KDB 865664 D01 SAR Measurement 100MHz to 6GHz
FCC 47 CFR part 2 (2.1093)

SAR EVALUATION REPORT

For

Bang & Olufsen, BeoSound Moment Jukebox
FCC ID: TTUBSMOMENT

Report Number UL-SAR-RP10144616JD16A V4.0
ISSUE DATE: 28 May 2015

Prepared for

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REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
--	25 July 2014	Initial Issue	--
1	27 October 2014	The following changes were made: 1. In Section 6.4. Equipment Category for 2.4GHz was corrected to state 802.11b/g/n 2. In Section 10.1, Max. measured Source based avg. power (dBm) was corrected 14.3dBm 3. In Appendix 6, the permittivity and conductivity target and measured values were corrected	Sandhya Menon
2	16 January 2015	The following changes were made: 1. Photo PHT/10144616JD16/012 in Appendix 4 has been updated.	Naseer Mirza
3	28 May 2015	The following changes were made: 1. Section 1 updated to include the DSS equipment class. 2. Section 2.1 and 2.2 updated for latest FCC KDB publications. 3. Section 6.6 updated to include the latest tune up power declared by manufacturer.	Naseer Mirza

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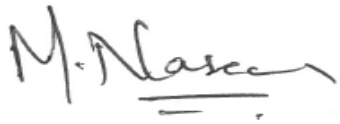
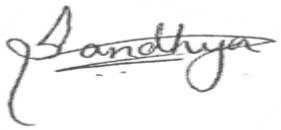
1. Attestation of Test Results

Applicant Name:	Bang & Olufsen				
Application Purpose	☒ Original Grant				
DUT Description	Tablet for use with music streaming device with WLAN				
Test Device is	An identical prototype				
Device category	Portable				
Exposure Category	General Population/Uncontrolled Exposure (1g SAR limit: 1.6 W/kg)				
Date Tested	03 March 2014 to 10 March 2014				
The highest reported SAR values	RF Exposure Conditions	Equipment Class			
		Licensed	DTS	DSS	UNII
	Body	N/A	1.164 W/kg	N/A	N/A
	Simultaneous Transmission	N/A	N/A	N/A	N/A
Applicable Standards	FCC 47 CFR part 2 (2.1093) Fcc KDB publications IEEE Std 1528-2013				
Test Results	Pass				

UL VS Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL VS Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties are in accordance with the above standard and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample(s), under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL VS Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL VS Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by UKAS. This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released By:	Prepared By:
	
Naseer Mirza Project Lead UL VS Ltd.	Sandhya Menon Laboratory Engineer UL VS Ltd.

2. Test Specification, Methods and Procedures

2.1. Test Specification

Reference:	KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
Title:	SAR Measurement Requirements for 100 MHz to 6 GHz
Purpose of Test:	Field probes, tissue dielectric properties, SAR scans, measurement accuracy and variability of the measured results are discussed. The field probe and SAR scan requirements are derived from criteria considered in standard IEEE 1528-2013.
The Equipment Under Test complied with the Specific Absorption Rate for general population/uncontrolled exposure limit of 1.6 W/kg as specified in FCC 47 CFR part 2 (2.1093).	

2.2. Methods and Procedures Reference Documentation

The test tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528- 2013 and the following FCC Published RF exposure KDB procedures:

IEEE 1528 - 2013
IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
.

FCC KDB Publications:
KDB 248227 D01 802.11 Wi-Fi SAR v02
KDB 447498 D01 General RF Exposure Guidance v05r02
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
KDB 865664 D02 RF Exposure Reporting v01r01

2.3. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the methods & procedures section above. Appendix 1 contains a list of the test equipment used.

3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at

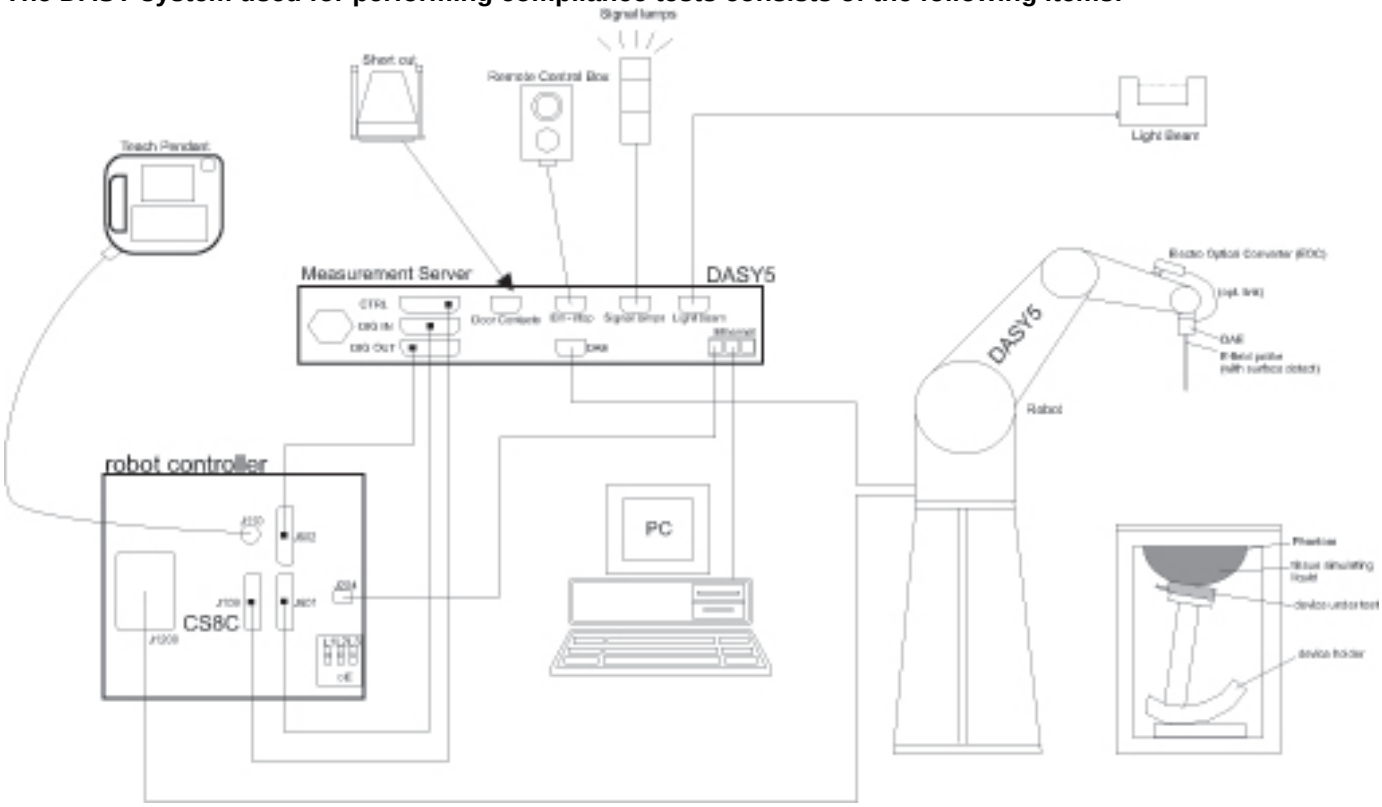
Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire, RG23 8BG UK	Facility Type
SAR Lab 56	Controlled Environment Chamber

UL VS Ltd, is accredited by UKAS (United Kingdom Accreditation Service), Laboratory UKAS Code 0644.

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

The DASY system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

4.2. Test Equipment

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards. Appendix 1 of the report details the equipment used.

5. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Test Name	Confidence Level	Calculated Uncertainty
Specific Absorption Rate- Wi-Fi 2450 MHz Body Configuration 1g	95%	±18.35%

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

See Appendix 7 for all uncertainty tables.

6. Equipment Under Test (EUT)

6.1. Identification of Equipment Under Test (EUT)

Model Name (For Reports)	BeoSound Moment
Part Number	Jukebox
Serial Number:	23840403 (Radiated Sample); 23840405 (Conducted Sample)
Hardware Version Number	8200359
Software Version Number	0.2.0_484
Country of Manufacture:	China
Date of Receipt:	03 March 2014

6.2. Further Description of EUT

The equipment under test (EUT) is a 'Tablet' for use with music streaming device. The EUT supports Wi-Fi 2.4 GHz 802.11b/g/n modes.

6.3. Modifications Incorporated in the EUT

There were no modification during the course of testing the device

6.4.Additional Information Related to Testing

<table>
<tr><td>Equipment Category</td><td>Wi-Fi Band</td><td>2.4 GHz</td><td>Data 802.11b/g/n</td></tr>
<tr><td>Type of Unit</td><td colspan="3">Portable Transceiver</td></tr>
<tr><td>Intended Operating Environment:</td><td colspan="3">Wi-Fi Coverage</td></tr>
<tr><td>Transmitter Maximum Output Power Characteristics:</td><td>2.4 GHz Wi-Fi 802.11b/g/n</td><td colspan="2">Test Software was used to configure the EUT to transmit at a maximum measured power as per section 7.3</td></tr>
<tr><td>Transmitter Frequency Range:</td><td>2.4 GHz Wi-Fi 802.11b/g/n</td><td colspan="2">(2412 to 2462) MHz</td></tr>
<tr><td rowspan="5">Transmitter Frequency Allocation of EUT When Under Test:</td><td colspan="3">Band: 2.4 GHz Wi-Fi 802.11b/g/n</td></tr>
<tr><td>Rule</td><td>Ch.#</td><td>Frq. (MHz)</td></tr>
<tr><td rowspan="3">15.247 DTS</td><td>1</td><td>2412.0</td></tr>
<tr><td>6</td><td>2437.0</td></tr>
<tr><td>11</td><td>2462.0</td></tr>
<tr><td>Modulation(s):</td><td colspan="2">DBPSK, BPSK, CCK (Wi-Fi):</td><td>0 Hz</td></tr>
<tr><td>Modulation Scheme (Crest Factor):</td><td colspan="2">DBPSK, BPSK, CCK (Wi-Fi802.11b/g/n):</td><td>1</td></tr>
<tr><td>Antenna Type:</td><td colspan="3">Internal integral</td></tr>
<tr><td>Antenna Length:</td><td colspan="3">None Stated</td></tr>
<tr><td>Number of Antenna Positions:</td><td colspan="2">WLAN</td><td>1 fixed</td></tr>
<tr><td>Power Supply Requirement:</td><td colspan="3">5.0 V</td></tr>
<tr><td>Battery Type(s):</td><td colspan="3">Li ion</td></tr>
</table>

6.5. Operating Modes

The EUT was tested in the following operating mode(s) unless otherwise stated:

- 2.4 GHz Wi-Fi802.11b/g/n - Data allocated mode using 'USI tool' software to excise mode ‘b’, ‘g’ and ‘n’, with maximum power of up to 14.3 dBm for ‘b’ mode and 14.3 dBm for ‘g’ and 14.2 dBm for ‘n’ modes.
- The device was set to operate in transmit mode using an inbuilt software incorporated in the equipment.

6.6. Nominal and Maximum Output Power

		RF Output Power (dBm)	
RF Air interface	**Mode**	**Target**	**Max. tune-up tolerance limit**
WiFi 2.4 GHz	802.11b	14.0	-2.5 ~ +1.0
	802.11g	14.0	-1.0 ~ +1.0
	802.11n	14.0	-1.0 ~ +1.0

Note:

1. The nominal and maximum average source based rated power, declared and supplied by manufacturer are shown in the above tables.
2. These are specified maximum allowed average power for all the modes and frequencies bands supported.

7. RF Exposure Conditions (Test Configurations)

7.1. Configuration and Peripherals

Body Configuration

a) The EUT was placed in a normal operating position where the centre of EUT was aligned with the centre reference point on the flat section of the 'Eli' phantom.

b) With the EUT touching the phantom at an imaginary centre line. The EUT was aligned with a marked plane (X and Y axis) consisting of two lines.

c) For the touch-safe position the EUT was gradually moved towards the flat section of the 'SAM' phantom until any point of the EUT touched the phantom.

d) For position(s) greater then 0mm separation the EUT was positioned as per the touch-safe position, and then the vertical height was decreased/adjusted as required.

e) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimise the drift.

f) The device was keyed to operate continuously in the transmit mode for the duration of the test.

g) The location of the maximum spatial SAR distribution (peak) was determined relative to the EUT and its antenna.

h) The EUT was transmitting at full power throughout the duration of the test powered by a fully charged battery.

7.2. Configuration Consideration

Technology Antenna	Configuration	Antenna-to-User Separation	Position	Antenna-to-Edge Separation	Evaluation Considered
WLAN	Body	0mm	Back	<25mm	Yes
			Top Edge	<25mm	Yes
			Bottom Edge	>25mm	No
			Right Edge	<25mm	Yes
			Left Edge	<25mm	Yes

Note:

1. The Antenna to Edge distances is shown in the Appendix 4, photo **PHT/10144616JD16/012** of the report.

7.3.RF Output Average Power Measurement: Wi-Fi

7.3.1.WiFi 802.11b/g/n (2.4 GHz)

		Avg Power (dBm)	
Channel Number	**Frequency (MHZ)**	**(1Mbps)**	**Operating Mode**
1	2412.0	13.8	**802.11b**
6	2437.0	13.7	
11	2462.0	14.0	
Channel Number	**Frequency (MHZ)**	**(6Mbps)**	**Operating Mode**
1	2412.0	13.9	**802.11g**
6	2437.0	13.8	
11	2462.0	14.3	
Channel Number	**Frequency (MHZ)**	**(6.5Mbps)**	**Operating Mode**
1	2412.0	13.7	**802.11n HT20**
6	2437.0	13.7	
11	2462.0	14.2	

8. System Check and Dielectric Parameters

See Appendix 5 and Appendix 6 for tables and measurements.

9. Measurements, Examinations and Derived Results

9.1. General Comments

This section contains test results only.

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to section 8 for details of measurement uncertainties.

9.1.1.Wi-Fi 2450 Body Configuration

Max Reported SAR = 1.164 (W/kg)

					Power (dBm)		1g : SAR Results (W/kg)			
Mode or Modulation	Dist (mm)	Test Position	Channel No.	Freq (MHz)	Tune-up limit	Meas.	Meas.	Scaled	Note(s)	Scan No.
DBPSK (802.11g 6Mbps)	0	Back	11	2462.0	15.0	14.3	0.991	1.164	2	1
DBPSK (802.11g 6Mbps)	0	Back	1	2437.0	15.0	13.9	0.609	0.785	-	2
DBPSK (802.11g 6Mbps)	0	Back	6	2462.0	15.0	13.8	0.642	0.846	-	3
DBPSK (802.11g 6Mbps)	0	Left Hand Side	11	2462.0	15.0	14.3	0.007	0.008	1	4
DBPSK (802.11g 6Mbps)	0	Right Hand Side	11	2462.0	15.0	14.3	0.020	0.023	1	5
DBPSK (802.11g 6Mbps)	0	Top	11	2412.0	15.0	14.3	0.079	0.093	1	6

Note(s):

1. Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g SAR for the mid-band or highest output power channel is:

   - ≤ 0.8 W/kg for 1-g, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg for 1-g, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg for 1-g, when the transmission band is ≥ 200 MHz

2. As per 865664 D01, the highest SAR measured > 0.8 W/kg has been re-measured and included in the report in Section 10 under ***SAR Measurement Variability and Measurement Uncertainty Analysis Results*** Table.

