MOTOROLA

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TESTING CERT # 2518.01

DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Enterprise Mobility Solutions
EME Test Laboratory
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Fort Lauderdale, FL. 33322.

Date of Report: 9/21/2010
Report Revision: O
Report ID: SAR rpt_ H98QDD9PW5AN (MNUE1005A) _Rev.O_100921_SR8653

Responsible Engineer:	Kim Uong (Principal Staff Eng.)
Report Author:	Kim Uong (Principal Staff Eng.)
Date/s Tested:	7/27/10 – 9/02/10, 9/16/10, 9/20/10
Manufacturer/Location:	Motorola, Reynosa/Schaumburg
Sector/Group/Div.:	G&PS
Date submitted for test:	7/23/10
DUT Description:	APX6000 UHF R1 380 – 470 MHz, 3-5.7W, 6.25K/12.5K/25K, Basic Top Display Model. Capable of digital and analog FM transmission. Also capable of TDMA transmission.
Test TX mode(s):	CW (PTT)
Max. Power output:	5.7 Watts
Nominal Power:	5.0 Watts
Tx Frequency Bands:	380 - 470 MHz
Signaling type:	FM and TDMA
Model(s) Tested:	H98QDD9PW5AN (MNUE1005A)
Model(s) Certified:	H98QDD9PW5AN (MNUE1005A)
Serial Number(s):	NUE1006A0052, NUE1006A0043
Classification:	Occupational/Controlled
FCC ID:	AZ489FT4899
FCC Rule Part(s):	90 (406.1 - 470 MHz)
IC:	109U-89FT4899
IC standard(s):	RSS 102 issue 4; Safety Code 6

* Refer to section 15 of part 1 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 EME Laboratory.
I attest to the accuracy of the data and assume full responsibility for the completeness of these measurements. This reporting format is consistent with the suggested guidelines of the TIA TSB-150 December 2004. The results and statements contained in this report pertain only to the device(s) evaluated.

Signature on file – Deanna Zakharia
Deanna Zakharia
EMS EME Lab Senior Resource Manager,
Laboratory Director

Approval Date: 10/1/2010

Certification Date:

Certification No.:

Part 1 of 2

APPENDICES

Part 2 of 2

APPENDICES

Report Revision History

Date	Revision	Comments
9/21/2010	O	Initial release

1.0 Introduction

This report details the utilization, test setup, test equipment, and test results of the Specific Absorption Rate (SAR) measurements performed at the EMS EME Test Laboratory for model number H98QDD9PW5AN (MNUE1005A).

2.0 Abbreviations / Definitions

CNR: Calibration Not Required
CQPSK**:** Compatible Quadrature Phase-Shift Keying
CW: Continues Wave
DUT: Device Under Test
FM: Frequency Modulation
NA: Not Applicable
PTT: Push to Talk
PSM: Public Safety Microphone
RSM: Remote Speaker Microphone
TDMA: Time Division Multiple Access
SAR: Specific Absorption Rate

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

3.0 Referenced Standards and Guidelines

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

- IEC62209-1*(2005) Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)
- United States Federal Communications Commission, Code of Federal Regulations; Rule Part 47CFR § 2.1093 sub-part J:1999
- Federal Communications Commission, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”, OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.
- IEEE 1528*(2003), Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
- American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE) C95. 1-1992
- Institute of Electrical and Electronics Engineers (IEEE) C95.1-2005

- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- Ministry of Health (Canada) Safety Code 6 (1999), Limits of Human Exposure to Radio frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz
- Australian Communications Authority Radio communications (Electromagnetic Radiation - Human Exposure) Standard (2003)
- ANATEL, Brazil Regulatory Authority, Resolution No. 303 of July 2, 2002 "Regulation of the limitation of exposure to electrical, magnetic, and electromagnetic fields in the radio frequency range between 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 H. 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 device operates using digital and analog frequency modulation (FM) as well as TDMA signaling incorporating traditional simplex two-way radio transmission protocol.

Time Division Multiple Access (TDMA) is used to allocate portions of the RF signal by dividing time into two slots. Time allocation enables each unit to transmit its voice information without interference from other transmitting units. Transmission from a unit or base station is accommodated during two time-slot lengths of 30 milliseconds with frame length of 60 milliseconds. C4FM CQPSK modulation is used and includes 12.5kHz channel spacing. The TDMA technique requires sophisticated algorithms and a digital signal processor (DSP) to perform voice compressions/decompressions and RF modulation/demodulation. The maximum duty cycle for TDMA is 2:1 and is controlled by software. The FM signal is continuous. However, because of hand shaking or Push-To-Talk (PTT) between users and/or base stations a conservative 50% duty cycle is applied. The TDMA mode was not tested because its duty cycle is inherently 50% and would include an additional 50% duty cycle for PTT.

The model represented under this filing utilizes a removable antenna and is capable of transmitting in the 380-470 MHz band. The nominal output power is 3 to 5 watts with maximum output powers of 5.7 watts as defined by upper limit of the production line final

test station. The intended operating positions are “at the face” with the DUT or PSM 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. All accessories were individually evaluated during the test plan creation to determine if testing was required. The following sections identify the test criteria and details for each accessory category.

7.1 Antennas:

All offered antennas were tested. The table below lists the antennas and their descriptions.

TABLE 2

Antenna Models	Description	*Tested
PMAE4065A	UHF/GPS whip; 380-520, 1575 MHz; ¼ wave; 1.5dBi gain	Yes
FAF5259A	UHF/PSM/GPS Stubby; 380-470, 1575 MHz; ¼ wave; 1.5dBi gain	Yes

*Refer to Exhibit 7B for antenna separation distances**.**

7.2 Batteries:

All offered batteries were tested. The table below lists the batteries, and there descriptions.

TABLE 3

Battery Models	Description	*Tested	Comments
PMNN4403A	Impres Li Ion slim 2150mAh	Yes	Height = 85mm
NNTN7038A	Hi Cap Impres Li Ion 2900mAh	Yes	Height = 85mm

*Refer to Exhibit 7B for antenna separation distances**.**

7.3 Body worn Accessories:

All offered body worn accessories were tested. The table below lists the body worn accessories, and their descriptions.

TABLE 4

Body worn Models	Description	*Tested	Comments
HLN6875A	3” Belt Clip	Yes	NA
NTN9179A	Swivel D clip & belt loop	Yes	NA

*Refer to Exhibit 7B for antenna separation distances**.**

7.4 Audio Accessories:

All audio accessories were tested. The table below lists the audio accessories and their descriptions.

TABLE 5

Audio Acc. Models	Description	Comments
PMMN4059A	Public Safety Microphone (PSM) 18" IP55, 3.5mm jack TX/RX	
RMN5058A	Core L/W Headset	

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, DAE3 and 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 Flat Phantom

TABLE 6

Phantom ID (s)	Material Parameters	Phantom Dimensions LxWxD (mm)	Material Thickness (mm)	Support Structure Material	Loss Tangent (wood)
OVAL1011 OVAL1018 OVAL1019	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.

Simulated Tissue Composition (by mass)

TABLE 7

% of listed ingredients	450MHz	
	Head	Body
Sugar	56.0	46.5
Diacetin	0	0
De ionized -Water	39.1	50.53
Salt	3.8	1.87
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 Due Date
Power Meter (Agilent)	E4419B	MY45103725	4/19/2011
Power Meter (Agilent)	E4418B	US39251152	3/2/2011
Power Meter (Agilent)	E4418B	GB40206480	12/7/2010
E-Series Avg. Power Sensor (Agilent)	E9301B	MY41495730	4/13/2011
E-Series Avg. Power Sensor (Agilent)	E9301B	MY41495733	4/13/2011
Power Sensor (Agilent)	8482B	3318A06773	5/7/2011
Power Sensor (Agilent)	8481B	3318A10894	3/5/2011
Signal Generator (Agilent)	E4428C	MY47381119	1/14/2012
Bi-Directional Coupler (NARDA)	3020A	40295	6/3/2012
AMP (Amplifier Research)	10WD1000	28782	CNR
Temperature Recording Equipment			
Dickson Temperature Recorder	TM125	1195889	2/16/2011
Omega Digital Thermometer with J Type TC Probe	HH202A	18800	11/10/2010
Omega Digital Thermometer with J Type TC Probe	HH202A	18801	4/19/2011
Omega Digital Thermometer with J Type TC Probe	HH202A	18812	3/24/2011
Tissue Station			
Agilent PNA-L Network Analyzer	N5230A	MY45001092	6/10/2011
Dielectric Probe Kit (HP)	85070C	US99360076	CNR
Dipole			
Speag Dipole	D450V2	1001	4/26/2012
Speag Dipole	D450V2	1002	9/26/2010

10.0 SAR Measurement System Verification:

The SAR measurements were conducted with probe model/serial number ES3DV3/SN3147. 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 9 summarizes the measured tissue parameters used for the SAR assessment.

