

ES3DV2 SN: 3019

July 12, 2003

DASY - Parameters of Probe: ES3DV2 SN: 3019**Sensitivity in Free Space****Diode Compression**

NormX	1.03 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	99
NormY	1.12 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	99
NormZ	0.98 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	99

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	6.4 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	6.4 $\pm 9.5\%$ (k=2)	Alpha	0.68
ConvF Z	6.4 $\pm 9.5\%$ (k=2)	Depth	1.11

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	5.0 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	5.0 $\pm 9.5\%$ (k=2)	Alpha	0.21
ConvF Z	5.0 $\pm 9.5\%$ (k=2)	Depth	2.78

Boundary Effect

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

Probe Tip to Boundary		1 mm	2 mm
SAR _{be} [%] Without Correction Algorithm		4.3	1.8
SAR _{be} [%] With Correction Algorithm		0.0	0.1

Head **1800 MHz** Typical SAR gradient: 10 % per mm

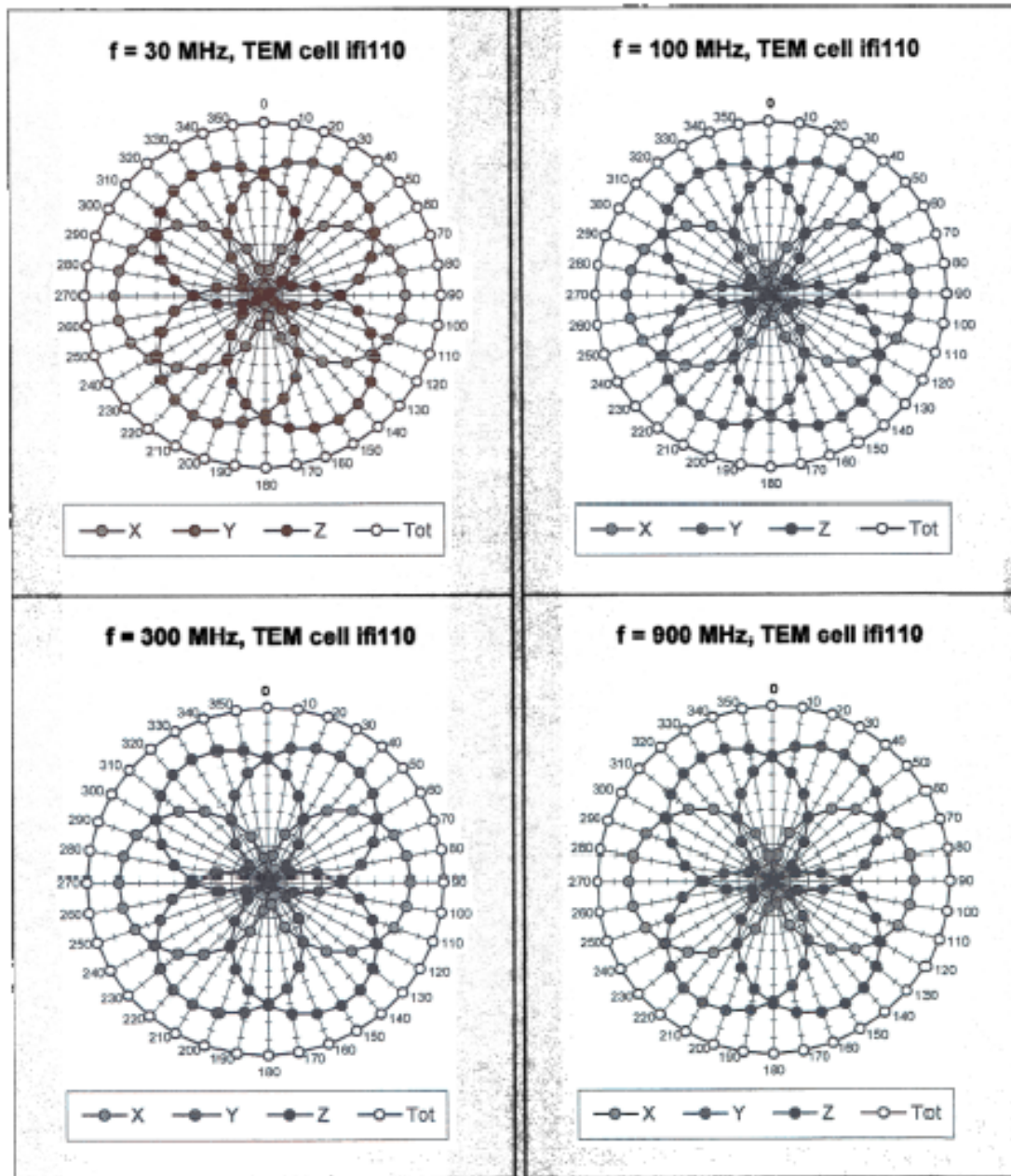
Probe Tip to Boundary		1 mm	2 mm
SAR _{be} [%] Without Correction Algorithm		7.4	5.0
SAR _{be} [%] With Correction Algorithm		0.0	0.1

