



# SAR TEST REPORT

HCT CO., LTD

EUT Type:	Tri-Band CDMA Phone with Bluetooth(CDMA/PCS CDMA/AWS CDMA)		
FCC ID:	Q78-A410		
Model:	A410	Trade Name	ZTE CORPORATION
Date of Issue:	Jun.14, 2010		
Test report No.:	HCTA1006FS02		
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Testing has been carried out in accordance with:	47CFR §2.1093 FCC OET Bulletin 65(Edition 97-01), Supplement C (Edition 01-01) ANSI/ IEEE C95.1 – 2005 IEEE 1528-2003		
Test result:	The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.		
Signature	<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">   <hr style="width: 200px; margin: 0 auto;"/>           Report prepared by            : Young- Soo Jang            Test Engineer of SAR Part         </div> <div style="text-align: center;">   <hr style="width: 200px; margin: 0 auto;"/>           Approved by            : Jae-Sang So            Manager of SAR Part         </div> </div>		

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# 1. INTRODUCTION

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

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-2005 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86 NCRP, 1986, Bethesda, MD 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

## SAR Definition

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

- $\sigma$  = conductivity of the tissue-simulant material (S/m)
- $\rho$  = mass density of the tissue-simulant material (kg/m<sup>3</sup>)
- $E$  = Total RMS electric field strength (V/m)

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

## 2. DESCRIPTION OF DEVICE

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

EUT Type	Tri-Band CDMA Phone with Bluetooth (CDMA/PCS CDMA/AWS CDMA)
FCC ID	Q78-A410
Model(s)	A410
Trade Name	ZTE CORPORATION
Serial Number(s)	#1
Application Type	Certification
Modulation(s)	CDMA835/AWS1700/PCS1900
Tx Frequency	824.70 – 848.31 MHz (CDMA) 1 711.25 – 1 753.75 MHz (AWS CDMA) 1 851.25 – 1 908.75 MHz (PCS CDMA)
Rx Frequency	869.70 – 893.31 MHz (CDMA) 2 111.25 – 2 153.75 MHz (AWS CDMA) 1 931.25 – 1 988.75 MHz (PCS CDMA)
FCC Classification	Licensed Portable Transmitter Held to Ear (PCE)
Production Unit or Identical Prototype	Prototype
Max SAR	1.13 W/kg CDMA835 Head SAR / 0.443 W/kg CDMA835 Body SAR 0.778 W/kg AWS1700 Head SAR / 0.339 W/kg AWS1700 Body SAR 0.799 W/kg PCS1900 Head SAR / 0.427 W/kg PCS1900 Body SAR
Date(s) of Tests	Jun. 10, 2010 ~ Jun. 11, 2010
Antenna Type	Intenna

## 3. DESCRIPTION OF TEST EQUIPMENT

### 3.1 SAR MEASUREMENT SETUP

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

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

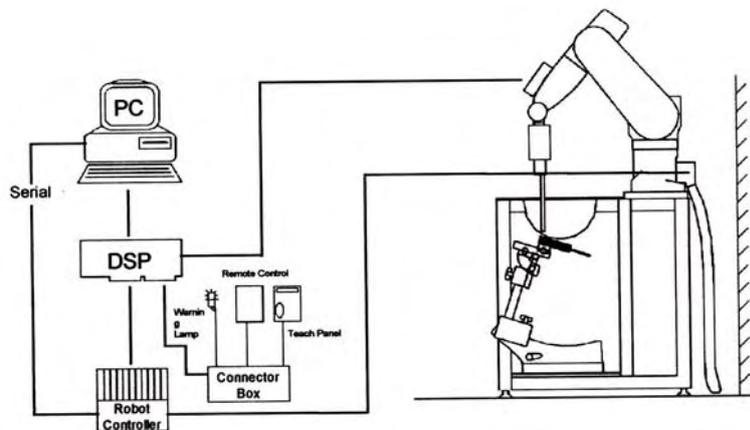


Figure 3.1 HCT SAR Lab. Test Measurement Set-up

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

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

### **3.2.1 ET3DV6 Probe Specification**

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



Figure 3.2 Photograph of the probe and the Phantom

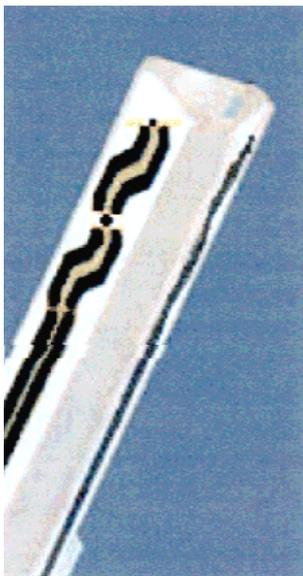


Figure 3.3 ET3DV6 E-field Probe

The SAR measurements were conducted with the dosimetric probe ET3DV6, designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches a maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2<sup>nd</sup> order fitting. The approach is stopped at reaching the maximum.

### 3.3 PROBE CALIBRATION PROCESS

#### 3.3.1 E-Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with an accuracy better than ± 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:

- $\Delta t$  = exposure time (30 seconds),
- C = heat capacity of tissue (brain or muscle),
- $\Delta T$  = temperature increase due to RF exposure.

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

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

where:

- $\sigma$  = simulated tissue conductivity,
- $\rho$  = Tissue density (1.25 g/cm<sup>3</sup> for brain tissue)

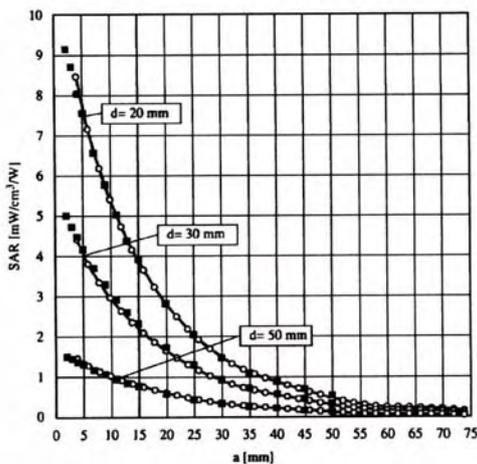


Figure 3.4 E-Field and Temperature measurements at 900 MHz

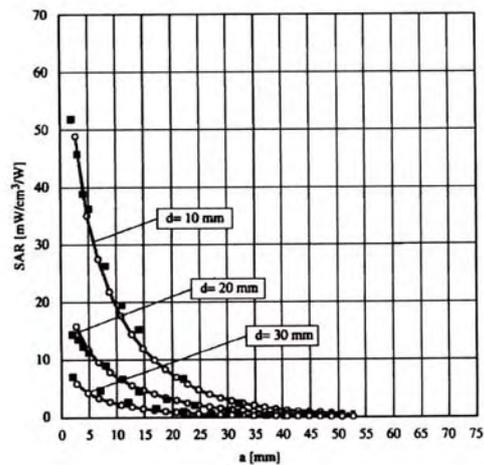


Figure 3.5 E-Field and temperature measurements at 1.8 GHz

### 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  
 $\sigma$  = conductivity in [mho/m] or [Siemens/m]  
 $\rho$  = equivalent tissue density in g/cm<sup>3</sup>

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

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

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

### 3.4 SAM Phantom

The SAM Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90 % of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

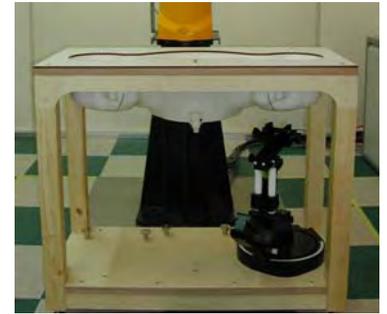


Figure 3.6 SAM Phantom

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

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

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

**Table 3.1 Composition of the Tissue Equivalent Matter**

### 3.7 SAR TEST EQUIPMENT

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	SAM Phantom	-	N/A	N/A	N/A
Staubli	Robot RX90L	F01/5K09A1/A/01	N/A	N/A	N/A
Staubli	Robot ControllerCS7MB	F99/5A82A1/C/01	N/A	N/A	N/A
HP	Pavilion t000_puffer	KRJ51201TV	N/A	N/A	N/A
SPEAG	Light Alignment Sensor	265	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D221340.01	N/A	N/A	N/A
SPEAG	DAE4	869	Sep 18, 2009	Annual	Sep. 18, 2010
SPEAG	DAE3	466	July 21, 2009	Annual	July 21, 2010
SPEAG	E-Field Probe ET3DV6	1798	Feb. 23, 2010	Annual	Feb. 23, 2011
SPEAG	E-Field Probe ET3DV6	1631	Jun. 24, 2009	Annual	Jun. 24, 2010
SPEAG	Validation Dipole D450V2	1007	July 15, 2008	Biennial	July 15, 2010
SPEAG	Validation Dipole D835V2	441	May 21, 2010	Annual	May 21, 2011
SPEAG	Validation Dipole D900V2	130	Aug. 24, 2009	Annual	Aug. 24, 2010
SPEAG	Validation Dipole D1800V2	2d006	Apr. 20, 2010	Biennial	Apr. 20, 2012
SPEAG	Validation Dipole D1900V2	5d032	July 20, 2009	Annual	July 20, 2010
SPEAG	Validation Dipole D2450V2	743	Aug. 27, 2008	Biennial	Aug. 27, 2010
Agilent	Power Meter(F) E4419B	MY41291386	Nov. 05, 2009	Annual	Nov. 05, 2010
Agilent	Power Sensor(G) 8481	MY41090870	Nov. 05, 2009	Annual	Nov. 05, 2010
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler	16072	Nov. 05, 2009	Annual	Nov. 05, 2010
R&S	Base Station CMU200	110740	July 26, 2009	Annual	July 26, 2010
Agilent	Base Station E5515C	GB44400269	Feb. 10, 2010	Annual	Feb. 10, 2011
HP	Signal Generator E4438C	MY42082646	Dec. 24, 2009	Annual	Dec. 24, 2010
HP	Network Analyzer 8753C	3310J01394	Dec. 04, 2009	Annual	Dec. 04, 2010
Tescom	TC-3000/ Bluetooth	3000A490112	Jan. 11, 2010	Annual	Jan. 11, 2011

**NOTE:**

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

## 4. SAR MEASUREMENT PROCEDURE

The evaluation was performed with the following procedure:

1. The SAR value at a fixed location above the ear point was measured and was used as a reference value for assessing the power drop.
2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.
3. Around this point, a volume of 32 mm x 32 mm x 30 mm was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:
  - a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
  - b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
  - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR value, at the same location as procedure #1, was re-measured. If the value changed by more than 5 %, the evaluation is repeated.

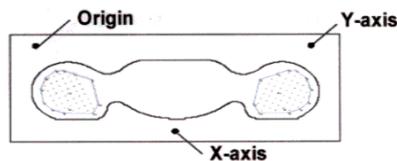


Figure 4.1 SAR Measurement Point in Area Scan

## 5. DESCRIPTION OF TEST POSITION

### 5.1 HEAD POSITION

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

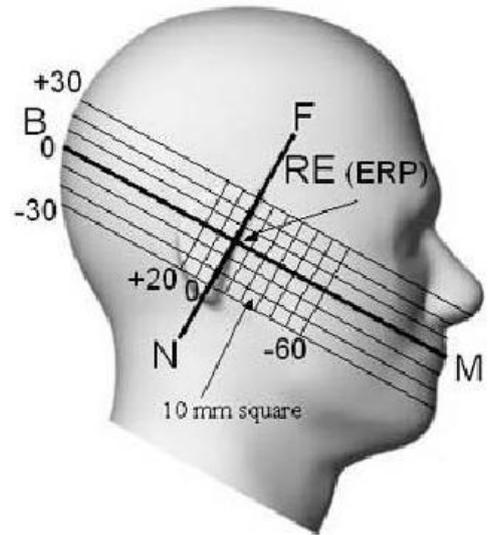


Figure 5.1 Side view of the phantom

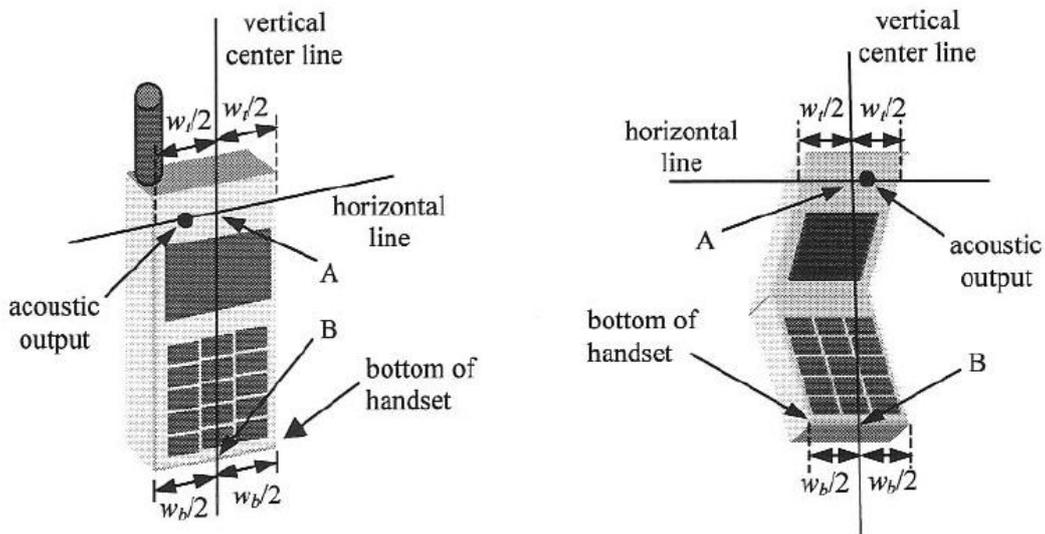


Figure 5.2 Handset vertical and horizontal reference lines

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

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

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

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

Since this EUT does not supply any body worn accessory to the end user a distance of 2.0 cm from the EUT back surface to the liquid interface is configured for the generic test.

"See the Test SET-UP Photo"

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

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

## 6. MEASUREMENT UNCERTAINTY

Measurement uncertainties in SAR measurements are difficult to quantify due to several variables including biological, physiological, and environmental. However, we estimate the measurement uncertainties in SAR to be less than 15 % - 25 %.

According to ANSI/IEEE C95.3, the overall uncertainties are difficult to assess and will vary with the type of meter and usage situation. However, accuracy's of 1 dB to  $\pm 3$  dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least  $\pm 2$  dB can be expected.

According to CENELEC, typical worst-case uncertainty of field measurements is 5 dB. For well-defined modulation characteristics the uncertainty can be reduced to  $\pm 3$  dB.

