MOTOROLA SOLUTIONS

A2LA ACCREDITED
TESTING CERT # 2518.05

DECLARATION OF COMPLIANCE SAR ASSESSMENT

Enterprise Mobility Solutions
EME Test Laboratory
Motorola Solutions Malaysia 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: 10/9/2013
Report Revision: A
Report ID: SR10696/10697 PCII Rpt PMUF1473B Rev A 131009

Responsible Engineer:	Veeramani Veerapan (Senior EME Engineer)
Report Author:	Veeramani Veerapan (Senior EME Engineer)
Date/s Tested:	6/13/2012 – 6/22/2012; 7/17/2012
Manufacturer/Location:	Motorola, Penang
Sector/Group/Div.:	EMS
Date submitted for test:	6/8/2012
DUT Description:	XPR 6580 IS 806-870MHz & 896-941MHz, 12.5kHz/25kHz, 2W, 160CH, FKP & Display w/GPS (Capable of analog FM transmission and digital TDMA transmission.)
Test TX mode(s):	CW (PTT)
Max. Power output:	2.65W
Nominal Power:	2.0W
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:	PMUF1473B
Model(s) Certified:	PMUF1473B
Serial Number(s):	477TNA1147
Classification:	Occupational/Controlled
FCC ID:	ABZ99FT5013; Rule part 90 (806-824, 851-869, 896-901 & 935-940MHz)
IC:	109AB-99FT5013 (806-821, 821-824, 851-866, 866-869, 896-901 & 935-940 MHz)

* Refer to section 15 for 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 result is 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 Solutions Inc 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
Zakharia Deanna-EDC015
Digitally signed by Zakharia Deanna-EDC015
DN: cn=Zakharia Deanna-EDC015
Date: 2013.10.09 15:00:31 -04'00'

Deanna Zakharia
EMS EME Lab Senior Resource Manager,
Laboratory Director

Approval Date: 10/9/2013

Certification Date: 7/18/2012

Certification No.: 120708AD & 120707AD

APPENDICES

Report Revision History

Date	Revision	Comments
7/18/2012	O	Release of PCII results with new offered antennas.
10/9/2013	A	Updated date on the report

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 Motorola Solutions Inc. EME Test Laboratory for model number PMUF1473B. The information herein is to demonstrate Class II Permissive Change compliance based on results of two new offered antenna kit models NAF5088A and NAF5087A.

2.0 Abbreviations / Definitions

CNR: Calibration Not Required
CW: Continuous Wave
DUT: Device Under Test
FM: Frequency Modulation
NA: Not Applicable
PTT: Push to Talk
4FSK: 4 Level Frequency Shift Keying
TDMA: Time Division Multiple Access
SAR: Specific Absorption Rate
RSM: Remote Speaker Microphone
DSP: Digital Signal Processor
GPS: Global Positioning Satellite

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 (2009), 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 9 kHz 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)	(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 F. For this device the “Max Calc. 1g-SAR” and “Max Calc.10g-SAR” are scaled using the following formula:

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

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)

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 narrow band 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 806-825 MHz, 851-870 MHz, 896-902 MHz and 935-941 MHz bands. The nominal output power is 2.2W and maximum output power is 2.65W for each of the applicable bands. The max power is 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

This device is offered with optional accessories. The following sections identify the test criteria and details for each accessory category applicable for this PCII filing only. Please refer to the initial filing for a detailed listing of previously approved offered accessories.

7.1 Antennas

There are two antennas applicable for this PCII filing. The table below lists there description.

TABLE 2

Antenna Models	Description	*Tested
NAF5087A	WHIP antenna 806-870MHz 1/2 wave 18cm -3dBd	Yes
NAF5088A	WHIP antenna 896-941MHz 1/2 wave 17cm -3dBd	Yes

* Refer to APPENDIX G for antenna separation distances**.**

7.2 Battery

There is one battery applicable for this PCII filing. The table below lists its description.

TABLE 3

Battery Models	Description	*Tested	Comments
NNTN8287A	MOTOTRBO CSA 157 IMPRES Li-Ion, 1750 mAh	Yes	Height = 140mm

* Refer to APPENDIX G for antenna separation distances.

7.3 Body worn Accessory

There is one body worn accessory applicable for this PCII filing. The table below lists its description.

TABLE 4

Body worn Models	Description	*Tested	Comments
PMLN5134A	ATEX/CSA Belt Clip 2.5 inch Belt Width	Yes	

* Refer to APPENDIX G for antenna separation distances.

7.4 Audio Accessory

There is one audio applicable for this PCII filing. The table below lists its description.

TABLE 5

Audio Acc. Models	Description	*Tested	Comments
PMLN5275C	Behind the Head Heavy Duty Headset	Yes	

* Refer to APPENDIX G for antenna separation distances.

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

Not applicable

8.2.2 SAM Phantom

Not applicable

8.2.3 Elliptical Phantom

TABLE 6

Phantom ID (s)	Material Parameters	Phantom Dimensions LxWxD (mm)	Material Thickness (mm)	Support Structure Material	Loss Tangent (wood)
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 table 7 below for 900 MHz. During the daily testing of this product, the applicable mixture was used to measure the Di-electric parameters at each of the tested frequencies to verify that the Di-electric parameters were within the tolerance of the tissue specifications.

TABLE 7: Simulated Tissue Composition (by mass)

% of listed ingredients	900MHz	
	Head	Body
Sugar	56.5	44.9
Diacetin	0	0
De ionized -Water	40.95	53.06
Salt	1.45	0.94
HEC	1.0	1.0
Bact.	0.1	0.1

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 Date	Calibration Due Date
Power Meter	E4416A	MY50001037	1/10/2012	1/10/2013
Power Sensor	N8481B	MY51450002	4/5/2012	4/5/2013
Power Meter	E4418B	MY45101014	1/31/2012	1/31/2013
Power Sensor	8481B	SG41090248	10/20/2011	10/20/2012
Power Meter	E4418B	MY45100532	10/19/2011	10/19/2012
Power Sensor	8481B	MY41091170	10/20/2011	10/20/2012
Bi-Directional Coupler (NARDA)	3020A	41931	8/11/2011	8/11/2012
Signal Generator	E4438C	MY45091014	10/11/2010	10/11/2012
Amplifier	10W1000C	312858	CNR	CNR
Temperature Recording Equipment				
Thermometer	HH806AU	080307	10/6/2011	10/6/2012
Therm. Probe	80PK-22	8765	10/7/2011	10/7/2012
Tissue Station				
Network Analyzer (HP)	E5071B	MY42403147	10/19/2011	10/19/2012
Dielectric Probe Kit (HP)	85070E	MY44300183	CNR	CNR
Dipole				
Speag Dipole	D900V2	1d026	11/18/2011	11/18/2013
Probe				
E-Field Probe	ES3DV3	3274	10/18/2011	10/18/2012
E-Field Probe	ES3DV3	3122	4/26/2012	4/26/2013

10.0 SAR Measurement System Verification

The SAR measurements were conducted with probe model/serial numbers ES3DV3/3274 and ES3DV3/3122. 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.

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. Frequencies in blue are outside FCC Part 90.

TABLE 9

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
806	FCC Body	0.97 (0.92 -1.02)	55.3 (52.5– 58.1)	0.97	54.0	7/17/2012
	IEEE / IEC Head	0.90 (0.85 – 0.94)	41.7 (39.6– 43.7)	0.89	41.0	7/17/2012
816	FCC Body	0.97 (0.92 -1.02)	55.3 (52.5– 58.0)	0.97	53.6	6/20/2012
	IEEE / IEC Head	0.90 (0.85 – 0.94)	41.6 (39.5– 43.7)	0.91	41.6	6/21/2012
824	FCC Body	0.97 (0.92 -1.02)	55.24 (52.5-58.0)	0.99	53.7	6/22/2012
	IEEE/ IEC Head	0.90 (0.86-0.95)	41.56 (39.5-43.6)	0.91	40.8	6/21/2012
825	FCC Body	0.97 (0.92 -1.02)	55.24 (52.5-58.0)	0.98	53.4	6/20/2012
	IEEE / IEC Head	0.90 (0.86-0.95)	41.55 (39.5-43.6)	0.92	41.5	6/21/2012
851	FCC Body	0.99 (0.94-1.04)	55.12 (52.4-57.9)	1.01	53.6	7/17/2012
	IEEE/ IEC Head	0.92 (0.87-0.96)	41.50 (39.4-43.6)	0.93	40.4	7/17/2012
861	FCC Body	1.00 (0.95-1.05)	55.1 (52.4-57.9)	1.02	53.2	6/20/2012
	IEEE/ IEC Head	0.93 (0.88-0.97)	41.5 (39.4-43.6)	0.95	41.1	6/21/2012
869	FCC Body	1.01 (0.96-1.06)	55.1 (52.4-57.9)	1.04	53.2	6/22/2012
	IEEE/ IEC Head	0.94 (0.89-0.99)	41.50 (39.4-43.6)	0.95	40.3	6/21/2012
870	FCC Body	1.01 (0.96-1.06)	55.1 (52.4-57.9)	1.03	53.1	6/20/2012
	IEEE/ IEC Head	0.94 (0.89-0.99)	41.50 (39.4-43.6)	0.96	41.0	6/21/2012
896	FCC Body	1.05 (0.99-1.10)	55.0 (52.3-57.8)	1.06	53.1	7/17/2012
	IEEE/ IEC Head	0.97 (0.92-1.02)	41.5 (39.4-43.6)	0.97	40.0	6/14/2012
899	FCC Body	1.05 (1.00-1.10)	55.0 (52.3-57.8)	1.06	52.8	6/20/2012
	IEEE/ IEC Head	0.97 (0.92-1.02)	41.5 (39.4-43.6)	0.99	40.6	6/21/2012
900	FCC Body	1.05 (1.00-1.10)	55.0 (52.3-57.8)	1.06	52.8	6/20/2012
				1.07	52.9	6/22/2012
				1.07	53.1	7/17/2012
	IEEE/ IEC Head	0.97 (0.92-1.02)	41.5 (39.4-43.6)	0.97	40.0	6/14/2012
				0.99	40.6	6/21/2012
				0.98	39.8	7/17/2012
901	FCC Body	1.05 (1.00-1.10)	55.0 (52.2-57.7)	1.07	52.9	6/22/2012
	IEEE/ IEC Head	0.97 (0.92-1.02)	41.5 (39.4-43.6)	0.98	39.9	6/21/2012

TABLE 9 (Continued)

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
902	FCC Body	1.05 (1.00-1.10)	55.0 (52.3-57.8)	1.06	52.8	6/20/2012
	IEEE/ IEC Head	0.97 (0.92-1.02)	41.5 (39.4-43.6)	0.99	40.6	6/21/2012
935	FCC Body	1.07 (1.02-1.12)	54.9 (52.2-57.7)	1.09	52.4	6/20/2012
	IEEE/ IEC Head	0.98 (0.94-1.03)	41.4 (39.4-43.5)	1.03	40.2	6/21/2012
938	FCC Body	1.07 (1.02-1.12)	54.9 (52.2-57.7)	1.11	52.7	7/17/2012
	IEEE/ IEC Head	0.99 (0.94-1.04)	41.4 (39.3-43.5)	1.01	39.5	6/14/2012
940	FCC Body	1.07 (1.02-1.12)	54.9 (52.2-57.7)	1.12	52.5	6/22/2012
	IEEE/ IEC Head	0.99 (0.94-1.04)	41.4 (39.4-43.5)	1.02	39.4	6/21/2012
941	FCC Body	1.07 (1.02-1.12)	54.9 (52.2-57.7)	1.10	52.3	6/20/2012
	IEEE/ IEC Head	0.99 (0.94-1.04)	41.4 (39.4-43.5)	1.03	40.1	6/21/2012

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	Dipole Kit / Serial #	Reference SAR @ 1W (W/kg)	System Check Test Results when normalized to 1W (W/kg)	Tested Date
3274	FCC Body	SPEAG D900V2 / 1d026	11.52+/- 10%	11.52	6/20/2012
				11.48	6/22/2012
	IEEE/ IEC Head	SPEAG D900V2 / 1d026	11.52+/- 10%	10.64	6/14/2012
				10.88	6/21/2012
3122	FCC Body	SPEAG D900V2 / 1d026	10.80+/- 10%	11.60	7/17/2012
	IEEE/ IEC Head	SPEAG D900V2 / 1d026	10.32+/- 10%	10.60	7/17/2012

11.0 Environmental Test Conditions

The EME Laboratory's 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: 21.3 – 23.3˚C Avg. 22.2 ˚C
Relative Humidity	30 - 70 %	Range: 43.2 – 55.2 % Avg. 48.8%
Tissue Temperature	NA	Range: 21.0 – 21.2˚C Avg. 21.1˚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/shoulder 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 considered in order to demonstrate PCII compliance.

12.3 DUT Positioning Procedures

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

12.3.1 Body

The DUT was positioned in intended use configuration against the phantom with the offered body worn and audio accessories where applicable.

12.3.2 Head

Not applicable.

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 using the following IEEE 1528 equation. The use of this equation produces the same or more test channels compared to the FCC KDB 447498 number of test channels formula.

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

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

12.5 DUT Test Plan

Two new offered antennas (NAF5087A & NAF5088A) were assessed across their frequency band at the body and face using the highest applicable configurations found during the initial compliance assessment on file with the FCC.
All tests were performed in CW mode (100% duty cycle), the measured SAR results was scaled using the formula indicated in section 5.0 to account for power leveling variations, power slump and duty cycle (50% for PTT operation).

