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”, manufactured by SPEAG
  Tissue: Simulated Tissue with electrical characteristics similar to those of the human at normal body temperature (23 ± 1°C)
  Shell: Fiberglass shell phantom with 2mm thickness
  Dimension: A100cm x 50cm x 85cm (L x W x H)

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 phantom table comes in the sizes: A 100x50x85 cm (LxWxH) table for use with free standing robots.
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 8753ES (30kHz – 6GHz)
  2) Agilent 85070D Dielectric Probe Kit

ELECTRICAL CHARACTERISTIC MEASUREMENT SETUP

- **Description of the Agilent 85070D Dielectric Probe Kit**

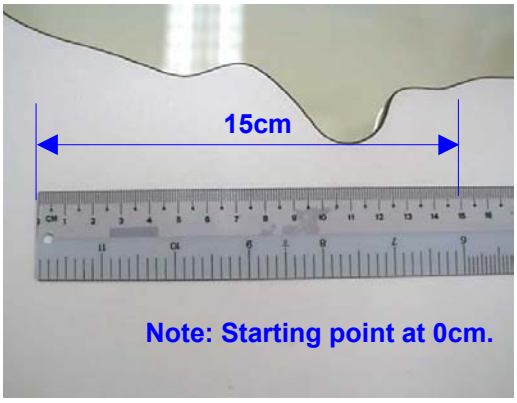
  The 85070D is a dielectric probe that is used to measure the intrinsic electrical properties of materials in the RF and microwave frequency bands. The 85070D software allows you to measure the complex dielectric constant (also called permittivity) of liquids and semi-solids, incuding the dielectric loss factor of loss tangent.

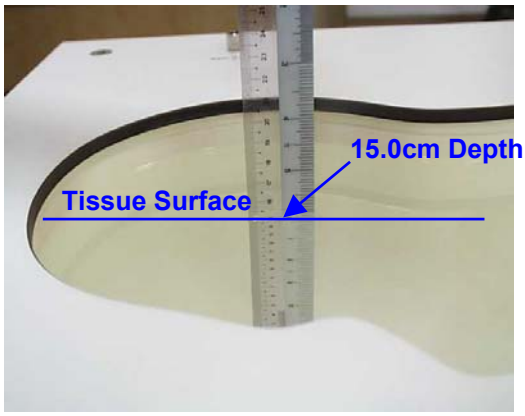
  To obtain data at hundreds of frequencies in seconds, simply immerse the probe into liquids or semi-solids - no special fixtures or containers are required. The 85070D must be used in conjunction with an Agilent network analyzer. The network analyzer provides the high frequency stimulus, and measures 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.

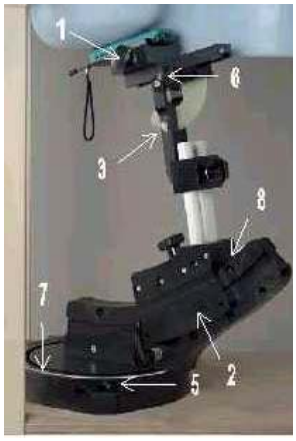
Liquid Depth

The liquid depth at the head of the Phantom SAM 12 is approximately Tissue Depth is approximately 15cm ±0.5cm.





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.

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

Instrument	Model	S/No	Cal Due Date	
Boonton RF Power Meter (Dual Channel)	4532	97701	-	✓
Boonton Power Sensor	51075	31534	-	✓
Boonton Power Sensor	51075	32002	6 July 2005	✓
S-Parameter Network Analyzer (30kHz – 6GHz)	8753ES	MY40001026	12 Oct 2005	✓
Agilent 85070D Dielectric Probe Kit	85075D	21356	-	✓
Anritsu RF Signal Generator (10MHz – 20GHz)	68347C	04306	-	✓
Amplifier Research Power Amplifier (1MHz – 1000MHz)	25W1000B	27225	-	
Amplifier Research Power Amplifier (800MHz – 4.2GHz)	25S1G4A	29346	-	✓
Agilent Dual Directional Coupler	HP778D	18289	-	✓
Radio Test Set	2967	296501/331	-	
R&S Universal Radio Communication Tester	CMU-200	836202/051	01 July 2005	✓
450MHz System Validation Dipole	D450V2	1004	13 Mar 2006	
835MHz System Validation Dipole	D835V2	4d006	13 July 2005	✓
900MHz System Validation Dipole	D900V2	1d006	13 July 2005	
1800MHz System Validation Dipole	D1800V2	2d095	15 July 2005	
1900MHz System Validation Dipole	D1900V2	5d048	15 July 2005	✓
2450MHz System Validation Dipole	D2450V2	752	18 July 2005	
Data Acquisition Electronics (DAE)	DAE4	627	20 May 2005	✓
Dosimetric E-field Probe	EX3DV4	3541	25 July 2005	✓

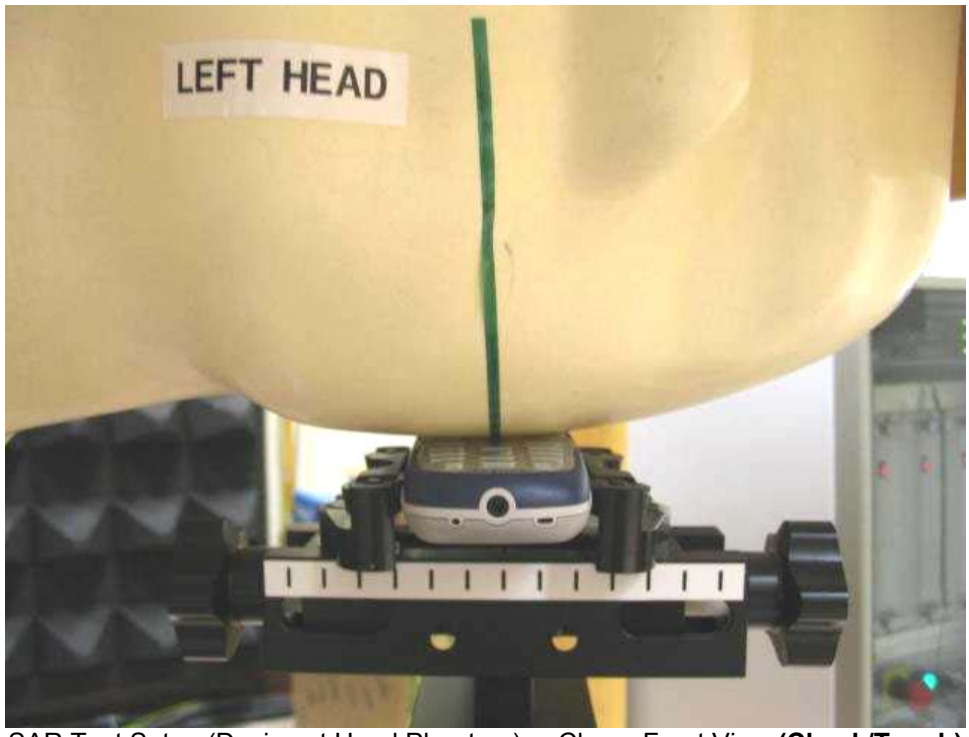
ANNEX B

TEST SETUP PHOTOGRAPHS

SAR Test Setup Photographs

SAR Test Setup (Device at Head Phantom)

