
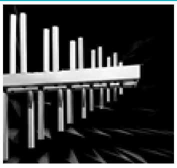
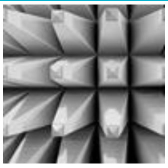

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TEST REPORT

Test Report No.: 1-2648/16-01-07-A

Deutsche Akkreditierungsstelle
D-PL-12076-01-01

Testing Laboratory

CTC advanced GmbH
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Accredited Test Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

Applicant

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Test Standard/s

IEEE 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR)in the Human Head from Wireless Communications Devices: Measurement Techniques
RSS-102 Issue 5	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	Payment Terminal
Device type:	portable device
Model name:	**Move/5000 or Move/3500 CL/3G/WiFi/BT/GPS/Camera or BCR**
S/N serial number:	163167333191036001230072 / 161677313191018601103817
FCC-ID:	XKB-M5000CL3GWIBT
IC:	2586D-M50CL3GWIBT
IMEI-Number:	355339067210750 / 357302070004410
Hardware status:	01
Software status:	OS 033902 / HTB 0066
Frequency:	see technical details
Antenna:	integrated antenna
Battery option:	P/N: F12432566 3.6V / 2900mAh
Module information:	Cinterion Module EHS6 / HW: B2 SW: 01
Test sample status:	identical prototype
Exposure category:	general population / uncontrolled environment

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test Report authorised:

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Marco Scigliano
Testing Manager
Radio Communications & EMC

1 Table of contents

2 General information

2.1 Notes and disclaimer

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2.2 Application details

Date of receipt of order:	2016-12-08
Date of receipt of test item:	2017-01-16
Start of test:	2017-01-17
End of test:	2017-03-14
Person(s) present during the test:	

2.3 Statement of compliance

The SAR values found for the Move/5000 or Move/3500 CL/3G/WiFi/BT/GPS/Camera or BCR Payment Terminal are below the maximum recommended levels of 1.6 W/Kg as averaged over any 1 g tissue according to the FCC rule §2.1093, the ANSI/IEEE C 95.1:1992, the NCRP Report Number 86 for uncontrolled environment, according to the Health Canada's Safety Code 6 and the Industry Canada Radio Standards Specification RSS-102 for General Population/Uncontrolled exposure.

2.4 Technical details

Band tested for this test report	Technology	Lowest transmit frequency/MHz	Highest transmit frequency/MHz	Lowest receive Frequency/MHz	Highest receive Frequency/MHz	Kind of modulation	Power Class	Tested power control level	GPRS/EGPRS mobile station class	GPRS/EGPRS multislot class	(E)GPRS voice mode or DTM	Test channel low	Test channel middle	Test channel high	Maximum output power/dBm)*
☐	GSM	880.2	914.8	925.2	959.8	GMSK 8-PSK	4 E2	5	B	12	no	975	37	124	--
☐	GSM DCS	1710.2	1784.8	1805.2	1879.8	GMSK 8-PSK	1 E2	0	B	12	no	512	698	885	--
☒	GSM cellular	824.2	848.8	869.2	893.8	GMSK 8-PSK	4 E2	5	B	12	no	128	190	251	32.2
☒	GSM PCS	1850.2	1909.8	1930.2	1989.8	GMSK 8-PSK	1 E2	0	B	12	no	512	661	810	29.0
☐	UMTS FDD I	1922.4	1977.6	2112.4	2167.6	QPSK	3	max	--	--	--	9612	9750	9888	--
☒	UMTS FDD II	1852.4	1907.6	1932.4	1987.6	QPSK	3	max	--	--	--	9262	9400	9538	23.6
☒	UMTS FDD V	826.4	846.6	871.4	891.6	QPSK	3	max	--	--	--	4132	4182	4233	24.5
☐	UMTS FDD VIII	882.4	912.6	927.4	957.6	QPSK	3	max	--	--	--	2712	2788	2863	--
☒	WLAN	2412	2462	2412	2462	CCK OFDM	--	max	--	--	--	1	6	11	6.0
☐	WLAN	5180	5240	5180	5240	OFDM	--	max	--	--	--	--	--	--	0.3
☐	WLAN	5260	5320	5260	5320	OFDM	--	max	--	--	--	--	--	--	1.7
☐	WLAN	5500	5700	5500	5700	OFDM	--	max	--	--	--	--	--	--	2.7
☐	WLAN	5745	5825	5745	5825	OFDM	--	max	--	--	--	--	--	--	3.2
☒	BT	2402	2480	2402	2480	GFSK	1	max	--	--	--	0	39	78	15.4

)*: measured slotted peak power for GSM, averaged max. RMS power for UMTS, WLAN and BT.

HSDPA Cat.8 / HSUPA Cat.6 data rates DL: max. 7.2 Mbps, UL: max. 5.76 Mbps
EDGE Class 12 data rates DL: max. 237 kbps, UL: max. 237 kbps
GPRS Class 12 data rates DL: max. 85.6 kbps, UL: max. 85.6 kbps
EU eCall and ERA/GLONASS support

2.5 Transmitter and Antenna Operating Configurations

Simultaneous transmission conditions		
GSM / GPRS / EDGE / UMTS	+	BT + WLAN 2.4GHz
GSM / GPRS / EDGE / UMTS	+	BT + WLAN 5GHz

Table 1: Simultaneous transmission conditions.

3 Test standards/ procedures references

Test Standard	Version	Test Standard Description
IEEE 1528-2013	2013-06	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
RSS-102 Issue 5	2015-03	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
Canada's Safety Code No. 6	2015-06	Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz
IEEE Std. C95-3	2002	IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave
IEEE Std. C95-1	2005	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
IEC 62209-2	2010	Human exposure to radio frequency fields from hand-held and bodymounted wireless communication devices. Human models, instrumentation, and procedures. Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)

FCC KDBs:

KDB 865664D01v01	August 7, 2015	FCC OET SAR measurement requirements 100 MHz to 6 GHz
KDB 865664D02v01	October 23, 2015	RF Exposure Compliance Reporting and Documentation Considerations
KDB 447498D01v06	October 23, 2015	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
KDB 648474D04v01	October 23, 2015	SAR Evaluation Considerations for Wireless Handsets
KDB 941225D01v03	October 23, 2015	SAR Measurements Procedures for 3G Devices
KDB 248227D01v02	October 23, 2015	SAR Measurement Procedures for 802.11 a/b/g Transmitters

