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:	**SGH-T589**
FCC ID (Requested):	**A3LSGHT589**
Job No:	**FI-106**
Report No:	**FI-106-S1**

- Abstract –

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

Prepared By

JG KIM - Test Engineer

Authorized By

JD JANG - Technical Manager

Contents

1. GENERAL INFORMATION

Test Dates :	Apr.26, 2011 ~ Apr.27, 2011
Manufacturer :	SAMSUNG ELECTRONICS Co., Ltd.
Address :	416 Maetan3-Dong, Suwon City, Korea
Test Standard :	§2.1093; FCC/OET Bulletin 65, Supplement C(June 2001)
FCC Classification :	Licensed Transmitter Held to Ear (PCE) Digital Transmission System (DTS)
Tested for :	FCC/TCB Certification

2. DESCRIPTION OF DEVICE

Test Sample :	850/1900 GSM/GPRS/EDGE and 1700/1900 WCDMA/HSPA Phone with Bluetooth and WLAN
Model Number :	SGH-T589
Serial Number :	Identical prototype (S/N : # FI-106-A)
Tx Freq. Range :	824.2 ~ 848.8 MHz (GSM850) 1850.20 ~ 1909.80 MHz (GSM1900) 1712.4 ~ 1752.5 MHz (WCDMA1700) 1852.4 ~ 1907.6 MHz (WCDMA1900) 2412 ~ 2462 MHz (WLAN)
Rx Freq. Range :	869.2 ~ 893.8 MHz (GSM850) 1930.20 ~ 1989.80 MHz (GSM1900) 2112.4 ~ 2152.5 MHz (WCDMA1700) 1932.4 ~ 1987.6 MHz (WCDMA1900) 2412 ~ 2462 MHz (WLAN)
Antenna Manufacturer :	TYCO Model No.: SGH-T589
GPRS Class	10
GSM Class	B
DTM Multislots	N/A
Antenna Dimensions :	50.20 X 15.50 X 7.53 (mm)
Separation distance between Main and Bluetooth antenna :	13 mm

3. DESCRIPTION OF TEST EQUIPMENT

3.1 SAR Measurement Setup

Robotic System

Measurements are performed using the DASY4 (or 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).

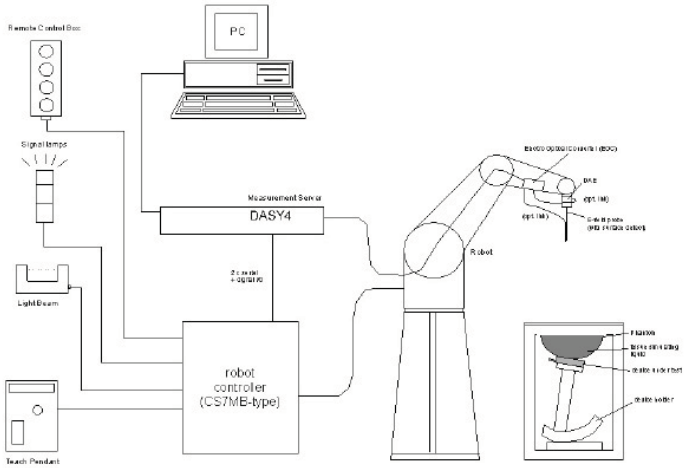


Figure 3.1 SAR Measurement System Setup

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 (or 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

Figure 3.2 DAE System

The SAR measurement were conducted with the dosimetric probe ES3DV2, ES3DV3, EX3DV4 and ET3DV6, 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 2nd order fitting (see Fig.3.2). The approach is stopped at reaching the maximum.

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

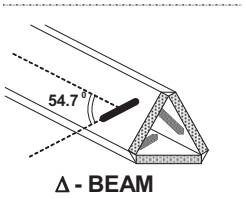


Figure 3.3 Triangular Probe Configuration

Additional CF for other liquids and frequencies upon request

Frequency 10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)

Directivity **[ES3DV3], [ET3DV6]**

± 0.2 dB in HSL (rotation around probe axis)

± 0.3 dB in tissue material (rotation normal to probe axis)

[EX3DV4]

± 0.3 dB in HSL (rotation around probe axis)

± 0.5 dB in tissue material (rotation normal to probe axis)

Dynamic Range **[ES3DV3], [ET3DV6]**

5μW/g to > 100mW/g; Linearity: ± 0.2dB

[EX3DV4]

10 μW/g to > 100 mW/g; Linearity: ± 0.2 dB

Dimensions **[ES3DV3], [ES3DV2]**

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

[ES3DV3] ,[ES3DV2]

[EX3DV4]

Overall length: 330 mm (Tip: 20 mm)

Tip diameter: 2.5 mm (Body: 12 mm)

Typical distance from probe tip to dipole centers: 1 mm

[ET3DV6]

Overall length: 330mm

Tip length: 16mm

Body diameter: 12mm

Tip diameter: 6.8mm

Distance from probe tip to dipole centers: 2.7mm

[EX3DV4]

Application	**[ES3DV3], [ES3DV2]** General dosimetry up to 5 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones **[EX3DV4]** High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields).Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30 %. **[ET3DV6]** General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms
Optical Surface Detection	**[ET3DV6]** ± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces

[ET3DV6]

3.3 Phantom

SAM Twin 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)

Figure3.5 SAM Twin Phantom

SAM Twin Phantom Specification

Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-2003, EN 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid.
Shell Thickness	2 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Height: 810 mm; Length: 1000 mm; Width: 500 mm

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

Modular Flat 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 ± 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

3.4 Brain Simulating Mixture Characterization

The brain mixtures consist of a viscous gel using hydroxethylcellullose (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.

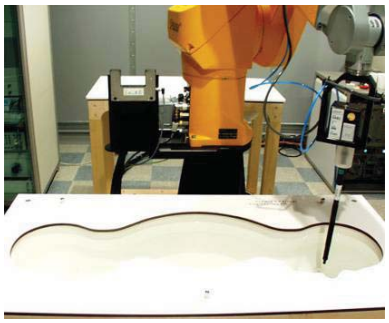


Figure 3.7 Simulated Tissue

Table 3.1 Composition of the Brain Tissue Equivalent Matter

INGREDIENTS	835MHz Brain	835MHz Muscle	1800MHz Brain	1800MHz Muscle	1900MHz Brain	1900MHz Muscle	2450MHz Brain	2450MHz Muscle
WATER	40.19%	50.75%	55.24%	69.04%	55.24%	70.23%	71.88%	73.4%
SUGAR	57.90%	48.21%	-	-	-	-	-	-
SALT	1.48%	0.94%	0.31%	2.72%	0.31%	0.29%	0.16%	0.06%
DGBE	-	-	44.45%	28.24%	44.45%	29.48%	7.99%	26.54%
Triton X-100	-	-	-	-	-	-	19.97%	-
BACTERIACIDE	0.18%	0.10%	-	-	-	-	-	-
HEC	0.25%	-	-	-	-	-	-	-
Dielectric Constant Target	41.5	55.2	40	53.3	40	53.3	39.2	52.7
Conductivity Target (S/m)	0.9	0.97	1.4	1.52	1.4	1.52	1.8	1.95

3.5 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 EN 50360:2001 and FCC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Figure 3.8 Device Holder

*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.

3.6 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, 1800,1900, 2450 MHz
Return Loss	< -20 dB at specified validation position
Dimensions	D835V2: dipole length: 161 mm; overall height: 330 mm D1750V2: dipole length: 75 mm; overall height: 302 mm D1900V2: dipole length: 68 mm; overall height: 300 mm D2450V2: dipole length: 51.8 mm; overall height: 300 mm

Note:

Usage of SAR dipoles calibrated less than 2 years ago but more than 1 year ago were confirmed in maintaining return loss (< -20dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibration in KDB 450824

D2450V2 S/N:807	Paramaters			
Date of Cal	Return loss (dB)	Deviation (%)	Impedance (Ω)	Deviation (Ω)
2010.02.04	-26.8	0	54.4	0
2011.03.31	-26.6	0.75	50.1	-4.3

- End of page –

3.7 Equipment Calibration

Table 3.2 Test Equipment Calibration

Type	Calibration Due Date	Serial No.
SPEAG E-Field Probe ES3DV2	May.25, 2011	3017
SPEAG DAE4	Feb.22, 2012	670
SPEAG E-Field Probe ES3DV3	Jan.26, 2012	3080
SPEAG Validation Dipole D835V2	Feb.23, 2013	4d050
SPEAG Validation Dipole D1750V2	Nov.25.2012	1043
SPEAG Validation Dipole D1900V2	Feb.23, 2013	5d082
SPEAG Validation Dipole D2450V2	Feb.04, 2012	807
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
E4421B Signal Generator	Oct.29, 2011	MY41000654
BBS3Q7ELU Power Amp	Oct.22, 2011	1007D/C0035
E4419B Power meter	Oct.22, 2011	GB41293847
E9300B Power sensor	Jun.09, 2011	MY41495880
ZVL 6	Feb.28, 2012	101296
HP85070C Dielectric Probe Kit	Not Required	US99360087
E4419B Power meter	May.14, 2011	MY45101765
E9300B Power sensor	Jun.09, 2011	MY41495872
E9300B Power sensor	Jun.09, 2011	MY41495885
DASY4 S/W (ver 4.7)	Not Required	-
Directional Coupler	Dec.02, 2011	50189
Base Station Simulator	Feb.09, 2012	GB43460148
Modular Phantom	Not Required	MP-1001

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)

- End of page -

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. 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 evaluated 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.

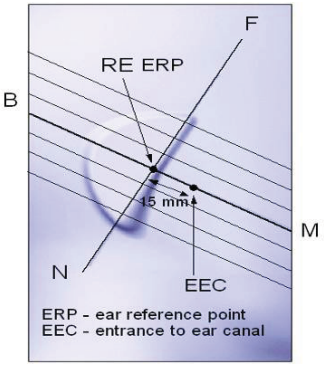


Figure 5.2 Close up side view

5.2 "cheek" 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 than 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 it's 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

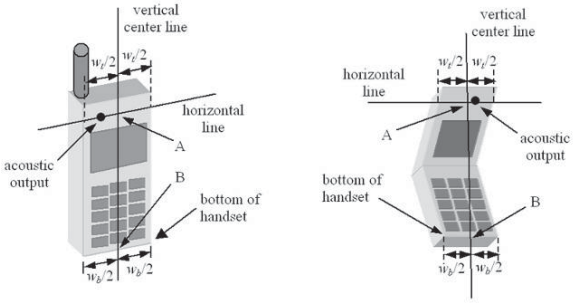


Figure 5.4 Handset vertical and horizontal reference lines

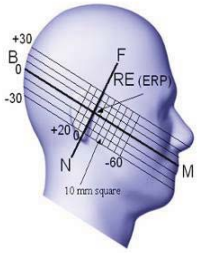


Figure 5.3 Side view of the phantom showing relevant markings

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

.

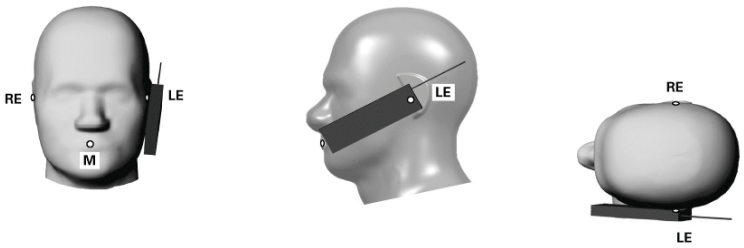


Figure 5.5 Front, Side and Top View of Cheek/Touch Position

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 "tilted" Position

With the test device aligned in the "cheek" position :

Step 1

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

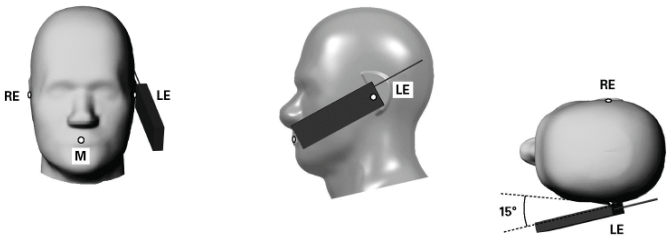


Figure 5.6 Front, side and Top View of Ear/Tilt 15° Position

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 Configurations for Single TX SAR considerations

5.4.1 Transmit Antenna Separation Distances

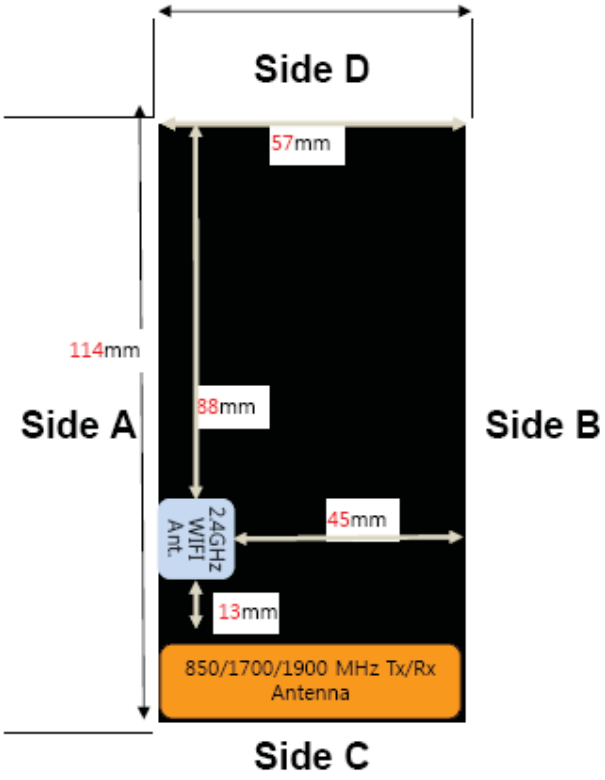


Figure 5.7 Antenna Locations, as viewed from back of device

Note : Per Oct 2010 TCB FCC Workshop, the edges with antennas within 2.5 cm are required to be evaluated for SAR.

Table 5.1 Mobile Hotspot Sides for SAR Testing

Mode	Back	Front	Side A	Side B	Side C	Side D
GPRS850	Yes	Yes	Yes	Yes	Yes	No
GPRS1900	Yes	Yes	Yes	Yes	Yes	No
WCDMA1700	Yes	Yes	Yes	Yes	Yes	No
WCDMA1900	Yes	Yes	Yes	Yes	Yes	No
WIFI	Yes	Yes	Yes	No	Yes	No

6. MEASUREMENT UNCERTAINTY

Table 6.1 Uncertainty Budget at 835MHz

Description	Uncertainty Value (±%)	Probability Distribution	Divisor	c_i	Standard uncertainty (±%)	v_i^2 or v_{eff}
Measurement System						
Probe Calibration	11.00	normal	2.000	1	5.50	∞
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	1.73	rectangular	1.732	1	1.00	∞
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	∞
Test Sample Related						
Test Sample positioning	1.12	normal	1.000	1	1.12	14
Device holded uncertainty	3.44	normal	1.000	1	3.44	∞
Power Drift	5.00	rectangular	1.732	1	2.89	∞
Phantom and Setup						
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)	0.38	normal	1.000	0.64	0.24	∞
Liquid permittivity (deviation from target)	5.00	rectangular	1.732	0.6	1.73	∞
Liquid permittivity (measurement error)	5.44	normal	1.000	0.6	3.26	∞
Combined Standard Uncertainty		Normal	-	-	**11.84**	**172776**
Extended Standard Uncertainty(K=2.00)					**23.69**	**172776**

Table 6.2 Uncertainty Budget at 1800MHz

Description	Uncertainty Value (±%)	Probability Distribution	Divisor	c_i	Standard uncertainty (±%)	v_i^2 or v_{eff}
Measurement System						
Probe Calibration	11.00	normal	2.000	1	5.50	∞
Axial Isotropy	7.55	rectangular	1.732	0.7	4.36	∞
Hemispherical Isotropy	1.00	rectangular	1.732	0.7	0.40	∞
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	0.80	∞
RF ambient conditions	3.00	rectangular	1.732	1	1.73	∞
Integration time	1.73	rectangular	1.732	1	1.00	∞
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	∞
Test Sample Related						
Test Sample positioning	2.38	normal	1.000	1	2.38	14
Device holded uncertainty	3.44	normal	1.000	1	3.44	∞
Power Drift	5.00	rectangular	1.732	1	2.89	∞
Phantom and Setup						
Modular Phantom uncertainty	5.81	normal	1.000	1	5.81	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)	1.82	normal	1.000	0.64	1.17	∞
Liquid permittivity (deviation from target)	5.00	rectangular	1.732	0.6	1.73	∞
Liquid permittivity (measurement error)	4.73	normal	1.000	0.6	2.84	∞
Combined Standard Uncertainty		Normal	-	-	**12.10**	**9306**
Extended Standard Uncertainty(K=2.00)					**24.21**	**9306**

Table 6.3 Uncertainty Budget at 1900MHz

Description	Uncertainty Value (±%)	Probability Distribution	Divisor	c_i	Standard uncertainty (±%)	v_i^2 or v_{eff}
Measurement System						
Probe Calibration	11.00	normal	2.000	1	5.50	∞
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	∞
Test Sample Related						
Test Sample positioning	1.50	normal	1.000	1	1.50	14
Device holded uncertainty	3.44	normal	1.000	1	3.44	∞
Power Drift	5.00	rectangular	1.732	1	2.89	∞
Phantom and Setup						
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)	1.84	normal	1.000	0.64	1.18	∞
Liquid permittivity (deviation from target)	5.00	rectangular	1.732	0.6	1.73	∞
Liquid permittivity (measurement error)	4.54	normal	1.000	0.6	2.73	∞
Combined Standard Uncertainty		Normal	-	-	**12.00**	**60176**
Extended Standard Uncertainty(K=2.00)					**24.00**	**60176**

Table 6.4 Uncertainty Budget at 2450MHz

Description	Uncertainty Value (±%)	Probability Distribution	Divisor	c_i	Standard uncertainty (±%)	v_i^2 or v_{eff}
Measurement System						
Probe Calibration	11.00	normal	2.000	1	5.00	∞
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	∞
Test Sample Related						
Test Sample positioning	4.22	normal	1.000	1	4.22	14
Device holded uncertainty	3.44	normal	1.000	1	3.44	∞
Power Drift	5.00	rectangular	1.732	1	2.89	∞
Phantom and Setup						
Modular Phantom uncertainty	2.32	Normal	1.0001	1	2.32	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)	2.04	normal	1.000	0.64	1.30	∞
Liquid permittivity (deviation from target)	5.00	rectangular	1.732	0.6	1.73	∞
Liquid permittivity (measurement error)	4.27	normal	1.000	0.6	2.56	∞
Combined Standard Uncertainty		Normal	-	-	**11.32**	**728**
Extended Standard Uncertainty(K=2.00)					**22.64**	**728**

7. SYSTEM VERIFICATION

7.1 Tissue Verification

Table 7.1 MEASURED TISSUE PARAMETERS

	835MHz Head		835MHz Body		1750MHz Head		1750MHz Body	
	Target	Measured	Target	Measured	Target	Measured	Target	Measured
Date	Apr.27,2011		Apr.27,2011		Apr.26,2011		Apr.26,2011	
Liquid Temperature(°C)	21.8		22.0		21.9		22.1	
Dielectric Constant: â'	41.5	41.2	55.2	54.8	40.1	39.9	53.43	52.0
Conductivity:	0.9	0.89	0.97	0.98	1.37	1.39	1.49	1.45
Tissue Batch Number	835DF1001U		835B1001Q		1800M1001R		1800B1001D	
	1900MHz Head		1900MHz Body		2450MHz Head		2450MHz Body	
	Target	Measured	Target	Measured	Target	Measured	Target	Measured
Date	Apr.26,2011		Apr.26,2011		Apr.27,2011		Apr.27,2011	
Liquid Temperature(°C)	21.8		22.4		22.4		22.5	
Dielectric Constant: â'	40	39.5	53.3	52.1	39.2	39.2	52.7	51.8
Conductivity:	1.4	1.43	1.52	1.56	1.8	1.84	1.95	1.9
Tissue Batch Number	1900F1002C		1900B1001P		2450MF1001Y		2450B1001H	

The measured value must be within ±5% of the target value.

7.2 Test System Validation

Prior to assessment, the system is verified to the ±10% of the specification at 835MHz, 1750MHz, 1900MHz and 2450MHz by using the system validation kit(s). (see Appendix D, Graphic Plot Attached)

Table 7.2 System Validation Results

System Validation Kit	Tissue	Targeted SAR_{1g} (mW/g)	Nomalized SAR_{1g} (mW/g)	Measured SAR_{1g} (mW/g)	Deviation (%)	Date	Liquid Temperature(°C)	Ambient Temperature(°C)	Input Power (mW)
4d050	835MHz Brain	9.61	10.0	1.0	4.06	Apr.27, 2011	21.8	22.3	100
4d050	835MHz Muscle	10.0	10.0	1.0	0	Apr.27, 2011	22.0	22.4	100
1043	1750MHz Brain	36.9	37.5	3.75	1.63	Apr.26, 2011	21.9	22.5	100
1043	1750MHz Muscle	37.4	38.0	3.80	1.60	Apr.26, 2011	22.1	22.5	100
5d082	1900MHz Brain	41.4	42.4	4.24	2.42	Apr.26, 2011	21.8	22.3	100
5d082	1900MHz Muscle	40.7	41.7	4.17	2.46	Apr.26, 2011	22.4	22.7	100
807	2450MHz Brain	54.4	53.9	5.39	-0.92	Apr.27, 2011	22.4	22.6	100
807	2450MHz Muscle	51.1	49.5	4.95	-3.13	Apr.27, 2011	22.5	22.8	100

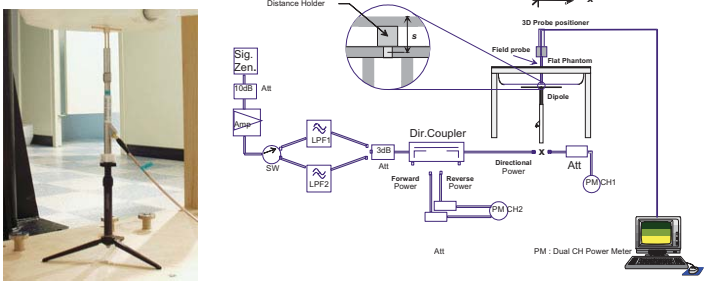


Figure 7.1 Dipole Validation Test Setup

8. SAR MEASUREMENT RESULTS

Procedures Used To Establish Test Signal

The handset was placed into simulated call mode using base station simulator. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR. When test modes are not available or inappropriate for testing a handset, the actual transmission is activated through a base station simulator or similar equipment. See data pages for actual procedure used in measurement.

SAR Measurement Conditions for WCDMA

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

Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the ge neral descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR wit h TPC (transmit power control) set to all “1s”. Results for all applicable physical channel co nfigurations (DPCCH, DPDCHn and spreading codes) should be tabulated in the test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations should be clearly identified.

Head SAR Measurements

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

Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits configured to all “1s”. SAR for other spreading codes and multiple DPDCHn, when supported by the DUT, are not required when the maximum average outputs of each RF channel, for each spreading code and DPDCHn configuration, are less than ¼ dB higher than those measured in

12.2 RMC. Otherwise, SAR is measured on the maximum output channel with an applicable RMC configuration for the corresponding spreading code or DPDCHn using the exposure configuration that results in the highest SAR with 12.2 RMC. When more than 2 DPDCHn are supported by the DUT, it may be necessary to configure the additional DPDCHn for the DUT using FTM(Factory Test Mode) with parameters similar to those used in 384 kbps and 768 kbps RMC.

Handsets with HSDPA

Body SAR is not required for handsets with HSDPA capabilities when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75% of the SAR limit. Otherwise, SAR is measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.

