MOTOROLA

ACCREDITED

TESTING CERT # 2518.01

FCC ID: AZ489FT4881
DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Government & Public Safety
EME Test Laboratory
8000 West Sunrise Blvd
Fort Lauderdale, FL 33322

Date of Report: 3/27/08
Report Revision: O
Report ID: XTS4000 Covert PCII _Rev O_080327_SR6203

Responsible Engineer:	Michael Sailsman (SR. Staff EME Engineer)
Date/s Tested:	2/19/08, 3/19/08-3/20/08
Manufacturer/Location:	Motorola/Penang
Sector/Group/Div.:	GTDG
Date submitted for test:	2/27/08
DUT Description:	Covert UHF1 380-470 MHz 1-2.3 Watt radio
Test TX mode(s):	CW
Max. Power output:	2.8 W
Nominal Power:	2.3 W
Tx Frequency Bands:	380-470MHz
Signaling type:	FM, APCO 25
Model(s) Tested:	H18QCN9PW9AN/NUE3623A
Model(s) Certified:	H18QCN9PW9AN/NUE3623A
Serial Number(s):	654CJD0000
Classification:	Occupational/Controlled
Rule Part(s):	90

Antenna(s):
NAE6552A (380-470MHz retractable ¼ wave antenna, -4dBi)
Battery(ies):
PMNN4083A (HiCAP Li-Ion battery 1260mAh)
Body worn accessory(ies):
NA
Audio/Data cable accessory(ies):
NNTN5006BP (Headset Earbud w/ PTT)

Max. Calc. : 1-g Avg. SAR: 2.03 W/kg (Body); 10-g Avg. SAR: 1.47 W/kg (Body)
Max. Calc. : 1-g Avg. SAR: 1.37 W/kg (Face); 10-g Avg. SAR: 1.01 W/kg (Face)
Max. Calc. : 1-g Avg. SAR: 6.01 W/kg (Head); 10-g Avg. SAR: 3.32 W/kg (Head)

Signature on file
Deanna Zakharia G&PS EME Lab Senior Resource Manager, Laboratory Director,

Approval Date: 3/27/08

Certification Date: 3/27/08

Certification No.: 080309AD

Part 1 of 2

Report Revision History

Date	Revision	Comments
3/27/08	O	PCII 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 G&PS EME Test Lab for FCC ID: AZ489FT4881. The results herein reflect PCII results with the new battery model PMNN4083A.

The highest SAR levels clearly demonstrate compliance to ICNIRP (1998) Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300GHz) RF Exposure limits of 10.0 W/kg averaged over 10grams of contiguous tissue. The results also adhere to the 8.0 W/kg averaged over 1 gram of tissue as stipulated in ANSI C95.1-2005.

2.0 Referenced Standards and Guidelines

This product is designed to comply with the following applicable 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)

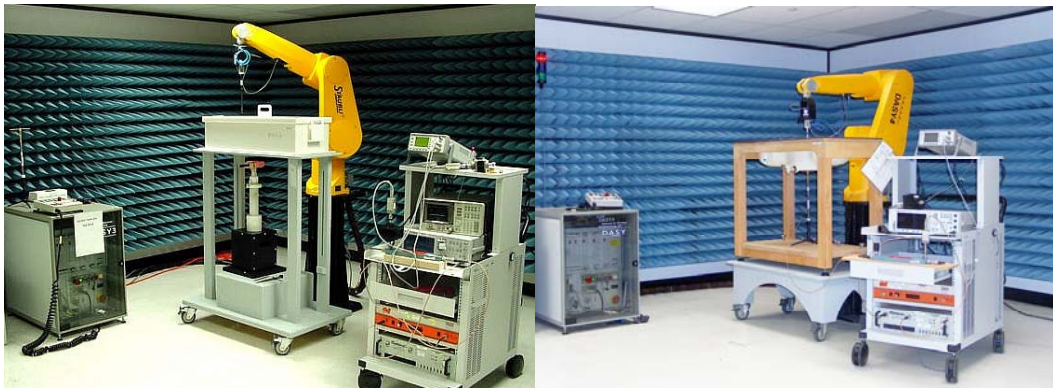
FCC ID: AZ489FT4881 is a UHF portable two-way radio disguised as a standard cellular phone that operates using APCO 25(C4FM) digital voice frequency modulation (FM) incorporating traditional simplex transmission protocol. This device uses a retractable antenna that is capable of transmitting in the 380-470MHz band. The nominal output power is 2.3 Watts with maximum output powers of 2.8 watts as defined by the upper limit of the production line final test station. This device uses PTT operation only “at the head”, “at the face” with the DUT at least 1 inch (2.5cm) from the mouth and “at the body” by means of the offered body-worn accessories. 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: AZ489FT4881 is being offered with the new battery accessory 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 55 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 Rectangular Phantom

Phantom ID	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 ID	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

4.2.3 Elliptical Phantom

Phantom ID	Material Parameters	Material Thickness (mm)	Support structure material	Loss Tangent (wood)
NA	300MHz -6GHz; Er = 4+/- 1, 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 similar type 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	450MHz	
	Head	Body
Sugar	56.0	46.5
Diacetin	NA	NA
De ionized -Water	39.1	50.53
Salt	3.8	1.87
HEC	1.0	1
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	4/25/2008
Power Meter (HP)	E4418B	US39251150	4/25/2008
Power Sensor (HP)	8482B	3318A06773	5/2/2008
Power Sensor (Agilent)	8482B	3318A07546	5/16/2008
Bi-Directional Coupler (NARDA)	3020A	40296	2/7/2010
AMP (Amplifier Research)	10W1000	5924	CNR
Signal Generator (HP)	E4421B	US39270649	8/16/2008
AMP (ComTech PST)	AR88258-10	M3Y6A00-1007	CNR
Tissue Station			
Agilent PNA-L Network Analyzer	N5230A	MY45001092	5/22/2008
Dielectric Probe Kit (HP)	85070C	US99360076	CNR
Dipole			
Speag Dipole	D450V2	1002	8/24/2008

6.0 SAR Measurement System Verification

The SAR measurements were conducted with probe model/serial number ET3DV6/SN1547. 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 G&PS 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 G&PS 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.