3.1 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain and Trunk)	1.60 mW/g	8.00 mW/g
Spatial Average SAR** (Whole Body)	0.08 mW/g	0.40 mW/g
Spatial Peak SAR*** **(Hands/Feet/Ankle/Wrist)**	**4.00 mW/g**	20.00 mW/g

Table 2: RF exposure limits

The limit applied in this test report is shown in bold letters

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

4 Summary of Measurement Results

☒	**No deviations from the technical specifications ascertained**
☐	Deviations from the technical specifications ascertained

Maximum SAR value reported for 10g (W/kg)				
		PCE	**DTS**	**DSS**
extremities 0 mm distance		**0.754**	**0.621**	**0.664**
collocated situations	**ΣSAR_{10g} evaluation**	**1.562**		

4.1 SAR measurement variability and measurement uncertainty analysis

frequency band	highest original measurement result at worst case position (W/kg)	repeated measurement result at worst case position (W/kg)	ratio <1.2
GSM 835	0.599	0.593	1.01
UMTS FDD V	0.580	0.572	1.01
Bluetooth	0.580	0.575	1.01

5 Test Environment

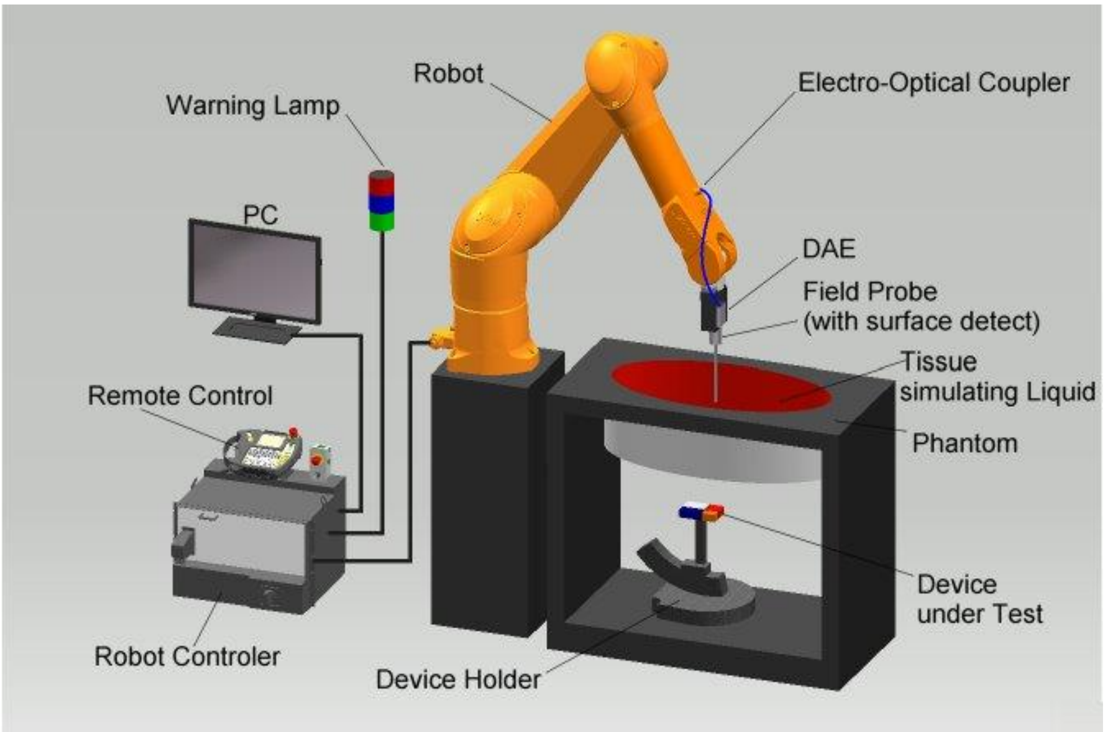
Ambient temperature:	20 – 24 °C
Tissue Simulating liquid:	20 – 24 °C
Relative humidity content:	40 – 50 %
Air pressure:	not relevant for this kind of testing
Power supply:	230 V / 50 Hz

Exact temperature values for each test are shown in the table(s) under 7.1 and/or on the measurement plots.

6 Test Set-up

6.1 Measurement system

6.1.1 System Description



- The DASY system for performing compliance tests consists of the following items:
- A standard high precision 6-axis robot (Stäubli RX/TX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY measurement server.
- The DASY measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 7.
- DASY software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The triple flat and eli phantom for the testing of handheld and body-mounted wireless devices.
- The device holder for handheld mobile phones and mounting device adaptor for laptops
- Tissue simulating liquid mixed according to the given recipes.
- System check dipoles allowing to validate the proper functioning of the system.

6.1.2 Test environment

The DASY measurement system is placed in a laboratory room within an environment which avoids influence on SAR measurements by ambient electromagnetic fields and any reflection from the environment. The pictures at the beginning of the photo documentation show a complete view of the test environment. The system allows the measurement of SAR values larger than 0.005 mW/g.

6.1.3 Probe description

Isotropic E-Field Probe ES3DV3 for Dosimetric Measurements	
Technical data according to manufacturer information	
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., butyl diglycol)
Calibration	Calibration certificate in Appendix D
Frequency	10 MHz to 3 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in HSL (rotation normal to probe axis)
Dynamic range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 20 mm Body diameter: 12 mm Tip diameter: 3.9 mm Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms (ES3DV3)

Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements	
Technical data according to manufacturer information	
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to >6 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 6 GHz)
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: 20mm) Tip length: 2.5 mm (Body: 12mm) Typical distance from probe tip to dipole centers: 1mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

6.1.4 Phantom description

The used SAM Phantom meets the requirements specified in FCC KDB865664 D01 for Specific Absorption Rate (SAR) measurements.
The phantom consists of a fibreglass shell integrated in a wooden table. It allows left-hand and right-hand head as well as body-worn measurements with a maximum liquid depth of 18 cm in head position and 22 cm in planar position (body measurements). The thickness of the Phantom shell is 2 mm +/- 0.1 mm.

ear reference point right hand side

ear reference point left hand side

reference point flat position

Triple Modular Phantom consists of three identical modules which can be installed and removed separately without emptying the liquid. It includes three reference points for phantom installation. Covers prevent evaporation of the liquid. Phantom material is resistant to DGBE based tissue simulating liquids.

