Date: October 17, 2002

Subject: Supplement to SAR Test Report for Motorola portable cellular phone (FCC ID IHDT56CG1 class II permissive change)

Reference:

Correspondence Reference Number:	221015.IHD
Confirmation Number:	TC1350
Date of Original Email:	10/15/2002
Log-in Date:	10/11/2002
FCC CRNs/Confirmation Nos.	4796/TC842138 (07/26/02); 5284/TC516641 (09/26/02)

Prepared by:
Steven Hauswirth
Motorola Personal Communications Sector Product Safety Laboratory
Harvard, Illinois

Andrew Bachler, Principal Staff Engineer
Motorola Personal Communications Sector
Libertyville, Illinois

Summary of FCC request for additional information

There was a request for additional information regarding Motorola's SAR Test Report for Motorola portable cellular phone (FCC ID IHDT56CG1). The requested information is addressed below in the same numbering sequence received.

1) Please provide additional test configuration photo for body worn position. Photograph provided must clearly show the distance from the body of the device to the phantom.

Response: Please see appendix 1 for additional body worn configuration photos.

2) Strong justification for the probe conversion factor used for 1900 MHz body measurements. No corresponding probe certification could be found.

Response: Since simulated tissue targets are the same for both 1800 & 1900 MHz head and the conversion factor for both 1800 & 1900 MHz head is the same ('3.4' for Probe SN1522), it is also true for body worn that both 1800 & 1900 MHz share the same conversion factor ('3.1' for Probe SN1522) since they share the same simulated tissue targets. The 1900MHz body worn conversion factor is shown on page 8 of 10 on the attached probe calibration sheet (note that this page indicates that the 1800MHz & 1900MHz conversion factors are the same value).

3) Statement explaining large SAR drift noted at 1900 MHz/Ch. 025 touch position. Retest as appropriate. Please include measurements of power versus time of the device for at least 30 minutes in PCS mode.

Response: Please see Appendix 2 for the SAR vs. time output plot. This plot shows that the output power does vary some over time. The amount of drift measured will really depend on the moment in time that the drift measurement occurs.

4) Please provide justification for testing only two body-worn accessories (i.e., plastic holsters/belt clips) during Body SAR measurements. There are four available body-worn accessories described in this filing.

Response: The previous filings for IHDT56CG1 were reviewed to find the body worn accessories that resulted in the highest SAR measurement values, by

band. These accessories were used for these additional measurements to determine if there was an SAR impact.

5) Statement explaining the second/cutoff hotspots which are evident on several head SAR plots. Please provide additional test data fully measuring these points.

Response: Attached in Appendix 3 are the SAR measurements for the 2nd hot spots for the 1900MHz Left Head Tilt position w/Ant Retracted and Extended. All other 2nd hot spots are not within 2.0dB of the highest peak identified. This follows the guidelines within Supplement C, "**Procedures to search for peak sar locations**" section.

6) Please provide recent calibration certificate for probe S/N: 1398.

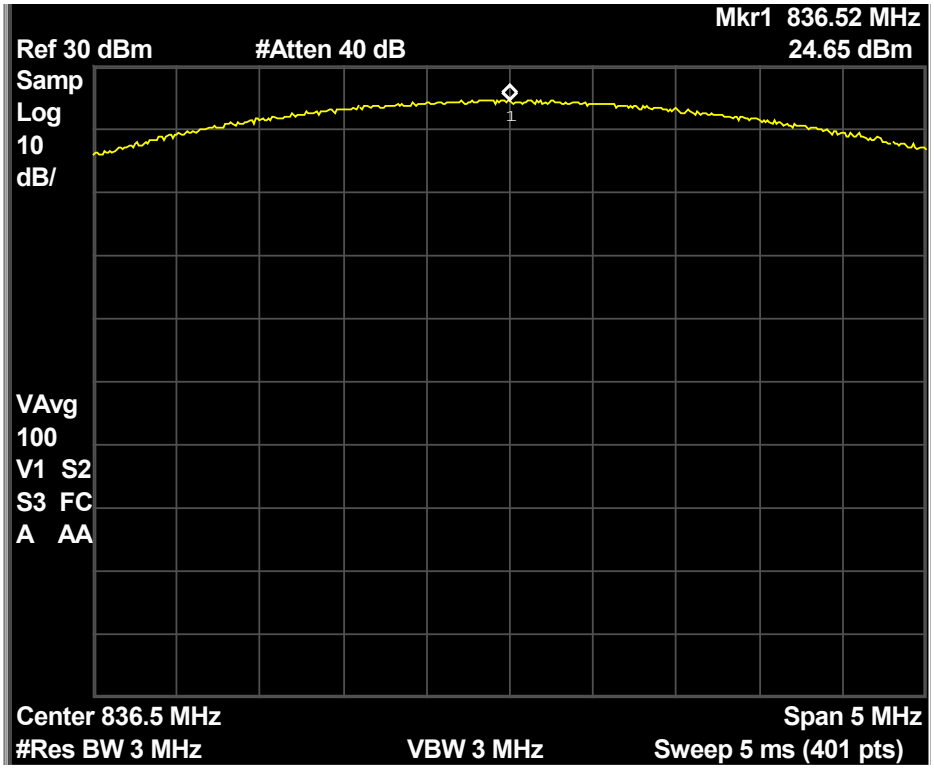
Response: Please see Appendix 4 for recent calibration certificate.

7) Please provide a statement that the EMC portion is not affected by this change (larger capacity battery) and the max. radiated power is the identical to the previously certified device. Alternatively, please send the EMC report. Please provide band edge plots per 22.901(d)

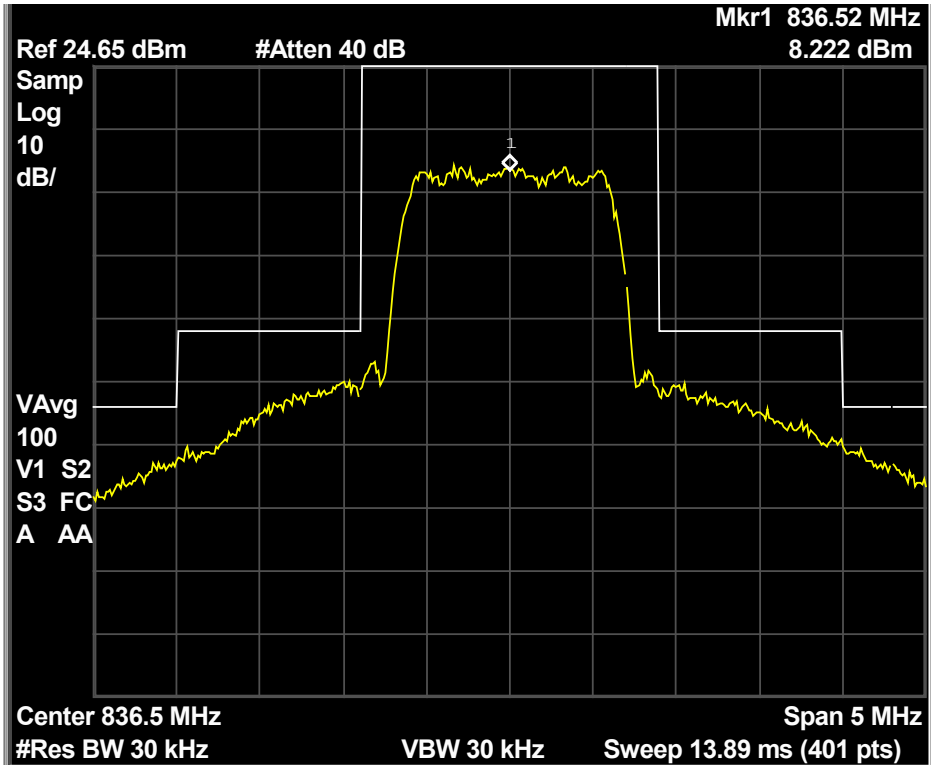
Response: Motorola confirms and attests that the larger capacity battery does not affect the EMC characteristics previously reported to the FCC. The band edge plots follow:

Measurement Results – CDMA 800

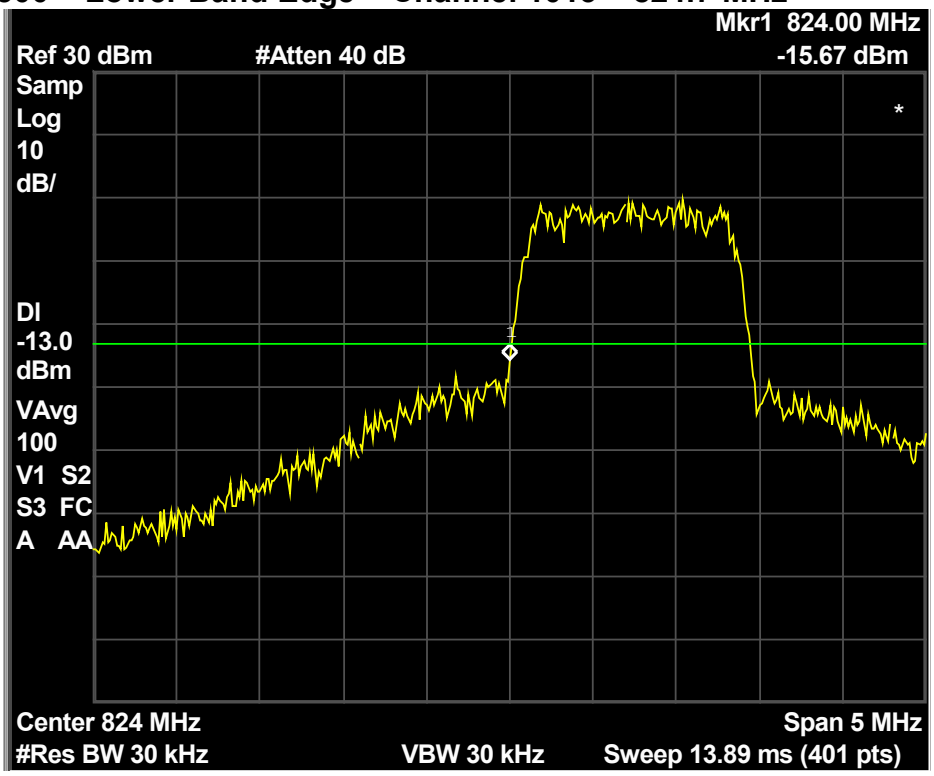
CDMA 800 – Reference Level Plot – Channel 384 – 836.52 MHz



