FCC SAR Test Report

Report No.	:	**SA141218E07**
Applicant	:	**HON HAI PRECISION IND. CO., LTD.**
Address	:	**5F-1, 5 Hsin-An Road Hsinchu, Science-Based Industrial Park Taiwan, R.O.C.**
Product	:	**LTE Cat4 PCI Express M.2 Module**
FCC ID	:	**MCLT77W595**
Brand	:	**FOXCONN**
Model No.	:	**T77W595**
Standards	:	**FCC 47 CFR Part 2 (2.1093) / IEEE C95.1:1992 / IEEE 1528:2003 IEEE 1528a-2005 / KDB 865664 D01 v01r03 KDB 447498 D01 v05r02 / KDB 941225 D01 v02 / KDB 941225 D02 v02r02 KDB 941225 D03 v01 / KDB 941225 D05 v02r03**
Sample Received Date	:	**Dec. 18, 2014**
Date of Testing	:	**Jan. 01, 2015 ~ Jan. 09, 2015**

CERTIFICATION: The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch – Lin Kou Laboratories**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's SAR characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by TAF or any government agencies.

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Release Control Record

Report No.	Reason for Change	Date Issued
SA141218E07	Initial release	Jan. 27, 2015

1. Summary of Maximum SAR Value

Equipment Class	Mode	Highest Reported Body SAR_{1g} (2.5 cm Gap) (W/kg)
PCB	GSM850	0.79
	GSM1900	0.79
	WCDMA II	0.50
	WCDMA IV	0.46
	WCDMA V	0.50
	CDMA BC0	0.60
	CDMA BC1	0.69
	CDMA BC10	0.40
	LTE 2	0.75
	LTE 4	0.66
	LTE 5	0.43
	LTE 7	0.62
	LTE 12	0.31
	LTE 13	0.34
	LTE 17	0.39
	LTE 25	0.71
	LTE 26	0.44

Note:

1. The SAR limit **(Head & Body: SAR_{1g} 1.6 W/kg)** for general population / uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992.

2. Description of Equipment Under Test

EUT Type	LTE Cat4 PCI Express M.2 Module
FCC ID	MCLT77W595
Brand Name	FOXCONN
Model Name	T77W595
Tx Frequency Bands (Unit: MHz)	GSM850 : 824.2 ~ 848.8 GSM1900 : 1850.2 ~ 1909.8 WCDMA Band II : 1852.4 ~ 1907.6 WCDMA Band IV : 1712.4 ~ 1752.6 WCDMA Band V : 826.4 ~ 846.6 CDMA BC0 : 824.7 ~ 848.31 CDMA BC1 : 1851.25 ~ 1908.75 CDMA BC10 : 817.9 ~ 823.1 LTE Band 2 : 1850.7 ~ 1909.3 (1.4M), 1851.5 ~ 1908.5 (3M), 1852.5 ~ 1907.5 (5M), 1855 ~ 1905 (10M), 1857.5 ~ 1902.5 (15M), 1860 ~ 1900 (20M) LTE Band 4 : 1710.7 ~ 1754.3 (1.4M), 1711.5 ~ 1753.5 (3M), 1712.5 ~ 1752.5 (5M), 1715 ~ 1750 (10M), 1717.5 ~ 1747.5 (15M), 1720 ~ 1745 (20M) LTE Band 5 : 824.7 ~ 848.3 (1.4M), 825.5 ~ 847.5 (3M), 826.5 ~ 846.5 (5M), 829 ~ 844 (10M) LTE Band 7 : 2502.5 ~ 2567.5 (5M), 2505 ~ 2565 (10M), 2507.5 ~ 2562.5 (15M), 2510 ~ 2560 (20M) LTE Band 12 : 699.7 ~ 715.3 (1.4M), 700.5 ~ 714.5 (3M), 701.5 ~ 713.5 (5M), 704 ~ 711 (10M) LTE Band 13 : 779.5 ~ 784.5 (5M), 782 (10M) LTE Band 17 : 706.5 ~ 713.5 (5M), 709 ~ 711 (10M) LTE Band 25 : 1850.7 ~ 1914.3 (1.4M), 1851.5 ~ 1913.5 (3M), 1852.5 ~ 1912.5 (5M), 1855 ~ 1910 (10M), 1857.5 ~ 1907.5 (15M), 1860 ~ 1905 (20M) LTE Band 26 : 814.7 ~ 848.3 (1.4M), 815.5 ~ 847.5 (3M), 816.5 ~ 846.5 (5M), 819 ~ 844 (10M), 821.5 ~ 841.5 (15M)
Uplink Modulations	GPRS : GMSK EDGE : 8PSK WCDMA : QPSK CDMA : QPSK LTE : QPSK, 16QAM
Maximum Tune-up Conducted Power (Unit: dBm)	GSM850 : 34.0 GSM1900 : 31.0 WCDMA Band II : 26.0 WCDMA Band IV : 27.0 WCDMA Band V : 26.0 CDMA BC0 : 26.0 CDMA BC1 : 26.0 CDMA BC10 : 26.0 LTE Band 2 : 26.0 LTE Band 4 : 26.0 LTE Band 5 : 25.0 LTE Band 7 : 26.0 LTE Band 12 : 25.0 LTE Band 13 : 25.0 LTE Band 17 : 25.0 LTE Band 25 : 26.0 LTE Band 26 : 25.0
Antenna Type	PIFA Antenna
EUT Stage	Identical Prototype

Note:

1. The antenna information is listed as below.

Antenna	Antenna Type	Gain (dBi)	Frequency Range (MHz)
0	PIFA	5.19	699~716MHz (band 12, 17)
1	PIFA	6.14 3.22 3.4 3.4	777~787MHz 816~824MHz 814~849MHz 824~849MHz (Band13, B5, B26, BC0, BC10,GSM850)
2	PIFA	3.62 4.25 4.37 3.82	1850~1915MHz 1710~1785MHz 2500~2570MHz 1920~1980MHz (other)

2. The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

3. SAR Measurement System

3.1 Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\mathbf{dm}}\right) = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\boldsymbol{\rho}\mathbf{dv}}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

3.2 SPEAG DASY System

DASY system consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY4/5 software defined. The DASY software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion form the optical into digital electric signal of the DAE and transfers data to the PC.

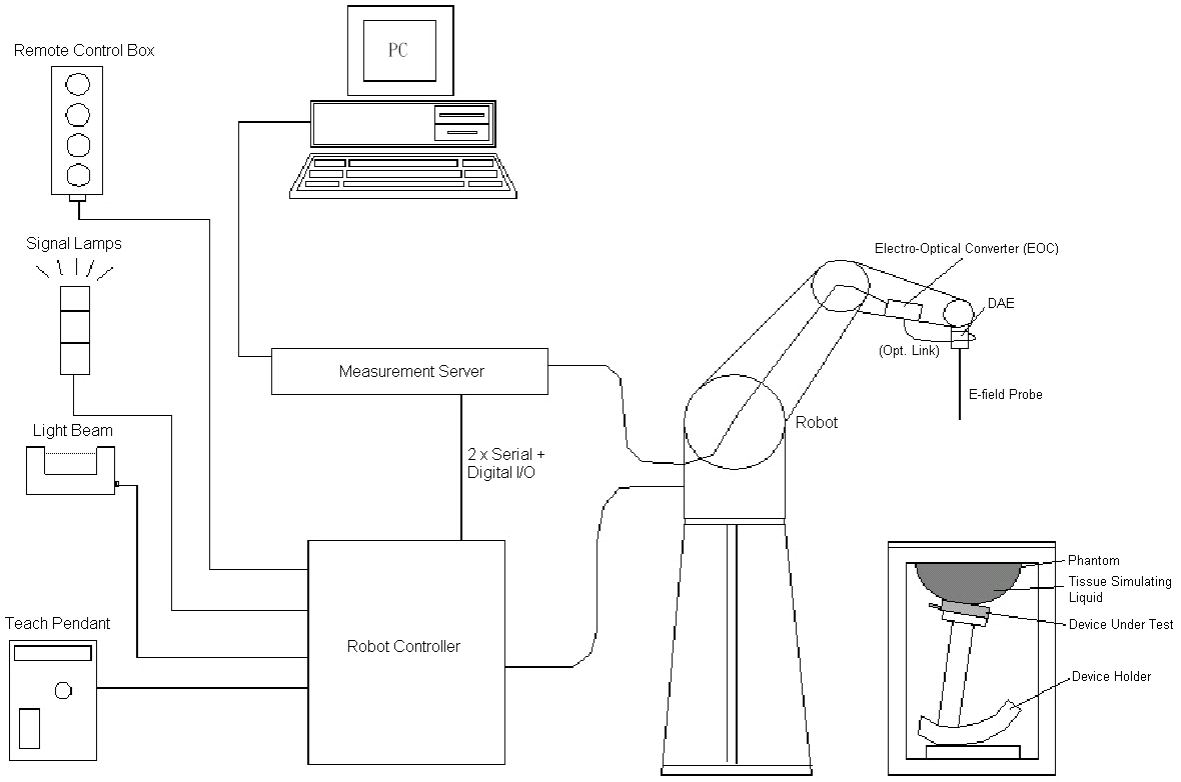


Fig-3.1 DASY System Setup

3.2.1 Robot

The DASY system uses the high precision robots from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY4: CS7MB; DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ±0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

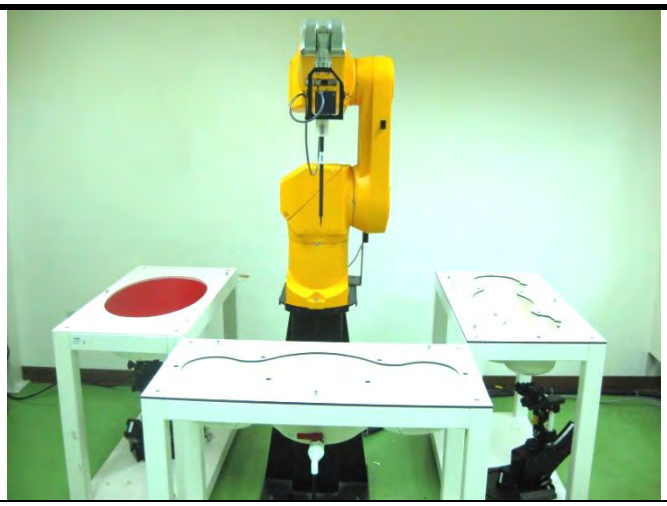


Fig-3.2 DASY4

Fig-3.3 DASY5

3.2.2 Probes

The SAR measurement is conducted with the dosimetric probe. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency.

Model	EX3DV4
Construction	Symmetrical design with triangular core. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).
Frequency	10 MHz to 6 GHz Linearity: ± 0.2 dB
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm

Model	ES3DV3
Construction	Symmetrical design with triangular core. Interleaved sensors. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).
Frequency	10 MHz to 4 GHz Linearity: ± 0.2 dB
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (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

3.2.3 Data Acquisition Electronics (DAE)

Model	DAE3, DAE4
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY 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	< 5µV (with auto zero)
Input Bias Current	< 50 fA
Dimensions	60 x 60 x 68 mm

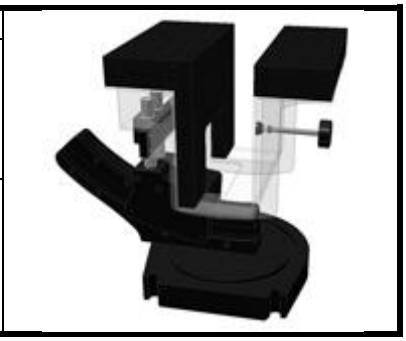
3.2.4 Phantoms

Model	Twin SAM	
Construction	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.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)	
Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet	
Filling Volume	approx. 25 liters	

Model	ELI	
Construction	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2.0 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	approx. 30 liters	

3.2.5 Device Holder

Model	Mounting Device	
Construction	In combination with the Twin SAM Phantom or ELI4, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Rotation point is the ear opening point. Transmitter devices can be easily and accurately positioned according to IEC, IEEE, FCC or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).	
Material	POM	

Model	Laptop Extensions Kit	
Construction	Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.). It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner.	
Material	POM, Acrylic glass, Foam	

3.2.6 System Validation Dipoles

Model	D-Serial	
Construction	Symmetrical dipole with l/4 balun. Enables measurement of feed point impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.	
Frequency	750 MHz to 5800 MHz	
Return Loss	> 20 dB	
Power Capability	> 100 W (f < 1GHz), > 40 W (f > 1GHz)	

3.2.7 Tissue Simulating Liquids

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in Table-3.1.

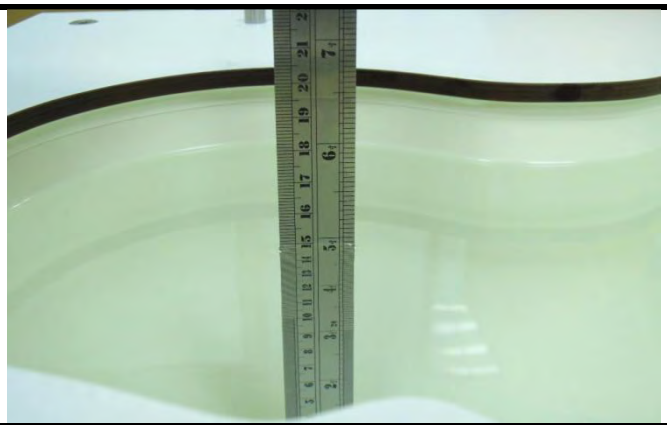
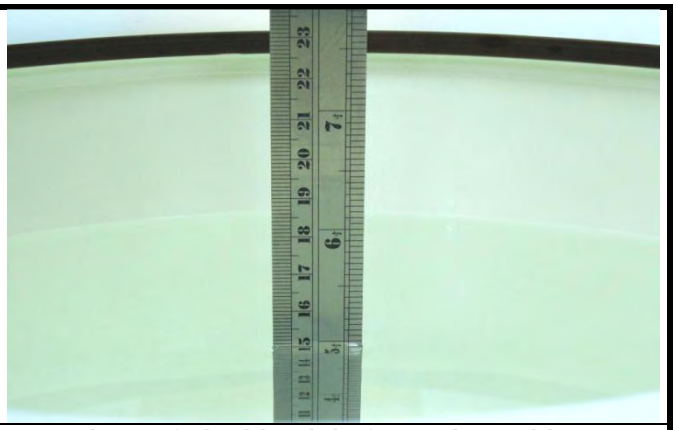
	

Photo of Liquid Height for Head Position	**Photo of Liquid Height for Body Position**

The dielectric properties of the head tissue simulating liquids are defined in IEEE 1528, and KDB 865664 D01 Appendix A. For the body tissue simulating liquids, the dielectric properties are defined in KDB 865664 D01 Appendix A. The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using a dielectric assessment kit and a network analyzer.

Table-3.1 Targets of Tissue Simulating Liquid

Frequency (MHz)	Target Permittivity	Range of ±5%	Target Conductivity	Range of ±5%
For Head				
750	41.9	39.8 ~ 44.0	0.89	0.85 ~ 0.93
835	41.5	39.4 ~ 43.6	0.90	0.86 ~ 0.95
900	41.5	39.4 ~ 43.6	0.97	0.92 ~ 1.02
1450	40.5	38.5 ~ 42.5	1.20	1.14 ~ 1.26
1640	40.3	38.3 ~ 42.3	1.29	1.23 ~ 1.35
1750	40.1	38.1 ~ 42.1	1.37	1.30 ~ 1.44
1800	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
1900	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2000	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2300	39.5	37.5 ~ 41.5	1.67	1.59 ~ 1.75
2450	39.2	37.2 ~ 41.2	1.80	1.71 ~ 1.89
2600	39.0	37.1 ~ 41.0	1.96	1.86 ~ 2.06
3500	37.9	36.0 ~ 39.8	2.91	2.76 ~ 3.06
5200	36.0	34.2 ~ 37.8	4.66	4.43 ~ 4.89
5300	35.9	34.1 ~ 37.7	4.76	4.52 ~ 5.00
5500	35.6	33.8 ~ 37.4	4.96	4.71 ~ 5.21
5600	35.5	33.7 ~ 37.3	5.07	4.82 ~ 5.32
5800	35.3	33.5 ~ 37.1	5.27	5.01 ~ 5.53
For Body				
750	55.5	52.7 ~ 58.3	0.96	0.91 ~ 1.01
835	55.2	52.4 ~ 58.0	0.97	0.92 ~ 1.02
900	55.0	52.3 ~ 57.8	1.05	1.00 ~ 1.10
1450	54.0	51.3 ~ 56.7	1.30	1.24 ~ 1.37
1640	53.8	51.1 ~ 56.5	1.40	1.33 ~ 1.47
1750	53.4	50.7 ~ 56.1	1.49	1.42 ~ 1.56
1800	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
1900	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2000	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2300	52.9	50.3 ~ 55.5	1.81	1.72 ~ 1.90
2450	52.7	50.1 ~ 55.3	1.95	1.85 ~ 2.05
2600	52.5	49.9 ~ 55.1	2.16	2.05 ~ 2.27
3500	51.3	48.7 ~ 53.9	3.31	3.14 ~ 3.48
5200	49.0	46.6 ~ 51.5	5.30	5.04 ~ 5.57
5300	48.9	46.5 ~ 51.3	5.42	5.15 ~ 5.69
5500	48.6	46.2 ~ 51.0	5.65	5.37 ~ 5.93
5600	48.5	46.1 ~ 50.9	5.77	5.48 ~ 6.06
5800	48.2	45.8 ~ 50.6	6.00	5.70 ~ 6.30

The following table gives the recipes for tissue simulating liquids.

Table-3.2 Recipes of Tissue Simulating Liquid

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
H750	0.2	-	0.2	1.5	56.0	-	42.1	-
H835	0.2	-	0.2	1.5	57.0	-	41.1	-
H900	0.2	-	0.2	1.4	58.0	-	40.2	-
H1450	-	43.3	-	0.6	-	-	56.1	-
H1640	-	45.8	-	0.5	-	-	53.7	-
H1750	-	47.0	-	0.4	-	-	52.6	-
H1800	-	44.5	-	0.3	-	-	55.2	-
H1900	-	44.5	-	0.2	-	-	55.3	-
H2000	-	44.5	-	0.1	-	-	55.4	-
H2300	-	44.9	-	0.1	-	-	55.0	-
H2450	-	45.0	-	0.1	-	-	54.9	-
H2600	-	45.1	-	0.1	-	-	54.8	-
H3500	-	8.0	-	0.2	-	20.0	71.8	-
H5G	-	-	-	-	-	17.2	65.5	17.3
B750	0.2	-	0.2	0.8	48.8	-	50.0	-
B835	0.2	-	0.2	0.9	48.5	-	50.2	-
B900	0.2	-	0.2	0.9	48.2	-	50.5	-
B1450	-	34.0	-	0.3	-	-	65.7	-
B1640	-	32.5	-	0.3	-	-	67.2	-
B1750	-	31.0	-	0.2	-	-	68.8	-
B1800	-	29.5	-	0.4	-	-	70.1	-
B1900	-	29.5	-	0.3	-	-	70.2	-
B2000	-	30.0	-	0.2	-	-	69.8	-
B2300	-	31.0	-	0.1	-	-	68.9	-
B2450	-	31.4	-	0.1	-	-	68.5	-
B2600	-	31.8	-	0.1	-	-	68.1	-
B3500	-	28.8	-	0.1	-	-	71.1	-
B5G	-	-	-	-	-	10.7	78.6	10.7

3.3 SAR System Verification

The system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. The system verification setup is shown as below.

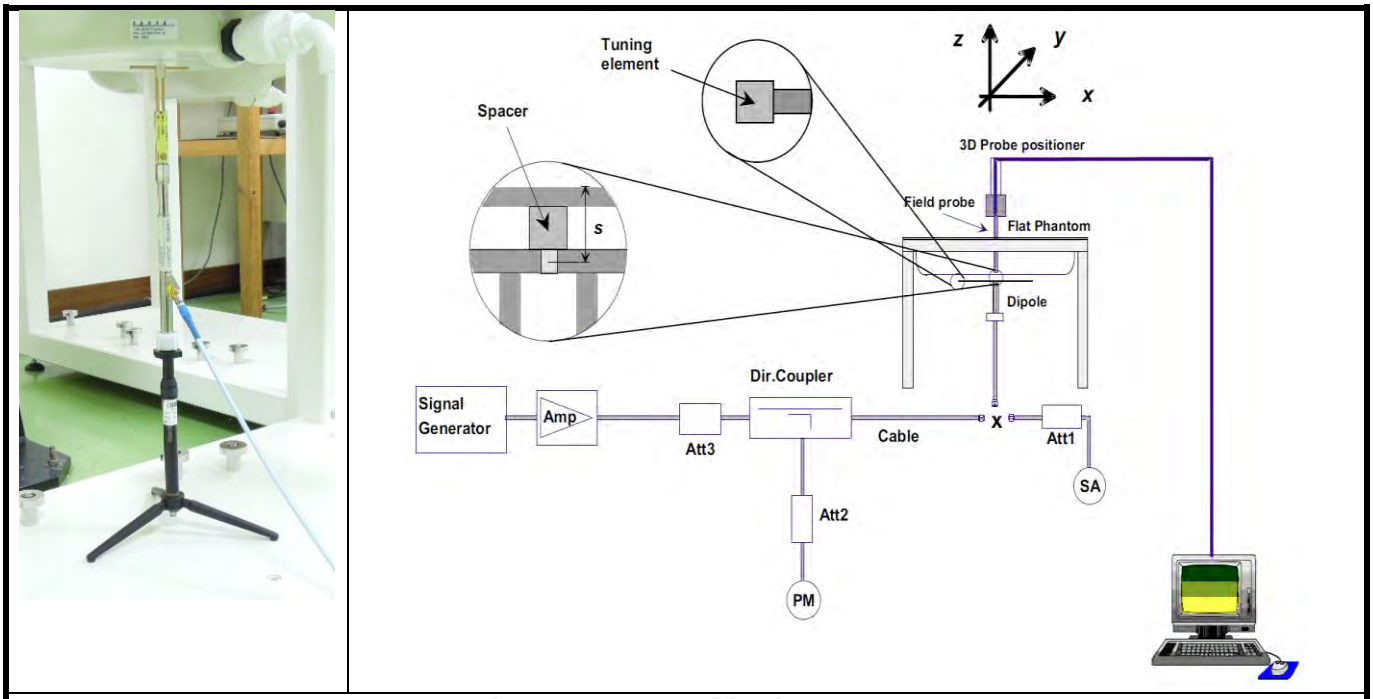


Fig-3.4 System Verification Setup

The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The spectrum analyzer measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power (250 mW is used for 700 MHz to 3 GHz, 100 mW is used for 3.5 GHz to 6 GHz) at the dipole connector and the power meter is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter.

After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

3.4 SAR Measurement Procedure

According to the SAR test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

The SAR measurement procedures for each of test conditions are as follows:

(a) Make EUT to transmit maximum output power
(b) Measure conducted output power through RF cable
(c) Place the EUT in the specific position of phantom
(d) Perform SAR testing steps on the DASY system
(e) Record the SAR value

3.4.1 Area & Zoom Scan Procedure

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. According to KDB 865664 D01, the resolution for Area and Zoom scan is specified in the table below.

Items	<= 2 GHz	2-3 GHz	3-4 GHz	4-5 GHz	5-6 GHz
Area Scan (Δx, Δy)	<= 15 mm	<= 12 mm	<= 12 mm	<= 10 mm	<= 10 mm
Zoom Scan (Δx, Δy)	<= 8 mm	<= 5 mm	<= 5 mm	<= 4 mm	<= 4 mm
Zoom Scan (Δz)	<= 5 mm	<= 5 mm	<= 4 mm	<= 3 mm	<= 2 mm
Zoom Scan Volume	>= 30 mm	>= 30 mm	>= 28 mm	>= 25 mm	>= 22 mm

Note:

When zoom scan is required and report SAR is <= 1.4 W/kg, the zoom scan resolution of Δx / Δy (2-3GHz: <= 8 mm, 3-4GHz: <= 7 mm, 4-6GHz: <= 5 mm) may be applied.

3.4.2 Volume Scan Procedure

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

3.4.3 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.

3.4.4 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

3.4.5 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard’s method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

4. SAR Measurement Evaluation

4.1 EUT Configuration and Setting

For WWAN SAR testing, the EUT was linked and controlled by base station emulator (Agilent E5515C). Communication between the EUT and the emulator was established by air link. The distance between the EUT and the communicating antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT. The EUT was set from the emulator to radiate maximum output power during SAR testing.

For GSM850, the power control level is set to 5. For GPRS850 (GMSK, CS1), the power control level is set to 5. For EDGE850 (8PSK:MCS9), the power control level is set to 8. For GSM1900, the power control level is set to 0. For GPRS1900 (GMSK, CS1), the power control level is set to 0. For EDGE1900 (8PSK:MCS9), the power control level is set to 2.

For WCDMA, head and body SAR is tested under 12.2k RMC mode with power control set all up bits. SAR for AMR is not required since its power is less than 1/4 dB higher than RMC. SAR for HSDPA/HSUPA is not required since its power is less than 1/4 dB higher than RMC without HSDPA/HSUPA and SAR for 12.2 kbps RMC is less than 75% of the SAR limit (1.2 W/kg).

For CDMA, SAR is tested under EVDO Rev.0 mode using Reverse Data Channel rate of 153.6 kbps in subtype 0/1 Physical Layer Configurations, and the power control set “All Up Bits”. SAR for EVDO Rev.A is not required since its power is less than EVDO Rev.0. SAR for 1xRTT is not required since its power is less than 1/4 dB higher than EVDO Rev.0. The steps for system simulator (Agilent E5515C) setup are as below.

1. Set the Sector ID
2. Set the Protocol Release
3. Set the Cell Band and connecting Channel
4. Set the RTAP Rate
5. Set the power control
6. Press “Start Data Connection” button

For LTE, set the related parameters of operating band, channel bandwidth, uplink channel number, modulation type, and RB in base station simulator. When the EUT has registered and communicated to base station simulator, set the simulator to make EUT transmitting the maximum radiated power. The steps for system simulator (Anritsu MT8820C) setup are as below.

1. Press the “Std” button to select “LTE 22.20S” function
2. Choose the “Screen Select” item to “Fundamental Measurement”
3. Enter the “Common” item
4. Set the Operating Band
5. Set the Channel Bandwidth
6. Set the UL Channel & Frequency
7. Set the Modulation
8. Set the RB number and RB shift
9. Press “Start Call” button when EUT register to the system simulator
10. Set the TX-1 Max. Power to make the EUT transmit maximum output power

4.2 EUT Testing Position

All antennas were tested for all six surfaces (Front Face, Rear Face, Left Side, Right Side, Top Side, and Bottom Side) with 2.5 cm air gap.

4.3 Tissue Verification

The measuring results for tissue simulating liquid are shown as below.

Test Date	Tissue Type	Frequency (MHz)	Liquid Temp. (℃)	Measured Conductivity (σ)	Measured Permittivity (ε_r)	Target Conductivity (σ)	Target Permittivity (ε_r)	Conductivity Deviation (%)	Permittivity Deviation (%)
Jan. 05, 2015	Body	750	21.6	0.968	55.448	0.96	55.5	0.83	-0.09
Jan. 09, 2015	Body	750	21.4	0.966	55.243	0.96	55.5	0.63	-0.46
Jan. 05, 2015	Body	835	21.6	0.992	56.824	0.97	55.2	2.27	2.94
Jan. 06, 2015	Body	835	21.2	0.991	55.186	0.97	55.2	2.16	-0.03
Jan. 09, 2015	Body	835	21.4	0.993	55.526	0.97	55.2	2.37	0.59
Jan. 07, 2015	Body	1750	21.7	1.498	52.238	1.49	53.4	0.54	-2.18
Jan. 01, 2015	Body	1900	21.1	1.545	52.324	1.52	53.3	1.64	-1.83
Jan. 07, 2015	Body	1900	21.7	1.569	53.013	1.52	53.3	3.22	-0.54
Jan. 09, 2015	Body	2600	21.8	2.208	52.423	2.16	52.5	2.22	-0.15
Jan. 14, 2015	Body	2600	21.3	2.199	52.429	2.16	52.5	1.81	-0.14

Note:

The dielectric properties of the tissue simulating liquid must be measured within 24 hours before the SAR testing and within ±5% of the target values. Liquid temperature during the SAR testing must be within ±2 ℃.

4.4 System Validation

The SAR measurement system was validated according to procedures in KDB 865664 D01. The validation status in tabulated summary is as below.

Test Date	Probe S/N	Calibration Point		Measured Conductivity (σ)	Measured Permittivity (ε_r)	Validation for CW			Validation for Modulation		
						Sensitivity Range	Probe Linearity	Probe Isotropy	Modulation Type	Duty Factor	PAR
Jan. 05, 2015	3864	Body	750	0.968	55.448	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 09, 2015	3971	Body	750	0.966	55.243	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 05, 2015	3864	Body	835	0.992	56.824	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 06, 2015	3971	Body	835	0.991	55.186	Pass	Pass	Pass	GMSK	Pass	N/A
Jan. 09, 2015	3971	Body	835	0.993	55.526	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 07, 2015	3971	Body	1750	1.498	52.238	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 01, 2015	3971	Body	1900	1.545	52.324	Pass	Pass	Pass	GMSK	Pass	N/A
Jan. 07, 2015	3971	Body	1900	1.569	53.013	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 09, 2015	3971	Body	2600	2.208	52.423	Pass	Pass	Pass	N/A	N/A	N/A
Jan. 14, 2015	3971	Body	2600	2.199	52.429	Pass	Pass	Pass	N/A	N/A	N/A

4.5 System Verification

The measuring result for system verification is tabulated as below.

Test Date	Mode	Frequency (MHz)	1W Target SAR-1g (W/kg)	Measured SAR-1g (W/kg)	Normalized to 1W SAR-1g (W/kg)	Deviation (%)	Dipole S/N	Probe S/N	DAE S/N
Jan. 05, 2015	Body	750	8.71	2.22	8.88	1.95	1013	3864	510
Jan. 09, 2015	Body	750	8.71	2.30	9.20	5.63	1013	3971	1431
Jan. 05, 2015	Body	835	9.55	2.31	9.24	-3.25	4d121	3864	510
Jan. 06, 2015	Body	835	9.55	2.30	9.20	-3.66	4d121	3971	1431
Jan. 09, 2015	Body	835	9.55	2.33	9.32	-2.41	4d121	3971	1431
Jan. 07, 2015	Body	1750	37.70	9.64	38.56	2.28	1055	3971	1431
Jan. 01, 2015	Body	1900	41.00	9.72	38.88	-5.17	5d036	3971	1431
Jan. 07, 2015	Body	1900	41.00	9.77	39.08	-4.68	5d036	3971	1431
Jan. 09, 2015	Body	2600	56.50	13.00	52.00	-7.96	1020	3971	1431
Jan. 14, 2015	Body	2600	56.50	13.80	55.20	-2.30	1020	3971	1431

Note:

Comparing to the reference SAR value provided by SPEAG, the validation data should be within its specification of 10 %. The result indicates the system check can meet the variation criterion and the plots can be referred to Appendix A of this report.

4.6 Maximum Output Power

4.6.1 Maximum Conducted Power

The maximum conducted average power (Unit: dBm) including tune-up tolerance is shown as below.

Mode	GSM850	GSM1900
GPRS (GMSK, 1Tx-slot)	34.0	31.0
GPRS (GMSK, 2Tx-slot)	33.0	31.0
GPRS (GMSK, 3Tx-slot)	33.0	31.0
GPRS (GMSK, 4Tx-slot)	33.0	31.0
EDGE (8PSK, 1Tx-slot)	29.0	27.0
EDGE (8PSK, 2Tx-slot)	28.0	27.0
EDGE (8PSK, 3Tx-slot)	28.0	27.0
EDGE (8PSK, 4Tx-slot)	28.0	27.0

Mode	WCDMA Band II	WCDMA Band IV	WCDMA Band V
RMC 12.2K	26.0	27.0	26.0
HSDPA	25.0	25.0	25.0
HSUPA	25.0	26.0	25.0

Mode	CDMA BC0	CDMA BC1	CDMA BC10
1xRTT	26.0	26.0	26.0
1xEVDO Rev.0	26.0	26.0	26.0
1xEVDO Rev.A	26.0	26.0	26.0

Mode	LTE 2	LTE 4	LTE 5
QPSK / 16QAM	26.0	26.0	25.0

Mode	LTE 7	LTE 12	LTE 13
QPSK / 16QAM	26.0	25.0	25.0

Mode	LTE 17	LTE 25	LTE 26
QPSK / 16QAM	25.0	26.0	25.0

4.6.2 Measured Conducted Power Result

The measuring conducted average power (Unit: dBm) is shown as below.

Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency (MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
Maximum Burst-Averaged Output Power						
GPRS (GMSK, 1Tx-slot)	32.04	**32.09**	32.06	29.60	29.58	**29.87**
GPRS (GMSK, 2Tx-slot)	31.86	31.91	31.88	29.55	29.53	29.77
GPRS (GMSK, 3Tx-slot)	31.63	31.68	31.65	29.54	29.52	29.76
GPRS (GMSK, 4Tx-slot)	31.41	31.46	31.43	29.49	29.47	29.71
EDGE (8PSK, 1Tx-slot)	26.96	27.01	26.98	25.65	25.63	25.87
EDGE (8PSK, 2Tx-slot)	26.89	26.94	26.91	25.58	25.56	25.80
EDGE (8PSK, 3Tx-slot)	26.72	26.77	26.74	25.50	25.48	25.72
EDGE (8PSK, 4Tx-slot)	26.56	26.61	26.58	25.47	25.45	25.69
Maximum Frame-Averaged Output Power						
GPRS (GMSK, 1Tx-slot)	23.04	23.09	23.06	20.60	20.58	20.87
GPRS (GMSK, 2Tx-slot)	25.86	25.91	25.88	23.55	23.53	23.77
GPRS (GMSK, 3Tx-slot)	27.37	27.42	27.39	25.28	25.26	25.50
GPRS (GMSK, 4Tx-slot)	28.41	**28.46**	28.43	26.49	26.47	**26.71**
EDGE (8PSK, 1Tx-slot)	17.96	18.01	17.98	16.65	16.63	16.87
EDGE (8PSK, 2Tx-slot)	20.89	20.94	20.91	19.58	19.56	19.80
EDGE (8PSK, 3Tx-slot)	22.46	22.51	22.48	21.24	21.22	21.46
EDGE (8PSK, 4Tx-slot)	23.56	23.61	23.58	22.47	22.45	22.69

Note:

1. SAR testing was performed on the maximum frame-averaged power mode.
2. The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:
   Frame-averaged power = 10 x log (Burst-averaged power mW x Slot used / 8)

Band	WCDMA Band II			WCDMA Band IV			WCDMA Band V			3GPP MPR (dB)
Channel	9262	9400	9538	1312	1413	1513	4132	4182	4233	
Frequency (MHz)	1852.4	1880.0	1907.6	1712.4	1732.6	1752.6	826.4	836.4	846.6	
RMC 12.2K	24.88	**24.90**	24.77	24.98	24.63	**25.25**	24.14	**24.35**	24.10	-
HSDPA Subtest-1	23.83	23.80	23.82	23.75	23.84	23.76	23.37	23.34	23.29	0
HSDPA Subtest-2	23.72	23.76	23.68	23.53	23.74	23.78	23.44	23.46	23.34	0
HSDPA Subtest-3	23.19	23.24	23.26	23.40	23.27	23.27	22.92	22.95	22.84	0.5
HSDPA Subtest-4	23.23	23.30	23.22	23.44	23.33	23.23	22.88	22.92	22.90	0.5
HSUPA Subtest-1	23.70	23.80	23.80	23.90	23.90	24.00	23.40	23.53	23.30	0
HSUPA Subtest-2	22.67	22.71	22.76	22.80	22.89	22.84	22.34	22.44	22.29	2
HSUPA Subtest-3	22.25	22.33	22.26	22.23	22.32	22.12	22.00	22.14	21.91	1
HSUPA Subtest-4	22.61	22.67	22.77	22.43	22.72	22.72	22.28	22.27	22.26	2
HSUPA Subtest-5	23.50	23.13	23.31	23.10	23.89	23.79	22.97	23.50	22.91	0

Band	CDMA BC0			CDMA BC1		
Channel	1013	384	777	25	600	1175
Frequency (MHz)	824.70	836.52	848.31	1851.25	1880.00	1908.75
1xRTT RC1+SO55	24.43	24.49	24.44	24.68	24.66	24.66
1xRTT RC3+SO55	24.48	**24.53**	24.49	24.59	**24.75**	24.57
1xRTT RC3+SO32 (FCH)	24.43	24.48	24.44	24.59	24.66	24.57
1xRTT RC3+SO32 (SCH)	24.44	24.46	24.45	24.58	24.65	24.56
1xEVDO Rev.0 RTAP 153.6	24.44	24.44	24.45	24.59	24.66	24.57
1xEVDO Rev.A RETAP 4096	24.49	24.52	24.50	24.64	24.71	24.62

Band	CDMA BC10		
Channel	476	580	684
Frequency (MHz)	817.9	820.5	823.1
1xRTT RC1+SO55	24.63	24.59	24.47
1xRTT RC3+SO55	**24.68**	24.54	24.42
1xRTT RC3+SO32 (FCH)	24.60	24.51	24.39
1xRTT RC3+SO32 (SCH)	24.61	24.52	24.40
1xEVDO Rev.0 RTAP 153.6	24.61	24.52	24.40
1xEVDO Rev.A RETAP 4096	24.65	24.56	24.44

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 18607 1850.7 MHz	Mid CH 18900 1880.0 MHz	High CH 19193 1909.3 MHz		Low CH 18607 1850.7 MHz	Mid CH 18900 1880.0 MHz	High CH 19193 1909.3 MHz	
2 / 1.4M	1	0	23.83	**23.93**	23.85	0	22.73	**22.83**	22.75	1
	1	2	23.78	23.70	23.58	0	22.68	22.60	22.48	1
	1	5	23.69	23.68	23.67	0	22.59	22.58	22.57	1
	3	0	23.76	23.87	23.79	0	22.66	22.77	22.69	1
	3	1	23.75	23.78	23.78	0	22.65	22.68	22.68	1
	3	3	23.80	23.81	23.72	0	22.70	22.71	22.62	1
	6	0	22.79	22.79	22.80	1	21.69	21.69	21.70	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 18615 1851.5 MHz	Mid CH 18900 1880.0 MHz	High CH 19185 1908.5 MHz		Low CH 18615 1851.5 MHz	Mid CH 18900 1880.0 MHz	High CH 19185 1908.5 MHz	
2 / 3M	1	0	23.78	**23.89**	23.81	0	22.71	**22.82**	22.74	1
	1	7	23.80	23.72	23.60	0	22.73	22.65	22.53	1
	1	14	23.71	23.70	23.69	0	22.64	22.63	22.62	1
	8	0	22.85	22.95	22.87	1	21.78	21.88	21.80	2
	8	3	22.77	22.80	22.80	1	21.70	21.73	21.73	2
	8	7	22.82	22.83	22.74	1	21.75	21.76	21.67	2
	15	0	22.81	22.81	22.82	1	21.74	21.74	21.75	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 18625 1852.5 MHz	Mid CH 18900 1880.0 MHz	High CH 19175 1907.5 MHz		Low CH 18625 1852.5 MHz	Mid CH 18900 1880.0 MHz	High CH 19175 1907.5 MHz	
2 / 5M	1	0	23.82	**23.93**	23.85	0	22.79	**22.90**	22.82	1
	1	12	23.84	23.76	23.64	0	22.81	22.73	22.61	1
	1	24	23.75	23.74	23.73	0	22.72	22.71	22.70	1
	12	0	22.89	22.99	22.91	1	21.86	21.96	21.88	2
	12	6	22.81	22.84	22.84	1	21.78	21.81	21.81	2
	12	13	22.86	22.87	22.78	1	21.83	21.84	21.75	2
	25	0	22.85	22.85	22.86	1	21.82	21.82	21.83	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 18650 1855.0 MHz	Mid CH 18900 1880.0 MHz	High CH 19150 1905.0 MHz		Low CH 18650 1855.0 MHz	Mid CH 18900 1880.0 MHz	High CH 19150 1905.0 MHz	
2 / 10M	1	0	23.88	**23.99**	23.91	0	22.83	**22.94**	22.86	1
	1	24	23.90	23.82	23.70	0	22.85	22.77	22.65	1
	1	49	23.81	23.80	23.79	0	22.76	22.75	22.74	1
	25	0	22.95	23.05	22.97	1	21.90	22.00	21.92	2
	25	12	22.87	22.90	22.90	1	21.82	21.85	21.85	2
	25	25	22.92	22.93	22.84	1	21.87	21.88	21.79	2
	50	0	22.91	22.91	22.92	1	21.86	21.86	21.87	2

LTE Band / BW	RB Size	RB Offset	QPSK Low CH 18675 1857.5 MHz	QPSK Mid CH 18900 1880.0 MHz	QPSK High CH 19125 1902.5 MHz	3GPP MPR (dB)	16QAM Low CH 18675 1857.5 MHz	16QAM Mid CH 18900 1880.0 MHz	16QAM High CH 19125 1902.5 MHz	3GPP MPR (dB)
2 / 15M	1	0	23.92	**24.03**	23.95	0	22.85	**22.96**	22.88	1
	1	37	23.94	23.86	23.74	0	22.87	22.79	22.67	1
	1	74	23.85	23.84	23.83	0	22.78	22.77	22.76	1
	36	0	22.99	23.09	23.01	1	21.92	22.02	21.94	2
	36	19	22.91	22.94	22.94	1	21.84	21.87	21.87	2
	36	39	22.96	22.97	22.88	1	21.89	21.90	21.81	2
	75	0	22.95	22.95	22.96	1	21.88	21.88	21.89	2

LTE Band / BW	RB Size	RB Offset	QPSK Low CH 18700 1860.0 MHz	QPSK Mid CH 18900 1880.0 MHz	QPSK High CH 19100 1900.0 MHz	3GPP MPR (dB)	16QAM Low CH 18700 1860.0 MHz	16QAM Mid CH 18900 1880.0 MHz	16QAM High CH 19100 1900.0 MHz	3GPP MPR (dB)
2 / 20M	1	0	23.99	**24.10**	24.02	0	22.91	**23.02**	22.94	1
	1	50	24.01	23.93	23.81	0	22.93	22.85	22.73	1
	1	99	23.92	23.91	23.90	0	22.84	22.83	22.82	1
	50	0	23.06	23.16	23.08	1	21.98	22.08	22.00	2
	50	25	22.98	23.01	23.01	1	21.90	21.93	21.93	2
	50	50	23.03	23.04	22.95	1	21.95	21.96	21.87	2
	100	0	23.02	23.02	23.03	1	21.94	21.94	21.95	2

LTE Band / BW	RB Size	RB Offset	QPSK Low CH 19957 1710.7 MHz	QPSK Mid CH 20175 1732.5 MHz	QPSK High CH 20393 1754.3 MHz	3GPP MPR (dB)	16QAM Low CH 19957 1710.7 MHz	16QAM Mid CH 20175 1732.5 MHz	16QAM High CH 20393 1754.3 MHz	3GPP MPR (dB)
4 / 1.4M	1	0	23.80	**24.13**	23.74	0	22.89	**23.22**	22.83	1
	1	2	23.72	23.65	23.72	0	22.81	22.74	22.81	1
	1	5	23.57	23.61	23.37	0	22.66	22.70	22.46	1
	3	0	23.92	23.76	23.79	0	23.01	22.85	22.88	1
	3	1	23.90	23.79	23.78	0	22.99	22.88	22.87	1
	3	3	23.79	23.91	23.65	0	22.88	23.00	22.74	1
	6	0	22.95	22.82	22.76	1	22.04	21.91	21.85	2

LTE Band / BW	RB Size	RB Offset	QPSK Low CH 19965 1711.5 MHz	QPSK Mid CH 20175 1732.5 MHz	QPSK High CH 20385 1753.5 MHz	3GPP MPR (dB)	16QAM Low CH 19965 1711.5 MHz	16QAM Mid CH 20175 1732.5 MHz	16QAM High CH 20385 1753.5 MHz	3GPP MPR (dB)
4 / 3M	1	0	23.81	**23.93**	23.67	0	22.93	**23.05**	22.79	1
	1	7	23.74	23.67	23.74	0	22.86	22.79	22.86	1
	1	14	23.59	23.63	23.39	0	22.71	22.75	22.51	1
	8	0	22.94	22.78	22.81	1	22.06	21.90	21.93	2
	8	3	22.92	22.81	22.80	1	22.04	21.93	21.92	2
	8	7	22.82	23.15	22.76	1	21.94	22.27	21.88	2
	15	0	22.97	22.84	22.78	1	22.09	21.96	21.90	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 19975	Mid CH 20175	High CH 20375		Low CH 19975	Mid CH 20175	High CH 20375	
			1712.5 MHz	1732.5 MHz	1752.5 MHz		1712.5 MHz	1732.5 MHz	1752.5 MHz	
4 / 5M	1	0	23.88	**24.00**	23.74	0	22.97	**23.09**	22.83	1
	1	12	23.81	23.74	23.81	0	22.90	22.83	22.90	1
	1	24	23.66	23.70	23.46	0	22.75	22.79	22.55	1
	12	0	23.01	22.85	22.88	1	22.10	21.94	21.97	2
	12	6	22.99	22.88	22.87	1	22.08	21.97	21.96	2
	12	13	22.89	23.22	22.83	1	21.98	22.31	21.92	2
	25	0	23.04	22.91	22.85	1	22.13	22.00	21.94	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 20000	Mid CH 20175	High CH 20350		Low CH 20000	Mid CH 20175	High CH 20350	
			1715.0 MHz	1732.5 MHz	1750.0 MHz		1715.0 MHz	1732.5 MHz	1750.0 MHz	
4 / 10M	1	0	23.94	**24.06**	23.80	0	22.98	**23.10**	22.84	1
	1	24	23.87	23.80	23.87	0	22.91	22.84	22.91	1
	1	49	23.72	23.76	23.52	0	22.76	22.80	22.56	1
	25	0	23.07	22.91	22.94	1	22.11	21.95	21.98	2
	25	12	23.05	22.94	22.93	1	22.09	21.98	21.97	2
	25	25	22.95	23.28	22.89	1	21.99	22.32	21.93	2
	50	0	23.10	22.97	22.91	1	22.14	22.01	21.95	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 20025	Mid CH 20175	High CH 20325		Low CH 20025	Mid CH 20175	High CH 20325	
			1717.5 MHz	1732.5 MHz	1747.5 MHz		1717.5 MHz	1732.5 MHz	1747.5 MHz	
4 / 15M	1	0	24.03	**24.15**	23.89	0	23.03	**23.15**	22.89	1
	1	37	23.96	23.89	23.96	0	22.96	22.89	22.96	1
	1	74	23.81	23.85	23.61	0	22.81	22.85	22.61	1
	36	0	23.16	23.00	23.03	1	22.16	22.00	22.03	2
	36	19	23.14	23.03	23.02	1	22.14	22.03	22.02	2
	36	39	23.04	23.37	22.98	1	22.04	22.37	21.98	2
	75	0	23.19	23.06	23.00	1	22.19	22.06	22.00	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 20050	Mid CH 20175	High CH 20300		Low CH 20050	Mid CH 20175	High CH 20300	
			1720.0 MHz	1732.5 MHz	1745.0 MHz		1720.0 MHz	1732.5 MHz	1745.0 MHz	
4 / 20M	1	0	24.11	**24.23**	23.97	0	23.06	**23.18**	22.92	1
	1	50	24.04	23.97	24.04	0	22.99	22.92	22.99	1
	1	99	23.89	23.93	23.69	0	22.84	22.88	22.64	1
	50	0	23.24	23.45	23.11	1	22.19	22.40	22.06	2
	50	25	23.22	23.11	23.10	1	22.17	22.06	22.05	2
	50	50	23.12	23.08	23.06	1	22.07	22.03	22.01	2
	100	0	23.27	23.14	23.08	1	22.22	22.09	22.03	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 20407	Mid CH 20525	High CH 20643		Low CH 20407	Mid CH 20525	High CH 20643	
			824.7 MHz	836.5 MHz	848.3 MHz		824.7 MHz	836.5 MHz	848.3 MHz	
5 / 1.4M	1	0	23.31	23.31	23.27	0	22.24	22.24	22.20	1
	1	2	23.33	**23.36**	23.29	0	22.26	**22.29**	22.22	1
	1	5	23.24	23.28	23.24	0	22.17	22.21	22.17	1
	3	0	23.33	23.35	23.29	0	22.26	22.28	22.22	1
	3	1	23.33	23.33	23.33	0	22.26	22.26	22.26	1
	3	3	23.20	23.32	23.27	0	22.13	22.25	22.20	1
	6	0	22.45	22.42	22.38	1	21.38	21.35	21.31	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 20415	Mid CH 20525	High CH 20635		Low CH 20415	Mid CH 20525	High CH 20635	
			825.5 MHz	836.5 MHz	847.5 MHz		825.5 MHz	836.5 MHz	847.5 MHz	
5 / 3M	1	0	23.37	23.37	23.33	0	22.28	22.28	22.24	1
	1	7	23.26	**23.38**	23.33	0	22.17	**22.29**	22.24	1
	1	14	23.30	23.34	23.30	0	22.21	22.25	22.21	1
	8	0	22.39	22.41	22.35	1	21.30	21.32	21.26	2
	8	3	22.39	22.39	22.39	1	21.30	21.30	21.30	2
	8	7	22.39	22.42	22.35	1	21.30	21.33	21.26	2
	15	0	22.51	22.48	22.44	1	21.42	21.39	21.35	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 20425	Mid CH 20525	High CH 20625		Low CH 20425	Mid CH 20525	High CH 20625	
			826.5 MHz	836.5 MHz	846.5 MHz		826.5 MHz	836.5 MHz	846.5 MHz	
5 / 5M	1	0	23.40	23.40	23.36	0	22.37	22.37	22.33	1
	1	12	23.29	**23.41**	23.36	0	22.26	**22.38**	22.33	1
	1	24	23.33	23.37	23.33	0	22.30	22.34	22.30	1
	12	0	22.42	22.44	22.38	1	21.39	21.41	21.35	2
	12	6	22.42	22.42	22.42	1	21.39	21.39	21.39	2
	12	13	22.42	22.45	22.38	1	21.39	21.42	21.35	2
	25	0	22.54	22.51	22.47	1	21.51	21.48	21.44	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 20450	Mid CH 20525	High CH 20600		Low CH 20450	Mid CH 20525	High CH 20600	
			829.0 MHz	836.5 MHz	844.0 MHz		829.0 MHz	836.5 MHz	844.0 MHz	
5 / 10M	1	0	23.48	23.48	23.44	0	22.42	22.42	22.38	1
	1	24	23.37	**23.49**	23.44	0	22.31	**22.43**	22.38	1
	1	49	23.41	23.45	23.41	0	22.35	22.39	22.35	1
	25	0	22.50	22.52	22.46	1	21.44	21.46	21.40	2
	25	12	22.50	22.53	22.50	1	21.44	21.47	21.44	2
	25	25	22.50	22.50	22.46	1	21.44	21.44	21.40	2
	50	0	22.62	22.59	22.55	1	21.56	21.53	21.49	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 20775	Mid CH 21100	High CH 21425		Low CH 20775	Mid CH 21100	High CH 21425	
			2502.5 MHz	2535.0 MHz	2567.5 MHz		2502.5 MHz	2535.0 MHz	2567.5 MHz	
7 / 5M	1	0	23.83	23.71	23.84	0	22.78	22.66	22.79	1
	1	12	23.81	23.92	23.66	0	22.76	22.87	22.61	1
	1	24	23.83	**23.99**	23.81	0	22.78	**22.94**	22.76	1
	12	0	22.75	23.00	22.86	1	21.70	21.95	21.81	2
	12	6	23.02	23.02	22.85	1	21.97	21.97	21.80	2
	12	13	22.83	23.19	22.82	1	21.78	22.14	21.77	2
	25	0	23.01	22.85	22.91	1	21.96	21.80	21.86	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 20800	Mid CH 21100	High CH 21400		Low CH 20800	Mid CH 21100	High CH 21400	
			2505.0 MHz	2535.0 MHz	2565.0 MHz		2505.0 MHz	2535.0 MHz	2565.0 MHz	
7 / 10M	1	0	23.90	23.78	23.91	0	22.82	22.70	22.83	1
	1	24	23.88	23.99	23.73	0	22.80	22.91	22.65	1
	1	49	23.90	**24.06**	23.88	0	22.82	**22.98**	22.80	1
	25	0	22.82	23.07	22.93	1	21.74	21.99	21.85	2
	25	12	23.09	23.09	22.92	1	22.01	22.01	21.84	2
	25	25	22.90	23.26	22.89	1	21.82	22.18	21.81	2
	50	0	23.08	22.92	22.98	1	22.00	21.84	21.90	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 20825	Mid CH 21100	High CH 21375		Low CH 20825	Mid CH 21100	High CH 21375	
			2507.5 MHz	2535.0 MHz	2562.5 MHz		2507.5 MHz	2535.0 MHz	2562.5 MHz	
7 / 15M	1	0	23.98	23.86	23.99	0	22.89	22.77	22.90	1
	1	37	23.96	24.07	23.81	0	22.87	22.98	22.72	1
	1	74	23.98	**24.14**	23.96	0	22.89	**23.05**	22.87	1
	36	0	22.90	23.15	23.01	1	21.81	22.06	21.92	2
	36	19	23.17	23.17	23.00	1	22.08	22.08	21.91	2
	36	39	22.98	23.34	22.97	1	21.89	22.25	21.88	2
	75	0	23.16	23.00	23.06	1	22.07	21.91	21.97	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 20850	Mid CH 21100	High CH 21350		Low CH 20850	Mid CH 21100	High CH 21350	
			2510.0 MHz	2535.0 MHz	2560.0 MHz		2510.0 MHz	2535.0 MHz	2560.0 MHz	
7 / 20M	1	0	24.01	23.89	24.02	0	22.94	22.82	22.95	1
	1	50	23.99	24.10	23.84	0	22.92	23.03	22.77	1
	1	99	24.01	**24.17**	23.99	0	22.94	**23.10**	22.92	1
	50	0	22.93	23.18	23.04	1	21.86	22.11	21.97	2
	50	25	23.20	23.20	23.03	1	22.13	22.13	21.96	2
	50	50	23.01	23.37	23.00	1	21.94	22.30	21.93	2
	100	0	23.19	23.03	23.09	1	22.12	21.96	22.02	2

LTE Band / BW	RB Size	RB Offset	QPSK Low CH 23017 699.7 MHz	QPSK Mid CH 23095 707.5 MHz	QPSK High CH 23173 715.3 MHz	3GPP MPR (dB)	16QAM Low CH 23017 699.7 MHz	16QAM Mid CH 23095 707.5 MHz	16QAM High CH 23173 715.3 MHz	3GPP MPR (dB)
12 / 1.4M	1	0	23.18	23.12	23.15	0	22.19	22.13	22.16	1
	1	2	23.10	23.20	23.21	0	22.11	22.21	22.22	1
	1	5	**23.37**	23.18	23.21	0	**22.38**	22.19	22.22	1
	3	0	23.33	23.17	23.20	0	22.34	22.18	22.21	1
	3	1	23.17	23.23	23.21	0	22.18	22.24	22.22	1
	3	3	23.24	23.24	23.23	0	22.25	22.25	22.24	1
	6	0	22.34	22.27	22.24	1	21.35	21.28	21.25	2

LTE Band / BW	RB Size	RB Offset	QPSK Low CH 23025 700.5 MHz	QPSK Mid CH 23095 707.5 MHz	QPSK High CH 23165 714.5 MHz	3GPP MPR (dB)	16QAM Low CH 23025 700.5 MHz	16QAM Mid CH 23095 707.5 MHz	16QAM High CH 23165 714.5 MHz	3GPP MPR (dB)
12 / 3M	1	0	23.22	23.16	23.19	0	22.22	22.16	22.19	1
	1	7	23.14	23.24	23.25	0	22.14	22.24	22.25	1
	1	14	**23.37**	23.21	23.24	0	**22.37**	22.21	22.24	1
	8	0	22.22	22.41	22.25	1	21.22	21.41	21.25	2
	8	3	22.21	22.27	22.25	1	21.21	21.27	21.25	2
	8	7	22.28	22.28	22.27	1	21.28	21.28	21.27	2
	15	0	22.38	22.31	22.28	1	21.38	21.31	21.28	2

LTE Band / BW	RB Size	RB Offset	QPSK Low CH 23035 701.5 MHz	QPSK Mid CH 23095 707.5 MHz	QPSK High CH 23155 713.5 MHz	3GPP MPR (dB)	16QAM Low CH 23035 701.5 MHz	16QAM Mid CH 23095 707.5 MHz	16QAM High CH 23155 713.5 MHz	3GPP MPR (dB)
12 / 5M	1	0	23.29	23.23	23.26	0	22.24	22.18	22.21	1
	1	12	23.21	23.31	23.32	0	22.16	22.26	22.27	1
	1	24	**23.44**	23.28	23.31	0	**22.39**	22.23	22.26	1
	12	0	22.29	22.48	22.32	1	21.24	21.43	21.27	2
	12	6	22.28	22.34	22.32	1	21.23	21.29	21.27	2
	12	13	22.35	22.35	22.34	1	21.30	21.30	21.29	2
	25	0	22.45	22.38	22.35	1	21.40	21.33	21.30	2

LTE Band / BW	RB Size	RB Offset	QPSK Low CH 23060 704.0 MHz	QPSK Mid CH 23095 707.5 MHz	QPSK High CH 23130 711.0 MHz	3GPP MPR (dB)	16QAM Low CH 23060 704.0 MHz	16QAM Mid CH 23095 707.5 MHz	16QAM High CH 23130 711.0 MHz	3GPP MPR (dB)
12 / 10M	1	0	23.35	23.29	23.32	0	22.27	22.21	22.24	1
	1	24	23.27	23.37	23.38	0	22.19	22.29	22.30	1
	1	49	**23.50**	23.34	23.37	0	**22.42**	22.26	22.29	1
	25	0	22.35	22.41	22.38	1	21.27	21.33	21.30	2
	25	12	22.34	22.40	22.38	1	21.26	21.32	21.30	2
	25	25	22.54	22.41	22.40	1	21.46	21.33	21.32	2
	50	0	22.51	22.44	22.41	1	21.43	21.36	21.33	2

LTE Band / BW	RB Size	RB Offset	QPSK Low CH 23205 779.5 MHz	QPSK Mid CH 23230 782.0 MHz	QPSK High CH 23255 784.5 MHz	3GPP MPR (dB)	16QAM Low CH 23205 779.5 MHz	16QAM Mid CH 23230 782.0 MHz	16QAM High CH 23255 784.5 MHz	3GPP MPR (dB)
13 / 5M	1	0	23.16	23.29	23.38	0	22.13	22.26	22.35	1
	1	12	23.25	23.38	23.47	0	22.22	22.35	22.44	1
	1	24	23.26	**23.48**	23.39	0	22.23	**22.45**	22.36	1
	12	0	22.31	22.44	22.53	1	21.28	21.41	21.50	2
	12	6	22.30	22.43	22.52	1	21.27	21.40	21.49	2
	12	13	22.32	22.45	22.54	1	21.29	21.42	21.51	2
	25	0	22.35	22.48	22.57	1	21.32	21.45	21.54	2

LTE Band / BW	RB Size	RB Offset	QPSK Mid CH 23230 782.0 MHz	3GPP MPR (dB)	16QAM Mid CH 23230 782.0 MHz	3GPP MPR (dB)
13 / 10M	1	0	23.23	0	21.97	1
	1	24	23.43	0	22.17	1
	1	49	**23.44**	0	**22.18**	1
	25	0	22.49	1	21.23	2
	25	12	22.53	1	21.27	2
	25	25	22.56	1	21.30	2
	50	0	22.58	1	21.32	2

LTE Band / BW	RB Size	RB Offset	QPSK Low CH 23755 706.5 MHz	QPSK Mid CH 23790 710.0 MHz	QPSK High CH 23825 713.5 MHz	3GPP MPR (dB)	16QAM Low CH 23755 706.5 MHz	16QAM Mid CH 23790 710.0 MHz	16QAM High CH 23825 713.5 MHz	3GPP MPR (dB)
17 / 5M	1	0	23.04	23.10	23.12	0	21.96	22.02	22.04	1
	1	12	23.05	23.11	23.13	0	21.97	22.03	22.05	1
	1	24	23.08	23.14	**23.16**	0	22.00	22.06	**22.08**	1
	12	0	22.07	22.13	22.15	1	20.99	21.05	21.07	2
	12	6	22.03	22.09	22.11	1	20.95	21.01	21.03	2
	12	13	22.11	22.17	22.19	1	21.03	21.09	21.11	2
	25	0	22.02	22.08	22.10	1	20.94	21.00	21.02	2

LTE Band / BW	RB Size	RB Offset	QPSK Low CH 23780 709.0 MHz	QPSK Mid CH 23790 710.0 MHz	QPSK High CH 23800 711.0 MHz	3GPP MPR (dB)	16QAM Low CH 23780 709.0 MHz	16QAM Mid CH 23790 710.0 MHz	16QAM High CH 23800 711.0 MHz	3GPP MPR (dB)
17 / 10M	1	0	23.16	23.22	23.24	0	22.12	22.18	22.20	1
	1	24	23.17	23.23	23.25	0	22.13	22.19	22.21	1
	1	49	23.20	23.26	**23.28**	0	22.16	22.22	**22.24**	1
	25	0	22.19	22.25	22.27	1	21.15	21.21	21.23	2
	25	12	22.15	22.21	22.23	1	21.11	21.17	21.19	2
	25	25	22.23	22.29	22.31	1	21.19	21.25	21.27	2
	50	0	22.14	22.20	22.22	1	21.10	21.16	21.18	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 26047	Mid CH 26365	High CH 26683		Low CH 26047	Mid CH 26365	High CH 26683	
			1850.7 MHz	1882.5 MHz	1914.3 MHz		1850.7 MHz	1882.5 MHz	1914.3 MHz	
25 / 1.4M	1	0	23.74	**24.06**	23.89	0	22.62	**22.94**	22.77	1
	1	2	23.79	23.72	23.62	0	22.67	22.60	22.50	1
	1	5	23.47	23.52	23.98	0	22.35	22.40	22.86	1
	3	0	23.89	23.86	23.81	0	22.77	22.74	22.69	1
	3	1	23.72	23.78	23.82	0	22.60	22.66	22.70	1
	3	3	23.82	23.82	23.86	0	22.70	22.70	22.74	1
	6	0	22.86	22.78	22.82	1	21.74	21.66	21.70	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 26055	Mid CH 26365	High CH 26675		Low CH 26055	Mid CH 26365	High CH 26675	
			1851.5 MHz	1882.5 MHz	1913.5 MHz		1851.5 MHz	1882.5 MHz	1913.5 MHz	
25 / 3M	1	0	23.75	**24.07**	23.90	0	22.70	**23.02**	22.85	1
	1	7	23.80	23.73	23.63	0	22.75	22.68	22.58	1
	1	14	23.48	23.53	23.99	0	22.43	22.48	22.94	1
	8	0	22.90	22.87	22.82	1	21.85	21.82	21.77	2
	8	3	22.73	22.79	22.83	1	21.68	21.74	21.78	2
	8	7	22.83	22.83	22.87	1	21.78	21.78	21.82	2
	15	0	22.87	22.79	22.83	1	21.82	21.74	21.78	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 26065	Mid CH 26365	High CH 26665		Low CH 26065	Mid CH 26365	High CH 26665	
			1852.5 MHz	1882.5 MHz	1912.5 MHz		1852.5 MHz	1882.5 MHz	1912.5 MHz	
25 / 5M	1	0	23.81	**24.13**	23.96	0	22.72	**23.04**	22.87	1
	1	12	23.86	23.79	23.69	0	22.77	22.70	22.60	1
	1	24	23.54	23.59	24.05	0	22.45	22.50	22.96	1
	12	0	22.96	22.93	22.88	1	21.87	21.84	21.79	2
	12	6	22.79	22.85	22.89	1	21.70	21.76	21.80	2
	12	13	22.89	22.89	22.93	1	21.80	21.80	21.84	2
	25	0	22.93	22.85	22.89	1	21.84	21.76	21.80	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 26090	Mid CH 26365	High CH 26640		Low CH 26090	Mid CH 26365	High CH 26640	
			1855.0 MHz	1882.5 MHz	1910.0 MHz		1855.0 MHz	1882.5 MHz	1910.0 MHz	
25 / 10M	1	0	23.87	**24.19**	24.02	0	22.75	**23.07**	22.90	1
	1	24	23.92	23.85	23.75	0	22.80	22.73	22.63	1
	1	49	23.60	23.65	24.11	0	22.48	22.53	22.99	1
	25	0	23.02	22.99	22.94	1	21.90	21.87	21.82	2
	25	12	22.85	22.91	22.95	1	21.73	21.79	21.83	2
	25	25	22.95	22.95	22.99	1	21.83	21.83	21.87	2
	50	0	22.99	22.91	22.95	1	21.87	21.79	21.83	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 26115	Mid CH 26365	High CH 26615		Low CH 26115	Mid CH 26365	High CH 26615	
			1857.5 MHz	1882.5 MHz	1907.5 MHz		1857.5 MHz	1882.5 MHz	1907.5 MHz	
25 / 15M	1	0	23.90	**24.22**	24.05	0	22.84	**23.16**	22.99	1
	1	37	23.95	23.88	23.78	0	22.89	22.82	22.72	1
	1	74	23.63	23.68	24.14	0	22.57	22.62	23.08	1
	36	0	23.05	23.02	22.97	1	21.99	21.96	21.91	2
	36	19	22.88	22.94	22.98	1	21.82	21.88	21.92	2
	36	39	22.98	22.98	23.02	1	21.92	21.92	21.96	2
	75	0	23.02	22.94	22.98	1	21.96	21.88	21.92	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 26140	Mid CH 26365	High CH 26590		Low CH 26140	Mid CH 26365	High CH 26590	
			1860.0 MHz	1882.5 MHz	1905.0 MHz		1860.0 MHz	1882.5 MHz	1905.0 MHz	
25 / 20M	1	0	23.96	**24.28**	24.11	0	22.91	**23.23**	23.06	1
	1	50	24.01	23.94	23.84	0	22.96	22.89	22.79	1
	1	99	23.69	23.74	24.20	0	22.64	22.69	23.15	1
	50	0	23.08	23.11	23.03	1	22.03	22.06	21.98	2
	50	25	22.94	23.00	23.04	1	21.89	21.95	21.99	2
	50	50	23.04	23.04	23.08	1	21.99	21.99	22.03	2
	100	0	23.08	23.00	23.04	1	22.03	21.95	21.99	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 26697	Mid CH 26865	High CH 27033		Low CH 26697	Mid CH 26865	High CH 27033	
			814.7 MHz	831.0 MHz	848.3 MHz		814.7 MHz	831.0 MHz	848.3 MHz	
26 / 1.4M	1	0	23.19	23.18	23.15	0	22.22	22.21	22.18	1
	1	2	**23.36**	23.26	23.27	0	**22.39**	22.29	22.30	1
	1	5	23.21	23.25	22.81	0	22.24	22.28	21.84	1
	3	0	23.34	23.21	23.19	0	22.37	22.24	22.22	1
	3	1	23.24	23.21	23.32	0	22.27	22.24	22.35	1
	3	3	23.35	23.18	23.19	0	22.38	22.21	22.22	1
	6	0	22.36	22.32	22.29	1	21.39	21.35	21.32	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 26705	Mid CH 26865	High CH 27025		Low CH 26705	Mid CH 26865	High CH 27025	
			815.5 MHz	831.0 MHz	847.5 MHz		815.5 MHz	831.0 MHz	847.5 MHz	
26 / 3M	1	0	23.25	23.24	23.21	0	22.26	22.25	22.22	1
	1	7	**23.41**	23.24	23.25	0	**22.42**	22.25	22.26	1
	1	14	23.27	23.31	22.87	0	22.28	22.32	21.88	1
	8	0	22.40	22.27	22.25	1	21.41	21.28	21.26	2
	8	3	22.30	22.27	22.38	1	21.31	21.28	21.39	2
	8	7	22.32	22.42	22.33	1	21.33	21.43	21.34	2
	15	0	22.42	22.38	22.35	1	21.43	21.39	21.36	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 26715	Mid CH 26865	High CH 27015		Low CH 26715	Mid CH 26865	High CH 27015	
			816.5 MHz	831.0 MHz	846.5 MHz		816.5 MHz	831.0 MHz	846.5 MHz	
26 / 5M	1	0	23.33	23.32	23.29	0	22.31	22.30	22.27	1
	1	12	**23.49**	23.32	23.33	0	**22.47**	22.30	22.31	1
	1	24	23.35	23.39	22.95	0	22.33	22.37	21.93	1
	12	0	22.48	22.35	22.33	1	21.46	21.33	21.31	2
	12	6	22.38	22.35	22.46	1	21.36	21.33	21.44	2
	12	13	22.40	22.50	22.41	1	21.38	21.48	21.39	2
	25	0	22.50	22.46	22.43	1	21.48	21.44	21.41	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 26740	Mid CH 26865	High CH 26990		Low CH 26740	Mid CH 26865	High CH 26990	
			819.0 MHz	831.0 MHz	844.0 MHz		819.0 MHz	831.0 MHz	844.0 MHz	
26 / 10M	1	0	23.42	23.41	23.38	0	22.36	22.35	22.32	1
	1	24	**23.58**	23.41	23.42	0	**22.52**	22.35	22.36	1
	1	49	23.44	23.48	23.04	0	22.38	22.42	21.98	1
	25	0	22.57	22.44	22.42	1	21.51	21.38	21.36	2
	25	12	22.47	22.44	22.55	1	21.41	21.38	21.49	2
	25	25	22.49	22.59	22.50	1	21.43	21.53	21.44	2
	50	0	22.59	22.55	22.52	1	21.53	21.49	21.46	2

