



CERTIFICATE 2518.01

**DECLARATION OF COMPLIANCE SAR ASSESSMENT Part 1 of 2**

**Motorola Solutions Inc.**  
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**Date of Report: 3/30/2016**  
**Report Revision: B**

**Responsible Engineer:** Saw Sun Hock (EME Engineer)  
**Report Author:** Saw Sun Hock (EME Engineer)  
**Date/s Tested:** 1/15/2016-1/17/2016  
**Manufacturer:** Motorola Solutions Inc.  
**DUT Description:** RDM2070D VHF MURS Display, 2 Watts, Fixed Antenna, Black, Li-Ion  
**Test TX mode(s):** CW (PTT)  
**Max. Power output:** 2.0W  
**Nominal Power:** 1.8W  
**Tx Frequency Bands:** 151.82-154.6MHz (VHF band)  
**Signaling type:** FM  
**Model(s) Tested:** PMUD2448E  
**Model(s) Certified:** PMUD2448E  
**Serial Number(s):** 1 & 2  
**Classification:** Occupational/Controlled  
**FCC ID:** AZ489FT3837

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 OET Bulletin 65. 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 4.0 of this report. This report shall not be reproduced without written approval from an officially designated representative of the Motorola Solutions Inc EME Laboratory. I attest to the accuracy of the data and assume full responsibility for the completeness of these measurements. This reporting format is consistent with the suggested guidelines of the TIA TSB-150 December 2004. The results and statements contained in this report pertain only to the device(s) evaluated.

**Deanna Zakharia**  
**EMS EME Lab Senior Resource Manager,**  
**Laboratory Director**  
**Approval Date: 4/8/2016**

**Certification Date: 4/8/2016**

**Certification No.: L1160401**

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**Report Revision History**

Date	Revision	Comments
01/17/2016	A	Initial release
03/30/2016	B	Updated the Session 4, Session 7 and Radio Transmitting Frequency Range.

## 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 handheld portable model number PMUD2448E. This device is classified as Occupational/Controlled.

## 2.0 FCC SAR Summary

**Table 1**

Equipment Class	Frequency band (MHz)	Max Calc at Body (W/kg)		Max Calc at Face (W/kg)	
		1g-SAR	10g-SAR	1g-SAR	10g-SAR
TNF	151.82-154.6	0.39	0.25	0.37	0.29
Simultaneous Results		NA	NA	NA	NA

## 3.0 Abbreviations / Definitions

CNR: Calibration Not Required

CW: Continuous Wave

DUT: Device Under Test

EME: Electromagnetic Energy

FM: Frequency Modulation

LMR: Land Mobile Radio

NA: Not Applicable

PTT: Push to Talk

SAR: Specific Absorption Rate

TNF: Licensed Non-Broadcast Transmitter Held to Face

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.

## 4.0 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)

- Federal Communications Commission, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”, OET Bulletin 65, FCC, Washington, D.C.: 1997.
- IEEE 1528 (2013), 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 (2015), Limits of Human Exposure to Radio frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz
- RSS-102 (Issue 5) – Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)
- Australian Communications Authority Radio communications (Electromagnetic Radiation - Human Exposure) Standard (2014)
- 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).
- FCC KDB – 643646 D01 SAR Test for PTT Radios v01r03
- FCC KDB – 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB – 865664 D02 RF Exposure Reporting v01r02
- FCC KDB – 447498 D01 General RF Exposure Guidance v06

**5.0 SAR Limits**

**Table 2**

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

**6.0 Description of Device Under Test (DUT)**

This portable device operates using Zero Intermediate Frequency (IF) with analog Frequency Modulation (FM) signaling incorporating traditional simplex two-way radio transmission protocol. This model intended use are to be 5-5-90 (5% TX, 5% RX and 90% standby), with a maximum duty cycle of 50%.

Table 3 below summarizes the technologies, bands, maximum duty cycles and maximum output powers. Maximum output powers are defined as upper limit of the production line final test station.

**Table 3**

Band (MHz)	Transmission	Duty Cycle (%)	Max Power (W)
151.82-154.6	FM	*50	2.00

Note - \* includes 50% PTT operation

The intended operating positions are “at the face” with the DUT at least 1 inch from the mouth, and “at the body” by means of the offered body worn accessories. Body worn audio and PTT operation is accomplished by means of optional remote accessories that are connected to the radio.

**7.0 Optional Accessories and Test Criteria**

This device is offered with optional accessories. 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 offered for this product. The table below lists its description.

**Table 4**

Antenna Models	Description	Selected for test	Tested
8575078C02	Fixed, 150.9-170MHz, ¼ wave, -6 dBd	Yes	Yes

**7.2 Battery**

There are optional batteries offered for this product. The Table below lists their descriptions.

**Table 5**

Battery Models	Description	Selected for test	Tested	Comments
60012000002	7.2 Li-Ion Ultra High Capacity 2400 mAh (RLN6308A)	Yes	Yes	Default Battery for Face
6080384X65	7.2 Li-Ion Standard Capacity 1100 mAh (RLN6351C)	Yes	Yes	Default Battery for Body

**7.3 Body worn Accessory**

Only one body worn was considered. The Table below lists the body worn accessory, and body worn accessory description.

**Table 6**

Body worn Models	Description	Selected for test	Tested	Comments
4280383X62	Spring Action Belt Clip (RLN6307A)	Yes	Yes	

**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 7**

Audio Acc. Models	Description	Selected for test	Tested	Comments
HKLN4604A	Swival Earpiece with PTT (RLN6423F)	Yes	Yes	Default Audio
HKLN4605A	EarBud with clip PTT Mic (53866F)	Yes	*No	
HKLN4606A	Remote Speaker Mic (53862F)	Yes	*No	
HKLN4601A	Dual Pin Surveillance with PTT (HKLN4477F)	Yes	*No	
HKLN4599A	Earpiece with in-line PTT Mic (56517F)	No	No	By Similarity to HKLN4604A

Note - \* SAR ≤ 4.0 W/kg, test not required as per KDB 643646 D01

## 8.0 Description of Test System



### 8.1 Descriptions of Robotics/Probes/Readout Electronics

**Table 8**

Dosimetric System type	System version	DAE type	Probe Type
Schmid & Partner Engineering AG SPEAG DASY 5	52.8.8.1222	DAE4	EX3DV4 (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 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 9**

