ITS Intertek Testing Services
ETL SEMKO

ADDENDUM
Specific Absorption Rate (SAR) Test Report

for

M/A-COM, Inc.

on the

Hand Held Portable Radio
Model Number: P800
FCC ID: BV8P800

Test Report: 30236225
Date of Report: February 3, 2003

Job #: 3023622
Date of Test: January 30-31, 2003

Tested by:	Suresh Kondapalli
Reviewed by: David Chernomordik	David Chernomordik., EMC Technical Manager

Review Date: 02/08/03

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M/A-COM, Inc., Model No: P800 Date of Test: January 30-31, 2003
FCC ID: BV8P800

1.0 INTRODUCTION

This is an Addendum report to the report #30236223.

The M/A-COM, Inc., device, model # P800, FCC ID: BV8P800 was originally tested for SAR on June 15-22, 2002 in accordance with the requirements for compliance testing defined in FCC OET Bulletin 65, Supplement C (Edition 01-01). Testing was performed at the Intertek Testing Services facility in Menlo Park, California. For the evaluation, the dosimetric assessment system DASY3 was used. The phantom employed was the "Generic Twin Phantom" from SPEAG.

As per FCC request (correspondence ref. Number 24608), additional tests were performed on January 31, 2003. The phantom employed was the "SAM Twin Phantom" from SPEAG. The device with the same output power and the same Duty Factor (50%) was tested at 2.5cm from the phantom. The scans of entire device on 3 frequencies were performed.

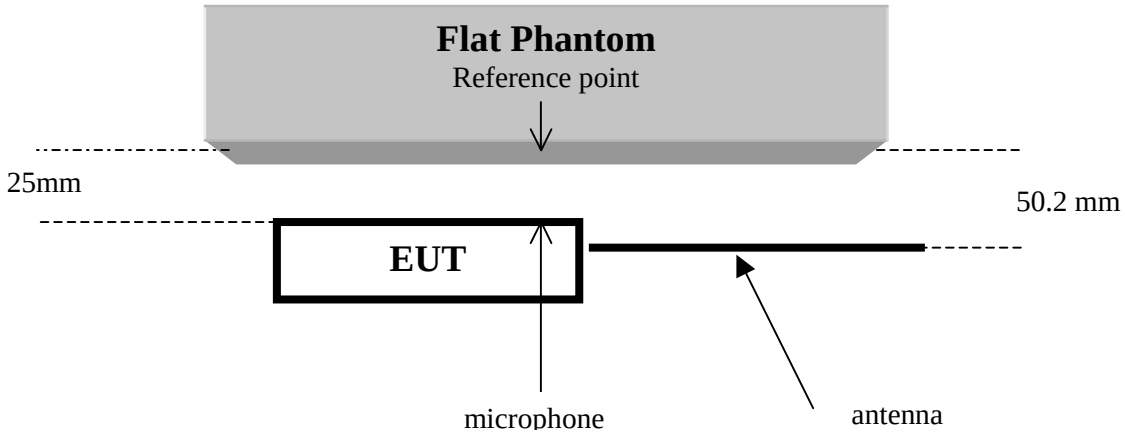
As the size of the device (33.5 cm including antenna) is more than the length of the flat section of the phantom (31 cm), the test was performed in two steps (in two positions) as described in the section 2.0. The test results clearly indicate the worst case SAR is within the boundaries of the measuring grid.

The maximum spatial peak SAR value for the device averaged over 1g for was found to be:

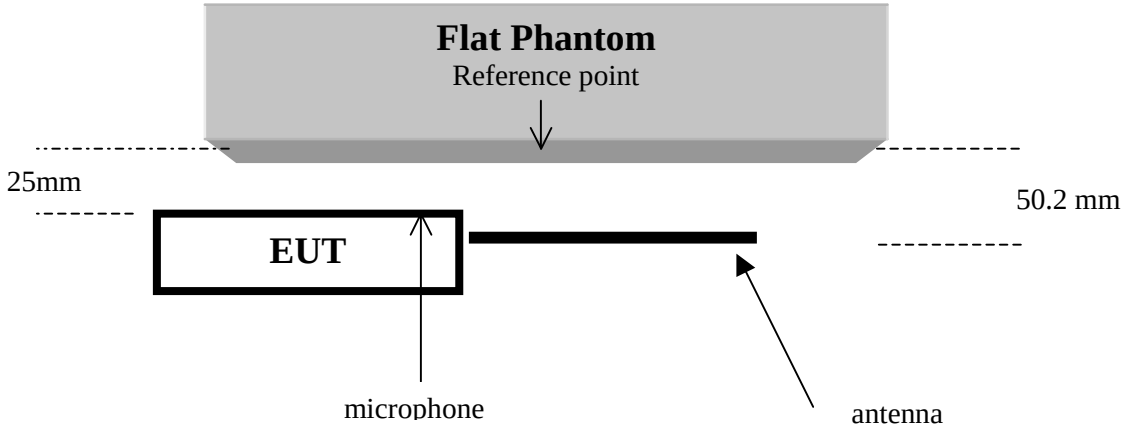
Position	Frequency (MHz)	SAR_{1g}, (mW/g)
2.5 cm from flat phantom	806	1.14

2.0 TEST POSITION

Test Position 1



Test Position 2



For details, see the setup photographs in section 3.2.

3.0 SAR EVALUATION

3.1 SAR Limits

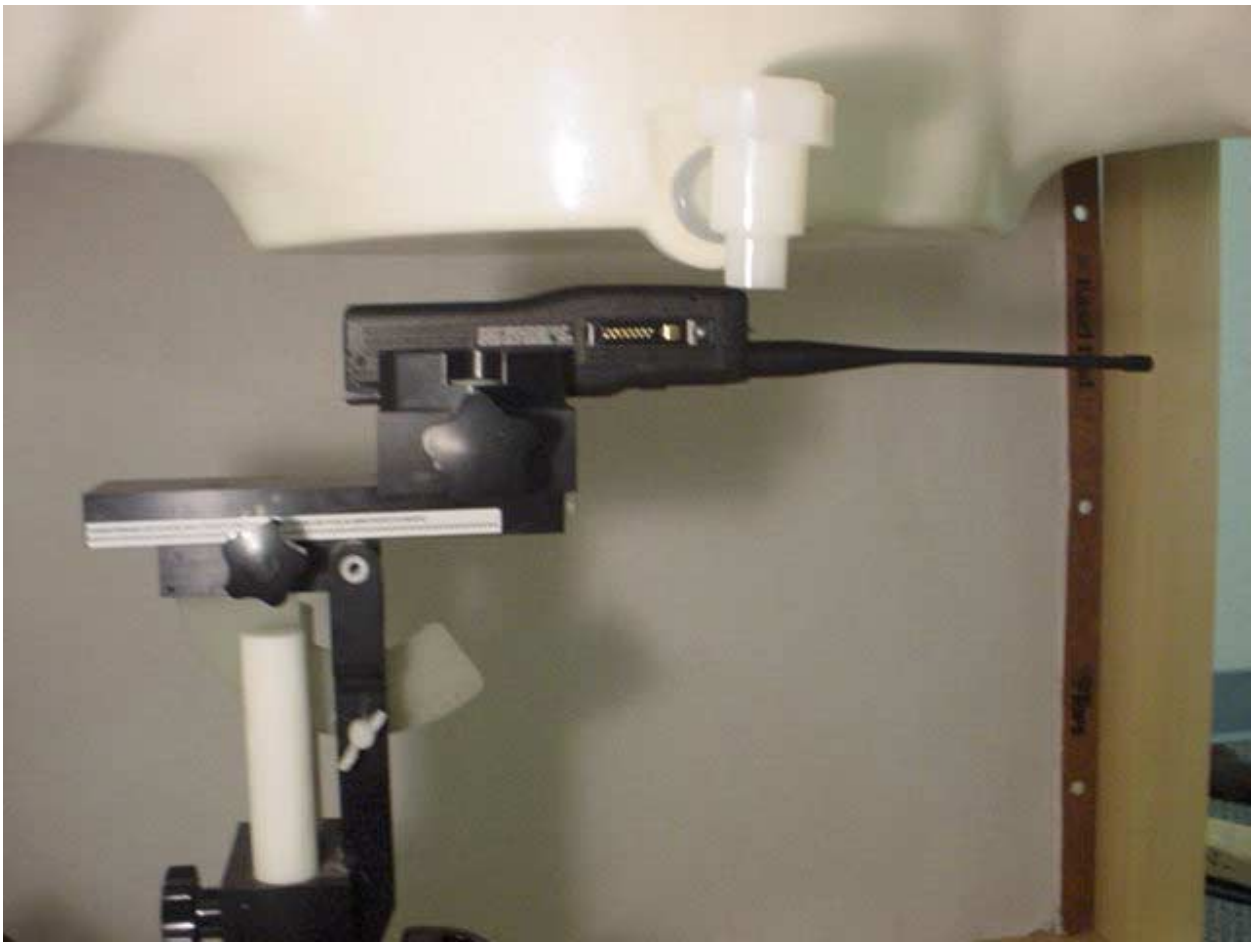
The following FCC limits for SAR apply to devices operate in General Population/Uncontrolled Exposure environment:

EXPOSURE (General Population/Uncontrolled Exposure environment)	**SAR (W/kg)**
Average over the whole body	0.08
Spatial Peak (1g)	1.60
Spatial Peak for hands, wrists, feet and ankles (10g)	4.00

3.2 Configuration Photographs

SAR Measurement Test Setup

Test Position 1
25mm from Phantom



SAR Measurement Test Setup

Test Position 2
25mm from Phantom

3.3 System Verification

Prior to the assessment, the system was verified to the ±10% of the specifications by using the system validation kit. The validation was performed at 900 MHz.

