SAR TEST REPORT

Equipment Under Test	Touchpad
Model Number of Host	HSTNH-I30C
Mode of Operation	GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA band
FCC ID	B94HHI30C
IC ID	3905A-HHI30C
Company Name	Hewlett-Packard Company
Company Address	950 W. Maude Ave, Sunnyvale, CA 94085 USA
Date of Receipt	2011.05.25
Date of Test(s)	2011.05.27
Date of Issue	2011.06.20

Standards:

FCC OET 65 supplement C,
IEEE /ANSI C95.1, C95.3, IEEE 1528
RSS-102

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan Electronic & Communication Laboratory or testing done by SGS Taiwan Electronic & Communication Laboratory in connection with distribution or use of the product described in this report must be approved by SGS Taiwan Electronic & Communication Laboratory in writing.

Tested by : **Antony Wu** **Date** : **2011.06.20**
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Approved by : **Robert Chang** **Date** : **2011.06.20**
Tech Manager

Revision Version

Report Number	Revision	Date	Memo
EN/2011/50008	00	2011/06/03	Initial creation of test report.
EN/2011/50008	01	2011/06/20	Modify 1st report

This test repot contains a reference to the previous version test report that it replaces.

Contents

1. General Information

1.1 Testing Laboratory

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1.2 Details of Applicant

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1.3 Description of EUT

EUT Name	Touchpad
Model No.	HSTNH-I30C
Model No of WWAN Module	ERICSON F5521qw(KRD 131 18/3)
Marketing Name.	HP TouchPad

FCC ID	B94HHI30C			
IC ID	3905A-HHI30C			
Definition	Production unit			
Mode of Operation	GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA band			
Definition	Production unit			
Duty Cycle	GPRS 850 (Class10)	GPRS 1900 (Class10)	WCDMA B2	WCDMA B5
	1/4		1	
TX Frequency Range (MHz)	GSM850	GSM1900	WCDMA B2	WCDMA B5
	824.2-848.8	1850.2-1909.8	1852.4-1907.6	826.4-846.6
Channel Number (ARFCN)	GSM850	GSM1900	WCDMA B2	WCDMA B5
	128-251	512- 810	9612-9888	4132-4233
Max. SAR Measured (1 g)	**GPRS 850**			
	1.08 mW/g (At GPRS 850 Body_Configuration 4_128 channel)			
	GPRS 1900			
	0.694 mW/g (At GPRS 1900 Body_Configuration 4_ 661 channel)			
	WCDMA B2			
	1.16 mW/g (At WCDMA B2 Body_Configuration 4_ 9400 channel)			
	WCDMA B5			
	1.09 mW/g (At WCDMA B5 Body_Configuration 4_ 4132 channel)			

Conducted Power

EUT Mode	Frequency (MHz)	CH	Avg. Power (1DN 1UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
GPRS 850 (Class 10)	824.2	128	33.0	30.0
	836.6	190	33.1	30.2
	848.8	251	33.2	30.3

EUT Mode	Frequency (MHz)	CH	Avg. Power (1DN 1UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
GPRS 1900 (Class 10)	1850.2	512	29.6	28.7
	1880.0	661	29.7	28.8
	1909.8	810	29.6	28.7

EUT Mode	Frequency (MHz)	CH	Avg. Power (1DN 1UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
EDGE 850 (Class 10)	824.2	128	27.0	27.0
	836.6	190	27.2	27.2
	848.8	251	27.3	27.3

EUT Mode	Frequency (MHz)	CH	Avg. Power (1DN 1UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
EDGE 1900 (Class 10)	1850.2	512	25.6	25.6
	1880.0	661	25.7	25.7
	1909.8	810	25.6	25.6

Mode	Sub-test	Band	WCDMA B2		
		Channel	9262	9400	9538
HSDPA	R99		22.33	22.32	22.01
	1	β_c/β_d (2/15)	22.5	22.21	21.87
	2	β_c/β_d(12/15)	22.21	22.18	21.86
	3	β_c/β_d(15/8)	22.02	21.76	21.34
	4	β_c/β_d(15/4)	22.09	21.77	21.46
HSUPA	1	β_c/β_d(11/15)	22.25	22.3	21.95
	2	β_c/β_d(6/15)	20.3	20.37	19.99
	3	β_c/β_d(15/9)	21.31	21.32	21.03
	4	β_c/β_d(2/15)	20.43	20.42	20.03
	5	β_c/β_d(15/15)	22.14	22.16	21.86
Mode	Sub-test	Band	WCDMA B5		
		Channel	4132	4183	4233
HSDPA	R99		24.30	24.21	24.25
	1	β_c/β_d (2/15)	24.09	24.07	24.37
	2	β_c/β_d(12/15)	24.23	24.1	24.12
	3	β_c/β_d(15/8)	23.63	23.59	23.88
	4	β_c/β_d(15/4)	23.68	23.63	23.94
HSUPA	1	β_c/β_d(11/15)	24.26	24.14	24.17
	2	β_c/β_d(6/15)	22.32	22.22	22.21
	3	β_c/β_d(15/9)	23.3	23.2	23.25
	4	β_c/β_d(2/15)	22.37	22.28	22.29
	5	β_c/β_d(15/15)	24.12	23.97	24.06

According to **KDB447498**-When the maximum output power variation across H, M and L channels is ≤ ½ dB, start with the middle channel; otherwise, start with the highest output power channel. When the measured 1-g SAR for the middle or highest output power channel is ≤ 0.8 W/kg, testing of the remaining two channels in that device and exposure configuration is not necessary.

Using **KDB941225 D01** to exclude SAR test requirements for HSPA modes due to the maximum average output power of HSPA active is less than 1/4 dB higher than that measured without HSPA using 12.2kbps RMC

#. Using **KDB941225 D03** to exclude SAR test requirements for EDGE modes due to the source-based time-averaged output power for edge mode is lower than that in the GPRS mode

1.4 Test Environment

Ambient Temperature : 22±2° C
Tissue Simulating Liquid: 22±2° C

1.5 Operation description

1. The EUT is controlled by using a Radio Communication Tester (Agilent 8960), and the communication between the EUT and the tester is established by air link.
2. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the batt-ery is fully charged.
3. During the SAR testing, the DASY5 system checks power drift by comparing the e-field strength of one specific location measured at the beginning with that measured at the end of the SAR testing.
4. When the maximum transmitter and antenna output power are ≦ 60/f(GHz) (mW) SAR evaluation is typically not required for FCC or TCB approval
   (BT power= 5.15dBm)

We will test it with 3 configurations:

Configuration 1: Front side. (test front position 10mm separation distance_hotspot mode) **(Appendix-Fig.3)**

Configuration 2: Lap-held mode. (WWAN/Main–to-user separation distance is 12mm) (Appendix-Fig.4)

Configuration 3: Primary Landscape mode. (WWAN/main-to-edge of screen distance is 175.11mm)(Appendix-Fig.5)

Configuration 4: Secondary Landscape mode. (WWAN/Main-to-user separation distance is 5.37 mm)(Appendix-Fig.6)

Configuration 5: Primary Portrait mode. (WWAN/main–to-edge of screen distance is 52.03 mm. SAR test is not required) (Appendix-Fig.7)

Configuration 6: Secondary Portrait mode. (WWAN/main–to-edge of screen distance is 86.61mm) (Appendix-Fig.8)

For larger tablets with a display or overall diagonal dimension > 20 cm, the SAR procedures in **KDB 447498** should be used.

The following procedures are applicable to tablet computers with antennas installed along the tablet edges while operating in Tablet Mode.21 When the output power of an antenna is > 60/f(GHz) mW, SAR is required for both bottom face and edge exposure conditions.

For edge configuration: SAR is required for each antenna located within 5 cm of the tablet edge closet to the user for the applicable display orientation

Front surface position with hotspot mode: The following procedures are applicable when the overall device length and width are ≥9 cm x 5 cm respectively, a test separation of 10 mm is required (referred as test guidance of **KDB 941225 D06**)

All the test positions of device relative to body were measured placing the device in direct contact with the phantom surface, so the requirements mentioned at RSS-102 Supplementary Procedures (SPR)-001 - SAR TESTING REQUIREMENTS WITH REGARD TO BYSTANDERS FOR LAPTOP TYPE COMPUTERS WITH ANTENNAS BUILT-IN ON DISPLAY SCREEN (LAPTOP MODE/TABLET MODE) are covered.

Configuration 1: Front side.

The highest 1-g SAR for WLAN is 0.167 W/kg and the highest 1-g SAR for WWAN is 0.728W/kg. The sum of 1-g for simultaneous transmitting WLAN and WWAN antenna pair is 0.167+0.728 = 0.895 W/kg < 1.6 W/kg.

Configuration 2: Lap-held mode.

The highest 1-g SAR for WLAN is 0.522 W/kg and the highest 1-g SAR for WWAN is 0.911W/kg. The sum of 1-g for simultaneous transmitting WLAN and WWAN antenna pair is 0.522+0.911 = 1.433 W/kg < 1.6 W/kg.

	Front side	**Lap-held mode.**	Primary Landscape mode.	Secondary Landscape mode.	Primary Portrait mode.	Secondary Portrait mode
1-g SAR for WLAN	**0.167 mW/g** (WLAN 802.11n (20M) 5.8G CH149)	**0.522 mW/g** (WLAN 802.11b CH6)	**0.057 mW/g** (WLAN 802.11n (40M) 5.8G CH159)	X	X	**0.965 mW/g** (WLAN 802.11n (40M) 5.5G CH118)
1-g SAR for WWAN	**0.728 mW/g** (WCDMA B2 CH9400)	**0.911 mW/g** (WCDMA B2 CH9538)	X	**1.16 mW/g** (WCDMA B2 CH9400)	X	X
SUM 1-g SAR	**0.895 mW/g**	**1.433 mW/g**	X	**1.16 mW/g**	X	**0.965 mW/g**

According to **KDB648474/KDB447498** Simultaneous SAR evaluation is not required.

1.6 The SAR Measurement System

A photograph of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY 5 professional system). A Model EX3DV4 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ ($|Ei|^2$)/ ρ where σ and ρ are the conductivity and mass density of the tissue-simulant.

The DASY5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc.

The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

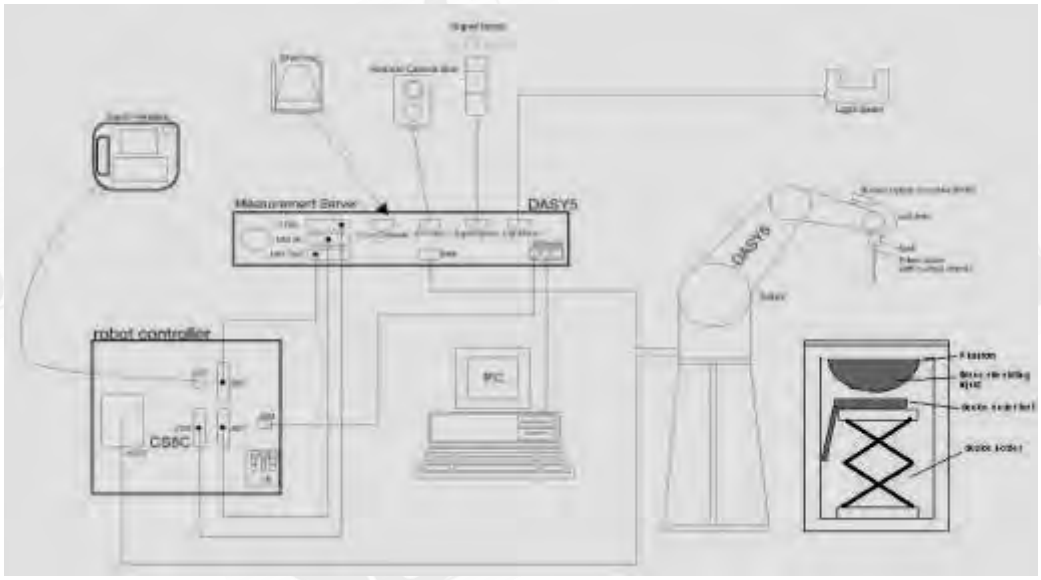


Fig.a The block diagram of SAR system

- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
  - A computer operating Windows 2000 or Windows XP.
  - DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
  - The SAM twin phantom enabling testing left-hand and right-hand usage.
  - The device holder for handheld mobile phones.
  - Tissue simulating liquid mixed according to the given recipes.
  - Validation dipole kits allowing to validate the proper functioning of the system.

