Author Data	Dates of Test	Test Report No
Daoud Attayi	February 12-13, 2003	RIM-0024-0302-02
Approved	Rev	FCC ID: L6AR6230GE

APPENDIX A: SAR DISTRIBUTION COMPARISON FOR THE ACCURACY VERIFICATION

02/12/03

Dipole 1900 MHz

SAM 1; Flat

Probe: ET3DV6 - SN1644; ConvF(5.40,5.40,5.40); Crest factor: 1.0; Head 1900 MHz: σ = 1.42 mho/m ε_r = 39.1 ρ = 1.00 g/cm^3

Cube 5x5x7: Peak: 87.6 mW/g, SAR (1g): 44.7 mW/g, SAR (10g): 22.2 mW/g, (Worst-case extrapolation)

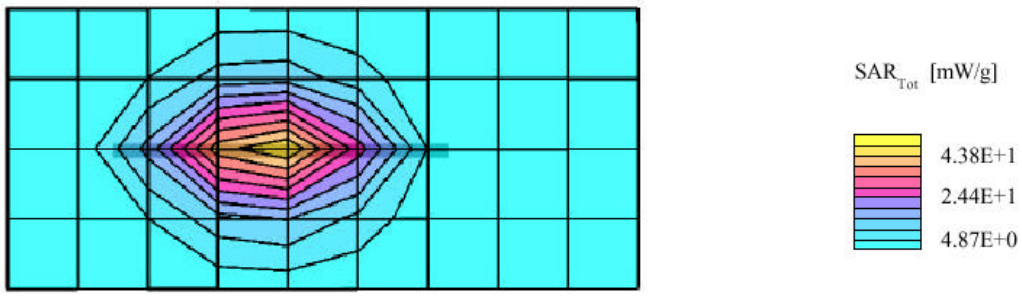
Penetration depth: 7.6 (7.1, 8.8) [mm]

Powerdrift: -0.00 dB

Tested on February 12, 2003

Ambient temperature: 24.6 Deg. Cel.

Liquid temperature: 23.4 Deg. Cel.



APPENDIX B: SAR DISTRIBUTION PLOTS FOR HEAD CONFIGURATION

02/12/03

BlackBerry Wireless Handheld Model No. R6230GE

SAM 1; Left Hand

Probe: ET3DV6 - SN1644; ConvF(5.40,5.40,5.40); Crest factor: 8.0; Head 1900 MHz: σ = 1.42 mho/m ε_r = 39.1 ρ = 1.00 g/cm^3

Cube 5x5x7: Peak: 0.288 mW/g, SAR (1g): 0.155 mW/g, SAR (10g): 0.0823 mW/g, (Worst-case extrapolation)

Penetration depth: 8.3 (7.7, 9.6) [mm]

Powerdrift: 0.34 dB

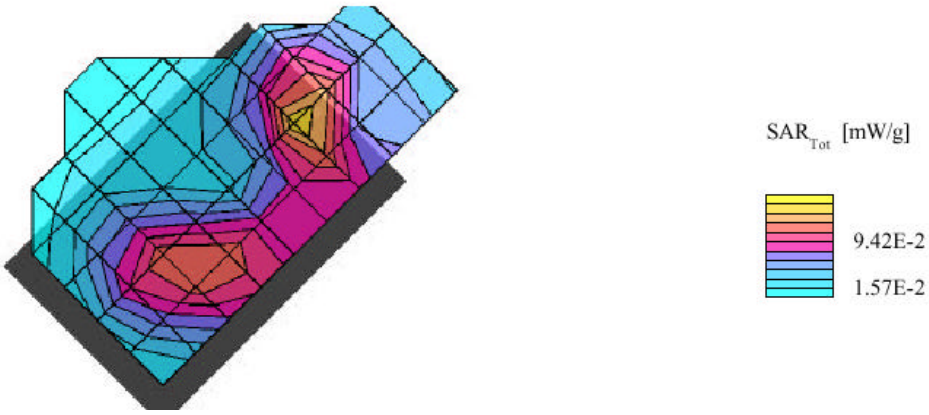
Tested on February 12, 2003

Ambient temperature: 24.0 Deg. Cel.

Liquid temperature: 22.6 Deg. Cel.

Left side of head, touch configuration

Channel: 810



02/12/03

BlackBerry Wireless Handheld Model No. R6230GE

SAM 1; Left Hand

Probe: ET3DV6 - SN1644; ConvF(5.40,5.40,5.40); Crest factor: 8.0; Head 1900 MHz: σ = 1.42 mho/m ε_r = 39.1 ρ = 1.00 g/cm^3

Cube 5x5x7: Peak: 0.480 mW/g, SAR (1g): 0.255 mW/g, SAR (10g): 0.131 mW/g * Max outside, (Worst-case extrapolation)

Penetration depth: 8.2 (7.7, 9.3) [mm]

Powerdrift: 0.04 dB

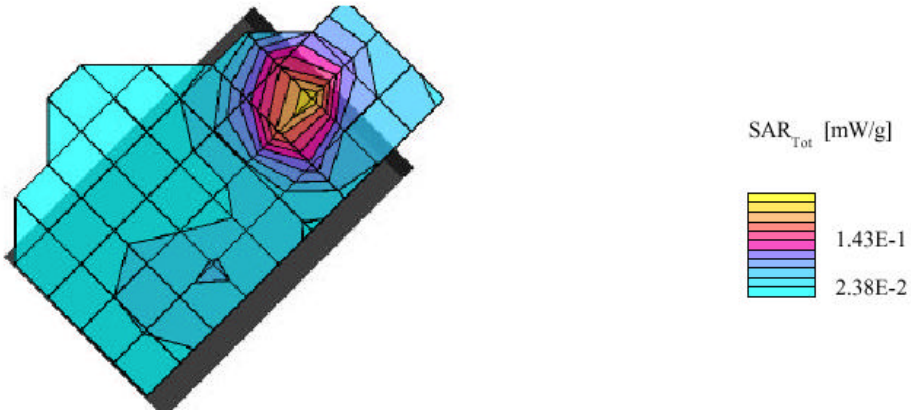
Tested on February 12, 2003

Ambient temperature: 24.0 Deg. Cel.

