



SAMSUNG ELECTRONICS Co., Ltd.,  
Regulatory Compliance Group  
IT R&D Center

416, Maetan-3dong,  
Yeongtong-gu, Suwon-si,  
Gyeonggi-do, Korea 443-742

# TEST REPORT ON SAR

Model Tested: SCH-U940  
FCC ID (Requested): A3LSCHU940  
Job No: FF-237  
Report No: FF-237-S1  
Date issued: Nov.20, 2008

- Abstract -

This document reports on SAR Tests carried out in accordance with FCC/OET Bulletin 65, Supplement C(July 2001).

Prepared By

YB KIM - Test Engineer

Authorized By

JH NAM - Technical Manager



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## 1. GENERAL INFORMATION

Test Sample : Dual-Band CDMA Phone with Bluetooth  
Model Number : SCH-U940  
Serial Number : Identical prototype (S/N : # FF-237-C)

Manufacturer : SAMSUNG ELECTRONICS Co., Ltd.  
Contact : HY KIM

Phone : +82-54-479-5931  
Fax : +82-54-479-5866  
Test Standard : §2.1093; FCC/OET Bulletin 65, Supplement C(July 2001)  
FCC Classification : Licensed Portable Transmitter Held to Ear (PCE)  
Test Dates : Nov.13, 2008 ~ Nov.14, 2008  
Tested for : FCC/TCB Certification

## 2. DESCRIPTION OF DEVICE

Tx Freq. Range : 824.70 ~ 848.31 MHz (CDMA)  
1851.25 ~ 1908.75 MHz (PCS)  
2402 ~ 2480 MHz (Bluetooth)

Rx Freq. Range : 869.70 ~ 893.31 MHz (CDMA)  
1931.25 ~ 1988.75 MHz (PCS)  
2402 ~ 2480 MHz (Bluetooth)

Antenna Manufacturer : PANASONIC  
Model No.: SCH-U940

Antenna Dimensions : 34mm × 13mm × 5.48mm

EV-DO Support (Revision 0)  
CDMA 2000 1x Support

Separation distance between  
GSM and Bluetooth antenna : 6 cm

### 3. DESCRIPTION OF TEST EQUIPMENT

#### 3.1 SAR Measurement Setup

##### Robotic System

Measurements are performed using the DASY4(DASY5) automated dosimetric assessment system. Which is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of high precision robotics system (Stäubli), robot controller, measurement server, Samsung computer, near-field probe, probe alignment sensor, and the SAM 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 Fig. 3.1).



**Figure 3.1 SAR Measurement System Setup**

##### System Hardware

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control is used to drive the robot motors. The PC consists of the Samsung computer with Windows XP system and SAR Measurement Software DASY4(DASY5), LCD monitor, mouse and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the



robot. A data acquisition electronic (DAE) circuit that 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 measurement server

### **System Electronics**

The DAE4(or DAE3) 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 measurement server 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.

### 3.2 E-field Probe

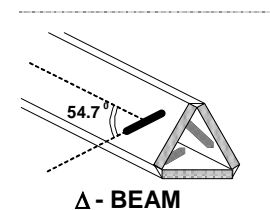


The SAR measurement were conducted with the dosimetric probe ES3DV3, designed in the classical triangular configuration (see Fig.3.3) and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. If the probe is flatly 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 (see Fig.3.2). The approach is stopped at reaching the maximum.

**Figure 3.2 DAE System**

#### Probe Specifications

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Basic Broad Band Calibration in air: 10-3000 MHz Conversion Factors (CF) for HSL 900 and HSL 1800 Additional CF for other liquids and frequencies upon request
Frequency	10 MHz to > 6 GHz; Linearity: $\pm 0.2$ dB (30 MHz to 3 GHz)
Directivity	$\pm 0.2$ dB in HSL (rotation around probe axis) $\pm 0.3$ dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 $\mu$ W/g to > 100mW/g; Linearity: $\pm 0.2$ dB



**Figure 3.3 Triangular Probe Configuration**



Dimensions Overall length: 330 mm (Tip: 20 mm)  
Tip diameter: 3.9 mm (Body: 12 mm)  
Distance from probe tip to dipole centers: 2.1 mm

Application General dosimetry up to 5 GHz  
Dosimetry in strong gradient fields  
Compliance tests of mobile phones



**Figure 3.4 Probe Thick-Film Technique**

### 3.3 SAM Phantom

The SAM Twin Phantom V4.0 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. (See Figure 3.5)



**Figure 3.5 SAM Twin Phantom**

#### Phantom Specification

Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-2003, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid.
Shell Thickness	$2 \pm 0.2$ mm
Filling Volume	Approx. 25 liters
Dimensions	Height: 810 mm; Length: 1000 mm; Width: 500 mm

### 3.4 Modular Flat Phantom

The Modular Flat Phantom V5.1 is constructed of a fiberglass shell integrated in a wooden table. Also It consists of three identical flat phantoms (modules) which can be installed and removed separately without emptying the liquid, as well as a wooden support.. It enables the dosimetric evaluation of 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. (See Figure 3.6)



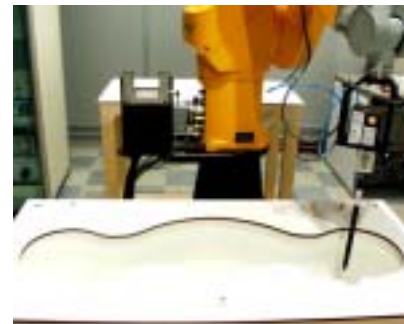
**Figure 3.6 Modular Flat Phantom**

### Phantom Specification

Construction	The shell corresponds to the specifications of IEEE 1528-2003. It enables the dosimetric evaluation of body mounted usage above 800 MHz at the flat phantom region. A cover prevents evaporation of the liquid.
Shell Thickness	$2 \pm 0.2$ mm
Filling Volume	Approx. 10 liters
Dimension	Wooden support - Height: 810 mm; Length: 830 mm; Width: 500 mm Each Module - Height: 190 mm; Length: 200 mm; width: 300 mm

### 3.5 Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydroxyethylcellulose (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 head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations.



**Figure 3.6 Simulated Tissue**

**Table 3.1 Composition of the Brain & Muscle Tissue Equivalent Matter**

INGREDIENTS	835MHz Brain	835MHz Muscle	1900MHz Brain	1900MHz Muscle
WATER	40.29%	50.75%	55.24%	70.23%
SUGAR	57.90%	48.21%	-	-
SALT	1.38%	0.94%	0.31%	0.29%
DGBE	-	-	44.45%	29.47%
BACTERIACIDE	0.18%	0.10%	-	-
HEC	0.24%	-	-	-
Dielectric Constant Target	41.50	55.20	40.00	53.30
Conductivity Target (S/m)	0.900	0.970	1.400	1.520

### 3.6 Device Holder for Transmitters

In combination with the Twin SAM Phantom V4.0, the Mounting Device (see Fig. 3.7) 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 repeatedly be positioned according to the FCC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

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

**Figure 3.7 Device Holder**

### 3.7 Validation Dipole

The reference dipole should have a return loss better than  $-20$  dB (measured in the setup) at the resonant frequency to reduce the uncertainty in the power measurement.

Frequency	835, 1900 MHz
Return Loss	< -20 dB at specified validation position
Dimensions	D835V2: dipole length: 161 mm; overall height: 330 mm D1900V2: dipole length: 68 mm; overall height: 300 mm



### 3.8 Equipment Calibration

**Table 3.2 Test Equipment Calibration**

Type	Calibration Due Date	Serial No.
SPEAG DAE4	Dec.05, 2008	686
E-Field Probe ES3DV3	Jan.29, 2009	3080
SPEAG Validation Dipole D835V2	Nov.21, 2008	4d014
SPEAG Validation Dipole D1900V2	Feb.14, 2010	5d023
Stäubli Robot RX90BL	Not Required	F01/5N19A1/A/01
SPEAG SAM Twin Phantom V4.0	Not Required	TP-1141
SPEAG SAM Twin Phantom V4.0	Not Required	TP-1143
SPEAG Modular Phantom	Not Required	MP-1001
E4438C Signal Generator	Mar.12, 2009	MY45092224
BBS3Q7ECK Power Amp	Jan.07, 2009	1023
E4419B Power Meter	May.02, 2009	MY45101765
E9300B Power Sensor	May.02, 2009	MY41495885
HP-8753ES Network Analyzer	Apr.28, 2009	US39173712
HP85070C Dielectric Probe Kit	Not Required	US99360087
E4419B Power Meter	Oct.23, 2009	GB41293847
8481A Power Sensor	Oct.23, 2009	MY41092080
8481A Power Sensor	Dec.11, 2008	MY41092077
DASY4 S/W (ver4.7)	Not Required	-
Directional Coupler	May.23, 2009	18842
Base Satation Simulator	Dec.24, 2008	GB46490113

**NOTE:**

The E-field probe was calibrated by SPEAG, by temperature measurement procedure. Dipole Validation measurement is performed by Samsung Lab. before each test. (see § 7.2) The brain simulating material is calibrated by Samsung using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the brain-equivalent material. (see § 7.1)



## 4. SAR MEASUREMENT PROCEDURE

The evaluation was performed using the following procedure.

### STEP 1

The SAR measurement was taken at a selected spatial reference point to monitor power variations during testing. This fixed location point was measured and used as a reference value.

### STEP 2

The SAR distribution at the exposed side of the head was measured at a distance of 3.9mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20mm x 20mm. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

### STEP 3

Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) 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:

The data at the surface was extrapolated, since the center of the dipoles is 2.7mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification) 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. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) 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. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

### STEP 4

The SAR value at the same location as in step 1 was again measured.

(If the value changed by more than 5%, the evaluation is repeated.)

## 5. DESCRIPTION OF TEST POSITION

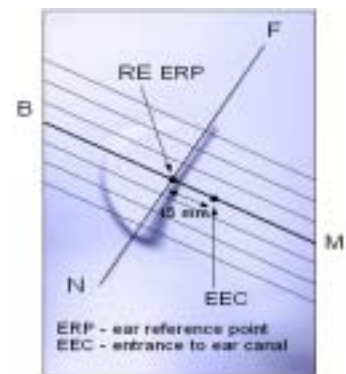
### 5.1 SAM Phantom Shape

Figure 5.1 shows the front, back and side views of SAM. The point “M” is the reference point for the center of mouth, “LE” is the left ear reference point (ERP), and “RE” is the right ERP. The ERPs are 15 mm posterior to the entrance to ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 5.2.



**Figure 5.1 Front, back and side view of SAM**

The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front) perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (see Figure 5.3). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines should be marked on the external phantom shell to facilitate handset positioning. Posterior to the N-F line, the thickness of the phantom shell with the shape of an ear is a flat surface 6 mm thick at the ERPs.

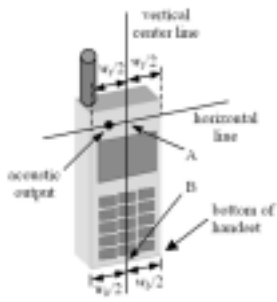


**Figure 5.2 Close up side view**

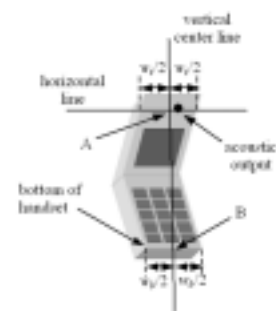
### 5.2 Cheek/Touch Position

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the “test device reference point” located along the “vertical centerline” on the front of the device aligned to the “ear reference point” (see Fig. 5.4). The “test device reference point” was then located at the same level as the center of

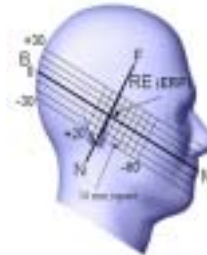
the ear reference point. The test device was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its tip and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point



**Figure 5.4 Handset vertical and horizontal reference lines**



**Figure 5.3 Side view of the phantom showing relevant markings**



**Step 1**

The test device was positioned with the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 5.5), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom



**Figure 5.5 Front, Side and Top View of Cheek/Touch Position**

**Step 2**

The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the ear.

**Step 3**

While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the plane normal to MB-NF including the line MB (reference plane).

**Step 4**

Rotate the handset around the vertical centerline until the phone (horizontal line) was symmetrical was respect to the line NF.

**Step 5**

While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, the handset was rotated about the line NF until any point on the handset made contact with a phantom point below the ear (cheek). See Figure 5.2.

**5.3 EAR/Tilt 15° Position**

With the test device aligned in the “Cheek/Touch Position”:

**Step 1**

Repeat steps 1 to 5 of 5.2 to place the device in the “Cheek/Touch Position”



**Figure 5.6 Front, side and Top View of Ear/Tilt 15° Position**

**Step 2**

While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15 degree.

### Step 3

The phone was then rotated around the horizontal line by 15 degree.

### Step 4

While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the phone touches the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head.

## 5.4 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 (see Figure 5.7). A device with a headset output is tested with a headset connected to the device. Body dielectric parameters are used.



**Figure 5.7 Body Belt Clip and Holster Configurations**

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 supplied with the device, the device is tested with each accessory that contains unique metallic component. 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 where a separation distance between the back of the device and the flat phantom is used.

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. Worst-case positioning is then documented and used to perform Body SAR testing.

In order for users to be aware of the body-worn operating requirements for meeting RF exposure compliance, operating instructions and cautions statements must be included in the user's manual.



## 6. MEASUREMENT UNCERTAINTY

**Table 6.1 Uncertainty Budget at 835MHz (Mar 2008)**

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	$c_i$	Standard uncertainty (±%)	$v_i^2$ or $v_{eff}$
<b>Measurement System</b>						
Probe Calibration	11.80	normal	2.000	1	5.90	∞
Axial Isotropy	4.70	rectangular	1.732	0.7	1.90	∞
Hemispherical Isotropy	9.60	rectangular	1.732	0.7	3.88	∞
Linearity	4.70	rectangular	1.732	1	2.71	∞
System Detection Limits	0.25	rectangular	1.732	1	0.14	∞
Boundary effects	1.00	rectangular	1.732	1	0.58	∞
Readout electronics	0.30	normal	1.000	1	0.30	∞
Response time	0.80	rectangular	1.732	1	0.46	∞
RF ambient conditions	3.00	rectangular	1.732	1	1.73	∞
Integration time	0.00	rectangular	1.732	1	0.00	∞
Mechanical constrains of robot	1.50	rectangular	1.732	1	0.87	∞
Probe positioning	2.90	rectangular	1.732	1	1.67	∞
Extrapolation and integration	1.00	rectangular	1.732	1	0.58	∞
<b>Test Sample Related</b>						
Test Sample positioning	1.16	normal	1.000	1	1.16	14
Device holded uncertainty	4.37	normal	1.000	1	4.37	∞
Power Drift	5.00	rectangular	1.732	1	2.89	∞
<b>Phantom and Setup</b>						
Modular Phantom uncertainty	5.62	normal	1.000	1	5.62	2
Phantom uncertainty	4.00	rectangular	1.732	1	2.31	∞
Liquid conductivity (deviation from target)	5.00	rectangular	1.732	0.64	1.85	∞
Liquid conductivity (measurement error)	5.84	normal	1.000	0.64	3.74	∞
Liquid permittivity (deviation from target)	5.00	rectangular	1.732	0.6	1.73	∞
Liquid permittivity (measurement error)	5.40	normal	1.000	0.6	3.24	∞
<b>Combined Standard Uncertainty</b>		Normal	-	-	<b>12.84</b>	<b>213263</b>
<b>Extended Standard Uncertainty(K=2.00)</b>					<b>25.17</b>	<b>213263</b>



**Table 6.2 Uncertainty Budget at 1900MHz (Mar 2008)**

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	c <sub>i</sub>	Standard uncertainty (±%)	v <sub>i</sub> <sup>2</sup> or v <sub>eff</sub>
<b>Measurement System</b>						
Probe Calibration	11.80	normal	2.000	1	5.90	∞
Axial Isotropy	4.70	rectangular	1.732	0.7	1.90	∞
Hemispherical Isotropy	9.60	rectangular	1.732	0.7	3.88	∞
Linearity	4.70	rectangular	1.732	1	2.71	∞
System Detection Limits	0.25	rectangular	1.732	1	0.14	∞
Boundary effects	1.00	rectangular	1.732	1	0.58	∞
Readout electronics	0.30	normal	1.000	1	0.30	∞
Response time	0.80	rectangular	1.732	1	0.46	∞
RF ambient conditions	3.00	rectangular	1.732	1	1.73	∞
Integration time	0.00	rectangular	1.732	1	0.00	∞
Mechanical constrains of robot	1.50	rectangular	1.732	1	0.87	∞
Probe positioning	2.90	rectangular	1.732	1	1.67	∞
Extrapolation and integration	1.00	rectangular	1.732	1	0.58	∞
<b>Test Sample Related</b>						
Test Sample positioning	1.16	normal	1.000	1	1.16	14
Device holded uncertainty	4.37	normal	1.000	1	4.37	∞
Power Drift	5.00	rectangular	1.732	1	2.89	∞
<b>Phantom and Setup</b>						
Modular Phantom uncertainty	6.02	normal	1.000	1	6.02	2
Phantom uncertainty	4.00	rectangular	1.732	1	2.31	∞
Liquid conductivity (deviation from target)	5.00	rectangular	1.732	0.64	1.85	∞
Liquid conductivity (measurement error)	5.18	normal	1.000	0.64	3.32	∞
Liquid permittivity (deviation from target)	5.00	rectangular	1.732	0.6	1.73	∞
Liquid permittivity (measurement error)	4.65	normal	1.000	0.6	2.79	∞
<b>Combined Standard Uncertainty</b>		Normal	-	-	<b>12.80</b>	<b>210539</b>
<b>Extended Standard Uncertainty(K=2.00)</b>					<b>25.09</b>	<b>210539</b>

## 7. SYSTEM VERIFICATION

### 7.1 Tissue Verification

**Table 7.1 MEASURED TISSUE PARAMETERS**

	835MHz Brain		835MHz Muscle		1900MHz Brain		1900MHz Muscle	
	Target	Measured	Target	Measured	Target	Measured	Target	Measured
Date	-	Nov.13, 2008	-	Nov.13, 2008	-	Nov.14, 2008	-	Nov.14, 2008
Liquid Temperature(°C)	-	22.1	-	22.1	-	22.3	-	22.2
Dielectric Constant: $\epsilon'$	41.5	42.0	55.2	55.1	40.0	39.9	53.3	52.2
Conductivity:	0.90	0.92	0.97	0.99	1.40	1.41	1.52	1.55

The measured value must be within  $\pm 5\%$  of the target value.