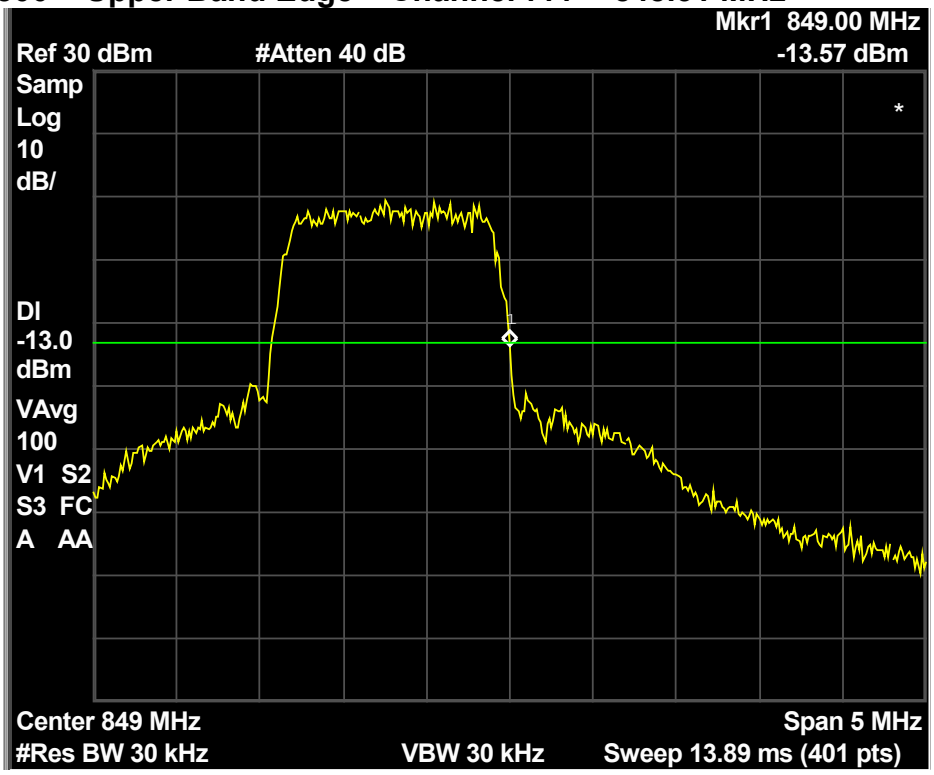
CDMA 800 – Channel 384 – 836.52 MHz



CDMA 800 – Lower Band Edge – Channel 1013 – 824.7 MHz

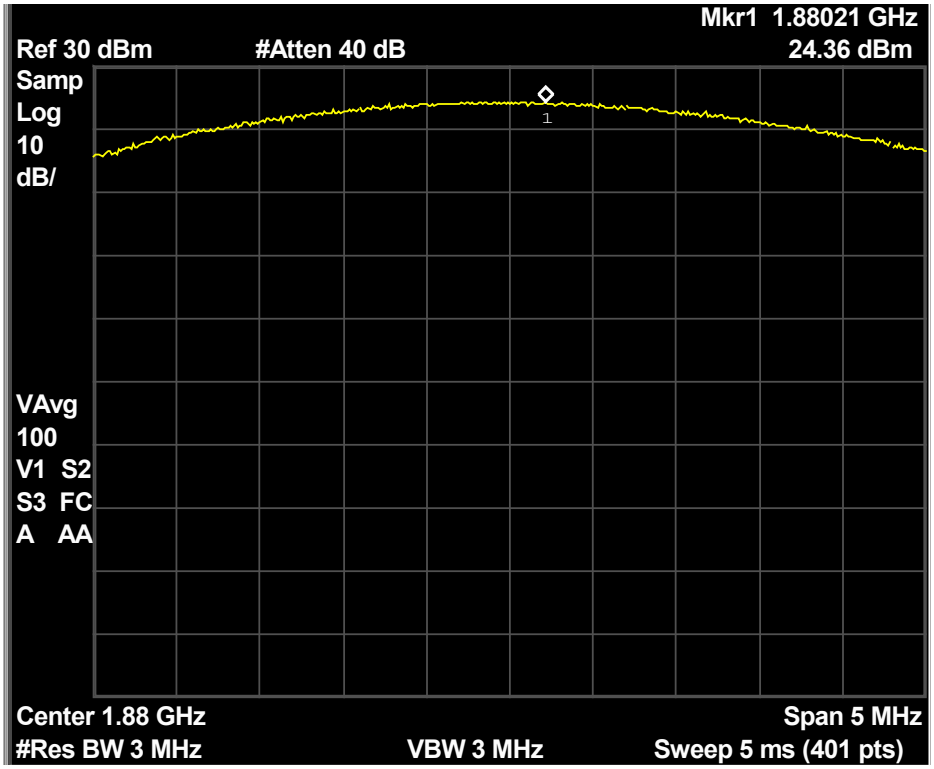


CDMA 800 – Upper Band Edge – Channel 777 – 848.31 MHz -

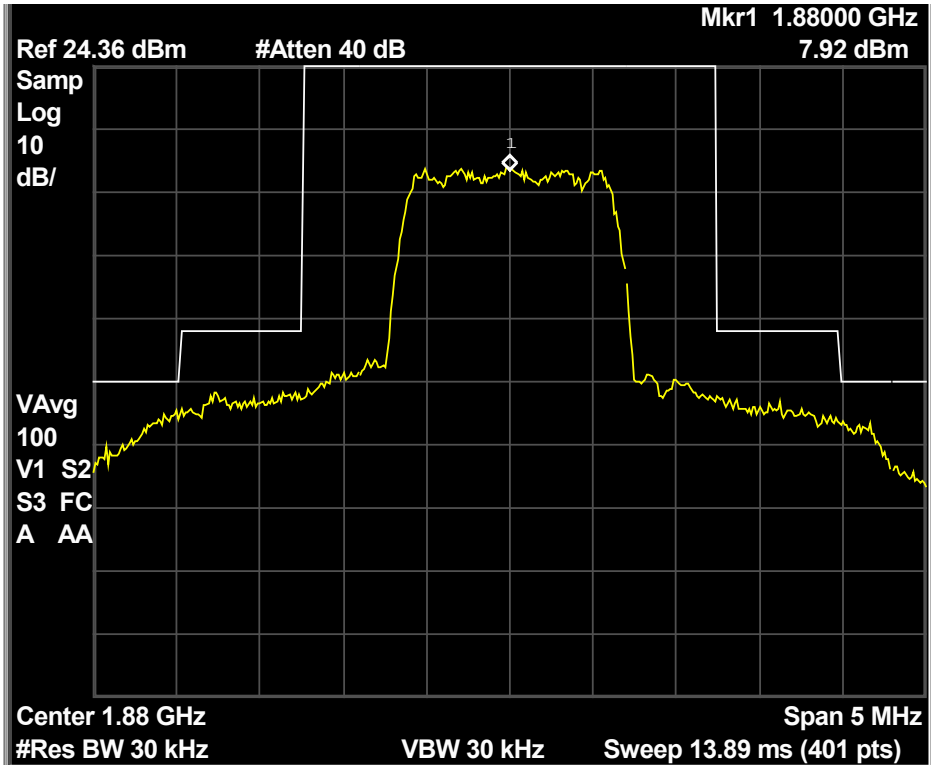


Measurement Results – CDMA 1900

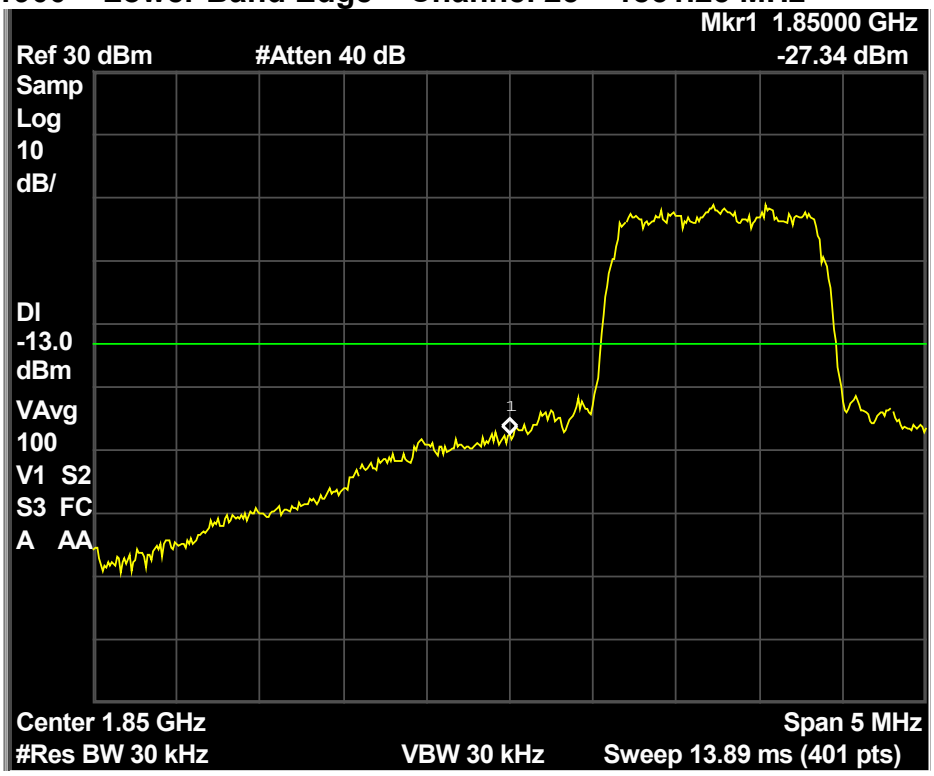
CDMA 1900 – Reference Level Plot – Channel 600 – 1880.0 MHz



