SAR TEST REPORT

Equipment Under Test	:	Industrial PDA
Model No.	:	AT911
Applicant	:	ATID
Address of Applicant	:	Room 1210 Byeoksan Digital Valley 2 Cha, Gasan-dong, Geumcheon-gu, Seoul, Korea
FCC ID	:	VUJAT911
Device Category	:	Portable Device
Exposure Category	:	General Population/Uncontrolled Exposure
Date of Receipt	:	2013-01-07
Date of Test(s)	:	2013-01-10 ~ 2013-01-15
Date of Issue	:	2013-02-21

Standards:

FCC OET Bulletin 65 supplement C
IEEE 1528, 2003
ANSI/IEEE C95.1, C95.3

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

Remarks:

Tested by	**:**	**Jongwon Ma**	**2013-02-21**
Approved by	**:**	**Denny Ham**	**2013-02-21**

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APPENDIX

A. DASY4 SAR Report

B. Uncertainty Analysis

C. Calibration certificate

1. General Information

1.1 Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, 435-040, Korea
Telephone : +82 +31 428 5700
FAX : +82 +31 427 2371
Homepage : All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx

1.2 Details of Manufacturer

Manufacturer : ATID
Address : Room 1210 Byeoksan Digital Valley 2 Cha, Gasan-dong, Geumcheon-gu, Seoul, Korea
Contact Person : Sangyun-Choi
Phone No. : 82-2-2113-0040
E-mail : choisy@atid1.com

1.3 Version of Report

Version Number	Date	Revision
00	2013-02-21	Initial issue

1.4 Description of EUT(s)

EUT Type	: Industrial PDA
Model	: AT911
Serial Number	: N/A
Mode of Operation	: GSM850, PCS1900, WCDMA V, WLAN, Bluetooth
Duty Cycle	: 8.3(GSM), 8.3(GPRS 1Tx Slot), 4.15(GPRS 2Tx Slot), 1(WCDMA V/II), 1(WLAN)
Body worn Accessory	: Audio Accessory
Tx Frequency Range	: 824.2 ㎒ ~ 848.8 ㎒ (GSM850) 1850.2 ㎒ ~ 1909.8 ㎒ (PCS1900) 826.4 ㎒ ~ 846.6 ㎒ (WCDMA V) 1852.4 ㎒ ~ 1907.6 ㎒ (WCDMA II) 2412 ㎒ ~ 2462 ㎒ (WLAN) 2402 ㎒ ~ 2480 ㎒ (Bluetooth)
Battery Type	: 3.7 d.c. (Lithum-ion Battery)

Equipment Class	**Band**	**Reported SAR**	
		1g Head (W/kg)	**1g Body-Worn (W/kg)**
PCE	GSM/GPRS/EDGE 850	0.502	0.433
	GSM/GPRS/EDGE 1900	0.297	0.183
	WCDMA V	0.450	0.492
	WCDMA II	0.636	0.451
DTS	2.45 ㎓ WLAN	0.050	0.009
DSS	Bluetooth	N/A	
Simultaneous SAR per KDB 690783 D01v01r02		N/A	

1.5 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 44798 D01v05.

Burst Average power for Production			
Mode	Nominal & Maximum	GSM850	PCS1900
Voice	**Maximum**	**33.00**	**29.00**
	Nominal	32.50	28.50
GPRS (GMSK, 1 Tx slot)	**Maximum**	**33.00**	**29.00**
	Nominal	32.50	28.50
GPRS (GMSK, 2 Tx slot)	**Maximum**	**30.00**	**26.00**
	Nominal	29.50	25.50
EGPRS (8PSK, 1 Tx slot)	**Maximum**	**27.00**	**24.50**
	Nominal	26.50	24.00
EGPRS (8PSK, 2 Tx slot)	**Maximum**	**26.50**	**23.50**
	Nominal	26.00	23.00

Average power for Production			
Mode	Nominal & Maximum	WCDMA V	WCDMA II
RMC 12.2K	**Maximum**	**24.00**	**24.00**
	Nominal	23.50	23.50

Average power for Production					
Mode	Nominal & Maximum	a	b	g	n
2.45 ㎓ WLAN	**Maximum**		**17.00**	**16.50**	
	Nominal		16.50	16.00	
Bluetooth	**Maximum**	**2.50**			
	Nominal	2.00			

1.6 Test Environment

Ambient temperature	: (22 ± 2) ° C
Tissue Simulating Liquid	: (22 ± 2) ° C
Relative Humidity	: (55 ± 5) % R.H.

1.7 Operation Configuration

The device in GSM and WCDMA was controlled by using a Communication tester (CMU200). Communication between the device and the tester was established by air link. And the client provided a special driver and test program which can control the frequency and power of the WLAN module. Measurements were performed at the lowest, middle and highest channels of the operating band. The EUT was set to maximum power level during all tests and at the beginning of each test the battery was fully charged.

The DASY4 system measures power drift during SAR testing by comparing e-field in the same location at the beginning and at the end of measurement. Based on the RF Power and antenna separation distance, stand-alone BT SAR and simultaneous SAR evaluation are not required.

1.8 EVALUATION PROCEDURES

- Power Reference Measurement Procedures

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2 ㎜. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 2.5 ㎜ for an EX3DV4 probe type).

1.9 SAR Measurement Procedures

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2 ㎜. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2 and 3: Area Scan & Zoom Scan 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 1 g and 10 g.

< Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01 >

			≤3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the area scan based *1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be larger than the step size in Z-direction.

1.10 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 4 professional system). A Model ET3DV6 1782 E-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 DASY4 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 for accommodating the data acquisition electronics (DAE).

•A dosimeter 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.

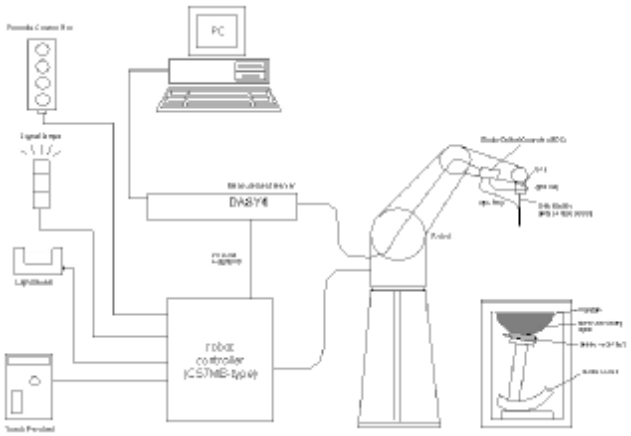


Fig a. The microwave circuit arrangement used for SAR system verification

• 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.

• DASY4 Version 4.7(Build80).

• Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.

• The SAM phantom enabling testing body usage.

• The device holder for flat phantom.

• Tissue simulating liquid mixed according to the given recipes.

• Validation dipole kits allowing to validate the proper functioning of the system.

1.11 System Components

ET3DV6 E-Field Probe

Construction : Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. glycol).

Calibration : In air from 10 ㎒ to 2.5 ㎓ In brain simulating tissue (accuracy ± 8 %)

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

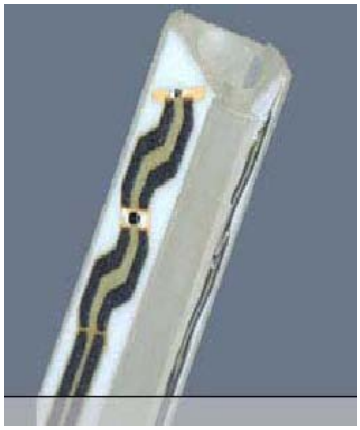
Directivity : ±0.2 ㏈ in brain tissue (rotation around probe axis)
±0.4 ㏈ in brain tissue (rotation normal to probe axis)

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

Srfce. Detect : ±0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces

Dimensions : Overall length: 330 mm
Tip length: 16 mm
Body diameter: 12 mm
Tip diameter: 6.8 mm
Distance from probe tip to dipole centers: 2.7 mm

Application : General dosimetry up to 3 ㎓ Compliance tests of mobile phone


ET3DV6 E-Field Probe

NOTE:

1. The Probe parameters have been calibrated by the SPEAG. Please reference “APPENDIX C” for the Calibration Certification Report.

SAM Phantom

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

Shell Thickness: 2.0 ㎜ ± 0.1 ㎜

Filling Volume: Approx. 25 liters

SAM Phantom

DEVICE HOLDER

Construction In combination with the Twin SAM PhantomV4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Device Holder

1.12 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 +/- 10 % from the target SAR values. These tests were done at 835 ㎒, 1900 ㎒, 2450 ㎒. The tests for EUT were conducted within 24 hours after each verification. The obtained results from the system accuracy verification are displayed in the table 1. During the tests, the ambient temperature of the laboratory was in the range (22 ± 2) ° C, the relative humidity was in the range (55 ± 5）% R.H. 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.

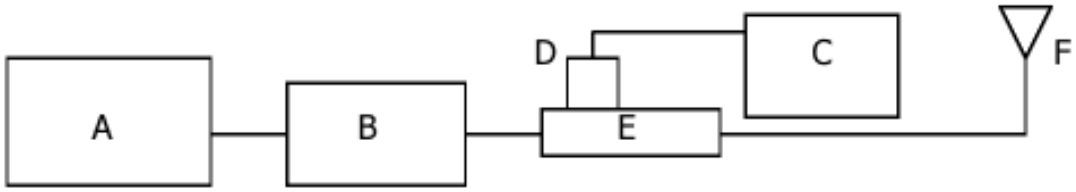


Fig b. The microwave circuit arrangement used for SAR system verification

A. Agilent Model E4421B Signal Generator

B. EMPOWER Model 2001-BBS3Q7ECK Amplifier

C. Agilent Model E4419B Power Meter

D. Agilent Model 9300H Power Sensor

E. Agilent Model 86205A Directional RF Bridges

F. Reference dipole Antenna

Photo of the dipole Antenna

System Verification Results

Verification Kit	Probe S/N	Tissue	Target SAR 1 g from Calibration Certificate (1 W)	Measured SAR 1 g (0.1 W)	Normalized SAR 1 g (1 W)	Deviation (%)	Date	Liquid Temp. (°C)
D835V2 S/N: 490	1782	835 ㎒ Head	9.39 W/kg	0.919 W/kg	**9.19 W/kg**	**-2.13**	2013-01-11	22.0
D835V2 S/N: 490	1782	835 ㎒ Body	9.35 W/kg	1.000 W/kg	**10.0 W/kg**	**6.95**	2013-01-10	21.9
D1900V2 S/N: 5d033	1782	1900 ㎒ Head	39.4 W/kg	3.87 W/kg	**38.7 W/kg**	**-1.78**	2013-01-14	22.2
D1900V2 S/N: 5d033	1782	1900 ㎒ Body	39.9 W/kg	3.90 W/kg	**39.0 W/kg**	**-2.26**	2013-01-15	23.0
D2450V2 S/N: 734	1782	2450 ㎒ Head	52.8 W/kg	4.98 W/kg	**49.8 W/kg**	**-5.68**	2013-01-13	22.3
D2450V2 S/N: 734	1782	2450 ㎒ Body	50.2 W/kg	5.22 W/kg	**52.2 W/kg**	**3.98**	2013-01-12	22.1

Table 1. Results system verification

1.13 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this simulant fluid were measured by using the Speag Model DAK-3.5 Dielectric Probe in conjunction with Agilent E5070B Network Analyzer(300 ㎑ - 3 ㎓) by using a procedure detailed in Section V.

f (㎒)	Tissue type	Limits / Measured	Dielectric Parameters		
			Permittivity	Conductivity	Simulated Tissue Temp(℃)
835	Head	Measured, 01/11/2013	41.0	0.88	22.0
		Recommended Limits	41.5	0.90	21.0 ~ 23.0
		Deviation(%)	**-1.20**	**-2.22**	-
	Body	Measured, 01/10/2013	**53.3**	**0.965**	21.9
		Recommended Limits	55.2	0.97	21.0 ~ 23.0
		Deviation(%)	**-3.44**	**-0.52**	-
1900	Head	Measured, 01/14/2013	39.7	1.39	22.2
		Recommended Limits	40	1.4	21.0 ~ 23.0
		Deviation(%)	**-3.25**	**-0.71**	-
	Body	Measured, 01/15/2013	**52.5**	**1.51**	23.0
		Recommended Limits	53.3	1.52	21.0 ~ 23.0
		Deviation(%)	**-1.50**	**-0.66**	-
2450	Head	Measured, 01/13/2013	40.4	1.85	22.3
		Recommended Limits	39.2	1.80	21.0 ~ 23.0
		Deviation(%)	**3.06**	**2.78**	
	Body	Measured, 01/12/2013	50.6	1.97	22.1
		Recommended Limits	52.7	1.95	21.0 ~ 23.0
		Deviation(%)	**-3.98**	**1.03**	

The composition of the brain & muscle tissue simulating liquid

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (㎒)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99 $^{+}$% Pure Sodium Chloride Sugar: 98 $^{+}$% Pure Sucrose

Water: De-ionized, 16 MΩ^{+} resistivity HEC: Hydroxyethyl Cellulose

DGBE: 99 $^{+}$% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

1.14 Test System Validation

Per FCC KDB 865664 D02v01, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the require tissue-equivalent media for system validation, according to the procedures outlined in IEEE 1528-2003 and FCC KDB 865664 D01v01. Since frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probe and tissue dielectric parameters has been included.

f (MHz)	Date	Probe S/N	Probe Cal point	Tissue Type	Dielectric Parameters		CW Validation			Modulated Validation		
					Permittivity	Conductivity	Sensitivity	Probe Linearity	Probe Isotropy	Mod. Type	Duty Factor	PAR
835	01/11/2013	1782	835	Head	41.0	0.88	PASS	PASS	PASS	GMSK	PASS	N/A
1900	01/14/2013	1782	1900	Head	39.7	1.39	PASS	PASS	PASS	GMSK	PASS	N/A
2450	01/13/2013	1782	2450	Head	40.4	1.85	PASS	PASS	PASS	OFDM	N/A	PASS
835	01/10/2013	1782	835	Body	53.3	0.97	PASS	PASS	PASS	GMSK	PASS	N/A
1900	01/15/2013	1782	1900	Body	52.5	1.51	PASS	PASS	PASS	GMSK	PASS	N/A
2450	01/12/2013	1782	2450	Body	50.6	1.97	PASS	PASS	PASS	OFDM	N/A	PASS

< SAR System Validation Summary>

1.15 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 ㎑ to 300 ㎓,” ANSI/IEEE C95.3–2003, Copyright 2003 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 ㎑ to 6 ㎓. Portable devices that transmit at frequencies above 6 ㎓ 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 ㎓ 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). 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.

(2) 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
Partial Peak SAR (Partial)	1.60 m W/g	8.00 m W/g
Partial Average SAR (Whole Body)	0.08 m W/g	0.40 m W/g
Partial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 m W/g	20.00 m W/g

Table .2 RF exposure limits

2. Instruments List

Maunfacturer	Device	Type	Serial Number	Cal Date	Cal Interval	Cal Due
Stäubli	Robot	RX90BL	F03/5W05A1/A/01	N/A	N/A	N/A
Schmid& Partner Engineering AG	Dosimetric E-Field Probe	ET3DV6	1782	04/27/2012	Annual	04/27/2013
Schmid& Partner Engineering AG	835 ㎒ System Validation Dipole	D835V2	490	05/16/2012	Biennial	05/16/2014
Schmid& Partner Engineering AG	1900 ㎒ System Validation Dipole	D1900V2	5d033	05/23/2012	Biennial	05/23/2014
Schmid& Partner Engineering AG	2450 ㎒ System Validation Dipole	D2450V2	734	05/17/ 2012	Biennial	05/17/ 2014
Schmid& Partner Engineering AG	Data acquisition Electronics	DAE4	534	09/06/2012	Annual	09/06/2013
Schmid& Partner Engineering AG	Software	DASY4 V4.7	-	N/A	N/A	N/A
Schmid& Partner Engineering AG	Phantom	SAM Phantom V4.0	TP-1645 TP-1300	N/A	N/A	N/A
Agilent	Network Analyzer	E5070B	MY42100282	01/03/2013	Annual	01/03/2014
Schmid& Partner Engineering AG	Dielectric Assessment Kit	DAK-3.5	1046	04/03/2012	Annual	04/03/2013
Agilent	Power Meter	E4419B	GB43311125	07/01/2012	Annual	07/01/2013
Agilent	Power Sensor	E9300H	MY41495314	09/18/2012	Annual	09/18/2013
			MY41495307	09/18/2012	Annual	09/18/2013
Agilent	Signal Generator	E4421B	MY42082477	03/29/2012	Annual	03/29/2013
Empower RF Systems	Power Amplifier	2001-BBS3Q7ECK	1032 D/C 0336	03/31/2012	Annual	03/31/2013
Agilent	Directional RF Bridges	86205A	MY31402302	07/03/2012	Annual	07/03/2013
Microlab	LP Filter	LA-15N LA-30N	N/A	09/14/2012	Annual	09/14/2013
R & S	Spectrum Analyzer	FSV30	100768	03/29/2012	Annual	03/29/2013
Agilent	Attenuator	8491B	50566	09/14/2012	Annual	09/14/2013
R&S	Mobile Test Unit	CMU200	109456	07/04/2012	Annual	07/04/2013

3.Summary of Results

3.1 FCC Power Measurement Procedures

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

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

3.2 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v05, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as reported SAR. Test highest reported SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r02.