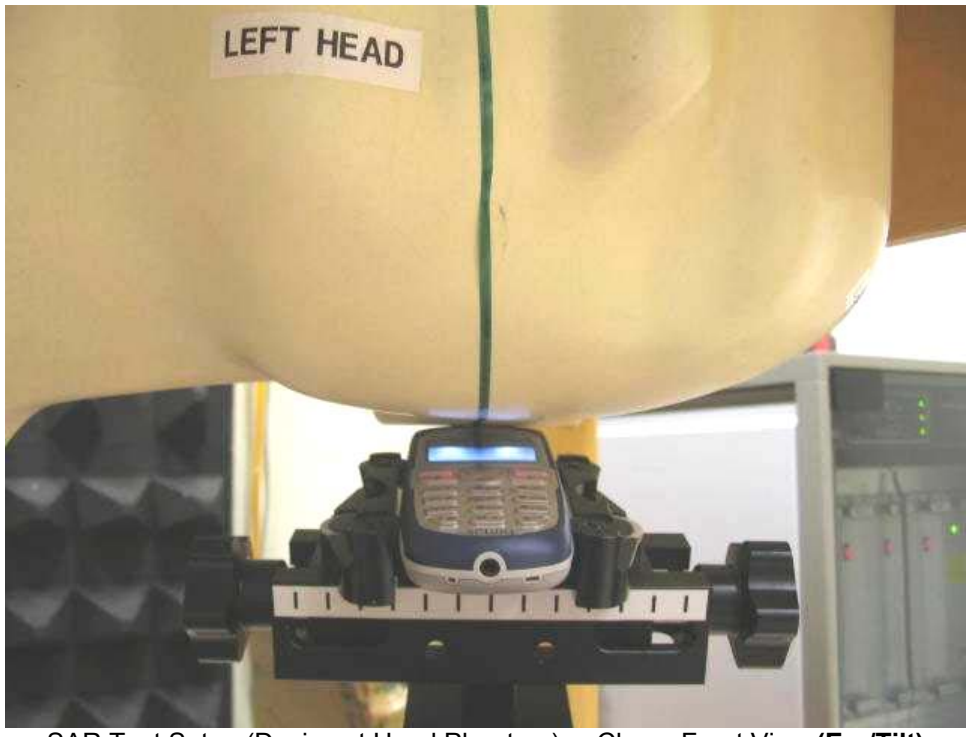
SAR Test Setup Photographs



SAR Test Setup (Device at Head Phantom) – Closer Front View **(Cheek/Touch)**

SAR Test Setup (Device at Head Phantom) – Closer Side View **(Cheek/Touch)**

SAR Test Setup Photographs



SAR Test Setup (Device at Head Phantom) – Closer Front View **(Ear/Tilt)**

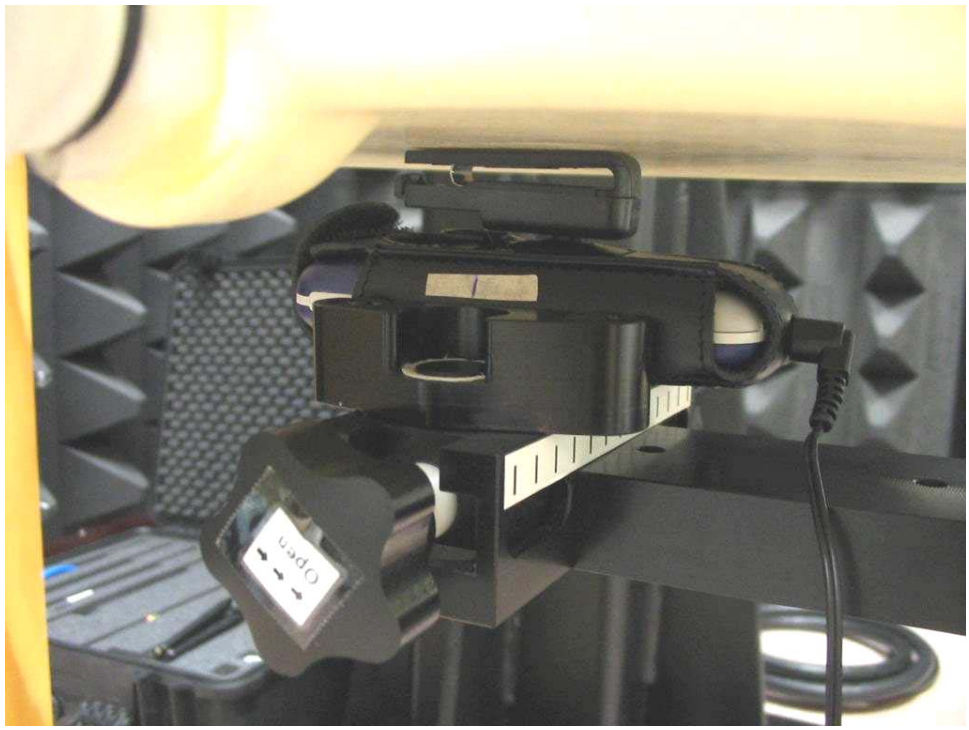
SAR Test Setup (Device at Head Phantom) – Closer Side View **(Ear/Tilt)**

SAR Test Setup Photographs

SAR Test Setup At Flat Phantom

SAR Test Setup Photographs

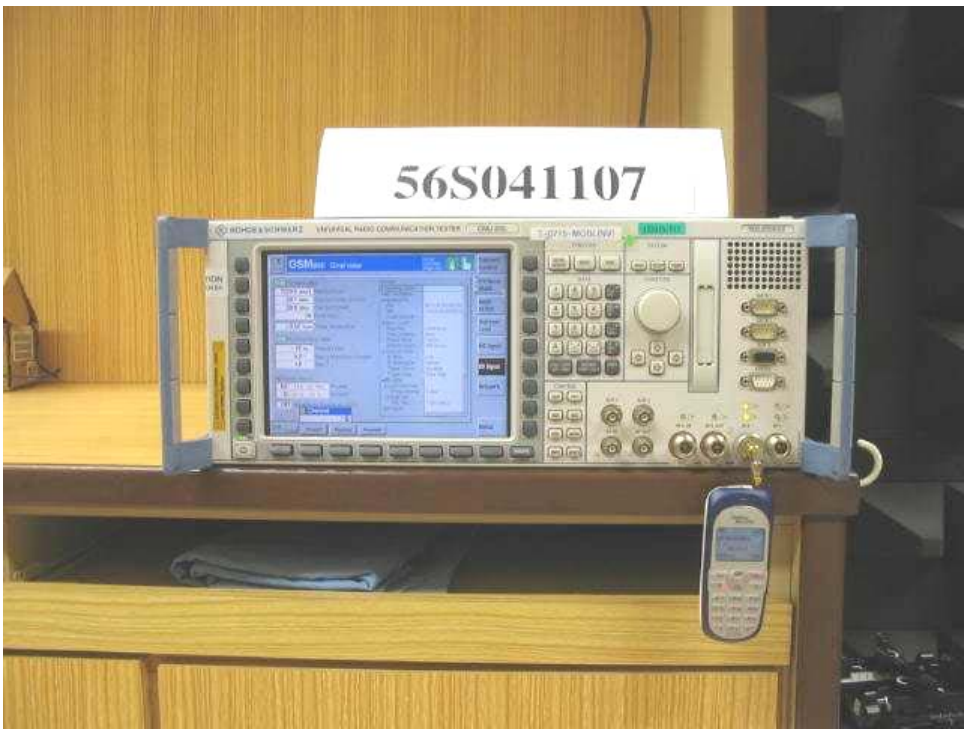
SAR Test Setup At Flat Phantom – Closer View (EUT **Front** Touched Phantom)



