ENGINEERING TEST REPORT

UHF Transceiver
Model No.: IC-F4161T, IC-F4161S, IC-F4161DT AND IC-F4161DS

Tested For

ICOM Incorporated
1-1-32, Kamiminami, Hirano-ku
Osaka
Japan, 547-0003

In Accordance With

SAR (Specific Absorption Rate) Requirements
using guidelines established in IEEE Standard C95.1,
FCC OET Bulletin 65 (Supplement C),
Industry Canada RSS-102(Issue 2),
EN 50360 (Council Recommendation 1999/519/EC) and
ACA 2003 / ARPANSA Standard

Remark: The worst case Head SAR test configuration has been repeated to support existing Class II Permissive Change filing (UltraTech File#: ICOM-176-SAR dated on June 18, 2008), which had been only performed in the worst case Body SAR test configuration, according to FCC's Permissive Change Policies (KDB178919).

UltraTech's File No.: ICOM-176-SAR-APPENDIX

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: July 28, 2008	
Report Prepared by: JaeWook Choi Issued Date: July 28, 2008	Tested by: Steven Lu Test Dates: July 24, 2008

The results in this Test Report apply only to the sample(s) tested, which has been randomly selected.

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3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
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EXHIBIT 1. SUMMARY OF TEST RESULTS

1.1. LOCATION OF TESTS

All of the measurements described in this report were performed at UltraTech Group of Labs located at:

3000 Bristol Circle, in the city of Oakville, Province of Ontario, Canada.

All measurements were performed in UltraTech's shielded chamber, 24' x 16' x 8'.

1.2. APPLICABILITY & SUMMARY OF SAR RESULTS

This test report is supporting exhibit for Class 2 Permissive Change and verifies RF exposure compliance only for the worst case test configuration which was found in the original filing.

The maximum peak spatial – 1g average Head SAR measured was found to be 2.77 W/Kg.

Exposure Category and SAR Limits	Test Requirements	Compliance (Yes/No)
General/Uncontrolled exposure 0.08W/kg whole body average and **spatial peak SAR of 1.6W/kg**, averaged over 1gram of tissue, or **spatial peak SAR of 2.0W/Kg**, averaged over 10 gram of tissue Hands, wrist, feet and ankles have a peak SAR not to exceed 4 W/kg, averaged over 10 grams of tissue.	Requirements using guidelines established in IEEE C95.1-2005 FCC OET Bulletin 65 (Supplement C Edition 01-01) Industry Canada RSS-102 (Issue 2). EN 50360 (Council Recommendation 1999/519/EC) ACA 2003 / ARPANSA Standard	N/A
Occupational/Controlled Exposure 0.4W/kg whole body average and **spatial peak SAR of 8W/kg**, averaged over 1gram of tissue, or **spatial peak SAR of 10W/Kg**, averaged over 10 gram of tissue Hands, wrist, feet and ankles have a peak SAR not to exceed 20W/kg, averaged over 10 grams of tissue.	Requirements using guidelines established in IEEE C95.1-2005 FCC OET Bulletin 65 (Supplement C Edition 01-01), Industry Canada RSS-102 (Issue 2) EN 50360 (Council Recommendation 1999/519/EC) ACA 2003 / ARPANSA Standard	Yes

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EXHIBIT 2. MEASUREMENTS, EXAMINATIONS & TEST DATA

2.1. TEST SETUP

D.U.T. Information		Condition	
Product Name	UHF Transceiver	**Robot Type**	6 Axis
Model Number	IC-F4161DT	**Scan Type**	SAR – Area/Zoom/Att Vs Depth
Serial Number	6600001	**Measured Field**	E
Operating Frequency [MHz]	450-512	**Phantom Type**	2_{mm} base Flat Phantom
Frequency Tested [MHz]	450.05, 485.05, 511.95	**Phantom Position**	Waist
Rated RF Output Power [mW]	5.56 W	**Room Temperature [°C]**	21.0 ± 1
Antenna Type	Helical antenna	**Room Humidity [%]**	40 ± 10
Modulation	FM	**Tissue Temperature [°C]**	21.0 ± 1
Worst Case Duty Cycle	50 %		
Duty Cycle Tested	100 %		
Source(or Usage)-based time-average	0.5		

