

SAR TEST REPORT

for

Hewlett-Packard Company

HP Slate 7

Model No.: SUN-B12

FCC ID : B94SUNB12

Prepared for : Hewlett-Packard Company
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SAR TEST REPORT

Applicant : Hewlett-Packard Company
 Manufacturer : Hewlett-Packard Company
 EUT Description : HP Slate 7
 FCC ID : B94SUNB12
 (A) MODEL NO. : SUN-B12
 (B) SERIAL NO. : N/A
 (C) TEST VOLTAGE : DC 3.7V From Battery

Measurement Standard Used:

- FCC 47 CFR Part 2 (2.1093)
- IEEE C95.1-1999
- IEEE 1528-2003
- FCC OET Bulletin 65 Supplement C (Edition 01-01)
- FCC KDB 447498 D01 v05
- FCC KDB 248227 D01 v01r02
- FCC KDB 865664 D01
- FCC KDB 616217 D04

The device described above is tested by Audix Technology (Shenzhen) Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Audix Technology (Shenzhen) Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. This report contains data that are not covered by the NVLAP accreditation. Also, this report shows that the EUT is technically compliant with the OET 65 Supplement C, KDB 248227, and Wrist Watch Transmitter Issues requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shenzhen) Co., Ltd.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Date of Test : Mar.15, 2013 Report of date: Mar.20, 2013

Prepared by :

Selina Liu
Selina Liu / Supervisor**AUDIX**[®]

信華科技(深圳)有限公司

Audix Technology (Shenzhen) Co., Ltd.

EMC 部門報告專用章

Reviewed by :

Sunny Lu
Sunny Lu / Assistant Manager

Stamp only for EMC Dept. Report

Signature: Ken Lu 3/20/13

Approved & Authorized Signer :

Ken Lu / Manager

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

| | |
|-----------------------|---|
| Description | : HP Slate 7 |
| Model Number | : SUN-B12 |
| FCC ID | B94SUNB12 |
| Radio | : Bluetooth V2.1+EDR; IEEE 802.11b/g/n |
| Operation Frequency | : IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n HT20: 2412MHz—2462MHz IEEE 802.11n HT40: 2422MHz—2452MHz Bluetooth 2402-2480MHz |
| Channel Number | : IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels, IEEE 802.11n HT40: 7 Channels Bluetooth: 79 channels |
| Modulation Technology | : IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK) Bluetooth: GFSK, $\pi/4$ QPSK, 8DPSK |
| Applicant | : Hewlett-Packard Company 1501 Page Mill Road, Palo Alto ,California, United States |
| Manufacturer | : Hewlett-Packard Company 1501 Page Mill Road, Palo Alto ,California, United States |
| Antenna | PCB, 2.182dBi PK Gain |
| Date of Test | : Mar.15, 2013 |
| Date of Receipt | : Feb.28, 2013 |
| Sample Type | : Prototype production |

2. GENERAL DESCRIPTION

2.1. Product Description For EUT

[None]

2.2. Applied Standards

The Specific Absorption Rate (SAR) testing specification, method and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- IEEE C95.1-1999
- IEEE 1528-2003
- FCC OET Bulletin 65 Supplement C (Edition 01-01)
- FCC KDB 447498 D01 v05
- FCC KDB 248227 D01 v01r02
- 865664 D01 SAR measurement requirement for 100 MHz to 6 GHz v01
- 616217 D04 SAR for laptop and tablets v01

2.3. Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

2.4. Test Conditions

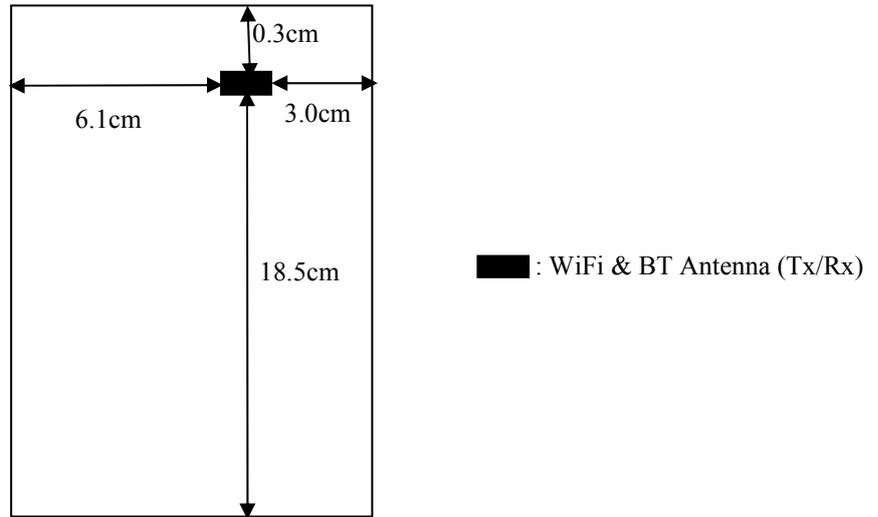
2.4.1. Ambient Condition

| | |
|---------------------|-------------|
| Ambient Temperature | 20 to 24 °C |
| Humidity | < 60 % |

2.4.2. Test Configuration

The distance between the EUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30dB smaller than the output power of EUT. The EUT was set from the emulator to radiate maximum output power during all tests.

2.5. Exposure Positions Consideration



(Front View)

| Antenna | Description |
|---------------------------|------------------------|
| WiFi & BT Antenna (Tx/Rx) | 802.11 b/g/nHT20/nHT40 |

Note:

1. The distance from the WLAN antenna to the back surface is 4mm.
2. The distance from the WLAN antenna to the Front surface is 4mm.
3. The length of the diagonal dimension of the EUT is larger than 20cm.

| Sides for Body SAR tests | | | | | | |
|--------------------------|------|-------|-----|--------|-------|------|
| Test distance: 0 mm | | | | | | |
| Band | Back | Front | Top | Bottom | Right | Left |
| WLAN 2.4GHz | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Note:

2.6. Block Diagram of connection between EUT and simulators



(Full charged battery)

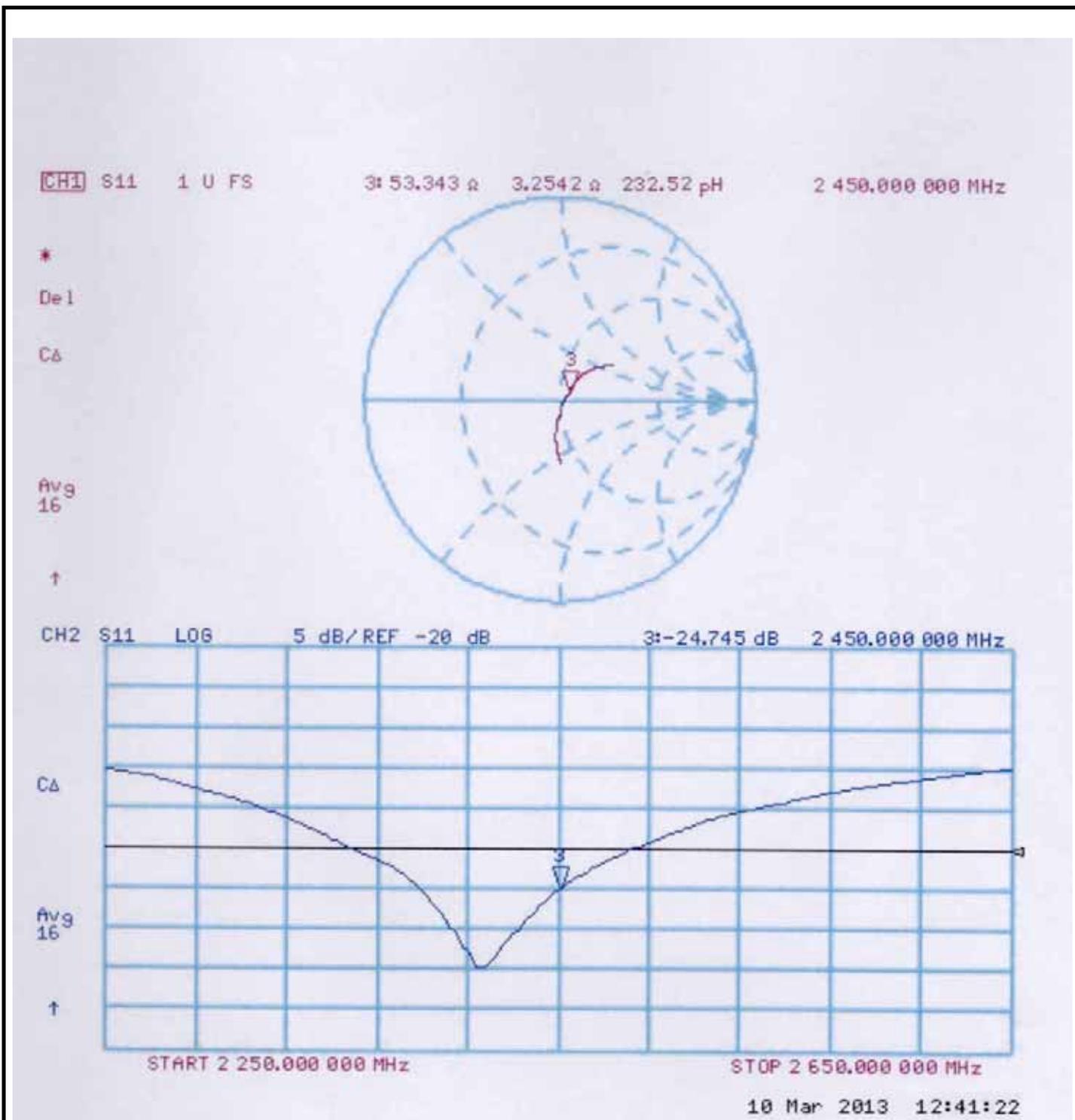
(EUT: HP Slate 7)

2.7. Test Equipment

| Item | Equipment | Manufacturer | Model No. | S/N | Last Cal Date | Cal. Interval |
|------|---------------------------------------|--------------|--------------------|------------|---------------|---------------|
| 1. | SAR Test System | Speag | DASY5 TX60L SAR | N/A | June.4,12 | 1 Year |
| 2. | Wireless Communication Test Set | Agilent | E5515C | GB44300243 | May.08, 12 | 1Year |
| 3. | Power Meter | Anritsu | ML2487A | 6K00002472 | May.08, 12 | 1 Year |
| 4. | Power Sensor | Anritsu | MA2491A | 032516 | May.08, 12 | 1 Year |
| 5. | Signal Generator | Marconi | 2031B | 119606/058 | May.08, 12 | 1 Year |
| 6. | Amplifier | Milmega | AS0206-50 | 1036253 | NCR | N/A |
| 7. | Dipole Antenna | Speag | D2450V2 | 862 | June.22,11 | 2 Year |
| 8. | Attenuator | Agilent | 8491A 3dB | MY39262001 | May.08, 12 | 1 Year |
| 9. | Attenuator | Agilent | 8491A 10dB | MY39264375 | May.08, 12 | 1 Year |
| 10. | DAE | Speag | DAE4 | 899 | July.25,12 | 1 Year |
| 11. | E-Field Probe | Speag | EX3DV3 | 3139 | July.25,12 | 1 Year |

Note:

Dipole antenna calibration interval is 2 year, annual check result to be follow (Refer to KDB 865640, Dipole calibration):



2.8. Laboratory Environment

| | |
|--|------------------------|
| Temperature | Min:20°C,Max.25°C |
| Relative humidity | Min. = 30%, Max. = 70% |
| Note: Ambient noise is checked and found very low and in compliance with requirement of standards. | |

2.9. Measurement Uncertainty

| Test Item | Uncertainty |
|--|-------------|
| Uncertainty for SAR test | 1g: 21.14 |
| | 10g: 20.64 |
| Uncertainty for test site temperature and humidity | 0.6°C |

| Source | Type | Uncertainty Value (%) | Probability Distribution | K | C1(1g) | C1(10g) | Standard uncertainty ul(%)1g | Standard uncertainty ul(%)10g | Degree of freedom Veff or Vi |
|--|--|-----------------------|--------------------------|----|--------|---------|------------------------------|-------------------------------|------------------------------|
| Measurement system repeatability | A | 0.5 | N | 1 | | 1 | 0.5 | 0.5 | 9 |
| Probe calibration | B | 5.9 | N | 1 | 1 | 1 | 5.9 | 5.9 | ∞ |
| Isotropy | B | 4.7 | R | √3 | 1 | 1 | 2.7 | 2.7 | ∞ |
| Linearity | B | 4.7 | R | √3 | 1 | 1 | 2.7 | 2.7 | ∞ |
| Probe modulation response | B | 0 | R | √3 | 1 | 1 | 0 | 0 | ∞ |
| Detection limits | B | 1.0 | R | √3 | 1 | 1 | 0.6 | 0.6 | ∞ |
| Boundary effect | B | 1.9 | R | √3 | 1 | 1 | 1.1 | 1.1 | ∞ |
| Readout electronics | B | 1.0 | N | 1 | 1 | 1 | 1.0 | 1.0 | ∞ |
| Response time | B | 0 | R | √3 | 1 | 1 | 0 | 0 | ∞ |
| Integration time | B | 4.32 | R | √3 | 1 | 1 | 2.5 | 2.5 | ∞ |
| RF ambient conditions – noise | B | 0 | R | √3 | 1 | 1 | 0 | 0 | ∞ |
| RF ambient conditions – reflections | B | 3 | R | √3 | 1 | 1 | 1.73 | 1.73 | ∞ |
| Probe positioner mech. restrictions | B | 0.4 | R | √3 | 1 | 1 | 0.2 | 0.2 | ∞ |
| Probe positioning with respect to phantom shell | B | 2.9 | R | √3 | 1 | 1 | 1.7 | 1.7 | ∞ |
| Post-processing | B | 0 | R | √3 | 1 | 1 | 0 | 0 | ∞ |
| Test sample related | | | | | | | | | |
| Device holder uncertainty | A | 2.94 | N | 1 | 1 | 1 | 2.94 | 2.94 | M-1 |
| Test sample positioning | A | 4.1 | N | 1 | 1 | 1 | 4.1 | 4.1 | M-1 |
| Power scaling | B | 5.0 | R | √3 | 1 | 1 | 2.9 | 2.9 | ∞ |
| Drift of output power (measured SAR drift) | B | 5.0 | R | √3 | 1 | 1 | 2.9 | 2.9 | ∞ |
| Phantom and set-up | | | | | | | | | |
| Phantom uncertainty (shape and thickness tolerances) | B | 4.0 | R | √3 | 1 | 1 | 2.3 | 2.1 | ∞ |
| Algorithm for correcting SAR for deviations in permittivity and conductivity | B | 1.9 | N | 1 | 1 | 0,84 | 1,9 | 1,6 | ∞ |
| Liquid conductivity (meas.) | A | 0.55 | N | 1 | 0.78 | 0.71 | 0.24 | 0.21 | M-1 |
| Liquid permittivity (meas.) | A | 0.19 | N | 1 | 0.23 | 0.26 | 0.09 | 0.06 | M |
| Liquid permittivity – temperature uncertainty | A | 5.0 | R | √3 | 0,78 | 0,71 | 1.4 | 1.1 | ∞ |
| Liquid conductivity – temperature uncertainty | A | 5.0 | R | √3 | 0.23 | 0,26 | 1.2 | 0.8 | ∞ |
| Combined standard uncertainty | $u_c = \sqrt{\sum_{i=1}^{23} c_i^2 u_i^2}$ | | | | | | 10.57 | 10.32 | |
| Expanded uncertainty (95 % conf. interval) | $u_c = 2u_c$ | | N | | K=2 | | 21.14 | 20.64 | |

3. MEASURE PROCEDURES

3.1. General description of test procedures

For the 802.11b/g SAR body tests, a communication link is set up with the test mode software for WIFI mode test. The Absolute Radiofrequency Channel Number (ARFCN) is allocated to 1,6 and 11 respectively in the case of 2450 MHz. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate. Testing at higher data rates is not required when the maximum average output power is less than 0.25dB higher than those measured at the lowest data rate.

802.11b/g operating modes are tested independently according to the service requirements in each frequency band. 802.11b/g modes are tested on channels 1,6,11; however, if output power reduction is necessary for channels 1 and/or 11 to meet restricted band requirements the highest output channels closest to each of these channels must be tested instead.

SAR is not required for 802.11g channels when the maximum average output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels. When the maximum average output channel in each frequency band is not included in the “default test channels”, the maximum channel should be tested instead of an adjacent “default test channels”, these are referred to as the “required test channels” and are illustrated in table 1.

| Mode | GHz | Channel | Turbo Channel | “Default Test Channels” | |
|-----------|-------|-----------------|-----------------|-------------------------|---------|
| | | | | 15.247 | |
| | | | | 802.11b | 802.11g |
| 802.11b/g | 2.412 | 1 [#] | 1 [#] | √ | * |
| | 2.437 | 6 | 6 | √ | * |
| | 2.462 | 11 [#] | 11 [#] | √ | * |

Table 1

Note: #= when output power is reduced for channel 1 and/or 11 to meet restricted band requirements the highest out put channels closet to each of these channels should be tested.

√= ” default test channels”

* = possible 802.11g channels with maximum average output 0.25dB>=the “default test channels”

3.2. Position of module in Portable devices

SAR is required for Front, back, edge, Top and bottom with the most conservative exposure conditions, The EUT is tested at the following test positions:

- (1) Test Position Front Side: The Front Side of the EUT towards and directed tightly to touch the flat phantom.
- (2) Test Position Back Side: The Back Side of the EUT towards and directed tightly to touch the flat phantom.
- (3) Test Position Top Side: The Top Side of the EUT towards and directed tightly to touch the flat phantom.
- (4) Test Position Bottom Side: The Bottom Side of the EUT towards and directed tightly to touch the flat phantom.
- (5) Test Position Left Side: The Left Side of the EUT towards and directed tightly to touch the flat phantom.
- (6) Test Position Right Side: The Right Side of the EUT towards and directed tightly to touch the flat phantom.

4. SAR MEASUREMENTS SYSTEM

4.1. SAR Measurement Set-up

DASY5 system for performing compliance tests consists of the following items:

- (1) A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- (2) A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage. It issues simulating liquid. The probe is equipped with an optical surface detector system.
- (3) A data acquisition electronic (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.
- (4) A unit to operate the optical surface detector which is connected to the EOC.
- (5) The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
- (6) The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003.
- (7) DASY5 software and SEMCAD data evaluation software.
- (8) Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- (9) The generic twin phantom enabling the testing of left-hand and right-hand usage.
- (10) The device holder for handheld mobile phones.
- (11) Tissue simulating liquid mixed according to the given recipes.
- (12) System validation dipoles allowing to validate the proper functioning of the system.

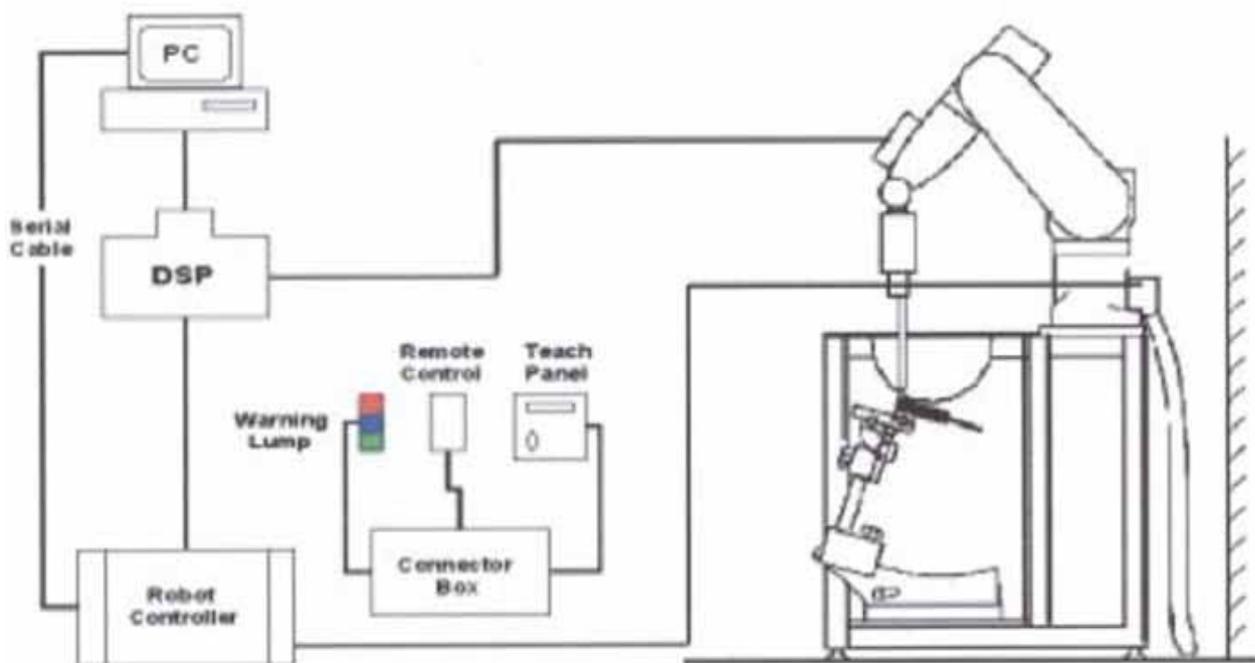


Figure 4.1 SAR Lab Test Measurement Set-up

4.2. ELI Phantom

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.



| | |
|----------------------|---|
| Material | Vynylester, glass fiber reinforced (VE-GF) |
| Liquid Compatibility | Compatible with all SPEAG tissue simulating liquids (incl. DGBE type) |
| Shell Thickness | 2.0 ± 0.2 mm (bottom plate) |
| Dimensions | Major axis: 600 mm Minor axis: 400 mm |
| Filling Volume | approx. 30 liters |
| Wooden Support | SPEAG standard phantom table |

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.

Figure 6.2 Top View of Twin Phantom

A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters.

On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

The phantom can be used with the following tissue simulating liquids:

- *Water-sugar based liquid
- *Glycol based liquids

4.3. Device Holder for SAM Twin Phantom

The SAR in the Phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source in 5 mm distance, a positioning uncertainty of $\pm 0.5\text{mm}$ would produce a SAR uncertainty of $\pm 20\%$. An accurate device position is therefore crucial for accurate and repeatable measurement. The position in which the devices must be measured, are defined by the standards.

The DASY5 device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (EPR).

Thus the device needs no repositioning when changing the angles.

The DASY5 device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity $\epsilon_r = 3$ and loss tangent $\delta = 0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



Figure 4.3 Device Holder

4.4. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.



Figure 4.4 EX3DV4 E-field Probe

4.4.1. EX3DV4 Probe Specification

| | |
|---------------|--|
| Construction | Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| Calibration | ISO/IEC 17025 calibration service available |
| Frequency | 10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz) |
| Directivity | ± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis) |
| Dynamic Range | 10 μ W/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/g) |
| Dimensions | Overall length: PRS-T2 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm |
| Application | High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%. |

4.5. E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than $\pm 10\%$. The spherical isotropy was evaluated and found to be better than $\pm 0.25\text{dB}$. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies below 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\text{SAR} = C \frac{\Delta T}{\Delta t}$$

Where: Δt = Exposure time (30 seconds),
 C = Heat capacity of tissue (brain or muscle),
 ΔT = Temperature increase due to RF exposure.
 Or

$$\text{SAR} = \frac{|E|^2 \sigma}{\rho}$$

Where:
 σ = Simulated tissue conductivity,
 ρ = Tissue density (kg/m^3).

4.6. Scanning procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

The "reference" and "drift" measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the EUT's output power and should vary max. $\pm 5\%$.

The "surface check" measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above $\pm 0.1\text{mm}$). To prevent wrong results tests are only executed when the liquid is free of air bubbles.

The difference between the optical surface detection and the actual surface depends on the Probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within $\pm 30^\circ$.)

Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged.

After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

Zoom Scan

Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by 7x7x7 points within a cube whose base is centered around the maxima found in the preceding area scan.

Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY5 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 7x7x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

With V_i = compensated signal of channel i ($i = x, y, z$)

U_i = input signal of channel i ($i = x, y, z$)

cf = crest factor of exciting field (DASY parameter)

dcp_i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$

H-field probes: $H_i = (V_i)^{1/2} \cdot (ai_0 + ai_1 f + ai_2 f^2) / f$

With V_i = compensated signal of channel i ($i = x, y, z$)

$Norm_i$ = sensor sensitivity of channel i ($i = x, y, z$)

$ConvF$ = sensitivity enhancement in solution

ai_j = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot}^2 \cdot \rho) / (60 \cdot 1000)$$

with

SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m

ρ = conductivity in [mho/m] or [Siemens/m]

ρ_{eq} = equivalent tissue density in g/cm³

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = equivalent power density of a plane wave in mW/cm²

E_{tot} = total electric field strength in V/m

H_{tot} = total magnetic field strength in A/m

6. SYSTEM CHECK

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulates were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulates, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the ANNEX A.

System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system ($\pm 10\%$).

System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.