Table 8.1. Max. Power Output Table for SGH-T589

		HSDPA Inactive		HSDPA Active
Operating Band	Channel	12.2 kbps RMC (dBm)	12.2 kbps AMR (dBm)	12.2 kbps RMC (dBm)
WCDMA 1700	1312	22.32	22.16	22
	1412	22.00	21.88	21.84
	1862	21.85	21.83	21.73
WCDMA 1900	9262	21.52	21.20	21.42
	9400	21.12	21.11	21.29
	9538	21.18	21.22	21.26

Table 8.2 HSDPA / HSUPA Conducted Output Power

	HSDPA	1312 (dBm)	1412 (dBm)	1862 (dBm)	MPR
WCDMA 1700	Subtest1	22	21.84	21.73	0.0
	Subtest2	22.03	21.77	21.76	0.0
	Subtest3	21.65	21.43	21.3	0.5
	Subtest4	21.7	21.38	21.36	0.5

	HSUPA	1312 (dBm)	1412 (dBm)	1862 (dBm)	MPR
WCDMA 1700	Subtest1	21.67	21.5	21.53	0
	Subtest2	20.73	20.74	20.63	1
	Subtest3	21.06	20.92	20.95	2
	Subtest4	20.81	20.68	20.7	1
	Subtest5	21.55	21.46	21.47	0

	HSDPA	9262 (dBm)	9400 (dBm)	9538 (dBm)	MPR
WCDMA 1900	Subtest1	21.42	21.29	21.26	0.0
	Subtest2	21.44	21.24	21.16	0.0
	Subtest3	20.91	20.77	20.84	0.5
	Subtest4	20.89	20.75	20.81	0.5

	HSUPA	9262 (dBm)	9400 (dBm)	9538 (dBm)	MPR
WCDMA 1900	Subtest1	21.44	20.72	21.19	0
	Subtest2	19.76	19.81	19.64	1
	Subtest3	20.3	20.11	20.15	2
	Subtest4	20.49	19.86	20.39	1
	Subtest5	21.28	20.57	21.09	0

Device Test Conditions with GPRS

The handset is battery operated. Each SAR measurement was taken with a fully charged battery. In order to verify that the device was tested at full power, conducted output power measurements were performed before and after each SAR measurement to confirm the output power. If a conducted power deviation of more than 5% occurred, the test was repeated. And all Tx(1~2Tx) conducted power were also investigated for Body-Worn SAR Measurement

Table 8.3 GPRS Power Table for SGH-T589

		RF Conducted Power Table				
		Voice	GPRS Data		EDGE Data	
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot
850	128	32.33	32.27	32.31	27.41	27.43
	190	32.29	32.29	32.27	27.39	27.39
	251	32.3	32.3	32.32	27.45	27.44
1900	512	29.16	29.16	29.16	26.3	26.27
	661	29.4	29.4	29.43	26.65	26.69
	810	29.39	29.39	29.41	26.61	26.65

- End of Page -

Table 8.4 802.11b Conducted Output Power

Freq [MHz]	Channel	Data Rate [Mbps]	Measured Average Power [dBm]	Measured Peak Power [dBm]
2412	1	1	**16.67**	19.54
		2	16.64	19.41
		5.5	16.63	19.43
		11	16.63	19.45
2437	6	1	16.39	19.27
		2	16.38	19.25
		5.5	16.41	19.27
		11	16.34	19.21
2462	11	1	16.49	19.36
		2	16.51	19.36
		5.5	16.26	19.12
		11	16.26	19.11

Table 8.5 802.11g Conducted Output Power

Freq [MHz]	Channel	Data Rate [Mbps]	Measured Average Power [dBm]	Measured Peak Power [dBm]
2412	1	6	13.86	21.61
		9	13.74	21.49
		12	**13.93**	21.71
		18	13.78	21.54
		24	13.82	21.53
		36	13.64	21.43
		48	13.76	21.72
		54	13.69	21.55
2437	6	6	13.85	21.23
		9	13.90	21.31
		12	13.87	21.52
		18	13.92	21.47
		24	13.71	21.35
		36	13.78	21.49
		48	13.79	21.72
		54	13.83	21.77
2462	11	6	13.53	21.09
		9	13.53	20.99
		12	13.59	21.22
		18	13.56	21.25
		24	13.45	20.93
		36	13.51	21.23
		48	13.45	21.31
		54	13.48	21.29

Table 8.6 802.11n Conducted Output Power

Freq [MHz]	Channel	MCS Index	Data Rate [Mbps]	Measured Average Power [dBm]	Measured Peak Power [dBm]
2412	1	0	6.5/7.2	12.81	20.05
		1	13/14.4	12.86	20.29
		2	19.5/21.7	12.63	20.05
		3	26/28.9	12.71	20.01
		4	39/43.3	12.68	20.05
		5	52/57.8	12.57	19.90
		6	58.5/65	12.63	19.98
		7	65/72.2	12.63	20.02
2437	6	0	6.5/7.2	12.91	20.33
		1	13/14.4	12.91	20.43
		2	19.5/21.7	**12.99**	20.52
		3	26/28.9	12.97	20.43
		4	39/43.3	12.83	20.31
		5	52/57.8	12.61	19.97
		6	58.5/65	12.67	19.98
		7	65/72.2	12.73	19.93
2462	11	0	6.5/7.2	12.57	19.79
		1	13/14.4	12.58	20.21
		2	19.5/21.7	12.62	20.13
		3	26/28.9	12.50	19.92
		4	39/43.3	12.54	19.98
		5	52/57.8	12.37	19.81
		6	58.5/65	12.37	19.96
		7	65/72.2	12.41	19.89

Simultaneous Transmission

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

Table 8.7 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 8.8 Summary of SAR Evaluation Requirements for Cell phones with Multiple Transmitters

	Individual Transmitter	**Simultaneous Transmission**
Licensed Transmitters	**Routine evaluation required**	**SAR not required:** **Unlicensed only** o when stand-alone 1-g SAR is not required and antenna is > 5 cm from other antennas **Licensed & Unlicensed** o when the sum of the 1-g SAR is <1.6 W/kg for all simultaneous transmitting antennas o when SAR to antenna separation ratio of simultaneous transmitting antenna pair is < 0.3 **SAR required:** **Licensed & Unlicensed** 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 Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply
Unlicensed Transmitters	**When there is no simultaneous transmission –** o output < 60/f: SAR not required o output ≥ 60/f: stand-alone SAR required **When there is simultaneous transmission –** **Stand-alone SAR not required when** O output ≤ 2.P_{Ref} and antenna is > 5.0 cm from other antennas O output ≤ PRef and antenna is ≥ 2.5 cm from other antennas O output ≤ PRef and antenna is < 2.5 cm from other antennas, each with either output power ≤ PRef or 1-g SAR < 1.2 W/kg **Otherwise stand-alone SAR is required** **When stand-alone SAR is required** o test SAR on highest output channel for each wireless mode and exposure condition o if SAR for highest output channel is > 50% of SAR limit, evaluate all channels according to normal procedures	

Table 8.9 Simultaneous Transmission Scenario (Held to Ear)

Simult Tx	Configuration	GSM850 SAR(W/Kg)	WIFI SAR (W/Kg)	Σ SAR (W/Kg)	Simult Tx	Configuration	GSM1900 SAR(W/Kg)	WIFI SAR (W/Kg)	Σ SAR (W/Kg)
Head SAR	Right Cheek	0.217	0.085	0.302	Head SAR	Right Cheek	0.329	0.085	0.414
	Right Tilt	0.138	0.023	0.161		Right Tilt	0.202	0.023	0.225
	Left Cheek	0.231	0.118	0.349		Left Cheek	0.369	0.118	0.487
	Left Tilt	0.158	0.018	0.176		Left Tilt	0.219	0.018	0.237
Simult Tx	Configuration	WCDMA1700 SAR(W/Kg)	WIFI SAR (W/Kg)	Σ SAR (W/Kg)	Simult Tx	Configuration	WCDMA1900 SAR(W/Kg)	WIFI SAR (W/Kg)	Σ SAR (W/Kg)
Head SAR	Right Cheek	0.323	0.085	0.408	Head SAR	Right Cheek	0.471	0.085	0.556
	Right Tilt	0.190	0.023	0.213		Right Tilt	0.270	0.023	0.293
	Left Cheek	0.224	0.118	0.342		Left Cheek	0.442	0.118	0.560
	Left Tilt	0.207	0.018	0.225		Left Tilt	0.281	0.018	0.299

Table 8.10 Simultaneous Transmission Scenario

Simult Tx	Configuration	GSM850 SAR(W/Kg)	WIFI SAR (W/Kg)	Σ SAR (W/Kg)	Simult Tx	Configuration	GSM1900 SAR(W/Kg)	WIFI SAR (W/Kg)	Σ SAR (W/Kg)
Body SAR	Back	1.05	0.110	1.160	Body SAR	Back	0.752	0.110	0.862
	Front	0.25	0.070	0.32		Front	0.32	0.070	0.39
	Side A	0.286	0.125	0.411		Side A	0.205	0.125	0.33
	Side B	0.421	-	0.421		Side B	0.186	-	0.186
	Side C	0.047	0.067	0.114		Side C	0.286	0.067	0.353
	Side D	-	-	-		Side D	-	-	-
Simult Tx	Configuration	WCDMA1700 SAR(W/Kg)	WIFI SAR (W/Kg)	Σ SAR (W/Kg)	Simult Tx	Configuration	WCDMA1900 SAR(W/Kg)	WIFI SAR (W/Kg)	Σ SAR (W/Kg)
Body SAR	Back	1.040	0.110	1.150	Body SAR	Back	1.03	0.110	1.140
	Front	0.234	0.070	0.304		Front	0.408	0.070	0.478
	Side A	0.205	0.125	0.330		Side A	0.236	0.125	0.361
	Side B	0.155	-	0.155		Side B	0.228	-	0.228
	Side C	0.260	0.067	0.327		Side C	0.326	0.067	0.393
	Side D	-	-	-		Side D	-	-	-

Note: "-" SAR results shown in the table are zero for summation purposes. SAR was not required to be measured due to exclusions mentioned in Section 5.4.

Conclusion

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

Based on the output power, antenna separation distance, and Body SAR, a stand-alone BT SAR test is not required. The summation of BT SAR and Licensed Transmitter SAR is 1.05 + 0 = 1.05, which is less than 1.6 W/Kg, therefore, a simultaneous SAR evaluation is not required.

8.1 GSM850 Head SAR Results

Frequency		Mode	Conducted		Side	Test Position	Antenna Type	Battery	SAR Level (W/kg)
MHz	Ch		Start	End					
836.6	190	GSM850	32.29	32.24	Right	Cheek/Touch	Intenna	Standard	0.217
836.6	190	GSM850	32.25	32.20	Right	Ear/Tilt 15°	Intenna	Standard	0.138
836.6	190	GSM850	32.26	32.31	Left	Cheek/Touch	Intenna	Standard	**0.231**
836.6	190	GSM850	32.28	32.33	Left	Ear/Tilt 15°	Intenna	Standard	0.158
ANSI / IEEE C95.1 1992 – SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure / General Population**						**1.6W/kg (mW/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [June 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.
6. Test Configuration ☐ Manu. Test Codes ☒ Base Station Simulator
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June, 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 GSM850 Body SAR Results

Frequency		Mode	Conducted		Side	Spacing	Antenna Type	Battery	GPRS Slots	Test Position	SAR Level (W/kg)
MHz	Ch		Start	End							
824.2	128	GSM850	32.31	32.38	Back	1.0 cm	Intenna	Standard	2	Body	0.590
836.6	190	GSM850	32.25	32.30	Back	1.0 cm	Intenna	Standard	2	Body	0.893
848.8	251	GSM850	32.33	32.39	Back	1.0 cm	Intenna	Standard	2	Body	**1.050**
836.6	190	GSM850	32.27	32.32	Front	1.0 cm	Intenna	Standard	2	Body	0.250
836.6	190	GSM850	32.24	32.29	Side A	1.0 cm	Intenna	Standard	2	Body	0.286
836.6	190	GSM850	32.25	32.25	Side B	1.0 cm	Intenna	Standard	2	Body	0.421
836.6	190	GSM850	32.30	32.29	Side C	1.0 cm	Intenna	Standard	2	Body	0.047
ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population						**1.6W/kg (mW/g)** averaged over 1 gram					

NOTES:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [June 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.
6. Justification for reduced test configurations: This model supports GPRS 850 and EDGE. The burst power and timing period is more than 2dB higher in GPRS mode than in GSM 850 and EDGE mode. Hence, the GSM 850 and EDGE mode was not reported. And all GPRS 850 cases were also investigated and the worst-case results are reported.(2Tx)
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
8. Body SAR was tested at 1cm distance because battery operated personal wireless routers(hotspots) enable multiple Wi-Fi connections, per TCB workshop October 2010. But position‘Side D’ not tested because antenna distance was >2.5cm.

8.3 GSM1900 Head SAR Results

Frequency		Mode	Conducted		Side	Test Position	Antenna Type	Battery	SAR Level (W/kg)
MHz	Ch		Start	End					
1880	661	GSM1900	29.40	29.44	Right	Cheek/Touch	Intenna	Standard	0.329
1880	661	GSM1900	29.38	29.41	Right	Ear/Tilt 15°	Intenna	Standard	0.202
1880	661	GSM1900	29.43	29.41	Left	Cheek/Touch	Intenna	Standard	**0.369**
1880	661	GSM1900	29.39	29.46	Left	Ear/Tilt 15°	Intenna	Standard	0.219
ANSI / IEEE C95.1 1992 – SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure / General Population**						**1.6W/kg (Mw/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [June 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.
6. Test Configuration ☐ Manu. Test Codes ☒ Base Station Simulator
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June, 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 GSM1900 Body SAR Results

Frequency		Mode	Conducted		Test Position	Spacing	Antenna Type	Battery	GPRS Slots	SAR Level (W/kg)
MHz	Ch		Start	End						
1880	661	GSM1900	29.43	29.39	Back	1.0 cm	Intenna	Standard	2	**0.752**
1880	661	GSM1900	29.42	29.48	Front	1.0 cm	Intenna	Standard	2	0.320
1880	661	GSM1900	29.45	29.50	Side A	1.0 cm	Intenna	Standard	2	0.205
1880	661	GSM1900	29.43	29.41	Side B	1.0 cm	Intenna	Standard	2	0.186
1880	661	GSM1900	29.40	29.47	Side C	1.0 cm	Intenna	Standard	2	0.286
ANSI / IEEE C95.1 1992 – SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure / General Population**						**1.6W/kg (Mw/g)** averaged over 1 gram				

NOTES:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [June 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.
6. Justification for reduced test configurations: This model supports GPRS 1900 and EDGE. The burst power and timing period is more than 2dB higher in GPRS mode than in GSM1900and EDGE mode. Hence, the GSM1900 and EDGE mode was not reported. And all GPRS1900 cases were also investigated and the worst-case results are reported.(2Tx)
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
8. Body SAR was tested at 1cm distance because battery operated personal wireless routers(hotspots) enable multiple Wi-Fi connections, per TCB workshop October 2010. But position‘Side D’ not tested because antenna distance was >2.5cm.

8.5 WCDMA1700 Head SAR Results

Frequency		Mode	Conducted Power		Side	Test Position	Antenna Type	Battery	SAR Level (W/kg)
MHz	Ch		Start	End					
1412	1732.4	WCDMA1700	22.01	22.05	Right	Cheek/Touch	Intenna	Standard	**0.323**
1412	1732.4	WCDMA1700	21.94	21.99	Left	Ear/Tilt 15°	Intenna	Standard	0.190
1412	1732.4	WCDMA1700	22.01	22.07	Right	Cheek/Touch	Intenna	Standard	0.224
1412	1732.4	WCDMA1700	22.03	21.99	Left	Ear/Tilt 15°	Intenna	Standard	0.207
ANSI / IEEE C95.1 1992 – SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure / General Population**						**1.6W/kg (Mw/g)** averaged over 1 gram			

NOTES:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [June 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.
6. Test Configuration ☐ Manu. Test Codes ☒ Base Station Simulator
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June, 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. WCDMA mode was tested under RMC 12.2 kbps with HSPA Inactive.

8.6 WCDMA1700 Body SAR Results

Frequency		Mode	Conducted		Test Position	Spacing	Antenna Type	Battery	SAR Level (W/kg)
MHz	Ch		Start	End					
1312	1712.4	WCDMA1700	22.32	22.38	Back	1.0 cm	Intenna	Standard	**1.040**
1412	1732.4	WCDMA1700	22.02	22.04	Back	1.0 cm	Intenna	Standard	0.976
1862	1752.5	WCDMA1700	21.88	21.92	Back	1.0 cm	Intenna	Standard	1.000
1412	1732.4	WCDMA1700	22.01	22.07	Front	1.0 cm	Intenna	Standard	0.234
1412	1732.4	WCDMA1700	21.99	21.94	Side A	1.0 cm	Intenna	Standard	0.205
1412	1732.4	WCDMA1700	21.95	22.01	Side B	1.0 cm	Intenna	Standard	0.155
1412	1732.4	WCDMA1700	22.07	22.04	Side C	1.0 cm	Intenna	Standard	0.260
ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population					**1.6W/kg (Mw/g) averaged over 1 gram**				

NOTES:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [June 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.
6. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
7. Body SAR was tested at 1cm distance because battery operated personal wireless routers(hotspots) enable multiple Wi-Fi connections, per TCB workshop October 2010. But position'Side D' not tested because antenna distance was >2.5cm.
8. WCDMA mode in Body SAR was tested under RMC 12.2 kbps with HSPA Inactive.

8.7 WCDMA1900 Head SAR Results

Frequency		Mode	Conducted Power		Side	Test Position	Antenna Type	Battery	SAR Level (W/kg)
MHz	Ch		Start	End					
1880	9400	WCDMA1900	21.12	21.18	Right	Cheek/Touch	Intenna	Standard	**0.471**
1880	9400	WCDMA1900	21.15	21.20	Right	Ear/Tilt 15°	Intenna	Standard	0.270
1880	9400	WCDMA1900	21.10	21.17	Left	Cheek/Touch	Intenna	Standard	0.442
1880	9400	WCDMA1900	21.11	21.15	Left	Ear/Tilt 15°	Intenna	Standard	0.281
ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population						**1.6W/kg (Mw/g) averaged over 1 gram**			

NOTES:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [June 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.
6. Test Configuration ☐ Manu. Test Codes ☒ Base Station Simulator
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June, 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. WCDMA mode was tested under RMC 12.2 kbps with HSPA Inactive.

8.8 WCDMA1900 Body SAR Results

Frequency		Mode	Conducted		Test Position	Spacing	Antenna Type	Battery	SAR Level (W/kg)
MHz	Ch		Start	End					
1852.4	9262	WCDMA1900	21.52	21.56	Back	1.0 cm	Intenna	Standard	**1.030**
1880	9400	WCDMA1900	21.12	21.18	Back	1.0 cm	Intenna	Standard	0.977
1907.6	9538	WCDMA1900	21.18	21.20	Back	1.0 cm	Intenna	Standard	0.908
1880	9400	WCDMA1900	21.10	21.17	Front	1.0 cm	Intenna	Standard	0.408
1880	9400	WCDMA1900	21.09	21.11	Side A	1.0 cm	Intenna	Standard	0.236
1880	9400	WCDMA1900	21.10	21.13	Side B	1.0 cm	Intenna	Standard	0.228
1880	9400	WCDMA1900	21.15	21.19	Side C	1.0 cm	Intenna	Standard	0.326
ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population					**1.6W/kg (Mw/g) averaged over 1 gram**				

NOTES:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [June 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.
6. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
7. Body SAR was tested at 1cm distance because battery operated personal wireless routers(hotspots) enable multiple Wi-Fi connections, per TCB workshop October 2010. But position'Side D' not tested because antenna distance was >2.5cm.
8. WCDMA mode in Body SAR was tested under RMC 12.2 kbps with HSPA Inactive.

8.9 WLAN Head SAR Results

Frequency		Mode	Conducted		Side	Test Position	Antenna Type	Battery	Data Rate (Mbps)	SAR Level (W/kg)
MHz	Ch		Start	End						
2437	6	WLAN	16.38	16.41	Right	Cheek/Touch	Intenna	Standard	1	0.085
2437	6	WLAN	16.39	16.44	Right	Ear/Tilt 15°	Intenna	Standard	1	0.023
2437	6	WLAN	16.37	16.40	Left	Cheek/Touch	Intenna	Standard	1	0.107
2437	6	WLAN	16.39	16.39	Left	Ear/Tilt 15°	Intenna	Standard	1	0.018
2412	1	WLAN	16.64	16.68	Left	Cheek/Touch	Intenna	Standard	1	**0.118**
2412	1	WLAN	16.67	16.70	Left	Cheek/Touch	Intenna	Standard	2	0.102
ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population						**1.6W/kg (mW/g) averaged over 1 gram**				

NOTES:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [June 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.
6. Test Configuration ☒ Manu. Test Codes ☐ Base Station Simulator
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June, 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. Justification for reduced test configurations for WIFI channels per Publication 248227 and April 2010 FCC/TCB Meeting Notes: Other IEEE 802.11 modes (including 802.11n) were investigated since the average output powers were greater than 0.25 dB than that of the corresponding channel in the lowest data rate IEEE 802.11b mode.
9. WLAN Transmission was verified using a spectrum analyzer.

8.10 WLAN Body SAR Results

Frequency		Mode	Conducted Power		Test Position	Spacing	Antenna Type	Battery	Data Rate (Mbps)	SAR Level (W/kg)
MHz	Ch		Start	End						
2437	6	WLAN	16.39	16.38	Back	1.0 cm	Intenna	Standard	1	0.110
2437	6	WLAN	16.41	16.41	Front	1.0 cm	Intenna	Standard	1	0.070
2437	6	WLAN	16.40	16.43	Side A	1.0 cm	Intenna	Standard	1	**0.125**
2437	6	WLAN	16.37	16.39	Side C	1.0 cm	Intenna	Standard	1	0.067
2412	1	WLAN	16.67	16.69	Side A	1.0 cm	Intenna	Standard	1	0.095
2412	1	WLAN	16.66	16.71	Side A	1.0 cm	Intenna	Standard	2	0.097
ANSI / IEEE C95.1 1992 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure / General Population						**1.6W/kg (Mw/g) averaged over 1 gram**				

NOTES:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [June 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.
6. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June, 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).
7. Justification for reduced test configurations for WIFI channels per Publication 248227 and April 2010 FCC/TCB Meeting Notes: Other IEEE 802.11 modes (including 802.11n) were investigated since the average output powers were greater than 0.25 dB than that of the corresponding channel in the lowest data rate IEEE 802.11b mode.
8. Side B and Side D were not tested since the antenna distance from the edges was greater than 2.5 cm per Oct 2010 TCB Workshop guidance (see Section 5.4).
9. WLAN Transmission was verified using a spectrum analyzer.

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.

The highest reported SAR values are as follows:
GSM850: Head: 0.231W/Kg : Body-worn: 1.050W/Kg
GSM1900: Head: 0.369W/Kg : Body-worn: 0.752W/Kg
WCDMA1700: Head: 0.323W/Kg : Body-worn: 1.040W/Kg
WCDMA1900: Head: 0.471W/Kg : Body-worn: 1.030W/Kg
WLAN: Head: 0.118W/Kg : Body-worn: 0.125W/Kg

10. REFERENCES

[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.

[2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300kHz to 100GHz, New York: IEEE, 2006.

[3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300kHz to 100GHz, New York: IEEE, Sept. 1992.

[4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.

[5] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, June 2001.

[6] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2003, Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices.

[7] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.

[8] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[9] 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.

[10] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.

[11] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[12] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.

[13] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.

[14] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.

[15] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[16] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.

[17] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recepies in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[18] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C, Dec. 1997.

[19] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

[20] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.

[21] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hoschschule Zürich, Dosimetric Evaluation of the Cellular Phone.

[22] IEC 62209-1, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz), Feb. 2005.

[23] Industry Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 4, March 2010.

[24] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2009

[25] FCC Public Notice DA-02-1438. Office of Engineering and Technology Announces a Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65, June 19, 2002

[26] FCC SAR Measurement Procedures for 3G Devices KDB 941225

[27] SAR Measurement procedures for IEEE 802.11a/b/g KDB 248227

[28] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB 648474

[29] FCC Application Note for SAR Probe Calibration and System Verification Consideration for Measurements at 150 MHz – 3 GHz, KDB 450824

[30] FCC SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens, KDB 616217

[31] FCC SAR Measurement Requirements for 3 – 6 GHz, KDB 865664

[32] FCC Mobile Portable RF Exposure Procedure, KDB 447498

[33] FCC SAR Procedures for Dongle Transmitters, KDB 447498

[34] Anexo à Resolução No. 533, de 10 de Septembro de 2009.

[35] FCC SAR Test Considerations for LTE Handsets and Data Modems, KDB Publication 941225

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 (p). It is also defined as the rate of RF energy absorption pet unit mass at a point in an absorbing body (see Fig. A.1) .

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

Figure A.1 SAR Mathematical Equation

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

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

Where :

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

Note: The primary factors that control rate 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 bellow 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).

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

where:

Δt = exposure time (30 seconds)

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

ΔT = temperature increase due to RF exposure.

SAR is proportional to ΔT/ Δt, the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E-field;

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

where:

σ = simulated tissue conductivity

p = Tissue density (1.25 g/cm^3 for brain tissue)

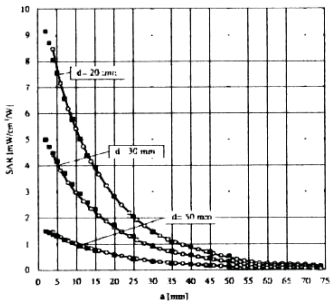


Figure B.1. E-Field and Temperature measurements at 900MHz

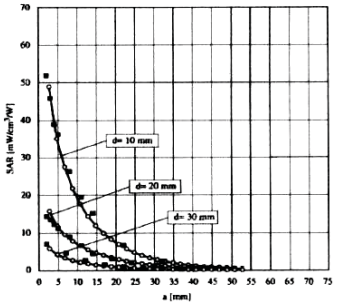


Figure B.2. E-Field and temperature measurements at 1.9GHz

APPENDIX C

ANSI/IEEE C95.1 – 1992 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[1] Brain	1.60	8.00
SPATIAL PEAK SAR[2] Whole Body	0.08	0.40
SPATIAL PEAK SAR[3] Hands,Feet,Ankles, Wrists	4.00	20.00

[1] 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.
[2] The Spatial Average value of the SAR averaged over the whole body.
[3] 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

The Validation Measurements

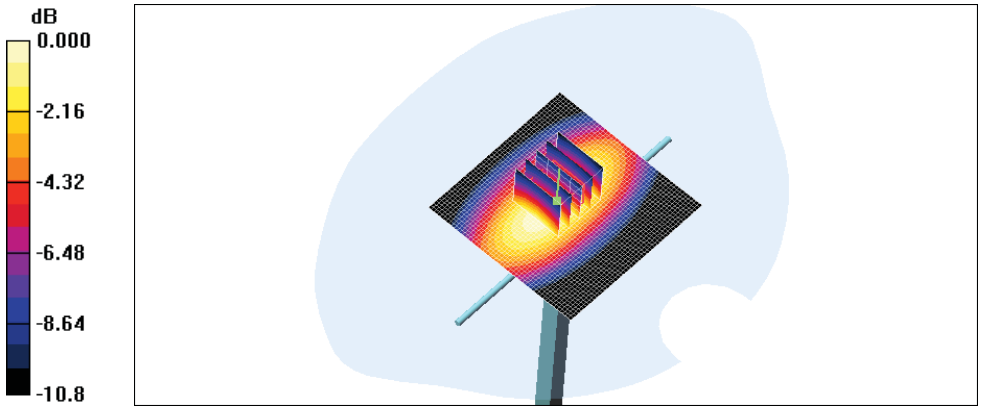
DUT: Dipole 835 MHz; Serial: 4d050
Program Name: 835MHz Dipole Validation 2011.04.27
Procedure Name: 835MHz @ 100mW Head
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-27/Apr/2011

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

835MHz @ 100mW/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.09 mW/g

835MHz @ 100mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.9 V/m; Power Drift = -0.020 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 1.000 mW/g; SAR(10 g) = 0.652 mW/g
Maximum value of SAR (measured) = 1.08 mW/g



0 dB = 1.08mW/g

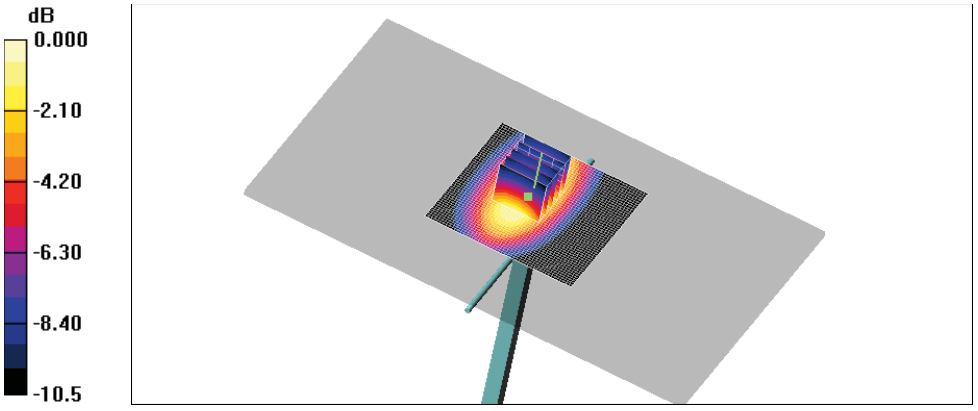
DUT: Dipole 835 MHz; Serial: 4d050
Program Name: 835MHz Dipole Validation 2011.04.27
Procedure Name: 835MHz @ 100mW Body
Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-22.0;Test Date-27/Apr/2011