SAR Test Setup At Flat Phantom – Closer View (EUT **Rear** To Phantom)

TEST SETUP PHOTOGRAPHS ANNEX B

Conducted Power Measurement Setup



Conducted Power Measurement Setup – Far View

EUT PHOTOGRAPHS

Front of EUT

Rear of EUT

EUT PHOTOGRAPHS / DIAGRAMS ANNEX B

EUT PHOTOGRAPHS

EUT with Accessories

ANNEX C

TISSUE SIMULANT DATA SHEETS

Type of Tissue	Head	Body
Target Frequency (MHz)	850	850
Target Dielectric Constant	42.48	56.10
Target Conductivity (S/m)	0.98	0.95
Composition (by weight)	Water (40.14%) Glycol (0%) Sugar (57.56%) Salt (1.51%) HEC (0%) Preventol D7 (0.80%)	Water (54.77%) Glycol (0%) Sugar (43.58%) Salt (0.83%) HEC (0%) Preventol D7 (0.81%)
Measured Dielectric Constant	43.03	55.31
Measured Conductivity (S/m)	0.9501	0.9931

Probe Name	Dosimetric E-field Probe EX3DV4	Dosimetric E-field Probe EX3DV4
Probe Serial Number	3541	3541
Sensor Offset (mm)	1.2	1.2
Conversion Factor	9.64	9.61
Probe Calibration Due Date (DD/MM/YY)	25 July 2005	25 July 2005

Type of Tissue	Head	Body
Target Frequency (MHz)	1900	1900
Target Dielectric Constant	40.0	53.3
Target Conductivity (S/m)	1.40	1.52
Composition (by weight)	Ultra Pure Water (54.54%) Glycol (45.00%) Sugar (0%) Salt (0.46%) HEC (0%) Preventol D7 (0%)	Ultra Pure Water (70.20%) Glycol (29.45%) Sugar (0%) Salt (0.35%) HEC (0%) Preventol D7 (0%)
Measured Dielectric Constant	38.72	53.17
Measured Conductivity (S/m)	1.4412	1.5155

Probe Name	Dosimetric E-field Probe EX3DV4	Dosimetric E-field Probe EX3DV4
Probe Serial Number	3541	3541
Sensor Offset (mm)	1.2	1.2
Conversion Factor	8.03	7.53
Probe Calibration Due Date (DD/MM/YY)	25 July 2005	25 July 2005

Head Tissue at 850MHz

Frequency	e'	e''	Conductivity
825000000	43.37	20.20	0.9257
826000000	43.37	20.17	0.9254
827000000	43.36	20.18	0.9273
828000000	43.32	20.19	0.9288
829000000	43.29	20.18	0.9293
830000000	43.31	20.17	0.9299
831000000	43.33	20.20	0.9328
832000000	43.25	20.18	0.9329
833000000	43.25	20.15	0.9324
834000000	43.29	20.15	0.9334
835000000	43.26	20.17	0.9355
836000000	43.23	20.17	0.9370
837000000	43.22	20.13	0.9362
838000000	43.22	20.18	0.9395
839000000	43.21	20.14	0.9388
840000000	43.15	20.16	0.9409
841000000	43.14	20.15	0.9414
842000000	43.18	20.11	0.9406
843000000	43.15	20.13	0.9428
844000000	43.12	20.14	0.9444
845000000	43.10	20.12	0.9444
846000000	43.11	20.11	0.9453
847000000	43.03	20.13	0.9470
848000000	43.04	20.09	0.9464
849000000	43.08	20.11	0.9483
850000000	**43.03**	**20.12**	**0.9501**
851000000	42.96	20.08	0.9493
852000000	43.00	20.09	0.9507
853000000	42.96	20.08	0.9516
854000000	42.95	20.13	0.9550
855000000	42.89	20.07	0.9532
856000000	42.90	20.05	0.9536
857000000	42.81	20.03	0.9536
858000000	42.84	20.05	0.9559
859000000	42.76	20.03	0.9556
860000000	42.82	20.07	0.9587
861000000	42.85	20.09	0.9608
862000000	42.84	20.08	0.9617
863000000	42.80	20.06	0.9619
864000000	42.81	20.07	0.9634
865000000	42.84	20.09	0.9652

(e' = Dielectric Constant)
(e'' = Loss Factor)

Tested by: NAC
Date : 1st Feb 2005
Frequency: 850MHz
Mixture: Head Tissue
Tissue temp: 23°C

Composition		
Tap Water	15000.0g	40.14%
Ultra Pure Water	0.0g	0.00%
Sugar	21510.0g	57.56%
Glyco	0.0g	0.00%
Salt	562.5g	1.51%
Preventol D7	300.0g	0.80%
Total Weight	37372.5g	100.0%

Result (FCC)	Dielectric Constant	Conductivity
Measured	43.03	0.9501
Target (FCC)	42.48	0.98
Low Limit	40.356	0.931
High Limit	44.604	1.029
% Off Target	1.29	-3.05

Body Tissue at 850MHz

Frequency	e'	e''	Conductivity
825000000	55.52	21.14	0.9688
826000000	55.53	21.10	0.9683
827000000	55.50	21.08	0.9687
828000000	55.48	21.09	0.9701
829000000	55.48	21.11	0.9720
830000000	55.46	21.11	0.9735
831000000	55.46	21.12	0.9749
832000000	55.43	21.08	0.9745
833000000	55.46	21.08	0.9754
834000000	55.44	21.07	0.9764
835000000	55.45	21.09	0.9786
836000000	55.38	21.08	0.9792
837000000	55.41	21.05	0.9790
838000000	55.40	21.06	0.9806
839000000	55.40	21.08	0.9826
840000000	55.34	21.08	0.9839
841000000	55.34	21.09	0.9852
842000000	55.37	21.06	0.9850
843000000	55.35	21.05	0.9859
844000000	55.32	21.06	0.9874
845000000	55.33	21.02	0.9870
846000000	55.31	21.05	0.9895
847000000	55.29	21.05	0.9905
848000000	55.27	21.02	0.9901
849000000	55.28	21.02	0.9917
850000000	**55.31**	**21.03**	**0.9931**
851000000	55.24	21.06	0.9956
852000000	55.26	21.04	0.9958
853000000	55.24	21.02	0.9961
854000000	55.24	21.04	0.9984
855000000	55.22	21.03	0.9991
856000000	55.24	21.02	0.9997
857000000	55.22	21.02	1.0009
858000000	55.16	21.00	1.0008
859000000	55.17	21.01	1.0025
860000000	55.18	21.03	1.0047
861000000	55.17	21.00	1.0046
862000000	55.15	21.01	1.0062
863000000	55.16	21.00	1.0067
864000000	55.14	21.00	1.0079
865000000	55.14	21.00	1.0093

(e' = Dielectric Constant)
(e'' = Loss Factor)

Tested by: NAC
Date : 2nd Feb 2005
Frequency: 850MHz
Mixture: Body Tissue
Tissue temp: 23°C

Composition		
Tap Water	19500.0g	54.77%
Ultra Pure Water	0.0g	0.00%
Sugar	15518.0g	43.58%
Glyco	0.0g	0.00%
Salt	296.1g	0.83%
Preventol D7	290.0g	0.81%
Total Weight	35604.1g	100.0%