3.3 RF Conducted Power

GSM

GSM	Channel	Frequency(㎒)	Burst-Conducted Average Power(dB m)				
			GSM	GPRS		EGDE	
				1 Tx Slot	2 Tx Slot	1 Tx Slot	2 Tx Slot
GSM 850 Band	128	824.2	32.24	32.00	29.28	25.94	24.81
	190	836.6	32.05	31.79	29.05	26.41	25.71
	251	848.8	32.12	31.82	28.94	26.36	25.63
PCS 1900 Band	512	1850.2	28.49	28.34	25.55	23.78	22.73
	661	1880.0	27.95	28.17	25.10	22.61	21.81
	810	1909.8	28.41	27.72	24.75	23.27	22.67
GSM	Channel	Frequency(㎒)	Calculated Frame-Conducted Average Power(dB m)				
			GSM	GPRS		EDGE	
				1 Tx Slot	2 Tx Slot	1 Tx Slot	2 Tx Slot
GSM 850 Band	128	824.2	23.21	22.97	23.26	16.91	18.79
	190	836.6	23.02	22.76	23.03	17.38	19.69
	251	848.8	23.09	22.79	22.92	17.33	19.61
PCS 1900 Band	512	1850.2	19.46	19.31	19.53	14.75	16.71
	661	1880.0	18.92	19.14	19.08	13.58	15.79
	810	1909.8	19.38	18.69	18.73	14.24	16.65

Notes

- CS1/MCS7 coding scheme was used in GPRS/EDGE output power measurements and SAR Testing, as a condition where GMSK/8-PSK modulation was ensured. Investigation has shown that CS1 - CS4/MCS5 – MCS9 settings do not have any impact on the output levels or modulation in the GPRS/EDGE modes.

WCDMA V

Band	Mode	Channel		Frequency (MHz)	Conducted Power (dBm)
WCDMA V (RMC)	RMC	4132		826.4	23.14
	RMC	4183		836.6	23.32
	RMC	4233		846.6	23.41
WCDMA V (HSDPA Active)	Sub-test 1	4132		826.4	22.33
		4183		836.6	22.13
		4233		846.6	22.22
	Sub-test 2	4132		826.4	21.62
		4183		836.6	21.55
		4233		846.6	21.61
	Sub-test 3	4132		826.4	20.63
		4183		836.6	20.67
		4233		846.6	20.76
	Sub-test 4	4132		826.4	20.50
		4183		836.6	20.60
		4233		846.6	20.64
		βc	βd	△ACK, △NACK, △CQI	AGV
	Sub-test 1	2	15	8	-
	Sub-test 2	12	15	8	-
	Sub-test 3	15	8	8	-
	Sub-test 4	15	4	8	-

WCDMA II

Band	Mode	Channel		Frequency (MHz)	Conducted Power (dBm)
WCDMA V (RMC)	RMC	9262		1852.4	23.60
	RMC	9400		1880.0	23.36
	RMC	9538		1907.6	23.20
WCDMA V (HSDPA Active)	Sub-test 1	9262		1852.4	23.40
		9400		1880.0	23.41
		9538		1907.6	23.53
	Sub-test 2	9262		1852.4	23.12
		9400		1880.0	22.56
		9538		1907.6	22.79
	Sub-test 3	9262		1852.4	22.15
		9400		1880.0	21.85
		9538		1907.6	22.24
	Sub-test 4	9262		1852.4	21.89
		9400		1880.0	21.77
		9538		1907.6	22.28
		βc	βd	△ACK, △NACK, △CQI	AGV
	Sub-test 1	2	15	8	-
	Sub-test 2	12	15	8	-
	Sub-test 3	15	8	8	-
	Sub-test 4	15	4	8	-

Bluetooth

Channel	Frequency (㎒)	GFSK (㏈ m)	PI/4DQPSK	8DPSK (㏈ m)
Low	2402	0.12	0.23	0.25
Middle	2441	1.45	1.68	1.71
High	2480	1.22	1.80	**1.83**

WLAN

802.11b Mode		Rated	Measured Power
Frequency (㎒)	Channel No.	(Mbps)	(㏈ m)
2412	1	1	16.30
		2	16.25
		5.5	16.21
		11	16.18
2437	6	1	**16.49**
		2	16.43
		5.5	16.41
		11	16.37
2462	11	1	15.98
		2	15.94
		5.5	15.89
		11	15.86

802.11g Mode		Rated	Measured Power
Frequency (㎒)	Channel No.	(Mbps)	(㏈ m)
2412	1	6	15.60
		9	15.49
		12	15.46
		18	15.43
		24	15.40
		36	15.38
		48	15.37
		54	15.33
2437	6	6	15.61
		9	15.57
		12	15.55
		18	15.51
		24	15.46
		36	15.43
		48	15.42
		54	15.38
2462	11	6	16.12
		9	16.06
		12	16.01
		18	15.99
		24	15.97
		36	15.92
		48	15.90
		54	15.86

3.4 SAR Test Exclusions Applied

Per FCC KDB 447498 D01v05, the SAR exclusion threshold for distances < 50 ㎜ is defined by the following equation:

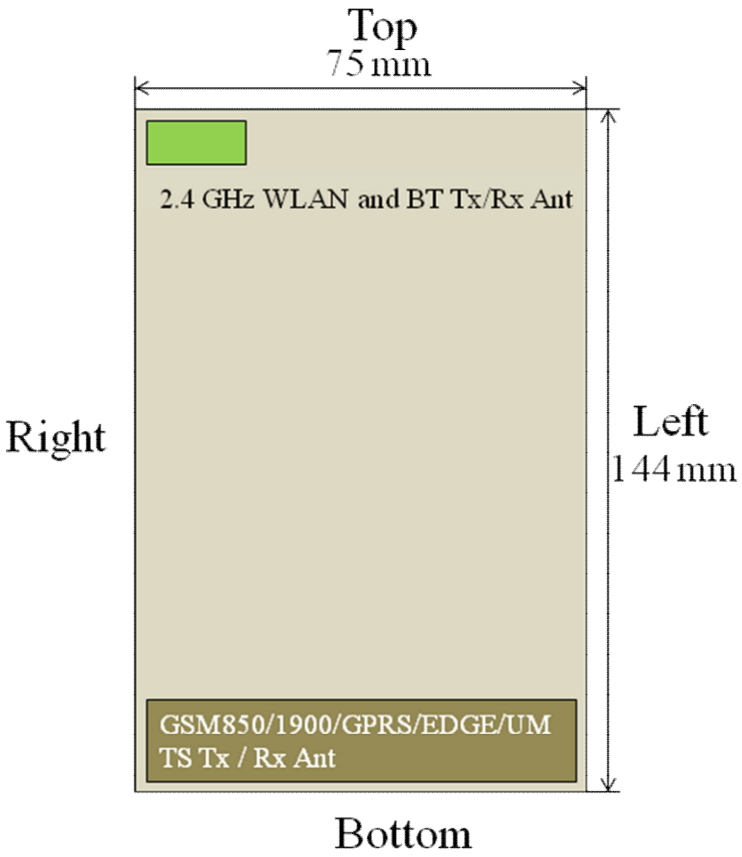
$$\frac{\text{Max Power of Channel (mW)}}{\text{Test Separation Distance (mm)}} * \sqrt{\text{Frequency(GHz)}} \leq 3.0$$

Based on the maximum tune-up tolerance limit of Bluetooth and the antenna to use separation distance,

Bluetooth SAR was not required:

(1.52/5 * √2.480 = 0.16 < 3.0)

<The Distance information of Antenna to Edges of EUT>



3.5 SAR Data Summary

Ambient Temperature (°C)	22.9
Liquid Temperature (°C)	22.0
Date	01/11/2013

GSM850 Head SAR

Test Mode	EUT Position	Traffic Channel		Measured Power [dB m]	Tune-Up Limit [dB m]	Power Drift(dB)	1 g SAR (W/kg)	Scaling Factor	Scaling SAR (1g)	1 g SAR Limits (W/kg)
		Frequency (㎒)	Channel							
GSM	Right Touch	836.6	190	32.05	33.00	-0.032	0.403	1.245	0.502	1.6
	Right Tilt	836.6	190	32.05	33.00	0.024	0.300	1.245	0.374	
	Left Touch	836.6	190	32.05	33.00	-0.088	0.334	1.245	0.416	
	Left Tilt	836.6	190	32.05	33.00	-0.038	0.300	1.245	0.374	

Ambient Temperature (°C)	23.2
Liquid Temperature (°C)	21.9
Date	01/10/2013

GSM850 Body SAR

Test Mode	EUT Position	Traffic Channel		Distance (㎜)	Measured Power [dB m]	Tune-Up Limit [dB m]	Power Drift(dB)	1 g SAR (W/kg)	Scaling Factor	Scaling SAR (1g)	1 g SAR Limits (W/kg)
		Frequency (㎒)	Channel								
GSM	Front	836.6	190	15	32.05	33.00	-0.013	0.287	1.245	0.357	1.6
	Rear	836.6	190	15	32.05	33.00	-0.010	0.348	1.245	0.433	

Ambient Temperature (°C)	23.4
Liquid Temperature (°C)	22.2
Date	01/14/2013

PCS1900 Head SAR

Test Mode	EUT Position	Traffic Channel		Measured Power [dB m]	Tune-Up Limit [dB m]	Power Drift(dB)	1 g SAR (W/kg)	Scaling Factor	Scaling SAR (1g)	1 g SAR Limits (W/kg)
		Frequency (㎒)	Channel							
GSM	Right Touch	1880.0	661	27.95	29.00	-0.048	0.233	1.274	0.297	1.6
	Right Tilt	1880.0	661	27.95	29.00	-0.019	0.066	1.274	0.084	
	Left Touch	1880.0	661	27.95	29.00	-0.080	0.192	1.274	0.245	
	Left Tilt	1880.0	661	27.95	29.00	-0.036	0.127	1.274	0.162	

Ambient Temperature (°C)	23.9
Liquid Temperature (°C)	23.0
Date	01/15/2013

PCS1900 Body SAR

Test Mode	EUT Position	Traffic Channel		Distance (㎜)	Measured Power [dB m]	Tune-Up Limit [dB m]	Power Drift(dB)	1 g SAR (W/kg)	Scaling Factor	Scaling SAR (1g)	1 g SAR Limits (W/kg)
		Frequency (㎒)	Channel								
GSM	Front	1880.0	661	15	27.95	29.00	0.031	0.105	1.274	0.134	1.6
	Rear	1880.0	661	15	27.95	29.00	0.007	0.144	1.274	0.183	

Ambient Temperature (°C)	22.9
Liquid Temperature (°C)	22.0
Date	01/11/2013

WCDMA FDD V Head SAR

Test Mode	EUT Position	Traffic Channel		Measured Power [dB m]	Tune-Up Limit [dB m]	Power Drift(dB)	1 g SAR (W/kg)	Scaling Factor	Scaling SAR (1g)	1 g SAR Limits (W/kg)
		Frequency (㎒)	Channel							
Right Ear	Cheek	836.4	4182	23.32	24.00	-0.030	0.385	1.169	0.450	1.6
	Tilt	836.4	4182	23.32	24.00	-0.007	0.273	1.169	0.319	
Left Ear	Cheek	836.4	4182	23.32	24.00	-0.056	0.332	1.169	0.388	
	Tilt	836.4	4182	23.32	24.00	-0.034	0.279	1.169	0.326	

Ambient Temperature (°C)	23.2
Liquid Temperature (°C)	21.9
Date	01/10/2013

WCDMA FDD V Body& Hotspot SAR

Test Mode	EUT Position	Traffic Channel		Distance (㎜)	Measured Power [dB m]	Tune-Up Limit [dB m]	Power Drift(dB)	1 g SAR (W/kg)	Scaling Factor	Scaling SAR (1g)	1 g SAR Limits (W/kg)
		Frequency (㎒)	Channel								
RMC	Front	836.4	4182	15	23.32	24.00	-0.053	0.329	1.169	0.385	1.6
	Rear	836.4	4182	15	23.32	24.00	-0.015	0.421	1.169	0.492	

Ambient Temperature (°C)	23.4
Liquid Temperature (°C)	22.2
Date	01/14/2013

WCDMA FDD II Head SAR

Test Mode	EUT Position	Traffic Channel		Measured Power [dB m]	Tune-Up Limit [dB m]	Power Drift(dB)	1 g SAR (W/kg)	Scaling Factor	Scaling SAR (1g)	1 g SAR Limits (W/kg)
		Frequency (㎒)	Channel							
Right Ear	Cheek	1880	9400	23.36	24.00	-0.034	0.549	1.159	0.636	1.6
	Tilt	1880	9400	23.36	24.00	-0.018	0.167	1.159	0.194	
Left Ear	Cheek	1880	9400	23.36	24.00	-0.093	0.406	1.159	0.471	
	Tilt	1880	9400	23.36	24.00	0.119	0.281	1.159	0.326	

Ambient Temperature (°C)	23.9
Liquid Temperature (°C)	23.0
Date	01/15/2013

WCDMA FDD II Body SAR

Test Mode	EUT Position	Traffic Channel		Distance (㎜)	Measured Power [dB m]	Tune-Up Limit [dB m]	Power Drift(dB)	1 g SAR (W/kg)	Scaling Factor	Scaling SAR (1g)	1 g SAR Limits (W/kg)
		Frequency (㎒)	Channel								
RMC	Front	1880	9400	15	23.36	24.00	0.007	0.246	1.159	0.285	1.6
	Rear	1880	9400	15	23.36	24.00	0.063	0.389	1.159	0.451	

Ambient Temperature (°C)	23.1
Liquid Temperature (°C)	22.3
Date	01/13/2013

WLAN Head SAR

Test Mode	EUT Position	Data Rate	Traffic Channel		Measured Power [dB m]	Tune-Up Limit [dB m]	Power Drift(dB)	1 g SAR (W/kg)	Scaling Factor	Scaling SAR (1g)	1 g SAR Limits (W/kg)
			Frequency (㎒)	Channel							
Right Ear	Cheek	1	2437	6	16.49	17.00	0.055	0.030	1.125	0.034	1.6
	Tilt	1	2437	6	16.49	17.00	0.181	0.020	1.125	0.023	
Left Ear	Cheek	1	2437	6	16.49	17.00	0.015	0.044	1.125	0.050	
	Tilt	1	2437	6	16.49	17.00	0.057	0.029	1.125	0.033	

Ambient Temperature (°C)	23.4
Liquid Temperature (°C)	22.1
Date	01/12/2013

WLAN Body SAR

Test Mode	EUT Position	Data Rate	Traffic Channel		Distance (㎜)	Measured Power [dB m]	Tune-Up Limit [dB m]	Power Drift(dB)	1 g SAR (W/kg)	Scaling Factor	Scaling SAR (1g)	1 g SAR Limits (W/kg)
			Frequency (㎒)	Channel								
WLAN	Front	1	2437	6	15	16.49	17.00	-0.186	0.006	1.125	0.007	1.6
	Rear	1	2437	6	15	16.49	17.00	-0.167	0.008	1.125	0.009	

SAR Test Notes

General Notes :

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, FCC/OET Bulletin 65, Supplement C [June 2001] and FCC KDB Publication 447498 D01v05.
2. All modes of operation were investigated, and worst-case results are reported.
3. Battery is fully charged for all readings and the standard batteries are the only options.
4. The EUT is tested 2nd hot-spot peak, if it is less than 2 dB below the highest peak.
5. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
6. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05.
7. Per FCC KDB Publication 648474 D04v01, SAR was evaluated without a headset connected to the device. Since the reported SAR was ≤ 1.2 W/kg, no additional SAR evaluations using a headset cable were required.

GSM Test Notes :

1. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > 1/2 dB, instead of the middle channel, the highest output power channel must be used.

WCDMA Notes :

1. WCDMA mode in Body SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB Publication 941225 D01v02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is≤0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > 1/2 dB, instead of the middle channel, the highest output power channel must be used

WLAN Notes :

1. Justification for reduced test configuration for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes: Highest average RF output power channel for the lowest data rate were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n and higher data rates) were not investigated since the average output powers were not greater than 0.25 dB than that of the corresponding channel in the lowest data rate IEEE 802.11a modes
2. WLAN transmission was verified using a spectrum analyzer.
3. Since the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is < 1.6 W/kg and the reported 1g averaged SAR is < 0.8 W/kg, SAR testing on other default channels was not required.