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; εr = 54.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.03, 6.03, 6.03); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

835MHz @ 100mW/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.10 mW/g

835MHz @ 100mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.9 V/m; Power Drift = 0.002 dB
Peak SAR (extrapolated) = 1.46 W/kg
SAR(1 g) = 1 mW/g; SAR(10 g) = 0.661 mW/g
Maximum value of SAR (measured) = 1.07 mW/g



0 dB = 1.07mW/g

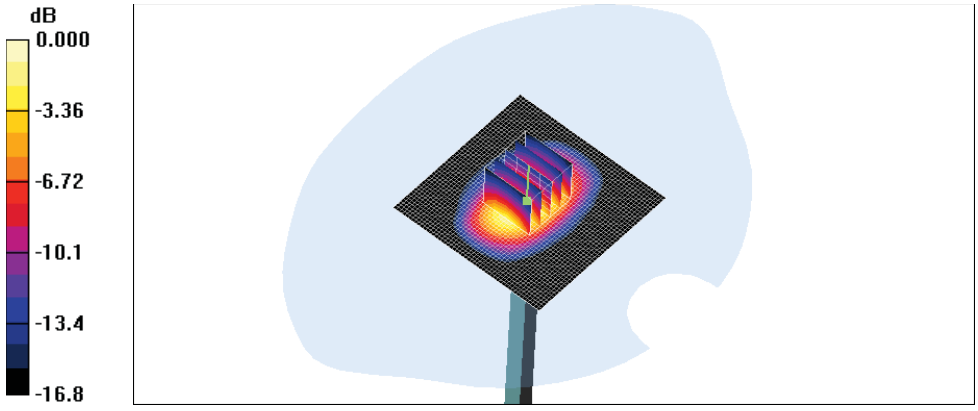
DUT: D1750V2; Serial: 1043
Program Name: 1750MHz Dipole Validation 2011.04.26
Procedure Name: 1750MHz @ 100mW Head
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-21.9;Test Date-26/Apr/2011

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.39 mho/m; εr = 39.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(5.08, 5.08, 5.08); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

1750MHz @ 100mW/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 5.87 mW/g

1750MHz @ 100mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.1 V/m; Power Drift = 0.012 dB
Peak SAR (extrapolated) = 6.72 W/kg
SAR(1 g) = 3.75 mW/g; SAR(10 g) = 1.99 mW/g
Maximum value of SAR (measured) = 4.20 mW/g



0 dB = 4.20mW/g

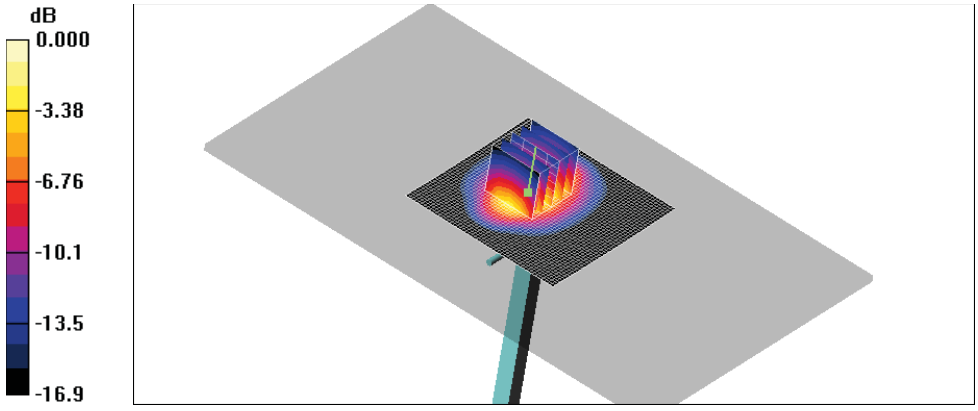
DUT: D1750V2; Serial: 1043
Program Name: 1750MHz Dipole Validation 2011.04.26
Procedure Name: 1750MHz @ 100mW Body
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-22.1;Test Date-26/Apr/2011

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.45 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.69, 4.69, 4.69); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

1750MHz @ 100mW/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 4.62 mW/g

1750MHz @ 100mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 42.8 V/m; Power Drift = 0.068 dB
Peak SAR (extrapolated) = 6.42 W/kg
SAR(1 g) = 3.8 mW/g; SAR(10 g) = 2.05 mW/g
Maximum value of SAR (measured) = 4.25 mW/g



0 dB = 4.25mW/g

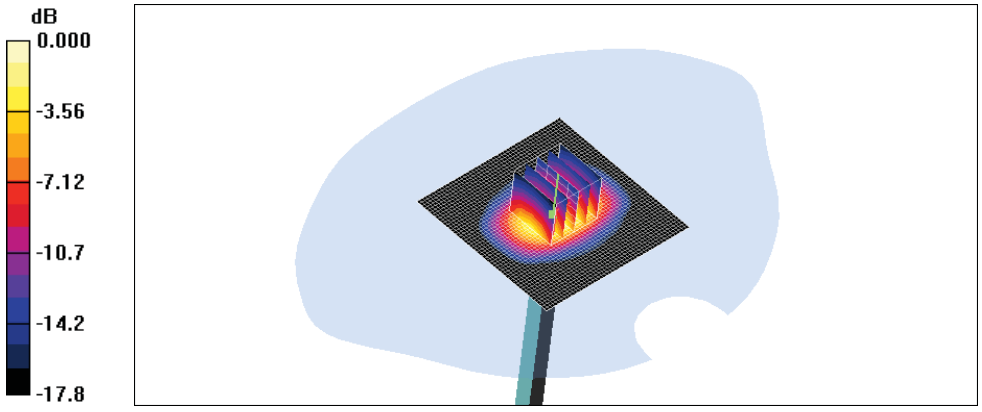
DUT: Dipole 1900 MHz; Serial: 5d082
Program Name: 1900MHz Dipole Validation 2011.04.26
Procedure Name: 1900MHz @ 100mW Head
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-26/Apr/2011

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.85, 4.85, 4.85); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

1900MHz @ 100mW/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 7.16 mW/g

1900MHz @ 100mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 59.1 V/m; Power Drift = -0.040 dB
Peak SAR (extrapolated) = 7.72 W/kg
SAR(1 g) = 4.24 mW/g; SAR(10 g) = 2.22 mW/g
Maximum value of SAR (measured) = 4.75 mW/g



0 dB = 4.75mW/g

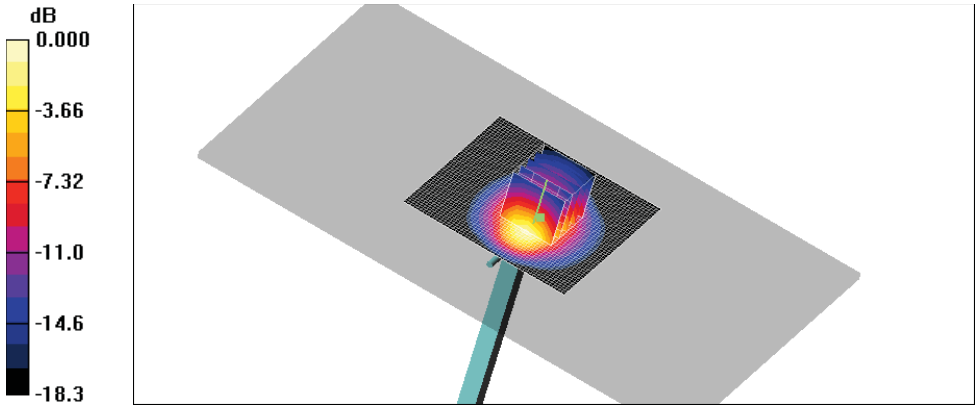
DUT: Dipole 1900 MHz; Serial: 5d082
Program Name: 1900MHz Dipole Validation 2011.04.26
Procedure Name: 1900MHz @ 100mW Body
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.56 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

1900MHz @ 100mW/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 4.88 mW/g

1900MHz @ 100mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 44.4 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 6.85 W/kg
SAR(1 g) = 4.17 mW/g; SAR(10 g) = 2.23 mW/g
Maximum value of SAR (measured) = 4.63 mW/g



0 dB = 4.63mW/g

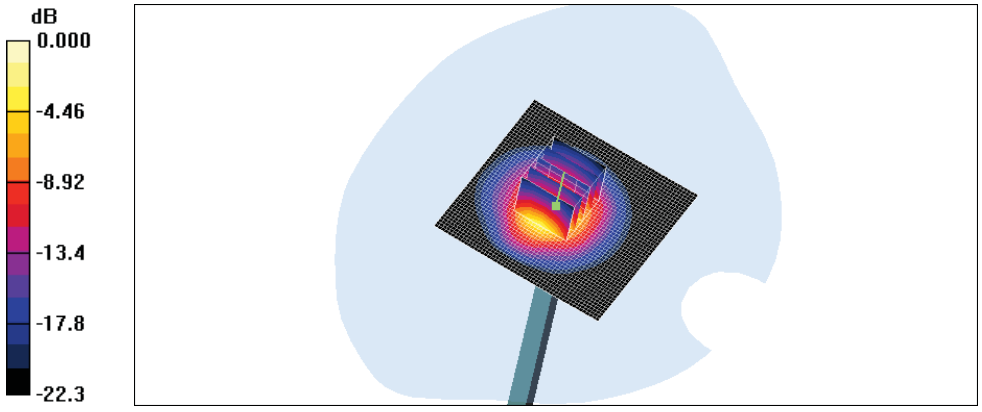
DUT: Dipole 2450 MHz; Serial: 807
Program Name: 2450MHz Dipole Validation 2011.04.27
Procedure Name: 2450MHz @ 100mW Head
Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.4;Test Date-27/Apr/2011

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.84 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.34, 4.34, 4.34); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

2450MHz @ 100mW/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 7.10 mW/g

2450MHz @ 100mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 49.8 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 10.9 W/kg
SAR(1 g) = 5.39 mW/g; SAR(10 g) = 2.51 mW/g
Maximum value of SAR (measured) = 6.05 mW/g



0 dB = 6.05mW/g

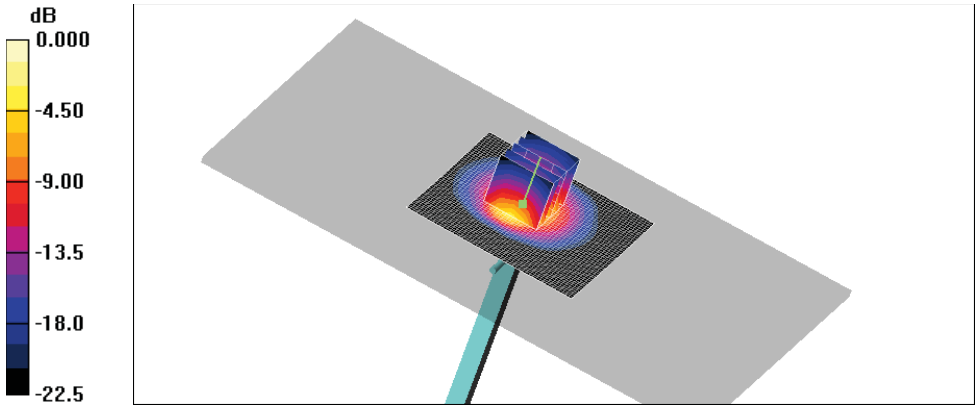
DUT: Dipole 2450 MHz; Serial: 807
Program Name: 2450MHz Dipole Validation 2011.04.27
Procedure Name: 2450MHz @ 100mW Body
Meas. Ambient Temp(celsius)-22.8,Tissue Temp(celsius)-22.5;Test Date-27/Apr/2011

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.9 mho/m; εr = 51.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.08, 4.08, 4.08); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

2450MHz @ 100mW/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 5.50 mW/g

2450MHz @ 100mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 40.5 V/m; Power Drift = 0.049 dB
Peak SAR (extrapolated) = 10.4 W/kg
SAR(1 g) = 4.95 mW/g; SAR(10 g) = 2.26 mW/g
Maximum value of SAR (measured) = 5.63 mW/g



0 dB = 5.63mW/g

APPENDIX E

Plots of The SAR Measurements

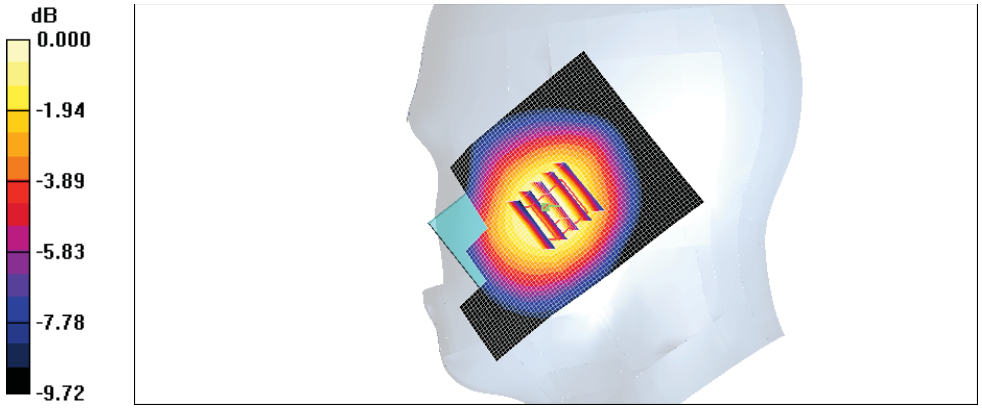
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GSM850 Right (Job No. : FI-106)
Procedure Name: Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-27/Apr/2011

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 836.6 MHz; σ = 0.89 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.232 mW/g

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.5 V/m; Power Drift = -0.060 dB
Peak SAR (extrapolated) = 0.271 W/kg
SAR(1 g) = 0.217 mW/g; SAR(10 g) = 0.162 mW/g
Maximum value of SAR (measured) = 0.227 mW/g



0 dB = 0.227mW/g

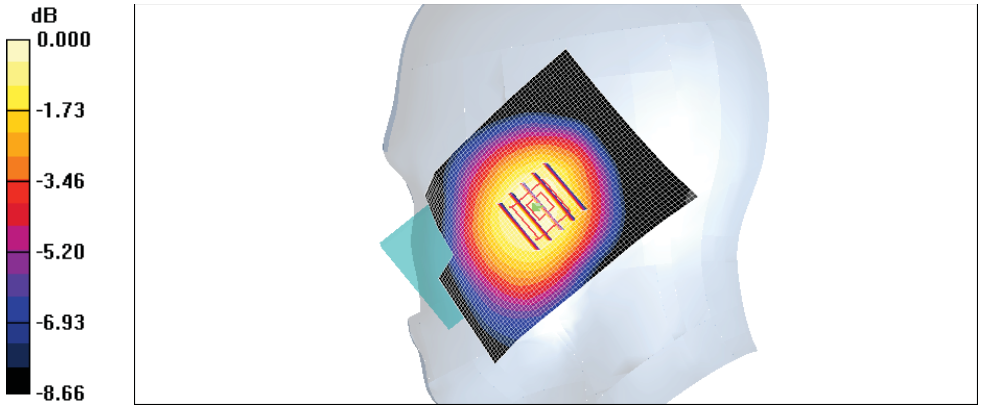
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GSM850 Right (Job No. : FI-106)
Procedure Name: Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-27/Apr/2011

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 836.6 MHz; σ = 0.89 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.148 mW/g

Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.29 V/m; Power Drift = -0.055 dB
Peak SAR (extrapolated) = 0.170 W/kg
SAR(1 g) = 0.138 mW/g; SAR(10 g) = 0.104 mW/g
Maximum value of SAR (measured) = 0.145 mW/g



0 dB = 0.145mW/g

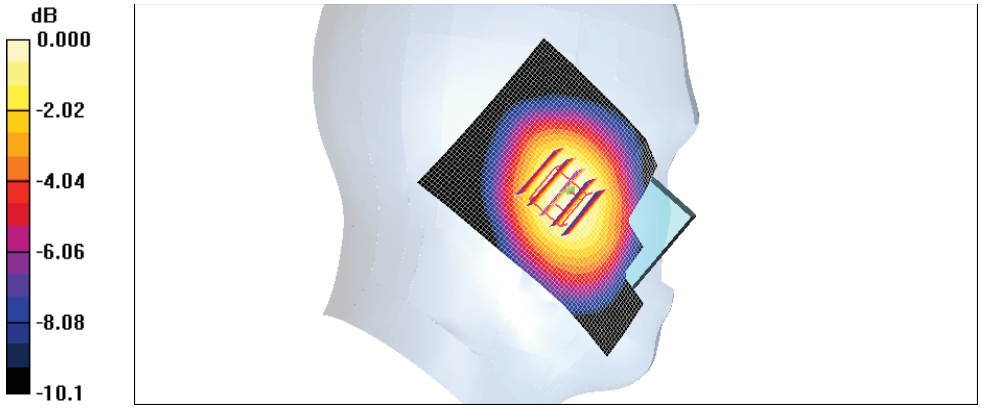
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GSM850 Left (Job No. : FI-106)
Procedure Name: Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-27/Apr/2011

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 836.6 MHz; σ = 0.89 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.250 mW/g

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.3 V/m; Power Drift = -0.082 dB
Peak SAR (extrapolated) = 0.292 W/kg
SAR(1 g) = 0.231 mW/g; SAR(10 g) = 0.172 mW/g
Maximum value of SAR (measured) = 0.242 mW/g



0 dB = 0.242mW/g

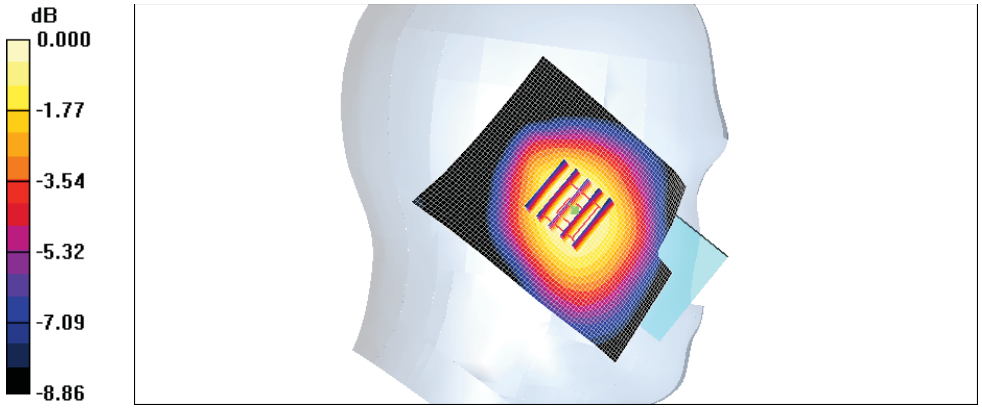
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GSM850 Left (Job No. : FI-106)
Procedure Name: Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-27/Apr/2011

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 836.6 MHz; σ = 0.89 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.169 mW/g

Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.5 V/m; Power Drift = 0.034 dB
Peak SAR (extrapolated) = 0.196 W/kg
SAR(1 g) = 0.158 mW/g; SAR(10 g) = 0.119 mW/g
Maximum value of SAR (measured) = 0.165 mW/g



0 dB = 0.165mW/g

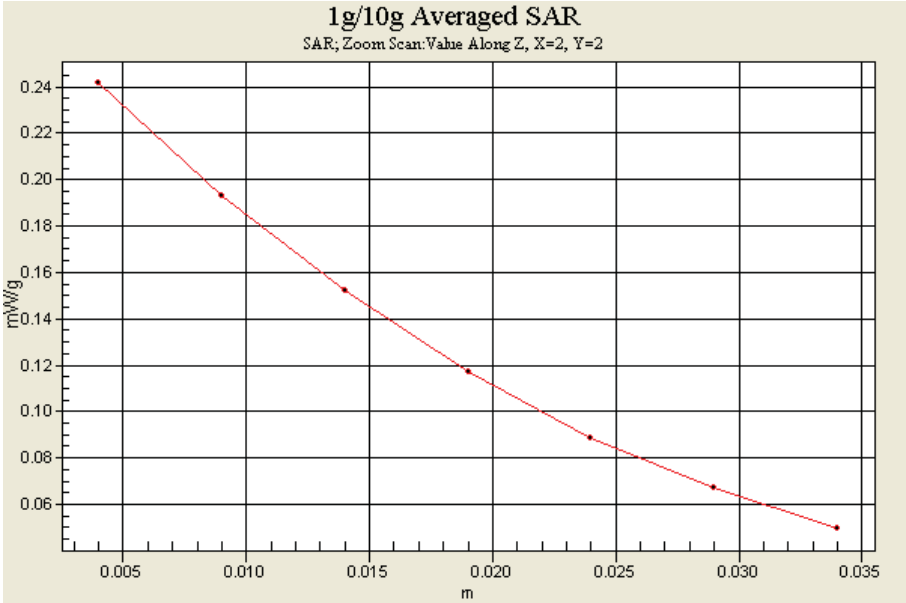
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GSM850 Left (Job No. : FI-106)
Procedure Name: Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-27/Apr/2011

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 836.6 MHz; σ = 0.89 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.250 mW/g

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.3 V/m; Power Drift = -0.082 dB
Peak SAR (extrapolated) = 0.292 W/kg
SAR(1 g) = 0.231 mW/g; SAR(10 g) = 0.172 mW/g
Maximum value of SAR (measured) = 0.242 mW/g



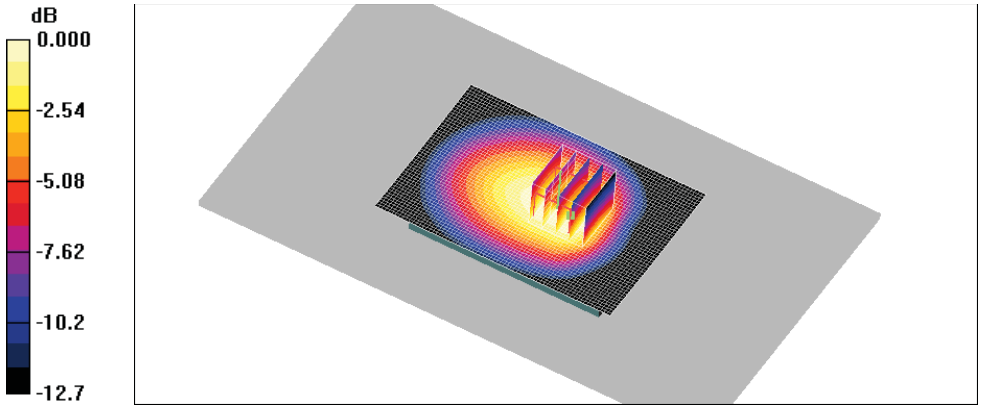
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS850 Body (Job No. : FI-106)
Procedure Name: Body, Ch. 128, Ant. Intenna, Bat. Standard Back
Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-22.0;Test Date-27/Apr/2011

Communication System: GPRS 850; Frequency: 824.2 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 824.2 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.03, 6.03, 6.03); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch. 128, Ant. Intenna, Bat. Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.721 mW/g

Body, Ch. 128, Ant. Intenna, Bat. Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.3 V/m; Power Drift = -0.034 dB
Peak SAR (extrapolated) = 1.27 W/kg
SAR(1 g) = 0.590 mW/g; SAR(10 g) = 0.409 mW/g
Maximum value of SAR (measured) = 0.639 mW/g



0 dB = 0.639mW/g

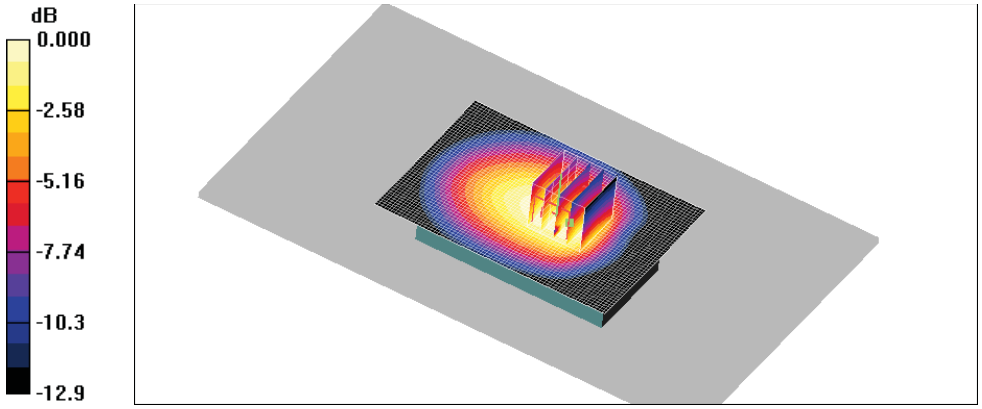
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS850 Body (Job No. : FI-106)
Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard Back
Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-22.0;Test Date-27/Apr/2011

Communication System: GPRS 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.03, 6.03, 6.03); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch. 190, Ant. Intenna, Bat. Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.07 mW/g

Body, Ch. 190, Ant. Intenna, Bat. Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.8 V/m; Power Drift = -0.065 dB
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 0.893 mW/g; SAR(10 g) = 0.623 mW/g
Maximum value of SAR (measured) = 0.943 mW/g



0 dB = 0.943mW/g

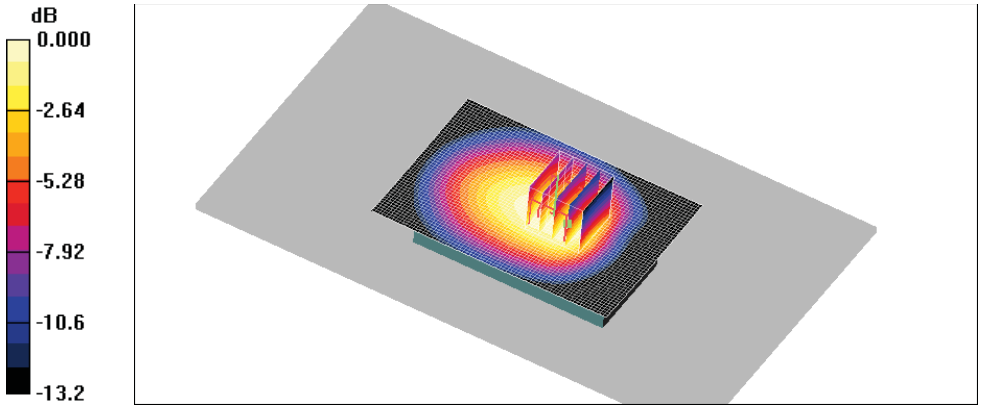
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS850 Body (Job No. : FI-106)
Procedure Name: Body, Ch. 251, Ant. Intenna, Bat. Standard Back
Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-22.0;Test Date-27/Apr/2011