Type of Tissue	Brain
Test Frequency [MHz]	450
Target Conductivity [S/m]	0.87
Target Dielectric Constant	43.5
Measured Conductivity [S/m]	0.87 (+0.3 %)
Measured Dielectric Constant	42.4 (-2.6 %)
Penetration Depth (Plane Wave Excitation) [mm]	42.4
Probe Model Number	ET20
Probe Serial Number	03MAR-0019
Probe Orientation	Isotropic
Probe Offset [mm]	2.1
Probe Tip Diameter [mm]	4.0
Sensor Factor (η_{pd}) [mV/(mW/cm^2)]	10.8
Conversion Factor (γ)	5.633
Sensitivity (ζ) [W/Kg/mV]	5.391E-02

2.2. PHOTOGRAPHS OF D.U.T. POSITION

2.2.1. Head Configuration

2.2.1.1. Head-Front configuration

< Head Front Configuration, PTT >

2.3. MAXIMUM PEAK SPATIAL-AVERAGE SAR

2.3.1. Maximum Peak Spatial-average SAR Data

s#	Configuration	Device Test Positions	Antenna Position	Freq. [MHz]	Channel	MAX. SAR_{1g} [W/Kg]
*	**Occupational/Controlled Exposure Category Limit**					**8.0**
02	Head Front	Body	Fixed	485.05	Middle	2.77

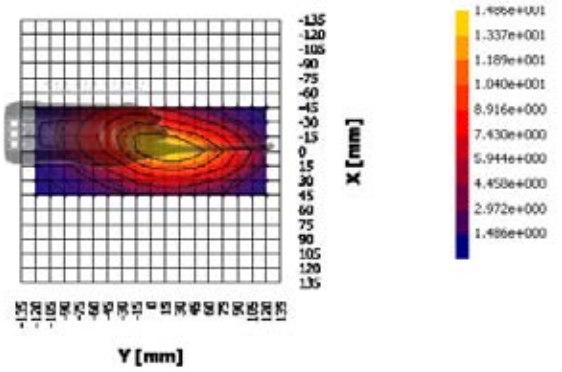
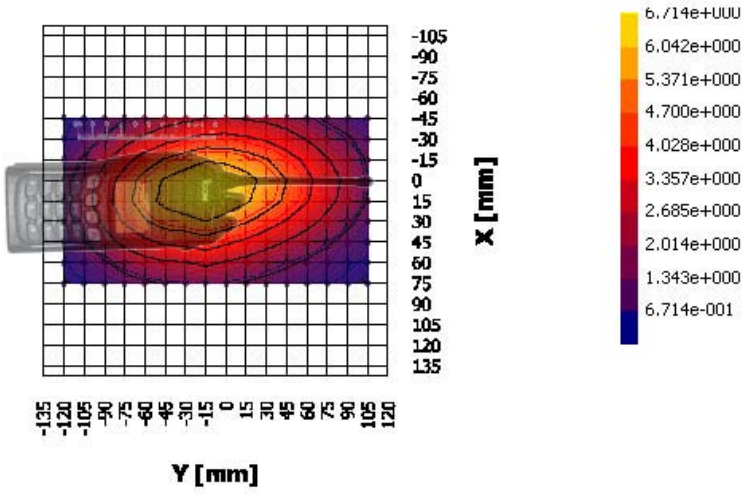


