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AT4 Wireless a DEKRA company

DEKRA

ilac-MRA ENAC ENSAYOS Nº 51/LE147

Test report No:

NIE: 49467RAN.002

Test report
REFERENCE STANDARDS:
FCC 47CFR Part 2.1093
ISED RSS -102 Issue 5:2015

Identification of item tested.................................:	Laser Range Meter
Trade ....:	HILTI
Model and /or type reference ....:	PD-CS (01)
Other identification of the product ....:	-
Final HW version ....:	4.00
Final SW version ....:	2.3.9
Features...:	BT, WLAN
Manufacturer...:	HILTI CORPORATION Feldkircherstr. 100 FL-9494 Schaan Principality of Liechtenstein
Test method requested, standard........................:	1. FCC 47 CFR Part 2.1093. (10-1-14 Edition) Radiofrequency radiation exposure evaluation: portable devices. 2. ISED RSS-102 Issue 5 (2015-03) – Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
Summary...:	Considering the results of the performed test according to FCC 47CFR Part 2.1093 and ISED RSS-102 Issue 5, the item under test is IN COMPLIANCE with the requested specifications specified in the standards. The maximum 1g volume averaged SAR found during this test into body-worn exposure condition has been 0.274 W/kg, for 802.11 b mode. NOTE: The results presented in this Test Report apply only to the particular item under test established in page 1 of this document, as presented for test on the date(s) shown in section, “USAGE OF SAMPLES, TESTING PERIOD AND ENVIRONMENTAL CONDITIONS”.

Approved by (name / position & signature) ......:	Miguel Lacave Antennas Lab Manager MIGUEL LACAVE GARCÍA 2016.11.03 15:33:58 +01'00'
Date of issue ....:	2016-11-03
Report template No...:	FDT08_18

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In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance program for its measurement equipment.

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Uncertainty

Uncertainty (factor k=2) was calculated according to the following documents:

1. FCC OET KDB 865664 D01 - SAR Measurement Requirements for 100 MHz to 6 GHz v01r04 (August 2015).

Usage of samples

Samples undergoing test have been selected by: the client

Sample M/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
49467/006	Laser Meter	PD-CS (01)	-	2016-05-24
49467/010	USB Cable	-	-	2016-05-24
49467/015	AC/DC Adapter	-	-	2016-05-24

Sample M/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
49467/001	Laser Meter	PD-CS (01)	-	2016-05-24
49467/010	USB Cable	-	-	2016-05-24
49467/015	AC/DC Adapter	-	-	2016-05-24

1. Sample M/01 has undergone the test(s) specified in subclause "Test method requested": Conducted average output power.
2. Sample M/02 has undergone the test(s) specified in subclause "Test method requested": SAR evaluation for 802.11 b/g/n modes.

Test sample description

The test sample consists of a laser meter.

Identification of the client

Company name: Bittium Wireless ltd.

Postal Address: Tutkijantie 8, 90590 Oulu, FINLAND

Contact person: Tomi Latvasalo

Job title / Department: PVV HW Test Manager

Telephone: +358 40 344 5846

e-mail: tomi.latvasalo@bittium.com

Testing period

The performed test started on 2016-05-24 and finished on 2016-05-26.

The tests have been performed at AT4 wireless.

Environmental conditions

In the laboratory for measurements, the following limits were not exceeded during the test:

Temperature	Min. = 22.87 ºC Max. = 24.88 ºC
Relative humidity	Min. = 41.89 % Max. = 54.68 %

References

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IC RSS-102 Issue 5 (2015-03) – Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) and the following FCC Published RF exposure KDB procedures:

1. FCC KDB 447498 D01 General RF Exposure Guidance v06 (October 2015)
2. FCC KDB 865664 D01 - SAR Measurement Requirements for 100 MHz to 6 GHz v01r04 (August 2015).
3. FCC KDB 865664 D02 RF Exposure Reporting v01r02 (October 2015)
4. FCC KDB 941225 D07 UMPC Mini Tablet v01r02 (October 2015)
5. FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02 (October 2015).

Remarks and comments

1: Zoom scan is not required according to FCC OET KDB 447498 D01 General RF Exposure Guidance v06, paragraph “4.4.2. Area scan based 1-g estimation”.

2: Testing of other required channels is not required according to FCC OET KDB 447498 D01 General RF Exposure Guidance v06, paragraph “4.4.1. General SAR test reduction considerations”.

3: Only the plots of the highest reported SAR for each test position and mode/band are included in appendix C.

Used instrumentation

1. Dosimetric E-field probes SPEAG ES3DV3
2. Data acquisition device SPEAG DAE4
3. Electro-optical converter SPEAG EOC3
4. 2450 MHz dipole validation kit SPEAG D2450V2
5. Robot STÄUBLI RX60BL, Robot controller STÄUBLI CS7MB
6. Measurement server SPEAG DASY5 SE UMS 011 BS
7. Oval flat phantom SPEAG ELI 4
8. SPEAG Mounting Device for Hand-Held Transmitters.
9. SAR measurement software SPEAG DASY52 V52.8.8.1222
10. SAR postprocessing software SPEAG SEMCAD X
11. Head Tissue Equivalent Liquid for 2450 MHz band
12. Vector network analyzer Agilent FieldFox N9923A
13. Dielectric probe kit SPEAG DAK-3.5
14. Power sensor DC 50 MHz to 18 GHz R&S model NRP-Z81
15. Power meter Agilent E4419B
16. DC Power supply Agilent U8002A
17. Dual directional coupler NARDA 4227-16
18. Power amplifier MITEQ AMF-4D-00400600-50-30P
19. 6 dB attenuator Weinschel 75 A-6-11
20. 20 dB attenuator Weinschel 75 A-20-11
21. Anritsu MT8852A Bluetooth testing unit.
22. Digital thermometer LKM Electronics model DTM300-Spezial
23. Temperature and humidity probe HUMIDIROBE Pico Technology.

Testing verdicts

Not applicable ....:	N/A
Pass ....:	P
Fail ....:	F
Not measured ....:	N/M

2450 MHz band

FCC 47CFR Part 2.1093 & IC RSS-102 Issue 5	**VERDICT**			
	NA	**P**	**F**	**NM**
802.11b		P		
802.11g		P		
802.11n		P		
Bluetooth		P		

Appendix A – Test configuration

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1. GENERAL INTRODUCTION

1.1. Application Standard

The Federal Communications Commission (FCC) sets the limits for General Population/Uncontrolled exposure to radio frequency electromagnetic fields for transmitting devices designed to be used within 20 centimetres of the body of the user under FCC 47 CFR Part 2.1093 - "Radiofrequency radiation exposure evaluation: portable devices", paragraph (d)(2).

Industry of Canada (ISED) sets the limits for General Population/Uncontrolled exposure when the expsosure occurs at a distance of 0.2 m or less into the Health Canada Safety Code 6, paragraph 2.1 "Basic restrictions".

1.2. General requirements

The SAR measurement has been performed continuing the following considerations and environment conditions:

- The ambient temperature shall be in the range of 18ºC to 25ºC and the variation shall not exceed +/- 2ºC during the test.
- The ambient humidity shall be in the range of and 30% - 70%.
- The device battery shall be fully charged before each measurement.

1.3. Measurement system requirements

The measurement system used for SAR tests fulfils the procedural and technical requirements described at the reference standards used.

1.4. Phantom requirements

The phantom model for body measurements is an elliptical open-top container with a flat bottom, with the following shape and dimensions:

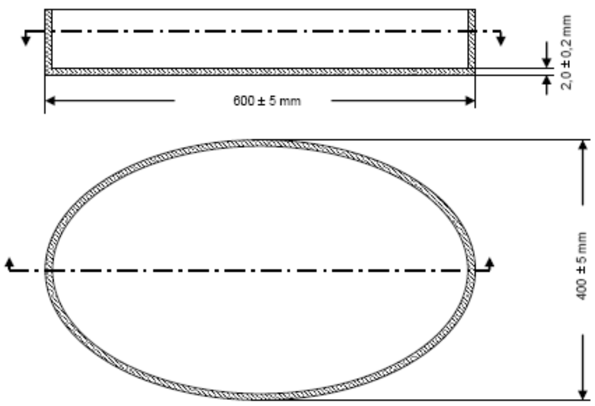

Figure 1: Proportions and shape of Phantom shell

1.5. Measurement Liquids requirements.

The liquids used to simulate the human tissues, must fulfils the requirements of the dielectric properties required. These target dielectric properties per FCC OET KDB 865664 D01 instructions come from the dipole and probe calibration data which are included in Appendix B, Section 3, of this document.

To minimize the effect of reflections on peak spatial-average SAR values, from the upper surface of the tissue-equivalent liquid, the depth of the liquid should be at least 15 cm.

2. MEASUREMENT SYSTEM

2.1. Measurement System

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

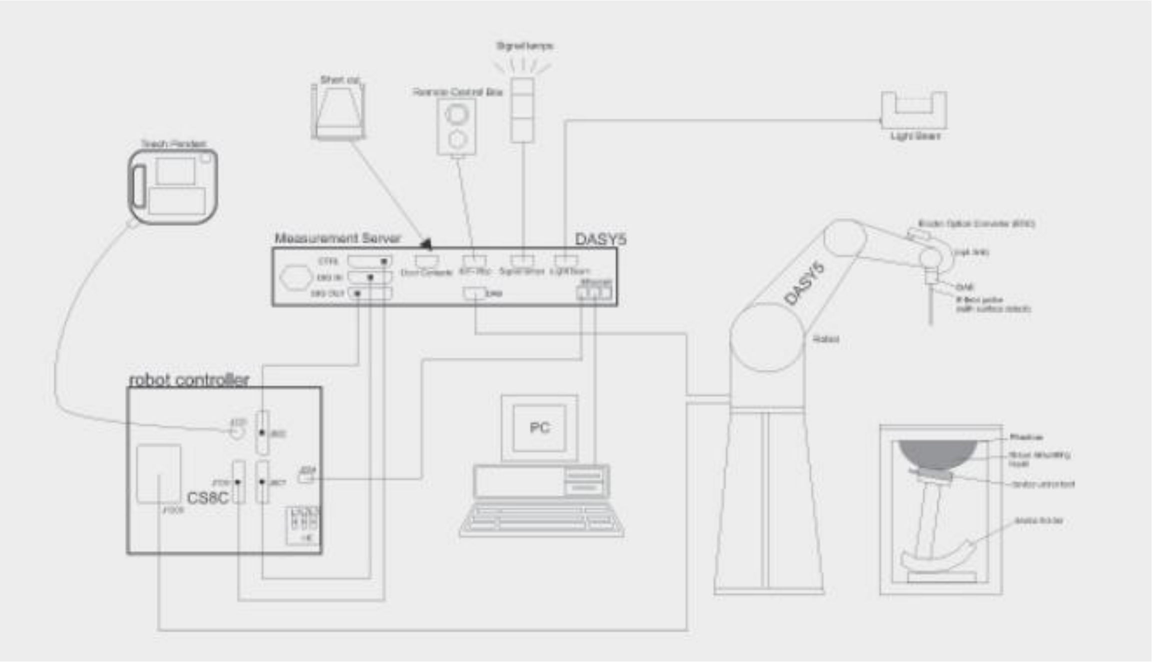

Figure 2: SAR Measurement system

- A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 professional operating system and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

