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ENAC ENSAYOS Nº 51/LE147

Informe de ensayo nº:
Test report No:

NIE: 45038RRF.002

Test report
REFERENCE STANDARDS:
FCC 47CFR Part 2.1093, Published RF Exposure KDB Procedures, IC RSS -102 Issue 5

Identificación del objeto ensayado.....: Identification of item tested	SmartPhone
Marca .....: Trade	YotaPhone
Modelo y/o referencia tipo .....: Model and /or type reference	YD201
Other identification of the product .....:	Commercial name: YOTAPHONE2 FCC ID: 2ADHW201
Final HW version .....:	P3
Final SW version .....:	3.57a
IMEI TAC .....:	IMEI: 356431060204320, 356431060204380
Características .....: Features	GSM/GPRS/E-GPRS, WCDMA/HSPA/HSPA+, LTE, WiFi b/g/n20 and WiFi a/n20/ac20/n40
Peticionario .....: Applicant	YOTA DEVICES LTD Arch. Makariou & Kalograion, 4, Nicolaides Sea View City, 9th Floor, Flat/Offices 903 -904, Block A-B, 6016, Larnaca, Cyprus. Contact person: Jukka Ollila Telephone: +358405433264 e-mail: jollila@yotadevices.com
Método de ensayo solicitado, norma.....: Test method requested, standard	1. FCC 47 CFR Part 2.1093. (10-1-11 Edition) – Radiofrequency radiation exposure evaluation: portable devices. 2. FCC OET KDB 447498 D01 General RF Exposure Guidance v05r02 (February 2014). 3. FCC OET KDB 865664 D01 v01r03 – SAR Measurement Requirements for 100 MHz to 6 GHz (February 2014). 4. FCC OET KDB 248227 D01 - v01r02 – SAR Measurements Procedures 802.11a/b/g Transmitters (May 2007 – Revised). 5. FCC OET KDB 941225 D01-v03 – 3G SAR Measurement Procedures (October 2014). 6. FCC OET KDB 648474 D04 - v01r02 – SAR Evaluation Considerations for Wireless Handsets (Dec 2013). 7. FCC OET KDB 941225 D07 UMPC Mini Tablet v01r01 – SAR Evaluation Procedures for UMPC Mini-Tablet Devices

	8. FCC OET KDB 941225 D06 Hot Spot SAR v02 – SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities. 9. IC RSS-102 Issue 5. Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands). 10. Canada`s Safety Code No.6 – Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz .
Resultado.....: 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 for standalone transmission found during this test has been 0.800 W/kg, for body position and WCDMA II Band. The maximum 1g volume averaged SAR for multiband transmission found during this test has been 0.996 W/kg, for body position. 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".
Aprobado por (nombre / cargo y firma) .....: Approved by (name / position & signature)	A. Llamas RF Lab. Manager  Firmado digitalmente por Alejandro Llamas Rodríguez Fecha: 2015.03.25 11:24:06 +01'00'
Fecha de realización .....: Date of issue	2015-03-25
Formato de informe No.....: Report template No	FDT08_15

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

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.

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Uncertainty

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

1. FCC OET KDB 865664 – SAR Measurements Requirements for 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
45038/03	Handset	YD201	356431060204320	02/02/2015

1. Sample M/01 has undergone the test(s) specified in subclause "Test method requested": SAR evaluation for 2G, 3G modes.

Test sample description

The test sample consists of Smartphone.

Test samples supplier

Same as applicant

Testing period

The performed test started on 2015-02-03 and finished on 2015-02-12.

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 ºC Max. = 25 ºC
Relative humidity	Min. = 30 % Max. = 70 %

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: Zoom scan is not required due to Area scan based 1-g estimation mention in FCC 447498 D01 – General Exposure Guidance (May 2013).

3: GSM, GPRS and EDGE mode tested only for one position due to testing reductions mentioned in FCC OET KDB 447498 D01 – General RF Exposure Guidance v05r02 (February 2014).

4: Testing of EDGE mode is not required according to FCC OET KDB 447498 D01 – General RF Exposure Guidance v05r02 (February 2014).

5: Testing of HSDPA/HSPA/HSPA+/DC-HSDPA modes are not required according to FCC OET KDB 941225 D01 – 3G SAR Measurement Procedures (October 2014) .

6: Testing of Bluetooth mode is not required according to FCC OET KDB 447498 D01 General RF Exposure Guidance v05r02, paragraph "4.3.1. Standalone SAR test exclusion considerations Individual Transmitters".

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

8: Results from AT4Wireless Test Report Num. 43480RRF.001A1.

Used instrumentation

1. Dosimetric E-field probe SPEAG ES3DV3
2. Data acquisition device SPEAG DAE4
3. Electro-optical converter SPEAG EOC3
4. 900 MHz dipole validation kit SPEAG D900V2
5. 1800MHz dipole validation kit SPEAG D1800V2
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. SAM head-body simulator SPEAG Twin SAM V4.0
12. Oval flat phantom SPEAG ELI 4
13. Head and Body Tissue Equivalent Liquids for 900MHz and 1800MHz bands
14. Radio Communication Tester R&S CMU 200
15. Wideband Radio Communication Tester R&S CMW 500
16. Vector network analyzer Agilent FieldFox N9923A
17. Dielectric probe kit SPEAG DAK-3.5
18. Power meter Agilent E4419B
19. RF Generator R&S SMU200A
20. DC Power supply Agilent U8002A
21. Dual directional coupler NARDA FSCM 99899
22. Dual directional coupler HP 778D.
23. Power amplifier MITEQ AMF-4D-00400600-50-30P
24. Handset positioner SPEAG Device Holder

Testing verdicts

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

850 MHz band

FCC 47CFR Part 2.1093 Paragraph	VERDICT			
	NA	**P**	**F**	**NM**
(d)(2) GSM		P		
(d)(2) GPRS		P		
(d)(2) EDGE				NM[4]
(d)(2) WCDMA Band V		P		
(d)(2) HSDPA, HSPA, HSPA$^+$ and DC-HSDPA Band V				NM[5]

4 and 5: See Remarks and Comments.

1900 MHz band

FCC 47CFR Part 2.1093 Paragraph	VERDICT			
	NA	**P**	**F**	**NM**
(d)(2) GSM		P		
(d)(2) GPRS		P		
(d)(2) EDGE				NM[4]
(d)(2) WCDMA Band II		P		
(d)(2) HSDPA, HSPA, HSPA$^+$ and DC-HSDPA Band II				NM[5]

4 and 5: See Remarks and Comments.

2450 MHz band

FCC 47CFR Part 2.1093 Paragraph	VERDICT			
	NA	P	F	NM
(d)(2) 802.11b		P[8]		
(d)(2) 802.11g		P[8]		
(d)(2) 802.11n		P[8]		
(d)(2) 802.11ac		P[8]		
(d)(2) Bluetooth				NM[6]

6 and 8: See Remarks and Comments.

5 GHz bands

FCC 47CFR Part 2.1093 Paragraph	VERDICT			
	NA	P	F	NM
(d)(2) 802.11a		P[8]		
(d)(2) 802.11n		P[8]		
(d)(2) 802.11ac		P[8]		

8: See Remarks and Comments.

FCC 47CFR Part 2.1093 Paragraph	VERDICT			
	NA	P	F	NM
(d)(2) Simultaneous multi-band transmission		P		

Appendix A – Test configuration

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1. GENERAL INTRODUCTION

1.1. Application Standard

The Federal Communications Commission (FCC) sets the limits for General Population / Uncontrolled exposure to radio frequency electromagnetic fields for transmitting devices designed to be used within 20 centimeters 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 for head worn is a simplified representation of the human anatomy and comprised of material with electrical properties similar to the corresponding tissues in human body. The human model has the following proportions:

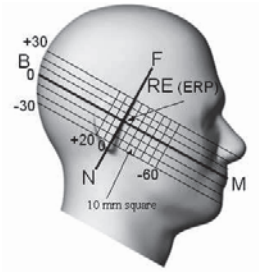


Figure 1: Proportions of Phantom

The shell model is a shaped container and it has the representation shown in the following figure:

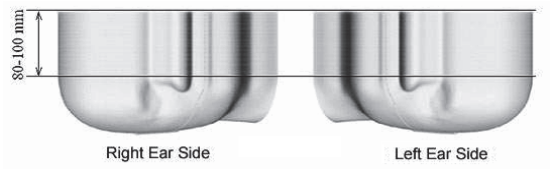


Figure 2: Proportions and shape of Phantom shell

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

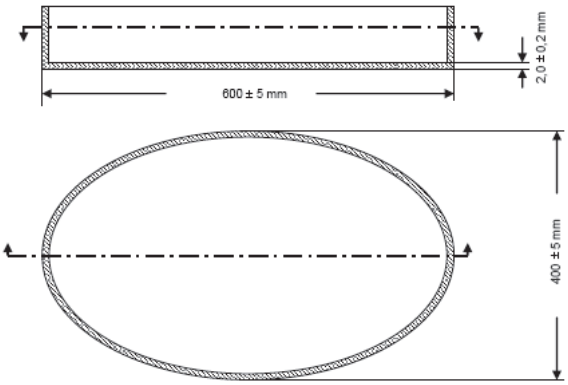


Figure 3: Proportions and shape of Phantom shell

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.

2. MEASUREMENT SYSTEM

2.1. Measurement System

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

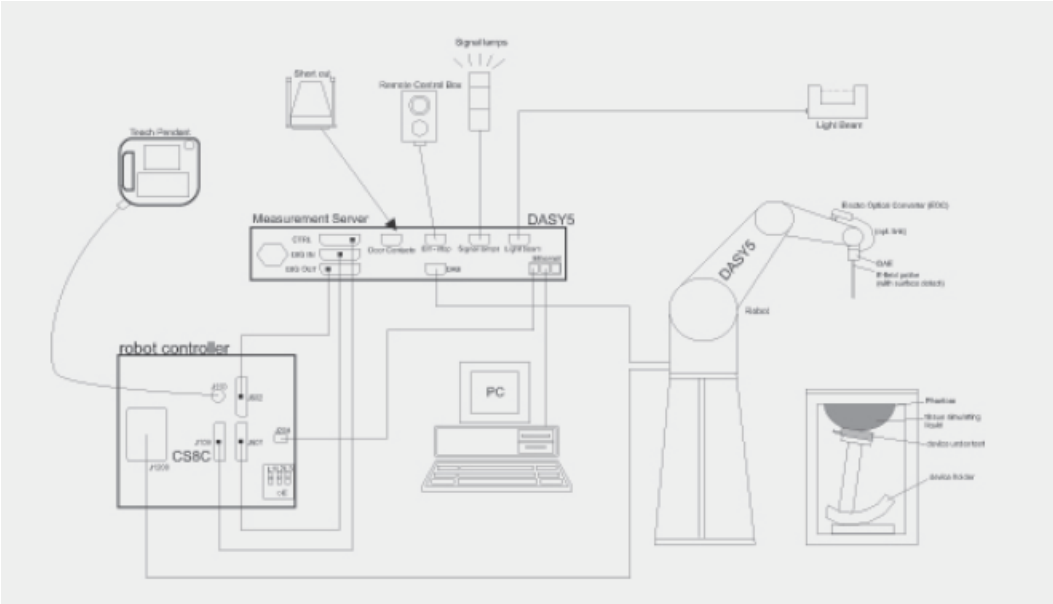


Figure 4: SAR Measurement system

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

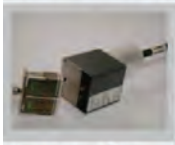
Manufacturer	Device	Type
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	ES3DV3
Schmid & Partner Engineering AG	Data Acquisition Electronics	DAE4
Schmid & Partner Engineering AG	Electro-Optical Converter	EOC3
Stäubli	Robot	RX60BL
Stäubli	Robot controller	CS7MB
Schmid & Partner Engineering AG	Measurement Server	DASY5 SE UMS 011 BS
Schmid & Partner Engineering AG	SAM head-body simulator	TWIN SAM V4.0
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 V52.8.2.969
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
HP	Dual directional coupler	778D
Weinschel	6dB attenuator	75A-6-11
Weinschel	20 dB attenuator	75A-20-11
Agilent	Power Meter	E4419B
Schmid & Partner Engineering AG	900 MHz System Validation Dipole	D900V2
Schmid & Partner Engineering AG	1800 MHz System Validation Dipole	D1800V2
Agilent	Vector Network Analyser	FieldFox N9923A
Schmid & Partner Engineering AG	Dielectric Probe Kit	DAK-3.5
Rohde & Schwarz	Radio Communication Tester	CMU 200
Rohde & Schwarz	Wideband Radio Communication Tester	CMW 500

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

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

SAM HEAD-BODY SIMULATOR

Twin SAM	
	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot. Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, 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 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions **(incl. Wooden Support)**	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 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 I/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	179.0	330.0
	D900V2	148.5	340.0
	D1800V2	72.5	300.0
	D2000V2	65.0	300.0
	D2450V2	52.0	290.0
	D2600V2	49.2	290.0
	D5GHzV2	20.6	300.0

2.2. Test Positions of device relative to head and body

Two test positions for the handset in the head are required. These positions are the "cheek" position and the "tilted" position. The tests positions used are described below. The handset should be tested in both positions (left and right sides) in the SAM phantom.

The EUT shall be placed in the Phantom in such way that the main point of the mobile terminal (acoustic output) coincides with the reference point located at the Phantom's ear.

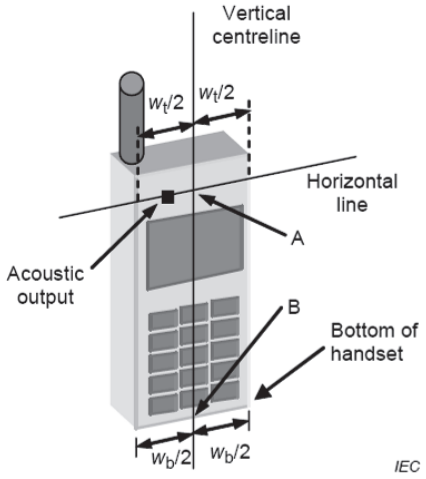


Figure 5: EUT's basic scheme

SAR measurements will be performed for the following configurations as indicated in the reference standard:

- Right side of Phantom, Cheek position.
- Right side of Phantom, 15º Tilted position.
- Left side of Phantom, Cheek position.
- Left side of Phantom, 15º Tilted position.

Definition of the "cheek" position

The "cheek" position relative to Phantom is described as follows:

1. - Position the device with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagital plane of the Phantom. While maintaining the device in this plane, align the centre line with the reference plane containing the three ear and mouth reference points (M, RE and LE).

2. - Translate the mobile phone box towards the Phantom until the ear-piece touches the ear reference point (RE or LE). While maintaining the device in the reference plane, move the bottom of the box until any point of the front side is in contact with the cheek of the Phantom.

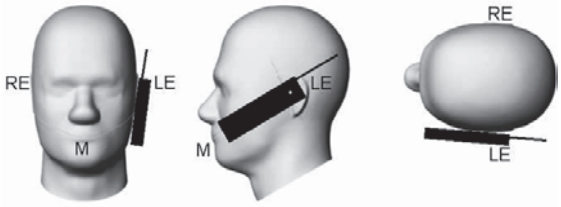


Figure 6: "Cheek" position of EUT

Definition of the tilted position:

The "15º tilted" position relative to Phantom is described as follows:

1. - Position the device in the "cheek" position described above.

2. - While maintaining the device in the reference plane described above and pivoting against the ear, move it outward away from the mouth by an angle of 15 degrees.

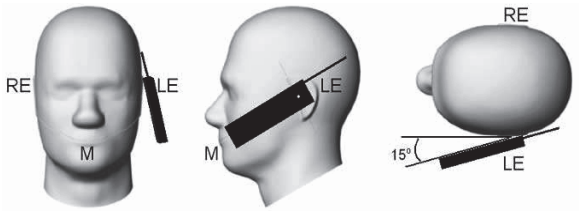


Figure 7: "Tilted" position of EUT

For devices that are designed to operate in body configurations SAR compliance should be evaluated using a flat phantom.

