MOTOROLA SOLUTIONS

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TESTING CERT # 2518.01

DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2

Motorola Solutions Inc. **EME Test Laboratory** 8000 West Sunrise Blvd Fort Lauderdale, FL. 33322.	**Date of Report:** 10/30/2013 **Report Revision:** B **Report ID:** SR11747 APX4000 900 Exp Rev B 131030

Responsible Engineer:	Michael Sailsman(Senior Staff EME Engineer)
Report Author:	Michael Sailsman (Senior Staff EME Engineer)
Date/s Tested:	7/25/2012-8/29/2012
Manufacturer/Location:	Motorola, Penang
Sector/Group/Div.:	AESS – Astro Engineering Subscriber Solutions
Date submitted for test:	7/19/2012
DUT Description:	896-941MHz 1-3W 6.25kHz/12.5kHz, Single Display Model full keypad. Capable of digital and analog FM transmission. Also capable of TDMA transmission. This radio is Bluetooth equipped.
Test TX mode(s):	CW (PTT); CW (Bluetooth)
Max. Power output:	3.0 W; 10 mW (Bluetooth)
Nominal Power:	2.5W; 10 mW (Bluetooth)
Tx Frequency Bands:	896- 902 MHz, 935-941 MHz; 2.402-2.480 GHz (Bluetooth)
Signaling type:	FM, TDMA, FHSS (Bluetooth)
Model(s) Tested:	H51WCH9PW7AN (MUF1608)
Model(s) Certified:	H51WCH9PW7AN (MUF1608)
Serial Number(s):	426TNP0238
Classification:	Occupational/Controlled
FCC ID:	AZ489FT5861; Rule Part 90 (896-901MHz & 935-940MHz); Rule Part 24 (901-902 & 940-941 MHz); Rule Part 15 (2402 – 2480 MHz) Results outside FCC bands are not applicable for FCC compliance demonstration.
IC:	N/A

* 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 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.

Zakharia Deanna-EDC015 **Deanna Zakharia** **EMS EME Lab Senior Resource Manager, Laboratory Director** **Approval Date:** 10/31/2013	**Certification Date**: 10/9/2013 **Certification No.:** L1131003

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Report Revision History

Date	Revision	Comments
9/27/2013	O	Initial release
10/3/2013	A	Removed references to IC designator
10/30/2013	B	Included simultaneous results to section 15

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 H51WCH9PW7AN (MUF1608).

2.0 Abbreviations / Definitions

CNR: Calibration Not Required
EME: Electromagnetic Energy
CQPSK**:** Compatible Quadrature Phase-Shift Keying
FHSS: Frequency Hopping Spread Spectrum
BT: Bluetooth
CW: Continuous Wave
DUT: Device Under Test
DC: Duty Cycle
FM: Frequency Modulation/Factory Mutual
NA: Not Applicable
PTT: Push to Talk
RSM: Remote Speaker Microphone
SAR: Specific Absorption Rate
TDMA: Time Division Multiple Access
RF: Radio Frequency
C4FM: Compatible 4-level Frequency Modulation
DSP: Digital Signal Processor

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 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. Negative or reduced SAR scaling is not permitted.

6.0 Description of Device Under Test (DUT)

This device operates using TDMA and analog frequency modulation (FM) 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 at 12.5 kHz 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 50% for F2 (2 slot TDMA) protocol 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. This device also incorporates a Class 1 Bluetooth device which is a Frequency Hopping Spread Spectrum (FHSS) technology. The Bluetooth radio modem is used to wireless link audio accessories. The maximum actual transmission duty cycle is imposed by the Bluetooth standard. The maximum duty cycle for BT is 76.1%.

The model represented under this filing utilizes a removable antenna (900 MHz band) and an internal fixed antenna (Bluetooth) capable of transmitting in the 896-902MHz & 935-941MHz and 2.402-2.480 GHz (Bluetooth) bands respectively. The nominal output powers are 2.5W (900MHz), with maximum output powers of 3.0 W. The nominal BT output power is 0.010 W and the maximum output power is 0.010 W as defined by upper limit of the production line final test station. The intended operating positions are "at the face" with the DUT at least 1 inch from the mouth, and "at the body" by means of the offered body worn accessories, and "at the shoulder" by means of the offered Public Safety Microphone. Body worn audio and PTT operation is accomplished by means of optional remote accessories that are connected to the radio. Operation at the body without an audio accessory attached is possible by means of wireless BT accessories.

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 per the guidelines outlined in "SAR Test Reduction Considerations for Occupational PTT Radios" FCC KDB 643646 to assess compliance of this device. The following sections identify the test criteria and details for each accessory category. Refer to Exhibit 7B for antenna separation distances.

7.1 Antennas

There is one antenna and one BT internal antenna offered for this product. The table below lists their descriptions.

TABLE 2

Antenna Models	Description	Selected for test	Tested
PMAF4008A	½ wave whip 896-940MHz/1575MHz	Yes	Yes
84009370001	internal speaker/mic/flex Bluetooth; 2402-2481 MHz ¼ wave	Yes	NA

7.2 Batteries

There are three batteries offered for this product. The table below lists the batteries, and battery description.

TABLE 3

Battery Models	Description	Selected for test	Tested	Comments
NNTN8128B	IMPRES Li Ion Slim Battery Non FM 1900mAh	Yes	Yes	
NNTN8129A	IMPRES Li Ion High Cap Battery FM, 2300 mAh	Yes	Yes	
PMNN4424A	IMPRES Li Ion High Cap Battery non FM, 2300 mAh	No	No	Similar to NNTN8129A

7.3 Body worn Accessories

All body worn accessories were considered. The table below lists the body worn accessories, and body worn accessory descriptions.

TABLE 4

Body worn Models	Description	Selected for test	Tested	Comments
PMLN6085A	Carry Holder with 2.5" swivel belt loop	Yes	Yes	
PMLN4651A	2" belt clip	Yes	Yes	
PMLN7008A	2.5" belt clip	Yes	Yes	
NTN5243A	Carry Strap	Yes	Yes	Tested with PMLN6085A

7.4 Audio Accessories

All audio accessories were considered. The table below lists the offered audio accessories and their descriptions. Exhibit 7B illustrates photos of the tested audio accessories.

