

 MOTOROLA	 ACCREDITED Certificate Number: 1449-01
FCC ID: AZ489FT7019 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: 6/9/06 Report Revision: Rev O Report ID: ic502 060609 SR3942
Responsible Engineer: Michael Sailsman (Sr. Staff Engineer) Date/s Tested: 5/5/06-6/8/06 Manufacturer/Location: Motorola – Plantation Sector/Group/Div.: iDEN Subscriber Date submitted for test: 5/3/06 DUT Description: ic502; single band CDMA2000 – 100%; TDMA: 1:6 iDEN-16QAM 0.6W Pulse Avg. MOTotalk (114:120 8FSK; 0.85 W nominal); GPS capable CDMA2000: 100%; iDEN/MOTotalk: 1:6/114:120 Test TX mode(s): CDMA2000 – 0.316W, Mototalk - 0.891W, iDEN - 0.640W Max. Power output: CDMA2000 – 0.2512W, MOTotalk - 0.85W, iDEN- 0.60W Nominal Power: CDMA2000 - 1851.250-1909.950MHz, MOTotalk - 902-928MHz, iDEN– 806-825MHz Tx Frequency Bands: CDMA2000; iDEN TDMA; MOTotalk - (FHSS 8FSK)] Signaling type: H90XAH9JR7AN/NWF1186A Model(s) Tested: H90XAH9JR7AN/NWF1186A Model(s) Certified: 364AGG009M, 364AGG0087, 364AGG009T, 364AGG009W Serial Number(s): General Population/Uncontrolled Classification: 15, 90 & 24 Rule Part(s): Approved Accessories: Antenna(s): 8575862A01(retractable ¼ wave antenna: 806-870MHz , 1.9dBi; 902-928MHz , 1.9dBi; retractable ½ wave antenna: 1850-1990MHz, 3.1dBi) Battery(ies): SNN5792A (High capacity Li Ion), NTN2351A(High capacity battery door); SNN5793A (Maximum capacity Li Ion), NTN2352A(max capacity battery door) Body worn accessory(ies): NNTN6752A (Swivel carry holster) Audio/Data cable accessory(ies): NNTN5330A (PTT headset, ear bud), NNTN5004A (PTT headset, over-the-ear), NNTN5005A (PTT headset, over-the-head), NNTN5006A (PTT headset, flexible ear wrap), NNTN5751A (Stereo mixing headset w/ PTT), NNTN5752A (Stereo mixing headset), NNTN5211A (2-wire surveillance headset), NNTN6312A (3-wire surveillance headset), SYN0896A (EMU headset), NNTN6531A (USB data cable), SKN6371B (USB data cable) Max. Calc. : 1-g Avg. SAR: 1.14 W/kg (Body); Max. Calc. : 1-g Avg. SAR: 0.76 W/kg (Face); Max. Calc. : 1-g Avg. SAR: 1.24 W/kg (Head); 10-g Avg. SAR: 0.82 W/kg (Body) 10-g Avg. SAR: 0.54 W/kg (Face) 10-g Avg. SAR: 0.71 W/kg (Head) 	
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.	
Ken Enger signature on file Ken Enger NE EME Lab Senior Resource Manager, Laboratory Director, Approval Date: 6/9/06	Certification Date: 6/9/06 Certification No.: L1060604P

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Report REVISION HISTORY

Date	Revision	Comments
6/9/06	O	Initial release

1.0 Introduction and Overview

This report details the utilization, test setup, test equipment, and test results of the Specific Absorption Rate (SAR) measurements performed at the NE EME Test Lab for the model number H90XAH9JR7AN/NWF1186A of FCC ID: AZ489FT7019. The results herein reflect initial test results.

2.0 Referenced Standards and Guidelines

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

- 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: AZ489FT7019 is a digital multi-service data capable device that contains two independent transmitter circuits. The CDMA 2000 transmitter operates in the 1900MHz PCS band and supports phone and data modes. The iDEN transmitter operates in the 800MHz band and only supports dispatch (PTT) communications. Only one transmitter can be intentionally accessed at a time. Incidental and transitory signaling traffic may be present on the 800MHz iDEN network while a PCS CDMA call is in progress, limited to that required to maintain network mobility. The details of this operation can be found in Exhibit 12. This product also contains a MOTOTalk transmitter which operates in the 900MHz ISM band. MOTOTalk functionality is enabled by exiting the standard operating mode.

Transmissions within the iDEN 800MHz band employs time division multiplexing transmission technology with a duty cycle of 16.67% using M16-QAM modulation for PTT transmissions. MOTOTalk transmissions employ a frequency hopping digital spread spectrum format operating in the 900 MHz ISM band. MOTOTalk uses a transmission duty cycle of 114:120 with 8 FSK modulation. MOTOTalk operates only in PTT mode in front of the face or at the abdomen with the applicable offered audio accessories. This device is also GPS capable.

This device will be marketed to and used by the general population. This device may be used while held against the head in CDMA 2000 phone and iDEN PTT (low audio output) modes, in front of the face in iDEN PTT and MOTOTalk modes (high audio output), as well as against the body using the appropriate audio accessories in CDMA 2000 phone/data, iDEN PTT and MOTOTalk modes.

FCC ID: AZ489FT7019 is capable of operating in the iDEN 806-825 MHz band. MOTOTalk operates in the 902-928MHz band. CDMA 2000 operates in the 1851.250-1909.950MHz. The rated conducted power is 0.60 watts pulsed averaged in 806-825MHz band, 0.85 watts in the MOTOTalk band and 0.2512 watts in the CDMA 2000 band. The maximum conducted output power is 0.64 watts pulsed average, 0.891 watts and 0.316 watts respectively as defined by the upper limit of the production line final test station.

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 40x30x20x0.2	68.58x20.32 60.96x15.24	Wood	< 0.05

4.2.2 SAM Phantom

Phantom Type	Material Parameters	Material Thickness (mm)	Support structure material	Loss Tangent (wood)
SAMTP1209 SAMTP1234	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	900MHz		1900MHz	
	Head	Body	Head	Body
Sugar	56.5	44.9	NA	NA
DGBE (Glycol)	NA	NA	NA	NA
Diacetin	NA	NA	47	30.8
De ionized -Water	40.95	53.06	52.8	68.91
Salt	1.45	0.94	0.2	0.29
HEC	1.0	1	NA	NA
Bact.	0.1	0.1	NA	NA

Reference section 6.1 for target parameters

5.0 Additional Test Equipment

Equipment Type	Model Number	Serial Number	Calibration Due Date
Power Meter (HP)	E4418B	GB40206480	11/30/2006
Power Meter (Agilent)	E4418B	GB40206553	4/21/2007
Power Meter (HP)	E4418B	US39251150	4/20/2007
Power Meter (HP)	E4418B	US39251152	3/29/2007
Power Meter (Agilent)	E4419B	MY403300364	1/31/2007
Power Sensor (HP)	8482B	3318A07393	3/27/2007
Power Sensor (HP)	8482B	3318A07546	10/6/2006
Power Sensor (HP)	8482B	3318A06774	4/22/2007
Power Sensor (HP)	8482B	3318A07548	12/9/2006
Power Sensor (HP)	8482H	1926A01906	12/12/2006
Power Sensor (HP)	8482B	3318A06773	4/19/2007
Bi-Directional Coupler (NARDA)	3020A	40295	7/18/2006
Bi-Directional Coupler (NARDA)	3020A	40296	11/17/07
Bi-Directional Coupler (NARDA)	3022	77114	11/17/2007
Bi-Directional Coupler (NARDA)	3022	77115	12/23/2007
Signal Generator (HP)	E4421B	US39270649	2/28/2007
AMP (ComTech PST)	AR88258-10	N1R1A00-1015	CNR
Agilent Wireless Communications Test Set	8960 Series 10 E5515C	GB46040169	1/24/2008
Tissue Station			
Network Analyzer (HP)	8753D	3410A09135	2/22/2007
Dielectric Probe Kit (HP)	85070C	US99360076	CNR
Dipole			
Speag Dipole	D900V2	85	8/19/2006
Speag Dipole	D1900V2	521	4/28/2008

6.0 SAR Measurement System Verification

The SAR measurements were conducted with probe model/serial number ET3DV6/ SN1545 & 1383. 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 NE 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 NE 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 (5/5/06 – 6/7/06)

FCC Body				
Frequency (MHz)	Di-electric Constant Target	Di-electric Constant Meas. (Range)	Conductivity Target S/m	Conductivity Meas. (Range) S/m
1880.6	53.3	51.9-52.1	1.52	1.54-1.56
915	55.0	52.8-53.7	1.06	1.05-1.07
815.5	55.3	53.6-54.6	0.97	0.94-0.96

IEEE Head				
Frequency (MHz)	Di-electric Constant Target	Di-electric Constant Meas. (Range)	Conductivity Target S/m	Conductivity Meas. (Range) S/m
1880.6	40.0	38.1-40.0	1.40	1.40-1.44
915	41.5	41.7-42.5	0.98	1.02-1.02
815.5	41.6	422.9-43.6	0.90	0.93-0.93

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)
1545	IEEE Head	10/25/05	SPEAG D900V2 /085	12.015 +/- 0.185	12.23 +/- 10%	5/5/06-5/8/06 (3 test days)
1383	FCC Body	2/22/06	SPEAG D900V2 /085	11.700 +/- 0.100	12.13 +/- 10%	5/17/06-5/19/06 & 6/7/06
1383	IEEE Head	2/22/06	SPEAG D900V2 /085	11.79 +/- 0.040	12.23 +/- 10%	5/16/06 & 5/22/06
1383	FCC Body	2/22/06	SPEAG D1900V2 /521	46.11 +/- 0.790	45.14 +/- 10%	6/2/06-6/6/06 (3 test days)
1383	IEEE Head	2/22/06	SPEAG D1900V2 /521	44.87 +/- 0.120	43.62 +/- 10%	6/3/06 & 6/4/06

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 CDMA 2000 (100%), iDEN (16.67%), and MOTotalk (95% FHSS 8FSK) transmission signaling operational at the body, head, and face using the applicable offered accessories. The device is placed in the test positions presented in Appendix G.

Test Plan

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

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

iDEN/MOTotalk assessments:

Head (PTT mode 1:6; 806-825MHz) [\[Pages 12 of 80; Tables 1\]](#)

- Assessment at the center of the band with the offered batteries using applicable test positions at the both sides of head with antenna in and out.
- Assessment at the band edges using the worst case configuration from above.

Face (PTT mode 1:6; 806-825MHz) [\[Page 13 of 80; Table 2\]](#)

- Assessment at the center frequency of the worst case battery from the head assessment above with the flip opened and closed and antenna in and out.
- Assessment of the band edges using the worst case configuration from above.

Face (MOTotalk mode 114:120; 902-928MHz) [\[Page 13 of 80; Table 2\]](#)

- Assessment at the center frequency using the worst case battery from the head assessment above with the flip opened and closed and antenna in and out.
- Assessment of the band edges using the worst case configuration from above.

Body (MOTotalk mode 114:120; 902-928MHz) [\[Page 14 of 80; Table 3\]](#)

- Assessment at the center frequency using one offered battery, the offered body-worn accessory and each of the offered audio attachments with the antenna out. The worst case configuration from above was tested with the antenna in. The other offered battery was assessed using the worst case audio attachment from above with the antenna in and out.
- Assessment of the band edges using the worst case configuration from above.

Body 2.5cm (MOTotalk mode 114:120; 902-928MHz) [\[Page 14 of 80; Table 3\]](#)

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

Body (iDEN PTT mode 1:6; 806-825MHz) [\[Page 14 of 80; Table 3\]](#)

- Assessment at the center frequency using the worst cast configuration overall from the body assessments above

Shortened scan assessment at the Face [\[APPENDIX E Part 2 of 2\]](#)

- 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.

CDMA 2000 Assessments:**Head (100%; 1851.250-1909.950MHz)** [\[Page 15 of 80; Tables 4\]](#)

- Assessment at the center of the band with the offered batteries using applicable test positions at the both sides of head with antenna in and out.
- Assessment at the band edges using the worst case configuration from above.

Body (100%; 1851.250-1909.950MHz) [\[Pages 16-17 of 80; Tables 5\]](#)

- Assessment at the center of the band with one of the offered batteries and carry holster with antenna in and out. The other battery was assessed using the worst case antenna position
- Assessment at the center of the band using each of the offered data cable attachments with the antenna in and out.
- Assessment at the center of the band using each of the offered audio accessories with the worst case antenna position from above.
- Assessment at the band edges using the worst case configuration from above.

Body 2.5cm (100%; 1851.250-1909.950MHz) [\[Pages 16-17 of 80; Table 5\]](#)

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

Shortened scan assessment at the head [\[APPENDIX E Part 2 of 2\]](#)

- 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 with the offered body worn accessory against the phantom and.

The DUT was positioned with its' front and back sides separated 2.5cm from the phantom.

7.2.2 Head

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

7.2.3 Face

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

8.0 Environmental Test Conditions

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

	Target	Measured
Ambient Temperature	20 - 25 °C	Range: 22.15-23.5°C Avg. 22.45°C
Relative Humidity	30 - 70 %	Range: 44.55-53.4% Avg. 47.29%
Tissue Temperature	NA	Range: 19.3-21.2°C Avg. 20.44 °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.

Table1

iDEN: Assessments at the Head (1:6 mode) 802-825MHz band

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)
Left ear - antenna positions, offered batteries; touch												
MeC-LEAR-060505-02/364AGG0087	In	815.5000	SNN5793A/ NTN2352A	Touch	None	None	0.639	0.165	0.404	0.270	0.212	0.14
MeC-LEAR-060505-08/364AGG0087	Out	815.5000	SNN5793A/ NTN2352A	Touch	None	None	0.639	0.0497	0.621	0.407	0.31	0.20
MeC-LEAR-060505-09/364AGG0087	In	815.5000	SNN5792A/ NTN2351A	Touch	None	None	0.638	0.120	0.399	0.267	0.20	0.13
MeC-LEAR-060505-10/364AGG0087	Out	815.5000	SNN5792A/ NTN2351A	Touch	None	None	0.639	-0.0141	0.629	0.421	0.32	0.21
Left ear – antenna positions, tilt												
MeC-LEAR-060505-11/364AGG0087	In	815.5000	SNN5792A/ NTN2351A	Tilt	None	None	0.638	-0.00570	0.127	0.089	0.06	0.04
MeC-LEAR-060505-12/364AGG0087	Out	815.5000	SNN5792A/ NTN2351A	Tilt	None	None	0.639	0.00222	0.184	0.131	0.09	0.07
Right ear - antenna positions, worst case battery; touch and tilt positions												
MeC-REAR-060507-02/364AGG0087	In	815.5000	SNN5792A/ NTN2351A	Touch	None	None	0.637	-0.1090	0.564	0.380	0.29	0.20
MeC-REAR-060507-03/364AGG0087	Out	815.5000	SNN5792A/ NTN2351A	Touch	None	None	0.639	-0.0579	0.706	0.475	0.36	0.24
MeC-REAR-060507-04/364AGG0087	In	815.5000	SNN5792A/ NTN2351A	Tilt	None	None	0.637	0.0951	0.116	0.0826	0.06	0.04
MeC-REAR-060507-05/364AGG0087	Out	815.5000	SNN5792A/ NTN2351A	Tilt	None	None	0.640	-0.0817	0.164	0.1170	0.08	0.06
Band edges with worst case head position												
*MeC-REAR-060507-06/364AGG0087	Out	806.0125	SNN5792A/ NTN2351A	Touch	None	None	0.636	-0.0583	0.716	0.481	0.37	0.25
MeC-REAR-060507-07/364AGG0087	Out	824.9875	SNN5792A/ NTN2351A	Touch	None	None	0.636	-0.0912	0.698	0.472	0.36	0.24

