MOTOROLA	ACCREDITED TESTING CERT # 2518.05

DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Enterprise Mobility Solutions **EME Test Laboratory** **Motorola Technology Sdn Bhd (455657-H)** **Customer Solution Center** **Plot 2, Bayan Lepas Technoplex Industrial Park,** **Mukim 12 SWD 11900 Bayan Lepas Penang, Malaysia.**	**Date of Report:** 8/9/2010 **Report Revision:** O **Report ID:** SAR rpt_PMUF1473A_Rev O _100809_ SR8414& SR8525

Responsible Engineer:	Veeramani Veerapan (Senior EME Engineer)
Report Author:	Veeramani Veerapan (Senior EME Engineer)
Date/s Tested:	6/10/10~7/22/10
Manufacturer/Location:	Motorola, Penang
Sector/Group/Div.:	EMS
Date submitted for test:	6/08/10
DUT Description:	XPR 6580 IS 806-870MHz & 896-941MHz, 12.5k/25k, 1W, 160CH, FKP w GPS (Capable of analog FM transmission and digital TDMA transmission.)
Test TX mode(s):	CW (PTT)
Max. Power output:	1.2 Watts
Nominal Power:	1.0 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:	PMUF1473A
Model(s) Certified:	PMUF1473A
Serial Number(s):	477TLL0008, 477TLL0009
Classification:	Occupational/Controlled
FCC ID:	ABZ99FT5012; Rule part 90 (806-824, 851-869, 896-901 & 935-940MHz)
IC ID:	109AB-99FT5012

*** Refer to section 15 of part 1 highest SAR summary results.**

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 10 grams results are not applicable to FCC filing.
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 3.0 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.

Deanna Zakharia **EMS EME Lab Senior Resource Manager,** **Laboratory Director** **Approval Date:** 8/18/2010	**Certification Date**: 6/24/2010 **Certification No.:** L1100650P

Part 1 of 2

Part 1 of 2 Continued

APPENDICES

Part 2 of 2

Report Revision History

Date	Revision	Comments
8/9/10	O	Initial release

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 Laboratory for tested model number PMUF1473A FCC ID: AZB99FT5012.

2.0 Abbreviations / Definitions

CNR: Calibration Not Required
4FSK: 4 Level Frequency Shift Keying
CW: Continues Wave
DUT: Device Under Test
FM: Frequency Modulation
NA: Not Applicable
PTT: Push to Talk
RSM: Remote Speaker Microphone
TDMA: Time Division Multiple Access
SAR: Specific Absorption Rate

Audio accessories: These accessories allow communication while the DUT is worn on the body.
Body worn accessories: These accessories allow the DUT to be worn on the body of the user.
Maximum Power: Defined as the upper limit of the production line final test station.

3.0 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”
- IEC62209-2 Edition 1.0 2010-03, Human Exposure to Radio Frequency Fields from Hand-held and Body-Mounted Wireless Communication Devices – Human models, Instrumentation, and Procedures Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz).

* The IEC62209-1 and IEEE 1528 are applicable for hand-held devices used in close proximity to the ear only.

4.0 SAR Limits

TABLE 1

EXPOSURE LIMITS	SAR (W/kg) (General Population / Uncontrolled Exposure Environment)	SAR (W/kg) (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

5.0 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 G. For this device the “Max Calc.1g-SAR” and “Max Calc.10g-SAR” are scaled using the following formula:

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

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

Additional SAR scaling was applied using the methodologies outlined in FCC KDB450824 using tissue sensitivity values. SAR was scaled for conditions where the tissue permittivity was measured above the nominal target and for tissue conductivity that was measured below the nominal target.

6.0 Description of Device Under Test (DUT):

FCC ID: ABZ99FT5012 operates using digital and analog frequency modulation (FM) as well as TDMA signaling incorporating traditional simplex two-way radio transmission protocol.

This product contains transmit and receive circuitry for both analog and digital two way radio communications as well as receive circuitry for Global Positioning Satellite (GPS) signals. The technology details for modes of operation employing transmitters are described below. The modulation scheme used for analog two-way radio communications is narrowband Frequency Modulation (FM). FM is a modulation technique that transmits voice information by altering a radio frequency (RF) signal. The instantaneous frequency of the RF signal is in direct proportion to changes in the amplitude of the voice signal. The rate of change of the RF signal carries the voice frequency information and the deviation of the RF signal carries the voice amplitude information. When the signal is received the change in frequency is converted back into the original voice signal. The FM modulation technique in this product uses sophisticated algorithms and a digital signal processor (DSP) to perform RF modulation/demodulation. The modulation scheme used for digital two-way radio communications is 4 Level Frequency Shift Keying (4FSK) and Time Division Multiple Access (TDMA). 4FSK is a modulation technique that transmits information by altering the frequency of the radio frequency (RF) signal. Data is converted into complex symbols, which alter the RF signal and transmit the information. When the signal is received, the change in frequency is converted back into symbols and then into the original data. The system can accommodate 2-voice channels in a standard 12.5 kHz channel as used in two-way radio. Time Division Multiple Access (TDMA) is used to allocate portions of the RF signal by dividing time into two slots. Time allocation enables independent units to transmit voice information without interference from each other. Transmission from a unit or base station is accommodated in time-slot lengths of 30 milliseconds and frame lengths of 60 milliseconds. The 4FSK TDMA modulation technique requires sophisticated algorithms and a digital signal processor (DSP) to perform voice compressions/decompressions and RF modulation/demodulation.

The model represented under this filing utilizes removable antenna and is capable of transmitting in the 806-825MHz, 851-870MHz, 896-902 MHz and 935-941 MHz bands. The nominal output power is 1.0 watts with maximum output powers of 1.2 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.

7.0 Optional Accessories and Test Criteria:

FCC ID: ABZ99FT5012 is offered with optional accessories. All accessories were individually evaluated during the test plan creation to determine if testing was required. The following sections identify the test criteria and details for each accessory category.

7.1 Antennas

There is only one antenna offered for this product. The table below lists the antenna and antenna description.

TABLE 2

Antenna Kit	Description	Tested
PMAF4003A	800/900+GPS Helical Antenna 806-941MHz, ½ wave, 0dBi	Yes

* Refer to Exhibit 7B for antenna separation distance.

7.2 Batteries

There is only one battery offered for this product. The table below lists the battery and battery description.

TABLE 3

Battery Kit	Description	Tested	Comments
NNTN7789A	MOTOTRBO CSA/IECEx/ATEX IMPRES Li Ion, 1750mAh	Yes	Height= 141mm

* Refer to Exhibit 7B for antenna separation distance.

7.3 Body worn Accessories

All offered body worn accessories were evaluated during the test plan generation.

TABLE 4

Body worn Kits	Description	Tested	Comments
PMLN5606A	Display Hard Leather 3 inch swivel belt loop	Yes	Tested with belt loop PMLN5610A
PMLN5607A	Display Soft Leather 3 inch swivel belt loop	Yes	Tested with belt loop PMLN5610A
PMLN5610A	2.5-inch replacement swivel belt loop	Yes	Tested with PMLN5606A & PMLN5607A
PMLN5611A	3.0 inch replacement swivel belt loop	Yes	Tested with PMLN5606A & PMLN5607A
PMLN5134A	ATEX/CSA belt clip 2.5 inch belt width	Yes	None

* Refer to Exhibit 7B for antenna separation distance.

7.4 Audio Accessories

There is only one audio accessory offered for this product. The table below lists the audio accessory and its description. Exhibit 7B illustrates the DUT with PMMN4067A audio accessory.

TABLE 5

Audio Acc. Kit	Description	Tested	Comments
PMMN4067A	IMPRES ATEX CSA Remote Speaker Microphone	Yes	Tested at the body

8.0 Description of Test System

8.1 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 9.0 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.

8.2 Description of Phantom(s)

8.2.1 Dual Flat Phantom

NA

8.2.2 SAM Phantom

NA

8.2.3 Elliptical Flat Phantom

TABLE 6

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

8.3 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.

The simulated tissue mixture was mixed based on the Simulated Tissue Composition indicated in the table 7 below for 900 MHz. During the test duration of this product, this mixture was used to measure the Di-electric parameters daily at 900 MHz as well as 815.5 MHz, 860.5 MHz, 899 MHz and 938 MHz frequencies to verify that the Di-electric parameters at these frequencies are within the tolerance of tissue specifications.

