

 MOTOROLA	 Certificate Number: 2518.01		
FCC ID: AZ489FT3814 DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 3			
Networks & Enterprise EME Test Laboratory 8000 West Sunrise Blvd Fort Lauderdale, FL. 33322	Date of Report: 10/18/2006 Report Revision: O Report ID: XTS4000_Rev O_061018 SR4417		
<table border="0"> <tr> <td style="vertical-align: top;"> Responsible Engineer: Stephen C. Whalen Sr. Staff EME Eng. Date/s Tested: 9/21/06-10/2/06 Manufacturer/Location: Motorola – Schaumburg IL Sector/Group/Div.: Networks and Enterprises Date submitted for test: 9/18/2006 DUT Description: XTS 4000 PORTABLE ASTRO DIGITAL 136-174MHZ 1-2W Test TX mode(s): FM APCO 25 Max. Power output: 2.8W Nominal Power: 2 Watts, conducted, constant envelope (APCO) Tx Frequency Bands: 136-174 MHz Signaling type: FM APCO 25 Model(s) Tested: H18KCN9PW9AN Model(s) Certified: H18KCN9PW9AN Serial Number(s): 687T000506 Classification: Occupational/Controlled Rule Part(s): 90 </td> <td style="vertical-align: top; text-align: center;">  </td> </tr> </table> Antenna(s): NAD6583A retractable (162-174 MHz ¼ wave -13.3 dBi), NAD6582A retractable (136-151 MHz ¼ wave -13.3 dBi), NAD6581A retractable (145-166 MHz ¼ wave -13.3 dBi) Battery(ies): NNTN6944A Li Ion Body worn accessory(ies): NNTN6946A leather pouch, NNTN6945A plastic holster Audio/Data cable accessory(ies): SYN8390B Ear Piece, NNTN5006BP Ear Piece, NNTN5211A Ear Piece Max. Calc. : 1-g Avg. SAR: 0.37 W/kg (Body); 10-g Avg. SAR: 0.19 W/kg (Body) Max. Calc. : 1-g Avg. SAR: 0.17 W/kg (Face); 10-g Avg. SAR: 0.13 W/kg (Face) Max. Calc. : 1-g Avg. SAR: 1.64 W/kg (Head); 10-g Avg. SAR: 0.71 W/kg (Head)		Responsible Engineer: Stephen C. Whalen Sr. Staff EME Eng. Date/s Tested: 9/21/06-10/2/06 Manufacturer/Location: Motorola – Schaumburg IL Sector/Group/Div.: Networks and Enterprises Date submitted for test: 9/18/2006 DUT Description: XTS 4000 PORTABLE ASTRO DIGITAL 136-174MHZ 1-2W Test TX mode(s): FM APCO 25 Max. Power output: 2.8W Nominal Power: 2 Watts, conducted, constant envelope (APCO) Tx Frequency Bands: 136-174 MHz Signaling type: FM APCO 25 Model(s) Tested: H18KCN9PW9AN Model(s) Certified: H18KCN9PW9AN Serial Number(s): 687T000506 Classification: Occupational/Controlled Rule Part(s): 90	
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Based on the information and the testing results provided herein, the undersigned certifies that when used as stated in the operating instructions supplied, said product complies with the national and international reference standards and guidelines listed in section 2.0 of this report. This report shall not be reproduced without written approval from an officially designated representative of the Motorola EME Laboratory. This reporting format is consistent with the test report guidelines of the TIA TSB-150 December 2004 The results and statements contained in this report pertain only to the device(s) evaluated.			
signature on file Ken Enger N&E EME Lab Senior Resource Manager, Laboratory Director, Approval Date: 10/20/06	Certification Date: Certification No.:		

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Report Revision History

Date	Revision	Comments
10/18/2006	O	Initial release

1.0 Introduction and Overview

This report details the utilization, test setup, test equipment, and test results of the Specific Absorption Rate (SAR) measurements performed at the N&E EME Test Lab for the model number H18KCN9PW9AN of FCC ID: AZ489FT3814. The results herein reflect initial test results.

2.0 Referenced Standards and Guidelines

This product is designed to comply with the following national and international standards and guidelines.

- IEC62209-1(2005) Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)
- United States Federal Communications Commission, Code of Federal Regulations; Rule Part 47CFR § 2.1093 sub-part J:1999
- Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.
- IEEE 1528, 2003 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques"
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992
- Institute of Electrical and Electronic Engineers (IEEE) C95.1-2005 Edition
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- Ministry of Health (Canada) Safety Code 6. Limits of Human Exposure to Radio frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz, 1999
- Australian Communications Authority Radiocommunications (Electromagnetic Radiation - Human Exposure) Standard 2003
- ANATEL, Brazil Regulatory Authority, Resolution No. 303 of July 2, 2002 "Regulation of the limitation of exposure to electrical, magnetic, and electromagnetic fields in the radio frequency range between 9KHz and 300 GHz." and "Attachment to resolution # 303 from July 2, 2002"

2.1 SAR Limits

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average - ANSI - (averaged over the whole body)	0.08	0.4
Spatial Peak - ANSI - (averaged over any 1-g of tissue)	1.60	8.0
Spatial Peak – ICNIRP/ANSI - (hands/wrists/feet/ankles averaged over 10-g)	4.0	20.0
Localized SAR - ICNIRP - (Head and Trunk 10-g)	2.0	10.0

3.0 Description of Device Under Test (DUT)

FCC ID: AZ489FT3814 is a VHF portable two-way radio that operates using APCO 25(C4FM) digital voice frequency modulation (FM) incorporating traditional simplex transmission protocol. This device uses removable antennas that are capable of transmitting within their respective ranges in the 136-174MHz band. The nominal output power is 2 Watts with maximum output powers of 2.8 watts as defined by the upper limit of the production line final test station. All intended operating positions use PTT operation only and are as follows; “at the head” same as a telephone, “at the face” with the DUT at least 1 inch (2.5cm) from the mouth, “at the body” by means of the offered body-worn accessories. Body-worn audio operation is accomplished by means of optional remote accessories that connect to the radio. This device will be marketed to and used by employees solely for occupational operations, such as public safety agencies, e.g. police, fire and emergency medical. User training is the responsibility of these agencies, which can be expected to employ the usage instructions, safety information and operational cautions set forth in the user's manual, instructional sessions or other means. Motorola also makes available to its customers training classes on the proper use of two-way radios and wireless data devices.

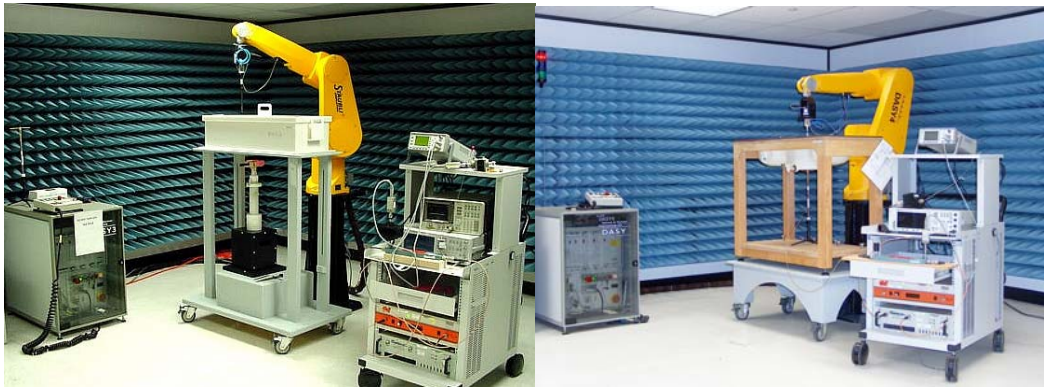
This two-way radio is designed to look like a phone and can be used while held against the head in PTT mode, in front of the face in PTT mode, and against the body in PTT mode.