*KDB 248227 - SAR is not required for 802.11b/n channels when the maximum average output power is < ¼ dB lower than that measured on the corresponding 802.11g channels.

10. SAR measurement variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

10.1. Repeated Measurement Results

Exposure Configuration	Technology Band	Measured 1g -SAR (W/Kg)	Equipment Class	Max Meas. Source base Avg Power [dBm]	Ratio of Largest to Smallest SAR Measured
Body (Separation Distance 0mm)	WiFi 2.4 GHz	0.991	DTS	14.3	1.16
		0.851			

Appendix 1. Test Equipment Used

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A034	Narda 20W Termination	Narda	374BNM	8706	Calibrated as part of system	-
A1097	SMA Directional Coupler	MiDISCO	MDC6223-30	None	Calibrated as part of system	-
A1137	3dB Attenuator	Narda	779	04690	Calibrated as part of system	-
A1174	Dielectric Probe Kit	Agilent Technologies	85070C	Us99360072	Calibrated before use	-
A1328	Handset Positioner	Schmid & Partner Engineering AG	Modification	SD 000 H01 DA	-	-
A2111	Data Acquisition Electronics	Schmid & Partner Engineering AG	DAE3	432	28 Aug 2013	12
A2077	Probe	Schmid & Partner Engineering AG	EX3 DV4	3814	24 Sep 2013	12
A1322	2450 MHz Dipole Kit	Schmid & Partner Engineering AG	D2450V2	725	16 May 2013	24
A1497	Amplifier	Mini-Circuits	zhl-42w (sma)	e020105	Calibrated as part of system	-
A2437	Eli Phantom	Schmid & Partner Engineering AG	Eli5	1235	Calibrated before use	-
A215	20 dB Attenuator	Narda	766-20	9402	Calibrated as part of system	-
A2263	Digital Camera	Samsung	PL211	9453C90B 607487L	-	-
M1015	Network Analyser	Agilent Technologies	8753ES	US39172406	04 Oct 2013	12
C1145	Cable	Rosenberger MICRO-COAX	FA147A F003003030	41843-1	Calibrated as part of system	-
C1146	Cable	Rosenberger MICRO-COAX	FA147A F030003030	41752-1	Calibrated as part of system	-
GO591	Robot Power Supply	Schmid & Partner Engineering AG	DASY4	None	Calibrated before use	-
G087	PSU	Thurlby Thandar	CPX200	100701	Calibrated before use	-
M1653	Robot Arm	Staubli	RX908 L	F01/5J8 6A1/C/01	Calibrated before use	-
M1768	Signal Generator	R&S	SME06	848695/003	24 Oct 2013	12
M1023	Dual Channel Power Meter	R & S	NRVD	863715/030	01 May 2014	12
S0567	SAR Lab	UL	Site 56	N/A	Calibrated before use	-

A.1.1. Calibration Certificates

This section contains the calibration certificates and data for the Probe(s) and Dipole(s) used, which are not included in the total number of pages for this report.

A2077

Checked M. Nalen 22/11/2013

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

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

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

Accreditation No.: SCS 108

Client UL RFI UK

Certificate No: EX3-3814_Sep13

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3814

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

Calibration date: September 24, 2013

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	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	4-Sep-13 (No. DAE4-660_Sep13)	Apr-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: September 25, 2013

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

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

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

Accreditation No.: SCS 108

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, D	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; Dx,y,z; VRx,y,z: 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 ≤ 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 EX3DV4

SN:3814

Manufactured: September 2, 2011
Calibrated: September 24, 2013

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3814

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.52	0.51	0.44	± 10.1 %
DCP (mV)[B]	97.0	96.4	102.5	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	168.7	±3.0 %
		Y	0.0	0.0	1.0		157.9	
		Z	0.0	0.0	1.0		147.2	

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%.

[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: EX3DV4 - SN:3814

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)
1450	40.5	1.20	8.48	8.48	8.48	0.50	0.80	± 12.0 %
2450	39.2	1.80	7.13	7.13	7.13	0.23	1.10	± 12.0 %
2600	39.0	1.96	7.01	7.01	7.01	0.45	0.80	± 12.0 %
3700	37.7	3.12	6.23	6.23	6.23	0.22	2.24	± 13.1 %
5200	36.0	4.66	5.07	5.07	5.07	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.86	4.86	4.86	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.76	4.76	4.76	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.35	4.35	4.35	0.50	1.80	± 13.1 %
5800	35.3	5.27	4.59	4.59	4.59	0.40	1.80	± 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.

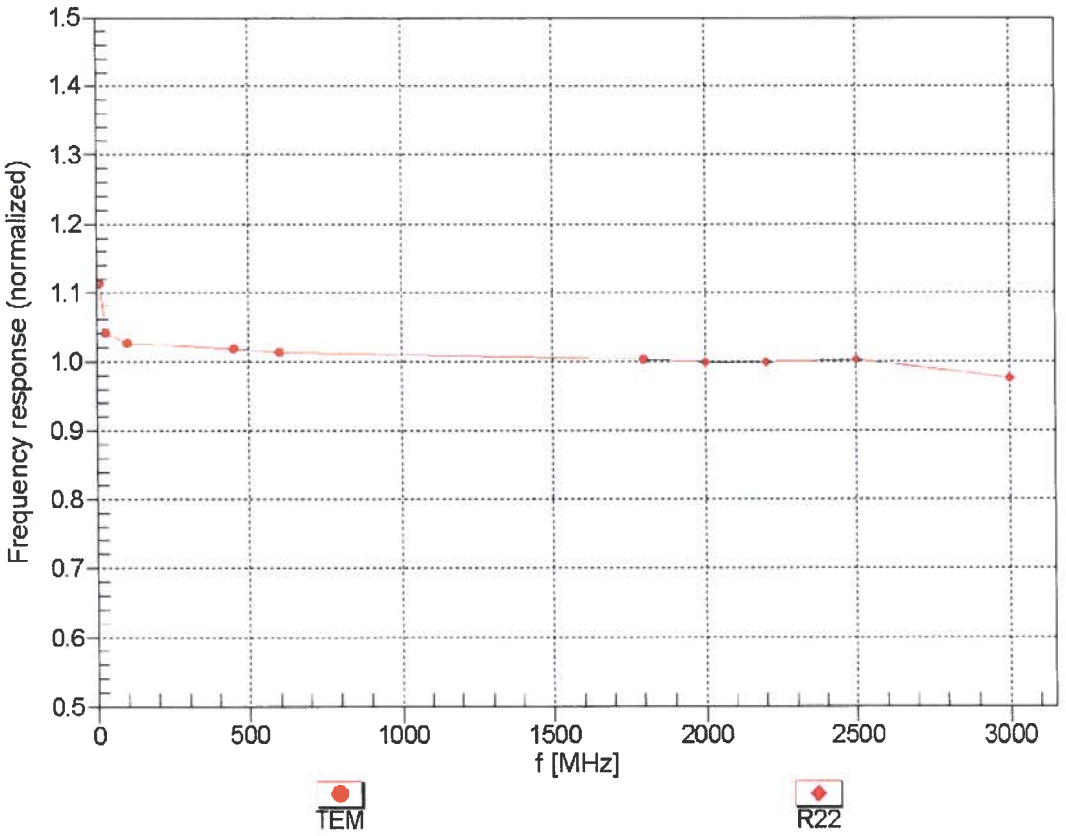
DASY/EASY - Parameters of Probe: EX3DV4 - SN:3814

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)
1450	54.0	1.30	7.80	7.80	7.80	0.59	0.71	± 12.0 %
2450	52.7	1.95	7.01	7.01	7.01	0.61	0.70	± 12.0 %
2600	52.5	2.16	6.74	6.74	6.74	0.80	0.50	± 12.0 %
3700	51.0	3.55	6.16	6.16	6.16	0.24	2.46	± 13.1 %
5200	49.0	5.30	4.44	4.44	4.44	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.09	4.09	4.09	0.60	1.90	± 13.1 %
5500	48.6	5.65	3.89	3.89	3.89	0.60	1.90	± 13.1 %
5600	48.5	5.77	3.74	3.74	3.74	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.96	3.96	3.96	0.60	1.90	± 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.

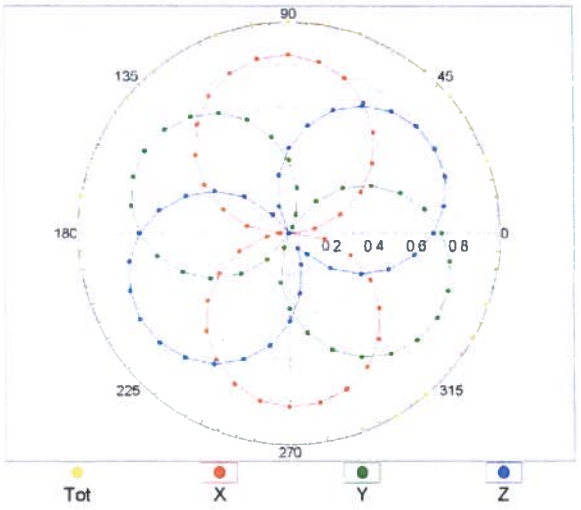
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



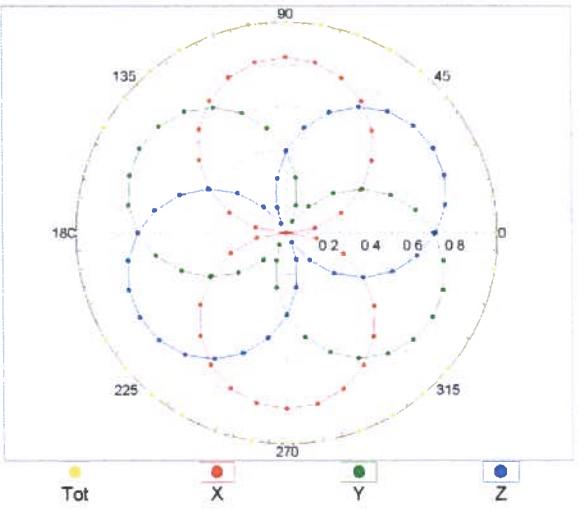
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

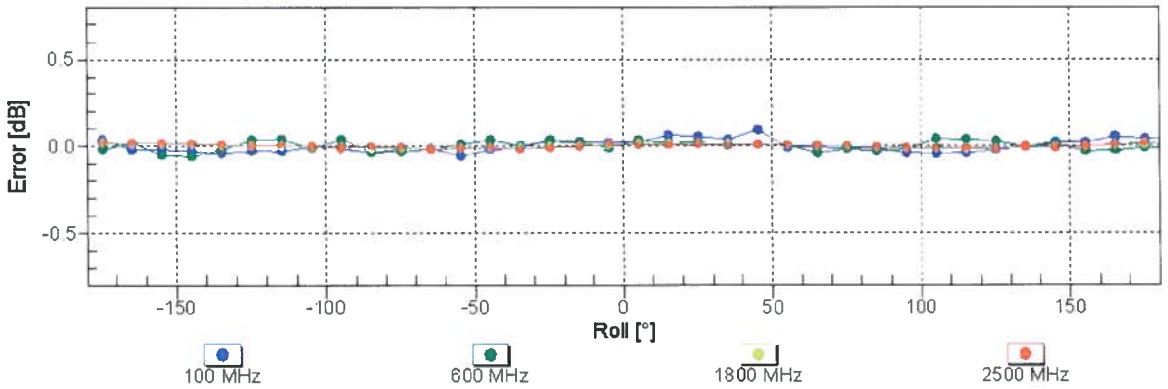
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



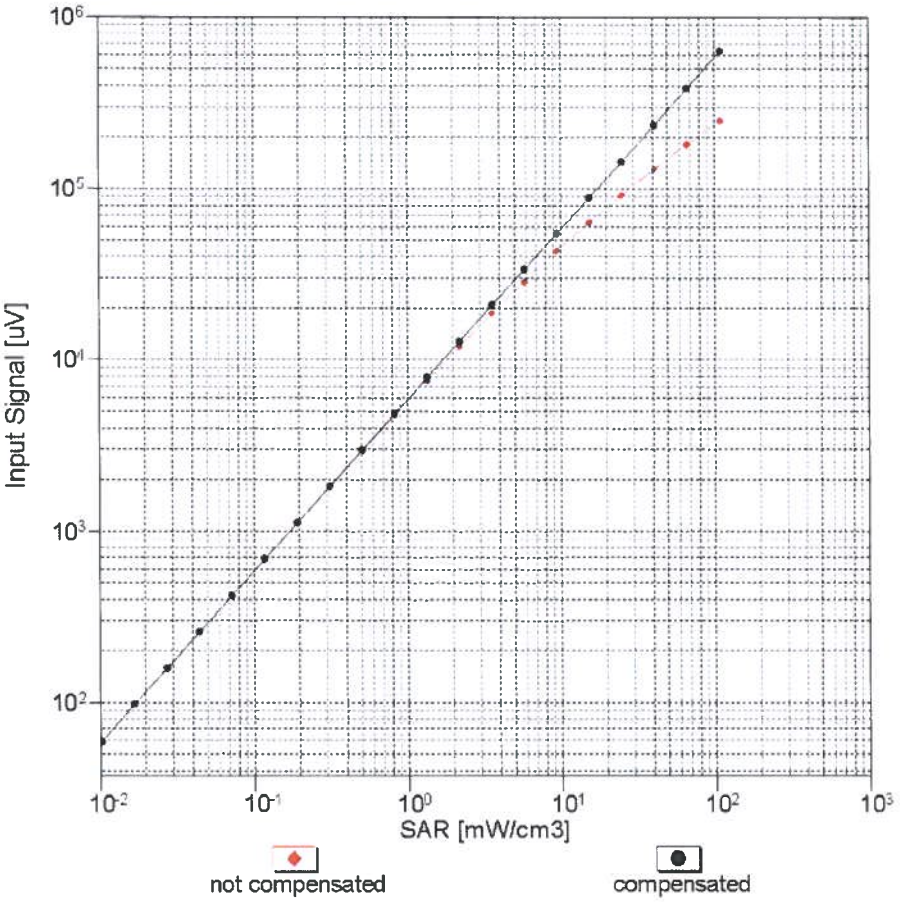
f=1800 MHz,R22

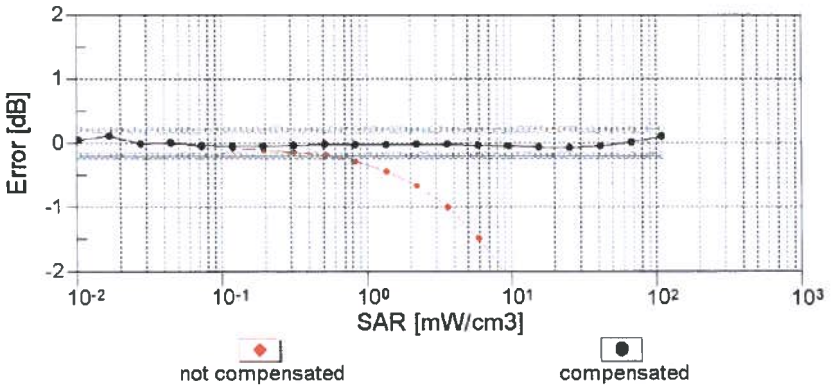




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

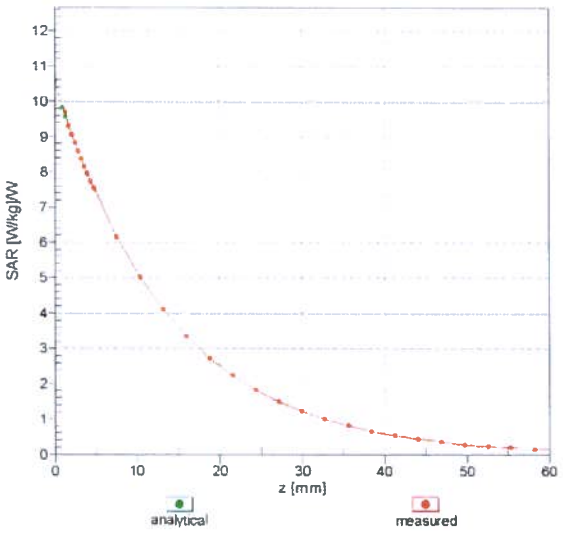




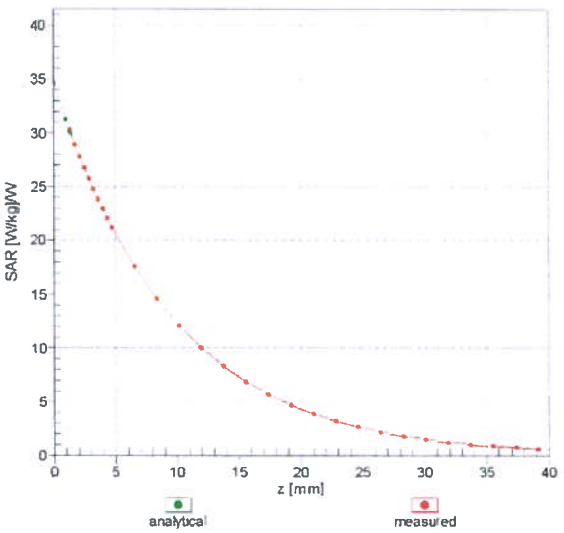
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 1450 MHz,WGLS R14 (H_convF)

