Research In Motion Limited
295 Phillip Street
Waterloo, Ontario
Canada N2L 3W8
+1 519 888 7465, fax +1 519 888 6906
E-mail: info@rim.net

Our Ref: 04094-CERT-CRN_23427 September 09, 2002

Mr. Andy Leimer
Federal Communications Commission,
Equipment Authorization Division
Application Processing Branch
7435 Oakland Mills Road
Columbia, MD 21045

Subject: Response to the FCC CRN 23427 dated July 24, 2002 for additional information on RIM BlackBerry Wireless Handheld FCC ID **L6AR6220GW**, 731 Confirmation # **EA603802**

ITEM 1:
Please refer to Appendix A for the new calibrated muscle tissue conversion factor data.

1.1 System accuracy verification for head use

f (MHz)	Limits / Measured	SAR (W/kg) 1 g/ 10g	Dielectric Parameters		Ambient Temp (°C)	Liquid Temp (°C)
			ε_r	σ [S/m]		
1900	Measured	45.8 / 23.0	39.1	1.44	22.5	21.5
	Recommended Limits	43.2 / 22.0	40.0	1.45	N/A	N/A

Table 1. System accuracy (validation for head use)

1.2 Electrical parameters of the tissue simulating liquid

The tissue dielectric parameters recommended limits are adopted from IEEE Std 1528-200X, Draft 6.3 – April8, 2001 " Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Environmental Techniques"
and from FCC Tissue Dielectric Properties web page at http://www.fcc.gov/fcc-bin/dielec.sh

f (MHz)	Tissue Type	Limits / Measured	Dielectric Parameters		Liquid Temp (°C)
			ε_r	σ [S/m]	
1900	Head	Measured	39.1	1.44	21.5
		Recommended Limits	40.0	1.40	N/A
	Muscle	Measured	52.4	1.50	21.7
		Recommended Limits	54.0	1.45	N/A

Table 2. Electrical parameters of tissue simulating liquid

1.3 Dielectric parameter measurements for 1900 MHz head and muscle tissue

Title

SubTitle

August 15, 2002 04:52 PM

Frequency	e'	e"
1.700000000 GHz	39.8499	13.1888
1.710000000 GHz	39.8070	13.2172
1.720000000 GHz	39.7705	13.2327
1.730000000 GHz	39.7419	13.2436
1.740000000 GHz	39.6935	13.2662
1.750000000 GHz	39.6600	13.3016
1.760000000 GHz	39.6286	13.3173
1.770000000 GHz	39.5931	13.3447
1.780000000 GHz	39.5531	13.3779
1.790000000 GHz	39.5114	13.4059
1.800000000 GHz	39.4801	13.4339
1.810000000 GHz	39.4283	13.4560
1.820000000 GHz	39.3878	13.4745
1.830000000 GHz	39.3346	13.5100
1.840000000 GHz	39.3044	13.5315
1.850000000 GHz	39.2567	13.5518
1.860000000 GHz	39.2269	13.5702
1.870000000 GHz	39.1910	13.5865
1.880000000 GHz	39.1787	13.6150
1.890000000 GHz	39.1319	13.6293
1.900000000 GHz	39.0902	13.6406
1.910000000 GHz	39.0588	13.6664
1.920000000 GHz	39.0146	13.7121

Title

SubTitle

August 15, 2002 11:39 AM

Frequency	e'	e"
1.700000000 GHz	53.1273	13.7396
1.710000000 GHz	53.0743	13.7625
1.720000000 GHz	53.0407	13.7843
1.730000000 GHz	52.9966	13.8041
1.740000000 GHz	52.9545	13.8371
1.750000000 GHz	52.9009	13.8580
1.760000000 GHz	52.8515	13.8904
1.770000000 GHz	52.8179	13.9388
1.780000000 GHz	52.7855	13.9647
1.790000000 GHz	52.7382	13.9962
1.800000000 GHz	52.7137	14.0266
1.810000000 GHz	52.6758	14.0433
1.820000000 GHz	52.6608	14.0550
1.830000000 GHz	52.6189	14.0793
1.840000000 GHz	52.5718	14.1121
1.850000000 GHz	52.5393	14.1181
1.860000000 GHz	52.5114	14.1274
1.870000000 GHz	52.4917	14.1440
1.880000000 GHz	52.4783	14.1696
1.890000000 GHz	52.4379	14.1873
1.900000000 GHz	52.4288	14.2056
1.910000000 GHz	52.4454	14.2185
1.920000000 GHz	52.4416	14.2428

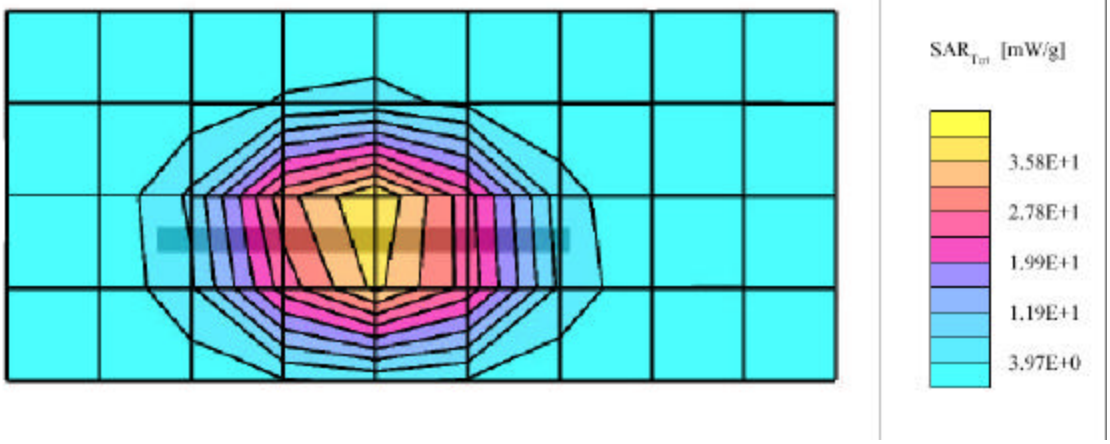
Table 3. 1900 MHz head and muscle tissue dielectric parameters

1.4 Dipole validation SAR plot for 1900 MHz head tissue

08/15/02

Dipole 1900 MHz
SAM 2; Flat
Probe: ET3DV6 - SN1642; ConvF(5.30,5.30,5.30); Crest factor: 1.0; Head 1900 MHz: σ = 1.44 mho/m ε_r = 39.1 ρ = 1.00 g/cm^3
Cube 5x5x7: Peak: 90.4 mW/g, SAR (1g): 45.8 mW/g, SAR (10g): 23.0 mW/g, (Worst-case extrapolation)
Penetration depth: 7.6 (7.1, 8.9) [mm]
Powerdrift: -0.06 dB

Tested on August 16, 2002
Ambient Temperature: 22.5 deg. cel.
Liquid Temperature: 21.5 deg. cel.