Uncertainty Budget

Frequency (MHz)	Error Description	Tot ( $\pm$ %)	Prob. dist.	Div.	$\kappa$	Standard Uncertainty ( $\pm$ %)	$\nu_{eff}$	Combined Uncertainty ( $\pm$ %)	k	Expanded STD Uncertainty ( $\pm$ %)
<b>1. Measurement System</b>										
	Probe Calibration	5.50	N	1	1	5.50	$\infty$			
	Axial Isotropy	4.70	R	1.73	0.7	1.90	$\infty$			
	Hemispherical Isotropy	9.60	R	1.73	0.7	3.88	$\infty$			
	Boundary Effects	1.00	R	1.73	1	0.58	$\infty$			
	Linearity	4.70	R	1.73	1	2.71	$\infty$			
	System Detection Limits	1.00	R	1.73	1	0.58	$\infty$			
	Readout Electronics	0.30	N	1.00	1	0.30	$\infty$			
	Response Time	0.8	R	1.73	1	0.46	$\infty$			
	Integration Time	2.6	R	1.73	1	1.50	$\infty$			
	RF Ambient Noise	3.00	R	1.73	1	1.73	$\infty$			
	RF Ambient Reflection	3.00	R	1.73	1	1.73	$\infty$			
	Probe Positioner	0.40	R	1.73	1	0.23	$\infty$			
	Probe Positioning	2.90	R	1.73	1	1.67	$\infty$			
	Max SAR Eval	1.00	R	1.73	1	0.58	$\infty$			
<b>2. Test Sample Related</b>										
	Device Positioning	1.80	N	1.00	1	1.80	9			
	Device Holder	3.60	N	1.00	1	3.60	5			
	Power Drift	5.00	R	1.73	1	2.89	$\infty$			
<b>3. Phantom and Setup</b>										
	Phantom Uncertainty	4.00	R	1.73	1	2.31	$\infty$			
	Liquid Conductivity(target)	5.00	R	1.73	0.64	1.85	$\infty$			
	Liquid Permittivity(target)	5.00	R	1.73	0.60	1.73	$\infty$			
835	Liquid Conductivity(mass.)	1.33	N	1	0.64	0.85	$\infty$	10.32	2	20.64
(Head)	Liquid Permittivity(mass.)	1.45	N	1	0.60	0.87	$\infty$			
835	Liquid Conductivity(mass.)	0.21	N	1	0.64	0.13	$\infty$	10.30	2	20.61
(Body)	Liquid Permittivity(mass.)	1.74	N	1	0.60	1.04	$\infty$			
1800	Liquid Conductivity(mass.)	2.14	N	1	0.64	1.37	$\infty$	10.62	2	21.23
(Head)	Liquid Permittivity(mass.)	4.00	N	1	0.60	2.40	$\infty$			
1800	Liquid Conductivity(mass.)	1.32	N	1	0.64	0.84	$\infty$	10.43	2	20.85
(Body)	Liquid Permittivity(mass.)	2.87	N	1	0.60	1.72	$\infty$			
1900	Liquid Conductivity(mass.)	0.00	N	1	0.64	0.00	$\infty$	10.53	2	21.05
(Head)	Liquid Permittivity(mass.)	4.00	N	1	0.60	2.40	$\infty$			
1900	Liquid Conductivity(mass.)	1.97	N	1	0.64	1.26	$\infty$	10.33	2	20.66
(Body)	Liquid Permittivity(mass.)	0.51	N	1	0.60	0.31	$\infty$			

Table 6.1 Breakdown of Errors

## 7. ANSI/ IEEE C95.1 - 2005 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	Jun. 10, 2010	Head	21.3	$\epsilon r$	41.5	42.1	+ 1.45	$\pm 5$
				$\sigma$	0.90	0.888	- 1.33	$\pm 5$
835	Jun. 10, 2010	Body	21.3	$\epsilon r$	55.2	54.24	- 1.74	$\pm 5$
				$\sigma$	0.97	0.972	+ 0.21	$\pm 5$
1 800	Jun. 10, 2010	Head	21.3	$\epsilon r$	40.0	41.6	+ 4.00	$\pm 5$
				$\sigma$	1.40	1.43	+ 2.14	$\pm 5$
1 800	Jun. 10, 2010	Body	21.3	$\epsilon r$	53.3	54.83	+ 2.87	$\pm 5$
				$\sigma$	1.52	1.50	- 1.32	$\pm 5$
1 900	Jun. 11, 2010	Head	21.2	$\epsilon r$	40.0	41.6	+ 4.00	$\pm 5$
				$\sigma$	1.40	1.4	0.00	$\pm 5$
1 900	Jun. 11, 2010	Body	21.2	$\epsilon r$	53.3	53.57	+ 0.51	$\pm 5$
				$\sigma$	1.52	1.49	- 1.97	$\pm 5$

### 8.2 System Validation

Prior to assessment, the system is verified to the  $\pm 10\%$  of the specifications at 835 MHz/1 800 MHz/1 900 MHz by using the system validation kit. (Graphic Plots Attached)

\* Input Power: 100 mW

Freq. [MHz]	Date	Liquid	Liquid Temp. [°C]	SAR Average	Target Value (SPEAG) (mW/g)	*Measured Value (mW/g)	Deviation [%]	Limit [%]
835	Jun. 10, 2010	Head	21.3	1 g	9.66	0.981	+ 1.55	$\pm 10$
1 800	Jun. 10, 2010	Head	21.3	1 g	38.9	3.95	+ 1.54	$\pm 10$
1 900	Jun. 11, 2010	Head	21.2	1 g	40.5	4.05	0.00	$\pm 10$

## 9. 3G MEASUREMENT PROCEDURES

### 9.1 Procedures Used To Establish Test Signal

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 evaluating 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.

### 9.2 SAR Measurement Conditions for CDMA2000 1x

These procedures were followed according to FCC "SAR Measurement Procedures for 3G Devices", May 2006.

#### 9.2.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices", May 2006. Maximum output power is verified on the High, Middle and Low channels according to procedures defined in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in "All Up" condition.

1. If the mobile station supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9 600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1 (Table 9.1) parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH0 and demodulation of RC 3, 4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9 600 bps Fundamental Channel and 9 600 bps SCH0 data rate Channel and 9 600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2(Table 9.2) was applied.
5. FCHs were configured at full rate for maximum SAR with "All Up" power control bits.

Parameter	Units	Value
$I_{or}$	dBm/1.23 MHz	-104
$\frac{Pilot E_c}{I_{or}}$	dB	-7
$\frac{Traffic E_c}{I_{or}}$	dB	-7.4

Table. 9.1

Parameter	Units	Value
$I_{or}$	dBm/1.23 MHz	-86
$\frac{Pilot E_c}{I_{or}}$	dB	-7
$\frac{Traffic E_c}{I_{or}}$	dB	-7.4

Table. 9.2

#### 9.2.2 Head SAR Measurement

SAR for head exposure configurations is measured in RC3 with the DUT configured to transmit at full rate using Loopback Service Option SO55. SAR for RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

### 9.2.3 Body SAR Measurement

SAR for body exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCHn) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + SCHn) with FCH at full rate and SCH0 enabled at 9 600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts.

Body SAR in RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1; with Loopback Service Option SO55, at full rate, using the body exposure configuration that results in the highest SAR for that channel in RC3.

### 9.2.4 Handsets with EV-DO

For handsets with Ev-Do capabilities, when the maximum average output of each channel in Rev. 0 is less than ¼ dB higher than that measured in RC3 (1x RTT), body SAR for Ev-Do is not required. Otherwise, SAR for Rev. 0 is measured on the maximum output channel at 153.6 kbps using the body exposure configuration that results in the highest SAR for that channel in RC3. SAR for Rev. A is not required when the maximum average output of each channel is less than that measured in Rev. 0 or less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel for Rev. A using a Reverse Data Channel payload size of 4 096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations. A Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots should be configured in the downlink for both Rev. 0 and Rev. A.

**Average Output Power Measurement for FCC ID: Q78-A410**

Band	Channel	SO2	SO2	SO55	SO55	TDSO	1xEvDO	1xEvDO
		RC1/1	RC3/3	RC1/1	RC3/3	SO32	Rev.0	Rev.0
						RC3/3	(FTAP)	(RTAP)
CDMA	1013	24.06	23.93	24.10	23.82	23.96	24.17	24.20
	384	23.85	23.61	23.65	23.55	23.57	23.84	23.73
	777	24.05	23.75	23.87	23.67	23.67	24.15	24.11
PCS	25	24.25	24.00	24.02	23.92	23.96	24.16	24.20
	600	24.01	23.96	24.06	23.90	23.80	24.09	24.10
	1175	23.95	23.73	23.76	23.58	23.60	23.98	24.00
AWS	25	23.76	23.56	23.70	23.54	23.57	23.85	23.87
	450	23.64	23.56	23.65	23.53	23.52	23.75	23.74
	875	23.77	23.70	23.69	23.75	23.79	23.80	23.83

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

## 10.1 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. 10.1 Output Power Thresholds for Unlicensed Transmitters

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

Table. 10.2 SAR Evaluation Requirements for Cellphones with Multiple Transmitters

**FCC ID: Q78-A410**

BT Max. RF output power: 1.72 dBm = 1.49 mW

Antenna separation distance: 3.13 cm

Because the conducted output power level of the BT transmitter is less than  $P_{ref}$ , and the BT antenna is more than 2.5 cm from the CDMA antenna, neither simultaneous SAR nor stand-alone BT SAR are required for the EUT.

# 11. SAR TEST DATA SUMMARY

## 11.1 Measurement Results (CDMA835 Head SAR Touch)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
824.70	1013 (Low)	CDMA835	23.82	23.73	Standard	Left Ear	Intenna	1.00
836.52	384 (Mid)	CDMA835	23.55	23.38	Standard	Left Ear	Intenna	0.864
848.31	777 (High)	CDMA835	23.67	23.64	Standard	Left Ear	Intenna	0.944
824.70	1013 (Low)	CDMA835	23.82	23.43	Standard	Right Ear	Intenna	1.13
836.52	384 (Mid)	CDMA835	23.55	23.40	Standard	Right Ear	Intenna	0.938
848.31	777 (High)	CDMA835	23.67	23.22	Standard	Right Ear	Intenna	1.04
<b>ANSI/ IEEE C95.1 2005 – Safety Limit</b>						<b>Head</b>		
<b>Spatial Peak</b>						<b>1.6 W/kg (mW/g)</b>		
<b>Uncontrolled Exposure/ General Population</b>						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
- Head SAR was tested under RC3/SO55.

## 11.2 Measurement Results (CDMA835 Head SAR Tilt)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.52	384 (Mid)	CDMA835	23.55	23.57	Standard	Left Tilt 15°	Intenna	0.420
836.52	384 (Mid)	CDMA835	23.55	23.44	Standard	Right Tilt 15°	Intenna	0.467
<b>ANSI/ IEEE C95.1 2005 – Safety Limit</b>						<b>Head</b>		
<b>Spatial Peak</b>						<b>1.6 W/kg (mW/g)</b>		
<b>Uncontrolled Exposure/ General Population</b>						<small>Averaged over 1 gram</small>		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type                     Standard                     Extended                     Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode     Manual Test cord             Base Station Simulator
- 7 Head SAR was tested under RC3/SO55.
- 8 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.3 Measurement Results (AWS1700 Head SAR Touch)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 732.5	450 (Mid)	AWS1700	23.53	23.39	Standard	Left Ear	Intenna	0.778
1 732.5	450 (Mid)	AWS1700	23.53	23.51	Standard	Right Ear	Intenna	0.769
<b>ANSI/ IEEE C95.1 2005 – Safety Limit</b>						<b>Head</b>		
<b>Spatial Peak</b>						<b>1.6 W/kg (mW/g)</b>		
<b>Uncontrolled Exposure/ General Population</b>						Averaged over 1 gram		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type                     Standard                     Extended                     Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode     Manual Test cord             Base Station Simulator
- 7 Head SAR was tested under RC3/SO55.
- 8 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.4 Measurement Results (AWS 1700 Head SAR Tilt)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 732.5	450 (Mid)	AWS1700	23.53	23.39	Standard	Left Tilt 15°	Intenna	0.512
1 732.5	450 (Mid)	AWS1700	23.53	23.50	Standard	Right Tilt 15°	Intenna	0.438
<b>ANSI/ IEEE C95.1 2005 – Safety Limit</b>						<b>Head</b>		
<b>Spatial Peak</b>						<b>1.6 W/kg (mW/g)</b>		
<b>Uncontrolled Exposure/ General Population</b>						<small>Averaged over 1 gram</small>		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type                     Standard                     Extended                     Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode     Manual Test cord             Base Station Simulator
- 7 Head SAR was tested under RC3/SO55.
- 8 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.5 Measurement Results (PCS1900 Head SAR Touch)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 880.00	600 (Mid)	PCS1900	23.9	23.96	Standard	Left Ear	Intenna	0.652
1 880.00	600 (Mid)	PCS1900	23.9	23.93	Standard	Right Ear	Intenna	0.799
<b>ANSI/ IEEE C95.1 2005 – Safety Limit</b>						<b>Head</b>		
<b>Spatial Peak</b>						<b>1.6 W/kg (mW/g)</b>		
<b>Uncontrolled Exposure/ General Population</b>						Averaged over 1 gram		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type                     Standard                     Extended                     Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode     Manual Test cord             Base Station Simulator
- 7 Head SAR was tested under RC3/SO55.
- 8 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.6 Measurement Results (PCS1900 Head SAR Tilt)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 880.00	600 (Mid)	PCS1900	23.9	23.90	Standard	Left Tilt 15°	Intenna	0.467
1 880.00	600 (Mid)	PCS1900	23.9	23.94	Standard	Right Tilt 15°	Intenna	0.528
<b>ANSI/ IEEE C95.1 2005 – Safety Limit</b>						<b>Head</b>		
<b>Spatial Peak</b>						<b>1.6 W/kg (mW/g)</b>		
<b>Uncontrolled Exposure/ General Population</b>						<small>Averaged over 1 gram</small>		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type                     Standard                     Extended                     Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode     Manual Test cord             Base Station Simulator
- 7 Head SAR was tested under RC3/SO55.
- 8 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.7 Measurement Results (CDMA835 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.52	384 (Mid)	CDMA835	23.57	23.42	Rear	2.0 cm without Holster	Intenna	0.377
836.52	384 (Mid)	CDMA835	23.57	23.49	Front	2.0 cm without Holster	Intenna	0.443
<b>ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population</b>						<b>Body 1.6 W/kg (mW/g) Averaged over 1 gram</b>		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type            Standard                    Extended                    Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode    Manual Test cord        Base Station Simulator
- 7 Both side of the phone were tested and the worst-case side is reported.
- 8 HEADSET was connected.
- 9 Test Configuration        With Holster                Without Holster
- 10 CDMA Body SAR was tested under RC3/SO32.
- 11 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.8 Measurement Results (AWS1700 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 732.5	450 (Mid)	AWS1700	23.52	23.44	Rear	2.0 cm without Holster	Intenna	0.339
1 732.5	450 (Mid)	AWS1700	23.52	23.51	Front	2.0 cm without Holster	Intenna	0.230
<b>ANSI/ IEEE C95.1 2005 – Safety Limit</b>						<b>Body</b>		
<b>Spatial Peak</b>						<b>1.6 W/kg (mW/g)</b>		
<b>Uncontrolled Exposure/ General Population</b>						<small>Averaged over 1 gram</small>		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type                     Standard                     Extended                     Slim  
    Batteries are fully charged for all readings.
- 6 Test Signal Call Mode     Manual Test cord             Base Station Simulator
- 7 Both side of the phone were tested and the worst-case side is reported.
- 8 HEADSET was connected.
- 9 Test Configuration             With Holster                     Without Holster
- 10 AWS Body SAR was tested under RC3/SO32.
- 11 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

## 11.9 Measurement Results (PCS1900 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 880.00	600 (Mid)	PCS1900	23.8	23.61	Rear	2.0 cm without Holster	Intenna	0.427
1 880.00	600 (Mid)	PCS1900	23.8	23.64	Front	2.0 cm without Holster	Intenna	0.234
<b>ANSI/ IEEE C95.1 2005 – Safety Limit</b>						<b>Body</b>		
<b>Spatial Peak</b>						<b>1.6 W/kg (mW/g)</b>		
<b>Uncontrolled Exposure/ General Population</b>						<small>Averaged over 1 gram</small>		

**NOTES:**

- 1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
- 2 All modes of operation were investigated and the worst-case are reported.
- 3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
- 4 Tissue parameters and temperatures are listed on the SAR plot.
- 5 Battery Type                     Standard                     Extended                     Slim  
Batteries are fully charged for all readings.
- 6 Test Signal Call Mode     Manual Test cord             Base Station Simulator
- 7 Both side of the phone were tested and the worst-case side is reported.
- 8 HEADSET was connected.
- 9 Test Configuration             With Holster                     Without Holster
- 10 PCS Body SAR was tested under RC3/SO32.
- 11 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. CONCLUSION**

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The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/IEEE C95.1 2005.

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.

