MOTOROLA

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TESTING CERT # 2518.01

FCC ID: IHDT56HH1
DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Networks & Enterprise
EME Test Laboratory
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Date of Report: June 6, 2007
Report Revision: O
Report ID: i425_Rev O_070606_SR4944

Responsible Engineer:	Stephen C. Whalen (EME Principle Staff Engineer)
Date/s Tested:	5/11/2007-5/25/2007
Manufacturer/Location:	Motorola – Plantation
Sector/Group/Div.:	iDEN MD Subscriber
Date submitted for test:	5/7/07
DUT Description:	TDMA: 236:310 WiDEN (76.1%), 81:120, 2:6, 1:12, and 1:6; 64 QAM, 16QAM, and QPSK Modulations; 0.6 W Pulse Avg, MOTOtalk: 114:120 8FSK; 0.85 W nominal (GPS capable)
Test TX mode(s):	1:3, 1:6, 114:120, 236:310, 81:120
Max. Power output:	640 mW pulsed average (iDEN/WiDEN); 0.891 W (MOTOtalk)
Nominal Power:	0.6 W Pulse Average Conducted Power (iDEN/WiDEN); 0.85 W (MOTOtalk)
Tx Frequency Bands:	806-825, 896-902 MHz (iDEN/WiDEN); 902-928 MHz (MOTOtalk)
Signaling type:	TDMA: iDEN; WiDEN, MOTOtalk - (FHSS 8FSK)
Model(s) Tested:	H98XAH6JR2AN / NWF1277A
Model(s) Certified:	H98XAH6JR2AN / NWF1277A
Serial Number(s):	364VHE3W18
Classification:	General Population/Uncontrolled
Rule Part(s):	15 & 90

DUT Photo (Refer to Exhibit 7B)

Approved Accessories:

Antenna(s):
8571750L01 (806-928MHz internal ¼ wave antenna, -1.76Bd, 806-825MHz; -1.76dBd, 896-902MHz; -1.81dBd, 902-928MHz)

Battery(ies):
SNN5784A (BK60 Slim Li-Ion Battery), NNTN7136A (i425 Slim Battery Door)

Audio/Data cable accessory(ies):
NNTN5330B (PTT Headset, Earbud), NNTN5004B (PTT headset, Over-the-Ear), NNTN5005B (PTT headset, Over-the-Head), NNTN5006B (PTT headset, Flexible Earwrap), NNTN5211B (2-Wire Surveillance Headset), NNTN6312A (3-Wire Surveillance Headset), NNTN6531A (Data cable), SKN6371C (Data cable)

Max. Calc. : 1-g Avg. SAR: 1.41 W/kg (Body); 10-g Avg. SAR: 1.04 W/kg (Body)
Max. Calc. : 1-g Avg. SAR: 1.16 W/kg (Face); 10-g Avg. SAR: 0.82 W/kg (Face)
Max. Calc. : 1-g Avg. SAR: 1.35 W/kg (Head); 10-g Avg. SAR: 0.99 W/kg (Head)

Signature on file
Deanna Zakharia N&E EME Lab Senior Resource Manager, Laboratory Director,

Approval Date: 6/6/2007

Certification Date: 6/6/2007

Certification No.: L1070605P

Part 1 of 2

APPENDICES

Part 2 of 2

Report Revision History

Date	Revision	Comments
6/6/2007	O	Initial release

1.0 Introduction and Overview

This report details the utilization, test setup, test equipment, and test results of the Specific Absorption Rate (SAR) measurements performed at the N&E EME Test Lab for the model number H98XAH6JR2AN / NWF1277A of FCC ID: IHDT56HH1. The results herein reflect initial test results.

The EME measurements were performed in accordance with the applicable testing guidelines set forth in IEC62209-1 (2005), Draft IEC62209-2 dated 8/31/06 and adopted by CENELEC as EN62209-1 (2006). The highest SAR levels clearly demonstrate compliance to ICNIRP (1998) Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300GHz) RF Exposure limits of 2.0 W/kg averaged over 10grams of contiguous tissue. The results also adhere to the 1.6 W/kg averaged over 1 gram of tissue as stipulated in ANSI C95.1-2005.

2.0 Referenced Standards and Guidelines

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

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

2.1 SAR Limits

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

3.0 Description of Device Under Test (DUT)

FCC ID: IHDT56HH1 is a digital multi-service device that employs time division multiplexing with duty cycles ranging from 16.667% to 76.1% for Voice (Dispatch or Interconnect), Circuit Data, Packet Data, and WiDEN emission modes, with possible modulations of QPSK, M16-QAM, or M64-QAM. All voice modes employ M16-QAM modulation, and are interleaved as 1:6 (for Dispatch) or 1:3 (maximum for Interconnect). The split 1:3 Interconnect operates at a 16.667% duty cycle, but because there will be two pulses in each 90-msec frame, the overall interleave is 2:6. Interconnect, Dispatch, and Data modes are available in both the 800 and 900 MHz bands. Data transmissions employ QPSK, M16-QAM, and M64-QAM modulations, and have duty cycle ranging from 67.5% (Packet Data) to a maximum of 76.1% (for the 25 kHz WiDEN mode). WiDEN operation is also possible in 50, 75, and 100 kHz modes, but these will have lower maximum duty cycle. Packet Data and WiDEN operation is possible with and without connection to an external data device (via a data cable). This device also possesses MOTOtalk, which is a Part 15 service, employing Frequency Hopping Spread Spectrum technology in the 900 MHz ISM band. MOTOtalk emissions have a duty cycle of 114:120, and uses 8FSK modulation. Only dispatch (i.e. PTT) operation is possible when operating in this mode. No simualtaneouse transmission is possible

No simultaneous transmissions are possible. Packet Data and WiDEN operations are possible with and without connection to an external data device, via a data cable. 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 voice mode, in front of the face in PTT mode, and next to the body (2.5cm separation distance) in phone, dispatch, MOTOtalk, Data, WiDEN and modes. This device can also be used in the hand for data mode applications. Testing at the hand was not conducted based on the current guidelines stated in IEC 62209-Part 2 section 6.1.4.6 for handheld devices which are intended to be mainly used at the ear or next to the body when transmitting.

