The Testcenter facility 'Dosimetric Test Lab' within IMST GmbH is accredited by the German National 'Deutsche Akkreditierungsstelle GmbH (DAkkS)' for testing according to the scope as listed in the accreditation certificate: D-PL-12139-01-00.

SAR Test Report

Dosimetric Assessment of the INARI5-WLAN-1 from Aava Mobile Oy

(FCC ID: 2ABVH-INARI51)
(IC: 11875A-INARI51)

According to the FCC Requirements

August 18, 2015

IMST GmbH

Carl-Friedrich-Gauß-Str. 2 - 4

47475 Kamp-Lintfort

Germany

Customer

7layers AG

Borsigstrasse 11

40880 Ratingen

Germany

Executive Summary

The INARI5-WLAN-1 is a smartphone (portable device) from Aava Mobile Oy operating in the 2.4 GHz and 5 GHz frequency range. The device has two integrated WiFi antennas and works in the IEEE 802.11 a/b/g/n standards.

The objective of the measurements done by IMST was the dosimetric assessment of one device in a worst case setup in head and body worn configuration. Since there was a special test software available, SAR tests in IEEE 802.11 are conducted with a specific channel, data rate and maximum output power. The examinations have been carried out with the dosimetric assessment system „DASY4“.

The measurements were made according to the 47 CFR § 2.1093 [47CFR] for evaluating compliance of portable devices with FCC limits for human exposure (general population) to radiofrequency emissions and IEEE 1528-2013 [IEEE1528-2013].

Additional information and guidelines given by the following FCC documents were used:

- SAR Measurement Requirements for 100 MHz to 6 GHz [KDB 865664 D01 v01r03]
- Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies [KDB 447498 D01 v05r02]
- SAR Evaluation Considerations for Wireless Handsets [648474 D04 Handset SAR v01r02]
- SAR Measurement Guidance for IEEE 802.11 Transmitters [KDB 248227 D01 SAR meas for 802 11 abg DR02-41929]

All measurements have been performed in accordance to the recommendations given by the system manufacturer SPEAG AG, Switzerland.

Compliance Statement

The INARI5-WLAN-1 from Aava Mobile Oy (FCC ID: 2ABVH-INARI51) is in compliance with the following standards for uncontrolled exposure:

- 47 CFR § 2.1093 [47CFR],
- IEEE Std. C95.1 - 1999 [C95.1-1999],
- IEEE 1528-2013 [IEEE1528-2013],
- The latest version of all relevant FCC OET KDB Procedures

SAR assessment in body worn configuration was conducted with a closest distance of 5 mm between the flat part of the phantom and the housing of the device.

All measured SAR results are shown in Chapter 5, the highest results of SAR for the INARI5-WLAN-1 are as follows:

Worst Case SAR Results (2.4 GHz)											
Configuration	Band	Antenna	Freq. [MHz]	Channel	Test Position	Gap [mm]	Fig No.	Measured SAR_{1g} [W/kg]	Reported SAR_{1g} [W/kg]	SAR Limit [W/kg]	
Head	IEEE 802.11 b (1 Mbit/s)	1	2412	1	Left Cheek	-	25	0.066	0.072	1.6	PASS
		2	2412	1	Right Cheek	-	23	0.047	0.063		PASS
Body		1	2412	1	Back Side	5	19	1.050	1.151		PASS
		2	2462	11	Right Side	5	20	0.191	0.276		PASS

Worst Case SAR Results (5 GHz)											
Configuration	Band	Antenna	Freq. [MHz]	Channel	Test Position	Gap [mm]	Fig No.	Measured SAR_{1g} [W/kg]	Reported SAR_{1g} [W/kg]	SAR Limit [W/kg]	
Head	IEEE 802.11a (5200 MHz)	1	5300	60	Right Cheek	-	23	0.058	0.058	1.6	PASS
Head	IEEE 802.11a (5200 MHz)	2	5260	52	Right Cheek	-	23	0.019	0.019	1.6	PASS
Body	IEEE 802.11a (5200 MHz)	1	5300	60	Back Side	5	19	0.663	0.663	1.6	PASS
Body	IEEE 802.11a (5200 MHz)	2	5260	52	Back Side	5	19	0.805	0.990	1.6	PASS
Head	IEEE 802.11a (5600MHz)	1	5580	116	Right Cheek	-	23	0.110	0.115	1.6	PASS
Head	IEEE 802.11a (5600MHz)	2	5580	116	Left Tilted	-	26	0.016	0.023	1.6	PASS
Body	IEEE 802.11a (5600MHz)	1	5580	116	Back Side	5	19	1.110	1.162	1.6	PASS
Body	IEEE 802.11a (5600MHz)	2	5580	116	Back Side	5	19	0.692	1.000	1.6	PASS
Head	IEEE 802.11a (5750 MHz)	1	5745	149	Right Cheek	-	23	0.091	0.095	1.6	PASS
Head	IEEE 802.11a (5750 MHz)	2	5745	149	Right Tilted	-	24	0.010	0.016	1.6	PASS
Body	IEEE 802.11a (5750 MHz)	1	5745	149	Back Side	5	19	1.140	1.194	1.6	PASS
Body	IEEE 802.11a (5750 MHz)	2	5745	149	Back Side	5	18	0.671	1.063	1.6	PASS

Prepared by: .... Reviewed by: ....

Alexander Rahn
Test Engineer

Markus Ridder
Quality Assurance

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Subject of Investigation

The INARI5-WLAN-1 is a smartphone (portable device) from Aava Mobile Oy operating in the 2.4 GHz and 5 GHz frequency range. The device has two integrated WiFi antennas and works in the IEEE 802.11 a/b/g/n standards.

Fig. 1: Pictures of the device under test.

The objective of the measurements done by IMST was the dosimetric assessment of one device in a worst case setup in head and body worn configuration. Since there was a special test software available, SAR tests in IEEE 802.11 are conducted with a specific channel, data rate and maximum output power. The examinations have been carried out with the dosimetric assessment system „DASY4“.

1 FCC Exposure Criteria

In the USA the FCC exposure criteria [KDB 865664] are based on the withdrawn IEEE Standard C95.1-1999 [IEEE C95.1-1999].

In this report the comparison between the FCC exposure limits and the measured data is made using the spatial peak SAR; the power level of the device under test guarantees that the whole body averaged SAR is not exceeded.

Having in mind a worst case consideration, the SAR limit is valid for uncontrolled environment and mobile respectively portable transmitters. According to Table 1 the SAR values have to be averaged over a mass of 1 g (SAR_{1g}) with the shape of a cube.

RULE	SAR LIMIT [W/kg]
47 CFR § 2.1093 (d)(2)	1.6

Table 1: Relevant spatial peak SAR limit averaged over a mass of 1 g.

1.1 Distinction between Exposed Population, Duration of Exposure and Frequencies

The American Standard [IEEE C95.1-1999] distinguishes between controlled and uncontrolled environment. Controlled environments are locations where there is exposure that may be incurred by persons who are aware of the potential for exposure as a concomitant of employment or by other cognizant persons. Uncontrolled environments are locations where there is the exposure of individuals who have no knowledge or control of their exposure. The exposures may occur in living quarters or workplaces. For exposure in controlled environments higher field strengths are admissible. In addition the duration of exposure is considered.

Due to the influence of frequency on important parameters, as the penetration depth of the electromagnetic fields into the human body and the absorption capability of different tissues, the limits in general vary with frequency.

1.2 Distinction between Maximum Permissible Exposure and SAR Limits

The biological relevant parameter describing the effects of electromagnetic fields in the frequency range of interest is the specific absorption rate SAR (dimension: power/mass). It is a measure of the power absorbed per unit mass. The SAR may be spatially averaged over the total mass of an exposed body or its parts. The SAR is calculated from the r.m.s. electric field strength E inside the human body, the conductivity σ and the mass density ρ of the biological tissue:

$$SAR = \sigma \frac{E^2}{\rho} = c \frac{\partial T}{\partial t}\bigg|_{t \to 0+} . \quad (1)$$

The specific absorption rate describes the initial rate of temperature rise $\partial T / \partial t$ as a function of the specific heat capacity c of the tissue. A limitation of the specific absorption rate prevents an excessive heating of the human body by electromagnetic energy.

As it is sometimes difficult to determine the SAR directly by measurement (e.g. whole body averaged SAR), the standard specifies more readily measurable maximum permissible exposures in terms of external electric *E* and magnetic field strength *H* and power density *S*, derived from the SAR limits. The limits for *E*, *H* and *S* have been fixed so that even under worst case conditions, the limits for the specific absorption rate SAR are not exceeded.

For the relevant frequency range the maximum permissible exposure may be exceeded if the exposure can be shown by appropriate techniques to produce SAR values below the corresponding limits.

2 The FCC Measurement Procedure

2.1 General Requirements

The test shall be performed in a laboratory with an environment which avoids influence on SAR measurements by ambient EM sources and any reflection from the environment itself. The ambient temperature shall be in the range of 20°C to 26°C and 30-70% humidity. All tests have been conducted according the latest version of all relevant KDBs.

3 Body-Worn Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. Per FCC KDB 648474 [KDB 648474], Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB 447498 [KDB 447498] should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body worn accessory, measured without headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body worn accessory with a headset attached to the handset.

For purpose of determining test requirements, accessories may be divided into two categories: those that do not contain metallic components and those that do. For multiple accessories that do not contain metallic components, the device may be tested only with that accessory which provides the closest spacing to the body.

For multiple accessories that contain metallic components, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component, only the accessory that provides the closest spacing to the body must be tested.

Devices that are designed to operate on the body of users using lanyards and straps, or without requiring additional body worn accessories, must be tested for SAR compliance using a conservative minimum test separation distance ≤ 5 mm to support compliance.

Nevertheless, all accessories that contain metallic components must be tested for compliance additionally.

Other separation distances may be used, but they shall not exceed 2.5 cm.

3.1 Phantom Requirements

For body-worn and other configurations a flat phantom shall be used which is comprised of material with electrical properties similar to the corresponding tissues.

3.2 Test to be Performed

The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at the middle channel resp. that channel with the highest output power for each test configuration is < 0.8 W/kg, testing at the high and low channels is optional.

3.2.1 Measurement Variability

According KDB 865664 repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. If the measured SAR value of the initial repeated measurement is < 1.45 W/kg with ≤ 20% variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. A second repeated measurement is required only if the measured result for the initial repeated measurement is within 10% of the SAR limit and vary by more than 20%, which are often related to device and measurement setup difficulties. The following procedures are applied to determine if repeated measurements are required.

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

4 The Measurement System

DASY is an abbreviation of „Dosimetric Assessment System“ and describes a system that is able to determine the SAR distribution inside a phantom of a human being according to different standards. The DASY4 system consists of the following items as shown in Fig. 2. Additional Fig. 3 shows the equipment, similar to the installations in other laboratories.

