



Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN5d041**

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL 1900 MHz;

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 38.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.96, 4.96, 4.96); Calibrated: 1/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn411; Calibrated: 11/6/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006;
- Measurement SW: DASYS4, V4.2 Build 30; Postprocessing SW: SEMCAD, V1.8 Build 98

**Pin = 250 mW; d = 10 mm/Area Scan (81x81x1):** Measurement grid: dx=15mm, dy=15mm

Reference Value = 93.8 V/m

Power Drift = 0.002 dB

Maximum value of SAR = 11.8 mW/g

**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

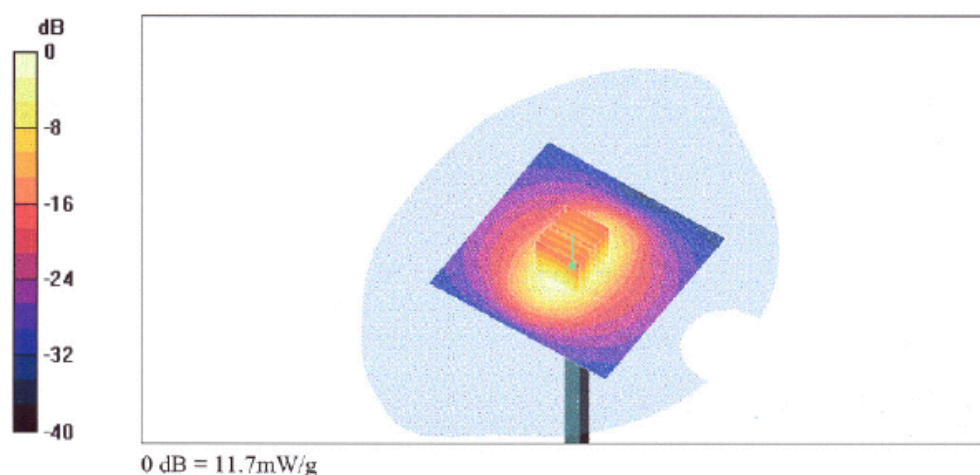
Peak SAR (extrapolated) = 18.7 W/kg

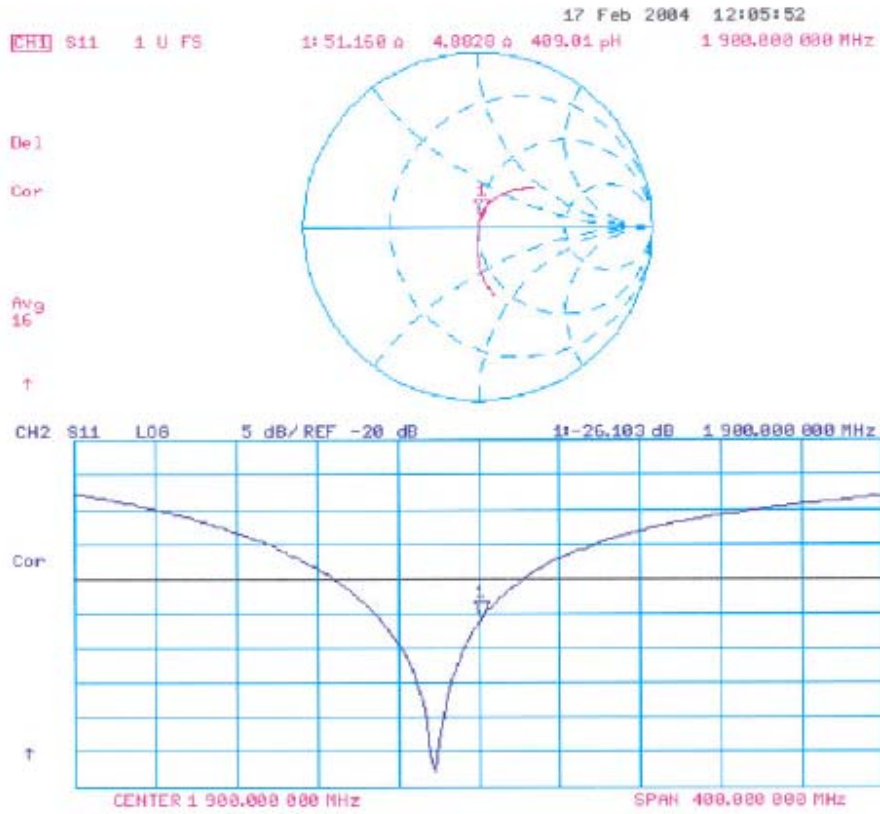
**SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.39 mW/g**

Reference Value = 93.8 V/m

Power Drift = 0.002 dB

Maximum value of SAR = 11.7 mW/g







Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN5d041**

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: Muscle 1900 MHz;

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.58$  mho/m;  $\epsilon_r = 52.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.57, 4.57, 4.57); Calibrated: 1/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 11/6/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006;
- Measurement SW: DASY4, V4.2 Build 25; Postprocessing SW: SEMCAD, V1.8 Build 101

**Pin = 250 mW; d = 10 mm/Area Scan (81x81x1):** Measurement grid: dx=15mm, dy=15mm

Reference Value = 92.6 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 11.8 mW/g