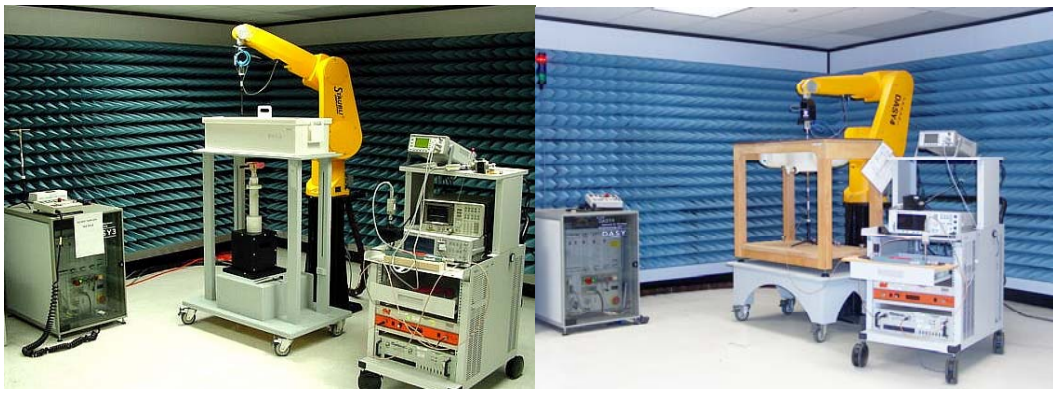
FCC ID: IHDT56HH1 is capable of operating in the 806-825 MHz, 896-902MHz and 902-928MHz bands. MOTOtalk operates in the 902-928MHz band. WiDEN operates with the 806-825MHz and 896-902MHz bands. The rated conducted power is 0.60 watts pulsed averaged in 806-825MHz, 896-902MHz and 902-928MHz band 0.85 watts in the MOTOtalk band. The maximum conducted output power is 0.64 watts pulsed average and 0.891 watts and respectively as defined by the upper limit of the production line final test station.

FCC ID: IHDT56HH1 is offered with the options and accessories listed on the coversheet of this report.

Test Output Power

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

4.0 Description of Test System



4.1 Descriptions of Robotics/probes/Readout Electronics

The laboratory utilizes a Dosimetric Assessment System (DASY4™) SAR measurement system Version 4.7 build 53 manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. The test system consists of a Stäubli RX90L robot, DAE3V1, and ET3DV6 E-Field probes. Please reference the SPEAG user manual and application notes for detailed probe, robot, and SAR computational procedures. Section 5.0 presents relevant test equipment information. Appendices B and C present the applicable calibration certificates. The E-field probe first scans a coarse grid over a large area inside the phantom in order to locate the interpolated maximum SAR distribution. After the coarse scan measurement, the probe is automatically moved to a position at the interpolated maximum. The subsequent scan can directly use this position as reference for the cube evaluations.

4.2 Description of Phantom(s)

4.2.1 Flat Phantom

Phantom Type	Phantom Material	Phantom Dimensions (cm)	Support structure opening dimensions (cm)	Support structure material	Loss Tangent (wood)
Flat	High Density Polyethylene (HDPE)	80x30x20x0.2	68.58x20.32	Wood	< 0.05

4.2.2 SAM Phantom

Phantom Type	Material Parameters	Material Thickness (mm)	Support structure material	Loss Tangent (wood)
SAMTP1022	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 similar type simulates, sugar and HEC ingredients are not needed. The solution is mixed thoroughly, covered, and allowed to sit overnight prior to use.

Simulated Tissue Composition

% of listed ingredients	835MHz		900MHz	
	Head	Body	Head	Body
Sugar	57.0	44.9	56.5	44.9
Diacetin	NA	NA	NA	NA
De ionized -Water	40.45	53.06	40.95	53.06
Salt	1.45	0.94	1.45	0.94
HEC	1.0	1.0	1.0	1.0
Bact.	0.1	0.1	0.1	0.1

Reference section 6.1 for target parameters

5.0 Additional Test Equipment

Equipment Type	Model Number	Serial Number	Calibration Due Date
Power Meter (Agilent)	E4419B	MY40330364	2/6/2008
Power Meter (HP)	E4418B	US39251152	3/17/2008
Power Meter (Agilent)	E4418B	GB40206553	4/25/2008
Power Meter (HP)	E4418B	US39251150	4/25/2008
Power Meter (HP)	437B	3125U16028	9/21/2007
Power Meter (HP)	437B	3737U26425	12/4/2007
E-Series Avg. Power Sensor (Agilent)	E9301B	MY41495593	2/16/2008
E-Series Avg. Power Sensor (Agilent)	E9301B	MY41495594	2/16/2008
Power Sensor (Agilent)	8482B	3318A07392	3/19/2008
Power Sensor (HP)	8482B	3318A06773	5/2/2008
Power Sensor (HP)	8482B	3318A06774	5/2/2008
Power Sensor (Agilent)	8482B	3318A07546	5/16/2008
Power Sensor (Agilent)	8482B	3318A07393	1/29/2008
Bi-Directional Coupler (NARDA)	3020A	40296	2/17/2008
Signal Generator (HP)	E4421B	US39270649	8/16/2008
AMP (Amplifier Research)	10WD1000	28782	CNR
AMP (ComTech PST)	AR88258-10	N1R1A00-1015	CNR
Agilent PNA-L Network Analyzer	N5230A	MY45001092	5/22/2008
Dielectric Probe Kit (HP)	85070C	US99360076	CNR

6.0 SAR Measurement System Verification

The SAR measurements were conducted with probe model/serial number ET3DV6/SN1383. The system performance check was conducted daily and within 24 hours prior to testing. DASY output files of the probe/dipole calibration certificates and system performance test results are included in appendices B, C, D respectively. The table below summarizes the system performance check results normalized to 1W.
Dipole validation scans at the head from SPEAG are provided in Appendix D. The N&E EME lab validated the dipole to the applicable IEEE system performance targets. Within the same day system validation was performed using FCC body tissue parameters to generate the system performance target values for body at the applicable frequency. The results of the N&E EME system performance validation are provided herein.