EXHIBIT 3. SAR MEASUREMENT

3.1. HEAD CONFIGURATION*

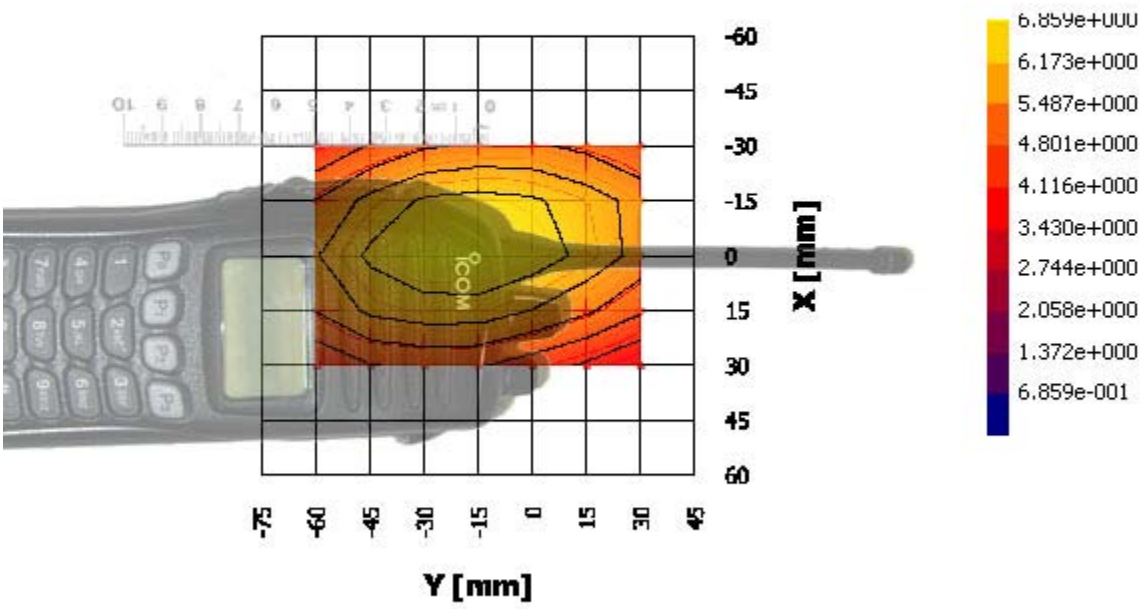
#	Configuration	Antenna Position	Frequency [MHz]	Channel	SAR_{local} Before [W/Kg]	SAR_{local} After [W/Kg]	MAX SAR_{1g} [W/Kg]
*	**Occupational/Controlled Exposure Category Limit**						**8.0**
01	Head Front	Fixed	450.05	Low			-
02		Fixed	485.05	Middle	1.83	1.80	2.77
03		Fixed	511.95	High			-