Sensor Offset

Probe Tip to Sensor Center	2.1	mm
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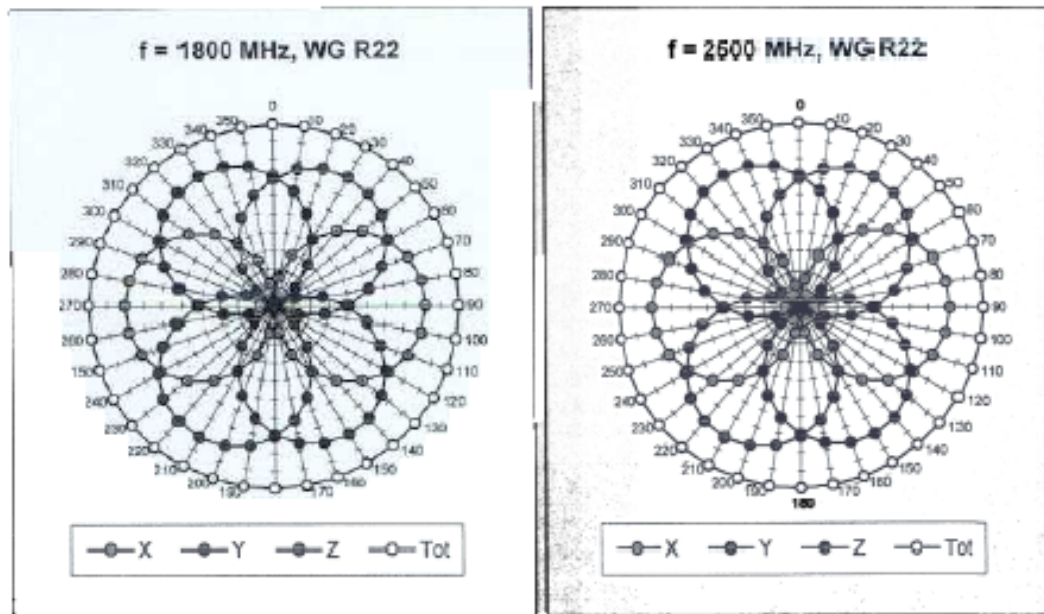
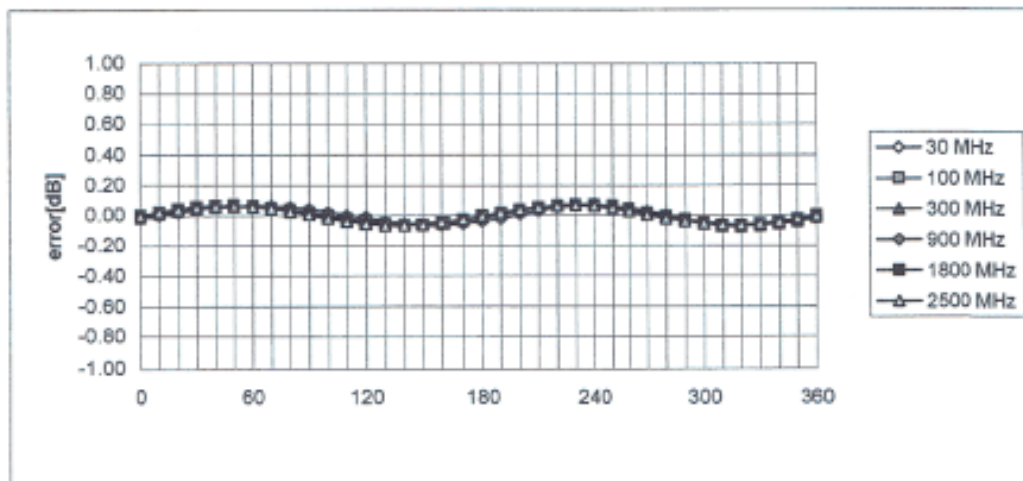
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Receiving Pattern (ϕ , $\theta = 0^\circ$)

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July 2003

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

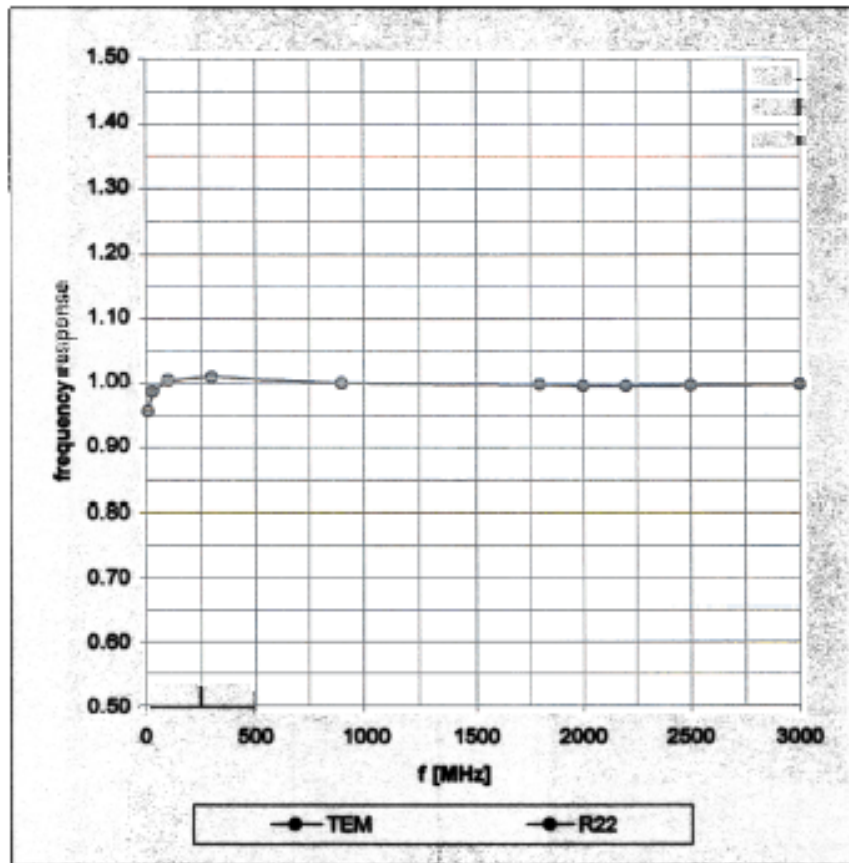
Page

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Frequency Response of E-Field

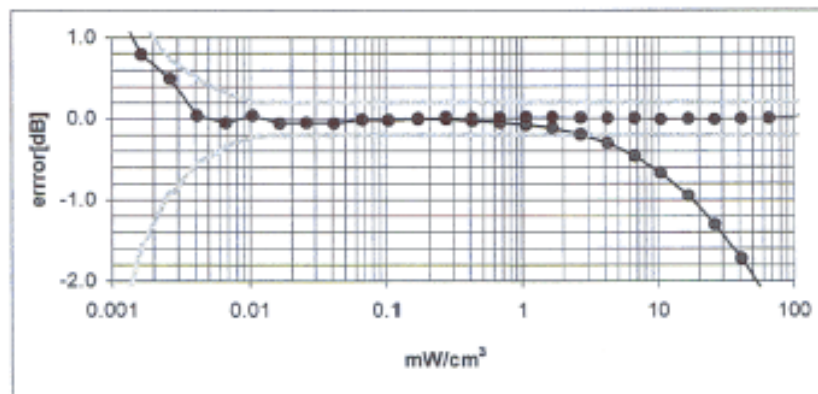
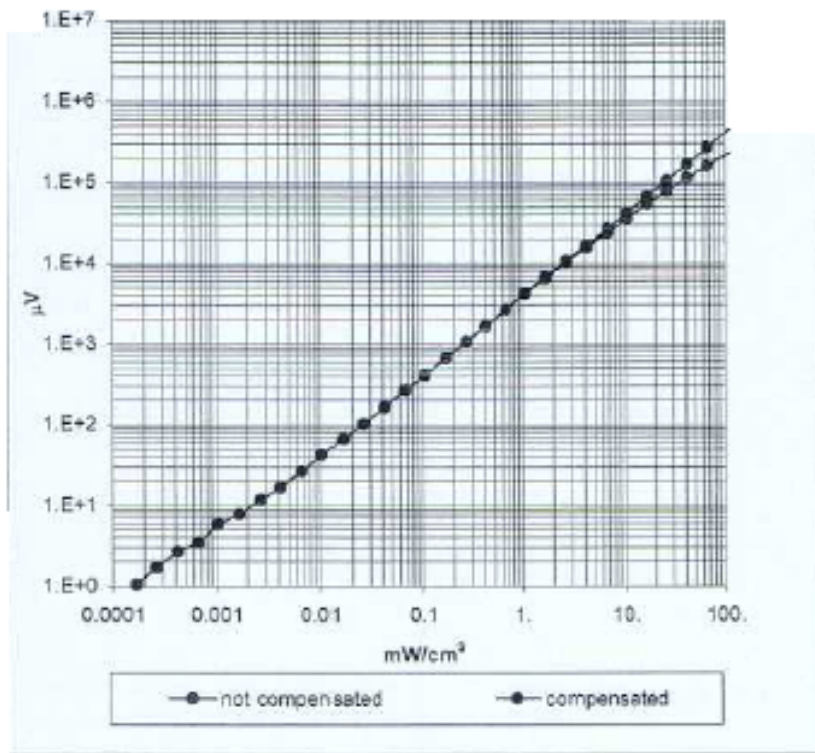
(TEM-Cell:Ifi110, Waveguide R22)



