MOTOROLA

ACCREDITED
TESTING CERT # 2518.05

FCC ID: ABZ99FT5011
DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Enterprise Mobility Solutions
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Date of Report:	**01/15/10**
Report Revision:	**A**
Report ID:	**PCII SAR rpt_PMUF1413A_Rev A 100115_SR7835/SR7842**

Responsible Engineer:	Veeramani Veerapan (EME Engineer)
Report Author:	Veeramani Veerapan (EME Engineer)
Date/s Tested:	11/20/09~01/13/10
Manufacturer/Location:	Penang
Sector/Group/Div.:	GTDG
Date submitted for test:	11/17/09
DUT Description:	806-870MHz & 896-941MHz, 12.5kHz/25kHz, 1-2.5W, 32CH, PLAIN without GPS (Capable of analog FM transmission and digital TDMA transmission.)
Test TX mode(s):	CW
Max. Power output:	3.0 Watts
Nominal Power:	2.5 Watts
Tx Frequency Bands:	TMO: 806-825, DMO: 851-870 (800 band) & TMO: 896-902, DMO: 935-941 (900 band)
Signaling type:	FM and TDMA 2:1
Model(s) Tested:	PMUF1413A
Model(s) Certified:	PMUF1413A
Serial Number(s):	777TKN0846
Classification:	Occupational/Controlled
Rule Part(s):	90

Approved Accessories:
Antenna(s): NAF5037A (806-870MHz, 1/2 Wave, Whip ANTENNA, -3dBd), NAF5038AR (896-941MHz, 1/2 Wave, Whip Antenna, -3dBd)
Battery(ies): PMNN4077C (IMPRES Li-Ion 2200mAh Submersible (IP57) Battery), PMNN4069A (IMPRES Li-Ion 1400mAh Battery with box (FM))
Body worn accessory(ies): RLN4570A (Break A-way Chest pack), HLN6602A (Universal Chest pack)
Audio/Data Cable accessory(ies): PMLN5097A (IMPRES 3-Wire Surveillance, black), RLN5878A (Receive only surveillance kit, black (single wire))

Max. Calc. : 1-g Avg. SAR: 5.30 W/kg (Body); 10-g Avg. SAR: 3.60 W/kg (Body)
Max. Calc. : 1-g Avg. SAR: 1.75 W/kg (Face); 10-g Avg. SAR: 1.24 W/kg (Face)

The test results clearly demonstrate compliance with FCC Occupational/Controlled RF Exposure limits of 8 W/kg averaged over 1 gram per the requirements of 47 CFR 2.1093(d).
The test results clearly demonstrate compliance with ICNIRP (1998) Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz), Health Physics 74, 494-522 RF Exposure limits of 10 W/kg averaged over 10grams of contiguous tissue.

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.
I attest to the accuracy of the data and assume full responsibility for the completeness of these measurements. This reporting format is consistent with the suggested 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** **EMS EME Lab Senior Resource Manager, Laboratory Director** **Approval Date:** 1/15/2010	**Certification Date**: 10/20/2009 **Certification No.:** L1091019

Part 1 of 2

APPENDICES

Part 2 of 2

Report Revision History

Date	Revision	Comments
09/18/09	O	Initial release.
01/15/10	A	Release of PCII results with new offered antennas accessories.

1.0 Introduction

This report details the utilization, test setup, test equipment, and test results of the Specific Absorption Rate (SAR) measurements performed at the EMS EME Test Lab for model PMUF1413A. The results herein reflect final pilot test results. This report presents PCII results for new offered antennas kit #NAF5037A and NAF5038AR.

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 Electronics Engineers (IEEE) C95. 1-1992
- Institute of Electrical and Electronics Engineers (IEEE) C95.1-2005
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- Ministry of Health (Canada) Safety Code 6 (1999), Limits of Human Exposure to Radio frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz
- Australian Communications Authority Radio communications (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"
- Draft of IEC62209-2 Ed.1, Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices – Human models, Instrumentation, and Procedures Part 2: Procedure to determine the specific absorption rate (SAR) for mobile wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz), revised on Oct 3, 2008.

* The IEC62209-1 and IEEE1528 are applicable for hand-held devices used in close proximity to the ear only.

3.0 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)	1.6	8.0
Spatial Peak – ICNIRP/ANSI - (hands/wrists/feet/ankles averaged over 10-g)	4.0	20.0
Spatial Peak - ICNIRP - (Head and Trunk 10-g)	2.0	10.0

4.0 Description of Device Under Test (DUT):

FCC ID: ABZ99FT5011 operates using digital and analog frequency modulation (FM) as well as TDMA signaling incorporating traditional simplex two-way radio transmission protocol.

Time Division Multiple Access (TDMA) is used to allocate portions of the RF signal by dividing time into two slots. Time allocation enables each unit to transmit its voice information without interference from other transmitting units. Transmission from a unit or base station is accommodated during two time-slot lengths of 30 milliseconds with frame length of 60 milliseconds. 4FSK TDMA modulation is used and includes the following channel spaces; 12.5 kHz and 25 kHz. The 4FSK TDMA technique requires sophisticated algorithms and a digital signal processor (DSP) to perform voice compressions/decompressions and RF modulation/demodulation. The maximum duty cycle for TDMA is 2:1 and is controlled by software. The TDMA mode was not tested because its duty cycle is inherently 50% and would include an additional 50% duty cycle for PTT.

The radio model PMUF1413A utilizes removable antennas and is capable of transmitting in the 806-824MHz, 851-869MHz, 896-902MHz and 935-941MHz bands. The nominal output power is 2.5 watts with maximum output powers of 3.0 watts as defined by upper limit of the production line final test station. The intended operating positions are “at the face” with the DUT at least 1 inch from the mouth, and “at the body” by means of the offered body worn accessories. Body worn audio and PTT operation is accomplished by means of optional remote accessories that are connected to the radio.

Test Output Power

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

5.0 Description of Test System

5.1 Descriptions of Robotics/Probes/Readout Electronics

The laboratory utilizes a Dosimetric Assessment System (DASY4™) SAR measurement system Version 4.7 build 80 manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. The test system consists of a Stäubli RX90L robot, DAE4, and ES3DV3 E-field probe. 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 ISO/IEC 17025 A2LA guidelines. Section 6.0 presents additional 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.