Phantom Type	Phantom(s) Used	Material Parameters	Phantom Dimensions LxWxD (mm)	Material Thickness (mm)	Support Structure Material	Loss Tangent (wood)
Triple Flat	NA	200MHz -6GHz; Er = 3-5, Loss Tangent = ≤0.05	280x175x175	2mm +/- 0.2mm	Wood	< 0.05
SAM	NA	300MHz -6GHz; Er = < 5, Loss Tangent = ≤0.05	Human Model			
Oval Flat	√	300MHz -6GHz; Er = 4+/- 1, Loss Tangent = ≤0.05	600x400x190			

### 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 10. 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 (percent by mass)

**Table 10**

Ingredients	150 MHz	
	Head	Body
Sugar	55.4	49.7
Diacetin	0	0
De ionized – Water	38.35	46.2
Salt	5.15	3.0
HEC	1.0	1.0
Bacteria	0.1	0.1

## 9.0 Additional Test Equipment

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

**Table 11**

Equipment Type	Model Number	Serial Number	Calibration Date	Calibration Due Date
Speag Probe	EX3DV4	3612	4/28/2015	4/28/2016
Speag DAE	DAE4	729	4/27/2015	4/27/2016
Power Meter	E4419B	MY50000505	9/2/2015	9/2/2017
Power Meter	E4418B	US39251267	1/26/2015	1/26/2016
Power Sensor	E9301B	MY50280001	8/5/2015	8/5/2016
Power Sensor	8482B	MY41091017	5/14/2015	5/14/2016
Bi-directional Coupler	3020A	40295	9/22/2015	9/22/2017
Signal Generator	E4438C	MY44270302	6/18/2015	6/18/2017
Dickson Temperature Recorder	TM325	12121144	6/17/2015	6/17/2016
Omega Digital Thermometer with J Type TC Probe	HH202A	18812	6/24/2015	6/24/2016
PNA-L Network Analyzer	N5230C	MY49002155	8/3/2015	8/3/2016
Dielectric Probe Kit (DAK1)	DAK-3.5	1059	4/21/2015	4/21/2016
Dielectric Probe Kit (DAK1)	DAK-12	1013	4/21/2015	4/21/2016
SPEAG DIPOLE	CLA150	4005	7/8/2015	7/8/2017

## 10.0 SAR Measurement System Validation and Verification

DASY output files of the probe/dipole calibration certificates and system verification test results are included in appendices B, C & D respectively.

### 10.1 System Validation

The SAR measurement system was validated according to procedures in KDB 865664. The validation status summary Table is below.

**Table 12**

Dates	Probe Calibration Point	Probe SN	Measured Tissue Parameters		Validation			
			$\sigma$	$\epsilon_r$	Sensitivity	Linearity	Isotropy	
CW								
9/10/2015	Body	150	3612	0.82	60.0	Pass	Pass	Pass
9/03/2015	Head	150		0.75	52.1	Pass	Pass	Pass

### 10.2 System Verification

System verification 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 13**

Probe Serial #	Tissue Type	Dipole Kit / Serial #	Ref SAR @ 1W (W/kg)	System Check Results Measured (W/kg)	System Check Test Results when normalized to 1W (W/kg)	Tested Date
3612	FCC Body	SPEAG CLA150 / 4005	3.88 +/- 10%	3.66	3.66	1/15/16
				3.66	3.66	1/16/16
	IEEE/IEC Head		3.83 +/- 10%	3.65	3.65	1/17/16

### 10.3 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 14**

Frequency (MHz)	Tissue Type	Conductivity Target (S/m)	Dielectric Constant Target	Conductivity Meas. (S/m)	Dielectric Constant Meas.	Tested Date
150	FCC Body	0.80 (0.76-0.84)	61.9 (58.8-65.0)	0.77	61.6	1/15/16
				0.77	60.8	1/16/16
	IEEE/ IEC Head	0.76 (0.72-0.80)	52.3 (49.7-54.9)	0.73	54.5	1/17/16
152	FCC Body	0.80 (0.76-0.84)	61.9 (58.8-64.9)	0.77	61.5	1/15/16
				0.77	60.7	1/16/16
	IEEE/ IEC Head	0.76 (0.72-0.80)	52.2 (49.6-54.8)	0.73	54.3	1/17/16

### 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 15**

	Target	Measured
Ambient Temperature	18 – 25 °C	Range: 20.6 – 21.6°C Avg. 20.9 °C
Tissue Temperature	NA	Range: 21.0-21.2°C Avg. 21.1°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 Setup and Methodology**

**12.1 Measurements**

SAR measurements were performed using the DASY system described in section 8.0 using zoom scans. Oval flat phantoms filled with applicable simulated tissue were used for body and face testing.

The Table below includes the step sizes and resolution of area and zoom scans per KDB 865664 requirements.

**Table 16**

Description		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: ΔxArea, ΔyArea		≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: ΔxZoom, ΔyZoom		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: ΔzZoom(n)	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.			

**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 G.

#### 12.3.1 Body

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

#### 12.3.2 Head

Not applicable.

#### 12.3.3 Face

The DUT was positioned with its' front 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.

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

Where

$N_c$  = Number of channels

$F_{\text{high}}$  = Upper channel

$F_{\text{low}}$  = Lower channel

$F_c$  = Center channel

### 12.5 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 drift. Appendix F includes a shortened scan to justify SAR scaling for drift. For this device the “Max Calc. 1g-SAR” and “Max Calc.10g-SAR” are scaled using the following formula:

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

$P_{\text{max}}$  = Maximum Power (W)

$P_{\text{int}}$  = 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  $P_{\text{int}} > P_{\text{max}}$ , then  $P_{\text{max}}/P_{\text{int}} = 1$ .

Drift = 1 for positive drift

Additional SAR scaling was applied using the methodologies outlined in FCC KDB 865664 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.

## 12.6 DUT Test Plan

The guidelines and requirements outlined in section 4.0 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 CW mode and 50% duty cycle was applied to PTT configurations in the final results.

## 13.0 DUT Test Data

### 13.1 LMR assessments at the Body for 151.82-154.6MHz band

Battery 6080384X65 was selected as the default battery for assessments at the Body (refer to Exhibit 7B for battery illustration). The default battery was used during conducted power measurements for all test channels within FCC allocated frequency range (151.82-154.6MHz) which are listed in Table 17. 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 Appendix E.