- Fully compliant with all current measurement standards as stated in Fig. 12
- High precision robot with controller
- Measurement server (for surveillance of the robot operation and signal filtering)
- Data acquisition electronics DAE (for signal amplification and filtering)
- Field probes calibrated for use in liquids
- Electro-optical converter EOC (conversion from the optical into a digital signal)
- Light beam (improving of the absolute probe positioning accuracy)
- Two SAM phantoms filled with tissue simulating liquid
- DASY4 software
- SEMCAD

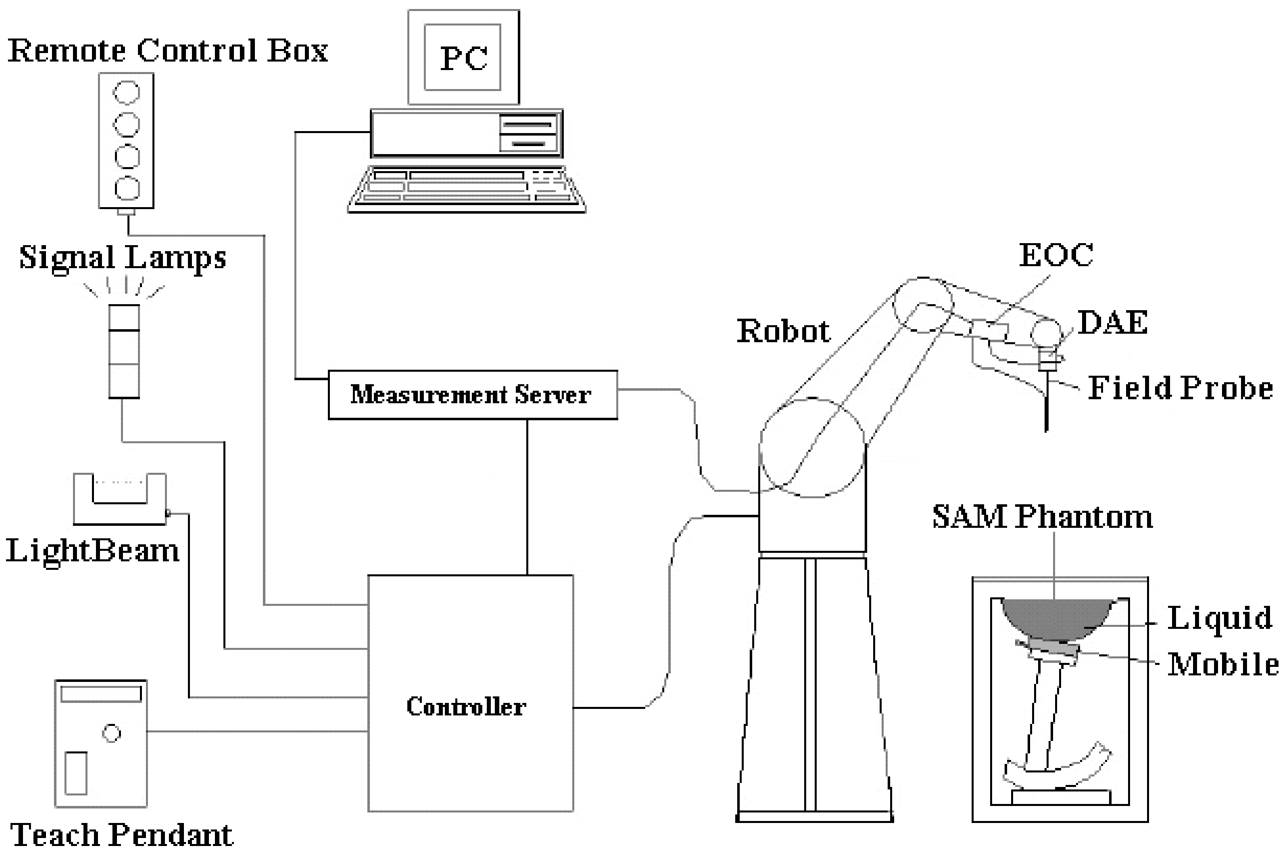

Fig. 2: The DASY4 measurement system.

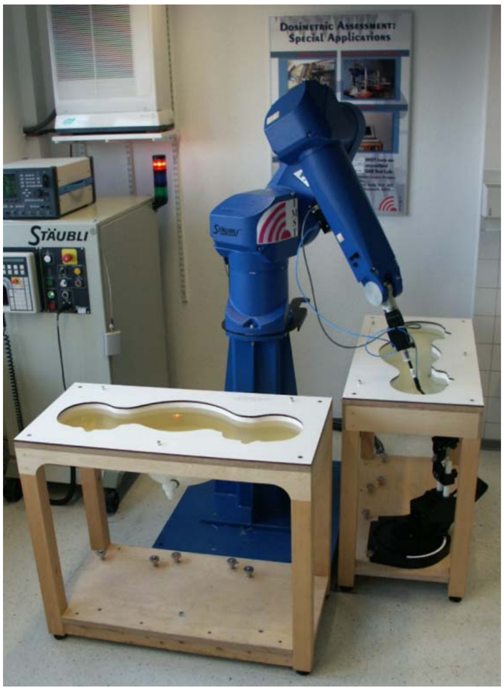

Fig. 3: The measurement set-up with two SAM phantoms containing tissue simulating liquid.

The mobile phone operating at the maximum power level is placed by a non metallic device holder (delivered from Schmid & Partner) in the above described positions at a shell phantom of a human being. The distribution of the electric field strength *E* is measured in the tissue simulating liquid within the shell phantom. For this miniaturised field probes with high sensitivity and low field disturbance are used. Afterwards the corresponding SAR values are calculated with the known electrical conductivity σ and the mass density ρ of the tissue in the SEMCAD FDTD software. The software is able to determine the averaged SAR values (averaging region 1 g or 10 g) for compliance testing.

The measurements are done by two scans: first a coarse scan determines the region of the maximum SAR, afterwards the averaged SAR is measured in a second scan within the shape of a cube. The measurement time takes about 20 minutes.

4.1 Phantoms

TWIN SAM PHANTOM V4.0	
	Specific Anthropomorphic Mannequin defined in IEEE 1528 and IEC 62209-1 and delivered by Schmid & Partner Engineering AG. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. The details and the Certificate of conformity can be found in Fig. 13.
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions	Length: 1000 mm; Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters

4.2 E-Field-Probes

For the measurements the Dosimetric E-Field Probes ET3DV6R or EX3DV4 with following specifications are used. They are manufactured and calibrated in accordance with KDB 865664 and IEEE 1528 recommendations annually by Schmid & Partner Engineering AG.

ET3DV6R	
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system (ET3DV6 only) Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Dimensions	Overall length: 337 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm
Frequency	10 MHz to 2.3 GHz Linearity: ± 0.2 dB (30 MHz to 2.3 GHz)
Directivity	Axial isotropy: ± 0.2 dB in TSL (rotation around probe axis) Spherical isotropy: ± 0.4 dB in TSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Calibration Range	450 MHz / 750 MHz / 900 MHz / 1750 MHz / 1900 MHz / 1950 MHz for head and body simulating liquid

EX3DV4	
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	Axial isotropy: ± 0.3 dB in TSL (rotation around probe axis) Spherical isotropy: ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Calibration Range	1950 MHz / 2450 MHz / 2600 MHz / 3500 MHz / 5200 MHz / 5300 MHz / 5600 MHz / 5800 MHz for head and body simulating liquid

4.3 Measurement Procedure

The following steps are used for each test position:

- Establish a call with the maximum output power with a base station simulator. The connection between the mobile phone and the base station simulator is established via air interface.
- Measurement of the local E-field value at a fixed location (P1). This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with resolution settings for area scan and zoom scan according KDB 865664 D01 as shown in Table 2.
- The used extrapolation and interpolation routines are all based on the modified Quadratic Shepard´s method [DASY4].
- Repetition of the E-field measurement at the fixed location (P1) and repetition of the whole procedure if the two results differ by more than ± 0.21dB.

<table>
<tr><th colspan="3"></th><th>≤ 3 GHz</th><th>≥ 3 GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 - 3 GHz: ≤ 12 mm</td><td>3 - 4 GHz: ≤ 12 mm
4 - 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: ΔX_{Zoom}, ΔY_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 - 3 GHz: ≤ 5 mm*</td><td>3 - 4 GHz: ≤ 5 mm*
4 - 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">Uniform grid: $\Delta Z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 - 4 GHz: ≤ 4 mm
4 - 5 GHz: ≤ 3 mm
5 - 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta Z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 - 4 GHz: ≤ 3 mm
4 - 5 GHz: ≤ 2.5 mm
5 - 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta Z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5· $\Delta Z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 - 4 GHz: ≥ 28 mm
4 - 5 GHz: ≥ 25 mm
5 - 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium: see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz</td></tr>
</table>

Table 2: Parameters for SAR scan procedures.

4.4 Uncertainty Assessment

Table 3 includes the worst case uncertainty budget suggested by the KDB 865664 and IEEE 1528 determined by Schmid & Partner Engineering AG. The expanded uncertainty (K=2) is assessed to be ± 21.6%.

Uncertainty Budget of DASY4						
Error Sources	**Uncertainty Value**	**Probability Distribution**	**Divisor**	**c_i**	**Standard Uncertainty**	**v_i^2 or v_{eff}**
Measurement System						
Probe calibration	± 5.9 %	Normal	1	1	± 5.9 %	∞
Axial isotropy	± 4.7 %	Rectangular	√3	0.7	± 1.9 %	∞
Hemispherical isotropy	± 9.6 %	Rectangular	√3	0.7	± 3.9 %	∞
Boundary effects	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Linearity	± 4.7 %	Rectangular	√3	1	± 2.7 %	∞
System detection limit	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Readout electronics	± 1.0 %	Normal	1	1	± 1.0 %	∞
Response time	± 0.8 %	Rectangular	√3	1	± 0.5 %	∞
Integration time	± 2.6%	Rectangular	√3	1	± 1.5 %	∞
RF ambient conditions	± 3.0 %	Rectangular	√3	1	± 1.7 %	∞
Probe positioner	± 0.4 %	Rectangular	√3	1	± 0.2 %	∞
Probe positioning	± 2.9 %	Rectangular	√3	1	± 1.7 %	∞
Algorithm for max SAR eval.	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Test Sample Related						
Device positioning	± 2.9 %	Normal	1	1	± 2.9 %	145
Device holder	± 3.6 %	Normal	1	1	± 3.6 %	5
Power drift	± 5.0 %	Rectangular	√3	1	± 2.9 %	∞
Phantom and Set-up						
Phantom uncertainty	± 4.0 %	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (target)	± 5.0 %	Rectangular	√3	0.64	± 1.8 %	∞
Liquid conductivity (meas.)	± 2.5 %	Normal	1	0.64	± 1.6 %	∞
Liquid permittivity (target)	± 5.0 %	Rectangular	√3	0.6	± 1.7 %	∞
Liquid permittivity (meas.)	± 2.5 %	Normal	1	0.6	± 1.5 %	∞
Combined Uncertainty					**± 10.8 %**	

Table 3: Uncertainty budget of DASY4.

5 SAR Test Conditions and Measurement Results

5.1 Output Power Values for IEEE 802.11 b/g/n (2.4 GHz)

Average Measured (RMS) Output Power Values [dBm]

Mode	Antenna	Freq. [MHz]	CH	Measured Output Power for Data Rate [Mbit/s]			
				1	2	5.5	11
IEEE 802.11b	1	2412	1	14.6	14.7	14.7	14.7
		2437	6	14.5	-	-	-
		2462	11	14.4	-	-	-
	2	2412	1	13.7	13.9	13.9	13.8
		2437	6	13.5	-	-	-
		2462	11	13.4	-	-	-

Mode	Antenna	Freq. [MHz]	CH	Measured Output Power for Data Rate [Mbit/s]							
				6	9	12	18	24	36	48	54
IEEE 802.11g	1	2412	1	13.7	-	-	-	-	-	-	-
		2437	6	13.7	-	-	-	-	-	-	-
		2462	11	13.6	-	-	-	-	-	-	-
	2	2412	1	12.8	-	-	-	-	-	-	-
		2437	6	12.9	-	-	-	-	-	-	-
		2462	11	12.6	-	-	-	-	-	-	-

Mode	Antenna	Freq. [MHz]	CH	Measured Output Power for Data Rate [Mbit/s]							
				MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
IEEE 802.11n 20 MHz	1	2412	1	12.7	-	-	-	-	-	-	-
		2437	6	12.6	-	-	-	-	-	-	-
		2462	11	12.4	-	-	-	-	-	-	-
	2	2412	1	11.7	-	-	-	-	-	-	-
		2437	6	11.9	-	-	-	-	-	-	-
		2462	11	11.7	-	-	-	-	-	-	-
IEEE 802.11n 40 MHz	1	2437	6	10.9	-	-	-	-	-	-	-
	2	2437	6	10.0	-	-	-	-	-	-	-

Table 4: Conducted output power values for INARI5-WLAN-1 from Aava Mobile Oy for IEEE 802.11 b/g/n.