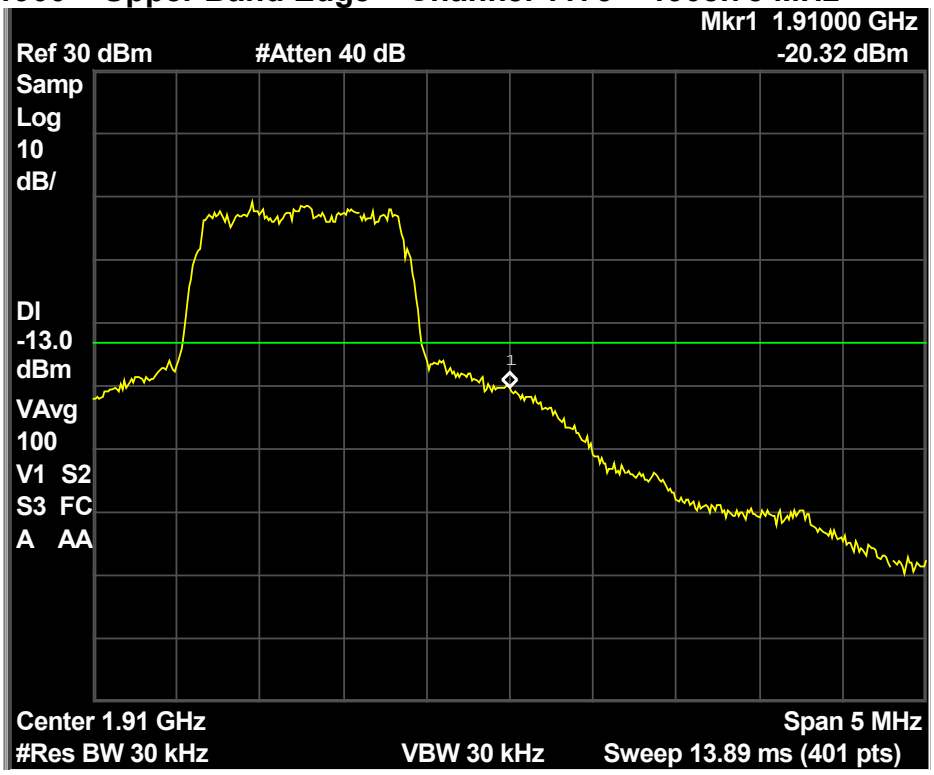
CDMA 1900 – Channel 600 – 1880.0 MHz



CDMA 1900 – Lower Band Edge – Channel 25 – 1851.25 MHz



CDMA 1900 – Upper Band Edge – Channel 1175 – 1908.75 MHz



Appendix 1

Photographs of Body Worn Configuration

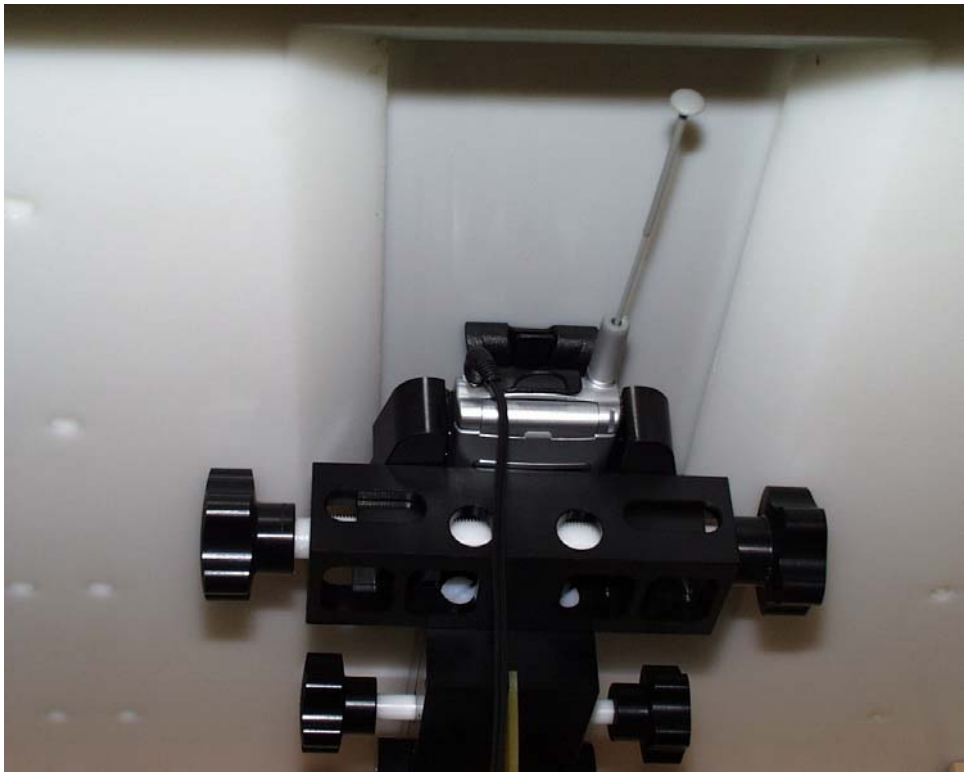


Figure 1: IHDT56CG1 with High Capacity Battery Body Worn Configuration

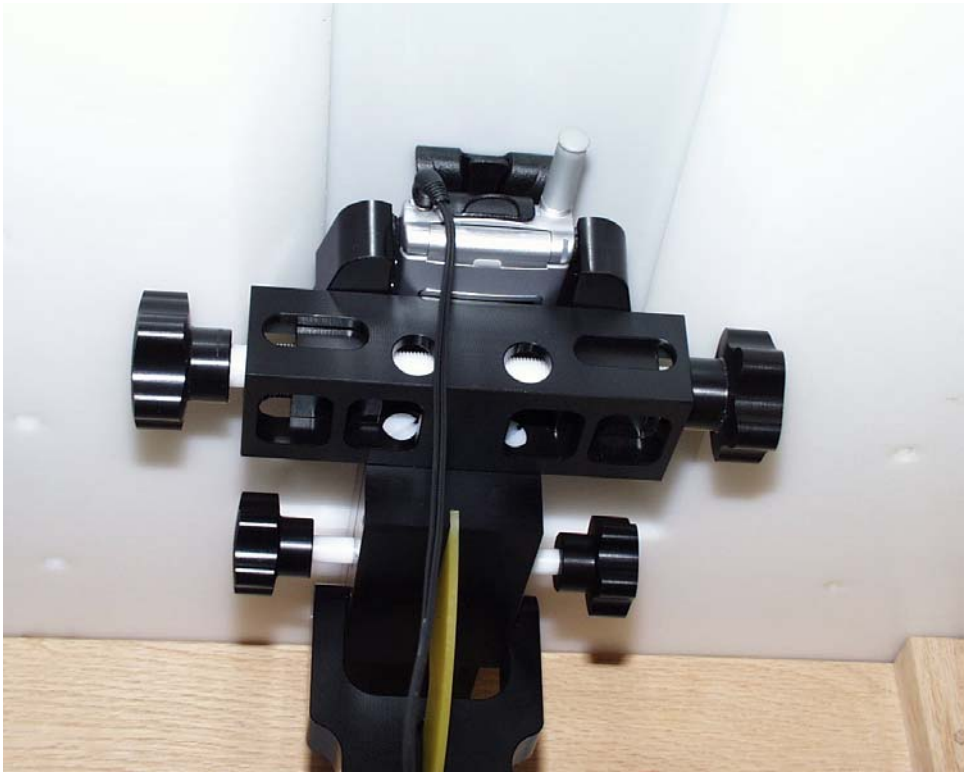


Figure 2: IHDT56CG1 with High Capacity Battery Body Worn Configuration

