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ENSAYOS Nº 51/LE147

Test report No:

NIE: 46071RRF.003A1

Test report (Modification 1)

REFERENCE STANDARDS:

FCC 47CFR Part 2.1093, Published RF Exposure KDB Procedures, IEEE Std 1528:2013, IEEE Std C95-3:2002, IEEE Std C95-1:2005, IC RSS -102 Issue 5:2015

Identification of item tested.................................:	INTEL DUAL BAND WIRELESS – AC 8260
Trade ....:	INTEL
Model and /or type reference ....:	8260NGW & 8260NGW NB
Other identification of the product ....:	FCC ID: PD98260NG & PD98260NGU IC ID: 1000M-8260NG
Final HW version ....:	Engineering Sample
Final SW version ....:	--
Features...:	802.11 a/b/g/n/ac Wireless LAN + BT 4.0
Manufacturer...:	INTEL MOBILE COMMUNICATIONS 100 Center Point Circle, Suite 200 Columbia, South Carolina 29210 USA
Test method requested, standard........................:	1. FCC 47 CFR Part 2.1093. (10-1-14 Edition) Radiofrequency radiation exposure evaluation: portable devices. 2. IEEE Std. 1528 (2013) – Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurements Techniques 3. IEEE Std. C95-3 (2002) – IEEE Recommended Practice for Measurement and Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to Such Fields, 100 kHz-300GHz. 4. IEEE Std. C95-1(2005) – IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. 5. FCC OET KDB 447498 D01 General RF Exposure Guidance v05r02 (February 2014) 6. FCC OET KDB 865664 D01 v01r03 – SAR Measurement Requirements for 100 MHz to 6 GHz (February 2014). 7. FCC OET KDB 248227 D01 802.11 Wi-Fi SAR v02 (March 2015).

	8. IC RSS-102 Issue 5 (2015-03) – Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) 9. Canada`s Safety Code No.6 – Limits of Human Exposure to Radiofrequency Electromag-netic Fields in the Frequency Range from 3 kHz to 300 GHz
Summary..:	Considering the results of the performed test according to FCC 47CFR Part 2.1093, 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 has been 0.725 W/kg, at minimum 14 mm separation distance, for 802.11a mode, in the 5.2 GHz frequency band. The maximum 1g volume averaged SAR for MIMO transmission found during this test has been 1.407 W/kg. 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).......:	A. Llamas RF Lab. Manager Firmado digitalmente por Alejandro Llamas Rodríguez Fecha: 2015.06.12 15:01:26 +02'00'
Date of issue..:	2015-06-12
Report template No..:	FDT11_16

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Competences and guarantees

AT4 wireless is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

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

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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Uncertainty

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

1. FCC OET KDB 865664 D01 - SAR Measurement 100 MHz to 6 GHz (February 2014).

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
46071/01	Laptop PC	E5440	JBSYN32	23/04/2015
46071/02	Test Board	8260 Test Board	-	23/04/2015
46071/03	WiFi & BT module	8260 NGW	3413E8300499	23/04/2015
46071/13	Reference antenna	SkyCross	Wimax/WLAN	23/04/2015
46071/14	Reference antenna	SkyCross	Wimax/WLAN	23/04/2015

1. Sample M/01 has undergone the test(s) specified in subclause "Test method requested".

Test sample description

The test sample consists of a WiFi & BT module.

Identification of the client

INTEL MOBILE COMMUNICATIONS

100 Center Point Circle, Suite 200

Columbia, South Carolina 29210 USA

Contact person: Steve Hackett

Telephone: Tel: 803-216-2344

e-mail: steven.c.hackett@intel.com

Testing period

The performed test started on 2015-05-08 and finished on 2014-05-28.

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. = 21.15 ºC Max. = 24.84 ºC
Relative humidity	Min. = 40.90 % Max. = 61.17 %

Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 46071RRF.003 related with the same samples, in the next clauses and sub-clauses:

Clauses / Sub-clauses	Modification	Justification
Title Page Model and/or type reference	8260 NGW NB model added (model without Bluetooth)	Client's request

This modification test report cancels and replaces the test report 46071RRF.003.

Remarks and comments

1: Testing of other required channels is not required according to FCC OET KDB 447498 D01 General RF Exposure Guidance v05r02, paragraph “4.3.3. SAR test reduction considerations”.

2: Testing is not required for this subsequent test configuration according to FCC OET KDB 248227 D01 802.11 Wi-Fi SAR v02, paragraph “5.3.4. Subsequent Test Configuration Procedures”.

3: Only the test position with the highest measured SAR for this frequency band has been tested, due to testing reductions mentioned in FCC OET KDB 447498 D01 General RF Exposure Guidance v05r02 (February 2014).

4: 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 and SPEAG EX3DV4
2. Data acquisition device SPEAG DAE4
3. Electro-optical converter SPEAG EOC3
4. 2450 MHz dipole validation kit SPEAG D2450V2
5. 5000 MHz dipole validation kit SPEAG D5GHzV2
6. Robot Stäubli RX60BL
7. Robot controller Stäubli CM7MB
8. SAR measurement software SPEAG DASY52 V52.8.8.1222
9. SAR post processing software SPEAG SEMCAD X
10. Measurement server SPEAG DASY5 SE UMS 011 BS
11. Oval flat phantom SPEAG ELI 4
12. Body Tissue Equivalent Liquids for 2450MHz and 5GHz bands
13. Vector network analyzer Agilent E5071C.
14. Dielectric probe kit SPEAG DAK-3.5
15. Power meter R&S NRVD and power sensor R&S NRV-Z51
16. RF Generator R&S SMU200A
17. DC Power supply Agilent U8002A
18. Dual directional coupler NARDA FSCM 99899
19. Power amplifier MITEQ AMF-4D-00400600-50-30P
20. Handset positioner SPEAG Device Holder
21. Anritsu MT8852A Bluetooth testing unit.

Testing verdicts

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

2450 MHz band

FCC 47CFR Part 2.1093 Paragraph	VERDICT			
	NA	**P**	**F**	**NM**
(d)(2) 802.11b		P		
(d)(2) 802.11g				NM[2]
(d)(2) 802.11n		P		
(d)(2) Bluetooth		P		

2: See Remarks and Comments.

5200 MHz band

FCC 47CFR Part 2.1093 Paragraph	VERDICT			
	NA	**P**	**F**	**NM**
(d)(2) 802.11a		P		
(d)(2) 802.11g				NM[2]
(d)(2) 802.11n		P		
(d)(2) 802.11ac		P		

2: See Remarks and Comments.

5300 MHz band

FCC 47CFR Part 2.1093 Paragraph	VERDICT			
	NA	**P**	**F**	**NM**
(d)(2) 802.11a		P		
(d)(2) 802.11g				NM[2]
(d)(2) 802.11n		P		
(d)(2) 802.11ac		P		

2: See Remarks and Comments.

5500 MHz band

FCC 47CFR Part 2.1093 Paragraph	VERDICT			
	NA	P	F	NM
(d)(2) 802.11a		P		
(d)(2) 802.11g				NM[2]
(d)(2) 802.11n		P		
(d)(2) 802.11ac		P		

2: See Remarks and Comments.

5800 MHz band

FCC 47CFR Part 2.1093 Paragraph	VERDICT			
	NA	P	F	NM
(d)(2) 802.11a		P		
(d)(2) 802.11g				NM[2]
(d)(2) 802.11n		P		
(d)(2) 802.11ac		P		

2: See Remarks and Comments.

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).

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 dimension:

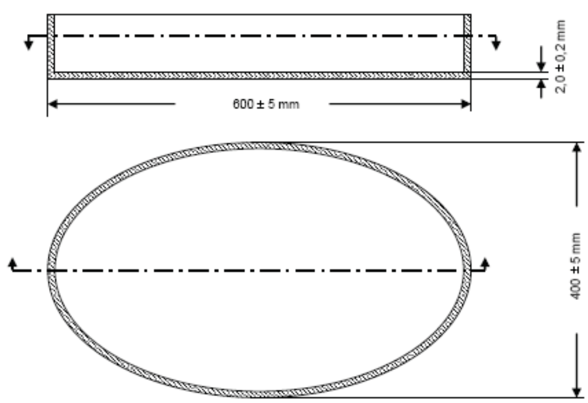

Figure 1: Proportions and shape of Phantom shell

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 450824 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:

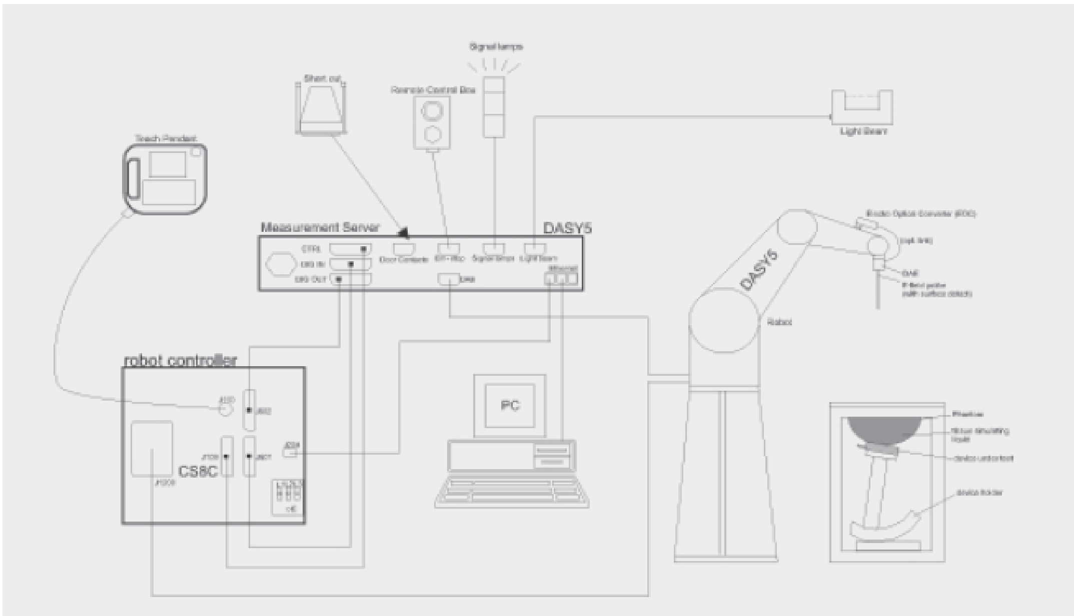

Figure 2: SAR Measurement system

- 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	Dosimetric E-Field Probe	EX3DV4
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	Handset Positioner	SD000 HD1HA
Schmid & Partner Engineering AG	Measurement Software	DASY52 V52.8.8.1222
Schmid & Partner Engineering AG	Postprocessing Software	SEMCAD X
Rohde & Schwarz	RF Generator	SMU 200A
MITEQ	Power amplifier	AMF-4D-00400600-50-30P
Agilent	DC Power supply	U8002A
NARDA	Directional coupler	FSCM 99899
Weinschel	6dB attenuator	75A-6-11
Weinschel	20 dB attenuator	75A-20-11
Rohde & Schwarz	Power Meter & Power Sensor	NRVD & NRV-Z51
Agilent	Power Meter	E4419B
Schmid & Partner Engineering AG	2450 MHz System Validation Dipole	D2450V2
Schmid & Partner Engineering AG	5000 MHz System Validation Dipole	D5GHzV2
Agilent	Vector Network Analyser	E5071C
Schmid & Partner Engineering AG	Dielectric Probe Kit	DAK-3.5

Table 1: Measurement Equipment

DOSIMETRIC E-FIELD PROBE

ES3DV3
Isotropic E-Field Probe for Dosimetric Measurements

	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025
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

DOSIMETRIC E-FIELD PROBE

EX3DV4
Smallest Isotropic E-Field Probe for Dosimetric Measurements

	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 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)
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

DATA ACQUISITION ELECTRONICS

DAE4 - Data Acquisition Electronics

	Signal amplifier, multiplexer, A/D converter, and control logic Serial optical link for communication with DASY4/5 embedded system (fully remote controlled) Two-step probe touch 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 Bias Current	< 50 fA

OVAL FLAT PHANTOM

ELI	
	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. ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure.
Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2.0 ± 0.2 mm (bottom plate)
Dimensions	Major axis: 600 mm Minor axis: 400 mm
Filling Volume	approx. 30 liters
Wooden Support	SPEAG standard phantom table

HANDSET POSITIONER

	**Mounting Device for Hand-Held Transmitters** 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)

DIPOLES

System Validation Kits 300 MHz – 6 GHz			
	Symmetrical dipole with l/4 balun Enables measurement of feedpoint impedance with NWA Matched for use near flat phantoms filled with tissue simulating solutions		
Calibration	ISO/IEC 17025		
Frequency	300, 400, 450, 600, 733, 750, 835, 850, 900, 1300, 1450, 1500, 1640, 1750, 1800, 1900, 1950, 2000, 2100, 2300, 2450, 2550, 2600, 3000, 3300, 3500, 3700 MHz and D5GHz (5100-5800 MHz)		
Return Loss	> 20 dB at specified validation position		
Power Capability	> 100 W (f < 1GHz); > 40 W (f > 1GHz)		
Dimensions (length and overall height in mm)	**Product**	**Dipole length**	**Overall height**
	D750V3 D900V2 D1800V2 D2000V2 D2450V2 D2600V2 D5GHzV2	179.0 148.5 72.5 65.0 52.0 49.2 20.6	330.0 340.0 300.0 300.0 290.0 290.0 300.0

2.2. Test Positions of device relative to body

The transmitter was tested using a representative antenna at different orientations relative to the phantom surface, in order to find the orientation with the highest measured SAR value. The test separation distance from the antenna to the phantom surface was 14 mm.

The transmitter was placed more than 15 cm away from the phantom to avoid interferences.

2.3. Test to be performed

Using a host laptop to configure the transmitter, all transmission modes were measured at the reference distance (14 mm) to confirm that the highest measured SAR value was ≤ 0.8 W/kg.

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 EUT, 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 EUT 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

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
Isotropy	7.558	R	√3	1	1	4.364	4.364
Linearity	4.700	R	√3	1	1	2.714	2.714
Probe modulation response	2.300	R	√3	1	1	1.328	1.328
Detection limits	0.250	R	√3	1	1	0.144	0.144
Boundary effect	2.000	R	√3	1	1	1.155	1.155
Readout electronics	0.300	N	1	1	1	0.300	0.300
Response time	0.000	R	√3	1	1	0.000	0.000
Integration time	1.900	R	√3	1	1	1.097	1.097
RF Ambien conditions - noise	3.000	R	√3	1	1	1.732	1.732
RF Ambien conditions – reflections	3.000	R	√3	1	1	1.732	1.732
Probe positioner mech. restrictions	0.400	R	√3	1	1	0.231	0.231
Probe positioning with respect to phantom shell	6.700	R	√3	1	1	3.868	3.868
Post-processing	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)	7.900	R	√3	1	1	4.561	4.561
Algorithm for correcting SAR for deviations in permittivity and conductivity	1.900	N	1	1	0.84	1.900	1.596
Liquid conductivity (meas.)	3.350	N	1	0.78	0.71	2.613	2.379
Liquid permittivity (meas.)	1.500	N	1	0.23	0.26	0.345	0.390
Liquid conductivity – temperature uncertainty	0.440	R	√3	0.78	0.71	0.198	0.180
Liquid permittivity – temperature uncertainty	3.120	R	√3	0.23	0.26	0.414	0.468
Combined standard uncertainty	$u_c = \sqrt{\sum_{1=1}^{m} c_i^2 \cdot u_i^2}$					**12.70**	**12.62**
Expanded uncertainty (confidence interval of 95%)	*ue =2.00 uc*					**25.40**	**25.23**

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	SAR	SAR Limit (W/Kg)
FCC 47 CFR Part 2.1093 Paragraph (d)(2)	$SAR_{1\ gr.}$	1.6

Table 3: SAR limit

5. DEVICE UNDER TEST

5.1. Dimmensions

Dimmensions	Millimetres
Height x Width x Depth	40.0 x 75.0 x 0.8

Table 4: Antenna dimmensions

5.2. Wireless Technology

Wireless Technology	Frequency Bands	Modes
Wi-Fi	2.4 GHz	- 802.11b/g/n
	5 GHz	- 802.11a/n/ac
Bluetooth	2.4 GHz	- Bluetooth

Table 5: DUT supported modes

5.3. Simultaneous Transmission

RF Exposure Condition	Capable Transmit Configurations (Chain A + Chain B)
Portable transmitter next to the body	Wi-Fi 2.45 GHz + (Wi-Fi 2.45 GHz or BT)
	Wi-Fi 5GHz + (Wi-Fi 5GHz + BT)

Table 6: DUT simultaneous transmission

5.4. Antenna Reference Positions

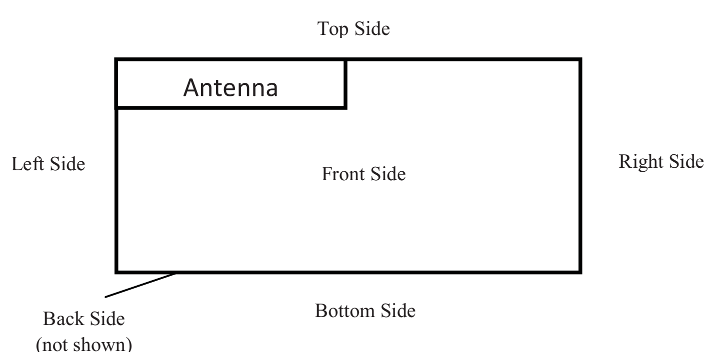

Figure 3: Antenna position against the flat phantom.

Appendix B – Test results

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1. TEST CONDITIONS

1.1. Temperature (ºC):

T_n = +21.15 to +24.84

The subscript n indicates normal test conditions.

1.2. Test signal, Output Power and Frequencies

The device was put into operation by using manufacturer proprietary test mode software (DRTU version 1.8.1.1252). For each channel into the 802.11 modes, the output power of the device was set to transmit at maximum power for all tests (continuous transmission aprox. 100% duty cycle).

The maximum average conducted power of the device was measured with a Power meter R&S NRVD and a thermocoupled Power sensor NRV-Z51.

1.3. EUT and test-site configurations

The device under test was an INTEL 8260NGW module controlled by a host laptop (Dell E5440) computer using a SkyCross Electronics antenna as reference antenna.

The reference antenna was placed with each face against the phantom at 14 mm test separation distance. Measurements have been performed for the hightest output power channel per mode, except for those with applicable test reductions, for each supported frequency band.

