MOTOROLA

ACCREDITED
Certificate Number: 2518.01

FCC ID: AZ489FT7017
DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Networks & Enterprise
EME Test Laboratory
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Date of Report: 12/12/06
Report Revision: A
Report ID: HC700i_F3130A_Rev A_061212
SR4462

Responsible Engineer:	Kim Uong (EME lead Eng.)
Date/s Tested:	10/5/06 – 10/24/06
Manufacturer/Location:	Motorola South – Arad Israel
Sector/Group/Div.:	MCIL Israel
Date submitted for test:	9/26/06
DUT Description:	HC700i is handheld computer, which includes GPS and the following: iDEN/WiDEN, BlueTooth, and WLAN b/g
Test TX mode(s):	TDMA 66.67% and TDMA 33.33% duty cycle for iDEN/WiDEN; CW for BlueTooth and WLAN.
Max. Power output:	0.7W for iDEN/WiDEN; 2.09mW for BlueTooth; 39.8mW for WLAN/b; 31.6mW for WLAN/g
Nominal Power:	0.6W for iDEN/WiDEN; 1mW for BlueTooth; 32mW for WLAN
Tx Frequency Bands:	iDEN/WiDEN: 806-825MHz ; 896-901MHz; BlueTooth: 2.402-2.48GHz; WLAN b/g: 2412-2462MHz
Signaling type:	TDMA: iDEN/WiDEN; DSSS: WLAN; FHSS: BlueTooth
Model(s) Tested:	F3130A
Model(s) Certified:	F3130A
Serial Number(s):	629SGS0300, 629SGS0302
Classification:	General Population/Uncontrolled
Rule Part(s):	22, 24 and 15

Antenna(s):
8587526V18 (Dual Band PIFA ,including GPS, 900MHz 1/4 wave , -2dBi); 8587526V18 (Dual Band PIFA, including GPS, 800MHz 1/4 wave, 0dBi); 8489993V01(Inverted F (on board) – WLAN 2.4-2.48 GHz 1/4 wave, +1.2dBi); 8489993V01 (Inverted F (on board)-BT 2.4-2.48 GHz 1/4 wave, 0dBi)

Battery(ies):
FNN7826A (7.2V battery, 1800mAH)

Body worn accessory(ies):
5589618V01 (Carry Strap); FTN7059A (Belt Holster)

Audio/Data cable accessory(ies):
None

Max. Calc. : 1-g Avg. SAR: 0.31 W/kg (Body); 10-g Avg. SAR: 0.19 W/kg (Body)
Max. Calc. : 1-g Avg. SAR: 0.05 W/kg (Face); 10-g Avg. SAR: 0.04 W/kg (Face)
Max. Calc. : 1-g Avg. SAR: 0.12 W/kg (Head); 10-g Avg. SAR: 0.08 W/kg (Head)
Max. Calc. 10-g Avg. SAR: 0.65 W/kg (Hand)

Based on the information and the testing results provided herein, the undersigned certifies that when used as stated in the operating instructions supplied, said product complies with the national and international reference standards and guidelines listed in section 2.0 of this report. This report shall not be reproduced without written approval from an officially designated representative of the Motorola EME Laboratory.

This reporting format is consistent with the test report guidelines of the TIA TSB-150 December 2004
The results and statements contained in this report pertain only to the device(s) evaluated.

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

Approval Date: 12/12/06

Certification Date: 10/30/06

Certification No.: L1061051P

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Report Revision History

Date	Revision	Comments
10/30/06	O	Initial release
12/12/06	A	Modify to correct information indicated in section 5.0, 6.2, and appendix E.

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 of FCC ID: AZ489FT7017. The results herein reflect initial test results.

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: AZ489FT7017, radio model F3130A is a handheld computer. This device incorporates an iDEN/WiDEN radio modem that operates in 800MHz and 900MHz, a BlueTooth radio modem used for any application in which data is exchanged with an external BlueTooth, and a WLAN radio module used to connect the device to a LAN via an Access Point (using CSMA/CA access protocol).

The iDEN/WiDEN modulation techniques termed Quad-QPSK, Quad-16QAM and Quad-64QAM are a linear digital modulation of a multi-channel variant of a 4, 16 and 64 states Quadrature Amplitude Modulation, respectively. The transmitter is configured using TDMA time slotting so that up to 6 users can simultaneously share the 25 kHz channel. The maximum duty cycle for Package Data mode is 66.67%, 33.33% for Phone mode , and 16.67% for Dispatch mode. BlueTooth radio modem uses Frequency Hopping Spread Spectrum (FHSS). The maximum actual transmission duty cycle is imposed by the BlueTooth standard: for single-slot operation the BlueTooth device transmits 366 microsec out of 625 microsec. The WLAN modem operates in the ISM band using Direct Sequence Spread Spectrum (DSSS) and works in compliance with the IEEE 802.11b/g standard.

The device has co-located transmitters and can simultaneously transmit with iDEN/WiDEN -800MHz/BlueTooth, iDEN/WiDEN -900MHz/BlueTooth and WLAN/ BlueTooth.

The intended operating user positions are at the side of head, body-worn by means of the offered body-worn accessory, 2.5cm in front of the face, and handheld.

This device will be marketed to and used by the general population. This device may be used while held against the head and in front of the face in voice modes (iDEN/WiDEN -800MHz and iDEN/WiDEN -900MHz only), against the body in phone, data modes with offered body-worn accessories, and against the hand in data modes.

The device model F3130A is capable of operating in the iDEN/WiDEN -800: 806-825MHz; iDEN/WiDEN -900: 896-901MHz; BT: 2.402-2.48GHz; WLAN: 2412-2462MHz bands.

The rated conducted power outputs are 0.6W for iDEN/WiDEN -800 and iDEN/WiDEN -900; 1mW for BlueTooth; 32mW for WLAN b/g.

The maximum outputs are 0.7W for iDEN/WiDEN -800 and iDEN/WiDEN -900; 2.09mW for BlueTooth, 39.8mW for WLAN802.11b, and 31.6mW for WLAN802.11g as defined by the upper limit of the production line final test station.

The radio model F3130A is offered with the options and accessories listed on the coversheet of this report.

