Certificate Number: 1449-01

FCC ID: AZ489FT4876
DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Networks & Enterprise
EME Test Laboratory
8000 West Sunrise Blvd
Fort Lauderdale, FL. 33322

Date of Report: 5/10/06
Report Revision: Rev O
Report ID: FCC rpt_ AAH55QDH9LA1AN_060510_SR3889

Responsible Engineer:	Stephen C. Whalen (Sr. Staff Eng.)
Date/s Tested:	4/28/2006 – 5/5/2006
Manufacturer/Location:	Motorola – Penang
Sector/Group/Div.:	NE/GTDG
Date submitted for test:	4/12/06
DUT Description:	403-470MHz / 4Watt keypad/Display W/GPS
Test TX mode(s):	CW
Max. Power output:	4.8W
Nominal Power:	4W
Tx Frequency Bands:	403-470MHz
Signaling type:	FM
Model(s) Tested:	AAH55QDH9LA1AN
Model(s) Certified:	AAH55QDH9LA1AN
Serial Number(s):	037T000015, 037T000014
Classification:	Occupational/Controlled
Rule Part(s):	90

Approved Accessories:

Antenna(s):
PMAE4018A (403-433 MHz, ¼ wave, Dual Band Folded Monopole (GPS) 2.2dBi), PMAE4021A (403-433MHz, ¼ wave, Dual Band Dual Element Stubby (GPS) 1.8dBi), PMAE4022A (403-470MHz, ¼ wave, Whip antenna, 2dBi), PMAE4023A (430-470MHz, ¼ wave, Dual Band Dual Element Stubby (GPS) 1.8dBi), PMAE4024A (430-470 MHz, ¼ wave, Dual Band Folded Monopole (GPS) 2.2dBi)

Battery(ies):
PMNN4065A (NiMH 1300 mAH), PMNN4066A (Li-Ion 1500 mAH Impres), PMNN4069A (Li-Ion 1500 mAH Impres FM)

Body worn accessory(ies):
PMLN4651A (Belt Clip 2), PMLN4652A (Belt Clip 2.5), HLN9985B (Waterproof Bag), RLN4570A (Break-A-Way Chest Pack), RLN4815A (Universal RadioPak & Utility Case), HLN6602A (Chest Pack)

Audio/Data cable accessory(ies):
See section 3.0 for list of approved audio acc

Max. Calc. 1-g/10-g Avg. SAR: 6.61/4.72 W/kg (Body)
Max. Calc. 1-g/10-g Avg. SAR: 4.82/3.50 W/kg (Face)

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: 5/10/06

Certification Date: 5/10/06

Certification No.: L1060509P

Part 1 of 2

APPENDICES

Part 2 of 2

Report REVISION HISTORY

Date	Revision	Comments
5/10/06	O	Initial Prototype 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 AAH55QDH9LA1AN of FCC ID: AZ489FT4876. The results herein reflect initial prototype results.

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

2.0 Referenced Standards and Guidelines

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

- 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) C95.1-1999 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: AZ489FT4876 is a UHF (403-470MHz) portable two-way radio that operates using frequency modulation (FM) incorporating traditional simplex transmission protocol. This device uses removable antennas that are capable of transmitting within their respective ranges in the 403-470MHz bands. The nominal output power is 4 watts with maximum output powers of 4.8 watts as defined by the upper limit of the production line final test station. The intended operating positions are “at the face” with the DUT 1 to 2 inches from the mouth, and “at the body” by means of the offered body-worn accessories. Body-worn audio and PTT 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.

FCC ID: AZ489FT4876 is offered with the options and accessories listed on the coversheet of this report as well as the audio accessories listed below:

Audio Acc.:

RMN5058A	Core Lightweight Headset w/PTT & VOX
RLN5879A	Core 1 Wire Surveillance Receive Only - beige
RLN5878A	Core 1 Wire Surveillance Receive Only - black
RLN5881A	Smart 2 Wire Surveillance - beige
RLN5880A	Smart 2 Wire Surveillance - black
RLN5882A	Smart 2 Wire w/ acoustic tube Black
RLN5883A	Smart 2 Wire w/ acoustic tube Beige
RLN6286A	1 Wire w/ acoustic tube Black
RLN6287A	1 Wire w/ acoustic tube Beige
RLN4885B	Receive Only Ear Bud
RLN4941A	Receive Only Earpiece w/translucent tube and ear tip-OTTO
WADN4190B	Over the Ear Receiver for RSM
RLN4295A	Small clip epaulet strap
PMMN4024A	Core RSM
PMMN4025A	Smart RSM

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 4.6 build 23 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)	80x30x20x0.2	68.58x20.32	Wood	< 0.05

4.2.2 SAM Phantom

Phantom Type	Material Parameters	Material Thickness (mm)	Support structure material	Loss Tangent (wood)
NA	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	450	
	Head	Body
Sugar	56.0	46.5
DGBE (Glycol)	NA	NA
Diacetin	NA	NA
De ionized -Water	39.1	50.53
Salt	3.8	1.87
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 (HP)	E4419B	MY40330364	1/31/2007
Power Meter (HP)	E4418B	GB40206480	11/30/2006
Power Meter (HP)	E4418B	US39251152	3/29/2007
Power Meter (HP)	437B	3737U26425	11/30/2006
Power Meter (HP)	437B	3125U21972	11/30/2006
Power Sensor (HP)	8482B	3318AO7546	10/6/2006
Power Sensor (HP)	8482B	3318AO7548	12/9/2006
Power Sensor (HP)	8482B	3318A07393	3/27/2007
Power Sensor (HP)	8481H	2703A14631	4/17/2007
Power Sensor (HP)	8481H	2703A09635	5/26/2007
Power Sensor (HP)	8482H	1926AO1906	12/12/2006
Bi-Directional Coupler (NARDA)	3020A	40296	11/17/2007
Signal Generator (HP)	E4438C	MY42082269	1/31/2007
AMP (Amplifier Research)	1W1000	16625	CNR
AMP (Amplifier Research)	10W1000	5924	CNR
Tissue Station			
Network Analyzer (HP)	8753D	3410A09135	2/22/2007
Dielectric Probe Kit (HP)	85070C	US99360076	CNR
Dipole			
Speag Dipole	D450V2	1001	5/22/2006
Speag Dipole	D450V2	1002	4/25/2008

6.0 SAR Measurement System Verification

The SAR measurements were conducted with probe model/serial number ET3DV6/SN11547. 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 Agilent (HP) probe kit model 85070C and a HP8753D Network Analyzer.