5.2 Output Power Values and Tune-Up Information for IEEE 802.11 a/n (5 GHz)

Average Measured (RMS) Output Power Values [dBm]											
Mode	Antenna	Freq. [MHz]	CH	Measured Output Power for Data Rate [Mbit/s]							
				6	9	12	18	24	36	48	54
IEEE 802.11a	1	5180	36	14.9	14.9	14.8	14.8	14.8	14.7	14.7	14.7
		5200	40	14.8	-	-	-	-	-	-	-
		5220	44	14.9	-	-	-	-	-	-	-
		5240	48	14.9	14.6	14.5	14.5	14.5	13.5	13.5	13.6
		5260	52	15.0	14.9	14.9	14.9	14.8	14.8	14.8	14.8
		5280	56	14.8	-	-	-	-	-	-	-
		5300	60	15.0	-	-	-	-	-	-	-
		5320	64	14.7	-	-	-	-	-	-	-
		5500	100	14.7	-	-	-	-	-	-	-
		5560	112	14.9	-	-	-	-	-	-	-
		5580	116	14.8	-	-	-	-	-	-	-
		5640	128	-	-	-	-	-	-	-	-
		5660	132	14.8	-	-	-	-	-	-	-
		5745	149	14.8	-	-	-	-	-	-	-
		5825	165	14.7	-	-	-	-	-	-	-
	2	5180	36	13.8	13.8	13.8	13.7	13.7	13.7	13.6	13.6
		5200	40	13.8	-	-	-	-	-	-	-
		5220	44	13.8	-	-	-	-	-	-	-
		5240	48	13.9	-	-	-	-	-	-	-
		5260	52	14.1	14.1	14.1	14.1	14.1	14.0	14.0	14.0
		5280	56	14.0	14.0	13.9	13.9	13.9	13.8	13.8	13.7
		5300	60	13.6	-	-	-	-	-	-	-
		5320	64	13.8	-	-	-	-	-	-	-
		5500	100	13.2	-	-	-	-	-	-	-
		5560	112	13.0	-	-	-	-	-	-	-
		5580	116	13.4	-	-	-	-	-	-	-
		5640	128	-	-	-	-	-	-	-	-
		5660	132	13.0	-	-	-	-	-	-	-
		5745	149	13.0	-	-	-	-	-	-	-
		5825	165	13.0	-	-	-	-	-	-	-

Table 5: Conducted output power values for INARI5-WLAN-1 from Aava Mobile Oy for IEEE 802.11 a.

Average Measured (RMS) Output Power Values [dBm]											
Mode	Antenna	Freq. [MHz]	CH	Measured Output Power for Data Rate [Mbit/s]							
				MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
IEEE 802.11n HT20MHz	1	5180	36	12.4	-	-	-	-	-	-	-
		5200	40	12.3	-	-	-	-	-	-	-
		5220	44	12.0	-	-	-	-	-	-	-
		5240	48	12.1	-	-	-	-	-	-	-
		5260	52	12.2	-	-	-	-	-	-	-
		5280	56	12.4	-	-	-	-	-	-	-
		5300	60	12.2	-	-	-	-	-	-	-
		5320	64	12.3	-	-	-	-	-	-	-
		5500	100	11.9	-	-	-	-	-	-	-
		5560	112	11.9	-	-	-	-	-	-	-
		5580	116	12.1	-	-	-	-	-	-	-
		5640	128	12.1	-	-	-	-	-	-	-
		5660	132	12.1	-	-	-	-	-	-	-
		5745	149	12.0	-	-	-	-	-	-	-
		5825	165	12.1	-	-	-	-	-	-	-
	2	5180	36	11.3	-	-	-	-	-	-	-
		5200	40	10.7	-	-	-	-	-	-	-
		5220	44	10.9	-	-	-	-	-	-	-
		5240	48	10.9	-	-	-	-	-	-	-
		5260	52	11.2	-	-	-	-	-	-	-
		5280	56	11.2	-	-	-	-	-	-	-
		5300	60	10.9	-	-	-	-	-	-	-
		5320	64	10.7	-	-	-	-	-	-	-
		5500	100	10.4	-	-	-	-	-	-	-
		5560	112	10.4	-	-	-	-	-	-	-
		5580	116	10.7	-	-	-	-	-	-	-
		5640	128	10.9	-	-	-	-	-	-	-
		5660	132	10.8	-	-	-	-	-	-	-
		5745	149	10.2	-	-	-	-	-	-	-
		5825	165	10.5	-	-	-	-	-	-	-

Table 6: Conducted output power values for INARI5-WLAN-1 from Aava Mobile Oy for IEEE 802.11 n, HT20MHz.

Average Measured (RMS) Output Power Values [dBm]											
Mode	Antenna	Freq. [MHz]	CH	Measured Output Power for Data Rate [Mbit/s]							
				MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
IEEE 802.11n HT40MHz	1	5190	38	12.1	-	-	-	-	-	-	-
		5230	46	12.1	-	-	-	-	-	-	-
		5270	54	12.0	-	-	-	-	-	-	-
		5310	62	11.8	-	-	-	-	-	-	-
		5510	102	11.9	-	-	-	-	-	-	-
		5550	110	11.9	-	-	-	-	-	-	-
		5590	118	11.9	-	-	-	-	-	-	-
		5630	126	12.1	-	-	-	-	-	-	-
		5670	134	12.0	-	-	-	-	-	-	-
		5710	142	-	-	-	-	-	-	-	-
		5755	151	12.1	-	-	-	-	-	-	-
		5795	159	11.9	-	-	-	-	-	-	-
	2	5190	38	11.0	-	-	-	-	-	-	-
		5230	46	10.8	-	-	-	-	-	-	-
		5270	54	10.7	-	-	-	-	-	-	-
		5310	62	10.7	-	-	-	-	-	-	-
		5510	102	10.7	-	-	-	-	-	-	-
		5550	110	10.6	-	-	-	-	-	-	-
		5590	118	10.7	-	-	-	-	-	-	-
		5630	126	10.9	-	-	-	-	-	-	-
		5670	134	10.6	-	-	-	-	-	-	-
		5710	142	-	-	-	-	-	-	-	-
		5755	151	10.4	-	-	-	-	-	-	-
		5795	159	10.3	-	-	-	-	-	-	-

Table 7: Conducted output power values for INARI5-WLAN-1 from Aava Mobile Oy for IEEE 802.11 n, HT40MHz.

5.3 SAR Measurement Results

The table below contains the measured SAR values averaged over a mass of 1 g. SAR assessment was conducted in the worst case configuration with output power values according to Tables 4 - 7.

According to KDB 447498 D01 V05, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.

- Scaling Factor = tune-up limit power (mW) / RF power (mW)
- Reported SAR = measured SAR * scaling factor

Furthermore, testing of other required channels within the operating mode of frequency band is not required when the reported SAR for the mid-band or highest output power channel is ≤ 0.4 W/kg for transmission band ≥ 200 MHz.

To control the output power stability during the SAR test the used DASY4 system calculates the power drift by measuring the e-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in the above tables labeled as: (Drift [dB]). This ensures that the power drift during one measurement is within 5%.

5.3.1 SAR Results in Head Configuration for IEEE 802.11 b (2.4 GHz)

Table 8 below contains measured SAR values in 2.4GHz frequency range in head configuration averaged over a mass of 1 g. Based on SAR area scans, measurement exclusions were conducted and according to KDB 248227 D01 v02 SAR an initial test position have been defined. Thus, SAR detailed testing has been performed on those initial test positions which results are shown in Table 9.

Area Scan SAR Results for Measurement Exclusion* (2.4 GHz Range)								
Configuration	Band	Antenna	Freq. [MHz]	Channel	Test Position		Figure No.	Measured SAR_{1g} [W/kg]
HEAD	IEEE 802.11b (1 Mbit/s)	1	2412	1	Left	Cheek	25	0.074*
						Tilted	26	0.025
					Right	Cheek	23	0.060
						Tilted	24	0.015
		2	2412	1	Left	Cheek	25	0.033
						Tilted	26	0.021
					Right	Cheek	23	0.043*
						Tilted	24	0.024

Table 8: Area Scan for measurement exclusion and defining an initial test position in head configuration for IEEE 802.11 b (2.4GHz) for INARI5-WLAN-1 tablet from Aava Mobile Oy.

*Note: *Initial Test Position defined according to KDB 248227 D01 v02*

SAR Results on ITP (2.4 GHz Range)													
Configuration	Band	Antenna	Freq. [MHz]	Channel	Test Position	Figure No.	Tune-Up Limit [dBm]	Output Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dBm]	Scaling Factor	Reported SAR_{1g} [W/kg]	Plot No.
HEAD	IEEE 802.11b (1 Mbit/s)	1	2412	1	Left Cheek	25	15.0	14.6	0.066	-0,115	1.096	0.072	1
		2	2412	1	Right Cheek	23	15.0	13.7	0.047	0.137	1.349	0.063	2

Table 9: SAR results on initial test position (ITP) in head configuration for IEEE 802.11 b for INARI5-WLAN-1 from Aava Mobile Oy.

Note: As per KDB 248227 D01, SAR is not required for all channels when the reported SAR value for the channel with worst-case output power is below 0.8 W/kg.
SAR is not required for g/n-mode when the maximum output power is less than ¼ dB higher than the one measured in the corresponding g-mode.

5.3.2 SAR Results in Head Configuration for IEEE 802.11 a (5 GHz)

Table 10 below contains measured SAR values in 5.2GHz frequency range in head configuration averaged over a mass of 1 g. Based on SAR area scans, measurement exclusions were conducted and according to KDB 248227 D01 v02 SAR an initial test position have been defined. Thus, SAR detailed testing has been performed on those initial test positions which results are shown in Table 11.

Area Scan SAR Results for Measurement Exclusion* (5.2 GHz Range)								
Configuration	Band	Antenna	Freq. [MHz]	Channel	Test Position		Figure No.	Measured SAR_{1g} [W/kg]
HEAD	IEEE 802.11b (1 Mbit/s)	1	5300	60	Left	Cheek	25	0.048
						Tilted	26	0.025
					Right	Cheek	23	0.096*
						Tilted	24	0.020
		2	5260	52	Left	Cheek	25	0.023
						Tilted	26	0.016
					Right	Cheek	23	0.024*
						Tilted	24	0.010

Table 10: Area Scan for measurement exclusion and defining an initial test position in head configuration for IEEE 802.11 a (5.2GHz) for INARI5-WLAN-1 from Aava Mobile Oy.

*Note: *Initial Test Position defined according to KDB 248227 D01 v02*

SAR Results on ITP (5.2 GHz Range)													
Configuration	Band	Antenna	Freq. [MHz]	Channel	Test Position	Figure No.	Tune-Up Limit [dBm]	Output Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dBm]	Scaling Factor	Reported SAR_{1g} [W/kg]	Plot No.
HEAD	IEEE 802.11a	1	5300	60	Right Cheek	23	15.0	15.0	0.058	0.111	1.000	0.058	3
		2	5260	52	Right Cheek	24	15.0	15.0	0.019	0.191	1.000	0.019	4

Table 11: SAR results on initial test position (ITP) in head configuration for IEEE 802.11a (5.2GHz) for INARI5-WLAN-1 from Aava Mobile Oy.

Note: As per KDB 248227 D01, SAR is not required for all channels when the reported SAR value for the channel with worst-case output power is below 0.8 W/kg.
SAR is not required for g/n-mode when the maximum output power is less than ¼ dB higher than the one measured in the corresponding g-mode.

Table 12 below contains measured SAR values in 5.6 GHz frequency range in head configuration averaged over a mass of 1 g. Based on SAR area scans, measurement exclusions were conducted and according to KDB 248227 D01 v02 SAR an initial test position have been defined. Thus, SAR detailed testing has been performed on those initial test positions which results are shown in Table 13.