Validation kit	Targeted SAR_{1g} (mW/g)	Measured SAR_{1g} (mW/g)	Plot #
D900V2, S/N #: 013	2.66	2.89	8

3.4 Evaluation Procedures

The SAR evaluation was performed with the following procedures:

a. SAR was measured at a fixed location above the reference point and used as a reference value for the assessing the power drop.

b. The SAR distribution at the exposed side of the flat Phantom was measured at a distance of 30 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

c. Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 5 x 5 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

   i) The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measurement point is 1.6 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in Z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

   ii) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum, the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3-D spline interpolation algorithm. The 3-D spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y and z directions). The volume was integrated with the trapezoidal algorithm. 1000 points (10 x 10 x 10) were interpolated to calculate the average.

   iii) All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

d. Re-measurements of the SAR value at the same location as in step a. above. If the value changed by more than 5 %, the evaluation was repeated.

3.5 Test Results

The results on the following page(s) were obtained when the device was tested in the condition described in this report. Detail measurement data and plots, which reveal information about the location of the maximum SAR with respect to the device, are reported in Appendix A.

M/A-COM, Inc., Model No: P800 Date of Test: January 30-31, 2003
FCC ID: BV8P800

Measurement Results

Trade Name:	M/A-COM	**Model No.:**	P800
Serial No.:	Not Labeled	**Test Engineer:**	Suresh Kondapalli

Brain 900 MHz Band			
Ambient Temperature	23.5 °C	**Relative Humidity**	55 %
Liquid Temperature	22°C ± 0.5 °C	**Liquid depth**	14.8 cm
Test Signal Source	Test Mode	**Signal Modulation**	50% duty cycle *
		Output Power Changes	Within ±0.2dB
Test Duration	45 Min. each scan	**Number of Battery Change**	New battery for every scan

Plot No	Frequency MHz	Operating Mode	Crest Factor	Position	Measured SAR_{1g} (mW/g)
1	806	See Note	2	2.5 cm From Phantom, Position 1	0.773
2	806	See Note	2	2.5 cm From Phantom, Position 2	1.14
3	816	See Note	2	2.5 cm From Phantom, Position 1	0.929
4	816	See Note	2	2.5 cm From Phantom, Position 2	1.08
5	824	See Note	2	2.5 cm From Phantom, Position 1	0.949
6	824	See Note	2	2.5 cm From Phantom, Position 2	1.03

* EUT was programmed to transmit 50% of the time, which simulates actual usage conditions. The duty cycle is shown on the plots #8 and #9.

Dipole, System Verification					
Frequency MHz	**Operating Mode**	**Crest Factor**	**Measured SAR_{1g} (mW/g)**	**Measured SAR_{10g} (mW/g)**	**Plot Number**
900	CW	1	2.89	1.85	7

Note: a) Worst case data were reported
b) Duty cycle factor included in the measured SAR data
c) Uncertainty of the system is not included

4.0 TEST EQUIPMENT

4.1 Equipment List

The Specific Absorption Rate (SAR) tests were performed with the SPEAG model DASY 3 automated near-field scanning system, which is a package, optimized for dosimetric evaluation of mobile radios [3].

The following major equipment/components were used for the SAR evaluations:

SAR Measurement System			
EQUIPMENT	**SPECIFICATIONS**	S/N #	Last cal. date
Robot	**Stäubi RX60L**	597412-01	N/A
	Repeatability: ± 0.025mm Accuracy: 0.806×10^{-3} degree Number of Axes: 6		
E-Field Probe	**ET3DV6**	1576	02/27/02
	Dynamic Range: 5 µW/g to >100 mW/g Tip diameter: 6.8 mm Probe Linearity: ± 0.2 dB (30 MHz to 3 GHz) Axial isotropy: ± 0.2 dB Spherical isotropy: ± 0.4 dB Length: 34.5 cm Distance between the probe tip and the dipole center: 2.7 mm Calibration: 835/900 MHz and 1800/1900 MHz for head & body simulating liquid		
Data Acquisition	**DAE3**	317	N/A
	Measurement Range: 1µV to >200mV Input offset Voltage: < 1µV (with auto zero) Input Resistance: 200 M		
Phantom	**SAM Twin V4.0**	TP-1243	QD000P40CA
	Type: SAM Twin, Homogenous Shell Material: Fiberglass Thickness: 2 ± 0.2 mm Capacity: 20 liter		
Device holder	Non-conductive holder supplied with DASY3, dielectric constant less than 5.0	N/A	N/A
Simulated Tissue	**Mixture**	N/A	01/30/03
	Please see section 6.2 for details		
Power Meter	**HP 8900D** w/ 84811A sensor	3607U00673	08/27/02
	Frequency Range: 100kHz to 18 GHz Power Range: 300µW to 3W		

4.2 Tissue Simulating Liquid

Solution	Ingredients for Brain simulation Frequency (835 MHz)
Water	41.05 %
Sugar	56.5 %
Salt	1.35%
Bactericide	0.1%
HEC	1.0 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	Simulation	ε_r*	σ *(mho/m)	ρ **(kg/m^3)
816	Brain	42.7	0.90	1000

* *Worst case uncertainty of the HP 85070A dielectric probe kit*
** *Worst case assumption*

4.3 E-Field Probe Calibration

Probes were calibrated by the manufacturer in the TEM cell ifi 110. To ensure consistency, a strict protocol was followed. The conversion factor (ConF) between this calibration and the measurement in the tissue simulation solution was performed by comparison with temperature measurement and computer simulations. Probe calibration factors are included in Appendix C.

4.4 Measurement Uncertainty

The Table below includes the uncertainty budget suggested by the IEEE Std 1528-200X and determined by SPEAG for the DASY3 measurement System.
The extended uncertainty (K=2) was assessed to be 27.8 %

Uncertainty Component	Tolerance (± %)	Probability Distribution	Divisor	c_i	Standard Uncertainty, (± %)	v_i^2 or v_{eff}
Measurement System						
Probe Calibration	4.7	Normal	1	1	4.7	Inf.
Axial Isotropy	4.7	Rectangular	√3	$(1\text{-cp})^{1/2}$	1.9	Inf.
Spherical Isotropy	9.6	Rectangular	√3	$\sqrt{c_p}$	3.9	Inf.
Boundary Effect	5.5	Rectangular	√3	1	3.2	Inf.
Linearity	4.7	Rectangular	√3	1	2.7	Inf.
System Detection Limits	1.0	Rectangular	√3	1	0.6	Inf.
Readout Electronics	1.0	Normal	1	1	1.0	Inf.
Response Time	0.8	Rectangular	√3	1	0.5	Inf.
Integration Time	1.4	Rectangular	√3	1	0.8	Inf.
RF Ambient Conditions	3.0	Rectangular	√3	1	1.7	Inf.
Probe Positioner Mechanical Tolerance	0.4	Rectangular	√3	1	0.2	Inf.
Probe Positioning with respect to Phantom Shell	2.9	Rectangular	√3	1	1.7	Inf.
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	3.9	Rectangular	√3	1	2.3	Inf.
Test sample Related						
Test Sample Positioning	6.0	Normal	0.89	1	6.7	12
Device Holder Uncertainty	5.0	Normal	0.84	1	5.9	8
Output Power Variation - SAR drift measurement	7.0	Rectangular	√3	1	4.0	Inf.
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	4.0	Rectangular	√3	1	2.3	Inf.
Liquid Conductivity Target tolerance	5.0	Rectangular	√3	0.6	1.7	Inf.
Liquid Conductivity - measurement uncertainty	10.0	Rectangular	√3	0.6	3.5	Inf.
Liquid Permittivity Target tolerance	5.0	Rectangular	√3	0.6	1.7	Inf.
Liquid Permittivity - measurement uncertainty	5.0	Rectangular	√3	0.6	1.7	Inf.
Combined Standard Uncertainty					13.9	
Expanded Uncertainty (95% CONFIDENCE INTERVAL)					27.8	

Notes.

1. The Divisor is a function of the probability distribution and degrees of freedom (ν_i and ν_{eff}). See NIST Technical Note TN1297, NIS 81 and NIS 3003.
2. c_i is the sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.

4.5 Measurement Tractability

All measurements described in this report are traceable to National Institute of Standards and Technology (NIST) standards or appropriate national standards.

5.0 DOCUMENT HISTORY

Revision/ Job Number	Writer Initials	Date	Change
1.0 /30236221	SS	April 27, 2002	Original document
1.1 /30236225	SS	February 3, 2003	Addendum report