Actual versus Target tissue parameters (04/28/06-05/05/06)

FCC Body				
Frequency (MHz)	Di-electric Constant Target	Di-electric Constant Meas. (Range)	Conductivity Target S/m	Conductivity Meas. (Range) S/m
436.5	56.8	55.1-56.0	0.94	0.90-0.92
450	56.7	54.8-55.8	0.94	0.90-0.93

IEEE Head				
Frequency (MHz)	Di-electric Constant Target	Di-electric Constant Meas. (Range)	Conductivity Target S/m	Conductivity Meas. (Range) S/m
436.5	43.7	44.4-44.8	0.87	0.84-0.85
450	43.5	44.1-44.5	0.87	0.85-0.86

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)
1547	FCC Body	10/25/05	SPEAG D450V2 /1001	4.96 +/- 0.085	4.96 +/- 10%	4/28/06, 4/29/06 4/30/06 (3 test days)
1547	FCC Body	10/25/05	SPEAG D450V2 /1002	5.03 +/- 0.080	5.07 +/- 10%	5/4/06, 5/5/06 (2 test days)
1547	IEEE Head	10/25/05	SPEAG D450V2 /1002	5.47 +/- 0.005	5.48 +/- 10%	5/2/06, 5/3/06 (2 test days)

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, 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 and section 3.0 of this report were considered in order to develop the SAR test plan for this product. SAR measurements were performed using a flat phantom with the applicable simulated tissue to assess performance at the body, and face respectively using the relevant transmission mode(s).
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 Body [Pages 11-12 of 72; Table 1]

- Assessment of each offered antenna at their respective center frequencies per band.
- Assessment of each offered battery accessories with the worst case antenna from above.
- 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.
- Assessment at 2.5cm separation distance with the applicable worst case configuration overall from above.

Assessments at the Face [Pages 12-13 of 72; Table 2]

- Assessment of each offered antenna at their respective center frequencies per band.
- Assessment of each offered battery accessories with the worst case antenna from above.
- Assessment of the applicable 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.

Shortened scan assessment at the Body [APPENDIX E]

- 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 back housing separated 2.5cm from the phantom.

7.2.2 Head

NA

7.2.3 Face

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

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 +/ - 2^{o}C of the temperature at which the dielectric properties were determined. The liquid depth within the phantom used for measurements was 15cm +/- 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 ˚C	Range: 21.8-22.6˚C Avg. 22.2˚C
Relative Humidity	30 - 70 %	Range: 44.3-49.4% Avg. 47.0%
Tissue Temperature	NA	Range: 20.1-22.6˚C Avg. 21.56 ˚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 were then assessed using the full DASY4™ coarse and 7x7x7 cube methodology, and they are presented as bolded results. 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

Run Number, SN	Antenna	Test Freq. (MHz)	Battery	Test position	Carry Access.	Cable Access.	Init Pwr (W)	SAR Drift (dB)	Meas 1g SAR (mW/g)	Meas 10g SAR (mW/g)	Max Cal 1g SAR (mW/g)	Max Cal 10g SAR (mW/g)
Assessment at the body												
Assessment of offered antennas												
MeC-Ab-060428-09,037T000015	PMAE4022A	436.5	PMNN4065A	Against phantom	PMLN4651A belt clip	RMN5058A headset	5.10	-0.491	8.28	6.05	**4.64**	3.39
MeC-AB-060429-03,037T000015	PMAE4021A	418.0	PMNN4065A	Against phantom	PMLN4651A belt clip	RMN5058A headset	5.20	-0.770	5.51	4.00	3.29	2.39
MeC-AB-060429-04,037T000015	PMAE4023A	450.0	PMNN4065A	Against phantom	PMLN4651A belt clip	RMN5058A headset	5.17	-0.913	3.28	2.36	2.02	1.46
MeC-AB-060429-05,037T000015	PMAE4018A	418.0	PMNN4065A	Against phantom	PMLN4651A belt clip	RMN5058A headset	5.15	-0.514	7.67	5.61	4.32	3.16
MeC-AB-060429-06,037T000015	PMAE4024A	450.0	PMNN4065A	Against phantom	PMLN4651A belt clip	RMN5058A headset	5.21	-0.355	7.39	5.38	4.01	2.92
Assessment of offered batteries												
JsT-Ab-060504-04,037T000015	PMAE4022A	436.5	PMNN4066A	Against phantom	PMLN4651A belt clip	RMN5058A headset	4.91	-0.436	7.69	5.59	4.25	3.09
JsT-Ab-060504-05,037T000015	PMAE4022A	436.5	PMNN4069A	Against phantom	PMLN4651A belt clip	RMN5058A headset	4.45	-0.477	6.58	4.80	3.96	2.89
Assessment of offered body-worn accessories												
CM-Ab-060504-06,037T000015	PMAE4022A	436.5	PMNN4065A	Against phantom	PMLN4652A belt clip	RMN5058A headset	4.85	-0.379	8.13	5.94	4.44	3.24
CM-Ab-060504-07,037T000015	PMAE4022A	436.5	PMNN4065A	Against phantom	RLN4570A chest pack	RMN5058A headset	4.90	-0.343	9.03	6.63	4.89	3.59
CM-Ab-060504-08,037T000015	PMAE4022A	436.5	PMNN4065A	Against phantom	RLN4815A universal radio	RMN5058A headset	4.82	-0.568	5.68	4.20	3.24	2.39
JsT-Ab-060505-02,037T000015	PMAE4022A	436.5	PMNN4065A	Against phantom	HLN6602A Chest pack	RMN5058A headset	5.03	-0.354	9.24	6.78	**5.01**	3.68
Assessment of offered audio accessories												
CM-Ab-060504-10,037T000015	PMAE4022A	436.5	PMNN4065A	Against phantom	HLN6602A Chest pack	RLN5880A ear piece	4.98	-0.306	8.15	5.99	4.37	3.21
CM-Ab-060504-11,037T000015	PMAE4022A	436.5	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4024A	5.02	-0.305	8.66	6.38	4.65	3.42
CM-Ab-060430-08,037T000015	PMAE4022A	436.5	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.10	-0.562	9.81	7.18	**5.58**	4.09
CM-Ab-060504-12,037T000015	PMAE4022A	436.5	PMNN4065A	Against phantom	HLN6602A Chest pack	RLN5881A	5.00	-0.423	7.73	5.67	4.26	3.13
Assessment across frequency of each antenna												
CM-Ab-060430-07,037T000015	PMAE4022A	403.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	4.91	-0.378	10.40	7.33	5.67	4.00
CM-Ab-060430-09,037T000015	PMAE4022A	470.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.10	-0.707	5.77	4.22	3.40	2.48
CM-Ab-060430-10,037T000015	PMAE4021A	403.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.00	-0.572	7.54	5.54	4.30	3.16
CM-Ab-060430-11,037T000015	PMAE4021A	418.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.10	-0.782	8.45	6.19	5.06	3.71
CM-Ab-060430-12,037T000015	PMAE4021A	433.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.11	-0.680	4.33	3.18	2.53	1.86
CM-Ab-060430-13,037T000015	PMAE4023A	430.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.14	-0.603	8.03	5.88	4.61	3.38
CM-Ab-060430-14,037T000015	PMAE4023A	450.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.15	-1.000	4.90	3.59	3.08	2.26

