT: GT-S6810M Side; Type: Bar; Serial: FK-006-A

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
 Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.89$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
 Phantom section: Center Section ; Measurement SW: DASy4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

WiFi2450 Body Right 1Mbps 1ch/Area Scan (51x121x1): Measurement grid: dx=12mm, dy=12mm
 Maximum value of SAR (interpolated) = 0.042 mW/g

WiFi2450 Body Right 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 3.95 V/m; Power Drift = 0.121 dB
 Peak SAR (extrapolated) = 0.075 W/kg
SAR(1 g) = 0.037 mW/g; SAR(10 g) = 0.018 mW/g
 Maximum value of SAR (measured) = 0.041 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: 21.0 °C
Test Date: Jan.15, 2013

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

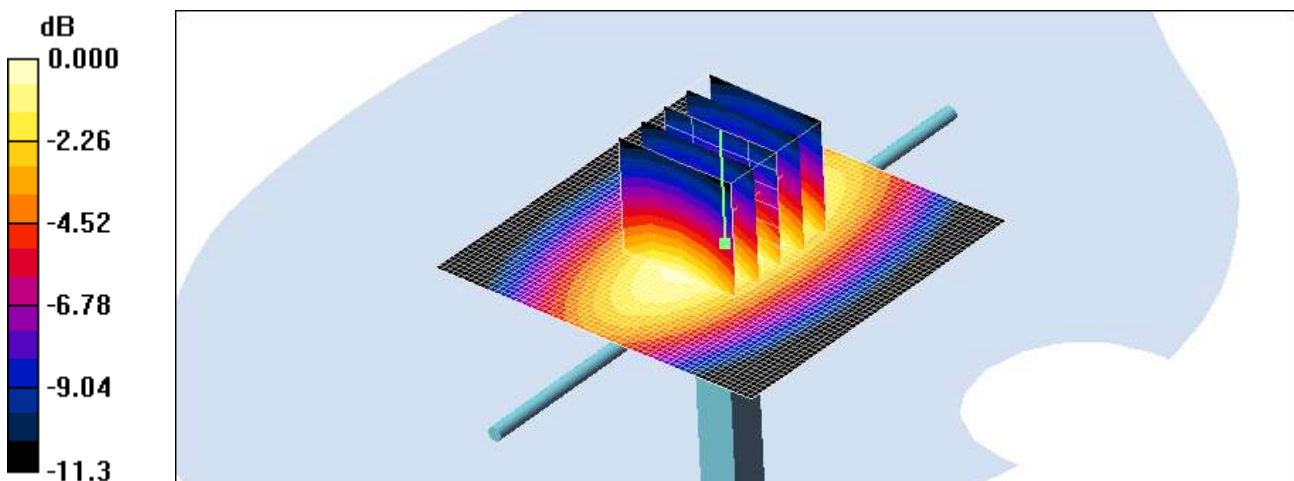
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 835$ MHz; $\sigma = 0.919$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(8.94, 8.94, 8.94); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: SAM 835/900 MHz; Type: SAM

Validation 835MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.03 mW/g

Validation 835MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.6 V/m; Power Drift = -0.064 dB
Peak SAR (extrapolated) = 1.51 W/kg
SAR(1 g) = 0.951 mW/g; SAR(10 g) = 0.604 mW/g
Maximum value of SAR (measured) = 1.03 mW/g



0 dB = 1.03mW/g

■ Validation Data (835 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power: 100 mW (20 dBm)
Liquid Temp: 21.0 °C
Test Date: Jan.15, 2013

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

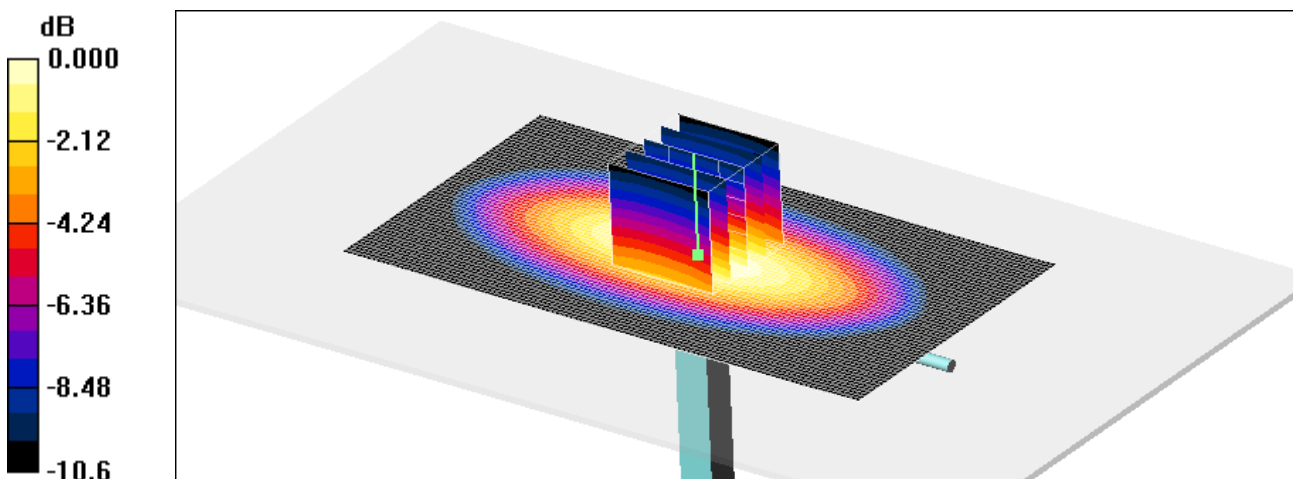
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 835$ MHz; $\sigma = 0.984$ mho/m; $\epsilon_r = 57.1$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

Validation 835 MHz/Area Scan (111x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.04 mW/g

Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.5 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 1.44 W/kg
SAR(1 g) = 0.963 mW/g; SAR(10 g) = 0.627 mW/g
Maximum value of SAR (measured) = 1.04 mW/g



0 dB = 1.04mW/g

■ Validation Data (1 900 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.3 °C
Test Date: Jan.16, 2013

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 40.8$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(7.47, 7.47, 7.47); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: 1800/1900 Phantom; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.53 mW/g