FCC ID: AZ489FT3814 is offered with the options and accessories listed on the coversheet of this report.

Test Output Power

A table of the characteristic power slump versus time is provided in Appendix F.

4.0 Description of Test System



4.1 Descriptions of Robotics/probes/Readout Electronics

The laboratory utilizes a Dosimetric Assessment System (DASY4™) SAR measurement system Version 4.7 build 44 manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. The test system consists of a Stäubli RX90L robot, DAE3V1, and ET3DV6 E-Field probes. Please reference the SPEAG user manual and application notes for detailed probe, robot, and SAR computational procedures. Section 5.0 presents relevant test equipment information. Appendices B and C present the applicable calibration certificates. The E-field probe first scans a coarse grid over a large area inside the phantom in order to locate the interpolated maximum SAR distribution. After the coarse scan measurement, the probe is automatically moved to a position at the interpolated maximum. The subsequent scan can directly use this position as reference for the cube evaluations.

4.2 Description of Phantom(s)

4.2.1 Flat Phantom

Phantom Type	Phantom Material	Phantom Dimensions (cm)	Support structure opening dimensions (cm)	Support structure material	Loss Tangent (wood)
Flat	High Density Polyethylene (HDPE)	80x60x20x0.2	68.58x25.4	Wood	< 0.05

4.2.2 SAM Phantom

Phantom Type	Material Parameters	Material Thickness (mm)	Support structure material	Loss Tangent (wood)
SAMTP1209	200MHz -3GHz; Er = <5, Loss Tangent = <0.05	2mm +/- 0.2mm	Wood	< 0.05

4.3 Description of Equivalent tissues

Type of Simulated Tissue

The simulated tissue used is compliant to that specified in FCC Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01) and IEEE 1528, 2003 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques".

The sugar based simulate tissue is produced by placing the correct measured amount of De-ionized water into a large container. Each of the dried ingredients are weighed and added to the water carefully to avoid clumping. If the solution has a high sugar concentration the water is pre-heated to aid in dissolving the ingredients. For Diacetin and Glycol based simulates, sugar and HEC ingredients are not needed. The solution is mixed thoroughly, covered, and allowed to sit overnight prior to use.

Simulated Tissue Composition

% of listed ingredients	150-300MHz	
	Head	Body
Sugar	56.0	47.1
DGBE (Glycol)	NA	NA
Diacetin	NA	NA
De ionized -Water	37.5	49.48
Salt	5.4	2.32
HEC	1.0	1.0
Bact.	0.1	0.1

Reference section 6.1 for target parameters

5.0 Additional Test Equipment

Equipment Type	Model Number	Serial Number	Calibration Due Date
Power Meter (Agilent)	E4418B	GB40206553	4/21/2007
Power Meter (Agilent)	E4418B	GB40206480	11/30/2006
Power Meter (Agilent)	E4419B	MY403300364	1/31/2007
Power Sensor (HP)	8482B	3318A07392	5/17/2007
Power Sensor (HP)	8482B	3318A07393	3/27/2007
Power Sensor (HP)	8482B	3318A06773	4/19/2007
Power Sensor (HP)	8482B	3318A06774	4/22/2007
Signal Generator (Agilent)	E4421B	US40051446	8/24/2008
Signal Generator (HP)	E4421B	US39270649	8/16/2008
Signal Generator (HP)	E4438C	MY42082269	6/23/2008

Additional Test Equipment (continued)

Equipment Type	Model Number	Serial Number	Calibration Due Date
AMP (Amplifier Research)	10W1000	5924	CNR
AMP (Amplifier Research)	10WD1000	28782	CNR
Bi-Directional Coupler (NARDA)	3020A	40295	6/6/2008
Bi-Directional Coupler (NARDA)	3020A	40296	11/17/2007
Agilent PNA-L Network Analyzer	N5230A	MY45001092	5/22/2007
Dielectric Probe Kit (HP)	85070C	US99360076	CNR

6.0 SAR Measurement System Verification

The SAR measurements were conducted with probe model/serial number ET3DV6/SN1384. The system performance check was conducted daily and within 24 hours prior to testing. DASY output files of the probe/dipole calibration certificates and system performance test results are included in appendices B, C, D respectively. The table below summarizes the system performance check results normalized to 1W.

Dipole validation scans at the head from SPEAG are provided in APPENDIX D. The N&E EME lab validated the dipole to the applicable IEEE system performance targets. Within the same day system validation was performed using FCC body tissue parameters to generate the system performance target values for body at the applicable frequency. The results of the N&E EME system performance validation are provided herein.

6.1 Equivalent Tissue Test Results

Simulated tissue prepared for SAR measurements is measured daily and within 24 hours prior to actual SAR testing to verify that the tissue is within +/- 5% of target parameters at the center of the transmit band. This measurement is done using the applicable equipment indicated in section 5.0.

Actual versus Target tissue parameters (9/21/06 – 10/02/06)

FCC Body				
Frequency (MHz)	Di-electric Constant Target	Di-electric Constant Meas. (Range)	Conductivity Target S/m	Conductivity Meas. (Range) S/m
155	61.8	61.1-64.1	0.80	0.78-0.81
300	58.2	56.7-60.2	0.92	0.88-0.92

IEEE Head				
Frequency (MHz)	Di-electric Constant Target	Di-electric Constant Meas. (Range)	Conductivity Target S/m	Conductivity Meas. (Range) S/m
155	52.1	52.4-54.1	0.76	0.73-0.76
300	45.3	45.5-47.5	0.87	0.86-0.89

6.2 System Check Test Results

Probe Serial #	Tissue Type	Probe Cal Date	Dipole Kit / Serial #	System Perf. Result when normalized to 1W (mW/g)	Reference S.A.R @ 1W (mW/g)	Test Date(s)
1384	FCC Body	5/30/06	SPEAG D300V2 /1002	2.81 +/- 0.115	2.79 +/- 10%	9/21/06-10/02/06 9 test days
1384	IEEE Head	5/30/06	SPEAG D300V2 /1002	2.98 +/- 0.015	3.01 +/- 10%	9/29/06 1 test day

Note: See APPENDIX D for an explanation of the reference SAR targets stated above.
(System performance results reflects the median performance +/- ½ of the test date(s) performance ranges)

The DASY4™ system is operated per the instructions in the DASY4™ Users Manual. The complete manual is available directly from SPEAG™. All measurement equipment used to assess EME SAR compliance was calibrated according to 17025 A2LA guidelines.

7.0 DUT Test Strategy and Methodology

7.1 DUT Configuration(s)

The DUT is a portable device with FM transmission signaling operational at the body, head, and face using the offered accessories. The device is placed in the test positions presented in Appendix G.

Test Plan

All options and accessories listed on the cover page of this report were considered in order to develop the SAR test plan for this product. SAR measurements were performed using a flat phantom and a SAM phantom with the applicable simulated tissue to assess performance at the body, head, and face respectively using the relevant transmission modes.

Note that a coarse-to-cube approximation methodology was utilized to determine the worst-case SAR performance configuration for each applicable body location. The test configurations that produced the highest SAR results for each body position using the coarse-to-cube approximation methodology were assessed using the full DASY4™ coarse and 7x7x7 cube scans.