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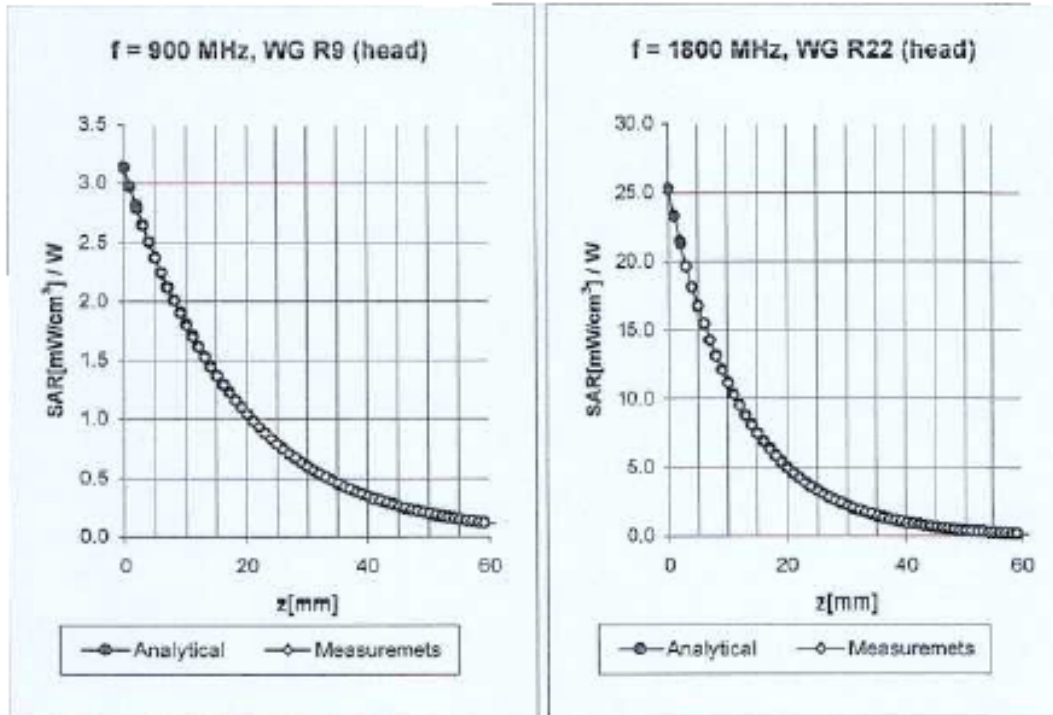
Dynamic Range $f(\text{SAR}_{\text{brain}})$ (Waveguide R22)



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Conversion Factor Assessment



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	6.4 $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	6.4 $\pm 9.5\%$ (k=2)	Alpha 0.68
ConvF Z	6.4 $\pm 9.5\%$ (k=2)	Depth 1.11

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

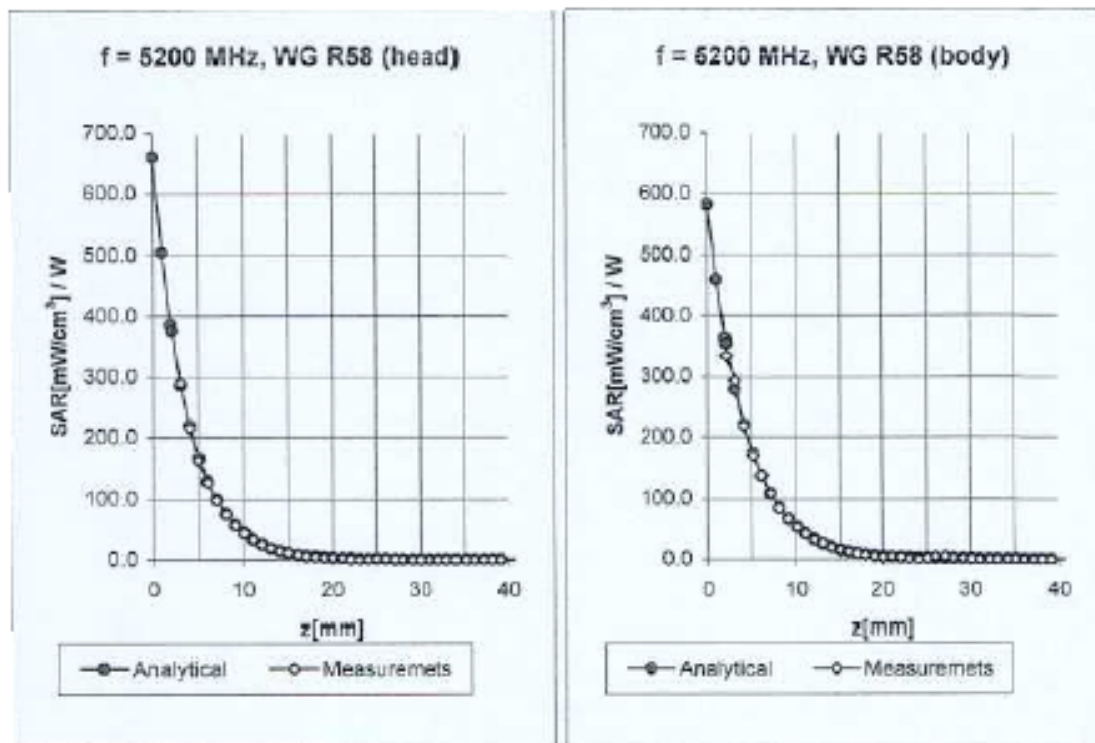
Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.0 $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	5.0 $\pm 9.5\%$ (k=2)	Alpha 0.21
ConvF Z	5.0 $\pm 9.5\%$ (k=2)	Depth 2.78