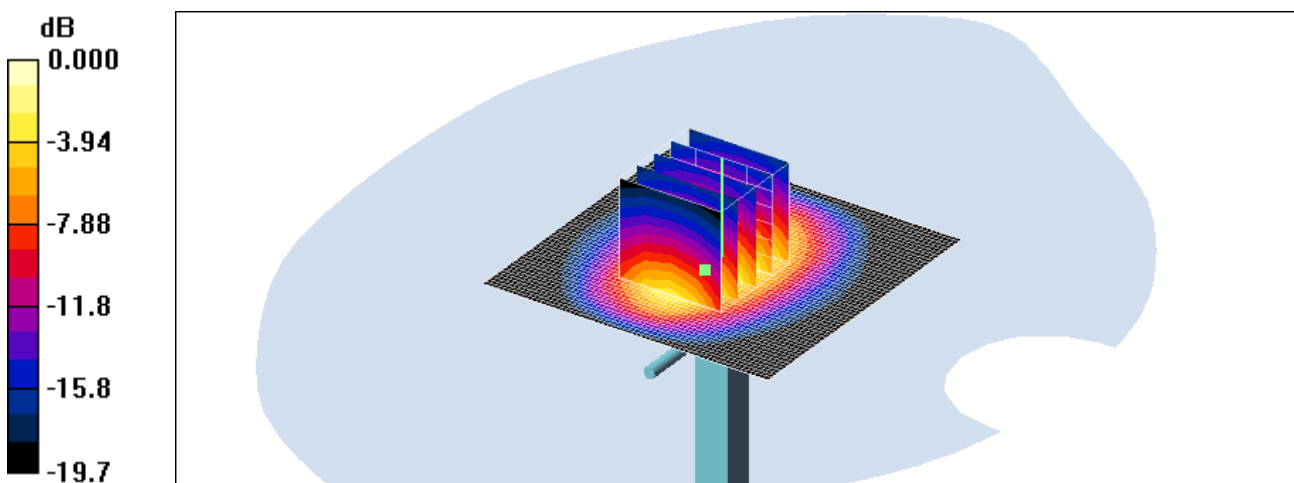
Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 55.5 V/m; Power Drift = 0.006 dB

Peak SAR (extrapolated) = 7.39 W/kg

SAR(1 g) = 3.84 mW/g; SAR(10 g) = 1.96 mW/g

Maximum value of SAR (measured) = 4.21 mW/g



■ Validation Data (1 900 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.3 °C
Test Date: Jan.16, 2013

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

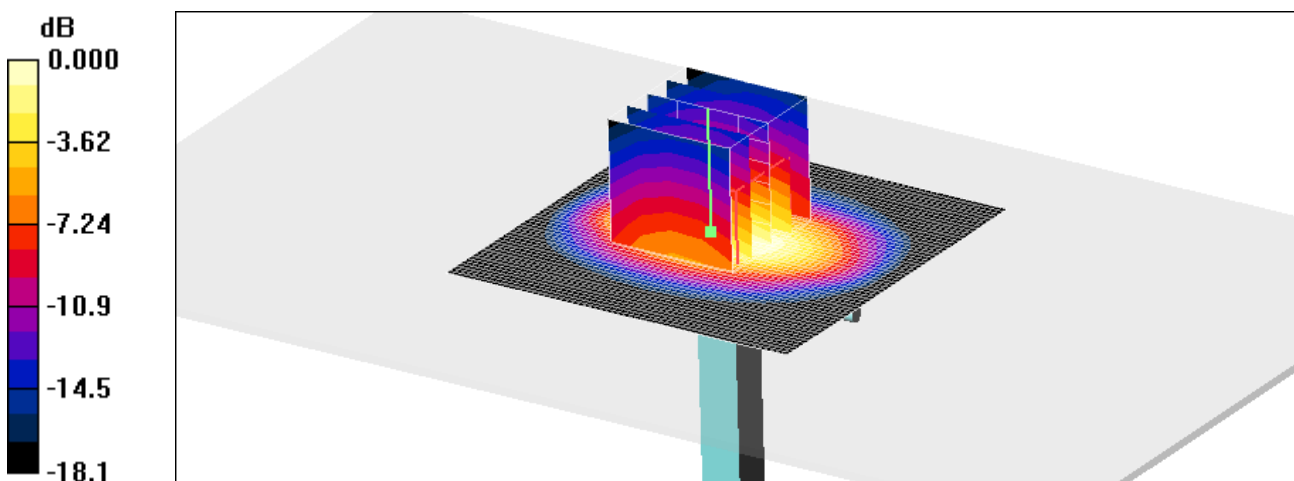
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 52$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

Validation1900 MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.68 mW/g

Validation1900 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.5 V/m; Power Drift = -0.019 dB
Peak SAR (extrapolated) = 7.01 W/kg
SAR(1 g) = 3.88 mW/g; SAR(10 g) = 2.03 mW/g
Maximum value of SAR (measured) = 4.26 mW/g



■ Validation Data (2 450 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.2 °C
Test Date: Jan.17, 2013

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

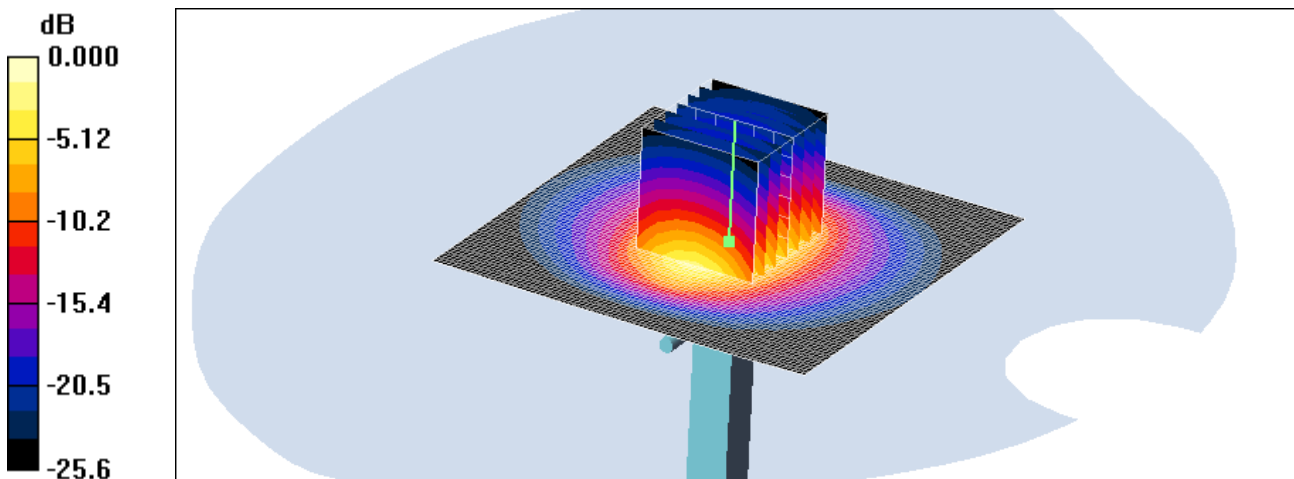
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2450$ MHz; $\sigma = 1.85$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(6.76, 6.76, 6.76); Calibrated: 2012-11-22
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: 835/900 Phantom ; Type: SAM

Validation 2450MHz/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 8.83 mW/g

Validation 2450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.4 V/m; Power Drift = -0.090 dB
Peak SAR (extrapolated) = 12.5 W/kg
SAR(1 g) = 5.39 mW/g; SAR(10 g) = 2.35 mW/g
Maximum value of SAR (measured) = 8.74 mW/g



0 dB = 8.74mW/g

■ Validation Data (2 450 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.2 °C
Test Date: Jan.17, 2013