1.5 SAR Measurement results at highest power measured against the body using Holster

Mode	f (MHz)	Conducted Output Power (dBm)	Chamber Temp. (°C)	Liquid Temp. (°C)	SAR, averaged over 1 g (W/kg)
PCS 1900	1850.20	30.50	23.2	22.0	**0.11**
	1880.00	30.40	23.0	22.0	0.10
	1908.80	30.30	23.1	22.0	0.08

Table 4. SAR results with holster for body configuration

1.6 SAR Measurement results at highest power measured for the hand

Mode	Device Configuration touching flat phantom	f *(MHz)*	Conducted Output Power (dBm)	Chamber Temp. (°C)	Liquid Temp. (°C)	SAR, averaged over 10 g (W/kg)
PCS 1900	back	1850.20	30.50	23.1	22.0	**1.48**
	back	1880.00	30.40	23.3	22.1	1.35
	back	1908.80	30.30	23.2	22.1	1.24

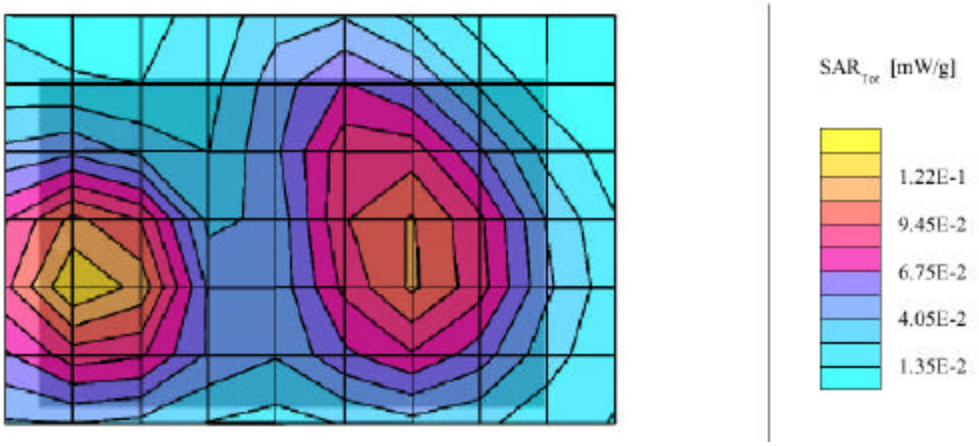
Table 5. SAR results for hand configuration

1.7 Body-worn SAR plot with the calibrated muscle conversion factor

08/16/02

BlackBerry Wireless Handheld Model No. R6220GW
SAM 1; Flat
Probe: ET3DV6 - SN1642; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Muscle 1900 MHz: σ = 1.50 mho/m ε_r = 52.4 ρ = 1.00 g/cm^3
Cube 5x5x7: Peak: 0.194 mW/g, SAR (1g): 0.113 mW/g, SAR (10g): 0.0692 mW/g, (Worst-case extrapolation)
Penetration depth: 11.2 (9.2, 13.7) [mm]
Powerdrift: -0.63 dB

Tested on August 16, 2002
Ambient Temperature: 23.2 deg. cel.
Liquid Temperature: 22.0 deg. cel.
Body worn with holster
Frequency: 1850.20 MHz

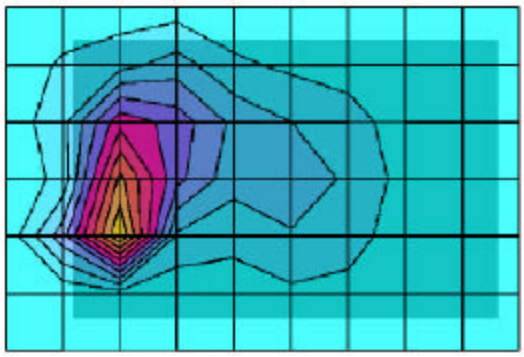


1.8 Hand SAR plots with the calibrated muscle conversion

08/16/02

BlackBerry Wireless Handheld Model No. R6220GW
SAM 1; Flat
Probe: ET3DV6 - SN1642; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Muscle 1900 MHz: σ = 1.50 mho/m ε_r = 52.4 ρ = 1.00 g/cm^3
Cube 5x5x7: Peak: 6.99 mW/g, SAR (1g): 3.24 mW/g, SAR (10g): 1.48 mW/g, (Worst-case extrapolation)
Penetration depth: 7.1 (6.3, 9.1) [mm]
Powerdrift: -0.08 dB

Tested on August 16, 2002
Ambient Temperature: 23.1 deg. cel.
Liquid Temperature: 22.0 deg. cel.
Hand SAR
Unit back touching flat phantom
Frequency: 1850.20 MHz



ITEM 2:
Please refer to Appendix A for dipole validation data supporting target values.

ITEM 3:
Please refer to Appendix B for photographs of all test positions:

- touch left side of head
- tilted left side of head
- touch right side of head
- tilted right side of head
- body-worn and holster with and without the headset
- hand SAR, device back touching the flat phantom with and without headset

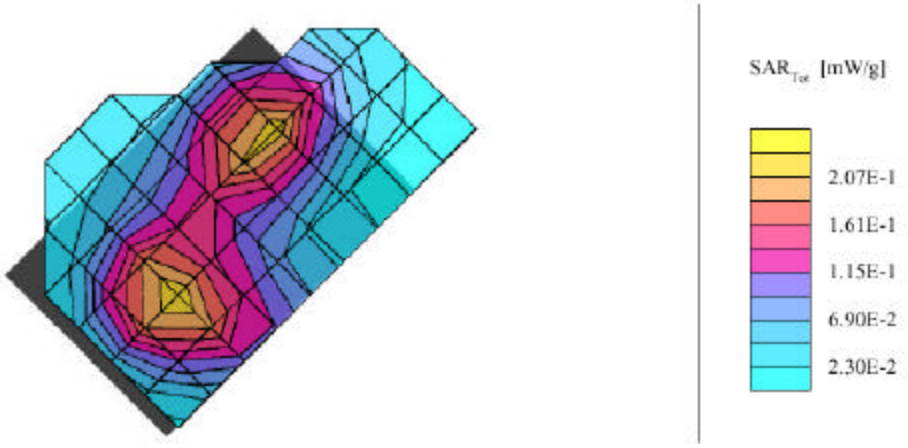
ITEM 4:
The following plots are the new head SAR plots with date and tempreture:

08/16/02

BlackBerry Wireless Handheld Model No. R6220GW

SAM 2; Left Hand
Probe: ET3DV6 - SN1642; ConvF(5.30,5.30,5.30); Crest factor: 8.0; Head 1900 MHz: σ = 1.44 mho/m ε_r = 39.1 ρ = 1.00 g/cm³
Cube 5x5x7: Peak: 0.378 mW/g, SAR (1g): 0.214 mW/g, SAR (10g): 0.123 mW/g, (Worst-case extrapolation)
Penetration depth: 9.9 (8.7, 11.6) [mm]
Powerdrift: -0.47 dB