Simulated Tissue Composition (by mass)

TABLE 7

% of listed ingredients	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

1) Reference section 10.1 for target parameters

9.0 Additional Test Equipment

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

TABLE 8

Equipment Type	Model Number	Serial Number	Calibration Due Date
Power Meter	E4418B	MY45101014	10/8/2010
Power Sensor	8481B	MY41091170	10/8/2010
Power Meter	E4418B	MY45100532	10/8/2010
Power Sensor	8481B	SG41090248	10/8/2010
Signal Generator	E4438C	MY45091014	8/26/2010
Thermometer	HH806AU	080307	8/19/2010
Therm. Probe	80PK-22	8765	8/24/2010
Dickson Temp & RH Data	TM320	07260127	10/15/2010
Amplifier	10W1000C	312858	CNR
NARDA Bi-Directional	3020A	41935	10/9/2010
Tissue Station			
Network Analyzer (HP)	E5071B	MY42403147	8/26/2010
Dielectric Probe Kit (HP)	85070E	MY44300183	CNR
Dipole			
Speag Dipole	D900V2	1d025	4/14/2011
Speag Dipole	D900V2	1d026	12/7/2011

10.0 SAR Measurement System Verification

The SAR measurements were conducted with probes model/serial number ES3DV3/SN3096 and ES3DV3/SN3122. 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.

10.1 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 9.0. The table below summarizes the measured tissue parameters used for the SAR assessment.

TABLE 9

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 (1.00 – 1.10)	55.0 (52.25–57.75)	1.06	53.1	6/10/10
				1.06	53.1	6/11/10
				1.06	52.9	6/14/10
				1.06	52.8	6/15/10
				1.07	52.9	6/23/10
				1.07	52.8	6/24/10
				1.06	52.8	7/22/10
900	IEEE/ IEC Head	0.97 (0.92-1.02)	41.5 (39.43-43.58)	0.97	40.2	6/16/10
815.5	FCC Body	0.97 (0.92-1.02)	55.3 (52.54-58.07)	0.97	53.9	6/10/10
				0.97	53.9	6/11/10
				0.97	53.6	6/15/10
815.5	IEEE/ IEC Head	0.90 (0.86-0.95)	41.6 (39.52-43.68)	0.89	41.0	6/15/10
				0.89	41.1	6/16/10
860.5	FCC Body	1.00 (0.95-1.05)	55.1 (52.35-57.86)	1.02	53.4	6/11/10
				1.02	53.3	6/14/10
				1.02	53.2	6/15/10
				1.02	53.3	6/23/10
				1.02	53.1	6/24/10
860.5	IEEE/ IEC Head	0.93 (0.88-0.98)	41.5 (39.43-43.58)	0.94	40.5	6/15/10
				0.93	40.6	6/16/10
899	FCC Body	1.05 (1.00-1.10)	55.0 (52.25-57.75)	1.06	52.9	6/14/10
				1.06	52.8	6/15/10
				1.06	52.8	7/22/10
899	IEEE/ IEC Head	0.97 (0.92-1.02)	41.5 (39.43-43.58)	0.97	40.1	6/15/10
				0.97	40.2	6/16/10
				0.97	40.0	7/22/10
938	FCC Body	1.07 (1.02-1.12)	54.9 (52.2-57.65)	1.11	52.5	6/14/10
				1.10	52.4	6/15/10
				1.11	52.4	7/22/10
938	IEEE/ IEC Head	0.99 (0.94-1.04)	41.4 (39.03-43.17)	1.01	39.7	6/16/10
				1.01	39.6	7/22/10

10.2 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.

TABLE 10

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
3096	FCC Body	12/14/2009	SPEAG D900V2 /1d026	10.84+/- 10%	11.24	6/10/10
					11.12	6/11/10
					11.08	6/14/10
					11.16	6/15/10
3122	FCC Body	4/23/2010	SPEAG D900V2 /1d025	10.92+/- 10%	11.44	6/23/10
					11.40	6/24/10
					10.92	7/22/10
3096	IEEE/ IEC Head	12/14/2009	SPEAG D900V2 /1d026	10.80+/- 10%	10.92	6/16/10

Note: See APPENDIX D for an explanation of the reference SAR targets stated above.

11.0 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 at least 15cm. 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:

TABLE 11

	Target	Measured
Ambient Temperature	18 - 25 ˚C	Range: 21.10-22.40˚C Avg. 21.66˚C
Relative Humidity	30 - 70 %	Range: 48.10-64.70% Avg. 55.64%
Tissue Temperature	NA	Range: 18.60-19.90˚C Avg. 19.30˚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.

12.0 DUT Test Methodology

12.1 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.

12.2 DUT Configuration(s)

The DUT is a portable device operational at the body and face as described in section 6.0 while using the applicable accessories listed in section 7.0. All accessories listed in section 7.0 of this report were used to test all possible accessory combinations.

12.3 Device Positioning Procedures

The positioning of the device for each body location is described below and illustrated in APPENDIX H.

12.3.1 Body

The DUT was positioned in intended use configuration against the phantom with the offered body worn accessories. The DUT was positioned with it`s front side separated 2.5cm and the back with DUT or antenna separated 2.5cm from the phantom. Testing at 2.5cm is done to satisfy the conditions noted in the safety section of the manual.

12.3.2 Head

NA

12.3.3 Face

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

12.4 DUT Test Channels:

The number of test channels was determined by the following equation.

$$N_c = 2 * roundup\ [10 * (f_{high} - f_{low}) / f_c] + 1$$

Where
N_c = Number of channels
F_{high} = Upper channel
F_{low} = Lower channel
F_c = Center channel

12.5 DUT Test Plan:

All modes of operation identified in section 6.0 were considered during the development of the test plan. The mode which presented the highest duty cycle was chosen for SAR assessment. All accessories listed in section 7.0 of this report were evaluated and only those identified for testing were used to develop the SAR test plan for this product. Tests were performed in each band at the center frequency(s) for all possible combinations of offered accessories. All other applicable frequencies were tested for any configurations that were within the 70% of the specification limit as recommended by the FCC. If the 70% threshold did not apply then the highest SAR configurations from the center channel assessments were tested at all other applicable frequencies.

***Test results that are outside the relevant FCC frequency allocations are presented herein in blue font.**

12.5.1 General Test Flowchart

The following flowcharts identify the general approach to the test sequences for body and face positions.

DUT Body Test Methodology
(General flowchart)

Step 1
Test all possible combinations for each of the offered accessories.
@ Center Channel(s)

↓

Step 2
Test all applicable frequencies using highest SAR configurations per band from step 1.

↓

Step 3
2.5cm test using the highest SAR configuration from steps 1 to 2.

Flowchart Objectives
Body

Step 1 - The objective is to determine the highest SAR configuration at the center channel(s) for all combinations of offered accessories at the body. See section 12.5 for a detailed test strategy.

Step 2 - The objective is to determine the highest SAR configurations for all possible combinations of offered accessories. See section 12.5 for a detailed test strategy.

Step 3 - Determine the highest SAR performance at 2.5cm separation distance to satisfy the safety manuals guidelines for non approved body worn accessories.

DUT Face Test Methodology
(General flowchart)

Step 1
Test all applicable frequencies per band.

Flowchart Objectives
Face

Step 1 - The objective is to determine the highest SAR configurations for all possible combinations of offered accessories. See section 12.5 for a detailed test strategy.

13.0 DUT Test Data

13.1 806-825MHz Test Data

Assessment at the Body (CW mode) – audio accessory PMMN4067A and offered body worn accessories:

All possible accessory combinations, audio cable PMMN4067A and offered carry cases were tested with antenna NNTN7789A and battery PMAF4003A at center band of frequency channels. The highest SAR result from the table below (bolded) is included in APPENDIX F Section 1.0.

TABLE 12

806-825MHz band assessments at the Body (CW mode) – carry cases and offered audio accessory												
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)**
PS-AB-100610-04 / 477TLL0008	PMAF4003A	815.500	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.230	-0.318	0.452	0.337	0.24	0.18
CcC-AB-100611-02 / 477TLL0008	PMAF4003A	815.500	NNTN7789A	Against phantom	PMLN5606A w/o belt loop tested w/ PMLN5610A	PMMN4067A	1.240	-0.352	0.061	0.047	0.03	0.03
CcC-AB-100611-03 / 477TLL0008	PMAF4003A	815.500	NNTN7789A	Against phantom	PMLN5607A w/o belt loop tested w/ PMLN5610A	PMMN4067A	1.240	-0.276	0.066	0.050	0.04	0.03
CcC-AB-100611-04 / 477TLL0008	PMAF4003A	815.500	NNTN7789A	Against phantom	PMLN5606A	PMMN4067A	1.230	-0.290	0.060	0.046	0.03	0.02
CcC-AB-100611-05 / 477TLL0008	PMAF4003A	815.500	NNTN7789A	Against phantom	PMLN5607A	PMMN4067A	1.240	-0.266	0.063	0.049	0.03	0.03

Assessment at the Body (CW mode) – Other frequency channels:

The DUT was tested at all other applicable frequencies using highest SAR configuration from table 12. Refer to section 12.5 for additional test consideration details. The highest SAR result from the table below (bolded) are included in APPENDIX F Section 2.0 and APPENDIX G Section 1.0.