5.2 Description of Phantom(s)

5.2.1 Dual Flat Phantom

Not Applicable

5.2.2 SAM Phantom

Not Applicable

5.2.3 Elliptical Flat Phantom

Phantom ID (s)	Material Parameters	Phantom Dimensions LxWxD (mm)	Material Thickness (mm)	Support Structure Material	Loss Tangent (wood)
ELI4 1050 ELI4 1028 ELI4 1037	300MHz -6GHz; Er = 4+/- 1, Loss Tangent = ≤0.05	600x400x190	2mm +/- 0.2mm	Wood	< 0.05

5.3 Description 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 Std 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 simulated tissue used is also compliant to that specified in IEC62209-1 (2005) and adopted by CENELEC as EN62209-1 (2006).

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 (by mass)

% of listed ingredients	800/900MHz	
	Head	Body
Sugar	56.5	44.9
Diacetin	0	0
De ionized -Water	40.95	50.06
Salt	1.45	0.94
HEC	1.0	1.0
Bact.	0.1	0.1

Reference section 7.1 for target parameters

6.0 Additional Test Equipment

The table below lists additional test equipment used during the SAR assessment.

Equipment Type	Model Number	Serial Number	Calibration Due Date
Power Meter	E4418B	MY45100739	6/15/2010
Power Sensor	8481B	MY41091243	6/1/2010
Power Meter	E4418B	MY45100911	5/29/2010
Power Sensor	8481B	SG41090258	6/1/2010
Signal Generator	E4438C	MY45091014	8/26/2010
Thermometer	HH202A	35882	6/11/2010
Therm. Probe	80PK-22	9135	6/11/2010
Dickson Temp & RH Data Logger	TM320	06153216	5/27/2010
NARDA Bi-Directional Coupler	3020A	41931	8/11/2010
Amplifier	10W1000C	312858	CNR
Network Analyzer (HP)	E5071B	MY42403147	8/26/2010
Dielectric Probe Kit (HP)	85070E	MY44300183	CNR
Speag Dipole	D900V2	1d025	4/14/2011
Speag Dipole	D835V2	4d029	4/14/2011

7.0 SAR Measurement System Verification

The SAR measurements were conducted with probe model/serial number ES3DV3/SN3122. 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.

Dipole validation scans using head tissue equivalent medium are provided in APPENDIX D. The EMS EME lab validated the dipole to the applicable IEEE 1528-2003 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 EMS EME system performance validation are provided herein.

7.1 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 6.0. The table below summarizes the measured tissue parameters used for the SAR assessment.

Frequency (MHz)	Tissue Type	Conductivity Target & Range (S/m)	Dielectric Constant Target & Range	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
900	FCC Body	1.05 (0.99-1.10)	55.0 (52.2-57.7)	1.06	53.0	11/20/2009
				1.06	52.9	11/25/2009
				1.06	52.9	11/30/2009
				1.07	52.9	12/17/2009
				1.07	53.0	12/22/2009
				1.07	52.6	01/12/2010
				1.06	52.9	01/13/2010
900	IEEE/ IEC Head	0.97 (0.92-1.02)	41.5 (39.43-43.58)	0.98	40.7	11/24/2009
815.5	FCC Body	0.97 (0.92-1.02)	55.3 (52.54-58.07)	0.97	53.9	11/20/2009
				0.98	53.9	12/09/2009
				0.98	53.8	12/17/2009
				0.98	53.8	12/22/2009
				0.98	53.4	01/12/2010
815.5	IEEE/ IEC Head	0.90 (0.86-0.95)	41.6 (39.52-43.68)	0.90	41.7	11/24/2009
				0.89	41.3	11/25/2009
				0.90	41.4	12/17/2009
835	FCC Body	0.97 (0.92-1.02)	55.2 (52.44-57.96)	1.00	53.7	12/9/2009
860.5	FCC Body	1.00 (0.95-1.05)	55.1 (52.35-57.86)	1.02	53.4	11/20/2009
				1.02	53.4	11/24/2009
				1.03	53.3	12/17/2009
				1.03	53.0	01/12/2010
860.5	IEEE/ IEC Head	0.93 (0.88-0.98)	41.5 (39.43-43.58)	0.94	41.2	11/24/2009
				0.95	40.8	12/17/2009

Frequency (MHz)	Tissue Type	Conductivity Target & Range (S/m)	Dielectric Constant Target & Range	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
899	FCC Body	1.05 (0.99-1.10)	55.0 (52.25-57.75)	1.06	53.1	11/20/2009
				1.06	52.9	11/25/2009
				1.07	52.9	12/17/2009
				1.06	52.9	01/13/2010
899	IEEE/ IEC Head	0.97 (0.92-1.02)	41.5 (39.43-43.58)	0.97	40.5	11/25/2009
				0.98	40.4	12/17/2009
938	FCC Body	1.07 (1.02-1.12)	54.9 (52.2-57.7)	1.11	52.7	11/20/2009
				1.11	52.6	11/30/2009
				1.11	52.6	12/17/2009
				1.11	52.5	01/13/2010
938	IEEE/ IEC Head	0.99 (0.94-1.04)	41.4 (39.03-43.17)	1.01	40.0	11/25/2009
				1.01	39.6	11/30/2009
				1.02	40.0	12/17/2009

7.2 System Check Test Results

System performance checks were conducted each day during the SAR assessment. The results are normalized to 1W. APPENDIX D explains how the targets were set and includes DASY plots for each day during the SAR assessment. The table below summarizes the daily system check results used for the SAR assessment.

Probe Serial #	Tissue Type	Probe Cal Date	Dipole Kit / Serial #	Reference SAR @ 1W (W/kg)	System Check Test Results when normalized to 1W (W/kg)	Tested Date
3122	FCC Body	4/24/2009	SPEAG D900V2 /1d025	10.88 +/- 10%	11.32	11/20/2009
					11.36	11/25/2009
					11.08	11/30/2009
					11.04	12/17/2009
					11.00	12/22/2009
					11.24	01/12/2010
					11.08	01/13/2010
3122	FCC Body	4/24/2009	SPEAG D835V2 /4d029	9.60 +/- 10%	9.80	12/09/2009
3122	IEEE/ IEC Head	4/24/2009	SPEAG D900V2 /1d025	10.92 +/- 10%	11.36	11/24/2009

8.0 DUT Test Methodology

8.1 Measurements

SAR measurements were performed using the DASY system described in section 8.0 using coarse and 5x5x7 zoom scan. Elliptical flat phantoms filled with applicable simulated tissue were used for body and face testing.