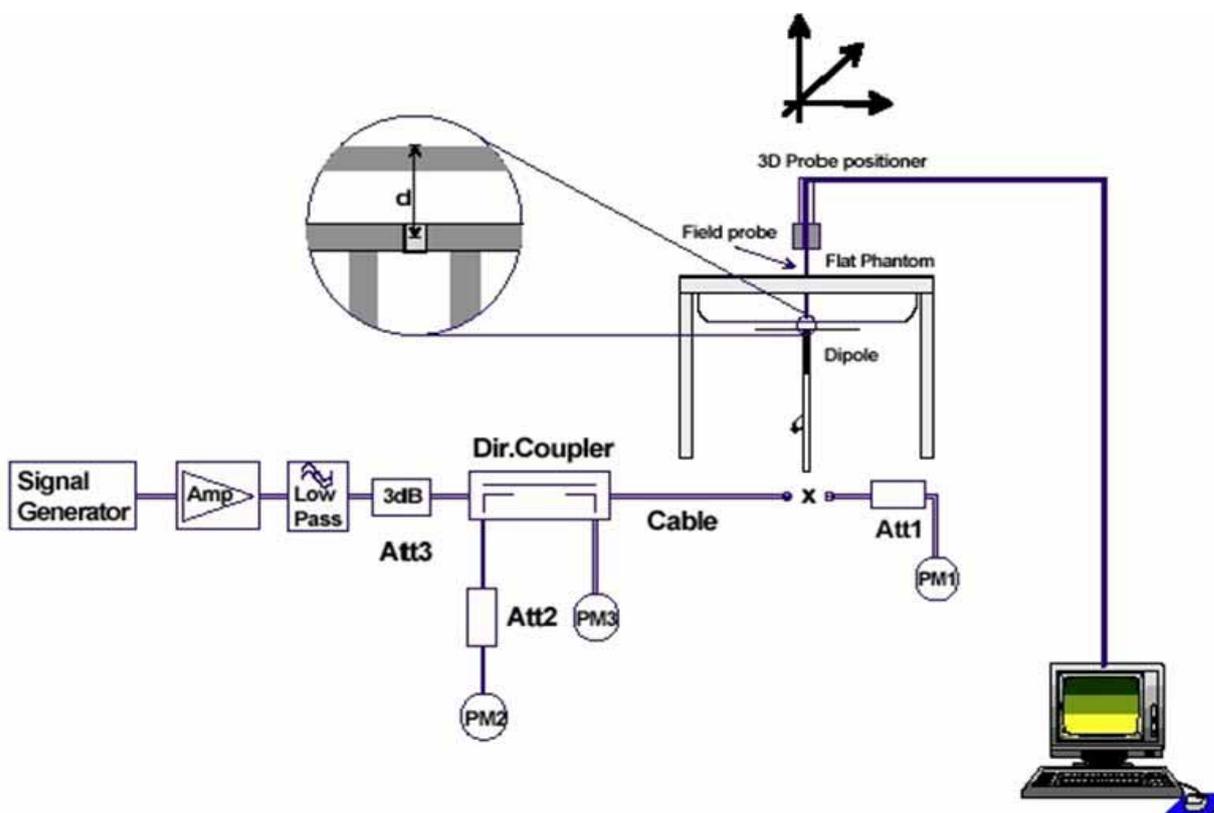


Figure 6.1: System Check Set-up

7. TEST RESULTS

7.1. Output power (Wifi)

| Mode | Data Rate | Channel | Peak Power (dBm) | Average Power (dBm) |
|--------------|-----------|---------|------------------|---------------------|
| 802.11b | 1Mbps | CH1 | 14.19 | 11.27 |
| | | CH6 | 14.25 | 11.30 |
| | | CH11 | 14.30 | 11.35 |
| 802.11g | 6Mbps | CH1 | 19.07 | 11.12 |
| | | CH6 | 19.41 | 11.16 |
| | | CH11 | 19.03 | 11.10 |
| 802.11n HT20 | 6.5Mbps | CH1 | 18.47 | 10.41 |
| | | CH6 | 18.82 | 10.81 |
| | | CH11 | 18.23 | 10.32 |
| 802.11n HT40 | 13.5Mbps | CH1 | 16.54 | 10.46 |
| | | CH4 | 17.30 | 10.70 |
| | | CH7 | 17.35 | 10.83 |

Note: Those data rate have the maximum output level.

Note:

- Per KDB 248227, 11g/n output power is less than 1/4 dB higher than 11b mode, thus the SAR can be excluded.

7.2. Output power (BT)

| Mode | Channel (MHz) | Peak Power (dBm) | Average Power (dBm) |
|---------|---------------|------------------|---------------------|
| GFSK | 2402 | 5.74 | 3.002 |
| | 2441 | 5.43 | 2.692 |
| | 2480 | 4.79 | 2.052 |
| 8- DPSK | 2402 | 5.30 | 3.942 |
| | 2441 | 5.19 | 3.692 |
| | 2480 | 4.78 | 3.162 |

Note1: Bluetooth output Power is less than the SAR test Exclusion thresholds, So SAR test can be exclude.

Note2: Bluetooth and WIFI can not transmit at same time.

7.3. System Check for Body Tissue simulating liquid

| Frequency | Description | SAR(W/kg) | | Dielectric Parameters | | Temp |
|-----------|----------------------------------|---------------------|-----------------------|-----------------------|----------------|-------|
| | | 10g | 1g | ϵ_r | σ (s/m) | °C |
| 2450MHz | Recommended value ±10% window | 5.86 5.27 — 6.45 | 12.8 11.52 — 14.08 | 52.7 | 1.95 | / |
| | Measurement value 2013-03-15 | 6.13 | 13.16 | 52.75 | 1.98 | 20.01 |
| | Measurement value 2013-03-22 | 6.11 | 13.09 | 51.15 | 2.05 | 22.50 |

Note: Recommended Values used derive from the calibration certificate and 250 mW is used as feeding power to the calibrated dipole.

7.4. Test Results

| Test Position | CH | Output Power | | Measured Results | Scaled | Power Drift (dB) | |
|---------------|--------------|------------------------|-------------------------|--------------------------|--------------------------|------------------|--------------|
| | | Max. Rated Power (dBm) | Measured AV Power (dBm) | SAR _{1g} (W/kg) | SAR _{1g} (W/kg) | | |
| IEEE 802.11b | Front | CH1 | 13 | 11.27 | 0.886 | 1.320 | 0.18 |
| | | CH6 | 13 | 11.30 | 0.916 | 1.355 | 0.15 |
| | | CH11 | 13 | 11.35 | 0.945 | 1.382 | 0.14 |
| | Front | CH11 | 13 | 11.35 | 0.898 | 1.313 | -0.04 |
| | Back | CH1 | 13 | 11.27 | 0.901 | 1.342 | 0.03 |
| | | CH6 | 13 | 11.30 | 0.912 | 1.349 | 0.14 |
| | | CH11 | 13 | 11.35 | 0.934 | 1.366 | 0.12 |
| | Top | CH1 | 13 | 11.27 | 0.336 | 0.500 | 0.12 |
| | | CH6 | 13 | 11.30 | 0.385 | 0.569 | 0.10 |
| | | CH11 | 13 | 11.35 | 0.389 | 0.569 | -0.03 |
| | Buttom | CH1 | 13 | 11.27 | 0.120 | 0.179 | -0.15 |
| | | CH6 | 13 | 11.30 | 0.095 | 0.141 | 0.14 |
| | | CH11 | 13 | 11.35 | 0.093 | 0.136 | 0.16 |
| | Left | CH1 | 13 | 11.27 | 0.036 | 0.054 | 0.13 |
| | | CH6 | 13 | 11.30 | 0.040 | 0.059 | 0.12 |
| | | CH11 | 13 | 11.35 | 0.052 | 0.076 | 0.11 |
| | Right | CH1 | 13 | 11.27 | 0.157 | 0.234 | -0.19 |
| | | CH6 | 13 | 11.30 | 0.330 | 0.488 | 0.16 |
| CH11 | | 13 | 11.35 | 0.334 | 0.488 | 0.12 | |

Note :

Factor= Rated Power/Measured Power
 Scaled SAR= Measured SAR*Factor

Note:

According to KDB 865664 D01 v01 section 2.8.1, repeated measurement are required;2)When the original highest measured SAR is $\geq 0.80\text{W/kg}$, repeat that measurement once.

7.5. Dielectric Performance for Body Tissue simulating liquid

| Frequency | Description | Dielectric Parameters | | Temp |
|-----------|---------------------------------|-----------------------|----------------------|--------------|
| | | ϵ_r | $\sigma(\text{s/m})$ | °C |
| 2450MHz | Target value ±5% window | 52.7 50.07-55.34 | 1.95 1.85-2.05 | / |
| | Measurement value 2013-03-15 | 52.75 | 1.98 | 20.01 |
| | Measurement value 2013-03-22 | 51.15 | 2.05 | 22.50 |



Figure 4.4: Liquid depth in the Flat Phantom

8. ANNEX A: SYSTEM CHECK RESULTS

Test Laboratory: Audix SAR Lab

Date: 15/03/2013

CW: 2450MHz

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN: 862

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.98$ mho/m; $\epsilon_r = 52.75$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASYS2, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/Body_2450/Area Scan (41x61x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 15.541 mW/g

Configuration/Body_2450/Zoom Scan (7x7x7)/Cube 0:

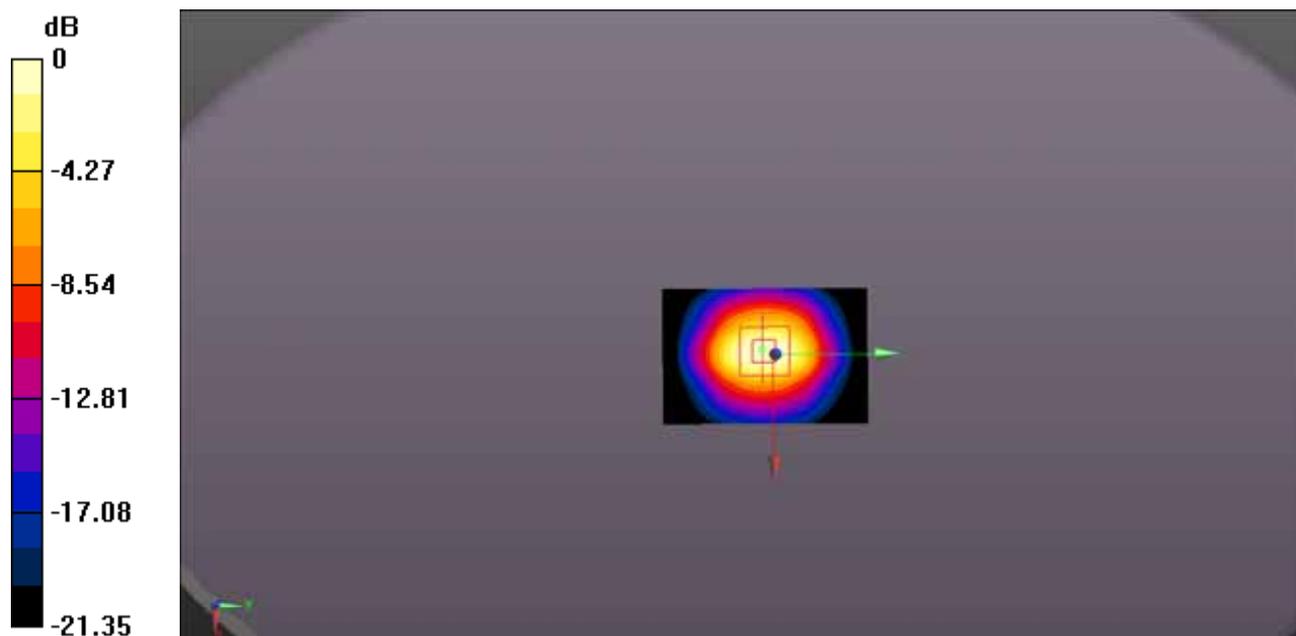
Measurement grid: dx=5mm, dy=5mm, dz=5mm

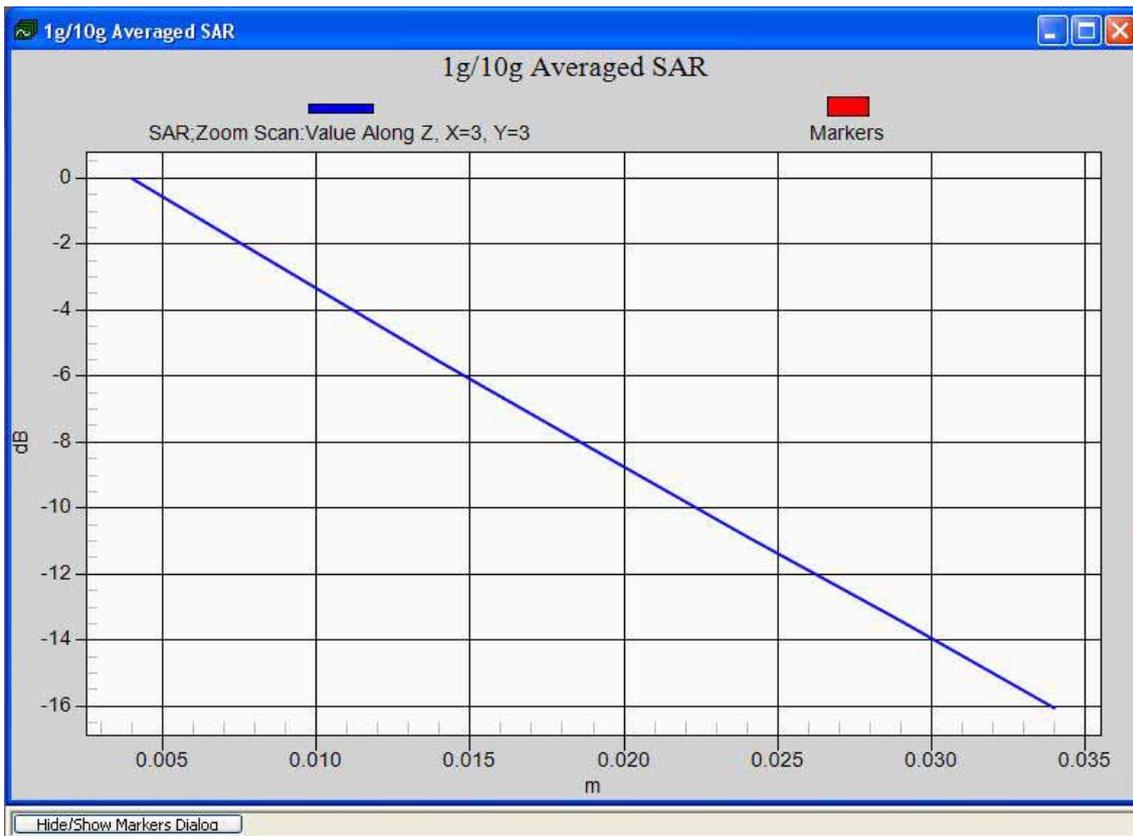
Reference Value = 84.723 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 26.0400

SAR(1 g) = 13.16 mW/g; SAR(10 g) = 6.13 mW/g

Maximum value of SAR (measured) = 14.876 mW/g





Test Laboratory: Audix SAR Lab
 CW: 2450MHz

Date: 22/03/2013

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN: 862

Communication System: CW; Frequency: 2450 MHz
 Medium parameters used: $f = 2450$ MHz; $\sigma = 2.05$ mho/m; $\epsilon_r = 51.15$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section
 Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)
 DASYS Configuration:

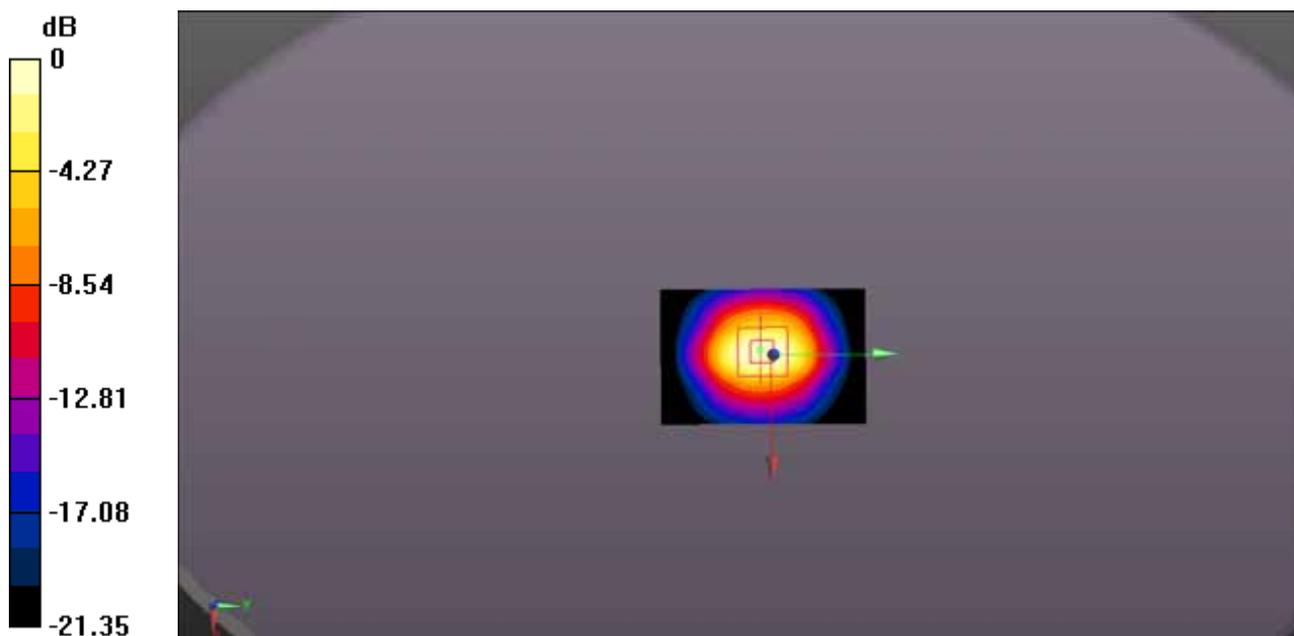
- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASYS2, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

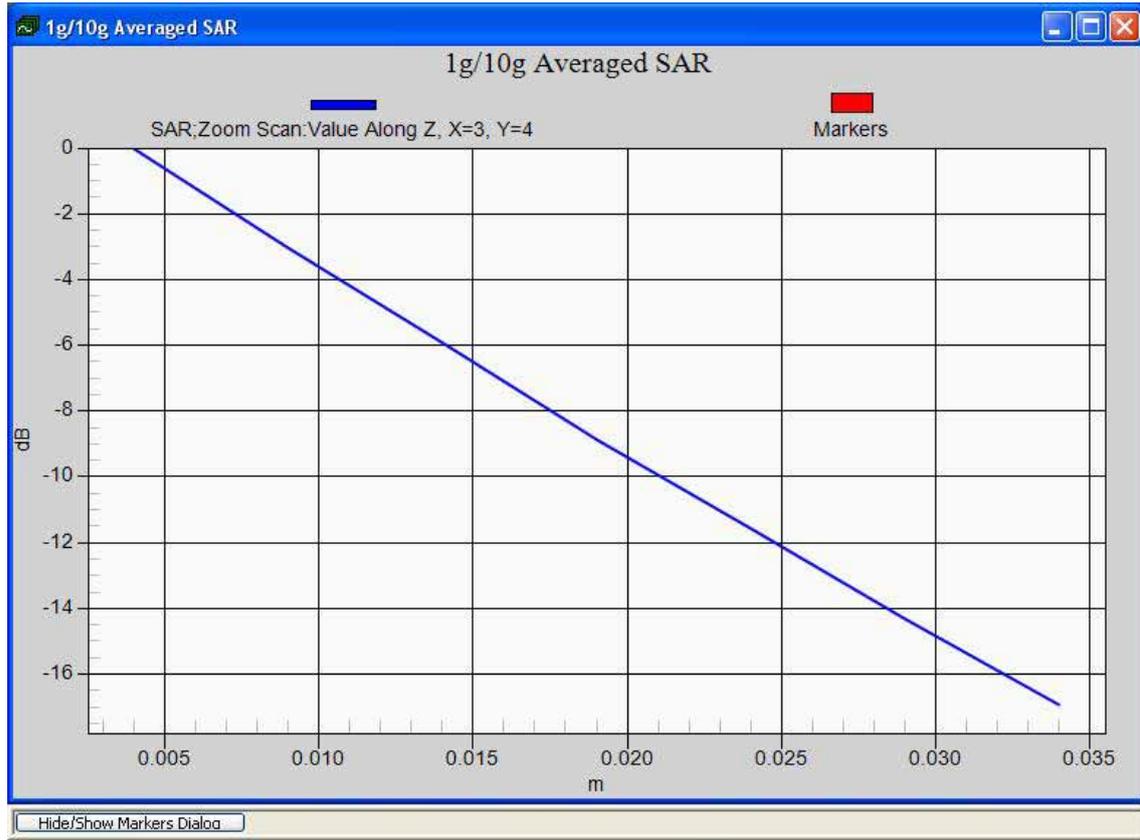
Configuration/Body_2450/Area Scan (41x61x1):

Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 15.448 mW/g

Configuration/Body_2450/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 84.590 V/m; Power Drift = -0.09 dB
 Peak SAR (extrapolated) = 25.8340
SAR(1 g) = 13.09 mW/g; SAR(10 g) = 6.11 mW/g
 Maximum value of SAR (measured) = 14.702 mW/g





9. ANNEX B: GRAPH RESULTS WITH BANDS OF WATCH

Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH1-Front(2412MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2412 MHz; Medium parameters used: $f = 2412$ MHz; $\sigma = 2.007$ mho/m; $\epsilon_r = 50.24$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH1-Front/Area Scan (101x131x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.740 W/kg

Configuration/802.11b_CH1-Front/Zoom Scan (7x7x7)/Cube 0:

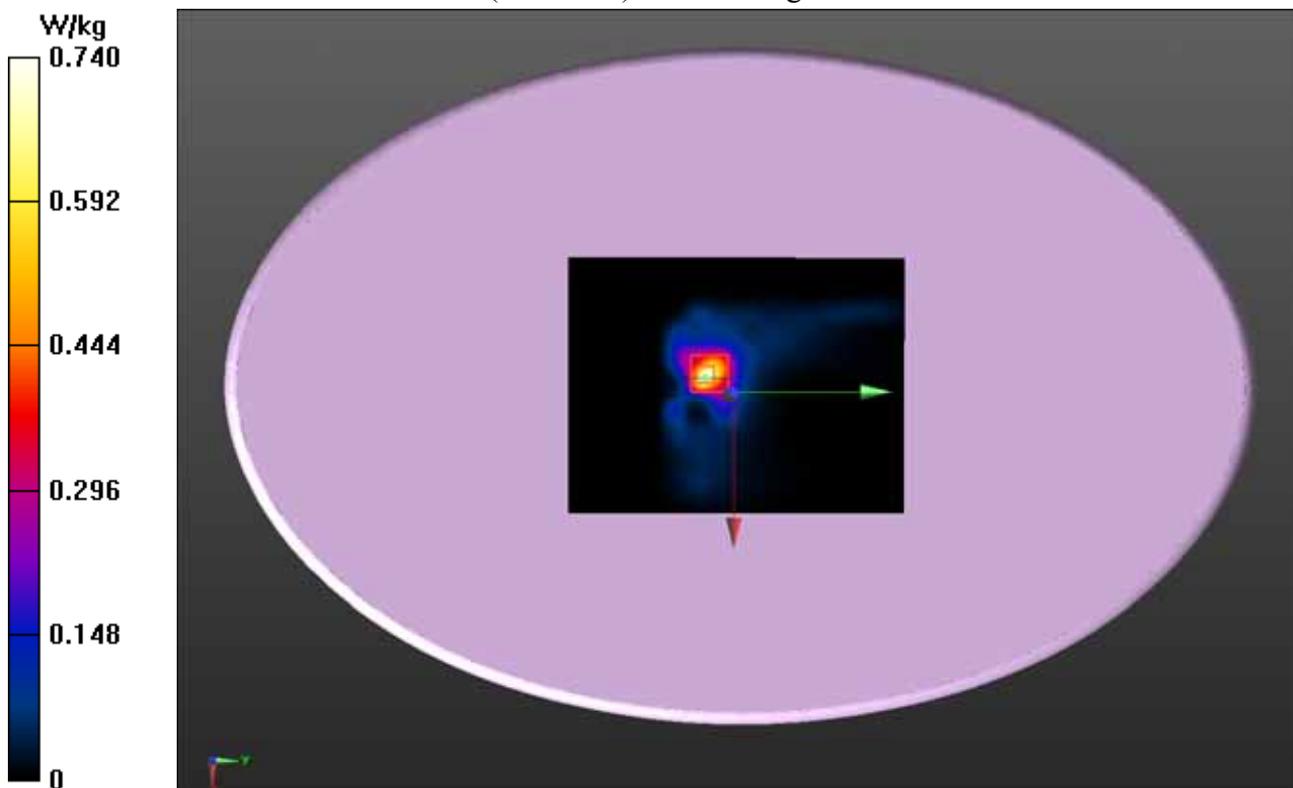
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.427 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 2.361 mW/g

SAR(1 g) = 0.886 mW/g; SAR(10 g) = 0.329 mW/g

Maximum value of SAR (measured) = 1.03 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH6-Front(2437MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2437 MHz ; Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.989$ mho/m; $\epsilon_r = 50.008$; $\rho = 1000$ kg/m³ ; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH6-Front/Area Scan (81x101x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.16 W/kg

Configuration/802.11b_CH6-Front/Zoom Scan (7x7x7)/Cube 0:

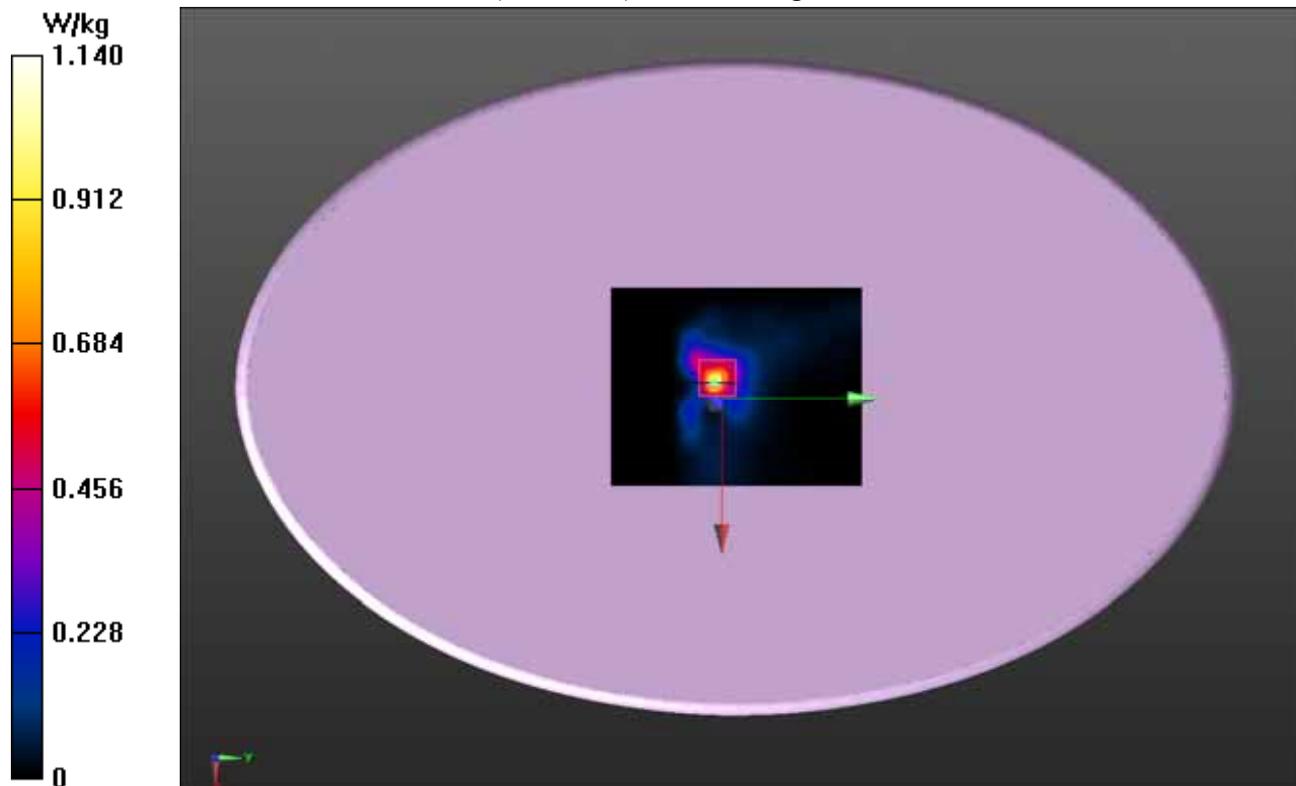
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.851 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 2.443 mW/g

SAR(1 g) = 0.916 mW/g; SAR(10 g) = 0.325 mW/g

Maximum value of SAR (measured) = 1.11 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH11-Front(2462MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2462 MHz; Medium parameters used: $f = 2462$ MHz; $\sigma = 2.078$ mho/m; $\epsilon_r = 49.554$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH11-Front/Area Scan (61x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.10 W/kg

Configuration/802.11b_CH11-Front/Zoom Scan (7x7x7)/Cube 0:

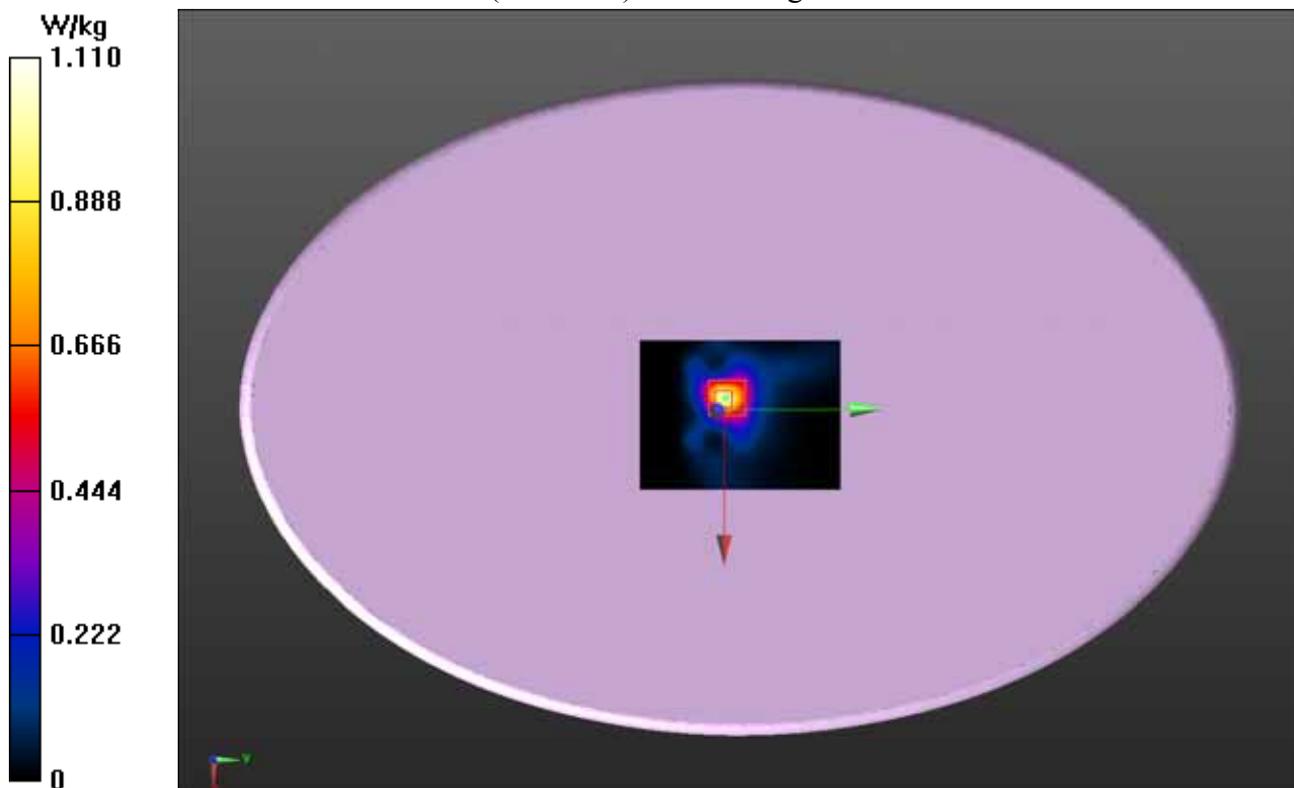
Measurement grid: dx=5mm, dy=5mm, dz=5mm

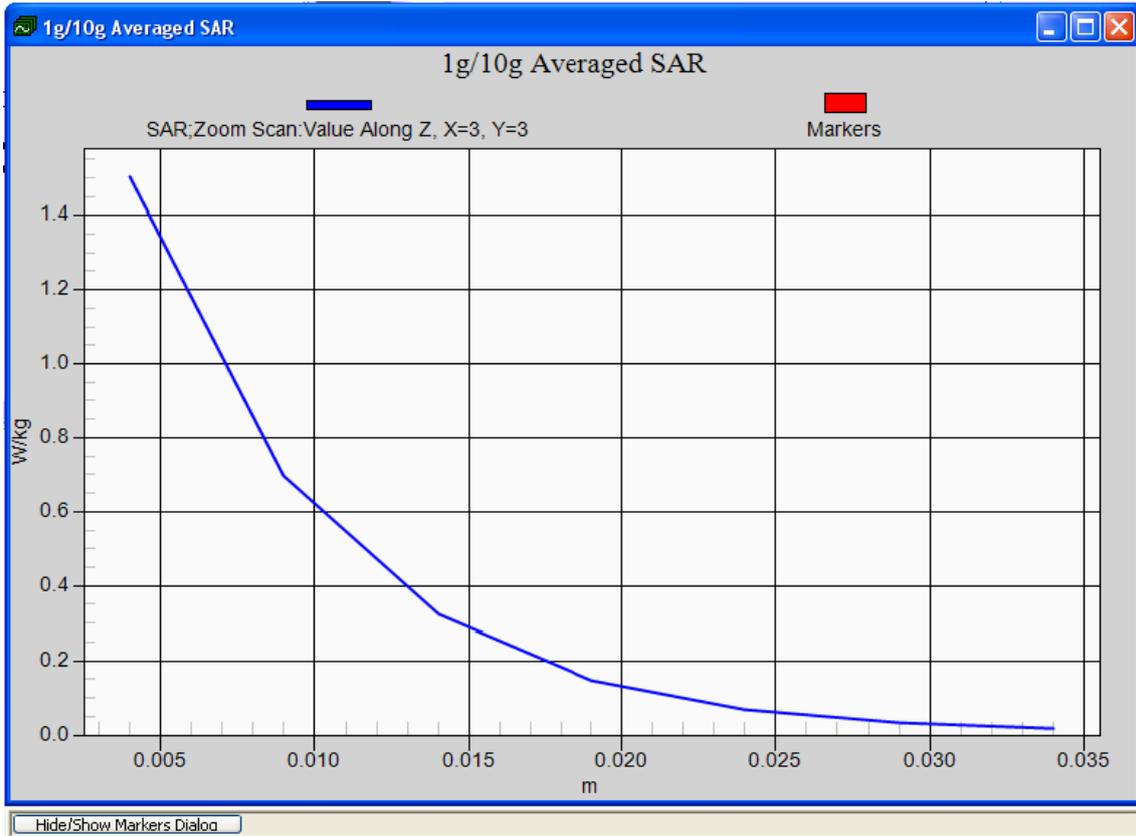
Reference Value = 16.107 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 3.128 mW/g

SAR(1 g) = 0.945 mW/g; SAR(10 g) = 0.358 mW/g

Maximum value of SAR (measured) = 1.31 W/kg





Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH1-Back(2412MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2412 MHz; Medium parameters used: $f = 2412$ MHz; $\sigma = 2.007$ mho/m; $\epsilon_r = 50.24$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_Back/Area Scan (61x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.606 W/kg

Configuration/802.11b_Back/Zoom Scan (7x7x7)/Cube 0:

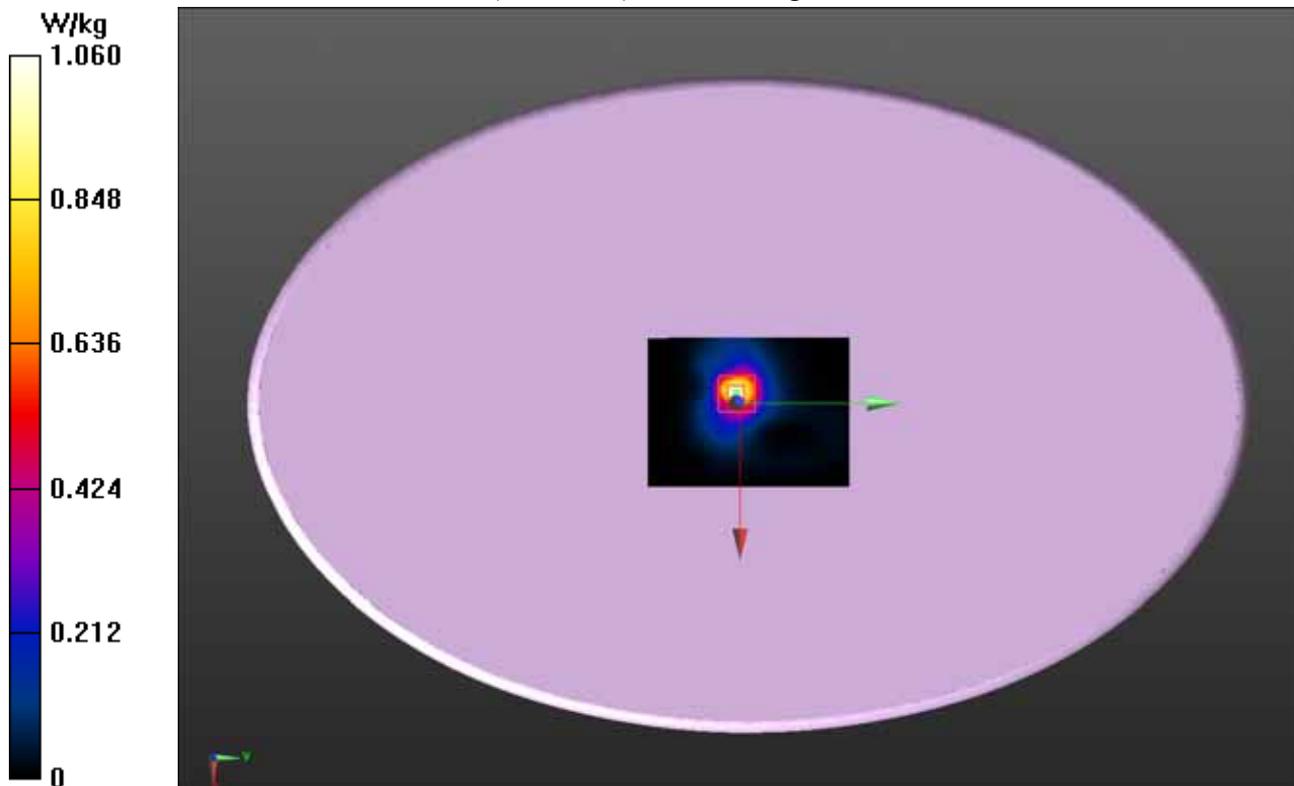
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.823 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 2.537 mW/g

SAR(1 g) = 0.901 mW/g; SAR(10 g) = 0.305 mW/g

Maximum value of SAR (measured) = 1.08 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH6-Back (2437MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2437 MHz; Medium parameters used: $f = 2437$ MHz; $\sigma = 1.989$ mho/m; $\epsilon_r = 50.008$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH6-Back/Area Scan (101x131x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.654 W/kg

Configuration/802.11b_CH6-Back/Zoom Scan (7x7x7)/Cube 0:

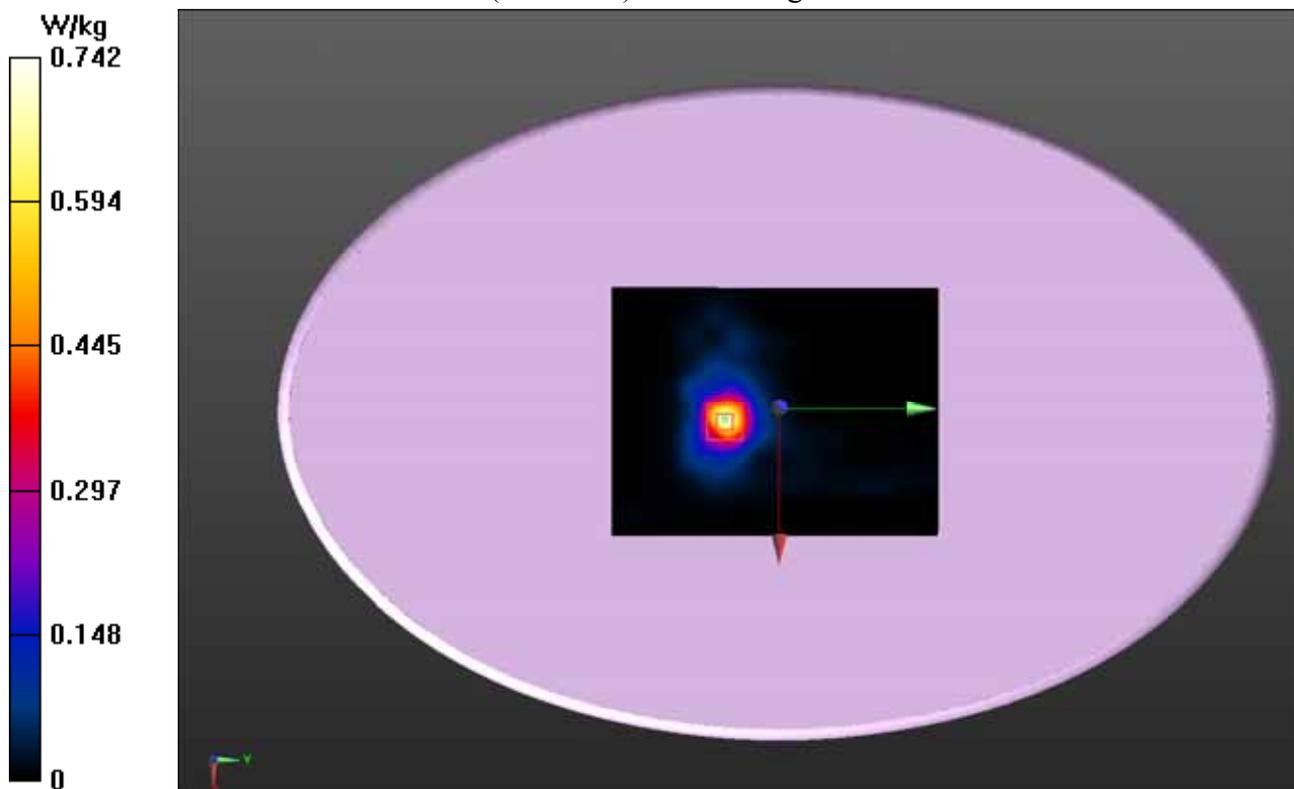
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.725 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 2.623 mW/g

SAR(1 g) = 0.912 mW/g; SAR(10 g) = 0.305 mW/g

Maximum value of SAR (measured) = 1.10 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH11-Back(2462MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2462 MHz ; Medium parameters used: $f = 2462$ MHz; $\sigma = 2.078$ mho/m; $\epsilon_r = 49.554$; $\rho = 1000$ kg/m³ ; Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH1-Back/Area Scan (61x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.02 W/kg

Configuration/802.11b_CH1-Back/Zoom Scan (7x7x7)/Cube 0:

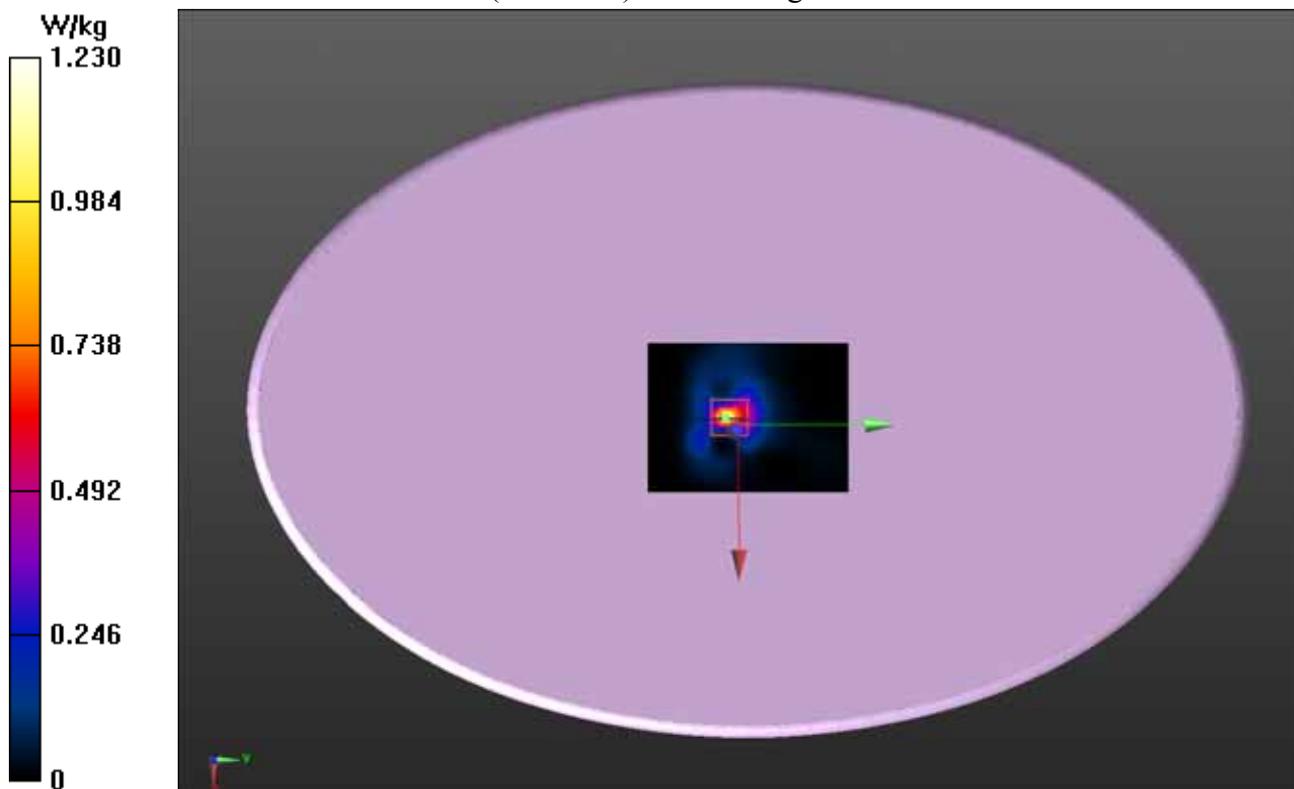
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.189 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 3.121 mW/g

SAR(1 g) = 0.934 mW/g; SAR(10 g) = 0.301 mW/g

Maximum value of SAR (measured) = 1.12 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH1-Top(2412MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2412 MHz; Medium parameters used: $f = 2412$ MHz; $\sigma = 1.989$ mho/m; $\epsilon_r = 50.008$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH1-Top/Area Scan (51x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.363 W/kg

Configuration/802.11b_CH1-Top/Zoom Scan (7x7x7)/Cube 0:

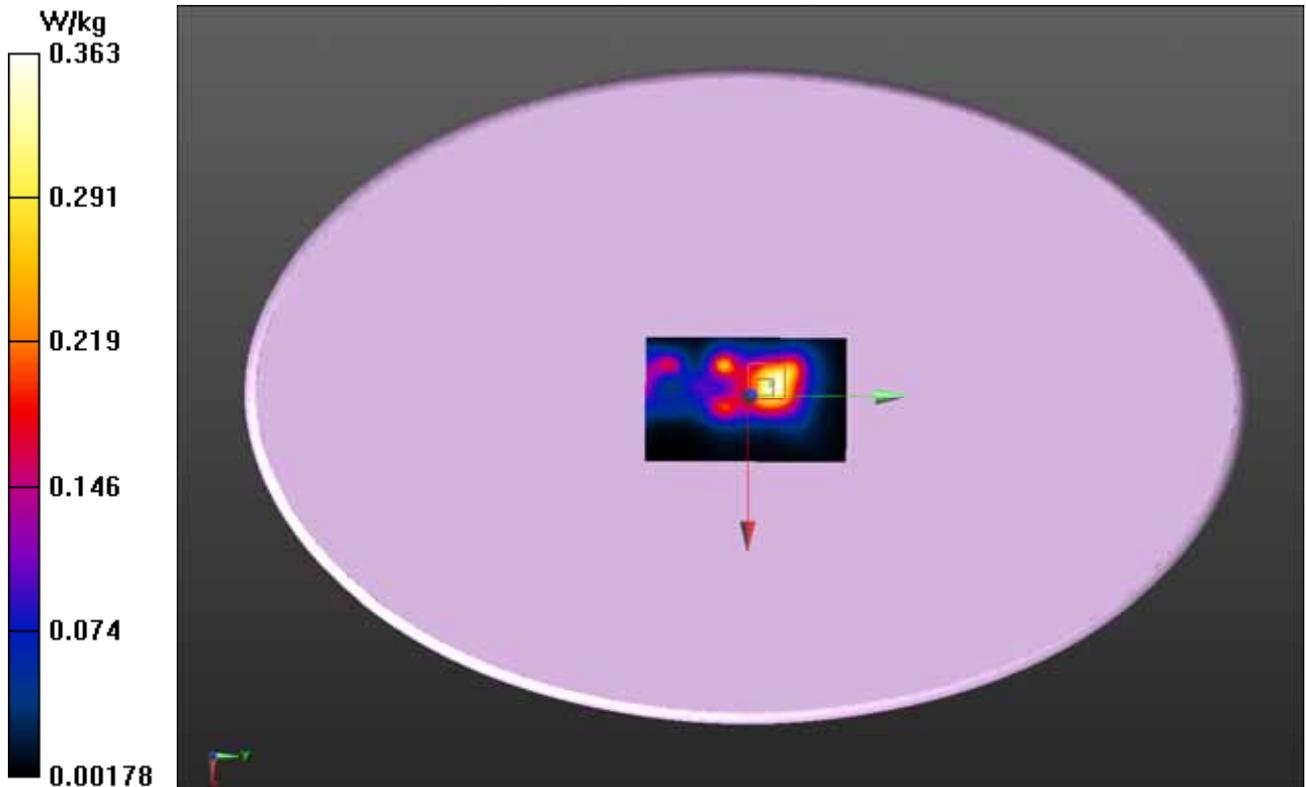
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.034 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.205 mW/g

SAR(1 g) = 0.336 mW/g; SAR(10 g) = 0.140 mW/g

Maximum value of SAR (measured) = 0.482 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH6-Top(2437MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2437 MHz ; Medium parameters used: $f = 2437$ MHz; $\sigma = 2.007$ mho/m; $\epsilon_r = 50.24$; $\rho = 1000$ kg/m³ ; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH6-Top/Area Scan (31x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.439 W/kg

Configuration/802.11b_CH6-Top/Zoom Scan (7x7x7)/Cube 0:

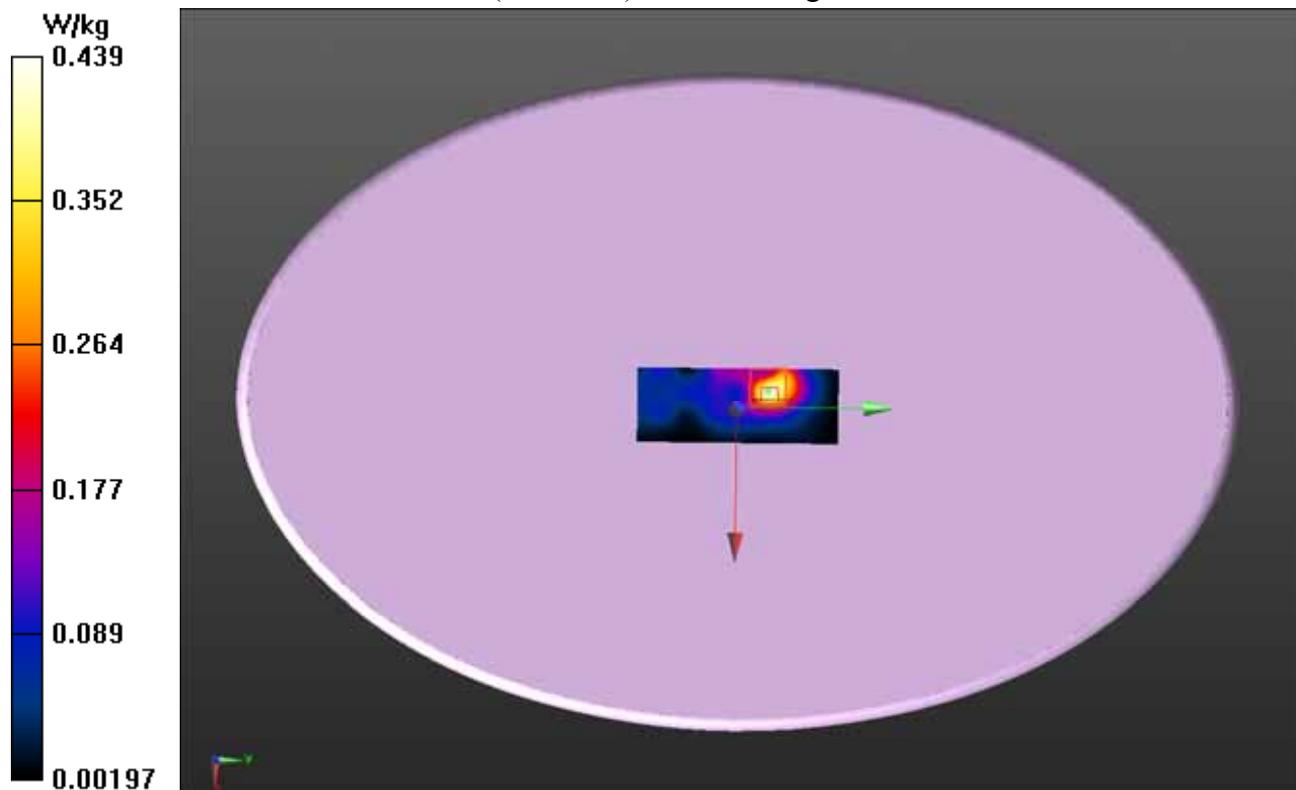
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.086 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 1.458 mW/g

SAR(1 g) = 0.385 mW/g; SAR(10 g) = 0.138 mW/g

Maximum value of SAR (measured) = 0.523 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH11-Top(2462MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2462 MHz; Medium parameters used: $f = 2462$ MHz; $\sigma = 2.078$ mho/m; $\epsilon_r = 49.554$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH11-Top/Area Scan (51x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.577 W/kg

Configuration/802.11b_CH11-Top/Zoom Scan (7x7x7)/Cube 0:

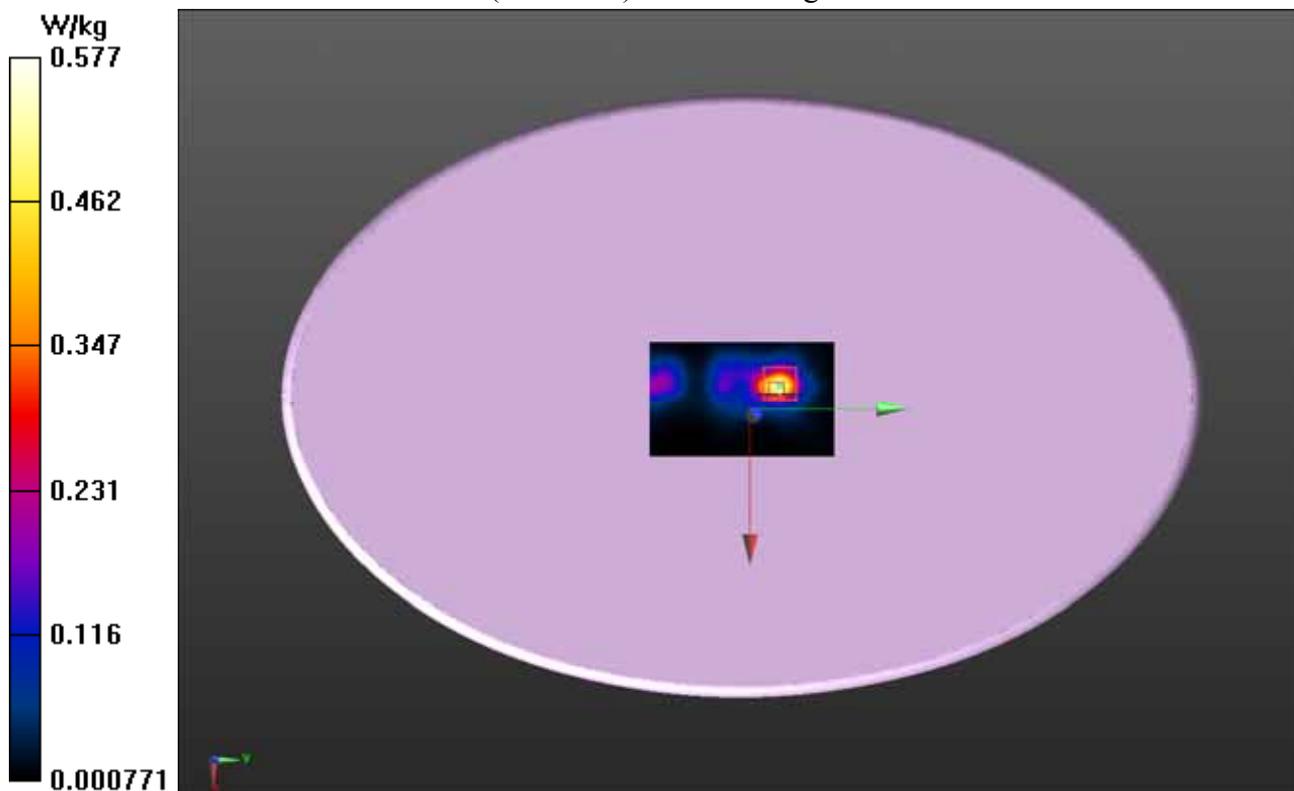
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.897 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 1.276 mW/g

SAR(1 g) = 0.389 mW/g; SAR(10 g) = 0.130 mW/g

Maximum value of SAR (measured) = 0.535 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH1-Bottom(2412MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2412 MHz; Medium parameters used: $f = 2412$ MHz; $\sigma = 2.007$ mho/m; $\epsilon_r = 50.24$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH1-Bottom/Area Scan (51x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.154 W/kg

Configuration/802.11b_CH1-Bottom/Zoom Scan (7x7x7)/Cube 0:

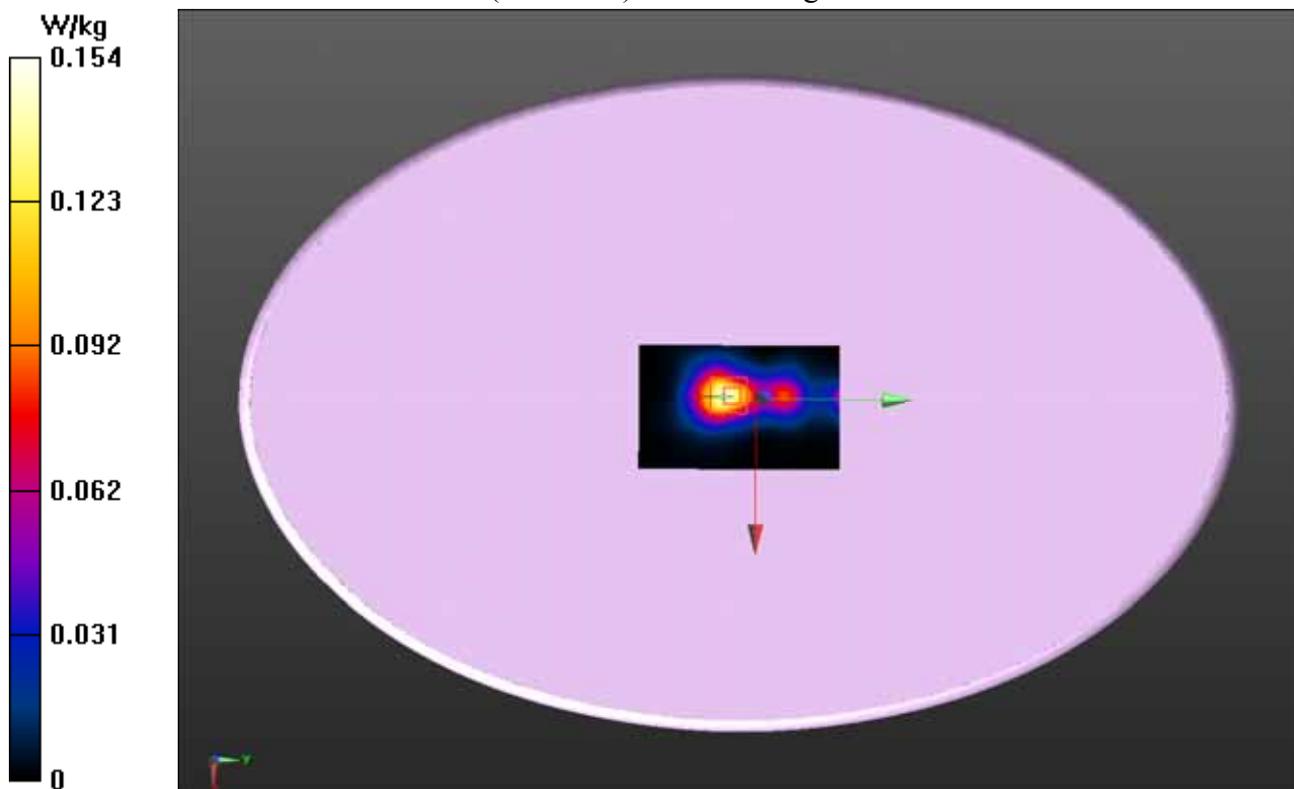
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.615 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.442 mW/g

SAR(1 g) = 0.120 mW/g; SAR(10 g) = 0.058 mW/g

Maximum value of SAR (measured) = 0.126 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH6-Bottom(2437MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2437 MHz; Medium parameters used: $f = 2437$ MHz; $\sigma = 1.989$ mho/m; $\epsilon_r = 50.008$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH6-Bottom/Area Scan (51x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0950 W/kg

Configuration/802.11b_CH6-Bottom/Zoom Scan (7x7x7)/Cube 0:

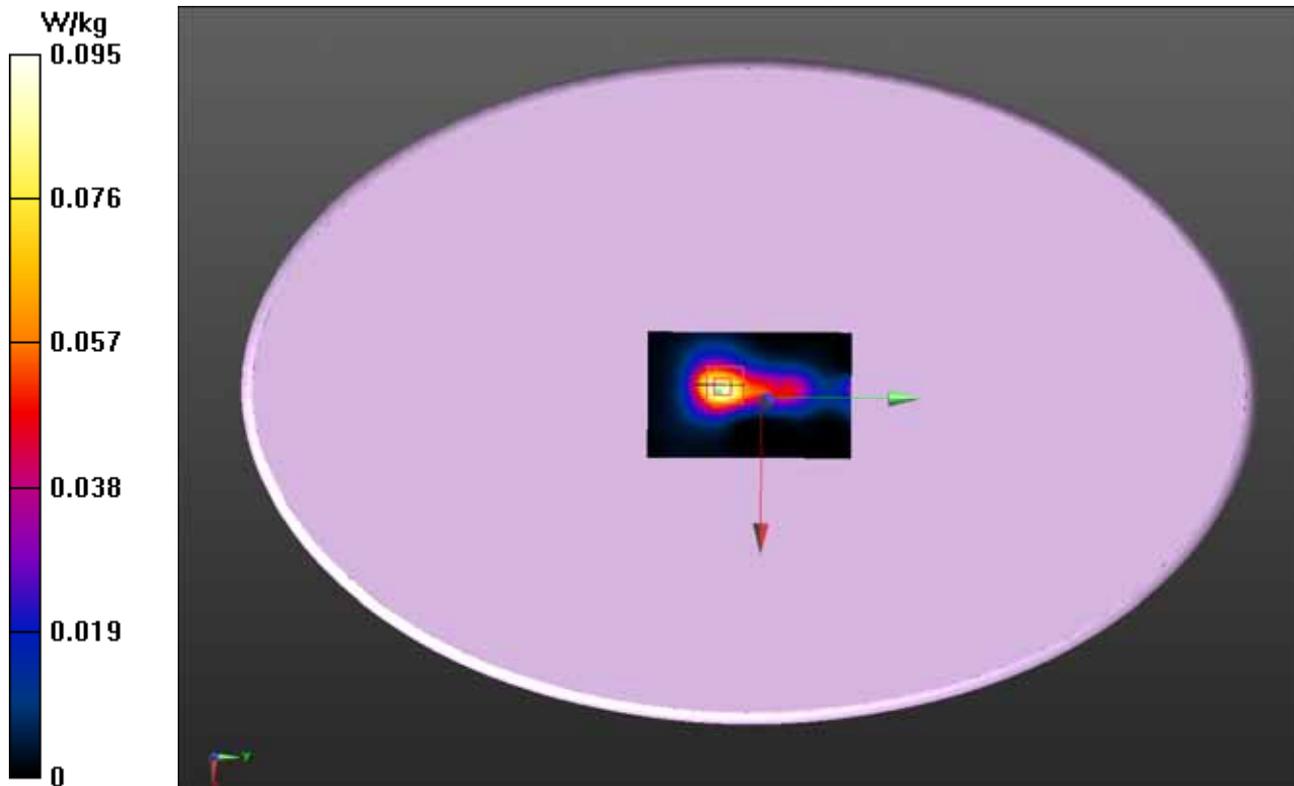
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.118 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.358 mW/g

SAR(1 g) = 0.095 mW/g; SAR(10 g) = 0.044 mW/g

Maximum value of SAR (measured) = 0.0985 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH11-Bottom(2462MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2462 MHz ; Medium parameters used: $f = 2462$ MHz; $\sigma = 2.078$ mho/m; $\epsilon_r = 49.554$; $\rho = 1000$ kg/m³ ; Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DA
- SY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH11-Bottom/Area Scan (51x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.124 W/kg

Configuration/802.11b_CH11-Bottom/Zoom Scan (7x7x7)/Cube 0:

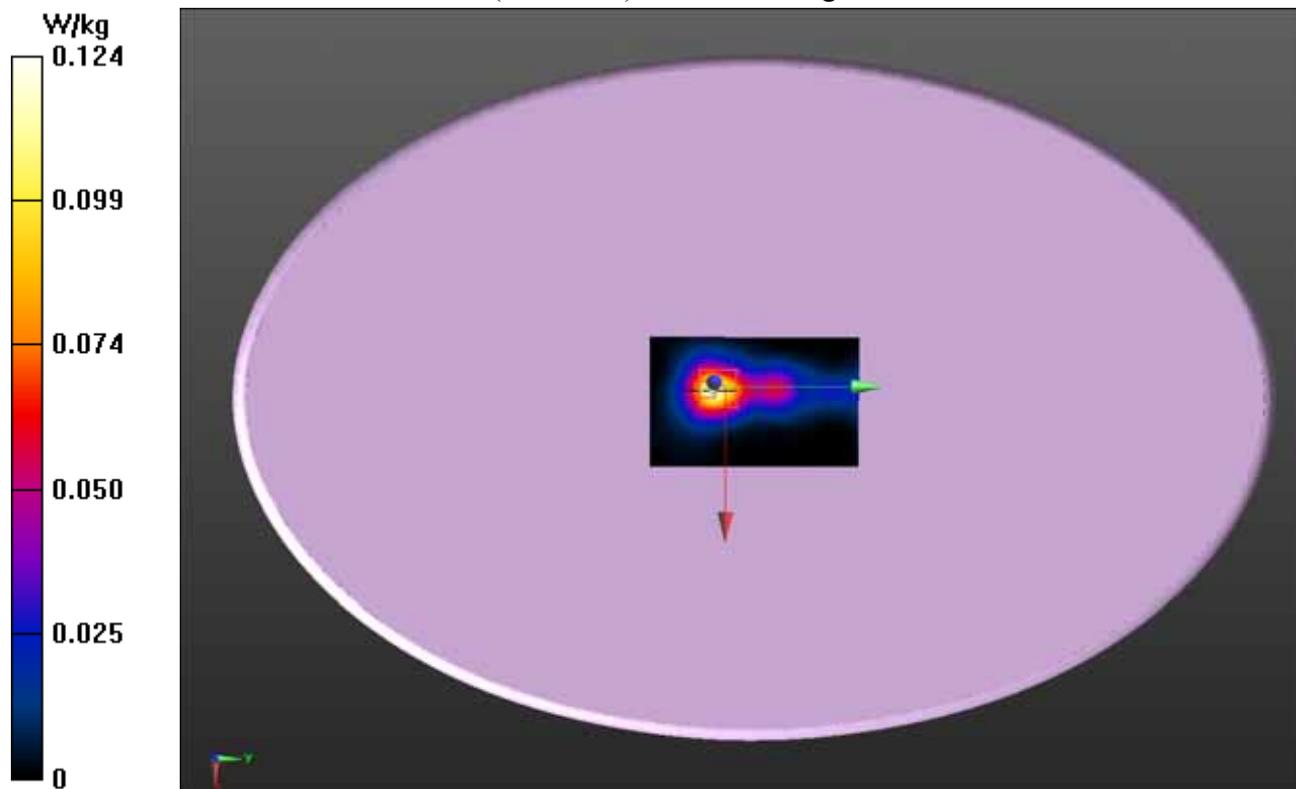
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.745 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.371 mW/g

SAR(1 g) = 0.093 mW/g; SAR(10 g) = 0.044 mW/g

Maximum value of SAR (measured) = 0.0991 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH1-Left(2412MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2412 MHz; Medium parameters used: $f = 2412$ MHz; $\sigma = 2.078$ mho/m; $\epsilon_r = 49.554$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH11-Left/Area Scan (51x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0521 W/kg

Configuration/802.11b_CH11-Left/Zoom Scan (7x7x7)/Cube 0:

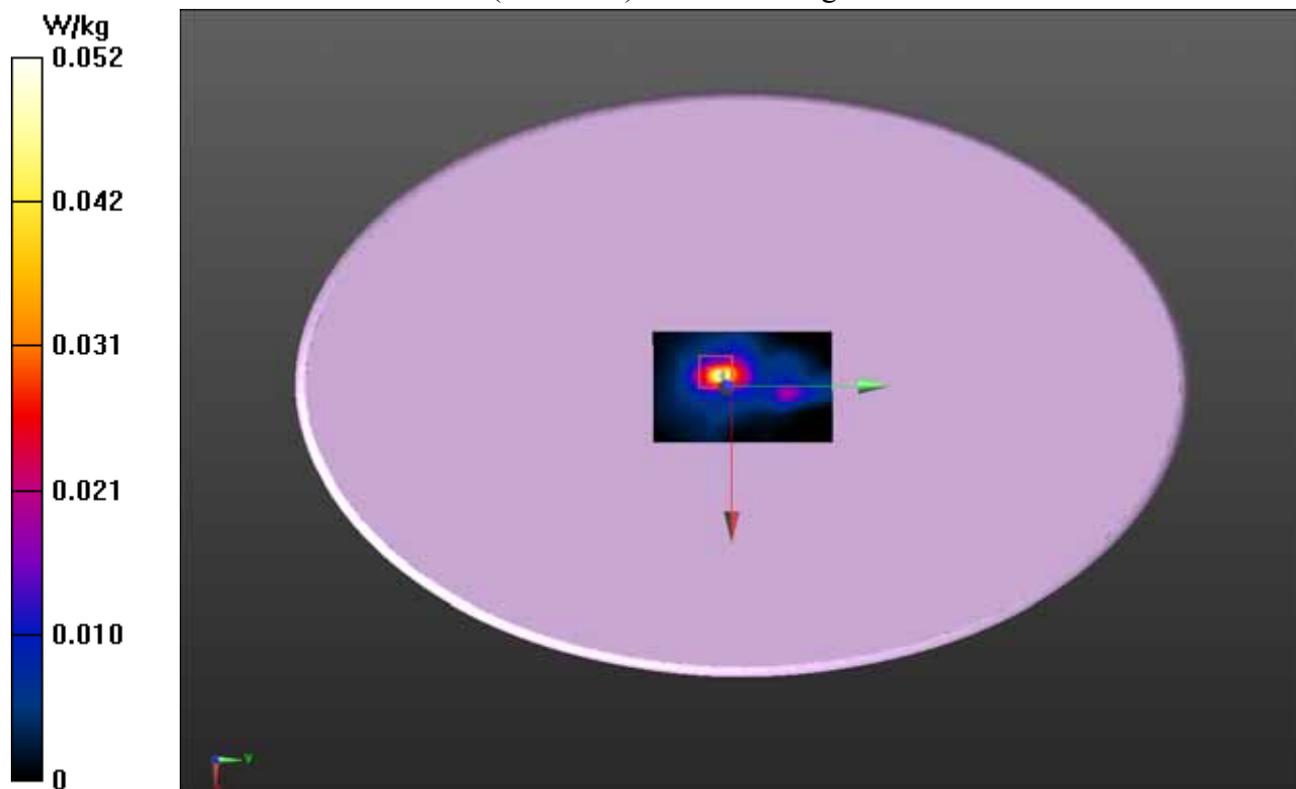
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.560 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.129 mW/g

SAR(1 g) = 0.036 mW/g; SAR(10 g) = 0.011 mW/g

Maximum value of SAR (measured) = 0.0512 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH6-Left(2437MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2437 MHz; Medium parameters used: $f = 2437$ MHz; $\sigma = 1.989$ mho/m; $\epsilon_r = 50.008$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH6-Left/Area Scan (51x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0551 W/kg

Configuration/802.11b_CH6-Left/Zoom Scan (7x7x7)/Cube 0:

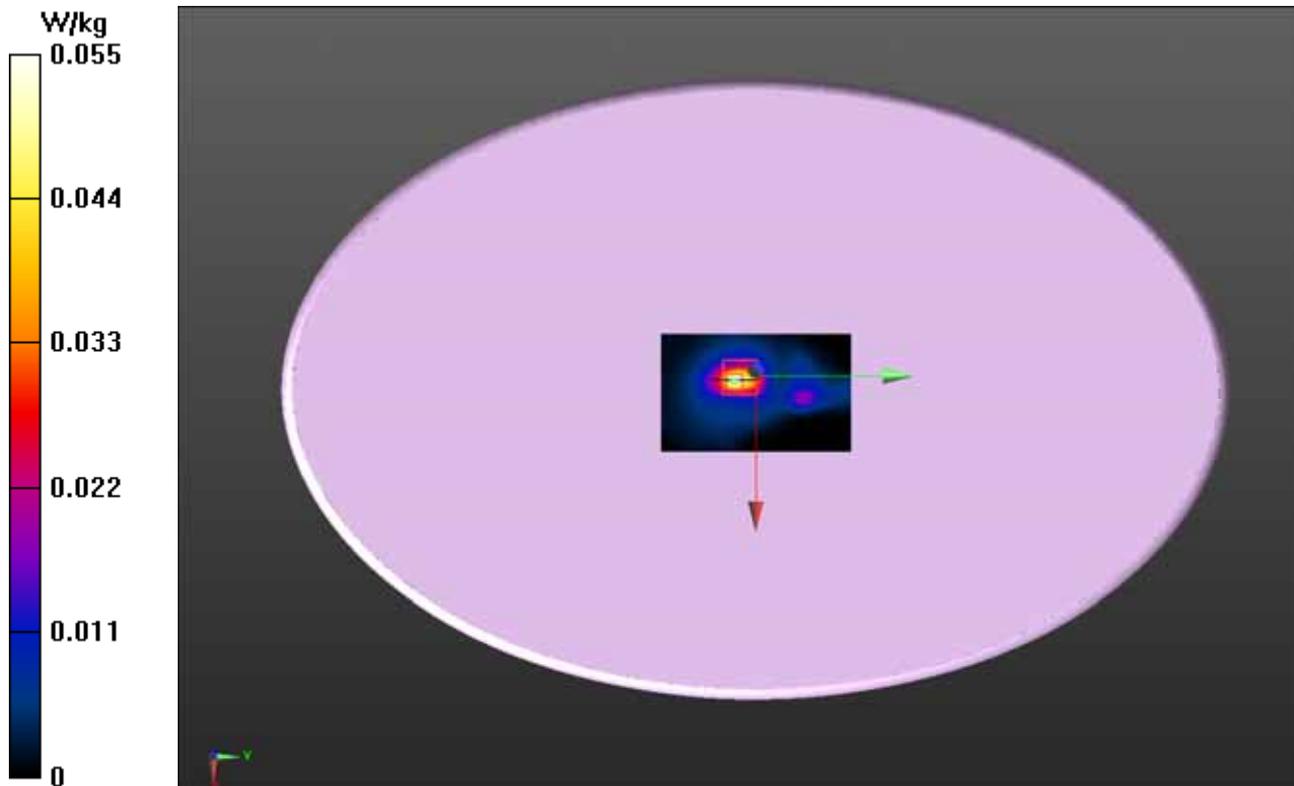
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.378 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.154 mW/g