Target versus Actual tissue parameters (2/19/08 & 3/19/08-3/20/08)

FCC Body				
Frequency (MHz)	Di-electric Constant Target	Di-electric Constant Meas. (Range)	Conductivity Target S/m	Conductivity Meas. (Range) S/m
450	56.7	55.2-56.3	0.94	0.93-0.95
425	57.0	55.6-55.7	0.94	0.91-0.93

IEEE Head				
Frequency (MHz)	Di-electric Constant Target	Di-electric Constant Meas. (Range)	Conductivity Target S/m	Conductivity Meas. (Range) S/m
450	43.5	42.9-44.3	0.87	0.85-0.86
425	43.8	43.5-44.9	0.87	0.83-0.84

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 SAR @ 1W (mW/g)	Test Date(s)
1547	FCC Body	11/19/07	SPEAG D450V2/1002	4.52 +/- 0.00	4.40 +/- 10%	3/19/08
1547	IEEE/IEC Head	11/19/07	SPEAG D450V2/1002	4.53 +/- 0.07	4.78 +/- 10%	2/19/08 & 3/20/08 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 two-way device with APCO 25 FM transmission signaling operational at the head, face and body using the offered accessories. The device is placed in the test positions presented in Appendix G.

Test Plan

The new battery accessory model PMNN4083A listed on the cover page of this report was assessed using the worst case test configuration per body location previously reported for this device. 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 5x5x7 cube scans.

Assessments at the Body [Page 10 of 39; Table 1]

- Assessment across the band with battery model PMNN4083A using the worst case configuration at the body previously reported

Assessments at the Face [Page 11 of 39; Table 2]

- Assessment across the band with battery model PMNN4083A using the worst case configuration at the face previously reported

Assessments at the Head [Page 11 of 39; Table 3]

- Assessment across the band with battery model PMNN4083A using the worst case configuration at the head previously reported.

Shortened scan assessment [Page 11 of 39; Table 4]

- A "shortened" scan was performed using the 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 with its' back towards the phantom and antenna separated 2.5cm from the phantom.

7.2.2 Head

The DUT was position in cheek touch position

7.2.3 Face

The DUT was positioned with its' front side separated 2.5cm from the phantom with the flip 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 +/ - 2°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: 21.2-22.2˚C Avg. 21.9˚C
Relative Humidity	30 - 70 %	Range: 47.8-56.6% Avg. 52.66%
Tissue Temperature	NA	Range: 21.1-22.2˚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 SAR 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 per band (in bold with *). The worst case test configurations observed for each body location were assessed using the full DASY4™ coarse and 5x5x7 cube methodology and they are summarized in the worst case 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 Body 380-470MHz band; Test mode: CW (PTT: 50%DC)												
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 of new battery across the band												
***MeC-Ab-080219-07/654CJD0000**	NAE6552A (OUT)	380.0000	PMNN4083A	Back - antenna 2.5cm	None	NNTN5006BP	2.45	-0.324	2.94	2.16	1.81	1.33
HvH-Ab-080319-02/654CJD0000	NAE6552A (OUT)	425.0000	PMNN4083A	Back - antenna 2.5cm	None	NNTN5006BP	2.44	-0.275	1.14	0.83	0.70	0.51
HvH-Ab-080319-03/654CJD0000	NAE6552A (OUT)	470.0000	PMNN4083A	Back - antenna 2.5cm	None	NNTN5006BP	2.45	-0.461	1.080	0.785	0.69	0.50

Table 2

Assessments at the Head 380-470MHz band; Test mode: CW (PTT: 50%DC)												
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 of new battery across the band												
***JsT-Lear-080219-04/654CJD0000**	NAE6552A (IN)	380.0000	PMNN4083A	Touch	None	None	2.44	-0.187	7.56	5.22	4.53	3.13
HvH-Lear-080319-04/654CJD0000	NAE6552A (IN)	425.0000	PMNN4083A	Touch	None	None	2.44	-0.364	3.41	2.35	2.13	1.47
HvH-Lear-080319-05/654CJD0000	NAE6552A (IN)	470.0000	PMNN4083A	Touch	None	None	2.39	-0.560	2.64	1.85	1.76	1.23

Table 3

Assessments at the Face 380-470MHz band; Test mode: CW (PTT: 50%DC)												
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 of new battery across the band												
***MeC-Face-080219-06/654CJD0000**	NAE6552A (OUT)	380.0000	PMNN4083A	Flip closed	None	None	2.46	-0.298	2.28	1.70	1.39	1.04
HvH-Face-080319-06/654CJD0000	NAE6552A (OUT)	425.0000	PMNN4083A	Flip closed	None	None	2.45	-0.403	0.592	0.440	0.37	0.28
HvH-Face-080320-02/654CJD0000	NAE6552A (OUT)	470.0000	PMNN4083A	Flip closed	None	None	2.39	-0.495	0.507	0.376	0.33	0.25

Table 4

*Worst case configuration per body location from above (including shortened scan) –using the DASY 4 full coarse and 5x5x7 cube scan measurements.												
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)**
HvH-Lear-080320-04/654CJD0000	NAE6552A (IN)	380.0000	PMNN4083A	Touch	None	None	2.47	0.147	8.380	4.830	4.75	2.74
MeC-Ab-080219-11/654CJD0000	NAE6552A (OUT)	380.0000	PMNN4083A	Back - antenna 2.5cm	None	NNTN5006BP	2.44	-0.051	3.49	2.53	2.03	1.47
HvH-Face-080320-03/654CJD0000	NAE6552A (OUT)	380.0000	PMNN4083A	Flip closed	None	None	2.48	-0.298	2.260	1.670	1.37	1.01
HvH-Lear-080320-05/654CJD0000 (Shortened scan)	NAE6552A (IN)	380.0000	PMNN4083A	Touch	None	None	2.48	-0.278	9.98	5.51	6.01	3.32

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 5x5x7 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: AZ489FT4881.

Max. Calc. : 1-g Avg. SAR: 2.03 W/kg (Body); 10-g Avg. SAR: 1.47 W/kg (Body)
Max. Calc. : 1-g Avg. SAR: 6.01 W/kg (Head); 10-g Avg. SAR: 3.32 W/kg (head)
Max. Calc. : 1-g Avg. SAR: 1.37 W/kg (Face); 10-g Avg. SAR: 1.01 W/kg (Face)

The results herein replace the previous results reported for this FCC ID

These test results clearly demonstrate compliance with FCC Occupational/Controlled RF Exposure limits of **8.0 W/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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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) *ci* - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.
g) *ui* – SAR uncertainty
h) *vi* - 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
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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_Nov07**

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1547
Calibration procedure(s)	QA CAL-01.v6 and QA CAL-12.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	November 19, 2007
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	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

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

Issued: November 19, 2007

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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Accredited by the Swiss Accreditation Service (SAS)
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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

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.