13.0 DUT Test Data

The new antennas model # NAF5087A and NAF5088A were assessed across the bandwidth using the accessories indicated in section 7.0 which represent the highest applicable configurations at the body and face found during the initial compliance assessment on file with the FCC. SAR plots of the highest results are presented in appendix E.

Note that test results that are outside the relevant FCC frequency allocations are presented herein in blue font.

TABLE 12

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (mW/g)	Meas. 10g-SAR (mW/g)	Max Calc. 1g-SAR (mW/g)	Max Calc. 10g-SAR (mW/g)	Run#
Assessments at the Body- 806-825MHz Band											
NAF5087A	NNTN8287A	PMLN5134A	PMLN5275C	806.0125	2.27	-0.393	1.190	0.893	0.76	0.57	Lee-Face-120717-04
				815.5000	2.29	-0.470	1.220	0.907	0.79	0.58	CcC-AB-120620-10
				824.0000	2.27	-0.487	1.230	0.913	**0.80**	**0.60**	PS-AB-120622-02
				825.0000	2.26	-0.454	1.180	0.873	0.77	0.57	CcC-AB-120620-11
Assessments at the Face- 806-825MHz Band											
NAF5087A	NNTN8287A	NONE	NONE	806.0125	2.29	-0.394	2.010	1.484	1.27	0.94	Lee-FACE-120717-07
				815.5000	2.28	-0.420	1.850	1.370	1.18	0.88	PS-FACE-120621-02
				824.0000	2.26	-0.408	2.150	1.570	**1.38**	**1.01**	CcC-FACE-120621-13
				825.0000	2.25	-0.372	1.990	1.460	1.28	0.94	PS-FACE-120621-03
Assessments at the Body- 851-870MHz Band											
NAF5087A	NNTN8287A	PMLN5134A	PMLN5275C	851.0125	2.21	-0.527	1.060	0.785	0.72	0.53	Lee-AB-120717-05
				860.5000	2.21	-0.495	1.070	0.789	0.72	0.53	CcC-AB-120620-12
				869.0000	2.21	-0.525	1.100	0.806	0.74	0.55	PS-AB-120622-03
				870.0000	2.23	-0.478	1.120	0.818	0.74	0.54	CcC-AB-120620-13
Assessments at the Face- 851-870MHz Band											
NAF5087A	NNTN8287A	NONE	NONE	851.0125	2.21	-0.535	1.89	1.38	1.28	0.94	Lee-FACE-120717-08
				860.5000	2.20	-0.405	1.830	1.330	1.21	0.88	PS-FACE-120621-04
				869.0000	2.23	-0.402	1.920	1.390	1.25	0.91	CcC-FACE-120621-15
				870.0000	2.22	-0.413	1.880	1.360	1.23	0.89	PS-FACE-120621-05

TABLE 13

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (mW/g)	Meas. 10g-SAR (mW/g)	Max Calc. 1g-SAR (mW/g)	Max Calc. 10g-SAR (mW/g)	Run#
Assessments at the Body- 896-902MHz Band											
NAF5088A	NNTN8287A	PMLN5134A	PMLN5275C	896.0000	2.20	-0.524	1.22	0.895	0.83	0.61	Lee-AB-120717-02
				899.0000	2.23	-0.572	1.220	0.891	0.83	0.60	CcC-AB-120620-08
				901.0000	2.26	-0.493	1.180	0.860	0.77	0.56	PS-AB-120622-05
				902.0000	2.26	-0.542	1.270	0.923	**0.84**	**0.61**	CcC-AB-120620-09
Assessments at the Face- 896-902MHz Band											
NAF5088A	NNTN8287A	NONE	NONE	896.0000	2.21	-0.454	2.080	1.500	1.38	1.00	CcC-FACE-120614-03
				899.0000	2.26	-0.560	2.150	1.540	1.43	1.03	PS-FACE-120621-06
				901.0000	2.26	-0.493	2.070	1.490	1.36	0.98	CcC-FACE-120621-11
				902.0000	2.27	-0.519	2.240	1.600	1.47	1.05	PS-FACE-120621-07
Assessments at the Body- 935-941MHz Band											
NAF5088A	NNTN8287A	PMLN5134A	PMLN5275C	938.000	2.29	-0.424	1.08	0.786	0.69	0.50	Lee-AB-120717-03
				935.0000	2.310	-0.485	1.260	0.911	0.81	0.58	CcC-AB-120620-06
				940.0000	2.310	-0.555	1.220	0.876	0.80	0.57	PS-AB-120622-04
				941.0000	2.300	-0.507	1.120	0.808	0.73	0.52	CcC-AB-120620-07
Assessments at the Face- 935-941MHz Band											
NAF5088A	NNTN8287A	NONE	NONE	938.0000	2.31	-0.566	2.130	1.510	1.39	0.99	CcC-FACE-120614-04
				935.0000	2.30	-0.602	2.230	1.580	**1.48**	**1.05**	PS-FACE-120621-08
				940.0000	2.30	-0.524	2.010	1.420	1.31	0.92	CcC-FACE-120621-12
				941.0000	2.31	-0.570	2.090	1.480	1.37	0.97	PS-FACE-120621-09

14.0 Shorten Scan Assessment:

Short scan assessment: A "shortened" scan was performed to validate the SAR drift of the 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 both SAR results from the table below are provided in APPENDIX E.

TABLE 14

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (W)	SAR Drift (dB)	Meas. 1g-SAR (mW/g)	Meas. 10g-SAR (mW/g)	Max Calc. 1g-SAR (mW/g)	Max Calc. 10g-SAR (mW/g)	Run#
Full scan											
NAF5087A	NNTN8287A	PMLN5134A	PMLN5275C	851.0125	2.27	-0.487	1.230	0.913	0.80	0.60	PS-AB-120622-02
NAF5087A	NNTN8287A	NONE	NONE	824.0000	2.26	-0.408	2.150	1.570	1.38	1.01	CcC-FACE-120621-13
NAF5088A	NNTN8287A	PMLN5134A	PMLN5275C	902.0000	2.26	-0.542	1.270	0.923	0.84	0.61	CcC-AB-120620-09
NAF5088A	NNTN8287A	NONE	NONE	935.0000	2.30	-0.602	2.230	1.580	1.48	1.05	PS-FACE-120621-08
Shorten scan											
NAF5087A	NNTN8287A	NONE	NONE	824.0000	2.24	-0.177	2.220	1.630	1.37	1.00	CcC-FACE-120621-14
NAF5088A	NNTN8287A	NONE	NONE	935.0000	2.28	-0.299	2.460	1.750	1.53	1.09	PS-FACE-120621-10

15.0 Simultaneous Transmission Exclusion

Not applicable.

16.0 Conclusion

The highest Operational Maximum Calculated 1-gram and 10-gram average SAR values found for this filing: Model PMUF1473B.

TABLE 15

Designator	Frequency (MHz)	Max Calc at Body (mW/g)		Max Calc at Face (mW/g)	
		1g-SAR	10g-SAR	1g-SAR	10g-SAR
Overall	806-825	0.80	0.60	1.38	1.01
	851-870	0.74	0.54	1.28	0.94
	896-902	0.84	0.61	1.47	1.05
	935-941	0.81	0.58	1.53	1.09
FCC	806-824	0.80	0.60	1.38	1.01
	851-869	0.74	0.55	1.28	0.94
	896-901	0.83	0.61	1.43	1.03
	935-940	0.81	0.58	1.53	1.09

The previously reported results at the face 1.02 W/kg are hereby replaced with the results presented herein. The previously reported results at the body 1.38 W/kg are maintained.

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 result is not applicable to FCC filing.

APPENDIX A
Measurement Uncertainty

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

TABLE 1

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

TABLE2

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 for Tables 1and 2

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

b) Tol. - tolerance in influence quantity.

c) Prob. Dist. – Probability distribution

d) N, R - normal, rectangular probability distributions

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

f) *ci* - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.

g) *ui* – SAR uncertainty

h) *vi* - degrees of freedom for standard uncertainty and effective degrees of freedom for the expanded uncertainty

APPENDIX B
Probe Calibration Certificates

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

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

Accredited by the Swiss 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: ES3-3274_Oct11

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3274

Calibration procedure(s): QA CAL-01.v8, QA CAL-12.v7, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: October 18, 2011

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	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 20, 2011

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

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

Accredited by the Swiss Accreditation Service (SAS)
Accreditation No.: SCS 108
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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 affect 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.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *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:3274

Manufactured: February 25, 2010
Calibrated: October 18, 2011

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3274

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.21	1.13	1.19	± 10.1 %
DCP (mV)[B]	101.0	98.7	99.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	106.9	±2.5 %
			Y	0.00	0.00	1.00	106.8	
			Z	0.00	0.00	1.00	115.8	

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 max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3274

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
300	45.3	0.87	7.17	7.1.7	7.17	0.25	1.03	± 13.4 %
450	43.5	0.87	6.54	6.54	6.54	0.15	1.65	± 13.4 %
750	41.9	0.89	6.31	6.31	6.31	0.80	1.00	± 12.0 %
900	41.5	0.97	5.98	5.98	5.98	0.80	1.30	± 12.0 %
1810	40.0	1.40	5.11	5.11	5.11	0.80	1.25	± 12.0 %
1950	40.0	1.40	4.92	4.92	4.92	0.80	1.21	± 12.0 %
2300	39.5	1.67	4.74	4.74	4.74	0.80	1.23	± 12.0 %
2450	39.2	1.80	4.39	4.39	4.39	0.80	1.22	± 12.0 %
2600	39.0	1.96	4.29	4.29	4.29	0.80	1.21	± 12.0 %
3500	37.9	2.91	4.30	4.30	4.30	0.85	1.23	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3274

Calibration Parameter Determined in Body Tissue Simulating Media

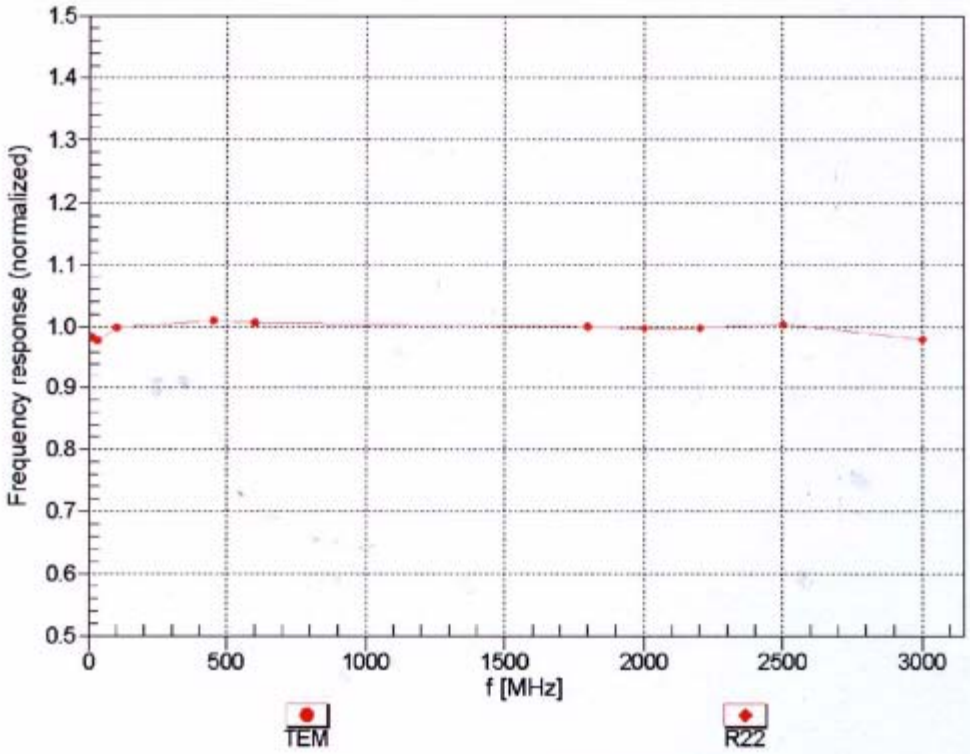
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
300	58.2	0.92	6.93	6.93	6.93	0.22	1.67	± 13.4 %
450	56.7	0.94	7.00	7.00	7.00	0.08	1.00	± 13.4 %
750	55.5	0.96	6.15	6.15	6.15	0.80	1.00	± 12.0 %
900	55.0	1.05	6.03	6.03	6.03	0.80	1.00	± 12.0 %
1810	53.3	1.52	4.70	4.70	4.70	0.80	1.33	± 12.0 %
1950	53.3	1.52	4.72	4.72	4.72	0.80	1.34	± 12.0 %
2300	52.9	1.81	4.41	4.41	4.41	0.80	1.24	± 12.0 %
2450	52.7	1.95	4.21	4.21	4.21	0.80	1.20	± 12.0 %
2600	52.5	2.16	4.15	4.15	4.15	0.80	1.23	± 12.0 %
3500	51.3	3.31	3.68	3.68	3.68	0.80	1.48	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

ES3DV3– SN:3274 October 18, 2011

Frequency Response of E-Field

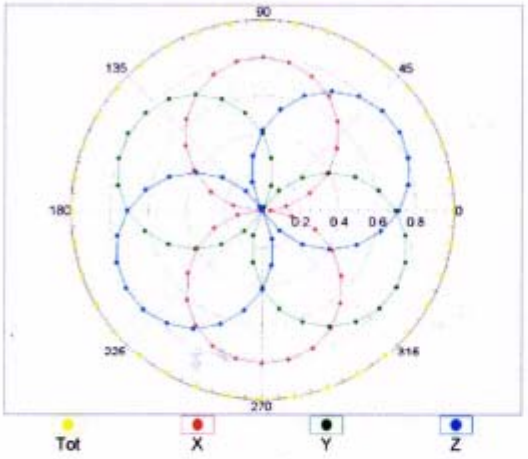
(TEM-Cell:ifi110 EXX, Waveguide: R22)