2. CONDUCTED AVERAGE POWER MEASUREMENTS

2.1. Wi-Fi & Bluetooth

- 2.4 GHz Band SISO:

Band	Mode	Channel / Freq (MHz)	Chain A Averaged Power (dBm)	Chain B Averaged Power (dBm)
2.4 GHz	802.11b	1 / 2412	18.81	18.49
		2 / 2417	19.19	20.88
		3 / 2422	21.00	20.89
		4 / 2427	20.99	21.16
		5 / 2432	21.22	21.16
		6 / 2437	21.24	21.17
		7 / 2442	21.24	21.26
		8 / 2447	21.04	21.29
		9 / 2452	21.28	21.28
		10 / 2457	20.05	19.33
		11 / 2462	20.03	19.32
	802.11g	1 / 2412	18.56	18.53
		2 / 2417	19.99	20.16
		3 / 2422	20.96	20.37
		4 / 2427	21.27	20.41
		5 / 2432	21.13	20.42
		6 / 2437	21.17	20.61
		7 / 2442	21.16	20.72
		8 / 2447	21.18	20.49
		9 / 2452	20.52	20.05
		10 / 2457	19.64	19.41
		11 / 2462	17.64	18.00
	802.11n20	1 / 2412	17.89	17.76
		2 / 2417	19.17	19.84
		3 / 2422	20.71	20.28
		4 / 2427	20.93	20.31
		5 / 2432	20.98	20.33
		6 / 2437	21.01	20.54
		7 / 2442	21.11	20.65
		8 / 2447	20.97	20.42
		9 / 2452	20.01	19.75
		10 / 2457	19.34	19.30
		11 / 2462	17.04	17.43
	802.11n40	3 / 2422	15.05	16.34
		4 / 2427	16.95	17.50
		5 / 2432	18.64	18.51
		6 / 2437	17.22	17.58
		7 / 2442	15.99	17.00
		8 / 2447	15.26	16.07
		9 / 2452	15.26	16.67

- **2.4 GHz Band MIMO:**

Band	Mode	Channel / Freq (MHz)	Chain A Averaged Power (dBm)	Chain B Averaged Power (dBm)
2.4 GHz	802.11n20	1 / 2412	13.35	13.36
		2 / 2417	15.71	15.72
		3 / 2422	17.49	17.45
		4 / 2427	17.95	17.95
		5 / 2432	17.95	17.94
		6 / 2437	17.93	17.91
		7 / 2442	17.88	17.82
		8 / 2447	17.86	17.82
		9 / 2452	17.85	17.81
		10 / 2457	17.87	17.82
		11 / 2462	16.16	15.88
	802.11n40	3 / 2422	13.59	13.56
		4 / 2427	13.95	13.92
		5 / 2432	14.21	14.19
		6 / 2437	15.2	15.16
		7 / 2442	12.97	12.94
		8 / 2447	12.47	12.45
		9 / 2452	15.05	15.03

- **Bluetooth:**

Band	Mode	Channel	Frequency	Averaged Power (dBm)
2.4 GHz	Bluetooth BR (GFSK)	0	2402	9.05
		39	2441	9.04
		78	2480	8.82
	Bluetooth EDR2 (π/4-DQPSK)	0	2402	8.73
		39	2441	9.08
		78	2480	9.32
	Bluetooth EDR3 (8-DPSK)	0	2402	8.75
		39	2441	9.09
		78	2480	9.33
	Bluetooth LE	0	2402	6.21
		39	2441	6.24
		78	2480	6.18

- **5.2 GHz Band SISO**:

Band	Mode	Channel / Freq (MHz)	Chain A Averaged Power (dBm)	Chain B Averaged Power (dBm)
5.2 GHz	802.11a	36/5180	20.97	18.55
		40/5200	21.39	21.29
		48/5240	21.28	21.35
	802.11n20	36/5180	20.65	18.46
		40/5200	21.32	21.22
		48/5240	21.23	21.39
	802.11n40	38/5190	18.39	17.00
		46/5230	21.14	21.22
	802.11ac80	42/5210	17.44	15.51

- **5.2 GHz Band MIMO**:

Band	Mode	Channel / Freq (MHz)	Chain A Averaged Power (dBm)	Chain B Averaged Power (dBm)
5.2 GHz	802.11n20	36/5180	18.85	18.23
		40/5200	18.09	18.11
		48/5240	18.07	17.81
	802.11n40	38/5190	16.51	16.31
		46/5230	17.94	18.10
	802.11ac80	42/5210	14.91	15.41

- **5.3 GHz Band SISO**:

Band	Mode	Channel / Freq (MHz)	Chain A Averaged Power (dBm)	Chain B Averaged Power (dBm)
5.3 GHz	802.11a	52/5260	21.29	21.39
		60/5300	21.21	21.44
		64/5320	19.63	17.79
	802.11n20	52/5260	21.20	21.35
		60/5300	21.39	21.11
		64/5320	19.29	17.65
	802.11n40	54/5270	15.74	12.95
		62/5310	21.02	21.03
	802.11ac80	58/5290	12.73	9.77

- **5.3 GHz Band MIMO**:

Band	Mode	Channel / Freq (MHz)	Chain A Averaged Power (dBm)	Chain B Averaged Power (dBm)
5.3 GHz	802.11n20	52/5260	18.25	17.77
		60/5300	18.15	17.86
		64/5320	17.91	18.52
	802.11n40	54/5270	18.43	18.06
		62/5310	12.64	12.72
	802.11ac80	58/5290	9.27	9.05

- **<u>5.6 GHz Band SISO</u>:**

Band	Mode	Channel / Freq (MHz)	Chain A Averaged Power (dBm)	Chain B Averaged Power (dBm)
5.6 GHz	802.11a	100/5500	18.50	18.62
		116/5580	21.01	21.12
		140/5700	21.11	21.27
	802.11n20	100/5500	18.10	18.27
		116/5580	21.24	21.29
		140/5700	21.02	21.03
	802.11ac20	144/5720	17.32	16.99
	802.11n40	102/5510	15.72	16.69
		110/5550	21.21	21.40
		134/ 5670	21.08	15.96
	802.11ac40	142/5710	21.32	21.24
	802.11ac80	106/5530	17.48	15.94
		138/5690	20.47	20.52

- **<u>5.6 GHz Band MIMO</u>:**

Band	Mode	Channel / Freq (MHz)	Chain A Averaged Power (dBm)	Chain B Averaged Power (dBm)
5.6 GHz	802.11n20	100/5500	16.78	17.23
		116/5580	18.09	18.22
		140/5700	18.06	17.98
	802.11ac20	144/5720	16.89	16.89
	802.11n40	102/5510	15.26	16.34
		110/5550	17.95	18.01
		134/ 5670	18.32	18.02
	802.11ac40	142/5710	17.15	17.23
	802.11ac80	106/5530	13.91	14.62
		138/5690	20.14	20.26

- **<u>5.8 GHz Band SISO</u>:**

Band	Mode	Channel / Freq (MHz)	Chain A Averaged Power (dBm)	Chain B Averaged Power (dBm)
5.8 GHz	802.11a	149/5745	21.52	21.03
		157/5785	21.46	21.13
		165/5825	21.62	21.03
	802.11n20	149/5745	21.21	20.94
		157/5785	21.39	20.95
		165/5825	21.86	21.52
	802.11n40	151/5755	21.46	21.14
		159/5795	21.65	21.56
	802.11ac80	155/5775	21.20	21.12

- **<u>5.8 GHz Band MIMO</u>:**

Band	Mode	Channel / Freq (MHz)	Chain A Averaged Power (dBm)	Chain B Averaged Power (dBm)
5.8 GHz	802.11n20	149/5745	18.31	18.11
		157/5785	18.39	18.17
		165/5825	18.42	18.27
	802.11n40	151/5755	18.17	18.31
		159/5795	18.41	18.21
	802.11ac80	155/5775	18.04	18.03

3. TISSUE PARAMETERS MEASUREMENTS

Frequency (MHz)	Target Body Tissue: Parameters used in Probe Calibration		Target Body Tissue: Parameters used in Dipole Calibration		Measured Body Tissue		Measured Date
	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
2450	52.70 ± 5%	1.95 ± 5%	50.5 ± 6%	2.01 ± 6%	51.61 ± 5%	1.98 ± 5%	20-05-2015
2450	52.70 ± 5%	1.95 ± 5%	50.5 ± 6%	2.01 ± 6%	51.55± 5%	1.95± 5%	28-05-2015
5200	49.01 ± 5%	5.30 ± 5%	48.9 ± 6%	5.40 ± 6%	50.19 ± 5%	5.17 ± 5%	21-05-2015
5200	49.01 ± 5%	5.30 ± 5%	48.9 ± 6%	5.40 ± 6%	50.37 ± 5%	5.20 ± 5%	25-05-2015
5500	48.61 ± 5%	5.65 ± 5%	48.4 ± 6%	5.79 ± 6%	48.35 ± 5%	5.61 ± 5%	26-05-2015
5800	48.20 ± 5%	6.00 ± 5%	47.9 ± 6%	6.21 ± 6%	47.60 ± 5%	6.20 ± 5%	27-05-2015

Note: The dielectric properties have been measured by the contact probe method at 23° C.

- Composition / Information on ingredients

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

Muscle Tissue Simulation Liquids HBBL5GHzV2

Water	76 – 80 %
Mineral Oil	10 – 12 %
Emulsifiers	8 – 10 %
Additives and Salt	1 – 3%

4. SYSTEM CHECK MEASUREMENTS

4.1. Validation results in 2450 MHz Band for Body TSL

DATE	SAR over	Target SAR	Measured SAR	Drift (%)	± 10% Limit	SAR (W/Kg)
20/05/2015	1 gr.	51.10	48.86	-4.39	√	12.20
	10 gr.	23.90	22.83	-4.49	√	5.70

4.2. Validation results in 2450 MHz Band for Body TSL

DATE	SAR over	Target SAR	Measured SAR	Drift (%)	± 10% Limit	SAR (W/Kg)
28/05/2015	1 gr.	51.10	48.57	-4.96	√	12.10
	10 gr.	23.90	22.56	-5.56	√	5.62

4.3. Validation results in 5200 MHz Band for Body TSL

DATE	SAR over	Target SAR	Measured SAR	Drift (%)	± 10% Limit	SAR (W/Kg)
21/05/2015	1 gr.	74.70	71.43	-4.38	√	7.11
	10 gr.	20.90	20.90	-2.42	√	2.03

4.4. Validation results in 5200 MHz Band for Body TSL

DATE	SAR over	Target SAR	Measured SAR	Drift (%)	± 10% Limit	SAR (W/Kg)
25/05/2015	1 gr.	74.70	72.40	-3.08	√	7.24
	10 gr.	20.90	20.90	-1.44	√	2.06

4.5. Validation results in 5500 MHz Band for Body TSL

DATE	SAR over	Target SAR	Measured SAR	Drift (%)	± 10% Limit	SAR (W/Kg)
26/05/2015	1 gr.	78.70	76.89	-2.30	√	7.68
	10 gr.	21.90	21.42	-2.17	√	2.14

4.6. Validation results in 5800 MHz Band for Body TSL

DATE	SAR over	Target SAR	Measured SAR	Drift (%)	± 10% Limit	SAR (W/Kg)
27/05/2015	1 gr.	75.10	75.44	0.46	√	7.72
	10 gr.	20.80	20.91	0.54	√	2.14

5. MEASUREMENT RESULTS FOR SAR (SPECIFIC ABSORPTION RATE)

5.1. Summary maximum results for 1g SAR measurements.

Band	Mode	Chain / Orientation	Channel (Frequency)	Reported SAR 1g (W/Kg)	SAR limit 1g (W/Kg)
2450 MHz	802.11b	Chain A/ Back side	CH 6 (2437 Mhz)	0.455	1.6
	Bluetooth	Chain B/ Back side	CH 78 (2480 Mhz)	0.018	1.6
5200 MHz	802.11a	Chain B/ Front side	CH 48 (5240 Mhz)	0.725	1.6
5300 MHz	802.11n40	Chain A/ Front side	CH 62 (5310 Mhz)	0.684	1.6
5500 MHz	802.11n40	Chain B/ Front side	CH 110 (5550 Mhz)	0.538	1.6
5800 MHz	802.11n40	Chain A/ Front side	CH 159 (5795 MHz)	0.710	1.6

5.2. Result for 1g body simultaneous evalutation MIMO

Transmission Mode	Band	Reported SAR 1g (W/Kg)	Σ SARi (W/kg)	SAR limit 1g (W/Kg)	Veredict
802.11b/Chain A	2450 MHz	0.455	0.897	1.6	Pass
802.11b/Chain B	2450 MHz	0.442			
802.11a/Chain A	5.2GHz	0.558	1.301	1.6	Pass
802.11a/Chain B	5.2GHz	0.725			
Bluetooth	2450 MHz	0.018			
802.11n40/Chain A	5.3 GHz	0.684	1.237	1.6	Pass
802.11n40/Chain B	5.3 GHz	0.535			
Bluetooth	2450 MHz	0.018			
802.11ac80/Chain A	5.5 GHz	0.519	1.075	1.6	Pass
802.11n40/Chain B	5.5 GHz	0.538			
Bluetooth	2450 MHz	0.018			
802.11n40/Chain A	5.8 GHz	0.710	1.407	1.6	Pass
802.11n40/Chain B	5.8 GHz	0.679			
Bluetooth	2450 MHz	0.018			

To calculate the separatation ratio the following formula is used:
$(SAR_1+SAR_2)^{1.5}/Ri$, where Ri is in mm, must be ≤ 0.04

For each of the pairs, the following calculations show the separatation ratio at the 50 mm separatation stated in the installation guide:

2.4 GHz Band: $(0.455+0.442)^{1.5}/50 = 0.02$
5.2 GHz Band: $(0.558+0.725+0.018)^{1.5}/50 = 0.03$
5.3 GHz Band: $(0.684+0.535+0.018)^{1.5}/50 = 0.03$
5.6 GHz Band: $(0.519+0.538+0.018)^{1.5}/50 = 0.02$
5.8 GHz Band: $(0.710+0.679+0.018)^{1.5}/50 = 0.03$

5.3. Results for Wi-Fi 2450 MHz Band.

- 802.11b

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11b	CH 6 (2437 Mhz)	0.429	0.58	21.5	0.455	1
Chain A/ Front side	14	802.11b	CH 6 (2437 Mhz)	0.316	2.33	21.5	0.335	
Chain A/ Top side	14	802.11b	CH 6 (2437 Mhz)	0.19	0.58	21.5	0.202	
Chain A/ Bottom side	14	802.11b	CH 6 (2437 Mhz)	0.073	-0.69	21.5	0.078	
Chain A/ Left side	14	802.11b	CH 6 (2437 Mhz)	0.111	-1.49	21.5	0.118	
Chain A/ Right side	14	802.11b	CH 6 (2437 Mhz)	0.061	0.93	21.5	0.065	
Chain A/ Back side	14	802.11b	CH 1 (2412 Mhz)	NM[1]				
Chain A/ Back side	14	802.11b	CH 11 (2462 Mhz)	NM[1]				

1: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11b	CH 6 (2437 Mhz)	0.41	0.81	21.5	0.442	2
Chain B/ Front side	14	802.11b	CH 6 (2437 Mhz)	0.335	0.81	21.5	0.361	
Chain B/ Top side	14	802.11b	CH 6 (2437 Mhz)	0.162	1.51	21.5	0.175	
Chain B/ Bottom side	14	802.11b	CH 6 (2437 Mhz)	0.074	0.35	21.5	0.08	
Chain B/ Left side	14	802.11b	CH 6 (2437 Mhz)	0.087	1.27	21.5	0.094	
Chain B/ Right side	14	802.11b	CH 6 (2437 Mhz)	0.052	3.04	21.5	0.056	
Chain B/ Back side	14	802.11b	CH 1 (2412 Mhz)	NM[1]				
Chain B/ Back side	14	802.11b	CH 11 (2462 Mhz)	NM[1]				

1: See remarks and comments

- 802.11g

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				
Chain A/ Front side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				
Chain A/ Top side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				
Chain A/ Bottom side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				
Chain A/ Left side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				
Chain A/ Right side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				

2: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				
Chain B/ Front side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				
Chain B/ Top side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				
Chain B/ Bottom side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				
Chain B/ Left side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				
Chain B/ Right side	14	802.11g	CH 6 (2437 Mhz)	NM[2]				

2: See remarks and comments

- 802.11n20

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11n20	CH 6 (2437 Mhz)	NM[2]				
Chain A/ Front side	14	802.11 n20	CH 6 (2437 Mhz)	NM[2]				
Chain A/ Top side	14	802.11 n20	CH 6 (2437 Mhz)	NM[2]				
Chain A/ Bottom side	14	802.11 n20	CH 6 (2437 Mhz)	NM[2]				
Chain A/ Left side	14	802.11 n20	CH 6 (2437 Mhz)	NM[2]				
Chain A/ Right side	14	802.11 n20	CH 6 (2437 Mhz)	NM[2]				

2: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11n20	CH 6 (2437 Mhz)	NM[2]				
Chain B/ Front side	14	802.11 n20	CH 6 (2437 Mhz)	NM[2]				
Chain B/ Top side	14	802.11 n20	CH 6 (2437 Mhz)	NM[2]				
Chain B/ Bottom side	14	802.11 n20	CH 6 (2437 Mhz)	NM[2]				
Chain B/ Left side	14	802.11 n20	CH 6 (2437 Mhz)	NM[2]				
Chain B/ Right side	14	802.11 n20	CH 6 (2437 Mhz)	NM[2]				

2: See remarks and comments

- 802.11n40

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11n40	CH 6 (2437 Mhz)	0.161	0.0	17.5	0.172	
Chain A/ Front side	14	802.11 n40	CH 6 (2437 Mhz)	NM[3]				
Chain A/ Top side	14	802.11 n40	CH 6 (2437 Mhz)	NM[3]				
Chain A/ Bottom side	14	802.11 n40	CH 6 (2437 Mhz)	NM[3]				
Chain A/ Left side	14	802.11 n40	CH 6 (2437 Mhz)	NM[3]				
Chain A/ Right side	14	802.11 n40	CH 6 (2437 Mhz)	NM[3]				
Chain A/ Back side	14	802.11 n40	CH 6 (2437 Mhz)	NM[1]				
Chain A/ Back side	14	802.11 n40	CH 6 (2437 Mhz)	NM[1]				

1 and 3: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11n40	CH 6 (2437 Mhz)	0.174	2.09	18	0.192	
Chain B/ Front side	14	802.11 n40	CH 6 (2437 Mhz)	NM[3]				
Chain B/ Top side	14	802.11 n40	CH 6 (2437 Mhz)	NM[3]				
Chain B/ Bottom side	14	802.11 n40	CH 6 (2437 Mhz)	NM[3]				
Chain B/ Left side	14	802.11 n40	CH 6 (2437 Mhz)	NM[3]				
Chain B/ Right side	14	802.11 n40	CH 6 (2437 Mhz)	NM[3]				
Chain B/ Back side	14	802.11 n40	CH 6 (2437 Mhz)	NM[1]				
Chain B/ Back side	14	802.11 n40	CH 6 (2437 Mhz)	NM[1]				

1 and 3: See remarks and comments

- Bluetooth

Side / Position	Dist (mm)	Mode	Channel	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	8-DPSK	78	0.015	1.16	10	0.018	
Chain B/ Front side	14	8-DPSK	78	0.014	3.51	10	0.016	
Chain B/ Top side	14	8-DPSK	78	0.0053	0.58	10	0.006	
Chain B/ Bottom side	14	8-DPSK	78	0.0018	-2.39	10	0.002	
Chain B/ Left side	14	8-DPSK	78	0.0031	1.62	10	0.004	
Chain B/ Right side	14	8-DPSK	78	0.0024	-1.83	10	0.003	
Chain B/ Back side	14	8-DPSK	0	NM[1]				
Chain B/ Back side	14	8-DPSK	39	NM[1]				

1: See remarks and comments

5.4. Results for Wi-Fi 5200 MHz Band.

- 802.11a

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11a	40 (5200 Mhz)	0.264	1.04	21.5	0.284	
Chain A/ Front side	14	802.11a	40 (5200 Mhz)	0.544	-0.46	21.5	0.558	3
Chain A/ Top side	14	802.11a	40 (5200 Mhz)	0.501	-0.80	21.5	0.514	
Chain A/ Bottom side	14	802.11a	40 (5200 Mhz)	0.071	2.45	21.5	0.073	
Chain A/ Left side	14	802.11a	40 (5200 Mhz)	0.131	-1.26	21.5	0.134	
Chain A/ Right side	14	802.11a	40 (5200 Mhz)	0.035	4.35	21.5	0.036	
Chain A/ Front side	14	802.11a	36 (5180 Mhz)	NM[1]				
Chain A/ Front side	14	802.11a	48 (5240 Mhz)	NM[1]				

1: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11a	48 (5240 Mhz)	0.450	-0.23	21.5	0.466	
Chain B/ Front side	14	802.11a	48 (5240 Mhz)	0.700	1.16	21.5	0.725	4
Chain B/ Top side	14	802.11a	48 (5240 Mhz)	0.601	0.35	21.5	0.622	
Chain B/ Bottom side	14	802.11a	48 (5240 Mhz)	0.103	0.35	21.5	0.107	
Chain B/ Left side	14	802.11a	48 (5240 Mhz)	0.205	-3.06	21.5	0.212	
Chain B/ Right side	14	802.11a	48 (5240 Mhz)	0.040	-2.39	21.5	0.041	
Chain B/ Front side	14	802.11a	36 (5180 Mhz)	NM[1]				
Chain B/ Front side	14	802.11a	40 (5200 Mhz)	NM[1]				

1: See remarks and comments

- 802.11n20

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11n20	40 (5200 Mhz)	NM^2				
Chain A/ Front side	14	802.11n20	40 (5200 Mhz)	NM^2				
Chain A/ Top side	14	802.11n20	40 (5200 Mhz)	NM^2				
Chain A/ Bottom side	14	802.11n20	40 (5200 Mhz)	NM^2				
Chain A/ Left side	14	802.11n20	40 (5200 Mhz)	NM^2				
Chain A/ Right side	14	802.11n20	40 (5200 Mhz)	NM^2				

2: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11n20	48 (5240 Mhz)	NM^2				
Chain B/ Front side	14	802.11n20	48 (5240 Mhz)	NM^2				
Chain B/ Top side	14	802.11n20	48 (5240 Mhz)	NM^2				
Chain B/ Bottom side	14	802.11n20	48 (5240 Mhz)	NM^2				
Chain B/ Left side	14	802.11n20	48 (5240 Mhz)	NM^2				
Chain B/ Right side	14	802.11n20	48 (5240 Mhz)	NM^2				

