

SAR TEST REPORT

HCT CO., LTD

EUT Type:	850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only	
FCC ID:	A3LGTS5270Y	
Model:	GT-S5270Y	
Date of Issue:	Dec. 16, 2011	
Test report No.:	HCTA1112FS04	
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Testing has been carried out in accordance with:	RSS-102 Issue 4; Health Canada Safety Code 6 47CFR §2.1093 FCC OET Bulletin 65(Edition 97-01), Supplement C (Edition 01-01) ANSI/ IEEE C95.1 – 1992 IEEE 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.	
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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).

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

where:

σ	=	conductivity of the tissue-simulant material (S/m)
ρ	=	mass density of the tissue-simulant material (kg/m ³)
E	=	Total RMS electric field strength (V/m)

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

2. DESCRIPTION OF DEVICE

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

EUT Type	850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only		
FCC ID:	A3LGTS5270Y		
Model:	GT-S5270Y		
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 (WLAN)		
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 (WLAN)		
FCC Classification	Licensed Portable Transmitter Held to Ear (PCE)		
Production Unit or Identical Prototype	Prototype		
Max SAR	Band	1g SAR (W/kg)	
		Head	Body-worn
	GSM850	0.453	0.582
	GSM1900	0.511	0.317
	WCDMA850	0.402	0.347
	WCDMA1900	0.588	0.215
	802.11b	0.680	0.022
Date(s) of Tests	Dec. 13, 2011 ~ Dec. 14, 2011		
Antenna Type	Integral Antenna		
GPRS	Multislot Class: 12, Mode Class: B		
Key Features	This device doesn't support Mobile Hotspot and VoIP capability.		

3. DESCRIPTION OF TEST EQUIPMENT

3.1 SAR MEASUREMENT SETUP

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure.3.1).

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

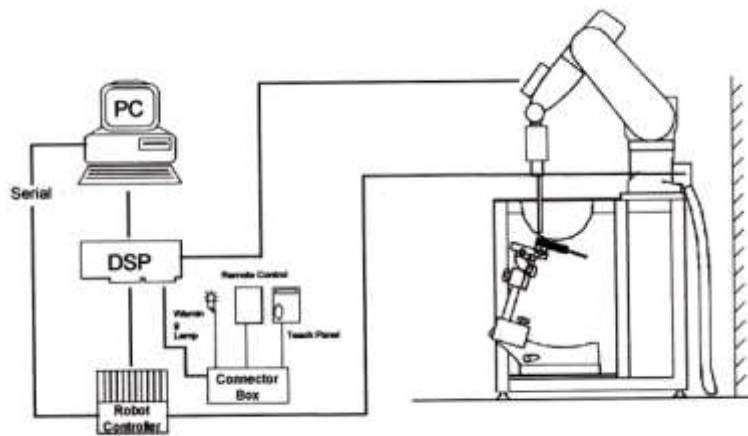


Figure 3.1 HCT SAR Lab. Test Measurement Set-up

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

3.2 DASY4 E-FIELD PROBE SYSTEM

3.2.1 EX3DV4 Probe Specification

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



Figure 3.2 Photograph of the probe and the Phantom



Figure 4.2 EX3DV4 E-field Probe

The SAR measurements were conducted with the dosimetric probe EX3DV4, designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches a maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped at reaching the maximum.

3.3 PROBE CALIBRATION PROCESS

3.3.1 E-Probe Calibration

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

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

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

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

where:

Δt = exposure time (30 seconds),

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

ΔT = temperature increase due to RF exposure.

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

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

where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm³ for brain tissue)

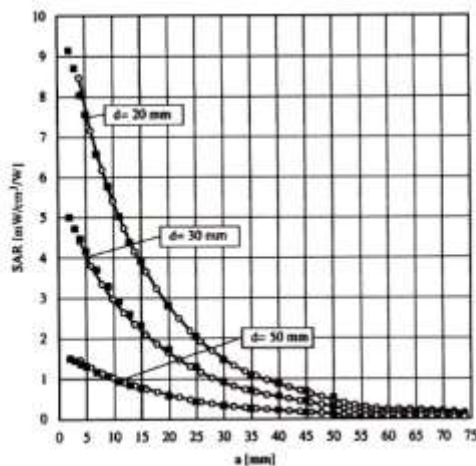


Figure 3.4 E-Field and Temperature measurements at 900 MHz

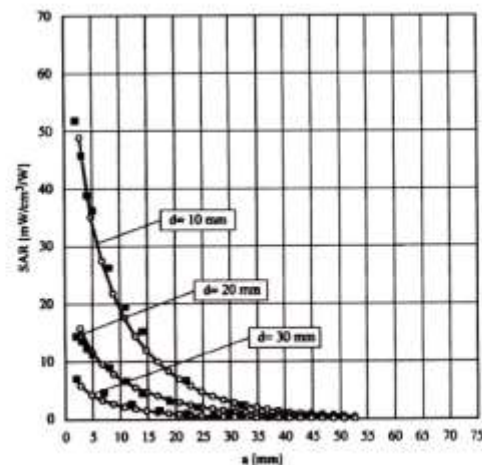


Figure 3.5 E-Field and temperature measurements at 1.8 GHz

3.3.2 Data Extrapolation

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

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

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

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

E-field probes:

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

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

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

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

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

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

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

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

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

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

3.4 SAM Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.



Figure 3.6 SAM Phantom

Shell Thickness	2.0 mm $\pm$ 0.2 mm (6 $\pm$ 0.2 mm at ear point)
Filling Volume	about 25 L
Dimensions	1 000 mm x 500 mm (L x W)

3.5 Device Holder for Transmitters

In combination with the SAM Phantom V 4.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatably positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produce an infinite number of configurations. To produce the Worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.



Figure 3.7 Device Holder

3.6 Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bactericide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrove.

Ingredients (% by weight)	Frequency (MHz)											
	450		750		835		915		1 900		2 450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.2	51.7	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.4	1.0	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	57	47.2	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	0.2	0.0	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.2	0.1	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7

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

Table 3.1 Composition of the Tissue Equivalent Matter

3.7 SAR TEST EQUIPMENT

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	SAM Phantom	-	N/A	N/A	N/A
Staubli	Robot RX90L	F01/5K09A1/A/01	N/A	N/A	N/A
Staubli	Robot ControllerCS7MB	F99/5A82A1/C/01	N/A	N/A	N/A
HP	Pavilion t000_puffer	KRJ51201TV	N/A	N/A	N/A
SPEAG	Light Alignment Sensor	265	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D221340.01	N/A	N/A	N/A
SPEAG	DAE3	466	Mar. 1, 2011	Annual	Mar. 1, 2012
SPEAG	E-Field Probe EX3DV4	3797	July 25, 2011	Annual	July 25, 2012
SPEAG	Validation Dipole D835V2	441	May 16, 2011	Annual	May 16, 2012
SPEAG	Validation Dipole D1900V2	5d032	July 22, 2011	Annual	July 22, 2012
SPEAG	Validation Dipole D2450V2	743	Aug. 29, 2011	Annual	Aug. 29, 2012
Agilent	Power Meter(F) E4419B	MY41291386	Nov. 04, 2011	Annual	Nov. 04, 2012
Agilent	Power Sensor(G) 8481	MY41090870	Nov. 04, 2011	Annual	Nov. 04, 2012
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler	16072	Nov. 04, 2011	Annual	Nov. 04, 2012
R&S	Base Station CMU200	110740	July 26, 2011	Annual	July 26, 2012
Agilent	Base Station E5515C	GB44400269	Feb. 10, 2011	Annual	Feb. 10, 2012
HP	Signal Generator E4438C	MY42082646	Nov. 11, 2011	Annual	Nov. 11, 2012
HP	Network Analyzer 8753ES	JP39240221	Mar. 30, 2011	Annual	Mar. 30, 2012

NOTE:

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

4. SAR MEASUREMENT PROCEDURE

The evaluation was performed with the following procedure:

1. The SAR value at a fixed location above the ear point was measured and was used as a reference value for assessing the power drop.
2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15 mm x 15 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.
3. Around this point, a volume of 32 mm x 32 mm x 30 mm was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:
 - a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
 - b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR value, at the same location as procedure #1, was re-measured. If the value changed by more than 5 %, the evaluation is repeated.

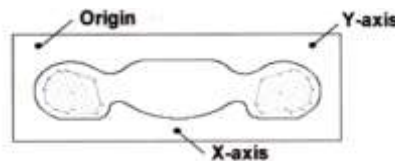


Figure 4.1 SAR Measurement Point in Area Scan

5. DESCRIPTION OF TEST POSITION

5.1 HEAD POSITION

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

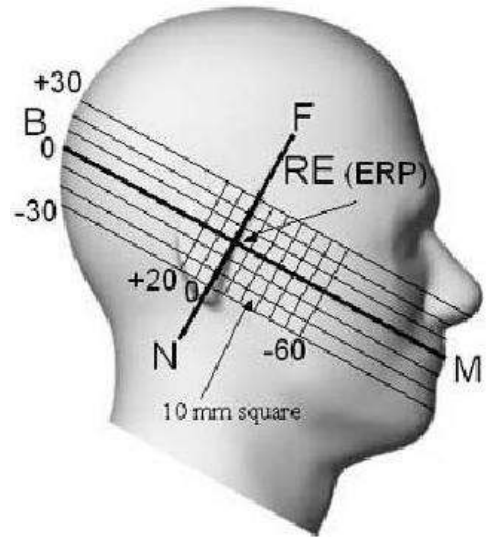


Figure 5.1 Side view of the phantom

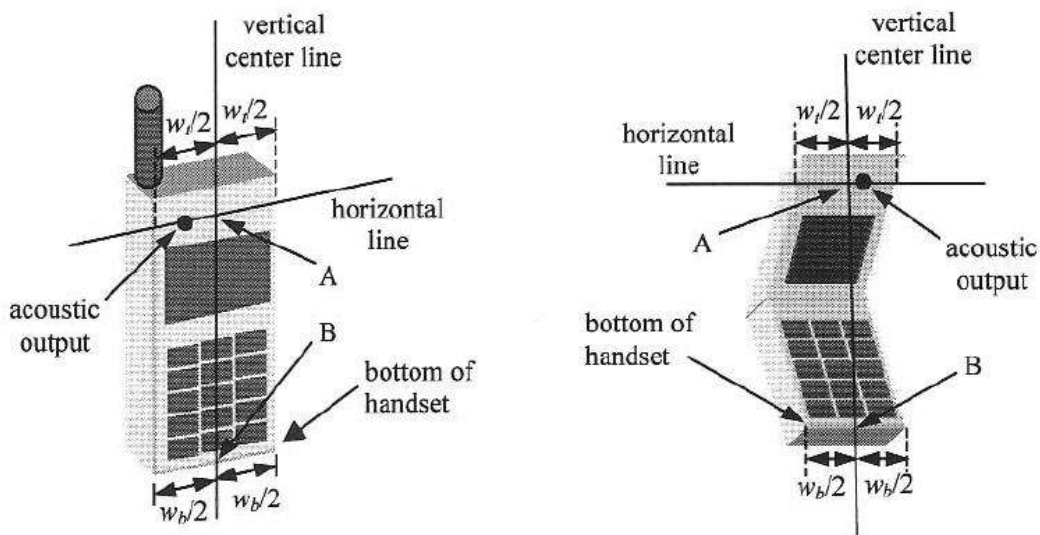


Figure 5.2 Handset vertical and horizontal reference lines

5.2 Body Holster/Belt Clip Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. A device with a headset output is tested with a headset connected to the device. Body dielectric parameters are used.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with each accessory. If multiple accessory share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some Devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used.

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

"See the Test SET-UP Photo"

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessory(ies), including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worstcase positioning is then documented and used to perform Body SAR testing.

6. MEASUREMENT UNCERTAINTY

Error Description	Tol (± %)	Prob. dist.	Div.	C _i	Standard Uncertainty (± %)	V _{eff}
1. Measurement System						
Probe Calibration	6.00	N	1	1	6.00	∞
Axial Isotropy	4.70	R	1.73	0.7	1.90	∞
Hemispherical Isotropy	9.60	R	1.73	0.7	3.88	∞
Boundary Effects	1.00	R	1.73	1	0.58	∞
Linearity	4.70	R	1.73	1	2.71	∞
System Detection Limits	1.00	R	1.73	1	0.58	∞
Readout Electronics	0.30	N	1.00	1	0.30	∞
Response Time	0.8	R	1.73	1	0.46	∞
Integration Time	2.6	R	1.73	1	1.50	∞
RF Ambient Conditions	3.00	R	1.73	1	1.73	∞
Probe Positioner	0.40	R	1.73	1	0.23	∞
Probe Positioning	2.90	R	1.73	1	1.67	∞
Max SAR Eval	1.00	R	1.73	1	0.58	∞
2. Test Sample Related						
Device Positioning	2.90	N	1.00	1	2.90	145
Device Holder	3.60	N	1.00	1	3.60	5
Power Drift	5.00	R	1.73	1	2.89	∞
3. Phantom and Setup						
Phantom Uncertainty	4.00	R	1.73	1	2.31	∞
Liquid Conductivity(target)	5.00	R	1.73	0.64	1.85	∞
Liquid Conductivity(meas.)	2.07	N	1	0.64	1.32	9
Liquid Permittivity(target)	5.00	R	1.73	0.6	1.73	∞
Liquid Permittivity(meas.)	5.02	N	1	0.6	3.01	9
Combine Standard Uncertainty					11.13	
Coverage Factor for 95 %					k=2	
Expanded STD Uncertainty					22.25	

Table 6.1 Uncertainty (800 MHz- 2450 MHz)

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

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

Table 7.1 Safety Limits for Partial Body Exposure

NOTES:

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

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

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

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

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

8. SYSTEM VERIFICATION

8.1 Tissue Verification

Freq. [MHz]	Date	Liquid	Liquid Temp.[°C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
835	Dec. 13, 2011	Head	21.2	ϵ_r	41.5	43	+ 3.61	± 5
				σ	0.90	0.903	0.33	± 5
835		Body	21.2	ϵ_r	55.2	54.5	- 1.27	± 5
				σ	0.97	0.97	0.00	± 5
1 900	Dec. 14, 2011	Head	21.3	ϵ_r	40.0	39.1	- 2.50	± 5
				σ	1.40	1.39	- 0.71	± 5
1 900		Body	21.3	ϵ_r	53.3	54.3	+ 1.88	± 5
				σ	1.52	1.45	- 4.61	± 5
2 450	Dec. 14, 2011	Head	21.3	ϵ_r	39.2	38.7	- 1.28	± 5
				σ	1.80	1.84	+ 2.22	± 5
2 450		Body	21.3	ϵ_r	52.7	52.1	- 1.14	± 5
				σ	1.95	1.88	- 3.59	± 5

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

8.2 System Validation

Prior to assessment, the system is verified to the $\pm 10\%$ of the specifications at 835 MHz /1 900 MHz/ 2 450 MHz by using the system validation kit. (Graphic Plots Attached) * Input Power: 100 m W

Probe (SN)	Freq. [MHz]	Dipole (SN)	Date	Liquid	Liquid Temp. [°C]	Ambient Temp. [°C]	SAR Average	Target Value (SPEAG) (mW/g)	*Measured Value (mW/g)	Deviation [%]	Limit [%]
3797	835	441	Dec.13,2011	Head	21.2	21.4	1 g	9.34	0.936	+ 0.21	± 10
	835			Body	21.2	21.4	1 g	9.45	0.977	+ 3.39	± 10
	1 900	5d032	Dec.14,2011	Head	21.3	21.5	1 g	39.9	4.07	+ 2.01	± 10
	1 900			Body	21.3	21.5	1 g	40.9	4.00	- 2.20	± 10
	2 450	743	Dec.14,2011	Head	21.3	21.5	1 g	53.8	5.35	- 0.56	± 10
	2 450			Body	21.3	21.5	1 g	51.7	4.93	- 4.64	± 10

8.3 System Validation Procedure

SAR measurement was Prior to assessment, the system is verified to the $\pm 10\%$ of the specifications at target frequency 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.

Note;

SAR Verification was performed according to the FCC KDB 450824.

9. RF CONDUCTED POWER MEASUREMENT

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

9.1 GSM

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



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

- Head SAR :GSM voice
- Body SAR: GPRS850 Body SAR with GPRS Multi-slot Class 11, 3 Tx with CS 1 (GMSK)
GPRS1900 Body SAR with GPRS Multi-slot Class 12, 4 Tx with CS 1 (GMSK)

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	32.45	32.44	31.51	30.46	27.55
	190	32.4	32.4	31.42	30.32	27.42
	251	32.45	32.44	31.41	30.34	27.5
GSM 1900	512	29.85	29.85	29.42	27.86	26.64
	661	29.52	29.52	29.09	27.57	26.33
	810	29.69	29.69	29.31	27.87	26.7

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	23.42	23.41	25.49	26.2	24.54
	190	23.37	23.37	25.4	26.06	24.41
	251	23.42	23.41	25.39	26.08	24.49
GSM 1900	512	20.82	20.82	23.4	23.6	23.63
	661	20.49	20.49	23.07	23.31	23.32
	810	20.66	20.66	23.29	23.61	23.69

Note:

Time slot average factor is as follows:

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

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

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

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

9.2 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.

9.2.1 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”.

9.2.2 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.

9.2.3 Body SAR Measurement

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

9.2.4 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 $\leq 75\%$ 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.

Sub-Test 1 Setup for Release 5 HSDPA

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	$\beta_{hs}^{(1)}$	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 $\beta_d = 15/15$.

3GPP Release Version	Mode	3GPP 34.121	Cellular Band [dBm]		
		Subtest	UL 4132 (826.4)	UL 4183 (836.6)	UL 4233 (846.6)
99	WCDMA	12.2 kbps RMC	22.35	22.17	22.35
99	WCDMA	12.2 kbps AMR	22.34	22.15	22.33
5	HSDPA	Subtest 1	22.16	22.12	22.31

3GPP Release Version	Mode	3GPP 34.121	PCS Band [dBm]		
		Subtest	UL 9262 (1852.4)	UL 9400 (1880.0)	UL 9538 (1907.6)
99	WCDMA	12.2 kbps RMC	21.50	21.30	21.17
99	WCDMA	12.2 kbps AMR	21.45	21.20	21.13
5	HSDPA	Subtest 1	21.24	21.29	21.15

WCDMA Average Conducted output powers

9.3 WiFi

9.3.1 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

80.11 a/b/g and 4.9 GHz operating modes are tested independently according to the service requirements in each frequency band. 80.211 b/g modes are tested on channels 1, 6 and 11. 802.11a is tested for UNII operations on channels 36 and 48 in the 5.15-5.25 GHz band; channels 52 and 64 in the 5.25-5.35 GHz band; Channels 104, 116, 124 and 136 in the 5.470-5.725 GHz band; and channels 149 and 161 in the 5.8 GHz band. When 5.8 GHz § 15.247 is also available, channels 149, 157 and 165 should be tested instead of the UNII channels. 4.9 GHz is tested on channels 1, 10 and 5 or 6, whichever has the higher output power, for 5 MHz channels; channels 11, 15 and 19 for 10 MHz channels; and channels 21 and 25 for 20 MHz channels.

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

Mode	GHz	Channel	Turbo Channel	"Default Test Channels"		
				§15.247	UNII	
802.11 b/g	2.412	1		√	√	
	2.437	6		√	√	
	2.462	11		√	√	
802.11a	5.18	36				√
	5.20	40	42 (5.21 GHz)			+
	5.22	44				+
	5.24	48	50 (5.25 GHz)			√
	5.26	52				√
	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				+
	5.620	124				√
	5.640	128				+
	5.660	132				+
	5.680	136				√
	5.700	140				+
	5.745	149		√		√
UNII or §15.247	5.785	153	152 (5.76 GHz)		+	+
	5.785	157		√		+
	5.805	161	160 (5.80 GHz)		+	√
§15.247	5.825	165		√		

802.11 Test Channels per FCC Requirements

Band	Channel	Conducted Power (dBm)			
		Data Rate (Mbps)			
		1	2	5.5	11
IEEE 802.11b	1	14.87	14.74	14.34	13.89
	6	14.40	14.21	13.72	13.29
	11	14.28	14.11	13.72	13.14

Average IEEE 802.11b Conducted output power

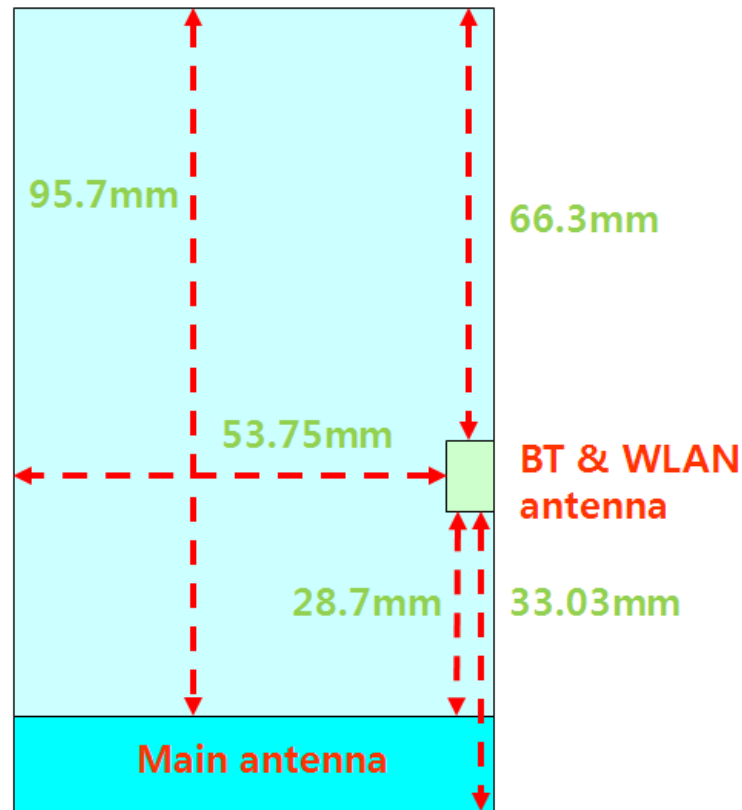
Band	Channel	Conducted Power (dBm)							
		Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
IEEE 802.11g	1	11.72	11.47	11.14	10.70	10.18	9.44	8.87	8.42
	6	11.28	10.82	10.55	9.86	9.43	8.79	8.21	7.87
	11	10.97	10.70	10.41	9.84	9.40	8.62	8.08	7.65

Average IEEE 802.11g Conducted output power

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

10. SAR Test configuration & Antenna Information

10.1 Antenna and Device Information



[Rear side View]

Note;

This device does not support Mobile Hotspot capability. So the Body Worn SAR was performed with Rear side 1.5 cm separation distance.