**Table 17**

Test Freq (MHz)	Power (W)
151.82	1.82
154.6	1.80

### 13.2 Assessments at the Body with Body worn 4280383X62

DUT assessment with offered antenna, default battery and body worn accessory per KDB 643646. Optional battery was tested per the requirements of KDB 643646. Refer to Table 17 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

**Table 18**

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (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#
8575078C02	6080384X65	4280383X62	HKLN4604A	151.82	1.82	-0.36	0.146	0.093	0.09	0.06	PS-AB-160115-12
				154.6							
Assessment of Additional Battery											
8575078C02	60012000002	4280383X62	HKLN4604A	151.82	2.00	-0.39	0.711	0.455	<b>0.39</b>	<b>0.25</b>	PS-AB-160115-16
				154.6							

**13.3 Assessment at the Body with other audio accessories**

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

**13.4 Assessment outside FCC Part 90 at the Body**

Not applicable.

**13.5 LMR assessment at the Face for 151.82-154.6MHz band**

Battery 60012000002 was used for assessments at the Face (refer to Exhibit 7B for battery illustration). The battery was used during conducted power measurements for all test channels within FCC allocated frequency range (151.82-154.6MHz) which are listed 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). SAR plots of the highest results per Table (bolded) are presented in Appendix E.

**Table 19**

Test Freq (MHz)	Power (W)
151.82	2.00
154.6	2.00

DUT assessment with offered antenna, default battery with front of DUT positioned 2.5cm facing phantom per KDB 643646. Optional battery was tested per the requirements of KDB 643646. Refer to Table 19 for highest output power channel. SAR plots of the highest results per Table (bolded) are presented in Appendix E.

**Table 20**

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (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#
8575078C02	60012000002	None	None	151.82	2.00	-0.71	0.636	0.492	<b>0.37</b>	<b>0.29</b>	PS-FACE-160117-02
				154.6							
Assessment of Additional Battery											
8575078C02	6080384X65	None	None	151.82	1.82	-0.65	0.584	0.450	0.37	0.29	PS-FACE-160117-03
				154.6							

**13.6 Assessment outside FCC Part 90 at the Face**

Not applicable.

**13.7 Assessment for Industry Canada**

Not applicable.

**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 D 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 F.

**Table 21**

Antenna	Battery	Carry Accessory	Cable Accessory	Test Freq (MHz)	Init Pwr (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#
8575078C02	60012000002	4280383X62	HKLN4604A	151.82	2.00	-0.44	0.690	0.438	<b>0.38</b>	<b>0.24</b>	PS-AB-160116-10

**14.0 Simultaneous Transmission Exclusion for BT**

Not applicable.

## 15.0 Results Summary

Based on the test guidelines from section 4.0 and satisfying frequencies within FCC bands, the highest Operational Maximum Calculated 1-gram and 10-gram average SAR values found for this filing:

**TABLE 22**

Designator	Frequency band (MHz)	Max Calc at Body (W/kg)		Max Calc at Face (W/kg)	
		1g-SAR	10g-SAR	1g-SAR	10g-SAR
FCC	151.82-154.6	0.39	0.25	0.37	0.29
Overall	151.82-154.6	0.39	0.25	0.37	0.29

All results are scaled to the maximum output power

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 OET Bulletin 65. The 10 grams result is not applicable to FCC filing.

## 16.0 Variability Assessment

Per the guidelines in KDB 865664 SAR variability assessment is not required because SAR results are below 4.0W/kg (Occupational).

## 17.0 System Uncertainty

A system uncertainty analysis is not required for this report per KDB 865664 because the highest report SAR value for Occupational exposure is less than 7.5W/kg.

Per the guidelines of ISO 17025 a reported system uncertainty is required and therefore measurement uncertainty budget is included in Appendix A.

## **Appendix A**

### **Measurement Uncertainty Budget**

**Table A.1: Uncertainty Budget for Device Under Test for 150 MHz**

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e = f(d,k)</i>	<i>f</i>	<i>g</i>	<i>h = c x f / e</i>	<i>i = c x g / e</i>	<i>k</i>
Uncertainty Component	IEEE 1528 section	Tol. (± %)	Prob Dist	Div.	ci (1 g)	ci (10 g)	1 g $u_i$ (±%)	10 g $u_i$ (±%)	$\nu_i$
<b>Measurement System</b>									
Probe Calibration	E.2.1	6.7	N	1.00	1	1	6.7	6.7	∞
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	∞
<b>Test sample Related</b>									
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	∞
<b>Phantom and Tissue Parameters</b>									
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	∞
<b>Combined Standard Uncertainty</b>			RSS				11	11	477
<b>Expanded Uncertainty (95% CONFIDENCE LEVEL)</b>			$k=2$				23	22	

Notes for uncertainty budget Tables:

- 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)  $\nu_i$  - degrees of freedom for standard uncertainty and effective degrees of freedom for the expanded uncertainty

**Table A.2: Uncertainty Budget for System Validation (dipole & flat phantom) for 150 MHz**

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e = f(d,k)</i>	<i>f</i>	<i>g</i>	<i>h = c x f / e</i>	<i>i = c x g / e</i>	<i>k</i>
Uncertainty Component	IEEE 1528 section	Tol. (± %)	Prob Dist	Div.	<i>c<sub>i</sub></i> (1 g)	<i>c<sub>i</sub></i> (10 g)	1 g <i>U<sub>i</sub></i> (±%)	10 g <i>U<sub>i</sub></i> (±%)	<i>v<sub>i</sub></i>
<b>Measurement System</b>									
Probe Calibration	E.2.1	6.7	N	1.00	1	1	6.7	6.7	∞
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	∞
<b>Dipole</b>									
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	∞
<b>Phantom and Tissue Parameters</b>									
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	∞
<b>Combined Standard Uncertainty</b>			RSS				10	9	99999
<b>Expanded Uncertainty (95% CONFIDENCE LEVEL)</b>			<i>k</i> =2				19	18	

Notes for uncertainty budget Tables:

- 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) *c<sub>i</sub>* - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.
- g) *u<sub>i</sub>* – SAR uncertainty
- h) *v<sub>i</sub>* - 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 0108**

Client **Motorola EME**

Certificate No: **EX3-3612\_Apr15**

**CALIBRATION CERTIFICATE**

Object: **EX3DV4 - SN:3612**

Calibration procedure(s): **QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v4, QA CAL-23.v5,  
QA CAL-25.v6  
Calibration procedure for dosimetric E-field probes**

Calibration date: **April 28, 2015**

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	01-Apr-15 (No. 217-02128)	Mar-16
Power sensor E4412A	MY41499087	01-Apr-15 (No. 217-02128)	Mar-16
Reference 3 dB Attenuator	SN: S5054 (3c)	01-Apr-15 (No. 217-02129)	Mar-16
Reference 20 dB Attenuator	SN: S5277 (20x)	01-Apr-15 (No. 217-02132)	Mar-16
Reference 30 dB Attenuator	SN: S5129 (30b)	01-Apr-15 (No. 217-02133)	Mar-16
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3842UG1700	4-Aug-09 (in house check Apr-13)	in house check: Apr-16
Network Analyzer HP 8753E	US37390565	18-Oct-01 (in house check Oct-14)	in house check: Oct-15