### 7.2 Test System Validation

Prior to assessment, the system is verified to the  $\pm 10\%$  of the specification at 835MHz and 1900MHz by using the system validation kit(s). (see Appendix E, Graphic Plot Attached)

**Table 7.2 System Validation Results**

System Validation Kit	Tissue	Targeted SAR <sub>1g</sub> (mW/g)	Measured SAR <sub>1g</sub> (mW/g)	Deviation (%)	Date	Liquid Temperature(°C)	Ambient Temperature(°C)
4d014	835MHz Brain	9.23	9.36	1.41	Nov. 13, 2008	22.1	22.3
5d023	1900MHz Brain	38.1	37.44	-1.73	Nov. 14, 2008	22.3	22.4

\* Validation was measured with input power 250 mW and normalized 1W.

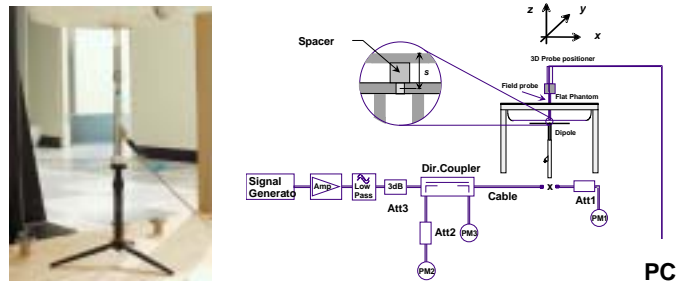


Figure 7.1 Dipole Validation Test Setup



## 8. SAR MEASUREMENT RESULTS

### 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.

### SAR Measurement Conditions for CDMA2000 1x

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

#### 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 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1 (Table 8-1) 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 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2 (Table 8-2) was applied.
5. FCHs were configured at full rate for maximum SAR with "All Up" power control bits.

Parameter	Units	Value	Parameter	Units	Value
$I_{\text{off}}$	dBm/1.23 MHz	-104	$I_{\text{off}}$	dBm/1.23 MHz	-80
$\frac{\text{Pilot } E_c}{I_{\text{off}}}$	dB	-7	$\frac{\text{Pilot } E_c}{I_{\text{off}}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{\text{off}}}$	dB	-7.4	$\frac{\text{Traffic } E_c}{I_{\text{off}}}$	dB	-7.4

Table 8.1  
Parameters for Max. Power for RC1

Table 8-2  
Parameters for Max. Power for RC3

#### 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.

#### Body SAR Measurements

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 9600 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.

### 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 4096 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.

### Simultaneous Transmission

Refer to the FCC OET document, 'SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas' (Feb 2008)

**Table 8.1 Output Power Thresholds for Unlicensed Transmitters**

	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				



Table 8.2 Summary of SAR Evaluation Requirements for Cell phones with Multiple Transmitters

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	<b><u>Routine evaluation required</u></b>	<p><b>SAR not required:</b></p> <p><b><u>Unlicensed only</u></b></p> <ul style="list-style-type: none"> <li>o when stand-alone 1-g SAR is not required and antenna is &gt; 5 cm from other antennas</li> </ul> <p><b><u>Licensed &amp; Unlicensed</u></b></p> <ul style="list-style-type: none"> <li>o when the sum of the 1-g SAR is &lt;1.6 W/kg for all simultaneous transmitting antennas</li> <li>o when SAR to antenna separation ratio of simultaneous transmitting antenna pair is &lt; 0.3</li> </ul>
Unlicensed Transmitters	<p><b>When there is no simultaneous transmission –</b></p> <ul style="list-style-type: none"> <li>o output &lt; 60/f: SAR not required</li> <li>o output ≥ 60/f: stand-alone SAR required</li> </ul> <p><b>When there is simultaneous transmission –</b></p> <p><b><u>Stand-alone SAR not required when</u></b></p> <ul style="list-style-type: none"> <li>o output ≤ 2.P<sub>Ref</sub> and antenna is &gt; 5.0 cm from other antennas</li> <li>o output ≤ P<sub>Ref</sub> and antenna is &gt; 2.5 cm from other antennas</li> </ul> <p><b><u>Otherwise stand-alone SAR is required</u></b></p> <p><b>When stand-alone SAR is required</b></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 &gt; 50% of SAR limit, evaluate all channels according to normal procedures</li> </ul>	<p><b>SAR required:</b></p> <p><b><u>Licensed &amp; Unlicensed</u></b></p> <p>antenna pairs with SAR to antenna separation ratio ≥ 0.3; test is only required for the configuration that results in the highest SAR in standalone configuration for each wireless mode and exposure condition</p> <p>Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply</p>



**Table 8-3 Max. Power Output Table for SCH-U940**

Band	Channel	1x EvDO (153.6kbps)	CDMA2000 RC	SO2 Loopback	SO55 Loopback	TDSO SO32 Loopback
CDMA	1013	25.63	RC1	25.58	25.58	-
			RC3	25.67	25.67	25.66
	384	25.6	RC1	25.56	25.56	-
			RC3	25.61	25.61	25.6
	777	25.61	RC1	25.58	25.58	-
			RC3	25.61	25.62	25.61

Band	Channel	1x EvDO (153.6kbps)	CDMA2000 RC	SO2 Loopback	SO55 Loopback	TDSO SO32 Loopback
PCS	25	25.29	RC1	25.26	25.26	-
			RC3	25.26	25.29	25.28
	600	25.02	RC1	24.99	24.99	-
			RC3	25.07	25.07	25.06
	1175	25.18	RC1	25.14	25.14	-
			RC3	25.24	25.24	25.23



## 8.1 Measurement Results(CDMA Right Head SAR - Touch)

Mixture Type : 835 MHz Brain

FREQUENCY		Modulation	Begin/End POWER*			Device Test Position	Antenna Position	Slide	SAR (W/kg)
MHz	Ch.		(dBm)		Battery				
836.52	384	CDMA	25.61	25.61	Standard	Cheek/Touch	Intenna	Close	<b>0.737</b>
836.52	384	CDMA	25.63	25.72	Standard	Cheek/Touch	Intenna	Open	0.562
<b>ANSI / IEEE C95.1 2005– SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population</b>						<b>1.6W/kg (mW/g) averaged over 1 gram</b>			

### 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, Supp.C [July 2001].
- All modes of operation were investigated, and the worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plot.
- Liquid tissue depth is  $15.2 \pm 0.2$ cm
- Battery is fully charged for all readings.  
\*Power Measured  Conducted
- Battery Option  Standard  Extended  Slim
- Phantom Configuration  Left Head  Flat Phantom  Right Head
- SAR Configuration  Head  Body  Hand
- Test Signal Call Mode  Manu. Test Codes  Base Station Simulator
- Head SAR was tested under RC3/SO55.
- Justification for reduced test configurations: Per FCC/OET Bulletin 65 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 least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).



## 8.2 Measurement Results(CDMA Right Head SAR - Tilt)

Mixture Type : 835 MHz Brain

FREQUENCY		Modulation	Begin/End POWER*			Device Test Position	Antenna Position	Slide	SAR (W/kg)
MHz	Ch.		(dBm)		Battery				
836.52	384	CDMA	25.70	25.63	Standard	Ear/Tilt 15°	Intenna	Close	<b>0.554</b>
836.52	384	CDMA	25.67	25.71	Standard	Ear/Tilt 15°	Intenna	Open	0.223
<b>ANSI / IEEE C95.1 2005– SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population</b>						<b>1.6W/kg (mW/g) averaged over 1 gram</b>			

### 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, Supp.C [July 2001].
- All modes of operation were investigated, and the worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plot.
- Liquid tissue depth is 15.2 ± 0.2cm
- Battery is fully charged for all readings.  
\*Power Measured  Conducted
- Battery Option  Standard  Extended  Slim
- Phantom Configuration  Left Head  Flat Phantom  Right Head
- SAR Configuration  Head  Body  Hand
- Test Signal Call Mode  Manu. Test Codes  Base Station Simulator
- Head SAR was tested under RC3/SO55.
- Justification for reduced test configurations: Per FCC/OET Bulletin 65 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 least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).



### 8.3 Measurement Results(CDMA Left Head SAR - Touch)

Mixture Type : 835 MHz Brain

FREQUENCY		Modulation	Begin/End POWER*			Device Test Position	Antenna Position	Slide	SAR (W/kg)
MHz	Ch.		(dBm)		Battery				
824.70	1013	CDMA	25.70	25.71	Standard	Cheek/Touch	Intenna	Close	0.484
836.52	384	CDMA	25.68	25.68	Standard	Cheek/Touch	Intenna	Close	0.779
848.31	777	CDMA	25.65	25.64	Standard	Cheek/Touch	Intenna	Close	<b>0.859</b>
836.52	384	CDMA	25.66	25.56	Standard	Cheek/Touch	Intenna	Open	0.568
848.31	777	CDMA	25.63	25.63	Extended	Cheek/Touch	Intenna	Close	0.808
<b>ANSI / IEEE C95.1 2005– SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population</b>						<b>1.6W/kg (mW/g) averaged over 1 gram</b>			

#### 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, Supp.C [July 2001].
- All modes of operation were investigated, and the worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plot.
- Liquid tissue depth is 15.2 ± 0.2cm
- Battery is fully charged for all readings.  
\*Power Measured  Conducted
- Battery Option  Standard  Extended  Slim
- Phantom Configuration  Left Head  Flat Phantom  Right Head
- SAR Configuration  Head  Body  Hand
- Test Signal Call Mode  Manu. Test Codes  Base Station Simulator
- Head SAR was tested under RC3/SO55.
- Justification for reduced test configurations: Per FCC/OET Bulletin 65 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 least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).



## 8.4 Measurement Results(CDMA Left Head SAR - Tilt)

Mixture Type : 835 MHz Brain

FREQUENCY		Modulation	Begin/End POWER*			Device Test Position	Antenna Position	Slide	SAR (W/kg)
MHz	Ch.		(dBm)		Battery				
836.52	384	CDMA	25.64	25.57	Standard	Ear/Tilt 15°	Intenna	Close	<b>0.596</b>
836.52	384	CDMA	25.62	25.64	Standard	Ear/Tilt 15°	Intenna	Open	0.241
<b>ANSI / IEEE C95.1 2005– SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population</b>						<b>1.6W/kg (mW/g) averaged over 1 gram</b>			

### 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, Supp.C [July 2001].
- All modes of operation were investigated, and the worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plot.
- Liquid tissue depth is 15.2 ± 0.2cm
- Battery is fully charged for all readings.
- \*Power Measured  Conducted
- Battery Option  Standard  Extended  Slim
- Phantom Configuration  Left Head  Flat Phantom  Right Head
- SAR Configuration  Head  Body  Hand
- Test Signal Call Mode  Manu. Test Codes  Base Station Simulator
- Head SAR was tested under RC3/SO55.
- Justification for reduced test configurations: Per FCC/OET Bulletin 65 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 least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).



### 8.5 Measurement Results(CDMA Body SAR without Holster)

Mixture Type : 835 MHz Muscle

FREQUENCY		Modulation	Begin/End POWER*			Device Test Position	Antenna Position	Slide	SAR (W/kg)
MHz	Ch.		(dBm)		Battery				
824.70	1013	CDMA	25.75	25.81	Standard	1.5 cm [w/o Holster]	Intenna	Close	0.549
836.52	384	CDMA	25.66	25.63	Standard	1.5 cm [w/o Holster]	Intenna	Close	0.854
848.31	777	CDMA	25.70	25.77	Standard	1.5 cm [w/o Holster]	Intenna	Close	<b>0.941</b>
848.31	777	CDMA	25.72	25.64	Extended	1.5 cm [w/o Holster]	Intenna	Close	0.863
<b>ANSI / IEEE C95.1 2005– SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population</b>						<b>1.6W/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, Supp.C [July 2001].
2. All modes of operation were investigated, and the worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plot.
4. Liquid tissue depth is 15.2 ± 0.2cm
5. Battery is fully charged for all readings.
- \*Power Measured  Conducted
6. Battery Option  Standard  Extended  Slim
7. Phantom Configuration  Left Head  Flat Phantom  Right Head
8. SAR Configuration  Head  Body  Hand
9. Test Signal Call Mode  Manu. Test Codes  Base Station Simulator
10. Body SAR was tested under RC3/SO32.
11. Test Configuration  With Holster  Without Holster



## 8.6 Measurement Results(PCS Right Head SAR - Touch)

Mixture Type : 1900 MHz Brain

FREQUENCY		Modulation	Begin/End POWER*			Device Test Position	Antenna Position	Slide	SAR (W/kg)
MHz	Ch.		(dBm)		Battery				
1880.00	600	CDMA	25.08	25.14	Standard	Cheek/Touch	Intenna	Close	0.454
1851.25	25	CDMA	25.27	25.31	Standard	Cheek/Touch	Intenna	Open	<b>0.761</b>
1880.00	600	CDMA	25.11	25.05	Standard	Cheek/Touch	Intenna	Open	0.524
1908.75	1175	CDMA	25.29	25.34	Standard	Cheek/Touch	Intenna	Open	0.555
1851.25	25	CDMA	25.34	25.35	Extended	Cheek/Touch	Intenna	Open	0.683
<b>ANSI / IEEE C95.1 2005- SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population</b>						<b>1.6W/kg (mW/g) averaged over 1 gram</b>			

### 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, Supp.C [July 2001].
- All modes of operation were investigated, and the worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plot.
- Liquid tissue depth is  $15.2 \pm 0.2$ cm
- Battery is fully charged for all readings.  
\*Power Measured  Conducted
- Battery Option  Standard  Extended  Slim
- Phantom Configuration  Left Head  Flat Phantom  Right Head
- SAR Configuration  Head  Body  Hand
- Test Signal Call Mode  Manu. Test Codes  Base Station Simulator
- Head SAR was tested under RC3/SO55.
- Justification for reduced test configurations: Per FCC/OET Bulletin 65 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 least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).



## 8.7 Measurement Results(PCS Right Head SAR - Tilt)

Mixture Type : 1900 MHz Brain

FREQUENCY		Modulation	Begin/End POWER*			Device Test Position	Antenna Position	Slide	SAR (W/kg)
MHz	Ch.		(dBm)		Battery				
1880.00	600	CDMA	25.15	25.20	Standard	Ear/Tilt 15°	Intenna	Close	0.357
1880.00	600	CDMA	25.13	25.08	Standard	Ear/Tilt 15°	Intenna	Open	0.220
<b>ANSI / IEEE C95.1 2005– SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population</b>						<b>1.6W/kg (mW/g) averaged over 1 gram</b>			

### 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, Supp.C [July 2001].
- All modes of operation were investigated, and the worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plot.
- Liquid tissue depth is 15.2 ± 0.2cm
- Battery is fully charged for all readings.  
\*Power Measured  Conducted
- Battery Option  Standard  Extended  Slim
- Phantom Configuration  Left Head  Flat Phantom  Right Head
- SAR Configuration  Head  Body  Hand
- Test Signal Call Mode  Manu. Test Codes  Base Station Simulator
- Head SAR was tested under RC3/SO55.
- Justification for reduced test configurations: Per FCC/OET Bulletin 65 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 least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).



## 8.8 Measurement Results(PCS Left Head SAR - Touch)

Mixture Type : 1900 MHz Brain

FREQUENCY		Modulation	Begin/End POWER*			Device Test Position	Antenna Position	Slide	SAR (W/kg)
MHz	Ch.		(dBm)		Battery				
1880.00	600	CDMA	25.15	25.05	Standard	Cheek/Touch	Intenna	Close	0.458
1880.00	600	CDMA	25.11	25.10	Standard	Cheek/Touch	Intenna	Open	<b>0.495</b>
<b>ANSI / IEEE C95.1 2005– SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population</b>						<b>1.6W/kg (mW/g) averaged over 1 gram</b>			

### 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, Supp.C [July 2001].
- All modes of operation were investigated, and the worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plot.
- Liquid tissue depth is  $15.2 \pm 0.2$ cm
- Battery is fully charged for all readings.  
\*Power Measured  Conducted
- Battery Option  Standard  Extended  Slim
- Phantom Configuration  Left Head  Flat Phantom  Right Head
- SAR Configuration  Head  Body  Hand
- Test Signal Call Mode  Manu. Test Codes  Base Station Simulator
- Head SAR was tested under RC3/SO55.
- Justification for reduced test configurations: Per FCC/OET Bulletin 65 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 least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).