ET3DV6 SN:1547 November 19, 2007

DASY - Parameters of Probe: ET3DV6 SN:1547

Sensitivity in Free Space[A] Diode Compression[B]

NormX	1.38 ± 10.1%	$\mu V/(V/m)^2$	DCP X	85 mV
NormY	1.32 ± 10.1%	$\mu V/(V/m)^2$	DCP Y	88 mV
NormZ	1.26 ± 10.1%	$\mu V/(V/m)^2$	DCP Z	86 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	6.5	3.3
SAR_{be} [%]	With Correction Algorithm	0.8	0.6

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	8.5
SAR_{be} [%]	With Correction Algorithm	0.5	0.4

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%.

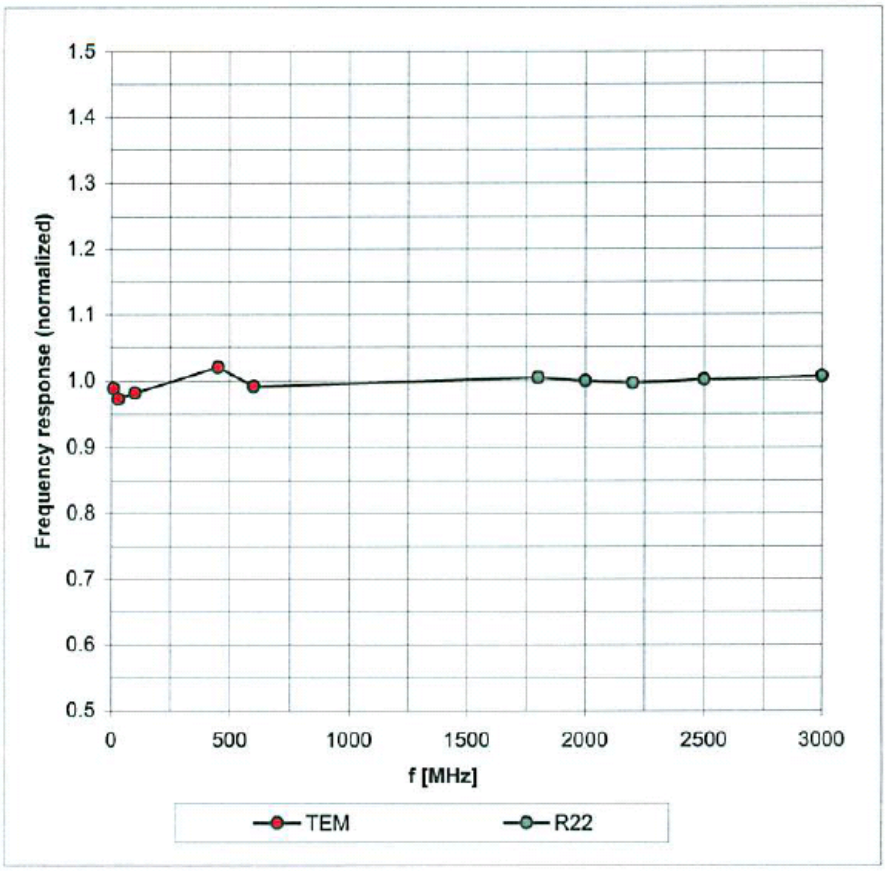
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1547 November 19, 2007

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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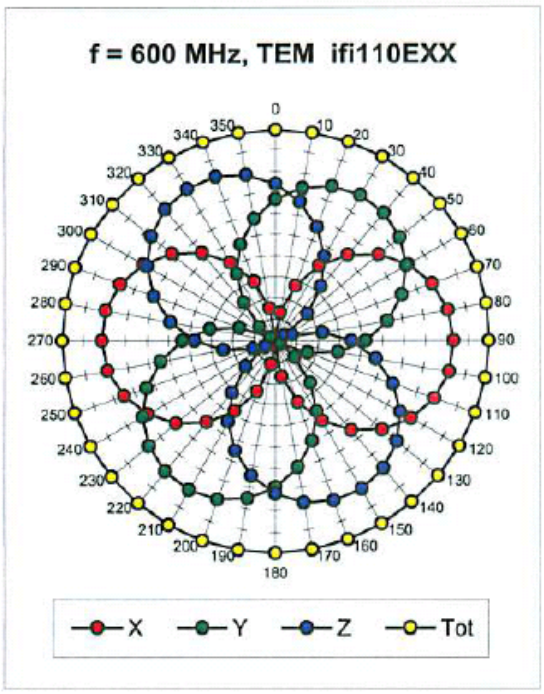
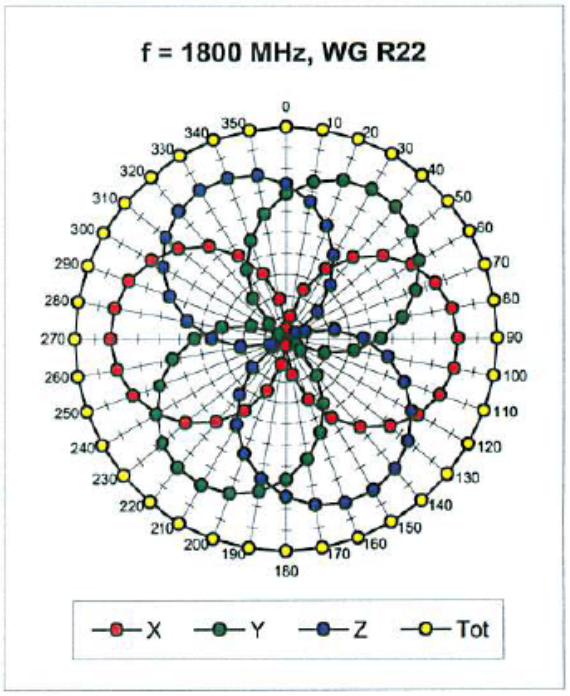
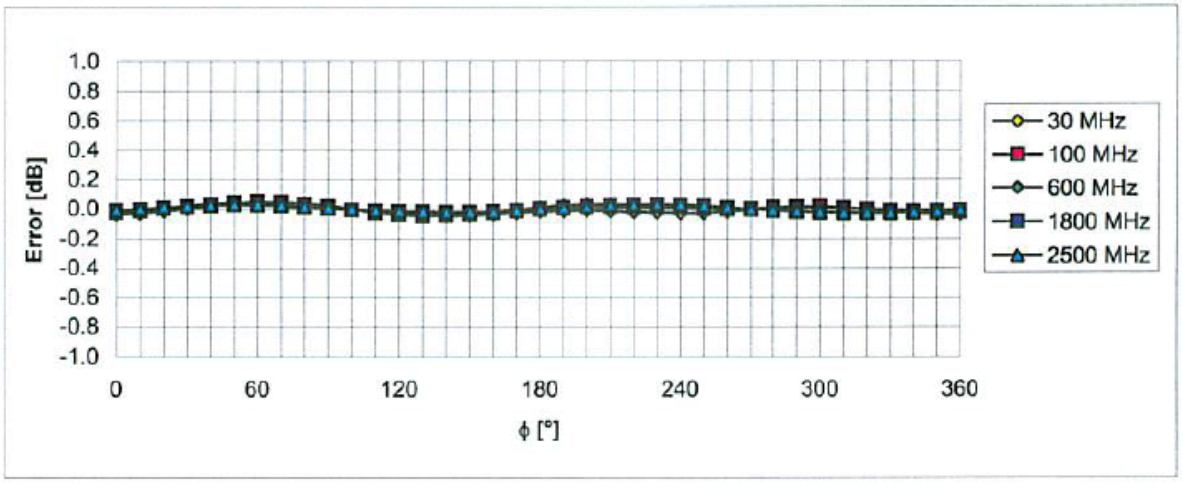
Receiving Pattern (ϕ), ϑ = 0°