Manufacturer	Device	Type
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	ES3DV3
Schmid & Partner Engineering AG	Data Acquisition Electronics	DAE4
Schmid & Partner Engineering AG	Electro-Optical Converter	EOC3
Stäubli	Robot	RX60BL
Stäubli	Robot controller	CS7MB
Schmid & Partner Engineering AG	Measurement Server	DASY5 SE UMS 011 BS
Schmid & Partner Engineering AG	Oval flat phantom	SPEAG ELI 4
Schmid & Partner Engineering AG	Mounting Device for Hand-Held Transmitters	SD000 HD1HA
Schmid & Partner Engineering AG	Measurement Software	DASY52 V52.8.8.1222
Schmid & Partner Engineering AG	Postprocessing Software	SEMCAD X
Schmid & Partner Engineering AG	2450 MHz System Validation Dipole	D2450V2
Agilent	Vector Network Analyser	FieldFox N9923A
Schmid & Partner Engineering AG	Dielectric Probe Kit	DAK-3.5

Table 1: Measurement Equipment

Model	ES3DV3
Construction	Symmetrical design with triangular core. Interleaved sensors. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm

Model	DAE4
Construction	Signal amplifier, multiplexer, A/D converter, and control logic. Serial optical link communication with DASY4/5 embedded system (fully remote controlled). Two-step probe tocuh detector for mechanical surface detection and emergency robot stop.
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)
Input Offset Voltage	< 5 µV (with auto zero)
Input Resistance	200 MOhm
Input Blas Current	< 50 fA

Model	ELI
Construction	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	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2 ± 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

Model	Mounting Device for Hand-Held Transmitters
Construction	In combination with the Twin SAM V5.0/V5.0c or ELI Phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).
Material	Polyoxymethylene (POM)

Model	System Validations Kits 450 MHz – 6 GHz		
Construction	Symmetrical dipole with l/4 balun. Enables measurement of feedpoint impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.		
Frequency	450 MHz to 5800 MHz		
Return Loss	20 dB at specified validation position		
Dimensions (length and overall height in mm)	**Product**	**Dipole length**	**Overall height**
	D450V3	290.0	330.0
	D750V3	179.0	330.0
	D900V2	148.5	340.0
	D1800V2	72.5	300.0
	D2000V2	65.0	300.0
	D2450V2	52.0	290.0
	D2600V2	49.2	290.0
	D5GHzV2	20.6	300.0

2.2. Test Positions of device relative to body

The device under test has a display and an overall diagonal dimension ≤ 20 cm. According to KDB 941225 D07 UMPC Mini Tablet v01r02, UMPC mini tablet devices must be tested for 1-g SAR on all surfaces and edges with a transmitting antenna located at ≤ 25 mm from that surface or edge, at 5 mm separation from a flat phantom, for the datas modes, wireless technologies and frequency bands supported by the device to determine SAR compliance. When 1-g SAR is tested at 5 mm, 10-g SAR is not required.

2.3. Test to be performed

DUT will be placed at the center of flat phantom. The DUT position using during the body SAR tests will be the one where the maximum peak SAR was found. Each data mode, wireless technology and frequency band supported by the device must be tested. Low and high channels for each band should be tested at this position.

If the DUT is also designed to transmit with other configurations (antenna fully extended/retracted, keypad cover opened/closed…), all tests described above shall be performed for each configuration. When considering multi-mode and multi-band mobile phones, all of the tests shall be performed at each transmitting mode/band with the corresponding maximum peak power level.

2.4. Description of interpolation/extrapolation scheme

The local SAR inside the Phantom is measured using small dipole sensing elements inside a probe element. The probe tip must not be in contact with the Phantoms surface in order to minimise measurement errors, but the highest local SAR is obtained from measurements at a certain distances from the shell trough extrapolation. The accurate assessment of the maximum SAR averaged over 1 gr and 10 gr. requires a very fine resolution in the three dimensional scanned data array. Since the measurements have to be performed over a limited time, the measured data have to be interpolated to provide an array of sufficient resolution.

The interpolation of 2D area scan is used after the initial area scan, at a fixed distance from the Phantom shell wall. The initial scan data is collected with approx. 15 mm spatial resolution and this interpolation is used to find the location of the local maximum for positioning the subsequent 3D scanning within a 1 mm resolution.

For the 3D scan, data is collected on a spatially regular 3D grid having 5 mm steps in both directions. After the data collection by the SAR probe, the data are extrapolated in the depth direction to assign values to points in the 3D array closer to the shell wall. A notional extrapolation value is also assigned to the first point outside the shell wall so that subsequent interpolation schemes will be applicable right up to the shell wall boundary.

2.5. Determination of the largest peak spatial-average SAR

To determine the maximum value of the peak spatial-average SAR of a DUT, all device positions, configurations and operational modes should be tested for each frequency band.

The averaging volume shall be chosen as 1gr. of contiguous tissue. The cubic volumes, over which the SAR measurements are averaged after extrapolation and interpolation, are chosen in order to include the highest values of local SAR.

The maximum SAR level for the DUT will be the maximum level obtained of the performed measurements, and indicated in the previous points.

2.6. System Validation

Prior to the SAR measurements, system verification is done to verify the system accuracy. A complete SAR evaluation is done using a half-wavelength dipole as source with the frequency of the mid-band channel of the operating band, or within 10% of this channel.

The measured 1 gr. and 10 gr. SAR should be within 10% of the expected target values specified in the calibration certificate of the dipole, for the specific tissue and frequency used.

3. UNCERTAINTY

According to FCC OET KDB 865664 D01 - SAR Measurement Requirements for 100 MHz to 6 GHz v01r04 (August 2015), as the highest measured 1-g SAR has been < 1.5 W/kg, SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in the actual SAR report, but it has been included for ISO 17025 accreditation.

Uncertainty for 300 MHz – 6 GHz

ERROR SOURCES	Uncertainty value (± %)	Probability distribution	Divisor	(c_i) 1g	(c_i) 10g	Standard uncertainty (1g) (± %)	Standard uncertainty (10g) (± %)
Measurement Equipment							
Probe Calibration	6.550	N	1	1	1	6.550	6.550
Axial Isotropy	4.700	R	√3	0.7	0.7	1.899	1.899
Hemisfericall Isotropy	9.600	R	√3	0.7	0.7	3.880	3.880
Boundary effect	2.000	R	√3	1	1	1.155	1.155
Linearity	4.700	R	√3	1	1	2.714	2.714
System Detection limits	1.000	R	√3	1	1	0.577	0.577
Probe modulation response	6.100	R	√3	1	1	3.522	3.522
Readout electronics	0.300	N	1	1	1	0.300	0.300
Response time	0.800	R	√3	1	1	0.462	0.462
Integration time	2.600	R	√3	1	1	1.501	1.501
RF Ambient noise	3.000	R	√3	1	1	1.732	1.732
RF Ambient reflections	3.000	R	√3	1	1	1.732	1.732
Probe positioner mech. restrictions	0.800	R	√3	1	1	0.462	0.462
Probe positioning with respect to phantom shell	6.700	R	√3	1	1	3.868	3.868
Max. SAR Eval.	4.000	R	√3	1	1	2.309	2.309
Test Sample Related							
Device holder uncertainty	2.900	N	1	1	1	2.900	2.900
Test sample positioning	3.600	N	1	1	1	3.600	3.600
Drift of output power	5.000	R	√3	1	1	2.887	2.887
Phantom and Setup							
Phantom uncertainty (shape and thickness tolerances)	6.600	R	√3	1	1	3.811	3.811
Algorithm for correcting SAR for deviations in permittivity and conductivity	1.900	R	√3	1	0.84	1.097	0.921
Liquid conductivity (meas.)	2.454	N	1	0.78	0.71	1.914	1.742
Liquid permittivity (meas.)	2.454	N	1	0.26	0.26	0.6.38	0.638
Liquid conductivity – temperature uncertainty	3.400	R	√3	0.78	0.71	1.531	1.394
Liquid permittivity – temperature uncertainty	0.400	R	√3	0.23	0.26	0.053	0.060
Combined standard uncertainty	$u_c = \sqrt{\sum_{1=1}^{m} c_i^2 \cdot u_i^2}$					**12.82**	**12.76**
Expanded uncertainty (confidence interval of 95%)	*ue =2.00 uc*					**25.64**	**25.53**

Table 2: Uncertainty Assessment for 300 MHz - 6 GHz

4. SAR LIMIT

Having a worst case measurement, the SAR limit is valid for general population/uncontrolled exposure.

The SAR values have to be averaged over a mass of 1 gr. (SAR 1 gr.) with the shape of a cube and averaged over a mass of 10 gr (Extremity SAR 10 gr). These levels couldn't exceed the values indicated in the application Standard:

Standard	Exposure	SAR	SAR Limit (W/kg)
FCC 47 CFR Part 2.1093, Paragraph (d)(2) RSS-102 Issue 5 (2015-03), Paragraph 4	General population/Uncontrolled	$SAR_{1\ gr.}$	1.6

Table 3: SAR limit

5. DEVICE UNDER TEST

5.1. Dimensions

Dimensions	Millimetres
Height x Width x Depth	155.0 x 77.0 x 20.0
Overall Diagonal:	165.0
Display Diagonal:	101.0

Table 4: Dimensions

5.2. Wireless Technology

Wireless Technology	Frequency Bands	Modes
Wi-Fi	2.45 GHz	- 802.11b/g/n(20MHz & 40MHz)
Bluetooth	2.45 GHz	- Bluetooth (BR, EDR2, EDR3)
Note: WiFi cannot transmit simultaneously with Bluetooth Radio.		

Table 5: Supported modes

5.3. Antenna Location

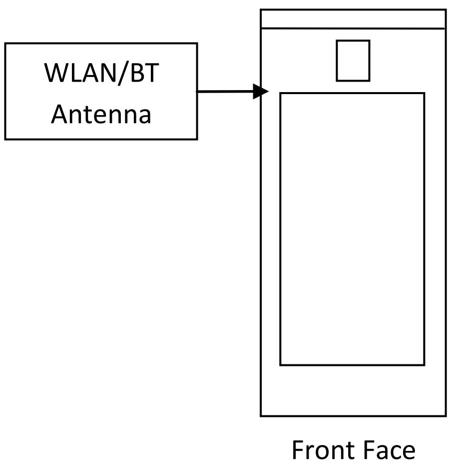

Figure 3: Antenna diagram location sketch

Appendix B – Test results

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1. TEST CONDITIONS

1.1. Power supply (V):

V_n = 3.8 Lithium Ion rechargeable battery

Type of power supply = DC Voltage from 3120 mAh rechargeable Li-Ion 3.6 V battery.