TABLE 13

806-825MHz band assessments at the Body (CW mode) – Other Frequency Channels												
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)**
CcC-AB-100611-06 / 477TLL0008	PMAF4003A	806.0125	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.220	-0.243	0.401	0.299	0.21	0.16
CcC-AB-100611-07 / 477TLL0008	PMAF4003A	825.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.220	-0.341	0.471	0.349	0.25	0.19
CcC-AB-100611-08 / 477TLL0008	PMAF4003A	824.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.210	-0.314	0.475	0.353	0.26	0.19

Assessment at 2.5cm without body worn accessory (CW mode):

DUT was tested with a separation distance of 2.5cm front from the phantom using the highest SAR configurations from tables 12-13.The highest applicable SAR results from table below (bolded) are provided in APPENDIX F Section 3.0

Note: The 2.5cm assessments included the following configurations:

- Back of the device facing the phantom, positioned at 2.5cm from the phantom surface. Depending on the hot spot location this configuration may or may not be included herein since hot spot on the antenna would present a closer separation distance.
- Back of the device facing the phantom with antenna positioned at 2.5cm from the phantom surface. Depending on the hot spot location this configuration may or may not be included herein.
- Front of the device facing the phantom, positioned at 2.5cm from the phantom surface.

TABLE 14

806-825MHz band assessments at 2.5cm without body worn accessory (CW mode)												
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)**
CcC-AB-100611-09 / 477TLL0008	PMAF4003A	824.000	NNTN7789A	Back - Antenna at 2.5cm	None	PMMN4067A	1.210	-0.334	1.460	1.040	0.79	0.56
PS-AB-100611-11 / 477TLL0008	PMAF4003A	824.000	NNTN7789A	Front - Radio at 2.5cm	None	PMMN4067A	1.210	-0.310	0.459	0.339	0.25	0.18

Assessment at the Face (CW mode)

The DUT was tested with antenna PMAF4003A with the offered battery NNTN7789A at the applicable frequencies with the DUT front side separated 2.5cm from the phantom. Refer to section 12.5 for additional frequency channels test considerations details. The highest SAR result from the table below (bolded) are included in APPENDIX F Section 4.0 and APPENDIX G Section 2.0.

TABLE 15

806-825MHz band assessments at the Face (CW)												
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)**
CcC-FACE-100615-08 / 477TLL0008	PMAF4003A	806.0125	NNTN7789A	DUT Front at 2.5cm	None	None	1.230	-0.219	0.487	0.356	0.26	0.19
CcC-FACE-100615-09 / 477TLL0008	PMAF4003A	815.500	NNTN7789A	DUT Front at 2.5cm	None	None	1.220	-0.249	0.510	0.371	0.27	0.20
CcC-FACE-100615-10 / 477TLL0008	PMAF4003A	825.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.220	-0.323	0.534	0.389	0.29	0.21
CcC-FACE-100615-11 / 477TLL0008	PMAF4003A	824.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.210	-0.293	0.538	0.390	0.29	0.21

13.2 851-870MHz Test Data

Assessment at the Body (CW mode) – audio accessory PMMN4067A and offered body worn accessories:

All possible accessory combinations, audio cable PMMN4067A and offered carry cases were tested with antenna NNTN7789A and battery PMAF4003A at center band of frequency channels. The highest SAR result from the table below (bolded) is included in APPENDIX F Section 5.0.

TABLE 16

851-870MHz band assessments at the Body (CW mode) – carry cases and offered audio accessory												
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)**
PS-AB-100611-12 / 477TLL0008	PMAF4003A	860.500	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.190	-0.337	0.892	0.641	0.49	0.35
PS-AB-100611-13 / 477TLL0008	PMAF4003A	860.500	NNTN7789A	Against phantom	PMLN5606A w/o belt loop tested w/ PMLN5610A	PMMN4067A	1.190	-0.320	0.180	0.132	0.10	0.07
PS-AB-100611-14 / 477TLL0008	PMAF4003A	860.500	NNTN7789A	Against phantom	PMLN5607A w/o belt loop tested w/ PMLN5610A	PMMN4067A	1.190	-0.325	0.207	0.152	0.11	0.08
PS-AB-100611-15 / 477TLL0008	PMAF4003A	860.500	NNTN7789A	Against phantom	PMLN5606A	PMMN4067A	1.190	-0.262	0.232	0.169	0.12	0.09
PS-AB-100611-16 / 477TLL0008	PMAF4003A	860.500	NNTN7789A	Against phantom	PMLN5607A	PMMN4067A	1.190	-0.324	0.236	0.173	0.13	0.09

Assessment at the Body (CW mode) – Other frequency channels:

The DUT was tested at all other applicable frequencies using highest SAR configuration from table 16. Refer to section 12.5 for additional test consideration details. The highest SAR result from the table below (bolded) are included in APPENDIX F Section 6.0 and APPENDIX G Section 3.0.

TABLE 17

851-870MHz band assessments at the Body (CW mode) – Other Frequency Channels												
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)**
PS-AB-100611-17 / 477TLL0008	PMAF4003A	851.0125	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.190	-0.329	0.701	0.506	0.38	0.28
PS-AB-100611-18 / 477TLL0008	PMAF4003A	870.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.200	-0.297	1.130	0.807	0.60	0.43
PS-AB-100611-19 / 477TLL0008	PMAF4003A	869.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.190	-0.270	0.946	0.678	0.51	0.36

Assessment at 2.5cm without body worn accessory (CW mode):

DUT was tested with a separation distance of 2.5cm front from the phantom using the highest SAR configurations from tables 16-17. The highest applicable SAR results from table below (bolded) are provided in APPENDIX F Section 7.0 and APPENDIX G Section 4.0.

Note: The 2.5cm assessments included the following configurations:

- Back of the device facing the phantom, positioned at 2.5cm from the phantom surface. Depending on the hot spot location this configuration may or may not be included herein since hot spot on the antenna would present a closer separation distance.
- Back of the device facing the phantom with antenna positioned at 2.5cm from the phantom surface. Depending on the hot spot location this configuration may or may not be included herein.
- Front of the device facing the phantom, positioned at 2.5cm from the phantom surface.

TABLE 18

851-870MHz band assessments at 2.5cm without body worn accessory (CW mode)												
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)**
PS-AB-100611-20 / 477TLL0008	PMAF4003A	870.000	NNTN7789A	Back - Antenna at 2.5cm	None	PMMN4067A	1.200	-0.368	1.410	0.995	0.77	0.54
PS-AB-100614-02 / 477TLL0008	PMAF4003A	870.000	NNTN7789A	Front - Radio at 2.5cm	None	PMMN4067A	1.220	-0.281	0.390	0.286	0.21	0.15
CcC-AB-100623-09 / 477TLL0008	PMAF4003A	869.000	NNTN7789A	Back - Antenna at 2.5cm	None	PMMN4067A	1.200	-0.331	1.470	1.040	0.79	0.56
CcC-AB-100623-11 / 477TLL0008	PMAF4003A	869.000	NNTN7789A	Front - Radio at 2.5cm	None	PMMN4067A	1.200	-0.234	0.446	0.325	0.24	0.17
PS-AB-100624-03 / 477TLL0009	PMAF4003A	869.000	NNTN7789A	Back - Antenna at 2.5cm	None	PMMN4067A	1.200	-0.310	1.510	1.060	0.81	0.57

Assessment at the Face (CW mode)

The DUT was tested with antenna PMAF4003A with the offered battery NNTN7789A at the applicable frequencies with the DUT front side separated 2.5cm from the phantom. Refer to section 12.5 for additional frequency channels test considerations details. The highest SAR result from the table below (bolded) are included in APPENDIX F Section 8.0 and APPENDIX G Section 5.0.

TABLE 19

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)
851-870MHz band assessments at the Face (CW)												
CcC-FACE-100615-12 / 477TLL0008	PMAF4003A	851.0125	NNTN7789A	DUT Front at 2.5cm	None	None	1.190	-0.237	0.605	0.438	0.32	0.23
CcC-FACE-100615-13 / 477TLL0008	PMAF4003A	860.500	NNTN7789A	DUT Front at 2.5cm	None	None	1.190	-0.213	0.587	0.424	0.31	0.22
CcC-FACE-100615-14 / 477TLL0008	PMAF4003A	870.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.200	-0.219	0.596	0.429	0.31	0.23
CcC-FACE-100615-15 / 477TLL0008	PMAF4003A	869.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.180	-0.188	0.582	0.419	0.31	0.22

13.3 896-902MHz Test Data

Assessment at the Body (CW mode) – audio accessory PMMN4067A and offered body worn accessories:

All possible accessory combinations, audio cable PMMN4067A and offered carry cases were tested with antenna PMAF4003A and battery NNTN7789A at center band of frequency channels. The highest SAR result from the table below (bolded) is included in APPENDIX F Section 9.0.