Assessments at the Head (PTT mode) [Pages 11, 12 of 30; Tables 1](#)

- Assessment of each offered antenna at their respective center frequencies using applicable touch and tilt test configurations at the head.
- Assessment across the respective bands for each offered antenna using the worst case configuration overall from above.

Assessments at the Face (PTT mode) [Page 13 of 30; Table 2](#)

- Assessment of each offered antenna at their respective center frequencies using applicable flip open and flip closed test configurations at the face.
- Assessment across the respective bands for each offered antenna using the worst case configuration overall from above.

Assessments at the Body (PTT mode) [Page 14 of 30; Table 3](#)

- Assessment of each offered antenna at their respective center frequencies per band.
- Assessment of the offered body worn accessories with the worst case configuration from above.
- Assessment of the relevant offered audio accessories with the worst case configuration from above.
- Assessment across the respective bands for each offered antenna using the worst case configuration overall from above.

Assessments at the Body 2.5cm (PTT mode) [Page 14 of 30; Table 3](#)

- Assessment using the worst case test configuration at the body overall from above with the antenna (DUT back to phantom) and front housing of the DUT separated 2.5cm from the phantom.

Shortened scan assessment at the Body [Page 15 of 30; Table 4](#)

- A “shortened” scan was performed using the offered battery and test configuration that produced the highest SAR results overall. Note that the shortened scan is obtained by first running a coarse scan to find the peak area and then, using a newly charged battery, a cube scan only was performed. The shortened scan represents the cube scan performance results.

7.2 Device Positioning Procedures

Reference Appendix G for photos of the DUT tested positions.

7.2.1 Body

The DUT was positioned in normal use configuration against the phantom with the offered body worn accessory.

The DUT was positioned with its’ front and antenna (DUT back to phantom) separated 2.5cm from the phantom.

7.2.2 Head

The DUT was placed against the right and left heads of the SAM phantom in the cheek touch and tilt positions.

7.2.3 Face

The DUT was positioned with its' front side separated 2.5cm from the phantom with the flip opened and closed.

8.0 Environmental Test Conditions

The EME Laboratory ambient environment is well controlled resulting in very stable simulated tissue temperature and therefore stable dielectric properties. Simulated tissue temperature is measured prior to each scan to insure it is within $\pm 2^{\circ}\text{C}$ of the temperature at which the dielectric properties were determined. The liquid depth within the phantom used for measurements was 15cm $\pm$ 0.5cm. Additional precautions are routinely taken to ensure the stability of the simulated tissue such as covering the phantoms when scans are not actively in process in order to minimize evaporation. The lab environment is continuously monitored. The table below presents the range and average environmental conditions during the SAR tests reported herein:

	Target	Measured
Ambient Temperature	20 - 25 $^{\circ}\text{C}$	Range: 21.6-23.4 $^{\circ}\text{C}$ Avg. 22.3 $^{\circ}\text{C}$
Relative Humidity	30 - 70 %	Range: 48.6-61.3% Avg. 55.0%
Tissue Temperature	NA	Range: 20.2-21.5 $^{\circ}\text{C}$ Avg. 20.7 $^{\circ}\text{C}$

The EME Lab RF environment uses a Spectrum Analyzer to monitor for extraneous large signal RF contaminants that could possibly affect the test results. If such unwanted signals are discovered the S.A.R scans are repeated.

9.0 Test Results Summary

All SAR results obtained by the tests described in Section 7.1 are listed below. As noted in section 7.1, a coarse-to-cube approximation methodology, was utilized to ascertain the worst-case test configuration for each body location. The worst case test configurations observed for each body location and band (in bold with *) were then assessed using the full DASY4™ coarse and 7x7x7 cube methodology, and they are presented in the worst case configuration table below. The associated SAR plots are provided in APPENDIX E. Appendix E also presents shortened SAR cube scans to assess the validity of the calculated results presented herein. Note: The results of the shortened cube scans presented in Appendix E demonstrate that the scaling methodology used to determine the calculated SAR results presented herein are valid.

Table 1

Assessments at the Head												
Run Number/ SN	Antenna Pos.	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	SAR Drift (dB)	Meas. 1g-SAR (mW/g)	Meas. 10g-SAR (mW/g)	Max Calc. 1g-SAR (mW/g)	Max Calc. 10g-SAR (mW/g)
Assessment at the left ear – touch and tilt w/ antenna positions												
MeC-LEAR-060921-07/687T000506	NAD6581A (145-166) Out	155.525	NNTN6944 A	cheek touch	none	none	2.72	-0.445	0.792	0.502	0.45	0.29
MeC-LEAR-060922-12/687T000506	NAD6581A (145-166) In	155.525	NNTN6944 A	cheek touch	none	none	2.73	-0.217	0.290	0.177	0.16	0.10
JsT-Lear-060922-02/687T000506	NAD6582A (136-151) Out	143.525	NNTN6944 A	cheek touch	none	none	2.72	-1.420	0.665	0.419	0.47	0.30
MeC-LEAR-060922-13/687T000506	NAD6582A (136-151) In	143.525	NNTN6944 A	cheek touch	none	none	2.72	-0.409	0.322	0.211	0.18	0.12
JsT-Lear-060922-04/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	cheek touch	none	none	2.65	-1.740	0.866	0.546	0.68	0.43
JsT-Lear-060922-05/687T000506	NAD6583A (162-174) In	168.025	NNTN6944 A	cheek touch	none	none	2.64	-1.540	0.355	0.238	0.27	0.18
JsT-Lear-060922-06/687T000506	NAD6581A (145-166) Out	155.525	NNTN6944 A	cheek tilt	none	none	2.71	-0.426	0.503	0.336	0.29	0.19
JsT-Lear-060922-07/687T000506	NAD6581A (145-166) In	155.525	NNTN6944 A	cheek tilt	none	none	2.73	-0.162	0.297	0.193	0.16	0.10
JsT-Lear-060922-08/687T000506	NAD6582A (136-151) Out	143.525	NNTN6944 A	cheek tilt	none	none	2.72	-1.130	0.475	0.307	0.32	0.20
JsT-Lear-060922-09/687T000506	NAD6582A (136-151) In	143.525	NNTN6944 A	cheek tilt	none	none	2.72	-0.825	0.183	0.119	0.11	0.07
JsT-Lear-060922-10/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	cheek tilt	none	none	2.63	-1.170	0.593	0.380	0.41	0.26
JsT-Lear-060922-11/687T000506	NAD6583A (162-174) In	168.025	NNTN6944 A	cheek tilt	none	none	2.63	-1.200	0.190	0.123	0.13	0.09
Assessment at the left ear – each antenna band edges with worst case configuration from above												
MeC-LEAR-060922-15/687T000506	NAD6581A (145-166) Out	145.025	NNTN6944 A	cheek touch	none	none	2.73	0.068	0.558	0.347	0.29	0.18
MeC-LEAR-060922-16/687T000506	NAD6581A (145-166) Out	165.975	NNTN6944 A	cheek touch	none	none	2.67	-0.456	1.320	0.807	0.77	0.47
FULL SCAN MeC-LEAR-060926-15/687T000506	NAD6582A (136-151) Out	136.025	NNTN6944 A	cheek touch	none	none	2.74	-0.186	1.760	0.808	0.94	0.43
FULL SCAN MeC-LEAR-060929-16/687T000506	NAD6582A (136-151) Out	150.975	NNTN6944 A	cheek touch	none	none	2.73	-0.619	0.251	0.116	0.15	0.07
MeC-LEAR-060922-19/687T000506	NAD6583A (162-174) Out	162.025	NNTN6944 A	cheek touch	none	none	2.71	-0.063	1.050	0.641	0.55	0.34
MeC-LEAR-060922-20/687T000506	NAD6583A (162-174) Out	173.975	NNTN6944 A	cheek touch	none	none	2.66	-0.883	0.328	0.200	0.21	0.13