Result (FCC)	Dielectric Constant	Conductivity
Measured	55.31	0.9931
Target (FCC)	56.1	0.95
Low Limit	53.295	0.9025
High Limit	58.905	0.9975
% Off Target	-1.41	4.53

Head Tissue at 1900MHz

Frequency	e'	e''	Conductivity
1890000000	38.73	13.63	1.4311
1891000000	38.73	13.63	1.4323
1892000000	38.73	13.64	1.4336
1893000000	38.72	13.63	1.4336
1894000000	38.73	13.64	1.4352
1895000000	38.72	13.65	1.4367
1896000000	38.72	13.65	1.4374
1897000000	38.72	13.64	1.4371
1898000000	38.73	13.66	1.4399
1899000000	38.71	13.65	1.4398
1900000000	**38.72**	**13.65**	**1.4412**
1901000000	38.72	13.66	1.4424
1902000000	38.71	13.68	1.4458
1903000000	38.71	13.68	1.4458
1904000000	38.72	13.69	1.4477
1905000000	38.70	13.69	1.4486
1906000000	38.72	13.69	1.4492
1907000000	38.71	13.70	1.4510
1908000000	38.72	13.70	1.4526
1909000000	38.71	13.70	1.4534
1910000000	38.71	13.71	1.4551
1911000000	38.71	13.72	1.4562
1912000000	38.70	13.73	1.4583
1913000000	38.71	13.73	1.4590
1914000000	38.71	13.73	1.4596
1915000000	38.70	13.73	1.4603
1916000000	38.71	13.71	1.4599
1917000000	38.71	13.74	1.4632
1918000000	38.70	13.75	1.4646
1919000000	38.71	13.75	1.4656
1920000000	38.70	13.76	1.4673
1921000000	38.69	13.76	1.4688
1922000000	38.70	13.76	1.4696
1923000000	38.71	13.78	1.4720
1924000000	38.71	13.77	1.4720
1925000000	38.70	13.77	1.4728
1926000000	38.71	13.78	1.4750
1927000000	38.69	13.79	1.4762
1928000000	38.72	13.79	1.4775
1929000000	38.70	13.80	1.4787
1930000000	38.71	13.79	1.4791

(e' = Dielectric Constant)
(e'' = Loss Factor)

Tested by: NAC
Date : 28TH Jan 2005
Frequency: 1900MHz
Mixture: Head Tissue
Tissue temp: 23°C

Composition		
Tap Water	0.0g	0.00%
Ultra Pure Water	200.0g	54.54%
Sugar	0.0g	0.00%
Glyco	165.0g	45.00%
Salt	1.7g	0.46%
Preventol D7	0.0g	0.00%
Total Weight	366.7g	100.0%

Result (FCC)	Dielectric Constant	Conductivity
Measured	38.72	1.4412
Target (FCC)	40	1.4
Low Limit	38	1.33
High Limit	42	1.47
% Off Target	-3.19	2.94

Result (EN)	Dielectric Constant	Conductivity
Measured	38.72	1.4412
Target (EN)	40	1.38
Low Limit	38	1.311
High Limit	42	1.449
% Off Target	-3.19	4.43

Body Tissue at 1900MHz

Frequency	e'	e''	Conductivity
1890000000	53.20	14.35	1.5066
1891000000	53.19	14.35	1.5074
1892000000	53.19	14.36	1.5097
1893000000	53.17	14.36	1.5097
1894000000	53.19	14.36	1.5111
1895000000	53.18	14.37	1.5127
1896000000	53.18	14.35	1.5120
1897000000	53.18	14.38	1.5153
1898000000	53.17	14.35	1.5129
1899000000	53.19	14.36	1.5155
1900000000	**53.17**	**14.36**	**1.5155**
1901000000	53.20	14.38	1.5185
1902000000	53.18	14.37	1.5189
1903000000	53.17	14.37	1.5193
1904000000	53.17	14.36	1.5194
1905000000	53.17	14.37	1.5207
1906000000	53.16	14.37	1.5215
1907000000	53.17	14.37	1.5229
1908000000	53.14	14.37	1.5228
1909000000	53.18	14.39	1.5262
1910000000	53.16	14.38	1.5258
1911000000	53.17	14.38	1.5264
1912000000	53.16	14.40	1.5300
1913000000	53.17	14.38	1.5281
1914000000	53.18	14.39	1.5296
1915000000	53.17	14.39	1.5304
1916000000	53.20	14.39	1.5320
1917000000	53.18	14.40	1.5340
1918000000	53.19	14.40	1.5345
1919000000	53.17	14.42	1.5369
1920000000	53.17	14.40	1.5360
1921000000	53.17	14.41	1.5383
1922000000	53.18	14.42	1.5398
1923000000	53.17	14.41	1.5390
1924000000	53.18	14.43	1.5421
1925000000	53.18	14.43	1.5427
1926000000	53.19	14.43	1.5442
1927000000	53.18	14.44	1.5457
1928000000	53.17	14.42	1.5449
1929000000	53.18	14.44	1.5476
1930000000	53.17	14.43	1.5468

(e' = Dielectric Constant)
(e'' = Loss Factor)

Tested by: NAC
Date : 31th Jan 05
Frequency: 1900MHz
Mixture: Body Tissue
Tissue temp: 24°C

Composition		
Tap Water	25000.0g	70.20%
Ultra Pure Water	0.0g	0.00%
Sugar	0.0g	0.00%
Glyco	10487.0g	29.45%
Salt	125.6g	0.35%
Preventol D7	0.0g	0.00%
Total Weight	35612.6g	100.0%

Result (FCC)	Dielectric Constant	Conductivity
Measured	53.17	1.5155
Target (FCC)	53.3	1.52
Low Limit	50.635	1.444
High Limit	55.965	1.596
% Off Target	-0.25	-0.30

ANNEX D

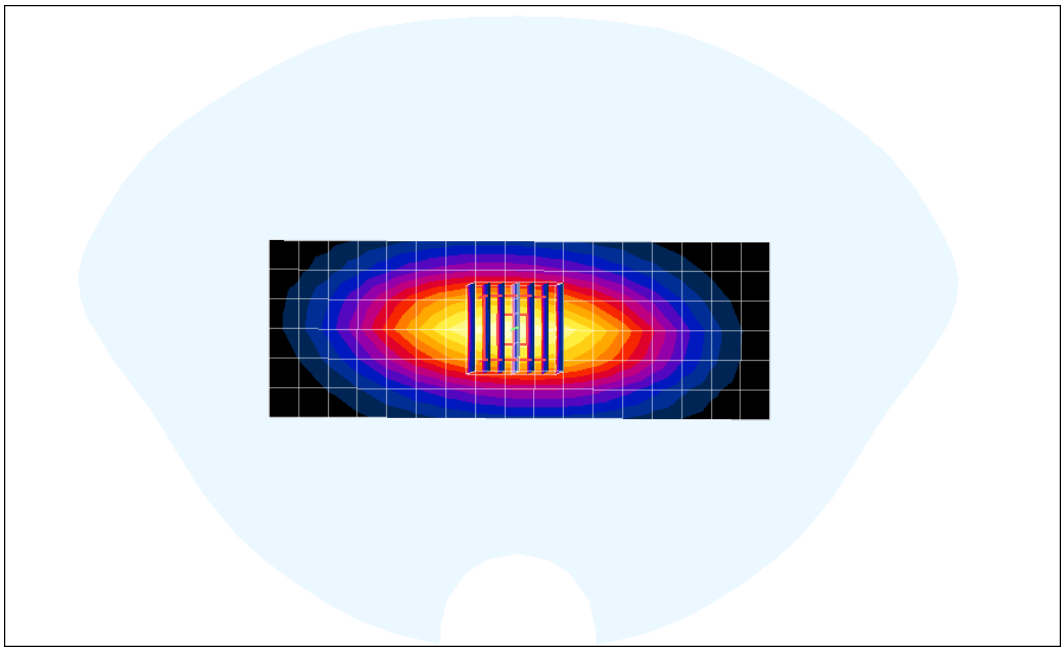
SAR VALIDATION RESULTS

SAR Validation – Head Tissue at 850MHz (Dipole forward power = 250mW)