LTE Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH 26765	Mid CH 26865	High CH 26965		Low CH 26765	Mid CH 26865	High CH 26965	
			821.5 MHz	831.0 MHz	841.5 MHz		821.5 MHz	831.0 MHz	841.5 MHz	
26 / 15M	1	0	23.16	23.15	23.12	0	22.09	22.08	22.05	1
	1	37	**23.32**	23.15	23.16	0	**22.25**	22.08	22.09	1
	1	74	23.18	23.22	22.78	0	22.11	22.15	21.71	1
	36	0	22.21	22.18	22.16	1	21.14	21.11	21.09	2
	36	19	22.33	22.18	22.29	1	21.26	21.11	21.22	2
	36	39	22.23	22.31	22.24	1	21.16	21.24	21.17	2
	75	0	22.33	22.29	22.26	1	21.26	21.22	21.19	2

4.7 SAR Testing Results

4.7.1 SAR Results for Body (Separation Distance is 2.5 cm Gap)

Plot No.	Band	Mode	Test Position	Ch.	Tx Antenna	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	GSM850	GPRS12	Front Face	189	1	33.0	31.46	1.43	-0.04	0.503	0.72
01	GSM850	GPRS12	Rear Face	189	1	33.0	31.46	1.43	-0.15	0.556	**0.79**
	GSM850	GPRS12	Left Side	189	1	33.0	31.46	1.43	-0.05	0.159	0.23
	GSM850	GPRS12	Right Side	189	1	33.0	31.46	1.43	-0.04	0.102	0.15
	GSM850	GPRS12	Top Side	189	1	33.0	31.46	1.43	-0.01	0.431	0.61
	GSM850	GPRS12	Bottom Side	189	1	33.0	31.46	1.43	0.11	0.071	0.10
	GSM1900	GPRS12	Front Face	810	2	31.0	29.71	1.35	-0.04	0.583	0.78
02	GSM1900	GPRS12	Rear Face	810	2	31.0	29.71	1.35	0.11	0.590	**0.79**
	GSM1900	GPRS12	Left Side	810	2	31.0	29.71	1.35	0.11	0.197	0.27
	GSM1900	GPRS12	Right Side	810	2	31.0	29.71	1.35	0	0	0.00
	GSM1900	GPRS12	Top Side	810	2	31.0	29.71	1.35	-0.11	0.220	0.30
	GSM1900	GPRS12	Bottom Side	810	2	31.0	29.71	1.35	0.11	0.029	0.04
	WCDMA II	RMC12.2K	Front Face	9400	2	26.0	24.9	1.29	0.04	0.382	0.49
03	WCDMA II	RMC12.2K	Rear Face	9400	2	26.0	24.9	1.29	-0.03	0.392	**0.50**
	WCDMA II	RMC12.2K	Left Side	9400	2	26.0	24.9	1.29	0.12	0.102	0.13
	WCDMA II	RMC12.2K	Right Side	9400	2	26.0	24.9	1.29	0	0	0.00
	WCDMA II	RMC12.2K	Top Side	9400	2	26.0	24.9	1.29	0.00	0.193	0.25
	WCDMA II	RMC12.2K	Bottom Side	9400	2	26.0	24.9	1.29	0.02	0.015	0.02
04	WCDMA IV	RMC12.2K	Front Face	1513	2	27.0	25.25	1.50	0.14	0.307	**0.46**
	WCDMA IV	RMC12.2K	Rear Face	1513	2	27.0	25.25	1.50	0.14	0.292	0.44
	WCDMA IV	RMC12.2K	Left Side	1513	2	27.0	25.25	1.50	0.11	0.021	0.03
	WCDMA IV	RMC12.2K	Right Side	1513	2	27.0	25.25	1.50	0	0	0.00
	WCDMA IV	RMC12.2K	Top Side	1513	2	27.0	25.25	1.50	-0.14	0.395	0.59
	WCDMA IV	RMC12.2K	Bottom Side	1513	2	27.0	25.25	1.50	0.11	0.025	0.04
05	WCDMA V	RMC12.2K	Front Face	4182	1	26.0	24.35	1.46	0.11	0.339	**0.50**
	WCDMA V	RMC12.2K	Rear Face	4182	1	26.0	24.35	1.46	-0.01	0.292	0.43
	WCDMA V	RMC12.2K	Left Side	4182	1	26.0	24.35	1.46	-0.02	0.064	0.09
	WCDMA V	RMC12.2K	Right Side	4182	1	26.0	24.35	1.46	0.01	0.041	0.06
	WCDMA V	RMC12.2K	Top Side	4182	1	26.0	24.35	1.46	0.09	0.174	0.25
	WCDMA V	RMC12.2K	Bottom Side	4182	1	26.0	24.35	1.46	0.15	0.031	0.05
06	CDMA BC0	RTAP 153.6	Front Face	777	1	26.0	24.45	1.43	0.07	0.422	**0.60**
	CDMA BC0	RTAP 153.6	Rear Face	777	1	26.0	24.45	1.43	-0.07	0.305	0.44
	CDMA BC0	RTAP 153.6	Left Side	777	1	26.0	24.45	1.43	-0.03	0.076	0.11
	CDMA BC0	RTAP 153.6	Right Side	777	1	26.0	24.45	1.43	0.04	0.05	0.07
	CDMA BC0	RTAP 153.6	Top Side	777	1	26.0	24.45	1.43	0.08	0.192	0.27
	CDMA BC0	RTAP 153.6	Bottom Side	777	1	26.0	24.45	1.43	-0.06	0.039	0.06
	CDMA BC1	RTAP 153.6	Front Face	600	2	26.0	24.66	1.36	0.11	0.301	0.41
07	CDMA BC1	RTAP 153.6	Rear Face	600	2	26.0	24.66	1.36	0.02	0.506	**0.69**
	CDMA BC1	RTAP 153.6	Left Side	600	2	26.0	24.66	1.36	0.06	0.087	0.12
	CDMA BC1	RTAP 153.6	Right Side	600	2	26.0	24.66	1.36	0.06	0.00705	0.01
	CDMA BC1	RTAP 153.6	Top Side	600	2	26.0	24.66	1.36	0.04	0.254	0.35
	CDMA BC1	RTAP 153.6	Bottom Side	600	2	26.0	24.66	1.36	0.18	0.016	0.02
	CDMA BC10	RTAP 153.6	Front Face	476	1	26.0	24.61	1.38	0.04	0.261	0.36
08	CDMA BC10	RTAP 153.6	Rear Face	476	1	26.0	24.61	1.38	0.06	0.287	**0.40**
	CDMA BC10	RTAP 153.6	Left Side	476	1	26.0	24.61	1.38	0	0.084	0.12
	CDMA BC10	RTAP 153.6	Right Side	476	1	26.0	24.61	1.38	0.13	0.054	0.07
	CDMA BC10	RTAP 153.6	Top Side	476	1	26.0	24.61	1.38	0	0.187	0.26
	CDMA BC10	RTAP 153.6	Bottom Side	476	1	26.0	24.61	1.38	0.11	0.036	0.05

Note:

1. SAR is performed on the highest power channel. When the reported SAR value of highest power channel is <= 0.8 W/kg, SAR testing for optional channel is not required.

Plot No.	Band	Mode	Test Position	Ch.	Tx Antenna	RB#	RB Offset	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
09	LTE 2	QPSK20M	Front Face	18900	2	1	0	26.0	24.1	1.55	0.09	0.486	**0.75**
	LTE 2	QPSK20M	Front Face	18900	2	50	0	25.0	23.16	1.53	0.03	0.317	0.48
10	LTE 2	QPSK20M	Rear Face	18900	2	1	0	26.0	24.1	1.55	0	0.318	0.49
	LTE 2	QPSK20M	Rear Face	18900	2	50	0	25.0	23.16	1.53	0.05	0.223	0.34
	LTE 2	QPSK20M	Left Side	18900	2	1	0	26.0	24.1	1.55	0.1	0.064	0.10
	LTE 2	QPSK20M	Left Side	18900	2	50	0	25.0	23.16	1.53	0.02	0.059	0.09
	LTE 2	QPSK20M	Right Side	18900	2	1	0	26.0	24.1	1.55	0.09	0.00468	0.01
	LTE 2	QPSK20M	Right Side	18900	2	50	0	25.0	23.16	1.53	0.02	0.00102	0.00
11	LTE 2	QPSK20M	Top Side	18900	2	1	0	26.0	24.1	1.55	0.10	0.274	0.42
	LTE 2	QPSK20M	Top Side	18900	2	50	0	25.0	23.16	1.53	-0.01	0.084	0.13
	LTE 2	QPSK20M	Bottom Side	18900	2	1	0	26.0	24.1	1.55	0.15	0.010	0.02
	LTE 2	QPSK20M	Bottom Side	18900	2	50	0	25.0	23.16	1.53	-0.01	0.003	0.00
	LTE 4	QPSK20M	Front Face	20175	2	1	0	26.0	24.23	1.50	0.12	0.259	0.39
	LTE 4	QPSK20M	Front Face	20175	2	50	0	25.0	23.45	1.43	0.03	0.208	0.30
	LTE 4	QPSK20M	Rear Face	20175	2	1	0	26.0	24.23	1.50	0.1	0.25	0.38
	LTE 4	QPSK20M	Rear Face	20175	2	50	0	25.0	23.45	1.43	0.06	0.157	0.22
	LTE 4	QPSK20M	Left Side	20175	2	1	0	26.0	24.23	1.50	-0.04	0.0076	0.01
	LTE 4	QPSK20M	Left Side	20175	2	50	0	25.0	23.45	1.43	0.01	0.00614	0.01
	LTE 4	QPSK20M	Right Side	20175	2	1	0	26.0	24.23	1.50	0.02	0.00271	0.00
	LTE 4	QPSK20M	Right Side	20175	2	50	0	25.0	23.45	1.43	0.01	0.00254	0.00
12	LTE 4	QPSK20M	Top Side	20175	2	1	0	26.0	24.23	1.50	0.00	0.436	**0.66**
	LTE 4	QPSK20M	Top Side	20175	2	50	0	25.0	23.45	1.43	-0.01	0.335	0.48
	LTE 4	QPSK20M	Bottom Side	20175	2	1	0	26.0	24.23	1.50	0.13	0.013	0.02
	LTE 4	QPSK20M	Bottom Side	20175	2	50	0	25.0	23.45	1.43	0.08	0.012	0.02
	LTE 5	QPSK10M	Front Face	20525	1	1	24	25.0	23.49	1.42	0.08	0.256	0.36
	LTE 5	QPSK10M	Front Face	20525	1	25	12	24.0	22.53	1.40	0.02	0.164	0.23
13	LTE 5	QPSK10M	Rear Face	20525	1	1	24	25.0	23.49	1.42	-0.01	0.303	**0.43**
	LTE 5	QPSK10M	Rear Face	20525	1	25	12	24.0	22.53	1.40	0.13	0.196	0.27
	LTE 5	QPSK10M	Left Side	20525	1	1	24	25.0	23.49	1.42	-0.02	0.061	0.09
	LTE 5	QPSK10M	Left Side	20525	1	25	12	24.0	22.53	1.40	-0.05	0.038	0.05
	LTE 5	QPSK10M	Right Side	20525	1	1	24	25.0	23.49	1.42	-0.09	0.023	0.03
	LTE 5	QPSK10M	Right Side	20525	1	25	12	24.0	22.53	1.40	-0.07	0.014	0.02
	LTE 5	QPSK10M	Top Side	20525	1	1	24	25.0	23.49	1.42	-0.05	0.138	0.20
	LTE 5	QPSK10M	Top Side	20525	1	25	12	24.0	22.53	1.40	0.1	0.091	0.13
	LTE 5	QPSK10M	Bottom Side	20525	1	1	24	25.0	23.49	1.42	0.09	0.028	0.04
	LTE 5	QPSK10M	Bottom Side	20525	1	25	12	24.0	22.53	1.40	0.07	0.017	0.02
14	LTE 7	QPSK20M	Front Face	21100	2	1	99	26.0	24.17	1.52	0.01	0.409	**0.62**
	LTE 7	QPSK20M	Front Face	21100	2	50	50	25.0	23.37	1.46	-0.18	0.320	0.47
	LTE 7	QPSK20M	Rear Face	21100	2	1	99	26.0	24.17	1.52	0.05	0.398	0.61
	LTE 7	QPSK20M	Rear Face	21100	2	50	50	25.0	23.37	1.46	0.06	0.307	0.45
	LTE 7	QPSK20M	Left Side	21100	2	1	99	26.0	24.17	1.52	0.08	0.017	0.03
	LTE 7	QPSK20M	Left Side	21100	2	50	50	25.0	23.37	1.46	-0.01	0.014	0.02
	LTE 7	QPSK20M	Right Side	21100	2	1	99	26.0	24.17	1.52	0.07	0.00943	0.01
	LTE 7	QPSK20M	Right Side	21100	2	50	50	25.0	23.37	1.46	0.11	0.00061	0.00
	LTE 7	QPSK20M	Top Side	21100	2	1	99	26.0	24.17	1.52	0.15	0.181	0.28
	LTE 7	QPSK20M	Top Side	21100	2	50	50	25.0	23.37	1.46	-0.1	0.141	0.21
	LTE 7	QPSK20M	Bottom Side	21100	2	1	99	26.0	24.17	1.52	0.09	0.038	0.06
	LTE 7	QPSK20M	Bottom Side	21100	2	50	50	25.0	23.37	1.46	0.01	0.028	0.04
	LTE 12	QPSK10M	Front Face	23060	0	1	49	25.0	23.5	1.41	0.03	0.217	0.31
	LTE 12	QPSK10M	Front Face	23060	0	25	25	24.0	22.54	1.40	0.1	0.182	0.25
15	LTE 12	QPSK10M	Rear Face	23060	0	1	49	25.0	23.5	1.41	-0.11	0.223	**0.31**
	LTE 12	QPSK10M	Rear Face	23060	0	25	25	24.0	22.54	1.40	0.13	0.186	0.26
	LTE 12	QPSK10M	Left Side	23060	0	1	49	25.0	23.5	1.41	0.09	0.085	0.12
	LTE 12	QPSK10M	Left Side	23060	0	25	25	24.0	22.54	1.40	0.11	0.068	0.10
	LTE 12	QPSK10M	Right Side	23060	0	1	49	25.0	23.5	1.41	-0.03	0.028	0.04
	LTE 12	QPSK10M	Right Side	23060	0	25	25	24.0	22.54	1.40	-0.15	0.021	0.03
	LTE 12	QPSK10M	Top Side	23060	0	1	49	25.0	23.5	1.41	0.08	0.091	0.13
	LTE 12	QPSK10M	Top Side	23060	0	25	25	24.0	22.54	1.40	-0.07	0.075	0.10
	LTE 12	QPSK10M	Bottom Side	23060	0	1	49	25.0	23.5	1.41	0.08	0.019	0.03
	LTE 12	QPSK10M	Bottom Side	23060	0	25	25	24.0	22.54	1.40	-0.1	0.014	0.02

Plot No.	Band	Mode	Test Position	Ch.	Tx Antenna	RB#	RB Offset	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	LTE 13	QPSK10M	Front Face	23230	1	1	49	25.0	23.44	1.43	0.08	0.196	0.28
	LTE 13	QPSK10M	Front Face	23230	1	25	25	24.0	22.56	1.39	0.05	0.154	0.21
16	LTE 13	QPSK10M	Rear Face	23230	1	1	49	25.0	23.44	1.43	0.03	0.238	**0.34**
	LTE 13	QPSK10M	Rear Face	23230	1	25	25	24.0	22.56	1.39	0.1	0.193	0.27
	LTE 13	QPSK10M	Left Side	23230	1	1	49	25.0	23.44	1.43	-0.11	0.092	0.13
	LTE 13	QPSK10M	Left Side	23230	1	25	25	24.0	22.56	1.39	-0.09	0.074	0.10
	LTE 13	QPSK10M	Right Side	23230	1	1	49	25.0	23.44	1.43	-0.04	0.022	0.03
	LTE 13	QPSK10M	Right Side	23230	1	25	25	24.0	22.56	1.39	0.07	0.016	0.02
	LTE 13	QPSK10M	Top Side	23230	1	1	49	25.0	23.44	1.43	0.09	0.128	0.18
	LTE 13	QPSK10M	Top Side	23230	1	25	25	24.0	22.56	1.39	-0.03	0.101	0.14
	LTE 13	QPSK10M	Bottom Side	23230	1	1	49	25.0	23.44	1.43	0.06	0.024	0.03
	LTE 13	QPSK10M	Bottom Side	23230	1	25	25	24.0	22.56	1.39	0.05	0.018	0.03
17	LTE 17	QPSK10M	Front Face	23800	0	1	49	25.0	23.28	1.49	0.03	0.261	**0.39**
	LTE 17	QPSK10M	Front Face	23800	0	25	25	24.0	22.31	1.48	-0.18	0.169	0.25
	LTE 17	QPSK10M	Rear Face	23800	0	1	49	25.0	23.28	1.49	-0.01	0.226	0.34
	LTE 17	QPSK10M	Rear Face	23800	0	25	25	24.0	22.31	1.48	0.02	0.145	0.21
	LTE 17	QPSK10M	Left Side	23800	0	1	49	25.0	23.28	1.49	0.02	0.081	0.12
	LTE 17	QPSK10M	Left Side	23800	0	25	25	24.0	22.31	1.48	0.05	0.053	0.08
	LTE 17	QPSK10M	Right Side	23800	0	1	49	25.0	23.28	1.49	0.13	0.024	0.04
	LTE 17	QPSK10M	Right Side	23800	0	25	25	24.0	22.31	1.48	-0.02	0.015	0.02
	LTE 17	QPSK10M	Top Side	23800	0	1	49	25.0	23.28	1.49	0.02	0.099	0.15
	LTE 17	QPSK10M	Top Side	23800	0	25	25	24.0	22.31	1.48	0.08	0.065	0.10
	LTE 17	QPSK10M	Bottom Side	23800	0	1	49	25.0	23.28	1.49	0.08	0.029	0.04
	LTE 17	QPSK10M	Bottom Side	23800	0	25	25	24.0	22.31	1.48	0.03	0.017	0.03
18	LTE 25	QPSK20M	Front Face	26365	2	1	0	26.0	24.28	1.49	0.14	0.479	**0.71**
	LTE 25	QPSK20M	Front Face	26365	2	50	0	25.0	23.11	1.55	-0.08	0.248	0.38
	LTE 25	QPSK20M	Rear Face	26365	2	1	0	26.0	24.28	1.49	0.08	0.324	0.48
	LTE 25	QPSK20M	Rear Face	26365	2	50	0	25.0	23.11	1.55	0.01	0.218	0.34
	LTE 25	QPSK20M	Left Side	26365	2	1	0	26.0	24.28	1.49	0.1	0.067	0.10
	LTE 25	QPSK20M	Left Side	26365	2	50	0	25.0	23.11	1.55	0.07	0.061	0.09
	LTE 25	QPSK20M	Right Side	26365	2	1	0	26.0	24.28	1.49	0.00	0.00252	0.00
	LTE 25	QPSK20M	Right Side	26365	2	50	0	25.0	23.11	1.55	0.09	0.000269	0.00
	LTE 25	QPSK20M	Top Side	26365	2	1	0	26.0	24.28	1.49	0.05	0.272	0.40
	LTE 25	QPSK20M	Top Side	26365	2	50	0	25.0	23.11	1.55	-0.02	0.204	0.32
	LTE 25	QPSK20M	Bottom Side	26365	2	1	0	26.0	24.28	1.49	0.13	0.00906	0.01
	LTE 25	QPSK20M	Bottom Side	26365	2	50	0	25.0	23.11	1.55	-0.04	0.00201	0.00
19	LTE 26	QPSK15M	Front Face	26765	1	1	37	25.0	23.32	1.47	0.02	0.301	**0.44**
	LTE 26	QPSK15M	Front Face	26765	1	36	19	24.0	22.33	1.47	-0.08	0.209	0.31
	LTE 26	QPSK15M	Rear Face	26765	1	1	37	25.0	23.32	1.47	-0.1	0.258	0.38
	LTE 26	QPSK15M	Rear Face	26765	1	36	19	24.0	22.33	1.47	0.07	0.177	0.26
	LTE 26	QPSK15M	Left Side	26765	1	1	37	25.0	23.32	1.47	0	0.06	0.09
	LTE 26	QPSK15M	Left Side	26765	1	36	19	24.0	22.33	1.47	0.02	0.041	0.06
	LTE 26	QPSK15M	Right Side	26765	1	1	37	25.0	23.32	1.47	0.15	0.033	0.05
	LTE 26	QPSK15M	Right Side	26765	1	36	19	24.0	22.33	1.47	-0.1	0.022	0.03
	LTE 26	QPSK15M	Top Side	26765	1	1	37	25.0	23.32	1.47	-0.03	0.166	0.24
	LTE 26	QPSK15M	Top Side	26765	1	36	19	24.0	22.33	1.47	-0.11	0.113	0.17
	LTE 26	QPSK15M	Bottom Side	26765	1	1	37	25.0	23.32	1.47	-0.1	0.019	0.03
	LTE 26	QPSK15M	Bottom Side	26765	1	36	19	24.0	22.33	1.47	-0.05	0.011	0.02

Note:

1. According to KDB 941225, LTE SAR testing for remaining RB offset configurations and required test channels is not required when the reported SAR of highest power 1RB configuration is less than 0.8 W/kg.
2. According to KDB 941225, LTE SAR testing for remaining RB offset configurations and required test channels is not required when the reported SAR of highest power 50% RB configuration is less than 0.8 W/kg.
3. According to KDB 941225, LTE SAR testing for 100% RB is not required when the maximum power of 100% RB is less than the maximum power of 1RB and 50% RB, and the highest reported SAR for 1RB and 50% RB is less than 0.8 W/kg.

4. According to KDB 941225, LTE SAR testing for 16QAM is not required when the maximum power of 16QAM is less 1/2 dB higher than QPSK, and the highest reported SAR of QPSK is less than 1.45 W/kg.
5. According to KDB 941225, LTE SAR testing for smaller channel bandwidth is not required when the maximum power of smaller channel bandwidth is less 1/2 dB higher than largest channel bandwidth, and the highest reported SAR of largest channel bandwidth is less than 1.45 W/kg.

4.7.2 SAR Measurement Variability

According to KDB 865664 D01, SAR measurement variability was assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 1.10, the highest SAR configuration for either head or body tissue-equivalent medium may be used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

Since all the measured SAR are less than 0.8 W/kg, the repeated measurement is not required.

Test Engineer：Raymond Wu, and Blake Wang

5. Calibration of Test Equipment

Equipment	Manufacturer	Model	SN	Cal. Date	Cal. Interval
System Validation Dipole	SPEAG	D750V3	1013	Aug. 28, 2014	2 Years
System Validation Dipole	SPEAG	D835V2	4d121	Aug. 28, 2014	2 Years
System Validation Dipole	SPEAG	D1750V2	1055	Aug. 28, 2014	2 Years
System Validation Dipole	SPEAG	D1900V2	5d036	Jan. 21, 2013	2 Years
System Validation Dipole	SPEAG	D2600V2	1020	Aug. 21, 2014	2 Years
Dosimetric E-Field Probe	SPEAG	EX3DV4	3864	Jul. 25, 2014	1 Year
Dosimetric E-Field Probe	SPEAG	EX3DV4	3971	Mar. 31, 2014	1 Year
Data Acquisition Electronics	SPEAG	DAE3	510	Aug. 26, 2014	1 Year
Data Acquisition Electronics	SPEAG	DAE4	1431	Mar. 24, 2014	1 Year
Wireless Communication Test Set	Agilent	E5515C	MY50260642	Nov. 25, 2013	2 Years
Radio Communication Analyzer	Anritsu	MT8802C	6201381727	May. 15, 2014	1 Year
ENA Series Network Analyzer	Agilent	E5071C	MY46214281	Jun. 13, 2014	1 Year
EXA Spectrum Analyzer	Agilent	N9010A	MY53470455	Feb. 22, 2014	1 Year
MXG Analong Signal Generator	Agilent	N5181A	MY50143868	Jun. 26, 2014	1 Year
Power Meter	Anritsu	ML2495A	1218009	Jun. 26, 2014	1 Year
Power Sensor	Anritsu	MA2411B	1207252	Jun. 26, 2014	1 Year
Thermometer	YFE	YF-160A	130504579	Aug. 21, 2014	1 Year

6. Measurement Uncertainty

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Standard Uncertainty (1g)	Vi
Measurement System						
Probe Calibration	6.0	Normal	1	1	± 6.0 %	∞
Axial Isotropy	4.7	Rectangular	√3	0.7	± 1.9 %	∞
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	± 3.9 %	∞
Boundary Effects	1.0	Rectangular	√3	1	± 0.6 %	∞
Linearity	4.7	Rectangular	√3	1	± 2.7 %	∞
System Detection Limits	1.0	Rectangular	√3	1	± 0.6 %	∞
Readout Electronics	0.6	Normal	1	1	± 0.6 %	∞
Response Time	0.0	Rectangular	√3	1	± 0.0 %	∞
Integration Time	1.7	Rectangular	√3	1	± 1.0 %	∞
RF Ambient Noise	3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Reflections	3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	0.5	Rectangular	√3	1	± 0.3 %	∞
Probe Positioning	2.9	Rectangular	√3	1	± 1.7 %	∞
Max. SAR Eval.	2.3	Rectangular	√3	1	± 1.3 %	∞
Test Sample Related						
Device Positioning	3.9	Normal	1	1	± 3.9 %	31
Device Holder	2.7	Normal	1	1	± 2.7 %	19
Power Drift	5.0	Rectangular	√3	1	± 2.9 %	∞
Phantom and Setup						
Phantom Uncertainty	4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	± 1.8 %	∞
Liquid Conductivity (Meas.)	5.0	Normal	1	0.64	± 3.2 %	29
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	± 1.7 %	∞
Liquid Permittivity (Meas.)	5.0	Normal	1	0.6	± 3.0 %	29
Combined Standard Uncertainty					± 11.7 %	
Expanded Uncertainty (K=2)					**± 23.4 %**	

Uncertainty budget for frequency range 300 MHz to 3 GHz

7. Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.adt.com.tw

The road map of all our labs can be found in our web site also.

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Appendix A. SAR Plots of System Verification

The plots for system verification with largest deviation for each SAR system combination are shown as follows.

Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2015/01/09

System Check_B750_150109

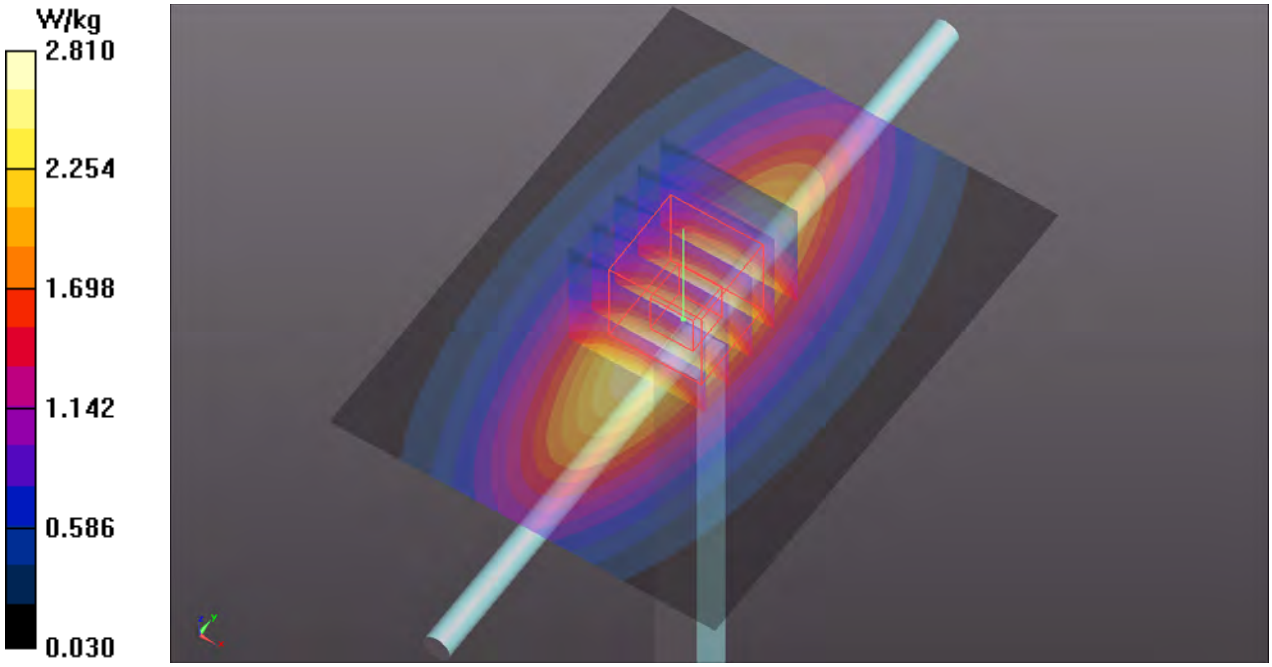
DUT: Dipole 750 MHz; Type: D750V3; SN: 1013

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: B07T08N3_0109 Medium parameters used: f = 750 MHz; σ = 0.966 S/m; ε_r = 55.243; ρ = 1000 kg/m^3
Ambient Temperature：21.6 ℃; Liquid Temperature：21.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(9.91, 9.91, 9.91); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.81 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 54.99 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 3.32 W/kg
SAR(1 g) = 2.3 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (measured) = 2.87 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2015/01/06

System Check_B835_150106

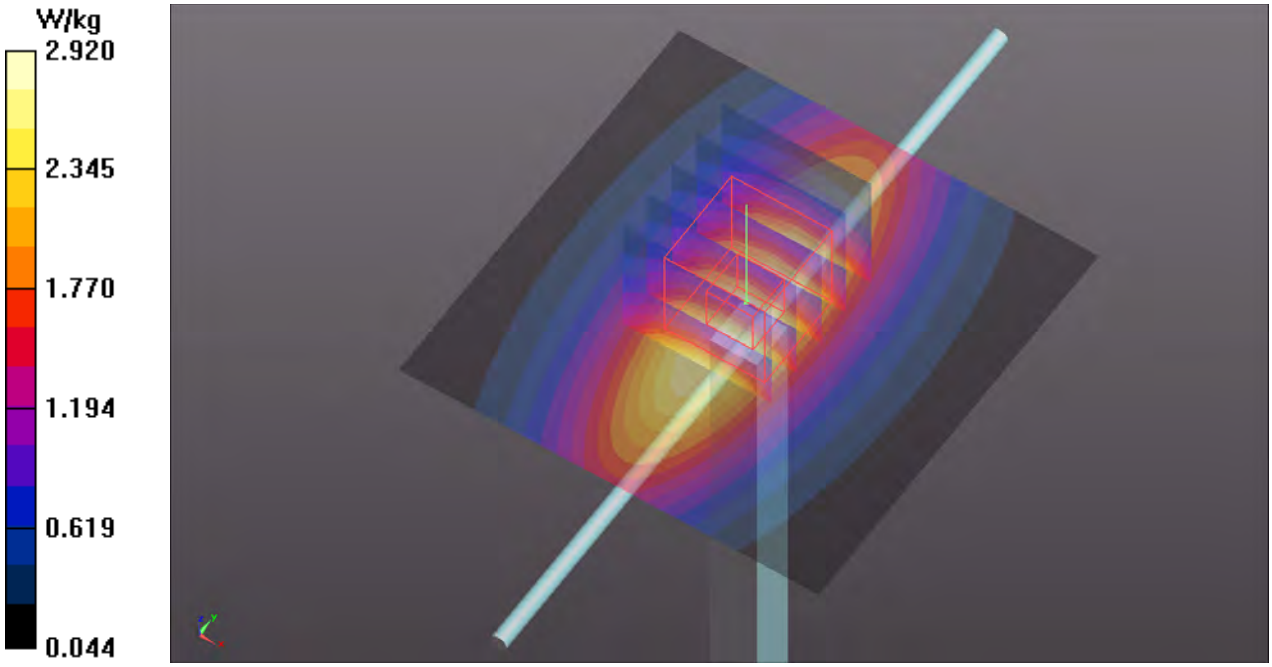
DUT: Dipole 835 MHz; Type: D835V2; SN: 4d121

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: B08T09N3_0106 Medium parameters used: f = 835 MHz; σ = 0.991 S/m; ε_r = 55.186; ρ = 1000 kg/m^3
Ambient Temperature：21.6 ℃; Liquid Temperature：21.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(9.74, 9.74, 9.74); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.92 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 51.99 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.50 W/kg
SAR(1 g) = 2.3 W/kg; SAR(10 g) = 1.51 W/kg
Maximum value of SAR (measured) = 2.91 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2015/01/07

System Check_B1750_150107

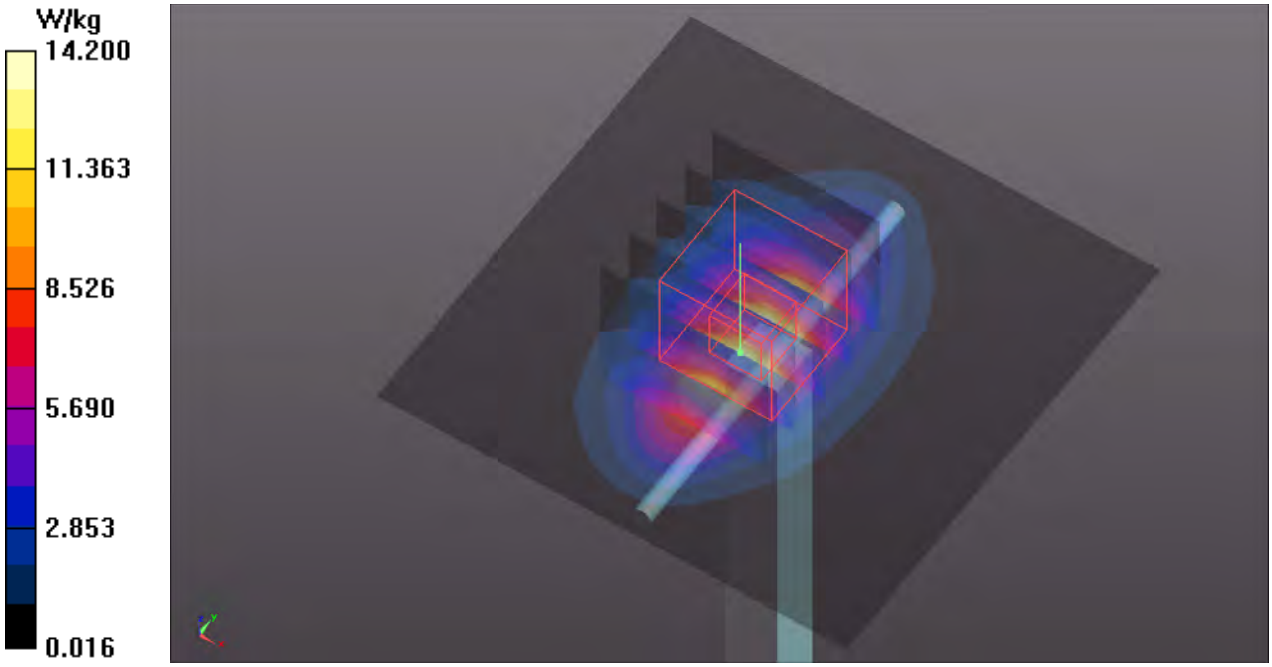
DUT: Dipole 1750 MHz; Type: D1750V2; SN: 1055

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: B17T18N3_0107 Medium parameters used: f = 1750 MHz; σ = 1.498 S/m; ε_r = 52.238; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(7.93, 7.93, 7.93); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.2 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 95.91 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 16.8 W/kg
SAR(1 g) = 9.64 W/kg; SAR(10 g) = 5.19 W/kg
Maximum value of SAR (measured) = 13.3 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2015/01/01

System Check_B1900_150101

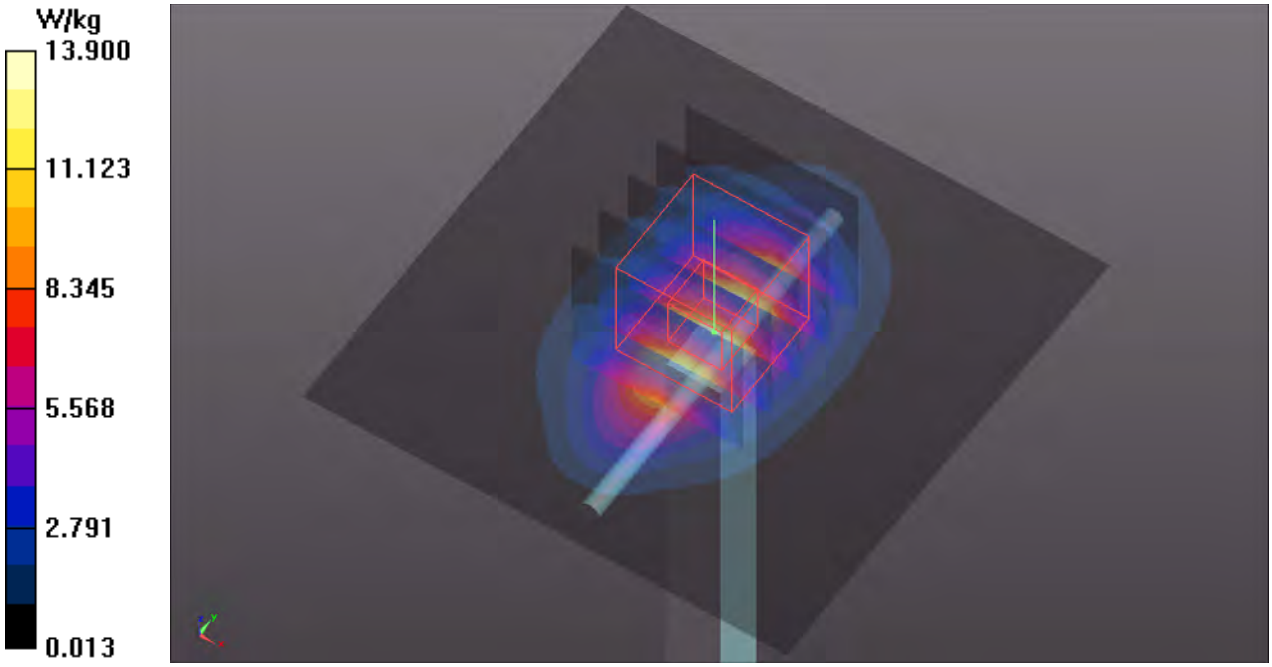
DUT: Dipole 1900 MHz; Type: D1900V2; SN: 5d036

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: B18T19N3_0101 Medium parameters used: f = 1900 MHz; σ = 1.545 S/m; ε_r = 52.324; ρ = 1000 kg/m^3
Ambient Temperature：21.7 ℃; Liquid Temperature：21.1 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(7.68, 7.68, 7.68); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 13.9 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 96.37 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.72 W/kg; SAR(10 g) = 5.03 W/kg
Maximum value of SAR (measured) = 13.9 W/kg



System Check_B2600_150109

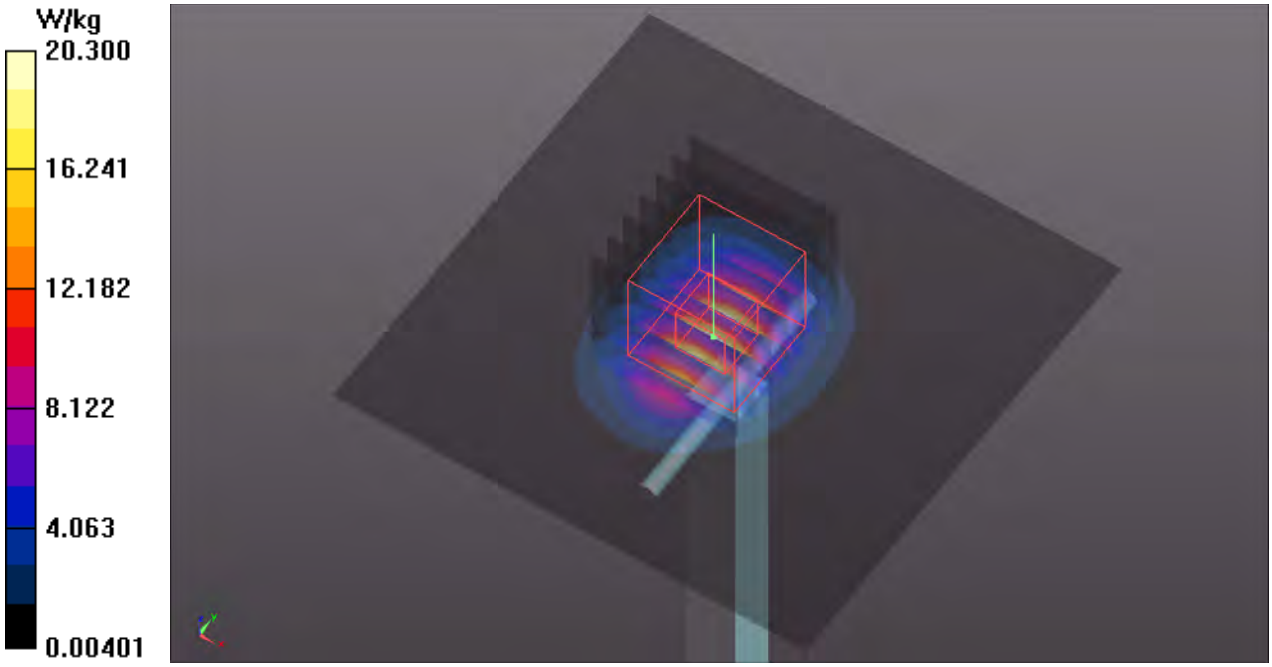
DUT: Dipole 2600 MHz; Type: D2600V2; SN: 1020

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium: B25T27N1_0109 Medium parameters used: f = 2600 MHz; σ = 2.208 S/m; ε_r = 52.423; ρ = 1000 kg/m^3
Ambient Temperature：22.2 ℃; Liquid Temperature：21.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(6.99, 6.99, 6.99); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 20.3 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.51 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 28.6 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 5.74 W/kg
Maximum value of SAR (measured) = 20.5 W/kg



Appendix B. SAR Plots of SAR Measurement

The SAR plots for highest measured SAR in each exposure configuration, wireless mode and frequency band combination, and measured SAR > 1.5 W/kg are shown as follows.

P01 GSM850_GPRS12_Rear Face_2.5Cm_Ch189_Ant1

DUT: 141218E07

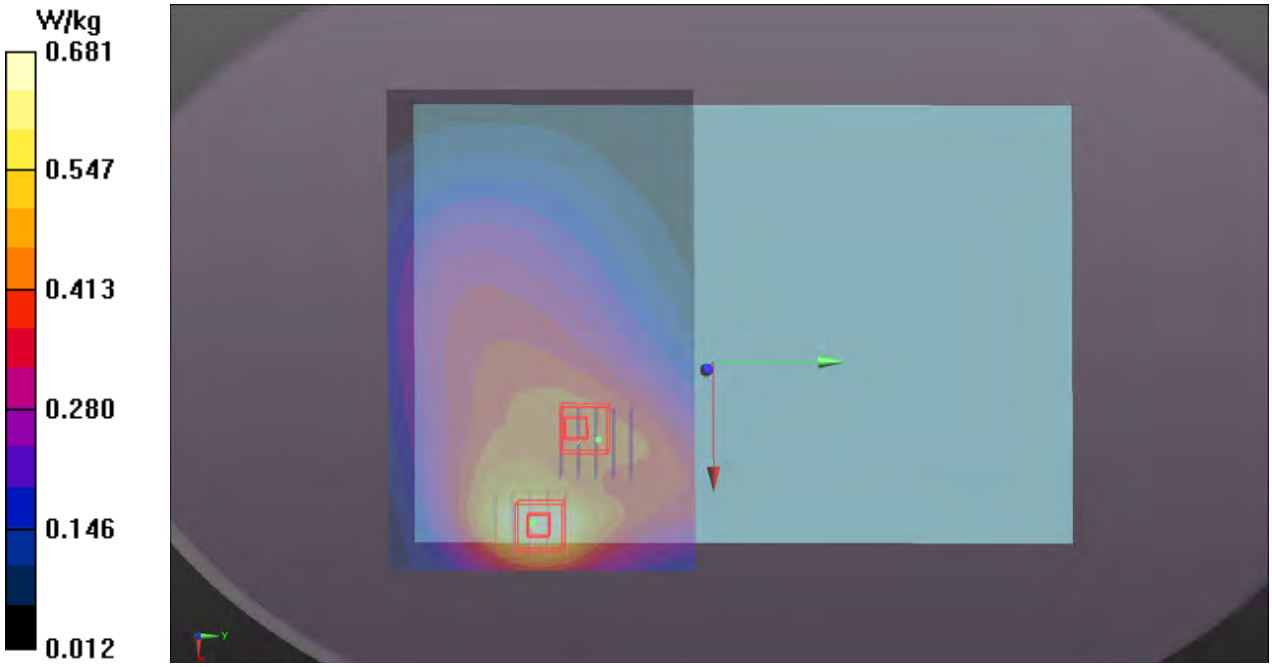
Communication System: GPRS12; Frequency: 836.4 MHz;Duty Cycle: 1:2
Medium: B08T09N3_0106 Medium parameters used: f = 836.4 MHz; σ = 0.992 S/m; ε_r = 55.172; ρ = 1000 kg/m^3
Ambient Temperature：21.6 ℃; Liquid Temperature：21.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(9.74, 9.74, 9.74); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (151x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.681 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.800 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.749 W/kg
SAR(1 g) = 0.556 W/kg; SAR(10 g) = 0.395 W/kg
Maximum value of SAR (measured) = 0.662 W/kg

- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.800 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.510 W/kg
SAR(1 g) = 0.384 W/kg; SAR(10 g) = 0.287 W/kg
Maximum value of SAR (measured) = 0.452 W/kg



P02 GSM1900_GPRS12_Rear Face_2.5cm_Ch810_Ant2

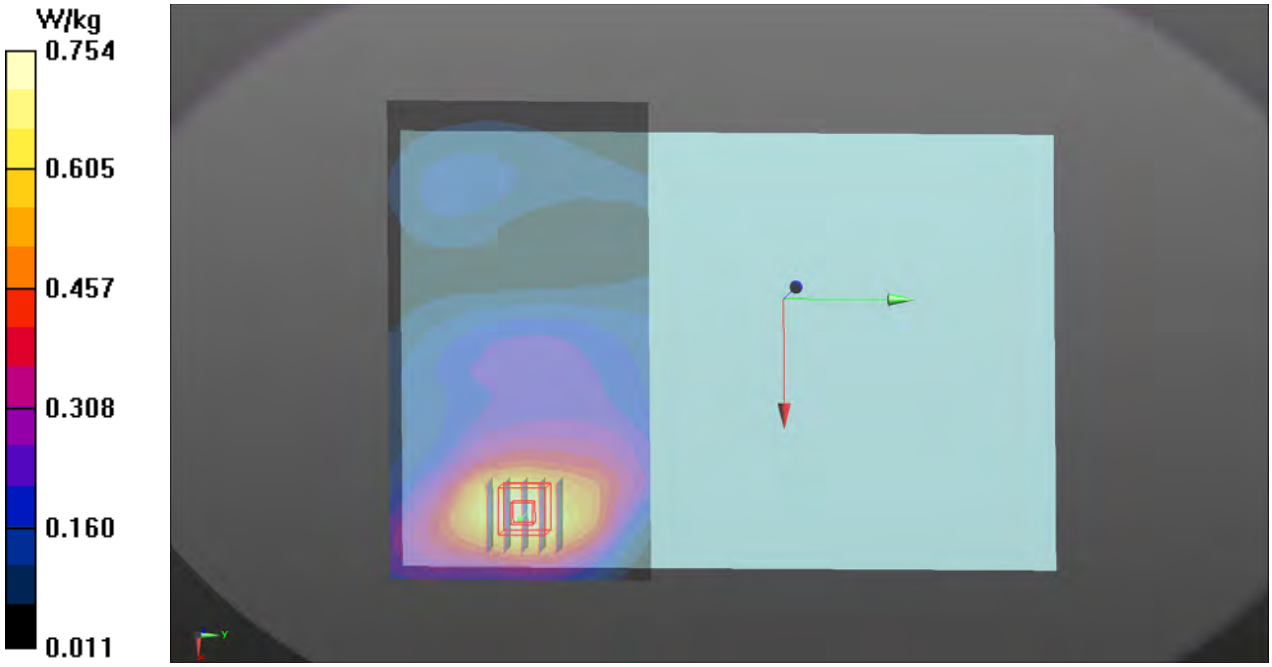
DUT: 141218E07

Communication System: GPRS12; Frequency: 1909.8 MHz;Duty Cycle: 1:2
Medium: B18T19N3_0101 Medium parameters used: f = 1909.8 MHz; σ = 1.558 S/m; ε_r = 52.305; ρ = 1000 kg/m^3
Ambient Temperature：21.7 ℃; Liquid Temperature：21.1 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(7.68, 7.68, 7.68); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (151x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.754 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.867 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.917 W/kg
SAR(1 g) = 0.590 W/kg; SAR(10 g) = 0.383 W/kg
Maximum value of SAR (measured) = 0.760 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2015/01/01

P03 WCDMA II_RMC12.2K_Rear Face_2.5cm_Ch9400_Ant2

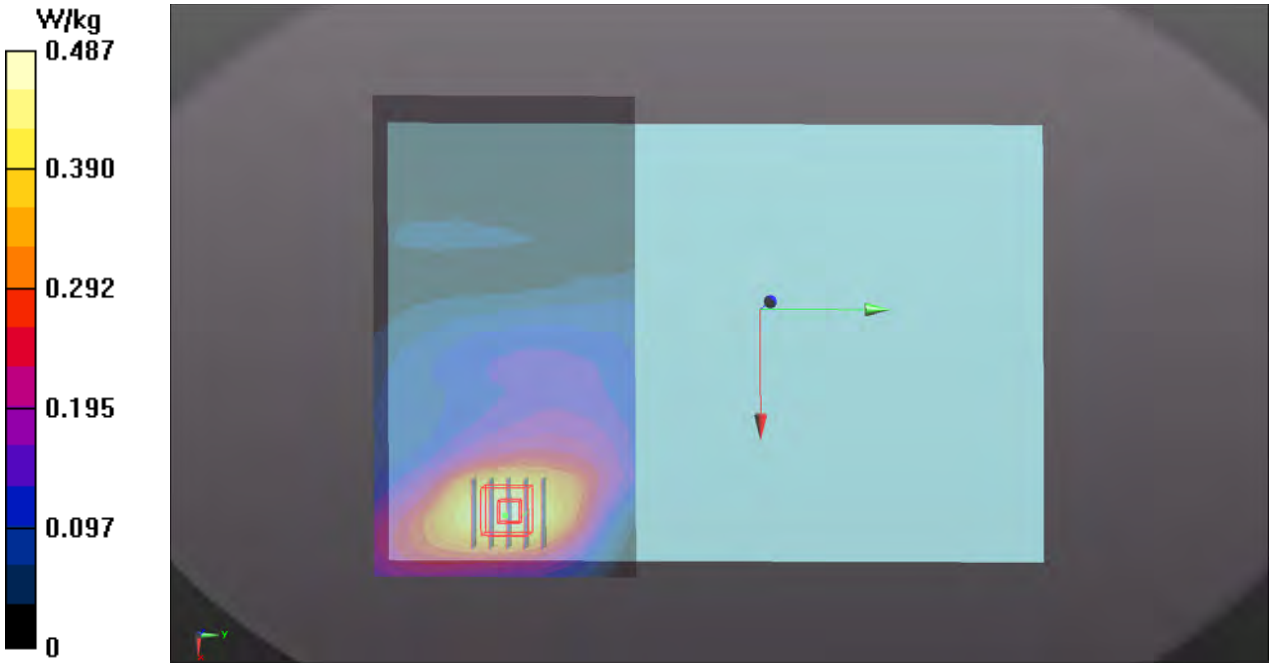
DUT: 141218E07

Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: B18T19N3_0101 Medium parameters used: f = 1880.1 MHz; σ = 1.521 S/m; ε_r = 52.39; ρ = 1000 kg/m^3
Ambient Temperature：21.7 ℃; Liquid Temperature：21.1 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(7.68, 7.68, 7.68); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (151x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.487 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.974 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.602 W/kg
SAR(1 g) = 0.392 W/kg; SAR(10 g) = 0.251 W/kg
Maximum value of SAR (measured) = 0.501 W/kg



P04 WCDMA IV_RMC12.2K_Front Face_2.5cm_Ch1513_Ant2

DUT: 141218E07

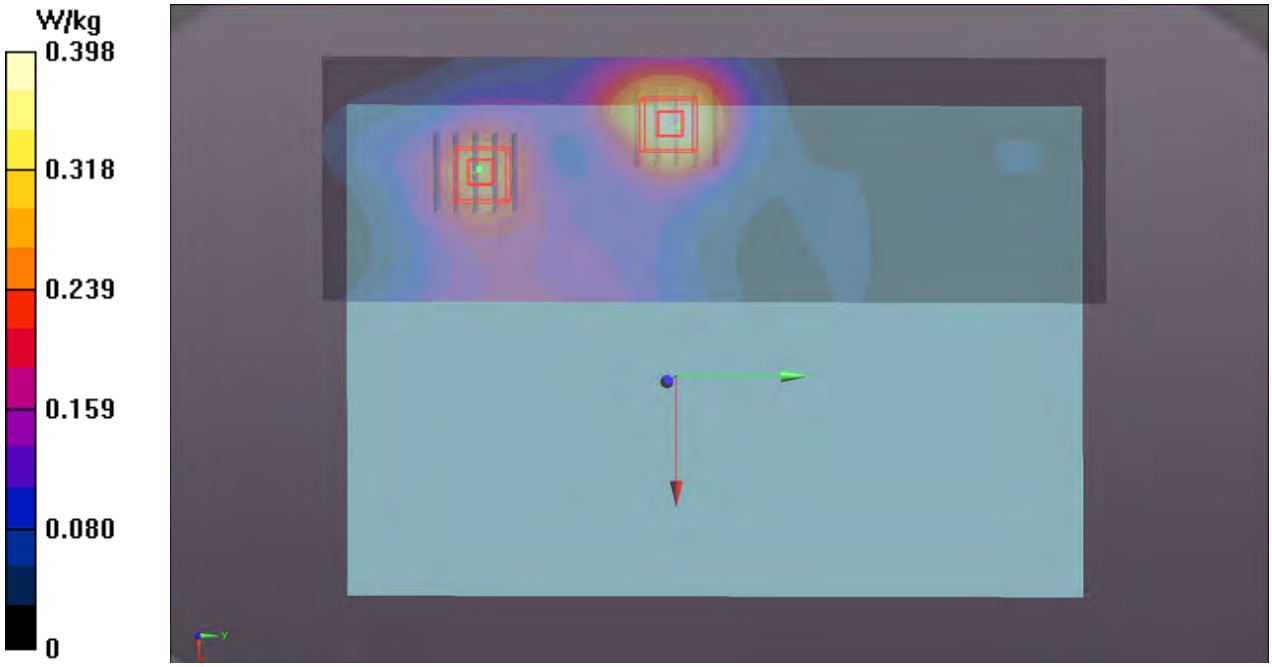
Communication System: WCDMA; Frequency: 1752.6 MHz;Duty Cycle: 1:1
Medium: B17T18N3_0107 Medium parameters used: f = 1753 MHz; σ = 1.502 S/m; ε_r = 52.225; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(7.93, 7.93, 7.93); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (71x221x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.398 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.511 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.463 W/kg
SAR(1 g) = 0.307 W/kg; SAR(10 g) = 0.197 W/kg
Maximum value of SAR (measured) = 0.387 W/kg

- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.511 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.351 W/kg
SAR(1 g) = 0.231 W/kg; SAR(10 g) = 0.148 W/kg
Maximum value of SAR (measured) = 0.294 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2015/01/06

P05 WCDMA V_RMC12.2K_Front Face_2.5Cm_Ch4182_Ant1

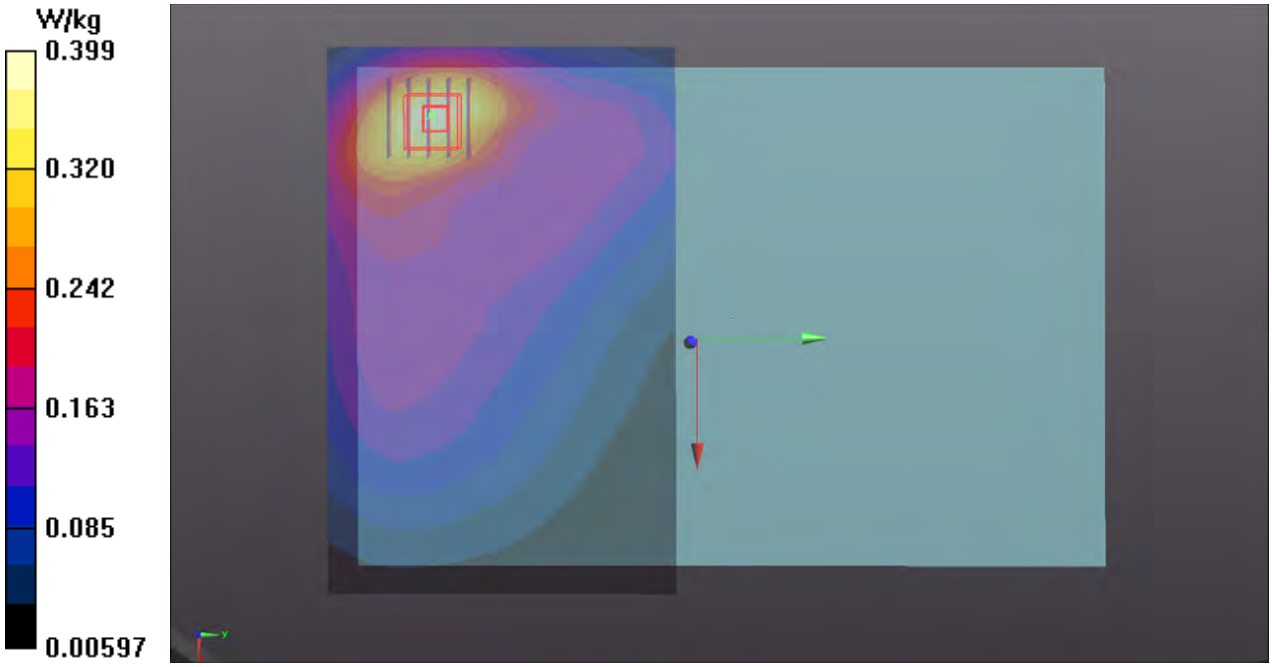
DUT: 141218E07

Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: B08T09N3_0106 Medium parameters used: f = 836.4 MHz; σ = 0.992 S/m; ε_r = 55.172; ρ = 1000 kg/m^3
Ambient Temperature：21.6 ℃; Liquid Temperature：21.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(9.74, 9.74, 9.74); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (151x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.399 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.958 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.459 W/kg
SAR(1 g) = 0.339 W/kg; SAR(10 g) = 0.242 W/kg
Maximum value of SAR (measured) = 0.406 W/kg



P06 CDMA2000 BC0_RTAP153.6_Front Face_2.5Cm_Ch777_Ant1

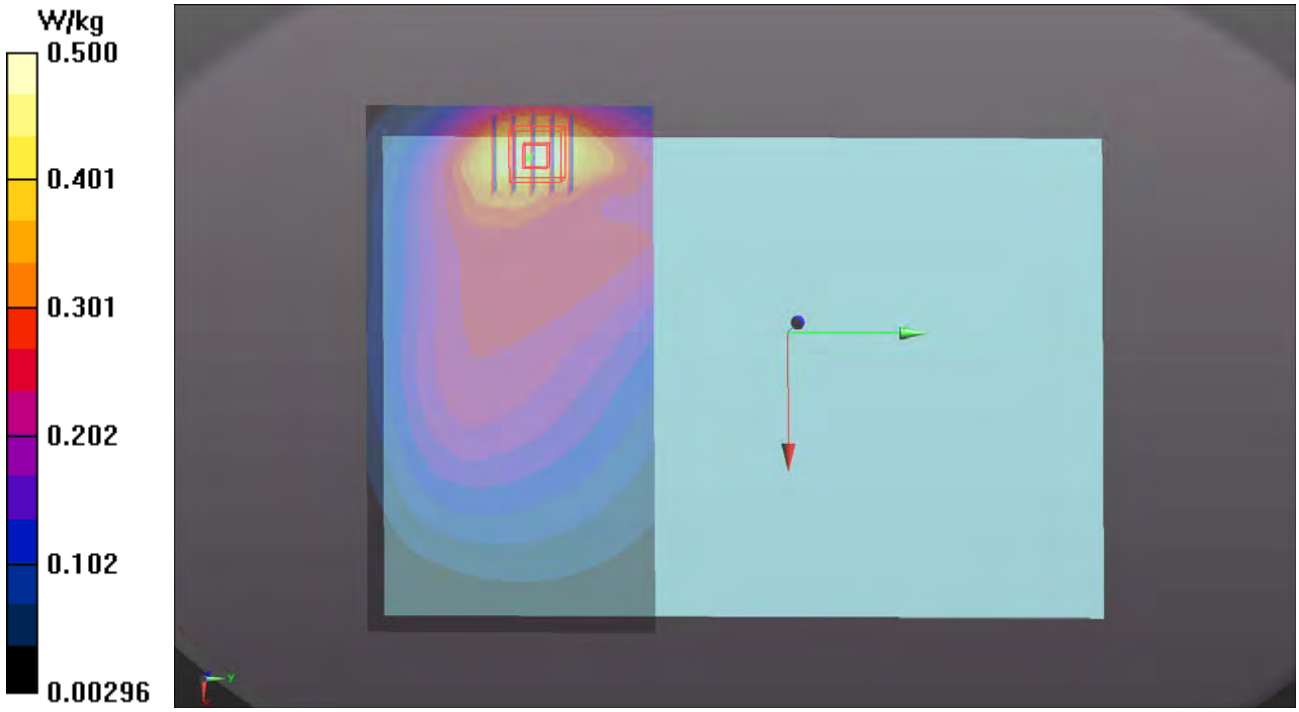
DUT: 141218E07

Communication System: CDMA2000; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium: B08T09N2_0105 Medium parameters used: f = 837 MHz; σ = 1.005 S/m; ε_r = 56.661; ρ = 1000 kg/m^3
Ambient Temperature：21.9 ℃ ； Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3864; ConvF(10.04, 10.04, 10.04); Calibrated: 2014/07/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2014/08/26
- Phantom: ELI Phantom_1039; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (151x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.500 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.428 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.570 W/kg
SAR(1 g) = 0.422 W/kg; SAR(10 g) = 0.297 W/kg
Maximum value of SAR (measured) = 0.505 W/kg



P07 CDMA2000 BC1_RTAP 153.6_Rear Face_2.5cm_Ch600_Ant2

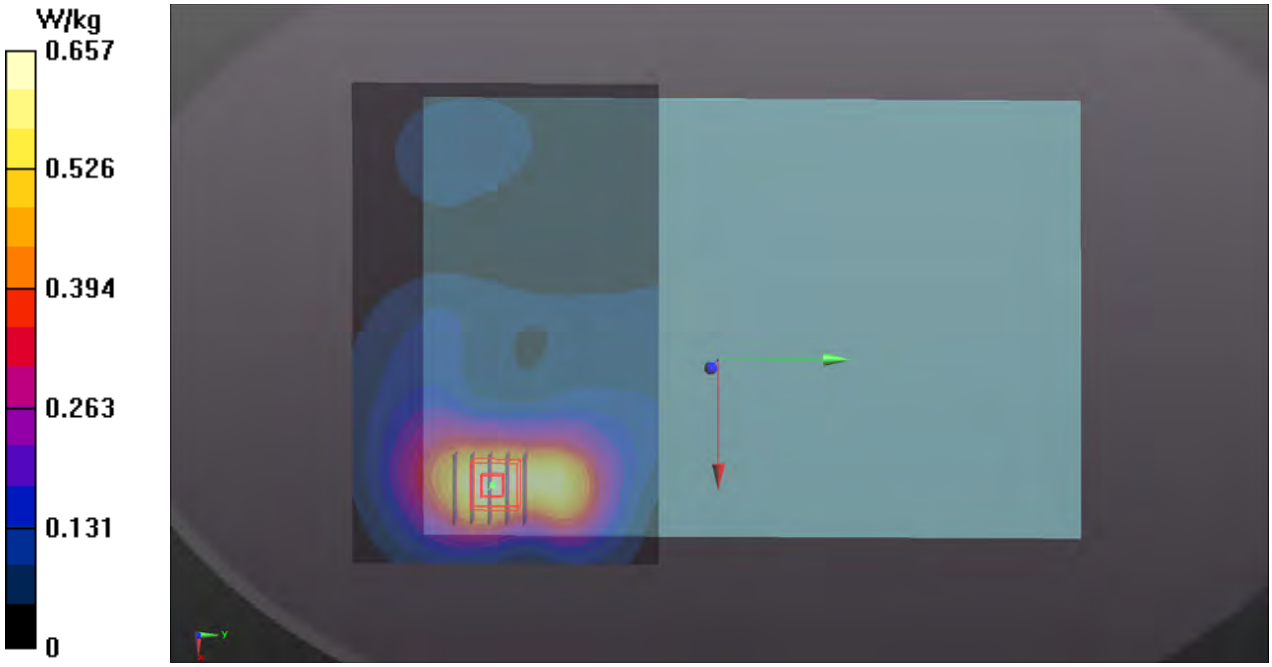
DUT: 141218E07

Communication System: CDMA2000; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: B18T19N3_0107 Medium parameters used: f = 1880 MHz; σ = 1.543 S/m; ε_r = 53.099; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(7.68, 7.68, 7.68); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (151x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.657 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.168 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.817 W/kg
SAR(1 g) = 0.506 W/kg; SAR(10 g) = 0.309 W/kg
Maximum value of SAR (measured) = 0.669 W/kg



