TEST REPORT

Report Number: ACS-S07002 Date of Report: Jul. 06, 2007

NOTE: This report is issued subject to Audix Technology (Shenzhen) Co., Ltd. "Terms and Conditions Governing Technical Services". The terms and conditions governing the issue of this report are set out as attached within this report.

COMPLIANCE REPORT ON TESTING IN ACCORDANCE WITH SAR (SPECIFIC ABSORPTION RATE) REQUIREMENTS

Supplement C (Edition 01-01)
FCC OET Bulletin 65 (Edition 97-01)

Product Description: GSM Phone

DUT: phone F1

TEST FACILITY: Audix Technology (Shenzhen) Co., Ltd.

PREPARED FOR: ShenZhen HaiLiang Communication CO., LTD

Tel : +86-755-86081630 Fax : +86-755-86081619

TEST PERIOD: Jun.28~Jul.05, 2007

PREPARED BY	**APPROVED BY**
	AUDIX® 信華科技(深圳)有限公司 Audix Technology (Shenzhen) Co., Ltd. EMC 部門報告專用章 Stamp only for EMC Dept. Report Signature: Ken Lu 7/9 07
Iceman Hu Iceman Hu Senior Engineer	Ken LU Deputy Manager

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The product was tested in accordance with the following standards.

Test Results Summary

Test Standards	Description	Pass / Fail
• Supplement C (Edition 01-01) to FCC OET Bulletin 65 (Edition 97-01) • ANSI/IEEE Standard C95.1-1993	SAR Measurement (PCS 1900) Device at head phantom	Pass
	SAR Measurement (PCS 1900) Device at body phantom	Pass

Note:

1. The worst-case SAR value was found to be 0.918**W/kg** which is lower than the maximum limit of 1.60 W/kg, over 1g of tissue.

   Based on spatial peak uncontrolled exposure / general population level:
   Head: 1.60 W/kg, over 1g of tissue.
   Body: 1.60 W/kg, over 1g of tissue.

Modifications

No modifications were made.

DEVICE DESCRIPTION

Description	GSM Phone
Device Category	phone F1
Exposure Environment	General Population
Test Device Type	Production Unit
Brand Name	N/A
Serial Numbers	N/A
FCC ID	VGT200706PHONEF1
Applicant	ShenZhen HaiLiang Communication CO., LTD
	4F, No.4 buliding, Longjing Gaofa Technology Park, Nanshan District, Shenzhen
Manufacturer	ShenZhen HaiLiang Communication CO., LTD
	4F, No.4 buliding, Longjing Gaofa Technology Park, Nanshan District, Shenzhen
Power Adaptor	Manufacturer: Da tai ning, M/N: TL998D29 Cable: Unshielded, Detachable, 1.8m
Test Period	Jun.28~Jul.05, 2007

DEVICE OPERATING CONFIGURATION

Operating Frequencies	PCS 1900 Channel 512 (1850.2MHz) Channel 661 (1880.0MHz) Channel 810 (1909.8MHz)
Operating Temperature	-20~~50 Degree Celsius
Operating Voltage	(3.6~ 4.2) Volt DC
Rated Output Power	30dBm ± 2dBm, Maximum (GSM 1900MHz)
Antenna Type	Inside Antenna
EUT Crest Factor	8.3
Input Power	DC 3.7V
Accessories	N/A

DEVICE OPERATING CONDITION

The EUT was put into operation by a radio test set. Communication between the EUT and the radio test set was established by air link. For every SAR measurement, the EUT was set to maximum output power level using fully charged battery.

TEMPERATURE AND HUMIDITY

PCS 1900 (Head)

Ambient Temperature:	23 ± 1^0 C
Tissue Temperature:	22 ± 1^0 C
Humidity:	50% to 55%

PCS 1900 (Body)

Ambient Temperature:	23 ± 1^0 C
Tissue Temperature:	22 ± 1^0 C
Humidity:	50% to 55%

TEST RESULTS

The measurement results were obtained with the EUT tested in the conditions described in this report (Annex A).

Table 1 - SAR Test Results (PCS 1900) – Device at head phantom **Test by:Iceman_Hu**

Phantom Configuration	Device Test Positions	Antenna Position	SAR (W/kg), over 1g Tissue Device Test Channel & Frequency		
			Channel: 512 1850.2MHz	Channel: 661 1880MHz	Channel: 810 1909.8MHz
Left Side of Head	Cheek / Touch	fixed	0.742	0.702	0.595
	Ear / Tilt	fixed	0.825	0.778	0.779
Conducted Power Measurement Results					
Output Power (dBm) Before Test			30.12	30.25	30.16
Output Power (dBm) After Test			30.08	30.17	30.11
Phantom Configuration	**Device Test Positions**	**Antenna Position**	**SAR (W/kg), over 1g Tissue Device Test Channel & Frequency**		
			Channel: 512 1850.2MHz	**Channel: 661 1880MHz**	**Channel: 810 1909.8MHz**
Right Side of Head	Cheek / Touch	fixed	0.744	0.677	0.561
	Ear / Tilt	fixed	0.918	0.875	0.759
Conducted Power Measurement Results					
Output Power (dBm) Before Test			30.22	30.59	30.15
Output Power (dBm) After Test			30.05	30.34	30.02

Remarks:

1. All modes of operations were investigated and the worst-case SAR levels are reported.
2. For every SAR measurement, the EUT was controlled via Agilent Base Station(E5515C 8960) to ensure the maximum output power level.This result contain conducted output power.This ensures that the power drift during one measurement is within 5%
3. During the process of testing ,the EUT using fully charged battery.
4. For **PCS 1900**, the worst-case SAR value was found to be **0.918W/Kg** (over a 1g tissue) at **Channel 512** which is lower than the maximum limit of 1.60 W/Kg, please refer to the above table.
5. The SAR limit of 1.60W/Kg (Spatial Peak level for Uncontrolled Exposure / General Population) is based on the Test Standards:
   a) Supplement C (Edition 01-01) to FCC OET Bulletin 65 (Edition 97-01)
   b) ANSI/IEEE Standard C95.1-1993

The measurement results were obtained with the EUT tested in the conditions described in this report (Annex A).

Table 3 – Body Worn Position SAR Test Results (PCS 1900) **Test by:Iceman_Hu**

Phantom Configuration	Device Test Positions	Antenna Position	SAR (W/kg), over 1g Tissue Device Test Channel & Frequency		
			Channel: 512 1850.2MHz	Channel: 661 1880MHz	Channel: 810 1909.8MHz
Flat Phantom	EUT **Front** Touched Phantom	fixed	0.893	0.839	0.730
Flat Phantom	EUT **Rear** To Phantom	fixed	0.802	0.673	0.568
Conducted Power Measurement Results					
Output Power (dBm) Before Test			30.12	30.03	30.22
Output Power (dBm) After Test			30.05	30.11	30.08

Remarks:

1. All modes of operations were investigated and the worst-case SAR levels are reported.
2. For every SAR measurement, the EUT was controlled via Agilent Base Station(E5515C 8960) to ensure the maximum output power level.This result contain conducted output power. This ensures that the power drift during one measurement is within 5%
3. During the process of testing ,the EUT using fully charged battery.
4. The DUT Front touched the Flat Phantom, and The DUT rear with 15mm gapaway from Flat Phantom
5. For **GSM 1900**, the worst-case SAR value was found to be **0.893W/Kg** (over a 1g tissue) at **Channel 512** which is lower than the maximum limit of 1.60 W/Kg, please refer to the above table.
6. The SAR limit of 1.60W/Kg (Spatial Peak level for Uncontrolled Exposure / General Population) is based on the Test Standards:
   a) Supplement C (Edition 01-01) to FCC OET Bulletin 65 (Edition 97-01)
   b) ANSI/IEEE Standard C95.1-1993

ANNEX A

TEST INSTRUMENTATION
&
GENERAL PROCEDURE

A.1 General Test Procedure

In the SAR measurement, the positioning of the probes must be performed with sufficient accuracy to obtain repeatable measurements in the presence of rapid spatial attenuation phenomena. The accurate positioning of the E-field probe is accomplished by using a high precision robot. The robot can be taught to position the probe sensor following a specific pattern of points. In a first sweep, the sensor is positioned as close as possible to the interface, with the sensor enclosure touching the inside of the fiberglass shell. The SAR is measured on a grid of points, which covers the curved surface of the phantom in an area larger than the size of the EUT. After the initial scan, a high- resolution grid is used to locate the absolute maximum measured energy point. At this location, attenuation versus depth scan will be accomplished by the measurement system to calculate the SAR value.