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

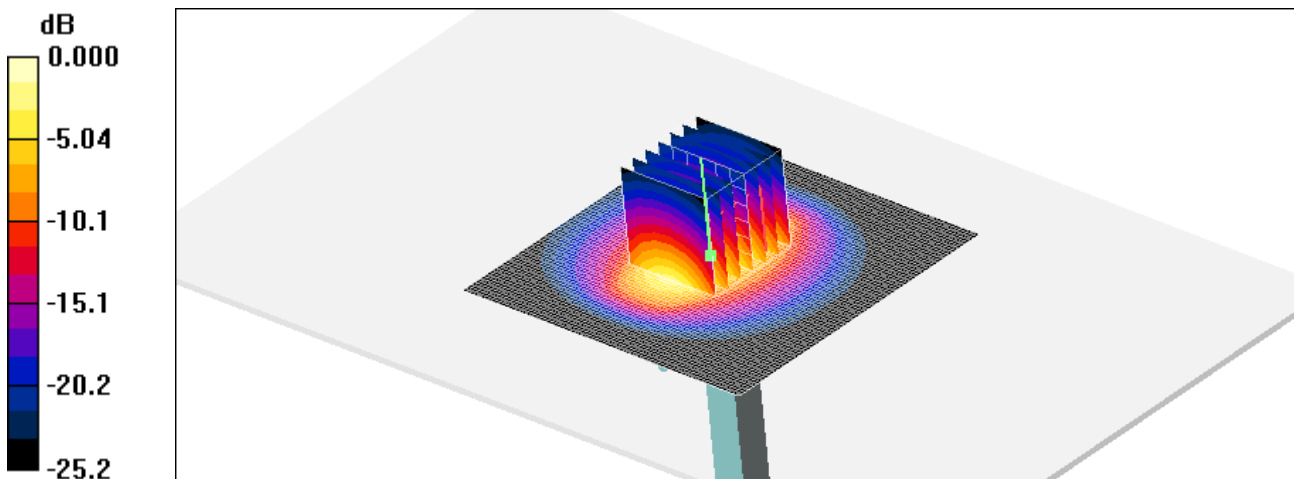
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2450$ MHz; $\sigma = 1.94$ mho/m; $\epsilon_r = 53.5$; $\rho = 1000$ kg/m³
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-11-22
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

Validation 2450MHz/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 8.46 mW/g

Validation 2450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.1 V/m; Power Drift = 0.055 dB
Peak SAR (extrapolated) = 12.1 W/kg
SAR(1 g) = 5.28 mW/g; SAR(10 g) = 2.3 mW/g
Maximum value of SAR (measured) = 8.47 mW/g



■ Dielectric Parameter (835 MHz Head)

Title GT-S6810M
SubTitle 835MHz
Test Date Jan.15, 2013

Frequency	e'	e''
800000000.0000	40.7432	19.9123
805000000.0000	40.6817	19.9000
810000000.0000	40.6514	19.8797
815000000.0000	40.6145	19.8722
820000000.0000	40.5717	19.8397
825000000.0000	40.5161	19.8163
830000000.0000	40.4776	19.7940
835000000.0000	40.4460	19.7753
840000000.0000	40.4093	19.7163
845000000.0000	40.3548	19.7045
850000000.0000	40.2889	19.6857
855000000.0000	40.2501	19.6495
860000000.0000	40.1913	19.6501
865000000.0000	40.1108	19.6058
870000000.0000	40.1005	19.5730
875000000.0000	40.0245	19.5387
880000000.0000	39.9474	19.5153
885000000.0000	39.8766	19.5107
890000000.0000	39.8188	19.4777
895000000.0000	39.7611	19.4253
900000000.0000	39.7114	19.4157

■ Dielectric Parameter (835 MHz Body)

Title GT-S6810M
SubTitle 835MHz
Test Date Jan.15, 2013

Frequency	e'	e''
800000000.0000	57.4895	21.5845
805000000.0000	57.4067	21.5413
810000000.0000	57.3714	21.4692
815000000.0000	57.3220	21.4032
820000000.0000	57.2655	21.3461
825000000.0000	57.1954	21.2949
830000000.0000	57.1537	21.2277
835000000.0000	57.1145	21.1937
840000000.0000	57.0722	21.1778
845000000.0000	57.0379	21.1091
850000000.0000	57.0011	21.1025
855000000.0000	56.9095	21.1067
860000000.0000	56.9003	21.0947
865000000.0000	56.8562	21.1020
870000000.0000	56.7936	21.1006
875000000.0000	56.7787	21.1340
880000000.0000	56.7664	21.1443
885000000.0000	56.7031	21.1325
890000000.0000	56.7091	21.1564
895000000.0000	56.6592	21.1073
900000000.0000	56.6655	21.1147

■ Dielectric Parameter (1 900 MHz Head)

Title GT-S6810M
SubTitle 1 900MHz
Test Date Jan.16, 2013

Frequency	e'	e''
1800000000.0000	41.2188	12.6754
1810000000.0000	41.1681	12.6999
1820000000.0000	41.1346	12.7315
1830000000.0000	41.0835	12.7491
1840000000.0000	41.0466	12.7794
1850000000.0000	41.0151	12.8135
1860000000.0000	40.9819	12.8586
1870000000.0000	40.9499	12.8915
1880000000.0000	40.9191	12.9122
1890000000.0000	40.8809	12.9468
1900000000.0000	40.8465	12.9608
1910000000.0000	40.7991	12.9973
1920000000.0000	40.7556	13.0218
1930000000.0000	40.7276	13.0513
1940000000.0000	40.6923	13.0918
1950000000.0000	40.6581	13.1261
1960000000.0000	40.6188	13.1374
1970000000.0000	40.5895	13.1678
1980000000.0000	40.5473	13.1980
1990000000.0000	40.5211	13.2147
2000000000.0000	40.4714	13.2486

■ Dielectric Parameter (1 900 MHz Body)

Title GT-S6810M
SubTitle 1 900MHz
Test Date Jan.16, 2013

Frequency	e'	e''
1850000000.0000	52.1344	14.5578
1855000000.0000	52.1214	14.5699
1860000000.0000	52.1098	14.5882
1865000000.0000	52.1138	14.6003
1870000000.0000	52.0803	14.6188
1875000000.0000	52.0817	14.6115
1880000000.0000	52.0706	14.6226
1885000000.0000	52.0723	14.6312
1890000000.0000	52.0495	14.6279
1895000000.0000	52.0337	14.6426
1900000000.0000	52.0089	14.6508
1905000000.0000	52.0012	14.6703
1910000000.0000	51.9829	14.6657
1915000000.0000	51.9728	14.6853
1920000000.0000	51.9558	14.6916
1925000000.0000	51.9396	14.7090
1930000000.0000	51.9195	14.7205
1935000000.0000	51.9084	14.7269
1940000000.0000	51.8916	14.7344
1945000000.0000	51.8700	14.7491
1950000000.0000	51.8687	14.7500

■ Dielectric Parameter (2 450 MHz Head)