11. SAR Considerations for Multiple Transmitters and Antennas

11.1 SAR Evaluation Considerations

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

	2.45	5.15 - 5.35	5.47 - 5.85	GHz
P_{Ref}	12	6	5	mW
Device output power should be rounded to the nearest mW to compare with values specified in this				

Table. 12.1 Output Power Thresholds for Unlicensed Transmitters

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

SAR Evaluation Requirements for Multiple Transmitters Handsets

FCC ID: A3LGTS5270Y / BT Max. RF output power: 6.08 dBm (4.06 mW)

Antenna separation distance between Main and BT/ WLAN: 28.7 mm

WLAN Max. RF output power: Wi-Fi 802.11b (14.87 dBm) / Wi-Fi 802.11g (11.72 dBm)

11.2 SAR Summation Scenario

Simultaneous Transmission Summation for Held to Ear

Simultaneous TX	configuration	850 GSM SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	1900 GSM SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Left Cheek	0.453	0.333	0.786	Head SAR	Left Cheek	0.511	0.333	0.844
	Left Tilt	0.219	0.089	0.308		Left Tilt	0.213	0.089	0.302
	Right Cheek	0.449	0.68	1.129		Right Cheek	0.48	0.68	1.160
	Right Tilt	0.27	0.069	0.339		Right Tilt	0.182	0.069	0.251
Simultaneous TX	configuration	850 WCDMA SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	1900 WCDMA SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Left Cheek	0.402	0.333	0.735	Head SAR	Left Cheek	0.588	0.333	0.921
	Left Tilt	0.183	0.089	0.272		Left Tilt	0.235	0.089	0.324
	Right Cheek	0.356	0.68	1.036		Right Cheek	0.585	0.68	1.265
	Right Tilt	0.185	0.069	0.254		Right Tilt	0.223	0.069	0.292

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

Simultaneous Transmission Summation for Body-Worn (1.5cm)

Simultaneous TX	configuration	850 GSM SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	1900 GSM SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.582	0.022	0.604	Body SAR	Back	0.317	0.022	0.339
Simultaneous TX	configuration	850 WCDMA SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)	Simultaneous TX	configuration	1900 WCDMA SAR(W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.347	0.022	0.369	Body SAR	Back	0.215	0.022	0.237

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

Note;

Although body-worn accessory conditions are typically for voice configurations, the 2 TX GPRS slot for GSM850 and the 3 Tx GPRS slot for GSM1900 frame averaged output power was more conservative and was included for the body-worn accessory SAR assessment.

11.3 Simultaneous Transmission Conclusion

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

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

The conducted output power level of the BT transmitter is less than P_{ref} , the BT antenna is more than 2.5 cm from the other antenna, and licensed Transmitter SAR is less than 1.2 W/kg, therefore, a stand-alone BT SAR evaluation is not required.

11.4 Simultaneous Transmission possibility

No	Capable Tx Configuration	supported	NOT supported
1	WWAN Voice + BT	✓	
2	WWAN Voice + WLAN	✓	
3	WWAN Data + BT	✓	
4	WWAN Data + WLAN	✓	
5	BT + WLAN		✓
6	BT + WLAN + WWAN		✓

12. SAR TEST DATA SUMMARY

12.1 Measurement Results (GSM850 Head SAR)

Frequency		Modulation	Conducted Power Power Drift (dBm)	Power Drift (dB)	Battery	Phantom Position	SAR(mW/g)
MHz	Channel						
836.6	190 (Mid)	GSM850	32.40	0.001	Standard	Left Ear	0.453
			32.40	0.015	Standard	Left Tilt 15°	0.219
			32.40	-0.057	Standard	Right Ear	0.449
			32.40	-0.027	Standard	Right Tilt 15°	0.270
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram	

NOTES:

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

12.2 Measurement Results (GSM1900 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	SAR(mW/g)
MHz	Channel						
1 880.0	661 (Mid)	GSM1900	29.52	-0.072	Standard	Left Ear	0.511
			29.52	-0.066	Standard	Left Tilt 15°	0.213
			29.52	0.062	Standard	Right Ear	0.480
			29.52	0.081	Standard	Right Tilt 15°	0.182
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram	

NOTES:

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

12.3 Measurement Results (WCDMA850 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	SAR(mW/g)
MHz	Channel						
836.6	4183 (Mid)	WCDMA850	22.17	-0.084	Standard	Left Ear	0.402
836.6	4183 (Mid)	WCDMA850	22.17	-0.064	Standard	Left Tilt 15°	0.183
836.6	4183 (Mid)	WCDMA850	22.17	0.085	Standard	Right Ear	0.356
836.6	4183 (Mid)	WCDMA850	22.17	-0.009	Standard	Right Tilt 15°	0.185
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram	

NOTES:

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

12.4 Measurement Results (WCDMA1900 Head SAR)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	SAR(mW/g)
MHz	Channel		Begin	End			
1 880.0	9400 (Mid)	WCDMA1900	21.30	-0.041	Standard	Left Ear	0.588
1 880.0	9400 (Mid)	WCDMA1900	21.30	-0.066	Standard	Left Tilt 15°	0.235
1 880.0	9400 (Mid)	WCDMA1900	21.30	-0.029	Standard	Right Ear	0.585
1 880.0	9400 (Mid)	WCDMA1900	21.30	-0.093	Standard	Right Tilt 15°	0.223
ANSI/ IEEE C95.1 - 2005- Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram	

NOTES:

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

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

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	SAR(mW/g)
MHz	Channel						
2 412	1 (Low)	802.11b	14.87	-0.01	Standard	Left Ear	0.333
			14.87	-0.005	Standard	Left Tilt 15°	0.089
			14.87	-0.093	Standard	Right Ear	0.680
			14.87	0.056	Standard	Right Tilt 15	0.069
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram	

NOTES:

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- All modes of operation were investigated and the worst-case are reported.
- Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- Tissue parameters and temperatures are listed on the SAR plot.
- Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
- Test Signal Call Mode ☒ Manual Test cord ☐ Base Station Simulator
- IEEE 802.11g(including 802.11n) SAR testing is required when the conducted powers are equal to or greater than 0.25 dB Than the conducted powers in IEEE 802.11b.
- For 2.4GHz WLAN, Highest average power channel for the lowest data rate was selected for SAR evaluation based on KDB 248227. Other channels are not necessary because 1g-average SAR < 0.8 W/Kg and peak SAR < 1.6W/Kg per KDB 248227.

12.6 Measurement Results (GSM850 Body-worn SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	SAR(mW/g)
MHz	Channel						
836.6	190 (Mid)	GPRS 3Tx	30.32	-0.064	Rear	1.5 cm	0.582
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram	

NOTES:

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- All modes of operation were investigated and the worst-case are reported.
- Measured Depth of Simulating Tissue is 15.0 cm $\pm$ 0.2 cm.
- Tissue parameters and temperatures are listed on the SAR plot.
- Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
- Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
- Test Configuration ☐ With Holster ☒ Without Holster
- Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
- For body SAR testing, the EUT was set in GPRS multi-slot class11 with 3uplink slots for GSM850 due to maximum source-based time-averaged output power.
According to the KDB 941225 D03 SAR test reduction GSM/GPRS/EDGE, the maximum output power configuration were chosen for Body SAR testing.

12.7 Measurement Results (GSM1900 Body-worn SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	SAR(mW/g)
MHz	Channel						
1880.0	661 (Mid)	GPRS 4Tx	26.33	-0.088	Rear	1.5 cm	0.317
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram	

NOTES:

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- All modes of operation were investigated and the worst-case are reported.
- Measured Depth of Simulating Tissue is 15.0 cm $\pm$ 0.2 cm.
- Tissue parameters and temperatures are listed on the SAR plot.
- Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
- Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
- Test Configuration ☐ With Holster ☒ Without Holster
- Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
- For body SAR testing, the EUT was set in GPRS multi-slot class12 with 4uplink 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 Body-worn SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	SAR(mW/g)
MHz	Channel						
836.6	4183 (Mid)	WCDMA850	22.17	-0.018	Rear	1.5 cm	0.347
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					Body 1.6 W/kg (mW/g) Averaged over 1 gram		

NOTES:

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

12.9 Measurement Results (WCDMA1900 Body-worn SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	SAR(mW/g)
MHz	Channel						
1 880.0	9400 (Mid)	WCDMA1900	21.30	-0.076	Rear	1.5 cm	0.215
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram	

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

12.10 Measurement Results (802.11b/g/n Body-worn SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	Data Rate	SAR(mW/g)
MHz	Channel							
2 412	1 (Low)	802.11b	14.87	0.091	Rear	1.5 cm	1 Mbps	0.022
ANSI/ IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram		

NOTES:

- The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- All modes of operation were investigated and the worst-case are reported.
- Measured Depth of Simulating Tissue is 15.0 cm $\pm$ 0.2 cm.
- Tissue parameters and temperatures are listed on the SAR plot.
- Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
- Test Signal Call Mode ☒ Manual Test code ☐ Base Station Simulator
- IEEE 802.11g(including 802.11n) SAR testing is required when the conducted powers are equal to or greater than 0.25 dB Than the conducted powers in IEEE 802.11b.
- For 2.4GHz WLAN, Highest average power channel for the lowest data rate was selected for SAR evaluation based on KDB 248227. Other channels are not necessary because 1g-average SAR < 0.8 W/Kg and peak SAR < 1.6W/Kg per KDB 248227.

13. CONCLUSION

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

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

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Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.904$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ 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(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

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

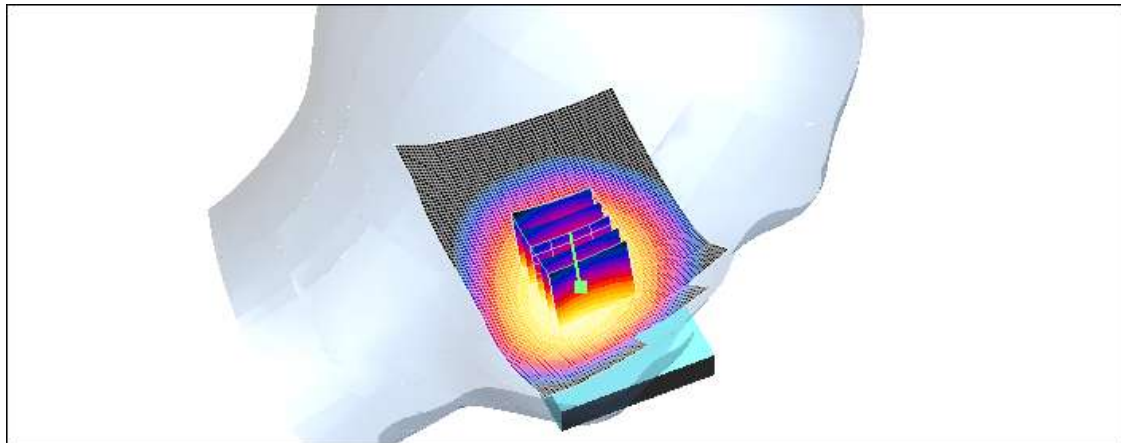
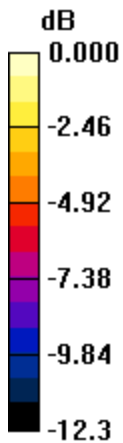
Maximum value of SAR (interpolated) = 0.487 mW/g

Left touch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.08 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 0.630 W/kg

SAR(1 g) = 0.453 mW/g; SAR(10 g) = 0.310 mW/g

Maximum value of SAR (measured) = 0.485 mW/g



0 dB = 0.485mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.904$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ 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(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

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

Maximum value of SAR (interpolated) = 0.227 mW/g

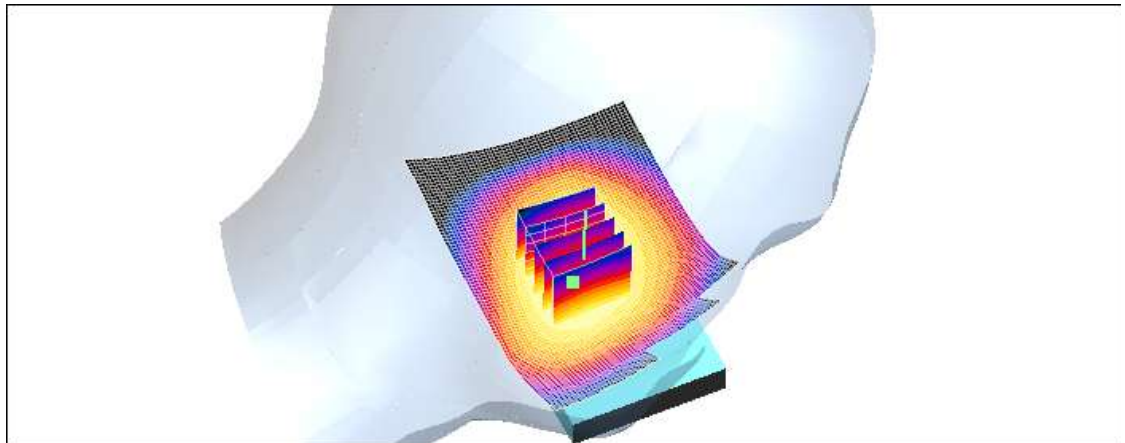
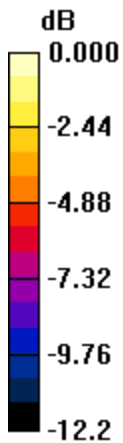
Left tilt 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.16 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 0.292 W/kg

SAR(1 g) = 0.219 mW/g; SAR(10 g) = 0.154 mW/g

Maximum value of SAR (measured) = 0.228 mW/g



0 dB = 0.228mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.904$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ 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(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

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

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

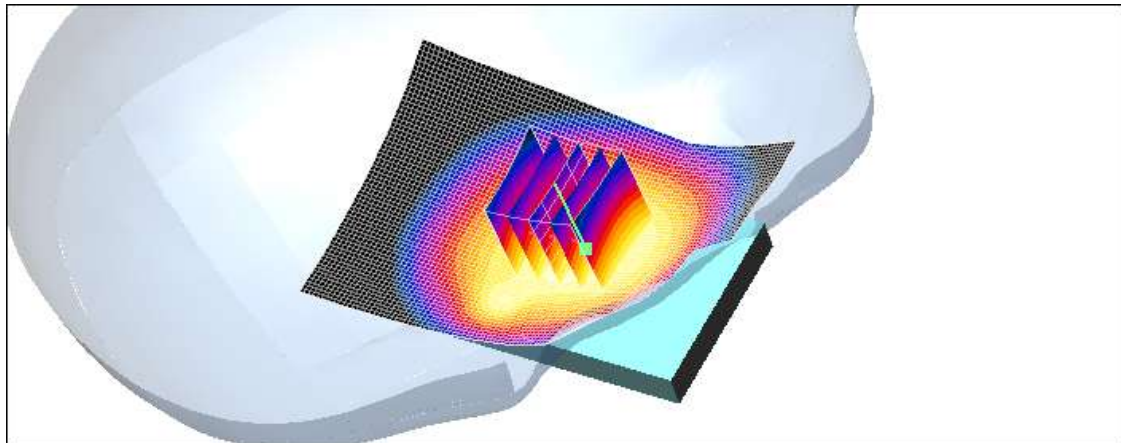
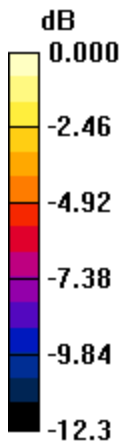
Right touch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.65 V/m; Power Drift = -0.057 dB

Peak SAR (extrapolated) = 0.606 W/kg

SAR(1 g) = 0.449 mW/g; SAR(10 g) = 0.312 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, WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.904$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ 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(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

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

Maximum value of SAR (interpolated) = 0.284 mW/g

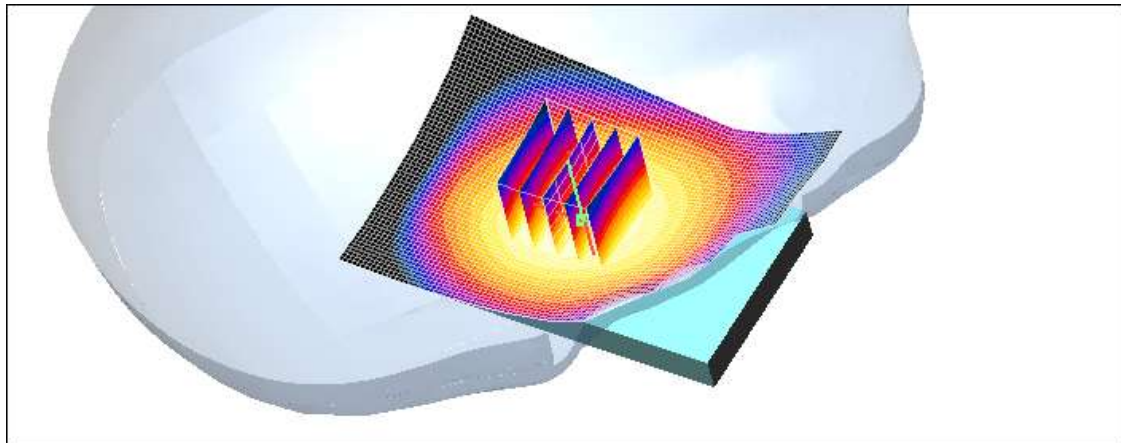
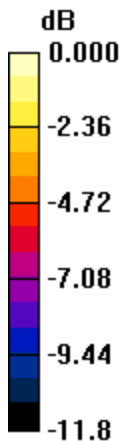
Right tilt 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.37 V/m; Power Drift = -0.027 dB

Peak SAR (extrapolated) = 0.365 W/kg

SAR(1 g) = 0.270 mW/g; SAR(10 g) = 0.189 mW/g

Maximum value of SAR (measured) = 0.283 mW/g



0 dB = 0.283mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

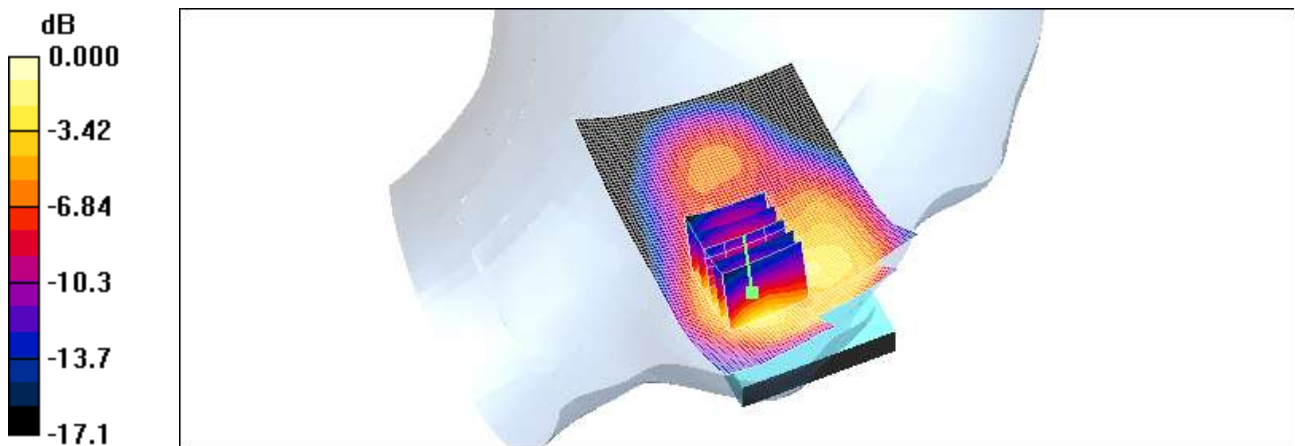
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left touch 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.577 mW/g

Left touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.50 V/m; Power Drift = -0.072 dB
Peak SAR (extrapolated) = 0.784 W/kg
SAR(1 g) = 0.511 mW/g; SAR(10 g) = 0.299 mW/g
Maximum value of SAR (measured) = 0.563 mW/g