2: See remarks and comments

- 802.11n40

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11n40	46 (5230 Mhz)	NM[3]				
Chain A/ Front side	14	802.11n40	46 (5230 Mhz)	0.483	-0.23	21.5	0.525	
Chain A/ Top side	14	802.11n40	46 (5230 Mhz)	NM[3]				
Chain A/ Bottom side	14	802.11n40	46 (5230 Mhz)	NM[3]				
Chain A/ Left side	14	802.11n40	46 (5230 Mhz)	NM[3]				
Chain A/ Right side	14	802.11n40	46 (5230 Mhz)	NM[3]				
Chain A/ Front side	14	802.11n40	38 (5190 Mhz)	NM[1]				

1 and 3: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11n40	46 (5230 Mhz)	NM[3]				
Chain B/ Front side	14	802.11n40	46 (5230 Mhz)	0.617	-1.03	21.5	0.626	
Chain B/ Top side	14	802.11n40	46 (5230 Mhz)	NM[3]				
Chain B/ Bottom side	14	802.11n40	46 (5230 Mhz)	NM[3]				
Chain B/ Left side	14	802.11n40	46 (5230 Mhz)	NM[3]				
Chain B/ Right side	14	802.11n40	46 (5230 Mhz)	NM[3]				
Chain B/ Front side	14	802.11n40	38 (5190 Mhz)	NM[1]				

1 and 3: See remarks and comments

- 802.11ac80

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11ac80	42 (5210 Mhz)	NM[3]				
Chain A/ Front side	14	802.11ac80	42 (5210 Mhz)	0.193	0.58	18	0.220	
Chain A/ Top side	14	802.11ac80	42 (5210 Mhz)	NM[3]				
Chain A/ Bottom side	14	802.11ac80	42 (5210 Mhz)	NM[3]				
Chain A/ Left side	14	802.11ac80	42 (5210 Mhz)	NM[3]				
Chain A/ Right side	14	802.11ac80	42 (5210 Mhz)	NM[3]				

3: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11ac80	42 (5210 Mhz)	NM[3]				
Chain B/ Front side	14	802.11ac80	42 (5210 Mhz)	0.133	1.27	10	0.140	
Chain B/ Top side	14	802.11ac80	42 (5210 Mhz)	NM[3]				
Chain B/ Bottom side	14	802.11ac80	42 (5210 Mhz)	NM[3]				
Chain B/ Left side	14	802.11ac80	42 (5210 Mhz)	NM[3]				
Chain B/ Right side	14	802.11ac80	42 (5210 Mhz)	NM[3]				

3: See remarks and comments

5.5. Results for Wi-Fi 5300 MHz Band.

- 802.11a

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11a	52 (5260 Mhz)	0.282	0.46	21.5	0.296	
Chain A/ Front side	14	802.11a	52 (5260 Mhz)	0.608	0.46	21.5	0.638	
Chain A/ Top side	14	802.11a	52 (5260 Mhz)	0.509	1.04	21.5	0.534	
Chain A/ Bottom side	14	802.11a	52 (5260 Mhz)	0.087	0.58	21.5	0.091	
Chain A/ Left side	14	802.11a	52 (5260 Mhz)	0.172	-0.34	21.5	0.181	
Chain A/ Right side	14	802.11a	52 (5260 Mhz)	0.029	4.71	21.5	0.030	
Chain A/ Front side	14	802.11a	60 (5300 Mhz)	NM[1]				
Chain A/ Front side	14	802.11a	64 (5320 Mhz)	NM[1]				

1: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11a	60 (5300 Mhz)	0.219	0.69	21.5	0.222	
Chain B/ Front side	14	802.11a	60 (5300 Mhz)	0.484	1.27	21.5	0.491	
Chain B/ Top side	14	802.11a	60 (5300 Mhz)	0.460	2.33	21.5	0.466	
Chain B/ Bottom side	14	802.11a	60 (5300 Mhz)	0.064	1.74	21.5	0.065	
Chain B/ Left side	14	802.11a	60 (5300 Mhz)	0.109	-3.62	21.5	0.111	
Chain B/ Right side	14	802.11a	60 (5300 Mhz)	0.027	0.027	21.5	0.027	
Chain B/ Front side	14	802.11a	52 (5260 Mhz)	NM[1]				
Chain B/ Front side	14	802.11a	64 (5320 Mhz)	NM[1]				

1: See remarks and comments

- 802.11n20

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11n20	52 (5260 Mhz)	NM[2]				
Chain A/ Front side	14	802.11n20	52 (5260 Mhz)	NM[2]				
Chain A/ Top side	14	8802.11n20	52 (5260 Mhz)	NM[2]				
Chain A/ Bottom side	14	802.11n20	52 (5260 Mhz)	NM[2]				
Chain A/ Left side	14	802.11n20	52 (5260 Mhz)	NM[2]				
Chain A/ Right side	14	802.11n20	52 (5260 Mhz)	NM[2]				

2: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11n20	52 (5260 Mhz)	NM[2]				
Chain B/ Front side	14	802.11n20	52 (5260 Mhz)	NM[2]				
Chain B/ Top side	14	8802.11n20	52 (5260 Mhz)	NM[2]				
Chain B/ Bottom side	14	802.11n20	52 (5260 Mhz)	NM[2]				
Chain B/ Left side	14	802.11n20	52 (5260 Mhz)	NM[2]				
Chain B/ Right side	14	802.11n20	52 (5260 Mhz)	NM[2]				

2: See remarks and comments

- 802.11n40

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11n40	62 (5310 Mhz)	NM[3]				
Chain A/ Front side	14	802.11n40	62 (5310 Mhz)	0.612	0.93	21.5	0.684	5
Chain A/ Top side	14	802.11n40	62 (5310 Mhz)	NM[3]				
Chain A/ Bottom side	14	802.11n40	62 (5310 Mhz)	NM[3]				
Chain A/ Left side	14	802.11n40	62 (5310 Mhz)	NM[3]				
Chain A/ Right side	14	802.11n40	62 (5310 Mhz)	NM[3]				
Chain A/ Front side	14	802.11n40	54 (5270 Mhz)	NM[1]				

1 and 3: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11n40	62 (5310 Mhz)	NM[3]				
Chain B/ Front side	14	802.11n40	62 (5310 Mhz)	0.480	1.62	21.5	0.535	6
Chain B/ Top side	14	802.11n40	62 (5310 Mhz)	NM[3]				
Chain B/ Bottom side	14	802.11n40	62 (5310 Mhz)	NM[3]				
Chain B/ Left side	14	802.11n40	62 (5310 Mhz)	NM[3]				
Chain B/ Right side	14	802.11n40	62 (5310 Mhz)	NM[3]				
Chain B/ Front side	14	802.11n40	54 (5270 Mhz)	NM[1]				

1 and 3: See remarks and comments

- 802.11ac80

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11ac80	58 (5290 Mhz)	NM[3]				
Chain A/ Front side	14	802.11ac80	58 (5290 Mhz)	0.065	-0.34	13	0.069	
Chain A/ Top side	14	802.11ac80	58 (5290 Mhz)	NM[3]				
Chain A/ Bottom side	14	802.11ac80	58 (5290 Mhz)	NM[3]				
Chain A/ Left side	14	802.11ac80	58 (5290 Mhz)	NM[3]				
Chain A/ Right side	14	802.11ac80	58 (5290 Mhz)	NM[3]				

3: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11ac80	58 (5290 Mhz)	NM[3]				
Chain B/ Front side	14	802.11ac80	58 (5290 Mhz)	0.025	3.87	10	0.026	
Chain B/ Top side	14	802.11ac80	58 (5290 Mhz)	NM[3]				
Chain B/ Bottom side	14	802.11ac80	58 (5290 Mhz)	NM[3]				
Chain B/ Left side	14	802.11ac80	58 (5290 Mhz)	NM[3]				
Chain B/ Right side	14	802.11ac80	58 (5290 Mhz)	NM[3]				

3: See remarks and comments

5.6. Results for Wi-Fi 5600 MHz Band.

- 802.11a

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11a	140 (5700 Mhz)	0.2	2.80	21.5	0.219	
Chain A/ Front side	14	802.11a	140 (5700 Mhz)	0.405	0.58	21.5	0.443	
Chain A/ Top side	14	802.11a	140 (5700 Mhz)	0.321	1.62	21.5	0.351	
Chain A/ Bottom side	14	802.11a	140 (5700 Mhz)	0.074	-0.69	21.5	0.081	
Chain A/ Left side	14	802.11a	140 (5700 Mhz)	0.099	-1.49	21.5	0.108	
Chain A/ Right side	14	802.11a	140 (5700 Mhz)	0.027	1.04	21.5	0.03	
Chain A/ Front side	14	802.11a	100 (5500 Mhz)	NM[1]				
Chain A/ Front side	14	802.11a	116 (5580 Mhz)	NM[1]				

1: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11a	140 (5700 Mhz)	0.239	1.86	21.5	0.252	
Chain B/ Front side	14	802.11a	140 (5700 Mhz)	0.433	1.74	21.5	0.457	
Chain B/ Top side	14	802.11a	140 (5700 Mhz)	0.286	2.92	21.5	0.302	
Chain B/ Bottom side	14	802.11a	140 (5700 Mhz)	0.034	2.57	21.5	0.036	
Chain B/ Left side	14	802.11a	140 (5700 Mhz)	0.085	-2.16	21.5	0.09	
Chain B/ Right side	14	802.11a	140 (5700 Mhz)	0.023	3.63	21.5	0.024	
Chain B/ Front side	14	802.11a	100 (5500 Mhz)	NM[1]				
Chain B/ Front side	14	802.11a	116 (5580 Mhz)	NM[1]				

1: See remarks and comments

- 802.11n20

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11n20	116 (5580 Mhz)	NM[2]				
Chain A/ Front side	14	802.11n20	116 (5580 Mhz)	NM[2]				
Chain A/ Top side	14	802.11n20	116 (5580 Mhz)	NM[2]				
Chain A/ Bottom side	14	802.11n20	116 (5580 Mhz)	NM[2]				
Chain A/ Left side	14	802.11n20	116 (5580 Mhz)	NM[2]				
Chain A/ Right side	14	802.11n20	116 (5580 Mhz)	NM[2]				

2: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11n20	116 (5580 Mhz)	NM[2]				
Chain B/ Front side	14	802.11n20	116 (5580 Mhz)	NM[2]				
Chain B/ Top side	14	802.11n20	116 (5580 Mhz)	NM[2]				
Chain B/ Bottom side	14	802.11n20	116 (5580 Mhz)	NM[2]				
Chain B/ Left side	14	802.11n20	116 (5580 Mhz)	NM[2]				
Chain B/ Right side	14	802.11n20	116 (5580 Mhz)	NM[2]				

2: See remarks and comments

- 802.11ac20

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11ac20	144 (5720 Mhz)	NM[2]				
Chain A/ Front side	14	802.11ac20	144 (5720 Mhz)	NM[2]				
Chain A/ Top side	14	802.11ac20	144 (5720 Mhz)	NM[2]				
Chain A/ Bottom side	14	802.11ac20	144 (5720 Mhz)	NM[2]				
Chain A/ Left side	14	802.11ac20	144 (5720 Mhz)	NM[2]				
Chain A/ Right side	14	802.11ac20	144 (5720 Mhz)	NM[2]				

2: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11ac20	144 (5720 Mhz)	NM[2]				
Chain B/ Front side	14	802.11ac20	144 (5720 Mhz)	NM[2]				
Chain B/ Top side	14	802.11ac20	144 (5720 Mhz)	NM[2]				
Chain B/ Bottom side	14	802.11ac20	144 (5720 Mhz)	NM[2]				
Chain B/ Left side	14	802.11ac20	144 (5720 Mhz)	NM[2]				
Chain B/ Right side	14	802.11ac20	144 (5720 Mhz)	NM[2]				

2: See remarks and comments

- 802.11n40

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11n40	110 (5550 Mhz)	NM[3]				
Chain A/ Front side	14	802.11n40	110 (5550 Mhz)	0.43	0.81	21.2	0.46	
Chain A/ Top side	14	802.11n40	110 (5550 Mhz)	NM[3]				
Chain A/ Bottom side	14	802.11n40	110 (5550 Mhz)	NM[3]				
Chain A/ Left side	14	802.11n40	110 (5550 Mhz)	NM[3]				
Chain A/ Right side	14	802.11n40	110 (5550 Mhz)	NM[3]				
Chain A/ Front side	14	802.11n40	102 (5510 Mhz)	NM[1]				
Chain A/ Front side	14	802.11n40	134 (5670 Mhz)	NM[1]				

1 and 3: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11n40	110 (5550 Mhz)	NM[3]				
Chain B/ Front side	14	802.11n40	110 (5550 Mhz)	0.49	1.04	21.5	0.538	7
Chain B/ Top side	14	802.11n40	110 (5550 Mhz)	NM[3]				
Chain B/ Bottom side	14	802.11n40	110 (5550 Mhz)	NM[3]				
Chain B/ Left side	14	802.11n40	110 (5550 Mhz)	NM[3]				
Chain B/ Right side	14	802.11n40	110 (5550 Mhz)	NM[3]				
Chain B/ Front side	14	802.11n40	102 (5510 Mhz)	NM[1]				
Chain B/ Front side	14	802.11n40	134 (5670 Mhz)	NM[1]				

1 and 3: See remarks and comments

- 802.11ac40

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11ac40	142 (5710 Mhz)	NM[3]				
Chain A/ Front side	14	802.11ac40	142 (5710 Mhz)	0.443	-0.34	21.5	0.462	
Chain A/ Top side	14	802.11ac40	142 (5710 Mhz)	NM[3]				
Chain A/ Bottom side	14	802.11ac40	142 (5710 Mhz)	NM[3]				
Chain A/ Left side	14	802.11ac40	142 (5710 Mhz)	NM[3]				
Chain A/ Right side	14	802.11ac40	142 (5710 Mhz)	NM[3]				

3: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11ac40	142 (5710 Mhz)	NM[3]				
Chain B/ Front side	14	802.11ac40	142 (5710 Mhz)	0.451	0.46	21.5	0.479	
Chain B/ Top side	14	802.11ac40	142 (5710 Mhz)	NM[3]				
Chain B/ Bottom side	14	802.11ac40	142 (5710 Mhz)	NM[3]				
Chain B/ Left side	14	802.11ac40	142 (5710 Mhz)	NM[3]				
Chain B/ Right side	14	802.11ac40	142 (5710 Mhz)	NM[3]				

3: See remarks and comments

- 802.11ac80

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11ac80	138 (5690 Mhz)	NM[3]				
Chain A/ Front side	14	802.11ac80	138 (5690 Mhz)	0.459	1.27	21	0.519	8
Chain A/ Top side	14	802.11ac80	138 (5690 Mhz)	NM[3]				
Chain A/ Bottom side	14	802.11ac80	138 (5690 Mhz)	NM[3]				
Chain A/ Left side	14	802.11ac80	138 (5690 Mhz)	NM[3]				
Chain A/ Right side	14	802.11ac80	138 (5690 Mhz)	NM[3]				

3: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11ac80	138 (5690 Mhz)	NM[3]				
Chain B/ Front side	14	802.11ac80	138 (5690 Mhz)	0.416	0.12	21	0.465	
Chain B/ Top side	14	802.11ac80	138 (5690 Mhz)	NM[3]				
Chain B/ Bottom side	14	802.11ac80	138 (5690 Mhz)	NM[3]				
Chain B/ Left side	14	802.11ac80	138 (5690 Mhz)	NM[3]				
Chain B/ Right side	14	802.11ac80	138 (5690 Mhz)	NM[3]				

3: See remarks and comments

5.7. Results for Wi-Fi 5800 MHz Band.

- 802.11a

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11a	165 (5825 Mhz)	0.269	1.62	22	0.294	
Chain A/ Front side	14	802.11a	165 (5825 Mhz)	0.582	0.35	22	0.635	
Chain A/ Top side	14	802.11a	165 (5825 Mhz)	0.392	1.39	22	0.428	
Chain A/ Bottom side	14	802.11a	165 (5825 Mhz)	0.04	4.35	22	0.044	
Chain A/ Left side	14	802.11a	165 (5825 Mhz)	0.08	2.68	22	0.087	
Chain A/ Right side	14	802.11a	165 (5825 Mhz)	0.02	3.40	22	0.022	
Chain A/ Front side	14	802.11a	149 (5745 Mhz)	NM[1]				
Chain A/ Front side	14	802.11a	157 (5785 Mhz)	NM[1]				

1: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11a	157 (5785 Mhz)	0.241	3.16	21.5	0.262	
Chain B/ Front side	14	802.11a	157 (5785 Mhz)	0.507	0.58	21.5	0.552	
Chain B/ Top side	14	802.11a	157 (5785 Mhz)	0.271	-0.12	21.5	0.295	
Chain B/ Bottom side	14	802.11a	157 (5785 Mhz)	0.049	-3.28	21.5	0.053	
Chain B/ Left side	14	802.11a	157 (5785 Mhz)	0.064	-4.06	21.5	0.07	
Chain B/ Right side	14	802.11a	157 (5785 Mhz)	0.021	-0.12	21.5	0.023	
Chain B/ Front side	14	802.11a	149 (5745 Mhz)	NM[1]				
Chain B/ Front side	14	802.11a	165 (5825 Mhz)	NM[1]				

1: See remarks and comments

- 802.11n20

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11n20	165 (5825 Mhz)	NM[2]				
Chain A/ Front side	14	802.11n20	165 (5825 Mhz)	NM[2]				
Chain A/ Top side	14	802.11n20	165 (5825 Mhz)	NM[2]				
Chain A/ Bottom side	14	802.11n20	165 (5825 Mhz)	NM[2]				
Chain A/ Left side	14	802.11n20	165 (5825 Mhz)	NM[2]				
Chain A/ Right side	14	802.11n20	165 (5825 Mhz)	NM[2]				

2: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11n20	165 (5825 Mhz)	NM[2]				
Chain B/ Front side	14	802.11n20	165 (5825 Mhz)	NM[2]				
Chain B/ Top side	14	802.11n20	165 (5825 Mhz)	NM[2]				
Chain B/ Bottom side	14	802.11n20	165 (5825 Mhz)	NM[2]				
Chain B/ Left side	14	802.11n20	165 (5825 Mhz)	NM[2]				
Chain B/ Right side	14	802.11n20	165 (5825 Mhz)	NM[2]				

2: See remarks and comments

- 802.11n40

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11n40	159 (5795 Mhz)	NM[3]				
Chain A/ Front side	14	802.11n40	159 (5795 Mhz)	0.655	1.86	22	0.710	9
Chain A/ Top side	14	802.11n40	159 (5795 Mhz)	NM[3]				
Chain A/ Bottom side	14	802.11n40	159 (5795 Mhz)	NM[3]				
Chain A/ Left side	14	802.11n40	159 (5795 Mhz)	NM[3]				
Chain A/ Right side	14	802.11n40	159 (5795 Mhz)	NM[3]				
Chain A/ Front side	14	802.11n40	151 (55755 Mhz)	NM[1]				

1 and 3: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11n40	159 (5795 Mhz)	NM[3]				
Chain B/ Front side	14	802.11n40	159 (5795 Mhz)	0.614	-0.34	22	0.679	10
Chain B/ Top side	14	802.11n40	159 (5795 Mhz)	NM[3]				
Chain B/ Bottom side	14	802.11n40	159 (5795 Mhz)	NM[3]				
Chain B/ Left side	14	802.11n40	159 (5795 Mhz)	NM[3]				
Chain B/ Right side	14	802.11n40	159 (5795 Mhz)	NM[3]				
Chain B/ Front side	14	802.11n40	151 (55755 Mhz)	NM[1]				

1 and 3: See remarks and comments

- 802.11ac80

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain A/ Back side	14	802.11ac80	155 (5775 Mhz)	NM[3]				
Chain A/ Front side	14	802.11ac80	155 (5775 Mhz)	0.484	0.93	21.5	5.19	
Chain A/ Top side	14	802.11ac80	155 (5775 Mhz)	NM[3]				
Chain A/ Bottom side	14	802.11ac80	155 (5775 Mhz)	NM[3]				
Chain A/ Left side	14	802.11ac80	155 (5775 Mhz)	NM[3]				
Chain A/ Right side	14	802.11ac80	155 (5775 Mhz)	NM[3]				

3: See remarks and comments

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Chain B/ Back side	14	802.11ac80	155 (5775 Mhz)	NM[3]				
Chain B/ Front side	14	802.11ac80	155 (5775 Mhz)	0.515	0.46	21.5	0.562	
Chain B/ Top side	14	802.11ac80	155 (5775 Mhz)	NM[3]				
Chain B/ Bottom side	14	802.11ac80	155 (5775 Mhz)	NM[3]				
Chain B/ Left side	14	802.11ac80	155 (5775 Mhz)	NM[3]				
Chain B/ Right side	14	802.11ac80	155 (5775 Mhz)	NM[3]				

3: See remarks and comments

5.8. Enhanced Energy Coupling.

According to KDB 447981 D01 General Exposure Guidance v05r02, section 5.2.4, only modules with no host platform restrictions would need additional SAR evalutation due to RF energy coupling enhacements at increased test separation distance.