Table 1 (continued)

Assessments at the Head												
Run Number/ SN	Antenna	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	SAR Drift (dB)	Meas. 1g-SAR (mW/g)	Meas. 10g-SAR (mW/g)	Max Calc. 1g-SAR (mW/g)	Max Calc. 10g-SAR (mW/g)
Assessment at the right ear – touch and tilt w/ antenna positions												
MeC-REAR-060923-02/687T000506	NAD6581A (145-166) In	155.525	NNTN6944 A	cheek touch	none	none	2.73	-0.401	0.558	0.342	0.31	0.19
JsT-Rear-060925-07/687T000506	NAD6581A (145-166) Out	155.525	NNTN6944 A	cheek touch	none	none	2.74	-0.675	1.720	0.756	1.03	0.45
MeC-REAR-060923-04/687T000506	NAD6582A (136-151) In	143.525	NNTN6944 A	cheek touch	none	none	2.73	-0.759	0.314	0.194	0.19	0.12
MeC-REAR-060923-05/687T000506	NAD6582A (136-151) Out	143.525	NNTN6944 A	cheek touch	none	none	2.72	-0.093	0.664	0.410	0.35	0.22
MeC-REAR-060923-06/687T000506	NAD6583A (162-174) In	168.025	NNTN6944 A	cheek touch	none	none	2.65	-1.110	0.386	0.237	0.26	0.16
MeC-REAR-060923-07/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	cheek touch	none	none	2.67	-0.206	0.811	0.512	0.45	0.28
MeC-REAR-060923-08/687T000506	NAD6581A (145-166) In	155.525	NNTN6944 A	cheek tilt	none	none	2.74	-0.499	0.288	0.192	0.17	0.11
MeC-REAR-060923-09/687T000506	NAD6581A (145-166) Out	155.525	NNTN6944 A	cheek tilt	none	none	2.73	-0.568	0.505	0.334	0.30	0.20
MeC-REAR-060923-10/687T000506	NAD6582A (136-151) In	143.525	NNTN6944 A	cheek tilt	none	none	2.72	-0.880	0.182	0.122	0.11	0.08
MeC-REAR-060923-11/687T000506	NAD6582A (136-151) Out	143.525	NNTN6944 A	cheek tilt	none	none	2.73	-1.270	0.511	0.338	0.35	0.23
MeC-REAR-060923-12/687T000506	NAD6583A (162-174) In	168.025	NNTN6944 A	cheek tilt	none	none	2.67	-1.470	0.221	0.148	0.16	0.11
MeC-REAR-060923-13/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	cheek tilt	none	none	2.66	-1.280	0.601	0.401	0.42	0.28
Assessment at the right ear – each antenna band edges with worst case configuration from above												
*MeC-REAR-060923-14/687T000506	NAD6581A (145-166) Out	145.025	NNTN6944 A	cheek touch	none	none	2.73	-0.409	2.780	1.710	1.57	0.96
MeC-REAR-060926-14/687T000506	NAD6581A (145-166) Out	165.975	NNTN6944 A	cheek touch	none	none	2.72	-0.553	0.595	0.374	0.35	0.22
JsT-Rear-060925-02/687T000506	NAD6582A (136-151) Out	136.025	NNTN6944 A	cheek touch	none	none	2.73	0.885	1.190	0.779	0.61	0.40
FULL SCAN MeC-REAR-060929-18/687T000506	NAD6582A (136-151) Out	150.975	NNTN6944 A	cheek touch	none	none	2.74	-0.236	0.207	0.097	0.11	0.05
JsT-Rear-060925-04/687T000506	NAD6583A (162-174) Out	162.025	NNTN6944 A	cheek touch	none	none	2.70	0.027	0.836	0.562	0.43	0.29
JsT-Rear-060925-05/687T000506	NAD6583A (162-174) Out	173.975	NNTN6944 A	cheek touch	none	none	2.66	-1.460	0.243	0.165	0.18	0.12

Table 2

Assessments at the Face												
Run Number/ SN	Antenna	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	SAR Drift (dB)	Meas. 1g-SAR (mW/g)	Meas. 10g-SAR (mW/g)	Max Calc. 1g-SAR (mW/g)	Max Calc. 10g-SAR (mW/g)
Assessment at the face – flip open and closed w/ antenna positions												
JsT-Face-060928-10/687T000506	NAD6581A (145-166) In	155.525	NNTN6944 A	flip closed	none	none	2.75	0.498	0.095	0.071	0.05	0.04
*JsT-Face-060928-11/687T000506	NAD6581A (145-166) Out	155.525	NNTN6944 A	flip closed	none	none	2.75	-0.274	0.311	0.236	0.17	0.13
JsT-Face-060928-12/687T000506	NAD6582A (136-151) In	143.525	NNTN6944 A	flip closed	none	none	2.75	-1.020	0.180	0.136	0.12	0.09
JsT-Face-060928-13/687T000506	NAD6582A (136-151) Out	143.525	NNTN6944 A	flip closed	none	none	2.75	-0.903	0.182	0.139	0.11	0.09
JsT-Face-060928-14/687T000506	NAD6583A (162-174) In	168.025	NNTN6944 A	flip closed	none	none	2.67	0.671	0.133	0.101	0.07	0.05
JsT-Face-060928-15/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	flip closed	none	none	2.66	-0.610	0.224	0.171	0.14	0.10
JsT-Face-060928-16/687T000506	NAD6581A (145-166) In	155.525	NNTN6944 A	flip open	none	none	2.75	-0.221	0.020	0.016	0.01	0.01
JsT-Face-060928-17/687T000506	NAD6581A (145-166) Out	155.525	NNTN6944 A	flip open	none	none	2.74	-0.440	0.113	0.086	0.06	0.05
JsT-Face-060929-02/687T000506	NAD6582A (136-151) In	143.525	NNTN6944 A	flip open	none	none	2.75	-0.780	0.014	0.011	0.01	0.01
JsT-Face-060929-03/687T000506	NAD6582A (136-151) Out	143.525	NNTN6944 A	flip open	none	none	2.74	-1.150	0.071	0.054	0.05	0.04
JsT-Face-060929-04/687T000506	NAD6583A (162-174) In	168.025	NNTN6944 A	flip open	none	none	2.68	-0.741	0.020	0.015	0.01	0.01
JsT-Face-060929-05/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	flip open	none	none	2.67	-0.807	0.097	0.074	0.06	0.05
Assessment at the face – each antenna band edges with worst case configuration from above												
JsT-Face-060929-06/687T000506	NAD6581A (145-166) Out	145.025	NNTN6944 A	flip closed	none	none	2.75	0.128	0.118	0.090	0.06	0.05
JsT-Face-060929-07/687T000506	NAD6581A (145-166) Out	165.975	NNTN6944 A	flip closed	none	none	2.72	-0.866	0.179	0.136	0.11	0.09
JsT-Face-060929-08/687T000506	NAD6582A (136-151) In	136.025	NNTN6944 A	flip closed	none	none	2.75	0.254	0.095	0.072	0.05	0.04
JsT-Face-060929-10/687T000506	NAD6582A (136-151) In	150.975	NNTN6944 A	flip closed	none	none	2.72	-1.240	0.118	0.085	0.08	0.06
JsT-Face-060929-12/687T000506	NAD6583A (162-174) Out	162.025	NNTN6944 A	flip closed	none	none	2.72	-0.023	0.176	0.134	0.09	0.07
JsT-Face-060929-13/687T000506	NAD6583A (162-174) Out	173.975	NNTN6944 A	flip closed	none	none	2.66	-1.320	0.084	0.064	0.06	0.05