1.2. Temperature (ºC):

T_n = +20.00 to +25.00

The subscript n indicates normal test conditions.

1.3. Test signal, Output Power and Frequencies

For the 802.11 b/g/n modes, the device was put into operation by using a manufacturer proprietary test mode, setting the maximum output power for each mode. The duty factor was set to maximum (aprox. 100%).

The actual SAR sample does not have accessible antenna connectors for conducted measurements, so the conducted average output power was measured using others identical samples (M/01) provided by the manufacturer with auxiliary external connectors that makes the measurements representative and applicable for all the tested samples. See 'usage of samples' paragraph of this report.

The maximum conducted time-averaged power of the device for each mode was measured with a power sensor R&S NRP-Z81.

A fully charged battery was used for every test sequence. In all operating bands and test position, the measurements were performed on middle channels. In each band, for those positions where the maximum averaged SAR was found, measurements were performed on lowest and highest channels except those with applicable test reductions [1, 4, 5, 6, 7.]

1, 4, 5, 6 and 7: See remarks and comments

The DUT doesn't support simultaneous transmission, so only standalone transmission operation has been evaluated.

The maximum target output power alignments for RF components declared by the manufacturer are:

Band	Output Power (dBm)				
	802.11b	802.11g	802.11n20	802.11n40	Bluetooth
2.45 GHz	15.0	12	12	12	11.5

1.4. DUT and test-site configurations

The device under is a wireless enabled laser meter with the ability to transmit while being used. All surfaces and edges with a transmitting antenna located at ≤ 25 mm from that surface or edge, has been tested at 5 mm separation from the flat phantom:

Edges	Distance (mm)	SAR testing needed
Top	15	Yes
Bottom	>25	No
Left	5	Yes
Right	>25	No

2. CONDUCTED AVERAGE POWER MEASUREMENTS

2.1. Wi-Fi & Bluetooth

- 2.4 GHz Band:

Band	Mode	Channel / Freq (MHz)	Average Output Power (dBm)
2.4 GHz	802.11b	1/2412	13.78
		6/2437	13.69
		11/2462	13.39
	802.11g	1/2412	11.23
		6/2437	11.05
		11/2462	11.33
	802.11n20	1/2412	11.08
		6/2437	11.43
		11/2462	11.20
	802.11n40	3/2422	9.08
		6/2437	8.89
		9/2452	9.39

Band	Mode	Channel / Freq (MHz)	Average Output Power (dBm)
2.4 GHz	Bluetooth BR (GFSK)	0 / 2402	10.58
		39 / 2441	10.50
		78 / 2480	9.50
	Bluetooth EDR2 (π/4-DQPSK)	0 / 2402	6.88
		39 / 2441	6.99
		78 / 2480	6.44
	Bluetooth EDR3 (8-DPSK)	0 / 2402	6.87
		39 / 2441	6.98
		78 / 2480	6.43

3. TISSUE PARAMETERS MEASUREMENTS

Frequency (MHz)	Target Body Tissue		Measured Body Tissue		Deviation %		Measured Date
	Permittivity ε	Conductivity σ [S/m]	Permittivity ε	Conductivity σ [S/m]	Permittivity ε	Conductivity σ [S/m]	
2450	52.7	1.95	51.21	2.01	-2.83	3.03	2016/05/25

Note: The dielectric properties have been measured by the contact probe method at 22° C.

- Composition / Information on ingredients

Head and Muscle Tissue Simulation Liquids HBBL1900-3800V3/M HBBL1900-3800V3

Water	50 – 73 %
Non-ionic detergents	27 – 50 % polyoxyethylenesorbitan monolaurate
NaCl	0 – 2 %
Preservative	0.05 – 0.1% Preventol-D7
Safety relevant ingredients:	
CAS-No. 55965-84-9	< 0.1 % aqueous preparation, containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyyl-3(2H)-isothiazolone
CAS-No. 9005-64-5	<50 % polyoxyethylenesorbitan monolaurate

4. SYSTEM CHECK MEASUREMENTS

4.1. Validation results for Body TSL

Date	Frequency (MHz)	SAR over	Fast SAR (W/kg)	SAR (W/kg)	Δ SAR - Fast SAR	1 W Target SAR (W/kg)	1 W Norm. SAR (W/kg)	Drift (%)
2016/02/26	2450	1 gr.	13.20	13.40	< ±3%	52.1	53.29	2.29
		10 gr.	5.90	6.27	< ±7%	24.4	24.94	2.20

5. MEASUREMENT RESULTS FOR SAR (SPECIFIC ABSORPTION RATE)

5.1. Summary maximum results for 1-g body SAR measurements.

Band	Mode	Position/ Distance	Channel (Frequency)	Reported SAR 1-g (W/kg)	Limit SAR 1-g (W/kg)
2450 MHz	802.11b	Back face 5 mm	CH 6 (2437 MHz)	0.274	2.0

5.2. Results for Wi-Fi 2450 MHz Band.

Position	Dist (mm)	Mode	Channel	Freq (MHz)	Fast SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Max Output Power (dBm)	Reported SAR 1-g (W/kg)	Plot No.
Front face	5	802.11b	6	2437	0.129	NM[1]	-0.23	15.0	0.175	
Back face	5	802.11b	6	2437	0.207	0.203	1.39	15.0	0.274	1
Left edge	5	802.11b	6	2437	0.122	NM[1]	1.16	15.0	0.166	
Top edge	5	802.11	6	2437	0.039	NM[1]	2.80	15.0	0.053	
Back face	5	802.11b	1	2412	NM[2]					
Back face	5	802.11b	11	2462	NM[2]					

1 and 2: See remarks and comments

- 2.4 GHz 802.11g/n OFDM modes

The highest reported SAR for 802.11b mode and worst case exposure condition is 0.274 W/Kg.

802.11 b Max declared Power = 15.0 dBm → 31.62 mW
802.11 g Max declared Power = 12.0 dBm → 15.85 mW
802.11 n20 Max declared Power = 12.0 dBm → 15.85 mW
802.11 n40 Max declared Power = 12.0 dBm → 15.85 mW

Adjusted SAR for 802.11g: 0.274 W/Kg x (15.85/31.62) = 0.137 W/Kg
Adjusted SAR for 802.11n20: 0.274 W/Kg x (15.85/31.62) = 0.137 W/Kg
Adjusted SAR for 802.11n40: 0.274 W/Kg x (15.85/31.62) = 0.137 W/Kg

As Adjusted SAR value for all 2.4 GHz 802.11g/n OFDM modes are ≤ 1.2 W/Kg, SAR measurements are not required for these 802.11 g/n OFDM modes.

5.3. Results for Bluetooth 2450 MHz Band.

Position	Dist (mm)	Mode	CH	Freq (MHz)	Fast SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Max Output Power (dBm)	Reported SAR 1-g (W/kg)	Plot No.
Front face	5	GFSK DH5	40	2441	0.040	NM[1]	2.92	11.5	0.050	
Back face	5	GFSK DH5	40	2441	0.070	0.07	3.40	11.5	0.088	2
Left edge	5	GFSK DH5	40	2441	0.049	NM[1]	-1.03	11.5	0.063	
Top edge	5	GFSK DH5	40	2441	0.008	NM[1]	2.09	115	0.010	
Back face	5	GFSK DH5	1	2402	NM[2]					
Back face	5	GFSK DH5	79	2480	NM[2]					

1 and 2: See remarks and comments

5.4. Variability results.

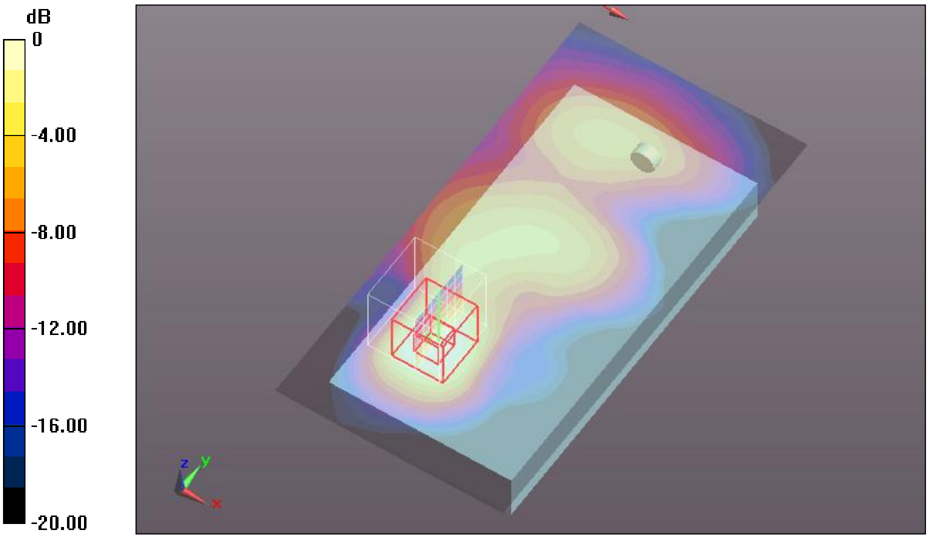
According to KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, paragraph "2.8.1. SAR measurement variability", repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. Therefore, repeated measurements are not necessary.