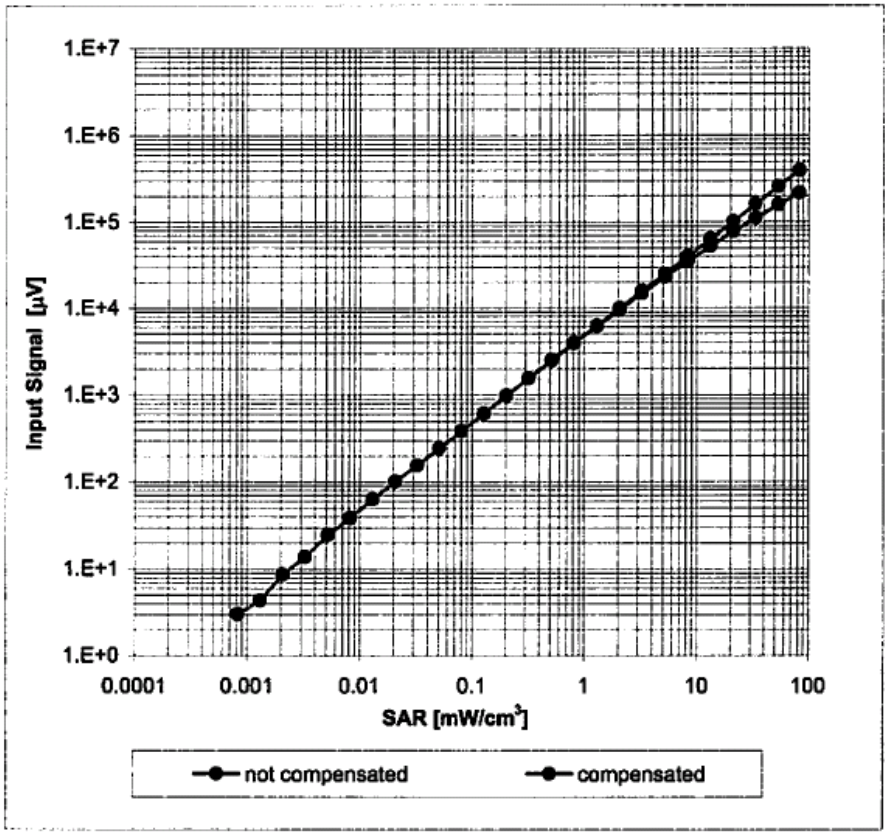


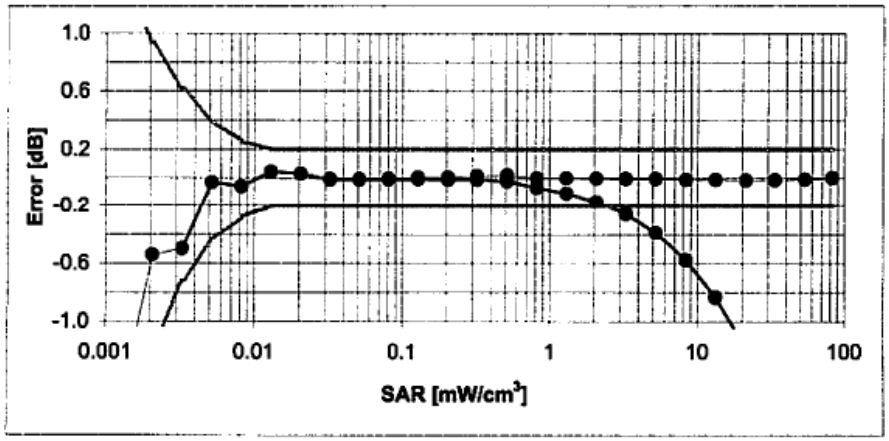
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ET3DV6 SN:1547 November 19, 2007

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)