6.1 Equivalent Tissue Test Results

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

Actual versus Target tissue parameters (5/11/07 – 5/25/07)

FCC Body				
Frequency (MHz)	**Di-electric Constant Target**	**Di-electric Constant Meas. (Range)**	**Conductivity Target S/m**	**Conductivity Meas. (Range) S/m**
815.5	55.3	54.8-54.8	0.97	0.97-0.97
899	55.0	52.5-54.0	1.05	1.05-1.05
900	55.0	52.5-53.1	1.05	1.05-1.07
915	55.0	52.3-52.8	1.06	1.07-1.07

IEEE Head				
Frequency (MHz)	**Di-electric Constant Target**	**Di-electric Constant Meas. (Range)**	**Conductivity Target S/m**	**Conductivity Meas. (Range) S/m**
815.5	41.6	41.1-41.5	0.90	0.88-0.88
899	41.5	40.2-40.2	0.97	0.96-0.96
900	41.5	39.7-40.6	0.97	0.96-0.96
915	41.5	40.0-40.3	0.98	0.98-0.97

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)
1383	FCC Body	4/21/08	SPEAG D900V2 /084	10.355 +/- 0.145	11.06 +/- 10%	5/17/07-5/18/07 5/23/07-5/25/07 5 test days
1383	IEEE Head	4/21/08	SPEAG D900V2 /084	10.340 +/- 0.180	10.47 +/- 10%	5/11/07, 5/14/07 & 5/22/07 3 test days

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

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

7.0 DUT Test Strategy and Methodology

7.1 DUT Configuration(s)

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

Test Plan

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

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

Assessments at the Head (Phone mode 1:3) **Pages 11 - 12 of 29; Tables 1**

- Assessment in the 806-825MHz band using applicable test configurations at the head.
- Assessment at the 806-825MHz band edges using the worst case configuration from above.
- Assessment in the 896-902MHz band using applicable test configurations at the head.
- Assessment at the 896-902MHz band edges the worst case configuration from 896-902MHz band.

Assessments at the Face (PTT mode 1:6) **Pages 12 of 29; Table 1**

- Assessment in the 806-825MHz band including band edges.
- Assessment in the 896-902MHz band including band edges.

Assessments at the Face (MOTOtalk mode 114:120) **Page 13 of 29; Table 1**

- Assessment in the 902-928MHz band including band edges.

Assessments at the Body 2.5cm (WiDEN mode 236:310) **Page 13 - 14 of 29; Table 2**

- Assessment in the 806-825MHz band without accessory cables.
- Assessment in the 806-825MHz band of the offered data cable options.
- Assessment in the 806-825MHz band of the band edge frequencies.
- Same sequence above followed for 896-902MHz band

Assessments at the Body 2.5cm (iDEN phone mode 1:3) **Pages 13 - 14 of 29; Table 2**

- Assessment in the 806-825MHz band of the offered audio accessories.
- Assessment in the 896-902MHz band of the offered audio accessories.

Assessments at the Body 2.5cm (MOTOtalk mode 114:120) **Pages 14 - 15 of 29; Table 2**

- Assessment in the 902-928MHz band of the offered audio accessories.
- Assessment in the 902-928MHz band of the band edges using the worst configuration from above.

Shortened scan assessment at the Body **Page 15 of 29; Table 3**

- 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 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 +/ - 2^{o}C of the temperature at which the dielectric properties were determined. The liquid depth within the phantom used for measurements was 15cm +/- 0.5cm. Additional precautions are routinely taken to ensure the stability of the simulated tissue such as covering the phantoms when scans are not actively in process in order to minimize evaporation. The lab environment is continuously monitored. The table below presents the range and average environmental conditions during the SAR tests reported herein:

	Target	Measured
Ambient Temperature	20 - 25 ˚C	Range: 21.0-24.8˚C Avg. 22.5˚C
Relative Humidity	30 - 70 %	Range: 50.2-72.4% Avg. 58.2%
Tissue Temperature	NA	Range: 19.9-21.9˚C Avg. 20.6 ˚C

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

9.0 Test Results Summary

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

Table 1

Assessments at the Head (Phone mode 1:3) 806-825MHz 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)**
Assessment at the right ear - touch/tilt and band edge search												
JsT-Rear-070511-03/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Cheek Touch	None	None	0.671	-0.043	1.32	0.916	1.33	0.93
JsT-Rear-070511-10/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Cheek Tilt	None	None	0.669	-0.104	0.718	0.500	0.74	0.51
JsT-Rear-070511-11/364VHE3W18	Internal	806.01250	SNN5784A NNTN7136A	Cheek Touch	None	None	0.635	-0.043	1.21	0.840	1.23	0.86
JsT-Rear-070511-12/364VHE3W18	Internal	824.98750	SNN5784A NNTN7136A	Cheek Touch	None	None	0.660	-0.034	1.40	0.970	1.41	0.98
Assessment at the left ear - touch/tilt and band edge search												
JsT-Lear-070511-13/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Cheek Touch	None	None	0.654	-0.004	1.28	0.885	1.28	0.89
JsT-Lear-070511-14/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Cheek Tilt	None	None	0.655	-0.055	0.784	0.540	0.79	0.55
JsT-Lear-070511-15/364VHE3W18	Internal	806.01250	SNN5784A NNTN7136A	Cheek Touch	None	None	0.635	-0.124	1.23	0.850	1.28	0.88
JsT-Lear-070511-16/364VHE3W18	Internal	824.98750	SNN5784A NNTN7136A	Cheek Touch	None	None	0.661	-0.113	1.35	0.930	1.39	0.95