Communication System: GPRS 850; Frequency: 848.8 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 848.8 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.03, 6.03, 6.03); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch. 251, Ant. Intenna, Bat. Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.25 mW/g

Body, Ch. 251, Ant. Intenna, Bat. Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.4 V/m; Power Drift = -0.023 dB
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.726 mW/g
Maximum value of SAR (measured) = 1.10 mW/g



0 dB = 1.10mW/g

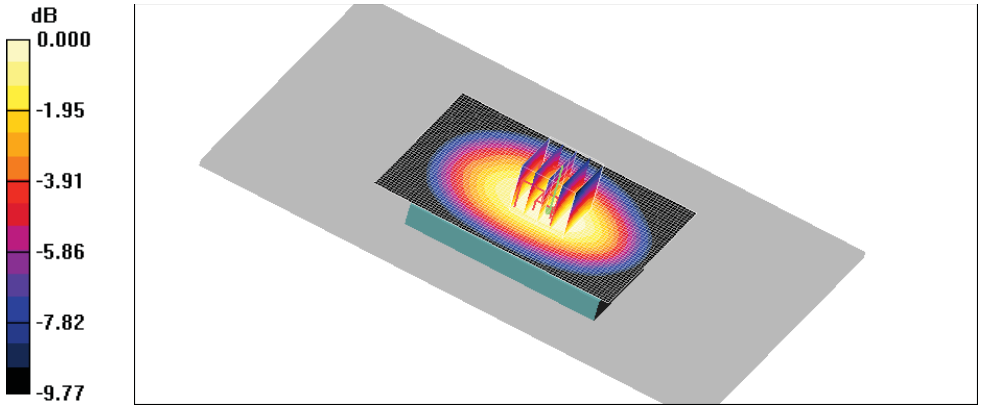
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS850 Body (Job No. : FI-106)
Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard Front
Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-22.0;Test Date-27/Apr/2011

Communication System: GPRS 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.03, 6.03, 6.03); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch. 190, Ant. Intenna, Bat. Standard Front/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.273 mW/g

Body, Ch. 190, Ant. Intenna, Bat. Standard Front/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.3 V/m; Power Drift = 0.009 dB
Peak SAR (extrapolated) = 0.316 W/kg
SAR(1 g) = 0.250 mW/g; SAR(10 g) = 0.186 mW/g
Maximum value of SAR (measured) = 0.264 mW/g



0 dB = 0.264mW/g

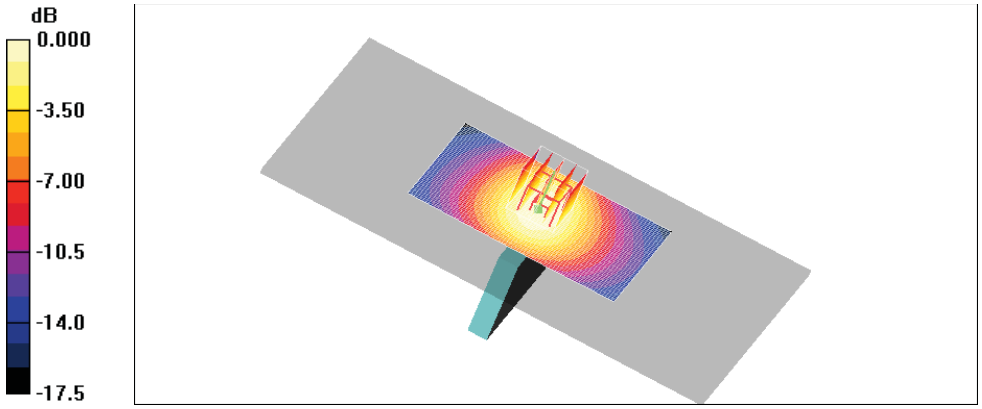
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS850 Body (Job No. : FI-106)
Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard Side A
Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-22.0;Test Date-27/Apr/2011

Communication System: GPRS 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.03, 6.03, 6.03); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch. 190, Ant. Intenna, Bat. Standard Side A/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.314 mW/g

Body, Ch. 190, Ant. Intenna, Bat. Standard Side A/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.8 V/m; Power Drift = 0.033 dB
Peak SAR (extrapolated) = 0.398 W/kg
SAR(1 g) = 0.286 mW/g; SAR(10 g) = 0.199 mW/g
Maximum value of SAR (measured) = 0.306 mW/g



0 dB = 0.306mW/g

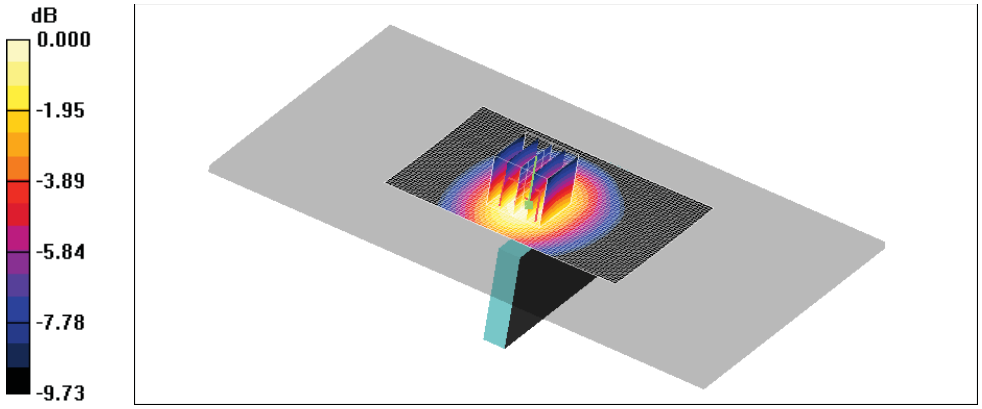
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS850 Body (Job No. : FI-106)
Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard Side B
Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-22.0;Test Date-27/Apr/2011

Communication System: GPRS 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.03, 6.03, 6.03); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch. 190, Ant. Intenna, Bat. Standard Side B/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.454 mW/g

Body, Ch. 190, Ant. Intenna, Bat. Standard Side B/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.5 V/m; Power Drift = -0.098 dB
Peak SAR (extrapolated) = 0.587 W/kg
SAR(1 g) = 0.421 mW/g; SAR(10 g) = 0.290 mW/g
Maximum value of SAR (measured) = 0.452 mW/g



0 dB = 0.452mW/g

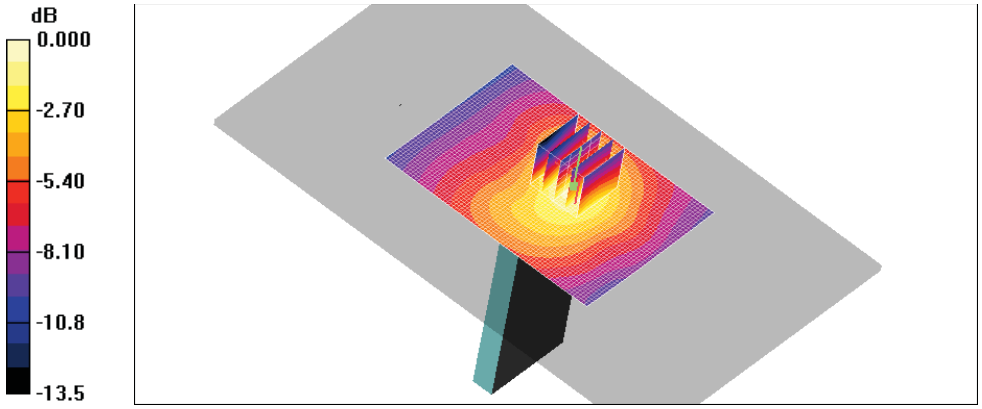
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS850 Body (Job No. : FI-106)
Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard Side C
Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-22.0;Test Date-27/Apr/2011

Communication System: GPRS 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.03, 6.03, 6.03); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch. 190, Ant. Intenna, Bat. Standard Bottom/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.047 mW/g

Body, Ch. 190, Ant. Intenna, Bat. Standard Bottom/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.06 V/m; Power Drift = -0.158 dB
Peak SAR (extrapolated) = 0.075 W/kg
SAR(1 g) = 0.047 mW/g; SAR(10 g) = 0.029 mW/g
Maximum value of SAR (measured) = 0.050 mW/g



0 dB = 0.050mW/g

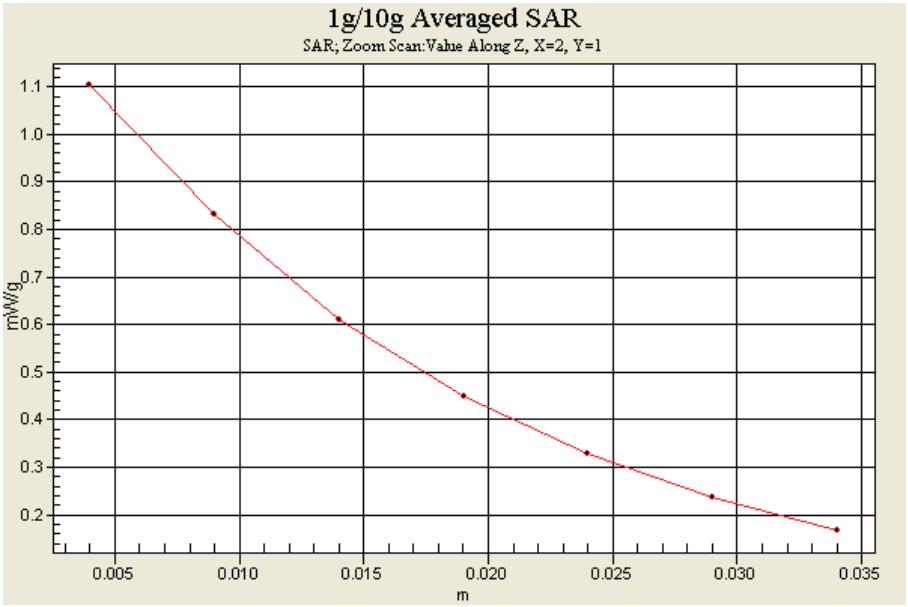
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS850 Body (Job No. : FI-106)
Procedure Name: Body, Ch. 251, Ant. Intenna, Bat. Standard Back
Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-22.0;Test Date-27/Apr/2011

Communication System: GPRS 850; Frequency: 848.8 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 848.8 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(6.03, 6.03, 6.03); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch. 251, Ant. Intenna, Bat. Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.25 mW/g

Body, Ch. 251, Ant. Intenna, Bat. Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.4 V/m; Power Drift = -0.023 dB
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.726 mW/g
Maximum value of SAR (measured) = 1.10 mW/g



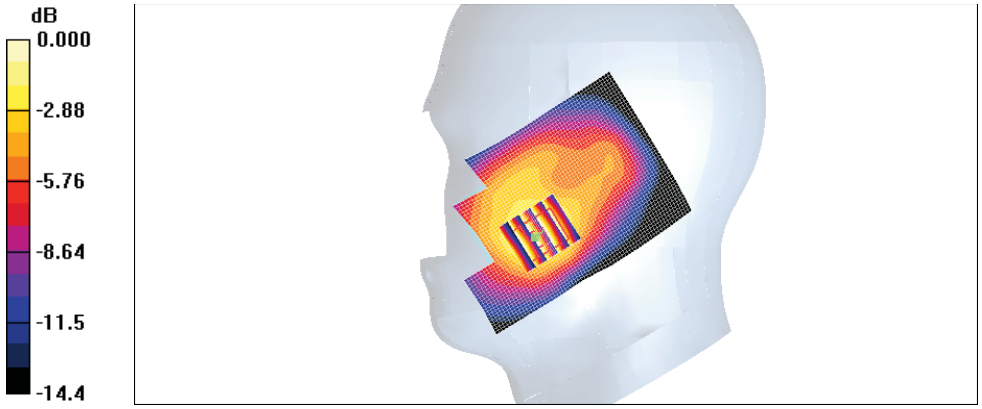
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GSM1900 Right (Job No. : FI-106)
Procedure Name: Cheek, Ch.661, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-26/Apr/2011

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.85, 4.85, 4.85); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.343 mW/g

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.1 V/m; Power Drift = -0.115 dB
Peak SAR (extrapolated) = 0.483 W/kg
SAR(1 g) = 0.329 mW/g; SAR(10 g) = 0.202 mW/g
Maximum value of SAR (measured) = 0.359 mW/g



0 dB = 0.359mW/g

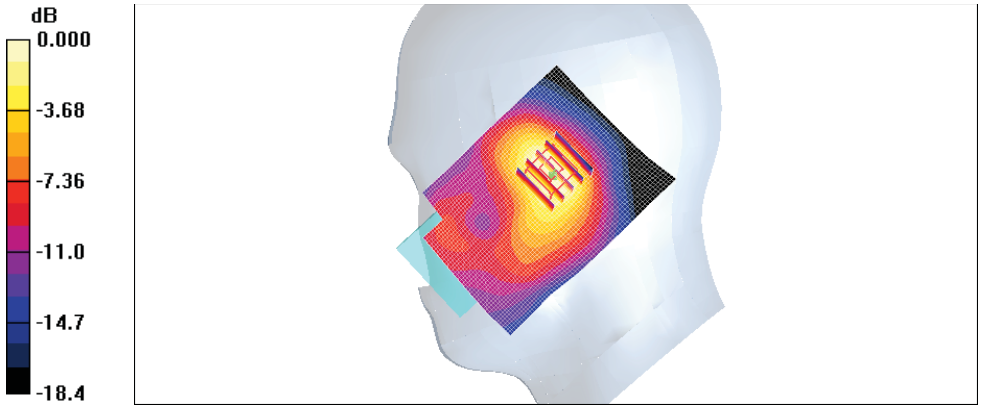
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GSM1900 Right (Job No. : FI-106)
Procedure Name: Tilt, Ch.661, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-26/Apr/2011

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.85, 4.85, 4.85); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Tilt, Ch.661, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.255 mW/g

Tilt, Ch.661, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.24 V/m; Power Drift = 0.108 dB
Peak SAR (extrapolated) = 0.309 W/kg
SAR(1 g) = 0.202 mW/g; SAR(10 g) = 0.121 mW/g
Maximum value of SAR (measured) = 0.218 mW/g



0 dB = 0.218mW/g

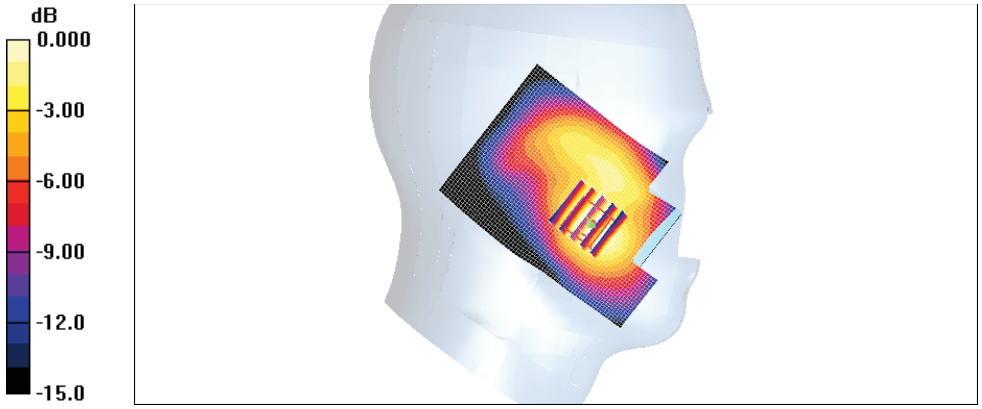
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GSM1900 Left (Job No. : FI-106)
Procedure Name: Cheek, Ch.661, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-26/Apr/2011

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.85, 4.85, 4.85); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.424 mW/g

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.0 V/m; Power Drift = -0.069 dB
Peak SAR (extrapolated) = 0.548 W/kg
SAR(1 g) = 0.369 mW/g; SAR(10 g) = 0.225 mW/g
Maximum value of SAR (measured) = 0.386 mW/g



0 dB = 0.386mW/g

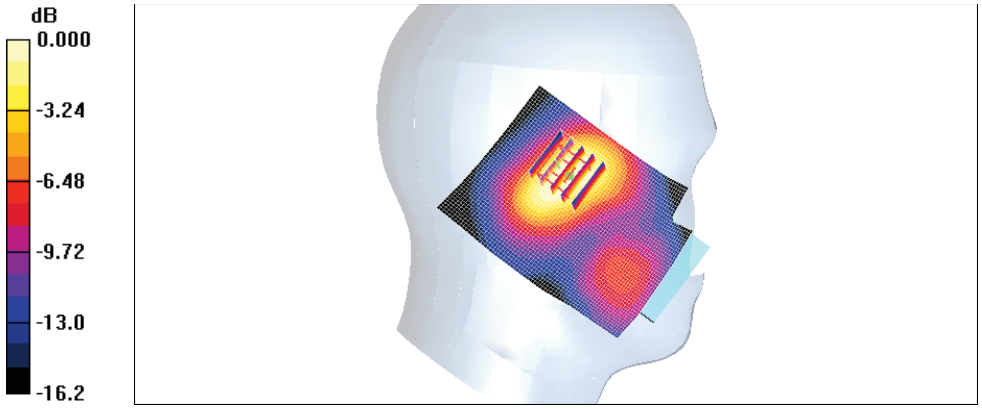
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GSM1900 Left (Job No. : FI-106)
Procedure Name: Tilt, Ch.661, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-26/Apr/2011

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.85, 4.85, 4.85); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Tilt, Ch.661, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.268 mW/g

Tilt, Ch.661, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.48 V/m; Power Drift = 0.078 dB
Peak SAR (extrapolated) = 0.323 W/kg
SAR(1 g) = 0.219 mW/g; SAR(10 g) = 0.137 mW/g
Maximum value of SAR (measured) = 0.236 mW/g



0 dB = 0.236mW/g

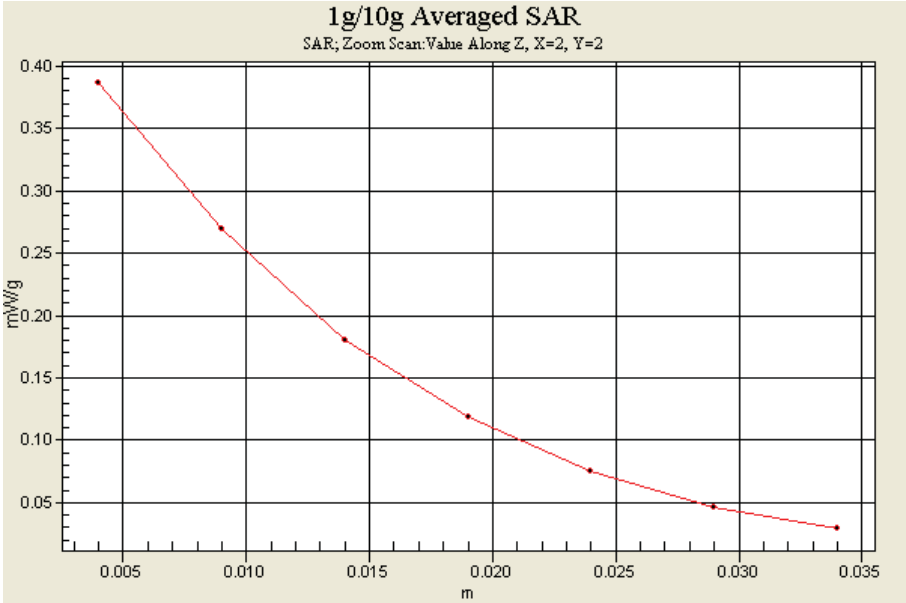
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GSM1900 Left (Job No. : FI-106)
Procedure Name: Cheek, Ch.661, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-26/Apr/2011

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.85, 4.85, 4.85); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.424 mW/g

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.0 V/m; Power Drift = -0.069 dB
Peak SAR (extrapolated) = 0.548 W/kg
SAR(1 g) = 0.369 mW/g; SAR(10 g) = 0.225 mW/g
Maximum value of SAR (measured) = 0.386 mW/g



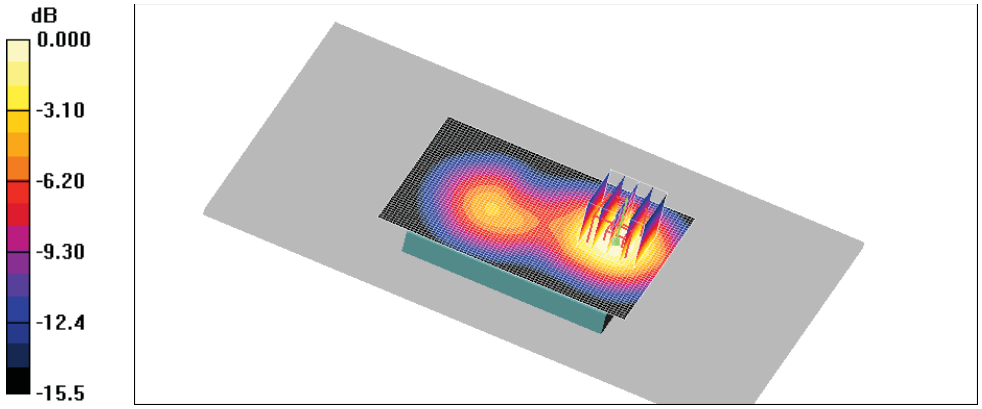
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard Back
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.661, Ant.Intenna, Bat.Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.856 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.0 V/m; Power Drift = 0.063 dB
Peak SAR (extrapolated) = 1.10 W/kg
SAR(1 g) = 0.752 mW/g; SAR(10 g) = 0.457 mW/g
Maximum value of SAR (measured) = 0.816 mW/g



0 dB = 0.816mW/g

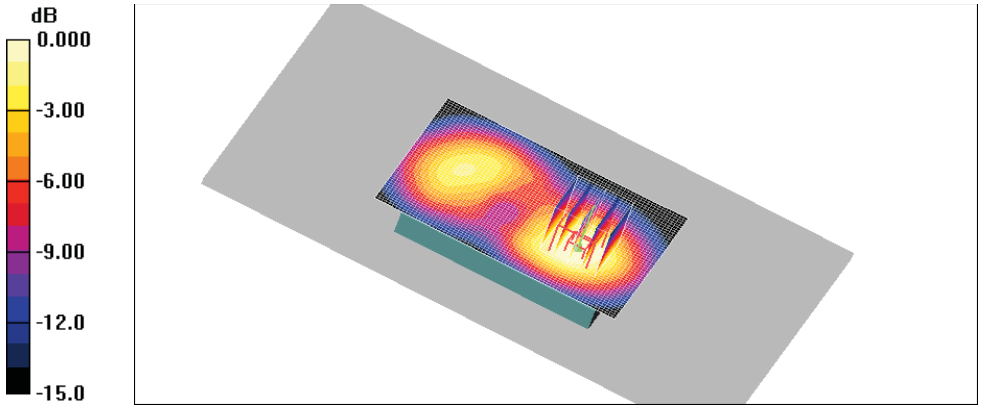
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard Front
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.661, Ant.Intenna, Bat.Standard Front/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.374 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard Front/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.18 V/m; Power Drift = 0.130 dB
Peak SAR (extrapolated) = 0.450 W/kg
SAR(1 g) = 0.320 mW/g; SAR(10 g) = 0.198 mW/g
Maximum value of SAR (measured) = 0.342 mW/g



0 dB = 0.342mW/g

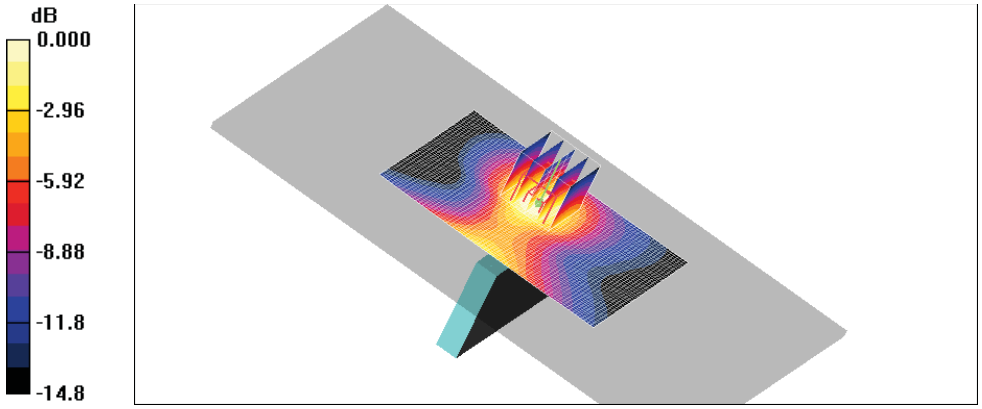
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard Side A
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.661, Ant.Intenna, Bat.Standard Side A/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.231 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard Side A/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.2 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 0.296 W/kg
SAR(1 g) = 0.205 mW/g; SAR(10 g) = 0.124 mW/g
Maximum value of SAR (measured) = 0.226 mW/g



0 dB = 0.226mW/g

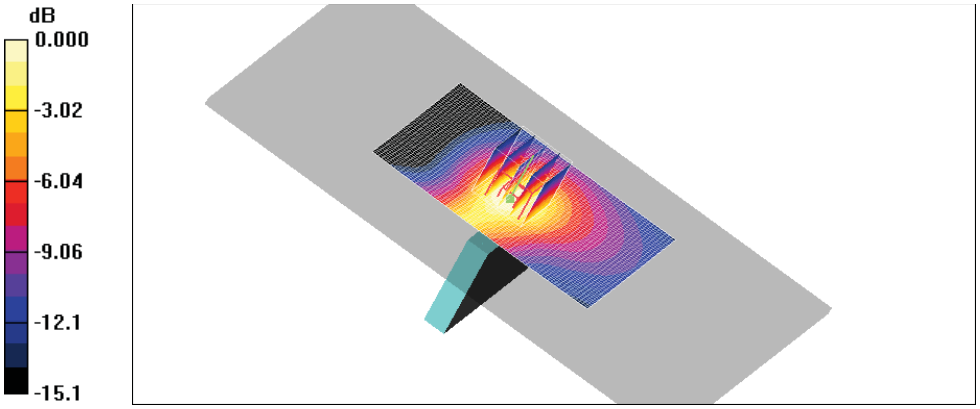
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard Side B
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.661, Ant.Intenna, Bat.Standard Side B/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.217 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard Side B/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.4 V/m; Power Drift = 0.041 dB
Peak SAR (extrapolated) = 0.276 W/kg
SAR(1 g) = 0.186 mW/g; SAR(10 g) = 0.112 mW/g
Maximum value of SAR (measured) = 0.206 mW/g



