ENGINEERING TEST REPORT

VHF MARINE TRANSCEIVER
Model No.: IC-M32

Tested For

ICOM Incorporated
2380 116 Avenue North East
USA

In Accordance With

SAR (Specific Absorption Rate) Requirements
using guidelines established in IEEE C95.1-1991,
FCC OET Bulletin 65 (Supplement C),
Industry Canada RSS-102(Issue 1) and
ACA Radiocommunications (Electromagnetic Radiation – Human Exposure)
Amendment Standard 2000 (No. 1)

(Note) This report is an addition to the original test report (UltraTech File #: ICOM-069-SAR), dated on September 11, 2003 in order to take account of the new battery pack (M/N: BP-242) provided by manufacturer.

UltraTech's File No.: ICOM-105-SAR

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: February 1, 2005	
Report Prepared by: JaeWook Choi, SAR System Engineer Issued Date: February 1, 2005	Tested by: Carolyn Luu Test Dates: January 28, 2005

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

UltraTech

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	SAR (Specific Absorption Rate) Requirements IEEE C95.1-1991, FCC OET Bulletin 65 (Supplement C Edition 01-01) Industry Canada RSS-102 (Issue 1). ACA Radiocommunications (Electromagnetic Radiation – Human Exposure), Amendment Standard 2000 (No. 1)
Title	Safety Levels with respect to human exposure to Radio Frequency Electromagnetic Fields Guideline for Evaluating the Environmental Effects of Radio Frequency Radiation
Purpose of Test:	To verify compliance with Federal regulated SAR requirements in Canada, Chatswood NSW 2067 and the US.
Method of Measurements:	IEEE C95.1-1991, FCC OET Bulletin 65 (Supplement C Edition 01-01) and Industry Canada RSS-102 (Issue 1)
Device Category	Portable
Exposure Category	Occupational/controlled

1.2. REFERENCES

The methods and procedures used for the measurements contained in this report are details in the following reference standards:

Publications	Year	Title
IEEE Std. 1528/D1.2	2003	Draft Recommended practice for determining the Peak Spatial-Average Specific Absorption rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.
Industry Canada RSS102	1999	"Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields"
ACA	2000	ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)
NCRP Report No.86	1986	"Biological Effects and Exposure Criteria for radio Frequency Electromagnetic Fields"
FCC OET Bulletin 65	1997	"Evaluating Compliance with FCC Guidelines for Human Exposure to radio Frequency Fields"
ANSI/IEEE C95.3	1992	"Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave"
ANSI/IEEE C95.1	1992	"Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz"
AS/NZS 2722.1	1998	Interim Chatswood NSW 2067n/New Zealand Standard. "Radiofrequency fields, Part 1:Maximum exposure levels – 3kHz to 300GHz "

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT AND MANUFACTURER INFORMATION

APPLICANT:	
Name:	ICOM Incorporated
Address:	1-1-32, Kamiminami, Hirano-ku Osaka Japan, 547-0003
Contact Person:	Mr. Takashi Aoki Phone #: +81 66 793 5302 Fax #: +81 66 793 0013 Email Address: export@icom.co.jp

MANUFACTURER:	
Name:	ICOM Incorporated
Address:	1-1-32, Kamiminami, Hirano-ku Osaka Japan, 547-0003
Contact Person:	Mr. Takashi Aoki Phone #: +81 66 793 5302 Fax #: +81 66 793 0013 Email Address: export@icom.co.jp

2.2. DEVICE UNDER TEST (D.U.T.) DESCRIPTION

The following is the information provided by the applicant.

Trade Name	ICOM Inc.
Type/Model Number	IC-M32
Type of Equipment	0020
Serial Number	VHF Marine Tranceiver
Frequency of Operation	156.025 ~ 157.425 MHz
Rated RF Power	5 W conducted (High) 1 W conducted (Low)
Modulation Employed	FM
Antenna	Monopole antenna (ICOM Inc. M/N: FA-SC55V-1, -12 dBi gain)
Power Supply	Rechargeable Li-Ion battery pack (M/N; BP-242, 7.2 V, 1150 mAh) Rechargeable Ni-Cd battery pack (M/N: BP-224, 7.2 V, 750 mAh) Battery Case (M/N: BP-223, 6 × AA alkaline batteries)
Primary User Functions of D.U.T.	Voice Radio Communication Through Air

2.3. LIST OF D.U.T.'S ACCESSORIES:

Li-Ion Battery Pack (M/N: BP-242, 7.2 V / 1150 mAh), Ni-CD battery pack (M/N: BP-224, 7.2 V/ 750 mAh), Battery Case (M/N: BP-223, 6 × AA alkaline batteries), Desktop Charger(M/N: BC-119N) + Charger Adapter(M/N: AD-103) + AC Adapter(M/N: BC-145), Desktop Charger(M/N: BC-150) + AC Adapter (M/N: BC-147A/E or MB-95V), Belt Clip(M/N:MB-68), Alligator-type belt clip(M/N:MB-74), Swivel Belt Clip(M/N:MB-87)

2.4. SPECIAL CHANGES ON THE D.U.T.'S HARDWARE/SOFTWARE FOR TESTING PURPOSES

N/A

2.5. ANCILLARY EQUIPMENT

N/A

2.6. GENERAL TEST CONFIGURATIONS

2.6.1. Equipment Configuration

Power and signal distribution, grounding, interconnecting cabling and physical placement of equipment of a test system shall simulate the typical application and usage in so far as is practicable, and shall be in accordance with the relevant product specifications of the manufacturer.

The configuration that tends to maximize the D.U.T.'s emission or minimize its immunity is not usually intuitively obvious and in most instances selection will involve some trial and error testing. For example, interface cables may be moved or equipment re-orientated during initial stages of testing and the effects on the results observed.

Only configurations within the range of positions likely to occur in normal use need to be considered.

The configuration selected shall be fully detailed and documented in the test report, together with the justification for selecting that particular configuration.

2.6.2. Exercising Equipment

The exercising equipment and other auxiliary equipment shall be sufficiently decoupled from the D.U.T. so that the performance of such equipment does not significantly influence the test results.

2.7. SPECIFIC OPERATING CONDITIONS

N/A.

2.8. BLOCK DIAGRAM OF TEST SETUP

The D.U.T. was configured as normal intended use. The following block diagram shows a representative equipment arrangement during tests:

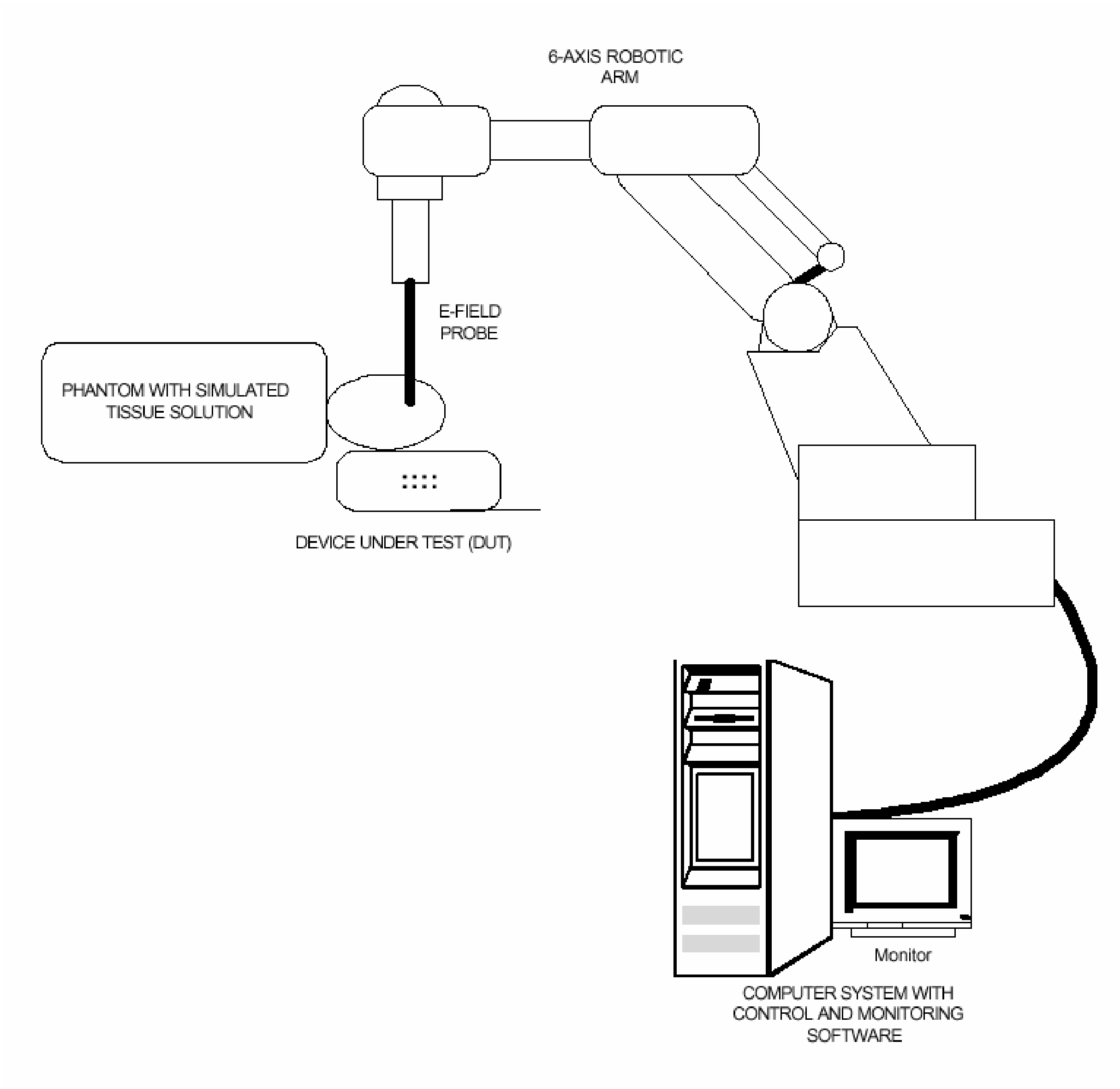


EXHIBIT 3. SUMMARY OF TEST RESULTS

3.1. 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'.

3.2. APPLICABILITY & SUMMARY OF SAR RESULTS

The maximum peak spatial - average SAR measured was found to be 1.52 W/Kg

Exposure Category and SAR Limits	Test Requirements	Compliance (Yes/No)
General population/Uncontrolled exposure 0.08W/kg whole body average and **spatial peak SAR of 1.6W/kg**, averaged over 1gram 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 C95.1-1991 FCC OET Bulletin 65 (Supplement C Edition 01-01) Industry Canada RSS-102 (Issue 1). ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)	N/A
Occupational/Controlled Exposure 0.4W/kg whole body average and **spatial peak SAR of 8W/kg**, averaged over 1gram of tissue Hands, wrist, feet and ankles have a peak SAR not to exceed 20 W/kg, averaged over 10 grams of tissue.	Requirements using guidelines established in IEEE C95.1-1991 FCC OET Bulletin 65 (Supplement C Edition 01-01), Industry Canada RSS-102 (Issue 1) ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)	YES

EXHIBIT 4. MEASUREMENTS, EXAMINATIONS & TEST DATA

4.1. TEST SETUP

D.U.T. Information		Condition	
Product Name	VHF MARINE TRANSCEIVER	**Robot Type**	6 Axis
Model Number	IC-M32	**Scan Type**	SAR – Area/Zoom/Att Vs Depth
Serial Number	0020	**Measured Field**	E
Frequency Band [MHz]	156.025 ~ 157.425	**Phantom Type**	2_{mm} base Flat Phantom
Frequency Tested [MHz]	156.025	**Phantom Position**	Waist, Head Front
Rated Conducted Power [W]	5	**Room Temperature** [°C]	22.0 ± 1
Antenna Type	Monopole	**Room Humidity** [%]	40 ± 10
Modulation	FM	**Tissue Temperature** [°C]	22.0 ± 1
Worst Case Duty Cycle	50 %*		
Duty Cycle Tested	100 %		
Source(or Usage)-Based Time-Average Factor	2.0**		

Type of Tissue	Brain	Muscle
Test Frequency [MHz]	150	150
Measured Dielectric Constant	53.9 (+3.1 %)	61.7 (-0.4 %)
Target Dielectric Constant	52.3	61.9
Measured Conductivity [S/m]	0.76 (+0.2 %)	0.76 (-4.5 %)
Target Conductivity [S/m]	0.76	0.80
Penetration Depth (Plane Wave Excitation) [mm]	62.3	64.4
Probe Model Number	E-TR	E-TR
Probe Serial Number	UT-0200-1	UT-0200-1
Probe Orientation	Isotropic	Isotropic
Probe Offset [mm]	2.00	2.00
Probe Tip Diameter [mm]	4.00	4.00
Sensor Factor (η_{pd}) [mV/(mW/cm^2)]	10.8	10.8
Conversion Factor (γ)	7.623	7.850
Sensitivity (ζ) [W/Kg/mV]	3.480E-02	3.380E-02

* ** D.U.T. is transmitting with 100% duty cycle but **50% duty factor** can only be applied for truly PTT device, that is using a mechanical switch and the device is designed for PTT that does not have feasibility to be connected to wired lines through an operator.