## 13. REFERENCES

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## Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

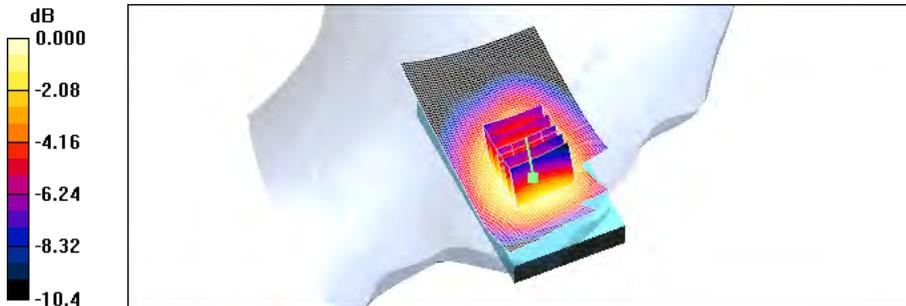
Communication System: CDMA 835MHz FCC; Frequency: 824.7 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 825$  MHz;  $\sigma = 0.881$  mho/m;  $\epsilon_r = 42.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.83, 5.83, 5.83); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phantom ; Type: SAM

**Left touch 1013/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.05 mW/g

**Left touch 1013/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 36.2 V/m; Power Drift = -0.094 dB  
Peak SAR (extrapolated) = 1.23 W/kg  
**SAR(1 g) = 1 mW/g; SAR(10 g) = 0.751 mW/g**  
Maximum value of SAR (measured) = 1.07 mW/g



0 dB = 1.07mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.52$  MHz;  $\sigma = 0.889$  mho/m;  $\epsilon_r = 42.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.83, 5.83, 5.83); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phamtom ; Type: SAM

**Left touch 384/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.907 mW/g

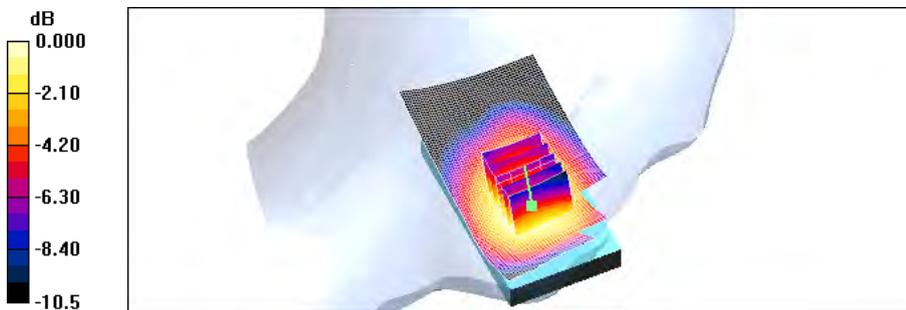
**Left touch 384/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 33.7 V/m; Power Drift = -0.166 dB

Peak SAR (extrapolated) = 1.06 W/kg

**SAR(1 g) = 0.864 mW/g; SAR(10 g) = 0.641 mW/g**

Maximum value of SAR (measured) = 0.919 mW/g



0 dB = 0.919mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

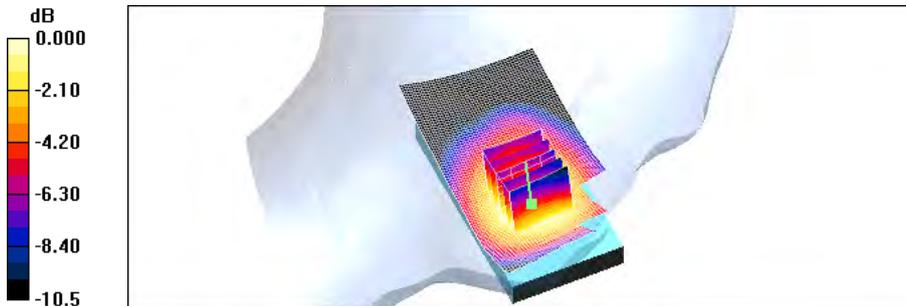
Communication System: CDMA 835MHz FCC; Frequency: 848.31 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 848.31 \text{ MHz}$ ;  $\sigma = 0.9 \text{ mho/m}$ ;  $\epsilon_r = 41.9$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.83, 5.83, 5.83); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phantom ; Type: SAM

**Left touch 777/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.01 mW/g

**Left touch 777/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 34.8 V/m; Power Drift = -0.031 dB  
Peak SAR (extrapolated) = 1.15 W/kg  
**SAR(1 g) = 0.944 mW/g; SAR(10 g) = 0.700 mW/g**  
Maximum value of SAR (measured) = 0.997 mW/g



0 dB = 0.997mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

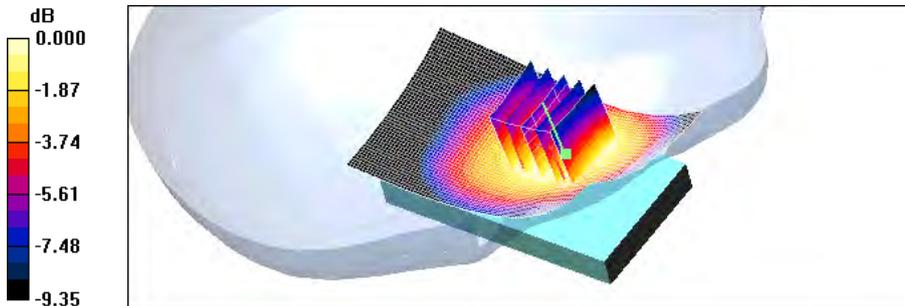
Communication System: CDMA 835MHz FCC; Frequency: 824.7 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 825$  MHz;  $\sigma = 0.881$  mho/m;  $\epsilon_r = 42.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.83, 5.83, 5.83); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phantom ; Type: SAM

**Right touch 1013/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.25 mW/g

**Right touch 1013/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 36.0 V/m; Power Drift = -0.099 dB  
Peak SAR (extrapolated) = 1.43 W/kg  
**SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.832 mW/g**  
Maximum value of SAR (measured) = 1.19 mW/g



0 dB = 1.19mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

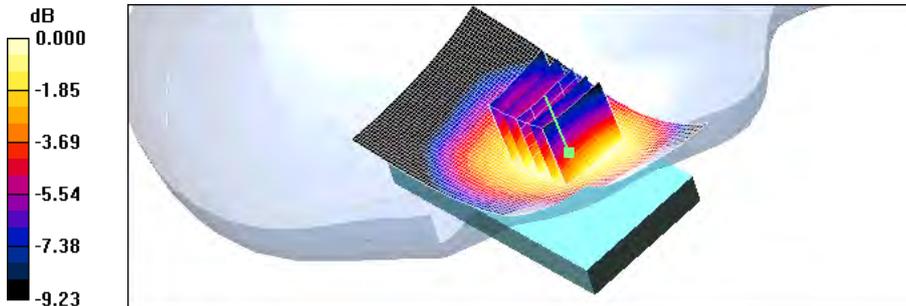
Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.52$  MHz;  $\sigma = 0.889$  mho/m;  $\epsilon_r = 42.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.83, 5.83, 5.83); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phantom ; Type: SAM

**Right touch 384/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.05 mW/g

**Right touch 384/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 33.0 V/m; Power Drift = -0.061 dB  
Peak SAR (extrapolated) = 1.19 W/kg  
**SAR(1 g) = 0.938 mW/g; SAR(10 g) = 0.691 mW/g**  
Maximum value of SAR (measured) = 0.984 mW/g



0 dB = 0.984mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

Communication System: CDMA 835MHz FCC; Frequency: 848.31 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 848.31$  MHz;  $\sigma = 0.9$  mho/m;  $\epsilon_r = 41.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.83, 5.83, 5.83); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phantom ; Type: SAM

**Right touch 777/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.15 mW/g

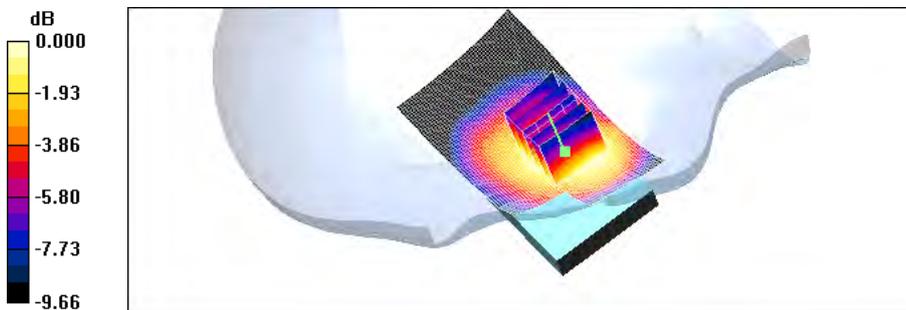
**Right touch 777/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 34.5 V/m; Power Drift = -0.157 dB

Peak SAR (extrapolated) = 1.35 W/kg

**SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.753 mW/g**

Maximum value of SAR (measured) = 1.08 mW/g



0 dB = 1.08mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

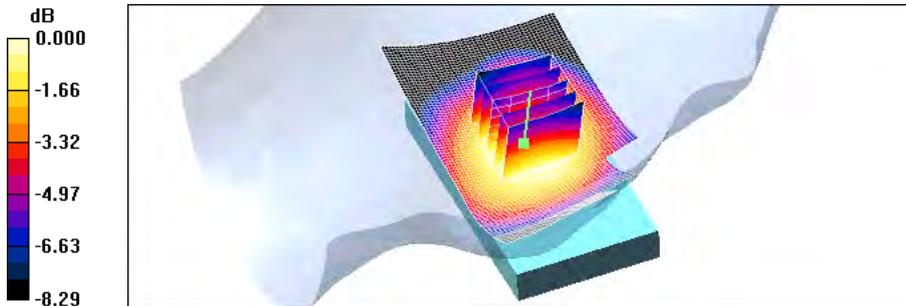
Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.52$  MHz;  $\sigma = 0.889$  mho/m;  $\epsilon_r = 42.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.83, 5.83, 5.83); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phantom ; Type: SAM

**Left tilt 384/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.452 mW/g

**Left tilt 384/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 20.7 V/m; Power Drift = 0.024 dB  
Peak SAR (extrapolated) = 0.496 W/kg  
**SAR(1 g) = 0.420 mW/g; SAR(10 g) = 0.327 mW/g**  
Maximum value of SAR (measured) = 0.436 mW/g



0 dB = 0.436mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

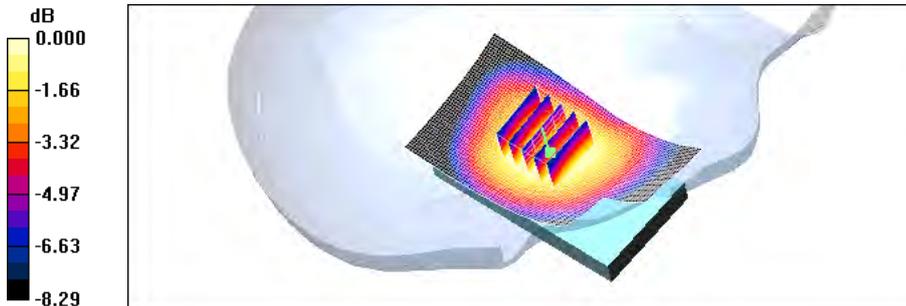
Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.52$  MHz;  $\sigma = 0.889$  mho/m;  $\epsilon_r = 42.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.83, 5.83, 5.83); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phantom ; Type: SAM

**Right tilt 384/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.495 mW/g

**Right tilt 384/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 20.1 V/m; Power Drift = -0.110 dB  
Peak SAR (extrapolated) = 0.553 W/kg  
**SAR(1 g) = 0.467 mW/g; SAR(10 g) = 0.358 mW/g**  
Maximum value of SAR (measured) = 0.488 mW/g



0 dB = 0.488mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

Communication System: AWS 1700 MHz FCC; Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1732.5$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 41.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

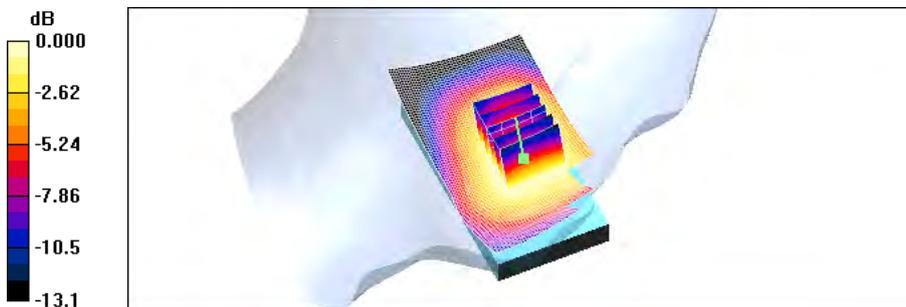
## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.3, 5.3, 5.3); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Left touch 450/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.857 mW/g

**Left touch 450/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 25.0 V/m; Power Drift = -0.075 dB  
Peak SAR (extrapolated) = 0.975 W/kg  
**SAR(1 g) = 0.778 mW/g; SAR(10 g) = 0.537 mW/g**

Maximum value of SAR (measured) = 0.834 mW/g



0 dB = 0.834mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

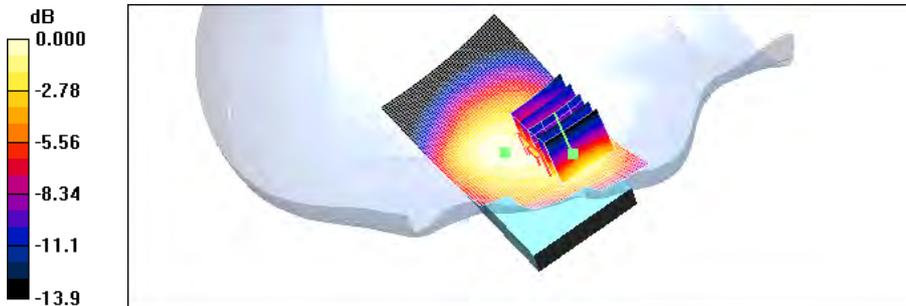
Communication System: AWS 1700 MHz FCC; Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1732.5$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 41.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.3, 5.3, 5.3); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Right touch 450/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.799 mW/g

**Right touch 450/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 25.8 V/m; Power Drift = 0.002 dB  
Peak SAR (extrapolated) = 1.01 W/kg  
**SAR(1 g) = 0.769 mW/g; SAR(10 g) = 0.503 mW/g**  
Maximum value of SAR (measured) = 0.847 mW/g



0 dB = 0.847mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

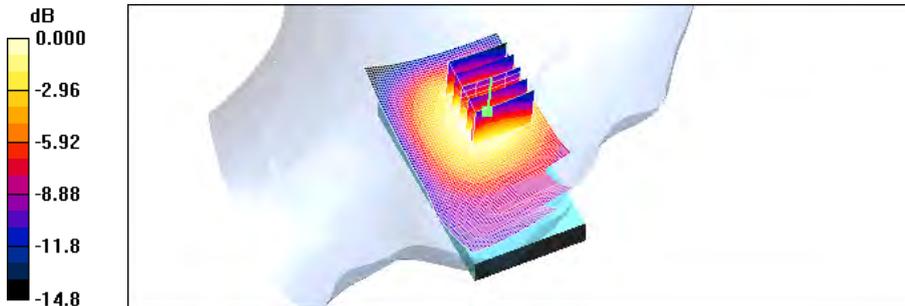
Communication System: AWS 1700 MHz FCC; Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1732.5$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 41.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.3, 5.3, 5.3); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Left tilt 450/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.566 mW/g

**Left tilt 450/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 11.0 V/m; Power Drift = -0.140 dB  
Peak SAR (extrapolated) = 0.652 W/kg  
**SAR(1 g) = 0.512 mW/g; SAR(10 g) = 0.339 mW/g**  
Maximum value of SAR (measured) = 0.551 mW/g



0 dB = 0.551mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

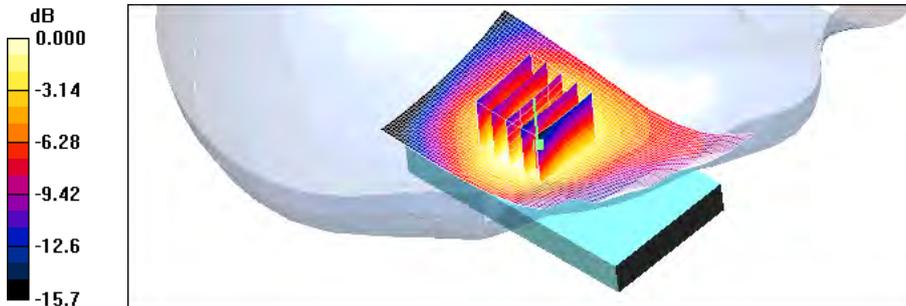
Communication System: AWS 1700 MHz FCC; Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1732.5$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 41.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.3, 5.3, 5.3); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Right tilt 450/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.495 mW/g