TABLE 5

Audio Acc. Models	Description	Selected for test	Tested	Comments
HMN4104B	IMPRES Display Submersible RSM w/jack & Ch. Selector	Yes	Yes	
HMN4101B	Model D-IMPRES no display submersible RSM w/ jack, no chnl	No	No	Similar to HMN4104B – same cable length and connector pins
HMN4103B	Model B-IMPRES no display submersible RSM w/ jack, no chnl	No	No	Similar to HMN4104B – same cable length and connector pins
RMN5116A	Rx/Tx boomless bone conductive temple transducer for DRSM	Yes	No	Intended for test with HMN4104B
RLN6424A	Rx-Only earpiece with translucent tube and rubber eartip	No	No	Similar to RMN5116A – connects to RSM
PMLN5275B	Core H/D headset	Yes	No	
PMLN5111A	Plus 3-wire – Black – One programmable button	Yes	No	
PMMN4062A	Large Plus Noise cancelling RSM IP55 3.5MM jack	Yes	No	
PMMN4069A	Large RSM with audio jack	No	No	Similar to PMMN4062A
PMMN4025A	Small RSM IP54 with 3.5mm jack Rx only	No	No	Similar to PMMN4062A – same cable length and connector pins
PMMN4065A	Standard Large IP57 RSM	Yes	No	
PMMN4024A	Small Core RSMIP54 with 3.5mm jack Rx only	Yes	No	
PMLN5102A	Core Ultra-lite headset	Yes	No	
PMLN5101A	IMPRES Temple Transducer	Yes	No	
RMN5058A	Core L/W Headset	Yes	No	
RLN5878A	Core 1 wire – Black	No	No	
RLN5882A	Plus 2-wire with translucent tube – Black – One programmable button	Yes	No	
RLN5880A	Plus 2-wire Black – one programmable button	No	No	Similar to RLN5882A
PMMN4040A	IMPRES IP57 submersible RSM	Yes	No	
PMMN4046A	IMPRES Speaker Mic w/ vol IP57	Yes	No	
PMMN4050A	IMPRES RSM, NC	Yes	No	
PMLN5096B	Core Earset D-Shell	Yes	No	
PMLN5097A	IMPRES 3 wire surveillance –BLK	Yes	No	
PMLN5653A	IMPRES Ear Mic System	Yes	No	
PMLN4620A	D-Shell RX-Only Earpiece (3.5mm)	No	No	Receive only
RLN4941A	3.5mm RX ONLY EARPIECE W/TRANSLUCENT TUBE-Short coiled cbl	No	No	Receive only
AARLN4885B	3.5mm RX ONLY EARBUD FOR REM SPK MIC short coiled cbl	No	No	Receive only
WADN4190B	3.5mm EAR RCVR W/COIL CBL-Short cbl	No	No	Receive only

8.0 Description of Test System

8.1 Descriptions of Robotics/Probes/Readout Electronics

Table 6

Dosimetric System type	System version	DAE type	Probe Type
Schmid & Partner Engineering AG SPEAG DASY 5	52.6.2.424	DAE3	ES3DV3 (E-Field)

The DASY5™ system is operated per the instructions in the DASY5™ 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)

TABLE 7

Phantom type	Phantom ID (s)	Material Parameters	Phantom Dimensions LxWxD (mm)	Material Thickness (mm)	Support Structure Material	Loss Tangent (wood)
Dual Flat	NA	300MHz -6GHz; Er = 4+/- 1, Loss Tangent = ≤0.05	600x400x190	2mm +/- 0.2mm	Wood	< 0.05
SAM	NA					
Elliptical	OVAL1021 OVAL1016					

8.3 Description of Simulated Tissue

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 8 below for 900MHz. 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.

Simulated Tissue Composition (by mass)
TABLE 8

Reference Standards	% of listed ingredients	900MHz	
		Head	Body
FCC Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 91-01) IEEE 1528-2003 IEC62209-1 (2005) CENELEC – EN62209-1 (2006)	Sugar	56.5	44.9
	Diacetin	NA	NA
	De ionized – Water	40.95	53.06
	Salt	1.45	0.94
	HEC	1	1
	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 9

Equipment Type	Model Number	Serial Number	Calibration Date	Calibration Due Date
Power Meter (Agilent)	E4419B	MY45103725	3/30/2012	3/30/2013
Power Meter (Agilent)	E4418B	US39251266	2/3/2012	2/3/2013
E-Series Avg. Power Sensor (Agilent)	E9301B	MY50280001	8/8/2011	8/8/2012
E-Series Avg. Power Sensor (Agilent)	E9301B	MY50290001	8/8/2011	8/8/2012
E-Series Avg. Power Sensor (Agilent)	E9301B	MY41495730	4/3/2012	4/3/2013
E-Series Avg. Power Sensor (Agilent)	E9301B	MY41495733	4/3/2012	4/3/2013
E-Series Avg. Power Sensor (Agilent)	E9301B	MY41495594	2/6/2012	2/6/2013
E-Series Avg. Power Sensor (Agilent)	E9301B	MY50280001	8/3/2012	8/3/2013
E-Series Avg. Power Sensor (Agilent)	E9301B	MY50290001	8/3/2012	8/3/2013
Bi-Directional Coupler (NARDA)	3020A	40296	2/9/2012	2/9/2014
Signal Generator (Agilent)	E4428C	MY47381119	6/24/2011	6/24/2013
AMP (Amplifier Research)	10WD1000	28782	CNR	CNR*
Dickson Temperature Recorder	TM325	12121144	5/18/2012	5/18/2013
Omega Digital Thermometer with J Type TC Probe	HH200A	20857	10/28/2011	10/28/2012
Omega Digital Thermometer with J Type TC Probe	HH202A	18800	2/22/2012	2/22/2013
Omega Digital Thermometer with J Type TC Probe	HH202A	18801	5/23/2012	5/23/2013
Omega Digital Thermometer with J Type TC Probe	HH202A	18812	6/25/2012	6/25/2013
Agilent PNA-L Network Analyzer	N5230A	MY45001092	6/4/2012	6/4/2013
Dielectric Probe Kit (HP)	85070C	US99360076	CNR	CNR*
SPEAG Probe	ES3DV3	3147	1/25/12	1/25/2013
SPEAG Dipole	D900V2	85	4/10/2012	4/10/2014

***Calibration is not required by the OEM. The dielectric probe kit is used in conjunction with a calibrated network analyzer. The dielectric probe kit is calibrated for short, open, and load using the calibrated network analyzer. A saline solution is routinely measured as an additional check point.**

10.0 SAR Measurement System Verification

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.

10.1 Equivalent Tissue Test Results

Simulated tissue prepared for SAR measurements is measured daily and within 24 hours prior to actual SAR testing to verify that the tissue is within +/- 5% of target parameters at the center of the transmit band. This measurement is done using the applicable equipment indicated in section 9.0. The table below summarizes the measured tissue parameters used for the SAR assessment.

TABLE 10

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
900	FCC Body	1.05 (1.00-1.10)	55.0 (52.3-57.8)	1.06	54.8	7/25/12
				1.08	54.7	8/10/12
				1.08	54.9	8/13/12
				1.07	53.1	8/21/12
				1.03	52.7	8/29/12
900	IEEE /IEC Head	0.97 (0.92-1.02)	41.5 (39.4-43.6)	0.94	40.3	7/27/12
896	FCC Body	1.05 (0.99-1.10)	55.0 (52.3-57.8)	1.06	54.9	7/25/12
				1.08	54.8	8/10/12
				1.08	55.0	8/13/12
				1.06	53.1	8/21/12
				1.03	52.7	8/29/12
896	IEEE / IEC Head	0.97 (0.92-1.02)	41.5 (39.4-43.6)	0.93	40.3	7/27/12
938	FCC Body	1.07 (1.02-1.12)	54.9 (52.2-57.7)	1.10	54.5	7/25/12
				1.12	54.6	8/13/12
				1.10	52.7	8/21/12
935	IEEE / IEC Head	0.98 (0.94-1.03)	41.4 (39.4-43.5)	1.00	40.0	7/27/12

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 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 11

Probe Serial #	Tissue Type	Dipole Kit / Serial #	Reference SAR @ 1W (W/kg)	System Check Results Measured (W/kg)	System Check Test Results when normalized to 1W (W/kg)	Tested Date
3147	900 MHz FCC Body	D900V2	11.25 +/- 10%	2.86	11.44	7/25/12
				2.74	11.40	8/10/12
				2.85	11.40	8/13/12
				2.80	11.20	8/21/12
				2.72	10.88	8/29/12
3147	900 MHz IEEE / IEC Head	D900V2	11.31 +/- 10%	2.82	11.28	7/27/12

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 12

	Target	Measured
Ambient Temperature	18 – 25 ˚C	Range: 20.8 – 22.1˚C Avg. 21.9 ˚C
Relative Humidity	30 – 70 %	Range: 50.0 – 60.4 % Avg. 53.6%
Tissue Temperature	NA	Range: 21.0-21.9˚C Avg. 21.5˚C

Relative humidity target range is a recommended target

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 zoom scans. 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 considered when implementing the guidelines specified in KDB 643646.