Test Output Power

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

4.0 Description of Test System

4.1 Descriptions of Robotics/probes/Readout Electronics

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

4.2 Description of Phantom(s)

4.2.1 Flat Phantom

Phantom Type	Phantom Material	Phantom Dimensions (cm)	Support structure opening dimensions (cm)	Support structure material	Loss Tangent (wood)
Flat	High Density Polyethylene (HDPE)	80x30x20x0.2	68.58x20.32	Wood	< 0.05
Flat	High Density Polyethylene (HDPE)	40x30x20x0.2	60.96x15.24	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 simulate, 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	800/900MHz		2450 MHz	
	Head	Body	Head	Body
Sugar	56.5	44.9	NA	NA
Diacetin	NA	NA	51	34.5
De ionized - Water	40.95	53.06	48.75	65.20
Salt	1.45	0.94	0.15	0.2
HEC	1.0	1		
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)	E4418B	GB40206553	4/21/2007
Power Meter (Agilent)	E4418B	GB40206480	11/30/2006
Power Sensor (HP)	8482B	3318A07392	5/17/2007
Power Sensor (HP)	8482B	3318A07393	3/27/2007
Bi-Directional Coupler (NARDA)	3020A	40295	6/6/2008
Signal Generator (Agilent)	E4421B	US40051446	8/24/2008
AMP (Amplifier Research)	10W1000	5924	CNR
AMP (ComTech PST)	AR88258-10	N1R1A00-1015	CNR
Tissue Station			
Agilent PNA-L Network Analyzer	N5230A	MY45001092	5/22/2007
Dielectric Probe Kit (HP)	85070C	US99360076	CNR
Dipole			
Speag Dipole	D900V2	85	8/15/2008
Speag Dipole	D2450V2	704	11/15/2006
Speag Dipole	D2450V2	703	5/19/2008

6.0 SAR Measurement System Verification

The SAR measurements were conducted with probe model/serial number ET3DV6/SN1393. 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 (10/5/06 – 10/24/06, 9 test days)

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	53.2-54.0	0.97	0.96-0.97
898.5	55.0	52.4-52.6	1.05	1.05
900	55.0	52.4-53.2	1.05	1.05
2437	52.7	50.2-51.4	1.94	2.01-2.02
2441	52.7	50.2-51.3	1.94	2.01-2.02
2450	52.7	50.2-51.3	1.95	2.02-2.04

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	41.9-42.2	0.90	0.93
898.5	41.5	40.9-41.2	0.97	1.0
900	41.5	40.9-41.2	0.97	1.0-1.01

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)
900	FCC Body	5/2/06	D900V2/SN85	11.76 ± 0.13	12.42 ± 10%	10/6/06 – 10/18/06 (4 test days)
900	IEEE Head	5/2/06	D900V2/SN85	12.11 ± 0.22	11.45 ± 10%	10/5/06 – 10/9/06 (2 test days)
2450	FCC Body	5/2/06	D2450V2/SN704	58.72 ± 0.55	58.06 ± 10%	10/12/06 – 10/18/06 (3 test days)
2450	FCC Body	5/2/06	D2450V2/SN703	58.81 ± 0.00	54.27 ± 10%	10/24/06 (1 test day)

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

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

7.0 DUT Test Strategy and Methodology

7.1 DUT Configuration(s)

This device is a handheld computer device. It can operate in iDEN/WiDEN 800/900 and WLAN 802.11b/g bands. It also has co-located transmitters that can operate with simultaneous iDEN/WiDEN 800 with BlueTooth, iDEN/WiDEN 900 with Bluetooth, and WLAN b/g with BlueTooth transmissions. The device is placed in the reported 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, face, and hand 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 Hand (iDEN/WiDEN 806-825 MHz, 66.67% duty cycle) Pages 14; Table 1

- The DUT was assessed at the center frequency of the offered antenna, without offered carry strap accessory, with the device's back, right, and left sides against the phantom, using the offered battery.
- The DUT was assessed at the center frequency of the offered antenna, using the carry strap accessory and the offered battery.
- The DUT was assessed at the band edges for the offered antenna, using the worst case configuration from above.
- Assessment at the worst case configuration from above, with simultaneous iDEN/WiDEN 806-825 MHz and internal BlueTooth transmission.

Assessments at the Body (iDEN/WiDEN 806-825 MHz, 66.67% duty cycle) Pages 14; Table 1

- The DUT was assessed across the frequency range of the offered antenna, using the offered body worn accessory and battery.
- Assessment at the worst case configuration from above, with simultaneous iDEN/WiDEN 806-825 MHz and internal BlueTooth transmission.

Assessments at the Body 2.5cm (iDEN/WiDEN 806-825 MHz, 66.67% duty cycle) Pages 14; Table 1

- The DUT was assessed using the highest test configuration at the body overall from above, with its' back and front sides facing phantom and separation 2.5cm from phantom.

Assessments at the Head (iDEN/WiDEN 806-825 MHz, 33.33% duty cycle) Page 15; Table 1

- The DUT was assessed at the center frequency of the offered antenna, using applicable test configurations at the head.
- The DUT was assessed at the band edges for the offered antenna, using the worst case configuration from above.
- Assessment at the worst case configuration from above, with simultaneous iDEN/WiDEN 806-825 MHz and internal BlueTooth transmission.

Assessments at the Face (iDEN/WiDEN 806-825 MHz, 33.33% duty cycle) Page 15; Table 1

- The DUT was assessed across the frequency range for the offered antenna, using the offered battery.
- Assessment at the worst case configuration from above, with simultaneous iDEN/WiDEN 806-825 MHz and BlueTooth transmission.

Assessments at the Hand (iDEN/WiDEN 896-901 MHz, 66.67% duty cycle) Pages 16; Table 2

- The DUT was assessed at the center frequency of the offered antenna, without offered carry strap accessory, with the device's back, right, and left sides against the phantom, using the offered battery.
- The DUT was assessed at the center frequency of the offered antenna, using the carry strap accessory and the offered battery.
- The DUT was assessed at the band edges for the offered antenna, using the worst case configuration from above.
- Assessment at the worst case configuration from above, with simultaneous iDEN/WiDEN 896-901 MHz and internal BlueTooth transmission.

Assessments at the Body (iDEN/WiDEN 896-901 MHz, 66.67% duty cycle) Pages 16; Table 2

- The DUT was assessed across the frequency range of the offered antenna, using the offered body worn accessory and battery.
- Assessment at the worst case configuration from above, with simultaneous iDEN/WiDEN 896-901 MHz and internal BlueTooth transmission.