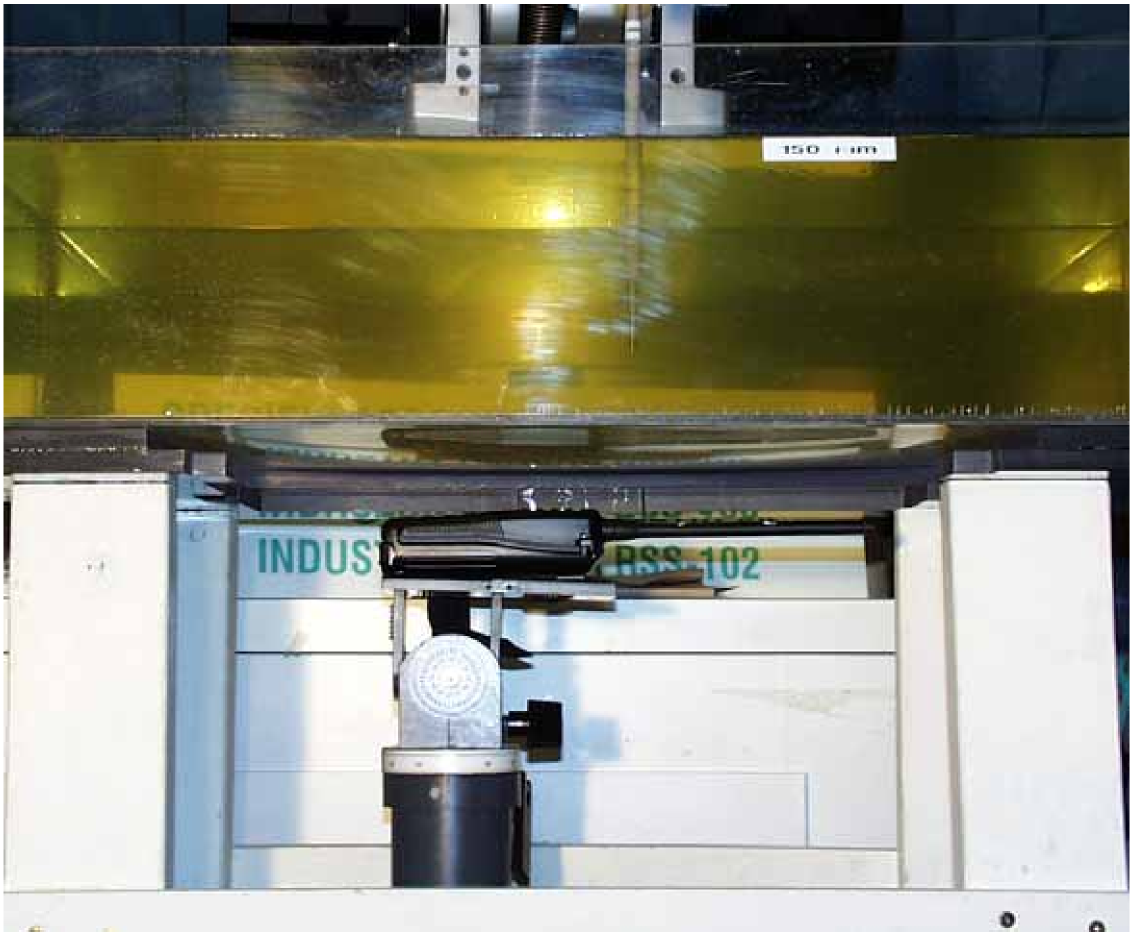
4.2. PHOTOGRAPH OF ADDITIONAL BATTERY PACK

< Rechargeable Li-Ion battery pack (M/N:BP-242, 7.2 V, 1150 mAh) >

4.3. PHOTOGRAPHS OF D.U.T. POSITION

4.3.1. Head Front Configuration

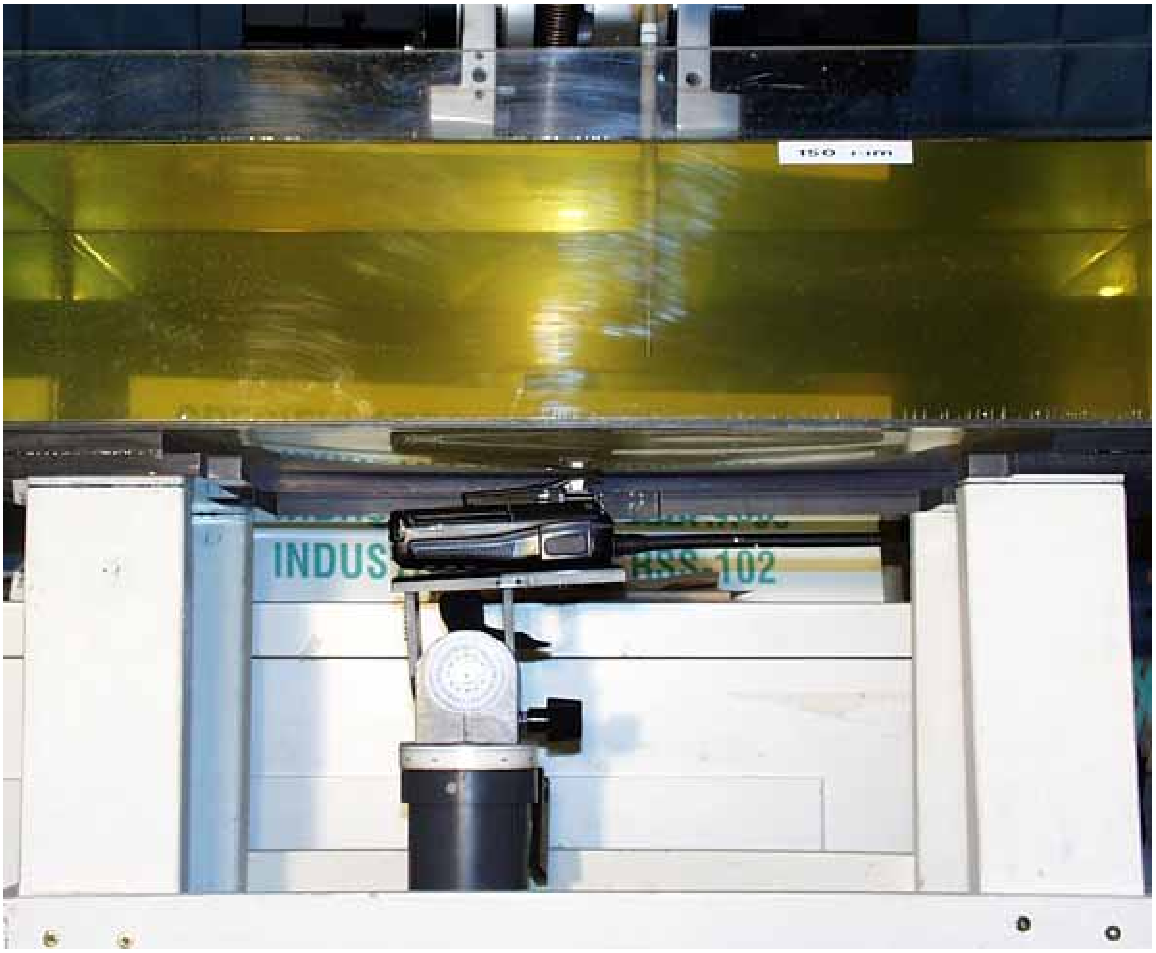
4.3.1.1. Push-To-Talk; Front-side in parallel to the phantom with the spacing of 25 mm



4.3.2. Body Configuration

4.3.2.1. Body-worn; Back-side in parallel to the phantom and the belt clip in contact

4.3.2.1.1. Alligator-type belt clip (M/N: MB-74) in contact with the phantom



4.4. MAXIMUM PEAK SPATIAL-AVERAGE SAR

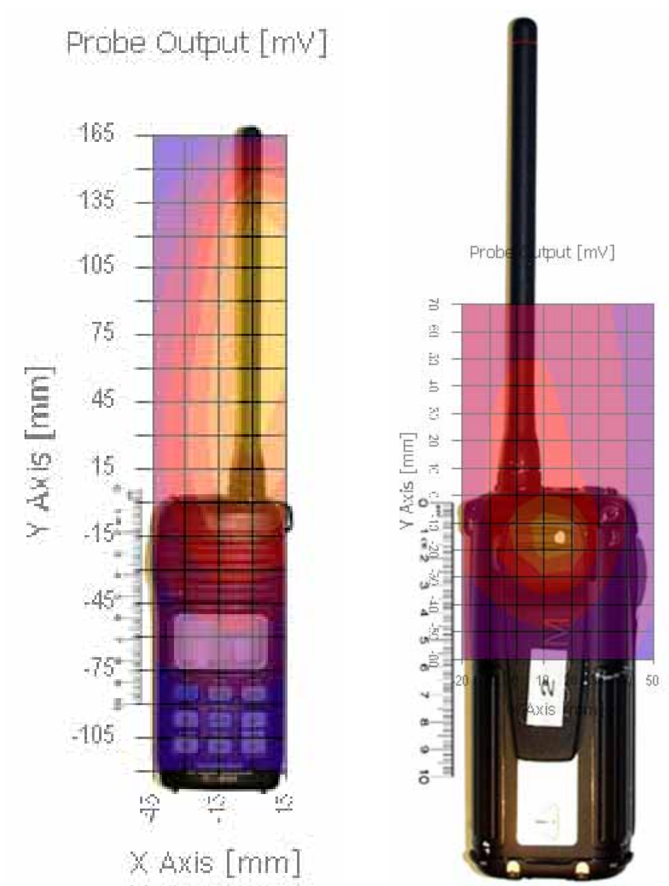
4.4.1. Maximum Peak Spatial-average SAR Data

#	Configuration	Device Test Positions	Antenna Position	Freq. [MHz]	Channel	MAX. SAR [W/Kg]
*	Occupational/Controlled Exposure Category Limit					8.0
04	Rechargeable Ni-Cd battery pack (M/N: BP-224) Alligator-type Belt Clip (M/N: MB-74)	Body-worn	FIX	156.050	Lowest	1.52

4.4.2. Maximum Peak Spatial-Average SAR Location

Complete area Prescans was conducted to determine the location of the highest SAR and the device was repositioned to allow the identified hot-spots to be orientated with as large an area around the hot-spots to come into contact with the phantom surface. This procedure ensured that the maximum SAR readings would be obtained from the hot-spot areas identified.

Unless otherwise specified, the reference point (0, 0) in the plots was set to the point at the base of antenna in the projected image of D.U.T. to the phantom surface.



4.5. SAR MEASUREMENT DATA

4.5.1. SAR measurement result for the additional battery pack (M/N: BP-242)

4.5.1.1. Head Front Configuration Result

4.5.1.1.1. Push-To-Talk; Front-side in parallel to the phantom with the spacing of 25 mm

#	Configuration	Antenna Position	Freq. [MHz]	Channel	SAR_{local} Before [W/Kg]	SAR_{local} After [W/Kg]	MAX SAR_{1g} [W/Kg]
*	Occupational/Controlled Exposure Category Limit						8.0
09	Li-Ion Battery Pack (M/N: BP-242)	FIX	156.050	Lowest	0.99	0.98	1.50

4.5.1.2. Body Configuration Result

4.5.1.2.1. Body-worn; Back-side in parallel to the phantom and the belt clip in contact

#	Configuration	Antenna Position	Freq. [MHz]	Channel	SAR_{local} Before [W/Kg]	SAR_{local} After [W/Kg]	MAX SAR_{1g} [W/Kg]
*	Occupational/Controlled Exposure Category Limit						8.0
10	Li-Ion Battery Pack (M/N: BP-242) Alligator-type Belt Clip (M/N: MB-74)	FIX	156.050	Lowest	0.53	0.51	1.19

4.5.2. SAR measurement results from the original report

4.5.2.1. Head Front Configuration Result

4.5.2.1.1. Push-To-Talk; Front-side in parallel to the phantom with the spacing of 25 mm

#	Configuration	Antenna Position	Freq. [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	Rechargeable Ni-Cd battery pack (M/N: BP-224)	FIX	156.050	Lowest	0.72	0.68	0.95
02	Battery Case (M/N: BP-223, 6 × AA Alkaline)	FIX	156.050	Lowest	0.49	0.45	1.08

4.5.2.2. Body Configuration Result

4.5.2.2.1. Body-worn; Back-side in parallel to the phantom and the belt clip in contact

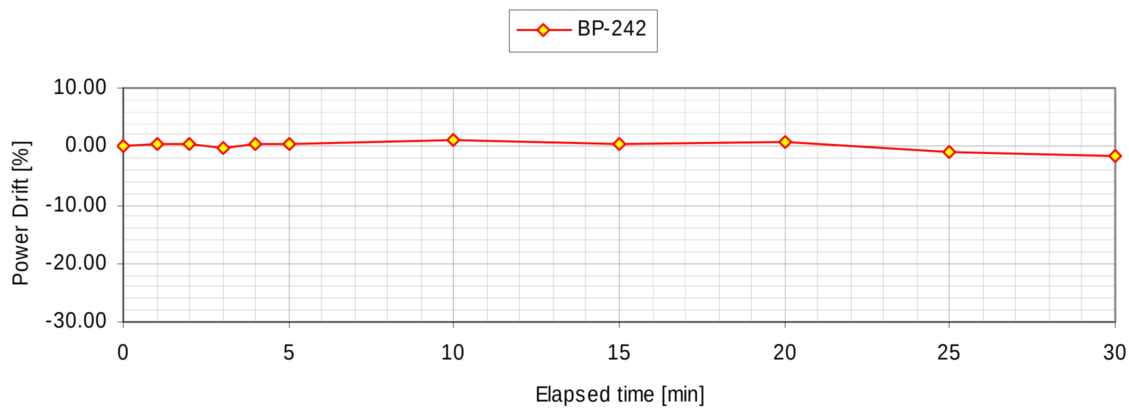
#	Configuration	Antenna Position	Freq. [MHz]	Channel	SAR_{local} Before [W/Kg]	SAR_{local} After [W/Kg]	MAX SAR_{1g} [W/Kg]
*	Occupational/Controlled Exposure Category Limit						8.0
03	Rechargeable Ni-Cd battery pack (M/N: BP-224) Belt Clip (M/N: MB-68)	FIX	156.050	Lowest	0.23	0.22	0.64
04	Rechargeable Ni-Cd battery pack (M/N: BP-224) Alligator-type Belt Clip (M/N: MB-74)	FIX	156.050	Lowest	0.51	0.48	1.52
05	Rechargeable Ni-Cd battery pack (M/N: BP-224) Swivel Belt Clip (M/N: MB-87)	FIX	156.050	Lowest	0.82	0.77	1.01
06	Battery Case (M/N: BP-223, 6 × AA Alkaline) Belt Clip (M/N: MB-68)	FIX	156.050	Lowest	0.55	0.50	0.87
07	Battery Case (M/N: BP-223, 6 × AA Alkaline) Alligator-type Belt Clip (M/N: MB-74)	FIX	156.050	Lowest	1.10	1.00	1.47
08	Battery Case (M/N: BP-223, 6 × AA Alkaline) Swivel Belt Clip (M/N: MB-87)	FIX	156.050	Lowest	0.65	0.59	0.79

4.5.3. Power Measurement

Channel	Frequency [MHz]	Measured conducted power [W]	Power Rating [W]
Lowest	156.050	5	5
Highest	157.425	5	5

The local SAR was measured at the arbitrary location in the vicinity of the antenna fed point in the simulated tissue at 156.050 MHz during the period of 30 minute for the additional Li-Ion battery pack (M/N: BP-242).