2.3. Test to be performed

Test shall be performed at both phone positions previously described, on each side of the head (left and right side) and using the centre frequency of each operating band.

Additionally, the configuration giving to the maximum mass averaged SAR shall be used to test the low-end and the high-end frequencies of each transmitting band. Thus, the tests to be performed in mobile phones are as follows:

- Measurements at Central Channel of application band:
  1. SAR measurement at the left side of Phantom and the cheek position of the EUT.
  2. SAR measurement at the left side of Phantom and the tilted 15º position of the EUT.
  3. SAR measurement at the right side of Phantom and the cheek position of the EUT.
  4. SAR measurement at the right side of Phantom and the tilted 15º position of the EUT.
- Measurements at Low Channel of application band: SAR measurement at the side and position where the maximum SAR level, measured at Central channel, was found.
- Measurements at High Channel of application band: SAR measurement at the side and position where the maximum SAR level, measured at Central channel, was found.

As noted above, measurements shall be performed using a flat phantom for body configurations. EUT will be placed at the center of flat phantom. The EUT position using during the body SAR tests will be the one where the maximum peak SAR was found. Low and high channels for each band should be tested at this position.

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

The device under test is a modified version from the original sample tested in AT4Wireless test report number 43480RRF.001A1. WWAN performance for frequency bands under 1GHz has been improved by the manufacturer through a hardware modification; therefore low band's configuration has been modified from the original version.

A complete SAR testing has been performed for the bands affected by this hardware modification:

- GSM/GPRS/EDGE 850 MHz Band
- WCDMA/HSDPA/HSPA/HSPA+/DC-HSDPA FDD Band V

In order to check possible changes into the absorption spectre for WWAN high bands due to the hardware modification, SAR measurements have been performed at the worst case configuration found into AT4Wireless test report num. 43480RRF.001A1 over the rest of the DUT's supported WWAN bands, for head and body.

Measurements results have been compared with the original sample's results from AT4Wireless test report num. 43480RRF.001A1, both results are shown at Appendix B. Paragraph 5, for each band and configuration.

There has been no modification into WLAN configuration; therefore no SAR testing has been performed for WLAN modes.

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. 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 1mm 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 daily 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 one-gram 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. This level 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

Dimensions	Millimetres
Height x Width x Depth	145.0 x 70.0 x 8.0
Overall Diagonal:	148.0
Display Diagonal:	127.0

Table 4: Dimensions

5.2. Wireless Technology

Wireless Technology	Frequency Bands	Modes
GSM	850 / 1900	- Voice (GMSK) - GPRS (GMSK, Multi-slot class 14) - EGPRS (8PSK, Multi-slot class 14)
W-CDMA	II / V	- UMTS Rel. 99 (Voice & Data) - HSDPA (Rel. 7) - HSUPA (Rel. 6) - DC-HSDPA (Rel. 8) - HSPA+ (Rel. 6)
Wi-Fi	2.4 GHz	- 802.11b/g/n(20MHz & 40MHz)/ac(20MHz)
	5 GHz	- 802.11a/n(20MHz & 40MHz)/ac(20MHz)
Bluetooth	2.4 GHz	- Bluetooth

Table 5: Supported modes

5.3. Simultaneous Transmission

Simultaneous transmission evaluation was performed following the FCC OET KDB 648474 D01 – SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas (Sept 2008), the EUT only admits simultaneous operation in 802.11 a/b/g/n/ac mode with the other ones. The detailed simultaneous transmission combination is:

RF Exposure Condition	Capable Transmit Configurations
Head	1. GSM 850/1900 Voice + WiFi 2.4/5GHz 2. GSM 850/1900 (GPRS/EDGE) + WiFi 2.4/5GHz 3. WCDMA Band II/V + WiFi 2.4/5GHz
Body-worn Accessory/Hotspot	1. GSM 850/1900 Voice + (WiFi 2.4/5GHz or BT) 2. GSM 850/1900 (GPRS/EDGE) + (WiFi 2.4/5GHz or BT) 3. WCDMA Band II/V + (WiFi 2.4/5GHz or BT)
Notes: 1. WiFi cannot transmit simultaneously with Bluetooth Radio.	

Table 6: Simultaneous transmission

5.4. DUT Antenna Location

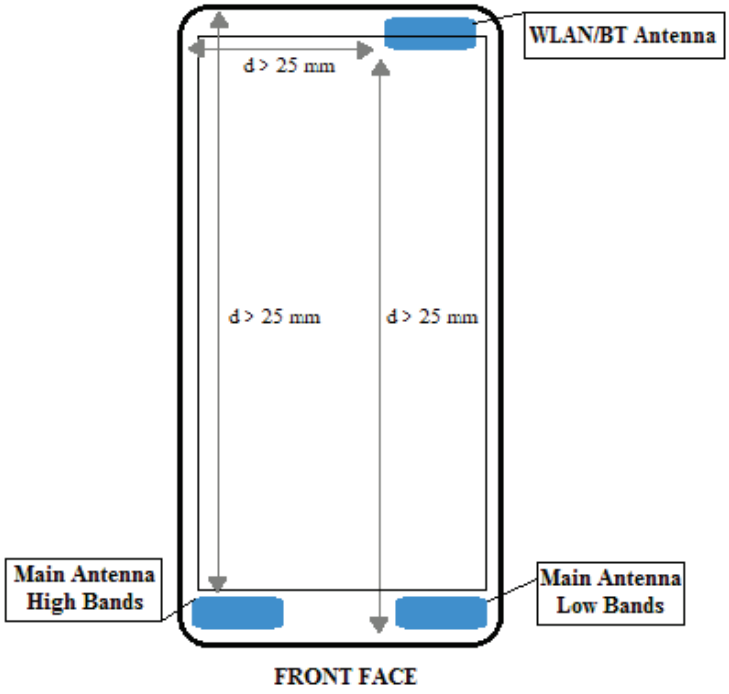


Figure 8: Antenna location.

Appendix B – Test results

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1. TEST CONDITIONS

1.1. Power supply (V):

V_n = 3.8 Li-polymer rechargeable battery

Type of power supply = DC Voltage from rechargeable Li-Ion 3.8 V battery.

1.2. Temperature (ºC):

T_n = +21.112 to +24.813

The subscript n indicates normal test conditions.

1.3. Test signal, Output Power and Frequencies

For the GSM/GPRS/EDGE and WCDMA modes, the sample (IMEI: 356431060204320) was put into operation by using a R&S CMU 200 and R&S CMW 500 as base station simulator. The output power of the device was set to Power Control Level (PCL) maximum for all tests.

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

1, 4, and 5: See remarks and comments

1.4. EUT and test-site configurations

For both modes, voice modes and only-data modes, the EUT was tested over head and body exposure conditions.

For head tests, the EUT was placed in cheek and tilt position on the right/left side of the SAM phantom.

For body tests, the EUT was placed in each face/edge position with a transmitting antenna located at ≤ 25 mm distance from that surface or edge against the flat phantom surface.

The separation distance between EUT and the flat phantom surface was 10 mm.

2. CONDUCTED AVERAGE POWER MEASUREMENTS [8]

2.1. GSM/GPRS/EGPRS Bands

- GSM 850: For voice mode PCL 5 was set in the CMU-200 to allow DUT's max power transmission.

Conducted Average Power Measurement 2G: GSM850					
Channel Number	Frecuency (MHz)	Frame Average Output Power (dBm)	Average Burst Output Power (dBm)	PCL	Modulation
128	824.2	23.9	32.9	5	GMSK
190	836.6	23.8	32.8	5	GMSK
251	848.8	24.5	33.5	5	GMSK

- GPRS 850: For data mode. PCL 5, CS1 coding scheme and Gamma 3 were set in the CMU-200 to allow DUT's max power transmission for each slot.

GPRS 850 - Frame Average Output Power							
Channel Number	Frecuency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slot	Power (dBm) 3 Slot	Power (dBm) 4 Slot	PCL	Modulation
128	824.2	23.9	25.1	24.3	23.8	5	GMSK-CS1
190	836.6	23.8	24.9	24.2	23.6	5	GMSK-CS1
251	848.8	24.4	24.5	24.0	23.3	5	GMSK-CS1

GPRS 850 - Average Burst Output Power							
Channel Number	Frecuency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slot	Power (dBm) 3 Slot	Power (dBm) 4 Slot	PCL	Modulation
128	824.2	32.9	31.1	28.5	26.8	5	GMSK-CS1
190	836.6	32.8	30.9	28.4	26.6	5	GMSK-CS1
251	848.8	33.5	30.5	28.2	26.3	5	GMSK-CS1

- EGPRS 850: For data mode. PCL 8, MCS5 coding scheme and Gamma 6 were set in the CMU-500 to allow DUT's max power transmission for each slot.

EDGE 850 - Frame Average Output Power							
Channel Number	Frecuency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slot	Power (dBm) 3 Slot	Power (dBm) 4 Slot	PCL	Modulation
128	824.2	20.7	20.4	19.6	18.8	8	8PSK-MCS5
190	836.6	20.6	20.5	19.4	18.8	8	8PSK-MCS5
251	848.8	20.7	20.3	19.2	18.4	8	8PSK-MCS5

EDGE 850 - Average Burst Output Power							
Channel Number	Frecuency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slot	Power (dBm) 3 Slot	Power (dBm) 4 Slot	PCL	Modulation
128	824.2	29.7	26.5	23.9	21.8	8	8PSK-MCS5
190	836.6	29.7	26.5	23.7	21.8	8	8PSK-MCS5
251	848.8	29.7	26.3	23.5	21.5	8	8PSK-MCS5

- GSM 1900: For voice mode PCL 0 was set in the CMU-200 to allow DUT's max power transmission.

Conducted Average Power Measurement 2G: GSM 1900					
Channel Number	Frecuency (MHz)	Frame Average Output Power (dBm)	Average Burst Output Power (dBm)	PCL	Modulation
512	1850.2	20.7	29.7	0	GMSK-CS1
661	1880	20.9	29.9	0	GMSK-CS1
810	1909.8	20.9	29.9	0	GMSK-CS1

- GPRS1900: For data mode. PCL 0, CS1 coding scheme and Gamma 3 were set in the CMU-200 to allow max power transmission for each slot.

GPRS 1900 - Frame Average Output Power							
Channel Number	Frecuency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slot	Power (dBm) 3 Slot	Power (dBm) 4 Slot	PCL	Modulation
512	1850.2	20.6	20.6	20.4	19.6	0	GMSK-CS1
661	1880	20.8	20.8	20.5	19.8	0	GMSK-CS1
810	1909.8	20.9	21.0	20.6	19.9	0	GMSK-CS1

GPRS 1900 - Average Burst Output Power							
Channel Number	Frecuency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slot	Power (dBm) 3 Slot	Power (dBm) 4 Slot	PCL	Modulation
512	1850.2	29.6	26.6	24.7	22.6	0	GMSK-CS1
661	1880	29.8	26.8	24.8	22.8	0	GMSK-CS1
810	1909.8	29.9	27.0	24.9	22.9	0	GMSK-CS1

- EGPRS 1900: For data mode, PCL 2, MCS5 coding scheme and Gamma 5 were set in the CMU-200 to allow max power transmission for each slot.

EDGE 1900 - Frame Average Output Power							
Channel Number	Frecuency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slot	Power (dBm) 3 Slot	Power (dBm) 4 Slot	PCL	Modulation
512	1850.2	16.0	17.2	17.0	16.1	2	8PSK-MCS5
661	1880	16.2	17.7	17.1	16.2	2	8PSK-MCS5
810	1909.8	16.3	18.1	17.4	16.7	2	8PSK-MCS5

EDGE 1900 - Average Burst Output Power							
Channel Number	Frecuency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slot	Power (dBm) 3 Slot	Power (dBm) 4 Slot	PCL	Modulation
512	1850.2	25.0	23.2	21.3	19.1	2	8PSK-MCS5
661	1880	25.2	23.7	21.4	19.2	2	8PSK-MCS5
810	1909.8	25.3	24.2	21.7	19.7	2	8PSK-MCS5

2.2. WCDMA/HSDPA/HSPA/HSPA+/DC-HSDPA Bands

- **WCDMA:** The DUT supports power Class 3, with a nominal maximum output power of 24 dBm (+1.7/-3.7). The tests were completed according to 3GPP TS31.121-1 test requirements.

Mode	Subtest	Rel99
WCDMA	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2Kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

Band	Mode	CH	Freq	Average Output Power (dBm)
FDD II 1900	WCDMA	9262	1852.4	23.29
FDD II 1900	WCDMA	9400	1880	23.54
FDD II 1900	WCDMA	9538	1907.6	23.52

Band	Mode	CH	Freq	Average Output Power (dBm)
FDD V 850	WCDMA	4132	826.4	23.84
FDD V 850	WCDMA	4182	836.4	23.79
FDD V 850	WCDMA	4233	846.6	23.65

- **HSDPA:**

Mode	Subtest	1	2	3	4
HSDPA	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2Kbps RMC			
	HSDPA FRC	H-Set1			
	HSUPA Test	HSUPA Loopback			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64	64	64	64
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR	0	0	0.5	0.5
	Dack	8			
	Dnak	8			
	Ack-Nack repetition factor	3			
	DCQI	8			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs =βhs/βc	30/15			

				Average Output Power (dBm)			
Band	Mode	CH	Freq	Subtest 1 HSDPA	Subtest 2 HSDPA	Subtest3 HSDPA	Subtest 4 HSDPA
FDD II 1900	HSDPA	9262	1852.4	22.21	22.08	21.58	21.57
FDD II 1900	HSDPA	9400	1880	22.49	22.57	22.1	22.1
FDD II 1900	HSDPA	9538	1907.6	22.49	22.58	22.06	22.05

				Average Output Power (dBm)			
Band	Mode	CH	Freq	Subtest 1 HSDPA	Subtest 2 HSDPA	Subtest3 HSDPA	Subtest 4 HSDPA
FDD V 850	HSDPA	4132	826.4	22.9	22.95	22.52	22.52
FDD V 850	HSDPA	4182	836.4	22.79	22.82	22.39	22.4
FDD V 850	HSDPA	4233	846.6	22.65	22.65	22.2	22.25

- HSPA:

Mode	Subtest	1	2	3	4	5
HSPA	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2Kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm 2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	15/15
	βec	209/225	12/15	30/15	2/15	24/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	βhs	22/15	12/15	30/15	4/15	30/15
	βed	1309/225	94/75	47/15	56/75	134/15
	MPR (dB)	0	2	1	2	0
	Dack	8				
	Dnak	8				
	Ack-Nack repetition factor	3				
	DCQI	8				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	Ahs =βhs/βc	30/15				
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81

				Average Output Power (dBm)				
Band	Mode	CH	Freq	Subtest 1 HSUPA	Subtest 2 HSUPA	Subtest3 HSUPA	Subtest 4 HSUPA	Subtest 5 HSUPA
FDD II 1900	HSPA	9262	1852.4	21.71	22.14	22.29	21.32	21.84
FDD II 1900	HSPA	9400	1880	22.09	22.61	22.67	21.75	22.26
FDD II 1900	HSPA	9538	1907.6	22.06	22.68	22.68	21.76	22.26

				Average Output Power (dBm)				
Band	Mode	CH	Freq	Subtest 1 HSUPA	Subtest 2 HSUPA	Subtest3 HSUPA	Subtest 4 HSUPA	Subtest 5 HSUPA
FDD V 850	HSPA	4132	826.4	22.55	22.99	23.06	22.23	22.7
FDD V 850	HSPA	4182	836.4	22.39	22.84	22.84	22.03	22.52
FDD V 850	HSPA	4233	846.6	22.28	22.8	22.78	21.94	22.44

- HSPA+

Mode	**Subtest**	**1**
HSPA+	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2Kbps RMC
	HSDPA FRC	H-Set1
	HSUPA Test	HSUPA Loopback
	Power Control Algorithm	Algorithm 2
	βc	1
	βd	0
	βec	30/15
	βhs	30/15
	βed (2xSF2)	βed1: 30/15
		βed2: 30/15
	βed (2xSF4)	βed3: 24/15
		βed4: 24/15
	CM (dB)	3.5
	MPR (dB)	2.5
	D E-DPCCH	7
	AG Index	14
	ETFCI	105