Test Laboratory: The name of your organization **Date: 02/01/05**
File Name: 850MHz Head_System Validation.da4
Program Name: Job Nos.: 56S041107
Phantom section: Flat Section
DUT: Dipole 835 MHz
Communication System: CW
Frequency: 835 MHz
Duty Cycle: 1:1
Medium: 850MHz Head TissueMedium parameters used: $\sigma = 0.9501$; mho/m, $\varepsilon_r = 43.03$; $\rho = 1000$ kg/m^3
DASY4 Configuration:
Electronics: DAE4 Sn627 Calibrated: 21/May/2004
Phantom: SAM 12 Measurement SW: DASY4, V4.4 Build 3
Probe: EX3DV4 - SN3541 ConvF(9.64, 9.64, 9.64) Calibrated: 26/Jul/2004
Postprocessing SW: SEMCAD, V1.8 Build 130
Sensor-Surface: 4mm (Mechanical Surface Detection)

850MHz Head_System Validation/Area Scan (7x18x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 2.43 mW/g

850MHz Head_System Validation/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.7 V/m; Power Drift = -0.002 dB
Peak SAR (extrapolated) = 3.4 W/kg
SAR(1 g) = 2.25 mW/g; SAR(10 g) = 1.46 mW/g
Maximum value of SAR (measured) = 2.44 mW/g



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

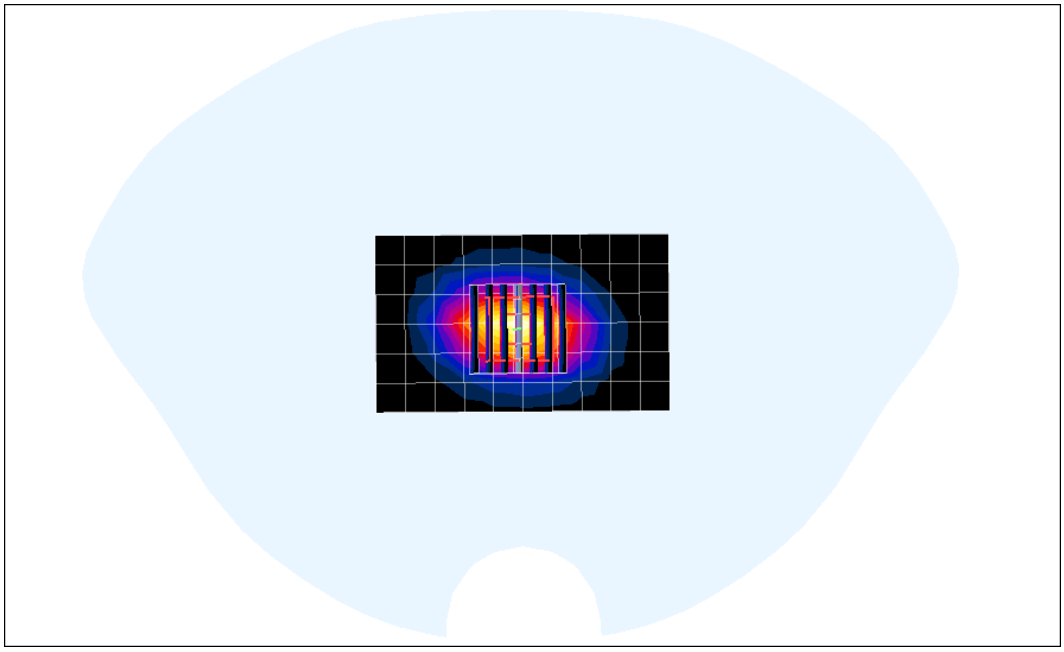
Test Laboratory: The name of your organization **Date: 01/28/05**
File Name: 1900MHz Head_System Validation_28th Jan 05.da4
Program Name: Job Nos.: 56S041107
Phantom section: Flat Section
DUT: Dipole 1900 MHz
Communication System: CW
Frequency: 1900 MHz
Duty Cycle: 1:1
Medium: 1900MHz Head TissueMedium parameters used: σ = 1.4412; mho/m, ε_r = 38.72; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE4 Sn627 Calibrated: 21/May/2004
Phantom: SAM 12 Measurement SW: DASY4, V4.4 Build 3
Probe: EX3DV4 - SN3541 ConvF(8.03, 8.03, 8.03) Calibrated: 26/Jul/2004
Postprocessing SW: SEMCAD, V1.8 Build 130
Sensor-Surface: 4mm (Mechanical Surface Detection)

1900MHz Head_System Validation_28 Jan 05/Area Scan (7x11x1):

Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 10.9 mW/g

1900MHz Head_System Validation_28 Jan 05/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88 V/m; Power Drift = -0.0 dB
Peak SAR (extrapolated) = 18.3 W/kg
SAR(1 g) = 9.95 mW/g; SAR(10 g) = 5.18 mW/g
Maximum value of SAR (measured) = 11.2 mW/g

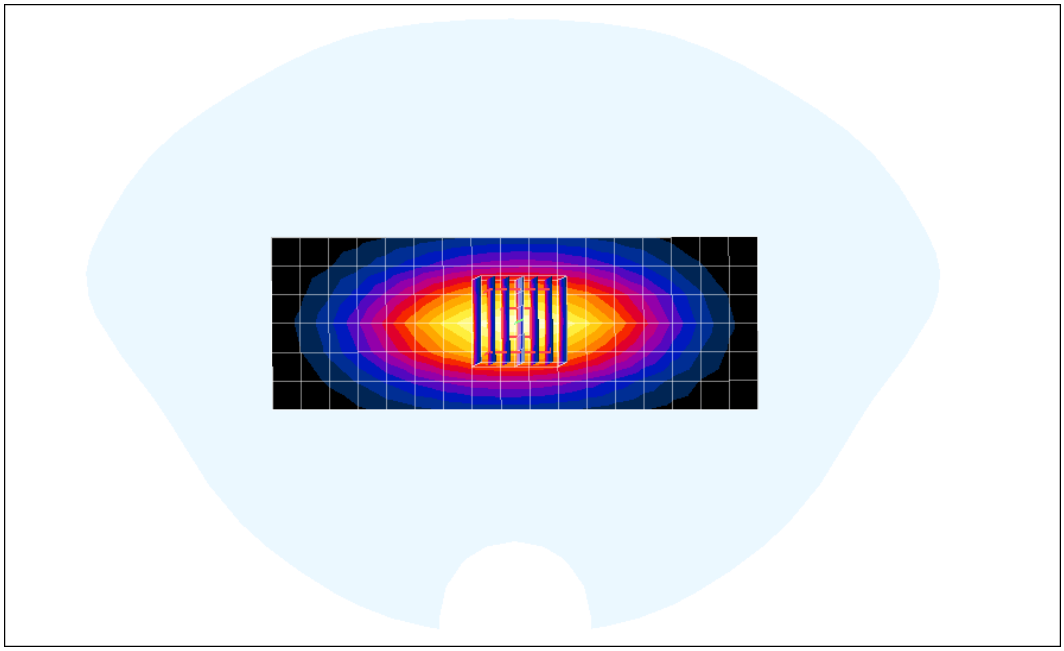


SAR Validation – Body Tissue at 850MHz (Dipole forward power = 250mW)