SAR(1 g) = 0.040 mW/g; SAR(10 g) = 0.014 mW/g

Maximum value of SAR (measured) = 0.0554 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH11-Left(2462MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2462 MHz; Medium parameters used: $f = 2462$ MHz; $\sigma = 2.007$ mho/m; $\epsilon_r = 50.24$; $\rho = 1000$ kg/m³ ; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH11-Left/Area Scan (51x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0616 W/kg

Configuration/802.11b_CH11-Left/Zoom Scan (7x7x7)/Cube 0:

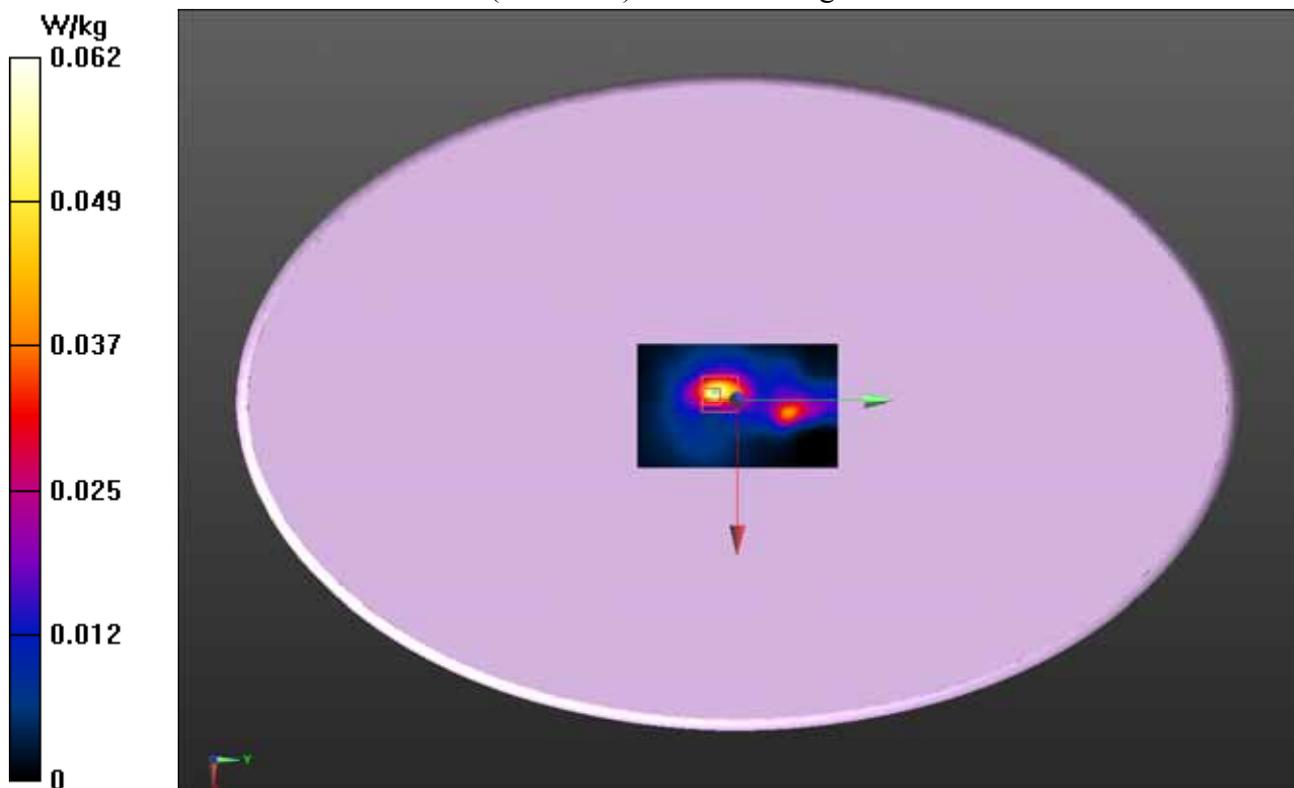
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.761 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.202 mW/g

SAR(1 g) = 0.052 mW/g; SAR(10 g) = 0.017 mW/g

Maximum value of SAR (measured) = 0.0753 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH1-Right(2412MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2412 MHz; Medium parameters used: $f = 2412$ MHz; $\sigma = 2.078$ mho/m; $\epsilon_r = 49.554$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH11-Right/Area Scan (51x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.199 W/kg

Configuration/802.11b_CH11-Right/Zoom Scan (7x7x7)/Cube 0:

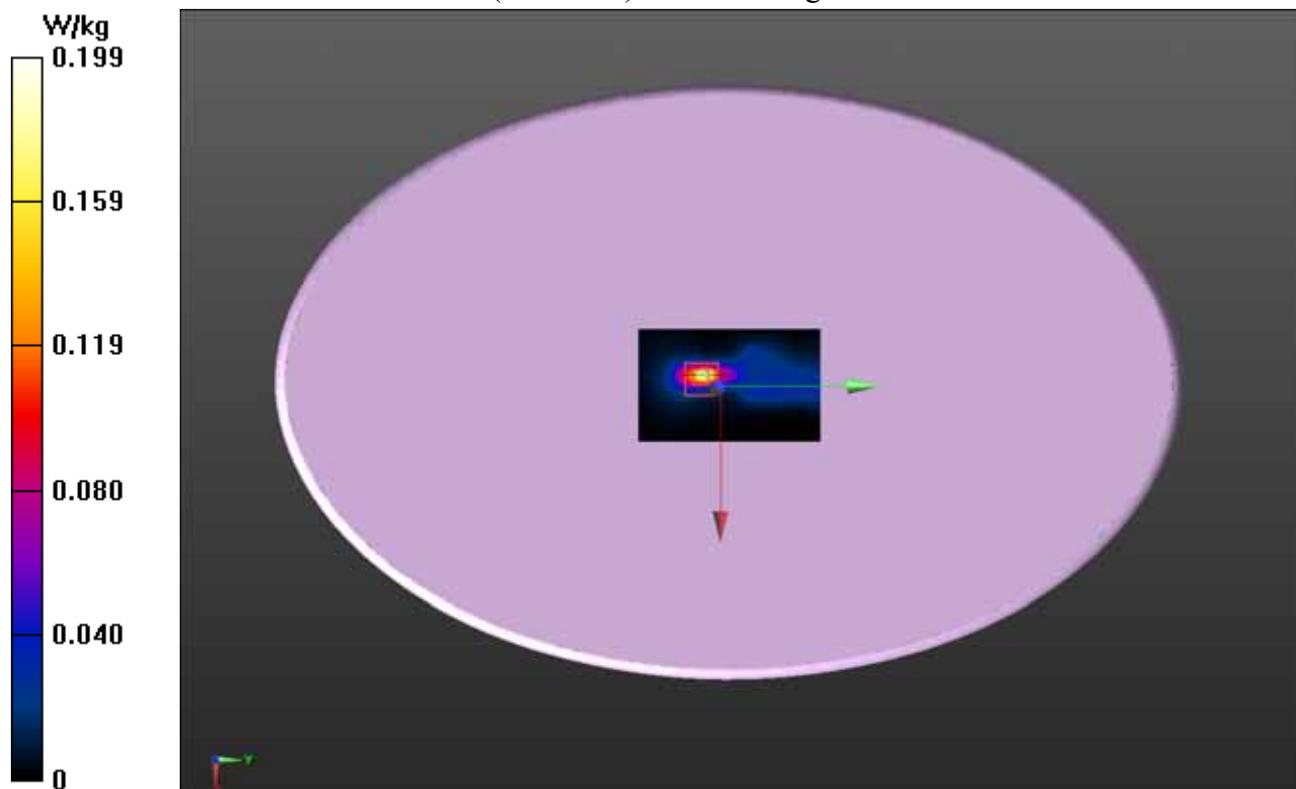
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.406 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 0.569 mW/g

SAR(1 g) = 0.157 mW/g; SAR(10 g) = 0.049 mW/g

Maximum value of SAR (measured) = 0.200 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH6-Right(2437MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2437 MHz ; Medium parameters used: $f = 2437$ MHz; $\sigma = 1.989$ mho/m; $\epsilon_r = 50.008$; $\rho = 1000$ kg/m³ ; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH6-Right/Area Scan (51x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.381 W/kg

Configuration/802.11b_CH6-Right/Zoom Scan (7x7x7)/Cube 0:

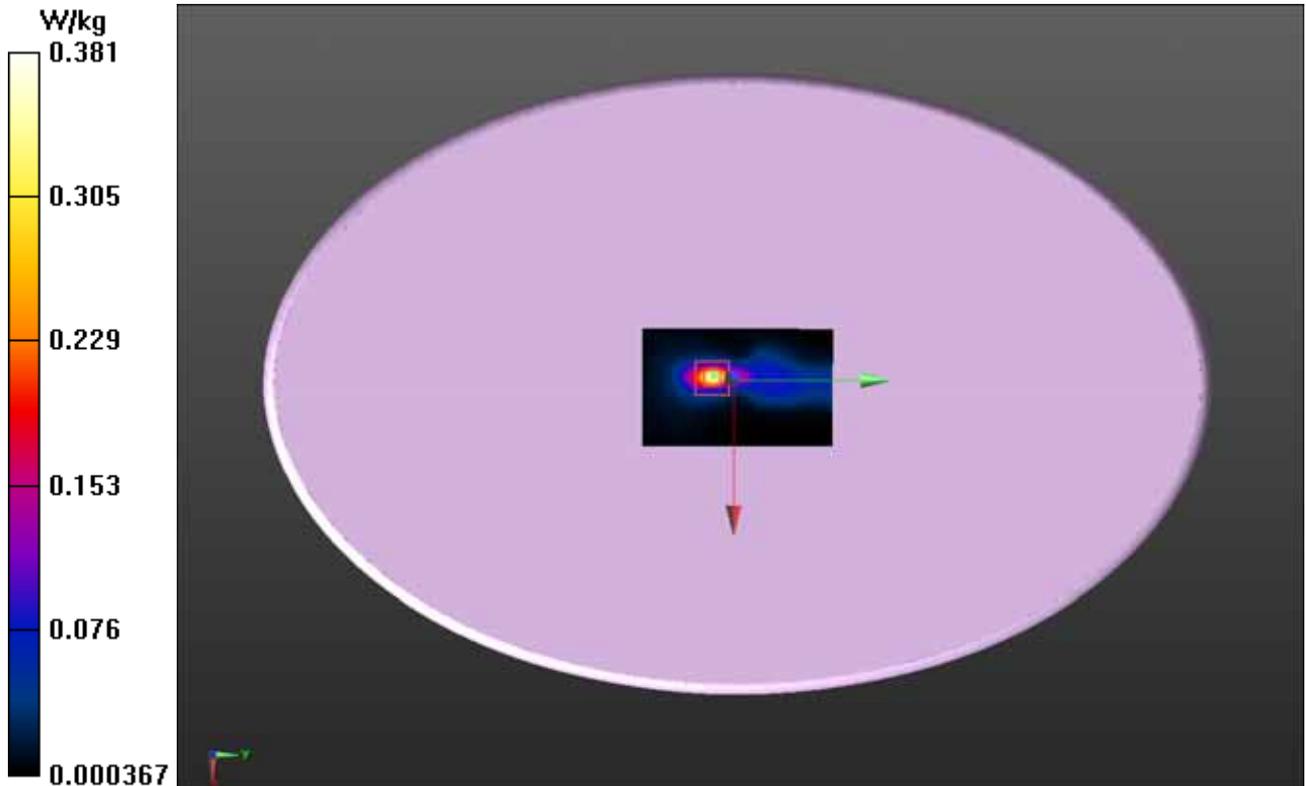
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.643 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 1.124 mW/g

SAR(1 g) = 0.330 mW/g; SAR(10 g) = 0.110 mW/g

Maximum value of SAR (measured) = 0.381 W/kg



Test Laboratory: Audix SAR Lab

Date: 15/03/2013

802.11b_CH11-Right(2462MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2462 MHz ; Medium parameters used: $f = 2462$ MHz; $\sigma = 2.007$ mho/m; $\epsilon_r = 50.24$; $\rho = 1000$ kg/m³ ; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH1-Right/Area Scan (51x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.392 W/kg

Configuration/802.11b_CH1-Right/Zoom Scan (7x7x7)/Cube 0:

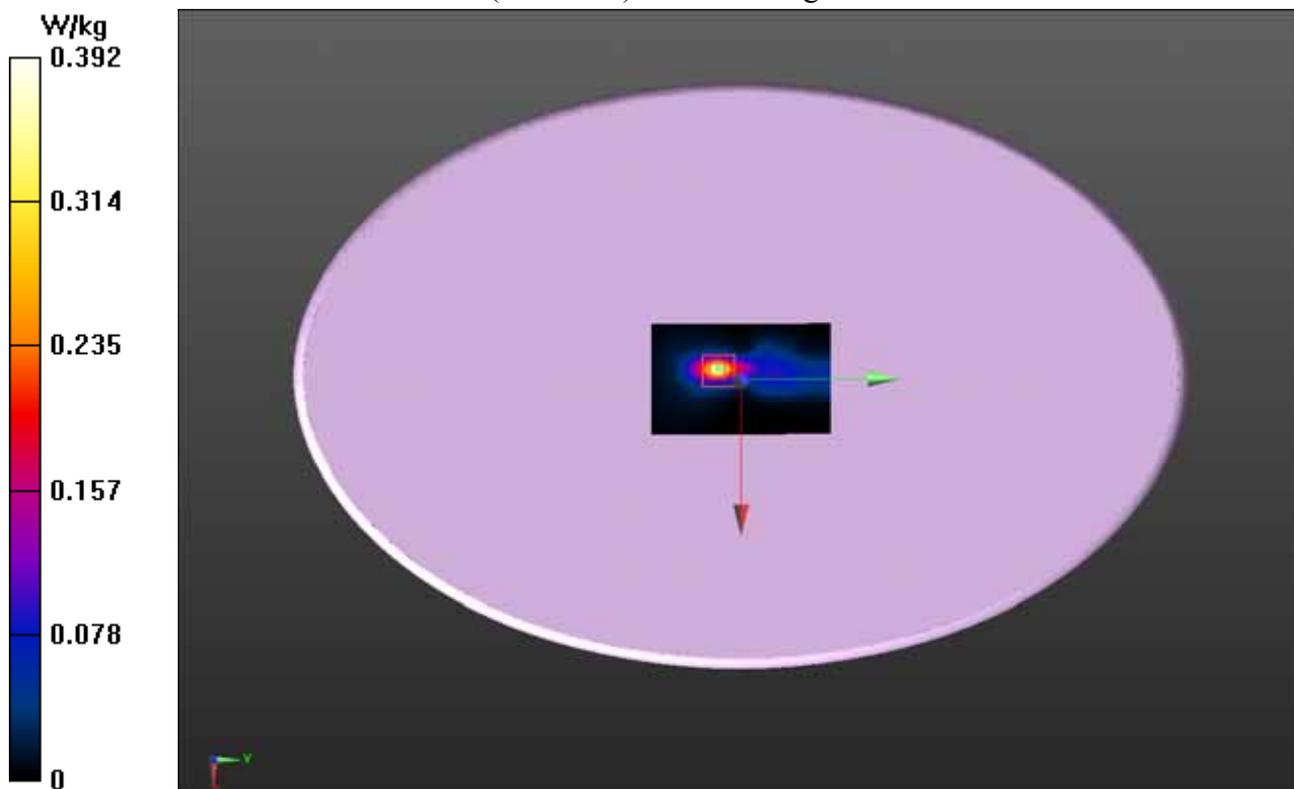
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.827 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.134 mW/g

SAR(1 g) = 0.334 mW/g; SAR(10 g) = 0.111 mW/g

Maximum value of SAR (measured) = 0.382 W/kg



Test Laboratory: Audix SAR Lab

Date: 22/03/2013

802.11b_CH11-Front(2462MHz)

DUT: HP Slate 7 M/N:SUN-B12

Communication System: IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2462 MHz; Medium parameters used (interpolated): $f = 2462$ MHz; $\sigma = 1.998$ mho/m; $\epsilon_r = 51.253$; $\rho = 1000$ kg/m³; Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3139; ConvF(4.16, 4.16, 4.16); Calibrated: 25/07/2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn899; Calibrated: 25/07/2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Configuration/802.11b_CH11-Front/Area Scan (61x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.763 W/kg

Configuration/802.11b_CH11-Front/Zoom Scan (7x7x7)/Cube 0:

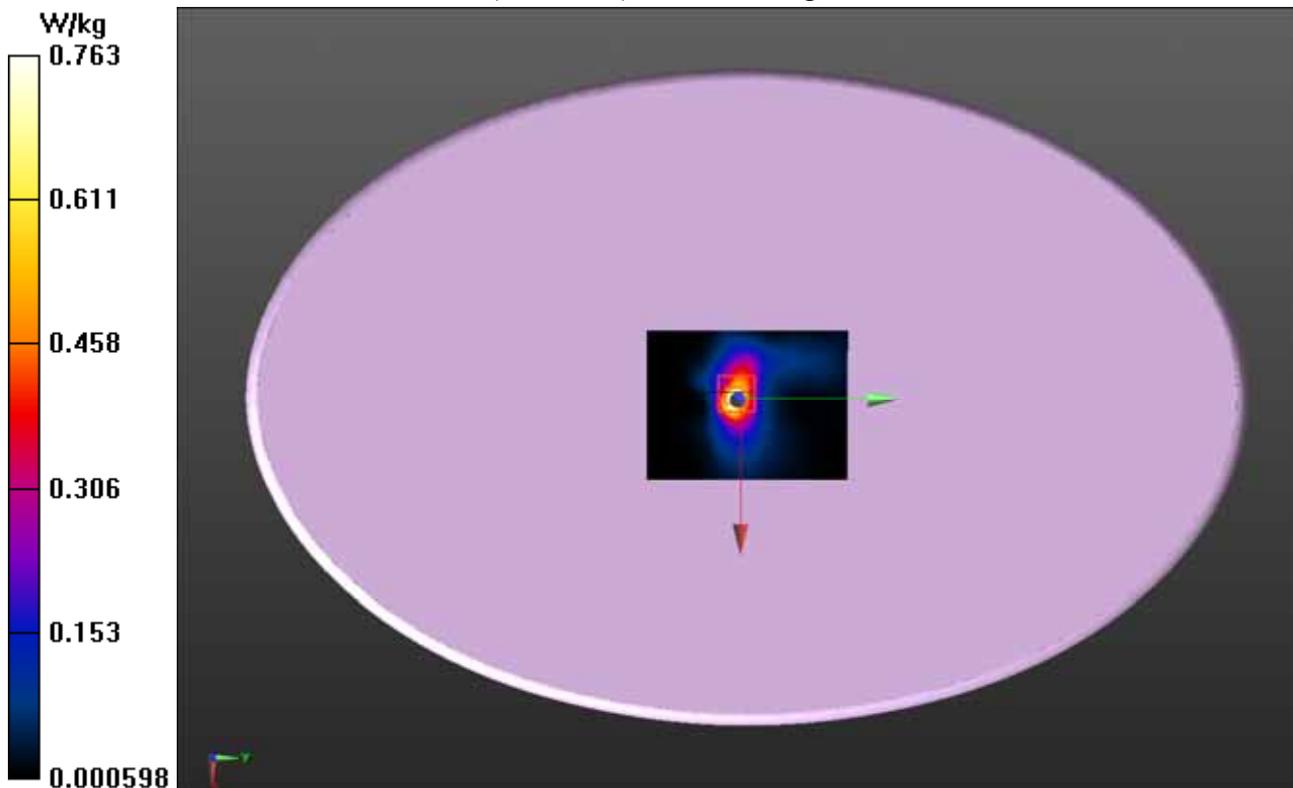
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.180 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 2.371 mW/g

SAR(1 g) = 0.898 mW/g; SAR(10 g) = 0.315 mW/g

Maximum value of SAR (measured) = 0.982 W/kg



10.ANNEC C: DASY CABLIBRATION CERTIFICATE

Schmid & Partner Engineering AG

s p e a g

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

IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:

Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:

Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:

To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

Schmid & Partner Engineering

TN_BR040315AD DAE4.doc

11.12.2009

**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 **Audix - CN (Auden)**

Certificate No: **DAE4-899_Jul12**

CALIBRATION CERTIFICATE

Object: **DAE4 - SD 000 D04 BJ - SN: 899**

Calibration procedure(s): **QA CAL-06.v24
Calibration procedure for the data acquisition electronics (DAE)**

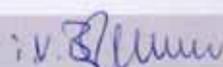
Calibration date: **July 25, 2012**

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|-------------------------------|--------------------|----------------------------|------------------------|
| Keithley Multimeter Type 2001 | SN: 0810278 | 28-Sep-11 (No:11450) | Sep-12 |
| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
| Calibrator Box V2.1 | SE UWS 053 AA 1001 | 05-Jan-12 (in house check) | In house check: Jan-13 |

| | | | |
|----------------|-----------------------|------------------------|--|
| Calibrated by: | Name Eric Hainfeld | Function Technician | Signature  |
| Approved by: | Fin Bornholt | R&D Director |  |

Issued: July 25, 2012

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
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S Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Glossary

DAE data acquisition electronics
 Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle:* The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
 - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
 - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
 - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
 - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
 - *Input Offset Measurement:* Output voltage and statistical results over a large number of zero voltage measurements.
 - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
 - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
 - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
 - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV, full range = -100...+300 mV
 Low Range: 1LSB = 61nV, full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X | Y | Z |
|---------------------|----------------------|----------------------|----------------------|
| High Range | 402.461 ± 0.1% (k=2) | 403.037 ± 0.1% (k=2) | 403.027 ± 0.1% (k=2) |
| Low Range | 3.97886 ± 0.7% (k=2) | 3.97416 ± 0.7% (k=2) | 3.98171 ± 0.7% (k=2) |

Connector Angle

| | |
|---|-------------|
| Connector Angle to be used in DASY system | 350 ° ± 1 ° |
|---|-------------|

Appendix

1. DC Voltage Linearity

| High Range | Reading (μV) | Difference (μV) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 199994.26 | -3.60 | -0.00 |
| Channel X + Input | 20000.44 | -0.45 | -0.00 |
| Channel X - Input | -19998.64 | 1.65 | -0.01 |
| Channel Y + Input | 199995.43 | -2.58 | -0.00 |
| Channel Y + Input | 20000.07 | -0.93 | -0.00 |
| Channel Y - Input | -20000.18 | 0.13 | -0.00 |
| Channel Z + Input | 199994.36 | -3.84 | -0.00 |
| Channel Z + Input | 19999.80 | -1.14 | -0.01 |
| Channel Z - Input | -20002.23 | -1.82 | 0.01 |

| Low Range | Reading (μV) | Difference (μV) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 2001.03 | 0.29 | 0.01 |
| Channel X + Input | 201.51 | 0.39 | 0.19 |
| Channel X - Input | -198.31 | 0.39 | -0.20 |
| Channel Y + Input | 2001.31 | 0.49 | 0.02 |
| Channel Y + Input | 200.62 | -0.65 | -0.32 |
| Channel Y - Input | -198.08 | 0.47 | -0.23 |
| Channel Z + Input | 2000.80 | 0.02 | 0.00 |
| Channel Z + Input | 200.54 | -0.71 | -0.35 |
| Channel Z - Input | -199.80 | -1.26 | 0.64 |

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | Common mode Input Voltage (mV) | High Range Average Reading (μV) | Low Range Average Reading (μV) |
|-----------|--------------------------------|--|---|
| Channel X | 200 | 8.64 | 6.85 |
| | -200 | -7.03 | -8.70 |
| Channel Y | 200 | 13.52 | 13.38 |
| | -200 | -14.82 | -14.74 |
| Channel Z | 200 | -7.05 | -7.41 |
| | -200 | 5.47 | 5.70 |

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | Input Voltage (mV) | Channel X (μV) | Channel Y (μV) | Channel Z (μV) |
|-----------|--------------------|-----------------------------|-----------------------------|-----------------------------|
| Channel X | 200 | - | 0.57 | -4.30 |
| Channel Y | 200 | 6.63 | - | 0.60 |
| Channel Z | 200 | 9.91 | 6.53 | - |

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | High Range (LSB) | Low Range (LSB) |
|-----------|------------------|-----------------|
| Channel X | 16013 | 16362 |
| Channel Y | 15643 | 16338 |
| Channel Z | 15800 | 13916 |

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input 10M Ω

| | Average (μ V) | min. Offset (μ V) | max. Offset (μ V) | Std. Deviation (μ V) |
|-----------|--------------------|------------------------|------------------------|---------------------------|
| Channel X | 0.47 | -1.07 | 1.68 | 0.45 |
| Channel Y | 0.32 | -1.08 | 1.30 | 0.46 |
| Channel Z | -0.66 | -1.86 | 0.41 | 0.40 |

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

| | Zeroing (kOhm) | Measuring (MOhm) |
|-----------|----------------|------------------|
| Channel X | 200 | 200 |
| Channel Y | 200 | 200 |
| Channel Z | 200 | 200 |

8. Low Battery Alarm Voltage (Typical values for information)

| Typical values | Alarm Level (VDC) |
|----------------|-------------------|
| Supply (+ Vcc) | +7.9 |
| Supply (- Vcc) | -7.6 |

9. Power Consumption (Typical values for information)

| Typical values | Switched off (mA) | Stand by (mA) | Transmitting (mA) |
|----------------|-------------------|---------------|-------------------|
| Supply (+ Vcc) | +0.01 | +6 | +14 |
| Supply (- Vcc) | -0.01 | -8 | -9 |

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Audix-CN (Auden)**

Certificate No: **ES3-3139_Jul12**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3139**

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

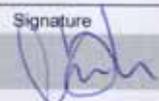
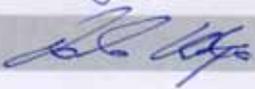
Calibration date: **July 25, 2012**

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID | Cal Date (Certificate No.) | Scheduled Calibration |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B | GB41293874 | 29-Mar-12 (No. 217-01508) | Apr-13 |
| Power sensor E4412A | MY41498087 | 29-Mar-12 (No. 217-01508) | Apr-13 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 27-Mar-12 (No. 217-01531) | Apr-13 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 27-Mar-12 (No. 217-01529) | Apr-13 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 27-Mar-12 (No. 217-01532) | Apr-13 |
| Reference Probe ES3DV2 | SN: 3013 | 29-Dec-11 (No. ES3-3013_Dec11) | Dec-12 |
| DAE4 | SN: 660 | 20-Jun-12 (No. DAE4-660_Jun12) | Jun-13 |
| Secondary Standards | ID | Check Date (in house) | Scheduled Check |
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (in house check Apr-11) | In house check: Apr-13 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (in house check Oct-11) | In house check: Oct-12 |

| | | | |
|----------------|--------------------------------|--|--|
| Calibrated by: | Name Claudio Leubler | Function Laboratory Technician | Signature  |
| Approved by: | Name Katja Pokovic | Function Technical Manager | Signature  |

Issued: July 25, 2012

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Accreditation No.: **SCS 108**

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Multilateral Agreement for the recognition of calibration certificates

Glossary:

| | |
|------------------------|--|
| TSL | tissue simulating liquid |
| NORM _{x,y,z} | sensitivity in free space |
| ConvF | sensitivity in TSL / NORM _{x,y,z} |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A, B, C | modulation dependent linearization parameters |
| Polarization φ | φ rotation around probe axis |
| Polarization θ | θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ 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:

- **NORM_{x,y,z}:** Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- **NORM(f)_{x,y,z} = NORM_{x,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.
- **DCP_{x,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
- **A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}:** A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- **ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ 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_{x,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.