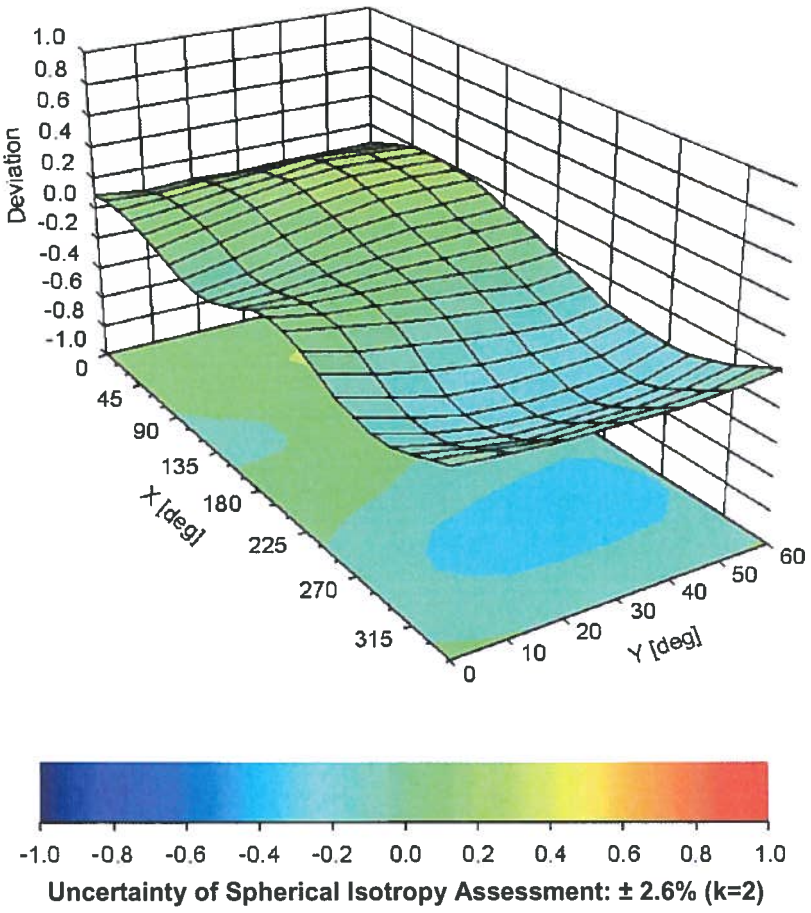


f = 2450 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3814

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-64.7
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	2 mm

checked by A 1322 DATE: 21 - JUNE - 2013

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

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

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

Accreditation No.: SCS 108

Client UL-RFI

Certificate No: D2450V2-725_May13

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 725
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	May 16, 2013

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	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14

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-12)	In house check: Oct-13

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

Issued: May 16, 2013

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	V52.8.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.6 ± 6 %	1.81 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	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.4 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.0 ± 6 %	1.99 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	12.7 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**49.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.90 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.4 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.7 Ω + 8.7 jΩ
Return Loss	- 20.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.5 Ω + 7.6 jΩ
Return Loss	- 22.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 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	October 16, 2002

DASY5 Validation Report for Head TSL

Date: 15.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 725

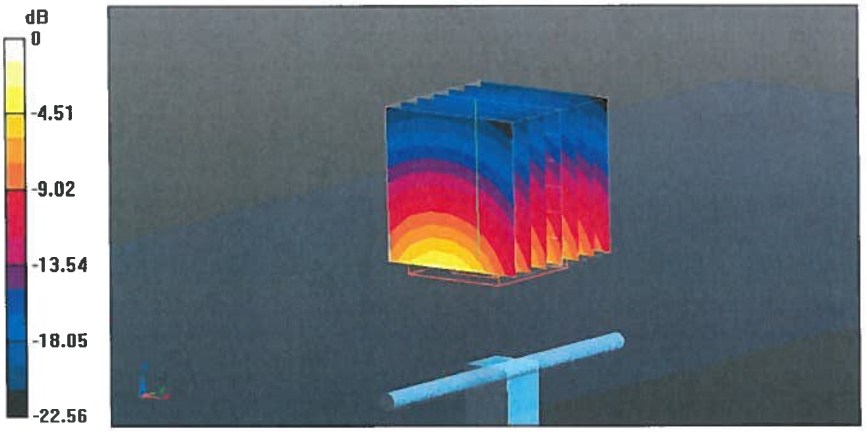
Communication System: UID 0 - CW ; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.81 S/m; ε_r = 37.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

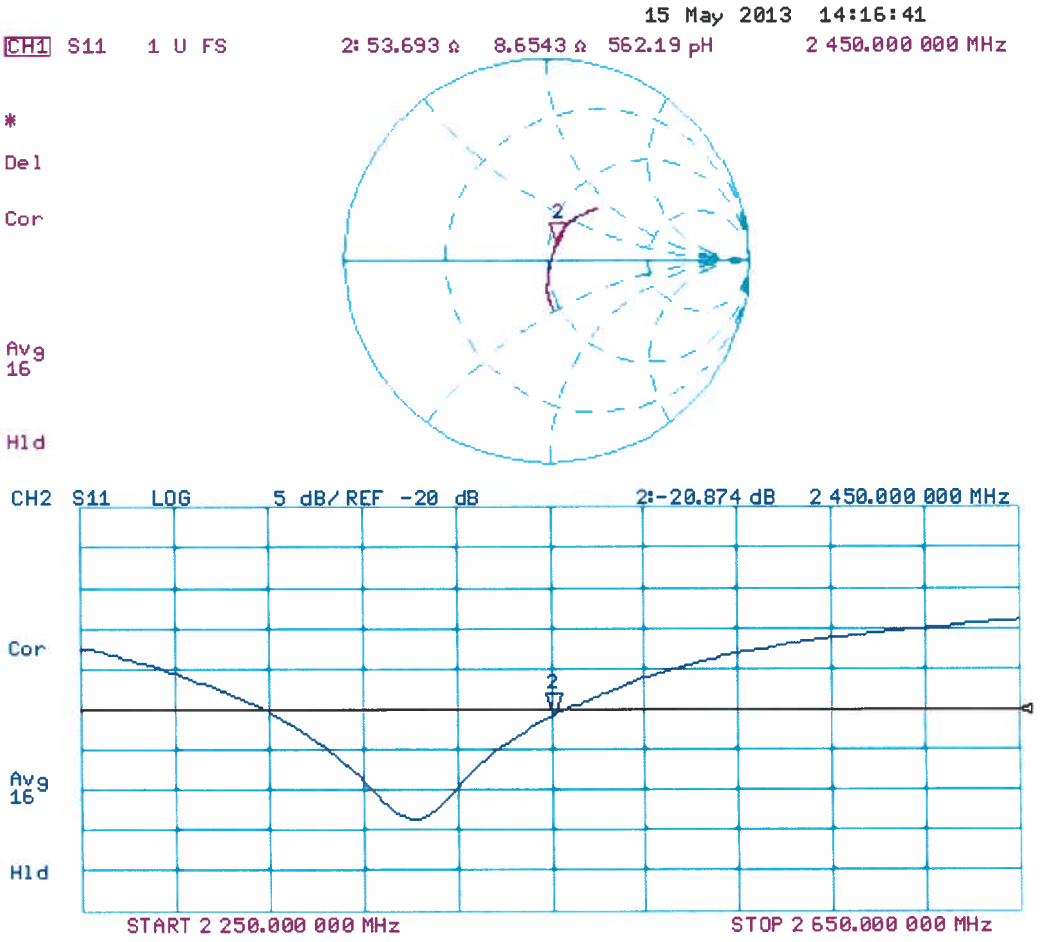
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.953 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 27.6 W/kg
SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.15 W/kg
Maximum value of SAR (measured) = 16.8 W/kg



0 dB = 16.8 W/kg = 12.25 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 725

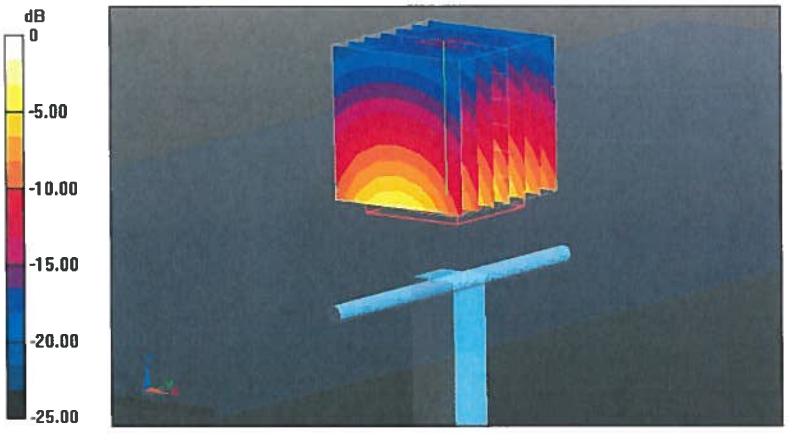
Communication System: UID 0 - CW ; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.99 S/m; ε_r = 51; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.42, 4.42, 4.42); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

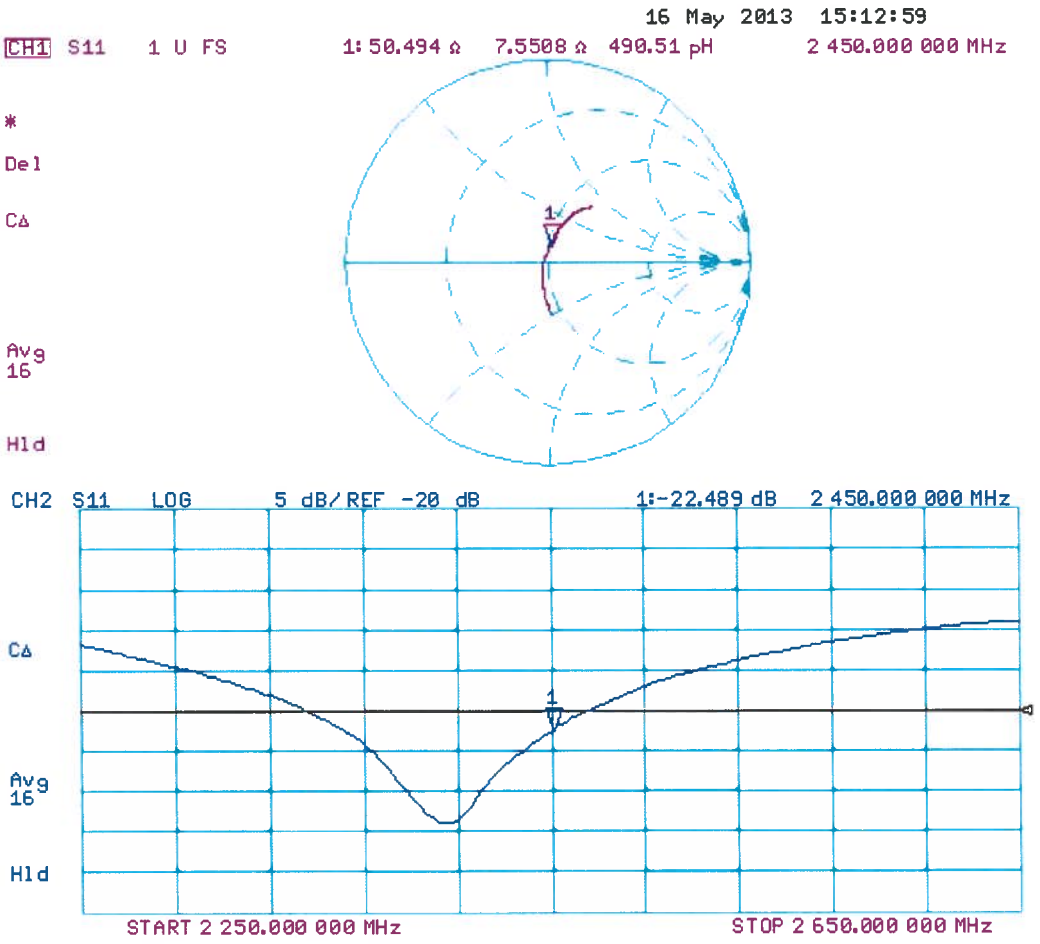
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.374 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 26.7 W/kg
SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.9 W/kg
Maximum value of SAR (measured) = 16.7 W/kg



0 dB = 16.7 W/kg = 12.23 dBW/kg

Impedance Measurement Plot for Body TSL



Appendix 2. Measurement Methods

A.2.1. Evaluation Procedure

The Specific Absorption Rate (SAR) evaluation was performed in the following manner:

a) (i) The evaluation was performed in an applicable area of the phantom depending on the type of device being tested. For devices worn about the ear during normal operation, both the left and right ear positions were evaluated at the centre frequency of the band at maximum power. The side, which produced the greatest SAR, determined which side of the phantom would be used for the entire evaluation. The positioning of the head worn device relative to the phantom was dictated by the test specification identified in section 3.1 of this report.

(ii) For body worn devices or devices which can be operated within 20 cm of the body, the flat section of the SAM phantom was used were the size of the device(s) is normal. for bigger devices and base station the 2mm Oval phantom is used for evaluation. The type of device being evaluated dictated the distance of the EUT to the outer surface of the phantom flat section.

b) The SAR was determined by a pre-defined procedure within the DASY4 software. The exposed region of the phantom was scanned near the inner surface with a grid spacing of 20mm x 20mm or appropriate resolution.

c) A 5x5x7 matrix for measurement < 2.0 GHz, 7x7x7 matrix for measurement 2.0 GHz to 3.0 GHz, and 7x7x12 for > 5.0 GHz was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

d) If the EUT had any appreciable drift over the course of the evaluation, then the EUT was re-evaluated. Any unusual anomalies over the course of the test also warranted a re-evaluation.