### 8.9 Measurement Results(PCS Left Head SAR - Tilt)

Mixture Type : 1900 MHz Brain

FREQUENCY		Modulation	Begin/End POWER*			Device Test Position	Antenna Position	Slide	SAR (W/kg)
MHz	Ch.		(dBm)		Battery				
1880.00	600	CDMA	25.12	25.13	Standard	Ear/Tilt 15°	Intenna	Close	<b>0.347</b>
1880.00	600	CDMA	25.15	25.20	Standard	Ear/Tilt 15°	Intenna	Open	0.180
<b>ANSI / IEEE C95.1 2005– SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population</b>						<b>1.6W/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, Supp.C [July 2001].
2. All modes of operation were investigated, and the worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plot.
4. Liquid tissue depth is 15.2 ± 0.2cm
5. Battery is fully charged for all readings.  
\*Power Measured  Conducted
6. Battery Option  Standard  Extended  Slim
7. Phantom Configuration  Left Head  Flat Phantom  Right Head
8. SAR Configuration  Head  Body  Hand
9. Test Signal Call Mode  Manu. Test Codes  Base Station Simulator
10. Head SAR was tested under RC3/SO55.
11. Justification for reduced test configurations: Per FCC/OET Bulletin 65 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 least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).



### 8.10 Measurement Results(PCS Body SAR without Holster)

Mixture Type : 1900 MHz Muscle

FREQUENCY		Modulation	Begin/End POWER*			Device Test Position	Antenna Position	Slide	SAR (W/kg)
MHz	Ch.		(dBm)		Battery				
1851.25	25	CDMA	25.35	25.40	Standard	1.5 cm [w/o Holster]	Intenna	Close	<b>0.675</b>
1880.00	600	CDMA	25.08	25.01	Standard	1.5 cm [w/o Holster]	Intenna	Close	0.489
1908.75	1175	CDMA	25.32	25.33	Standard	1.5 cm [w/o Holster]	Intenna	Close	0.485
1851.25	25	CDMA	25.33	25.36	Extended	1.5 cm [w/o Holster]	Intenna	Close	0.538
<b>ANSI / IEEE C95.1 2005-- SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population</b>						<b>1.6W/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, Supp.C [July 2001].
  2. All modes of operation were investigated, and the worst-case results are reported.
  3. Tissue parameters and temperatures are listed on the SAR plot.
  4. Liquid tissue depth is 15.2 ± 0.2cm
  5. Battery is fully charged for all readings.
- \*Power Measured                    Conducted
6. Battery Option                    Standard            Extended            Slim
7. Phantom Configuration        Left Head        Flat Phantom    Right Head
8. SAR Configuration            Head            Body            Hand
9. Test Signal Call Mode        Manu. Test Codes    Base Station Simulator
10. Body SAR was tested under RC3/SO32.
11. Test Configuration            With Holster            Without Holster



## 9. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC. 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. The test results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because innumerable factors may interact to determine the specific biological outcome of an exposure to electromagnetic fields, any protection guide shall consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

EV-DO Mode is only used for DATA transmit, so EV-DO measurements would be performed in Body SAR configuration. But, in this report EV-DO Body SAR measurements were not performed refer to "SAR measurement procedures for 3G devices. (FCC, May 2006)"The highest reported SAR values are as follows:

CDMA: Head: 0.859 W/Kg : Body-worn: 0.941 W/Kg

PCS: Head: 0.761 W/Kg : Body-worn: 0.675 W/Kg



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## APPENDIX A

### SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy ( $dU$ ) absorbed by (dissipated in ) an incremental mass ( $dm$ ) contained in a volume element ( $dV$ ) of a given density ( $\rho$ ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. A.1) .

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

Figure A.1 SAR Mathematical Equation

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

$$SAR = \frac{E^2}{\rho}$$

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 or 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.

## APPENDIX B

### Probe Calibration Process

#### Dosimetric Assessment Procedure

Each probe is calibrated according to a dosimetric assessment procedure described in **K. Pokovic, T.Schmid, N. Kuster, *Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies*, ICECOM97, Oct. 1997, pp. 120-124** with an accuracy better than +/-10%. The spherical isotropy was evaluated with the procedure described in **K. Pokovic, T.Schmid, N. Kuster, *E-field Probe with improved isotropy in brain simulating liquids*, Proceedings of the ELMAR, Zadar, June 23-25, 1996, pp. 172-175** and found to be better than +/-0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe is tested.

#### Free Space Assessment

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 (see Fig. B.1), 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.

#### Temperature Assessment

E-field temperature correlation calibration is performed in a flat phantom 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 (see Fig. B.2).

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

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

where:

**t** = exposure time (30 seconds)

**C** = heat capacity of tissue (brain or muscle).

**T** = temperature increase due to RF exposure.

SAR is proportional to  $T/t$ , 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;

where:

$\sigma$  = simulated tissue conductivity

**p** = Tissue density (1.25 g/cm<sup>3</sup> for brain tissue)

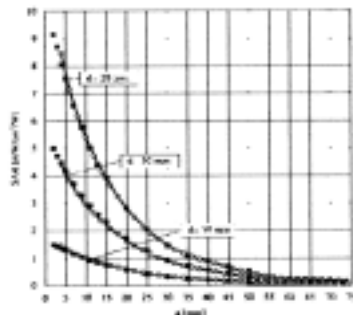


Figure B.1. E-Field and Temperature measurements at 900MHz

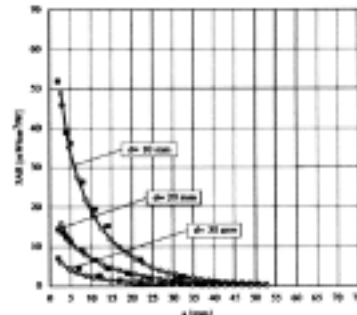


Figure B.2. E-Field and temperature measurements at 1.9GHz

## APPENDIX C

### ANSI/IEEE C95.1 – 2005 RF EXPOSURE LIMITS

#### Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

#### Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is the exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

**Table C.1 Safety Limits for Partial Body Exposure**

	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)
SPATIAL PEAK SAR <sup>1</sup> Brain	1.60	8.00
SPATIAL PEAK SAR <sup>2</sup> Whole Body	0.08	0.40
SPATIAL PEAK SAR <sup>3</sup> Hands, Feet, Ankles, Wrists	4.00	20.00

<sup>1</sup> The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as tissue volume in the shape of a cube) and over the appropriate averaging time.

<sup>2</sup> The Spatial Average value of the SAR averaged over the whole body.

<sup>3</sup> The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

## **APPENDIX D**

### **Test Setup Photographs**

## **APPENDIX E**

### **The Validation Measurements**

DUT: Dipole 835 MHz; Serial: 4d014

Program Name: 835MHz Dipole Validation 2008.11.13

Procedure Name: 835MHz @ 250mW

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

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.92 \text{ mho/m}$ ;  $\epsilon_r = 42$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.97, 5.97, 5.97); Calibrated: 2008-01-29
- Sensor - Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2008-04-28
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**835MHz @ 250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 53.7 V/m; Power Drift = -0.036 dB

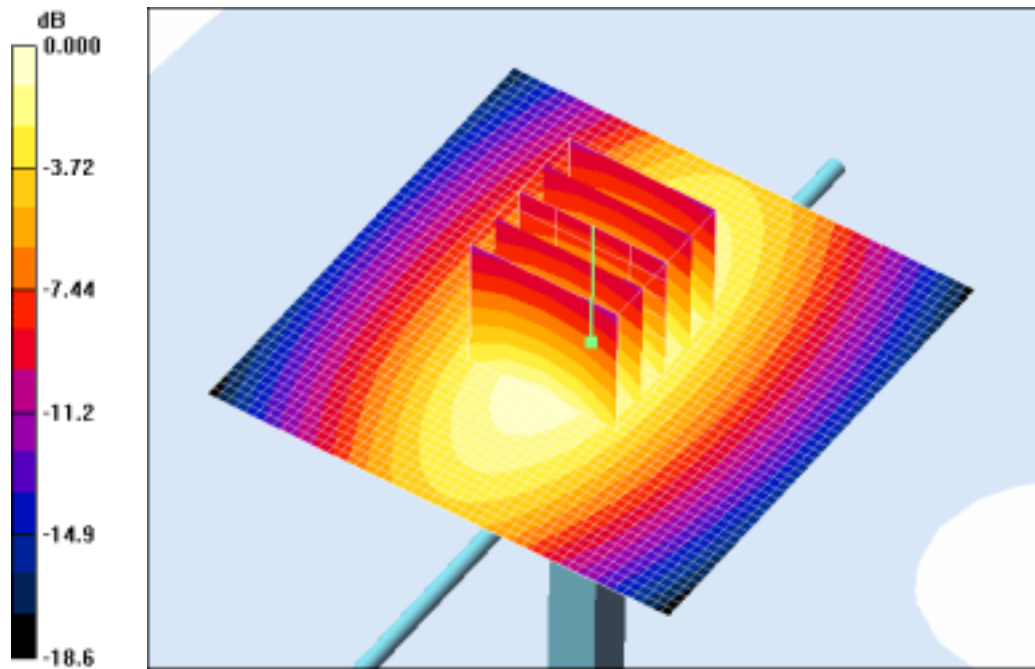
Peak SAR (extrapolated) = 3.41 W/kg

**SAR(1 g) = 2.34 mW/g; SAR(10 g) = 1.53 mW/g**

Maximum value of SAR (measured) = 2.53 mW/g

**835MHz @ 250mW/Area Scan (51x51x1):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 2.55 mW/g



0 dB = 2.55mW/g

DUT: Dipole 1900 MHz; Serial: 5d023

Program Name: 1900MHz Dipole Validation 2008.11.14

Procedure Name: 1900MHz @ 250mW

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.96, 4.96, 4.96); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**1900MHz @ 250mW/Area Scan (51x51x1):** Measurement grid: dx=20mm, dy=20mm  
Maximum value of SAR (interpolated) = 13.6 mW/g

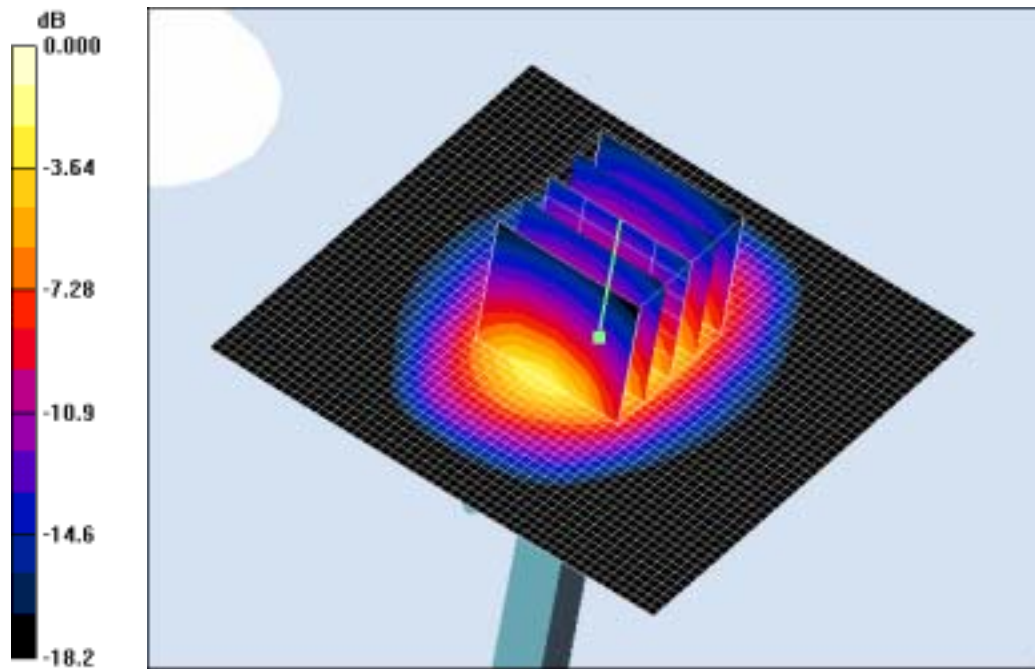
**1900MHz @ 250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 88.8 V/m; Power Drift = -0.009 dB

Peak SAR (extrapolated) = 16.6 W/kg

**SAR(1 g) = 9.36 mW/g; SAR(10 g) = 4.88 mW/g**

Maximum value of SAR (measured) = 10.6 mW/g



## **APPENDIX F**

### **Plots of The SAR Measurements**

SAMSUNG FCC ID : A3LSCHU940 CDMA Head SAR

DUT: SCH-U940(Close); Serial: FF-237-C

Program Name: SCH-U940 CDMA Right, Slide Close (Job No. : FF-237)

Procedure Name: Cheek/Touch, Ch.0384, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.3; Tissue Temp(celsius)-22.1; Test Date-13/Nov/2008

Communication System: CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 836.52$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 42$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.97, 5.97, 5.97); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Cheek/Touch, Ch.0384, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:**

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 29.1 V/m; Power Drift = -0.115 dB

Peak SAR (extrapolated) = 0.959 W/kg

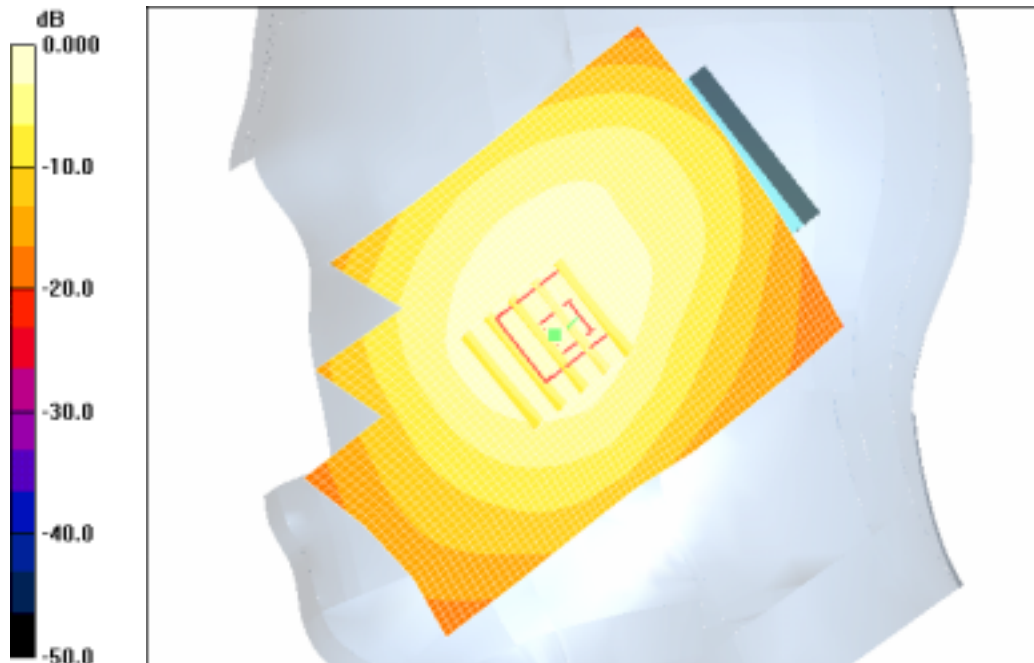
**SAR(1 g) = 0.737 mW/g; SAR(10 g) = 0.536 mW/g**

Maximum value of SAR (measured) = 0.771 mW/g

**Cheek/Touch, Ch.0384, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.802 mW/g



0 dB = 0.802mW/g

SAMSUNG FCC ID : A3LSCHU940 CDMA Head SAR

DUT: SCH-U940(Close); Serial: FF-237-C

Program Name: SCH-U940 CDMA Right, Slide Close (Job No. : FF-237)

Procedure Name: Ear/Tilt, Ch.0384, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.3; Tissue Temp(celsius)-22.1; Test Date-13/Nov/2008

Communication System: CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 836.52$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 42$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.97, 5.97, 5.97); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Ear/Tilt, Ch.0384, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.2 V/m; Power Drift = 0.019 dB

Peak SAR (extrapolated) = 0.690 W/kg

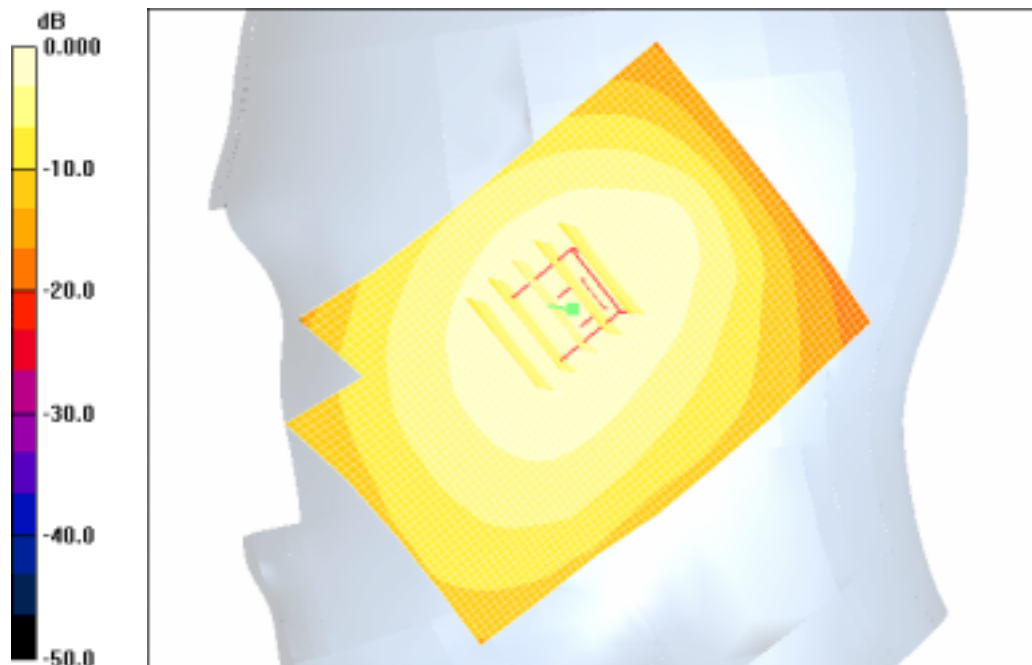
**SAR(1 g) = 0.554 mW/g; SAR(10 g) = 0.415 mW/g**