3.6 FCC Multi-TX SAR considerations

3.6.1 The Simultaneous Transmission possibilities are listed as below

No	Capable TX Configuration	Head SAR	Body SAR
1	WWAN (GSM850, PCS1900, WCDMA V/II) + WLAN 2.4 ㎓	X	X
2	WWAN (GSM850, PCS1900, WCDMA V/II) + Bluetooth	X	X
3	WWAN (GSM850, PCS1900, WCDMA V/II) + WLAN 2.4 ㎓ + Bluetooth	X	X

3.7 Repeated SAR Measurement

Test Mode	EUT Position	Traffic Channel		Distance (㎜)	Measured 1 g SAR (W/kg)	1st Repeated 1 g SAR (W/kg)	Deviation (%)
		Frequency (㎒)	Channel				
N/A							

<Note>

1. Per KDB 865664 D01v01, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8 W/kg.
2. Per KDB 865664 D01v01, if the deviation among the repeated measurement is ≤20% and the measured SAR < 1.45 W/kg, only one repeated measurement is required.
3. The deviation is the difference in percentage between original and repeated measured SAR.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

Appendix

List

Appendix A	DASY4 Report (Plots of the SAR Measurements)	- 835 ㎒, 1900 ㎒, 2450 ㎒ Verification Test - GSM850 Test - PCS1900 Test - WLAN Test
Appendix B	Uncertainty Analysis	
Appendix C	Calibration Certificate	- PROBE - DAE - DIPOLE

Appendix A

Test Plot – DASY4 Report

835 ㎒ Validation Test_Head

Date: 2013-01-11

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Validation 835 MHz_Head.da4

Input Power : 100 mW

Ambient Temp : 22.9 ℃ Tissue Temp : 22.0 ℃

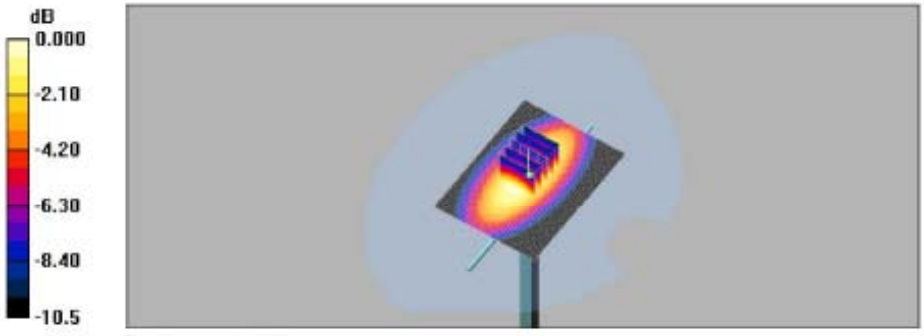
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:490
Program Name: Vaildation 835 MHz_Head

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.88 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Validation 835 MHz_Head/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.974 mW/g

Validation 835 MHz_Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 34.4 V/m; Power Drift = -0.120 dB
Peak SAR (extrapolated) = 1.30 W/kg
SAR(1 g) = 0.919 mW/g; SAR(10 g) = 0.607 mW/g
Maximum value of SAR (measured) = 0.994 mW/g



0 dB = 0.994mW/g

835 ㎒ Validation Test_Body

Date: 2013-01-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Validation 835 MHz_Body.da4

Input Power : 100mW

Ambient Temp : 23.2 ℃ Tissue Temp : 21.9 ℃

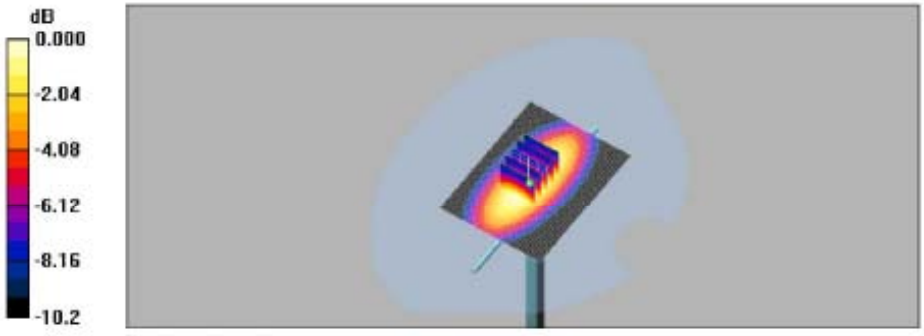
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:490
Program Name: Vaildation 835 MHz_Body

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.965 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Validation 835 MHz_Body/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.08 mW/g

Validation 835 MHz_Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 34.3 V/m; Power Drift = -0.041 dB
Peak SAR (extrapolated) = 1.47 W/kg
SAR(1 g) = 1 mW/g; SAR(10 g) = 0.666 mW/g
Maximum value of SAR (measured) = 1.08 mW/g



0 dB = 1.08mW/g

1900 ㎒ Validation Test_Head

Date: 2013-01-14

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Validation 1900 MHz_Head.da4

Input Power : 100 mW

Ambient Temp : 23.4 ℃ Tissue Temp : 22.2℃

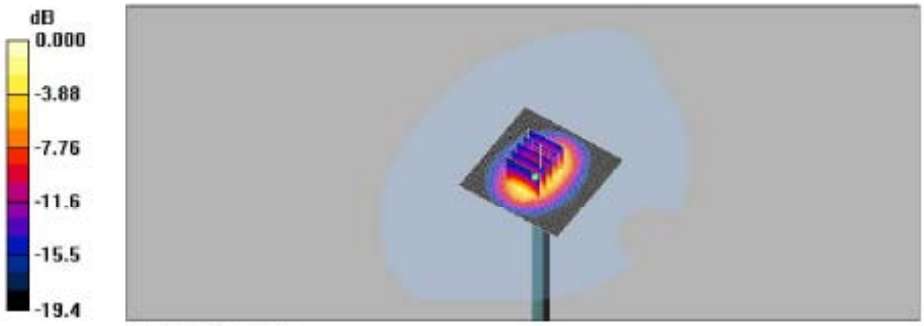
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d033
Program Name: Validation 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.39 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.12, 5.12, 5.12); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Validation 1900 MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.57 mW/g

Validation 1900 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 59.7 V/m; Power Drift = -0.028 dB
Peak SAR (extrapolated) = 6.98 W/kg
SAR(1 g) = 3.87 mW/g; SAR(10 g) = 2.01 mW/g
Maximum value of SAR (measured) = 4.25 mW/g



0 dB = 4.25mW/g

1900 ㎒ Validation Test_Body

Date: 2013-01-15

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Validation 1900 MHz_Body.da4

Input Power : 100 mW

Ambient Temp : 23.9 ℃ Tissue Temp : 23.0 ℃

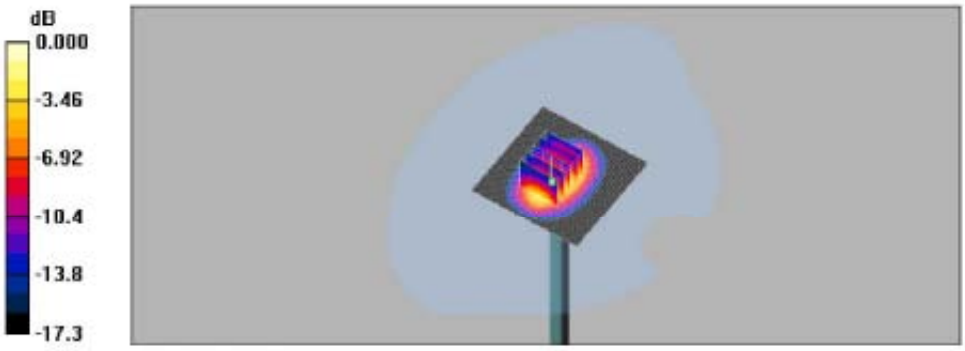
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d033
Program Name: Validation 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.51 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.59, 4.59, 4.59); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Validation 1900 MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.75 mW/g

Validation 1900 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.2 V/m; Power Drift = -0.023 dB
Peak SAR (extrapolated) = 6.66 W/kg
SAR(1 g) = 3.9 mW/g; SAR(10 g) = 2.1 mW/g
Maximum value of SAR (measured) = 4.27 mW/g



0 dB = 4.27mW/g

2450 ㎒ Validation Test_Head

Date: 2013-01-13

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Validation 2450 MHz_Head.da4

Input Power : 100 mW

Ambient Temp : 23.1 ℃ Tissue Temp : 22.3 ℃

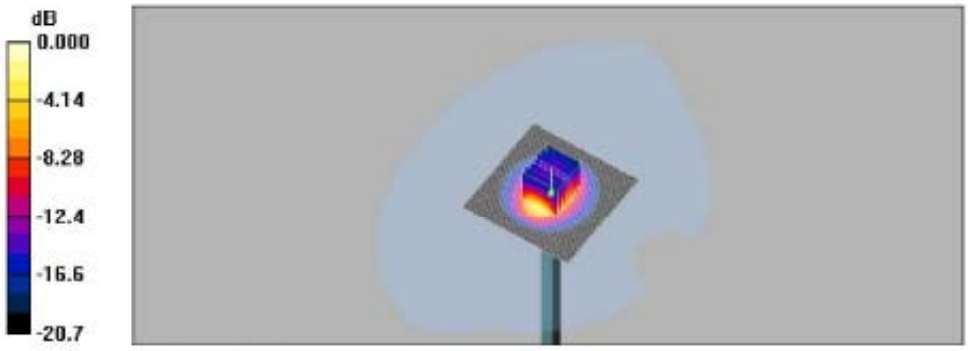
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:734
Program Name: Validation 2450 MHz_Head

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.85 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.48, 4.48, 4.48); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Validation 2450 MHz_Head/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 5.92 mW/g

Validation 2450 MHz_Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.1 V/m; Power Drift = 0.008 dB
Peak SAR (extrapolated) = 10.7 W/kg
SAR(1 g) = 4.98 mW/g; SAR(10 g) = 2.34 mW/g
Maximum value of SAR (measured) = 5.61 mW/g



0 dB = 5.61mW/g

2450 ㎒ Validation Test_Body

Date: 2013-01-12

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: Validation 2450 MHz_Body.da4

Input Power : 100 mW

Ambient Temp : 23.4 ℃ Tissue Temp : 22.1 ℃

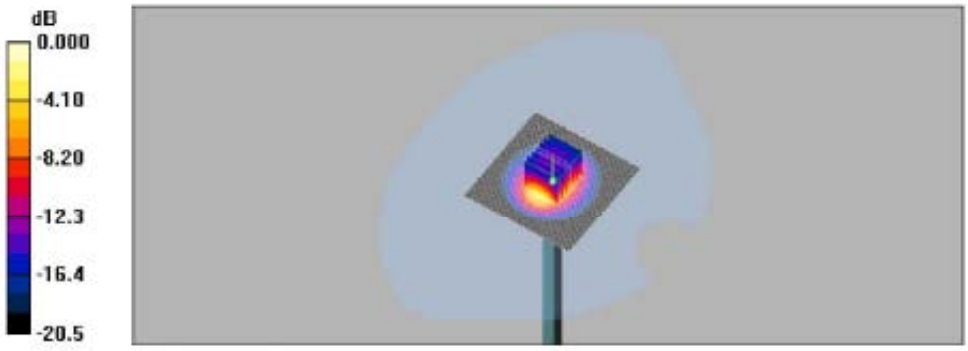
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:734
Program Name: Validation 2450 MHz_Body

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 50.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.11, 4.11, 4.11); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Validation 2450 MHz_Body/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 6.27 mW/g

Validation 2450 MHz_Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.2 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 10.7 W/kg
SAR(1 g) = 5.22 mW/g; SAR(10 g) = 2.48 mW/g
Maximum value of SAR (measured) = 5.94 mW/g



0 dB = 5.94mW/g

GSM 850 Head SAR Test

Date: 2013-01-11

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: GSM850_Right Touch_CH190.da4

Ambient Temp : 22.9 ℃ Tissue Temp : 22.0 ℃

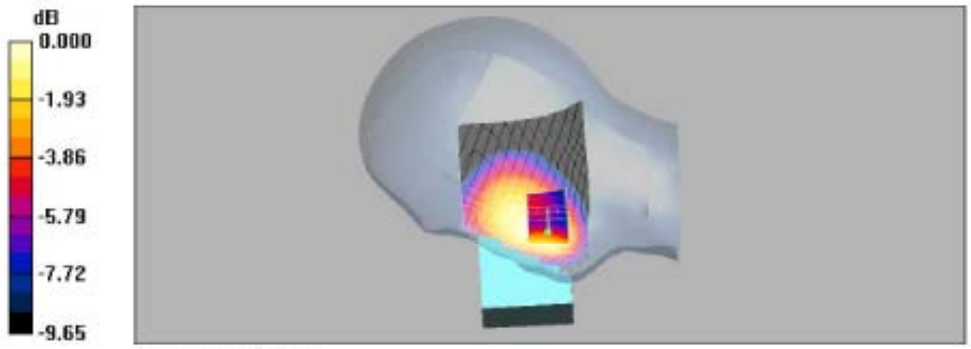
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: GSM850_Right Touch

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; σ = 0.882 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM850_Right Touch_CH190/Area Scan (71x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.445 mW/g

GSM850_Right Touch_CH190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.4 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 0.525 W/kg
SAR(1 g) = 0.403 mW/g; SAR(10 g) = 0.308 mW/g
Maximum value of SAR (measured) = 0.423 mW/g



0 dB = 0.423mW/g

Date: 2013-01-11

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: GSM850_Right Tilt_CH190.da4

Ambient Temp : 22.9 ℃ Tissue Temp : 22.0 ℃

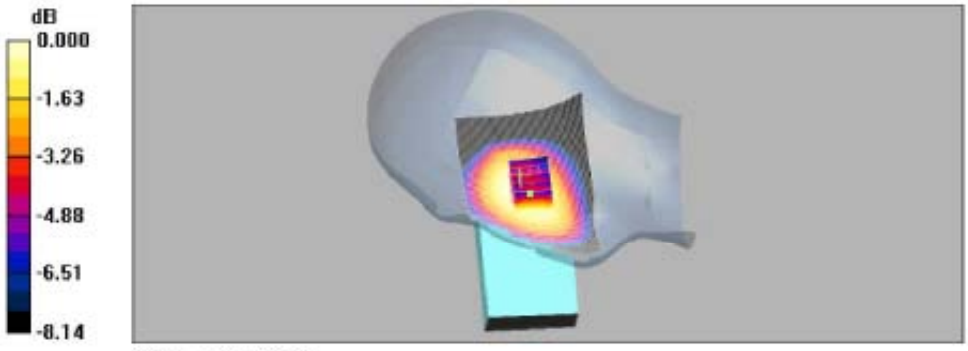
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: GSM850_Right Tilt

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; σ = 0.882 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM850_Right Tilt_CH190/Area Scan (71x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.314 mW/g

GSM850_Right Tilt_CH190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.0 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 0.347 W/kg
SAR(1 g) = 0.300 mW/g; SAR(10 g) = 0.237 mW/g
Maximum value of SAR (measured) = 0.311 mW/g



0 dB = 0.311mW/g

Date: 2013-01-11

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: GSM850_Left Touch_CH190.da4

Ambient Temp : 22.9 ℃ Tissue Temp : 22.0 ℃

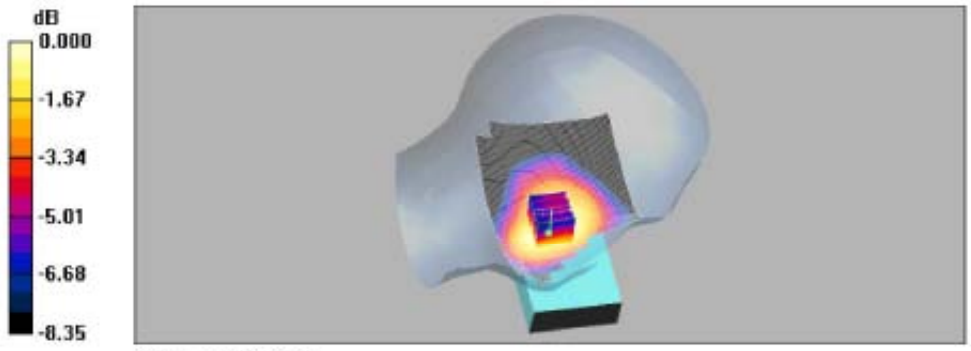
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: GSM850_Left Touch

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; σ = 0.882 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM850_Left Touch_CH190/Area Scan (81x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.357 mW/g