Band	Mode	CH	Freq	Average Output Power (dBm)
FDD II 1900	HSPA+	9262	1852.4	22.17
FDD II 1900	HSPA+	9400	1880	22.6
FDD II 1900	HSPA+	9538	1907.6	22.75

Band	Mode	CH	Freq	Average Output Power (dBm)
FDD V 850	HSPA+	4132	826.4	22.89
FDD V 850	HSPA+	4182	836.4	22.87
FDD V 850	HSPA+	4233	846.6	22.66

DC-HSDPA

	Mode	**HSDPA**	**HSDPA**	**HSDPA**	**HSDPA**
	Subtest	**1**	**2**	**3**	**4**
W-CDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2 Kbps RMC			
	HSDPA FRC	H-Set 12			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	CM (dB)	0	1	1.5	1.5
	MPR	0.0	0.0	0.5	0.5
HSDPA Specific Settings	Dack	8			
	Dnak	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs =βhs/βc	30/15			

				Average Output Power (dBm)			
Band	Mode	CH	Freq	Subtest 1 DC-HSDPA	Subtest 2 DC-HSDPA	Subtest 3 DC-HSDPA	Subtest 4 DC-HSDPA
FDD II 1900	DC-HSDPA	9262	1852.4	22.07	22.08	21.61	21.63
FDD II 1900	DC-HSDPA	9400	1880	22.52	22.54	22.07	22.08
FDD II 1900	DC-HSDPA	9538	1907.6	22.5	22.65	22.08	22.08

				Average Output Power (dBm)			
Band	Mode	CH	Freq	Subtest 1 DC-HSDPA	Subtest 2 DC-HSDPA	Subtest 3 DC-HSDPA	Subtest 4 DC-HSDPA
FDD V 850	DC-HSDPA	4132	826.4	22.92	22.95	22.55	22.50
FDD V 850	DC-HSDPA	4182	836.4	22.85	22.83	22.36	22.35
FDD V 850	DC-HSDPA	4233	846.6	22.72	22.73	22.28	22.27

2.3. Wi-Fi & Bluetooth 2.4 GHz

Band	Mode	Channel / Freq (MHz)	Averaged Power (dBm)
2.4 GHz	802.11b	1/2412	15.3
		2/2417	15.65
		3/2422	15.2
		4/2427	15.14
		5/2432	15.56
		6/2437	15.2
		7/2442	15.24
		8/2447	15.31
		9/2452	15.46
		10/2457	15.46
		11/2462	15.3
	802.11g	1/2412	15.8
		2/2417	15.94
		3/2422	15.85
		4/2427	15.85
		5/2432	15.97
		6/2437	15.8
		7/2442	15.59
		8/2447	15.68
		9/2452	15.83
		10/2457	15.81
		11/2462	15.7
	802.11n20	1/2412	15.0
		2/2417	14.94
		3/2422	14.85
		4/2427	14.73
		5/2432	14.8
		6/2437	14.9
		7/2442	14.77
		8/2447	14.84
		9/2452	14.96
		10/2457	14.93
		11/2462	14.9

		Average Conducted Power (dBm)		
Band	**Mode**	**CH Low**	**CH Mid**	**CH High**
2450	Bluetooth GFSK	7.265	7.715	5.965
	Bluetooth π/4 DQPSK	8.095	8.695	6.085
	Bluetooth 8 DPSK	8.385	8.815	7.095

Based on the paragraph "4.3.1. Standalone SAR test exclusion considerations" of the KDB 447498 D01 - General RF Exposure Guidance v05r02:

[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [√f(GHz)]

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

Communication System	Time Average Max Conducted Power		Min. Test separation distance (mm)	Frequency (Ghz)	Result
	(dBm)	(mW)			
Bluetooth 8 DPSK	8.815	7.612	5	2441	2.38

The computed value is < 3.0, Bluetooth qualifies for Standalone SAR test exclusion for 1-g SAR.

2.4. Wi-Fi 5 GHz

5.2 GHz Band:

Band	Mode	Channel / Freq (MHz)	Averaged Power (dBm)
5.2 GHz	802.11a	36/5180	14.30
		40/5200	14.28
		44/5200	14.32
		48/5240	14.36
	802.11n20	36/5180	14.24
		40/5200	14.29
		44/5200	14.31
		48/5240	14.41
	802.11ac20	36/5180	13.07
		40/5200	13.07
		44/5200	13.26
		48/5240	13.68
	802.11n40	38/5190	13.60
		46/5230	13.42

- 5.3 GHz Band:

Band	Mode	Channel / Freq (MHz)	Averaged Power (dBm)
5.3 GHz	802.11a	52/5260	14.52
		56/5280	14.51
		60/5300	14.14
		64/5320	14.19
	802.11n20	52/5260	14.53
		56/5280	14.52
		60/5300	14.19
		64/5320	14.18
	802.11ac20	52/5260	13.43
		56/5280	13.28
		60/5300	13.12
		64/5320	12.97
	802.11n40	54/5270	13.80
		62/5310	13.40

- 5.6 GHz Band:

Band	Mode	Channel / Freq (MHz)	Averaged Power (dBm)
5.6 GHz	802.11a	100/5500	14.67
		104/5520	14.53
		108/5540	14.75
		116/5580	14.72
		132/5660	14.74
		136/5680	14.59
		140/5700	14.50
	802.11n20	100/5500	13.69
		104/5520	13.97
		108/5540	14.22
		116/5580	14.12
		132/5660	14.03
		136/5680	13.81
		140/5700	13.86
	802.11ac20	100/5500	13.62
		104/5520	13.89
		108/5540	14.17
		116/5580	13.95
		132/5660	13.88
		136/5680	13.77
		140/5700	13.78
	802.11n40	102/5510	13.74
		110/5550	14.19
		134/ 5670	14.01

3. TISSUE PARAMETERS MEASUREMENTS

Frequency (MHz)	Target Head Tissue: Parameters used in Probe Calibration		Target Head Tissue: Parameters used in Dipole Calibration		Measured Head Tissue		Measured Date
	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
900	41.5 ± 5%	0.97 ± 5%	41.6 ± 6%	0.94 ± 6%	43.01	0.97	03-02-2015
900	41.5 ± 5%	0.97 ± 5%	41.6 ± 6%	0.94 ± 6%	42.15	0.98	05-02-2015
1800	40.0 ± 5%	1.40 ± 5%	38.7 ± 6%	1.37 ± 6%	39.71	1.40	11-02-2015

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]	
900	55.0 ± 5%	1.05 ± 5%	54.8 ± 6%	1.03 ± 6%	53.64	1.02	09-02-2015
1800	53.3 ± 5%	1.52 ± 5%	51.4 ± 6%	1.53 ± 6%	51.65	1.53	12-02-2015

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

- Composition / Information on ingredients

Head and Muscle Tissue Simulation Liquids HSL900/MSL900

H2O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40 – 60%
NaCl	Sodium Chloride, 0 – 6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyyl-3(2H)-isothiazolone, 0.1 – 0.7%

Head and Muscle Tissue Simulation Liquids HSL1800/MSL1800

H2O	Water, 52 – 75%
C8H18O3	Diethylene glycol monobutyl ether (DGBE), 25 – 48% (CAS-No. 112-34-5, EC-No. 203-961-6, EC-index-No. 603-096-00-8)
NaCl	Sodium Chloride, <1.0%

4. SYSTEM CHECK MEASUREMENTS

4.1. Validation results in 900 MHz Band for Head TSL

DATE	SAR	Target SAR	Measured SAR	Drift (%)	± 10% Limit	SAR 1g	Fast SAR 1g	±3%
03/02/2015	1 gr.	10.70	10.82	1.14	√	2.74	2.77	√
	10 gr.	6.85	6.95	1.48	√	1.76	-	-

DATE	SAR	Target SAR	Measured SAR	Drift (%)	± 10% Limit	SAR 1g	Fast SAR 1g	±3%
05/02/2015	1 gr.	10.70	10.74	0.36	√	2.66	2.70	√
	10 gr.	6.85	6.85	1.37	√	1.72	-	-

4.2. Validation results in 900 MHz Band for Body TSL

DATE	SAR	Target SAR	Measured SAR	Drift (%)	± 10% Limit	SAR 1g	Fast SAR 1g	±3%
09/02/2015	1 gr.	10.70	11.20	4.68	√	2.81	2.83	√
	10 gr.	6.95	7.29	4.96	√	1.83	-	-

4.3. Validation results in 1800 MHz Band for Head TSL

DATE	SAR	Target SAR	Measured SAR	Drift (%)	± 10% Limit	SAR 1g	Fast SAR 1g	±3%
11/02/2015	1 gr.	38.90	37.59	-3.38	√	9.44	9.64	√
	10 gr.	20.40	19.47	-4.56	√	4.89	-	-

4.4. Validation results in 1800 MHz Band for Body TSL

DATE	SAR	Target SAR	Measured SAR	Drift (%)	± 10% Limit	SAR 1g	Fast SAR 1g	±3%
12/02/2015	1 gr.	39.50	40.92	3.59	√	10.30	10.40	√
	10 gr.	21.00	21.09	0.45	√	5.31	-	-

5. MEASUREMENT RESULTS FOR SAR (SPECIFIC ABSORPTION RATE)

5.1. Summary maximum results for head measurements.

Band	Mode	Side / Position	Channel (Frequency)	Reported SAR (1g avg) (W/Kg)	SAR limit (1g avg) (W/Kg)
850 MHz	GSM	Right / Cheek	CH 251 (848.8 MHz)	0.140	1.6
	GPRS 2 slots	Right / Cheek	CH 190 (836.6 MHz)	0.181	1.6
	WCDMA Band V	Right / Cheek	CH 4183 (836.6 MHz)	0.203	1.6
1900 MHz	GSM	Right / Cheek	CH 661 (1880 MHz)	0.179	1.6
	GPRS 2 slots	Right / Cheek	CH 661 (1880 MHz)	0.176	1.6
	WCDMA Band II	Right / Cheek	CH 9400 (1880 MHz)	0.379	1.6

5.2. Summary maximum results for body measurements

Band	Mode	Side / Position	Channel (Frequency)	Reported SAR (1g avg) (W/Kg)	SAR limit (1g avg) (W/Kg)
850 MHz	GSM	Back face 10 mm	CH 251 (848.8 MHz)	0.259	1.6
	GPRS 2 slots	Back face 10mm	CH 190 (836.6 MHz)	0.282	1.6
	WCDMA Band V	Back face 10 mm	CH 4183 (836.6 MHz)	0.339	1.6
1900 MHz	GSM	Front face 10mm	CH 661 (1880 MHz)	0.400	1.6
	GPRS 2 slots	Front face 10 mm	CH 661 (1880 MHz)	0.374	1.6
	WCDMA Band II	Back face 10 mm	CH 9400 (1880 Mhz)	0.800	1.6

5.3. Result for head simultaneous multi-band transmission

WWAN + Wi-Fi 2.4 GHz

Transmission Mode	Band	Max SAR (1g avg) (W/Kg)	Σ SARi (W/kg)	SAR limit (W/Kg)	Veredict
GSM / GPRS /EDGE	850MHz	0.181	0.578	1.6	Pass
802.11g	2.4 GHz	0.397			
GSM / GPRS /EDGE	1900MHz	0.179	0.576	1.6	Pass
802.11g	2.4 GHz	0.397			
WCDMA	FDD V	0.203	0.600	1.6	Pass
802.11g	2.4 GHz	0.397			
WCDMA	FDD II	0.365	0.762	1.6	Pass
802.11g	2.4 GHz	0.397			

WWAN + Wi-Fi 5 GHz

Transmission Mode	Band	Max SAR (1g avg) (W/Kg)	Σ SARi (W/kg)	SAR limit (W/Kg)	Veredict
GSM / GPRS /EDGE	850MHz	0.181	0.619	1.6	Pass
802.11n40	5.2/5.3GHz	0.438			
GSM / GPRS /EDGE	1900MHz	0.179	0.617	1.6	Pass
802.11n40	5.2/5.3GHz	0.438			
WCDMA	FDD V	0.203	0.641	1.6	Pass
802.11n40	5.2/5.3GHz	0.438			
WCDMA	FDD II	0.365	0.803	1.6	Pass
802.11n40	5.2/5.3GHz	0.438			

5.4. Result for body simultaneous multi-band transmission

WWAN + Wi-Fi 2.4 GHz

Transmission Mode	Band	Max SAR (1g avg) (W/Kg)	Σ SARi (W/kg)	SAR limit (W/Kg)	Veredict
GSM / GPRS /EDGE	850MHz	0.282	0.469	1.6	Pass
802.11b	2.4 GHz	0.187			
GSM / GPRS /EDGE	1900MHz	0.400	0.587	1.6	Pass
802.11b	2.4 GHz	0.187			
WCDMA	FDD V	0.339	0.526	1.6	Pass
802.11b	2.4 GHz	0.187			
WCDMA	FDD II	0.800	0.987	1.6	Pass
802.11b	2.4 GHz	0.187			

WWAN + Wi-Fi 5 GHz

Transmission Mode	Band	Max SAR (1g avg) (W/Kg)	Σ SARi (W/kg)	SAR limit (W/Kg)	Veredict
GSM / GPRS /EDGE	850MHz	0.282	0.478	1.6	Pass
802.11n40	5.6 GHz	0.196			
GSM / GPRS /EDGE	1900MHz	0.400	0.596	1.6	Pass
802.11n40	5.6 GHz	0.196			
WCDMA	FDD V	0.339	0.535	1.6	Pass
802.11n40	5.6 GHz	0.196			
WCDMA	FDD II	0.800	0.996	1.6	Pass
802.11n40	5.6 GHz	0.196			

5.5. Results for GSM 850 MHz band.

- **Head measurements**

Side / Position	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	±0.1 (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Left / Cheek	0	CH 251 (848.8 Mhz)	0.128	NM[2]	-	1.16	33.5	0.128	
Left / 15º Tilted	0	CH 251 (848.8 Mhz)	0.071	NM[2]	-	3.16	33.5	0.071	
Right / Cheek	0	CH 251 (848.8 Mhz)	0.138	0.140	√	3.75	33.5	0.140	1
Right / 15º Tilted	0	CH 251 (848.8 Mhz)	0.076	NM[2]	-	3.75	33.5	0.076	
Right / Cheek	0	CH 128 (824.2 Mhz)	NM[1]				33.5	-	
Right / Cheek	0	CH 190 (836.6 Mhz)	NM[1]				33.5	-	

1 and 2: See remarks and comments.

- **Body measurements**

Side / Position	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	±0.1 (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Front face	10	CH 251 (848.8 Mhz)	0.206	NM[2]	-	0.35	33.5	0.206	
Back face	10	CH 251 (848.8 Mhz)	0.268	0.259	√	-0.12	33.5	0.259	2
Left edge	10	CH 251 (848.8 Mhz)	0.165	NM[2]	-	0.46	33.5	0.165	
Right edge	10	CH 251 (848.8 Mhz)	0.200	NM[2]	-	0.58	33.5	0.200	
Bottom edge	10	CH 251 (848.8 Mhz)	0.148	NM[2]	-	1.16	33.5	0.148	
Back face	10	CH 128 (824.2 Mhz)	NM[1]				33.5	-	
Back face	10	CH 190 (836.6 Mhz)	NM[1]				33.5	-	

1 and 2: See remarks and comments.

5.6. Results for GPRS 850 MHz band – 2 slots.

- **Head measurements**

Side / Position	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	±0.1 (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Left / Cheek	0	CH 190 (836.6 Mhz)	0.130	NM[2]	-	3.99	31.5	0.149	
Left / 15º Tilted	0	CH 190 (836.6 Mhz)	0.080	NM[2]	-	1.39	31.5	0.092	
Right / Cheek	0	CH 190 (836.6 Mhz)	0.159	0.158	√	0.35	31.5	0.181	3
Right / 15º Tilted	0	CH 190 (836.6 Mhz)	0.089	NM[2]	-	2.21	31.5	0.102	
Right / Cheek	0	CH 128 (824.2 Mhz)	NM[1]				31.5	-	
Right / Cheek	0	CH 251 (848.8 Mhz)	NM[1]				31.5	-	

1 and 2: See remarks and comments.