**Right tilt 450/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 11.2 V/m; Power Drift = -0.030 dB  
Peak SAR (extrapolated) = 0.539 W/kg  
**SAR(1 g) = 0.438 mW/g; SAR(10 g) = 0.297 mW/g**  
Maximum value of SAR (measured) = 0.474 mW/g



0 dB = 0.474mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Jun.11, 2010

**DUT: A410; Type: Bar; Serial: #1**

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 41.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

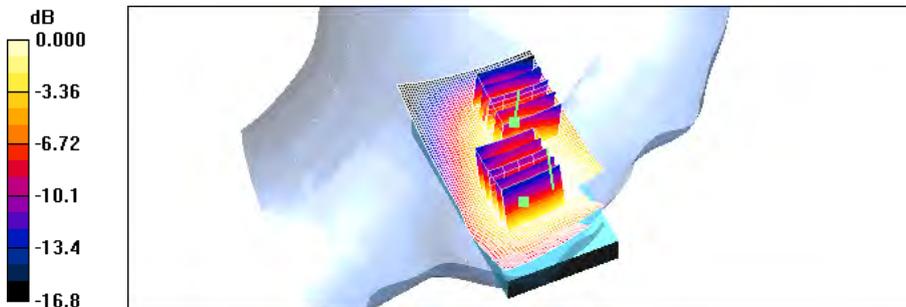
## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.07, 5.07, 5.07); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Left touch 600/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.810 mW/g

**Left touch 600/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 24.3 V/m; Power Drift = -0.048 dB  
Peak SAR (extrapolated) = 0.892 W/kg  
**SAR(1 g) = 0.652 mW/g; SAR(10 g) = 0.434 mW/g**  
aximum value of SAR (measured) = 0.724 mW/g

**Left touch 600/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 24.3 V/m; Power Drift = -0.048 dB  
Peak SAR (extrapolated) = 0.750 W/kg  
SAR(1 g) = 0.561 mW/g; SAR(10 g) = 0.359 mW/g  
Maximum value of SAR (measured) = 0.618 mW/g



0 dB = 0.618mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Jun.11, 2010

**DUT: A410; Type: Bar; Serial: #1**

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 41.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

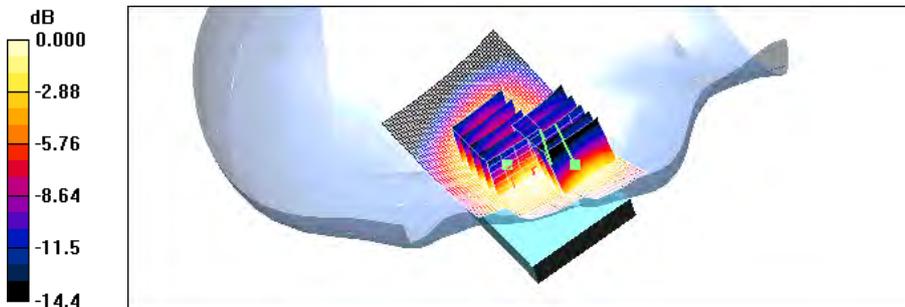
## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.07, 5.07, 5.07); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Right touch 600/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.795 mW/g

**Right touch 600/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 23.1 V/m; Power Drift = 0.004 dB  
Peak SAR (extrapolated) = 1.17 W/kg  
**SAR(1 g) = 0.799 mW/g; SAR(10 g) = 0.472 mW/g**  
Maximum value of SAR (measured) = 0.920 mW/g

**Right touch 600/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 23.1 V/m; Power Drift = 0.004 dB  
Peak SAR (extrapolated) = 0.877 W/kg  
SAR(1 g) = 0.597 mW/g; SAR(10 g) = 0.371 mW/g  
Maximum value of SAR (measured) = 0.722 mW/g



0 dB = 0.722mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Jun.11, 2010

**DUT: A410; Type: Bar; Serial: #1**

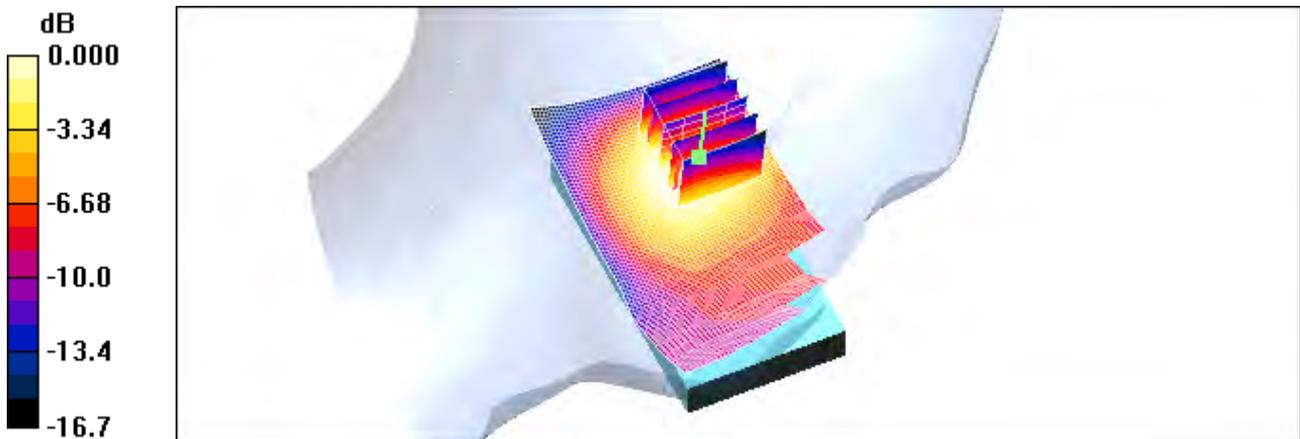
Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 41.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.07, 5.07, 5.07); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Left tilt 600/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.619 mW/g

**Left tilt 600/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 9.18 V/m; Power Drift = -0.065 dB  
Peak SAR (extrapolated) = 0.651 W/kg  
**SAR(1 g) = 0.467 mW/g; SAR(10 g) = 0.288 mW/g**  
Maximum value of SAR (measured) = 0.495 mW/g



0 dB = 0.495mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Jun.11, 2010

**DUT: A410; Type: Bar; Serial: #1**

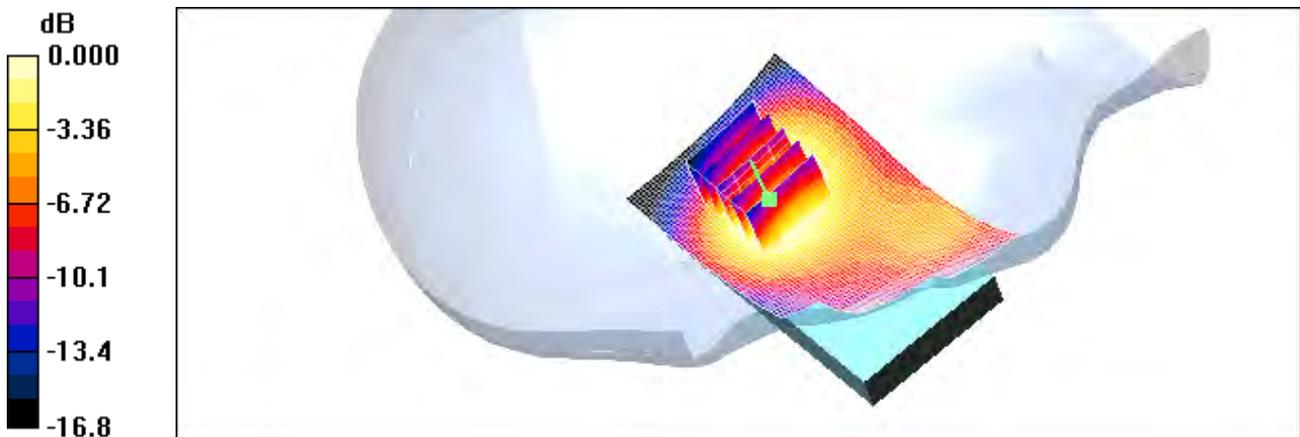
Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 41.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.07, 5.07, 5.07); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Right tilt 600/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.638 mW/g

**Right tilt 600/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 10.5 V/m; Power Drift = 0.042 dB  
Peak SAR (extrapolated) = 0.684 W/kg  
**SAR(1 g) = 0.528 mW/g; SAR(10 g) = 0.348 mW/g**  
Maximum value of SAR (measured) = 0.561 mW/g



0 dB = 0.561mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

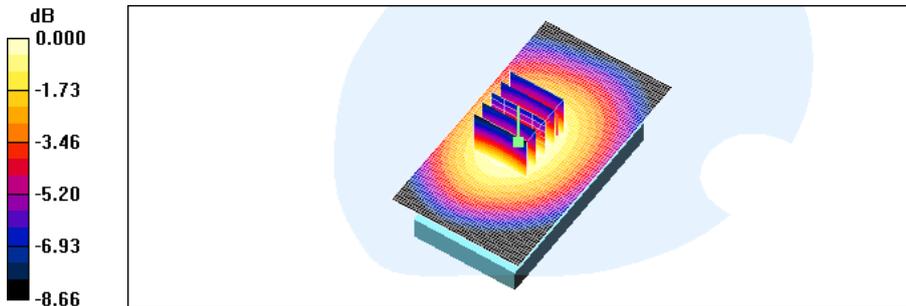
Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.52$  MHz;  $\sigma = 0.975$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.91, 5.91, 5.91); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phantom ; Type: SAM

**CDMA 850 384/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.394 mW/g

**CDMA 850 384/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 12.9 V/m; Power Drift = -0.150 dB  
Peak SAR (extrapolated) = 0.467 W/kg  
**SAR(1 g) = 0.377 mW/g; SAR(10 g) = 0.281 mW/g**  
Maximum value of SAR (measured) = 0.397 mW/g



0 dB = 0.397mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

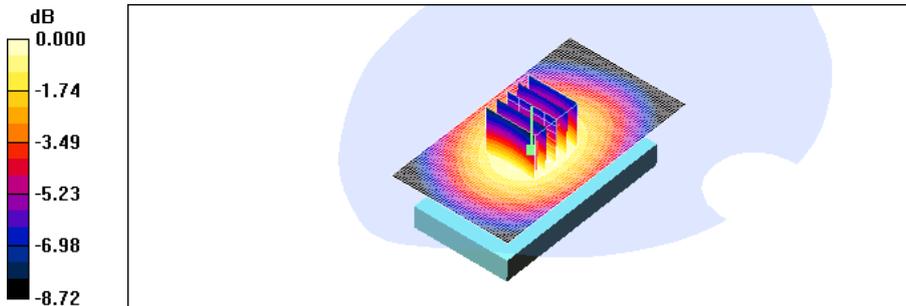
Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 836.52$  MHz;  $\sigma = 0.975$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.91, 5.91, 5.91); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phantom ; Type: SAM

**CDMA 850 384/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.469 mW/g

**CDMA 850 384/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 13.1 V/m; Power Drift = -0.082 dB  
Peak SAR (extrapolated) = 0.551 W/kg  
**SAR(1 g) = 0.443 mW/g; SAR(10 g) = 0.331 mW/g**  
Maximum value of SAR (measured) = 0.469 mW/g



0 dB = 0.469mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

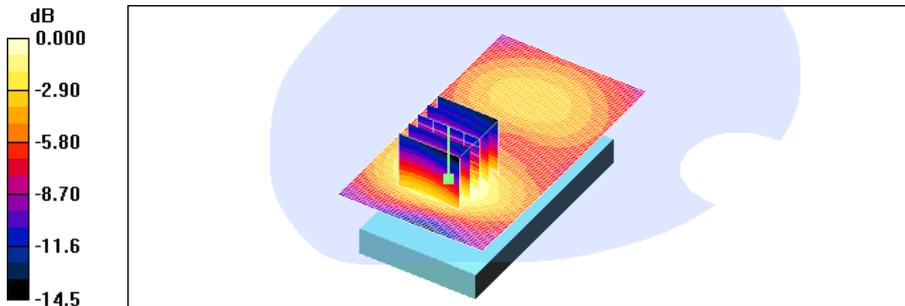
Communication System: AWS 1700 MHz FCC; Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1732.5$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 55$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(4.67, 4.67, 4.67); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**AWS Body 450/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.407 mW/g

**AWS Body 450/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 11.7 V/m; Power Drift = -0.077 dB  
Peak SAR (extrapolated) = 0.439 W/kg  
**SAR(1 g) = 0.339 mW/g; SAR(10 g) = 0.214 mW/g**  
Maximum value of SAR (measured) = 0.373 mW/g



0 dB = 0.373mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

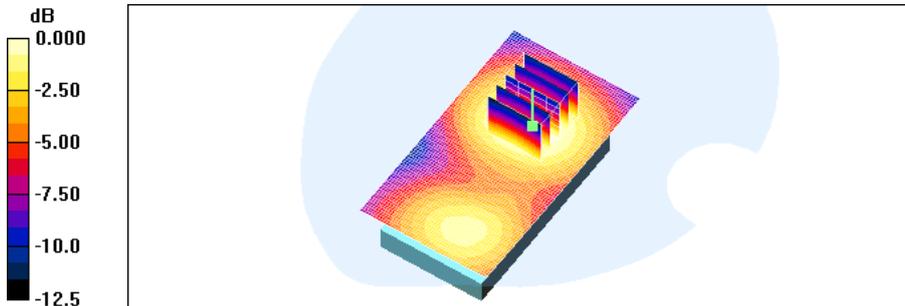
Communication System: AWS 1700 MHz FCC; Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1732.5$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 55$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(4.67, 4.67, 4.67); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**AWS Body 450/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.237 mW/g

**AWS Body 450/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 11.3 V/m; Power Drift = -0.020 dB  
Peak SAR (extrapolated) = 0.275 W/kg  
**SAR(1 g) = 0.230 mW/g; SAR(10 g) = 0.156 mW/g**  
Maximum value of SAR (measured) = 0.248 mW/g



0 dB = 0.248mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Jun.11, 2010

**DUT: A410; Type: Bar; Serial: #1**

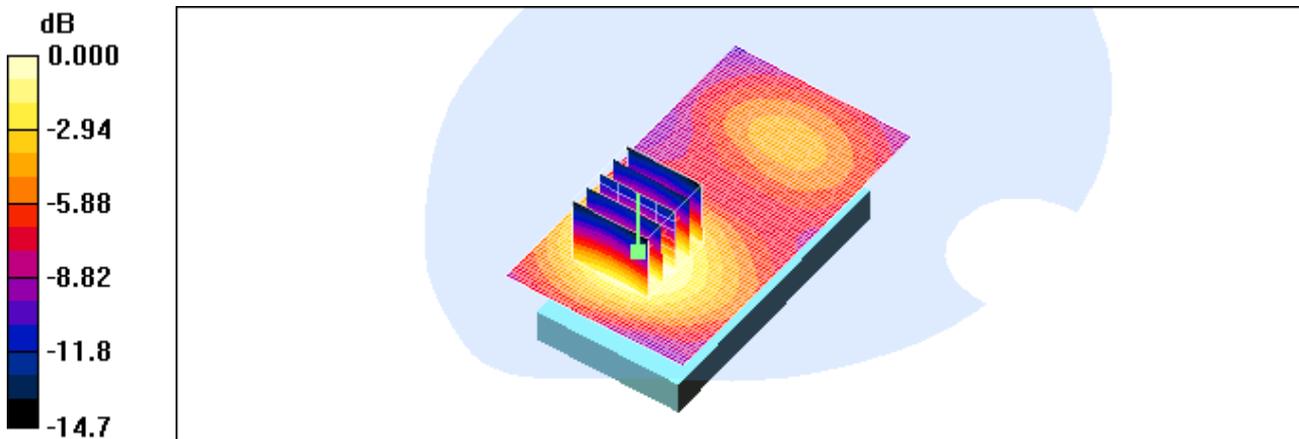
Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(4.48, 4.48, 4.48); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**PCS Body 600/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.487 mW/g

**PCS Body 600/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 11.5 V/m; Power Drift = -0.105 dB  
Peak SAR (extrapolated) = 0.586 W/kg  
**SAR(1 g) = 0.427 mW/g; SAR(10 g) = 0.265 mW/g**  
Maximum value of SAR (measured) = 0.466 mW/g