Assessments at the Body 2.5cm (iDEN/WiDEN 896-901 MHz, 66.67% duty cycle) Pages 16; Table 2

- The DUT was assessed using the highest test configuration at the body overall from above, with its' back and front sides facing phantom and separation 2.5cm from phantom.

Assessments at the Head (iDEN/WiDEN 896-901 MHz, 33.33% duty cycle) Page 17; Table 2

- The DUT was assessed at the center frequency of the offered antenna, using applicable test configurations at the head.
- The DUT was assessed at the band edges for the offered antenna, using the worst case configuration from above.
- Assessment at the worst case configuration from above, with simultaneous iDEN/WiDEN 896-901 MHz and internal BlueTooth transmission.

Assessments at the Face (iDEN/WiDEN 896-901 MHz, 33.33% duty cycle) Page 17; Table 2

- The DUT was assessed across the frequency range for the offered antenna, using the offered battery.
- Assessment at the worst case configuration from above, with simultaneous iDEN/WiDEN 896-901 MHz and BlueTooth transmission.

Assessments at the Hand (WLAN/b 2412-2462MHz CW test mode) Page 18; Table 3

- The DUT was assessed at the center frequency of the offered antenna, without offered carry strap accessory, with the device's back, right, and left sides against the phantom, using the offered battery.
- The DUT was assessed at the center frequency of the offered antenna, using the carry strap accessory and the offered battery.
- The DUT was assessed at the band edges for the offered antenna, using the worst case configuration from above.
- Assessment at the worst case configuration from above, with simultaneous WLAN 802.11b and internal BlueTooth transmission.

Assessments at the Body (WLAN/b 2412-2462MHz CW test mode) Page 18; Table 3

- The DUT was assessed across the frequency range of the offered antenna, using the offered body worn accessory and battery.
- Assessment at the worst case configuration from above, with simultaneous WLAN 802.11b and internal BlueTooth transmission.

Assessments at the Body 2.5cm (WLAN/b 2412-2462MHz CW test mode) Pages 18; Table 3

- The DUT was assessed using the highest test configuration at the body overall from above, with its' back and front sides facing phantom and separation 2.5cm from phantom.

Assessments at the Hand (BlueTooth 2402-2480MHz CW test mode) Page 19; Table 4

- The DUT was assessed at the center frequency of the offered antenna, without offered carry strap accessory, with the device's back, right, and left sides against the phantom, using the offered battery.
- The DUT was assessed at the center frequency of the offered antenna, using the carry strap accessory and the offered battery.

Assessments at the Body (BlueTooth 2402-2480MHz CW test mode) Page 19; Table 4

- The DUT was assessed at the center frequency of the offered antenna, using the offered body worn accessory and battery.

Assessments at the Body 2.5cm (BlueTooth 2402-2480MHz CW test mode) Pages 19; Table 4

- The DUT was assessed using the highest test configuration at the body overall from above, with its' back and front sides facing phantom and separation 2.5cm from phantom.

Shortened scan assessment Page 20; Table 5

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

7.2 Device Positioning Procedures

Reference Appendix G for photos of the DUT tested positions.

7.2.1 Body

The DUT was positioned in normal use configuration against the phantom with the offered body worn accessory.
The DUT was positioned with its' front and back 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.

7.2.4 Hand

The DUT was positioned with its' back, right, and left sides against the phantom.
The DUT with carry strap was positioned against the phantom.

8.0 Environmental Test Conditions

The EME Laboratory ambient environment is well controlled resulting in very stable simulated tissue temperature and therefore stable dielectric properties. Simulated tissue temperature is measured prior to each scan to insure it is within +/ - 2°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: 21.7 – 23.7˚C Avg. 22.4˚C
Relative Humidity	30 - 70 %	Range: 44.7 – 65.7% Avg. 54.0%
Tissue Temperature	NA	Range: 19.1 – 21.7˚C Avg. 20.8 ˚C

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

9.0 Test Results Summary

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

Table 1

Assessments at the iDEN/WiDEN 806 – 825 MHz band												
Run Number/ SN	**Antenna Pos.**	**Freq. (MHz)**	**Battery**	**Test Pos.**	**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 Hand												
CM-Hand-061005-09/ 629SGS0300	Internal	813.5625	FNN7826A	Back of DUT against phantom	None	None	0.690	0.0235	1.0400	0.6800	1.055	0.690
CM-Hand-061005-13/ 629SGS0300	Internal	813.5625	FNN7826A	Right side of DUT against phantom	None	None	0.690	-0.160	0.7610	0.5300	0.801	0.558
CM-Hand-061005-14/ 629SGS0300	Internal	813.5625	FNN7826A	Left side of DUT against phantom	None	None	0.690	-0.141	0.7400	0.5090	0.775	0.533
CM-Hand-061005-15/ 629SGS0300	Internal	813.5625	FNN7826A	Against phantom	5589618V01 Hand strap	None	0.690	-0.0756	0.8450	0.5610	0.872	0.579
Band edges assessment at the Hand												
CM-Hand-061005-16/ 629SGS0300	Internal	806.0625	FNN7826A	Back of DUT against phantom	None	None	0.685	-0.054	1.0300	0.6780	1.066	0.702
CM-Hand-061005-17/ 629SGS0300	Internal	824.9875	FNN7826A	Back of DUT against phantom	None	None	0.689	-0.0514	0.9910	0.6540	1.019	0.672
Assessment at the Hand with BlueTooth												
***CM-Hand-061005-18/ 629SGS0300**	**Internal BT on**	**806.0625**	**FNN7826A**	**Back of DUT against phantom**	**None**	**None**	**0.685**	**0.00168**	**1.0500**	**0.6810**	**1.073**	**0.696**
Across the band assessment at the Body												
HvH-Ab-061006-05/ 629SGS0300	Internal	806.0625	FNN7826A	Against phantom	FTN7059A	None	0.685	0.00669	0.2490	0.1570	0.254	0.160
HvH-Ab-061006-06/ 629SGS0300	Internal	813.5625	FNN7826A	Against phantom	FTN7059A	None	0.690	0.0517	0.2560	0.1610	0.260	0.163
***CM-Ab-061011-02/ 629SGS0302**	**Internal**	**813.5625**	**FNN7826A**	**Against phantom**	**FTN7059A**	**None**	**0.695**	**-0.308**	**0.2950**	**0.1850**	**0.319**	**0.200**
HvH-Ab-061006-07/ 629SGS0300	Internal	824.9875	FNN7826A	Against phantom	FTN7059A	None	0.689	-0.2290	0.2250	0.1420	0.241	0.152
Assessment at the Body with BlueTooth												
HvH-Ab-061006-08/ 629SGS0300	Internal BT On	813.5625	FNN7826A	Against phantom	FTN7059A	None	0.690	-0.0493	0.2470	0.1540	0.253	0.158
Assessment at the Body – 2.5cm												
HvH-Ab-061006-09/ 629SGS0300	Internal	813.5625	FNN7826A	Back of DUT at 2.5cm	None	None	0.690	-0.0253	0.0937	0.0675	0.096	0.069
CM-Ab-061006-10/ 629SGS0300	Internal	813.5625	FNN7826A	Front of DUT at 2.5cm	None	None	0.690	-0.0343	0.1050	0.0758	0.107	0.078