Table 1 Continued

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)
Assessments at the Head (Phone mode 1:3) 896-902MHz band												
Assessment at the right ear - touch/tilt and band edge search												
JsT-Rear-070514-03/364VHE3W18	Internal	898.49375	SNN5784A NNTN7136 A	Cheek Touch	None	None	0.669	-0.118	1.37	0.949	1.41	0.98
JsT-Rear-070514-04/364VHE3W18	Internal	898.49375	SNN5784A NNTN7136 A	Cheek Tilt	None	None	0.670	-0.090	0.822	0.566	0.84	0.58
***JsT-Rear-070514-05/364VHE3W18**	Internal	896.01875	SNN5784A NNTN7136 A	Cheek Touch	None	None	0.665	-0.150	1.40	0.960	1.45	0.99
JsT-Rear-070514-06/364VHE3W18	Internal	901.98125	SNN5784A NNTN7136 A	Cheek Touch	None	None	0.662	-0.141	1.32	0.914	1.36	0.94
Assessment at the left ear - touch/tilt and band edge search												
JsT-Lear-070514-07/364VHE3W18	Internal	898.49375	SNN5784A NNTN7136 A	Cheek Touch	None	None	0.669	0.003	1.28	0.892	1.28	0.89
JsT-Lear-070514-08/364VHE3W18	Internal	898.49375	SNN5784A NNTN7136 A	Cheek Tilt	None	None	0.667	-0.097	0.852	0.586	0.87	0.60
JsT-Lear-070514-09/364VHE3W18	Internal	896.01875	SNN5784A NNTN7136 A	Cheek Touch	None	None	0.663	-0.151	1.32	0.921	1.37	0.95
JsT-Lear-070514-10/364VHE3W18	Internal	901.98125	SNN5784A NNTN7136 A	Cheek Touch	None	None	0.664	-0.210	1.23	0.851	1.29	0.89
Assessments at the Face (Dispatch mode 1:6) 806-825MHz band												
Assessment at the face – across the band												
JsT-Face-070511-17/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136 A	Front 2.5cm	None	None	0.653	0.005	0.280	0.200	0.14	0.10
JsT-Face-070511-18/364VHE3W18	Internal	806.01250	SNN5784A NNTN7136 A	Front 2.5cm	None	None	0.633	-0.011	0.268	0.190	0.14	0.10
JsT-Face-070514-02/364VHE3W18	Internal	824.98750	SNN5784A NNTN7136 A	Front 2.5cm	None	None	0.663	0.055	0.273	0.192	0.14	0.10
Assessments at the Face (Dispatch mode 1:6) 896-901MHz band												
Assessment at the face – across the band												
MeC-FACE-070514-15/364VHE3W18	Internal	898.49375	SNN5784A NNTN7136 A	Front 2.5cm	None	None	0.669	-0.024	0.308	0.217	0.16	0.11
MeC-FACE-070514-16/364VHE3W18	Internal	896.01875	SNN5784A NNTN7136 A	Front 2.5cm	None	None	0.667	-0.046	0.321	0.227	0.16	0.11
MeC-FACE-070514-17/364VHE3W18	Internal	901.98125	SNN5784A NNTN7136 A	Front 2.5cm	None	None	0.666	-0.035	0.322	0.226	0.16	0.11

Table 1 Continued

Assessments at the Face (Dispatch MOTOtalk mode 114:120) 902-928MHz 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)**
Assessment at the face – across the band												
JsT-Face-070517-04/364VHE3W18	Internal	915.52500	SNN5784A NNTN7136A	Front 2.5cm	None	None	0.905	-0.075	2.02	1.43	1.03	0.73
***JsT-Face-070518-05/364VHE3W18**	Internal	902.52500	SNN5784A NNTN7136A	Front 2.5cm	None	None	0.930	-0.011	2.32	1.63	1.16	0.82
JsT-Face-070518-06/364VHE3W18	Internal	927.47500	SNN5784A NNTN7136A	Front 2.5cm	None	None	0.883	0.080	1.88	1.32	0.95	0.67

Table 2

Assessments at the Body 2.5cm (WiDEN mode 236:310) 806-825MHz 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)**
Assessment at the body – data cable search												
JsT-Ab-070522-02/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Back 2.5cm	None	None	0.603	-0.185	0.992	0.697	1.10	0.77
JsT-Ab-070522-03/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Back 2.5cm	None	data cable NNTN6531A	0.602	-0.282	0.827	0.582	0.94	0.66
JsT-Ab-070522-04/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Back 2.5cm	None	data cable SKN6371C	0.600	-0.034	0.902	0.641	0.97	0.69
Assessments at the Body 2.5cm (Phone mode 1:3) 806-825MHz band												
Assessment at the body - audio cable search												
JsT-Ab-070522-05/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5330B	0.655	0.000	0.468	0.329	0.47	0.33
JsT-Ab-070522-06/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5004B	0.653	-0.009	0.527	0.373	0.53	0.37
JsT-Ab-070522-07/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5005B	0.658	-0.006	0.404	0.286	0.40	0.29
JsT-Ab-070522-08/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5006B	0.658	-0.006	0.455	0.321	0.46	0.32
JsT-Ab-070522-09/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5211B	0.657	-0.013	0.438	0.308	0.44	0.31
JsT-Ab-070522-10/364VHE3W18	Internal	813.51250	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN6312A	0.658	-0.039	0.433	0.304	0.44	0.31
Assessments at the Body 2.5cm (WiDEN mode 236:310) 806-825MHz band												
Assessment at the body - band edge from worst case above												
JsT-Ab-070522-12/364VHE3W18	Internal	806.01250	SNN5784A NNTN7136A	Back 2.5cm	None	None	0.586	-0.011	1.03	0.722	1.13	0.79
JsT-Ab-070522-13/364VHE3W18	Internal	824.98750	SNN5784A NNTN7136A	Back 2.5cm	None	None	0.609	-0.046	0.945	0.672	1.00	0.71
Assessment at the body - from worst case above												
JsT-Ab-070522-14/364VHE3W18	Internal	806.01250	SNN5784A NNTN7136A	Front 2.5cm	None	None	0.585	-0.027	0.909	0.644	1.00	0.71