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 was positioned in normal use configuration against the phantom with the offered body worn accessory as well as with and without the offered audio accessories as 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

The guidelines and requirements outlined in "SAR Test Reduction Considerations for Occupational PTT Radios" FCC KDB 643646 for head (face) and body/shoulder were used to assess compliance of this device. All modes of operation identified in section 6.0 were considered during the development of the test plan. All tests were performed in 100% CW mode and then 50% duty cycle was applied to the final results. In some cases the initial power listed herein may exceed the reported maximum power due to software step size tuning limitations. However, the initial powers measured are not greater than the allowed 5% of the reported maximum power.

13.0 DUT Test Data

13.1 Assessments at the Body for 896 –902 MHz band

The battery NNTN8128B was selected as the default battery for assessments at the Body since it is the thinnest battery (refers to Exhibit 7B for the dimension of the battery). The conducted power measurement for all test channels within Part 90 frequency range using the default battery NNTN8128B is indicated in Table 13. The channel with the highest conducted power will be identified as the default channel per KDB 643646 SAR Test for PTT Radios. SAR plots of the highest results per table (bolded) are presented in APPENDICES E-G.

TABLE 13

Test Freq (MHz)	Power (W)
896.0125	3.15
899.000	3.12
901.000	3.11

Assessments at the Body with Body worn PMLN4651A

Assessment of the offered antenna with the default battery, body worn PMLN4651A, and additional offered battery per KDB 643646 SAR Test for PTT Radios – Body SAR Test Considerations for Body worn Accessories. Refer to Table 13 for highest output power channel. SAR plots of the highest results per table (bolded) are presented in APPENDIX F.

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#
PMAF4008A	NNTN8128B	PMLN4651 A	HMN4104B	896.0125	3.10	-0.630	2.99	2.16	**1.73**	1.25	JsT-Ab-120725-02
				899.00							
				901.00							
Assessment of the additional offered battery											
PMAF4008A	NNTN8129A	PMLN4651 A	HMN4104B	896.0125	3.11	-0.690	2.62	1.91	1.54	1.12	HvH-Ab-120810-04
				899.00							
				901.00							

Assessments at the Body with Body worn PMLN7008A

Assessment of the offered antenna with the default battery, body worn PMLN7008A, and additional offered battery per KDB 643646 SAR Test for PTT Radios – Body SAR Test Considerations for Body worn Accessories. Refer to Table 13 for highest output power channel. SAR plots of the highest results per table (bolded) are presented in APPENDIX F.

TABLE 15

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#
PMAF4008A	NNTN8128B	PMLN7008A	HMN4104B	896.0125	3.10	-0.520	2.67	1.94	**1.50**	1.09	JsT-Ab-120725-03
				899.00							
				901.00							
Assessment of the additional offered battery											
PMAF4008A	NNTN8129A	PMLN7008A	HMN4104B	896.0125	3.11	-0.640	2.36	1.72	1.37	1.00	HvH-Ab-120810-05
				899.00							
				901.00							

Assessments at the Body with Body worn PMLN6085A

Assessment of the offered antenna with the default battery, body worn PMLN6085A, and additional offered battery per KDB 643646 SAR Test for PTT Radios – Body SAR Test Considerations for Body worn Accessories. Refer to Table 13 for highest output power channel. SAR plots of the highest results per table (bolded) are presented in APPENDIX F.

TABLE 16

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#
PMAF4008A	NNTN8128B	PMLN6085A	HMN4104B	896.0125	3.12	-0.480	0.484	0.362	0.27	0.20	JsT-Ab-120725-04
				899.00							
				901.00							
Assessment of the additional offered battery											
PMAF4008A	NNTN8129A	PMLN6085A	HMN4104B	896.0125	3.11	-0.490	0.506	0.379	**0.28**	0.21	CM-Ab-120813-02
				899.00							
				901.00							

Assessments at the Body with Body worn PMLN6085A (no belt loop) with NTN5243A carry strap

Assessment of the offered antenna with the default battery and body worn PMLN6085A (no belt loop) with NTN5243A carry strap with additional offered battery per KDB 643646 SAR Test for PTT Radios – Body SAR Test Considerations for Body worn Accessories. Refer to Table 13 for highest output power channel. SAR plots of the highest results per table (bolded) are presented in APPENDIX F.

TABLE 17

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#
PMAF4008A	NNTN8128B	PMLN6085A (no belt loop)/NTN5243A	HMN4104B	896.0125	3.12	0.110	2.69	1.80	1.35	0.90	JsT-Ab-120821-03
				899.00							
				901.00							
Assessment of the additional offered battery											
PMAF4008A	NNTN8129A	PMLN6085A (no belt loop)/NTN5243A	HMN4104B	896.0125	3.13	-0.480	2.64	1.69	**1.47**	0.94	JsT-Ab-120821-04
				899.00							
				901.00							

Assessment of other audio accessories at the body

Assessment per "KDB 643646 Body SAR Test Consideration for Audio Accessories without Built-in Antenna; Sec 1, A. when overall < 4.0 W/kg, SAR tested for that audio accessory is not necessary." This was applicable to all remaining accessories.

13.2 Assessments of wireless BT configuration

Assessment using the overall highest SAR configuration at the body from above without an audio accessory attached. SAR plots of the highest results per table (bolded) are presented in APPENDIX F.

TABLE 18

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#
PMAF4008A	NNTN8128B	PMLN4651A	None	896.0125	3.13	-0.440	3.53	2.55	**1.95**	1.41	JsT-Ab-120725-06
				899.00							
				901.00							

13.3 Assessments at the Body for 935-941MHz band

The battery NNTN8128B was selected as the default battery for assessments at the Body since it is the thinnest battery (refers to Exhibit 7B for the dimension of the battery). The conducted power measurement for all test channels within Part 90 frequency range using the default battery NNTN8128B is indicated in Table 19. The channel with the highest conducted power will be identified as the default channel per KDB 643646 SAR Test for PTT Radios v01r01. SAR plots of the highest results per table (bolded) are presented in APPENDICES E-G.