6.1.5 Device holder description

The DASY device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. This device holder is used for standard mobile phones or PDA's only. If necessary an additional support of polystyrene material is used.

Larger DUT's (e.g. notebooks) cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values.
Therefore those devices are normally only tested at the flat part of the SAM.

6.1.6 Scanning procedure

- The DASY installation includes predefined files with recommended procedures for measurements and system check. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.
- The „reference“ and „drift“ measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. +/- 5 %.
- The highest integrated SAR value is the main concern in compliance test applications. These values can mostly be found at the inner surface of the phantom and cannot be measured directly due to the sensor offset in the probe. To extrapolate the surface values, the measurement distances to the surface must be known accurately. A distance error of 0.5mm could produce SAR errors of 6% at 1800 MHz. Using predefined locations for measurements is not accurate enough. Any shift of the phantom (e.g., slight deformations after filling it with liquid) would produce high uncertainties. For an automatic and accurate detection of the phantom surface, the DASY5 system uses the mechanical surface detection. The detection is always at touch, but the probe will move backward from the surface the indicated distance before starting the measurement.
- The „area scan“ measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The scan uses different grid spacings for different frequency measurements. Standard grid spacing for head measurements in frequency ranges ≤ 2GHz is 15 mm in x- and y- dimension. For higher frequencies a finer resolution is needed, thus for the grid spacing is reduced according the following table:

Area scan grid spacing for different frequency ranges	
Frequency range	Grid spacing
≤ 2 GHz	≤ 15 mm
2 – 4 GHz	≤ 12 mm
4 – 6 GHz	≤ 10 mm

  Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation. Results of this coarse scan are shown in annex B.
- A „zoom scan” measures the field in a volume around the 2D peak SAR value acquired in the previous „coarse“ scan. It uses a fine meshed grid where the robot moves the probe in steps along all the 3 axis (x, y and z-axis) starting at the bottom of the Phantom. The grid spacing for the cube measurement is varied according to the measured frequency range, the dimensions are given in the following table:

Zoom scan grid spacing and volume for different frequency ranges			
Frequency range	Grid spacing for x, y axis	Grid spacing for z axis	Minimum zoom scan volume
≤ 2 GHz	≤ 8 mm	≤ 5 mm	≥ 30 mm
2 – 3 GHz	≤ 5 mm*	≤ 5 mm	≥ 28 mm
3 – 4 GHz	≤ 5 mm*	≤ 4 mm	≥ 28 mm
4 – 5 GHz	≤ 4 mm*	≤ 3 mm	≥ 25 mm
5 – 6 GHz	≤ 4 mm*	≤ 2 mm	≥ 22 mm

* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

DASY is also able to perform repeated zoom scans if more than 1 peak is found during area scan. In this document, the evaluated peak 1g and 10g averaged SAR values are shown in the 2D-graphics in annex B. Test results relevant for the specified standard (see section 3) are shown in table form in section 7.

6.1.7 Spatial Peak SAR Evaluation

The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The basis of the evaluation are the SAR values measured at the points of the fine cube grid consisting of all points in the three directions x, y and z. The algorithm that finds the maximal averaged volume is separated into three different stages.

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 1 to 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting 'Graph Evaluated'.

- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.

- All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.

Extrapolation

The extrapolation is based on a least square algorithm [W. Gander, Computermathematik, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

Interpolation

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computermathematik, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff].

Volume Averaging

At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.

Advanced Extrapolation

DASY uses the advanced extrapolation option which is able to compensate boundary effects on E-field probes.

6.1.8 Data Storage and Evaluation

Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4", ".DA5x". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf/dcp_i$$

with	V_i	= compensated signal of channel i	(i = x, y, z)
	U_i	= input signal of channel i	(i = x, y, z)
	cf	= crest factor of exciting field	(DASY parameter)
	dcp_i	= diode compression point	(DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $$E_i = (V_i \,/\, Norm_i \cdot ConvF)^{1/2}$$

H-field probes: $$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1}f + a_{i2}f^2)/f$$

with	V_i	= compensated signal of channel i	(i = x, y, z)
	$Norm_i$	= sensor sensitivity of channel i [mV/(V/m)^2] for E-field Probes	(i = x, y, z)
	ConvF	= sensitivity enhancement in solution	
	a_{ij}	= sensor sensitivity factors for H-field probes	
	f	= carrier frequency [GHz]	
	E_i	= electric field strength of channel i in V/m	
	H_i	= magnetic field strength of channel i in A/m	

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_X^2 + E_Y^2 + E_Z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot}^2 \cdot \sigma) \,/\, (\rho \cdot 1000)$$

with	SAR	= local specific absorption rate in mW/g
	E_{tot}	= total field strength in V/m
	σ	= conductivity in [mho/m] or [Siemens/m]
	ρ	= equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 \,/\, 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with	P_{pwe}	= equivalent power density of a plane wave in mW/cm^2
	E_{tot}	= total electric field strength in V/m
	H_{tot}	= total magnetic field strength in A/m

6.1.9 Tissue simulating liquids: dielectric properties

The following materials are used for producing the tissue-equivalent materials.
(Liquids used for tests described in section 7. are marked with ☒):

Ingredients (% of weight)	Frequency (MHz)								
frequency band	☐ 450	☐ 750	☒ 835	☐ 900	☐ 1450	☐ 1750	☒ 1900	☒ 2450	☐ 5000
Water	51.16	51.7	52.4	56.0	71.40	71.45	71.56	71.65	64 - 78
Salt (NaCl)	1.49	0.9	1.40	0.76	0.55	0.5	0.39	0.3	2 - 3
Sugar	46.78	47.2	45.0	41.76	0.0	0.0	0.0	0.0	0.0
HEC	0.52	0.0	1.0	1.21	0.0	0.0	0.0	0.0	0.0
Bactericide	0.05	0.1	0.1	0.27	0.1	0.1	0.1	0.1	0.0
Tween 20	0.0	0.0	0.0	0.0	27.95	27.95	27.95	27.95	0.0
Emulsifiers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9 - 15
Mineral Oil	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11 - 18

Table 3: Body tissue dielectric properties

Salt: 99+% Pure Sodium Chloride
Sugar: 98+% Pure Sucrose
Water: De-ionized, 16MΩ+ resistivity
HEC: Hydroxyethyl Cellulose
Tween 20: Polyoxyethylene (20) sorbitan monolaurate