GSM850_Left Touch_CH190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.7 V/m; Power Drift = -0.088 dB
Peak SAR (extrapolated) = 0.414 W/kg
SAR(1 g) = 0.334 mW/g; SAR(10 g) = 0.257 mW/g
Maximum value of SAR (measured) = 0.348 mW/g



0 dB = 0.348mW/g

Date: 2013-01-11

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: GSM850_Left Tilt_CH190.da4

Ambient Temp : 22.9 ℃ Tissue Temp : 22.0 ℃

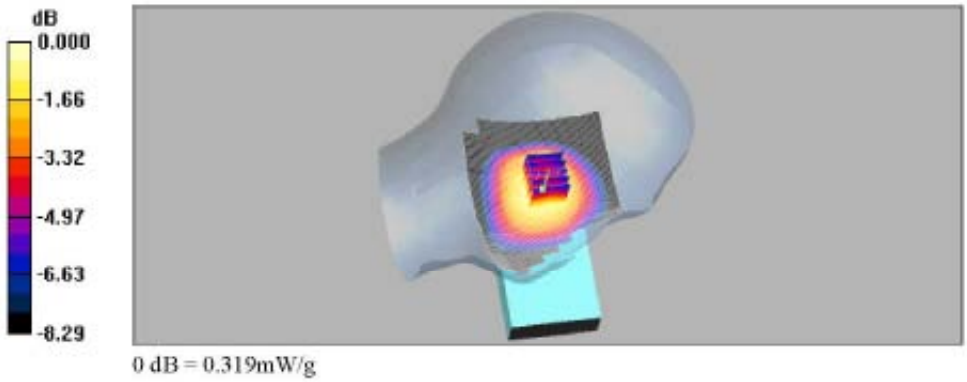
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: GSM850_Left Tilt

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; σ = 0.882 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM850_Left Tilt_CH190/Area Scan (81x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.290 mW/g

GSM850_Left Tilt_CH190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.1 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 0.362 W/kg
SAR(1 g) = 0.300 mW/g; SAR(10 g) = 0.227 mW/g
Maximum value of SAR (measured) = 0.319 mW/g



0 dB = 0.319mW/g

GSM 850 Body SAR Test

Date: 2013-01-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: GSM850_Front_CH190.da4

Ambient Temp : 23.2 ℃ Tissue Temp : 21.9 ℃

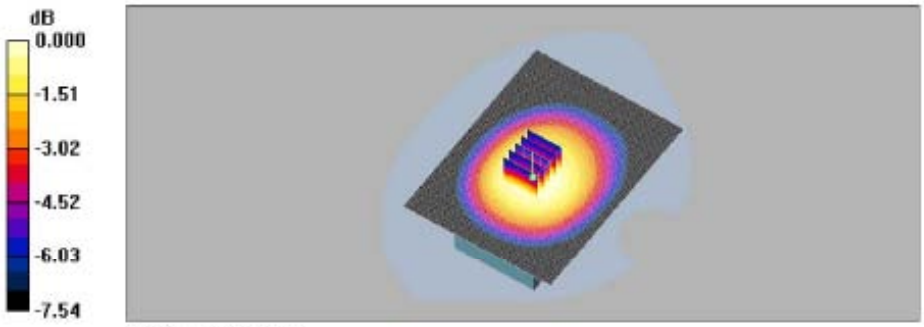
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: GSM850_ Body

Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; σ = 0.967 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM850_Front_CH190/Area Scan (91x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.300 mW/g

GSM850_Front_CH190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.1 V/m; Power Drift = -0.013 dB
Peak SAR (extrapolated) = 0.365 W/kg
SAR(1 g) = 0.287 mW/g; SAR(10 g) = 0.221 mW/g
Maximum value of SAR (measured) = 0.301 mW/g



0 dB = 0.301mW/g

Date: 2013-01-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: GSM850_Rear_CH190.da4

Ambient Temp : 23.2 ℃ Tissue Temp : 21.9℃

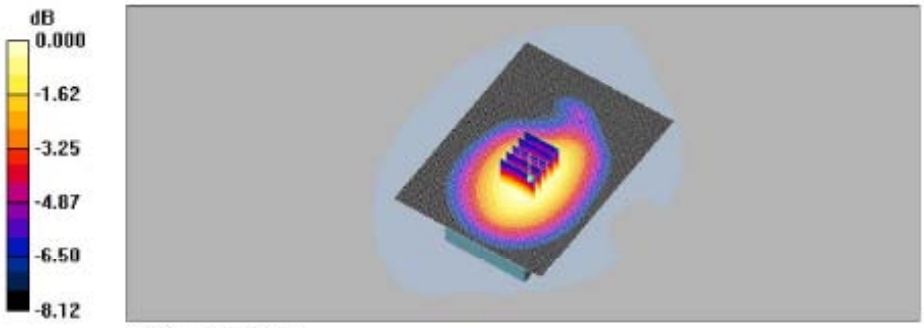
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: GSM850_ Body

Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; σ = 0.967 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GSM850_Rear_CH190/Area Scan (91x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.364 mW/g

GSM850_Rear_CH190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.6 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 0.441 W/kg
SAR(1 g) = 0.348 mW/g; SAR(10 g) = 0.261 mW/g
Maximum value of SAR (measured) = 0.367 mW/g



0 dB = 0.367mW/g

PCS1900 Head SAR Test

Date: 2013-01-14

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: PCS1900_Right Touch_CH661.da4

Ambient Temp : 23.4 ℃ Tissue Temp : 22.2 ℃

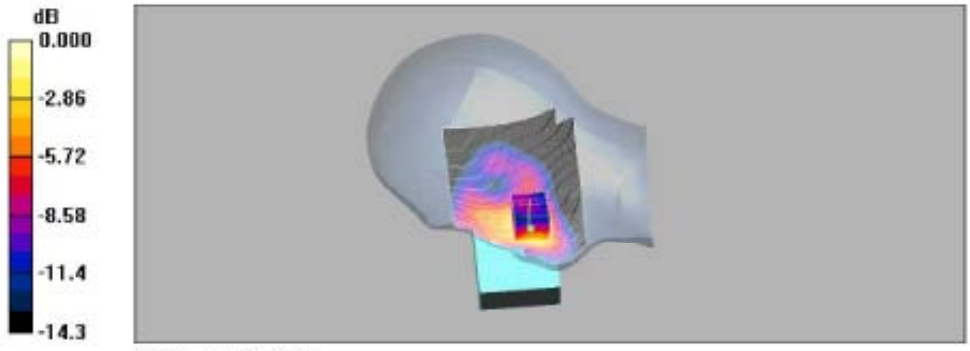
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: PCS1900_Right Touch

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.36 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.12, 5.12, 5.12); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

PCS1900_Right Touch_CH661/Area Scan (81x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.251 mW/g

PCS1900_Right Touch_CH661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.97 V/m; Power Drift = -0.048 dB
Peak SAR (extrapolated) = 0.329 W/kg
SAR(1 g) = 0.233 mW/g; SAR(10 g) = 0.145 mW/g
Maximum value of SAR (measured) = 0.248 mW/g



0 dB = 0.248mW/g

Date: 2013-01-14

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: PCS1900_Right Tilt_CH661.da4

Ambient Temp : 23.4 ℃ Tissue Temp : 22.2 ℃

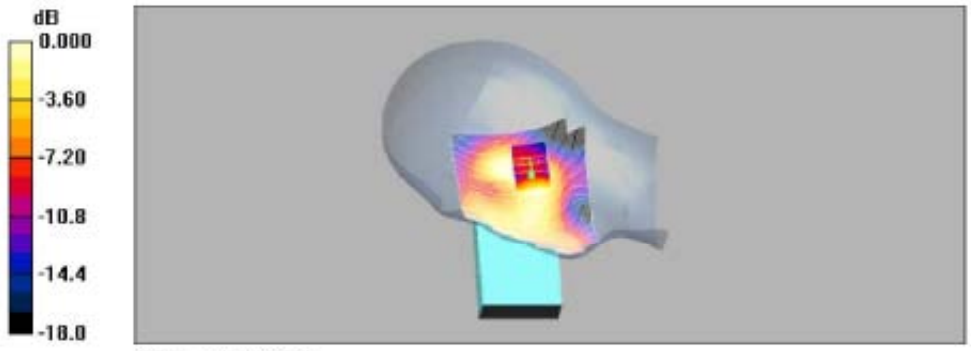
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: PCS1900_Right Tilt

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.36 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.12, 5.12, 5.12); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

PCS1900_Right Tilt_CH661/Area Scan (81x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.074 mW/g

PCS1900_Right Tilt_CH661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.59 V/m; Power Drift = -0.019 dB
Peak SAR (extrapolated) = 0.093 W/kg
SAR(1 g) = 0.066 mW/g; SAR(10 g) = 0.042 mW/g
Maximum value of SAR (measured) = 0.071 mW/g



0 dB = 0.071mW/g

Date: 2013-01-14

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: PCS1900_Left Touch_CH661.da4

Ambient Temp : 23.4 ℃ Tissue Temp : 22.2 ℃

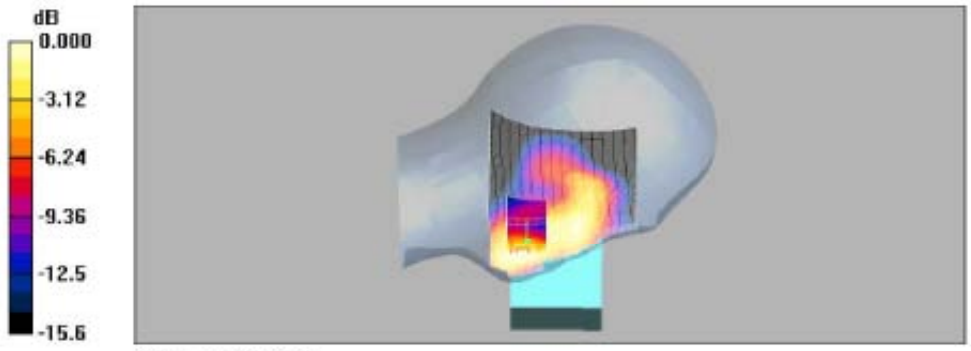
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: PCS1900_Left Touch

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.36 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.12, 5.12, 5.12); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

PCS1900_Left Touch_CH661/Area Scan (81x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.210 mW/g

PCS1900_Left Touch_CH661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.07 V/m; Power Drift = -0.080 dB
Peak SAR (extrapolated) = 0.276 W/kg
SAR(1 g) = 0.192 mW/g; SAR(10 g) = 0.127 mW/g
Maximum value of SAR (measured) = 0.205 mW/g



0 dB = 0.205mW/g

Date: 2013-01-14

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: PCS1900_Left Tilt_CH661.da4

Ambient Temp : 23.4 ℃ Tissue Temp : 22.2 ℃

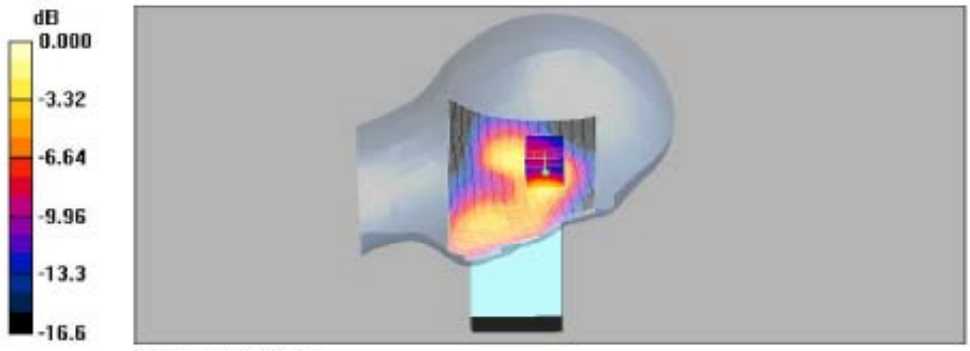
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: PCS1900_Left Tilt

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.36 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.12, 5.12, 5.12); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

PCS1900_Left Tilt_CH661/Area Scan (81x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.148 mW/g

PCS1900_Left Tilt_CH661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.29 V/m; Power Drift = -0.036 dB
Peak SAR (extrapolated) = 0.193 W/kg
SAR(1 g) = 0.127 mW/g; SAR(10 g) = 0.077 mW/g
Maximum value of SAR (measured) = 0.141 mW/g



0 dB = 0.141mW/g

PCS1900 Body SAR Test

Date: 2013-01-15

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: PCS1900_Front_CH661.da4

Ambient Temp : 23.9 ℃ Tissue Temp : 23.0℃

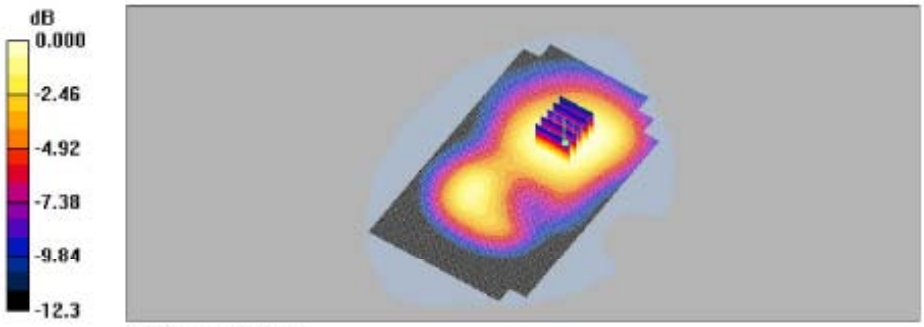
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: PCS1900_ Body

Communication System: PCS1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.49 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.59, 4.59, 4.59); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

PCS1900_Front_CH661/Area Scan (91x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.113 mW/g

PCS1900_Front_CH661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.33 V/m; Power Drift = 0.031 dB
Peak SAR (extrapolated) = 0.151 W/kg
SAR(1 g) = 0.105 mW/g; SAR(10 g) = 0.072 mW/g
Maximum value of SAR (measured) = 0.111 mW/g



0 dB = 0.111mW/g

Date: 2013-01-15

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: PCS1900_Rear_CH661.da4

Ambient Temp : 23.9 ℃ Tissue Temp : 23.0℃

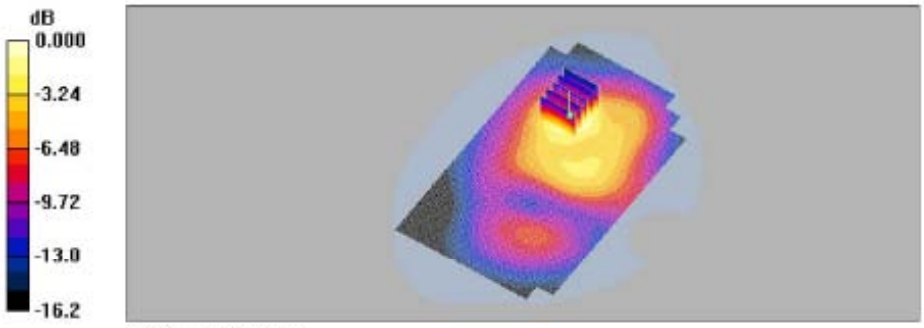
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: PCS1900_ Body

Communication System: PCS1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.49 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.59, 4.59, 4.59); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

PCS1900_Rear_CH661/Area Scan (91x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.157 mW/g

PCS1900_Rear_CH661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.68 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 0.237 W/kg
SAR(1 g) = 0.144 mW/g; SAR(10 g) = 0.086 mW/g
Maximum value of SAR (measured) = 0.156 mW/g



0 dB = 0.156mW/g

WCDMA V Head SAR Test

Date: 2013-01-11

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD V_Right Touch_CH4182.da4

Ambient Temp : 22.9 ℃ Tissue Temp : 22.0 ℃

DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA_Right Touch

Communication System: WCDMA V; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.4 MHz; σ = 0.881 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Right Section

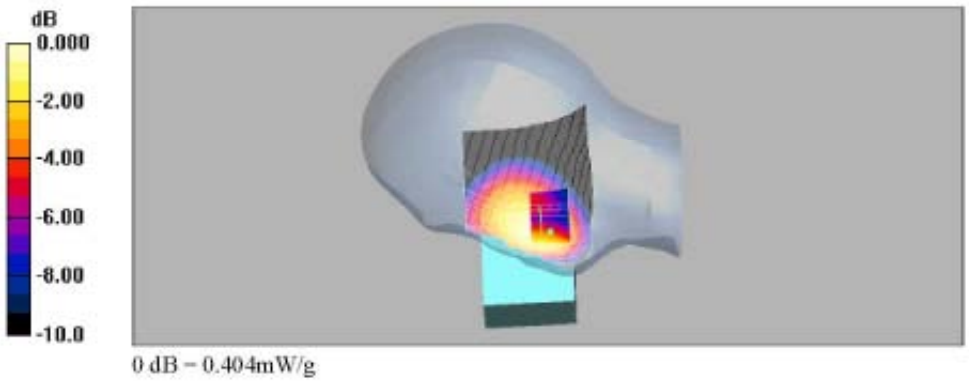
DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA FDD V_Right Touch_CH4182/Area Scan (71x131x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.414 mW/g