0 dB = 0.206mW/g

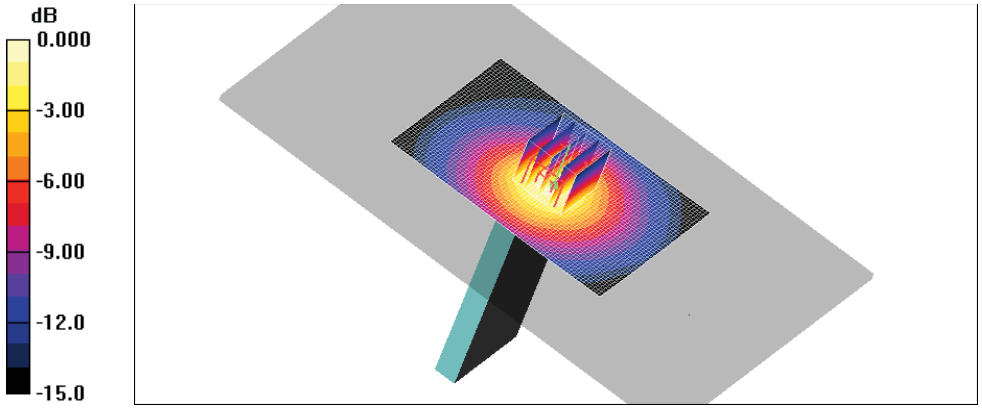
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard Side Side C
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.661, Ant.Intenna, Bat.Standard Side Bottom/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.274 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard Side Bottom/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.2 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 0.419 W/kg
SAR(1 g) = 0.286 mW/g; SAR(10 g) = 0.171 mW/g
Maximum value of SAR (measured) = 0.310 mW/g



0 dB = 0.310mW/g

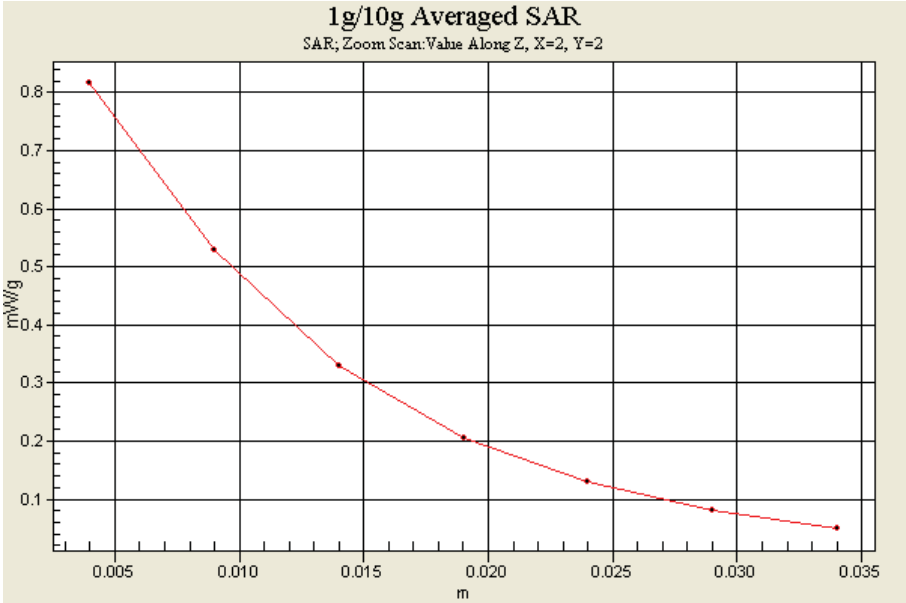
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 GPRS1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard Back
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.661, Ant.Intenna, Bat.Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.856 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.0 V/m; Power Drift = 0.063 dB
Peak SAR (extrapolated) = 1.10 W/kg
SAR(1 g) = 0.752 mW/g; SAR(10 g) = 0.457 mW/g
Maximum value of SAR (measured) = 0.816 mW/g



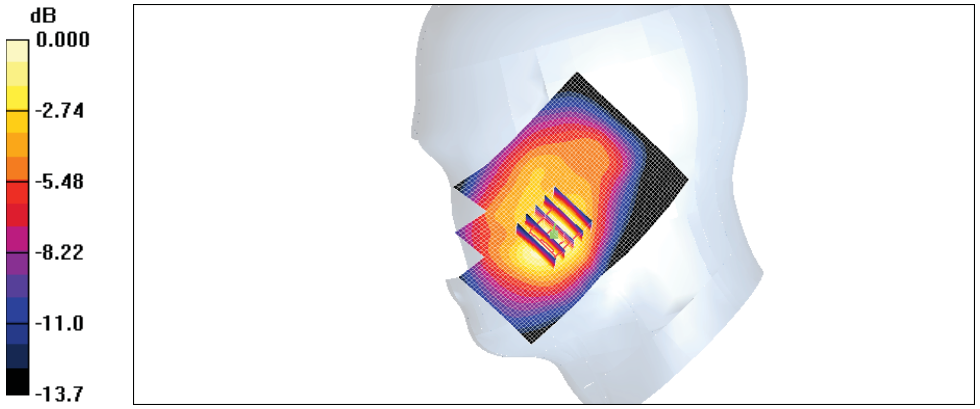
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Right (Job No.: FI-106)
Procedure Name: Cheek/Touch, Ch1412, Ant.Intenna, Bat.Satandard
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-21.9;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.4 MHz; σ = 1.39 mho/m; εr = 39.9; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(5.08, 5.08, 5.08); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch, Ch1412, Ant.Intenna, Bat.Satandard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.337 mW/g

Cheek/Touch, Ch1412, Ant.Intenna, Bat.Satandard/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.9 V/m; Power Drift = 0.016 dB
Peak SAR (extrapolated) = 0.469 W/kg
SAR(1 g) = 0.323 mW/g; SAR(10 g) = 0.202 mW/g
Maximum value of SAR (measured) = 0.340 mW/g



0 dB = 0.340mW/g

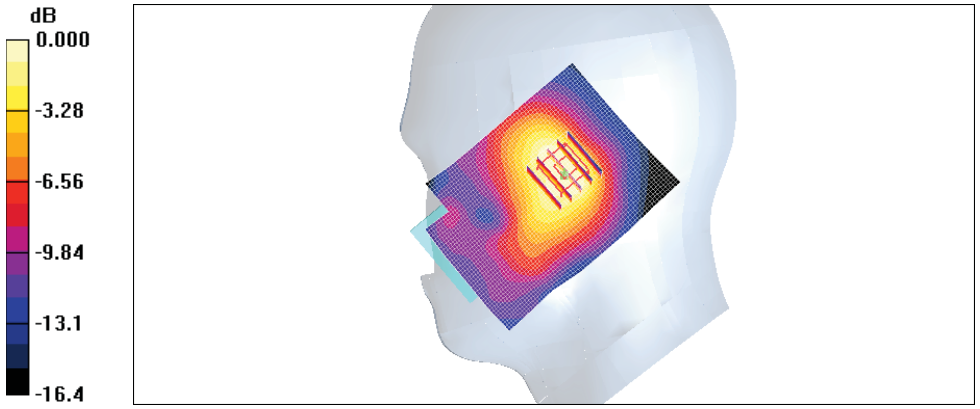
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Right (Job No.: FI-106)
Procedure Name: Ear/Tilt, Ch.1412, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-21.9;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.4 MHz; σ = 1.39 mho/m; εr = 39.9; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(5.08, 5.08, 5.08); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Ear/Tilt, Ch.1412, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.252 mW/g

Ear/Tilt, Ch.1412, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.39 V/m; Power Drift = 0.046 dB
Peak SAR (extrapolated) = 0.278 W/kg
SAR(1 g) = 0.190 mW/g; SAR(10 g) = 0.121 mW/g
Maximum value of SAR (measured) = 0.196 mW/g



0 dB = 0.196mW/g

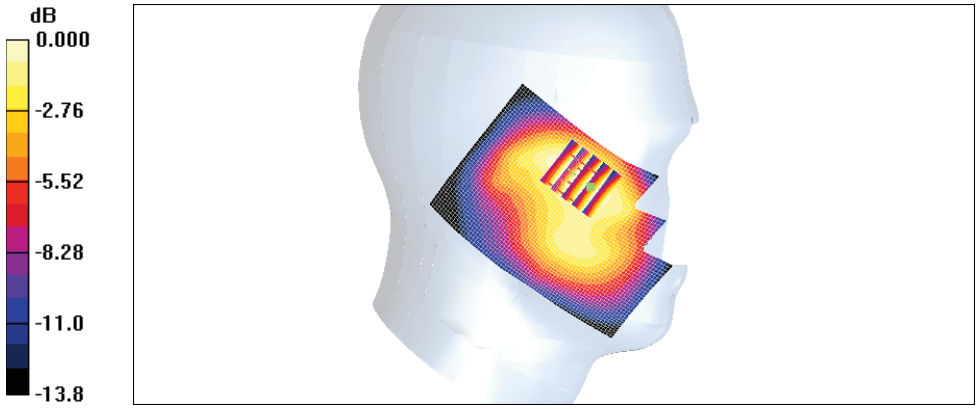
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Left (Job No.:FI-106)
Procedure Name: Cheek/Touch, Ch1412, Ant.Intenna, Bat.Satandard
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-21.9;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.4 MHz; σ = 1.39 mho/m; εr = 39.9; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(5.08, 5.08, 5.08); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch, Ch1412, Ant.Intenna, Bat.Satandard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.259 mW/g

Cheek/Touch, Ch1412, Ant.Intenna, Bat.Satandard/Zoom Scan 2 (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.9 V/m; Power Drift = -0.033 dB
Peak SAR (extrapolated) = 0.328 W/kg
SAR(1 g) = 0.224 mW/g; SAR(10 g) = 0.150 mW/g
Maximum value of SAR (measured) = 0.242 mW/g



0 dB = 0.242mW/g

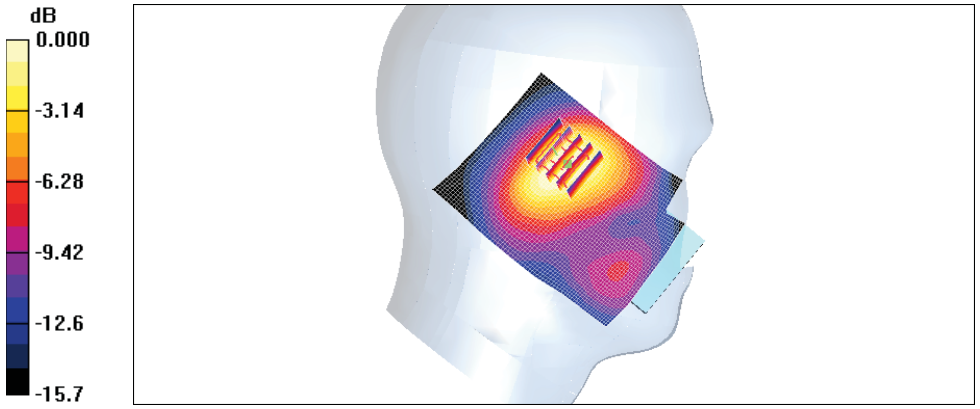
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Left (Job No.:FI-106)
Procedure Name: Ear/Tilt, Ch.1412, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-21.9;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.4 MHz; σ = 1.39 mho/m; εr = 39.9; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(5.08, 5.08, 5.08); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Ear/Tilt, Ch.1412, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.253 mW/g

Ear/Tilt, Ch.1412, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.35 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 0.294 W/kg
SAR(1 g) = 0.207 mW/g; SAR(10 g) = 0.133 mW/g
Maximum value of SAR (measured) = 0.220 mW/g



0 dB = 0.220mW/g

DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Right (Job No.: FI-106)
Procedure Name: Cheek/Touch, Ch1412, Ant.Intenna, Bat.Satandard
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-21.9;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.4 MHz; σ = 1.39 mho/m; εr = 39.9; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(5.08, 5.08, 5.08); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch, Ch1412, Ant.Intenna, Bat.Satandard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.337 mW/g

Cheek/Touch, Ch1412, Ant.Intenna, Bat.Satandard/Zoom Scan (5x5x7)/Cube 0:

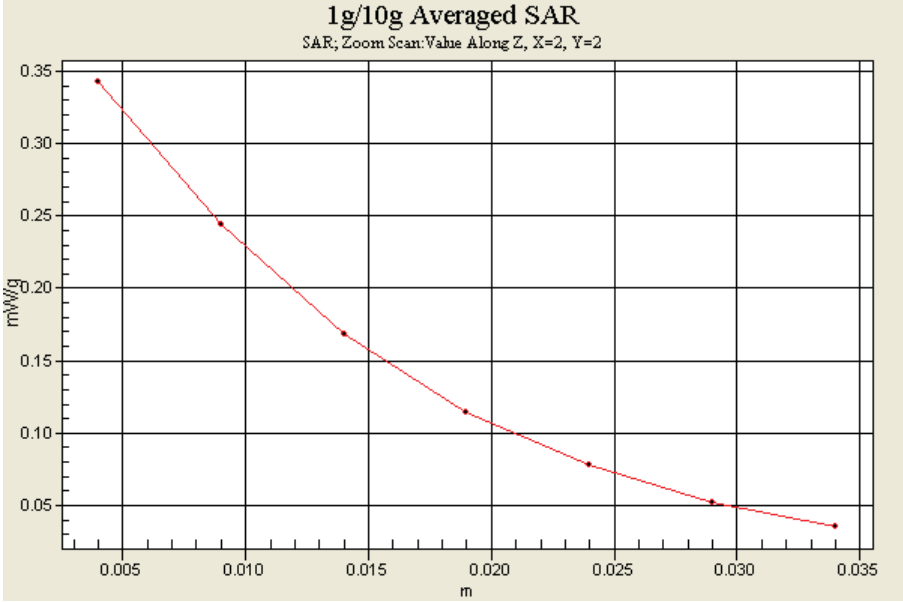
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.9 V/m; Power Drift = 0.016 dB

Peak SAR (extrapolated) = 0.469 W/kg

SAR(1 g) = 0.323 mW/g; SAR(10 g) = 0.202 mW/g

Maximum value of SAR (measured) = 0.340 mW/g



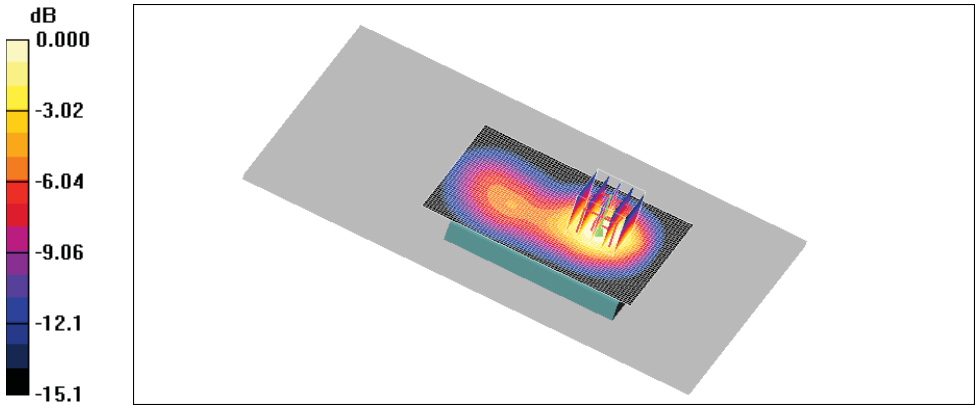
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Body (Job No. : FI-106)
Procedure Name: Body, Ch.1312, Ant.Intenna, Bat.Standard Back
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-22.1;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1712.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1712.4 MHz; σ = 1.45 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.69, 4.69, 4.69); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.1312, Ant.Intenna, Bat.Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.26 mW/g

Body, Ch.1312, Ant.Intenna, Bat.Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.1 V/m; Power Drift = 0.126 dB
Peak SAR (extrapolated) = 1.63 W/kg
SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.619 mW/g
Maximum value of SAR (measured) = 1.12 mW/g



0 dB = 1.12mW/g

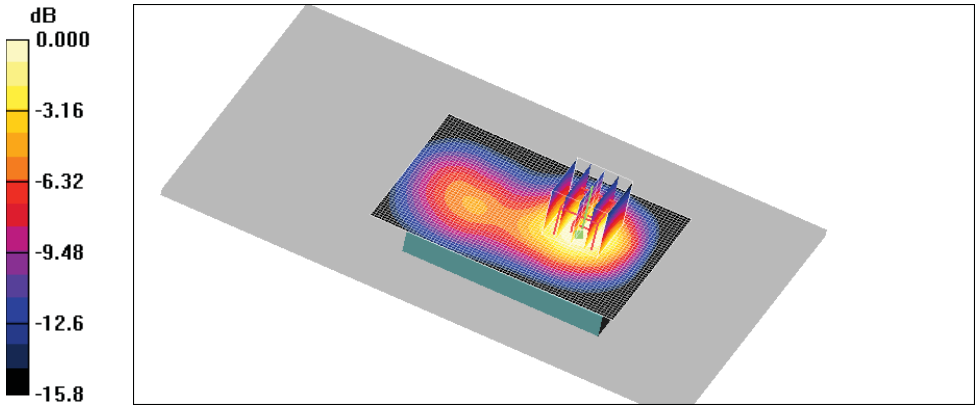
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Body (Job No. : FI-106)
Procedure Name: Body, Ch.1412, Ant.Intenna, Bat.Standard Back
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-22.1;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.4 MHz; σ = 1.45 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.69, 4.69, 4.69); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.1412, Ant.Intenna, Bat.Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.17 mW/g

Body, Ch.1412, Ant.Intenna, Bat.Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = -0.148 dB
Peak SAR (extrapolated) = 1.53 W/kg
SAR(1 g) = 0.976 mW/g; SAR(10 g) = 0.581 mW/g
Maximum value of SAR (measured) = 1.07 mW/g



0 dB = 1.07mW/g

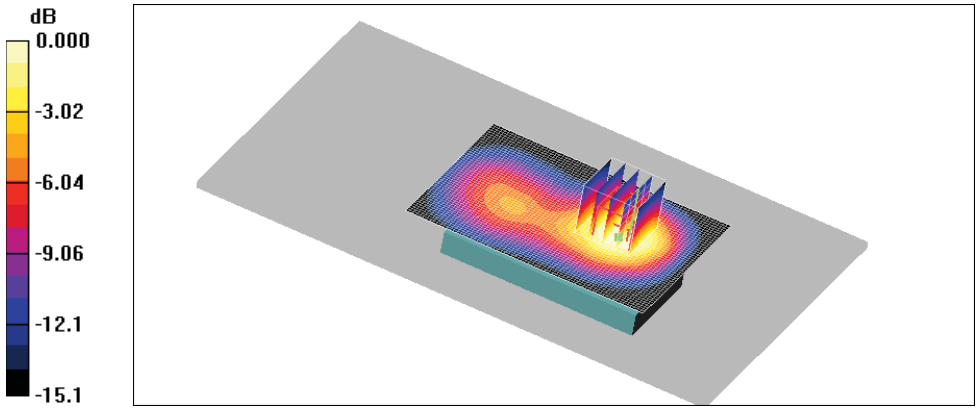
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Body (Job No. : FI-106)
Procedure Name: Body, Ch.1862, Ant.Intenna, Bat.Standard Back
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-22.1;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1752.5 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1752.5 MHz; σ = 1.45 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.69, 4.69, 4.69); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.1862, Ant.Intenna, Bat.Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.18 mW/g

Body, Ch.1862, Ant.Intenna, Bat.Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.5 V/m; Power Drift = 0.043 dB
Peak SAR (extrapolated) = 1.57 W/kg
SAR(1 g) = 1 mW/g; SAR(10 g) = 0.600 mW/g
Maximum value of SAR (measured) = 1.06 mW/g



0 dB = 1.06mW/g

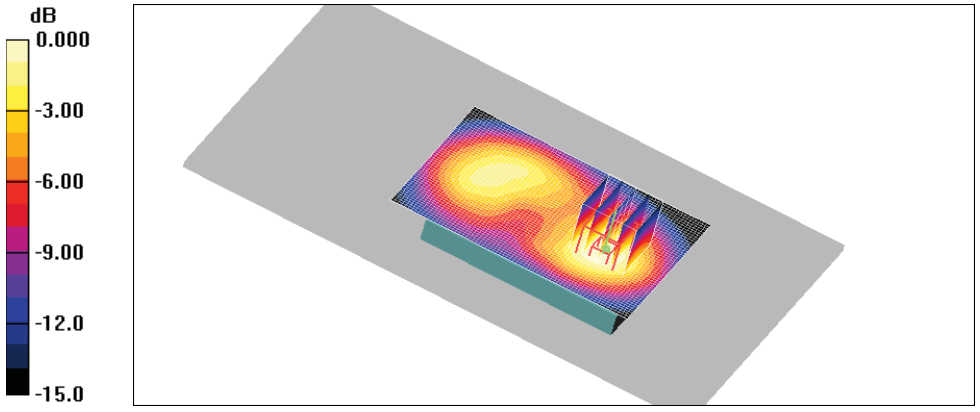
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Body (Job No. : FI-106)
Procedure Name: Body, Ch.1412, Ant.Intenna, Bat.Standard Front
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-22.1;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.4 MHz; σ = 1.45 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.69, 4.69, 4.69); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.1412, Ant.Intenna, Bat.Standard Front/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.257 mW/g

Body, Ch.1412, Ant.Intenna, Bat.Standard Front/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.22 V/m; Power Drift = 0.082 dB
Peak SAR (extrapolated) = 0.364 W/kg
SAR(1 g) = 0.234 mW/g; SAR(10 g) = 0.139 mW/g
Maximum value of SAR (measured) = 0.258 mW/g



0 dB = 0.258mW/g

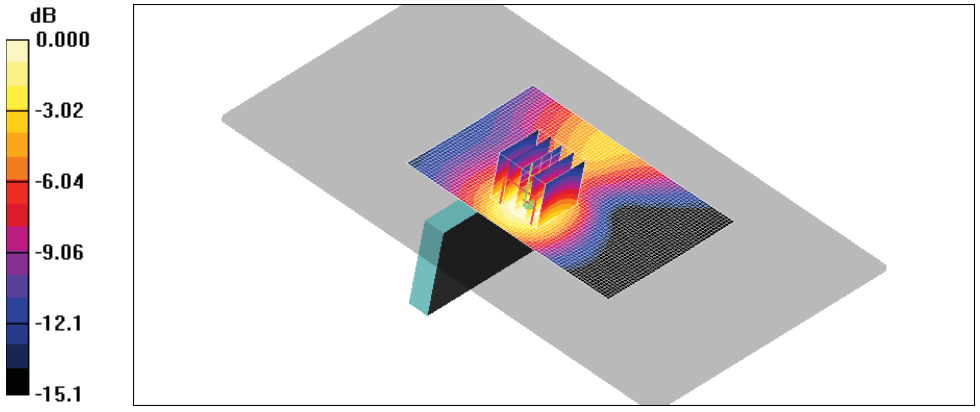
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Body (Job No. : FI-106)
Procedure Name: Body, Ch.1412, Ant.Intenna, Bat.Standard Side A
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-22.1;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.4 MHz; σ = 1.45 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.69, 4.69, 4.69); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.1412, Ant.Intenna, Bat.Standard Side A/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.222 mW/g

Body, Ch.1412, Ant.Intenna, Bat.Standard Side A/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.06 V/m; Power Drift = -0.086 dB
Peak SAR (extrapolated) = 0.309 W/kg
SAR(1 g) = 0.205 mW/g; SAR(10 g) = 0.125 mW/g
Maximum value of SAR (measured) = 0.220 mW/g



0 dB = 0.220mW/g

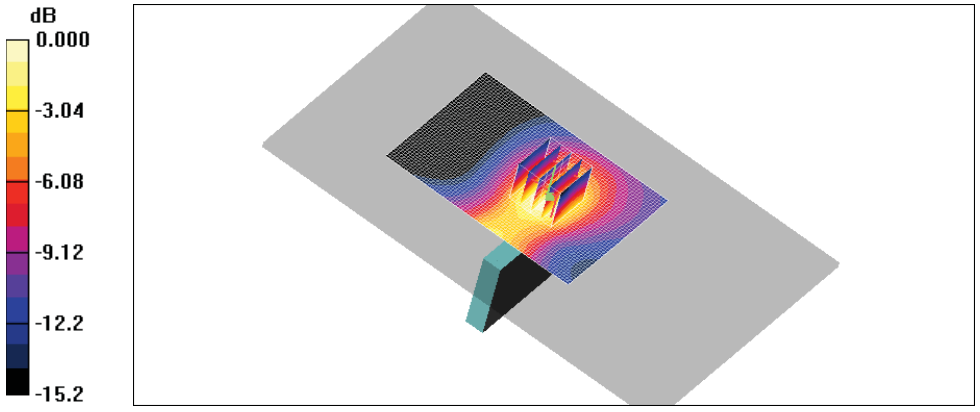
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Body (Job No. : FI-106)
Procedure Name: Body, Ch.1412, Ant.Intenna, Bat.Standard Side B
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-22.1;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.4 MHz; σ = 1.45 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.69, 4.69, 4.69); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.1412, Ant.Intenna, Bat.Standard Side B/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.180 mW/g

Body, Ch.1412, Ant.Intenna, Bat.Standard Side B/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.2 V/m; Power Drift = -0.043 dB
Peak SAR (extrapolated) = 0.241 W/kg
SAR(1 g) = 0.155 mW/g; SAR(10 g) = 0.092 mW/g
Maximum value of SAR (measured) = 0.170 mW/g