6.1.10 Tissue simulating liquids: parameters

Liquid MSL	Freq. (MHz)	Target body tissue		Measurement **body** tissue					Measurement date
		Permittivity	Conductivity (S/m)	Permittivity	Dev.	Conductivity ε"	Conductivity (S/m)	Dev.	
850/900	824	55.24	0.97	53.7	-2.8%	20.84	0.96	-1.4%	2017-01-17
	825	55.24	0.97	53.7	-2.9%	20.82	0.96	-1.4%	
	835	55.20	0.97	53.5	-3.1%	20.79	0.97	-0.5%	
	837	55.19	0.97	53.5	-3.1%	20.76	0.97	-0.6%	
	847	55.16	0.98	53.4	-3.3%	20.68	0.97	-1.1%	
	849	55.16	0.99	53.4	-3.3%	20.66	0.98	-1.2%	
850/900	824	55.24	0.97	53.7	-2.8%	20.84	0.96	-1.4%	2017-02-08
	825	55.24	0.97	53.7	-2.9%	20.82	0.96	-1.4%	
	835	55.20	0.97	53.5	-3.1%	20.79	0.97	-0.5%	
	837	55.19	0.97	53.5	-3.1%	20.76	0.97	-0.6%	
	847	55.16	0.98	53.4	-3.3%	20.68	0.97	-1.1%	
	849	55.16	0.99	53.4	-3.3%	20.66	0.98	-1.2%	
1900	1850	53.30	1.52	53.0	-0.6%	14.13	1.45	-4.4%	2017-02-09
	1852	53.30	1.52	53.0	-0.7%	14.11	1.45	-4.3%	
	1880	53.30	1.52	53.0	-0.6%	14.28	1.49	-1.8%	
	1900	53.30	1.52	52.9	-0.7%	14.34	1.52	-0.3%	
	1908	53.30	1.52	52.9	-0.7%	14.26	1.51	-0.4%	
	1910	53.30	1.52	52.9	-0.7%	14.24	1.51	-0.5%	
2450	2412	52.75	1.91	51.7	-2.0%	14.57	1.95	2.1%	2017-03-10
	2437	52.72	1.94	51.6	-2.0%	14.62	1.98	2.3%	
	2450	52.70	1.95	51.7	-2.0%	14.68	2.00	2.6%	
	2462	52.68	1.97	51.6	-2.2%	14.69	2.01	2.3%	
2450	2402	52.76	1.90	51.8	-1.8%	14.51	1.94	1.8%	2017-03-13
	2437	52.72	1.94	51.6	-2.0%	14.62	1.98	2.3%	
	2450	52.70	1.95	51.7	-2.0%	14.68	2.00	2.6%	
	2480	52.66	1.99	51.5	-2.2%	14.73	2.03	2.0%	

Table 4: Parameter of the body tissue simulating liquid
Note: The dielectric properties have been measured using the contact probe method at 22°C.

6.1.11 Measurement uncertainty evaluation for SAR test

DASY5 Uncertainty Budget According to IEEE 1528/2003 and IEC 62209-1 for the 300 MHz - 3 GHz range								
Source of uncertainty	Uncertainty Value ± %	Probability Distribution	Divisor	c_i (1g)	c_i (10g)	Standard Uncertainty ± %, (1g)	Standard Uncertainty ± %, (10g)	v_i^2 or v_{eff}
Measurement System								
Probe calibration	± 6.0 %	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Axial isotropy	± 4.7 %	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %	∞
Hemispherical isotropy	± 9.6 %	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %	∞
Boundary effects	± 1.0 %	Rectangular	√3	1	1	± 0.6 %	± 0.6 %	∞
Probe linearity	± 4.7 %	Rectangular	√3	1	1	± 2.7 %	± 2.7 %	∞
System detection limits	± 1.0 %	Rectangular	√3	1	1	± 0.6 %	± 0.6 %	∞
Readout electronics	± 0.3 %	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8 %	Rectangular	√3	1	1	± 0.5 %	± 0.5 %	∞
Integration time	± 2.6 %	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF ambient noise	± 3.0 %	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF ambient reflections	± 3.0 %	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe positioner	± 0.4 %	Rectangular	√3	1	1	± 0.2 %	± 0.2 %	∞
Probe positioning	± 2.9 %	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Max.SAR evaluation	± 1.0 %	Rectangular	√3	1	1	± 0.6 %	± 0.6 %	∞
Test Sample Related								
Device positioning	± 2.9 %	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device holder uncertainty	± 3.6 %	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power drift	± 5.0 %	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
Phantom and Set-up								
Phantom uncertainty	± 4.0 %	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
Liquid conductivity (target)	± 5.0 %	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid conductivity (meas.)	± 5.0 %	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %	∞
Liquid permittivity (target)	± 5.0 %	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %	∞
Liquid permittivity (meas.)	± 5.0 %	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %	∞
Combined Std.						± 11.1 %	± 10.8 %	387
Expanded Std.						± **22.1** %	± **21.6** %	

Table 5: Measurement uncertainties
Worst-Case uncertainty budget for DASY5 assessed according to IEEE 1528/2003.
The budget is valid for 2G and 3G communication signals and frequency range 300MHz - 3 GHz.
For these conditions it represents a worst-case analysis. For specifc tests and configurations, the uncertainty could be considerable smaller.