Table 1 (continued)

Assessments at the iDEN/WiDEN 806 – 825 MHz band												
Run Number/ SN	**Antenna Pos.**	**Freq. (MHz)**	**Battery**	**Test Pos.**	**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 Head – Left Ear												
CM-LEAR-061006-12/ 629SGS0300	Internal	813.5625	FNN7826A	Cheek Touch	None	None	0.681	0.0640	0.1040	0.0734	0.107	0.075
CM-LEAR-061006-13/ 629SGS0300	Internal	813.5625	FNN7826A	Cheek Tilt	None	None	0.681	0.0372	0.0874	0.0616	0.090	0.063
Assessment at the Head – Right Ear												
CM-REAR-061006-14/ 629SGS0300	Internal	813.5625	FNN7826A	Cheek Touch	None	None	0.681	0.0274	0.1020	0.0721	0.105	0.074
CM-REAR-061006-15/ 629SGS0300	Internal	813.5625	FNN7826A	Cheek Tilt	None	None	0.681	0.00444	0.0830	0.0589	0.085	0.061
Band edges assessment at the Head												
CM-LEAR-061006-16/ 629SGS0300	Internal	806.0625	FNN7826A	Cheek Touch	None	None	0.688	0.0326	0.1030	0.0726	0.105	0.074
CM-LEAR-061006-17/ 629SGS0300	Internal	824.9875	FNN7826A	Cheek Touch	None	None	0.685	0.0841	0.1030	0.0720	0.105	0.074
Assessment at the Head with BlueTooth												
CM-LEAR-061006-18/ 629SGS0300	Internal BT on	813.5625	FNN7826A	Cheek Touch	None	None	0.681	0.0994	0.1120	0.0794	0.115	0.082
***CM-LEAR-061011-13/ 629SGS0302**	**Internal BT on**	**813.5625**	**FNN7826A**	**Cheek Touch**	**None**	**None**	**0.680**	**0.0837**	**0.1170**	**0.0821**	**0.120**	**0.085**
Across the band assessment at the Face												
CM-Face-061009-02/ 629SGS0300	Internal	806.0625	FNN7826A	Front of DUT at 2.5cm	None	None	0.688	-0.0731	0.0488	0.0349	0.050	0.036
CM-Face-061009-03/ 629SGS0300	Internal	813.5625	FNN7826A	Front of DUT at 2.5cm	None	None	0.681	0.0357	0.0507	0.0361	0.052	0.037
***CM-Face-061009-12/ 629SGS0302**	**Internal**	**813.5625**	**FNN7826A**	**Front of DUT at 2.5cm**	**None**	**None**	**0.680**	**0.0589**	**0.0533**	**0.0382**	**0.055**	**0.039**
CM-Face-061009-04/ 629SGS0300	Internal	824.9875	FNN7826A	Front of DUT at 2.5cm	None	None	0.685	-0.114	0.0474	0.0340	0.050	0.036
Assessment at the Face with BlueTooth												
CM-Face-061009-05/ 629SGS0300	Internal BT on	813.5625	FNN7826A	Front of DUT at 2.5cm	None	None	0.681	0.0223	0.0263	0.0185	0.027	0.019

Table 2

Assessments at the iDEN/WiDEN 896 - 901 MHz band												
Run Number/ SN	**Antenna Pos.**	**Freq. (MHz)**	**Battery**	**Test Pos.**	**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 Hand												
CM-Hand-061010-02/ 629SGS0300	Internal	900.98125	FNN7826A	Back of DUT against phantom	None	None	0.678	-0.198	0.7760	0.5120	0.839	0.553
CM-Hand-061010-03/ 629SGS0300	Internal	900.98125	FNN7826A	Right side of DUT against phantom	None	None	0.678	0.0762	0.6380	0.4250	0.659	0.439
CM-Hand-061010-04/ 629SGS0300	Internal	900.98125	FNN7826A	Left side of DUT against phantom	None	None	0.678	-0.0919	0.7120	0.4780	0.751	0.504
CM-Hand-061010-05/ 629SGS0300	Internal	900.98125	FNN7826A	Against phantom	5589618V01 Hand strap	None	0.678	-0.103	0.6160	0.4150	0.651	0.439
Band edges assessment at the Hand												
CM-Hand-061010-06/ 629SGS0300	Internal	896.01875	FNN7826A	Back of DUT against phantom	None	None	0.681	0.003	0.8140	0.5270	0.837	0.542
CM-Hand-061010-07/ 629SGS0300	Internal	901.98125	FNN7826A	Back of DUT against phantom	None	None	0.685	-0.264	0.7020	0.4770	0.762	0.518
Assessment at the Hand with BlueTooth												
CM-Hand-061010-08/ 629SGS0300	Internal BT on	900.98125	FNN7826A	Back of DUT against phantom	None	None	0.678	-0.234	0.7150	0.4840	0.779	0.527
Across the band assessment at the Body												
CM-Ab-061010-11/ 629SGS0300	Internal	896.01875	FNN7826A	Against phantom	FTN7059A	None	0.681	-0.0848	0.1600	0.0994	0.168	0.104
CM-Ab-061010-12/ 629SGS0300	Internal	900.98125	FNN7826A	Against phantom	FTN7059A	None	0.678	-0.0135	0.1310	0.0813	0.136	0.084
CM-Ab-061010-13/ 629SGS0300	Internal	901.98125	FNN7826A	Against phantom	FTN7059A	None	0.685	0.086	0.1430	0.0872	0.146	0.089
Assessment at the Body with BlueTooth												
CM-Ab-061010-14/ 629SGS0300	Internal BT On	896.01875	FNN7826A	Against phantom	FTN7059A	None	0.681	0.022	0.1530	0.0942	0.157	0.097
Assessment at the Body – 2.5cm												
CM-Ab-061010-15/ 629SGS0300	Internal	896.01875	FNN7826A	Back of DUT at 2.5cm	None	None	0.681	0.0361	0.1080	0.0773	0.111	0.079
CM-Ab-061010-16/ 629SGS0300	Internal	896.01875	FNN7826A	Front of DUT at 2.5cm	None	None	0.681	-0.0235	0.0974	0.0690	0.101	0.071