- **Body measurements**

Side / Position	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	±0.1 (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Front face	10	CH 190 (836.6 Mhz)	0.197	NM[2]	-	-2.95	31.5	0.226	
Back face	10	CH 190 (836.6 Mhz)	0.262	0.246	√	-2.28	31.5	0.282	4
Left edge	10	CH 190 (836.6 Mhz)	0.172	NM[2]	-	0.35	31.5	0.197	
Right edge	10	CH 190 (836.6 Mhz)	0.214	NM[2]	-	-0.46	31.5	0.246	
Bottom edge	10	CH 190 (836.6 Mhz)	0.123	NM[2]	-	0.69	31.5	0.141	
Back face	10	CH 128 (824.2 Mhz)	NM[1]				31.5	-	
Back face	10	CH 251 (848.8 Mhz)	NM[1]				31.5	-	

1 and 2: See remarks and comments.

5.7. Results for GSM 1900 MHz Band

- **Head measurements**

Side / Position	Mode	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	±0.1 (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Right / Cheek	GSM	0	CH 661 (1880 Mhz)	0.121	0.124	√	0.23	31.5	0.179	5
Right / Cheek	GPRS 2 slots	0	CH 661 (1880 Mhz)	0.117	0.119	√	3.16	28.5	0.176	6

Side / Position	Mode	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Right / Cheek	GSM	0	CH 661 (1880 Mhz)	0.185	0.186	-0.23	31.5	0.269	43480RRF.001A1
Right / Cheek	GPRS 2 slots	0	CH 661 (1880 Mhz)	0.181	0.179	-1.83	28.5	0.265	

- **Body measurements**

Side / Position	Mode	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	±0.1 (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Front face	GSM	10	CH 661 (1880 Mhz)	0.277	0.277	√	-0.57	31.5	0.400	7
Front face	GPRS 2 slots	10	CH 661 (1880 Mhz)	0.253	0.253	√	-0.46	28.5	0.374	8

Side / Position	Mode	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Front Face	GSM	10	CH 661 (1880 Mhz)	0.405	0.405	-0.69	31.5	0.585	43480RRF.001A1
Front Face	GPRS 2 slots	10	CH 661 (1880 Mhz)	0.39	0.386	0.35	28.5	0.571	

5.8. Results for WCDMA Band II

- **Head measurements**

Side / Position	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	±0.1 (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Right / Cheek	0	CH 9400 (1880 Mhz)	0.322	0.328	√	0.93	24	0.365	9

Side / Position	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Right / Cheek	0	CH 9400 (1880 Mhz)	0.337	0.342	-0.57	24	0.380	43480RRF.001A1

- **Body measurements**

Side / Position	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	±0.1 (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot No.
Back face	10	CH 9400 (1880 Mhz)	0.720	0.720	√	-0.46	24	0.800	10

Side / Position	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Back Face	10	CH 9400 (1880 Mhz)	0.855	0.867	0.46	24	0.964	43480RRF.001A1

5.9. Results for WCDMA Band V

- **Head measurements**

Side / Position	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	±0.1 (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot
Left / Cheek	0	CH 4183 (836.6 Mhz)	0.171	NM[2]	-	2.21	24	0.179	
Left / 15º Tilted	0	CH 4183 (836.6 Mhz)	0.111	NM[2]	-	0.58	24	0.116	
Right / Cheek	0	CH 4183 (836.6 Mhz)	0.187	0.193	√	-0.34	24	0.203	11
Right / 15º Tilted	0	CH 4183 (836.6 Mhz)	0.104	NM[2]	-	2.09	24	0.109	
Right / Cheek	0	CH 4132 (826.4 Mhz)	NM[1]				24	-	
Right / Cheek	0	CH 4233 (846.6 Mhz)	NM[1]				24	-	

1 and 2: See remarks and comments

- **Body measurements**

Side / Position	Dist (mm)	Channel (Frequency)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	±0.1 (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Plot
Front face	10	CH 4183 (836.6 Mhz)	0.273	NM[2]	-	0	24	0.287	
Back face	10	CH 4183 (836.6 Mhz)	0.336	0.323	√	0.12	24	0.339	12
Left edge	10	CH 4183 (836.6 Mhz)	0.193	NM[2]	-	0.46	24	0.203	
Right edge	10	CH 4183 (836.6 Mhz)	0.243	NM[2]	-	0.35	24	0.255	
Bottom edge	10	CH 4183 (836.6 Mhz)	0.165	NM[2]	-	2.21	24	0.173	
Back face	10	CH 4132 (826.4 Mhz)	NM[1]				24	-	
Back face	10	CH 4233 (846.6 Mhz)	NM[1]				24	-	

1 and 2: See remarks and comments

5.10. Results for Wifi 2.4 GHz Band[8]

- **Head measurements**

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Left / Cheek	0	802.11b	CH 6 (2437 Mhz)	0.333	0.337	-0.12	15	0.337	43480RRF.001A1
Left / 15º Tilted	0	802.11b	CH 6 (2437 Mhz)	0.274	NM[2]	0.69	15	0.274	
Right / Cheek	0	802.11b	CH 6 (2437 Mhz)	0.195	NM[2]	4.47	15	0.195	
Right / 15º Tilted	0	802.11b	CH 6 (2437 Mhz)	0.221	NM[2]	0.93	15	0.221	
Left / Cheek	0	802.11b	CH 1 (2412 Mhz)	NM[1]			15	-	
Left / Cheek	0	802.11b	CH 11 (2462 Mhz)	NM[1]			15	-	
Left / Cheek	0	802.11g	CH 6 (2437 Mhz)	0.384	0.379	-2.21	16	0.397	
Left / Cheek	0	802.11n20	CH 6 (2437 Mhz)	0.300	0.296	0.69	15	0.303	

1 and 2: See remarks and comments

- **Body measurements**

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	Extrapolated 1-g SAR (W/Kg)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Front face	10	802.11b	CH 6 (2437 Mhz)	0.097	NM[2]	0	15	0.097	43480RRF.001A1
Back face	10	802.11b	CH 6 (2437 Mhz)	0.19	0.187	-1.49	15	0.187	
Right edge	10	802.11b	CH 6 (2437 Mhz)	0.06	NM[2]	-0.69	15	0.060	
Top edge	10	802.11b	CH 6 (2437 Mhz)	0.053	NM[2]	-3.39	15	0.053	
Back face	10	802.11b	CH 1 (2412 Mhz)	NM[1]			15	-	
Back face	10	802.11b	CH 11 (2462 Mhz)	NM[1]			15	-	
Back face	10	802.11g	CH 6 (2437 Mhz)	0.171	0.166	2.21	16	0.174	
Back face	10	802.11n20	CH 6 (2437 Mhz)	0.137	0.132	0.69	15	0.135	

1 and 2: See remarks and comments

5.11. Results for Wi-Fi 5200 MHz Band[8]

- **Head measurements**

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Left / Cheek	0	802.11a	48 (5240 Mhz)	0.310	2.09	15	0.359	43480RRF.001A1
Left / 15º Tilted	0	802.11a	48 (5240 Mhz)	0.284	4.59	15	0.329	
Right / Cheek	0	802.11a	48 (5240 Mhz)	0.204	-1.03	15	0.236	
Right / 15º Tilted	0	802.11a	48 (5240 Mhz)	0.218	-0.80	15	0.253	
Left / Cheek	0	802.11a	36 (5180 Mhz)	NM[1]		15	-	
Left / Cheek	0	802.11a	40 (5200 Mhz)	NM[1]		15	-	
Left / Cheek	0	802.11n20	48 (5240 Mhz)	0.283	2.33	15	0.324	
Left / Cheek	0	802.11ac20	48 (5240 Mhz)	0.220	1.62	14	0.237	
Left / Cheek	0	802.11n40	38 (5190 Mhz)	0.252	-2.95	16	0.438	

1: See remarks and comments

- **Body measurements**

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Front face	10	802.11a	48 (5240 Mhz)	0.082	1.27	15	0.095	43480RRF.001A1
Back face	10	802.11a	48 (5240 Mhz)	0.086	-0.92	15	0.100	
Right edge	10	802.11a	48 (5240 Mhz)	0.095	-0.69	15	0.110	
Top edge	10	802.11a	48 (5240 Mhz)	0.07	2.09	15	0.081	
Right edge	10	802.11a	36 (5180 Mhz)	NM[1]		15	-	
Right edge	10	802.11a	40 (5200 Mhz)	NM[1]		15	-	
Right edge	10	802.11n20	48 (5240 Mhz)	0.093	-1.71	15	0.107	
Right edge	10	802.11ac20	48 (5240 Mhz)	0.068	0	14	0.073	
Right edge	10	802.11n40	38 (5190 Mhz)	0.075	1.04	16	0.130	

1: See remarks and comments

5.12. Results for Wi-Fi 5300 MHz Band[8].

- **Head measurements**

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Left / Cheek	0	802.11a	52 (5260 Mhz)	0.286	1.16	15	0.319	43480RRF.001A1
Left / 15º Tilted	0	802.11a	52 (5260 Mhz)	0.325	1.04	15	0.363	
Right / Cheek	0	802.11a	52 (5260 Mhz)	0.225	1.74	15	0.251	
Right / 15º Tilted	0	802.11a	52 (5260 Mhz)	0.228	3.16	15	0.255	
Left / Cheek	0	802.11a	60 (5300 Mhz)	NM[1]		15	-	
Left / Cheek	0	802.11a	64 (5320 Mhz)	NM[1]		15	-	
Left / Cheek	0	802.11n20	52 (5260 Mhz)	0.299	-3.17	15	0.333	
Left / Cheek	0	802.11ac20	52 (5260 Mhz)	0.218	1.16	14	0.249	
Left / Cheek	0	802.11n40	54 (5270 Mhz)	0.264	2.33	16	0.438	

1: See remarks and comments

- **Body measurements**

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Front face	10	802.11a	52 (5260 Mhz)	0.072	3.40	15	0.08	43480RRF.001A1
Back face	10	802.11a	52 (5260 Mhz)	0.103	4.23	15	0.115	
Right edge	10	802.11a	52 (5260 Mhz)	0.095	3.87	15	0.106	
Top edge	10	802.11a	52 (5260 Mhz)	0.078	0.12	15	0.087	
Back face	10	802.11a	60 (5300 Mhz)	NM[1]		15	-	
Back face	10	802.11a	64 (5320 Mhz)	NM[1]		15	-	
Back face	10	802.11n20	52 (5260 Mhz)	0.084	1.74	15	0.094	
Back face	10	802.11ac20	52 (5260 Mhz)	0.049	2.80	14	0.056	
Back face	10	802.11n40	54 (5270 Mhz)	0.066	1.04	16	0.11	

1: See remarks and comments

5.13. Results for Wi-Fi 5600 MHz Band[8].

- **Head measurements**

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Left / Cheek	0	802.11a	108 (5260 Mhz)	0.24	1.51	15	0.254	43480RRF.001A1
Left / 15º Tilted	0	802.11a	108 (5260 Mhz)	0.236	-0.34	15	0.25	
Right / Cheek	0	802.11a	108 (5260 Mhz)	0.181	1.98	15	0.192	
Right / 15º Tilted	0	802.11a	108 (5260 Mhz)	0.167	2.68	15	0.177	
Left / Cheek	0	802.11a	104 (5520 Mhz)	NM[1]		15	-	
Left / Cheek	0	802.11a	136 (5680 Mhz)	NM[1]		15	-	
Left / Cheek	0	802.11n20	108 (5540 Mhz)	0.265	2.21	14	0.265	
Left / Cheek	0	802.11ac20	108 (5540 Mhz)	0.263	3.75	14	0.263	
Left / Cheek	0	802.11n40	110 (5550 Mhz)	0.281	3.16	16	0.426	

1: See remarks and comments

- **Body measurements**

Side / Position	Dist (mm)	Mode	Ch #. (Freq)	1-g SAR (W/Kg)	Power Drift (%)	Max Output Power (dBm)	Max. Reported 1-g SAR	Test Report No.
Front face	10	802.11a	108 (5260 Mhz)	0.046	0.58	15	0.049	43480RRF.001A1
Back face	10	802.11a	108 (5260 Mhz)	0.065	0.35	15	0.069	
Right edge	10	802.11a	108 (5260 Mhz)	0.064	3.40	15	0.068	
Top edge	10	802.11a	108 (5260 Mhz)	0.077	1.16	15	0.082	
Top edge	10	802.11a	104 (5520 Mhz)	NM[1]		15	-	
Top edge	10	802.11a	136 (5680 Mhz)	NM[1]		15	-	
Top edge	10	802.11n20	108 (5540 Mhz)	0.063	4.23	14	0.063	
Top edge	10	802.11ac20	108 (5540 Mhz)	0.074	0.93	14	0.074	
Top edge	10	802.11n40	110 (5550 Mhz)	0.129	-0.23	16	0.196	

1: See remarks and comments

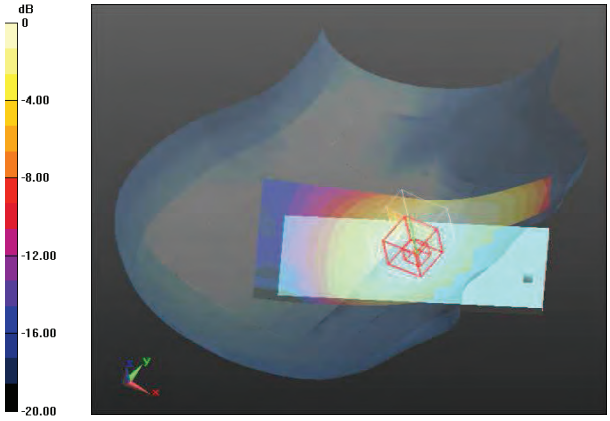
Appendix C – Measurement report

GSM 850 MHz – Right hand side – Cheek position – Highest Channel – Plot Nº 1

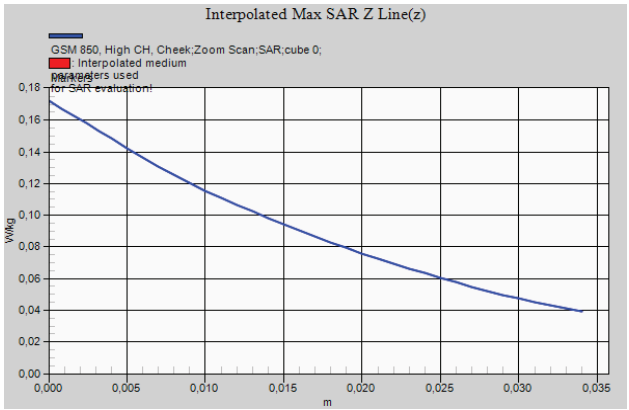
Test Laboratory: AT4 Wireless; Date: 05/02/2015
DUT: YotaPhone2 MOD; Type: Handset; Serial: IMEI:356431060204320
Communication System: UID 10021 - DAB, GSM-FDD (TDMA, GMSK); Frequency: 848.6 MHz; Duty Cycle: 1:8.6896
Medium parameters used (interpolated): f = 848.6 MHz; σ = 0.947 S/m; ε_r = 42.548; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(6.5, 6.5, 6.5); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: SAM head-body simulator ; Type: Twin SAM V4.0; Serial: ---
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right Hand Side - 850 MHz/GSM 850, High CH, Cheek/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.158 W/kg

Right Hand Side - 850 MHz/GSM 850, High CH, Cheek/Zoom Scan (7x8x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.239 V/m; Power Drift = 0.32 dB
Peak SAR (extrapolated) = 0.172 W/kg
SAR(1 g) = 0.140 W/kg; SAR(10 g) = 0.109 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.148 W/kg