Figure 3: IHDT56CG1 with High Capacity Battery Body Worn Configuration

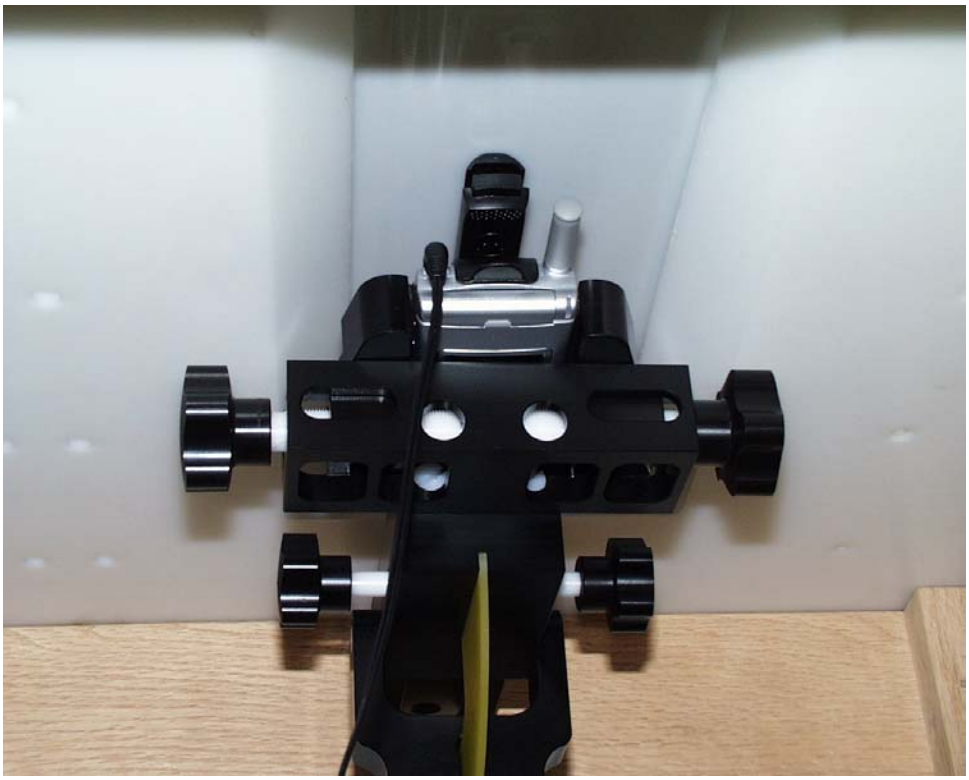


Figure 4: IHDT56CG1 with High Capacity Battery Body Worn Configuration

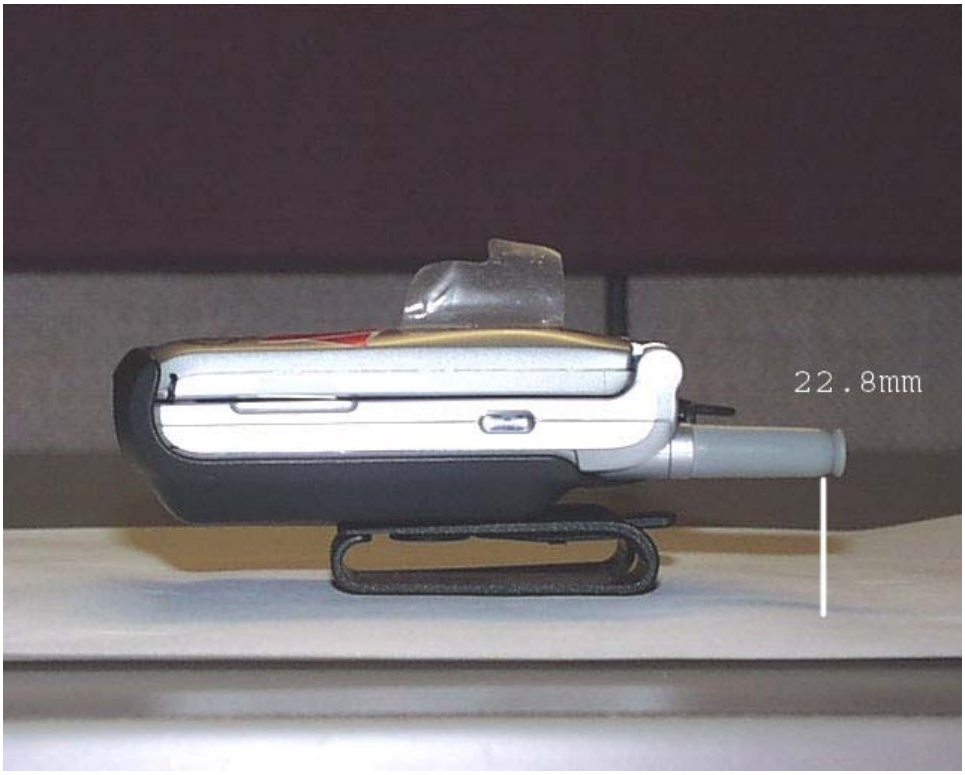


Figure 5: IHDT56CG1 with High Capacity Battery Body Worn Configuration

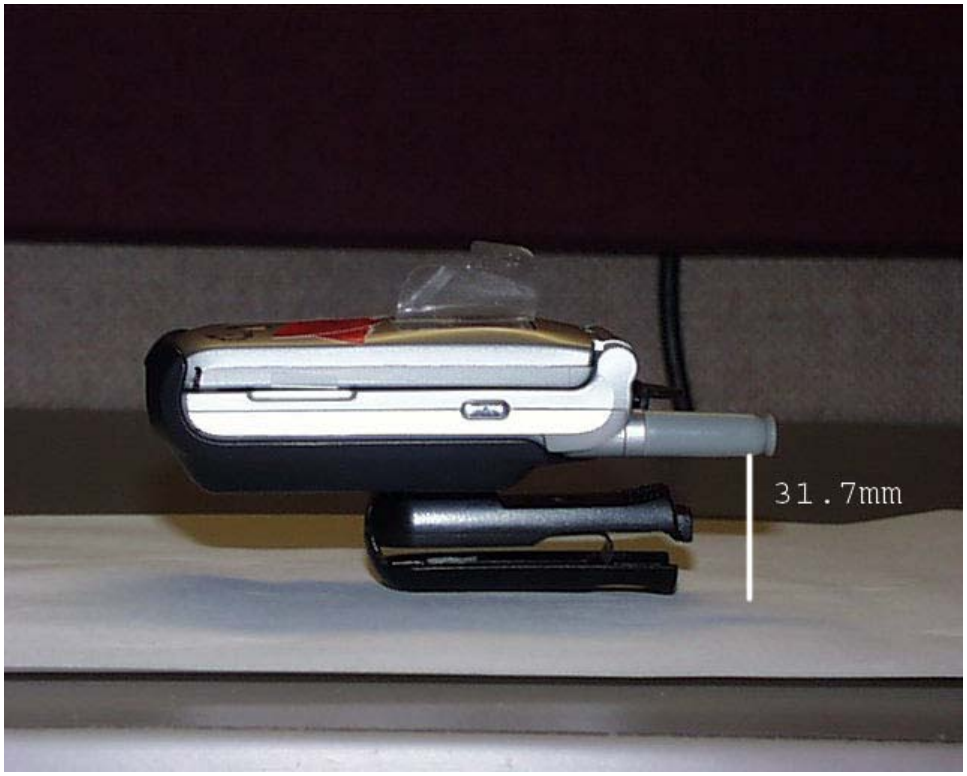


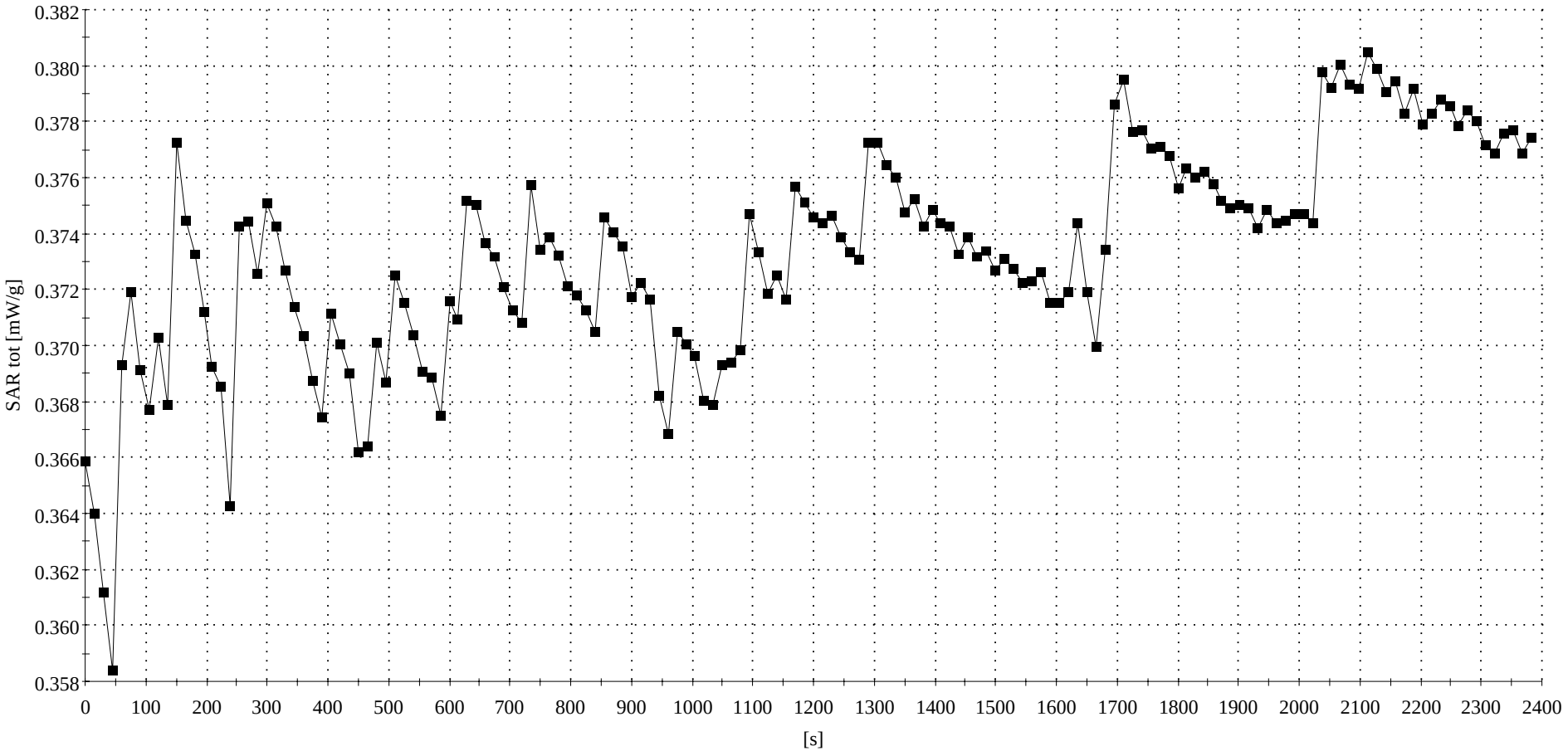
Figure 6: IHDT56CG1 with High Capacity Battery Body Worn Configuration