The power (SAR) drift after 30 minutes of the continuous exposure at the maximum power level was found to be -1.7 [%].



4.6. SAR MEASUREMENT UNCERTAINTY

This uncertainty analysis covers the 3D-EMC Laboratory test procedure for Specific Absorption Rate (SAR) associated with wireless telephones and similar devices.

Standards Covered Are:

WGMTE 96/4 - Secretary SC211/B

FCC 96-326, ET Docket No. 93-62

Industry Canada RSS 102

ACA Radiocommunications (Electromagnetic Radiation – Human Exposure) Amendment Standard 2000 (No. 1)

The laboratory test procedure, and this uncertainty analysis, may be used to cover all standards above. It is based on test equipment and procedures specified by 3D-EMC Laboratories, Inc. located in Ft. Lauderdale, Florida.

4.6.1. Measurement Uncertainty

4.6.1.1. Measurement Uncertainty evaluation for handset SAR test

a	*b*	*c*	*d*	*e = f(d,k)*	*F*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	Sec.	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1-g)**	**c_i (10-g)**	**1-g u_i (±%)**	**10-g u_i (±%)**	**v_i**
Measurement System									
Probe Calibration	E1.1	3.0	N	1	1	1	3.0	3.0	∞
Axial Isotropy	E1.2	5.0	R	√3	0.7	0.7	2.0	2.0	∞
Hemispherical Isotropy	E1.2	8.0	R	√3	1	1	4.6	4.6	∞
Boundary Effect	E1.3	10.0	R	√3	1	1	5.8	5.8	∞
Linearity	E1.4	4.2	R	√3	1	1	2.4	2.4	∞
System Detection Limits	E1.5	2.0	R	√3	1	1	1.2	1.2	∞
Readout Electronics	E1.6	1.0	N	1	1	1	1.0	1.0	∞
Response Time	E1.7	1.5	R	√3	1	1	0.9	0.9	∞
Integration Time	E1.8	2.0	R	√3	1	1	1.2	1.2	∞
RF Ambient Conditions	E5.1	3.0	R	√3	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E5.2	1.0	R	√3	1	1	0.6	0.6	∞
Probe Positioning with respect to Phantom Shell	E5.3	3.0	R	√3	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E4.2	3.5	R	√3	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E3.2.1	7.5	N	1	1	1	7.5	7.5	*11*
Device Holder Uncertainty	E3.1.1	6.5	N	1	1	1	6.5	6.5	*8*
Output Power Variation - SAR drift measurement	5.6.2	5.0	R	√3	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E2.1	4.0	R	√3	1	1	2.3	2.3	∞
Liquid Conductivity Target - tolerance	E2.2	5.0	R	√3	0.7	0.5	2.0	1.4	∞
Liquid Conductivity - measurement uncertainty	E2.2	4.0	R	√3	0.7	0.5	1.6	1.2	∞
Liquid Permittivity Target tolerance	E2.2	5.0	R	√3	0.6	0.5	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E2.2	4.0	R	√3	0.6	0.5	1.4	1.2	∞
Combined Standard Uncertainty			RSS				14.3	14.2	
Expanded Uncertainty (95% confidence interval)							**28.5**	**28.3**	

4.6.1.2. Measurement Uncertainty for System Performance Check

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	Sec.	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1-g)**	**c_i (10-g)**	**1-g u_i (±%)**	**10-g u_i (±%)**	**v_i or v_{eff}**
Measurement System									
Probe Calibration	E1.1	3.0	N	1	1	1	3.0	3.0	∞
Axial Isotropy	E1.2	5.0	R	√3	0.7	0.7	2.0	2.0	∞
Hemispherical Isotropy	E1.2	8.0	R	√3	1	1	4.6	4.6	∞
Boundary Effect	E1.3	10.0	R	√3	1	1	5.8	5.8	∞
Linearity	E1.4	4.2	R	√3	1	1	2.4	2.4	∞
System Detection Limits	E1.5	2.0	R	√3	1	1	1.2	1.2	∞
Readout Electronics	E1.6	1.0	N	1	1	1	1.0	1.0	∞
Response Time	E1.7	1.5	R	√3	1	1	0.9	0.9	∞
Integration Time	E1.8	2.0	R	√3	1	1	1.2	1.2	∞
RF Ambient Conditions	E5.1	3.0	R	√3	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E5.2	0.4	R	√3	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E5.3	3.0	R	√3	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E4.2	3.5	R	√3	1	1	2.0	2.0	∞
Dipole									
Dipole Axis to Liquid Distance	7, X3.2	2.0	R	√3	1	1	1.2	1.2	∞
Input Power and SAR Drift Measurement	7, 5.6.2	3.0	R	√3	1	1	1.7	1.7	∞
Phantom and Tissue Parameters									
Phantom Uncertainty - shell thickness tolerance	E2.1	4.0	R	√3	1	1	2.3	2.3	∞
Liquid Conductivity – deviation from target values	E2.2	5.0	R	√3	0.7	0.5	2.0	1.4	∞
Liquid Conductivity - measurement uncertainty	E2.2	4.0	R	√3	0.7	0.5	1.6	1.2	∞
Liquid Permittivity – deviation from target values	E2.2	5.0	R	√3	0.6	0.5	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E2.2	4.0	R	√3	0.6	0.5	1.4	1.2	∞
Combined Standard Uncertainty			RSS				10.0	9.9	
Expanded Uncertainty (95% confidence interval)							**20.1**	**19.8**	

EXHIBIT 5. SAR MEASUREMENT

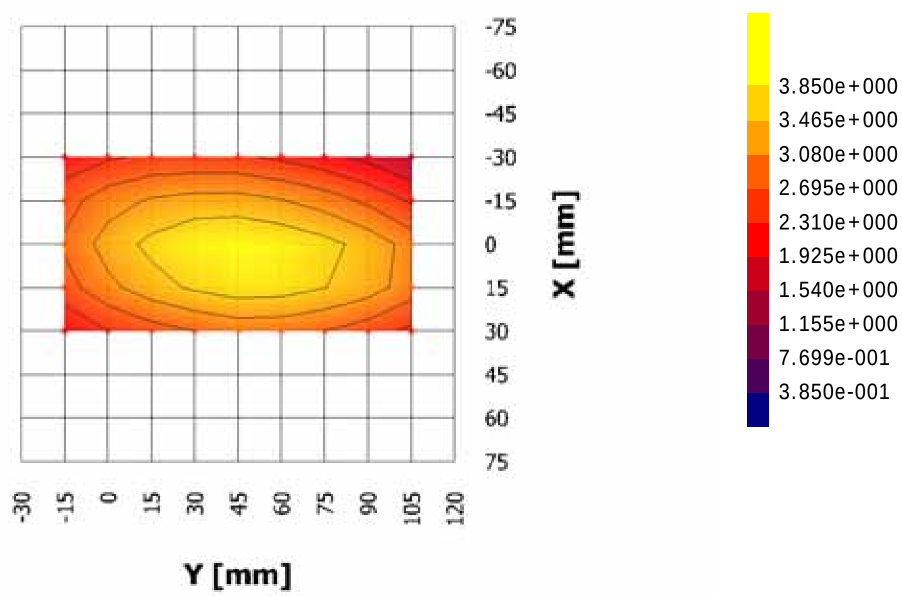
5.1. HEAD FRONT CONFIGURATION

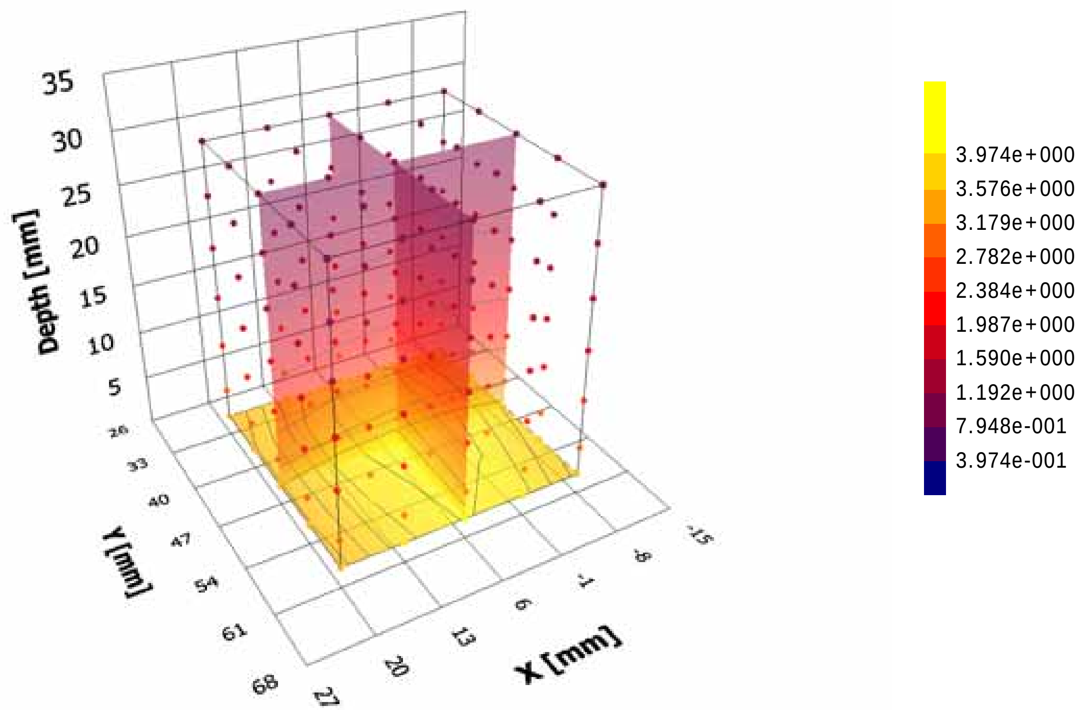
5.1.1. Push-To-Talk; Front-side in parallel to the phantom with the spacing of 25 mm

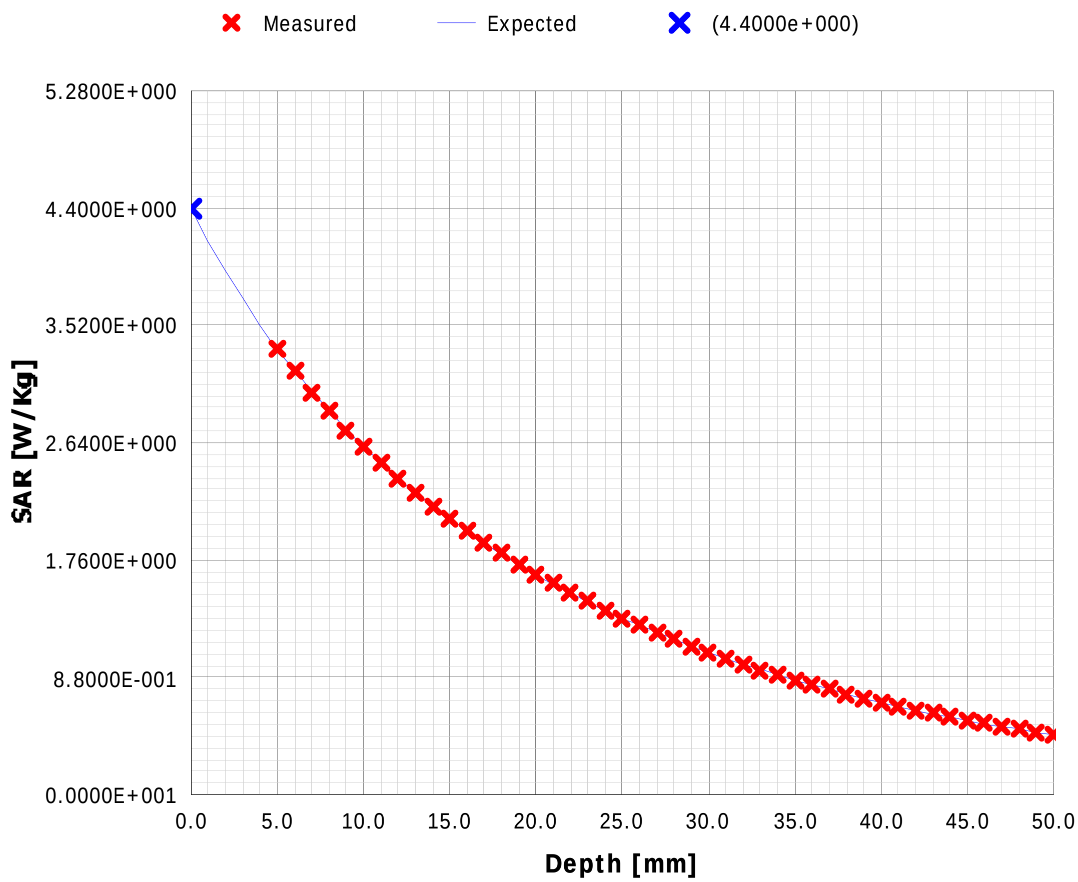
#	Configuration	Antenna Position	Freq. [MHz]	Channel	SAR_{local} Before [W/Kg]	SAR_{local} After [W/Kg]	MAX SAR_{1g} [W/Kg]
*	**Occupational/Controlled Exposure Category Limit**						**8.0**
09	Li-Ion Battery Pack (M/N: BP-242)	FIX	156.050	Lowest	0.99	0.98	1.50

5.1.1.1. Li-Ion battery pack (M/N: BP-242), 156.050 MHz; #09

Test date [MM/DD/YYYY]	01/28/2005
Test by	Carolyn Luu
Room temperature [°C]	22
Room humidity [%]	40
Simulated tissue temperature [°C]	22
Separation distance, d [mm]	25
Test frequency [MHz]	156.050
E-field Probe	M/N: E-TR, S/N: UT-0200-1, Sensor Offset: 2.0 mm
Sensor Factor (η_{Pd}) [mV/(mW/cm^2)]	10.8
Amplifier Settings (AS_1, AS_2, AS_3)	0.0077512493, 0.0071572467, 0.0077122447
Tissue Type	Brain
Measured conductivity [S/m]	0.76 (-0.2 %)
Measured dielectric constant	53.9 (+3.1 %)
Conversion Factor (γ)	7.623
Sensitivity (ζ) [W/Kg/mV]	3.480E-02
Source-(or Usage-)Based Time-Average Factor	2.0
Measurement Area Specification (X × Y)	120 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]	1.50