Appendix C – Measurement report

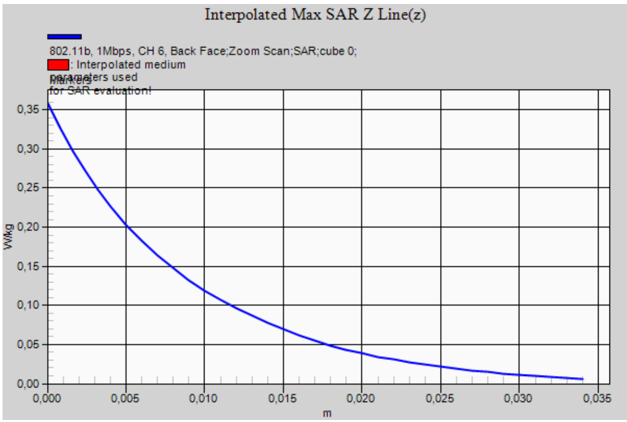
802.11b – 2450MHz – Back Face, d=5 mm – Middle Channel – Plot Nº1

Test Laboratory: AT4 Wireless; Date: 25/05/2016
DUT: HILTI; Type: Laser Meter; Serial: -
Communication System: UID 10012 - CAB, IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2437 MHz; Duty Cycle: 1:1.53815
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.994 S/m; ε_r = 51.21; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(4.31, 4.31, 4.31); Calibrated: 20/07/2015;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 13/07/2015
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Flat Phantom 2450 MHz, d=5mm/802.11b, 1Mbps, CH 6, Back Face/Area Scan (81x161x1):
Interpolated grid: dx=1.200 mm, dy=1.200 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.263 W/kg
Flat Phantom 2450 MHz, d=5mm/802.11b, 1Mbps, CH 6, Back Face/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.591 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.358 W/kg
SAR(1 g) = 0.203 W/kg; SAR(10 g) = 0.102 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.223 W/kg



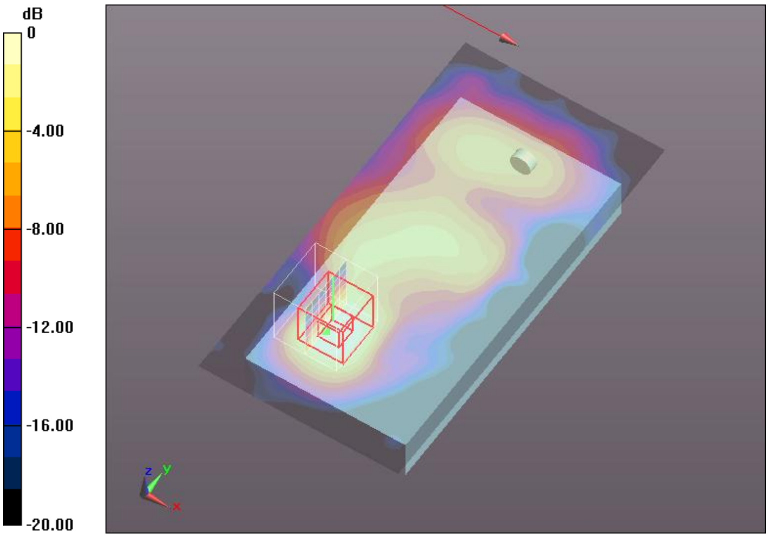
0 dB = 0.223 W/kg = -6.52 dBW/kg



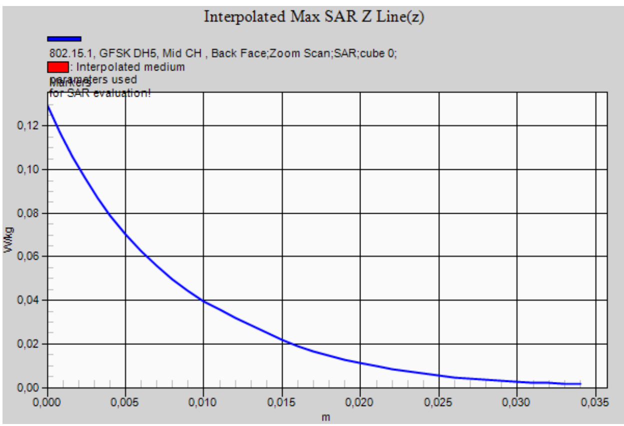
802.15.1 – GFSK DH5 - 2450MHz – Back Face, d=5 mm – Middle Channel – Plot Nº2

Test Laboratory: AT4 Wireless; Date: 25/05/2016
DUT: HILTI; Type: Laser Meter; Serial: -
Communication System: UID 10032 - CAA, IEEE 802.15.1 Bluetooth (GFSK, DH5); Frequency: 2441 MHz; Duty Cycle: 1:1.30617
Medium parameters used (interpolated): f = 2441 MHz; σ = 2.001 S/m; ε_r = 51.21; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(4.31, 4.31, 4.31); Calibrated: 20/07/2015;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 13/07/2015
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Flat Phantom 2450 MHz, d=5mm/802.15.1, GFSK DH5, Mid CH, Back Face/Area Scan (81x161x1):
Interpolated grid: dx=1.200 mm, dy=1.200 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0904 W/kg
Flat Phantom 2450 MHz, d=5mm/802.15.1, GFSK DH5, Mid CH, Back Face/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.625 V/m; Power Drift = 0.29 dB
Peak SAR (extrapolated) = 0.129 W/kg
SAR(1 g) = 0.070 W/kg; SAR(10 g) = 0.035 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0757 W/kg



0 dB = 0.0757 W/kg = -11.21 dBW/kg



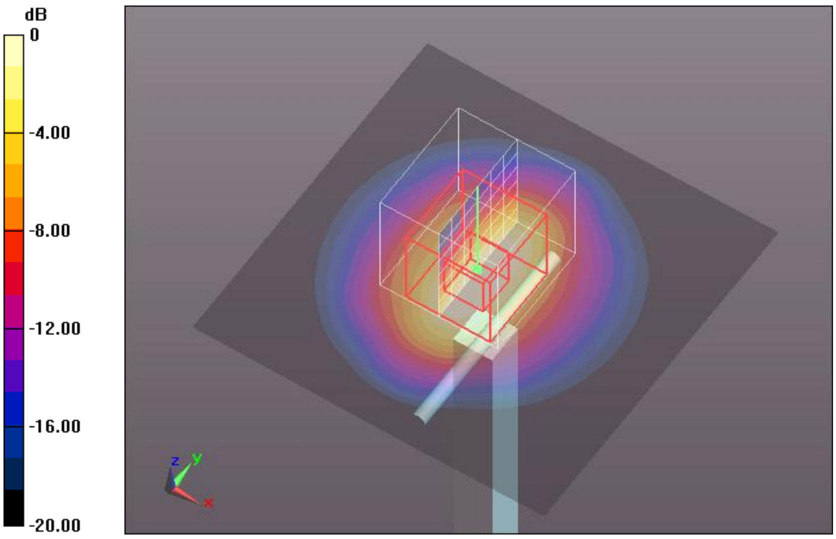
Appendix D – System Validation Reports

Validation results in 2450 MHz Band for Body TSL

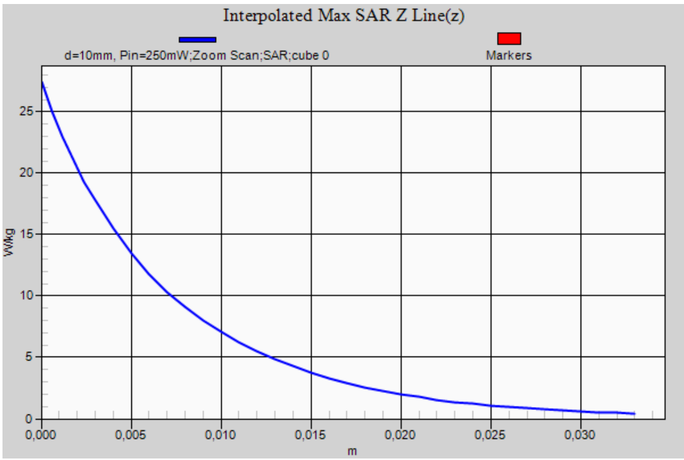
Test Laboratory: AT4 Wireless; Date: 25/05/2016

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:756
Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 2.01 S/m; ε_r = 51.21; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(4.31, 4.31, 4.31); Calibrated: 20/07/2015;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 13/07/2015
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

FCC System Performance Check with D2450V2 Dipole/d=10mm, Pin=250mW/Area Scan (61x61x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 17.8 W/kg
FCC System Performance Check with D2450V2 Dipole/d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.22 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.27 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 17.5 W/kg



0 dB = 17.5 W/kg = 12.43 dBW/kg



Appendix E – Calibration data

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Accreditation No.: SCS 0108

Client **AT4 Wireless**

Certificate No: **DAE4-669_Jul15**

CALIBRATION CERTIFICATE

Object: DAE4 - SD 000 D04 BM - SN: 669

Calibration procedure(s): QA CAL-06.v29
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: July 13, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-14 (No:15573)	Oct-15
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	06-Jan-15 (in house check)	In house check: Jan-16
Calibrator Box V2.1	SE UMS 006 AA 1002	06-Jan-15 (in house check)	In house check: Jan-16

	Name	Function	Signature
Calibrated by:	Eric Hainfeld	Technician	
Approved by:	Fin Bomholt	Deputy Technical Manager	i.V.

Issued: July 13, 2015

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Accreditation No.: **SCS 0108**

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	403.316 ± 0.02% (k=2)	403.856 ± 0.02% (k=2)	404.236 ± 0.02% (k=2)
Low Range	3.95586 ± 1.50% (k=2)	3.97459 ± 1.50% (k=2)	3.97433 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	192.5 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	200039.20	0.36	0.00
Channel X	+ Input	20009.81	5.49	0.03
Channel X	- Input	-20001.49	3.94	-0.02
Channel Y	+ Input	200034.48	-4.78	-0.00
Channel Y	+ Input	20009.04	4.84	0.02
Channel Y	- Input	-20002.50	3.09	-0.02
Channel Z	+ Input	200039.88	4.95	0.00
Channel Z	+ Input	20008.37	4.22	0.02
Channel Z	- Input	-20004.02	1.52	-0.01

Low Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	2000.99	0.18	0.01
Channel X	+ Input	201.17	0.42	0.21
Channel X	- Input	-198.81	0.15	-0.08
Channel Y	+ Input	2000.78	-0.00	-0.00
Channel Y	+ Input	200.28	-0.43	-0.22
Channel Y	- Input	-199.96	-0.88	0.44
Channel Z	+ Input	2000.74	0.05	0.00
Channel Z	+ Input	199.41	-1.31	-0.65
Channel Z	- Input	-200.05	-0.90	0.45

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	2.14	0.76
	- 200	-0.53	-1.17
Channel Y	200	11.12	11.00
	- 200	-12.56	-12.76
Channel Z	200	-9.30	-9.86
	- 200	7.61	7.45

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	-	-1.77	-3.34
Channel Y	200	9.21	-	-1.30
Channel Z	200	4.15	6.67	-

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	16075	15845
Channel Y	15795	15291
Channel Z	15997	15303

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.38	-1.20	1.34	0.45
Channel Y	0.48	-0.62	1.36	0.40
Channel Z	0.10	-1.36	1.40	0.47

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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Accreditation No.: **SCS 0108**

Client **AT4 Wireless**

Certificate No: **ES3-3052_Jul15**

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3052

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

Calibration date: July 20, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	01-Apr-15 (No. 217-02128)	Mar-16
Power sensor E4412A	MY41498087	01-Apr-15 (No. 217-02128)	Mar-16
Reference 3 dB Attenuator	SN: S5054 (3c)	01-Apr-15 (No. 217-02129)	Mar-16
Reference 20 dB Attenuator	SN: S5277 (20x)	01-Apr-15 (No. 217-02132)	Mar-16
Reference 30 dB Attenuator	SN: S5129 (30b)	01-Apr-15 (No. 217-02133)	Mar-16
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Israe Elnaouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 21, 2015