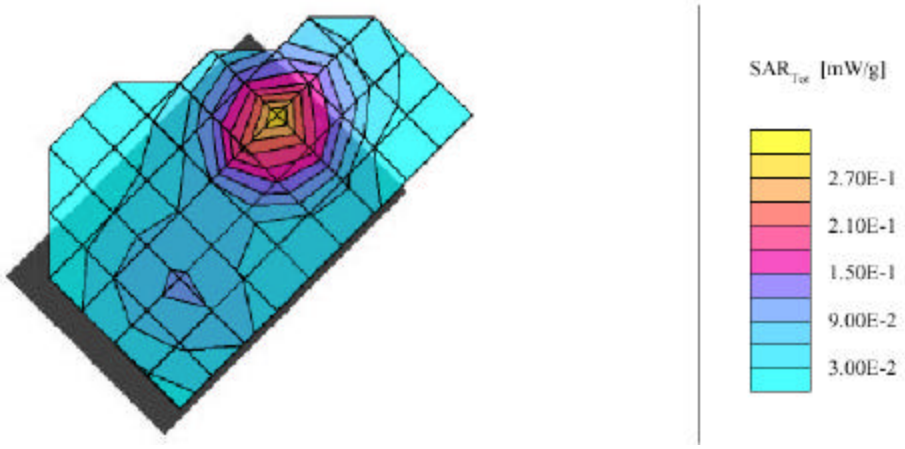
Tested on August 16, 2002
Ambient Temperature: 22.5 deg. cel.
Liquid Temperature: 21.5 deg. cel.
Touch position
Frequency: 1850.20 MHz



BlackBerry Wireless Handheld Model No. R6220GW

SAM 2; Left Hand
Probe: ET3DV6 - SN1642; ConvF(5.30,5.30,5.30); Crest factor: 8.0; Head 1900 MHz: σ = 1.44 mho/m ε_r = 39.1 ρ = 1.00 g/cm³
Cube 5x5x7: Peak: 0.470 mW/g, SAR (1g): 0.272 mW/g, SAR (10g): 0.155 mW/g, (Worst-case extrapolation)
Penetration depth: 10.2 (9.2, 11.5) [mm]
Powerdrift: -0.31 dB

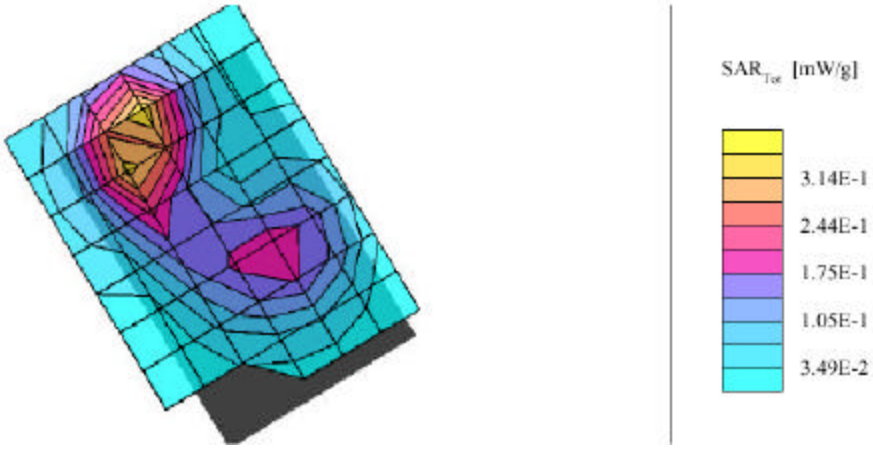
Tested on August 16, 2002
Ambient Temperature: 22.5 deg. cel.
Liquid Temperature: 21.5 deg. cel.
Tilted position
Frequency: 1850.20 MHz



BlackBerry Wireless Handheld Model No. R6220GW

SAM 2; Right Hand
Probe: ET3DV6 - SN1642; ConvF(5.30,5.30,5.30); Crest factor: 8.0; Head 1900 MHz: σ = 1.44 mho/m ε_r = 39.1 ρ = 1.00 g/cm^3
Cube 5x5x7: Peak: 0.633 mW/g, SAR (1g): 0.349 mW/g, SAR (10g): 0.192 mW/g, (Worst-case extrapolation)
Penetration depth: 9.3 (8.3, 10.8) [mm]
Powerdrift: 0.35 dB

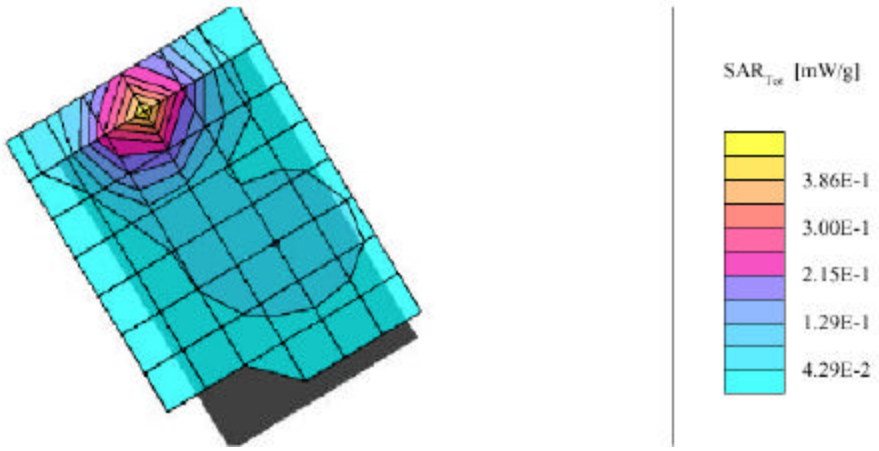
Tested on August 16, 2002
Ambient Temperature: 22.8 deg. cel.
Liquid Temperature: 21.7 deg. cel.
Touch position
Frequency: 1850.20 MHz



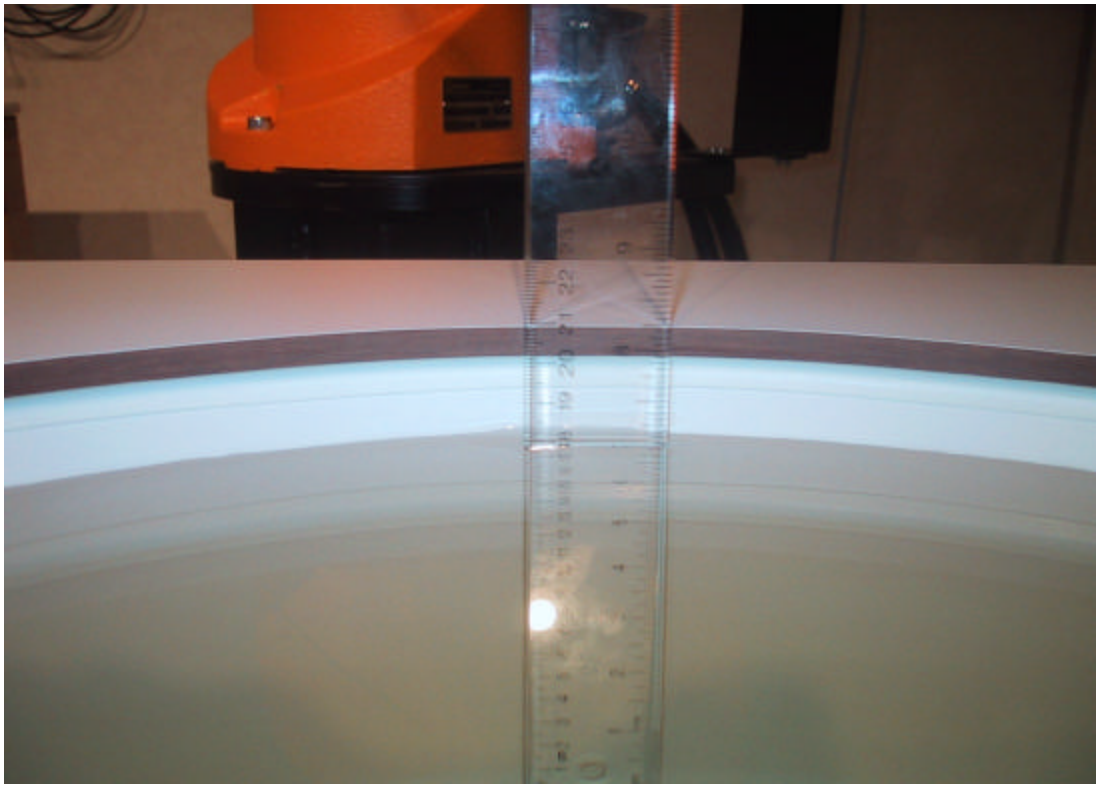
BlackBerry Wireless Handheld Model No. R6220GW