35
30
25
20
15
10
5
Depth [mm]
26
33
40
47
54
61
68
Y [mm]
27
20
13
6
-1
-8
-15
X [mm]
3.974e+000
3.576e+000
3.179e+000
2.782e+000
2.384e+000
1.987e+000
1.590e+000
1.192e+000
7.948e-001
3.974e-001


Measured
Expected
(4.4000e+000)
5.2800E+000
4.4000E+000
3.5200E+000
2.6400E+000
1.7600E+000
8.8000E-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]

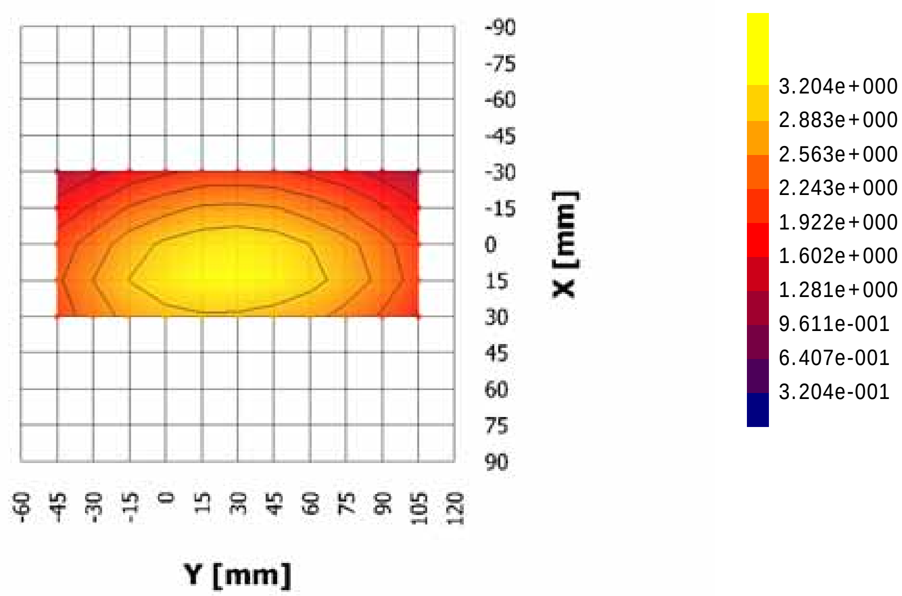
5.2. BODY CONFIGURATION

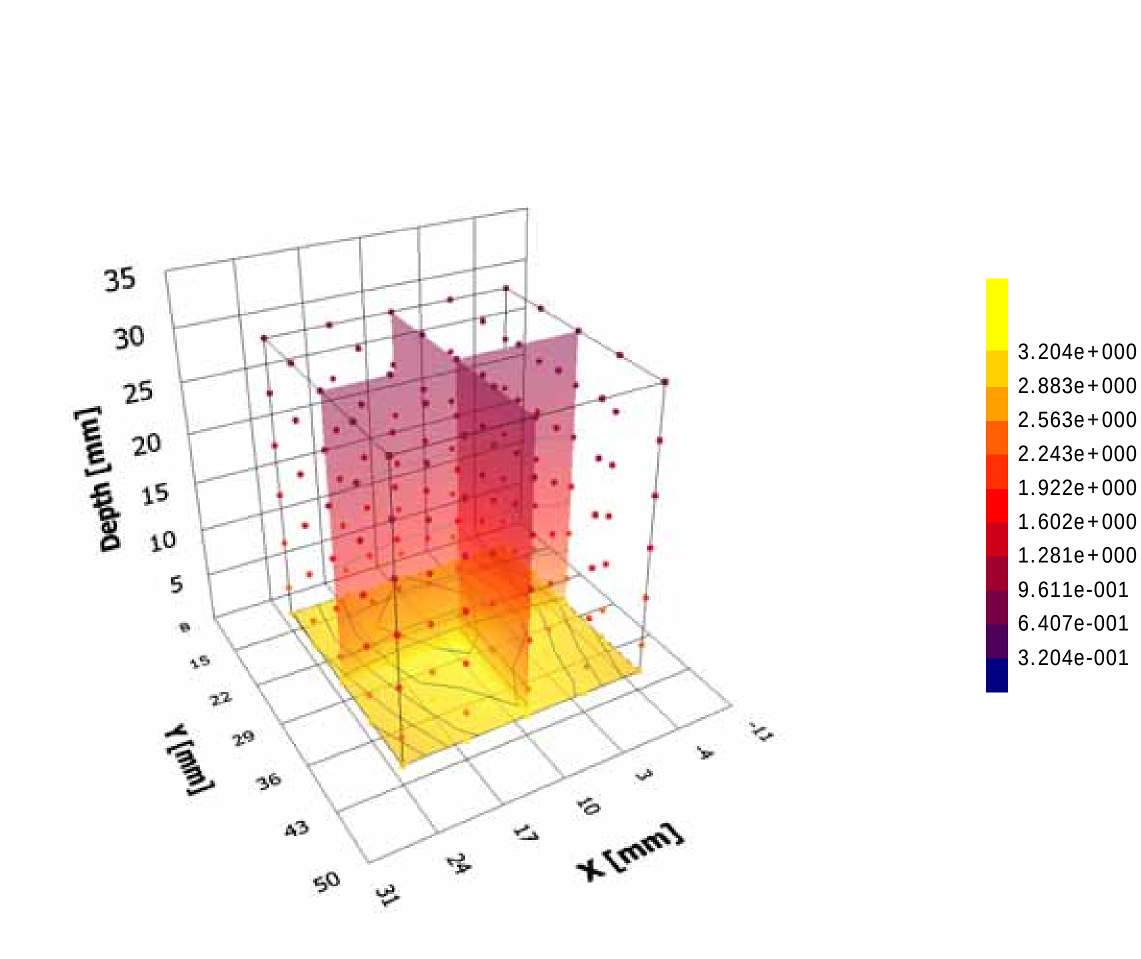
5.2.1. Body-worn; Back-side in parallel to the phantom and the belt clip in contact

#	Configuration	Antenna Position	Freq. [MHz]	Channel	SAR_{local} Before [W/Kg]	SAR_{local} After [W/Kg]	MAX SAR_{1g} [W/Kg]
*	Occupational/Controlled Exposure Category Limit						8.0
10	Li-Ion Battery Pack (M/N: BP-242) Alligator-type Belt Clip (M/N: MB-74)	FIX	156.050	Lowest	0.53	0.51	1.19

5.2.1.1. Li-Ion battery pack (M/N: BP-242), Alligator-Type Belt Clip (M/N: MB-74), 156.050 MHz; #10

Test date [MM/DD/YYYY]	01/28/2005
Test by	Carolyn Luu
Room temperature [°C]	22
Room humidity [%]	40
Simulated tissue temperature [°C]	22
Separation distance, d [mm]	0
Test frequency [MHz]	156.050
E-field Probe	M/N: E-TR, S/N: UT-0200-1, Sensor Offset: 2.0 mm
Sensor Factor (η_{Pd}) [mV/(mW/cm^2)]	10.8
Amplifier Settings (AS_1, AS_2, AS_3)	0.0077512493, 0.0071572467, 0.0077122447
Tissue Type	Muscle
Measured conductivity [S/m]	0.76 (-4.5 %)
Measured dielectric constant	61.7 (-0.4 %)
Conversion Factor (γ)	7.850
Sensitivity (ζ) [W/Kg/mV]	3.380E-02
Source-(or Usage-)Based Time-Average Factor	2.0
Measurement Area Specification (X × Y)	150 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]	1.19




Depth [mm]
35
30
25
20
15
10
5
Y [mm]
15
22
29
36
43
50
X [mm]
-11
-4
3
10
17
24
31
3.204e+000
2.883e+000
2.563e+000
2.243e+000
1.922e+000
1.602e+000
1.281e+000
9.611e-001
6.407e-001
3.204e-001

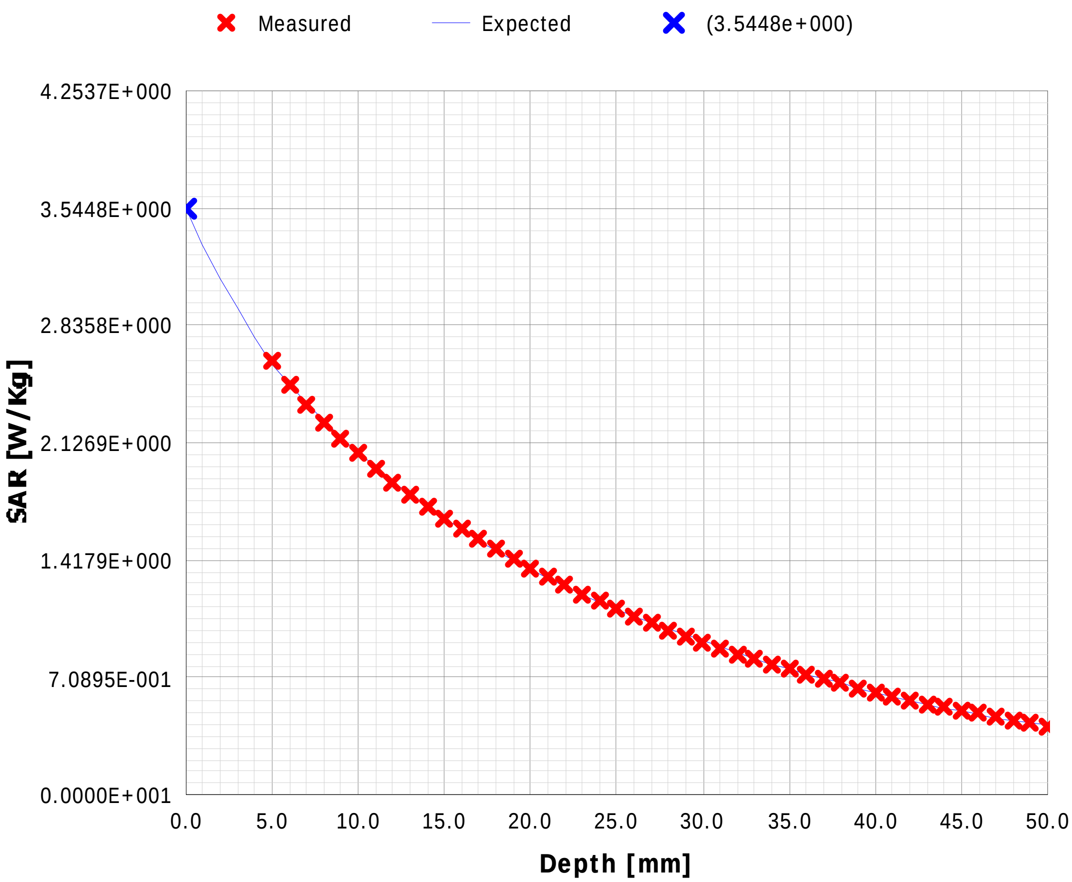

Measured
Expected
(3.5448e+000)
4.2537E+000
3.5448E+000
2.8358E+000
2.1269E+000
1.4179E+000
7.0895E-001
0.0000E+001
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
SAR [W/Kg]
Depth [mm]

EXHIBIT 6. TISSUE DIELECTRIC PARAMETER CALIBRATION

The tissue conductivity was calibrated in accordance with IEEE Std 1528-200X, Draft 6.1 November 14, 2000, Sponsor IEEE SCC 34

Tissue calibration type	HP Dielectric Strength Probe System (M/N: 85070C)	
Tissue calibration date [MM/DD/YYYY]	01/28/2005	01/28/2005
Tissue calibrated by	Carolyn Luu	Carolyn Luu
Room temperature [°C]	22	22
Room humidity [%]	40	40
Simulated tissue temperature [°C]	22	22
Tissue calibration frequency [MHz]	150	150
Tissue Type	Brain	Muscle
Target conductivity [S/m]	0.76	0.80
Target dielectric constant	52.3	61.9
Composition (by weight) [%]	DI Water (39.58 %) Sugar (55.51 %) Salt (4.30 %) HEC (0.50 %) Bactericide (0.10 %)	DI Water (49.97 %) Sugar (47.56 %) Salt (2.23 %) HEC (0.17 %) Bactericide (0.08 %)
Measured conductivity [S/m]	0.76 (+0.2 %)	0.76 (-4.5 %)
Measured dielectric constant	53.9 (+3.1 %)	61.7 (-0.4 %)
Penetration depth (plane wave excitation) [mm]	62.3	64.4

6.1. 150 MHZ & 300 MHZ BRAIN TISSUE

	Meas. after 5min			DI Water at 20°C			Init. Meas.		
Frequency [MHz]	ε'	ε''	σ [S/m]	ε'	ε''	σ [S/m]	ε'	ε''	σ [S/m]
140.000	54.5829	96.5683	0.75	80.3724	0.6898	0.01	54.5299	95.6941	0.75
150.000	53.9124	91.2558	0.76	80.3387	0.7651	0.01	53.7371	90.2282	0.75
160.000	53.3247	86.4712	0.77	80.4212	0.7400	0.01	53.3257	85.7266	0.76
290.000	47.5886	54.8970	0.89	80.4067	1.3276	0.02	47.4784	54.4171	0.88
300.000	47.2213	53.5754	0.89	80.4036	1.3910	0.02	47.1164	53.1388	0.89
310.000	46.9177	52.8048	0.91	80.4366	1.4752	0.03	46.7227	51.9063	0.90

6.2. 150 MHZ MUSCLE TISSUE

	Meas. after 5min			DI Water at 20°C			Init. Meas.		
Frequency [MHz]	ε'	ε''	σ [S/m]	ε'	ε''	σ [S/m]	ε'	ε''	σ [S/m]
140.000	61.9409	97.1461	0.76	80.3201	0.6947	0.01	61.9912	97.0254	0.76
150.000	61.6553	91.5992	0.76	80.4898	0.7991	0.01	61.7098	91.5952	0.76
160.000	61.3113	86.4040	0.77	80.4236	0.7628	0.01	61.2523	86.3058	0.77