Table 3

Assessments at the Body												
Run Number/ SN	Antenna	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	SAR Drift (dB)	Meas. 1g-SAR (mW/g)	Meas. 10g-SAR (mW/g)	Max Calc. 1g-SAR (mW/g)	Max Calc. 10g-SAR (mW/g)
Assessment at the body – w/ antenna positions												
JsT-Ab-060927-02/687T000506	NAD6581A (145-166) In	155.525	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.72	-0.079	0.256	0.188	0.13	0.10
MeC-Ab-060927-13/687T000506	NAD6581A (145-166) Out	155.525	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.74	-0.287	0.406	0.287	0.22	0.16
JsT-Ab-060927-04/687T000506	NAD6582A (136-151) In	143.525	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.74	-0.839	0.202	0.146	0.13	0.09
FULL SCAN MeC-AB-061001-03/687T000506	NAD6582A (136-151) Out	143.525	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.74	-1.000	0.231	0.130	0.15	0.08
JsT-Ab-060927-06/687T000506	NAD6583A (162-174) In	168.025	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.66	-0.147	0.432	0.274	0.24	0.15
*JsT-Ab-060927-07/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.67	-0.605	0.600	0.382	0.36	0.23
JsT-Ab-060927-08/687T000506	NAD6583A (162-174) In	168.025	NNTN6944 A	against phantom	NNTN6945A Plastic	NNTN5211A 2-wire kit	2.67	-0.150	0.307	0.205	0.17	0.11
MeC-Ab-060927-09/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	against phantom	NNTN6945A Plastic	NNTN5211A 2-wire kit	2.67	-0.723	0.402	0.275	0.25	0.17
MeC-Ab-060927-10/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5006B P PTT earbud	2.68	-0.809	0.306	0.215	0.19	0.14
MeC-Ab-060927-11/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	against phantom	NNTN6946A Leather	SYN8390B earbud mic	2.67	-0.761	0.221	0.168	0.14	0.10
Assessment at the body – each antenna band edges with worst case configuration from above												
MeC-Ab-060927-12/687T000506	NAD6581A (145-166) Out	145.025	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.74	0.290	0.441	0.325	0.23	0.17
MeC-Ab-060927-14/687T000506	NAD6581A (145-166) Out	165.975	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.71	-0.769	0.320	0.217	0.20	0.13
FULL SCAN MeC-AB-061001-04/687T000506	NAD6582A (136-151) Out	136.025	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.73	0.120	0.453	0.262	0.23	0.13
JsT-Ab-061002-02/687T000506	NAD6582A (136-151) Out	150.975	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.73	-0.445	0.050	0.037	0.03	0.02
JsT-Ab-060928-02/687T000506	NAD6583A (162-174) Out	162.025	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.71	-0.211	0.399	0.278	0.22	0.15
JsT-Ab-060928-04/687T000506	NAD6583A (162-174) Out	173.975	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.66	-1.510	0.223	0.150	0.17	0.11
Assessment at the body – 2.5cm w/ antenna out												
JsT-Ab-060928-05/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	DUT back w/ ant @ 2.5cm	none	NNTN5211A 2-wire kit	2.66	-0.354	0.196	0.139	0.11	0.08
JsT-Ab-060928-07/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	DUT front @ 2.5cm	none	NNTN5211A 2-wire kit	2.67	-0.371	0.120	0.090	0.07	0.05

Table 4

[*Worst case configuration per body location and mode from above –using the DASY 4 full coarse and 7x7x7 cube scan measurements.]												
FULL SCAN JsT-Rear-060925-06/687T000506	NAD6581A (145-166) Out	145.025	NNTN6944 A	cheek touch	none	none	2.74	-0.460	2.880	1.250	1.64	0.71
SHORTEN SCAN MeC-REAR-060929-21/687T000506	NAD6581A (145-166) Out	145.025	NNTN6944 A	cheek touch	none	none	2.74	0.058	2.230	0.989	1.14	0.51
FULL SCAN MeC-FACE-060929-15/687T000506	NAD6581A (145-166) Out	155.525	NNTN6944 A	flip closed	none	none	2.75	-0.509	0.297	0.225	0.17	0.13
FULL SCAN JsT-Ab-060928-09/687T000506	NAD6583A (162-174) Out	168.025	NNTN6944 A	against phantom	NNTN6946A Leather	NNTN5211A 2-wire kit	2.68	-0.933	0.578	0.292	0.37	0.19

9.1 Highest SAR results calculation methodology

The calculated maximum 1-gram and 10-gram averaged SAR results reported herein for the full DASY™ coarse and 7x7x7 cube measurements are determined by scaling the measured SAR to account for power leveling variations and power slump. For this device the Maximum Calculated 1-gram and 10-gram averaged peak SAR is calculated using the following formula:

Max. Calc. 1-g/10-g Avg. SAR = ((SAR meas. / (10^{^(Pdrift/10)}))*(Pmax/Pint))* DC%

P_{max} = Maximum Power (W)

P_{int} = Initial Power (W)

Pdrift = DASY drift results (dB) - (for conservative results positive drifts are not accounted for)

SAR_{meas.} = Measured 1-g/10-g Avg. SAR (mW/g)

DC % = Transmission mode duty cycle in % where applicable

50% duty cycle is applied for PTT operation.

10.0 Conclusion

The highest Operational Maximum Calculated 1-gram and 10-gram average SAR values found for FCC ID: AZ489FT3814 models H18KCN9PW9AN.

Max. Calc. : 1-g Avg. SAR: 0.37 W/kg (Body); 10-g Avg. SAR: 0.19 W/kg (Body)

Max. Calc. : 1-g Avg. SAR: 0.17 W/kg (Face); 10-g Avg. SAR: 0.13 W/kg (Face)

Max. Calc. : 1-g Avg. SAR: 1.64 W/kg (Head); 10-g Avg. SAR: 0.71 W/kg (Head)

These test results clearly demonstrate compliance with FCC Occupational/Controlled RF Exposure limits of **8.0W/kg** per the requirements of 47 CFR 2.1093(d).

APPENDIX A

Measurement Uncertainty

Uncertainty Budget for Device Under Test, for 30 MHz to 3 GHz

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	$e = f(d, k)$	<i>f</i>	<i>g</i>	$h = c \times f / e$	$i = c \times g / e$	<i>k</i>
Uncertainty Component	IEEE 1528 section	Tol. ($\pm$ %)	Prob. Dist.	Div.	c_i (1 g)	c_i (10 g)	1 g u_i ($\pm$ %)	10 g u_i ($\pm$ %)	v_i
Measurement System									
Probe Calibration	E.2.1	5.9	N	1.00	1	1	5.9	5.9	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mech. Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.2	N	1.00	1	1	3.2	3.2	29
Device Holder Uncertainty	E.4.1	4.0	N	1.00	1	1	4.0	4.0	8
SAR drift	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	3.3	N	1.00	0.64	0.43	2.1	1.4	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	1.9	N	1.00	0.6	0.49	1.1	0.9	∞
Combined Standard Uncertainty			RSS				11	11	411
Expanded Uncertainty (95% CONFIDENCE LEVEL)			$k=2$				22	22	

Uncertainty Budget for System Validation (dipole & flat phantom) for 30 MHz to 3 GHz