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Conversion Factor Assessment



Head 5200 MHz $\epsilon_r = 36.0 \pm 5\%$ $\sigma = 4.66 \pm 5\%$ mho/m

Valid for f=4940-5460 MHz with Head Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	2.3 $\pm$ 14.6% (k=2)	Boundary effect:	
ConvF Y	2.3 $\pm$ 14.6% (k=2)	Alpha	1.05
ConvF Z	2.3 $\pm$ 14.6% (k=2)	Depth	1.50

Body 5200 MHz $\epsilon_r = 49.0 \pm 5\%$ $\sigma = 5.30 \pm 5\%$ mho/m

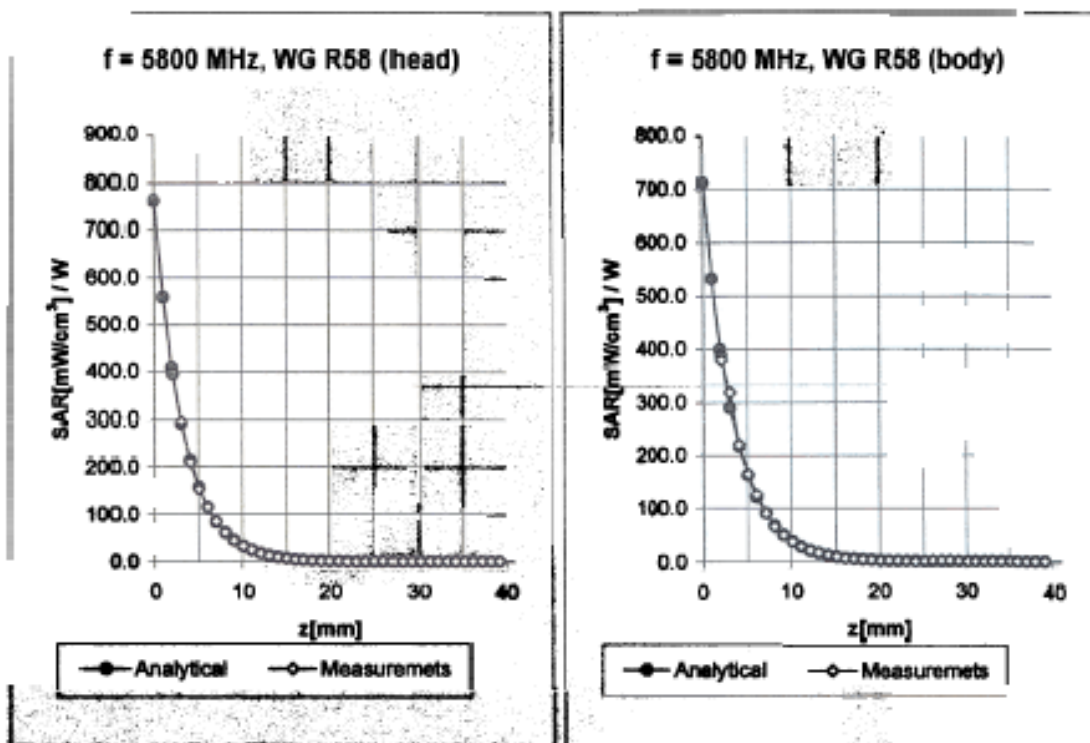
Valid for f=4940-5460 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	1.4 $\pm$ 14.6% (k=2)	Boundary effect:	
ConvF Y	1.4 $\pm$ 14.6% (k=2)	Alpha	1.01
ConvF Z	1.4 $\pm$ 14.6% (k=2)	Depth	1.85

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Conversion Factor Assessment



Head 5800 MHz $\epsilon_r = 35.3 \pm 5\%$ $\sigma = 5.27 \pm 5\%$ mho/m

Valid for f=5510-6090 MHz with Head Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	$1.8 \pm 14.6\%$ (k=2)	Boundary effect:	
ConvF Y	$1.8 \pm 14.6\%$ (k=2)	Alpha	0.90
ConvF Z	$1.8 \pm 14.6\%$ (k=2)	Depth	1.90

Body 5800 MHz $\epsilon_r = 48.2 \pm 5\%$ $\sigma = 6.00 \pm 5\%$ mho/m

Valid for f=5510-6090 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

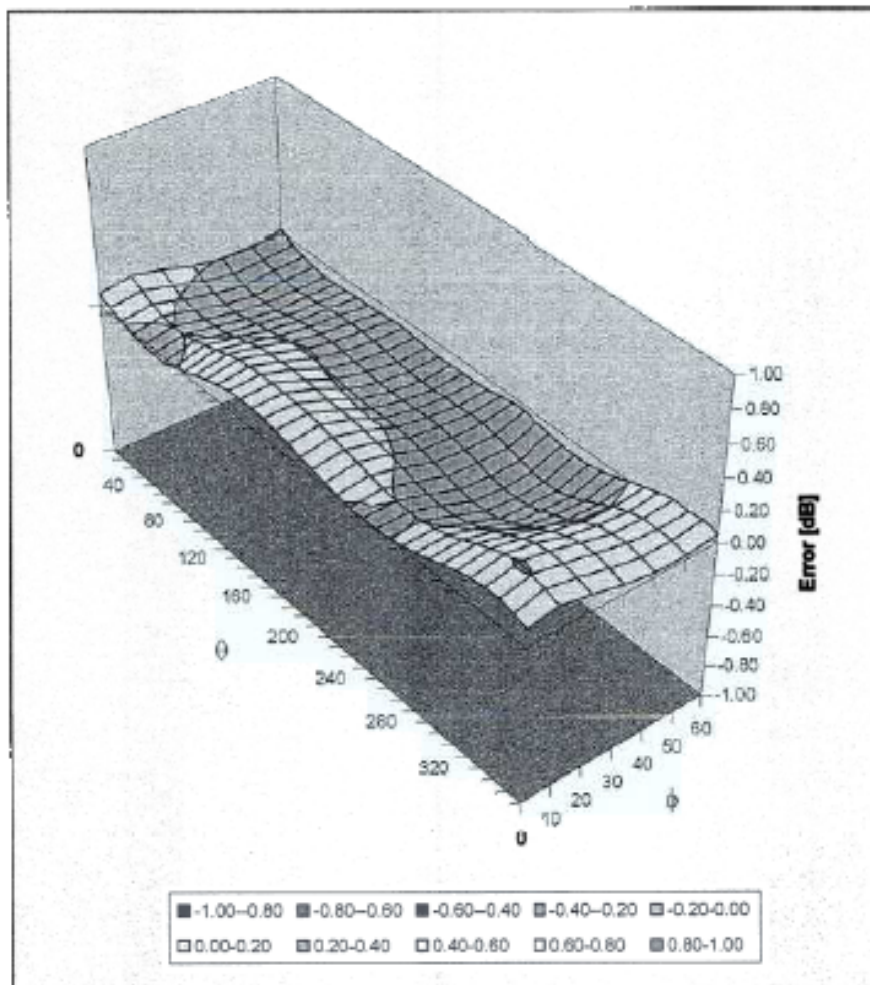
ConvF X	$1.2 \pm 14.6\%$ (k=2)	Boundary effect:	
ConvF Y	$1.2 \pm 14.6\%$ (k=2)	Alpha	1.18
ConvF Z	$1.2 \pm 14.6\%$ (k=2)	Depth	1.65