WCDMA FDD V_Right Touch_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.6 V/m; Power Drift = -0.030 dB
Peak SAR (extrapolated) = 0.503 W/kg
SAR(1 g) = 0.385 mW/g; SAR(10 g) = 0.290 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.404 mW/g



0 dB = 0.404mW/g

Date: 2013-01-11

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD V_Right Tilt_CH4182.da4

Ambient Temp : 22.9 ℃ Tissue Temp : 22.0 ℃

DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA_Right Tilt

Communication System: WCDMA V; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.4 MHz; σ = 0.881 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Right Section

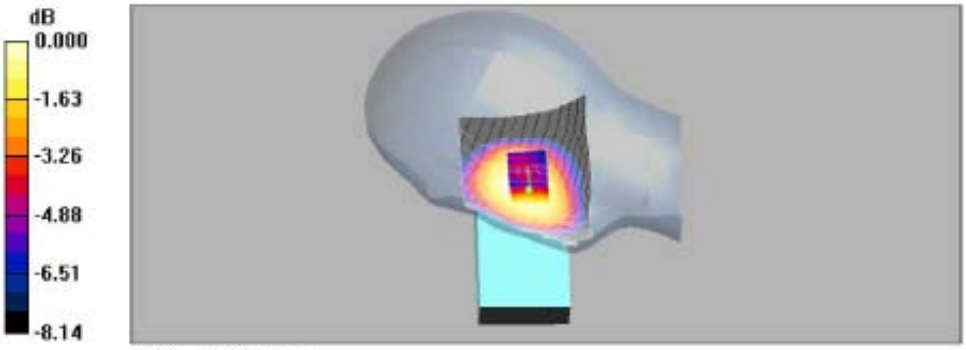
DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA FDD V_Right Tilt_CH4182/Area Scan (71x131x1): Measurement grid:
dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.286 mW/g

WCDMA FDD V_Right Tilt_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid:
dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.3 V/m; Power Drift = -0.007 dB
Peak SAR (extrapolated) = 0.316 W/kg
SAR(1 g) = 0.273 mW/g; SAR(10 g) = 0.216 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.284 mW/g



0 dB = 0.284mW/g

Date: 2013-01-11

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD V_Left Touch_CH4182.da4

Ambient Temp : 22.9 ℃ Tissue Temp : 22.0 ℃

DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA_Left Touch

Communication System: WCDMA V; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.4 MHz; σ = 0.881 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section

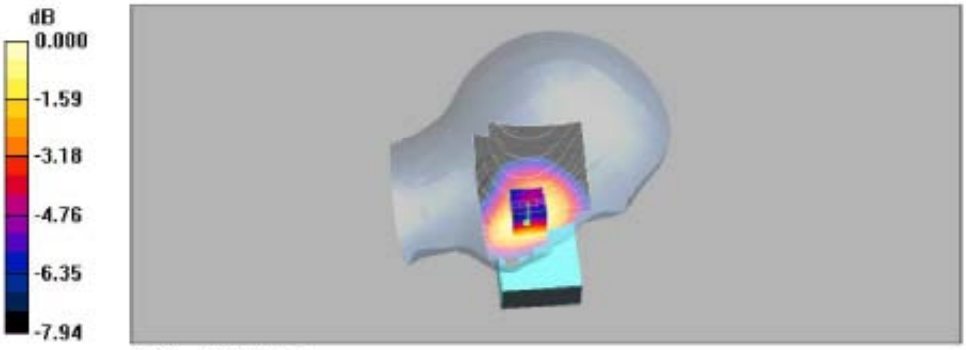
DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA FDD V_Left Touch_CH4182/Area Scan (71x131x1): Measurement grid:
dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.355 mW/g

WCDMA FDD V_Left Touch_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid:
dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.1 V/m; Power Drift = -0.056 dB
Peak SAR (extrapolated) = 0.400 W/kg
SAR(1 g) = 0.332 mW/g; SAR(10 g) = 0.257 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.349 mW/g



0 dB = 0.349mW/g

Date: 2013-01-11

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD V_Left Tilt_CH4182.da4

Ambient Temp : 22.9 ℃ Tissue Temp : 22.0 ℃

DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA_Left Tilt

Communication System: WCDMA V; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.4 MHz; σ = 0.881 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section

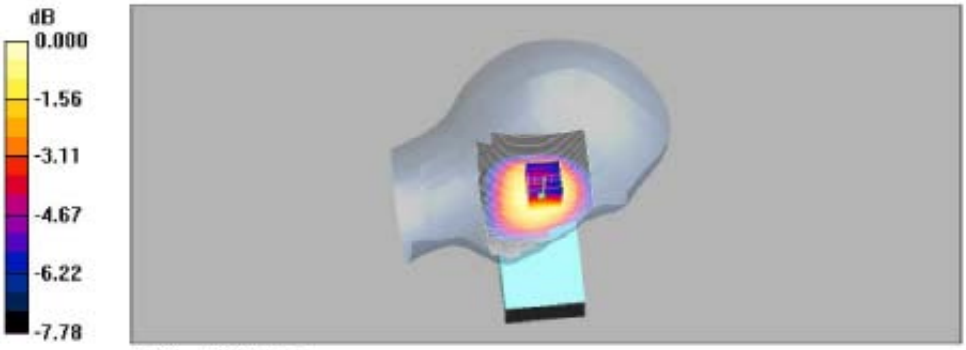
DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA FDD V_Left Tilt_CH4182/Area Scan (71x131x1): Measurement grid:
dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.290 mW/g

WCDMA FDD V_Left Tilt_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid:
dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.8 V/m; Power Drift = -0.034 dB
Peak SAR (extrapolated) = 0.330 W/kg
SAR(1 g) = 0.279 mW/g; SAR(10 g) = 0.219 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.290 mW/g



0 dB = 0.290mW/g

WCDMA V Body SAR Test

Date: 2013-01-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD V_Front_CH4182.da4

Ambient Temp : 23.2 ℃ Tissue Temp : 21.9 ℃

DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA Body

Communication System: WCDMA V; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.4 MHz; σ = 0.966 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

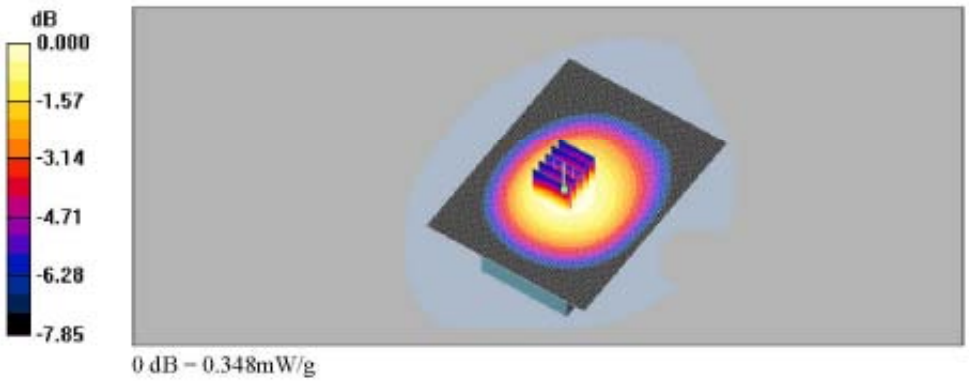
DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA FDD V_Front_CH4182/Area Scan (91x121x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.349 mW/g

WCDMA FDD V_Front_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.8 V/m; Power Drift = -0.053 dB
Peak SAR (extrapolated) = 0.412 W/kg
SAR(1 g) = 0.329 mW/g; SAR(10 g) = 0.252 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.348 mW/g



0 dB = 0.348mW/g

Date: 2013-01-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD V_Rear_CH4182.da4

Ambient Temp : 23.2 ℃ Tissue Temp : 21.9 ℃

DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA Body

Communication System: WCDMA V; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.4 MHz; σ = 0.966 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

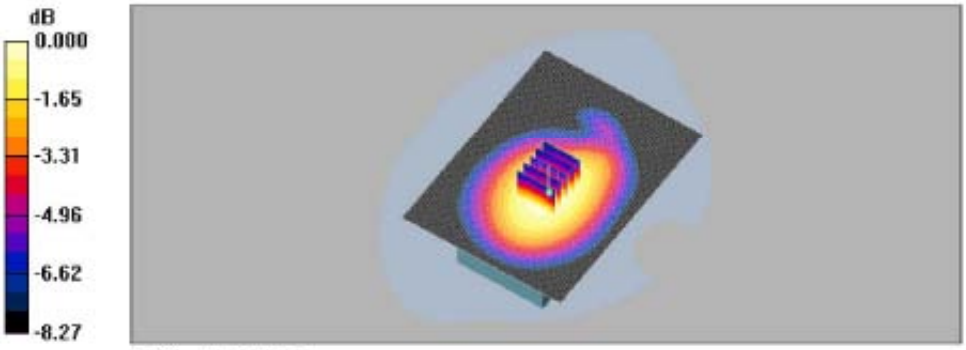
DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA FDD V_Rear_CH4182/Area Scan (91x121x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.435 mW/g

WCDMA FDD V_Rear_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.7 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 0.533 W/kg
SAR(1 g) = 0.421 mW/g; SAR(10 g) = 0.317 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.442 mW/g



0 dB = 0.442mW/g

WCDMA II Head SAR Test

Date: 2013-01-14

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD II_Right Touch_CH9400.da4

Ambient Temp : 23.4 ℃ Tissue Temp : 22.2 ℃

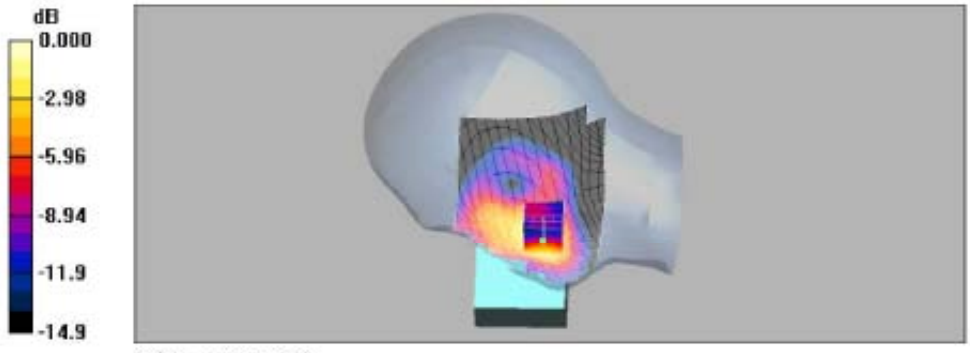
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA_Right Touch

Communication System: W-CDMA II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.36 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.12, 5.12, 5.12); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA FDD II_Right Touch_CH9400/Area Scan (81x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.590 mW/g

WCDMA FDD II_Right Touch_CH9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.13 V/m; Power Drift = -0.034 dB
Peak SAR (extrapolated) = 0.763 W/kg
SAR(1 g) = 0.549 mW/g; SAR(10 g) = 0.345 mW/g
Maximum value of SAR (measured) = 0.594 mW/g



0 dB = 0.594mW/g

Date: 2013-01-14

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD II_Right Tilt_CH9400.da4

Ambient Temp : 23.4 ℃ Tissue Temp : 22.2 ℃

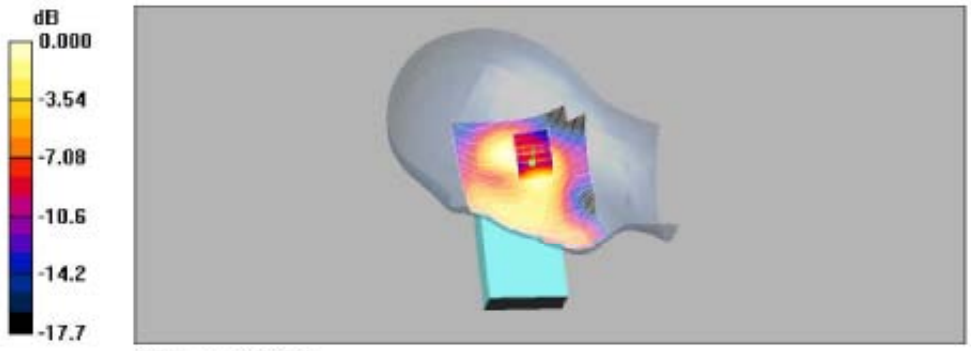
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA_Right Tilt

Communication System: W-CDMA II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.36 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.12, 5.12, 5.12); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA FDD II_Right Tilt_CH9400/Area Scan (81x131x1): Measurement grid:
dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.192 mW/g

WCDMA FDD II_Right Tilt_CH9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid:
dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.9 V/m; Power Drift = -0.018 dB
Peak SAR (extrapolated) = 0.243 W/kg
SAR(1 g) = 0.167 mW/g; SAR(10 g) = 0.106 mW/g
Maximum value of SAR (measured) = 0.179 mW/g



0 dB = 0.179mW/g

Date: 2013-01-14

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD II_Left Touch_CH9400.da4

Ambient Temp : 23.4 ℃ Tissue Temp : 22.2 ℃

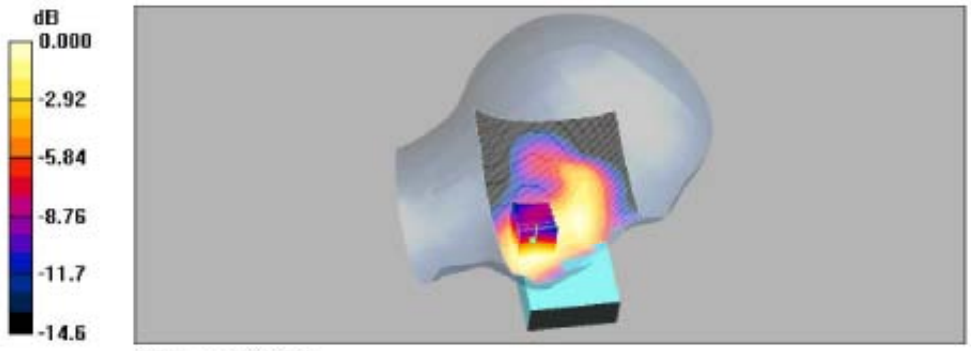
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA_Left Touch

Communication System: W-CDMA II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.36 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.12, 5.12, 5.12); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA FDD II_Left Touch_CH9400/Area Scan (81x131x1): Measurement grid:
dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.456 mW/g

WCDMA FDD II_Left Touch_CH9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid:
dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.80 V/m; Power Drift = -0.093 dB
Peak SAR (extrapolated) = 0.582 W/kg
SAR(1 g) = 0.406 mW/g; SAR(10 g) = 0.268 mW/g
Maximum value of SAR (measured) = 0.440 mW/g



0 dB = 0.440mW/g

Date: 2013-01-14

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA FDD II_Left Tilt_CH9400.da4

Ambient Temp : 23.4 ℃ Tissue Temp : 22.2 ℃

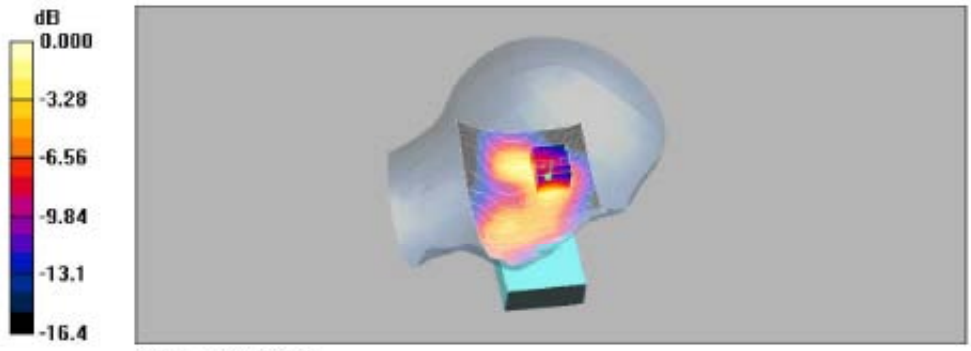
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA_Left Tilt

Communication System: W-CDMA II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.36 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.12, 5.12, 5.12); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA FDD II_Left Tilt_CH9400/Area Scan (81x131x1): Measurement grid:
dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.320 mW/g

WCDMA FDD II_Left Tilt_CH9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid:
dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.5 V/m; Power Drift = 0.119 dB
Peak SAR (extrapolated) = 0.421 W/kg
SAR(1 g) = 0.281 mW/g; SAR(10 g) = 0.171 mW/g
Maximum value of SAR (measured) = 0.309 mW/g