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	$e = f(d, k)$	<i>f</i>	<i>g</i>	$h = c \times f / e$	$i = c \times g / e$	<i>k</i>
Uncertainty Component	IEEE 1528 section	Tol. ($\pm$ %)	Prob. Dist.	Div.	c_i (1 g)	c_i (10 g)	1 g u_i ($\pm$ %)	10 g u_i ($\pm$ %)	v_i
Measurement System									
Probe Calibration	E.2.1	5.9	N	1.00	1	1	5.9	5.9	∞
Axial Isotropy	E.2.2	4.7	R	1.73	1	1	2.7	2.7	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	0.0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t. Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	2.0	R	1.73	1	1	1.2	1.2	∞
Input Power and SAR Drift Measurement	8, 6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	3.3	R	1.73	0.64	0.43	1.2	0.8	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	1.9	R	1.73	0.6	0.49	0.6	0.5	∞
Combined Standard Uncertainty			RSS				9	9	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			$k=2$				18	17	

Notes for Tables 1 and 2

a) Column headings *a-k* are given for reference.

b) Tol. - tolerance in influence quantity.

c) Prob. Dist. – Probability distribution

d) N, R - normal, rectangular probability distributions

e) Div. - divisor used to translate tolerance into normally distributed standard uncertainty

f) c_i - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.g) u_i – SAR uncertaintyh) v_i - degrees of freedom for standard uncertainty and effective degrees of freedom for the expanded uncertainty.

Appendix B

Probe Calibration Certificates

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola CGISS**

Certificate No: **ET3-1384_May06**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN: 1384**

Calibration procedure(s) **QA CAL-01.v5 and QA CAL-12.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **May 30, 2006**

Condition of the calibrated item **In Tolerance**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	2-Feb-06 (SPEAG, No. DAE4-654_Feb06)	Feb-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov 06

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: May 31, 2006

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Calibration Laboratory of
Schmid & Partner
Engineering AG
 Zeughausstrasse 43, 8004 Zurich, Switzerland



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * *frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

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May 30, 2006

Probe ET3DV6

SN:1384

Manufactured:	August 16, 1999
Last calibrated:	May 26, 2005
Recalibrated:	May 30, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

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DASY - Parameters of Probe: ET3DV6 SN:1384

Sensitivity in Free Space^A

Diode Compression^B

NormX	1.80 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	92 mV
NormY	1.82 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	92 mV
NormZ	2.06 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	92 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	9.4	4.9
SAR _{be} [%]	With Correction Algorithm	0.0	0.2

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	7.4	4.1
SAR _{be} [%]	With Correction Algorithm	0.1	0.2

Sensor Offset

Probe Tip to Sensor Center **2.7 mm**

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

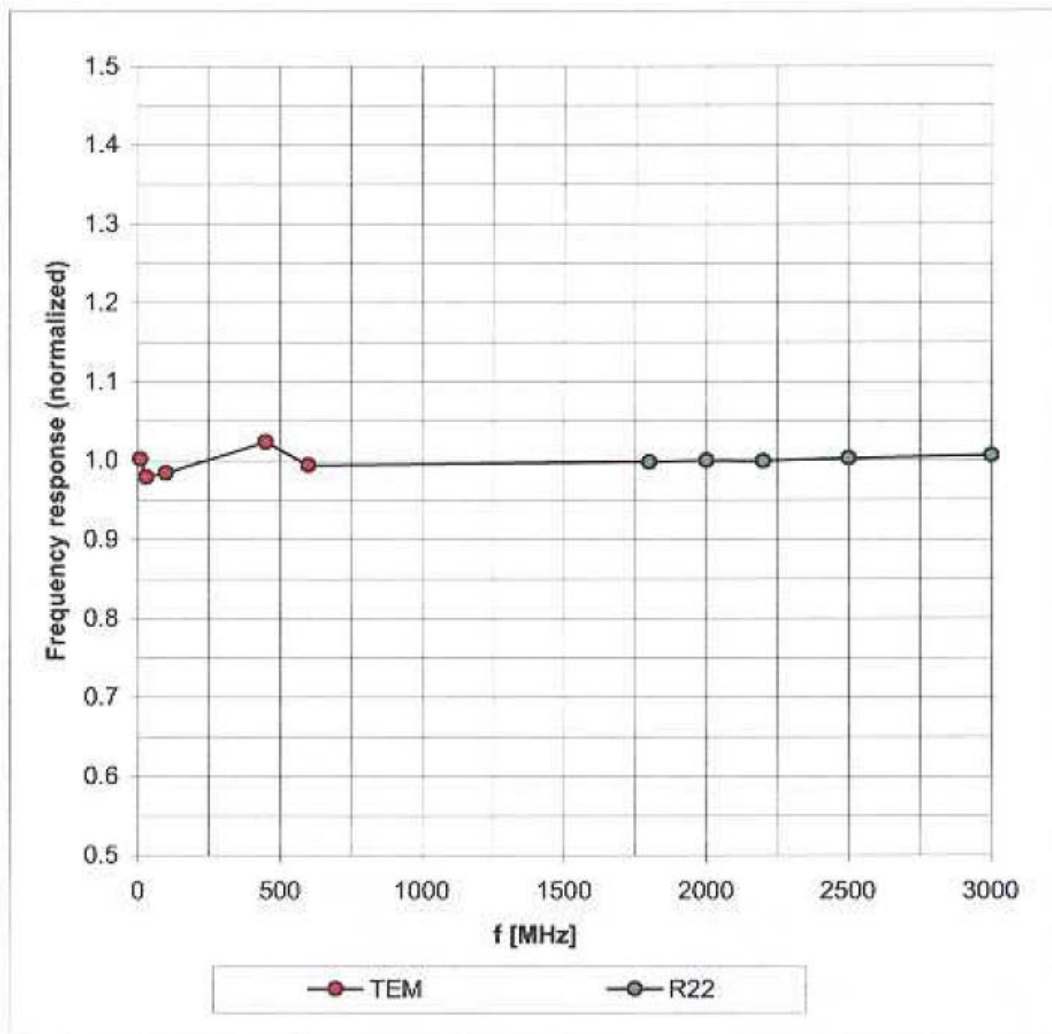
^B Numerical linearization parameter; uncertainty not required.

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Frequency Response of E-Field