**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm,

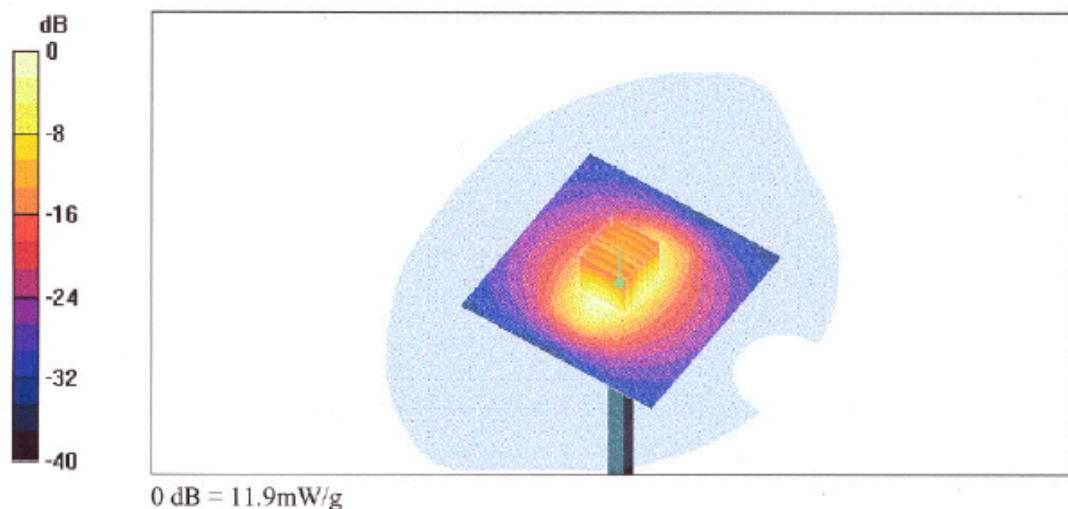
dy=5mm, dz=5mm

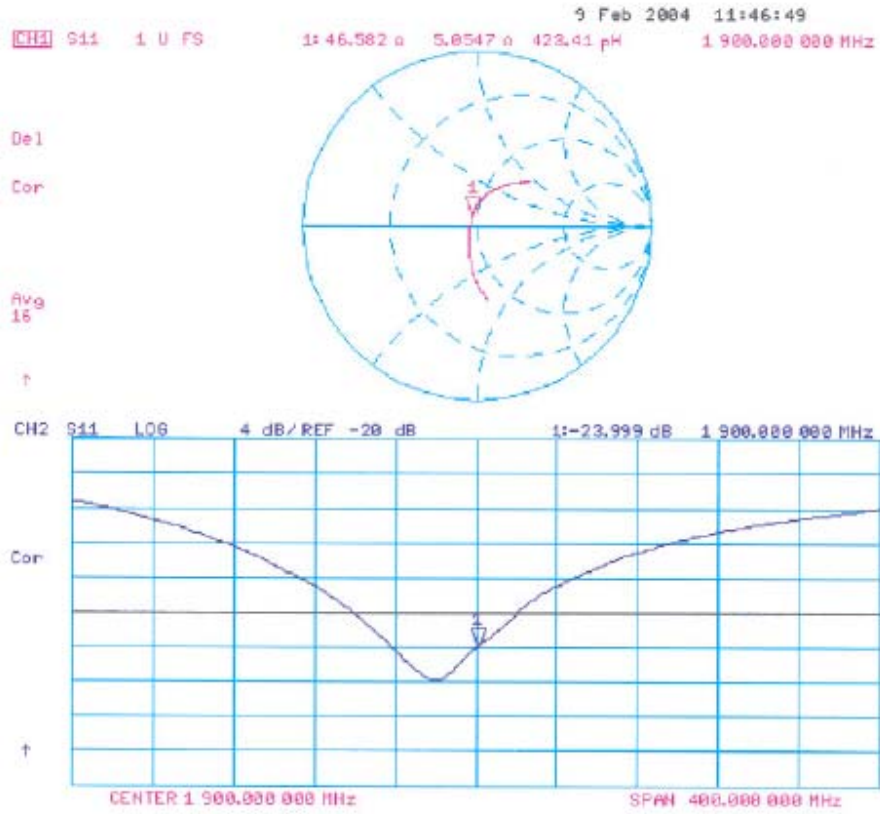
Reference Value = 92.6 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 11.9 mW/g

Peak SAR (extrapolated) = 18.8 W/kg

SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.49 mW/g







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

Client Auden > Sporton Int. Inc.

CALIBRATION CERTIFICATE			
Object(s)	ET3DV6 - SN:1788		
Calibration procedure(s)	QA CAL-01 v2 Calibration procedure for dosimetric E-field probes		
Calibration date:	August 29, 2003		
Condition of the calibrated item	In Tolerance (according to the specific calibration document)		
This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.			
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
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (Agilent, No. 20020918)	Sep-03
Power meter EPM E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Apr-04
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01 (ELCAL, No.2360)	Sep-03
Calibrated by:	Name Nico Vetterli	Function Technician	Signature 
Approved by:	Name Katja Pokovic	Function Laboratory Director	Signature 
Date issued: August 28, 2003			
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.			