0 dB = 0.148 W/kg = -8.30 dBW/kg

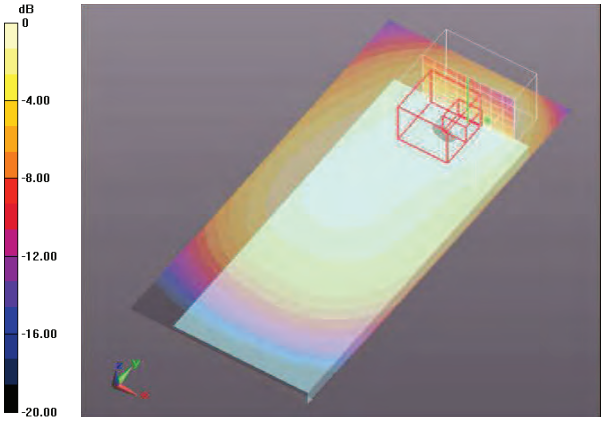


GSM 850 MHz – Body – Back Face 10 mm – Middle Channel – Plot Nº 2

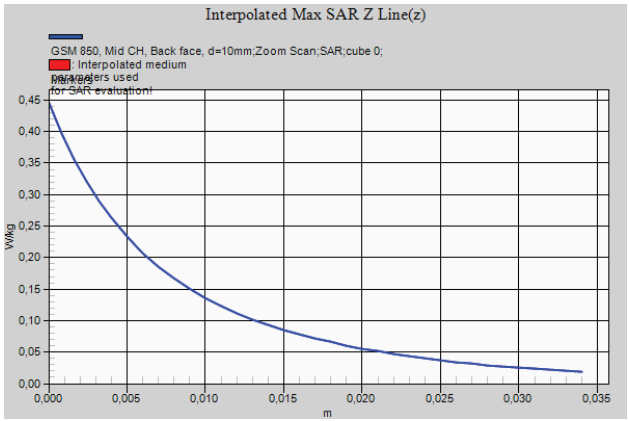
Test Laboratory: AT4 Wireless; Date: 09/02/2015
DUT: YotaPhone2; Type: Handset; Serial: IMEI:356431060204380
Communication System: UID 10021 - DAB, GSM-FDD (TDMA, GMSK); Frequency: 848.6 MHz; Duty Cycle: 1:8.6896
Medium parameters used (interpolated): f = 848.6 MHz; σ = 0.987 S/m; ε_r = 54.023; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(6.26, 6.26, 6.26); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (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)

Flat Phantom Side - 850 MHz/GSM 850, Mid CH, Back face, d=10mm/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.318 W/kg

Flat Phantom Side - 850 MHz/GSM 850, Mid CH, Back face, d=10mm/Zoom Scan (9x9x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.49 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.445 W/kg
SAR(1 g) = 0.259 W/kg; SAR(10 g) = 0.182 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.276 W/kg



0 dB = 0.276 W/kg = -5.59 dBW/kg

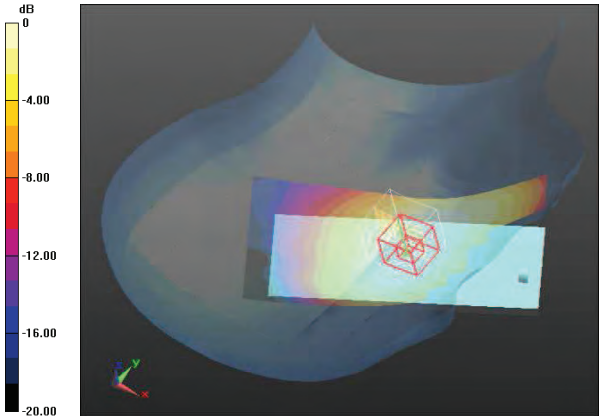


GPRS 850 MHz 2 slots – Right and side – Cheek position – Middle Channel – Plot Nº 3

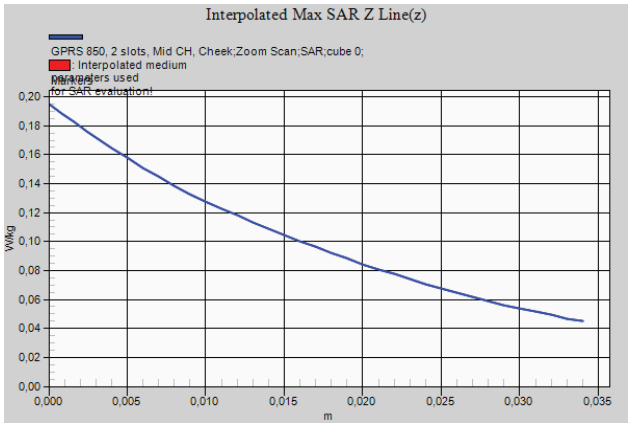
Test Laboratory: AT4 Wireless; Date: 05/02/2015
DUT: YotaPhone2 MOD; Type: Handset; Serial: IMEI:356431060204320
Communication System: UID 10024 - DAB, GPRS-FDD (TDMA, GMSK, TN 0-1); Frequency: 836.6 MHz; Duty Cycle: 1:4.52898
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.93 S/m; ε_r = 42.654; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(6.5, 6.5, 6.5); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: SAM head-body simulator ; Type: Twin SAM V4.0; Serial: ---
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right Hand Side - 850 2G MHz/GPRS 850, 2 slots, Mid CH, Cheek/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.181 W/kg

Right Hand Side - 850 2G MHz/GPRS 850, 2 slots, Mid CH, Cheek/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.818 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.195 W/kg
SAR(1 g) = 0.158 W/kg; SAR(10 g) = 0.123 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.164 W/kg



0 dB = 0.164 W/kg = -7.85 dBW/kg

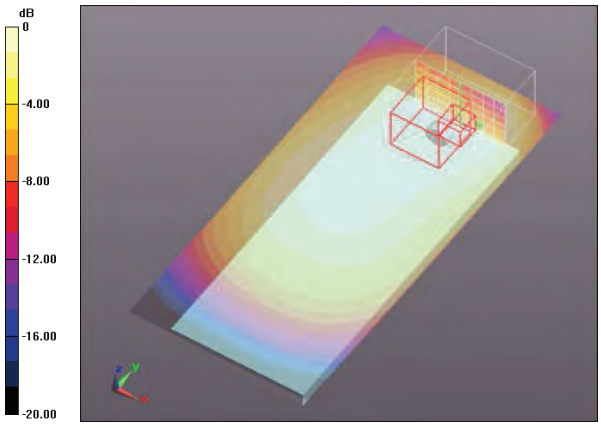


GPRS 850 MHz 2 slots – Body – Back Face 10 mm – Middle Channel – Plot Nº 4

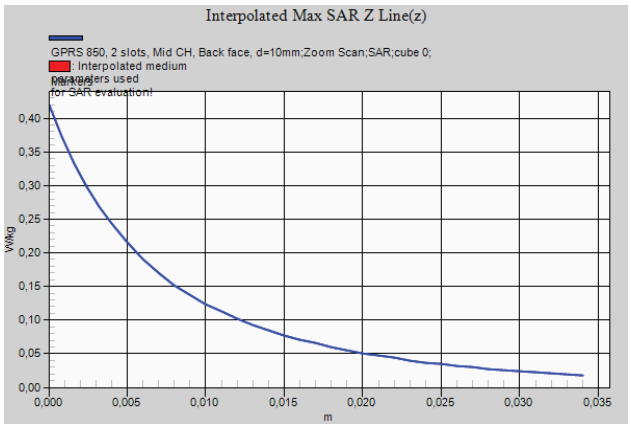
Test Laboratory: AT4 Wireless; Date: 09/02/2015
DUT: YotaPhone2; Type: Handset; Serial: IMEI:356431060204380
Communication System: UID 10024 - DAB, GPRS-FDD (TDMA, GMSK, TN 0-1); Frequency: 836.6 MHz; Duty Cycle: 1:4.52898
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.963 S/m; ε_r = 54.087; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(6.26, 6.26, 6.26); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (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)

Flat Phantom Side - 850 MHz/GPRS 850, 2 slots, Mid CH, Back face, d=10mm/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.310 W/kg

Flat Phantom Side - 850 MHz/GPRS 850, 2 slots, Mid CH, Back face, d=10mm/Zoom Scan (9x9x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.62 V/m; Power Drift = -0.20 dB
Peak SAR (extrapolated) = 0.420 W/kg
SAR(1 g) = 0.246 W/kg; SAR(10 g) = 0.174 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.262 W/kg



0 dB = 0.262 W/kg = -5.82 dBW/kg

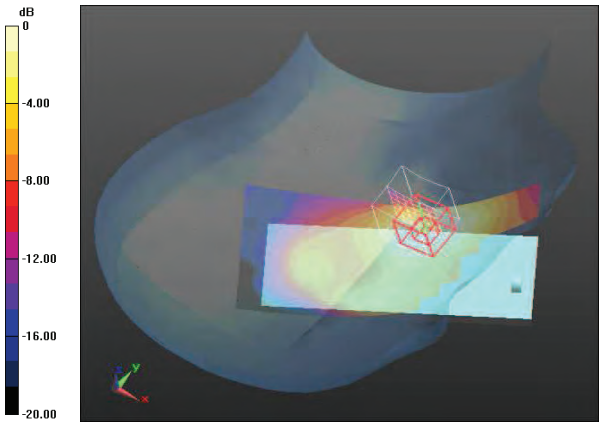


GSM 1900 MHz – Right hand side – Cheek position – Middle Channel – Plot Nº 5

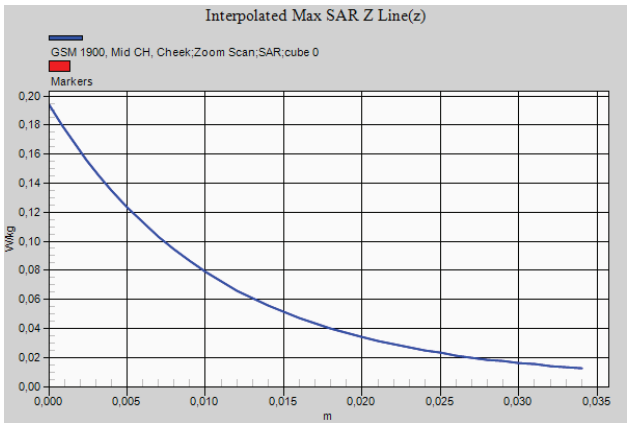
Test Laboratory: AT4 Wireless; Date: 12/02/2015
DUT: YotaPhone2; Type: Handset; Serial: IMEI:356431060204320
Communication System: UID 10021 - DAB, GSM-FDD (TDMA, GMSK); Frequency: 1880 MHz; Duty Cycle: 1:8.6896
Medium parameters used: f = 1880 MHz; σ = 1.47 S/m; ε_r = 39.47; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(5.12, 5.12, 5.12); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: SAM head-body simulator ; Type: Twin SAM V4.0; Serial: ---
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right Hand Side - 1800 MHz/GSM 1900, Mid CH, Cheek/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.150 W/kg

Right Hand Side - 1800 MHz/GSM 1900, Mid CH, Cheek/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.886 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.194 W/kg
SAR(1 g) = 0.124 W/kg; SAR(10 g) = 0.075 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.134 W/kg



0 dB = 0.134 W/kg = -8.73 dBW/kg

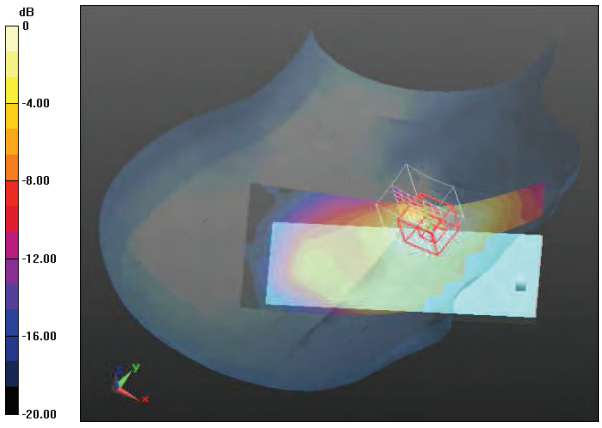


GPRS 1900 MHz 2 slots – Righthand side – Cheek position – Middle Channel – Plot Nº 6

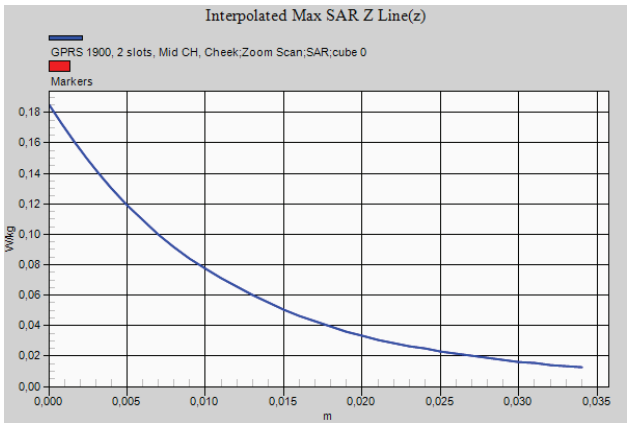
Test Laboratory: AT4 Wireless; Date: 12/02/2015
DUT: YotaPhone2; Type: Handset; Serial: IMEI:356431060204320
Communication System: UID 10024 - DAB, GPRS-FDD (TDMA, GMSK, TN 0-1); Frequency: 1880 MHz; Duty Cycle: 1:4.52898
Medium parameters used: f = 1880 MHz; σ = 1.47 S/m; ε_r = 39.47; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(5.12, 5.12, 5.12); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: SAM head-body simulator ; Type: Twin SAM V4.0; Serial: ---
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right Hand Side - 1800 MHz/GPRS 1900, 2 slots, Mid CH, Cheek/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.145 W/kg

Right Hand Side - 1800 MHz/GPRS 1900, 2 slots, Mid CH, Cheek/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.718 V/m; Power Drift = 0.27 dB
Peak SAR (extrapolated) = 0.185 W/kg
SAR(1 g) = 0.119 W/kg; SAR(10 g) = 0.073 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.130 W/kg



0 dB = 0.130 W/kg = -8.86 dBW/kg

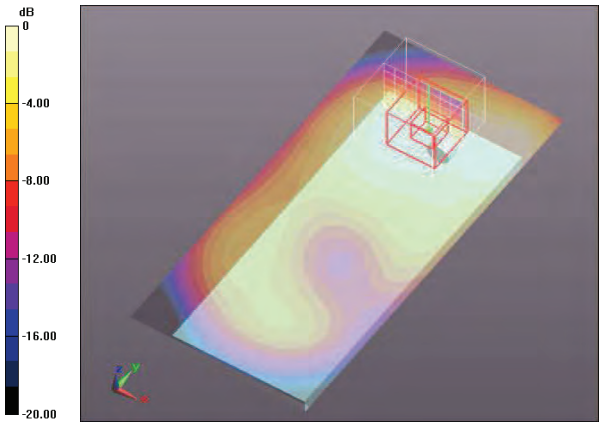


GSM 1900 MHz – Body – FrontFace 10 mm – Middle Channel – Plot Nº 7

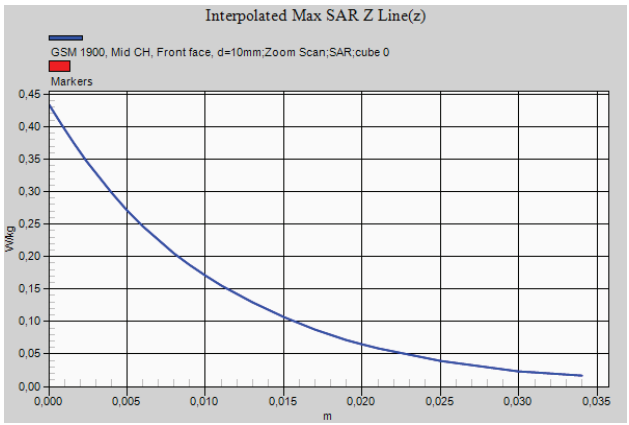
Test Laboratory: AT4 Wireless; Date: 12/02/2015
DUT: YotaPhone2; Type: Handset; Serial: IMEI:356431060204320
Communication System: UID 10021 - DAB, GSM-FDD (TDMA, GMSK); Frequency: 1880 MHz; Duty Cycle: 1:8.6896
Medium parameters used: f = 1880 MHz; σ = 1.57 S/m; ε_r = 51.49; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(4.71, 4.71, 4.71); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (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)