Title GT-S6810M
SubTitle 2 450MHz
Test Date Jan.17, 2013

Frequency	e'	e''
2400000000.0000	38.8708	13.4105
2405000000.0000	38.8761	13.4262
2410000000.0000	38.8762	13.4321
2415000000.0000	38.8576	13.4286
2420000000.0000	38.8268	13.4436
2425000000.0000	38.7790	13.4646
2430000000.0000	38.7123	13.4792
2435000000.0000	38.6622	13.5133
2440000000.0000	38.6010	13.5403
2445000000.0000	38.5182	13.5412
2450000000.0000	38.4353	13.5811
2455000000.0000	38.3711	13.6166
2460000000.0000	38.3164	13.6498
2465000000.0000	38.2836	13.6760
2470000000.0000	38.2484	13.6989
2475000000.0000	38.2339	13.7266
2480000000.0000	38.2277	13.7474
2485000000.0000	38.2329	13.7586
2490000000.0000	38.2512	13.7589
2495000000.0000	38.2769	13.7612
2500000000.0000	38.3115	13.7640

■ Dielectric Parameter (2 450 MHz Body)

Title GT-S6810M
SubTitle 2 450MHz
Test Date Jan.17, 2013

Frequency	e'	e''
2400000000.0000	53.6906	14.0269
2405000000.0000	53.6809	14.0421
2410000000.0000	53.6686	14.0609
2415000000.0000	53.6561	14.0645
2420000000.0000	53.6131	14.0891
2425000000.0000	53.6062	14.1169
2430000000.0000	53.6001	14.1244
2435000000.0000	53.5612	14.1364
2440000000.0000	53.5405	14.1558
2445000000.0000	53.5201	14.1986
2450000000.0000	53.5168	14.2186
2455000000.0000	53.5156	14.2282
2460000000.0000	53.4734	14.2538
2465000000.0000	53.4456	14.2838
2470000000.0000	53.4264	14.3025
2475000000.0000	53.4030	14.3351
2480000000.0000	53.3908	14.3525
2485000000.0000	53.3822	14.3692
2490000000.0000	53.3582	14.4033
2495000000.0000	53.3558	14.4356
2500000000.0000	53.3313	14.4629

Attachment 3. – Probe Calibration Data

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



S Schweizerischer Kalibrierdienst
S 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: **EX3-3797_Nov12**

CALIBRATION CERTIFICATE

Object: **EX3DV4 - SN:3797**

Calibration procedure(s): **QA CAL-01.v8, QA CAL-12.v7, QA CAL-14.v3, QA CAL-23.v4,
QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **November 22, 2012**

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41488067	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: November 22, 2012

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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization 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., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- **NORM_{x,y,z}:** Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not 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.
- **DCP_{x,y,z}:** DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- **PAR:** PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- **A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}:** A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- **ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 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.

EX3DV4 – SN:3797

November 22, 2012

Probe EX3DV4

SN:3797

Manufactured: April 5, 2011
Calibrated: November 22, 2012

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

EX3DV4- SN:3797

November 22, 2012

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3797

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$) ^a	0.63	0.59	0.57	± 10.1 %
DCP (mV) ^b	97.5	94.8	93.7	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^c (k=2)
0	CW	0.00	X	0.0	0.0	1.0	134.7	±3.0 %
			Y	0.0	0.0	1.0	130.7	
			Z	0.0	0.0	1.0	130.3	

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.

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

EX3DV4- SN:3797

November 22, 2012

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3797

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^D	Conductivity (S/m) ^E	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	9.30	9.30	9.30	0.15	3.00	± 13.4 %
835	41.5	0.90	8.94	8.94	8.94	0.44	0.78	± 12.0 %
900	41.5	0.97	8.83	8.83	8.83	0.37	0.88	± 12.0 %
1450	40.5	1.20	7.89	7.89	7.89	0.24	1.28	± 12.0 %
1750	40.1	1.37	7.77	7.77	7.77	0.75	0.60	± 12.0 %
1900	40.0	1.40	7.47	7.47	7.47	0.44	0.82	± 12.0 %
1950	40.0	1.40	7.27	7.27	7.27	0.80	0.59	± 12.0 %
2450	39.2	1.80	6.76	6.76	6.76	0.41	0.83	± 12.0 %
2600	39.0	1.96	6.68	6.68	6.68	0.46	0.81	± 12.0 %
5200	36.0	4.68	4.84	4.84	4.84	0.34	1.80	± 13.1 %
5300	35.9	4.76	4.61	4.61	4.61	0.34	1.80	± 13.1 %
5500	35.6	4.96	4.58	4.58	4.58	0.34	1.80	± 13.1 %
5600	35.5	5.07	4.45	4.45	4.45	0.31	1.80	± 13.1 %
5800	35.3	5.27	4.50	4.50	4.50	0.34	1.80	± 13.1 %

^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.

^D At frequencies below 3 GHz, the validity of tissue parameters (ϵ and n) 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 n) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

EX3DV4- SN:3797

November 22, 2012

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3797

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^e	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	10.22	10.22	10.22	0.07	3.31	± 13.4 %
835	55.2	0.97	8.98	8.98	8.98	0.44	0.85	± 12.0 %
1750	53.4	1.49	7.58	7.58	7.58	0.68	0.66	± 12.0 %
1900	53.3	1.52	7.28	7.28	7.28	0.49	0.79	± 12.0 %
2450	52.7	1.95	6.98	6.98	6.98	0.80	0.58	± 12.0 %
2600	52.5	2.16	6.73	6.73	6.73	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.17	4.17	4.17	0.46	1.90	± 13.1 %
5300	48.9	5.42	4.20	4.20	4.20	0.42	1.90	± 13.1 %
5500	48.6	5.65	4.05	4.05	4.05	0.41	1.90	± 13.1 %
5600	48.5	5.77	4.06	4.06	4.06	0.30	1.90	± 13.1 %
5800	48.2	6.00	4.19	4.19	4.19	0.42	1.90	± 13.1 %

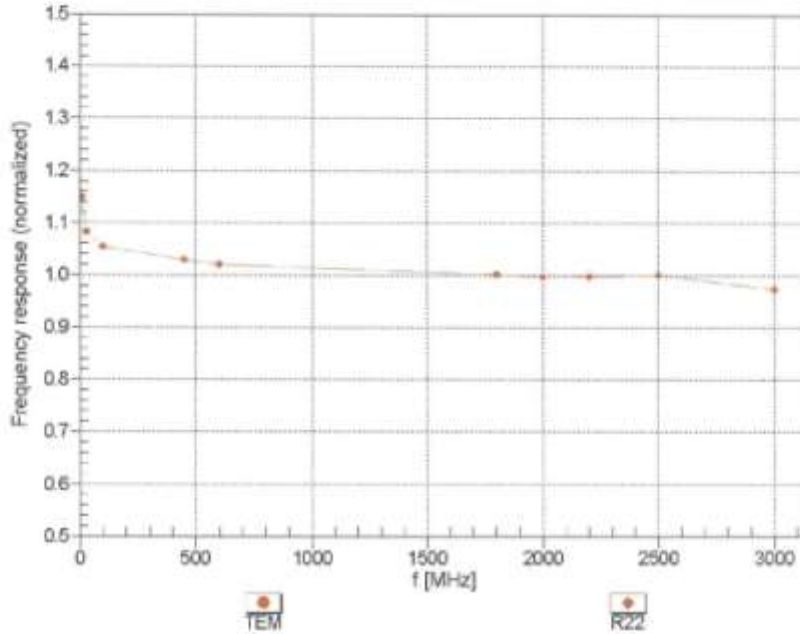
^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^e 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.