Schmid & Partner Engineering AG

**s p e a g**

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# Probe ET3DV6

## SN:1788

Manufactured: May 28, 2003  
Last calibration: August 29, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)



ET3DV6 SN:1788

August 29, 2003

**DASY - Parameters of Probe: ET3DV6 SN:1788**

Sensitivity in Free Space

NormX	1.68 $\mu\text{V}/(\text{V}/\text{m})^2$
NormY	1.62 $\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	1.71 $\mu\text{V}/(\text{V}/\text{m})^2$

Diode Compression

DCP X	95	mV
DCP Y	95	mV
DCP Z	95	mV

Sensitivity in Tissue Simulating Liquid

Head 900 MHz  $\epsilon_r = 41.5 \pm 5\%$   $\sigma = 0.97 \pm 5\%$  mho/m

Valid for f=800-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	6.6 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	6.6 $\pm 9.5\%$ (k=2)	Alpha	0.34
ConvF Z	6.6 $\pm 9.5\%$ (k=2)	Depth	2.48

Head 1800 MHz  $\epsilon_r = 40.0 \pm 5\%$   $\sigma = 1.40 \pm 5\%$  mho/m

Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.3 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	5.3 $\pm 9.5\%$ (k=2)	Alpha	0.43
ConvF Z	5.3 $\pm 9.5\%$ (k=2)	Depth	2.80

Boundary Effect

Head 900 MHz Typical SAR gradient: 5 % per mm

Probe Tip to Boundary		1 mm	2 mm
SAR <sub>te</sub> [%]	Without Correction Algorithm	8.7	5.0
SAR <sub>te</sub> [%]	With Correction Algorithm	0.3	0.5

Head 1800 MHz Typical SAR gradient: 10 % per mm

Probe Tip to Boundary		1 mm	2 mm
SAR <sub>te</sub> [%]	Without Correction Algorithm	12.8	8.9
SAR <sub>te</sub> [%]	With Correction Algorithm	0.3	0.1

Sensor Offset

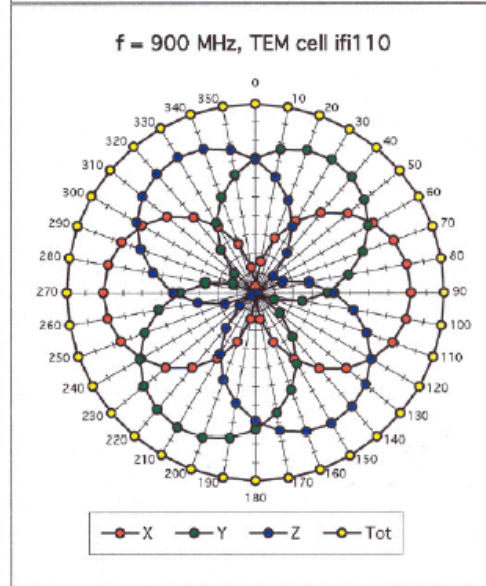
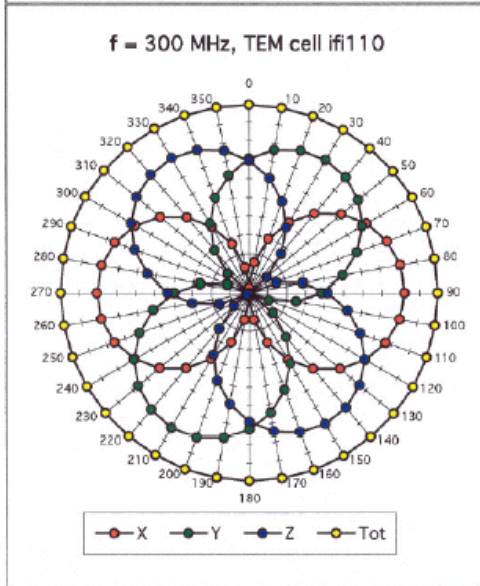
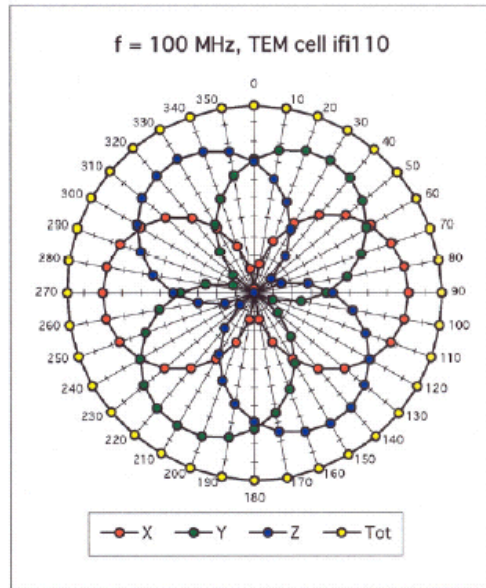
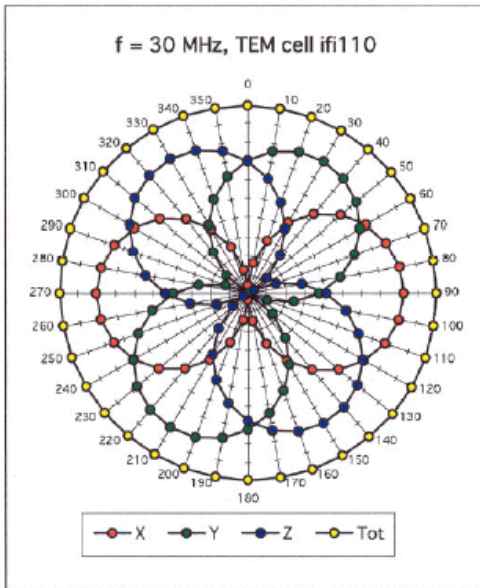
Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.6 $\pm 0.2$	mm