Table 2 (continued)

Assessments at the iDEN/WiDEN 896 - 901 MHz band												
Run Number/ SN	**Antenna Pos.**	**Freq. (MHz)**	**Battery**	**Test Pos.**	**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 Head – Left Ear												
CM-LEAR-061011-05/ 629SGS0300	Internal	900.98125	FNN7826A	Cheek Touch	None	None	0.676	0.102	0.0761	0.0535	0.079	0.055
CM-LEAR-061011-06/ 629SGS0300	Internal	900.98125	FNN7826A	Cheek Tilt	None	None	0.676	0.088	0.0622	0.0434	0.064	0.045
Assessment at the Head – Right Ear												
CM-REAR-061011-07/ 629SGS0300	Internal	900.98125	FNN7826A	Cheek Touch	None	None	0.676	0.120	0.0649	0.0454	0.067	0.047
CM-REAR-061011-08/ 629SGS0300	Internal	900.98125	FNN7826A	Cheek Tilt	None	None	0.676	-0.0189	0.0586	0.0416	0.061	0.043
Band edges assessment at the Head												
CM-LEAR-061011-09/ 629SGS0300	Internal	896.01875	FNN7826A	Cheek Touch	None	None	0.679	-0.00178	0.0756	0.0535	0.078	0.055
CM-LEAR-061011-10/ 629SGS0300	Internal	901.98125	FNN7826A	Cheek Touch	None	None	0.670	0.054	0.0720	0.0512	0.075	0.053
Assessment at the Head with BlueTooth												
CM-LEAR-061011-11/ 629SGS0300	Internal BT on	900.98125	FNN7826A	Cheek Touch	None	None	0.676	-0.0198	0.0773	0.0539	0.080	0.056
Across the band assessment at the Face												
CM-Face-061009-07/ 629SGS0300	Internal	896.01875	FNN7826A	Front of DUT at 2.5cm	None	None	0.679	-0.012	0.0475	0.0335	0.049	0.035
CM-Face-061009-08/ 629SGS0300	Internal	900.98125	FNN7826A	Front of DUT at 2.5cm	None	None	0.676	-0.0214	0.0459	0.0324	0.048	0.034
CM-Face-061009-09/ 629SGS0300	Internal	901.98125	FNN7826A	Front of DUT at 2.5cm	None	None	0.670	0.0113	0.0443	0.0315	0.046	0.033
Assessment at the Face with BlueTooth												
CM-Face-061009-10/ 629SGS0300	Internal BT on	896.01875	FNN7826A	Front of DUT at 2.5cm	None	None	0.679	-0.0133	0.0461	0.0327	0.048	0.034

Table 3

Assessments at the WLAN-b 2412-2462MHz band												
Run Number/ SN	**Antenna Pos.**	**Freq. (MHz)**	**Battery**	**Test Pos.**	**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 Hand												
MeC-HAND-061017-02/ 629SGS0300	Internal	2437.0	FNN7826A	Back of DUT against phantom	None	None	0.039	0.385	0.0894	0.0462	0.091	0.047
MeC-HAND-061017-03/ 629SGS0300	Internal	2437.0	FNN7826A	Right side of DUT against phantom	None	None	0.039	-0.1620	0.1720	0.0840	0.182	0.089
MeC-HAND-061017-04/ 629SGS0300	Internal	2437.0	FNN7826A	Left side of DUT against phantom	None	None	0.039	-0.2780	0.0511	0.0240	0.056	0.026
MeC-HAND-061017-05/ 629SGS0300	Internal	2437.0	FNN7826A	Against phantom	5589618V01 Hand strap	None	0.039	-0.1620	0.0765	0.0395	0.081	0.042
Band edges assessment at the Hand												
MeC-HAND-061017-06/ 629SGS0300	Internal	2412.0	FNN7826A	Right side of DUT against phantom	None	None	0.038	-0.199	0.1520	0.0756	0.167	0.083
MeC-HAND-061017-07/ 629SGS0300	Internal	2462.0	FNN7826A	Right side of DUT against phantom	None	None	0.040	-0.2010	0.2040	0.0990	0.214	0.104
Assessment at the Hand with BlueTooth												
MeC-HAND-061017-08/ 629SGS0300	Internal BT on	2462.0	FNN7826A	Right side of DUT against phantom	None	None	0.040	-0.1210	0.1990	0.0952	0.205	0.098
Across the band assessment at the Body												
MeC-AB-061017-10/ 629SGS0300	Internal	2412.0	FNN7826A	Against phantom	FTN7059A	None	0.038	-0.309	0.0366	0.0199	0.041	0.022
MeC-AB-061017-11/ 629SGS0300	Internal	2437.0	FNN7826A	Against phantom	FTN7059A	None	0.039	-0.359	0.0358	0.0195	0.040	0.022
MeC-AB-061018-02/ 629SGS0300	Internal	2462.0	FNN7826A	Against phantom	FTN7059A	None	0.040	-1.8600	0.0572	0.0310	0.088	0.048
Assessment at the Body with BlueTooth												
MeC-AB-061018-04/ 629SGS0300	Internal BT On	2462.0	FNN7826A	Against phantom	FTN7059A	None	0.040	-0.3580	0.0452	0.0243	0.049	0.026
Assessment at the Body – 2.5cm												
MeC-AB-061018-05/ 629SGS0300	Internal	2462.0	FNN7826A	Back of DUT at 2.5cm	None	None	0.040	-0.2560	0.0294	0.0163	0.031	0.017
MeC-AB-061018-06/ 629SGS0300	Internal	2462.0	FNN7826A	Front of DUT at 2.5cm	None	None	0.040	-0.1870	0.0269	0.0148	0.028	0.015