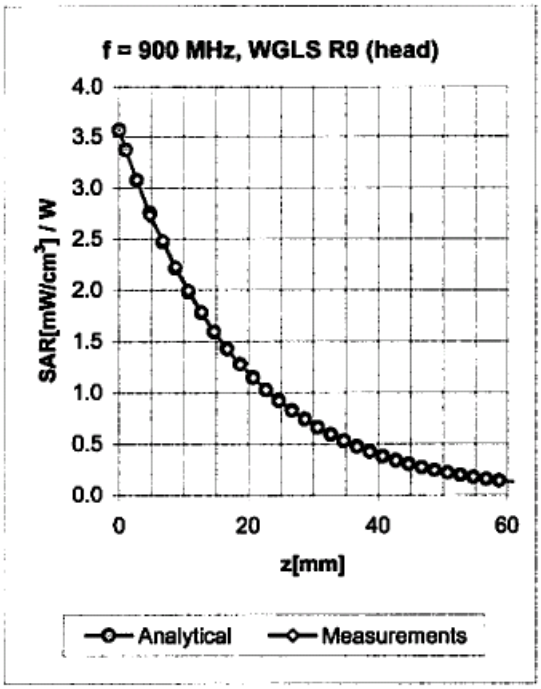


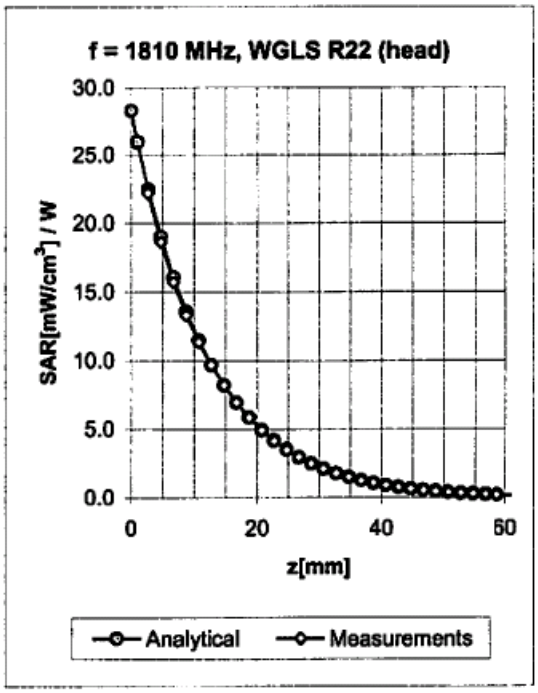


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ET3DV6 SN:1547 November 19, 2007

Conversion Factor Assessment





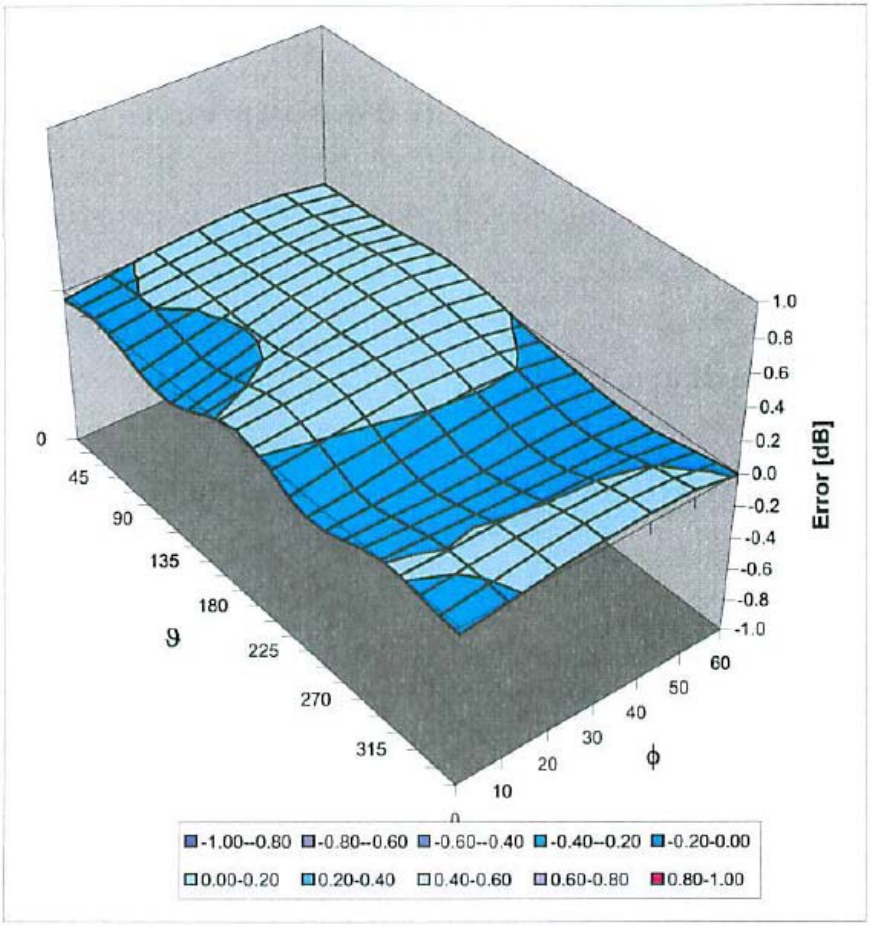
f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.38	1.96	7.08 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.76	1.97	6.21 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.71	2.09	5.05 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.73	2.02	4.82 ± 11.0% (k=2)
2300	± 50 / ± 100	Head	39.4 ± 5%	1.71 ± 5%	0.99	1.57	4.61 ± 11.8% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.79	1.98	4.51 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.31	1.95	7.50 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.79	2.01	5.73 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.69	2.27	4.58 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.72	2.13	4.35 ± 11.0% (k=2)
2300	± 50 / ± 100	Body	52.8 ± 5%	1.85 ± 5%	0.73	1.66	4.14 ± 11.8% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.72	2.23	3.90 ± 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.

ET3DV6 SN:1547 November 19, 2007

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1547**
Place of Assessment:	**Zurich**
Date of Assessment:	**November 23, 2007**
Probe Calibration Date:	**November 19, 2007**

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:

Dosimetric E-Field Probe ET3DV6 SN:1547

Conversion factor (± standard deviation)

150 MHz	*ConvF*	8.4 ± 10%	ε_r = 52.3 σ = 0.76 mho/m (head tissue)
250 MHz	*ConvF*	7.7 ± 10%	ε_r = 47.6 σ = 0.83 mho/m (head tissue)
300 MHz	*ConvF*	7.6 ± 9%	ε_r = 45.3 σ = 0.87 mho/m (head tissue)
750 MHz	*ConvF*	6.5 ± 7%	ε_r = 41.9 σ = 0.89 mho/m (head tissue)
150 MHz	*ConvF*	8.2 ± 10%	ε_r = 61.9 σ = 0.80 mho/m (body tissue)
250 MHz	*ConvF*	7.7 ± 10%	ε_r = 59.4 σ = 0.88 mho/m (body tissue)
300 MHz	*ConvF*	7.6 ± 9%	ε_r = 58.2 σ = 0.92 mho/m (body tissue)
750 MHz	*ConvF*	6.3 ± 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

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Accreditation No.: SCS 108

Client Motorola CGISS

Certificate No: D450V2-1002_Aug06

CALIBRATION CERTIFICATE

Object	D450V2 - SN: 1002
Calibration procedure(s)	QA CAL-15.v4 Calibration Procedure for dipole validation kits below 800 MHz
Calibration date:	August 24, 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)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference Probe ET3DV6	SN 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-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:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 28, 2006

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

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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 cm³ (1 g) of Head TSL	condition	
SAR measured	398 mW input power	2.10 mW / g
SAR normalized	normalized to 1W	5.28 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**5.31 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	398 mW input power	1.41 mW / g
SAR normalized	normalized to 1W	3.54 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**3.55 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	55.5 Ω - 5.1 jΩ
Return Loss	- 23.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.354 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: 24.08.2006 12:40:39