Liquid temperature: 22.6 Deg. Cel.

Left side of head, tilt configuration

Channel: 810



02/12/03

BlackBerry Wireless Handheld Model No. R6230GE

SAM 1; Right Hand

Probe: ET3DV6 - SN1644; ConvF(5.40,5.40,5.40); Crest factor: 8.0; Head 1900 MHz: σ = 1.42 mho/m ε_r = 39.1 ρ = 1.00 g/cm^3

Cube 5x5x7: Peak: 0.343 mW/g, SAR (1g): 0.200 mW/g, SAR (10g): 0.116 mW/g, (Worst-case extrapolation)

Penetration depth: 9.9 (9.0, 11.1) [mm]

Powerdrift: 0.86 dB

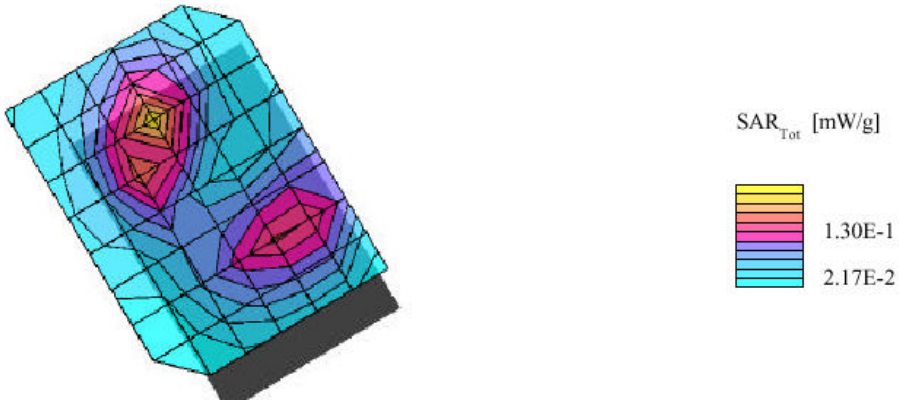
Tested on February 12, 2003

Ambient temperature: 24.3 Deg. Cel.

Liquid temperature: 22.8 Deg. Cel.

Right side of head touch configuration

Channel: 512



02/12/03

BlackBerry Wireless Handheld Model No. R6230GE

SAM 1; Right Hand

Probe: ET3DV6 - SN1644; ConvF(5.40,5.40,5.40); Crest factor: 8.0; Head 1900 MHz: σ = 1.42 mho/m ε_r = 39.1 ρ = 1.00 g/cm^3

Cube 5x5x7: Peak: 0.369 mW/g, SAR (1g): 0.212 mW/g, SAR (10g): 0.119 mW/g, (Worst-case extrapolation)

Penetration depth: 9.7 (8.9, 11.0) [mm]

Powerdrift: 0.50 dB

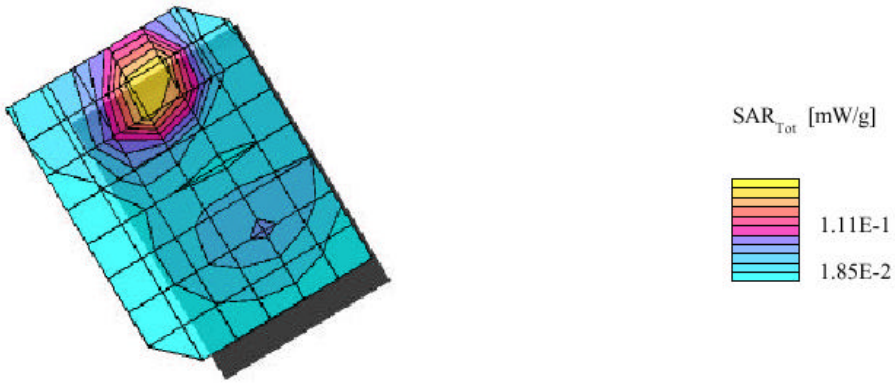
Tested on February 12, 2003

Ambient temperature: 24.4 Deg. Cel.

Liquid temperature: 23.0 Deg. Cel.

Right side of head, tilt configuration

Channel: 512



APPENDIX C: SAR DISTRIBUTION PLOTS FOR BODY-WORN AND HAND SAR CONFIGURATION

02/13/03

BlackBerry Wireless Handheld Model No. R6230GE

SAM 2; Flat

Probe: ET3DV6 - SN1644; ConvF(5.10,5.10,5.10); Crest factor: 8.0; Muscle 1900 MHz: σ = 1.42 mho/m ε_r = 51.6 ρ = 1.00 g/cm^3

Cube 5x5x7: Peak: 0.113 mW/g, SAR (1g): 0.0656 mW/g, SAR (10g): 0.0389 mW/g, (Worst-case extrapolation)

Penetration depth: 10.3 (8.9, 12.4) [mm]

Powerdrift: -0.11 dB

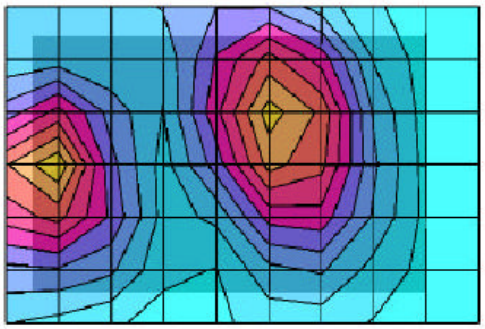
Tested on February 13, 2003

Ambient temperature: 24.7 Deg. Cel.

Liquid temperature: 23.4 Deg. Cel.