Test Laboratory: The name of your organization **Date: 02/02/05**
File Name: 850MHz Body_System Validation.da4
Program Name: Job Nos.: 56S041107
Phantom section: Flat Section
DUT: Dipole 835 MHz
Communication System: CW
Frequency: 835 MHz
Duty Cycle: 1:1
Medium: 850MHz Body TissueMedium parameters used: $\sigma = 0.9931$; mho/m, $\varepsilon_r = 55.31$; $\rho = 1000$ kg/m^3
DASY4 Configuration:
Electronics: DAE4 Sn627 Calibrated: 21/May/2004
Phantom: SAM 12 Measurement SW: DASY4, V4.4 Build 3
Probe: EX3DV4 - SN3541 ConvF(9.61, 9.61, 9.61) Calibrated: 26/Jul/2004
Postprocessing SW: SEMCAD, V1.8 Build 130
Sensor-Surface: 4mm (Mechanical Surface Detection)

850MHz Body_System Validation/Area Scan (7x18x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 2.65 mW/g

850MHz Body_System Validation/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.1 V/m; Power Drift = -0.007 dB
Peak SAR (extrapolated) = 3.59 W/kg
SAR(1 g) = 2.48 mW/g; SAR(10 g) = 1.66 mW/g
Maximum value of SAR (measured) = 2.67 mW/g

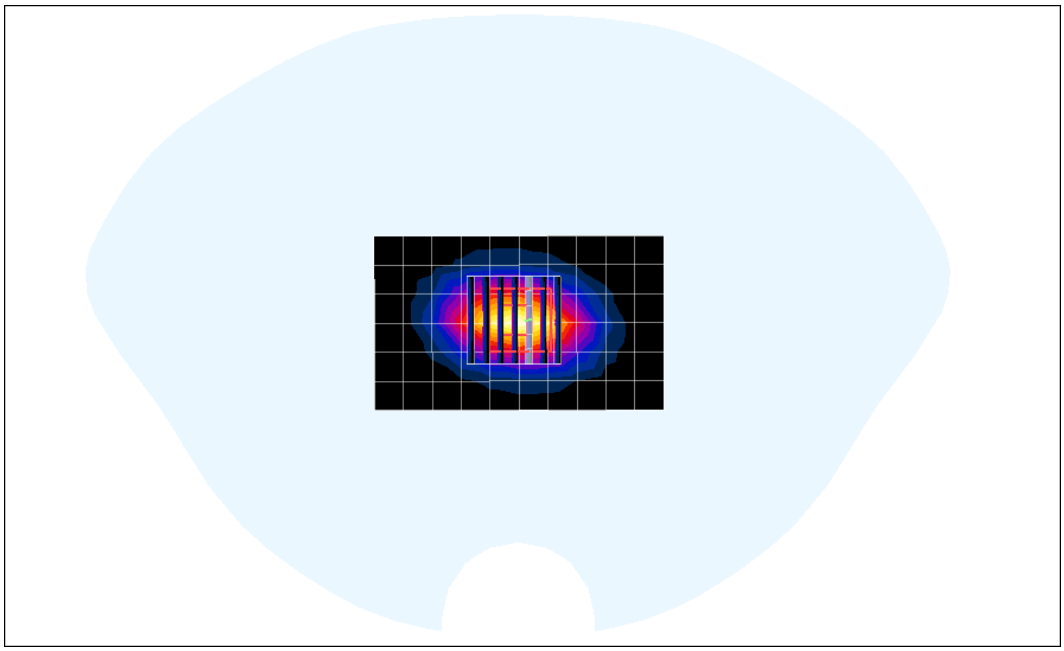


SAR Validation – Body Tissue at 1900MHz (Dipole forward power = 250mW)

Test Laboratory: The name of your organization **Date: 01/31/05**
File Name: 1900MHz Body_System Validation_31st Jan 05.da4
Program Name: Job Nos.: 56S041107
Phantom section: Flat Section
DUT: Dipole 1900 MHz
Communication System: CW
Frequency: 1900 MHz
Duty Cycle: 1:1
Medium: 1900MHz Body TissueMedium parameters used: $\sigma = 1.5155$; mho/m, $\varepsilon_r = 53.17$; $\rho = 1000$ kg/m^3
DASY4 Configuration:
Electronics: DAE4 Sn627 Calibrated: 21/May/2004
Phantom: SAM 12 Measurement SW: DASY4, V4.4 Build 3
Probe: EX3DV4 - SN3541 ConvF(7.53, 7.53, 7.53) Calibrated: 26/Jul/2004
Postprocessing SW: SEMCAD, V1.8 Build 130
Sensor-Surface: 4mm (Mechanical Surface Detection)

1900MHz Body_System Validation/Area Scan (7x11x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 11.3 mW/g

1900MHz Body_System Validation/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.4 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 10 mW/g; SAR(10 g) = 5.37 mW/g
Maximum value of SAR (measured) = 11.3 mW/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

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

Client **PSB**

CALIBRATION CERTIFICATE

Object(s) EX3DV4 - SN:3541

Calibration procedure(s) QA CAL-01.v2
Calibration procedure for dosimetric E-field probes

Calibration date: July 26, 2004

Condition of the calibrated item In Tolerance (according to the specific calibration document)

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 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E4419B	GB41293874	5-May-04 (METAS, No 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No 251-00388)	May-05
Reference 20 dB Attenuator	SN: 5086 (20b)	3-May-04 (METAS, No 251-00389)	May-05
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct 03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug 02)	In house check: Aug 05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct 03)	In house check: Oct 05

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

Date issued: July 26, 2004

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Probe EX3DV4

SN:3541

Manufactured: May 3, 2004
Last calibrated: July 26, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

EX3DV4 SN:3541 July 26, 2004

DASY - Parameters of Probe: EX3DV4 SN:3541

Sensitivity in Free Space

Diode Compression[A]

NormX	**0.49** μV/(V/m)^2	DCP X	**93** mV
NormY	**0.43** μV/(V/m)^2	DCP Y	**93** mV
NormZ	**0.41** μV/(V/m)^2	DCP Z	**93** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 7.