0 dB = 0.466mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.11, 2010

**DUT: A410; Type: Bar; Serial: #1**

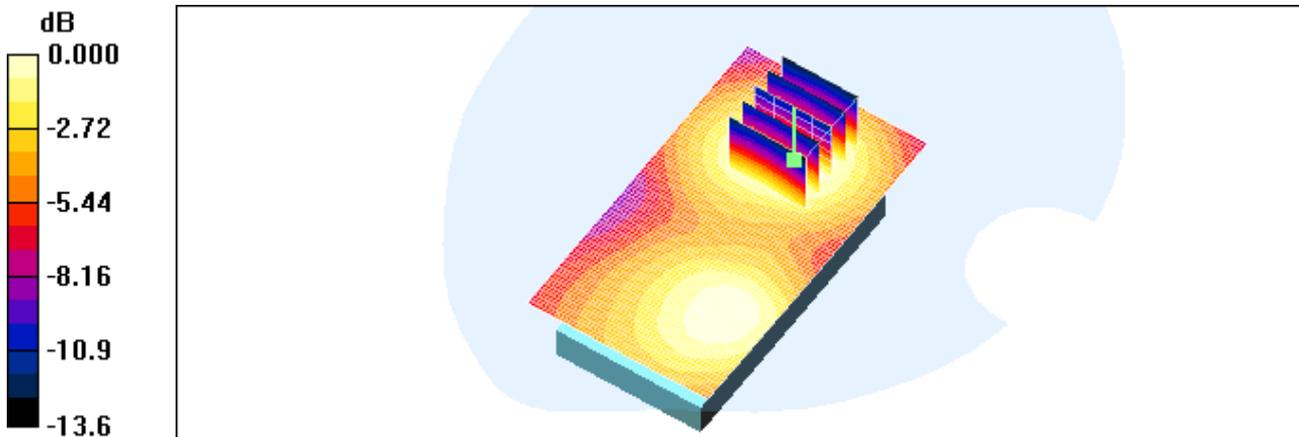
Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(4.48, 4.48, 4.48); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**PCS Body 600/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.257 mW/g

**PCS Body 600/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 13.1 V/m; Power Drift = -0.157 dB  
Peak SAR (extrapolated) = 0.299 W/kg  
**SAR(1 g) = 0.234 mW/g; SAR(10 g) = 0.152 mW/g**  
Maximum value of SAR (measured) = 0.255 mW/g



0 dB = 0.255mW/g

Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

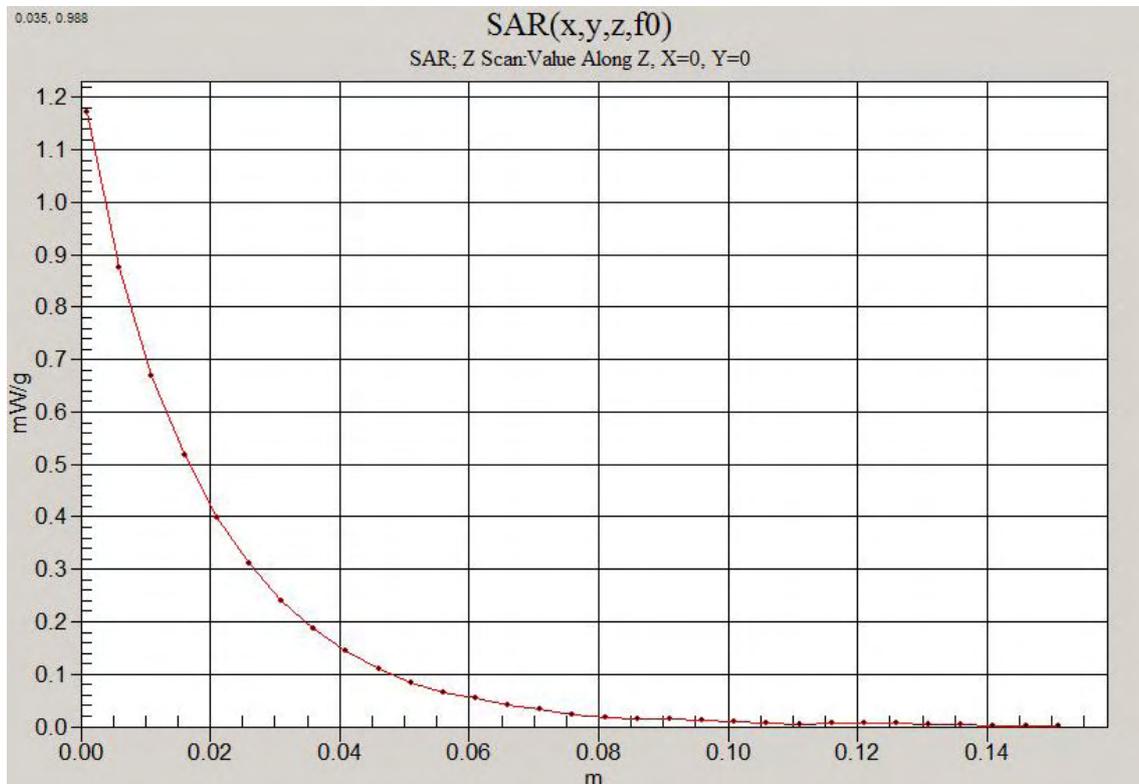
Communication System: CDMA 835MHz FCC; Frequency: 824.7 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 825$  MHz;  $\sigma = 0.881$  mho/m;  $\epsilon_r = 42.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.83, 5.83, 5.83); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phantom ; Type: SAM

**Right touch 1013/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.25 mW/g

**Right touch 1013/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 36.0 V/m; Power Drift = -0.099 dB  
Peak SAR (extrapolated) = 1.43 W/kg  
**SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.832 mW/g**  
Maximum value of SAR (measured) = 1.19 mW/g



Test Laboratory: HCT CO., LTD  
 EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
 Liquid Temperature: 21.3 °C  
 Ambient Temperature: 21.5 °C  
 Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

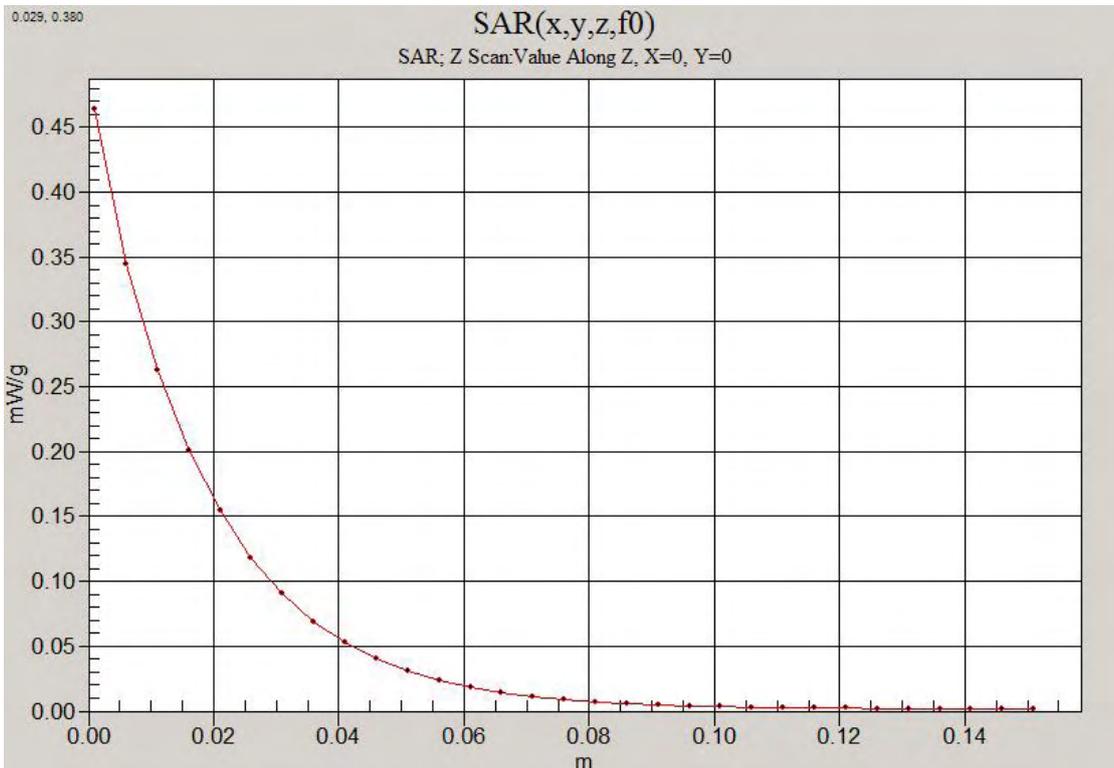
Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz; Duty Cycle: 1:1  
 Medium parameters used (interpolated):  $f = 836.52$  MHz;  $\sigma = 0.975$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.91, 5.91, 5.91); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phamtom ; Type: SAM

**CDMA 850 384/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (interpolated) = 0.469 mW/g

**CDMA 850 384/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 13.1 V/m; Power Drift = -0.082 dB  
 Peak SAR (extrapolated) = 0.551 W/kg  
**SAR(1 g) = 0.443 mW/g; SAR(10 g) = 0.331 mW/g**  
 Maximum value of SAR (measured) = 0.469 mW/g



Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.3 °C  
Ambient Temperature: 21.5 °C  
Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

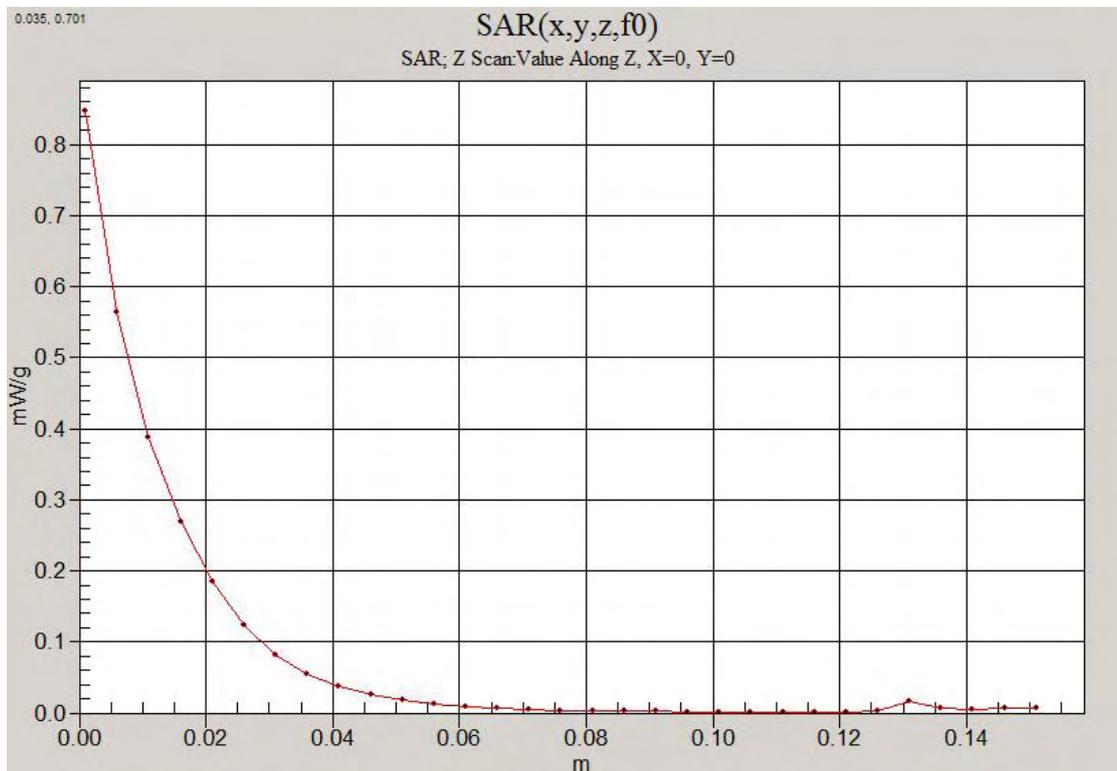
Communication System: AWS 1700 MHz FCC; Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1732.5$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 41.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.3, 5.3, 5.3); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Left touch 450/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.857 mW/g

**Left touch 450/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 25.0 V/m; Power Drift = -0.075 dB  
Peak SAR (extrapolated) = 0.975 W/kg  
**SAR(1 g) = 0.778 mW/g; SAR(10 g) = 0.537 mW/g**  
Maximum value of SAR (measured) = 0.834 mW/g



Test Laboratory: HCT CO., LTD  
 EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
 Liquid Temperature: 21.3 °C  
 Ambient Temperature: 21.5 °C  
 Test Date: Jun.10, 2010

**DUT: A410; Type: Bar; Serial: #1**

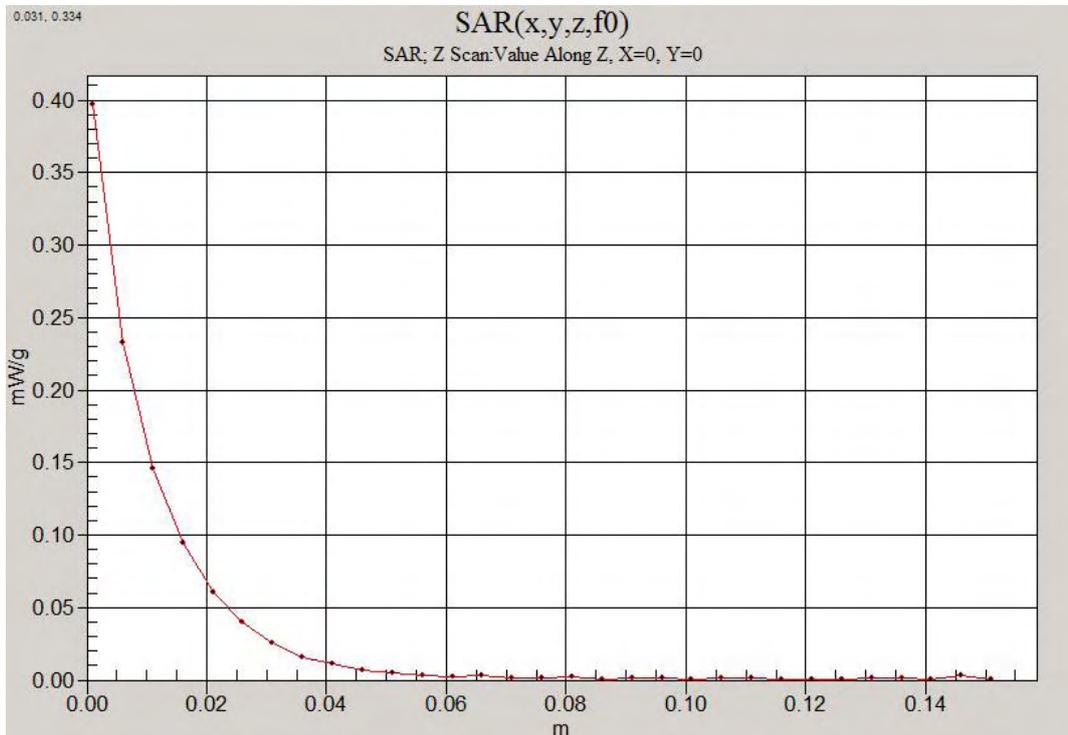
Communication System: AWS 1700 MHz FCC; Frequency: 1732.5 MHz; Duty Cycle: 1:1  
 Medium parameters used (interpolated):  $f = 1732.5$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 55$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(4.67, 4.67, 4.67); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**AWS Body 450/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (interpolated) = 0.407 mW/g

**AWS Body 450/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 11.7 V/m; Power Drift = -0.077 dB  
 Peak SAR (extrapolated) = 0.439 W/kg  
**SAR(1 g) = 0.339 mW/g; SAR(10 g) = 0.214 mW/g**  
 Maximum value of SAR (measured) = 0.373 mW/g



Test Laboratory: HCT CO., LTD  
 EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
 Liquid Temperature: 21.2 °C  
 Ambient Temperature: 21.4 °C  
 Test Date: Jun.11, 2010

**DUT: A410; Type: Bar; Serial: #1**

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 41.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