8.2 Test Plan

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

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 antenna using the coarse-to-cube approximation methodology were assessed using the full DASY4™ coarse and 5x5x7 cube scans.

Assessment at the Body **[Page 11 & 12 ; Table 1]**

- Assessment across the 806-825MHz and 851-870MHz bands of new offered antenna kit # NAF5037A at the body using the worst case configuration from previously reported.
- The highest SAR configuration from above assessment will be assessed for chest pack HLN6602A and batteries PMNN4069A, PMNN4077C.

- Assessment across the 896-902MHz and 935-941MHz bands of new offered antenna kit # NAF5038AR at the body using the worst case configuration from previously reported.
- The highest SAR configuration from above assessment will be assessed for chest pack HLN6602A and batteries PMNN4069A, PMNN4077C.

Assessment at the Face **[Page 13 ; Table 2]**

- Assessment across the 806-825MHz and 851-870MHz bands of new offered antenna kit # NAF5037A at the face using the worst case configuration from previously reported.
- Assessment across the 896-902MHz and 935-941MHz bands of new offered antenna kit # NAF5038AR at the face using the worst case configuration from previously reported.

-The highest SAR configuration from above assessment will be assessed for battery PMNN4069A.

Shortened scan assessment at the Face **[Page 14 ; Table 3]**

- A “shortened” scan was performed using the offered antenna that produced the highest SAR results for each body position. 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.

9.0 Device Positioning Procedures

Reference Appendix G for photos of the DUT tested positions.

9.1 Body

The DUT was positioned in normal use configuration against the phantom with the offered body worn accessory.

9.2 Head

Not Applicable.

9.3 Face

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

10.0 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	18 - 25 ˚C	Range: 21.8-22.7˚C Avg. 22.1˚C
Relative Humidity	30 - 70 %	Range: 47.6-62.2 % Avg. 54.8%
Tissue Temperature	NA	Range: 20.7-21.7˚C Avg. 21.2˚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.

11.0 Test Results Summary

All SAR results obtained by the tests described in Section 8.0 are listed below. As noted in section 8.0, a coarse-to-cube approximation methodology, was utilized to ascertain the worst case test configuration for each antenna at each body location per band (in bold with *). The worst case test configurations observed for each body location were assessed using the full DASY4^{TM} coarse and 5x5x7 cube methodology and they are summarized in the worst case table below. The associated SAR plots are provided in APPENDIX E. Appendix E also presents shortened SAR cube scans to assess the validity of the calculated results presented herein. Note: The results of the shortened cube scans presented in Appendix E demonstrate that the scaling methodology used to determine the calculated SAR results presented herein are valid. The SAR peak location for each of the new antennas are located at the antenna, where the previous SAR peak location was located at the device, as indicated in the Appendix J.

TABLE 1

Run Number/ SN	Antenna	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)
Assessments at the Body												
Assessments at the Body - 806-825MHz Band												
CcC-AB-091209-07 / 777TKN0846	NAF5037A	824.000	PMNN4077C	Against phantom	RLN4570A Chest Pack	PMLN5097A 3-Wire	3.090	-0.648	7.820	5.420	4.54	3.15
CcC-AB-091120-17 / 777TKN0846	NAF5037A	815.500	PMNN4077C	Against phantom	RLN4570A Chest Pack	PMLN5097A 3-Wire	3.080	-0.506	6.200	4.320	3.48	2.43
CcC-AB-091120-18 / 777TKN0846	NAF5037A	806.0125	PMNN4077C	Against phantom	RLN4570A Chest Pack	PMLN5097A 3-Wire	3.070	-0.350	6.230	4.340	3.38	2.35
Test with battery PMNN4069A with the highest configuration from above												
***PS-AB-091217-11 / 777TKN0846**	NAF5037A	824.000	PMNN4069A	Against phantom	RLN4570A Chest Pack	PMLN5097A 3-Wire	2.830	-0.675	7.490	5.190	4.64	3.21
Test with battery PMNN4069A and HLN6602A chest pack												
CcC-AB-100112-08 / 777TKN0846	NAF5037A	824.000	PMNN4069A	Against phantom	HLN6602A Chest Pack	PMLN5097A 3-Wire	2.740	-0.605	6.840	4.740	4.30	2.98
CcC-AB-100112-09 / 777TKN0846	NAF5037A	806.0125	PMNN4069A	Against phantom	HLN6602A Chest Pack	PMLN5097A 3-Wire	2.810	-0.531	6.560	4.550	3.96	2.74
CcC-AB-100112-10 / 777TKN0846	NAF5037A	815.500	PMNN4069A	Against phantom	HLN6602A Chest Pack	PMLN5097A 3-Wire	2.820	-0.435	5.650	3.920	3.32	2.30
Test with battery PMNN4077C with the highest configuration from above												
CcC-AB-100112-11 / 777TKN0846	NAF5037A	824.000	PMNN4077C	Against phantom	HLN6602A Chest Pack	PMLN5097A 3-Wire	3.090	-0.663	7.540	5.240	4.39	3.05
Assessments at the Body - 851-870MHz Band												
CcC-AB-091120-19 / 777TKN0846	NAF5037A	869.000	PMNN4069A	Against phantom	RLN4570A Chest Pack	None	2.780	-0.600	5.020	3.470	3.11	2.15
PS-AB-091124-08 / 777TKN0846	NAF5037A	851.0125	PMNN4069A	Against phantom	RLN4570A Chest Pack	None	2.850	-0.793	6.650	4.590	4.20	2.90
PS-AB-091124-09 / 777TKN0846	NAF5037A	860.500	PMNN4069A	Against phantom	RLN4570A Chest Pack	None	2.830	-0.687	5.380	3.730	3.34	2.32
Test with battery PMNN4077C with the highest configuration from above												
PS-AB-091217-12 / 777TKN0846	NAF5037A	851.0125	PMNN4077C	Against phantom	RLN4570A Chest Pack	None	3.070	-0.865	6.930	4.810	4.23	2.94
Test with battery PMNN4069A and HLN6602A chest pack												
CcC-AB-100112-12 / 777TKN0846	NAF5037A	869.000	PMNN4069A	Against phantom	HLN6602A Chest Pack	None	2.790	-0.626	5.330	3.680	3.31	2.29
CcC-AB-100112-13 / 777TKN0846	NAF5037A	851.0125	PMNN4069A	Against phantom	HLN6602A Chest Pack	None	2.730	-0.693	6.520	4.510	4.20	2.91
CcC-AB-100112-14 / 777TKN0846	NAF5037A	860.500	PMNN4069A	Against phantom	HLN6602A Chest Pack	None	2.780	-0.663	5.830	4.020	3.66	2.53
Test with battery PMNN4077C with the highest configuration from above												
CcC-AB-100112-15 / 777TKN0846	NAF5037A	851.0125	PMNN4077C	Against phantom	HLN6602A Chest Pack	None	3.080	-0.819	6.590	4.580	3.98	2.77