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Deviation from Isotropy in HSL

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



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Probe ES3DV2

SN:3019

Additional Conversion Factors

Manufactured:	December 5, 2002
Last calibration:	July 12, 2003
Add. calibration:	October 9, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV2 SN:3019**Sensitivity in Free Space**

NormX	1.05 $\mu\text{V}/(\text{V}/\text{m})^2$
NormY	1.14 $\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	0.98 $\mu\text{V}/(\text{V}/\text{m})^2$

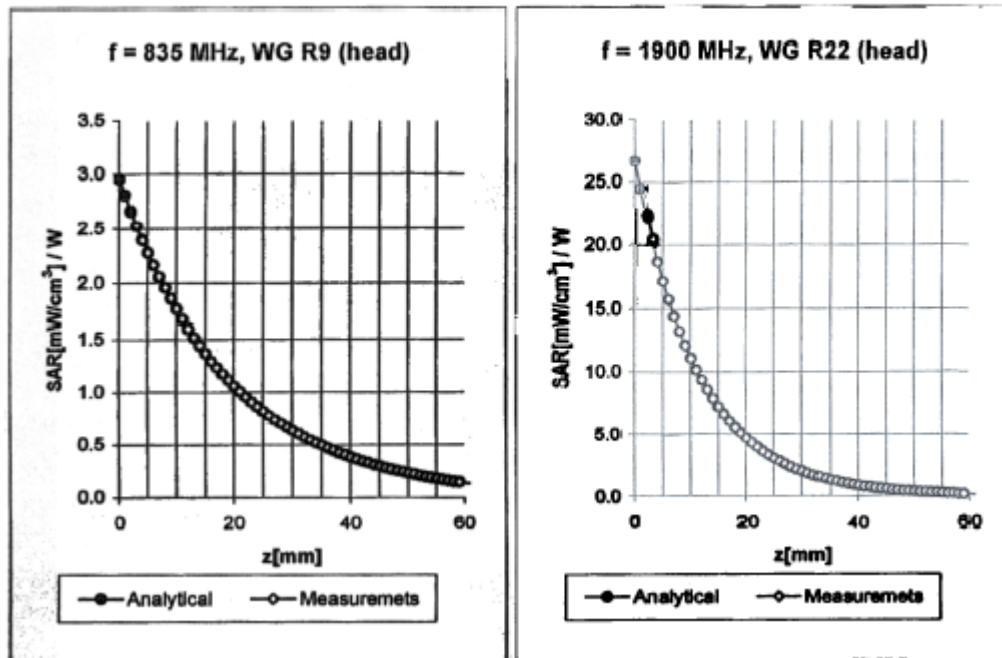
Diode Compression

DCP X	99
DCP Y	99
DCP Z	99

Sensor Offset

Probe Tip to Sensor Center	2.1	mm
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Conversion Factor Assessment



Head 835 MHz $\epsilon_r = 41.5 \pm 5\%$ $\sigma = 0.90 \pm 5\%$ mho/m

Valid for f=793-877 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

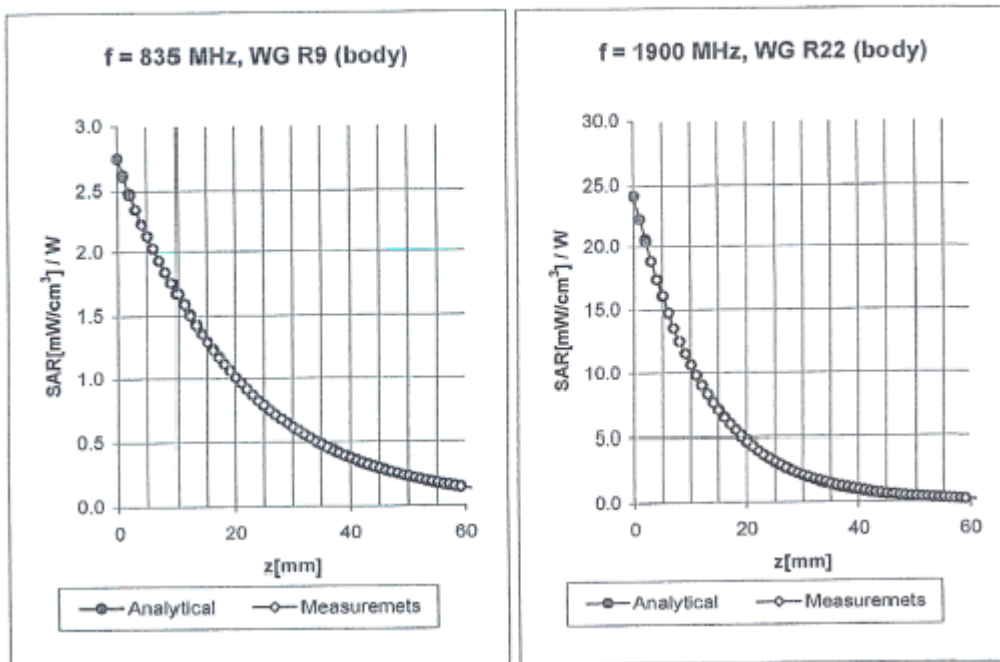
ConvF X	$6.5 \pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	$6.5 \pm 9.5\%$ (k=2)	Alpha	0.35
ConvF Z	$6.5 \pm 9.5\%$ (k=2)	Depth	1.46

Head 1900 MHz $\epsilon_r = 40.0 \pm 5\%$ $\sigma = 1.40 \pm 5\%$ mho/m

Valid for f=1805-1995 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	$4.7 \pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	$4.7 \pm 9.5\%$ (k=2)	Alpha	0.22
ConvF Z	$4.7 \pm 9.5\%$ (k=2)	Depth	3.48

Conversion Factor Assessment



Body **835 MHz** $\epsilon_r = 55.2 \pm 5\%$ $\sigma = 0.97 \pm 5\% \text{ mho/m}$