Relative DASY5 Uncertainty Budget for SAR Tests According to IEEE 1528/2013 and IEC62209/2011 for the 0.3 - 3GHz range								
Error Description	certainty Valu ± %	Probability Distribution	Divisor	c_i (1g)	c_i (10g)	Standard Uncertainty ± %, (1g)	 ± %, (10g)	v_i^2 or v_{eff}
Measurement System								
Probe calibration	± 6.0 %	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Axial isotropy	± 4.7 %	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %	∞
Hemispherical isotropy	± 9.6 %	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %	∞
Boundary effects	± 1.0 %	Rectangular	√3	1	1	± 0.6 %	± 0.6 %	∞
Probe linearity	± 4.7 %	Rectangular	√3	1	1	± 2.7 %	± 2.7 %	∞
System detection limits	± 1.0 %	Rectangular	√3	1	1	± 0.6 %	± 0.6 %	∞
Modulation Response	± 2.4 %	Rectangular	√3	1	1	± 1.4 %	± 1.4 %	∞
Readout electronics	± 0.3 %	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8 %	Rectangular	√3	1	1	± 0.5 %	± 0.5 %	∞
Integration time	± 2.6 %	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF ambient noise	± 3.0 %	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF ambient reflections	± 3.0 %	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe positioner	± 0.4 %	Rectangular	√3	1	1	± 0.2 %	± 0.2 %	∞
Probe positioning	± 2.9 %	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Max. SAR evaluation	± 2.0 %	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Test Sample Related								
Device positioning	± 2.9 %	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device holder uncertainty	± 3.6 %	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power drift	± 5.0 %	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
Phantom and Set-up								
Phantom uncertainty	± 6.1 %	Rectangular	√3	1	1	± 3.5 %	± 3.5 %	∞
SAR correction	± 1.9 %	Rectangular	√3	1	0.84	± 1.1 %	± 0.9 %	∞
Liquid conductivity (meas.)	± 5.0 %	Rectangular	√3	0.78	0.71	± 2.3 %	± 2.0 %	∞
Liquid permittivity (meas.)	± 5.0 %	Rectangular	√3	0.26	0.26	± 0.8 %	± 0.8 %	∞
Temp. Unc. - Conductivity	± 3.4 %	Rectangular	√3	0.78	0.71	± 1.5 %	± 1.4 %	∞
Temp. Unc. - Permittivity	± 0.4 %	Rectangular	√3	0.23	0.26	± 0.1 %	± 0.1 %	∞
Combined Uncertainty						± 11.3 %	± 11.3 %	330
Expanded Std. Uncertainty						± **22.7** %	± **22.5** %	

Table 6: Measurement uncertainties
Worst-Case uncertainty budget for DASY5 assessed according to IEEE 1528/2013
and IEC 62209-1/2011 standards. The budget is valid for the frequency range 300MHz -3 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

DASY5 Uncertainty Budget

According to IEC 62209-2/2010 for the 300 MHz - 6 GHz range

Source of uncertainty	Uncertainty Value	Probability Distribution	Divisor	c_i (1g)	c_i (10g)	Standard Uncertainty ± %, (1g)	Standard Uncertainty ± %, (10g)	v_i^2 or v_{eff}
Measurement System								
Probe calibration	± 6.6 %	Normal	1	1	1	± 6.6 %	± 6.6 %	∞
Axial isotropy	± 4.7 %	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %	∞
Hemispherical isotropy	± 9.6 %	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %	∞
Boundary effects	± 2.0 %	Rectangular	√3	1	1	± 1.2 %	± 1.2 %	∞
Probe linearity	± 4.7 %	Rectangular	√3	1	1	± 2.7 %	± 2.7 %	∞
System detection limits	± 1.0 %	Rectangular	√3	1	1	± 0.6 %	± 0.6 %	∞
Modulation Response	± 2.4 %	Rectangular	√3	1	1	± 1.4 %	± 1.4 %	∞
Readout electronics	± 0.3 %	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.8 %	Rectangular	√3	1	1	± 0.5 %	± 0.5 %	∞
Integration time	± 2.6 %	Rectangular	√3	1	1	± 1.5 %	± 1.5 %	∞
RF ambient noise	± 3.0 %	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
RF ambient reflections	± 3.0 %	Rectangular	√3	1	1	± 1.7 %	± 1.7 %	∞
Probe positioner	± 0.8 %	Rectangular	√3	1	1	± 0.5 %	± 0.5 %	∞
Probe positioning	± 6.7 %	Rectangular	√3	1	1	± 3.9 %	± 3.9 %	∞
Post-processing	± 4.0 %	Rectangular	√3	1	1	± 2.3 %	± 2.3 %	∞
Test Sample Related								
Device positioning	± 2.9 %	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device holder uncertainty	± 3.6 %	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power drift	± 5.0 %	Rectangular	√3	1	1	± 2.9 %	± 2.9 %	∞
Phantom and Set-up								
Phantom uncertainty	± 7.9 %	Rectangular	√3	1	1	± 4.6 %	± 4.6 %	∞
SAR correction	± 1.9 %	Rectangular	√3	1	0.84	± 1.1 %	± 0.9 %	∞
Liquid conductivity (meas.)	± 5.0 %	Rectangular	√3	0.78	0.71	± 2.3 %	± 2.0 %	∞
Liquid permittivity (meas.)	± 5.0 %	Rectangular	√3	0.26	0.26	± 0.8 %	± 0.8 %	∞
Temp. Unc. - Conductivity	± 3.4 %	Rectangular	√3	0.78	0.71	± 1.5 %	± 1.4 %	∞
Temp. Unc. - Permittivity	± 0.4 %	Rectangular	√3	0.23	0.26	± 0.1 %	± 0.1 %	∞
Combined Uncertainty						± 12.7 %	± 12.6 %	330
Expanded Std. Uncertainty						± **25.4** %	± **25.3** %	

Table 7: Measurement uncertainties.
Worst-Case uncertainty budget for DASY5 assessed according to according to IEC 62209-2/2010 standard. The budget is valid for the frequency range 300MHz - 6 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