TABLE 1 (Continued)

Run Number/ SN	Antenna	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)
Assessments at the Body												
Assessments at the Body - 896-902MHz Band												
CcC-AB-091120-12 / 777TKN0846	NAF5038AR	899.000	PMNN4069A	Against phantom	RLN4570A Chest Pack	None	2.780	-0.613	7.110	4.900	4.42	3.04
PS-AB-091125-17 / 777TKN0846	NAF5038AR	896.000	PMNN4069A	Against phantom	RLN4570A Chest Pack	None	2.760	-0.704	6.900	4.770	4.41	3.05
PS-AB-091125-18 / 777TKN0846	NAF5038AR	902.000	PMNN4069A	Against phantom	RLN4570A Chest Pack	None	2.770	-0.665	6.380	4.410	4.03	2.78
Test with battery PMNN4077C with the highest configuration from above												
CcC-AB-091217-13 / 777TKN0846	NAF5038AR	899.000	PMNN4077C	Against phantom	RLN4570A Chest Pack	None	3.010	-0.723	6.770	4.690	4.00	2.77
Test with battery PMNN4069A and HLN6602A chest pack												
PS-AB-100113-02 / 777TKN0846	NAF5038AR	899.000	PMNN4069A	Against phantom	HLN6602A Chest Pack	None	2.740	-0.642	7.880	5.400	5.00	3.43
PS-AB-100113-03 / 777TKN0846	NAF5038AR	896.000	PMNN4069A	Against phantom	HLN6602A Chest Pack	None	2.730	-0.668	8.200	5.620	5.25	3.60
PS-AB-100113-04 / 777TKN0846	NAF5038AR	902.000	PMNN4069A	Against phantom	HLN6602A Chest Pack	None	2.760	-0.713	8.290	5.670	5.31	3.63
Test with battery PMNN4077C with the highest configuration from above												
PS-AB-100113-05 / 777TKN0846	NAF5038AR	902.000	PMNN4077C	Against phantom	HLN6602A Chest Pack	None	2.990	-0.785	7.280	5.020	4.38	3.02
Assessments at the Body - 935-941MHz Band												
CcC-AB-091120-13 / 777TKN0846	NAF5038AR	935.000	PMNN4069A	Against phantom	RLN4570A Chest Pack	None	2.710	-0.739	7.170	4.900	4.70	3.22
CcC-AB-091120-14 / 777TKN0846	NAF5038AR	938.000	PMNN4069A	Against phantom	RLN4570A Chest Pack	None	2.770	-0.753	6.940	4.750	4.47	3.06
CcC-AB-091120-15 / 777TKN0846	NAF5038AR	941.000	PMNN4069A	Against phantom	RLN4570A Chest Pack	None	2.860	-0.865	6.790	4.640	4.35	2.97
Test with battery PMNN4077C with the highest configuration from above												
CcC-AB-091217-14 / 777TKN0846	NAF5038AR	935.000	PMNN4077C	Against phantom	RLN4570A Chest Pack	None	2.980	-0.792	7.750	5.310	4.68	3.21
Test with battery PMNN4069A and HLN6602A chest pack												
***PS-AB-100113-06 / 777TKN0846**	NAF5038AR	935.000	PMNN4069A	Against phantom	HLN6602A Chest Pack	None	2.640	-0.769	8.050	5.480	5.46	3.72
PS-AB-100113-07 / 777TKN0846	NAF5038AR	938.000	PMNN4069A	Against phantom	HLN6602A Chest Pack	None	2.680	-0.889	7.780	5.300	5.34	3.64
PS-AB-100113-08 / 777TKN0846	NAF5038AR	941.000	PMNN4069A	Against phantom	HLN6602A Chest Pack	None	2.720	-0.773	7.510	5.130	4.95	3.38
Test with battery PMNN4077C with the highest configuration from above												
PS-AB-100113-09 / 777TKN0846	NAF5038AR	935.000	PMNN4077C	Against phantom	HLN6602A Chest Pack	None	3.020	-0.851	7.720	5.300	4.70	3.22