Maximum value of SAR (measured) = 0.580 mW/g

**Ear/Tilt, Ch.0384, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.590 mW/g



0 dB = 0.590mW/g

SAMSUNG FCC ID : A3LSCHU940 CDMA Head SAR

DUT: SCH-U940(Close); Serial: FF-237-C

Program Name: SCH-U940 CDMA Left, Slide Close (Job No. : FF-237)

Procedure Name: Cheek/Touch, Ch.0777, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.3; Tissue Temp(celsius)-22.1; Test Date-13/Nov/2008

Communication System: CDMA; Frequency: 848.31 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 848.31$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 42$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.97, 5.97, 5.97); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Cheek/Touch, Ch.0777, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.894 mW/g

**Cheek/Touch, Ch.0777, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:**

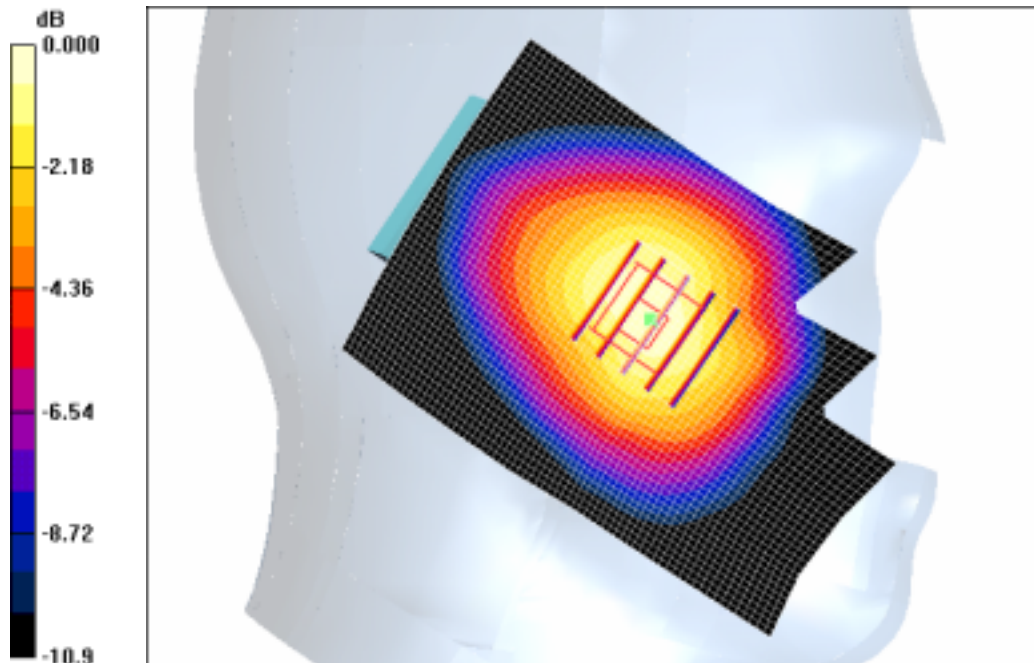
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 31.4 V/m; Power Drift = -0.008 dB

Peak SAR (extrapolated) = 1.09 W/kg

**SAR(1 g) = 0.859 mW/g; SAR(10 g) = 0.629 mW/g**

Maximum value of SAR (measured) = 0.904 mW/g



0 dB = 0.904mW/g

SAMSUNG FCC ID : A3LSCHU940 CDMA Head SAR

DUT: SCH-U940(Close); Serial: FF-237-C

Program Name: SCH-U940 CDMA Left, Slide Close (Job No. : FF-237)

Procedure Name: Ear/Tilt, Ch.0384, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.3; Tissue Temp(celsius)-22.1; Test Date-13/Nov/2008

Communication System: CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 836.52$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 42$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.97, 5.97, 5.97); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Ear/Tilt, Ch.0384, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.8 V/m; Power Drift = -0.078 dB

Peak SAR (extrapolated) = 0.753 W/kg

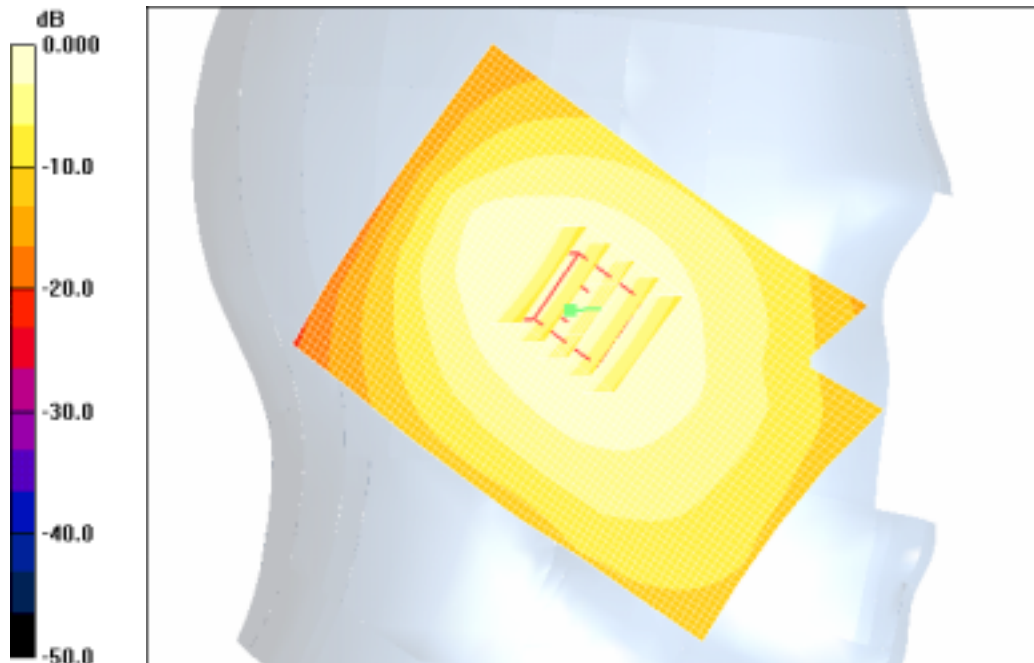
**SAR(1 g) = 0.596 mW/g; SAR(10 g) = 0.443 mW/g**

Maximum value of SAR (measured) = 0.632 mW/g

**Ear/Tilt, Ch.0384, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.648 mW/g



0 dB = 0.648mW/g

SAMSUNG FCC ID : A3LSCHU940 CDMA Head SAR

DUT: SCH-U940(Open); Serial: FF-237-C

Program Name: SCH-U940 CDMA Right, Slide Open (Job No. : FF-237)

Procedure Name: Cheek/Touch, Ch.0384, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.3; Tissue Temp(celsius)-22.1; Test Date-13/Nov/2008

Communication System: CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 836.52$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 42$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.97, 5.97, 5.97); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Cheek/Touch, Ch.0384, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.596 mW/g

**Cheek/Touch, Ch.0384, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:**

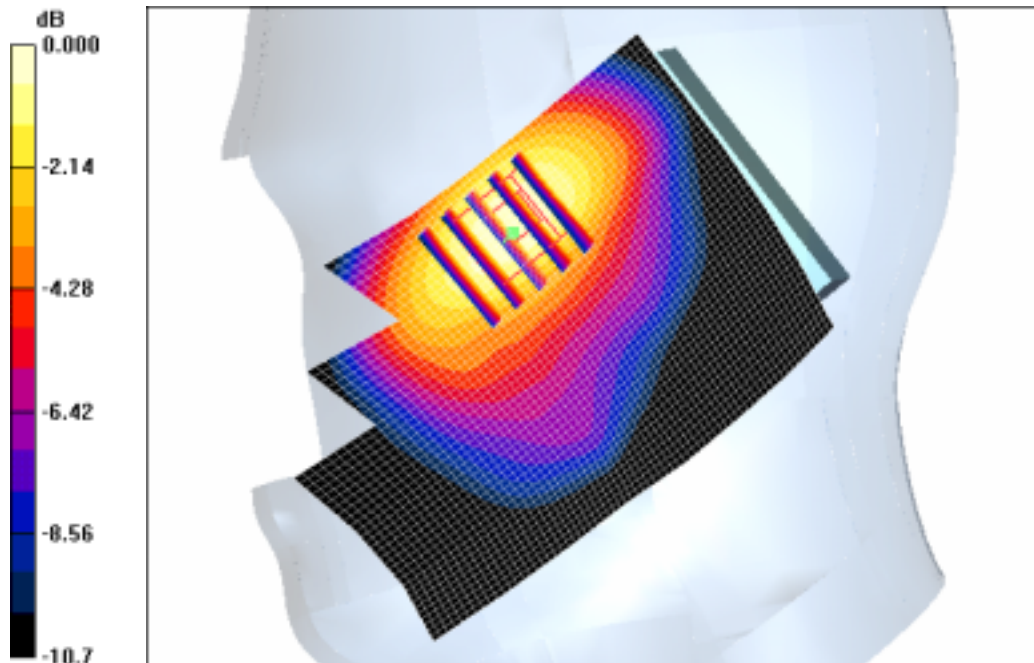
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.1 V/m; Power Drift = -0.009 dB

Peak SAR (extrapolated) = 0.869 W/kg

**SAR(1 g) = 0.562 mW/g; SAR(10 g) = 0.358 mW/g**

Maximum value of SAR (measured) = 0.602 mW/g



0 dB = 0.602mW/g

SAMSUNG FCC ID : A3LSCHU940 CDMA Head SAR

DUT: SCH-U940(Open); Serial: FF-237-C

Program Name: SCH-U940 CDMA Right, Slide Open (Job No. : FF-237)

Procedure Name: Ear/Tilt, Ch.0384, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.3; Tissue Temp(celsius)-22.1; Test Date-13/Nov/2008

Communication System: CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 836.52$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 42$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.97, 5.97, 5.97); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Ear/Tilt, Ch.0384, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.1 V/m; Power Drift = -0.125 dB

Peak SAR (extrapolated) = 0.285 W/kg

**SAR(1 g) = 0.223 mW/g; SAR(10 g) = 0.174 mW/g**

Maximum value of SAR (measured) = 0.232 mW/g

**Ear/Tilt, Ch.0384, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.232 mW/g



0 dB = 0.232mW/g

SAMSUNG FCC ID : A3LSCHU940 CDMA Head SAR

DUT: SCH-U940(Open); Serial: FF-237-C

Program Name: SCH-U940 CDMA Left, Slide Open (Job No. : FF-237)

Procedure Name: Cheek/Touch, Ch.0384, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.3; Tissue Temp(celsius)-22.1; Test Date-13/Nov/2008

Communication System: CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 836.52$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 42$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.97, 5.97, 5.97); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Cheek/Touch, Ch.0384, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.608 mW/g

**Cheek/Touch, Ch.0384, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:**

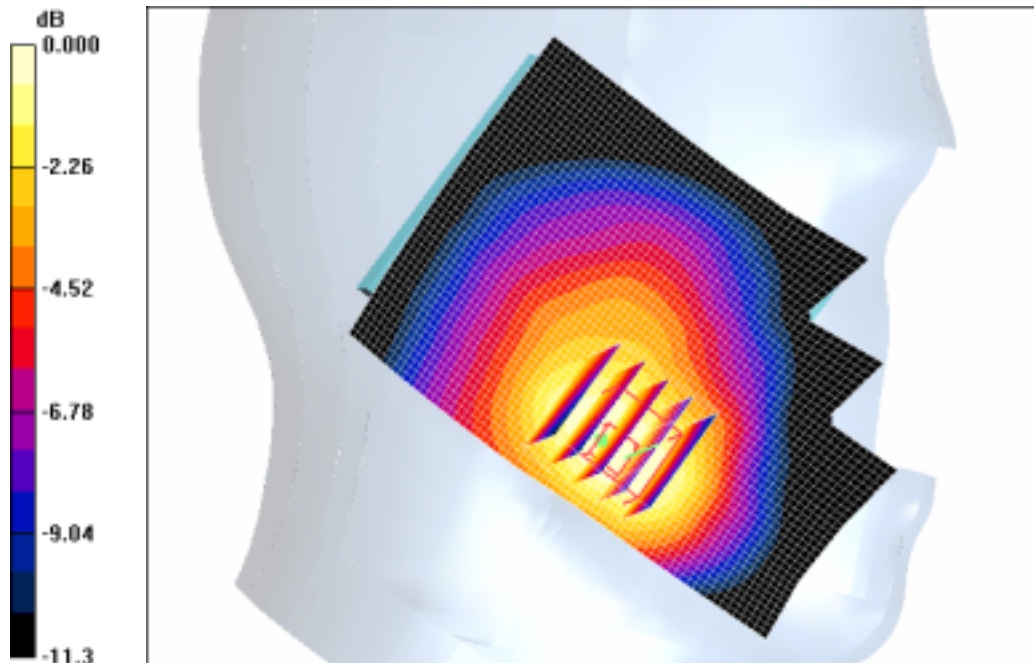
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.7 V/m; Power Drift = 0.012 dB

Peak SAR (extrapolated) = 0.764 W/kg

**SAR(1 g) = 0.568 mW/g; SAR(10 g) = 0.399 mW/g**

Maximum value of SAR (measured) = 0.599 mW/g



0 dB = 0.599mW/g

SAMSUNG FCC ID : A3LSCHU940 CDMA Head SAR

DUT: SCH-U940(Open); Serial: FF-237-C

Program Name: SCH-U940 CDMA Left, Slide Open (Job No. : FF-237)

Procedure Name: Ear/Tilt, Ch.0384, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.3; Tissue Temp(celsius)-22.1; Test Date-13/Nov/2008

Communication System: CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 836.52$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 42$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.97, 5.97, 5.97); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Ear/Tilt, Ch.0384, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.3 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 0.290 W/kg

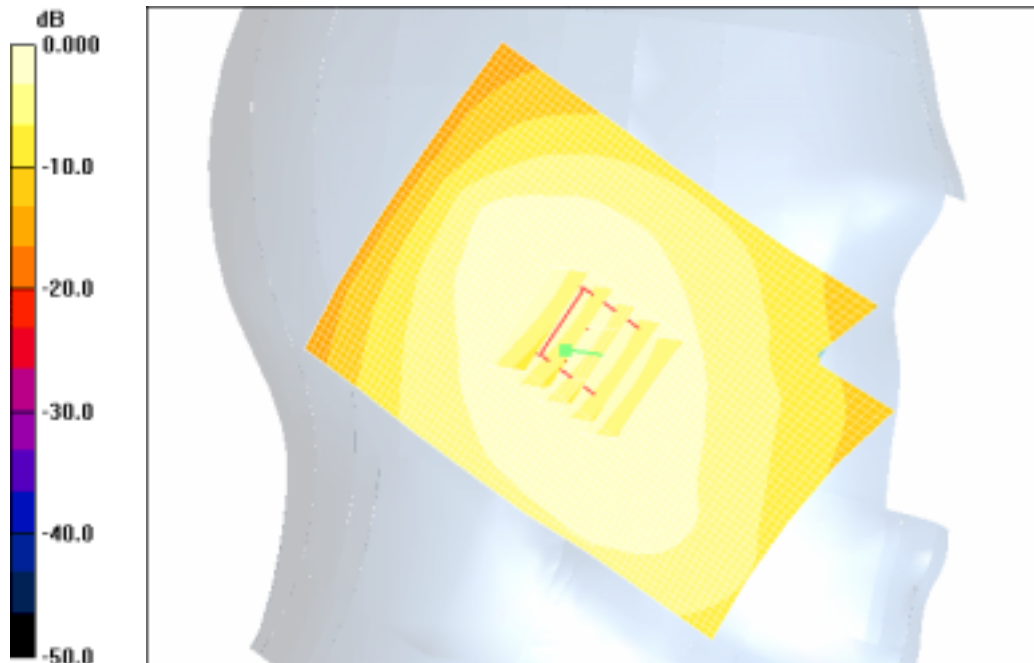
**SAR(1 g) = 0.241 mW/g; SAR(10 g) = 0.186 mW/g**

Maximum value of SAR (measured) = 0.254 mW/g

**Ear/Tilt, Ch.0384, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.247 mW/g



0 dB = 0.247mW/g

SAMSUNG FCC ID : A3LSCHU940 CDMA Head SAR

DUT: SCH-U940(Close); Serial: FF-237-C

Program Name: SCH-U940 CDMA Left, Slide Close (Job No. : FF-237)

Procedure Name: Cheek/Touch, Ch.0777, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.3; Tissue Temp(celsius)-22.1; Test Date-13/Nov/2008

Communication System: CDMA; Frequency: 848.31 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 848.31$  MHz;  $\sigma = 0.92$  mho/m;  $\epsilon_r = 42$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.97, 5.97, 5.97); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Cheek/Touch, Ch.0777, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.894 mW/g