ES3DV3 – SN:3139

July 25, 2012

Probe ES3DV3

SN:3139

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

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

ES3DV3- SN:3139

July 25, 2012

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3139

Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|----------|----------|----------|--------------|
| Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A | 1.28 | 1.32 | 1.35 | $\pm 10.1\%$ |
| DCP (mV) ^B | 106.6 | 102.5 | 104.0 | |

Modulation Calibration Parameters

| UID | Communication System Name | PAR | | A dB | B dB | C dB | VR mV | Unc ^E (k=2) |
|-----|---------------------------|------|---|---------|---------|---------|----------|---------------------------|
| 0 | CW | 0.00 | X | 0.00 | 0.00 | 1.00 | 117.7 | $\pm 3.0\%$ |
| | | | Y | 0.00 | 0.00 | 1.00 | 117.9 | |
| | | | Z | 0.00 | 0.00 | 1.00 | 118.7 | |

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 E²-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.

ES3DV3- SN:3139

July 25, 2012

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3139

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) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 835 | 41.5 | 0.90 | 5.92 | 5.92 | 5.92 | 0.36 | 1.73 | ± 12.0 % |
| 900 | 41.5 | 0.97 | 5.88 | 5.88 | 5.88 | 0.51 | 1.36 | ± 12.0 % |
| 1450 | 40.5 | 1.20 | 5.20 | 5.20 | 5.20 | 0.30 | 1.96 | ± 12.0 % |
| 1750 | 40.1 | 1.37 | 5.24 | 5.24 | 5.24 | 0.53 | 1.50 | ± 12.0 % |
| 1900 | 40.0 | 1.40 | 5.02 | 5.02 | 5.02 | 0.48 | 1.57 | ± 12.0 % |
| 2000 | 40.0 | 1.40 | 4.98 | 4.98 | 4.98 | 0.80 | 1.20 | ± 12.0 % |

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

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

ES3DV3- SN:3139

July 25, 2012

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3139

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) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 835 | 55.2 | 0.97 | 5.91 | 5.91 | 5.91 | 0.74 | 1.23 | ± 12.0 % |
| 900 | 55.0 | 1.05 | 5.87 | 5.87 | 5.87 | 0.80 | 1.09 | ± 12.0 % |
| 1450 | 54.0 | 1.30 | 5.16 | 5.16 | 5.16 | 0.80 | 1.13 | ± 12.0 % |
| 1750 | 53.4 | 1.49 | 4.79 | 4.79 | 4.79 | 0.40 | 1.79 | ± 12.0 % |
| 1900 | 53.3 | 1.52 | 4.53 | 4.53 | 4.53 | 0.45 | 1.68 | ± 12.0 % |
| 2000 | 53.3 | 1.52 | 4.64 | 4.64 | 4.64 | 0.80 | 1.04 | ± 12.0 % |
| 2450 | 52.7 | 1.95 | 4.16 | 4.16 | 4.16 | 0.71 | 1.14 | ± 12.0 % |

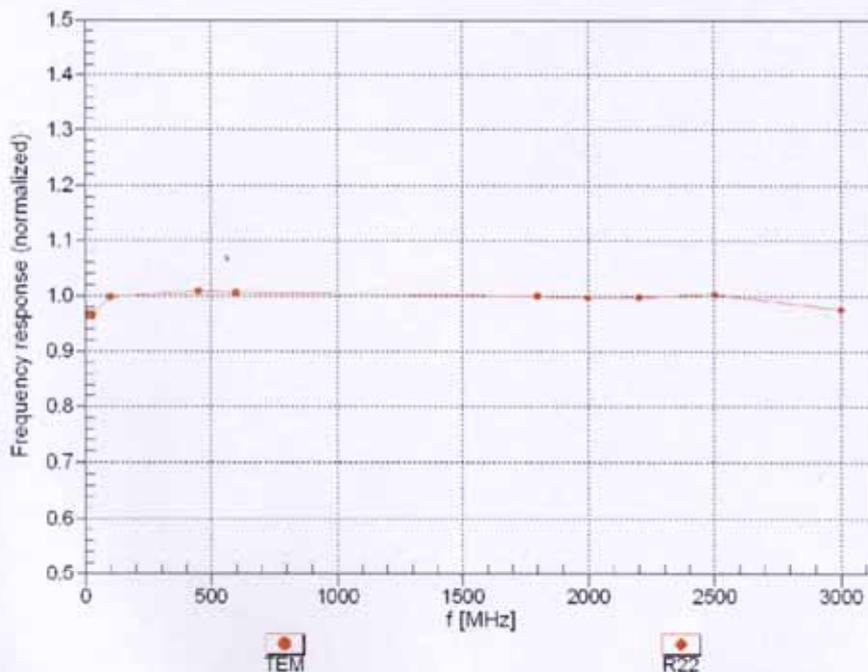
^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

ES3DV3- SN:3139

July 25, 2012

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



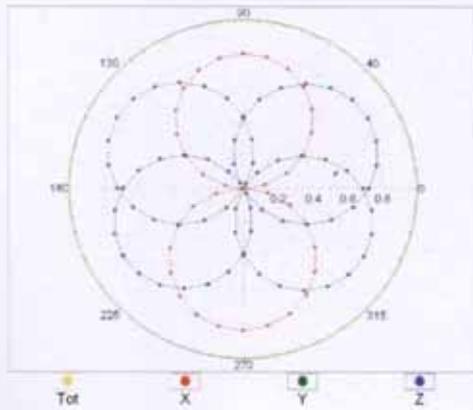
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

ES3DV3- SN:3139

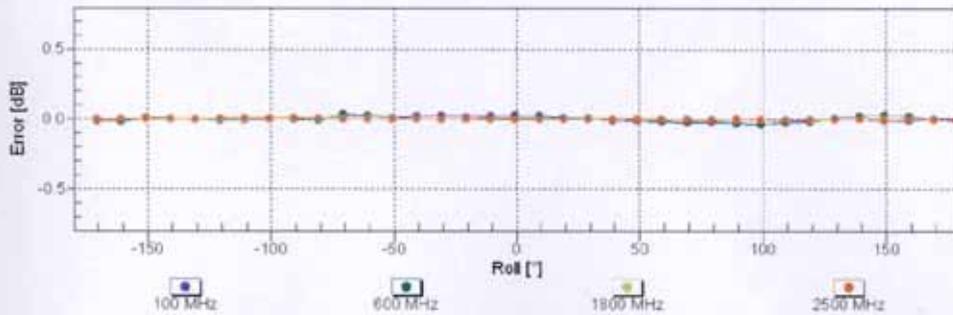
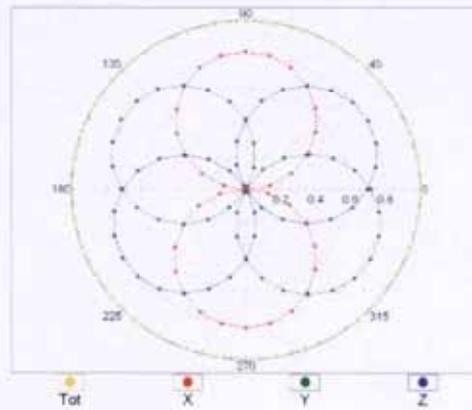
July 25, 2012

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

f=600 MHz,TEM



f=1800 MHz,R22

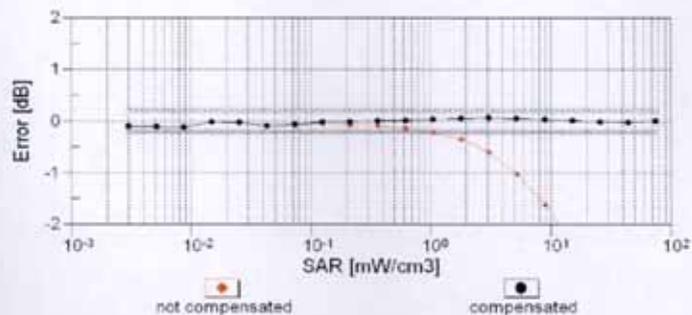
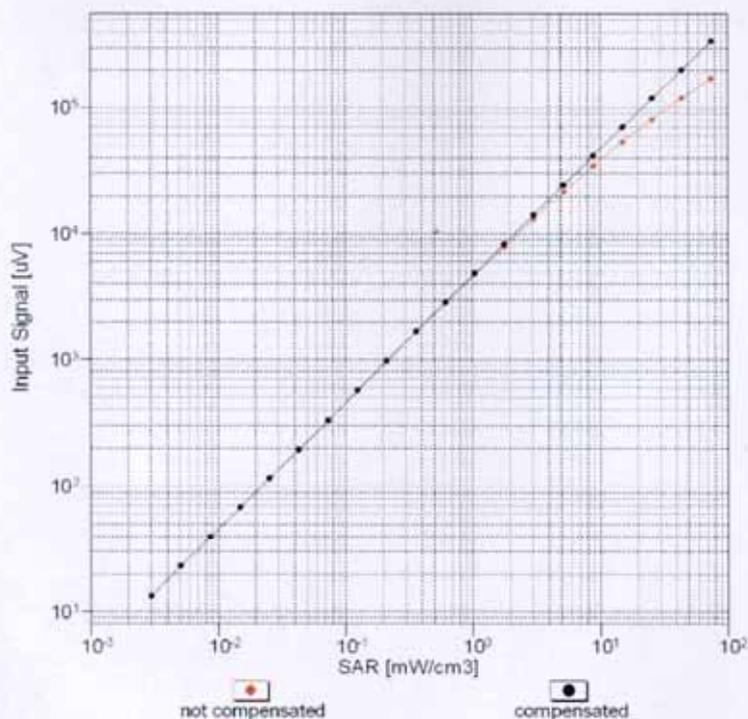


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

ES3DV3- SN:3139

July 25, 2012

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

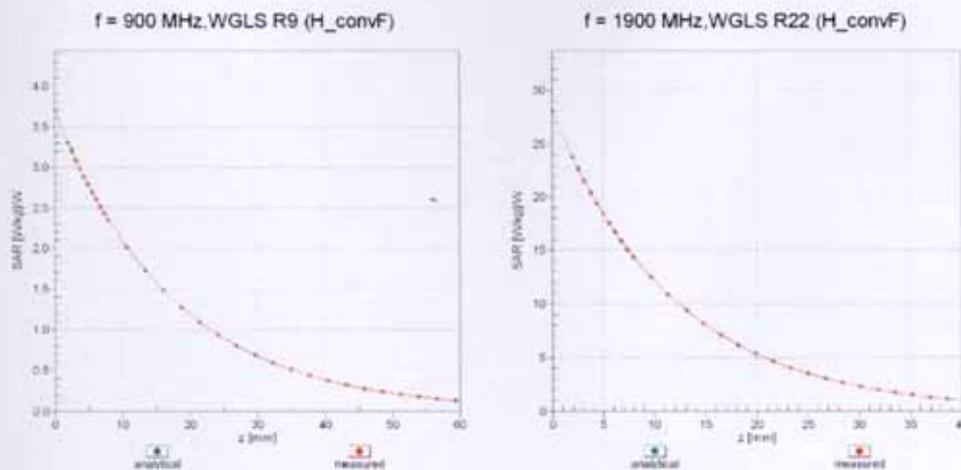


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ES3DV3- SN:3139

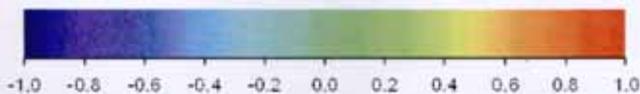
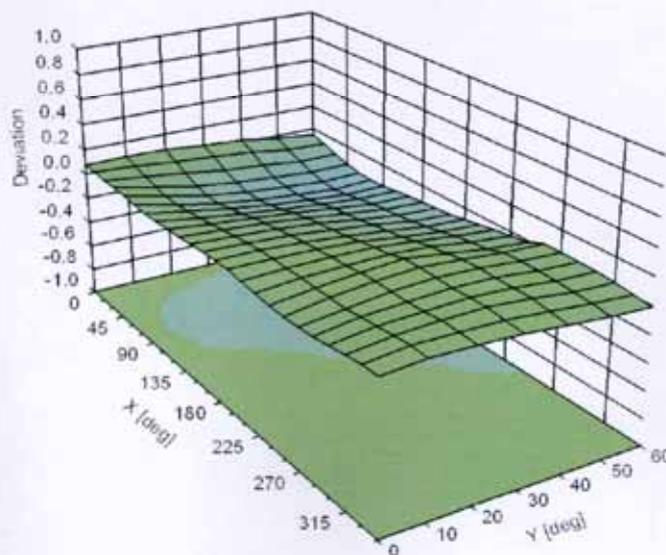
July 25, 2012

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ (k=2)

ES3DV3- SN:3139

July 25, 2012

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3139**Other Probe Parameters**

| | |
|---|------------|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | 89.2 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disabled |
| Probe Overall Length | 337 mm |
| Probe Body Diameter | 10 mm |
| Tip Length | 10 mm |
| Tip Diameter | 4 mm |
| Probe Tip to Sensor X Calibration Point | 2 mm |
| Probe Tip to Sensor Y Calibration Point | 2 mm |
| Probe Tip to Sensor Z Calibration Point | 2 mm |
| Recommended Measurement Distance from Surface | 3 mm |

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Accreditation No.: **SCS 108**

Client **Audix (Auden)**

Certificate No: **D2450V2-862_Mar11**

CALIBRATION CERTIFICATE

Object: **D2450V2 - SN: 862**

Calibration procedure(s): **QA CAL-05.v8
Calibration procedure for dipole validation kits**

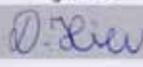
Calibration date: **March 22, 2011**

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|-----------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A | GB37480704 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Power sensor HP 8481A | US37292783 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Reference 20 dB Attenuator | SN: 5086 (20g) | 30-Mar-10 (No. 217-01158) | Mar-11 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 30-Mar-10 (No. 217-01162) | Mar-11 |
| Reference Probe ES3DV3 | SN: 3205 | 30-Apr-10 (No. ES3-3205_Apr10) | Apr-11 |
| DAE4 | SN: 601 | 10-Jun-10 (No. DAE4-601_Jun10) | Jun-11 |
| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06 | 100005 | 4-Aug-99 (in house check Oct-09) | In house check: Oct-11 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-10) | In house check: Oct-11 |

| Calibrated by: | Name | Function | Signature |
|----------------|---------------|-----------------------|---|
| | Dirce Iliev | Laboratory Technician |  |
| Approved by: | Katja Pokovic | Technical Manager |  |

Issued: March 23, 2011

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

| | |
|-------|---------------------------------|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

Calibration is Performed According to the Following Standards:

- 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
- 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
- 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:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

| | | |
|------------------------------|---------------------------|-------------|
| DASY Version | DASY5 | V52.6.2 |
| Extrapolation | Advanced Extrapolation | |
| Phantom | Modular Flat Phantom V5.0 | |
| 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 | 38.7 ± 6 % | 1.72 mho/m ± 6 % |
| Head TSL temperature during test | (21.3 ± 0.2) °C | ---- | ---- |

SAR result with Head TSL

| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
|---|--------------------|----------------------------------|
| SAR measured | 250 mW input power | 13.1 mW / g |
| SAR normalized | normalized to 1W | 52.4 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | 53.3 mW /g ± 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | |
|---|--------------------|----------------------------------|
| SAR measured | 250 mW input power | 6.12 mW / g |
| SAR normalized | normalized to 1W | 24.5 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | 24.6 mW /g ± 16.5 % (k=2) |

Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 52.7 | 1.95 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 51.5 ± 6 % | 1.92 mho/m ± 6 % |
| Body TSL temperature during test | (22.0 ± 0.2) °C | ---- | ---- |

SAR result with Body TSL

| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 12.8 mW / g |
| SAR normalized | normalized to 1W | 51.2 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | 51.3 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Body TSL | condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 5.86 mW / g |
| SAR normalized | normalized to 1W | 23.4 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | 23.4 mW / g ± 16.5 % (k=2) |

Appendix

Antenna Parameters with Head TSL

| | |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 54.6 Ω + 3.6 j Ω |
| Return Loss | - 25.0 dB |

Antenna Parameters with Body TSL

| | |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 50.3 Ω + 4.9 j Ω |
| Return Loss | - 26.3 dB |

General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.160 ns |
|----------------------------------|----------|

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

| | |
|-----------------|----------------|
| Manufactured by | SPEAG |
| Manufactured on | April 23, 2010 |

DASY5 Validation Report for Head TSL

Date/Time: 22.03.2011 14:07:14

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:862

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL U12 BB

Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.72 \text{ mho/m}$; $\epsilon_r = 38.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

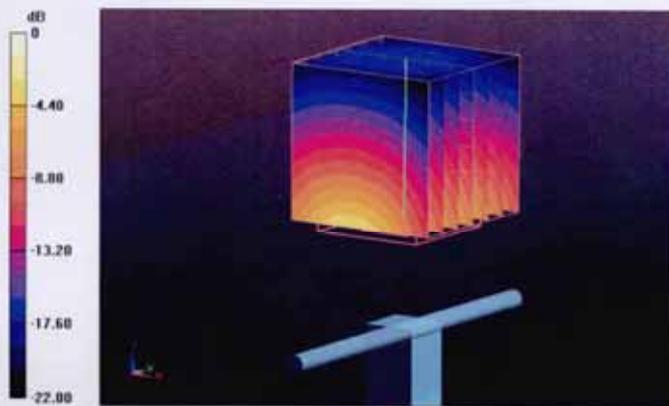
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.7 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 26.808 W/kg

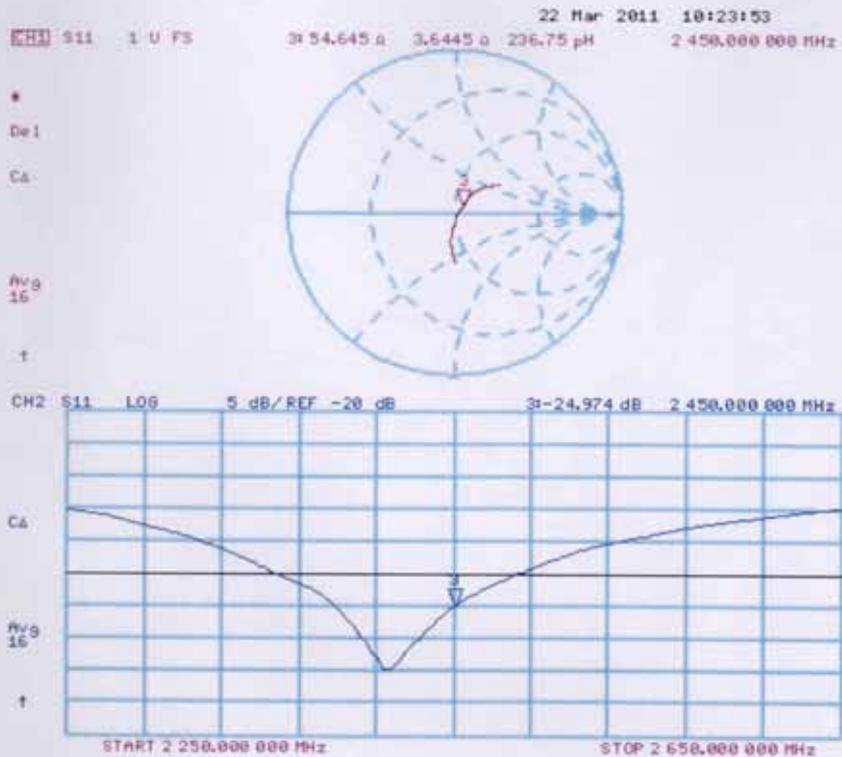
SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.12 mW/g

Maximum value of SAR (measured) = 16.641 mW/g



0 dB = 16.640mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 21.03.2011 14:22:38

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:862

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: MSL U12 BB

Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.92 \text{ mho/m}$; $\epsilon_r = 51.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.31, 4.31, 4.31); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

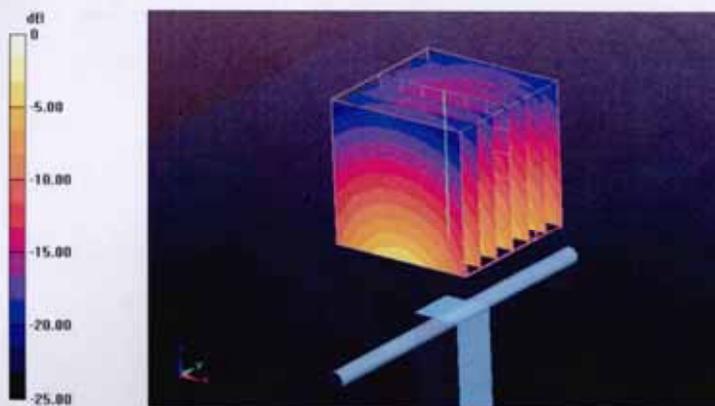
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement
 grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.402 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 27.156 W/kg

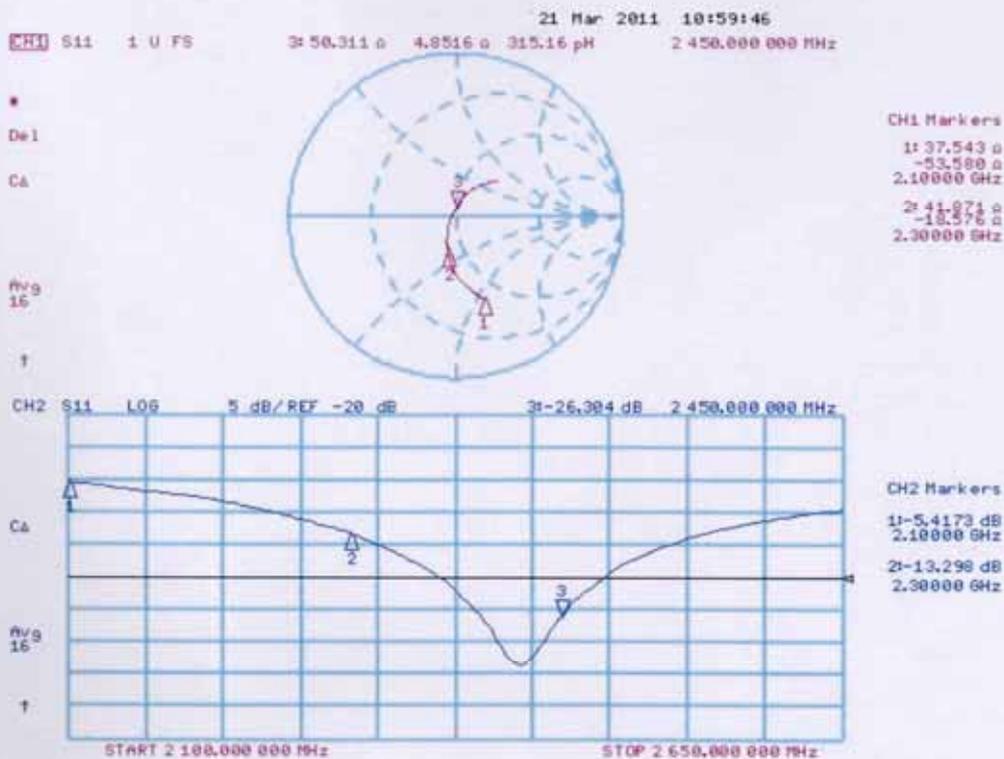
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 5.86 mW/g