TABLE 19

Test Freq (MHz)	Power (W)
935.0125	3.13
937.500	3.15
940.000	3.11

Assessments at the Body with Body worn PMLN4651A

Assessment of the offered antenna with the default battery, body worn PMLN4651A, and additional offered battery per KDB 643646 SAR Test for PTT Radios – Body SAR Test Considerations for Body worn Accessories. Refer to Table 19 for highest output power channel. SAR plots of the highest results per table (bolded) are presented in APPENDIX F.

TABLE 20

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#
PMAF4008A	NNTN8128B	PMLN4651A	HMN4104B	935.0125							
				937.500	3.11	-0.500	2.41	1.73	**1.35**	0.97	JsT-Ab-120725-07
				940.000							
Assessment of the additional offered battery											
PMAF4008A	NNTN8129A	PMLN4651A	HMN4104B	935.0125							
				937.500	2.97	-0.300	2.20	1.59	1.19	0.86	CM-Ab-120813-06
				940.000							

Assessments at the Body with Body worn PMLN7008A

Assessment of the offered antenna with the default battery, body worn PMLN7008A, and additional offered battery per KDB 643646 SAR Test for PTT Radios – Body SAR Test Considerations for Body worn Accessories. Refer to Table 19 for highest output power channel. SAR plots of the highest results per table (bolded) are presented in APPENDIX F.

TABLE 21

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#
PMAF4008A	NNTN8128B	PMLN7008A	HMN4104B	935.0125							
				937.500	3.11	-0.490	2.30	1.65	**1.29**	0.92	JsT-Ab-120725-08
				940.000							
Assessment of the additional offered battery											
PMAF4008A	NNTN8129A	PMLN7008A	HMN4104B	935.0125							
				937.500	3.05	-0.470	2.06	1.48	1.15	0.82	CM-Ab-120813-07
				940.000							

Assessments at the Body with Body worn PMLN6085A

Assessment of the offered antenna with the default battery, body worn PMLN6085A, and additional offered battery per KDB 643646 SAR Test for PTT Radios – Body SAR Test Considerations for Body worn Accessories. Refer to Table 19 for highest output power channel. SAR plots of the highest results per table (bolded) are presented in APPENDIX F.

TABLE 22

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#
PMAF4008A	NNTN8128B	PMLN6085A	HMN4104B	935.0125							
				937.500	3.11	-0.290	0.454	0.335	**0.24**	0.18	JsT-Ab-120725-09
				940.000							
Assessment of the additional offered battery											
PMAF4008A	NNTN8129A	PMLN6085A	HMN4104B	935.0125							
				937.500	3.07	-0.360	0.408	0.303	0.22	0.16	CM-Ab-120813-08
				940.000							

Assessments at the Body with Body worn PMLN6085A (no belt loop) with NTN5243A carry strap

Assessment of the offered antenna with the default battery and body worn PMLN6085A (no belt loop) and NTN5243A carry strap with additional offered battery per KDB 643646 SAR Test for PTT Radios – Body SAR Test Considerations for Body worn Accessories. Refer to Table 19 for highest output power channel. SAR plots of the highest results per table (bolded) are presented in APPENDIX F.

TABLE 23

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#
PMAF4008A	NNTN8128B	PMLN6085A (no belt loop)/NTN5243 A	HMN4104B	935.0125							
				937.500	3.11	0.080	1.23	0.792	0.615	0.40	JsT-Ab-120821-06
				940.000							
Assessment of the additional offered battery											
PMAF4008A	NNTN8129A	PMLN6085A (no belt loop)/NTN5243 A	HMN4104B	935.0125							
				937.500	3.11	-0.580	2.59	1.52	**1.48**	0.87	CM-Ab-120821-07
				940.000							

Assessment of other audio accessories at the body

Assessment per "KDB 643646 Body SAR Test Consideration for Audio Accessories without Built-in Antenna; Sec 1, A. when overall < 4.0 W/kg, SAR tested for that audio accessory is not necessary." This was applicable to all remaining accessories.

13.4 Assessment of wireless BT configuration

Assessment of the offered antenna PMAF4008A with the default battery and body worn accessories PMLN6085A (no belt loop)/NTN5243A without audio accessory attached. SAR plots of the highest results per table (bolded) are presented in APPENDIX F.

TABLE 24

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#
PMAF4008A	NNTN8129A	PMLN6085A (no belt loop)/NTN5243 A	None	935.0125							
				937.500	3.11	-0.690	2.57	1.53	**1.51**	0.90	CM-Ab-120821-09
				940.000							

13.5 Assessments at the Face 896 – 902 MHz band

The highest capacity battery NNTN8129A was selected as the default battery. The conducted power measurement for all test channels within Part 90 frequency range using the default battery NNTN8129A is indicated in the Table 25. The channel with the highest conducted power was used as the default channel per KDB 643646 SAR Test for PTT Radios. SAR plots of the highest results per table (bolded) are presented in APPENDICES E-G.

TABLE 25

Test Freq (MHz)	Power (W)
896.0125	3.12
899.00	3.12
901.00	3.12

Assessment of the offered antenna with the default battery NNTN8129A, front of DUT facing phantom, and additional offered battery per KDB 643646 SAR Test for PTT Radios – Head SAR Test Considerations. Refer to Table 25 for highest output power channel. SAR plots of the highest results per table (bolded) are presented in APPENDIX E.

TABLE 26

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#
PMAF4008A	NNTN8129A	None	None	896.0125	3.12	-0.43	3.18	2.31	**1.76**	1.28	ErC-Face-120727-02
				899.00							
				901.00							
Assessment of the additional offered battery											
PMAF4008A	NNTN8128B	None	None	896.0125	3.12	-0.39	3.00	2.18	1.64	1.19	ErC-Face-120727-03
				899.00							
				901.00							

13.6 Assessments at the Face 935-941 MHz band

The highest capacity battery NNTN8129A was selected as the default battery. The conducted power measurement for all test channels within Part 90 frequency range using the default battery NNTN8129A is indicated in the Table 27. The channel with the highest conducted power was used as the default channel per KDB 643646 SAR Test for PTT Radios. SAR plots of the highest results per table (bolded) are presented in APPENDICES E-G.

TABLE 27

Test Freq (MHz)	Power (W)
935.0125	3.14
937.500	3.13
940.000	3.11

Assessment of the offered antenna with the default battery NNTN8129A, front of DUT facing phantom, and additional offered battery per KDB 643646 SAR Test for PTT Radios – Head SAR Test Considerations. Refer to Table 27 for highest output power channel. SAR plots of the highest results per table (bolded) are presented in APPENDIX F.

TABLE 28

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#
PMAF4008A	NNTN8129A	None	None	935.0125	3.12	-0.44	2.04	1.48	**1.13**	0.82	ErC-Face-120727-05
				937.500							
				940.000							
Assessment of the additional offered battery											
PMAF4008A	NNTN8128B	None	None	935.0125	3.12	-0.44	2.03	1.47	1.12	0.81	ErC-Face-120727-06
				937.500							
				940.000							

13.7 Assessment at the Bluetooth band

Per guidelines in KDB 447498, the following formula was used to determine the test exclusion for standalone Bluetooth transmitter;

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] *[$\sqrt{F_{(GHz)}}$] = 2.5, which is ≤ 3 for 1-g SAR

Where:

Max. power = 8mW (10mW*76.1% duty cycle)
Min. test separation distance = 5mm for actual test separation < 5mm
F(GHz) = 2.48 GHz

Per the result from the calculation above, the standalone SAR assessment was not required for Bluetooth band. Therefore, SAR results for Bluetooth are not reported herein.