A.2.2. Specific Absorption Rate (SAR) Measurements to 865664 D01 SAR Measurement 100 MHz to 6MHz

Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields

SAR measurements were performed in accordance with IEEE 1528 and FCC KDB procedures, against appropriate limits for each measurement position in accordance with the standard. In some cases the FCC was contacted using a PBA or KDB process to ensure test is performed correctly.

The test was performed in a shielded enclosure with the temperature controlled to remain between +18.0ºC and +25.0ºC. The tissue equivalent material fluid temperature was controlled to give a maximum variation of ± 2.0ºC

Prior to any SAR measurements on the EUT, system Check and material dielectric property measurements were conducted. In the absence of a detailed procedure within the specification, system Check and material dielectric property measurements were performed in accordance with FCC KDB publication 865664 D01.

Following the successful system Check and material dielectric property measurements, a SAR versus time sweep shall be performed within 10 mm of the phantom inner surface. If the EUT power output is stable after three minutes then the measurement probe will perform a coarse surface level scan at each test position in order to ascertain the location of the maximum local SAR level. Once this area had been established, a 5x5x7 cube of 175 points for frequency below 2.0 GHz, above 2.0GHz up to 3.0 GHz 7x7x7 cube of 343 points and a 7x7x12 cube of 588 points for frequency 5.0 GHz and above will be centred at the area of concern. Extrapolation and interpolation will then be carried out on the 27g of tissue and the highest averaged SAR over a 1g cube determined.

Once the maximum interpolated SAR measurement is complete; the coarse scan is visually assessed to check for secondary peaks within 50% of the maximum SAR level. If there are any further SAR measurements required, extra 5x5x7 or 7x7x7 or 7x7x12 cubes shall be centred on each of these extra local SAR maxima.

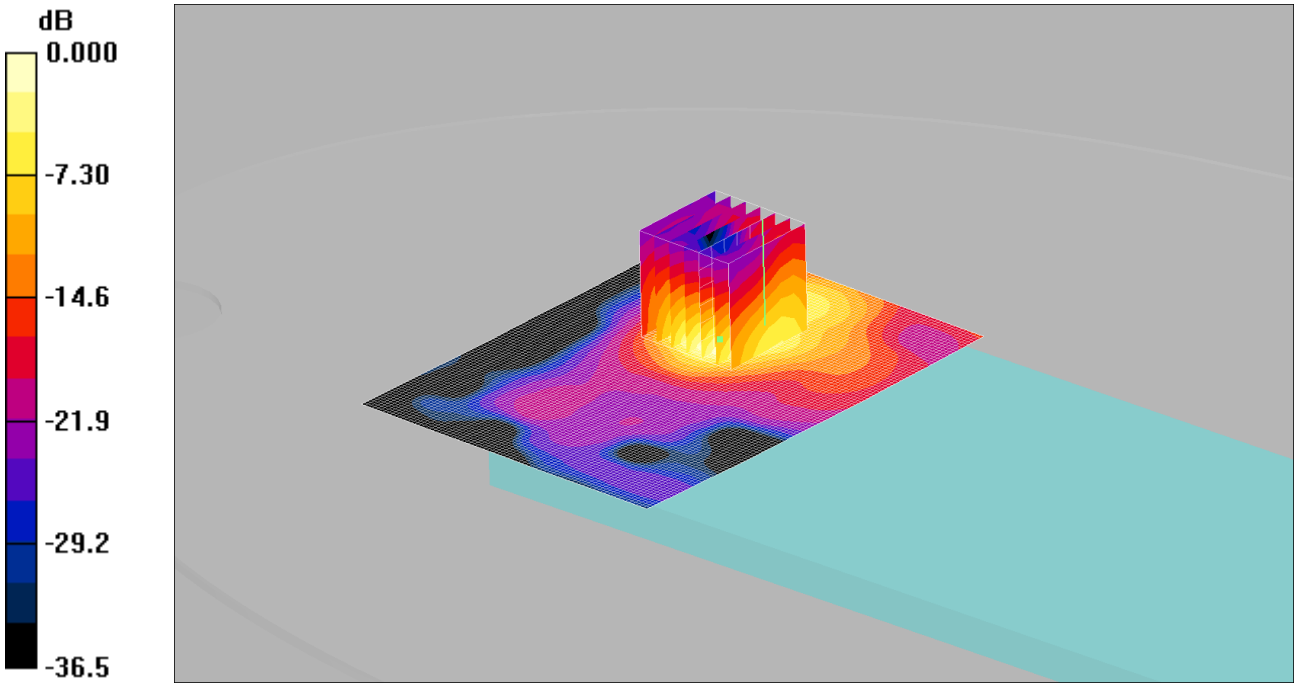
At the end of each position test case a second time sweep shall be performed to check whether the EUT has remained stable throughout the test.

Appendix 3. SAR Distribution Scans

This appendix contains SAR distribution scans which are included in the total number of pages for this report.

Scan Reference Number	Title
001	Back of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH11
002	Back of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH1
003	Back of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH6
004	Right Hand Side of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH11
005	Left Hand Side of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH11
006	Top of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH11
007	System Performance Check 2450MHz Body 06 03 14
008	System Performance Check 2450MHz Body 07 03 14
009	System Performance Check 2450MHz Body 10 03 14

001: Back of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH11
Date: 10/03/2014
DUT: Bang & Olufsen as; Type: FCC ID: TTUBSMOMENT



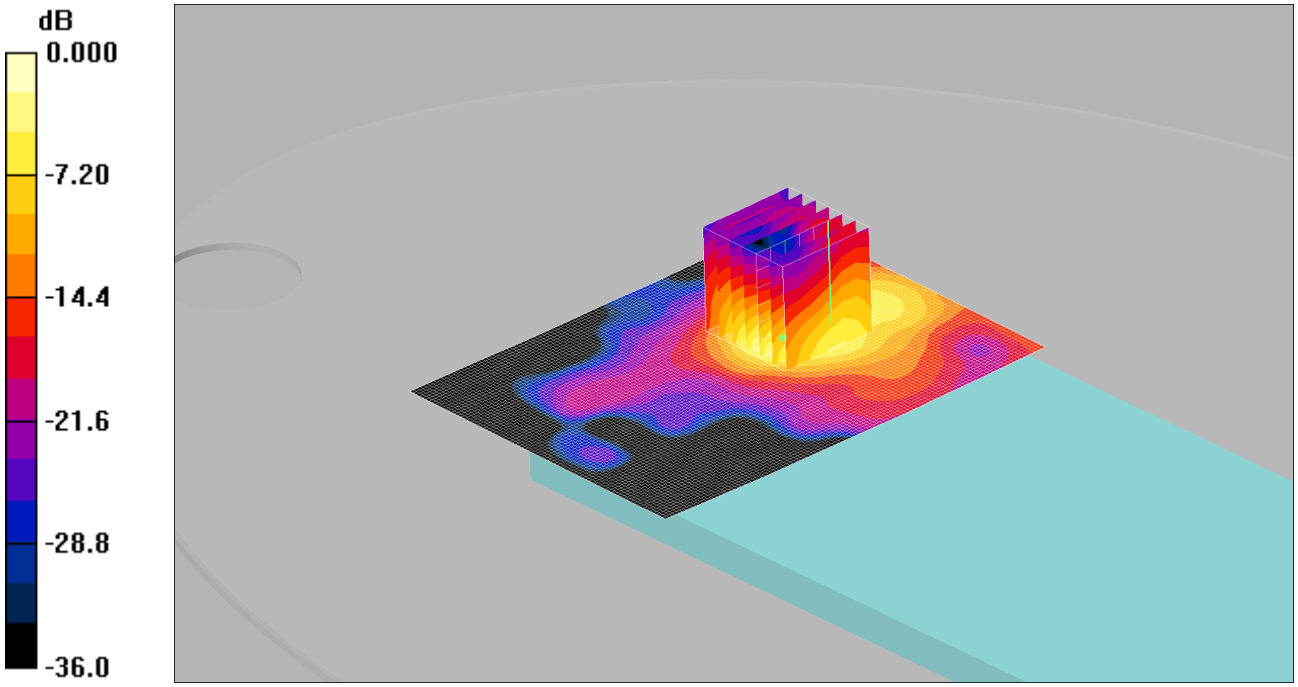
0 dB = 1.57mW/g

Communication System: WLAN; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 MHz MSL Medium parameters used (interpolated): f = 2462 MHz; σ = 2.01 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(7.01, 7.01, 7.01);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 28/08/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1235
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 159

Back of EUT - Middle 2/Area Scan (111x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 2.09 mW/g

Back of EUT - Middle 2/Zoom Scan (7x7x7) 2 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.3 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 2.55 W/kg
SAR(1 g) = 0.991 mW/g; SAR(10 g) = 0.401 mW/g
Maximum value of SAR (measured) = 1.57 mW/g

002: Back of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH1
Date: 10/03/2014
DUT: Bang & Olufsen as; Type: FCC ID: TTUBSMOMENT



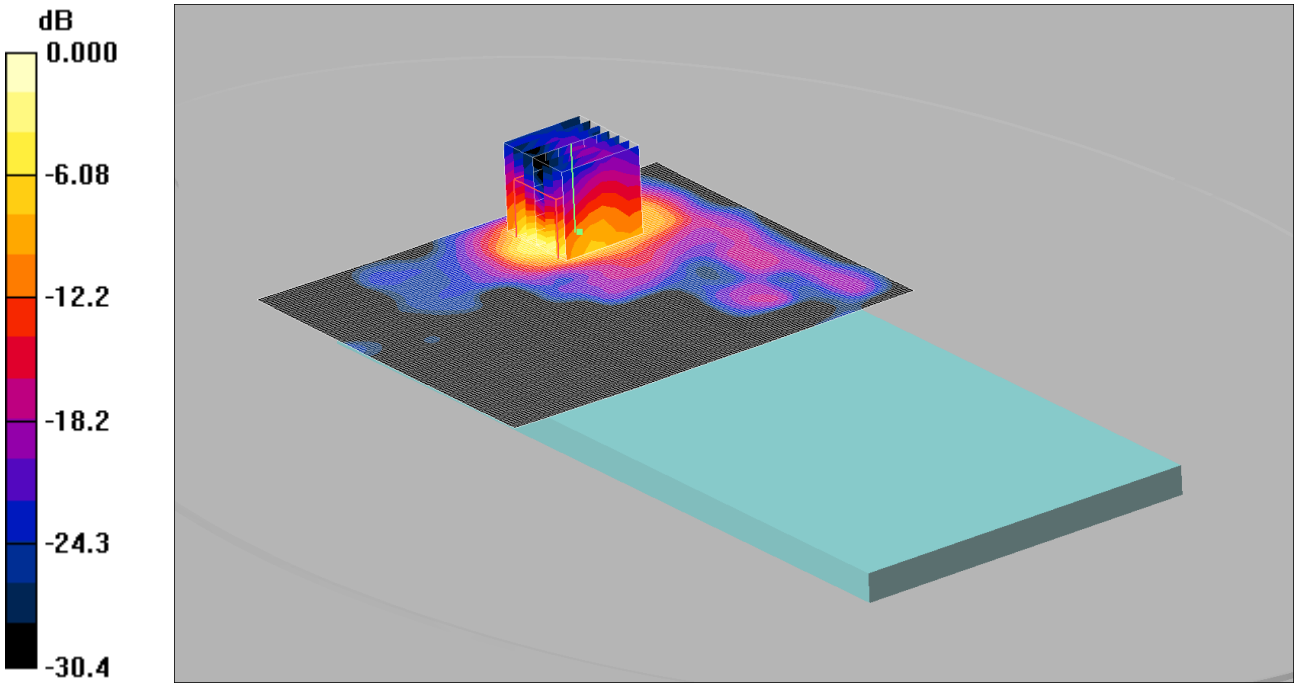
0 dB = 0.975mW/g

Communication System: WLAN; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: 2450 MHz MSL Medium parameters used (interpolated): f = 2412 MHz; σ = 1.95 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(7.01, 7.01, 7.01);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 28/08/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1235
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 159

Back of EUT - Middle 2/Area Scan (111x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 1.24 mW/g

Back of EUT - Middle 2/Zoom Scan (7x7x7) 2 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.30 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 1.58 W/kg
SAR(1 g) = 0.609 mW/g; SAR(10 g) = 0.238 mW/g
Maximum value of SAR (measured) = 0.975 mW/g

003: Back of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH6
Date: 07/03/2014
DUT: Bang & Olufsen as; Type: FCC ID: TTUBSMOMENT

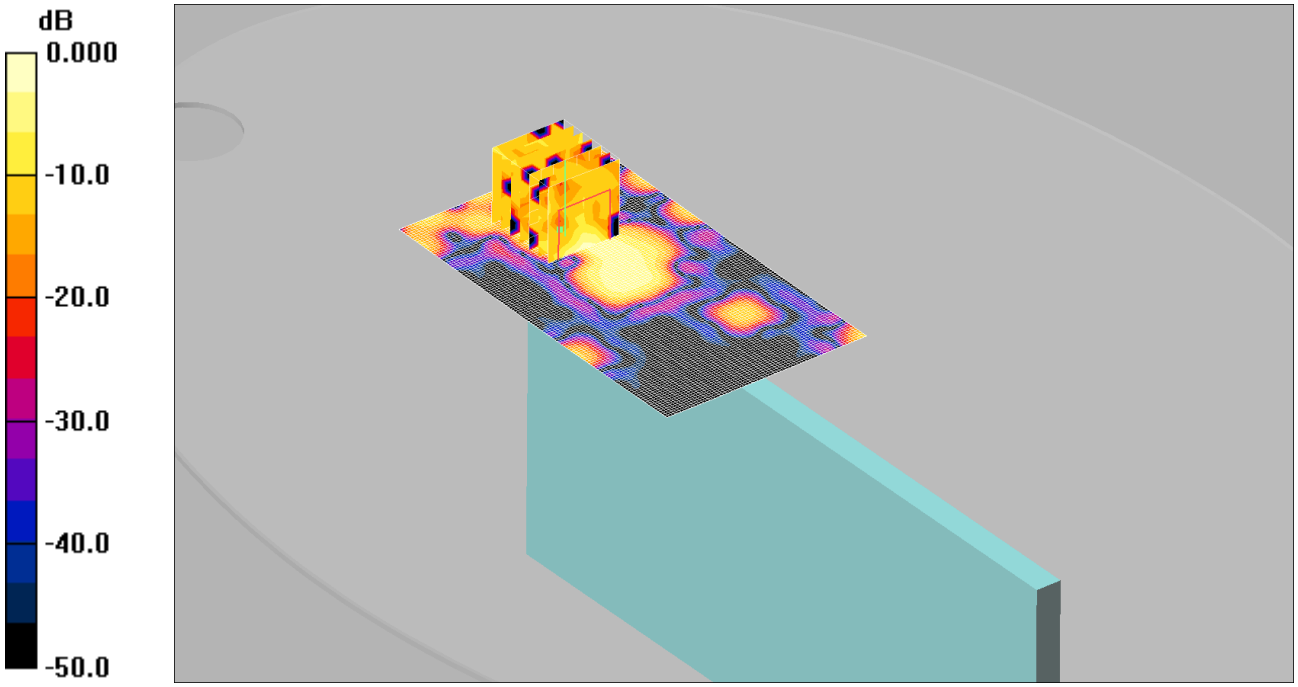


0 dB = 1.17mW/g

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 MHz MSL Medium parameters used (interpolated): f = 2437 MHz; σ = 2.02 mho/m; ε_r = 51; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(7.01, 7.01, 7.01);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 28/08/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1235
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
Back of EUT - Middle 2/Area Scan (131x111x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 1.19 mW/g