Table 2

iDEN: Assessment at the face (1:6 & 114:120 modes) 806-825MHz & 902-928MHz bands												
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)
1:6 mode; Worst case battery; flip opened and closed; antenna in/out												
JsT-Face-060508-02/364AGG0087	In	815.5000	SNN5792A/ NTN2351A	flip opened front 2.5cm	None	None	0.640	0.0982	0.0891	0.064	0.045	0.032
JsT-Face-060508-03/364AGG0087	Out	815.5000	SNN5792A/ NTN2351A	flip opened front 2.5cm	None	None	0.639	-0.0884	0.100	0.0721	0.051	0.037
JsT-Face-060508-04/364AGG0087	In	815.5000	SNN5792A/ NTN2351A	flip closed front 2.5cm	None	None	0.639	-0.065	0.114	0.0816	0.058	0.041
JsT-Face-060508-05/364AGG0087	Out	815.5000	SNN5792A/ NTN2351A	flip closed front 2.5cm	None	None	0.640	-0.00535	0.209	0.150	0.1046	0.0751
1:6 mode Band edges												
JsT-Face-060508-06/364AGG0087	Out	806.0125	SNN5792A/ NTN2351A	flip closed front 2.5cm	None	None	0.639	0.100	0.210	0.150	0.1052	0.0751
JsT-Face-060508-11/364AGG0087	Out	824.9875	SNN5792A/ NTN2351A	flip closed front 2.5cm	None	None	0.638	0.031	0.199	0.142	0.0998	0.0712
114:120 mode; Worst case battery; flip opened and closed; antenna in/out												
JsT-Face-060508-08/364AGG0087	In	915.525	SNN5792A/ NTN2351A	flip opened front 2.5cm	None	None	0.903	-0.296	0.467	0.332	0.25	0.18
JsT-Face-060516-04/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	flip opened front 2.5cm	None	None	0.897	-0.0114	0.653	0.466	0.327	0.234
JsT-Face-060516-05/364AGG0087	In	915.525	SNN5792A/ NTN2351A	flip closed front 2.5cm	None	None	0.895	-0.260	0.969	0.688	0.51	0.37
JsT-Face-060516-06/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	flip closed front 2.5cm	None	None	0.899	-0.023	1.40	0.990	0.70	0.50
114:120 band edges												
JsT-Face-060516-07/364AGG0087	Out	902.525	SNN5792A/ NTN2351A	flip closed front 2.5cm	None	None	0.907	0.00090	1.51	1.07	0.755	0.54
*JsT-Face-060519-10/364AGG009M	Out	902.525	SNN5792A/ NTN2351A	flip closed front 2.5cm	None	None	0.894	-0.0197	1.58	1.12	0.79	0.56
JsT-Face-060516-08/364AGG0087	Out	927.475	SNN5792A/ NTN2351A	flip closed front 2.5cm	None	None	0.905	0.00812	1.36	0.961	0.68	0.48

***Assessment with the worst case test configuration above using the full DASY 4 coarse and 7x7x7 cube scan measurements.**

JsT-Rear-060522-02/364AGG0087	Out	806.0125	SNN5792A/ NTN2351A	Touch	None	None	0.638	0.00834	0.681	0.467	0.34	0.23
JsT-Face-060522-03/364AGG009M	Out	902.525	SNN5792A/ NTN2351A	flip closed front 2.5cm	None	None	0.896	0.0541	1.51	1.07	0.755	0.535
JsT-Face-060522-04/364AGG009M (shortened scan)	Out	902.525	SNN5792A/ NTN2351A	flip closed front 2.5cm	None	None	0.895	-0.0417	1.50	1.07	0.757	0.540

Table 3

iDEN; Assessment at the body (1:6 & 114:120 modes) 806-825MHz & 902-928MHz bands												
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)
114:120 mode; Audio accessories search												
JsT-Ab-060516-12/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5330A	0.902	0.0106	2.34	1.63	1.17	0.82
JsT-Ab-060517-02/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5004A	0.902	0.0229	1.99	1.39	1.00	0.70
JsT-Ab-060517-03/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5005A	0.903	0.0444	2.39	1.67	1.20	0.84
*JsT-Ab-060517-04/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5006A	0.902	0.0439	2.44	1.70	1.22	0.85
JsT-Ab-060517-05/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5751A	0.900	-0.105	2.13	1.48	1.09	0.76
JsT-Ab-060517-06/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5752A	0.903	0.00135	2.35	1.64	1.18	0.82
JsT-Ab-060517-07/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5211A	0.904	0.0123	2.18	1.52	1.09	0.76
JsT-Ab-060517-08/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN6312A	0.903	-0.0169	1.94	1.35	0.97	0.68
JsT-Ab-060518-06/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	SYN0896A	0.904	-0.0348	1.74	1.21	0.88	0.61
114:120 mode; other offered battery w/ worst case audio from above												
JsT-Ab-060607-02/364AGG0087	In	915.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5006A	0.893	-0.627	1.20	0.836	0.69	0.48
JsT-Ab-060607-03/364AGG0087	In	915.525	SNN5793A/ NTN2352A	Against phantom	NNTN6752A	NNTN5006A	0.895	-0.529	1.14	0.797	0.64	0.45
JsT-Ab-060607-04/364AGG0087	Out	915.525	SNN5793A/ NTN2352A	Against phantom	NNTN6752A	NNTN5006A	0.893	0.00554	2.13	1.49	1.07	0.75
114:120 mode; band edges												
JsT-Ab-060607-07/364AGG0087	Out	902.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5006A	0.904	-0.028	2.15	1.50	1.08	0.75
JsT-Ab-060607-08/364AGG0087	Out	927.475	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5006A	0.900	0.0449	2.30	1.60	1.15	0.80
114:120 mode; 2.5cm separation w/ worst case audio from above												
JsT-Ab-060608-02/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	DUT back 2.5cm	NNTN6752A	NNTN5006A	0.894	0.0226	2.24	1.56	1.12	0.78
JsT-Ab-060608-03/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	DUT front 2.5cm	NNTN6752A	NNTN5006A	0.895	-0.141	1.22	0.858	0.63	0.44
1:6 mode; worst case configuration from body assessments above												
JsT-Ab-060608-04/364AGG0087	Out	815.5000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5006A	0.636	-0.0417	0.280	0.198	0.142	0.101

***Assessment with the worst case test configuration above using the full DASY 4 coarse and 7x7x7 cube scan measurements.**

JsT-Ab-060608-07/364AGG0087	Out	915.525	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5006A	0.897	0.255	2.27	1.63	1.14	0.82
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Table 4

CDMA 2000: Assessments at the Head (100%) 1851.250-1909.950MHz band												
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)
Right ear - antenna positions, offered batteries; touch												
*JsT-Rear-060602-09/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Touch	None	None	0.317	-0.475	1.05	0.611	1.171	0.68
JsT-Rear-060603-02/364AGG009T	Out	1880.6000	SNN5792A/ NTN2351A	Touch	None	None	0.315	0.207	0.816	0.459	0.819	0.46
JsT-Rear-060603-03/364AGG009T	In	1880.6000	SNN5793A/ NTN2352A	Touch	None	None	0.312	-0.0806	1.03	0.595	1.06	0.61
JsT-Rear-060603-04/364AGG009T	Out	1880.6000	SNN5793A/ NTN2352A	Touch	None	None	0.316	-0.110	0.501	0.284	0.514	0.29
Right ear- antenna positions, tilt												
JsT-Rear-060603-05/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Tilt	None	None	0.315	-0.128	0.375	0.214	0.387	0.221
JsT-Rear-060603-06/364AGG009T	Out	1880.6000	SNN5792A/ NTN2351A	Tilt	None	None	0.318	-0.117	0.200	0.120	0.205	0.123
Left ear - antenna positions, worst case battery; touch and tilt positions												
JsT-Lear-060603-08/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Touch	None	None	0.318	-0.0594	1.03	0.624	1.04	0.63
JsT-Lear-060603-09/364AGG009T	Out	1880.6000	SNN5792A/ NTN2351A	Touch	None	None	0.314	-0.300	0.486	0.257	0.524	0.28
JsT-Lear-060603-12/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Tilt	None	None	0.317	0.0448	0.307	0.183	0.31	0.18
JsT-Lear-060603-13/364AGG009T	Out	1880.6000	SNN5792A/ NTN2351A	Tilt	None	None	0.319	-0.0901	0.225	0.134	0.23	0.14
Band edges with worst case head position												
JsT-Rear-060605-04/364AGG009T	In	1850.000	SNN5792A/ NTN2351A	Touch	None	None	0.310	-0.112	1.05	0.622	1.10	0.65
JsT-Rear-060605-05/364AGG009T	In	1910.000	SNN5792A/ NTN2351A	Touch	None	None	0.325	-0.154	1.13	0.653	1.171	0.68

Table 5

CDMA 2000: Assessments at the body (100%) 1851.250-1909.950MHz band												
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)
Antenna positions; offered batteries												
*JsT-Ab-060605-08/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	None	0.320	-0.375	0.516	0.311	0.56	0.34
JsT-Ab-060605-09/364AGG009T	Out	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	None	0.318	-0.0619	0.475	0.288	0.48	0.29
Other battery												
JsT-Ab-060605-10/364AGG009T	In	1880.6000	SNN5793A/ NTN2352A	Against phantom	NNTN6752A	None	0.320	-0.060	0.499	0.299	0.51	0.30
Offered data cable attachments; antenna in/out												
JsT-Ab-060605-11/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN6531A	0.317	-0.0628	0.532	0.317	0.54	0.32
JsT-Ab-060605-12/364AGG009T	Out	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN6531A	0.318	-0.0978	0.487	0.297	0.50	0.30
JsT-Ab-060605-13/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	SKN6371B	0.317	-0.0471	0.512	0.310	0.52	0.31
JsT-Ab-060605-14/364AGG009T	Out	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	SKN6371B	0.319	-0.240	0.494	0.301	0.522	0.32
Offered audio attachments; worst case antenna position from above												
JsT-Ab-060605-15/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5330A	0.320	-0.114	0.525	0.315	0.54	0.32
JsT-Ab-060606-02/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5004A	0.321	-0.127	0.509	0.309	0.52	0.32
JsT-Ab-060606-03/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5005A	0.319	-0.0592	0.477	0.288	0.48	0.29
JsT-Ab-060606-04/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5006A	0.320	-0.0978	0.504	0.304	0.52	0.31
JsT-Ab-060606-05/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5751A	0.318	-0.111	0.517	0.311	0.53	0.32
JsT-Ab-060606-06/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5752A	0.319	-0.0465	0.441	0.268	0.45	0.27
JsT-Ab-060606-07/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN5211A	0.321	-0.109	0.454	0.276	0.47	0.28
JsT-Ab-060606-08/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	NNTN6312A	0.319	-0.0829	0.463	0.280	0.47	0.29
JsT-Ab-060606-09/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	SYN0896A	0.320	-0.0842	0.541	0.334	0.55	0.34
Band edges with worst case configuration from above												
JsT-Ab-060606-10/364AGG009T	In	1850.0000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	None	0.312	0.0613	0.475	0.291	0.48	0.29
JsT-Ab-060606-11/364AGG009T	In	1910.0000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	None	0.323	-0.0412	0.476	0.287	0.48	0.29

Table 5 (continued)

CDMA 2000: Assessments at the body (100%) 1851.250-1909.950MHz band												
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)
2.5cm separation w/ worst case audio from above												
JsT-Ab-060606- 13/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	DUT back 2.5cm	None	None	0.319	-0.123	0.379	0.231	0.39	0.24
JsT-Ab-060606- 14/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	DUT front 2.5cm	None	None	0.321	-0.123	0.265	0.164	0.27	0.17

*Assessment with the worst case test configuration above using the full DASY 4 coarse and 7x7x7 cube scan measurements.												
JsT-Rear-060606- 18/364AGG009W	In	1880.6000	SNN5792A/ NTN2351A	Touch	None	None	0.324	-0.239	1.16	0.673	1.23	0.71
JsT-Rear-060606- 20/364AGG009W (Short scan)	In	1880.6000	SNN5792A/ NTN2351A	Touch	None	None	0.329	-0.327	1.15	0.662	1.24	0.71
JsT-Ab-060606- 16/364AGG009T	In	1880.6000	SNN5792A/ NTN2351A	Against phantom	NNTN6752A	None	0.322	-0.181	0.516	0.324	0.54	0.34

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:

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

P_{max} = Maximum Power (W)

P_{int} = Initial Power (W)

P_{drift} = DASY drift results (dB) - (for conservative results positive drifts are not accounted for)

$\text{SAR}_{\text{meas.}}$ = 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: AZ489FT7019 models H90XAH9JR7AN/NWF1186A.

At the Body: 1-g Avg. = 1.14 W/kg; 10-g Avg. = 0.82 W/kg

At the Face: 1-g Avg. = 0.76 W/kg; 10-g Avg. = 0.54 W/kg

At the Head: 1-g Avg. = 1.24 W/kg; 10-g Avg. = 0.71 W/kg

These test results clearly demonstrate compliance with FCC General Population/Uncontrolled RF Exposure limits of **1.6W/kg** per the requirements of 47 CFR 2.1093(d).

APPENDIX A

Measurement Uncertainty

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

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e = f(d,k)</i>	<i>f</i>	<i>g</i>	<i>h = c x f / e</i>	<i>i = c x g / e</i>	<i>k</i>
Uncertainty Component	IEEE 1528 section	Tol. (± %)	Prob Dist	Div.	<i>c_i</i> (1 g)	<i>c_i</i> (10 g)	1 g <i>u_i</i> (±%)	10 g <i>u_i</i> (±%)	<i>v_i</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)			<i>k</i> =2				22	22	

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

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e = f(d,k)</i>	<i>f</i>	<i>g</i>	<i>h = c x f / e</i>	<i>i = c x g / e</i>	<i>k</i>
Uncertainty Component	IEEE 1528 section	Tol. (± %)	Prob. Dist.	Div.	<i>c_i</i> (1 g)	<i>c_i</i> (10 g)	1 g <i>u_i</i> (±%)	10 g <i>u_i</i> (±%)	<i>v_i</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)			<i>k</i> =2				18	17	

Notes for Tables 1 and 2

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

b) Tol. - tolerance in influence quantity.

c) Prob. Dist. – Probability distribution

d) N, R - normal, rectangular probability distributions

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

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

Appendix B

Probe Calibration Certificates

Calibration Laboratory of
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Accreditation No.: **SCS 108**

Client **Motorola CGISS**

Certificate No: **ET3-1383_Feb06**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1383**

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

Calibration date: **February 22, 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 $(22 \pm 3)^\circ\text{C}$ 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	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	2-Feb-06 (SPEAG, No. DAE4-654_Feb06)	Feb-07

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

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

Issued: February 22, 2006

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

Calibration Laboratory of

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Zeughausstrasse 43, 8004 Zurich, Switzerland



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Accreditation No.: **SCS 108****Glossary:**

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

ET3DV6 SN:1383

February 22, 2006

DASY - Parameters of Probe: ET3DV6 SN:1383**Sensitivity in Free Space^A****Diode Compression^B**

NormX	1.87 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	90 mV
NormY	1.63 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	90 mV
NormZ	1.70 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	90 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

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

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	9.4	5.0
SAR _{be} [%]	With Correction Algorithm	0.0	0.0

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	8.3	4.5
SAR _{be} [%]	With Correction Algorithm	0.1	0.3