TABLE 9

Frequency (MHz)	Tissue Type	Conductivity Target & Range (S/m)	Dielectric Constant Target & Range	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
395	IEEE/IEC Head	0.87 (0.83-0.91)	44.2 (42.0-46.4)	0.84	44.2	7/27/2010
				0.83	43.8	7/28/2010
				0.84	44.1	7/29/2010
				0.84	44.2	7/30/2010
				0.86	44.6	7/31/2010
				0.87	43.7	9/02/2010
422	IEEE/ IEC Head	0.87 (0.83-0.91)	43.8 (41.6-46.0)	0.85	43.2	7/27/2010
				0.84	42.9	7/28/2010
				0.84	43.2	7/29/2010
				0.85	43.3	7/30/2010
				0.87	43.7	7/31/2010
				0.89	45.9	8/06/2010
				0.88	42.7	9/02/2010
438	IEEE/ IEC Head	0.87 (0.83-0.91)	43.6 (41.4-45.8)	0.85	42.4	7/28/2010
				0.88	43.2	7/31/2010
				0.89	42.2	9/02/2010
450	IEEE/ IEC Head	0.87 (0.83-0.91)	43.5 (41.3-45.7)	0.87	42.4	7/27/2010
				0.86	42.1	7/28/2010
				0.86	42.2	7/29/2010
				0.88	42.6	7/30/2010
				0.89	42.9	7/31/2010
				0.90	41.9	9/02/2010
454	IEEE/ IEC Head	0.87 (0.83-0.91)	43.5 (41.3-45.7)	0.88	42.3	7/27/2010
				0.87	42.0	7/28/2010
				0.87	42.3	7/29/2010
				0.88	42.4	7/30/2010
				0.90	42.8	7/31/2010
				0.91	41.8	9/02/2010

TABLE 9 (continued)

Frequency (MHz)	Tissue Type	Conductivity Target & Range (S/m)	Dielectric Constant Target & Range	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
395	FCC Body	0.93 (0.88 -0.98)	57.3 (54.4 – 60.2)	0.90	57.5	8/01/2010
				0.91	57.6	8/02/2010
				0.89	57.4	8/03/2010
				0.89	57.5	8/04/2010
				0.89	57.1	8/05/2010
422	FCC Body	0.94 (0.89-0.98)	57.0 (54.1-59.8)	0.91	56.7	8/01/2010
				0.92	56.9	8/02/2010
				0.90	56.7	8/03/2010
				0.90	56.8	8/04/2010
				0.90	56.4	8/05/2010
				0.90	56.0	8/06/2010
				0.90	55.6	9/02/2010
				0.93	55.1	9/20/2010
438	FCC Body	0.94 (0.89-0.98)	56.8 (53.9-59.6)	0.92	56.3	8/01/2010
				0.92	56.4	8/03/2010
				0.91	56.0	8/05/2010
				0.91	55.7	8/06/2010
				0.93	54.2	9/16/2010
450	FCC Body	0.94 (0.89-0.99)	56.7 (53.9-59.5)	0.93	56.1	8/01/2010
				0.95	56.3	8/02/2010
				0.93	56.1	8/03/2010
				0.93	56.1	8/04/2010
				0.93	55.8	8/05/2010
				0.92	55.4	8/06/2010
				0.94	54.0	9/16/2010
				0.96	54.6	9/20/2010
454	FCC Body	0.94 (0.89-0.99)	56.7 (53.9-59.5)	0.94	56.0	8/01/2010
				0.95	56.2	8/02/2010
				0.93	56.1	8/03/2010
				0.93	56.0	8/04/2010
				0.93	55.7	8/05/2010

10.2 System Check Test Results:

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

TABLE 10

Probe Serial #	Tissue Type	Probe Cal Date	Dipole Kit / Serial #	Reference SAR @ 1W (W/kg)	System Check Test Results when normalized to 1W (W/kg)	Tested Date
3147	IEEE/ IEC Head	2/18/2010	SPEAG D450V2 /1002	4.58 +/- 10%	4.44	7/27/2010
					4.48	7/28/2010
					4.56	7/29/2010
					4.60	7/30/2010
					4.60	7/31/2010
	FCC Body			4.40 +/- 10%	4.12	8/1/2010
					4.12	8/2/2010
					4.24	8/3/2010
					4.16	8/4/2010
					4.12	8/5/2010
					4.12	8/6/2010
3147	IEEE/ IEC Head	2/18/2010	SPEAG D450V2 /1001	4.72 +/- 10%	4.80	9/2/2010
	FCC Body			4.32 +/- 10%	4.24	9/16/2010
					4.36	9/20/2010

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

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°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: 21.2 -23.8˚C Avg. 21.7˚C
Relative Humidity	30 - 70 %	Range: 48.4 – 71.8% Avg. 54.4%
Tissue Temperature	NA	Range: 20.2-21.7˚C Avg. 21.0˚C

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

12.0 DUT Test Methodology

12.1 Measurements

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

12.2 DUT Configuration(s)

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

12.3 DUT Positioning Procedures

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

12.3.1 Body:

The DUT and PSM were positioned in the 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 and back side separated 2.5cm from the phantom. Note that this product has two microphones, one on the front and one on the back of the DUT and therefore both sides were assessed. The offered PSMs were also tested with 2.5cm separation from the phantom.

12.4 DUT Test Channels:

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

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

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

12.5 DUT Test Plan:

All modes of operation identified in section 6.0 were considered during the development of the test plan. The mode which presented the highest duty cycle was chosen for SAR assessment.

All accessories listed in section 7.0 of this report were evaluated and only those identified for testing were used to develop the SAR test plan for this product.

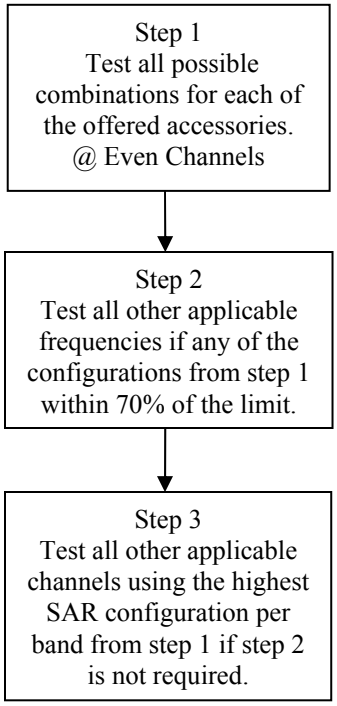
Tests were performed in each band at the even channels of the UHF (380-470MHz) Band. Depending on the SAR result for each of the test configurations at these channels, the other frequency channels are assessed only for the configuration that indicated highest SAR result or for each of the configurations that indicated SAR results within 70% of the specification limit as recommended by the FCC. If the 70% threshold is not required then the highest SAR configurations from the even channel assessments were tested at all other applicable frequencies.

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

12.5.1 General Test Flowchart

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

DUT Body Test Methodology (General flowchart)



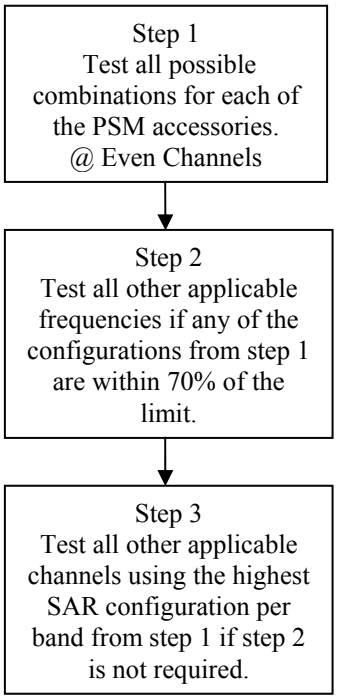
Flowchart Objectives Body

Step 1 - The objective is to determine the highest SAR configuration at the even channels for all combinations of offered accessories at the body. Refer to section 12.5 for additional frequency channels test consideration details.

Step 2 – The objective is to determine the highest SAR configurations for all possible combinations of offered accessories.

Step 3 - Determine the highest SAR performance across all applicable channels if the SAR results from Step 1 is below the recommended 70% threshold. Refer to section 12.5 for additional channels test consideration details.