0 dB = 0.309mW/g

WCDMA II Body SAR Test

Date: 2013-01-15

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA II_Front_CH9400.da4

Ambient Temp : 23.9 ℃ Tissue Temp : 23.0 ℃

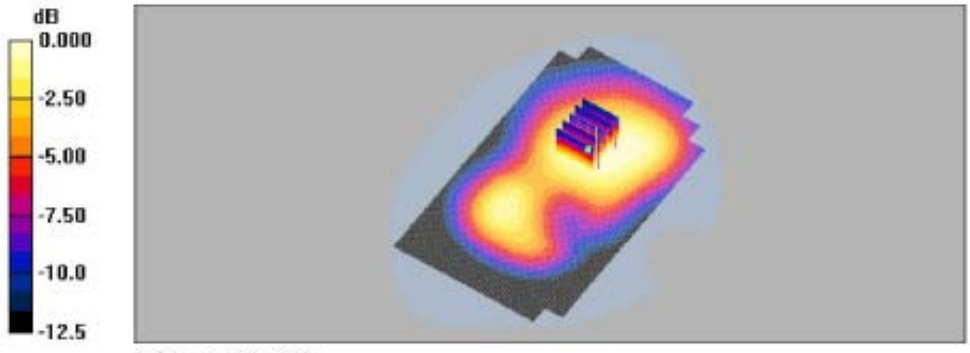
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA II_Body

Communication System: W-CDMA II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.49 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.59, 4.59, 4.59); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA II_Front_CH9400/Area Scan (91x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.260 mW/g

WCDMA II_Front_CH9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.55 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 0.357 W/kg
SAR(1 g) = 0.246 mW/g; SAR(10 g) = 0.168 mW/g
Maximum value of SAR (measured) = 0.262 mW/g



0 dB = 0.262mW/g

Date: 2013-01-15

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WCDMA II_Rear_CH9400.da4

Ambient Temp : 23.9 ℃ Tissue Temp : 23.0 ℃

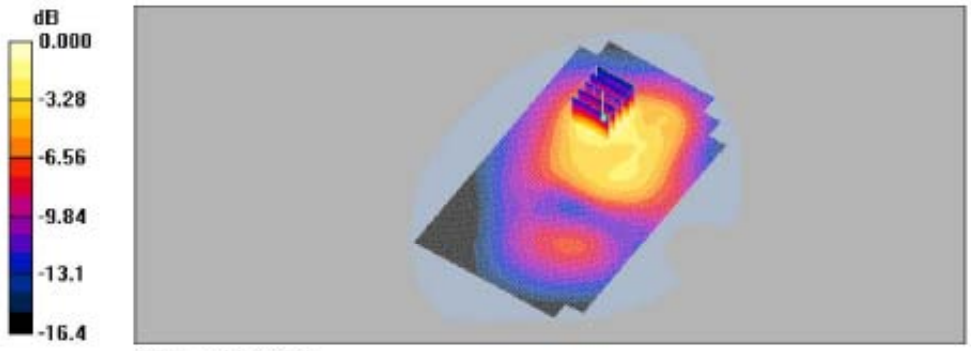
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WCDMA II_ Body

Communication System: W-CDMA II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.49 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.59, 4.59, 4.59); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA II_Rear_CH9400/Area Scan (91x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.427 mW/g

WCDMA II_Rear_CH9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.88 V/m; Power Drift = 0.063 dB
Peak SAR (extrapolated) = 0.639 W/kg
SAR(1 g) = 0.389 mW/g; SAR(10 g) = 0.228 mW/g
Maximum value of SAR (measured) = 0.426 mW/g



0 dB = 0.426mW/g

WLAN Head SAR Test

Date: 2013-01-13

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WLAN_Right Touch_1Mbps_CH6.da4

Ambient Temp : 23.1 ℃ Tissue Temp : 22.3 ℃

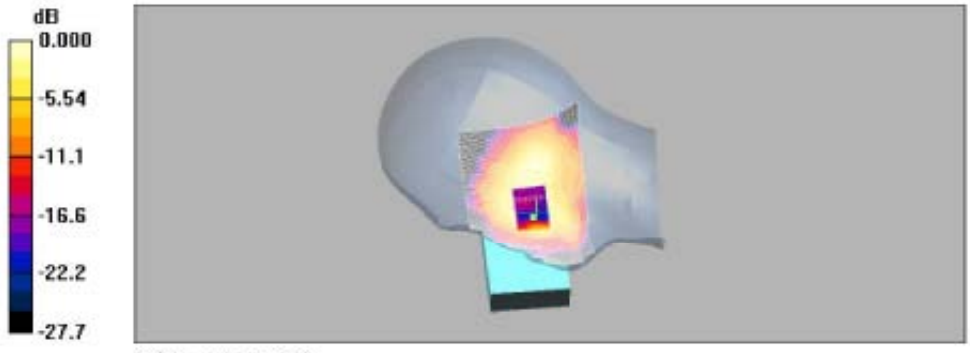
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WLAN_Right Touch

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.48, 4.48, 4.48); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Right Touch_1Mbps_CH6/Area Scan (111x181x1): Measurement grid:
dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.034 mW/g

WLAN_Right Touch_1Mbps_CH6/Zoom Scan (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.61 V/m; Power Drift = 0.055 dB
Peak SAR (extrapolated) = 0.056 W/kg
SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.015 mW/g
Maximum value of SAR (measured) = 0.034 mW/g



0 dB = 0.034mW/g

Date: 2013-01-13

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WLAN_Right Tilt_1Mbps_CH6.da4

Ambient Temp : 23.1 ℃ Tissue Temp : 22.3 ℃

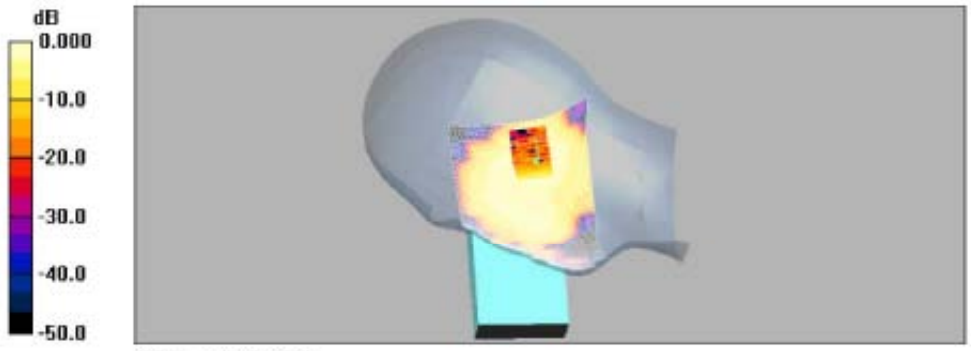
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WLAN_Right Tilt

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.48, 4.48, 4.48); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Right Tilt_1Mbps_CH6/Area Scan (111x181x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.022 mW/g

WLAN_Right Tilt_1Mbps_CH6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.52 V/m; Power Drift = 0.181 dB
Peak SAR (extrapolated) = 0.041 W/kg
SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.00976 mW/g
Maximum value of SAR (measured) = 0.022 mW/g



0 dB = 0.022mW/g

Date: 2013-01-13

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WLAN_Left Touch_1Mbps_CH6.da4

Ambient Temp : 23.1 ℃ Tissue Temp : 22.3 ℃

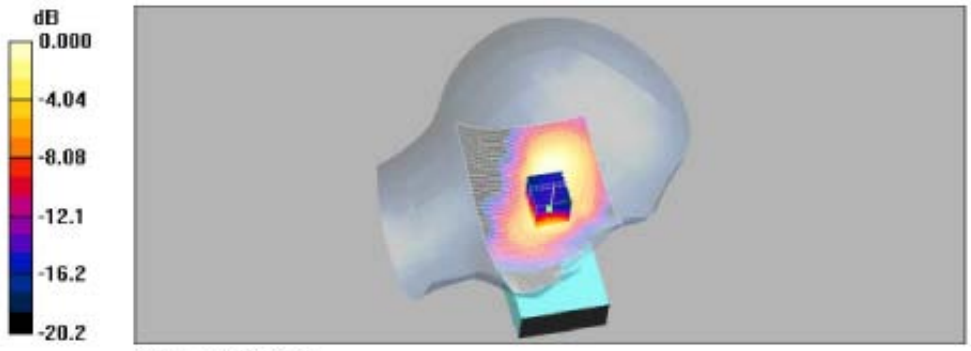
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WLAN_Left Touch

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.48, 4.48, 4.48); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Left Touch_1Mbps_CH6/Area Scan (111x181x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.050 mW/g

WLAN_Left Touch_1Mbps_CH6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.87 V/m; Power Drift = 0.015 dB
Peak SAR (extrapolated) = 0.083 W/kg
SAR(1 g) = 0.044 mW/g; SAR(10 g) = 0.022 mW/g
Maximum value of SAR (measured) = 0.048 mW/g



0 dB = 0.048mW/g

Date: 2013-01-13

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WLAN_Left Tilt_1Mbps_CH6.da4

Ambient Temp : 23.1 ℃ Tissue Temp : 22.3 ℃

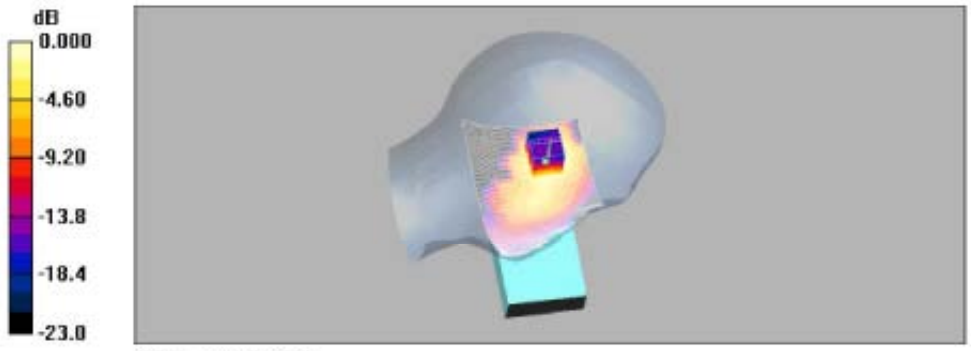
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WLAN_Left Tilt

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.48, 4.48, 4.48); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Left Tilt_1Mbps_CH6/Area Scan (111x181x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.032 mW/g

WLAN_Left Tilt_1Mbps_CH6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.60 V/m; Power Drift = 0.057 dB
Peak SAR (extrapolated) = 0.061 W/kg
SAR(1 g) = 0.029 mW/g; SAR(10 g) = 0.015 mW/g
Maximum value of SAR (measured) = 0.032 mW/g



0 dB = 0.032mW/g

WLAN Body SAR Test

Date: 2013-01-12

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WLAN_Front_11b_1Mbps_CH6.da4

Ambient Temp : 23.4 ℃ Tissue Temp : 22.1 ℃

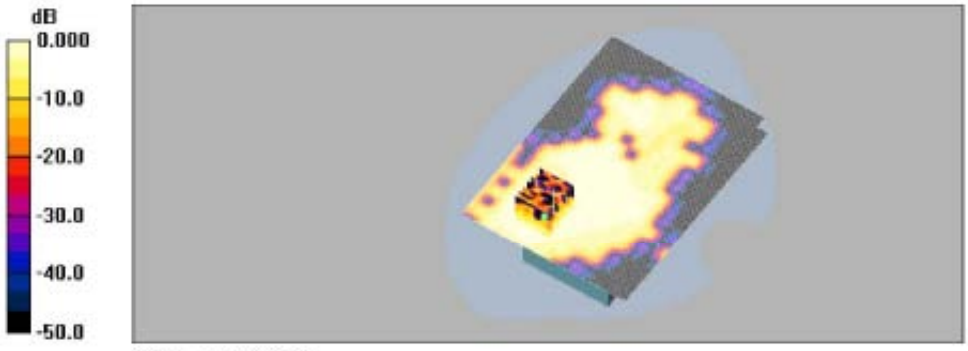
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WLAN Body

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.95 mho/m; ε_r = 50.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.11, 4.11, 4.11); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Front_11b_1Mbps_CH6/Area Scan (141x191x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.007 mW/g

WLAN_Front_11b_1Mbps_CH6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.73 V/m; Power Drift = -0.186 dB
Peak SAR (extrapolated) = 0.020 W/kg
SAR(1 g) = 0.00581 mW/g; SAR(10 g) = 0.00289 mW/g
Maximum value of SAR (measured) = 0.006 mW/g



0 dB = 0.006mW/g

Date: 2013-01-12

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WLAN_Rear_11b_1Mbps_CH6.da4

Ambient Temp : 23.4 ℃ Tissue Temp : 22.1 ℃

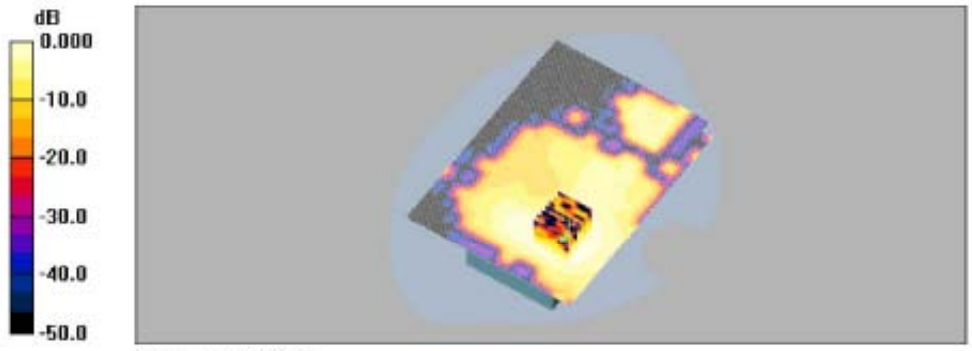
DUT: AT911; Type: Industrial PDA; Serial: N/A
Program Name: WLAN Body

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.95 mho/m; ε_r = 50.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(4.11, 4.11, 4.11); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn534; Calibrated: 2012-09-06
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_Rear_11b_1Mbps_CH6/Area Scan (141x191x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.010 mW/g

WLAN_Rear_11b_1Mbps_CH6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.845 V/m; Power Drift = -0.167 dB
Peak SAR (extrapolated) = 0.015 W/kg
SAR(1 g) = 0.00835 mW/g; SAR(10 g) = 0.00441 mW/g
Maximum value of SAR (measured) = 0.009 mW/g



0 dB = 0.009mW/g

Appendix B

Uncertainty Analysis

Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

a	b	c	d	e = f(d,k)	g	i = cxg/e	k
Uncertainty Component	Section in P1528	Tol (%)	Prob . Dist.	Div.	Ci (1g)	1g ui (%)	Vi (Veff)
Probe calibration	E.2.1	6.0	N	1	1	6.00	∞
Axial isotropy	E.2.2	0.25	R	1.73	1	0.14	∞
hemispherical isotropy	E.2.2	1.3	R	1.73	1	0.75	∞
Boundary effect	E.2.3	0.4	R	1.73	1	0.23	∞
Linearity	E.2.4	0.3	R	1.73	1	0.17	∞
System detection limit	E.2.5	0.25	R	1.73	1	0.14	∞
Readout electronics	E.2.6	0.3	N	1	1	0.30	∞
Response time	E.2.7	0.8	R	1.73	1	0.46	∞
Integration time	E.2.8	2.6	R	1.73	1	1.50	∞
RF ambient Condition -Noise	E.6.1	3.0	R	1.73	1	1.73	∞
RF ambient Condition - reflections	E.6.1	3.0	R	1.73	1	1.73	∞
Probe positioning- mechanical tolerance	E.6.2	1.5	R	1.73	1	0.87	∞
Probe positioning- with respect to phantom	E.6.3	2.9	R	1.73	1	1.67	∞
Max. SAR evaluation	E.5.2	1.0	R	1.73	1	0.58	∞
Test sample positioning	E.4.2	5.84	N	1	1	5.84	9
Device holder uncertainty	E.4.1	3.6	N	1	1	3.60	∞
Output power variation -SAR drift measurement	6.62	5.0	R	1.73	1	2.89	∞
Phantom uncertainty (shape and thickness tolerances)	E.3.1	6.6	R	1.73	1	3.81	∞
Liquid conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	1.85	∞
Liquid conductivity - measurement uncertainty	E.3.2	0.70	N	1	0.64	0.45	5
Liquid permittivity - deviation from target values	E.3.3	5.0	R	1.73	0.6	1.73	∞
Liquid permittivity - measurement uncertainty	E.3.3	0.56	N	1	0.6	0.34	5
Combined standard uncertainty				RSS		11.22	123
Expanded uncertainty (95% CONFIDENCE INTERVAL)				K=2		22.44	