0 dB = 0.563mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

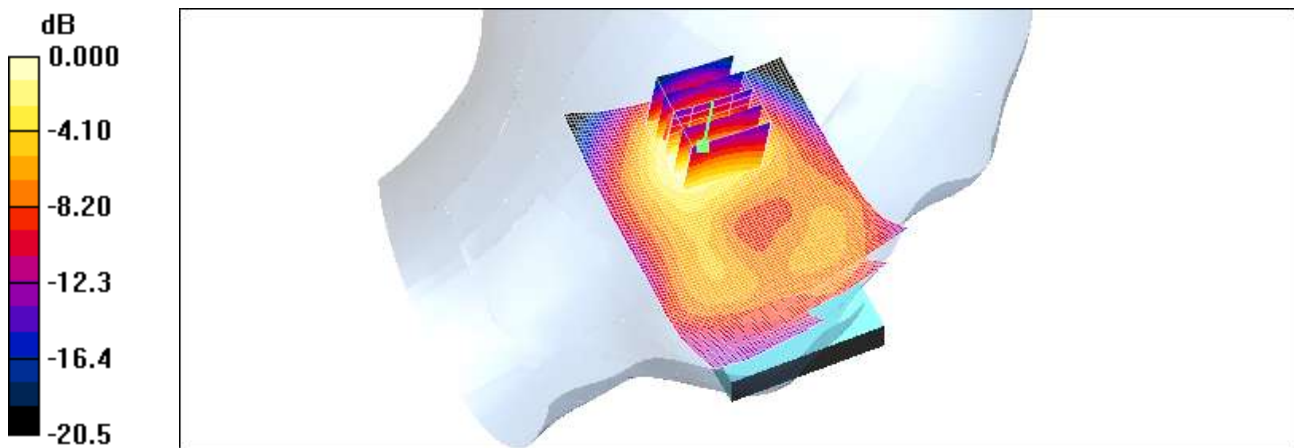
DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.37 \text{ mho/m}$; $\epsilon_r = 39.2$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
 - Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn466; Calibrated: 2011-03-01
 - Phantom: SAM 1800/1900 MHz; Type: SAM

Left tilt 661/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 0.236 mW/g

Left tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 11.7 V/m; Power Drift = -0.066 dB
 Peak SAR (extrapolated) = 0.356 W/kg
SAR(1 g) = 0.213 mW/g; SAR(10 g) = 0.123 mW/g
 Maximum value of SAR (measured) = 0.230 mW/g



0 dB = 0.230mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

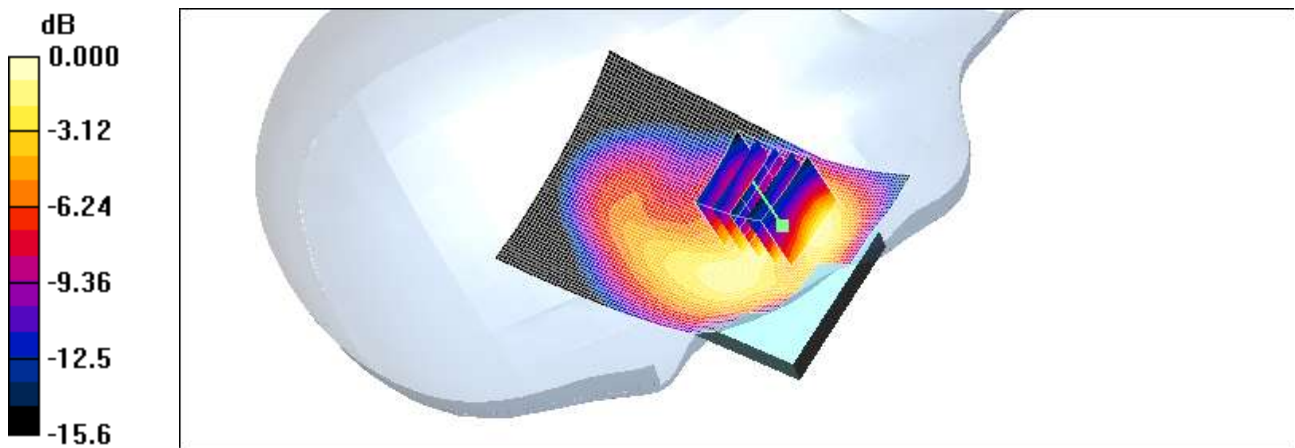
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.37 \text{ mho/m}$; $\epsilon_r = 39.2$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 661/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 0.512 mW/g

Right touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 7.46 V/m; Power Drift = 0.062 dB
 Peak SAR (extrapolated) = 0.786 W/kg
SAR(1 g) = 0.480 mW/g; SAR(10 g) = 0.275 mW/g
 Maximum value of SAR (measured) = 0.514 mW/g



0 dB = 0.514mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

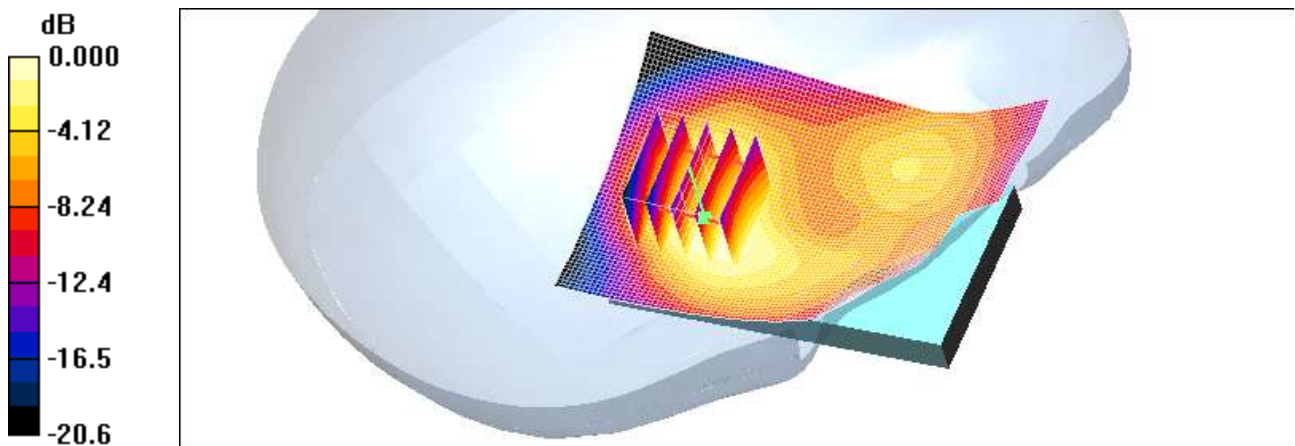
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right tilt 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.219 mW/g

Right tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.45 V/m; Power Drift = 0.081 dB
Peak SAR (extrapolated) = 0.290 W/kg
SAR(1 g) = 0.182 mW/g; SAR(10 g) = 0.111 mW/g
Maximum value of SAR (measured) = 0.198 mW/g



0 dB = 0.198mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.2 °C
 Ambient Temperature: 21.4 °C
 Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
 Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.904 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 4183/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

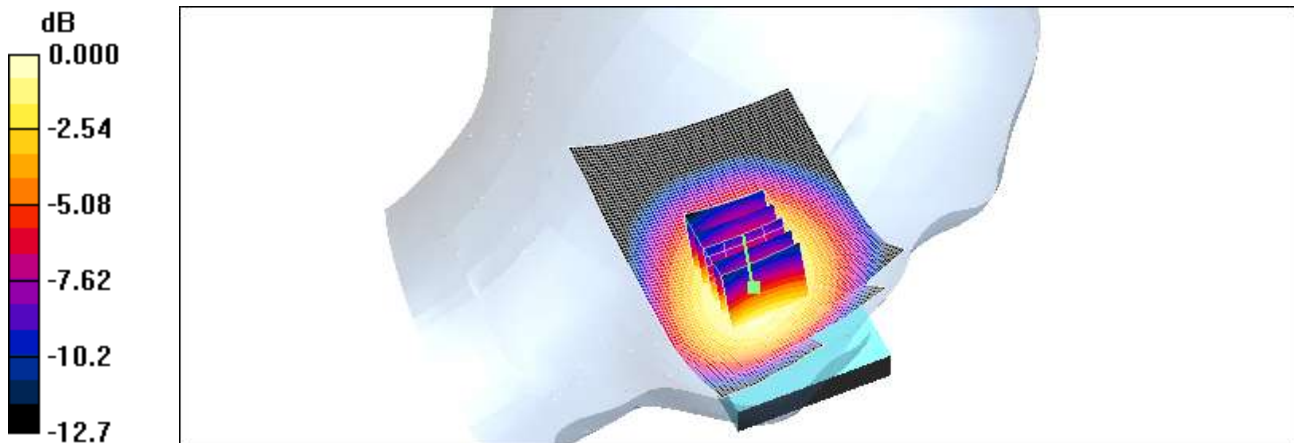
Left touch 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 5.35 V/m; Power Drift = -0.084 dB

Peak SAR (extrapolated) = 0.558 W/kg

SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.275 mW/g

Maximum value of SAR (measured) = 0.430 mW/g



0 dB = 0.430mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.904 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Left tilt 4183/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.198 mW/g

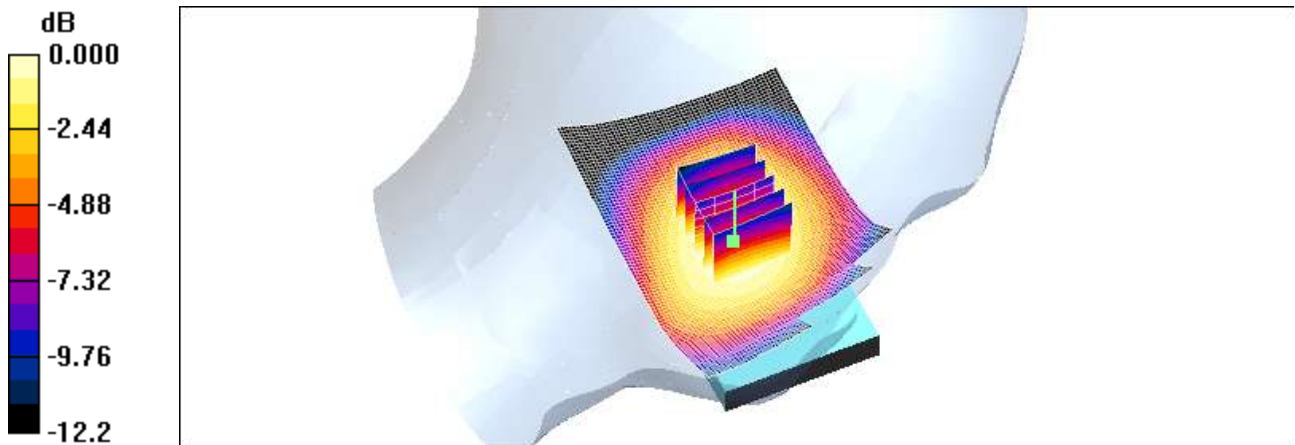
Left tilt 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 7.27 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 0.248 W/kg

SAR(1 g) = 0.183 mW/g; SAR(10 g) = 0.128 mW/g

Maximum value of SAR (measured) = 0.193 mW/g



0 dB = 0.193mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.2 °C
 Ambient Temperature: 21.4 °C
 Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
 Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.904 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 4183/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.380 mW/g

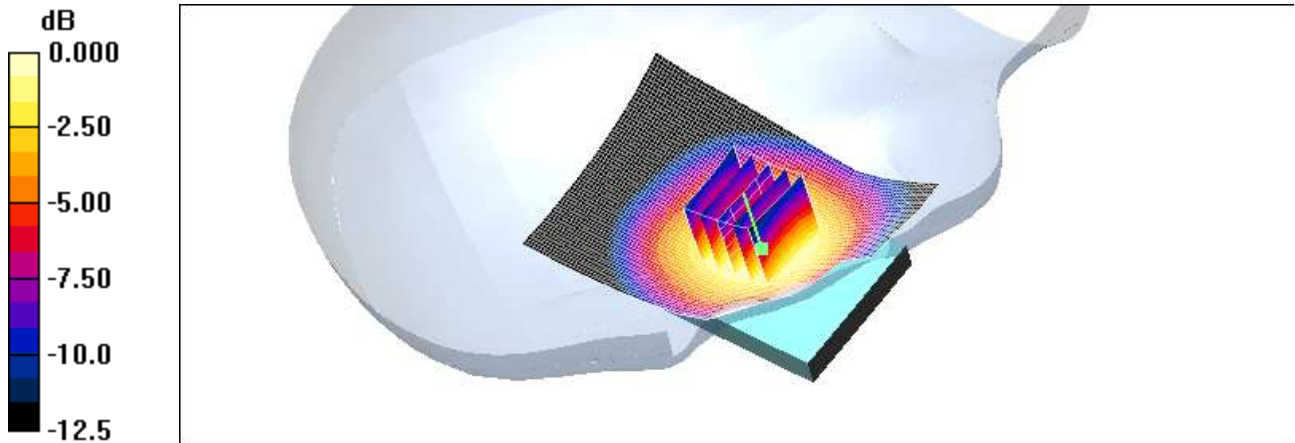
Right touch 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 4.18 V/m; Power Drift = 0.085 dB

Peak SAR (extrapolated) = 0.482 W/kg

SAR(1 g) = 0.356 mW/g; SAR(10 g) = 0.246 mW/g

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



0 dB = 0.378mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.904$ mho/m; $\epsilon_r = 43$; $\rho = 1000$ 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(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

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

Maximum value of SAR (interpolated) = 0.197 mW/g

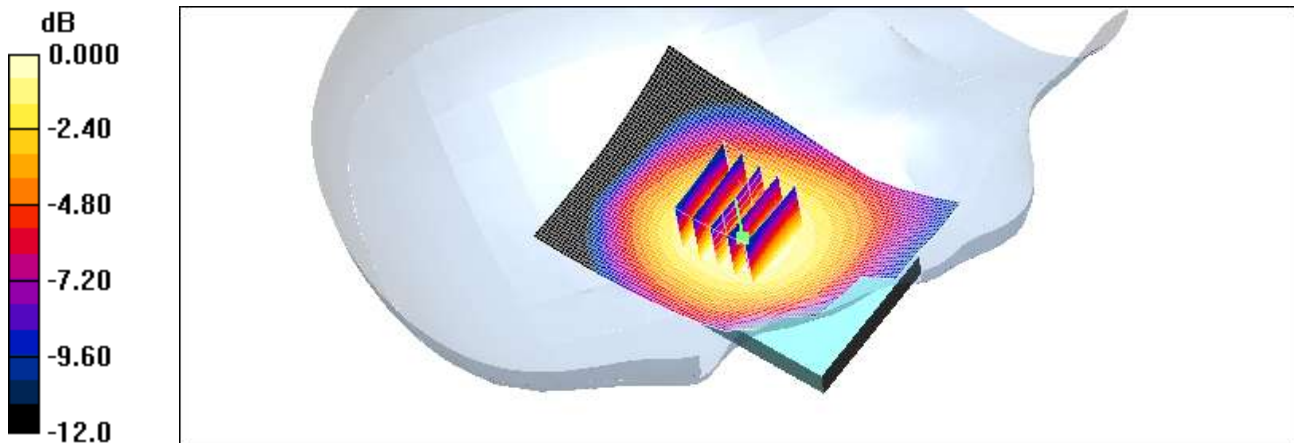
Right tilt 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.59 V/m; Power Drift = -0.009 dB

Peak SAR (extrapolated) = 0.251 W/kg

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

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



0 dB = 0.195mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

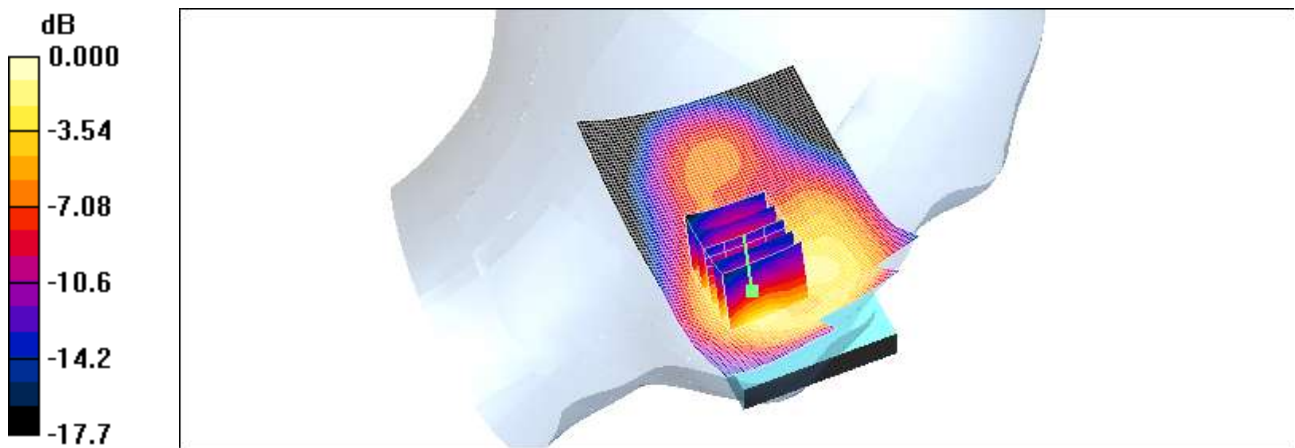
DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.37 \text{ mho/m}$; $\epsilon_r = 39.2$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
 - Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn466; Calibrated: 2011-03-01
 - Phantom: SAM 1800/1900 MHz; Type: SAM

Left touch 9400/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 0.680 mW/g

Left touch 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 9.92 V/m; Power Drift = -0.041 dB
 Peak SAR (extrapolated) = 0.931 W/kg
SAR(1 g) = 0.588 mW/g; SAR(10 g) = 0.339 mW/g
 Maximum value of SAR (measured) = 0.648 mW/g



0 dB = 0.648mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

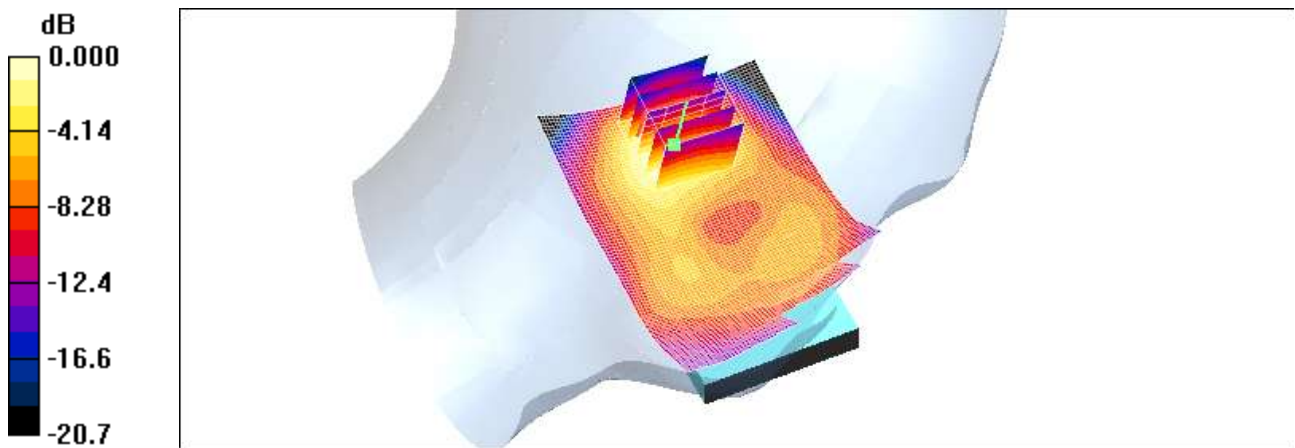
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left tilt 9400/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.260 mW/g

Left tilt 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.9 V/m; Power Drift = -0.066 dB
Peak SAR (extrapolated) = 0.395 W/kg
SAR(1 g) = 0.235 mW/g; SAR(10 g) = 0.134 mW/g
Maximum value of SAR (measured) = 0.257 mW/g



0 dB = 0.257mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.37 \text{ mho/m}$; $\epsilon_r = 39.2$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

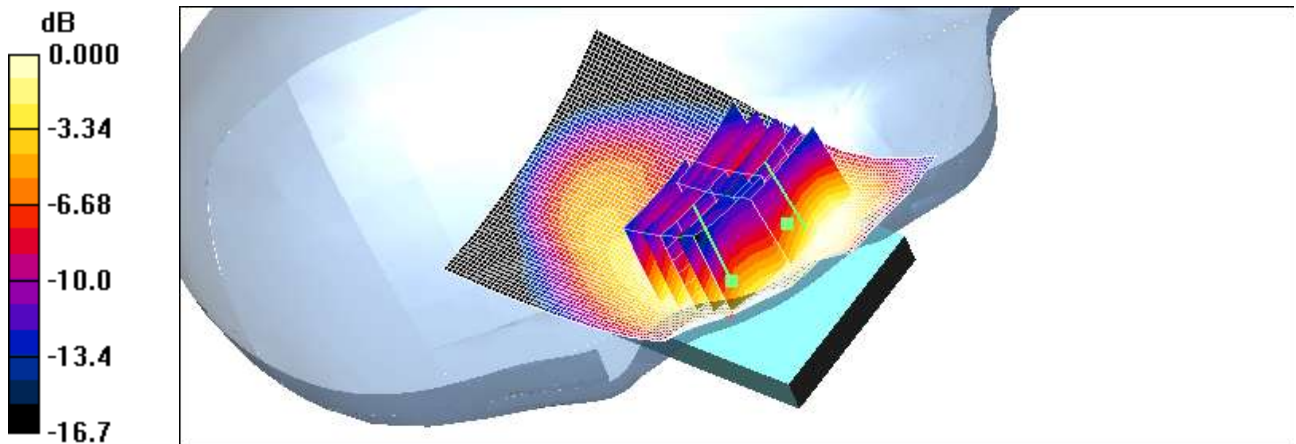
DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 9400/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 0.629 mW/g

Right touch 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 9.20 V/m; Power Drift = -0.029 dB
 Peak SAR (extrapolated) = 0.968 W/kg
SAR(1 g) = 0.585 mW/g; SAR(10 g) = 0.335 mW/g
 Maximum value of SAR (measured) = 0.625 mW/g