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Probe ES3DV3

SN:3052

Manufactured: September 30, 2003
Calibrated: July 20, 2015

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3052

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m)^2)[A]	1.13	0.42	1.10	± 10.1 %
DCP (mV)[B]	105.6	103.0	104.7	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√µV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	196.8	±3.5 %
		Y	0.0	0.0	1.0		195.5	
		Z	0.0	0.0	1.0		190.9	
10011-CAB	UMTS-FDD (WCDMA)	X	3.28	67.5	19.0	2.91	134.3	±0.5 %
		Y	3.02	65.2	17.2		132.7	
		Z	3.21	66.9	18.4		131.4	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	3.20	71.2	20.2	1.87	135.6	±0.7 %
		Y	2.41	65.5	16.8		132.2	
		Z	2.69	67.7	18.2		133.4	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	10.80	70.2	23.2	9.46	129.4	±3.0 %
		Y	10.48	68.4	21.5		127.3	
		Z	10.64	69.8	22.9		126.0	
10021-DAB	GSM-FDD (TDMA, GMSK)	X	8.94	85.5	23.0	9.39	128.9	±2.2 %
		Y	1.93	64.2	13.0		81.7	
		Z	8.27	84.0	22.0		147.6	
10023-DAB	GPRS-FDD (TDMA, GMSK, TN 0)	X	11.80	90.3	24.8	9.57	145.8	±2.2 %
		Y	1.85	63.9	13.3		77.7	
		Z	8.69	85.2	22.7		141.4	
10024-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	30.54	99.9	24.9	6.56	134.0	±1.9 %
		Y	2.66	70.1	14.2		131.9	
		Z	8.78	82.5	19.3		131.5	
10025-DAB	EDGE-FDD (TDMA, 8PSK, TN 0)	X	13.11	100.0	39.2	12.62	137.2	±3.0 %
		Y	4.64	68.8	23.6		54.0	
		Z	12.46	98.9	38.8		133.8	
10026-DAB	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	11.91	94.5	33.8	9.55	133.4	±2.2 %
		Y	4.88	72.4	23.4		112.2	
		Z	9.35	88.0	30.9		130.6	
10027-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	36.19	99.9	23.5	4.80	125.9	±2.2 %
		Y	7.11	80.8	16.5		138.0	
		Z	44.98	99.6	22.5		126.0	
10028-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	47.58	100.0	22.2	3.55	138.3	±2.5 %
		Y	1.96	68.0	11.0		130.2	
		Z	68.44	99.7	20.9		136.7	
10029-DAB	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	9.15	87.4	29.4	7.78	128.1	±1.9 %
		Y	4.67	72.7	22.5		135.1	
		Z	10.25	90.6	30.6		126.8	

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10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	12.49	99.0	22.5	1.16	132.4	±1.9 %
		Y	0.19	57.1	3.6		128.4	
		Z	99.74	91.8	15.1		132.7	
10035-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	X	4.62	73.2	21.7	3.83	145.0	±0.7 %
		Y	3.53	67.5	18.5		140.4	
		Z	4.35	71.9	20.9		145.0	
10038-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	X	4.62	72.1	21.5	4.10	145.3	±0.9 %
		Y	3.67	67.0	18.5		142.5	
		Z	4.37	70.9	20.7		145.0	
10048-CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	X	6.02	80.0	24.4	13.80	81.1	±1.4 %
		Y	1.92	61.0	14.1		30.0	
		Z	5.26	77.4	23.1		79.5	
10049-CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	X	12.05	90.8	25.8	10.79	127.7	±1.7 %
		Y	2.25	65.9	14.9		60.7	
		Z	12.63	91.6	25.7		148.9	
10058-DAB	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	7.97	84.6	27.5	6.52	135.1	±1.9 %
		Y	4.16	71.4	21.3		128.6	
		Z	7.97	84.8	27.3		135.0	
10097-CAB	UMTS-FDD (HSDPA)	X	4.59	67.1	19.0	3.98	139.7	±0.7 %
		Y	4.40	65.5	17.6		141.5	
		Z	4.49	66.6	18.5		140.0	
10098-CAB	UMTS-FDD (HSUPA, Subtest 2)	X	4.59	67.0	18.9	3.98	140.4	±0.7 %
		Y	4.44	65.7	17.7		142.1	
		Z	4.51	66.6	18.5		140.7	
10100-CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	6.53	68.2	20.3	5.67	148.2	±1.4 %
		Y	6.32	66.8	19.0		147.7	
		Z	6.43	67.8	19.9		148.2	
10102-CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	7.58	67.7	20.2	6.60	134.6	±1.4 %
		Y	7.48	66.7	19.2		135.0	
		Z	7.51	67.5	20.0		135.0	
10101-CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	7.58	67.7	20.2	6.42	134.6	±12.2 %
		Y	7.48	66.7	19.2		135.0	
		Z	7.51	67.5	20.0		135.0	
10108-CAC	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	6.38	67.8	20.2	5.80	146.1	±1.7 %
		Y	6.21	66.3	18.8		145.5	
		Z	6.28	67.4	19.8		145.6	
10110-CAC	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	6.01	67.1	19.8	5.75	141.5	±1.2 %
		Y	5.86	65.7	18.6		141.5	
		Z	5.95	66.8	19.6		141.4	
10154-CAC	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	6.01	67.1	19.8	5.75	141.5	±12.2 %
		Y	5.86	65.7	18.6		141.5	
		Z	5.95	66.8	19.6		141.4	
10112-CAC	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	7.27	67.3	20.1	6.59	130.6	±1.4 %
		Y	7.21	66.4	19.1		130.3	
		Z	7.19	67.0	19.8		130.8	

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10109-CAC	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	7.27	67.3	20.1	6.43	130.6	±12.2 %
		Y	7.21	66.4	19.1		130.3	
		Z	7.19	67.0	19.8		130.8	
10150-CAB	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	7.27	67.3	20.1	6.60	130.6	±12.2 %
		Y	7.21	66.4	19.1		130.3	
		Z	7.19	67.0	19.8		130.8	
10149-CAB	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	7.27	67.3	20.1	6.42	130.6	±12.2 %
		Y	7.21	66.4	19.1		130.3	
		Z	7.19	67.0	19.8		130.8	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	10.22	69.2	21.6	8.07	136.5	±2.2 %
		Y	10.07	68.1	20.5		135.4	
		Z	10.17	69.1	21.5		136.3	
10140-CAB	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	7.51	67.7	20.2	6.49	135.6	±1.4 %
		Y	7.45	66.8	19.3		136.7	
		Z	7.43	67.4	20.0		135.7	
10141-CAB	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	7.51	67.7	20.2	6.53	135.6	±12.2 %
		Y	7.45	66.8	19.3		136.7	
		Z	7.43	67.4	20.0		135.7	
10158-CAC	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	7.03	67.1	20.1	6.62	127.5	±1.4 %
		Y	6.93	66.1	19.1		127.0	
		Z	6.98	67.0	19.9		127.3	
10111-CAC	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	7.03	67.1	20.1	6.44	127.5	±12.2 %
		Y	6.93	66.1	19.1		127.0	
		Z	6.98	67.0	19.9		127.3	
10113-CAC	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	7.03	67.1	20.1	6.62	127.5	±12.2 %
		Y	6.93	66.1	19.1		127.0	
		Z	6.98	67.0	19.9		127.3	
10155-CAC	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	7.03	67.1	20.1	6.43	127.5	±12.2 %
		Y	6.93	66.1	19.1		127.0	
		Z	6.98	67.0	19.9		127.3	
10161-CAB	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	7.03	67.1	20.1	6.43	127.5	±12.2 %
		Y	6.93	66.1	19.1		127.0	
		Z	6.98	67.0	19.9		127.3	
10162-CAB	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	7.03	67.1	20.1	6.58	127.5	±12.2 %
		Y	6.93	66.1	19.1		127.0	
		Z	6.98	67.0	19.9		127.3	
10173-CAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	8.13	78.1	28.1	9.48	136.8	±2.5 %
		Y	6.23	70.5	23.4		146.9	
		Z	7.81	77.0	27.5		135.6	
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	8.13	78.1	28.1	9.49	136.8	±12.2 %
		Y	6.23	70.5	23.4		146.9	
		Z	7.81	77.0	27.5		135.6	
10235-CAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	8.13	78.1	28.1	9.48	136.8	±12.2 %
		Y	6.23	70.5	23.4		146.9	
		Z	7.81	77.0	27.5		135.6	

10229-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	8.13	78.1	28.1	9.48	136.8	±12.2 %
		Y	6.23	70.5	23.4		146.9	
		Z	7.81	77.0	27.5		135.6	
10232-CAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	8.13	78.1	28.1	9.48	136.8	±12.2 %
		Y	6.23	70.5	23.4		146.9	
		Z	7.81	77.0	27.5		135.6	
10238-CAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	8.13	78.1	28.1	9.48	136.8	±12.2 %
		Y	6.23	70.5	23.4		146.9	
		Z	7.81	77.0	27.5		135.6	
10179-CAC	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	5.69	68.4	21.0	6.50	143.1	±1.7 %
		Y	5.23	66.3	19.4		138.0	
		Z	5.63	68.2	20.8		143.0	
10170-CAB	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	5.69	68.4	21.0	6.52	143.1	±12.2 %
		Y	5.23	66.3	19.4		138.0	
		Z	5.63	68.2	20.8		143.0	
10176-CAC	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	5.69	68.4	21.0	6.52	143.1	±12.2 %
		Y	5.23	66.3	19.4		138.0	
		Z	5.63	68.2	20.8		143.0	
10188-CAC	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	5.69	68.4	21.0	6.52	143.1	±12.2 %
		Y	5.23	66.3	19.4		138.0	
		Z	5.63	68.2	20.8		143.0	
10180-CAC	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	5.69	68.4	21.0	6.50	143.1	±12.2 %
		Y	5.23	66.3	19.4		138.0	
		Z	5.63	68.2	20.8		143.0	
10178-CAC	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	5.69	68.4	21.0	6.52	143.1	±12.2 %
		Y	5.23	66.3	19.4		138.0	
		Z	5.63	68.2	20.8		143.0	
10182-CAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	5.69	68.4	21.0	6.52	143.1	±12.2 %
		Y	5.23	66.3	19.4		138.0	
		Z	5.63	68.2	20.8		143.0	
10185-CAC	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	5.69	68.4	21.0	6.51	143.1	±12.2 %
		Y	5.23	66.3	19.4		138.0	
		Z	5.63	68.2	20.8		143.0	
10187-CAC	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	5.01	67.6	20.3	5.73	144.7	±1.2 %
		Y	4.57	65.2	18.5		137.4	
		Z	4.93	67.1	19.9		144.3	
10166-CAC	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	5.01	67.6	20.3	5.46	144.7	±12.2 %
		Y	4.57	65.2	18.5		137.4	
		Z	4.93	67.1	19.9		144.3	
10181-CAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	5.01	67.6	20.3	5.72	144.7	±12.2 %
		Y	4.57	65.2	18.5		137.4	
		Z	4.93	67.1	19.9		144.3	
10169-CAB	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	5.01	67.6	20.3	5.73	144.7	±12.2 %
		Y	4.57	65.2	18.5		137.4	
		Z	4.93	67.1	19.9		144.3	