EX30V4- SN:3797

November 22, 2012

Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



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

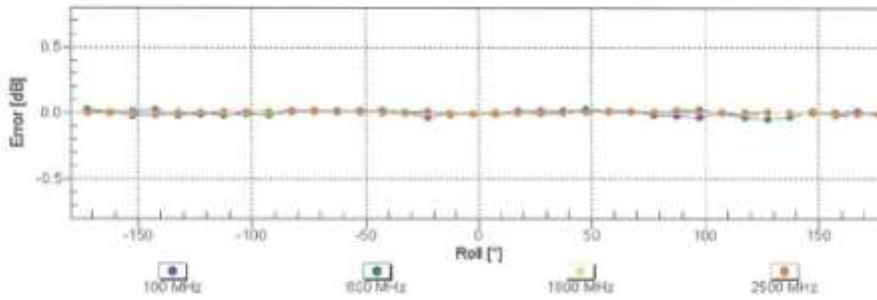
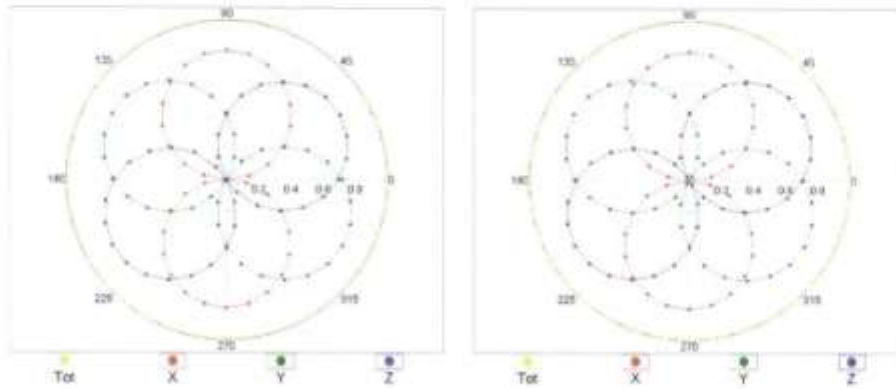
EX3DV4- SN:3797

November 22, 2012

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

f=600 MHz, TEM

f=1800 MHz, R22

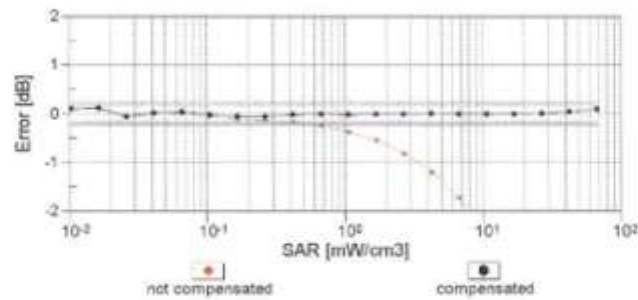
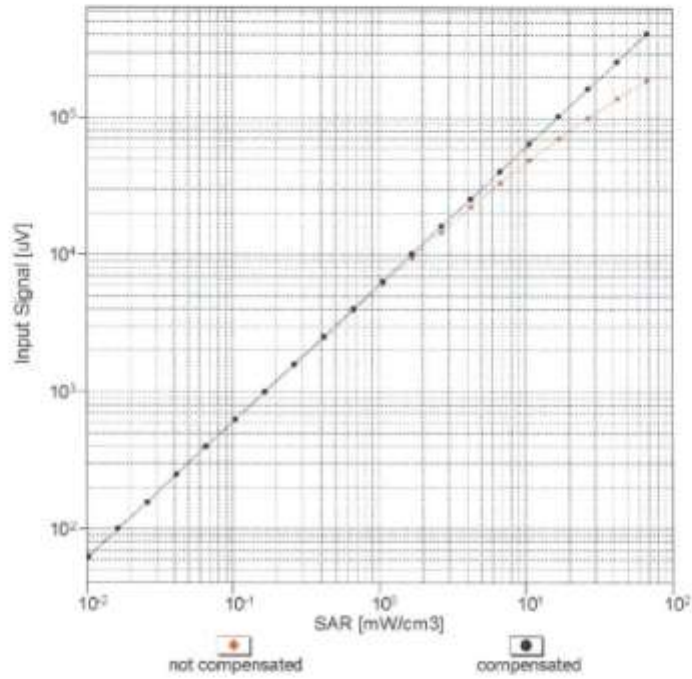


Uncertainty of Axial isotropy Assessment: $\pm 0.5\%$ (k=2)

EX3DV4-SN:3797

November 22, 2012

Dynamic Range f(SAR_{head}) (TEM cell , f = 900 MHz)

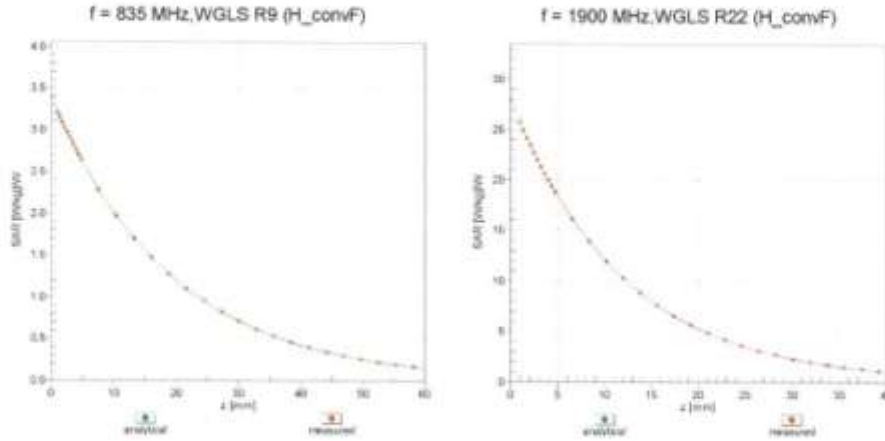


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

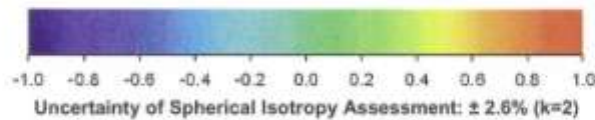
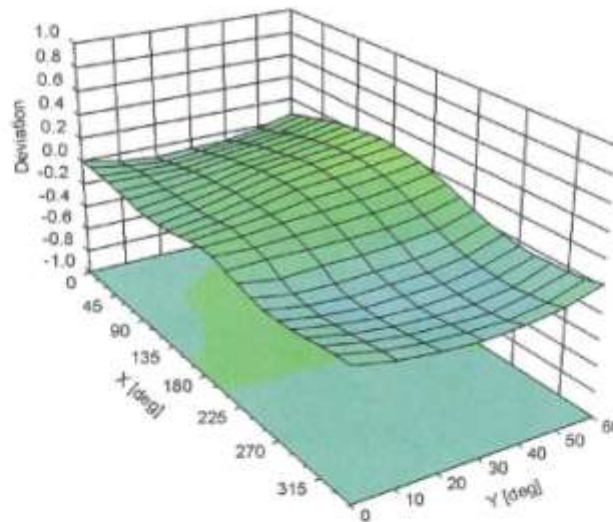
EX3DV4- SN:3797