Back of EUT - Middle 2/Zoom Scan (7x7x7) 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.68 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 0.642 mW/g; SAR(10 g) = 0.248 mW/g
Maximum value of SAR (measured) = 1.17 mW/g

004: Right Hand Side of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH11
Date: 06/03/2014
DUT: Bang & Olufsen as; Type: FCC ID: TTUBSMOMENT



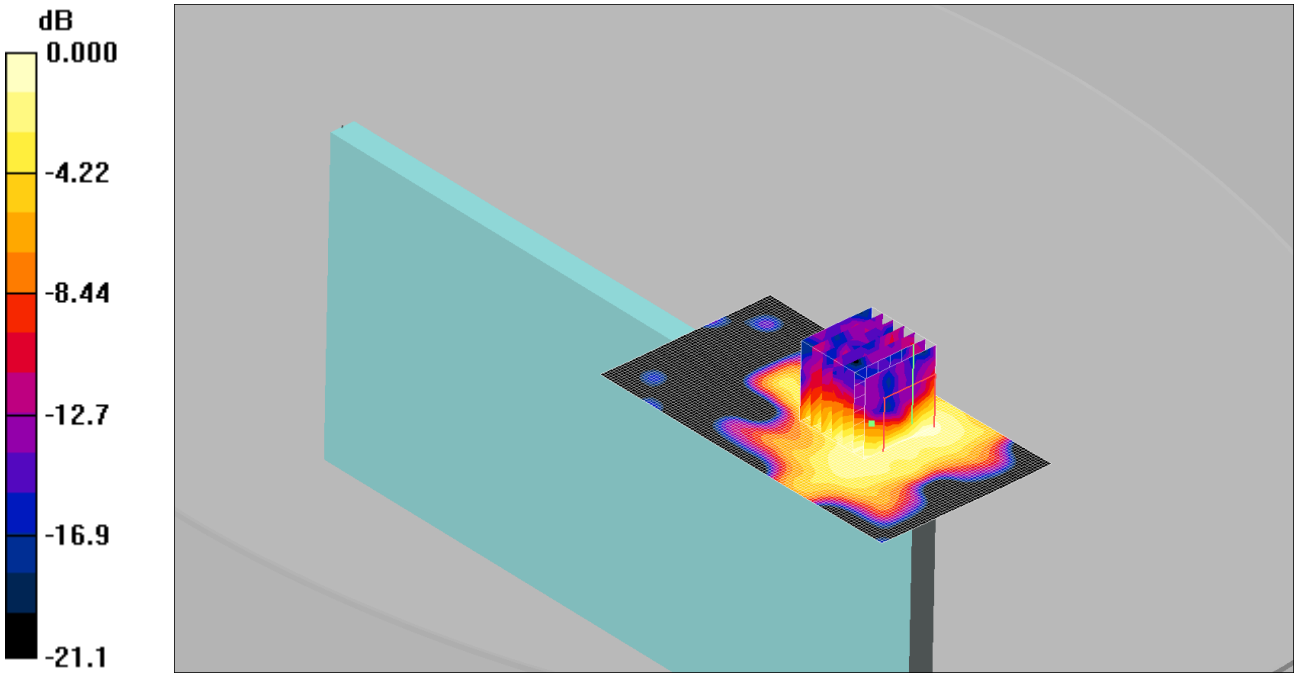
0 dB = 0.013mW/g

Communication System: WLAN; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 MHz MSL Medium parameters used (interpolated): f = 2462 MHz; σ = 2.04 mho/m; ε_r = 51; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(7.01, 7.01, 7.01);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 28/08/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1235
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Right Hand Side of EUT - Middle/Area Scan (71x121x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.010 mW/g
Right Hand Side of EUT - Middle/Zoom Scan (7x7x7) 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.34 V/m; Power Drift = -0.153 dB
Peak SAR (extrapolated) = 0.019 W/kg
SAR(1 g) = 0.00643 mW/g; SAR(10 g) = 0.00184 mW/g
Maximum value of SAR (measured) = 0.013 mW/g

Note: SAR level measured is very low as equivalent to noise floor.

005: Left Hand Side of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH11
Date: 06/03/2014
DUT: Bang & Olufsen as; Type: FCC ID: TTUBSMOMENT



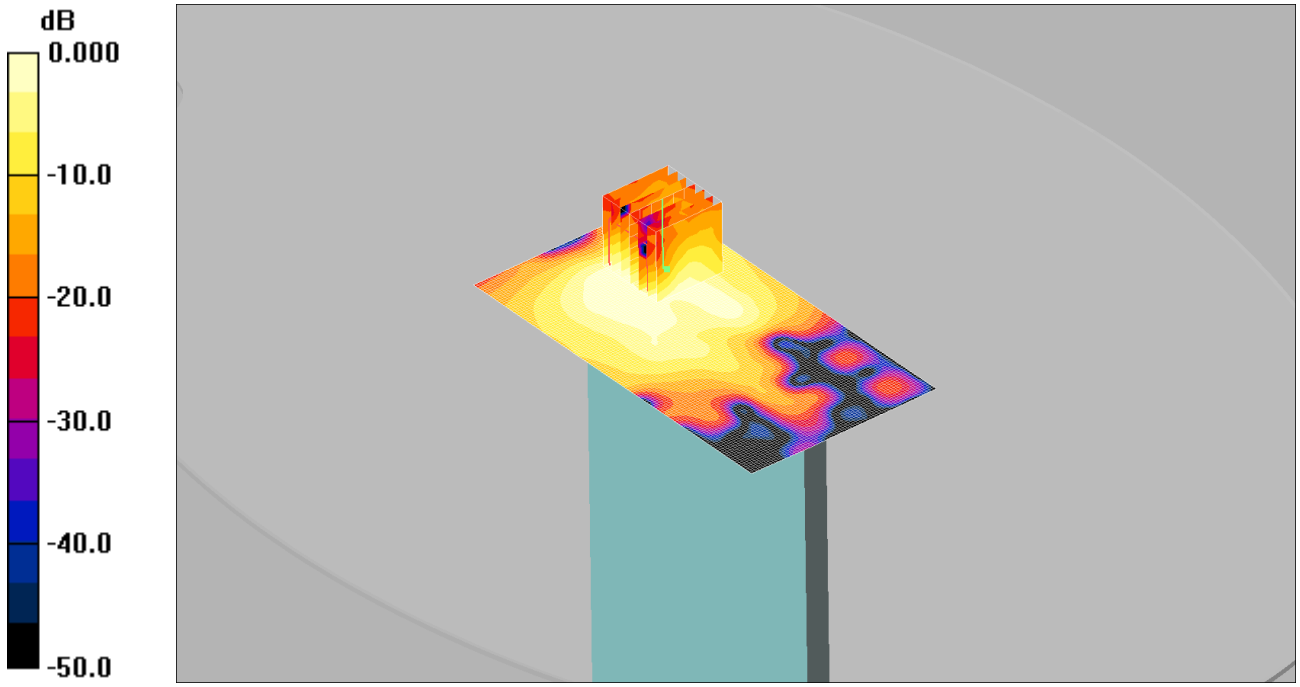
0 dB = 0.030mW/g

Communication System: WLAN; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 MHz MSL Medium parameters used (interpolated): f = 2462 MHz; σ = 2.04 mho/m; ε_r = 51; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(7.01, 7.01, 7.01);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 28/08/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1235
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Left Hand Side of EUT - Middle/Area Scan (61x111x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.028 mW/g
Left Hand Side of EUT - Middle/Zoom Scan (7x7x7) 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.04 V/m; Power Drift = 0.136 dB
Peak SAR (extrapolated) = 0.044 W/kg
SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.00956 mW/g
Maximum value of SAR (measured) = 0.030 mW/g

Note: SAR level measured is very low as equivalent to noise floor.

006: Top of EUT Facing Phantom 2.4GHz 802.11g 6Mbps CH11
Date: 06/03/2014
DUT: Bang & Olufsen as; Type: FCC ID: TTUBSMOMENT



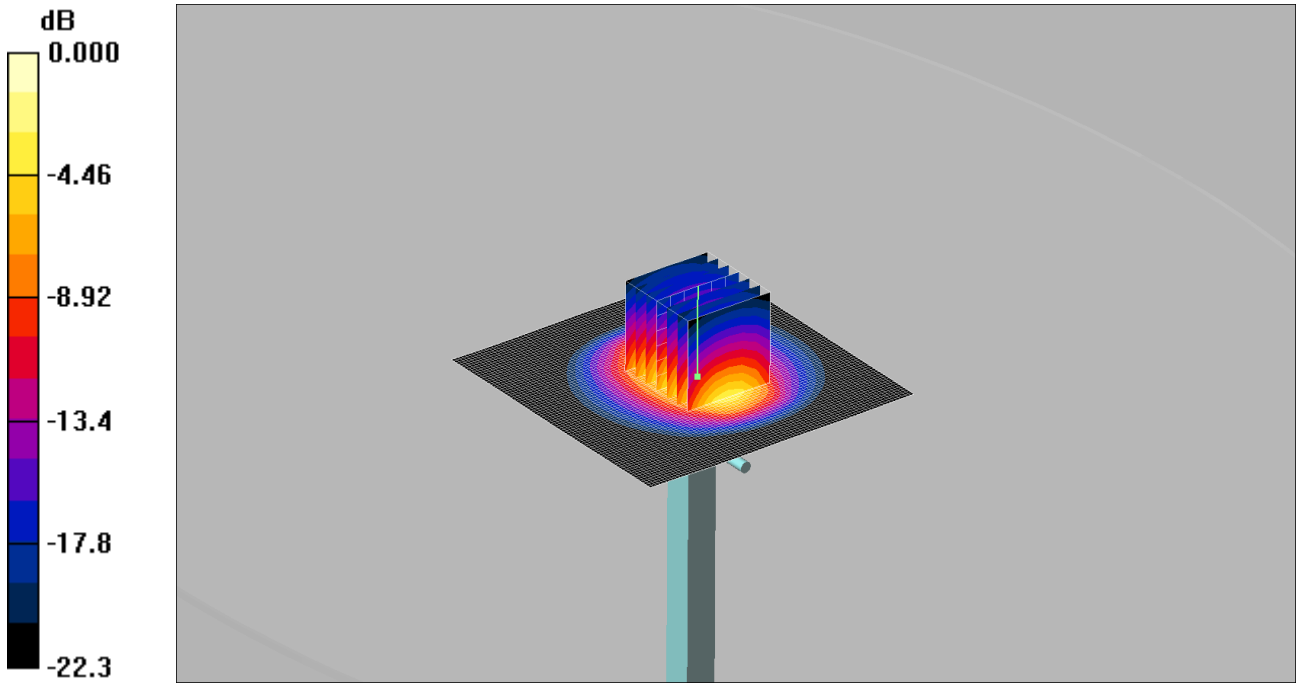
0 dB = 0.117mW/g

Communication System: WLAN; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 MHz MSL Medium parameters used (interpolated): f = 2462 MHz; σ = 2.04 mho/m; ε_r = 51; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(7.01, 7.01, 7.01);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 28/08/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1235
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Top of EUT - Middle/Area Scan (71x131x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.107 mW/g
Top of EUT - Middle/Zoom Scan (7x7x7) 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.64 V/m; Power Drift = 0.129 dB
Peak SAR (extrapolated) = 0.158 W/kg
SAR(1 g) = 0.079 mW/g; SAR(10 g) = 0.034 mW/g
Maximum value of SAR (measured) = 0.117 mW/g

Note: SAR level measured is very low as equivalent to noise floor.

007: System Performance Check 2450MHz Body 06 03 14
Date: 06/03/2014
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:725



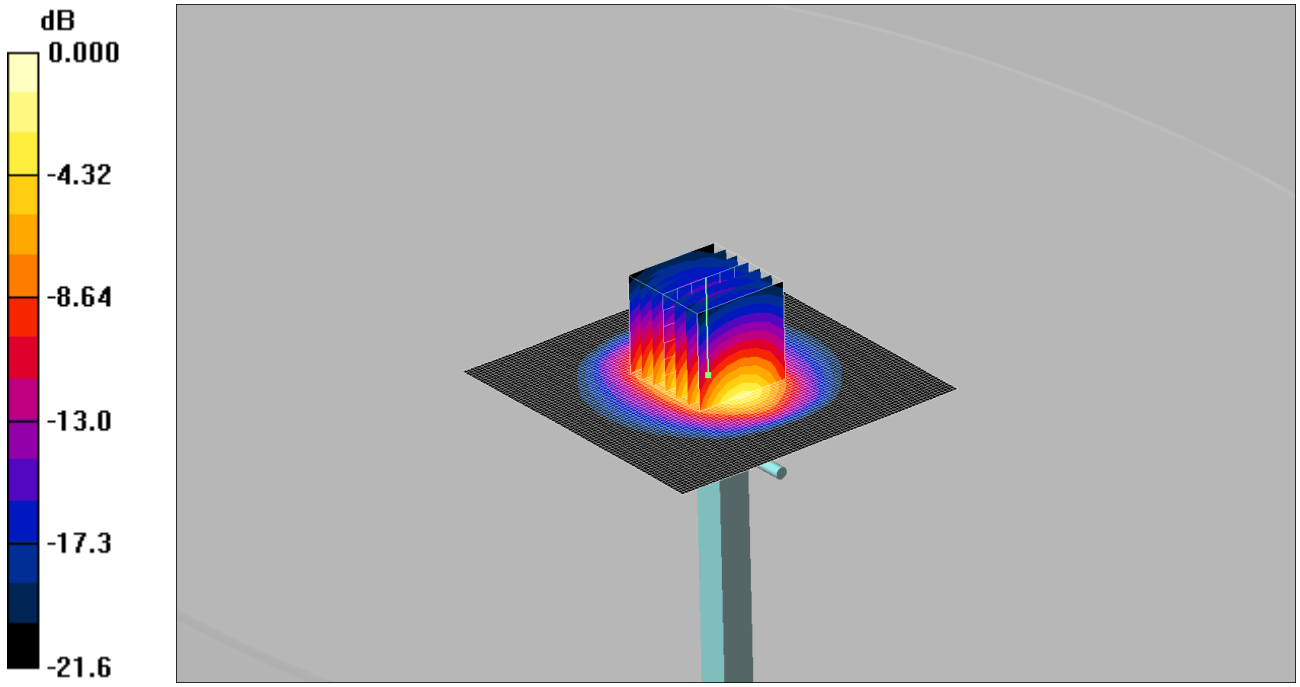
0 dB = 14.4mW/g

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 MHz MSL Medium parameters used: f = 2450 MHz; σ = 2.03 mho/m; ε_r = 51.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(7.01, 7.01, 7.01);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 28/08/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1235
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW 2/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 14.8 mW/g

d=10mm, Pin=250mW 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83.6 V/m; Power Drift = 0.006 dB
Peak SAR (extrapolated) = 26.4 W/kg
SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.74 mW/g
Maximum value of SAR (measured) = 14.4 mW/g