Appendix C

Calibration Certificate

- **PROBE**
- **DAE**
- **835 ㎒, 1900 ㎒, 2450 ㎒ DIPOLE**

- PROBE Calibration Certificate

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

S C S Schweizerischer Kalibrierdienst
Service suisse d'étalonnage
Servizio svizzero di taratura
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 (Dymstec) **Certificate No: ET3-1782_Apr12**

CALIBRATION CERTIFICATE

Object: ET3DV6 - SN:1782

Calibration procedure(s): QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: April 27, 2012

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: April 27, 2012

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
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS) **Accreditation No.: SCS 108**
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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 affect 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.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 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 ET3DV6

SN:1782

Manufactured: April 15, 2003
Calibrated: April 27, 2012

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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1782

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	2.01	1.66	1.88	± 10.1 %
DCP (mV)[B]	96.2	96.7	96.7	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.00	0.00	1.00	154.8	±1.9 %
			Y	0.00	0.00	1.00	185.8	
			Z	0.00	0.00	1.00	151.1	

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 max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1782

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	7.17	7.17	7.17	0.23	2.35	± 13.4 %
835	41.5	0.90	6.40	6.40	6.40	0.32	3.00	± 12.0 %
1750	40.1	1.37	5.39	5.39	5.39	0.80	1.66	± 12.0 %
1900	40.0	1.40	5.12	5.12	5.12	0.80	1.98	± 12.0 %
2450	39.2	1.80	4.48	4.48	4.48	0.80	1.97	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1782

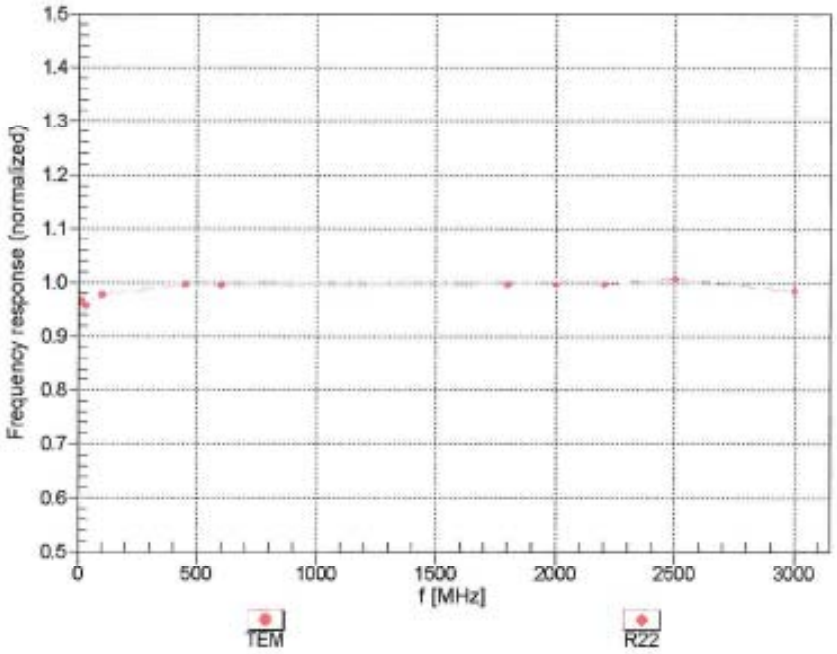
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.57	7.57	7.57	0.16	2.29	± 13.4 %
835	55.2	0.97	6.22	6.22	6.22	0.24	3.00	± 12.0 %
1750	53.4	1.49	4.79	4.79	4.79	0.76	2.24	± 12.0 %
1900	53.3	1.52	4.59	4.59	4.59	0.75	2.18	± 12.0 %
2450	52.7	1.95	4.11	4.11	4.11	0.76	2.25	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

ET3DV6- SN:1782 April 27, 2012

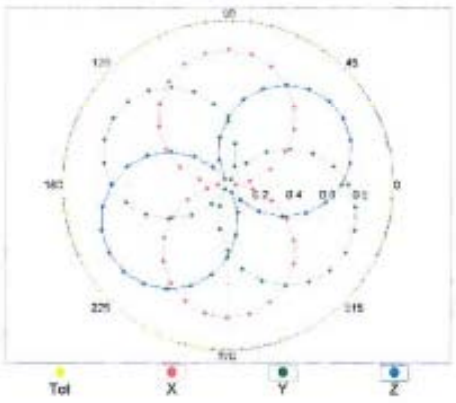
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



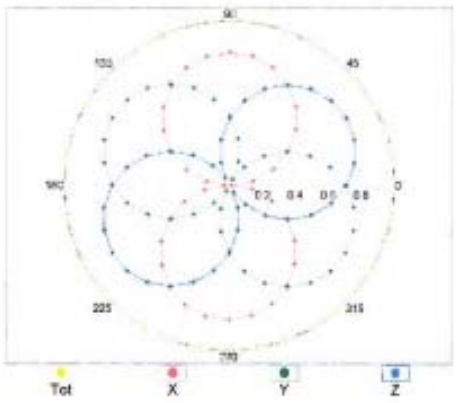
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

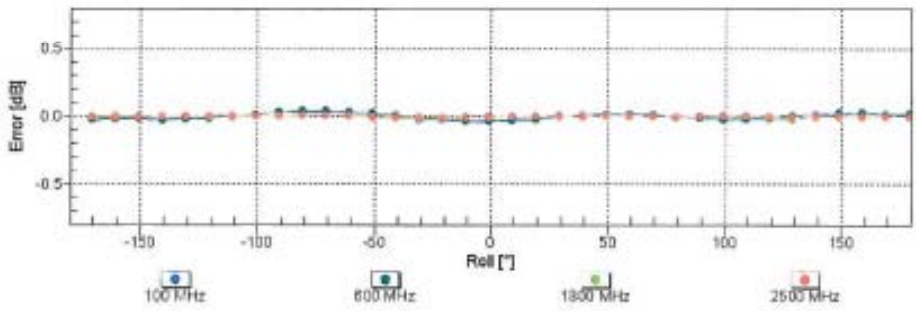
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



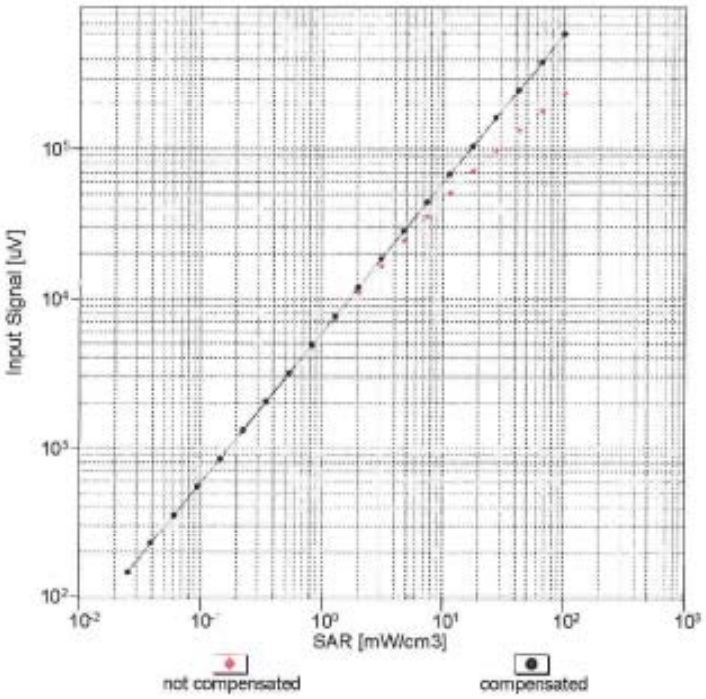
f=1800 MHz,R22

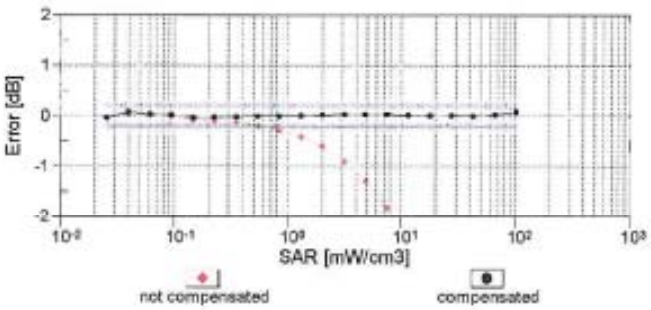




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)



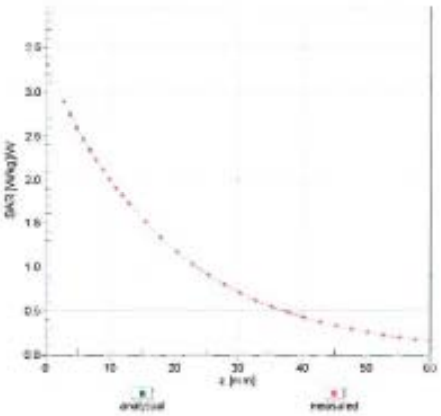


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

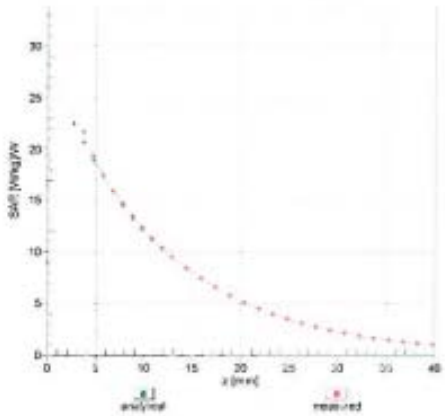
ET3DV6- SN:1782 April 27, 2012

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

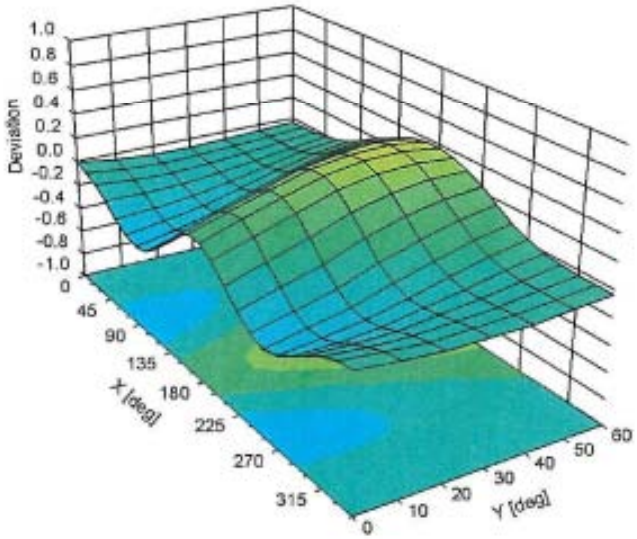


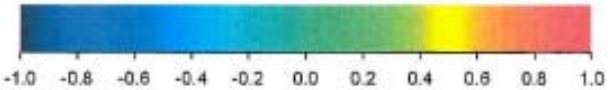
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1782

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	49.1
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

- DAE3 Calibration Certificate

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Client LG (Dymstec)

Certificate No: DAE4-534_Sep12

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 534
Calibration procedure(s)	QA CAL-06.v25 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	September 06, 2012

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	28-Sep-11 (No:11450)	Sep-12
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V2.1	SE UWS 053 AA 1001	05-Jan-12 (in house check)	In house check: Jan-13

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

Issued: September 6, 2012

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Accreditation No.: SCS 108

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV
Low Range: 1LSB = 61nV , full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.398 ± 0.1% (k=2)	403.551 ± 0.1% (k=2)	403.432 ± 0.1% (k=2)
Low Range	3.97473 ± 0.7% (k=2)	3.95424 ± 0.7% (k=2)	4.00654 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	50 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199993.89	-2.83	-0.00
Channel X	+ Input	20000.82	1.15	0.01
Channel X	- Input	-19998.97	2.74	-0.01
Channel Y	+ Input	199993.92	-2.93	-0.00
Channel Y	+ Input	19998.59	-1.09	-0.01
Channel Y	- Input	-20000.75	1.03	-0.01
Channel Z	+ Input	199995.20	-1.50	-0.00
Channel Z	+ Input	19997.49	-2.10	-0.01
Channel Z	- Input	-20001.54	0.31	-0.00

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	1999.74	-0.17	-0.01
Channel X	+ Input	200.36	-0.01	-0.01
Channel X	- Input	-199.39	0.16	-0.08
Channel Y	+ Input	1999.70	-0.16	-0.01
Channel Y	+ Input	199.88	-0.40	-0.20
Channel Y	- Input	-199.47	0.13	-0.06
Channel Z	+ Input	1999.85	-0.01	-0.00
Channel Z	+ Input	199.35	-0.94	-0.47
Channel Z	- Input	-200.76	-1.16	0.58

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-12.43	-13.96
	- 200	15.33	13.20
Channel Y	200	4.53	4.13
	- 200	-4.89	-5.32
Channel Z	200	-1.29	-1.17
	- 200	-0.63	-0.78

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	2.06	-4.50
Channel Y	200	8.06	-	1.51
Channel Z	200	9.22	6.26	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16116	15808
Channel Y	15813	15945
Channel Z	15935	16059

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.82	0.08	1.90	0.30
Channel Y	-0.84	-2.46	-0.16	0.32
Channel Z	-1.55	-2.53	-0.72	0.33

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

- 835 ㎒ Dipole Calibration Certificate

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Accreditation No.: SCS 108

Client SGS (Dymstec)

Certificate No: D835V2-490_May12

CALIBRATION CERTIFICATE

Object D835V2 - SN: 490

Calibration procedure(s) QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: May 16, 2012

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	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 16, 2012

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Certificate No: D835V2-490_May12 Page 1 of 8

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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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 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	40.6 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.34 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.39 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.53 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.14 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	54.3 ± 6 %	1.00 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.40 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.35 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.58 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.19 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.8 Ω - 5.5 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.9 Ω - 7.3 jΩ
Return Loss	- 21.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.381 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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	May 19, 2003

DASY5 Validation Report for Head TSL

Date: 16.05.2012

Test Laboratory: SPEAG, Zurich, Switzerland

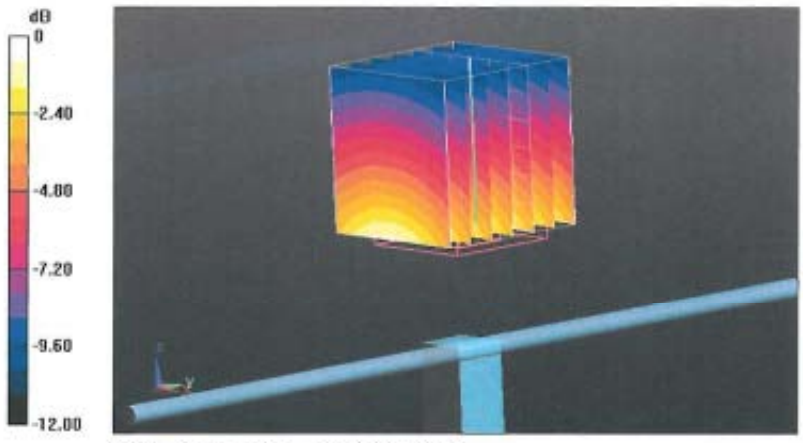
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 490

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

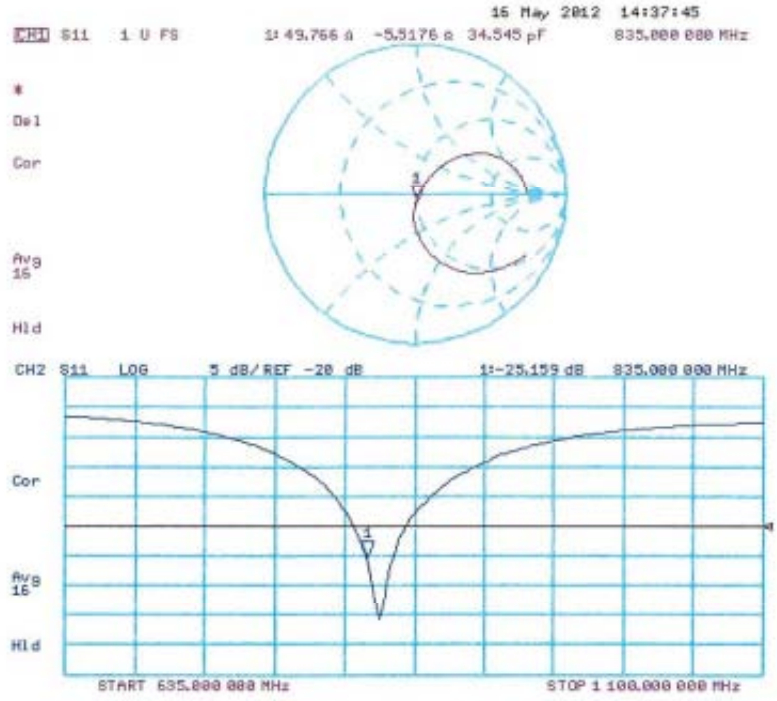
- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm 2/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.851 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.449 mW/g
SAR(1 g) = 2.34 mW/g; SAR(10 g) = 1.53 mW/g
Maximum value of SAR (measured) = 2.71 mW/g