SAM 2; Right Hand
Probe: ET3DV6 - SN1642; ConvF(5.30,5.30,5.30); Crest factor: 8.0; Head 1900 MHz: σ = 1.44 mho/m ε_r = 39.1 ρ = 1.00 g/cm³
Cube 5x5x7: Peak: 0.696 mW/g, SAR (1g): 0.383 mW/g, SAR (10g): 0.209 mW/g, (Worst-case extrapolation)
Penetration depth: 9.1 (8.1, 10.8) [mm]
Powerdrift: 0.71 dB

Tested on August 16, 2002
Ambient Temperature: 22.9 deg. cel.
Liquid Temperature: 21.7 deg. cel.
Tilted position
Frequency: 1850.20 MHz



ITEM 5:
The liquid depth in the DASY phantom is about 18 cm as shown in the photo below. SPEAG recommends that the phantom be filled up to about 1 inch below the top surface of the phantom.



ITEM 6:
Yes, the BlackBerry Wireless Handheld Model No. R6220GW can be used in a similar manner to a normal cell phone and be held against the ear.

I trust that this fully addresses your questions, however if further clarification is required please do not hesitate to contact the undersigned.

Sincerely yours,

Masud Attayi, P.Eng.,
Senior Engineer, Compliance & Certification
Research In Motion Limited
Tel: +1 519 888–7465 x2442
Fax: +1 519 888-6906
Email: mattayi@rim.net
Web: www.rim.net; www.blackberry.net

APPENDIX A: PROBE AND DIPOLE CALIBRATION DATA

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Calibration Certificate

Dosimetric E-Field Probe

Type:	ET3DV6
Serial Number:	1642
Place of Calibration:	Zurich
Date of Calibration:	July 26, 2002
Calibration Interval:	12 months

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	U. Kellel
Approved by:	

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Telephone +41 1 245 97 00, Fax +41 1 245 97 79

Probe ET3DV6

SN:1642

Manufactured:	November 7, 2001
Last calibration:	November 26, 2001
Recalibrated:	July 26, 2002

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1642

Sensitivity in Free Space

Diode Compression

NormX	1.62 $\mu V/(V/m)^2$	DCP X	96	mV
NormY	1.85 $\mu V/(V/m)^2$	DCP Y	96	mV
NormZ	1.61 $\mu V/(V/m)^2$	DCP Z	96	mV

Sensitivity in Tissue Simulating Liquid

Head **900 MHz** ε_r = 41.5 ± 5% σ = 0.97 ± 5% mho/m

ConvF X	6.5 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	6.5 ± 8.9% (k=2)	Alpha	0.34
ConvF Z	6.5 ± 8.9% (k=2)	Depth	2.68

Head **1800 MHz** ε_r = 40.0 ± 5% σ = 1.40 ± 5% mho/m

ConvF X	5.4 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	5.4 ± 8.9% (k=2)	Alpha	0.53
ConvF Z	5.4 ± 8.9% (k=2)	Depth	2.33

Boundary Effect

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

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	9.9	5.7
SAR_{be} [%]	With Correction Algorithm	0.4	0.5

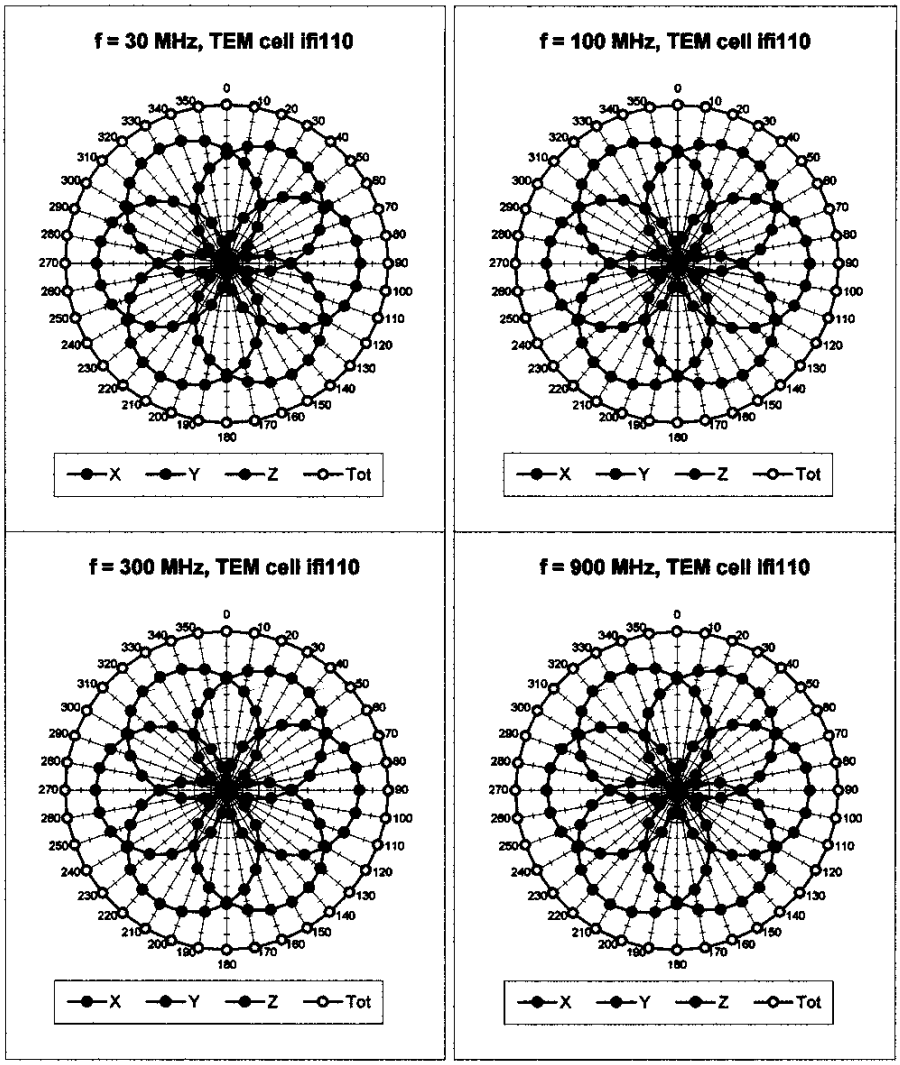
Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