A.2 SAR Test Instrumentation

SAR Measurement System

- **Positioning Equipment**
  Type: High Precision Industrial Robot, RX90.
  Precision: High precision (repeatability 0.02mm)
  Reliability: High reliability (industrial design)

- **Compaq Computer**
  Type: 2.4GHz Pentium
  Memory: 512MB SDRAM
  Operating System: Windows 2000
  Dell Monitor: 17" LCD

- **Dosimetric E-Field Probe**
  Type: ET3DV6
  Isotropy Error (∅): ±0.25dB
  Dynamic Range: 0.01 – 100 W/kg

- **Phantom & Tissue**
  Phantom: "Phantom SAM 12" and "450MHz Phantom" were manufactured by SPEAG.
  Tissue: Simulated Tissue with electrical characteristics similar to those of the human at normal body temperature (22 ± 1°C)
  Shell: Fiberglass shell phantom with 2mm thickness for "Phantom SAM 12".
  Fiberglass shell phantom with 2mm or 6mm thickness for "450MHz Flat Phantom".

A.3 Test Setup

Phantom

The "Phantom SAM 12", manufactured by SPEAG is a fiberglass shell phantom with 2 mm shell thickness. It has three measurement areas:

- Left hand
- Right hand
- Flat phantom

The "450MHz Flat Phantom", manufactured by SPEAG is a fiberglass shell phantom with 2mm or 6mm shell thickness. It has one measurement areas:

- Flat phantom

1) The "Phantom SAM 12" table comes in the sizes: A 100x50x85 cm (LxWxH).
2) The "450MHz Flat Phantom – 6mm Shell Thickness" table comes in the sizes: A 82x44x18 cm (LxWxH) is used for System Validation Test.
3) The "450MHz Flat Phantom – 2mm Shell Thickness" table comes in the sizes: A 82x44x18 cm (LxWxH) is used for SAR Measurement.

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. Only one device holder is necessary if two phantoms are used (e.g., for different solutions).

Simulated tissue

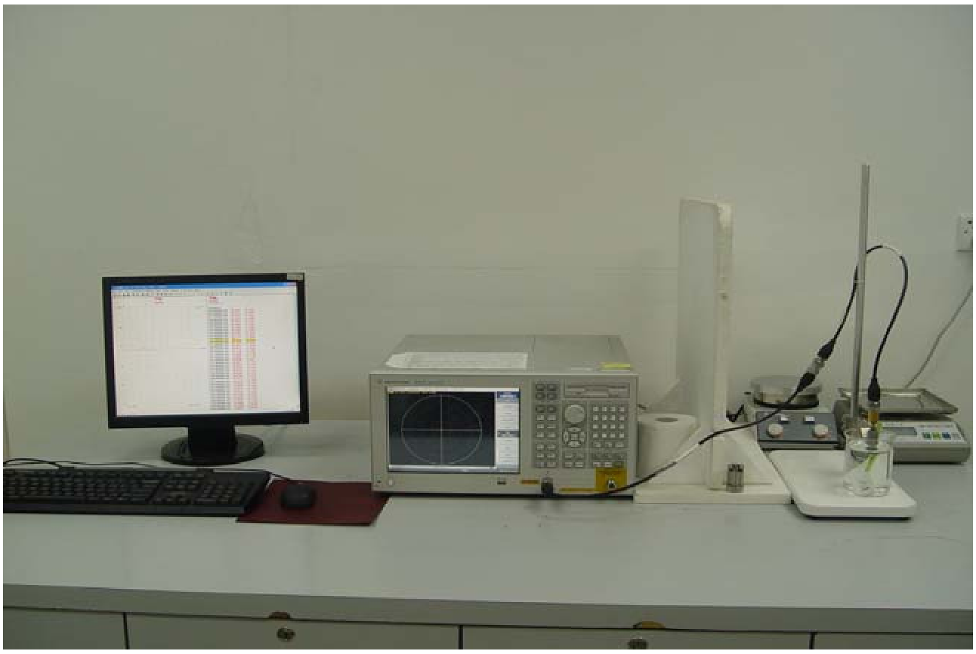
Simulated Tissue: Suggested in a paper by George Hartsgrove and colleagues in University of Ottawa Ref.: Bioelectromagnetics 8:29-36 (1987)

This simulated tissue is mainly composed of water, sugar and salt. At higher frequencies, in order to achieve the proper conductivity, the solution does not contain salt. Also, at these frequencies, D.I. water and alcohol is preferred.
Tissue Density : Approximately 1.25 g/cm^3

- **Preparation**
  The ingredients (i.e. water, sugar, salt, etc) required to prepare the simulated tissue are carefully weighed and poured into a clean container for mixing. A stirring paddle, that is attached to a hand drill is used to stir the solution for a duration of about 30 minutes or more. When the ingredients are completely dissolved, the solution is left in the container for the air bubbles to disappear.

- **Measurement of Electrical Characteristics of Simulated Tissue**
  1) S-PARAMETER Network Analyzer, Agilent E5071B (30kHz – 6GHz)
  2) Agilent 85033E Dielectric Probe Kit

ELECTRICAL CHARACTERISTIC MEASUREMENT SETUP



- **Description of the Agilent 85033E Dielectric Probe Kit**

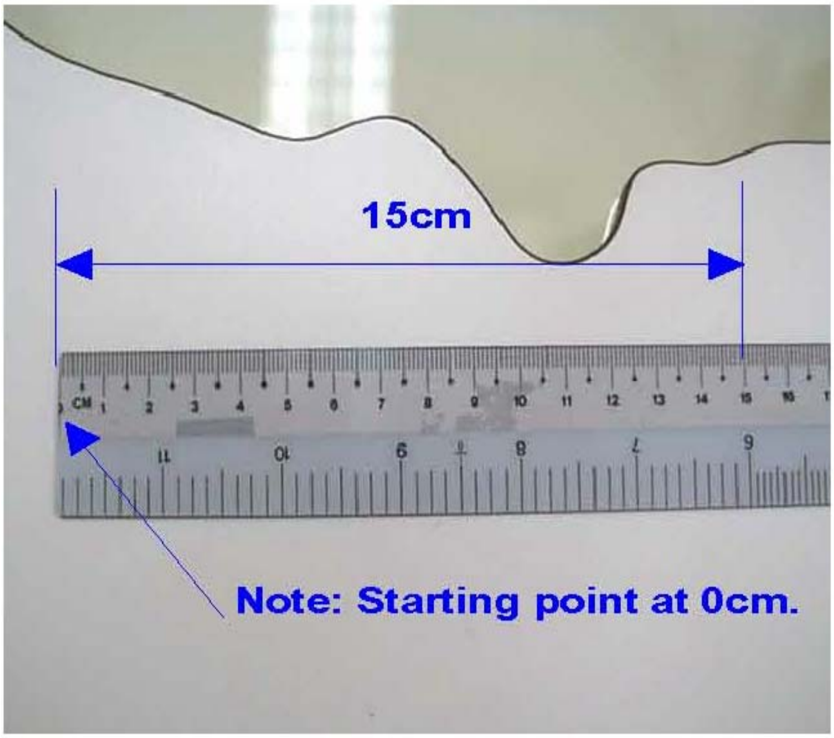
The 85033E is a dielectric probe that is used to measure the intrinsic electrical properties of materials in the RF and microwave frequency bands. The 85033E software allows you to measure the complex dielectric constant (also called permittivity) of liquids and semi-solids, incuding the dielectric loss factor of loss tangent.