**Cheek/Touch, Ch.0777, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:**

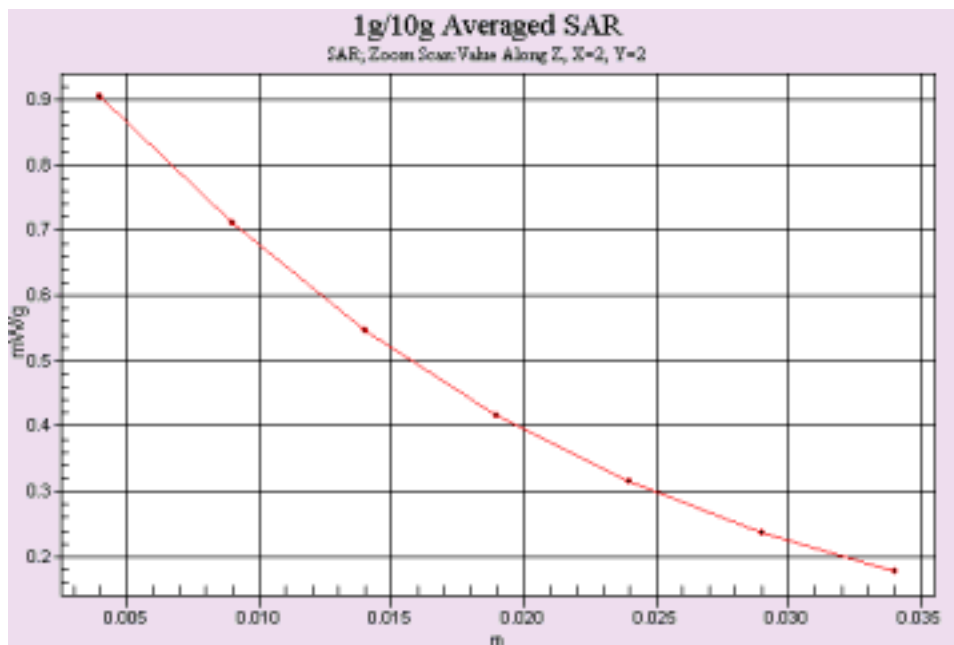
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 31.4 V/m; Power Drift = -0.008 dB

Peak SAR (extrapolated) = 1.09 W/kg

**SAR(1 g) = 0.859 mW/g; SAR(10 g) = 0.629 mW/g**

Maximum value of SAR (measured) = 0.904 mW/g



SAMSUNG FCC ID : A3LSCHU940 CDMA Body SAR

DUT: SCH-U940(Body); Serial: FF-237-C

Program Name: SCH-U940 CDMA Body (Job No. : FF-237)

Procedure Name: Body, Ch. 777, Ant. Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.2; Tissue Temp(celsius)-22.1; Test Date-13/Nov/2008

Communication System: CDMA; Frequency: 848.31 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 848.31$  MHz;  $\sigma = 0.99$  mho/m;  $\epsilon_r = 55.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.67, 5.67, 5.67); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: 1001
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Body, Ch. 777, Ant. Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 30.1 V/m; Power Drift = -0.098 dB

Peak SAR (extrapolated) = 1.21 W/kg

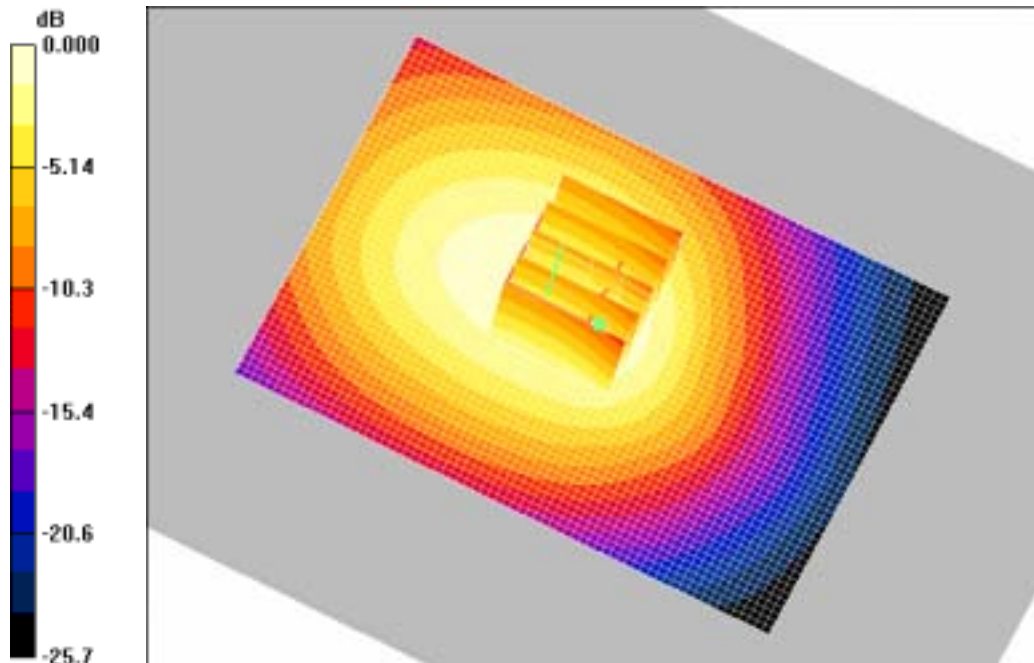
**SAR(1 g) = 0.941 mW/g; SAR(10 g) = 0.686 mW/g**

Maximum value of SAR (measured) = 0.992 mW/g

**Body, Ch. 777, Ant. Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

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



0 dB = 1.06mW/g

SAMSUNG FCC ID : A3LSCHU940 CDMA Body SAR

DUT: SCH-U940(Body); Serial: FF-237-C

Program Name: SCH-U940 CDMA Body (Job No. : FF-237)

Procedure Name: Body, Ch. 777, Ant. Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.2; Tissue Temp(celsius)-22.1; Test Date-13/Nov/2008

Communication System: CDMA; Frequency: 848.31 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 848.31$  MHz;  $\sigma = 0.99$  mho/m;  $\epsilon_r = 55.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(5.67, 5.67, 5.67); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: 1001
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Body, Ch. 777, Ant. Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 30.1 V/m; Power Drift = -0.098 dB

Peak SAR (extrapolated) = 1.21 W/kg

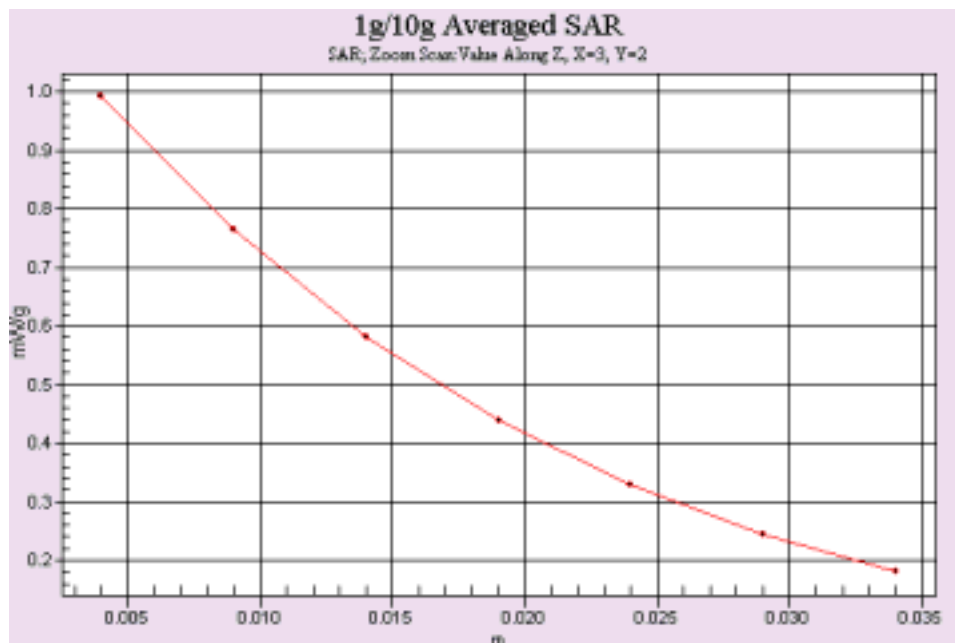
**SAR(1 g) = 0.941 mW/g; SAR(10 g) = 0.686 mW/g**

Maximum value of SAR (measured) = 0.992 mW/g

**Body, Ch. 777, Ant. Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

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



SAMSUNG FCC ID : A3LSCHU940 PCS Head SAR

DUT: SCH-U940(Close); Serial: FF-237-C

Program Name: SCH-U940 PCS Right, Slide Close (Job No. : FF-237)

Procedure Name: Cheek/Touch, Ch.0600, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.4; Tissue Temp(celsius)-22.3; Test Date-14/Nov/2008

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.96, 4.96, 4.96); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Cheek/Touch, Ch.0600, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:**

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.1 V/m; Power Drift = 0.005 dB

Peak SAR (extrapolated) = 0.688 W/kg

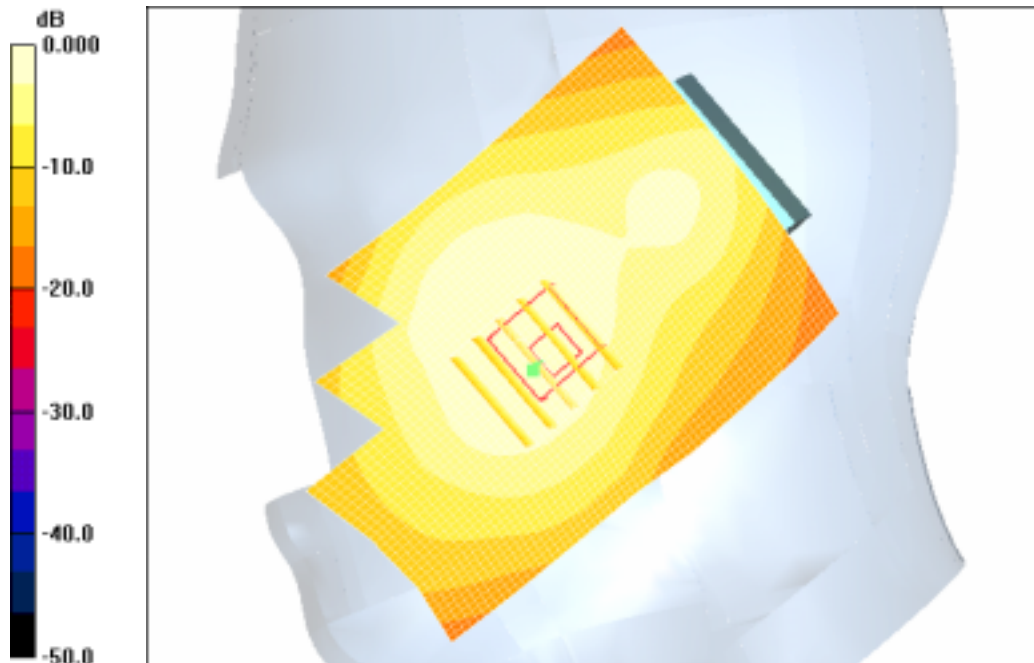
**SAR(1 g) = 0.454 mW/g; SAR(10 g) = 0.274 mW/g**

Maximum value of SAR (measured) = 0.486 mW/g

**Cheek/Touch, Ch.0600, Intenna, Bat. Standard/Area Scan (51x71x1): Measurement grid:**

dx=20mm, dy=20mm

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



0 dB = 0.484mW/g

SAMSUNG FCC ID : A3LSCHU940 PCS Head SAR

DUT: SCH-U940(Close); Serial: FF-237-C

Program Name: SCH-U940 PCS Right, Slide Close (Job No. : FF-237)

Procedure Name: Ear/Tilt, Ch.0600, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.4; Tissue Temp(celsius)-22.3; Test Date-14/Nov/2008

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.96, 4.96, 4.96); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ear/Tilt, Ch.0600, Intenna, Bat. Standard/Area Scan (51x71x1): Measurement grid:

$dx=20$ mm,  $dy=20$ mm

Maximum value of SAR (interpolated) = 0.411 mW/g

Ear/Tilt, Ch.0600, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0: Measurement

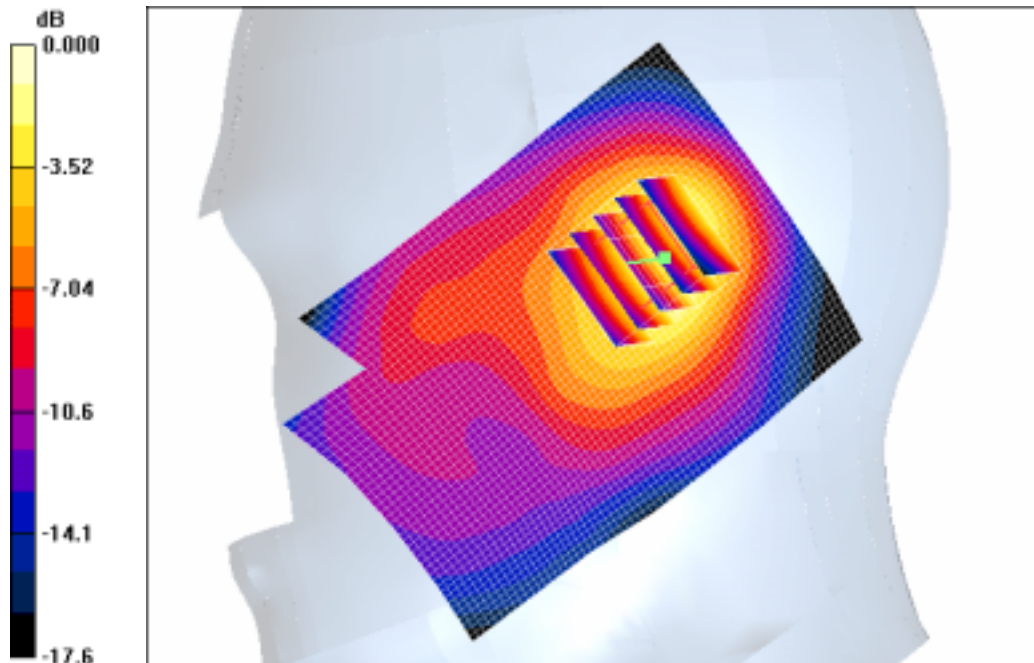
grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 16.8 V/m; Power Drift = 0.046 dB

Peak SAR (extrapolated) = 0.530 W/kg

**SAR(1 g) = 0.357 mW/g; SAR(10 g) = 0.217 mW/g**

Maximum value of SAR (measured) = 0.384 mW/g



0 dB = 0.384mW/g

SAMSUNG FCC ID : A3LSCHU940 PCS Head SAR

DUT: SCH-U940(Close); Serial: FF-237-C

Program Name: SCH-U940 PCS Left, Slide Close (Job No. : FF-237)

Procedure Name: Cheek/Touch, Ch.0600, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.4; Tissue Temp(celsius)-22.3; Test Date-14/Nov/2008

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.96, 4.96, 4.96); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Cheek/Touch, Ch.0600, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

$dx=20$ mm,  $dy=20$ mm

Maximum value of SAR (interpolated) = 0.502 mW/g

**Cheek/Touch, Ch.0600, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:**

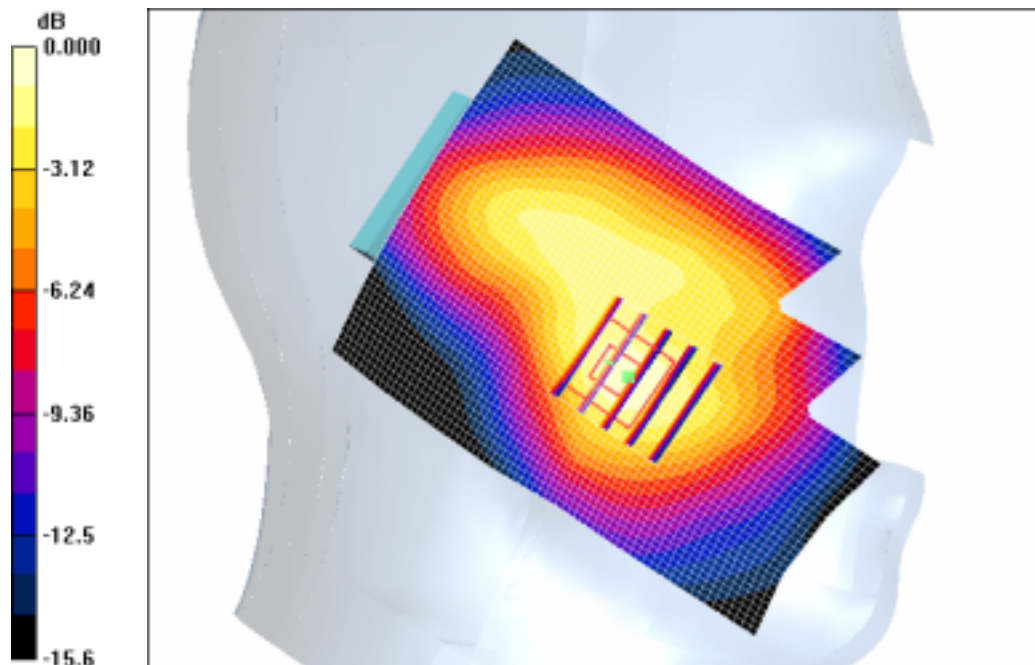
Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 15.9 V/m; Power Drift = 0.060 dB