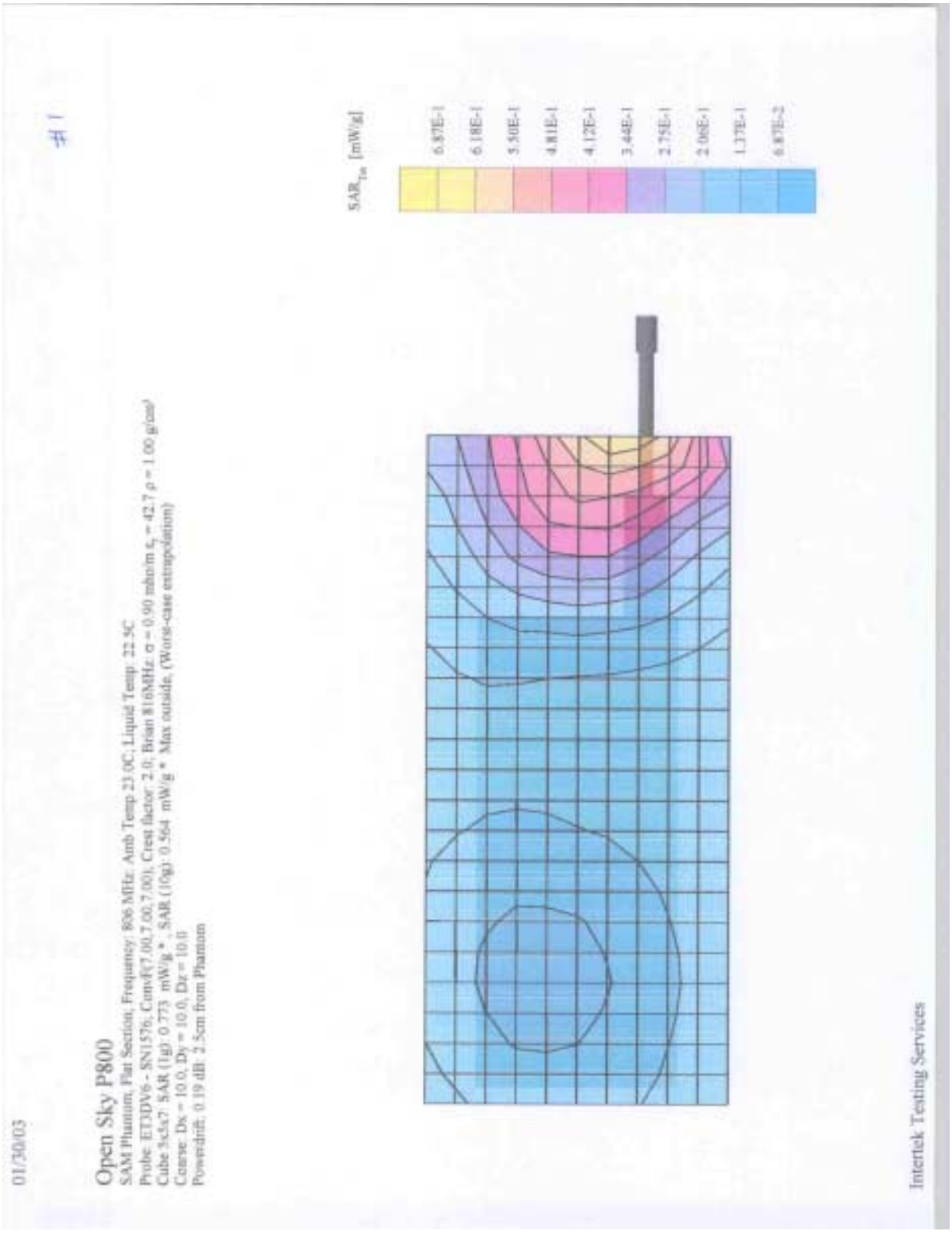
M/A-COM, Inc., Model No: P800 Date of Test: January 30-31, 2003
FCC ID: BV8P800

APPENDIX A - SAR Evaluation Data

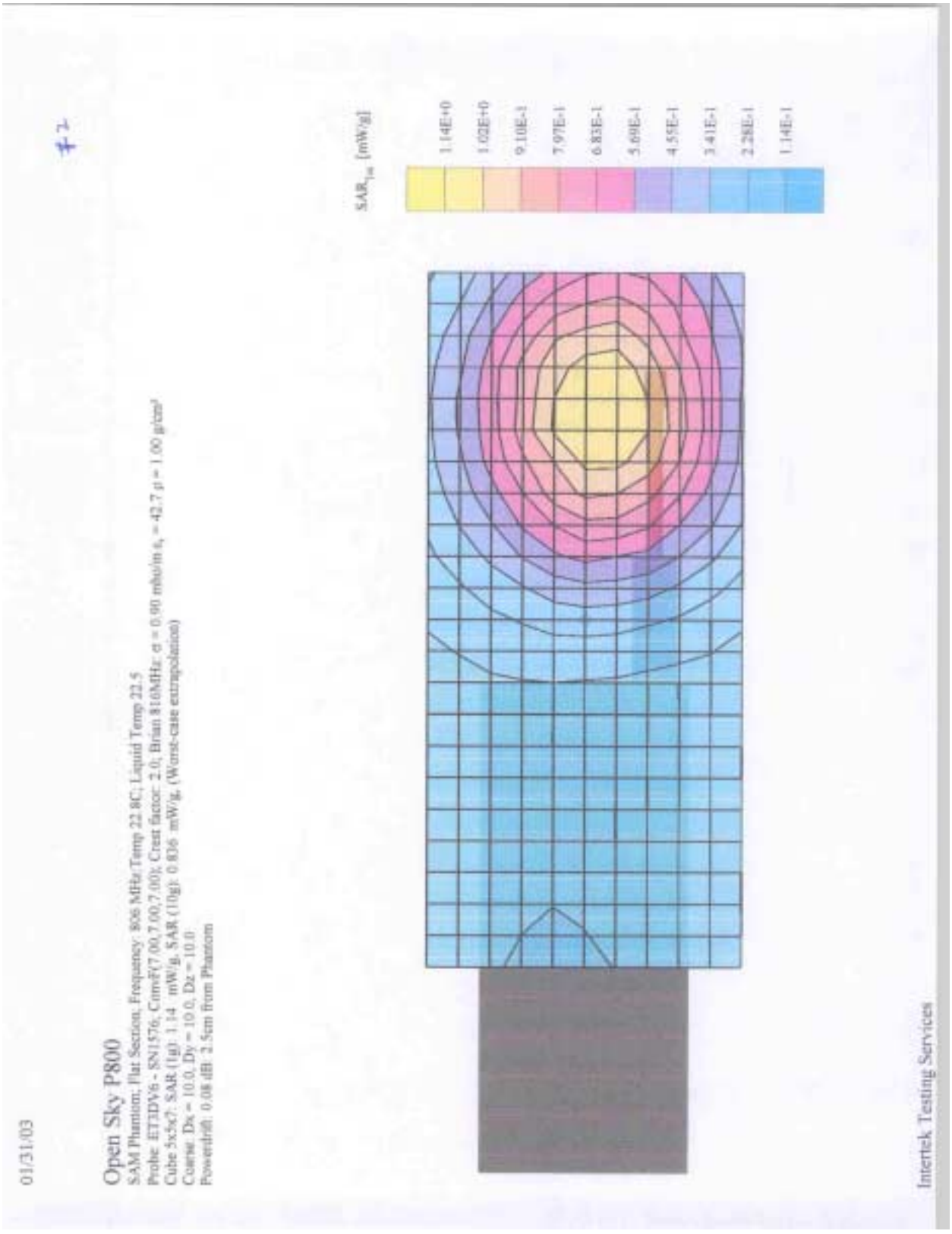
Please note that the graphical visualization of the phone position onto the SAR distribution gives only limited information on the current distribution of the device, since the curvature of the head results in graphical distortion. Full information can only be obtained either by H-field scans in free space or SAR evaluation with a flat phantom.

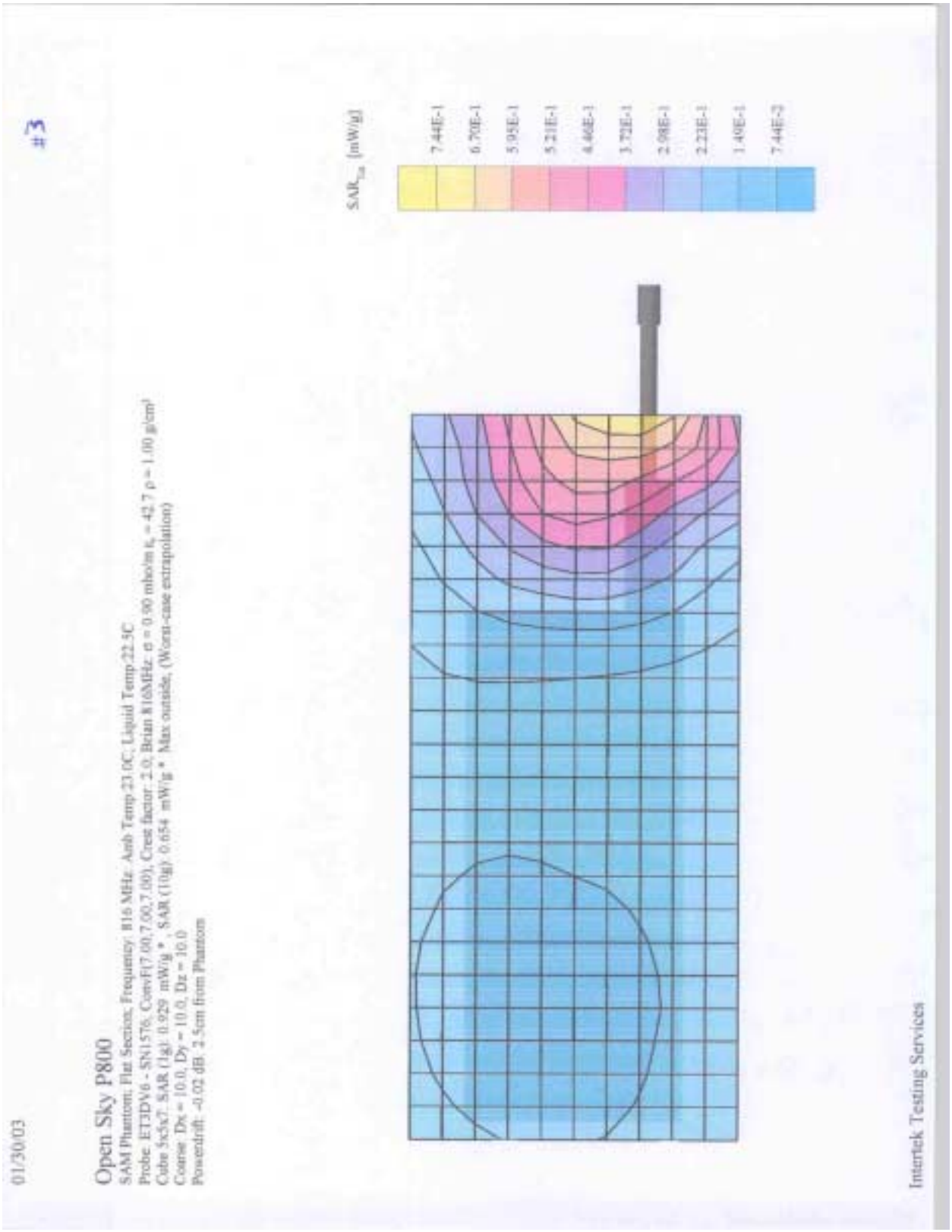
Power drift is the measurement of power drift of the device over one complete SAR scan.