6.1.12 Measurement uncertainty evaluation for System Check

Uncertainty of a System Performance Check with DASY5 System for the 0.3 - 3 GHz range								
Source of uncertainty	Uncertainty Value	Probability Distribution	Divisor	c_i (1g)	c_i (10g)	Standard Uncertainty ± %, (1g)	Standard Uncertainty ± %, (10g)	v_i^2 or v_{eff}
Measurement System								
Probe calibration	± 6.0 %	Normal	1	1	1	± 6.0 %	± 6.0 %	∞
Axial isotropy	± 4.7 %	Rectangular	√ 3	0.7	0.7	± 1.9 %	± 1.9 %	∞
Hemispherical isotropy	± 0.0 %	Rectangular	√ 3	0.7	0.7	± 0.0 %	± 0.0 %	∞
Boundary effects	± 1.0 %	Rectangular	√ 3	1	1	± 0.6 %	± 0.6 %	∞
Probe linearity	± 4.7 %	Rectangular	√ 3	1	1	± 2.7 %	± 2.7 %	∞
System detection limits	± 1.0 %	Rectangular	√ 3	1	1	± 0.6 %	± 0.6 %	∞
Readout electronics	± 0.3 %	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response time	± 0.0 %	Rectangular	√ 3	1	1	± 0.0 %	± 0.0 %	∞
Integration time	± 0.0 %	Rectangular	√ 3	1	1	± 0.0 %	± 0.0 %	∞
RF ambient conditions	± 3.0 %	Rectangular	√ 3	1	1	± 1.7 %	± 1.7 %	∞
Probe positioner	± 0.4 %	Rectangular	√ 3	1	1	± 0.2 %	± 0.2 %	∞
Probe positioning	± 2.9 %	Rectangular	√ 3	1	1	± 1.7 %	± 1.7 %	∞
Max. SAR evaluation	± 1.0 %	Rectangular	√ 3	1	1	± 0.6 %	± 0.6 %	∞
Test Sample Related								
Dev. of experimental dipole	± 0.0 %	Rectangular	√ 3	1	1	± 0.0 %	± 0.0 %	∞
Source to liquid distance	± 2.0 %	Rectangular	√ 3	1	1	± 1.2 %	± 1.2 %	∞
Power drift	± 3.4 %	Rectangular	√ 3	1	1	± 2.0 %	± 2.0 %	∞
Phantom and Set-up								
Phantom uncertainty	± 4.0 %	Rectangular	√ 3	1	1	± 2.3 %	± 2.3 %	∞
SAR correction	± 1.9 %	Rectangular	√ 3	1	0.84	± 1.1 %	± 0.9 %	∞
Liquid conductivity (meas.)	± 5.0 %	Normal	1	0.78	0.71	± 3.9 %	± 3.6 %	∞
Liquid permittivity (meas.)	± 5.0 %	Normal	1	0.26	0.26	± 1.3 %	± 1.3 %	∞
Temp. unc. - Conductivity	± 1.7 %	Rectangular	√ 3	0.78	0.71	± 0.8 %	± 0.7 %	∞
Temp. unc. - Permittivity	± 0.3 %	Rectangular	√ 3	0.23	0.26	± 0.0 %	± 0.0 %	∞
Combined Uncertainty						± 9.1 %	± 8.9 %	330
Expanded Std. Uncertainty						± **18.2** %	± **17.9** %	

Table 8: Measurement uncertainties of the System Check with DASY5 (0.3-3GHz)

Note: Worst case probe calibration uncertainty has been applied for all probes used during the measurements.

6.1.13 System check

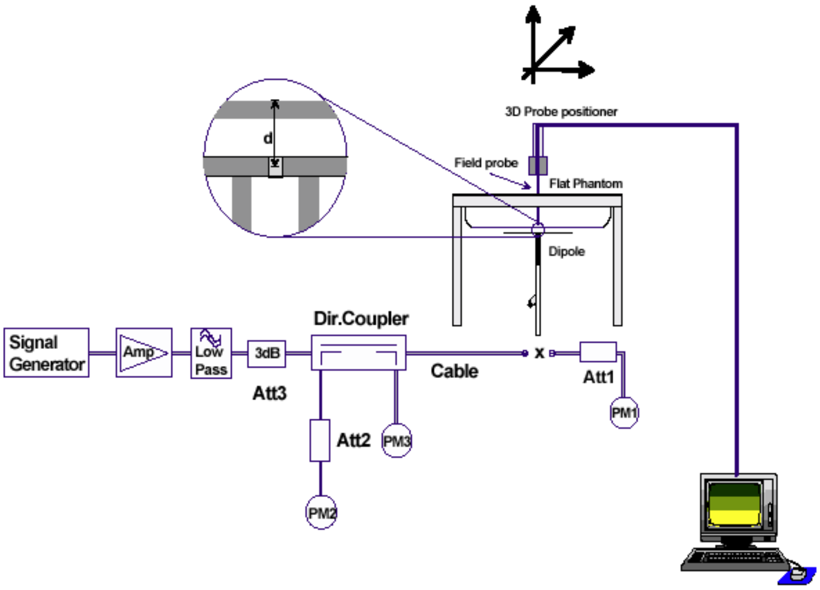
The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEEE 1528. The following table shows system check results for all frequency bands and tissue liquids used during the tests (plot(s) see annex A).

System performence check (1000 mW)										
System validation Kit	Probe	Frequency	Target SAR_{1g} /mW/g (+/- 10%)	Target SAR_{10g} /mW/g (+/- 10%)	Measured SAR_{1g} / mW/g	SAR_{1g} dev.	Measured SAR_{10g} / mW/g	SAR_{10g} dev.	Measured date
D835V2 S/N: 4d153	EX3DV4 S/N: 3944	835 MHz MSL	9.40	6.12	9.55	1.6%	6.35	3.8%	2017-01-17
D835V2 S/N: 4d153	ES3DV3 S/N: 3320	835 MHz MSL	9.40	6.12	9.38	-0.2%	6.21	1.5%	2017-02-08
D1900V2 S/N: 5d009	ES3DV3 S/N: 3320	1900 MHz MSL	40.50	21.50	40.60	0.2%	21.50	0.0%	2017-02-09
D2450V2 S/N: 710	ES3DV3 S/N: 3320	2450 MHz MSL	51.10	24.20	50.70	-0.8%	23.50	-2.9%	2017-03-09
D2450V2 S/N: 710	ES3DV3 S/N: 3320	2450 MHz MSL	51.10	24.20	50.70	-0.8%	23.60	-2.5%	2017-03-10
D2450V2 S/N: 710	ES3DV3 S/N: 3320	2450 MHz MSL	51.10	24.20	52.60	2.9%	24.20	0.0%	2017-03-13

Table 9: Results system check

6.1.14 System check procedure

The system check is performed by using a validation dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 1000 mW for frequencies below 2 GHz or 100 mW for frequencies above 2 GHz. To adjust this power a power meter is used. The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the validation to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).
System check results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system.



6.1.15 System validation

The system validation is performed in a similar way as a system check. It needs to be performed once a SAR measurement system has been established and allows an evaluation of the system accuracy with all components used together with the specified system. It has to be repeated at least once a year or when new system components are used (DAE, probe, phantom, dipole, liquid type).
In addition to the procedure used during system check a system validation also includes checks of probe isotropy, probe modulation factor and RF signal.