To obtain data at hundreds of frequencies in seconds, simply immerse the probe into liquids or semi-solids - no special fixtures or containers are required. The 85033E must be used in conjunction with an Agilent network analyzer. The network analyzer provides the high frequency stimulus, and measures the reflected response.

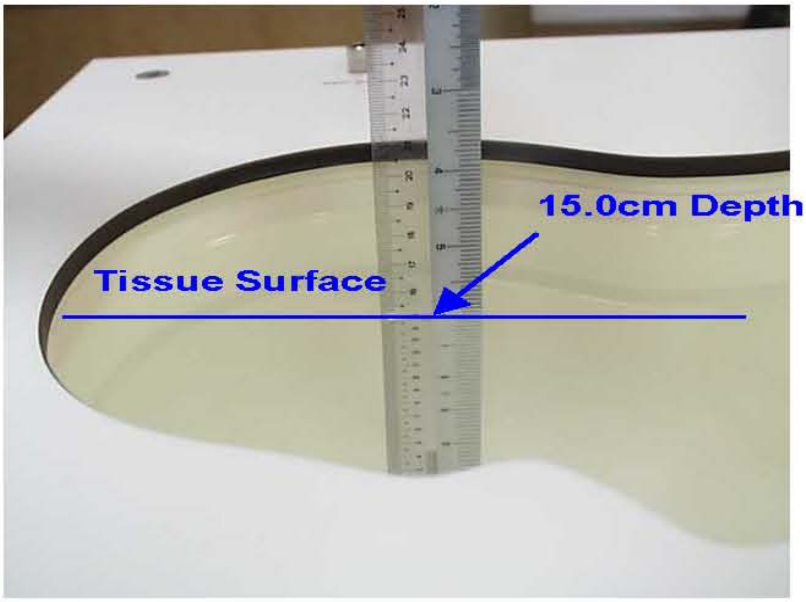
The probe transmits a signal into the material under test (MUT). The measured reflected response from the materials is then related to its dielectric properties. A computer controls the system, and runs software that guides the user through a measurement sequence. An effort is made to keep the results dielectric constant and conductivity within 5 % of published data.

Tissue Depth

The tissue depth at the "Phantom SAM 12" is approximately 15cm ±0.5cm.

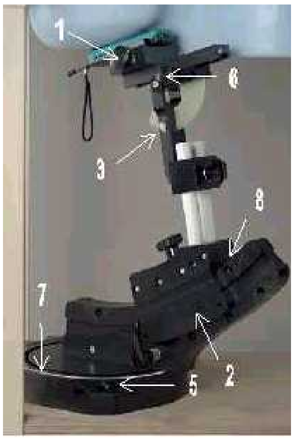


At "Phantom SAM 12"



Tissue – 15.0cm Depth

Positioning of EUT



The DASY4 holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65º. The intended use position in the CENELEC document is has a rotation angle of 65º and an inclination angle of 80º. The rotation centers for both scales is the ear opening. Thus the device needs no repositioning when changing the angles. The device rotation around the device axis is not changed in the holder. In the CENELEC standard it is always 0º. If the standard changes, a support will be provided with the new angle.

1. **"Cheek/Touch Position"** – the device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom. This test position is established:

i) When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.

ii) (Or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms – when the handset loses contact with the phantom at the pivotingpoint, rotation should continue until the device touches the cheek of the phantom or breaks its last contact from the ear spacer.

2. **"Ear/Tilt Position"** – With the handset aligned in the "Cheek/Touch Position":

i) If the earpiece of the handset is not in full contact with the phantom's ear spacer (in the "Cheek/Touch position") and the peak SAR location for the "Cheek/Touch" position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the "initial ear position" by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.

ii) (Otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both "ear reference points" (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the handset is tilted away from the mouth with respect to the "test device reference point" by 15°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

3. **Body Worn Configuration**

All body worn accessories are tested for the FCC RF exposure compliance. The phone is positioned into carrying case (if available) and placed below of the flat phantom. Headset or ear piece (if available) is connected during measurements.

Instrument	Model	S/No	Cal Due Date	
Anritsu Power Meter	ML2487A	6K00003262	11 May 2008	
Anritsu Power Sensor	MA2491A	033005	11 May 2008	
Anritsu Power Meter	ML2487A	6K00002472	11 May 2008	
Anritsu Power Sensor	MA2491A	032516	11 May 2008	
Agilent Attenuation	8491B	MY39262166	11 May 2008	
ENA Series Network Analyzer (300kHz – 8.5GHz)	E5071B	MY42403549	11 May 2008	
Agilent 85033E Dielectric Probe Kit	85033E	10012	N/A	
MARCONI RF Signal Generator (10KHz – 20GHz)	2031	1196061058	11 May 2008	
MILMEGA Power Amplifier (800MHz – 2500MHz)	AS0825-125	1014056	N/A	
AR Directional Coupler (0.8~4.2)GHz	DC7144A	311987	N/A	
Agilent Communication Tester E5515C	8960	GB44300243	11 May 2008	
R&S Universal Radio Communication Tester	CMU-200	110432	11 May 2008	
835MHz System Validation Dipole	D835V2	447	06 Dec 2007	
900MHz System Validation Dipole	D900V2	134	06 Dec 2007	
1800MHz System Validation Dipole	D1800V2	2d019	12 Dec 2007	
1900MHz System Validation Dipole	D1900V2	546	12 Dec 2007	
2450MHz System Validation Dipole	D2450V2	715	13 Dec 2007	
Data Acquisition Electronics (DAE3)	DAE3	475	08 Dec 2007	
Dosimetric E-field Probe	ET3DV6	1645	06 Dec 2007	
Dosimetric E-field Probe	ER3DV6	2354	28 Aug 2007	
Dosimetric H-field Probe	H3DV6	6177	28 Aug 2007	
835MHz System Validation Dipole	CD835V3	1040	29 Aug 2007	
1880MHz System Validation Dipole	CD1880V3	1033	29 Avg 2007	
2450MHz System Validation Dipole	CD2450V3	1034	29 Avg 2007	

ANNEX C

TISSUE SIMULANT DATA SHEETS

Type of Tissue	Head	Body
Target Frequency (MHz)	1900	1900
Target Dielectric Constant	40	53.3
Target Conductivity (S/m)	1.4	1.52
Composition (by weight)	Water (55.43%) Glycol (44.35%) Sugar (---------) Salt (0.22%) Preventol D7 (-------)	Water (70.16%) Glycol (29.44%) Sugar (--------) Salt (0.39%) Preventol D7 (------)
Measured Dielectric Constant	40.3	55.05
Measured Conductivity (S/m)	1.394	1.5394

Probe Name	Dosimetric E-field Probe ET3DV6	Dosimetric E-field Probe ET3DV6
Probe Serial Number	1645	1645
Sensor Offset (mm)	2.7	2.7
Conversion Factor	5.08 ± 11 %	4.52 ± 11 %
Probe Calibration Due Date (DD/MM/YY)	Dec 14, 2006	Dec 14, 2006

Head Tissue at 1900MHz

Title

2007-06-28 10:24

Frequency	e'	e"	Conductivity
1890000000	40.33	13.18	1.3843
1891000000	40.34	13.19	1.3857
1892000000	40.34	13.18	1.3856
1893000000	40.35	13.17	1.3852
1894000000	40.33	13.19	1.3878
1895000000	40.31	13.20	1.3898
1896000000	40.33	13.19	1.3894
1897000000	40.31	13.20	1.3909
1898000000	40.30	13.21	1.3927
1899000000	40.32	13.20	1.3926
1900000000	**40.30**	**13.21**	**1.3940**
1901000000	40.29	13.22	1.3960
1902000000	40.29	13.22	1.3973
1903000000	40.29	13.22	1.3975
1904000000	40.30	13.21	1.3971
1905000000	40.28	13.23	1.3997
1906000000	40.27	13.24	1.4015
1907000000	40.29	13.23	1.4013
1908000000	40.27	13.24	1.4033
1909000000	40.26	13.25	1.4048
1910000000	40.28	13.24	1.4045
1911000000	40.26	13.25	1.4064
1912000000	40.25	13.25	1.4079
1913000000	40.25	13.26	1.4091
1914000000	40.25	13.26	1.4094
1915000000	40.26	13.25	1.4095
1916000000	40.24	13.26	1.4116
1917000000	40.23	13.27	1.4132
1918000000	40.25	13.26	1.4133
1919000000	40.23	13.27	1.4149
1920000000	40.22	13.28	1.4165
1921000000	40.22	13.29	1.4179
1922000000	40.22	13.28	1.4181
1923000000	40.22	13.28	1.4189
1924000000	40.21	13.29	1.4207
1925000000	40.21	13.29	1.4208
1926000000	40.23	13.28	1.4209
1927000000	40.20	13.29	1.4230
1928000000	40.19	13.30	1.4242
1929000000	40.21	13.30	1.4248
1930000000	40.19	13.30	1.4260