Right touch 9400/Zoom Scan (5x5x7)/Cube 1: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 9.20 V/m; Power Drift = -0.029 dB
 Peak SAR (extrapolated) = 0.696 W/kg
SAR(1 g) = 0.448 mW/g; SAR(10 g) = 0.274 mW/g
 Maximum value of SAR (measured) = 0.474 mW/g



0 dB = 0.474mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

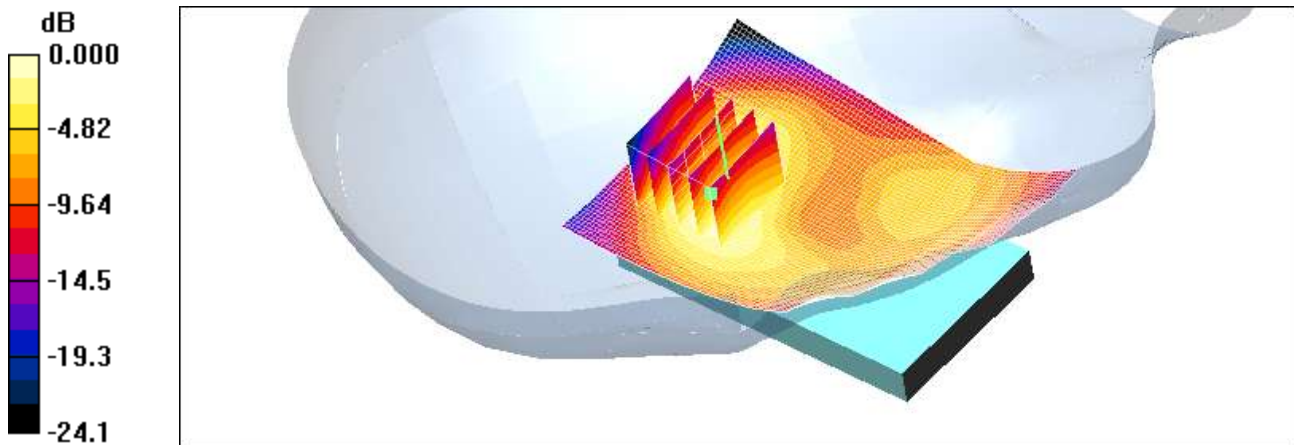
DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.37 \text{ mho/m}$; $\epsilon_r = 39.2$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
 - Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn466; Calibrated: 2011-03-01
 - Phantom: SAM 1800/1900 MHz; Type: SAM

Right tilt 9400/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 0.261 mW/g

Right tilt 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 11.7 V/m; Power Drift = -0.093 dB
 Peak SAR (extrapolated) = 0.363 W/kg
SAR(1 g) = 0.223 mW/g; SAR(10 g) = 0.132 mW/g
 Maximum value of SAR (measured) = 0.238 mW/g



0 dB = 0.238mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
 Medium parameters used (interpolated): $f = 2412 \text{ MHz}$; $\sigma = 1.8 \text{ mho/m}$; $\epsilon_r = 38.8$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

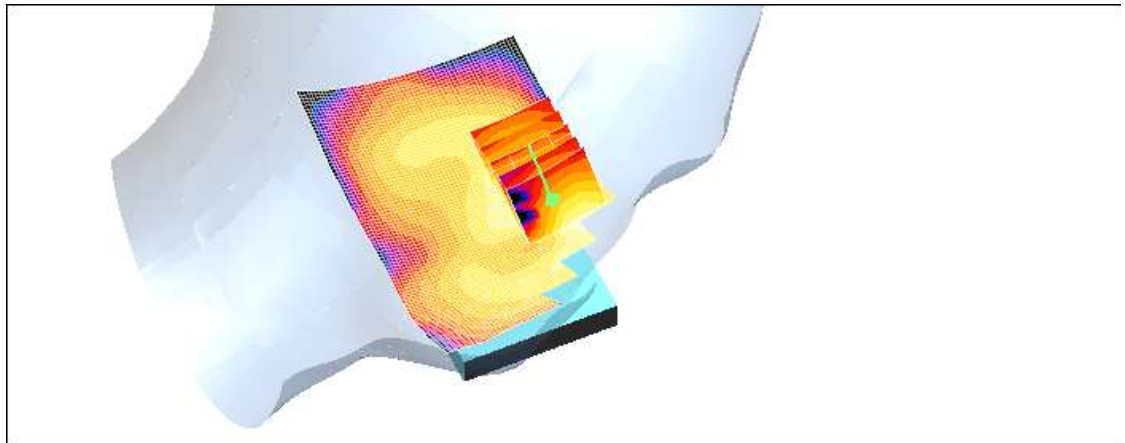
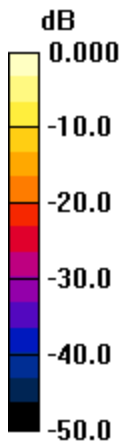
DASY4 Configuration:
 - Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn466; Calibrated: 2011-03-01
 - Phantom: 1800/1900 Phantom; Type: SAM

Left touch 1/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.386 mW/g

Left touch 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 3.66 V/m; Power Drift = -0.01 dB
 Peak SAR (extrapolated) = 0.708 W/kg
SAR(1 g) = 0.333 mW/g; SAR(10 g) = 0.152 mW/g

Maximum value of SAR (measured) = 0.391 mW/g



0 dB = 0.391mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
 Medium parameters used (interpolated): $f = 2412 \text{ MHz}$; $\sigma = 1.8 \text{ mho/m}$; $\epsilon_r = 38.8$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Left tilt 1/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

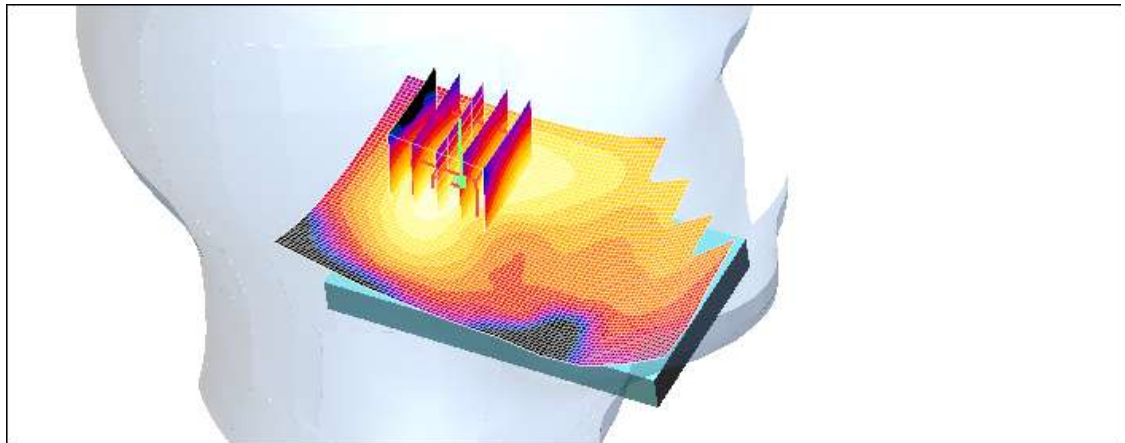
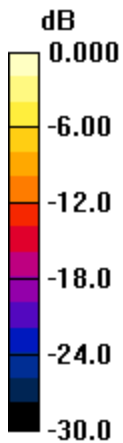
Maximum value of SAR (interpolated) = 0.104 mW/g

Left tilt 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 4.62 V/m; Power Drift = -0.005 dB

Peak SAR (extrapolated) = 0.169 W/kg

SAR(1 g) = 0.089 mW/g; SAR(10 g) = 0.045 mW/g

Maximum value of SAR (measured) = 0.098 mW/g



0 dB = 0.098mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.8$ mho/m; $\epsilon_r = 38.8$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 1/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.922 mW/g

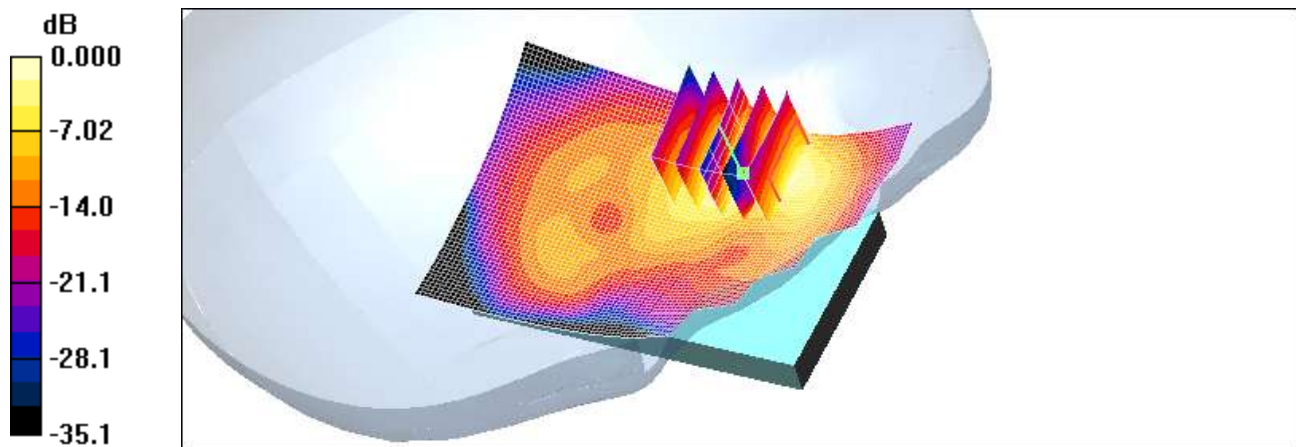
Right touch 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.66 V/m; Power Drift = -0.093 dB

Peak SAR (extrapolated) = 1.89 W/kg

SAR(1 g) = 0.680 mW/g; SAR(10 g) = 0.257 mW/g

Maximum value of SAR (measured) = 0.840 mW/g



0 dB = 0.840mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

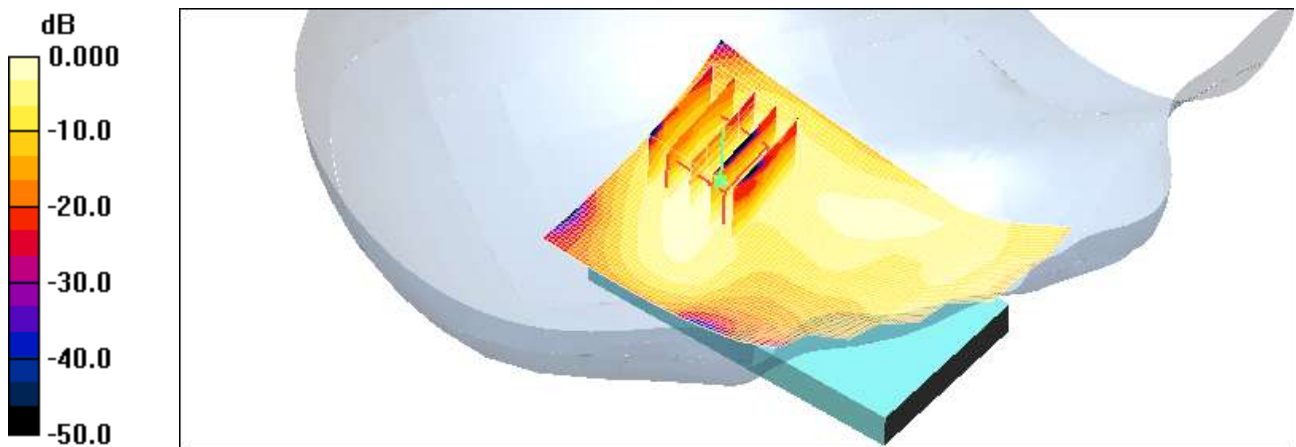
Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
 Medium parameters used (interpolated): $f = 2412 \text{ MHz}$; $\sigma = 1.8 \text{ mho/m}$; $\epsilon_r = 38.8$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
 - Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn466; Calibrated: 2011-03-01
 - Phantom: 1800/1900 Phantom; Type: SAM

Right tilt 1/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.067 mW/g

Right tilt 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 5.16 V/m; Power Drift = 0.056 dB
 Peak SAR (extrapolated) = 0.137 W/kg
SAR(1 g) = 0.069 mW/g; SAR(10 g) = 0.034 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, WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2.77
Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.971$ mho/m; $\epsilon_r = 54.5$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

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

Maximum value of SAR (interpolated) = 0.617 mW/g

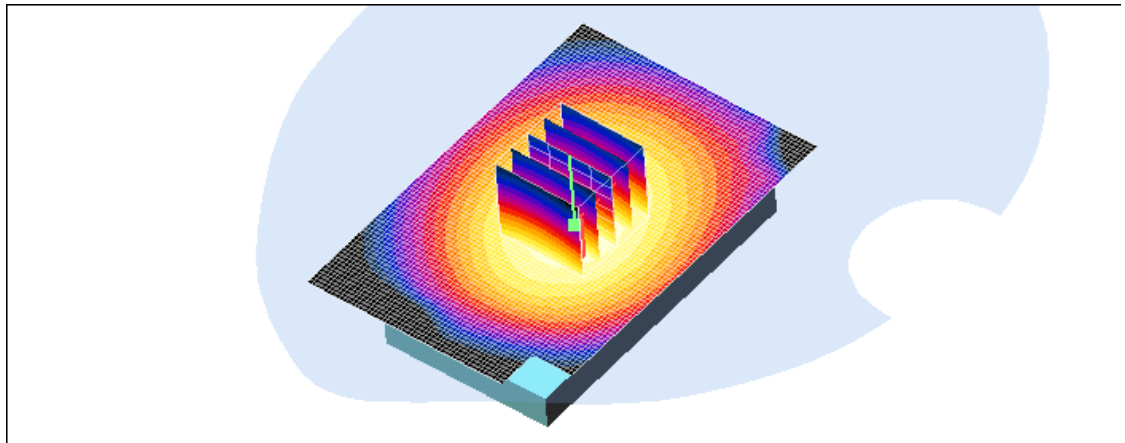
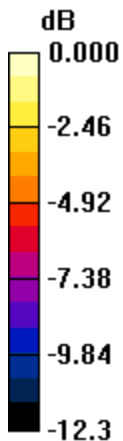
Body 190 Rear /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.0 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 0.846 W/kg

SAR(1 g) = 0.582 mW/g; SAR(10 g) = 0.390 mW/g

Maximum value of SAR (measured) = 0.619 mW/g



0 dB = 0.619mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

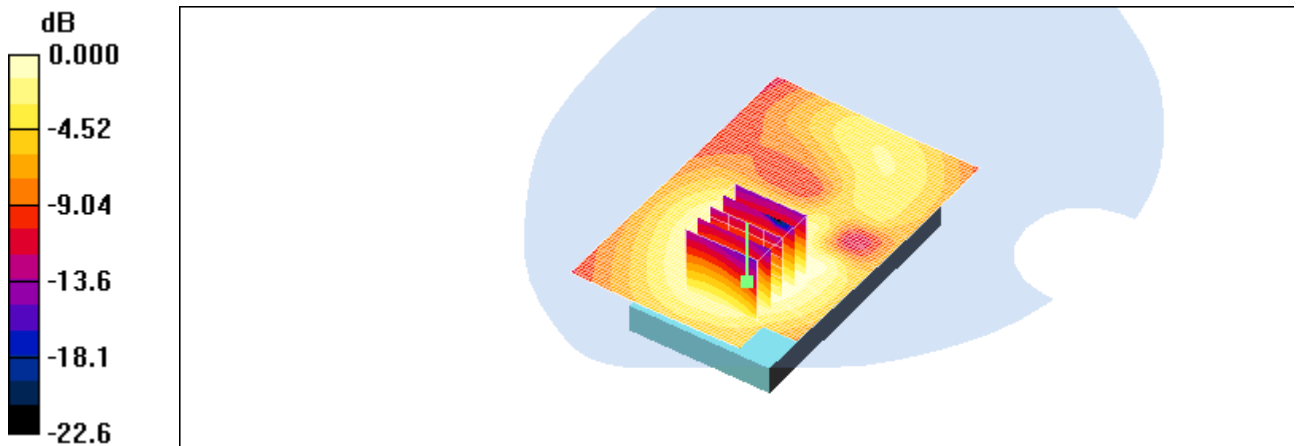
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:2.075
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.43 \text{ mho/m}$; $\epsilon_r = 54.3$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Body 661 Rear /Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 0.347 mW/g

Body 661 Rear /Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 10.3 V/m; Power Drift = -0.088 dB
Peak SAR (extrapolated) = 0.760 W/kg
SAR(1 g) = 0.317 mW/g; SAR(10 g) = 0.191 mW/g
Maximum value of SAR (measured) = 0.337 mW/g



0 dB = 0.337mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.2 °C
Ambient Temperature: 21.4 °C
Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.971 \text{ mho/m}$; $\epsilon_r = 54.5$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

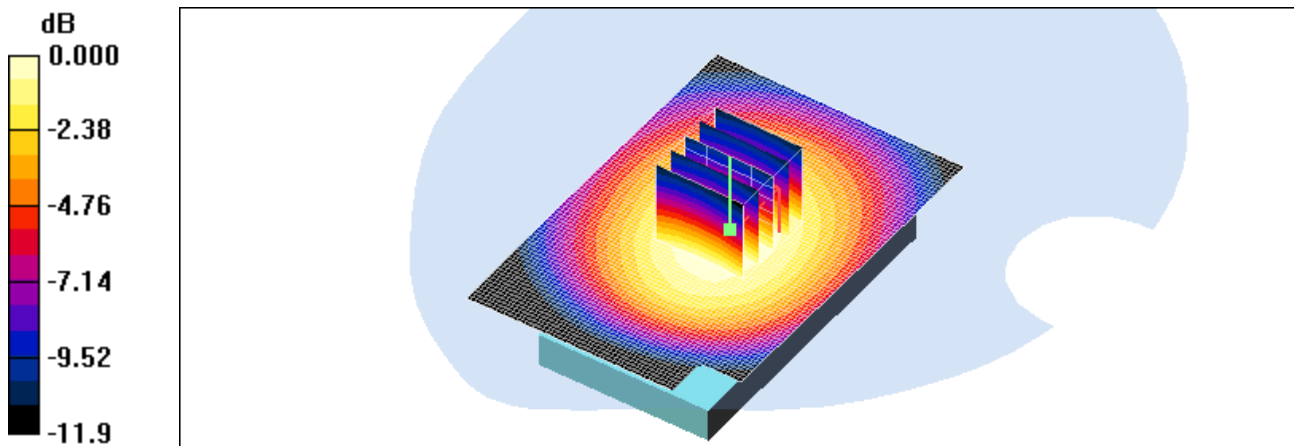
DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

Body 4183 Rear /Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.371 mW/g

Body 4183 Rear /Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 11.2 V/m; Power Drift = -0.018 dB
Peak SAR (extrapolated) = 0.507 W/kg
SAR(1 g) = 0.347 mW/g; SAR(10 g) = 0.232 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, WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

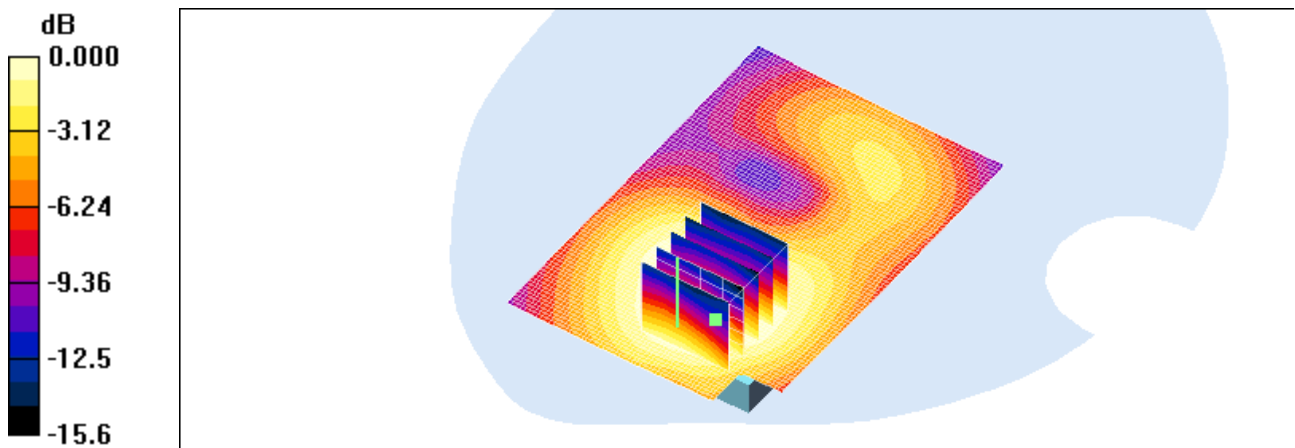
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.43 \text{ mho/m}$; $\epsilon_r = 54.3$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Body 9400 Rear/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 0.244 mW/g

Body 9400 Rear/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 9.19 V/m; Power Drift = -0.076 dB
Peak SAR (extrapolated) = 0.339 W/kg
SAR(1 g) = 0.215 mW/g; SAR(10 g) = 0.135 mW/g
Maximum value of SAR (measured) = 0.230 mW/g



0 dB = 0.230mW/g

Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.83$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 835/900 Phantom ; Type: SAM

Body 1ch. 1 Mbps Rear/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.026 mW/g