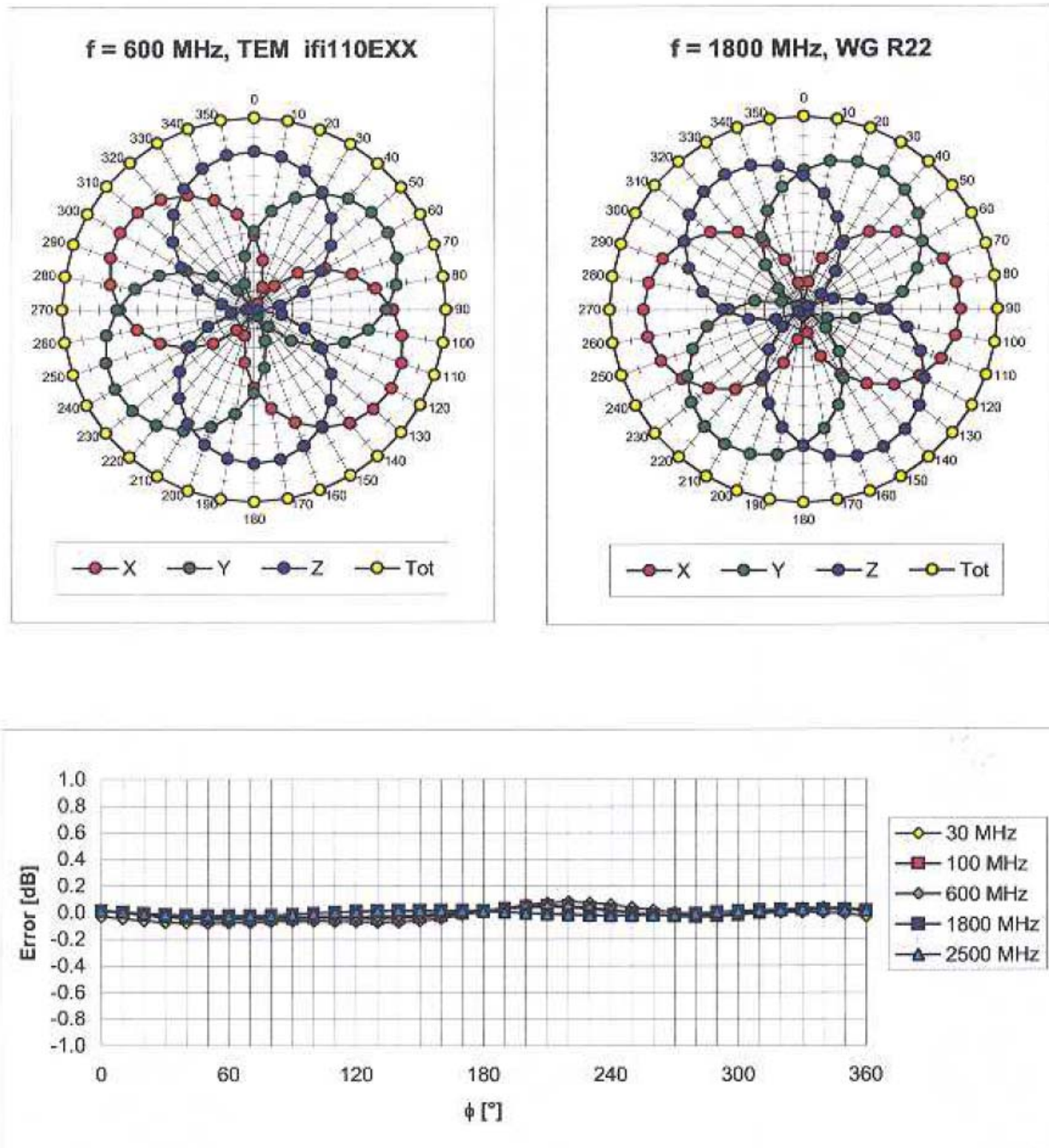
(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

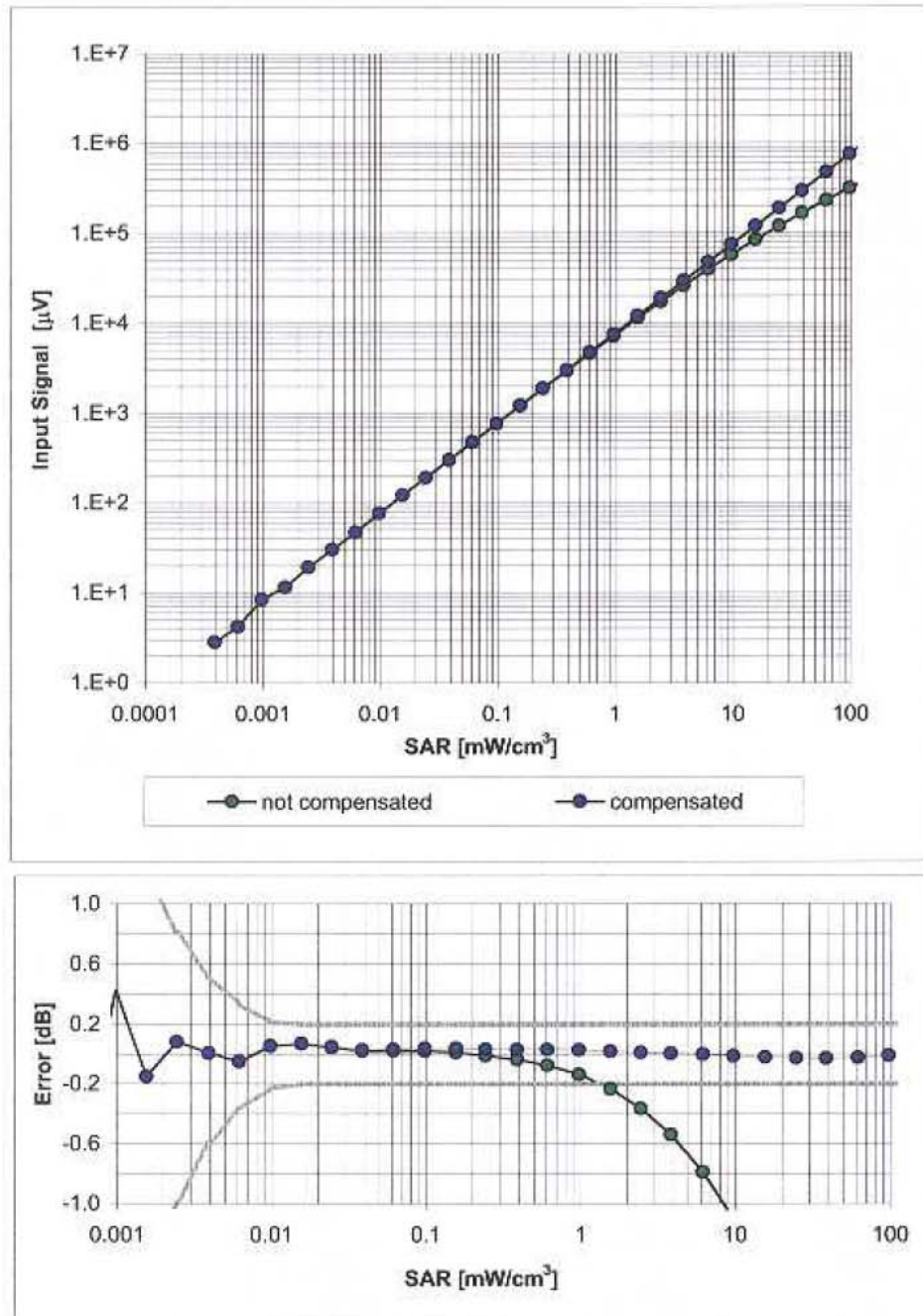
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Receiving Pattern (ϕ), $\theta = 0^\circ$ 