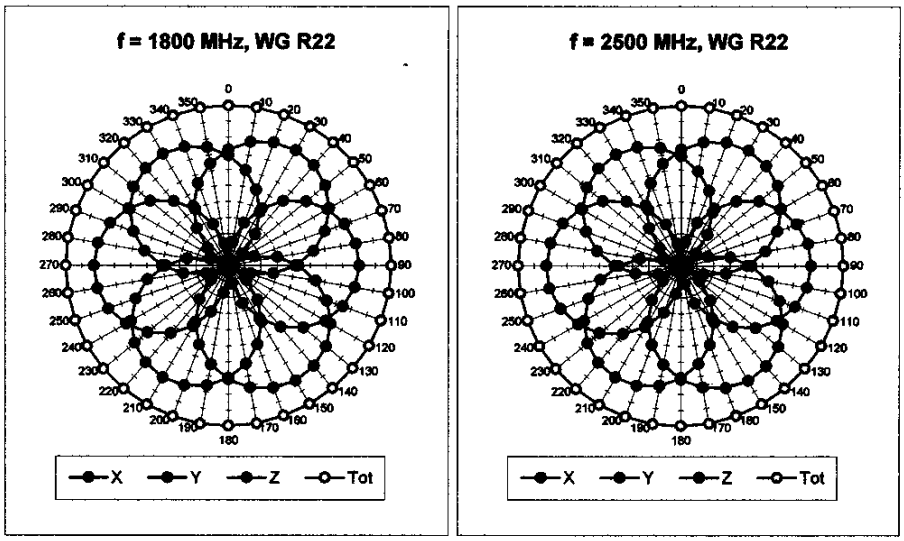
Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	12.0	7.8
SAR_{be} [%]	With Correction Algorithm	0.2	0.2

Sensor Offset

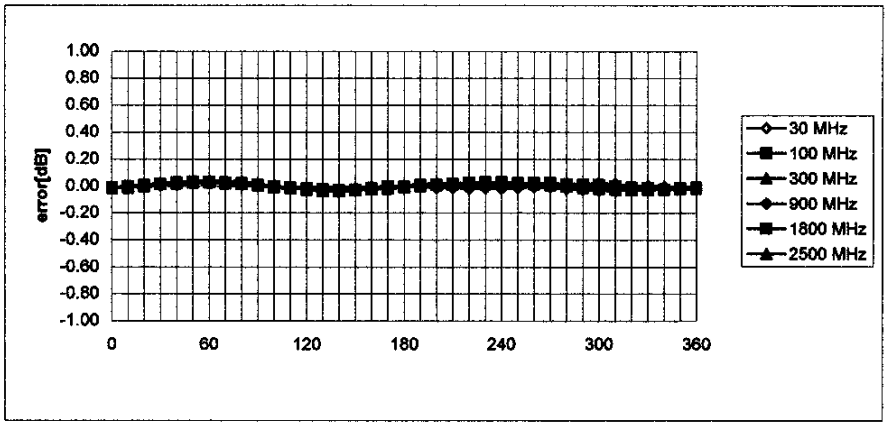
Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.1 ± 0.2	mm

Receiving Pattern (ϕ), θ = 0°



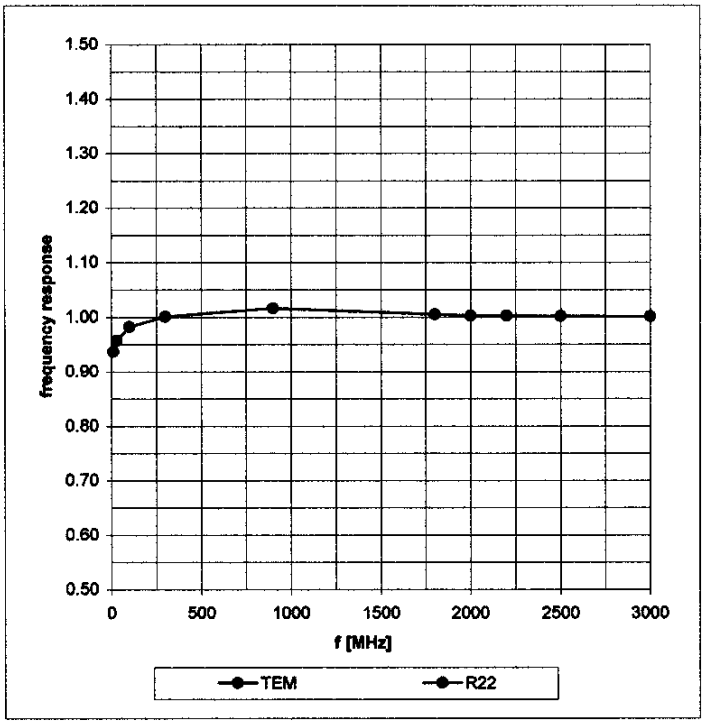


Isotropy Error (ϕ), θ = 0°



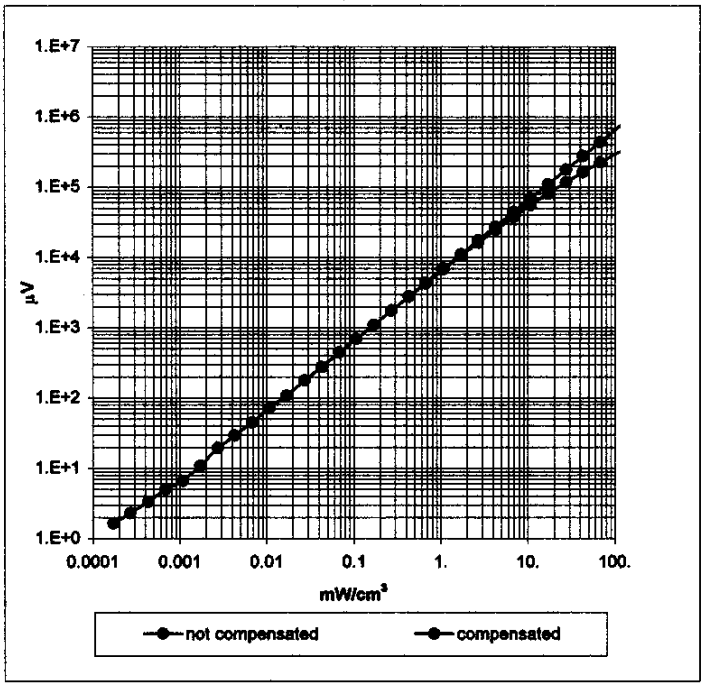
Frequency Response of E-Field

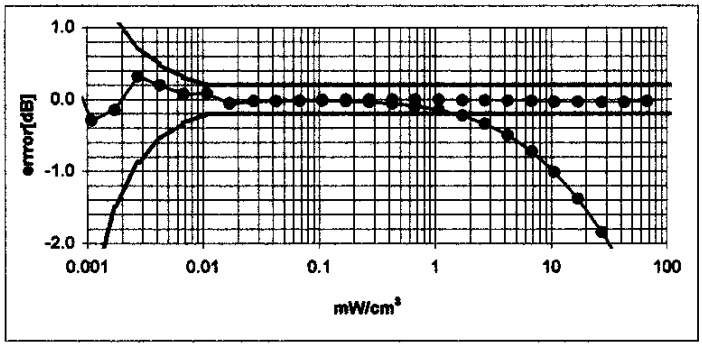
(TEM-Cell:ifi110, Waveguide R22)