Table 2 Continued

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)
Assessments at the Body 2.5cm (WiDEN mode 236:310) 896-902MHz band												
Assessment at the body – data cable search												
JsT-Ab-070522-16/364VHE3W18	Internal	899.66875	SNN5784A NNTN7136A	Back 2.5cm	None	None	0.617	-0.464	1.22	0.853	1.41	0.98
JsT-Ab-070522-17/364VHE3W18	Internal	899.66875	SNN5784A NNTN7136A	Back 2.5cm	None	data cable NNTN6531A	0.618	-0.415	0.852	0.594	0.97	0.68
JsT-Ab-070522-18/364VHE3W18	Internal	899.66875	SNN5784A NNTN7136A	Back 2.5cm	None	data cable SKN6371C	0.617	-0.285	0.935	0.646	1.04	0.72
Assessments at the Body 2.5cm (Phone mode 1:3) 896-902MHz band												
Assessment at the body - audio cable search												
JsT-Ab-070522-19/364VHE3W18	Internal	898.49375	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5330B	0.672	0.019	0.558	0.390	0.56	0.39
JsT-Ab-070522-20/364VHE3W18	Internal	898.49375	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5004B	0.671	-0.015	0.566	0.394	0.57	0.40
JsT-Ab-070523-02/364VHE3W18	Internal	898.49375	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5005B	0.671	-0.066	0.577	0.400	0.59	0.41
JsT-Ab-070523-03/364VHE3W18	Internal	898.49375	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5006B	0.672	0.000	0.582	0.406	0.58	0.41
JsT-Ab-070523-04/364VHE3W18	Internal	898.49375	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5211B	0.670	0.008	0.591	0.409	0.59	0.41
JsT-Ab-070523-05/364VHE3W18	Internal	898.49375	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN6312A	0.672	-0.017	0.564	0.396	0.57	0.40
Assessments at the Body 2.5cm (WiDEN mode 236:310) 896-902MHz band												
Assessment at the body - band edge from worst case above												
JsT-Ab-070523-07/364VHE3W18	Internal	896.01875	SNN5784A NNTN7136A	Back 2.5cm	None	None	0.616	-0.319	1.25	0.874	1.40	0.98
***JsT-Ab-070523-08/364VHE3W18**	Internal	901.98125	SNN5784A NNTN7136A	Back 2.5cm	None	None	0.615	-0.211	1.31	0.910	1.43	0.99
Assessment at the body - from worst case above												
JsT-Ab-070523-09/364VHE3W18	Internal	901.98125	SNN5784A NNTN7136A	Front 2.5cm	None	None	0.613	-0.246	1.09	0.760	1.20	0.84
Assessments at the Body 2.5cm (Dispatch MOTOtalk mode 114:120) 902-928MHz band												
Assessment at the body - audio cable search												
JsT-Ab-070523-12/364VHE3W18	Internal	915.52500	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5330B	0.904	0.041	1.98	1.38	0.99	0.69
JsT-Ab-070523-13/364VHE3W18	Internal	915.52500	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5004B	0.907	-0.028	2.29	1.59	1.15	0.80
***JsT-Ab-070523-14/364VHE3W18**	Internal	915.52500	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5005B	0.906	-0.298	2.26	1.57	1.21	0.84
JsT-Ab-070523-15/364VHE3W18	Internal	915.52500	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5006B	0.907	0.097	2.13	1.48	1.07	0.74
JsT-Ab-070523-16/364VHE3W18	Internal	915.52500	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5211B	0.908	-0.013	2.32	1.62	1.16	0.81
JsT-Ab-070524-02/364VHE3W18	Internal	915.52500	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN6312A	0.912	-0.009	2.40	1.66	1.20	0.83

Table 2 Continued

Assessments at the Body 2.5cm (Dispatch MOTOtalk mode 114:120) 902-928MHz band Continued												
Run Number/ SN	**Antenna Pos.**	**Freq. (MHz)**	**Battery**	**Test position**	**Carry Case**	**Additional attachments**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (mW/g)**	**Meas. 10g-SAR (mW/g)**	**Max Calc. 1g-SAR (mW/g)**	**Max Calc. 10g-SAR (mW/g)**
Assessment at the body - band edge from worst case above												
JsT-Ab-070524-03/364VHE3W18	Internal	902.52500	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5005B	0.935	-0.028	2.09	1.45	1.05	0.73
JsT-Ab-070524-04/364VHE3W18	Internal	927.47500	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5005B	0.889	-0.020	1.82	1.27	0.92	0.64
Assessment at the body - from worst case above												
JsT-Ab-070524-05/364VHE3W18	Internal	915.52500	SNN5784A NNTN7136A	Front 2.5cm	None	NNTN5005B	0.910	-0.011	2.23	1.55	1.12	0.78

Table 3

*Worst case configuration per body location and mode (highest duty cycle) from above –using the DASY 4 full coarse and 7x7x7 cube scan measurements.												
Full Scan JsT-Rear-070514-14/364VHE3W18	Internal	896.01875	SNN5784A NNTN7136A	Cheek Touch	None	None	0.667	-0.271	1.27	0.929	1.35	0.99
Full Scan JsT-Face-070518-08/364VHE3W18	Internal	902.52500	SNN5784A NNTN7136A	Front 2.5cm	None	None	0.930	0.050	2.31	1.64	1.16	0.82
Full Scan JsT-Ab-070523-11/364VHE3W18	Internal	901.98125	SNN5784A NNTN7136A	Back 2.5cm	None	None	0.615	-0.919	1.10	0.811	1.41	1.04
Short Scan JsT-Ab-070525-03/364VHE3W18	Internal	901.98125	SNN5784A NNTN7136A	Back 2.5cm	None	None	0.622	-0.273	1.26	0.923	1.38	1.01
Full Scan JsT-Ab-070524-07/364VHE3W18	Internal	915.52500	SNN5784A NNTN7136A	Back 2.5cm	None	NNTN5005B	0.912	-0.018	2.23	1.63	1.12	0.82