TABLE 2

Run Number/ SN	Antenna	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	SAR Drift (dB)	Meas. 1g-SAR (W/kg)	Meas. 10g-SAR (W/kg)	Max Calc. 1g-SAR (W/kg)	Max Calc. 10g-SAR (W/kg)
Assessments at the Face												
Assessments at the Face - 806-825MHz Band												
***PS-FACE-091124-02 / 777TKN0846**	NAF5037A	824.000	PMNN4077C	DUT front 2.5cm	None	RLN5878A	3.120	-0.801	2.593	1.842	1.56	1.11
PS-FACE-091124-03 / 777TKN0846	NAF5037A	815.500	PMNN4077C	DUT front 2.5cm	None	RLN5878A	3.120	-0.576	2.193	1.572	1.25	0.90
PS-FACE-091124-04 / 777TKN0846	NAF5037A	806.0125	PMNN4077C	DUT front 2.5cm	None	RLN5878A	3.120	-0.549	2.253	1.612	1.28	0.91
Test with battery PMNN4069A with the highest configuration from above												
CcC-FACE-091217-19 / 777TKN0846	NAF5037A	824.000	PMNN4069A	DUT front 2.5cm	None	RLN5878A	2.840	-0.699	2.490	1.780	1.54	1.10
Assessments at the Face - 851-870MHz Band												
PS-FACE-091124-05 / 777TKN0846	NAF5037A	851.0125	PMNN4077C	DUT front 2.5cm	None	None	3.060	-0.825	2.220	1.580	1.34	0.96
PS-FACE-091124-06 / 777TKN0846	NAF5037A	860.500	PMNN4077C	DUT front 2.5cm	None	None	3.110	-0.855	1.910	1.360	1.16	0.83
PS-FACE-091124-07 / 777TKN0846	NAF5037A	870.000	PMNN4077C	DUT front 2.5cm	None	None	3.040	-0.685	1.750	1.240	1.02	0.73
Test with battery PMNN4069A with the highest configuration from above												
CcC-FACE-091217-22 / 777TKN0846	NAF5037A	851.0125	PMNN4069A	DUT front 2.5cm	None	None	2.780	-0.760	2.080	1.480	1.34	0.95
Assessments at the Face - 896-902MHz Band												
PS-FACE-091125-10 / 777TKN0846	NAF5038AR	899.000	PMNN4077C	DUT front 2.5cm	None	None	3.050	-0.819	2.580	1.830	1.56	1.10
PS-FACE-091125-11 / 777TKN0846	NAF5038AR	896.000	PMNN4077C	DUT front 2.5cm	None	None	3.060	-0.717	2.710	1.920	1.60	1.13
PS-FACE-091125-12 / 777TKN0846	NAF5038AR	902.000	PMNN4077C	DUT front 2.5cm	None	None	3.020	-0.744	2.550	1.810	1.51	1.07
Test with battery PMNN4069A with the highest configuration from above												
CcC-FACE-091217-17 / 777TKN0846	NAF5038AR	896.000	PMNN4069A	DUT front 2.5cm	None	None	2.810	-0.624	2.520	1.780	1.55	1.10
Assessments at the Face - 935-941MHz Band												
PS-FACE-091125-13 / 777TKN0846	NAF5038AR	935.000	PMNN4077C	DUT front 2.5cm	None	RLN5878A	3.010	-0.845	2.730	1.930	1.66	1.17
PS-FACE-091125-14 / 777TKN0846	NAF5038AR	938.000	PMNN4077C	DUT front 2.5cm	None	RLN5878A	3.080	-0.891	2.800	1.970	1.72	1.21
***PS-FACE-091125-15 / 777TKN0846**	NAF5038AR	941.000	PMNN4077C	DUT front 2.5cm	None	RLN5878A	3.120	-0.921	2.850	2.010	1.76	1.24
Test with battery PMNN4069A with the highest configuration from above												
CcC-FACE-091217-18 / 777TKN0846	NAF5038AR	941.000	PMNN4069A	DUT front 2.5cm	None	RLN5878A	2.780	-0.720	2.180	1.530	1.39	0.97

TABLE 3

*Assessment with the worst case test configuration at the Body and Face using full DASY coarse and 5x5x7 cube scan measurements.												
Run Number/ SN	**Antenna**	**Freq. (MHz)**	**Battery**	**Test position**	**Carry Case**	**Additional attachments**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc. 1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**
Full scan PS-AB-091222-03 777TKN0846	NAF5037A	824.000	PMNN4069A	Against phantom	RLN4570A Chest Pack	PMLN5097A 3-Wire	2.800	-0.684	7.070	4.970	4.43	3.12
Full scan PS-FACE-091125-09 / 777TKN0846	NAF5037A	824.000	PMNN4077C	DUT front 2.5cm	None	RLN5878A	3.120	-0.923	2.564	1.865	1.59	1.15
Full scan PS-AB-100113-10 / 777TKN0846	NAF5038AR	935.000	PMNN4069A	Against phantom	HLN6602A Chest Pack	None	2.690	-0.929	7.670	5.210	5.30	3.60
Full scan PS-FACE-091125-16 / 777TKN0846	NAF5038AR	941.000	PMNN4077C	DUT front 2.5cm	None	RLN5878A	3.130	-1.070	2.680	1.900	1.71	1.22
Shorten scan PS-AB-100113-11 / 777TKN0846	NAF5038AR	935.000	PMNN4069A	Against phantom	HLN6602A Chest Pack	None	2.630	-0.606	7.610	5.220	4.99	3.42
Shorten scan CcC-FACE-091130-12 / 777TKN0846	NAF5038AR	941.000	PMNN4077C	DUT front 2.5cm	None	RLN5878A	3.140	-0.604	3.050	2.150	1.75	1.24

12.0 SAR Result Scaling Methodology

The calculated 1-gram and 10-gram averaged SAR results indicated as “Max Calc. 1g-SAR” and “Max Calc.10g-SAR” in the data tables is determined by scaling the measured SAR to account for power leveling variations and power slump. A table and graph of output power versus time is provided in APPENDIX F for this device the “Max Calc. 1g-SAR” and “Max Calc.10g-SAR” are scaled using the following formula:

$$Max\_Calc = SAR\_meas \cdot 10^{\frac{-(Drift)}{10}} \cdot \frac{P\_\max}{P\_\mathrm{int}} \cdot DC$$

P_max = Maximum Power (W)
P_int = Initial Power (W)
Drift = DASY drift results (dB)
SAR_meas = Measured 1-g or 10-g Avg. SAR (W/kg)
DC = Transmission mode duty cycle in % where applicable
50% duty cycle is applied for PTT operation

Note: for conservative results, the following are applied:

If P_int > P_max, then P_max/P_int = 1.

Drift = 1 for positive drift

13.0 Conclusion

The highest Operational Maximum Calculated 1-gram and 10-gram average SAR values found for FCC ID: ABZ99FT5011 model PMUF1413A.

Max. Calc. : 1-g Avg. SAR: 5.30 W/kg (Body); 10-g Avg. SAR: 3.60 W/kg (Body)
Max. Calc. : 1-g Avg. SAR: 1.75 W/kg (Face); 10-g Avg. SAR: 1.24 W/kg (Face)

The previously reported results at the face 1.30 W/kg are hereby replaced with the results presented herein. The previously reported results at the body 4.56 W/kg are maintained.