Calibrated by:	Name <b>Jeton Kasrafi</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	Name <b>Katja Pokovic</b>	Technical Manager	

Issued: April 28, 2015

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

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



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**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 0108**

**Glossary:**

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\theta$	$\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

**Calibration is Performed According to the Following Standards:**

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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:**

- **NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\theta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- **NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* 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.
- **DCP<sub>x,y,z</sub>**: 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
- **A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; A, B, C, D** 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  $f \leq 800$  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 NORM<sub>x,y,z</sub> \* 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  $\pm 50$  MHz to  $\pm 100$  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.
- **Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

EX3DV4 – SN:3612

April 28, 2015

# Probe EX3DV4

## SN:3612

Manufactured: March 23, 2007  
Calibrated: April 28, 2015

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

EX3DV4- SN:3612

April 28, 2015

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3612

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.45	0.49	0.40	$\pm 10.1 \%$
DCP (mV) <sup>B</sup>	97.2	96.7	98.1	

### Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc <sup>C</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	156.0	$\pm 3.0 \%$
		Y	0.0	0.0	1.0		145.6	
		Z	0.0	0.0	1.0		142.9	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	3.09	70.4	20.0	1.87	140.0	$\pm 0.7 \%$
		Y	2.83	68.1	18.6		130.1	
		Z	3.35	71.9	20.6		130.3	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	10.68	69.5	22.7	9.46	134.1	$\pm 3.0 \%$
		Y	10.66	69.1	22.2		145.3	
		Z	10.84	70.0	23.0		148.1	
10059-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	X	3.26	71.4	20.7	2.12	138.4	$\pm 0.7 \%$
		Y	3.00	69.1	19.2		128.4	
		Z	3.40	72.1	20.8		130.1	
10060-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	X	5.17	85.6	26.9	2.83	143.6	$\pm 0.7 \%$
		Y	3.16	74.7	22.1		131.8	
		Z	5.00	84.4	26.1		134.2	
10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	4.31	77.3	23.8	3.60	139.7	$\pm 0.5 \%$
		Y	3.42	71.7	20.9		130.5	
		Z	4.32	77.1	23.4		133.4	
10062-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	10.34	69.0	21.9	8.68	135.7	$\pm 2.5 \%$
		Y	10.14	68.3	21.3		124.8	
		Z	10.13	68.6	21.6		127.6	
10063-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	X	10.20	69.0	21.9	8.63	133.4	$\pm 2.5 \%$
		Y	10.01	68.2	21.3		124.2	
		Z	10.06	68.7	21.7		129.5	
10064-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	X	10.65	69.3	22.4	9.09	135.3	$\pm 2.5 \%$
		Y	10.48	68.6	21.7		125.9	
		Z	10.52	69.1	22.1		130.3	
10065-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	X	10.23	68.9	22.1	9.00	129.9	$\pm 2.7 \%$
		Y	10.46	69.2	22.1		148.4	
		Z	10.16	66.8	22.0		126.2	
10066-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	X	10.43	69.0	22.5	9.38	127.8	$\pm 3.0 \%$
		Y	10.65	69.4	22.4		147.1	
		Z	10.37	69.1	22.4		125.0	
10067-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	X	10.95	69.6	23.2	10.12	126.6	$\pm 3.3 \%$
		Y	11.14	69.8	23.1		145.6	
		Z	11.31	70.7	23.8		149.3	

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10068-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	11.24	70.6	24.1	10.24	147.4	±3.3 %
		Y	10.92	69.6	23.1		139.2	
		Z	11.08	70.5	23.8		142.2	
10069-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	X	11.50	70.9	24.4	10.56	146.6	±3.5 %
		Y	11.21	69.8	23.4		141.5	
		Z	11.34	70.7	24.1		143.0	
10071-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	11.02	70.3	23.5	9.83	149.0	±3.3 %
		Y	10.77	69.3	22.7		145.7	
		Z	10.92	70.2	23.4		145.8	
10072-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	10.56	70.1	23.4	9.62	145.0	±3.3 %
		Y	10.24	69.9	22.3		136.0	
		Z	10.40	69.8	23.0		140.3	
10073-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	10.46	70.0	23.6	9.94	136.5	±3.3 %
		Y	10.12	68.7	22.5		132.2	
		Z	10.34	69.8	23.3		135.8	
10074-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	10.53	70.2	24.0	10.30	134.5	±3.3 %
		Y	10.15	68.7	22.8		128.2	
		Z	10.40	70.0	23.7		131.3	
10075-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	10.58	70.3	24.4	10.77	128.6	±3.8 %
		Y	10.33	69.2	23.4		144.5	
		Z	10.71	70.9	24.6		148.9	
10076-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	10.80	71.1	25.0	10.94	148.0	±3.8 %
		Y	10.24	69.0	23.4		140.9	
		Z	10.66	70.8	24.7		145.5	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	10.77	71.1	25.1	11.00	146.7	±3.8 %
		Y	10.19	69.0	23.5		139.5	
		Z	10.64	70.9	24.8		144.0	
10114-CAB	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	10.46	69.1	21.6	8.10	141.7	±2.2 %
		Y	10.36	68.7	21.1		140.4	
		Z	10.39	69.0	21.4		140.3	
10115-CAB	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	X	10.99	69.6	22.0	8.46	146.5	±2.5 %
		Y	10.86	69.2	21.5		142.1	
		Z	10.95	69.6	21.9		145.1	
10116-CAB	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	X	10.52	69.3	21.6	8.15	143.5	±2.5 %
		Y	10.35	68.7	21.1		138.6	
		Z	10.46	69.2	21.5		141.5	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	10.51	69.3	21.6	8.07	144.9	±2.5 %
		Y	10.33	68.8	21.1		139.7	
		Z	10.44	69.2	21.5		142.9	
10118-CAB	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	X	11.16	69.9	22.2	8.59	149.3	±2.7 %
		Y	10.97	69.3	21.7		142.0	
		Z	11.09	69.8	22.0		146.8	
10119-CAB	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	10.54	69.3	21.7	8.13	145.4	±2.2 %
		Y	10.35	68.7	21.1		138.6	
		Z	10.45	69.2	21.5		141.7	