Table 4

Assessments at the BlueTooth 2402 - 2480 MHz band												
Run Number/ SN	**Antenna Pos.**	**Freq. (MHz)**	**Battery**	**Test Pos.**	**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 Hand												
CM-Hand-061012-02/ 629SGS0300	Internal	2440.0	FNN7826A	Back of DUT against phantom	None	None	0.00197	0.176	0.0046	0.0022	0.005	0.002
CM-Hand-061012-03/ 629SGS0300	Internal	2440.0	FNN7826A	Right side of DUT against phantom	None	None	0.00197	0.124	0.0112	0.0045	0.012	0.005
CM-Hand-061012-04/ 629SGS0300	Internal	2440.0	FNN7826A	Left side of DUT against phantom	None	None	0.00197	-0.239	0.0002	0.0001	0.000	0.000
CM-Hand-061012-05/ 629SGS0300	Internal	2440.0	FNN7826A	Against phantom	5589618V01 Hand strap	None	0.00197	3.52	0.0013	0.0004	0.001	0.000
Band edges assessment at the Hand												
CM-Hand-061012-06/ 629SGS0300	Internal	2402	FNN7826A	Right side of DUT against phantom	None	None	0.00196	-0.0892	0.0147	0.0063	0.016	0.007
CM-Hand-061012-07/ 629SGS0300	Internal	2480.0	FNN7826A	Right side of DUT against phantom	None	None	0.00195	-0.304	0.0154	0.0061	0.018	0.007
CM-Hand-061012-11/ 629SGS0302	Internal	2480.0	FNN7826A	Right side of DUT against phantom	None	None	0.00199	-0.321	0.0185	0.0068	0.021	0.008
Assessment at the Body												
CM-Ab-061012-08/ 629SGS0300	Internal	2440.0	FNN7826A	Against phantom	FTN7059A	None	0.00197	-0.572	0.0002	0.0000	0.000	0.000
Assessment at the Body - 2.5cm												
CM-Ab-061012-09/ 629SGS0300	Internal	2440.0	FNN7826A	Back of DUT at 2.5cm	None	None	0.00197	3.43	0.0001	0.0000	0.002	0.000
CM-Ab-061012-10/ 629SGS0300	Internal	2440.0	FNN7826A	Front of DUT at 2.5cm	None	None	0.00197	0.5930	0.0002	0.0000	0.004	0.001

Table 5

*Highest configuration per body location from above –using the DASY 4 full coarse and 7x7x7 cube scan measurements.												
Run Number/ SN	**Antenna Pos.**	**Freq. (MHz)**	**Battery**	**Test Pos.**	**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 Hand												
CM-Hand-061005-20/ 629SGS0300	Internal BT on	806.0625	FNN7826A	Back of DUT against phantom	None	None	0.685	-0.232	1.0300	0.6000	1.110	0.647
MeC-Hand-061018-09/ 629SGS0300 (Shorten scan)	Internal BT on	806.0625	FNN7826A	Back of DUT against phantom	None	None	0.685	-0.363	0.9710	0.5880	**1.079**	**0.653**
Assessment at the Body												
CM-Ab-061011-03/ 629SGS0302	Internal	813.5625	FNN7826A	Against phantom	FTN7059A	None	0.695	-0.487	0.2770	0.1690	**0.312**	**0.190**
Assessment at the Head												
CM-LEAR-061011-15/ 629SGS0302	Internal BT on	813.5625	FNN7826A	Cheek Touch	None	None	0.680	-0.0443	0.1140	0.0798	0.119	0.083
Assessment at the Face												
CM-Face-061009-13/ 629SGS0302	Internal	813.5625	FNN7826A	Front of DUT at 2.5cm	None	None	0.680	0.0567	0.0514	0.0388	0.053	0.040

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: AZ489FT7017 model F3130A.

Max. Calc. : 1-g Avg. SAR: 0.31 W/kg (Body); 10-g Avg. SAR: 0.19 W/kg (Body)
Max. Calc. : 1-g Avg. SAR: 0.05 W/kg (Face); 10-g Avg. SAR: 0.04 W/kg (Face)
Max. Calc. : 1-g Avg. SAR: 0.12 W/kg (Head); 10-g Avg. SAR: 0.08 W/kg (Head)
Max. Calc. 10-g Avg. SAR: 0.65 W/kg (Hand)

These test results clearly demonstrate compliance with FCC General Population/Uncontrolled RF Exposure limits of 1.6W/kg averaged over 1gram for head, body and face; and 4.0 W/Kg averaged over 10grams for Hand per the requirements of 47 CFR 2.1093(d).

APPENDIX A
Measurement Uncertainty

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

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

FCD-0558 Rev 5

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
Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: SCS 108

Client **Motorola CGISS**

Certificate No: ET3-1393_May06

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN: 1393
Calibration procedure(s)	QA CAL-01.v5 and QA CAL-12.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	May 2, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: May 3, 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

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

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

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
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., $\vartheta = 0$ 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 $\vartheta = 0$ ($f \leq 900$ 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 $f \leq 800$ 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 *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:1393

Manufactured:	October 1, 1999
Last calibrated:	May 20, 2005
Recalibrated:	May 2, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1393 **May 2, 2006**

DASY - Parameters of Probe: ET3DV6 SN:1393

Sensitivity in Free Space[A]			Diode Compression[B]	
NormX	**1.85** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**93** mV
NormY	**1.52** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**93** mV
NormZ	**1.81** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**93** 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	7.8	4.3
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	7.0	3.9
SAR_{be} [%]	With Correction Algorithm	0.3	0.3