0 dB = 0.170mW/g

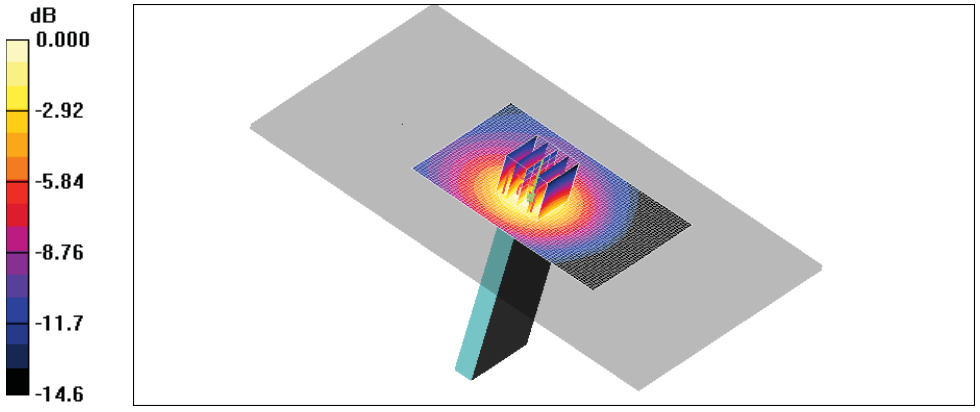
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Body (Job No. : FI-106)
Procedure Name: Body, Ch.1412, Ant.Intenna, Bat.Standard Side C
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-22.1;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1732.4 MHz; σ = 1.45 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.69, 4.69, 4.69); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.1412, Ant.Intenna, Bat.Standard Bottom/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.293 mW/g

Body, Ch.1412, Ant.Intenna, Bat.Standard Bottom/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.5 V/m; Power Drift = -0.060 dB
Peak SAR (extrapolated) = 0.397 W/kg
SAR(1 g) = 0.260 mW/g; SAR(10 g) = 0.155 mW/g
Maximum value of SAR (measured) = 0.279 mW/g



0 dB = 0.279mW/g

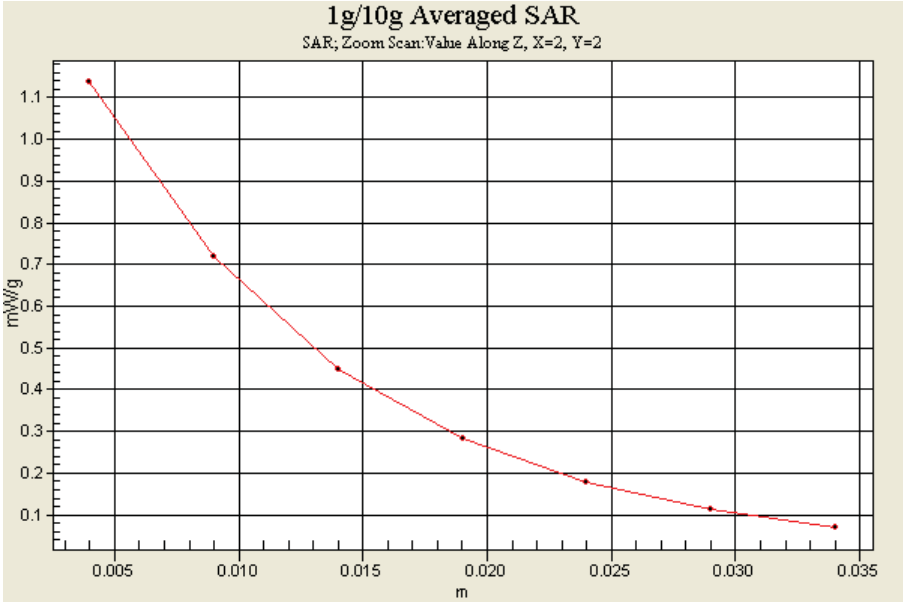
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1700 Body (Job No. : FI-106)
Procedure Name: Body, Ch.1312, Ant.Intenna, Bat.Standard Back
Meas. Ambient Temp(celsius)-22.5,Tissue Temp(celsius)-22.1;Test Date-26/Apr/2011

Communication System: WCDMA1700; Frequency: 1712.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1712.4 MHz; σ = 1.45 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.69, 4.69, 4.69); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.1312, Ant.Intenna, Bat.Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.26 mW/g

Body, Ch.1312, Ant.Intenna, Bat.Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.1 V/m; Power Drift = 0.126 dB
Peak SAR (extrapolated) = 1.63 W/kg
SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.619 mW/g
Maximum value of SAR (measured) = 1.12 mW/g



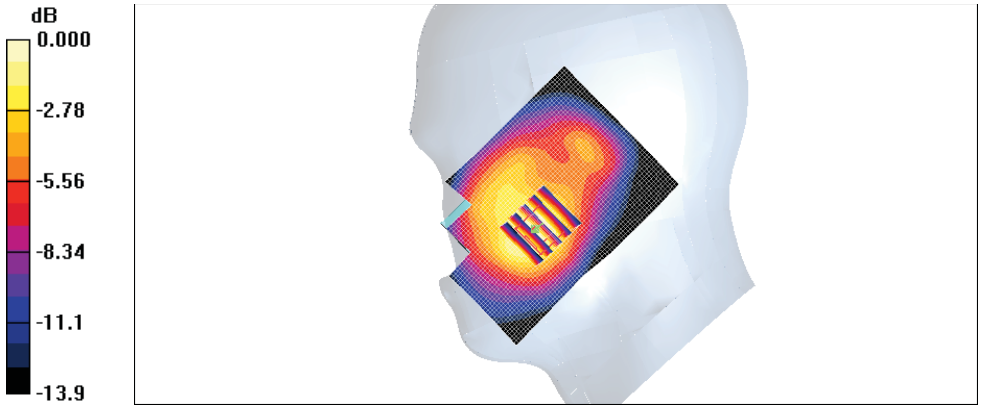
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Right (Job No.: FI-106)
Procedure Name: Cheek/Touch, Ch9400, Ant.Intenna, Bat.Satandard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-26/Apr/2011

Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.85, 4.85, 4.85); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch, Ch9400, Ant.Intenna, Bat.Satandard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.505 mW/g

Cheek/Touch, Ch9400, Ant.Intenna, Bat.Satandard/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.9 V/m; Power Drift = -0.057 dB
Peak SAR (extrapolated) = 0.686 W/kg
SAR(1 g) = 0.471 mW/g; SAR(10 g) = 0.289 mW/g
Maximum value of SAR (measured) = 0.493 mW/g



0 dB = 0.493mW/g

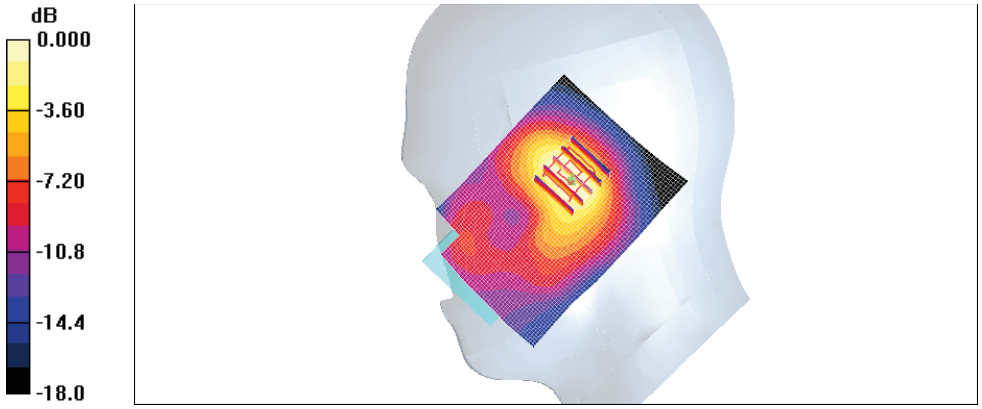
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Right (Job No.: FI-106)
Procedure Name: Ear/Tilt, Ch.9400, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-26/Apr/2011

Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.85, 4.85, 4.85); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Ear/Tilt, Ch.9400, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.353 mW/g

Ear/Tilt, Ch.9400, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.1 V/m; Power Drift = 0.028 dB
Peak SAR (extrapolated) = 0.412 W/kg
SAR(1 g) = 0.270 mW/g; SAR(10 g) = 0.162 mW/g
Maximum value of SAR (measured) = 0.283 mW/g



0 dB = 0.283mW/g

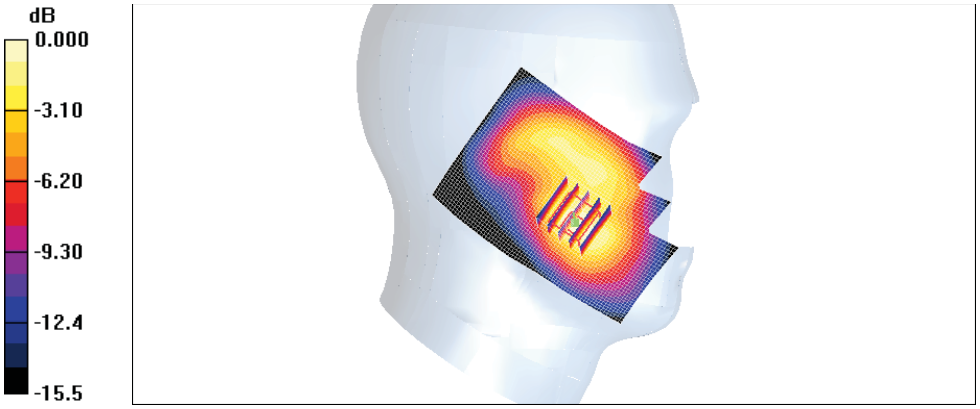
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Left (Job No.:FI-106)
Procedure Name: Cheek/Touch, Ch9400, Ant.Intenna, Bat.Satandard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-26/Apr/2011

Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.85, 4.85, 4.85); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch, Ch9400, Ant.Intenna, Bat.Satandard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.482 mW/g

Cheek/Touch, Ch9400, Ant.Intenna, Bat.Satandard/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.2 V/m; Power Drift = -0.057 dB
Peak SAR (extrapolated) = 0.647 W/kg
SAR(1 g) = 0.442 mW/g; SAR(10 g) = 0.270 mW/g
Maximum value of SAR (measured) = 0.482 mW/g



0 dB = 0.482mW/g

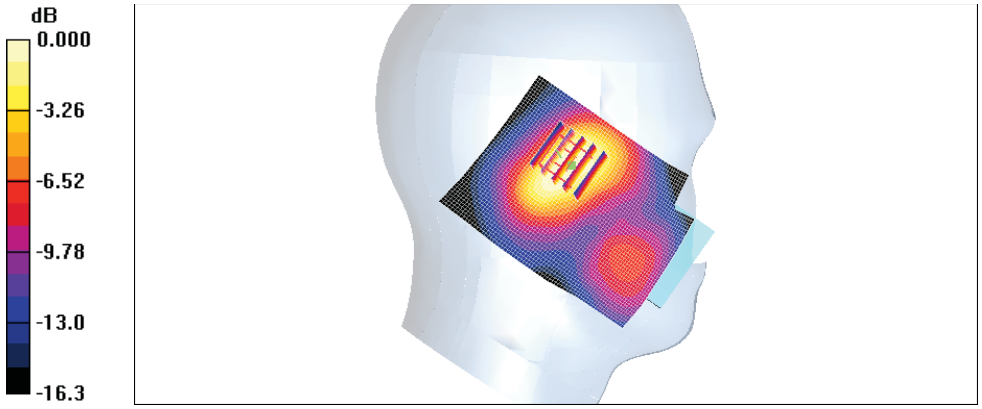
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Left (Job No.:FI-106)
Procedure Name: Ear/Tilt, Ch.9400, Ant.Intenna, Bat.Standard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-26/Apr/2011

Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.85, 4.85, 4.85); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Ear/Tilt, Ch.9400, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.340 mW/g

Ear/Tilt, Ch.9400, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.9 V/m; Power Drift = -0.017 dB
Peak SAR (extrapolated) = 0.409 W/kg
SAR(1 g) = 0.281 mW/g; SAR(10 g) = 0.176 mW/g
Maximum value of SAR (measured) = 0.302 mW/g



0 dB = 0.302mW/g

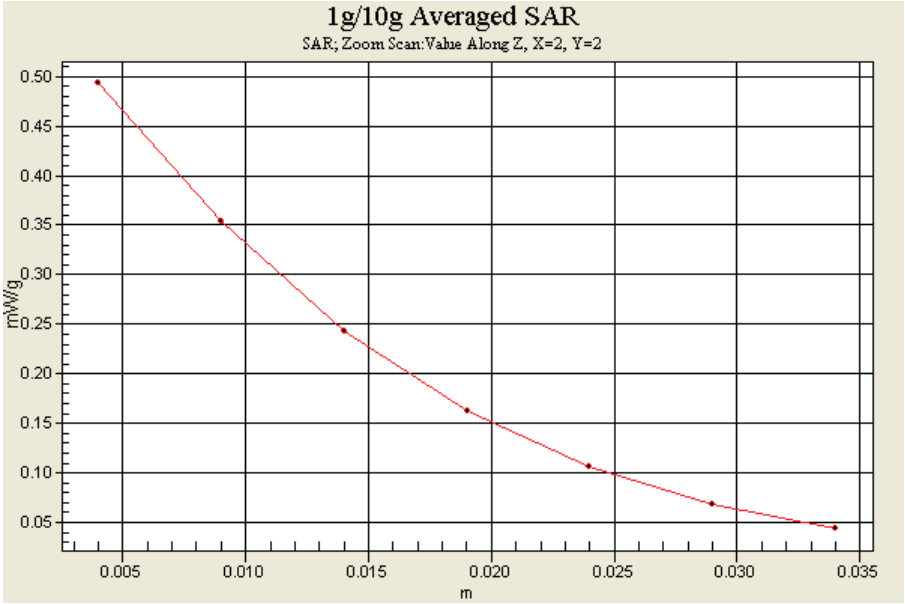
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Right (Job No.: FI-106)
Procedure Name: Cheek/Touch, Ch9400, Ant.Intenna, Bat.Satandard
Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-26/Apr/2011

Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; εr = 39.5; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.85, 4.85, 4.85); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch, Ch9400, Ant.Intenna, Bat.Satandard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.505 mW/g

Cheek/Touch, Ch9400, Ant.Intenna, Bat.Satandard/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.9 V/m; Power Drift = -0.057 dB
Peak SAR (extrapolated) = 0.686 W/kg
SAR(1 g) = 0.471 mW/g; SAR(10 g) = 0.289 mW/g
Maximum value of SAR (measured) = 0.493 mW/g



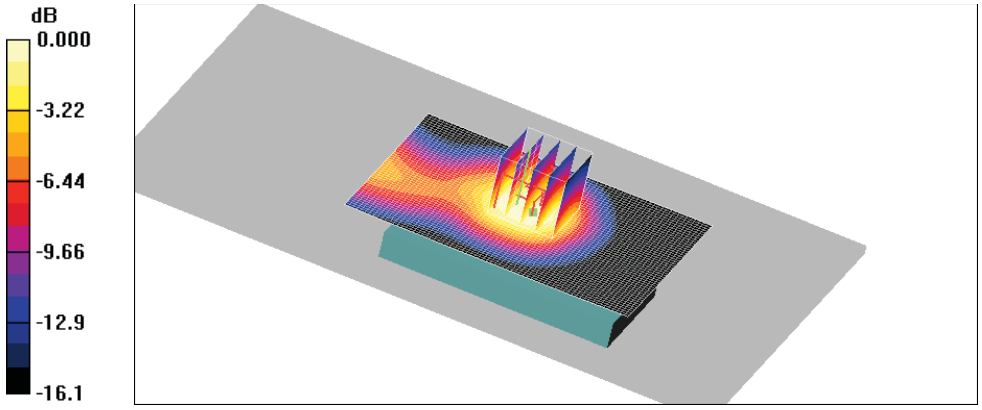
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.9262, Ant.Intenna, Bat.Standard Back
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: WCDMA; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1852.4 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.9262, Ant.Intenna, Bat.Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.27 mW/g

Body, Ch.9262, Ant.Intenna, Bat.Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.8 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.624 mW/g
Maximum value of SAR (measured) = 1.07 mW/g



0 dB = 1.07mW/g

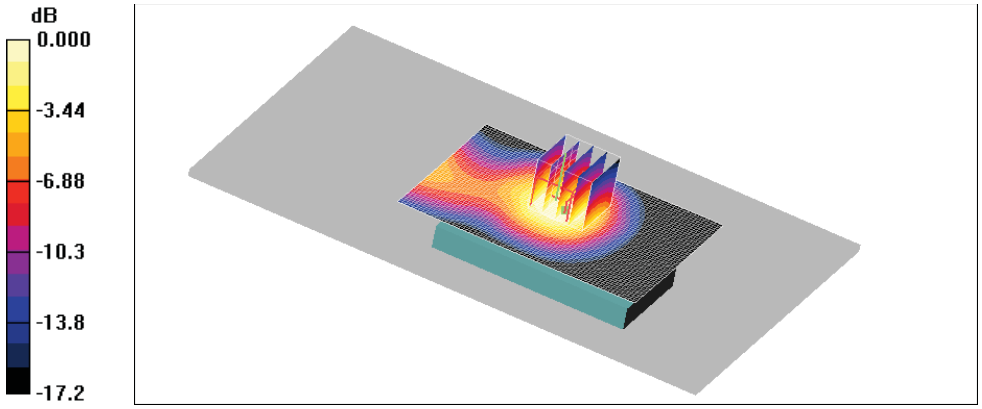
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.9400, Ant.Intenna, Bat.Standard Back
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.9400, Ant.Intenna, Bat.Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.20 mW/g

Body, Ch.9400, Ant.Intenna, Bat.Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.8 V/m; Power Drift = -0.017 dB
Peak SAR (extrapolated) = 1.45 W/kg
SAR(1 g) = 0.977 mW/g; SAR(10 g) = 0.595 mW/g
Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.05mW/g

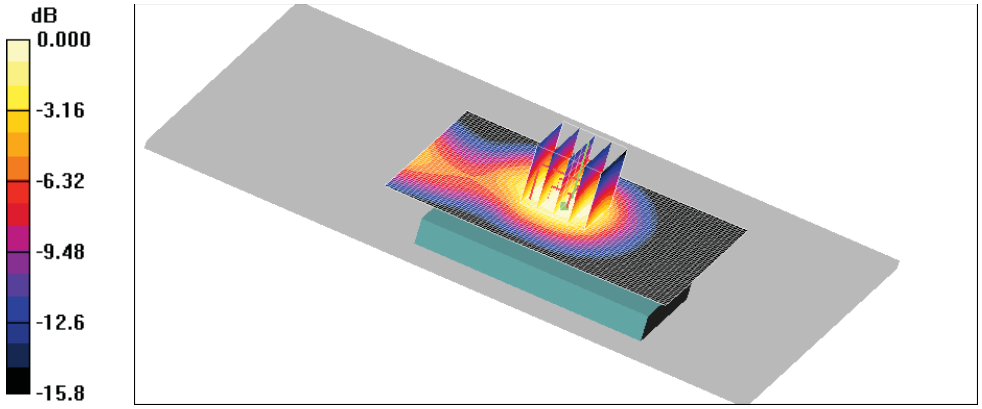
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.9538, Ant.Intenna, Bat.Standard Back
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: WCDMA; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1907.6 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.9538, Ant.Intenna, Bat.Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.11 mW/g

Body, Ch.9538, Ant.Intenna, Bat.Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.5 V/m; Power Drift = -0.020 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.908 mW/g; SAR(10 g) = 0.554 mW/g
Maximum value of SAR (measured) = 0.959 mW/g



0 dB = 0.959mW/g

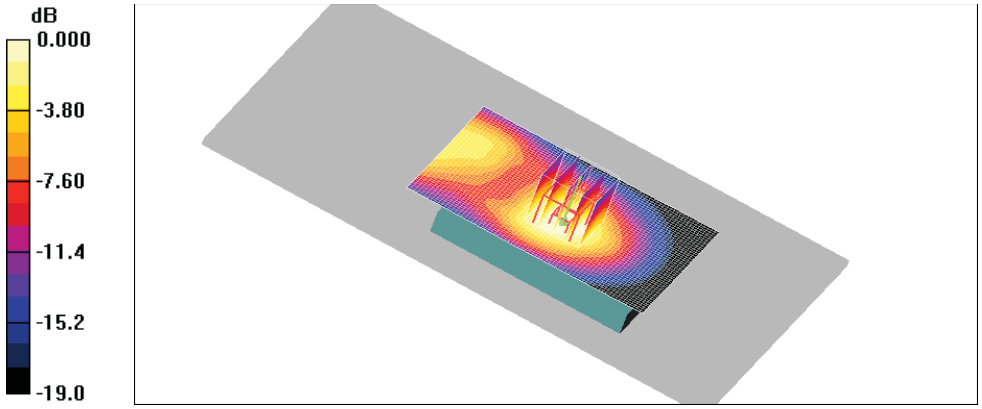
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.9400, Ant.Intenna, Bat.Standard Front
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.9400, Ant.Intenna, Bat.Standard Front/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.464 mW/g

Body, Ch.9400, Ant.Intenna, Bat.Standard Front/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.18 V/m; Power Drift = 0.022 dB
Peak SAR (extrapolated) = 0.600 W/kg
SAR(1 g) = 0.408 mW/g; SAR(10 g) = 0.248 mW/g
Maximum value of SAR (measured) = 0.443 mW/g



0 dB = 0.443mW/g

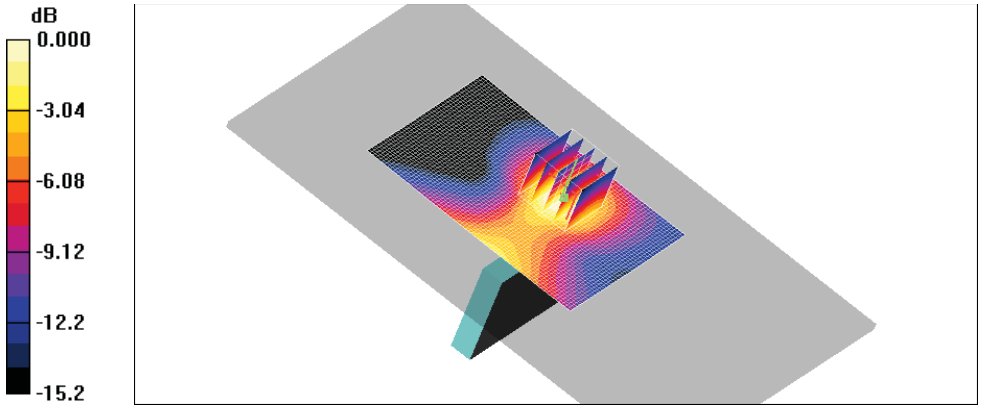
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.9400, Ant.Intenna, Bat.Standard Side A
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.9400, Ant.Intenna, Bat.Standard Side A/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.268 mW/g

Body, Ch.9400, Ant.Intenna, Bat.Standard Side A/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.8 V/m; Power Drift = -0.007 dB
Peak SAR (extrapolated) = 0.342 W/kg
SAR(1 g) = 0.236 mW/g; SAR(10 g) = 0.143 mW/g
Maximum value of SAR (measured) = 0.258 mW/g



0 dB = 0.258mW/g

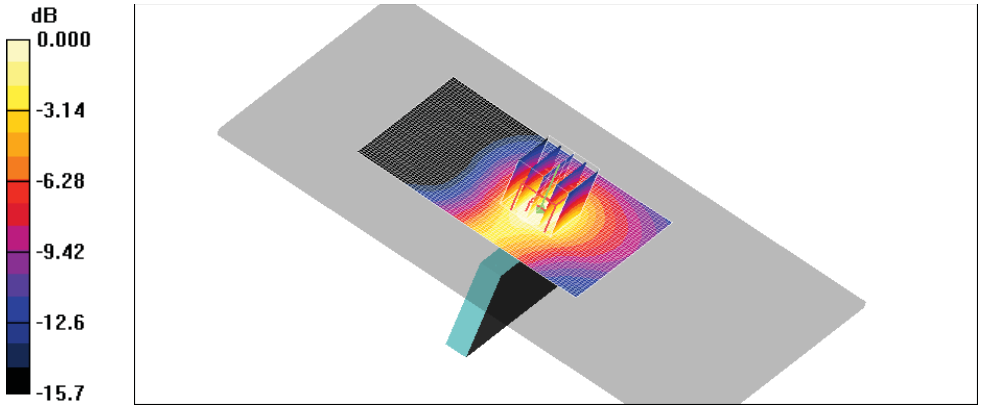
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.9400, Ant.Intenna, Bat.Standard Side B
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.9400, Ant.Intenna, Bat.Standard Side B/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.265 mW/g

Body, Ch.9400, Ant.Intenna, Bat.Standard Side B/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.1 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 0.334 W/kg
SAR(1 g) = 0.228 mW/g; SAR(10 g) = 0.138 mW/g
Maximum value of SAR (measured) = 0.249 mW/g



0 dB = 0.249mW/g

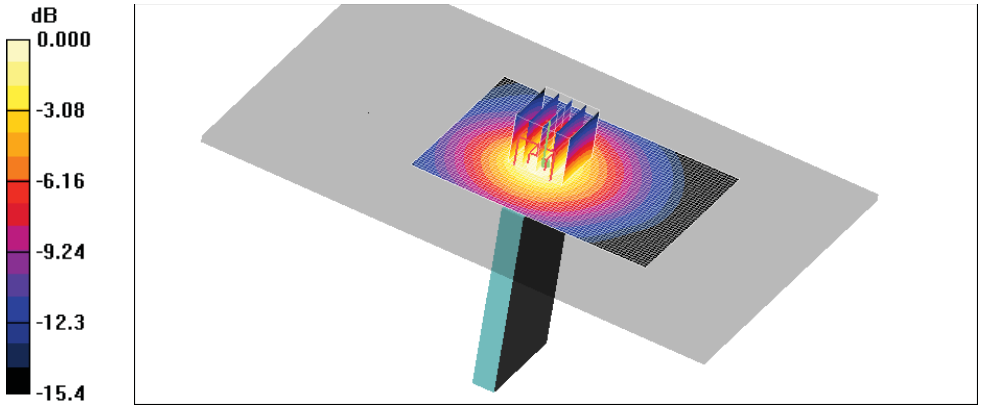
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.9400, Ant.Intenna, Bat.Standard Side C
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.9400, Ant.Intenna, Bat.Standard Bottom/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.335 mW/g

Body, Ch.9400, Ant.Intenna, Bat.Standard Bottom/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.5 V/m; Power Drift = 0.041 dB
Peak SAR (extrapolated) = 0.481 W/kg
SAR(1 g) = 0.326 mW/g; SAR(10 g) = 0.194 mW/g
Maximum value of SAR (measured) = 0.349 mW/g