1.7 System Components

EX3DV4 E-Field Probe

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for MSL850/1900 MHZ Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz, Linearity: ± 0.2 dB (30 MHz to 6 GHz)	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	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	
Application	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%.	

SAM PHANTOM V4.0C

Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.	
Shell Thickness	2 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Height: 850 mm; Length: 1000 mm; Width: 500 mm	

DEVICE HOLDER

Construction	The device holder (Supporter) for Notebook is made by POM (polyoxymethylene resin) , which is non-metal and non-conductive. The height can be adjusted to fit varies kind of notebooks.	 Device Holder

1.8 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 5% from the target SAR values. These tests were done at 850/1900 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was in the range 22.1°C, the relative humidity was in the range 62% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

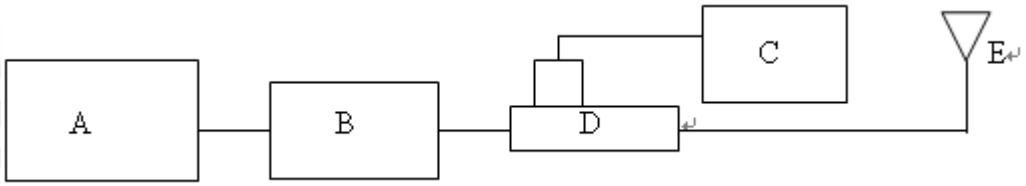
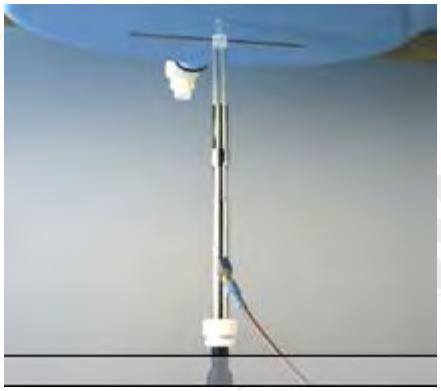


Fig.b The block diagram of system verification

A. Agilent Model 8648D Signal Generator
B. Mini circuits Model ZHL-42 Amplifier
C. Agilent Model U2001B Power Sensor
D. Agilent Model 778D Dual directional coupling
E. Reference dipole antenna



Photograph of the dipole Antenna

Validation Kit	Frequency (MHz)	Target SAR (1g) (Pin=250mW)	Measured SAR (1g)	Measured Date
D835V2 S/N: 4d063	835 MHz (Body)	2.58 mW/g	2.47 mW/g	2011-05-27
D1900V2 S/N: 5d027	1900 MHz (Body)	9.93 mW/g	10.1 mW/g	2011-05-27

Table 1. Results of system validation

1.9 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this body-simulant fluid were measured by using the Agilent Model 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with HP 8753D Network Analyzer (30 KHz-6000 MHz) by using a procedure detailed in Section V.

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The depth of the tissue timulant in the ear reference point of the phantom was 15cm±5mm during all tests. (Fig .2)

Frequency (MHz)	Tissue type	Measurement date/ Limits	Dielectric Parameters		
			ρ	σ (S/m)	Simulated Tissue Temperature(° C)
850	Body	Measured, 2011-05-27	52.405	1.007	21.7
		Recommended Limits	52.25-57.75	0.96-1.06	20-24
1900	Body	Measured, 2011-05-27	52.619	1.529	21.7
		Recommended Limits	48.55-53.66	1.44-1.60	20-24

Table 2. Dielectric Parameters of Tissue Simulant Fluid

1.10 Evaluation Procedures

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan.
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. The generation of a high-resolution mesh within the measured volume
4. The interpolation of all measured values from the measurement grid to the high-resolution grid
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. The calculation of the averaged SAR within masses of 1g and 10g.

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within –2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans. The routines are verified and optimized for the grid dimensions used in these cube measurements.
The measured volume of 30x30x30mm contains about 30g of tissue.
The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is the moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

1.11 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (“SAR”) in Section 4.2 of “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,” ANSI/IEEE C95.1–1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in “Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields,” NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814.

SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube).

(2) Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(3) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.(Table .4)

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR (Brain)	1.60 m W/g	8.00 m W/g
Spatial Average SAR (Whole Body)	0.08 m W/g	0.40 m W/g
Spatial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 m W/g	20.00 m W/g

Table .3 RF exposure limits

Notes:

1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

2. Summary of Results

GPRS 850 MHZ

Configuration 1: Front side(test front position 10mm separation distance_hotspot mode)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850 MHz	190	836.6	30.2dBm	0.559	22.1	21.7
Configuration 2: Lap-held						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850 MHz	190	836.6	30.2dBm	0.766	22.1	21.7
Configuration 4: Secondary Landscape						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850 MHz	128	824.2	30.0dBm	1.08	22.1	21.7
	190	836.6	30.2dBm	1.07	22.1	21.7
	251	848.8	30.3dBm	1.01	22.1	21.7
Configuration 4: Secondary Landscape _repeated with EDGE mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850 MHz	128	824.2	27dBm	0.548	22.1	21.7

GPRS 1900 MHZ

Configuration 1: Front side(test front position 10mm separation distance_hotspot mode)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900 MHz	661	1880	28.8dBm	0.476	22.1	21.7
Configuration 2: Lap-held						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900 MHz	661	1880	28.8dBm	0.633	22.1	21.7
Configuration 4: Secondary Landscape						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900 MHz	661	1880	28.8dBm	0.694	22.1	21.7

WCDMA B2

Configuration 1: Front side(test front position 10mm separation distance_hotspot mode)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
WCDMA B2	9400	1880	22.32dBm	0.728	22.1	21.7
Configuration 2: Lap-held						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
WCDMA B2	9262	1852.4	22.33dBm	0.703	22.1	21.7
	9400	1880	22.32dBm	0.888	22.1	21.7
	9538	1907.6	22.01dBm	0.911	22.1	21.7
Configuration 4: Secondary Landscape						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
WCDMA B2	9262	1852.4	22.33dBm	1.07	22.1	21.7
	9400	1880	22.32dBm	**1.16**	22.1	21.7
	9538	1907.6	22.01dBm	1.15	22.1	21.7

WCDMA B5

Configuration 1: Front side(test front position 10mm separation distance_hotspot mode)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
WCDMA B5	4183	836.6	24.21dBm	0.441	22.1	21.7
Configuration 2: Lap-held						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
WCDMA B5	4183	836.6	24.21dBm	0.586	22.1	21.7
Configuration 4: Secondary Landscape						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
WCDMA B5	4132	826.4	24.30dBm	1.09	22.1	21.7
	4183	836.6	24.21dBm	1.03	22.1	21.7
	4233	846.6	24.25dBm	1.05	22.1	21.7

Note: The SAR measurement results with transmitter at maximum output power.

3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4	3703	Jan.24.2011
Schmid & Partner Engineering AG	850 /1900 MHz System Validation Dipole	D835V2	4d082	Jul.20.2010
		D1900V2	5d027	Apr.19.2011
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	679	Jun.18.2010
Schmid & Partner Engineering AG	Software	DASY 5 V5.0 Build125	N/A	Calibration not required
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration not required
HP	Network Analyzer	8753D	3410A05547	Mar.16.2011
HP	Dielectric Probe Kit	85070D	US01440168	Calibration not required
Agilent	Dual-directional coupler	778D	50313	Aug.25.2010
Agilent	RF Signal Generator	8648D	3847M00432	Jun.04.2010
Agilent	Power Sensor	U2001B	MY48100169	Apr.28.2011
Agilent	Radio Communication Test	E5515C	GB44051912	Jul.27.2010

4. Measurements

Date: 5/27/2011

Configuration 1_ CH190

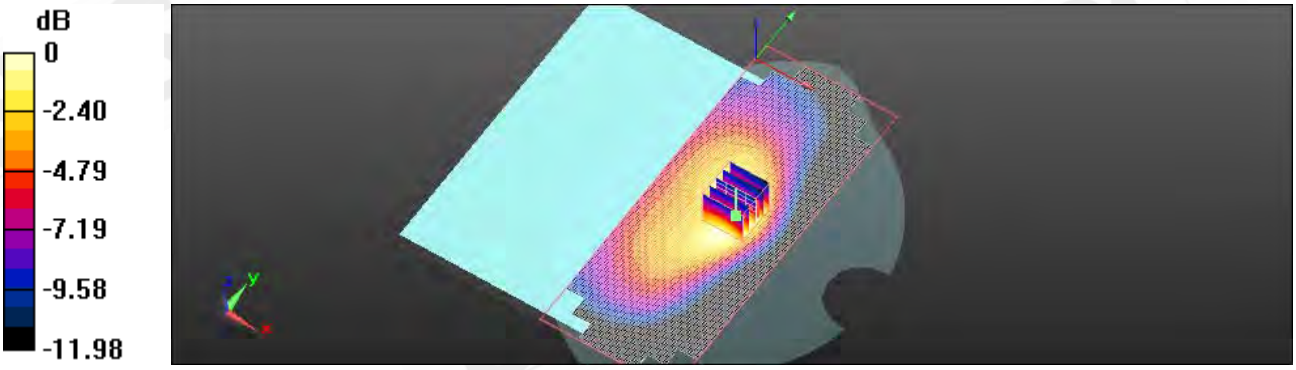
Communication System: GPRS(Class 10); Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1.012 mho/m; ε_r = 52.447; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (71x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.596 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.436 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.950 W/kg

SAR(1 g) = 0.559 mW/g; SAR(10 g) = 0.341 mW/g
Maximum value of SAR (measured) = 0.593 mW/g



0 dB = 0.590mW/g

Configuration 2_ CH190

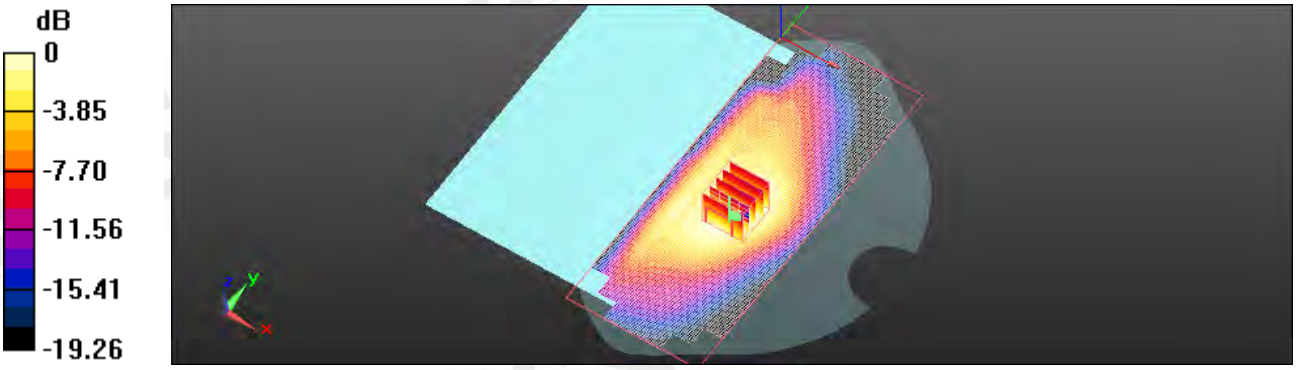
Communication System: GPRS(Class 10); Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1.012 mho/m; ε_r = 52.447; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (71x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.808 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.571 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 1.244 W/kg