DUT PSM Body Test Methodology
(General flowchart)



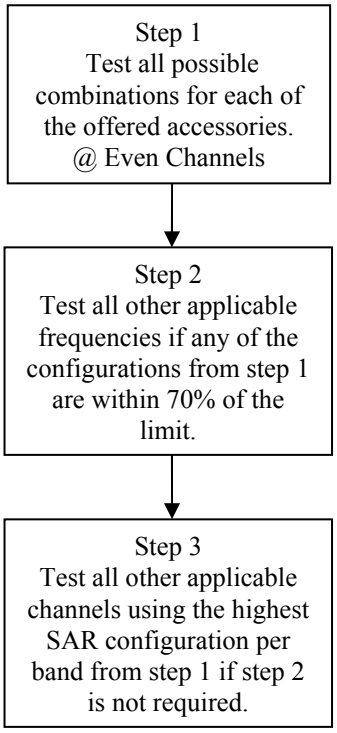
Flowchart
Objectives PSM Body

Step 1 - The objective is to determine the highest SAR configuration at the even channels for all combinations of offered accessories at the body.

Step 2 – The objective is to determine the highest SAR configurations for all possible combinations of offered accessories. Refer to section 12.5 for additional channels test consideration details.

Step 3 - Determine the highest SAR performance across all applicable channels if the SAR results from Step 1 is below the recommended 70% threshold. Refer to section 12.5 for additional channels test consideration details.

DUT Face Test Methodology
(General flowchart)



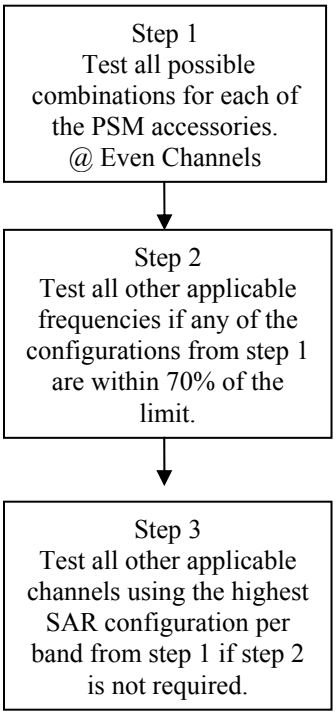
Flowchart
Objectives Face

Step 1 - The objective is to determine the highest SAR configuration at the even channels for all combinations of offered accessories at the body. Refer to section 12.5 for additional frequency channels test consideration details.

Step 2 – The objective is to determine the highest SAR configurations for all possible combinations of offered accessories. Refer to section 12.5 for additional channels test consideration details.

Step 3 - Determine the highest SAR performance across all applicable channels if the SAR results from Step 2 is below the recommended 70% threshold. Refer to section 12.5 for additional channels test consideration details.

DUT PSM Face Test Methodology
(General flowchart)



Flowchart
Objectives PSM Face

Step 1 - The objective is to determine the highest SAR configuration at the even channels for all combinations of offered accessories at the body. Refer to section 12.5 for additional channels test consideration details.

Step 2 – The objective is to determine the highest SAR configurations for all possible combinations of offered accessories. Refer to section 12.5 for additional channels test consideration details.

Step 3 - Determine the highest SAR performance across all applicable channels if the SAR results from Step 1 is below the recommended 70% threshold. Refer to section 12.5 for additional channels test consideration details.

13.0 DUT Test Data

13.1 Assessments at the Face (CW mode):

Assessment at the Face with antenna FAF5259A: The DUT was tested with antenna FAF5259A using batteries NNTN7038A and PMNN4403A, at the applicable even frequency channels (2, 4, and 6). The DUT front and back sides separated 2.5cm from the phantom. Refer to section 12.5 for additional frequency channels test consideration details.

The highest SAR result from the table below (bolded) is included in APPENDIX F and G Section 1.0

TABLE 12

Assessments at the Face (CW mode) with antenna FAF5259A												
Antenna	**Battery**	**Carry Accessory**	**Test Position**	**Additional attachments**	**Test Freq. (MHz)**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc.1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**	**Run#**
FAF5259A (380 – 470 / 1575 MHz)	NNTN7038A	None	Front DUT at 2.5cm	None	380.0125							
					395.0000	5.64	-0.674	6.96	5.18	4.11	3.06	MeC-Face-100727-03
					406.1250							
					422.1250	5.6	-0.278	5.93	4.42	3.22	2.40	MeC-Face-100727-04
					438.1250							
					453.9875	5.53	-0.026	2.82	2.1	1.46	1.09	MeC-Face-100727-05
					469.9875							
FAF5259A (380 – 470 / 1575 MHz)	NNTN7038A	None	Back DUT at 2.5cm	None	380.0125							
					395.0000	5.62	-0.681	7.04	5.22	4.18	3.10	MeC-Face-100727-06
					406.1250							
					422.1250	5.58	-0.226	7.06	5.23	3.80	2.81	MeC-Face-100727-07
					438.1250							
					453.9875	5.55	-0.0686	3.18	2.37	1.66	1.24	MeC-Face-100727-08
					469.9875							
FAF5259A (380 – 470 / 1575 MHz)	PMNN4403A	None	Front DUT at 2.5cm	None	380.0125							
					395.0000	5.68	-0.768	7.84	5.76	**4.69**	**3.45**	MeC-Face-100728-02
					406.1250							
					422.1250	5.62	-0.336	7.49	5.51	**4.10**	**3.02**	MeC-Face-100728-03
					438.1250							
					453.9875	5.51	-0.0736	3.29	2.43	1.73	1.28	MeC-Face-100728-04
					469.9875							
FAF5259A (380 - 470 / 1575MHz)	PMNN4403A	None	Back DUT at 2.5cm	None	380.0125							
					395.0000	5.66	-0.749	6.54	4.85	3.91	2.90	MeC-Face-100728-05
					406.1250							
					422.1250	5.59	-0.298	7.34	5.44	4.01	2.97	MeC-Face-100728-06
					438.1250							
					453.9875	5.61	-0.127	3.23	2.4	1.69	1.26	MeC-Face-100728-07
					469.9875							

Assessment at the Face with antenna FAF5259A – Other Frequency channels:
The DUT was tested at all other applicable frequencies using the highest SAR configuration from table 12. Refer to section 12.5 for additional frequency channels test consideration details.

The highest SAR result from the table below (bolded) is included in APPENDIX F and G Section 2.0

TABLE 13

Assessments at the Face (CW mode) with antenna FAF5259A – Other Frequency channels												
Antenna	**Battery**	**Carry Accessory**	**Test Position**	**Additional attachments**	**Test Freq. (MHz)**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc.1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**	**Run#**
FAF5259A (380 - 470 / 1575MHz)	PMNN4403A	None	Front DUT at 2.5cm	None	380.0125	5.67	-0.23	6.11	4.53	3.24	2.40	MeC-Face-100728-08
				None	406.125	5.66	-0.801	10.18	7.59	**6.16**	**4.60**	MeC-Face-100806-11
				None	438.1250	5.68	-0.154	4.9	3.62	2.55	1.88	MeC-Face-100728-10
				None	469.9875	5.63	-0.131	2.49	1.84	1.30	0.96	MeC-Face-100728-11

Assessment at the Face with antenna PMAE4065A: The DUT was tested with antenna PMAE4065A using batteries NNTN7038A and PMNN4403A, at the applicable even frequency channels (2, 4, and 6). The DUT front and back sides separated 2.5cm from the phantom. Refer to section 12.5 for additional frequency channels test consideration details.

The highest SAR result from the table below (bolded) is included in APPENDIX F and G Section 3.0.

TABLE 14

Assessments at the Face (CW mode) with antenna PMAE4065A												
Antenna	**Battery**	**Carry Accessory**	**Test Position**	**Additional attachments**	**Test Freq. (MHz)**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc.1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**	**Run#**
PMAE4065A (380 - 520 / 1575MHz)	NNTN7038A	None	Front DUT at 2.5cm	None	380.0125							
					395.0000	5.67	-0.499	6.89	5.11	3.88	2.88	MeC-Face-100729-02
					406.1250							
					422.1250	5.62	-0.305	5.62	4.16	3.06	2.26	MeC-Face-100729-03
					438.1250							
					453.9875	5.64	-0.124	3.55	2.63	1.85	1.37	MeC-Face-100729-04
					469.9875							
PMAE4065A (380 - 520 / 1575MHz)	NNTN7038A	None	Back DUT at 2.5cm	None	380.0125							
					395.0000	5.69	-0.509	7.36	5.46	4.14	3.07	MeC-Face-100729-05
					406.1250							
					422.1250	5.66	-0.279	6.4	4.72	3.44	2.53	MeC-Face-100729-06
					438.1250							
					453.9875	5.67	-0.153	3.9	2.89	2.03	1.50	MeC-Face-100729-07
					469.9875							
PMAE4065A (380 - 520 / 1575MHz)	PMNN4403A	None	Front DUT at 2.5cm	None	380.0125							
					395.0000	5.67	-0.772	7.91	5.82	**4.75**	**3.49**	MeC-Face-100729-08
					406.1250							
					422.1250	5.62	-0.257	7.19	5.31	**3.87**	**2.86**	MeC-Face-100729-09
					438.1250							
					453.9875	5.66	-0.158	4.39	3.24	2.29	1.69	MeC-Face-100729-10
					469.9875							
PMAE4065A (380 - 520 / 1575MHz)	PMNN4403A	None	Back DUT at 2.5cm	None	380.0125							
					395.0000	5.67	-0.701	6.75	5	3.99	2.95	MeC-Face-100730-02
					406.1250							
					422.1250	5.69	-0.262	6.71	4.97	3.57	2.64	MeC-Face-100730-03
					438.1250							
					453.9875	5.62	-0.0932	4.22	3.13	2.19	1.62	MeC-Face-100730-04
					469.9875							

Assessment at the Face with antenna PMAE4065A – Other Frequency channels:
The DUT was tested at all other applicable frequencies using the highest SAR configuration from table 14. Refer to section 12.5 for additional frequency channels test consideration details.