P08 CDMA2000 BC10_RTAP153.6_Rear Face_2.5Cm_Ch476_Ant1

DUT: 141218E07

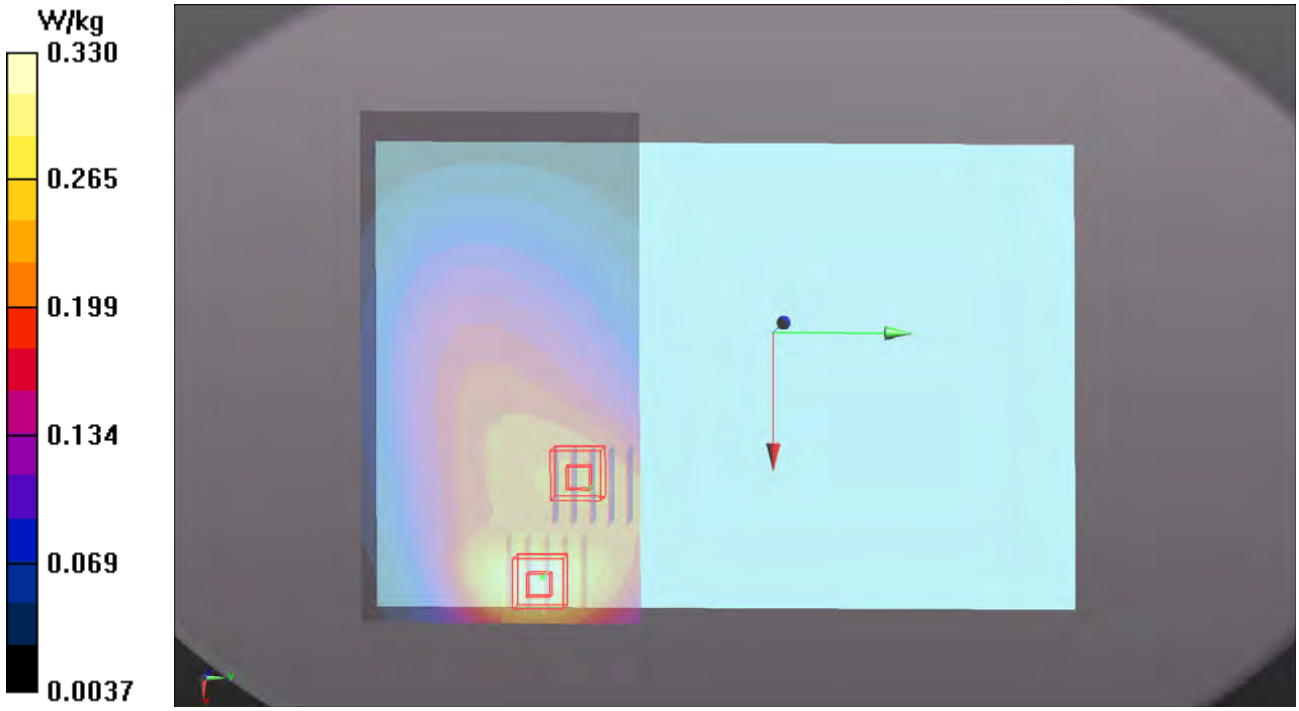
Communication System: CDMA2000; Frequency: 817.9 MHz;Duty Cycle: 1:1
Medium: B08T09N2_0105 Medium parameters used: f = 818 MHz; σ = 0.975 S/m; ε_r = 57.003; ρ = 1000 kg/m^3
Ambient Temperature：21.9 ℃ ； Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3864; ConvF(10.04, 10.04, 10.04); Calibrated: 2014/07/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2014/08/26
- Phantom: ELI Phantom_1039; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (151x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.330 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.321 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.381 W/kg
SAR(1 g) = 0.287 W/kg; SAR(10 g) = 0.207 W/kg
Maximum value of SAR (measured) = 0.332 W/kg

- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.321 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.260 W/kg
SAR(1 g) = 0.198 W/kg; SAR(10 g) = 0.149 W/kg
Maximum value of SAR (measured) = 0.232 W/kg



P09 LTE 2_QPSK20M_Front Face_2.5Cm_Ch18900_Ant2_1RB_OS0

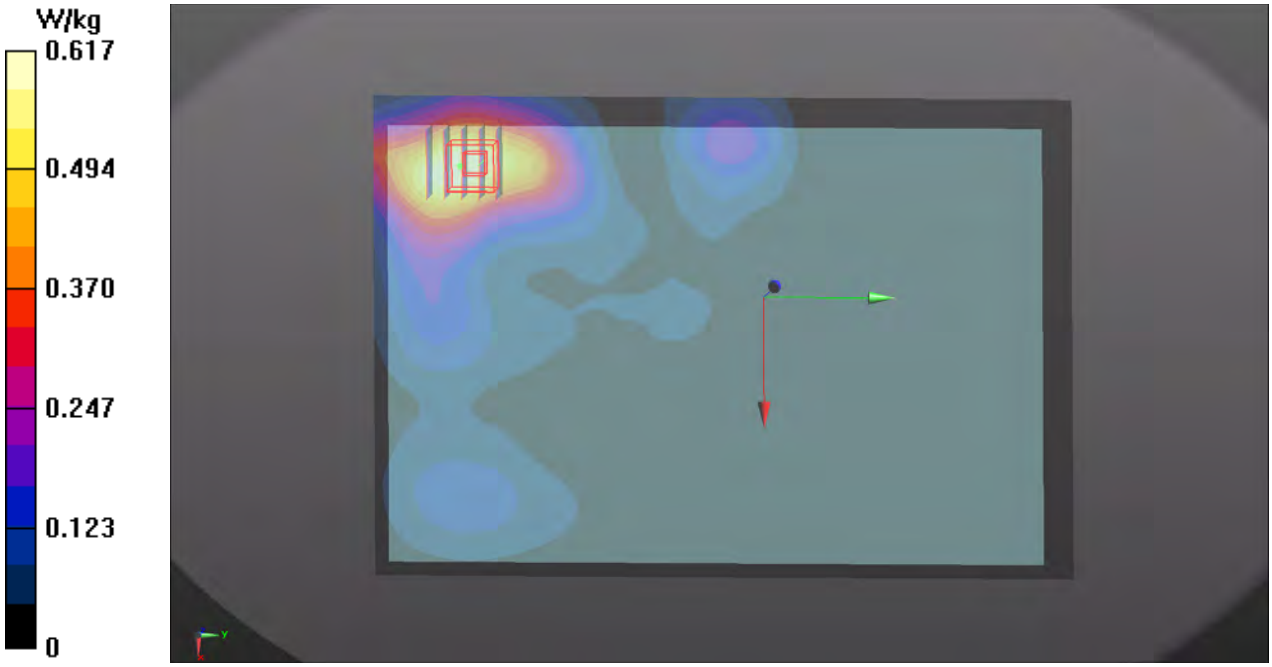
DUT: 141218E07

Communication System: LTE; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: B18T19N3_0101 Medium parameters used: f = 1880.1 MHz; σ = 1.521 S/m; ε_r = 52.39; ρ = 1000 kg/m^3
Ambient Temperature：21.7 ℃; Liquid Temperature：21.1 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(7.68, 7.68, 7.68); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (151x221x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.617 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.140 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.762 W/kg
SAR(1 g) = 0.486 W/kg; SAR(10 g) = 0.304 W/kg
Maximum value of SAR (measured) = 0.629 W/kg



P10 LTE 2_QPSK20M_Rear Face_2.5Cm_Ch18900_Ant2_1RB_OS0

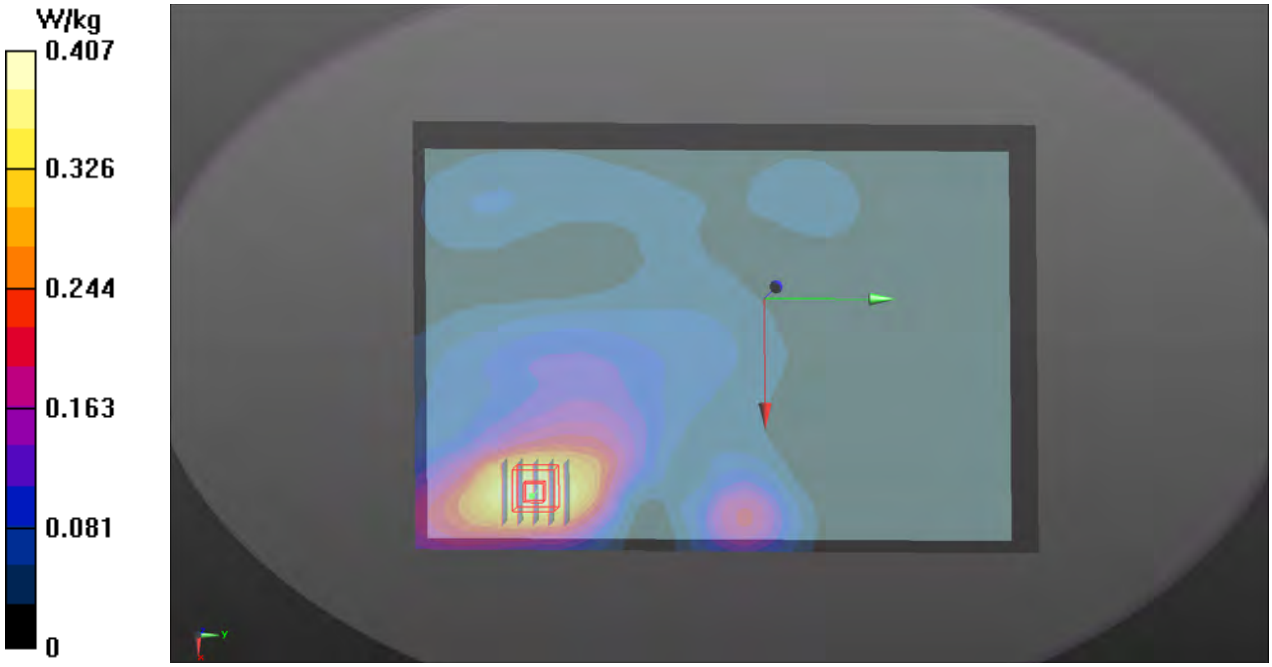
DUT: 141218E07

Communication System: LTE; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: B18T19N3_0101 Medium parameters used: f = 1880.1 MHz; σ = 1.521 S/m; ε_r = 52.39; ρ = 1000 kg/m^3
Ambient Temperature：21.7 ℃; Liquid Temperature：21.1 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(7.68, 7.68, 7.68); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (151x221x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.407 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.454 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.486 W/kg
SAR(1 g) = 0.318 W/kg; SAR(10 g) = 0.203 W/kg
Maximum value of SAR (measured) = 0.404 W/kg



P11 LTE 2_QPSK20M_Top Side_2.5cm_Ch18900_Ant2_1RB_OS0

DUT: 141218E07

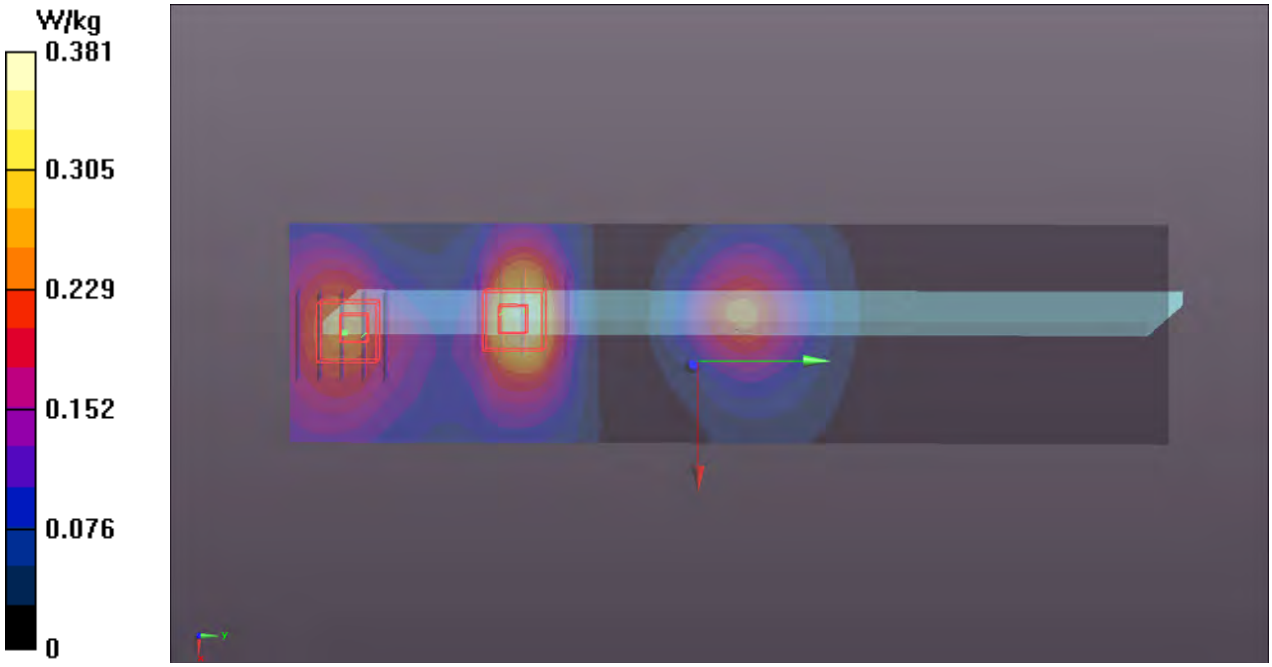
Communication System: LTE; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: B18T19N3_0101 Medium parameters used: f = 1880.1 MHz; σ = 1.521 S/m; ε_r = 52.39; ρ = 1000 kg/m^3
Ambient Temperature：21.7 ℃; Liquid Temperature：21.1 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(7.68, 7.68, 7.68); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (201x221x1): Interpolated grid: dx=0.400 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.381 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.92 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.428 W/kg
SAR(1 g) = 0.274 W/kg; SAR(10 g) = 0.167 W/kg
Maximum value of SAR (measured) = 0.344 W/kg

- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.92 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.336 W/kg
SAR(1 g) = 0.213 W/kg; SAR(10 g) = 0.132 W/kg
Maximum value of SAR (measured) = 0.269 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2015/01/07

P12 LTE 4_QPSK20M_Top Side_2.5cm_Ch20175_Ant2_1RB_OS0

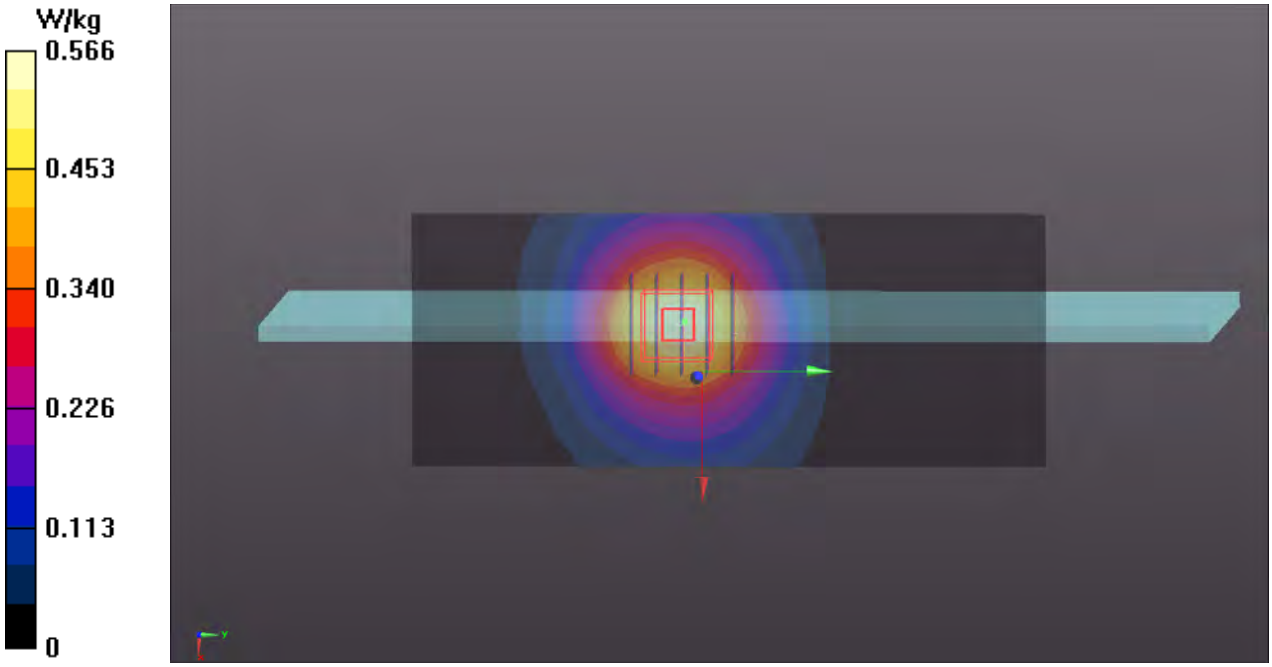
DUT: 141218E07

Communication System: LTE; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: B17T18N3_0107 Medium parameters used: f = 1732.5 MHz; σ = 1.478 S/m; ε_r = 52.34; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(7.93, 7.93, 7.93); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (201x141x1): Interpolated grid: dx=0.400 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.566 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.12 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.650 W/kg
SAR(1 g) = 0.436 W/kg; SAR(10 g) = 0.281 W/kg
Maximum value of SAR (measured) = 0.549 W/kg



P13 LTE 5_QPSK10M_Rear Face_2.5cm_Ch20525_Ant1_1RB_OS24

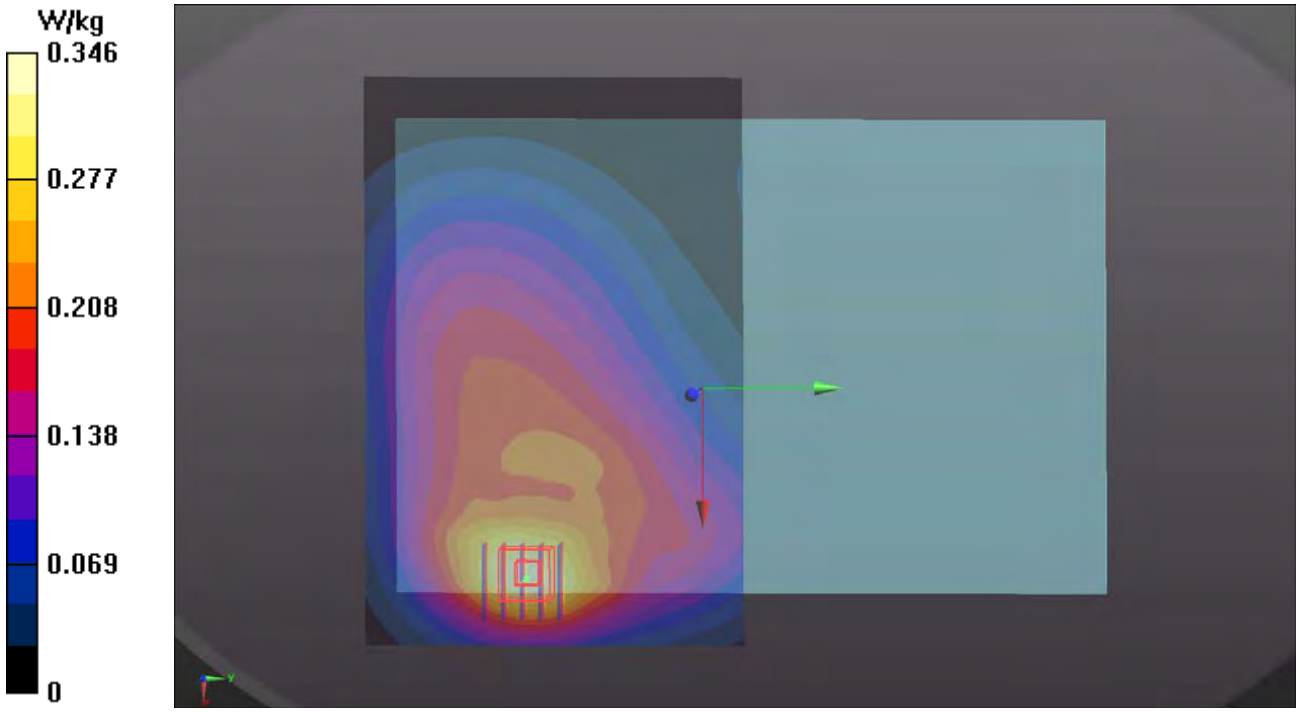
DUT: 141218E07

Communication System: LTE; Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium: B08T09N2_0105 Medium parameters used: f = 836.5 MHz; σ = 0.993 S/m; ε_r = 56.811; ρ = 1000 kg/m^3
Ambient Temperature：21.9 ℃ ； Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3864; ConvF(10.04, 10.04, 10.04); Calibrated: 2014/07/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2014/08/26
- Phantom: ELI Phantom_1039; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (161x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.346 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.626 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.403 W/kg
SAR(1 g) = 0.303 W/kg; SAR(10 g) = 0.218 W/kg
Maximum value of SAR (measured) = 0.358 W/kg



P14 LTE 7_QPSK20M_Front Face_2.5cm_Ch21100_Ant2_1RB_OS99

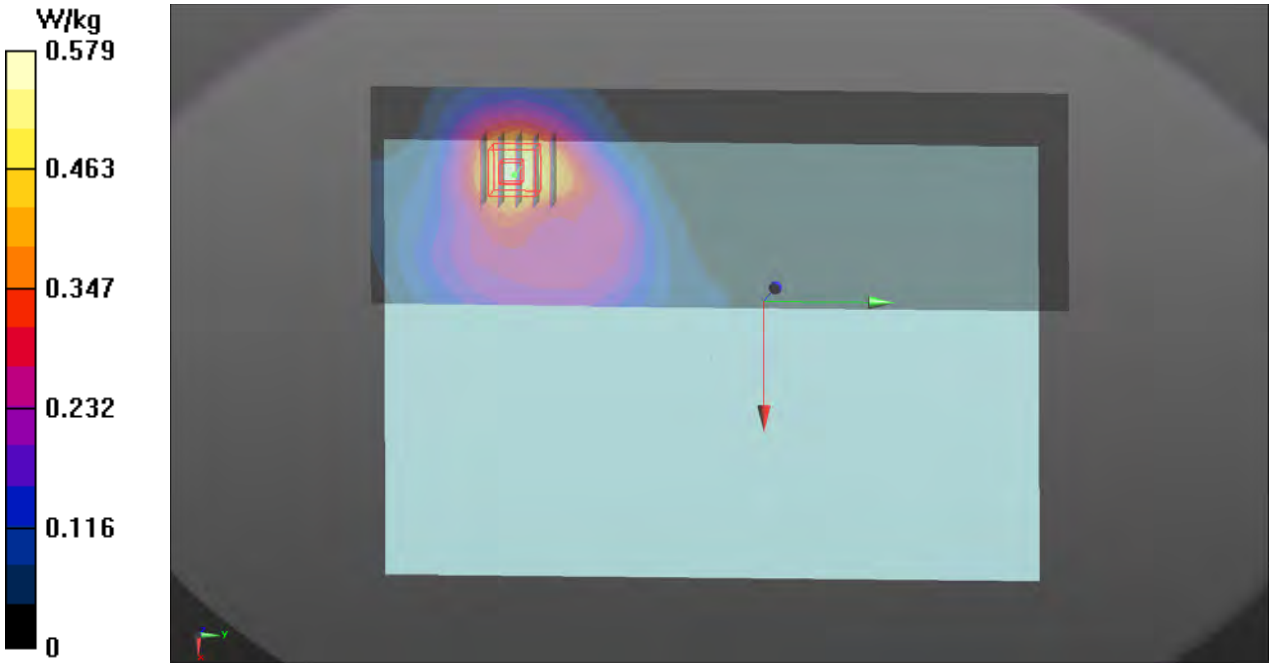
DUT: 141218E07

Communication System: LTE; Frequency: 2535 MHz;Duty Cycle: 1:1
Medium: B25T27N1_0109 Medium parameters used: f = 2535 MHz; σ = 2.124 S/m; ε_r = 52.658; ρ = 1000 kg/m^3
Ambient Temperature：22.2 ℃; Liquid Temperature：21.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(6.99, 6.99, 6.99); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (91x281x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.579 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.360 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.740 W/kg
SAR(1 g) = 0.409 W/kg; SAR(10 g) = 0.235 W/kg
Maximum value of SAR (measured) = 0.564 W/kg



P15 LTE 12_QPSK10M_Rear Face_2.5cm_Ch23060_Ant0_1RB_OS49

DUT: 141218E07

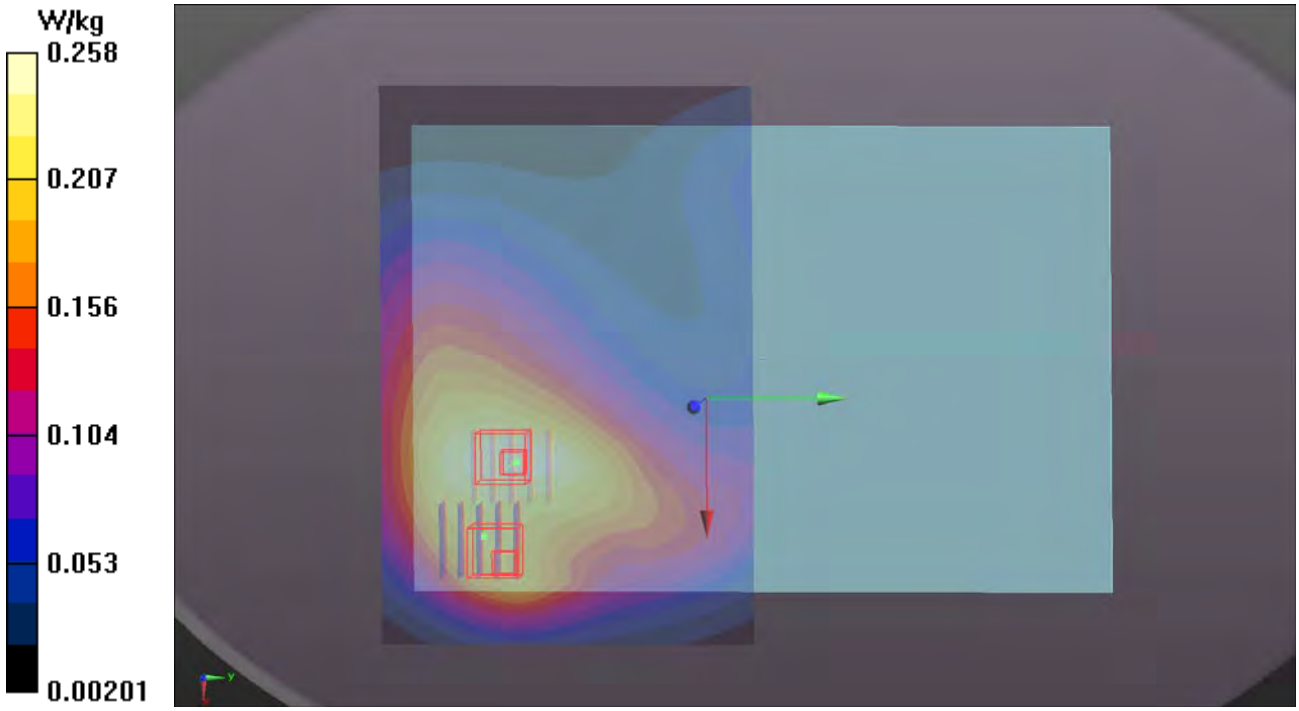
Communication System: LTE; Frequency: 704 MHz;Duty Cycle: 1:1
Medium: B07T08N2_0105 Medium parameters used: f = 704 MHz; σ = 0.929 S/m; ε_r = 55.823; ρ = 1000 kg/m^3
Ambient Temperature：21.9 ℃ ； Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3864; ConvF(10.08, 10.08, 10.08); Calibrated: 2014/07/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2014/08/26
- Phantom: ELI Phantom_1039; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (161x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.258 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.919 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.286 W/kg
SAR(1 g) = 0.223 W/kg; SAR(10 g) = 0.172 W/kg
Maximum value of SAR (measured) = 0.258 W/kg

- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.919 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.259 W/kg
SAR(1 g) = 0.186 W/kg; SAR(10 g) = 0.138 W/kg
Maximum value of SAR (measured) = 0.229 W/kg



P16 LTE 13_QPSK10M_Rear Face_2.5cm_Ch23230_Ant1_1RB_OS49

DUT: 141218E07

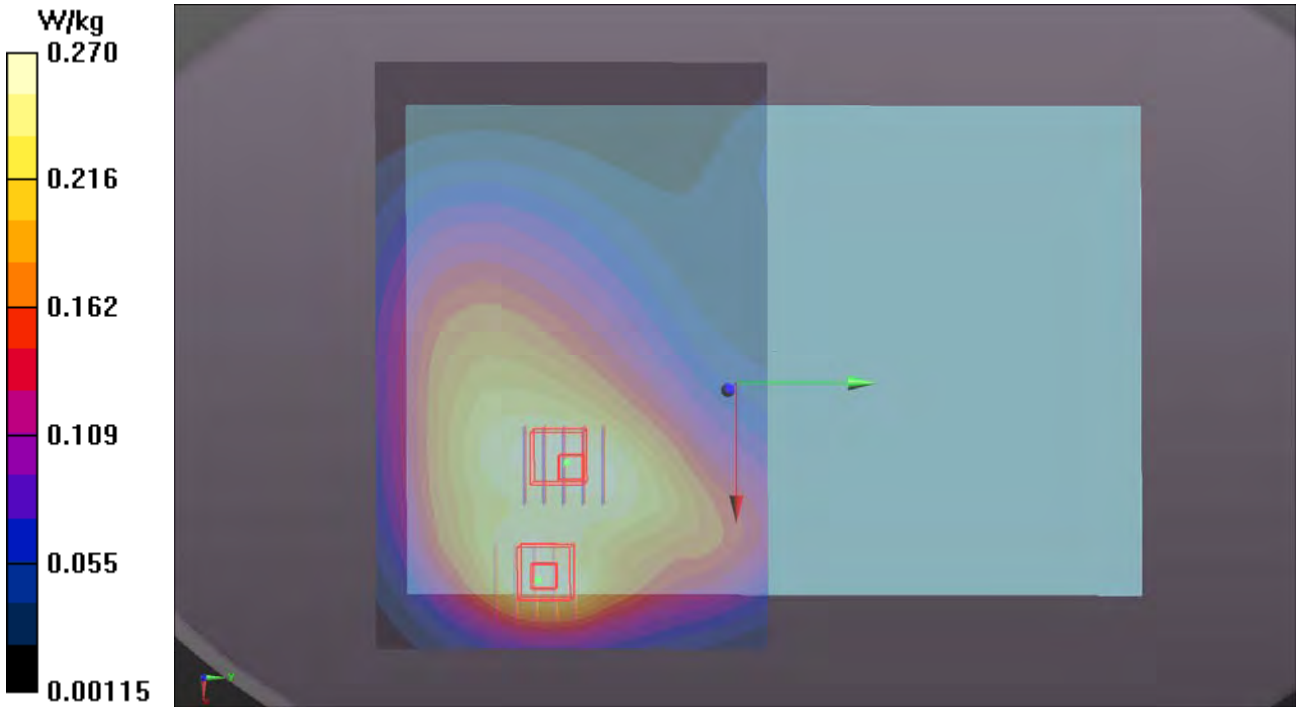
Communication System: LTE; Frequency: 782 MHz;Duty Cycle: 1:1
Medium: B07T08N2_0105 Medium parameters used: f = 782 MHz; σ = 0.993 S/m; ε_r = 55.125; ρ = 1000 kg/m^3
Ambient Temperature：21.9 ℃ ； Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3864; ConvF(10.08, 10.08, 10.08); Calibrated: 2014/07/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2014/08/26
- Phantom: ELI Phantom_1039; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (161x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.270 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.979 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.313 W/kg
SAR(1 g) = 0.238 W/kg; SAR(10 g) = 0.175 W/kg
Maximum value of SAR (measured) = 0.279 W/kg

- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.979 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.302 W/kg
SAR(1 g) = 0.231 W/kg; SAR(10 g) = 0.174 W/kg
Maximum value of SAR (measured) = 0.269 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2015/01/09