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

APPENDIX A
Measurement Uncertainty

The Measurement Uncertainty tables indicated in this APPENDIX are applicable to the DUT ranging from 800MHz to 3GHz, and for Dipole test frequency ranging from 800MHz to 3GHz. Therefore, the highest tolerance for the probe calibration uncertainty is indicated.

Table 1: Uncertainty Budget for Device Under Test: 800 – 3000 MHz

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	

Table 2: Uncertainty Budget for System Validation: 800 – 3000 MHz

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	

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 Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **Motorola MY (Precision)**

Certificate No: ES3-3122_Apr09

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3122
Calibration procedure(s)	QA CAL-01.v6, QA CAL-12.v5, QA CAL-14.v3 and QA CAL-23.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	April 24, 2009
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 (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09

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

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

Issued: April 24, 2009

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 Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, “IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, December 2003
b) IEC 62209-1, “Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV3

SN:3122

Manufactured:	July 11, 2006
Last calibrated:	May 15, 2008
Recalibrated:	April 24, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3122

Sensitivity in Free Space[A]

NormX	**1.34** ± 10.1%	$\mu V/(V/m)^2$
NormY	**1.27** ± 10.1%	$\mu V/(V/m)^2$
NormZ	**1.44** ± 10.1%	$\mu V/(V/m)^2$

Diode Compression[B]

DCP X	**94** mV
DCP Y	**93** mV
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		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	9.9	5.7
SAR_{be} [%]	With Correction Algorithm	0.8	0.5

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	8.4	4.6
SAR_{be} [%]	With Correction Algorithm	0.7	1.3

Sensor Offset

Probe Tip to Sensor Center **2.0** mm

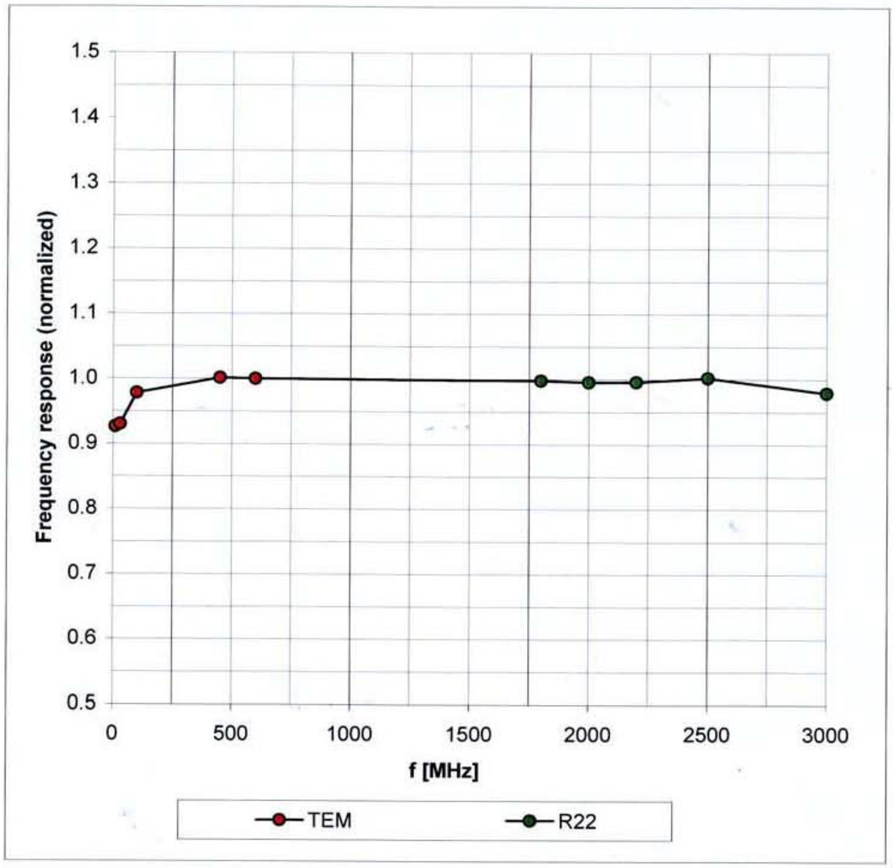
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[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.

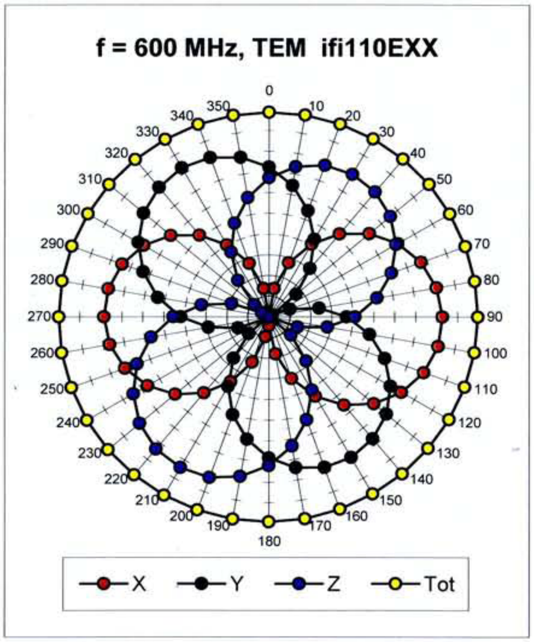
Frequency Response of E-Field

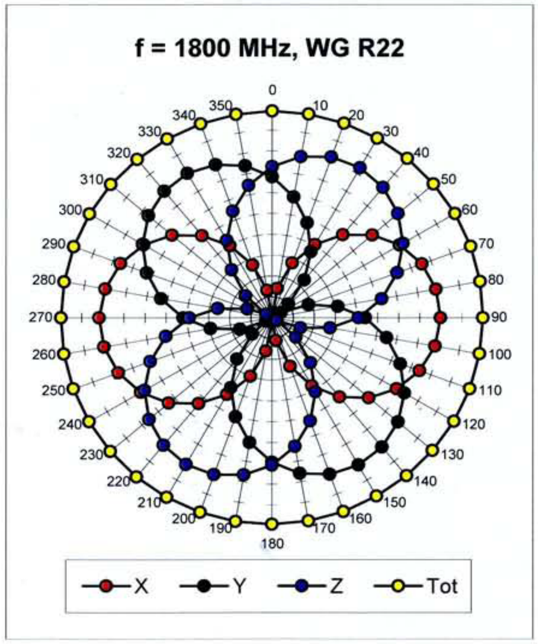
(TEM-Cell:ifi110 EXX, Waveguide: R22)