9.1 Highest SAR results calculation methodology

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

Max. Calc. 1-g/10-g Avg. SAR = ((SAR meas. / (10^(Pdrift/10)))*(Pmax/Pint))* DC%
P_{max} = Maximum Power (W)
P_{int} = Initial Power (W)
Pdrift = DASY drift results (dB) - (for conservative results positive drifts are not accounted for)
SAR_{meas}. = Measured 1-g/10-g Avg. SAR (mW/g)
DC % = Transmission mode duty cycle in % where applicable
50% duty cycle is applied for PTT operation.

10.0 Conclusion

The highest Operational Maximum Calculated 1-gram and 10-gram average SAR values found for FCC ID: IHDT56HH1 model H98XAH6JR2AN / NWF1277A are below.

Max. Calc. : 1-g Avg. SAR: 1.41 W/kg (Body); 10-g Avg. SAR: 1.04 W/kg (Body)
Max. Calc. : 1-g Avg. SAR: 1.16 W/kg (Face); 10-g Avg. SAR: 0.82 W/kg (Face)
Max. Calc. : 1-g Avg. SAR: 1.35 W/kg (Head); 10-g Avg. SAR: 0.99 W/kg (Head)

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) and ANSIC95.1.

These test results clearly demonstrate compliance with ICNIRP General Population/Uncontrolled SAR Exposure limits of **2.0 W/kg** averaged over 10grams per the guidelines published in the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998.

APPENDIX A
Measurement Uncertainty

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

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

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

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

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Notes for Tables 1 and 2
a) Column headings *a-k* are given for reference.
b) Tol. - tolerance in influence quantity.
c) Prob. Dist. – Probability distribution
d) N, R - normal, rectangular probability distributions
e) Div. - divisor used to translate tolerance into normally distributed standard uncertainty
f) *ci* - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.
g) *ui* – SAR uncertainty
h) *vi* - degrees of freedom for standard uncertainty and effective degrees of freedom for the expanded uncertainty.

Appendix B
Probe Calibration Certificates

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

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

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

Accreditation No.: SCS 108

Client **Motorola CGISS**

Certificate No: ET3-1383_Feb07

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 15, 2007
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-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 Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Fin Bomholt	R&D Director	

Issued: February 15, 2007

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

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

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ET3DV6

SN:1383

Manufactured:	August 16, 1999
Last calibrated:	February 22, 2006
Recalibrated:	February 15, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

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DASY - Parameters of Probe: ET3DV6 SN:1383

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

NormX	1.85 ± 10.1%	$\mu V/(V/m)^2$	DCP X	93 mV
NormY	1.61 ± 10.1%	$\mu V/(V/m)^2$	DCP Y	91 mV
NormZ	1.68 ± 10.1%	$\mu V/(V/m)^2$	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	9.9	5.0
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR_{be} [%]	Without Correction Algorithm	13.6	8.8
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

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

[B] Numerical linearization parameter: uncertainty not required.

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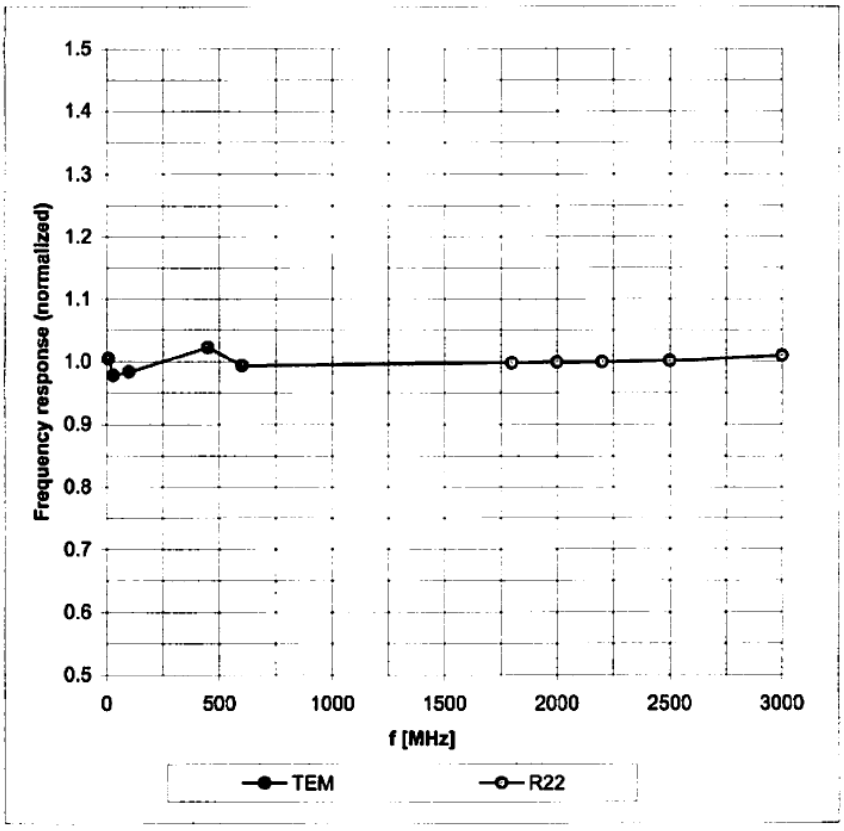
Frequency Response of E-Field