SAR(1 g) = 0.766 mW/g; SAR(10 g) = 0.487 mW/g
Maximum value of SAR (measured) = 0.819 mW/g



0 dB = 0.820mW/g

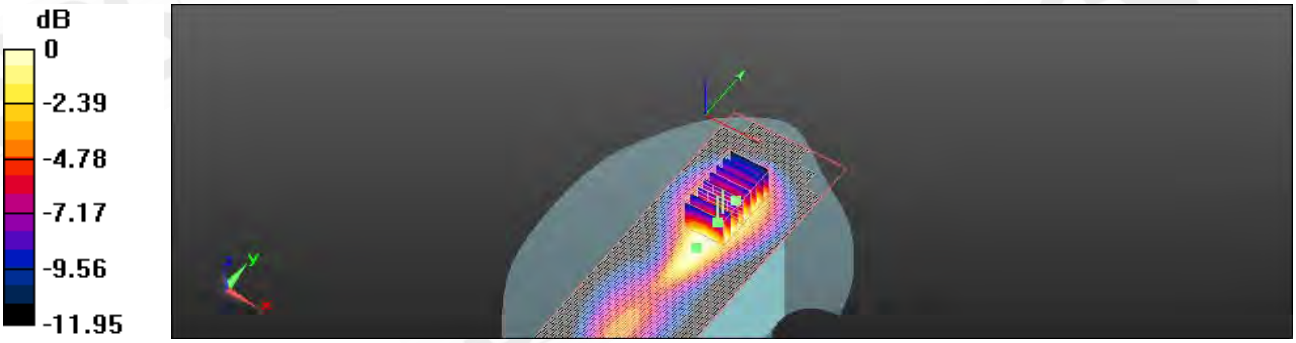
Date: 5/27/2011

Configuration 4_ CH128

Communication System: GPRS(Class 10); Frequency: 824.2 MHz
Medium parameters used: f = 824.2 MHz; σ = 0.985 mho/m; ε_r = 52.452; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.208 mW/g
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.356 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.667 W/kg
SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.734 mW/g
Maximum value of SAR (measured) = 1.164 mW/g
Configuration/Body/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.356 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.524 W/kg
SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.702 mW/g
Maximum value of SAR (measured) = 1.135 mW/g



0 dB = 1.130mW/g

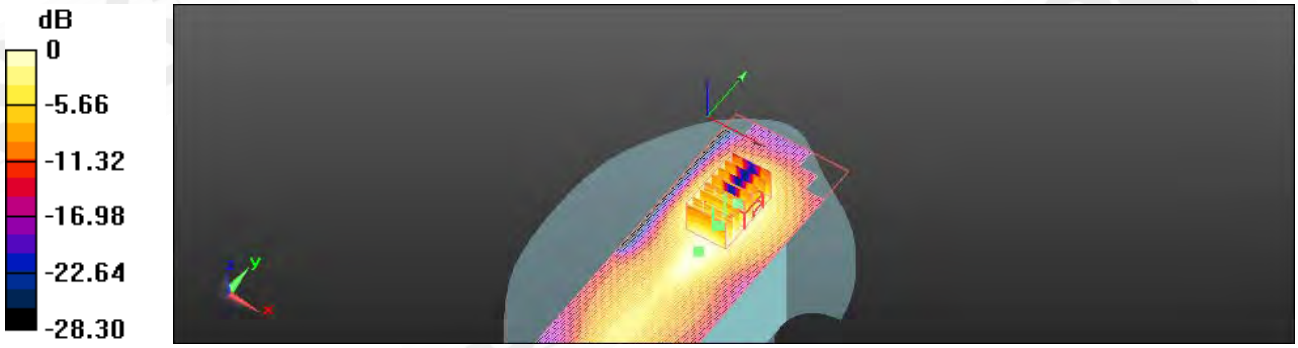
Date: 5/27/2011

Configuration 4_ CH190

Communication System: GPRS(Class 10); Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1.012 mho/m; ε_r = 52.447; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.179 mW/g
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.812 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.711 W/kg
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.720 mW/g
Maximum value of SAR (measured) = 1.165 mW/g
Configuration/Body/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.812 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 2.177 W/kg
SAR(1 g) = 0.946 mW/g; SAR(10 g) = 0.372 mW/g
Maximum value of SAR (measured) = 1.129 mW/g



0 dB = 1.130mW/g

Date: 5/27/2011

Configuration 4_CH251

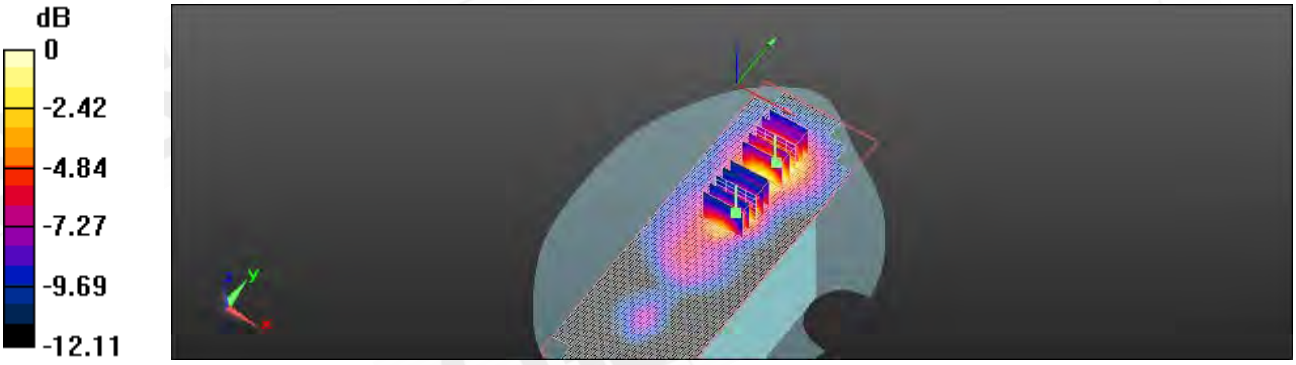
Communication System: GPRS(Class 10); Frequency: 848.8 MHz
Medium parameters used: f = 849 MHz; σ = 1.017 mho/m; ε_r = 52.694; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.137 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.061 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.470 W/kg

SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.670 mW/g
Maximum value of SAR (measured) = 1.092 mW/g



0 dB = 1.090mW/g

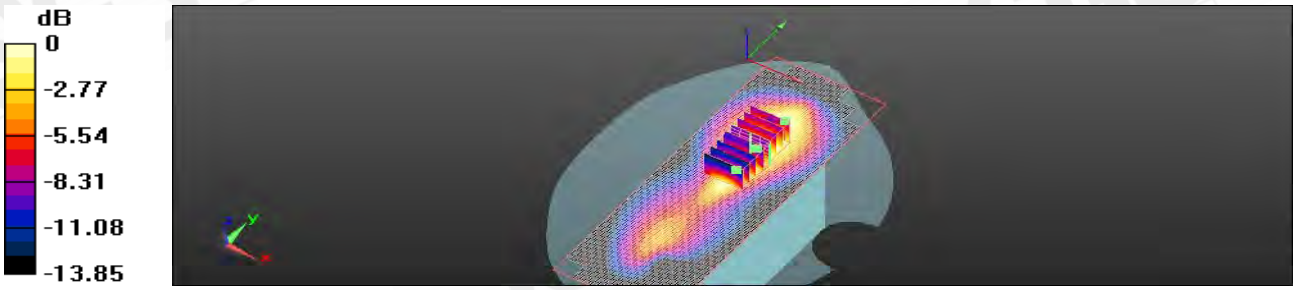
Date: 5/27/2011

Configuration 4_CH128_repeated with EDGE mode

Communication System: GPRS(Class 10); Frequency: 824.2 MHz
Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.985 mho/m; ε_r = 52.452; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.605 mW/g
Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.295 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.856 W/kg
SAR(1 g) = 0.548 mW/g; SAR(10 g) = 0.370 mW/g
Maximum value of SAR (measured) = 0.593 mW/g
Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.295 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.856 W/kg
SAR(1 g) = 0.524 mW/g; SAR(10 g) = 0.293 mW/g
Maximum value of SAR (measured) = 0.599 mW/g



0 dB = 0.600mW/g

Date: 5/27/2011

Configuration 1_ CH661

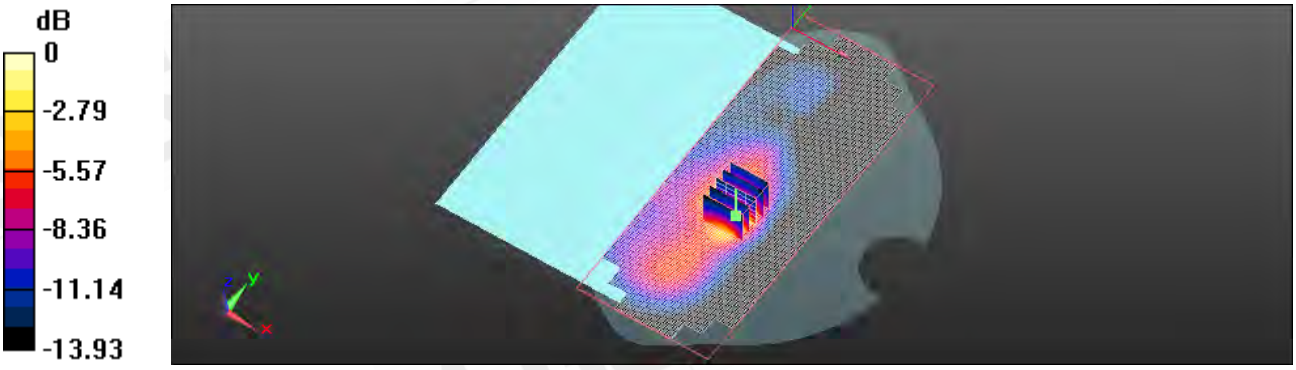
Communication System: GPRS(Class 10); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.503 mho/m; εr = 52.734; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (71x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.497 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.277 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.910 W/kg

SAR(1 g) = 0.476 mW/g; SAR(10 g) = 0.243 mW/g
Maximum value of SAR (measured) = 0.547 mW/g