Area Scan SAR Results for Measurement Exclusion* (5.6 GHz Range)								
Configuration	Band	Antenna	Freq. [MHz]	Channel	Test Position		Figure No.	Measured SAR_{1g} [W/kg]
HEAD	IEEE 802.11b (1 Mbit/s)	1	5580	116	Left	Cheek	25	0.075
						Tilted	26	0.025
					Right	Cheek	23	0.193*
						Tilted	24	0.031
		2	5580	116	Left	Cheek	25	0.023
						Tilted	26	0.030*
					Right	Cheek	23	0.022
						Tilted	24	0.020

Table 12: Area Scan for measurement exclusion and defining an initial test position in head configuration for IEEE 802.11 a (5.2GHz) for INARI5-WLAN-1 from Aava Mobile Oy.

*Note: *Initial Test Position defined according to KDB 248227 D01 v02*

SAR Results on ITP (5.6 GHz Range)													
Configuration	Band	Antenna	Freq. [MHz]	Channel	Test Position	Figure No.	Tune-Up Limit [dBm]	Output Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dBm]	Scaling Factor	Reported SAR_{1g} [W/kg]	Plot No.
HEAD	IEEE 802.11a	1	5580	116	Right Cheek	23	15.0	14.8	0.110	0.000	1.047	0.115	5
		2	5580	116	Left Tilted	26	15.0	13.4	0.016	0.000	1.445	0.023	6

Table 13: SAR results on initial test position (ITP) in head configuration for IEEE 802.11a (5.6 GHz) for INARI5-WLAN-1 from Aava Mobile Oy.

Note: As per KDB 248227 D01, SAR is not required for all channels when the reported SAR value for the channel with worst-case output power is below 0.8 W/kg.
SAR is not required for g/n-mode when the maximum output power is less than ¼ dB higher than the one measured in the corresponding g-mode.

Table 14 below contains measured SAR values in 5.8GHz frequency range in head configuration averaged over a mass of 1 g. Based on SAR area scans, measurement exclusions were conducted and according to KDB 248227 D01 v02 SAR an initial test position have been defined. Thus, SAR detailed testing has been performed on those initial test positions which results are shown in Table 15.

Area Scan SAR Results for Measurement Exclusion* (5.8 GHz Range)								
Configuration	Band	Antenna	Freq. [MHz]	Channel	Test Position		Figure No.	Measured SAR_{1g} [W/kg]
HEAD	IEEE 802.11b (1 Mbit/s)	1	5745	149	Left	Cheek	25	0.065
						Tilted	26	0.030
					Right	Cheek	23	0.140*
						Tilted	24	0.029
		2	5745	149	Left	Cheek	25	0.014
						Tilted	26	0.032
					Right	Cheek	23	0.026
						Tilted	24	0.033*

Table 14: Area Scan for measurement exclusion and defining an initial test position in head configuration for IEEE 802.11 a (5.8GHz) for INARI5-WLAN-1 from Aava Mobile Oy.

*Note: *Initial Test Position defined according KDB 248227 D01 v02*

SAR Results on ITP (5.8 GHz Range)													
Configuration	Band	Antenna	Freq. [MHz]	Channel	Test Position	Figure No.	Tune-Up Limit [dBm]	Output Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dBm]	Scaling Factor	Reported SAR_{1g} [W/kg]	Plot No.
HEAD	IEEE 802.11a	1	5745	149	Right Cheek	23	15.0	14.8	0.091	0.121	1.047	0.095	7
		2	5745	149	Right Tilted	24	15.0	13.0	0.010	0.079	1.585	0.016	8

Table 15: SAR results on initial test position (ITP) in head configuration for IEEE 802.11a (5.8GHz) for INARI5-WLAN-1 from Aava Mobile Oy.

Note: As per KDB 248227 D01, SAR is not required for all channels when the reported SAR value for the channel with worst-case output power is below 0.8 W/kg.
SAR is not required for g/n-mode when the maximum output power is less than ¼ dB higher than the one measured in the corresponding g-mode.

5.4 Standalone SAR Test Exclusion for Body Worn Configuration

Transmission Scenario for Body Exposure (Initial Test Position)									
Exposure Position	Mode	802.11b		802.11a					
		Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2
	Frequency [GHz]	2.412	2.412	5.180	5.180	5.500	5.500	5.745	5.745
	Maximum Power [dBm]	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
	Max. rated power [mW]	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6
Top	Antenna to user [mm]	42.0	128.0	42.0	128.0	42.0	128.0	42.0	128.0
	SAR testing required?	no	no	no	no	no	no	no	no
Back	Antenna to user [mm]	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	SAR testing required?	yes	yes	yes	yes	yes	yes	yes	yes
Front	Antenna to user [mm]	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
	SAR testing required?	yes	yes	yes	yes	yes	yes	yes	yes
Left	Antenna to user [mm]	67.0	62.0	67.0	62.0	67.0	62.0	67.0	62.0
	SAR testing required?	no	no	no	no	no	no	no	no
Right	Antenna to user [mm]	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	SAR testing required?	yes	yes	yes	yes	yes	yes	yes	yes
Bottom	Antenna to user [mm]	67.0	9.0	67.0	9.0	67.0	9.0	67.0	9.0
	SAR testing required ?	no	yes	no	yes	no	yes	no	yes

Table 16: SAR test exclusion consideration for the worst-case modes against different device edges.

The above table shows the SAR test exclusion consideration for the applicable worst-case modes against the different device edges with the relevant distances.

The 1g and 10g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50mm are determined by:

$$\frac{\text{Max. Tune Up Power [mW]}}{\text{Min. Test Separation Distance [mm]}} \times \sqrt{f\,[\text{GHz}]}$$

≤ 3.0 for 1g SAR and ≤ 7.5 for 10g extremity SAR

When the minimum test separation distance is < 5mm, a distance of 5mm is applied to determine SAR test exclusion.

At 100 MHz to 6GHz and a test separation distance of > 50 mm, the SAR test exclusion threshold is determined according to the following and illustrated in Appendix B of KDB 447498 D01:

- [(Power allowed at numeric threshold for 50mm) + (Test Separation Distance - 50mm) × $\frac{f\,[MHz]}{150}$] mW at 100 MHz to 1500 MHz
- [(Power allowed at numeric threshold for 50mm) + (Test Separation Distance - 50mm) × 10] mW at 1500 MHz to 6 GHz

5.4.1 SAR Results in Body Worn Configuration for IEEE 802.11 b (2.4 GHz)

SAR Results for 2.4 GHz Range														
Configuration	**Band**	**Antenna**	**Freq. [MHz]**	**Channel**	**Test Position**	**Spacing [mm]**	**Figure No.**	**Tune-Up Limit [dBm]**	**Output Power [dBm]**	**Measured SAR_{1g} [W/kg]**	**Power Drift [dBm]**	**Scaling Factor**	**Reported SAR_{1g} [W/kg]**	**Plot No.**
BODY	IEEE 802.11b (1 Mbit/s)	1	2412	1	Front	5	18	15	14.6	0.058	0.047	1.096	0.064	
					Back	5	19			1.050	0.194	1.096	1.151	9
					Right	5	20			0.860	0.004	1.096	0.943	
			2437	6	Back	5	19		14.5	0.945	0.123	1.122	1.060	
			2462	11	Back	5	19		14.4	0.714	0.109	1.148	0.820	
		2	2412	1	Front	5	18	15	13.7	0.095	0.152	1.349	0.128	
					Back	5	19			0.136	0.052	1.349	0.183	
					Right	5	20			0.159	-0.085	1.349	0.214	
					Bottom	5	21			0.104	0.098	1.349	0.140	
			2437	6	Right	5	20		13.5	0.187	0.081	1.413	0.264	
			2462	11	Right	5	20		13.4	0.191	-0.061	1.445	0.276	10

Table 17: SAR results in body supported configuration for IEEE 802.11 b for INARI5-WLAN-1 from Aava Mobile Oy.

Note: SAR is not required for g/n-mode when the maximum output power is less than ¼ dB higher than the one measured in the corresponding g-mode

5.4.2 SAR Results in Body Worn Configuration for IEEE 802.11 a (5 GHz)

SAR Results for 5.2 GHz Range														
Configuration	Band	Antenna	Freq. [MHz]	Channel	Test Position	Spacing [mm]	Figure No.	Tune-Up Limit [dBm]	Output Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dBm]	Scaling Factor	Reported SAR_{1g} [W/kg]	Plot No.
BODY	IEEE 802.11a (6 Mbit/s)	1	5300	60	Front	5	18	15.0	15.0	0.041	0.044	1.000	0.041	
				60	Back	5	19			0.663	-0.036	1.000	0.663	11
				60	Right	5	20			0.551	-0.172	1.000	0.551	
		2	5260	52	Front	5	18	15.0	14.1	0.020	0.148	1.230	0.025	
				52	Back	5	19			0.805	-0.175	1.230	0.990	12
				52	Right	5	20			0.209	-0.077	1.230	0.257	
				52	Bottom	5	21			0.108	0.126	1.230	0.133	

Table 18: SAR results in body worn configuration for IEEE 802.11a (5.2 GHz) for INARI5-WLAN-1 from Aava Mobile Oy.

Note: SAR is not required for n-mode when the maximum output power is less than ¼ dB higher than the one measured in the corresponding a-mode

SAR Results for 5.6 GHz and 5.8 GHz Range														
Configuration	**Band**	**Antenna**	**Freq. [MHz]**	**Channel**	**Test Position**	**Spacing [mm]**	**Figure No.**	**Tune-Up Limit [dBm]**	**Output Power [dBm]**	**Measured SAR_{1g} [W/kg]**	**Power Drift [dBm]**	**Scaling Factor**	**Reported SAR_{1g} [W/kg]**	**Plot No.**
BODY	IEEE 802.11a (6 Mbit/s)	1	5580	116	Front	5	18	15.0	14.8	0.069	-0.022	1.047	0.072	
					Back	5	19			1.110	-0.131	1.047	1.162	13
					Back*	5	19			1.010	0.195	1.047	1.058	
					Back**	5	22			1.090	-0.109	1.047	1.141	
					Right	5	20			1.050	-0.157	1.047	1.099	
		2	5580	116	Front	5	18	15.0	13.4	0.027	-0.032	1.445	0.039	
					Back	5	19			0.692	0.019	1.445	1.000	14
					Right	5	20			0.290	0.191	1.445	0.419	
					Bottom	5	21			0.154	-0.189	1.445	0.223	
BODY	IEEE 802.11a (6 Mbit/s)	1	5745	149	Front	5	18	15.0	14.8	0.042	0.146	1.047	0.044	
					Back	5	19			1.140	-0.006	1.047	1.194	15
					Back*	5	19			1.120	-0.088	1.047	1.173	
					Back**	5	22			1.130	0.029	1.047	1.183	
					Right	5	20			0.865	-0.021	1.047	0.906	
		2	5745	149	Front	5	18	15.0	13.0	0.044	0.183	1.585	0.070	
					Back	5	19			0.671	-0.188	1.585	1.063	16
					Right	5	20			0.319	0.038	1.585	0.506	
					Bottom	5	21			0.178	-0.183	1.585	0.282	

Table 19: SAR results in body worn configuration for IEEE 802.11a (5.6 GHz and 5.8 GHz) for INARI5-WLAN-1 from Aava Mobile Oy.