Peak SAR (extrapolated) = 0.701 W/kg

**SAR(1 g) = 0.458 mW/g; SAR(10 g) = 0.266 mW/g**

Maximum value of SAR (measured) = 0.494 mW/g



0 dB = 0.494mW/g

SAMSUNG FCC ID : A3LSCHU940 PCS Head SAR

DUT: SCH-U940(Close); Serial: FF-237-C

Program Name: SCH-U940 PCS Left, Slide Close (Job No. : FF-237)

Procedure Name: Ear/Tilt, Ch.0600, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.4; Tissue Temp(celsius)-22.3; Test Date-14/Nov/2008

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.96, 4.96, 4.96); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Ear/Tilt, Ch.0600, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

$dx=20$ mm,  $dy=20$ mm

Maximum value of SAR (interpolated) = 0.390 mW/g

**Ear/Tilt, Ch.0600, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:** Measurement

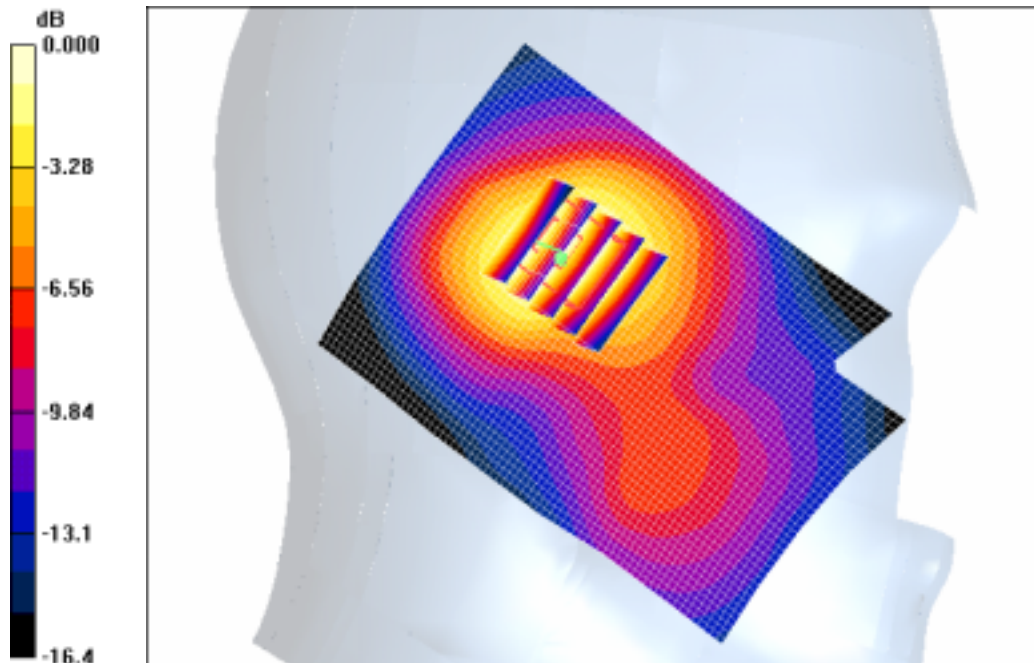
grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 15.5 V/m; Power Drift = 0.029 dB

Peak SAR (extrapolated) = 0.494 W/kg

**SAR(1 g) = 0.347 mW/g; SAR(10 g) = 0.215 mW/g**

Maximum value of SAR (measured) = 0.365 mW/g



0 dB = 0.365mW/g

SAMSUNG FCC ID : A3LSCHU940 PCS Head SAR

DUT: SCH-U940(Open); Serial: FF-237-C

Program Name: SCH-U940 PCS Right, Slide Open (Job No. : FF-237)

Procedure Name: Cheek/Touch, Ch.0025, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.4; Tissue Temp(celsius)-22.3; Test Date-14/Nov/2008

Communication System: PCS; Frequency: 1851.25 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1851.25$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.96, 4.96, 4.96); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Cheek/Touch, Ch.0025, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.775 mW/g

**Cheek/Touch, Ch.0025, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:**

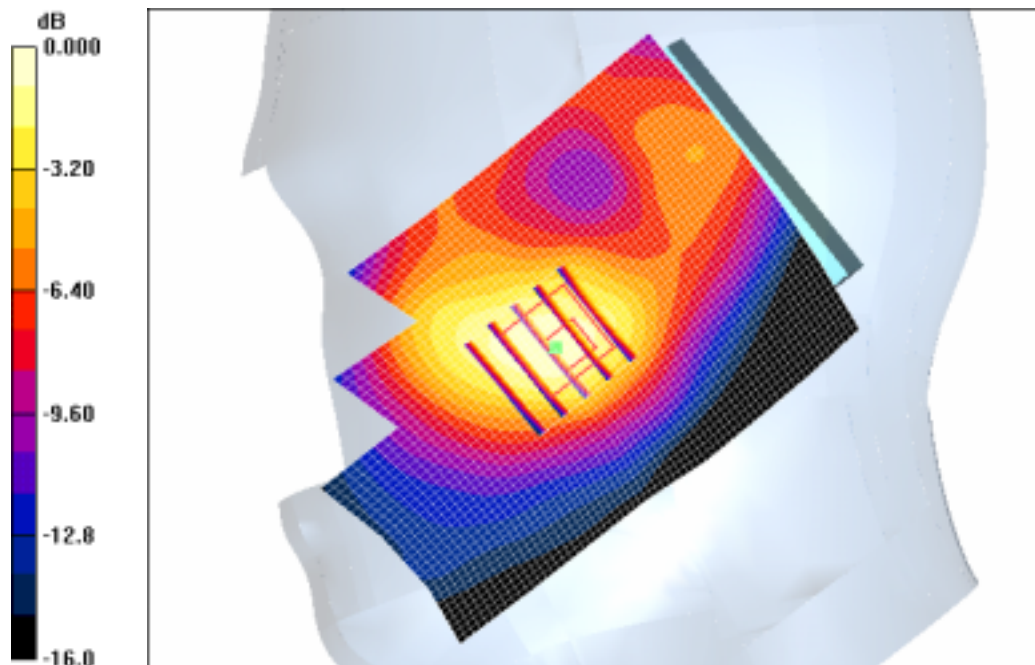
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.9 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 1.06 W/kg

**SAR(1 g) = 0.761 mW/g; SAR(10 g) = 0.474 mW/g**

Maximum value of SAR (measured) = 0.808 mW/g



0 dB = 0.808mW/g

SAMSUNG FCC ID : A3LSCHU940 PCS Head SAR

DUT: SCH-U940(Open); Serial: FF-237-C

Program Name: SCH-U940 PCS Right, Slide Open (Job No. : FF-237)

Procedure Name: Ear/Tilt, Ch.0600, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.4; Tissue Temp(celsius)-22.3; Test Date-14/Nov/2008

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.96, 4.96, 4.96); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Ear/Tilt, Ch.0600, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

$dx=20$ mm,  $dy=20$ mm

Maximum value of SAR (interpolated) = 0.242 mW/g

**Ear/Tilt, Ch.0600, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:** Measurement

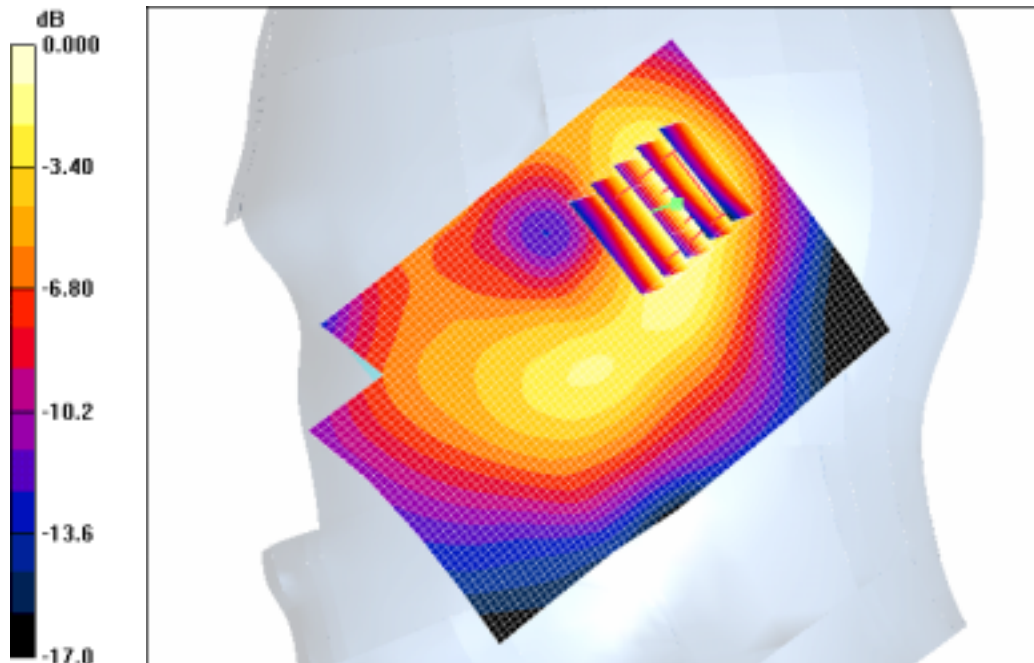
grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 12.6 V/m; Power Drift = 0.081 dB

Peak SAR (extrapolated) = 0.340 W/kg

**SAR(1 g) = 0.220 mW/g; SAR(10 g) = 0.128 mW/g**

Maximum value of SAR (measured) = 0.243 mW/g



0 dB = 0.243mW/g

SAMSUNG FCC ID : A3LSCHU940 PCS Head SAR

DUT: SCH-U940(Open); Serial: FF-237-C

Program Name: SCH-U940 PCS Left, Slide Open (Job No. : FF-237)

Procedure Name: Cheek/Touch, Ch.0600, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.4; Tissue Temp(celsius)-22.3; Test Date-14/Nov/2008

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.96, 4.96, 4.96); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Cheek/Touch, Ch.0600, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

$dx=20$ mm,  $dy=20$ mm

Maximum value of SAR (interpolated) = 0.548 mW/g

**Cheek/Touch, Ch.0600, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:**

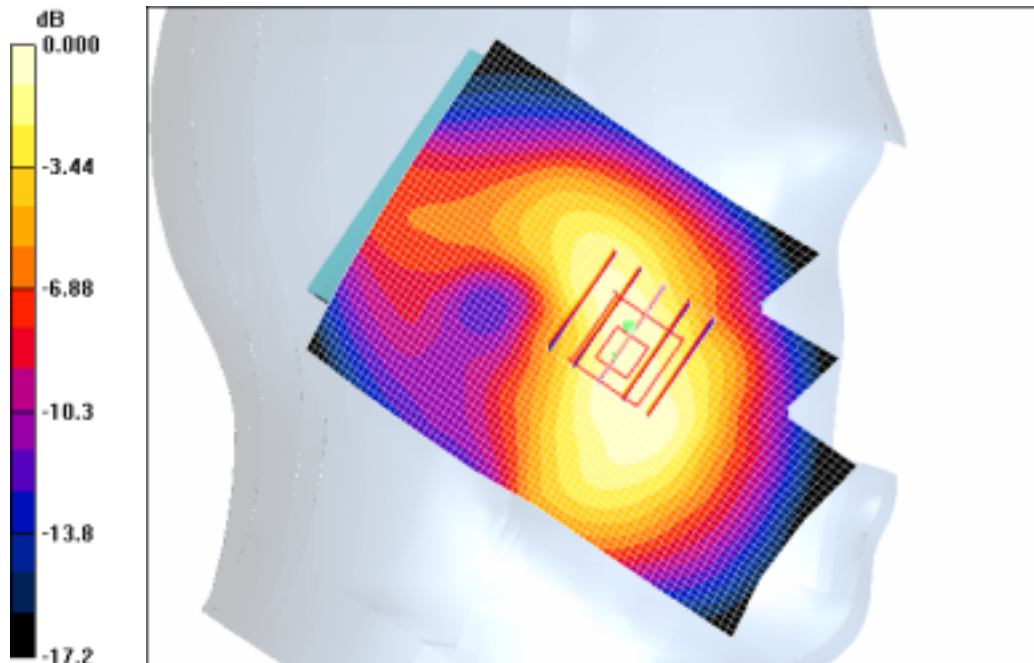
Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 19.8 V/m; Power Drift = 0.020 dB

Peak SAR (extrapolated) = 0.697 W/kg

**SAR(1 g) = 0.495 mW/g; SAR(10 g) = 0.322 mW/g**

Maximum value of SAR (measured) = 0.537 mW/g



0 dB = 0.537mW/g

SAMSUNG FCC ID : A3LSCHU940 PCS Head SAR

DUT: SCH-U940(Open); Serial: FF-237-C

Program Name: SCH-U940 PCS Left, Slide Open (Job No. : FF-237)

Procedure Name: Ear/Tilt, Ch.0600, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.4; Tissue Temp(celsius)-22.3; Test Date-14/Nov/2008

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.96, 4.96, 4.96); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Ear/Tilt, Ch.0600, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

$dx=20$ mm,  $dy=20$ mm

Maximum value of SAR (interpolated) = 0.194 mW/g

**Ear/Tilt, Ch.0600, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:** Measurement

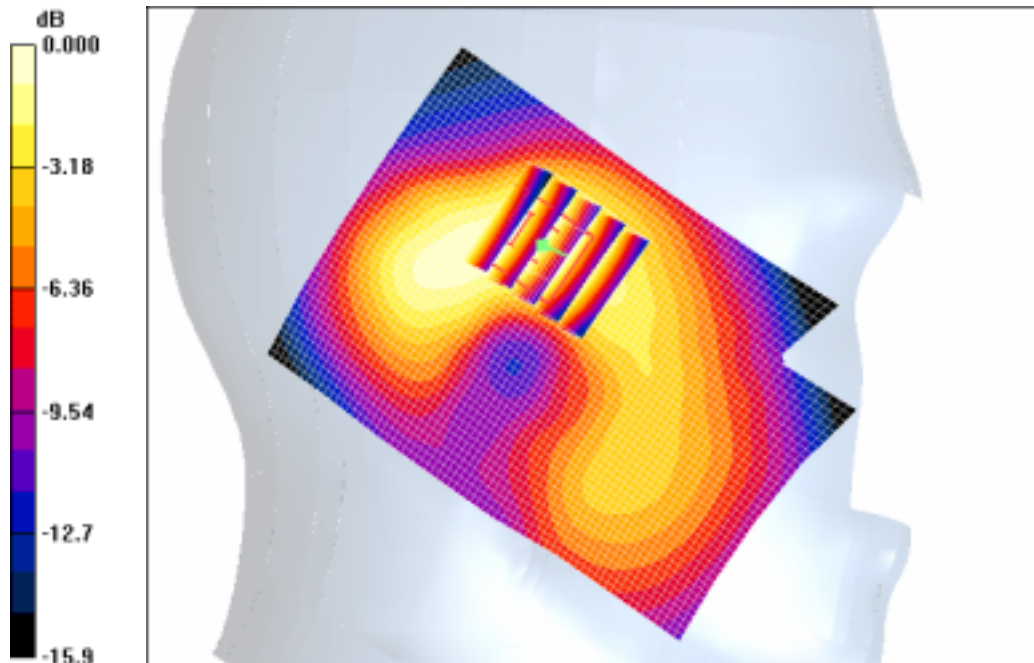
grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 11.8 V/m; Power Drift = 0.019 dB

Peak SAR (extrapolated) = 0.265 W/kg

**SAR(1 g) = 0.180 mW/g; SAR(10 g) = 0.113 mW/g**

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



0 dB = 0.195mW/g

SAMSUNG FCC ID : A3LSCHU940 PCS Head SAR

DUT: SCH-U940(Open); Serial: FF-237-C

Program Name: SCH-U940 PCS Right, Slide Open (Job No. : FF-237)

Procedure Name: Cheek/Touch, Ch.0025, Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.4; Tissue Temp(celsius)-22.3; Test Date-14/Nov/2008

Communication System: PCS; Frequency: 1851.25 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1851.25$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.96, 4.96, 4.96); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Cheek/Touch, Ch.0025, Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.775 mW/g

**Cheek/Touch, Ch.0025, Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:**

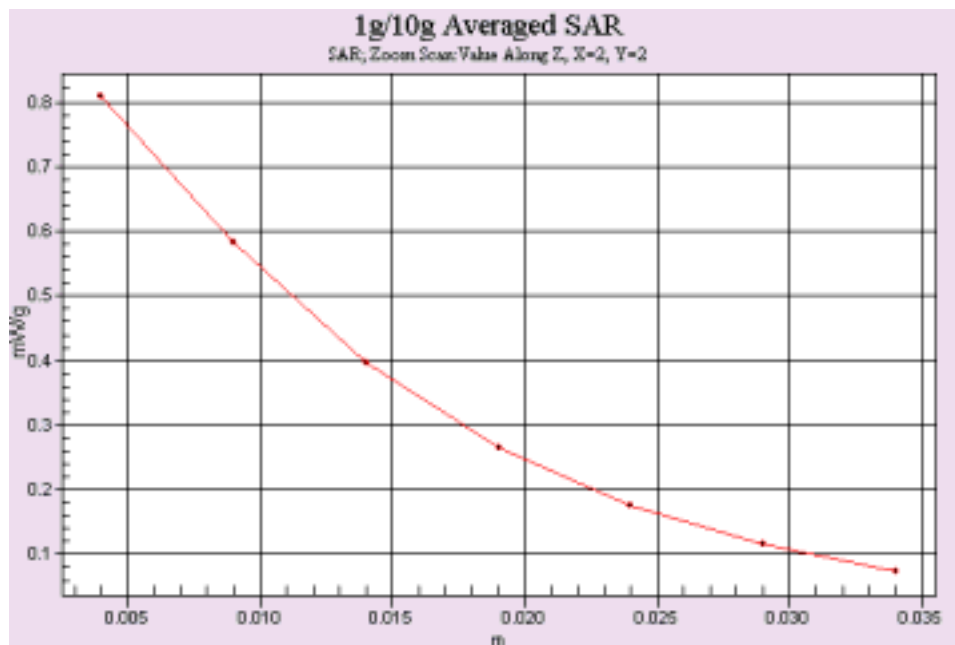
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.9 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 1.06 W/kg