Test Laboratory: SPEAG, Zurich, Switzerland

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

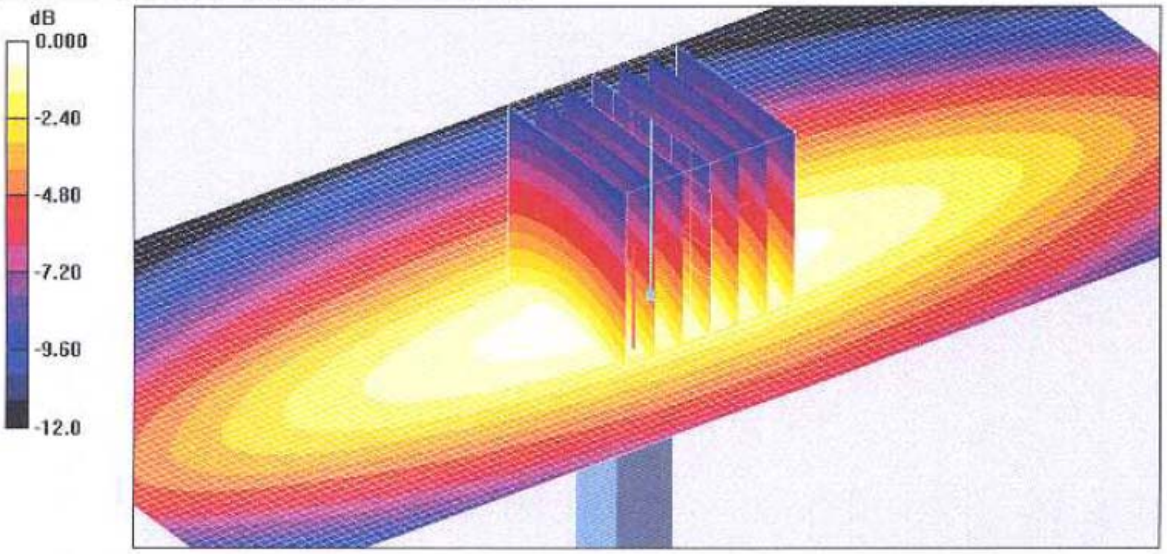
Communication System: CW; Frequency: 450 MHz;Duty Cycle: 1:1
Medium: HSL450;
Medium parameters used: f = 450 MHz; σ = 0.86 mho/m; ε_r = 43.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (LF); ConvF(6.46, 6.46, 6.46); Calibrated: 10.07.2006
- 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 44; Postprocessing SW: SEMCAD, V1.8 Build 171

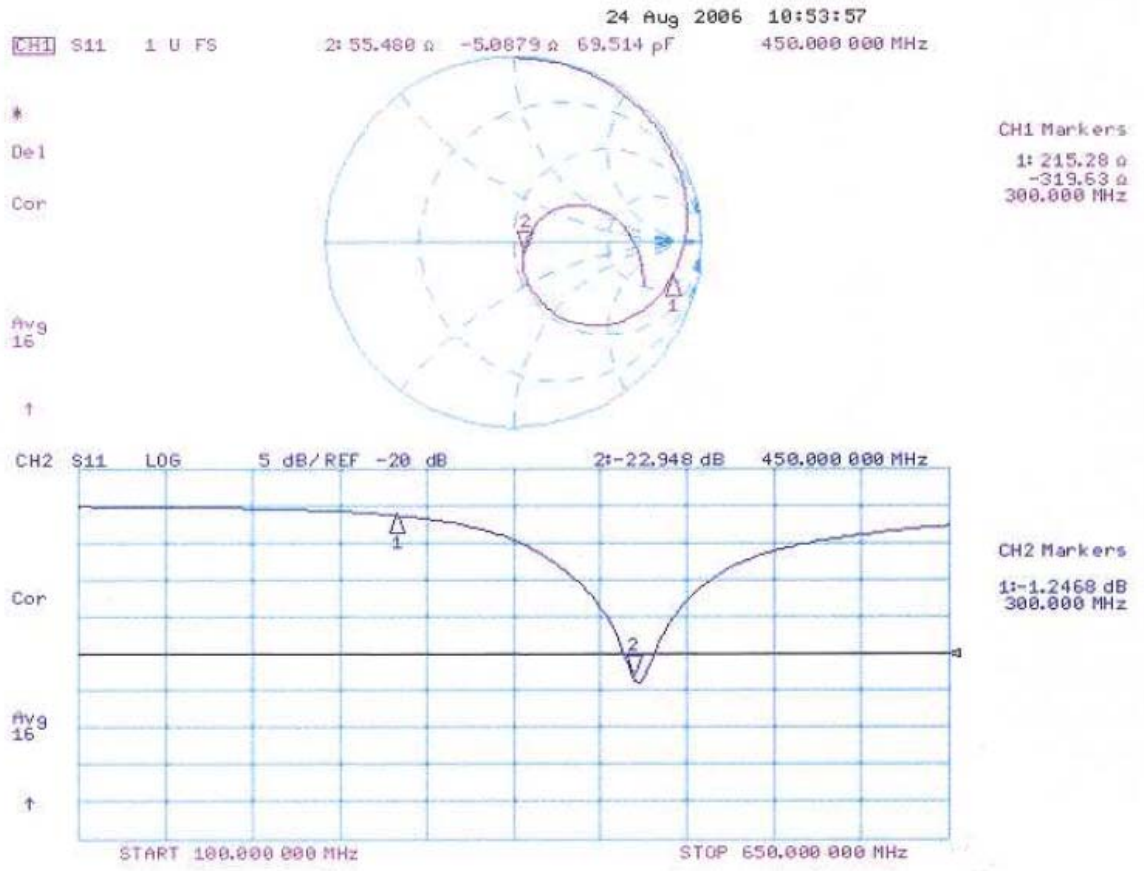
d=15mm, Pin=398mW 2/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.21 mW/g

d=15mm, Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.2 V/m; Power Drift = -0.018 dB
Peak SAR (extrapolated) = 3.09 W/kg
SAR(1 g) = 2.1 mW/g; SAR(10 g) = 1.41 mW/g
Maximum value of SAR (measured) = 2.26 mW/g



0 dB = 2.26mW/g

Impedance Measurement Plot for Head TSL



Appendix D
Test System Verification Scans

Dipole validation scans at the head from SPEAG are provided in APPENDIX C. G&PS' EME lab validates its' dipole(s) to the applicable IEEE system performance targets. A system validation was performed using FCC body tissue parameters to generate the system performance target values for body at the applicable frequency. Dipoles are assessed using multiple probes and measurements were performed using the isotropic assessment procedure mentioned below.
To assess the isotropic characteristics of the measurement probe, two system performance zoom scans (0 and 90 degrees) were measured. The measured results were averaged together in order to obtain the final calculated 1 gram results.
The results obtained from each probe were then averaged together to determine the new measured SAR target.