008: System Performance Check 2450MHz Body 07 03 14
Date: 07/03/2014
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:725



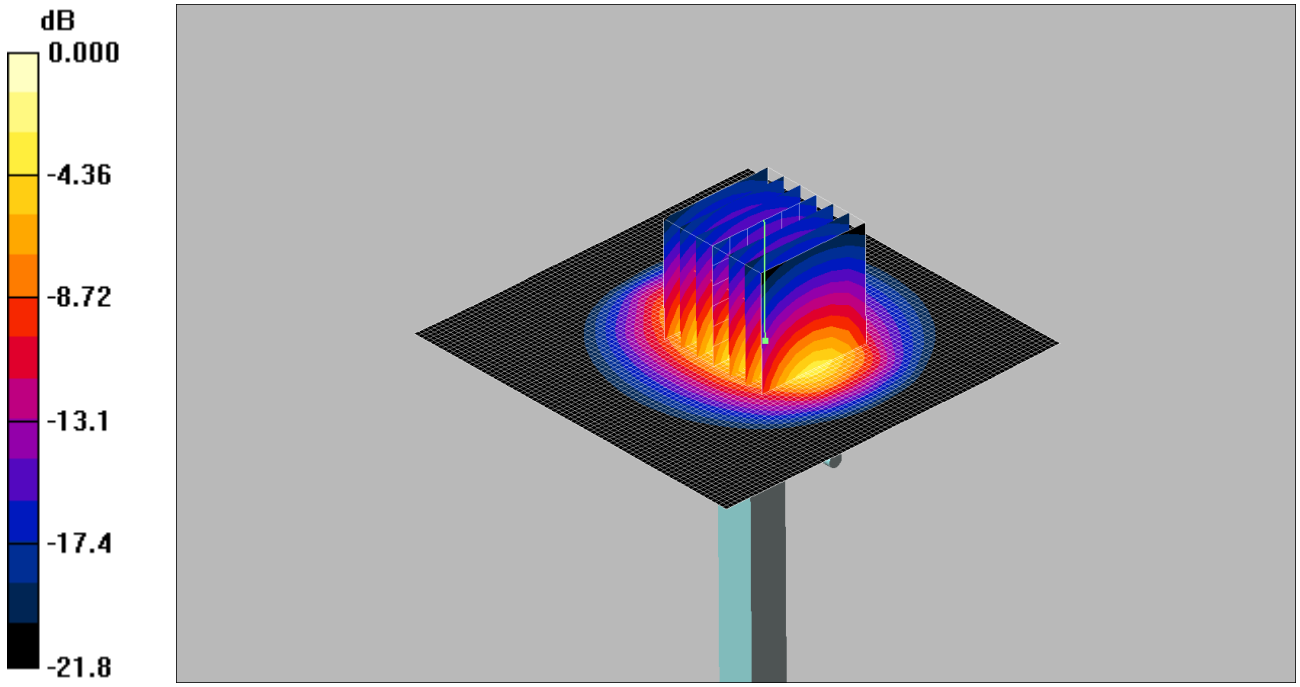
0 dB = 14.5mW/g

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 MHz MSL Medium parameters used: f = 2450 MHz; σ = 2.03 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(7.01, 7.01, 7.01);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 28/08/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1235
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW 2/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 14.8 mW/g

d=10mm, Pin=250mW 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83.8 V/m; Power Drift = -0.028 dB
Peak SAR (extrapolated) = 26.0 W/kg
SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.84 mW/g
Maximum value of SAR (measured) = 14.5 mW/g

009: System Performance Check 2450MHz Body 10 03 14
Date: 10/03/2014
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:725



0 dB = 13.8mW/g

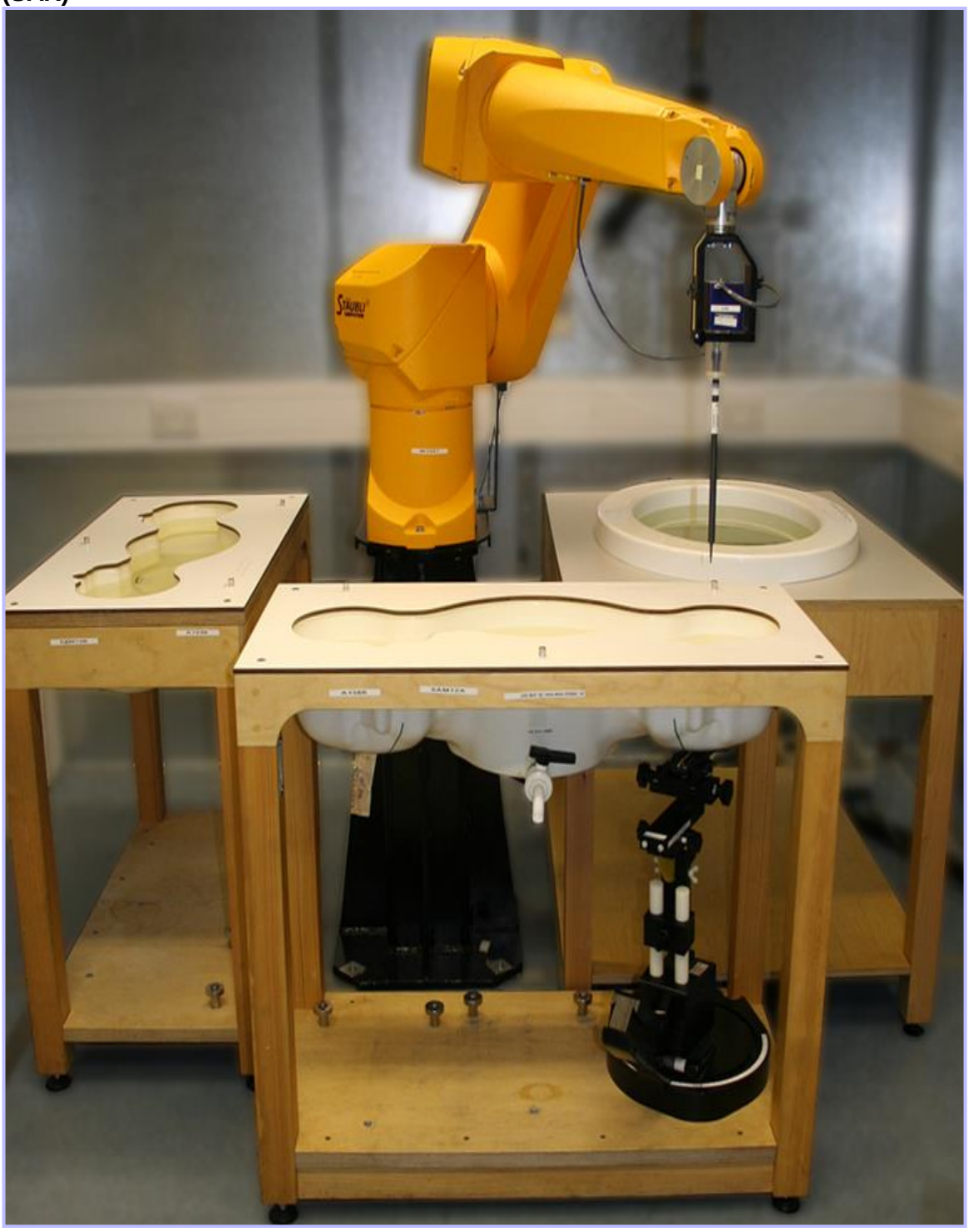
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 MHz MSL Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: EX3DV4 - SN3814; ConvF(7.01, 7.01, 7.01);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 28/08/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1235
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186
d=10mm, Pin=250mW 2/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 14.6 mW/g
d=10mm, Pin=250mW 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83.5 V/m; Power Drift = -0.116 dB
Peak SAR (extrapolated) = 24.8 W/kg
SAR(1 g) = 12.1 mW/g; SAR(10 g) = 5.57 mW/g
Maximum value of SAR (measured) = 13.8 mW/g

Appendix 4. Photographs

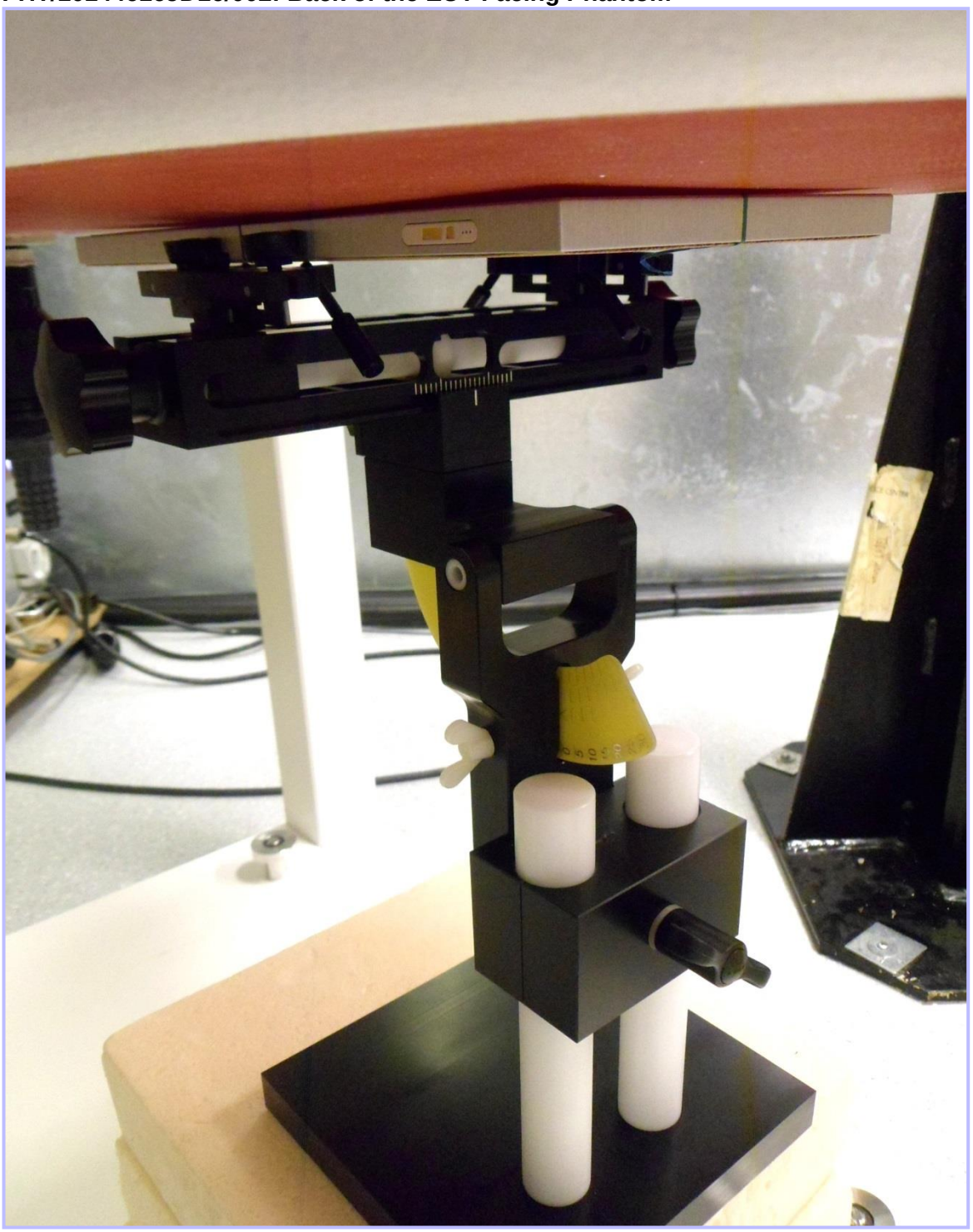
This appendix contains the following photographs:

Photo Reference Number	Title
PHT/10295117JD06/001	Test configuration for the measurement of Specific Absorption Rate (SAR)
PHT/10295117JD06/002	Back of the EUT Facing Phantom
PHT/10295117JD06/003	Top of the EUT Facing Phantom
PHT/10295117JD06/004	Right Hand Side of the EUT Facing Phantom
PHT/10295117JD06/005	Left Hand Side of the EUT Facing Phantom
PHT/10295117JD06/006	Front View of the EUT
PHT/10295117JD06/007	Back View of the EUT
PHT/10295117JD06/008	Right Hand Side View of the EUT
PHT/10295117JD06/009	Left Hand Side View of the EUT
PHT/10295117JD06/010	Front View of the Conducted EUT
PHT/10295117JD06/011	Back View of the Conducted EUT
PHT/10295117JD06/012	Interval View of EUT
PHT/10295117JD06/013	2450 Body Fluid Level

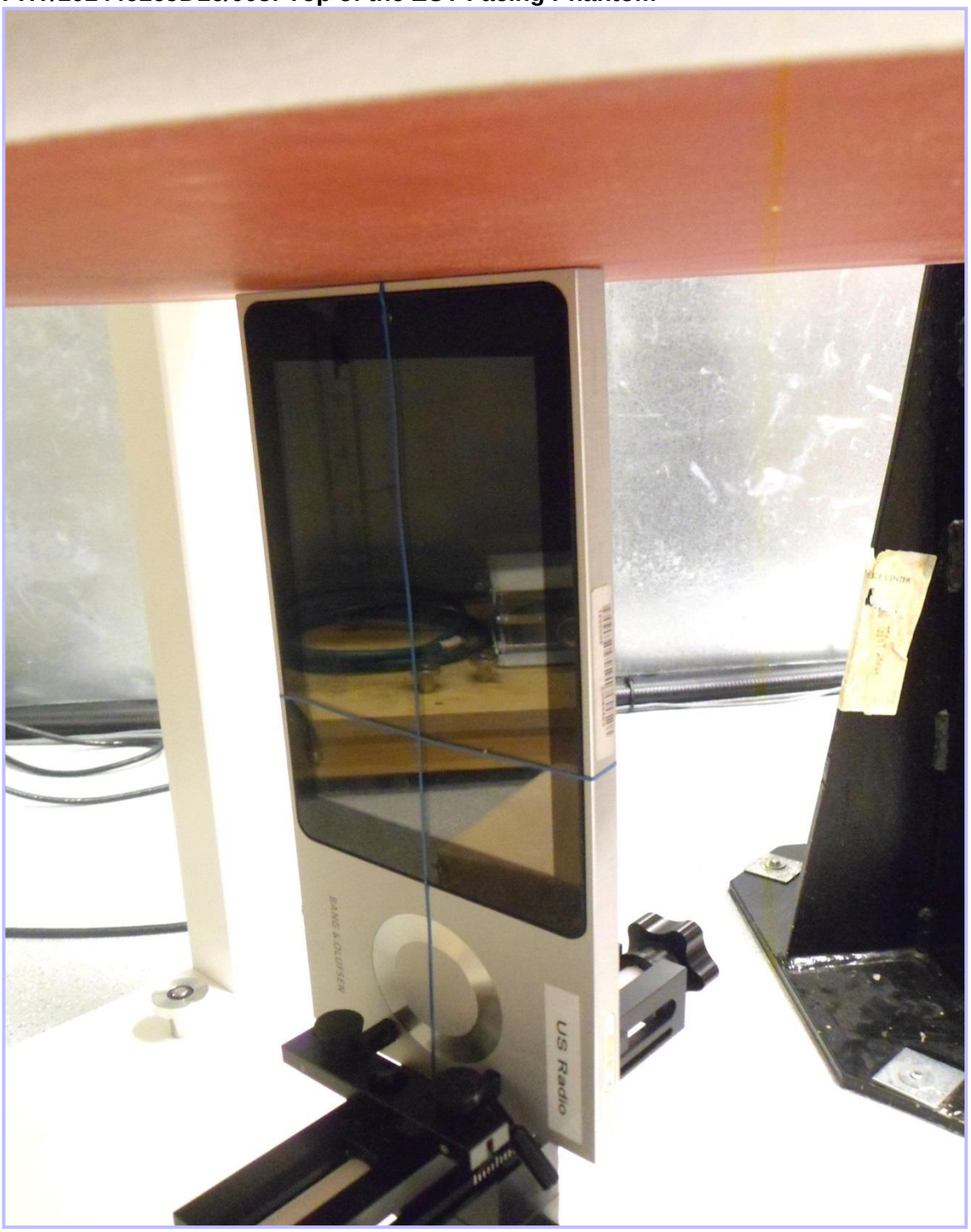
PHT/10144616JD16/001: Test configuration for the measurement of Specific Absorption Rate (SAR)