Sensor Offset

Probe Tip to Sensor Center	2.7 mm
Optical Surface Detection	NOT in Tolerance

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

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

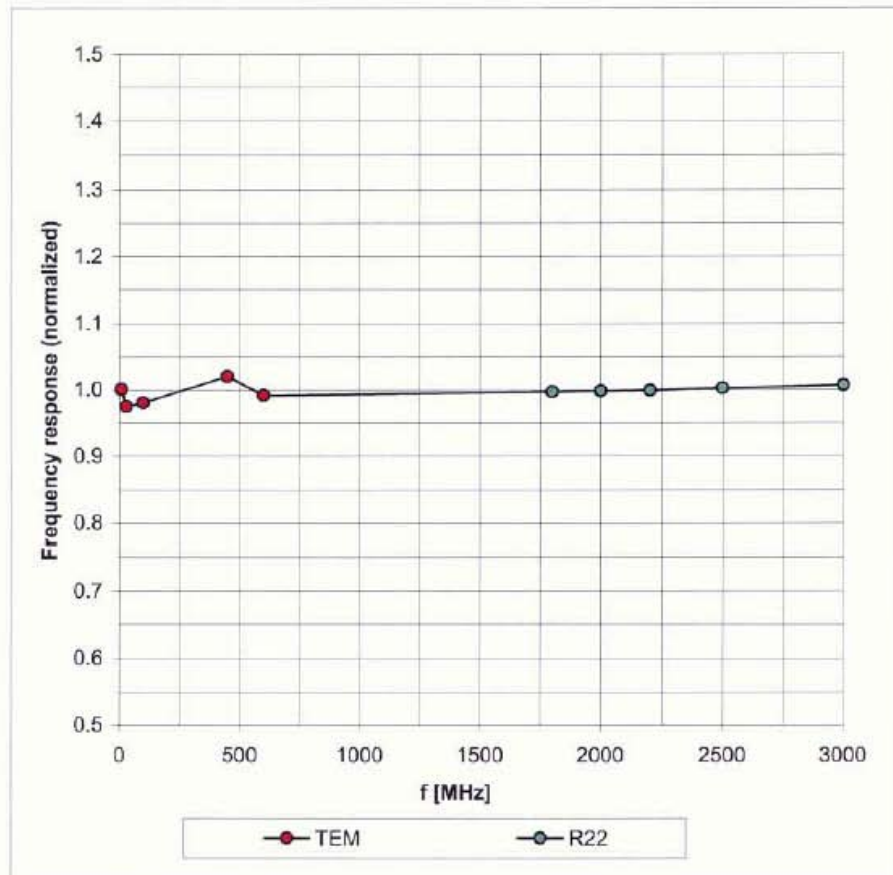
^B Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1383

February 22, 2006

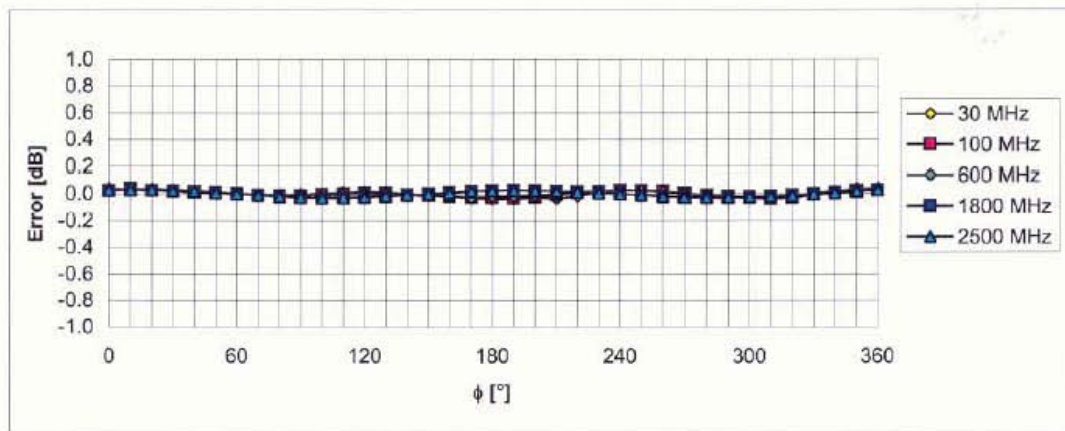
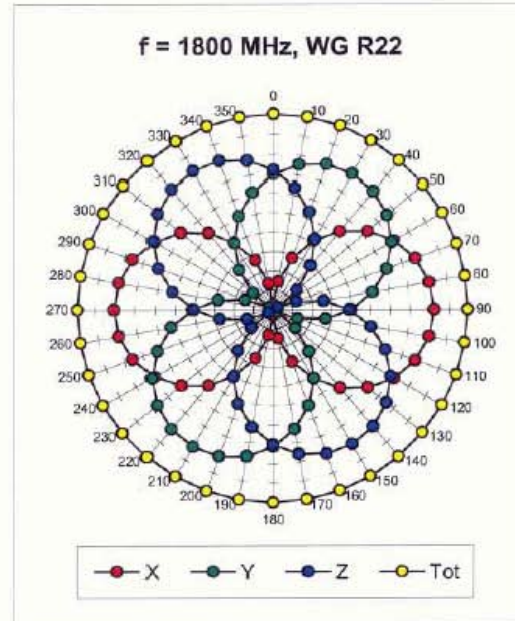
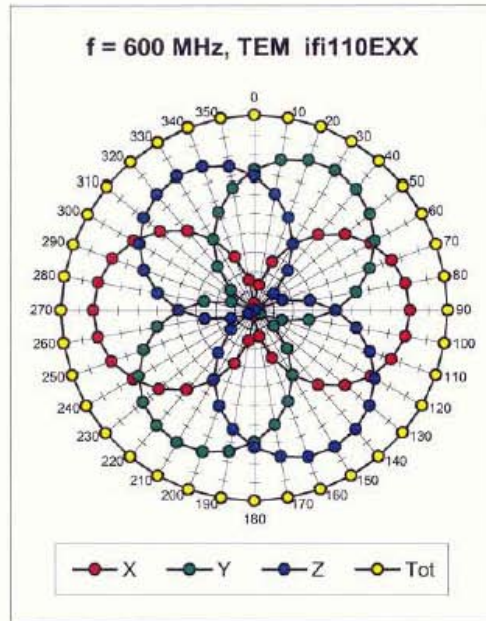
Frequency Response of E-Field

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

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

ET3DV6 SN:1383

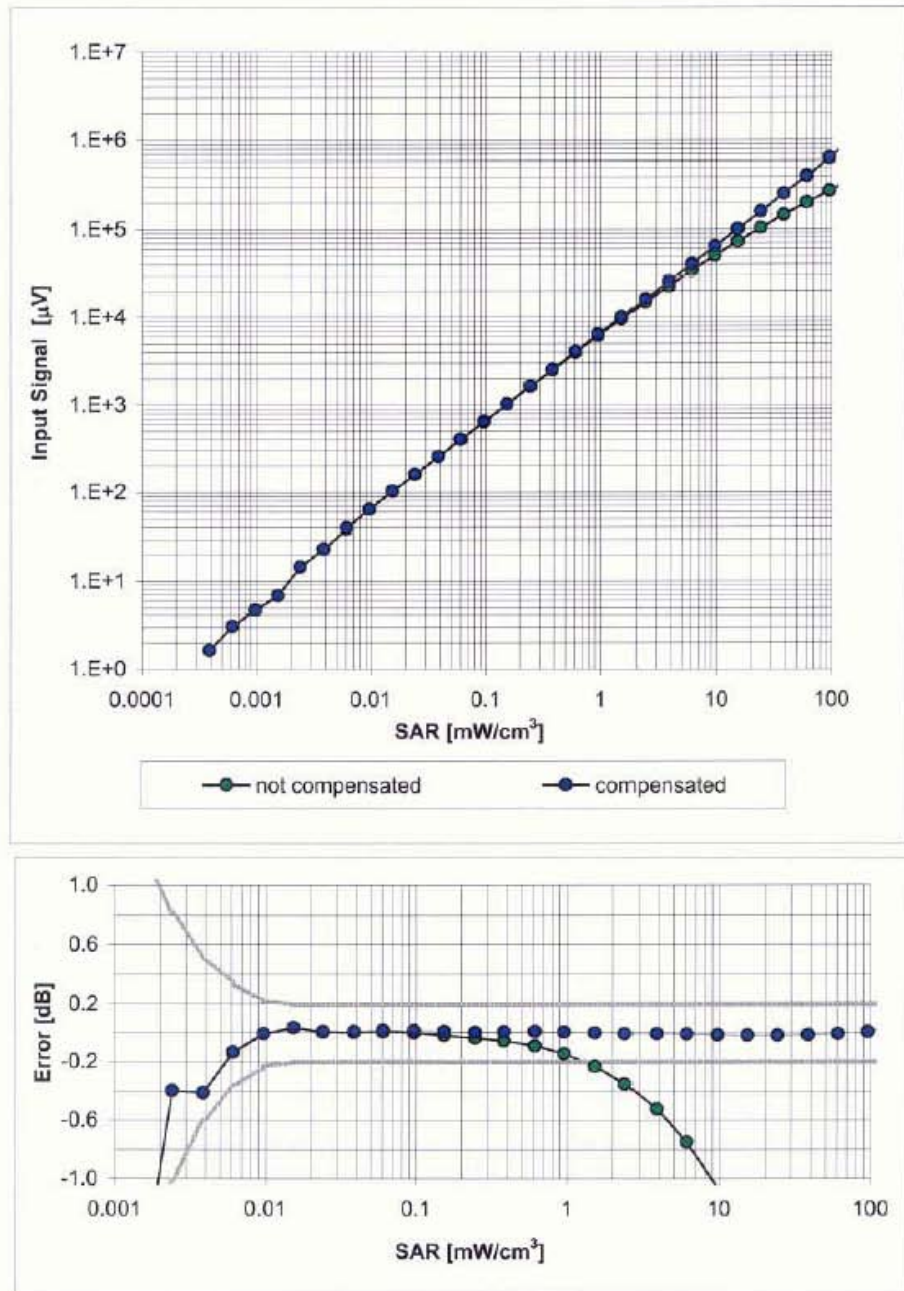
February 22, 2006

Receiving Pattern (ϕ), $\vartheta = 0^\circ$ **Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)**

ET3DV6 SN:1383

February 22, 2006

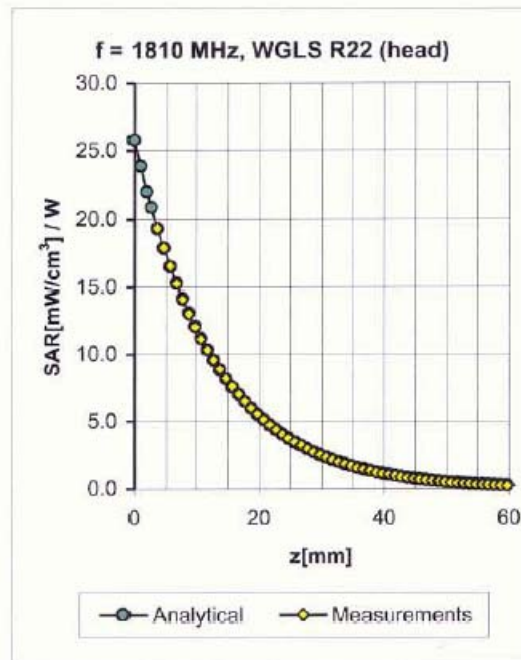
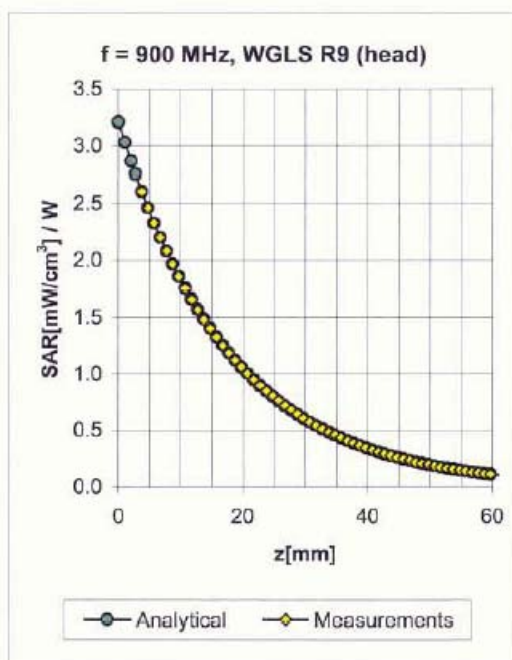
Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$)



ET3DV6 SN:1383

February 22, 2006

Conversion Factor Assessment



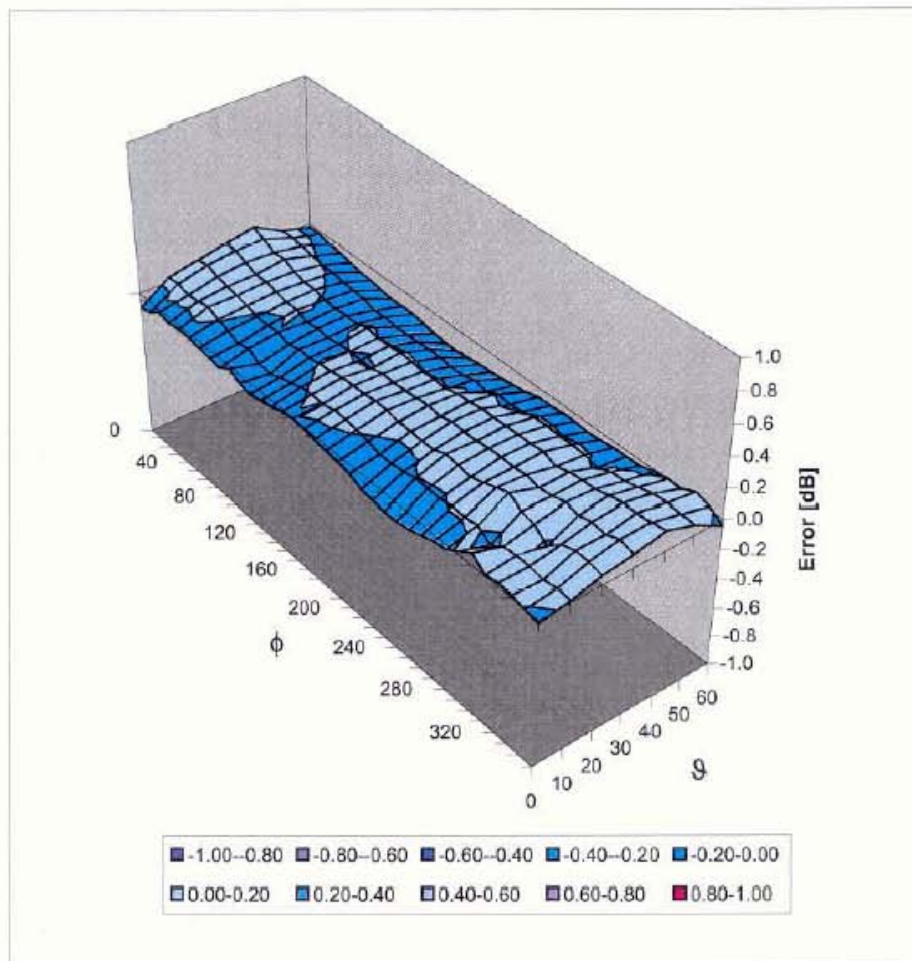
f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.30	2.95	6.74 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.74	1.72	6.21 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.77	1.59	5.13 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	1.12	1.16	4.56 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.27	3.94	7.12 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.62	1.94	5.89 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.88	1.77	4.66 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	1.29	1.16	4.29 ± 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:1383

February 22, 2006

Deviation from Isotropy in HSL

Error (ϕ , θ), $f = 900$ MHzUncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

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Accreditation No.: **SCS 108**

Client **Motorola CGISS**

Certificate No: **ET3-1545_Oct05**

CALIBRATION CERTIFICATE

Object **ET3DV6R - SN:1545**

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**

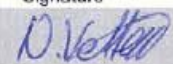
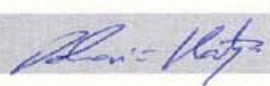
This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ 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