Flat Phantom Side - 1800 MHz/GSM 1900, Mid CH, Front face, d=10mm/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.334 W/kg

Flat Phantom Side - 1800 MHz/GSM 1900, Mid CH, Front face, d=10mm/Zoom Scan (8x8x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.000 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.434 W/kg
SAR(1 g) = 0.277 W/kg; SAR(10 g) = 0.172 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.300 W/kg



0 dB = 0.300 W/kg = -5.23 dBW/kg

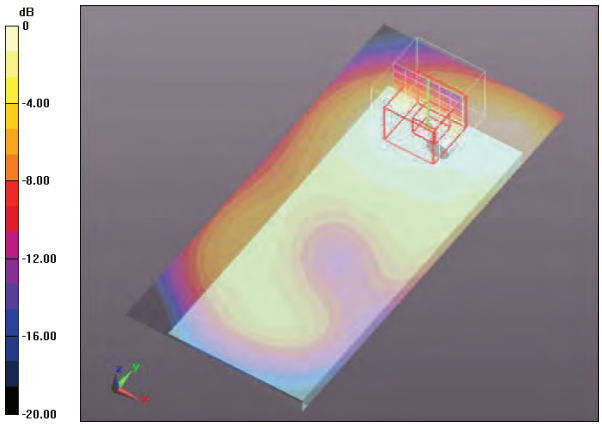


GPRS 1900 MHz 2 slots – Body – Front Face 10 mm – Middle Channel – Plot Nº 8

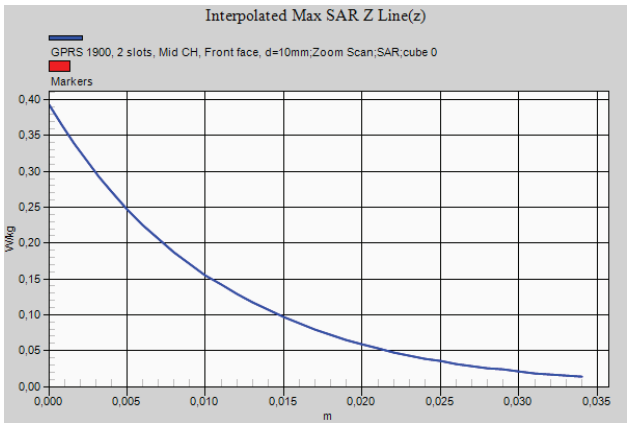
Test Laboratory: AT4 Wireless; Date: 12/02/2015
DUT: YotaPhone2; Type: Handset; Serial: IMEI:356431060204320
Communication System: UID 10026 - DAB, EDGE-FDD (TDMA, 8PSK, TN 0-1); Frequency: 1880 MHz; Duty Cycle: 1:9.01571
Medium parameters used: f = 1880 MHz; σ = 1.57 S/m; ε_r = 51.49; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(4.71, 4.71, 4.71); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (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)

Flat Phantom Side - 1800 MHz/GPRS 1900, 2 slots, Mid CH, Front face, d=10mm/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.306 W/kg

Flat Phantom Side - 1800 MHz/GPRS 1900, 2 slots, Mid CH, Front face, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.55 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.393 W/kg
SAR(1 g) = 0.253 W/kg; SAR(10 g) = 0.157 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.272 W/kg



0 dB = 0.272 W/kg = -5.65 dBW/kg



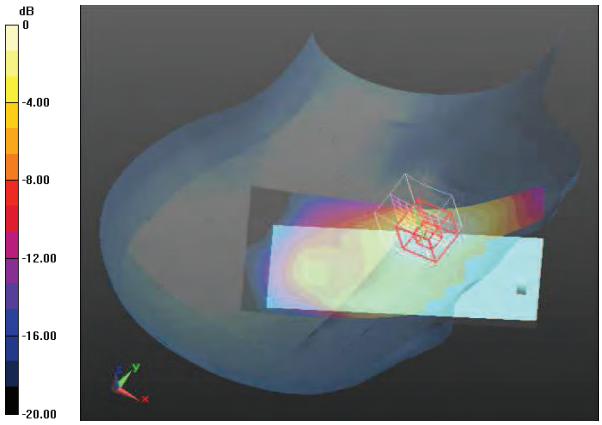
WCDMA Band II – Right hand side – Cheek position – Middle Channel – Plot Nº 9

Test Laboratory: AT4 Wireless; Date: 12/02/2015

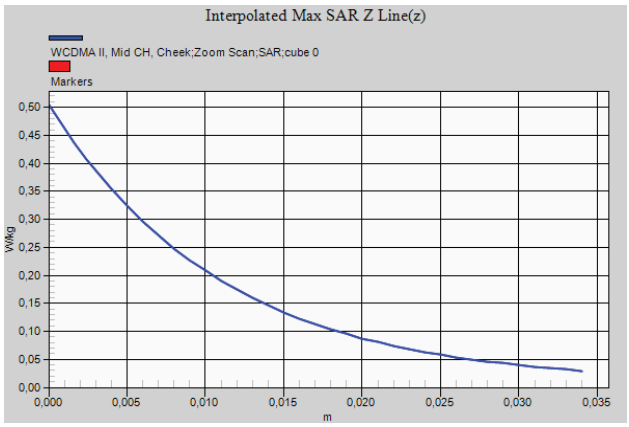
DUT: YotaPhone2; Type: Handset; Serial: IMEI:356431060204320
Communication System: UID 10011 - CAB, UMTS-FDD (WCDMA); Frequency: 1880 MHz; Duty Cycle: 1:1.95434
Medium parameters used: f = 1880 MHz; σ = 1.47 S/m; ε_r = 39.47; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(5.12, 5.12, 5.12); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: SAM head-body simulator ; Type: Twin SAM V4.0; Serial: ---
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right Hand Side - 1800 MHz/WCDMA II, Mid CH, Cheek/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.394 W/kg

Right Hand Side - 1800 MHz/WCDMA II, Mid CH, Cheek/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.234 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.504 W/kg
SAR(1 g) = 0.328 W/kg; SAR(10 g) = 0.199 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.356 W/kg



0 dB = 0.356 W/kg = -4.49 dBW/kg

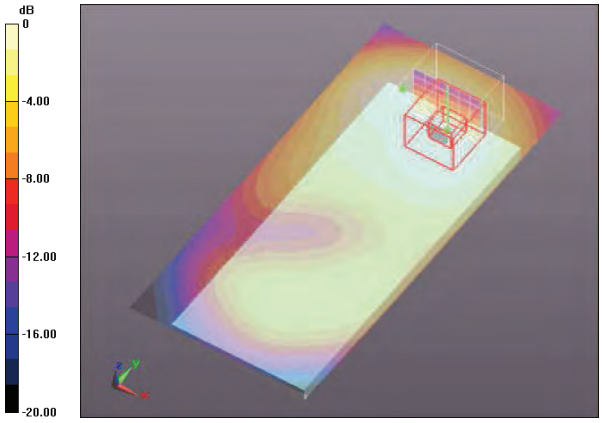


WCDMA Band II – Body – Back Face 10 mm – Middle Channel – Plot Nº 10

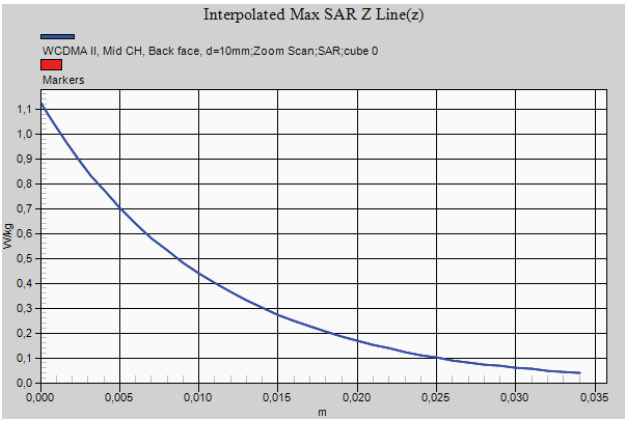
Test Laboratory: AT4 Wireless; Date: 12/02/2015
DUT: YotaPhone2; Type: Handset; Serial: IMEI:356431060204320
Communication System: UID 10011 - CAB, UMTS-FDD (WCDMA); Frequency: 1880 MHz; Duty Cycle: 1:1.95434
Medium parameters used: f = 1880 MHz; σ = 1.57 S/m; ε_r = 51.49; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(4.71, 4.71, 4.71); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 4mm (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)

Flat Phantom Side - 1800 MHz/WCDMA II, Mid CH, Back face, d=10mm/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.860 W/kg

Flat Phantom Side - 1800 MHz/WCDMA II, Mid CH, Back face, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.26 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.12 W/kg
SAR(1 g) = 0.720 W/kg; SAR(10 g) = 0.452 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.772 W/kg



0 dB = 0.772 W/kg = -1.12 dBW/kg



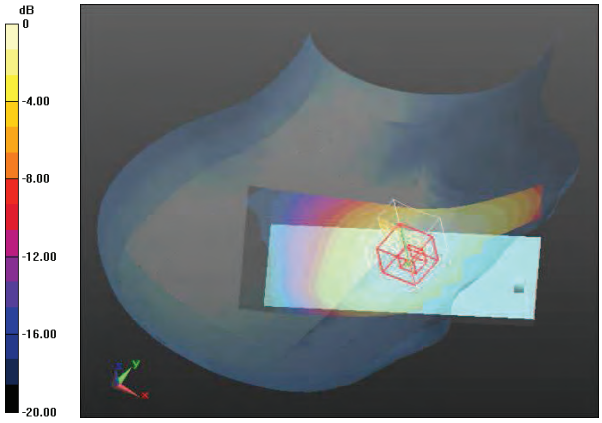
WCDMA Band V – Right hand side – Cheek position – Middle Channel – Plot Nº 11

Test Laboratory: AT4 Wireless; Date: 04/02/2015
DUT: YotaPhone2 MOD; Type: Handset; Serial: IMEI:356431060204320
Communication System: UID 10011 - CAB, UMTS-FDD (WCDMA); Frequency: 836.6 MHz; Duty Cycle: 1:1.95434
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.913 S/m; ε_r = 43.361; ρ = 1000 kg/m^3
Phantom section: Right Section

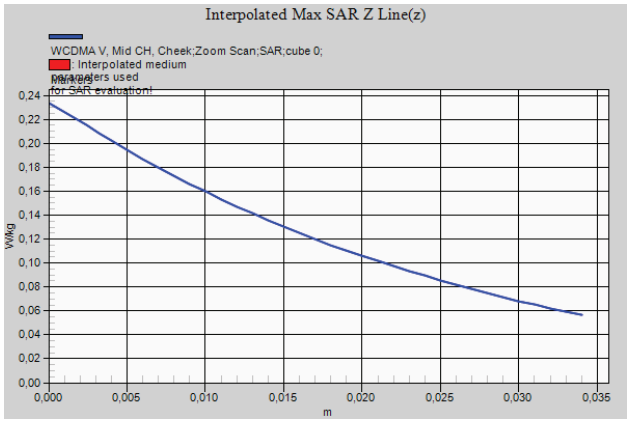
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(6.5, 6.5, 6.5); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: SAM head-body simulator ; Type: Twin SAM V4.0; Serial: ---
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right Hand Side - WCDMA 850 MHz/WCDMA V, Mid CH, Cheek/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.213 W/kg

Right Hand Side - WCDMA 850 MHz/WCDMA V, Mid CH, Cheek/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.471 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.234 W/kg
SAR(1 g) = 0.193 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) = 0.203 W/kg



0 dB = 0.203 W/kg = -6.93 dBW/kg



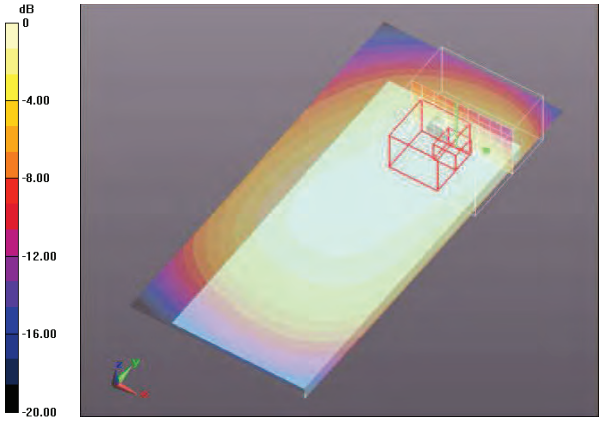
WCDMA Band V – Body – Back Face 10 mm – Middle Channel – Plot Nº 12

Test Laboratory: AT4 Wireless; Date: 10/02/2015

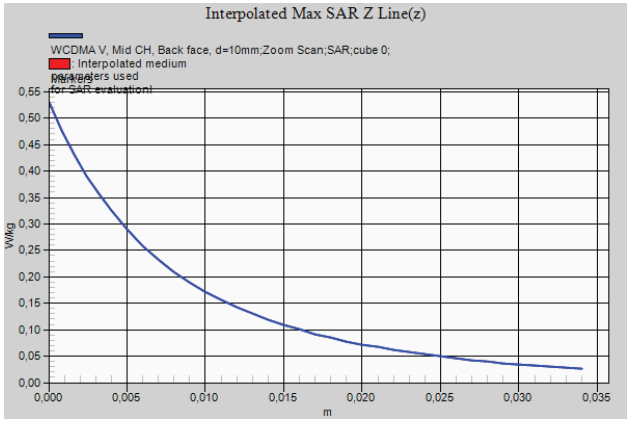
DUT: YotaPhone2; Type: Handset; Serial: IMEI:356431060204380
Communication System: UID 10011 - CAB, UMTS-FDD (WCDMA); Frequency: 836.6 MHz; Duty Cycle: 1:1.95434
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.963 S/m; ε_r = 54.087; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(6.26, 6.26, 6.26); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (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)

Flat Phantom Side - 850 MHz/WCDMA V, Mid CH, Back face, d=10mm/Area Scan (81x171x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.403 W/kg

Flat Phantom Side - 850 MHz/WCDMA V, Mid CH, Back face, d=10mm/Zoom Scan (10x10x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.52 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.530 W/kg
SAR(1 g) = 0.323 W/kg; SAR(10 g) = 0.229 W/kg (SAR corrected for target medium)
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.341 W/kg



0 dB = 0.341 W/kg = -4.67 dBW/kg



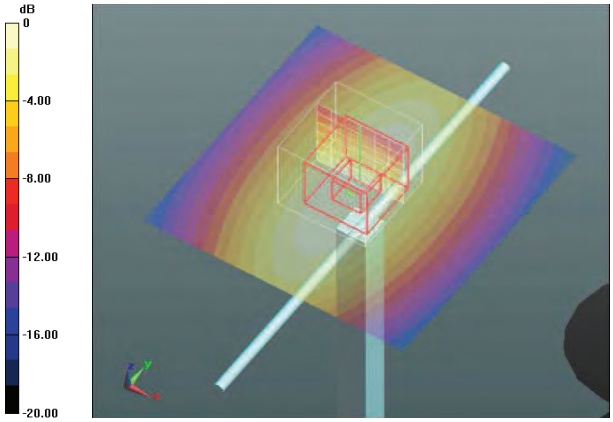
Appendix D – System Validation Reports

Validation results in 900 MHz Band for Head TSL

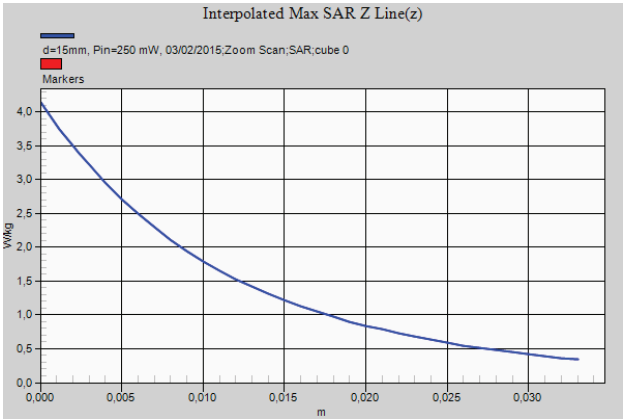
Test Laboratory: AT4 Wireless; Date: 03/02/2015
DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 - SN:1d007
Communication System: UID 0, CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 0.97 S/m; ε_r = 43.01; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(6.4, 6.4, 6.4); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: SAM head-body simulator ; Type: Twin SAM V4.0; Serial: ---
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check with D900V2 Dipole/d=15mm, Pin=250 mW, 03/02/2015/Area Scan (61x61x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.16 W/kg