November 22, 2012

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, θ), f = 900 MHz



EX3DV4-- SN:3797

November 22, 2012

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3797**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	67.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

Attachment 4. – Dipole Calibration Data

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



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Accreditation No.: **SCS 108**

Client **HCT (Dymstec)**

Certificate No: **D835V2-441_May12**

CALIBRATION CERTIFICATE																																															
Object	D835V2 - SN: 441																																														
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz																																														
Calibration date:	May 16, 2012																																														
<p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <table border="1"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter EPM-442A</td> <td>GB37480704</td> <td>05-Oct-11 (No. 217-01451)</td> <td>Oct-12</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>US37292783</td> <td>05-Oct-11 (No. 217-01451)</td> <td>Oct-12</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: 5058 (20k)</td> <td>27-Mar-12 (No. 217-01530)</td> <td>Apr-13</td> </tr> <tr> <td>Type-N mismatch combination</td> <td>SN: 5047.2 / 06327</td> <td>27-Mar-12 (No. 217-01533)</td> <td>Apr-13</td> </tr> <tr> <td>Reference Probe ES3DV3</td> <td>SN: 3205</td> <td>30-Dec-11 (No. ES3-3205_Dec11)</td> <td>Dec-12</td> </tr> <tr> <td>DAE4</td> <td>SN: 601</td> <td>04-Jul-11 (No. DAE4-601_Jul11)</td> <td>Jul-12</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Check Date (in house)</th> <th>Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>Power sensor HP 8481A</td> <td>MY41082317</td> <td>18-Oct-02 (in house check Oct-11)</td> <td>In house check: Oct-13</td> </tr> <tr> <td>RF generator R&S SMT-06</td> <td>100005</td> <td>04-Aug-99 (in house check Oct-11)</td> <td>In house check: Oct-13</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585 S4206</td> <td>18-Oct-01 (in house check Oct-11)</td> <td>In house check: Oct-12</td> </tr> </tbody> </table>				Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration	Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12	Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12	Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13	Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13	Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12	DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	Power sensor HP 8481A	MY41082317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13	RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13	Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12
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Calibrated by:	Name Israa El-Naouq	Function Laboratory Technician	Signature 																																												
Approved by:	Katja Pokovic	Technical Manager																																													
			Issued: May 16, 2012																																												
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- 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
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	40.6 \pm 6 %	0.89 mho/m \pm 6 %
Head TSL temperature change during test	< 0.5 °C	---	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.35 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.43 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.18 mW / g \pm 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 \pm 0.2) °C	54.3 \pm 6 %	1.00 mho/m \pm 6 %
Body TSL temperature change during test	< 0.5 °C	---	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.44 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.50 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.27 mW / g \pm 16.5 % (k=2)

Appendix**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	51.1 Ω - 5.8 j Ω
Return Loss	- 24.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.0 Ω - 8.1 j Ω
Return Loss	- 21.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.372 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 09, 2001

DASY5 Validation Report for Head TSL

Date: 16.05.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm 2/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.129 V/m; Power Drift = 0.00 dB

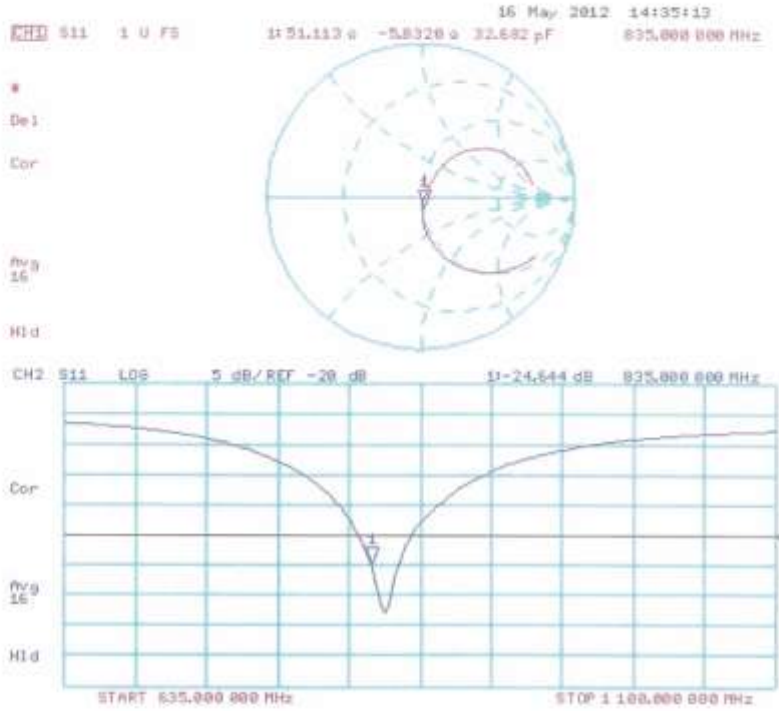
Peak SAR (extrapolated) = 3.474 mW/g

SAR(1 g) = 2.35 mW/g; SAR(10 g) = 1.54 mW/g

Maximum value of SAR (measured) = 2.73 mW/g



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.05.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

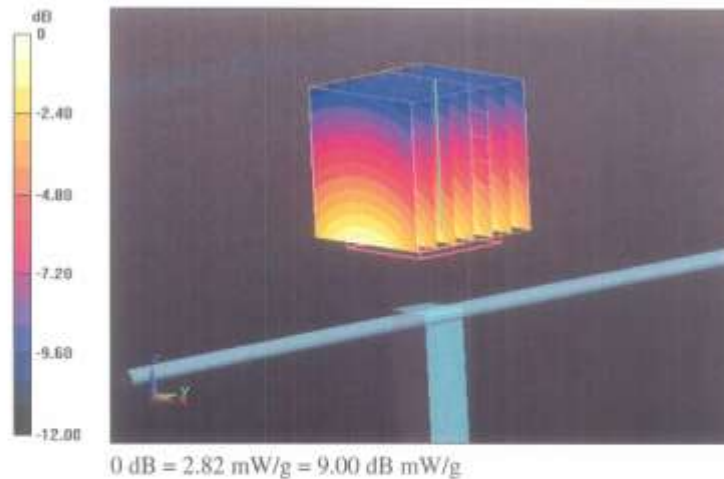
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.054 V/m; Power Drift = 0.03 dB