P17 LTE 17_QPSK10M_Front Face_2.5cm_Ch23800_Ant0_1RB_OS49

DUT: 141218E07

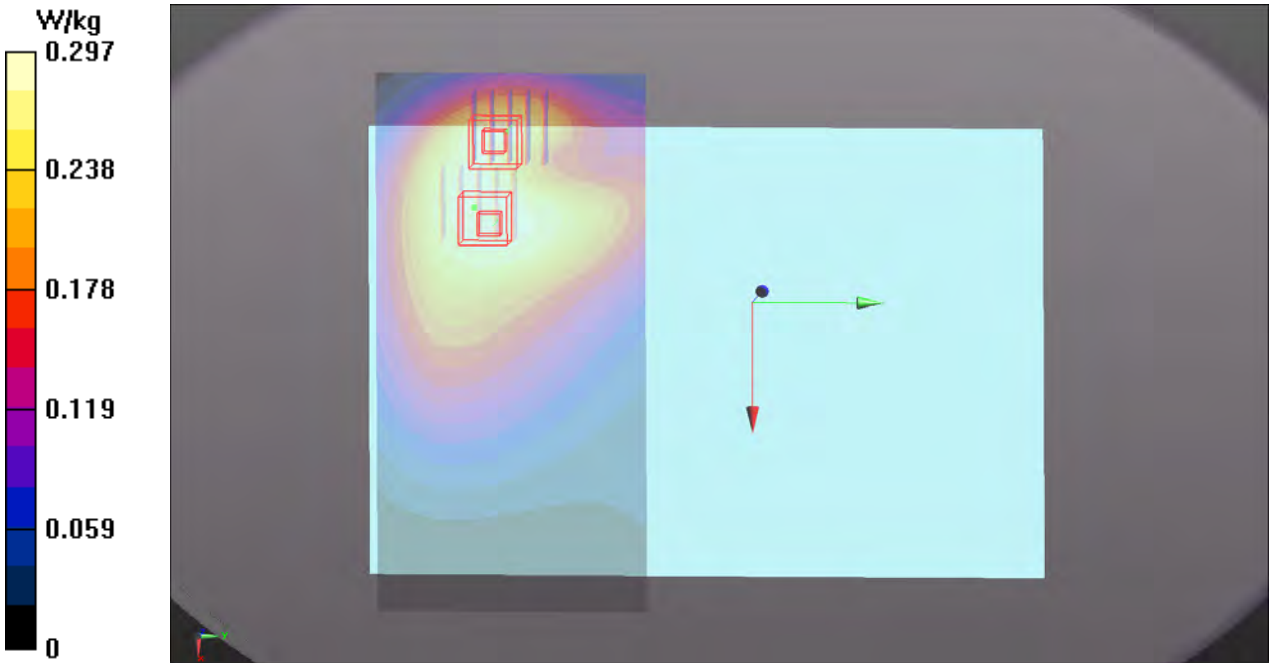
Communication System: LTE; Frequency: 711 MHz;Duty Cycle: 1:1
Medium: B07T08N3_0109 Medium parameters used: f = 711 MHz; σ = 0.933 S/m; ε_r = 55.564; ρ = 1000 kg/m^3
Ambient Temperature：21.6 ℃; Liquid Temperature：21.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(9.91, 9.91, 9.91); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (161x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.297 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.947 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.328 W/kg
SAR(1 g) = 0.261 W/kg; SAR(10 g) = 0.201 W/kg
Maximum value of SAR (measured) = 0.299 W/kg

- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.947 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.319 W/kg
SAR(1 g) = 0.243 W/kg; SAR(10 g) = 0.180 W/kg
Maximum value of SAR (measured) = 0.284 W/kg



P18 LTE 25_QPSK20M_Front Face_2.5Cm_Ch26365_Ant2_1RB_OS0

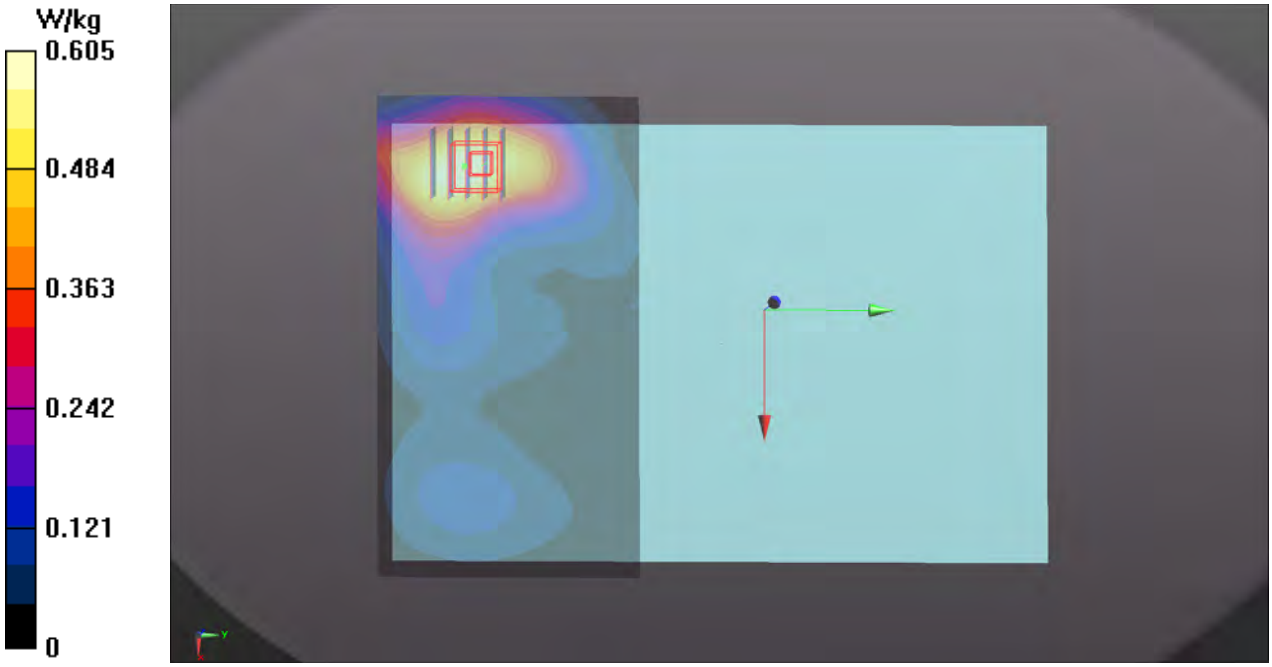
DUT: 141218E07

Communication System: LTE; Frequency: 1882.5 MHz;Duty Cycle: 1:1
Medium: B18T19N3_0101 Medium parameters used: f = 1882.5 MHz; σ = 1.524 S/m; ε_r = 52.383; ρ = 1000 kg/m^3
Ambient Temperature：21.7 ℃; Liquid Temperature：21.1 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(7.68, 7.68, 7.68); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (151x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.605 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.101 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.749 W/kg
SAR(1 g) = 0.479 W/kg; SAR(10 g) = 0.299 W/kg
Maximum value of SAR (measured) = 0.619 W/kg



P19 LTE 26_QPSK15M_Front Face_2.5cm_Ch26765_Ant1_1RB_OS37

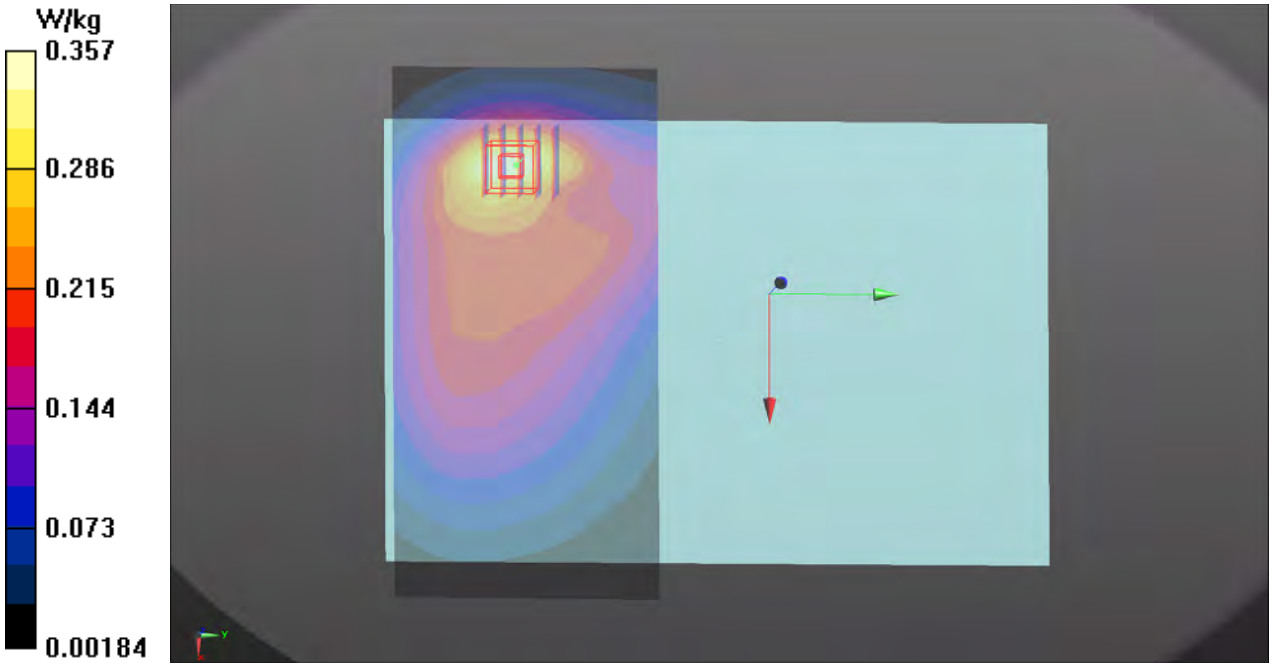
DUT: 141218E07

Communication System: LTE; Frequency: 821.5 MHz;Duty Cycle: 1:1
Medium: B08T09N3_0109 Medium parameters used: f = 821.5 MHz; σ = 0.979 S/m; ε_r = 55.626; ρ = 1000 kg/m^3
Ambient Temperature：21.6 ℃; Liquid Temperature：21.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3971; ConvF(9.74, 9.74, 9.74); Calibrated: 2014/03/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1431; Calibrated: 2014/03/24
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (161x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.357 W/kg

- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.813 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.404 W/kg
SAR(1 g) = 0.301 W/kg; SAR(10 g) = 0.216 W/kg
Maximum value of SAR (measured) = 0.359 W/kg



Appendix C. Calibration Certificate for Probe and Dipole

The SPEAG calibration certificates are shown as follows.

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 **B.V. ADT (Auden)**

Certificate No: D750V3-1013_Aug14

CALIBRATION CERTIFICATE

Object: D750V3 - SN: 1013

Calibration procedure(s): QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: August 28, 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 EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

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

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 28, 2014

Glossary:

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

Calibration is Performed According to the Following Standards:

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

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	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.2 ± 6 %	0.91 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	2.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.35 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.53 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	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.4 ± 6 %	0.99 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	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.71 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.48 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.81 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.2 Ω - 0.3 jΩ
Return Loss	- 30.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω - 2.8 jΩ
Return Loss	- 29.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.035 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	March 22, 2010

DASY5 Validation Report for Head TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1013

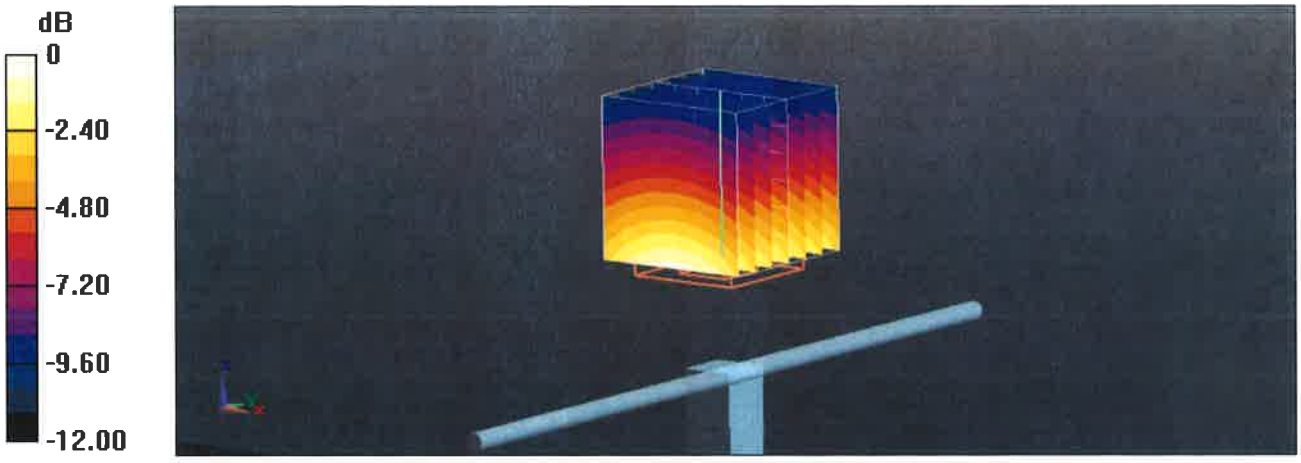
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 42.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.37, 6.37, 6.37); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

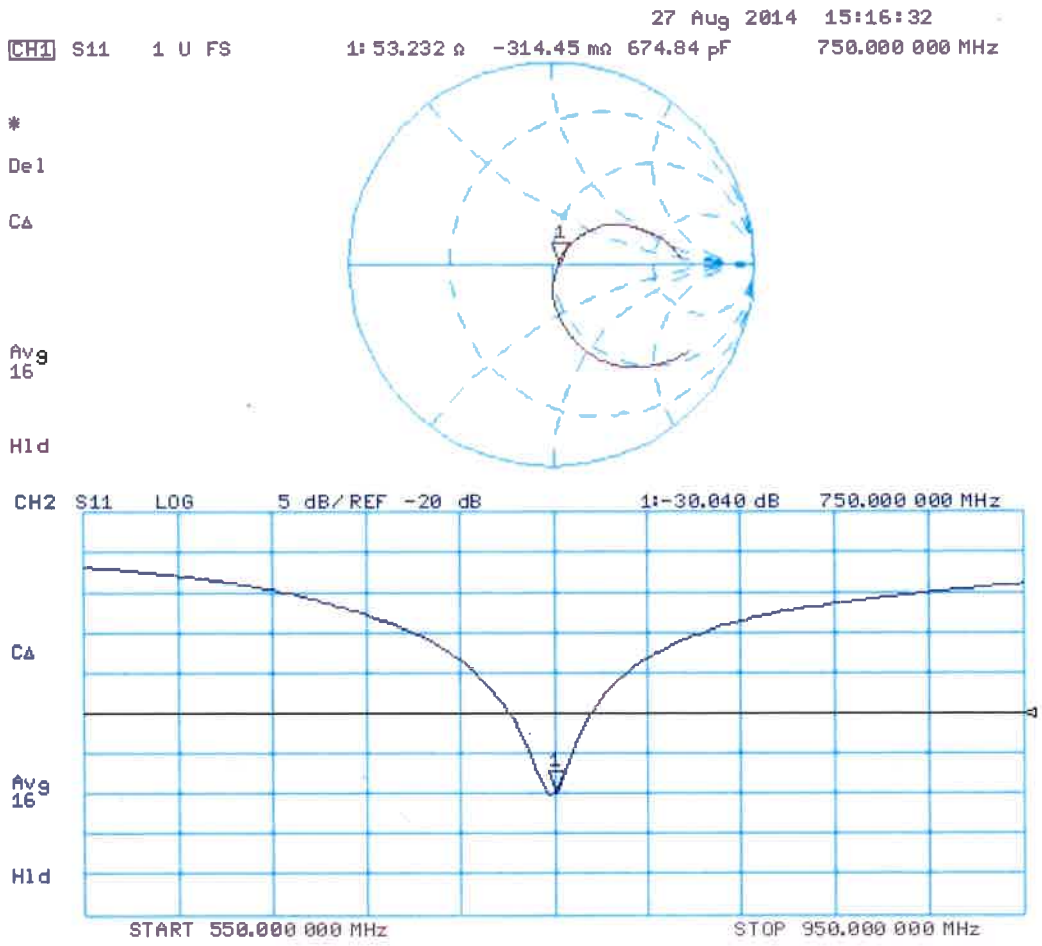
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.96 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.15 W/kg
SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.4 W/kg
Maximum value of SAR (measured) = 2.48 W/kg



0 dB = 2.48 W/kg = 3.94 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 27.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1013

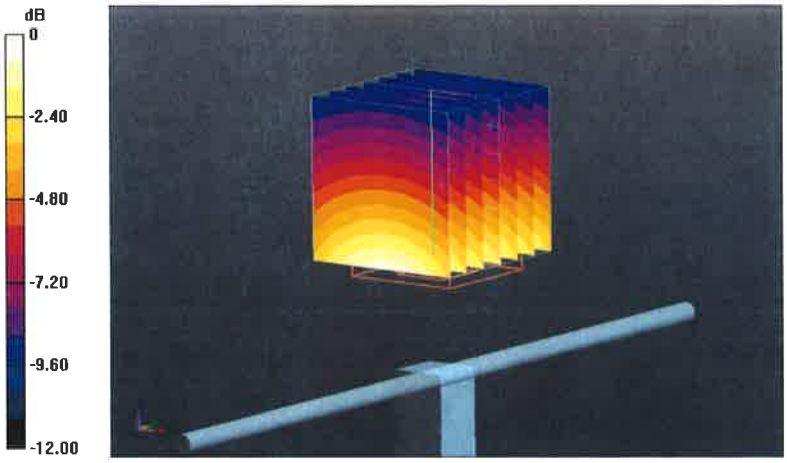
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.99 S/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.13, 6.13, 6.13); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

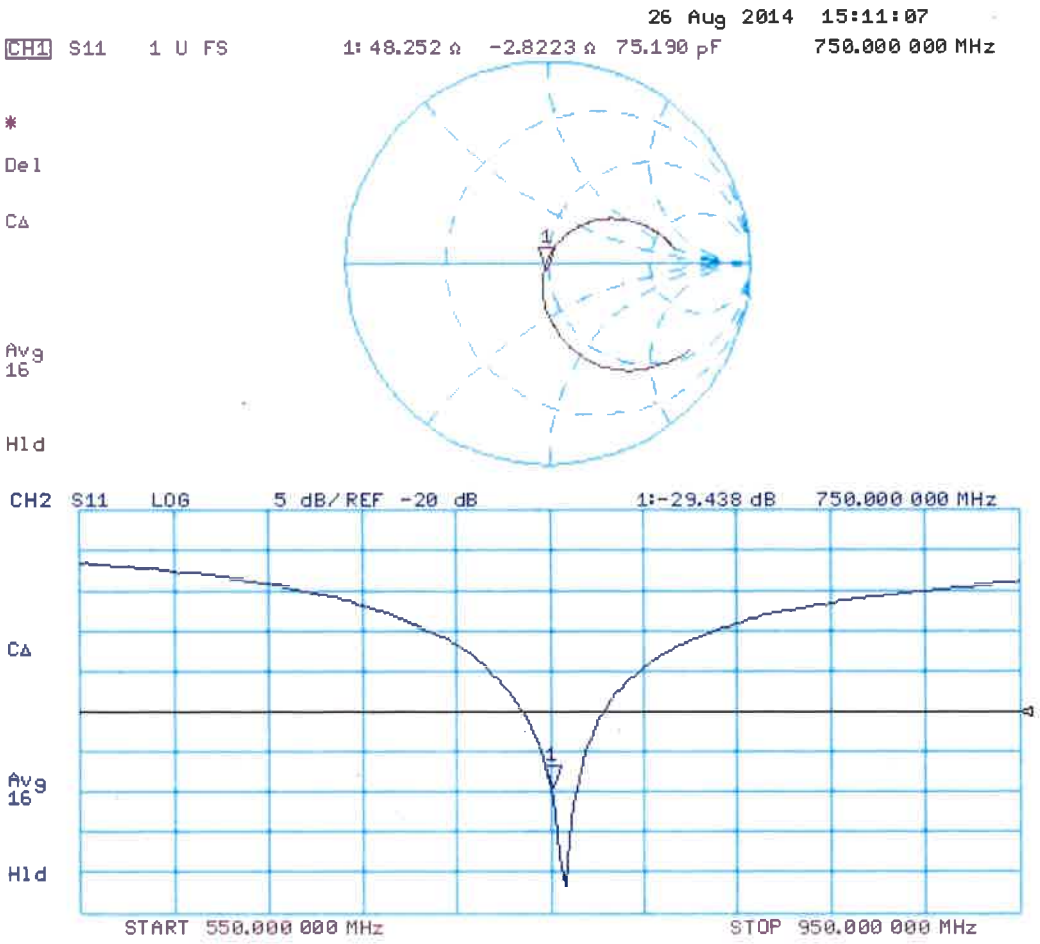
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.09 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.24 W/kg
SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.48 W/kg
Maximum value of SAR (measured) = 2.59 W/kg



0 dB = 2.59 W/kg = 4.13 dBW/kg

Impedance Measurement Plot for Body TSL



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 **B.V. ADT (Auden)**

Certificate No: D835V2-4d121_Aug14

CALIBRATION CERTIFICATE

Object: D835V2 - SN: 4d121

Calibration procedure(s): QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: August 28, 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 EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

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

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 28, 2014

Glossary:

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

Calibration is Performed According to the Following Standards:

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

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	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 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	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.0 ± 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	2.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.43 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.21 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	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.2 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.55 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.33 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.9 Ω - 1.8 jΩ
Return Loss	- 31.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.4 Ω - 4.0 jΩ
Return Loss	- 26.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.394 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	June 29, 2010

DASY5 Validation Report for Head TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d121

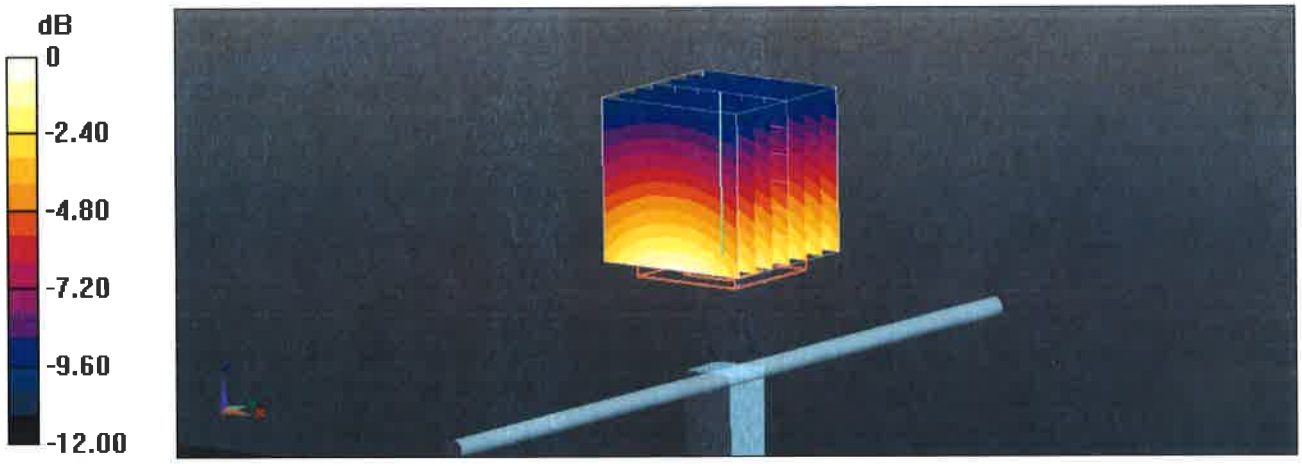
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

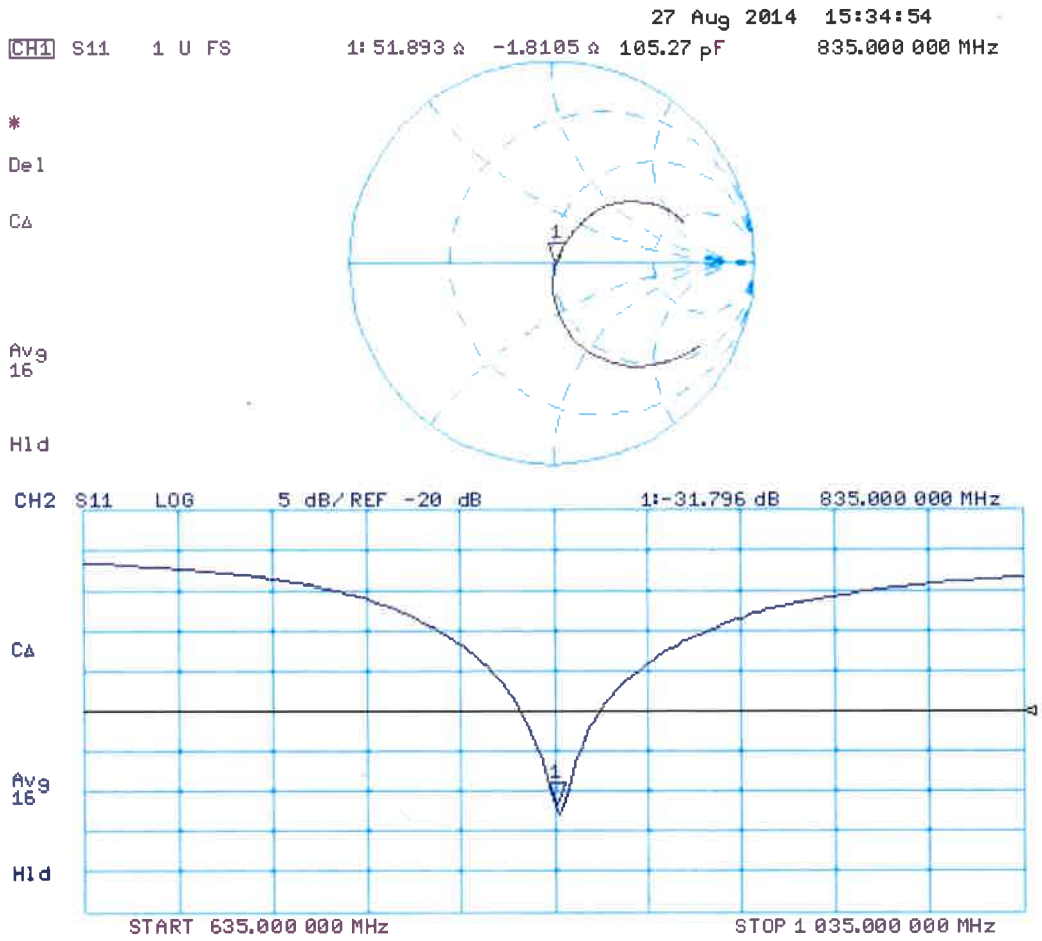
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.89 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.59 W/kg
Maximum value of SAR (measured) = 2.85 W/kg



0 dB = 2.85 W/kg = 4.55 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 27.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d121

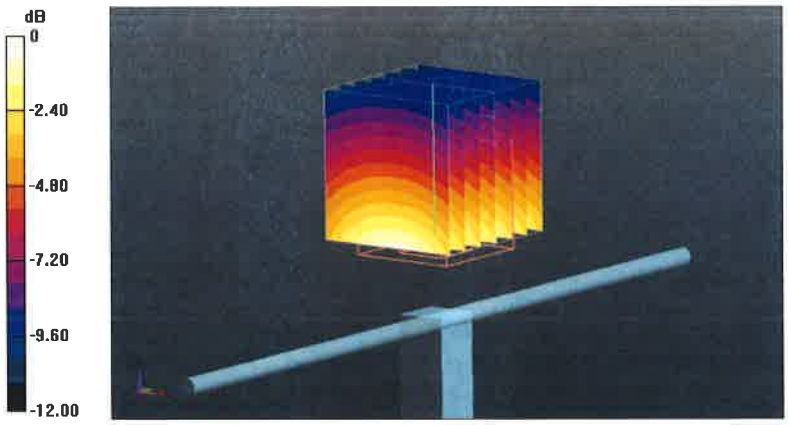
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.01 S/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

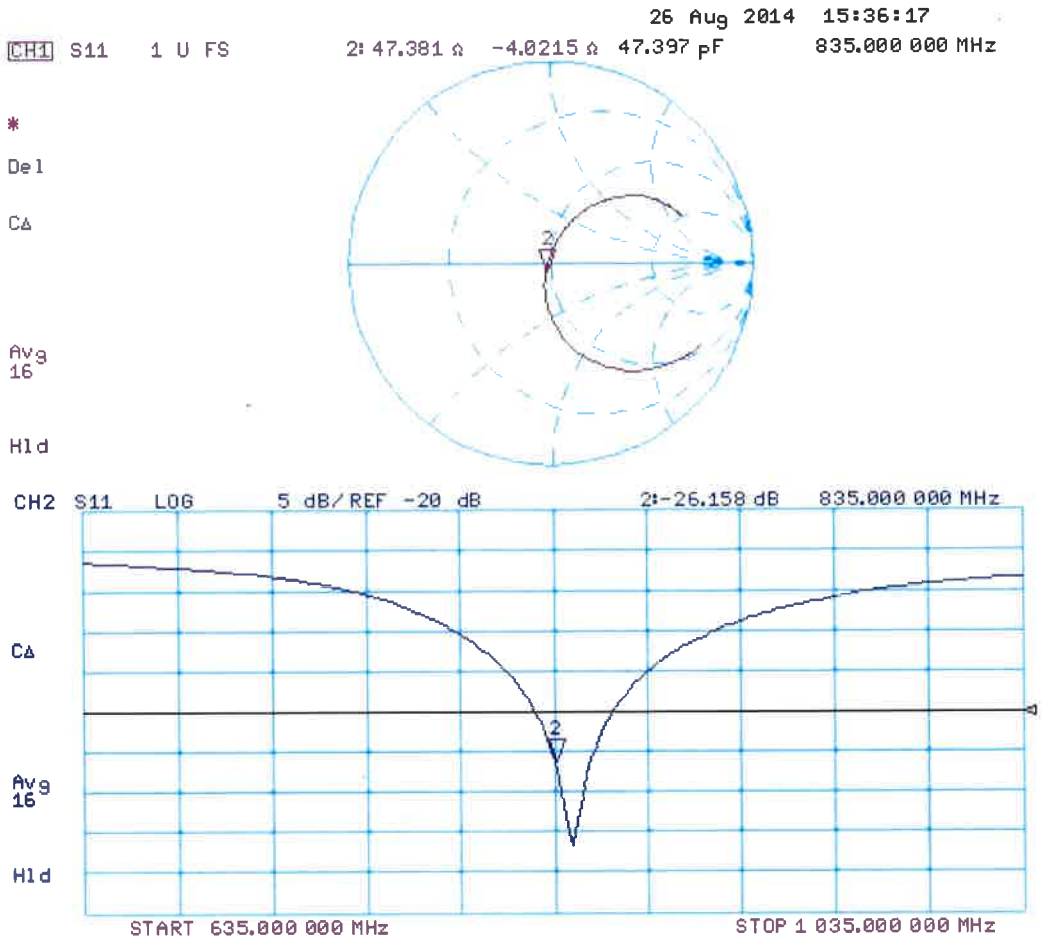
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.00 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.60 W/kg
SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.62 W/kg
Maximum value of SAR (measured) = 2.86 W/kg



0 dB = 2.86 W/kg = 4.56 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

Accreditation No.: SCS 108

Client **B.V. ADT (Auden)**

Certificate No: D1750V2-1055_Aug14

CALIBRATION CERTIFICATE

Object: D1750V2 - SN: 1055

Calibration procedure(s): QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: August 28, 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 EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

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

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 28, 2014

Glossary:

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

Calibration is Performed According to the Following Standards:

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

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	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.2 ± 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	9.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.97 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.8 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	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.0 ± 6 %	1.49 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	9.48 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.3 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.9 Ω + 2.2 jΩ
Return Loss	- 32.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7 Ω + 1.7 jΩ
Return Loss	- 28.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.223 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 19, 2010

DASY5 Validation Report for Head TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1055

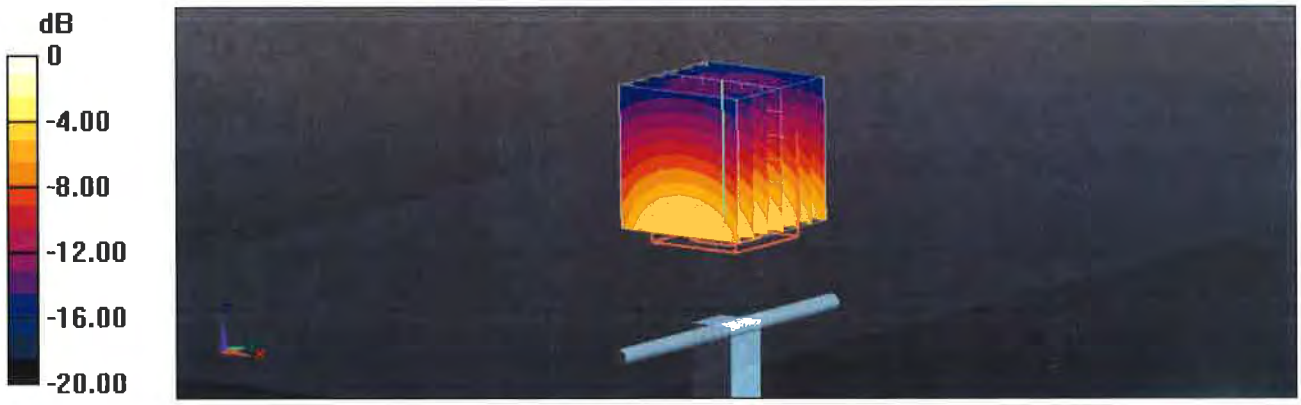
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.37 S/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.23, 5.23, 5.23); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