Maximum value of SAR (measured) = 16.826 mW/g



0 dB = 16.830mW/g

Impedance Measurement Plot for Body TSL



11.ANNEX D: TEST SETUP PHOTOS

Front



Back



Top



Bottom



Left



Right



12.ANNEX E: PHOTOS OF THE EUT

Figure 1
General Appearance of the EUT



Figure 2
General Appearance of the EUT



Figure 3
General Appearance of the EUT



Figure 4
General Appearance of the EUT



Figure 5
General Appearance of the EUT



Figure 6
General Appearance of the EUT



Figure 7
General Appearance of the EUT

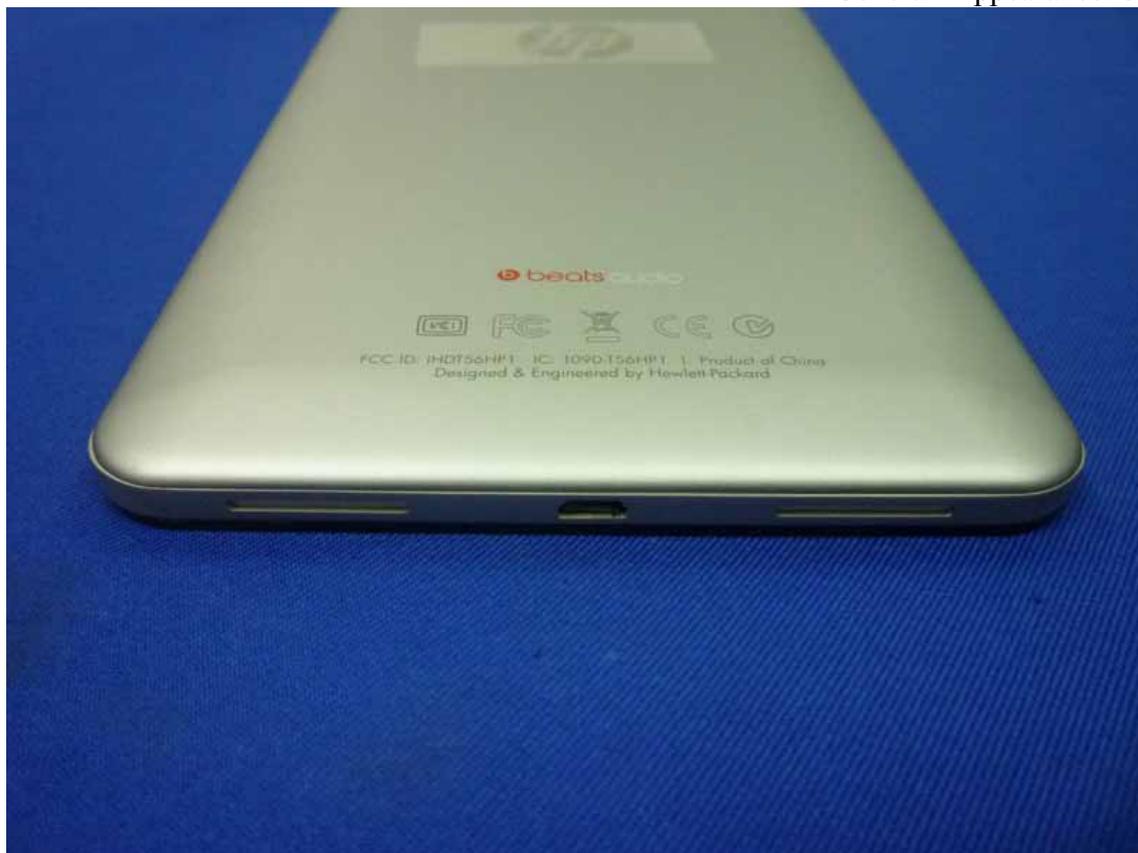


Figure 8
General Appearance of the EUT

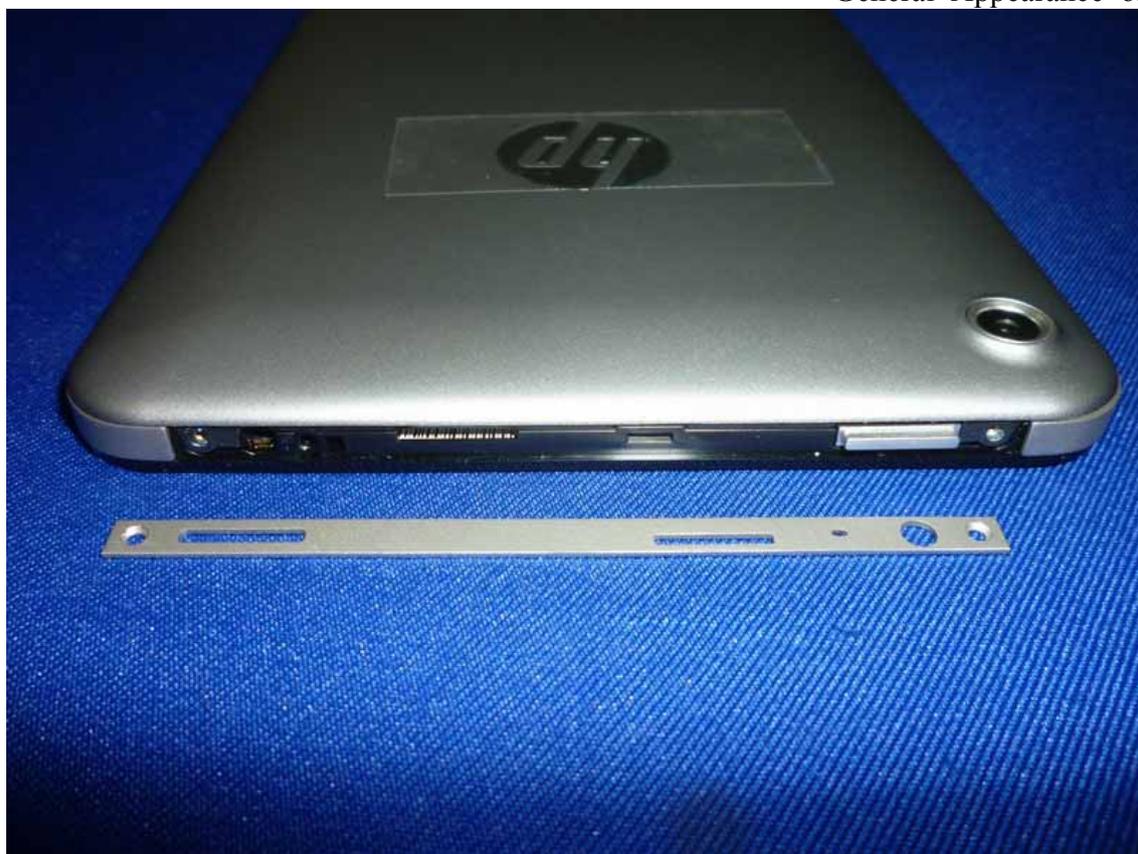


Figure 9
Inside of the EUT



Figure 10
Inside of the EUT

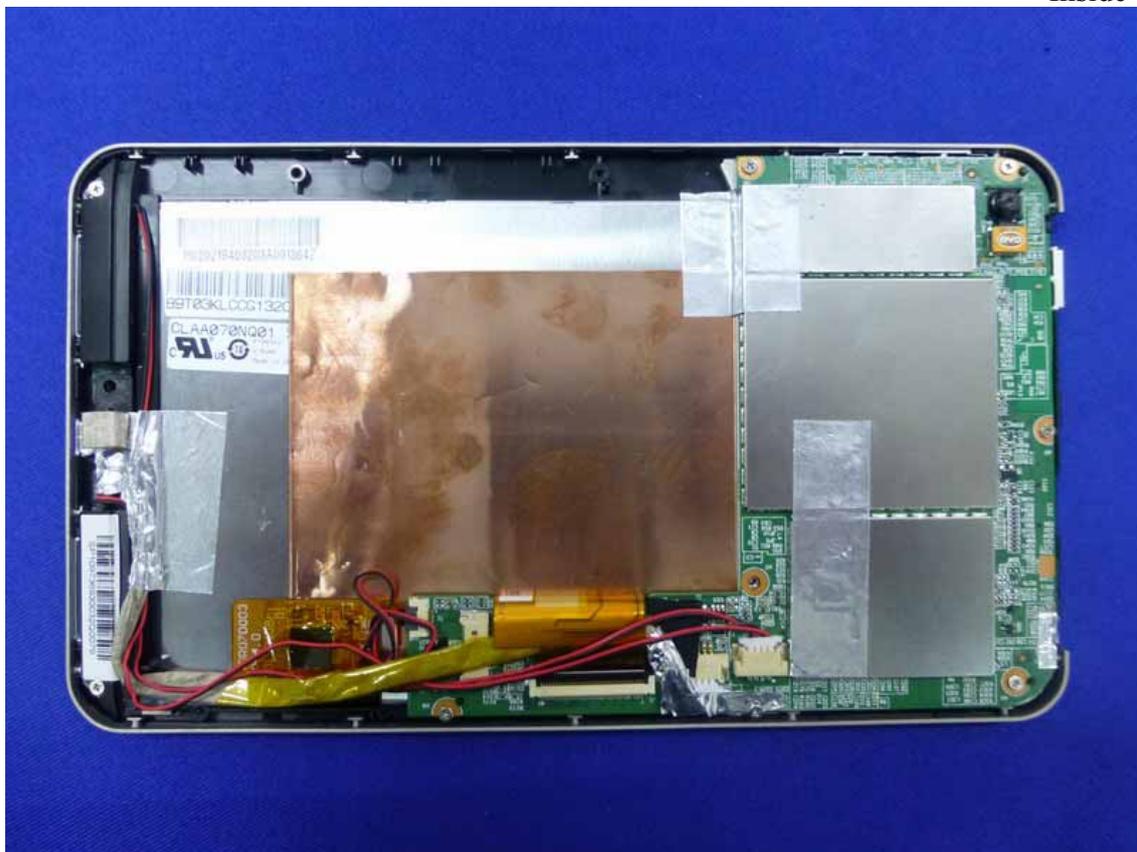


Figure 11
Inside of the EUT



Figure 12
Inside of the EUT



Figure 13
Inside of the EUT



Figure 14
Inside of the EUT

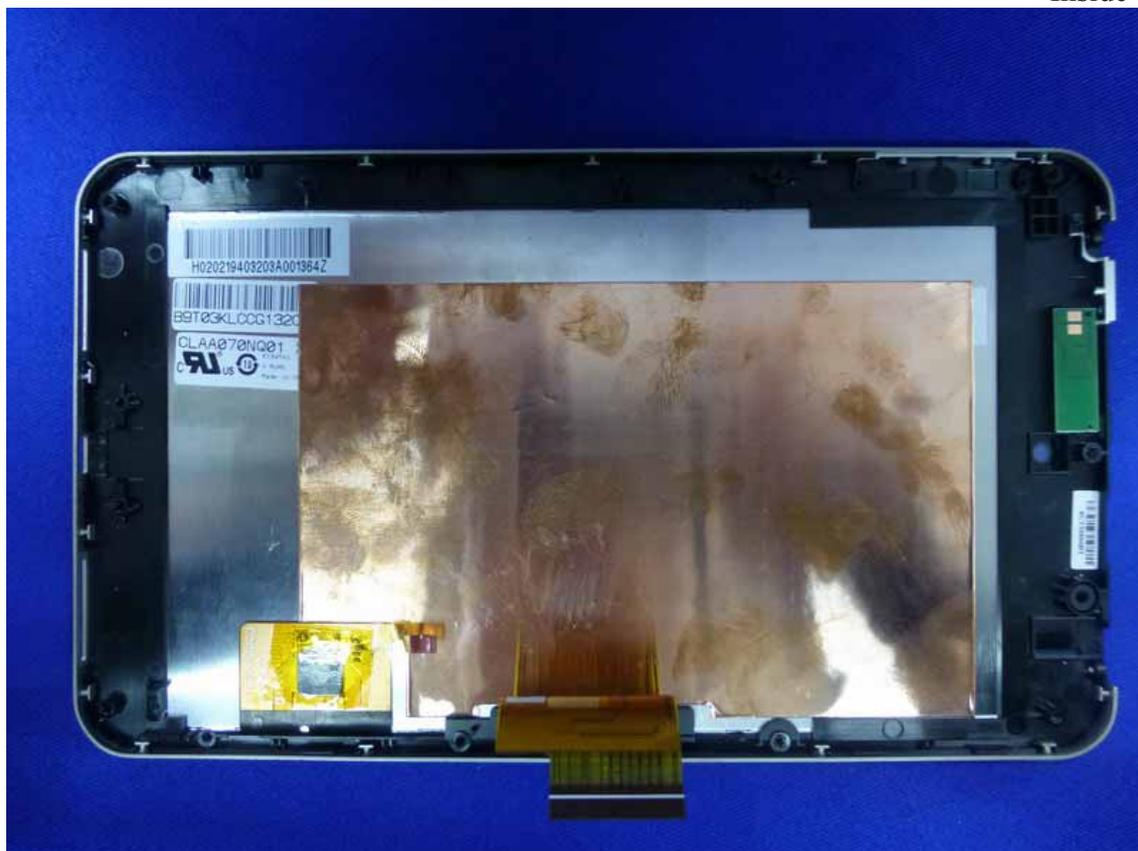


Figure 15
Inside of the EUT



Figure 16
Inside of the EUT

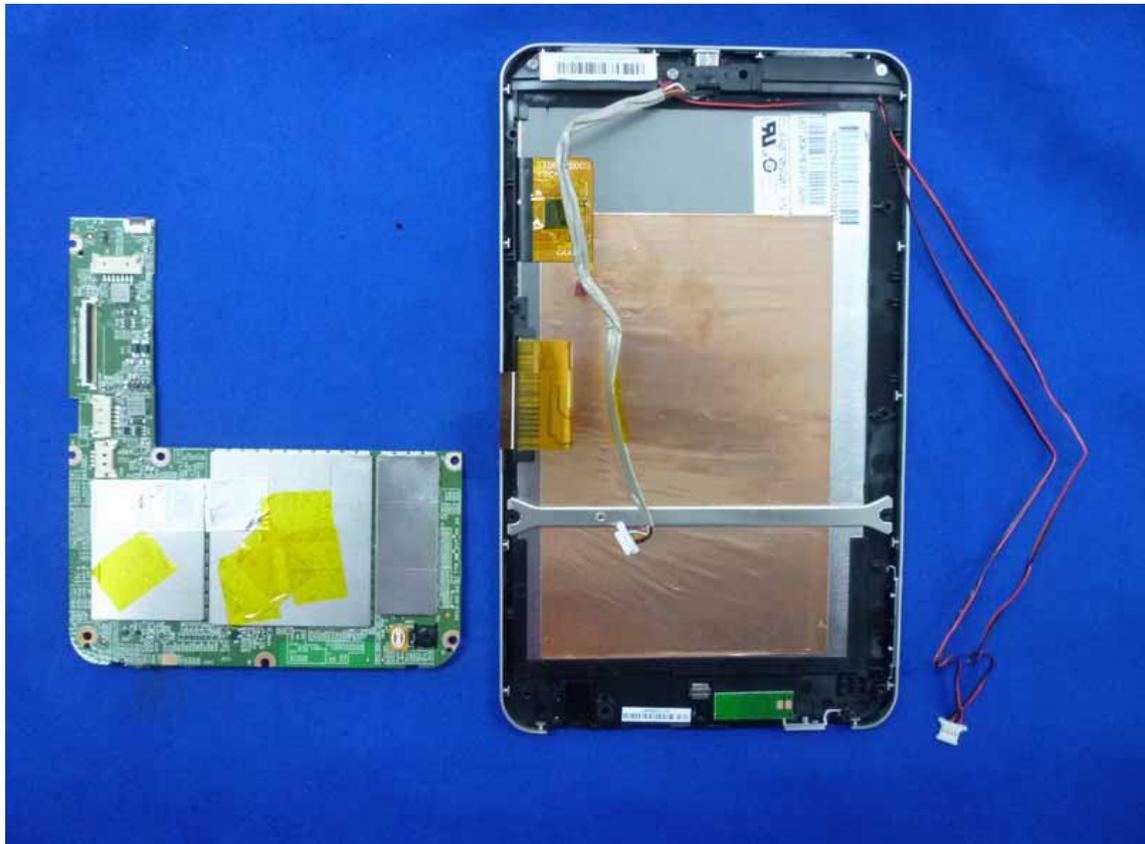


Figure 17
Inside of the EUT



Figure18