EXHIBIT 7. SAR SYSTEM CALIBRATION

7.1. GENERAL INFORMATION OF THE PROBE

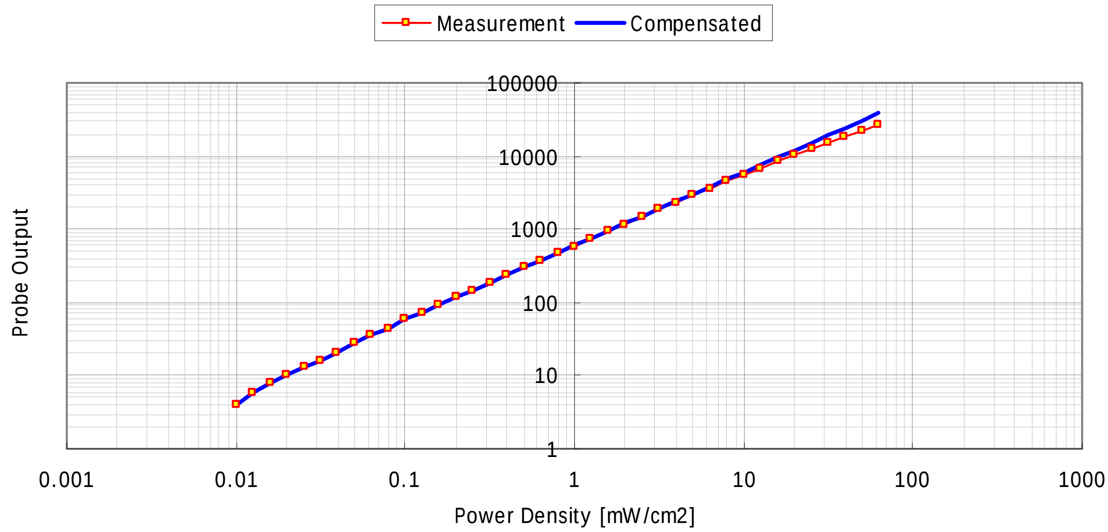
Probe Type	E-Field Triangle, Isotropic
Model Number	ET20
Serial Number	03JUN-0028
Manufacturer	EMF Safety
Manufactured Date	June 2003
Probe Length [mm]	270
Probe offset [mm]	2.0
Probe Tip diameter [mm]	4.0
Sensor Factor (η_{Pd}) [mV/(mW/cm^2)]	10.8
Sensor Factor (η_{E2}) [mV/(V/m)^2]	10.8 / 3770

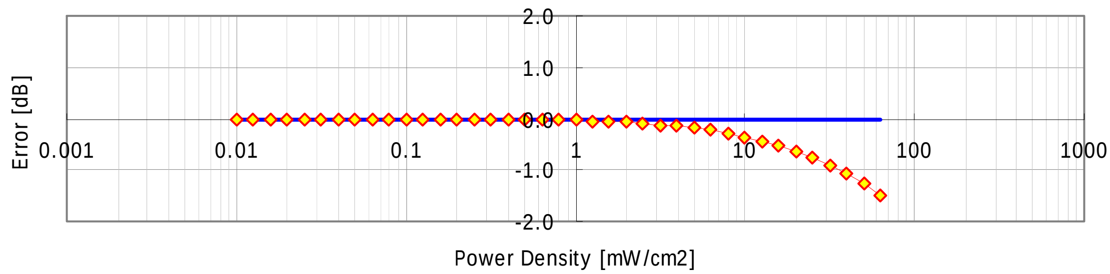
7.2. PROBE LINEARITY AND DYNAMIC RANGE

7.2.1. Diode Compression Potential

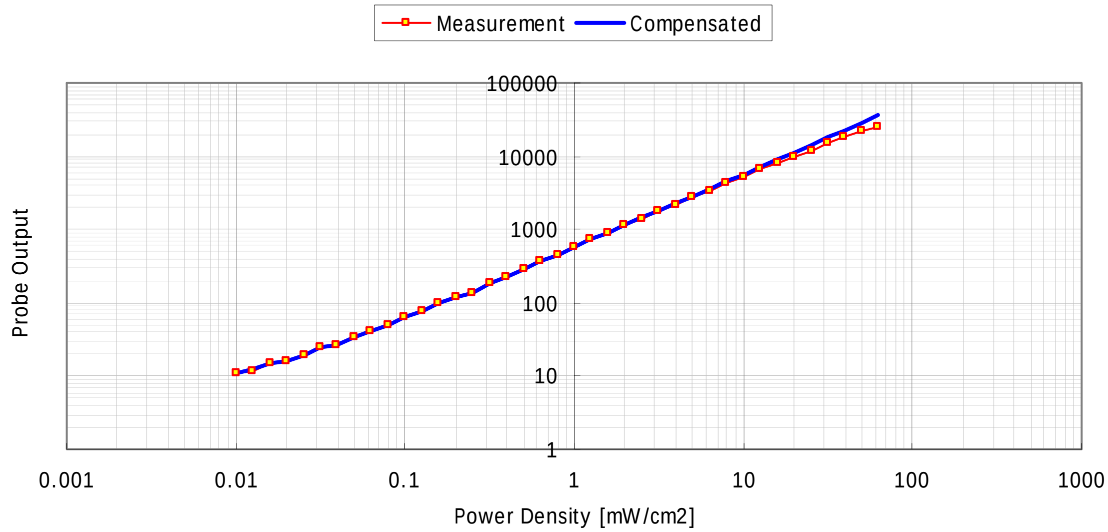
DCP_1	66459
DCP_2	67796
DCP_3	69561

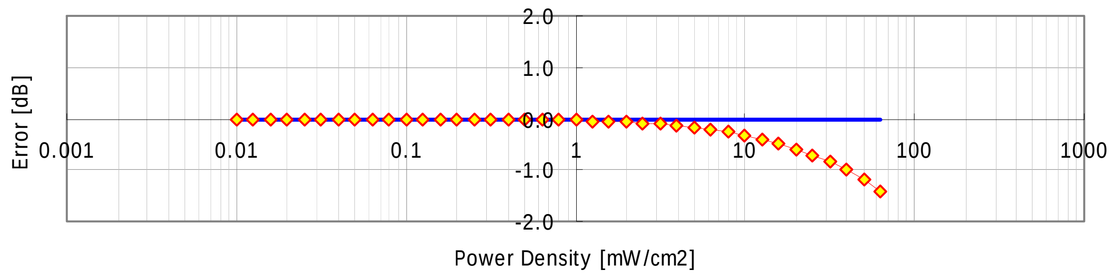
7.2.2. Channel 1



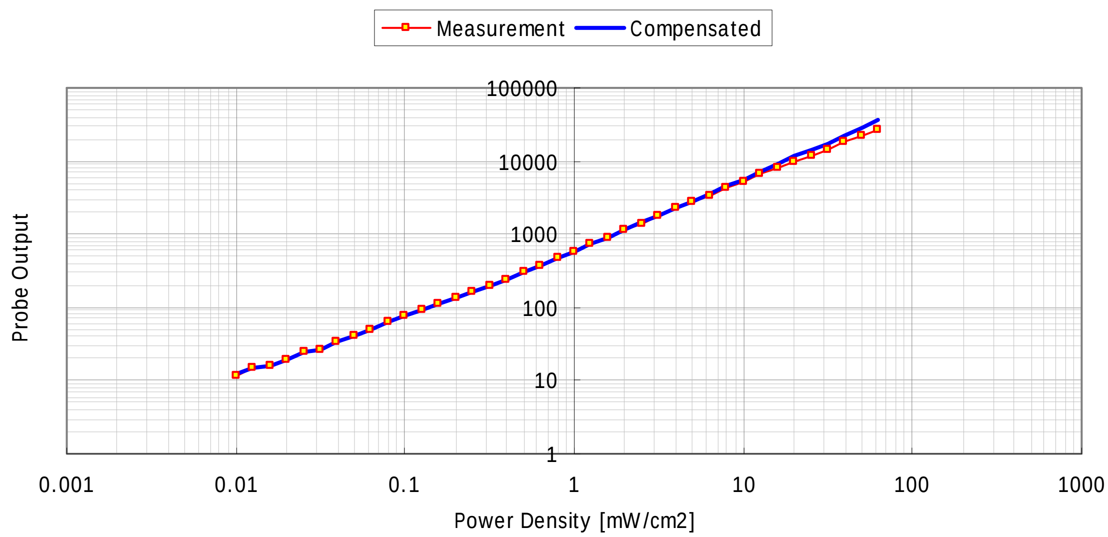


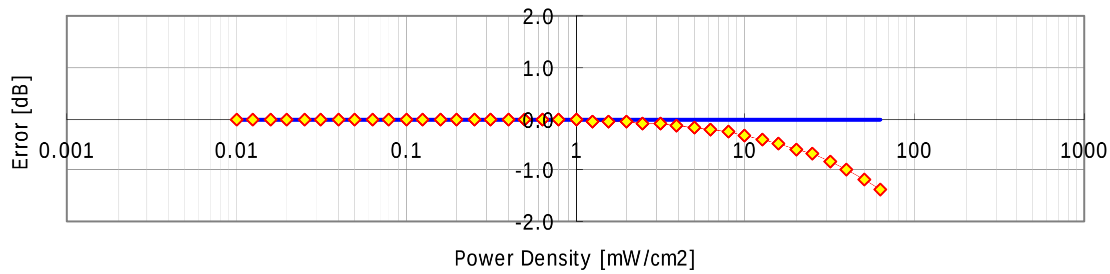
7.2.3. Channel 2





7.2.4. Channel 3





7.3. PROBE ISOTROPY CALIBRATION

7.3.1. Calibration Setup

Calibration cell type	TEM cell
Model Number	CC-110
Serial Number	162
Manufacturer	IFI Inc.
Input Power / Power Density [mW/(mW/cm^2)] @ 150 MHz & 300 [MHz]	271

7.3.2. Amplifier Settings

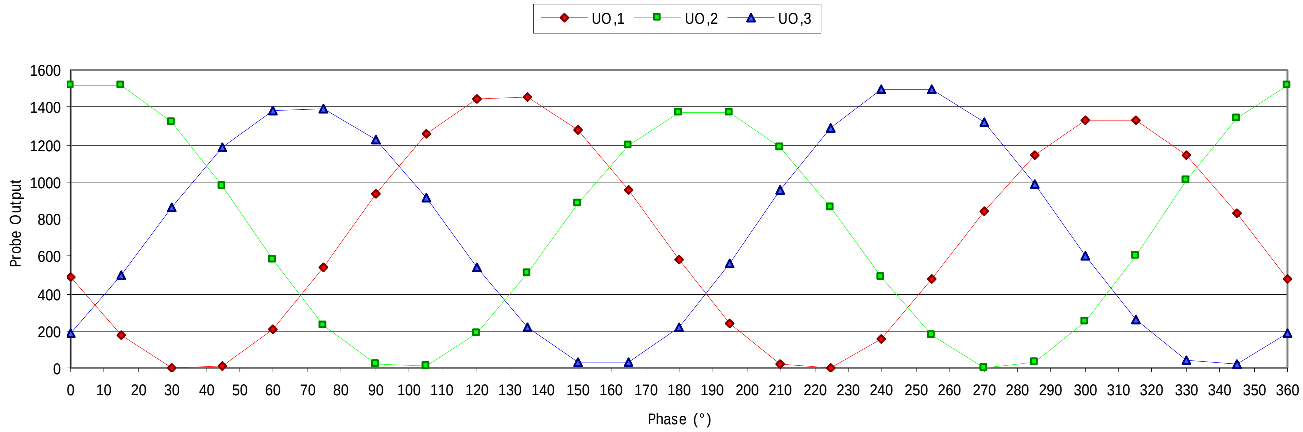
7.3.2.1. Isotropy calibration at 150 MHz

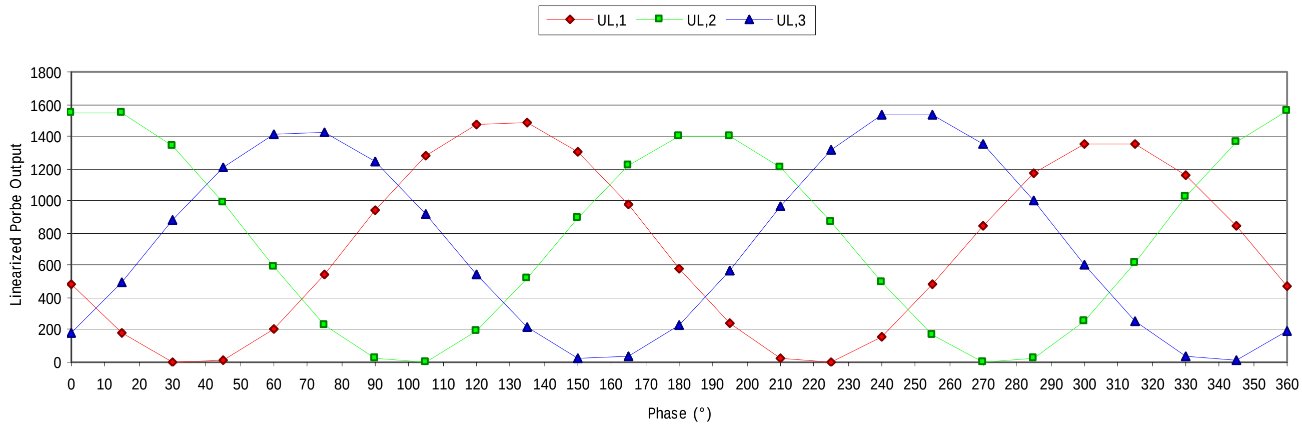
Calibration Date [MM/DD/YYYY]	07/26/2004
Calibrated by	JaeWook Choi
Calibration Frequency [MHz]	150
Room Temperature [°C]	24
Room Humidity [%]	40
φ [°]	90
Φ_1, Φ_2, Φ_3 [°]	54.7, 54.7, 54.7
Pd [mW/cm^2]	2.0
SUM($U_{L,1}$(0°), … ,$U_{L,1}$(360°))	17,576
SUM($U_{L,2}$(0°), … ,$U_{L,2}$(360°))	19,484
SUM($U_{L,3}$(0°), … ,$U_{L,3}$(360°))	18,197
$R_{ISO,1,1}$	1.0000000000
$R_{ISO,2,1}$	0.9020901478
$R_{ISO,3,1}$	0.9658843502
AS_1	0.0096763599
AS_2	0.0087289489
AS_3	0.0093462446