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

ET3DV6R SN:1545

October 25, 2005

DASY - Parameters of Probe: ET3DV6R SN:1545**Sensitivity in Free Space^A****Diode Compression^B**

NormX	2.12 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	94 mV
NormY	2.21 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	94 mV
NormZ	1.86 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	94 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	8.7	4.5
SAR _{be} [%]	With Correction Algorithm	0.1	0.2

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	13.6	9.1
SAR _{be} [%]	With Correction Algorithm	0.8	0.1

Sensor Offset

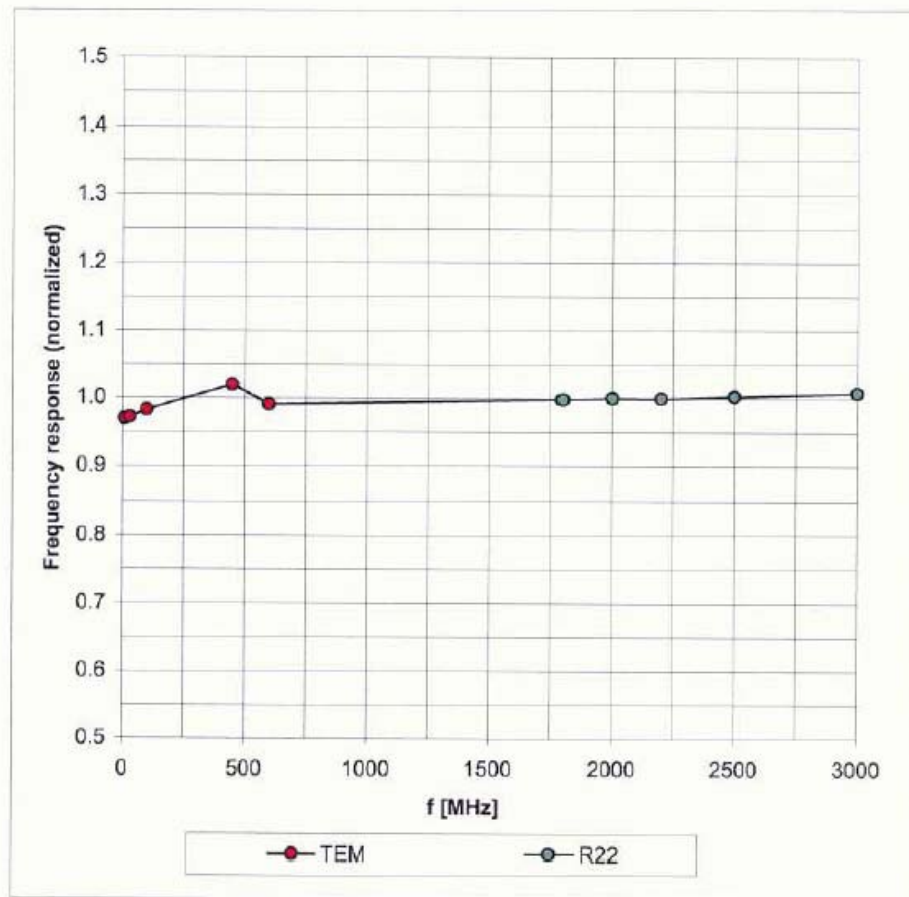
Probe Tip to Sensor Center	2.7 mm
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ET3DV6R SN:1545

October 25, 2005

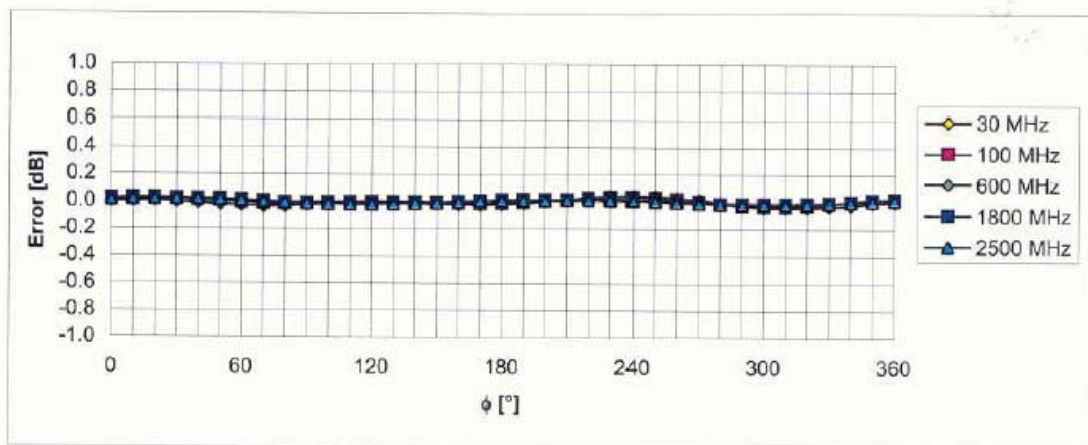
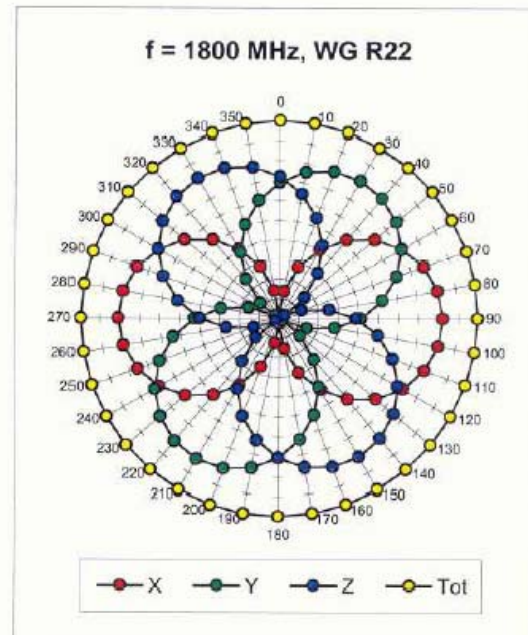
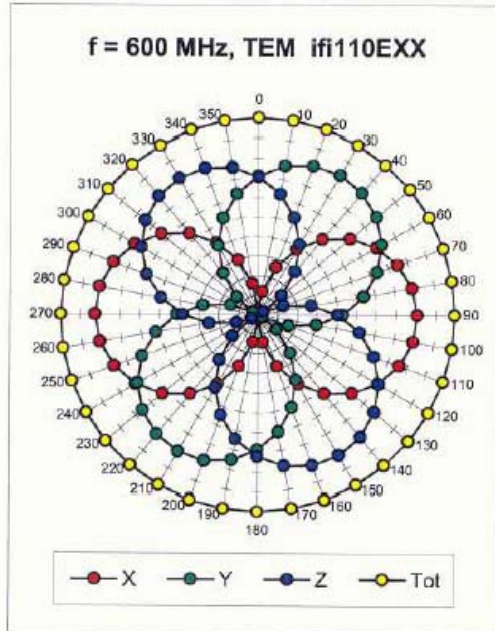
Frequency Response of E-Field

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

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

ET3DV6R SN:1545

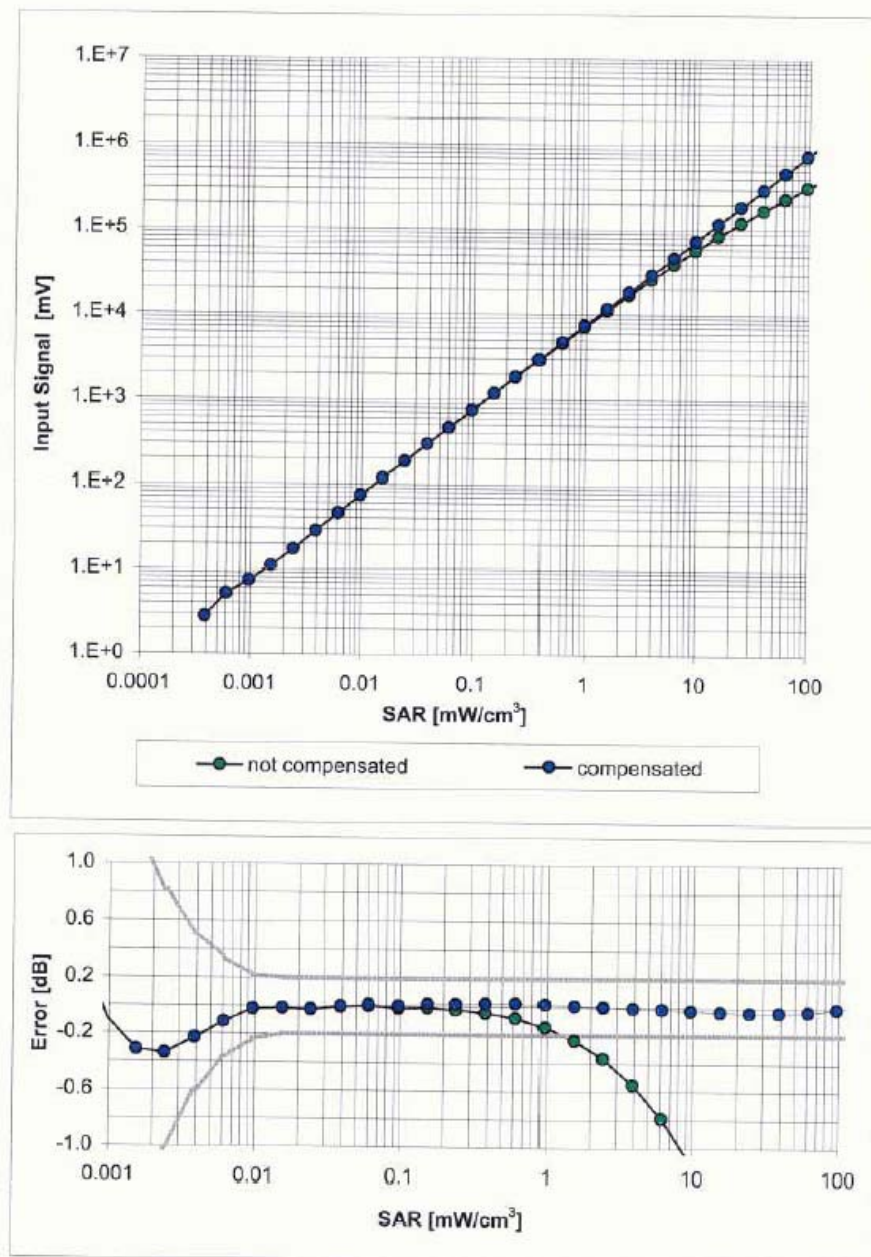
October 25, 2005

Receiving Pattern (ϕ), $\theta = 0^\circ$ Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

ET3DV6R SN:1545

October 25, 2005

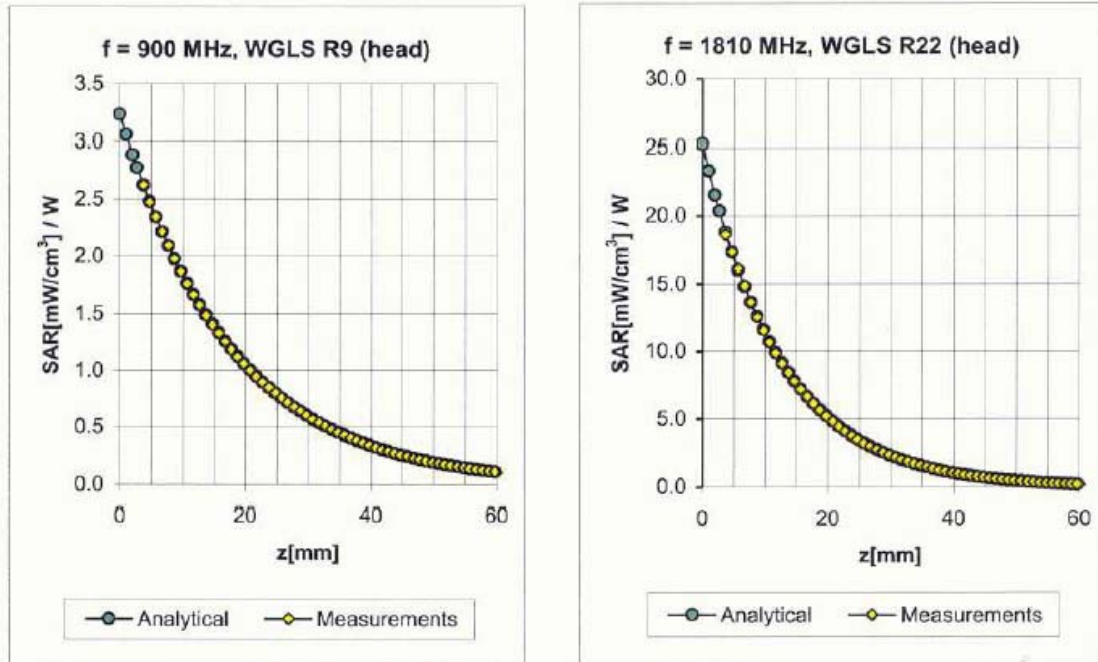
Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$)

Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

ET3DV6R SN:1545

October 25, 2005

Conversion Factor Assessment



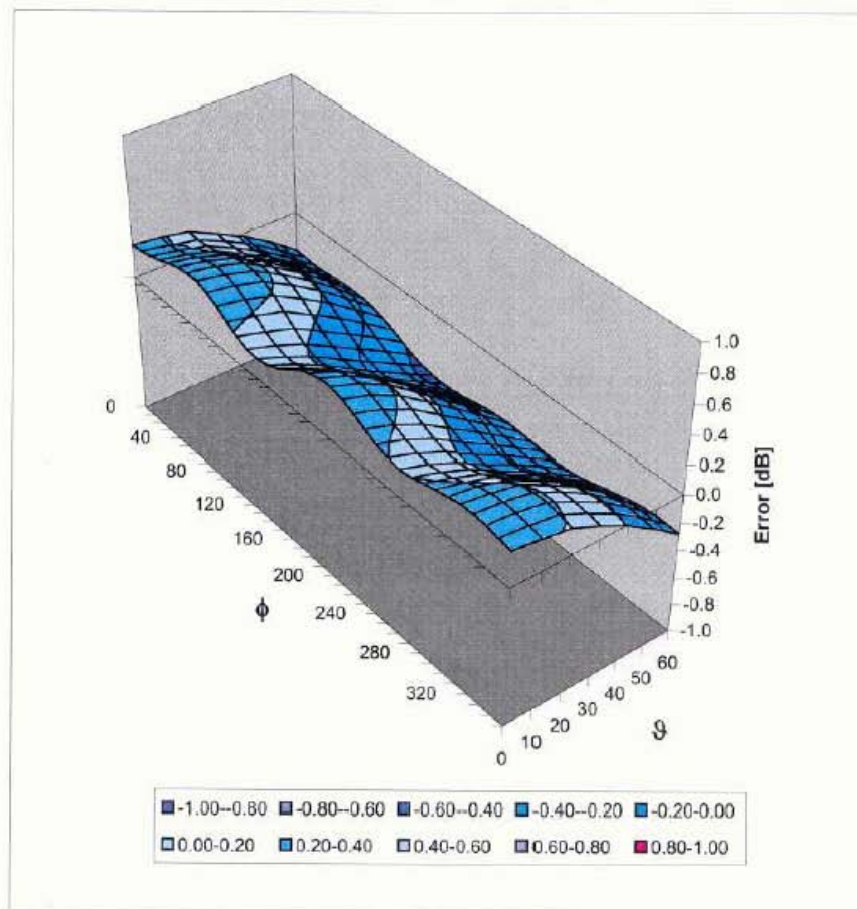
f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.04	2.40	6.38 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.62	1.80	5.68 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.65	2.27	4.72 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.80	2.02	3.99 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.02	2.60	6.68 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.53	2.03	5.57 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.64	2.47	4.17 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.91	1.73	3.96 ± 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.