Boundary Effect

Head **900 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	3.6	1.2
SAR_{be} [%]	With Correction Algorithm	0.0	0.0

Head **1750 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	4.8	2.8
SAR_{be} [%]	With Correction Algorithm	0.1	0.4

Sensor Offset

Probe Tip to Sensor Center	**1.2** mm

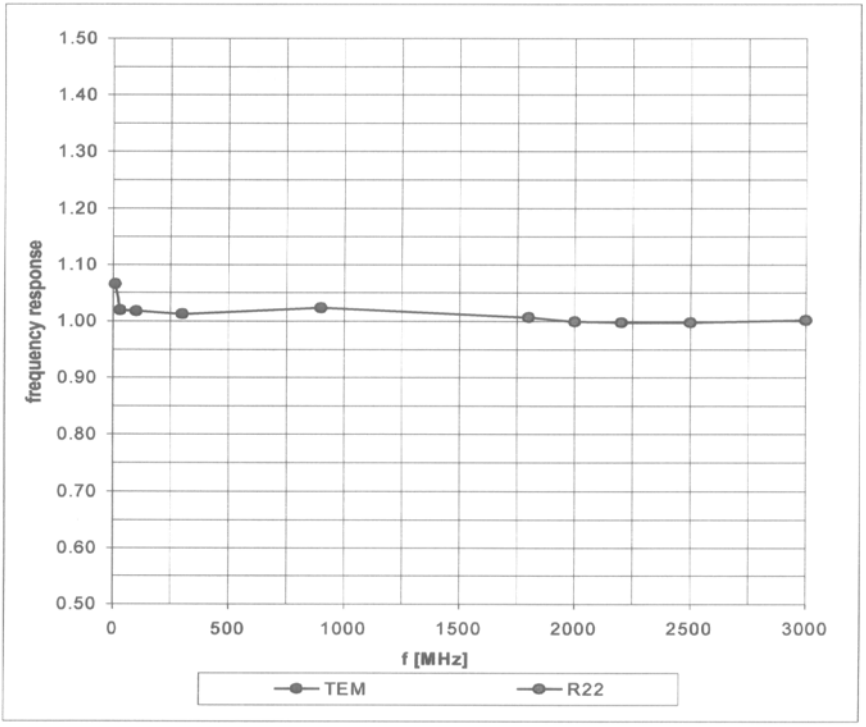
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] numerical linearization parameter: uncertainty not required

EX3DV4 SN:3541 July 26, 2004

Frequency Response of E-Field

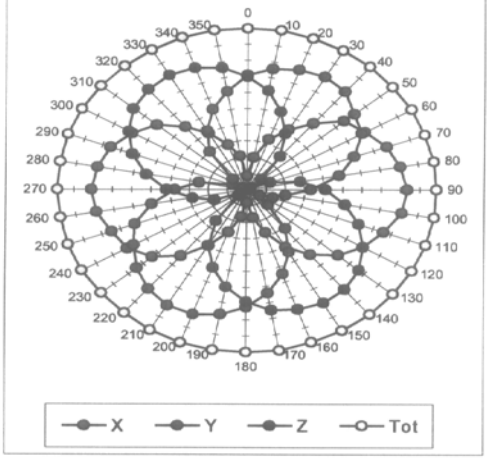
(TEM-Cell:ifi110, Waveguide R22)



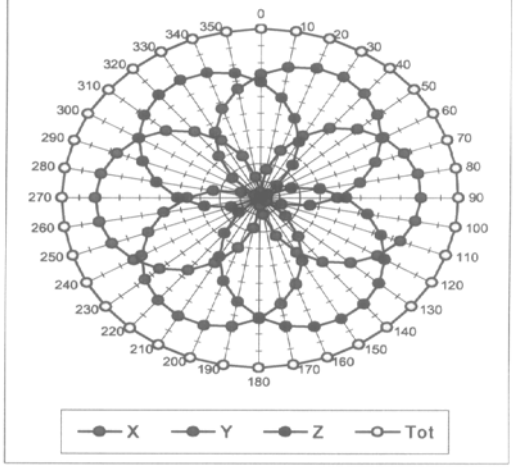
EX3DV4 SN:3541 July 26, 2004

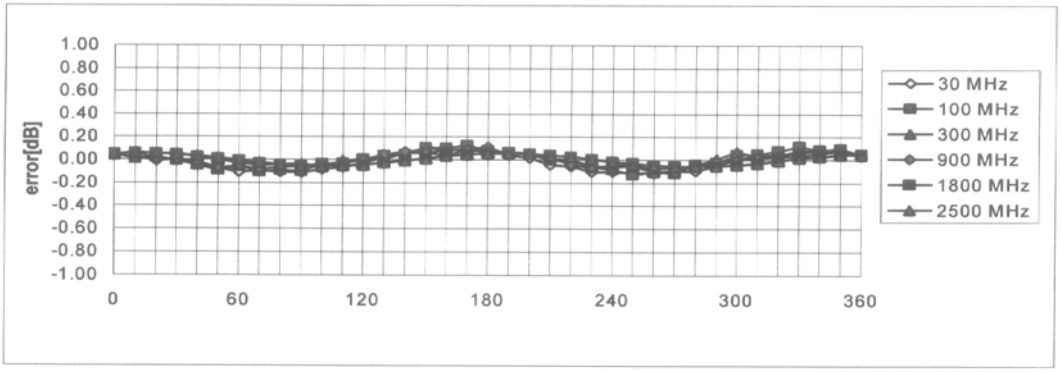
Receiving Pattern (ϕ), θ = 0°

f = 900 MHz, TEM cell ifi110



f = 1800 MHz, WG R22



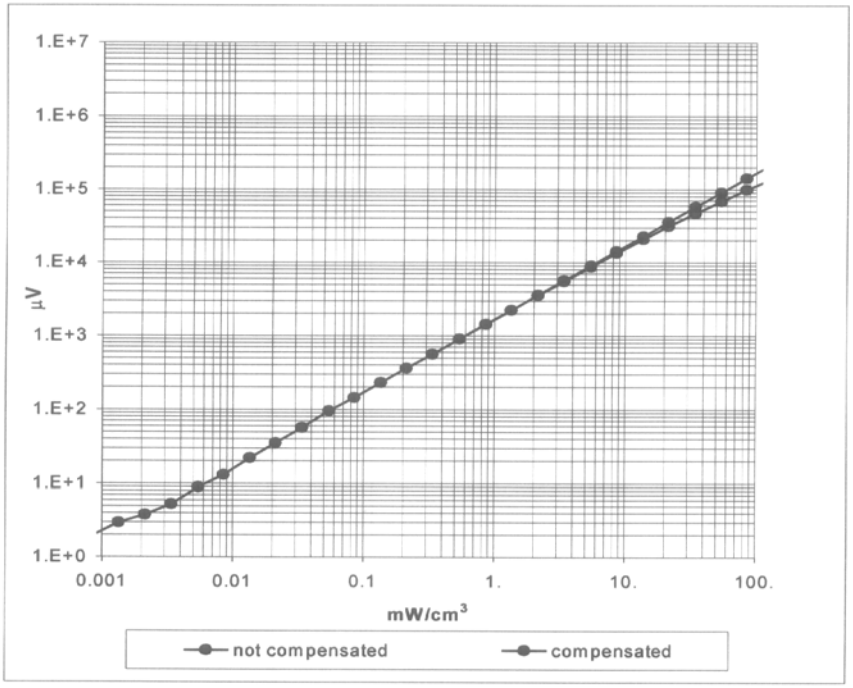


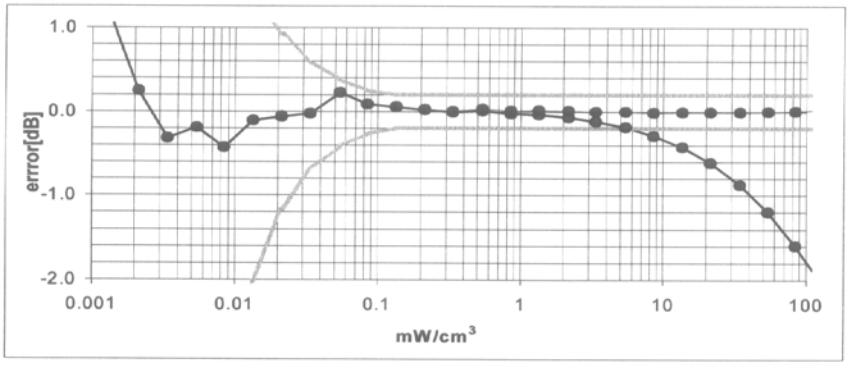
Axial Isotropy Error < ± 0.2 dB

EX3DV4 SN:3541 July 26, 2004

Dynamic Range f(SAR$_{head}$)