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



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

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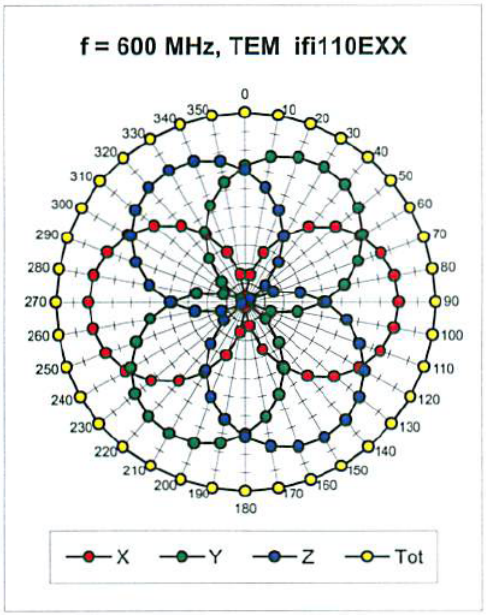
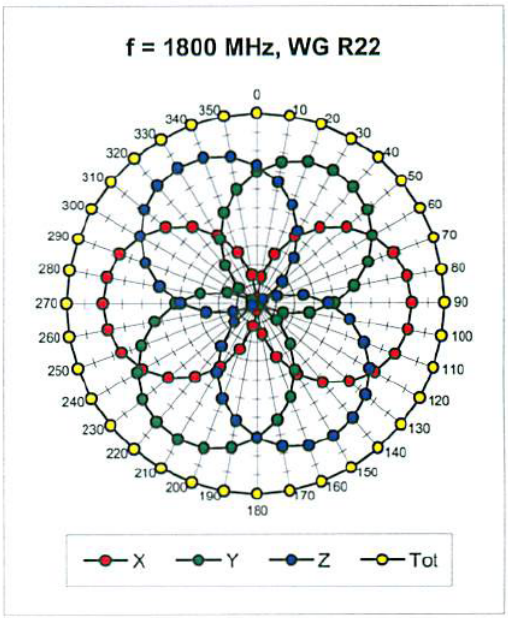
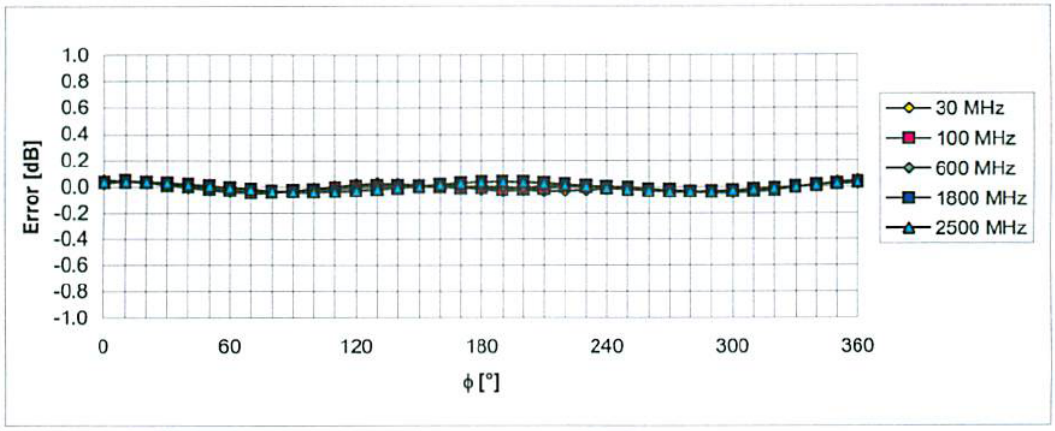
Receiving Pattern (ϕ), ϑ = 0°







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

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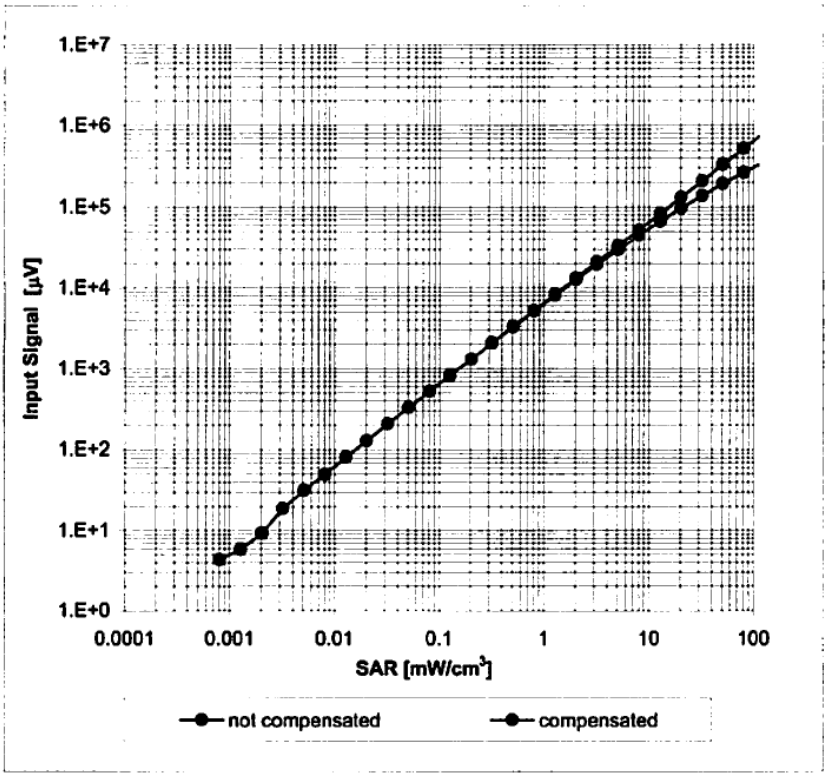
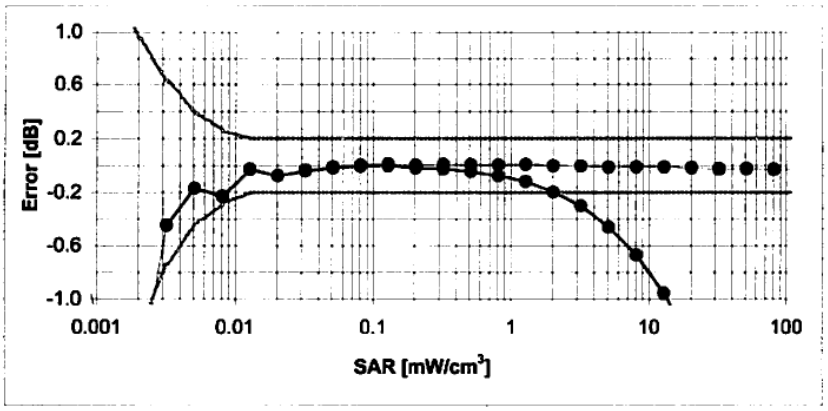
Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)