(e' = Dielectric Constant)

(e" = Loss Factor)

Tested by:	Iceman
Date :	June 28, 2007
Frequency:	1900MHz
Mixture:	Head Tissue
Tissue temp:	22°C

Composition		
Tap Water	0.0g	0.00%
Ultra Pure Water	20000.0g	55.43%
Sugar	0.0g	0.00%
Glyco	16000.0g	44.35%
Salt	80.0g	0.22%
Preventol D7	0.0g	0.00%
Total Weight	36080.0g	100.0%

Result (FCC)	Dielectric Constant	Conductivity
Measured	40.30	1.3940
Target (FCC)	40	1.4
Low Limit	38	1.33
High Limit	42	1.47
% Off Target	0.76	-0.43

Result (EN)	Dielectric Constant	Conductivity
Measured	40.30	1.3940
Target (EN)	40	1.38
Low Limit	38	1.311
High Limit	42	1.449
% Off Target	0.76	1.01

Body Tissue at 1900MHz

Title

2007-06-28 15:43

Frequency	e'	e"	Conductivity
1890000000	55.05	14.56	1.5290
1891000000	55.07	14.57	1.5309
1892000000	55.02	14.57	1.5319
1893000000	55.04	14.58	1.5331
1894000000	55.06	14.58	1.5342
1895000000	55.02	14.57	1.5342
1896000000	55.04	14.58	1.5358
1897000000	55.05	14.59	1.5372
1898000000	55.05	14.59	1.5382
1899000000	55.05	14.59	1.5387
1900000000	**55.05**	**14.58**	**1.5394**
1901000000	55.06	14.58	1.5399
1902000000	55.07	14.57	1.5399
1903000000	55.04	14.56	1.5397
1904000000	55.06	14.56	1.5402
1905000000	55.09	14.56	1.5410
1906000000	55.07	14.55	1.5404
1907000000	55.08	14.54	1.5405
1908000000	55.08	14.53	1.5404
1909000000	55.08	14.52	1.5398
1910000000	55.09	14.51	1.5391
1911000000	55.09	14.50	1.5392
1912000000	55.09	14.49	1.5390
1913000000	55.11	14.48	1.5392
1914000000	55.08	14.46	1.5379
1915000000	55.10	14.45	1.5378
1916000000	55.10	14.44	1.5375
1917000000	55.11	14.43	1.5367
1918000000	55.11	14.42	1.5363
1919000000	55.11	14.41	1.5361
1920000000	55.11	14.40	1.5361
1921000000	55.11	14.39	1.5359
1922000000	55.11	14.38	1.5354
1923000000	55.11	14.37	1.5349
1924000000	55.13	14.37	1.5358
1925000000	55.09	14.34	1.5338
1926000000	55.11	14.35	1.5352
1927000000	55.11	14.34	1.5356
1928000000	55.10	14.34	1.5362
1929000000	55.10	14.34	1.5364
1930000000	55.10	14.33	1.5367

(e' = Dielectric Constant)

(e" = Loss Factor)

Tested by: Iceman
Date : June 28, 2007
Frequency: 1900MHz
Mixture: Body Tissue
Tissue temp: 23.7°C

Composition		
Tap Water	0.0g	0.00%
Ultra Pure Water	21489.0g	70.16%
Sugar	0.0g	0.00%
Glyco	9018.0g	29.44%
Salt	120.0g	0.39%
Preventol D7	0.0g	0.00%
Total Weight	30627.0g	100.0%

Result (FCC)	Dielectric Constant	Conductivity
Measured	55.05	1.5394
Target (FCC)	53.3	1.52
Low Limit	50.635	1.444
High Limit	55.965	1.596
% Off Target	3.29	1.28

ANNEX D

SAR VALIDATION RESULTS

SAR Validation – Head Tissue at 1900MHz (Dipole forward power = 250mW)

Liquid parameters	Frequency		Permittivity ε		Conductivity σ (S/m)	
	1900MHz		40.30		1.394	
Verification results (1900MHz)	Target value(W/kg)			Measurement value (W/kg)		
	10 g Average	1 g Average		10 g Average	1 g Average	
	4.92	9.3		5.39	10.1	

Remarks:

1. Measurement is made at temperature 23.2 °C ,relative humidity 54%,input power 250 mW,Liquid temperature during the test:22 °C
2. FCC policy is to have the target values form the Dipole calibration.
   System check target values should be within ±10%.
3. 250 mW is used as feeding power to the validation dipole (SPEAG using)

Test result:

Test Laboratory: Audix Technology(ShenZhen)Co.,Ltd, Telecom & EMC

Date: 28/Jun/2007

File Name: 1900MHz head_System Validation_1645.da4

Program Name: 1900MHz head_System Validation_1645

Phantom section: Flat Section

DUT: Dipole 1900MHz Serial: 546

Communication System: CW

Frequency: 1900 MHz

Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.39 mho/m; ε_r = 40.3; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE3 Sn475 Calibrated: 08/Dec/2006

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 44

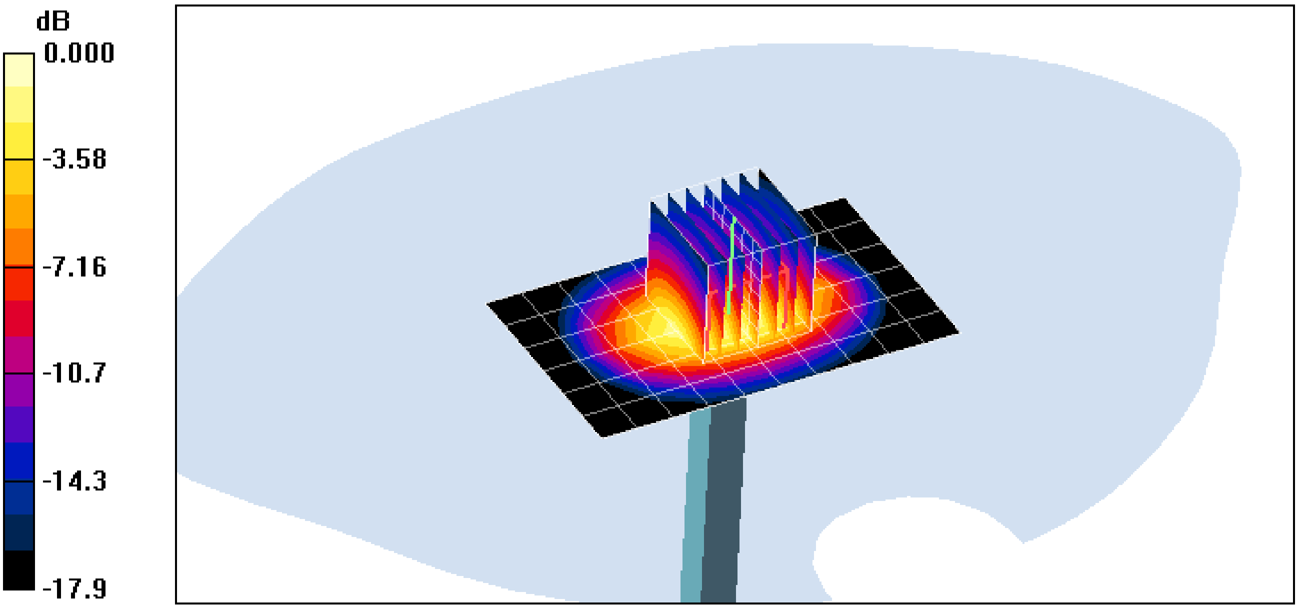
Probe: ET3DV6 - SN1645 ConvF(5.08, 5.08, 5.08) Calibrated: 14/Dec/2006