ET3DV6R SN:1545

October 25, 2005

Deviation from Isotropy in HSL

Error (ϕ , θ), $f = 900$ MHz**Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)**

Appendix C

Dipole Calibration Certificates

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

Client **Motorola CGISS**

CALIBRATION CERTIFICATE

Object(s) **D900V2 - SN:085**

Calibration procedure(s) **QA CAL-05.v2**
Calibration procedure for dipole validation kits

Calibration date: **August 19, 2004**

Condition of the calibrated item **In Tolerance (according to the specific calibration document)**

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 ± 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 E442	GB37480704	6-Nov-03 (METAS, No. 252-0254)	Nov-04
Power sensor HP 8481A	US37292783	6-Nov-03 (METAS, No. 252-0254)	Nov-04
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check; Mar-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-03)	In house check; Oct 05

	Name	Function	Signature
Calibrated by:	Judith Mueller	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: August 25, 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.

1. Measurement Conditions

The measurements were performed in the half size flat phantom filled with **head simulating solution** of the following electrical parameters at 900 MHz:

Relative Dielectricity	41.0 $\pm 5\%$
Conductivity	0.97 mho/m $\pm 5\%$

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.18 at 900 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole center to the solution surface. 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 $250\text{mW} \pm 3\%$. The results are normalized to 1W input power.

2. SAR Measurement with DASY4 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:	11.0 mW/g $\pm 16.8\%$ ($k=2$) ¹
averaged over 10 cm^3 (10 g) of tissue:	7.04 mW/g $\pm 16.2\%$ ($k=2$) ¹

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:	1.392 ns	(one direction)
Transmission factor:	0.987	(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 900 MHz:	$\text{Re}\{Z\} = 48.8 \, \Omega$
---------------------------------	-----------------------------------

	$\text{Im}\{Z\} = -6.6 \, \Omega$
--	-----------------------------------

Return Loss at 900 MHz	-22.7 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 900 MHz; Type: D900V2; Serial: D900V2 - SN085

Communication System: CW-900; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: HSL 900 MHz;

Medium parameters used: $f = 900$ MHz; $\sigma = 0.97$ mho/m; $\epsilon_r = 41$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.18, 6.18, 6.18); Calibrated: 1/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 7/22/2004
- Phantom: Flat Phantom half size; Type: QD000P49AA; Serial: SN:1001;
- Measurement SW: DASY4, V4.3 Build 16; Postprocessing SW: SEMCAD, V1.8 Build 123

Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.93 mW/g

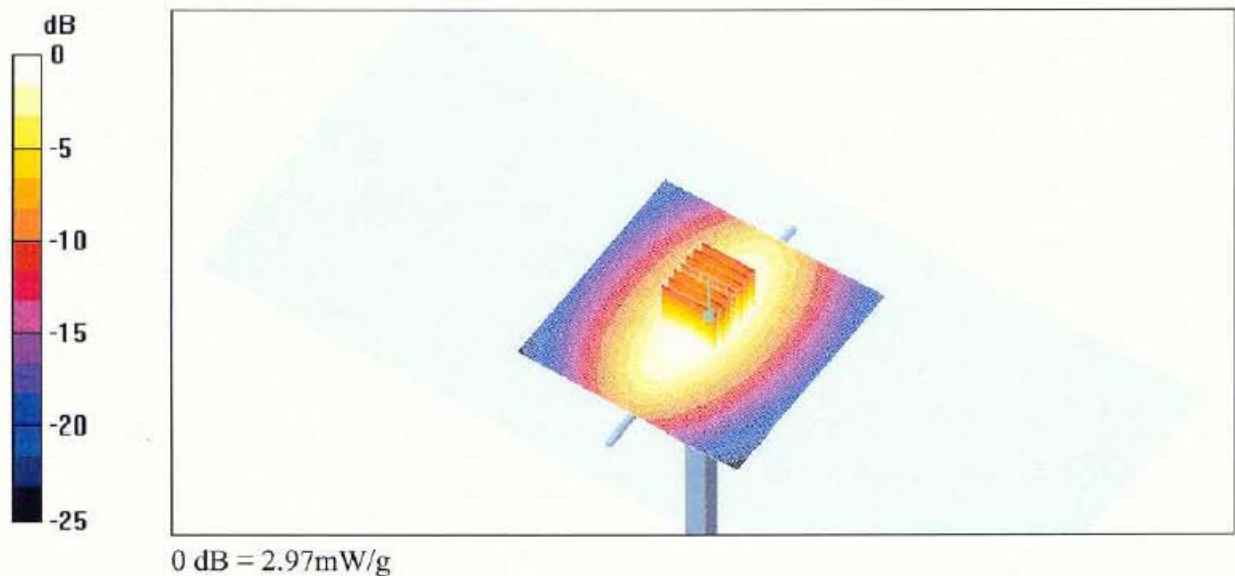
Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.2 V/m; Power Drift = -0.0 dB

Peak SAR (extrapolated) = 4.11 W/kg

SAR(1 g) = 2.74 mW/g; SAR(10 g) = 1.76 mW/g

Maximum value of SAR (measured) = 2.97 mW/g



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



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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: **D1900V2-521_Apr06**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 521**

Calibration procedure(s) **QA CAL-05.v6
Calibration procedure for dipole validation kits**

Calibration date: **April 28, 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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
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
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov-06

Calibrated by:	Name Marcel Fehr	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 2, 2006

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

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



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

- 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	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.4 $\pm$ 6 %	1.41 mho/m $\pm$ 6 %
Head TSL temperature during test	(21.6 $\pm$ 0.2) °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	9.33 mW / g
SAR normalized	normalized to 1W	37.3 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	36.9 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.89 mW / g
SAR normalized	normalized to 1W	19.6 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	19.4 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.4 Ω - 8.4 j Ω
Return Loss	- 20.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.189 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	September 20, 2000

DASY4 Validation Report for Head TSL

Date/Time: 28.04.2006 14:38:56

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:521

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.74, 4.74, 4.74); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 21; Postprocessing SW: SEMCAD, V1.8 Build 165

Pin = 250 mW; d = 10 mm/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 10.9 mW/g

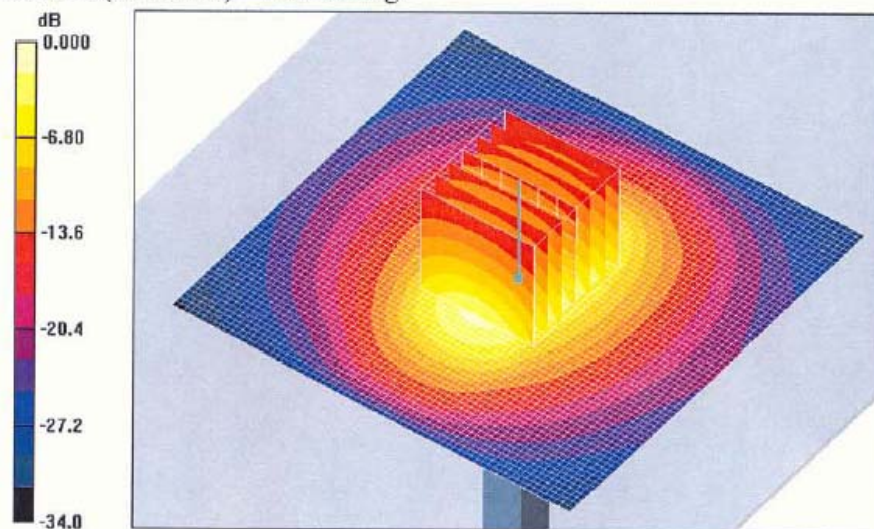
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.1 V/m; Power Drift = -0.036 dB

Peak SAR (extrapolated) = 16.1 W/kg

SAR(1 g) = 9.33 mW/g; SAR(10 g) = 4.89 mW/g

Maximum value of SAR (measured) = 10.7 mW/g



0 dB = 10.7mW/g

Appendix D

Test System Verification Scans

Note: Dipole validation scans at the head from SPEAG are provided in APPENDIX D. The NE 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 NE EME system performance validation are provided herein. To assess the isotropic characteristics of the measurement probe, two system performance zoom scans (0 and 90 degrees) were measured. The results were averaged together and adjusted to account for the power drift in order to obtain the final calculated 1 and 10 gram results.

Motorola NE EME Lab**SPEAG 900 MHz Dipole; Model D900V2, SN 085; Test Date: 5/5/06**

Run #: ErC SysP 900H-060505-01 Sim.Tissue Temp: 21.1 (C)

TX Freq: 900 (MHz) Start power: 250 (mW)

Target:

12.23 mW/g for 1g SAR; 7.76 mW/g for 10g SAR

11.83 mW/g calculated 1g-SAR; - 3.25% from target (including drift)

7.54 mW/g calculated 10g-SAR; - 2.87% from target (including drift)

Probe: ET3DV6R - SN1545, Calibrated: 10/25/2005, ConvF(5.68, 5.68, 5.68)

Duty Cycle: 1:1, Medium: 900 IEEE Head, Medium parameters used: $f = 900$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 41.9$; $\rho = 1000$ kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 58.7 V/m; Power Drift = 0.0247 dB

Peak SAR (extrapolated) = 4.58 W/kg

SAR(1 g) = 3.01 mW/g; SAR(10 g) = 1.92 mW/g

Maximum value of SAR (measured) = 3.28 mW/g

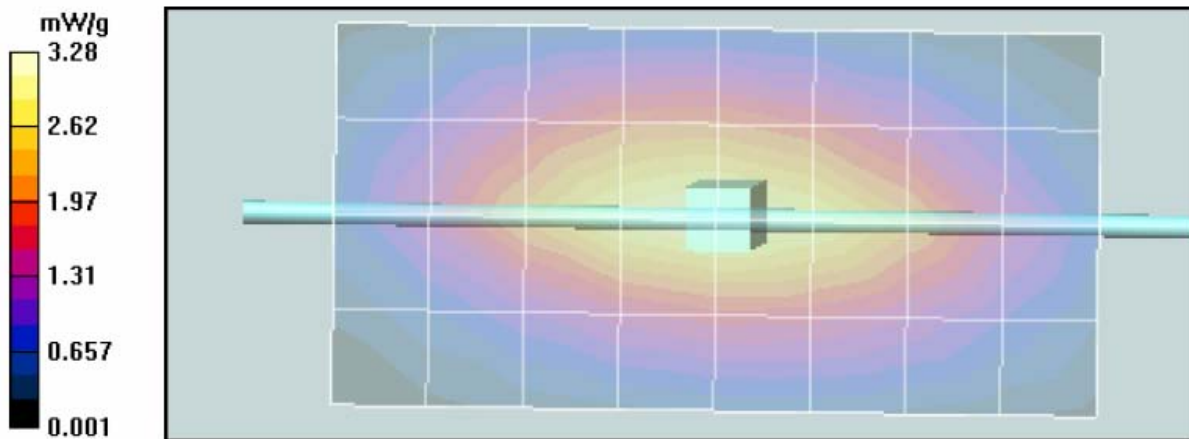
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 58.7 V/m; Power Drift = 0.0247 dB

Peak SAR (extrapolated) = 4.50 W/kg

SAR(1 g) = 2.94 mW/g; SAR(10 g) = 1.87 mW/g

Maximum value of SAR (measured) = 3.16 mW/g



Motorola NE EME Lab**SPEAG 900 MHz Dipole; Model D900V2, SN 085; Test Date: 5/7/06**

Run #: MeC-SYSP 900H-060507-01 Sim.Tissue Temp: 21.0 (C)

TX Freq: 900 (MHz) Start power: 250 (mW)

Target:

12.23 mW/g for 1g SAR; 7.76 mW/g for 10g SAR

11.89 mW/g calculated 1g-SAR; - 2.77 % from target (including drift)

7.58 mW/g calculated 10g-SAR; - 2.33 % from target (including drift)

Probe: ET3DV6R - SN1545, Calibrated: 10/25/2005, ConvF(5.68, 5.68, 5.68)

Duty Cycle: 1:1, Medium: 900 IEEE Head, Medium parameters used: $f = 900$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 42.6$; $\rho = 1000$ kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 58.6 V/m; Power Drift = -0.0112 dB

Peak SAR (extrapolated) = 4.58 W/kg

SAR(1 g) = 3 mW/g; SAR(10 g) = 1.91 mW/g

Maximum value of SAR (measured) = 3.26 mW/g

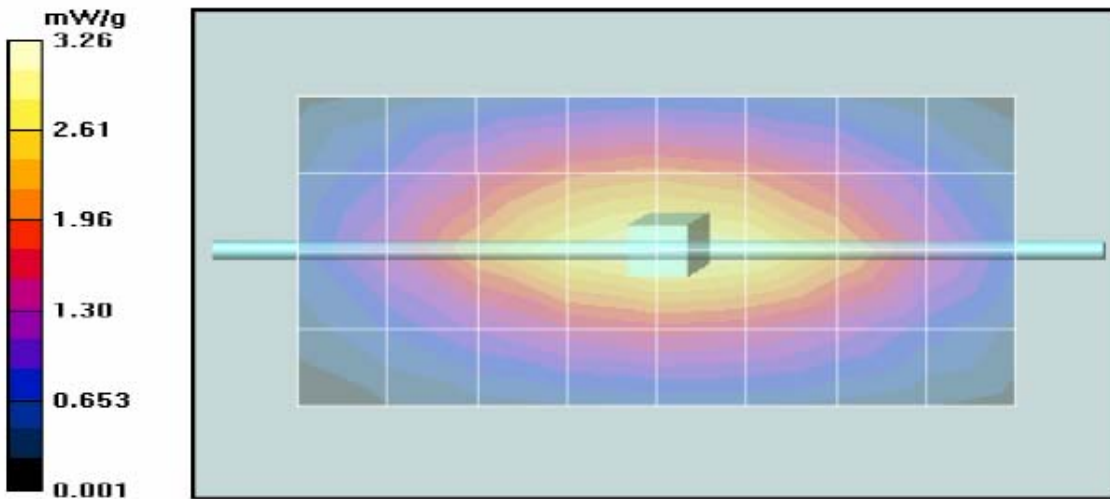
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 58.6 V/m; Power Drift = -0.0112 dB

Peak SAR (extrapolated) = 4.49 W/kg

SAR(1 g) = 2.93 mW/g; SAR(10 g) = 1.87 mW/g

Maximum value of SAR (measured) = 3.17 mW/g



Motorola NE EME Lab**SPEAG 900 MHz Dipole; Model D900V2, SN 085; Test Date: 5/8/06**

Run #: JsT-SYSP-900H-060508-01 Sim.Tissue Temp: 21.0 (C)

TX Freq: 900 (MHz) Start power: 250 (mW)

Target:

12.23 mW/g for 1g SAR; 7.76 mW/g for 10g SAR

12.20 mW/g calculated 1g-SAR; -0.25% from target (including drift)

7.75 mW/g calculated 10g-SAR; -0.13% from target (including drift)

Probe: ET3DV6R - SN1545, Calibrated: 10/25/2005, ConvF(5.68, 5.68, 5.68)

Duty Cycle: 1:1, Medium: 900 IEEE Head, Medium parameters used: $f = 900$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 42.6$; $\rho = 1000$ kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 59.6 V/m; Power Drift = -0.0282 dB