10175-CAC	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	5.01	67.6	20.3	5.72	144.7	±12.2 %
		Y	4.57	65.2	18.5		137.4	
		Z	4.93	67.1	19.9		144.3	
10177-CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	5.01	67.6	20.3	5.73	144.7	±12.2 %
		Y	4.57	65.2	18.5		137.4	
		Z	4.93	67.1	19.9		144.3	
10184-CAC	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	5.01	67.6	20.3	5.73	144.7	±12.2 %
		Y	4.57	65.2	18.5		137.4	
		Z	4.93	67.1	19.9		144.3	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	9.79	68.8	21.5	8.10	129.9	±2.5 %
		Y	9.69	67.7	20.3		128.7	
		Z	9.73	68.7	21.3		128.8	
10225-CAB	UMTS-FDD (HSPA+)	X	6.84	66.9	19.5	5.97	132.7	±1.2 %
		Y	6.84	66.2	18.7		132.9	
		Z	6.81	66.8	19.4		132.4	
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	7.79	77.2	27.7	9.22	140.4	±2.2 %
		Y	6.01	69.8	23.0		149.6	
		Z	7.63	76.7	27.4		138.3	
10237-CAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	7.79	77.2	27.7	9.21	140.4	±12.2 %
		Y	6.01	69.8	23.0		149.6	
		Z	7.63	76.7	27.4		138.3	
10172-CAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	7.79	77.2	27.7	9.21	140.4	±12.2 %
		Y	6.01	69.8	23.0		149.6	
		Z	7.63	76.7	27.4		138.3	
10231-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	7.79	77.2	27.7	9.19	140.4	±12.2 %
		Y	6.01	69.8	23.0		149.6	
		Z	7.63	76.7	27.4		138.3	
10234-CAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	7.79	77.2	27.7	9.21	140.4	±12.2 %
		Y	6.01	69.8	23.0		149.6	
		Z	7.63	76.7	27.4		138.3	
10240-CAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	7.79	77.2	27.7	9.21	140.4	±12.2 %
		Y	6.01	69.8	23.0		149.6	
		Z	7.63	76.7	27.4		138.3	
10246-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	8.17	74.0	26.0	9.30	133.6	±2.2 %
		Y	6.81	68.0	22.0		146.0	
		Z	7.98	73.4	25.6		132.0	
10249-CAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	8.17	74.0	26.0	9.29	133.6	±12.2 %
		Y	6.81	68.0	22.0		146.0	
		Z	7.98	73.4	25.6		132.0	
10258-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	8.17	74.0	26.0	9.34	133.6	±12.2 %
		Y	6.81	68.0	22.0		146.0	
		Z	7.98	73.4	25.6		132.0	
10256-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	8.92	74.4	26.6	9.96	136.3	±3.0 %
		Y	7.58	68.8	22.7		149.4	
		Z	8.78	74.1	26.3		135.0	

10247-CAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	8.92	74.4	26.6	9.91	136.3	±12.2 %
		Y	7.58	68.8	22.7		149.4	
		Z	8.78	74.1	26.3		135.0	
10244-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	8.92	74.4	26.6	10.06	136.3	±12.2 %
		Y	7.58	68.8	22.7		149.4	
		Z	8.78	74.1	26.3		135.0	
10262-CAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	9.03	72.4	25.3	9.83	126.8	±2.7 %
		Y	8.01	67.9	22.0		140.4	
		Z	8.89	72.0	25.0		125.3	
10250-CAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	9.03	72.4	25.3	9.81	126.8	±12.2 %
		Y	8.01	67.9	22.0		140.4	
		Z	8.89	72.0	25.0		125.3	
10259-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	9.03	72.4	25.3	9.98	126.8	±12.2 %
		Y	8.01	67.9	22.0		140.4	
		Z	8.89	72.0	25.0		125.3	
10264-CAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	8.92	75.0	26.5	9.23	144.6	±3.0 %
		Y	7.07	67.4	21.5		134.5	
		Z	8.67	74.3	26.0		142.4	
10252-CAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	8.92	75.0	26.5	9.24	144.6	±12.2 %
		Y	7.07	67.4	21.5		134.5	
		Z	8.67	74.3	26.0		142.4	
10261-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	8.92	75.0	26.5	9.24	144.6	±12.2 %
		Y	7.07	67.4	21.5		134.5	
		Z	8.67	74.3	26.0		142.4	
10265-CAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	9.70	73.1	25.7	9.92	134.7	±3.5 %
		Y	8.48	68.1	22.1		148.2	
		Z	9.57	72.8	25.5		133.2	
10152-CAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	9.70	73.1	25.7	9.92	134.7	±12.2 %
		Y	8.48	68.1	22.1		148.2	
		Z	9.57	72.8	25.5		133.2	
10267-CAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	8.79	73.2	25.3	9.30	125.7	±2.7 %
		Y	7.51	67.9	21.6		140.6	
		Z	8.63	72.7	24.9		124.7	
10151-CAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	8.79	73.2	25.3	9.28	125.7	±12.2 %
		Y	7.51	67.9	21.6		140.6	
		Z	8.63	72.7	24.9		124.7	
10297-AAA	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	6.41	67.8	20.2	5.81	147.2	±1.4 %
		Y	6.21	66.3	18.8		145.7	
		Z	6.29	67.4	19.8		146.1	

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 Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 10 and 11).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3052

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 [G]	Depth [G] (mm)	Unc (k=2)
450	43.5	0.87	6.91	6.91	6.91	0.20	2.33	± 13.3 %
750	41.9	0.89	6.47	6.47	6.47	0.28	2.08	± 12.0 %
835	41.5	0.90	6.34	6.34	6.34	0.33	1.87	± 12.0 %
900	41.5	0.97	6.23	6.23	6.23	0.45	1.53	± 12.0 %
1750	40.1	1.37	5.17	5.17	5.17	0.52	1.37	± 12.0 %
1900	40.0	1.40	4.97	4.97	4.97	0.68	1.27	± 12.0 %
2000	40.0	1.40	4.95	4.95	4.95	0.80	1.16	± 12.0 %
2450	39.2	1.80	4.40	4.40	4.40	0.77	1.25	± 12.0 %
2600	39.0	1.96	4.23	4.23	4.23	0.80	1.22	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[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.

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

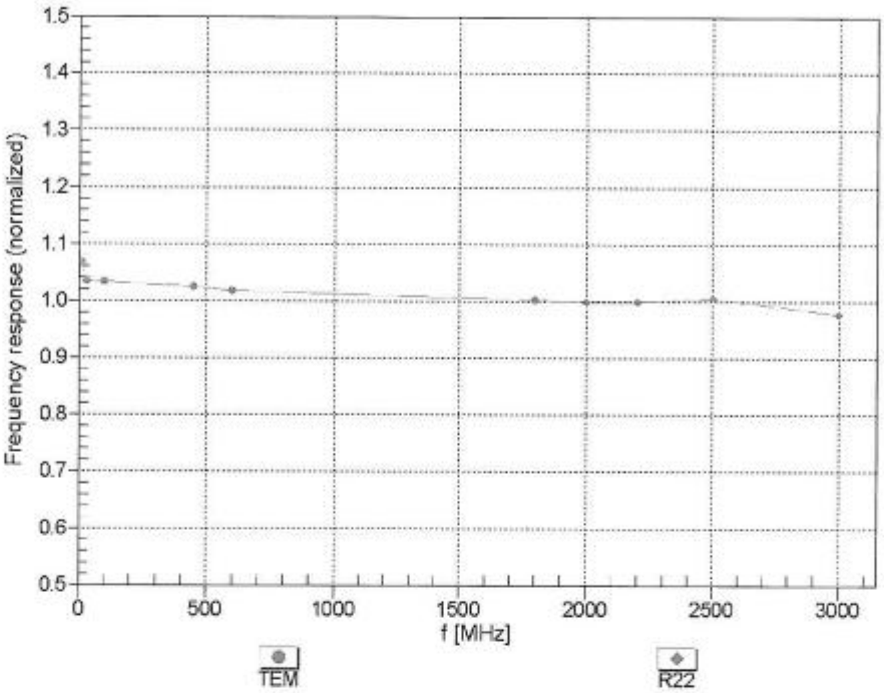
DASY/EASY - Parameters of Probe: ES3DV3 - SN:3052

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 [G]	Depth [G] (mm)	Unc (k=2)
450	56.7	0.94	7.11	7.11	7.11	0.15	1.78	± 13.3 %
750	55.5	0.96	6.15	6.15	6.15	0.53	1.43	± 12.0 %
835	55.2	0.97	6.06	6.06	6.06	0.53	1.41	± 12.0 %
900	55.0	1.05	6.03	6.03	6.03	0.33	1.64	± 12.0 %
1750	53.4	1.49	4.85	4.85	4.85	0.60	1.34	± 12.0 %
1900	53.3	1.52	4.67	4.67	4.67	0.55	1.49	± 12.0 %
2000	53.3	1.52	4.77	4.77	4.77	0.62	1.46	± 12.0 %
2450	52.7	1.95	4.31	4.31	4.31	0.80	1.20	± 12.0 %
2600	52.5	2.16	4.11	4.11	4.11	0.80	1.24	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[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.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

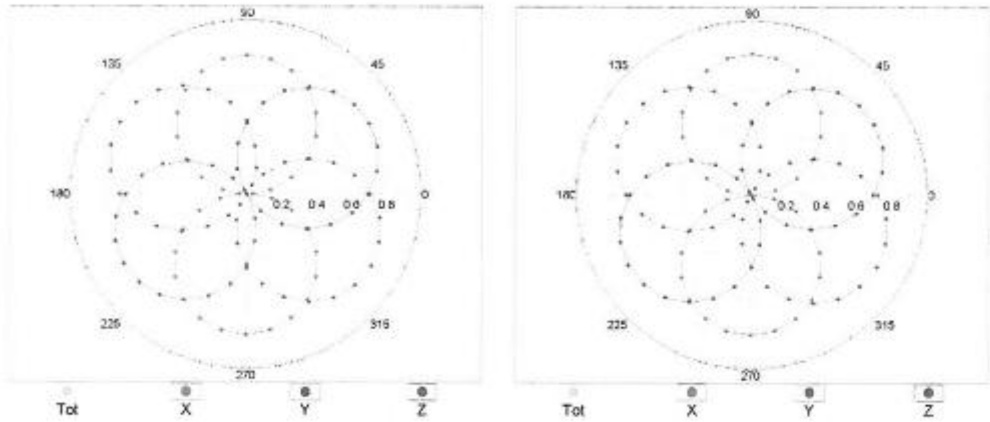
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)