Postprocessing SW: SEMCAD, V1.8 Build 171

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

1900MHz head_System Validation_1645/Area Scan (7x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 11.7 mW/g

1900MHz head_System Validation_1645/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.7 V/m; Power Drift = -0.027 dB
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.39 mW/g



0 dB = 11.7mW/g

SAR Validation – Body Tissue at 1900MHz (Dipole forward power = 250mW)

Liquid parameters	Frequency		Permittivity ε		Conductivity σ (S/m)
	1900MHz		55.05		1.5394
Verification results (1900MHz)	Target value(W/kg)		Measurement value (W/kg)		
	10 g Average	1 g Average	10 g Average	1 g Average	
	5.02	9.43	5.5	10.3	

Remarks:

1. Measurement is made at temperature 23.2 ˚C ,relative humidity 54%,input power 250 mW,Liquid temperature during the test:22 ˚C
2. FCC policy is to have the target values form the Dipole calibration. System check target values should be within ±10%.
3. 250 mW is used as feeding power to the validation dipole (SPEAG using)

Test result:

Test Laboratory: Audix Technology(ShenZhen)Co.,Ltd, Telecom & EMC.

Date: 28/Jun/2007

File Name: 1900MHz Body_System Validation_1645.da4

Program Name: 1900MHz Body_System Validation_1645

Phantom section: Flat Section

DUT: Dipole 1900MHz Serial: 546

Communication System: CW

Frequency: 1900 MHz

Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 55; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE3 Sn475 Calibrated: 08/Dec/2006

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 44

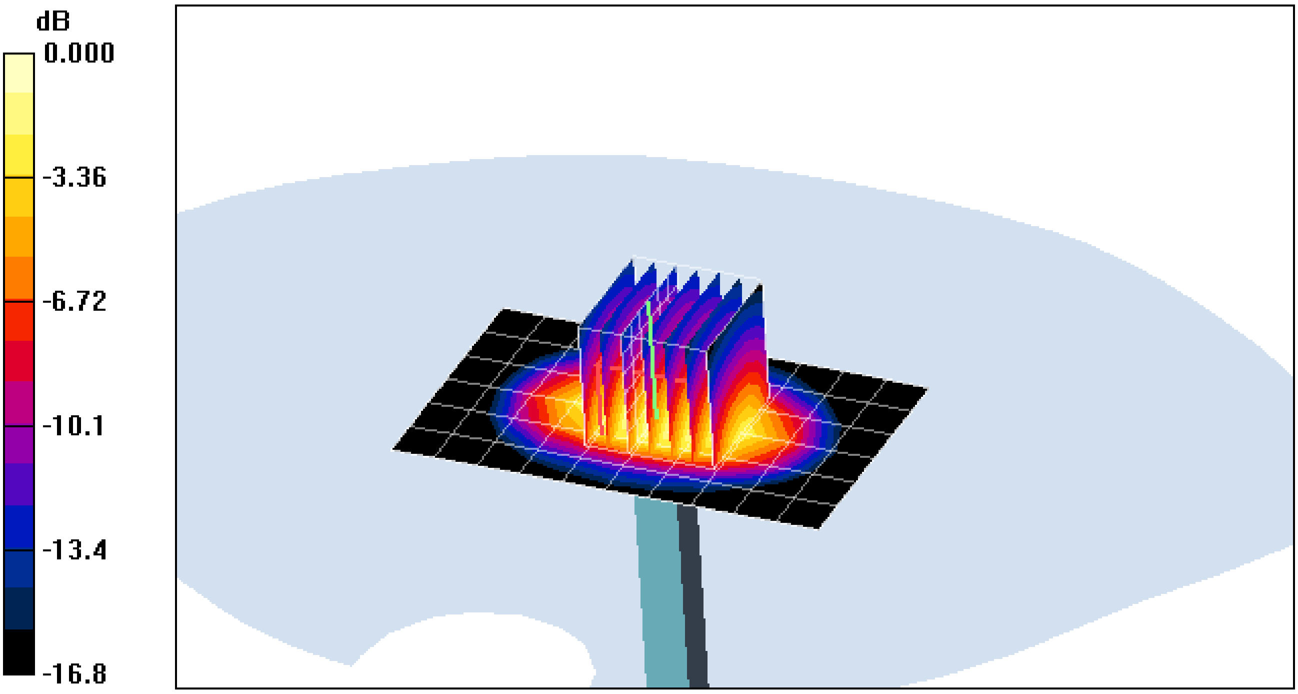
Probe: ET3DV6 - SN1645 ConvF(4.52, 4.52, 4.52) Calibrated: 14/Dec/2006

Postprocessing SW: SEMCAD, V1.8 Build 171

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

1900MHz Body_System Validation_1645/Area Scan (7x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 11.8 mW/g

1900MHz Body_System Validation_1645/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.1 V/m; Power Drift = 0.133 dB
Peak SAR (extrapolated) = 16.8 W/kg
SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.5 mW/g



0 dB = 11.5mW/g

ANNEX E

MEASUREMENT UNCERTAINTY

Measurement Uncertainty

All test measurement carried out are traceable to national standards. The uncertainty of measurement at a confidence level of 95%, with a coverage of 2, is ±**20.6%.**

Error Description	Uncertainty Value ± %	Probability Distribution	Divisor	ci 1g	Standard Unc.(1g)	Vi or Veff
Measurement System						
Probe Calibration	± 4.8	normal	1	1	± 4.8	∞
Axial isotropy	± 4.7	rectangular	√3	(1-cp)^1/2	± 1.9	∞
Hemispherical Isotropy	± 9.6	rectangular	√3	(cp)^1/2	± 3.9	∞
Spatial resolution	± 0.0	rectangular	√3	1	± 0.0	∞
Boundary effects	± 1.0	rectangular	√3	1	± 0.6	∞
Linearity	± 4.7	rectangular	√3	1	± 2.7	∞
System Detection limit	± 1.0	rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	normal	1	1	± 1.0	∞
Response time	± 0.8	rectangular	√3	1	± 0.5	∞
Integration time	± 2.6	rectangular	√3	1	± 1.5	∞
RF ambient conditions	± 3.0	rectangular	√3	1	± 1.7	∞
Probe Positioning Mechanical Tolerance	± 0.4	rectangular	√3	1	± 0.2	∞
Probe Positioning with respect to Phantom Shell	± 2.9	rectangular	√3	1	± 1.7	∞
Extrapolation, Interpolation and Integration Algorithms for Max. SAR Evaluation	± 1.0	rectangular	√3	1	± 0.6	∞
Test Sample Related						
Device positioning	± 2.9	normal	1	1	± 2.9	145
Device holder uncertainty	± 3.6	normal	1	1	± 3.6	5
Power drift	± 5.0	rectangular	√3	1	± 2.9	∞
Phantom and Tissue Parameters						
Phantom uncertainty	± 4.0	rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	rectangular	√3	0.64	± 1.8	∞
Liquid conductivity (meas)	± 2.5	normal	1	0.64	± 1.6	∞
Liquid permittivity (target)	± 5.0	rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (meas)	± 2.5	normal	1	0.6	± 1.5	∞
Combined Standard Uncertainty					± 10.3	330
Coverage Factor for 95%		**k=2**				
Extended Standard Uncertainty					± 20.6	

ANNEX F

SAR PROBE CALIBRATION CERTIFICATES

Schmid & Partner Engineering AG

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IMPORTANT NOTICE

USAGE OF PROBES IN ORGANIC SOLVENTS

Diethylene Gycol Monobuthy Ether (the basis for liquids above 1 GHz), as many other organic solvents, is a very effective softener for synthetic materials. These solvents can cause irreparable damage to certain SPEAG products, except those which are explicitly declared as compliant with organic solvents.