0 dB = 0.550mW/g

Date: 5/27/2011

Configuration 2_ CH661

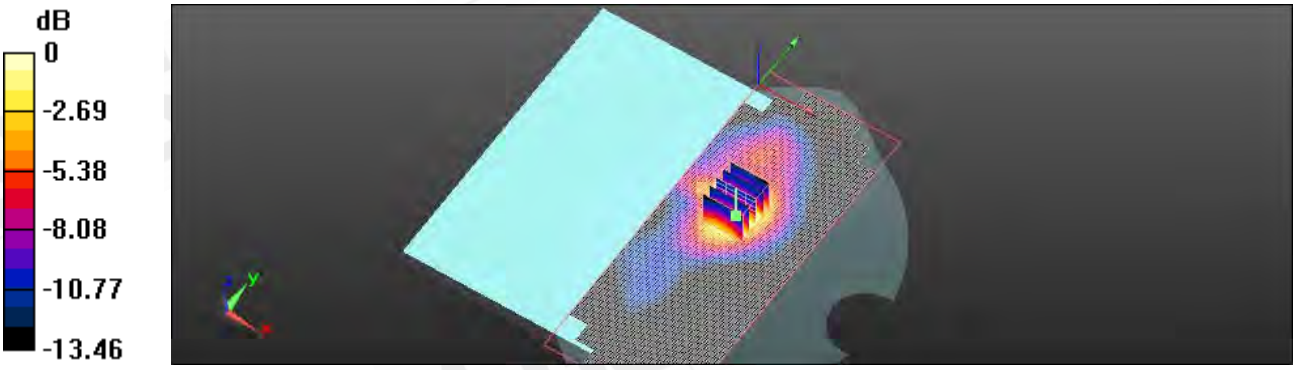
Communication System: GPRS(Class 10); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.503 mho/m; εr = 52.734; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (71x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.688 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.666 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.045 W/kg

SAR(1 g) = 0.633 mW/g; SAR(10 g) = 0.365 mW/g
Maximum value of SAR (measured) = 0.694 mW/g



0 dB = 0.690mW/g

Date: 5/27/2011

Configuration 4_ CH661

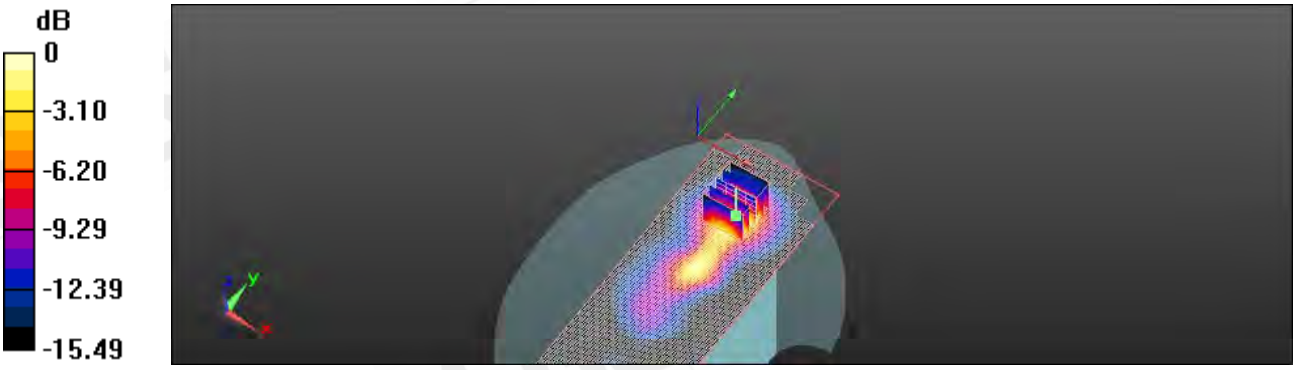
Communication System: GPRS(Class 10); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.503 mho/m; εr = 52.734; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.859 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.930 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.168 W/kg

SAR(1 g) = 0.694 mW/g; SAR(10 g) = 0.371 mW/g
Maximum value of SAR (measured) = 0.767 mW/g



0 dB = 0.770mW/g

Date: 5/27/2011

Configuration 1 _CH9400

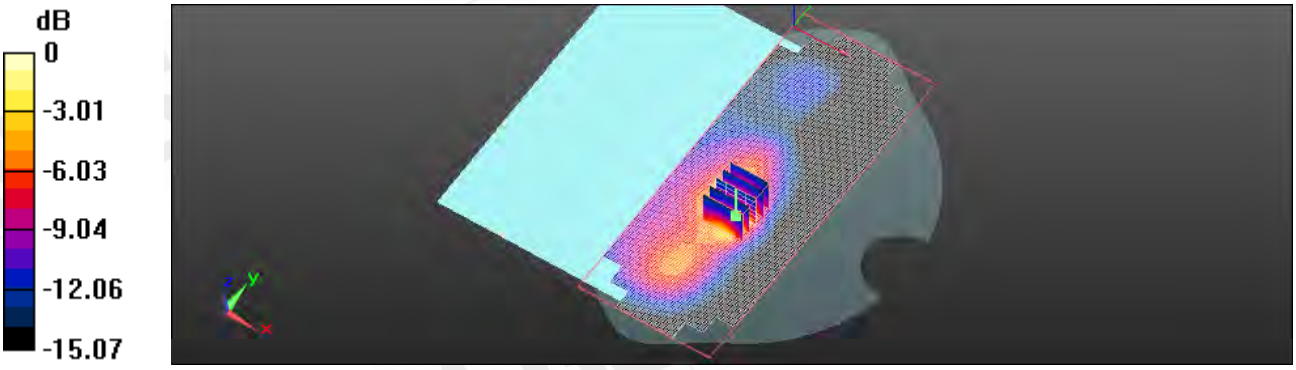
Communication System: WCDMA; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.503 mho/m; εr = 52.734; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (71x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.829 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.275 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.394 W/kg

SAR(1 g) = 0.728 mW/g; SAR(10 g) = 0.378 mW/g
Maximum value of SAR (measured) = 0.849 mW/g



0 dB = 0.850mW/g

Date: 5/27/2011

Configuration 2 _CH9262

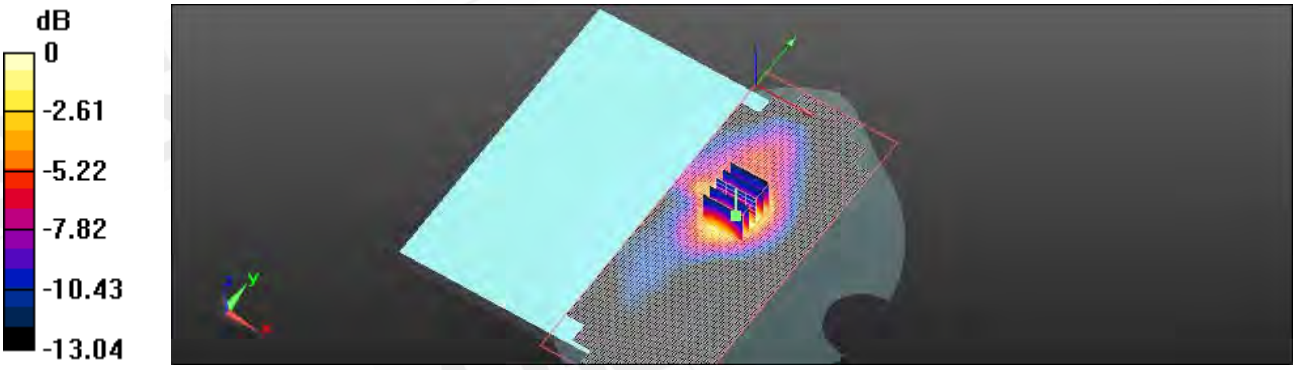
Communication System: WCDMA; Frequency: 1852.4 MHz
Medium parameters used: f = 1852.4 MHz; σ = 1.479 mho/m; ε_r = 52.885; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (71x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.763 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.728 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.114 W/kg

SAR(1 g) = 0.703 mW/g; SAR(10 g) = 0.413 mW/g
Maximum value of SAR (measured) = 0.770 mW/g



0 dB = 0.770mW/g

Date: 5/27/2011

Configuration 2_ CH9400

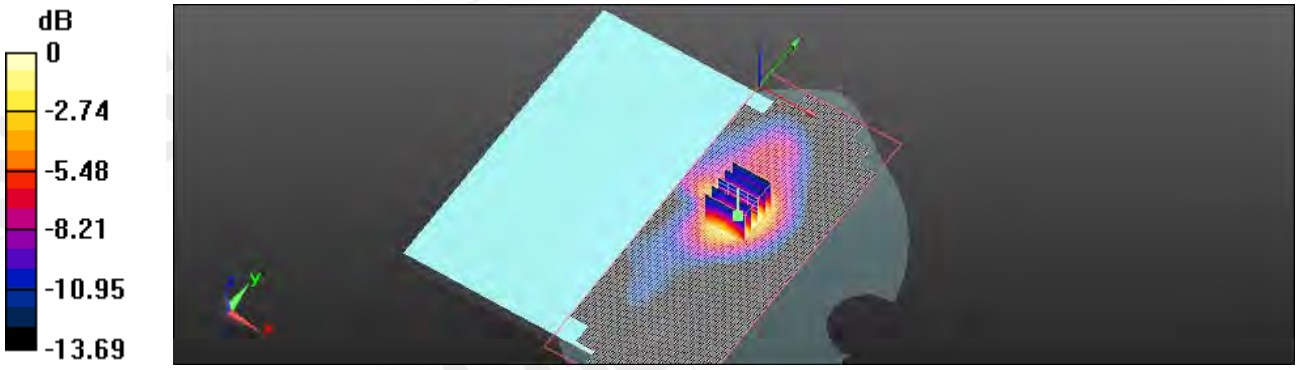
Communication System: WCDMA; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.503 mho/m; εr = 52.734; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (71x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.956 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.058 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 1.478 W/kg

SAR(1 g) = 0.888 mW/g; SAR(10 g) = 0.513 mW/g
Maximum value of SAR (measured) = 0.973 mW/g



0 dB = 0.970mW/g

Date: 5/27/2011

Configuration 2 _CH9538

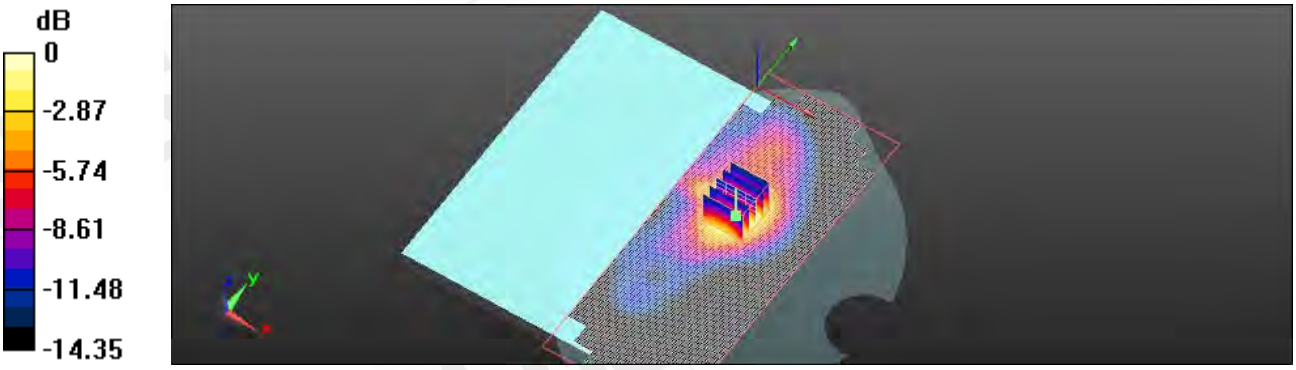
Communication System: WCDMA; Frequency: 1907.6 MHz
Medium parameters used: f = 1908 MHz; σ = 1.538 mho/m; ε_r = 52.573; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (71x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.981 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.289 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.498 W/kg

SAR(1 g) = 0.911 mW/g; SAR(10 g) = 0.528 mW/g
Maximum value of SAR (measured) = 0.989 mW/g