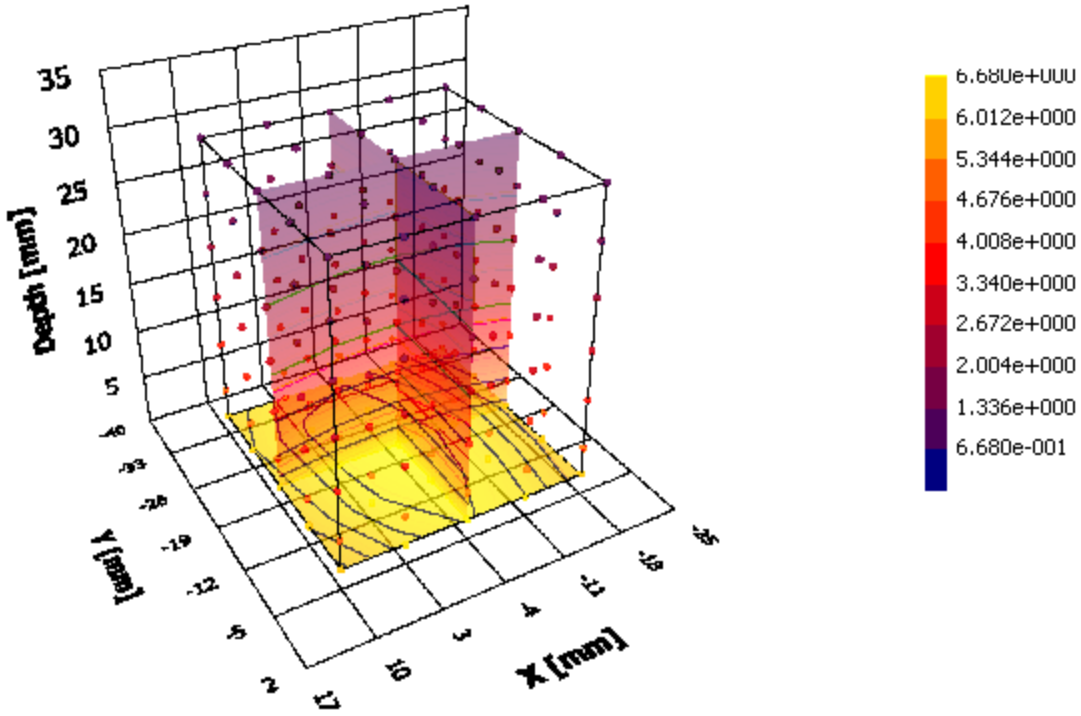


* If the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

3.1.1.1. Head Front; 485.05 MHz; #02

Test date [MM/DD/YYYY]	07/24/2008
Test by	Steven Lu
Room temperature [°C]	21
Room humidity [%]	40
Simulated tissue temperature [°C]	21
Separation distance, d [mm]	25
Test frequency [MHz]	480.05
E-field Probe	M/N: ET20, S/N:03MAR-0019, Sensor Offset: 2.1 mm
Sensor Factor (η_{Pd}) [mV/(mW/cm^2)]	10.8
Amplifier Settings (AS_1, AS_2, AS_3)	0.0075307056, 0.0080137981, 0.0081171369
Tissue Type	Brain
Measured conductivity [S/m]	0.87 (+0.3 %)
Measured dielectric constant	42.4 (-2.6 %)
Conversion Factor (γ)	5.633
Sensitivity (ζ) [W/Kg/mV]	5.391E-02
Source-(or Usage-)Based Time-Average Factor	0.5
Measurement Area Specification (X × Y)	90 mm × 60 mm; Resolution: 15 mm × 15 mm
Measurement Volume Specification (X × Y× Z)	5 pts × 5 pts × 7 pts, 28 mm × 28 mm × 30 mm; Resolution: 7 mm × 7 mm × 5 mm
SAR_{1g} [W/Kg]	2.77




35
30
25
20
15
10
5
Depth [mm]
X [mm]
6.680e+000
6.012e+000
5.344e+000
4.676e+000
4.008e+000
3.340e+000
2.672e+000
2.004e+000
1.336e+000
6.680e-001

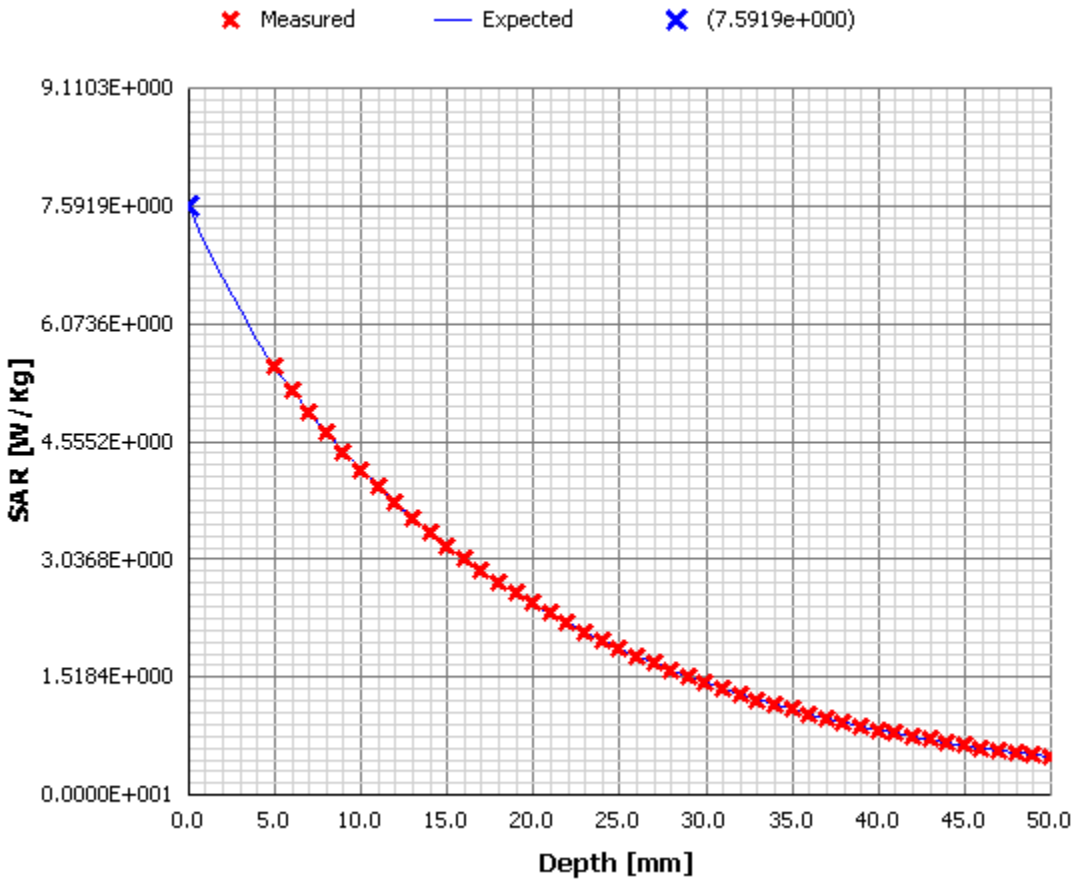

Measured
Expected
(7.5919e+000)
9.1103E+000
7.5919E+000
6.0736E+000
4.5552E+000
3.0368E+000
1.5184E+000
0.0000E+001
SAR [W / Kg]
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
Depth [mm]