Inside of the EUT

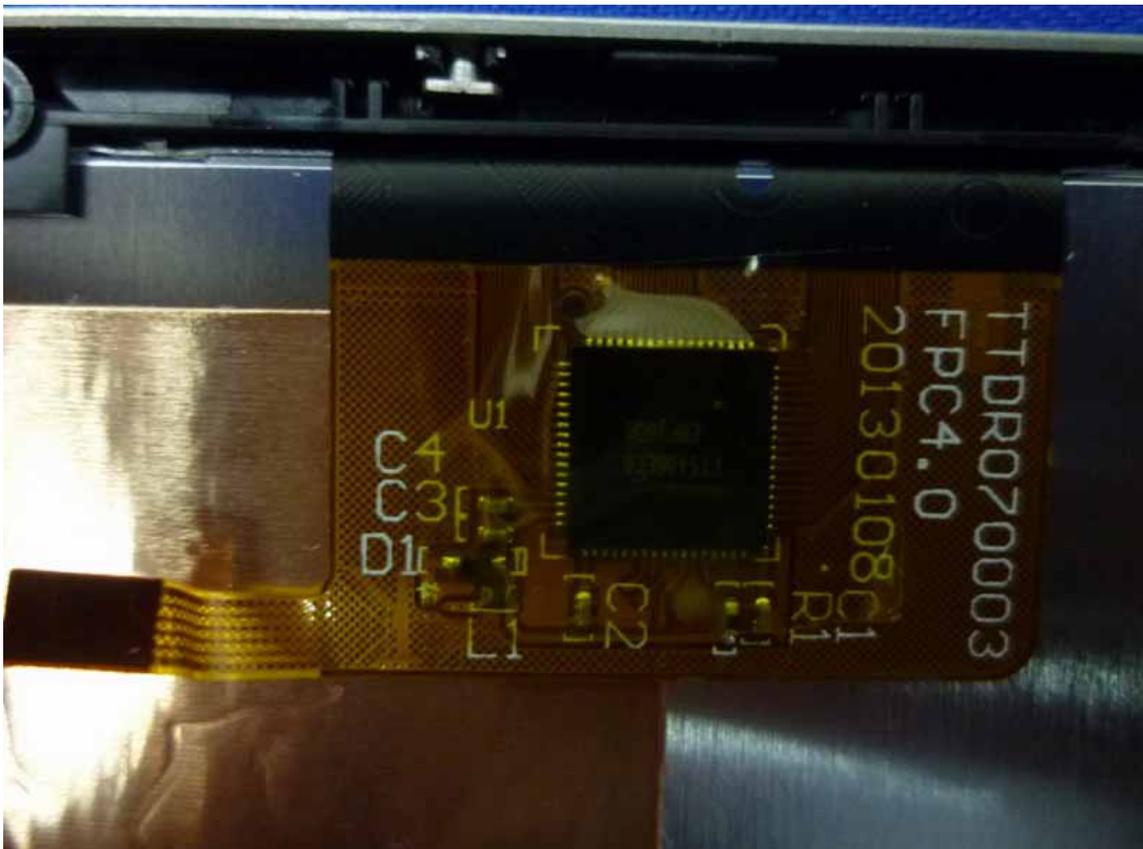


Figure 19
Inside of the EUT



Figure 20
Inside of the EUT

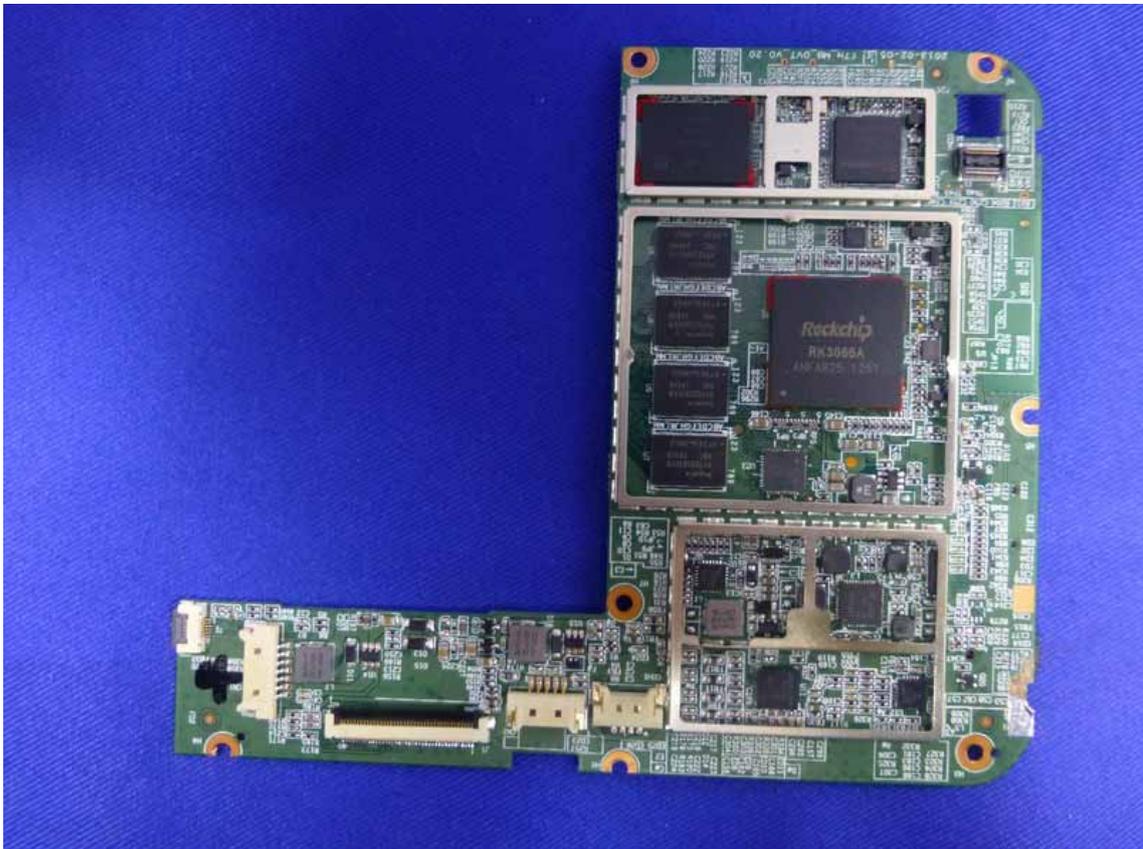


Figure 21
Inside of the EUT

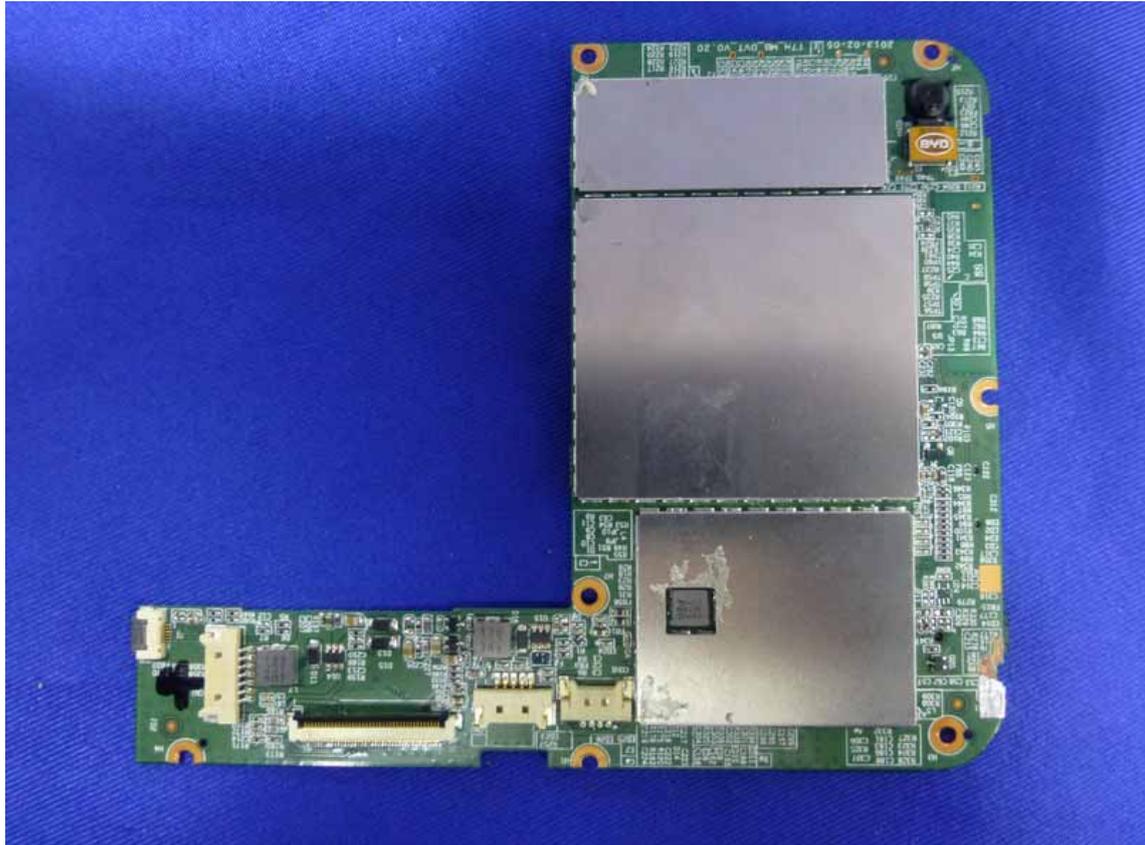


Figure 22
Inside of the EUT



Figure 23
Inside of the EUT

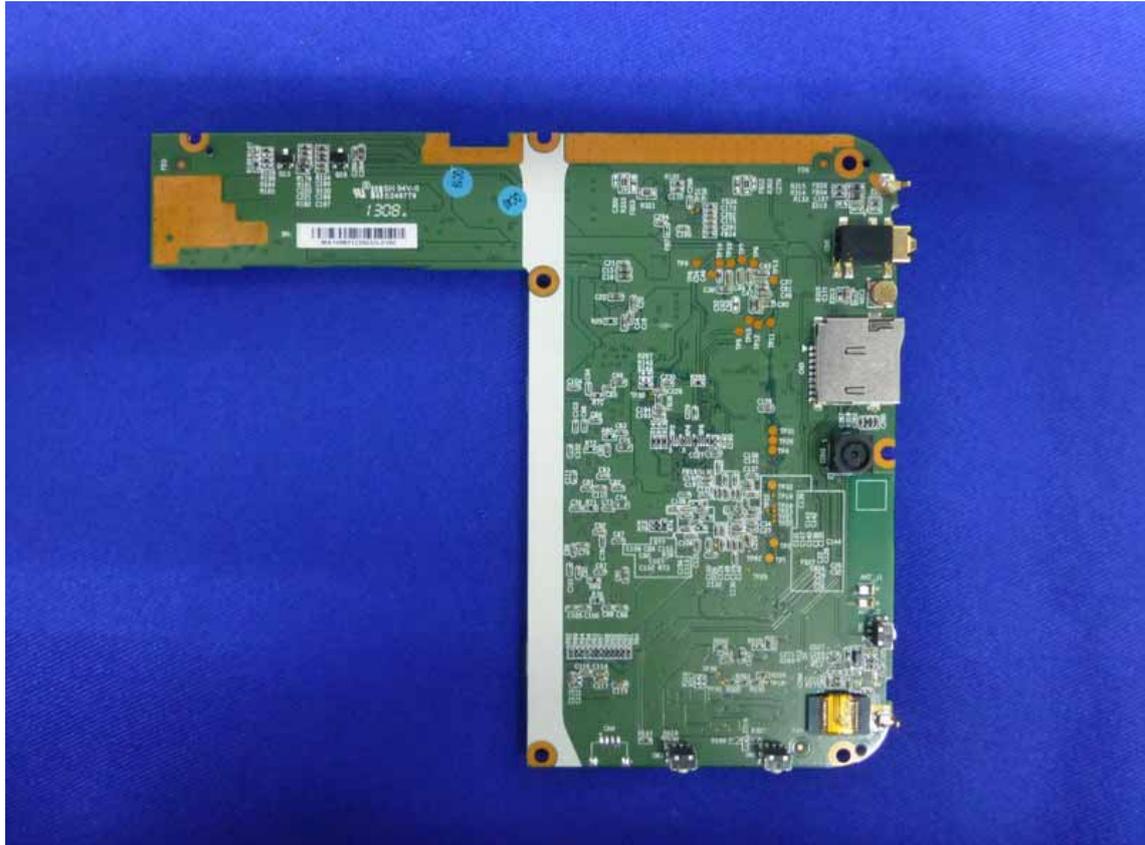


Figure 24
Inside of the EUT



Figure 25
Inside of the EUT

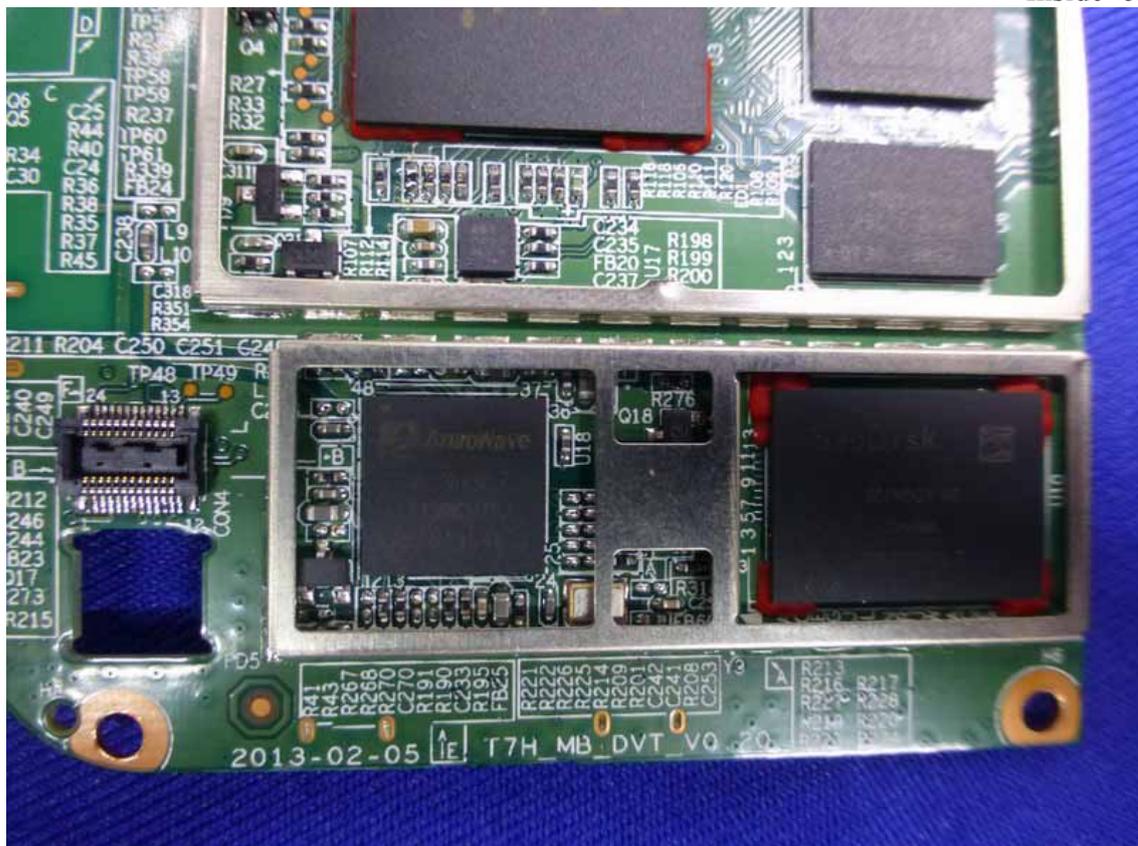


Figure 26
Inside of the EUT

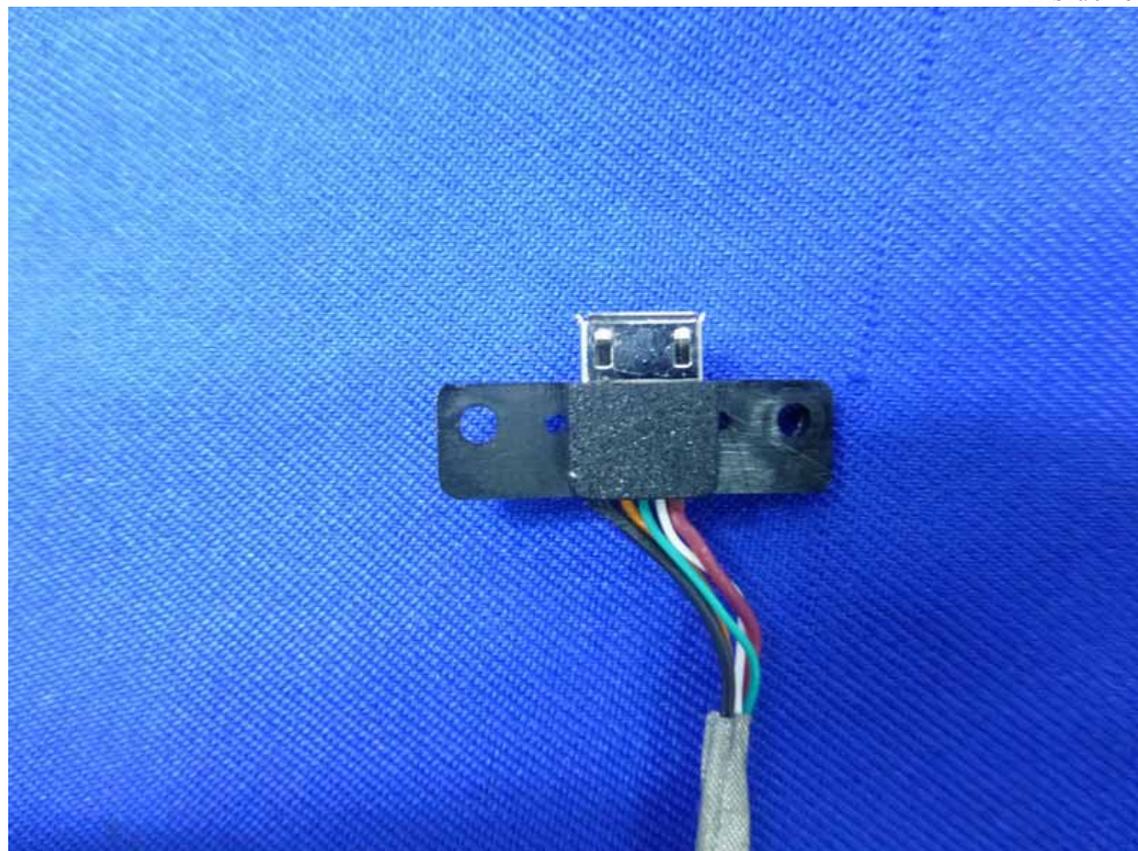


Figure 27
Inside of the EUT

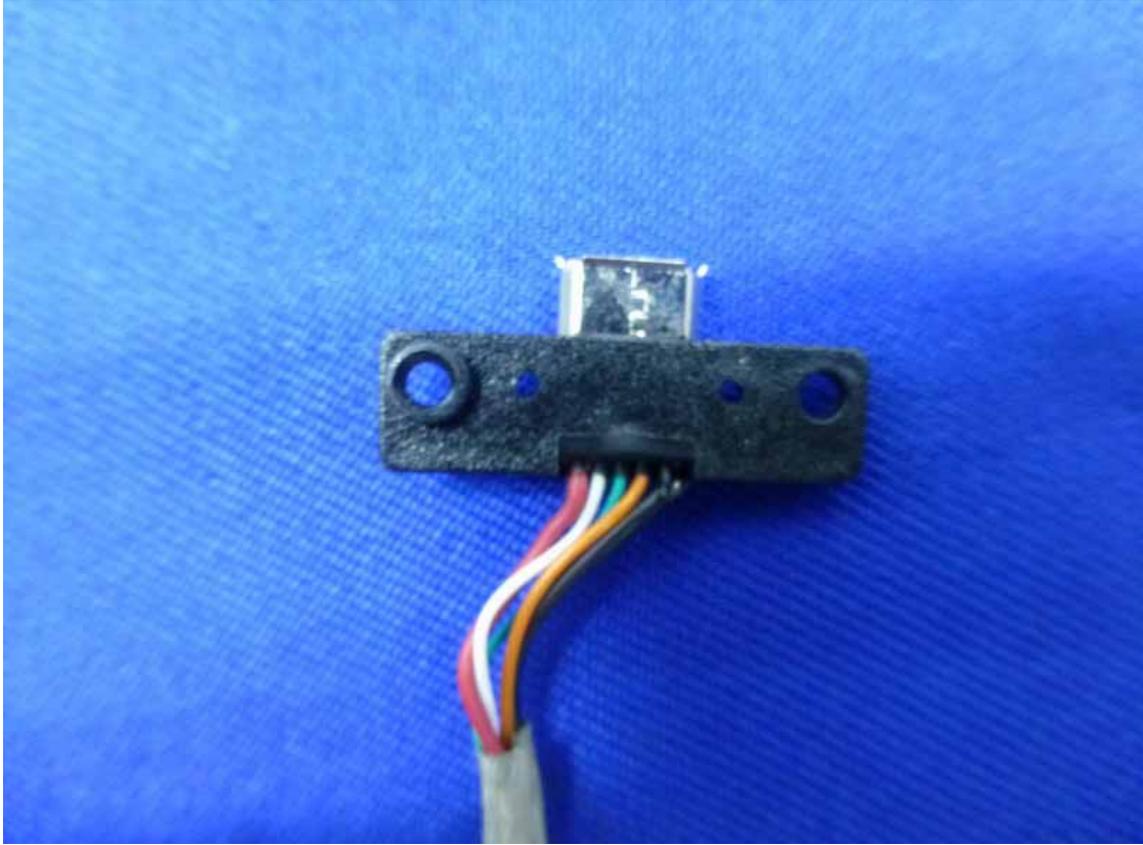


Figure 28
Inside of the EUT

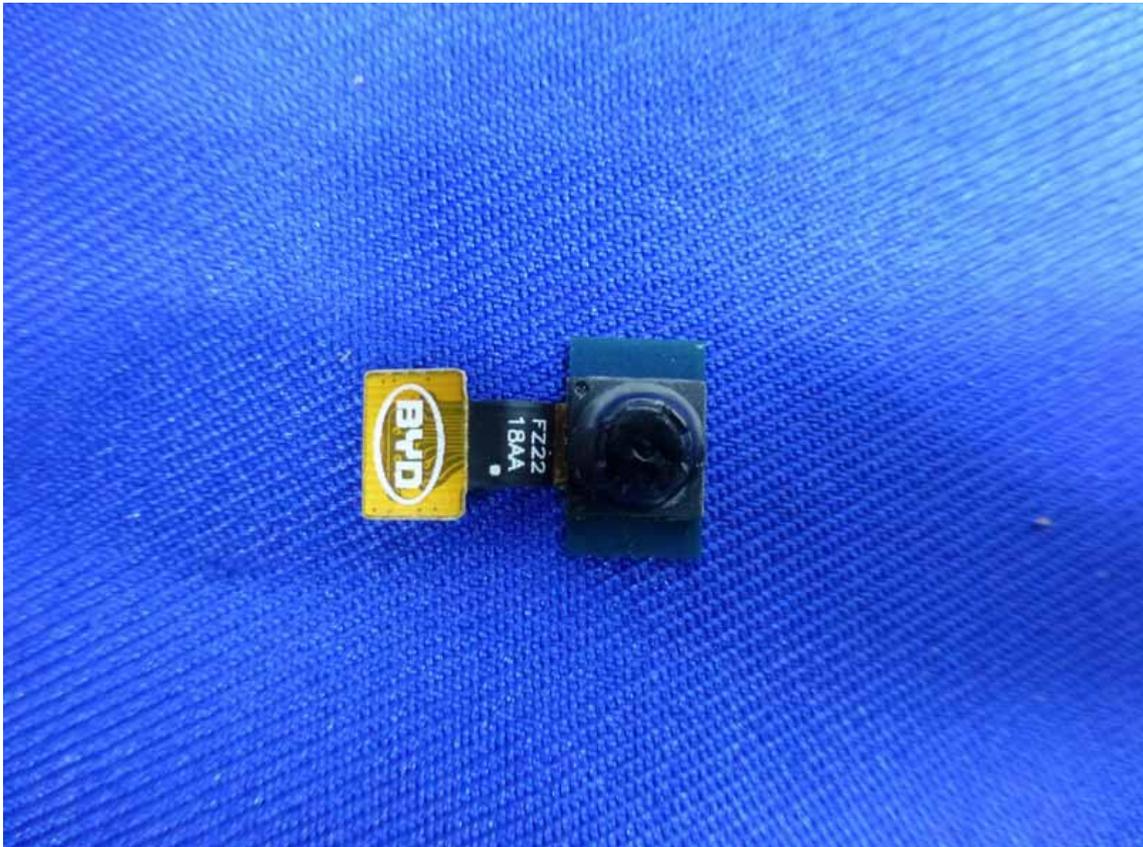


Figure 29
Inside of the EUT

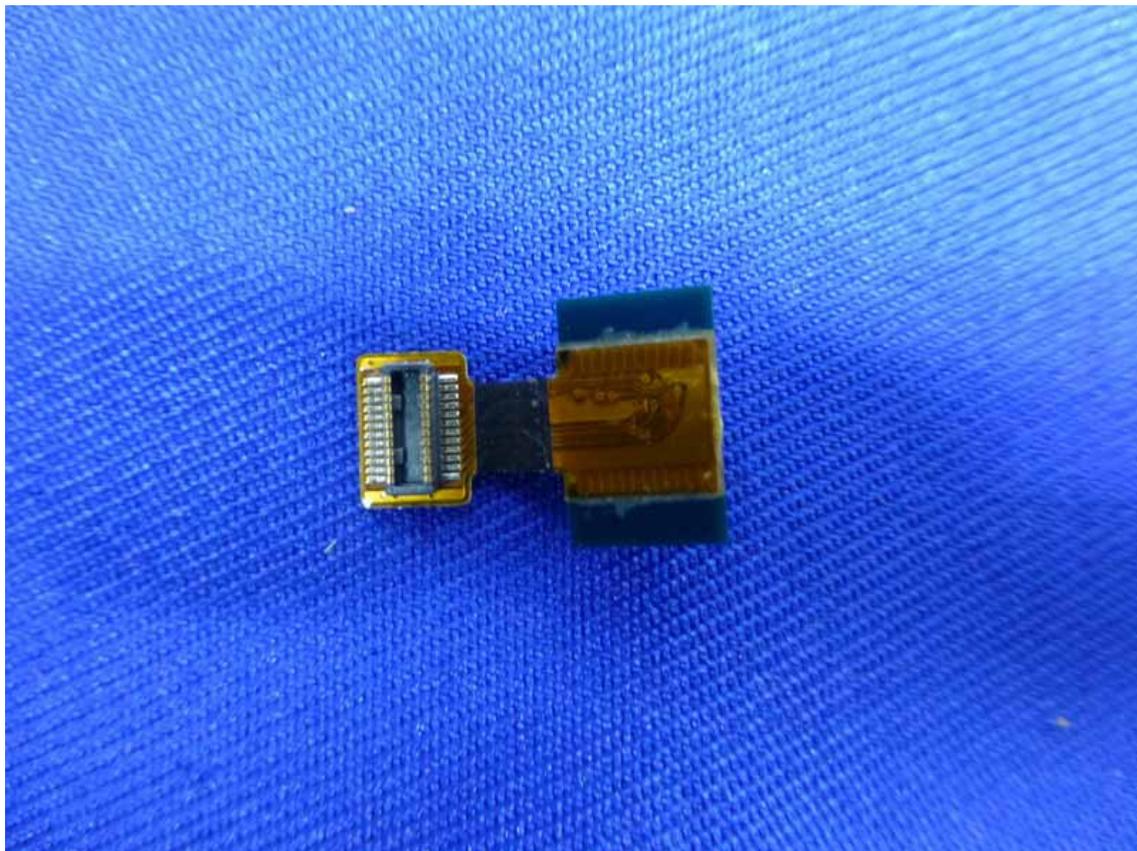


Figure 30
Battery of the EUT



Figure 31
Battery of the EUT



Figure 32
Speaker



Figure 33
Speaker



Figure 34
ANT of the EUT

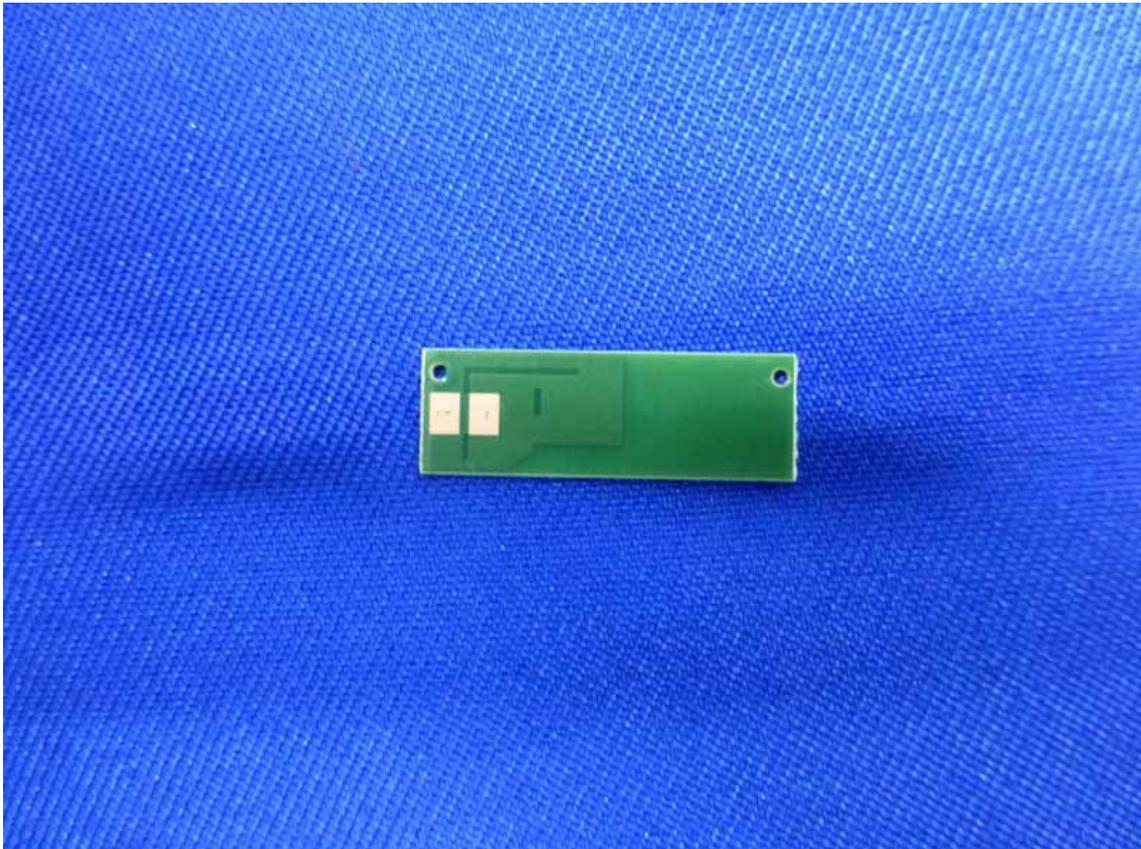


Figure 35
ANT of the EUT

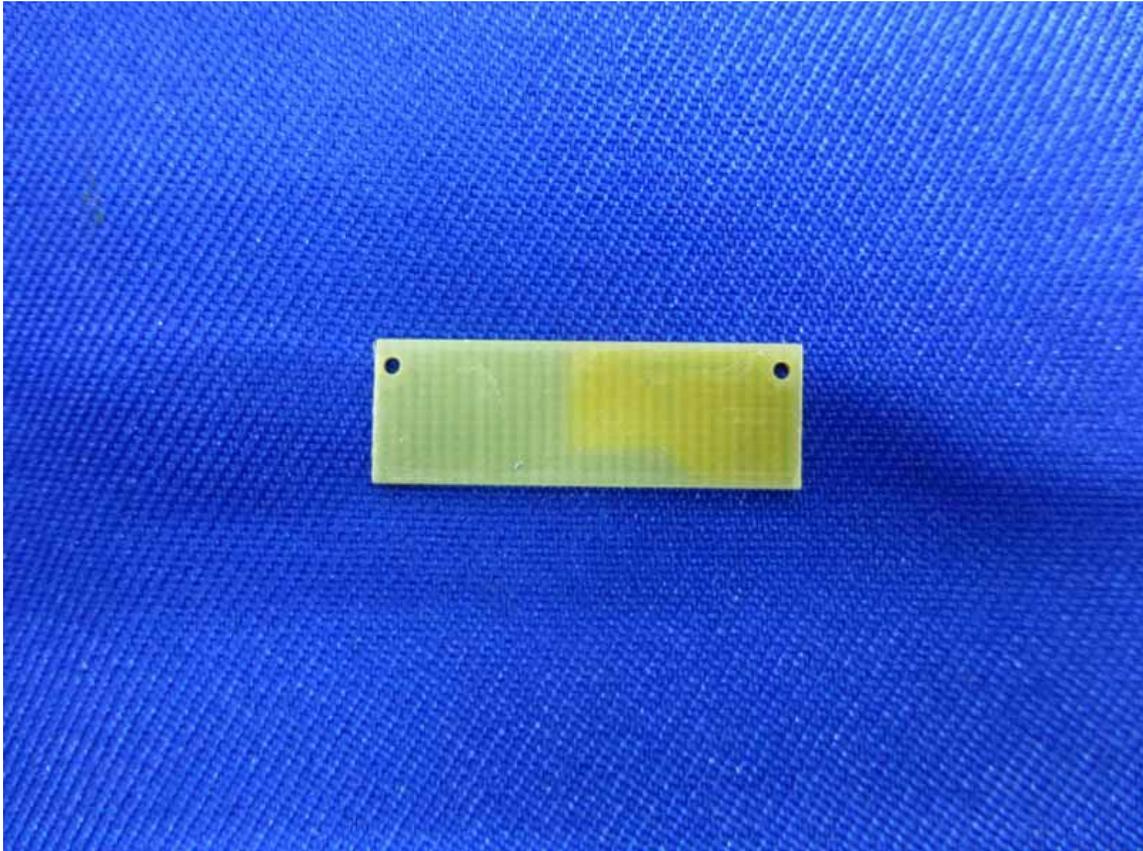


Figure 36
Power Adapter



Figure 37
Power Adapter



Figure 38
Power Adapter