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10193-CAB	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	X	10.10	69.0	21.6	6.09	139.2	±2.2 %
		Y	10.01	68.5	21.1		134.8	
		Z	9.95	68.7	21.3		134.8	
10194-CAB	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	X	10.12	69.0	21.6	8.12	138.8	±2.2 %
		Y	10.03	68.5	21.1		134.5	
		Z	10.00	68.8	21.4		134.5	
10195-CAB	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	X	10.28	69.2	21.7	8.21	141.0	±2.2 %
		Y	10.16	68.6	21.2		135.5	
		Z	10.14	68.9	21.5		135.4	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	10.06	68.9	21.5	6.10	139.1	±2.2 %
		Y	9.98	68.4	21.1		134.6	
		Z	9.94	68.7	21.3		134.6	
10197-CAB	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	X	10.15	69.0	21.6	6.13	139.9	±2.5 %
		Y	10.06	68.5	21.1		134.9	
		Z	10.03	68.8	21.4		135.2	
10198-CAB	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	X	10.30	69.1	21.7	6.27	141.2	±2.5 %
		Y	10.21	68.7	21.3		135.1	
		Z	10.20	69.0	21.6		136.1	
10219-CAB	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	X	9.96	68.9	21.5	6.03	139.2	±2.2 %
		Y	9.87	68.4	21.0		133.5	
		Z	9.84	68.7	21.3		133.4	
10220-CAB	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	X	10.15	69.0	21.6	6.13	140.3	±2.2 %
		Y	10.07	68.6	21.2		134.8	
		Z	10.06	68.9	21.4		135.3	
10221-CAB	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	X	10.31	69.2	21.7	6.27	141.1	±2.2 %
		Y	10.23	68.7	21.3		135.9	
		Z	10.21	69.0	21.6		136.5	
10222-CAB	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	X	10.50	69.3	21.6	6.06	147.0	±2.5 %
		Y	10.31	68.7	21.1		139.9	
		Z	10.39	69.1	21.4		141.9	
10223-CAB	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	X	10.59	68.8	21.4	6.48	124.0	±2.5 %
		Y	10.67	69.2	21.6		143.1	
		Z	10.96	69.7	21.9		146.5	
10224-CAB	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	X	10.53	69.5	21.7	6.06	147.9	±2.5 %
		Y	10.32	68.8	21.2		138.8	
		Z	10.40	69.2	21.5		141.6	
10315-AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	X	3.36	72.4	21.1	1.71	141.1	±0.7 %
		Y	2.93	69.1	19.2		135.6	
		Z	3.27	71.8	20.5		136.0	
10316-AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	X	10.22	69.0	21.8	6.36	139.3	±2.5 %
		Y	10.07	68.4	21.2		129.8	
		Z	10.04	68.7	21.5		131.4	
10317-AAB	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	X	10.27	69.2	21.9	6.36	140.9	±2.5 %
		Y	10.10	68.5	21.2		132.2	
		Z	10.11	68.8	21.6		133.9	

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10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	3.34	72.6	21.3	1.54	142.4	±0.7 %
		Y	2.98	69.7	19.5		136.4	
		Z	3.26	72.0	20.6		137.5	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	10.18	69.0	21.7	8.23	140.5	±2.2 %
		Y	10.00	68.4	21.1		129.6	
		Z	9.99	68.7	21.4		131.7	
10417-AAA	IEEE 802.11a/n WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	X	10.20	69.1	21.8	8.23	142.4	±2.5 %
		Y	10.02	68.4	21.1		131.9	
		Z	10.02	68.7	21.4		134.2	
10418-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preamble)	X	10.08	69.0	21.7	8.14	141.4	±2.2 %
		Y	9.92	68.4	21.1		131.2	
		Z	9.92	68.8	21.4		133.1	
10419-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preamble)	X	10.15	69.1	21.7	8.19	142.3	±2.2 %
		Y	9.97	68.3	21.1		130.7	
		Z	10.00	68.8	21.5		134.2	

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%.

<sup>A</sup> The uncertainties of NormX, Y, Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 8 and 9).  
<sup>B</sup> Numerical linearization parameter: uncertainty not required.  
<sup>C</sup> 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: EX3DV4 - SN:3612

### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>c</sup>	Relative Permittivity <sup>e</sup>	Conductivity (S/m) <sup>f</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>g</sup>	Depth (mm) <sup>g</sup>	Unct. (k=2)
150	52.3	0.76	9.97	9.97	9.97	0.00	1.00	± 13.3 %
220	49.0	0.81	9.88	9.88	9.88	0.00	1.00	± 13.3 %
2450	39.2	1.80	6.26	6.26	6.26	0.39	0.80	± 12.0 %
4950	36.3	4.40	4.96	4.96	4.96	0.30	1.80	± 13.1 %
5200	36.0	4.66	4.66	4.66	4.66	0.30	1.80	± 13.1 %
5300	35.9	4.76	4.47	4.47	4.47	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.45	4.45	4.45	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.18	4.18	4.18	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.38	4.38	4.38	0.40	1.80	± 13.1 %

<sup>c</sup> Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 26, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) 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 ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>g</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3612

### Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>H</sup> (mm)	Unct. (k=2)
150	61.9	0.80	9.64	9.64	9.64	0.00	1.00	± 13.3 %
220	60.2	0.86	9.18	9.18	9.18	0.00	1.00	± 13.3 %
2450	52.7	1.95	6.40	6.40	6.40	0.34	0.80	± 12.0 %
4950	49.4	5.01	4.46	4.46	4.46	0.35	1.90	± 13.1 %
5200	49.0	5.30	4.37	4.37	4.37	0.35	1.90	± 13.1 %
5300	48.9	5.42	4.07	4.07	4.07	0.40	1.90	± 13.1 %
5500	48.6	5.65	3.78	3.78	3.78	0.40	1.90	± 13.1 %
5600	48.5	5.77	3.65	3.65	3.65	0.45	1.90	± 13.1 %
5800	48.2	6.00	3.95	3.95	3.95	0.45	1.90	± 13.1 %