EXHIBIT 4. TISSUE DIELECTRIC PARAMETER CALIBRATION

4.1. SIMULATED TISSUE AT 450 MHZ

Tissue calibration type	HP Dielectric Strength Probe System (M/N: 85070C)
Tissue calibration date [MM/DD/YYYY]	07/24/2008
Tissue calibrated by	Steven Lu
Room temperature [°C]	21
Room humidity [%]	40
Simulated tissue temperature [°C]	21
Tissue calibration frequency [MHz]	450
Tissue Type	Brain
Target conductivity [S/m]	0.87
Target dielectric constant	43.5
Composition (by weight) [%]	DI Water (38.56 %) Sugar (56.32 %) Salt (3.95 %) HEC (0.25 %) Bactericide (0.92 %)
Measured conductivity [S/m]	0.87 (+0.3 %)
Measured dielectric constant	42.4 (-2.6 %)
Penetration depth (plane wave excitation) [mm]	42.4

4.1.1. 450 MHz Brain Tissue

Frequency [MHz]	Meas. After 5min			DI Water at 20°C			Init. Meas.		
	ε'	ε''	σ [S/m]	ε'	ε''	σ [S/m]	ε'	ε''	σ [S/m]
425.000	43.0489	35.9810	0.85	78.9507	1.6223	0.04	43.0272	36.1721	0.86
450.000	42.3707	34.8668	0.87	78.9635	1.8012	0.05	42.3745	35.0164	0.88
475.000	41.8729	33.8653	0.89	78.9796	1.9395	0.05	41.8825	33.9263	0.90

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EXHIBIT 5. SAR SYSTEM VERIFICATION

5.1. VERIFICATION SETUP

5.1.1. Test setup at 450 MHz using the dipole reference

Flat phantom dimension (W × L × H) [mm]	420 × 700 × 200
Flat phantom shell thickness (d_3) [mm]	2.0
Flat phantom shell permittivity	2.98
Reference dipole dimension (L × h × d) [mm]	280.0 × 172.0 × 6.35
Dipole-to-Phantom (d_2) [mm]	13.0
Dipole-to-Liquid ($d_2 + d_3$) [mm]	15.0 (13.0 + 2.0)
Return Loss (at test frequency) [dB]	More then -20 dB

5.2. SIMULATED TISSUE

5.2.1. Simulated brain tissue at 450 MHz

Tissue calibration type	HP Dielectric Strength Probe System
Tissue calibration date [MM/DD/YYYY]	07/24/2008
Tissue calibrated by	Steven Lu
Room temperature [°C]	21
Room humidity [%]	40
Simulated tissue temperature [°C]	21
Tissue calibration frequency [MHz]	450
Tissue Type	Brain
Target conductivity [S/m]	0.87
Target dielectric constant	43.5
Measured conductivity [S/m]	0.87 (+0.3 %)
Measured dielectric constant	42.4 (-2.6 %)
Penetration depth (plane wave excitation) [mm]	42.4

5.3. VERIFICATION RESULT

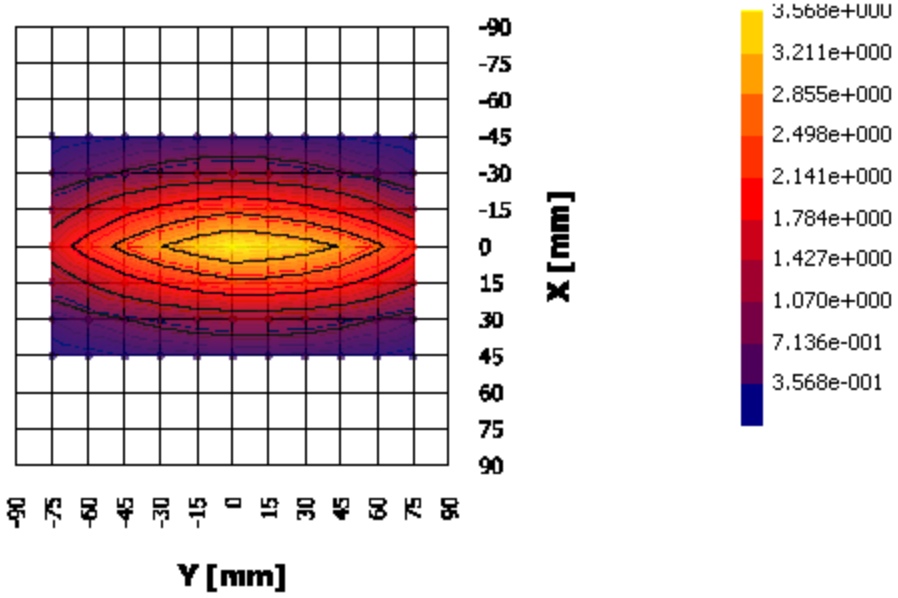
5.3.1. Reference SAR values for simulated brain tissue at 450 MHz*