Peak SAR (extrapolated) = 4.68 W/kg

SAR(1 g) = 3.07 mW/g; SAR(10 g) = 1.95 mW/g

Maximum value of SAR (measured) = 3.34 mW/g

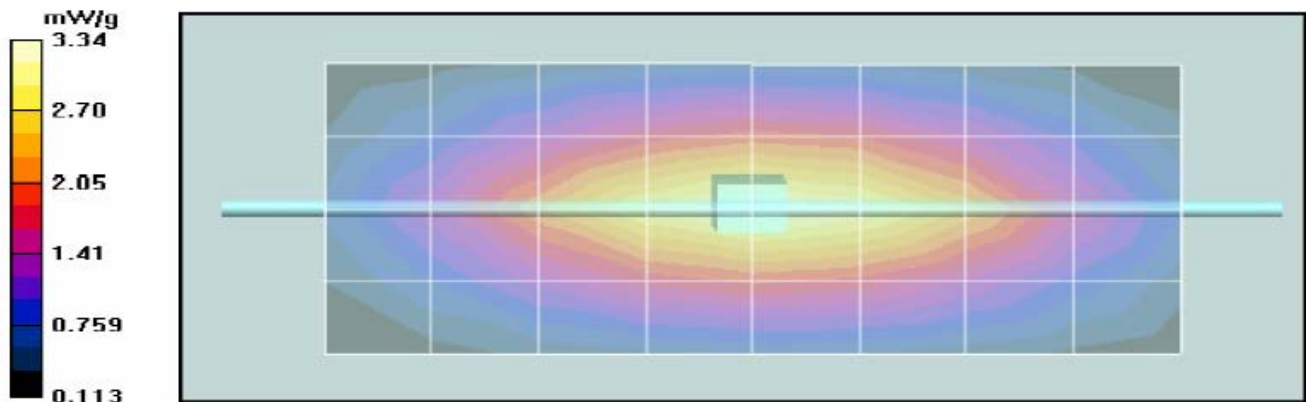
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 59.6 V/m; Power Drift = -0.0282 dB

Peak SAR (extrapolated) = 4.58 W/kg

SAR(1 g) = 2.99 mW/g; SAR(10 g) = 1.9 mW/g

Maximum value of SAR (measured) = 3.26 mW/g



Motorola NE EME Lab**SPEAG 900 MHz Dipole; Model D900V2, SN 085; Test Date: 5/16/06**

Run #: JsT-SYSP-900H-060516-01 Sim.Tissue Temp: 20.5 (C)

TX Freq: 900 (MHz) Start power: 250 (mW)

Target:

12.23 mW/g for 1g SAR; 7.76 mW/g for 10g SAR

11.75 mW/g calculated 1g-SAR; -3.95% from target (including drift)

7.46 mW/g calculated 10g-SAR; -3.83% from target (including drift)

Probe: ET3DV6 - SN1383, Calibrated: 2/22/2006, ConvF(6.21, 6.21, 6.21)

Duty Cycle: 1:1, Medium: 900 IEEE Head, Medium parameters used: $f = 900$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 42.6$; $\rho = 1000$ kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 58.3 V/m; Power Drift = -0.0249 dB

Peak SAR (extrapolated) = 4.49 W/kg

SAR(1 g) = 2.93 mW/g; SAR(10 g) = 1.86 mW/g

Maximum value of SAR (measured) = 3.19 mW/g

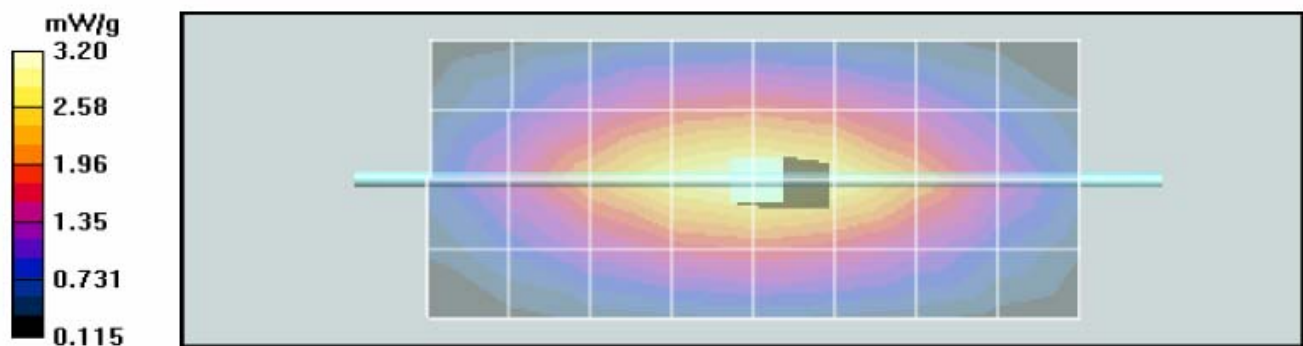
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 58.3 V/m; Power Drift = -0.0249 dB

Peak SAR (extrapolated) = 4.46 W/kg

SAR(1 g) = 2.91 mW/g; SAR(10 g) = 1.85 mW/g

Maximum value of SAR (measured) = 3.16 mW/g



Motorola NE EME Lab**SPEAG 900 MHz Dipole; Model D900V2, SN 085; Test Date: 5/17/06**

Run #: JsT-SYSP-900B-060517-01 Sim.Tissue Temp: 21.2 (C)

TX Freq: 900 (MHz) Start power: 250 (mW)

Target:

12.13 mW/g for 1g SAR; 7.81 mW/g for 10g SAR

11.60 mW/g calculated 1g-SAR; -4.39% from target (including drift)

7.46 mW/g calculated 10g-SAR; -4.48% from target (including drift)

Probe: ET3DV6 - SN1383, Calibrated: 2/22/2006, ConvF(5.89, 5.89, 5.89)

Duty Cycle: 1:1, Medium: 900 MHz FCC Body, Medium parameters used: $f = 900$ MHz; $\sigma = 1.03$ mho/m; $\epsilon_r = 53.2$; $\rho =$ 1000 kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 57.8 V/m; Power Drift = 0.0233 dB

Peak SAR (extrapolated) = 4.34 W/kg

SAR(1 g) = 2.92 mW/g; SAR(10 g) = 1.88 mW/g

Maximum value of SAR (measured) = 3.18 mW/g

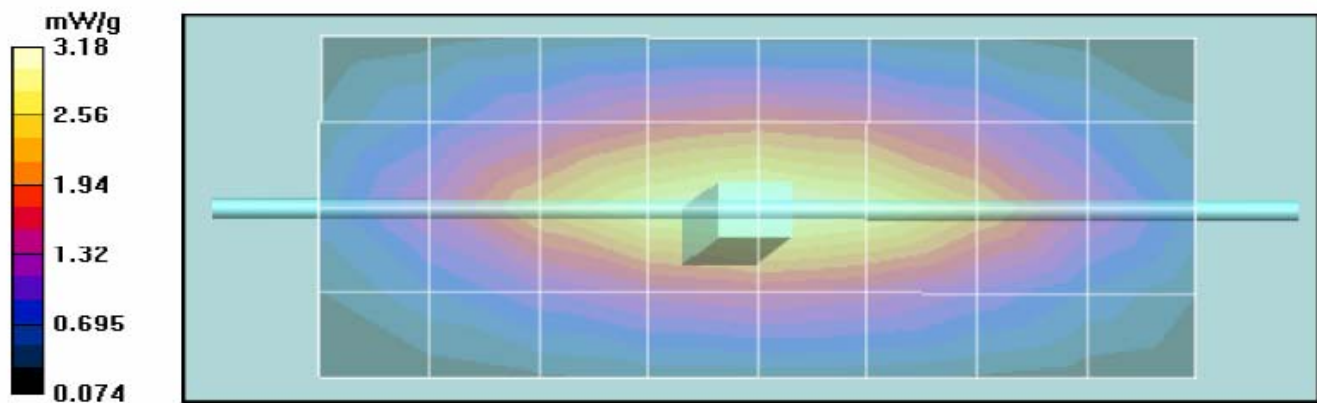
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 57.8 V/m; Power Drift = 0.0233 dB

Peak SAR (extrapolated) = 4.35 W/kg

SAR(1 g) = 2.91 mW/g; SAR(10 g) = 1.87 mW/g

Maximum value of SAR (measured) = 3.11 mW/g



Motorola NE EME Lab**SPEAG 900 MHz Dipole; Model D900V2, SN 085; Test Date: 5/18/06**

Run #: JsT-SYSP-900B-060518-05 Sim.Tissue Temp: 20.5 (C)

TX Freq: 900 (MHz) Start power: 250 (mW)

Target:

12.13 mW/g for 1g SAR; 7.81 mW/g for 10g SAR

11.77 mW/g calculated 1g-SAR; -3.00% from target (including drift)

7.55 mW/g calculated 10g-SAR; -3.33% from target (including drift)

Probe: ET3DV6 - SN1383, Calibrated: 2/22/2006, ConvF(5.89, 5.89, 5.89)

Duty Cycle: 1:1, Medium: 900 MHz FCC Body, Medium parameters used: $f = 900$ MHz; $\sigma = 1.04$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 57.5 V/m; Power Drift = -0.0171 dB

Peak SAR (extrapolated) = 4.37 W/kg

SAR(1 g) = 2.94 mW/g; SAR(10 g) = 1.89 mW/g

Maximum value of SAR (measured) = 3.21 mW/g

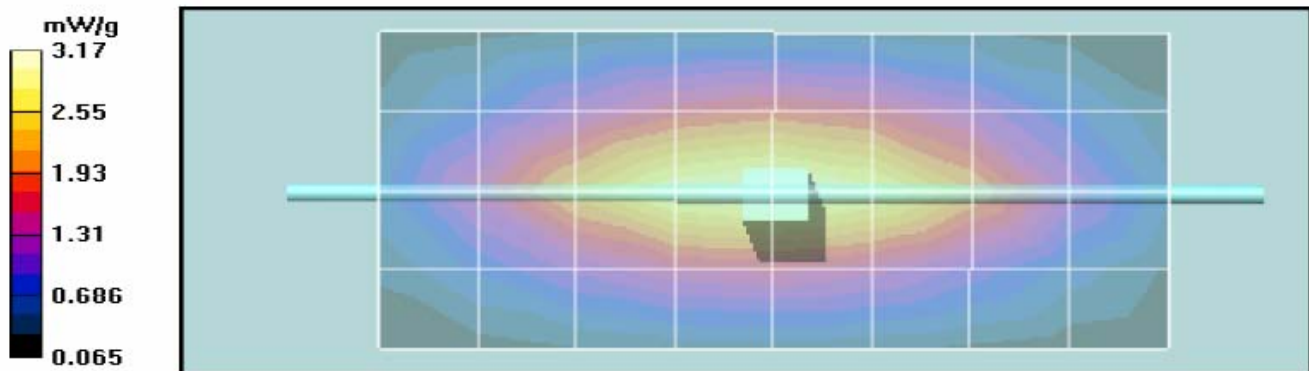
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 57.5 V/m; Power Drift = -0.0171 dB

Peak SAR (extrapolated) = 4.34 W/kg

SAR(1 g) = 2.92 mW/g; SAR(10 g) = 1.87 mW/g

Maximum value of SAR (measured) = 3.14 mW/g



Motorola NE EME Lab**SPEAG 900 MHz Dipole; Model D900V2, SN 085; Test Date: 5/19/06**

Run #: JsT-SYSP-900B-060519-01 Sim.Tissue Temp: 21.0 (C)

TX Freq: 900 (MHz) Start power: 250 (mW)

Target:

12.13 mW/g for 1g SAR; 7.81 mW/g for 10g SAR

11.80 mW/g calculated 1g-SAR; -2.75% from target (including drift)

7.57 mW/g calculated 10g-SAR; -3.06% from target (including drift)

Probe: ET3DV6 - SN1383, Calibrated: 2/22/2006, ConvF(5.89, 5.89, 5.89)

Duty Cycle: 1:1, Medium: 900 MHz FCC Body, Medium parameters used: $f = 900$ MHz; $\sigma = 1.04$ mho/m; $\epsilon_r = 53.3$; $\rho =$ 1000 kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

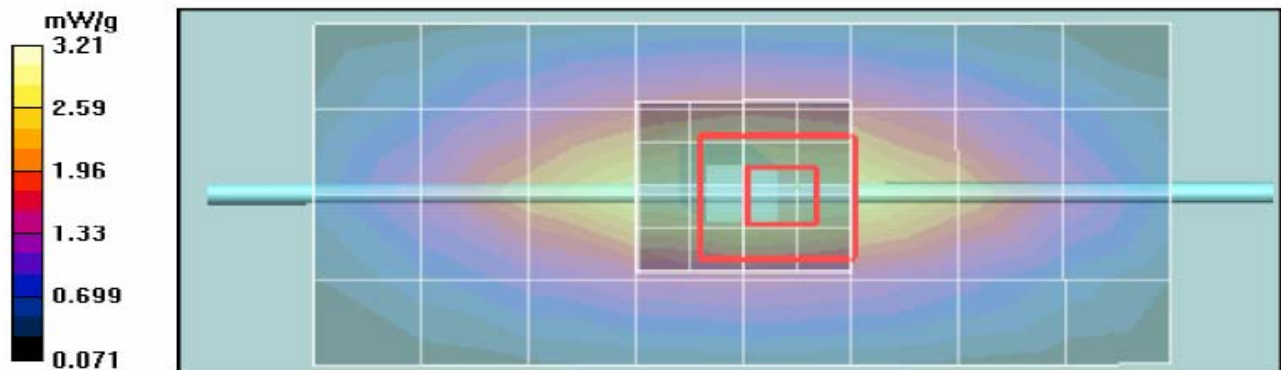
dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 57.9 V/m; Power Drift = -0.0062 dB

Peak SAR (extrapolated) = 4.36 W/kg

SAR(1 g) = 2.93 mW/g; SAR(10 g) = 1.88 mW/g

Maximum value of SAR (measured) = 3.16 mW/g

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.