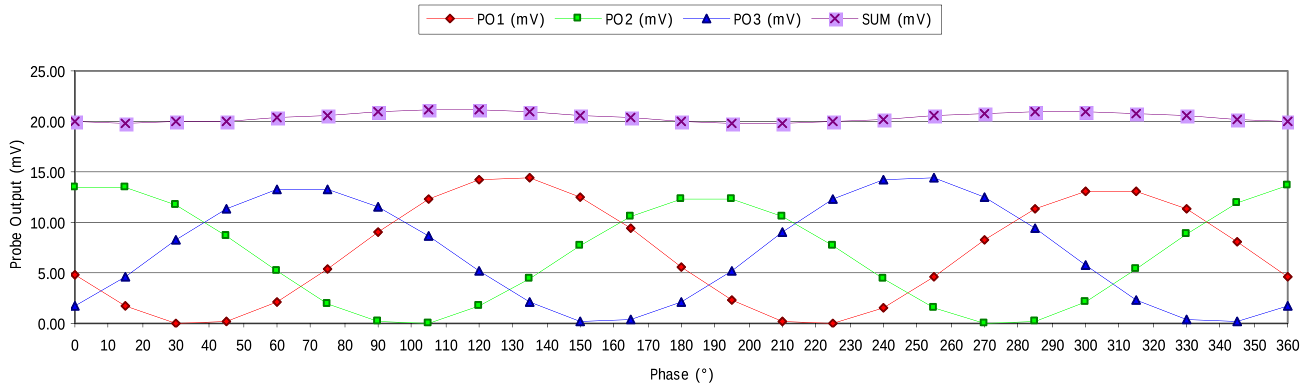
7.3.2.2. Isotropy calibration at 300 MHz

Calibration Date [MM/DD/YYYY]	07/26/2004
Calibrated by	JaeWook Choi
Calibration Frequency [MHz]	300
Room Temperature [°C]	24
Room Humidity [%]	40
φ [°]	90
Φ_1, Φ_2, Φ_3 [°]	54.7, 54.7, 54.7
Pd [mW/cm^2]	2.0
SUM($U_{L,1}$(0°), … ,$U_{L,1}$(360°))	22,442
SUM($U_{L,2}$(0°), … ,$U_{L,2}$(360°))	24,305
SUM($U_{L,3}$(0°), … ,$U_{L,3}$(360°))	22,556
$R_{ISO,1,1}$	1.0000000000
$R_{ISO,2,1}$	0.9233668539
$R_{ISO,3,1}$	0.9949635711
AS_1	0.0077512493
AS_2	0.0071572467
AS_3	0.0077122447

7.3.3. Isotropic response at 150 MHz

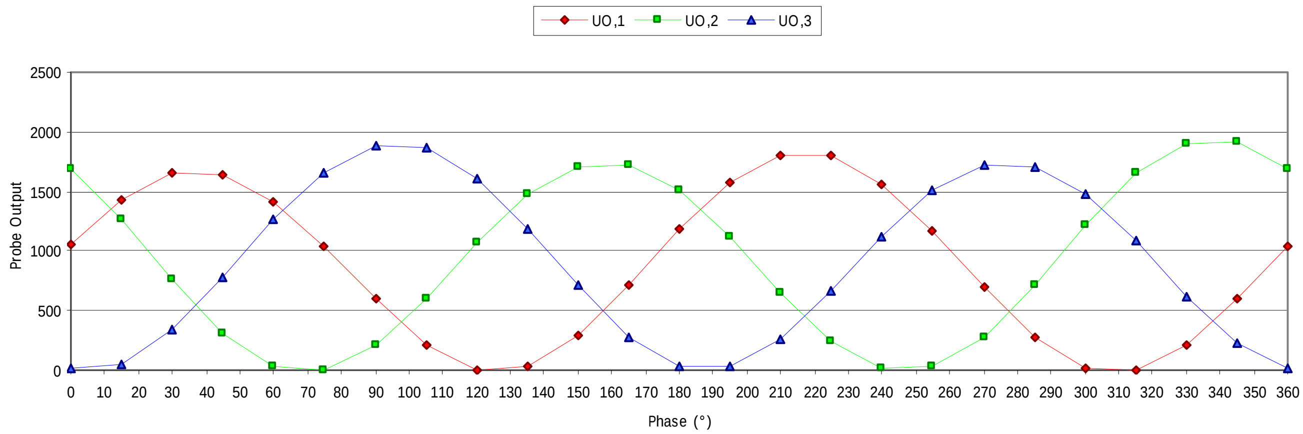


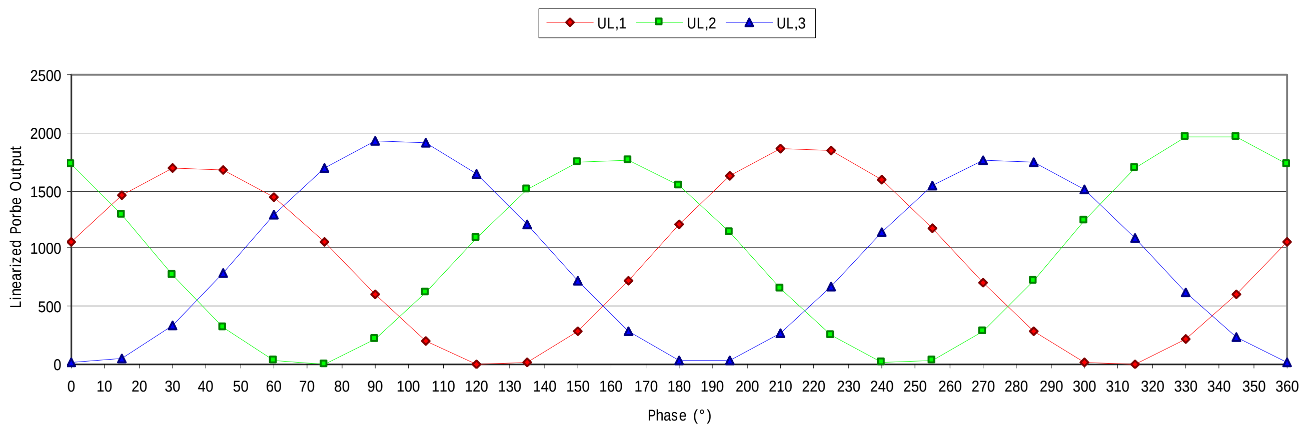


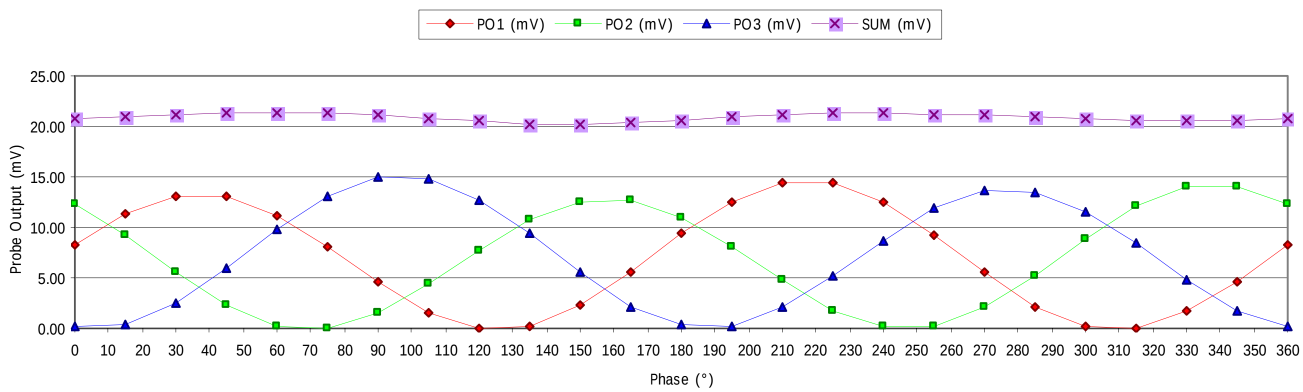


Isotropy at 150 MHz: ±0.14 dB

7.3.4. Isotropic response at 300 MHz







Isotropy at 300 MHz: ±0.12 dB

7.4. PROBE THERMAL TRANSFER CALIBRATION

7.4.1. Calibration Setup

7.4.1.1. Setup for 155 MHz

Calibration type	Thermal transfer calibration
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
Calibration dipole dimension (L × h × d) [mm]	37.0(helical; 102 turns, 20.0 [mm] per turn) × 45.4 × 1.35
Sensor-to-Phantom (d_1) [mm]	5.0
Dipole-to-Phantom (d_2) [mm]	13.0
Sensor-to-Dipole ($d_1 + d_2 + d_3$) [mm]	20.0 (5.0 + 13.0 + 2.0)
Return Loss (at test frequency) [dB]	-20.0

7.4.1.2. Setup for 300 MHz

Calibration type	Thermal transfer calibration
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
Calibration dipole dimension (L × h × d) [mm]	443.0 × 250.0 × 3.6
Sensor-to-Phantom (d_1) [mm]	5.0
Dipole-to-Phantom (d_2) [mm]	13.0
Sensor-to-Dipole ($d_1 + d_2 + d_3$) [mm]	20.0 (5.0 + 13.0 + 2.0)
Return Loss (at test frequency) [dB]	-24.0

7.4.2. Simulated Tissue

7.4.2.1. Brain Tissue at 150 MHz

Tissue calibration type	HP Dielectric Strength Probe System
Tissue calibration date [MM/DD/YYYY]	07/26/2004
Tissue calibrated by	JaeWook Choi
Room temperature [°C]	24
Room humidity [%]	50
Simulated tissue temperature [°C]	24
Tissue calibration frequency [MHz]	150
Tissue Type	Brain
Target conductivity [S/m]	0.76
Target dielectric constant	52.3
Specific Heat Capacity [J/Kg/°C]	3,140
Mass Density [Kg/m3]	1,308
Measured conductivity [S/m]	0.75 (-1.2 %)
Measured dielectric constant	54.4 (+4.1 %)
Penetration depth (plane wave excitation) [mm]	63.2

7.4.2.2. Muscle Tissue at 150 MHz

Tissue calibration type	HP Dielectric Strength Probe System
Tissue calibration date [MM/DD/YYYY]	07/26/2004
Tissue calibrated by	JaeWook Choi
Room temperature [°C]	24
Room humidity [%]	50
Simulated tissue temperature [°C]	24
Tissue calibration frequency [MHz]	150
Tissue Type	Muscle
Target conductivity [S/m]	0.80
Target dielectric constant	61.9
Specific Heat Capacity [J/Kg/°C]	3,046
Mass Density [Kg/m3]	1,241
Measured conductivity [S/m]	0.80 (+0.0 %)
Measured dielectric constant	63.8 (+3.1 %)
Penetration depth (plane wave excitation) [mm]	62.8

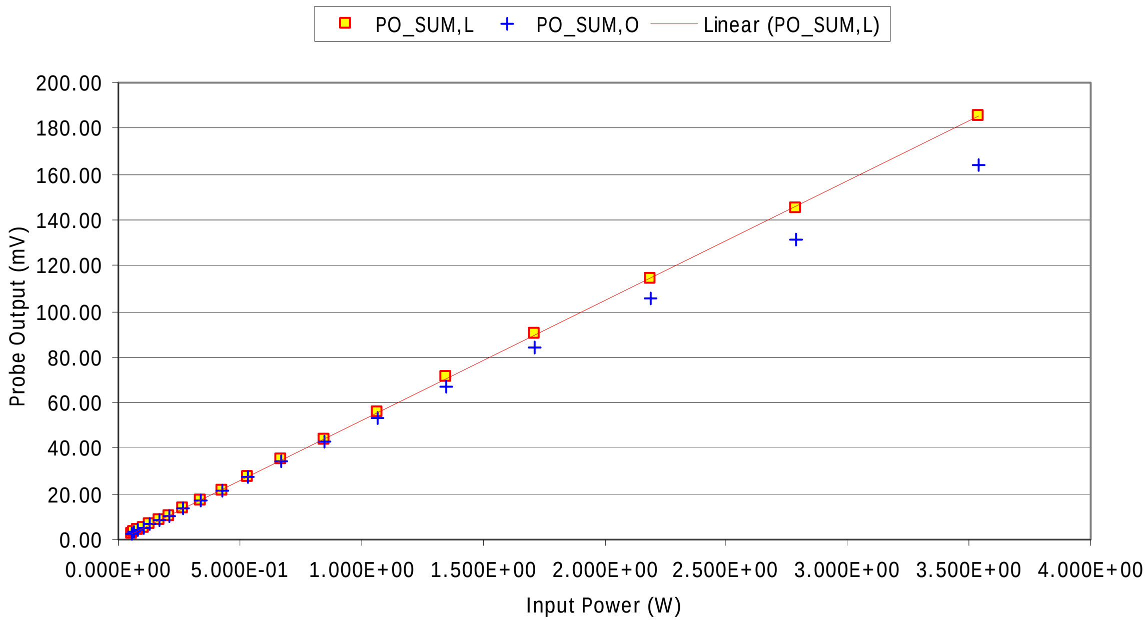
7.4.2.3. Brain Tissue at 300 MHz

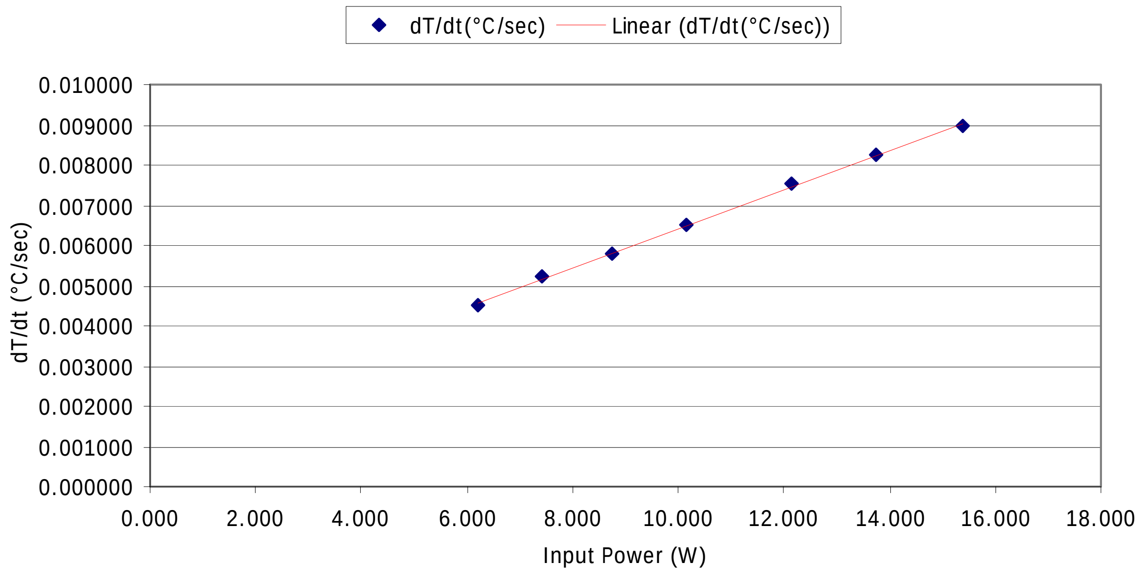
Tissue calibration type	HP Dielectric Strength Probe System
Tissue calibration date [MM/DD/YYYY]	07/26/2004
Tissue calibrated by	JaeWook Choi
Room temperature [°C]	24
Room humidity [%]	45
Simulated tissue temperature [°C]	24
Tissue calibration frequency [MHz]	300
Tissue Type	Brain
Target conductivity [S/m]	0.87
Target dielectric constant	45.3
Specific Heat Capacity [J/Kg/°C]	3,140
Mass Density [Kg/m3]	1,308
Measured conductivity [S/m]	0.88 (+1.2 %)
Measured dielectric constant	48.0 (+6.0 %)
Penetration depth (plane wave excitation) [mm]	46.5