TABLE 20

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)
896-902MHz band assessments at the Body (CW mode) – carry cases and offered audio accessory												
PS-AB-100614-03 / 477TLL0008	PMAF4003A	899.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.210	-0.386	1.480	1.060	0.81	0.58
PS-AB-100614-04 / 477TLL0008	PMAF4003A	899.000	NNTN7789A	Against phantom	PMLN5606A w/o belt loop tested w/ PMLN5610A	PMMN4067A	1.200	-0.350	0.500	0.363	0.27	0.20
PS-AB-100614-05 / 477TLL0008	PMAF4003A	899.000	NNTN7789A	Against phantom	PMLN5607A w/o belt loop tested w/ PMLN5610A	PMMN4067A	1.190	-0.380	0.459	0.334	0.25	0.18
PS-AB-100614-06 / 477TLL0008	PMAF4003A	899.000	NNTN7789A	Against phantom	PMLN5606A	PMMN4067A	1.200	-0.335	0.619	0.448	0.33	0.24
PS-AB-100614-07 / 477TLL0008	PMAF4003A	899.000	NNTN7789A	Against phantom	PMLN5607A	PMMN4067A	1.190	-0.368	0.565	0.410	0.31	0.23

Assessment at the Body (CW mode) – Other frequency channels:

The DUT was tested at all other applicable frequencies using highest SAR configuration from table 20. Refer to section 12.5 for additional test consideration details. The highest SAR result from the table below (bolded) are included in APPENDIX F Section 10.0 and APPENDIX G Section 6.0.

TABLE 21

896-902MHz band assessments at the Body (CW mode) – Other Frequency Channels												
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)**
PS-AB-100614-08 / 477TLL0008	PMAF4003A	896.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.200	-0.404	1.430	1.020	0.78	0.56
PS-AB-100722-02 / 477TLL0008	PMAF4003A	901.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.190	-0.675	1.120	0.804	0.66	0.47
PS-AB-100614-09 / 477TLL0008	PMAF4003A	902.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.210	-0.441	1.430	1.010	0.79	0.56

Assessment at 2.5cm without body worn accessory (CW mode):

DUT was tested with a separation distance of 2.5cm front from the phantom using the highest SAR configurations from tables 20-21. The highest applicable SAR results from table below (bolded) are provided in APPENDIX F Section 11.0

Note: The 2.5cm assessments included the following configurations:

- Back of the device facing the phantom, positioned at 2.5cm from the phantom surface. Depending on the hot spot location this configuration may or may not be included herein since hot spot on the antenna would present a closer separation distance.
- Back of the device facing the phantom with antenna positioned at 2.5cm from the phantom surface. Depending on the hot spot location this configuration may or may not be included herein.
- Front of the device facing the phantom, positioned at 2.5cm from the phantom surface.

TABLE 22

896-902MHz band assessments at 2.5cm without body worn accessory (CW mode)												
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)**
PS-AB-100614-10 / 477TLL0008	PMAF4003A	899.000	NNTN7789A	Back - Antenna at 2.5cm	None	PMMN4067A	1.210	-0.379	1.370	0.958	0.75	0.52
CcC-AB-100614-12 / 477TLL0008	PMAF4003A	899.000	NNTN7789A	Front - Radio ats 2.5cm	None	PMMN4067A	1.200	-0.310	0.426	0.314	0.23	0.17

Assessment at the Face (CW mode)

The DUT was tested with antenna PMAF4003A with the offered battery NNTN7789A at the applicable frequencies with the DUT front side separated 2.5cm from the phantom. Refer to section 12.5 for additional frequency channels test considerations details. The highest SAR result from the table below (bolded) are included in APPENDIX F Section 12.0 and APPENDIX G Section 7.0.

TABLE 23

896-902MHz band assessments at the Face (CW)												
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)**
CcC-FACE-100615-16 / 477TLL0008	PMAF4003A	896.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.190	-0.316	0.538	0.385	0.29	0.21
CcC-FACE-100615-17 / 477TLL0008	PMAF4003A	899.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.190	-0.315	0.508	0.364	0.28	0.20
PS-FACE-100722-04 / 477TLL0008	PMAF4003A	901.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.210	-0.357	0.527	0.381	0.29	0.21
PS-FACE-100616-02 / 477TLL0008	PMAF4003A	902.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.220	-0.354	0.543	0.393	0.29	0.21

13.4 935-941MHz Test Data

Assessment at the Body (CW mode) – audio accessory PMMN4067A and offered body worn accessories:

All possible accessory combinations, audio cable PMMN4067A and offered carry cases were tested with antenna PMAF4003A and battery NNTN7789A at center band of frequency channels. The highest SAR result from the table below (bolded) is included in APPENDIX F Section 13.0.

TABLE 24

935-941MHz band assessments at the Body (CW mode) – carry cases and offered audio accessory												
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)**
CcC-AB-100614-13 / 477TLL0008	PMAF4003A	938.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.190	-0.431	1.160	0.825	0.65	0.46
CcC-AB-100614-14 / 477TLL0008	PMAF4003A	938.000	NNTN7789A	Against phantom	PMLN5606A w/o belt loop tested w/ PMLN5610A	PMMN4067A	1.200	-0.504	0.592	0.427	0.33	0.24
CcC-AB-100614-15 / 477TLL0008	PMAF4003A	938.000	NNTN7789A	Against phantom	PMLN5607A w/o belt loop tested w/ PMLN5610A	PMMN4067A	1.200	-0.463	0.526	0.381	0.29	0.21
CcC-AB-100614-16 / 477TLL0008	PMAF4003A	938.000	NNTN7789A	Against phantom	PMLN5606A	PMMN4067A	1.200	-0.448	0.634	0.457	0.35	0.25
CcC-AB-100614-17 / 477TLL0008	PMAF4003A	938.000	NNTN7789A	Against phantom	PMLN5607A	PMMN4067A	1.190	-0.412	0.594	0.429	0.33	0.24

Assessment at the Body (CW mode) – Other frequency channels:

The DUT was tested at all other applicable frequencies using the highest SAR configuration from table 24. The highest SAR result from the table below (bolded) are included in APPENDIX F Section 14.0 and APPENDIX Section 8.0.

TABLE 25

935-941MHz band assessments at the Body (CW mode) – Other Frequency Channels												
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)**
CcC-AB-100614-18 / 477TLL0008	PMAF4003A	935.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.190	-0.510	0.947	0.676	0.54	0.38
PS-AB-100722-03 / 477TLL0008	PMAF4003A	940.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.200	-0.530	0.963	0.687	0.54	0.39
CcC-AB-100614-19 / 477TLL0008	PMAF4003A	941.000	NNTN7789A	Against phantom	PMLN5134A	PMMN4067A	1.190	-0.529	1.090	0.775	0.62	0.44

Assessment at 2.5cm without body worn accessory (CW mode):

DUT was tested with a separation distance of 2.5cm front from the phantom using the highest SAR configurations from tables 24-25. The highest applicable SAR results from table below (bolded) are provided in APPENDIX F Section 15.0

Note: The 2.5cm assessments included the following configurations:

- Back of the device facing the phantom, positioned at 2.5cm from the phantom surface. Depending on the hot spot location this configuration may or may not be included herein since hot spot on the antenna would present a closer separation distance.
- Back of the device facing the phantom with antenna positioned at 2.5cm from the phantom surface. Depending on the hot spot location this configuration may or may not be included herein.
- Front of the device facing the phantom, positioned at 2.5cm from the phantom surface.

TABLE 26

935-941MHz band assessments at 2.5cm without body worn accessory (CW mode)												
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)**
CcC-AB-100614-21 / 477TLL0008	PMAF4003A	938.000	NNTN7789A	Back - Radio at 2.5cm	None	PMMN4067A	1.200	-0.471	0.458	0.332	0.26	0.19
PS-AB-100615-02 / 477TLL0008	PMAF4003A	938.000	NNTN7789A	Front - Radio at 2.5cm	None	PMMN4067A	1.210	-0.518	0.501	0.365	0.28	0.21

Assessment at the Face (CW mode)

The DUT was tested with antenna PMAF4003A with the offered battery NNTN7789A at the applicable frequencies with the DUT front side separated 2.5cm from the phantom. The highest SAR result from the table below (bolded) are included in APPENDIX F Section 16.0 and APPENDIX G Section 9.0.