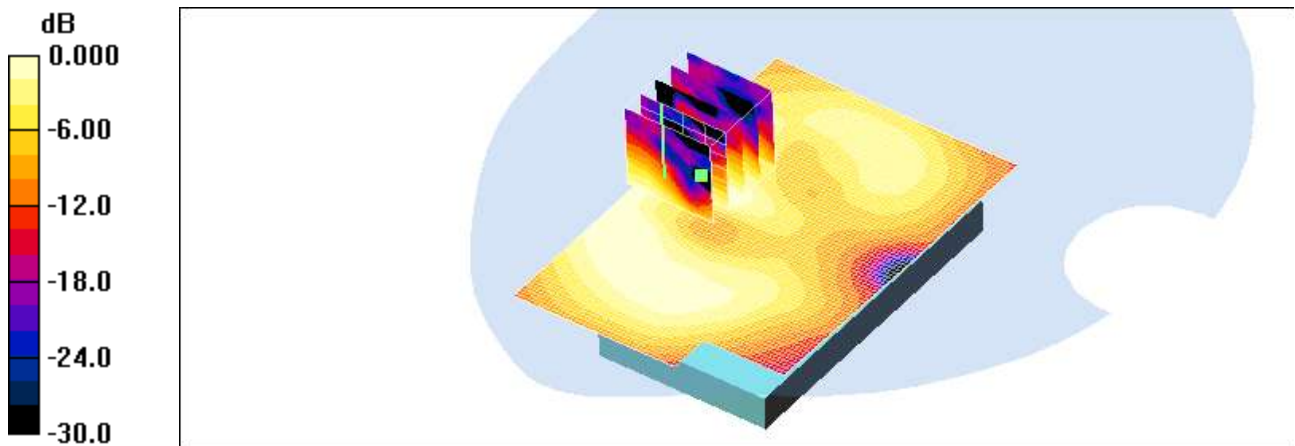
Body 1ch. 1Mbps Rear/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.62 V/m; Power Drift = 0.091 dB

Peak SAR (extrapolated) = 0.042 W/kg

SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.011 mW/g

Maximum value of SAR (measured) = 0.024 mW/g



0 dB = 0.024mW/g

Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.2 °C
 Ambient Temperature: 21.4 °C
 Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
 Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.904 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
 - Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn466; Calibrated: 2011-03-01
 - Phantom: SAM 835/900 MHz; Type: SAM

Left touch 190/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.487 mW/g

Left touch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 6.08 V/m; Power Drift = 0.001 dB
 Peak SAR (extrapolated) = 0.630 W/kg
SAR(1 g) = 0.453 mW/g; SAR(10 g) = 0.310 mW/g

Maximum value of SAR (measured) = 0.485 mW/g



Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.2 °C
 Ambient Temperature: 21.4 °C
 Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2.77
 Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.971$ mho/m; $\epsilon_r = 54.5$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

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

Maximum value of SAR (interpolated) = 0.617 mW/g

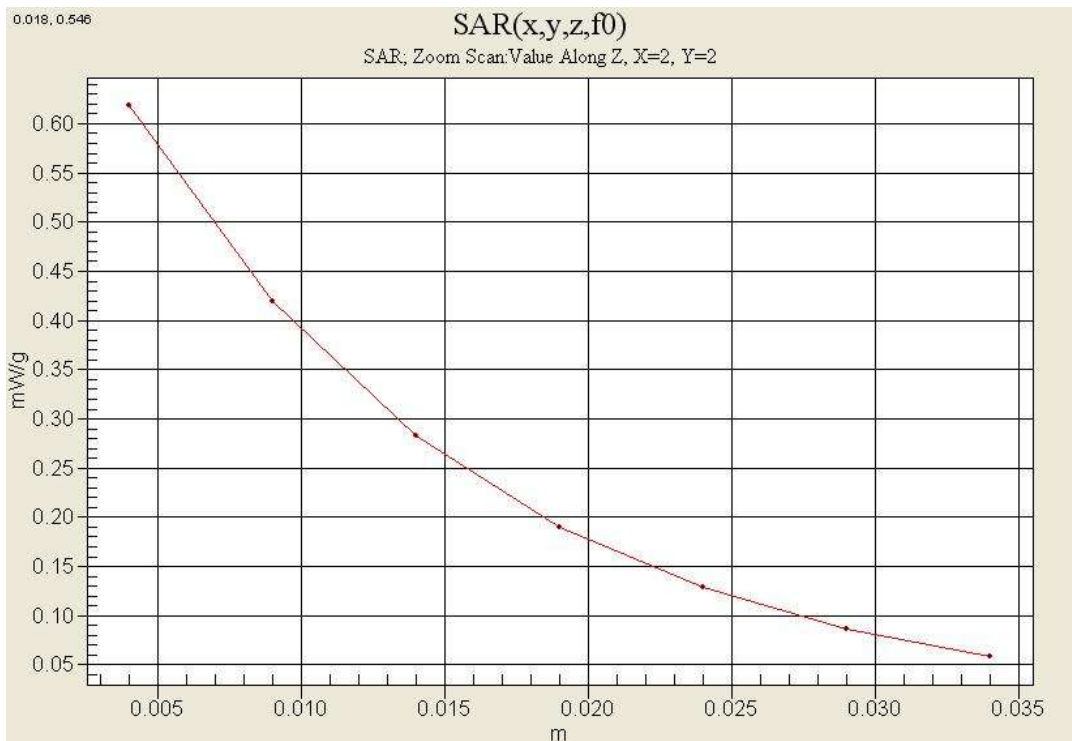
Body 190 Rear/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.0 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 0.846 W/kg

SAR(1 g) = 0.582 mW/g; SAR(10 g) = 0.390 mW/g

Maximum value of SAR (measured) = 0.619 mW/g



Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

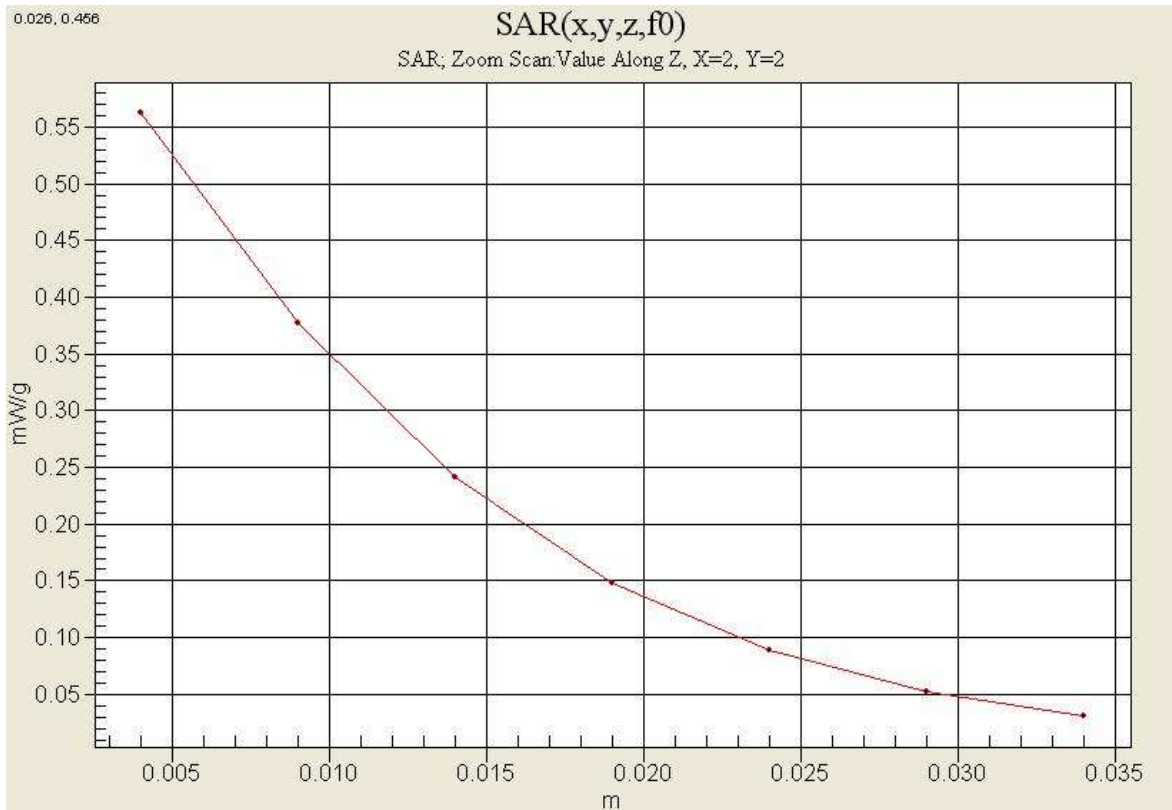
DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.37 \text{ mho/m}$; $\epsilon_r = 39.2$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
 - Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn466; Calibrated: 2011-03-01
 - Phantom: SAM 1800/1900 MHz; Type: SAM

Left touch 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.577 mW/g

Left touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 8.50 V/m; Power Drift = -0.072 dB
 Peak SAR (extrapolated) = 0.784 W/kg
SAR(1 g) = 0.511 mW/g; SAR(10 g) = 0.299 mW/g
 Maximum value of SAR (measured) = 0.563 mW/g



Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

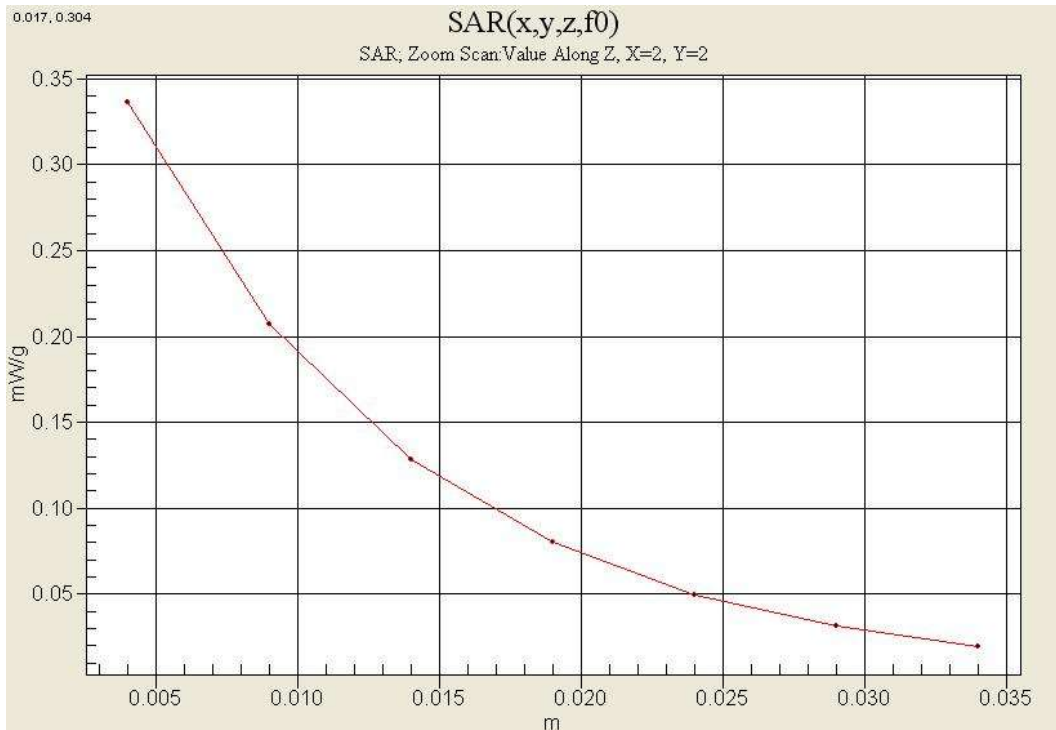
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:2.075
 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.43 \text{ mho/m}$; $\epsilon_r = 54.3$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Body 661 Rear/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 0.347 mW/g

Body 661 Rear/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 10.3 V/m; Power Drift = -0.088 dB
 Peak SAR (extrapolated) = 0.760 W/kg
SAR(1 g) = 0.317 mW/g; SAR(10 g) = 0.191 mW/g
 Maximum value of SAR (measured) = 0.337 mW/g



Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.2 °C
 Ambient Temperature: 21.4 °C
 Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
 Medium parameters used (interpolated): $f = 836.6 \text{ MHz}$; $\sigma = 0.904 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8
 Build 184

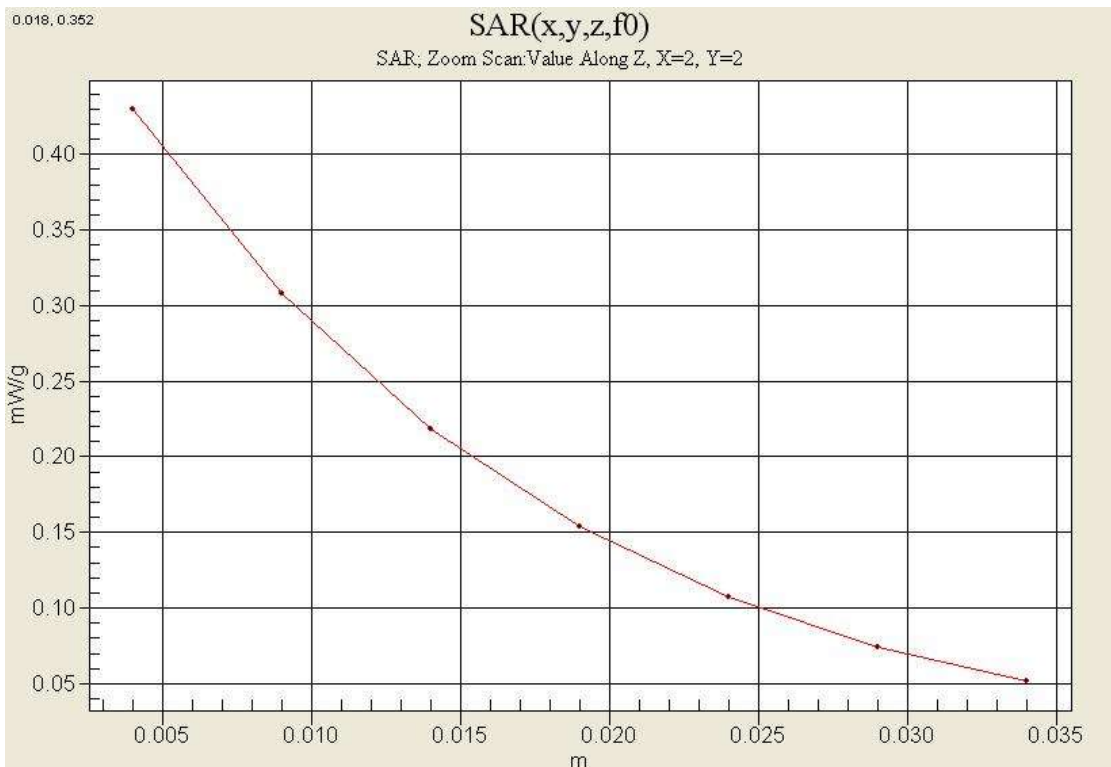
DASY4 Configuration:
 - Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn466; Calibrated: 2011-03-01
 - Phantom: SAM 835/900 MHz; Type: SAM

Left touch 4183/Area Scan (61x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Left touch 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 5.35 V/m; Power Drift = -0.084 dB
 Peak SAR (extrapolated) = 0.558 W/kg
SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.275 mW/g

Maximum value of SAR (measured) = 0.430 mW/g



Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.2 °C
 Ambient Temperature: 21.4 °C
 Test Date: Dec. 13, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
 Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.971$ mho/m; $\epsilon_r = 54.5$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

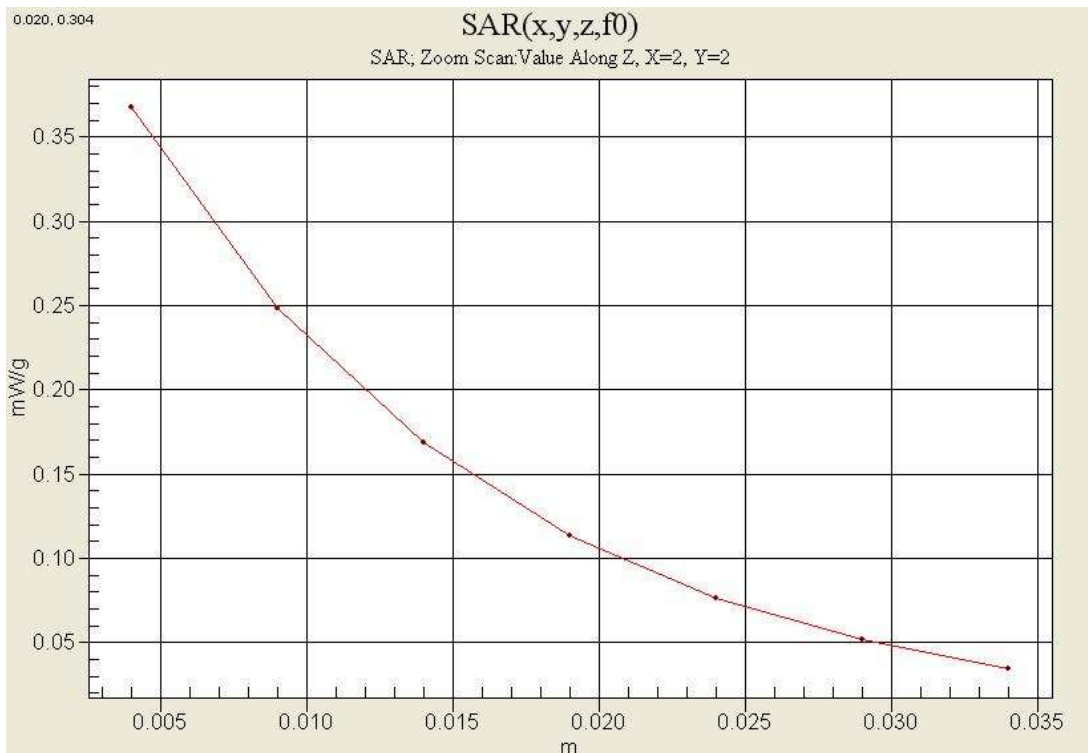
DASY4 Configuration:
 - Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn466; Calibrated: 2011-03-01
 - Phantom: SAM 835/900 MHz; Type: SAM

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

Maximum value of SAR (interpolated) = 0.371 mW/g

Body 4183 Rear/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 11.2 V/m; Power Drift = -0.018 dB
 Peak SAR (extrapolated) = 0.507 W/kg
SAR(1 g) = 0.347 mW/g; SAR(10 g) = 0.232 mW/g

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



Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

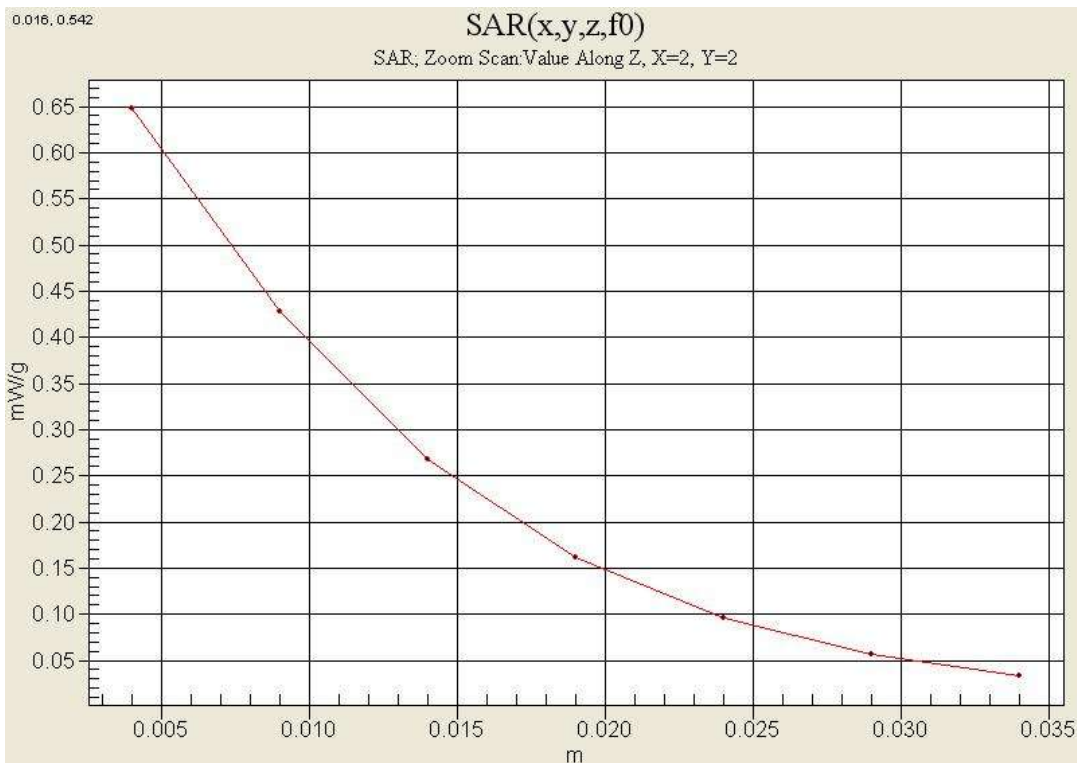
DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³
 Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
 - Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn466; Calibrated: 2011-03-01
 - Phantom: SAM 1800/1900 MHz; Type: SAM

Left touch 9400/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.680 mW/g

Left touch 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 9.92 V/m; Power Drift = -0.041 dB
 Peak SAR (extrapolated) = 0.931 W/kg
SAR(1 g) = 0.588 mW/g; SAR(10 g) = 0.339 mW/g
 Maximum value of SAR (measured) = 0.648 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