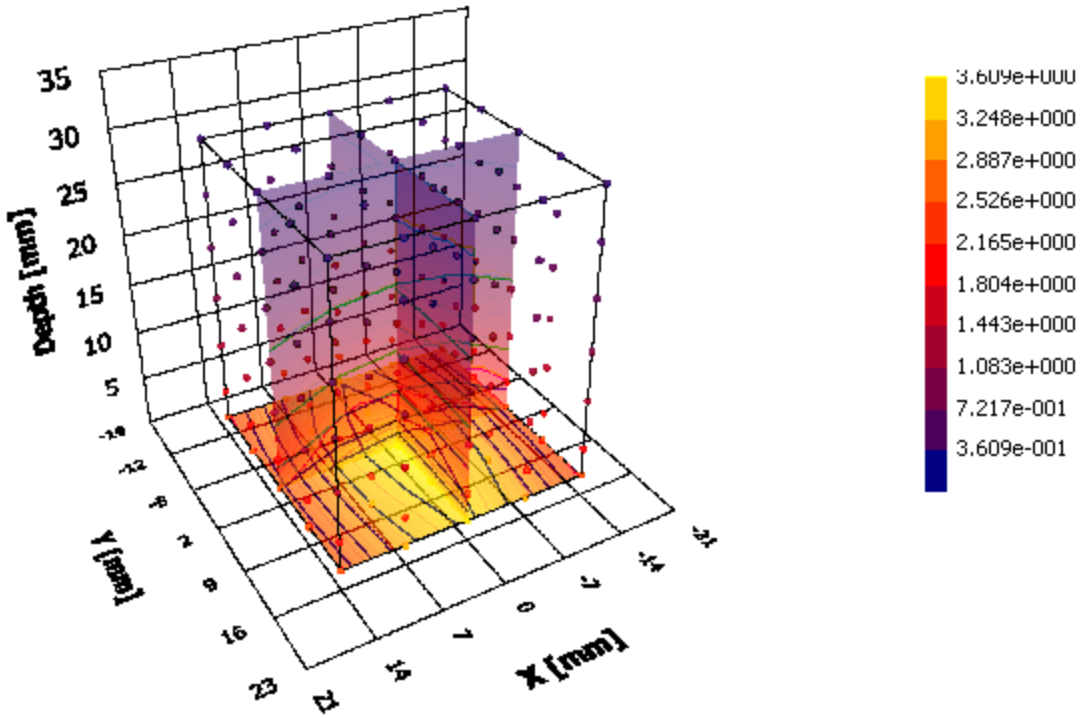
Reference SAR_{1g} [W/Kg]	4.9
Reference SAR_{s} [W/Kg]	7.2
Measured SAR_{1g} [W/Kg]	4.9
Measured SAR_{s} [W/Kg]	8.5