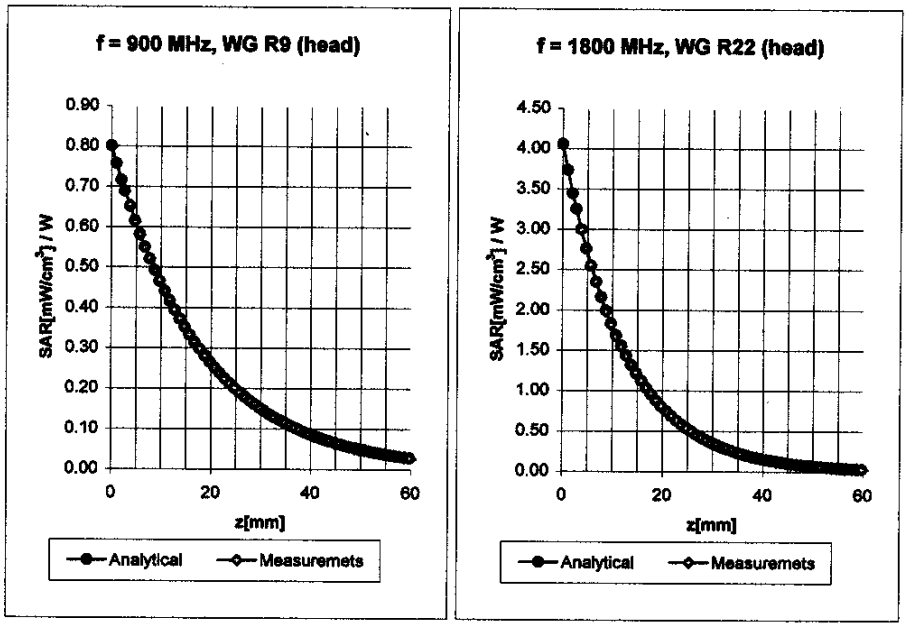
Dynamic Range f(SAR_{brain})

(Waveguide R22)





Conversion Factor Assessment



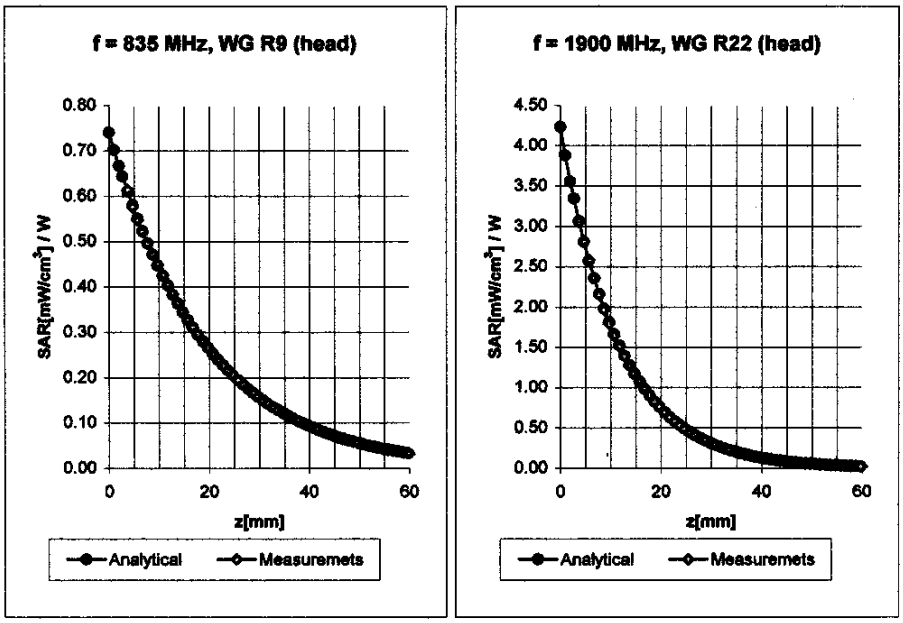
Head **900 MHz** ε_r = 41.5 ± 5% σ = 0.97 ± 5% mho/m

ConvF X	**6.5** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**6.5** ± 8.9% (k=2)	Alpha	**0.34**
ConvF Z	**6.5** ± 8.9% (k=2)	Depth	**2.68**

Head **1800 MHz** ε_r = 40.0 ± 5% σ = 1.40 ± 5% mho/m

ConvF X	**5.4** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**5.4** ± 8.9% (k=2)	Alpha	**0.53**
ConvF Z	**5.4** ± 8.9% (k=2)	Depth	**2.33**

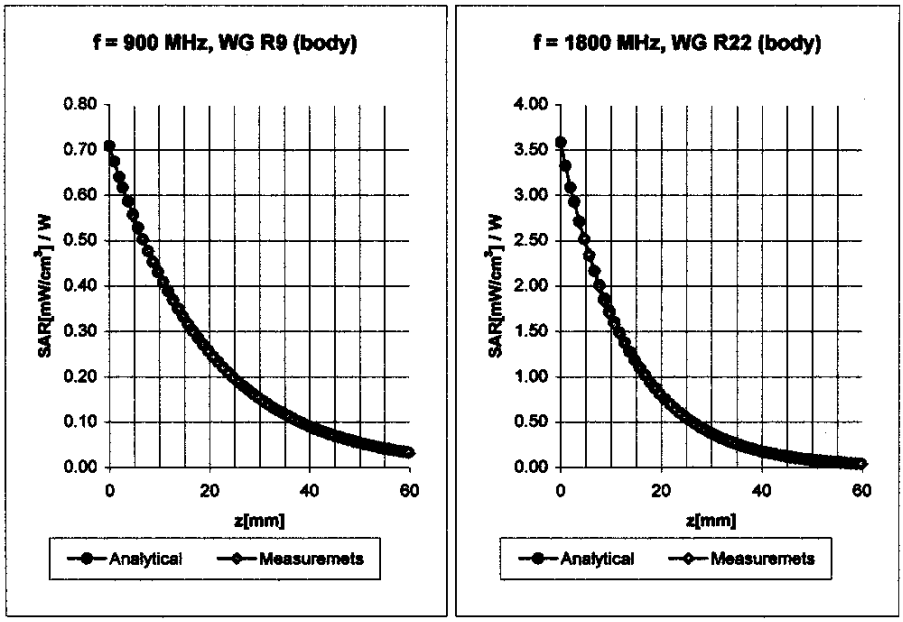
Conversion Factor Assessment



Head	835 MHz	ε_r = 41.5 ± 5%	σ = 0.90 ± 5% mho/m
ConvF X	6.5 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	6.5 ± 8.9% (k=2)	Alpha	0.34
ConvF Z	6.5 ± 8.9% (k=2)	Depth	2.65

Head	1900 MHz	ε_r = 40.0 ± 5%	σ = 1.40 ± 5% mho/m
ConvF X	5.3 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	5.3 ± 8.9% (k=2)	Alpha	0.57
ConvF Z	5.3 ± 8.9% (k=2)	Depth	2.28