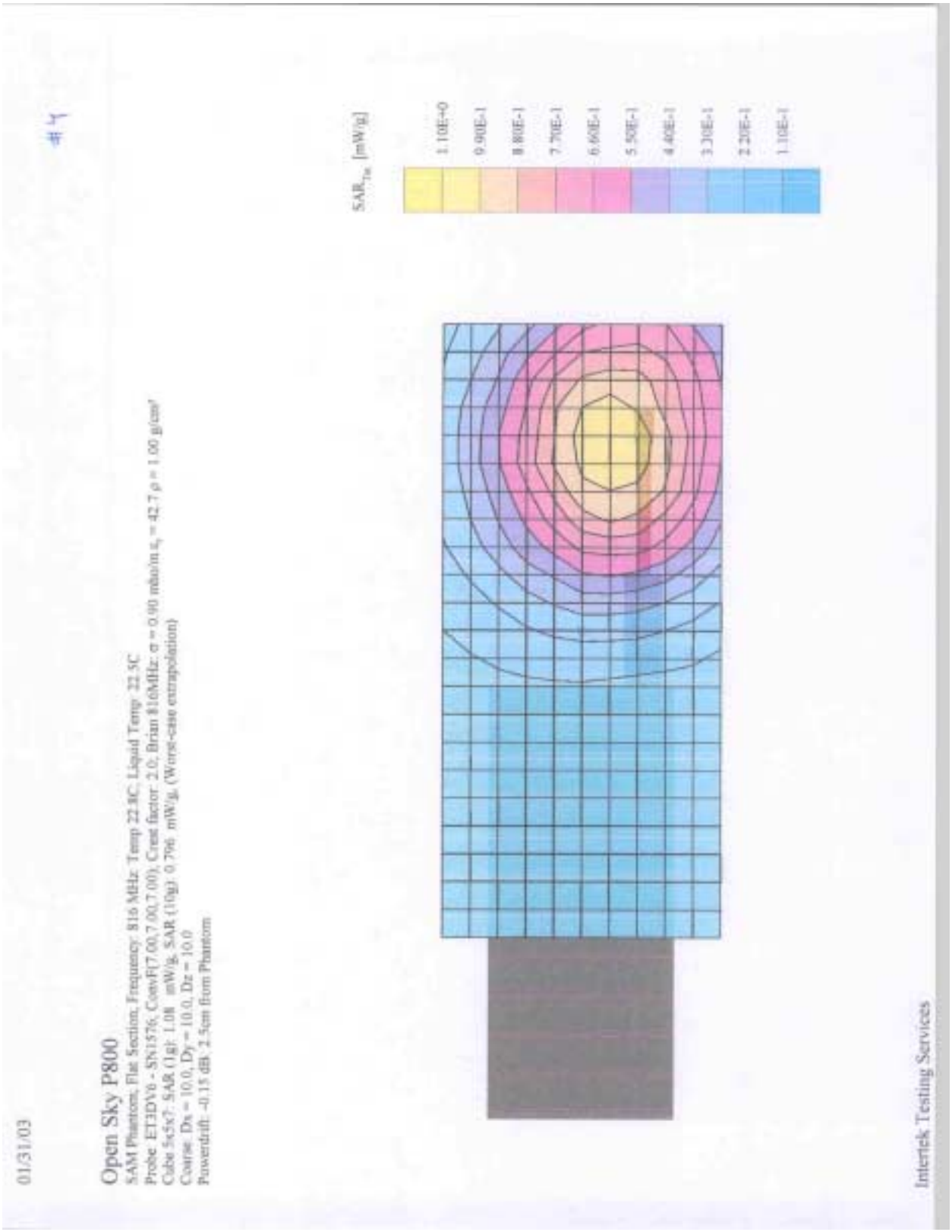
M/A-COM, Inc., Model No: P800 Date of Test: January 30-31, 2003
FCC ID: BV8P800