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Date/Time: 2/19/2008 1:21:48 PM

Robot# / Run#: DASY4-FL-2 / JsT-SYSP-450H-080219-03
Phantom# / Tissue Temp.: SAMTP1209 / 21.1 (C)
Dipole Model# / Serial#: D450V2 / 1001
TX Freq. / Start power: 450 (MHz) / 250 (mW)

Target:	4.77 mW/g	(1g)
Calculated:	4.46 mW/g	(1g)
Percent from Target (+/-):	6.5 %	(1g)

Probe: ET3DV6 - SN1547, Calibrated: 11/19/2007, ConvF(7.08, 7.08, 7.08)
Electronics: DAE3 Sn401, Calibrated: 8/28/2007

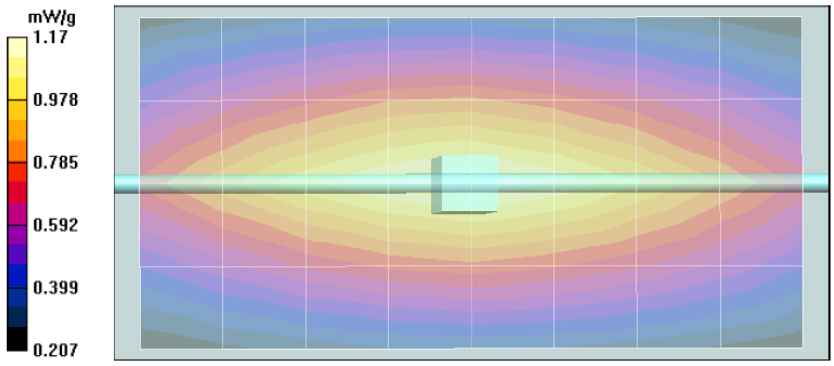
Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.85 mho/m; ε_r = 44.3; ρ = 1000 kg/m^3

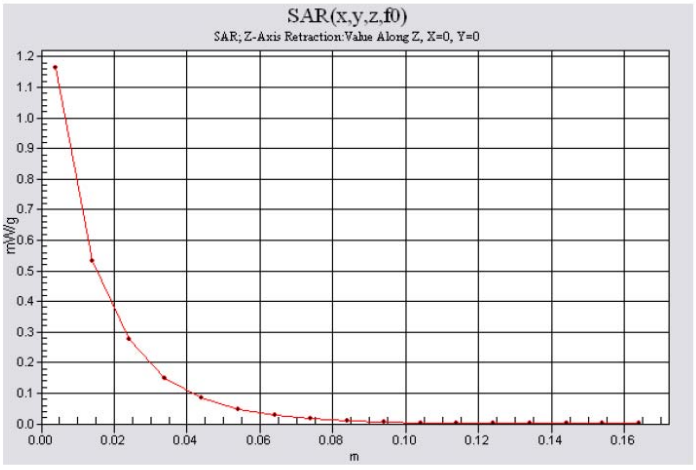
System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 38.2 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.722 mW/g
Maximum value of SAR (measured) = 1.17 mW/g

System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 38.2 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 1.14 mW/g; SAR(10 g) = 0.754 mW/g
Maximum value of SAR (measured) = 1.22 mW/g

System Performance Check/Dipole Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

System Performance Check/Z-Axis Retraction (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 1.16 mW/g





Motorola Government & Public Safety EME Laboratory

Date/Time: 3/19/2008 11:58:55 AM

Robot# / Run#: DASY4-FL-2/ HvH-SYSP-450B-080319-01
Phantom# / Tissue Temp.: 80302002B-S8 / 20.9 (C)
Dipole Model# / Serial#: D450V2 / 1002
TX Freq. / Start power: 450 (MHz) / 250 (mW)

Target: 4.40 mW/g (1g)
Calculated: 4.52 mW/g (1g)
Percent from Target (+/-): 2.7 % (1g)

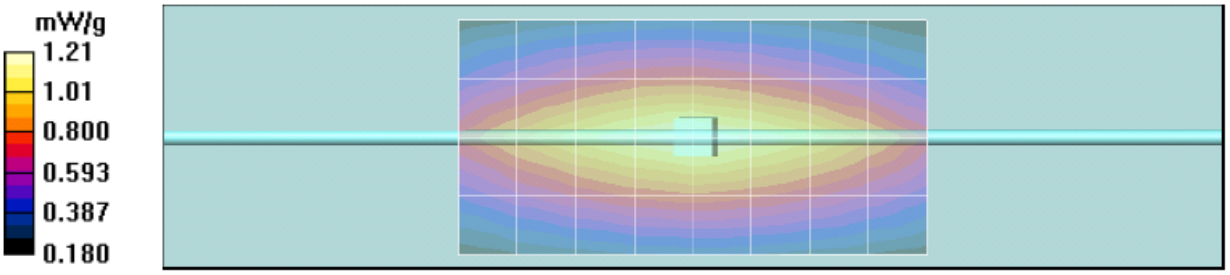
Probe: ET3DV6 - SN1547, Calibrated: 11/19/2007, ConvF(7.5, 7.5, 7.5)
Electronics: DAE3 Sn401, Calibrated: 8/28/2007
Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.95 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3

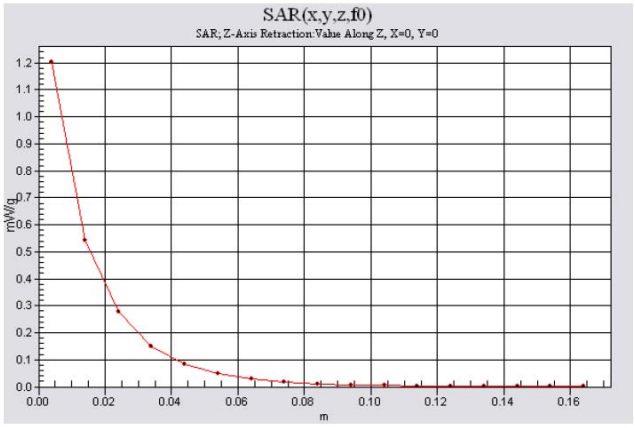
System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 36.5 V/m; Power Drift = 0.0138 dB
Peak SAR (extrapolated) = 1.84 W/kg
SAR(1 g) = 1.14 mW/g; SAR(10 g) = 0.742 mW/g
Maximum value of SAR (measured) = 1.22 mW/g