<sup>C</sup> Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

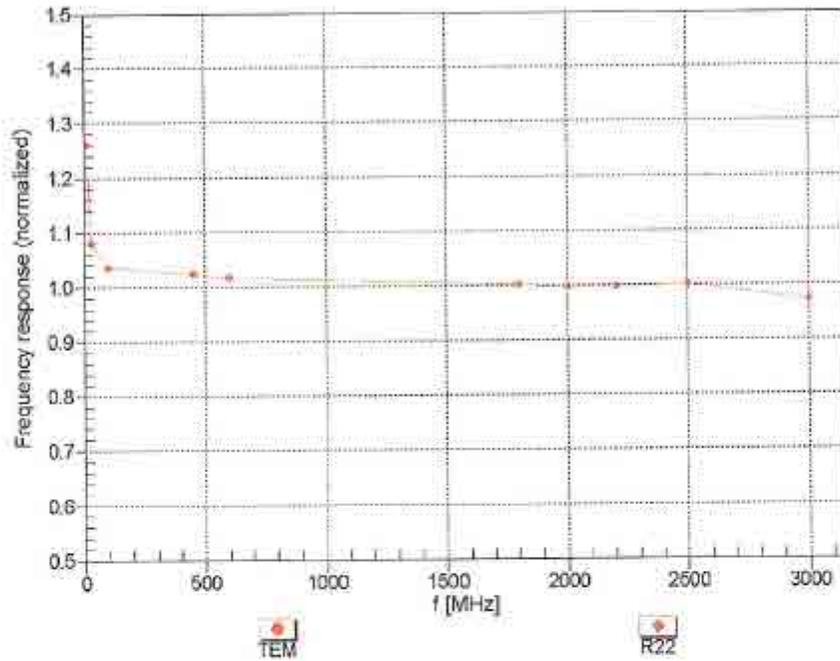
<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>H</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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

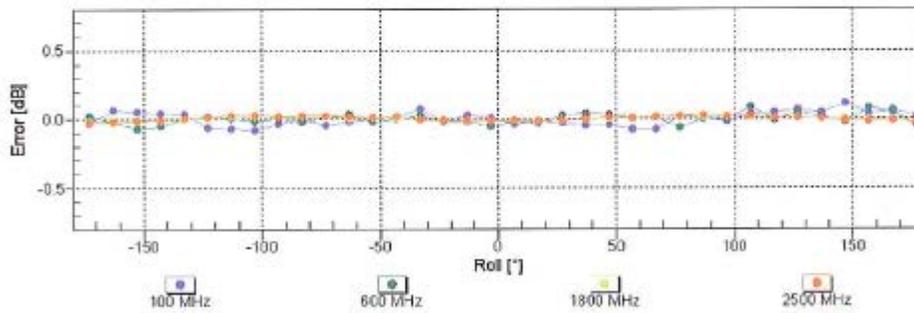
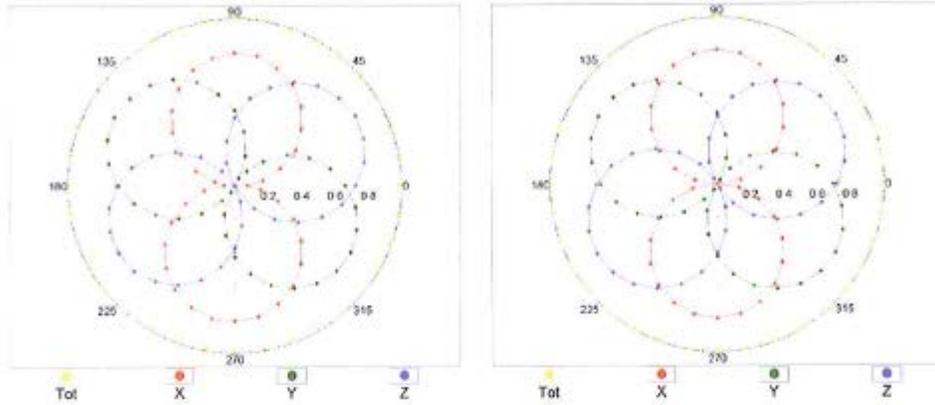


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

### Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$

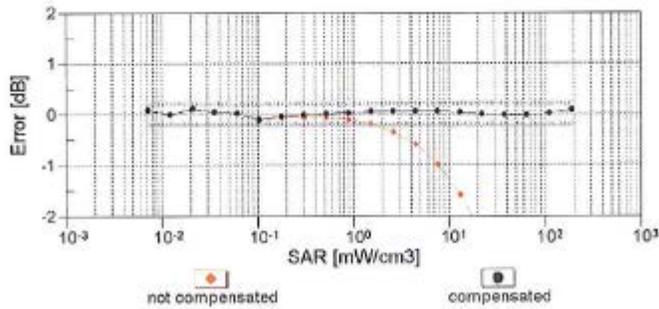
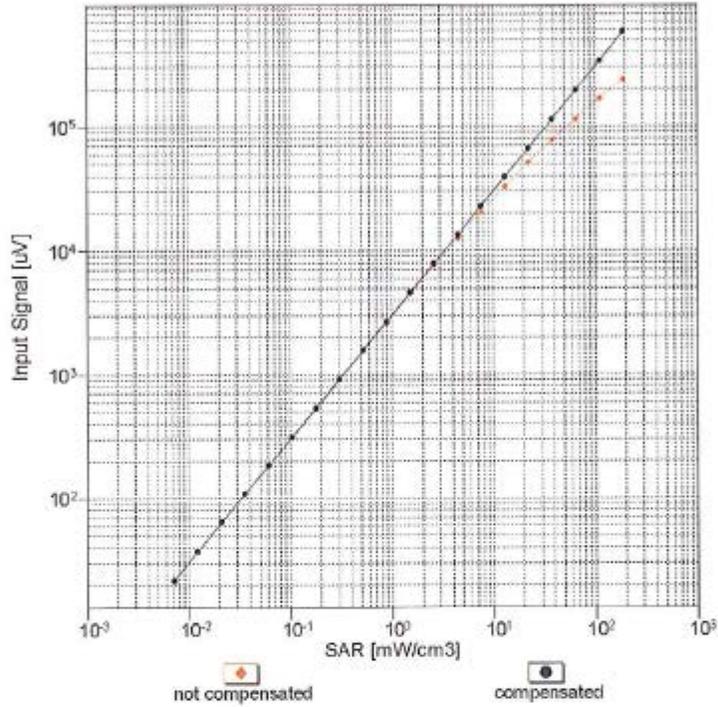
f=600 MHz,TEM

f=1800 MHz,R22



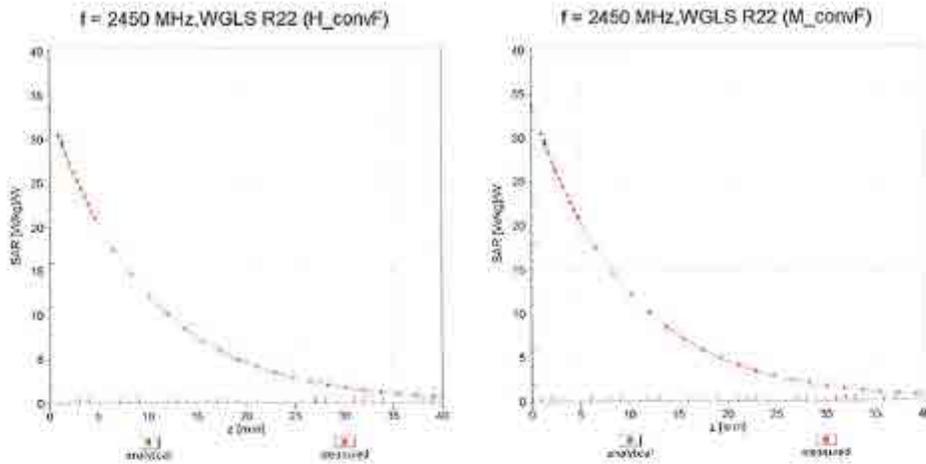
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

### Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f<sub>eval</sub>= 1900 MHz)

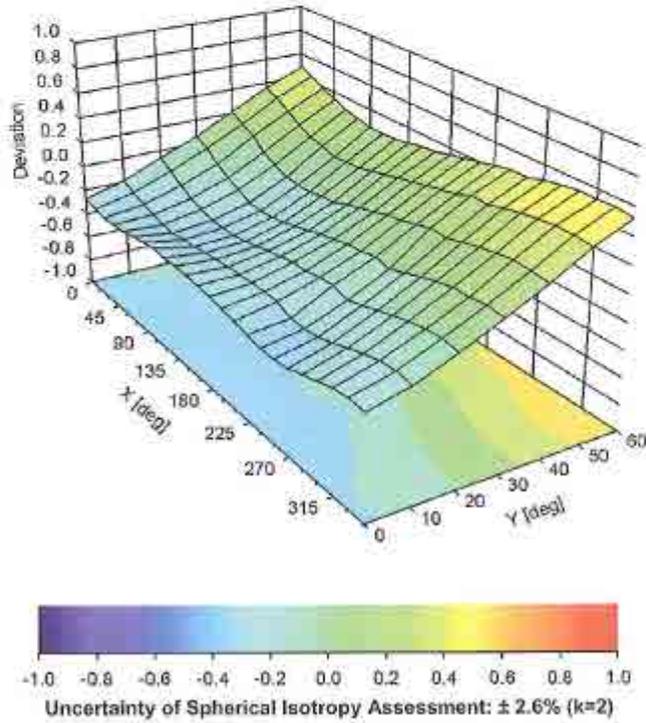


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

### Conversion Factor Assessment



### Deviation from Isotropy in Liquid Error ( $\phi, \theta$ ), f = 900 MHz



EX3DV4- SN:3612

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## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3612

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	77
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

**Appendix C**  
**Dipole Calibration Certificates**

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



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

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

Accreditation No.: **SCS 0108**

Client: **Motorola EME**

Certificate No.: **CLA150-4005\_Jul15**

**CALIBRATION CERTIFICATE**

Object: **CLA150 - SN: 4005**

Calibration procedure(s): **QA CAL-15.v8  
Calibration procedure for system validation sources below 700 MHz**

Calibration date: **July 08, 2015**

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	GB41293674	01-Apr-15 (No. 217-02128)	Mar-16
Power sensor E4412A	MY41498087	01-Apr-15 (No. 217-02128)	Mar-16
Reference 3 dB Attenuator	SN: S5054 (3c)	01-Apr-15 (No. 217-02129)	Mar-16
Reference 20 dB Attenuator	SN: S5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe EX3DV4	SN: 3877	09-Jan-15 (No. EX3-3877_Jan15)	Jan-16
DAE4	SN: 654	22-Jun-15 (No. DAE4-654_Jun15)	Jun-16
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	04-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by:	Name: <b>Claudio Leubler</b>	Function: <b>Laboratory Technician</b>	Signature:
Approved by:	Name: <b>Katja Pokovic</b>	Function: <b>Technical Manager</b>	Signature:

Issued: July 15, 2015.

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

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



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**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 0108**

**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 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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) IEC 62209-2, "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)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- e) 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
EUT Positioning	Touch Position	
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	150 MHz ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	52.3	0.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	50.2 ± 6 %	0.77 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

**SAR result with Head TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	1 W input power	3.90 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>3.83 W/kg ± 18.4 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	1 W input power	2.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>2.53 W/kg ± 18.0 % (k=2)</b>

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	61.9	0.80 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	60.1 ± 6 %	0.84 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

**SAR result with Body TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	1 W input power	4.06 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>3.88 W/kg ± 18.4 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	1 W input power	2.68 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>2.57 W/kg ± 18.0 % (k=2)</b>

**Appendix (Additional assessments outside the scope of SCS 0108)**

**Antenna Parameters with Head TSL at 149.5 MHz**

Impedance, transformed to feed point	35.3 Ω - 5.4 jΩ
Return Loss	- 14.8 dB

**Antenna Parameters with Head TSL at 150.0 MHz**

Impedance, transformed to feed point	41.6 Ω - 2.1 jΩ
Return Loss	- 20.5 dB

**Antenna Parameters with Head TSL at 150.5 MHz**

Impedance, transformed to feed point	49.8 Ω + 0.8 jΩ
Return Loss	- 33.7 dB

**Antenna Parameters with Body TSL at 149.5 MHz**

Impedance, transformed to feed point	36.8 Ω - 7.0 jΩ
Return Loss	- 15.3 dB

**Antenna Parameters with Body TSL at 150.0 MHz**

Impedance, transformed to feed point	43.3 Ω - 4.2 jΩ
Return Loss	- 21.4 dB

**Antenna Parameters with Body TSL at 150.5 MHz**

Impedance, transformed to feed point	51.3 Ω - 2.0 jΩ
Return Loss	- 32.5 dB

**Additional EUT Data**

Manufactured by	SPEAG
Manufactured on	August 23, 2013

**DASY5 Validation Report for Head TSL**

Date: 08.07.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: CLA150; Type: CLA150; Serial: CLA150 - SN: 4005**

Communication System: UID 0 - CW; Frequency: 150 MHz  
 Medium parameters used:  $f = 150 \text{ MHz}$ ;  $\sigma = 0.768 \text{ S/m}$ ;  $\epsilon_r = 50.203$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