*Note: * Measurement variability according to KDB 865664*
*** Worst case measurement with attached headset*

SAR is not required for n-mode when the maximum output power is less than ¼ dB higher than the one measured in the corresponding a-mode

6 Appendix

6.1 Administrative Data

Date of Validation:	2450MHz Head (IEEE802.11b): April 28, 2015 2450MHz Body (IEEE802.11b): April 24, 2015 5250MHz Head (IEEE802.11a): May 06, 2015 5250MHz Body (IEEE802.11a): May 28, 2015 5600MHz Head (IEEE802.11a): May 11, 2015 5600MHz Body (IEEE802.11a): May 29, 2015 5750MHz Head (IEEE802.11b): May 18, 2015 5750MHz Body (IEEE802.11a): June 1, 2015
Date of Measurement:	April 24, 2015 - June 2, 2015
Data Stored:	7layers_60320_6150152
Contact:	IMST GmbH Carl-Friedrich-Gauß-Str. 2 - 4 47475 Kamp-Lintfort, Germany Tel.: +49- 2842-981 384 Fax: +49- 2842-981 499 email: ridder@imst.de

6.2 Device under Test and Test Conditions

MTE:	Aava Mobile Oy INARI5-WLAN-1 (Variant AAB-B-A)
Date of Receipt:	April 20, 2015
SN:	EB44900008
FCC ID:	2ABVH-INARI51
IC:	11875A-INARI51
Equipment Class:	Portable device
RF Exposure Environment:	General Population/ Uncontrolled
Power Supply:	Internal battery (AMME 2675)
Antenna:	integrated
Measured Standards:	IEEE 802.11 a/b/g/n
Method to establish a Call:	Test software

Aava Mobile Oy INARI5-WLAN-1	TX Range [MHz]	RX Range [MHz]	Used Channels	Used Crest Factor	Phantom
IEEE 802.11 b/g/n	2412.0 – 2462.0	2412.0 – 2462.0	1, 6, 11	1	SAM Twin Phantom V4.0
IEEE 802.11 a/n	5180.0 – 5320.0	5180.0 – 5320.0	52, 60	1	
	5520.0 – 5680.0	5520.0 – 5680.0	116	1	
	5745.0 - 5805.0	5745.0 - 5805.0	149	1	

Table 20: Used channels and crest factors during the test.

6.3 Tissue Recipes

The following recipes are provided in percentage by weight.

2450 MHz, Head:	45.00%	Diethylenglykol-monobutylether
	55.00%	De-Ionized Water
2450 MHz, Body:	31.40%	Diethylenglykol-monobutylether
	68.60%	De-Ionized Water

The tissue simulating liquids for the frequency range from 3.5 GHz up to 5.8 GHz were delivered by SPEAG, therefore the detailed compositions are not available and only the included ingredients were listed and shown in Figure 12.

3500 MHz – 5800 MHz, Head / Body:

11.0 % - 36.0 %	Mineral Oil
0.5 % - 15.0 %	Emulsifiers
60.0 % - 78.0 %	Water
0.4 % - 3.0 %	Additives and salt

6.4 Material Parameters

For the measurement of the following parameters the HP 85070B dielectric probe kit is used, representing the open-ended coaxial probe measurement procedure. The measured values should be within ± 5% of the recommended values given by the FCC.

Frequency		ε_r	σ [S/m]	Temperature Ambient [C]	Temperature Liquid [° C]
2450 MHz Head (IEEE 802.11 b)	Recommended Value	39.2 ± 1.90	1.80 ± 0.09	20.0 - 26.0	
	Measured Value (Validation)	37.4	1.84	23.1	21.8
	Measured Value (CH 1)	37.6	1.78		
	Measured Value (CH 6)	37.4	1.82		
	Measured Value (CH 11)	37.4	1.87		
2450 MHz Body (IEEE 802.11 b)	Recommended Value	52.70 ± 2.62	1.95 ± 0.09	22.7	22.3
	Measured Value (Validation)	54.0	1.98		
	Measured Value (CH 1)	54.3	1.92		
	Measured Value (CH 6)	54.1	1.96		
	Measured Value (CH 11)	53.9	2.00		
5250 MHz Head (IEEE 802.11 a/n)	Recommended Value	35.90 ± 1.80	4.71 ± 0.24	22.7	21.9
	Measured Value (Validation)	36.6	4.67		
	Measured Value (Ch. 52)	36.6	4.68		
	Measured Value (Ch. 60)	36.4	4.72		
5250 MHz Body (IEEE 802.11 a/n)	Recommended Value	48.9 ± 2.40	5.36 ± 0.27	22.2	21.3
	Measured Value (Validation)	50.9	5.10		
	Measured Value (Ch. 52)	50.8	5.11		
	Measured Value (Ch. 60)	50.6	5.21		
5600 MHz Head (IEEE 802.11 a)	Recommended Value	35.5 ± 1.80	5.07 ± 0.25	22.5	22.2
	Measured Value (Validation)	35.7	5.09		
	Measured Value (Ch. 116)	35.7	5.06		
5600 MHz Body (IEEE 802.11 a)	Recommended Value	48.50 ± 2.40	5.77 ± 0.29	22.6	21.7
	Measured Value (Validation)	50.1	5.72		
	Measured Value (Ch. 116)	50.1	5.67		
5750 MHz Head (IEEE 802.11 a)	Recommended Value	35.4 ± 1.80	5.22 ± 0.26	22.7	22.4
	Measured Value (Validation)	35.3	5.25		
	Measured Value (Ch. 116)	35.3	5.24		
5750 MHz Body (IEEE 802.11 a)	Recommended Value	48.30 ± 2.40	5.94 ± 0.30	22.0	21.5
	Measured Value (Validation)	49.8	5.95		
	Measured Value (Ch. 149)	49.8	5.95		

Table 21: Parameters of the tissue simulating liquids.

6.5 Simplified Performance Checking

The simplified performance check was realized using the dipole validation kits. The input power of the dipole antennas were 250 mW (cw signal) and they were placed under the flat part of the SAM phantom. The target and measured results are listed in the table 22 and shown in figure 11. The target values were adopted from the calibration certificates which are attached in the appendix. Table 23 includes the uncertainty assessment for the system performance checking which was suggested by the KDB 865664 and determined by Schmid & Partner Engineering AG. The expanded uncertainty (K=2) is assessed to be ± 16.8%.

Available Dipoles		SAR_{1g} [W/kg]	ε_r	σ [S/m]
D2450V2, SN #709 (2450MHz validation)	Target Values Head	14.25	40.4	1.84
	Measured Values Head	14.20	37.4	1.84
D2450V2, SN #709 (2450MHz validation)	Target Values Body	14.33	53.8	1.96
	Measured Values Body	14.10	54.0	1.98
D5GHzV2, SN #1028 (5250MHz validation)	Target Values Head	20.45	34.7	4.51
	Measured Values Head	21.40	36.6	4.67
D5GHzV2, SN #1028 (5250MHz validation)	Target Values Body	19.43	47.3	5.40
	Measured Values Body	20.20	50.9	5.10
D5GHzV2, SN #1028 (5600MHz validation)	Target Values Head	20.88	34.2	4.86
	Measured Values Head	22.10	35.7	5.09
D5GHzV2, SN #1028 (5600MHz validation)	Target Values Body	20.60	46.7	5.86
	Measured Values Body	20.40	50.1	5.72
D5GHzV2, SN #1028 (5750MHz validation)	Target Values Head	20.33	34.0	5.01
	Measured Values Head	21.10	35.3	5.25
D5GHzV2, SN #1028 (5750MHz validation)	Target Values Body	19.38	46.4	6.08
	Measured Values Body	19.30	49.8	5.95

Table 22: Dipole validation target and measured results.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: 280415_b_3536_631.da4

DUT: Dipole 2450 MHz SN: 709; Type: D2450V2; Serial: D2450V2 - SN:709

Program Name: System Performance Check at 2450 MHz

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.84 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3536; ConvF(7.52, 7.52, 7.52); Calibrated: 24.07.2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn631; Calibrated: 23.07.2014
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (8x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.9 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.8 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 31.4 W/kg
SAR(1 g) = 14.2 mW/g; SAR(10 g) = 6.41 mW/g
Maximum value of SAR (measured) = 16.2 mW/g

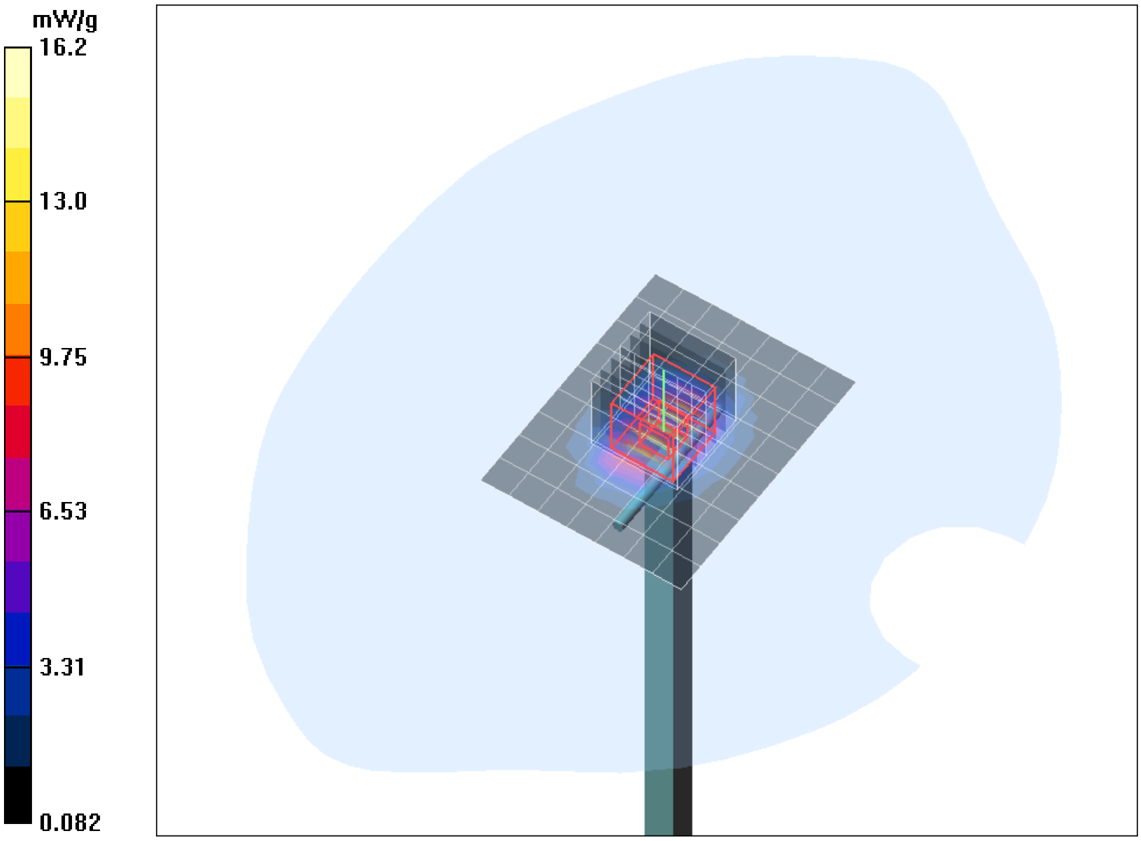

Fig. 4: Validation measurement 2450 MHz Head (April 28, 2015), coarse grid.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: 240415_b_3536_631.da4

DUT: Dipole 2450 MHz SN: 709; Type: D2450V2; Serial: D2450V2 - SN:709
Program Name: System Performance Check at 2450 MHz

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.98 mho/m; ε_r = 54; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3536; ConvF(7.34, 7.34, 7.34); Calibrated: 24.07.2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn631; Calibrated: 23.07.2014
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (8x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.5 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.3 V/m; Power Drift = 0.046 dB
Peak SAR (extrapolated) = 28.7 W/kg
SAR(1 g) = 14.1 mW/g; SAR(10 g) = 6.53 mW/g
Maximum value of SAR (measured) = 16.3 mW/g