Valid for f=793-877 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

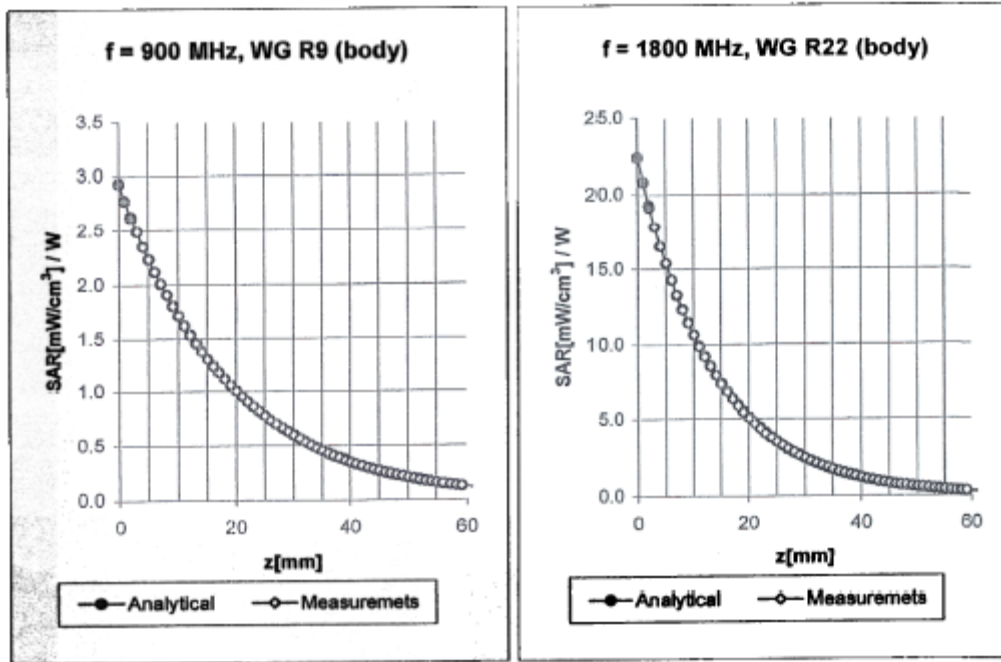
ConvF X	6.1 $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	6.1 $\pm 9.5\%$ (k=2)	Alpha 0.24
ConvF Z	6.1 $\pm 9.5\%$ (k=2)	Depth 2.00

Body **1900 MHz** $\epsilon_r = 53.3 \pm 5\%$ $\sigma = 1.52 \pm 5\% \text{ mho/m}$

Valid for f=1805-1995 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	4.6 $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	4.6 $\pm 9.5\%$ (k=2)	Alpha 0.24
ConvF Z	4.6 $\pm 9.5\%$ (k=2)	Depth 2.64

Conversion Factor Assessment



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

Valid for f=855-945 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

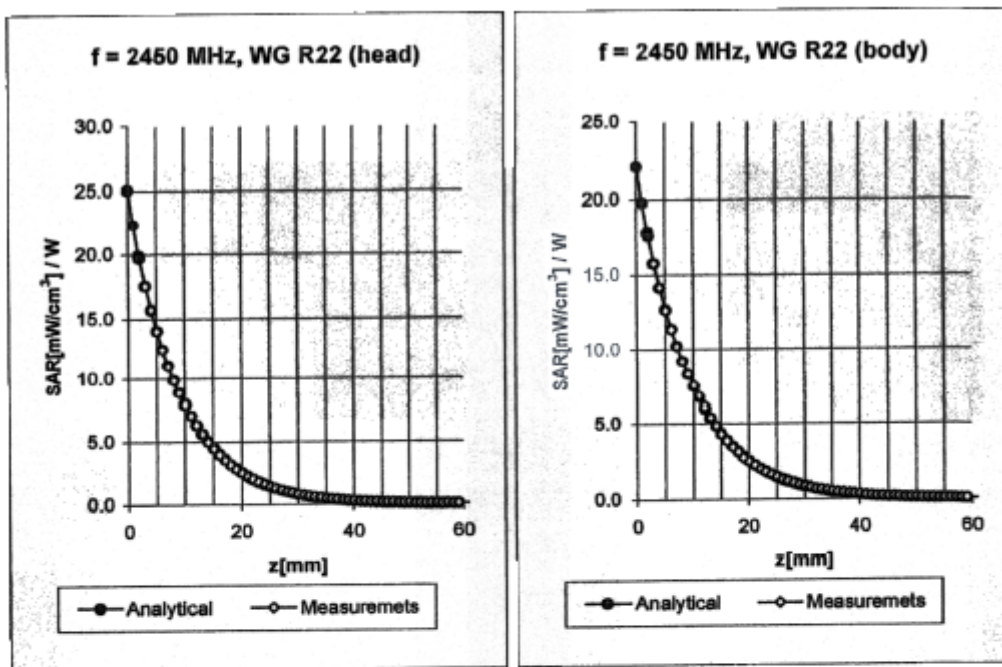
ConvF X	6.1 $\pm$ 9.5% (k=2)	Boundary effect:
ConvF Y	6.1 $\pm$ 9.5% (k=2)	Alpha 0.27
ConvF Z	6.1 $\pm$ 9.5% (k=2)	Depth 1.82

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

Valid for f=1710-1890 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	4.7 $\pm$ 9.5% (k=2)	Boundary effect:
ConvF Y	4.7 $\pm$ 9.5% (k=2)	Alpha 0.23
ConvF Z	4.7 $\pm$ 9.5% (k=2)	Depth 2.99

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 60381, P1528-200X

ConvF X	4.5 $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	4.5 $\pm 9.5\%$ (k=2)	Alpha 0.40
ConvF Z	4.5 $\pm 9.5\%$ (k=2)	Depth 1.62

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	4.2 $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	4.2 $\pm 9.5\%$ (k=2)	Alpha 0.32
ConvF Z	4.2 $\pm 9.5\%$ (k=2)	Depth 1.98

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

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:

ES3DV2

Serial Number:

3019

Place of Assessment:

Zurich

Date of Assessment:

October 13, 2003

Probe Calibration Date:

October 9, 2003

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:



ES3DV2-SN:3019

October 13, 2003

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Dosimetric E-Field Probe ES3DV2 SN:3019

Conversion factor ($\pm$ standard deviation)

150 MHz ConvF **$8.7 \pm 8\%$**

$\epsilon_r = 52.3 \pm 5\%$
 $\sigma = 0.76 \pm 5\%$ mho/m
(head tissue)

150 MHz ConvF **$8.3 \pm 8\%$**

$\epsilon_r = 61.9 \pm 5\%$
 $\sigma = 0.80 \pm 5\%$ mho/m
(body tissue)