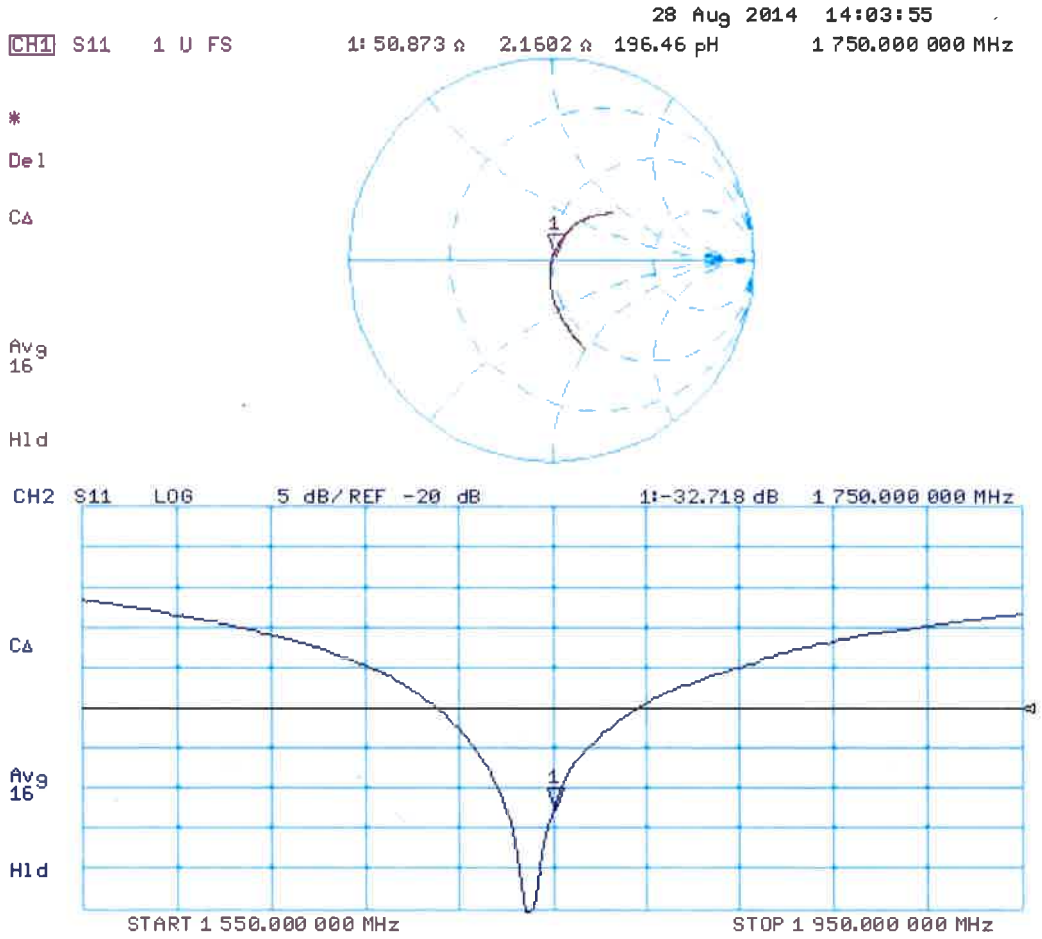
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.13 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 16.9 W/kg
SAR(1 g) = 9.38 W/kg; SAR(10 g) = 4.97 W/kg
Maximum value of SAR (measured) = 11.8 W/kg



0 dB = 11.8 W/kg = 10.72 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1055

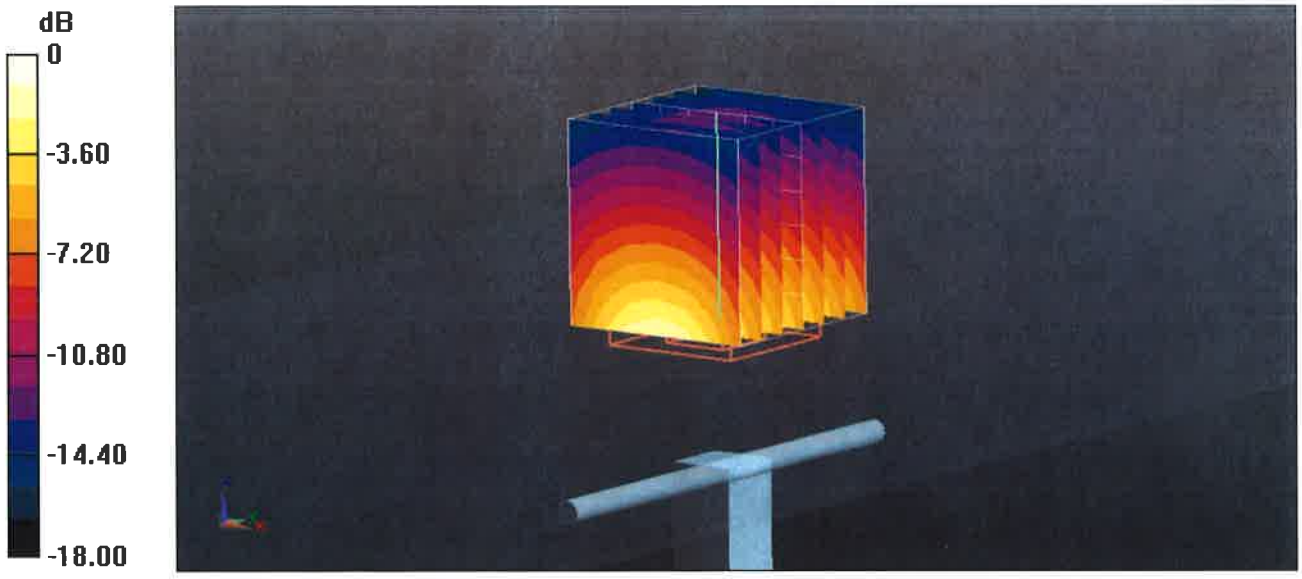
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.49 S/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.89, 4.89, 4.89); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

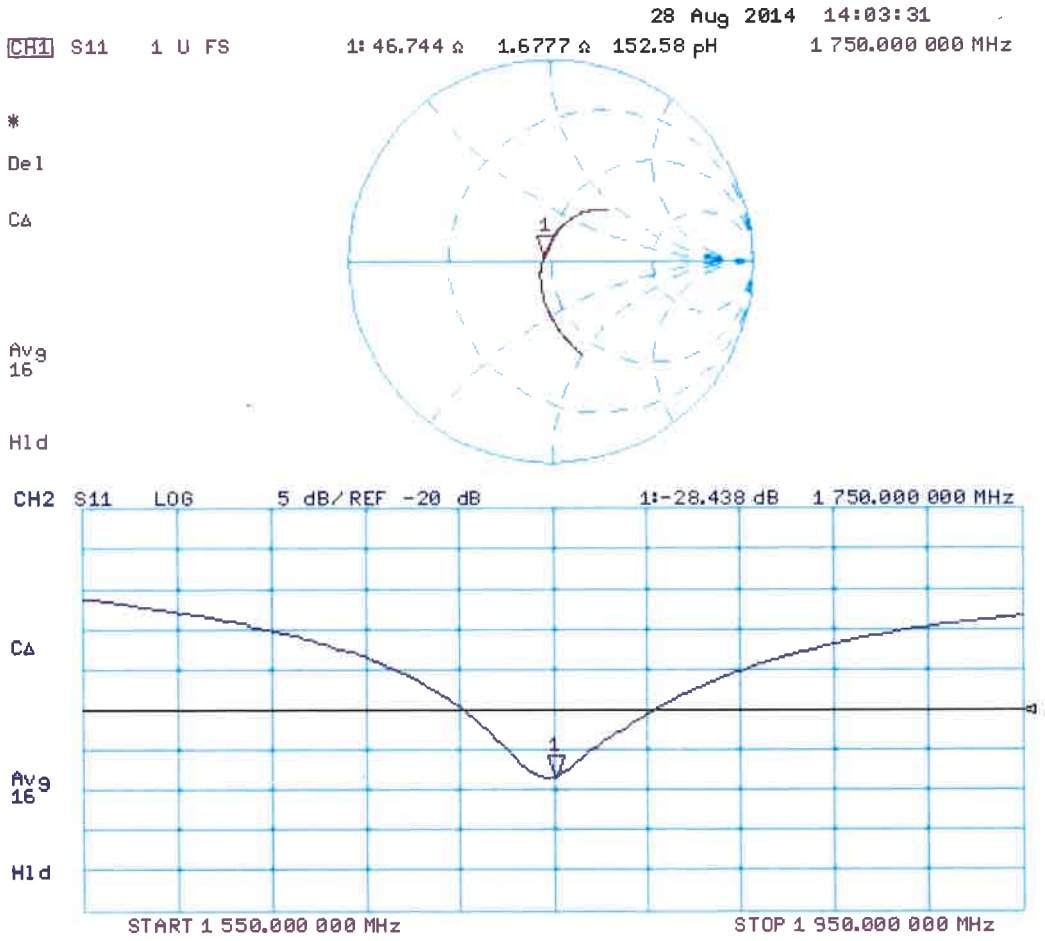
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.41 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 9.48 W/kg; SAR(10 g) = 5.09 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 Body TSL



Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Client **B.V. ADT (Auden)**

Certificate No: D1900V2-5d036_Jan13

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d036
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	January 21, 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)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

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	Israe El-Naouq
Approved by:	Fin Bomholt	Deputy Technical Manager	F. Bomholt

Issued: January 22, 2013

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.5
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 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	39.4 ± 6 %	1.38 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	10.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**40.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.3 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	52.2 ± 6 %	1.52 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	10.3 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**41.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.6 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.1 Ω + 5.0 jΩ
Return Loss	- 26.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.5 Ω + 5.2 jΩ
Return Loss	- 24.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 08, 2003

DASY5 Validation Report for Head TSL

Date: 21.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d036

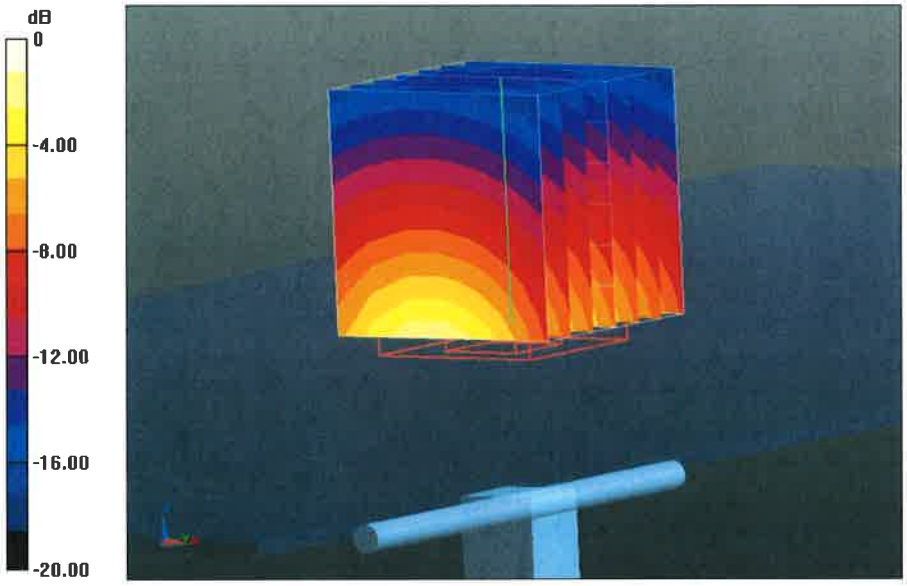
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.38 S/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.98, 4.98, 4.98); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

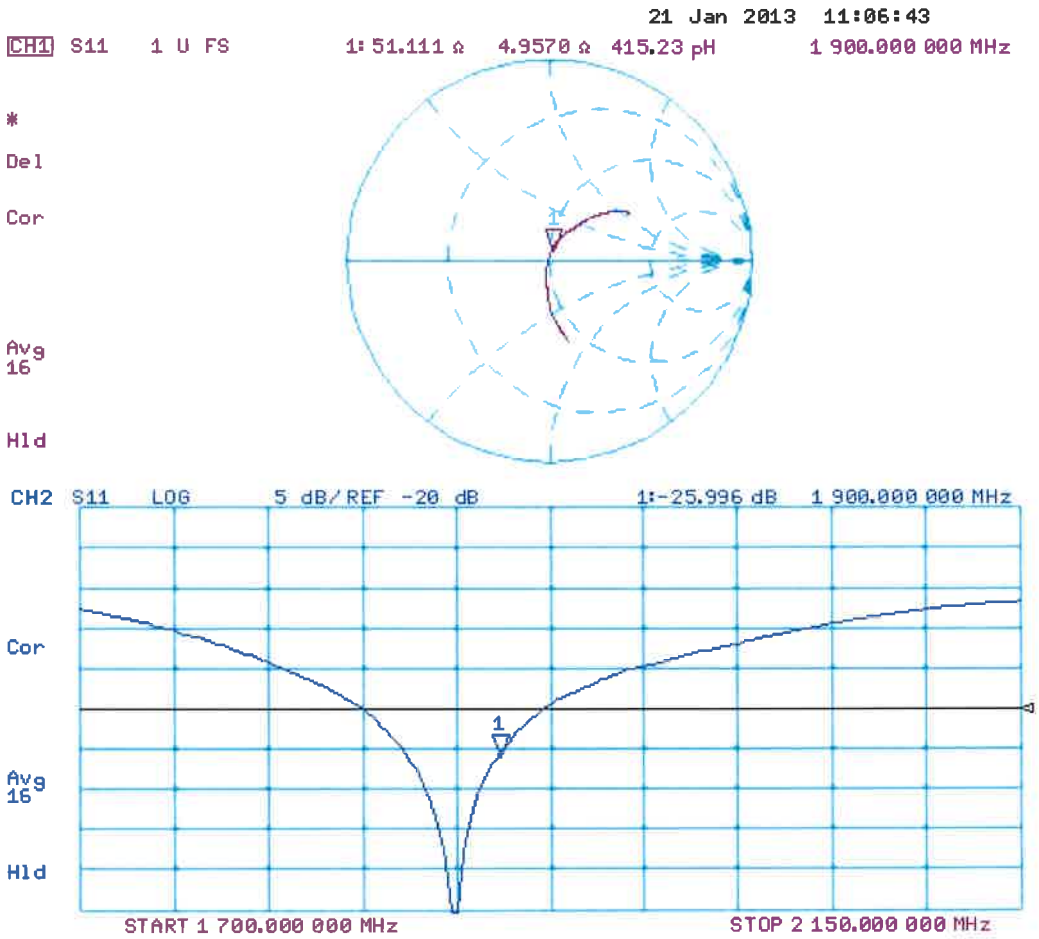
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.363 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.31 W/kg
Maximum value of SAR (measured) = 12.6 W/kg



0 dB = 12.6 W/kg = 11.00 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 21.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d036

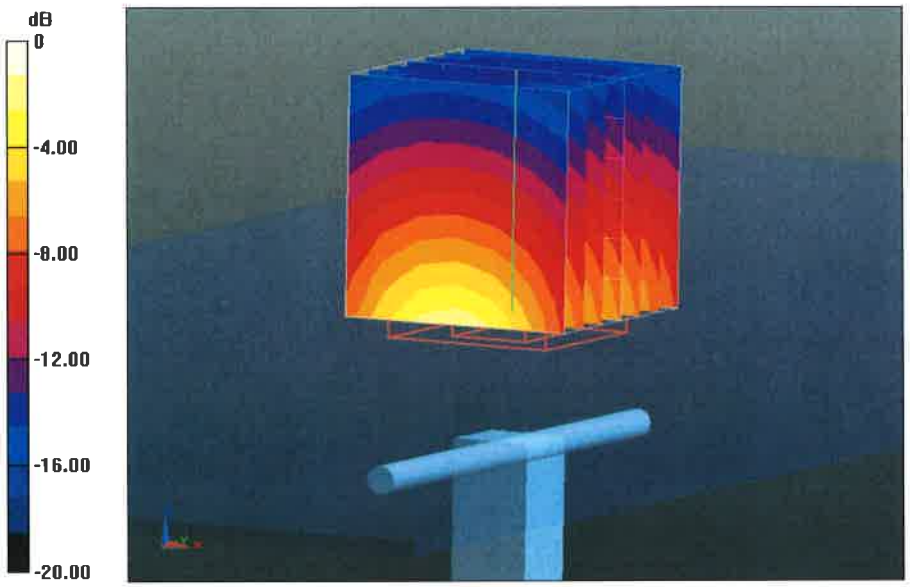
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.52 S/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.6, 4.6, 4.6); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

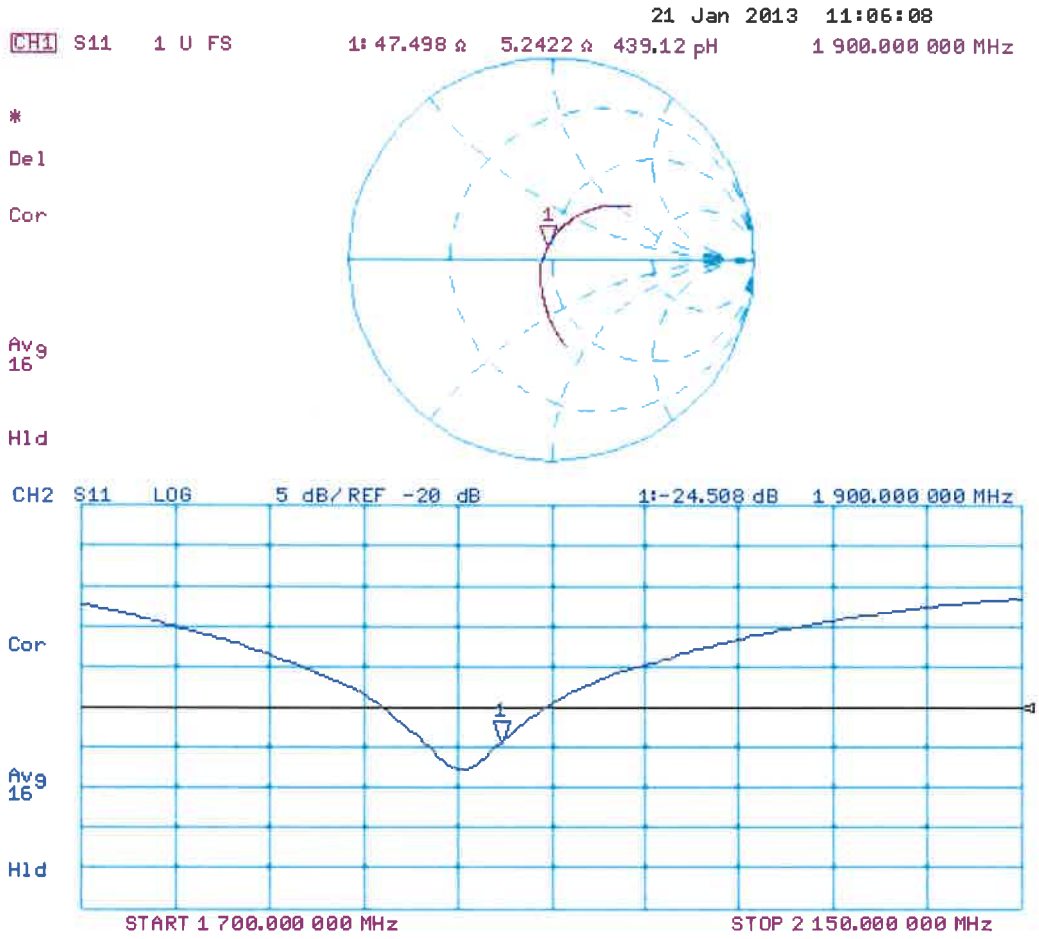
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.692 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 18.0 W/kg
SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.42 W/kg
Maximum value of SAR (measured) = 13.0 W/kg



0 dB = 13.0 W/kg = 11.14 dBW/kg

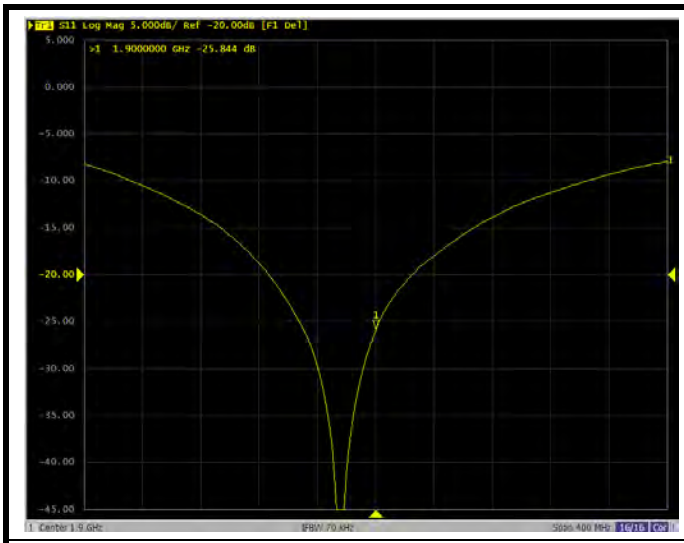
Impedance Measurement Plot for Body TSL



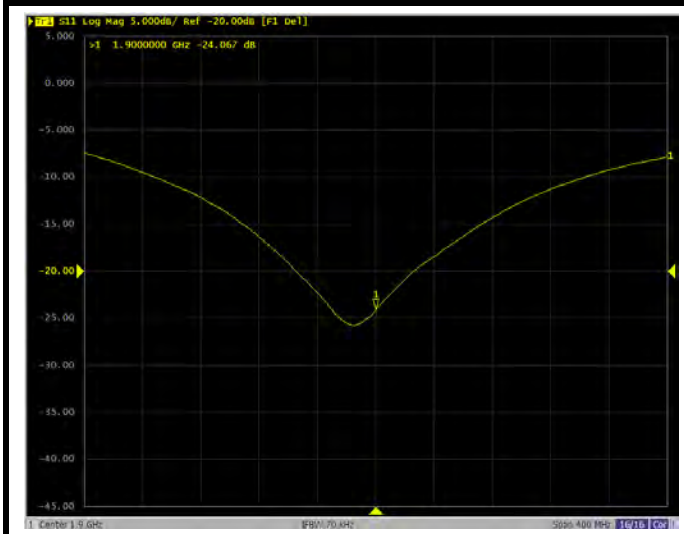
Annual Confirmation of SAR Reference Dipole

Model: D1900V2 **S/N :** 5d036 **Measured Date :** Jan. 20, 2014

Frequency (MHz)	Type	Item	Previous Measurement	Annual Check	Deviation	Accepted Tolerance	Note
1900	Head TSL	Return Loss	-25.996	**-25.844**	-0.6 %	±20 %	**PASS**
		Real Impedance	51.111	**51.555**	0.444	±5 Ω	**PASS**
		Imaginary Impedance	4.957	**5.0363**	0.0793	±5 Ω	**PASS**
1900	Body TSL	Return Loss	-24.508	**-24.067**	-1.8 %	±20 %	**PASS**
		Real Impedance	47.498	**46.556**	-0.942	±5 Ω	**PASS**
		Imaginary Impedance	5.2422	**4.9878**	-0.2544	±5 Ω	**PASS**



1900 MHz, Head TSL



1900 MHz, Body TSL

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

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

Accreditation No.: SCS 108

Client **B.V. ADT (Auden)**

Certificate No: D2600V2-1020_Aug14

CALIBRATION CERTIFICATE

Object: D2600V2 - SN: 1020

Calibration procedure(s): QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: August 21, 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 EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

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

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

Issued: August 21, 2014

Glossary:

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

Calibration is Performed According to the Following Standards:

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

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

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.5 ± 6 %	1.99 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.6 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**57.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.53 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.9 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.0 ± 6 %	2.20 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	14.4 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**56.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.38 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**25.2 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.7 Ω - 3.6 jΩ
Return Loss	- 28.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.3 Ω - 3.4 jΩ
Return Loss	- 24.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 13, 2008

DASY5 Validation Report for Head TSL

Date: 21.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1020

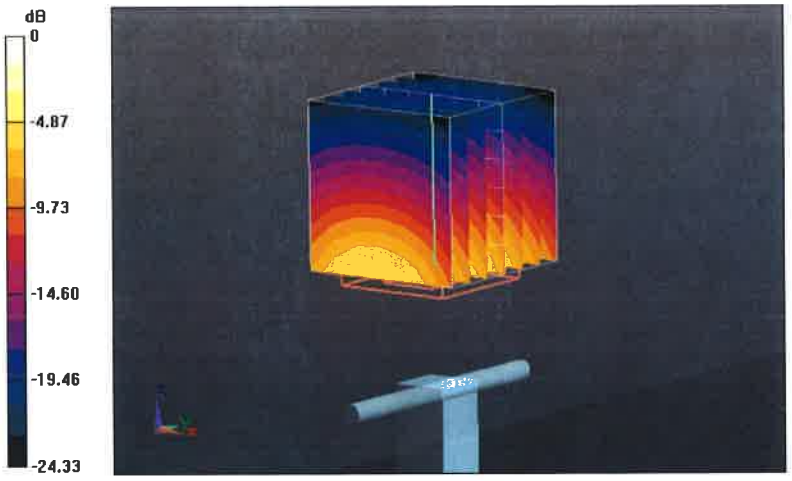
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 1.99 S/m; ε_r = 37.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.46, 4.46, 4.46); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

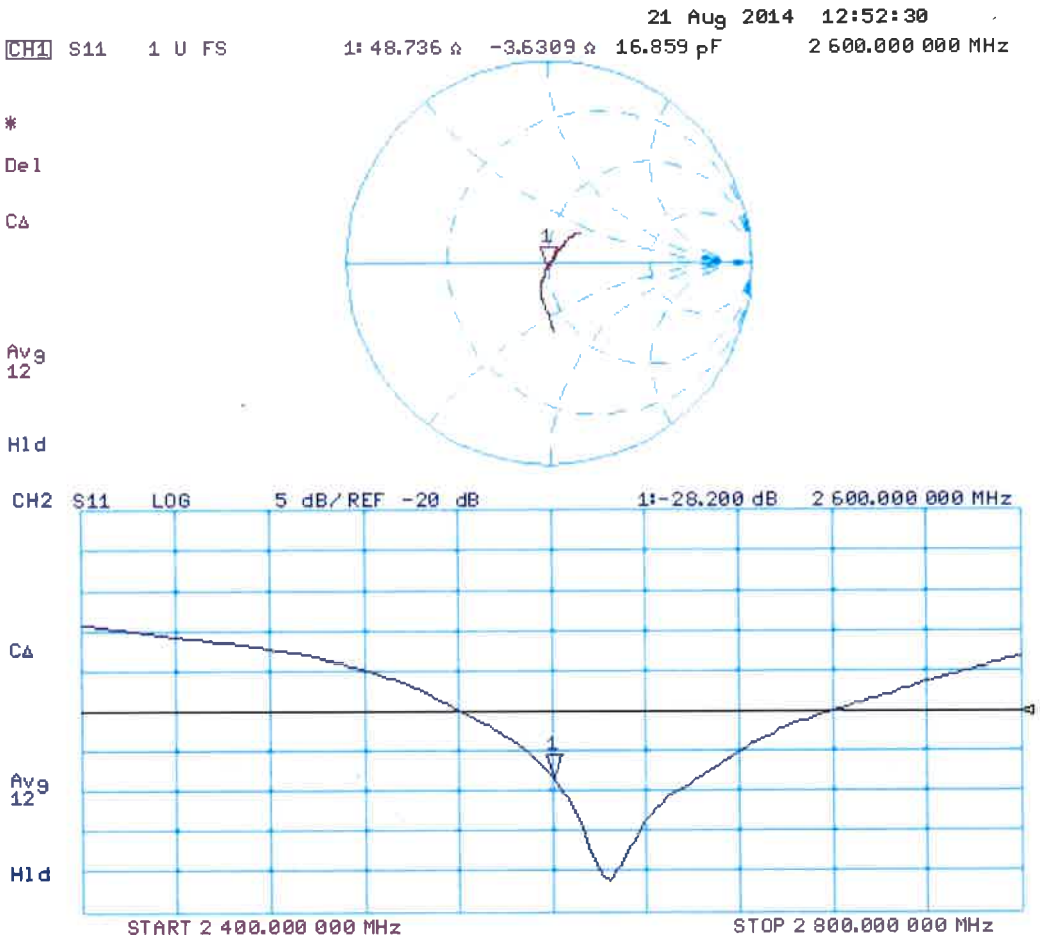
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.5 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 31.0 W/kg
SAR(1 g) = 14.6 W/kg; SAR(10 g) = 6.53 W/kg
Maximum value of SAR (measured) = 19.4 W/kg



0 dB = 19.4 W/kg = 12.88 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 21.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1020

Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.2 S/m; ε_r = 50; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

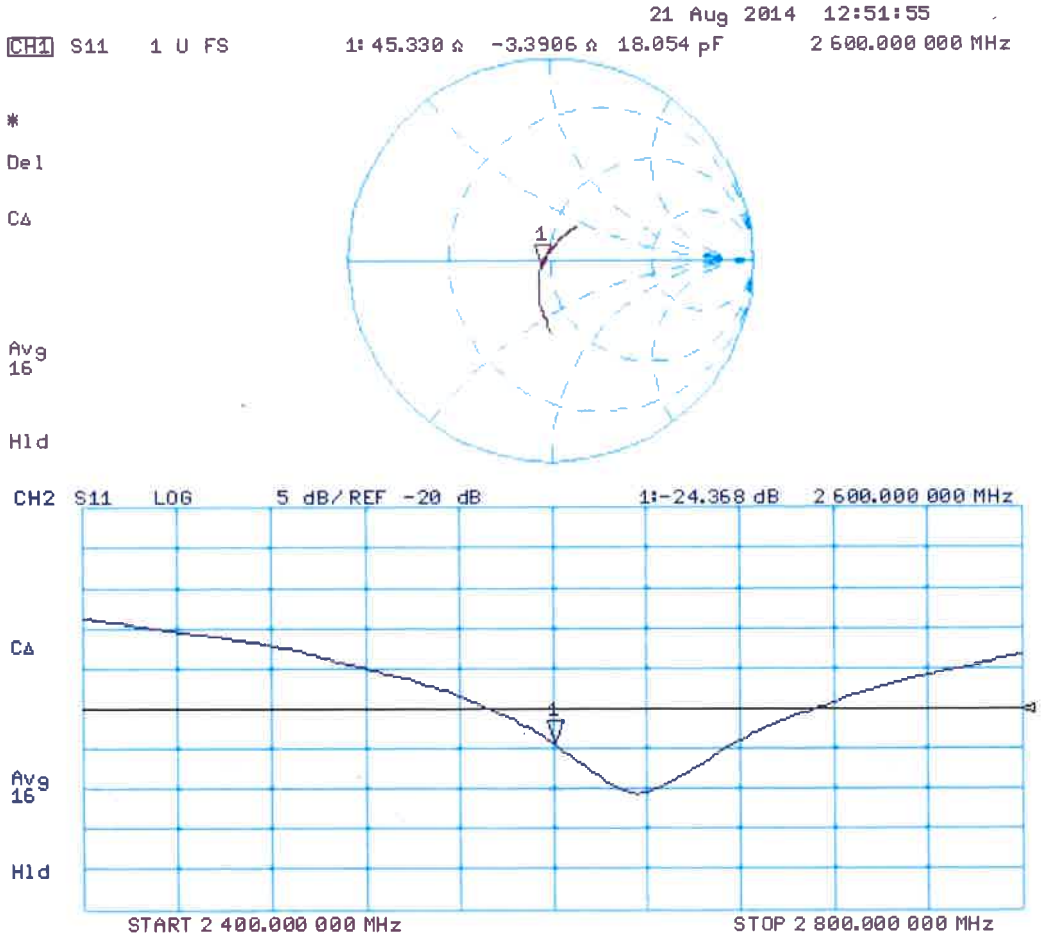
- Probe: ES3DV3 - SN3205; ConvF(4.24, 4.24, 4.24); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.98 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 31.2 W/kg
SAR(1 g) = 14.4 W/kg; SAR(10 g) = 6.38 W/kg
Maximum value of SAR (measured) = 19.1 W/kg

0 dB = 19.1 W/kg = 12.81 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client **B.V.ADT (Auden)**

Certificate No: EX3-3864_Jul14

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3864

Calibration procedure(s): QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: July 25, 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:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 26, 2014

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ 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 $\vartheta = 0$ ($f \leq 900$ 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 $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Probe EX3DV4

SN:3864

Manufactured: February 2, 2012
Calibrated: July 25, 2014

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3864

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.47	0.45	0.49	± 10.1 %
DCP (mV)[B]	98.7	96.9	98.1	

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	135.4	±2.7 %
		Y	0.0	0.0	1.0		149.4	
		Z	0.0	0.0	1.0		144.7	

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

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3864

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	10.44	10.44	10.44	0.79	0.61	± 12.0 %
835	41.5	0.90	10.03	10.03	10.03	0.79	0.58	± 12.0 %
900	41.5	0.97	9.77	9.77	9.77	0.29	0.97	± 12.0 %
1450	40.5	1.20	9.06	9.06	9.06	0.24	1.30	± 12.0 %
1640	40.3	1.29	8.49	8.49	8.49	0.74	0.56	± 12.0 %
1750	40.1	1.37	8.39	8.39	8.39	0.41	0.74	± 12.0 %
1900	40.0	1.40	8.10	8.10	8.10	0.65	0.61	± 12.0 %
2000	40.0	1.40	8.21	8.21	8.21	0.30	0.92	± 12.0 %
2300	39.5	1.67	7.80	7.80	7.80	0.31	0.87	± 12.0 %
2450	39.2	1.80	7.39	7.39	7.39	0.29	0.96	± 12.0 %
2600	39.0	1.96	7.27	7.27	7.27	0.26	1.11	± 12.0 %
3500	37.9	2.91	6.86	6.86	6.86	0.36	1.05	± 13.1 %
5200	36.0	4.66	5.35	5.35	5.35	0.35	1.80	± 13.1 %
5300	35.9	4.76	5.03	5.03	5.03	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.90	4.90	4.90	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.78	4.78	4.78	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.75	4.75	4.75	0.40	1.80	± 13.1 %