Table 1 Continued

Run Number, SN	Antenna	Test Freq.	Battery	Test position	Carry Access.	Cable Access.	Init Pwr	SAR Drift	Meas 1g SAR	Meas 10g	Max Cal 1g	Max Cal 10g
Assessment at the body												
CM-Ab-060430-15,037T000015	PMAE4023A	470.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.11	-1.120	3.36	2.46	2.17	1.59
MeC-AB-060430-16,037T000015	PMAE4018A	403.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.05	-0.456	9.48	6.99	5.26	3.88
CM-Ab-060430-05,037T000015	PMAE4018A	418.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.18	-0.547	11.30	8.35	**6.41**	4.74
MeC-AB-060430-17,037T000015	PMAE4018A	433.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.05	-0.458	10.10	7.40	5.61	4.11
*MeC-AB-060430-18,037T000015	PMAE4024A	430.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.11	-0.512	11.00	8.09	6.19	4.55
MeC-AB-060430-19,037T000015	PMAE4024A	450.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.13	-0.440	8.67	6.36	4.80	3.52
MeC-AB-060430-20,037T000015	PMAE4024A	470.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.10	-0.665	6.86	5.03	4.00	2.93
Assessment at 2.5cm												
MeC-AB-060430-21,037T000015	PMAE4018A	418.0	PMNN4065A	Against phantom	ant. @ 2.5cm	PMMN4025A	5.12	-0.547	9.39	6.91	5.33	3.92
MeC-AB-060430-22,037T000015	PMAE4018A	418.0	PMNN4065A	Against phantom	radio back @ 2.5cm	PMMN4025A	5.08	-0.476	5.00	3.71	2.79	2.07
MeC-AB-060430-23,037T000015	PMAE4018A	418.0	PMNN4065A	Against phantom	radio front @ 2.5cm	PMMN4025A	5.14	-0.608	5.23	3.86	3.01	2.22
*** Assessment with the worst case test configuration above using the full DASY 4 coarse and 7x7x7 cube scan measurements.**												
CM-Ab-060503-13,037T000014	PMAE4024A	430.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	5.03	-0.744	11.00	7.89	6.53	4.68
*** Assessment with the worst case test configuration above using the DASY 4 shorten scan (5x5x7 cube scan) measurements.**												
CM-Ab-060503-14,037T000014	PMAE4024A	430.0	PMNN4065A	Against phantom	HLN6602A Chest pack	PMMN4025A	4.99	-0.571	11.60	8.28	**6.61**	4.72

* Note – A second radio (SN 037T000014) was tested after the completion of radio SN 037T000015 using a selected set of highest configurations above. SN 037T000014 was then tested using a full scan and a shorten scan. The highest SAR result at the abdomen is reported above.

Table 2

Run Number, SN	Antenna	Test Freq. (MHz)	Battery	Test position	Carry Access.	Cable Access.	Init Pwr (W)	SAR Drift (dB)	Meas 1g SAR (mW/g)	Meas 10g SAR (mW/g)	Max Cal 1g SAR (mW/g)	Max Cal 10g SAR (mW/g)
Assessment at the face												
Assessment of offered antennas												
CM-Face-060502-04,037T000015	PMAE4021A	418.0	PMNN4065A	DUT front 2.5cm	none	none	5.15	-0.682	6.38	4.73	3.73	2.77
CM-Face-060502-05,037T000015	PMAE4023A	450.0	PMNN4065A	DUT front 2.5cm	none	none	5.03	-1.13	4.57	3.37	2.96	2.19
CM-Face-060502-06,037T000015	PMAE4018A	418.0	PMNN4065A	DUT front 2.5cm	none	none	5.11	-0.468	7.41	5.48	4.13	3.05
CM-Face-060502-07,037T000015	PMAE4024A	450.0	PMNN4065A	DUT front 2.5cm	none	none	5.00	-0.606	7.22	5.34	4.15	3.07
CM-Face-060502-08,037T000015	PMAE4022A	436.5	PMNN4065A	DUT front 2.5cm	none	none	5.09	-0.599	7.52	5.56	**4.32**	3.19

Table 2 Continued

Run Number, SN	Antenna	Test Freq. (MHz)	Battery	Test position	Carry Access.	Cable Access.	Init Pwr (W)	SAR Drift (dB)	Meas 1g SAR (mW/g)	Meas 10g SAR (mW/g)	Max Cal 1g SAR (mW/g)	Max Cal 10g SAR (mW/g)
Assessment at the face												
Assessment of offered batteries												
CM-Face-060502-09,037T000015	PMAE4022A	436.5	PMNN4066A	DUT front 2.5cm	none	none	4.85	-0.420	7.61	5.62	4.19	3.10
CM-Face-060502-10,037T000015	PMAE4022A	436.5	PMNN4069A	DUT front 2.5cm	none	none	4.50	-0.459	7.27	5.37	4.31	3.18
Assessment of offered audio accessories												
CM-Face-060502-11,037T000015	PMAE4022A	436.5	PMNN4065A	DUT front 2.5cm	none	RLN5878A ear piece	5.05	-0.498	4.59	3.40	2.57	1.91
Assessment across frequency of each antenna												
CM-Face-060502-12,037T000015	PMAE4022A	403.0	PMNN4065A	DUT front 2.5cm	none	none	5.05	-0.386	5.38	3.99	2.94	2.18
CM-Face-060502-13,037T000015	PMAE4022A	470.0	PMNN4065A	DUT front 2.5cm	none	none	4.70	-0.647	4.23	3.12	2.51	1.85
CM-Face-060502-14,037T000015	PMAE4021A	403.0	PMNN4065A	DUT front 2.5cm	none	none	4.90	-0.436	5.40	3.99	2.99	2.21
CM-Face-060502-15,037T000015	PMAE4021A	433.0	PMNN4065A	DUT front 2.5cm	none	none	5.00	-0.931	4.30	3.18	2.66	1.97
CM-Face-060502-16,037T000015	PMAE4023A	430.0	PMNN4065A	DUT front 2.5cm	none	none	4.80	-0.837	4.86	3.61	2.95	2.19
CM-Face-060502-17,037T000015	PMAE4023A	470.0	PMNN4065A	DUT front 2.5cm	none	none	4.75	-0.914	1.27	0.942	0.79	0.59
CM-Face-060502-18,037T000015	PMAE4018A	403.0	PMNN4065A	DUT front 2.5cm	none	none	5.07	-0.409	6.15	4.57	3.38	2.51
*CM-Face-060502-19,037T000015	PMAE4018A	433.0	PMNN4065A	DUT front 2.5cm	none	none	5.09	-0.524	8.44	6.27	**4.76**	3.54
CM-Face-060502-20,037T000015	PMAE4024A	430.0	PMNN4065A	DUT front 2.5cm	none	none	4.90	-0.520	7.52	5.55	4.24	3.13
CM-Face-060502-21,037T000015	PMAE4024A	470.0	PMNN4065A	DUT front 2.5cm	none	none	5.09	-0.686	5.25	3.88	3.07	2.27
*** Assessment with the worst case test configuration above using the full DASY 4 coarse and 7x7x7 cube scan measurements.**												
JsT-Face-060503-02,037T000015	PMAE4018A	433.0	PMNN4065A	DUT front 2.5cm	none	none	5.02	-0.834	7.96	5.77	**4.82**	3.50
*** Assessment with the worst case test configuration above using the DASY 4 shorten scan (5x5x7 cube scan) measurements.**												
JsT-Face-060503-03,037T000015	PMAE4018A	433.0	PMNN4065A	DUT front 2.5cm	none	none	5.04	-0.0815	8.92	6.53	4.54	3.33