TABLE 27

935-941MHz band assessments at the Face (CW)												
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)**
PS-FACE-100616-03 / 477TLL0008	PMAF4003A	935.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.200	-0.501	0.784	0.562	0.44	0.32
PS-FACE-100616-04 / 477TLL0008	PMAF4003A	938.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.210	-0.528	0.781	0.560	0.44	0.32
PS-FACE-100722-05 / 477TLL0008	PMAF4003A	940.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.190	-0.622	0.825	0.589	0.48	0.34
PS-FACE-100616-05 / 477TLL0008	PMAF4003A	941.000	NNTN7789A	DUT Front at 2.5cm	None	None	1.200	-0.528	0.776	0.556	0.44	0.31

13.5 Shorten Scan Assessment

A “shortened” scan was performed to validate the SAR drift of full DASY4™ coarse and 5x5x7 zoom scans. Note that the shortened scan represents the zoom scan performance result; this is obtained by first running a coarse scan to find the peak area and then, using a newly charged battery, a 5x5x7 zoom scan only was performed. The results of the shortened cube scan presented in APPENDIX E demonstrate that the scaling methodology used to determine the calculated SAR results presented herein are valid. The shortened scan SAR result from the table below is provided in APPENDIX E Section – Shortened scan results.

TABLE 28

Shortened scan Assessment												
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-100624-03 / 477TLL009	PMAF4003A	869.000	NNTN7789A	Back - Antenna at 2.5cm	None	PMMN4067A	1.200	-0.310	1.510	1.060	0.81	0.57
Shorten scan												
PS-AB-100624-04 / 477TLL0009	PMAF4003A	869.000	NNTN7789A	Back - Antenna at 2.5cm	None	PMMN4067A	1.190	-0.155	1.530	1.080	0.80	0.56

14 Simultaneous Transmission Exclusion: NA

15 Conclusion:

The highest Operational Maximum Calculated 1-gram and 10-gram average SAR values found for this filing: FCC ID: ABZ99FT5012, model PMUF1473A:

RF Exposure Results for FCC Part 90 (806-824), (851-869), (896-901) & (935-940):

TABLE 29

	Max Calc at Body (W/kg)		Max Calc at Face (W/kg)	
Frequency Range (MHz)	1g-SAR	10g-SAR	1g-SAR	10g-SAR
806-824	0.79	0.56	0.29	0.21
851-869	0.81	0.57	0.32	0.23
896-901	0.81	0.58	0.29	0.21
935-940	0.65	0.46	0.48	0.34

RF Exposure Results (824-825), (869-870), (901-902) & (940-941):

TABLE 30

	Max Calc at Body (W/kg)		Max Calc at Face (W/kg)	
Frequency Range (MHz)	1g-SAR	10g-SAR	1g-SAR	10g-SAR
824-825	0.25	0.19	0.29	0.21
869-870	0.77	0.54	0.31	0.23
901-902	0.79	0.56	0.29	0.21
940-941	0.62	0.44	0.44	0.31

The 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 800 MHz to 3 GHz, and for Dipole test frequency ranging from 800 MHz to 3 GHz. Therefore, the highest tolerance for the probe calibration uncertainty is indicated.

Uncertainty Budget for Device Under Test, for 800 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 Uncertainty Budget Rev.8

Uncertainty Budget for System Validation (dipole & flat phantom) for 800 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	

FCD-0558 Uncertainty Budget Rev.8

Notes:
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: **ES3-3096_Dec09**

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3096

Calibration procedure(s): QA CAL-01.v6, QA CAL-12.v6, QA CAL-14.v3, QA CAL-23.v3 and QA CAL-25.v2
Calibration procedure for dosimetric E-field probes

Calibration date: December 14, 2009

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	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

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

Issued: December 17, 2009

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
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *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:3096

Manufactured:	July 12, 2005
Last calibrated:	December 18, 2008
Recalibrated:	December 14, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3096

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.27	1.16	1.28	± 10.1%
DCP (mV)[B]	92.7	92.7	92.7	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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 Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

DASY - Parameters of Probe: ES3DV3 SN:3096

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	43.5 ± 5%	0.87 ± 5%	6.06	6.06	6.06	0.24	1.51 ± 13.3%
750	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	5.98	5.98	5.98	0.83	1.10 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	5.71	5.71	5.71	0.90	1.04 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.82	4.82	4.82	0.53	1.42 ± 11.0%
2300	± 50 / ± 100	39.5 ± 5%	1.67 ± 5%	4.52	4.52	4.52	0.49	1.54 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.25	4.25	4.25	0.44	1.66 ± 11.0%
2600	± 50 / ± 100	39.0 ± 5%	1.96 ± 5%	4.27	4.27	4.27	0.47	1.62 ± 11.0%
3500	± 50 / ± 100	37.9 ± 5%	2.91 ± 5%	3.93	3.93	3.93	0.85	1.10 ± 13.1%

[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.

DASY - Parameters of Probe: ES3DV3 SN:3096

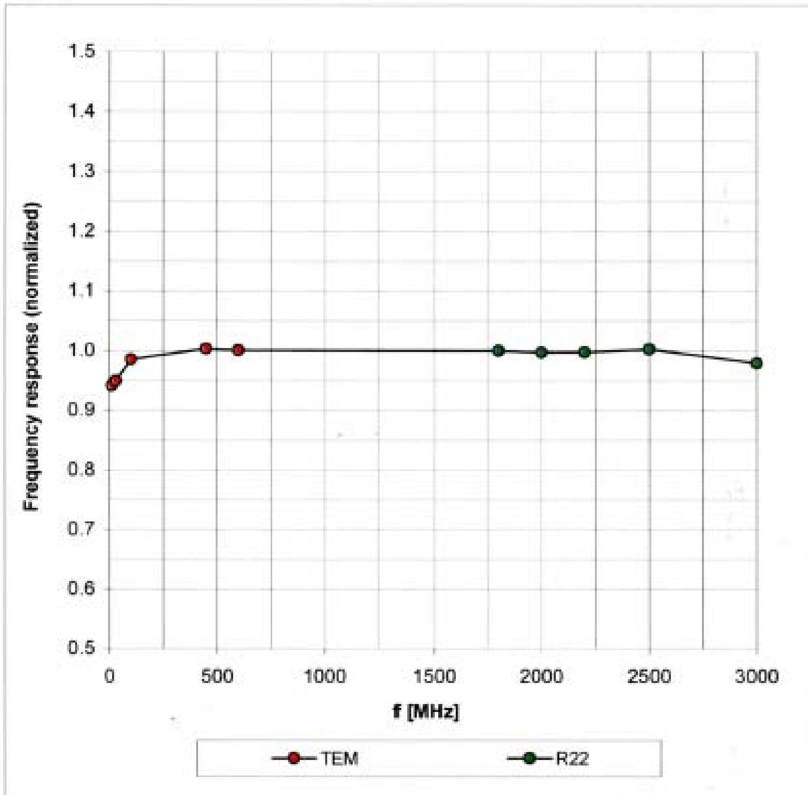
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	56.7 ± 5%	0.94 ± 5%	6.60	6.60	6.60	0.16	1.32 ± 13.3%
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	5.71	5.71	5.71	0.89	1.09 ± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	5.60	5.60	5.60	0.99	1.08 ± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.63	4.63	4.63	0.35	2.05 ± 11.0%
2300	± 50 / ± 100	52.8 ± 5%	1.85 ± 5%	4.32	4.32	4.32	0.56	1.54 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.12	4.12	4.12	0.66	1.33 ± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	4.05	4.05	4.05	0.90	1.13 ± 11.0%
3500	± 50 / ± 100	51.3 ± 5%	3.31 ± 5%	3.46	3.46	3.46	0.85	1.20 ± 13.1%

[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.

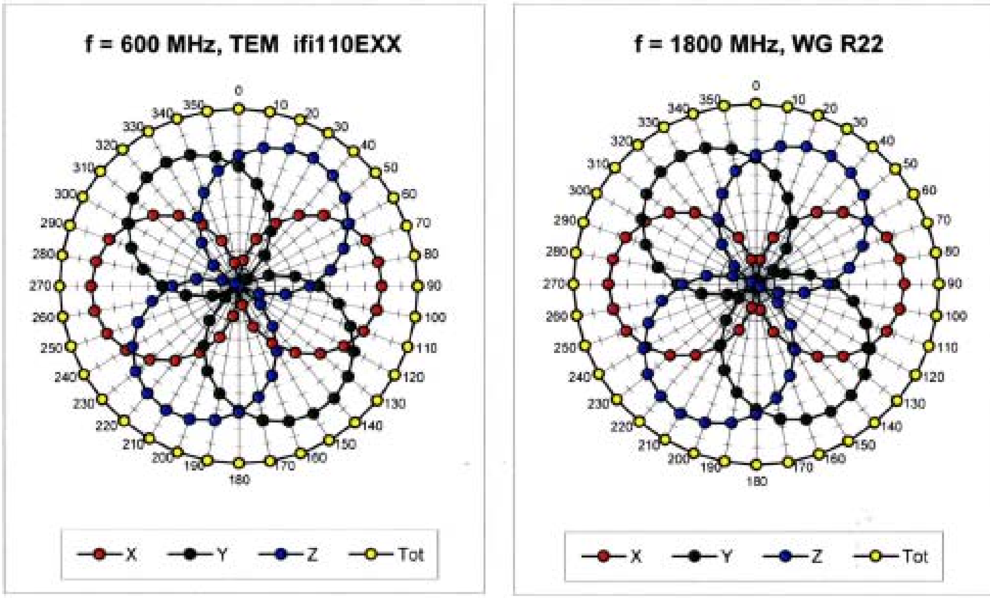
Frequency Response of E-Field

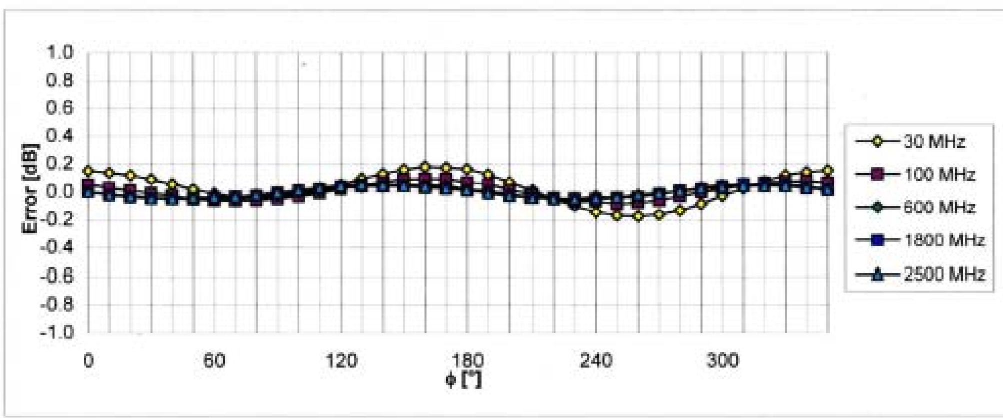
(TEM-Cell:ifi110 EXX, Waveguide: R22)



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

Receiving Pattern (ϕ), ϑ = 0°

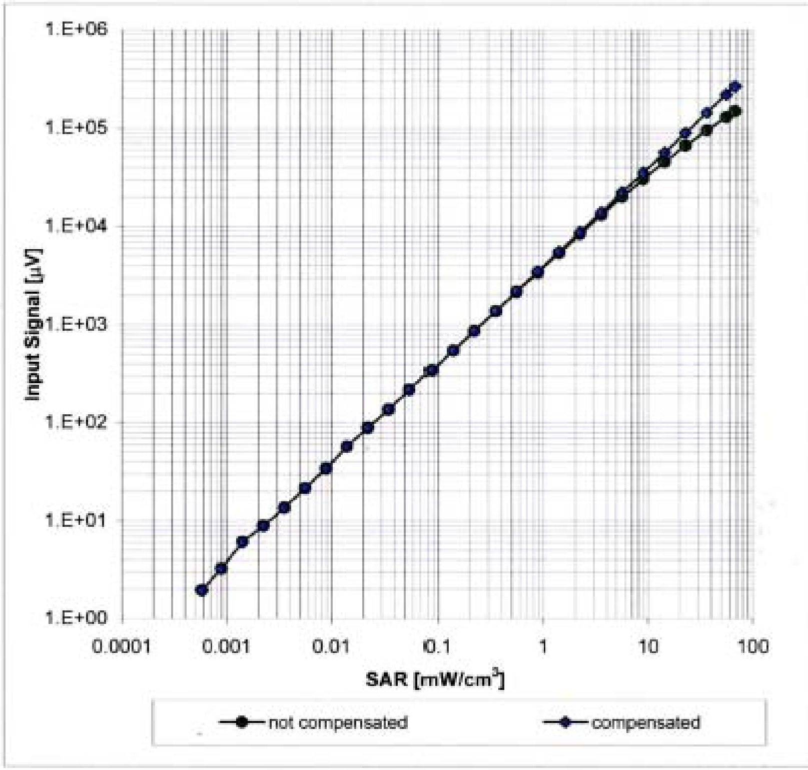


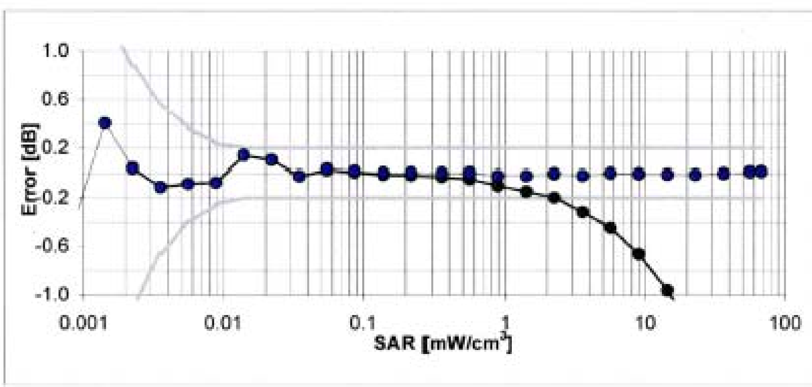


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

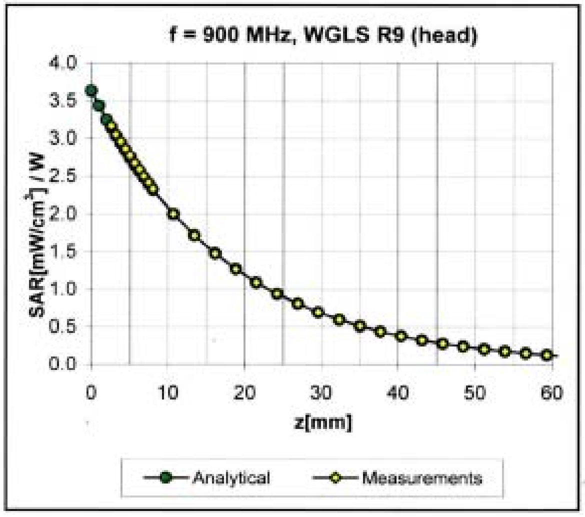
(Waveguide R22, f = 1800 MHz)

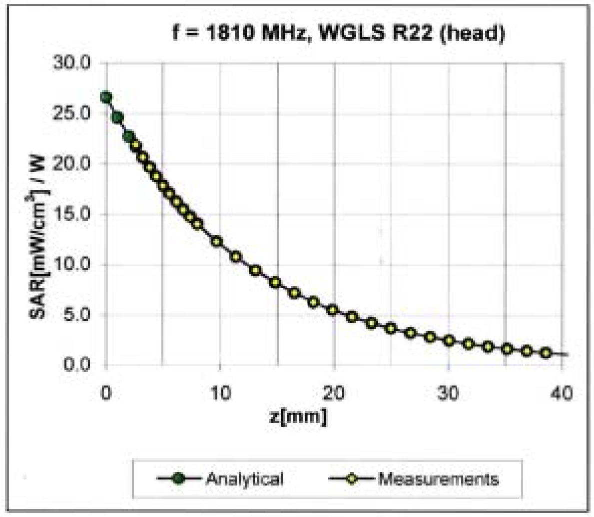




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

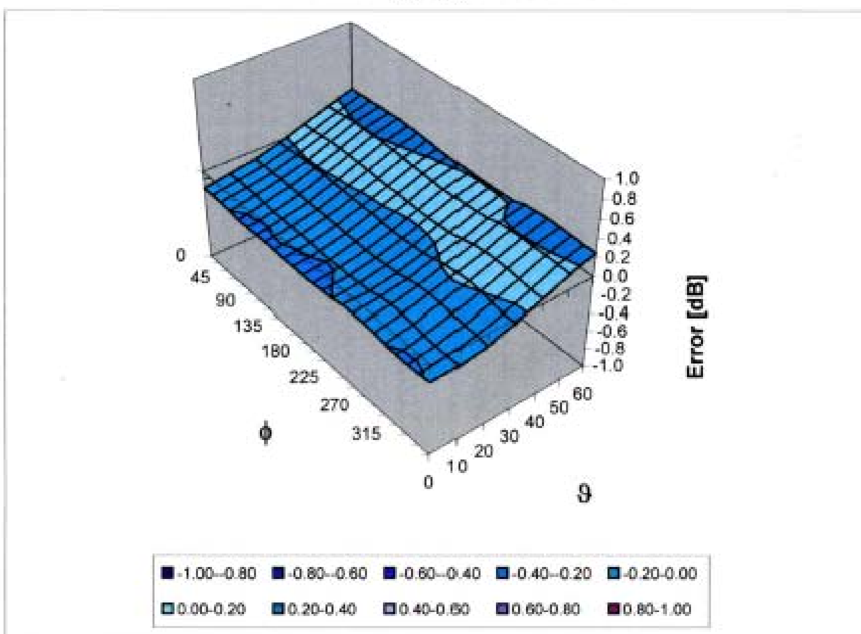
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4.0 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ES3DV3**
Serial Number:	**3096**
Place of Assessment:	**Zurich**
Date of Assessment:	**December 17, 2009**
Probe Calibration Date:	**December 14, 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:

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ES3DV3 SN:3096

Conversion factor (± standard deviation)

150 ± 50 MHz	*ConvF*	7.8 ± 10%	ε_r = 52.3 σ = 0.76 mho/m (head tissue)
250 ± 50 MHz	*ConvF*	7.0 ± 10%	ε_r = 47.6 σ = 0.83 mho/m (head tissue)
300 ± 50 MHz	*ConvF*	7.0 ± 9%	ε_r = 45.3 σ = 0.87 mho/m (head tissue)
150 ± 50 MHz	*ConvF*	7.5 ± 10%	ε_r = 61.9 σ = 0.80 mho/m (body tissue)
250 ± 50 MHz	*ConvF*	7.1 ± 10%	ε_r = 59.4 σ = 0.88 mho/m (body tissue)
300 ± 50 MHz	*ConvF*	7.0 ± 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 DASY Manual.

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

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_Apr10

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3122
Calibration procedure(s)	QA CAL-01.v6, QA CAL-12.v6, QA CAL-14.v3, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	April 23, 2010

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-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

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

Issued: April 24, 2010

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
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *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:	April 24, 2009
Recalibrated:	April 23, 2010

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3122

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.34	1.27	1.44	± 10.1%
DCP (mV)[B]	99.4	96.9	94.7	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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 Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

DASY - Parameters of Probe: ES3DV3 SN:3122

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth	Unc (k=2)
450	± 50 / ± 100	43.5 ± 5%	0.87 ± 5%	6.29	6.29	6.29	0.14	1.71	± 13.3%
750	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.21	6.21	6.21	0.99	1.04	± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	5.87	5.87	5.87	0.99	1.04	± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.98	4.98	4.98	0.46	1.57	± 11.0%
2300	± 50 / ± 100	39.5 ± 5%	1.67 ± 5%	4.63	4.63	4.63	0.32	2.17	± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.37	4.37	4.37	0.43	1.78	± 11.0%
2600	± 50 / ± 100	39.0 ± 5%	1.96 ± 5%	4.33	4.33	4.33	0.57	1.56	± 11.0%
3500	± 50 / ± 100	37.9 ± 5%	2.91 ± 5%	4.04	4.04	4.04	0.90	1.20	± 13.1%

[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.

DASY - Parameters of Probe: ES3DV3 SN:3122

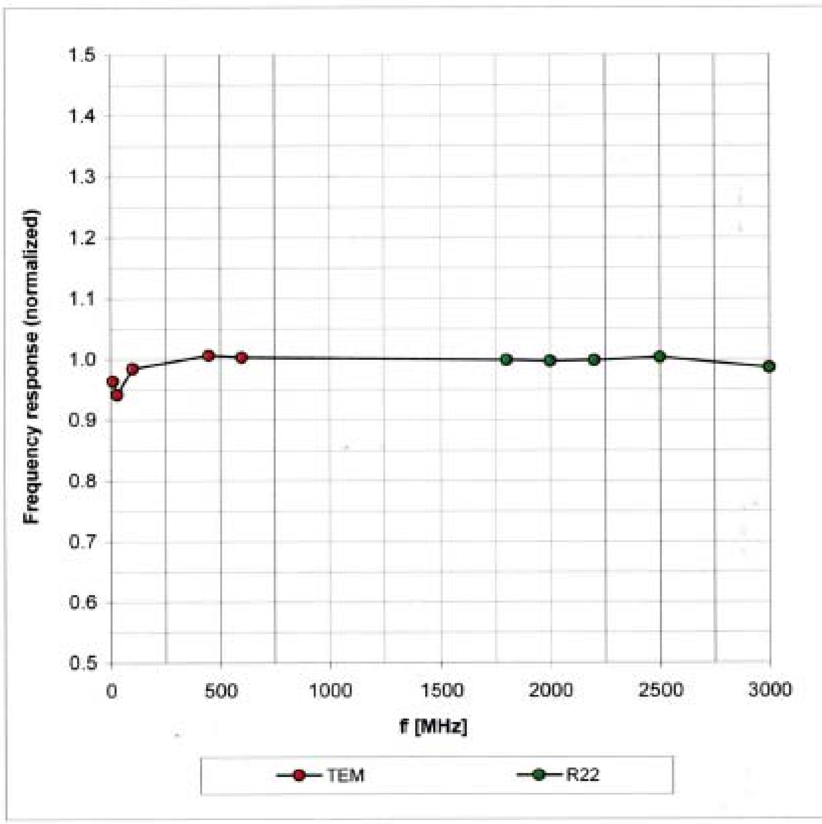
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth	Unc (k=2)
450	± 50 / ± 100	56.7 ± 5%	0.94 ± 5%	6.68	6.68	6.68	0.08	1.00	± 13.3%
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	6.01	6.01	6.01	0.99	1.08	± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	5.89	5.89	5.89	0.85	1.15	± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.68	4.68	4.68	0.42	1.74	± 11.0%
2300	± 50 / ± 100	52.8 ± 5%	1.85 ± 5%	4.35	4.35	4.35	0.46	1.73	± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.28	4.28	4.28	0.71	1.26	± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	4.17	4.17	4.17	0.99	1.07	± 11.0%
3500	± 50 / ± 100	51.3 ± 5%	3.31 ± 5%	3.41	3.41	3.41	0.99	1.28	± 13.1%

[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.

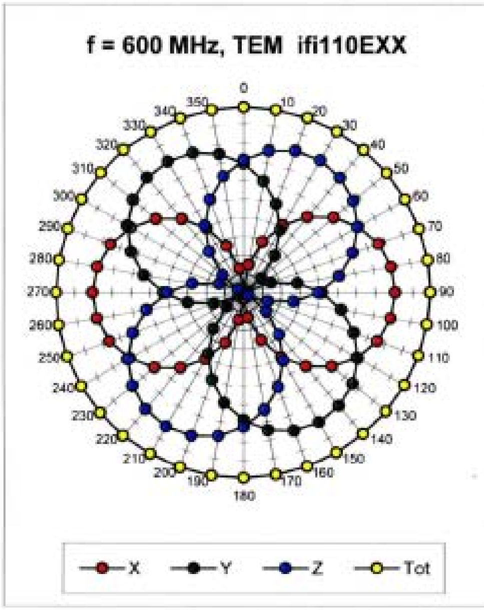
Frequency Response of E-Field

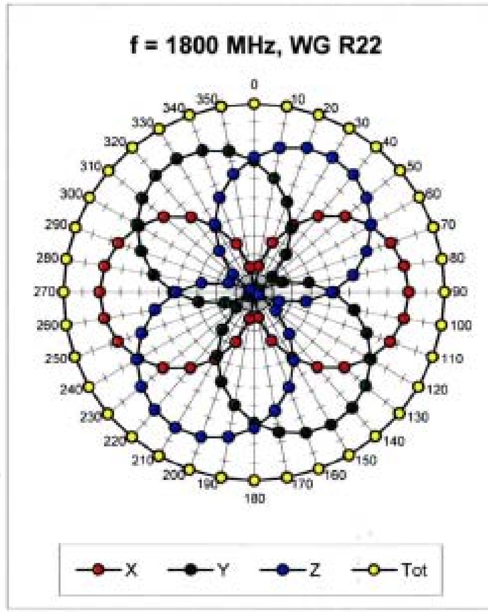
(TEM-Cell:ifi110 EXX, Waveguide: R22)

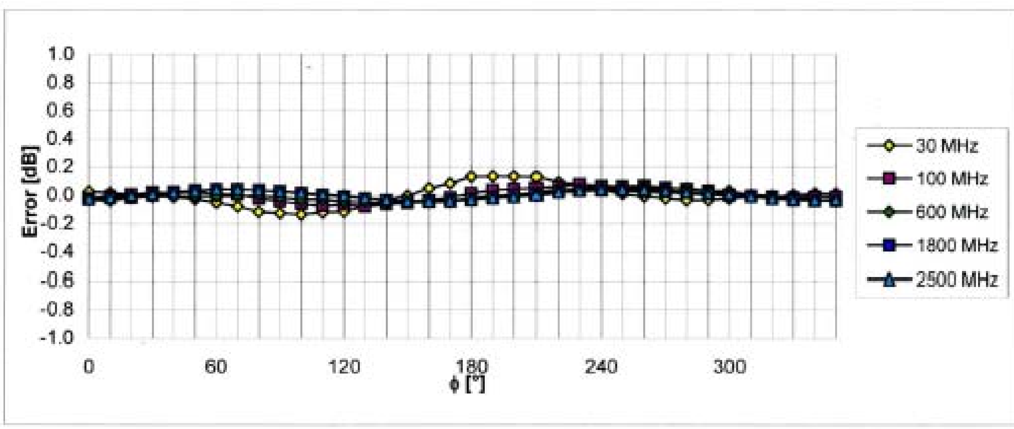


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



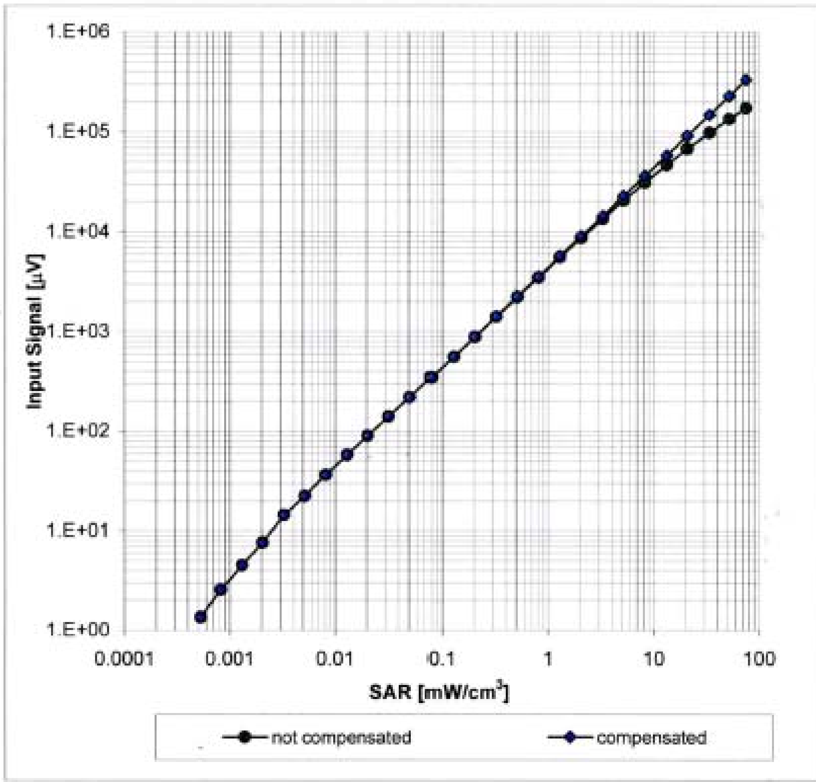


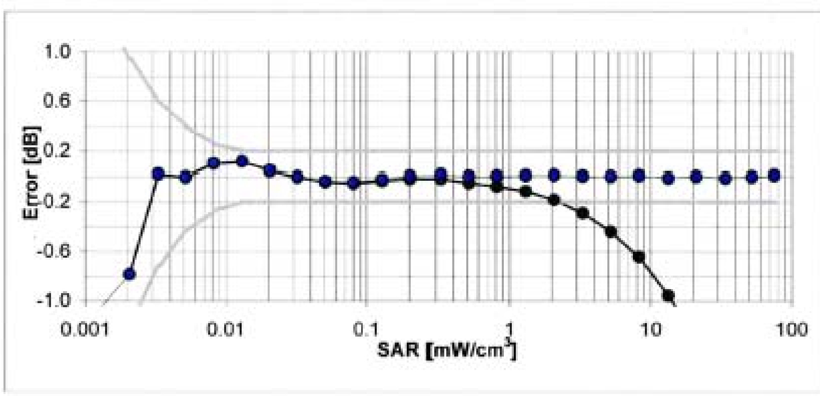


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

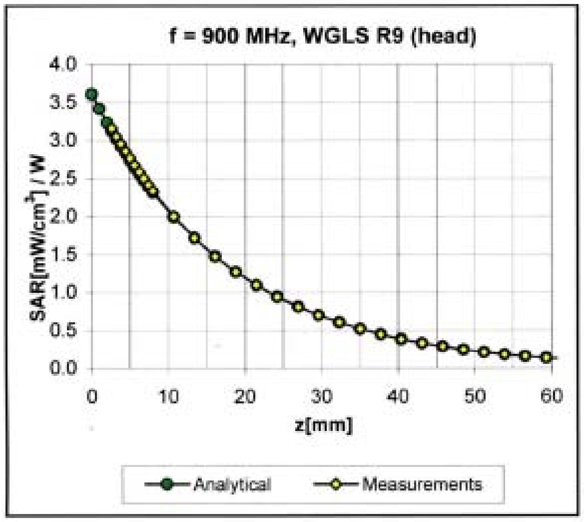
(Waveguide R22, f = 1800 MHz)

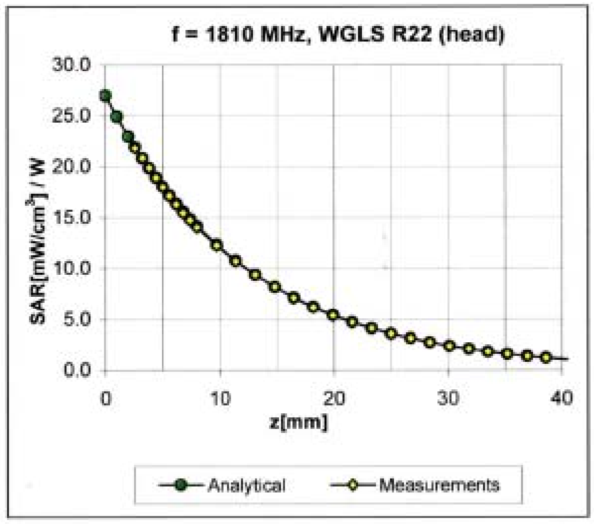




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

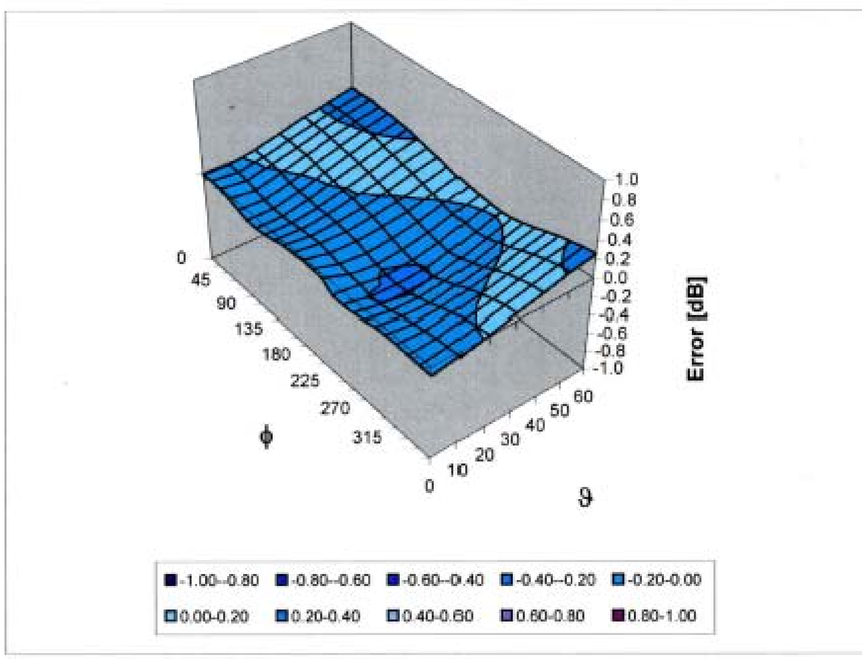
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4.0 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ES3DV3**
Serial Number:	**3122**
Place of Assessment:	**Zurich**
Date of Assessment:	**April 28, 2010**
Probe Calibration Date:	**April 23, 2010**

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
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ES3DV3 SN:3122

Conversion factor (± standard deviation)

150 MHz	*ConvF*	**8.0 ± 10%**	**ε_r = 52.3** **σ = 0.76 mho/m** (head tissue)
250 MHz	*ConvF*	**7.4 ± 10%**	**ε_r = 47.6** **σ = 0.83 mho/m** (head tissue)
300 MHz	*ConvF*	**7.2 ± 9%**	**ε_r = 45.3** **σ = 0.87 mho/m** (head tissue)
150 MHz	*ConvF*	**7.7 ± 10%**	**ε_r = 61.9** **σ = 0.80 mho/m** (body tissue)
250 MHz	*ConvF*	**7.3 ± 10%**	**ε_r = 59.4** **σ = 0.88 mho/m** (body tissue)
300 MHz	*ConvF*	**7.2 ± 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 DASY Manual.

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