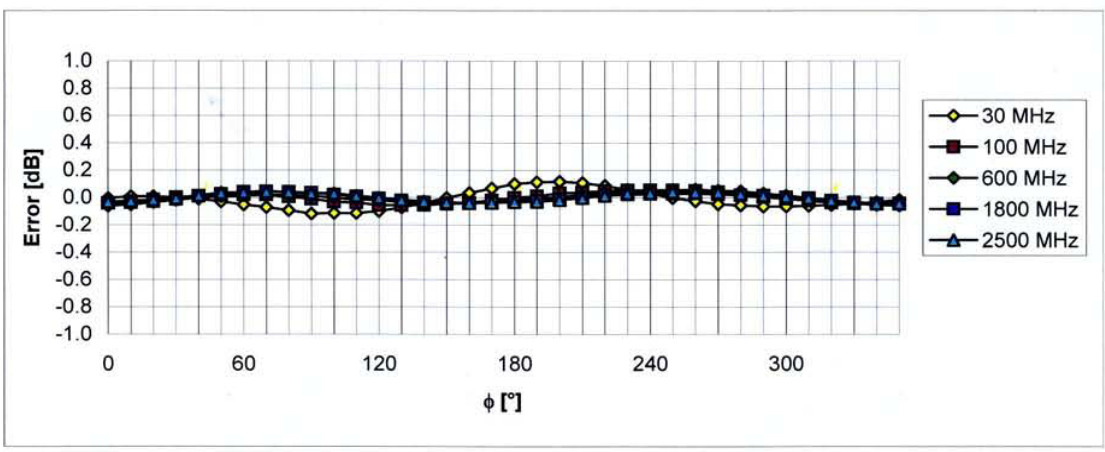


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), $\vartheta = 0°$







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

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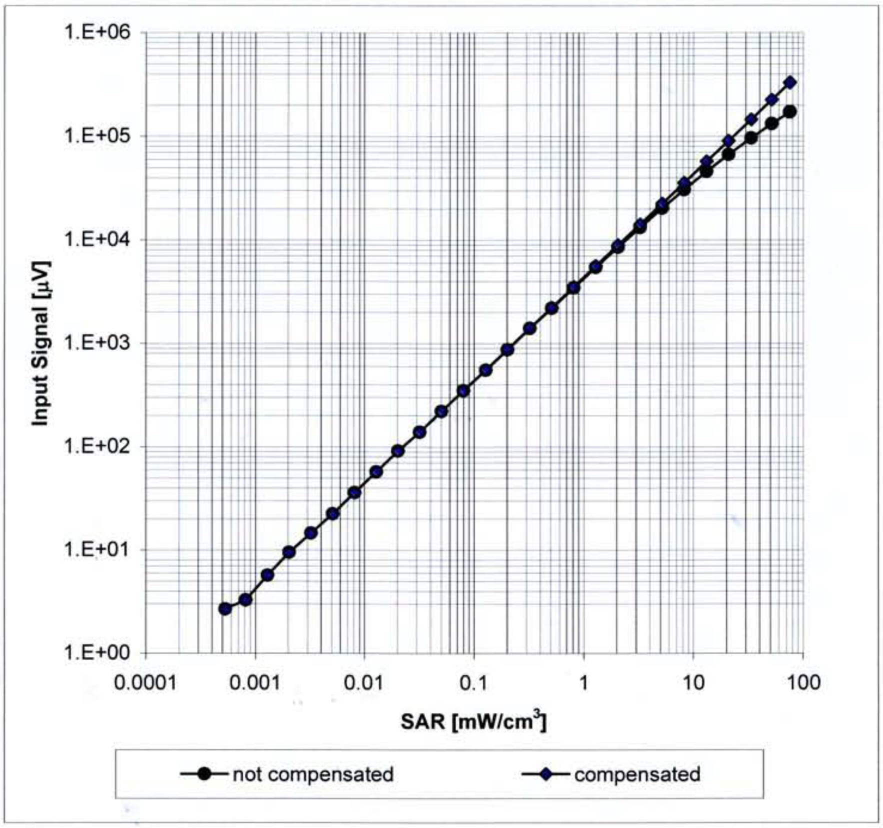
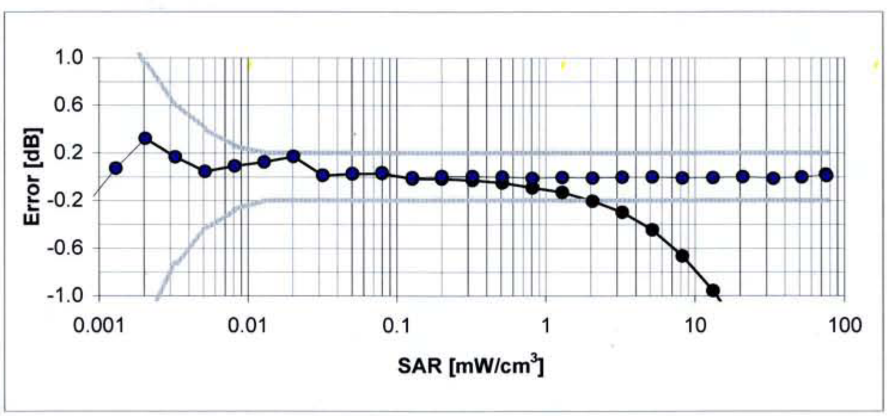
Dynamic Range f(SAR$_{head}$)

(Waveguide R22, f = 1800 MHz)