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 gram averaged peak 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: AZ489FT4876 models AAH55QDH9LA1AN.

At the Body: **1-g Avg. = 6.61W/kg; 10-g Avg. = 4.72W/kg**
At the Face: **1-g Avg. = 4.82W/kg; 10-g Avg. = 3.50W/kg**

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

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	IEEE 1528 section	**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	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	

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

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	**IEEE 1528 section**	**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	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	

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Appendix B
Probe Calibration Certificates

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

SWISS CALIBRATION

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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: **ET3-1547_Oct05**

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1547
Calibration procedure(s)	QA CAL-01.v5 and QA CAL-12.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	October 25, 2005
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	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
DAE4	SN: 654	29-Nov-04 (SPEAG, No. DAE4-654_Nov04)	Nov-05

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 25, 2005

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

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

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,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., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) 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
b) 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:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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*.
- *DCPx,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 ≤ 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 *NORMx,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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DASY - Parameters of Probe: ET3DV6 SN:1547

Sensitivity in Free Space[A]

NormX	**1.41** ± 10.1%	μV/(V/m)^2
NormY	**1.30** ± 10.1%	μV/(V/m)^2
NormZ	**1.27** ± 10.1%	μV/(V/m)^2

Diode Compression[B]

DCP X	**88** mV
DCP Y	**88** mV
DCP Z	**88** 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	8.8	4.4
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

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	13.2	8.9
SAR_{be} [%]	With Correction Algorithm	0.9	0.1

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 E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

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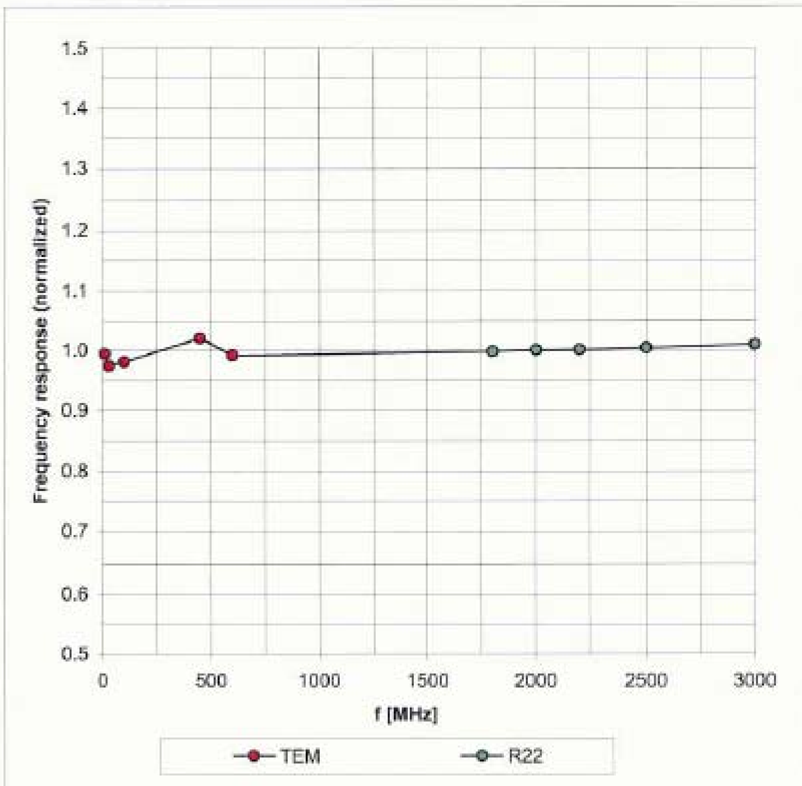
Frequency Response of E-Field

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



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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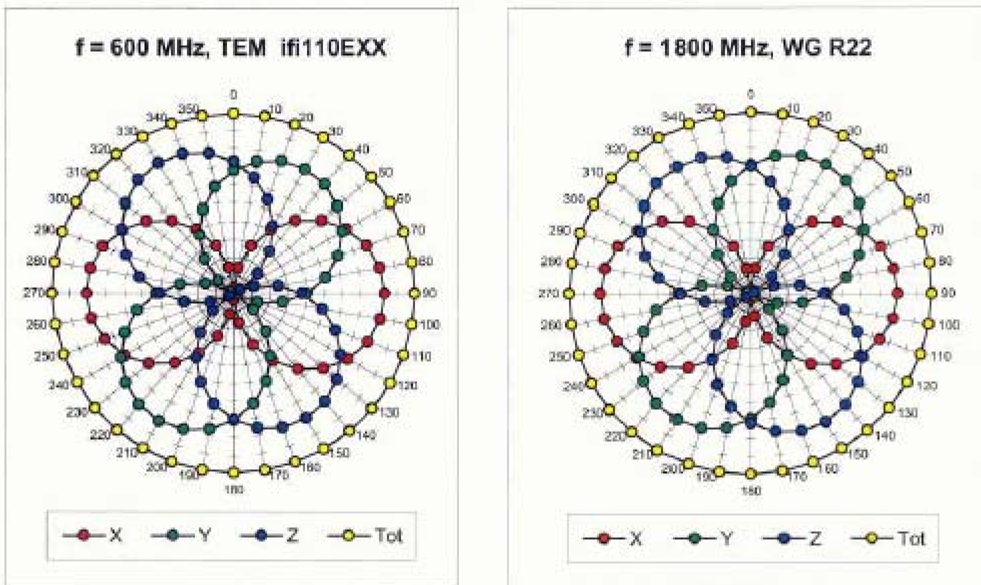
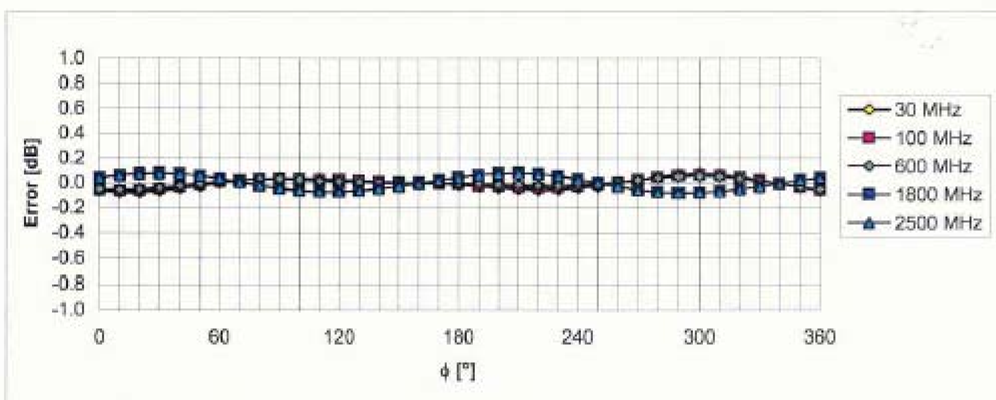
Receiving Pattern (φ), ϑ = 0°





Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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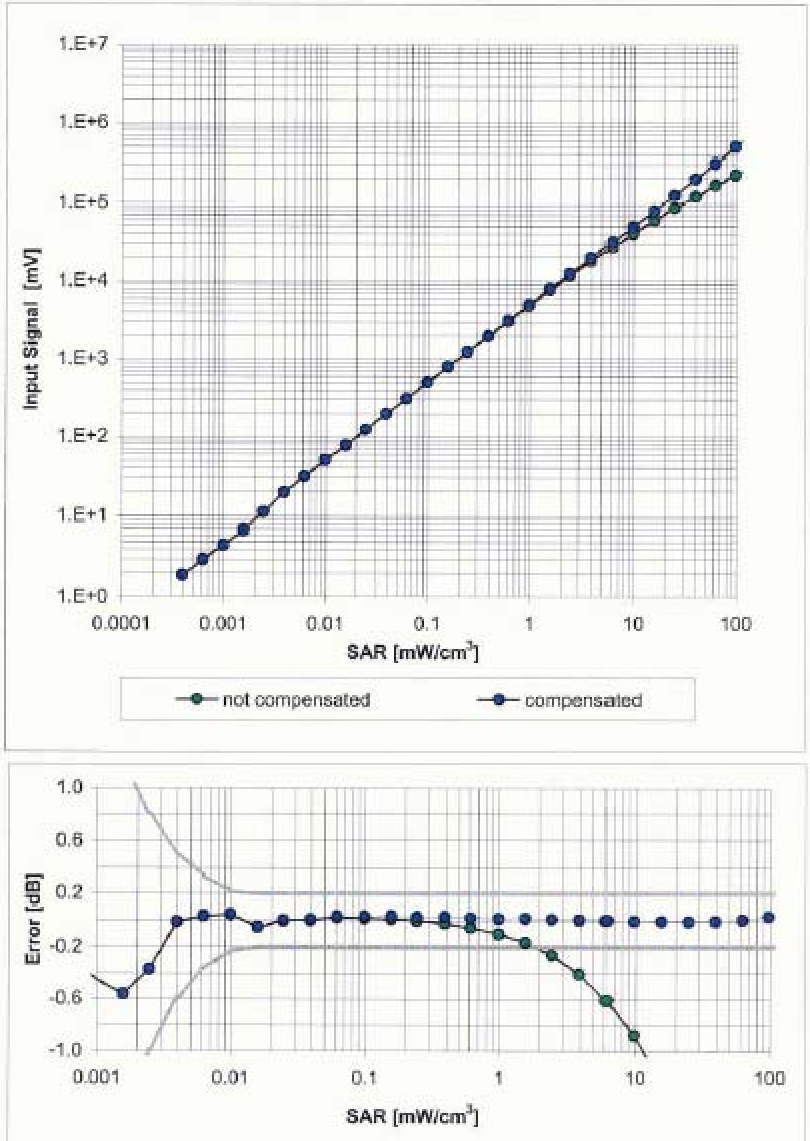
Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)



Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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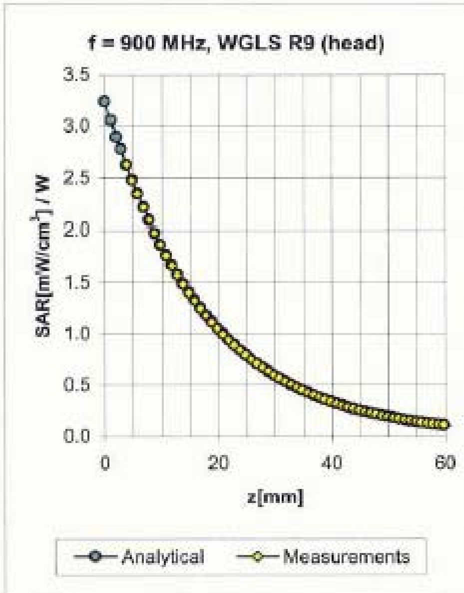
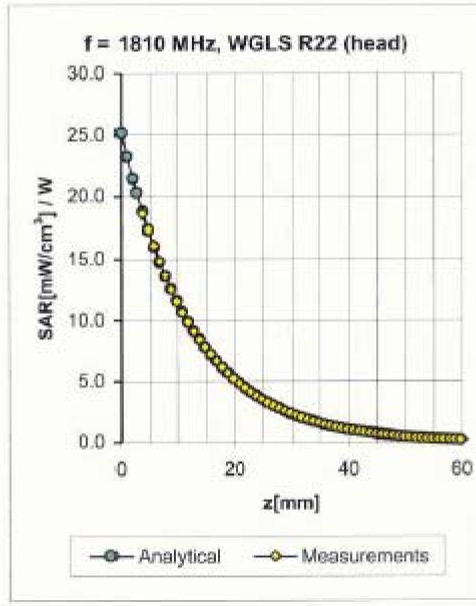
Conversion Factor Assessment