Motorola NE EME Lab**SPEAG 900 MHz Dipole; Model D900V2, SN 085; Test Date: 5/22/06**

Run #: JsT-SYSP-900H-060522-01 Sim.Tissue Temp: 20.1 (C)

TX Freq: 900 (MHz) Start power: 250 (mW)

Target:

12.23 mW/g for 1g SAR; 7.76 mW/g for 10g SAR

11.83 mW/g calculated 1g-SAR; -3.23% from target (including drift)

7.51 mW/g calculated 10g-SAR; -3.16% from target (including drift)

Probe: ET3DV6 - SN1383, Calibrated: 2/22/2006, ConvF(6.21, 6.21, 6.21)

Duty Cycle: 1:1, Medium: 900 IEEE Head, Medium parameters used: $f = 900$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 42.3$; $\rho = 1000$ kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 58.5 V/m; Power Drift = -0.0202 dB

Peak SAR (extrapolated) = 4.52 W/kg

SAR(1 g) = 2.96 mW/g; SAR(10 g) = 1.88 mW/g

Maximum value of SAR (measured) = 3.21 mW/g

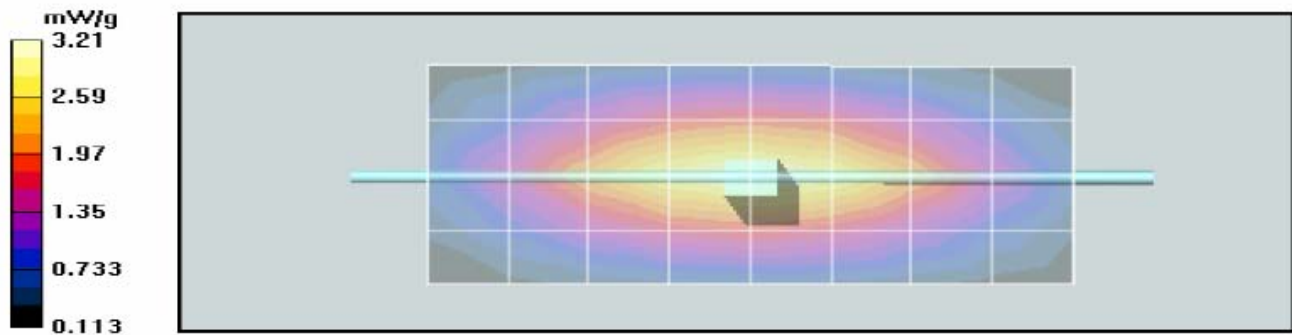
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 58.5 V/m; Power Drift = -0.0202 dB

Peak SAR (extrapolated) = 4.47 W/kg

SAR(1 g) = 2.93 mW/g; SAR(10 g) = 1.86 mW/g

Maximum value of SAR (measured) = 3.17 mW/g



Motorola NE EME Lab**SPEAG 1900 MHz Dipole; Model D1900V2, SN 521; Test Date: 6/2/06**

Run #: ErC-SYSP-1900B-060602-01 Sim.Tissue Temp: 21.5 (C)

TX Freq: 1900 (MHz) Start power: 250 (mW)

Target:

45.14 mW/g for 1g SAR; 23.41 mW/g for 10g SAR

46.90 mW/g calculated 1g-SAR; 3.90 % from target (including drift)

23.97 mW/g calculated 10g-SAR; 2.41 % from target (including drift)

Probe: ET3DV6 - SN1383, Calibrated: 2/22/2006, ConvF(4.66, 4.66, 4.66)

Duty Cycle: 1:1, Medium: 1900 MHz FCC Body, Medium parameters used: $f = 1900$ MHz; $\sigma = 1.59$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 95.0 V/m; Power Drift = -0.0279 dB

Peak SAR (extrapolated) = 22.5 W/kg

SAR(1 g) = 11.7 mW/g; SAR(10 g) = 5.98 mW/g

Maximum value of SAR (measured) = 12.8 mW/g

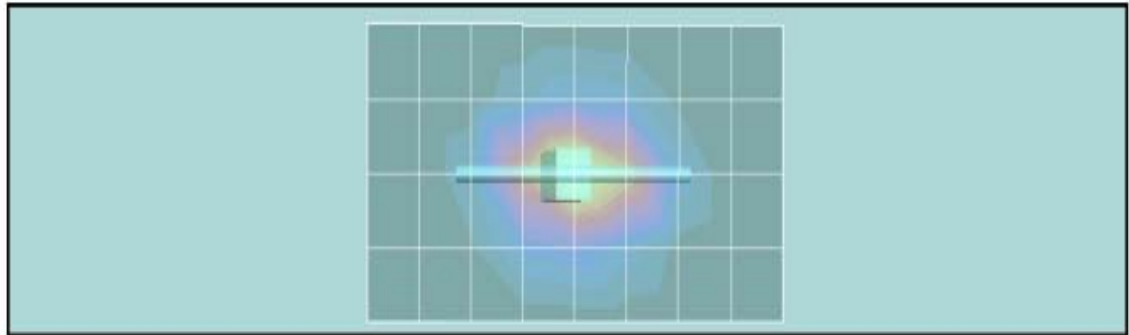
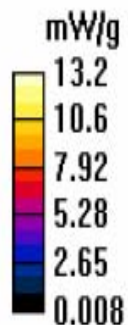
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 95.0 V/m; Power Drift = -0.0279 dB

Peak SAR (extrapolated) = 22.4 W/kg

SAR(1 g) = 11.6 mW/g; SAR(10 g) = 5.93 mW/g

Maximum value of SAR (measured) = 12.7 mW/g



Motorola NE EME Lab**SPEAG 1900 MHz Dipole; Model D1900V2, SN 521; Test Date: 6/3/06**

Run #: JsT-SYSP-1900H-060603-01 Sim.Tissue Temp: 21.0 (C)

TX Freq: 1900 (MHz) Start power: 250 (mW)

Target:

43.62 mW/g for 1g SAR; 22.46 mW/g for 10g SAR

44.75 mW/g calculated 1g-SAR; 2.58% from target (including drift)

22.87 mW/g calculated 10g-SAR; 1.84% from target (including drift)

Probe: ET3DV6 - SN1383, Calibrated: 2/22/2006, ConvF(5.13, 5.13, 5.13)

Duty Cycle: 1:1, Medium: 1900 IEEE Head, Medium parameters used: $f = 1900$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 97.3 V/m; Power Drift = 0.00522 dB

Peak SAR (extrapolated) = 22.3 W/kg

SAR(1 g) = 11.3 mW/g; SAR(10 g) = 5.76 mW/g

Maximum value of SAR (measured) = 12.4 mW/g

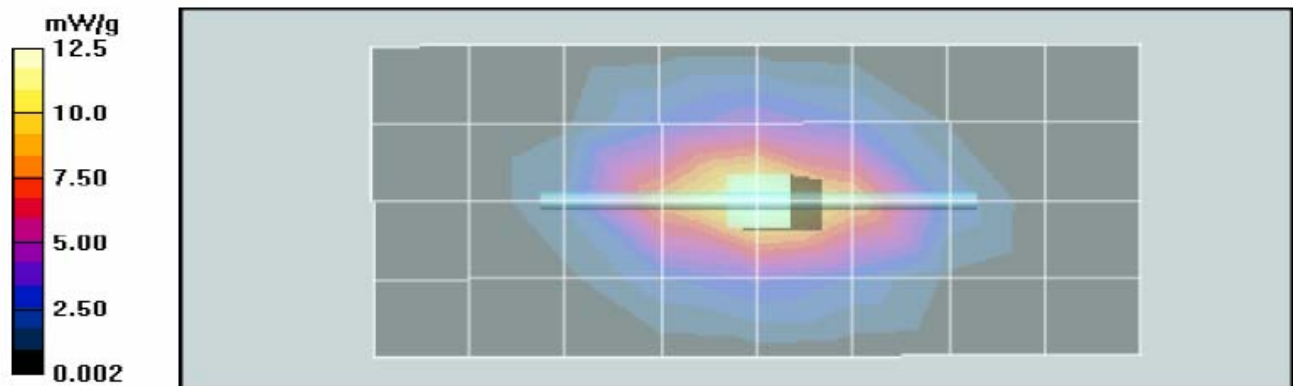
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 97.3 V/m; Power Drift = 0.00522 dB

Peak SAR (extrapolated) = 21.8 W/kg

SAR(1 g) = 11.1 mW/g; SAR(10 g) = 5.69 mW/g

Maximum value of SAR (measured) = 11.7 mW/g



Motorola NE EME Lab**SPEAG 1900 MHz Dipole; Model D1900V2, SN 521; Test Date: 6/4/06**

Run #: JsT-SYSP-1900H-060604-01 Sim.Tissue Temp: 20.9 (C)

TX Freq: 1900 (MHz) Start power: 250 (mW)

Target:

43.62 mW/g for 1g SAR; 22.46 mW/g for 10g SAR

44.99 mW/g calculated 1g-SAR; 3.14% from target (including drift)

22.87 mW/g calculated 10g-SAR; 1.84% from target (including drift)

Probe: ET3DV6 - SN1383, Calibrated: 2/22/2006, ConvF(5.13, 5.13, 5.13)

Duty Cycle: 1:1, Medium: 1900 IEEE Head, Medium parameters used: $f = 1900$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 38$; $\rho = 1000$ kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 96.3 V/m; Power Drift = 0.0203 dB

Peak SAR (extrapolated) = 22.4 W/kg

SAR(1 g) = 11.4 mW/g; SAR(10 g) = 5.78 mW/g

Maximum value of SAR (measured) = 12.4 mW/g

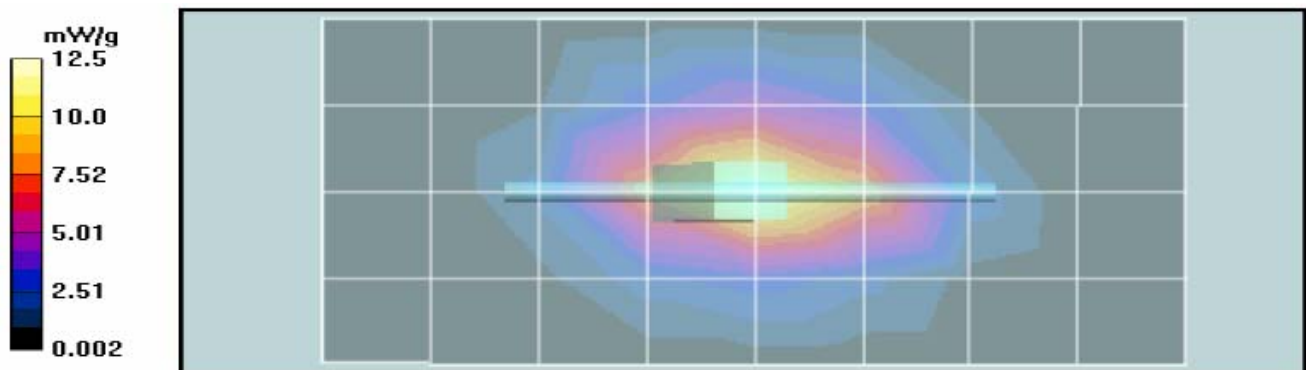
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 96.3 V/m; Power Drift = 0.0203 dB

Peak SAR (extrapolated) = 22.0 W/kg

SAR(1 g) = 11.2 mW/g; SAR(10 g) = 5.71 mW/g

Maximum value of SAR (measured) = 12.0 mW/g



Motorola NE EME Lab**SPEAG 1900 MHz Dipole; Model D1900V2, SN 521; Test Date: 6/5/06**

Run #: JsT-SYSP-1900B-060605-01 Sim.Tissue Temp: 21.0 (C)

TX Freq: 1900 (MHz) Start power: 250 (mW)

Target:

45.14 mW/g for 1g SAR 23.41 mW/g for 10g SAR

45.88 mW/g calculated 1g-SAR; 1.65% from target (including drift)

23.56 mW/g calculated 10g-SAR; 0.65% from target (including drift)

Probe: ET3DV6 - SN1383, Calibrated: 2/22/2006, ConvF(4.66, 4.66, 4.66)

Duty Cycle: 1:1, Medium: 1900 MHz FCC Body, Medium parameters used: $f = 1900$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 51.8$; $\rho =$ 1000 kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 93.3 V/m; Power Drift = -0.00794 dB

Peak SAR (extrapolated) = 22.1 W/kg

SAR(1 g) = 11.6 mW/g; SAR(10 g) = 5.94 mW/g

Maximum value of SAR (measured) = 13.0 mW/g

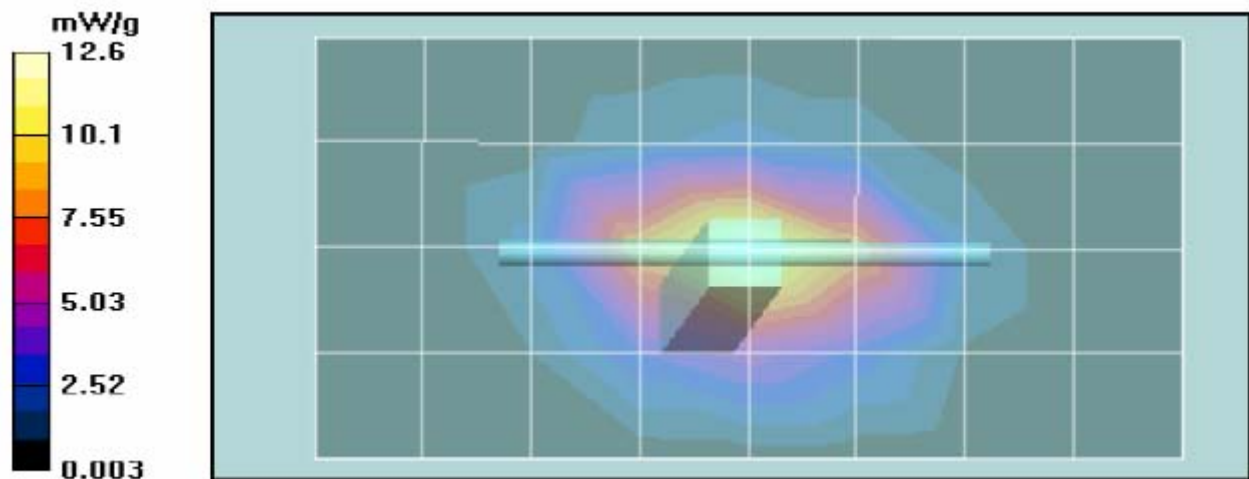
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 93.3 V/m; Power Drift = -0.00794 dB

Peak SAR (extrapolated) = 21.3 W/kg

SAR(1 g) = 11.3 mW/g; SAR(10 g) = 5.82 mW/g

Maximum value of SAR (measured) = 12.4 mW/g



Motorola NE EME Lab**SPEAG 1900 MHz Dipole; Model D1900V2, SN 521; Test Date: 6/6/06**

Run #: JsT-SYSP-1900B-060606-01 Sim.Tissue Temp: 21.5 (C)

TX Freq: 1900 (MHz) Start power: 250 (mW)

Target:

45.14 mW/g for 1g SAR; 23.41 mW/g for 10g SAR

45.32 mW/g calculated 1g-SAR; 0.39% from target (including drift)

23.14 mW/g calculated 10g-SAR; -1.16% from target (including drift)

Probe: ET3DV6 - SN1383, Calibrated: 2/22/2006, ConvF(4.66, 4.66, 4.66)

Duty Cycle: 1:1, Medium: 1900 MHz FCC Body, Medium parameters used: $f = 1900$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 51.7$; $\rho =$ 1000 kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 93.6 V/m; Power Drift = -0.0111 dB

Peak SAR (extrapolated) = 21.7 W/kg

SAR(1 g) = 11.4 mW/g; SAR(10 g) = 5.82 mW/g

Maximum value of SAR (measured) = 12.6 mW/g

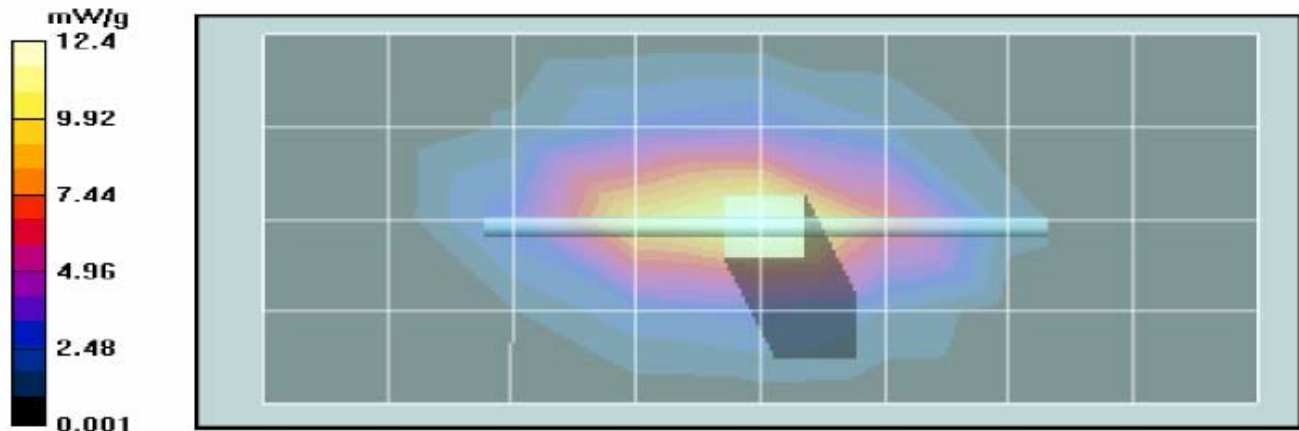
System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 93.6 V/m; Power Drift = -0.0111 dB

Peak SAR (extrapolated) = 21.4 W/kg

SAR(1 g) = 11.2 mW/g; SAR(10 g) = 5.72 mW/g

Maximum value of SAR (measured) = 12.5 mW/g



Motorola NE EME Lab**SPEAG 1900 MHz Dipole; Model D1900V2, SN 521; Test Date: 6/7/06**