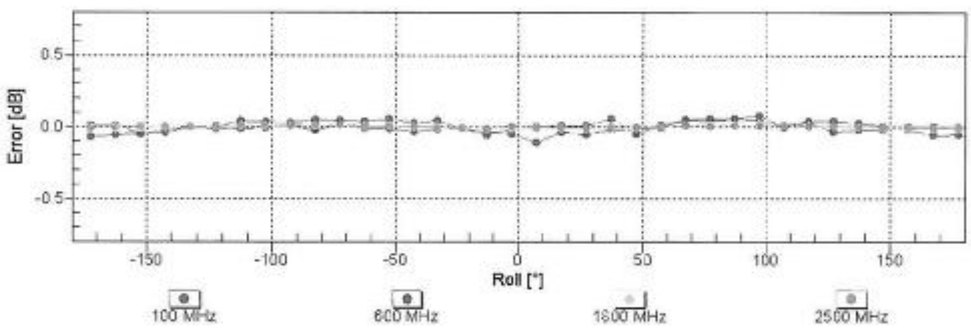


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°

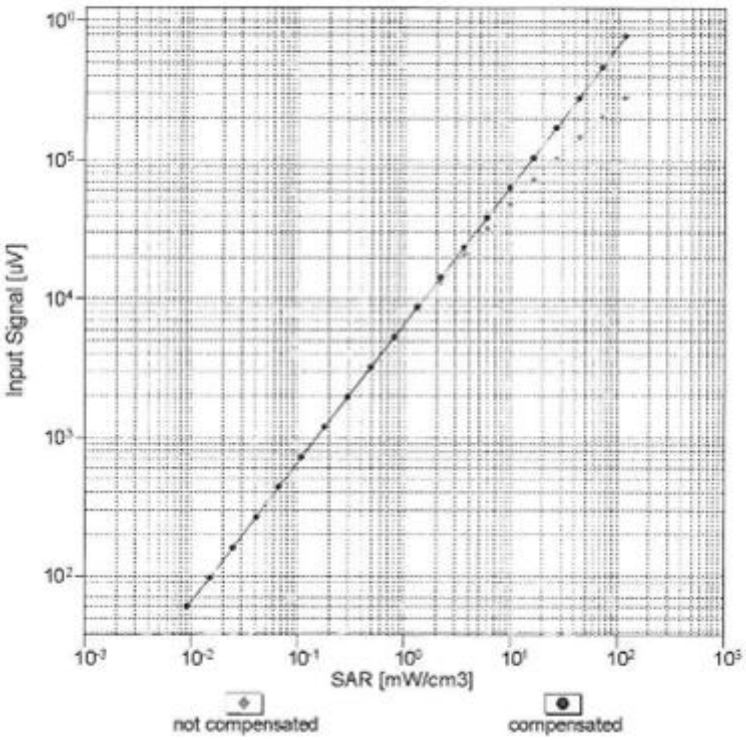
f=600 MHz,TEM f=1800 MHz,R22

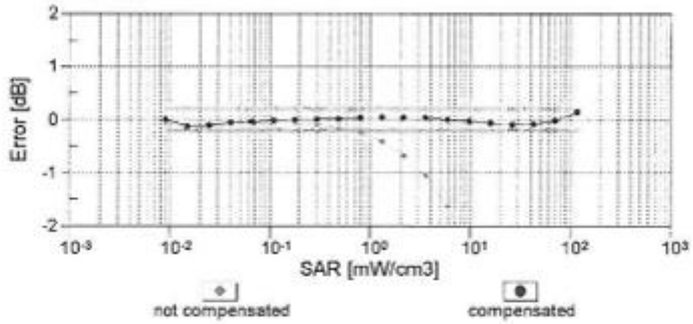




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)
(TEM cell , f_{eval}= 1900 MHz)

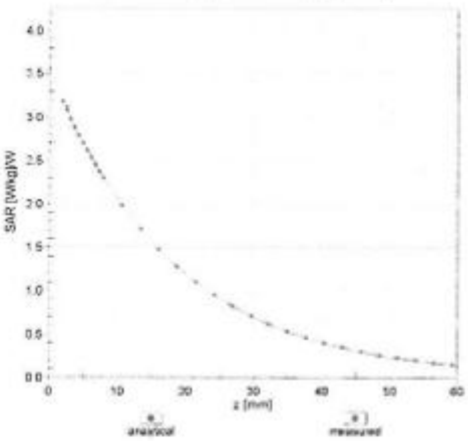




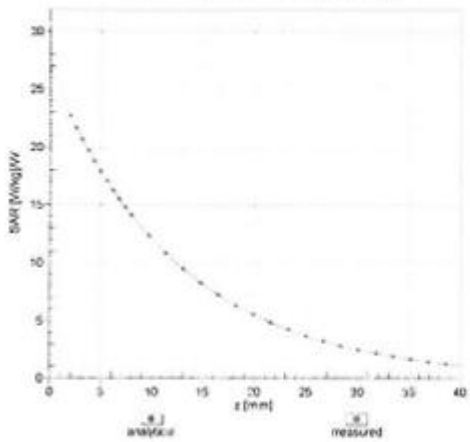
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

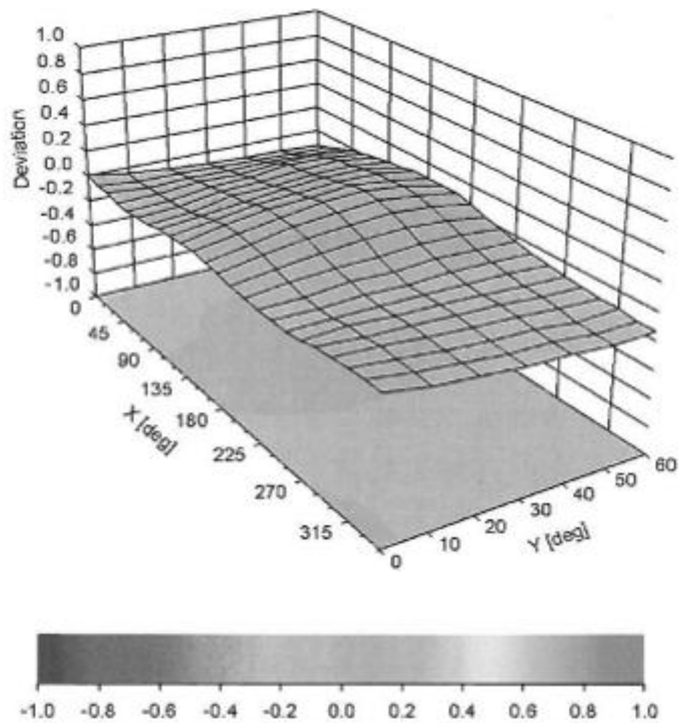


f = 1750 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3052

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	127.3
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 0108

Client **AT4 Wireless**

Certificate No: **D2450V2-756_Jul15**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:756
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 08, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

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

Issued: July 9, 2015

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

Certificate No: D2450V2-756_Jul15 Page 1 of 8

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.9 ± 6 %	1.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.8 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**53.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.46 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.4 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.4 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**52.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.4 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.9 Ω + 2.7 jΩ
Return Loss	- 24.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	52.4 Ω + 4.3 jΩ
Return Loss	- 26.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	April 22, 2004

DASY5 Validation Report for Head TSL

Date: 08.07.2015

Test Laboratory: SPEAG, Zurich, Switzerland

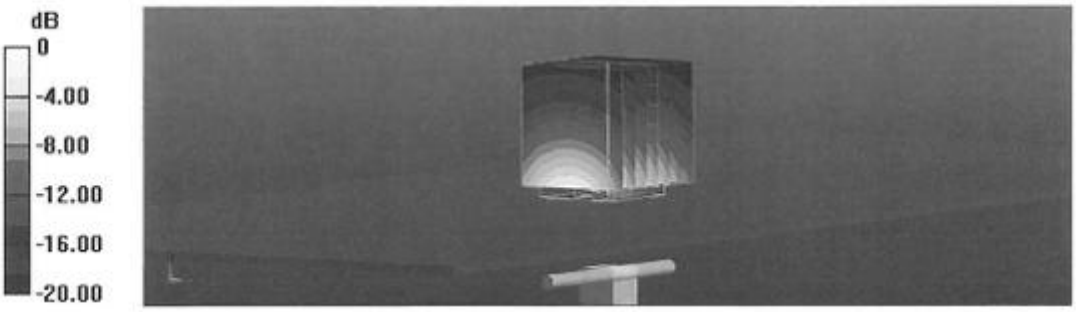
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:756

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.88 S/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

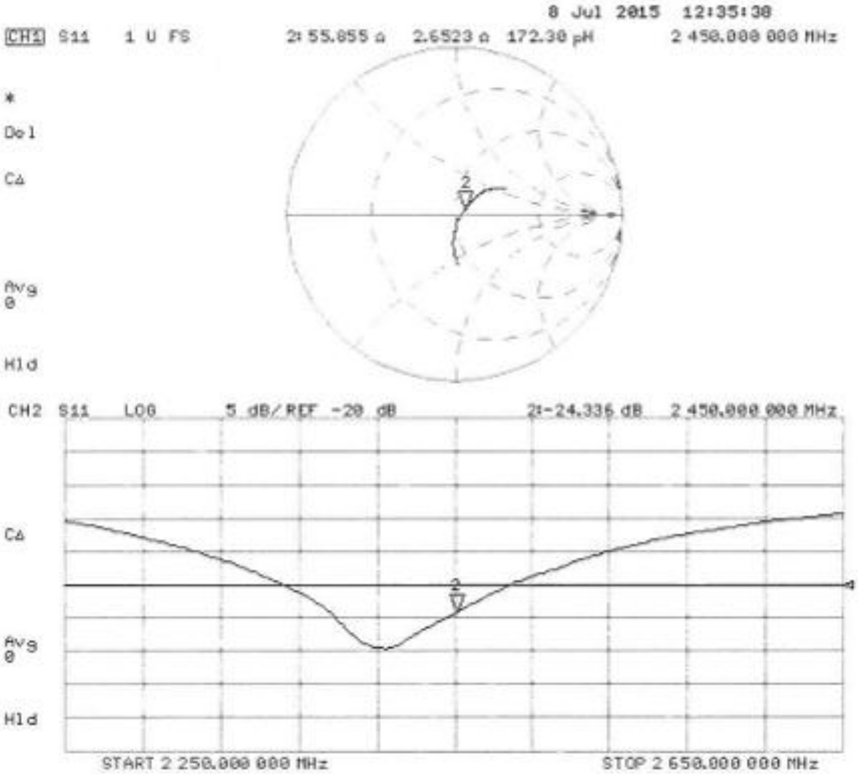
- Probe: ES3DV3 - SN3205; ConvF(4.54, 4.54, 4.54); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.3 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.46 W/kg
Maximum value of SAR (measured) = 18.0 W/kg



0 dB = 18.0 W/kg = 12.55 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.07.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:756