0 dB = 0.990mW/g

Date: 5/27/2011

Configuration 4 _CH9262

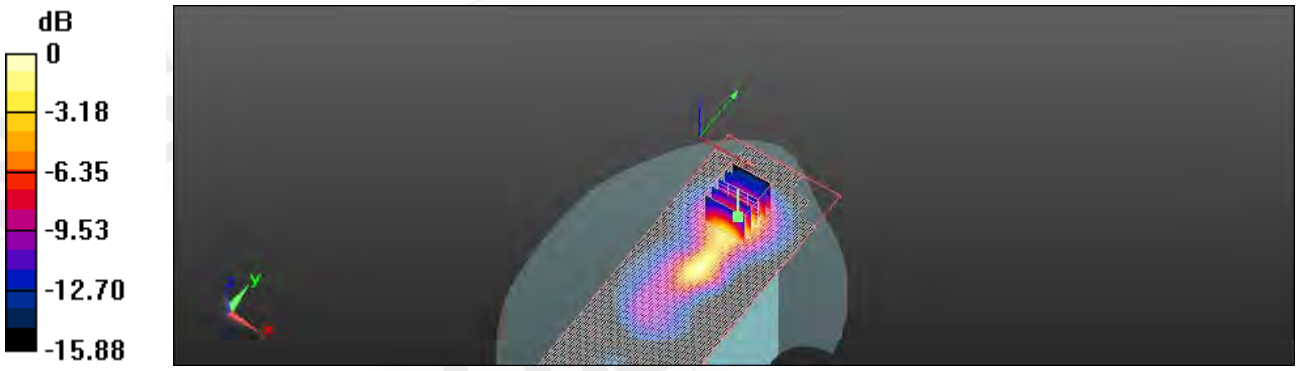
Communication System: WCDMA; Frequency: 1852.4 MHz
Medium parameters used: f = 1852.4 MHz; σ = 1.479 mho/m; ε_r = 52.885; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.288 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.495 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 1.871 W/kg

SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.572 mW/g
Maximum value of SAR (measured) = 1.156 mW/g



0 dB = 1.160mW/g

Date: 5/27/2011

Configuration 4 _CH9400

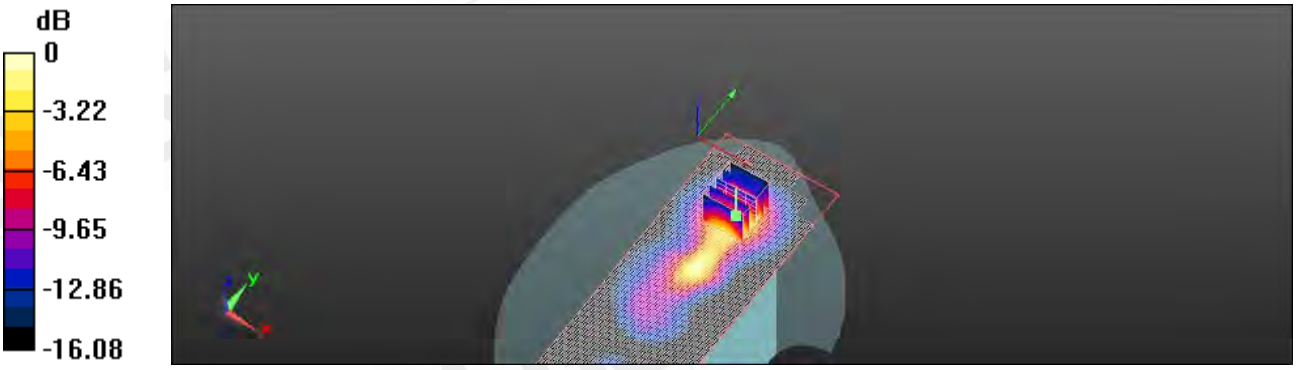
Communication System: WCDMA; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.503 mho/m; εr = 52.734; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.440 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.570 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 2.079 W/kg

SAR(1 g) = 1.16 mW/g; SAR(10 g) = 0.617 mW/g
Maximum value of SAR (measured) = 1.262 mW/g



0 dB = 1.260mW/g

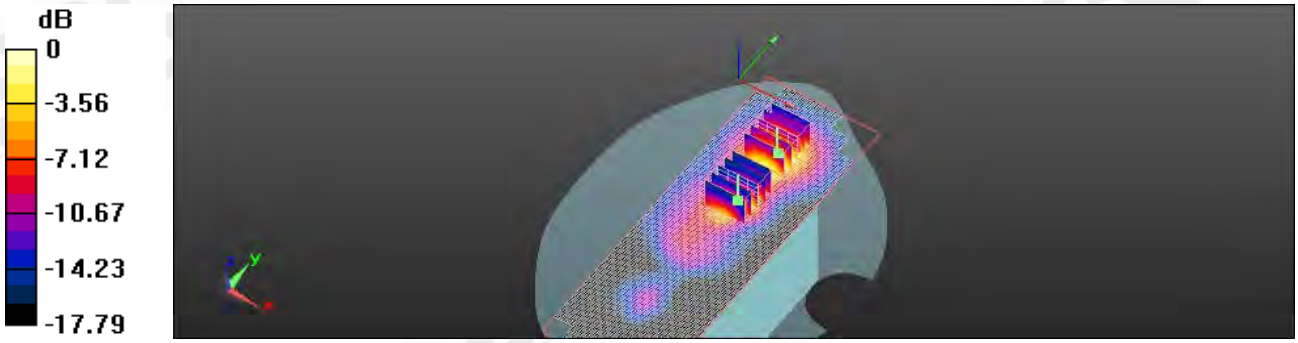
Date: 5/27/2011

Configuration 4 _CH9538

Communication System: WCDMA; Frequency: 1907.6 MHz
Medium parameters used: f = 1908 MHz; σ = 1.538 mho/m; ε_r = 52.573; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.471 mW/g
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.286 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 2.193 W/kg
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.586 mW/g
Maximum value of SAR (measured) = 1.288 mW/g
Configuration/Body/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.286 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 2.029 W/kg
SAR(1 g) = 0.907 mW/g; SAR(10 g) = 0.388 mW/g
Maximum value of SAR (measured) = 1.012 mW/g



0 dB = 1.010mW/g

Date: 5/27/2011

Configuration 1 _CH4183

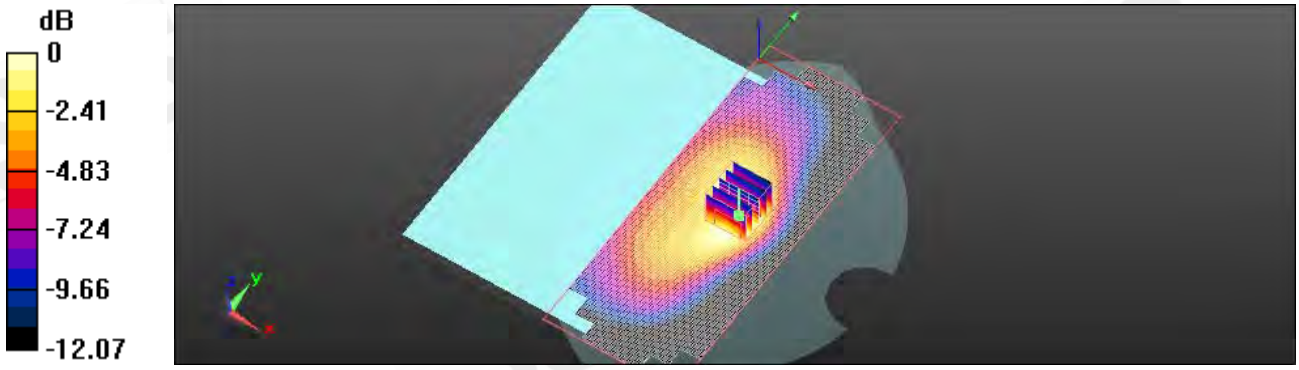
Communication System: WCDMA; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1.012 mho/m; ε_r = 52.447; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (71x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.467 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.405 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.757 W/kg

SAR(1 g) = 0.441 mW/g; SAR(10 g) = 0.269 mW/g
Maximum value of SAR (measured) = 0.468 mW/g



0 dB = 0.470mW/g

Date: 5/27/2011

Configuration 2 _CH4183

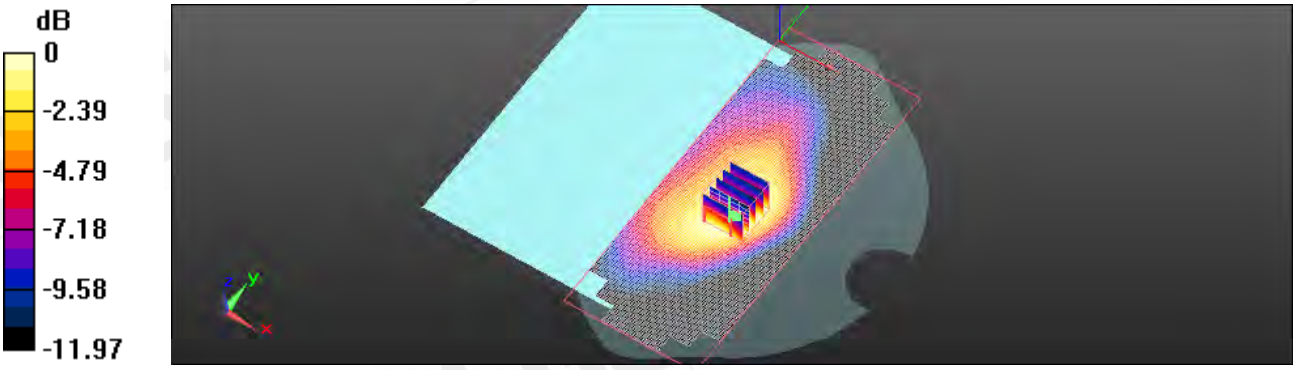
Communication System: WCDMA; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1.012 mho/m; ε_r = 52.447; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (71x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.641 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.727 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.954 W/kg

SAR(1 g) = 0.586 mW/g; SAR(10 g) = 0.368 mW/g
Maximum value of SAR (measured) = 0.628 mW/g



0 dB = 0.630mW/g

Date: 5/27/2011

Configuration 4 _CH4132

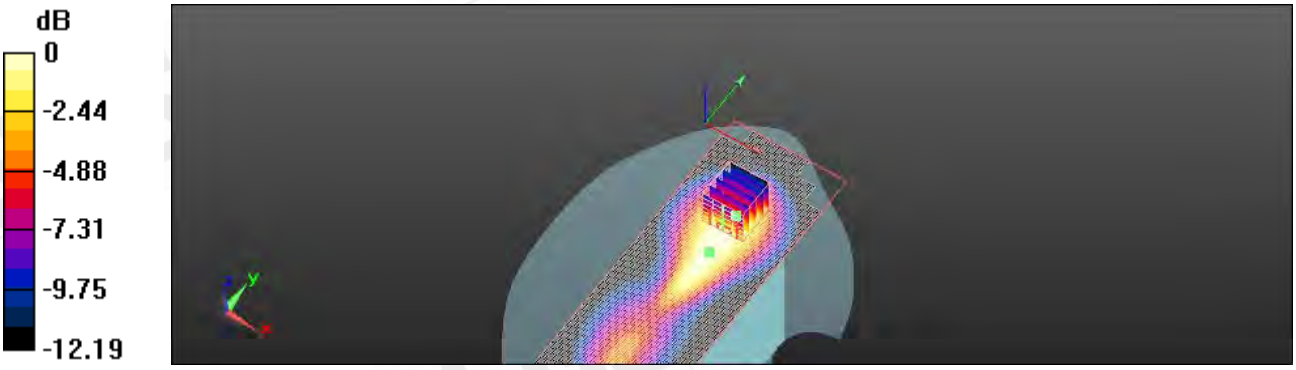
Communication System: WCDMA; Frequency: 826.4 MHz
Medium parameters used: f = 826.4 MHz; σ = 0.989 mho/m; ε_r = 52.525; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.345 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.899 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.683 W/kg

SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.784 mW/g
Maximum value of SAR (measured) = 1.176 mW/g



0 dB = 1.180mW/g

Date: 5/27/2011

Configuration 4 _CH4183

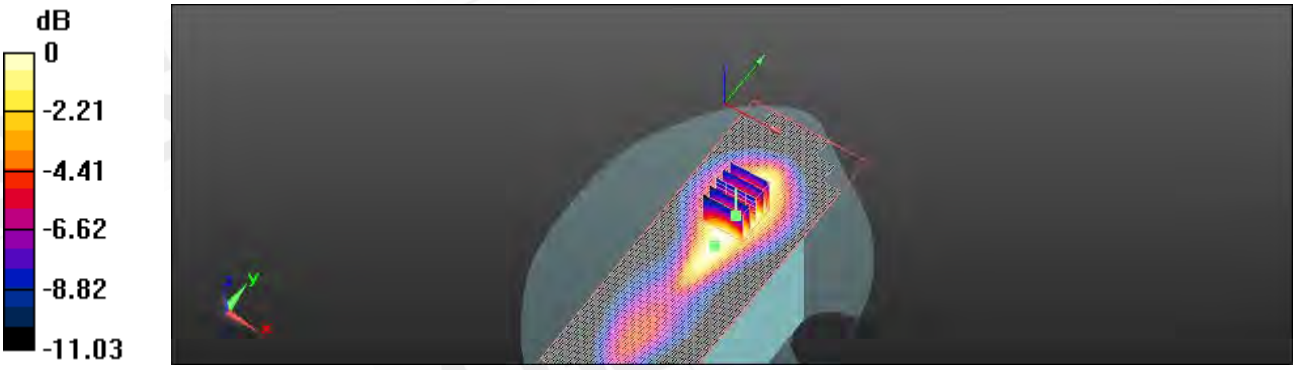
Communication System: WCDMA; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1.012 mho/m; ε_r = 52.447; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.166 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.748 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.574 W/kg

SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.696 mW/g
Maximum value of SAR (measured) = 1.085 mW/g



0 dB = 1.080mW/g

Date: 5/27/2011

Configuration 4 _CH4233

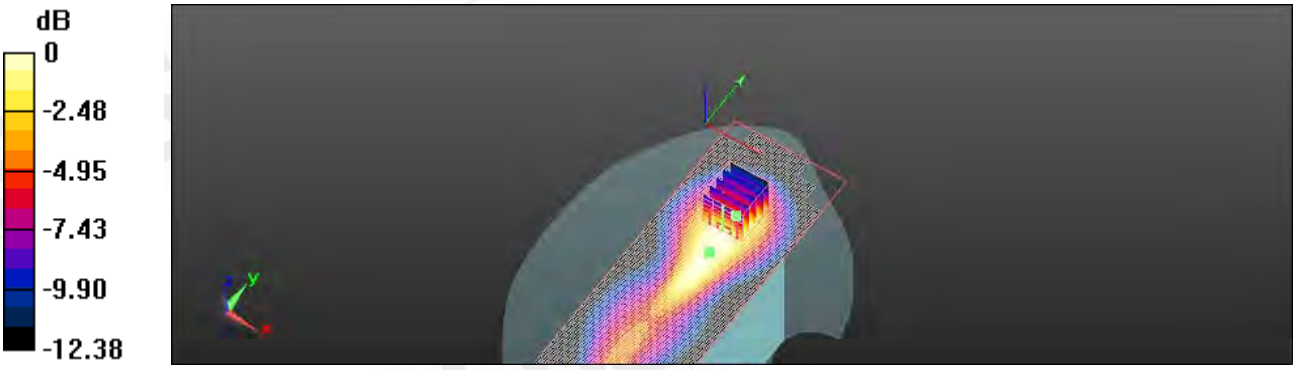
Communication System: WCDMA; Frequency: 846.6 MHz
Medium parameters used: f = 847 MHz; σ = 1.012 mho/m; ε_r = 52.669; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/Body/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.198 mW/g

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.515 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.587 W/kg

SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.692 mW/g
Maximum value of SAR (measured) = 1.133 mW/g



0 dB = 1.130mW/g

5. SAR System Performance Verification

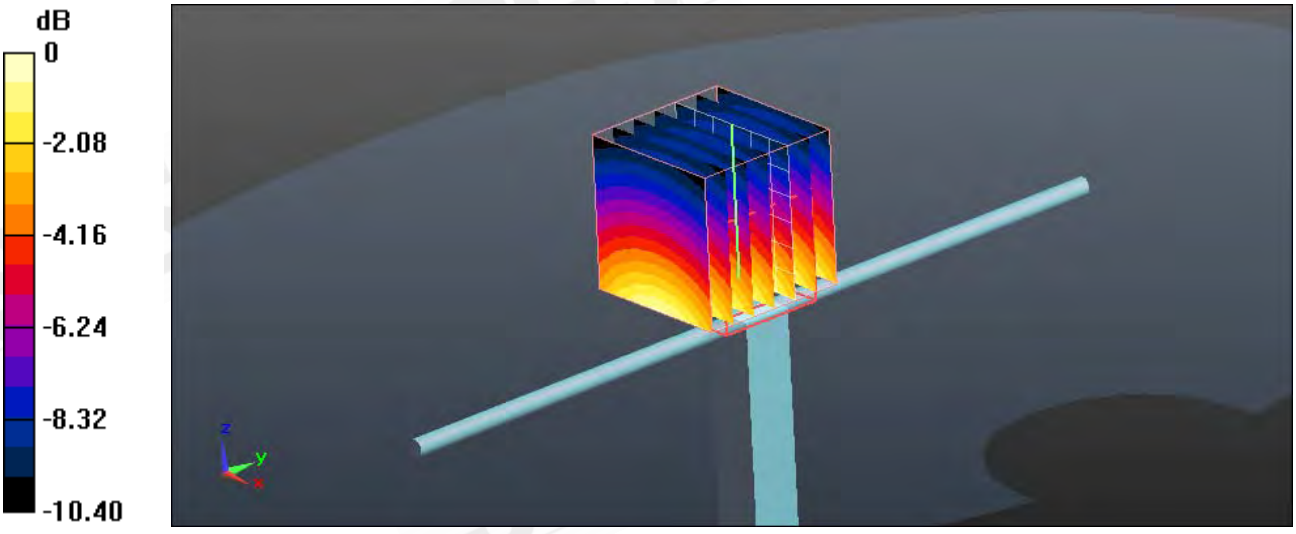
Date: 5/27/2011

DUT: Dipole 835 MHz;

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.007 mho/m; ε_r = 52.405; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/d=15mm, Pin=250mW, dist=4mm: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 49.429 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 3.793 W/kg
SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.62 mW/g
Maximum value of SAR (measured) = 2.624 mW/g



0 dB = 2.620mW/g

Date: 5/27/2011

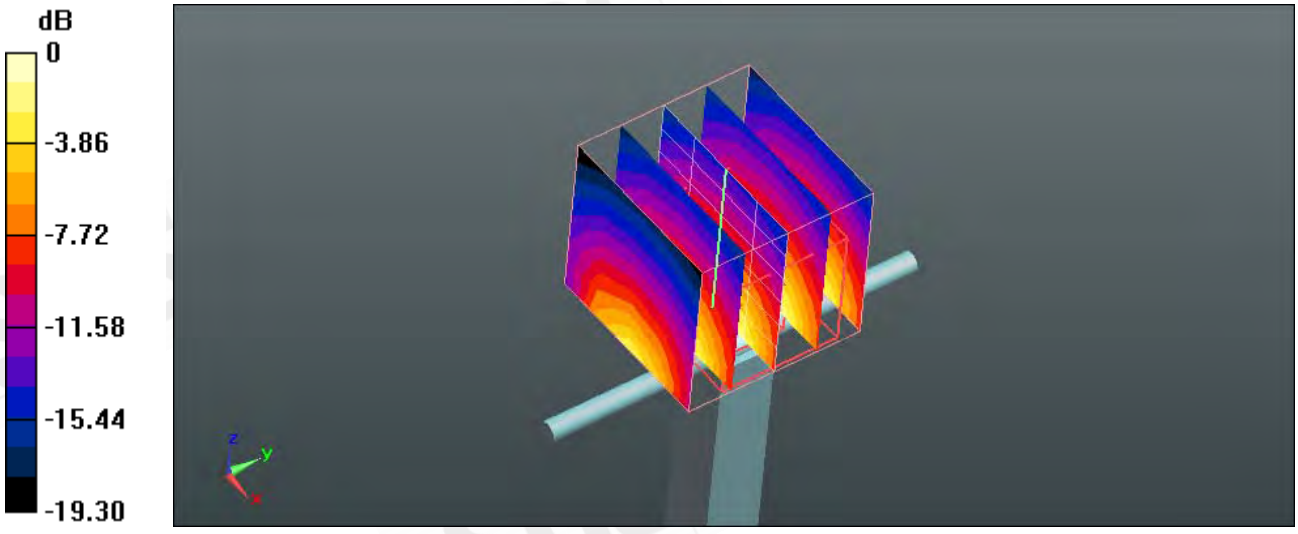
DUT: Dipole 1900 MHz;

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.529 mho/m; ε_r = 52.619; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 6/18/2010
- Phantom: SAM with CRP Left; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (1); SEMCAD X Version 14.4.2 (2595)

Configuration/d=10mm, Pin=250mW, dist=4mm: Measurement grid:
dx=8mm, dy=8mm, dz=5mm
Reference Value = 94.098 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 20.133 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 4.98 mW/g
Maximum value of SAR (measured) = 12.591 mW/g



0 dB = 12.590mW/g

6. DAE & Probe Calibration certificate

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 **Auden**

Certificate No: **DAE4-679_Jun10**

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 679
Calibration procedure(s)	QA CAL-06.v21 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	June 18, 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
Keithley Multimeter Type 2001	SN: 0810278	1-Oct-09 (No: 9055)	Oct-10
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	R&D Director	

Issued: June 18, 2010

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

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

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S 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 **SGS-TW (Auden)**

Certificate No: **EX3-3703_Jan11**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3703

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

Calibration date: January 24, 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:	Katja Pokovic	Technical Manager	
Approved by:	Fin Bomholt	R&D Director	

Issued: January 25, 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

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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
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 EX3DV4

SN:3703

Manufactured:	July 21, 2009
Last calibrated:	December 30, 2009
Recalibrated:	January 24, 2011

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

EX3DV4 SN:3703 January 24, 2011

DASY/EASY - Parameters of Probe: EX3DV4 SN:3703

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.52	0.52	0.54	± 10.1%
DCP (mV)[B]	98.8	94.8	99.6	

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	154.8	± 3.1 %
			Y	0.00	0.00	1.00	118.0	
			Z	0.00	0.00	1.00	156.4	

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: EX3DV4 SN:3703

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%	9.21	9.21	9.21	0.73	0.65 ± 11.0%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	8.83	8.83	8.83	0.79	0.61 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	8.78	8.78	8.78	0.73	0.63 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	8.02	8.02	8.02	0.50	0.71 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	7.67	7.67	7.67	0.39	0.82 ± 11.0%
2000	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	7.63	7.63	7.63	0.35	0.86 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	7.00	7.00	7.00	0.32	0.91 ± 11.0%
2600	± 50 / ± 100	39.0 ± 5%	1.96 ± 5%	6.75	6.75	6.75	0.30	1.02 ± 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.