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

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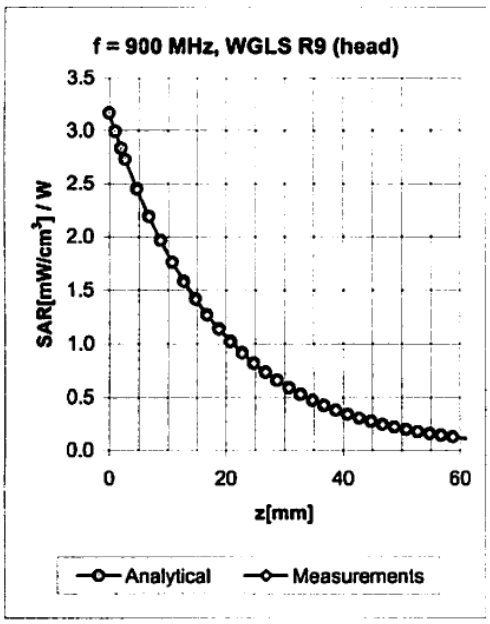
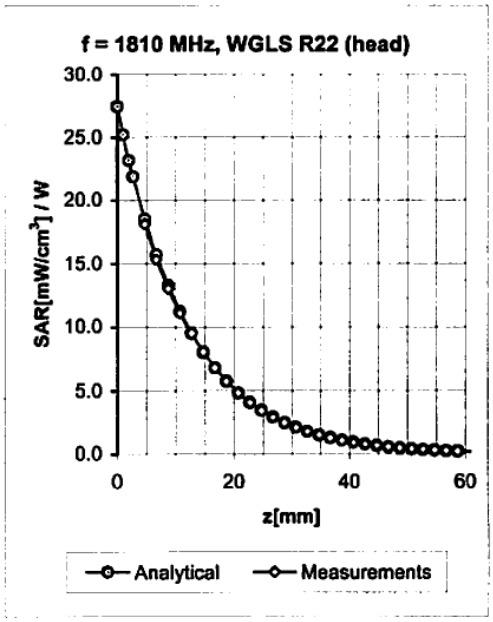
Conversion Factor Assessment





f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.39	2.01	7.11 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.33	2.58	6.31 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.63	2.32	5.27 ± 11.0% (k=2)
2300	± 50 / ± 100	Head	39.4 ± 5%	1.71 ± 5%	0.83	1.99	4.87 ± 11.8% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.85	1.62	4.71 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.35	2.08	7.67 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.37	2.60	6.03 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.80	2.19	4.71 ± 11.0% (k=2)
2300	± 50 / ± 100	Body	52.8 ± 5%	1.85 ± 5%	0.86	1.68	4.42 ± 11.8% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.85	1.60	4.19 ± 11.8% (k=2)

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

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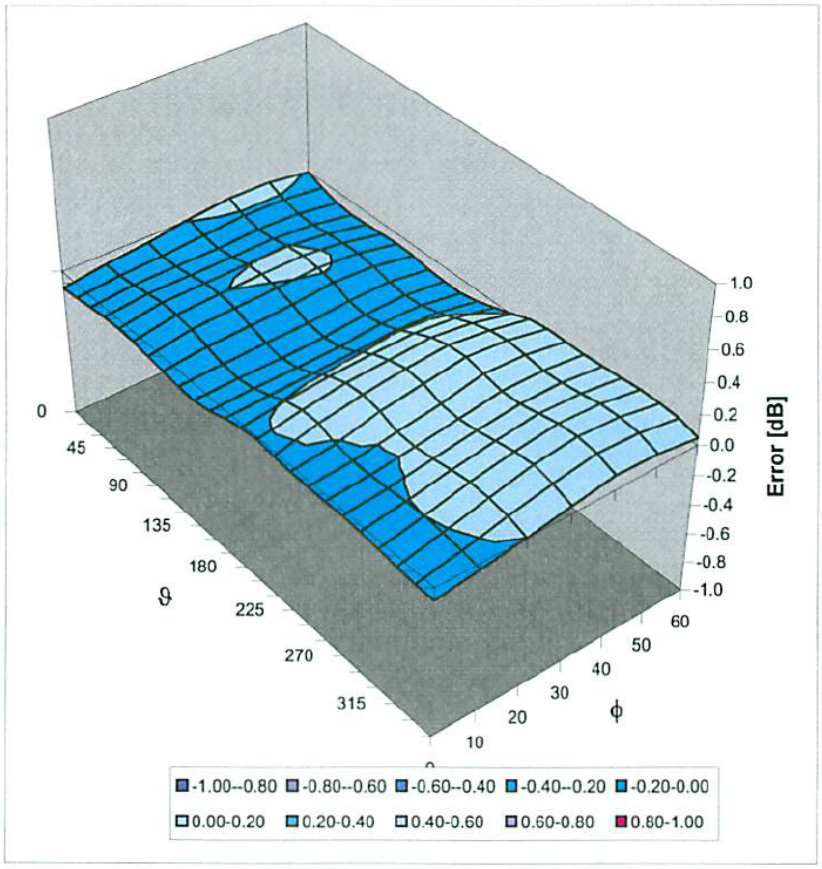
Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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