(Waveguide R22)

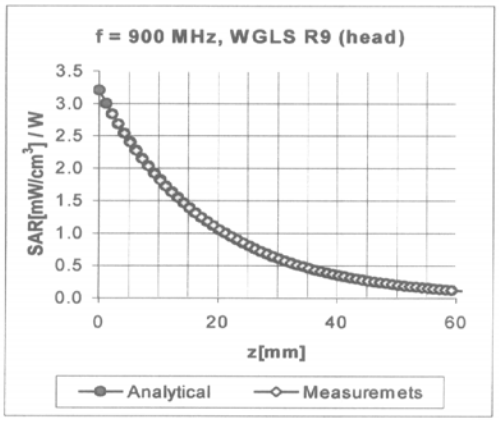


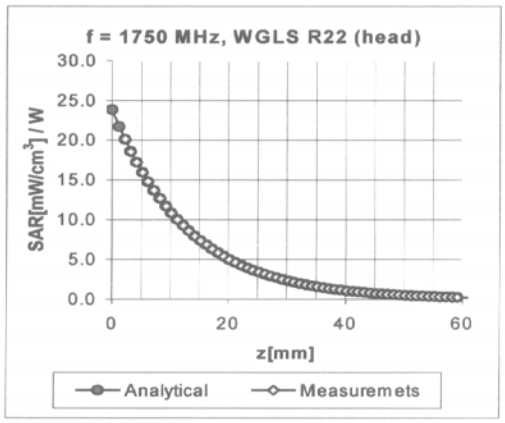


Probe Linearity Error < ± 0.2 dB

EX3DV4 SN:3541 July 26, 2004

Conversion Factor Assessment





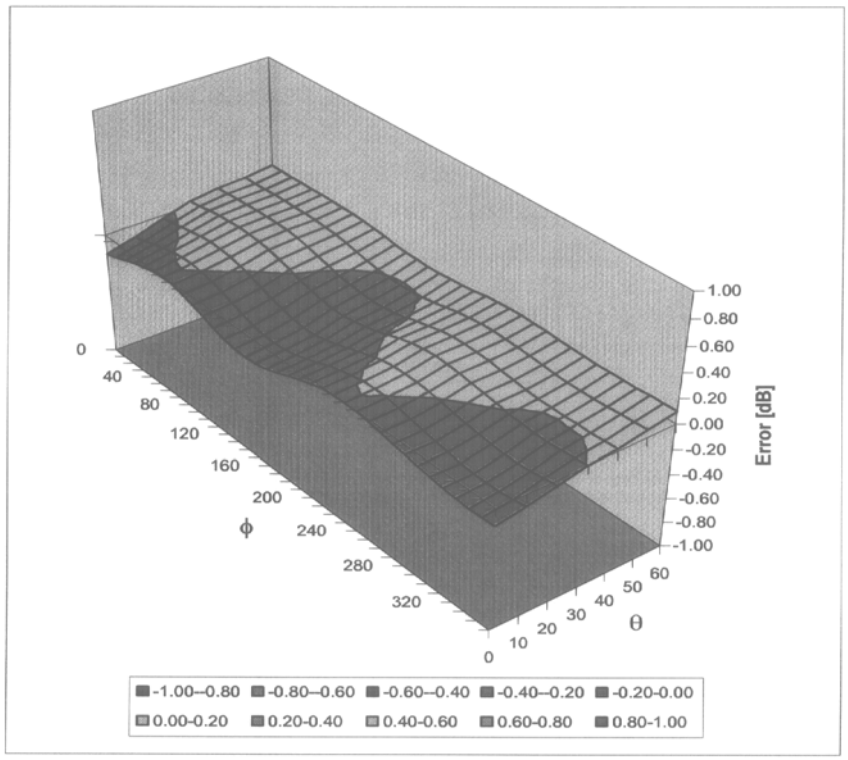
f [MHz]	Validity [MHz][B]	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	785-885	Head	41.5 ± 5%	0.90 ± 5%	0.17	1.55	9.64 ± 9.7% (k=2)
900	850-950	Head	41.5 ± 5%	0.97 ± 5%	0.42	0.89	9.28 ± 9.7% (k=2)
1750	1700-1800	Head	40.0 ± 5%	1.40 ± 5%	0.10	2.74	8.21 ± 9.7% (k=2)
1900	1850-1950	Head	40.0 ± 5%	1.40 ± 5%	0.12	2.49	8.03 ± 9.7% (k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	0.22	1.28	7.34 ± 9.7% (k=2)
5200	5150-5250	Head	36.0 ± 5%	4.66 ± 5%	0.50	1.80	5.11 ± 13.6% (k=2)
5500	5450-5550	Head	35.6 ± 5%	4.96 ± 5%	0.50	1.80	4.66 ± 13.6% (k=2)
5800	5750-5850	Head	35.3 ± 5%	5.27 ± 5%	0.50	1.80	4.60 ± 13.6% (k=2)
835	785-885	Body	55.2 ± 5%	0.97 ± 5%	0.24	1.27	9.61 ± 9.7% (k=2)
900	850-950	Body	55.0 ± 5%	1.05 ± 5%	0.31	1.07	9.26 ± 9.7% (k=2)
1750	1700-1800	Body	53.3 ± 5%	1.52 ± 5%	0.11	4.09	7.76 ± 9.7% (k=2)
1900	1850-1950	Body	53.3 ± 5%	1.52 ± 5%	0.12	4.45	7.53 ± 9.7% (k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	0.41	0.93	7.72 ± 9.7% (k=2)
5200	5150-5250	Body	49.0 ± 5%	5.30 ± 5%	0.50	1.95	4.61 ± 13.6% (k=2)
5500	5450-5550	Body	48.6 ± 5%	5.65 ± 5%	0.50	1.90	4.47 ± 13.6% (k=2)
5800	5750-5850	Body	48.2 ± 5%	6.00 ± 5%	0.50	1.90	4.42 ± 13.6% (k=2)

[B] The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.

EX3DV4 SN:3541 July 26, 2004

Deviation from Isotropy in HSL

Error (θ, ϕ), f = 900 MHz



Spherical Isotropy Error < ± 0.4 dB

ANNEX G

REFERENCES

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 1528-200X	2000	"Product Performance Standards Relative to the safe Use of Electromagnetic Energy"
ANSI/IEEE C95.3	1992	"Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave"
ANSI/IEEE C95.1	1992	"Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz"
ACA, Radio Communications (EMR Human Exposure)	2000 (No.2)	“Radiocommunication (Electromagnetic Radiation – Human Exposure)”
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)