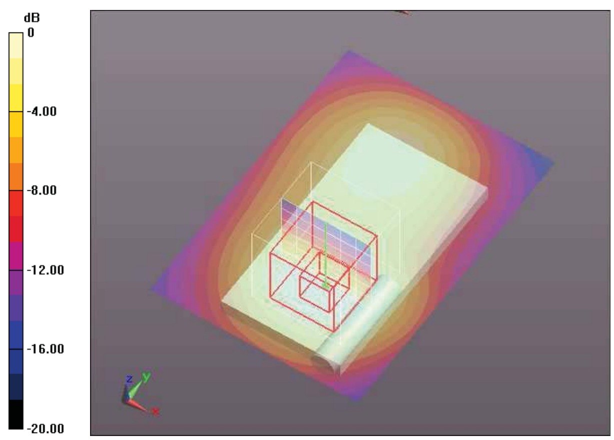
Appendix C – Measurement report

2.4 GHz – Chain A – d=14 mm – Back Side / 802.11b – CH 6 – Plot Nº1

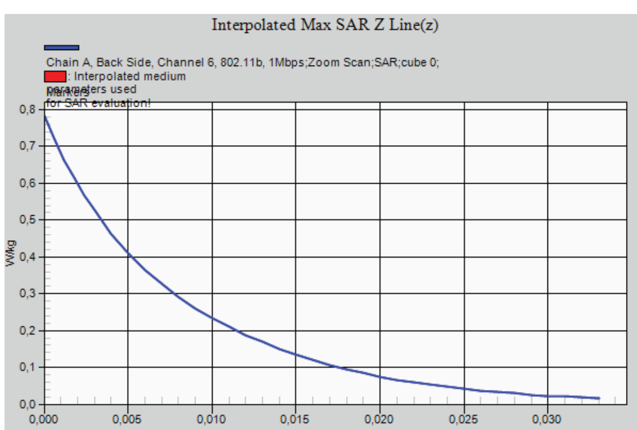
Test Laboratory: AT4 Wireless; Date: 28/05/2015
DUT: 8260NGW + SkyCross; Type: -; Serial: 3413E8300499
Communication System: UID 10012 - CAA, IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2437 MHz; Duty Cycle: 1:1.53815
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.93 S/m; ε_r = 51.66; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(4.3, 4.3, 4.3); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Modular SAR - 2.4GHz, d=14mm/Chain A, Back Side, Channel 6, 802.11b, 1Mbps/Area Scan (71x101x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.531 W/kg

Modular SAR - 2.4GHz, d=14mm/Chain A, Back Side, Channel 6, 802.11b, 1Mbps/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.414 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.783 W/kg
SAR(1 g) = 0.429 W/kg; SAR(10 g) = 0.236 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.525 W/kg



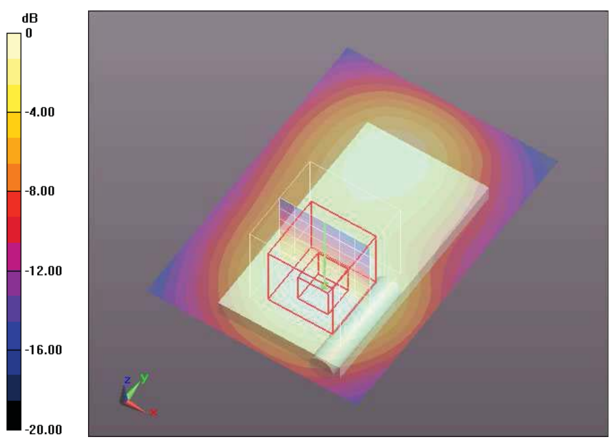
0 dB = 0.525 W/kg = -2.80 dBW/kg



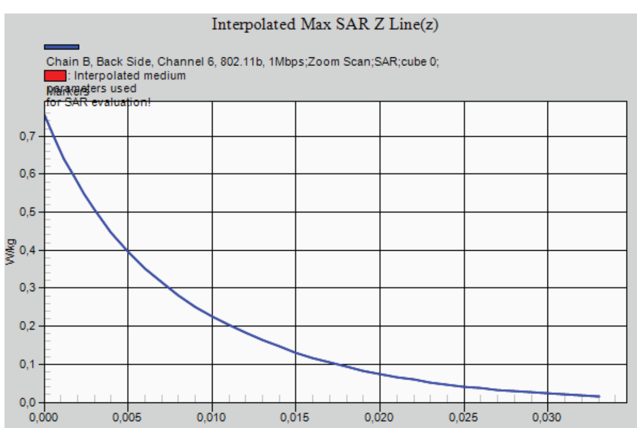
2.4 GHz – Chain B – d=14 mm – Back Side / 802.11b – CH 6 – Plot Nº2
Test Laboratory: AT4 Wireless; Date: 28/05/2015
DUT: 8260NGW + SkyCross; Type: -; Serial: 3413E8300499
Communication System: UID 10012 - CAA, IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps); Frequency: 2437 MHz; Duty Cycle: 1:1.53815
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.93 S/m; ε_r = 51.66; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(4.3, 4.3, 4.3); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Modular SAR - 2.4GHz, d=14mm/Chain B, Back Side, Channel 6, 802.11b, 1Mbps/Area Scan (71x101x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.506 W/kg

Modular SAR - 2.4GHz, d=14mm/Chain B, Back Side, Channel 6, 802.11b, 1Mbps/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.263 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.755 W/kg
SAR(1 g) = 0.410 W/kg; SAR(10 g) = 0.224 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.506 W/kg



0 dB = 0.506 W/kg = -2.96 dBW/kg

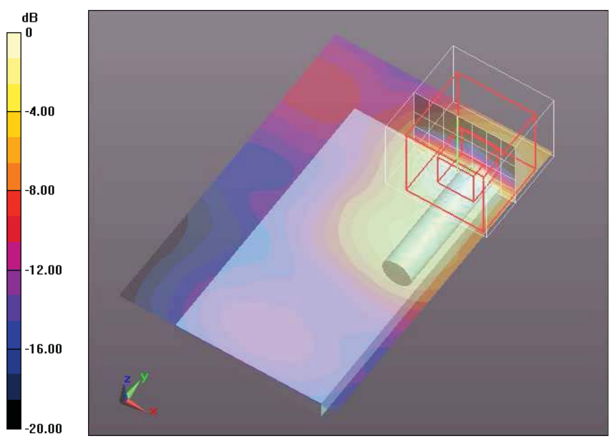


5.2 GHz – Chain A – d=14 mm – Front Side / 802.11a – CH 40 – Plot Nº3

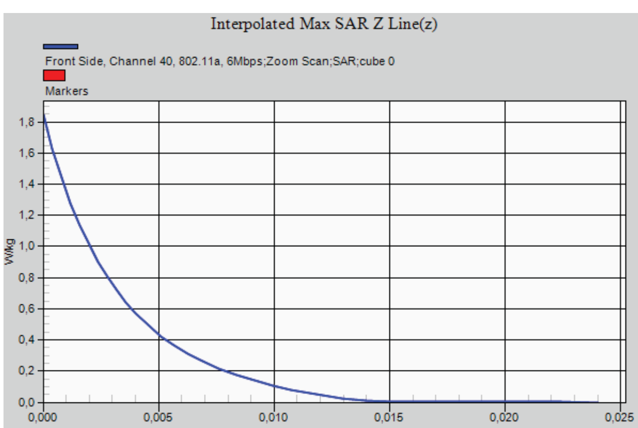
Test Laboratory: AT4 Wireless; Date: 22/05/2015
DUT: 8260NGW + SkyCross; Type: -; Serial: 3413E8300499
Communication System: UID 10062 - CAA, IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps); Frequency: 5200 MHz; Duty Cycle: 1:7.37904
Medium parameters used: f = 5200 MHz; σ = 5.17 S/m; ε_r = 50.19; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(4.32, 4.32, 4.32); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Modular SAR - 5.2GHz - Chain A, d=14mm/Front Side, Channel 40, 802.11a, 6Mbps/Area Scan (61x91x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.992 W/kg

Modular SAR - 5.2GHz - Chain A, d=14mm/Front Side, Channel 40, 802.11a, 6Mbps/Zoom Scan (8x8x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 12.35 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.85 W/kg
SAR(1 g) = 0.544 W/kg; SAR(10 g) = 0.192 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.987 W/kg



0 dB = 0.987 W/kg = -0.06 dBW/kg

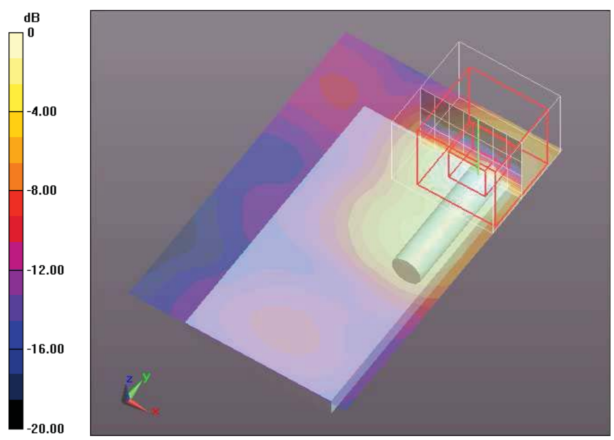


5.2 GHz – Chain B – d=14 mm – Front Side / 802.11a – CH 48 – Plot Nº4

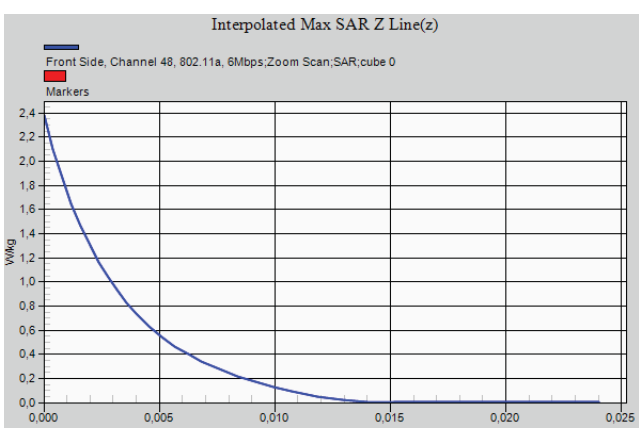
Test Laboratory: AT4 Wireless; Date: 22/05/2015
DUT: 8260NGW + SkyCross; Type: -; Serial: 3413E8300499
Communication System: UID 10062 - CAA, IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps); Frequency: 5240 MHz; Duty Cycle: 1:7.37904
Medium parameters used: f = 5240 MHz; σ = 5.19 S/m; ε_r = 50.04; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(4.32, 4.32, 4.32); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Modular SAR - 5.2GHz - Chain B, d=14mm/Front Side, Channel 48, 802.11a, 6Mbps/Area Scan (61x91x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.27 W/kg

Modular SAR - 5.2GHz - Chain B, d=14mm/Front Side, Channel 48, 802.11a, 6Mbps/Zoom Scan (8x8x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 13.81 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 2.38 W/kg
SAR(1 g) = 0.700 W/kg; SAR(10 g) = 0.250 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.26 W/kg



0 dB = 1.26 W/kg = 1.00 dBW/kg

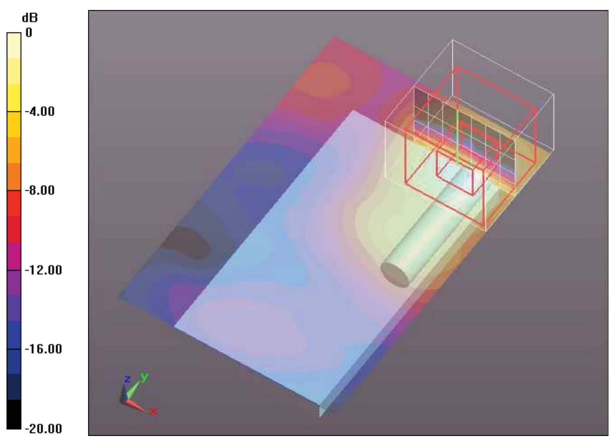


<u>5.3 GHz – Chain A – d=14 mm – Front Side / 802.11n40 – CH 62 – Plot Nº5</u>

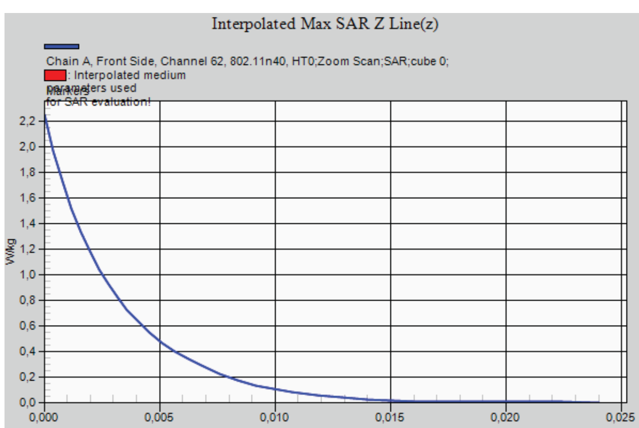
Test Laboratory: AT4 Wireless; Date: 25/05/2015
DUT: 8260NGW + SkyCross; Type: -; Serial: 3413E8300499
Communication System: UID 10117 - CAA, IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK); Frequency: 5310 MHz; Duty Cycle: 1:6.4121
Medium parameters used (interpolated): f = 5310 MHz; σ = 5.36 S/m; ε_r = 50.095; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(4.15, 4.15, 4.15); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Modular SAR - 5.3GHz, d=14mm/Chain A, Front Side, Channel 62, 802.11n40, HT0/Area Scan (61x91x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.13 W/kg

Modular SAR - 5.3GHz, d=14mm/Chain A, Front Side, Channel 62, 802.11n40, HT0/Zoom Scan (8x8x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 12.98 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 2.25 W/kg
SAR(1 g) = 0.612 W/kg; SAR(10 g) = 0.214 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.16 W/kg



0 dB = 1.16 W/kg = 0.64 dBW/kg

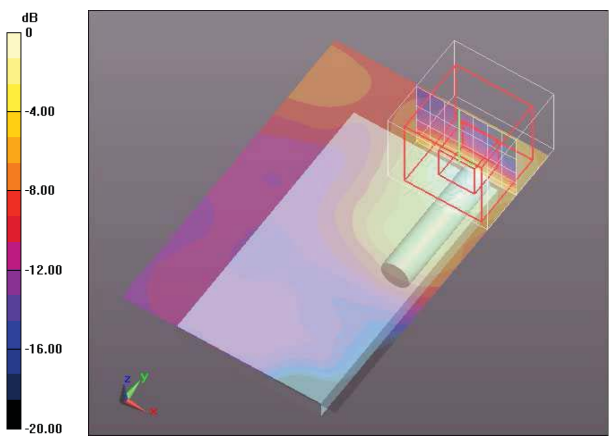


5.3 GHz – Chain B – d=14 mm – Front Side / 802.11n40 – CH 62 – Plot Nº6

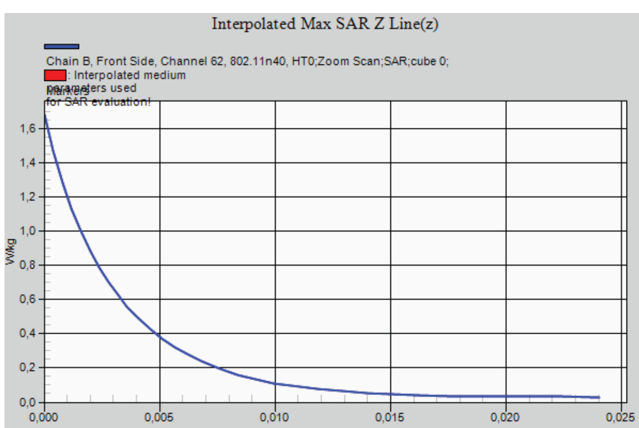
Test Laboratory: AT4 Wireless; Date: 25/05/2015
DUT: 8260NGW + SkyCross; Type: -; Serial: 3413E8300499
Communication System: UID 10117 - CAA, IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK); Frequency: 5310 MHz; Duty Cycle: 1:6.4121
Medium parameters used (interpolated): f = 5310 MHz; σ = 5.36 S/m; ε_r = 50.095; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(4.15, 4.15, 4.15); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Modular SAR - 5.3GHz, d=14mm/Chain B, Front Side, Channel 62, 802.11n40, HT0/Area Scan (61x91x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.845 W/kg

Modular SAR - 5.3GHz, d=14mm/Chain B, Front Side, Channel 62, 802.11n40, HT0/Zoom Scan (8x8x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 11.55 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 1.68 W/kg
SAR(1 g) = 0.480 W/kg; SAR(10 g) = 0.186 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.861 W/kg



0 dB = 0.861 W/kg = -0.65 dBW/kg

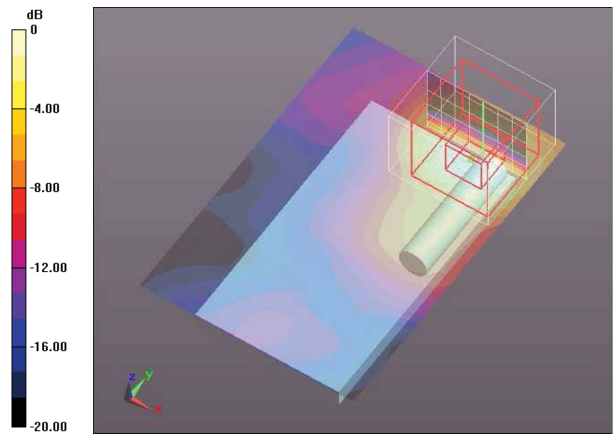


5.5 GHz – Chain A – d=14 mm – Front Side / 802.11ac80 – CH 138 – Plot Nº7

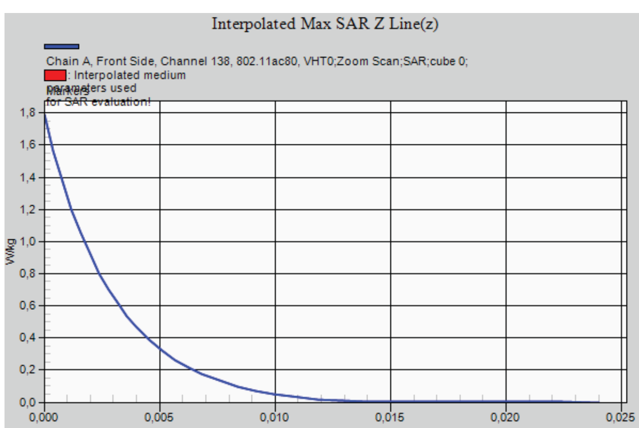
Test Laboratory: AT4 Wireless; Date: 26/05/2015
DUT: 8260NGW + SkyCross; Type: -; Serial: 3413E8300499
Communication System: UID 10402 - AAA, IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle); Frequency: 5690 MHz; Duty Cycle: 1:7.12853
Medium parameters used (interpolated): f = 5690 MHz; σ = 5.895 S/m; ε_r = 47.87; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(3.67, 3.67, 3.67); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Modular SAR - 5.5GHz, d=14mm/Chain A, Front Side, Channel 138, 802.11ac80, VHT0/Area Scan (61x91x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.934 W/kg

Modular SAR - 5.5GHz, d=14mm/Chain A, Front Side, Channel 138, 802.11ac80, VHT0/Zoom Scan (8x8x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 10.10 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 1.79 W/kg
SAR(1 g) = 0.459 W/kg; SAR(10 g) = 0.151 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.887 W/kg