ET3DV6 SN:1788

August 29, 2003

Receiving Pattern ( $\phi$ ),  $\theta = 0^\circ$

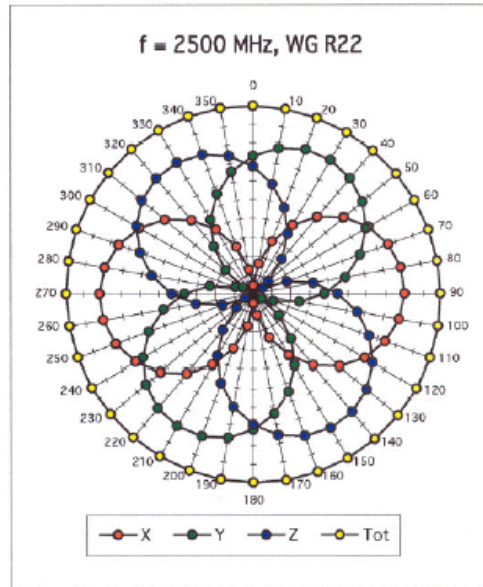
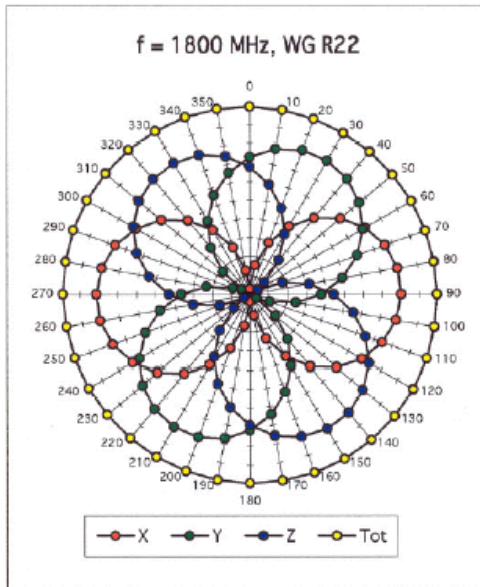