Body-worn with holster

Channel: 810



02/13/03

BlackBerry Wireless Handheld Model No. R6230GE

SAM 2; Flat

Probe: ET3DV6 - SN1644; ConvF(5.10,5.10,5.10); Crest factor: 8.0; Muscle 1900 MHz: σ = 1.42 mho/m ε_r = 51.6 ρ = 1.00 g/cm^3

Cube 5x5x7: Peak: 17.2 mW/g, SAR (1g): 7.81 mW/g * , SAR (10g): 2.80 mW/g * Max outside, (Worst-case extrapolation)

Penetration depth: 6.3 (5.8, 7.6) [mm]

Powerdrift: -0.02 dB

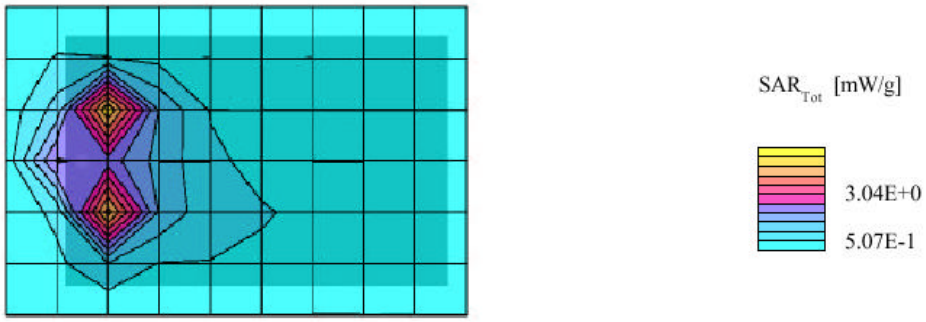
Tested on February 13, 2003

Ambient temperature: 24.5 Deg. Cel.

Liquid temperature: 22.7 Deg. Cel.

Hand SAR , device with headset back side touching flat phatom

Channel: 512



APPENDIX D: PROBE & 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:	1644
Place of Calibration:	Zurich
Date of Calibration:	October 21, 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:	
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:1644

Manufactured:	November 7, 2001
Last calibration:	November 26, 2001
Recalibrated:	October 21, 2002

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1644 **October 21, 2002**

DASY - Parameters of Probe: ET3DV6 SN:1644

Sensitivity in Free Space

Diode Compression

NormX	1.73 $\mu V/(V/m)^2$	DCP X	95	mV
NormY	1.88 $\mu V/(V/m)^2$	DCP Y	95	mV
NormZ	1.83 $\mu V/(V/m)^2$	DCP Z	95	mV

Sensitivity in Tissue Simulating Liquid

Head	**900 MHz**	ε_r = 41.5 ± 5%	σ = 0.97 ± 5% mho/m
Head	**835 MHz**	ε_r = 41.5 ± 5%	σ = 0.90 ± 5% mho/m
ConvF X	**6.6** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.6** ± 9.5% (k=2)	Alpha	**0.32**
ConvF Z	**6.6** ± 9.5% (k=2)	Depth	**2.91**

Head	**1800 MHz**	ε_r = 40.0 ± 5%	σ = 1.40 ± 5% mho/m
Head	**1900 MHz**	ε_r = 40.0 ± 5%	σ = 1.40 ± 5% mho/m
ConvF X	**5.4** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.4** ± 9.5% (k=2)	Alpha	**0.49**
ConvF Z	**5.4** ± 9.5% (k=2)	Depth	**2.47**

Boundary Effect

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

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	10.4	6.1
SAR_{be} [%]	With Correction Algorithm	0.5	0.6

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

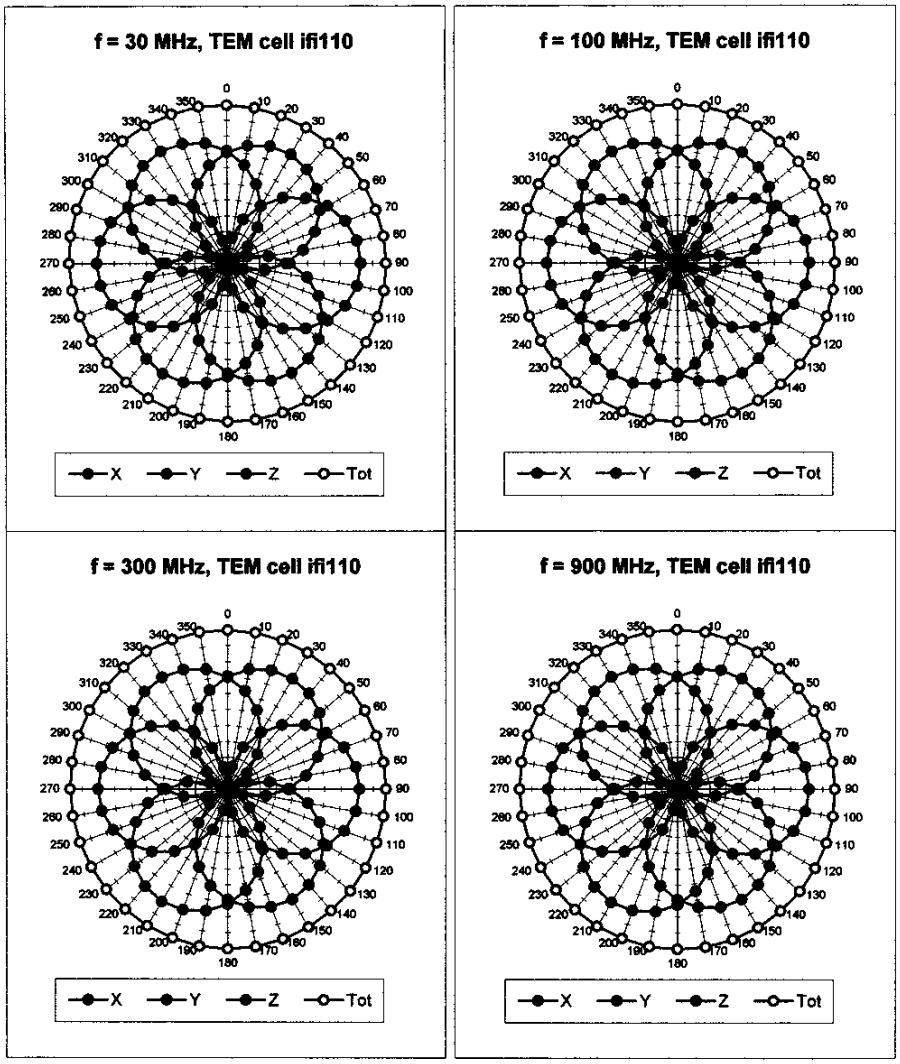
Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	12.2	8.0
SAR_{be} [%]	With Correction Algorithm	0.1	0.1