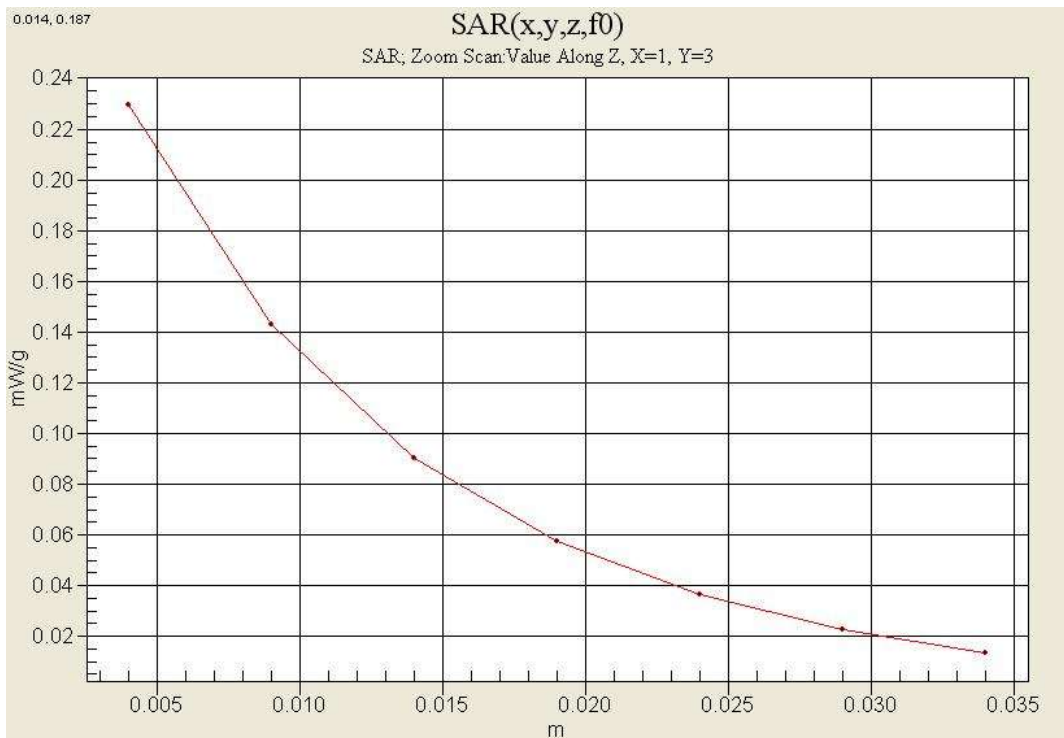
Communication System: WCDMA1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 1800/1900 MHz; Type: SAM

Body 9400 Rear/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.244 mW/g

Body 9400 Rear/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.19 V/m; Power Drift = -0.076 dB
Peak SAR (extrapolated) = 0.339 W/kg
SAR(1 g) = 0.215 mW/g; SAR(10 g) = 0.135 mW/g
Maximum value of SAR (measured) = 0.230 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
Liquid Temperature: 21.3 °C
Ambient Temperature: 21.5 °C
Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.8$ mho/m; $\epsilon_r = 38.8$; $\rho = 1000$ kg/m³
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 1/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.922 mW/g

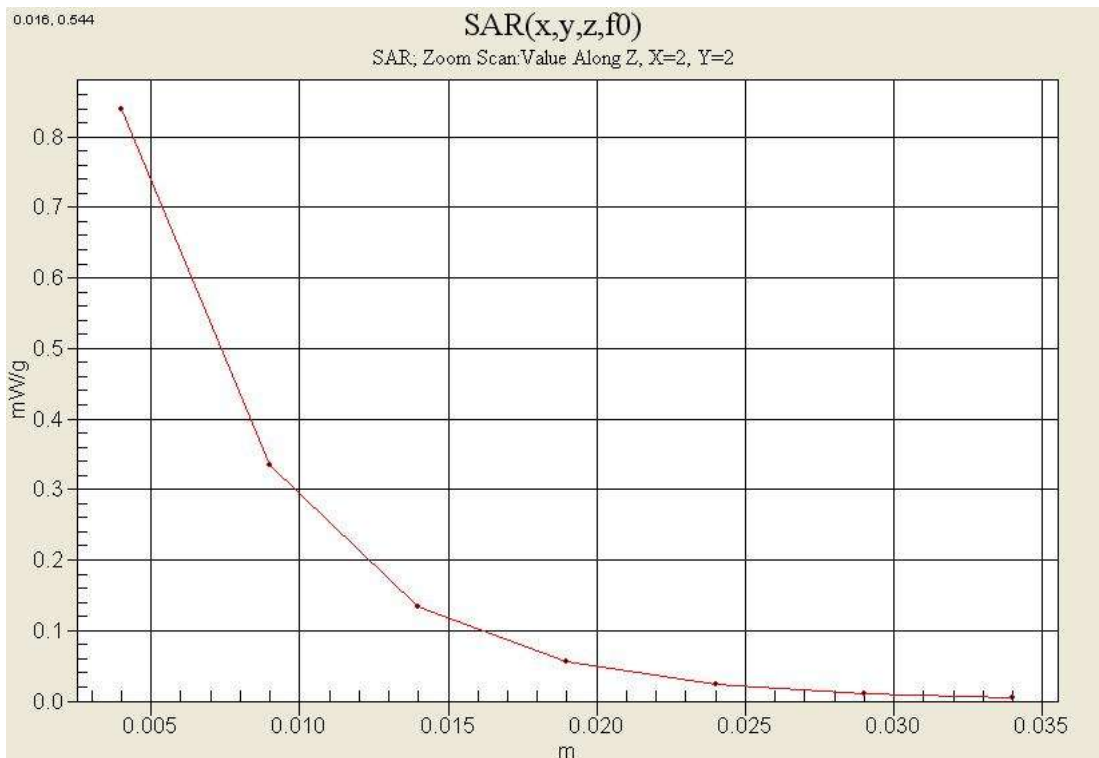
Right touch 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.66 V/m; Power Drift = -0.093 dB

Peak SAR (extrapolated) = 1.89 W/kg

SAR(1 g) = 0.680 mW/g; SAR(10 g) = 0.257 mW/g

Maximum value of SAR (measured) = 0.840 mW/g



Test Laboratory: HCT CO., LTD
 EUT Type: 850/1900 GSM/GPRS/WCDMA Phone with Bluetooth, WLAN and EDGE Rx Only
 Liquid Temperature: 21.3 °C
 Ambient Temperature: 21.5 °C
 Test Date: Dec. 14, 2011

DUT: GT-S5270Y; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2412 MHz; Duty Cycle: 1:1
 Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.83$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

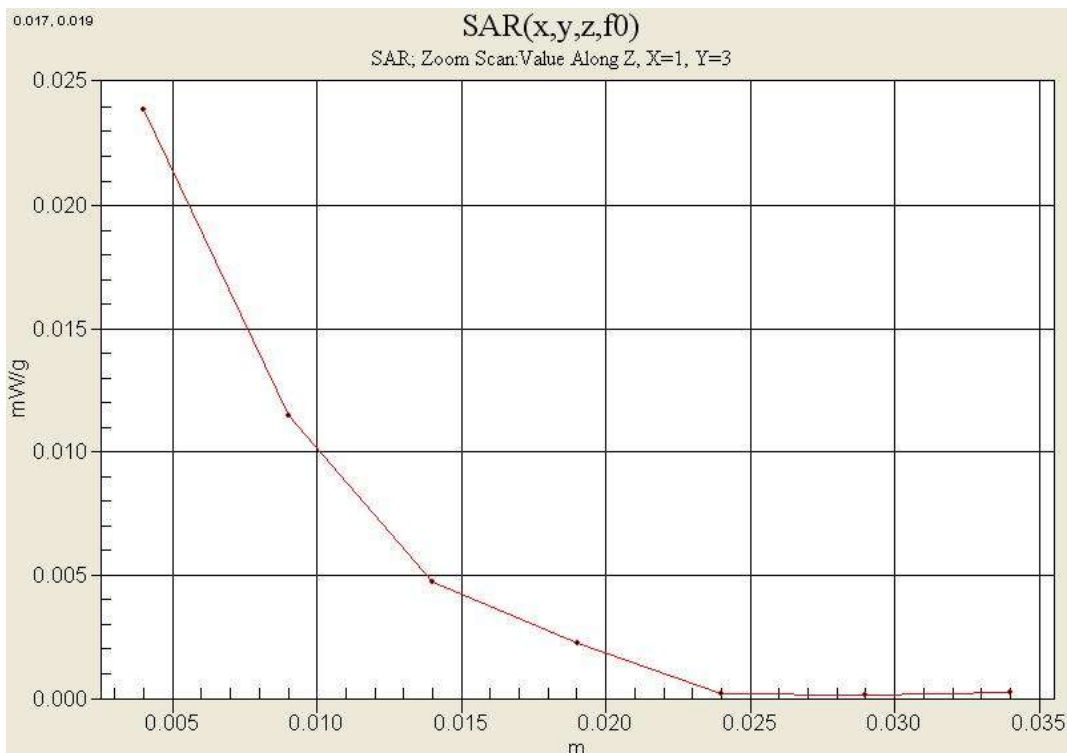
DASY4 Configuration:
 - Probe: EX3DV4 - SN3797; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-07-25
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn466; Calibrated: 2011-03-01
 - Phantom: 835/900 Phantom ; Type: SAM

Body 1ch. 1Mbps Rear/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.026 mW/g

Body 1ch. 1Mbps Rear /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 2.62 V/m; Power Drift = 0.091 dB
 Peak SAR (extrapolated) = 0.042 W/kg
SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.011 mW/g

Maximum value of SAR (measured) = 0.024 mW/g



Attachment 2. – Dipole Validation Plots

■ Validation Data (835 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.2 °C
Test Date: Dec. 13, 2011

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

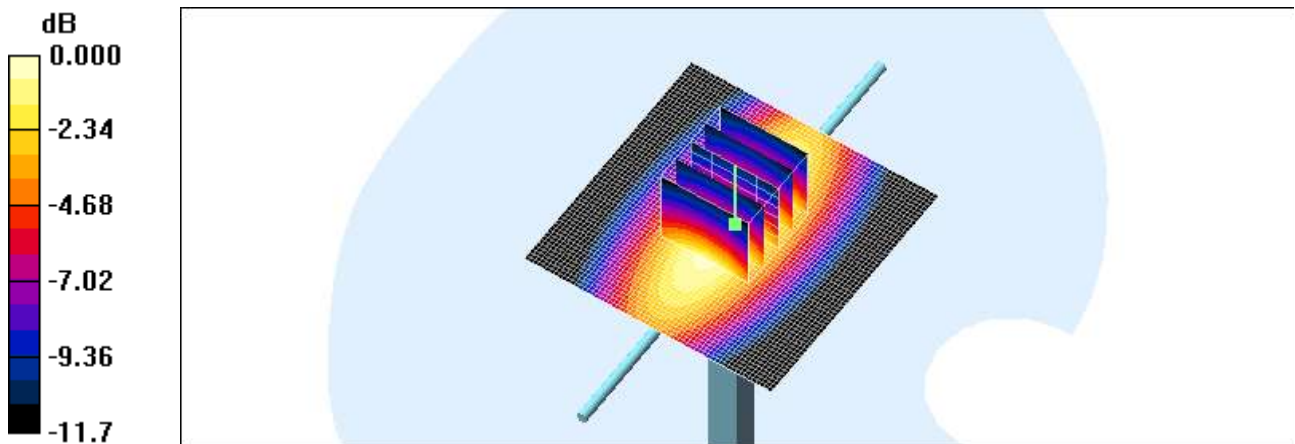
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.903 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Validation 835MHz/Area Scan (61x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 1.02 mW/g

Validation 835MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 33.8 V/m; Power Drift = 0.003 dB
Peak SAR (extrapolated) = 1.55 W/kg
SAR(1 g) = 0.936 mW/g; SAR(10 g) = 0.570 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: 21.2 °C
Test Date: Dec. 13, 2011

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

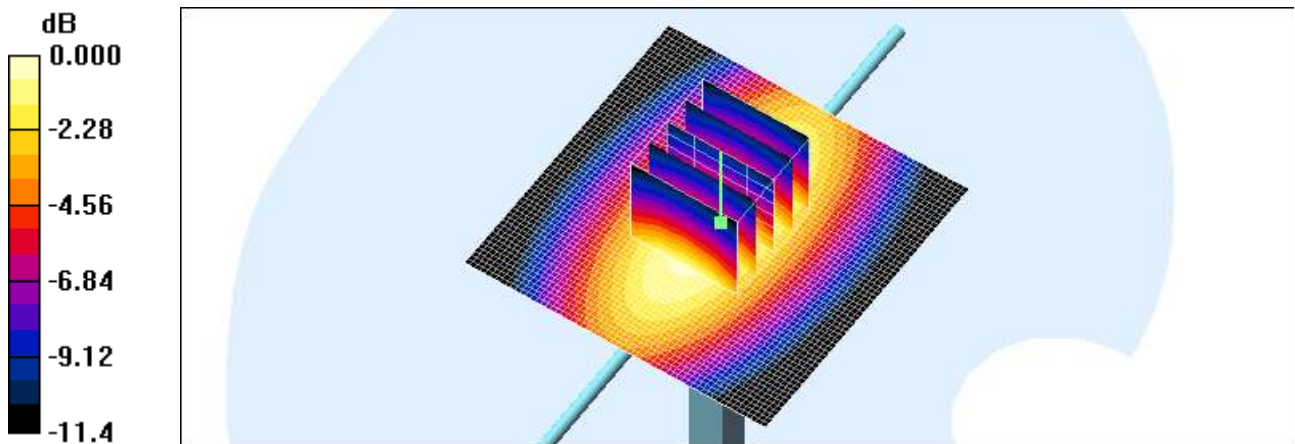
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.97 \text{ mho/m}$; $\epsilon_r = 54.5$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: SAM 835/900 MHz; Type: SAM

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

Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 33.2 V/m; Power Drift = -0.095 dB
Peak SAR (extrapolated) = 1.56 W/kg
SAR(1 g) = 0.977 mW/g; SAR(10 g) = 0.618 mW/g
Maximum value of SAR (measured) = 1.06 mW/g



0 dB = 1.06mW/g

■ Validation Data (1 900 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power: 100 mW (20 dBm)
Liquid Temp: 21.3 °C
Test Date: Dec. 14, 2011

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

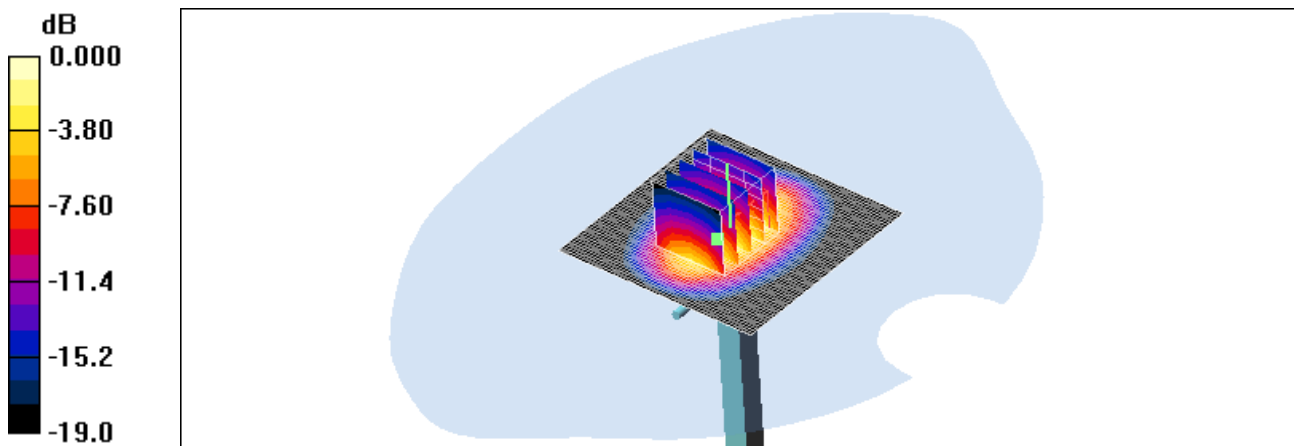
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.39 \text{ mho/m}$; $\epsilon_r = 39.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 4.70 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 56.8 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 7.56 W/kg
SAR(1 g) = 4.07 mW/g; SAR(10 g) = 2.11 mW/g
Maximum value of SAR (measured) = 4.50 mW/g



0 dB = 4.50mW/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: Dec. 14, 2011

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

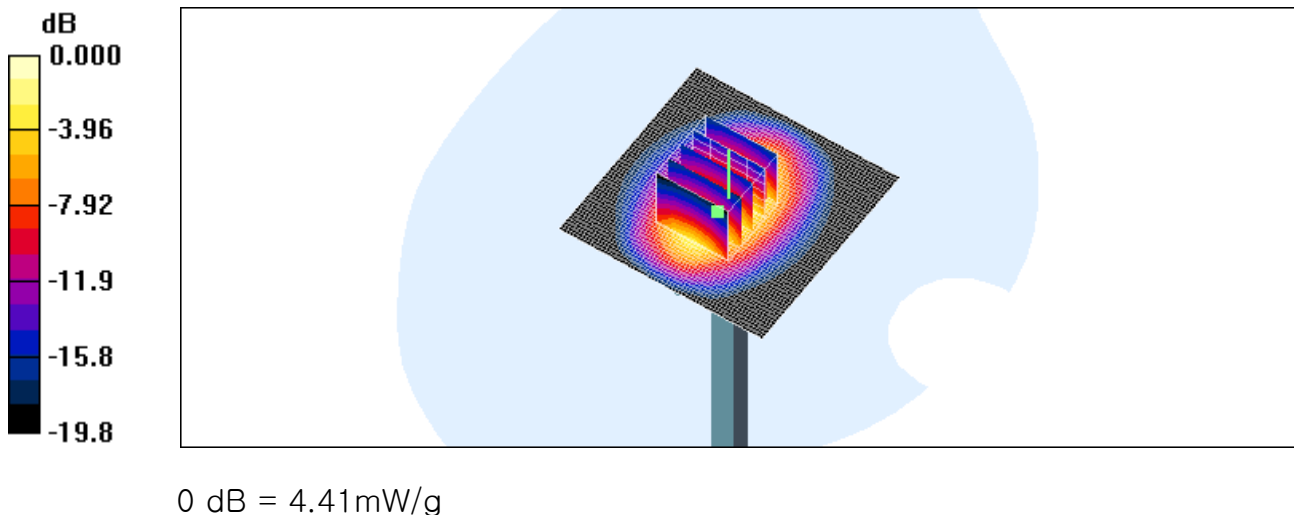
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.45 \text{ mho/m}$; $\epsilon_r = 54.3$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 4.74 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 55.2 V/m; Power Drift = -0.005 dB
 Peak SAR (extrapolated) = 7.72 W/kg
SAR(1 g) = 4 mW/g; SAR(10 g) = 2.04 mW/g
 Maximum value of SAR (measured) = 4.41 mW/g



■ Validation Data (2 450 MHz Head)

Test Laboratory: HCT CO., LTD
 Input Power 100 mW (20 dBm)
 Liquid Temp: 21.3 °C
 Test Date: Dec. 14, 2011

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

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2450$ MHz; $\sigma = 1.84$ mho/m; $\epsilon_r = 38.7$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

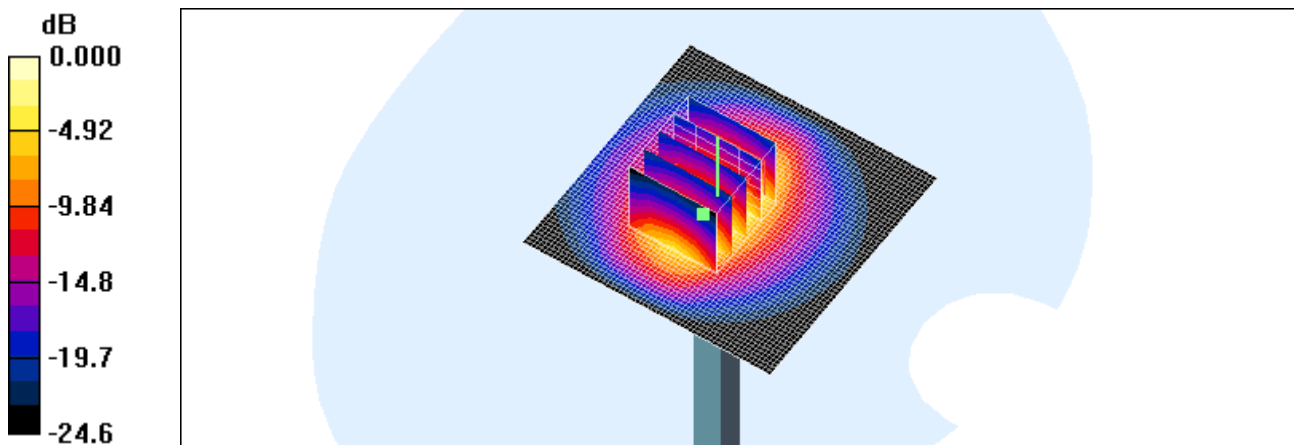
DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 800/900 Phantom; Type: SAM

Validation 2450MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 6.42 mW/g

Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 56.8 V/m; Power Drift = 0.093 dB
 Peak SAR (extrapolated) = 11.4 W/kg
SAR(1 g) = 5.35 mW/g; SAR(10 g) = 2.5 mW/g

Maximum value of SAR (measured) = 5.97 mW/g



0 dB = 5.97mW/g

■ Validation Data (2 450 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 °C

Test Date: Dec. 14, 2011

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

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

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.88$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³

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

DASY4 Configuration:

- Probe: EX3DV4 – SN3797; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 800/900 Phantom; Type: SAM