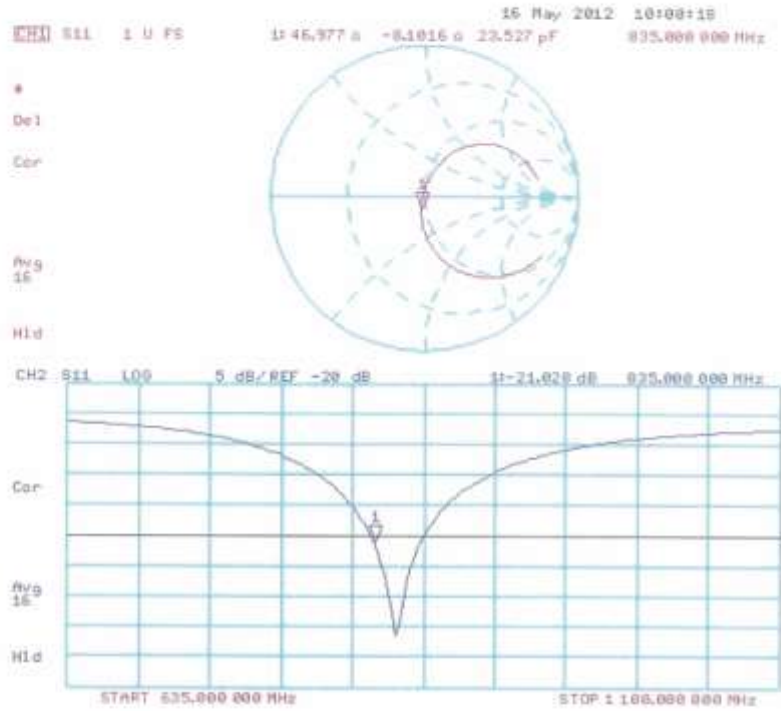
Peak SAR (extrapolated) = 3.533 mW/g

SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

Maximum value of SAR (measured) = 2.82 mW/g



Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client **HCT (Dymstec)**

Certificate No: D1900V2-5d032_Jul12

CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d032
Calibration procedure(s): QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz
Calibration date: July 20, 2012

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292793	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41002317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-09 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Dimita Ilev	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 20, 2012

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

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL tissue simulating liquid
ConvF sensitivity in TSL / NORM x,y,z
N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

- 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
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:* SAR measured at the stated antenna input power.
- SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.9 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.88 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	39.9 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.11 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.5 mW / g ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.5 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	39.9 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.30 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.2 mW / g ± 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.0 Ω + 3.1 jΩ
Return Loss	- 30.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.2 Ω + 3.7 jΩ
Return Loss	- 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.194 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 17, 2003

DASY5 Validation Report for Head TSL

Date: 20.07.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.38$ mho/m; $\epsilon_r = 39.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

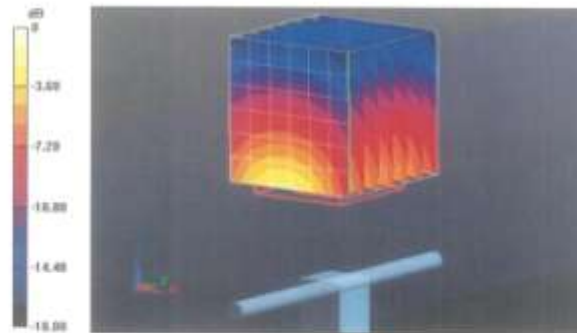
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.864 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 17.209 mW/g

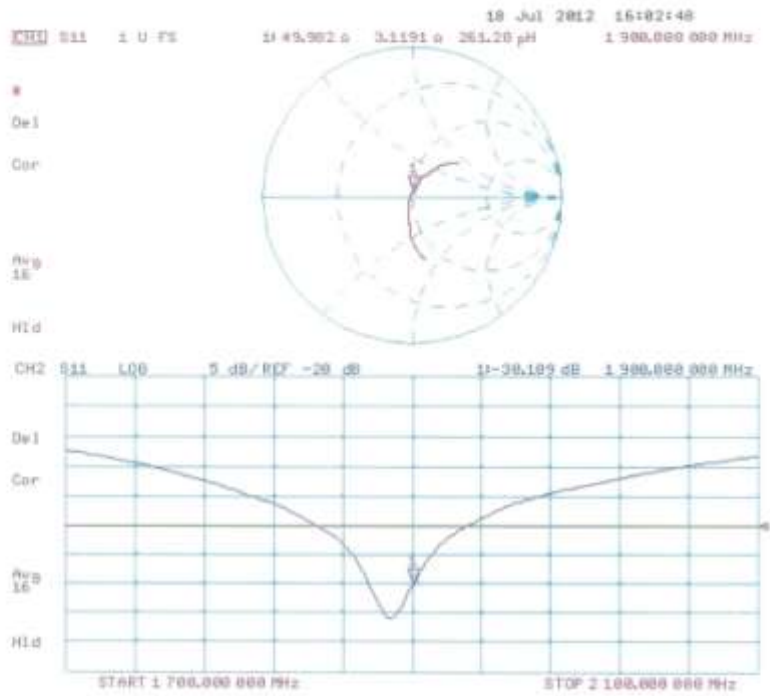
SAR(1 g) = 9.68 mW/g; SAR(10 g) = 5.11 mW/g

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



0 dB = 12.1 mW/g = 21.66 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 20.07.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

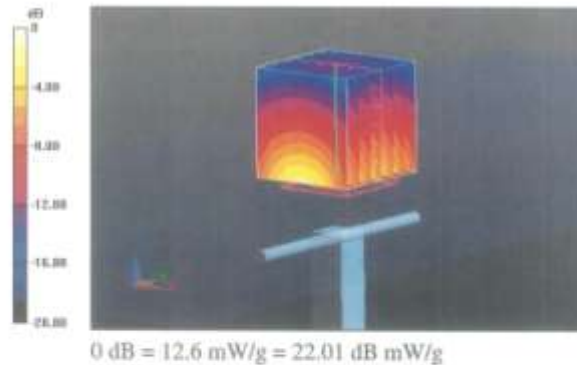
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.470 V/m; Power Drift = -0.00 dB