System Performance Check with D900V2 Dipole/d=15mm, Pin=250 mW, 03/02/2015/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.85 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 4.14 W/kg
SAR(1 g) = 2.74 W/kg; SAR(10 g) = 1.76 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 3.21 W/kg



0 dB = 3.21 W/kg = 5.07 dBW/kg

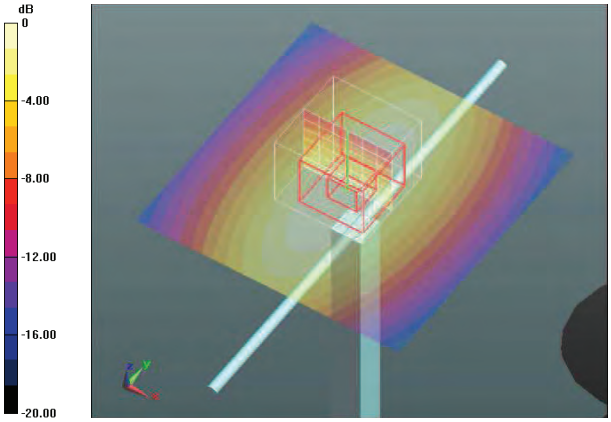


Validation results in 900 MHz Band for Head TSL

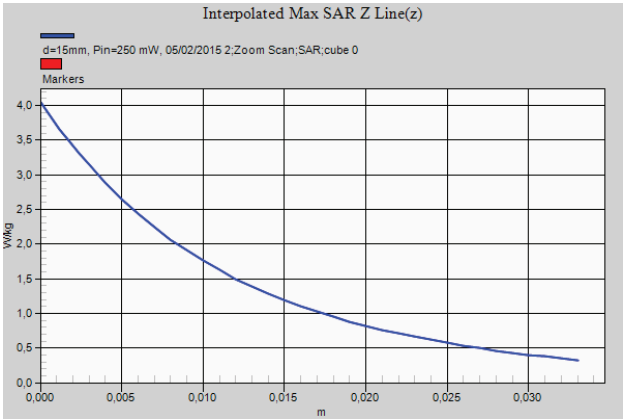
Test Laboratory: AT4 Wireless; Date: 05/02/2015
DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 - SN:1d007
Communication System: UID 0, CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 0.98 S/m; ε_r = 42.15; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(6.4, 6.4, 6.4); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: SAM head-body simulator ; Type: Twin SAM V4.0; Serial: ---
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check with D900V2 Dipole 2/d=15mm, Pin=250 mW, 05/02/2015 2/Area Scan (61x61x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.11 W/kg

System Performance Check with D900V2 Dipole 2/d=15mm, Pin=250 mW, 05/02/2015 2/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.60 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 4.04 W/kg
SAR(1 g) = 2.66 W/kg; SAR(10 g) = 1.72 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 3.14 W/kg



0 dB = 3.14 W/kg = 4.97 dBW/kg

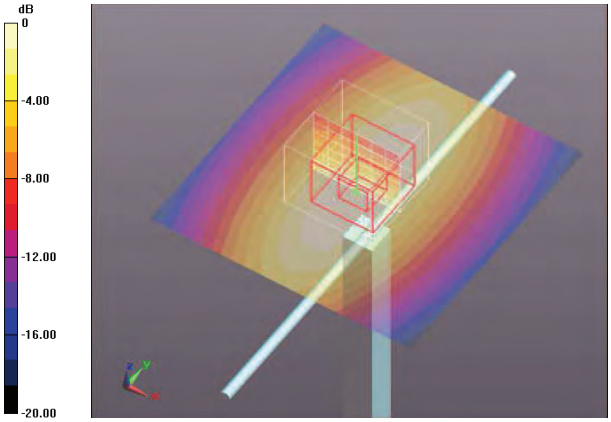


Validation results in 900 MHz Band for Body TSL

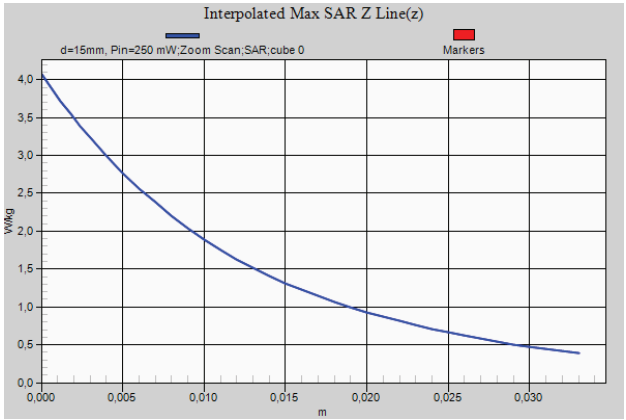
Test Laboratory: AT4 Wireless; Date: 09/02/2015
DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 - SN:1d007
Communication System: UID 0, CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 1.02 S/m; ε_r = 53.64; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(6.14, 6.14, 6.14); 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 D900V2 Dipole Body/d=15mm, Pin=250 mW/Area Scan (61x61x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.22 W/kg

System Performance Check with D900V2 Dipole Body/d=15mm, Pin=250 mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.88 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 4.07 W/kg
SAR(1 g) = 2.81 W/kg; SAR(10 g) = 1.83 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 3.23 W/kg



0 dB = 3.23 W/kg = 5.09 dBW/kg

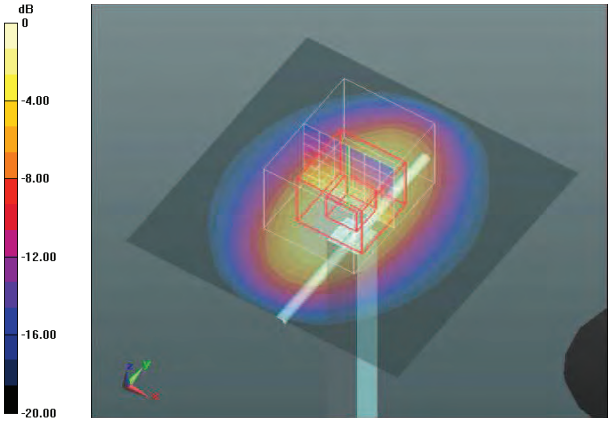


Validation results in 1800 MHz Band for Head TSL

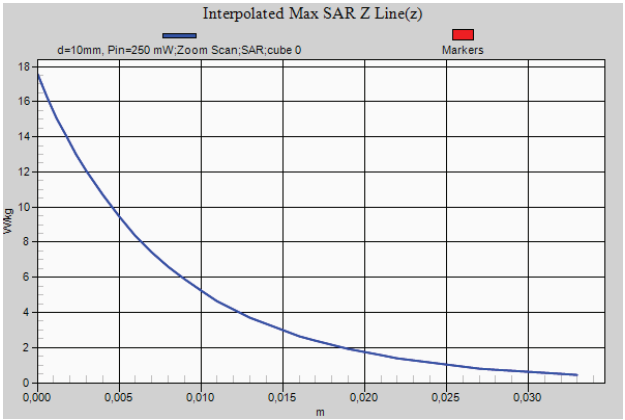
Test Laboratory: AT4 Wireless; Date: 11/02/2015
DUT: Dipole 1800 MHz D1800V2; Type: D1800V2; Serial: D1800V2 - SN:2d099
Communication System: UID 0, CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1800 MHz; σ = 1.4 S/m; ε_r = 39.71; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(5.28, 5.28, 5.28); Calibrated: 24/09/2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 08/07/2014
- Phantom: SAM head-body simulator ; Type: Twin SAM V4.0; Serial: ---
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check with D1800V2 Dipole/d=10mm, Pin=250 mW/Area Scan (91x91x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 12.0 W/kg

System Performance Check with D1800V2 Dipole/d=10mm, Pin=250 mW/Zoom Scan (7x9x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.05 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.44 W/kg; SAR(10 g) = 4.89 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 12.1 W/kg



0 dB = 12.1 W/kg = 10.83 dBW/kg

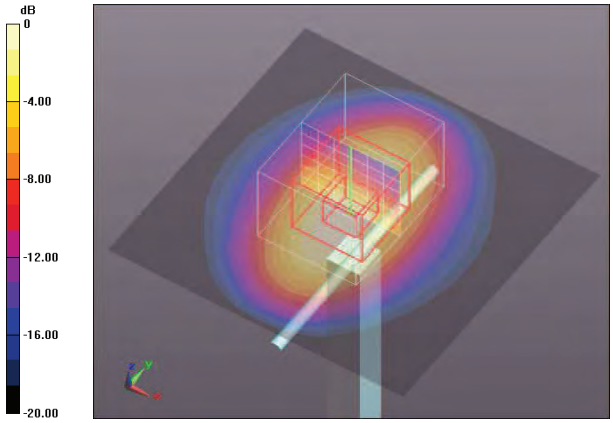


Validation results in 1800 MHz Band for Body TSL

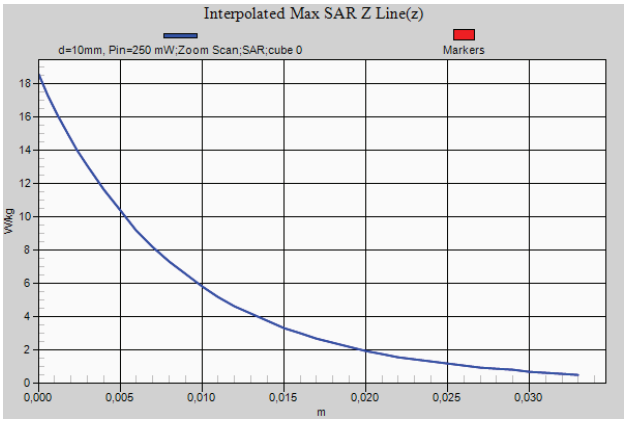
Test Laboratory: AT4 Wireless; Date: 12/02/2015
DUT: Dipole 1800 MHz D1800V2; Type: D1800V2; Serial: D1800V2 - SN:2d099
Communication System: UID 0, CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1800 MHz; σ = 1.53 S/m; ε_r = 51.65; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:
- Probe: ES3DV3 - SN3052; ConvF(4.94, 4.94, 4.94); 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 D1800V2 Dipole Body/d=10mm, Pin=250 mW/Area Scan (91x91x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 13.0 W/kg

System Performance Check with D1800V2 Dipole Body/d=10mm, Pin=250 mW/Zoom Scan (7x9x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.50 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 18.5 W/kg
SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.31 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 13.1 W/kg



0 dB = 13.1 W/kg = 11.17 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
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: 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	
Approved by:	Fin Bomholt	Deputy Technical Manager	i.V.

Issued: July 8, 2014

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

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

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

Accreditation No.: SCS 108

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
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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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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

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

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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 ($\mu V/(V/m)^2$)[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.

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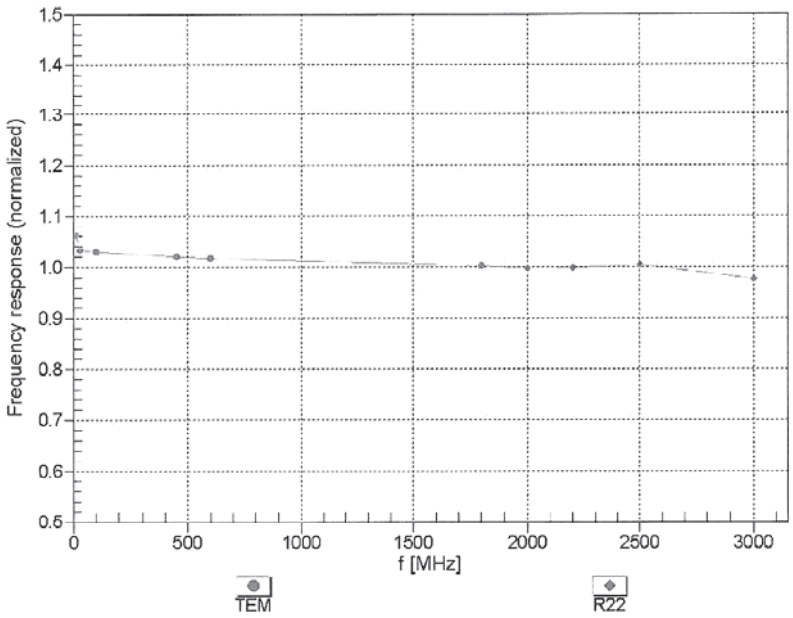
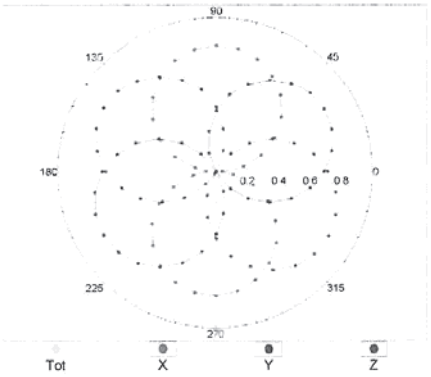
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



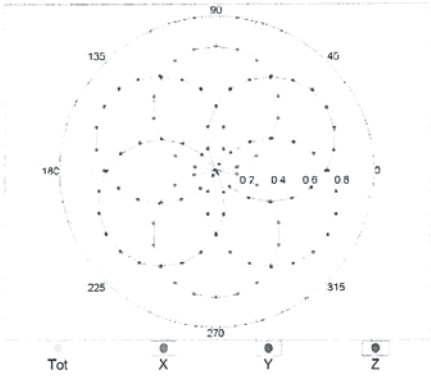
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

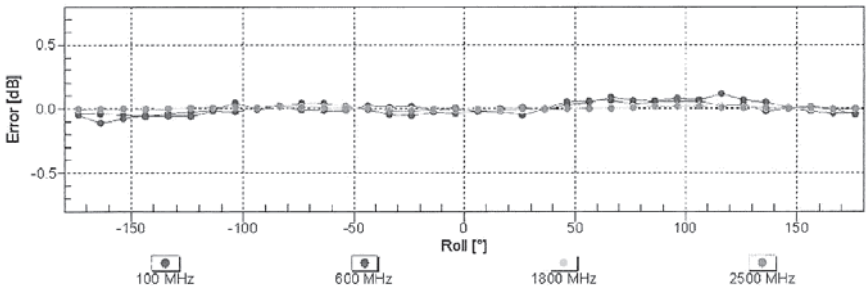
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



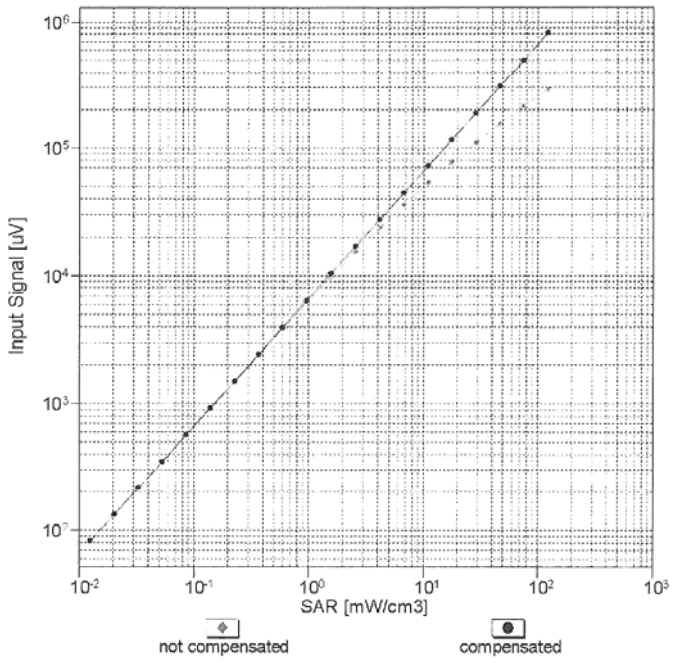
f=1800 MHz,R22

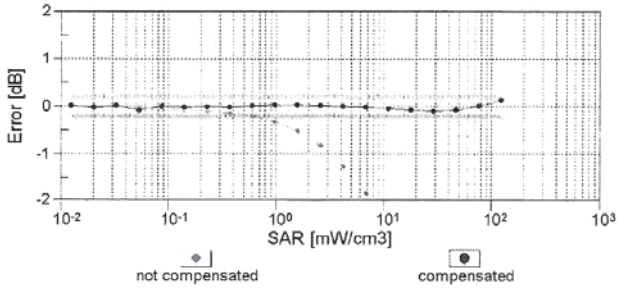




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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