Compatible Probes:
- ET3DV6
- ET3DV6R
- ES3DVx
- EX3DVx
- ER3DV6
- H3DV6

Important Note for ET3DV6 Probes:
The ET3DV6 probes shall not be exposed to solvents longer than necessary for the measurements and shall be cleaned daily after use with warm water and stored dry.

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Accreditation No.: **SCS 108**

Client **PSB**

Certificate No: **ET3-1645_Dec06**

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1645
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	December 14, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

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

Issued: December 14, 2006

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

Certificate No: ET3-1645_Dec06 Page 1 of 9

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
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) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 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:1645

Manufactured:	November 7, 2001
Last calibrated:	September 27, 2005
Recalibrated:	December 14, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1645 December 14, 2006

DASY - Parameters of Probe: ET3DV6 SN:1645

Sensitivity in Free Space[A]

NormX	**1.78** ± 10.1%	μV/(V/m)^2
NormY	**1.82** ± 10.1%	μV/(V/m)^2
NormZ	**1.86** ± 10.1%	μV/(V/m)^2

Diode Compression[B]

DCP X	**94** mV
DCP Y	**95** mV
DCP Z	**95** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	5.6	2.6
SAR_{be} [%]	With Correction Algorithm	0.1	0.0

TSL 1750 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	12.9	8.3
SAR_{be} [%]	With Correction Algorithm	0.3	0.0

Sensor Offset

Probe Tip to Sensor Center **2.7** mm

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

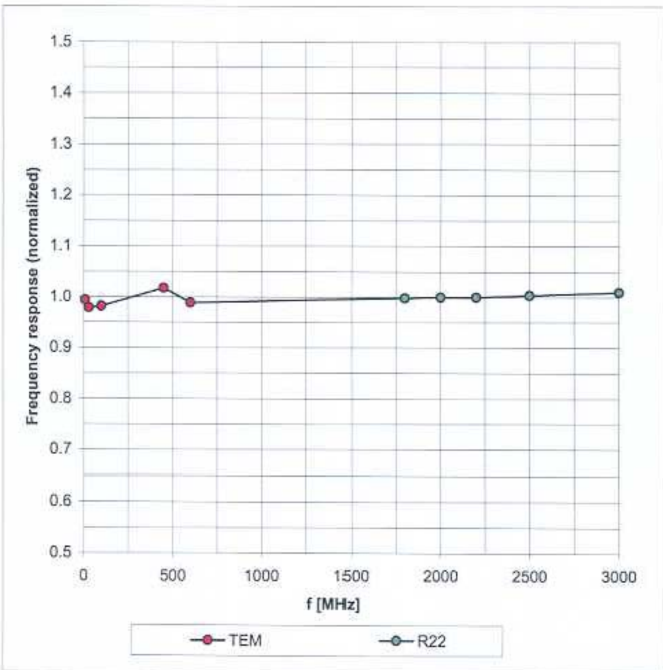
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1645 December 14, 2006

Frequency Response of E-Field

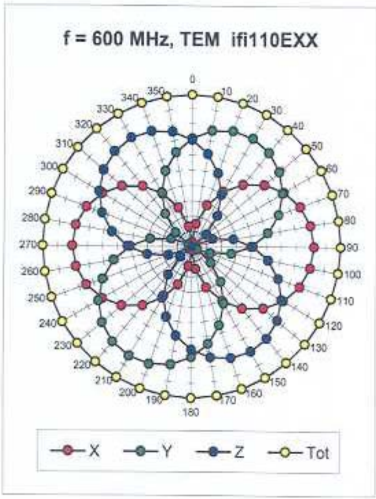
(TEM-Cell:ifi110 EXX, Waveguide: R22)

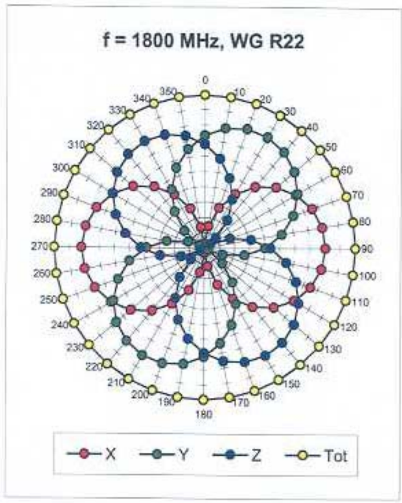


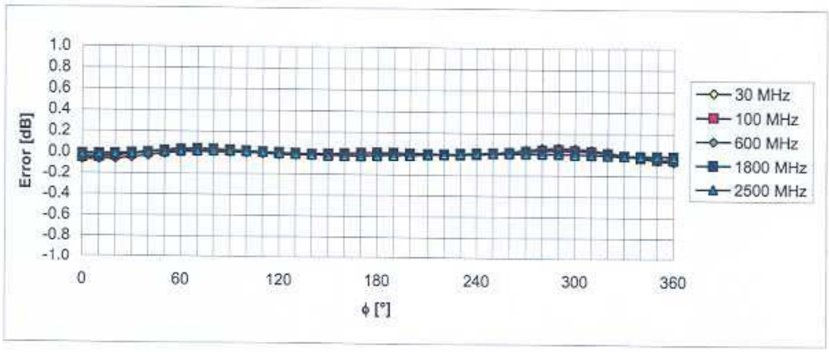
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ET3DV6 SN:1645 December 14, 2006

Receiving Pattern (ϕ), $\vartheta = 0°$





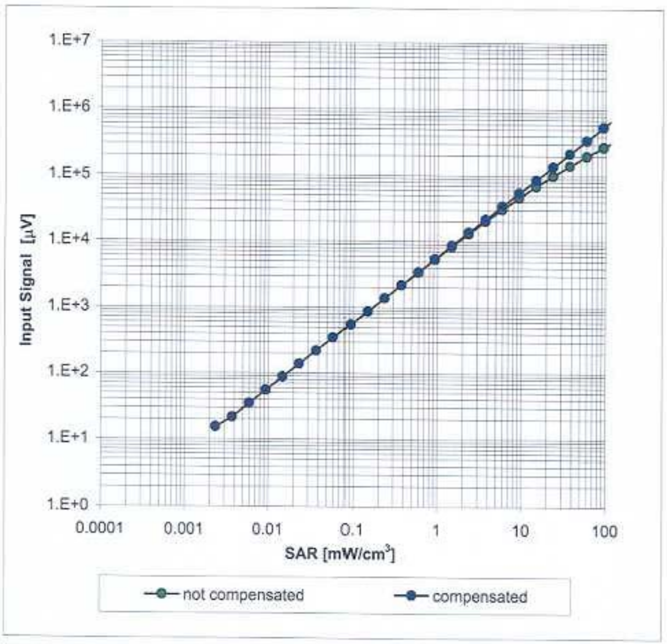


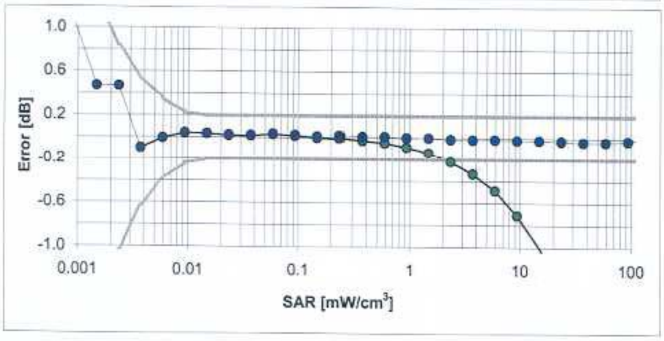
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ET3DV6 SN:1645 December 14, 2006

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)