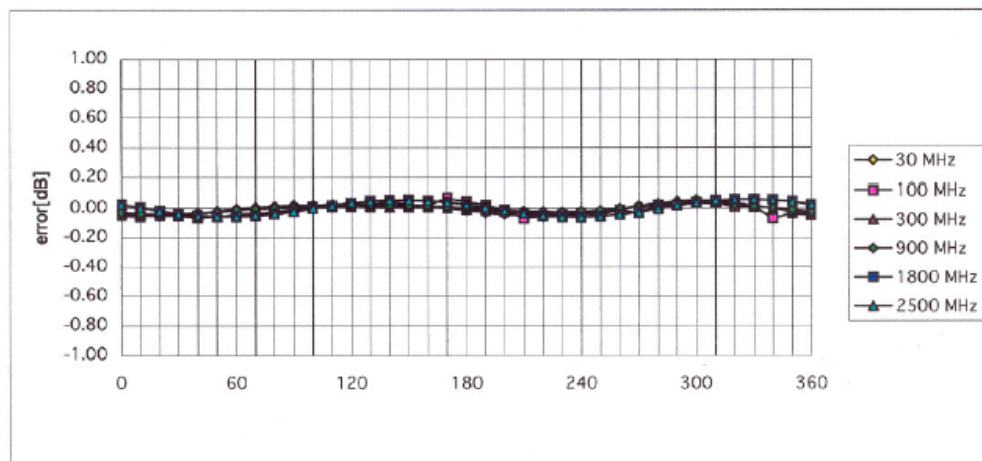


ET3DV6 SN:1788

August 29, 2003



Isotropy Error ( $\phi$ ),  $\theta = 0^\circ$



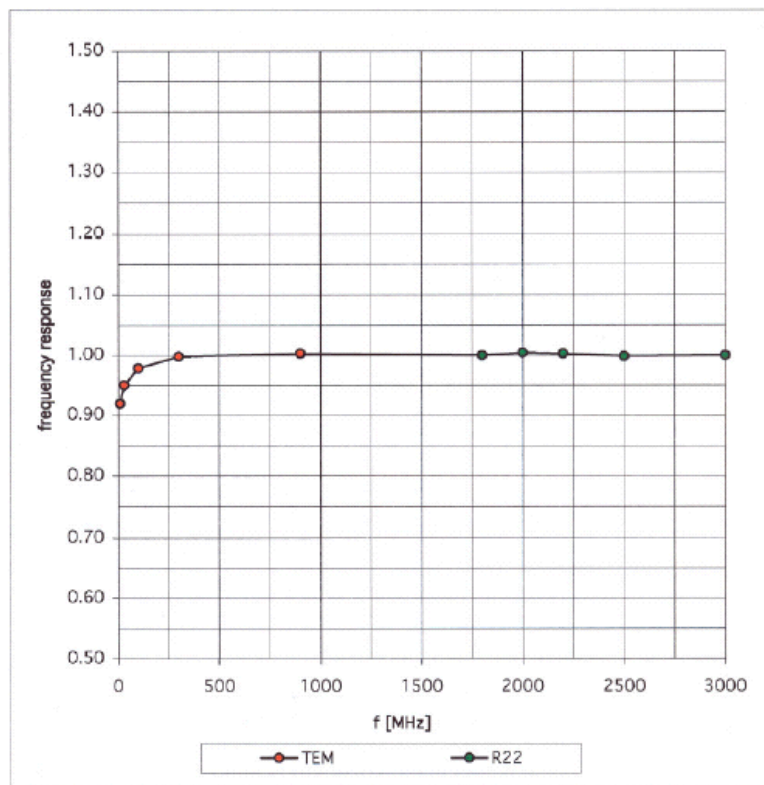


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August 29, 2003

### Frequency Response of E-Field

( TEM-Cell:ifi110, Waveguide R22)



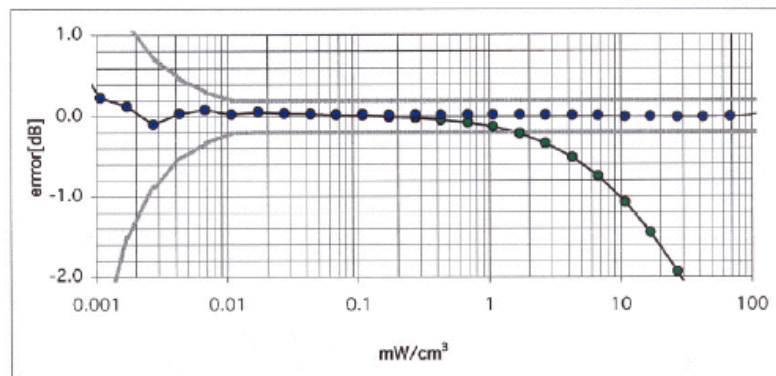
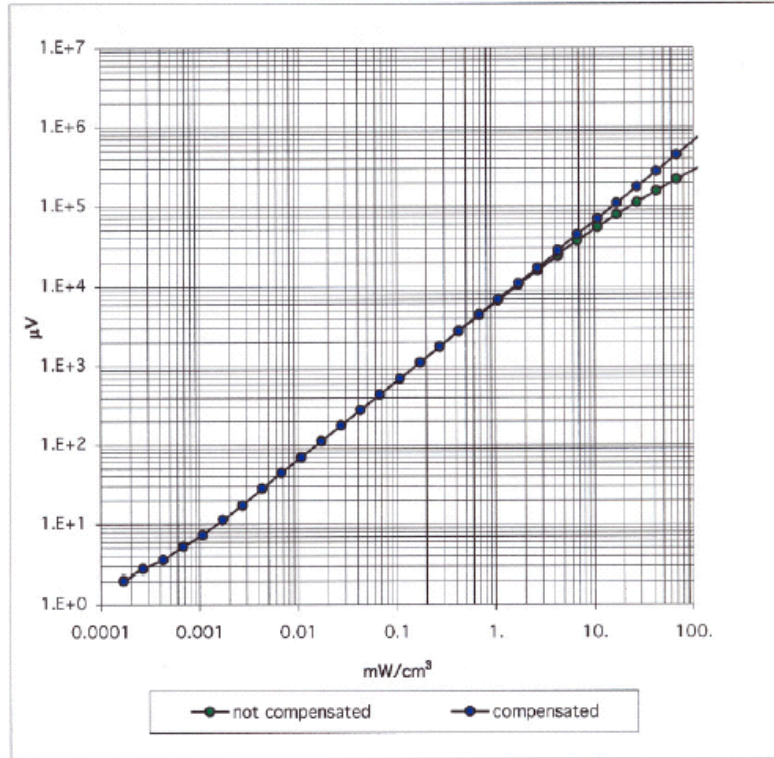


ET3DV6 SN:1788

August 29, 2003

### Dynamic Range f(SAR<sub>brain</sub>)

( Waveguide R22 )