0 dB = 0.887 W/kg = -0.52 dBW/kg

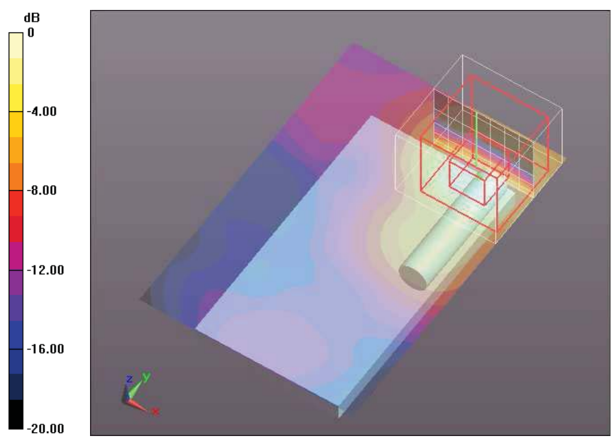


5.5 GHz – Chain B – d=14 mm – Front Side / 802.11n40 – CH 110 – Plot Nº8

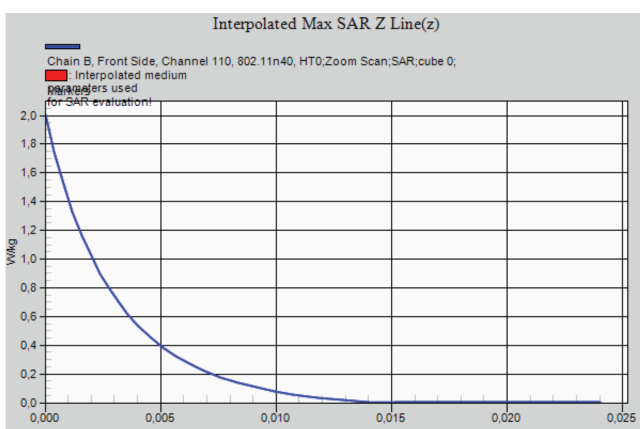
Test Laboratory: AT4 Wireless; Date: 26/05/2015
DUT: 8260NGW + SkyCross; Type: -; Serial: 3413E8300499
Communication System: UID 10117 - CAA, IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK); Frequency: 5550 MHz; Duty Cycle: 1:6.4121
Medium parameters used (interpolated): f = 5550 MHz; σ = 5.685 S/m; ε_r = 48.155; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(3.67, 3.67, 3.67); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Modular SAR - 5.5GHz, d=14mm/Chain B, Front Side, Channel 110, 802.11n40, HT0/Area Scan (61x91x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.986 W/kg

Modular SAR - 5.5GHz, d=14mm/Chain B, Front Side, Channel 110, 802.11n40, HT0/Zoom Scan (8x8x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 11.12 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 2.00 W/kg
SAR(1 g) = 0.526 W/kg; SAR(10 g) = 0.181 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.970 W/kg



0 dB = 0.970 W/kg = -0.13 dBW/kg

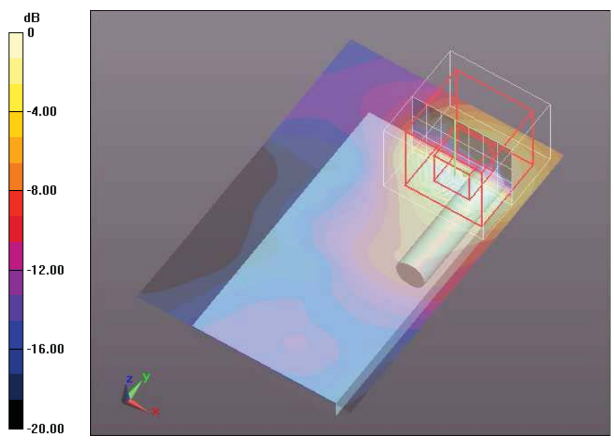


<u>5.8 GHz – Chain A – d=14 mm – Front Side / 802.11n40 – CH 159 – Plot Nº9</u>

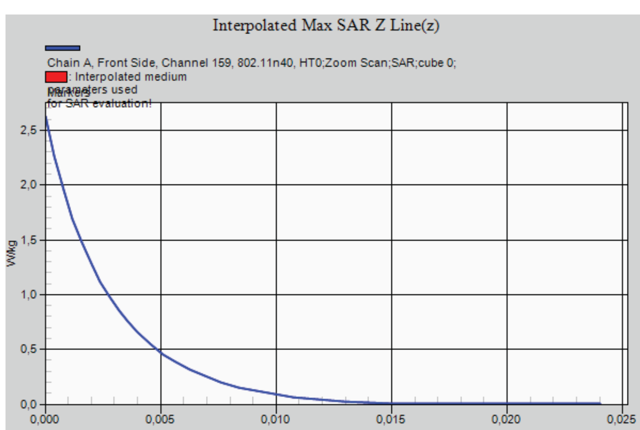
Test Laboratory: AT4 Wireless; Date: 27/05/2015
DUT: 8260NGW + SkyCross; Type: -; Serial: 3413E8300499
Communication System: UID 10117 - CAA, IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK); Frequency: 5795 MHz; Duty Cycle: 1:6.4121
Medium parameters used (interpolated): f = 5795 MHz; σ = 6.205 S/m; ε_r = 47.595; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(3.89, 3.89, 3.89); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Modular SAR - 5.8GHz, d=14mm/Chain A, Front Side, Channel 159, 802.11n40, HT0/Area Scan (61x91x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.34 W/kg

Modular SAR - 5.8GHz, d=14mm/Chain A, Front Side, Channel 159, 802.11n40, HT0/Zoom Scan (8x8x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 11.22 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 2.63 W/kg
SAR(1 g) = 0.655 W/kg; SAR(10 g) = 0.233 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.23 W/kg



0 dB = 1.23 W/kg = 0.90 dBW/kg

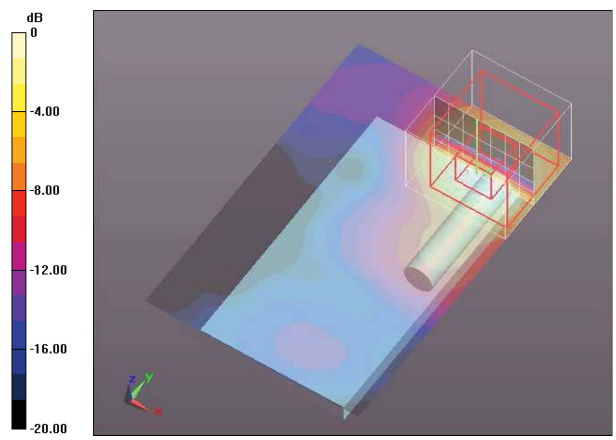


5.8 GHz – Chain B – d=14 mm – Front Side / 802.11n40 – CH 159 – Plot Nº10

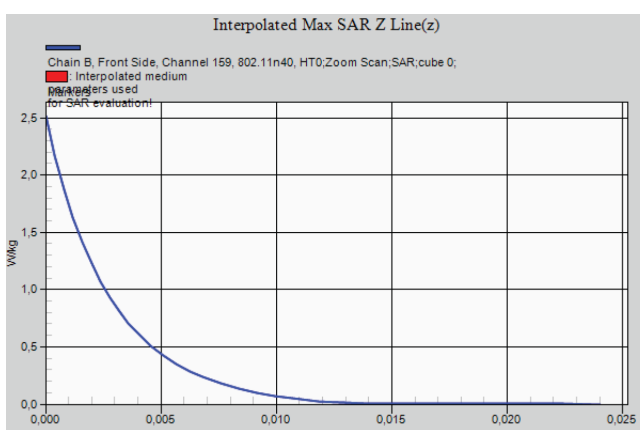
Test Laboratory: AT4 Wireless; Date: 27/05/2015
DUT: 8260NGW + SkyCross; Type: -; Serial: 3413E8300499
Communication System: UID 10117 - CAA, IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK); Frequency: 5795 MHz; Duty Cycle: 1:6.4121
Medium parameters used (interpolated): f = 5795 MHz; σ = 6.205 S/m; ε_r = 47.595; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(3.89, 3.89, 3.89); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Modular SAR - 5.8GHz, d=14mm/Chain B, Front Side, Channel 159, 802.11n40, HT0/Area Scan (61x91x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.24 W/kg

Modular SAR - 5.8GHz, d=14mm/Chain B, Front Side, Channel 159, 802.11n40, HT0/Zoom Scan (8x8x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 12.88 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.52 W/kg
SAR(1 g) = 0.614 W/kg; SAR(10 g) = 0.206 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.20 W/kg



0 dB = 1.20 W/kg = 0.79 dBW/kg



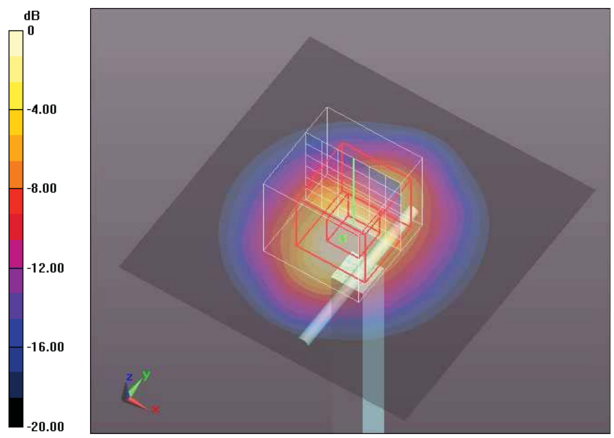
Appendix D – System Validation Reports

Validation results in 2450 MHz Band for Body TSL

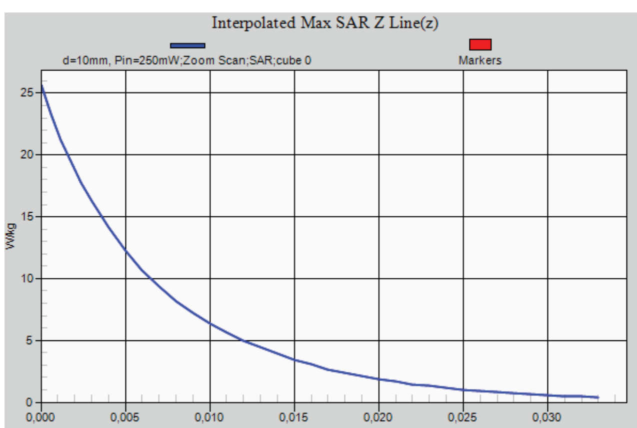
Test Laboratory: AT4 Wireless; Date: 20/05/2015
DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:756
Communication System: UID 10000, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.98 S/m; ε_r = 51.61; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(4.3, 4.3, 4.3); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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) = 16.8 W/kg

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 = 94.69 V/m; Power Drift = -0.23 dB
Peak SAR (extrapolated) = 25.6 W/kg
SAR(1 g) = 12.2 W/kg; SAR(10 g) = 5.7 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 16.2 W/kg



0 dB = 16.2 W/kg = 12.10 dBW/kg

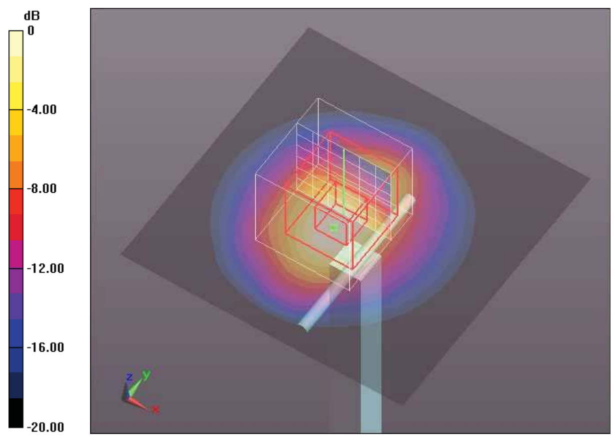


Validation results in 2450 MHz Band for Body TSL

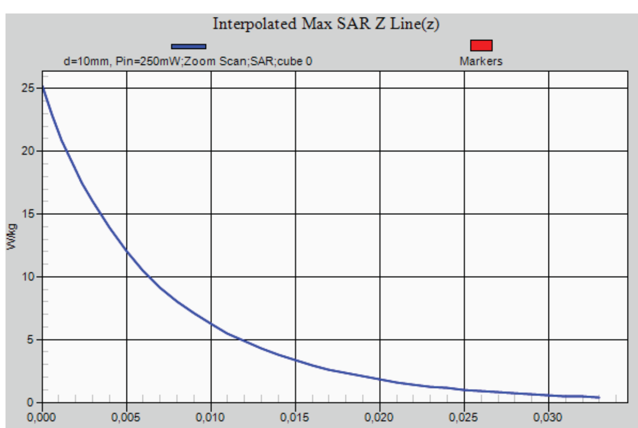
Test Laboratory: AT4 Wireless; Date: 28/05/2015
DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:756
Communication System: UID 10000, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.95 S/m; ε_r = 51.55; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(4.3, 4.3, 4.3); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check with D2450V2 Dipole, 28-05-2015/d=10mm, Pin=250mW/Area Scan (61x61x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 16.9 W/kg

System Performance Check with D2450V2 Dipole, 28-05-2015/d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.60 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 25.2 W/kg
SAR(1 g) = 12.1 W/kg; SAR(10 g) = 5.62 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 15.9 W/kg



0 dB = 15.9 W/kg = 12.01 dBW/kg

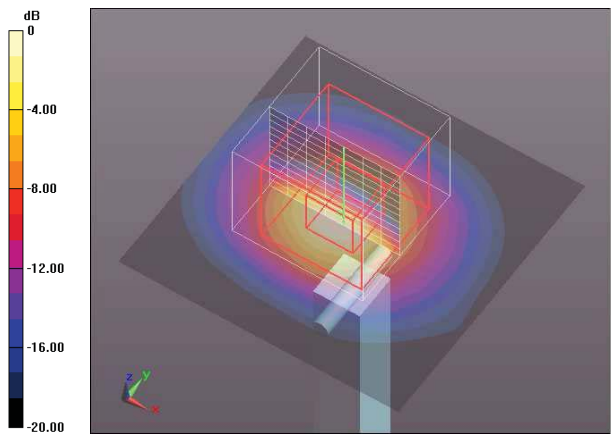


Validation results in 5200 MHz Band for Body TSL

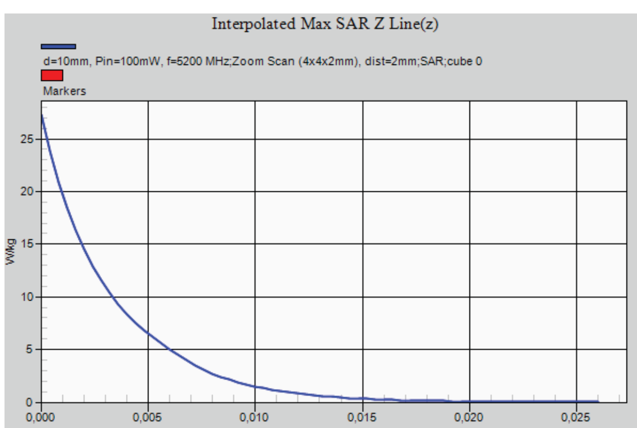
Test Laboratory: AT4 Wireless; Date: 21/05/2015
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1071
Communication System: UID 0, CW-5GHz; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.17 S/m; ε_r = 50.19; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(4.32, 4.32, 4.32); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check with D5.2GHzV2 Dipole/d=10mm, Pin=100mW, f=5200 MHz/Area Scan (61x61x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 14.5 W/kg

System Performance Check with D5.2GHzV2 Dipole/d=10mm, Pin=100mW, f=5200 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x13)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 55.03 V/m; Power Drift = 0.20 dB
Peak SAR (extrapolated) = 27.3 W/kg
SAR(1 g) = 7.11 W/kg; SAR(10 g) = 2.03 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 13.7 W/kg



0 dB = 13.7 W/kg = 11.37 dBW/kg

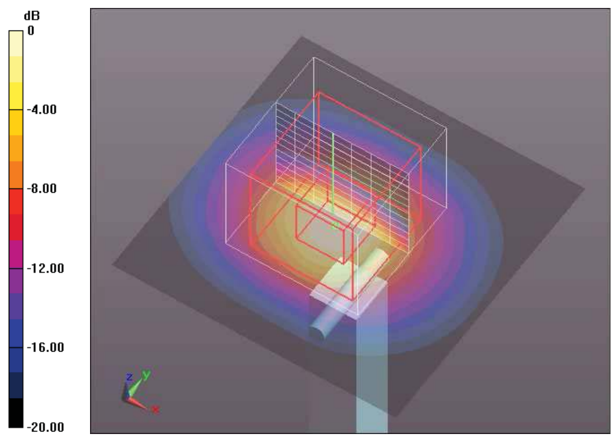


Validation results in 5200 MHz Band for Body TSL

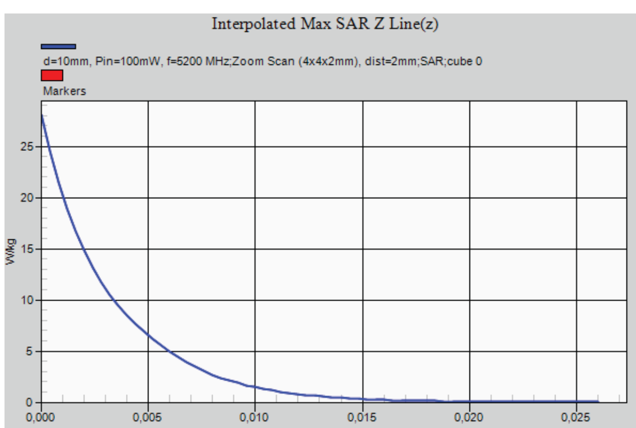
Test Laboratory: AT4 Wireless; Date: 25/05/2015
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1071
Communication System: UID 0, CW-5GHz; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.2 S/m; ε_r = 50.37; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(4.32, 4.32, 4.32); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check with D5.2GHzV2 Dipole 25_05_2015/d=10mm, Pin=100mW, f=5200 MHz/Area Scan (61x61x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 14.9 W/kg

System Performance Check with D5.2GHzV2 Dipole 25_05_2015/d=10mm, Pin=100mW, f=5200 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x13)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 56.39 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 28.1 W/kg
SAR(1 g) = 7.24 W/kg; SAR(10 g) = 2.06 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 13.5 W/kg



0 dB = 13.5 W/kg = 11.30 dBW/kg

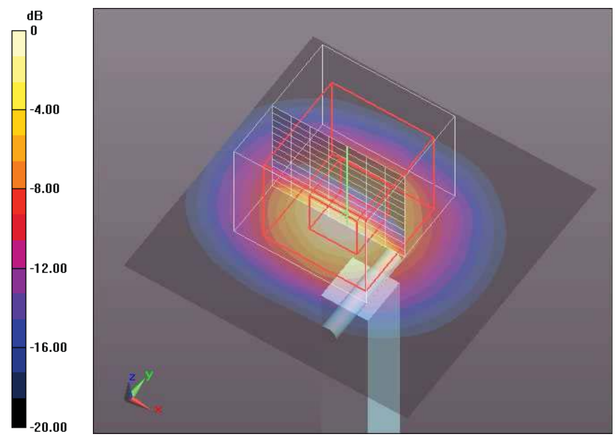


Validation results in 5500 MHz Band for Body TSL

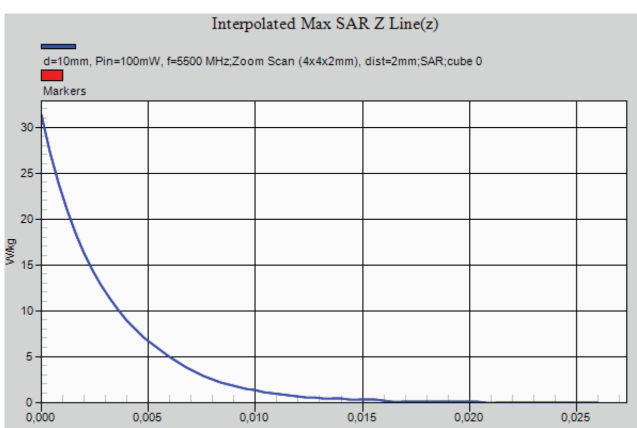
Test Laboratory: AT4 Wireless; Date: 26/05/2015
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1071
Communication System: UID 0, CW-5GHz; Frequency: 5500 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 5.61 S/m; ε_r = 48.35; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(3.67, 3.67, 3.67); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check with D5.5GHzV2 Dipole/d=10mm, Pin=100mW, f=5500 MHz/Area Scan (61x61x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 15.7 W/kg

System Performance Check with D5.5GHzV2 Dipole/d=10mm, Pin=100mW, f=5500 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x13)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 53.61 V/m; Power Drift = 0.39 dB
Peak SAR (extrapolated) = 31.4 W/kg
SAR(1 g) = 7.68 W/kg; SAR(10 g) = 2.14 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 15.4 W/kg