13.8 Shortened Scan Assessment

A "shortened" scan using the highest SAR configuration overall from above was performed to validate the SAR drift of the full DASY5™ coarse and 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 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 SAR result from the table below is provided in APPENDIX E.

TABLE 29

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#
PMAF4008A	NNTN8128B	PMLN4651A	None	896.0125	3.12	-0.240	3.56	2.57	1.88	1.36	CM-Ab-120829-08

14.0 Simultaneous Transmission Exclusion

Per guidelines in KDB 447498, the following formula was used to determine the test exclusion to an antenna that transmits simultaneously with other antennas for test distances ≤ 50mm:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] *[√F(GHz)/X] = 0.32 W/kg (1g-SAR)

Where:
X = 7.5 for 1g-SAR; 18.75 for 10g (per KDB 447498 D01 v05)
Max. power = 8mW (10mW*76.1% duty cycle)
Min. test separation distance = 5mm for actual test separation < 5mm
F(GHz) = 2.48 GHz

Per the result from the calculation above, the 1g/10g SAR estimation for Bluetooth are 0.3/0.1 W/kg.

15.0 Conclusion

The highest Operational Maximum Calculated 1-gram and 10-gram average SAR values found for this filing: Model H51WCH9PW7AN (MUF1608).

TABLE 30

Designator	Frequency band (MHz)	Max Calc at Body (mW/g)		Max Calc at Face (mW/g)	
		1g-SAR	10g-SAR	1g-SAR	10g-SAR
Overall	896-902	1.95	1.41	1.76	1.28
	935-941	1.51	0.90	1.13	0.82
FCC	896-902	1.95	1.41	1.76	1.28
	935-941	1.51	0.90	1.13	0.82

All results are scaled to the maximum output power

The highest combined 1g-SAR results for simultaneous is indicated in the following table:

TABLE 31

Designator	Frequency bands	Combined 1g-SAR (mW/g) Body	Combined 10g-SAR (mW/g) Body	Combined 1g-SAR (mW/g) Face	Combined 10g-SAR (mW/g) Face
Overall	896-902	2.25	1.51	2.06	1.38
	935-941	1.81	1.00	1.43	0.92
FCC	896-902	2.25	1.51	2.06	1.38
	935-941	1.81	1.00	1.43	0.92

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.

16.0 Variability Assessment

Based on the guidelines in KDB 865664 variability assessments are not required for this 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.

Uncertainty Budget for Device Under Test, for 800 MHz to 3 GHz

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

FCD-0558 Uncertainty Budget Rev.8

Uncertainty Budget for System Validation (dipole & flat phantom) for 800 MHz to 3 GHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	IEEE 1528 section	Tol. (± %)	Prob. Dist.	Div.	c_i (1 g)	c_i (10 g)	1 g u_i (±%)	10 g u_i (±%)	v_i
Measurement System									
Probe Calibration	E.2.1	5.9	N	1.00	1	1	5.9	5.9	∞
Axial Isotropy	E.2.2	4.7	R	1.73	1	1	2.7	2.7	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	0.0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t. Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	2.0	R	1.73	1	1	1.2	1.2	∞
Input Power and SAR Drift Measurement	8, 6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	3.3	R	1.73	0.64	0.43	1.2	0.8	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	1.9	R	1.73	0.6	0.49	0.6	0.5	∞
Combined Standard Uncertainty			RSS				9	9	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				18	17	

FCD-0558 Uncertainty Budget Rev.8

Notes 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

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C Service suisse d'étalonnage
S Servizio svizzero di taratura
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Accreditation No.: **SCS 108**

Client **Motorola EME**

Certificate No: **ES3-3147_Jan12**

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3147
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:	January 25, 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	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-11 (No. ES3-3013_Dec11)	Dec-12
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: January 27, 2012

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

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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 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:3147

Manufactured: July 12, 2007
Calibrated: January 25, 2012

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

DASY/EASY - 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]	1.26	1.20	1.18	± 10.1 %
DCP (mV)[B]	100.8	104.2	104.7	

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	107.9	±2.7 %
			Y	0.00	0.00	1.00	113.9	
			Z	0.00	0.00	1.00	106.4	

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:3147

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	7.00	7.00	7.00	0.24	1.05	± 13.4 %
450	43.5	0.87	6.50	6.50	6.50	0.14	1.70	± 13.4 %
750	41.9	0.89	6.29	6.29	6.29	0.20	2.38	± 12.0 %
900	41.5	0.97	5.97	5.97	5.97	0.24	2.24	± 12.0 %
1810	40.0	1.40	5.18	5.18	5.18	0.80	1.17	± 12.0 %
1950	40.0	1.40	4.97	4.97	4.97	0.62	1.28	± 12.0 %
2300	39.5	1.67	4.78	4.78	4.78	0.80	1.23	± 12.0 %
2450	39.2	1.80	4.49	4.49	4.49	0.74	1.32	± 12.0 %
2600	39.0	1.96	4.30	4.30	4.30	0.75	1.34	± 12.0 %
3500	37.9	2.91	4.25	4.25	4.25	1.00	0.94	± 13.1 %
3700	37.7	3.12	3.78	3.78	3.78	1.00	1.18	± 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:3147

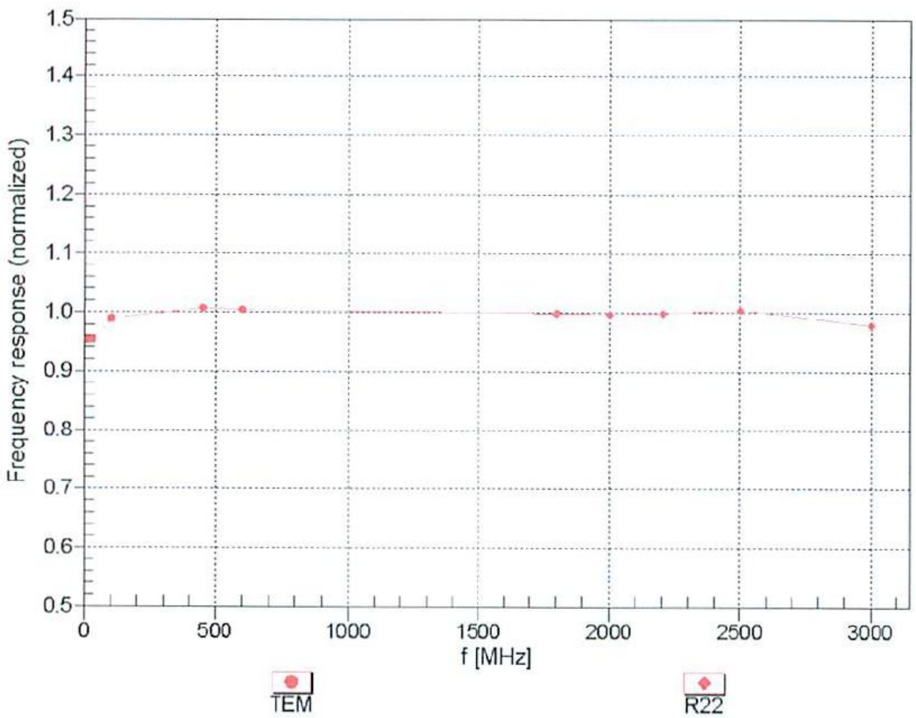
Calibration Parameter Determined in Body Tissue Simulating Media