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

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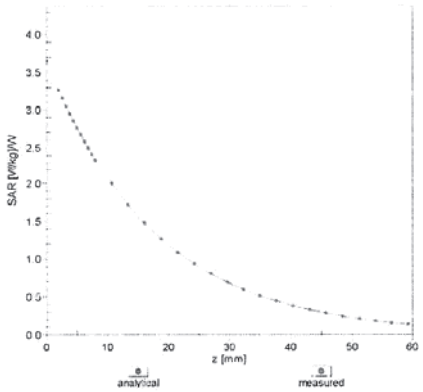
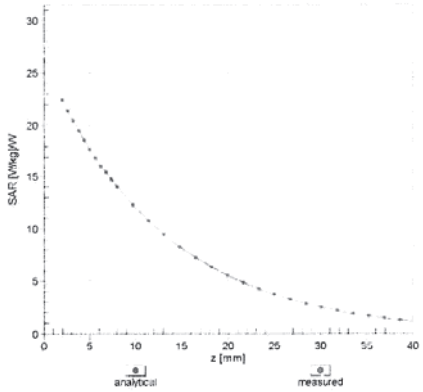
Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

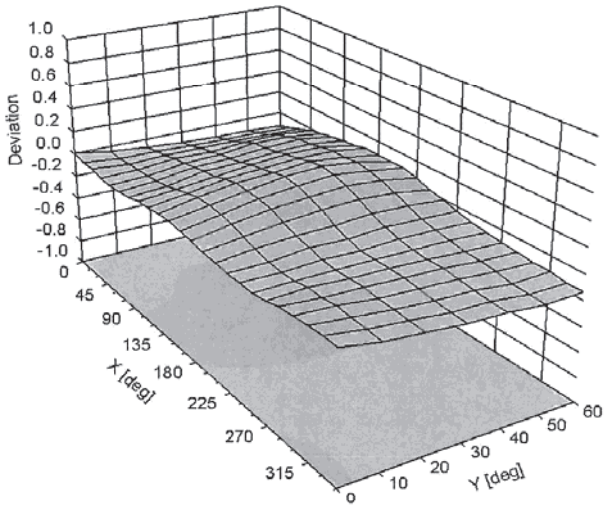


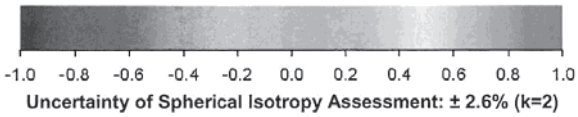
f = 1750 MHz,WGLS R22 (H_convF)



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
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: D900V2-1d007_Jul13

CALIBRATION CERTIFICATE

Object	D900V2 - SN: 1d007
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 19, 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:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 19, 2013

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Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.6 ± 6 %	0.94 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	2.60 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**10.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.68 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.85 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	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.8 ± 6 %	1.03 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	2.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**10.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.72 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.95 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.7 Ω - 1.7 jΩ
Return Loss	- 34.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω - 3.5 jΩ
Return Loss	- 25.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.410 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	February 13, 2004

DASY5 Validation Report for Head TSL

Date: 19.07.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 1d007

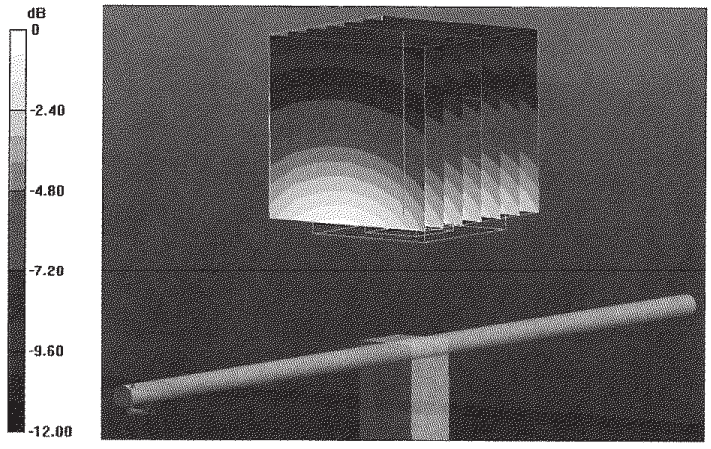
Communication System: SDM - GVD; Frequency: 900 MHz
Communication System Frame Length in ms: 0
Medium parameters used: f = 900 MHz; σ = 0.94 S/m; ε_r = 41.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.95, 5.95, 5.95); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

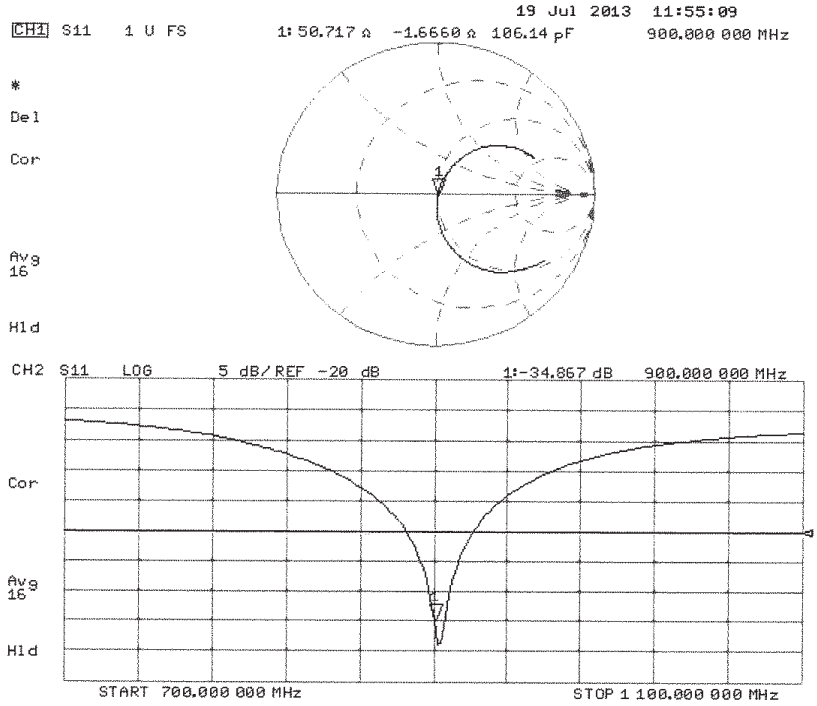
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.428 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.92 W/kg
SAR(1 g) = 2.6 W/kg; SAR(10 g) = 1.68 W/kg
Maximum value of SAR (measured) = 3.05 W/kg



0 dB = 3.05 W/kg = 4.84 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.07.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 1d007

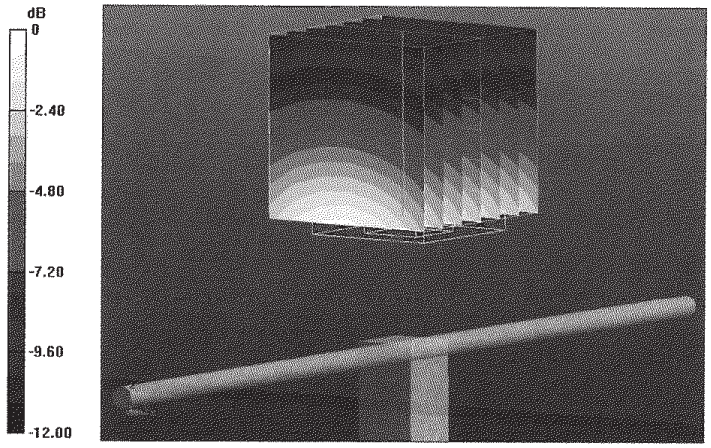
Communication System: UID 0 - CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 1.03 S/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.95, 5.95, 5.95); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

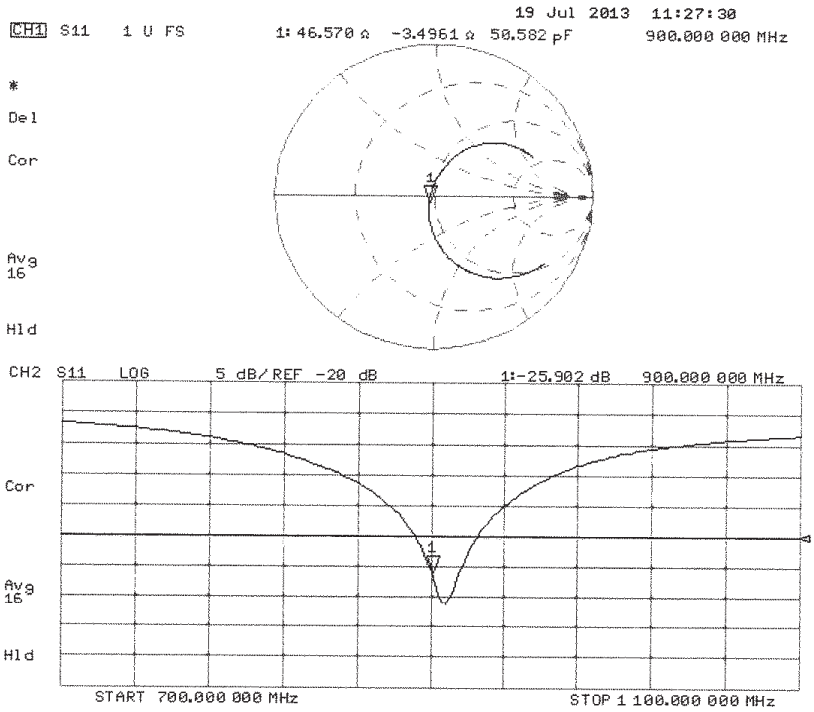
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.533 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.90 W/kg
SAR(1 g) = 2.65 W/kg; SAR(10 g) = 1.72 W/kg
Maximum value of SAR (measured) = 3.09 W/kg



0 dB = 3.09 W/kg = 4.90 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client AT4 Wireless

Certificate No: D1800V2-2d099_Jul13

CALIBRATION CERTIFICATE

Object	D1800V2 - SN: 2d099
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 18, 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 19, 2013

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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	1800 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.7 ± 6 %	1.37 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	9.67 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**38.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.4 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.4 ± 6 %	1.53 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	10.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.30 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.0 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.1 Ω - 4.2 jΩ
Return Loss	- 27.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.4 Ω - 4.0 jΩ
Return Loss	- 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.206 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	January 30, 2004

DASY5 Validation Report for Head TSL

Date: 18.07.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d099

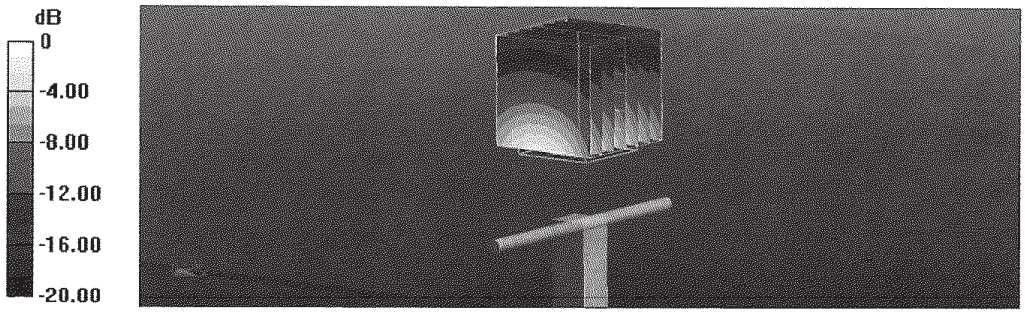
Communication System: UID 0 - CW ; Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.37 S/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.04, 5.04, 5.04); 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)

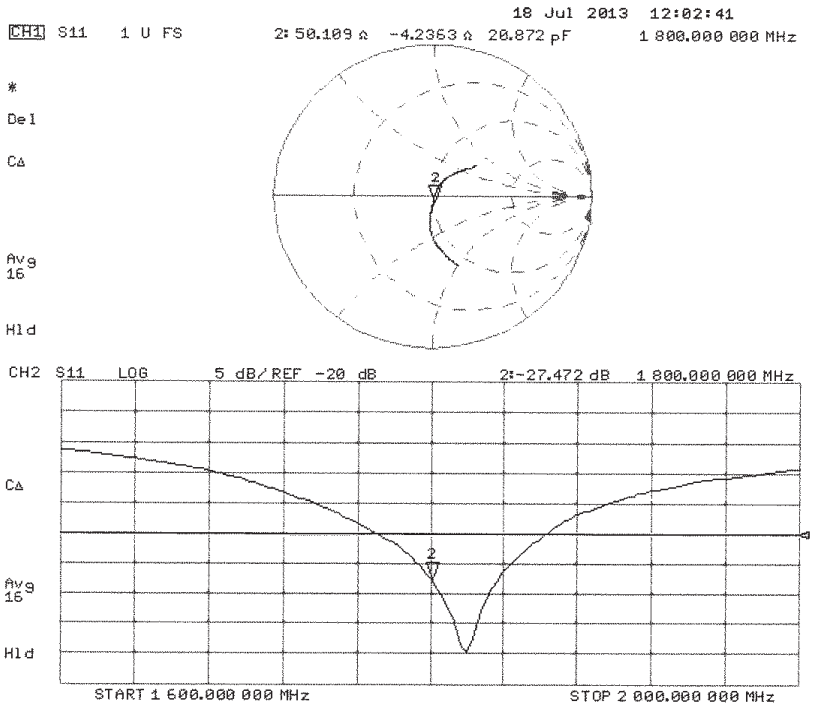
Dipole Calibration for Head Tissue 2/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.245 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 9.67 W/kg; SAR(10 g) = 5.08 W/kg
Maximum value of SAR (measured) = 11.9 W/kg



0 dB = 11.9 W/kg = 10.76 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 18.07.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d099

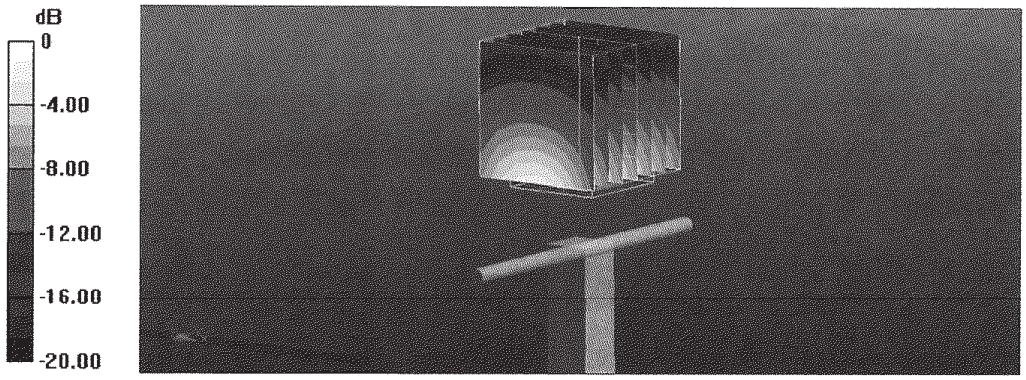
Communication System: UID 0 - CW ; Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.53 S/m; ε_r = 51.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.73, 4.73, 4.73); 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 = 93.813 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 17.9 W/kg
SAR(1 g) = 10 W/kg; SAR(10 g) = 5.3 W/kg
Maximum value of SAR (measured) = 12.5 W/kg



0 dB = 12.5 W/kg = 10.97 dBW/kg

Impedance Measurement Plot for Body TSL