f [MHz]	Validity [MHz][c]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty	
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.03	2.20	6.54	± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.66	1.76	5.92	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.64	2.27	4.87	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.73	2.16	4.22	± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.04	2.30	6.91	± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.55	1.98	5.82	± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.60	2.66	4.36	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.86	1.76	4.15	± 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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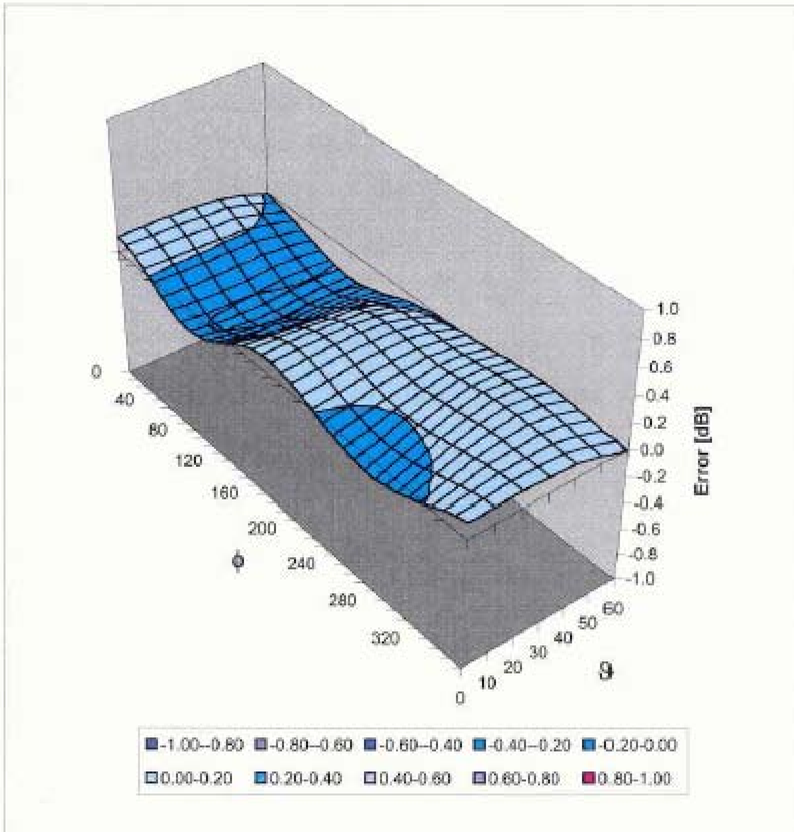
Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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s p e a g

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Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1547**
Place of Assessment:	**Zurich**
Date of Assessment:	**October 27, 2005**
Probe Calibration Date:	**October 25, 2005**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ET3DV6 SN:1547

Conversion factor (± standard deviation)

150 MHz	*ConvF*	**8.0 ± 10%**	ε_r = 52.3 σ = 0.76 mho/m (head tissue)
250 MHz	*ConvF*	**7.3 ± 10%**	ε_r = 47.6 σ = 0.83 mho/m (head tissue)
300 MHz	*ConvF*	**7.2 ± 9%**	ε_r = 45.3 σ = 0.87 mho/m (head tissue)
750 MHz	*ConvF*	**6.2 ± 7%**	ε_r = 41.9 σ = 0.89 mho/m (head tissue)
150 MHz	*ConvF*	**7.8 ± 10%**	ε_r = 61.9 σ = 0.80 mho/m (body tissue)
250 MHz	*ConvF*	**7.4 ± 10%**	ε_r = 59.4 σ = 0.88 mho/m (body tissue)
300 MHz	*ConvF*	**7.2 ± 9%**	ε_r = 58.2 σ = 0.92 mho/m (body tissue)
750 MHz	*ConvF*	**6.0 ± 7%**	ε_r = 55.5 σ = 0.96 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.

Appendix C
Dipole Calibration Certificates

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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: **D450V2-1002_Apr06**

CALIBRATION CERTIFICATE

Object	D450V2 - SN: 1002
Calibration procedure(s)	QA CAL-15.v4 Calibration Procedure for dipole validation kits below 800 MHz
Calibration date:	April 25, 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 Probe ET3DV6	SN 1507	11-Jul-05 (SPEAG, No. ET3-1507_Jul05)	Jul-06
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

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: April 25, 2006

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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**

Glossary:

TSL	tissue simulating liquid
ConF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) 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
b) 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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Flat Phantom V4.4	Shell thickness: 6 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	43.5	0.87 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	43.6 ± 6 %	0.86 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	398 mW input power	1.99 mW / g
SAR normalized	normalized to 1W	5.00 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**5.03 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	398 mW input power	1.35 mW / g
SAR normalized	normalized to 1W	3.39 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**3.40 mW / g ± 17.6 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.6 Ω - 6.2 jΩ
Return Loss	- 22.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.350 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 22, 2002

DASY4 Validation Report for Head TSL

Date/Time: 25.04.2006 16:14:14

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 450 MHz; Type: D450V2; Serial: D450V2 - SN:1002

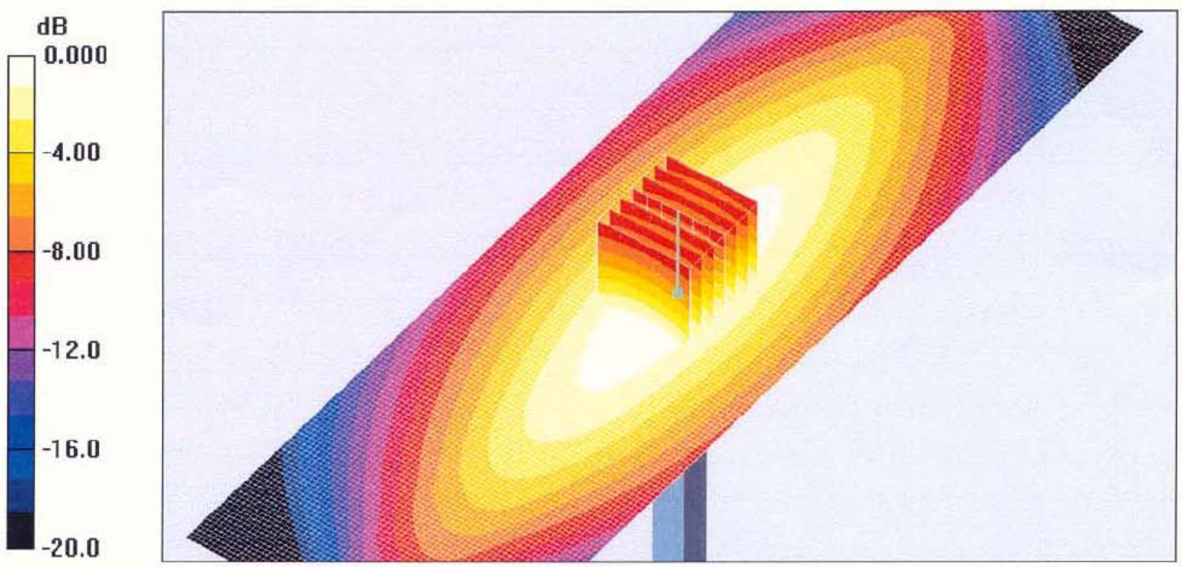
Communication System: CW; Frequency: 450 MHz; Duty Cycle: 1:1
Medium: HSL450;
Medium parameters used: f = 450 MHz; σ = 0.86 mho/m; ε_r = 43.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (LF); ConvF (6.59, 6.59, 6.59); Calibrated: 11.07.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.4; Type: Flat Phantom 4.4
- Measurement SW: DASY4, V4.7 Build 21; Postprocessing SW: SEMCAD, V1.8 Build 165