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

Certificate No: ET3-1645_Dec06

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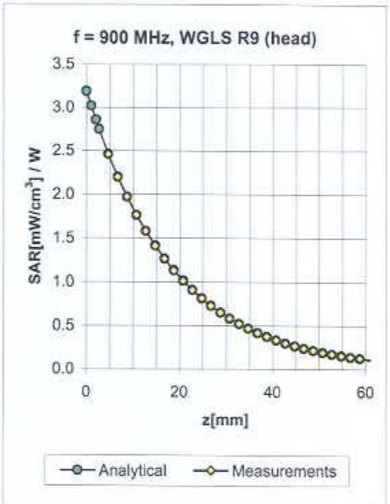
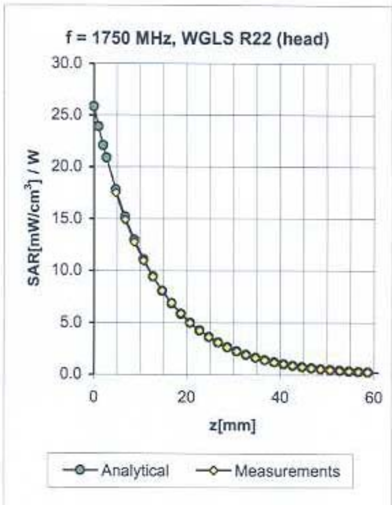
ET3DV6 SN:1645 December 14, 2006

Conversion Factor Assessment





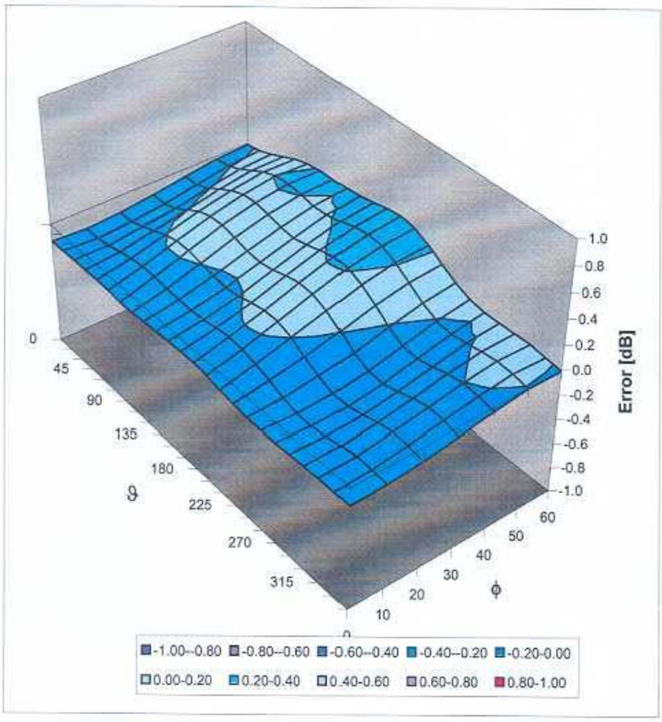
f [MHz]	Validity [MHz][c]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.29	2.59	6.71	± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.29	2.74	6.55	± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.50	2.60	5.27	± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.55	2.66	5.08	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.72	1.92	4.55	± 11.8% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.35	2.89	6.59	± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.35	2.89	6.35	± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.65	2.59	4.68	± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.72	2.48	4.52	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.69	1.96	4.31	± 11.8% (k=2)

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

ET3DV6 SN:1645 December 14, 2006

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: ET3-1645_Dec06 Page 9 of 9

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IMPORTANT NOTICE

USAGE OF THE DAE 3

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE3 unit is connected to a fragile 3-pin battery connector. Customer is responsible to apply outmost caution not to bend or damage the connector when changing batteries.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration Customer shall remove the batteries and pack the DAE in an antistatic bag. The packaging shall protect the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, Customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Schmid & Partner Engineering

TN_BR03091211BA DAE3.doc 15.03.2004

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Accreditation No.: **SCS 108**

Client **PSB**

Certificate No: **DAE3-475_Dec06**

CALIBRATION CERTIFICATE

Object	DAE3 - SD 000 D03 AA - SN: 475
Calibration procedure(s)	QA CAL-06.v12 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	December 8, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	13-Oct-06 (Elcal AG, No: 5492)	Oct-07
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-06 (Elcal AG, No: 5478)	Oct-07
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1002	15-Jun-06 (SPEAG, in house check)	In house check Jun-07

	Name	Function	Signature
Calibrated by:	Stefano Giannotta	Technician	Giannotta Stefano
Approved by:	Fin Bomholt	R&D Director	F. Bomholt

Issued: December 8, 2006

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Certificate No: DAE3-475_Dec06 Page 1 of 5

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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 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:* 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	404.493 ± 0.1% (k=2)	405.535 ± 0.1% (k=2)	404.133 ± 0.1% (k=2)
Low Range	3.92682 ± 0.7% (k=2)	3.95655 ± 0.7% (k=2)	3.92676 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	6 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	200000	199999.9	0.00
Channel X	+ Input	20000	20001.66	0.01
Channel X	- Input	20000	-20000.17	0.00
Channel Y	+ Input	200000	200000.0	0.00
Channel Y	+ Input	20000	19997.26	-0.01
Channel Y	- Input	20000	-20004.10	0.02
Channel Z	+ Input	200000	199999.9	0.00
Channel Z	+ Input	20000	19999.43	0.00
Channel Z	- Input	20000	-20003.8	0.02

Low Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	2000	1999.9	0.00
Channel X	+ Input	200	199.86	-0.07
Channel X	- Input	200	-200.66	0.33
Channel Y	+ Input	2000	1999.9	0.00
Channel Y	+ Input	200	199.51	-0.25
Channel Y	- Input	200	-200.88	0.44
Channel Z	+ Input	2000	2000.1	0.00
Channel Z	+ Input	200	199.24	-0.38
Channel Z	- Input	200	-200.84	0.42

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	-5.34	-6.56
	- 200	7.35	6.70
Channel Y	200	0.79	1.02
	- 200	-1.80	-1.67
Channel Z	200	-3.40	-4.06
	- 200	2.60	2.30

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	-	2.88	-0.06
Channel Y	200	0.50	-	4.90
Channel Z	200	-0.86	0.04	-

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	15728	16614
Channel Y	16334	15624
Channel Z	16356	17036

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	0.16	-0.75	1.32	0.26
Channel Y	0.01	-2.04	1.35	0.39
Channel Z	-1.04	-1.86	-0.09	0.27

6. Input Offset Current

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

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	198.8	0.2001
Channel Y	197.5	0.2000
Channel Z	199.9	0.2001

8. Low Battery Alarm Voltage (verified during pre test)

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

9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	–0.01	-8	-9

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Accreditation No.: **SCS 108**

Client **PSB**

Certificate No: **D1900V2-546_Dec06**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 546
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	December 12, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Power sensor HP 8481A	US37292783	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ET3DV6	SN: 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07
Reference Probe ES3DV3	SN: 3025	19-Oct-06 (SPEAG, No. ES3-3025_Oct06)	Oct-07
DAE4	SN: 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	M. Meili
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: December 14, 2006

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

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
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 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Area Scan Resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.4 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature during test	(21.2 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	250 mW input power	9.30 mW / g
SAR normalized	normalized to 1W	37.2 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**36.4 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.92 mW / g
SAR normalized	normalized to 1W	19.7 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**19.4 mW / g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.8 ± 6 %	1.54 mho/m ± 6 %
Body TSL temperature during test	(21.8 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.43 mW / g
SAR normalized	normalized to 1W	37.7 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**36.7 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.02 mW / g
SAR normalized	normalized to 1W	20.1 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**19.7 mW / g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.1 Ω + 2.5 jΩ
Return Loss	- 28.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.1 Ω + 4.5 jΩ
Return Loss	- 26.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.180 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 15, 2001