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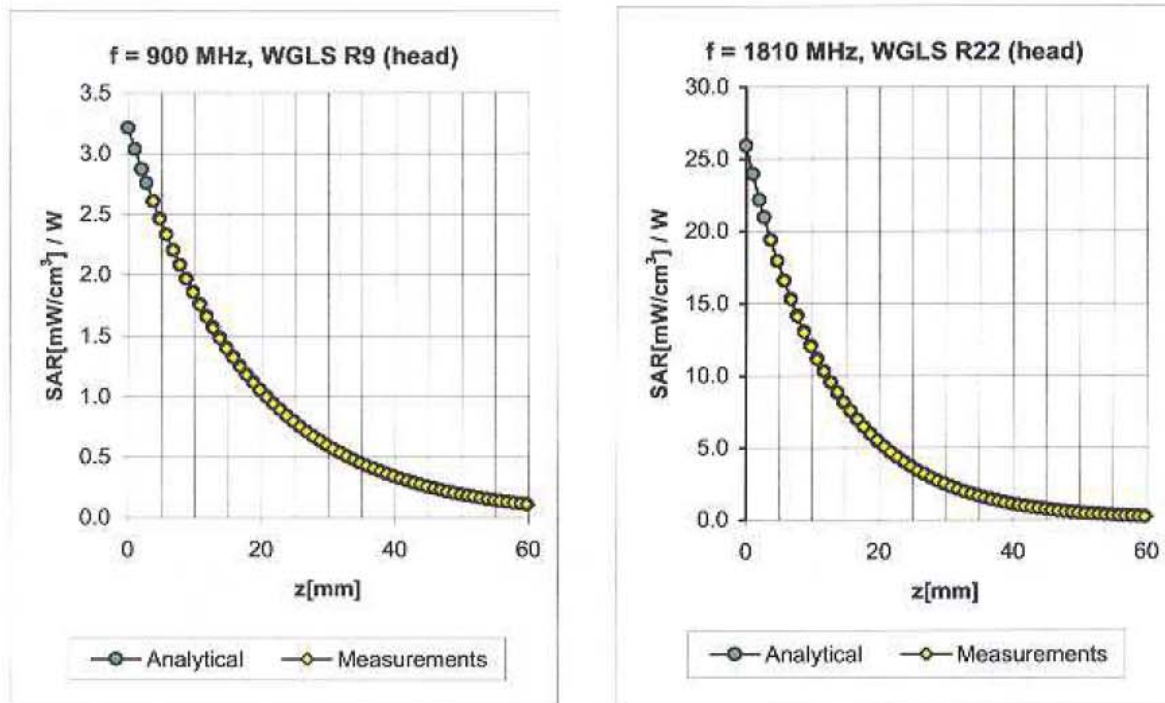
May 30, 2006

Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$)Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

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Conversion Factor Assessment



f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.38	1.96	6.94 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.68	1.79	6.12 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.55	2.64	5.11 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.79	1.77	4.52 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.33	2.01	7.53 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.53	2.10	5.95 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.66	2.50	4.58 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.74	1.91	4.18 ± 11.8% (k=2)

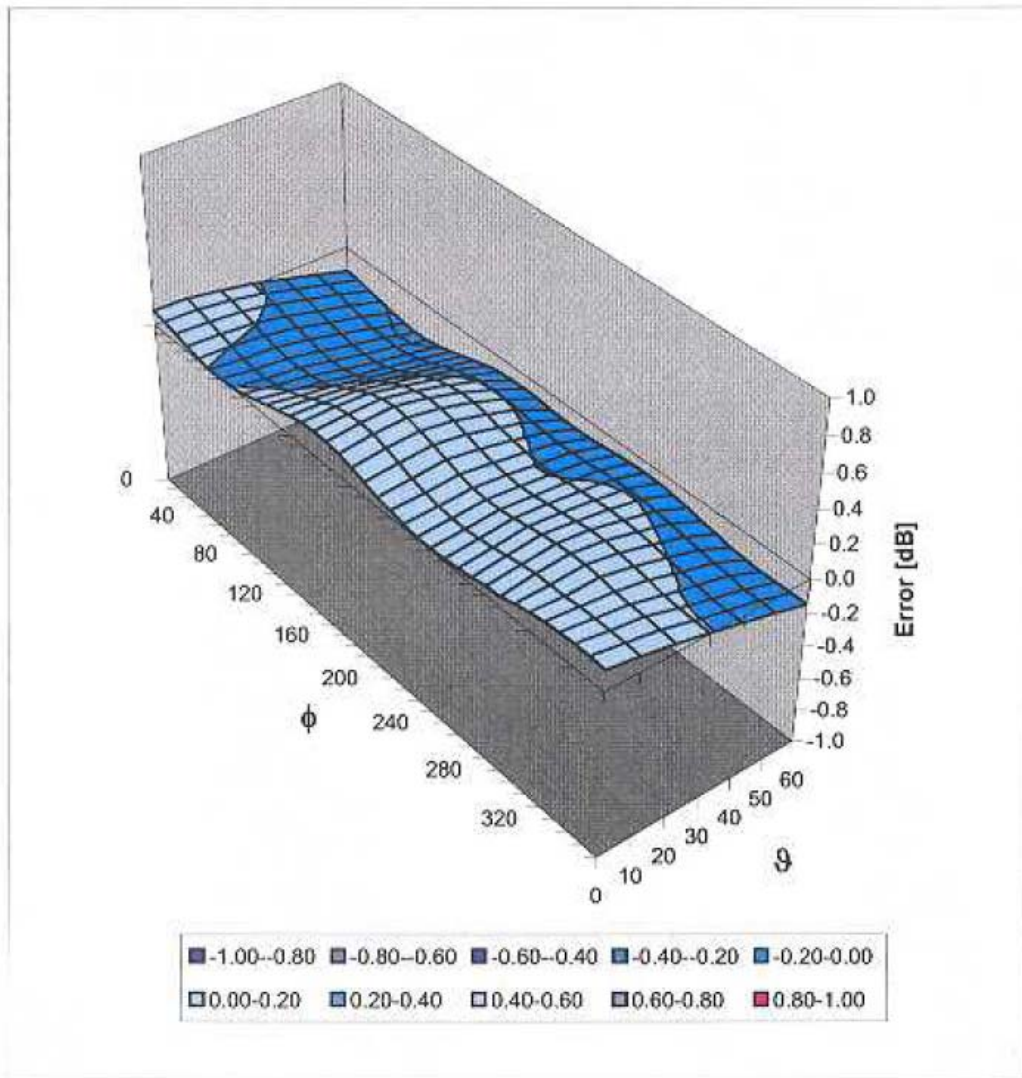
^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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Deviation from Isotropy in HSL

Error (ϕ , θ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

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Additional Conversion Factors for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1384

Place of Assessment:

Zurich

Date of Assessment:

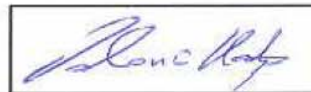
June 1, 2006

Probe Calibration Date:

May 30, 2006

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 1810 MHz.

Assessed by:



Schmid & Partner Engineering AG

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Dosimetric E-Field Probe ET3DV6 SN:1384Conversion factor ($\pm$ standard deviation)

150 MHz	<i>ConvF</i>	$8.3 \pm 10\%$	$\epsilon_r = 52.3$ $\sigma = 0.76 \text{ mho/m}$ (head tissue)
250 MHz	<i>ConvF</i>	$7.6 \pm 10\%$	$\epsilon_r = 47.6$ $\sigma = 0.83 \text{ mho/m}$ (head tissue)
300 MHz	<i>ConvF</i>	$7.5 \pm 9\%$	$\epsilon_r = 45.3$ $\sigma = 0.87 \text{ mho/m}$ (head tissue)
750 MHz	<i>ConvF</i>	$6.4 \pm 7\%$	$\epsilon_r = 41.9$ $\sigma = 0.89 \text{ mho/m}$ (head tissue)
150 MHz	<i>ConvF</i>	$7.9 \pm 10\%$	$\epsilon_r = 61.9$ $\sigma = 0.80 \text{ mho/m}$ (body tissue)
250 MHz	<i>ConvF</i>	$7.6 \pm 10\%$	$\epsilon_r = 59.4$ $\sigma = 0.88 \text{ mho/m}$ (body tissue)
300 MHz	<i>ConvF</i>	$7.5 \pm 9\%$	$\epsilon_r = 58.2$ $\sigma = 0.92 \text{ mho/m}$ (body tissue)
750 MHz	<i>ConvF</i>	$6.2 \pm 7\%$	$\epsilon_r = 55.5$ $\sigma = 0.96 \text{ mho/m}$ (body tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also Section 4.7 of the DASY4 Manual.