Conversion Factor Assessment



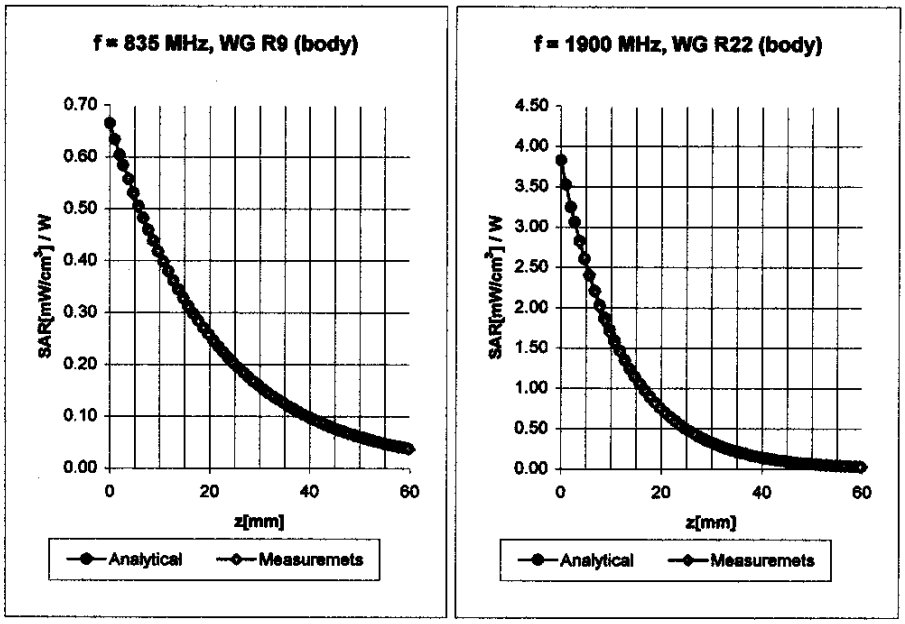
Body **900 MHz** ε_r = 55.2 ± 5% σ = 0.97 ± 5% mho/m

ConvF X	**6.3** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**6.3** ± 8.9% (k=2)	Alpha	**0.36**
ConvF Z	**6.3** ± 8.9% (k=2)	Depth	**2.63**

Body **1800 MHz** ε_r = 53.3 ± 5% σ = 1.52 ± 5% mho/m

ConvF X	**5.2** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**5.2** ± 8.9% (k=2)	Alpha	**0.61**
ConvF Z	**5.2** ± 8.9% (k=2)	Depth	**2.30**

Conversion Factor Assessment



Body **835 MHz** ε_r = 55.0 ± 5% σ = 1.05 ± 5% mho/m

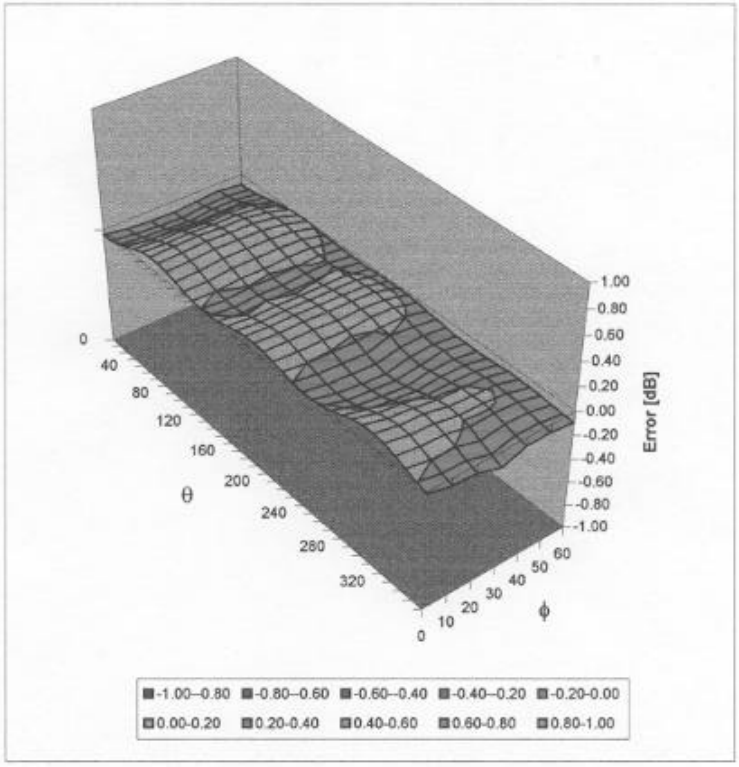
ConvF X	**6.4** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**6.4** ± 8.9% (k=2)	Alpha	**0.36**
ConvF Z	**6.4** ± 8.9% (k=2)	Depth	**2.66**

Body **1900 MHz** ε_r = 53.3 ± 5% σ = 1.52 ± 5% mho/m

ConvF X	**4.8** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**4.8** ± 8.9% (k=2)	Alpha	**0.74**
ConvF Z	**4.8** ± 8.9% (k=2)	Depth	**2.07**

Deviation from Isotropy in HSL

Error (θ,φ), f = 900 MHz



Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

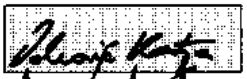
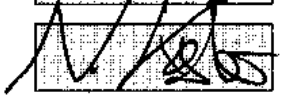
Calibration Certificate

1900 MHz System Validation Dipole

Type:	D1900V2
Serial Number:	545
Place of Calibration:	Zurich
Date of Calibration:	November 26, 2001
Calibration Interval:	24 months

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	
Approved by:	

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

DASY3

Dipole Validation Kit

Type: D1900V2

Serial: 545

Manufactured: November 15, 2001
Calibrated: November 26, 2001

1. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with brain simulating sugar solution of the following electrical parameters at 1900 MHz:

Relative permitivity	**40.0**	± 5%
Conductivity	**1.45 mho/m**	± 10%

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, conversion factor 5.31 at 1800 MHz) was used for the measurements.

The dipole feedpoint was positioned below the center marking and oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole center to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 20mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging.
The dipole input power (forward power) was 250mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement

Standard SAR-measurements were performed with the head phantom according to the measurement conditions described in section 1. The results (see figure) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue:	**43.2 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**22.0 mW/g**

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well. The estimated sensitivities of SAR-values and penetration depths to the liquid parameters are listed in the DASY Application Note 4: 'SAR Sensitivities'.

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:	**1.216 ns**	(one direction)
Transmission factor:	**0.992**	(voltage transmission, one direction)

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

Feedpoint impedance at 1900 MHz:	Re{Z} = **50.4 Ω**
	Im {Z} = **1.9 Ω**
Return Loss at 1900 MHz	**- 34.3 dB**

4. 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.

5. 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.