The highest SAR result from the table below (bolded) is included in APPENDIX F and G Section 4.0

TABLE 15

Assessments at the Face (CW mode) with antenna PMAE4065A – Other Frequency channels												
Antenna	**Battery**	**Carry Accessory**	**Test Position**	**Additional attachments**	**Test Freq. (MHz)**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc.1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**	**Run#**
PMAE4065A (380 - 520 / 1575MHz)	PMNN4403A	None	Front DUT at 2.5cm	None	380.0125	5.65	-0.289	6.78	5.01	3.66	2.70	MeC-Face-100902-02
					406.1250	5.57	-0.484	8.01	5.84	**4.58**	**3.34**	MeC-Face-100902-03
					438.1250	5.53	-0.123	5.18	3.8	2.75	2.01	MeC-Face-100902-04
					469.9875	5.59	-0.19	3.67	2.69	1.95	1.43	MeC-Face-100902-05

Assessment at the Face with PSM PMMN4059A and antenna FAF5259A: The DUT was tested with PSM PMMN4059A and antenna FAF5259A using batteries NNTN7038A and PMNN4403A, at the applicable even frequency channels (2, 4, and 6). The PSM front side separated 2.5cm from the phantom. Refer to section 12.5 for additional frequency channels test consideration details.

The highest SAR result from the table below (bolded) is included in APPENDIX F and G Section 5.0

TABLE 16

Assessments at the Face (CW mode) with PSM PMMN4059A and antenna FAF5259A												
Antenna	**Battery**	**Carry Accessory**	**Test Position**	**Additional attachments**	**Test Freq. (MHz)**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc.1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**	**Run#**
FAF5259A (380 - 470 / 1575MHz)	NNTN7038A	None	Front PSM at 2.5cm	PMMN4059A	380.0125							
					395.0000	5.68	-0.589	1.52	1.1	0.87	0.63	MeC-Face-100730-09
					406.1250							
					422.1250	5.63	-0.176	2.92	2.1	1.54	1.11	MeC-Face-100730-10
					438.1250							
					453.9875	5.66	-0.29	6.58	4.75	3.54	2.56	MeC-Face-100730-11
					469.9875							
FAF5259A (380 - 470 / 1575MHz)	PMNN4403A	None	Front PSM at 2.5cm	PMMN4059A	380.0125							
					395.0000	5.67	-0.696	1.42	1.03	0.84	0.61	MeC-Face-100731-02
					406.1250							
					422.1250	5.68	-0.167	2.61	1.89	1.36	0.99	MeC-Face-100731-03
					438.1250							
					453.9875	5.62	-0.35	6.55	4.74	**3.60**	**2.61**	MeC-Face-100731-04
					469.9875							
FAF5259A (380 - 470 / 1575MHz)	PMNN4403A	None	Front PSM at 2.5cm	PMMN4059A	380.0125	5.64	-0.44	1.25	0.901	0.70	0.50	MeC-Face-100731-05
					406.1250	5.66	-0.807	2.14	1.55	1.30	0.94	MeC-Face-100731-06
					438.1250	5.62	-0.026	3.66	2.65	1.87	1.35	MeC-Face-100731-07
					469.9875	5.65	-0.304	4.88	3.51	2.64	1.90	MeC-Face-100731-08

13.2 Assessments at the Body (CW mode):

Assessment at the Body with antenna FAF5259A: The DUT was tested with antenna FAF5259A using batteries NNTN7038A and PMNN4403A, body worn accessories HLN6875A and NTN9179A, and audio cable RMN5058A at the applicable even frequency channels (2, 4, and 6). Refer to section 12.5 for additional frequency channels test consideration details.

The highest SAR result from the table below (bolded) is included in APPENDIX F and G Section 6.0

TABLE 17

Assessments at the Body (CW mode) with antenna FAF5259A												
Antenna	**Battery**	**Carry Accessory**	**Test Position**	**Additional attachments**	**Test Freq. (MHz)**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc.1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**	**Run#**
FAF5259A (380 - 470 / 1575MHz)	NNTN7038A	HLN6875A Belt clip	Against phantom	RMN5058A (headset)	380.0125							
					395.0000	5.67	-0.736	8.49	4.04	**5.06**	**2.41**	MeC-Ab-100802-10
					406.1250							
					422.1250	5.64	-0.247	4.78	2.55	2.56	1.36	MeC-Ab-100802-11
					438.1250							
					453.9875	5.65	-0.145	2.74	2.04	1.43	1.06	MeC-Ab-100802-12
					469.9875							
FAF5259A (380 - 470 / 1575MHz)	PMNN4403A	HLN6875A Belt clip	Against phantom	RMN5058A (headset)	380.0125							
					395.0000	5.65	-0.996	4.74	2.7	3.01	1.71	MeC-Ab-100802-13
					406.1250							
					422.1250	5.67	-0.345	3.9	2.29	2.12	1.25	MeC-Ab-100802-14
					438.1250							
					453.9875	5.66	-0.133	2.68	1.99	1.39	1.03	MeC-Ab-100802-15
					469.9875							
FAF5259A (380 - 470 / 1575MHz)	NNTN7038A	NTN9179A D-clip and Belt Loop	Against phantom	RMN5058A (headset)	380.0125							
					395.0000	5.68	-0.631	7.66	3.57	4.44	2.07	MeC-Ab-100802-16
					406.1250							
					422.1250	5.66	-0.236	5.46	2.53	**2.90**	**1.35**	MeC-Ab-100802-17
					438.1250							
					453.9875	5.65	-0.0867	2.52	1.23	1.30	0.63	MeC-Ab-100802-18
					469.9875							
FAF5259A (380 - 470 / 1575MHz)	PMNN4403A	NTN9179A D-clip and Belt Loop	Against phantom	RMN5058A (headset)	380.0125							
					395.0000	5.66	-0.803	3.66	2.76	2.22	1.67	MeC-Ab-100803-02
					406.1250							
					422.125	5.62	-0.414	4.54	2.21	2.53	1.23	MeC-Ab-100803-03
					438.1250							
					453.9875	5.65	-0.0824	2.24	1.16	1.15	0.60	MeC-Ab-100803-04
					469.9875							

Assessment at the Body with antenna FAF5259A – Other Frequency channels:
The DUT was tested at all other applicable frequencies using the highest SAR configuration from table 17. Refer to section 12.5 for additional frequency channels test consideration details.

The highest SAR result from the table below (bolded) is included in APPENDIX F and G Section 7.0

TABLE 18

Assessments at the Body (CW mode) with Antenna FAF5259A – Other Frequency channels												
Antenna	**Battery**	**Carry Accessory**	**Test Position**	**Additional attachments**	**Test Freq. (MHz)**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc.1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**	**Run#**
FAF5259A (380 - 470 / 1575MHz)	NNTN7038A	HLN6875A Belt clip	Against phantom	RMN5058A (headset)	380.0125	5.69	-0.429	7.89	3.41	4.36	1.89	MeC-Ab-100803-05
					406.1250	5.69	-0.4	6.3	3.44	3.46	1.89	MeC-Ab-100803-06
					438.1250	5.65	-0.183	3.75	2.78	1.97	1.46	MeC-Ab-100803-07
					469.9875	5.66	-0.127	2.07	1.52	1.07	0.79	MeC-Ab-100803-08
FAF5259A (380 - 470 / 1575MHz)	NNTN7038A	NTN9179A D-clip and Belt Loop	Against phantom	RMN5058A (headset)	380.0125	5.72	-0.246	8.47	3.37	4.48	1.78	JsT-Ab-100805-05
					406.1250	5.47	-0.619	10.13	3.97	**6.09**	**2.39**	JsT-Ab-100920-02
					438.1250	5.67	-0.212	4.28	1.76	2.26	0.93	JsT-Ab-100805-07
					469.9875	5.67	-0.13	1.79	0.799	0.93	0.41	JsT-Ab-100805-08

Assessment at the Body with antenna PMAE4065A: The DUT was tested with antenna PMAE4065A using batteries NNTN7038A and PMNN4403A, body worn accessories HLN6875A and NTN9179A, and audio cable RMN5058A at the applicable even frequency channels (2, 4, and 6). Refer to section 12.5 for additional frequency channels test consideration details.

The highest SAR result from the table below (bolded) is included in APPENDIX F and G Section 8.0

TABLE 19

Assessments at the Body (CW mode) with antenna PMAE4065A												
Antenna	**Battery**	**Carry Accessory**	**Test Position**	**Additional attachments**	**Test Freq. (MHz)**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc.1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**	**Run#**
PMAE4065A (380 - 520 / 1575MHz)	NNTN7038A	HLN6875A Belt clip	Against phantom	RMN5058A (headset)	380.0125							
					395.0000	5.69	-0.199	7.07	3.43	3.71	1.80	MeC-Ab-100804-05
					406.1250							
					422.1250	5.65	-0.188	4.08	2.18	2.15	1.15	MeC-Ab-100804-06
					438.1250							
					453.9875	5.61	-0.0744	3.47	2.57	1.79	1.33	MeC-Ab-100804-07
					469.9875							
PMAE4065A (380 - 520 / 1575MHz)	PMNN4403A	HLN6875A Belt clip	Against phantom	RMN5058A (headset)	380.0125							
					395.0000	5.67	-0.26	6.12	4.56	3.27	2.43	MeC-Ab-100804-08
					406.1250							
					422.1250	5.64	-0.244	5.12	3.81	2.74	2.04	MeC-Ab-100804-09
					438.1250							
					453.9875	5.66	-0.146	3.49	2.58	1.82	1.34	MeC-Ab-100804-10
					469.9875							
PMAE4065A (380 - 520 / 1575MHz)	NNTN7038A	NTN9179A D-clip and Belt Loop	Against phantom	RMN5058A (headset)	380.0125							
					395.0000	5.66	-0.113	7.78	3.25	**4.02**	**1.68**	MeC-Ab-100804-11
					406.1250							
					422.1250	5.68	-0.152	5.95	2.36	**3.09**	**1.23**	MeC-Ab-100804-12
					438.1250							
					453.9875	5.63	-0.179	3.61	1.62	1.90	0.85	MeC-Ab-100804-13
					469.9875							
PMAE4065A (380 - 520 / 1575MHz)	PMNN4403A	NTN9179A D-clip and Belt Loop	Against phantom	RMN5058A (headset)	380.0125							
					395.0000	5.71	-0.322	5.99	2.49	3.23	1.34	JsT-Ab-100805-02
					406.1250							
					422.1250	5.67	-0.213	5.58	2.35	2.95	1.24	JsT-Ab-100805-03
					438.1250							
					453.9875	5.67	-0.121	3.31	1.46	1.71	0.75	JsT-Ab-100805-04
					469.9875							

Assessment at the Body with antenna PMAE4065A – Other Frequency channels:
The DUT was tested at all other applicable frequencies using the highest SAR configuration from table 19. Refer to section 12.5 for additional frequency channels test consideration details.

The highest SAR result from the table below (bolded) is included in APPENDIX F and G Section 9.0

TABLE 20

Assessments at the Body (CW mode) with antenna PMAE4065A – Other Frequency channels												
Antenna	**Battery**	**Carry Accessory**	**Test Position**	**Additional attachments**	**Test Freq. (MHz)**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc.1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**	**Run#**
PMAE4065A (380 – 520 / 1575MHz)	NNTN7038A	NTN9179A D-clip and Belt Loop	Against phantom	RMN5058A (headset)	380.0125	5.76	-0.276	7.5	2.97	4.00	1.58	JsT-Ab-100805-09
					406.1250	5.74	-0.282	7.92	3.18	**4.23**	**1.70**	MeC-Ab-100805-10
					438.1250	5.71	-0.166	4.58	1.88	2.38	0.98	MeC-Ab-100805-11
					469.9875	5.71	-0.241	2.61	1.22	1.38	0.64	MeC-Ab-100805-12

Assessment at the Body with PSM PMMN4059A and antenna FAF5259A: The DUT was tested with PSM PMMN4059A and antenna FAF5259A using batteries NNTN7038A and PMNN4403A, and PSM belt clip 4205823V01, at the applicable even frequency channels (2, 4, and 6). Refer to section 12.5 for additional frequency channels test consideration details.

The highest SAR result from the table below (bolded) is included in APPENDIX F and G Section 10.0

TABLE 21

Assessment at the Body with PSM PMMN4059A and antenna FAF5259A												
Antenna	**Battery**	**Carry Accessory**	**Test Position**	**Additional attachments**	**Test Freq. (MHz)**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc.1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**	**Run#**
FAF5259A (380 - 470 / 1575MHz)	NNTN7038A	4205823V01 PSM Belt clip	Against phantom	PMMN4059A	380.0125	5.65	-0.741	9.73	5.41	5.82	3.24	MeC-Ab-100801-02
					395.0000	5.68	-0.58	10.17	6.11	5.83	3.50	MeC-Ab-100731-09
					406.1250	5.66	-0.164	10.94	6.39	5.72	3.34	MeC-Ab-100801-03
					422.1250	5.64	-0.109	9.72	6.14	5.04	3.18	MeC-Ab-100731-10
					438.1250	5.64	-0.411	12.92	8.25	7.18	4.58	MeC-Ab-100801-04
					453.9875	5.67	-0.439	12	8.56	6.67	4.76	MeC-Ab-100731-11
					469.9875	5.64	-0.134	6.55	4.68	3.41	2.44	MeC-Ab-100801-05
FAF5259A (380 - 470 / 1575MHz)	PMNN4403A	4205823V01 PSM Belt clip	Against phantom	PMMN4059A	380.0125	5.66	-0.633	8.66	4.82	5.04	2.81	MeC-Ab-100801-09
					395.0000	5.68	-0.68	10.49	6.08	6.16	3.57	MeC-Ab-100801-06
					406.1250	5.64	-0.168	10.94	6.47	5.75	3.40	MeC-Ab-100801-10
					422.1250	5.66	-0.0982	10.54	6.46	5.43	3.33	MeC-Ab-100801-07
					438.1250	5.50	-0.481	13.46	8.38	**7.79**	**4.85**	MeC-Ab-100916-09
					453.9875	5.6	-0.428	11.7	8.39	6.57	4.71	MeC-Ab-100801-08
					469.9875	5.64	-0.192	6.54	4.68	3.45	2.47	MeC-Ab-100801-12

13.3 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 22

Short scan assessment												
Antenna	**Battery**	**Carry Accessory**	**Test Position**	**Additional attachments**	**Test Freq. (MHz)**	**Initial Power (W)**	**SAR Drift (dB)**	**Meas. 1g-SAR (W/kg)**	**Meas. 10g-SAR (W/kg)**	**Max Calc.1g-SAR (W/kg)**	**Max Calc. 10g-SAR (W/kg)**	**Run#**
Full scan												
FAF5259A (380 - 470 / 1575MHz)	PMNN4403A	None	Front DUT at 2.5cm	None	406.125	5.66	-0.801	10.18	7.59	6.16	4.60	MeC-Face-100806-11
Shortened scan												
FAF5259A (380 - 470 / 1575MHz)	PMNN4403A	None	Front DUT at 2.5cm	None	406.125	5.64	-0.417	10.9	8.04	6.06	4.47	MeC-Face-100902-06

14.0 Simultaneous Transmission Exclusion:

Not applicable.

15.0 Conclusion:

The highest Operational Maximum Calculated 1-gram and 10-gram average SAR values found for this filing: model H98QDD9PW5AN (MNUE1005A):

TABLE 23: RF Exposure Results for FCC Part 90

Frequency Range (MHz)	Max Calc at Body (W/kg)		Max Calc at Face (W/kg)	
	1g-SAR	10g-SAR	1g-SAR	10g-SAR
406.1-470	7.79	4.85	6.16	4.60

TABLE 24: RF Exposure Results for entire frequency range

Frequency Range (MHz)	Max Calc at Body (W/kg)		Max Calc at Face (W/kg)	
	1g-SAR	10g-SAR	1g-SAR	10g-SAR
380-470	7.79	4.85	6.16	4.60

The test results clearly demonstrate compliance with FCC Occupational/Controlled RF Exposure limits of **8 W/kg** per the requirements of 47 CFR 2.1093(d).

APPENDIX A
Measurement Uncertainty

The Measurement Uncertainty tables indicated in this APPENDIX are applicable to the DUT ranging from 100MHz to 800MHz and for Dipole test frequency ranging from 300MHz to 800MHz. Therefore, the highest tolerance for the probe calibration uncertainty is indicated.

Table A1:

Uncertainty Budget for Device Under Test, for 100 MHz to 800 MHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*
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 (±%)**
Measurement System								
Probe Calibration	E.2.1	10.0	N	1.00	1	1	10.0	10.0
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
Device Holder Uncertainty	E.4.1	4.0	N	1.00	1	1	4.0	4.0
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				14	13
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				27	27

FCD-0558 Uncertainty Budget Rev.8

Table A2:

Uncertainty Budget for System Validation (dipole & flat phantom) for 300 MHz to 800 MHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*
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 (±%)**
Measurement System								
Probe Calibration	E.2.1	9.0	N	1.00	1	1	9.0	9.0
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				11	11
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				22	22

FCD-0558 Uncertainty Budget Rev.8

Notes for Tables 1, 2, 3 and 4
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
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 EME**

Certificate No: **ES3-3147_Feb10**

CALIBRATION CERTIFICATE

Object ES3DV3 - SN:3147

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

Calibration date: February 18, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10

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

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

Issued: February 19, 2010

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
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV3

SN:3147

Manufactured:	July 12, 2007
Last calibrated:	February 13, 2009
Recalibrated:	February 18, 2010

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ES3DV3 SN:3147 February 18, 2010

DASY - Parameters of Probe: ES3DV3 SN:3147

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.25	1.22	1.20	± 10.1%
DCP (mV)[B]	90.7	94.9	92.9	

Modulation Calibration Parameters

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

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

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

DASY - Parameters of Probe: ES3DV3 SN:3147

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
300	± 50 / ± 100	45.3 ± 5%	0.87 ± 5%	6.79	6.79	6.79	0.23	0.86 ± 13.3%
450	± 50 / ± 100	43.5 ± 5%	0.87 ± 5%	6.43	6.43	6.43	0.23	1.45 ± 13.3%
750	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.24	6.24	6.24	0.64	1.19 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	5.85	5.85	5.85	0.70	1.14 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.06	5.06	5.06	0.42	1.80 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.81	4.81	4.81	0.44	1.69 ± 11.0%
2300	± 50 / ± 100	39.5 ± 5%	1.67 ± 5%	4.68	4.68	4.68	0.40	1.85 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.42	4.42	4.42	0.40	2.06 ± 11.0%
2600	± 50 / ± 100	39.0 ± 5%	1.96 ± 5%	4.29	4.29	4.29	0.48	1.71 ± 11.0%
3500	± 50 / ± 100	37.9 ± 5%	2.91 ± 5%	4.09	4.09	4.09	1.00	1.23 ± 13.1%
3700	± 50 / ± 100	37.7 ± 5%	3.12 ± 5%	3.68	3.68	3.68	1.00	1.30 ± 13.1%

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

DASY - Parameters of Probe: ES3DV3 SN:3147

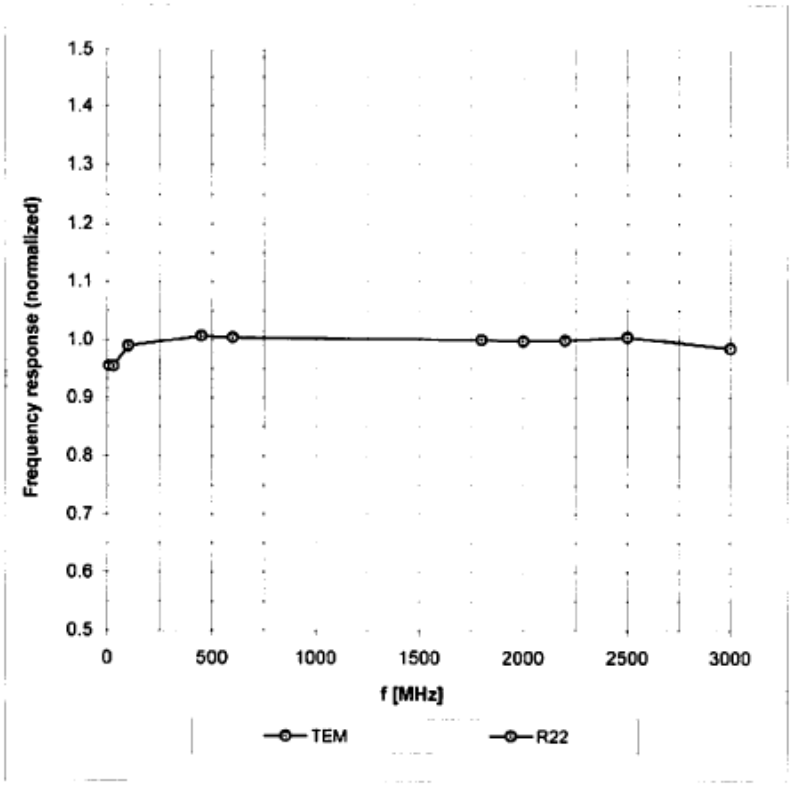
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth	Unc (k=2)
450	± 50 / ± 100	56.7 ± 5%	0.94 ± 5%	6.82	6.82	6.82	0.10	2.74	± 13.3%
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	5.95	5.95	5.95	0.78	1.14	± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	5.81	5.81	5.81	0.88	1.13	± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.90	4.90	4.90	0.28	2.75	± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.75	4.75	4.75	0.42	1.98	± 11.0%
2300	± 50 / ± 100	52.8 ± 5%	1.85 ± 5%	4.33	4.33	4.33	0.45	1.82	± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.18	4.18	4.18	0.70	1.29	± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	4.07	4.07	4.07	0.87	1.15	± 11.0%
3500	± 50 / ± 100	51.3 ± 5%	3.31 ± 5%	3.50	3.50	3.50	1.00	1.38	± 13.1%
3700	± 50 / ± 100	51.0 ± 5%	3.55 ± 5%	3.38	3.38	3.38	0.64	1.93	± 13.1%

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

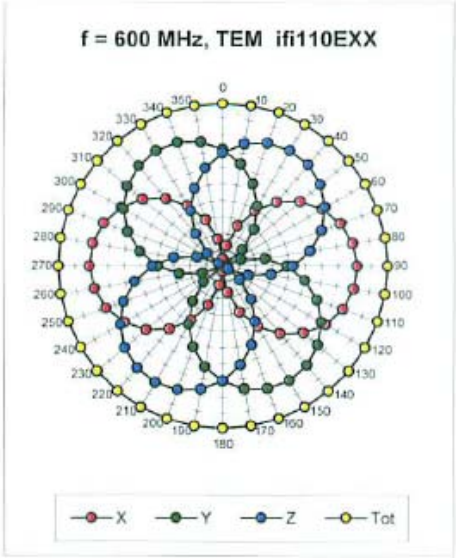
Frequency Response of E-Field

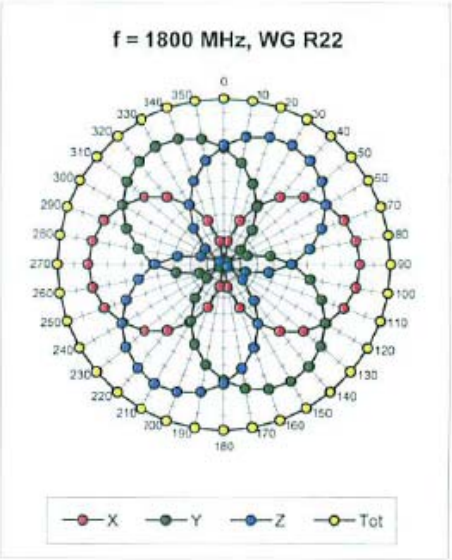
(TEM-Cell:ifi110 EXX, Waveguide: R22)

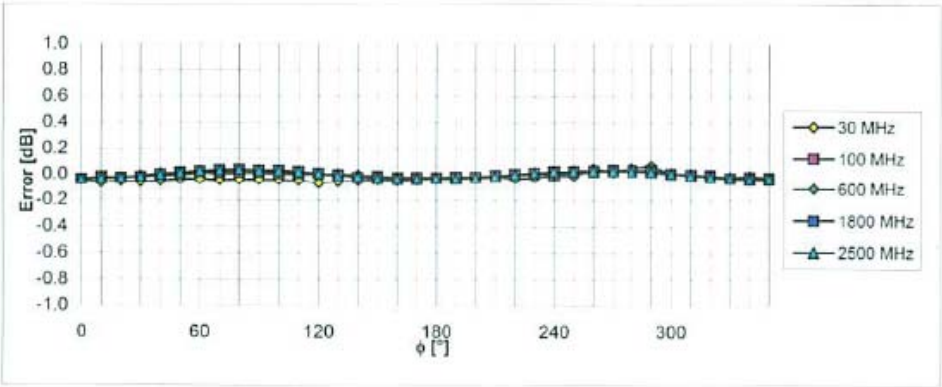


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



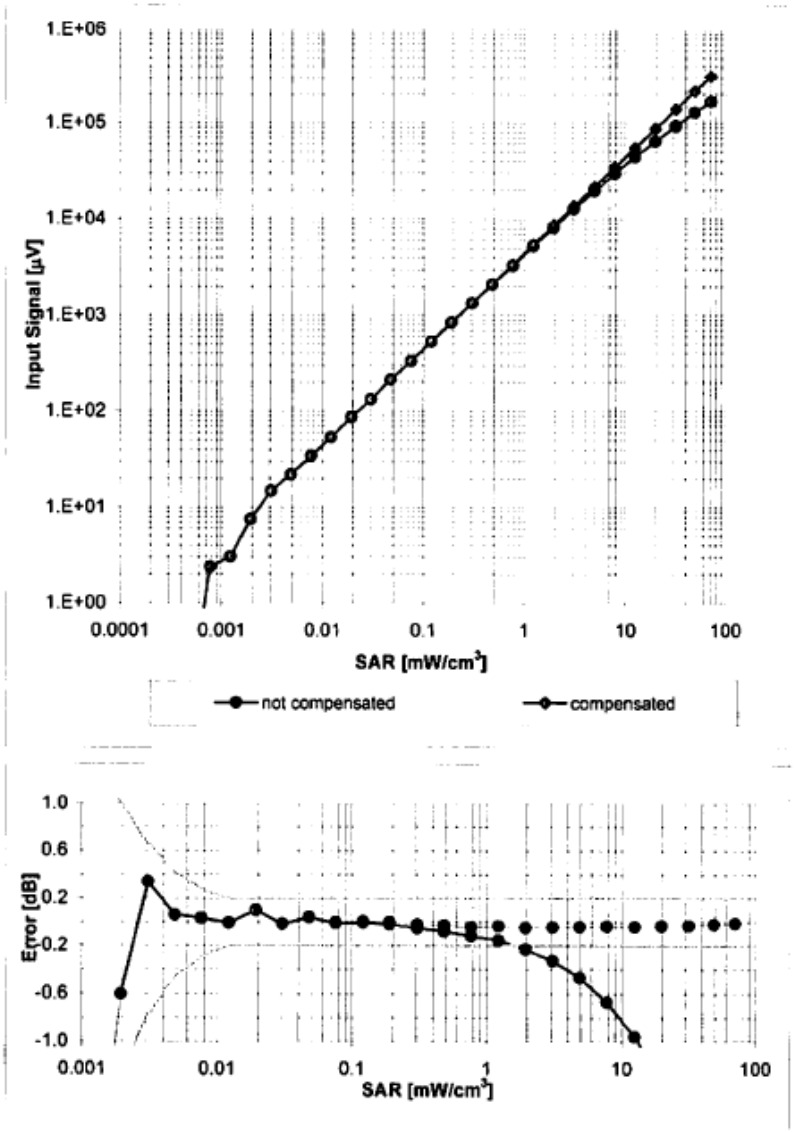




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

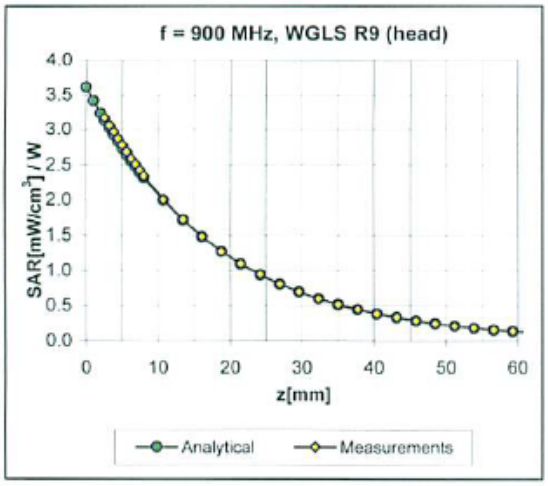
Dynamic Range f(SAR_{head})

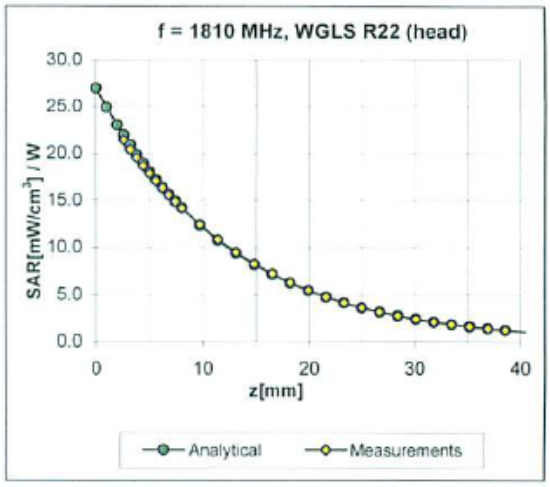
(Waveguide R22, f = 1800 MHz)



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

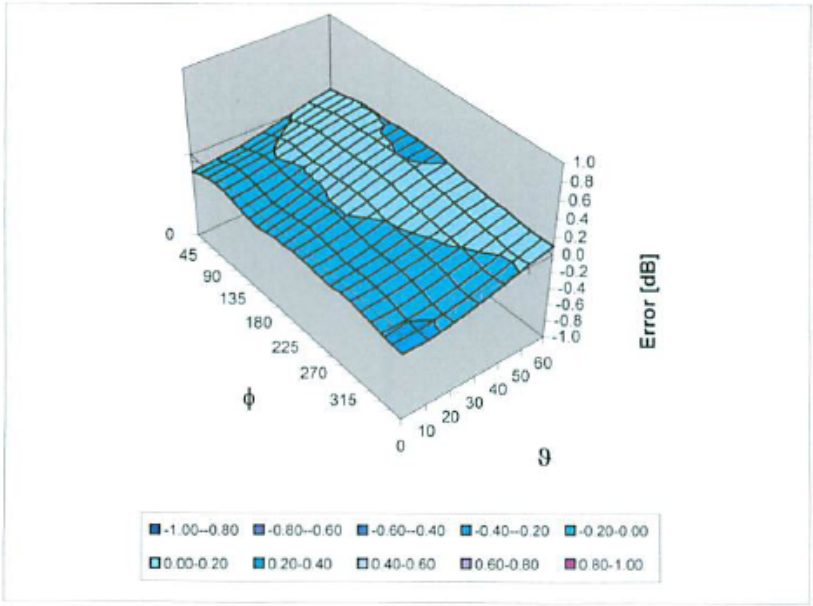
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Other Probe Parameters

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

Schmid & Partner Engineering AG

s p e a g

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

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ES3DV3**
Serial Number:	**3147**
Place of Assessment:	**Zurich**
Date of Assessment:	**February 22, 2010**
Probe Calibration Date:	**February 18, 2010**

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

Assessed by:

Schmid & Partner Engineering AG

s p e a g

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

Dosimetric E-Field Probe ES3DV3 SN:3147

Conversion factor (± standard deviation)

150 MHz	*ConvF*	**8.0 ± 10%**	**ε_r = 52.3** **σ = 0.76 mho/m** (head tissue)
250 MHz	*ConvF*	**7.2 ± 10%**	**ε_r = 47.6** **σ = 0.83 mho/m** (head tissue)
150 MHz	*ConvF*	**7.7± 10%**	**ε_r = 61.9** **σ = 0.80 mho/m** (body tissue)
250 MHz	*ConvF*	**7.3 ± 10%**	**ε_r = 59.4** **σ = 0.88 mho/m** (body tissue)
300 MHz	*ConvF*	**7.1 ± 9%**	**ε_r = 58.2** **σ = 0.92 mho/m** (body tissue)

Important Note:

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

Please see also Section 4.7 of the DASY4 Manual.

APPENDIX C
Dipole Calibration Certificates

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

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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 CGISS**

Certificate No: **D450V2-1002_Sep08**

CALIBRATION CERTIFICATE

Object	D450V2 - SN: 1002
Calibration procedure(s)	QA CAL-15.v5 Calibration Procedure for dipole validation kits below 800 MHz
Calibration date:	September 26, 2008
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	01-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	01-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	01-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	01-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Mar-09
Type-N mismatch combination	SN: 5047.2 / 06327	01-Jul-08 (No. 217-00867)	Jul-09
Reference Probe ET3DV6 (LF)	SN: 1507	27-Jun-08 (No. ET3-1507_Jun08)	Jun-09
DAE4	SN: 601	14-Mar-08 (No. DAE4-601_Mar08)	Mar-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	04-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	19-Oct-01 (in house check Oct-07)	In house check: Oct-08

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

Issued: September 29, 2008

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

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConF	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	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Flat Phantom V4.4	Shell thickness: 6 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Area Scan Resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	43.5	0.87 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	43.1 ± 6 %	0.83 mho/m ± 6 %
Head TSL temperature during test	(21.8 ± 0.2) °C	----	—

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	398 mW input power	1.97 mW / g
SAR normalized	normalized to 1W	4.95 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**5.03 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	398 mW input power	1.33 mW / g
SAR normalized	normalized to 1W	3.34 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**3.37 mW / g ± 17.6 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	56.3 Ω - 6.1 jΩ
Return Loss	- 21.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.348 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	March 22, 2002

DASY5 Validation Report for Head TSL

Date/Time: 26.09.2008 13:21:17

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 450 MHz; Type: D450V2; Serial: D450V2 - SN:1002

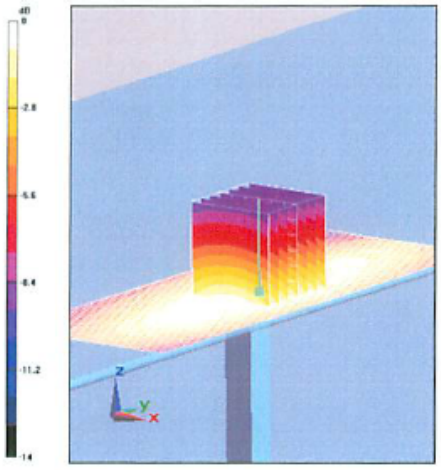
Communication System: CW; Frequency: 450 MHz; Duty Cycle: 1:1
Medium: HSL450
Medium parameters used: f = 450 MHz; σ = 0.83 mho/m; ε_r = 43.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ET3DV6 - SN1507 (LF); ConvF(6.66, 6.66, 6.66); Calibrated: 27.06.2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 4.4; Type: Flat Phantom 4.4
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

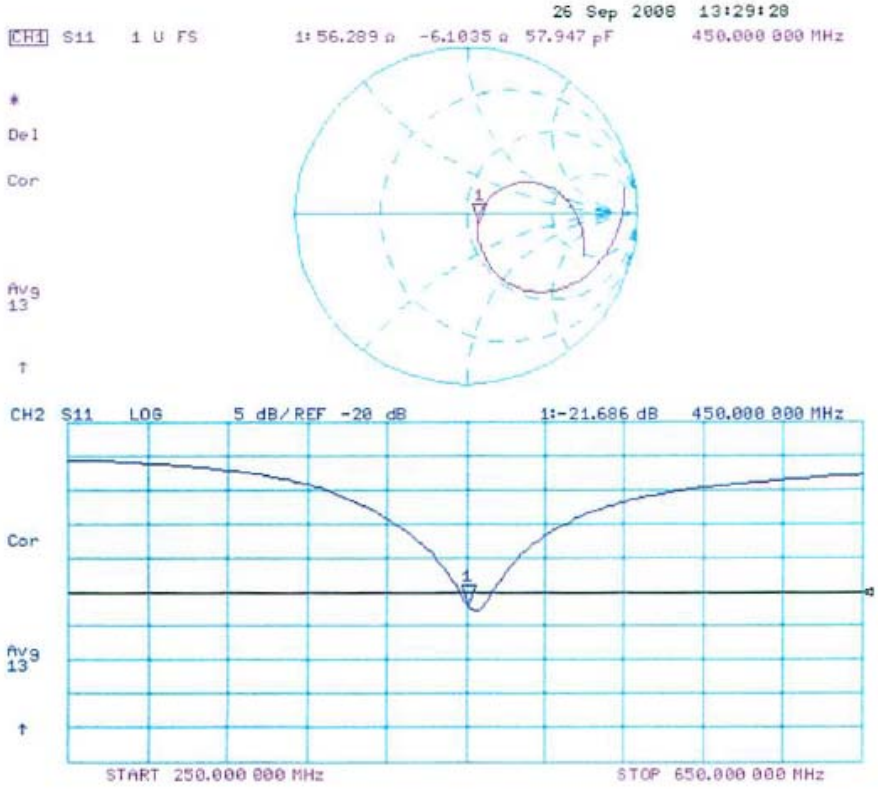
d=15mm, Pin=398mW/Area Scan (41x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.09 mW/g

d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.7 V/m; Power Drift = -0.034 dB
Peak SAR (extrapolated) = 2.92 W/kg
SAR(1 g) = 1.97 mW/g; SAR(10 g) = 1.33 mW/g
Maximum value of SAR (measured) = 2.12 mW/g



0 dB = 2.12mW/g

Impedance Measurement Plot for Head TSL



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Accreditation No.: SCS 108

Client **Motorola EME**

Certificate No: D450V2-1001_Apr10

CALIBRATION CERTIFICATE

Object D450V2 - SN: 1001

Calibration procedure(s) QA CAL-15.v5
Calibration Procedure for dipole validation kits below 800 MHz

Calibration date: April 26, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Type-N mismatch combination	SN: 5047.3 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ET3DV6 (LF)	SN: 1507	03-Jul-09 (No. ET3-1507_Jul09)	Jul-10
DAE4	SN: 654	23-Apr-10 (No. DAE4-654_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

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

Issued: April 26, 2010

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConF	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 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	V5.2
Extrapolation	Advanced Extrapolation	
Phantom	Flat Phantom V4.4	Shell thickness: 6 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Area Scan Resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	43.5	0.87 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	44.2 ± 6 %	0.83 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	398 mW input power	1.93 mW / g
SAR normalized	normalized to 1W	4.85 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**5.05 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	398 mW input power	1.28 mW / g
SAR normalized	normalized to 1W	3.22 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**3.33 mW / g ± 17.6 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.3 Ω - 9.3 jΩ
Return Loss	- 20.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.343 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	March 22, 2002

DASY5 Validation Report for Head TSL

Date/Time: 26.04.2010 11:59:05

Test Laboratory: SPEAG, Zurich, Switzerland

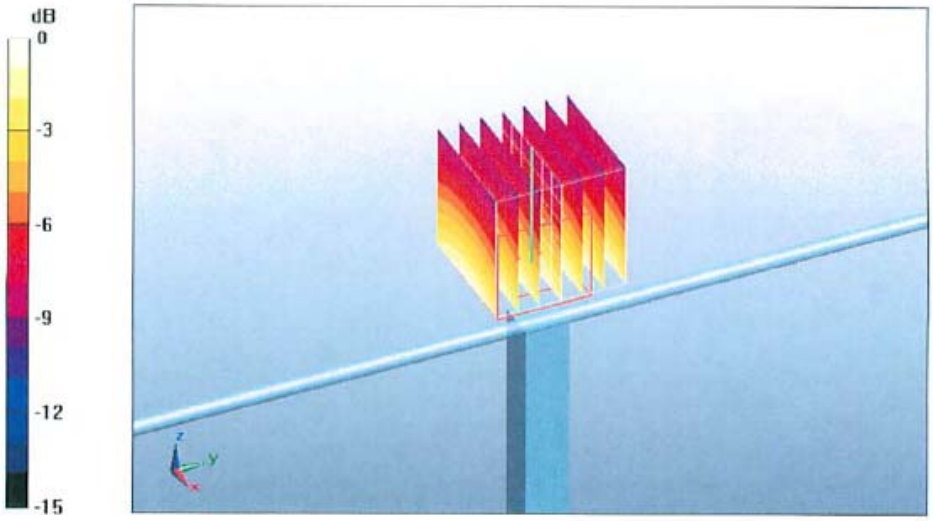
DUT: Dipole 450 MHz; Type: D450V2; Serial: D450V2 - SN:1001

Communication System: CW; Frequency: 450 MHz; Duty Cycle: 1:1
Medium: HSL450
Medium parameters used: f = 450 MHz; σ = 0.83 mho/m; ε_r = 44.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ET3DV6 - SN1507 (LF); ConvF(6.66, 6.66, 6.66); Calibrated: 03.07.2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 23.04.2010
- Phantom: Flat Phantom 4.4 ; Type: Flat Phantom 4.4; Serial: 1002
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 57

Pin=398mW/d=15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.7 V/m; Power Drift = 0.0013 dB
Peak SAR (extrapolated) = 2.89 W/kg
SAR(1 g) = 1.93 mW/g; SAR(10 g) = 1.28 mW/g
Maximum value of SAR (measured) = 2.07 mW/g



0 dB = 2.07mW/g

Impedance Measurement Plot for Head TSL