7.4.3. Conversion Factor

7.4.3.1. Thermal transfer calibration at 155 MHz for simulated brain tissue

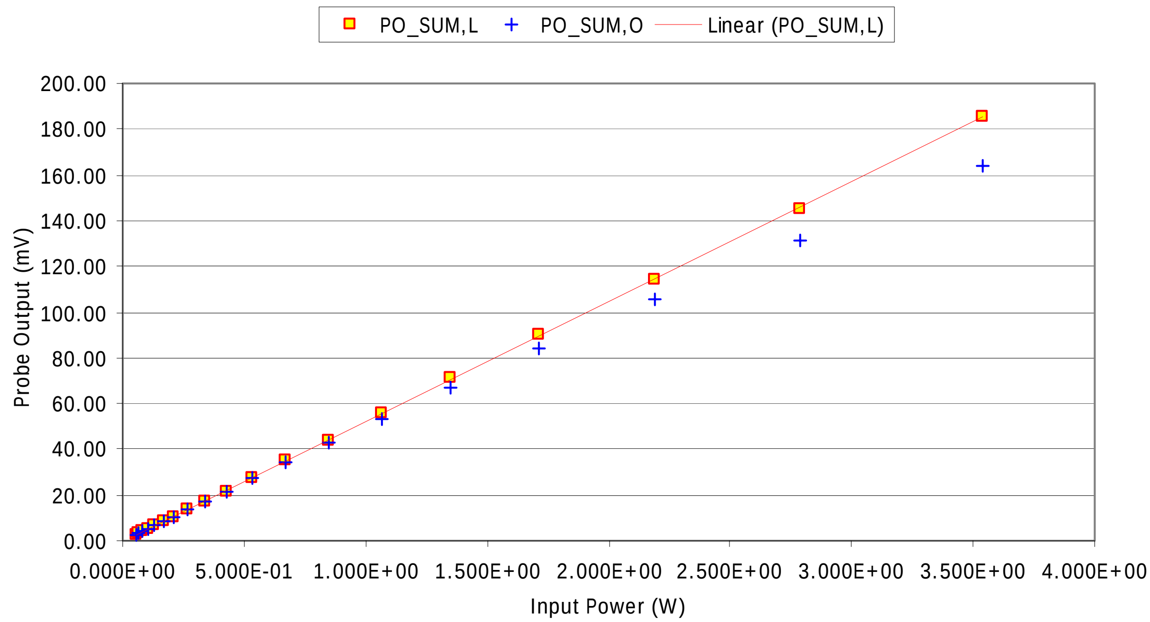
Calibration Date [MM/DD/YYYY]	07/26/2004
Calibration by	JaeWook Choi
Calibration Frequency [MHz]	155
Room Temperature [°C]	24
Room Humidity [%]	40
Simulated Tissue Temperature [°C]	24
$\delta(PO_{tot\_tissue})/\delta P$ [mV/W]	5.244283E+01
$\delta(\Delta T/\Delta t)/\delta P$ [°C/sec/W]	6.222592E-04
Conversion Factor (γ)	5.380

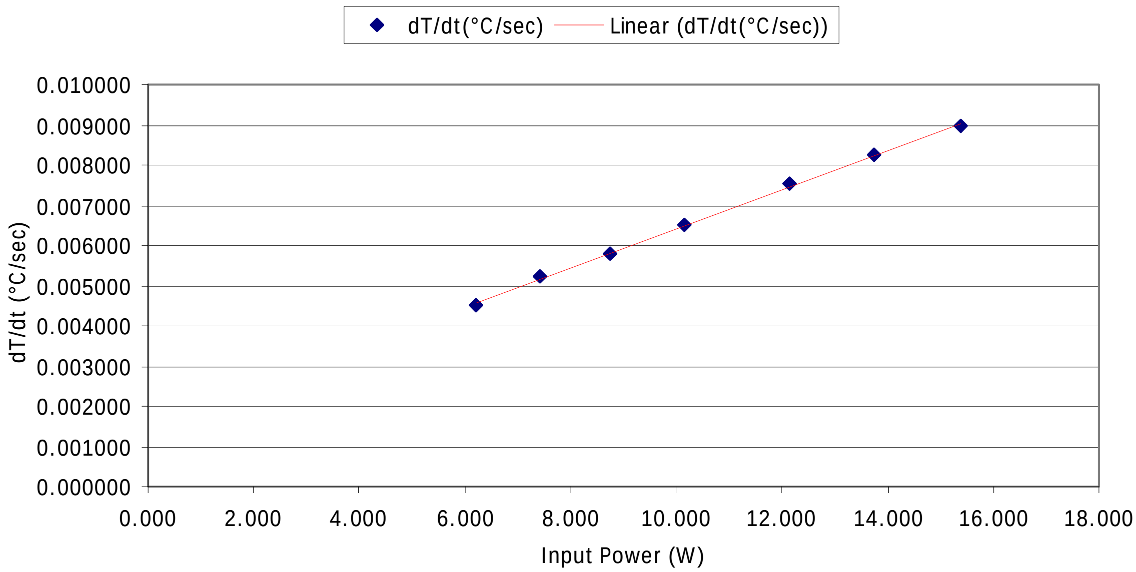



dT/dt(°C/sec)
Linear (dT/dt(°C/sec))
dT/dt (°C/sec)
0.010000
0.009000
0.008000
0.007000
0.006000
0.005000
0.004000
0.003000
0.002000
0.001000
0.000000
0.000
2.000
4.000
6.000
8.000
10.000
12.000
14.000
16.000
18.000
Input Power (W)

7.4.3.2. Thermal transfer calibration at 155 MHz for simulated muscle tissue

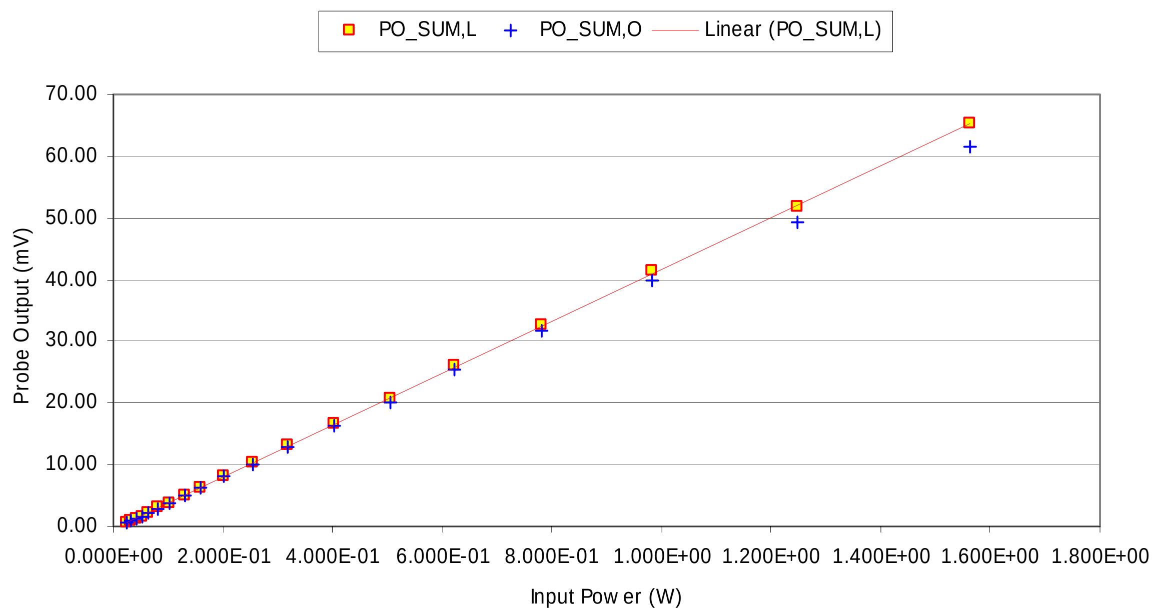
Calibration Date [MM/DD/YYYY]	07/26/2004
Calibration by	JaeWook Choi
Calibration Frequency [MHz]	155
Room Temperature [°C]	24
Room Humidity [%]	40
Simulated Tissue Temperature [°C]	24
$\delta(PO_{tot\_tissue})/\delta P$ [mV/W]	5.489062E+01
$\delta(\Delta T/\Delta t)/\delta P$ [°C/sec/W]	6.240645E-04
Conversion Factor (γ)	6.498




dT/dt(°C/sec)
Linear (dT/dt(°C/sec))
0.010000
0.009000
0.008000
0.007000
0.006000
0.005000
0.004000
0.003000
0.002000
0.001000
0.000000
dT/dt (°C/sec)
0.000
2.000
4.000
6.000
8.000
10.000
12.000
14.000
16.000
18.000
Input Power (W)

7.4.3.3. Thermal transfer calibration at 300 MHz for simulated brain tissue

Calibration Date [MM/DD/YYYY]	07/26/2004
Calibration by	JaeWook Choi
Calibration Frequency [MHz]	300
Room Temperature [°C]	24
Room Humidity [%]	40
Simulated Tissue Temperature [°C]	24
$\delta(PO_{tot\_tissue})/\delta P$ [mV/W]	4.211803E+01
$\delta(\Delta T/\Delta t)/\delta P$ [°C/sec/W]	5.222509E-04
Conversion Factor (γ)	6.032



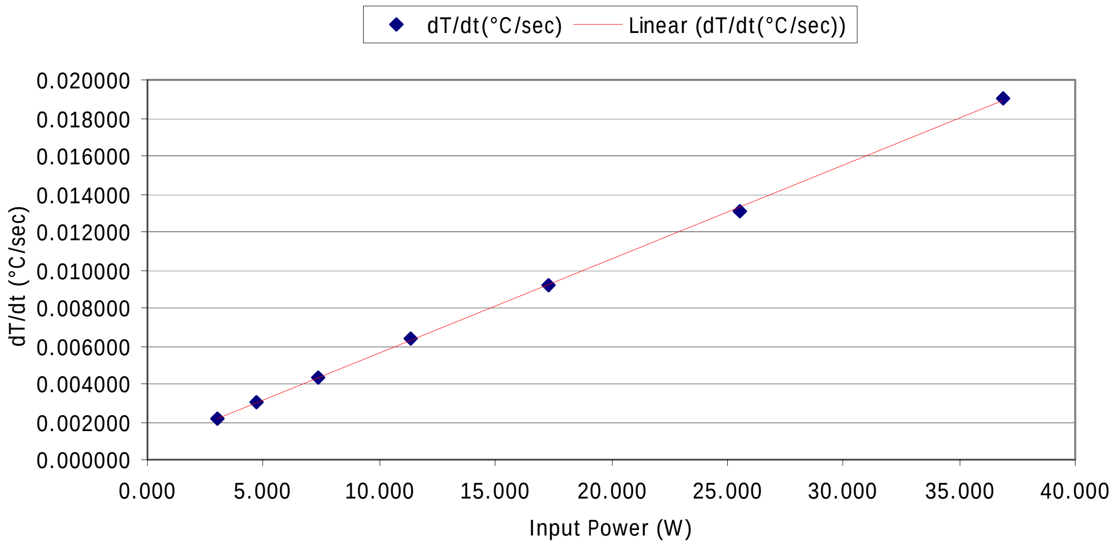

dT/dt(°C/sec)
Linear (dT/dt(°C/sec))
dT/dt (°C/sec)
0.020000
0.018000
0.016000
0.014000
0.012000
0.010000
0.008000
0.006000
0.004000
0.002000
0.000000
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
40.000
Input Power (W)

EXHIBIT 8. SAR SYSTEM VERIFICATION USING DIPOLE REFERENCE

8.1. VERIFICATION SETUP

8.1.1. At 300 MHz

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]	443.0 × 250.0 × 3.6
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]	-24.0

8.2. SIMULATED TISSUE

8.2.1. Brain tissue at 300 MHz

Tissue calibration type	HP Dielectric Strength Probe System
Tissue calibration date [MM/DD/YYYY]	01/28/2005
Tissue calibrated by	JaeWook Choi
Room temperature [°C]	22
Room humidity [%]	40
Simulated tissue temperature [°C]	22
Tissue calibration frequency [MHz]	300
Tissue Type	Brain
Target conductivity [S/m]	0.87
Target dielectric constant	45.3
Specific Heat Capacity [J/Kg/°C]	3,140
Mass Density [Kg/m3]	1,308
Measured conductivity [S/m]	0.89 (+2.8 %)
Measured dielectric constant	47.2 (+4.2 %)
Penetration depth (plane wave excitation) [mm]	45.7