DASY4 Validation Report for Head TSL

Date/Time: 11.12.2006 18:22:37

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:546

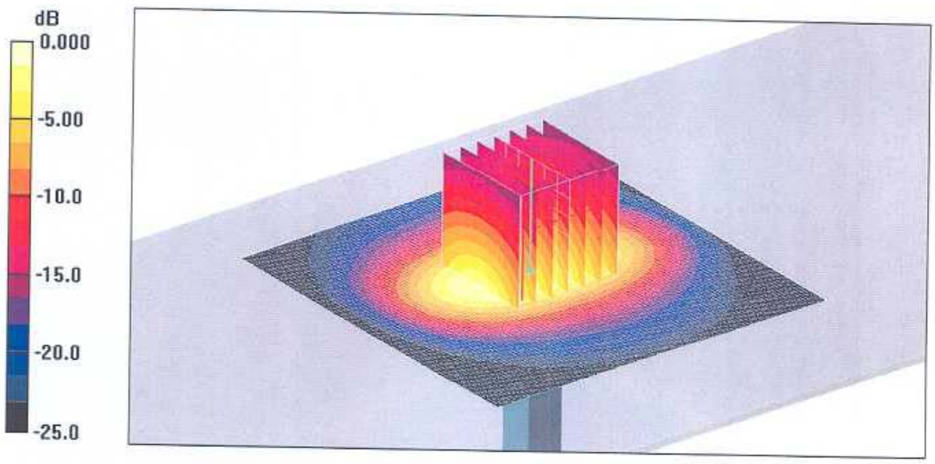
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U10 BB;
Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.97, 4.97, 4.97); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

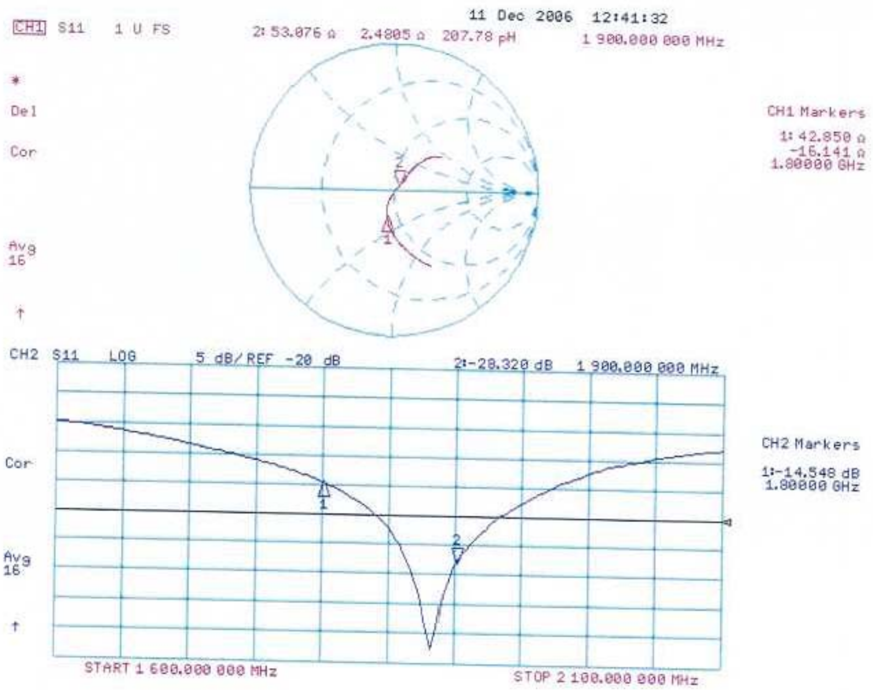
Pin = 250 mW; d = 10 mm/Area Scan (101x101x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 10.4 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.4 V/m; Power Drift = 0.068 dB
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 9.3 mW/g; SAR(10 g) = 4.92 mW/g
Maximum value of SAR (measured) = 10.6 mW/g



0 dB = 10.6mW/g

Impedance Measurement Plot for Head TSL



DASY4 Validation Report for Body TSL

Date/Time: 12.12.2006 16:12:35

Test Laboratory: SPEAG, Zurich, Switzerland

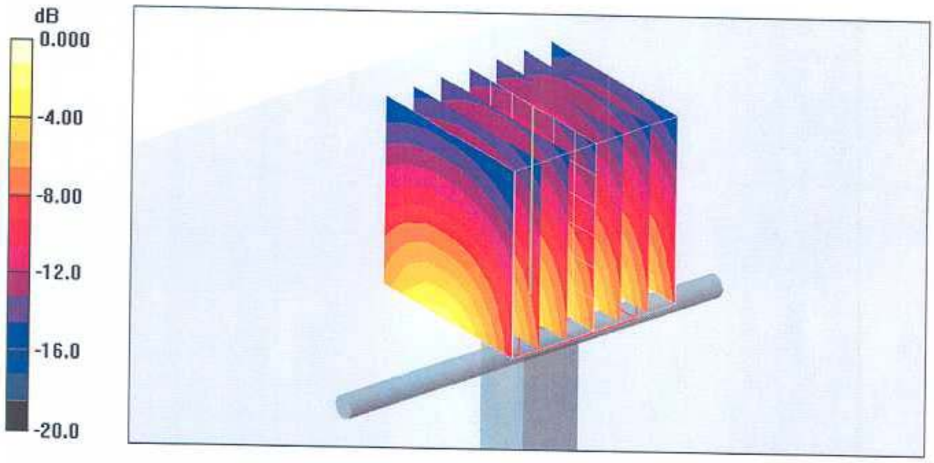
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:546

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U10 BB;
Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

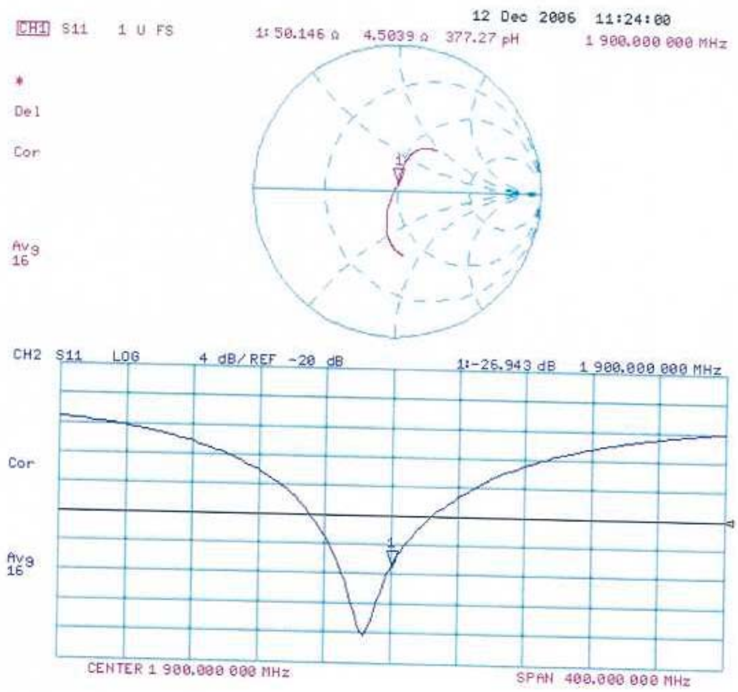
- Probe: ET3DV6 - SN1507 (HF); ConvF(4.43, 4.43, 4.43); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.5 V/m; Power Drift = 0.039 dB
Peak SAR (extrapolated) = 15.9 W/kg
SAR(1 g) = 9.43 mW/g; SAR(10 g) = 5.02 mW/g
Maximum value of SAR (measured) = 10.5 mW/g



0 dB = 10.5mW/g

Impedance Measurement Plot for Body TSL



ANNEX G

REFERENCES

REFERENCES

ANNEX G

The methods and procedures used for the measurements contained in this report are details in the following reference standards:

Publications	Year	Title
Supplement C (Edition 01-01) to FCC OET Bulletin 65 (Edition 97-01)	2001	"Evaluating Compliance with FCC Guidelines for Human Exposure to radio Frequency Fields"
IEEE Standard 1528-2003	2003	"Product Performance Standards Relative to the safe Use of Electromagnetic Energy"
ANSI/IEEE C95.1	1999	"Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz"
EN50360	2001	Product Standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300MHz – 3GHz)
EN50361	2001	Basic Standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phone (300MHz – 3GHz)