Appendix 2

SAR vs. Time Output Plot

s/n 52DE6413

TIME SWEEP TEMPLATE Original Scan Drift Value: -.47dB
Ch# 25 / Pwr Step: Always up Antenna Position:RET
Type of Modulation:1900 CDMA Battery Model #: SNN5595A
DEVICE POSITION: Cheek Touch
R3: Glycol TP-1157 (rev. 3) ;
Probe: ET3DV6R - SN1522 - IEEE Head; ConvF(3.40,3.40,3.40); Crest factor: 1.0; 1880 MHz Head & Body: σ = 1.47 mho/m ε_r = 38.3 ρ = 1.00 g/cm^3
: , , ()



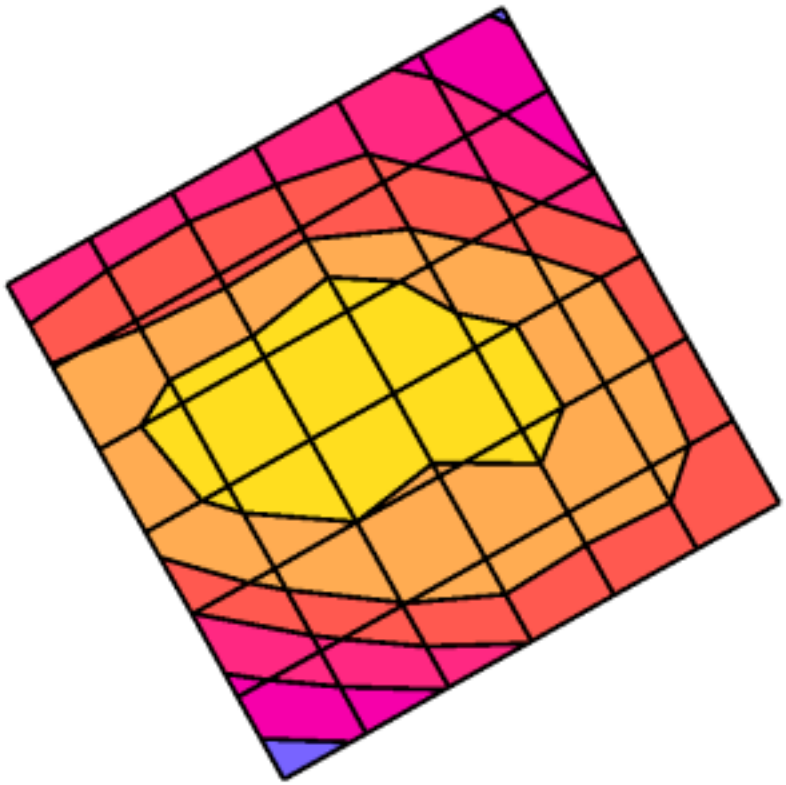
Appendix 3

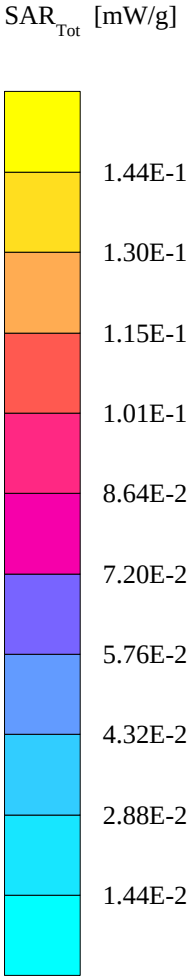
1900MHz Left Head Tilt 2nd Hot Spot Evaluations

10/06/02

s/n 52DE6413

Ch# 600 / Pwr Step: OTA (Always Up) Antenna Position: EXTENDED
Type of Modulation: CDMA 1900 Battery Model #: SNN5595A
DEVICE POSITION (cheek or rotated): Tilt
Accessory Model #: BATTERY SNN5595A AND THICKER BATTERY COVER 1586653K
R3: Glycol TP-1157 (rev. 3) Phantom; Left Hand Section; Position: (90°,180°); Frequency: 1880 MHz
Probe: ET3DV6R - SN1522 - IEEE Head; ConvF(3.40,3.40,3.40); Crest factor: 1.0; 1880 MHz Head & Body: σ = 1.46 mho/m ε_r = 38.3 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.0833 mW/g, SAR (10g): 0.0493 mW/g, (Worst-case extrapolation)
Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0
Penetration depth: 9.7 (8.7, 11.2) [mm]

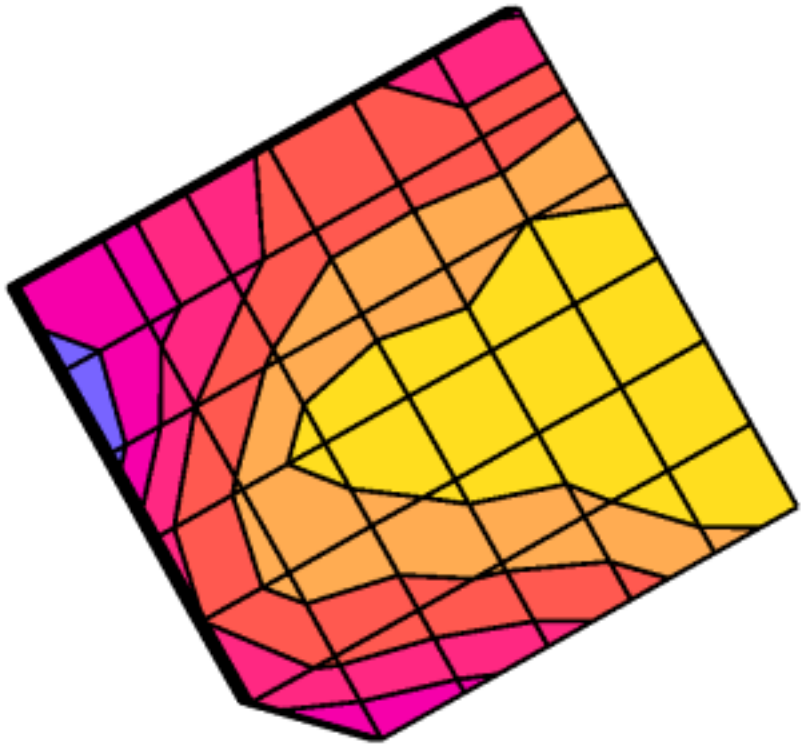


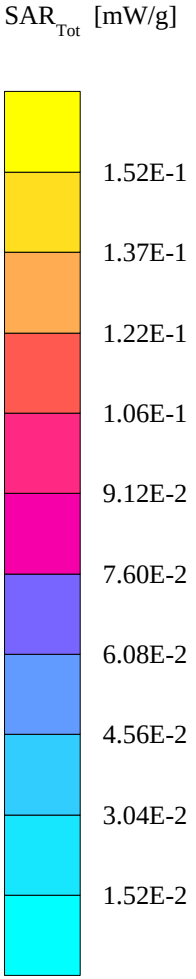


10/06/02

s/n 52DE6413

Ch# 600 / Pwr Step: OTA (Always Up) Antenna Position:RETRACTED
Type of Modulation: CDMA 1900 Battery Model #: SNN5595A
DEVICE POSITION (cheek or rotated): TILT
Accessory Model #: BATTERY SNN5595A AND THICKER BATTERY COVER 1586653K
R3: Glycol TP-1157 (rev. 3) Phantom; Left Hand Section; Position: (90°,180°); Frequency: 1880 MHz
Probe: ET3DV6R - SN1522 - IEEE Head; ConvF(3.40,3.40,3.40); Crest factor: 1.0; 1880 MHz Head & Body: σ = 1.46 mho/m ε_r = 38.3 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.105 mW/g, SAR (10g): 0.0727 mW/g, (Worst-case extrapolation)
Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0
Penetration depth: 13.8 (13.7, 14.1) [mm]





Appendix 4

E-Field Probe SN1398 Calibration Certificate

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:	1398
Place of Calibration:	Zurich
Date of Calibration:	September 6, 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:	D. Veller
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:1398

Manufactured:	October 24, 1999
Last calibration:	August 31, 2001
Recalibrated:	September 6, 2002