**SAR(1 g) = 0.761 mW/g; SAR(10 g) = 0.474 mW/g**

Maximum value of SAR (measured) = 0.808 mW/g



SAMSUNG FCC ID : A3LSCHU940 PCS Body SAR

DUT: SCH-U940(Body); Serial: FF-237-C

Program Name: SCH-U940 PCS Body (Job No. : FF-237)

Procedure Name: Body, Ch. 0025, Ant. Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.4; Tissue Temp(celsius)-22.2; Test Date-14/Nov/2008

Communication System: PCS; Frequency: 1851.25 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1851.25$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.68, 4.68, 4.68); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: 1001
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Body, Ch. 0025, Ant. Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.3 V/m; Power Drift = -0.065 dB

Peak SAR (extrapolated) = 1.08 W/kg

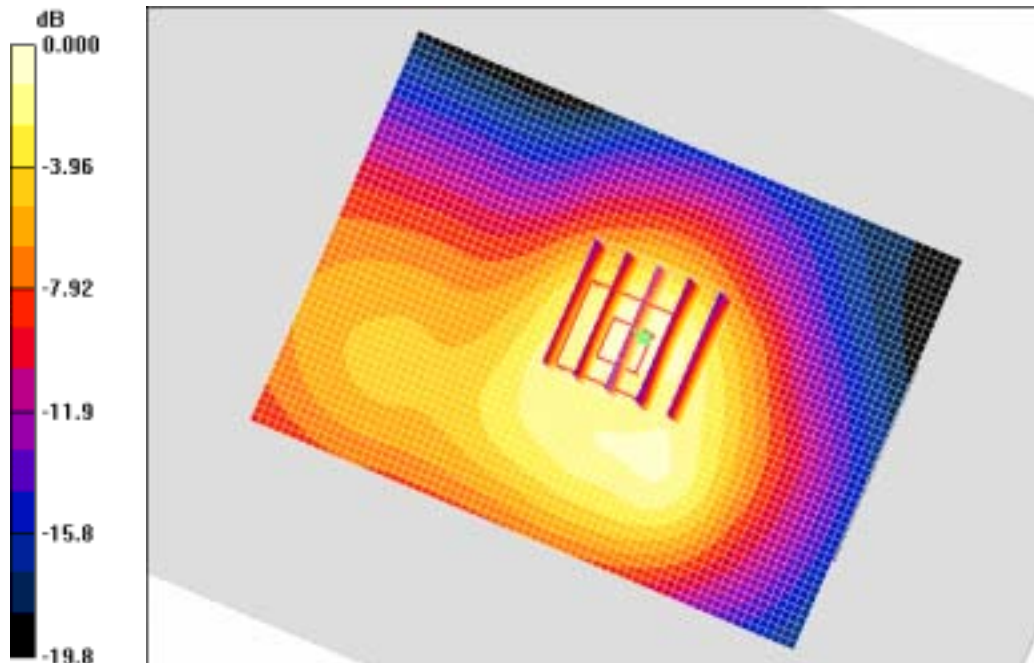
**SAR(1 g) = 0.675 mW/g; SAR(10 g) = 0.402 mW/g**

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

**Body, Ch. 0025, Ant. Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.743 mW/g



0 dB = 0.743mW/g

SAMSUNG FCC ID : A3LSCHU940 PCS Body SAR

DUT: SCH-U940(Body); Serial: FF-237-C

Program Name: SCH-U940 PCS Body (Job No. : FF-237)

Procedure Name: Body, Ch. 0025, Ant. Intenna, Bat. Standard

Meas. Ambient Temp(celsius)-22.4; Tissue Temp(celsius)-22.2; Test Date-14/Nov/2008

Communication System: PCS; Frequency: 1851.25 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1851.25$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3080; ConvF(4.68, 4.68, 4.68); Calibrated: 2008-01-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn686; Calibrated: 2007-12-05
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: 1001
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Body, Ch. 0025, Ant. Intenna, Bat. Standard/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.3 V/m; Power Drift = -0.065 dB

Peak SAR (extrapolated) = 1.08 W/kg

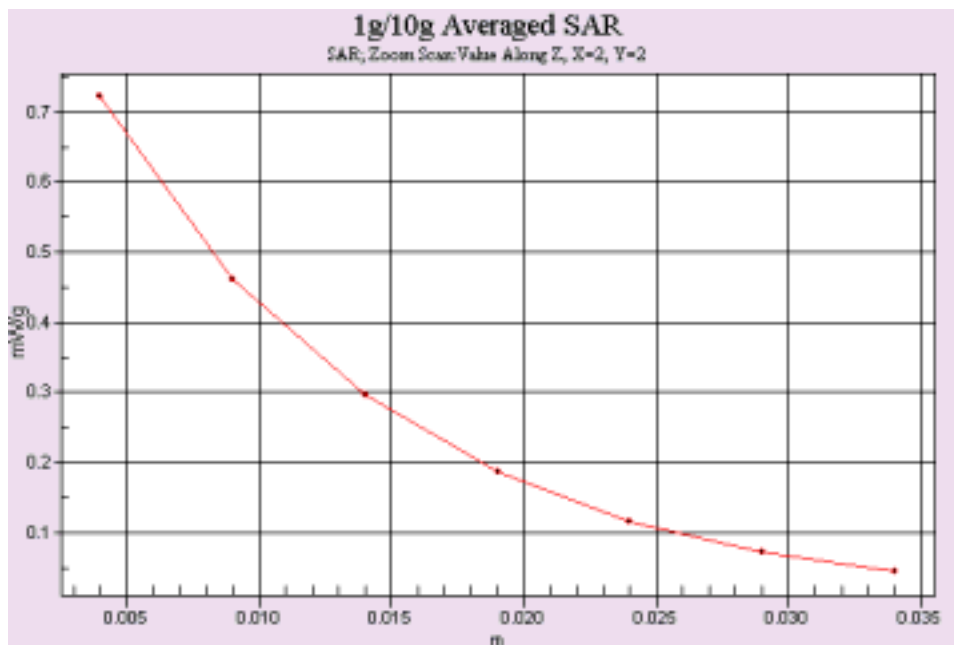
**SAR(1 g) = 0.675 mW/g; SAR(10 g) = 0.402 mW/g**

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

**Body, Ch. 0025, Ant. Intenna, Bat. Standard/Area Scan (51x71x1):** Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.743 mW/g



## **APPENDIX G**

### **Probe Calibration**



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 **Samsung (Dymstec)**

Certificate No: ES3-3080\_Jan08

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3080**

Calibration procedure(s) **QA CAL-01.v6  
Calibration procedure for dosimetric E-field probes**

Calibration date: **January 29, 2008**

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  $(22 \pm 3)^{\circ}\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293574	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (SPEAG, No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642UD1700	4-Aug-09 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

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

issued: February 28, 2008

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

OK to use  
2008.3.7



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

Accreditation No.: SCS 108

#### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConF	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:

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

#### Methods Applied and Interpretation of Parameters:

- NORM<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*.
- DCP<sub>x,y,z</sub>**: 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.

# Probe ES3DV3

## SN:3080

Manufactured:	March 14, 2005
Last calibrated:	May 31, 2007
Recalibrated:	January 29, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

**DASY - Parameters of Probe: ES3DV3 SN:3080****Sensitivity in Free Space<sup>A</sup>****Diode Compression<sup>B</sup>**

NormX	1.22 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	94 mV
NormY	1.12 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	95 mV
NormZ	1.17 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	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		3.0 mm	4.0 mm
SAR <sub>be</sub> [%]	Without Correction Algorithm	12.2	6.8
SAR <sub>be</sub> [%]	With Correction Algorithm	0.9	0.8

**TSL                    1810 MHz    Typical SAR gradient: 10 % per mm**

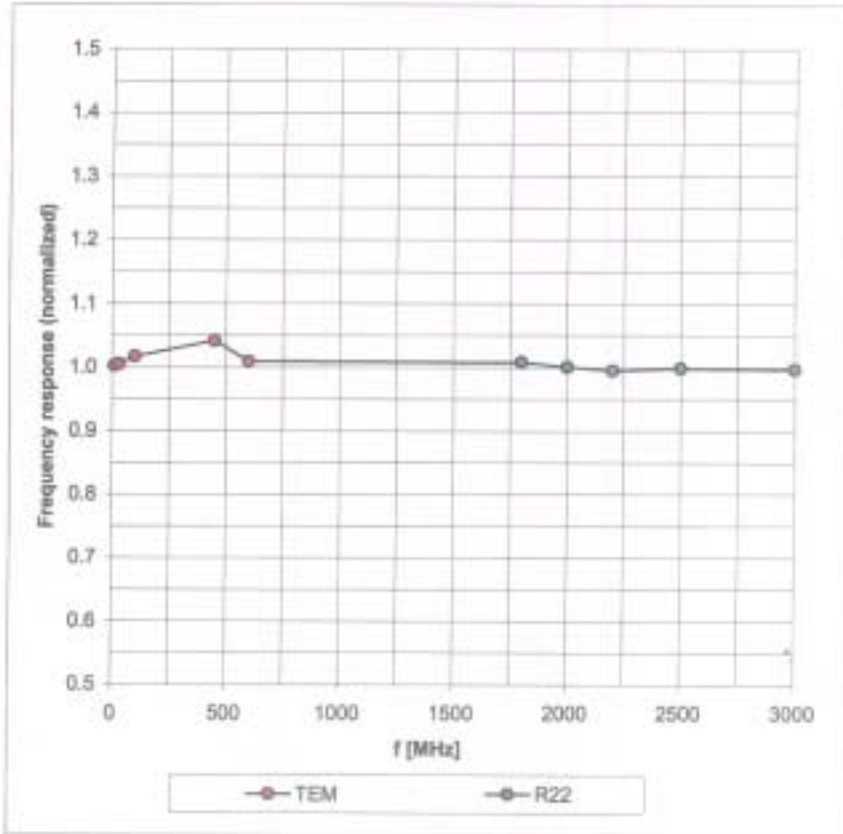
Sensor Center to Phantom Surface Distance		3.0 mm	4.0 mm
SAR <sub>be</sub> [%]	Without Correction Algorithm	13.6	7.9
SAR <sub>be</sub> [%]	With Correction Algorithm	0.8	0.7

**Sensor Offset**Probe Tip to Sensor Center                    **2.0 mm**

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.

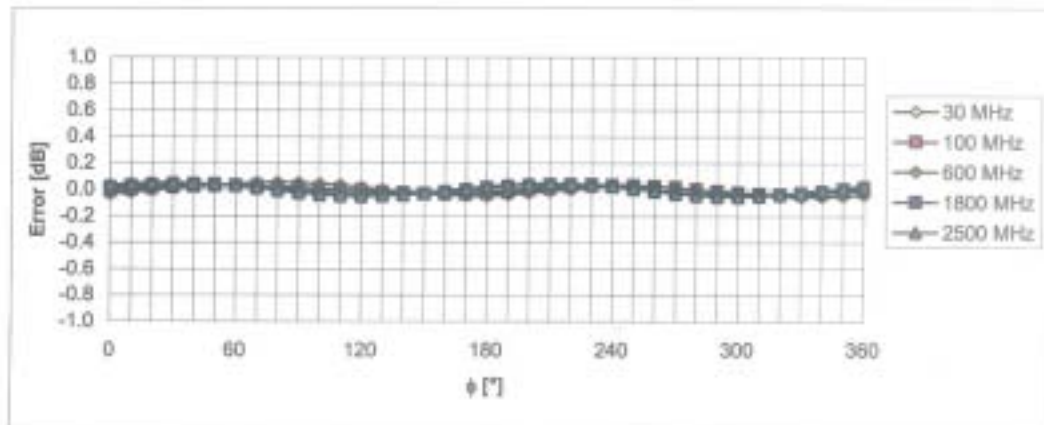
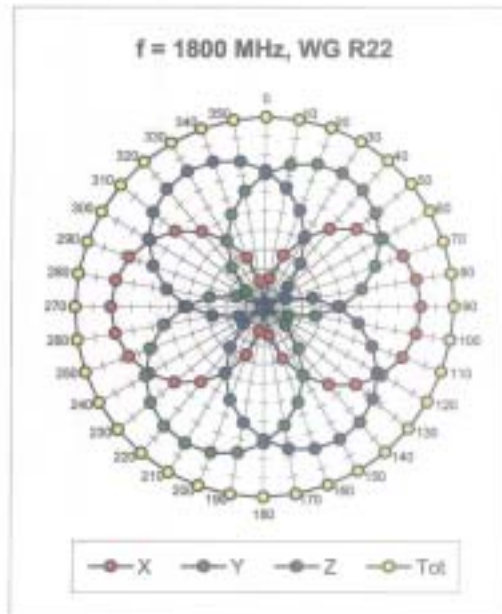
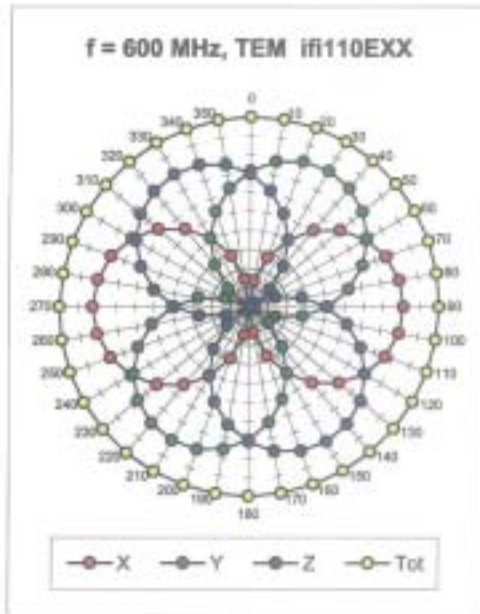
### Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



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

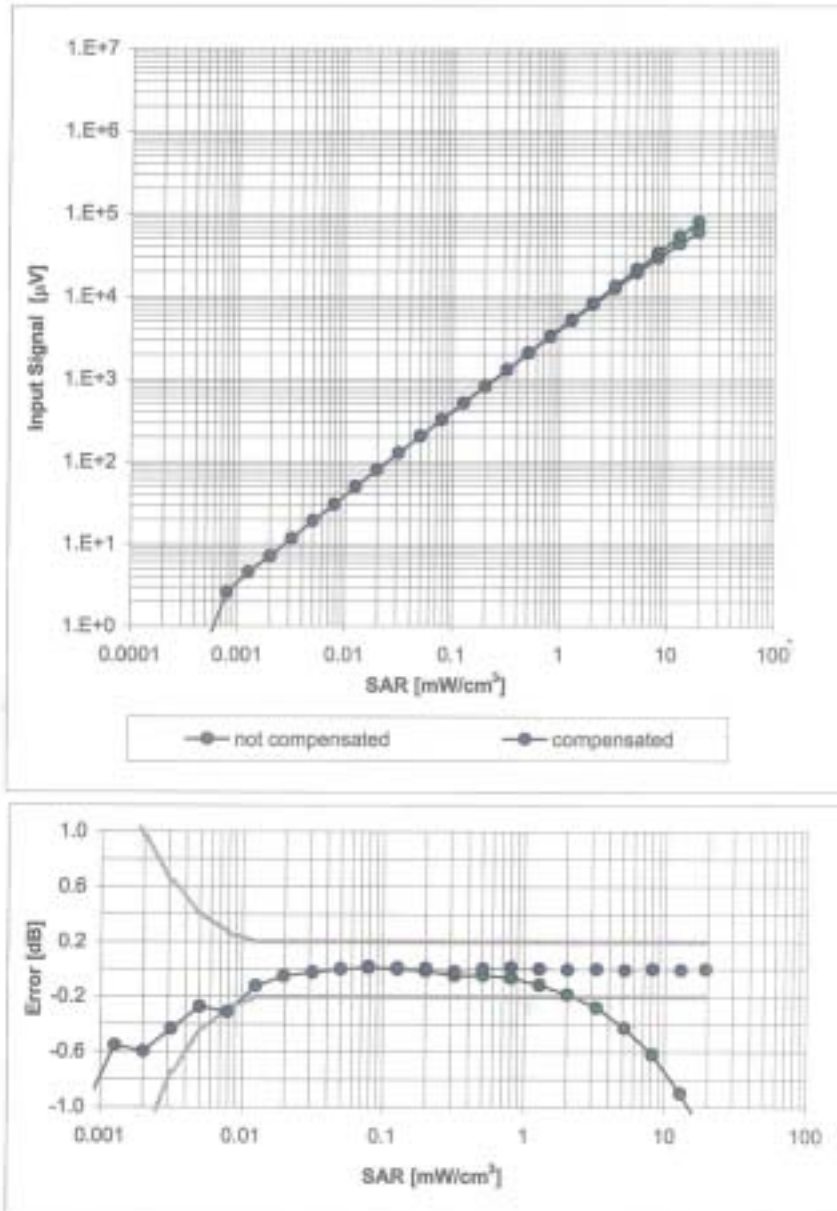
ES3 - 11 - 01(C)