450 MHz ConvF **$7.4 \pm 8\%$**

$\epsilon_r = 43.5 \pm 5\%$
 $\sigma = 0.87 \pm 5\%$ mho/m
(head tissue)

450 MHz ConvF **$7.3 \pm 8\%$**

$\epsilon_r = 56.7 \pm 5\%$
 $\sigma = 0.94 \pm 5\%$ mho/m
(body tissue)

ES3DV2-SN:3019

October 13, 2003

APPENDIX C – DIPOLE CALIBRATION CERTIFICATES

Certificate of Calibration Verification

Description of EUT	Tuned Dipole Antenna
EUT Model Number	D-1800-S-1
EUT Serial Number	BCL-049
Center Frequency	1800 MHz

Calibration Date: 12 April 2004

Testing conditions:

per P1528/D1.2:2003:
Ambient Temperature (18-25 °C) 23 °C
Ambient Humidity 43%

Liquid Temperature at start of measurements:($\leq 2^{\circ}\text{C}$) 21 °C
Liquid temperature at end of measurements: 21 °C

Date and time at beginning of test: 2004-04-09-16:20 PST
Date and time at beginning of test: 2004-04-09-19:40 PST

Equipment used for measurements

Network Analyzer	HP	8752C	1 Nov 2002
Impedance adapter	AGILENT	43961A	31 Oct 2003
Short Reference	HP	04191-85300	31 Oct 2003
Open Reference	HP	04191-85302	31 Oct 2003
Load Reference	HP	04191-85301	31 Oct 2003
Signal Generator	HP	83650B	29 Feb 2004
Calibration Cable:	SMA Utiflex, 3.05 meter cable S/N 99E1206 (Number 8)		
Phantom Model:	SAM		
Liquid:	1800 MHz, Head Liquid		
Liquid Validation Date:	12 April 2004		
Quantity of Liquid in Phantom:	19.8 Liters		

Measurement Procedure

In accordance with IEEE P1528/D1.2:2003, 8.3.4, 8.2.3 through 8.2.4

Liquid Validation

Instrument	Manufacturer Model		Calibrated
Network Analyzer	HP	4396B	1 Nov 2002
Dielectric Probe Kit,	Agilent	85070C	Each Use
H ₂ O, 18 M-Ohm	BACL		Each Use
Probe, SAR 10 kHz - 6 GHz	SPEAG	ES3DV2	9 Oct 2003

Attestation:

I hereby attest that the equipment are suitable for the performance requirements of IEEE P1528/D1.2:2003 and the personnel operating the test equipment and measurements are properly trained to perform the verification of this calibration procedure set forth in IEEE P1528/D1.2:2003.

The validation antenna herein meets the minimum requirements of 20 dB insertion loss



2004-04-12

Hans T. Mellberg
Engineering Manager

Date

1800 MHz Head Liquid validation

Date : 12APR2004

Ambient Temp = 23 °C

Liquid Temp = 22 °C

Frequency

e'

e''

 $\sigma (\sigma = 2\pi f \epsilon_0 \epsilon''')$

1850000000.0000	38.8246	13.2534	
1852000000.0000	38.7736	13.2429	
1854000000.0000	38.8400	13.2576	
1856000000.0000	38.8463	13.2425	
1858000000.0000	38.8167	13.2672	
1860000000.0000	38.8129	13.2552	
1862000000.0000	38.8118	13.2476	
1864000000.0000	38.7654	13.2345	
1866000000.0000	38.7686	13.2633	
1868000000.0000	38.7997	13.2690	
1870000000.0000	38.7262	13.2308	
1872000000.0000	38.7413	13.2642	
1874000000.0000	38.7458	13.2802	
1876000000.0000	38.7127	13.2833	
1878000000.0000	38.7145	13.2799	
1880000000.0000	38.7380	13.2633	
1882000000.0000	38.7086	13.2820	
1884000000.0000	38.7111	13.2991	
1886000000.0000	38.7184	13.2656	
1888000000.0000	38.7086	13.2724	
1890000000.0000	38.6697	13.2703	
1892000000.0000	38.6773	13.3051	
1894000000.0000	38.6729	13.2817	
1896000000.0000	38.6377	13.2805	
1898000000.0000	38.6113	13.2648	
1900000000.0000	38.6019	13.2714	1.40
1902000000.0000	38.5554	13.2951	
1904000000.0000	38.5535	13.2851	
1906000000.0000	38.5103	13.3424	
1908000000.0000	38.5402	13.3692	
1910000000.0000	38.5162	13.3760	
1912000000.0000	38.4971	13.3857	
1914000000.0000	38.5126	13.3651	
1916000000.0000	38.4920	13.3817	
1918000000.0000	38.5463	13.3665	
1920000000.0000	38.5063	13.3804	
1922000000.0000	38.4973	13.3868	
1924000000.0000	38.5244	13.3470	
1926000000.0000	38.5362	13.3583	
1928000000.0000	38.5352	13.3774	
1930000000.0000	38.5427	13.3676	
1932000000.0000	38.5433	13.3562	
1934000000.0000	38.5374	13.3814	
1936000000.0000	38.5717	13.4048	
1938000000.0000	38.5057	13.4235	
1940000000.0000	38.5314	13.4375	
1942000000.0000	38.5104	13.4338	
1944000000.0000	38.4827	13.4285	
1946000000.0000	38.4545	13.4411	
1948000000.0000	38.4227	13.4385	
1950000000.0000	38.3682	13.4325	

System Validation for 1900 MHz Head Liquid (Ambient Temp = 23 C, Liquid Temp = 22 C,
Forward Power = 20.42 dBm, 4/12/2004)

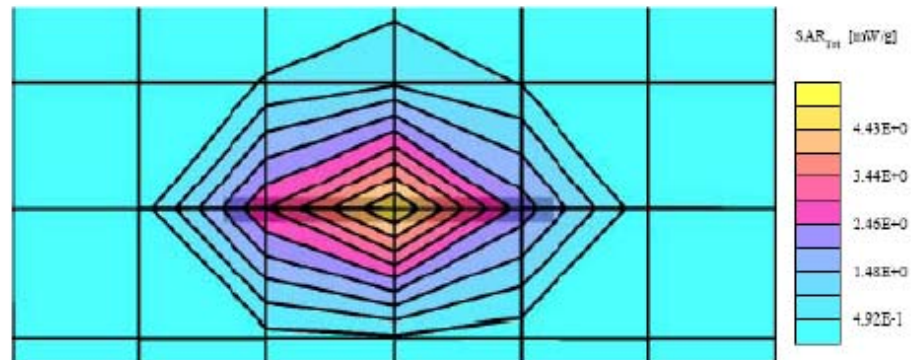
SAM Phantom: Flat Section; Position: (90°,90°); Frequency: 1900 MHz