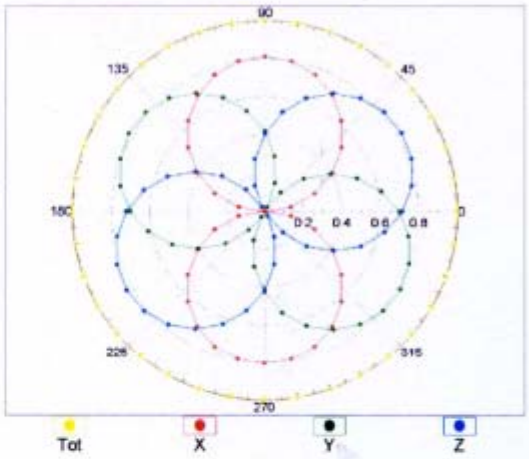
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

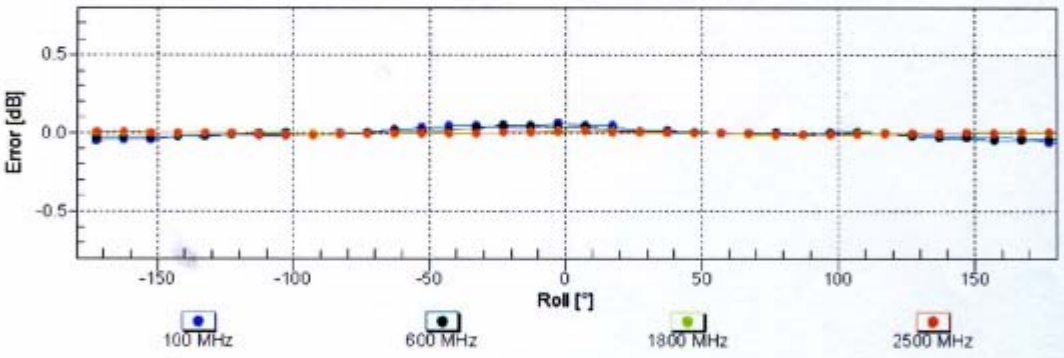
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



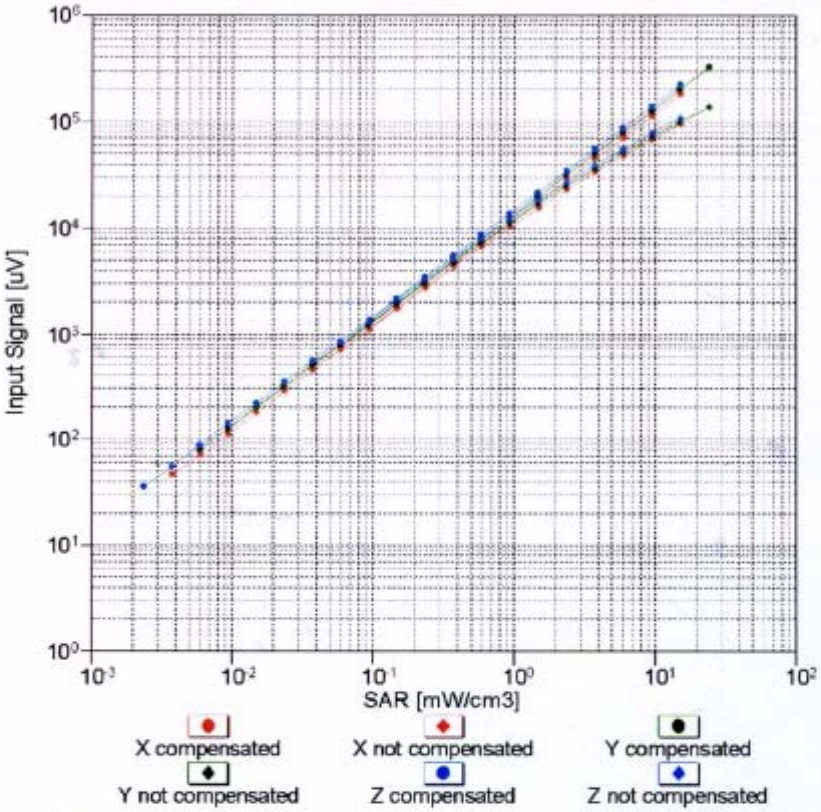
f=1800 MHz,R22

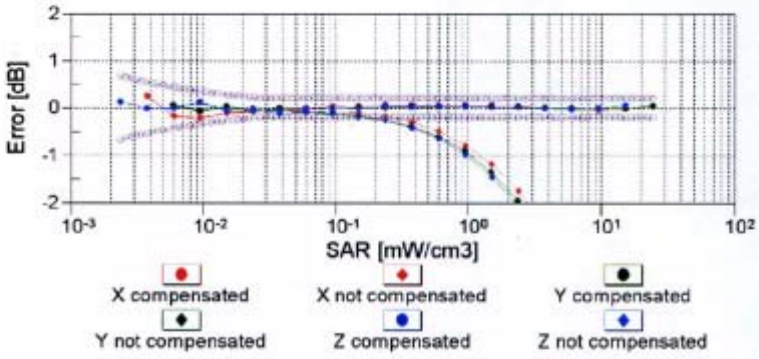




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)



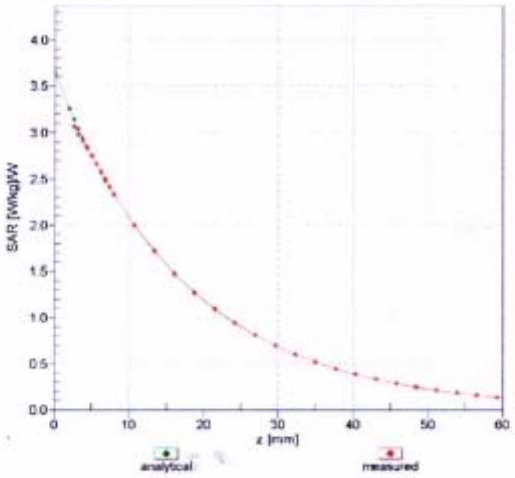


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

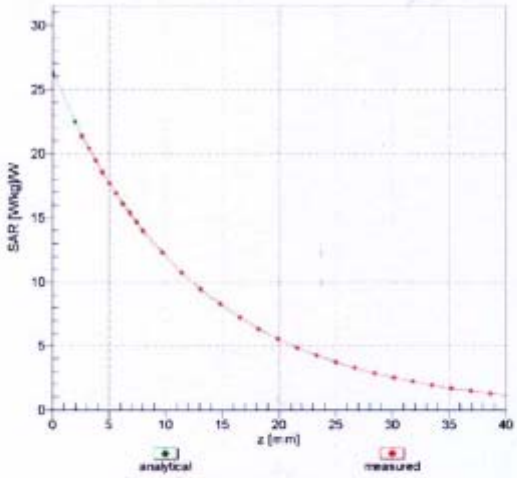
ES3DV3– SN:3274 October 18, 2011

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

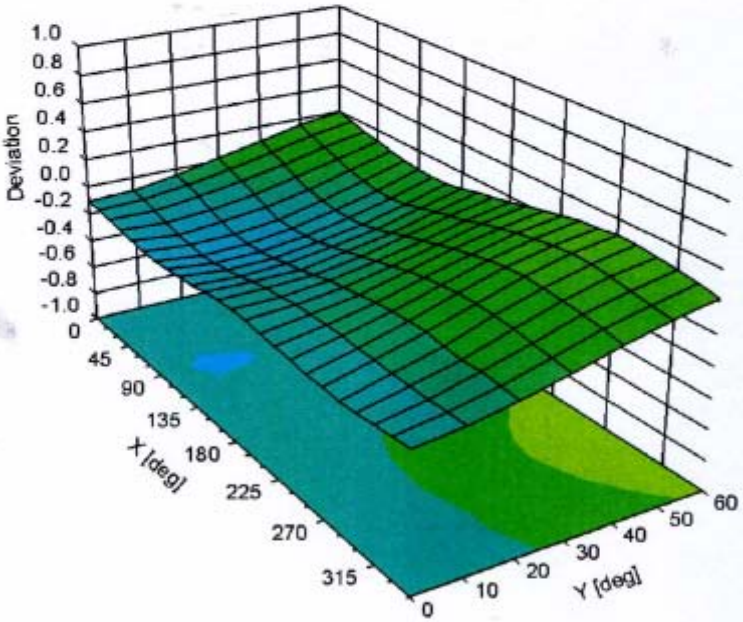


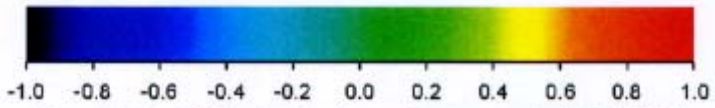
f = 1810 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3274

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 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

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

s p e a g

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ES3DV3**
Serial Number:	**3274**
Place of Assessment:	**Zurich**
Date of Assessment:	**October 21, 2011**
Probe Calibration Date:	**October 18, 2011**

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 450, 900 and 1810 MHz.

Assessed by:

Schmid & Partner Engineering AG

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:3274

Conversion factor (± standard deviation)

150 ± 50 MHz	*ConvF*	**8.1 ± 10%**	**ε_r = 52.3 ± 5%** **σ = 0.76 ± 5% mho/m** (head tissue)
250 ± 50 MHz	*ConvF*	**7.6 ± 10%**	**ε_r = 47.6 ± 5%** **σ = 0.83 ± 5% mho/m** (head tissue)
150 ± 50 MHz	*ConvF*	**7.9 ± 10%**	**ε_r = 61.9 ± 5%** **σ = 0.80 ± 5% mho/m** (body tissue)
250 ± 50 MHz	*ConvF*	**7.4 ± 10%**	**ε_r = 59.4 ± 5%** **σ = 0.88 ± 5% 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.

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

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

Accredited by the Swiss 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

Certificate No: ES3-3122_Apr12

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3122

Calibration procedure(s): QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: April 26, 2012

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 27, 2012

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

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

Accredited by the Swiss Accreditation Service (SAS) Accreditation No.: SCS 108
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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 affect 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.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *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
Calibrated: April 26, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - 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	1.22	1.42	± 10.1 %
DCP (mV)[B]	102.0	100.9	99.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.00	0.00	1.00	161.7	±3.0 %
			Y	0.00	0.00	1.00	154.6	
			Z	0.00	0.00	1.00	179.0	

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.
[C] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3122

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
300	45.3	0.87	6.94	6.94	6.94	0.25	1.10	± 13.4 %
450	43.5	0.87	6.41	6.41	6.41	0.14	1.67	± 13.4 %
750	41.9	0.89	6.55	6.55	6.55	0.25	2.02	± 12.0 %
900	41.5	0.97	6.22	6.22	6.22	0.20	2.33	± 12.0 %
1810	40.0	1.40	5.29	5.29	5.29	0.60	1.40	± 12.0 %
1950	40.0	1.40	5.16	5.16	5.16	0.61	1.39	± 12.0 %
2300	39.5	1.67	4.95	4.95	4.95	0.62	1.42	± 12.0 %
2450	39.2	1.80	4.60	4.60	4.60	0.80	1.19	± 12.0 %
2600	39.0	1.96	4.42	4.42	4.42	0.80	1.12	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3122

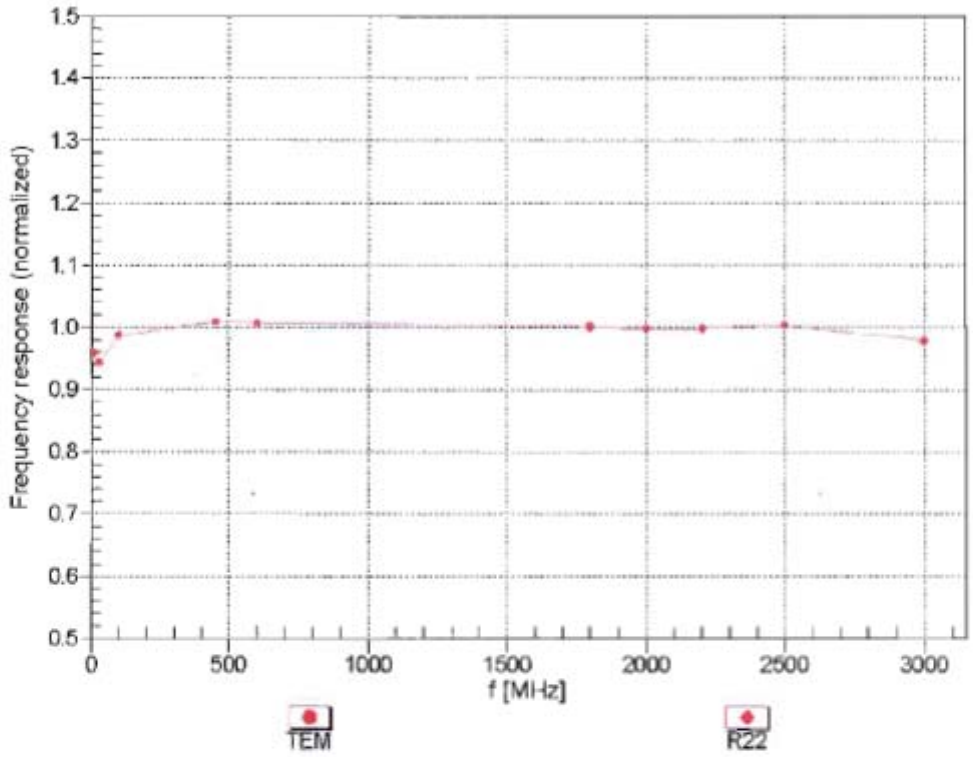
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
300	58.2	0.92	6.58	6.58	6.58	0.23	1.88	± 13.4 %
450	56.7	0.94	6.82	6.82	6.82	0.09	1.00	± 13.4 %
750	55.5	0.96	6.19	6.19	6.19	0.29	1.92	± 12.0 %
900	55.0	1.05	6.06	6.06	6.06	0.38	1.60	± 12.0 %
1810	53.3	1.52	4.74	4.74	4.74	0.27	2.98	± 12.0 %
1950	53.3	1.52	4.64	4.64	4.64	0.42	1.99	± 12.0 %
2300	52.9	1.81	4.25	4.25	4.25	0.69	1.24	± 12.0 %
2450	52.7	1.95	4.16	4.16	4.16	0.80	0.61	± 12.0 %
2600	52.5	2.16	3.94	3.94	3.94	0.80	0.50	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