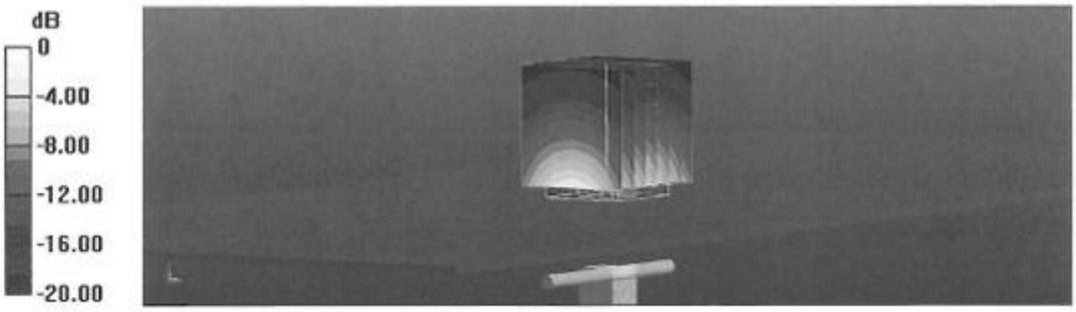
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.32, 4.32, 4.32); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

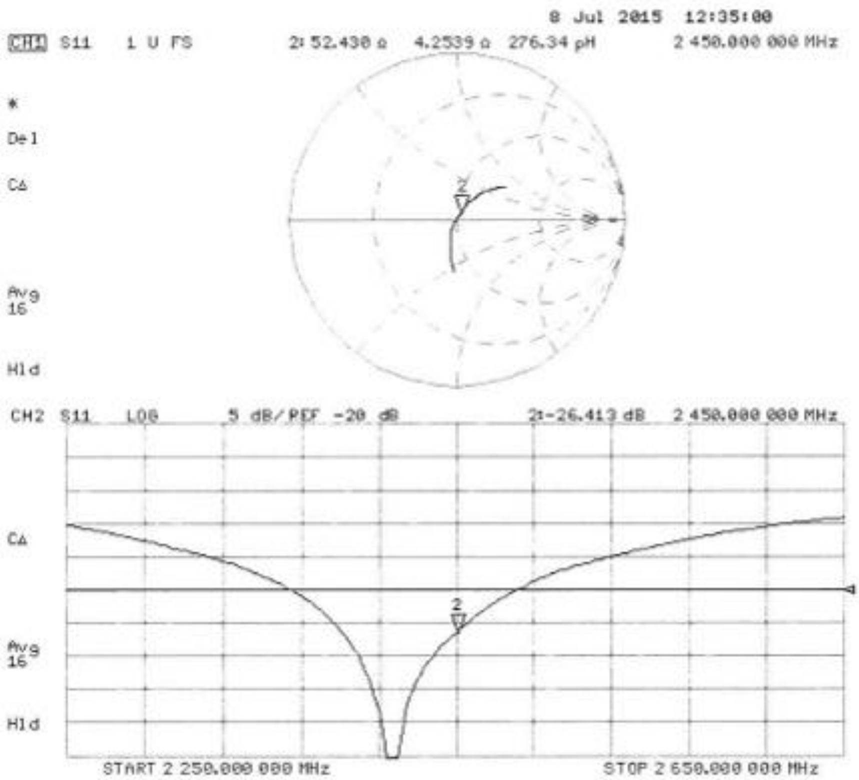
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.96 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.17 W/kg
Maximum value of SAR (measured) = 17.6 W/kg



0 dB = 17.6 W/kg = 12.46 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **AT4 Wireless**

Certificate No: **D2600V2-1023_Jul15**

CALIBRATION CERTIFICATE

Object	D2600V2 - SN: 1023
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 08, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

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

Issued: July 9, 2015

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Accreditation No.: **SCS 0108**

Glossary:

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ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

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a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.3 ± 6 %	2.05 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**57.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.60 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.9 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.9 ± 6 %	2.22 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	14.2 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**56.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.40 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**25.4 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.4 Ω - 5.4 jΩ
Return Loss	- 24.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.3 Ω - 3.3 jΩ
Return Loss	- 24.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.148 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 13, 2008

DASY5 Validation Report for Head TSL

Date: 08.07.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1023

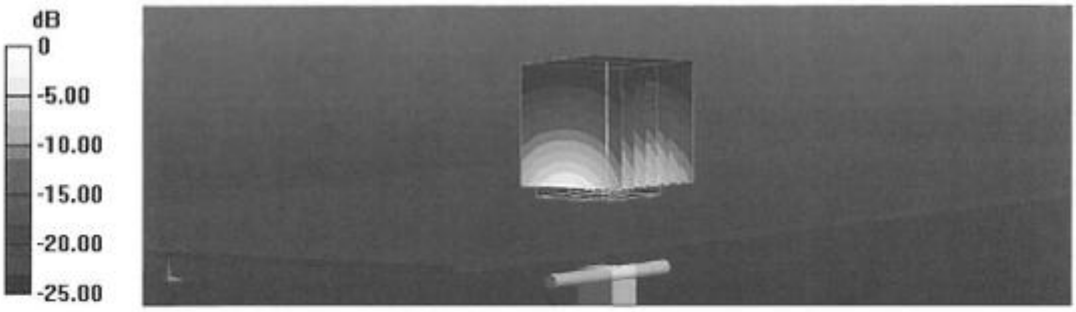
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.05 S/m; ε_r = 37.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.49, 4.49, 4.49); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

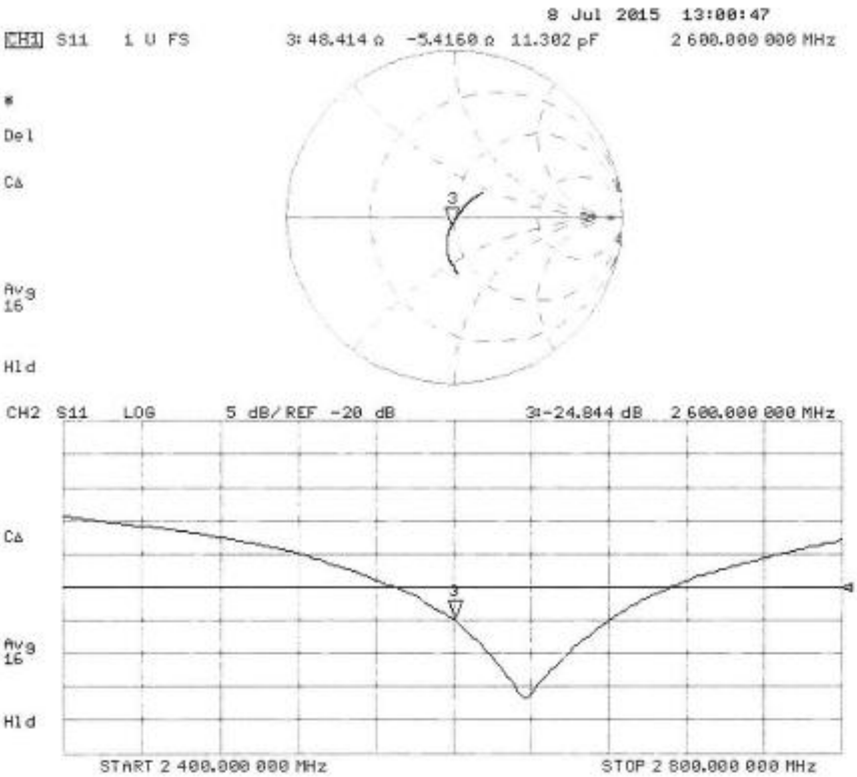
Dipole Calibration for Head/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.9 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 30.5 W/kg
SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.6 W/kg
Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 19.3 W/kg = 12.86 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.07.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1023

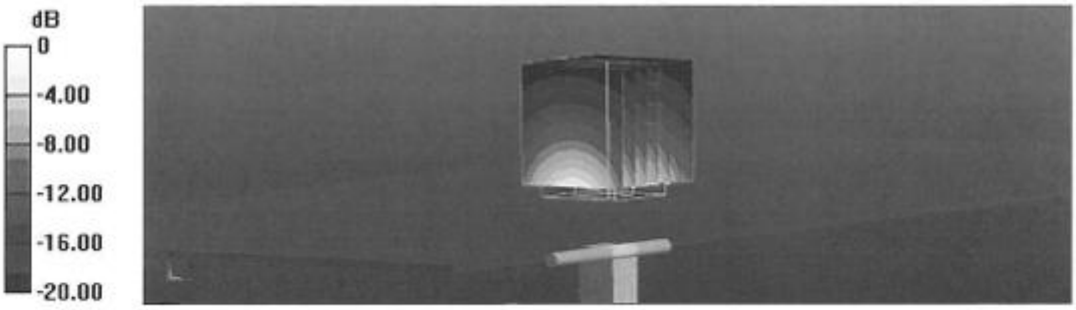
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.22 S/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.13, 4.13, 4.13); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

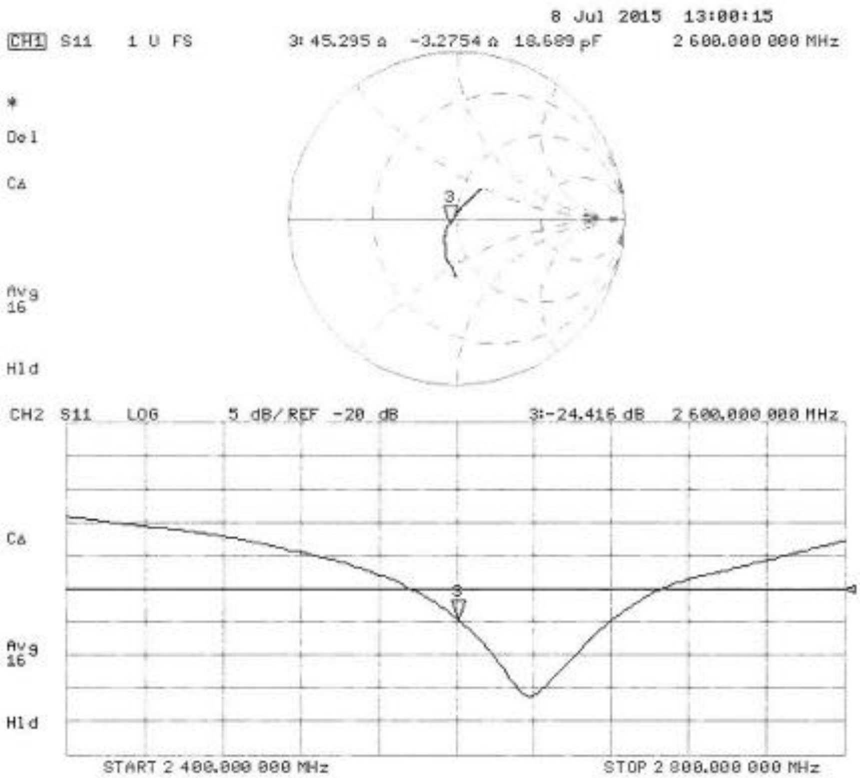
Dipole Calibration for Body/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.69 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.4 W/kg
Maximum value of SAR (measured) = 18.9 W/kg



0 dB = 18.9 W/kg = 12.76 dBW/kg

Impedance Measurement Plot for Body TSL



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