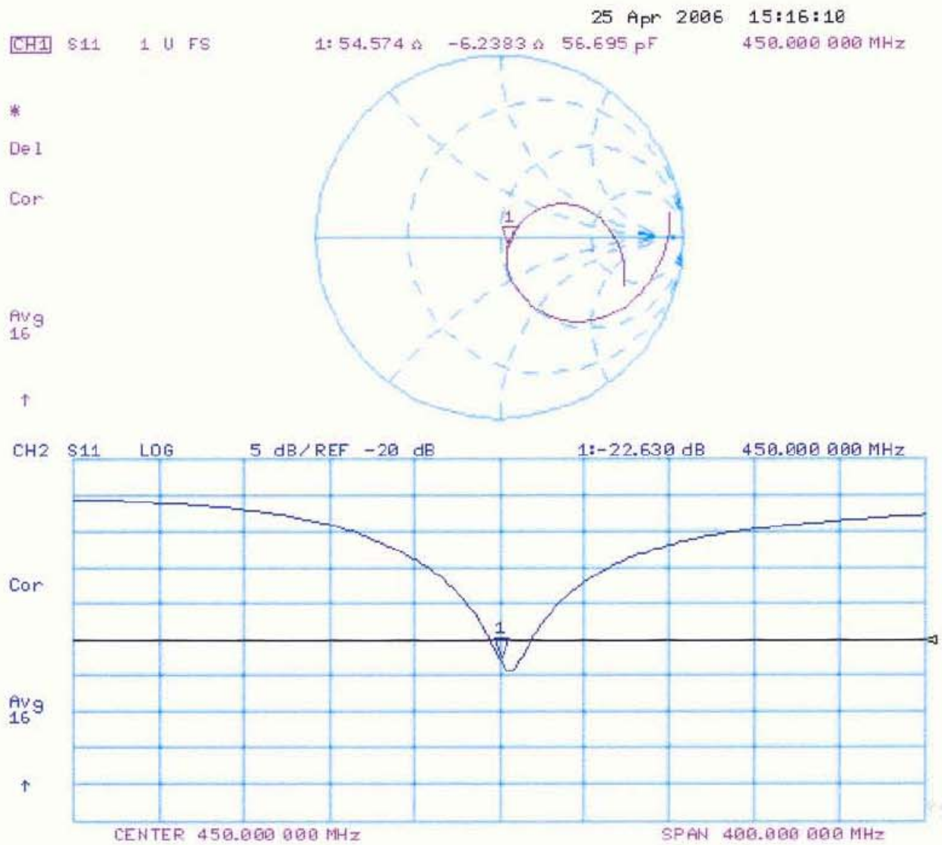
d=15mm, Pin=398mW/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.12 mW/g

d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=dy=5mm, dy=5mm
Reference Value = 52.6 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 2.86 W/kg
SAR(1 g) = 1.99 mW/g; SAR(10 g) = 1.35 mW/g
Maximum value of SAR (measured) = 2.15 mW/g



0 dB = 2.15mW/g

Impedance Measurement Plot for Head TSL



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

Client Motorola CGISS

CALIBRATION CERTIFICATE

Object(s)	D450V2 - SN:1001
Calibration procedure(s)	QA CAL-15.v2 Calibration procedure for dipole validation kits below 800 MHz
Calibration date:	May 22, 2004
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibrationprocedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E4419B	GB41293874	5-May-04 (METAS, No 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No 251-00388)	May-05
Reference 20 dB Attenuator	SN: 5086 (20b)	3-May-04 (METAS, No 251-00389)	May-05
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-03)	In house check: Oct 05

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Laboratory Director	Pokovic Katja
Approved by:	Fin Bomholt	R&D Director	F. Bomholt

Date issued: May 24, 2004

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

880-KP0301061-A

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Schmid & Partner Engineering AG

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s p e a g

DASY

Dipole Validation Kit

Type: D450V2

Serial: 1001

Manufactured: March 22, 2002
Calibrated: May 22, 2004

May 04

D450V2- SN:1001

1. Measurement Conditions

The measurements were performed in the 6mm thick flat phantom filled with **head** simulating liquid of the following electrical parameters at 450 MHz:

Relative Dielectricity	**45.1**	± 5%
Conductivity	**0.85 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.45 at 450 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center of the flat phantom and the dipole was oriented parallel to the longer side of the phantom. The standard measuring distance was 15mm from dipole center to the liquid surface including the 6mm thick phantom shell. The included distance spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.

The dipole input power (forward power) was 398 mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement with DASY System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	**5.28 mW/g** ± 20.7 % (k=2)[1]
averaged over 10 cm^3 (10 g) of tissue:	**3.52 mW/g** ± 20.2 % (k=2)[1]

D450V2- SN:1001

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.346 ns**	(one direction)
Transmission factor:	**0.991**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance spacer was in place during impedance measurements.

Feedpoint impedance at 450 MHz:	Re{Z} = **53.0 Ω**
	Im {Z} = **-11.1 Ω**
Return Loss at 450 MHz	**-19.2 dB**

4. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

5. Design

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

6. Power Test

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Test Laboratory: SPEAG, Zurich, Switzerland
DUT: Dipole 450 MHz; Serial: D450V2 - SN:1001