M/A-COM, Inc., Model No: P800 Date of Test: January 30-31, 2003
FCC ID: BV8P800

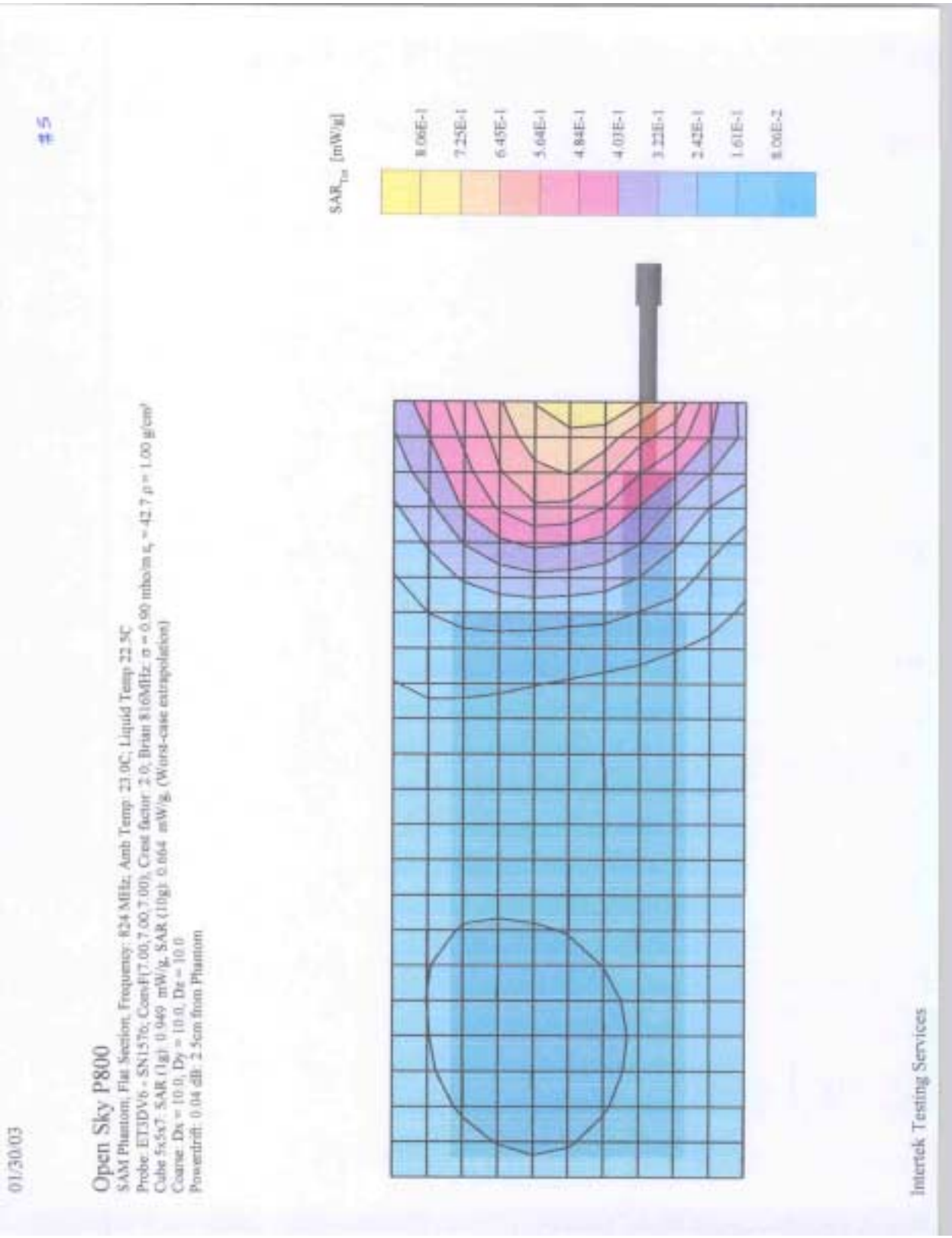


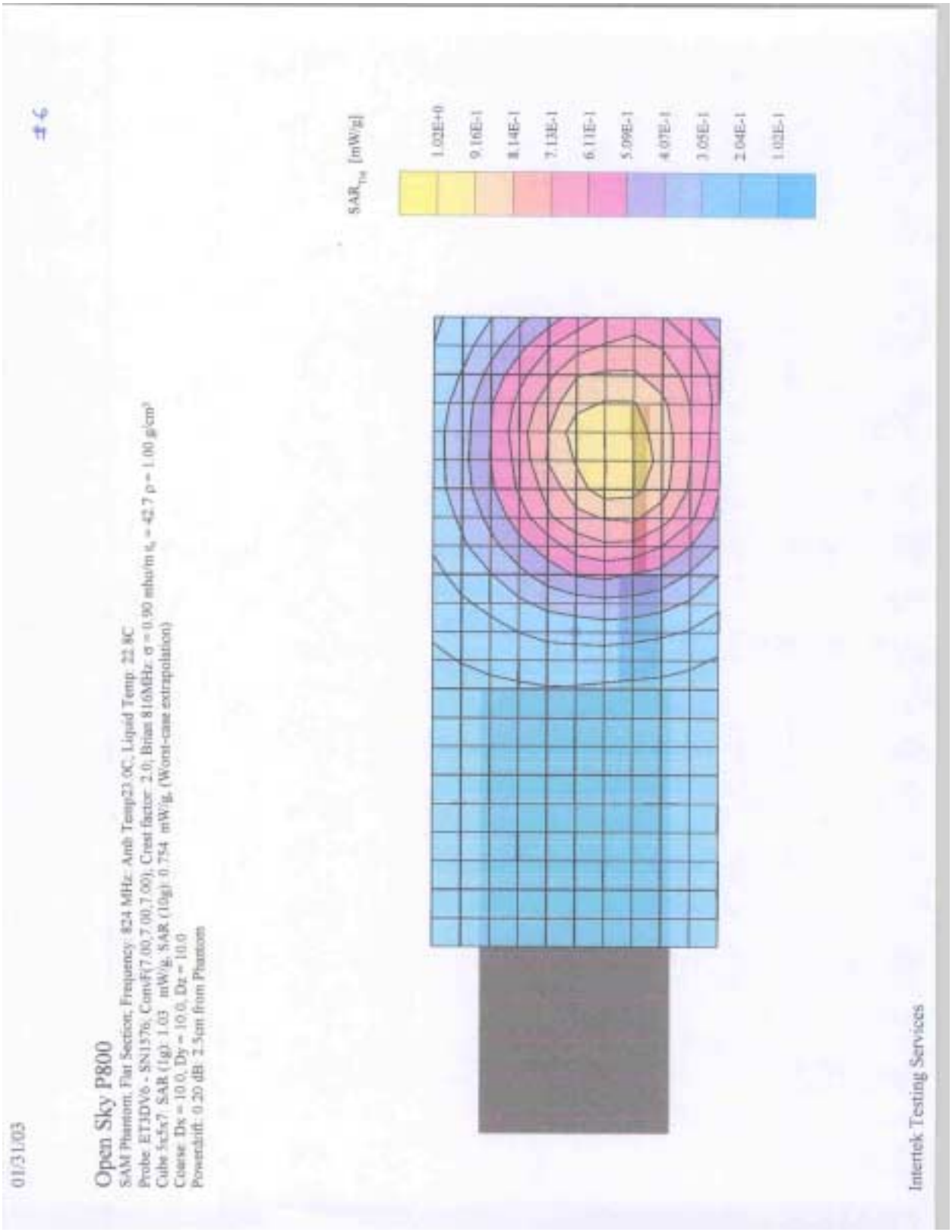

#3
SAR1g (mW/g)
7.44E-1
6.70E-1
5.95E-1
5.21E-1
4.46E-1
3.72E-1
2.98E-1
2.23E-1
1.49E-1
7.44E-2
Open Sky P800
SAM Phantom; Flat Section; Frequency: 816 MHz; Amb Temp:23.0C; Liquid Temp:22.5C
Probe: ET3DV6 - SN1576; ConvF(7.00,7.00,7.00); Crest factor: 2.0; Brian 816MHz: σ = 0.90 mho/m εr = 42.7 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.929 mW/g *, SAR (10g): 0.654 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.02 dB 2.5cm from Phantom
01/30/03
Intertek Testing Services


#4
SAR$_{Tot}$ [mW/g]
1.10E+0
9.90E-1
8.80E-1
7.70E-1
6.60E-1
5.50E-1
4.40E-1
3.30E-1
2.20E-1
1.10E-1
Open Sky P800
SAM Phantom; Flat Section; Frequency: 816 MHz Temp 22.8C; Liquid Temp: 22.5C
Probe: ET3DV6 - SN1576; ConvF(7.00,7.00,7.00); Crest factor: 2.0; Brian 816MHz: σ = 0.90 mho/m ε$_r$ = 42.7 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 1.08 mW/g, SAR (10g): 0.796 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.15 dB, 2.5cm from Phantom
01/31/03
Intertek Testing Services

M/A-COM, Inc., Model No: P800
FCC ID: BV8P800

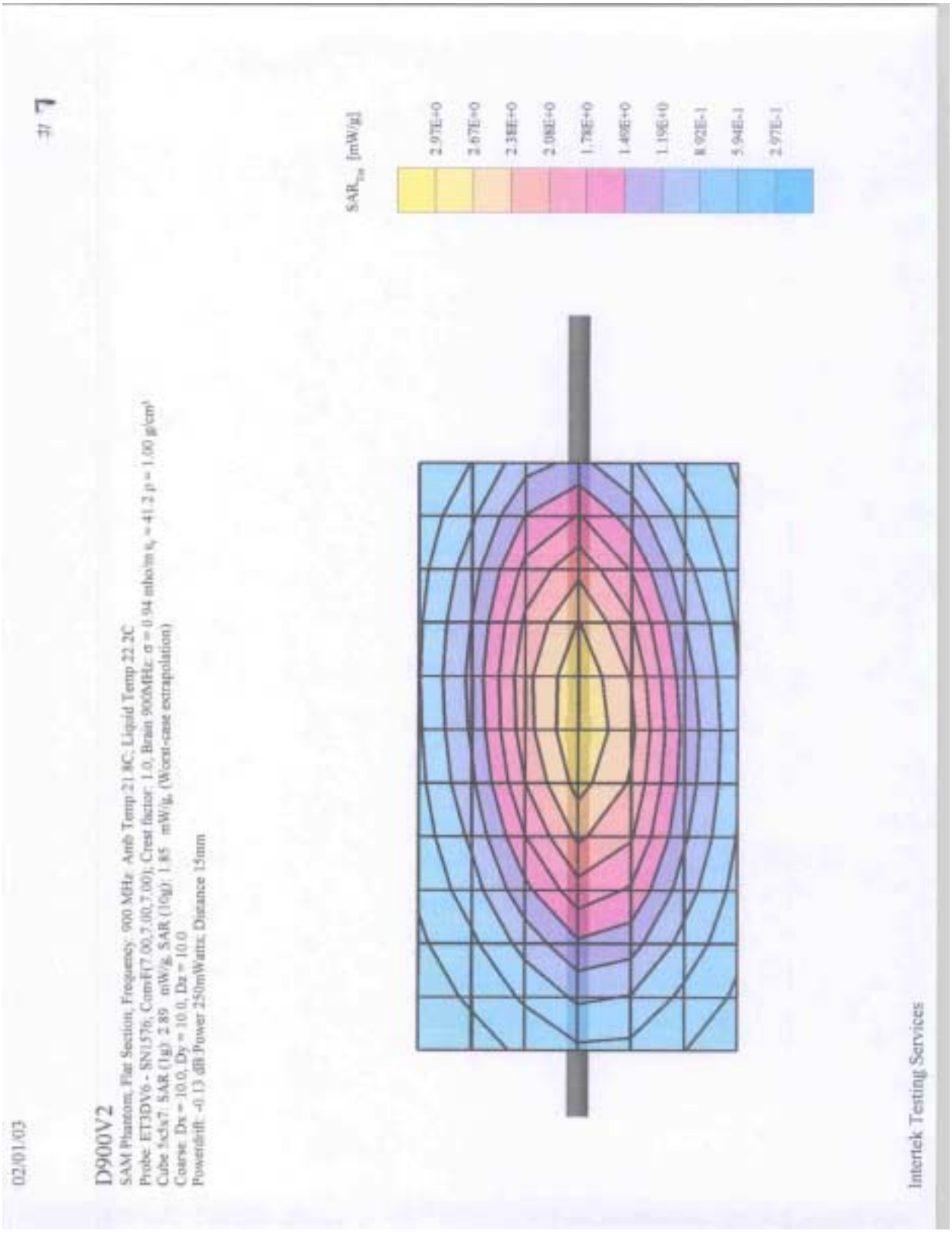
Date of Test: January 30-31, 2003




#6
SAR$_{1g}$ [mW/g]
1.02E+0
9.16E-1
8.14E-1
7.13E-1
6.11E-1
5.09E-1
4.07E-1
3.05E-1
2.04E-1
1.02E-1
Open Sky P800
SAM Phantom; Flat Section; Frequency: 824 MHz; Amb Temp:23.0C; Liquid Temp: 22.8C
Probe: ET3DV6 - SN1376; ConvF(7.00,7.00,7.00); Crest factor: 2.0; Brian 816MHz: σ = 0.90 mho/m ε$_r$ = 42.7 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 1.03 mW/g; SAR (10g): 0.754 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: 0.20 dB; 2.5cm from Phantom
01/31/03
Intertek Testing Services