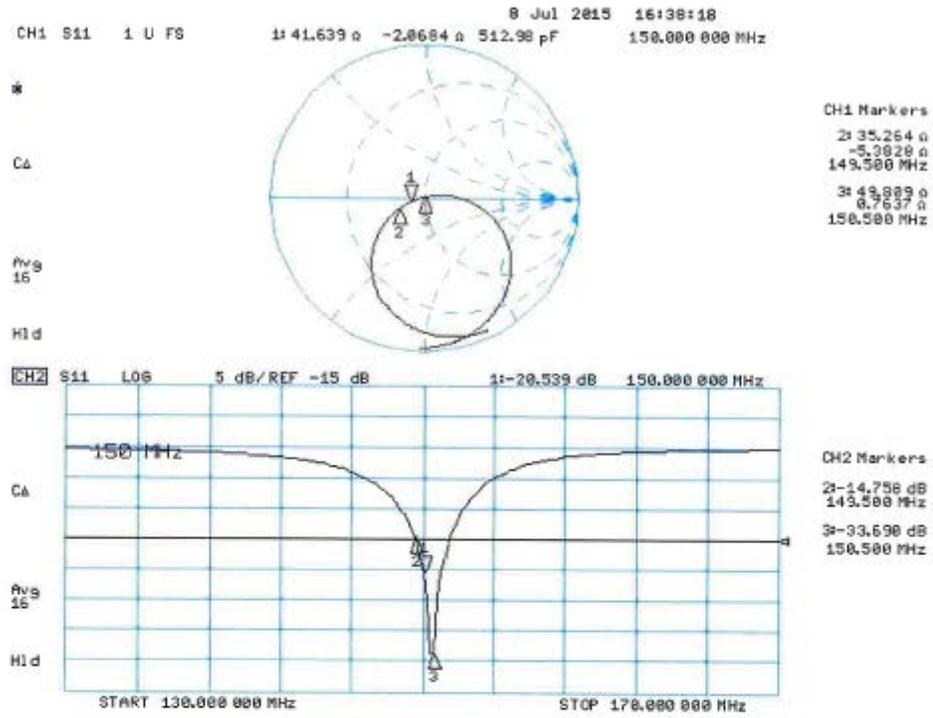
- Probe: EX3DV4 - SN3877; ConvF(12, 12, 12); Calibrated: 09.01.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 22.06.2015
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**CLA Calibration for HSL-LF Tissue/CLA150, touch configuration, Pin=1W/Area Scan (81x81x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$   
 Maximum value of SAR (interpolated) = 5.53 W/kg

**CLA Calibration for HSL-LF Tissue/CLA150, touch configuration, Pin=1W/Zoom Scan, dist=1.4mm (8x9x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$   
 Reference Value = 77.52 V/m; Power Drift = 0.04 dB  
 Peak SAR (extrapolated) = 7.54 W/kg  
**SAR(1 g) = 3.9 W/kg; SAR(10 g) = 2.57 W/kg**  
 Maximum value of SAR (measured) = 5.48 W/kg



Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date: 08.07.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: CLA150; Type: CLA150; Serial: CLA150 - SN: 4005**

Communication System: UID 0 - CW; Frequency: 150 MHz  
 Medium parameters used:  $f = 150 \text{ MHz}$ ;  $\sigma = 0.84 \text{ S/m}$ ;  $\epsilon_r = 60.08$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

**DASY52 Configuration:**

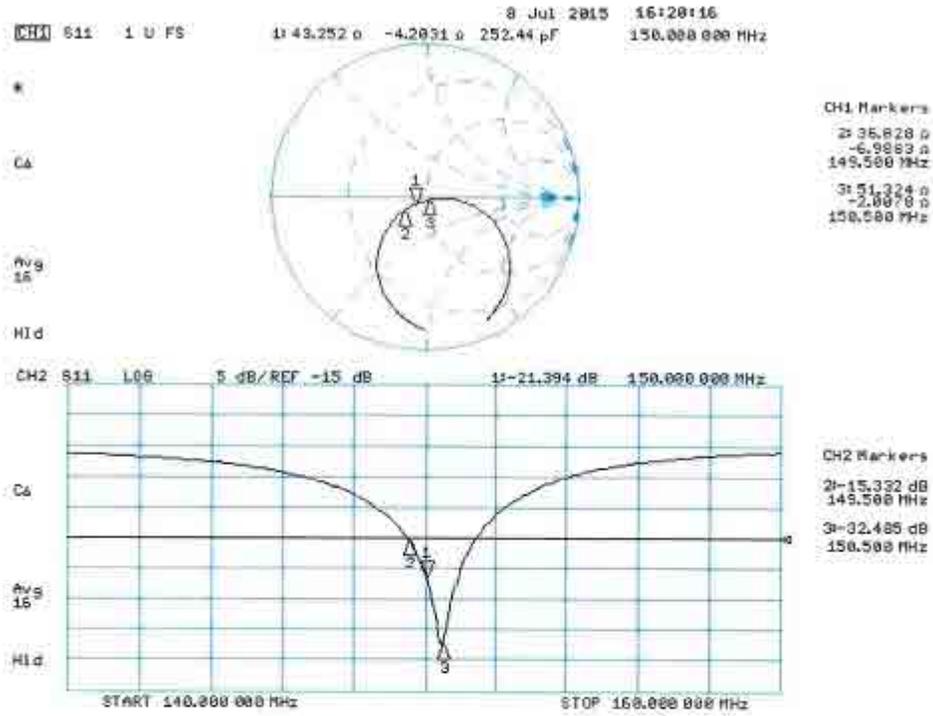
- Probe: EX3DV4 - SN3877; ConvF(11.42, 11.42, 11.42); Calibrated: 09.01.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 22.06.2015
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**CLA Calibration for MSL-LF Tissue/CLA150, touch configuration, Pin=1W/Area Scan (81x81x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$   
 Maximum value of SAR (interpolated) =  $5.10 \text{ W/kg}$

**CLA Calibration for MSL-LF Tissue/CLA150, touch configuration, Pin=1W/Zoom Scan, dist=1.4mm (8x9x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$   
 Reference Value =  $77.99 \text{ V/m}$ ; Power Drift =  $-0.01 \text{ dB}$   
 Peak SAR (extrapolated) =  $7.76 \text{ W/kg}$   
**SAR(1 g) =  $4.06 \text{ W/kg}$ ; SAR(10 g) =  $2.68 \text{ W/kg}$**   
 Maximum value of SAR (measured) =  $5.73 \text{ W/kg}$



Impedance Measurement Plot for Body TSL



## Dipole Data

As stated in KDB 865664, only dipoles used for longer calibration intervals required to provide supporting information and measurement to qualify for extended calibration interval.

Dipole CLA150-4005 does not exceeds the annual calibration data, therefore validation for impedance and return loss is not required.