0 dB = 15.4 W/kg = 11.88 dBW/kg

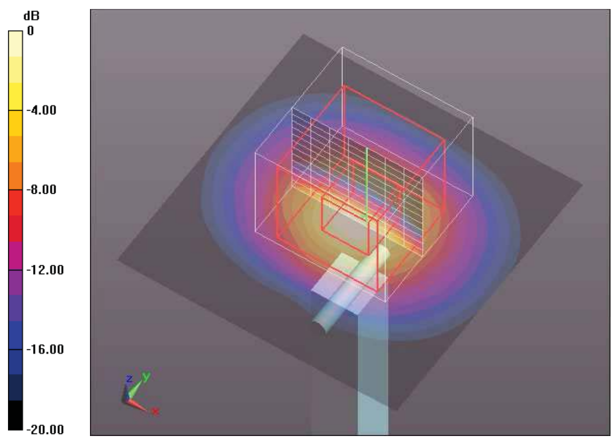


Validation results in 5800 MHz Band for Body TSL

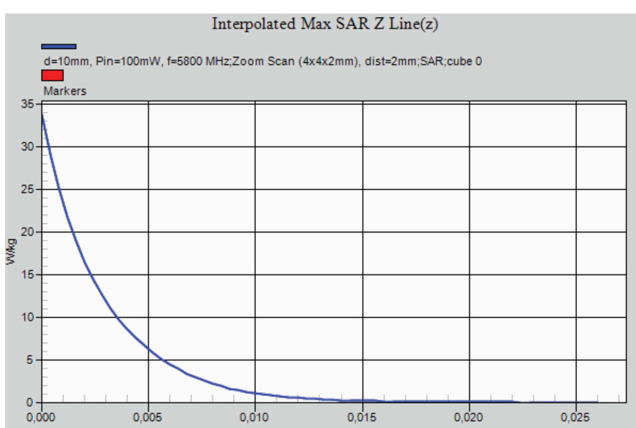
Test Laboratory: AT4 Wireless; Date: 27/05/2015
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1071
Communication System: UID 0, CW-5GHz; Frequency: 5800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.2 S/m; ε_r = 47.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: EX3DV4 - SN3687; ConvF(3.89, 3.89, 3.89); Calibrated: 14/07/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check with D5.8GHzV2 Dipole/d=10mm, Pin=100mW, f=5800 MHz/Area Scan (61x61x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 15.7 W/kg

System Performance Check with D5.8GHzV2 Dipole/d=10mm, Pin=100mW, f=5800 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x13)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 52.06 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 33.8 W/kg
SAR(1 g) = 7.72 W/kg; SAR(10 g) = 2.14 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 15.3 W/kg



0 dB = 15.3 W/kg = 11.85 dBW/kg



Appendix E – Calibration data

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

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

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

Accreditation No.: **SCS 108**

Client **AT4 Wireless**

Certificate No: **DAE4-669_Jul14**

CALIBRATION CERTIFICATE

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

Calibration procedure(s): QA CAL-06.v26
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: July 08, 2014

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	01-Oct-13 (No:13976)	Oct-14
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	07-Jan-14 (in house check)	In house check: Jan-15
Calibrator Box V2.1	SE UMS 006 AA 1002	07-Jan-14 (in house check)	In house check: Jan-15

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	[signature]
Approved by:	Fin Bomholt	Deputy Technical Manager	i.V. [signature]

Issued: July 8, 2014

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

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	403.321 ± 0.02% (k=2)	403.870 ± 0.02% (k=2)	404.236 ± 0.02% (k=2)
Low Range	3.95654 ± 1.50% (k=2)	3.97463 ± 1.50% (k=2)	3.97450 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	193.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199998.19	1.59	0.00
Channel X	+ Input	20005.64	5.16	0.03
Channel X	- Input	-19996.31	4.81	-0.02
Channel Y	+ Input	199995.73	-1.00	-0.00
Channel Y	+ Input	20004.06	3.54	0.02
Channel Y	- Input	-19997.93	3.28	-0.02
Channel Z	+ Input	199997.38	0.79	0.00
Channel Z	+ Input	20004.17	3.55	0.02
Channel Z	- Input	-19997.90	3.31	-0.02

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.84	0.28	0.01
Channel X	+ Input	201.50	0.42	0.21
Channel X	- Input	-197.83	0.90	-0.45
Channel Y	+ Input	2001.06	0.57	0.03
Channel Y	+ Input	200.71	-0.32	-0.16
Channel Y	- Input	-199.39	-0.60	0.30
Channel Z	+ Input	2001.12	0.68	0.03
Channel Z	+ Input	199.84	-1.25	-0.62
Channel Z	- Input	-200.65	-1.79	0.90

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	2.02	0.88
	- 200	1.03	-0.74
Channel Y	200	11.55	10.93
	- 200	-12.37	-12.38
Channel Z	200	-9.56	-9.90
	- 200	8.49	8.06

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	-	-2.27	-2.78
Channel Y	200	9.49	-	-1.75
Channel Z	200	3.99	7.50	-

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	16079	16148
Channel Y	15795	15263
Channel Z	15997	15243

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	0.48	-0.54	1.65	0.44
Channel Y	-0.35	-1.84	1.53	0.54
Channel Z	0.15	-1.16	0.99	0.42

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

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

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

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

Accreditation No.: **SCS 108**

Client **AT4 Wireless**

Certificate No: **ES3-3052_Sep14**

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3052
Calibration procedure(s)	QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6 Calibration procedure for dosimetric E-field probes
Calibration date:	September 24, 2014

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	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 24, 2014

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

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
Repaired:	September 18, 2014
Calibrated:	September 24, 2014

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]	104.3	98.3	102.9	

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	199.5	±3.5 %
		Y	0.0	0.0	1.0		180.7	
		Z	0.0	0.0	1.0		199.0	
10011-CAB	UMTS-FDD (WCDMA)	X	3.36	67.7	18.9	2.91	136.2	±0.7 %
		Y	3.05	64.3	16.5		144.5	
		Z	3.24	66.7	18.2		136.3	
10012-CAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	2.93	69.1	19.0	1.87	138.2	±0.7 %
		Y	2.41	64.0	15.8		143.3	
		Z	2.90	68.5	18.4		137.9	
10013-CAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	11.13	70.8	23.4	9.46	135.8	±3.3 %
		Y	10.99	69.1	21.9		143.7	
		Z	11.06	70.4	23.1		135.3	
10021-DAB	GSM-FDD (TDMA, GMSK)	X	10.62	86.4	23.2	9.39	144.0	±1.9 %
		Y	2.75	68.5	16.2		87.9	
		Z	17.37	95.8	26.8		144.4	
10023-DAB	GPRS-FDD (TDMA, GMSK, TN 0)	X	15.14	93.2	25.8	9.57	145.2	±2.2 %
		Y	2.61	67.2	15.9		82.8	
		Z	19.74	98.0	27.4		130.3	
10024-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	32.39	99.8	25.1	6.56	128.1	±1.4 %
		Y	4.81	76.8	17.9		126.8	
		Z	34.20	99.8	25.0		141.2	
10025-DAB	EDGE-FDD (TDMA, 8PSK, TN 0)	X	13.71	99.1	38.4	12.62	139.8	±3.0 %
		Y	4.87	67.9	23.1		59.1	
		Z	13.94	99.6	38.7		126.3	
10026-DAB	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	11.01	90.1	31.4	9.55	126.7	±2.5 %
		Y	5.75	74.5	24.4		124.5	
		Z	12.89	93.9	33.0		139.8	
10027-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	32.71	94.5	21.4	4.80	144.2	±1.4 %
		Y	2.79	69.7	13.7		132.6	
		Z	50.44	99.9	22.9		130.7	
10028-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	47.66	99.5	22.1	3.55	126.6	±2.2 %
		Y	24.59	92.3	19.6		146.3	
		Z	55.77	99.6	21.9		143.7	
10029-DAB	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	16.20	99.3	33.6	7.78	147.3	±3.3 %
		Y	5.14	72.9	22.5		132.6	
		Z	10.86	89.3	29.7		137.0	

10048-CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	X	7.45	83.0	25.7	13.80	90.0	±1.9 %
		Y	2.39	62.3	15.5		32.0	
		Z	7.27	82.6	25.8		84.7	
10049-CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	X	13.92	91.7	26.1	10.79	148.8	±1.7 %
		Y	3.21	69.9	17.8		65.7	
		Z	14.37	92.6	26.6		138.7	
10058-DAB	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	7.02	80.2	25.3	6.52	128.8	±2.2 %
		Y	5.09	73.7	22.3		141.9	
		Z	14.75	96.3	31.4		144.1	
10098-CAB	UMTS-FDD (HSUPA, Subtest 2)	X	4.49	66.4	18.4	3.98	127.8	±0.9 %
		Y	4.51	65.2	17.4		150.0	
		Z	4.62	66.8	18.7		140.4	
10100-CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	6.34	67.3	19.6	5.67	134.3	±1.4 %
		Y	6.31	66.1	18.5		134.8	
		Z	6.54	68.0	20.0		148.0	
10102-CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	7.72	67.9	20.3	6.60	147.1	±1.9 %
		Y	7.76	66.9	19.3		148.6	
		Z	7.62	67.5	20.1		134.4	
10101-CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	7.72	67.9	20.3	6.42	147.1	±12.2 %
		Y	7.76	66.9	19.3		148.6	
		Z	7.62	67.5	20.1		134.4	
10110-CAB	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	5.87	66.2	19.2	5.75	129.6	±1.4 %
		Y	5.91	65.3	18.3		130.0	
		Z	6.06	67.0	19.7		141.4	
10154-CAB	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	5.87	66.2	19.2	5.75	129.6	±12.2 %
		Y	5.91	65.3	18.3		130.0	
		Z	6.06	67.0	19.7		141.4	
10112-CAB	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	7.44	67.6	20.2	6.59	142.4	±1.9 %
		Y	7.48	66.6	19.2		144.0	
		Z	7.35	67.3	20.0		130.5	
10109-CAB	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	7.44	67.6	20.2	6.43	142.4	±12.2 %
		Y	7.48	66.6	19.2		144.0	
		Z	7.35	67.3	20.0		130.5	
10150-CAB	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	7.44	67.6	20.2	6.60	142.4	±12.2 %
		Y	7.48	66.6	19.2		144.0	
		Z	7.35	67.3	20.0		130.5	
10149-CAB	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	7.44	67.6	20.2	6.42	142.4	±12.2 %
		Y	7.48	66.6	19.2		144.0	
		Z	7.35	67.3	20.0		130.5	
10117-CAA	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	10.44	69.6	21.7	8.07	149.5	±2.7 %
		Y	10.10	67.7	20.2		124.9	
		Z	10.31	69.2	21.5		136.0	
10140-CAB	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	7.66	68.0	20.2	6.49	147.5	±1.7 %
		Y	7.46	66.2	18.9		124.4	
		Z	7.58	67.6	20.1		134.6	

10141-CAB	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	7.66	68.0	20.2	6.53	147.5	±12.2 %
		Y	7.46	66.2	18.9		124.4	
		Z	7.58	67.6	20.1		134.6	
10146-CAB	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	6.36	66.9	19.8	6.41	127.6	±1.4 %
		Y	6.30	65.7	18.7		128.9	
		Z	6.55	67.6	20.2		139.3	
10147-CAB	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	6.63	67.1	20.0	6.72	127.1	±1.7 %
		Y	6.58	65.9	19.0		128.3	
		Z	6.83	67.8	20.5		139.2	
10157-CAB	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	6.62	66.8	19.8	6.49	130.4	±1.7 %
		Y	6.65	65.8	18.9		133.0	
		Z	6.83	67.5	20.2		142.9	
10158-CAB	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	7.15	67.3	20.0	6.62	137.7	±1.9 %
		Y	7.22	66.4	19.2		140.7	
		Z	7.05	66.9	19.9		125.4	
10111-CAB	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	7.15	67.3	20.0	6.44	137.7	±12.2 %
		Y	7.22	66.4	19.2		140.7	
		Z	7.05	66.9	19.9		125.4	
10113-CAB	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	7.15	67.3	20.0	6.62	137.7	±12.2 %
		Y	7.22	66.4	19.2		140.7	
		Z	7.05	66.9	19.9		125.4	
10155-CAB	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	7.15	67.3	20.0	6.43	137.7	±12.2 %
		Y	7.22	66.4	19.2		140.7	
		Z	7.05	66.9	19.9		125.4	
10161-CAB	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	7.15	67.3	20.0	6.43	137.7	±12.2 %
		Y	7.22	66.4	19.2		140.7	
		Z	7.05	66.9	19.9		125.4	
10162-CAB	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	7.15	67.3	20.0	6.58	137.7	±12.2 %
		Y	7.22	66.4	19.2		140.7	
		Z	7.05	66.9	19.9		125.4	
10159-CAB	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	6.78	67.1	20.0	6.56	132.1	±1.9 %
		Y	6.79	66.1	19.0		135.6	
		Z	6.97	67.8	20.4		144.2	
10173-CAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	8.21	77.1	27.3	9.48	128.8	±2.7 %
		Y	6.63	70.6	23.3		143.3	
		Z	9.09	80.2	29.0		142.6	
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	8.21	77.1	27.3	9.49	128.8	±12.2 %
		Y	6.63	70.6	23.3		143.3	
		Z	9.09	80.2	29.0		142.6	
10235-CAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	8.21	77.1	27.3	9.48	128.8	±12.2 %
		Y	6.63	70.6	23.3		143.3	
		Z	9.09	80.2	29.0		142.6	
10229-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	8.21	77.1	27.3	9.48	128.8	±12.2 %
		Y	6.63	70.6	23.3		143.3	
		Z	9.09	80.2	29.0		142.6	

10232-CAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	8.21	77.1	27.3	9.48	128.8	±12.2 %
		Y	6.63	70.6	23.3		143.3	
		Z	9.09	80.2	29.0		142.6	
10238-CAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	8.21	77.1	27.3	9.48	128.8	±12.2 %
		Y	6.63	70.6	23.3		143.3	
		Z	9.09	80.2	29.0		142.6	
10179-CAB	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	5.61	67.5	20.4	6.50	131.2	±1.9 %
		Y	5.52	66.6	19.5		149.2	
		Z	5.78	68.2	20.8		142.1	
10170-CAB	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	5.61	67.5	20.4	6.52	131.2	±12.2 %
		Y	5.52	66.6	19.5		149.2	
		Z	5.78	68.2	20.8		142.1	
10176-CAB	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	5.61	67.5	20.4	6.52	131.2	±12.2 %
		Y	5.52	66.6	19.5		149.2	
		Z	5.78	68.2	20.8		142.1	
10188-CAB	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	5.61	67.5	20.4	6.52	131.2	±12.2 %
		Y	5.52	66.6	19.5		149.2	
		Z	5.78	68.2	20.8		142.1	
10180-CAB	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	5.61	67.5	20.4	6.50	131.2	±12.2 %
		Y	5.52	66.6	19.5		149.2	
		Z	5.78	68.2	20.8		142.1	
10178-CAB	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	5.61	67.5	20.4	6.52	131.2	±12.2 %
		Y	5.52	66.6	19.5		149.2	
		Z	5.78	68.2	20.8		142.1	
10182-CAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	5.61	67.5	20.4	6.52	131.2	±12.2 %
		Y	5.52	66.6	19.5		149.2	
		Z	5.78	68.2	20.8		142.1	
10185-CAB	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	5.61	67.5	20.4	6.51	131.2	±12.2 %
		Y	5.52	66.6	19.5		149.2	
		Z	5.78	68.2	20.8		142.1	
10187-CAB	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	4.91	66.6	19.6	5.73	132.5	±1.7 %
		Y	4.82	65.4	18.6		149.1	
		Z	5.03	67.1	19.9		144.0	
10166-CAB	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	4.91	66.6	19.6	5.46	132.5	±12.2 %
		Y	4.82	65.4	18.6		149.1	
		Z	5.03	67.1	19.9		144.0	
10181-CAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	4.91	66.6	19.6	5.72	132.5	±12.2 %
		Y	4.82	65.4	18.6		149.1	
		Z	5.03	67.1	19.9		144.0	
10169-CAB	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	4.91	66.6	19.6	5.73	132.5	±12.2 %
		Y	4.82	65.4	18.6		149.1	
		Z	5.03	67.1	19.9		144.0	
10175-CAB	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	4.91	66.6	19.6	5.72	132.5	±12.2 %
		Y	4.82	65.4	18.6		149.1	
		Z	5.03	67.1	19.9		144.0	

10177-CAD	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	4.91	66.6	19.6	5.73	132.5	±12.2 %
		Y	4.82	65.4	18.6		149.1	
		Z	5.03	67.1	19.9		144.0	
10184-CAB	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	4.91	66.6	19.6	5.73	132.5	±12.2 %
		Y	4.82	65.4	18.6		149.1	
		Z	5.03	67.1	19.9		144.0	
10196-CAA	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	9.98	69.0	21.5	8.10	140.6	±2.7 %
		Y	10.10	68.2	20.6		140.7	
		Z	9.90	68.8	21.4		129.4	
10225-CAB	UMTS-FDD (HSPA+)	X	6.99	67.1	19.5	5.97	143.6	±1.4 %
		Y	7.11	66.4	18.8		149.0	
		Z	6.91	66.8	19.3		133.0	
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	8.00	76.7	27.1	9.22	132.0	±2.7 %
		Y	6.43	70.1	23.1		147.2	
		Z	8.85	79.7	28.7		146.7	
10237-CAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	8.00	76.7	27.1	9.21	132.0	±12.2 %
		Y	6.43	70.1	23.1		147.2	
		Z	8.85	79.7	28.7		146.7	
10172-CAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	8.00	76.7	27.1	9.21	132.0	±12.2 %
		Y	6.43	70.1	23.1		147.2	
		Z	8.85	79.7	28.7		146.7	
10231-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	8.00	76.7	27.1	9.19	132.0	±12.2 %
		Y	6.43	70.1	23.1		147.2	
		Z	8.85	79.7	28.7		146.7	
10234-CAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	8.00	76.7	27.1	9.21	132.0	±12.2 %
		Y	6.43	70.1	23.1		147.2	
		Z	8.85	79.7	28.7		146.7	
10240-CAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	8.00	76.7	27.1	9.21	132.0	±12.2 %
		Y	6.43	70.1	23.1		147.2	
		Z	8.85	79.7	28.7		146.7	
10246-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	8.24	73.2	25.3	9.30	124.9	±3.8 %
		Y	7.22	68.4	22.2		139.6	
		Z	8.98	75.8	26.8		140.1	
10249-CAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	8.24	73.2	25.3	9.29	124.9	±12.2 %
		Y	7.22	68.4	22.2		139.6	
		Z	8.98	75.8	26.8		140.1	
10258-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	8.24	73.2	25.3	9.34	124.9	±12.2 %
		Y	7.22	68.4	22.2		139.6	
		Z	8.98	75.8	26.8		140.1	
10256-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	9.05	73.9	26.0	9.96	128.6	±3.8 %
		Y	8.03	69.3	22.9		146.6	
		Z	9.83	76.5	27.6		144.6	
10247-CAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	9.05	73.9	26.0	9.91	128.6	±12.2 %
		Y	8.03	69.3	22.9		146.6	
		Z	9.83	76.5	27.6		144.6	

10244-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	9.05	73.9	26.0	10.06	128.6	±12.2 %
		Y	8.03	69.3	22.9		146.6	
		Z	9.83	76.5	27.6		144.6	
10262-CAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	10.05	74.8	26.4	9.83	145.4	±3.3 %
		Y	8.44	68.3	22.1		138.9	
		Z	9.81	74.1	26.1		133.2	
10250-CAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	10.05	74.8	26.4	9.81	145.4	±12.2 %
		Y	8.44	68.3	22.1		138.9	
		Z	9.81	74.1	26.1		133.2	
10259-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	10.05	74.8	26.4	9.98	145.4	±12.2 %
		Y	8.44	68.3	22.1		138.9	
		Z	9.81	74.1	26.1		133.2	
10264-CAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	9.03	74.4	25.8	9.23	135.1	±3.3 %
		Y	7.47	67.7	21.5		132.4	
		Z	8.83	73.7	25.5		124.7	
10252-CAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	9.03	74.4	25.8	9.24	135.1	±12.2 %
		Y	7.47	67.7	21.5		132.4	
		Z	8.83	73.7	25.5		124.7	
10261-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	9.03	74.4	25.8	9.24	135.1	±12.2 %
		Y	7.47	67.7	21.5		132.4	
		Z	8.83	73.7	25.5		124.7	
10265-CAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	9.82	72.7	25.2	9.92	127.0	±3.8 %
		Y	8.92	68.6	22.3		145.9	
		Z	10.52	74.9	26.6		142.0	
10152-CAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	9.82	72.7	25.2	9.92	127.0	±12.2 %
		Y	8.92	68.6	22.3		145.9	
		Z	10.52	74.9	26.6		142.0	
10267-CAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	9.90	75.7	26.4	9.30	144.2	±3.5 %
		Y	7.92	68.2	21.7		136.6	
		Z	9.53	74.6	25.9		131.7	
10151-CAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	9.90	75.7	26.4	9.28	144.2	±12.2 %
		Y	7.92	68.2	21.7		136.6	
		Z	9.53	74.6	25.9		131.7	
10297-AAA	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	6.25	67.0	19.6	5.81	133.5	±1.4 %
		Y	6.26	65.9	18.6		134.7	
		Z	6.44	67.6	19.9		147.8	
10299-AAA	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	6.52	67.2	19.9	6.39	130.9	±1.7 %
		Y	6.48	66.0	18.9		130.5	
		Z	6.68	67.7	20.2		144.1	
10300-AAA	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	6.71	67.2	20.0	6.60	131.2	±1.7 %
		Y	6.66	66.0	19.0		129.6	
		Z	6.89	67.9	20.4		143.8	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	2.67	68.6	18.7	1.54	145.7	±0.5 %
		Y	2.30	64.3	16.0		141.9	
		Z	2.54	67.4	18.1		135.2	

10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	10.13	69.3	21.7	8.23	143.5	±2.7 %
		Y	10.20	68.2	20.7		142.2	
		Z	10.02	68.9	21.5		131.6	
10418-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	X	10.01	69.2	21.6	8.14	142.9	±2.5 %
		Y	10.10	68.3	20.7		142.3	
		Z	9.92	69.0	21.6		132.0	
10419-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule)	X	10.08	69.2	21.7	8.19	144.0	±2.7 %
		Y	10.19	68.3	20.8		143.7	
		Z	10.00	69.0	21.6		132.9	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 11 and 12.