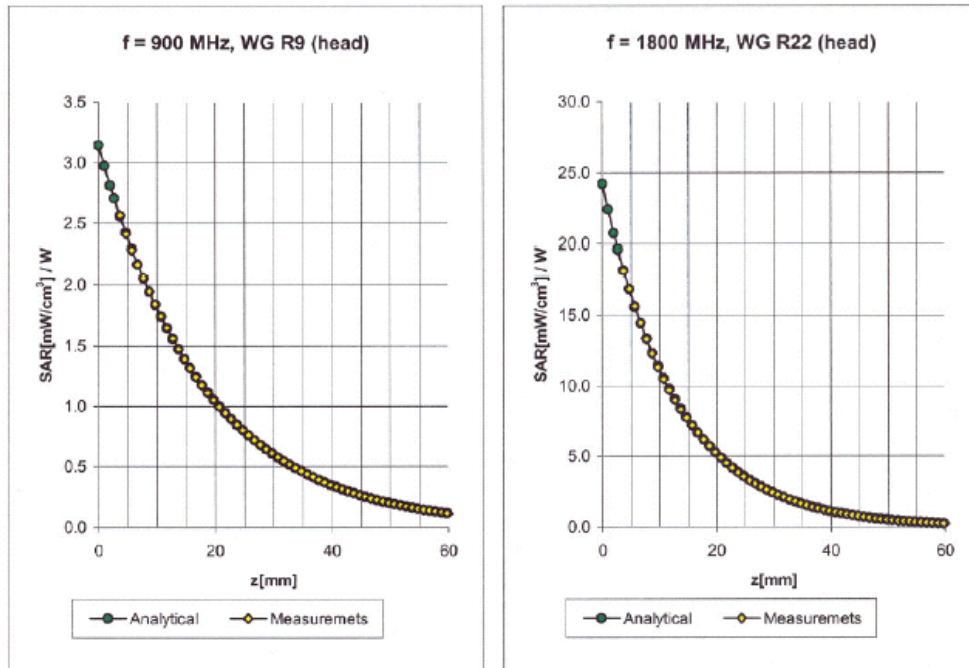




ET3DV6 SN:1788

August 29, 2003

### Conversion Factor Assessment



Head                      900 MHz                       $\epsilon_r = 41.5 \pm 5\%$                        $\sigma = 0.97 \pm 5\%$  mho/m

Valid for f=800-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	6.6 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.6 ± 9.5% (k=2)	Alpha	0.34
ConvF Z	6.6 ± 9.5% (k=2)	Depth	2.48

Head                      1800 MHz                       $\epsilon_r = 40.0 \pm 5\%$                        $\sigma = 1.40 \pm 5\%$  mho/m

Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

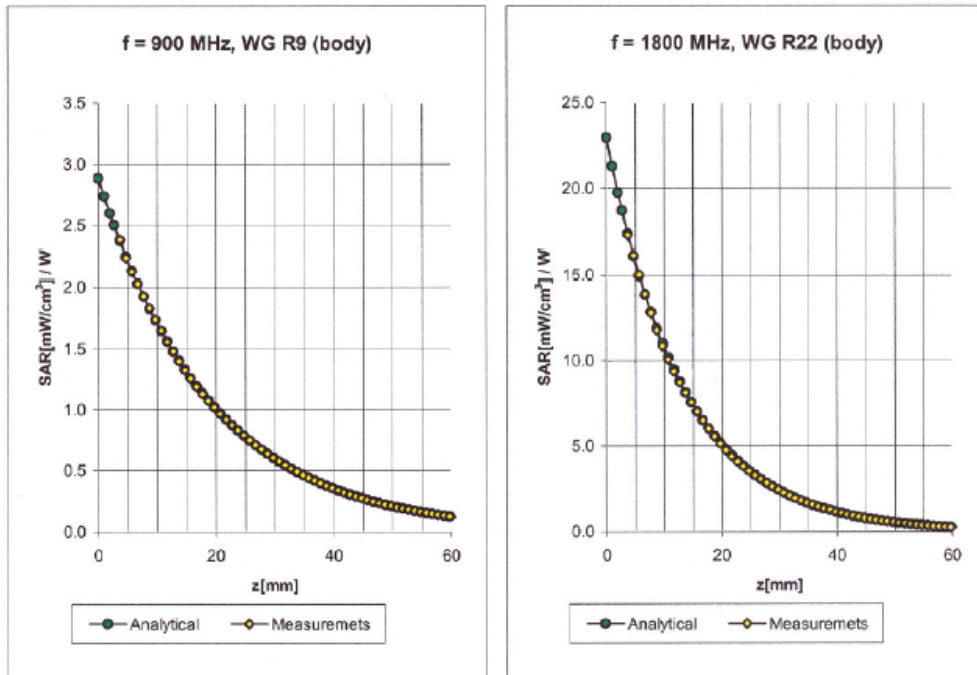
ConvF X	5.3 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.3 ± 9.5% (k=2)	Alpha	0.43
ConvF Z	5.3 ± 9.5% (k=2)	Depth	2.80



ET3DV6 SN:1788

August 29, 2003

### Conversion Factor Assessment



Body                      900 MHz                       $\epsilon_r = 55.0 \pm 5\%$                        $\sigma = 1.05 \pm 5\%$  mho/m

Valid for f=800-1000 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	<b>6.5</b> $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	<b>6.5</b> $\pm 9.5\%$ (k=2)	Alpha	<b>0.31</b>
ConvF Z	<b>6.5</b> $\pm 9.5\%$ (k=2)	Depth	<b>2.92</b>

Body                      1800 MHz                       $\epsilon_r = 53.3 \pm 5\%$                        $\sigma = 1.52 \pm 5\%$  mho/m