0 dB = 0.349mW/g

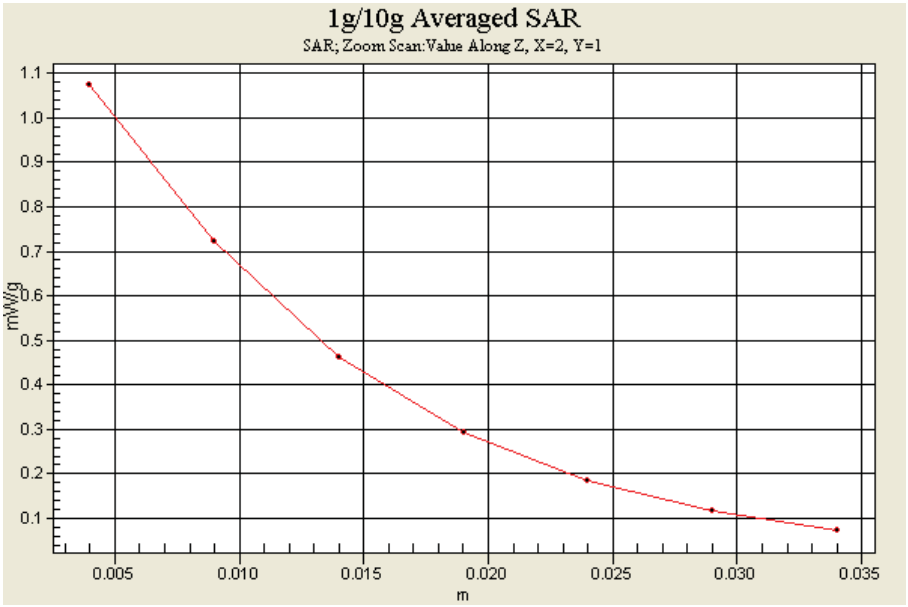
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WCDMA1900 Body (Job No. : FI-106)
Procedure Name: Body, Ch.9262, Ant.Intenna, Bat.Standard Back
Meas. Ambient Temp(celsius)-22.7,Tissue Temp(celsius)-22.4;Test Date-26/Apr/2011

Communication System: WCDMA; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1852.4 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV2 - SN3017; ConvF(4.43, 4.43, 4.43); Calibrated: 2010-05-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.9262, Ant.Intenna, Bat.Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 1.27 mW/g

Body, Ch.9262, Ant.Intenna, Bat.Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.8 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.624 mW/g
Maximum value of SAR (measured) = 1.07 mW/g



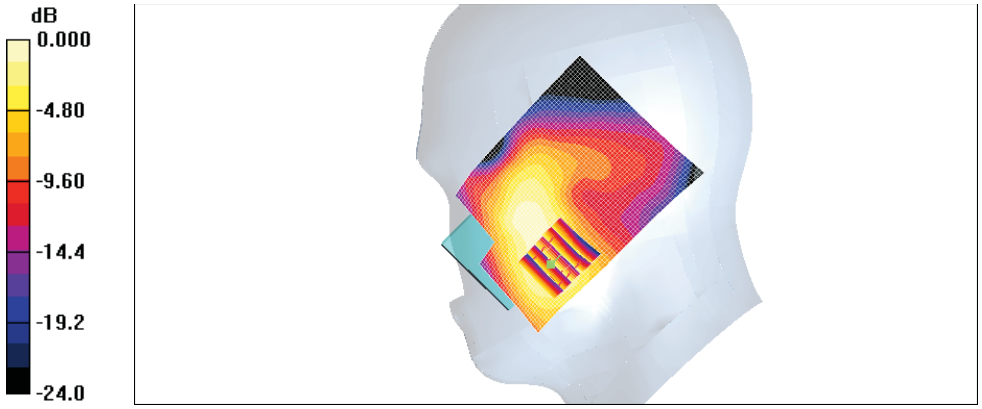
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Right(Job No. : FI-106)
Procedure Name: Cheek, Ch.06, Ant.Intenna, Bat.Standard 1Mbps
Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.4;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.34, 4.34, 4.34); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek, Ch.06, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.098 mW/g

Cheek, Ch.06, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.32 V/m; Power Drift = 0.105 dB
Peak SAR (extrapolated) = 0.159 W/kg
SAR(1 g) = 0.085 mW/g; SAR(10 g) = 0.047 mW/g
Maximum value of SAR (measured) = 0.090 mW/g



0 dB = 0.090mW/g

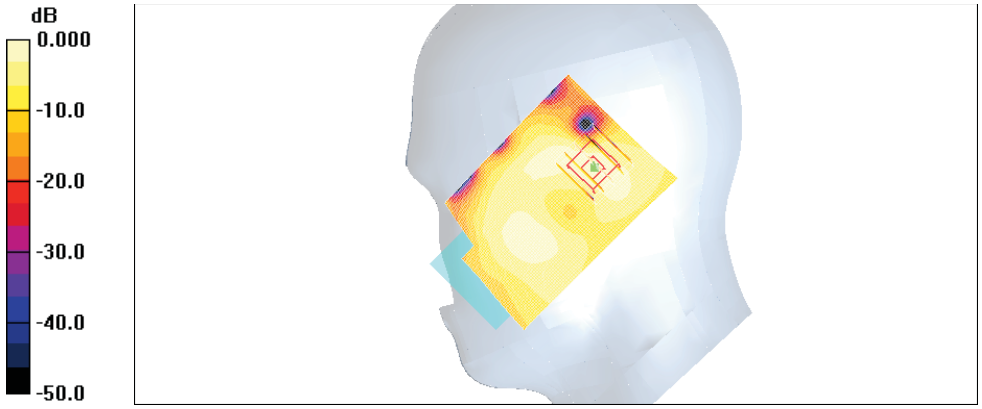
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Right(Job No. : FI-106)
Procedure Name: Tilted, Ch.06, Ant.Intenna, Bat.Standard 1Mbps
Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.4;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.34, 4.34, 4.34); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Tilted, Ch.06, Ant.Intenna, Bat.Standard/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.031 mW/g

Tilted, Ch.06, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.01 V/m; Power Drift = 0.009 dB
Peak SAR (extrapolated) = 0.035 W/kg
SAR(1 g) = 0.023 mW/g; SAR(10 g) = 0.012 mW/g
Maximum value of SAR (measured) = 0.026 mW/g



0 dB = 0.026mW/g

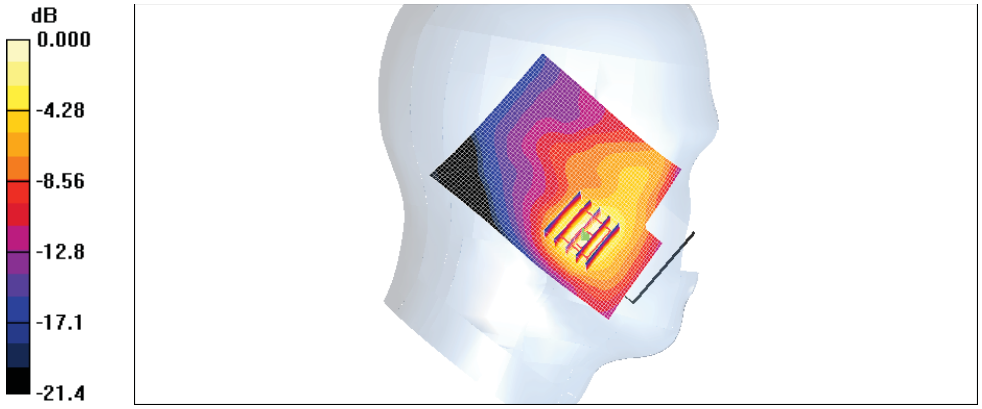
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Left(Job No. : FI-106)
Procedure Name: Cheek, Ch.06, Ant.Intenna, Bat.Standard 1Mbps
Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.4;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.34, 4.34, 4.34); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek, Ch.06, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.105 mW/g

Cheek, Ch.06, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.65 V/m; Power Drift = 0.120 dB
Peak SAR (extrapolated) = 0.178 W/kg
SAR(1 g) = 0.107 mW/g; SAR(10 g) = 0.060 mW/g
Maximum value of SAR (measured) = 0.116 mW/g



0 dB = 0.116mW/g

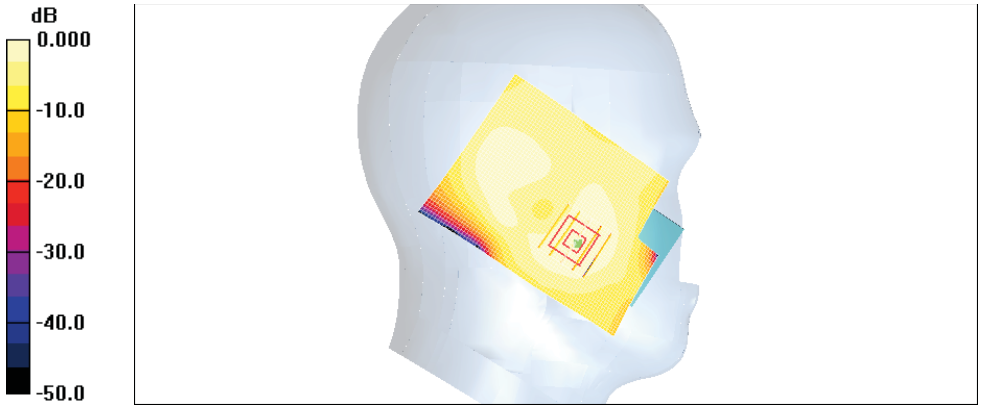
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Left(Job No. : FI-106)
Procedure Name: Tilted, Ch.06, Ant.Intenna, Bat.Standard 1Mbps
Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.4;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.34, 4.34, 4.34); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Tilted, Ch.06, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.021 mW/g

Tilted, Ch.06, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.61 V/m; Power Drift = 0.081 dB
Peak SAR (extrapolated) = 0.029 W/kg
SAR(1 g) = 0.018 mW/g; SAR(10 g) = 0.011 mW/g
Maximum value of SAR (measured) = 0.020 mW/g



0 dB = 0.020mW/g

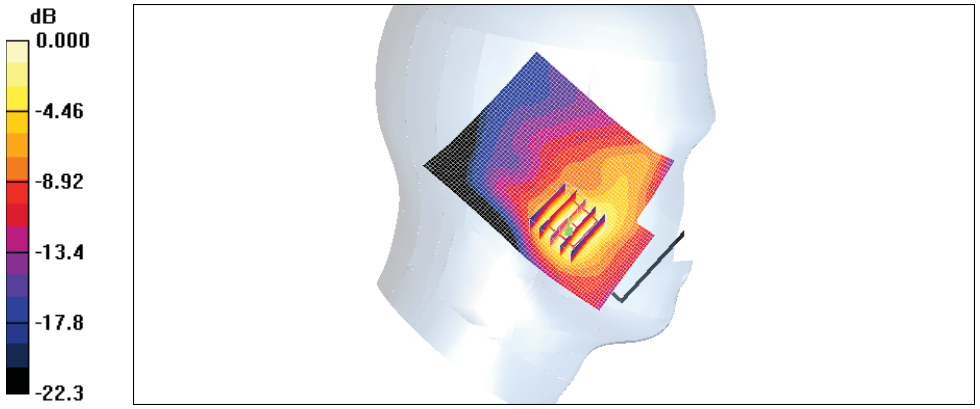
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Left(Job No. : FI-106)
Procedure Name: Cheek, Ch.01, Ant.Intenna, Bat.Standard 1Mbps
Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.4;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.84 mho/m; εr = 39.2; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.34, 4.34, 4.34); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek, Ch.01, Ant.Intenna, Bat.Standard 1Mbps/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.132 mW/g

Cheek, Ch.01, Ant.Intenna, Bat.Standard 1Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.46 V/m; Power Drift = 0.112 dB
Peak SAR (extrapolated) = 0.193 W/kg
SAR(1 g) = 0.118 mW/g; SAR(10 g) = 0.067 mW/g
Maximum value of SAR (measured) = 0.129 mW/g



0 dB = 0.129mW/g

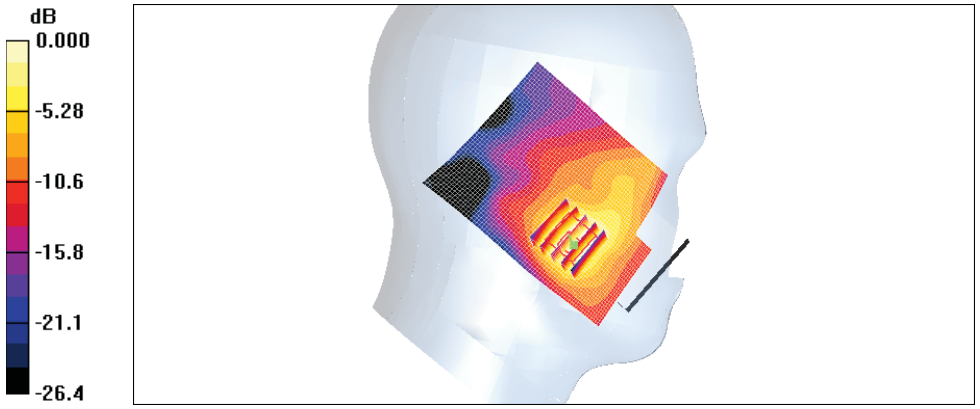
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Left(Job No. : FI-106)
Procedure Name: Cheek, Ch.01, Ant.Intenna, Bat.Standard 2Mbps
Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.4;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.84 mho/m; εr = 39.2; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.34, 4.34, 4.34); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek, Ch.01, Ant.Intenna, Bat.Standard 2Mbps/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.114 mW/g

Cheek, Ch.01, Ant.Intenna, Bat.Standard 2Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.45 V/m; Power Drift = 0.113 dB
Peak SAR (extrapolated) = 0.172 W/kg
SAR(1 g) = 0.102 mW/g; SAR(10 g) = 0.057 mW/g
Maximum value of SAR (measured) = 0.110 mW/g



0 dB = 0.110mW/g

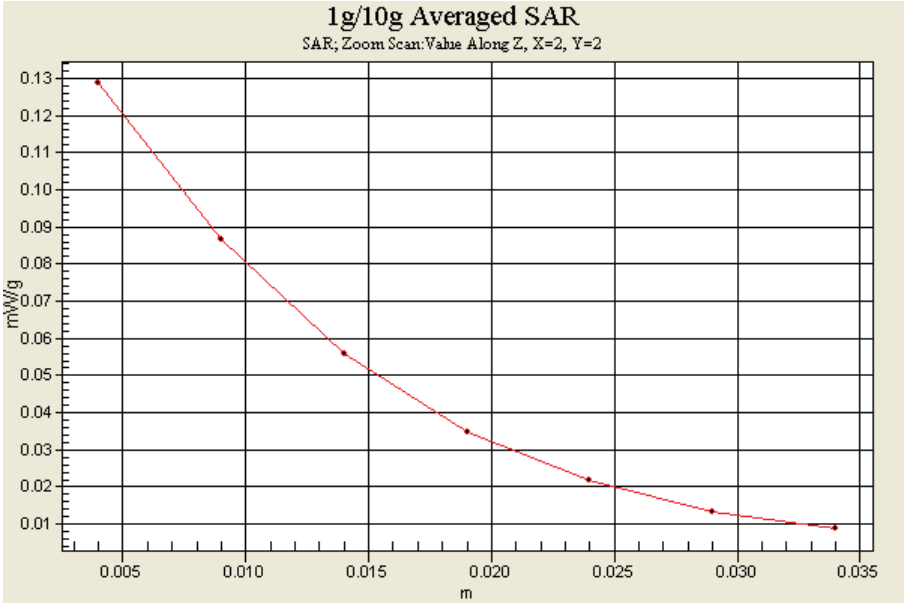
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Left(Job No. : FI-106)
Procedure Name: Cheek, Ch.01, Ant.Intenna, Bat.Standard 1Mbps
Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.4;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.84 mho/m; εr = 39.2; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.34, 4.34, 4.34); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1143
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek, Ch.01, Ant.Intenna, Bat.Standard 1Mbps/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.132 mW/g

Cheek, Ch.01, Ant.Intenna, Bat.Standard 1Mbps/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.46 V/m; Power Drift = 0.112 dB
Peak SAR (extrapolated) = 0.193 W/kg
SAR(1 g) = 0.118 mW/g; SAR(10 g) = 0.067 mW/g
Maximum value of SAR (measured) = 0.129 mW/g



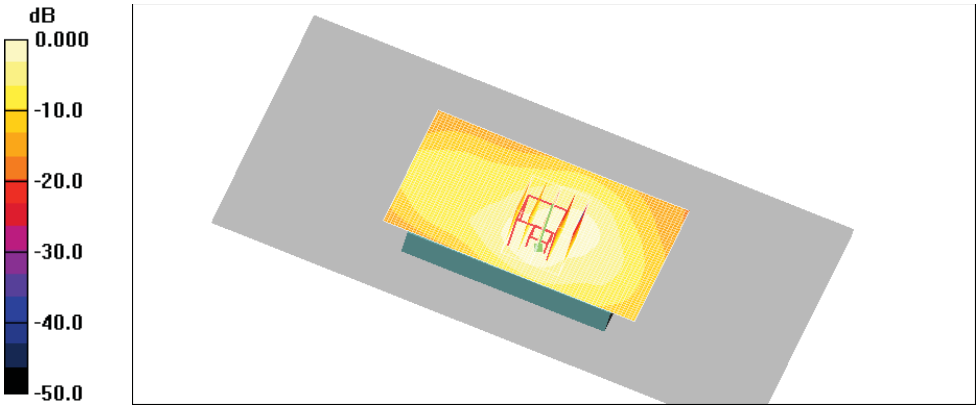
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Body (Job No. : FI-106)
Procedure Name: Body, Ch.06, Ant.Intenna, Bat.Standard Back 1Mbps
Meas. Ambient Temp(celsius)-22.8,Tissue Temp(celsius)-22.5;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.9 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.08, 4.08, 4.08); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.06, Ant.Intenna, Bat.Standard Back/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.100 mW/g

Body, Ch.06, Ant.Intenna, Bat.Standard Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.67 V/m; Power Drift = 0.076 dB
Peak SAR (extrapolated) = 0.231 W/kg
SAR(1 g) = 0.110 mW/g; SAR(10 g) = 0.056 mW/g
Maximum value of SAR (measured) = 0.119 mW/g



0 dB = 0.119mW/g

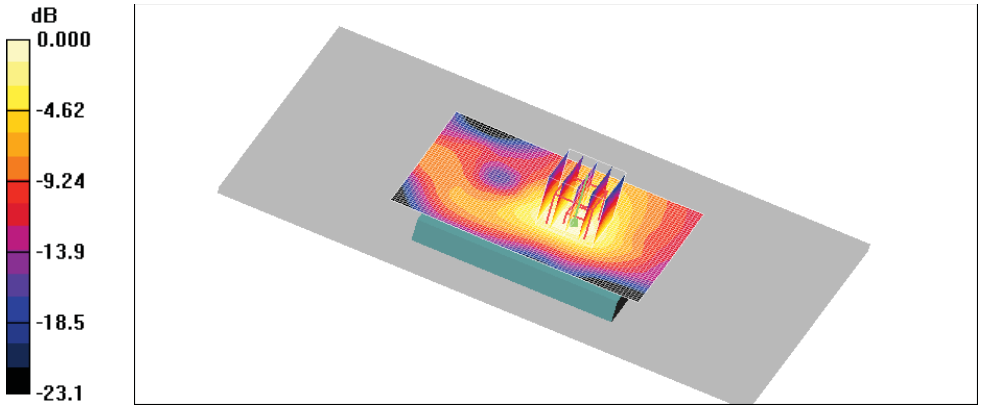
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Body (Job No. : FI-106)
Procedure Name: Body, Ch.06, Ant.Intenna, Bat.Standard Front 1Mbps
Meas. Ambient Temp(celsius)-22.8,Tissue Temp(celsius)-22.5;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.9 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.08, 4.08, 4.08); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.06, Ant.Intenna, Bat.Standard Front/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.075 mW/g

Body, Ch.06, Ant.Intenna, Bat.Standard Front/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.13 V/m; Power Drift = -0.085 dB
Peak SAR (extrapolated) = 0.127 W/kg
SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.039 mW/g
Maximum value of SAR (measured) = 0.076 mW/g



0 dB = 0.076mW/g

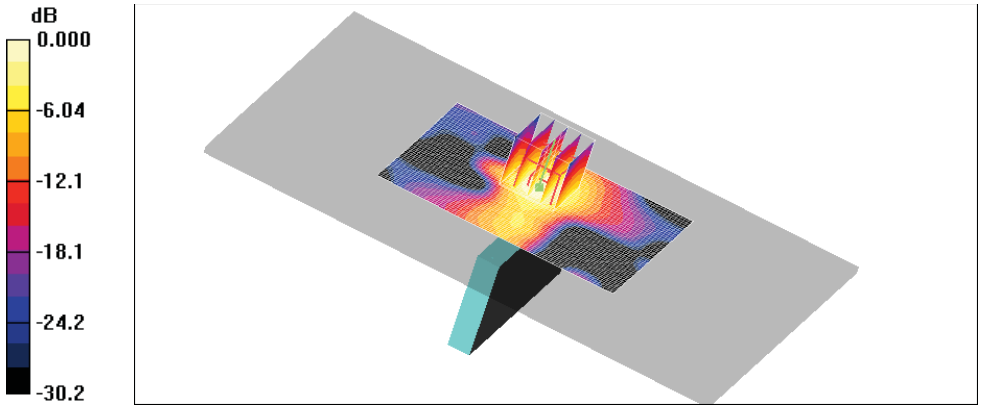
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Body (Job No. : FI-106)
Procedure Name: Body, Ch.06, Ant.Intenna, Bat.Standard Side A 1Mbps
Meas. Ambient Temp(celsius)-22.8,Tissue Temp(celsius)-22.5;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.9 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.08, 4.08, 4.08); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.06, Ant.Intenna, Bat.Standard Side A/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.145 mW/g

Body, Ch.06, Ant.Intenna, Bat.Standard Side A/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.76 V/m; Power Drift = 0.016 dB
Peak SAR (extrapolated) = 0.249 W/kg
SAR(1 g) = 0.125 mW/g; SAR(10 g) = 0.059 mW/g
Maximum value of SAR (measured) = 0.142 mW/g



0 dB = 0.142mW/g

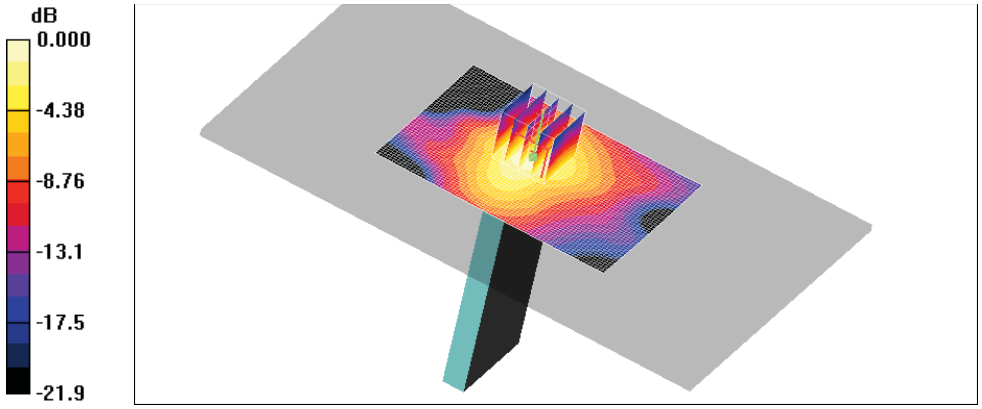
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Body (Job No. : FI-106)
Procedure Name: Body, Ch.06, Ant.Intenna, Bat.Standard Side C 1Mbps
Meas. Ambient Temp(celsius)-22.8,Tissue Temp(celsius)-22.5;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.9 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.08, 4.08, 4.08); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.06, Ant.Intenna, Bat.Standard Bottom/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.075 mW/g

Body, Ch.06, Ant.Intenna, Bat.Standard Bottom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.78 V/m; Power Drift = 0.086 dB
Peak SAR (extrapolated) = 0.110 W/kg
SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.036 mW/g
Maximum value of SAR (measured) = 0.078 mW/g



0 dB = 0.078mW/g

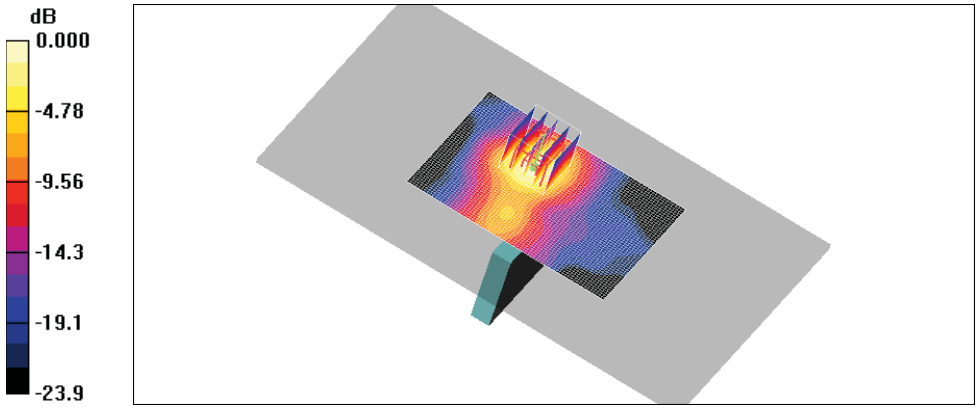
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Body (Job No. : FI-106)
Procedure Name: Body, Ch.01, Ant.Intenna, Bat.Standard Side A 1Mbps
Meas. Ambient Temp(celsius)-22.8,Tissue Temp(celsius)-22.5;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.9 mho/m; εr = 51.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.08, 4.08, 4.08); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.01, Ant.Intenna, Bat.Standard Side A 1Mbps/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.092 mW/g

Body, Ch.01, Ant.Intenna, Bat.Standard Side A 1Mbps/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.85 V/m; Power Drift = 0.104 dB
Peak SAR (extrapolated) = 0.191 W/kg
SAR(1 g) = 0.095 mW/g; SAR(10 g) = 0.046 mW/g
Maximum value of SAR (measured) = 0.108 mW/g