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



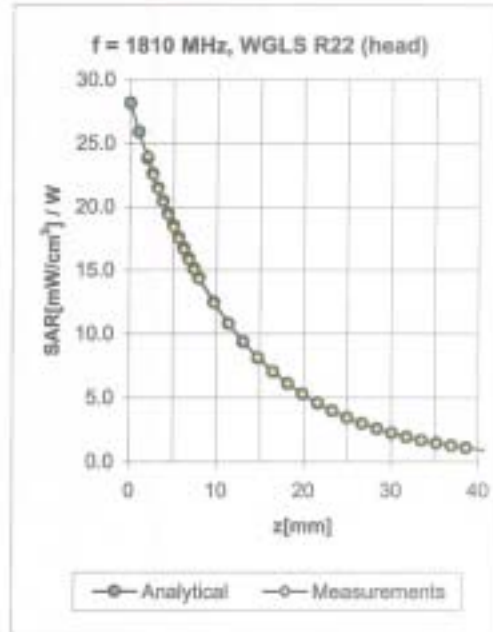
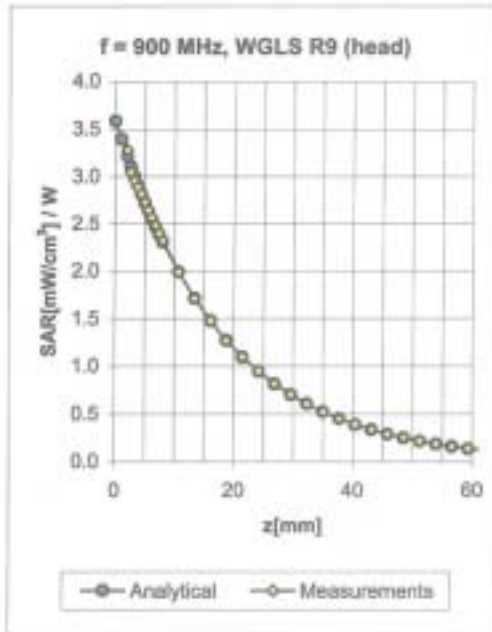
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

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



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

### Conversion Factor Assessment



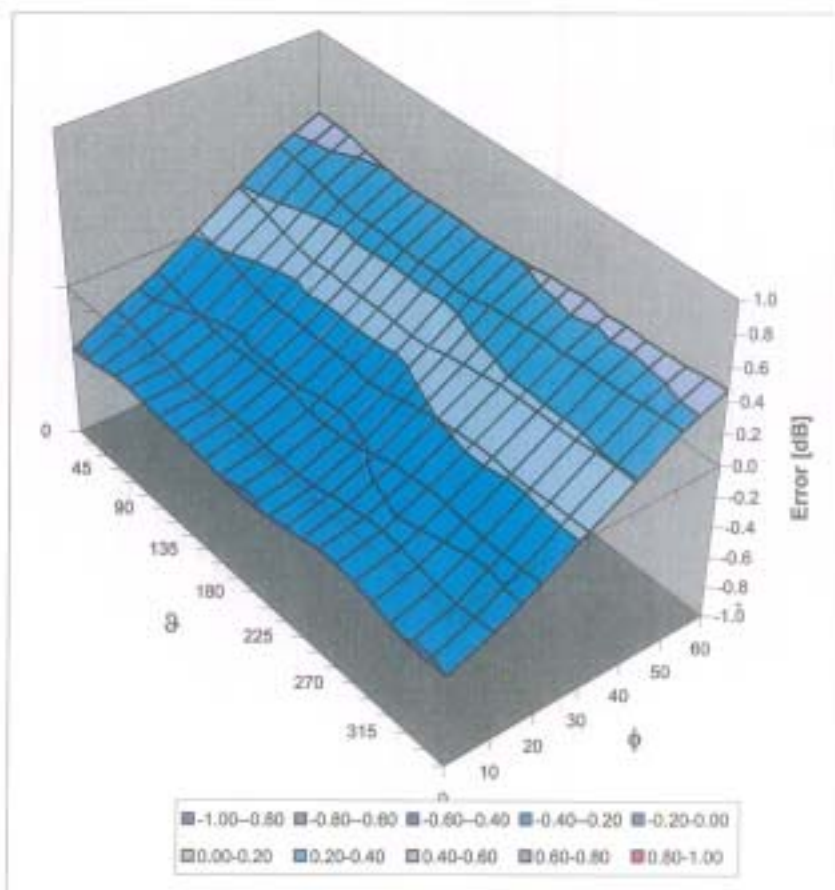
f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	1.00	1.25	5.97 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.74	1.59	4.96 ± 11.0% (k=2)
2000	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.88	1.40	4.65 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.75	1.55	4.39 ± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	1.00	1.19	5.67 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.86	1.37	4.88 ± 11.0% (k=2)
2000	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.78	1.50	4.34 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.90	1.33	4.06 ± 11.8% (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.

[3]10 - 11 - 01(C)

### Deviation from Isotropy in HSL

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



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

## **APPENDIX H**

### **Calibration of The Validation Dipole**



Accredited by the Swiss Federal Office of Metrology and Accreditation  
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 **Samsung Suwon (Dymstec)**

Certificate No: **D835V2-4d014\_Nov06**

## CALIBRATION CERTIFICATE

Object: **D835V2 - SN: 4d014**

Calibration procedure(s): **QA CAL-05.v6  
Calibration procedure for dipole validation kits**

Calibration date: **November 21, 2006**

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 ( $22 \pm 3$ )°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	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Power sensor HP 8481A	US37282783	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ET3DV6 (HF)	SN 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4208	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 22, 2006

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

*Handwritten notes:*  
11/21/06  
2006.12.14  
S. Pokovic



Accredited by the Swiss Federal Office of Metrology and Accreditation  
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 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	DASY4	V4.7
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	42.1 $\pm$ 6 %	0.90 mho/m $\pm$ 6 %
Head TSL temperature during test	(22.3 $\pm$ 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	2.29 mW / g
SAR normalized	normalized to 1W	9.16 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	9.23 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.50 mW / g
SAR normalized	normalized to 1W	6.00 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	6.04 mW / g $\pm$ 16.5 % (k=2)

<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	52.2 $\Omega$ - 3.2 $\mu\Omega$
Return Loss	- 28.5 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.392 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	April 22, 2004

## DASY4 Validation Report for Head TSL

Date/Time: 21.11.2006 14:00:13

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d014**

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

Medium: HSL 900 MHz;

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.901$  mho/m;  $\epsilon_r = 42.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

### DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(6.09, 6.09, 6.09); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:**

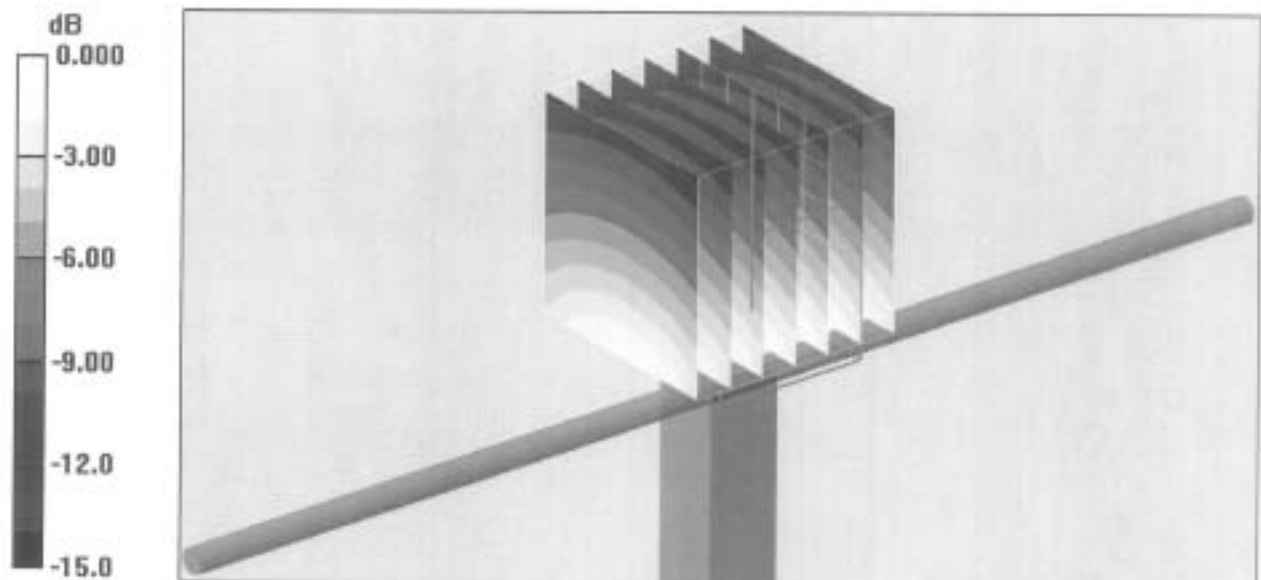
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.5 V/m; Power Drift = 0.016 dB

Peak SAR (extrapolated) = 3.32 W/kg

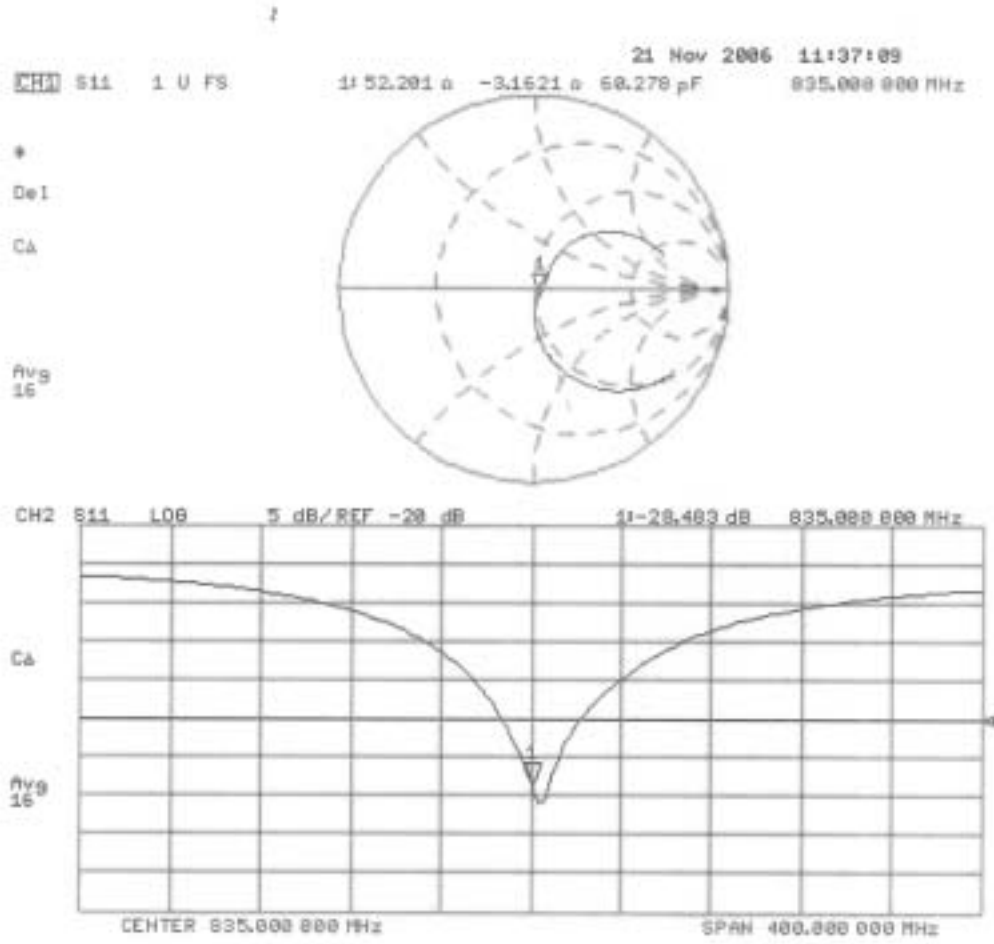
**SAR(1 g) = 2.29 mW/g; SAR(10 g) = 1.5 mW/g**

Maximum value of SAR (measured) = 2.48 mW/g



0 dB = 2.48mW/g

# Impedance Measurement Plot for Head TSL





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: Samsung (Dymstec)

Certificate No: D1900V2-5d023\_Feb08

## CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d023

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

Calibration date: February 14, 2008

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  $(22 \pm 3)^\circ\text{C}$  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	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5088 (20g)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference 10 dB Attenuator	SN: 5047.2 (10r)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference Probe ET3DVB (HF)	SN: 1507	26-Oct-07 (SPEAG, No. ET3-1507_Oct07)	Oct-08
DAE4	SN 601	3-Jan-08 (SPEAG, No. DAE4-601_Jan08)	Jan-09
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-07)	In house check: Oct-08
RF generator R&S SMT-06	100005	4-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

Calibrated by:	Name	Function	Signature
	Mika Melli	Laboratory Technician	<i>M. Melli</i>
Approved by:	Katja Pokovic	Technical Manager	<i>Katja Pokovic</i>

Issued: February 14, 2008

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

OK to use  
2008.2.15



Accredited by the Swiss Accreditation Service (SAS)  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

#### Glossary:

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

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

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

#### Additional Documentation:

- DASY4 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	DASY4	V4.7
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	1900 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.5 $\pm$ 6 %	1.48 mho/m $\pm$ 6 %
Head TSL temperature during test	(21.3 $\pm$ 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	9.67 mW / g
SAR normalized	normalized to 1W	38.7 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	38.1 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.07 mW / g
SAR normalized	normalized to 1W	20.3 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	20.2 mW / g $\pm$ 16.5 % (k=2)

<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	51.7 $\Omega$ + 3.4 j $\Omega$
Return Loss	- 26.6 dB

### General Antenna Parameters and Design

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

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

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

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	September 28, 2002

## DASY4 Validation Report for Head TSL

Date/Time: 14.02.2008 13:43:56

Test Laboratory: SPEAG; Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d023**

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

Medium: HSL U10 BB;

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1,46$  mho/m;  $\epsilon_r = 40,5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.86, 4.86, 4.86); Calibrated: 26.10.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 S6601; Calibrated: 03.01.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:**

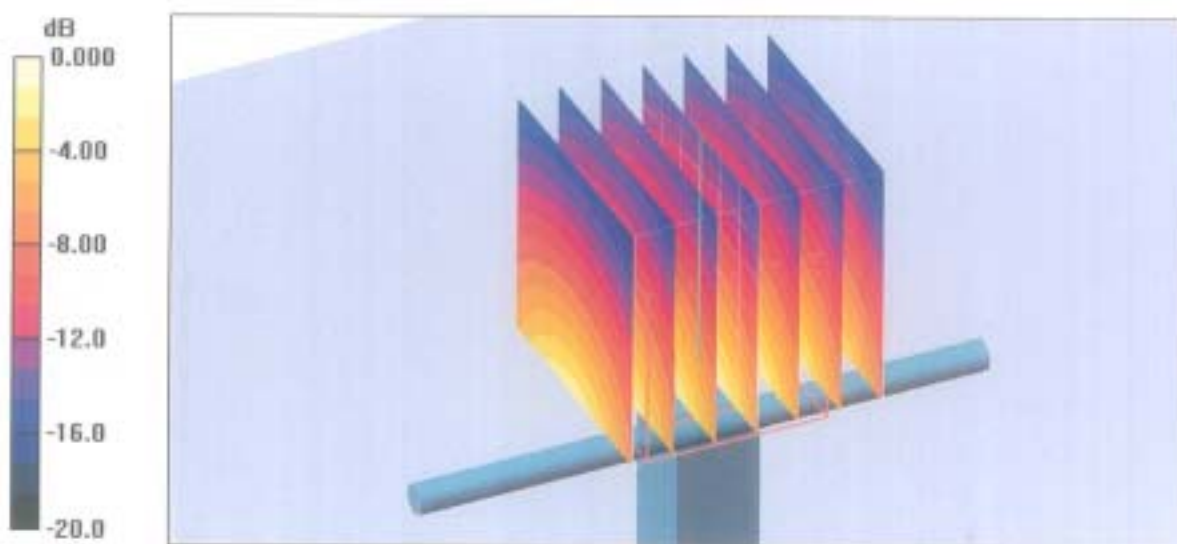
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 91.2 V/m; Power Drift = 0.031 dB

Peak SAR (extrapolated) = 17.0 W/kg

**SAR(1 g) = 9.67 mW/g; SAR(10 g) = 5.07 mW/g**

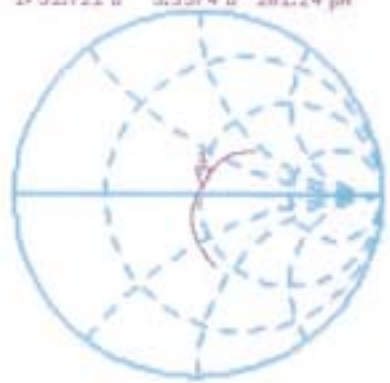
Maximum value of SAR (measured) = 10.8 mW/g



# Impedance Measurement Plot for Head TSL

14 Feb 2008 12:26:55  
S11 1 U FS 1: 51.721  $\Omega$  3.3574  $\Omega$  281.24  $\mu\text{H}$  1 500.000 000 MHz

Cor



AVG 16

CH2 S11 LOG 5 dB/REF -20 dB 11-28.682 dB 1 500.000 000 MHz

Cor

AVG 16