Valid for f=1710-1910 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

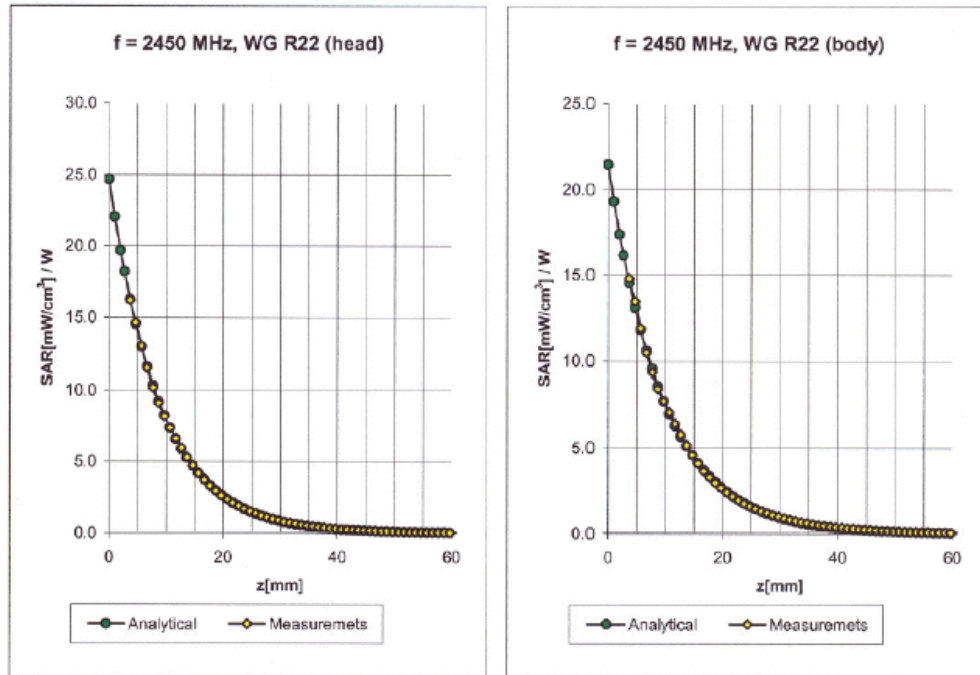
ConvF X	<b>5.0</b> $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	<b>5.0</b> $\pm 9.5\%$ (k=2)	Alpha	<b>0.51</b>
ConvF Z	<b>5.0</b> $\pm 9.5\%$ (k=2)	Depth	<b>2.78</b>



ET3DV6 SN:1788

August 29, 2003

### Conversion Factor Assessment



Head                      2450 MHz                       $\epsilon_r = 39.2 \pm 5\%$                        $\sigma = 1.80 \pm 5\%$  mho/m

Valid for f=2400-2500 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	4.7 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	4.7 ± 8.9% (k=2)	Alpha	<b>0.99</b>
ConvF Z	4.7 ± 8.9% (k=2)	Depth	<b>1.81</b>

Body                      2450 MHz                       $\epsilon_r = 52.7 \pm 5\%$                        $\sigma = 1.95 \pm 5\%$  mho/m

Valid for f=2400-2500 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	4.5 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	4.5 ± 8.9% (k=2)	Alpha	<b>1.01</b>
ConvF Z	4.5 ± 8.9% (k=2)	Depth	<b>1.74</b>

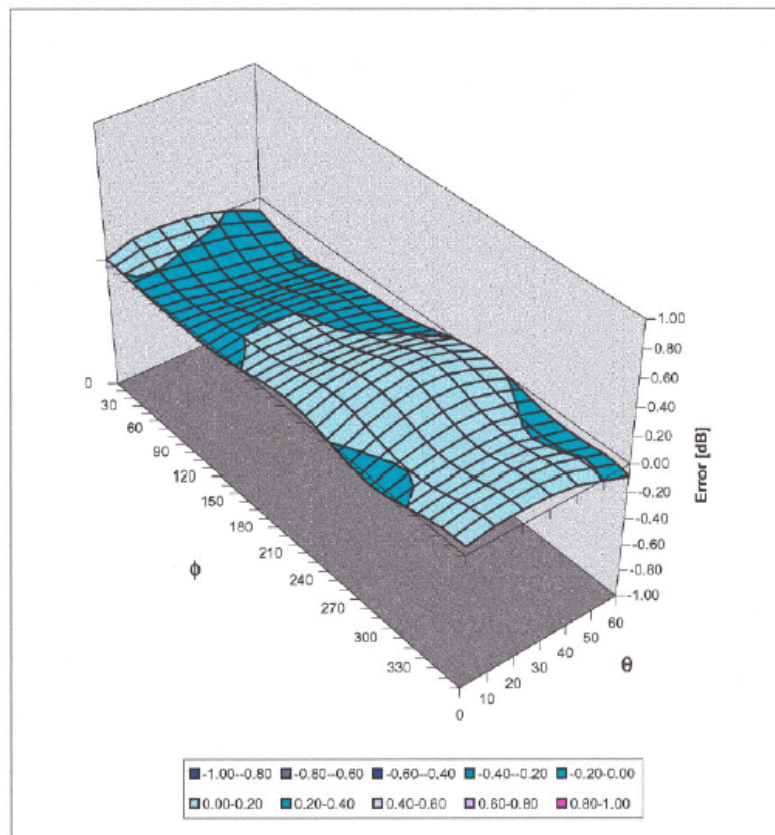


ET3DV6 SN:1788

August 29, 2003

### Deviation from Isotropy in HSL

Error ( $\theta, \phi$ ),  $f = 900$  MHz





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

Client Sporton (Auden)

CALIBRATION CERTIFICATE			
Object(s)	DAE3 – SD 000 D03 AA – SN:577		
Calibration procedure(s)	QA CAL-06.v4 Calibration procedure for the data acquisition unit (DAE)		
Calibration date:	21.11.2003		
Condition of the calibrated item	In Tolerance (according to the specific calibration document)		
This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.			
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	Scheduled Calibration
Fluke Process Calibrator Type 702	SN. 6295803	8-Sep-03	Sep-05
Calibrated by:	Name Philipp Storchenegger	Function Technician	Signature 
Approved by:	Name Fin Bomholt	Function R&D Director	Signature 
Date issued 21.11.2003			
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.			