[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)	Unct. (k=2)
750	41.9	0.89	6.73	6.73	6.73	0.80	1.13	± 12.0 %
835	41.5	0.90	6.50	6.50	6.50	0.52	1.40	± 12.0 %
900	41.5	0.97	6.40	6.40	6.40	0.77	1.16	± 12.0 %
1750	40.1	1.37	5.28	5.28	5.28	0.41	1.60	± 12.0 %
1900	40.0	1.40	5.12	5.12	5.12	0.43	1.62	± 12.0 %
2000	40.0	1.40	5.10	5.10	5.10	0.41	1.60	± 12.0 %
2450	39.2	1.80	4.52	4.52	4.52	0.71	1.28	± 12.0 %
2600	39.0	1.96	4.37	4.37	4.37	0.80	1.21	± 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)	Unct. (k=2)
750	55.5	0.96	6.34	6.34	6.34	0.80	1.14	± 12.0 %
835	55.2	0.97	6.26	6.26	6.26	0.75	1.18	± 12.0 %
900	55.0	1.05	6.14	6.14	6.14	0.44	1.56	± 12.0 %
1750	53.4	1.49	4.94	4.94	4.94	0.46	1.68	± 12.0 %
1900	53.3	1.52	4.71	4.71	4.71	0.45	1.73	± 12.0 %
2000	53.3	1.52	4.75	4.75	4.75	0.55	1.56	± 12.0 %
2450	52.7	1.95	4.30	4.30	4.30	0.74	1.10	± 12.0 %
2600	52.5	2.16	4.16	4.16	4.16	0.80	1.01	± 12.0 %

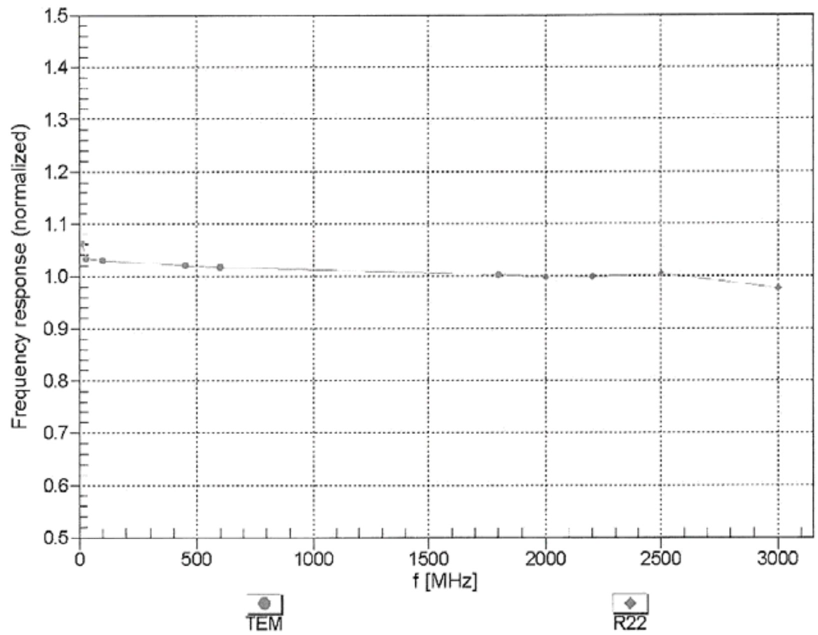
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz 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.

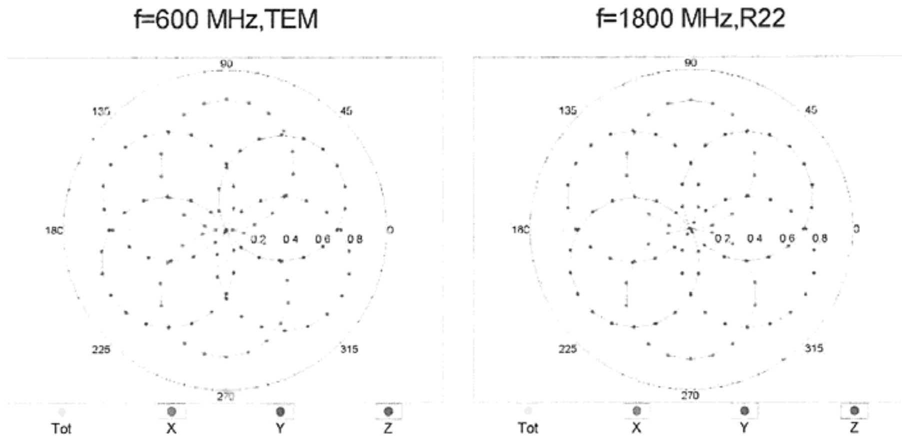
Frequency Response of E-Field

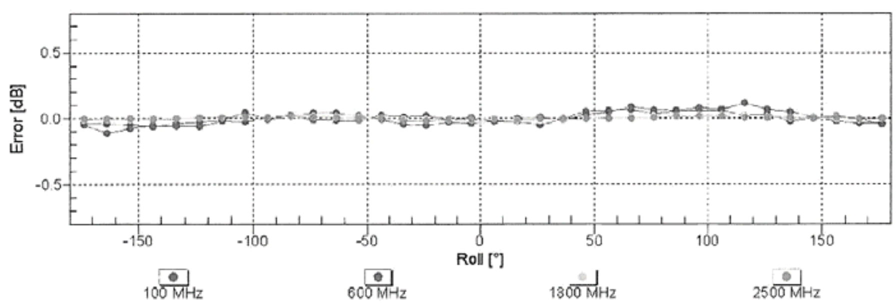
(TEM-Cell:ifi110 EXX, Waveguide: R22)



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

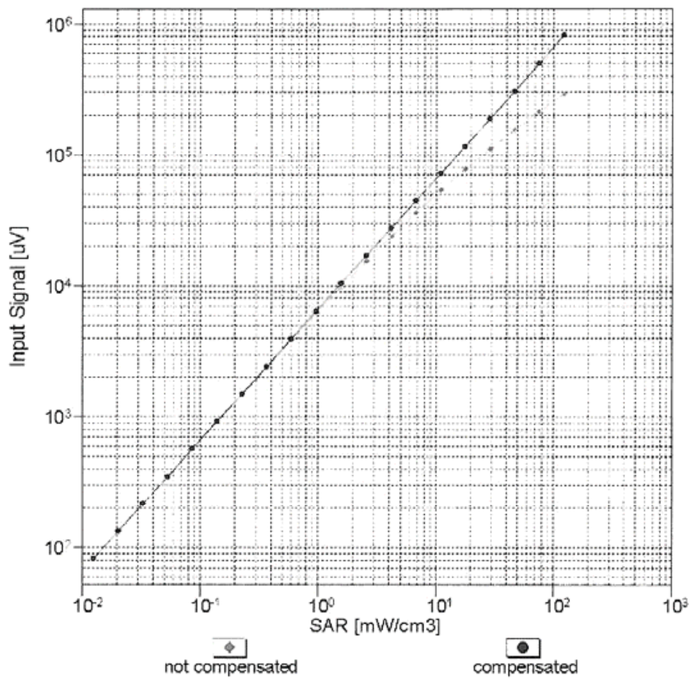
Receiving Pattern (ϕ), ϑ = 0°

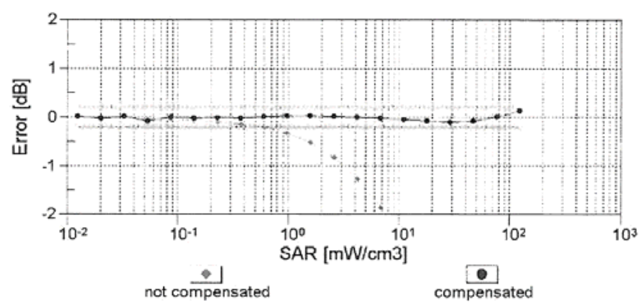




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

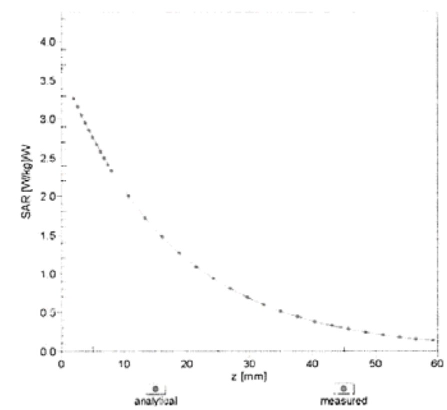




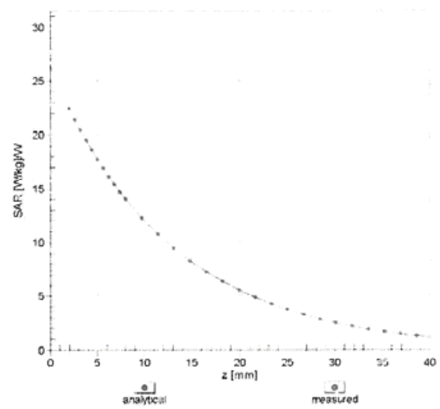
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

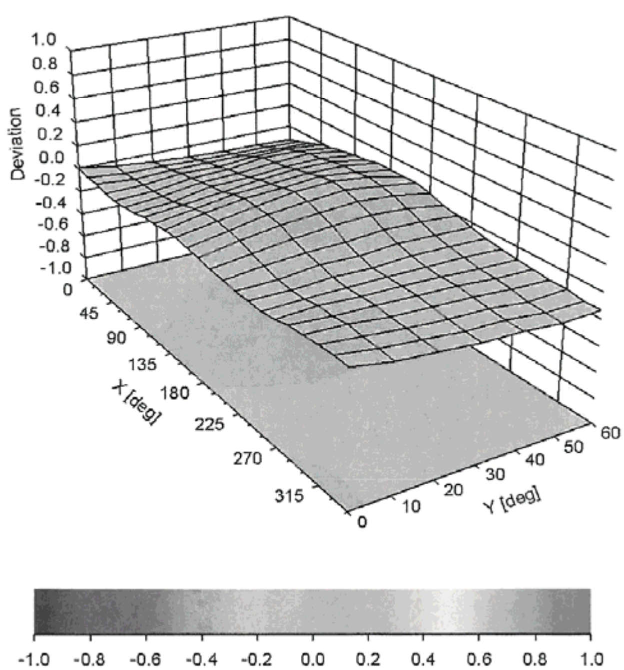


f = 1750 MHz,WGLS R22 (H_convF)



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 (°)	-53.7
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	2 mm

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

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

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

Accreditation No.: **SCS 108**

Client **AT4 Wireless**

Certificate No: **EX3-3687_Jul14**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3687
Calibration procedure(s)	QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6 Calibration procedure for dosimetric E-field probes
Calibration date:	July 14, 2014

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	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 17, 2014

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

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *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 EX3DV4

SN:3687

Manufactured: March 10, 2009
Calibrated: July 14, 2014

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3687

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.51	0.44	0.50	± 10.1 %
DCP (mV)[B]	100.3	100.4	99.5	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	140.8	±3.5 %
		Y	0.0	0.0	1.0		148.4	
		Z	0.0	0.0	1.0		130.5	
10062-CAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	9.95	68.3	21.3	8.68	123.7	±3.3 %
		Y	10.27	68.5	21.3		130.5	
		Z	10.38	69.1	21.8		137.7	
10117-CAA	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	10.08	68.3	20.9	8.07	132.6	±3.0 %
		Y	10.13	68.1	20.6		130.4	
		Z	10.50	69.3	21.4		149.7	
10196-CAA	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	9.65	68.1	20.9	8.10	125.9	±3.0 %
		Y	9.83	68.0	20.7		126.2	
		Z	10.05	68.9	21.3		142.9	
10400-AAA	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	9.90	68.3	21.1	8.37	126.1	±3.0 %
		Y	10.11	68.3	21.0		127.6	
		Z	10.29	69.1	21.6		141.6	
10401-AAA	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	X	10.73	69.0	21.5	8.60	135.8	±3.0 %
		Y	10.79	68.7	21.2		134.6	
		Z	10.66	68.6	21.3		125.2	
10402-AAA	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	X	11.00	69.4	21.5	8.53	138.1	±3.0 %
		Y	10.77	68.6	21.0		134.0	
		Z	10.89	69.0	21.3		127.7	
10417-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	X	9.70	68.0	20.9	8.23	124.9	±2.7 %
		Y	9.88	68.0	20.7		124.3	
		Z	10.13	69.0	21.5		142.6	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3687

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)	Unct. (k=2)
5200	36.0	4.66	4.77	4.77	4.77	0.30	1.80	± 13.1 %
5300	35.9	4.76	4.60	4.60	4.60	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.25	4.25	4.25	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.29	4.29	4.29	0.40	1.80	± 13.1 %

[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.

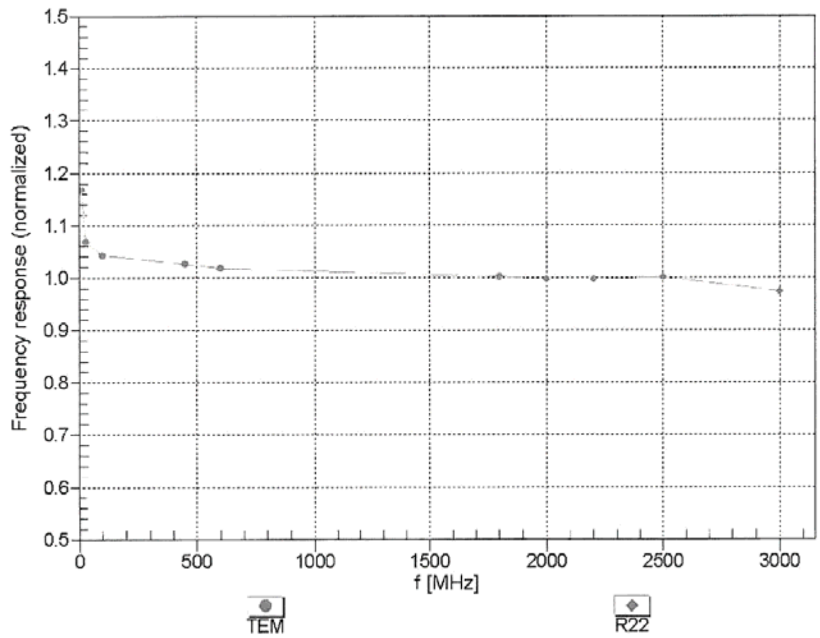
DASY/EASY - Parameters of Probe: EX3DV4 - SN:3687

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)	Unct. (k=2)
5200	49.0	5.30	4.32	4.32	4.32	0.45	1.90	± 13.1 %
5300	48.9	5.42	4.15	4.15	4.15	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.67	3.67	3.67	0.50	1.90	± 13.1 %
5800	48.2	6.00	3.89	3.89	3.89	0.50	1.90	± 13.1 %

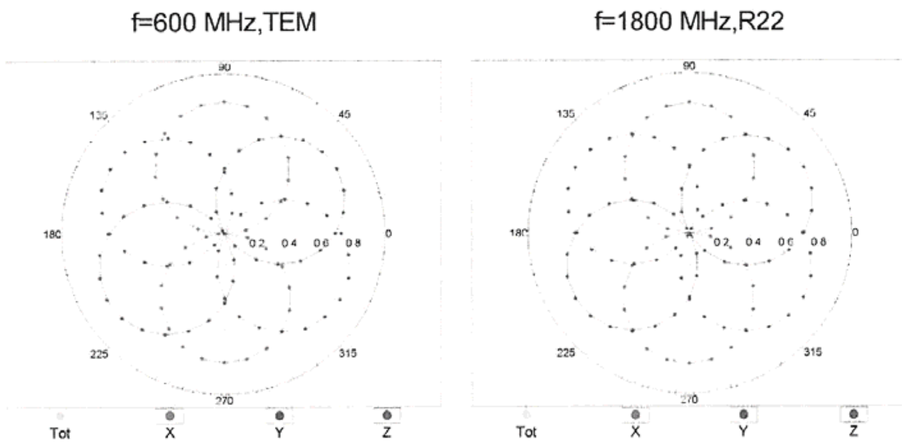
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz 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.

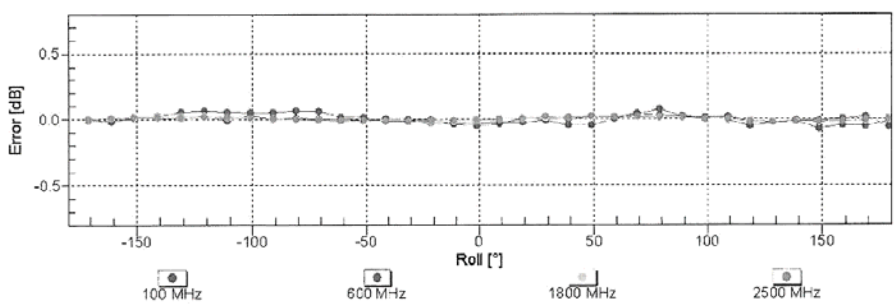
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



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

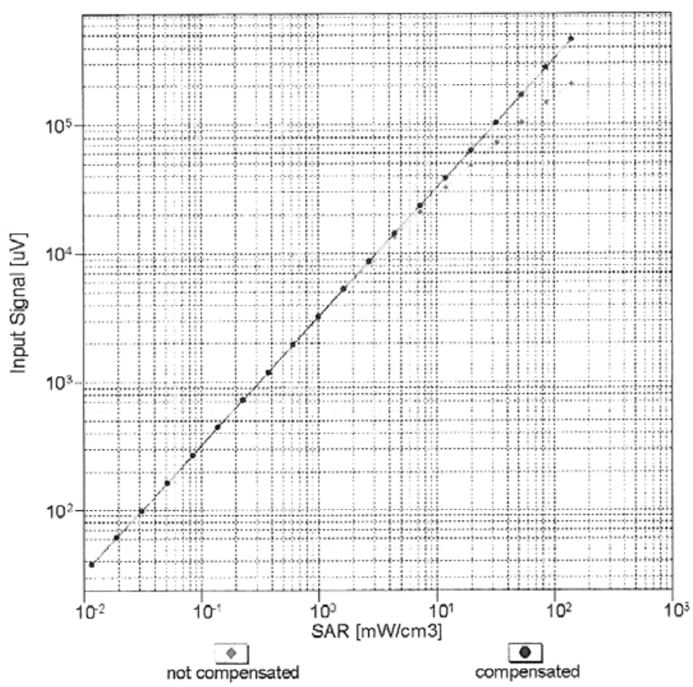
Receiving Pattern (ϕ), ϑ = 0°

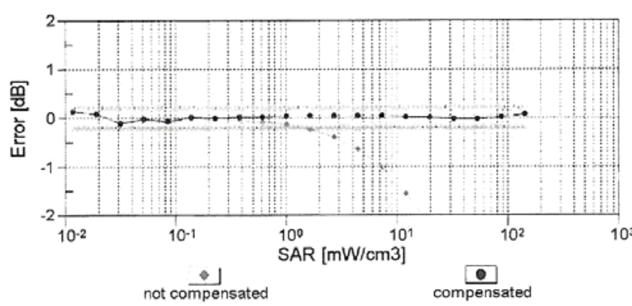




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

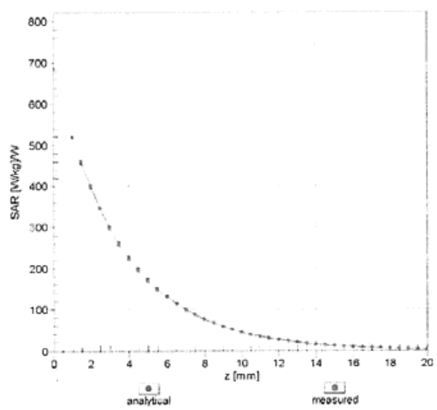




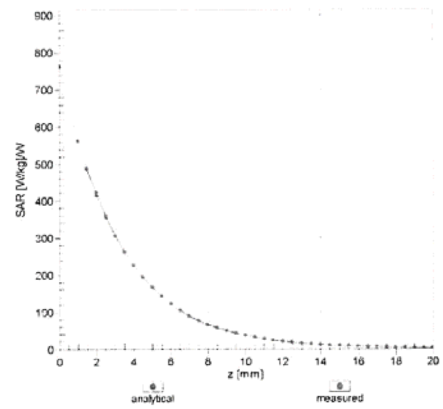
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 5200 MHz,WGLS R58 (H_convF)-SCS