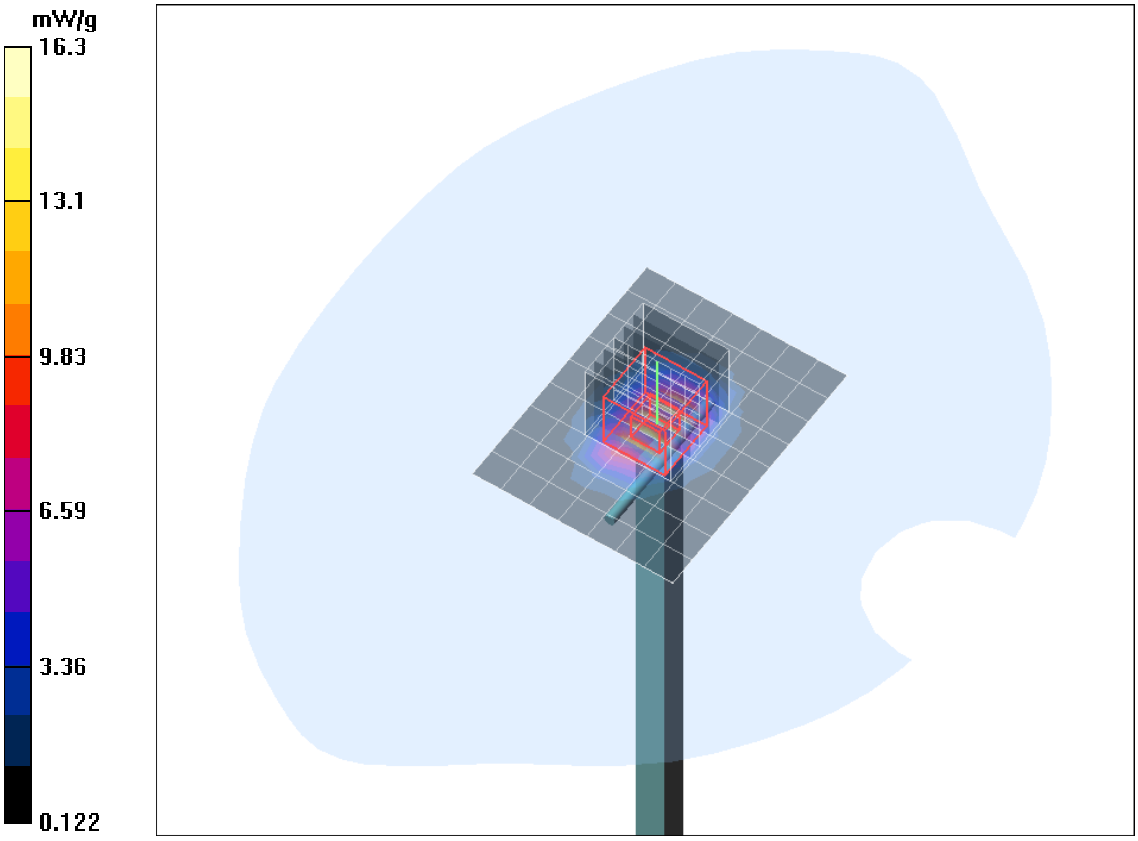

Fig. 5: Validation measurement 2450 MHz Body (April 24, 2015), coarse grid.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: 060515_b_3536_335_5250.da4

DUT: Dipole 5GHz SN: 1028; Type: D5GHzV2; Serial: D5GHzV2 - SN:1028
Program Name: System Performance Check at 5250 MHz

Communication System: CW; Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.67 mho/m; ε_r = 36.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3536; ConvF(5.18, 5.18, 5.18); Calibrated: 24.07.2014
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 19.02.2015
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (9x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 33.7 mW/g
d=10mm, Pin=250mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 91.9 V/m; Power Drift = 0.079 dB
Peak SAR (extrapolated) = 74.0 W/kg
SAR(1 g) = 21.4 mW/g; SAR(10 g) = 6.27 mW/g
Maximum value of SAR (measured) = 40.5 mW/g

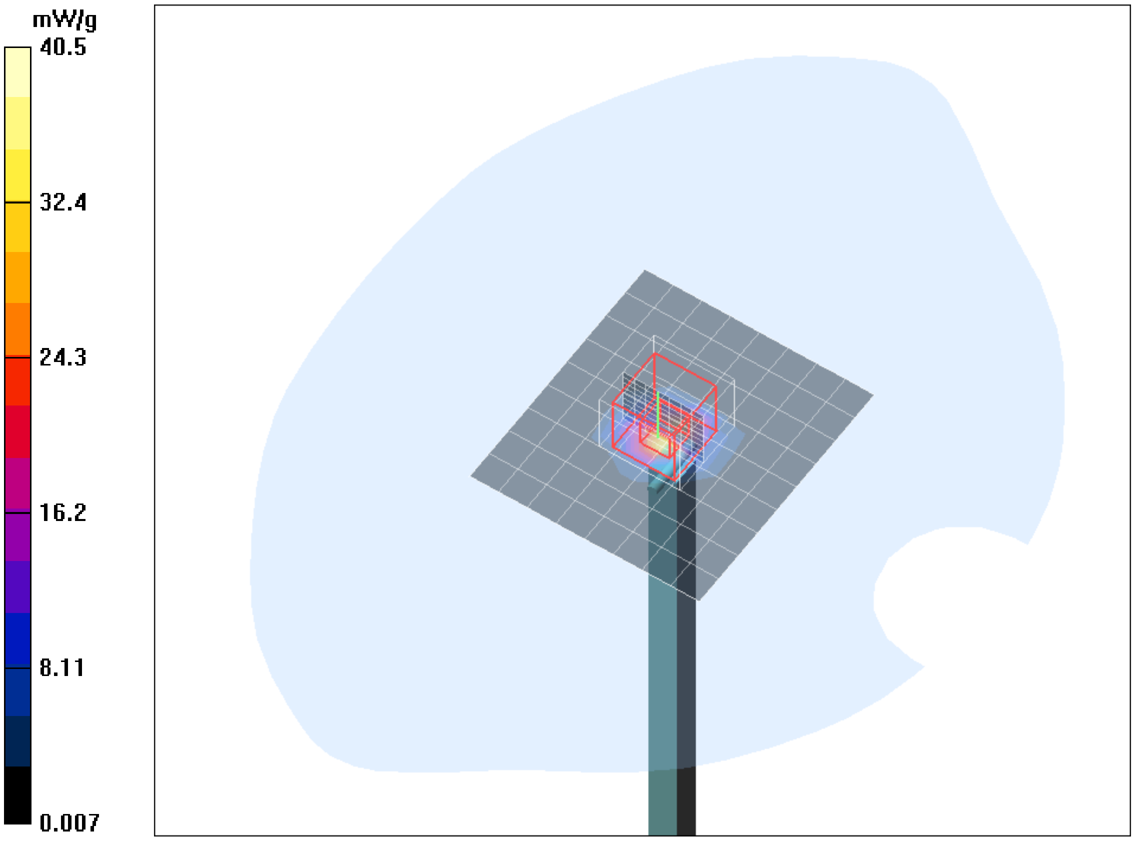

Fig. 6: Validation measurement 5250 MHz Head (May 06, 2015), coarse grid.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: 280515_b_3536_335_5250.da4

DUT: Dipole 5GHz SN: 1028; Type: D5GHzV2; Serial: D5GHzV2 - SN:1028
Program Name: System Performance Check at 5250 MHz

Communication System: CW; Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 5.1 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3536; ConvF(4.85, 4.85, 4.85); Calibrated: 24.07.2014
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 19.02.2015
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 42.3 mW/g
d=10mm, Pin=250mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 97.2 V/m; Power Drift = 0.001 dB
Peak SAR (extrapolated) = 72.4 W/kg
SAR(1 g) = 20.2 mW/g; SAR(10 g) = 5.73 mW/g
Maximum value of SAR (measured) = 39.0 mW/g

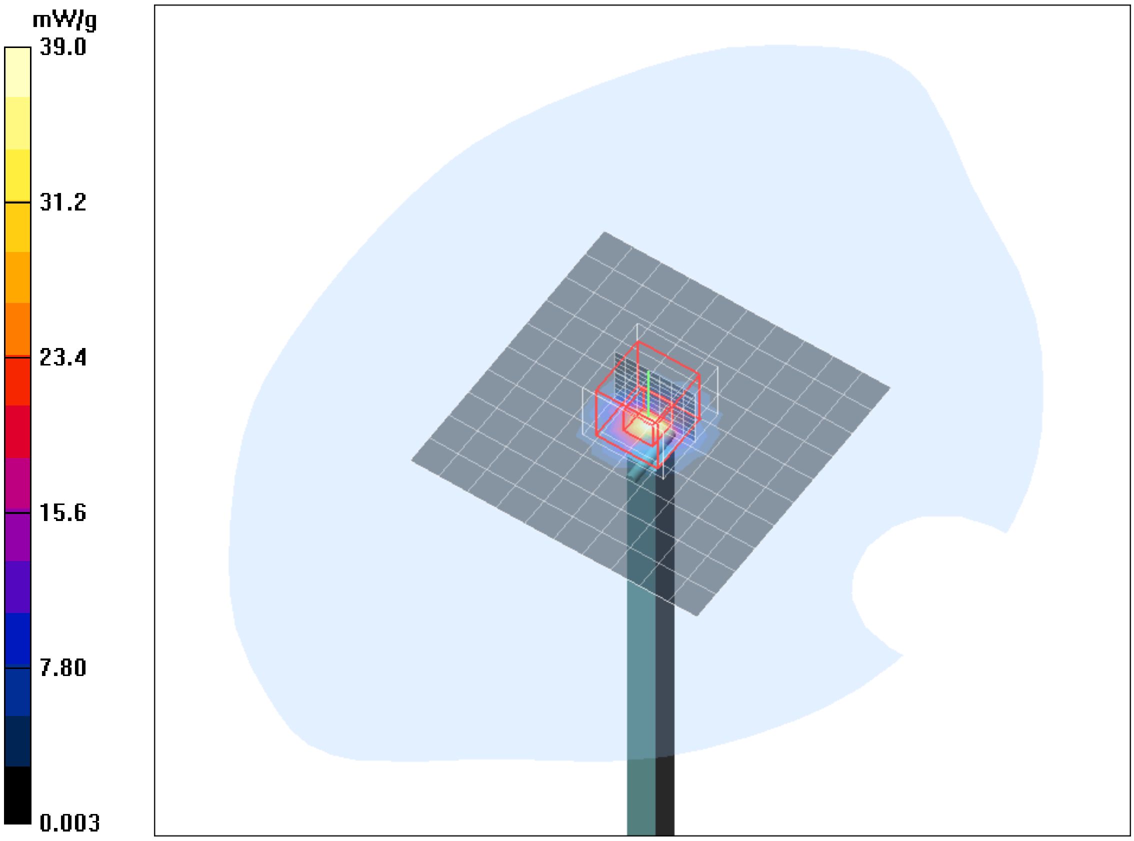

Fig. 7: Validation measurement 5250 MHz Body (May 28, 2015), coarse grid.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: 110515_b_3536_335_5600.da4
DUT: Dipole 5GHz SN: 1028; Type: D5GHzV2; Serial: D5GHzV2 - SN:1028
Program Name: System Performance Check at 5600 MHz

Communication System: CW; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.09 mho/m; ε_r = 35.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3536; ConvF(4.75, 4.75, 4.75); Calibrated: 24.07.2014
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 19.02.2015
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (9x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 36.0 mW/g
d=10mm, Pin=250mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 89.4 V/m; Power Drift = 0.061 dB
Peak SAR (extrapolated) = 82.0 W/kg
SAR(1 g) = 22.1 mW/g; SAR(10 g) = 6.42 mW/g
Maximum value of SAR (measured) = 43.0 mW/g