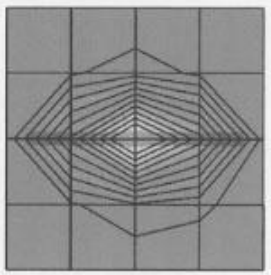
6. Power Test

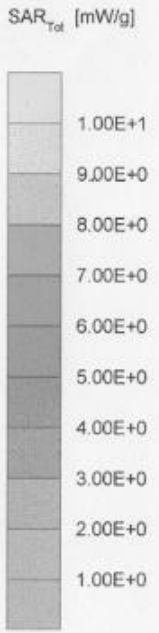
After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

11/21/01

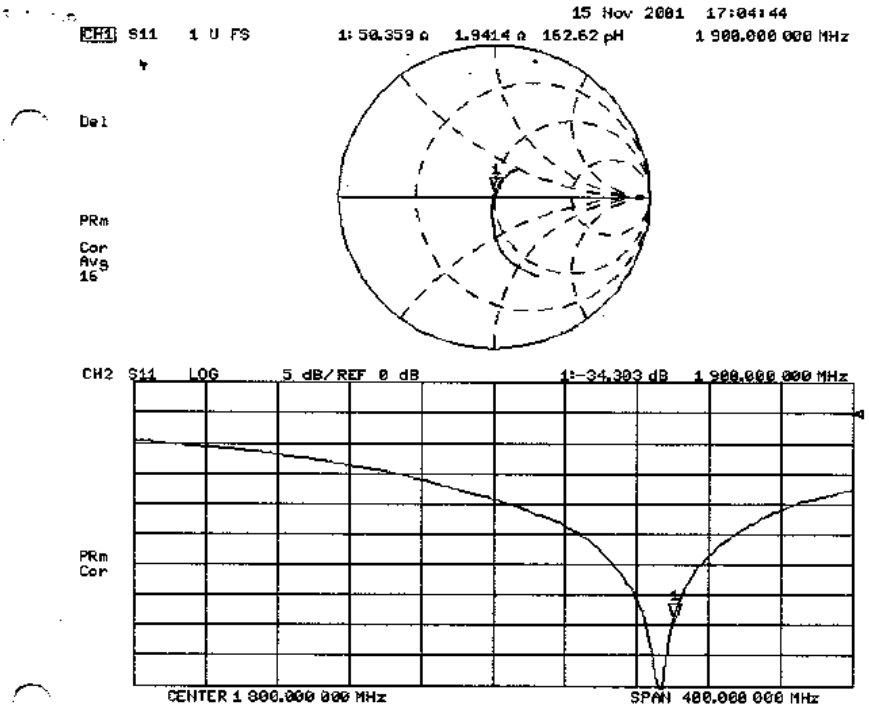
Validation Dipole D1900V2 SN:545, d = 10 mm

Frequency: 1900 MHz; Antenna Input Power: 250 [mW]
SAM Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(5.31,5.31,5.31) at 1800 MHz; IEEE1528 1900 MHz ; σ = 1.45 mho/m ε_r = 40.0 ρ = 1.00 g/cm^3
Cubes (2): Peak: 20.8 mW/g ± 0.07 dB, SAR (1g): 10.8 mW/g ± 0.05 dB, SAR (10g): 5.51 mW/g ± 0.03 dB, (Worst-case extrapolation)
Penetration depth: 7.8 (7.4, 8.9) [mm]
Powerdrift: -0.02 dB





Schmid & Partner Engineering AG, Zurich, Switzerland



APPENDIX B: SAR SETUP PHOTOS

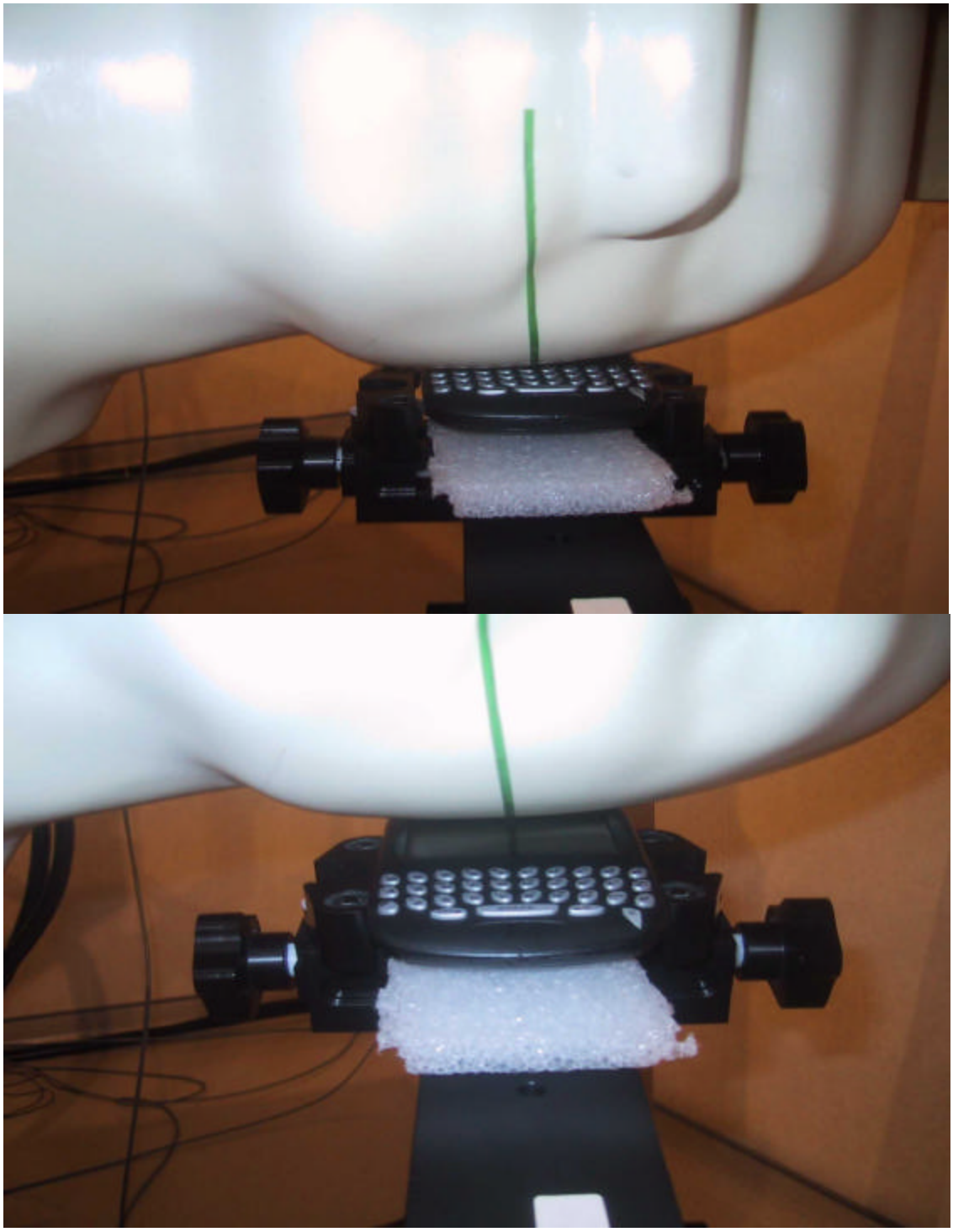


Figure B1. Left ear configuration, touch and tilted 15 degrees

Figure B2. Right ear configuration, touch and tilted 15 degrees

Figure B3. Body worn configuration with holster and headset

Figure B4. Hand SAR configuration, unit back touching flat phantom