System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 36.5 V/m; Power Drift = 0.0138 dB
Peak SAR (extrapolated) = 1.79 W/kg
SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.735 mW/g
Maximum value of SAR (measured) = 1.19 mW/g

System Performance Check/Dipole Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.21 mW/g

System Performance Check/Z-Axis Retraction (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 1.20 mW/g





Motorola Government & Public Safety EME Laboratory

Date/Time: 3/20/2008 7:54:49 AM

Robot# / Run#: DASY4-FL-2/ ErC-SYSP-450H-080320-01
Phantom# / Tissue Temp.: SAMTP1209 / 21.9 (C)
Dipole Model# / Serial#: D450V2 / 1002
TX Freq. / Start power: 450 (MHz) / 250 (mW)

Target: 4.78 mW/g (1g)
Calculated: 4.60 mW/g (1g)
Percent from Target (+/-): 3.8 % (1g)

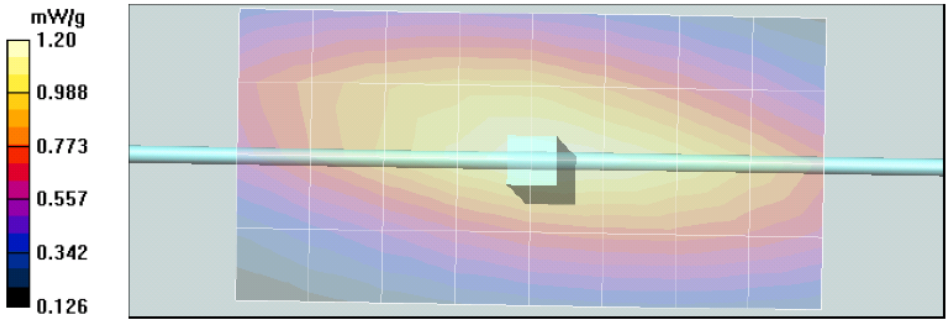
Probe: ET3DV6 - SN1547, Calibrated: 11/19/2007, ConvF(7.08, 7.08, 7.08)
Electronics: DAE3 Sn401, Calibrated: 8/28/2007
Duty Cycle: 1:1, Medium parameters used: f = 450 MHz; σ = 0.86 mho/m; ε_r = 42.9; ρ = 1000 kg/m^3

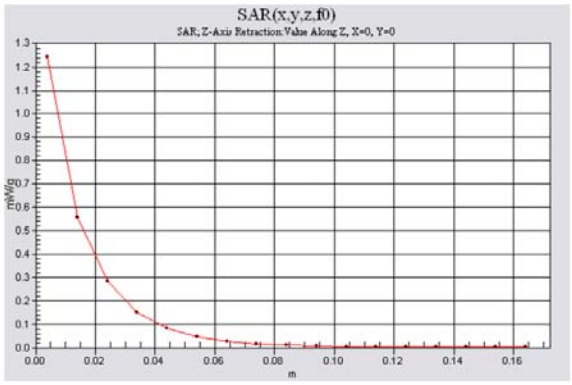
System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 38.7 V/m; Power Drift = -0.0485 dB
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.757 mW/g
Maximum value of SAR (measured) = 1.23 mW/g

System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 38.7 V/m; Power Drift = -0.0485 dB
Peak SAR (extrapolated) = 1.81 W/kg
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.756 mW/g
Maximum value of SAR (measured) = 1.20 mW/g

System Performance Check/Dipole Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

System Performance Check/Z-Axis Retraction (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 1.24 mW/g





DIPOLE SAR TARGET - HEAD

Date:	08/02/07	Frequency (MHz):	450
Lab Location:	NE	Mixture Type:	IEEE Head
DAE Serial #:	406	Ambient Temp.(°C):	21.7

Tissue Characteristics

Permitivity:	43.3	Phantom Type/SN:	80302002A-S7
Conductivity:	0.84	Distance (mm):	15
Tissue Temp.(°C):	20.9		

Reference Source:	Dipole	Power to Dipole:	250 mW
Reference SN:	1002		

Target SAR Value: **4.9** mW/g (1g avg.), **3.3** mW/g (10g avg.)
(normalized to 1.0 W)

New Target:

Average Measured SAR Value: **4.78** mW/g (1g avg.), **3.19** mW/g (10g avg.)

Percent Difference From Target (MUST be within k=2 Uncertainty): **-2.50%** (1g ave)
-3.41% (10g ave)

Test performed by: **Ed Church** Initial: E.C

Probe SN #s	1-G Cube	Diff from Ave	10-G Cube	Diff from Ave	Robot
1393	4.75	-0.58%	3.16	-0.86%	R3
1384	4.83	1.10%	3.20	0.39%	R3
1547	4.82	0.89%	3.21	0.71%	R3
1383	4.71	-1.41%	3.18	-0.24%	R3
		-100.00%		-100.00%	
Average	4.7775		3.1875	New Measured SAR Value	
		(normalized to 1.0 W, including drift)			

DIPOLE SAR TARGET - BODY

Date:	08/01/07	Frequency (MHz):	450
Lab Location:	NE	Mixture Type:	FCC Body
DAE Serial #:	406	Ambient Temp.(°C):	20.4

Tissue Characteristics

Permitivity:	56.0	Phantom Type/SN:	80302002B-S8
Conductivity:	0.90	Distance (mm):	15
Tissue Temp.(°C):	20.4		

Reference Source:	Dipole	Power to Dipole:	250 mW
Reference SN:	1002		

New Target:

Average Measured SAR Value: **4.40** mW/g(1g avg.), **2.91** mW/g (10g avg.)

Test performed by: **C. Miller** Initial:

Probe SN #s	1-G Cube	Diff from Ave	10-G Cube	Diff from Ave	Robot
1393	4.37	-0.7%	2.93	0.6%	R3
1383	4.47	1.6%	2.90	-0.4%	R3
1384	4.47	1.6%	2.97	2.0%	R3
1547	4.29	-2.5%	2.85	-2.1%	Rx
5		-100.0%		-100.0%	Rx
Average	**4.4000**		**2.9125**	**New Measured SAR Value**	
(normalized to 1.0 W, including drift)					

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