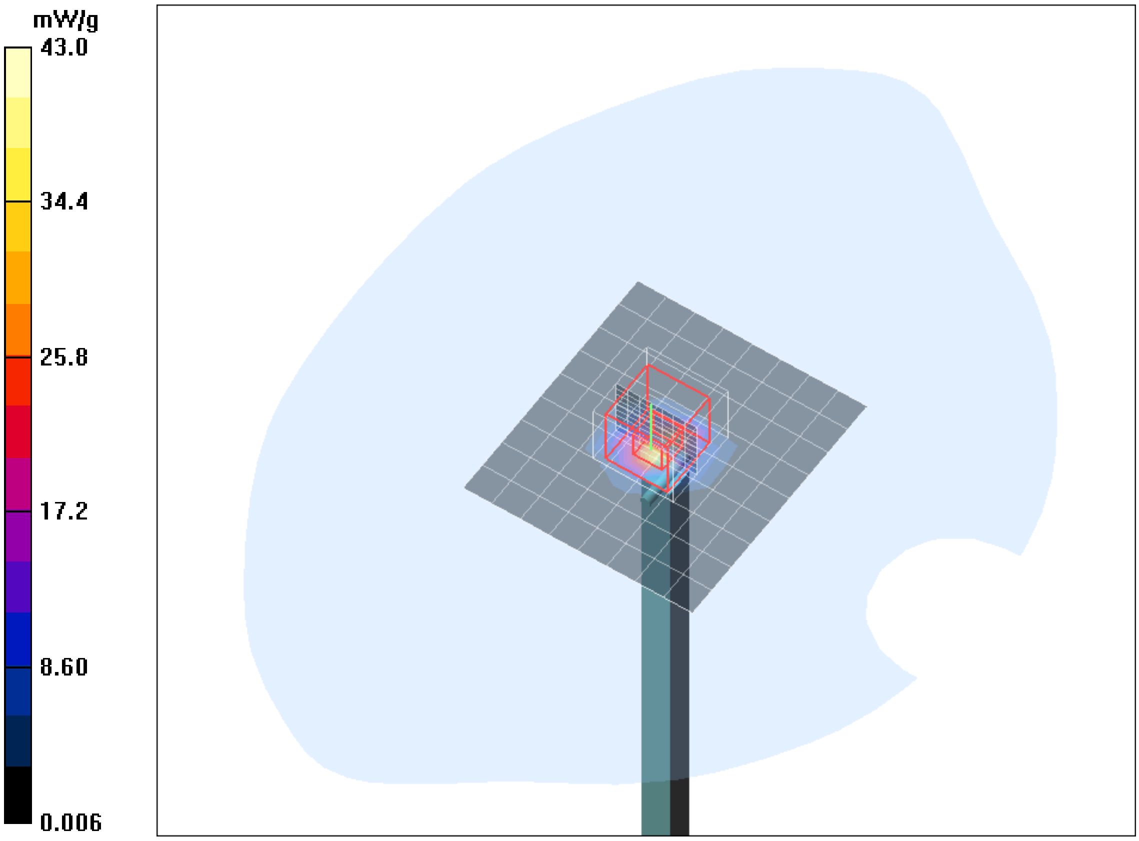

Fig. 8: Validation measurement 5600 MHz Head (May 11, 2015), coarse grid.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: 290515_b_3536_335_5600.da4
DUT: Dipole 5GHz SN: 1028; Type: D5GHzV2; Serial: D5GHzV2 - SN:1028
Program Name: System Performance Check at 5600 MHz

Communication System: CW; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.72 mho/m; ε_r = 50.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3536; ConvF(4.3, 4.3, 4.3); Calibrated: 24.07.2014
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 19.02.2015
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 42.8 mW/g
d=10mm, Pin=250mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 95.0 V/m; Power Drift = 0.044 dB
Peak SAR (extrapolated) = 76.9 W/kg
SAR(1 g) = 20.4 mW/g; SAR(10 g) = 5.72 mW/g
Maximum value of SAR (measured) = 39.7 mW/g

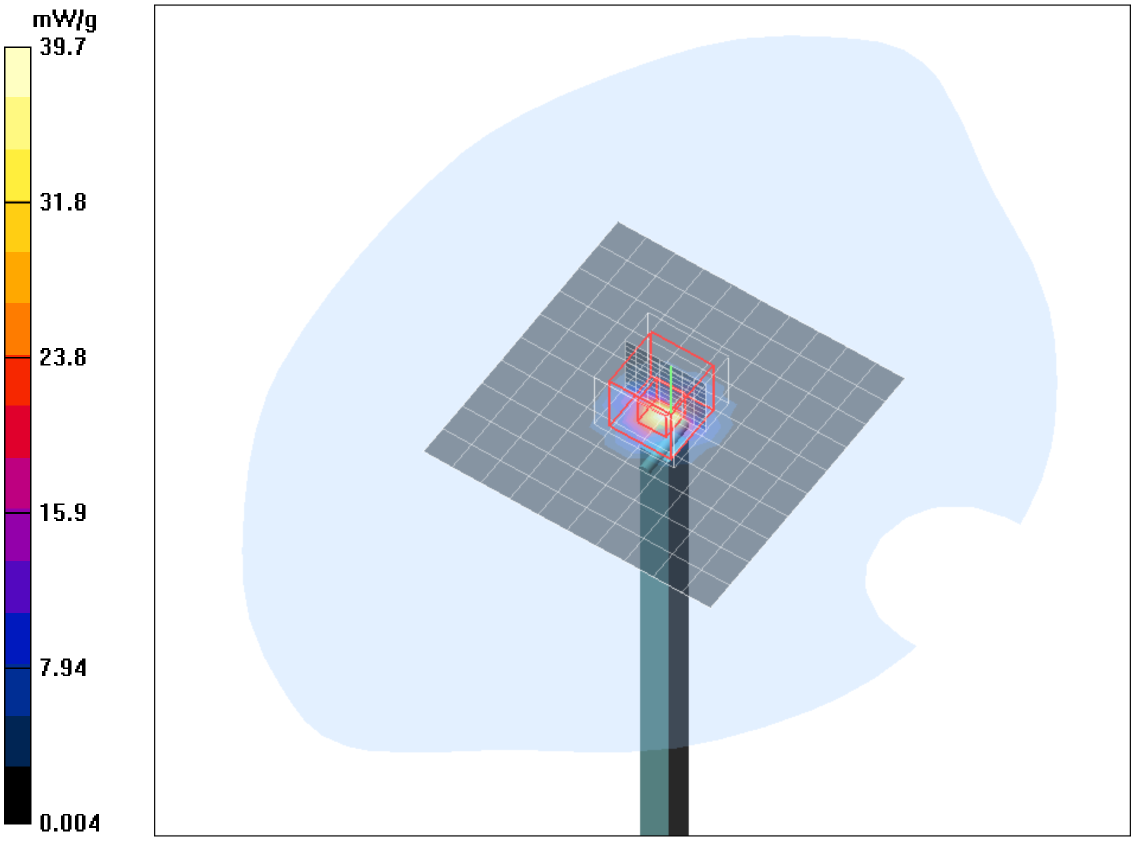

Fig. 9: Validation measurement 5600 MHz Body (May 29, 2015), coarse grid.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: 180515_b_3536_335_5750.da4

DUT: Dipole 5GHz SN: 1028; Type: D5GHzV2; Serial: D5GHzV2 - SN:1028
Program Name: System Performance Check at 5750 MHz

Communication System: CW; Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.25 mho/m; ε_r = 35.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3536; ConvF(4.67, 4.67, 4.67); Calibrated: 24.07.2014
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 19.02.2015
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (9x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 33.8 mW/g
d=10mm, Pin=250mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 87.7 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 77.3 W/kg
SAR(1 g) = 21.1 mW/g; SAR(10 g) = 6.14 mW/g
Maximum value of SAR (measured) = 41.7 mW/g

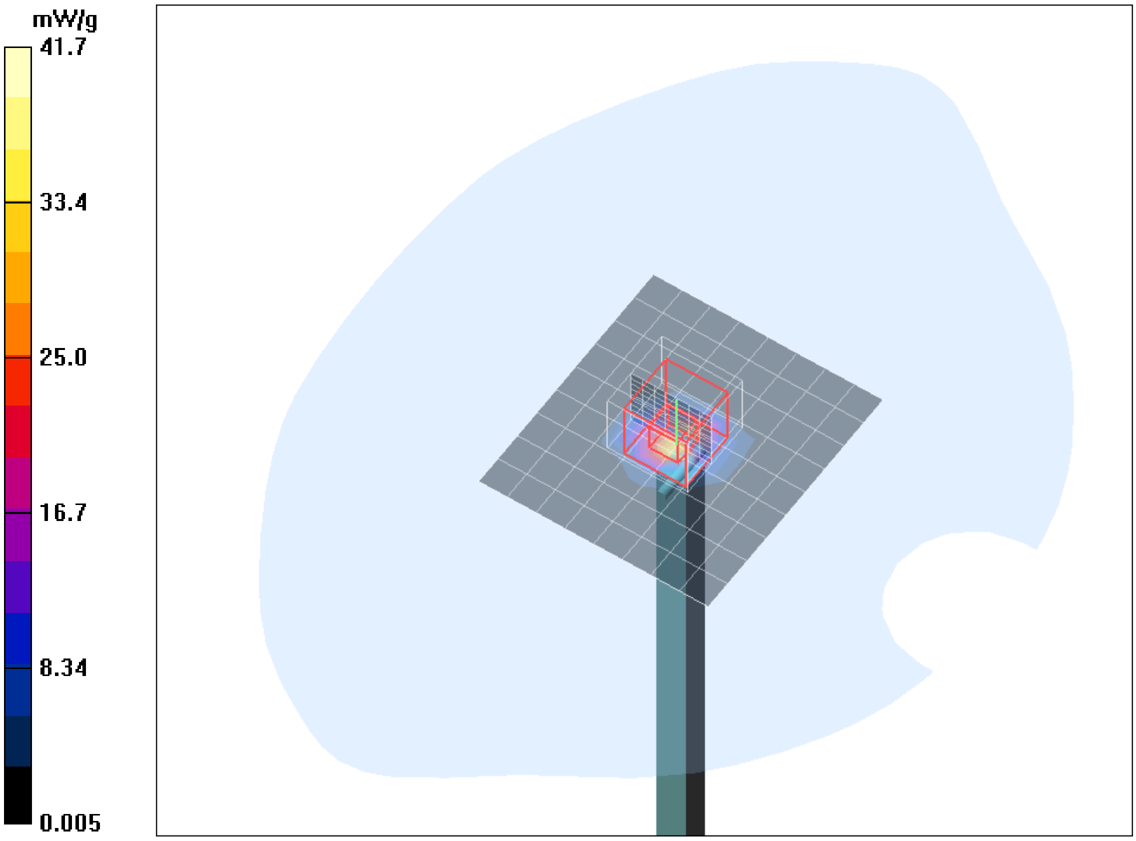

Fig. 10: Validation measurement 5750 MHz Head (May 18, 2015), coarse grid.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: 010615_b_3536_335_5750.da4

DUT: Dipole 5GHz SN: 1028; Type: D5GHzV2; Serial: D5GHzV2 - SN:1028
Program Name: System Performance Check at 5750 MHz

Communication System: 5 GHz ; Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.95 mho/m; ε_r = 49.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3536; ConvF(4.59, 4.59, 4.59); Calibrated: 24.07.2014
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 19.02.2015
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 42.0 mW/g
d=10mm, Pin=250mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 91.0 V/m; Power Drift = -0.082 dB
Peak SAR (extrapolated) = 72.7 W/kg
SAR(1 g) = 19.3 mW/g; SAR(10 g) = 5.44 mW/g
Maximum value of SAR (measured) = 37.8 mW/g