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

Maximum value of SAR (interpolated) = 5.96 mW/g

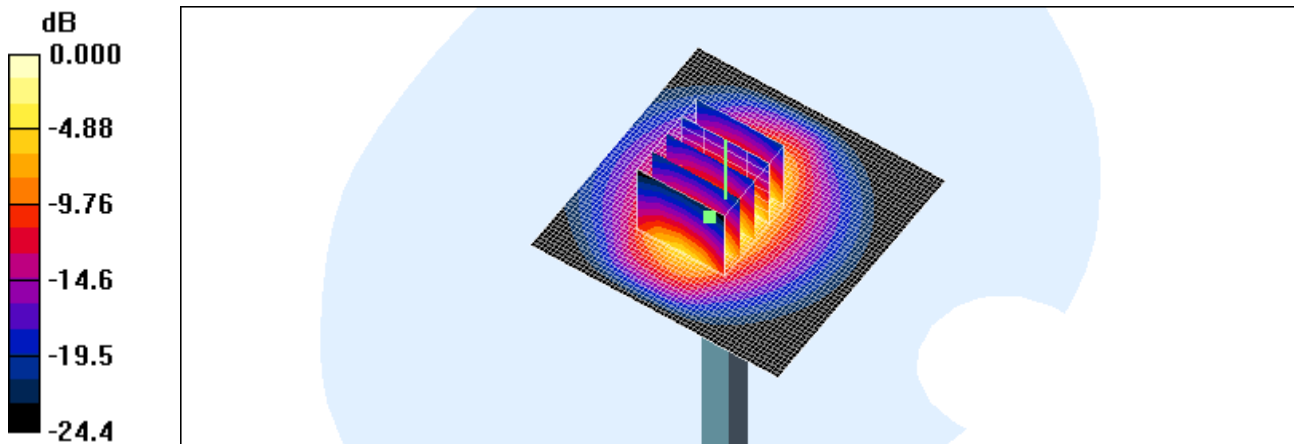
Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 54.3 V/m; Power Drift = -0.003 dB

Peak SAR (extrapolated) = 10.5 W/kg

SAR(1 g) = 4.93 mW/g; SAR(10 g) = 2.31 mW/g

Maximum value of SAR (measured) = 5.50 mW/g



0 dB = 5.50mW/g

■ Dielectric Parameter (835 MHz Head)

Title GT-S5270Y
 SubTitle 835MHz
 Test Date Dec. 13, 2011

Frequency	e'	e''
800000000.0000	43.4736	19.5534
805000000.0000	43.4184	19.5775
810000000.0000	43.3729	19.5553
815000000.0000	43.2784	19.5097
820000000.0000	43.2150	19.4935
825000000.0000	43.1471	19.4949
830000000.0000	43.1067	19.4408
835000000.0000	42.9879	19.4417
840000000.0000	42.9578	19.4172
845000000.0000	42.8692	19.4049
850000000.0000	42.7813	19.4084
855000000.0000	42.7272	19.3814
860000000.0000	42.6924	19.3646
865000000.0000	42.6286	19.3515
870000000.0000	42.5349	19.3374
875000000.0000	42.5189	19.3411
880000000.0000	42.4645	19.3159
885000000.0000	42.4017	19.2935
890000000.0000	42.3729	19.2812
895000000.0000	42.3282	19.2639
900000000.0000	42.2627	19.2732

■ Dielectric Parameter (835 MHz Body)

Title GT-S5270Y
 SubTitle 835MHz
 Test Date Dec. 13, 2011

Frequency	e'	e''
800000000.0000	54.9794	21.3084
805000000.0000	54.8924	21.2541
810000000.0000	54.8440	21.2093
815000000.0000	54.7758	21.1384
820000000.0000	54.6759	21.0855
825000000.0000	54.6168	21.0185
830000000.0000	54.5581	20.9355
835000000.0000	54.4652	20.8771
840000000.0000	54.4229	20.8337
845000000.0000	54.3551	20.7783
850000000.0000	54.3098	20.7370
855000000.0000	54.2667	20.7277
860000000.0000	54.2453	20.7589
865000000.0000	54.2110	20.7248
870000000.0000	54.1705	20.7843
875000000.0000	54.1221	20.8197
880000000.0000	54.1119	20.8402
885000000.0000	54.0712	20.8616
890000000.0000	54.0351	20.8916
895000000.0000	54.0364	20.9067
900000000.0000	53.9589	20.8792

■ Dielectric Parameter (1 900 MHz Head)

Title GT-S5270Y
 SubTitle 1 900MHz
 Test Date Dec. 14, 2011

Frequency	e'	e''
1800000000.0000	39.4550	12.8738
1810000000.0000	39.3970	12.9043
1820000000.0000	39.3749	12.9372
1830000000.0000	39.3418	12.9797
1840000000.0000	39.3021	12.9993
1850000000.0000	39.2683	13.0362
1860000000.0000	39.2269	13.0540
1870000000.0000	39.1960	13.0773
1880000000.0000	39.1566	13.1089
1890000000.0000	39.1198	13.1330
1900000000.0000	39.0720	13.1612
1910000000.0000	39.0232	13.1814
1920000000.0000	38.9988	13.2332
1930000000.0000	38.9478	13.2463
1940000000.0000	38.9123	13.2906
1950000000.0000	38.8801	13.3153
1960000000.0000	38.8291	13.3319
1970000000.0000	38.7808	13.3643
1980000000.0000	38.7599	13.3878
1990000000.0000	38.7019	13.4328
2000000000.0000	38.6799	13.4687

■ Dielectric Parameter (1 900 MHz Body)

Title GT-S5270Y
 SubTitle 1 900MHz
 Test Date Dec. 14, 2011

Frequency	e'	e''
1850000000.0000	54.4199	13.5906
1855000000.0000	54.4145	13.6236
1860000000.0000	54.3911	13.6010
1865000000.0000	54.3724	13.6135
1870000000.0000	54.3429	13.6349
1875000000.0000	54.3427	13.6529
1880000000.0000	54.3315	13.6635
1885000000.0000	54.3220	13.6800
1890000000.0000	54.3206	13.7011
1895000000.0000	54.3100	13.7160
1900000000.0000	54.2969	13.7394
1905000000.0000	54.3041	13.7564
1910000000.0000	54.3148	13.7724
1915000000.0000	54.3043	13.7800
1920000000.0000	54.2947	13.7692
1925000000.0000	54.2984	13.7846
1930000000.0000	54.2955	13.7850
1935000000.0000	54.2783	13.7921
1940000000.0000	54.2761	13.7920
1945000000.0000	54.2542	13.7640
1950000000.0000	54.2365	13.7643

■ Dielectric Parameter (2 450 MHz Head)

Title GT-S5270Y
 SubTitle 2 450MHz
 Test Date Dec. 14, 2011

Frequency	e'	e''
2400000000.0000	38.8907	13.3942
2405000000.0000	38.8687	13.4072
2410000000.0000	38.8535	13.4148
2415000000.0000	38.8289	13.4274
2420000000.0000	38.8170	13.4351
2425000000.0000	38.7954	13.4509
2430000000.0000	38.7743	13.4636
2435000000.0000	38.7517	13.4777
2440000000.0000	38.7461	13.4886
2445000000.0000	38.7282	13.4878
2450000000.0000	38.7075	13.5032
2455000000.0000	38.6815	13.5121
2460000000.0000	38.6633	13.5366
2465000000.0000	38.6620	13.5414
2470000000.0000	38.6366	13.5501
2475000000.0000	38.6209	13.5505
2480000000.0000	38.5888	13.5705
2485000000.0000	38.5688	13.5914
2490000000.0000	38.5573	13.5831
2495000000.0000	38.5367	13.6156
2500000000.0000	38.5127	13.6181

■ Dielectric Parameter (2 450 MHz Body)

Title GT-S5270Y
 SubTitle 2 450MHz
 Test Date Dec. 14, 2011

Frequency	e'	e''
2400000000.0000	52.3128	13.5995
2405000000.0000	52.2862	13.6090
2410000000.0000	52.2630	13.6179
2415000000.0000	52.2408	13.6333
2420000000.0000	52.2120	13.6461
2425000000.0000	52.2009	13.6666
2430000000.0000	52.1754	13.7019
2435000000.0000	52.1491	13.7158
2440000000.0000	52.1487	13.7495
2445000000.0000	52.1308	13.7605
2450000000.0000	52.1075	13.7787
2455000000.0000	52.0937	13.7923
2460000000.0000	52.0589	13.8184
2465000000.0000	52.0649	13.8291
2470000000.0000	52.0611	13.8379
2475000000.0000	52.0539	13.8436
2480000000.0000	52.0193	13.8399
2485000000.0000	52.0032	13.8499
2490000000.0000	51.9911	13.8397
2495000000.0000	51.9754	13.8496
2500000000.0000	51.9481	13.8447

Attachment 3. – Probe Calibration Data

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info@speag.com, <http://www.speag.com>**USAGE OF ORGANIC SOLVENTS WITH SPEAG PRODUCTS****INTRODUCTION**

SPEAG offers a wide range of simulating liquids. These liquids are based on various ingredients depending on their frequency range. The below compatibility table shows compatibility of SPEAG products used in conjunction with tissue simulating liquids. Proper treatment and maintenance of all SPEAG products is essential regardless of its compliance status.

COMPATIBILITY TABLE

Y= fully compatible with the tissue simulating liquid. Long time exposure is not critical.
P= partially compatible. It is essential to keep the exposure time to a minimum and to rinse and clean the item after exposure to the respective tissue simulating liquid. Continuous exposure will reduce the item life-time drastically and will therefore void any warranty. 100 hours per 7 days maximum exposure.
R= restricted compatibility with the respective tissue simulating liquid. Short time exposure of less than 4 hours is possible given that the item is thoroughly rinsed and dried after each exposure.
N= not compatible with the respective tissue simulating liquid. Short time exposure will cause irreparable damage to the item exposed.

SPEAG MSDS Probes & Phantoms	Liquid Type		772-SLAAx8yy		772-SLAAx1yy		772-SLAAx2yy		772-SLAAx4yy		772-SLAAx6yy		772-SLAAx8yy		772-SLAAx10yy		3rd Party Liquids	
	IR 900	IR 171 to IRSL 900	MSL 450 to MSL 900	IRSL 1450 to IRSL 2450	MSL 1450 to MSL 2450	IRSL 3500 - 5000 Broadband	MSL 3500 - 5000 Broadband	IRSL 3500 - 5000 Broadband	MSL 3500 - 5000 Broadband	IRSL 5000 Broadband	MSL 5000 Broadband	IRSL 1000 Broadband	MSL 1000 Broadband	IRSL BB 1.5 to IRSL BB 1.9	MSL BB 1.5 to MSL BB 1.9	Triam Broad Liquids	Acids	Solvents
Twin SAM Phantom V4.0	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
ELI Oval Phantom V4.0	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Flat Phantom V4.x / V5.x	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Whole Body Mannequin	Y	Y	Y	R	R	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
SAM HEAD V4.5	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
SAM HEAD V4.5 CTIA	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
SAM HEAD V4.5 BS																		
SAM HEAD V6.0 / 6.1	Y	Y	Y	R	R	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe ER3DV6 / ETMDV6R	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe ES3DVx / EX3DVx	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe H3DV6 and higher	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe EU2DVx / HU2DVx	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe ET1DVx	Y	Y	Y	R	R	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe T1V3 / T1V3 Lab	Y	Y	Y	R	R	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
PEX 150 / 300 Probe Extension	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probes in PMMA enclosures	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
ASTM Phantom	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
ELIT 1.5 / 1.8T Phantom	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N

IMPORTANT NOTE FOR PROBES: The probe shall not be exposed to solvents longer than necessary for the measurements and shall be cleaned daily after use with warm water and stored dry.

IMPORTANT NOTE FOR PHANTOMS: Phantoms shall not be exposed to solvents longer than necessary for the measurement. After use, they shall be washed in the inside with clean water and stored dry. Any damaging of the inner surface must be avoided. Once a week, also the outside of the phantom shell shall be washed with clean water and dried.

Schmid & Partner Engineering AG

771-TN-BR-100621-7A

BR

June 2010

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



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

Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: SCS 108

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

Client HCT (Dymstec)

Certificate No: EX3-3797_Jul11

CALIBRATION CERTIFICATE

Object EX3DV4 - SN:3797

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

Calibration date: July 25, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293674	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41499067	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-09 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: July 25, 2011

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Accreditation No.: **SCS 108**

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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:

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

Methods Applied and Interpretation of Parameters:

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

July 25, 2011

Probe EX3DV4

SN:3797

Manufactured: April 5, 2011
Calibrated: July 25, 2011

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

EX3DV4-- SN:3797

July 25, 2011

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	$\pm 10.1 \%$
DCP (mV) ^B	94.6	95.3	96.6	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^C (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	96.0	$\pm 2.5 \%$
			Y	0.00	0.00	1.00	126.8	
			Z	0.00	0.00	1.00	126.7	

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 square of the field value.

EX3DV4- SN:3797

July 25, 2011

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^①	Relative Permittivity ^②	Conductivity (S/m) ^③	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.29	9.29	9.29	0.80	0.68	± 12.0 %
835	41.5	0.90	8.93	8.93	8.93	0.80	0.67	± 12.0 %
900	41.5	0.97	8.83	8.83	8.83	0.80	0.66	± 12.0 %
1450	40.5	1.20	8.30	8.30	8.30	0.59	0.78	± 12.0 %
1750	40.1	1.37	7.88	7.88	7.88	0.77	0.62	± 12.0 %
1900	40.0	1.40	7.60	7.60	7.60	0.80	0.60	± 12.0 %
1950	40.0	1.40	7.44	7.44	7.44	0.78	0.61	± 12.0 %
2300	39.5	1.67	7.30	7.30	7.30	0.75	0.62	± 12.0 %
2450	39.2	1.80	6.94	6.94	6.94	0.74	0.62	± 12.0 %
2600	39.0	1.96	7.16	7.16	7.16	0.59	0.72	± 12.0 %
5200	36.0	4.66	4.73	4.73	4.73	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.44	4.44	4.44	0.42	1.80	± 13.1 %
5500	35.6	4.96	4.48	4.48	4.48	0.42	1.80	± 13.1 %
5600	35.5	5.07	4.16	4.16	4.16	0.42	1.80	± 13.1 %
5800	35.3	5.27	4.26	4.26	4.26	0.45	1.80	± 13.1 %

^① 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^② uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^② At frequencies below 3 GHz, the validity of tissue parameters (ε and α) 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 α) is restricted to ± 5%. The uncertainty is the RSS of the ConvF^② uncertainty for indicated target tissue parameters.

EX3DV4- SN:3797

July 25, 2011

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

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.22	9.22	9.22	0.80	0.70	± 12.0 %
835	55.2	0.97	9.14	9.14	9.14	0.80	0.69	± 12.0 %
1750	53.4	1.49	7.69	7.69	7.69	0.80	0.66	± 12.0 %
1900	53.3	1.52	7.26	7.26	7.26	0.80	0.64	± 12.0 %
2300	52.9	1.81	7.18	7.18	7.18	0.80	0.62	± 12.0 %
2450	52.7	1.95	6.96	6.96	6.96	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.90	6.90	6.90	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.10	4.10	4.10	0.50	1.90	± 13.1 %
5300	48.9	5.42	3.83	3.83	3.83	0.55	1.90	± 13.1 %
5500	48.6	5.65	3.72	3.72	3.72	0.55	1.90	± 13.1 %
5600	48.5	5.77	3.60	3.60	3.60	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.75	3.75	3.75	0.60	1.90	± 13.1 %

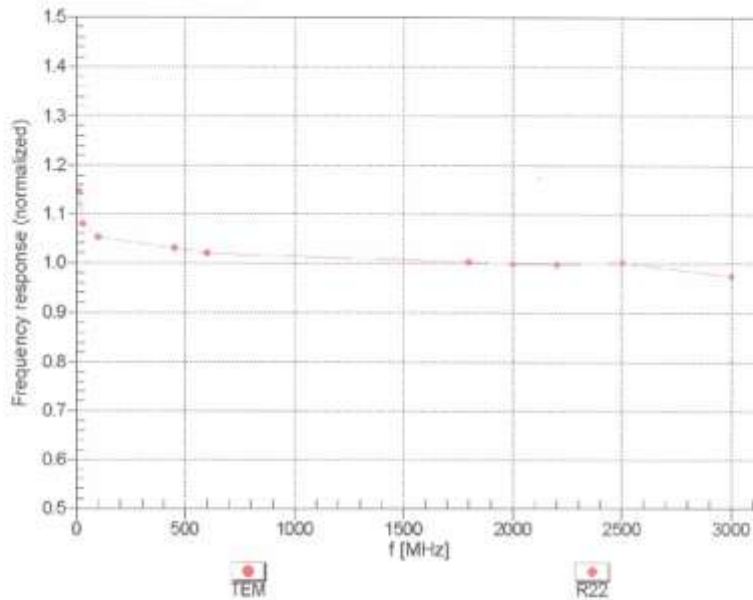
^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

EX3DV4- SN-3797

July 25, 2011

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

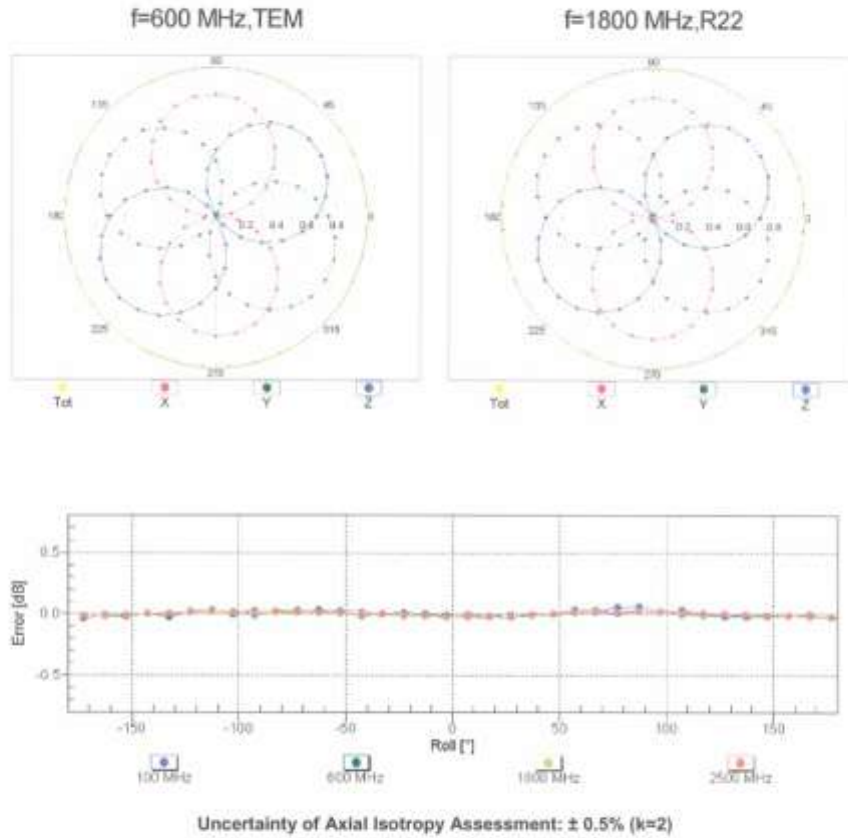


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

EX3DV4-SN:3797

July 25, 2011

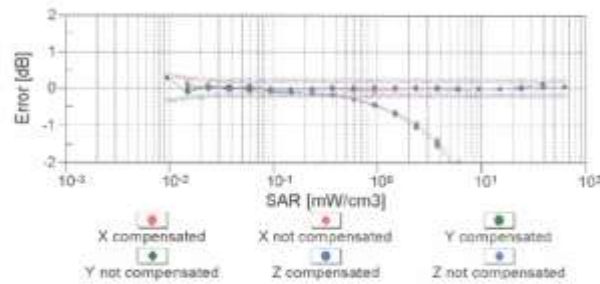
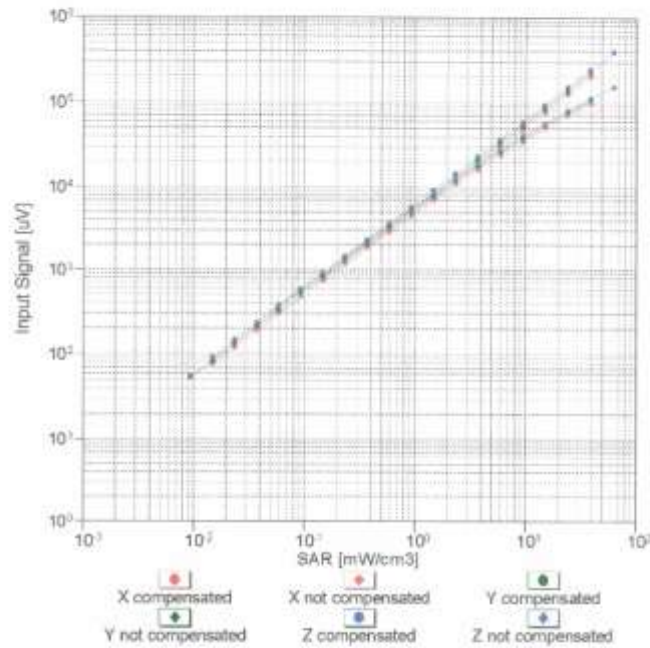
Receiving Pattern (ϕ), $\theta = 0^\circ$



EX3DV4- SN-3797

July 25, 2011

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

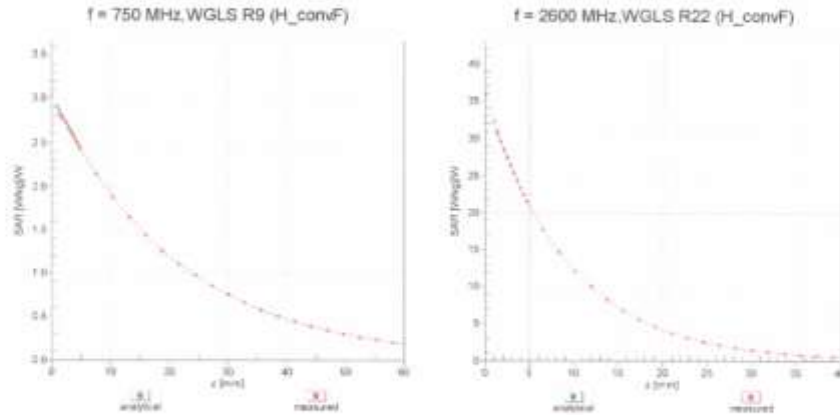


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

EX3DV4- SN:3797

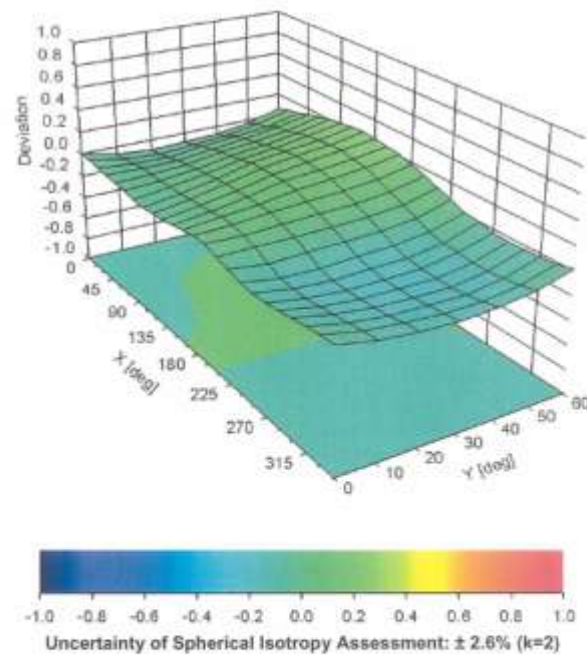
July 25, 2011

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900$ MHz



EX3DV4- SN:3797

July 25, 2011

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

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	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

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Accreditation No.: SCS 108

Client **HCT (Dymstec)**

Certificate No: D835V2-441_May11

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, 2011**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37282783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: May 16, 2011

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Certificate No: D835V2-441_May11

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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.