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1398

Sensitivity in Free Space

NormX	1.31 $\mu V/(V/m)^2$
NormY	1.33 $\mu V/(V/m)^2$
NormZ	1.48 $\mu V/(V/m)^2$

Diode Compression

DCP X	96	mV
DCP Y	96	mV
DCP Z	96	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	6.2 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.2 ± 9.5% (k=2)	Alpha	0.35
ConvF Z	6.2 ± 9.5% (k=2)	Depth	2.80

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	5.2 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.2 ± 9.5% (k=2)	Alpha	0.55
ConvF Z	5.2 ± 9.5% (k=2)	Depth	2.37

Boundary Effect

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

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	10.9	6.3
SAR_{be} [%]	With Correction Algorithm	0.5	0.7

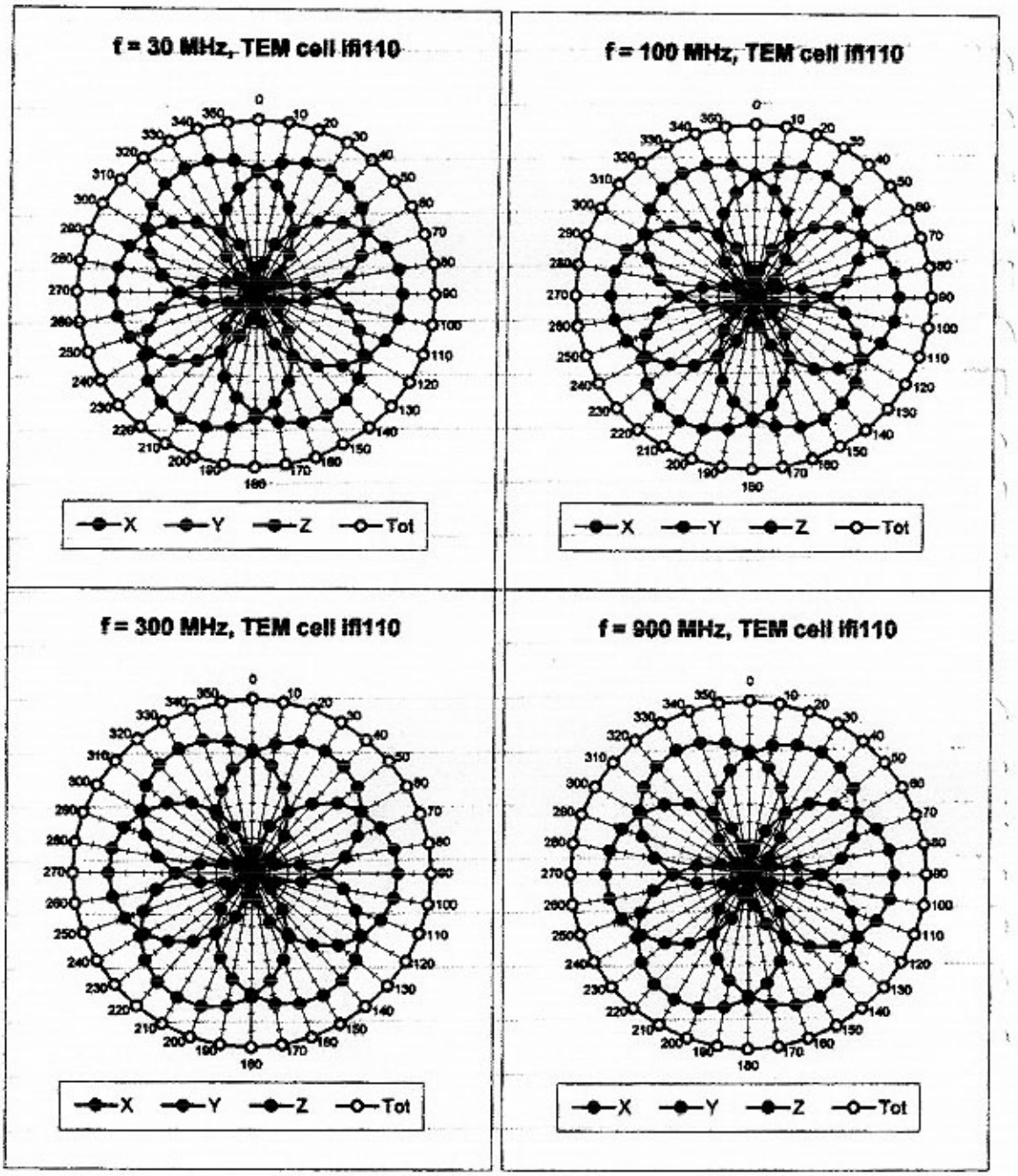
Head 1800 MHz **Typical SAR gradient: 10 % per mm**

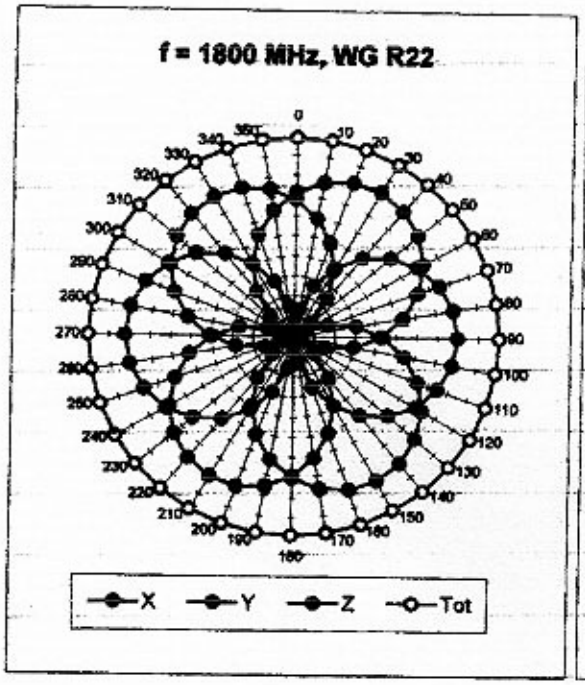
Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	12.8	8.3
SAR_{be} [%]	With Correction Algorithm	0.1	0.1

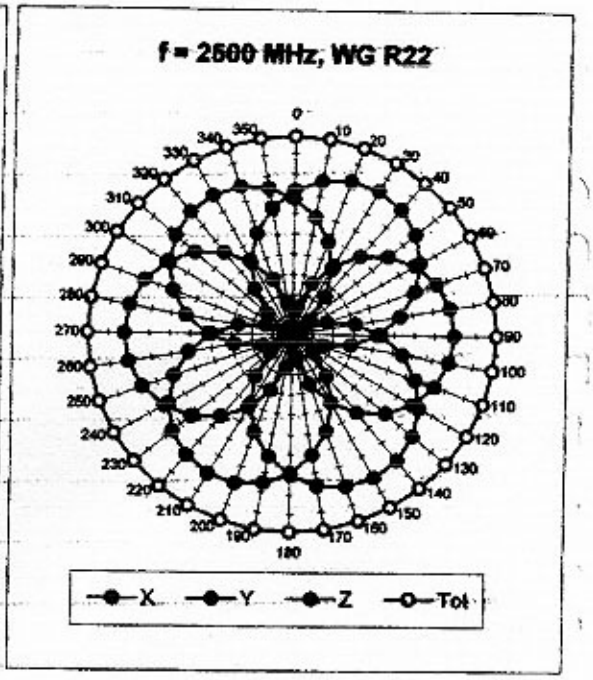
Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.0 ± 0.2	mm