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	6.81	6.81	6.81	0.20	1.31	± 13.4 %
450	56.4	0.94	6.92	6.92	6.92	0.09	1.00	± 13.4 %
750	55.5	0.96	6.15	6.15	6.15	0.80	1.14	± 12.0 %
900	55.0	1.05	6.03	6.03	6.03	0.80	1.12	± 12.0 %
1810	53.3	1.52	4.82	4.82	4.82	0.45	1.80	± 12.0 %
1950	53.3	1.52	4.74	4.74	4.74	0.62	1.46	± 12.0 %
2300	52.9	1.81	4.33	4.33	4.33	0.80	1.15	± 12.0 %
2450	52.7	1.95	4.23	4.23	4.23	0.80	0.99	± 12.0 %
2600	52.5	2.16	4.08	4.08	4.08	0.67	1.01	± 12.0 %
3500	51.3	3.31	3.45	3.45	3.45	1.00	1.34	± 13.1 %
3700	51.0	3.55	3.40	3.40	3.40	0.76	1.62	± 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.

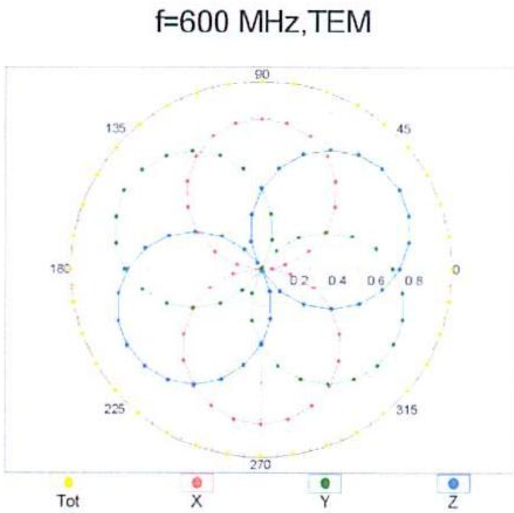
Frequency Response of E-Field

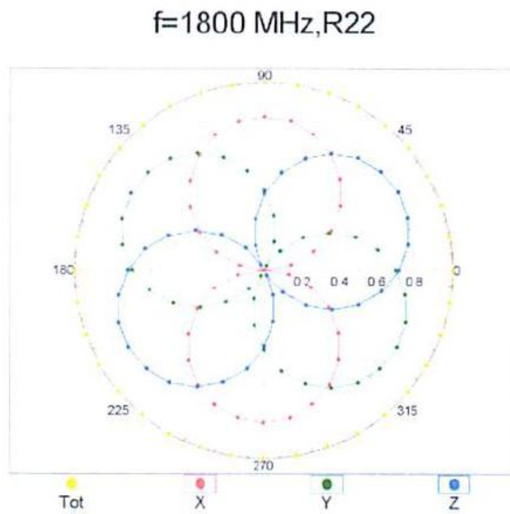
(TEM-Cell:ifi110 EXX, Waveguide: R22)