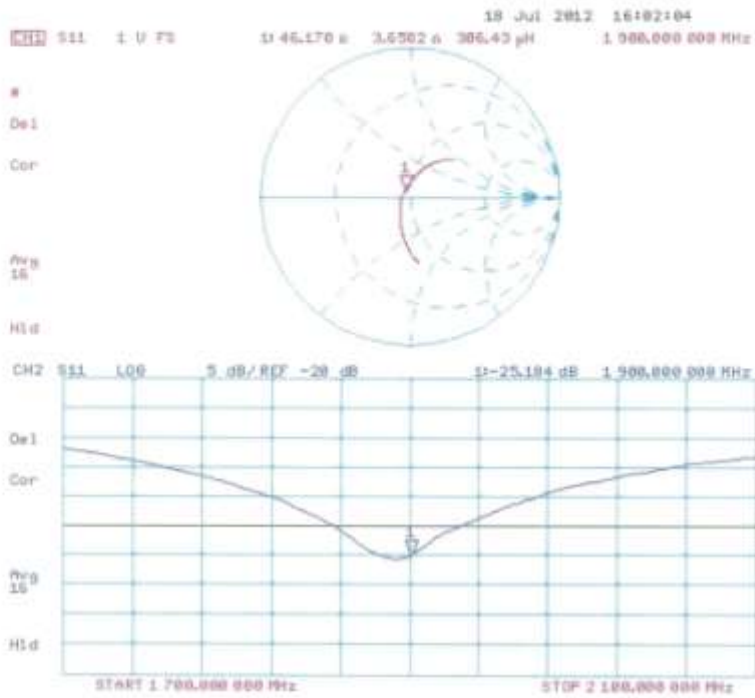
Peak SAR (extrapolated) = 17.332 mW/g

SAR(1 g) = 10 mW/g; SAR(10 g) = 5.3 mW/g

Maximum value of SAR (measured) = 12.6 mW/g



Impedance Measurement Plot for Body TSL



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



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C Service suisse d'étalonnage
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client HCT (Dymstec)

Certificato No: D2450V2-743_Aug12

CALIBRATION CERTIFICATE

Object D2450V2 - SN: 743

Calibration procedure(s) QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: August 23, 2012

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GIS37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20K)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by: Name Israa El-Naouq Function Laboratory Technician

Signature:

Approved by: Name Katja Pokovic Function Technical Manager

Signature:

Issued: August 23, 2012

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

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Glossary:

TSL tissue simulating liquid
ConvF sensitivity in TSL / NORM x,y,z
N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

- 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
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:* SAR measured at the stated antenna input power.
- SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.2 ± 6 %	1.81 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	52.7 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.18 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.7 mW / g ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.3 ± 6 %	1.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	51.2 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.10 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	24.2 mW / g ± 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.0 Ω + 4.7 jΩ
Return Loss	-24.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.9 Ω + 6.5 jΩ
Return Loss	-23.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.158 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 01, 2003

DASY5 Validation Report for Head TSL

Date: 23.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.81$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52-52.8.2(969); SEMCAD X 14.6.6(6824)

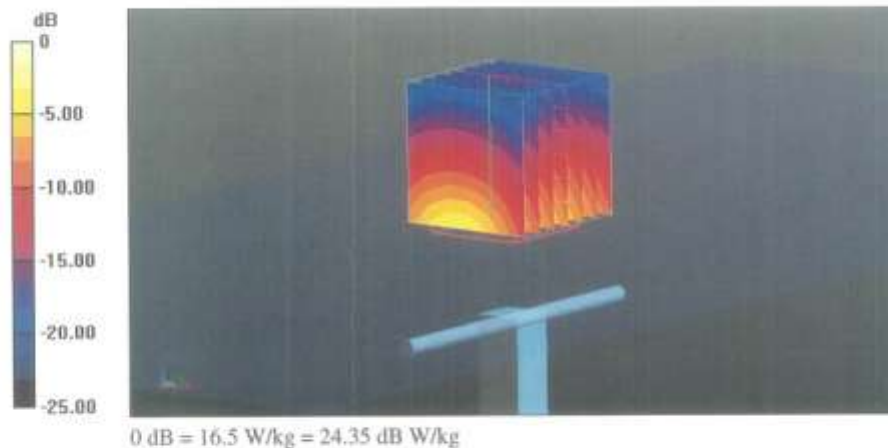
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 98.554 V/m; Power Drift = 0.01 dB

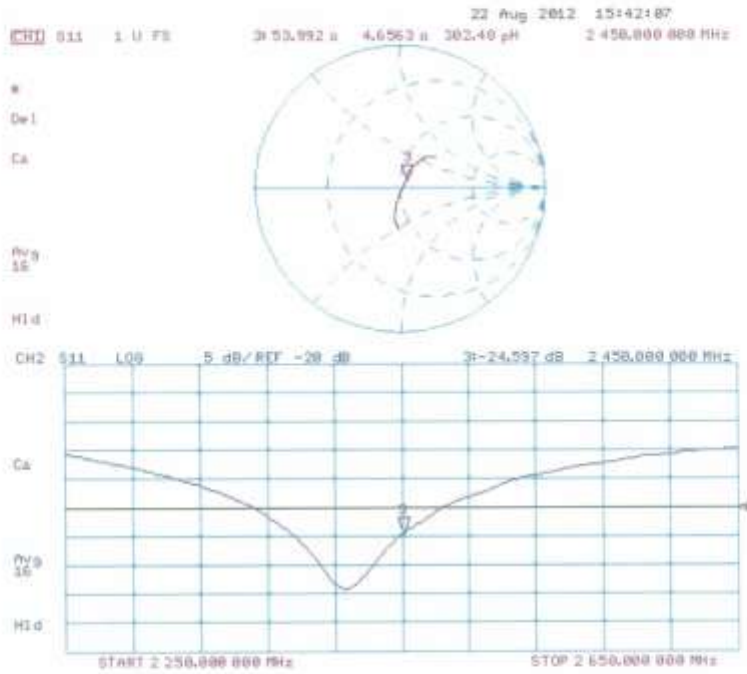
Peak SAR (extrapolated) = 26.584 mW/g

SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.18 mW/g

Maximum value of SAR (measured) = 16.5 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 22.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 51.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

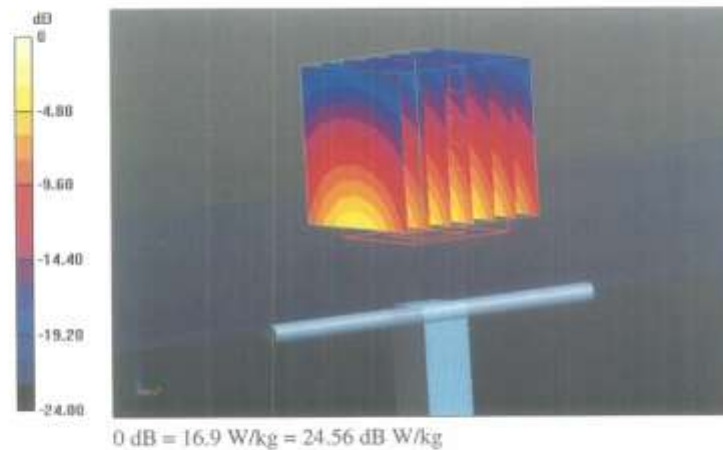
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.699 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 26.489 mW/g

SAR(1 g) = 13 mW/g; SAR(10 g) = 6.1 mW/g

Maximum value of SAR (measured) = 16.9 W/kg



Impedance Measurement Plot for Body TSL