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
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	40.4 $\pm$ 6 %	0.88 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	2.31 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.34 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	1.51 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.09 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	53.9 $\pm$ 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	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.45 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	50.2 Ω - 9.8 j Ω
Return Loss	- 20.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω - 10.3 j Ω
Return Loss	- 18.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.374 ns
----------------------------------	----------

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 09, 2001

DASY5 Validation Report for Head TSL

Date: 16.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL900

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.88 \text{ mho/m}$; $\epsilon_r = 40.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

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

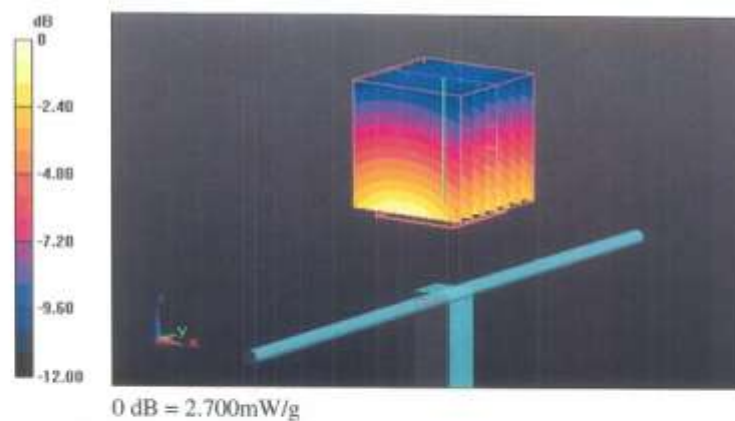
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.041 V/m; Power Drift = 0.03 dB

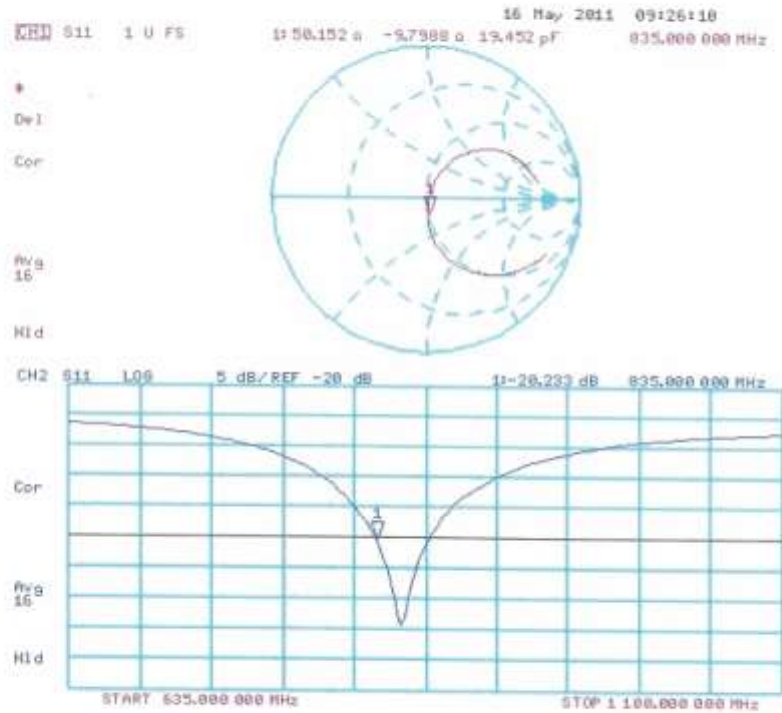
Peak SAR (extrapolated) = 3.442 W/kg

SAR(1 g) = 2.31 mW/g; SAR(10 g) = 1.51 mW/g

Maximum value of SAR (measured) = 2.703 mW/g



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1 \text{ mho/m}$; $\epsilon_r = 53.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

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

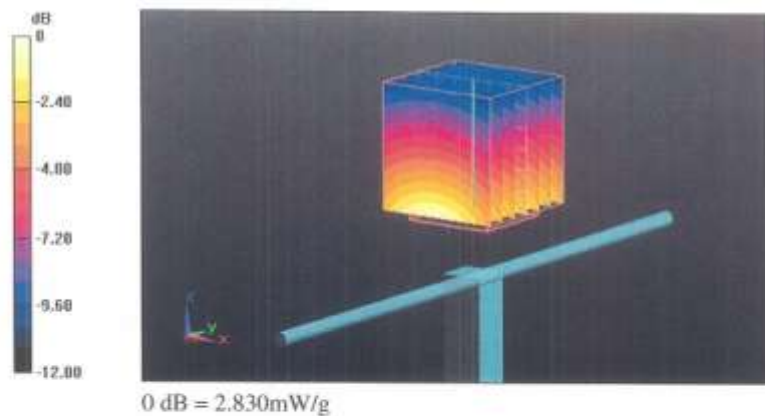
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.302 V/m; Power Drift = 0.02 dB

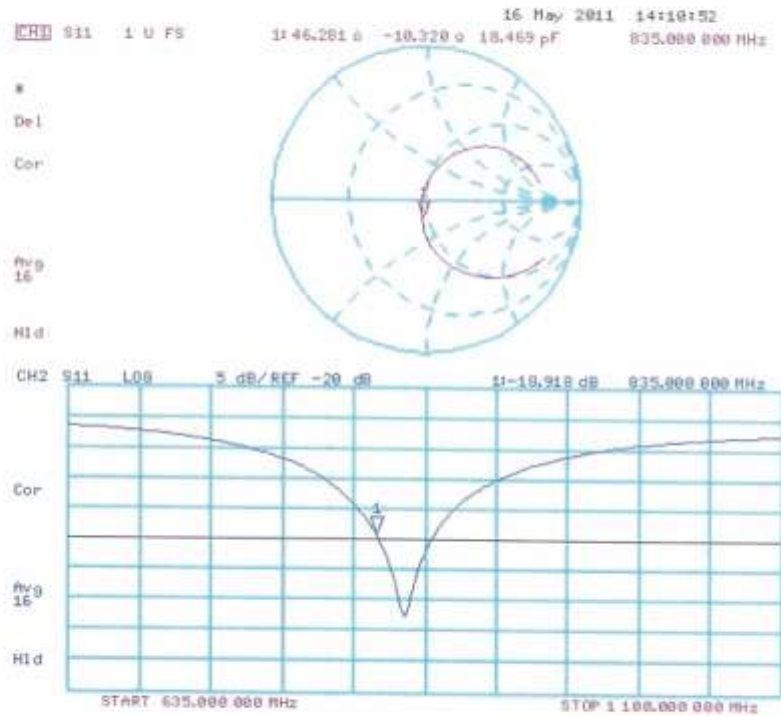
Peak SAR (extrapolated) = 3.553 W/kg

SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g

Maximum value of SAR (measured) = 2.833 mW/g



Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client **HCT**

Certificate No: D1900V2-5d032_Jul11

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 22, 2011**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	0837480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (206)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES30V3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-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	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 54206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dance Hsu	Laboratory Technician	
Approved by:	Kata Pokomo	Technical Manager	

Issued: July 22, 2011

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

Certificate No: D1900V2-5d032_Jul11

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**Calibration Laboratory of
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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.

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 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 $\pm$ 0.2) °C	39.1 $\pm$ 6 %	1.42 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	10.1 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	39.9 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	5.29 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.0 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	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.3 $\pm$ 6 %	1.53 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	10.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	40.9 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	5.39 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.5 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$52.6 \Omega + 6.5 j\Omega$
Return Loss	- 23.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$46.6 \Omega + 6.0 j\Omega$
Return Loss	- 22.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.190 ns
----------------------------------	----------

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 17, 2003

DASY5 Validation Report for Head TSL

Date: 20.07.2011

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; $\sigma = 1.42$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ 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: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

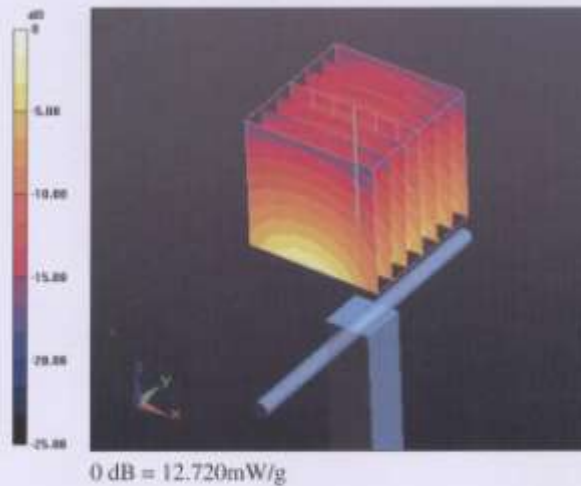
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.253 V/m; Power Drift = 0.03 dB

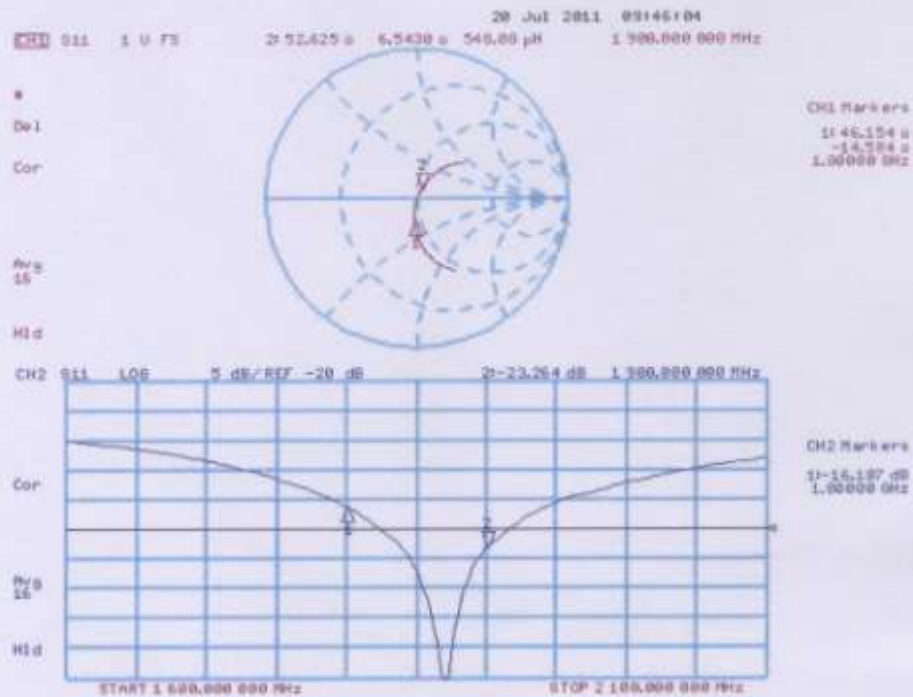
Peak SAR (extrapolated) = 18.469 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.29 mW/g

Maximum value of SAR (measured) = 12.721 mW/g



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 22.07.2011

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; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

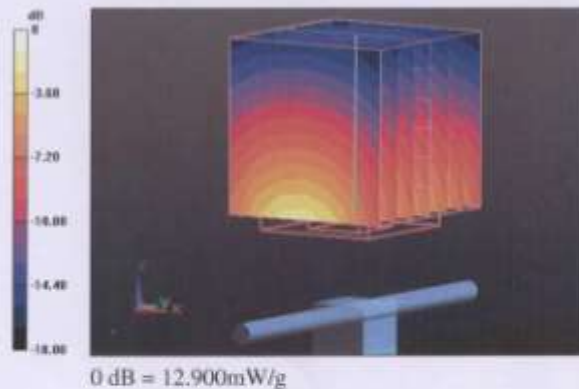
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.827 V/m; Power Drift = 0.0078 dB

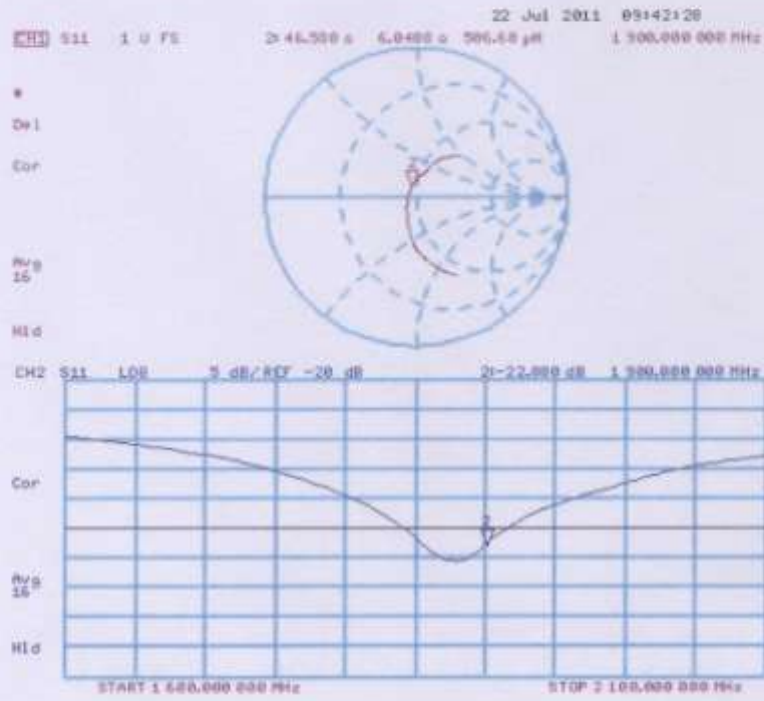
Peak SAR (extrapolated) = 18.111 W/kg

SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.39 mW/g

Maximum value of SAR (measured) = 12.898 mW/g



Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client **HCT (Dymstec)**

Certificate No: D2450V2-743_Aug11

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 29, 2011**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 55086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 08327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-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	MY41092317	18-Oct-02 (in house check Oct-09)	in house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	in house check: Oct-11
Network Analyzer HP 8753E	US37380585 S4206	18-Oct-01 (in house check Oct-10)	in house check: Oct-11

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

Issued: August 29, 2011

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Certificate No: D2450V2-743_Aug11

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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.

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
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 $\pm$ 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 $\pm$ 0.2) °C	38.4 $\pm$ 6 %	1.85 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	13.7 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	53.8 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	6.40 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.4 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	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.8 $\pm$ 6 %	2.02 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	13.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	51.7 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	6.11 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	24.2 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.0 Ω + 4.8 j Ω
Return Loss	- 23.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.3 Ω + 5.8 j Ω
Return Loss	- 24.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.160 ns
----------------------------------	----------

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 01, 2003

DASY5 Validation Report for Head TSL

Date: 29.08.2011

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; $\sigma = 1.85$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ 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: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

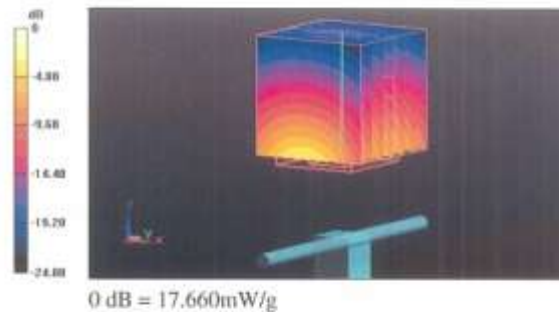
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.2 V/m; Power Drift = 0.03 dB

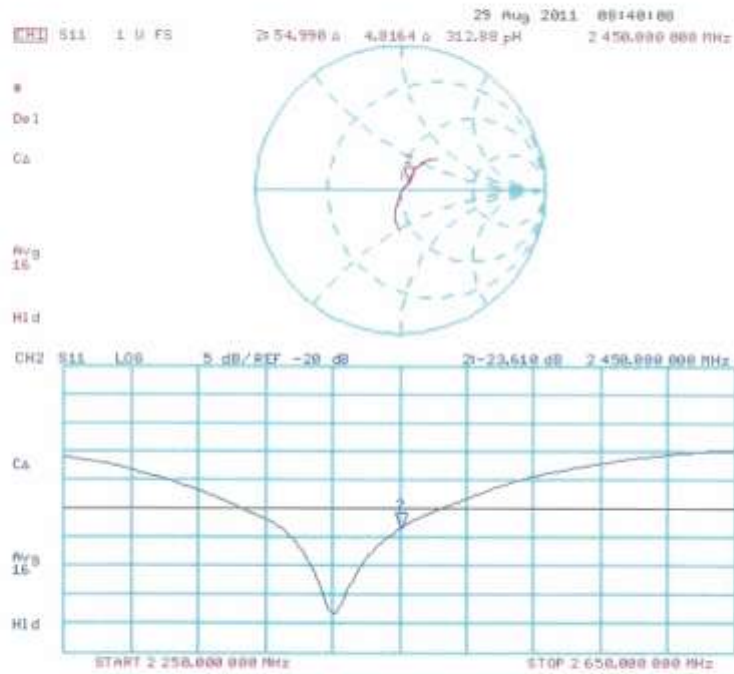
Peak SAR (extrapolated) = 28.291 W/kg

SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.4 mW/g

Maximum value of SAR (measured) = 17.657 mW/g



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 29.08.2011

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; $\sigma = 2.02$ mho/m; $\epsilon_r = 51.8$; $\rho = 1000$ 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: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

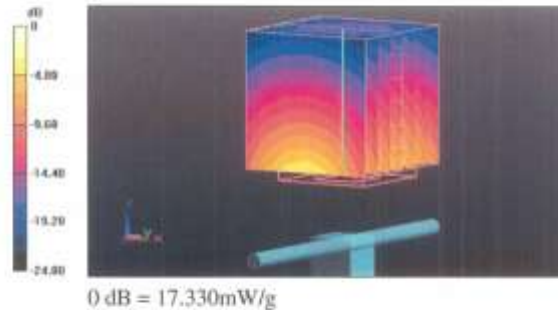
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.903 V/m; Power Drift = -0.0051 dB

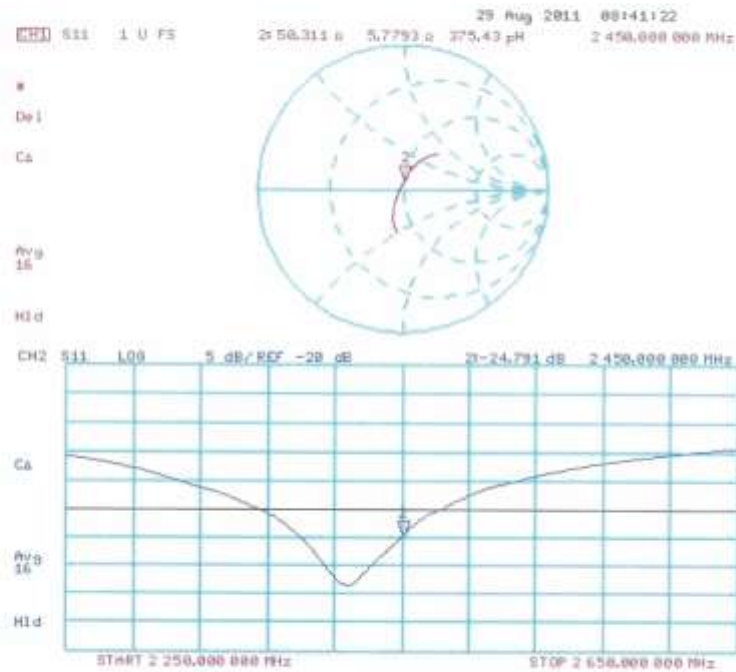
Peak SAR (extrapolated) = 27.107 W/kg

SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.11 mW/g

Maximum value of SAR (measured) = 17.329 mW/g



Impedance Measurement Plot for Body TSL



Impedance Measurement Plot for Body TSL