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

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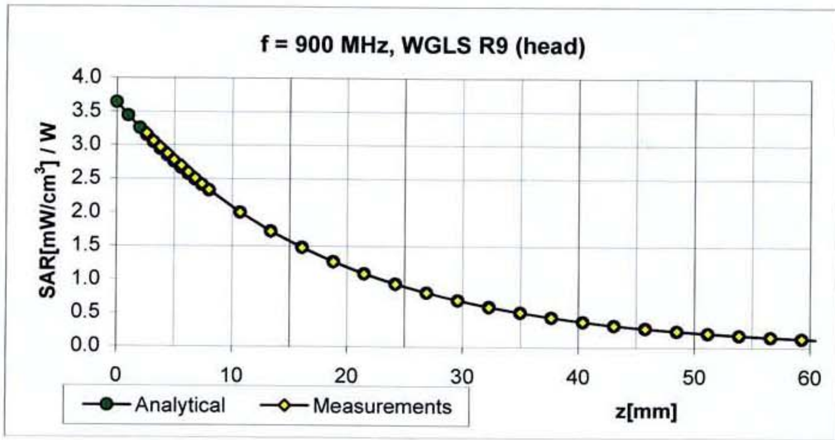
Conversion Factor Assessment



f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.24	1.52	6.15	± 13.3% (k=2)
750	± 50 / ± 100	Head	41.9 ± 5%	0.89 ± 5%	0.99	1.07	6.03	± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.76	1.17	5.78	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.39	1.73	4.96	± 11.0% (k=2)
2300	± 50 / ± 100	Head	39.5 ± 5%	1.67 ± 5%	0.35	1.93	4.78	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.39	1.86	4.47	± 11.0% (k=2)
2600	± 50 / ± 100	Head	39.0 ± 5%	1.96 ± 5%	0.39	1.91	4.45	± 11.0% (k=2)
3500	± 50 / ± 100	Head	37.9 ± 5%	2.91 ± 5%	0.75	1.40	3.86	± 13.1% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.16	1.28	6.65	± 13.3% (k=2)
750	± 50 / ± 100	Body	55.5 ± 5%	0.96 ± 5%	0.99	1.08	5.87	± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.94	1.11	5.78	± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.39	1.97	4.65	± 11.0% (k=2)
2300	± 50 / ± 100	Body	52.8 ± 5%	1.85 ± 5%	0.65	1.33	4.16	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.35	1.80	4.14	± 11.0% (k=2)
2600	± 50 / ± 100	Body	52.5 ± 5%	2.16 ± 5%	0.99	1.03	4.05	± 11.0% (k=2)
3500	± 50 / ± 100	Body	51.3 ± 5%	3.31 ± 5%	0.75	1.50	3.37	± 13.1% (k=2)

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

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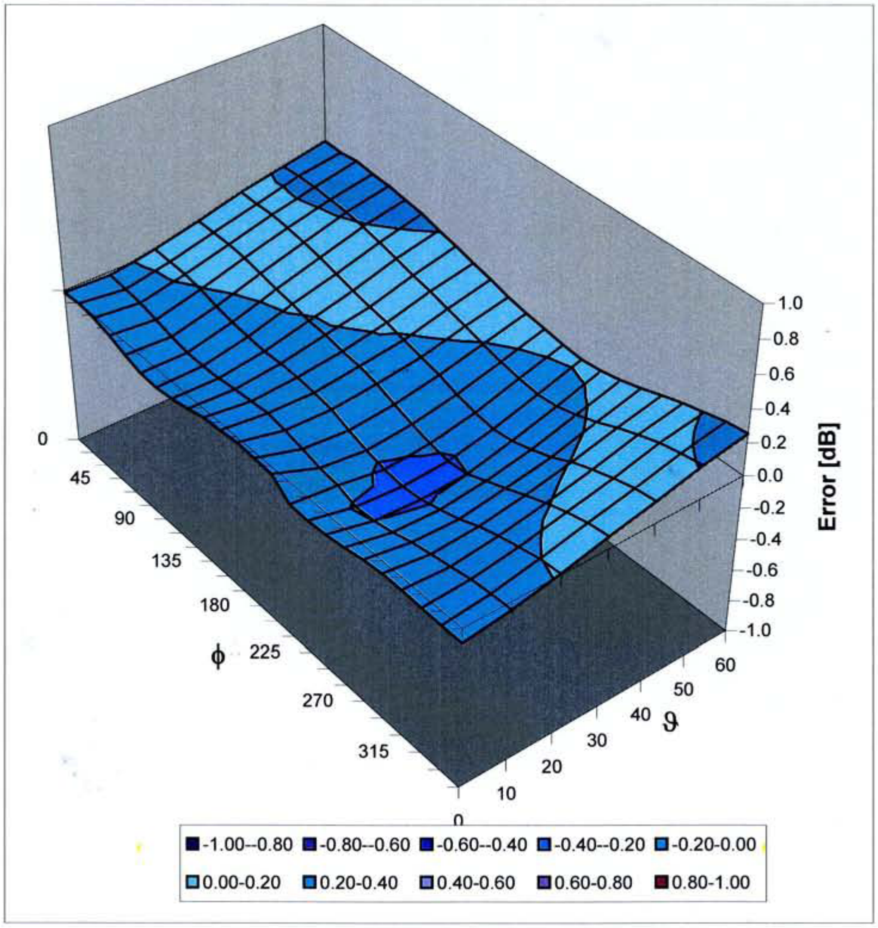
Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

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Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ES3DV3**
Serial Number:	**3122**
Place of Assessment:	**Zurich**
Date of Assessment:	**April 28, 2009**
Probe Calibration Date:	**April 24, 2009**

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: [signature]

Schmid & Partner Engineering AG

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Dosimetric E-Field Probe ES3DV3 SN:3122

Conversion factor (± standard deviation)

150 MHz	*ConvF*	**7.9 ± 10%**	ε_r = 52.3 σ = 0.76 mho/m (head tissue)
250 MHz	*ConvF*	**7.3 ± 10%**	ε_r = 47.6 σ = 0.83 mho/m (head tissue)
300 MHz	*ConvF*	**7.1 ± 9%**	ε_r = 45.3 σ = 0.87 mho/m (head tissue)
150 MHz	*ConvF*	**7.6 ± 10%**	ε_r = 61.9 σ = 0.80 mho/m (body tissue)
250 MHz	*ConvF*	**7.2 ± 10%**	ε_r = 59.4 σ = 0.88 mho/m (body tissue)
300 MHz	*ConvF*	**7.1 ± 9%**	ε_r = 58.2 σ = 0.92 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.

Note: The standard deviation for each Conversion factor stated in above numerical assessments were taken at k = 1.