DAE3 SN: 577

DATE: 21.11.2003

**1. Cal Lab. Incoming Inspection & Pre Test**

<b>Modification Status</b>	Note Status here → → → →	BC
<b>Visual Inspection</b>	Note anomalies.....	None
	.....	.....
<b>Pre Test</b>	<b>Indication</b>	<b>Yes/No</b>
<b>Probe Touch</b>	Function	Yes
<b>Probe Collision</b>	Function	Yes
<b>Probe Touch&amp;Collision</b>	Function	Yes

**2. DC Voltage Measurement**

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1µV, full range = 400 mV  
 Low Range: 1LSB = 61nV, full range = 4 mV

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

Calibration Factors	X	Y	Z
High Range	404.434	403.889	404.352
Low Range	3.94303	3.94784	3.9501
Connector Angle to be used in DASY System	127 °		

High Range	Input	Reading in µV	% Error
Channel X + Input	200mV	200000.6	0.00
	20mV	20000.9	0.00
Channel X - Input	20mV	-19992.7	-0.04
Channel Y + Input	200mV	200000.6	0.00
	20mV	19999.1	0.00
Channel Y - Input	20mV	-19994.7	-0.03
Channel Z + Input	200mV	199999.8	0.00
	20mV	19998.1	-0.01
Channel Z - Input	20mV	-19999.2	0.00

Low Range	Input	Reading in µV	% Error
Channel X + Input	2mV	1999.94	0.00
	0.2mV	199.08	-0.46
Channel X - Input	0.2mV	-200.24	0.12
Channel Y + Input	2mV	1999.98	0.00
	0.2mV	199.50	-0.25
Channel Y - Input	0.2mV	-200.80	0.40
Channel Z + Input	2mV	1999.98	0.00
	0.2mV	199.11	-0.44
Channel Z - Input	0.2mV	-201.12	0.56



DAE3 SN: 577

DATE: 21.11.2003

**3. Common mode sensitivity**

DASY measurement parameters:

Auto Zero Time: 3 sec,

Measuring time: 3 sec

High/Low Range

in $\mu\text{V}$	Common mode Input Voltage	High Range Reading	Low Range Reading
Channel X	200mV	12.00	11.9
	- 200mV	-10.76	-12.44
Channel Y	200mV	-8.55	-8.51
	- 200mV	7.58	6.67
Channel Z	200mV	-0.86	-0.58
	- 200mV	-0.85	-0.77

**4. Channel separation**

DASY measurement parameters:

Auto Zero Time: 3 sec,

Measuring time: 3 sec

High Range

in $\mu\text{V}$	Input Voltage	Channel X	Channel Y	Channel Z
Channel X	200mV	-	1.96	0.28
Channel Y	200mV	0.66	-	3.59
Channel Z	200mV	-0.89	-0.11	-

**5.1 AD-Converter Values with Input Voltage set to 2.0 VDC**

in Zero Low	Low Range Max - Min	Max.	Min
Channel X	17	16137	16120
Channel Y	27	16767	16740
Channel Z	8	15103	15077

**5.2 AD-Converter Values with inputs shorted**

in LSB	Low Range	High Range
Channel X	16134	15955
Channel Y	16740	15960
Channel Z	15093	16252

**6. Input Offset Measurement**



DAE3 SN: 577

DATE: 21.11.2003

DASY measurement parameters:

Auto Zero Time: 3 sec, Measuring time: 3 sec  
Number of measurements: 100, Low Range

Input 10MΩ

in μV	Average	min. Offset	max. Offset	Std. Deviation
Channel X	-0.64	-1.84	0.71	0.49
Channel Y	-1.77	-3.93	0.94	0.58
Channel Z	-2.21	-3.14	-0.81	0.34

Input shorted

in μV	Average	min. Offset	max. Offset	Std. Deviation
Channel X	0.12	-1.34	1.45	0.69
Channel Y	-0.69	-1.39	0.30	0.26
Channel Z	-0.94	-1.58	-0.30	0.23

**7. Input Offset Current**

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

**8. Input Resistance**

In MOhm	Calibrating	Measuring
Channel X	0.2000	197.1
Channel Y	0.1999	200.3
Channel Z	0.2001	198.3

**9. Low Battery Alarm Voltage**

in V	Alarm Level
Supply (+ Vcc)	7.58
Supply (- Vcc)	-7.65

**10. Power Consumption**

in mA	Switched off	Stand by	Transmitting
Supply (+ Vcc)	0.00	5.65	13.7
Supply (- Vcc)	-0.01	-7.69	-8.97