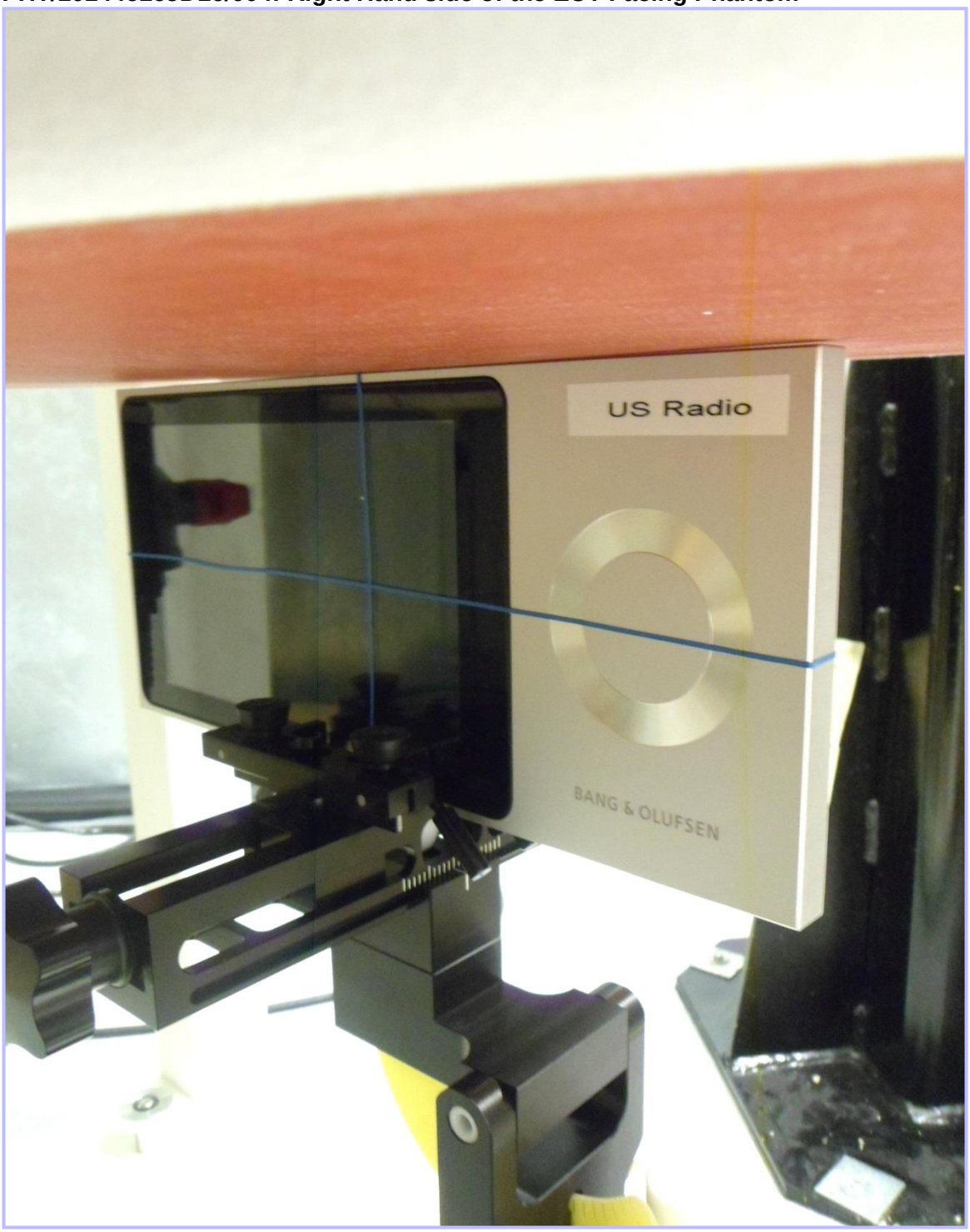
PHT/10144616JD16/002: Back of the EUT Facing Phantom



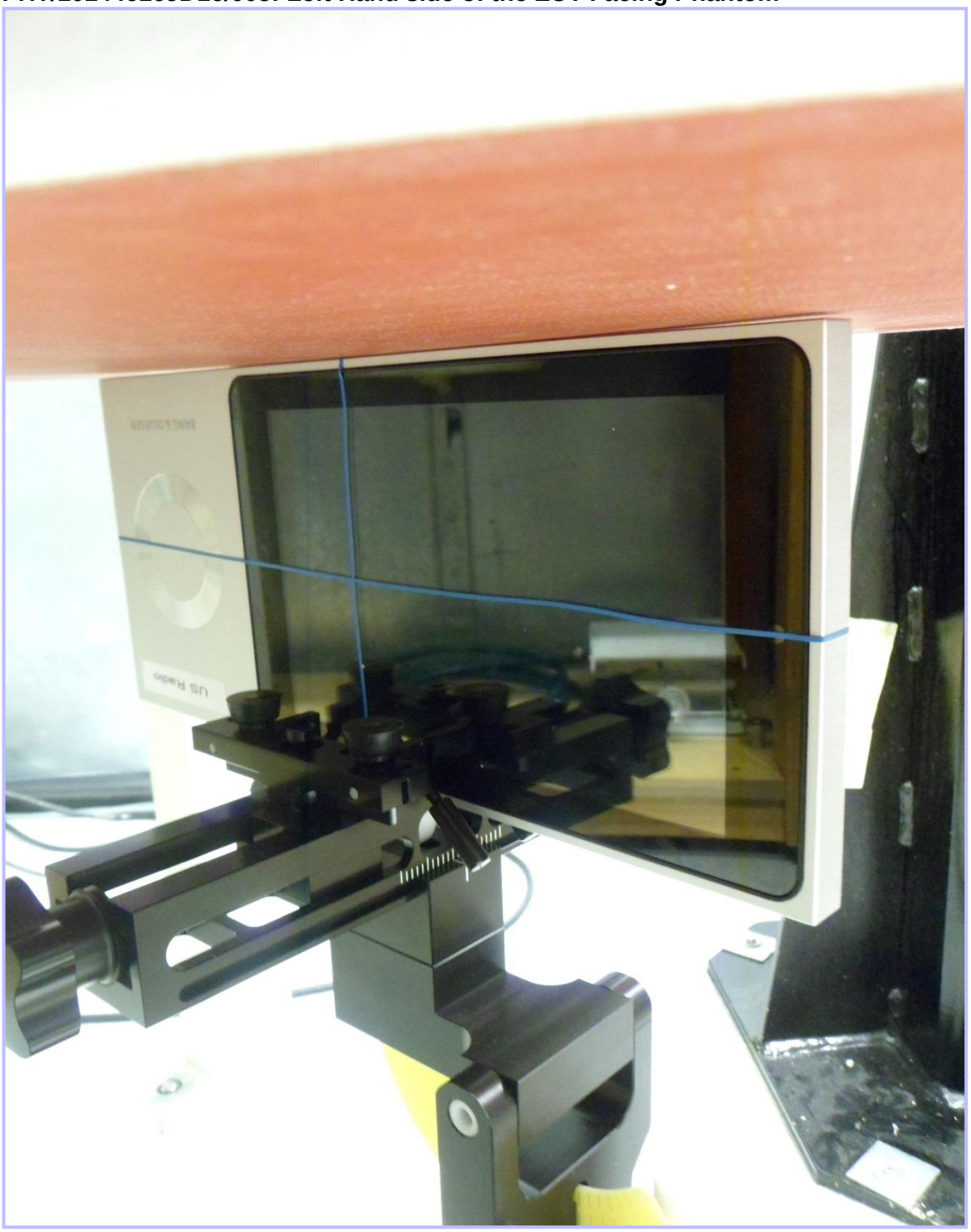
PHT/10144616JD16/003: Top of the EUT Facing Phantom