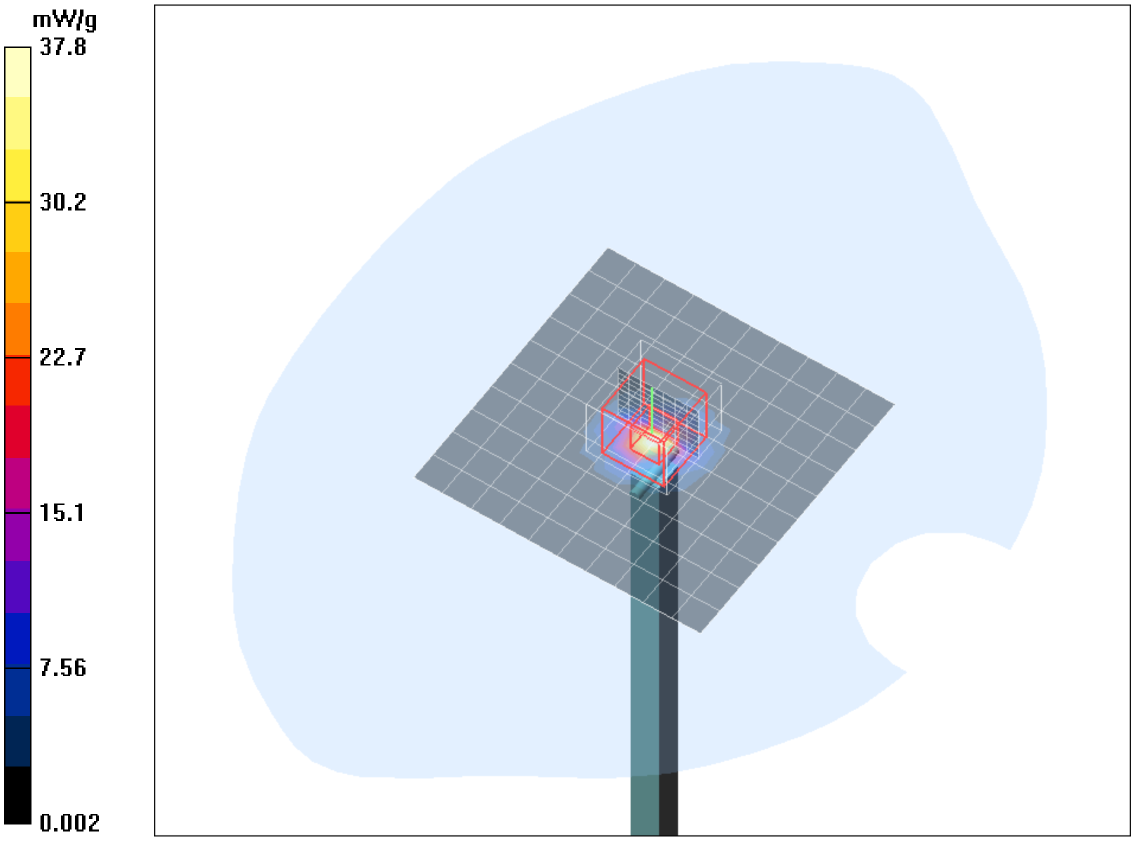

Fig. 11: Validation measurement 5750 MHz Body (June 1, 2015), coarse grid.

Uncertainty Budget						
Error Sources	**Uncertainty Value**	**Probability Distribution**	**Divisor**	**c_i**	**Standard Uncertainty**	**v_i^2 or v_{eff}**
Measurement System						
Probe calibration	± 4.8 %	Normal	1	1	± 4.8 %	∞
Axial isotropy	± 4.7 %	Rectangular	√3	1	± 2.7 %	∞
Hemispherical isotropy	± 0 %	Rectangular	√3	1	± 0 %	∞
Boundary effects	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Linearity	± 4.7 %	Rectangular	√3	1	± 2.7 %	∞
System detection limit	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Readout electronics	± 1.0 %	Normal	1	1	± 1.0 %	∞
Response time	± 0 %	Rectangular	√3	1	± 0 %	∞
Integration time	± 0%	Rectangular	√3	1	± 0 %	∞
RF ambient conditions	± 3.0 %	Rectangular	√3	1	± 1.7 %	∞
Probe positioner	± 0.4 %	Rectangular	√3	1	± 0.2 %	∞
Probe positioning	± 2.9 %	Rectangular	√3	1	± 1.7 %	∞
Algorithms for max SAR eval.	± 1.0 %	Rectangular	√3	1	± 0.6 %	∞
Dipole						
Dipole Axis to Liquid Distance	± 2.0 %	Rectangular	1	1	± 1.2 %	∞
Input power and SAR drift mea.	± 4.7 %	Rectangular	√3	1	± 2.7 %	∞
Phantom and Set-up						
Phantom uncertainty	± 4.0 %	Rectangular	√3	1	± 2.3 %	∞
Liquid conductivity (target)	± 5.0 %	Rectangular	√3	0.64	± 1.8 %	∞
Liquid conductivity (meas.)	± 2.5 %	Normal	1	0.64	± 1.6 %	∞
Liquid permittivity (target)	± 5.0 %	Rectangular	√3	0.6	± 1.7 %	∞
Liquid permittivity (meas.)	± 2.5 %	Normal	1	0.6	± 1.5 %	∞
Combined Uncertainty					± 8.4 %	

Table 23: Uncertainty budget for the system performance check.

6.6 Environment

To comply with the required noise level (less than 12 mW/kg) periodically measurements without a DUT were conducted.

Humidity: 40% ± 5 %

6.7 Test Equipment

Test Equipment	Model	Serial Number	Last Calibration	Next Calibration
DASY4 Systems				
Software Versions DASY4	V4.7	N/A	N/A	N/A
Software Versions SEMCAD	V1.8	N/A	N/A	N/A
Dosimetric E-Field Probe	EX3DV4	3536	07/2014	07/2015
Data Acquisition Electronics	DAE 3	335	02/2015	02/2016
Data Acquisition Electronics	DAE 4	631	07/2014	07/2015
Phantom	SAM	1176	N/A	N/A
Phantom	SAM	1341	N/A	N/A
Dipoles				
Validation Dipole	D2450V2	709	07/2014	07/2016
Validation Dipole	D5GHzV2	1028	06/2014	06/2016
Material Measurement				
Network Analyzer	E5071C	MY46103220	07/2013	07/2015
Dielectric Probe Kit	HP85070B	US33020263	N/A	N/A

Table 24: SAR equipment.

Test Equipment				
Test Equipment	**Model**	**Serial Number**	**Last Calibration**	**Next Calibration**
Power Meters				
Power Meter, Agilent	E4416A	GB41050414	02/2015	02/2017
Power Meter, Agilent	E4417A	GB41050441	02/2015	02/2017
Power Meter. Anritsu	ML2487A	6K00002319	02/2014	02/2016
Power Meter. Anritsu	ML2488A	6K00002078	02/2014	02/2016
Power Sensors				
Power Sensor, Agilent	E9301H	US40010212	03/2015	03/2017
Power Sensor, Agilent	E9301A	MY41495584	03/2015	03/2017
Power Sensor. Anritsu	MA2481B	031600	02/2014	02/2016
Power Sensor. Anritsu	MA2490A	031565	02/2014	02/2016
RF Sources				
Network Analyzer	E5071C	MY46103220	07/2013	07/2015
Rohde & Schwarz	SME300	100142	N/A	N/A
Amplifiers				
Mini Circuits	ZHL-42	D012296	N/A	N/A
Mini Circuits	ZHL-42	D031104#01	N/A	N/A
Mini Circuits	ZVE-8G	D031004	N/A	N/A
Radio Tester				
Rohde & Schwarz	CMU200	835305/050	N/A	N/A

Table 25: Test equipment, General.

6.8 Certificates of Conformity

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

Certificate of conformity

Item	Dosimetric Assessment System DASY4
Type No	SD 000 401A, SD 000 402A
Software Version No	DASY 4.7
Manufacturer / Origin	Schmid & Partner Engineering AG Zeughausstrasse 43, CH-8004 Zürich, Switzerland

References

[1] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003
[2] EN 50361:2001, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz – 3 GHz)", July 2001
[3] IEC 62209 – 1, "Specific Absorption Rate (SAR) in the frequency range of 300 MHz to 3 GHz – Measurement Procedure, Part 1: Hand-held mobile wireless communication devices", February 2005
[4] IEC 62209 – 2, Draft Version 0.9, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation and Procedures
Part 2: Procedure to determine the Specific Absorption Rate (SAR) for ... including accessories and multiple transmitters", December 2004
[5] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 01-01
[6] ANSI-C63.19-2006, "American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids", June 2006
[7] ANSI-C63.19-2007, "American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids", June 2007

Conformity

We certify that this **system is designed to be fully compliant** with the standards [1 – 7] for RF emission tests of wireless devices.

Uncertainty

The uncertainty of the measurements with this system was evaluated according to the above standards and is documented in the applicable chapters of the DASY4 system handbook.
The uncertainty values represent current state of methodology and are subject to changes. They are applicable to all laboratories using DASY4 provided the following requirements are met (responsibility of the system end user):

1) the system is used by an experienced engineer who follows the manual and the guidelines taught during the training provided by SPEAG,
2) the probe and validation dipoles have been calibrated for the relevant frequency bands and media within the requested period,
3) the DAE has been calibrated within the requested period,
4) the "minimum distance" between probe sensor and inner phantom shell and the radiation source is selected properly,
5) the system performance check has been successful,
6) the operational mode of the DUT is CW, CDMA, FDMA or TDMA (GSM, DCS, PCS, IS136, PDC) and the measurement/integration time per point is ≥ 500 ms,
7) if applicable, the probe modulation factor is evaluated and applied according to field level, modulation and frequency,
8) the dielectric parameters of the liquid are conformant with the standard requirement,
9) the DUT has been positioned as described in the manual.
10) the uncertainty values from the calibration certificates, and the laboratory and measurement equipment dependent uncertainties, are updated by end user accordingly.

Date 24.4.2008 **Signature / Stamp**

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Fig. 12: Certificate of conformity for the used DASY4 system:

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 18.11.2001

Signature / Stamp

Schmid & Partner
Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

Fig. 13: Certificate of conformity for the used SAM phantom.

6.9 Pictures of the Device under Test

Figure 14 - 17 show the device under test.

Fig. 14: Antenna locations and defining device sides for testing purpose of INARI5-WLAN-1 from Aava Mobile Oy.

Fig. 15: Front view of the INARI5-WLAN-1 .

Fig. 16: Back view of the INARI5-WLAN-1..

Fig. 17: Side view of the INARI5-WLAN-1 with attached headset. .

6.10 Test Positions for the Device under Test

Fig. 18 – 22 show the test positions for the SAR measurements.

Fig. 18: Front side towards the phantom, 5mm distance.

Fig. 19: Back side towards the phantom, 5mm distance.

Fig. 20: Right side towards the phantom, 5mm distance.

Fig. 21: Bottom side towards the phantom, 5mm distance.

Fig. 22: Back side towards the phantom, 5mm distance, headset attached.

Fig. 23 – 26 show the test positions for the SAR measurements.

Fig. 23: Right Cheek of phantom.

Fig. 24: Right Tilted towards the phantom.

Fig. 25: Left Cheek of phantom.

Fig. 26: Left Tilted towards the phantom.

6.11 Pictures to Demonstrate the Required Liquid Depth

Figure 27 - 30 show the liquid depth in the used SAM phantom.

Fig. 27: Liquid depth for 2.4 GHz head measurements.

Fig. 28: Liquid depth for 5 GHz head measurements.

Fig. 29: Liquid depth for 2.4 GHz body measurements.

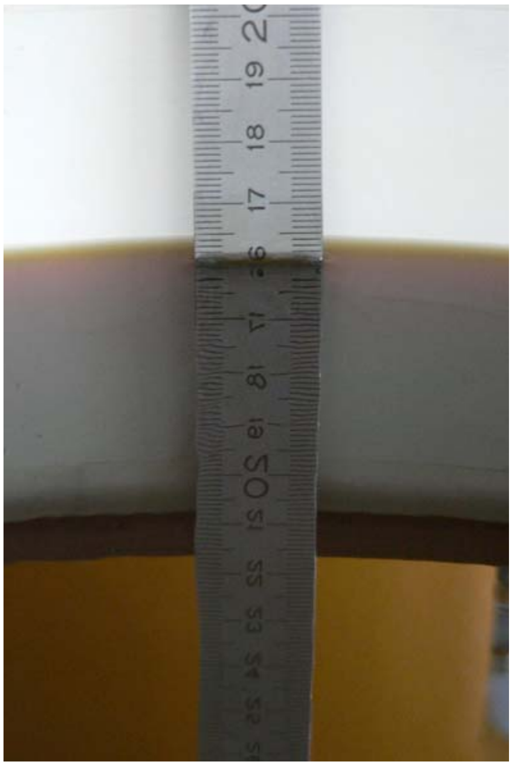

Fig. 30: Liquid depth for 5 GHz body measurements.

7 References

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