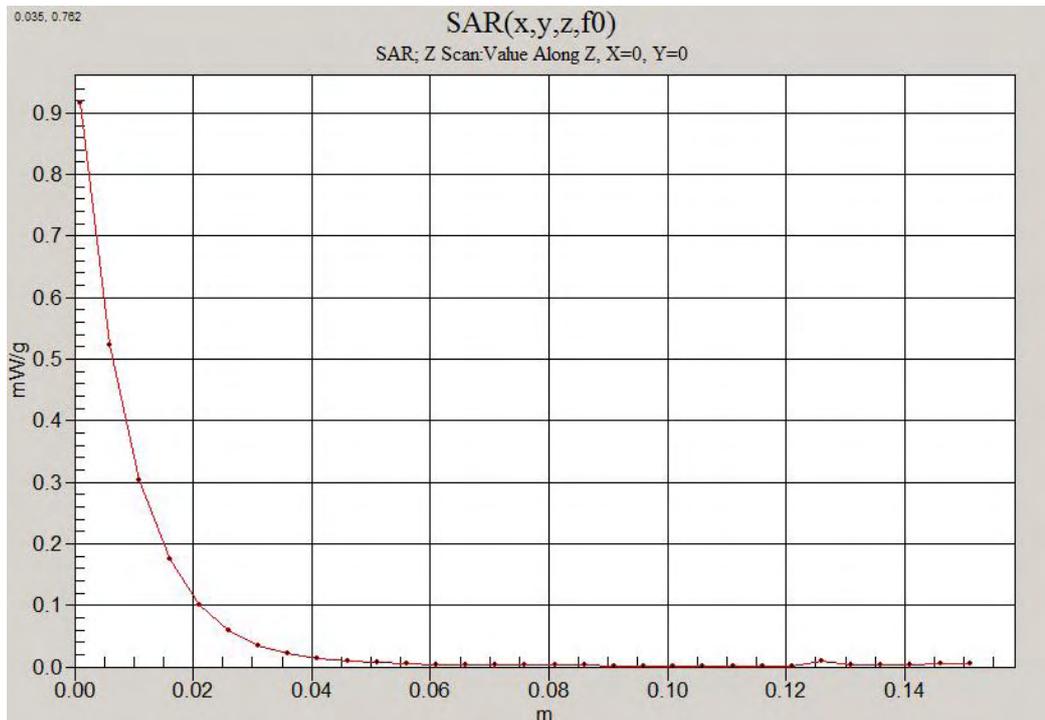
DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(5.07, 5.07, 5.07); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Right touch 600/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (interpolated) = 0.795 mW/g

**Right touch 600/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 23.1 V/m; Power Drift = 0.004 dB  
 Peak SAR (extrapolated) = 1.17 W/kg  
**SAR(1 g) = 0.799 mW/g; SAR(10 g) = 0.472 mW/g**  
 Maximum value of SAR (measured) = 0.920 mW/g

**Right touch 600/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
 Reference Value = 23.1 V/m; Power Drift = 0.004 dB  
 Peak SAR (extrapolated) = 0.877 W/kg  
 SAR(1 g) = 0.597 mW/g; SAR(10 g) = 0.371 mW/g  
 Maximum value of SAR (measured) = 0.722 mW/g



Test Laboratory: HCT CO., LTD  
EUT Type: Tri-Band CDMA Phone (CDMA/PCS CDMA/AWS CDMA) with Bluetooth  
Liquid Temperature: 21.2 °C  
Ambient Temperature: 21.4 °C  
Test Date: Jun.11, 2010

**DUT: A410; Type: Bar; Serial: #1**

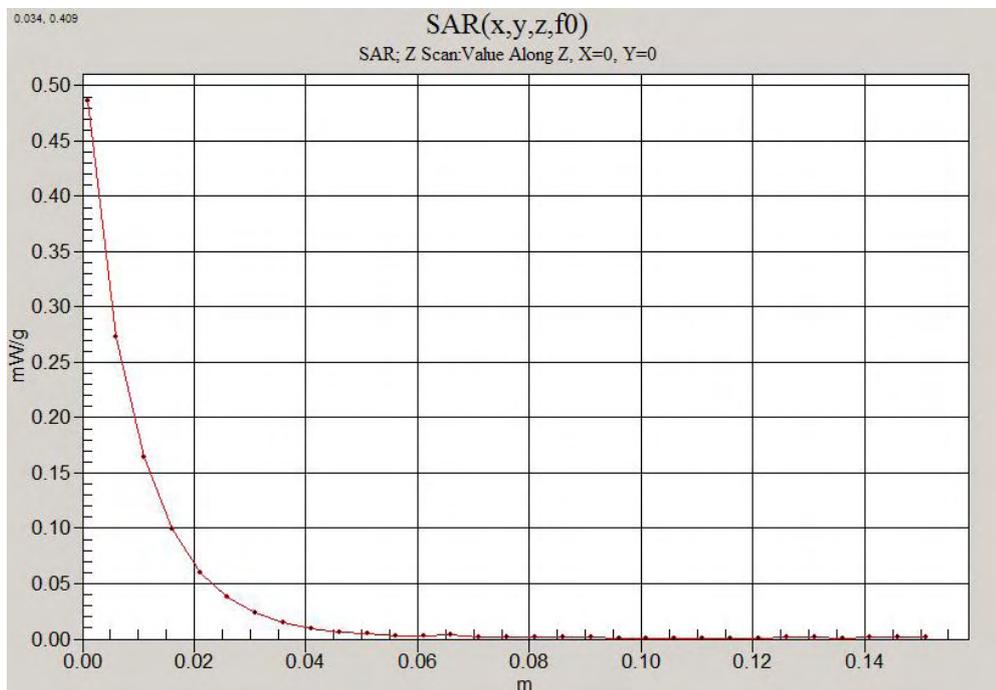
Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

## DASY4 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(4.48, 4.48, 4.48); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

**PCS Body 600/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.487 mW/g

**PCS Body 600/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 11.5 V/m; Power Drift = -0.105 dB  
Peak SAR (extrapolated) = 0.586 W/kg  
**SAR(1 g) = 0.427 mW/g; SAR(10 g) = 0.265 mW/g**  
Maximum value of SAR (measured) = 0.466 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: 21.3 °C  
Test Date: Jun.10, 2010

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

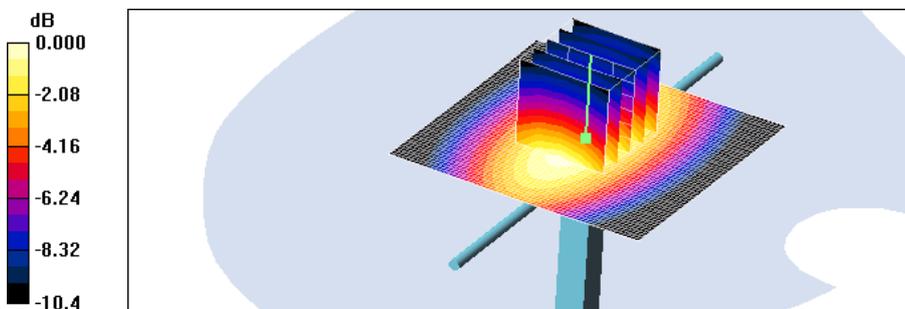
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.888$  mho/m;  $\epsilon_r = 42.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:

- Probe: ET3DV6 – SN1631; ConvF(5.83, 5.83, 5.83); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Validation 835MHz/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 1.07 mW/g

**Validation 835MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 36.0 V/m; Power Drift = -0.036 dB  
Peak SAR (extrapolated) = 1.40 W/kg  
**SAR(1 g) = 0.981 mW/g; SAR(10 g) = 0.648 mW/g**  
Maximum value of SAR (measured) = 1.06 mW/g



0 dB = 1.06mW/g

## ■ Validation Data (1800 MHz Head)

Test Laboratory: HCT CO., LTD  
Input Power 100 mW (20 dBm)  
Liquid Temp: 21.3 °C  
Test Date: Jun.10, 2010

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 – SN:2d006**

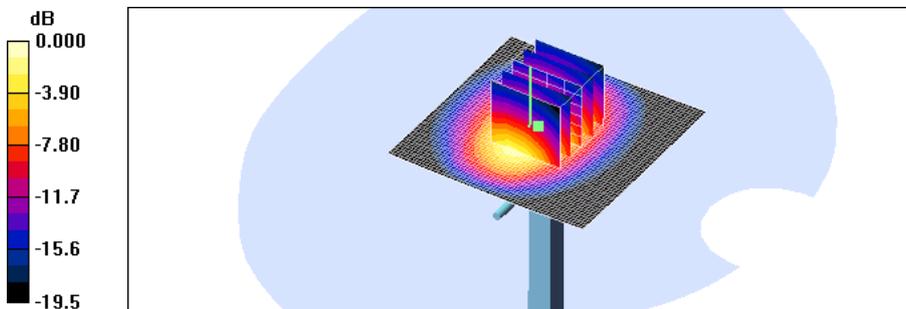
Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 41.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:

- Probe: ET3DV6 – SN1631; ConvF(5.3, 5.3, 5.3); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Dipole 1800MHz Validation/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 4.61 mW/g

**Dipole 1800MHz Validation/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 55.5 V/m; Power Drift = 0.001 dB  
Peak SAR (extrapolated) = 6.67 W/kg  
**SAR(1 g) = 3.95 mW/g; SAR(10 g) = 2.07 mW/g**  
Maximum value of SAR (measured) = 4.34 mW/g



0 dB = 4.34mW/g

## ■ Validation Data (1900 MHz Head)

Test Laboratory: HCT CO., LTD  
Input Power 100 mW (20 dBm)  
Liquid Temp: 21.2 °C  
Test Date: Jun.11, 2010

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

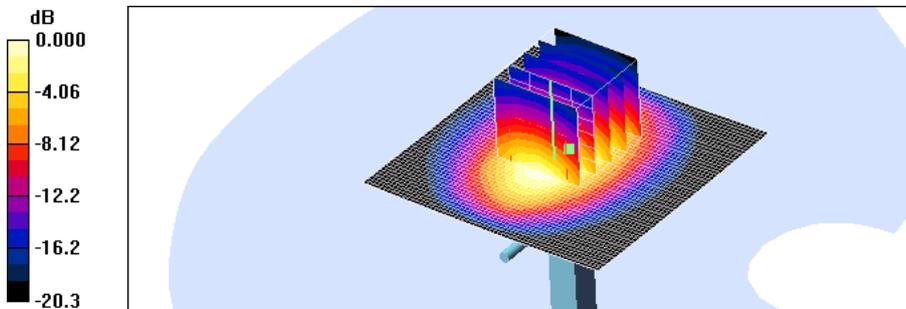
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 41.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:

- Probe: ET3DV6 – SN1631; ConvF(5.07, 5.07, 5.07); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Dipole 1900MHz Validation/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 4.79 mW/g

**Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 60.3 V/m; Power Drift = 0.006 dB  
Peak SAR (extrapolated) = 6.96 W/kg  
**SAR(1 g) = 4.05 mW/g; SAR(10 g) = 2.08 mW/g**  
Maximum value of SAR (measured) = 4.57 mW/g



0 dB = 4.57mW/g

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

Title                   A410  
SubTitle               CDMA835(Head)  
Test Date               Jun.10, 2010

Frequency	e'	e''
800000000	42.3922	19.2362
805000000	42.3677	19.2183
810000000	42.3214	19.1581
815000000	42.2653	19.1763
820000000	42.2388	19.1435
825000000	42.1556	19.1907
830000000	42.1090	19.1745
835000000	42.0814	19.1110
840000000	42.0466	19.1131
845000000	41.9789	19.0516
850000000	41.9225	19.0809
855000000	41.9004	19.1002
860000000	41.8097	19.0571
865000000	41.7543	19.0964
870000000	41.6390	19.0664
875000000	41.6388	19.0440
880000000	41.5179	19.0218
885000000	41.4936	18.9818
890000000	41.4498	19.0429
895000000	41.3710	18.9996
900000000	41.3327	18.9893

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

Title                   A410  
SubTitle               CDMA835(Body)  
Test Date               Jun.10, 2010

Frequency	e'	e''
800000000	54.8177	21.1819
805000000	54.7379	21.1339
810000000	54.6756	21.0732
815000000	54.5395	21.0334
820000000	54.4776	21.0464
825000000	54.3914	21.0096
830000000	54.3295	20.9653
835000000	54.2433	20.9569
840000000	54.2263	20.9168
845000000	54.1277	20.9294
850000000	54.1048	20.9152
855000000	54.0619	20.9515
860000000	54.0978	20.9276
865000000	54.0832	20.9221
870000000	54.0592	20.9132
875000000	54.1074	20.9383
880000000	54.0899	20.9212
885000000	54.0443	20.8983
890000000	54.0472	20.8830
895000000	54.0205	20.8973
900000000	53.9769	20.8869

**■ Dielectric Parameter (1800 MHz Head)**

Title A410  
SubTitle AWS1700(Head)  
Test Date Jun.10, 2010

Frequency	e'	e''
1700000000	41.9272	13.9096
1710000000	41.8183	13.9121
1720000000	41.6617	13.8805
1730000000	41.4800	13.8465
1740000000	41.3243	13.8364
1750000000	41.2090	13.8688
1760000000	41.1548	13.8802
1770000000	41.1699	13.9713
1780000000	41.2755	14.1246
1790000000	41.4351	14.1955
1800000000	41.5636	14.2496
1810000000	41.6113	14.3223
1820000000	41.5882	14.3458
1830000000	41.4816	14.3201
1840000000	41.3180	14.2764
1850000000	41.0729	14.2282
1860000000	40.8686	14.2112
1870000000	40.6835	14.2017
1880000000	40.6161	14.2486
1890000000	40.6489	14.3252
1900000000	40.7697	14.4868

**■ Dielectric Parameter (1800 MHz Body)**

Title                   A410  
SubTitle               AWS1700 (Body)  
Test Date               Jun.10, 2010

Frequency	e'	e''
1700000000	55.2069	14.8164
1710000000	55.1874	14.8387
1720000000	55.1070	14.8182
1730000000	55.0271	14.8624
1740000000	55.0060	14.8491
1750000000	54.9679	14.8622
1760000000	54.9217	14.8939
1770000000	54.8989	14.9282
1780000000	54.8735	14.9913
1790000000	54.8576	15.0197
1800000000	54.8356	15.0725
1810000000	54.7948	15.0558
1820000000	54.7636	15.1061
1830000000	54.7378	15.1141
1840000000	54.6620	15.1231
1850000000	54.6328	15.1275
1860000000	54.6126	15.1316
1870000000	54.5621	15.1415
1880000000	54.4798	15.2156
1890000000	54.4697	15.2601
1900000000	54.4702	15.3173

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

Title A410  
SubTitle PCS1900(Head)  
Test Date Apr.11, 2010

Frequency	e'	e''
1800000000.0000	41.9766	12.9360
1810000000.0000	41.9600	12.9254
1820000000.0000	41.9349	12.9946
1830000000.0000	41.9179	13.0644
1840000000.0000	41.9177	13.0919
1850000000.0000	41.8743	13.0987
1860000000.0000	41.8347	13.1186
1870000000.0000	41.7593	13.1381
1880000000.0000	41.7063	13.1888
1890000000.0000	41.6543	13.2024
1900000000.0000	41.5937	13.2465
1910000000.0000	41.5237	13.2699
1920000000.0000	41.4797	13.2940
1930000000.0000	41.4489	13.3396
1940000000.0000	41.4541	13.3784
1950000000.0000	41.4444	13.3638
1960000000.0000	41.4673	13.3988
1970000000.0000	41.4572	13.4024
1980000000.0000	41.3852	13.4319
1990000000.0000	41.3475	13.4613
2000000000.0000	41.2935	13.4786

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

Title A410  
SubTitle PCS1900(Body)  
Test Date Apr.11, 2010

Frequency	e'	e''
1850000000	53.8238	14.0212
1855000000	53.8214	14.0316
1860000000	53.8233	14.0525
1865000000	53.8065	14.0770
1870000000	53.7672	14.0615
1875000000	53.7508	14.0988
1880000000	53.7075	14.1317
1885000000	53.6966	14.1363
1890000000	53.6361	14.1677
1895000000	53.5933	14.1723
1900000000	53.5866	14.2053
1905000000	53.5446	14.2016
1910000000	53.5194	14.2433
1915000000	53.4514	14.2516
1920000000	53.4744	14.3070
1925000000	53.4768	14.3113
1930000000	53.4009	14.3296
1935000000	53.4386	14.3631
1940000000	53.4358	14.3681
1945000000	53.4386	14.4240
1950000000	53.4575	14.4203