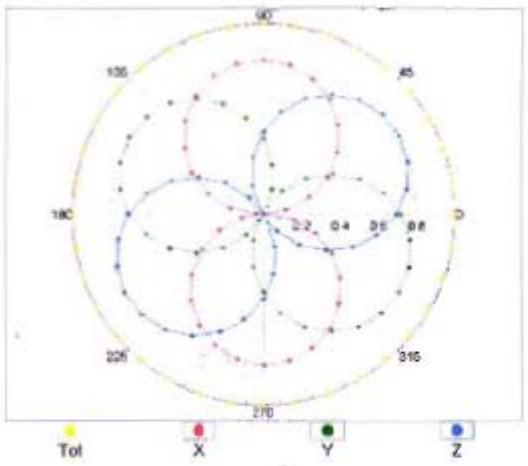
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



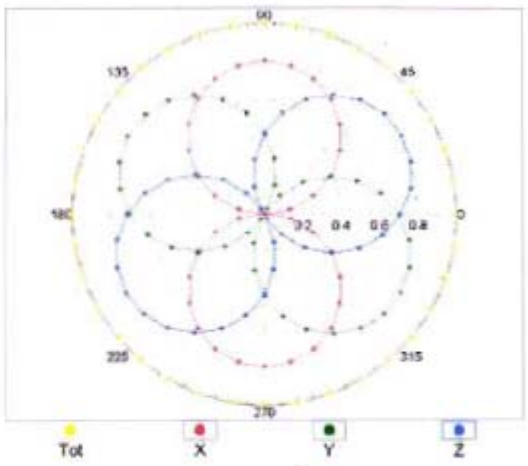
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

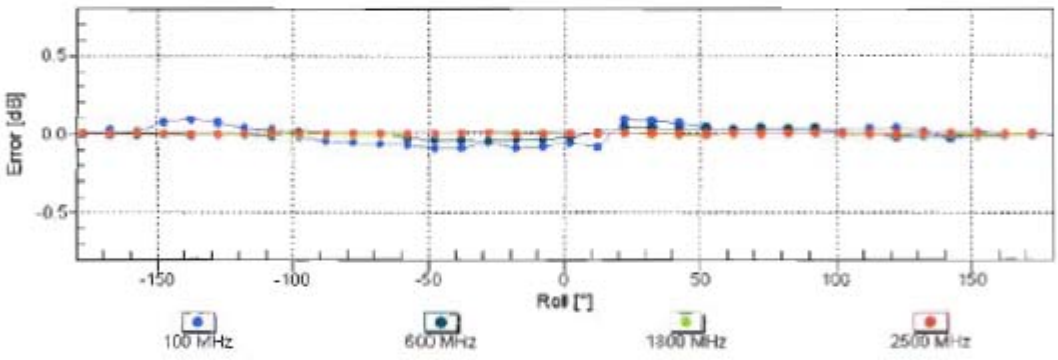
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



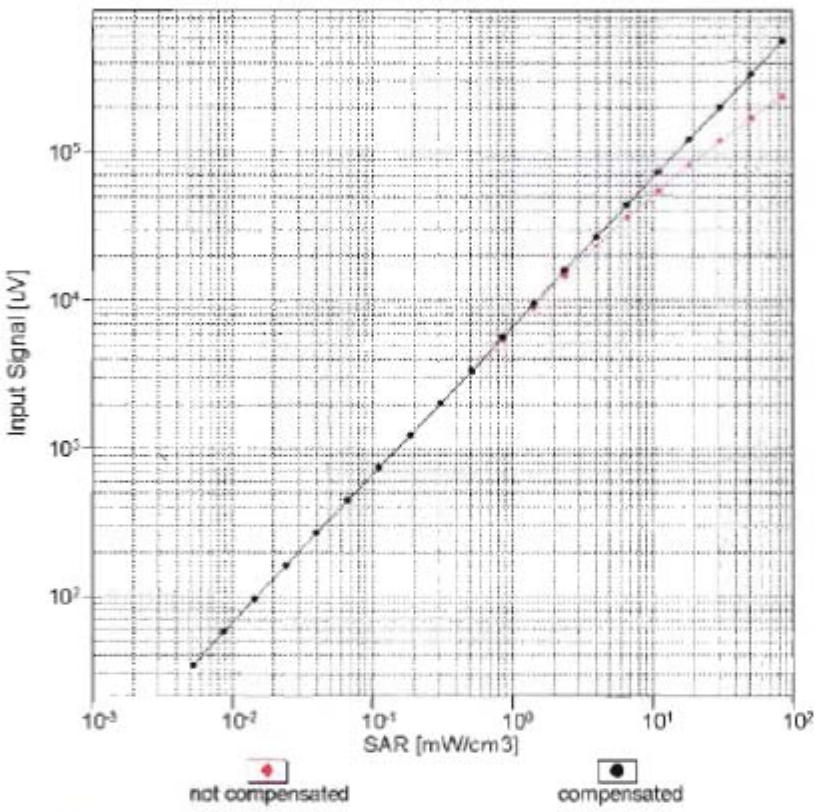
f=1800 MHz,R22

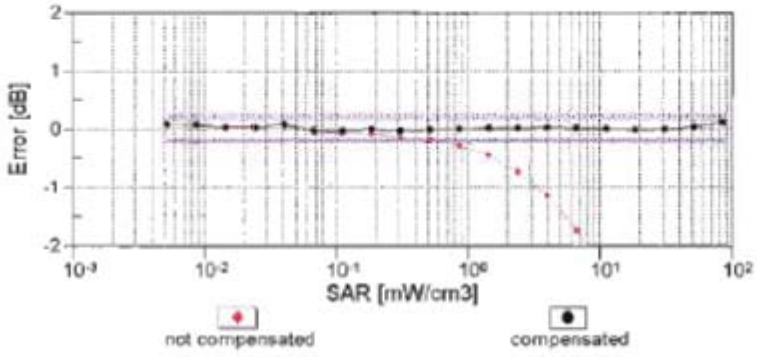




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)
(TEM cell , f = 900 MHz)

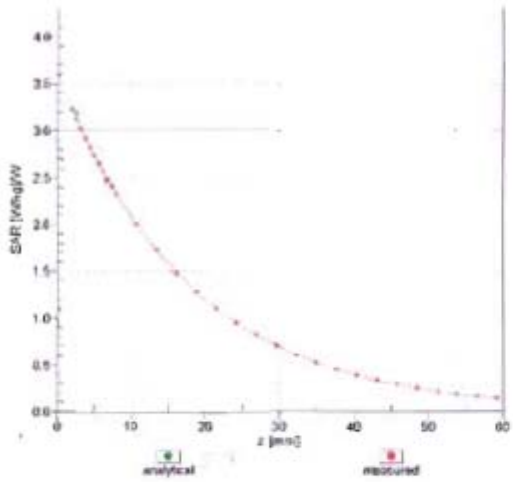




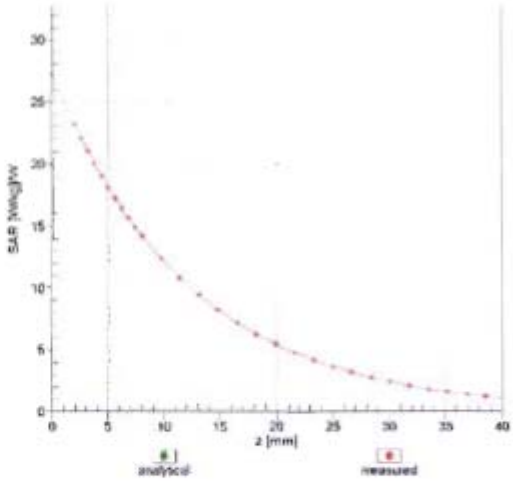
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

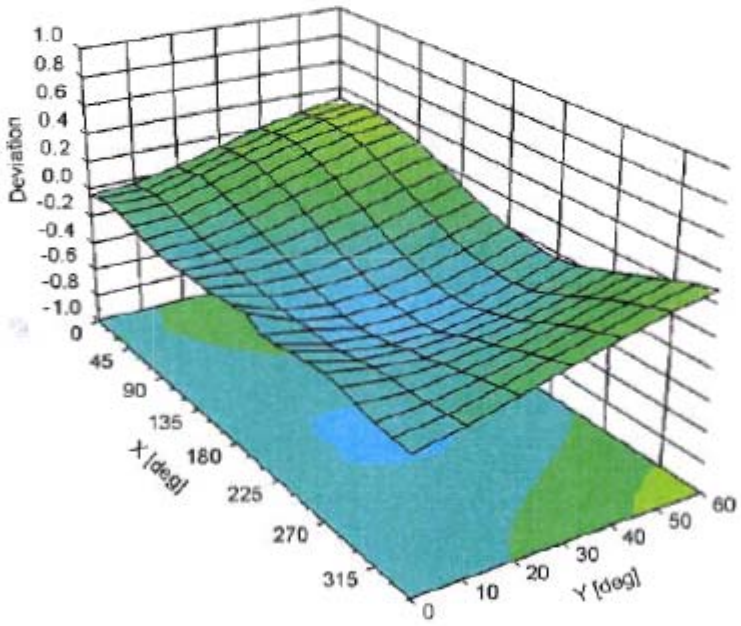


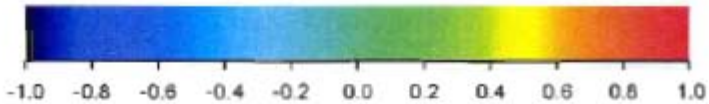
f = 1810 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3122

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	22.4
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 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, 2012**
Probe Calibration Date:	**April 26, 2012**

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 450, 900 MHz or 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 ± 50 MHz	*ConvF*	8.5 ± 10%	ε_r = 52.3 ± 5% σ = 0.76 ± 5% mho/m (head tissue)
250 ± 50 MHz	*ConvF*	7.9 ± 10%	ε_r = 47.6 ± 5% σ = 0.83 ± 5% mho/m (head tissue)
150 ± 50 MHz	*ConvF*	8.2 ± 10%	ε_r = 61.9 ± 5% σ = 0.80 ± 5% mho/m (body tissue)
250 ± 50 MHz	*ConvF*	7.7 ± 10%	ε_r = 59.4 ± 5% σ = 0.88 ± 5% 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.

APPENDIX C
Dipole Calibration Certificates

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

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

Certificate No: D900V2-1d026_Nov11

CALIBRATION CERTIFICATE

Object	D900V2 - SN: 1d026
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	November 18, 2011

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 EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 18, 2011

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

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

Accredited by the Swiss 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
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	0.95 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.67 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**10.8 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.71 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.90 mW /g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.7 Ω - 7.5 jΩ
Return Loss	- 22.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.399 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 08, 2005

DASY5 Validation Report for Head TSL

Date: 18.11.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 1d026

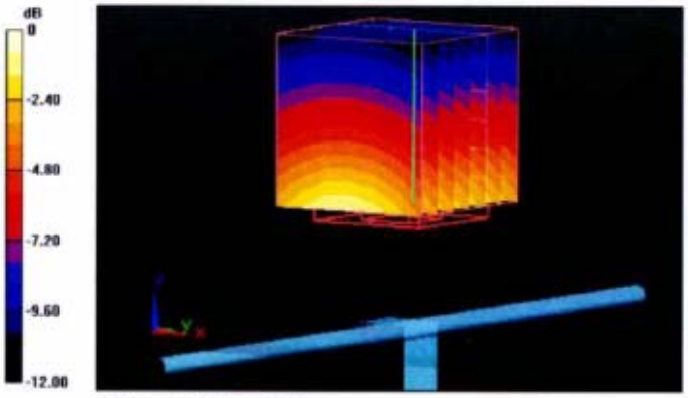
Communication System: CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 0.95 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.97, 5.97, 5.97); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

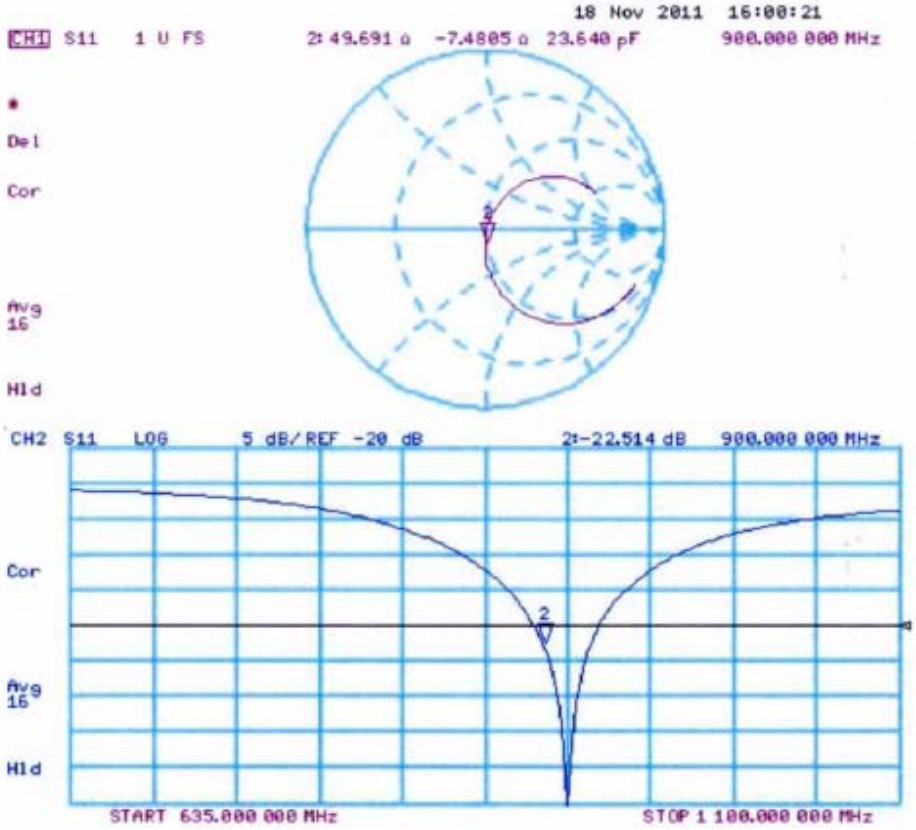
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.051 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.992 W/kg
SAR(1 g) = 2.67 mW/g; SAR(10 g) = 1.71 mW/g
Maximum value of SAR (measured) = 3.121 mW/g



0 dB = 3.120mW/g

Impedance Measurement Plot for Head TSL



APPENDIX D
Test System Verification Scans

The SAR result indicated on the Manufacture's Calibrated certificate for dipoles D900V2 S/N 1d026 was not used due to the following:

-- The IEEE 1528-2003 and the FCC OET-65 Supplement C, System Verification section recommends that the measured 1-g SAR should be within 10% of the expected target values specified for the specific phantom and RF source used in the system verification measurement.

-- SPEAG calibration certificate indicates that the allowed tolerance for the dipole is higher than +/- 10% (e.g. +/-17.0 % at k=2 for the 1g-SAR).

-- The allowed tolerance for the probe are also higher than +/- 10% (e.g. 12.0 %, k=2, at 900 MHz for the probe being used to assess this product).

Due to probe, dipole and system tolerances noted above, the lab averages dipole results across multiple probes to establish a set of averaged targets for each dipole using the following procedure:
• The System Validation was conducted per IEEE1528-2003 and IEC62209-2 Edition 1.0 2010-03 standards using the simulated head tissue and multiple probes that are available and applicable for the dipole under test to verify the System Validation. Results for this dipole are within the measurement system uncertainty of the reference SAR values indicated within IEC62209-2 Edition 1.0 2010-03 when using flat phantom with 2mm thickness is used. These results then are averaged and used as the target for the daily system performance check when the simulated head tissue is used.
• The dipole targets for the body are set immediately following the same process noted above. Since there is no standard referencing the SAR values for the System Validation using the simulated body tissue, the compliant System Validation results using the simulated head tissue are used to justify the use of the System Validation results using the simulated body tissue due to the same setup except for the simulated tissue type.

The targets set in this report were conducted following the above process.

Note that the target set for the tested dipole, when using the simulated head tissue, meets the requirement for the system validation per IEEE 1528-2003, IEC62209-2 Edition 1.0 2010-03 standards, and the differences between this result and the result from the manufacture's dipole calibration certificates are 6.3 % for the 900 MHz dipole which is well within the measurement uncertainty of the measurement system at k=2.

To assess the isotropic characteristics of the measurement probe, a probe rotation was performed using the "Rotation (1D)" function in the DASY software with a measured isotropy tolerance of +/- 0.5dB.

Motorola Solutions, Inc. EME Laboratory
Date/Time: 6/14/2012 7:03:35 AM

Robot#: DASY4-PG-1 | Run#:	CcC-SYSP-900H-120614-01
Dipole Model#	D900V2
Phantom#:	ELI4 1028
Tissue Temp:	21.0 (C)
Serial#:	1d026
Test Freq:	900 (MHz)
Start Power:	250 (mW)

Target SAR (1W):	11.52 mW/g (1g)
Adjusted SAR (1W):	10.64 mW/g (1g)
Percent from Target (+/-):	7.60 % (1g)
Rotation (1D):	0.037 dB

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 2.660 mW/g (1g); 1.700 mW/g (10g)

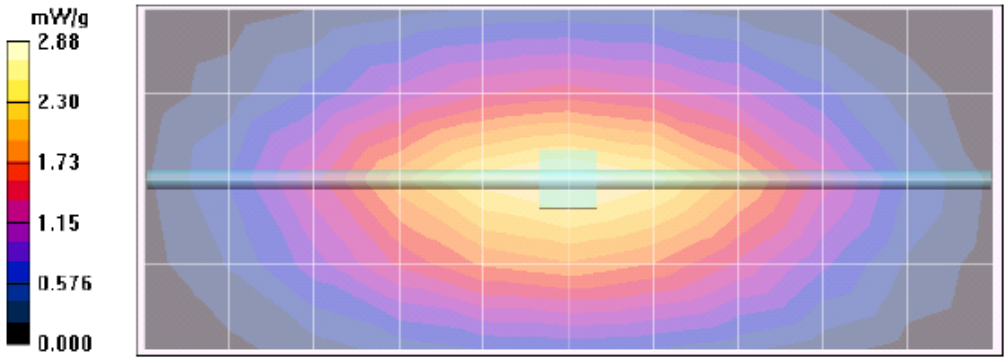
Comments:

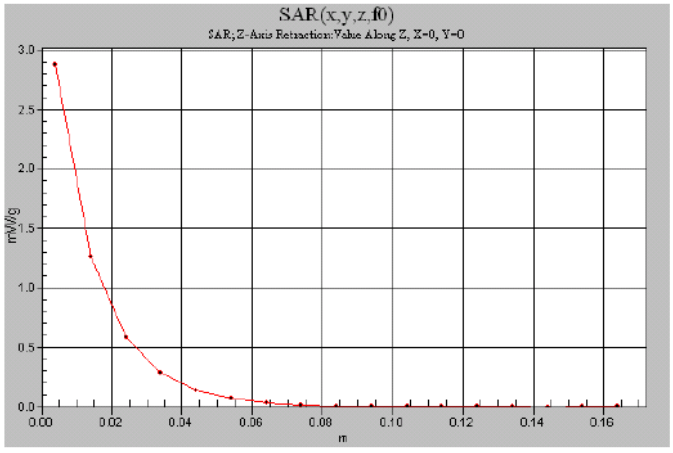
Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 0.97 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3274, Calibrated: 10/18/2011, ConvF(5.98, 5.98, 5.98)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

System Performance Check/0-Degree Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 55.6 V/m; Power Drift = -0.00288 dB
Peak SAR (extrapolated) = 3.99 W/kg
SAR(1 g) = 2.66 mW/g; SAR(10 g) = 1.7 mW/g
Maximum value of SAR (measured) = 2.90 mW/g

System Performance Check/Dipole Area Scan 2 (5x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.85 mW/g

System Performance Check/Z-Axis Retraction (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 2.88 mW/g





Motorola Solutions, Inc. EME Laboratory

Date/Time: 6/20/2012 3:53:55 PM

Robot#: DASY4-PG-1 | Run#: CcC-SYSP-900B-120620-05
Dipole Model# D900V2
Phantom#: ELI4 1050
Tissue Temp: 21.1 (C)
Serial#: 1d026
Test Freq: 450 (MHz)
Start Power: 250 (mW)

Target SAR (1W): 11.52 mW/g (1g)
Adjusted SAR (1W): 11.52 mW/g (1g)
Percent from Target (+/-): 0.00 % (1g)
Rotation (1D): 0.043 dB

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 2.880 mW/g (1g); 1.850 mW/g (10g)

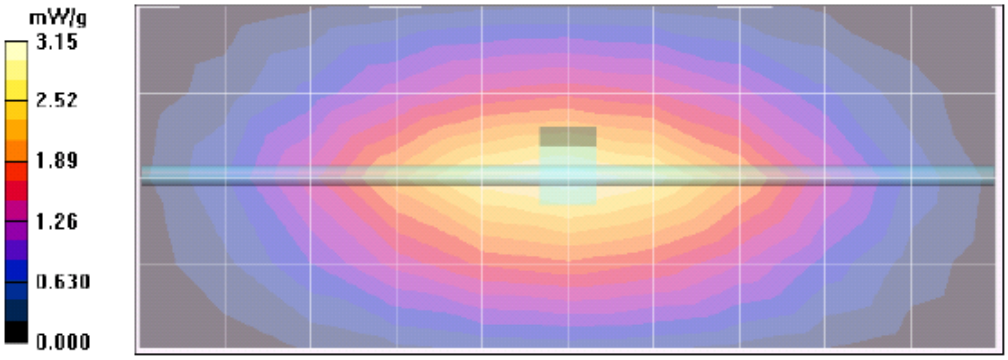
Comments:

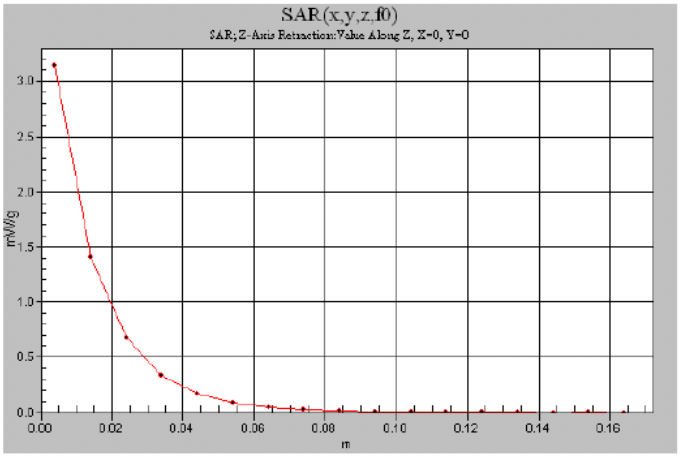
Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 1.06 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3274, Calibrated: 10/18/2011, ConvF(6.03, 6.03, 6.03)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

System Performance Check/0-Degree Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 54.6 V/m; Power Drift = 0.00151 dB
Peak SAR (extrapolated) = 4.39 W/kg
SAR(1 g) = 2.88 mW/g; SAR(10 g) = 1.85 mW/g
Maximum value of SAR (measured) = 3.10 mW/g

System Performance Check/Dipole Area Scan 2 (5x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.13 mW/g

System Performance Check/Z-Axis Retraction (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 3.15 mW/g





Motorola Solutions, Inc. EME Laboratory
Date/Time: 6/21/2012 7:02:47 AM

Robot#: DASY4-PG-1 | Run#: PS-SYSP-900H-120621-01
Dipole Model# D900V2
Phantom#: ELI4 1028
Tissue Temp: 21.2 (C)
Serial#: 1d026
Test Freq: 450 (MHz)
Start Power: 250 (mW)

Target SAR (1W): 11.52 mW/g (1g)
Adjusted SAR (1W): 10.88 mW/g (1g)
Percent from Target (+/-): 5.60 % (1g)
Rotation (1D): 0.042 dB

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 2.720 mW/g (1g); 1.740 mW/g (10g)

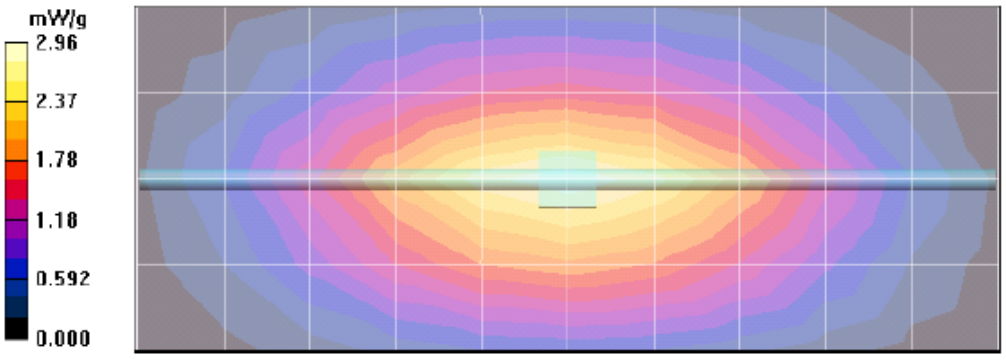
Comments:

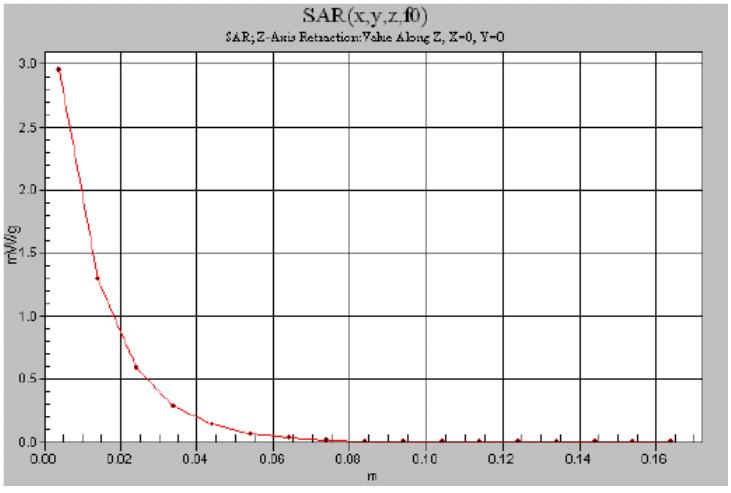
Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 0.99 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3274, Calibrated: 10/18/2011, ConvF(5.98, 5.98, 5.98)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

System Performance Check/0-Degree Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 55.5 V/m; Power Drift = -0.019 dB
Peak SAR (extrapolated) = 4.08 W/kg
SAR(1 g) = 2.72 mW/g; SAR(10 g) = 1.74 mW/g
Maximum value of SAR (measured) = 2.96 mW/g

System Performance Check/Dipole Area Scan 2 (5x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.94 mW/g

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





Motorola Solutions, Inc. EME Laboratory
Date/Time: 6/22/2012 6:48:23 AM

Robot#: DASY4-PG-1 | Run#: PS-SYSP-900B-120622-01
Dipole Model# D900V2
Phantom#: ELI4 1050
Tissue Temp: 20.2 (C)
Serial#: 1d026
Test Freq: 450 (MHz)
Start Power: 250 (mW)

Target SAR (1W): 11.52 mW/g (1g)
Adjusted SAR (1W): 11.48 mW/g (1g)
Percent from Target (+/-): 0.30 % (1g)
Rotation (1D): 0.031 dB

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 2.870 mW/g (1g); 1.840 mW/g (10g)

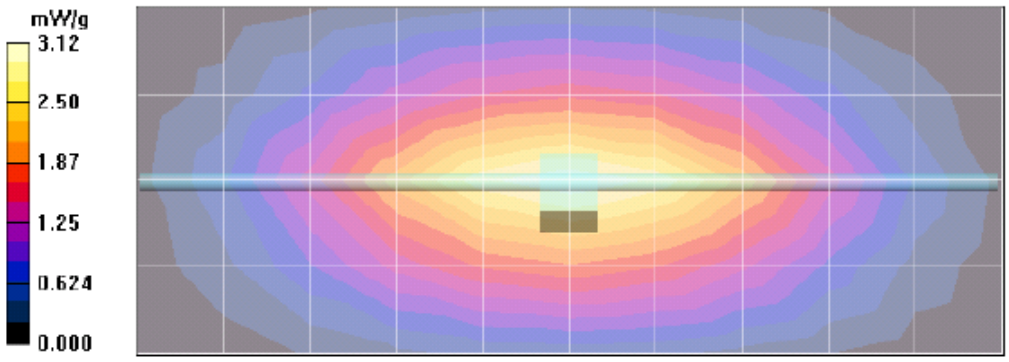
Comments:

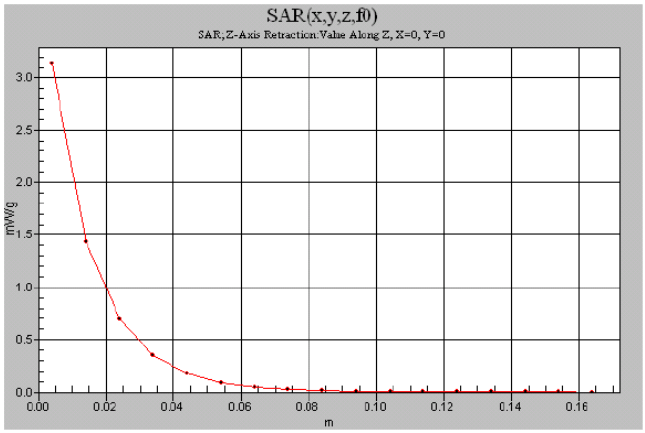
Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 1.07 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3274, Calibrated: 10/18/2011, ConvF(6.03, 6.03, 6.03)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

System Performance Check/0-Degree Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 54.0 V/m; Power Drift = -0.0209 dB
Peak SAR (extrapolated) = 4.38 W/kg
SAR(1 g) = 2.87 mW/g; SAR(10 g) = 1.84 mW/g
Maximum value of SAR (measured) = 3.10 mW/g

System Performance Check/Dipole Area Scan 2 (5x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.12 mW/g

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





Motorola Solutions, Inc. EME Laboratory

Date/Time: 7/17/2012 10:24:20 AM

Robot#: DASY4-PG-1 | Run#: Lee-SYSP-900B-120717-01
Dipole Model# D900V2
Phantom#: ELI4 1050
Tissue Temp: 21.1 (C)
Serial#: 1d026
Test Freq: 900 (MHz)
Start Power: 250 (mW)

Target SAR (1W): 10.80 mW/g (1g)
Adjusted SAR (1W): 11.60 mW/g (1g)
Percent from Target (+/-): 7.40 % (1g)
Rotation (1D): 0.046 dB

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 2.900 mW/g (1g); 1.880 mW/g (10g)

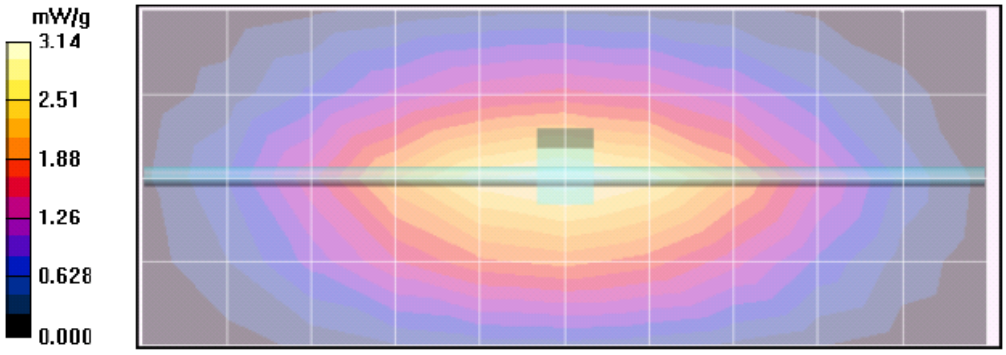
Comments:

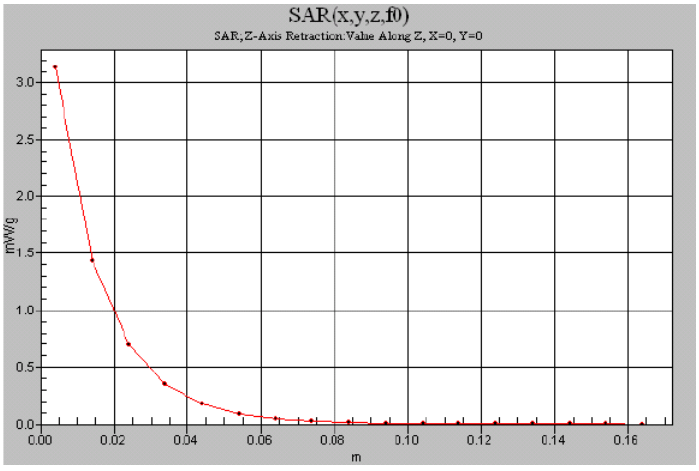
Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 1.07 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3122, Calibrated: 4/26/2012, ConvF(6.06, 6.06, 6.06)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

System Performance Check/0-Degree Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 54.8 V/m; Power Drift = 0.00617 dB
Peak SAR (extrapolated) = 4.30 W/kg
SAR(1 g) = 2.9 mW/g; SAR(10 g) = 1.88 mW/g
Maximum value of SAR (measured) = 3.14 mW/g

System Performance Check/Dipole Area Scan 2 (5x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.11 mW/g

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





Motorola Solutions, Inc. EME Laboratory
Date/Time: 7/17/2012 3:22:21 PM

Robot#: DASY4-PG-1 | Run#: Lee-SYSP-900H-120717-06
Dipole Model# D900V2
Phantom#: ELI4 1028
Tissue Temp: 20.6 (C)
Serial#: 1d026
Test Freq: 900 (MHz)
Start Power: 250 (mW)

Target SAR (1W): 10.32 mW/g (1g)
Adjusted SAR (1W): 10.60 mW/g (1g)
Percent from Target (+/-): 2.70 % (1g)
Rotation (1D): 0.047 dB

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 2.650 mW/g (1g); 1.700 mW/g (10g)

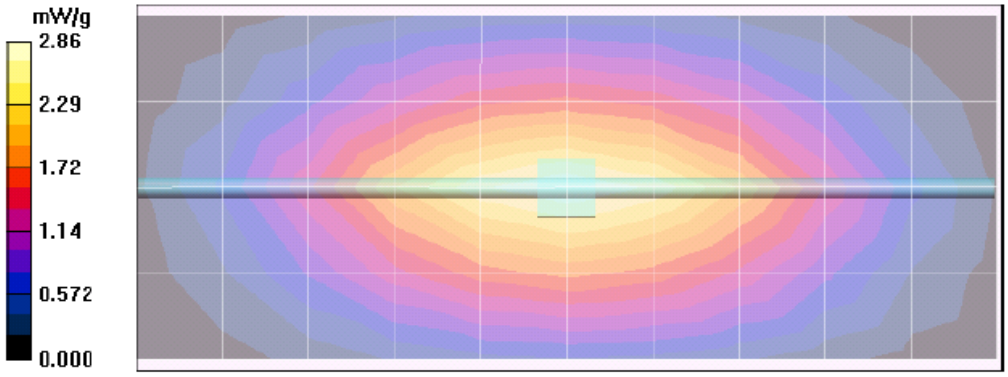
Comments:

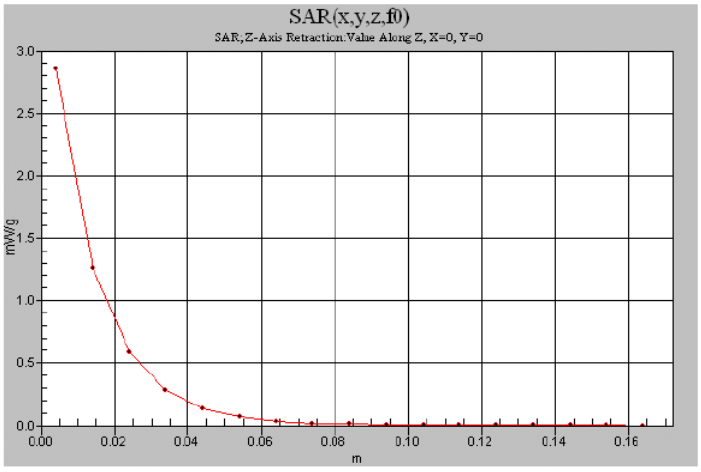
Duty Cycle: 1:1, Medium parameters used: f = 900 MHz; σ = 0.98 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3122, Calibrated: 4/26/2012, ConvF(6.22, 6.22, 6.22)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

System Performance Check/0-Degree Cube (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 54.7 V/m; Power Drift = -0.0111 dB
Peak SAR (extrapolated) = 3.97 W/kg
SAR(1 g) = 2.65 mW/g; SAR(10 g) = 1.7 mW/g
Maximum value of SAR (measured) = 2.89 mW/g

System Performance Check/Dipole Area Scan 2 (5x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.88 mW/g

System Performance Check/Z-Axis Retraction (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 2.86 mW/g





DIPOLE SAR TARGET - BODY

Date:	12/15/11	Frequency (MHz):	900
Lab Location:	PG-EMS	Mixture Type:	Body
DAE Serial #:	374	Ambient Temp.(°C):	21.6

Tissue Characteristics

Permitivity:	52.6	Phantom Type/SN:	ELI4 1103
Conductivity:	1.05	Distance (mm):	15
Tissue Temp.(°C):	20.5		

Reference Source:	Dipole	Power to Dipole:	250 mW
Reference SN:	1d026		

New Target:

Average Measured SAR Value: **11.52** mW/g(1g avg.),

Probe SN #s	1-G Cube	Diff from Ave	Robot
3096	11.60	*0.7%*	R1
3274	11.44	*-0.7%*	R1
Average		New Measured SAR Value	

(normalized to 1.0 W)

Test performed by: **Patrick Saw** Initial:

DIPOLE SAR TARGET - HEAD

Date:	12/15/11	Frequency (MHz):	900
Lab Location:	PG-EMS	Mixture Type:	IEEE Head
DAE Serial #:	374	Ambient Temp.(°C):	21.4

Tissue Characteristics			
Permitivity:	40.3	Phantom Type/SN:	ELI5 1150
Conductivity:	0.97	Distance (mm):	15
Tissue Temp.(°C):	20.6		

Reference Source:	Dipole	Power to Dipole:	250 mW
Reference SN:	1d026		

Target 1g-SAR Value (mW/g, normalized to 1.0 W):

10.9

Difference from Target

5.69% (1g-SAR)

New Target:

Average 1g-SAR Value (mW/g):	11.52

Passes K=2

Percent Difference From Target (MUST be within k=2 Uncertainty):

Probe SN #s	1g-SAR (Cube)	Diff from Ave	Robot
3096	11.72	*1.7%*	R1
3274	11.32	*-1.7%*	R1
Average	**11.5200**	New Measured SAR Value	

(normalized to 1.0 W)

Test performed by: **Patrick Saw** Initial:

DIPOLE SAR TARGET - BODY

Date:	06/06/12	Frequency (MHz):	900
Lab Location:	PG-EMS	Mixture Type:	Body
DAE Serial #:	688	Ambient Temp.(°C):	22.2

Tissue Characteristics

Permitivity:	52.8	Phantom Type/SN:	ELI4 1050
Conductivity:	1.06	Distance (mm):	15
Tissue Temp.(°C):	20.8		

Reference Source:	Dipole	Power to Dipole:	250 mW
Reference SN:	1d026		

New Target:

Average Measured SAR Value: **10.80** mW/g(1g avg.),

Probe SN #s	1-G Cube	Diff from Ave	Robot
3196	10.68	*-1.1%*	R2
3122	10.92	*1.1%*	R2
Average		New Measured SAR Value	

(normalized to 1.0 W)

Test performed by: **Patrick Saw** Initial: 06.06.12

DIPOLE SAR TARGET - HEAD

Date:	06/06/12	Frequency (MHz):	900
Lab Location:	PG-EMS	Mixture Type:	IEEE Head
DAE Serial #:	688	Ambient Temp.(°C):	22
Tissue Characteristics			
Permitivity:	40.1	Phantom Type/SN:	ELI4 1028
Conductivity:	0.98	Distance (mm):	15
Tissue Temp.(°C):	21.1		
Reference Source:	Dipole	Power to Dipole:	250 mW
Reference SN:	1d026		

Target 1g-SAR Value (mW/g, normalized to 1.0 W):	Difference from Target
10.9	-5.32% (1g-SAR)

New Target:

Average 1g-SAR Value (mW/g):	10.32

Passes K=2

Percent Difference From Target (MUST be within k=2 Uncertainty):

Probe SN #s	1g-SAR (Cube)	Diff from Ave	Robot
3196	10.32	*0.0%*	R2
3122	10.32	*0.0%*	R2
Average	**10.3200**	New Measured SAR Value	

(normalized to 1.0 W)

Test performed by: **CC Chang** Initial: C.C. 06.06.12

APPENDIX E
DUT Scans – (Shortened Scans and Highest SAR configurations)

Shortened Scans Results

Motorola Solutions, Inc. EME Laboratory

Date/Time: 6/21/2012 1:50:01 PM

Robot#: DASY4-PG-1 | Run#:	PS-FACE-120621-10
Model#:	PMUF1473B
Phantom#:	ELI4 1028
Tissue Temp:	21.0 (C)
Serial#:	477TNA1147
Antenna:	NAF5088A
Test Freq:	935.000 (MHz)
Battery:	NNTN8287A
Carry Acc:	NONE
Audio Acc:	NONE
Start Power:	2.28 (W)

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 2.460 mW/g (1g); 1.750 mW/g (10g)

Comments: Shorten scan.

Duty Cycle: 1:1, Medium parameters used: f = 935 MHz; σ = 1.03 mho/m; ε_r = 40.2; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3274, Calibrated: 10/18/2011, ConvF(5.98, 5.98, 5.98)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

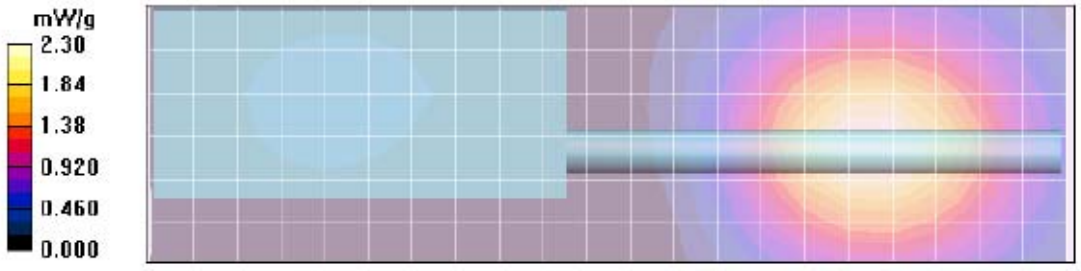
Face Scan/1-Area Scan (61x211x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 49.6 V/m; Power Drift = -0.399 dB
Motorola Fast SAR: SAR(1 g) = 2.27 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (interpolated) = 2.41 mW/g

Face Scan/2-Volume Scan 2D (41x41x1): Measurement grid: dx=7.5mm, dy=7.5mm, dz=1mm
Reference Value = 49.6 V/m; Power Drift = -0.446 dB
Peak SAR (extrapolated) = 2.32 W/kg
Motorola Fast SAR: SAR(1 g) = 2.19 mW/g; SAR(10 g) = 1.55 mW/g
Maximum value of SAR (interpolated) = 2.32 mW/g

Face Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 52.6 V/m; Power Drift = -0.299 dB
Peak SAR (extrapolated) = 3.29 W/kg
SAR(1 g) = 2.46 mW/g; SAR(10 g) = 1.75 mW/g
Maximum value of SAR (measured) = 2.61 mW/g

Face Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 2.30 mW/g

Shortened scan reflect highest SAR producing configuration; approximate run time is 7 minutes. Representative full scan time was 26 minutes.
"Shortened" scan max calculated SAR using SAR drift: 1-g Avg.=1.53 mW/g; 10-g Avg.=1.09 mW/g.
Zoom scan max calculated SAR using drift: 1-g Avg. = 1.48 mW/g; 10-g Avg. = 1.05 mW/g.
(Run# PS-Face-120621-08, Table 13)



Motorola Solutions, Inc. EME Laboratory
Date/Time: 6/21/2012 6:36:34 PM

Robot#: DASY4-PG-1 | Run#:	CcC-FACE-120621-14
Model#:	PMUF1473B
Phantom#:	ELI4 1028
Tissue Temp:	20.6 (C)
Serial#:	477TNA1147
Antenna:	NAF5087A
Test Freq:	824.000 (MHz)
Battery:	NNTN8287A
Carry Acc:	NONE
Audio Acc:	NONE
Start Power:	2.24 (W)

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 2.220 mW/g (1g); 1.630 mW/g (10g)

Comments: Shorten scan.

Duty Cycle: 1:1, Medium parameters used: f = 824 MHz; σ = 0.91 mho/m; ε_r = 40.8; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3274, Calibrated: 10/18/2011, ConvF(5.98, 5.98, 5.98)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

Face Scan/1-Area Scan (61x221x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 52.6 V/m; Power Drift = -0.264 dB
Motorola Fast SAR: SAR(1 g) = 2.28 mW/g; SAR(10 g) = 1.63 mW/g
Maximum value of SAR (interpolated) = 2.41 mW/g

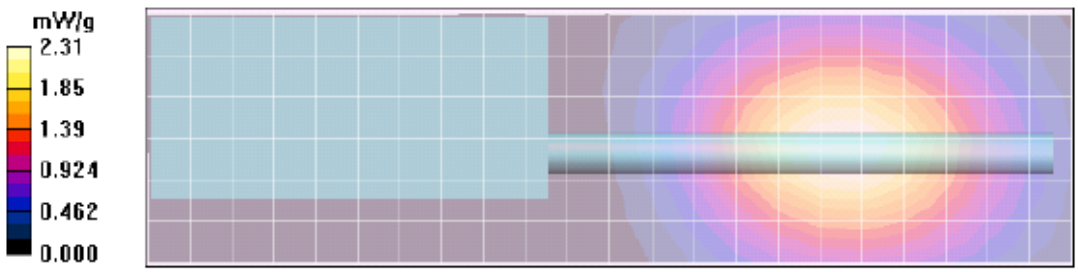
Face Scan/2-Volume Scan 2D (41x41x1): Measurement grid: dx=7.5mm, dy=7.5mm, dz=1mm
Reference Value = 52.6 V/m; Power Drift = -0.301 dB
Peak SAR (extrapolated) = 2.33 W/kg
Motorola Fast SAR: SAR(1 g) = 2.22 mW/g; SAR(10 g) = 1.58 mW/g
Maximum value of SAR (interpolated) = 2.33 mW/g

Face Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 52.6 V/m; Power Drift = -0.177 dB
Peak SAR (extrapolated) = 2.85 W/kg
SAR(1 g) = 2.22 mW/g; SAR(10 g) = 1.63 mW/g
Maximum value of SAR (measured) = 2.34 mW/g

Face Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 2.31 mW/g

Shortened scan reflect highest SAR producing configuration; approximate run time is 7 minutes. Representative full scan time was 26 minutes.

"Shortened" scan max calculated SAR using SAR drift: 1-g Avg.= 1.37 mW/g; 10-g Avg.= 1.00 mW/g.
Zoom scan max calculated SAR using drift: 1-g Avg. = 1.38 mW/g; 10-g Avg. = 1.01 mW/g.
(Run# CcC-Face-120621-13, Table 12)



Highest Body SAR Configuration Results

Outside FCC Part 90 at the body

Motorola Solutions, Inc. EME Laboratory

Date/Time: 6/20/2012 6:24:54 PM

Robot#: DASY4-PG-1 | Run#:	CcC-AB-120620-09
Model#:	PMUF1473B
Phantom#:	ELI4 1050
Tissue Temp:	20.8 (C)
Serial#:	477TNA1147
Antenna:	NAF5088A
Test Freq:	902.000 (MHz)
Battery:	NNTN8287A
Carry Acc:	PMLN5134A
Audio Acc:	PMLN5275C
Start Power:	2.26 (W)

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 1.270 mW/g (1g); 0.923 mW/g (10g)

Comments: Full scan.

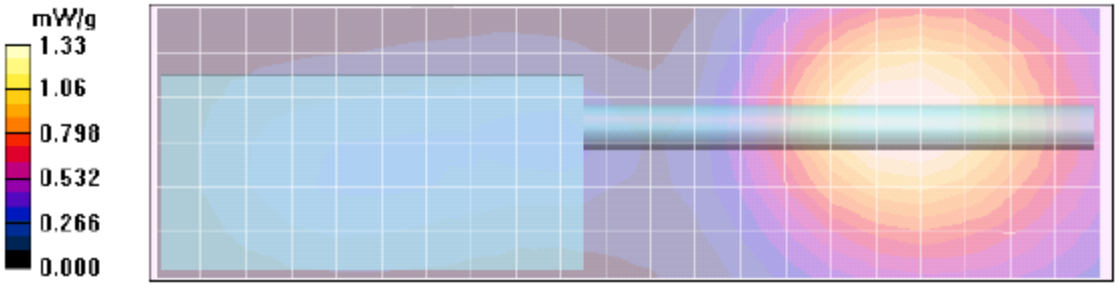
Duty Cycle: 1:1, Medium parameters used: f = 902 MHz; σ = 1.06 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3274, Calibrated: 10/18/2011, ConvF(6.03, 6.03, 6.03)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

Ab Scan/1-Area Scan (61x211x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 37.8 V/m; Power Drift = -0.401 dB
Motorola Fast SAR: SAR(1 g) = 1.34 mW/g; SAR(10 g) = 0.955 mW/g
Maximum value of SAR (interpolated) = 1.41 mW/g

Ab Scan/2-Volume 2D Scan (41x41x1): Measurement grid: dx=7.5mm, dy=7.5mm, dz=1mm
Reference Value = 37.8 V/m; Power Drift = -0.443 dB
Peak SAR (extrapolated) = 1.36 W/kg
Motorola Fast SAR: SAR(1 g) = 1.29 mW/g; SAR(10 g) = 0.922 mW/g
Maximum value of SAR (interpolated) = 1.36 mW/g

Ab Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 37.8 V/m; Power Drift = -0.542 dB
Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.923 mW/g
Maximum value of SAR (measured) = 1.34 mW/g

Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 1.33 mW/g



Motorola Solutions, Inc. EME Laboratory
Date/Time: 6/22/2012 7:25:14 AM

Robot#: DASY4-PG-1 | Run#:	PS-AB-120622-02
Model#:	PMUF1473B
Phantom#:	ELI4 1050
Tissue Temp:	20.0 (C)
Serial#:	477TNA1147
Antenna:	NAF5087A
Test Freq:	824.000 (MHz)
Battery:	NNTN8287A
Carry Acc:	PMLN5134A
Audio Acc:	PMLN5275C
Start Power:	2.27 (W)

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 1.230 mW/g (1g); 0.913 mW/g (10g)

Comments: Full scan.

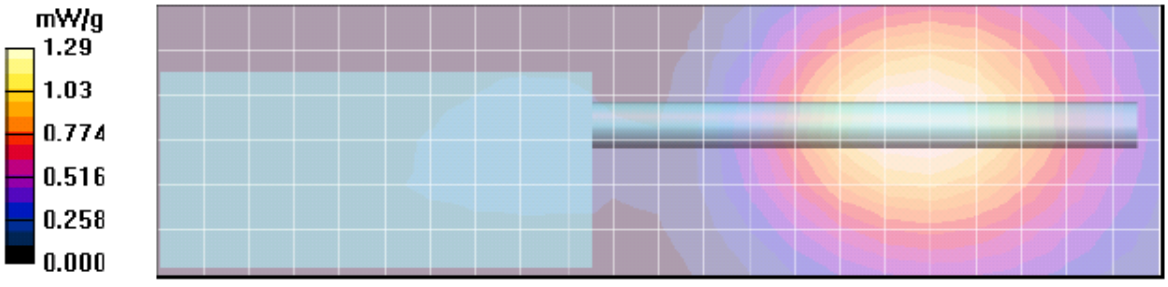
Duty Cycle: 1:1, Medium parameters used: f = 824 MHz; σ = 0.99 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3274, Calibrated: 10/18/2011, ConvF(6.03, 6.03, 6.03)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

Ab Scan/1-Area Scan (61x221x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 37.4 V/m; Power Drift = -0.374 dB
Motorola Fast SAR: SAR(1 g) = 1.28 mW/g; SAR(10 g) = 0.921 mW/g
Maximum value of SAR (interpolated) = 1.35 mW/g

Ab Scan/2-Volume 2D Scan (41x41x1): Measurement grid: dx=7.5mm, dy=7.5mm, dz=1mm
Reference Value = 37.4 V/m; Power Drift = -0.409 dB
Peak SAR (extrapolated) = 1.31 W/kg
Motorola Fast SAR: SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.898 mW/g
Maximum value of SAR (interpolated) = 1.31 mW/g

Ab Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 37.4 V/m; Power Drift = -0.487 dB
Peak SAR (extrapolated) = 1.62 W/kg
SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.913 mW/g
Maximum value of SAR (measured) = 1.30 mW/g

Ab Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 1.29 mW/g



Highest Face SAR Configuration Results

Motorola Solutions, Inc. EME Laboratory
Date/Time: 6/21/2012 5:59:35 PM

Robot#: DASY4-PG-1 | Run#:	CcC-FACE-120621-13
Model#:	PMUF1473B
Phantom#:	ELI4 1028
Tissue Temp:	21.0 (C)
Serial#:	477TNA1147
Antenna:	NAF5087A
Test Freq:	824.000 (MHz)
Battery:	NNTN8287A
Carry Acc:	NONE
Audio Acc:	NONE
Start Power:	2.26 (W)

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 2.150 mW/g (1g); 1.570 mW/g (10g)

Comments: Full scan.

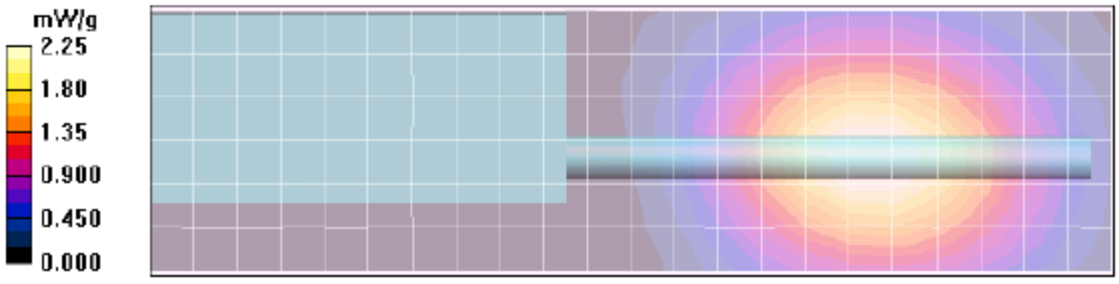
Duty Cycle: 1:1, Medium parameters used: f = 824 MHz; σ = 0.91 mho/m; ε_r = 40.8; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3274, Calibrated: 10/18/2011, ConvF(5.98, 5.98, 5.98)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

Face Scan/1-Area Scan (61x221x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 52.3 V/m; Power Drift = -0.306 dB
Motorola Fast SAR: SAR(1 g) = 2.25 mW/g; SAR(10 g) = 1.61 mW/g
Maximum value of SAR (interpolated) = 2.38 mW/g

Face Scan/2-Volume Scan 2D (41x41x1): Measurement grid: dx=7.5mm, dy=7.5mm, dz=1mm
Reference Value = 52.3 V/m; Power Drift = -0.338 dB
Peak SAR (extrapolated) = 2.30 W/kg
Motorola Fast SAR: SAR(1 g) = 2.18 mW/g; SAR(10 g) = 1.56 mW/g
Maximum value of SAR (interpolated) = 2.30 mW/g

Face Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 52.3 V/m; Power Drift = -0.408 dB
Peak SAR (extrapolated) = 2.77 W/kg
SAR(1 g) = 2.15 mW/g; SAR(10 g) = 1.57 mW/g
Maximum value of SAR (measured) = 2.27 mW/g

Face Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 2.25 mW/g



Motorola Solutions, Inc. EME Laboratory

Date/Time: 6/21/2012 12:33:20 PM

Robot#: DASY4-PG-1 | Run#:	PS-FACE-120621-08
Model#:	PMUF1473B
Phantom#:	ELI4 1028
Tissue Temp:	21.0 (C)
Serial#:	477TNA1147
Antenna:	NAF5088A
Test Freq:	935.000 (MHz)
Battery:	NNTN8287A
Carry Acc:	NONE
Audio Acc:	NONE
Start Power:	2.30 (W)

Note:
Prior to recording the Reported SAR values below, the Measured SAR values were corrected for tissue frequencies from 136 MHz to 3 GHz.

Reported SAR: 2.230 mW/g (1g); 1.580 mW/g (10g)

Comments: Full scan.

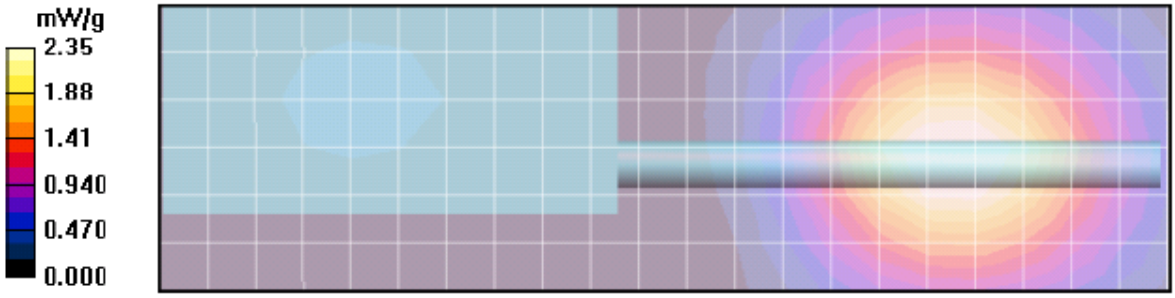
Duty Cycle: 1:1, Medium parameters used: f = 935 MHz; σ = 1.03 mho/m; ε_r = 40.2; ρ = 1000 kg/m^3
Probe: ES3DV3 - SN3274, Calibrated: 10/18/2011, ConvF(5.98, 5.98, 5.98)
Electronics: DAE4 Sn1294, Calibrated: 10/18/2011

Face Scan/1-Area Scan (61x211x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 51.3 V/m; Power Drift = -0.478 dB
Motorola Fast SAR: SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.69 mW/g
Maximum value of SAR (interpolated) = 2.54 mW/g

Face Scan/2-Volume Scan 2D (41x41x1): Measurement grid: dx=7.5mm, dy=7.5mm, dz=1mm
Reference Value = 51.3 V/m; Power Drift = -0.506 dB
Peak SAR (extrapolated) = 2.41 W/kg
Motorola Fast SAR: SAR(1 g) = 2.29 mW/g; SAR(10 g) = 1.62 mW/g
Maximum value of SAR (interpolated) = 2.41 mW/g

Face Scan/3-Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 51.3 V/m; Power Drift = -0.602 dB
Peak SAR (extrapolated) = 2.99 W/kg
SAR(1 g) = 2.23 mW/g; SAR(10 g) = 1.58 mW/g
Maximum value of SAR (measured) = 2.37 mW/g

Face Scan/4-Z-Axis Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (measured) = 2.35 mW/g



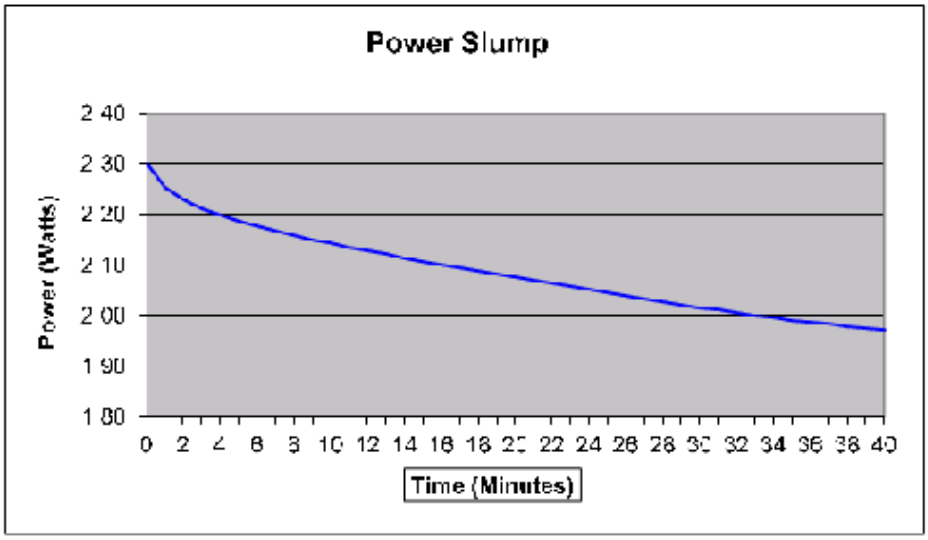
APPENDIX F
DUT Supplementary Data (Power slump)

Power Slump Model # : PMUF1473B
Serial # : 477TNA1147

Battery: NNTN8287A
Frequency: 935 MHz
Date: 6/25/2012

Transmit Mode: CW
Audio Accessory: N/A

Tx Time (Minutes)	Measure Power (Watts)
0.0	2.30
1.0	2.25
2.0	2.23
3.0	2.21
4.0	2.20
5.0	2.19
6.0	2.18
7.0	2.17
8.0	2.16
9.0	2.15
10.0	2.14
11.0	2.13
12.0	2.13
13.0	2.12
14.0	2.11
15.0	2.11
16.0	2.10
17.0	2.09
18.0	2.09
19.0	2.08
20.0	2.08
21.0	2.07
22.0	2.06
23.0	2.06
24.0	2.05
25.0	2.04
26.0	2.04
27.0	2.03
28.0	2.03
29.0	2.02
30.0	2.02
31.0	2.01
32.0	2.01
33.0	2.00
34.0	2.00
35.0	1.99
36.0	1.99
37.0	1.98
38.0	1.98
39.0	1.97
40.0	1.97

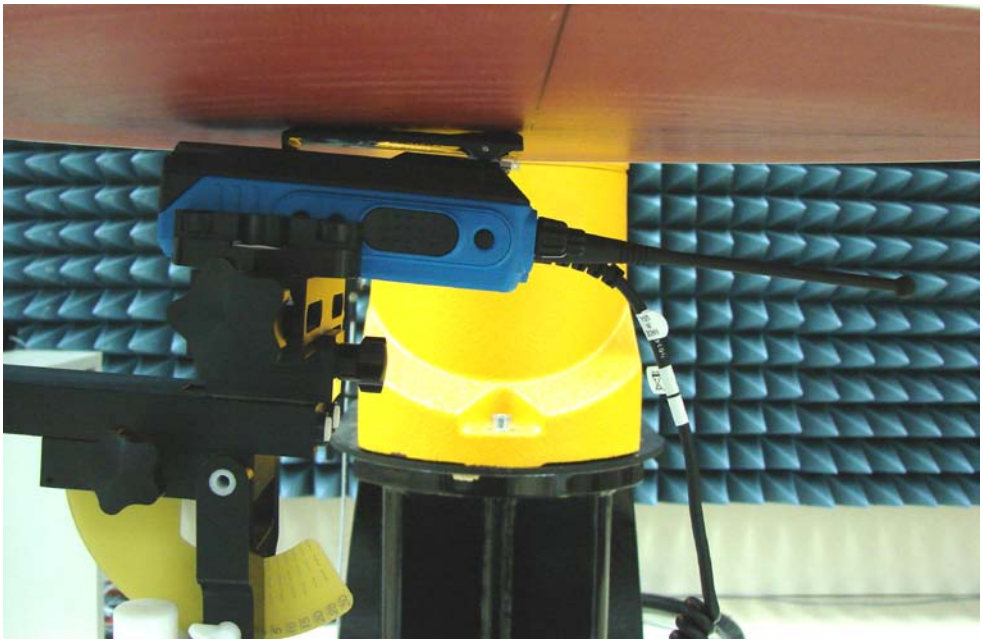


APPENDIX G
DUT Test Position Photos

1.0 Highest SAR Test Position per body location

1.1 Body

DUT with antenna NAF5088A, offered battery NNTN8287A, audio cable PMLN5275C and body worn accessory PMLN5134A against the phantom. Similar position for the other offered antenna NAF5087A.



Antenna kit #	Body-worn Kit #	Battery kit #	Separation Distances (mm)		
			@ bottom surface of the DUT	@ antenna`s base	@ antenna`s tip
NAF5088A	PMLN5134A *	NNTN8287A *	7	36	62
NAF5087A			7	36	58

* Accessories that were previously reported.

1.2 Face

DUT with front side separated 2.5cm from phantom with antenna NAF5088A and battery NNTN8287A. Similar position for the other offered antenna NAF5087A.

Antenna kit #	Body-worn Kit #	Battery kit #	Separation Distances (mm)		
			@ bottom surface of the DUT	@ antenna`s base	@ antenna`s tip
NAF5088A	None	NNTN8287A *	27	39	45
NAF5087A			27	39	47

* Accessory that was previously reported.

1.3 Head

Not Applicable

1.4 Hand

Not Applicable