The following table lists the system validations relevant for this test report:

Frequency (MHz)	DASY SW	Dipole Type /SN	Probe Type / SN	Calibrated signal type(s)	DAE unit Type / SN	body validation
835	V52.8.7	D835V2 / 4d153	EX3DV4 / 3944	CW	DAE3/ 477	2016-08-31
835	V52.8.7	D835V2 / 4d153	ES3DV3 / 3320	CW	DAE3 / 413	2017-01-20
1900	V52.8.7	D1900V2 / 5d009	ES3DV3 / 3320	CW	DAE3 / 413	2017-02-07
2450	V52.8.7	D2450V2 / 710	ES3DV3 / 3320	CW	DAE3 / 413	2017-02-13

7 Detailed Test Results

7.1 Conducted power measurements

For the measurements the Rohde & Schwarz Radio Communication Tester CMU 200 and NRP Power Meter were used.
The output power was measured using an integrated RF connector and attached RF cable.
The conducted output power was also checked before and after each SAR measurement. The resulting power values were within a 0.2 dB tolerance of the values shown below.

Note: CMU200 measures GSM peak and average output power for active timeslots.
For SAR the time based average power is relevant. The difference in-between depends on the duty cycle of the TDMA signal:

No. of timeslots	***1***	***2***	***3***	***4***
Duty Cycle	1 : 8	1: 4	1 : 2.66	1 : 2
time based avg. power compared to slotted avg. power	- 9.03 dB	- 6.02 dB	- 4.26 dB	- 3.01 dB

The signalling modes differ as follows:

mode	***coding scheme***	***modulation***
GPRS	CS1 to CS4	GMSK
EGPRS (EDGE)	MCS1 to MCS4	GMSK
EGPRS (EDGE)	MCS5 to MCS9	8PSK

Apart from modulation change (GMSK/8PSK) coding schemes differ in code rate without influence on the RF signal. Therefore one coding scheme per mode was selected for conducted power measurements.

7.1.1 Conducted power measurements GSM 850 MHz

Conducted output power GSM 850 MHz (dBm)								
			Slotted avg. power			Time based avg. power		
TS	mod.	upper limit	CH 128	CH 190	CH 251	CH 128	CH 190	CH 251
			824.2 MHz	836.6 MHz	848.8 MHz	824.2 MHz	836.6 MHz	848.8 MHz
1	GMSK	**33.0**	32.2	32.2	32.1	23.17	23.17	23.07
2	GMSK	**31.0**	29.6	29.6	29.5	23.58	23.58	23.48
3	GMSK	**29.0**	27.9	27.8	27.7	23.64	23.54	23.44
4	GMSK	**27.5**	**26.7**	**26.6**	**26.5**	**23.69**	**23.59**	**23.49**
1	8PSK	**27.0**	26.5	26.5	26.4	17.47	17.47	17.37
2	8PSK	**25.0**	23.9	23.8	23.7	17.88	17.78	17.68
3	8PSK	**23.5**	22.0	21.9	21.9	17.74	17.64	17.64
4	8PSK	**22.0**	20.9	20.8	20.7	17.89	17.79	17.69

Table 10: Test results conducted power measurement GSM 850 MHz

7.1.2 Conducted power measurements GSM 1900 MHz

Conducted output power GSM 1900 MHz (dBm)								
SN:			Slotted avg. power			Time based avg. power		
TS	mod.	upper limit	CH 512	CH 661	CH 810	CH 512	CH 661	CH 810
			1850.2 MHz	1880.0 MHz	1909.8 MHz	1850.2 MHz	1880.0 MHz	1909.8 MHz
1	GMSK	**30.0**	28.9	29.0	28.8	19.87	19.97	19.77
2	GMSK	**28.0**	26.2	26.2	26.1	20.18	20.18	20.08
3	GMSK	**26.0**	24.4	24.5	24.3	20.14	20.24	20.04
4	GMSK	**24.5**	**23.2**	**23.3**	**23.1**	**20.19**	**20.29**	**20.09**
1	8PSK	**26.0**	25.1	25.1	24.9	16.07	16.07	15.87
2	8PSK	**24.0**	22.1	22.3	22.1	16.08	16.28	16.08
3	8PSK	**22.0**	20.3	20.4	20.2	16.04	16.14	15.94
4	8PSK	**20.5**	19.1	19.2	19.0	16.09	16.19	15.99

Table 11: Test results conducted power measurement GSM 1900 MHz

7.1.3 Conducted power measurements WCDMA FDD V (850 MHz)

Max. RMS output power 850 MHz (FDD V) / dBm			
	Channel / frequency		
mode	4132 / 826.4 MHz	4182 / 836.6 MHz	4233 / 846.6 MHz
RMC 12.2 kbit/s	**24.5**	**24.2**	**24.2**
RMC 64 kbit/s	24.3	24.2	24.1
RMC 144 kbit/s	24.3	24.2	24.1
RMC 384 kbit/s	24.4	24.1	24.0
AMR 4.75 kbit/s	24.4	24.0	24.0
AMR 5.15 kbit/s	24.3	24.0	24.0
AMR 5.9 kbit/s	24.4	24.1	24.0
AMR 6.7 kbit/s	24.3	24.1	24.0
AMR 7.4 kbit/s	24.3	24.0	24.1
AMR 7.95 kbit/s	24.3	24.1	24.1
AMR 10.2 kbit/s	24.4	24.0	24.2
AMR 12.2 kbit/s	24.3	24.0	24.1
HSDPA Sub test 1	**24.5**	**24.0**	**24.2**
HSDPA Sub test 2	23.3	22.9	23.0
HSDPA Sub test 3	22.9	22.6	22.5
HSDPA Sub test 4	22.8	22.6	22.5
HSUPA Sub test 1	24.5	24.1	24.1
HSUPA Sub test 2	22.2	22.1	22.0
HSUPA Sub test 3	23.4	23.0	22.9
HSUPA Sub test 4	22.3	22.0	21.9
HSUPA Sub test 5	**24.4**	**24.2**	**24.0**