## Attachment 3. – Probe Calibration Data

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



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

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

Accreditation No.: **SCS 108**

Client **H-CT (Dymstec)**

Certificate No: **ET3-1631\_Jun09**

**CALIBRATION CERTIFICATE**

Object **ET3DV6 - SN:1631**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-12.v5 and QA CAL-23.v3  
Calibration procedure for dosimetric E-field probes**

Calibration date: **June 24, 2009**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

Calibrated by: **Jeton Kastrati** (Name)      **Laboratory Technician** (Function)      *[Signature]* (Signature)

Approved by: **Katja Pokovic** (Name)      **Technical Manager** (Function)      *[Signature]* (Signature)

Issued: June 24, 2009

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**Calibration Laboratory of**  
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Zeughausstrasse 43, 8004 Zurich, Switzerland



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

Accreditation No.: **SCS 108**

**Glossary:**

TSL tissue simulating liquid  
 NORM<sub>x,y,z</sub> sensitivity in free space  
 ConvF sensitivity in TSL / NORM<sub>x,y,z</sub>  
 DCP diode compression point  
 Polarization  $\varphi$   $\varphi$  rotation around probe axis  
 Polarization  $\vartheta$   $\vartheta$  rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e.,  $\vartheta = 0$  is normal to probe axis

**Calibration is Performed According to the Following Standards:**

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

**Methods Applied and Interpretation of Parameters:**

- **NORM<sub>x,y,z</sub>:** Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- **NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* 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 (no uncertainty required). DCP does not depend on frequency nor media.
- **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<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- **Spherical isotropy (3D deviation from isotropy):** in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- **Sensor Offset:** The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

ET3DV6 SN:1631

June 24, 2009

# Probe ET3DV6

## SN:1631

Manufactured:	October 12, 2001
Last calibrated:	October 29, 2001
Modified:	June 17, 2009
Recalibrated:	June 24, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1631

June 24, 2009

**DASY - Parameters of Probe: ET3DV6 SN:1631**

Sensitivity in Free Space<sup>A</sup>

Diode Compression<sup>B</sup>

NormX	1.86 ± 10.1%	$\mu V/(V/m)^2$	DCP X	93 mV
NormY	1.83 ± 10.1%	$\mu V/(V/m)^2$	DCP Y	92 mV
NormZ	1.75 ± 10.1%	$\mu V/(V/m)^2$	DCP Z	92 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL                    900 MHz    Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR <sub>be</sub> [%]	Without Correction Algorithm	11.8	7.6
SAR <sub>be</sub> [%]	With Correction Algorithm	0.9	0.6

TSL                    1750 MHz    Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR <sub>be</sub> [%]	Without Correction Algorithm	15.7	10.6
SAR <sub>be</sub> [%]	With Correction Algorithm	0.8	0.7

Sensor Offset

Probe Tip to Sensor Center	2.7 mm
Optical Surface Detection	not supported

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

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 8).

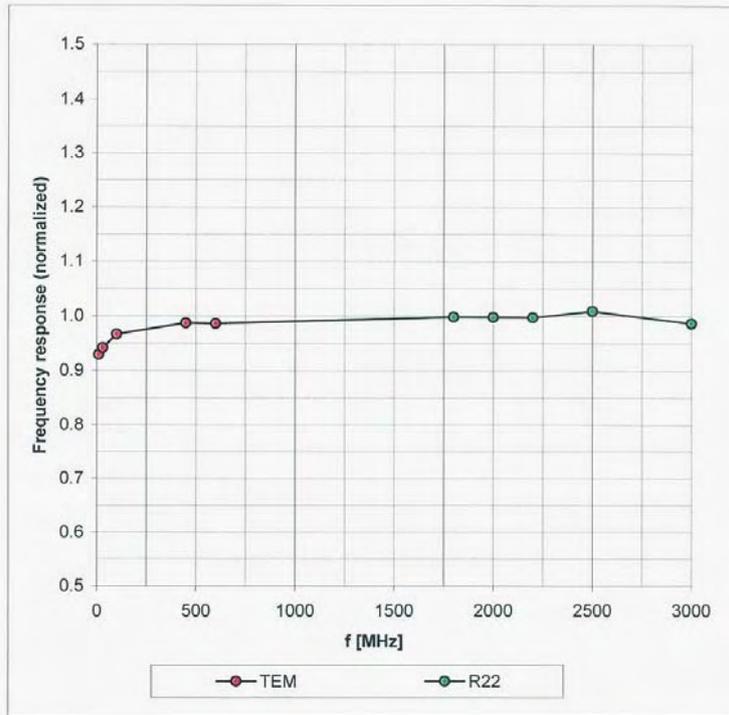
<sup>B</sup> Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1631

June 24, 2009

### Frequency Response of E-Field

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

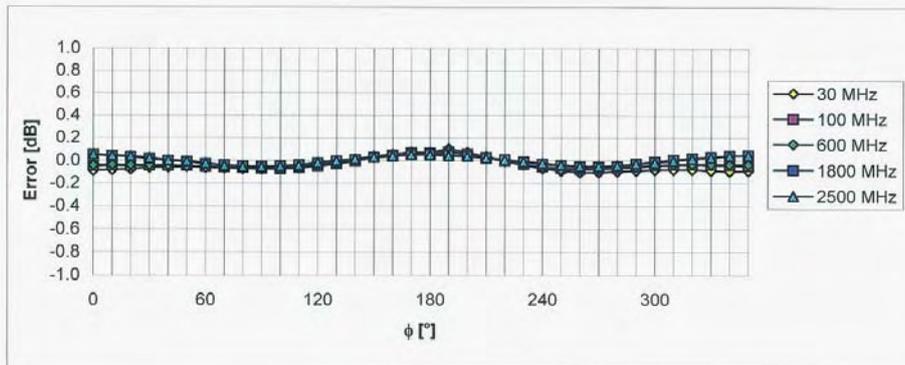
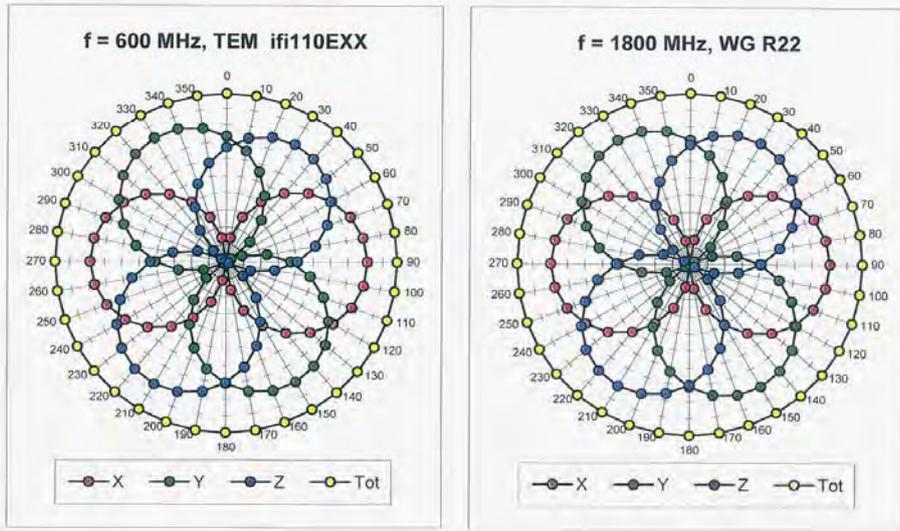


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

ET3DV6 SN:1631

June 24, 2009

**Receiving Pattern ( $\phi$ ),  $\vartheta = 0^\circ$**

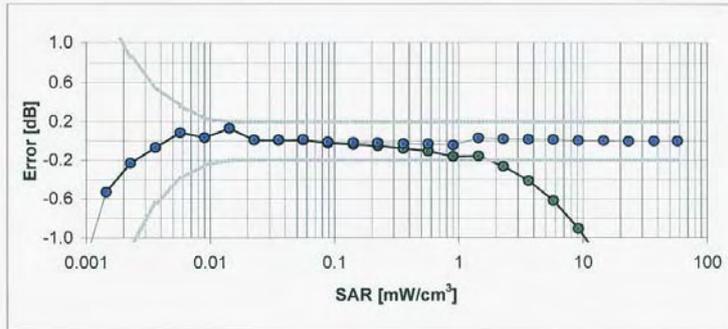
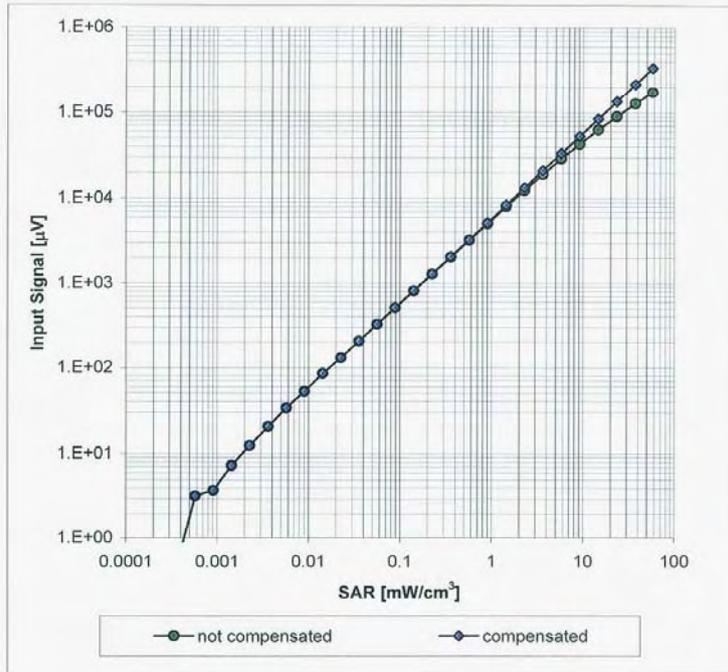


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

ET3DV6 SN:1631

June 24, 2009

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

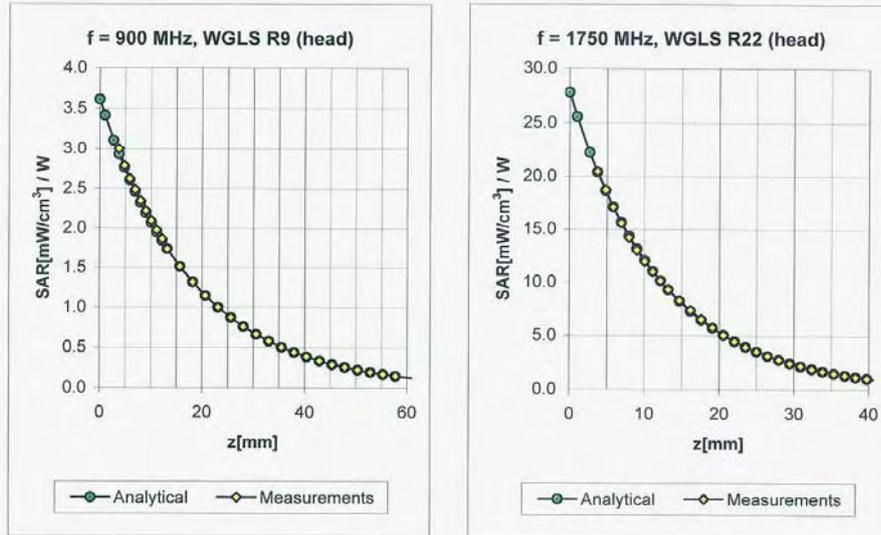


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ET3DV6 SN:1631

June 24, 2009

### Conversion Factor Assessment



f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.30	1.98	6.83 ± 13.3% (k=2)
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.34	2.67	5.83 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.25	3.45	5.67 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.67	2.50	5.30 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.71	2.45	5.07 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.69	2.46	4.90 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.99	1.90	4.52 ± 11.0% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.23	2.04	7.31 ± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.51	2.18	5.91 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.63	3.28	4.67 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.82	2.63	4.48 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.92	2.40	4.60 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.99	1.80	4.21 ± 11.0% (k=2)

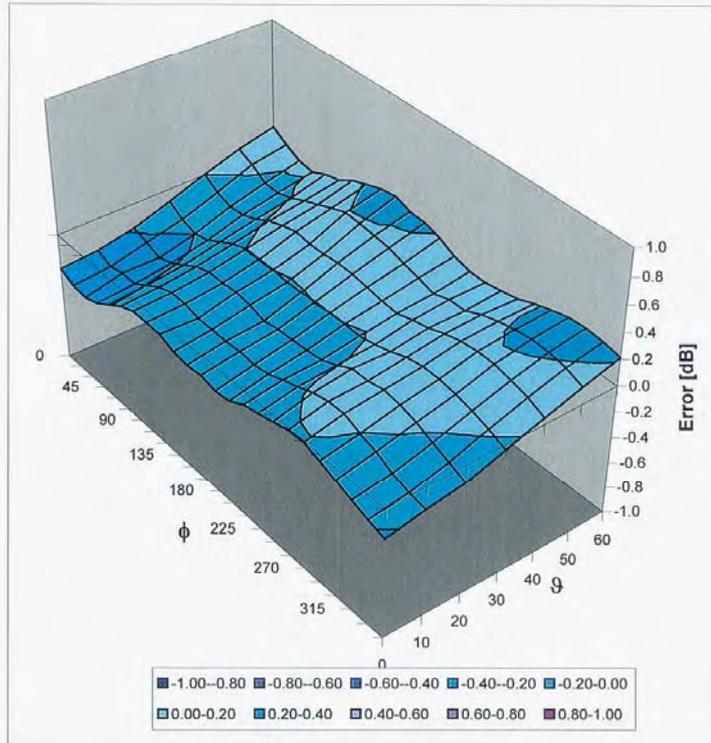
<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ET3DV6 SN:1631

June 24, 2009

### Deviation from Isotropy in HSL

Error ( $\phi$ ,  $\theta$ ),  $f = 900$  MHz



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

## **Attachment 4. – Dipole Calibration Data**

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Accreditation No.: **SCS 108**

Client **HCT (Dymstec)**

Certificate No: **D835V2-441\_May10**

**CALIBRATION CERTIFICATE**

Object **D835V2 - SN: 441**

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

Calibration date: **May 21, 2010**

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-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	02-Mar-10 (No. DAE4-601_Mar10)	Mar-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

	<b>Name</b>	<b>Function</b>	<b>Signature</b>
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 21, 2010

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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	V5.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 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	41.7 $\pm$ 6 %	0.91 mho/m $\pm$ 6 %
Head TSL temperature during test	(22.5 $\pm$ 0.2) °C	----	----

**SAR result with Head TSL**

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

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

**Body TSL parameters**

The following parameters and calculations were applied.