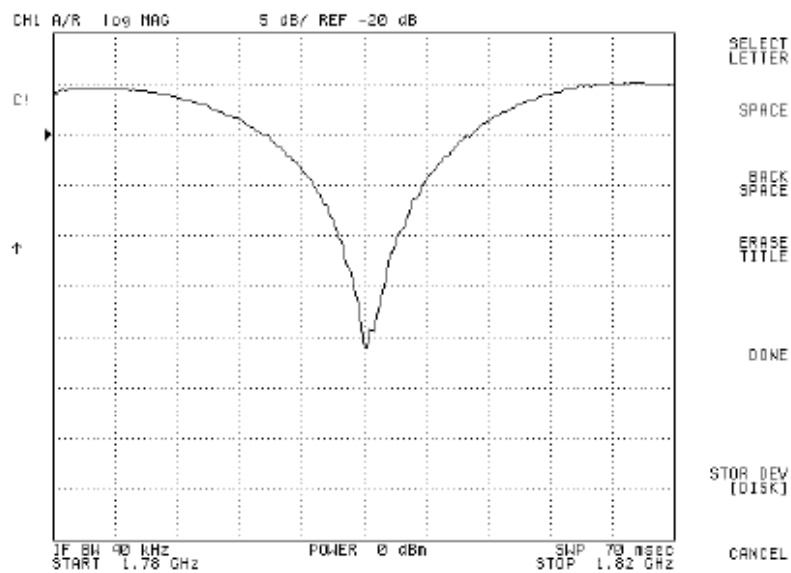
Probe: E55D12 - S33019, Coax(F(4.70,4.70,4.70), Crest factor: 1.0, Head Liquid 1900 MHz: $\sigma = 1.40 \text{ mho/m}$, $\rho = 40.0 \text{ g/cm}^3$)

Case Setup: SAR (1g): 4.38 mW/g, SAR (10g): 2.21 mW/g (Worst-case extrapolation)

Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0

Powerdift: 0.01 dB



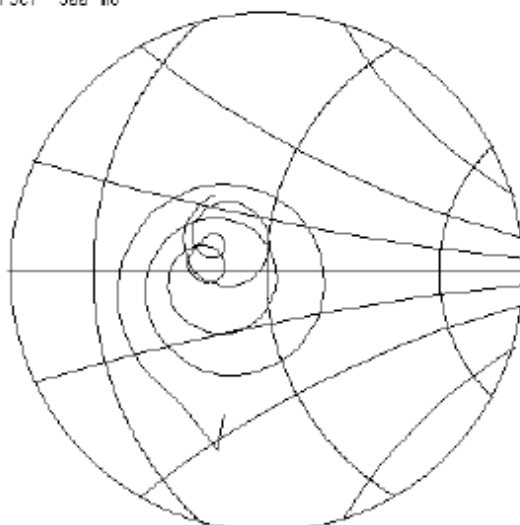
Insertion Loss Plot
S11

Smith Chart

CH1 A/R F5c1 500 mV

C1

↑

IF BW 90 kHz
START 1.62 GHz

POWER 0 dBm

SWP 70 MHz
STOP 1.82 GHzSELECT
LETTER

SPACE

BACK
SPACEERASE
TITLE

DONE

STOR DEV
(DISK)

CANCEL

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

Client Bay Area Comp. Lab (BACL)

CALIBRATION CERTIFICATE

Object(s) D900V2 - SN:122

Calibration procedure(s) QA CAL-05.v2
Calibration procedure for dipole validation kits

Calibration date: October 3, 2003

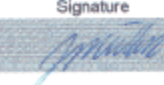
Condition of the calibrated item In Tolerance (according to the specific calibration document)

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
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03

	Name	Function	Signature
Calibrated by:	Judith Mueller	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: October 9, 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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DASY

Dipole Validation Kit

Type: D900V2

Serial: 122

Manufactured: July 4, 2001
Calibrated: October 3, 2003

1. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with **head simulating solution** of the following electrical parameters at 900 MHz:

Relative Dielectricity	42.3	$\pm 5\%$
Conductivity	0.96 mho/m	$\pm 5\%$

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.6 at 900 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole center to the solution surface. The included distance spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.

The dipole input power (forward power) was $250\text{mW} \pm 3\%$. The results are normalized to 1W input power.

2. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	10.2 mW/g $\pm 16.8\%$ (k=2) ¹
averaged over 10 cm^3 (10 g) of tissue:	6.60 mW/g $\pm 16.2\%$ (k=2) ¹

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	1.409 ns	(one direction)
Transmission factor:	0.983	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance spacer was in place during impedance measurements.

Feedpoint impedance at 900 MHz:	$\text{Re}\{Z\} = 50.8 \Omega$
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	$\text{Im}\{Z\} = -5.7 \Omega$
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Return Loss at 900 MHz	-24.8 dB
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4. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with **body simulating solution** of the following electrical parameters at 900 MHz:

Relative Dielectricity	54.4	$\pm 5\%$
Conductivity	1.04 mho/m	$\pm 5\%$

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.3 at 900 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole center to the solution surface. The included distance spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.

The dipole input power (forward power) was 250mW $\pm 3\%$. The results are normalized to 1W input power.

5. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 4. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm³ (1 g) of tissue: **10.7 mW/g ± 16.8 % (k=2)²**

averaged over 10 cm³ (10 g) of tissue: **6.92 mW/g ± 16.2 % (k=2)²**

6. Dipole Impedance and Return Loss

The dipole was positioned at the flat phantom sections according to section 4 and the distance spacer was in place during impedance measurements.

Feedpoint impedance at 900 MHz: **Re{Z} = 47.1 Ω**

Im {Z} = -6.7 Ω

Return Loss at 900 MHz **-22.6 dB**

7. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

8. Design

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.

9. Power Test

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

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN122

Communication System: CW-900; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: HSL 900 MHz ($\sigma = 0.96$ mho/m, $\epsilon_r = 42.26$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section

Measurement Standard: DASYS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.6, 6.6, 6.6); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASYS4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 60

$P_{in} = 250$ mW; $d = 15$ mm/Area Scan (81x81x1); Measurement grid: $dx=15$ mm, $dy=15$ mm

Reference Value = 55.6 V/m

Power Drift = 0.003 dB

Maximum value of SAR = 2.75 mW/g

$P_{in} = 250$ mW; $d = 15$ mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Peak SAR (extrapolated) = 3.81 W/kg

SAR(1 g) = 2.55 mW/g; SAR(10 g) = 1.65 mW/g

Reference Value = 55.6 V/m

Power Drift = 0.003 dB

Maximum value of SAR = 2.76 mW/g