EX3DV4 SN:3703 January 24, 2011

DASY/EASY - Parameters of Probe: EX3DV4 SN:3703

Calibration Parameter Determined in Body Tissue Simulating Media

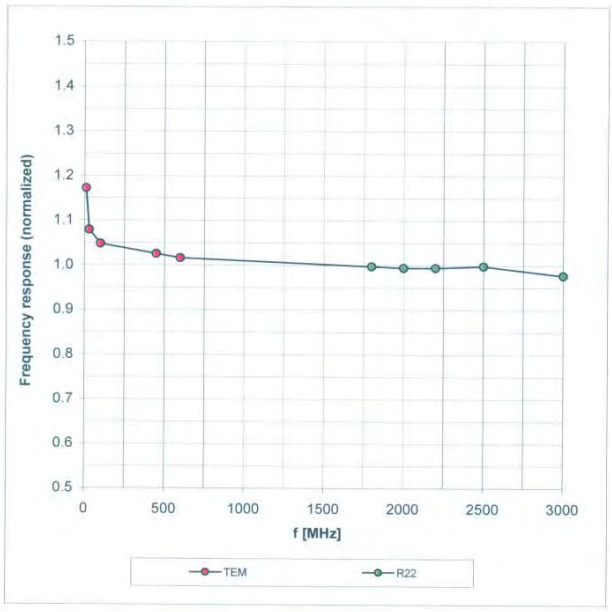
f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	9.06	9.06	9.06	0.57	0.73 ± 11.0%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	8.85	8.85	8.85	0.46	0.83 ± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	8.74	8.74	8.74	0.45	0.83 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	7.26	7.26	7.26	0.58	0.70 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	7.04	7.04	7.04	0.44	0.82 ± 11.0%
2000	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	7.13	7.13	7.13	0.61	0.70 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	6.82	6.82	6.82	0.41	0.82 ± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	6.78	6.78	6.78	0.33	0.89 ± 11.0%
5200	± 50 / ± 100	49.0 ± 5%	5.30 ± 5%	4.00	4.00	4.00	0.50	1.95 ± 13.1%
5300	± 50 / ± 100	48.9 ± 5%	5.42 ± 5%	3.73	3.73	3.73	0.55	1.95 ± 13.1%
5600	± 50 / ± 100	48.5 ± 5%	5.77 ± 5%	3.42	3.42	3.42	0.65	1.95 ± 13.1%
5800	± 50 / ± 100	48.2 ± 5%	6.00 ± 5%	3.67	3.67	3.67	0.65	1.95 ± 13.1%

[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.

EX3DV4 SN:3703 January 24, 2011

Frequency Response of E-Field

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



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

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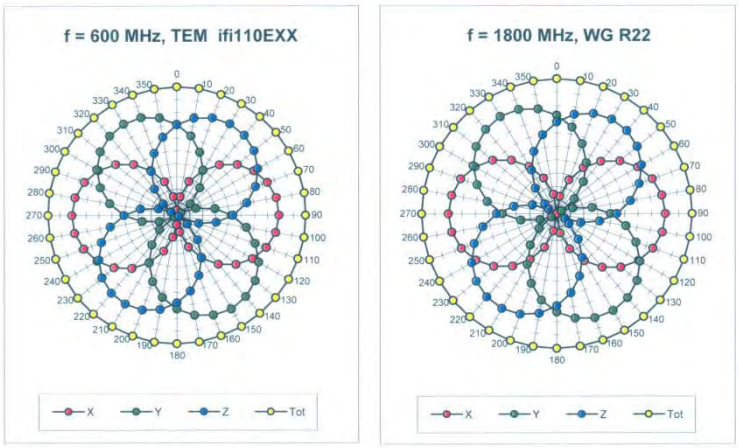
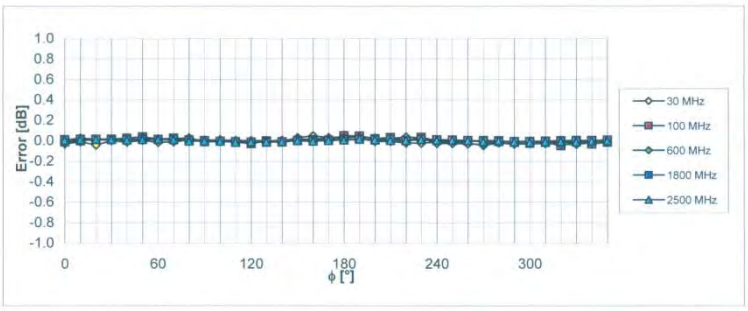
EX3DV4 SN:3703 January 24, 2011

Receiving Pattern (ϕ), ϑ = 0°



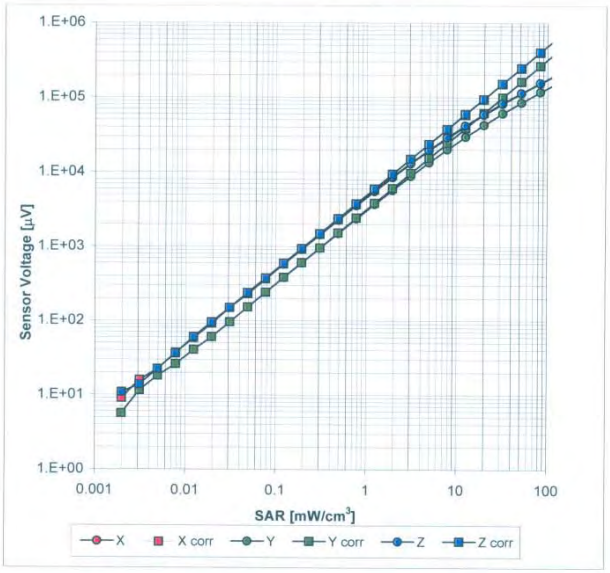


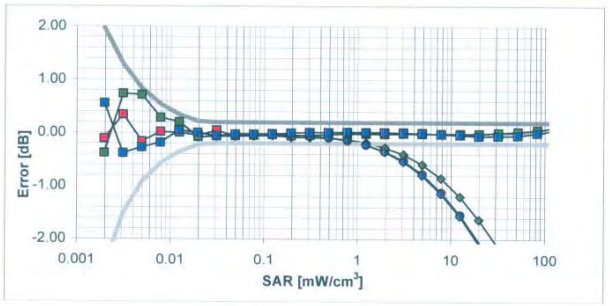
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

EX3DV4 SN:3703 January 24, 2011

Dynamic Range f(SAR_{head})

(TEM cell, f = 900 MHz)

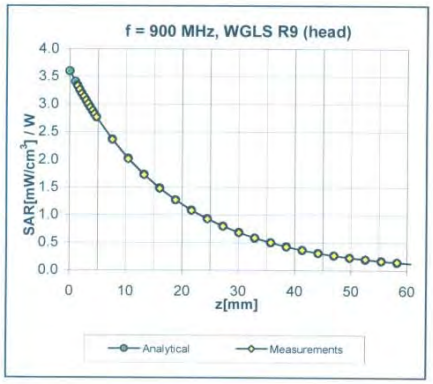


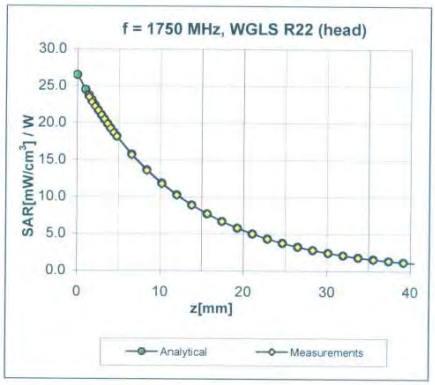


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

EX3DV4 SN:3703 January 24, 2011

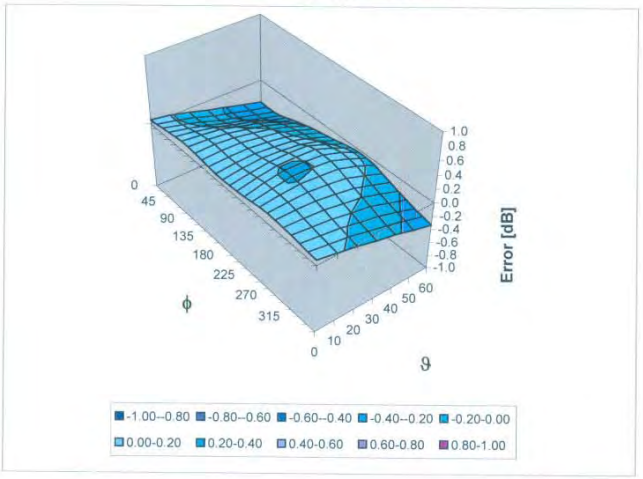
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

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EX3DV4 SN:3703 January 24, 2011

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 Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

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7. Uncertainty Budget

DASY5 Uncertainty Budget
According to IEEE 1528 [1]

Error Description	Uncertainty value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±5.9%	N	1	1	1	±5.9%	±5.9%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (target)	±5.0%	R	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Permittivity (target)	±5.0%	R	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Std. Uncertainty						±10.9%	±10.7%	387
Expanded STD Uncertainty						±21.9%	±21.4%	

Table 19.6: Worst-Case uncertainty budget for DASY5 assessed according to IEEE 1528 [1]. The budget is valid for the frequency range 300 MHz - 3 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

8. Phantom Description

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info@speag.com, http://www.speag.com

s p e a g

Certificate of Conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 C
Series No	TP-1150 and higher
Manufacturer	SPEAG Zeughausstrasse 43 CH-8004 Zürich Switzerland

Tests
The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series items (called samples) or are tested at each item.

Test	Requirement	Details	Units tested
Dimensions	Compliant with the geometry according to the CAD model	IT'IS CAD File (*)	First article, Samples
Material thickness of shell	Compliant with the requirements according to the standards	2mm +/- 0.2mm in flat and specific areas of head section	First article, Samples, TP-1314 ff.
Material thickness at ERP	Compliant with the requirements according to the standards	6mm +/- 0.2mm at ERP	First article, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz – 6 GHz: Relative permittivity < 5, Loss tangent < 0.05	Material samples
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe technical Note for material compatibility	DEGMBE based simulating liquids	Pre-series, First article, Material samples
Sagging	Compliant with the requirements according to the standards. Sagging of the flat section when filled with tissue simulating liquid	< 1% typical < 0.8% if filled with 155mm of HSL900 and without OUT below	Prototypes, Sample testing

Standards
[1] CENELEC EN 50361
[2] IEEE Std 1528-2003
[3] IEC 62209 Part I
[4] FCC OET Bulletin 65, Supplement C, Edition 01-01
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

Conformity
Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standards [1] to [4].