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

**SAR result with Body TSL**

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

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

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

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

**Antenna Parameters with Body TSL**

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

**General Antenna Parameters and Design**

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

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

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

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

**Additional EUT Data**

Manufactured by	SPEAG
Manufactured on	March 09, 2001

**DASY5 Validation Report for Head TSL**

Date/Time: 21.05.2010 09:55:07

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: HSL900

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 41.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

## DASY5 Configuration:

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

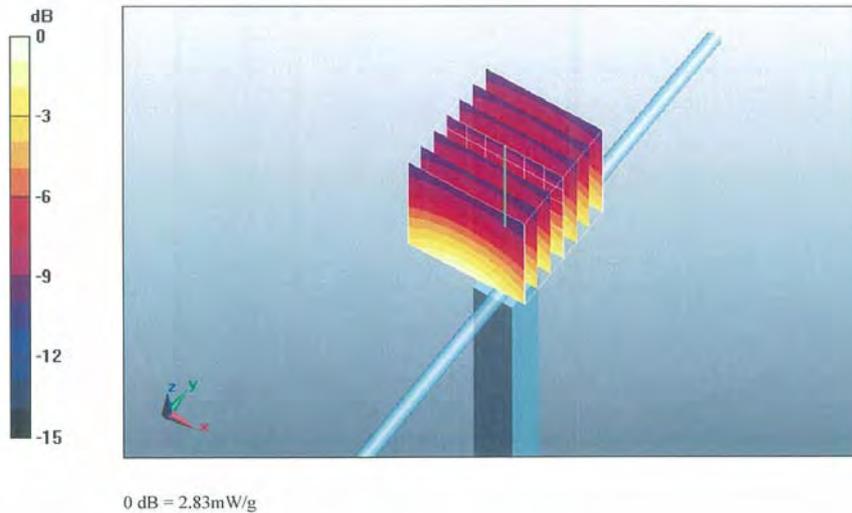
**Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement**  
grid: dx=5mm, dy=5mm, dz=5mm

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

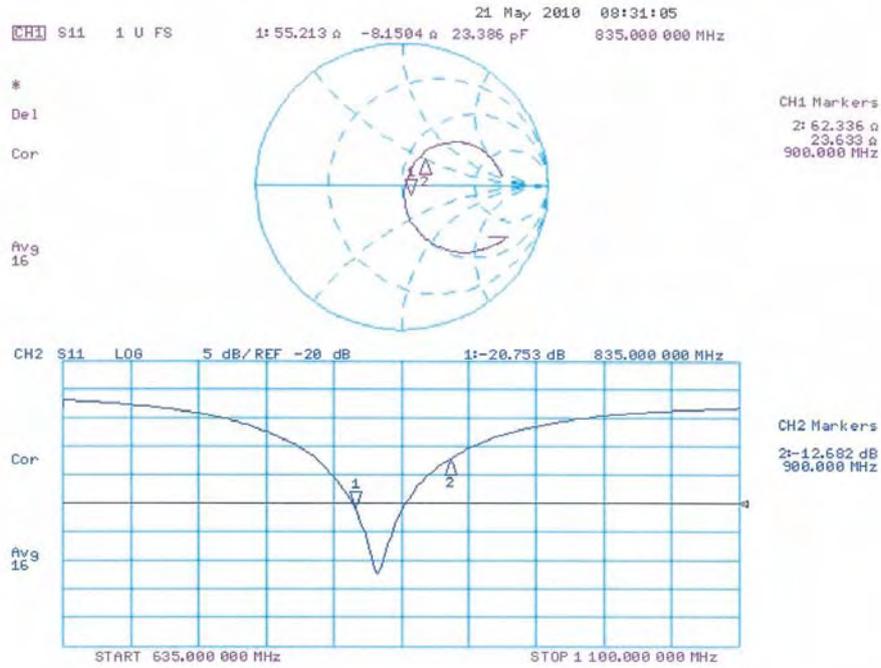
Peak SAR (extrapolated) = 3.63 W/kg

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

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



**Impedance Measurement Plot for Head TSL**



**DASY5 Validation Report for Body**

Date/Time: 20.05.2010 09:50:16

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: MSL900

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.98$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

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

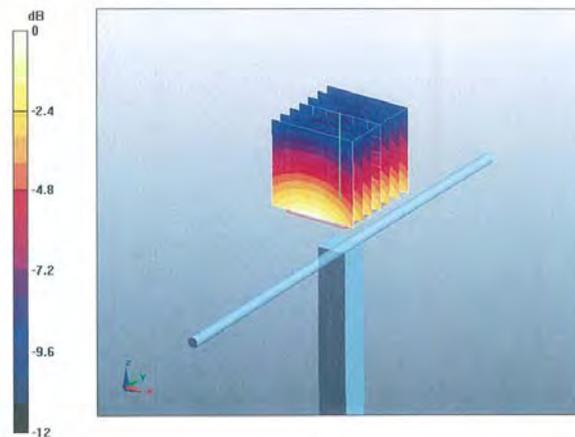
**Pin250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement**  
grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 3.69 W/kg

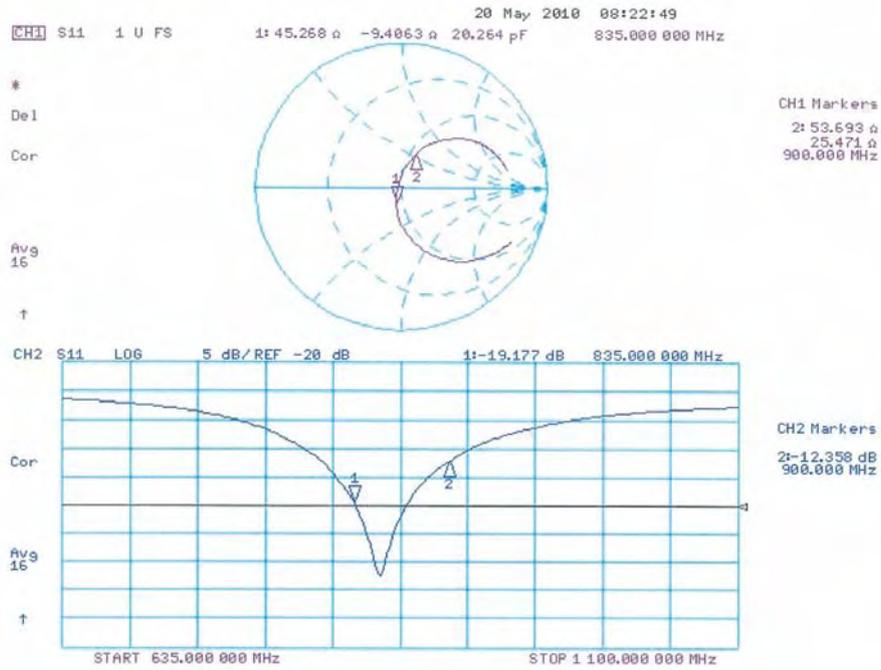
**SAR(1 g) = 2.51 mW/g; SAR(10 g) = 1.64 mW/g**

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



0 dB = 2.93mW/g

**Impedance Measurement Plot for Body TSL**



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Accreditation No.: **SCS 108**

Client **HTC (Dymstec)**

Certificate No: **D1800V2\_2d006\_Apr10**

**CALIBRATION CERTIFICATE**

Object: **D1800V2 - SN: 2d006**

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

Calibration date: **April 20, 2010**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 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-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	26-Jun-09 (No. ES3-3205_Jun09)	Jun-10
DAE4	SN: 601	02-Mar-10 (No. DAE4-601_Mar10)	Mar-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

Calibrated by: **Name: Jeton Kastrati, Function: Laboratory Technician, Signature: [Signature]**

Approved by: **Name: Katja Pokovic, Function: Technical Manager, Signature: [Signature]**

Issued: April 20, 2010

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Accreditation No.: **SCS 108**

**Glossary:**

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

**Calibration is Performed According to the Following Standards:**

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**Additional Documentation:**

- d) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

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

**Measurement Conditions**

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

DASY Version	DASY5	V5.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1800 MHz ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.5 ± 6 %	1.35 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

**SAR result with Head TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.33 mW / g
SAR normalized	normalized to 1W	37.3 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>38.2 mW /g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.92 mW / g
SAR normalized	normalized to 1W	19.7 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>19.9 mW /g ± 16.5 % (k=2)</b>

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.8 ± 6 %	1.47 mho/m ± 6 %
Body TSL temperature during test	(21.5 ± 0.2) °C	---	---

**SAR result with Body TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.63 mW / g
SAR normalized	normalized to 1W	38.5 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>39.6 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.16 mW / g
SAR normalized	normalized to 1W	20.6 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>20.9 mW / g ± 16.5 % (k=2)</b>

**Appendix**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	47.6 $\Omega$ - 6.1 j $\Omega$
Return Loss	- 23.4 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	43.8 $\Omega$ - 6.8 j $\Omega$
Return Loss	- 20.2 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.209 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	July 23, 2001

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**DASY5 Validation Report for Head TSL**

Date/Time: 20.04.2010 10:13:38

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d006**

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium: HSL U11 BB

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.35$  mho/m;  $\epsilon_r = 40.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

## DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.25, 5.25, 5.25); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

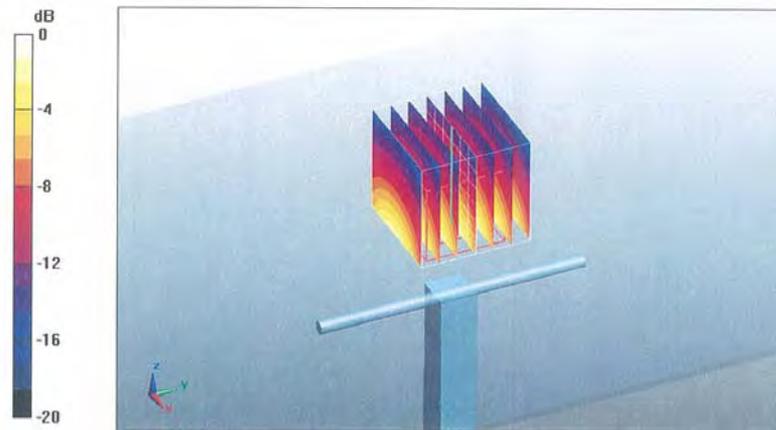
**Pin=250 mW/d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement**  
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 16.9 W/kg

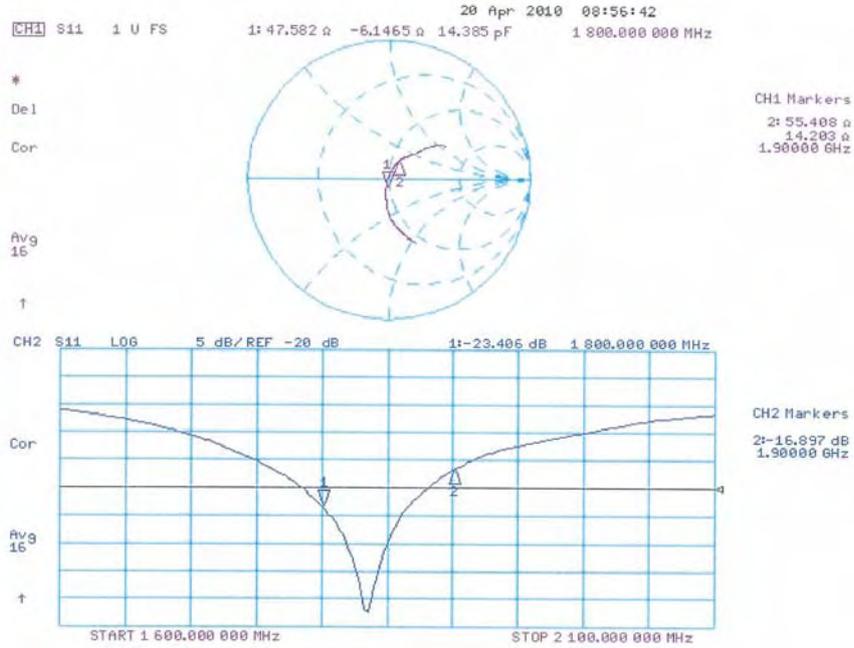
**SAR(1 g) = 9.33 mW/g; SAR(10 g) = 4.92 mW/g**

Maximum value of SAR (measured) = 11.6 mW/g



0 dB = 11.6mW/g

**Impedance Measurement Plot for Head TSL**



**DASY5 Validation Report for Body**

Date/Time: 20.04.2010 12:31:55

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d006**

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium: MSL U10 BB

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 54.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3205; ConvF(4.8, 4.8, 4.8); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

**Pin250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement**

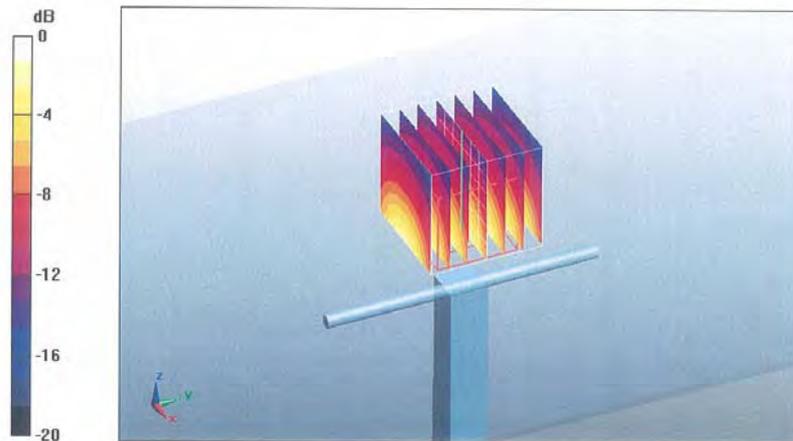
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.5 V/m; Power Drift = 0.023 dB

Peak SAR (extrapolated) = 16.6 W/kg

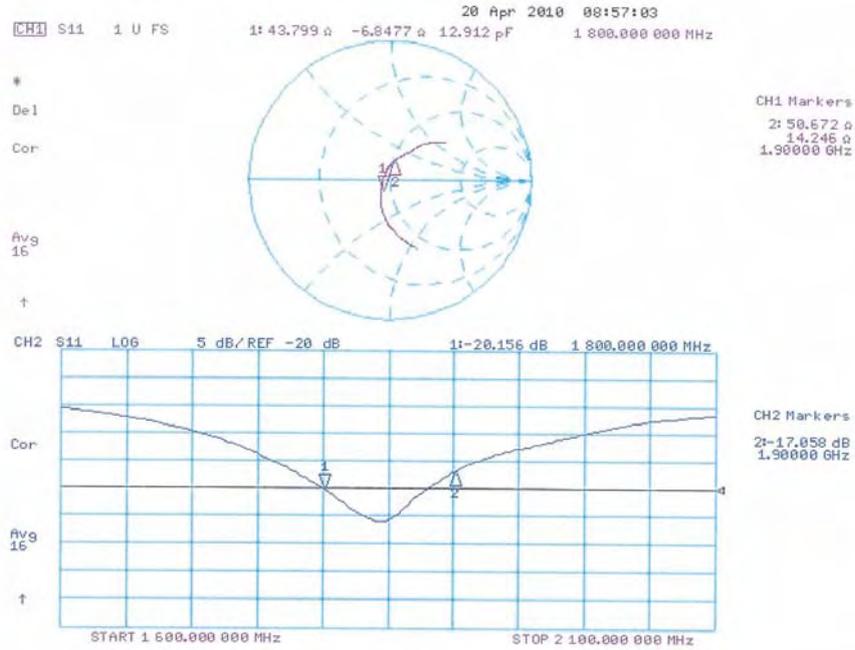
**SAR(1 g) = 9.63 mW/g; SAR(10 g) = 5.16 mW/g**

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



0 dB = 12.1mW/g

Impedance Measurement Plot for Body TSL



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



**S** Schweizerischer Kalibrierdienst  
**S** Service suisse d'étalonnage  
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**S** Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Client **HCT (Dymstec)**

Certificate No: **D1900V2-5d032\_Jul09**

**CALIBRATION CERTIFICATE**

Object **D1900V2 - SN: 5d032**

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

Calibration date: **July 20, 2009**

Condition of the calibrated item **In Tolerance**

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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	30-Apr-09 (No. ES3-3025_Apr09)	Apr-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature 

Issued: July 22, 2009

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

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



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**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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

Accreditation No.: **SCS 108**

#### Glossary:

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

#### Calibration is Performed According to the Following Standards:

- 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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
- 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.

<b>DASY Version</b>	DASY5	V5.0
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom V5.0	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	1900 MHz $\pm$ 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	40.0	1.40 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	40.9 $\pm$ 6 %	1.43 mho/m $\pm$ 6 %
<b>Head TSL temperature during test</b>	(22.0 $\pm$ 0.2) °C	----	----

**SAR result with Head TSL**

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	10.2 mW / g
SAR normalized	normalized to 1W	40.8 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>40.5 mW / g <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	5.36 mW / g
SAR normalized	normalized to 1W	21.4 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>21.4 mW / g <math>\pm</math> 16.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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

Impedance, transformed to feed point	51.2 $\Omega$ + 4.4 j $\Omega$
Return Loss	- 27.0 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.197 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/Time: 20.07.2009 14:41:47

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: HSL U11 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 40.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

**DASY5 Configuration:**

- Probe: ES3DV2 - SN3025; ConvF(4.88, 4.88, 4.88); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**Pin = 250 mW; dip = 10 mm, scan at 3.0 mm/Zoom Scan (dist=3.0 mm, probe 0deg)****(7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.5 V/m; Power Drift = 0.063 dB

Peak SAR (extrapolated) = 18.6 W/kg

**SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.36 mW/g**

Maximum value of SAR (measured) = 12.8 mW/g



0 dB = 12.8mW/g

### Impedance Measurement Plot for Head TSL