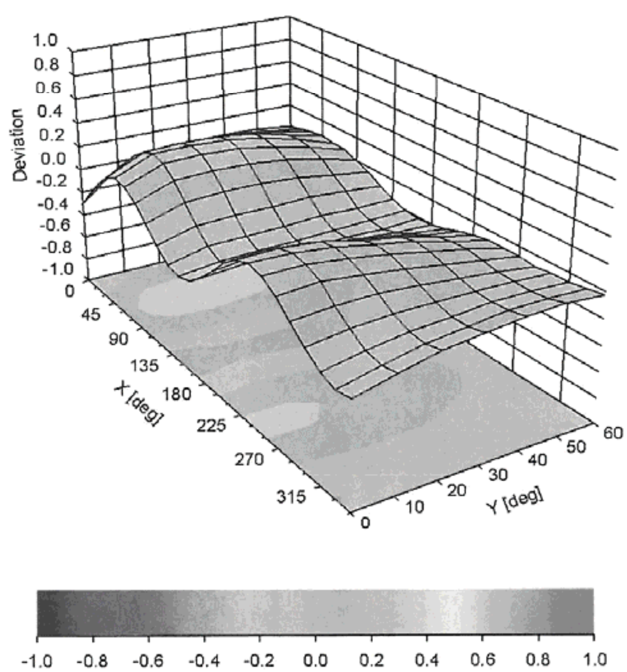


f = 5800 MHz,WGLS R58 (H_convF)-SCS



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3687

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-51.1
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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S Swiss Calibration Service

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

Accreditation No.: SCS 108

Client **AT4 Wireless**

Certificate No: D2450V2-756_Jul13

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 22, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: July 22, 2013

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.7
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	37.8 ± 6 %	1.81 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**53.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.20 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.6 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	50.5 ± 6 %	2.01 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	13.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**51.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.06 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.9 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	56.2 Ω + 2.2 jΩ
Return Loss	- 24.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.8 Ω + 3.8 jΩ
Return Loss	- 27.8 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: 22.07.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

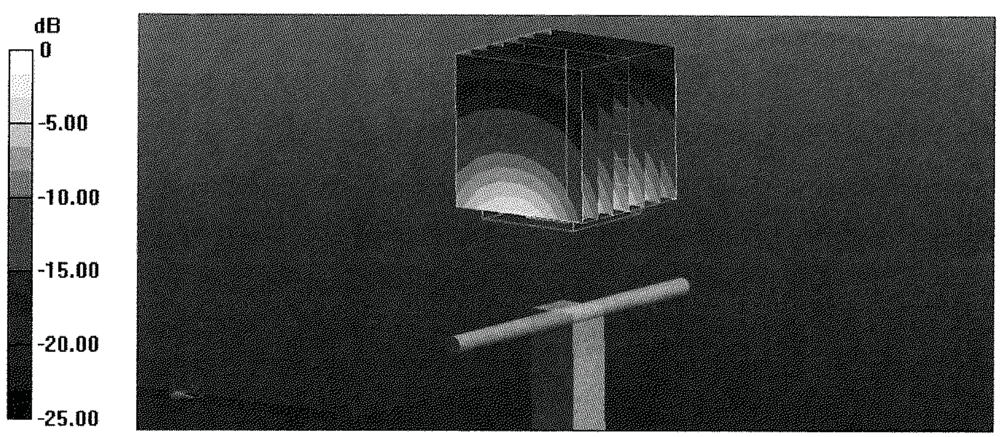
Communication System: UID 0 - CW ; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.81 S/m; ε_r = 37.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

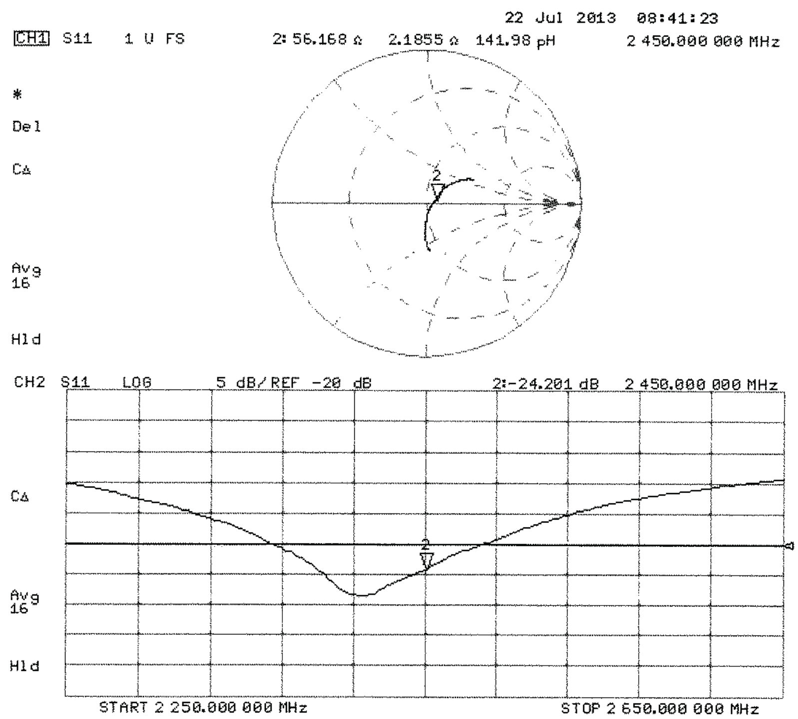
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.304 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 27.7 W/kg
SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.2 W/kg
Maximum value of SAR (measured) = 17.1 W/kg



0 dB = 17.1 W/kg = 12.33 dBW/kg

Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-756_Jul13 Page 6 of 8

DASY5 Validation Report for Body TSL

Date: 19.07.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

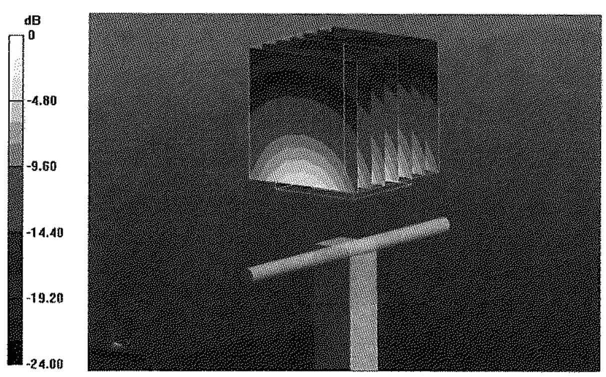
Communication System: UID 0 - CW ; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.01 S/m; ε_r = 50.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.42, 4.42, 4.42); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

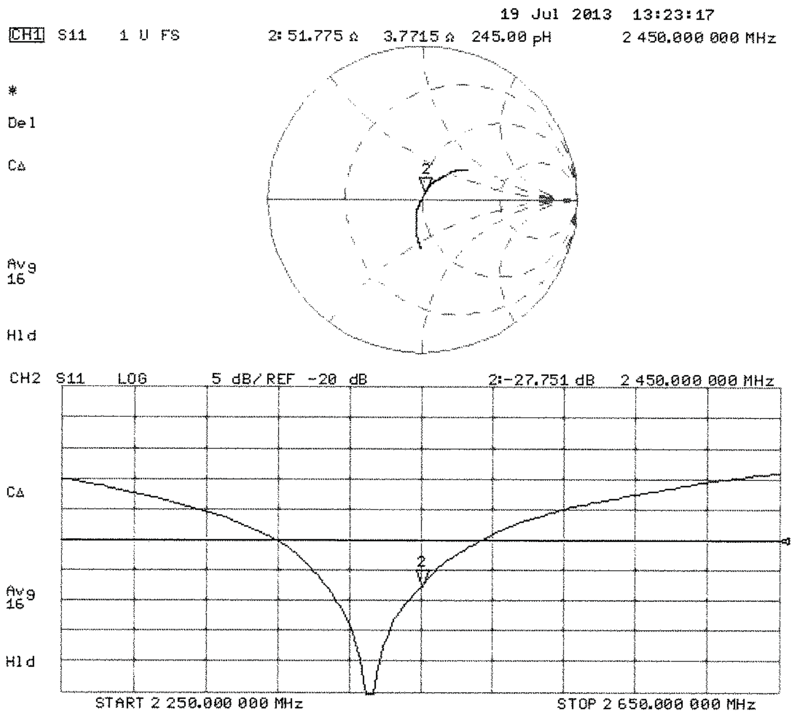
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.304 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 27.3 W/kg
SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.06 W/kg
Maximum value of SAR (measured) = 17.2 W/kg



0 dB = 17.2 W/kg = 12.36 dBW/kg

Impedance Measurement Plot for Body TSL



Certificate No: D2450V2-756_Jul13 Page 8 of 8

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

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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **AT4 Wireless**

Certificate No: D5GHzV2-1071_Jul13

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN: 1071
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	July 23, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe EX3DV4	SN: 3503	28-Dec-12 (No. EX3-3503_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: July 24, 2013

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEC 62209-2, "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", March 2010
b) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

c) 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	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5500 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.2 ± 6 %	4.46 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.95 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.29 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.7 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.8 ± 6 %	4.74 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.0 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.7 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.4 ± 6 %	5.05 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.97 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.6 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.9 ± 6 %	5.40 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.47 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**74.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.4 ± 6 %	5.79 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.87 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**78.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.19 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.9 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.9 ± 6 %	6.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.51 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.08 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.8 W/kg ± 19.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	52.9 Ω - 7.4 jΩ
Return Loss	- 22.3 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	53.0 Ω - 3.1 jΩ
Return Loss	- 27.6 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	53.9 Ω - 1.2 jΩ
Return Loss	- 28.1 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	51.8 Ω - 3.9 jΩ
Return Loss	- 27.5 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	54.3 Ω + 0.3 jΩ
Return Loss	- 27.7 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	54.6 Ω - 0.2 jΩ
Return Loss	- 27.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.208 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	September 26, 2008

DASY5 Validation Report for Head TSL

Date: 23.07.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1071

Communication System: UID 0 - CW ; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.46 S/m; ε_r = 35.2; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5500 MHz; σ = 4.74 S/m; ε_r = 34.8; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5800 MHz; σ = 5.05 S/m; ε_r = 34.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

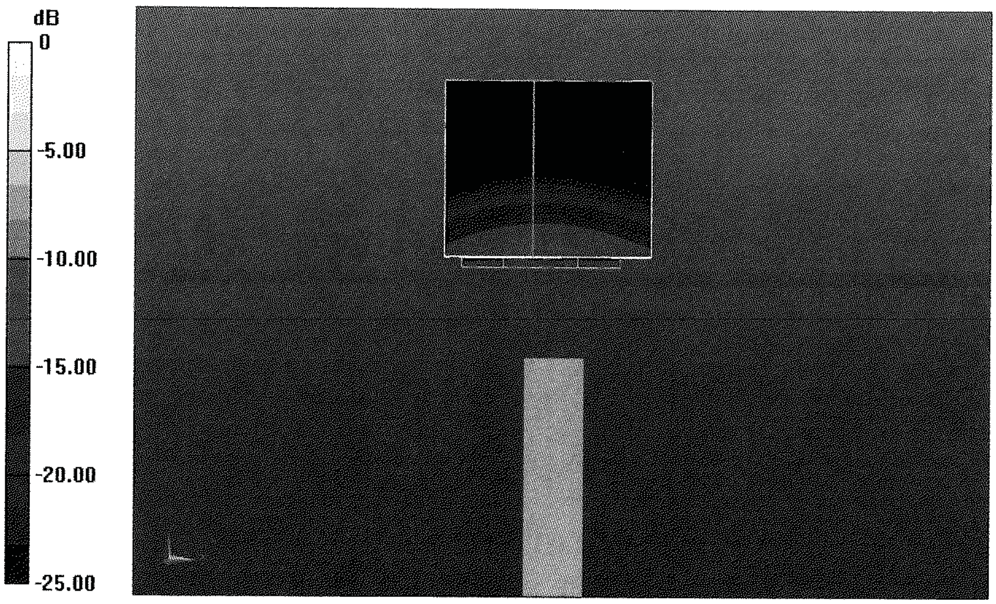
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41); Calibrated: 28.12.2012, ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.81, 4.81, 4.81); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.878 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 28.6 W/kg
SAR(1 g) = 7.95 W/kg; SAR(10 g) = 2.29 W/kg
Maximum value of SAR (measured) = 18.5 W/kg

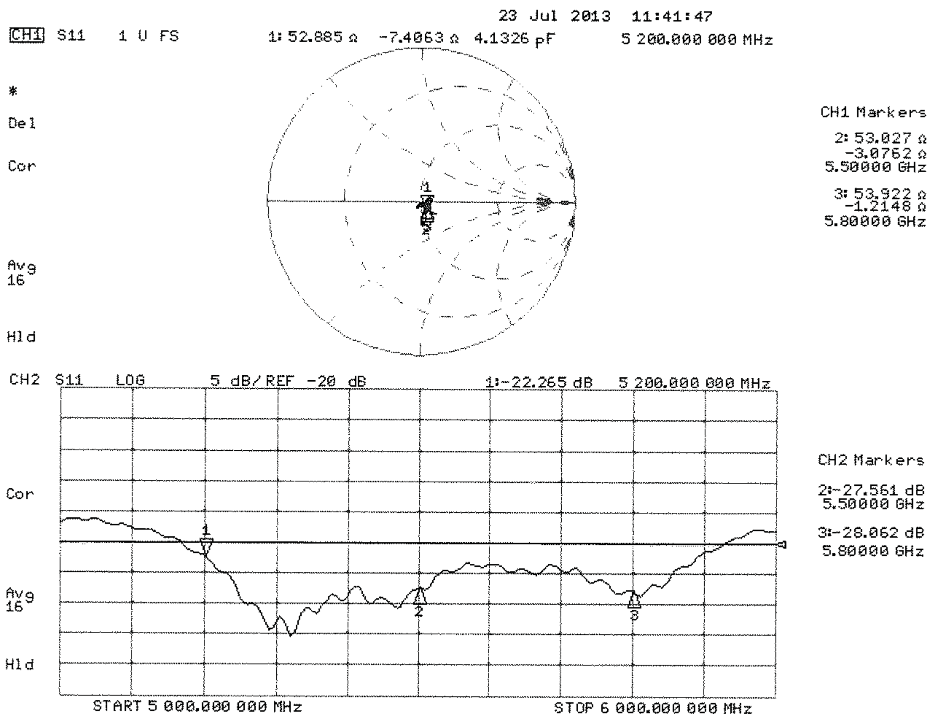
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.722 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 32.0 W/kg
SAR(1 g) = 8.36 W/kg; SAR(10 g) = 2.39 W/kg
Maximum value of SAR (measured) = 19.8 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 61.571 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 32.2 W/kg
SAR(1 g) = 7.97 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 19.5 W/kg



0 dB = 19.5 W/kg = 12.90 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.07.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1071

Communication System: UID 0 - CW ; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.4 S/m; ε_r = 48.9; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5500 MHz; σ = 5.79 S/m; ε_r = 48.4; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5800 MHz; σ = 6.21 S/m; ε_r = 47.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

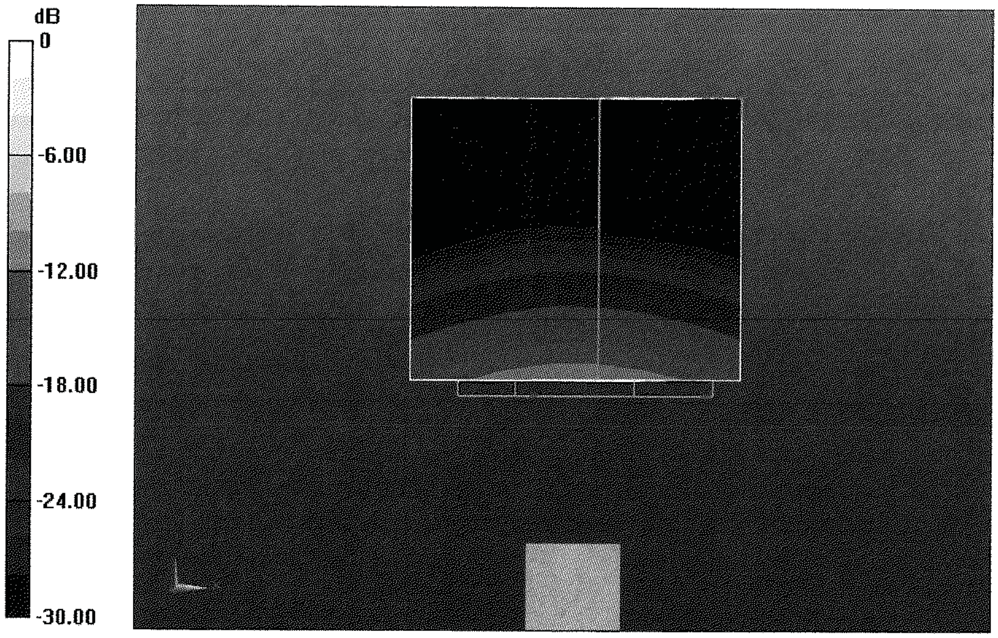
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.43, 4.43, 4.43); Calibrated: 28.12.2012, ConvF(4.38, 4.38, 4.38); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 59.271 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 29.4 W/kg
SAR(1 g) = 7.47 W/kg; SAR(10 g) = 2.09 W/kg
Maximum value of SAR (measured) = 17.8 W/kg

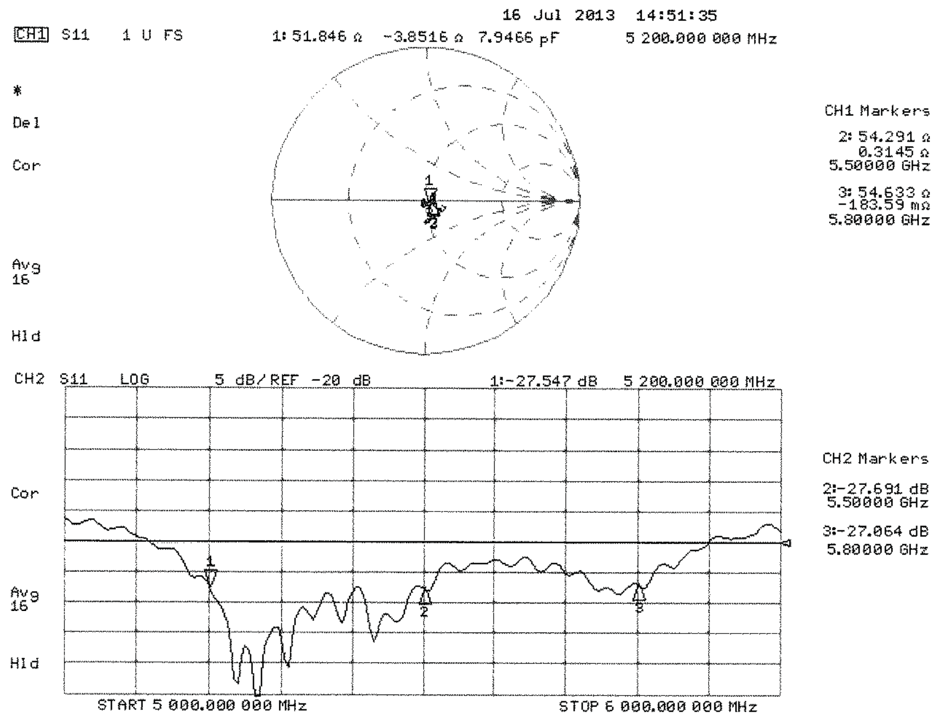
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 59.207 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 33.7 W/kg
SAR(1 g) = 7.87 W/kg; SAR(10 g) = 2.19 W/kg
Maximum value of SAR (measured) = 19.3 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 55.736 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 34.6 W/kg
SAR(1 g) = 7.51 W/kg; SAR(10 g) = 2.08 W/kg
Maximum value of SAR (measured) = 18.8 W/kg



0 dB = 18.8 W/kg = 12.74 dBW/kg

Impedance Measurement Plot for Body TSL



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