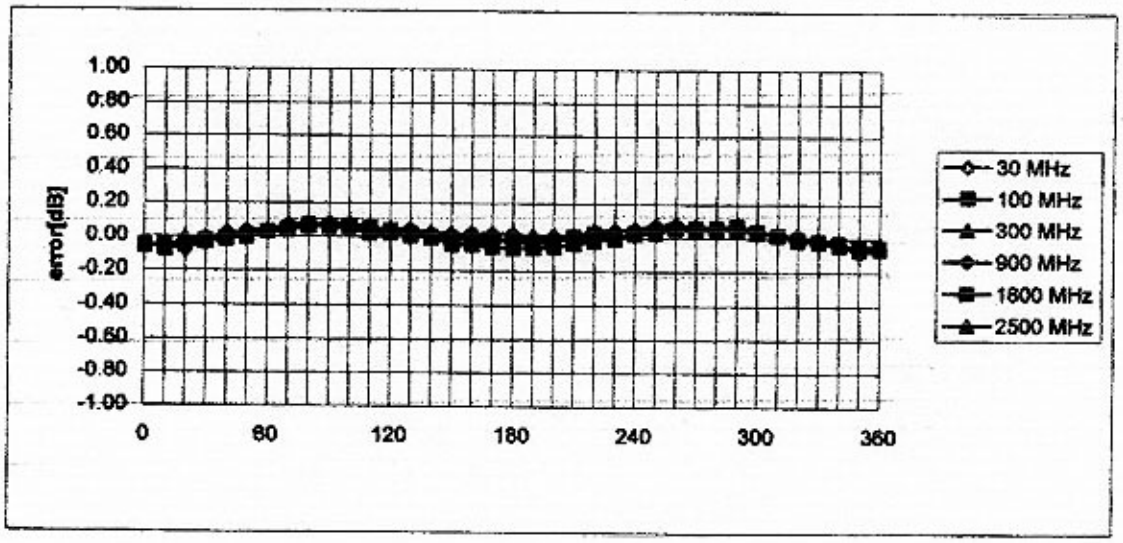
Receiving Pattern (ϕ), θ = 0°





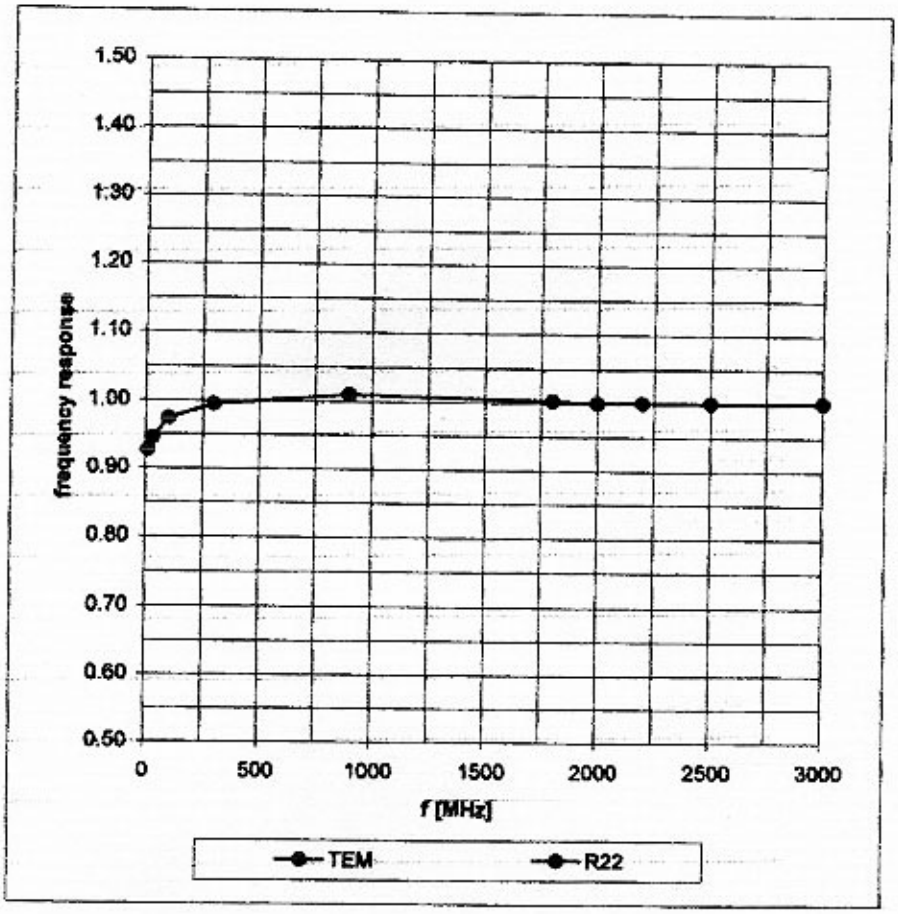


Isotropy Error (ϕ), θ = 0°



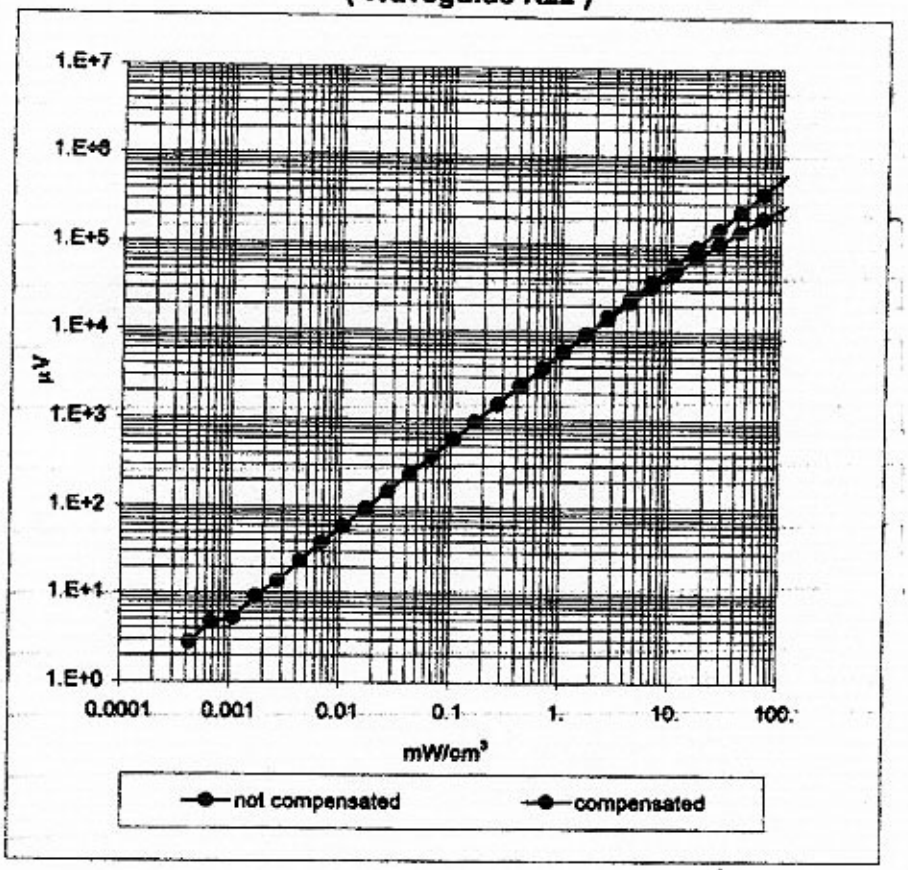
Frequency Response of E-Field

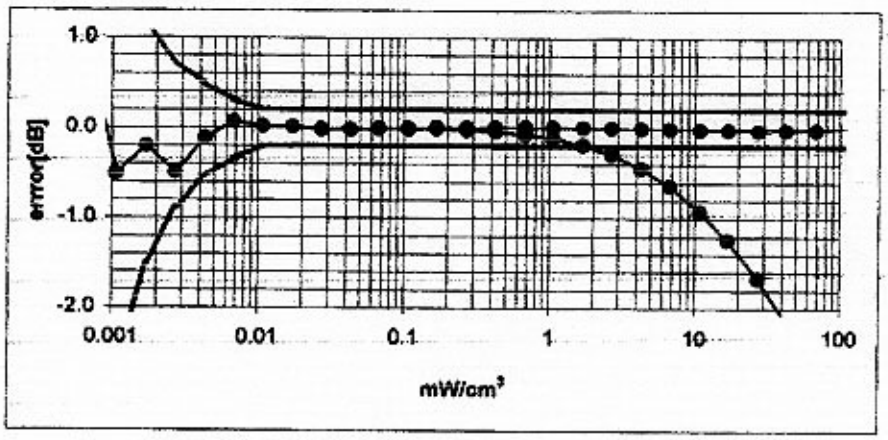
(TEM-Cell:ifi110, Waveguide R22)



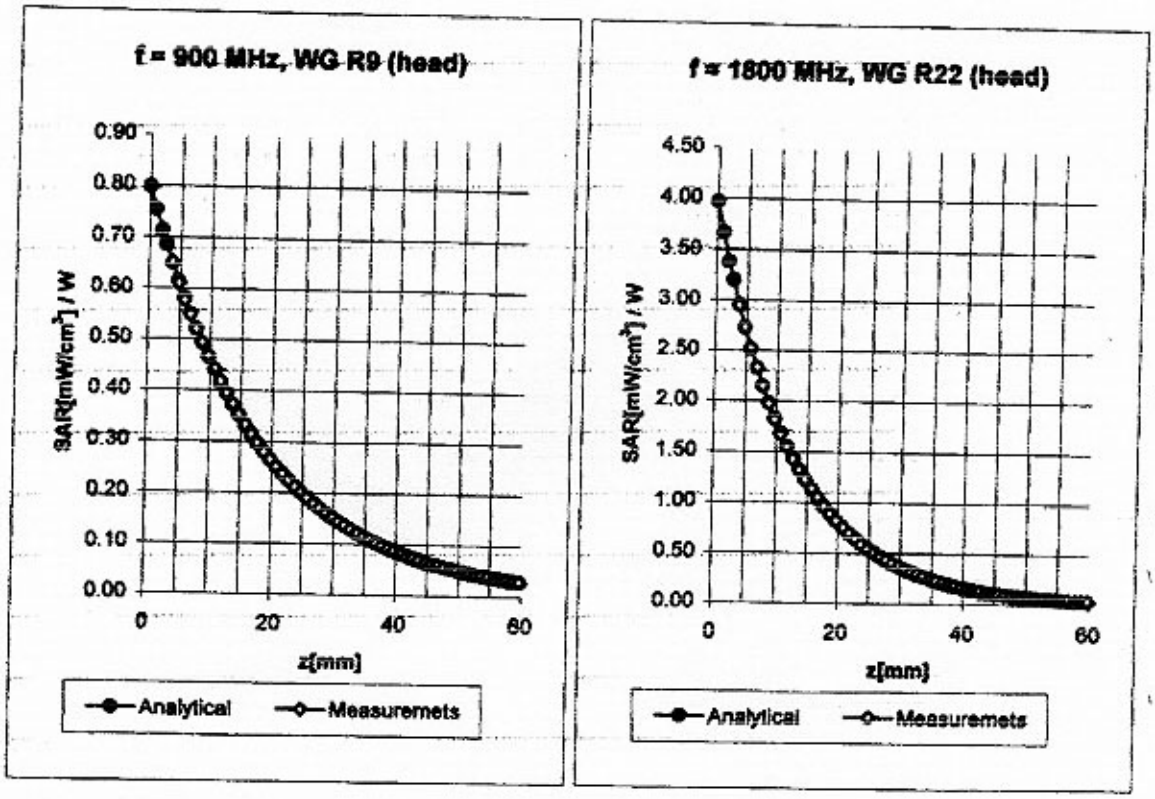
Dynamic Range f(SAR_{brain})