Sensor Offset

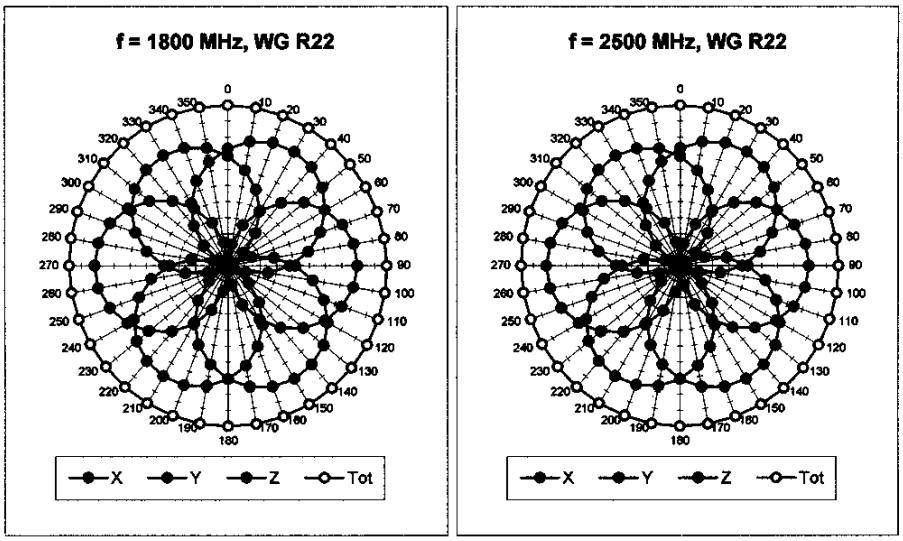
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.4 ± 0.2**	mm

ET3DV6 SN:1644 **October 21, 2002**

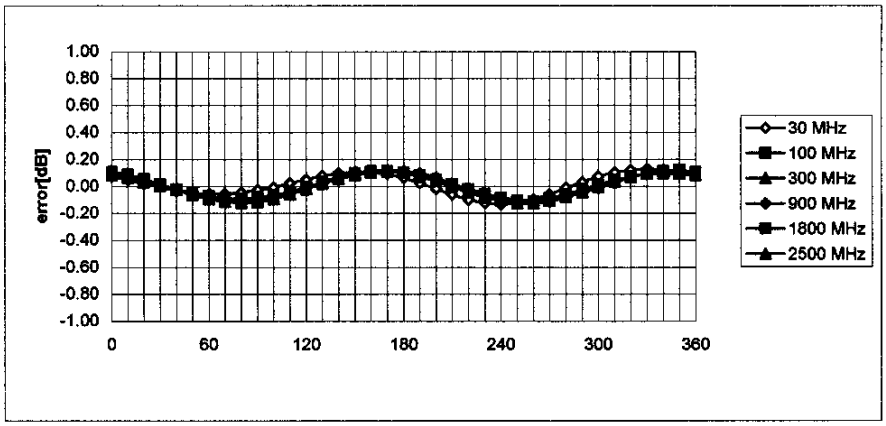
Receiving Pattern (ϕ), θ = 0°



ET3DV6 SN:1644 **October 21, 2002**



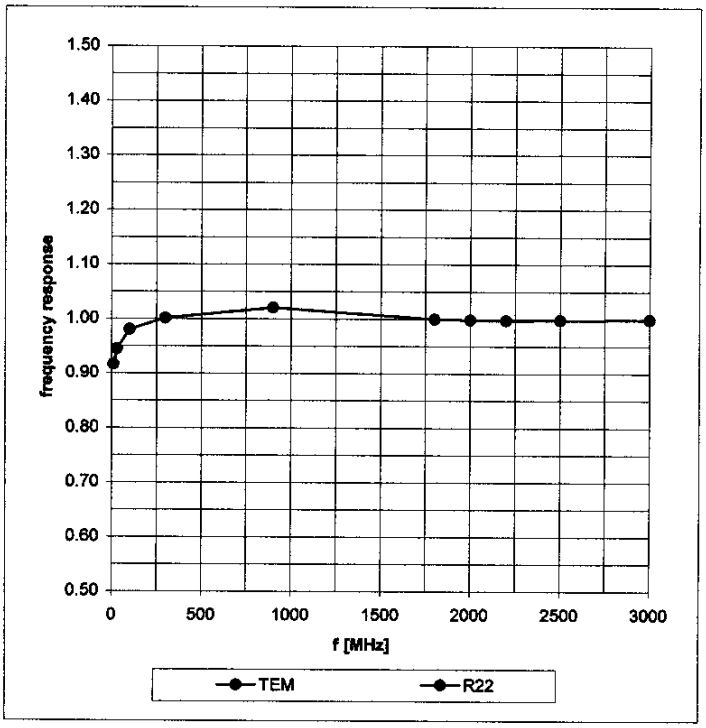
Isotropy Error (ϕ), θ = 0°



ET3DV6 SN:1644 **October 21, 2002**

Frequency Response of E-Field

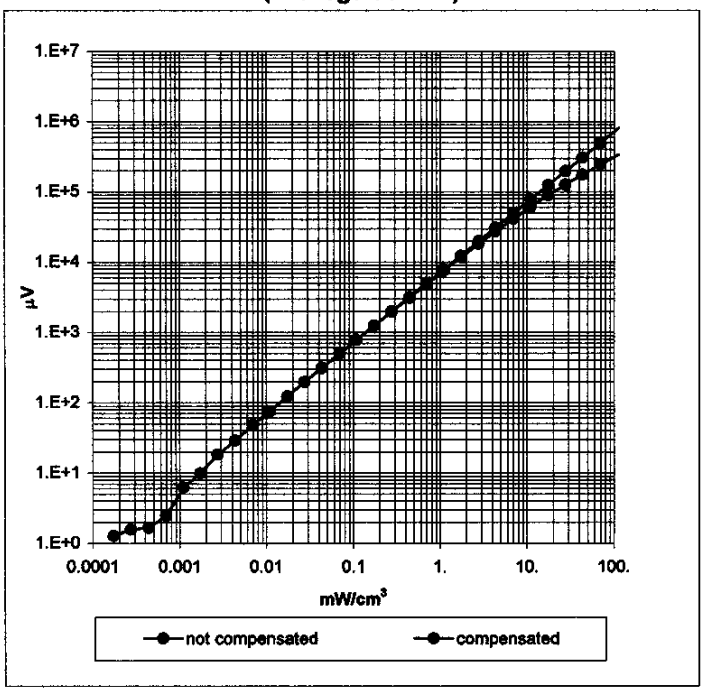
(TEM-Cell:ifi110, Waveguide R22)

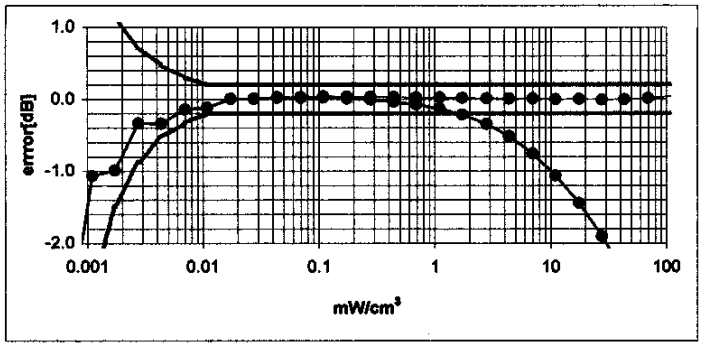


ET3DV6 SN:1644 **October 21, 2002**

Dynamic Range f(SAR_{brain})

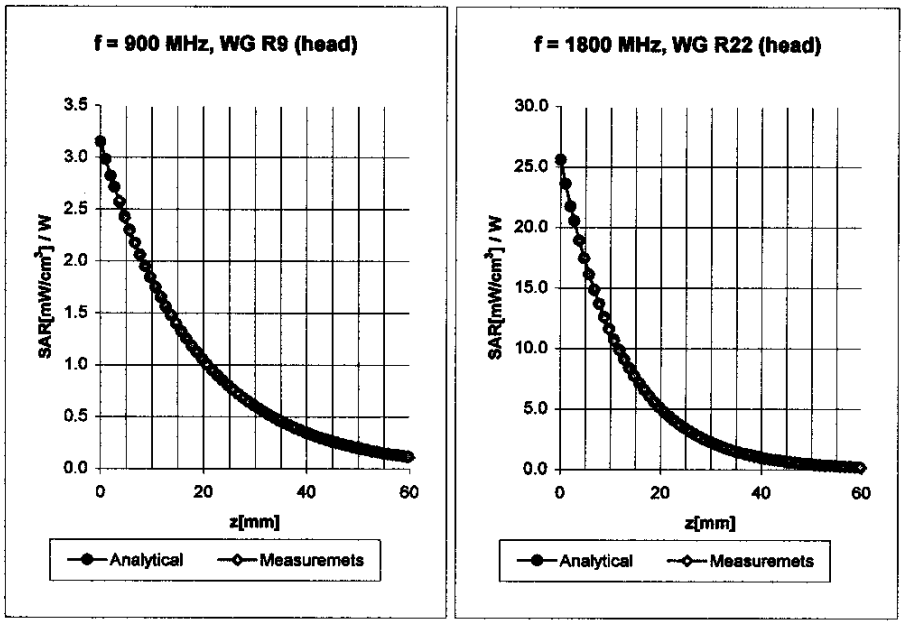
(Waveguide R22)





ET3DV6 SN:1644 **October 21, 2002**

Conversion Factor Assessment

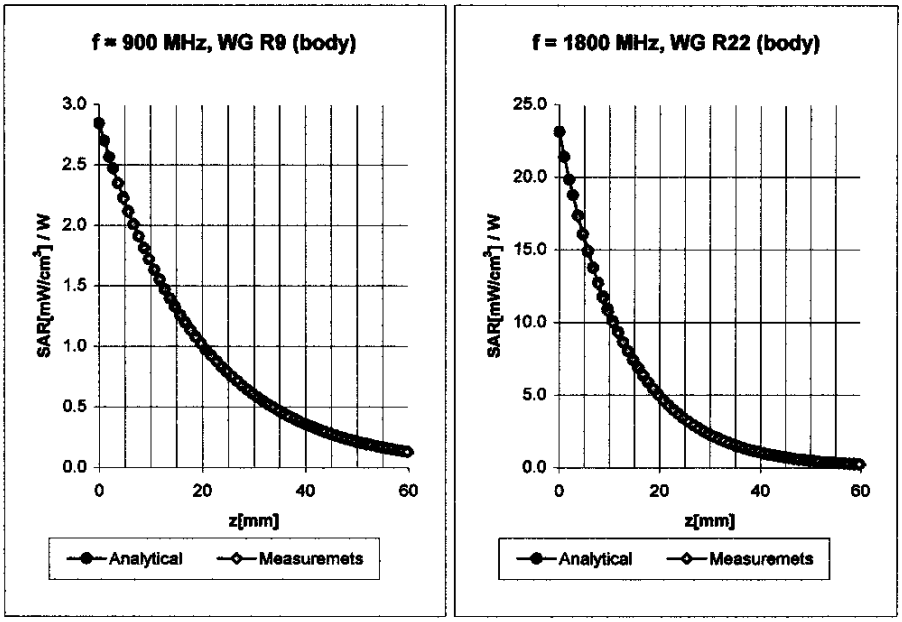


Head	**900 MHz**	ε_r = **41.5 ± 5%**	σ = **0.97 ± 5% mho/m**		
Head	**835 MHz**	ε_r = **41.5 ± 5%**	σ = **0.90 ± 5% mho/m**		
	ConvF X	**6.6** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**6.6** ± 9.5% (k=2)		Alpha	**0.32**
	ConvF Z	**6.6** ± 9.5% (k=2)		Depth	**2.91**

Head	**1800 MHz**	ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**		
Head	**1900 MHz**	ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**		
	ConvF X	**5.4** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**5.4** ± 9.5% (k=2)		Alpha	**0.49**
	ConvF Z	**5.4** ± 9.5% (k=2)		Depth	**2.47**

ET3DV6 SN:1644 **October 21, 2002**

Conversion Factor Assessment



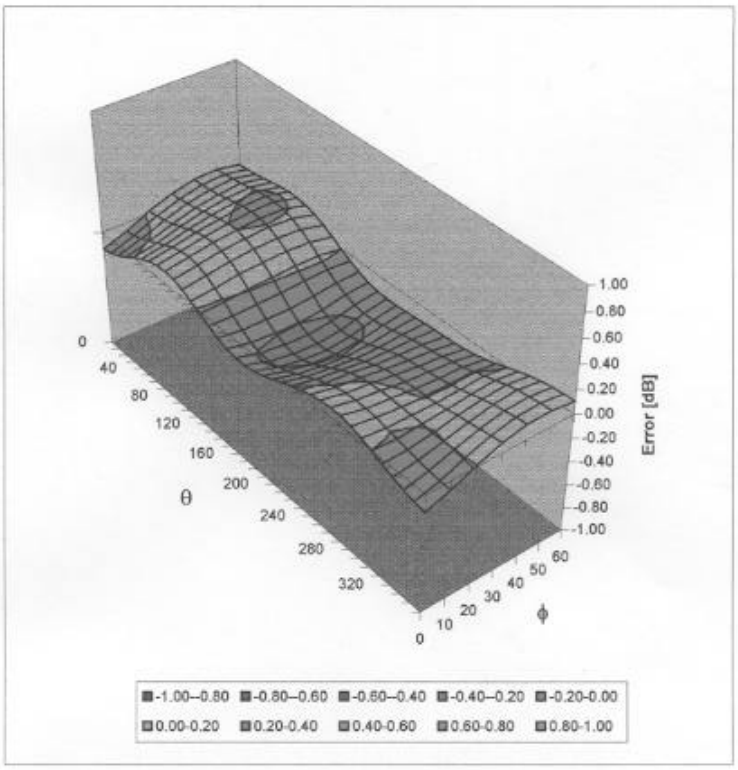
Body	**900 MHz**		ε_r = 55.0 ± 5%	σ = 1.05 ± 5% mho/m	
Body	**835 MHz**		ε_r = 55.2 ± 5%	σ = 0.97 ± 5% mho/m	
	ConvF X	**6.4** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**6.4** ± 9.5% (k=2)		Alpha	**0.39**
	ConvF Z	**6.4** ± 9.5% (k=2)		Depth	**2.56**

Body	**1800 MHz**		ε_r = 53.3 ± 5%	σ = 1.52 ± 5% mho/m	
Body	**1900 MHz**		ε_r = 53.3 ± 5%	σ = 1.52 ± 5% mho/m	
	ConvF X	**5.1** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**5.1** ± 9.5% (k=2)		Alpha	**0.61**
	ConvF Z	**5.1** ± 9.5% (k=2)		Depth	**2.35**

ET3DV6 SN:1644 October 21, 2002

Deviation from Isotropy in HSL

Error (θ,φ), f = 900 MHz



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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

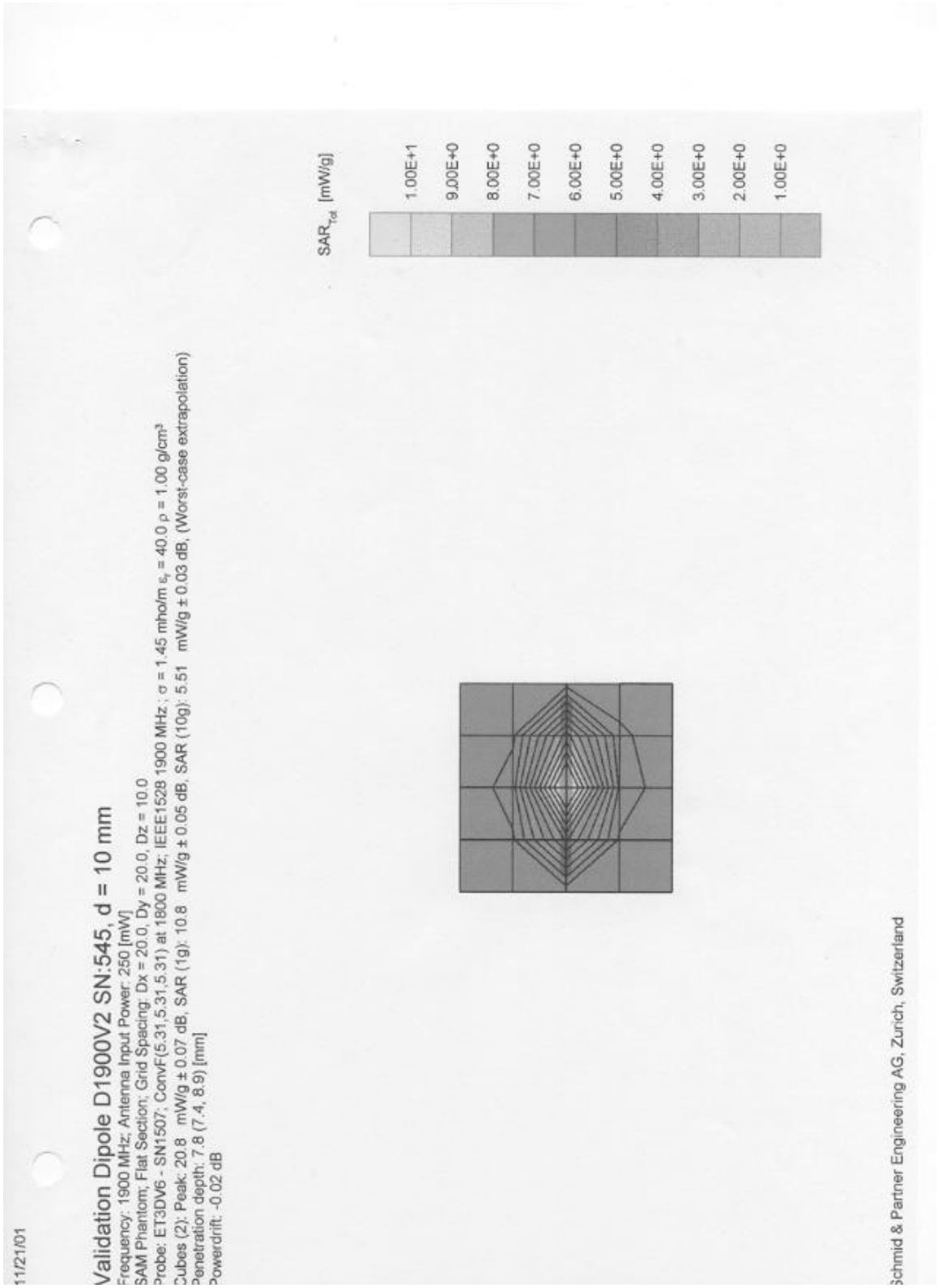
Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

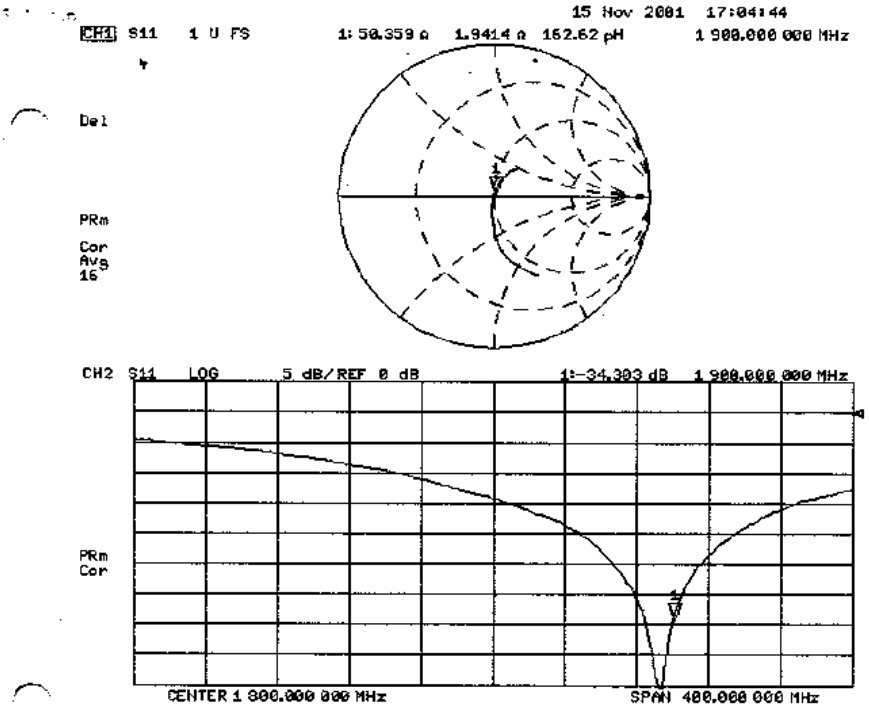
5. Design

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.





APPENDIX E: SAR SET UP PHOTOS

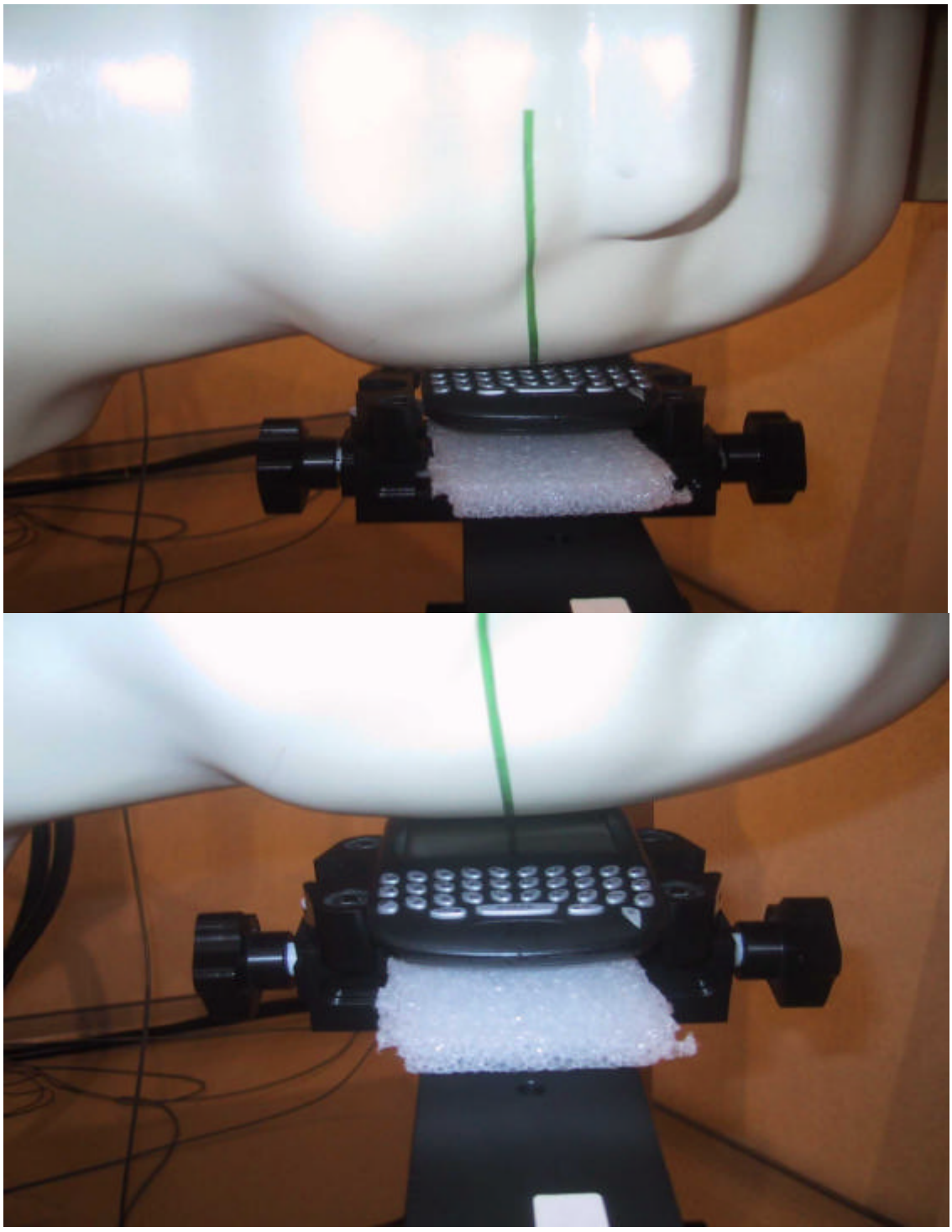


Figure E1. Left ear configuration

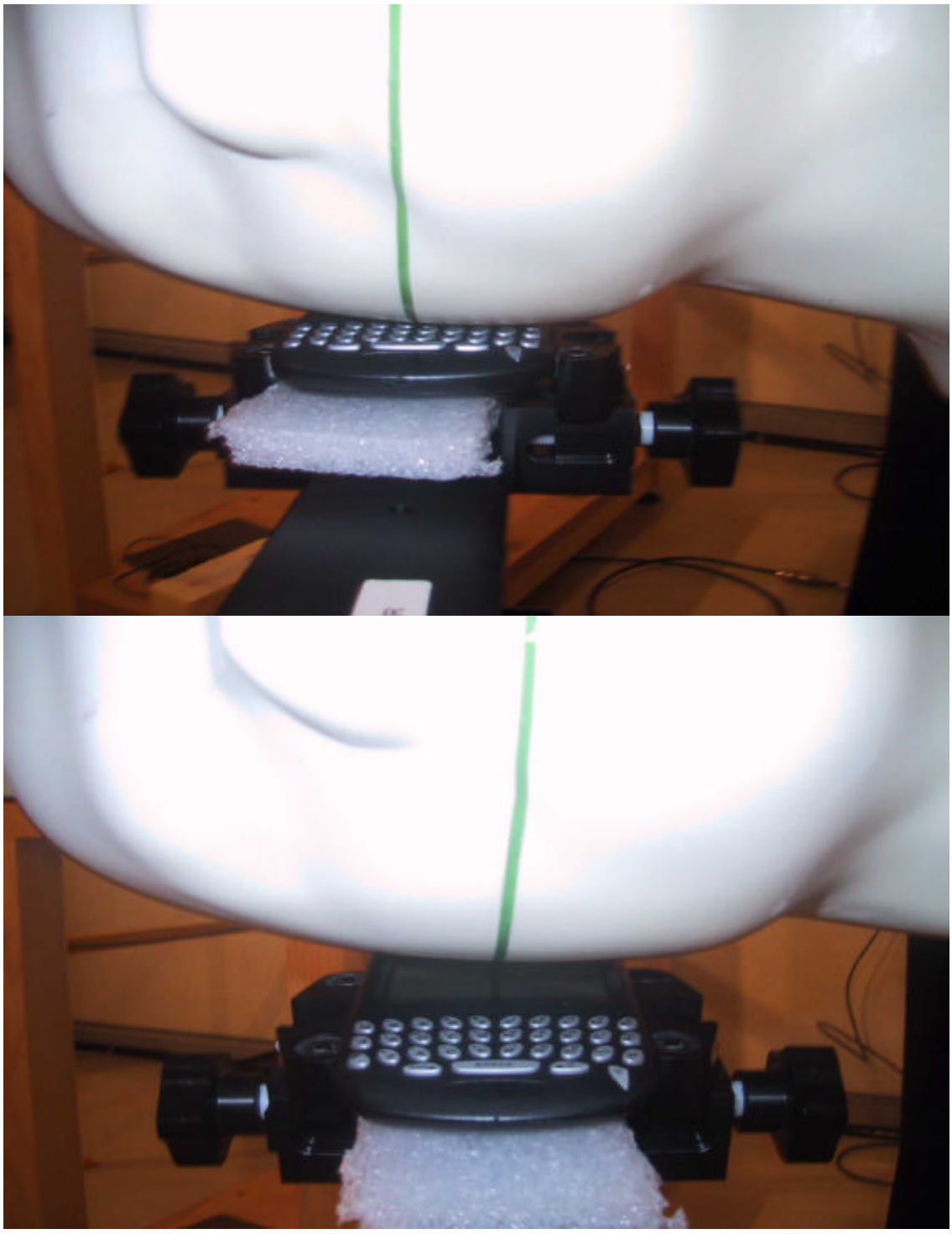


Figure E2. Right ear configuration

Figure E3. Body worn configuration with holster and headset

Figure E4. Hand SAR configuration, unit back touching flat phantom