M/A-COM, Inc., Model No: P800
FCC ID: BV8P800

Date of Test: January 30-31, 2003



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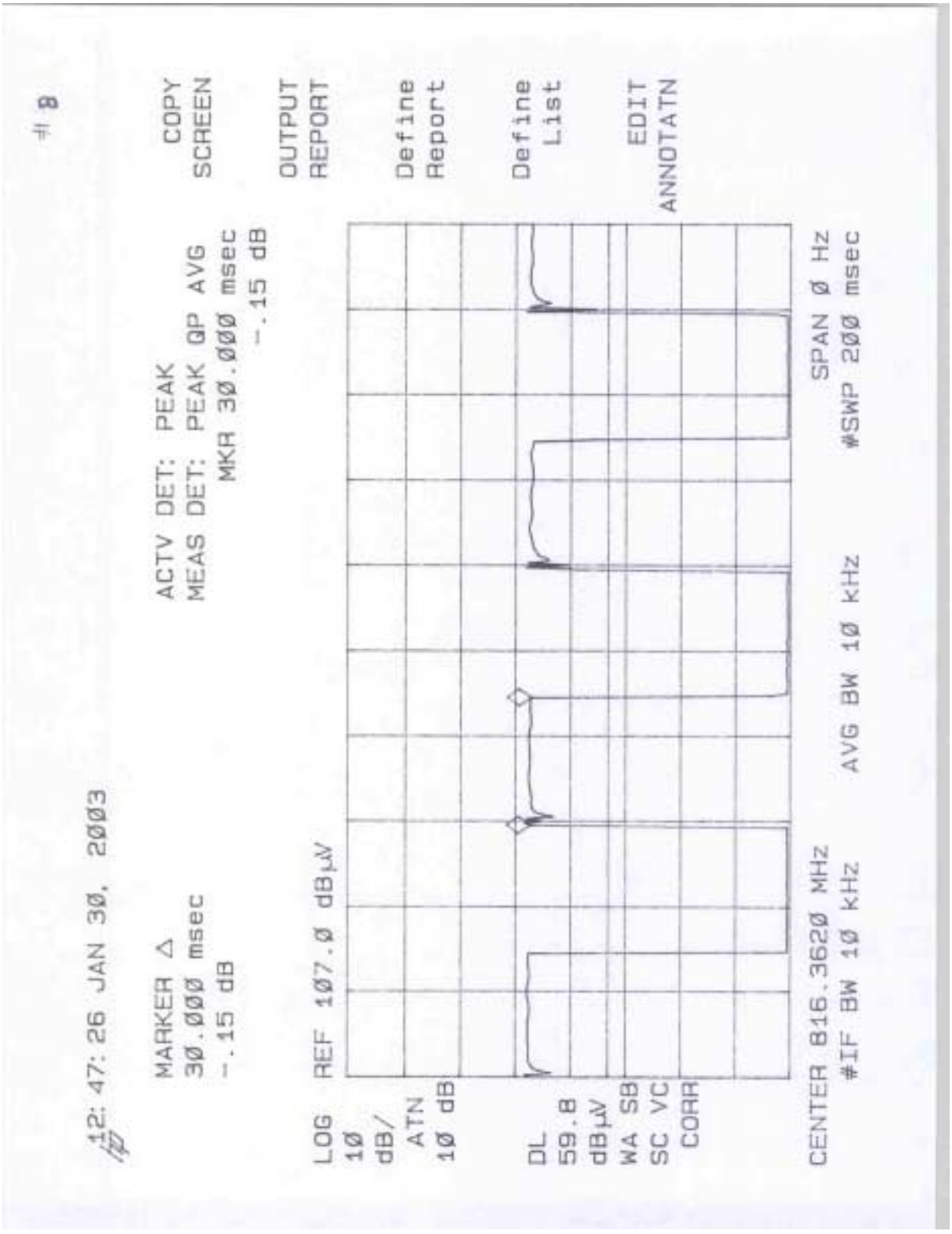
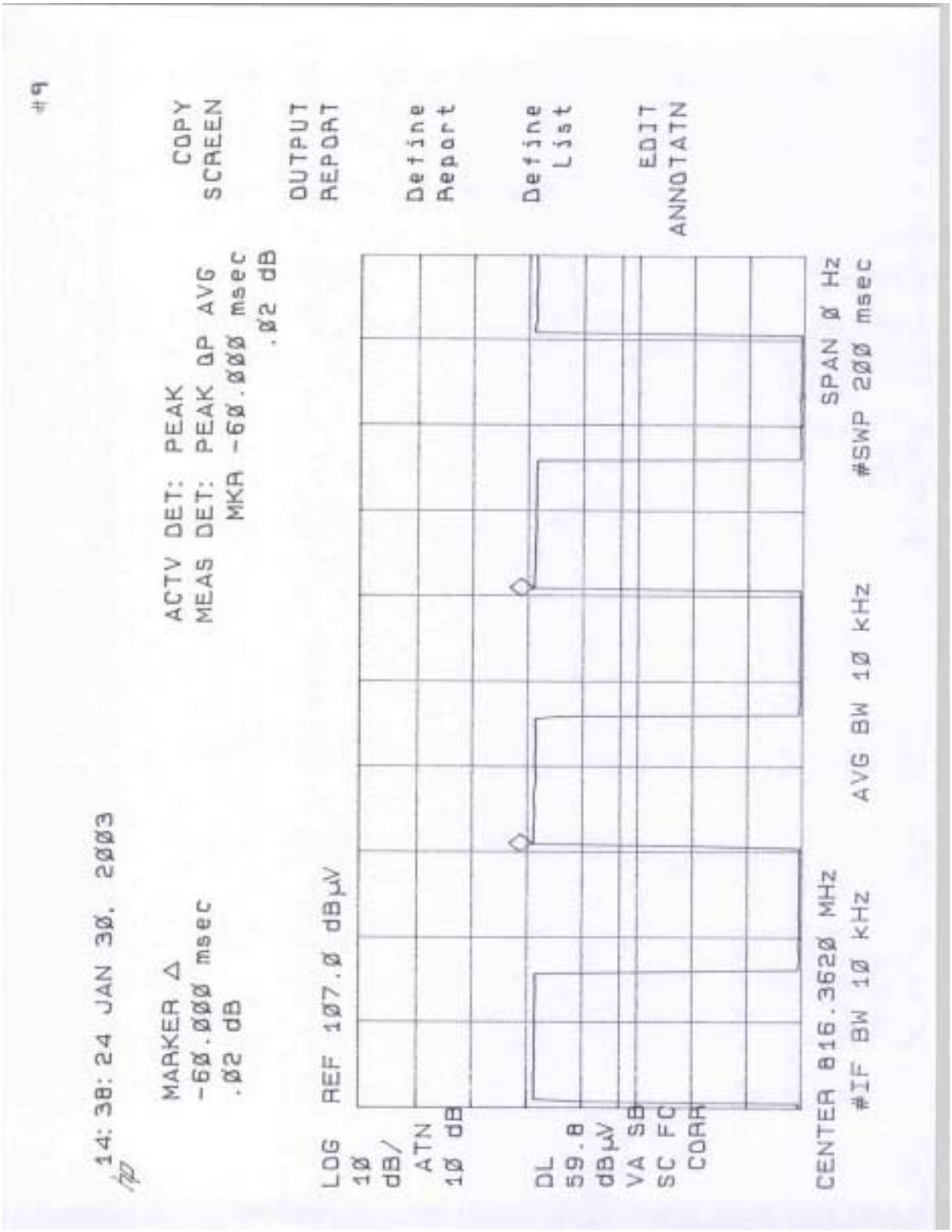
FCC ID: BV8P800




#9
14: 38: 24 JAN 30, 2003
MARKER Δ
-60.000 msec
.02 dB
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR -60.000 msec
.02 dB
COPY SCREEN
OUTPUT REPORT
Define Report
Define List
EDIT ANNOTATN
LOG REF 107.0 dBμV
10 dB/
ATN 10 dB
DL 59.8 dBμV
VA SB
SC FC
CORR
CENTER 816.3620 MHz
#IF BW 10 kHz
AVG BW 10 kHz
SPAN 0 Hz
#SWP 200 msec

APPENDIX B - E-Field Probe Calibration Data

See attached.

Schmid & Partner
Engineering AG

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

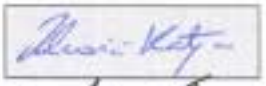
Calibration Certificate

Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1576**
Place of Calibration:	**Zurich**
Date of Calibration:	**February 27, 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:1576

Manufactured:	April 6, 2001
Last calibration:	April 20, 2001
Recalibrated:	February 27, 2002

Calibrated for System DASY3

ET3DV6 SN:1576 February 27, 2002

DASY3 - Parameters of Probe: ET3DV6 SN:1576

Sensitivity in Free Space

Diode Compression

NormX	1.77 μV/(V/m)^2	DCP X	98	mV
NormY	1.81 μV/(V/m)^2	DCP Y	98	mV
NormZ	1.76 μV/(V/m)^2	DCP Z	98	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	7.0 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	7.0 ± 9.5% (k=2)	Alpha	0.30
ConvF Z	7.0 ± 9.5% (k=2)	Depth	2.51

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	0.45
ConvF Z	5.4 ± 9.5% (k=2)	Depth	2.30

Boundary Effect

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

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	7.6	4.3
SAR_{be} [%]	With Correction Algorithm	0.3	0.5

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

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	9.7	6.6
SAR_{be} [%]	With Correction Algorithm	0.2	0.3