Date 07.07.2005

Signature / Stamp

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info@speag.com, http://www.speag.com

9. System Validation from Original equipment supplier

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 ATL (Auden)

Certificate No: D835V2-4d082_Jul10

CALIBRATION CERTIFICATE

Object D835V2 - SN: 4d082

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

Calibration date: July 20, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

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

Issued: July 20, 2010

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

Certificate No: D835V2-4d082_Jul10 Page 1 of 9

Calibration Laboratory of
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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
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.0 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature during test	(23.1 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.40 mW / g
SAR normalized	normalized to 1W	9.60 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.65 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 mW / g
SAR normalized	normalized to 1W	6.24 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.26 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.0 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.58 mW / g
SAR normalized	normalized to 1W	10.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**10.0 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.69 mW / g
SAR normalized	normalized to 1W	6.76 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.60 mW / g ± 16.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7 Ω - 3.2 jΩ
Return Loss	- 29.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω - 4.6 jΩ
Return Loss	- 26.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.389ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 17, 2008

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DASY5 Validation Report for Head TSL

Date/Time: 20.07.2010 15:48:57

Test Laboratory: SPEAG, Zurich, Switzerland

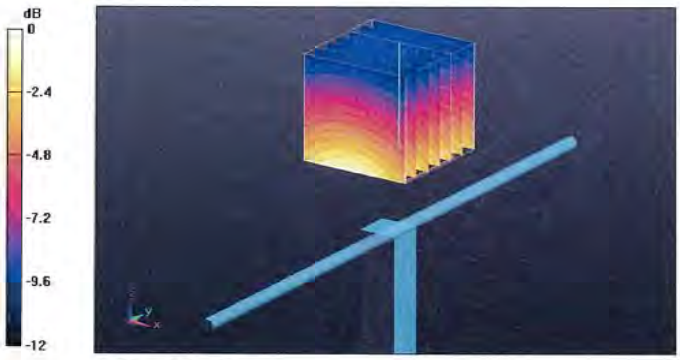
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d082

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 835 MHz; σ = 0.9 mho/m; ε_r = 42.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

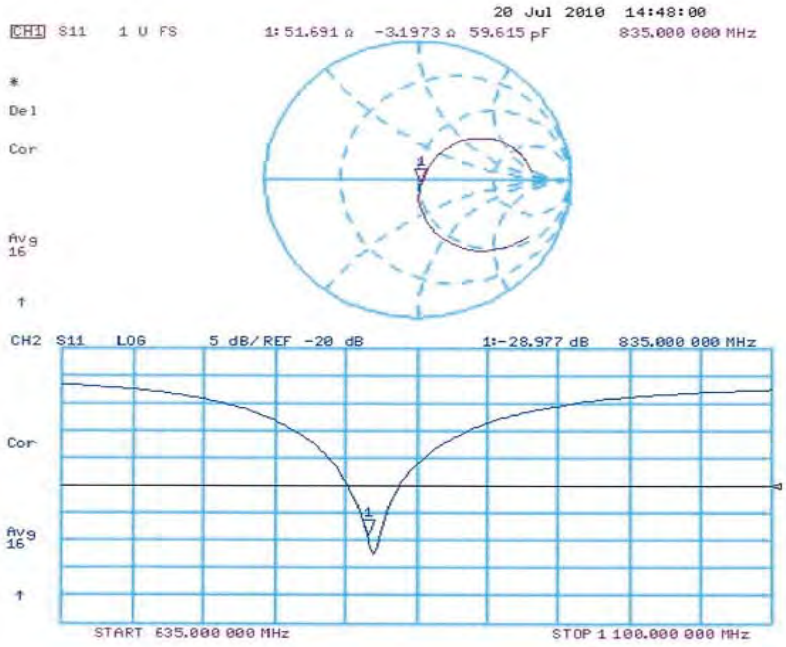
- Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.1 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 3.63 W/kg
SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.56 mW/g
Maximum value of SAR (measured) = 2.8 mW/g



0 dB = 2.8mW/g

Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body

Date/Time: 20.07.2010 12:03:13

Test Laboratory: SPEAG, Zurich, Switzerland

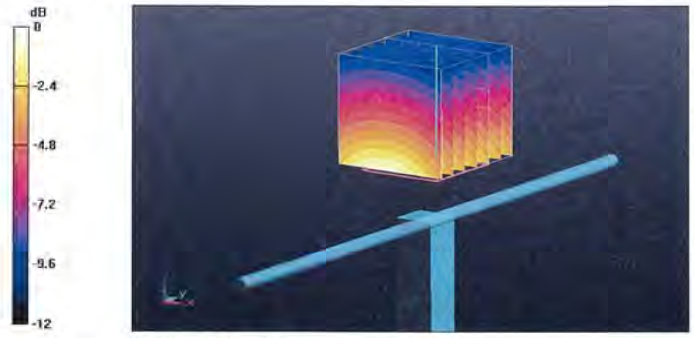
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d082

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 1.01 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

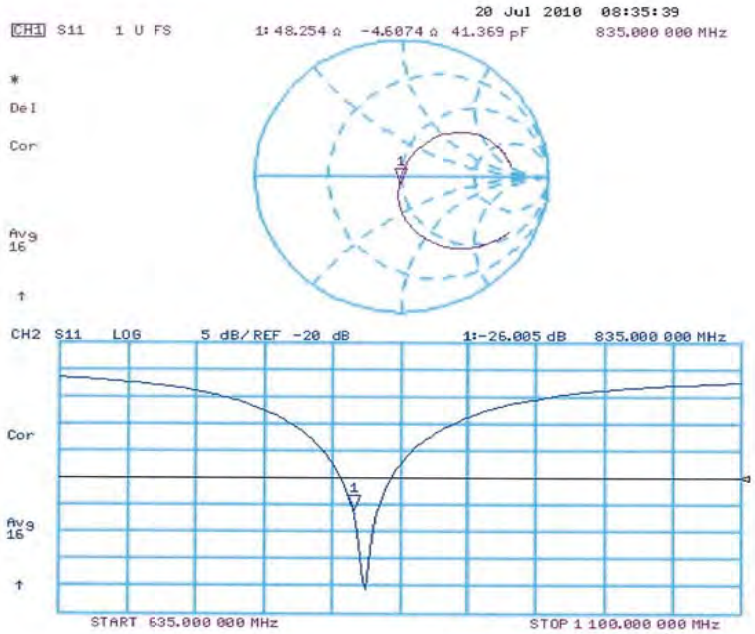
- Probe: ES3DV3 - SN3205; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.1 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 3.81 W/kg
SAR(1 g) = 2.58 mW/g; SAR(10 g) = 1.69 mW/g
Maximum value of SAR (measured) = 2.98 mW/g



0 dB = 2.98mW/g

Impedance Measurement Plot for Body TSL



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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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

Accreditation No.: SCS 108

Client SGS TW (Auden) **Certificate No:** D1900V2-5d027_Apr11

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d027
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits
Calibration date:	April 19, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: April 19, 2011

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

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.9 ± 6 %	1.41 mho/m ± 6 %
Head TSL temperature during test	(21.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.1 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.9 mW /g ± 16.5 % (k=2)**

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Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.1 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature during test	(21.8 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.93 mW / g
SAR normalized	normalized to 1W	39.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**39.4 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.18 mW / g
SAR normalized	normalized to 1W	20.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.6 mW / g ± 16.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω + 6.4 jΩ
Return Loss	- 23.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 Ω + 6.6 jΩ
Return Loss	- 23.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.194 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 17, 2002

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DASY5 Validation Report for Head TSL

Date/Time: 18.04.2011 15:27:22

Test Laboratory: SPEAG, Zurich, Switzerland

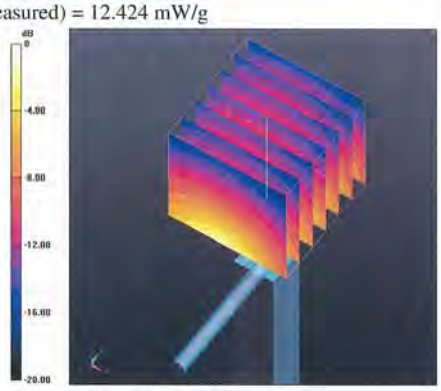
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d027

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.41 mho/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

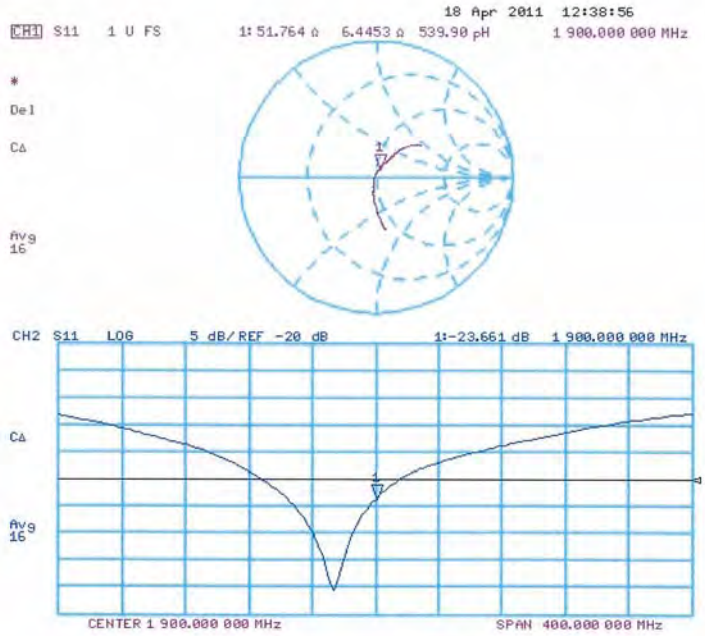
- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2829)

Pin=250 mW, Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.235 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 18.650 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.26 mW/g
Maximum value of SAR (measured) = 12.424 mW/g



0 dB = 12.420mW/g

Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date/Time: 19.04.2011 12:53:51

Test Laboratory: SPEAG, Zurich, Switzerland

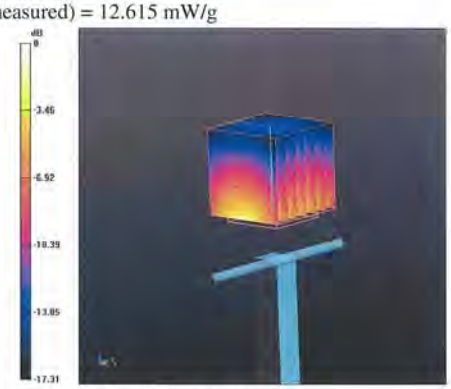
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d027

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.52 mho/m; ε_r = 51.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2829)

Pin=250 mW, Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.170 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 17.156 W/kg
SAR(1 g) = 9.93 mW/g; SAR(10 g) = 5.18 mW/g
Maximum value of SAR (measured) = 12.615 mW/g



0 dB = 12.610mW/g

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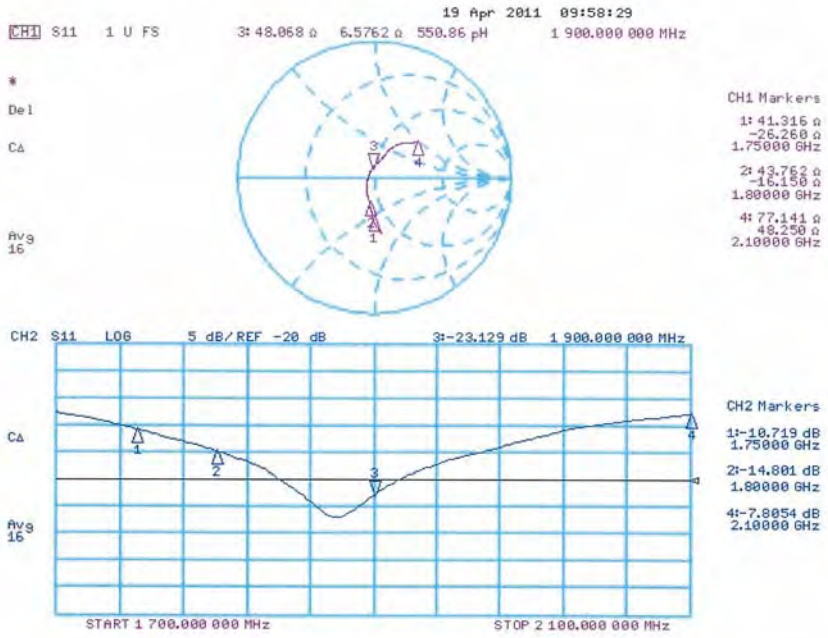
Impedance Measurement Plot for Body TSL



End of 1st part of report

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