(Waveguide R22)





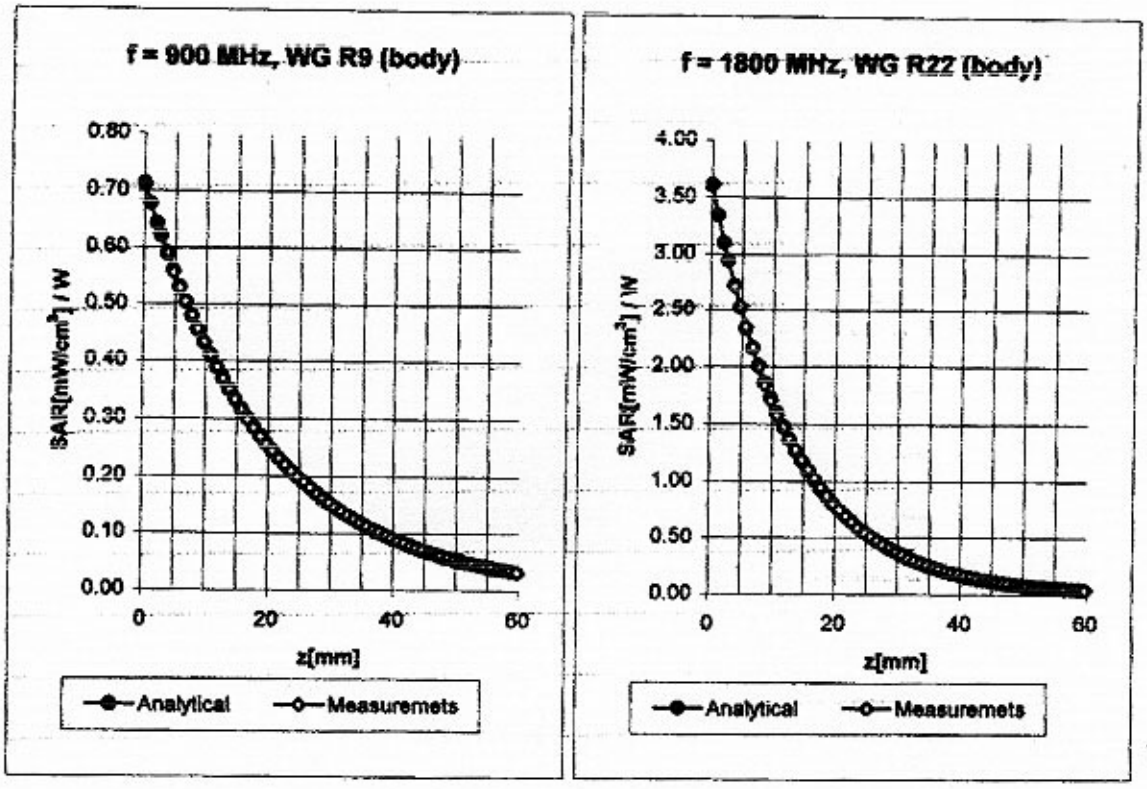
Conversion Factor Assessment



Head	**900 MHz**	ε_r = 41.5 ± 5%	σ = 0.97 ± 5% mho/m	
Head	**835 MHz**	ε_r = 41.5 ± 5%	σ = 0.90 ± 5% mho/m	
	ConvF X	**6.2** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.2** ± 9.5% (k=2)	Alpha	**0.35**
	ConvF Z	**6.2** ± 9.5% (k=2)	Depth	**2.80**

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	**5.2** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.2** ± 9.5% (k=2)	Alpha	**0.55**
	ConvF Z	**5.2** ± 9.5% (k=2)	Depth	**2.37**

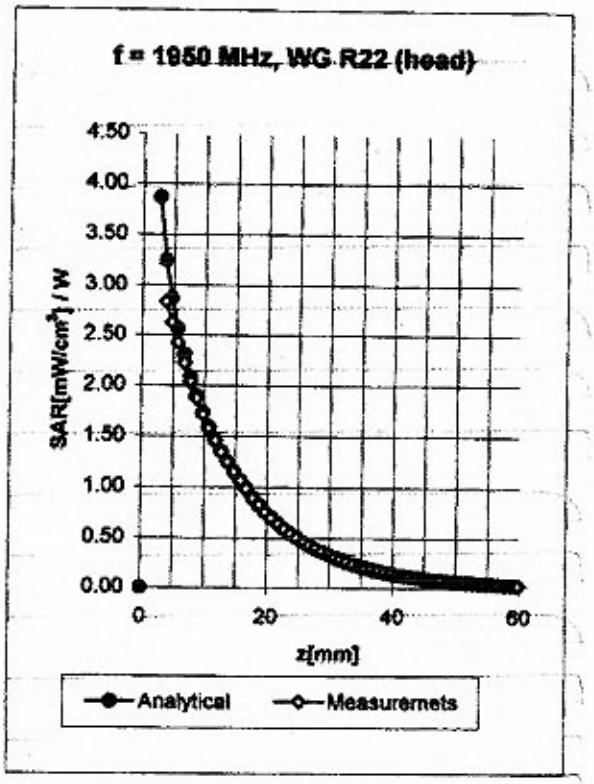
Conversion Factor Assessment



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	**5.9** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**5.9** ± 9.5% (k=2)		Alpha **0.40**
	ConvF Z	**5.9** ± 9.5% (k=2)		Depth **2.70**

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	**4.9** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**4.9** ± 9.5% (k=2)		Alpha **0.61**
	ConvF Z	**4.9** ± 9.5% (k=2)		Depth **2.41**

Conversion Factor Assessment

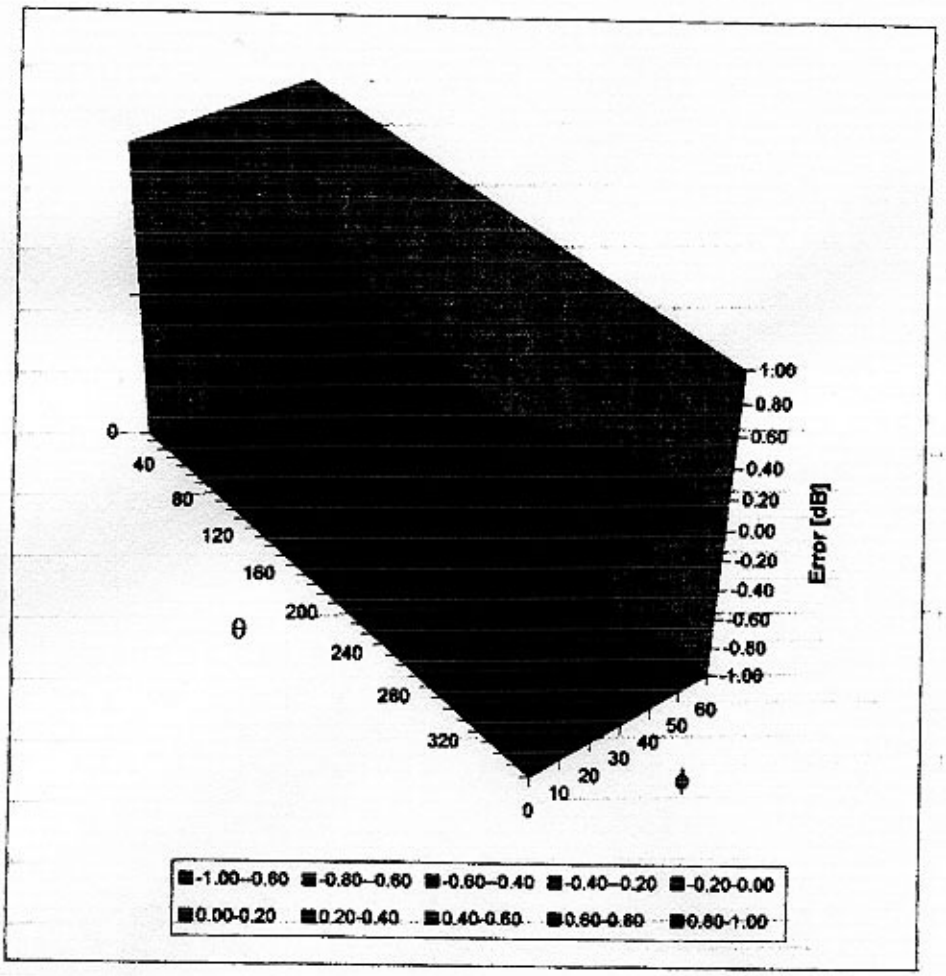


Head **1950 MHz** ε_r = 40.0 ± 5% σ = 1.40 ± 5% mho/m

ConvF X	**4.9** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.9** ± 9.5% (k=2)	Alpha	**0.63**
ConvF Z	**4.9** ± 9.5% (k=2)	Depth	**2.32**

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

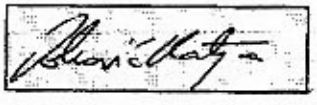
Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1398**
Place of Assessment:	**Zurich**
Date of Assessment:	**September 8, 2002**
Probe Calibration Date:	**September 6, 2002**

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:



Dosimetric E-Field Probe ET3DV6 SN:1398

Conversion factor (± standard deviation)

1950 MHz	ConvF	**4.6 ± 8%**	**ε_r = 53.3 ± 5%** **σ = 1.52 ± 5% mho/m** (body tissue)