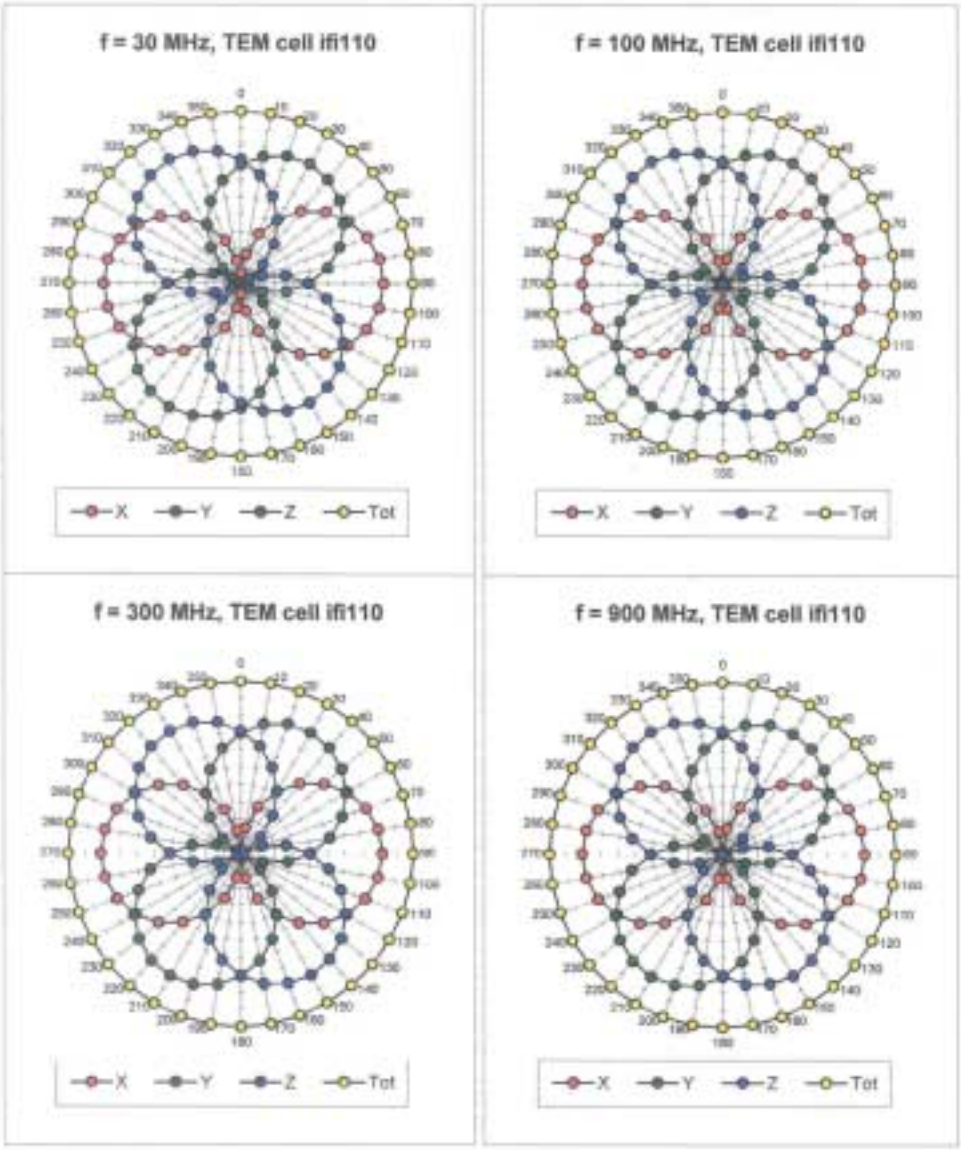
Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.9 ± 0.2	mm

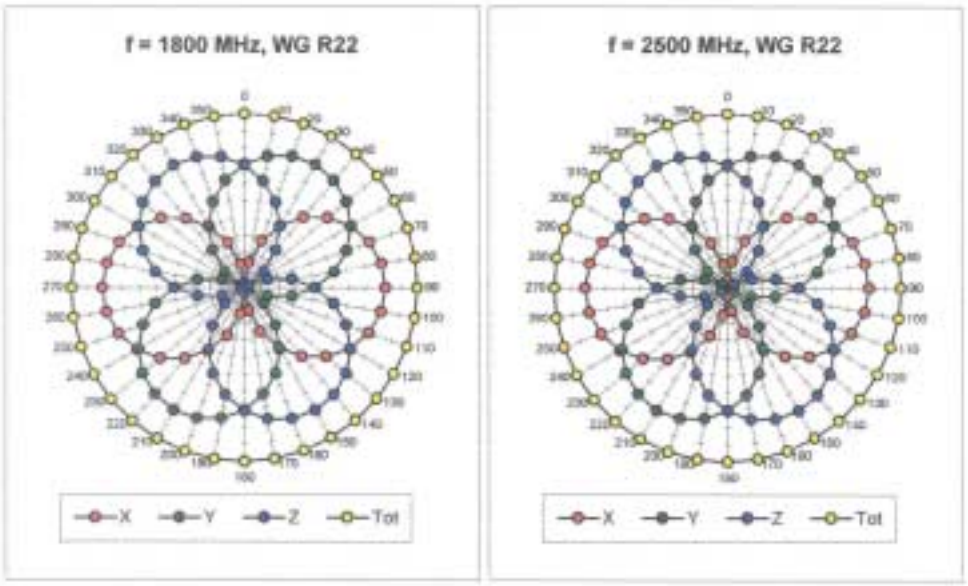
ET3DV6 SN:1576

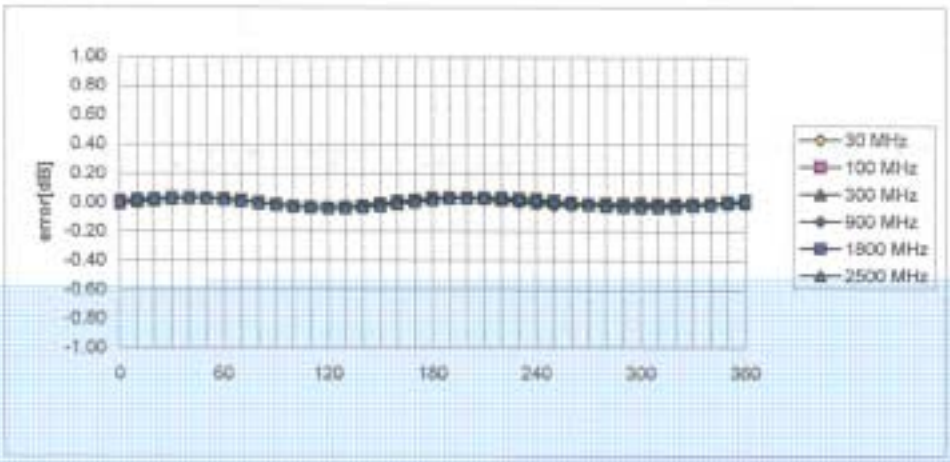
February 27, 2002

Receiving Pattern (ϕ), θ = 0°



ET3DV6 SN:1576 February 27, 2002





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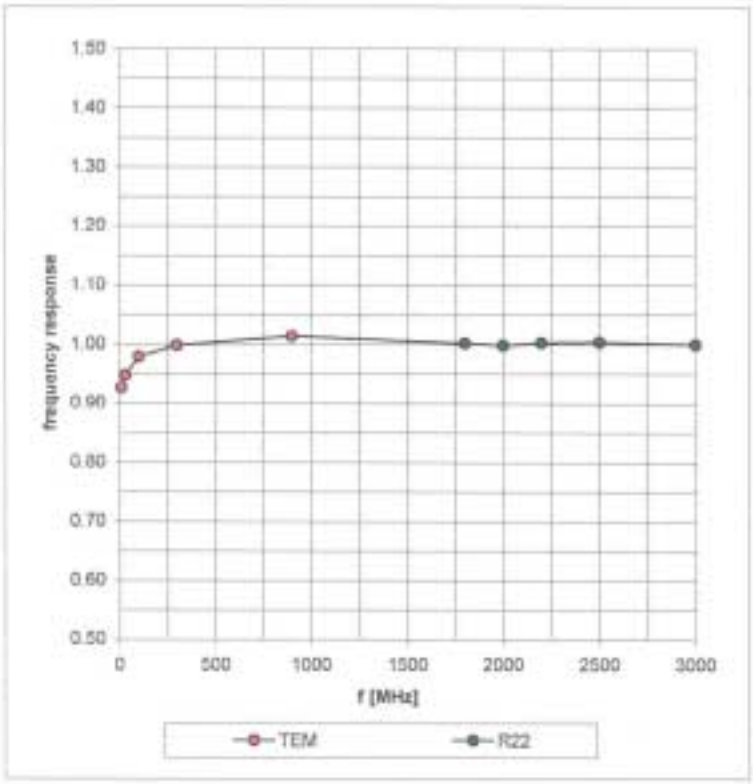
Frequency Response of E-Field

(TEM-Cell:ifi110, Waveguide R22)



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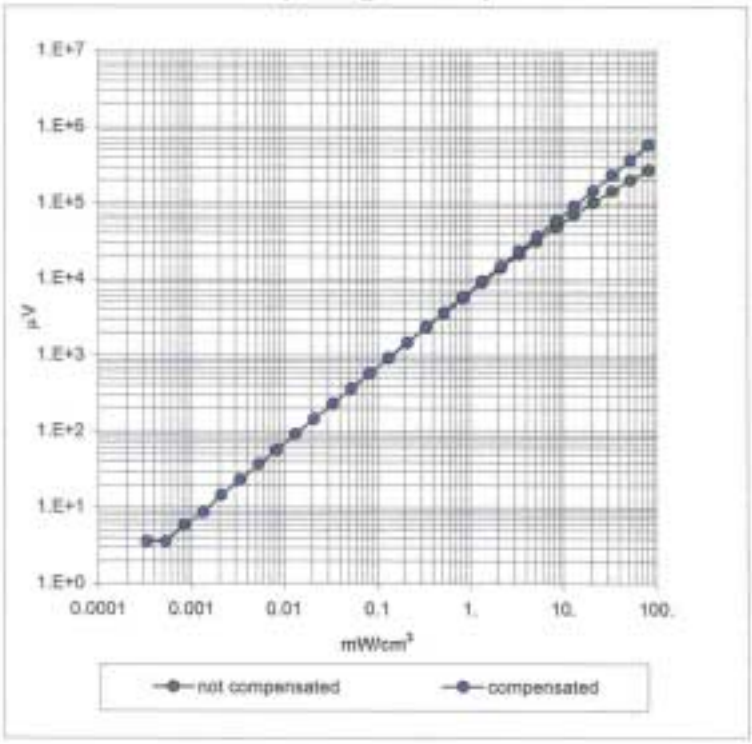
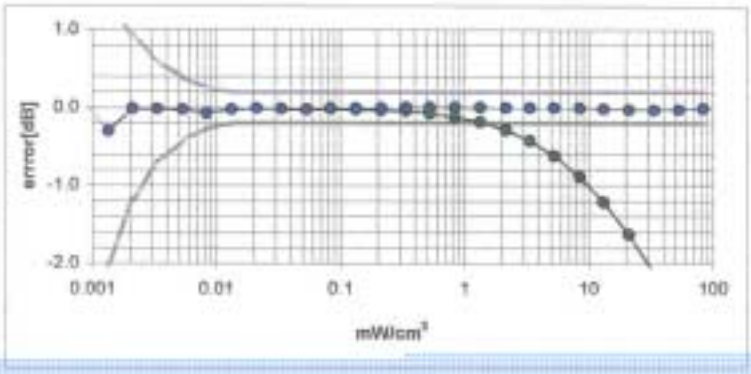
Dynamic Range f(SAR_{brain})