Sensor Offset

Probe Tip to Sensor Center **2.7** mm

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

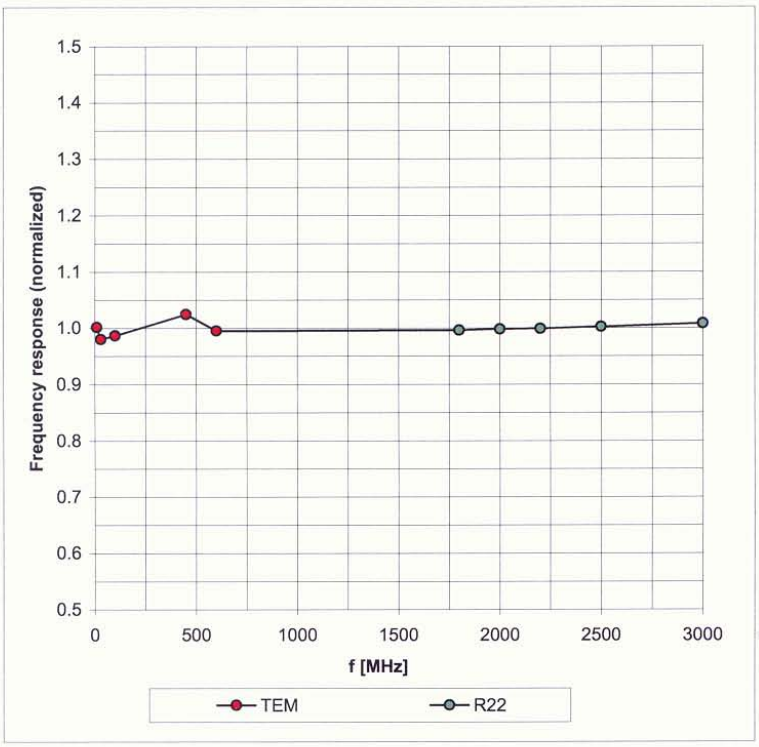
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1393 **May 2, 2006**

Frequency Response of E-Field

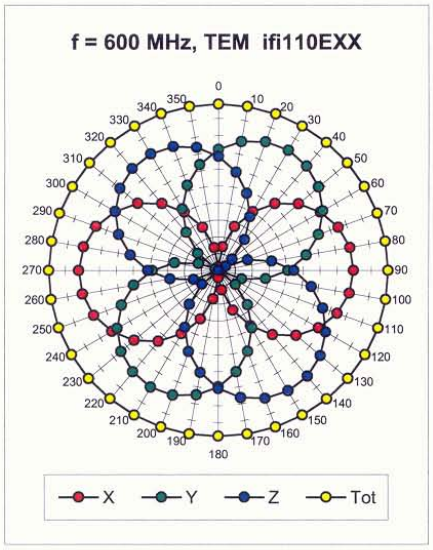
(TEM-Cell:ifi110 EXX, Waveguide: R22)

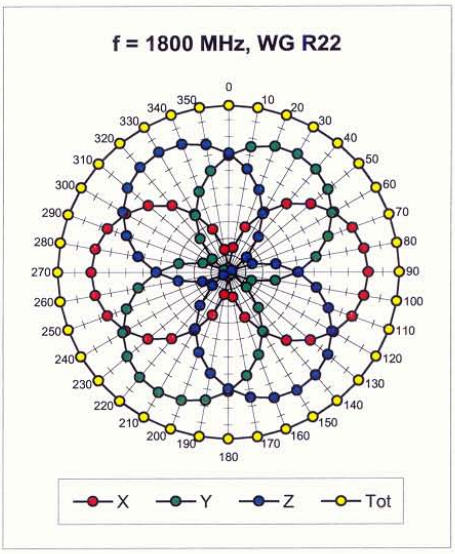


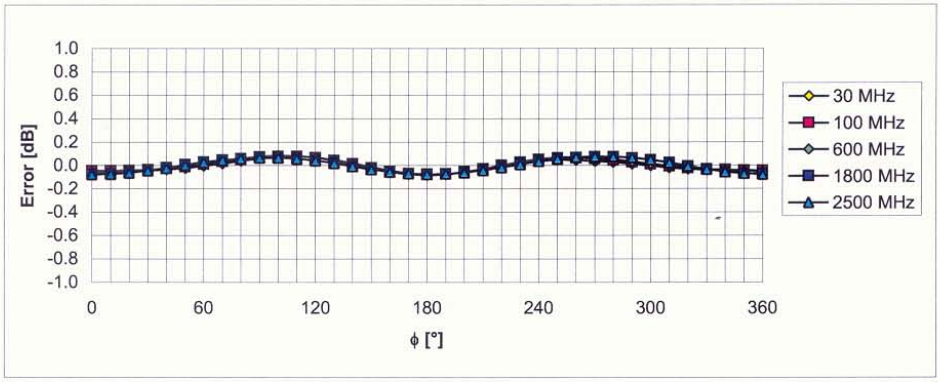
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ET3DV6 SN:1393 **May 2, 2006**

Receiving Pattern (ϕ), ϑ = 0°







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

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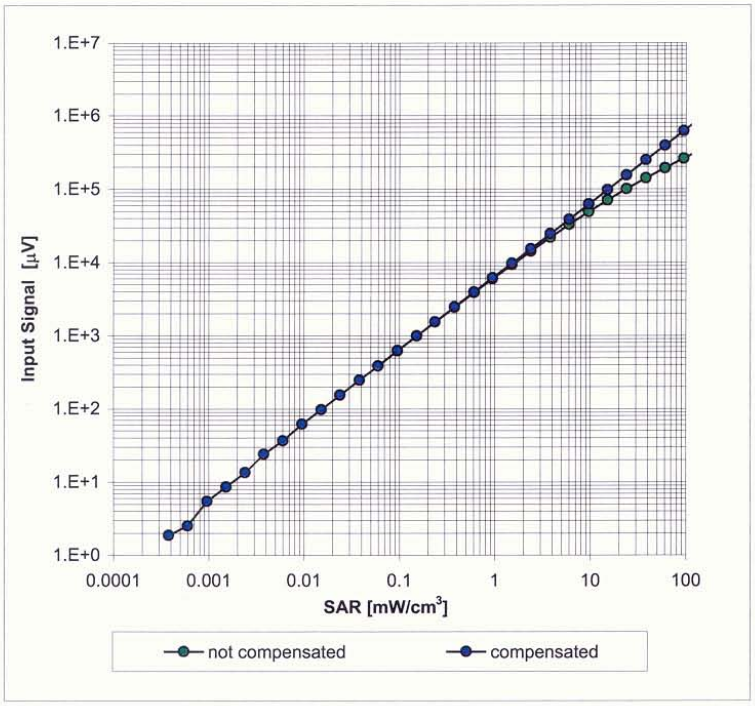
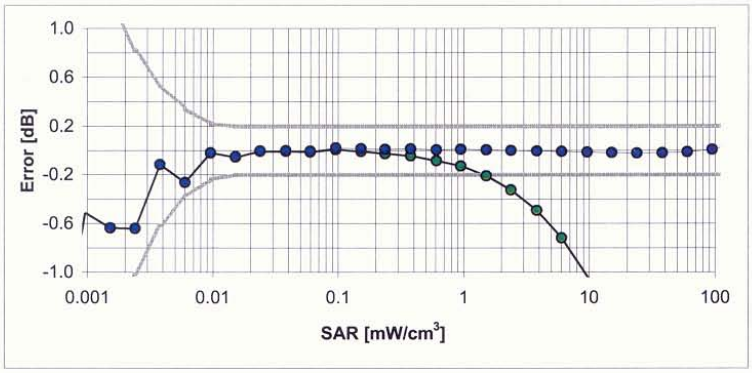
ET3DV6 SN:1393 **May 2, 2006**