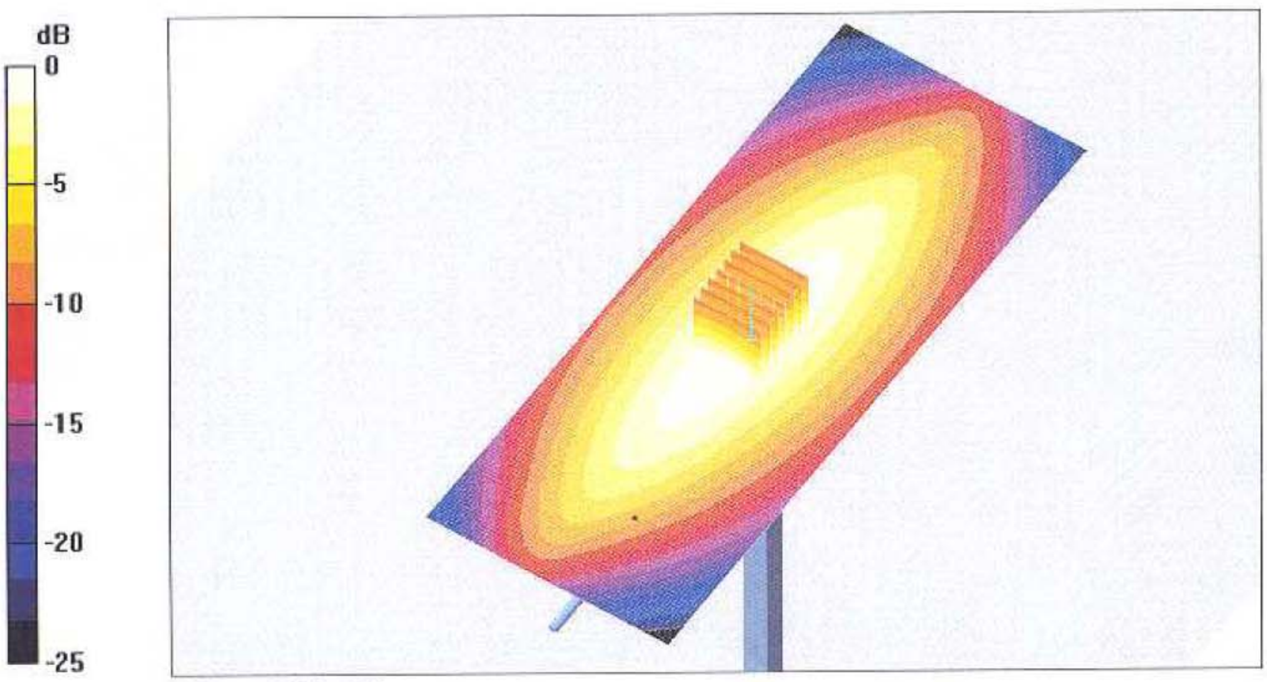
Communication System: CW;Duty Cycle: 1:1; Medium: HSL450
Medium parameters used: f = 450 MHz; $\sigma = 0.85$ mho/m; $\varepsilon_r = 45.1$; $\rho = 1000$ kg/m^3
Phantom: Flat Phantom 4.4; Phantom section: Flat Section

DASY4 Configuration:

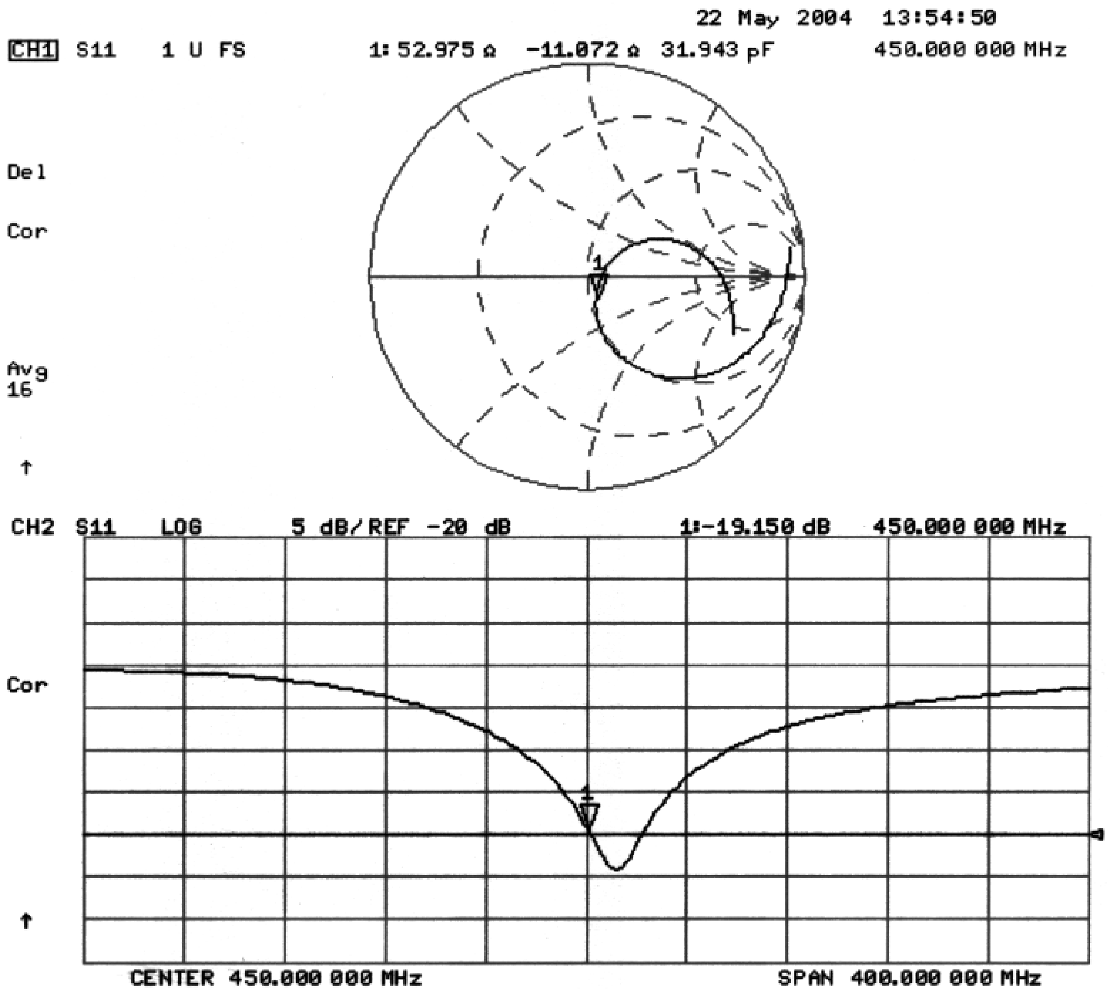
- Probe: ET3DV6 - SN1507; ConvF(6.45, 6.45, 6.45);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 600; Calibrated: 9/30/2003
- Measurement SW: DASY4, V4.2 Build 44;

d=15mm, Pin=398mW/Area Scan (71x181x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 52.5 V/m; Power Drift = -0.0 dB
Maximum value of SAR (interpolated) = 2.21 mW/g

d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.5 V/m; Power Drift = -0.0 dB
Maximum value of SAR (measured) = 2.25 mW/g
Peak SAR (extrapolated) = 3.18 W/kg
SAR(1 g) = 2.1 mW/g; SAR(10 g) = 1.4 mW/g



0 dB = 2.25mW/g


22 May 2004 13:54:50
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Del
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Cor
CENTER 450.000 000 MHz
SPAN 400.000 000 MHz