(Waveguide R22)





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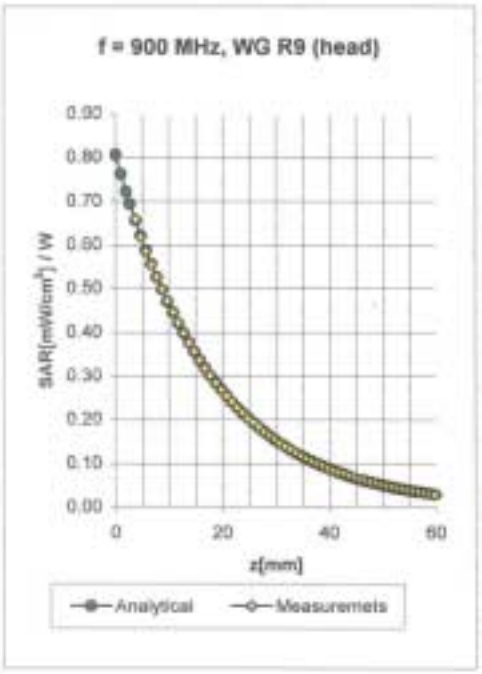
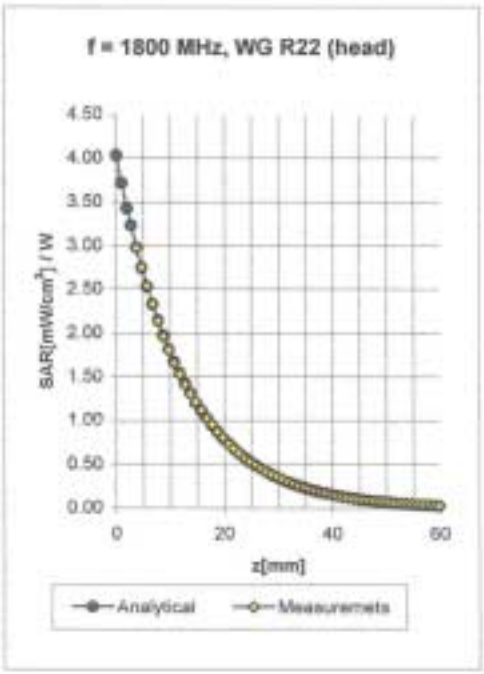
Conversion Factor Assessment





Head	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	7.0 ± 9.5% (k=2)	Boundary effect:
	ConvF Y	7.0 ± 9.5% (k=2)	Alpha 0.30
	ConvF Z	7.0 ± 9.5% (k=2)	Depth 2.51

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 0.45
	ConvF Z	5.4 ± 9.5% (k=2)	Depth 2.30

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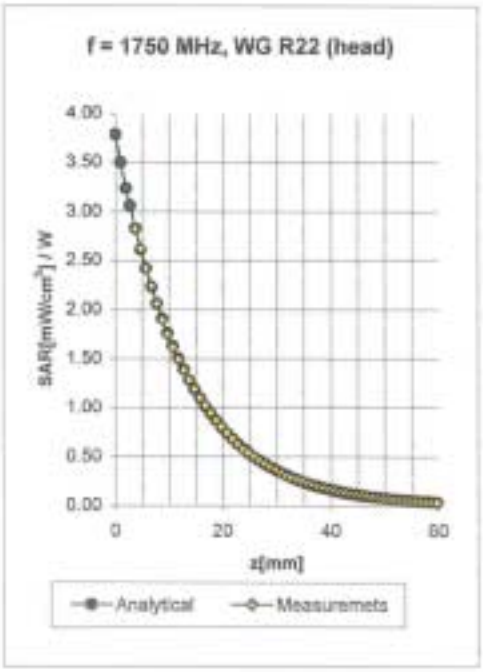
Conversion Factor Assessment



Head 1750 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	0.45
ConvF Z	5.4 ± 8.9% (k=2)	Depth	2.27

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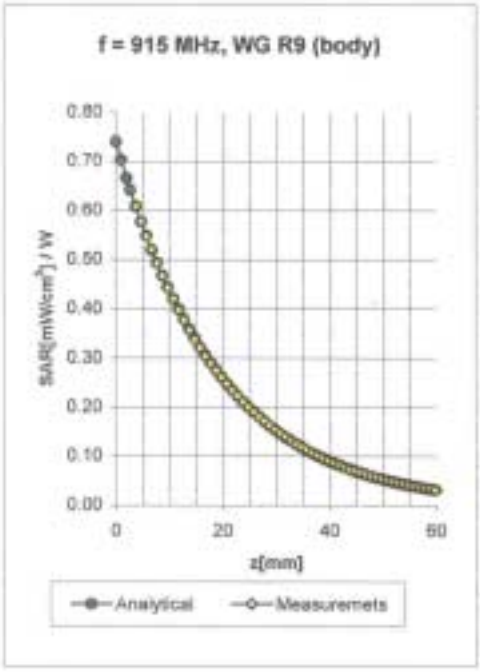
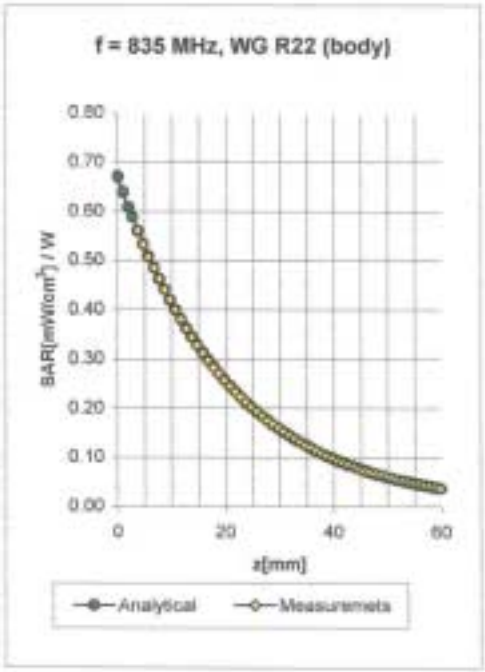
Conversion Factor Assessment





Body 915 MHz ε_r = 55.0 ± 5% σ = 1.06 ± 5% mho/m

ConvF X	6.7 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	6.7 ± 8.9% (k=2)	Alpha	0.45
ConvF Z	6.7 ± 8.9% (k=2)	Depth	2.01

Body 835 MHz ε_r = 55.2 ± 5% σ = 0.97 ± 5% mho/m

ConvF X	6.7 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	6.7 ± 8.9% (k=2)	Alpha	0.34
ConvF Z	6.7 ± 8.9% (k=2)	Depth	2.37

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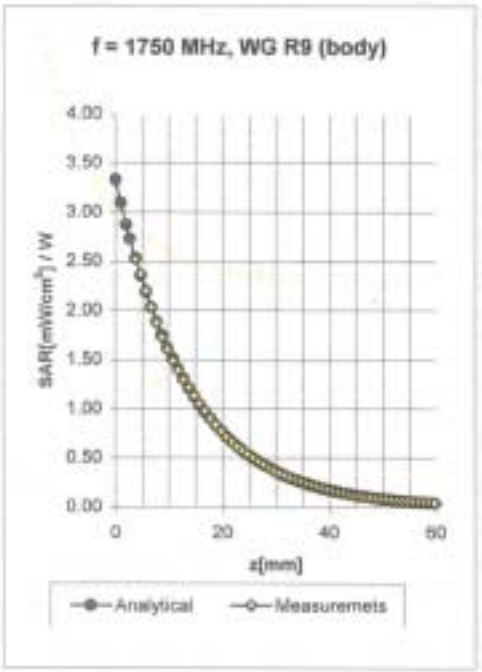
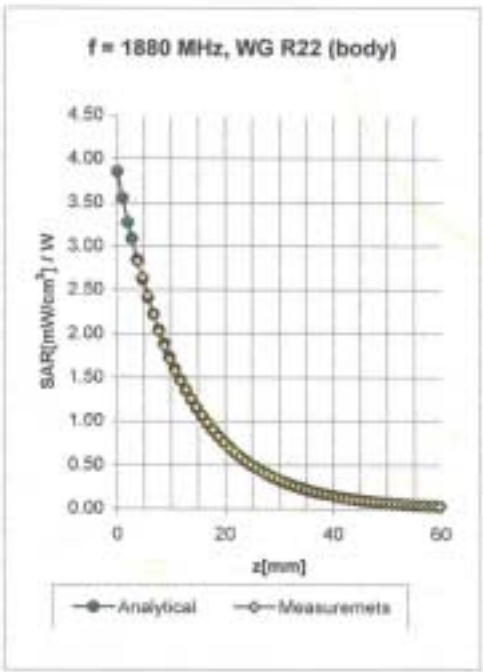
Conversion Factor Assessment





Body	1750 MHz	ε_r = 53.3 ± 5%	σ = 1.52 ± 5% mho/m
ConvF X	5.1 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	5.1 ± 8.9% (k=2)	Alpha	0.51
ConvF Z	5.1 ± 8.9% (k=2)	Depth	2.31

Body	1880 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	0.63
ConvF Z	4.8 ± 8.9% (k=2)	Depth	2.10

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Deviation from Isotropy in HSL

Error (θ,φ), f = 900 MHz