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)



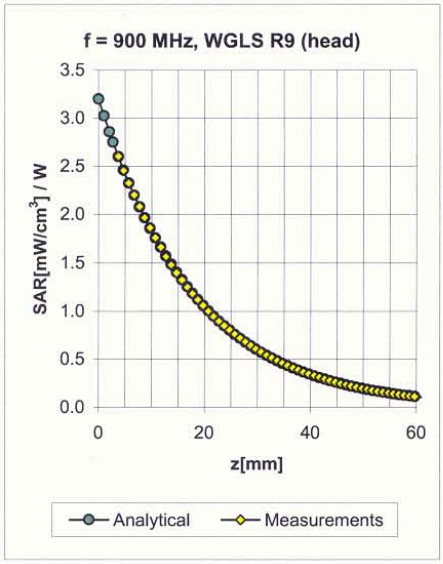


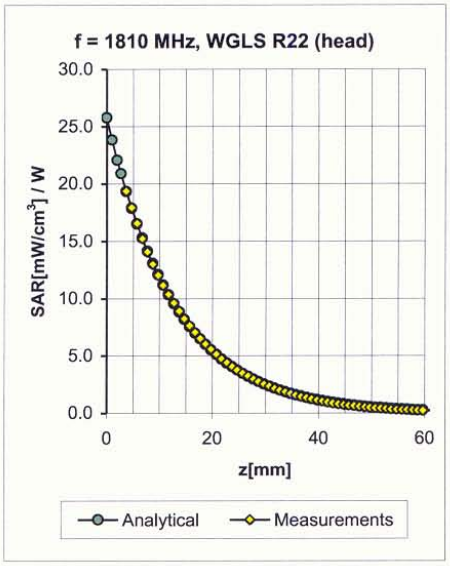
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: ET3-1393_May06 Page 7 of 9

ET3DV6 SN:1393 **May 2, 2006**

Conversion Factor Assessment





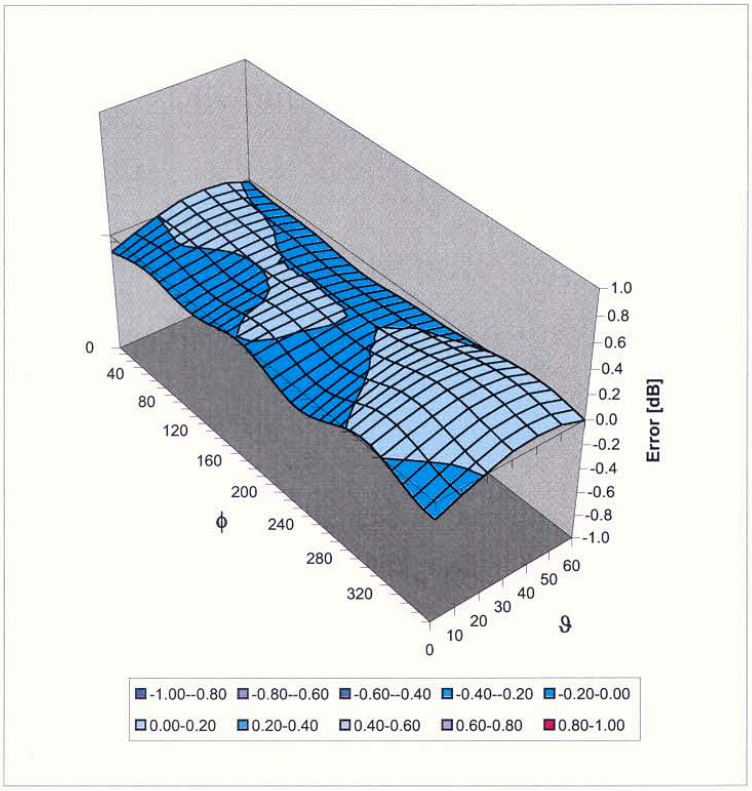
f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.25	2.93	7.24 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.47	1.97	6.50 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.43	2.87	5.26 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.51	2.31	4.49 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.24	4.51	7.59 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.44	2.16	6.22 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.57	2.56	4.76 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.48	2.09	4.15 ± 11.8% (k=2)

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

ET3DV6 SN:1393 **May 2, 2006**

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: ET3-1393_May06 Page 9 of 9

Schmid & Partner Engineering AG

s p e a g

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info@speag.com, http://www.speag.com

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1393**
Place of Assessment:	**Zurich**
Date of Assessment:	**May 5, 2006**
Probe Calibration Date:	**May 2, 2006**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1810 MHz.

Assessed by:

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
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info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ET3DV6 SN:1393

Conversion factor (± standard deviation)

150 MHz	*ConvF*	**8.8 ± 10%**	ε_r **= 52.3** σ **= 0.76 mho/m** (head tissue)
250 MHz	*ConvF*	**8.0 ± 10%**	ε_r **= 47.6** σ **= 0.83 mho/m** (head tissue)
300 MHz	*ConvF*	**7.9 ± 9%**	ε_r **= 45.3** σ **= 0.87 mho/m** (head tissue)
750 MHz	*ConvF*	**6.8 ± 7%**	ε_r **= 41.9** σ **= 0.89 mho/m** (head tissue)
150 MHz	*ConvF*	**8.5 ± 10%**	ε_r **= 61.9** σ **= 0.80 mho/m** (body tissue)
250 MHz	*ConvF*	**8.1 ± 10%**	ε_r **= 59.4** σ **= 0.88 mho/m** (body tissue)
300 MHz	*ConvF*	**8.0 ± 9%**	ε_r **= 58.2** σ **= 0.92 mho/m** (body tissue)
750 MHz	*ConvF*	**6.6 ± 7%**	ε_r **= 55.5** σ **= 0.96 mho/m** (body tissue)

Important Note:

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

Please see also Section 4.7 of the DASY4 Manual.