PHT/10144616JD16/004: Right Hand side of the EUT Facing Phantom



PHT/10144616JD16/005: Left Hand side of the EUT Facing Phantom

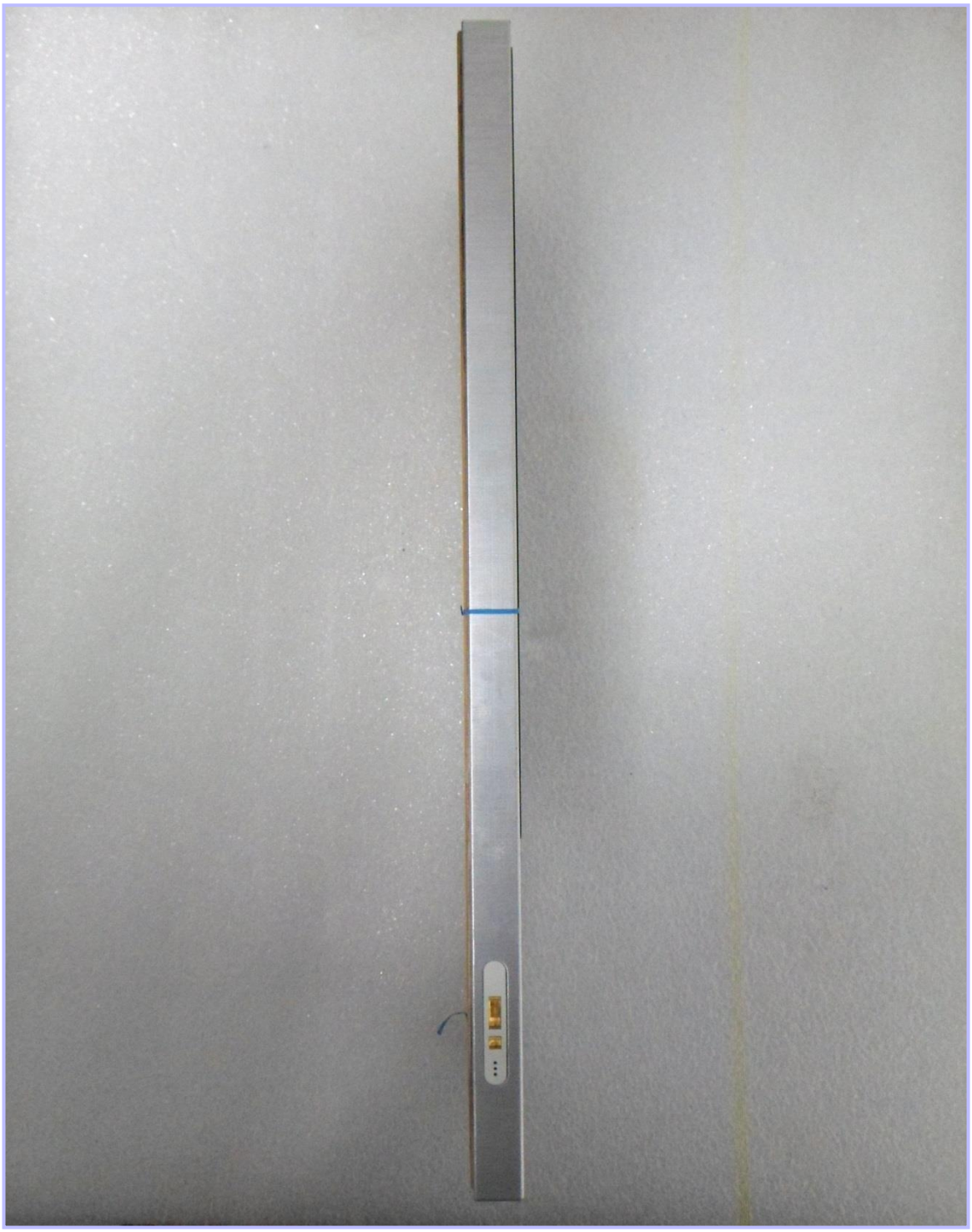


PHT/10144616JD16/006: Front view of EUT

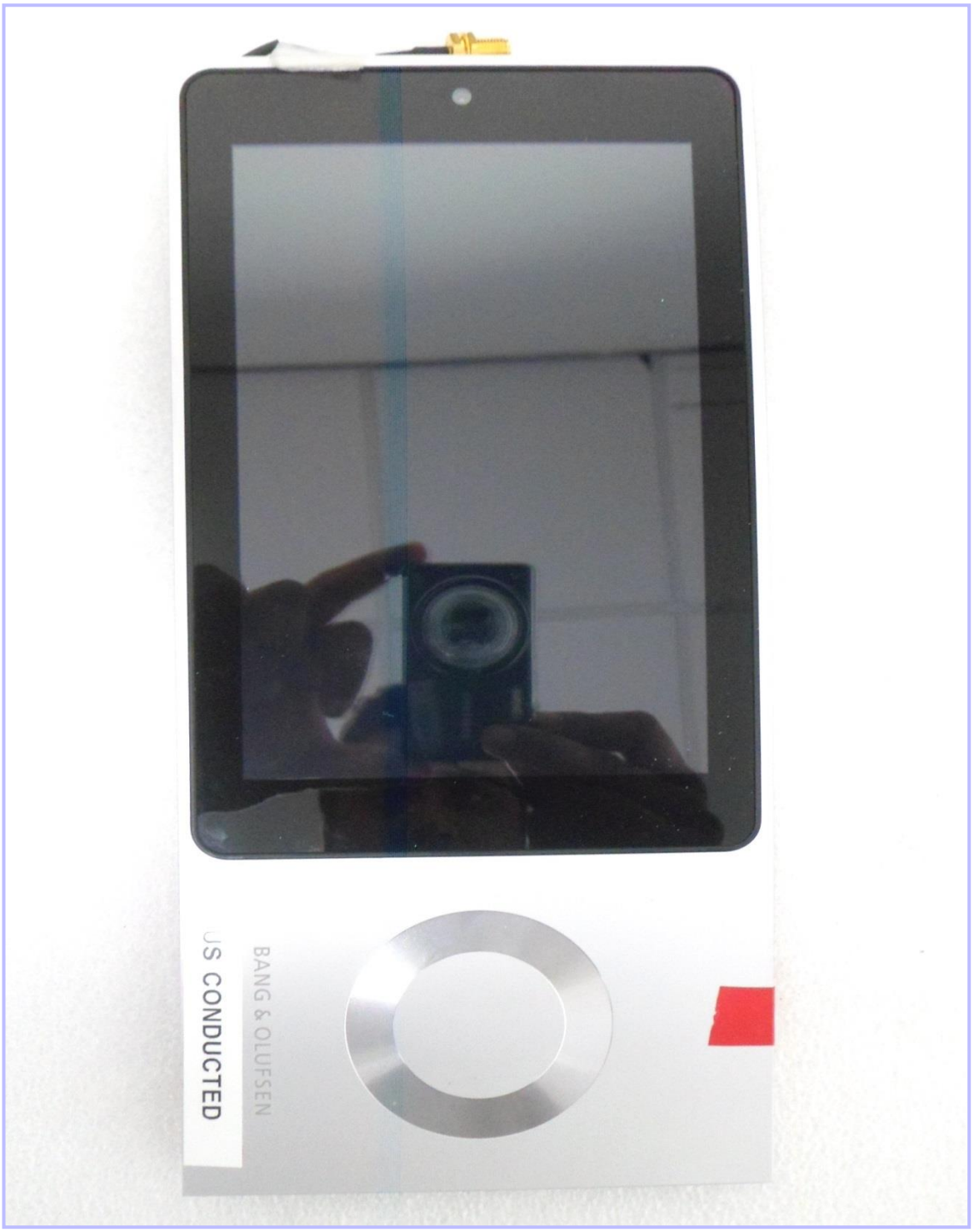
PHT/10144616JD16/007: Back view of EUT

PHT/10144616JD16/008: Right Hand side view of EUT

PHT/10144616JD16/009: Left Hand side view of EUT

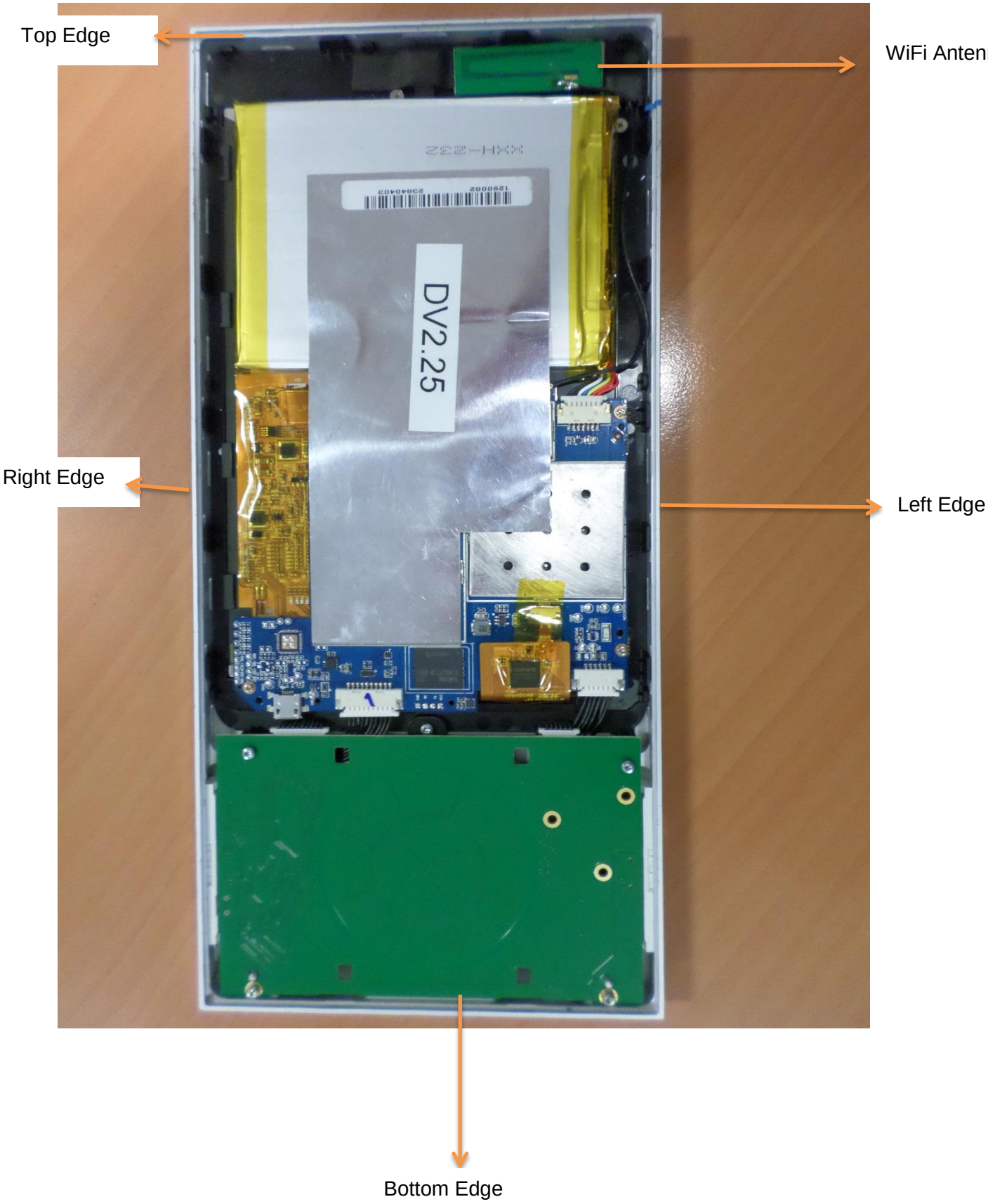


PHT/10144616JD16/010: Front view of Conducted EUT

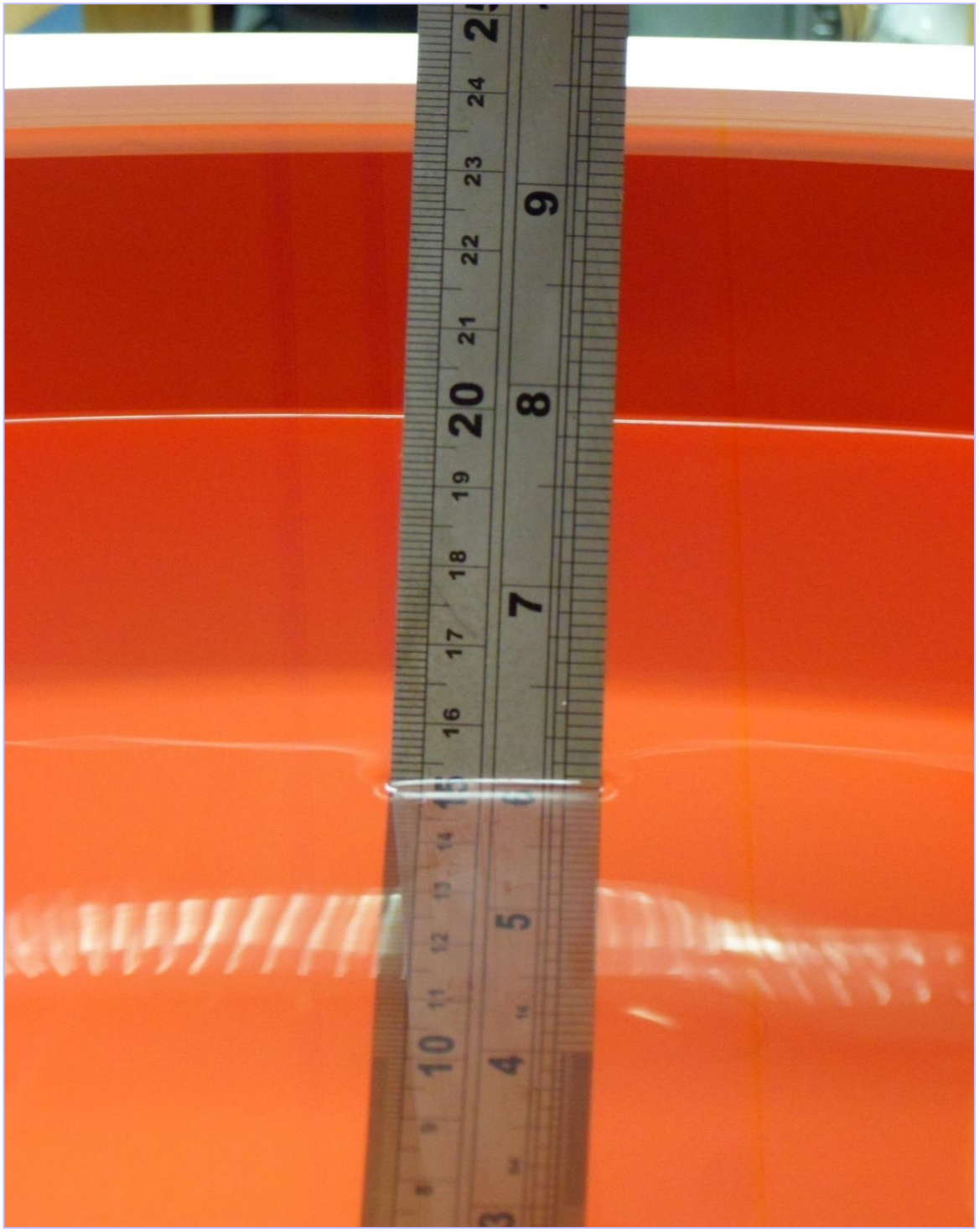


PHT/10144616JD16/011: Back view of Conducted EUT

PHT/10144616JD16/012: Internal View of EUT



PHT/10144616JD16/013: 2450 Body Fluid Level



Appendix 5. Simulated Tissues

The body mixture consists of water, Polysorbate (Tween 20) and salt. Visual inspection is made to ensure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the tissue.

Ingredient (% by weight)	**Frequency 2450 MHz**
	Body
De-Ionized Water	71.70
Polysorbate 20	28.00
Salt	0.30

Appendix 6. System Check and Dielectric Parameters

Dielectric Property Measurements: The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized.
The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.
Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

System Performance Check: Prior to the assessment, the system was verified in the flat region of the phantom, 2450 MHz dipole was used. A forward power of 250 mW was applied to the 2450 MHz dipoles was applied and the system was verified to a tolerance of ±5% for the 2450 MHz dipole.

The applicable verification normalised to 1 Watt.

System Check 2450 Body
Date: 06/03/2014
Validation Dipole and Serial Number: D2450V2 SN: 725

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	2450	24.0	24.0	ε_r	52.70	51.06	-3.11	5.00
				σ	1.95	2.03	3.93	5.00
				1g SAR	49.90	50.40	1.00	5.00
				10g SAR	23.40	22.96	-1.88	5.00

Channel Number	Channel Description	Frequency (MHz)	Parameters	
CH1	802.11g	2412.0	ε_r	51.18
			σ	1.98
CH6	802.11g	2437.0	ε_r	51.10
			σ	2.01
CH11	802.11g	2462.0	ε_r	51.00
			σ	2.04

System Check 2450 Body (Continued):
Date: 07/03/2014
Validation Dipole and Serial Number: D2450V2 SN: 725

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	2450	24.0	24.0	ε_r	52.70	50.92	-3.38	5.00
				σ	1.95	2.03	4.21	5.00
				1g SAR	49.90	50.40	1.00	5.00
				10g SAR	23.40	23.36	-0.17	5.00

Channel Number	Channel Description	Frequency (MHz)	Parameters	
CH1	802.11g	2412.0	ε_r	51.02
			σ	1.98
CH6	802.11g	2437.0	ε_r	50.96
			σ	2.02
CH11	802.11g	2462.0	ε_r	50.88
			σ	2.05

Date: 10/03/2014
Validation Dipole and Serial Number: D2450V2 SN: 725

Simulant	Frequency (MHz)	Room Temp	Liquid Temp	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)
Body	2450	24.0	24.0	ε_r	52.70	51.93	-1.46	5.00
				σ	1.95	1.99	1.98	5.00
				1g SAR	49.90	48.40	-3.01	5.00
				10g SAR	23.40	22.28	-4.79	5.00

Channel Number	Channel Description	Frequency (MHz)	Parameters	
CH1	802.11g	2412.0	ε_r	52.00
			σ	1.95
CH6	802.11g	2437.0	ε_r	51.95
			σ	1.98
CH11	802.11g	2462.0	ε_r	51.90
			σ	2.01

Appendix 7. Measurement Uncertainty Table

Measurement uncertainty tables for technologies tested.

A.7.1. Wi-Fi 2450 MHz Body Configuration 1g

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	$c_{i\ (1g)}$	Standard Uncertainty		υ_i or υ_{eff}
							+ u (%)	- u (%)	
B	Probe calibration	6.000	6.000	normal (k=1)	1.0000	1.0000	6.000	6.000	∞
B	Axial Isotropy	0.250	0.250	normal (k=1)	1.0000	1.0000	0.250	0.250	∞
B	Hemispherical Isotropy	1.300	1.300	normal (k=1)	1.0000	1.0000	1.300	1.300	∞
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	∞
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	∞
B	Linearity	0.600	0.600	Rectangular	1.7321	1.0000	0.346	0.346	∞
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	∞
B	Readout Electronics	0.160	0.160	normal (k=1)	1.0000	1.0000	0.160	0.160	∞
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	Integration Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	∞
B	RF Ambient conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	∞
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	∞
B	Extrapolation and integration / Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	∞
A	Test Sample Positioning	2.440	2.440	normal (k=1)	1.0000	1.0000	2.440	2.440	10
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	∞
B	Drift of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	∞
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	0.6400	1.848	1.848	∞
A	Liquid Conductivity (measured value)	2.260	2.260	normal (k=1)	1.0000	0.6400	1.446	1.446	5
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	0.6000	1.732	1.732	∞
A	Liquid Permittivity (measured value)	2.150	2.150	normal (k=1)	1.0000	0.6000	1.290	1.290	5
	Combined standard uncertainty			t-distribution			9.36	9.36	>500
	Expanded uncertainty			k = 1.96			18.35	18.35	>500

Appendix 8. DASY4 System Details

A.8.1. DASY4 SAR Measurement System

UL, SAR measurement facility utilises the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, and the SAM phantom containing brain or muscle equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller; teach pendant (Joystick), and remote control. This is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. The data acquisition electronics (DAE) performs signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection etc. The DAE is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card. The DAE3 utilises a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching mulitplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

A.8.2. DASY4 SAR System Specifications

Robot System

Positioner:	Stäubli Unimation Corp. Robot Model: RX90L
Repeatability:	0.025 mm
No. of Axis:	6
Serial Number:	F00/SD89A1/A/01
Reach:	1185 mm
Payload:	3.5 kg
Control Unit:	CS7
Programming Language:	V+

Data Acquisition Electronic (DAE) System

Serial Number:	DAE3 SN:432

DASY4 SAR System Specifications (Continued)	
PC Controller	
PC:	Dell Precision 340
Operating System:	Windows 2000
Data Card:	DASY Measurement Server
Serial Number:	1080
Data Converter	
Features:	Signal Amplifier, multiplexer, A/D converted and control logic.
Software:	DASY4 Software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock.
PC Interface Card	
Function:	24 bit (64 MHz) DSP for real time processing Link to DAE3 16 nit A/D converter for surface detection system serial link to robot direct emergency stop output for robot.
E-Field Probe	
Model:	EX3DV4
Serial No:	3814
Construction:	Triangular core
Frequency:	10 MHz to >6 GHz
Linearity:	±0.2 dB (30 MHz to 6 GHz)
Probe Length (mm):	337
Probe Diameter (mm):	10
Tip Length (mm):	9
Tip Diameter (mm):	2.5
Sensor X Offset (mm):	1
Sensor Y Offset (mm):	1
Sensor Z Offset (mm):	1
Phantom	
Phantom:	Eli Phantom
Shell Material:	Fibreglass
Thickness:	2.0 ±0.1 mm