8.3. VERIFICATION RESULT

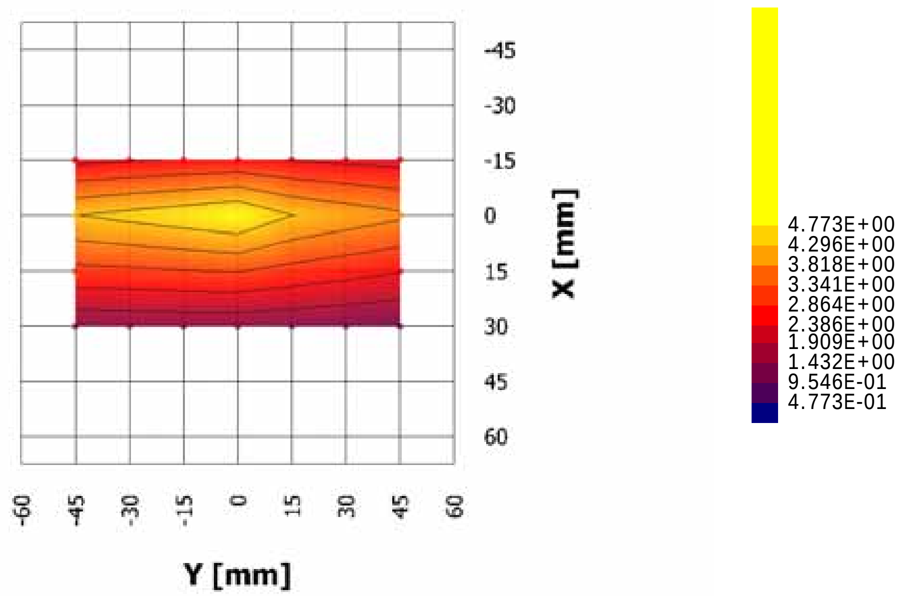
8.3.1.1. Reference SAR values at 300 MHz[*]

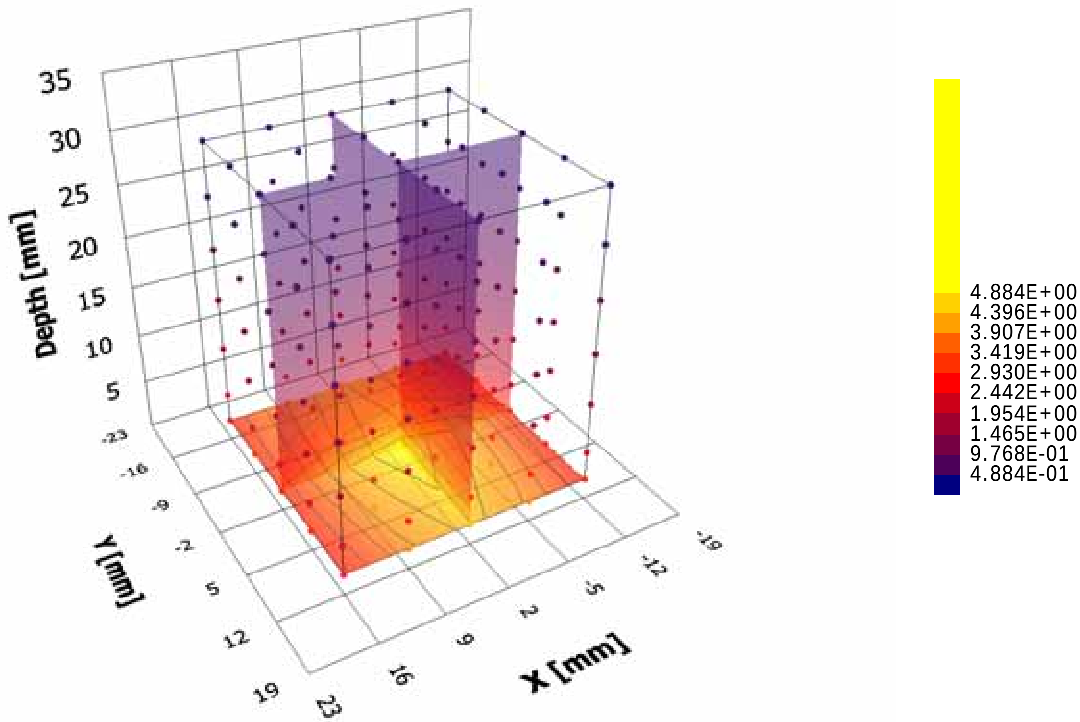
Reference SAR$_{1g}$ [W/Kg]	3.0
Reference SAR$_{s}$ [W/Kg]	4.4
Measured SAR$_{1g}$ [W/Kg]	3.2
Measured SAR$_{s}$ [W/Kg]	4.2

8.3.1.2. Verification at 300 MHz

Test date [MM/DD/YYYY]	01/28/2005
Test by	JaeWook Choi
Room temperature [°C]	24
Room humidity [%]	40
Simulated tissue temperature [°C]	24
Test frequency [MHz]	300
E-field Probe	M/N: ET-20, S/N: 03JUN-0028, Sensor Offset: 2.0 mm
Sensor Factor (η_{Pd}) [mV/(mW/cm^2)]	10.8
Amplifier Settings (AS$_1$, AS$_2$, AS$_3$)	0.0077512493, 0.0071572467, 0.0077122447
Tissue Type	Brain
Measured conductivity [S/m]	0.89 (+2.8 %)
Measured dielectric constant	47.2 (+4.2 %)
Specific Heat Capacity [J/Kg/°C]	3,140
Mass Density [Kg/m3]	1,308
Conversion Factor (γ)	6.032
Sensitivity (ζ) [W/Kg/mV]	5.150E-02
Power [mW]	1000 (forward power)
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]	3.2
SAR$_{s}$ [W/Kg]	4.2

[*] All SAR values in 8.3.1.1 are normalized to a forward power of 1 W.


-45
-30
-15
0
15
30
45
60
X [mm]
-60
-45
-30
-15
0
15
30
45
60
Y [mm]
4.773E+00
4.296E+00
3.818E+00
3.341E+00
2.864E+00
2.386E+00
1.909E+00
1.432E+00
9.546E-01
4.773E-01


35
30
25
20
15
10
5
Depth [mm]
-23
-16
-9
-2
5
12
19
Y [mm]
23
16
9
2
-5
-12
-19
X [mm]
4.884E+00
4.396E+00
3.907E+00
3.419E+00
2.930E+00
2.442E+00
1.954E+00
1.465E+00
9.768E-01
4.884E-01

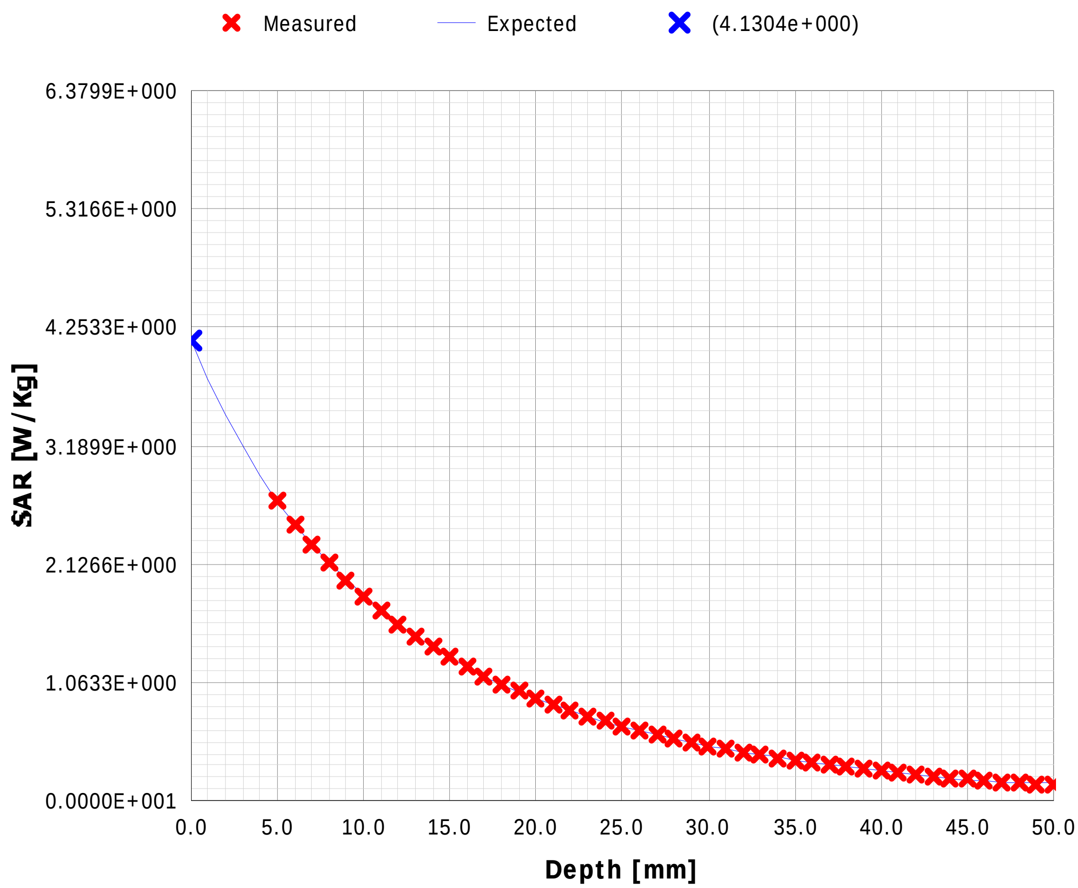

Measured
Expected
(4.1304e+000)
6.3799E+000
5.3166E+000
4.2533E+000
3.1899E+000
2.1266E+000
1.0633E+000
0.0000E+001
SAR [W/Kg]
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
Depth [mm]

EXHIBIT 9. SAR CALCULATION SUMMARY

9.1. TERMINOLOGY

AS_i	Amplifier Setting for channel i (i = 1, 2, 3)
Pd	Power density at the measurement point [mW/cm^2]
PO_{tot_air}	Probe Output in the air [mV]
PO_{tot_tissue}	Probe Output in the simulated tissue [mV]
η_{E2}	Sensor Factor to the $\|E\|^2$, an arbitrary value 10.8/3,770 [$mV/(V/m)^2$]
η_{pd}	Sensor Factor to the uniform power density, an arbitrary value 10.8 [$mV/(mW/cm^2)$]
γ	Conversion factor; ratio of sensor response in air to response in the dielectric media
ζ	Sensitivity of the probe in the simulated tissue [W/Kg/mV]
c	Specific heat capacity of the simulated tissue [J/Kg/ ^oC]
$\sigma_{@cal}$	Conductivity of the simulated tissue during the thermal transfer calibration [S/m]
$\sigma_{@meas}$	Conductivity of the simulated tissue during the SAR measurement [S/m]
ρ	Mass density of the simulated tissue [Kg/m^3]
$\Delta T/\Delta t$	Initial rate of tissue heating, before thermal diffusion takes place [^oC /sec]

9.1.1. Sensor factor(η_{pd} and η_{E2}) in the air (Z_0 = 377[Ω])

$$\eta_{Pd} = 10.8[mV/(mW/cm)^2] \equiv \eta_{E2} = \frac{10.8}{3{,}770}[mV/(V/m)^2]$$

$$Pd[mW/cm^2] = \frac{PO_{tot}}{\eta_{Pd}} \quad , \quad |E|^2[(V/m)^2] = \frac{PO_{tot}}{\eta_{E2}} \quad \text{and} \quad SAR[W/Kg] = \frac{\sigma \times \frac{PO_{tot}}{\eta_{E2}}}{\rho}$$

9.1.2. Amplifier settings(AS_i) and probe output

$$AS_i = \frac{\eta_{Pd}}{V_{\max_i} - DC_i} \times \cos^2(\varphi - \theta_i) \times Pd$$

$$PO_1[mV] = (V_1 - DC_1) \times AS_1 \equiv |E_1|^2 \times \eta_{E2}$$

$$PO_2[mV] = (V_2 - DC_2) \times AS_2 \equiv |E_2|^2 \times \eta_{E2}$$

$$PO_3[mV] = (V_3 - DC_3) \times AS_3 \equiv |E_3|^2 \times \eta_{E2}$$

$$PO_{tot}[mV] \equiv |E|^2 \times \eta_{E2} = (|E_1|^2 + |E_2|^2 + |E_3|^2) \times \eta_{E2} = |E_1|^2 \times \eta_{E2} + |E_2|^2 \times \eta_{E2} + |E_3|^2 \times \eta_{E2}$$
$$\equiv PO_1 + PO_2 + PO_3$$

9.1.3. Conversion factor (γ) in the simulated tissue

$$\left|E_{tissue}\right|^2 = \frac{PO_{tot\_tissue}}{\eta_{E2}} \times \frac{1}{\gamma}$$

$$SAR_t = SAR_{tissue} = \frac{\sigma_{@cal} \times \left|E_{tissue}\right|^2}{\rho} = \frac{\sigma_{@cal} \times \frac{PO_{tot\_tissue}}{\eta_{E2}} \times \frac{1}{\gamma}}{\rho[Kg/m^3]} = \left(\frac{\sigma_{@cal} \times \frac{PO_{tot\_tissue}}{\eta_{E2}}}{\rho}\right) \times \frac{1}{\gamma} = SAR_{PO_{tot\_tissue}} \times \frac{1}{\gamma}$$

9.1.4. Conversion factor (γ) Calculation

$$\frac{\delta}{\delta P} SAR_t = \frac{\delta}{\delta P} SAR_{tissue}$$

$$\frac{\delta}{\delta P}\left(c \times \frac{\Delta T}{\Delta t}\right) = \frac{\delta}{\delta P}\left(\frac{\sigma_{@cal} \times \left|E_{tissue}\right|^2}{\rho}\right) = \frac{\delta}{\delta P}\left(\frac{\sigma_{@cal} \times \frac{PO_{tot\_tissue}}{\eta_{E2}} \times \frac{1}{\gamma}}{\rho}\right)$$

$$\gamma = \frac{\frac{\delta}{\delta P} SAR_{PO_{tot\_tissue}}}{\frac{\delta}{\delta P} SAR_t} = \frac{\frac{\sigma_{@cal} \times \frac{\frac{\delta}{\delta P} PO_{tot\_tissue}}{\eta_{E2}}}{\rho}}{c \times \frac{\delta}{\delta P} \frac{\Delta T}{\Delta t}} = \frac{\sigma_{@cal}}{\eta_{E2} \times c \times \rho} \times \frac{\frac{\delta}{\delta P} PO_{tot\_tissue}}{\frac{\delta}{\delta P} \frac{\Delta T}{\Delta t}}$$

9.1.5. Sensitivity (ζ) in the simulated tissue

$$\zeta[W/Kg/mV] = \frac{\sigma_{@meas}}{\eta_{E2} \times 1{,}000[Kg/m^3] \times \gamma}$$

9.1.6. SAR calculation

$$SAR[W/Kg] = \zeta[W/Kg/mV] \times PO_{tot\_tissue}[mV]$$