0 dB = 2.71 mW/g = 8.66 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.05.2012

Test Laboratory: SPEAG, Zurich, Switzerland

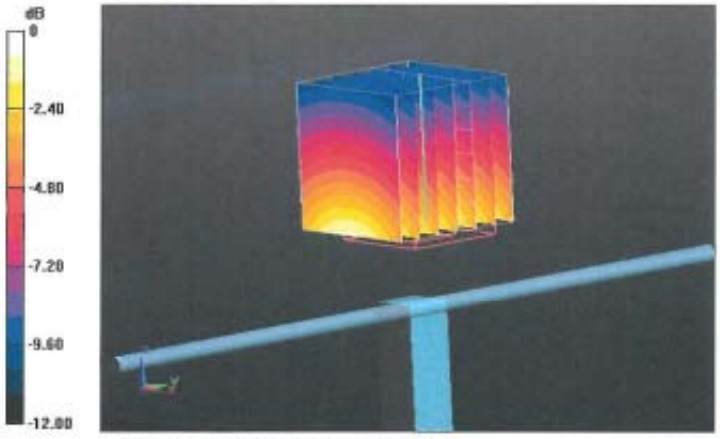
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 490

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 54.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

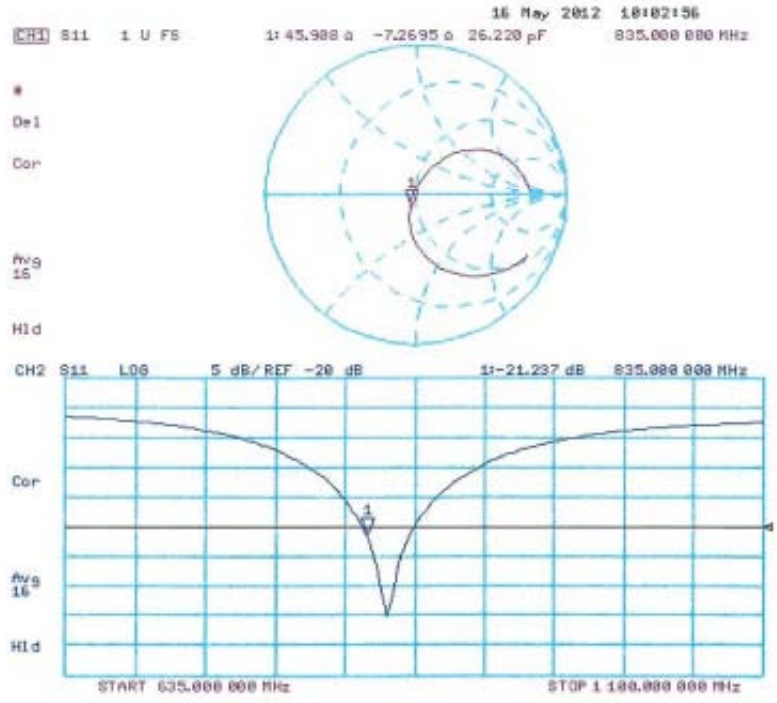
- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.760 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.479 mW/g
SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.58 mW/g
Maximum value of SAR (measured) = 2.79 mW/g



0 dB = 2.79 mW/g = 8.91 dB mW/g

Impedance Measurement Plot for Body TSL



- 1900 ㎒ Dipole Calibration Certificate

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Accreditation No.: SCS 108

Client SGS (Dymstec)

Certificate No: D1900V2-5d033_May12

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d033
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	May 23, 2012

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	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israa El-Naouq	Laboratory Technician	Israa El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 23, 2012

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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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.5 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.69 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**39.4 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.13 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.7 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	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.9 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**39.9 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.31 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.2 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω + 3.3 jΩ
Return Loss	- 28.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.5 Ω + 3.6 jΩ
Return Loss	- 27.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.196 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 17, 2003

DASY5 Validation Report for Head TSL

Date: 23.05.2012

Test Laboratory: SPEAG, Zurich, Switzerland

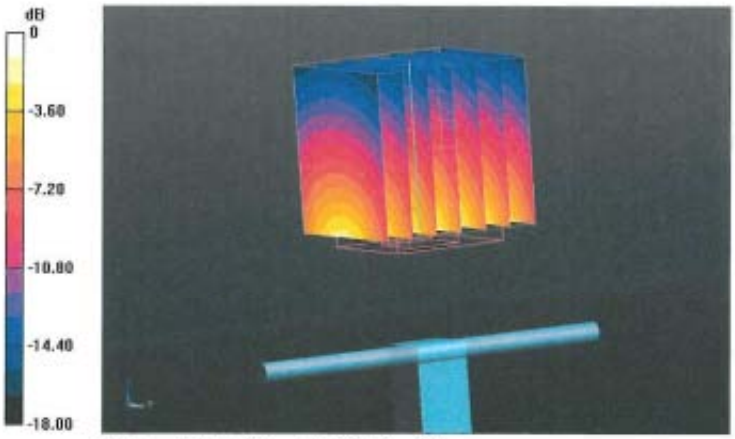
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d033

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.37 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

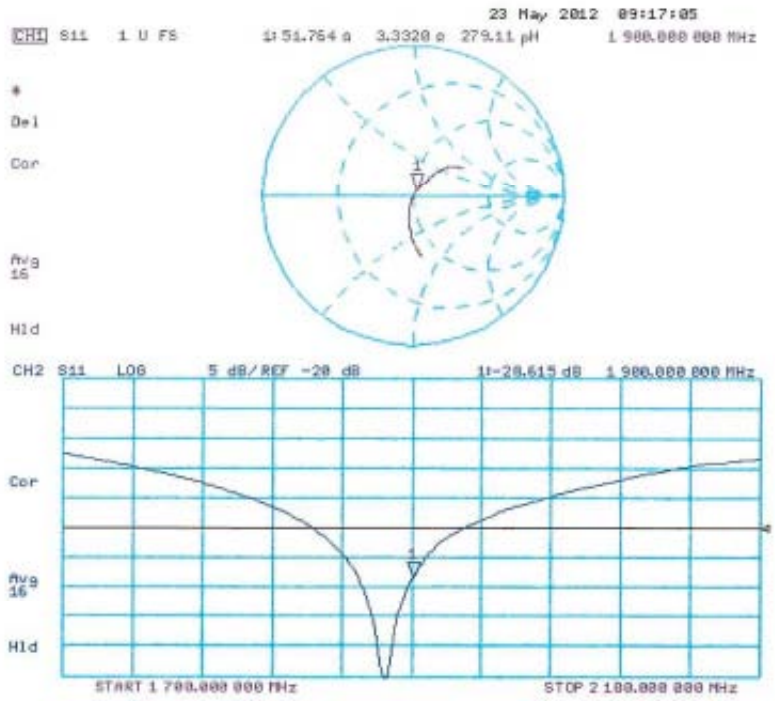
- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.469 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 17.118 mW/g
SAR(1 g) = 9.69 mW/g; SAR(10 g) = 5.13 mW/g
Maximum value of SAR (measured) = 12.1 mW/g



0 dB = 12.1 mW/g = 21.66 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 23.05.2012

Test Laboratory: SPEAG, Zurich, Switzerland

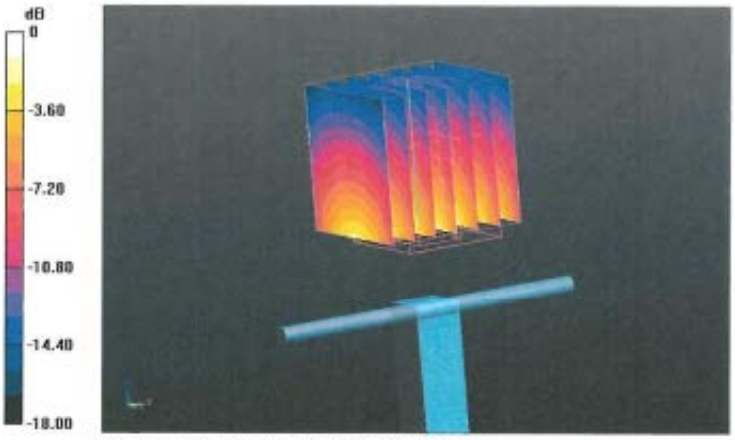
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d033

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.52 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

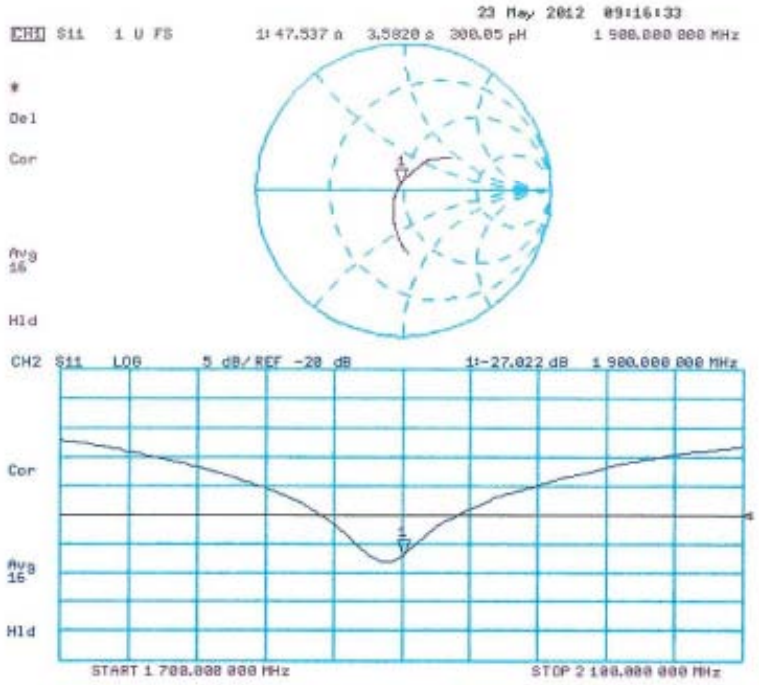
- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.832 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 17.393 mW/g
SAR(1 g) = 10 mW/g; SAR(10 g) = 5.31 mW/g
Maximum value of SAR (measured) = 12.7 mW/g



0 dB = 12.7 mW/g = 22.08 dB mW/g

Impedance Measurement Plot for Body TSL



- 2450 ㎒ Dipole Calibration Certificate

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Accreditation No.: SCS 108

Client SGS (Dymstec)

Certificate No: D2450V2-734_May12

CALIBRATION CERTIFICATE

Object D2450V2 - SN: 734

Calibration procedure(s) QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: May 17, 2012

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	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: May 17, 2012

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

Certificate No: D2450V2-734_May12 Page 1 of 8

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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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	1.85 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**52.8 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.19 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.7 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	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.3 ± 6 %	1.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**50.2 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.95 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**23.6 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.3 Ω + 3.6 jΩ
Return Loss	- 26.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.9 Ω + 5.1 jΩ
Return Loss	- 25.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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	May 07, 2003

DASY5 Validation Report for Head TSL

Date: 17.05.2012

Test Laboratory: SPEAG, Zurich, Switzerland

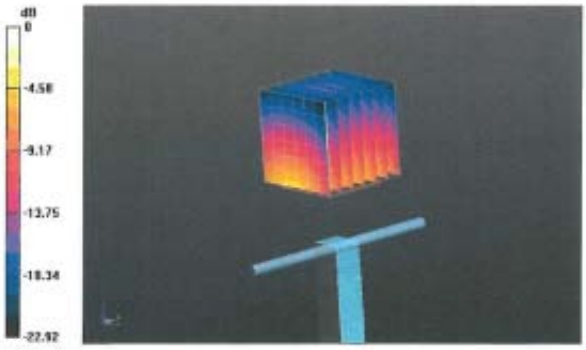
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 734

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.85 mho/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

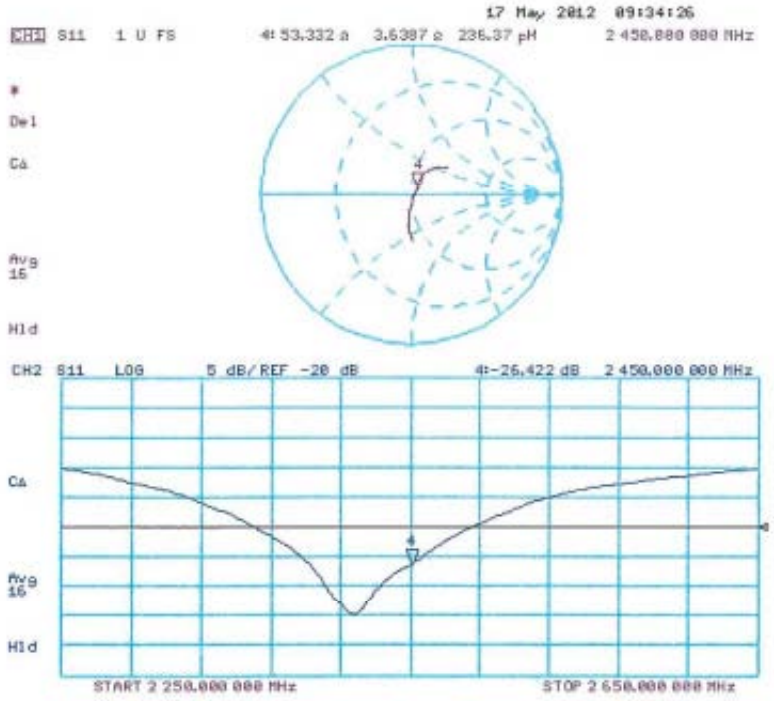
- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.190 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 27.316 mW/g
SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.19 mW/g
Maximum value of SAR (measured) = 16.9 mW/g



0 dB = 16.9 mW/g = 24.56 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 15.05.2012

Test Laboratory: SPEAG, Zurich, Switzerland

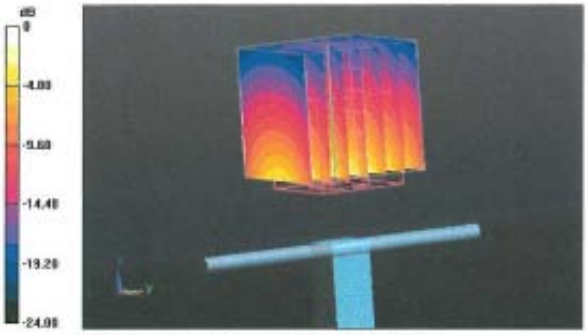
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 734

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

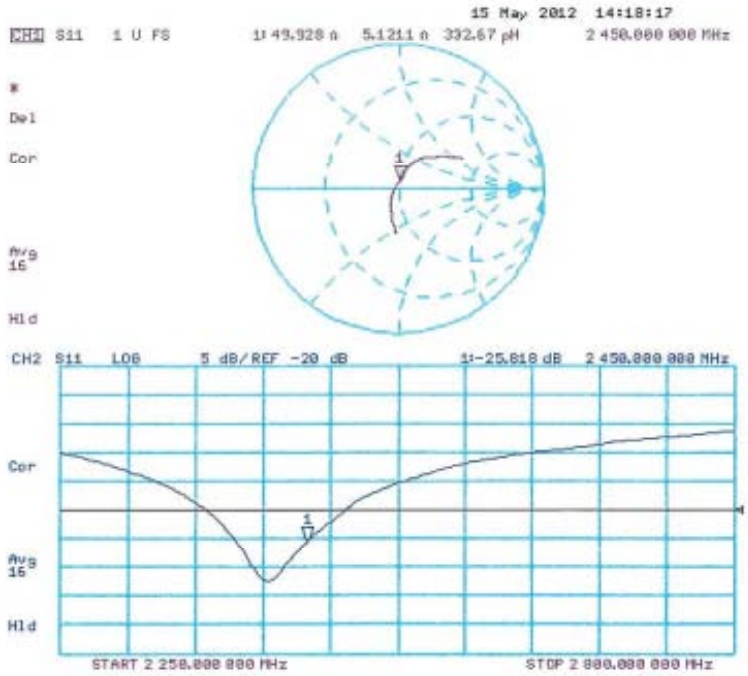
- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.201 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 25.791 mW/g
SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.95 mW/g
Maximum value of SAR (measured) = 16.8 mW/g



0 dB = 16.8 mW/g = 24.51 dB mW/g

Impedance Measurement Plot for Body TSL



-THE END-