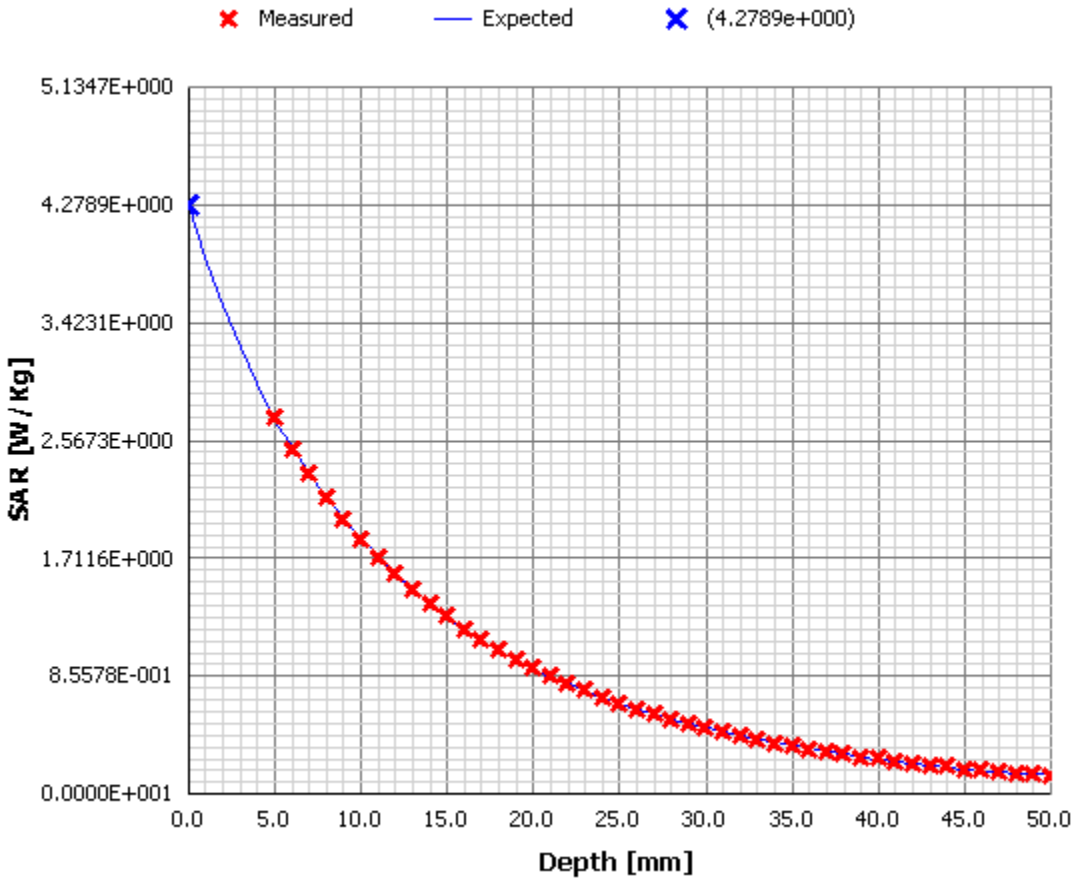
5.3.2. Verification result at 450 MHz

Test date [MM/DD/YYYY]	07/24/2008
Test by	Steven Lu
Room temperature [°C]	21
Room humidity [%]	40
Simulated tissue temperature [°C]	21
Test frequency [MHz]	450
E-field Probe	M/N: ET20, S/N: 03MAR-0019, Sensor Offset: 2.1 mm
Sensor Factor (η_{Pd}) [mV/(mW/cm^2)]	10.8
Amplifier Settings (AS_1, AS_2, AS_3)	0.0075307056, 0.0080137981, 0.0081171369
Tissue Type	Brain
Measured conductivity [S/m]	0.87 (+0.3 %)
Measured dielectric constant	42.4 (-2.6 %)
Conversion Factor (γ)	5.633
Sensitivity (ζ) [W/Kg/mV]	5.391E-02
Power [mW]	500
Measurement Volume Specification (X × Y × Z)	5 pts × 5 pts × 7 pts, 28 mm × 28 mm × 30 mm; Resolution: 7 mm × 7 mm × 5 mm
SAR_{1g} [W/Kg]	2.47
SAR_{s} [W/Kg]	4.28

* All SAR values in 5.3.1are normalized to a forward power of 1 W.


-90
-75
-60
-45
-30
-15
0
15
30
45
60
75
90
X [mm]
-90 -75 -60 -45 -30 -15 0 15 30 45 60 75 90
Y [mm]
3.568e+000
3.211e+000
2.855e+000
2.498e+000
2.141e+000
1.784e+000
1.427e+000
1.070e+000
7.136e-001
3.568e-001


35
30
25
20
15
10
5
Depth [mm]
Y [mm]
X [mm]
3.609e+000
3.248e+000
2.887e+000
2.526e+000
2.165e+000
1.804e+000
1.443e+000
1.083e+000
7.217e-001
3.609e-001


Measured
Expected
(4.2789e+000)
5.1347E+000
4.2789E+000
3.4231E+000
2.5673E+000
1.7116E+000
8.5578E-001
0.0000E+001
SAR [W / Kg]
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
Depth [mm]