Run #: HvH-SYSP-900B-060607-01 Sim.Tissue Temp: 21.3 (C)

TX Freq: 900 (MHz) Start power: 250 (mW)

Target: 12.13 mW/g for 1g SAR 7.81 mW/g for 10g SAR

11.76 mW/g calculated 1g-SAR; - 3.08 % from target (including drift)

7.54 mW/g calculated 10g-SAR; - 3.49 % from target (including drift)

Probe: ET3DV6 - SN1383, Calibrated: 2/22/2006, ConvF(5.89, 5.89, 5.89)

Duty Cycle: 1:1, Medium: 900 MHz FCC Body, Medium parameters used: $f = 900$ MHz; $\sigma = 1.04$ mho/m; $\epsilon_r = 53.9$; $\rho = 1000$ kg/m³ Electronics: DAE3 Sn406, Calibrated: 11/21/2005**System Performance Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:** Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 57.5 V/m; Power Drift = 0.00135 dB

Peak SAR (extrapolated) = 4.37 W/kg

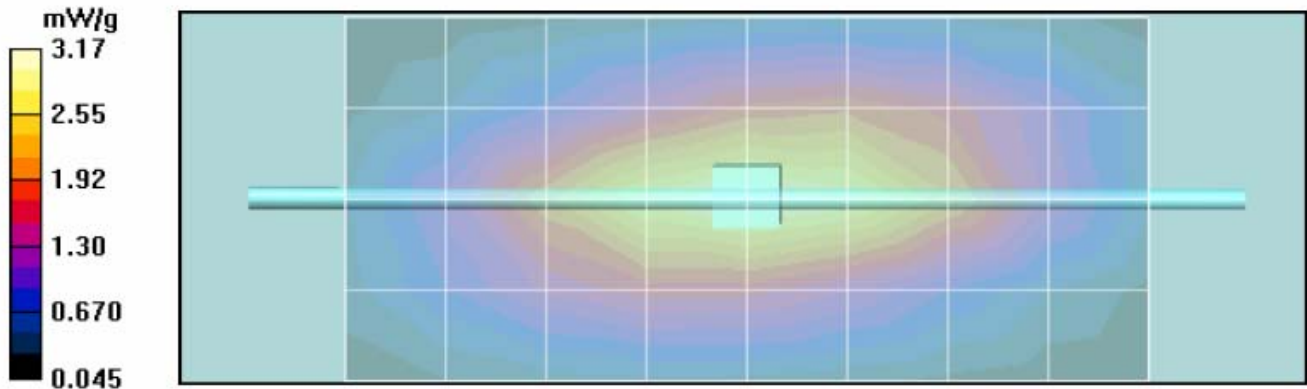
SAR(1 g) = 2.94 mW/g; SAR(10 g) = 1.89 mW/g

Maximum value of SAR (measured) = 3.20 mW/g

System Performance Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm; Reference Value = 57.5 V/m; Power Drift = 0.00135 dB

Peak SAR (extrapolated) = 4.36 W/kg

SAR(1 g) = 2.94 mW/g; SAR(10 g) = 1.88 mW/g

SYSTEM VALIDATION

Date:	<u>3/28/2006</u>	Frequency (MHz):	<u>900</u>
Lab Location:	<u>GEMS EME</u>	Mixture Type:	<u>IEEE Head</u>
Robot System:	<u>GEMS-2</u>	Ambient Temp.(°C):	<u>22.3</u>
Probe Serial #:	<u>1547</u>	Tissue Temp.(°C):	<u>21.1</u>
DAE Serial #:	<u>401</u>		

Tissue Characteristics

Permittivity:	<u>40.6</u>	Phantom Type/SN:	<u>SAMTP1209</u>
Conductivity:	<u>1.00</u>	Distance (mm):	<u>15</u>

Reference Source:	<u>Dipole</u>	(Dipole)
Reference SN:	<u>85</u>	

Power to Dipole:	<u>250</u>	mW
Power Output (radio):	<u>n/a</u>	mW

Target SAR Value:	<u>10.80</u>	mW/g,	<u>6.90</u>	mW/g (10g avg.)
(normalized to 1.0 W)				

Measured SAR Value:	<u>3.05</u>	mW/g,	<u>1.935</u>	mW/g (10g avg.)
Power Drift:	<u>-0.0115</u>	dB		

Measured SAR Value:	<u>12.23</u>	mW/g,	<u>7.76</u>	mW/g (10g avg.)
(normalized to 1.0 W, including drift)				

Percent Difference From Target (MUST be within System Uncertainty K=2):	<u>13.26%</u>	(1g ave)
	<u>12.47%</u>	(10g ave)

Test performed by:	<u>Ed Church</u>	Initial:	<u>EC</u>
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DUT: Dipole 900 MHz;

Run #: ErC-VAL-900H-060328- 02

Robot #: GEMS-2

Model #: D900V2

TX Freq: 900 (MHz)

New Targets: 12.23 mW/g for 1g SAR

12.23 mW/g calculated 1g-SAR 0 % from target (including drift)

7.76 mW/g calculated 10g-SAR 0 % from target (including drift)

Sim.Tissue Temp: 21.1 (C)

Phantom #: SAMTP1209

S/N: 085

Start power: 250 (mW)

7.76 mW/g for 10g SAR

Probe: ET3DV6 - SN1547, Calibrated: 10/25/2005, ConvF(5.92, 5.92, 5.92),

Duty Cycle: 1:1, Medium: 900 MHz IEEE Head, Medium parameters used: $f = 900$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³ ;

Electronics: DAE3 Sn401, Calibrated: 8/18/2005

Validation/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 59.5 V/m; Power Drift = -0.0115 dB

Peak SAR (extrapolated) = 4.67 W/kg

SAR(1 g) = 3.04 mW/g; SAR(10 g) = 1.93 mW/g

Maximum value of SAR (measured) = 3.31 mW/g

Validation/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 59.5 V/m; Power Drift = -0.0115 dB

Peak SAR (extrapolated) = 4.68 W/kg

SAR(1 g) = 3.06 mW/g; SAR(10 g) = 1.94 mW/g

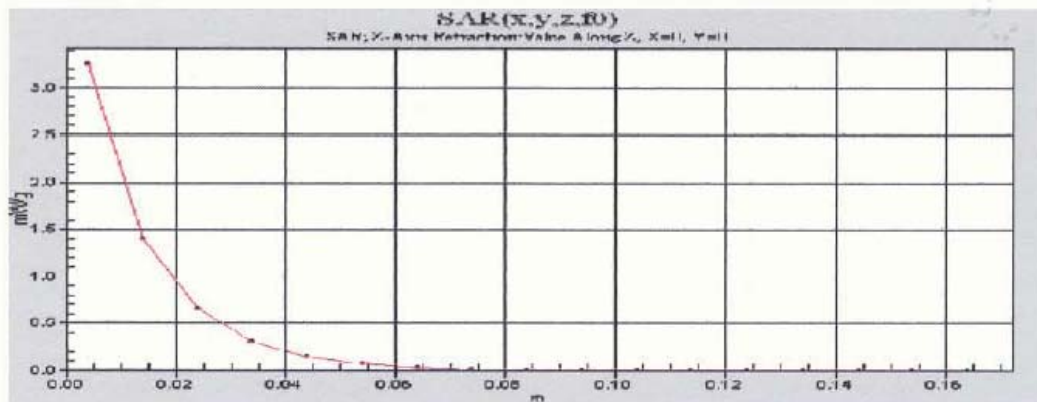
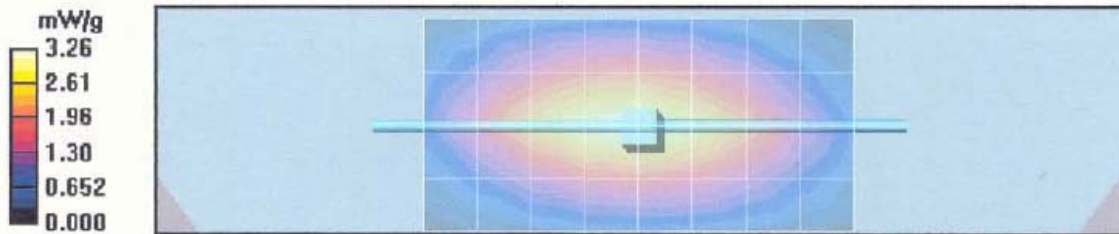
Maximum value of SAR (measured) = 3.33 mW/g

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

Maximum value of SAR (measured) = 3.29 mW/g

Validation/Z-Axis Retraction (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm

Maximum value of SAR (measured) = 3.26 mW/g



SYSTEM PERFORMANCE CHECK TARGET SAR

Date:	<u>3/28/2006</u>	Frequency (MHz):	<u>900</u>
Lab Location:	<u>GEMS EME</u>	Mixture Type:	<u>FCC Body</u>
Robot System:	<u>GEMS-2</u>	Ambient Temp.(°C):	<u>22.4</u>
Probe Serial #:	<u>1547</u>	Tissue Temp.(°C):	<u>21.8</u>
DAE Serial #:	<u>401</u>		

Tissue Characteristics

Permittivity:	<u>53.4</u>	Phantom Type/SN:	<u>80302002A-S7</u>
Conductivity:	<u>1.05</u>	Distance (mm):	<u>15</u>

Reference Source:	<u>Dipole</u>	(Dipole)
Reference SN:	<u>85</u>	

Power to Dipole: 250 mW

Measured SAR Value:	<u>3.03</u> mW/g,	<u>1.95</u> mW/g (10g avg.)
Power Drift:	<u>-0.0028</u> dB	

New Target/Measured

SAR Value:	<u>12.13</u> mW/g,	<u>7.81</u> mW/g (10g avg.)
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(normalized to 1.0 W, including drift)

Test performed by: Ed Church Initial: EC

DUT: Dipole 900 MHz;

Run #: ErC-VAL-900B-060328- 03

Robot #: GEMS-2

Model #: D900V2

TX Freq: 900 (MHz)

New Targets: 12.13 mW/g for 1g SAR

12.13 mW/g calculated 1g-SAR

7.81 mW/g calculated 10g-SAR

Sim.Tissue Temp: 21.8 (C)

Phantom #: 80302002A-S7

S/N: 085

Start power: 250 (mW)

7.81 mW/g for 10g SAR

0 % from target (including drift)

0 % from target (including drift)

Probe: ET3DV6 - SN1547, Calibrated: 10/25/2005, ConvF(5.82, 5.82, 5.82),

Duty Cycle: 1:1, Medium: 900 MHz FCC Body, Medium parameters used: $f = 900$ MHz; $\sigma = 1.05$ mho/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³ ;

Electronics: DAE3 Sn401, Calibrated: 8/18/2005

Validation/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 57.8 V/m; Power Drift = -0.0028 dB

Peak SAR (extrapolated) = 4.46 W/kg

SAR(1 g) = 3.02 mW/g; SAR(10 g) = 1.94 mW/g

Maximum value of SAR (measured) = 3.29 mW/g

Validation/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 57.8 V/m; Power Drift = -0.0028 dB

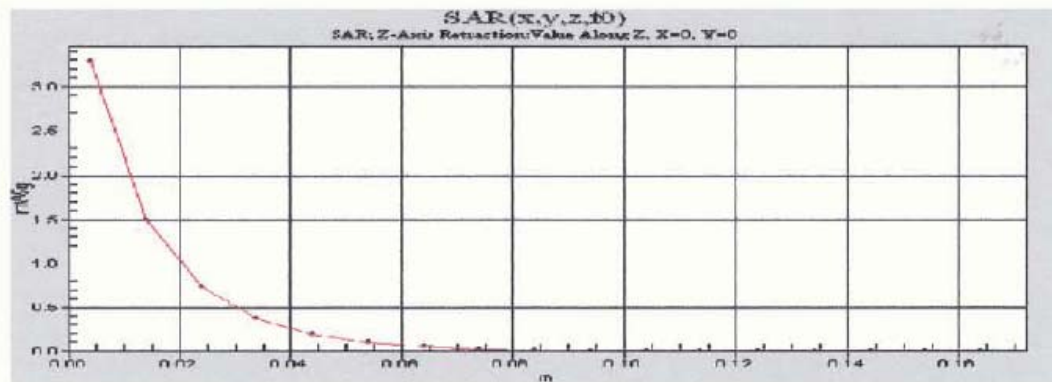
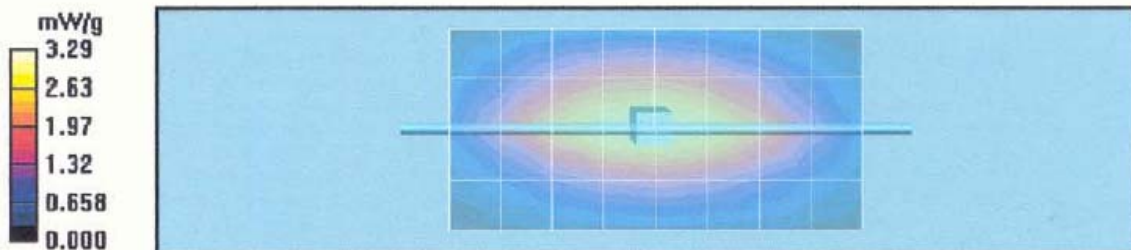
Peak SAR (extrapolated) = 4.46 W/kg

SAR(1 g) = 3.04 mW/g; SAR(10 g) = 1.96 mW/g

Maximum value of SAR (measured) = 3.30 mW/g

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

Maximum value of SAR (measured) = 3.25 mW/g

Validation/Z-Axis Retraction (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm

Certification Target for Dipole System Validation

Date:	<u>6/1/2006</u>	Frequency (MHz):	<u>1900</u>
Lab Location:	<u>GEMS EME</u>	Mixture Type:	<u>IEEE Head</u>
Robot System:	<u>GEMS-1</u>	Ambient Temp.(°C):	<u>22.3</u>
DAE Serial #:	<u>406</u>	Tissue Temp.(°C):	<u>21.5</u>

Tissue Characteristics

Permittivity:	<u>39.7</u>	Phantom Type/SN:	<u>40302002B-S12</u>
Conductivity:	<u>1.47</u>	Distance (mm):	<u>10</u>

Reference Source:	<u>Dipole</u>	(Dipole)	
Reference SN:	<u>521</u>		

Power to Dipole:	<u>250</u>	mW	
Power Output (radio):	<u>n/a</u>	mW	

IEEE Target SAR Value: 39.70 mW/g, 20.50 mW/g (10g avg.)
(normalized to 1.0 W)

Measured SAR Value: **43.62** mW/g, **22.46** mW/g (10g avg.)
(normalized to 1.0 W, including drift)

Percent Difference From Target (MUST be within System Uncertainty k=2): **9.87%** (1g ave)
9.56% (10g ave)

Test performed by: **E. Church** Initial: **EC**

The target was derived from the averaged values of multiple probes.

Certification SAR Target for Dipole System Performance Check

Date:	<u>06/02/06</u>	Frequency (MHz):	<u>1900</u>
Lab Location:	<u>GEMS EME</u>	Mixture Type:	<u>FCC Body</u>
Robot System:	<u>GEMS-1</u>	Ambient Temp.(°C):	<u>22.3</u>
DAE Serial #:	<u>406</u>	Tissue Temp.(°C):	<u>21.4</u>
Tissue Characteristics			
Permittivity:	<u>52.8</u>	Phantom Type/SN:	<u>40302002A-S11</u>
Conductivity:	<u>1.59</u>	Distance (mm):	<u>10</u>
Reference Source:	<u>Dipole</u>	(Dipole)	
Reference SN:	<u>521</u>		
Power to Dipole:	<u>250</u>	mW	

New Target/Measured

SAR Value: 45.14 mW/g, 23.41 mW/g (10g avg.)
(normalized to 1.0 W, including drift)

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

The target was derived from the averaged values of multiple probes.

Motorola Internal Use Only

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