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

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

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3864

Calibration Parameter Determined in Body Tissue Simulating Media

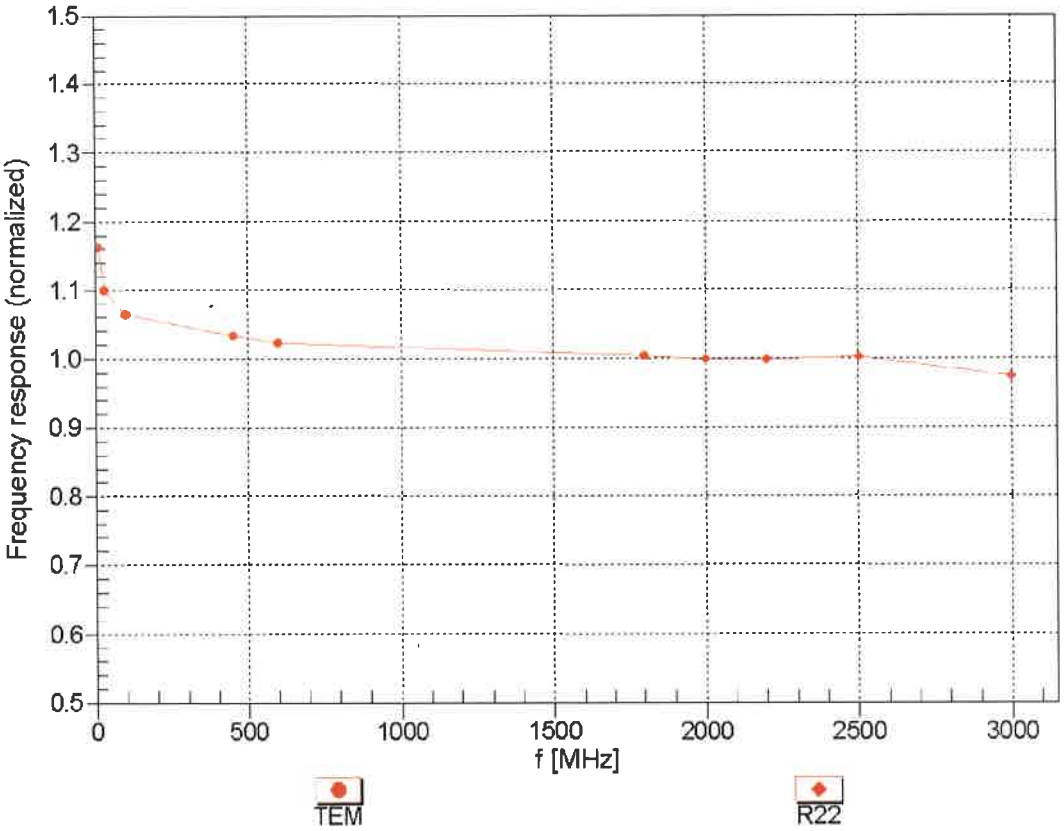
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
750	55.5	0.96	10.08	10.08	10.08	0.64	0.70	± 12.0 %
835	55.2	0.97	10.04	10.04	10.04	0.44	0.82	± 12.0 %
900	55.0	1.05	9.71	9.71	9.71	0.28	1.08	± 12.0 %
1450	54.0	1.30	8.18	8.18	8.18	0.33	0.98	± 12.0 %
1640	53.8	1.40	8.49	8.49	8.49	0.57	0.71	± 12.0 %
1750	53.4	1.49	8.02	8.02	8.02	0.31	0.97	± 12.0 %
1900	53.3	1.52	7.72	7.72	7.72	0.49	0.75	± 12.0 %
2000	53.3	1.52	7.80	7.80	7.80	0.46	0.75	± 12.0 %
2300	52.9	1.81	7.43	7.43	7.43	0.64	0.65	± 12.0 %
2450	52.7	1.95	7.14	7.14	7.14	0.57	0.65	± 12.0 %
2600	52.5	2.16	7.00	7.00	7.00	0.80	0.50	± 12.0 %
3500	51.3	3.31	6.42	6.42	6.42	0.41	1.07	± 13.1 %
5200	49.0	5.30	4.49	4.49	4.49	0.45	1.90	± 13.1 %
5300	48.9	5.42	4.16	4.16	4.16	0.50	1.90	± 13.1 %
5500	48.6	5.65	3.92	3.92	3.92	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.77	3.77	3.77	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.01	4.01	4.01	0.50	1.90	± 13.1 %

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

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

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

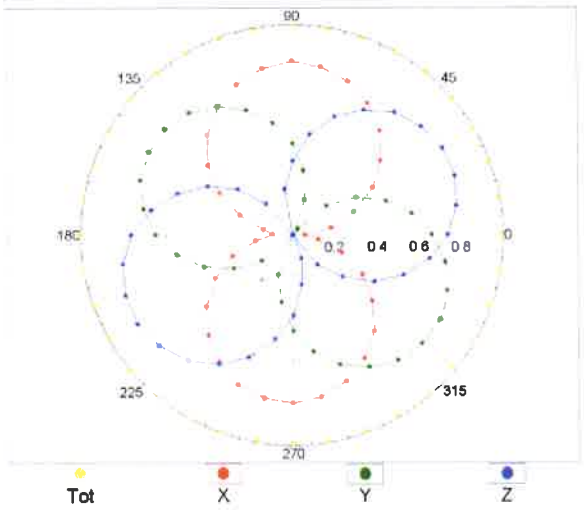
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



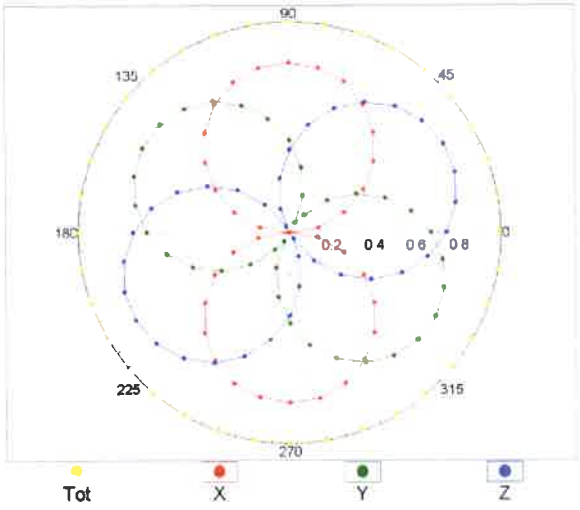
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

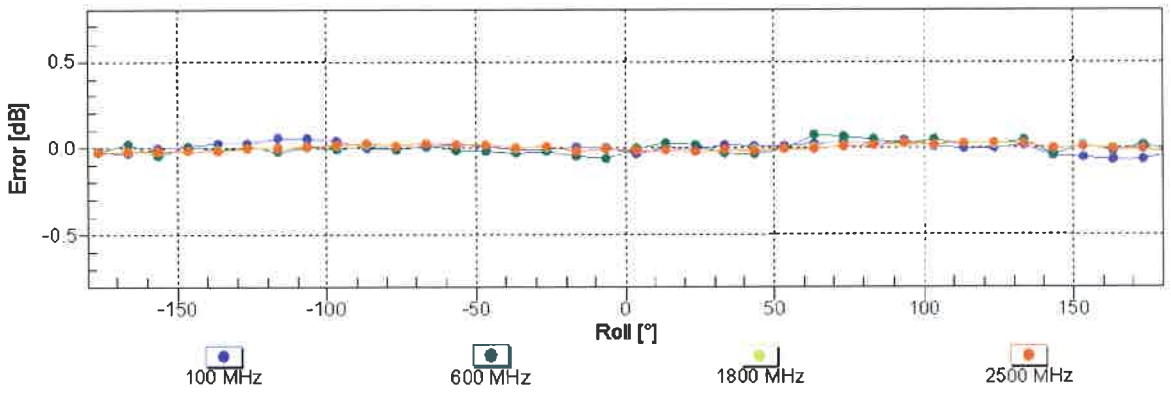
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



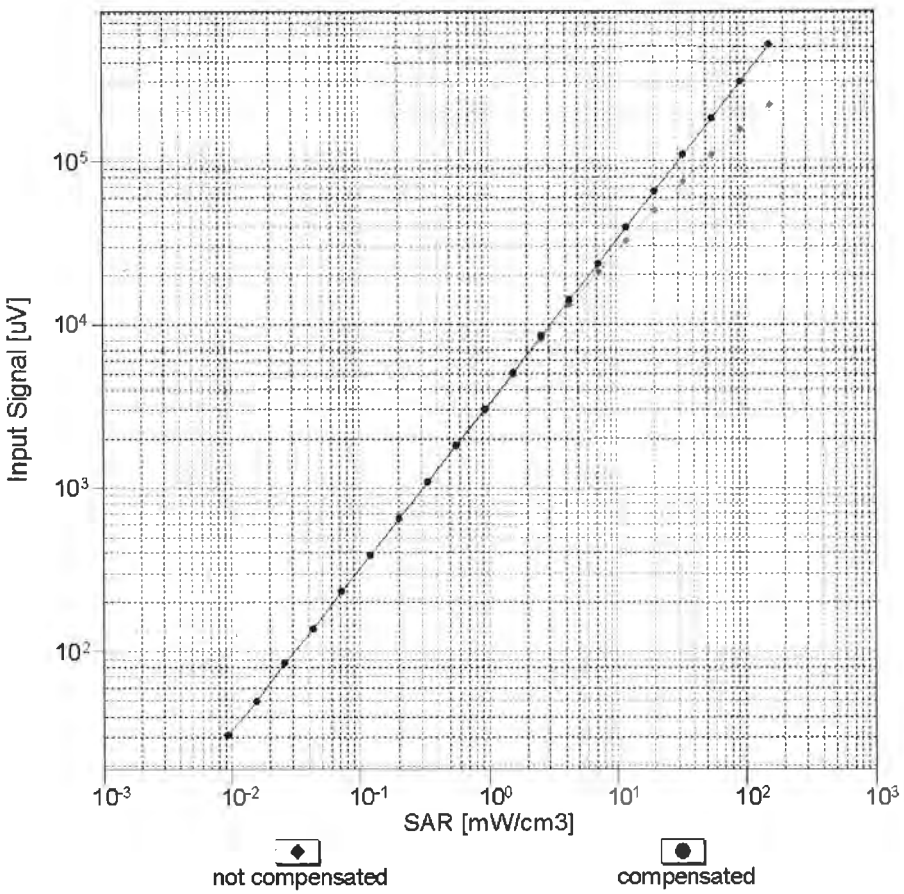
f=1800 MHz,R22

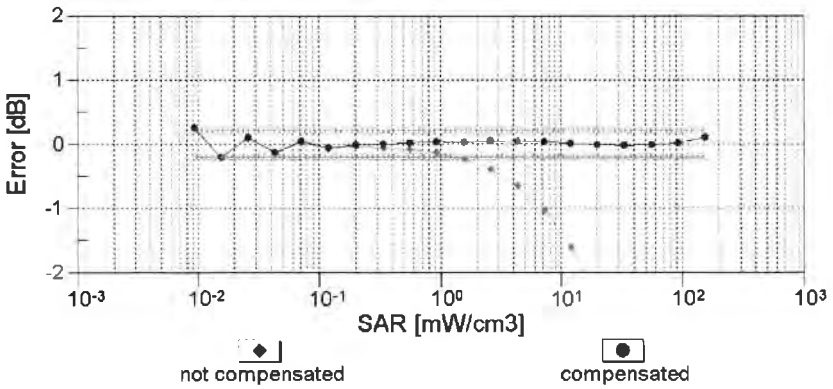




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

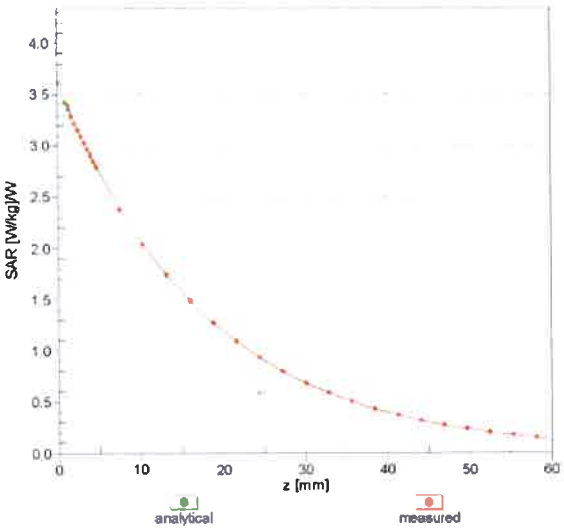




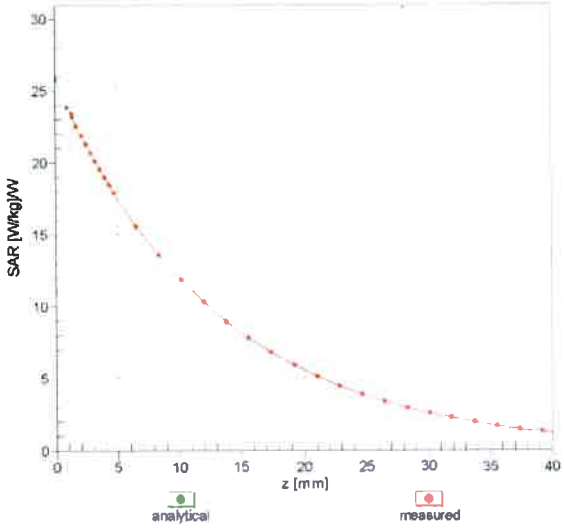
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

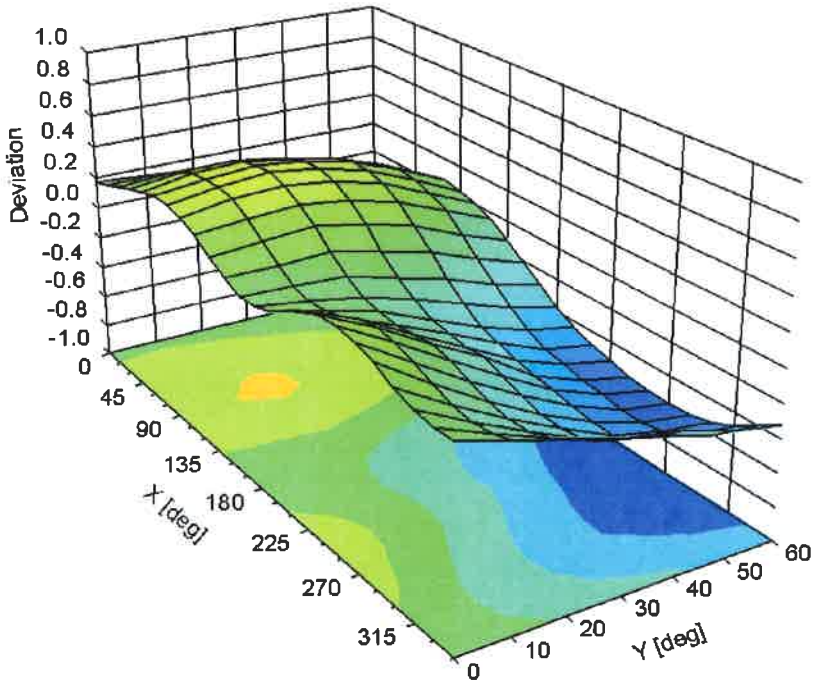


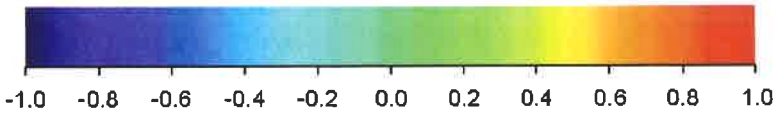
f = 1750 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3864

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-116.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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

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

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

Accreditation No.: SCS 108

Client **B.V. ADT (Auden)**

Certificate No: EX3-3971_Mar14

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3971

Calibration procedure(s): QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: March 31, 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	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
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:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 1, 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
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:

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., $\vartheta = 0$ 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 $\vartheta = 0$ ($f \leq 900$ 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 $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Probe EX3DV4

SN:3971

Manufactured: December 30, 2013
Calibrated: March 31, 2014

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3971

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.41	0.53	0.50	± 10.1 %
DCP (mV)[B]	99.1	98.1	98.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	140.6	±3.3 %
		Y	0.0	0.0	1.0		143.4	
		Z	0.0	0.0	1.0		149.6	

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

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3971

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	10.30	10.30	10.30	0.37	0.95	± 12.0 %
835	41.5	0.90	10.00	10.00	10.00	0.45	0.79	± 12.0 %
900	41.5	0.97	9.66	9.66	9.66	0.23	1.21	± 12.0 %
900	41.5	0.97	9.82	9.82	9.82	0.34	0.93	± 12.0 %
1450	40.5	1.20	8.84	8.84	8.84	0.27	1.12	± 12.0 %
1640	40.3	1.29	8.44	8.44	8.44	0.80	0.50	± 12.0 %
1750	40.1	1.37	8.40	8.40	8.40	0.32	0.91	± 12.0 %
1810	40.0	1.40	8.21	8.21	8.21	0.56	0.71	± 12.0 %
1900	40.0	1.40	8.19	8.19	8.19	0.31	0.91	± 12.0 %
2000	40.0	1.40	8.19	8.19	8.19	0.55	0.66	± 12.0 %
2300	39.5	1.67	7.77	7.77	7.77	0.61	0.64	± 12.0 %
2450	39.2	1.80	7.43	7.43	7.43	0.39	0.83	± 12.0 %
2600	39.0	1.96	7.15	7.15	7.15	0.37	0.87	± 12.0 %
3500	37.9	2.91	6.87	6.87	6.87	0.50	0.93	± 13.1 %
5200	36.0	4.66	5.22	5.22	5.22	0.30	1.80	± 13.1 %
5300	35.9	4.76	4.81	4.81	4.81	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.93	4.93	4.93	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.55	4.55	4.55	0.50	1.80	± 13.1 %
5800	35.3	5.27	4.53	4.53	4.53	0.50	1.80	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

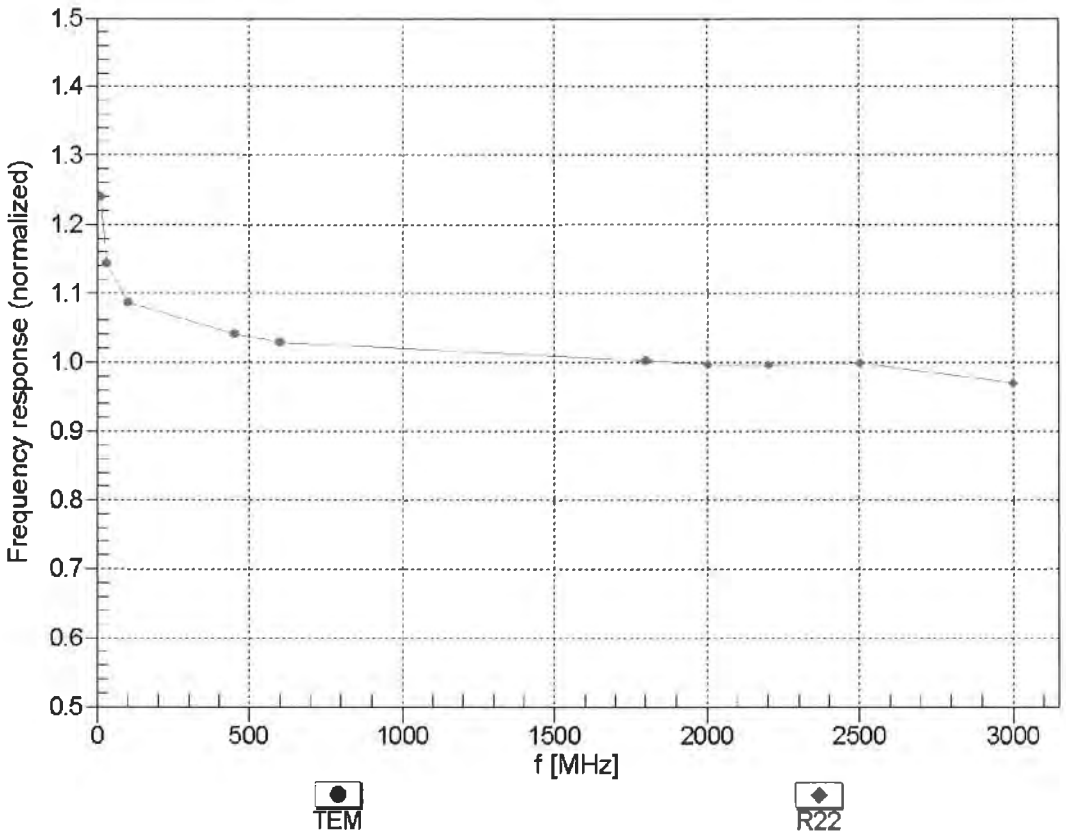
DASY/EASY - Parameters of Probe: EX3DV4 - SN:3971

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	9.91	9.91	9.91	0.49	0.81	± 12.0 %
835	55.2	0.97	9.74	9.74	9.74	0.56	0.73	± 12.0 %
900	55.0	1.05	9.53	9.53	9.53	0.67	0.67	± 12.0 %
1450	54.0	1.30	8.25	8.25	8.25	0.26	1.20	± 12.0 %
1640	53.8	1.40	8.36	8.36	8.36	0.30	1.01	± 12.0 %
1750	53.4	1.49	7.93	7.93	7.93	0.45	0.80	± 12.0 %
1900	53.3	1.52	7.68	7.68	7.68	0.37	0.90	± 12.0 %
2000	53.3	1.52	7.80	7.80	7.80	0.37	0.89	± 12.0 %
2300	52.9	1.81	7.51	7.51	7.51	0.68	0.65	± 12.0 %
2450	52.7	1.95	7.29	7.29	7.29	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.99	6.99	6.99	0.80	0.50	± 12.0 %
3500	51.3	3.31	6.66	6.66	6.66	0.27	1.34	± 13.1 %
5200	49.0	5.30	4.59	4.59	4.59	0.40	1.90	± 13.1 %
5300	48.9	5.42	4.19	4.19	4.19	0.50	1.90	± 13.1 %
5500	48.6	5.65	4.14	4.14	4.14	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.87	3.87	3.87	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.12	4.12	4.12	0.50	1.90	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

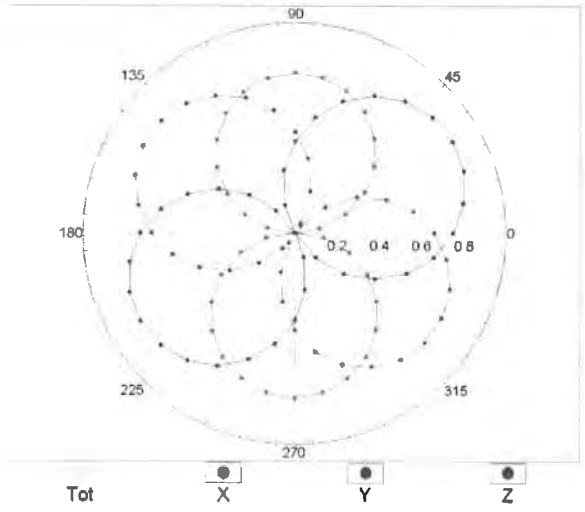
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



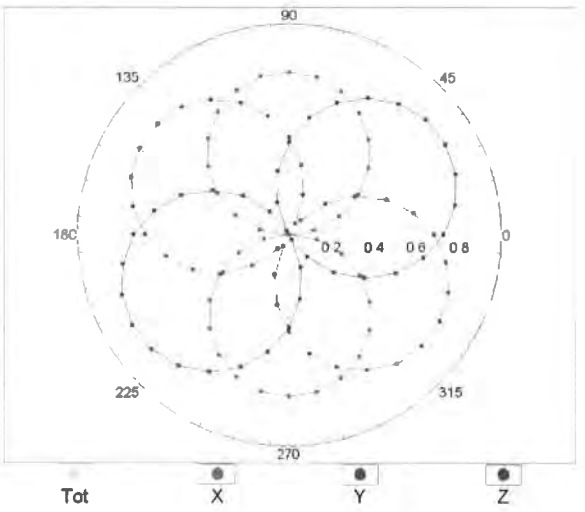
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

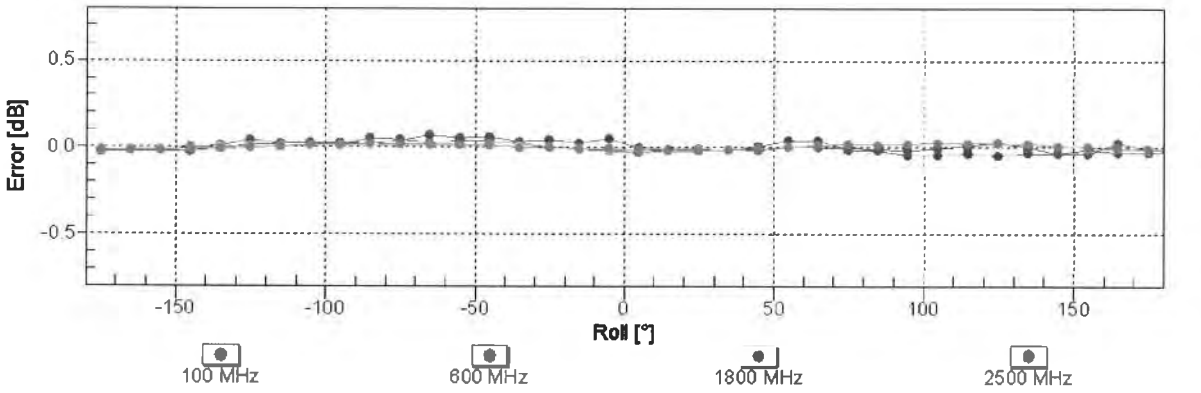
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



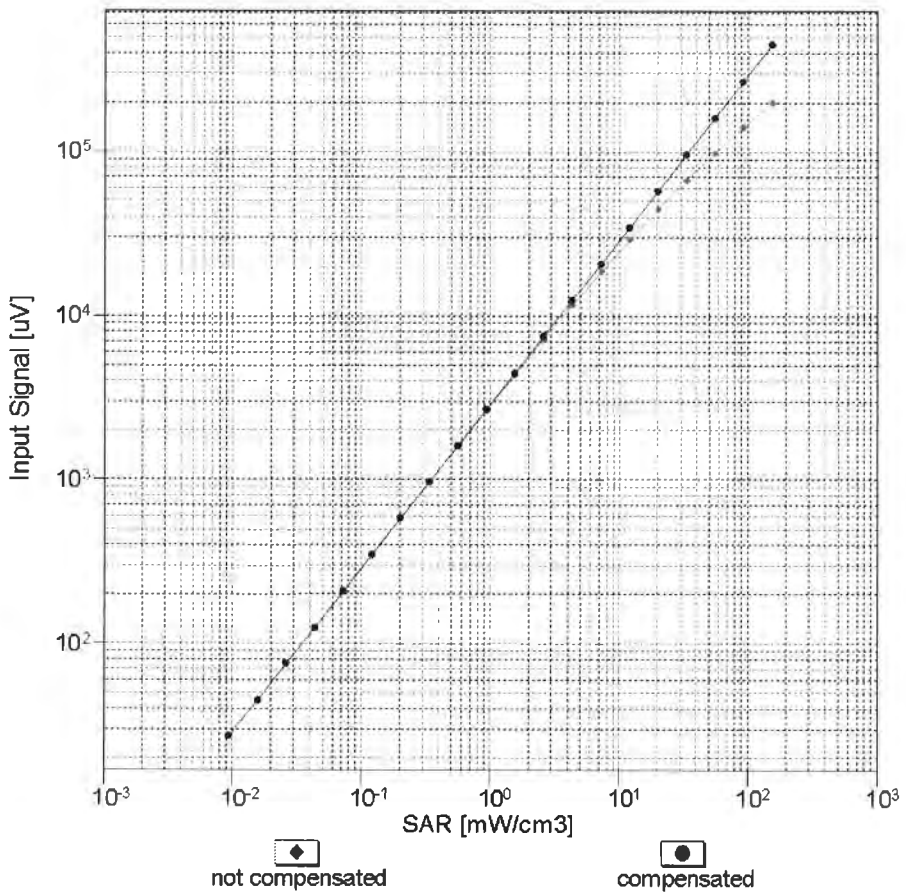
f=1800 MHz,R22

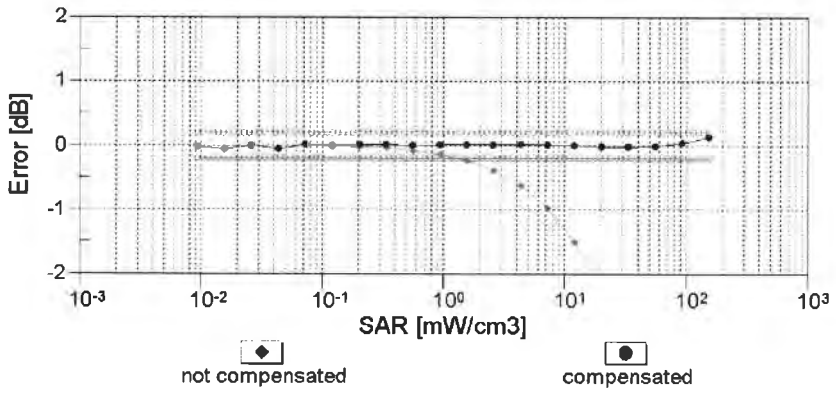




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

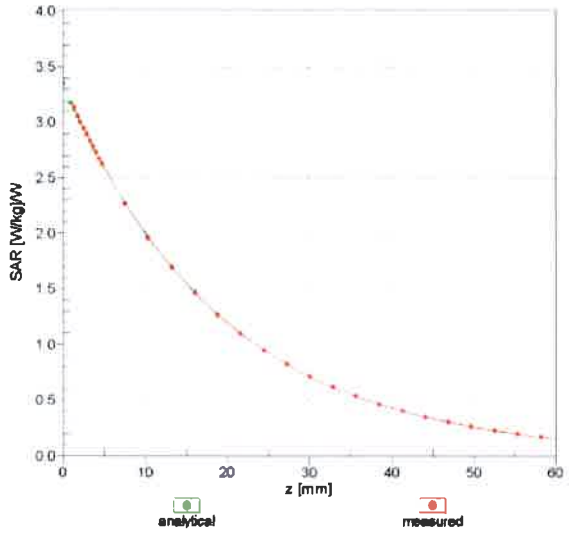




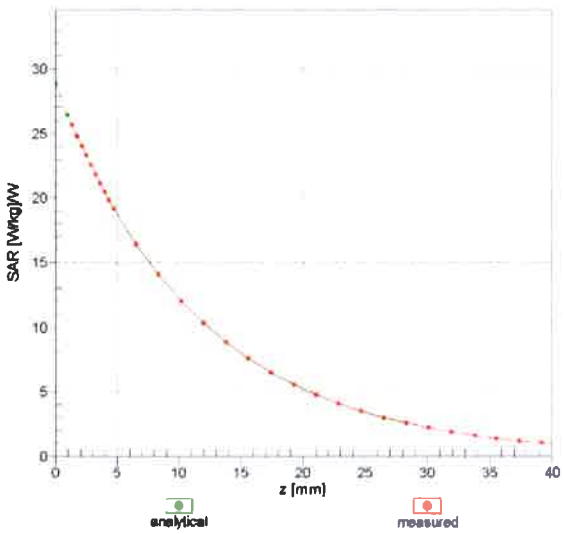
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

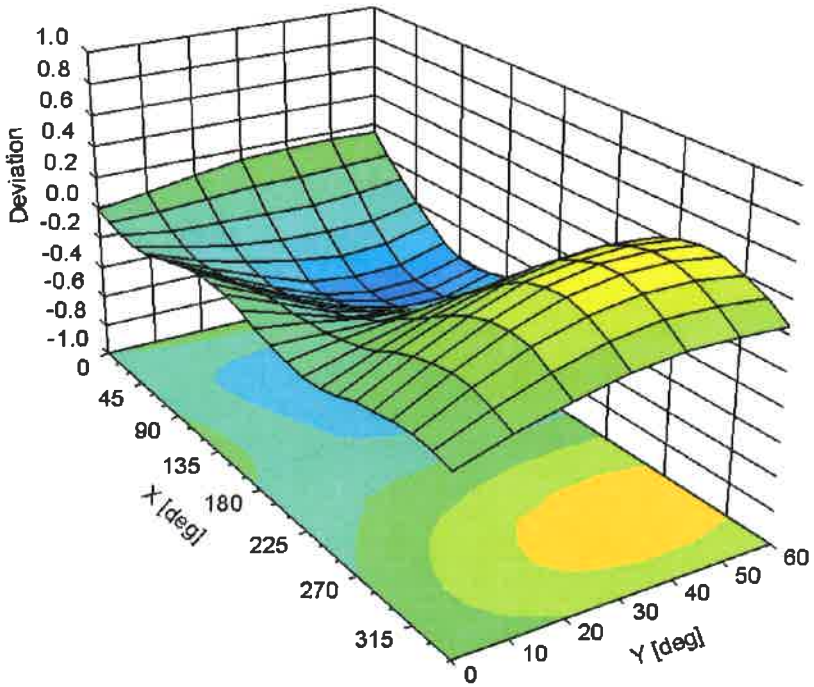


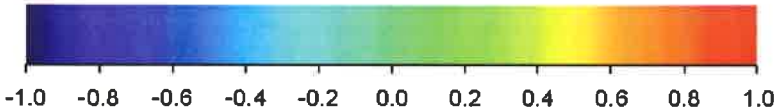
f = 1900 MHz,WGLS R22 (H_convF)



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: EX3DV4 - SN:3971

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-105.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

Appendix D. Photographs of EUT and Setup