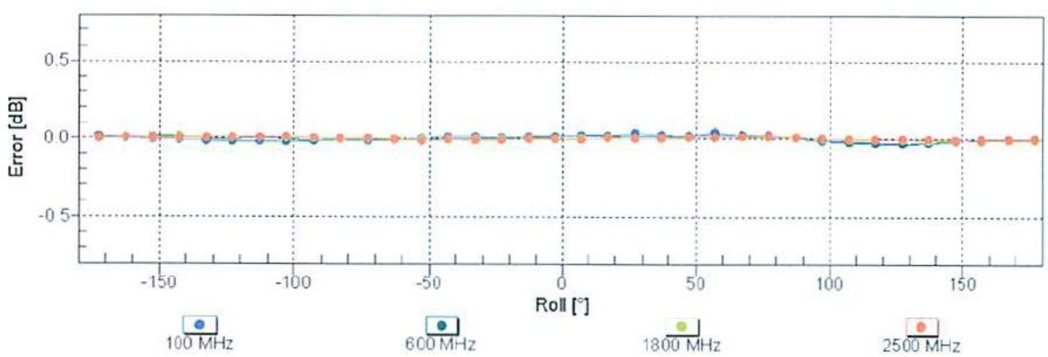


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°

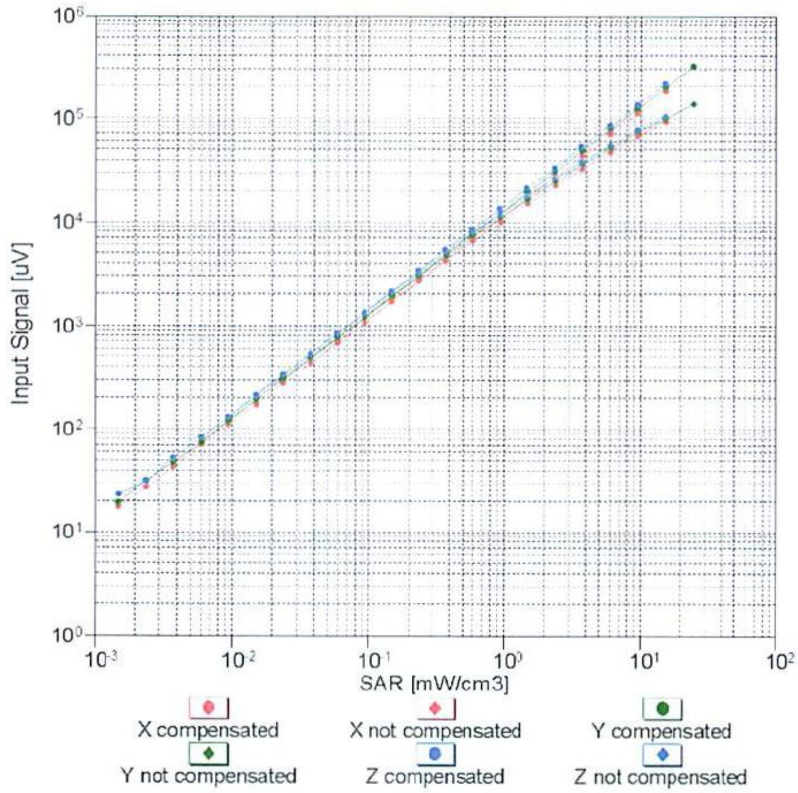


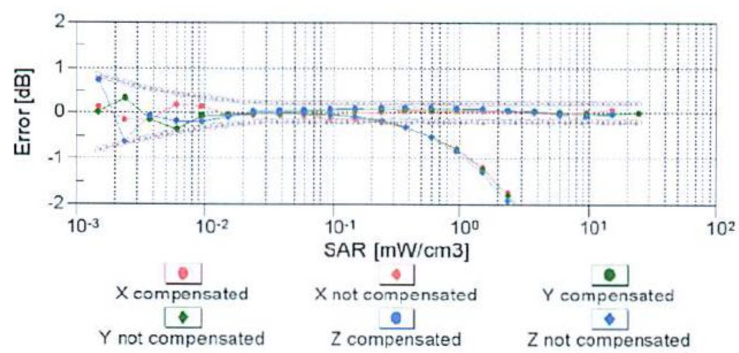




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

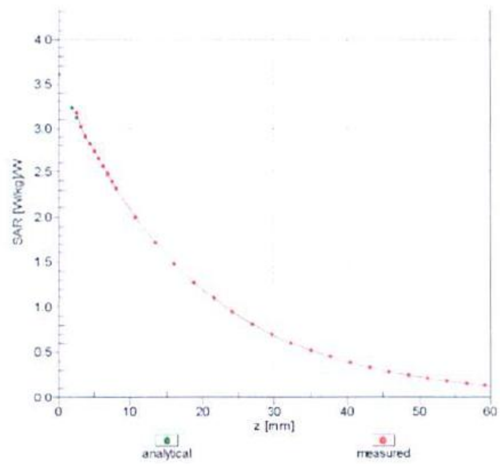
Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

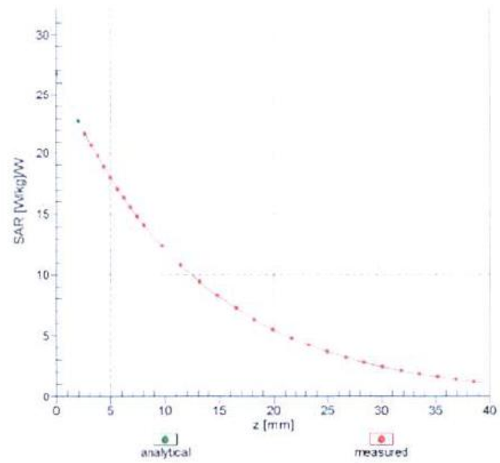




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

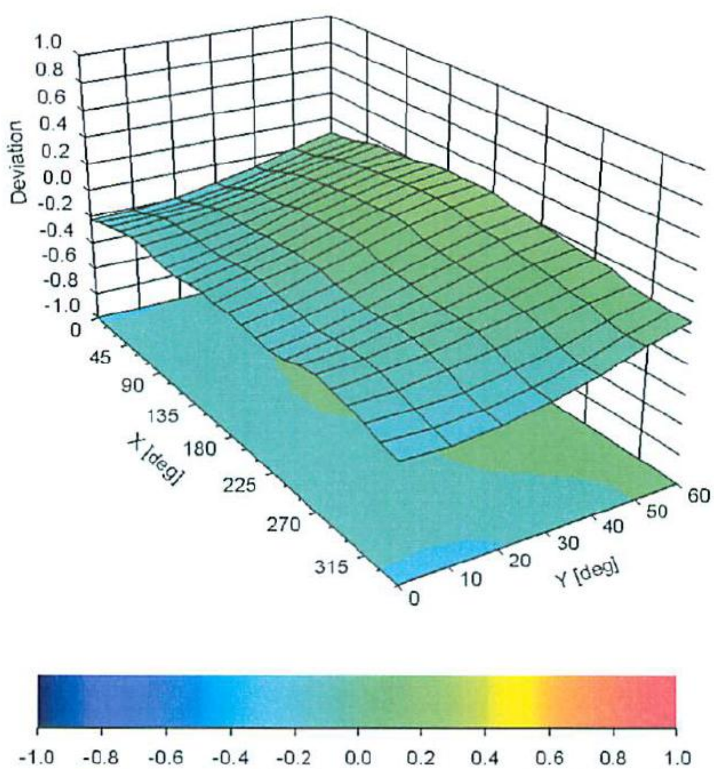
Conversion Factor Assessment





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:3147

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

s p e a g

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Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ES3DV3**
Serial Number:	**3147**
Place of Assessment:	**Zurich**
Date of Assessment:	**January 27, 2012**
Probe Calibration Date:	**January 25, 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 or at 1810 MHz.

Assessed by: [signature]

ES3DV3-SN:3147 Page 1 of 2 January 27, 2012

Schmid & Partner Engineering AG

s p e a g

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Dosimetric E-Field Probe ES3DV3 SN:3147

Conversion factor (± standard deviation)

150 ± 50 MHz	*ConvF*	8.1 ± 10%	ε_r = 52.3 ± 5% σ = 0.76 ± 5% mho/m (head tissue)
150 ± 50 MHz	*ConvF*	7.8 ± 10%	ε_r = 61.9 ± 5% σ = 0.80 ± 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

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Accreditation No.: SCS 108

Client **Motorola EME**

Certificate No: **D900V2-085_Apr12**

CALIBRATION CERTIFICATE

Object	D900V2 - SN: 085
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 10, 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 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: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-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:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 10, 2012

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
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	40.5 ± 6 %	0.96 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	2.59 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**10.4 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.67 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.70 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	1.07 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.73 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**10.7 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.76 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.95 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.9 Ω - 1.6 jΩ
Return Loss	- 35.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.1 Ω - 3.4 jΩ
Return Loss	- 26.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.391 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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	September 20, 2000

DASY5 Validation Report for Head TSL

Date: 10.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

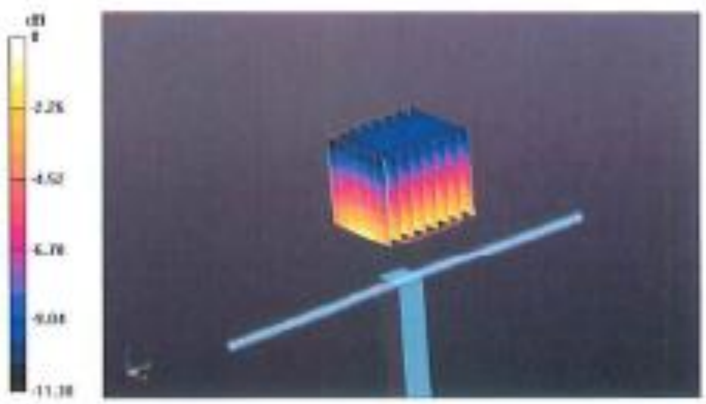
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 085

Communication System: CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 0.96 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