0 dB = 0.108mW/g

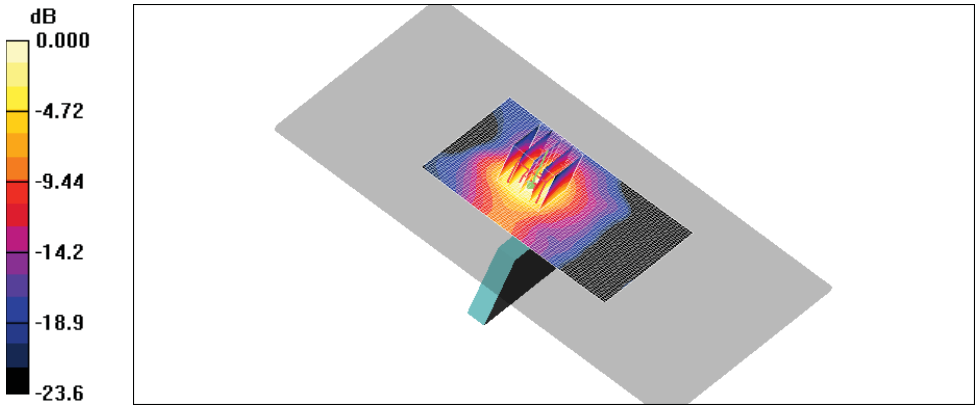
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Body (Job No. : FI-106)
Procedure Name: Body, Ch.01, Ant.Intenna, Bat.Standard Side A 2Mbps
Meas. Ambient Temp(celsius)-22.8,Tissue Temp(celsius)-22.5;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.9 mho/m; εr = 51.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.08, 4.08, 4.08); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.01, Ant.Intenna, Bat.Standard Side A 2Mbps/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.097 mW/g

Body, Ch.01, Ant.Intenna, Bat.Standard Side A 2Mbps/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.74 V/m; Power Drift = 0.028 dB
Peak SAR (extrapolated) = 0.195 W/kg
SAR(1 g) = 0.097 mW/g; SAR(10 g) = 0.046 mW/g
Maximum value of SAR (measured) = 0.111 mW/g



0 dB = 0.111mW/g

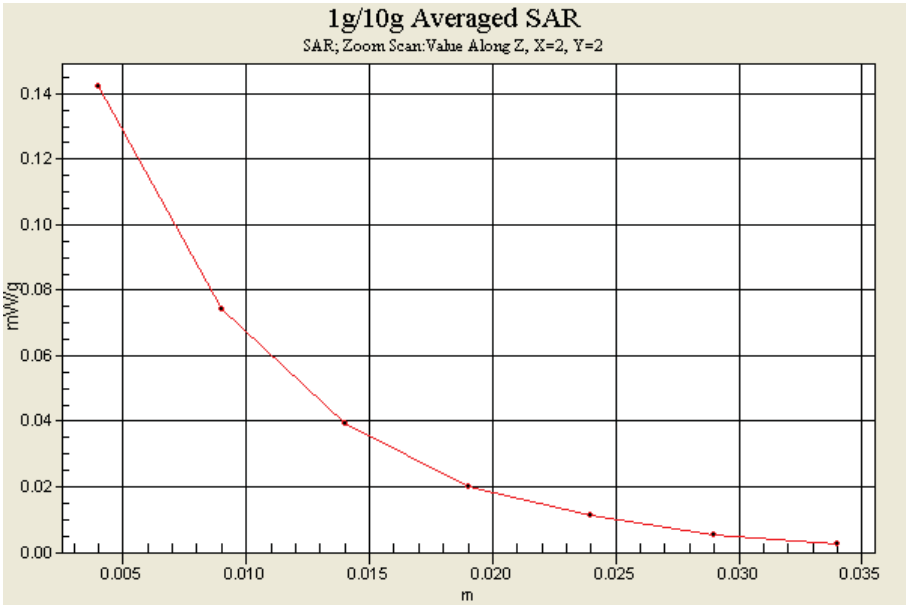
DUT: SGH-T589; Serial: FI-106-A
Program Name: SGH-T589 WLAN Body (Job No. : FI-106)
Procedure Name: Body, Ch.06, Ant.Intenna, Bat.Standard Side A 1Mbps
Meas. Ambient Temp(celsius)-22.8,Tissue Temp(celsius)-22.5;Test Date-27/Apr/2011

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.9 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3080; ConvF(4.08, 4.08, 4.08); Calibrated: 2011-01-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn670; Calibrated: 2011-02-22
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1001
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body, Ch.06, Ant.Intenna, Bat.Standard Side A/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.145 mW/g

Body, Ch.06, Ant.Intenna, Bat.Standard Side A/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.76 V/m; Power Drift = 0.016 dB
Peak SAR (extrapolated) = 0.249 W/kg
SAR(1 g) = 0.125 mW/g; SAR(10 g) = 0.059 mW/g
Maximum value of SAR (measured) = 0.142 mW/g



APPENDIX F

Probe Calibration

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

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

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

Accreditation No.: **SCS 108**

Client **Samsung (Dymstec)**

Certificate No: ES3-3017_May10

CALIBRATION CERTIFICATE

Object	ES3DV2 - SN:3017
Calibration procedure(s)	QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	May 25, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

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

Issued: May 25, 2010

O.K to Use
28.6.9 (Deputy)

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

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

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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *Ax,y,z; Bx,y,z; Cx,y,z; VRx,y,z*: *A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV2

SN:3017

Manufactured:	December 5, 2002
Last calibrated:	July 22, 2009
Recalibrated:	May 25, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV2 SN:3017

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/(V/m)^2)[A]	1.63	1.68	1.80	± 10.1%
DCP (mV)[B]	99.2	93.2	92.3	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value

DASY/EASY - Parameters of Probe: ES3DV2 SN:3017

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	41.9 ± 5%	0.89 ± 5%	6.39	6.39	6.39	0.35	1.46 ± 11.0%
850	± 50 / ± 100	41.5 ± 5%	0.92 ± 5%	6.07	6.07	6.07	0.38	1.41 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.08	5.08	5.08	0.27	1.84 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.85	4.85	4.85	0.26	2.07 ± 11.0%
2600	± 50 / ± 100	39.0 ± 5%	1.96 ± 5%	4.05	4.05	4.05	0.31	2.07 ± 11.0%

[C] 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.

DASY/EASY - Parameters of Probe: ES3DV2 SN:3017

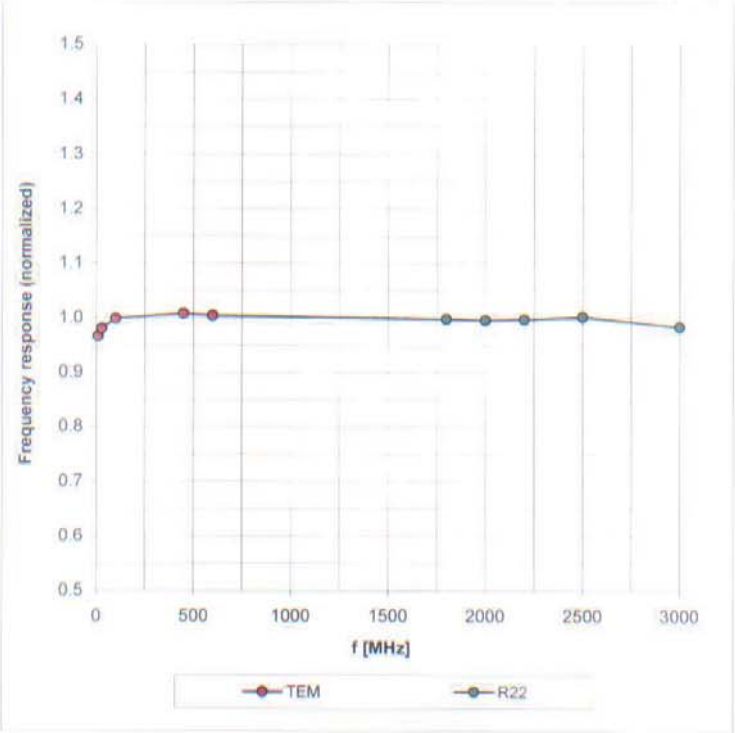
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	6.20	6.20	6.20	0.45	1.36 ± 11.0%
850	± 50 / ± 100	55.2 ± 5%	0.99 ± 5%	6.03	6.03	6.03	0.40	1.50 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.69	4.69	4.69	0.25	2.76 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.43	4.43	4.43	0.21	4.63 ± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	3.77	3.77	3.77	0.64	1.09 ± 11.0%

[C] 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.

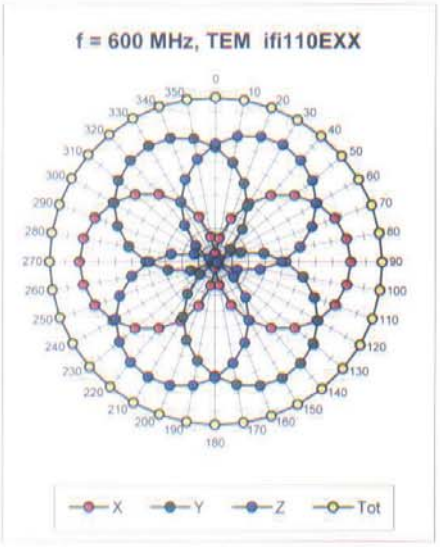
Frequency Response of E-Field

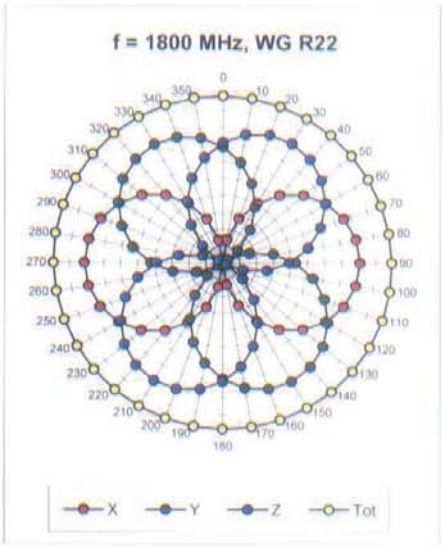
(TEM-Cell:ifi110 EXX, Waveguide: R22)

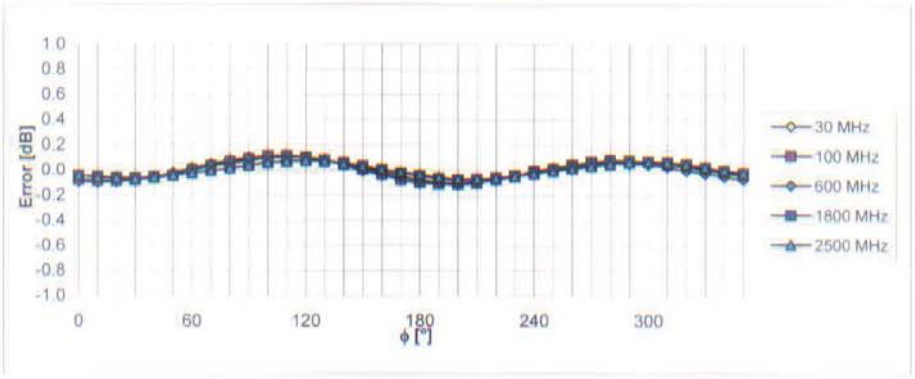


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



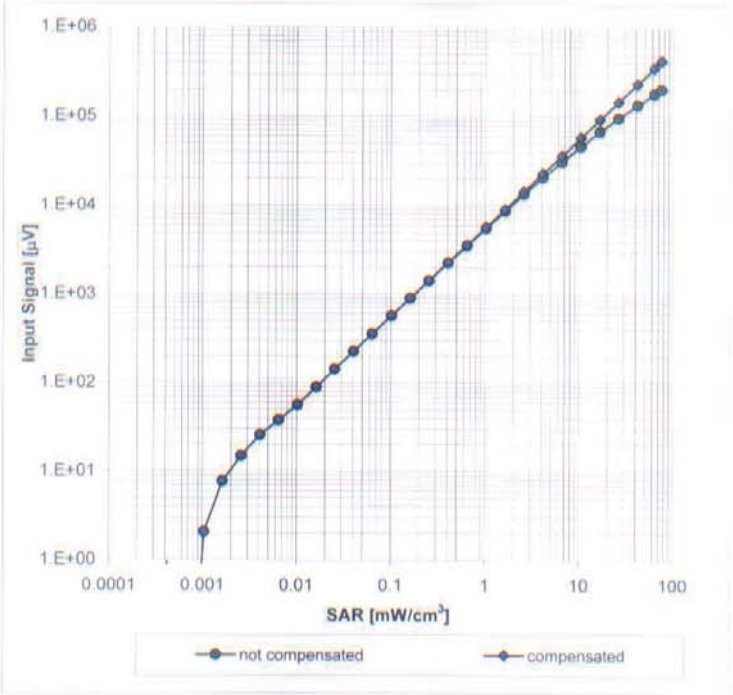


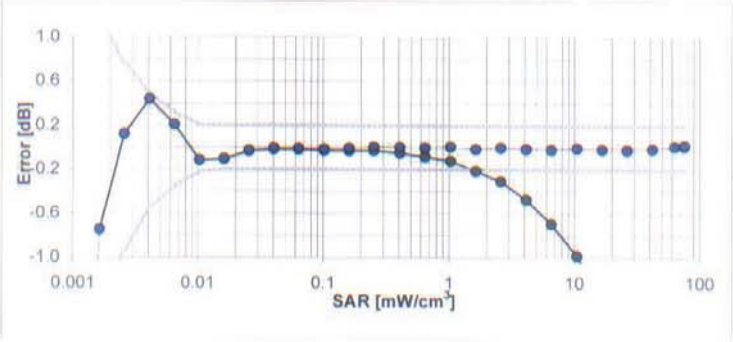


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

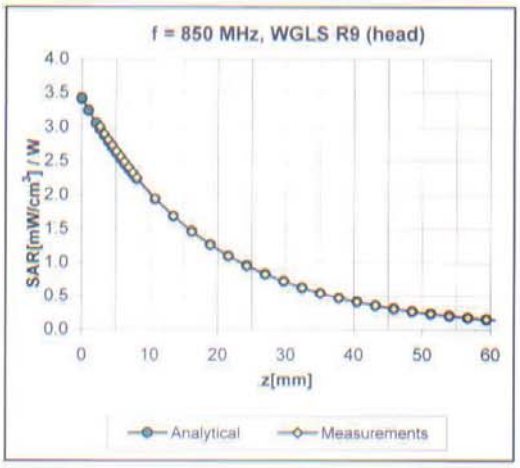
(Waveguide R22, f = 1800 MHz)

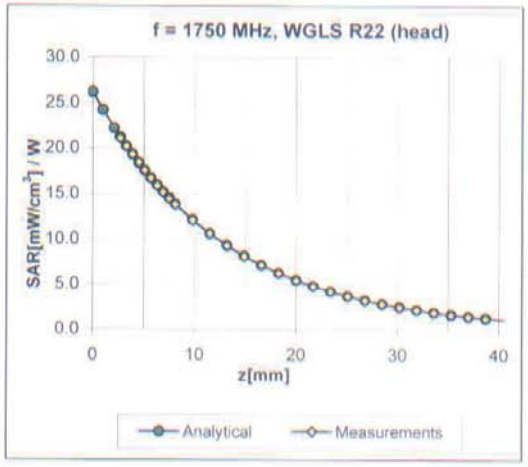




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

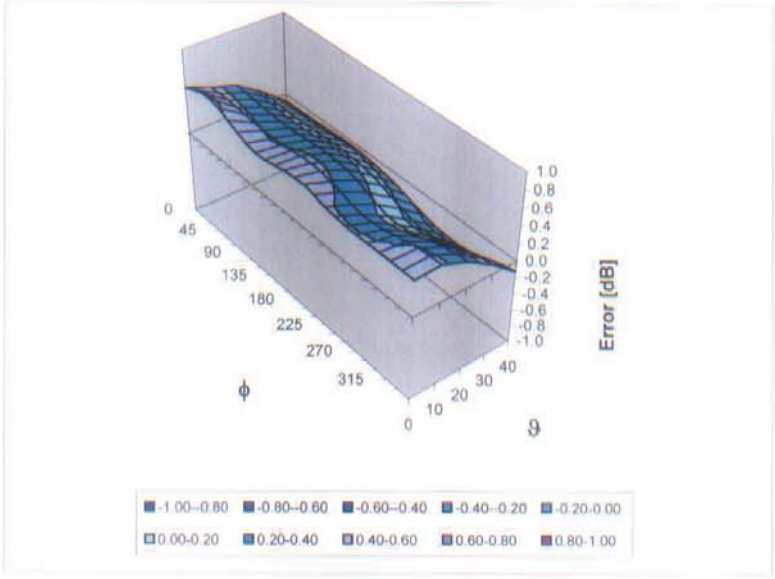
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4.0 mm
Probe Tip to Sensor X Calibration Point	2.1 mm
Probe Tip to Sensor Y Calibration Point	2.1 mm
Probe Tip to Sensor Z Calibration Point	2.1 mm
Recommended Measurement Distance from Surface	3 mm

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

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

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

Accreditation No.: **SCS 108**

Client **Samsung (Dymstec)**

Certificate No: ES3-3080_Jan11

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3080
Calibration procedure(s)	QA CAL-01.v7, QA CAL-23.v4 and QA CAL-25.v3 Calibration procedure for dosimetric E-field probes
Calibration date	January 26, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: January 26, 2011

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

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

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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *Ax,y,z; Bx,y,z; Cx,y,z; VRx,y,z*: *A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 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 *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3080

Manufactured:	March 14, 2005
Last calibrated:	January 27, 2010
Recalibrated:	January 26, 2011

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 SN:3080

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.23	1.13	1.17	± 10.1%
DCP (mV)[B]	99.1	100.8	101.3	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[F] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	112.3	± 3.1 %
			Y	0.00	0.00	1.00	140.7	
			Z	0.00	0.00	1.00	148.3	

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

[A] The uncertainties of NormX,Y,Z do not affect the E² field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

[F] Uncertainty is determined using the maximum deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 SN:3080

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
850	± 50 / ± 100	41.5 ± 5%	0.92 ± 5%	5.77	5.77	5.77	0.99	1.09 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	5.70	5.70	5.70	0.99	1.08 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.07	5.07	5.07	0.51	1.54 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.92	4.92	4.92	0.64	1.41 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.87	4.87	4.87	0.65	1.37 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.34	4.34	4.34	0.47	1.80 ± 11.0%
2600	± 50 / ± 100	39.0 ± 5%	1.96 ± 5%	4.24	4.24	4.24	0.63	1.53 ± 11.0%

[C] 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.

DASY/EASY - Parameters of Probe: ES3DV3 SN:3080

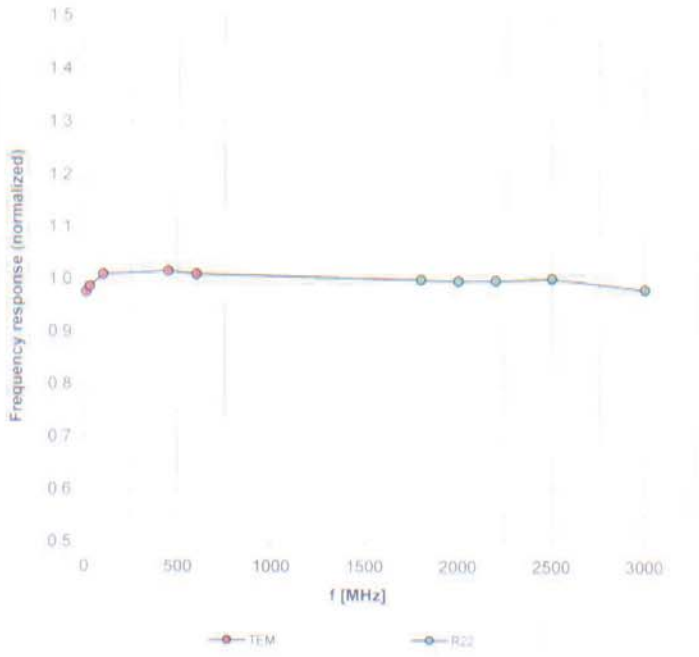
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
850	± 50 / ± 100	55.2 ± 5%	0.99 ± 5%	5.72	5.72	5.72	0.99	1.13 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.61	4.61	4.61	0.56	1.64 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.38	4.38	4.38	0.38	2.17 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.08	4.08	4.08	0.99	1.11 ± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	4.09	4.09	4.09	0.99	1.11 ± 11.0%

[C] 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.

Frequency Response of E-Field

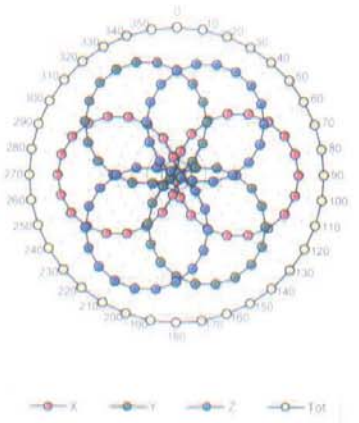
(TEM-Cell:ifi110 EXX, Waveguide: R22)



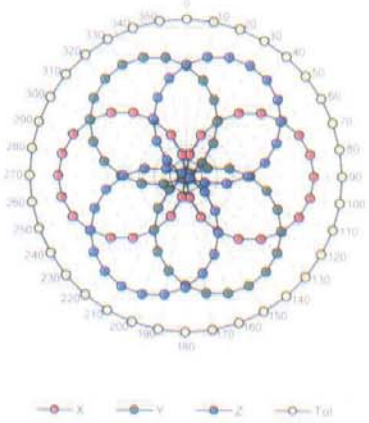
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

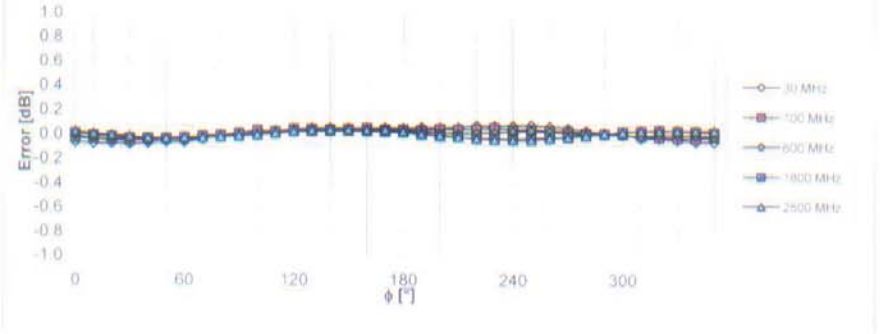
Receiving Pattern (ϕ), ϑ = 0°

f = 600 MHz, TEM ifi110EXX



f = 1800 MHz, WG R22

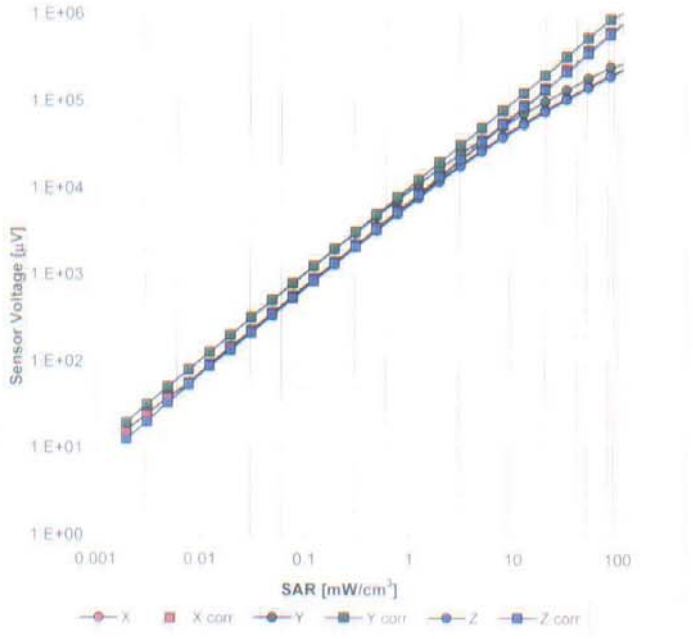


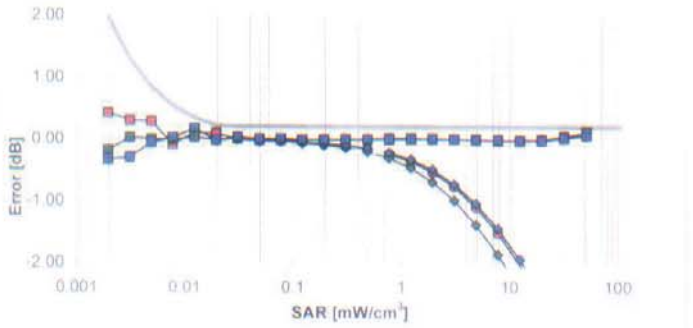


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

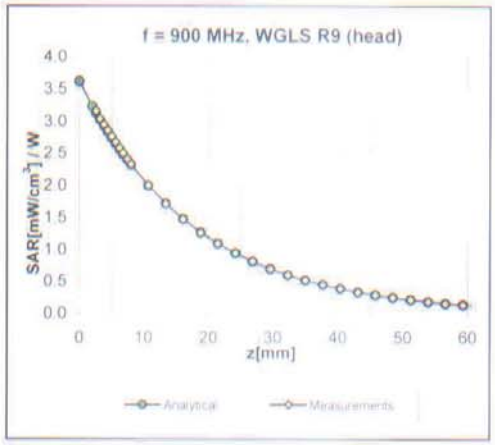
(TEM cell, f = 900 MHz)

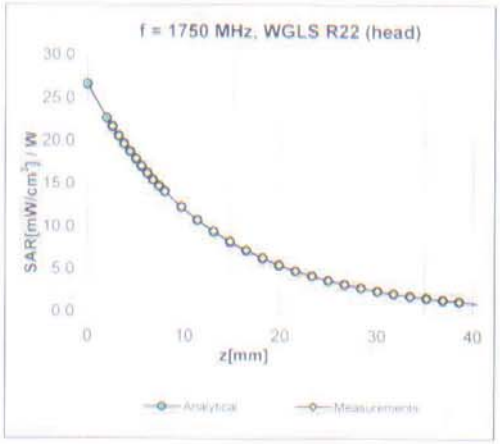




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

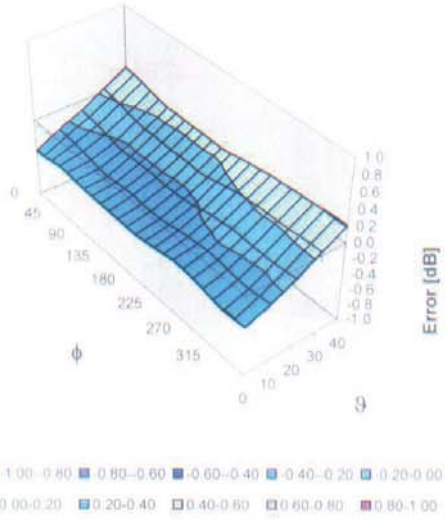
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm