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Our Ref: 03587-CERT- CORRESP_23426 July 30, 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 Correspondence Reference # 23426 for additional information on RIM BlackBerry Wireless Handheld FCC ID **L6AR6510IN**, 731 Confirmation # **EA218687**

The following addresses the comments on your **Correspondence Reference #23426**, dated July 24, 2002.

ITEM 1 & 2:
We do not have certified muscle probe factors available at this time. SPEAG, the manufacturer of the probes, provided us with only head conversion factors. We have arranged for SPEAG to calibrate our probes for muscle probe factor parameters. We expect to have these in a few weeks.

Consequently, the ratio of muscle to head probe factor was estimated from similar probes used by other manufacturers applications with FCC ID: 1HDT6CH1 and GMLNHP-2AX. The estimated ratio of muscle to head conversion factor of 0.96 is used for 800-900 and the BlackBerry Wireless Handheld Model No. R6510IN, S/N: R2DV-153 was evaluated for body-worn and hand SAR with the estimated muscle conversion factors. The new results are shown in the tables below.

1.1 System accuracy verification for body-worn and hand use

f (MHz)	Limits / Measured	SAR (W/kg) 1 g/ 10g	Dielectric Parameters		Ambient Temp (°C)	Liquid Temp (°C)
			ε_r	σ [S/m]		
835	Measured	11.6 / 6.8	56.6	0.98	23.5	22.7
	Recommended Limits	10.7 / 6.8	56.1	0.95	N/A	N/A

Table 1. System accuracy (validation for body-worn use)

1.2 Dielectric parameter measurements for 835 MHz muscle tissue

Title
SubTitle
July 24, 2002 06:34 PM

Frequency	e'	e''
800.000000 MHz	56.7404	21.3335
805.000000 MHz	56.6977	21.2678
810.000000 MHz	56.6539	21.2429
815.000000 MHz	56.6564	21.1725
820.000000 MHz	56.6216	21.1222
825.000000 MHz	56.6018	21.0945
830.000000 MHz	56.5839	21.0550
835.000000 MHz	56.5823	20.9983
840.000000 MHz	56.5501	20.9758
845.000000 MHz	56.5054	20.9472
850.000000 MHz	56.4823	20.9434
855.000000 MHz	56.4299	20.9181
860.000000 MHz	56.3721	20.8627
865.000000 MHz	56.3114	20.8523
870.000000 MHz	56.2435	20.8343
875.000000 MHz	56.1915	20.7995
880.000000 MHz	56.1315	20.8218
885.000000 MHz	56.0540	20.7979
890.000000 MHz	56.0117	20.7919
895.000000 MHz	55.9765	20.7620
900.000000 MHz	55.9421	20.7320
905.000000 MHz	55.8977	20.7011
910.000000 MHz	55.8575	20.6531
915.000000 MHz	55.8454	20.6458
920.000000 MHz	55.8128	20.6003

Table 2. 835 MHz muscle tissue dielectric parameters

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

Mode	f (MHz)	Conducted pulse average power (dBm)	Antenna Configuration	Chamber Temp. (°C)	Liquid Temp. (°C)	SAR, averaged over 1 g (W/kg)	SAR, averaged over 1 g with headset (W/kg)
TDMA	806.0125	28.35	retracted	23.9	23.2	0.46	0.32
	806.0125	28.35	extended	23.9	23.2	0.27	-
	815.5000	28.35	retracted	24.4	23.2	**0.49**	-
	815.5000	28.35	extended	24.4	23.3	0.35	-
	824.9880	28.45	retracted	24.4	23.3	0.39	-
	824.9880	28.45	extended	24.4	23.3	-	-

Table 3. SAR results with holster for body configuration

1.4 SAR Measurement results at highest power measured for hand.

Mode	f (MHz)	Conducted pulse average power (dBm)	Device Config. Touching Phantom	Antenna Config.	Chamber Temp. (°C)	Liquid Temp. (°C)	SAR, averaged over 10 g (W/kg)	SAR, averaged over 10 g with headset (W/kg)
TDMA	806.0125	28.35	Back side	retracted	24.4	23.3	0.66	0.63
	806.0125	28.35	Back side	extended	24.4	23.3	0.61	-
	815.5000	28.35	Back side	retracted	23.9	23.2	0.61	-
	815.5000	28.35	Back side	extended	23.9	23.2	-	-
	824.9880	28.45	Back side	retracted	23.7	23.0	0.53	-
	824.9880	28.45	Back side	extended	23.7	23.0	-	-
	806.0125	28.35	Left edge	retracted	23.8	22.8	**1.12**	Not Possible
	806.0125	28.35	Left edge	extended	23.8	22.8	0.46	-
	815.5000	28.35	Left edge	retracted	23.8	22.6	1.04	-
	815.5000	28.35	Left edge	extended	23.8	22.6	-	-
	824.9880	28.45	Left edge	retracted	23.7	22.4	1.04	-
	824.9880	28.45	Left edge	extended	23.7	22.4	-	-

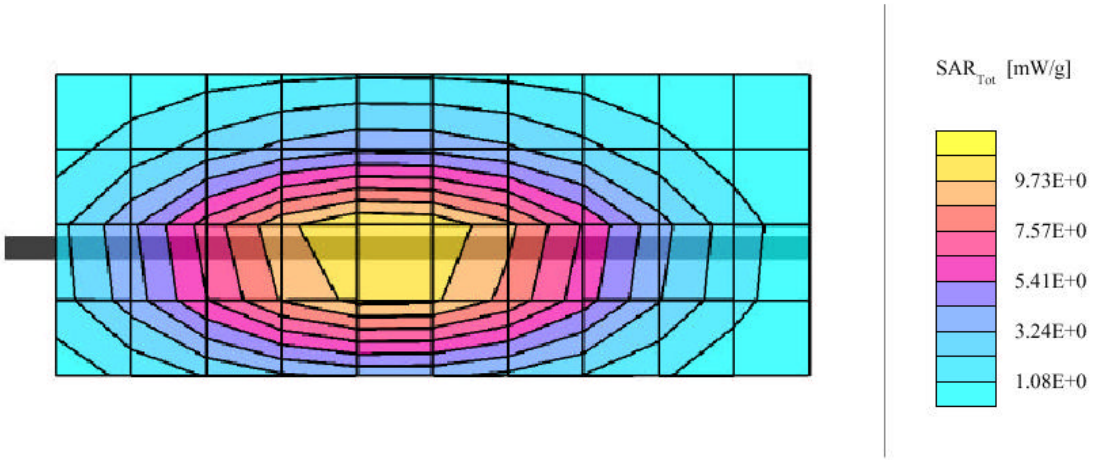
Table 4. SAR results for hand configuration

1.5 Dilpole validation plot with the estimated muscle conversion factor

07/24/02

Dipole 835
SAM 2; Flat
Probe: ET3DV6 - SN1644; ConvF(6.18,6.18,6.18); Crest factor: 1.0; Muscle 835 MHz: σ = 0.98 mho/m ε_r = 56.6 ρ = 1.00 g/cm^3
Cube 5x5x7: Peak: 18.5 mW/g, SAR (1g): 11.6 mW/g, SAR (10g): 7.37 mW/g, (Worst-case extrapolation)
Penetration depth: 12.3 (10.7, 14.3) [mm]
Powerdrift: 0.00 dB

Tested on July 24, 2002
Ambient Temperature: 23.0 deg. cel.
Liquid Temperature: 22.8 deg. cel.
Input power of 30 dBm CW

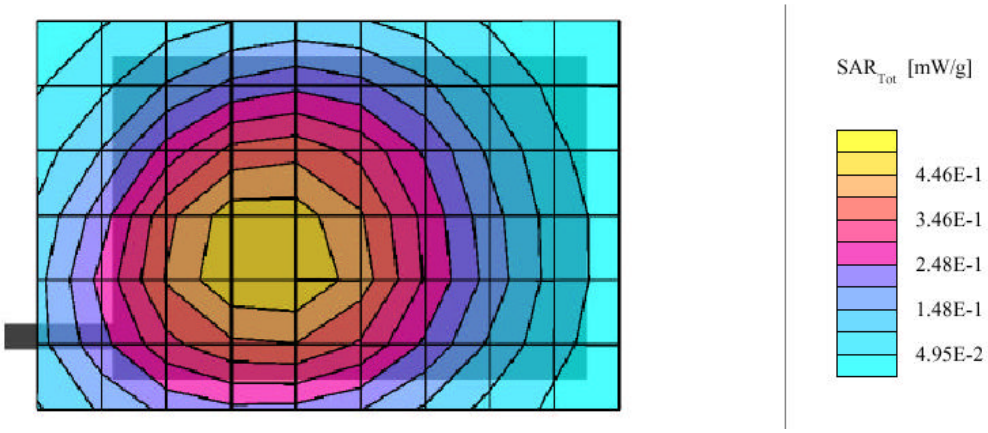


1.6 Body-worn SAR plot with the estimated muscle conversion factor

07/25/02

BlackBerry Wireless Handheld Model No. R6510IN
SAM 2; Flat
Probe: ET3DV6 - SN1644; ConvF(6.18,6.18,6.18); Crest factor: 3.0; Muscle 835 MHz: σ = 0.99 mho/m ε_r = 57.0 ρ = 1.00 g/cm^3
Cube 5x5x7: Peak: 0.685 mW/g, SAR (1g): 0.491 mW/g, SAR (10g): 0.361 mW/g, (Worst-case extrapolation)
Penetration depth: 17.8 (15.2, 20.4) [mm]
Powerdrift: -0.08 dB

Tested on July 25, 2002
Ambient Temperature: 23.9 deg. cel.
Liquid Temperature: 23.2 deg. cel.
Body-worn with holster
Retracted antenna
Middle frequency: 815.500 MHz

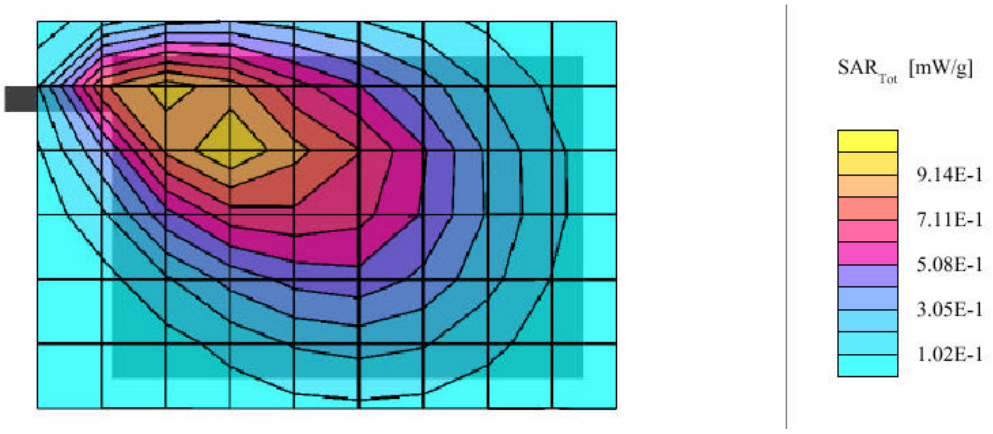


1.7 Hand SAR plot with the estimated muscle conversion factor for the back of the unit touching flat phantom

07/25/02

BlackBerry Wireless Handheld Model No. R6510IN
SAM 2; Flat
Probe: ET3DV6 - SN1644; ConvF(6.18,6.18,6.18); Crest factor: 3.0; Muscle 835 MHz: σ = 0.99 mho/m ε_r = 57.0 ρ = 1.00 g/cm^3
Cube 5x5x7: Peak: 1.90 mW/g, SAR (1g): 1.04 mW/g, SAR (10g): 0.658 mW/g, (Worst-case extrapolation)
Penetration depth: 12.0 (10.5, 14.0) [mm]
Powerdrift: -0.14 dB

Tested on July 25, 2002
Ambient Temperature: 24.4 deg. cel.
Liquid Temperature: 23.3 deg. cel.
Hand SAR device back touching the flat phantom
Retracted antenna
Low frequency: 806.0125 MHz

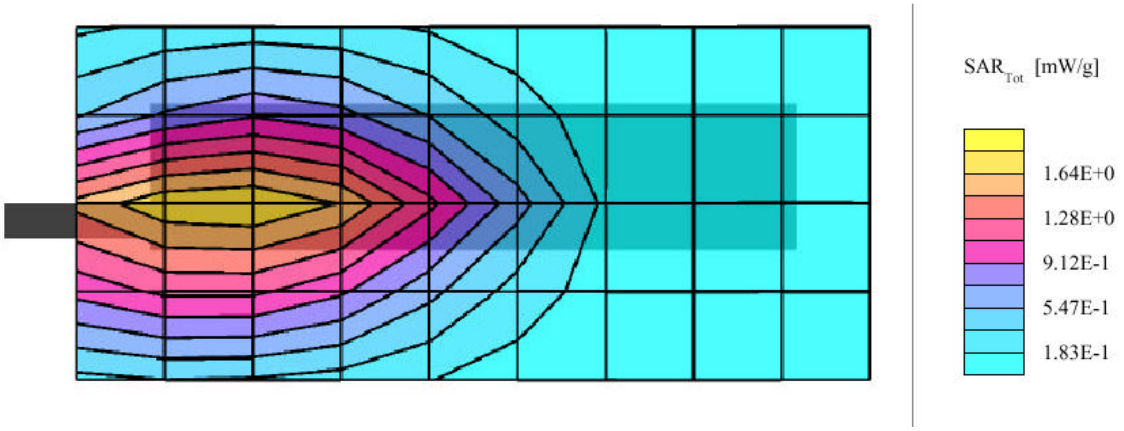


1.8 Hand SAR plot with the estimated muscle conversion factor for the left edge of the unit touching flat phantom

07/25/02

BlackBerry Wireless Handheld Model No. R6510IN
SAM 2; Flat
Probe: ET3DV6 - SN1644; ConvF(6.18,6.18,6.18); Crest factor: 3.0; Muscle 835 MHz: σ = 0.99 mho/m ε_r = 57.0 ρ = 1.00 g/cm^3
Cube 5x5x7: Peak: 2.98 mW/g, SAR (1g): 1.78 mW/g, SAR (10g): 1.12 mW/g, (Worst-case extrapolation)
Penetration depth: 12.0 (9.8, 15.0) [mm]
Powerdrift: 0.00 dB

Tested on July 25, 2002
Ambient Temperature: 23.8 deg. cel.
Liquid Temperature: 22.8 deg. cel.
Hand SAR device left edge touching the flat phantom
Retracted antenna
Low frequency: 806.0125 MHz



ITEM 3:
The manual has been revised with the new body SAR value as shown below:

"The highest SAR value for this model handheld when tested for use at the ear is 0.919 W/kg and when worn on the body, as described in this user guide, is 0.491 W/kg."

ITEM 4:
Yes, the testing was done with the maximum duty cycle of 2/6, i.e. with 2 time slots transmitting out of 6 time slot frame.

ITEM 5:
Please refer to Appendix A for the dipole validation target development data.

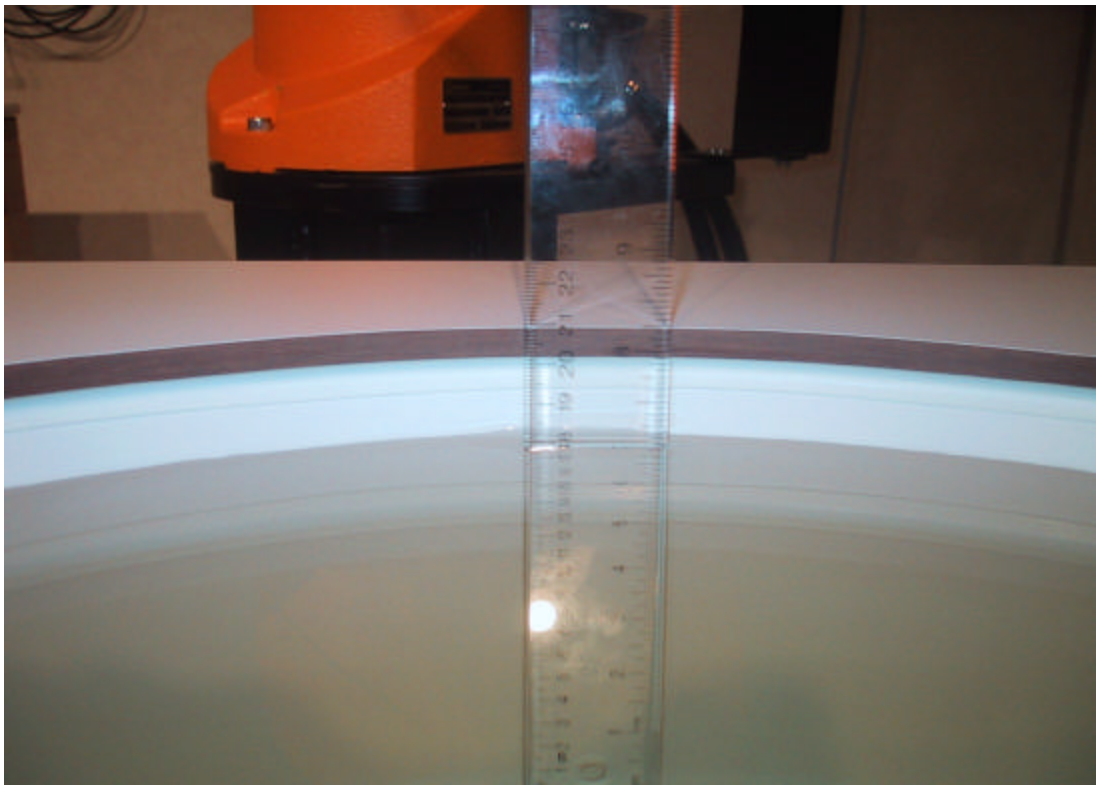
ITEM 6:
Please refer to Appendix C for photographs of all test positions:

- touch left side of head retracted antenna
- touch left side of head extended antenna
- tilted left side of head retracted antenna
- tilted left side of head extended antenna
- touch right side of head retracted antenna
- touch right side of head extended antenna
- tilted right side of head extended antenna
- tilted right side of head extended antenna
- body-worn with holster retracted antenna
- body-worn with holster extended antenna
- hand SAR with device back touching the flat phantom retracted antenna,
- hand SAR with device back touching the flat phantom extended antenna,
- hand SAR with device left edge touching the flat phantom retracted antenna, and
- hand SAR with device left edge touching the flat phantom extended antenna

ITEM 7:
Updated uncertainty budget using the draft P1528 template.

Uncertainty Component	Tolerance (± %)	Probability Distribution	Sensitivity coefficient (1-g)	Sensitivity coefficient (10-g)	1-g Standard Uncertainty (±%)	10-g Standard Uncertainty (±%)
Measurement System						
Probe Calibration (k=1)	4.8	Normal	1	1	4.8	4.8
Axial Isotropy	4.7	Rectangle	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.6	Rectangle	0.7	0.7	3.9	3.9
Boundary Effect	11.0	Rectangle	1	1	6.4	6.4
Linearity	4.7	Rectangle	1	1	2.7	2.7
System Detection Limits	1.0	Rectangle	1	1	0.6	0.6
Readout Electronics	1.0	Normal	1	1	1.0	1.0
Response Time	0.8	Rectangle	1	1	0.5	0.5
Integration Time	1.8	Rectangle	1	1	1.1	1.1
RF Ambient Conditions	3.0	Rectangle	1	1	1.7	1.7
Probe Positioner Mechanical Tolerance	0.4	Rectangle	1	1	0.2	0.2
Probe Positioning with respect to Phantom Shell	2.9	Rectangle	1	1	1.7	1.7
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	3.9	Rectangle	1	1	2.3	2.3
Test sample Related						
Test Sample Positioning		Normal	1	1	6.7	6.7
Device Holder Uncertainty		Normal	1	1	5.9	5.9
Output Power Variation - SAR drift measurement	5	Rectangle	1	1	2.9	2.9
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	4.0	Rectangle	1	1	2.3	2.3
Liquid Conductivity - deviation from target values	5.0	Rectangle	0.7	0.5	2.0	1.4
Liquid Conductivity - measurement uncertainty	10.0	Rectangle	0.7	0.5	4.0	2.9
Liquid Permittivity - deviation from target values	5.0	Rectangle	0.6	0.5	1.7	1.4
Liquid Permittivity - measurement uncertainty	5.0	Rectangle	0.6	0.5	1.7	1.4
Combined Standard Uncertainty		RSS			14.9	14.5
Expanded Uncertainty (95% CONFIDENCE LEVEL)					29.8	29.0

ITEM 8:
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 9:
The 1.58 Watts provided on the FCC Form 731 is the Effective Radiated Power (ERP) which is measured in the 3-m chamber. The 0.7 Watts in the test report is the conducted power measured directly at the rf port of the device.

ITEM 10:
There are a total of 6 time slots per iDEN frame with a maximum of 2 transmission time slots which results in a crest factor of 3.

ITEM 11:
Yes, the BlackBerry Wireless Handheld Model No. R6510IN can be used in a similar manner to a normal cell phone and be held against the ear.

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

Yours truly,

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APPENDIX A: DIPOLE VALIDATION TARGET DEVELOPMENT DATA

Schmid & Partner
Engineering AG

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

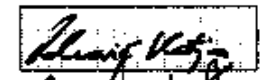
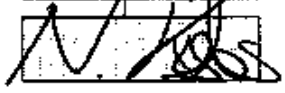
Calibration Certificate

835 MHz System Validation Dipole

Type:	D835V2
Serial Number:	446
Place of Calibration:	Zurich
Date of Calibration:	November 12, 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

DASY

Dipole Validation Kit

Type: D835V2

Serial: 446

Manufactured: October 24, 2001
Calibrated: November 12, 2001

1. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with head simulating solution of the following electrical parameters at 835 MHz:

Relative Dielectricity	**42.3**	**± 5%**
Conductivity	**0.91 mho/m**	**± 5%**

The DASY3 System (Software version 3.1c) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.27 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 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 phantom according to the measurement conditions described in section 1. The results 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:	**10.7 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**6.84 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.

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:	**1.401 ns**	(one direction)
Transmission factor:	**0.993**	(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 835 MHz:	Re{Z} = **49.8 Ω**
	Im {Z} = **-4.8 Ω**
Return Loss at 835 MHz	**-26.4 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.

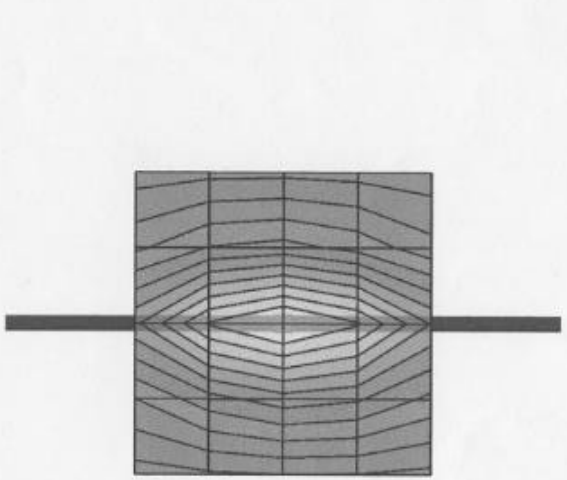
6. Power Test

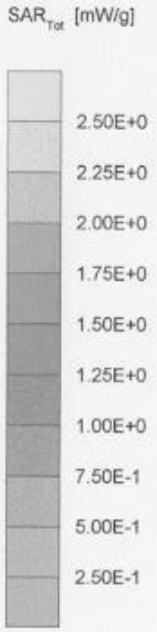
After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

11/01/01

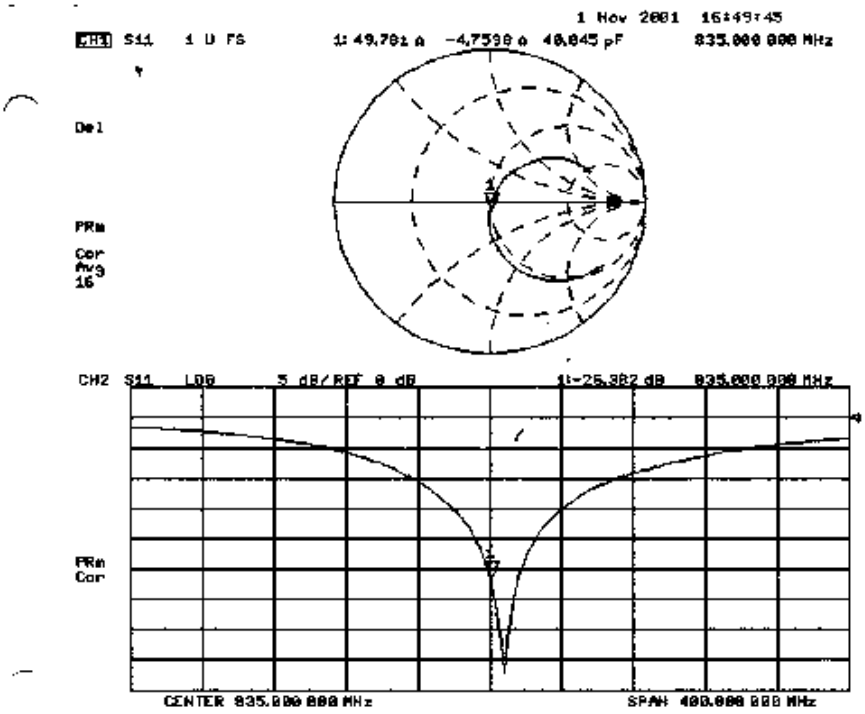
Validation Dipole D835V2 SN:446, d = 15 mm

Frequency: 835 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(6.27,6.27,6.27) at 900 MHz; IEEE1528 835 MHz; σ = 0.91 mho/m ε_r = 42.3 ρ = 1.00 g/cm^3
Cubes (2): Peak: 4.30 mW/g ± 0.00 dB, SAR (1g): 2.68 mW/g ± 0.01 dB, SAR (10g): 1.71 mW/g ± 0.02 dB, (Worst-case extrapolation)
Penetration depth: 12.0 (10.6, 13.7) [mm]
Powerdrift: -0.00 dB





Schmid & Partner Engineering AG, Zurich, Switzerland



APPENDIX B: PROBE CALIBRATION

Schmid & Partner
Engineering AG

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

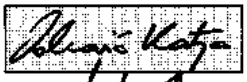
Calibration Certificate

Dosimetric E-Field Probe

Type:	ET3DV6
Serial Number:	1644
Place of Calibration:	Zurich
Date of Calibration:	November 26, 2001
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
Calibrated: November 26, 2001

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1644

Sensitivity in Free Space

Diode Compression

NormX	1.77 $\mu V/(V/m)^2$	DCP X	98 mV
NormY	1.91 $\mu V/(V/m)^2$	DCP Y	98 mV
NormZ	1.85 $\mu V/(V/m)^2$	DCP Z	98 mV

Sensitivity in Tissue Simulating Liquid

Head 450 MHz ε_r = 43.5 ± 5% σ = 0.87 ± 10% mho/m

ConvF X	7.07 extrapolated	Boundary effect:	
ConvF Y	7.07 extrapolated	Alpha	0.37
ConvF Z	7.07 extrapolated	Depth	2.27

Head 800 - 1000 MHz ε_r = 39.0 - 43.5 σ = 0.80 - 1.10 mho/m

ConvF X	6.51 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.51 ± 9.5% (k=2)	Alpha	0.43
ConvF Z	6.51 ± 9.5% (k=2)	Depth	2.25

Head 1500 MHz ε_r = 40.4 ± 5% σ = 1.23 ± 10% mho/m

ConvF X	5.76 interpolated	Boundary effect:	
ConvF Y	5.76 interpolated	Alpha	0.52
ConvF Z	5.76 interpolated	Depth	2.22

Head 1700 - 1910 MHz ε_r = 39.5 - 41.0 σ = 1.20 - 1.55 mho/m

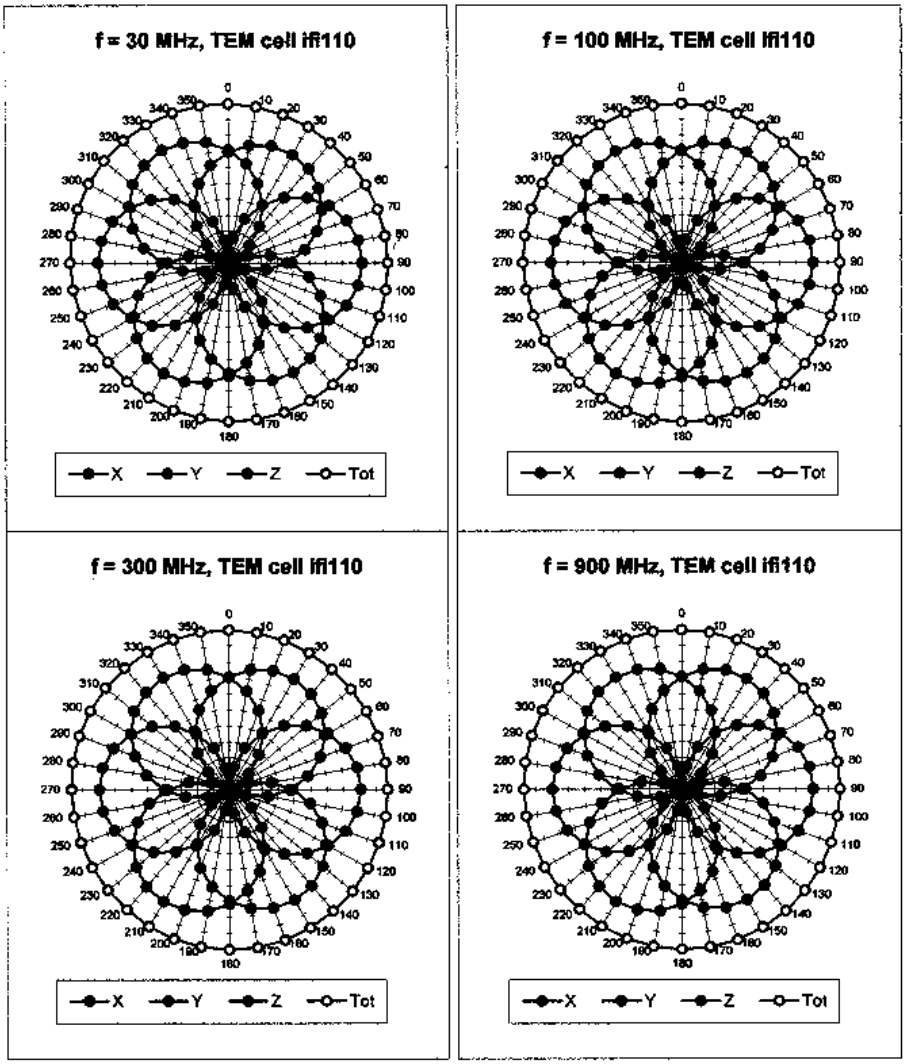
ConvF X	5.39 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.39 ± 9.5% (k=2)	Alpha	0.56
ConvF Z	5.39 ± 9.5% (k=2)	Depth	2.20

Sensor Offset

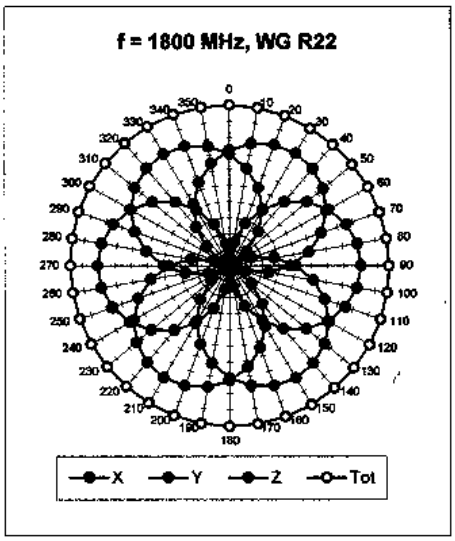
Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.4 ± 0.2	mm

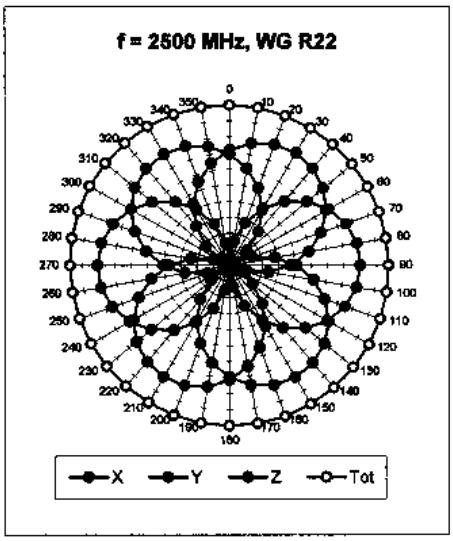
ET3DV6 SN:1644

Receiving Pattern (ϕ), θ = 0°

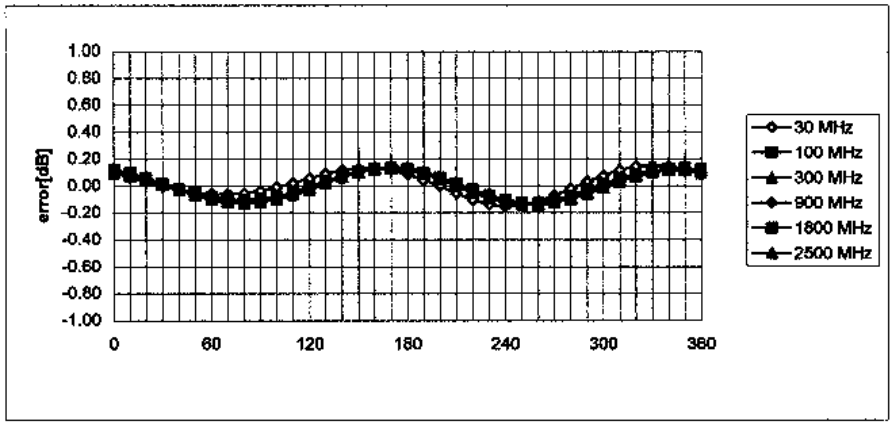


ET3DV6 SN:1644



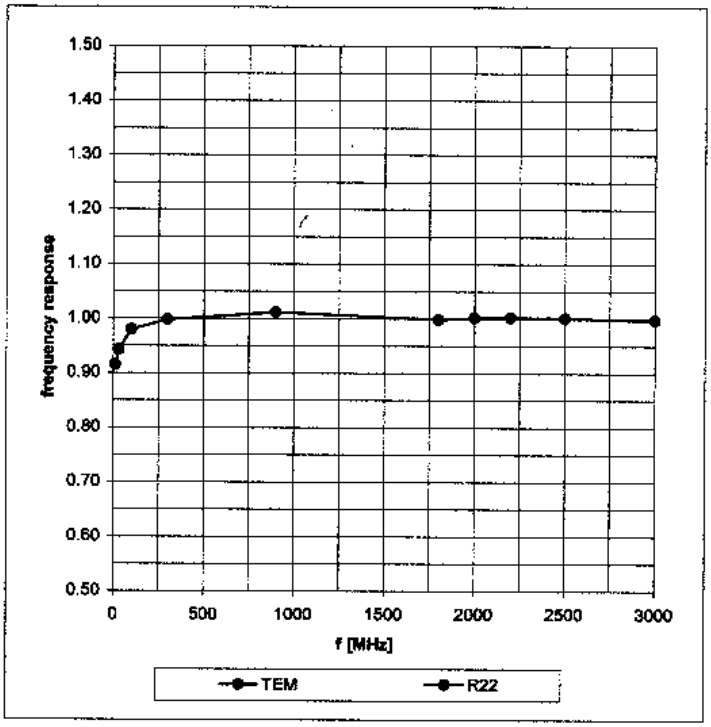


Isotropy Error (ϕ), θ = 0°



Frequency Response of E-Field

(TEM-Cell:ifi110, Waveguide R22)



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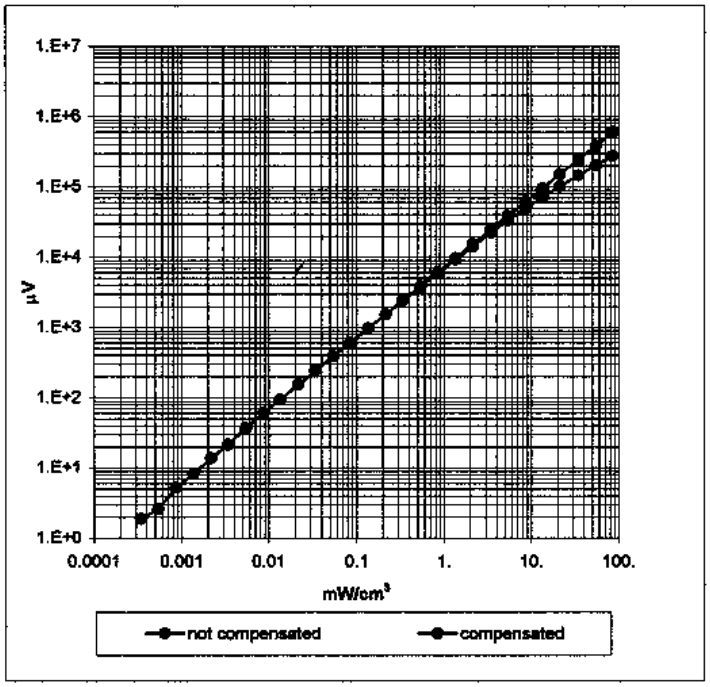
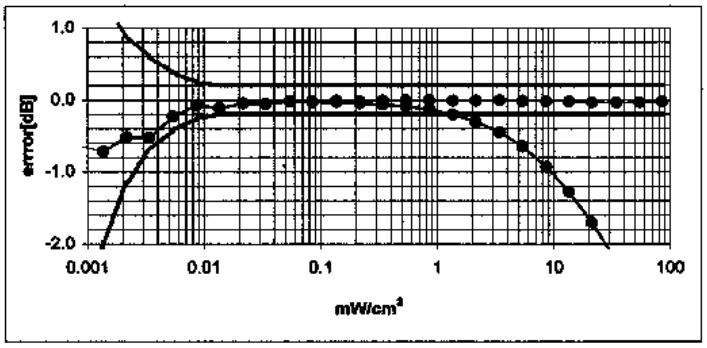
Dynamic Range f(SAR_{brain})

(Waveguide R22)





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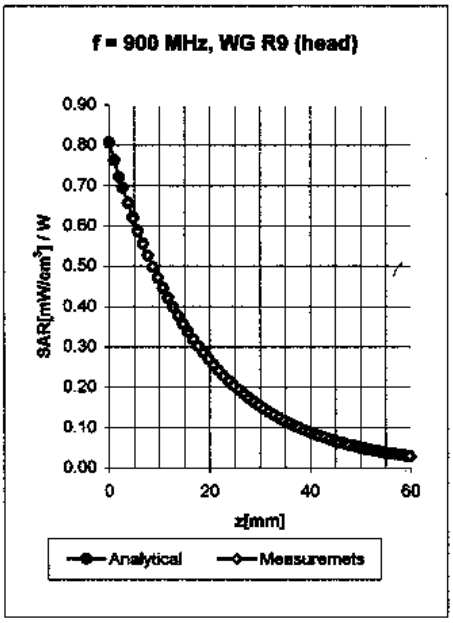
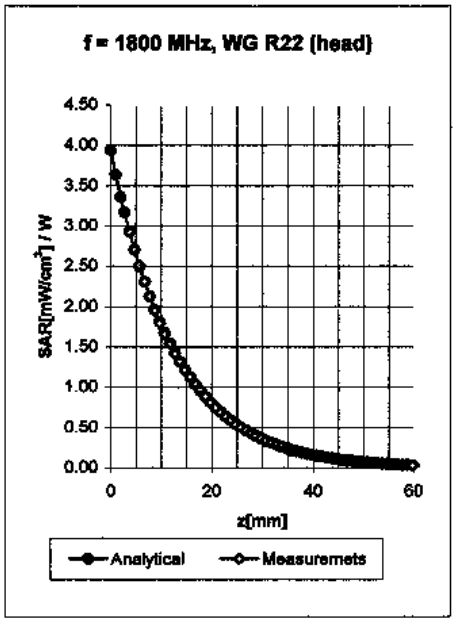
Conversion Factor Assessment





Head **800 - 1000 MHz** ε_r = 39.0 - 43.6 σ = 0.80 - 1.10 mho/m

ConvF X	**6.51** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.51** ± 9.5% (k=2)	Alpha	**0.43**
ConvF Z	**6.51** ± 9.5% (k=2)	Depth	**2.25**

Head **1700 - 1910 MHz** ε_r = 39.5 - 41.0 σ = 1.20 - 1.55 mho/m

ConvF X	**5.39** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.39** ± 9.5% (k=2)	Alpha	**0.56**
ConvF Z	**5.39** ± 9.5% (k=2)	Depth	**2.20**

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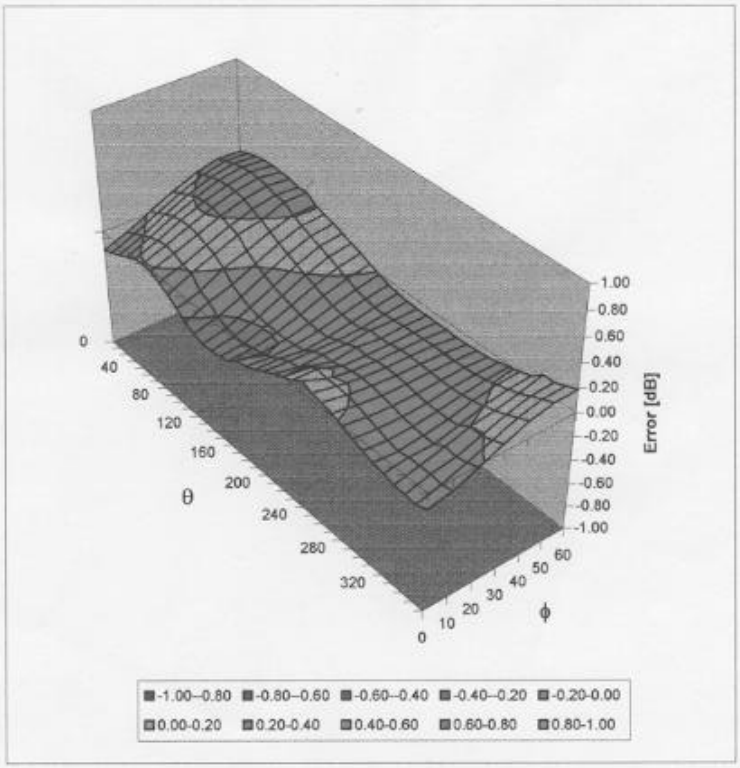
Deviation from Isotropy in HSL

Error (θ,ϕ), f = 900 MHz



APPENDIX C: SAR SETUP PHOTOS

Figure C1. Left ear touch configuration

Figure C2. Left ear tilted configuration

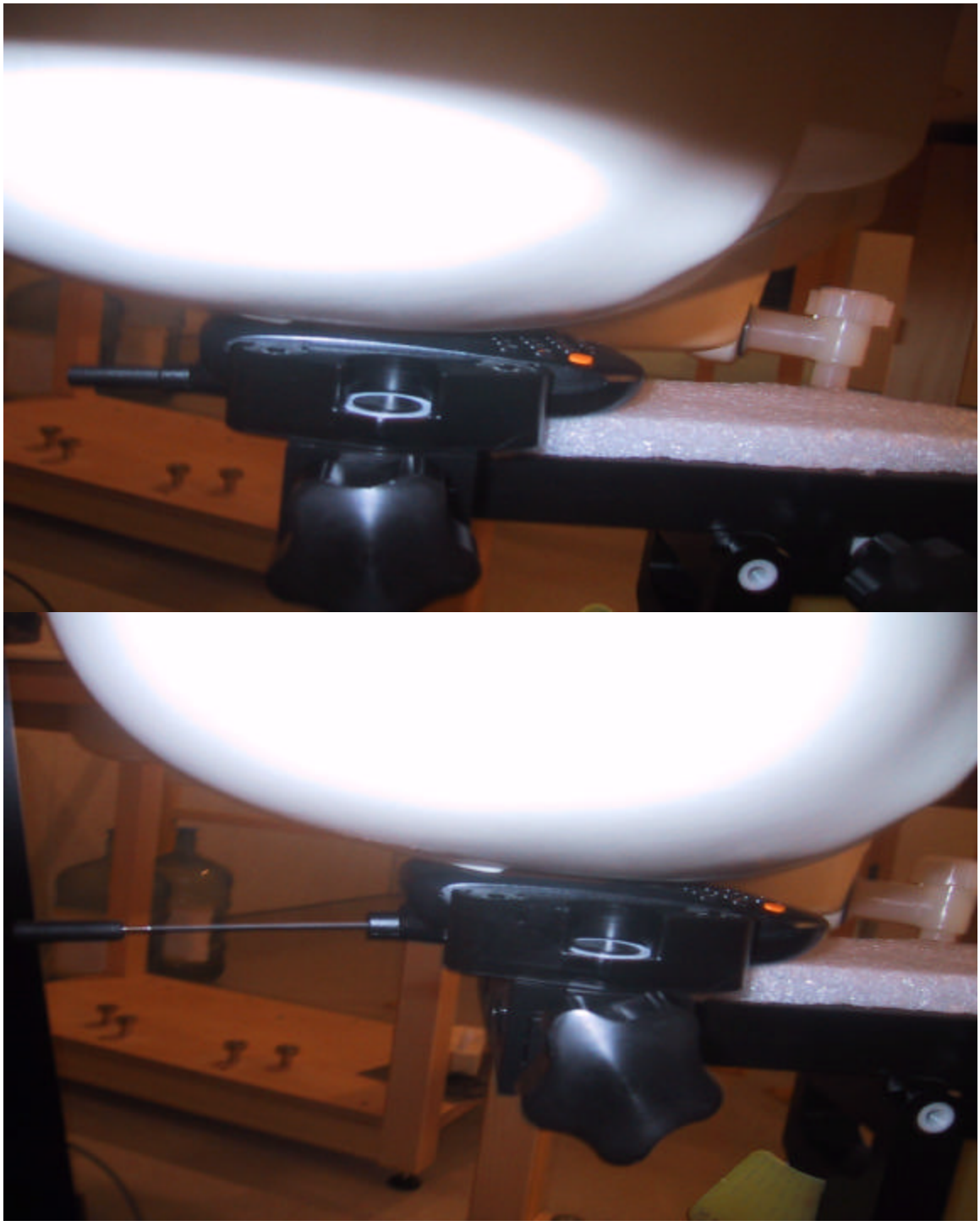


Figure C3. Right ear touch configuration

Figure C4. Right ear tilted configuration

Figure C5. Body worn configuration retracted antenna with holster and headset

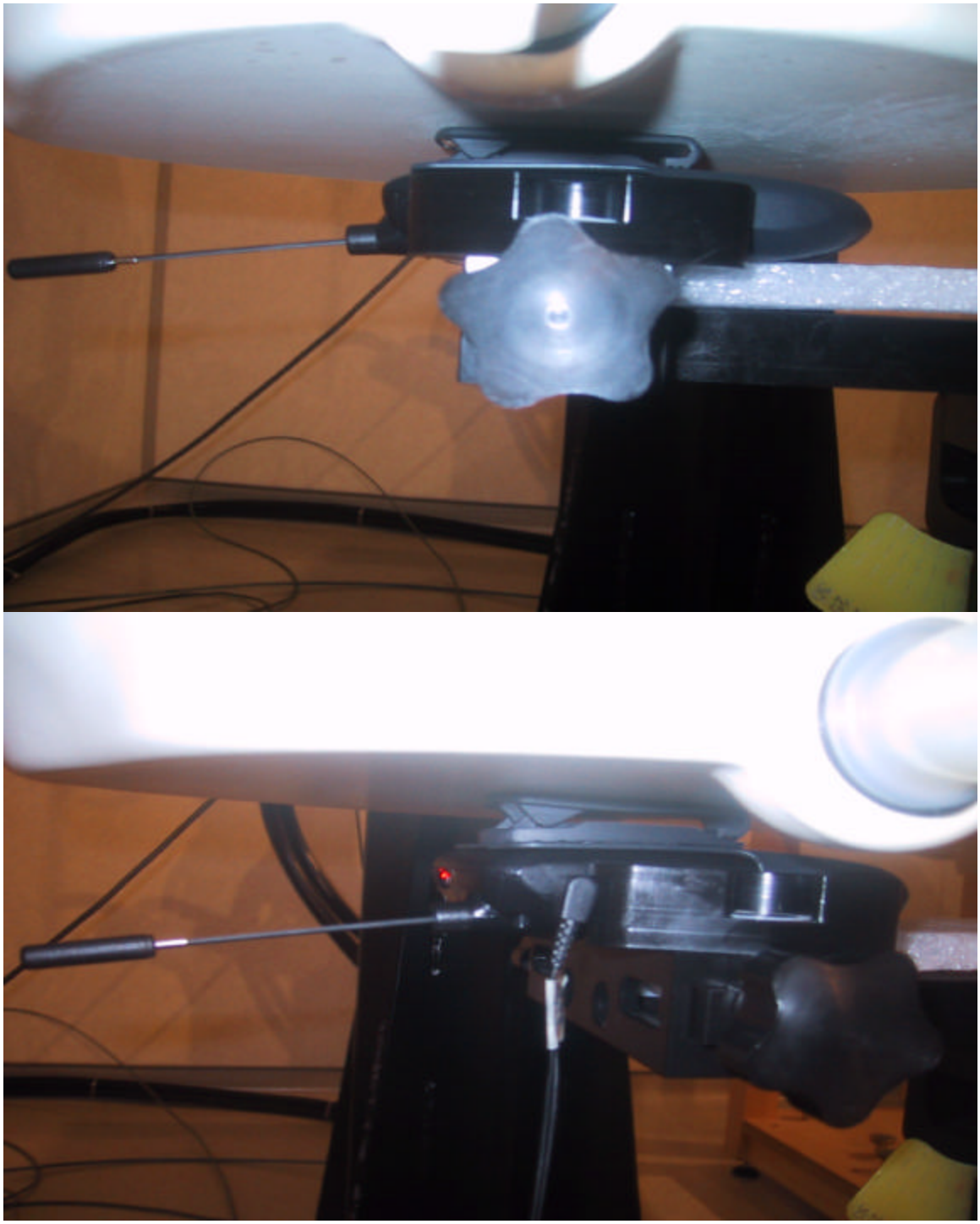


Figure C6. Body worn configuration extended antenna with holster and headset

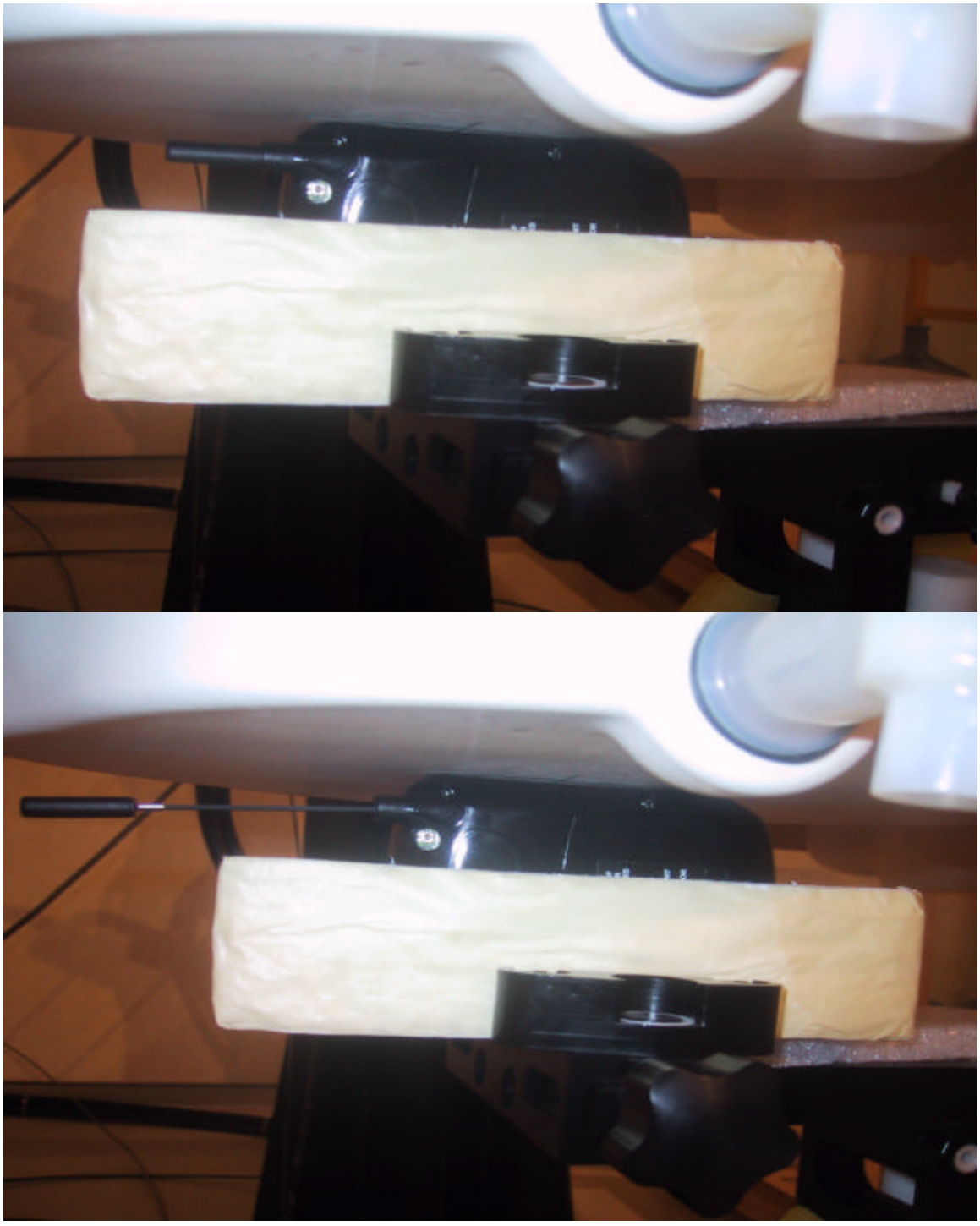


Figure C7. Hand SAR configuration, unit left edge touching flat phantom

Figure C8. Hand SAR configuration, unit back touching flat phantom