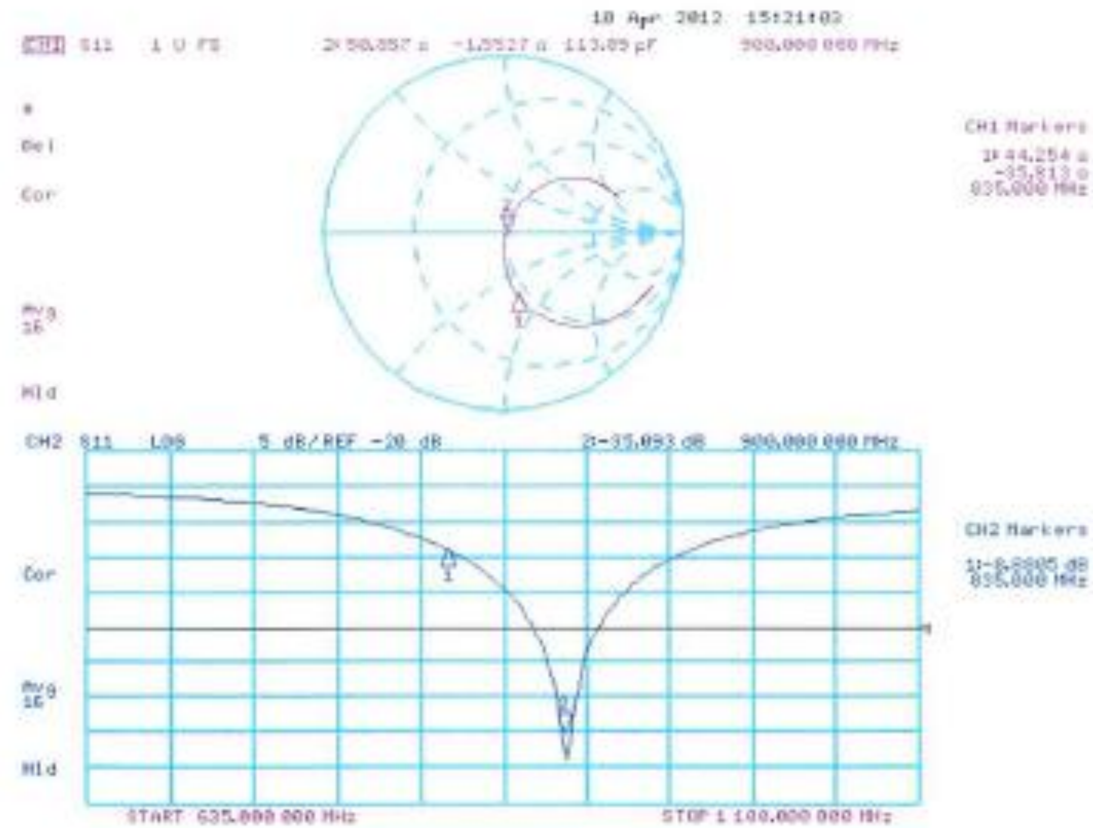
- Probe: ES3DV3 - SN3205; ConvF(5.97, 5.97, 5.97); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x8x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.851 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.879 mW/g
SAR(1 g) = 2.59 mW/g; SAR(10 g) = 1.67 mW/g
Maximum value of SAR (measured) = 3.05 mW/g



0 dB = 3.05 mW/g = 9.68 dB mW/g

Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 10.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

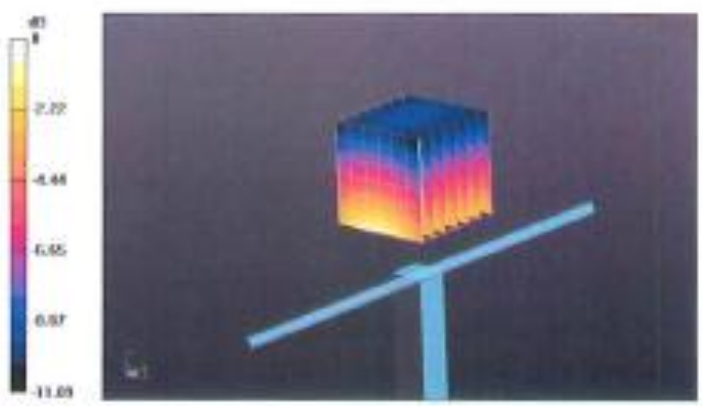
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 085

Communication System: CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 1.07 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

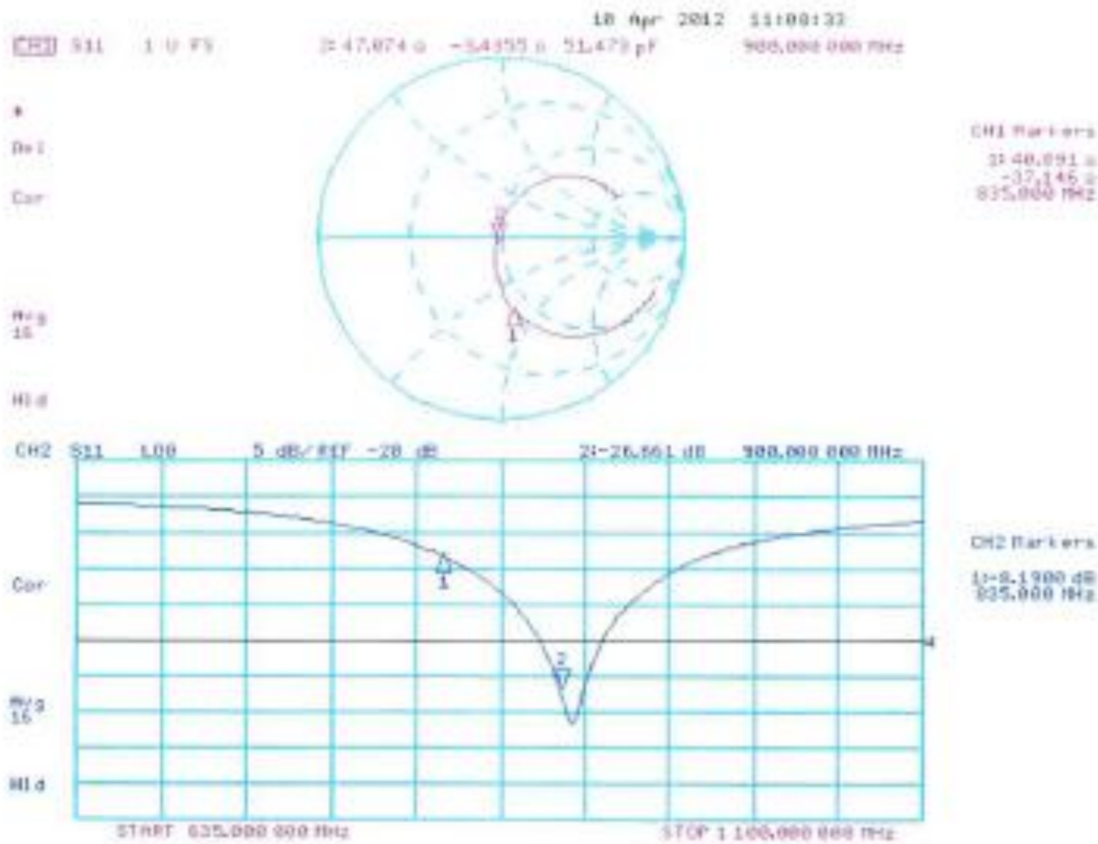
- Probe: ES3DV3 - SN3205; ConvF(5.94, 5.94, 5.94); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.040 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 4.153 mW/g
SAR(1 g) = 2.73 mW/g; SAR(10 g) = 1.76 mW/g
Maximum value of SAR (measured) = 3.20 mW/g



0 dB = 3.20 mW/g = 10.09 dB mW/g

Impedance Measurement Plot for Body TSL



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