Table 12: Test results conducted power measurement UMTS FDD V 850MHz

7.1.4 Conducted power measurements WCDMA FDD II (1900 MHz)

Max. RMS output power FDD II (1900MHz) / dBm			
	Channel / frequency		
mode	9262 / 1852.4 MHz	9400 / 1880.0 MHz	9538 / 1907.6 MHz
RMC 12.2 kbit/s	**23.1**	**23.6**	**23.0**
RMC 64 kbit/s	23.0	23.5	22.9
RMC 144 kbit/s	22.9	23.4	22.9
RMC 384 kbit/s	23.1	23.4	23.0
AMR 4.75 kbit/s	22.9	23.4	22.9
AMR 5.15 kbit/s	22.9	23.5	22.8
AMR 5.9 kbit/s	23.0	23.5	22.8
AMR 6.7 kbit/s	23.1	23.6	22.9
AMR 7.4 kbit/s	23.0	23.4	22.8
AMR 7.95 kbit/s	23.0	23.5	22.8
AMR 10.2 kbit/s	23.1	23.4	22.9
AMR 12.2 kbit/s	22.9	23.4	22.8
HSDPA Sub test 1	**22.9**	**23.4**	**22.9**
HSDPA Sub test 2	22.0	22.4	21.9
HSDPA Sub test 3	21.4	21.8	21.3
HSDPA Sub test 4	21.5	22.0	21.4
HSUPA Sub test 1	23.0	23.5	22.8
HSUPA Sub test 2	20.9	21.5	20.9
HSUPA Sub test 3	22.0	22.4	21.9
HSUPA Sub test 4	20.9	21.3	20.9
HSUPA Sub test 5	**22.9**	**23.4**	**22.9**

Table 13: Test results conducted power measurement UMTS FDD II 1900MHz

Remark: None of the HSDPA/HSUPA settings leads to conducted power values exceeding the conducted power in RMC mode by more than 0.25 dB.
Therefore no additional SAR measurements were performed in HSDPA/HSUPA mode.

7.1.5 Test-set-up information for WCDMA / HSPDA / HSUPA

a) WCDMA RMC

In RMC (reference measurement channel) mode the conducted power at 4 different bit rates was measured. They correspond with the used spreading factors as follows:

Bit rate	***12.2 kbit/s***	***64 kbit/s***	***144 kbit/s***	***384 kbit/s***
Spreading factor (SF)	64	16	8	4

In RMC mode only DPCCH and DPDCH are active. As bit rate changes do not influence the relative power of any code channel the measured RMS output power remains on the same level which is set to maximum by TPC (Transmit power control) pattern type 'All 1'.

b) HSDPA

HSDPA adds the HS-DPCCH in uplink as a control channel for high speed data transfer in downlink.
In HSDPA mode 4 sub-tests are defined by 3GPP 34.121 according to the following table:

Sub-test	β_c	β_d	**β_d (SF)**	β_c/β_d	β_{hs} (1)	**CM(dB)** (2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 (3)	15/15 (3)	64	12/15 (3)	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5
Note 1: Δ_{ACK}, Δ_{NACK}, Δ_{CQI} = 8 $\Longleftrightarrow$ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\Longleftrightarrow$ $\beta_{hs} = 30/15 * \beta_c$ Note 2 : CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$ Note 3 : For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to β_c = 11/15 and β_d = 15/15						

Table 14: Sub-tests for UMTS Release 5 HSDPA

The β_c and β_d gain factors for DPCCH and DPDCH were set according to the values in the above table, β_{hs} for HS-DPCCH is set automatically to the correct value when Δ_{ACK}, Δ_{NACK}, Δ_{CQI} = 8. The variation of the β_c/β_d ratio causes a power reduction at sub-tests 2 - 4.
The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK.

Parameter	***Value***
Nominal average inf. bit rate	534 kbit/s
Inter-TTI Distance	3 TTI's
Number of HARQ Processes	2 Processes
Information Bit Payload	3202 Bits
MAC-d PDU size	336 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	4800 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	9600 SMLs
Coding Rate	0.67
Number of Physical Channel Codes	5

Table 15: settings of required H-Set 1 QPSK acc. to 3GPP 34.121

c) HSUPA

In HSUPA mode additional code channels (E-DPCCH, E-DPDCHn) are added for data transfer in uplink at higher bit rates.

5 sub-tests are defined by 3GPP 34.121 according to the following table:

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ec} (SF)	β_{ed} (code)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK}, Δ_{CQI} = 8 $\Longleftrightarrow$ A_{hs} = β_{hs}/β_c = 30/15 $\Longleftrightarrow$ β_{hs} = 30/15 * β_c

Note 2 : CM = 1 for β_c/β_d = 12/15, β_{hs}/β_c = 24/15. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference

Note 3 : For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to β_c = 10/15 and β_d = 15/15

Note 4 : For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to β_c = 14/15 and β_d = 15/15

Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g

Note 6 : β_{ed} can not be set directly; it is set by Absolute Grant Value

Table 16: Subtests for UMTS Release 6 HSUPA

To achieve the settings above some additional procedures were defined by 3GPP 34.121. Those have been included in an application note for the CMU200 and were exactly followed:

- Test mode connection (BS signal tab):
RMC 12.2 kbit/s + HSPA 34.108 with loop mode 1
- HS-DSCH settings (BS signal tab):
- FRC with H-set 1 QPSK
- ACK-NACK repetition factor = 3
- CQI feedback cycle = 4ms
- CQI repetition factor = 2
- HSUPA-specific signalling settings (UE signal tab):
- E-TFCI table index = 0
- E-DCH minimum set E-TFCI = 9
- Puncturing limit non-max = 0.84
- max. number of channelisation codes = 2x SF4
- Initial Serving Grant Value = Off
- HSDPA and HSUPA Gain factors (UE signal tab)

Sub-test	β_c	β_d	Δ_{ACK}, Δ_{NACK}, Δ_{CQI}	ΔE–DPCCH)*
1	10	15	8	6
2	6	15	8	8
3	15	9	8	8
4	2	15	8	5
5	14	15	8	7

)* : β_{ec} and β_{ed} ratios (relative to β_c and β_d) are set by ΔE–DPCCH

- HSUPA Reference E-TFCIs (UE signal tab > HSUPA gain factors):

Sub-test	**1, 2, 4, 5**				
Number of E-TFCIs	5				
Reference E-TFCI	11	67	71	75	81
Reference E-TFCI power offset	4	18	23	26	27

Sub-test	**3**	
Number of E-TFCIs	2	
Reference E-TFCI	11	92
Reference E-TFCI power offset	4	18

- HSUPA-specific generator parameters (BS Signal tab > HSUPA > E-AGCH > AG Pattern)

Sub-test	*Absolute Grant Value (AG Index)*
1	20
2	12
3	15
4	17
5	21

- Power Level settings (BS Signal tab > Node B-settings):
- Level reference: Output Channel Power (Ior)
- Output Channel Power (Ior): -86 dBm

- Downlink Physical Channel Settings (BS signal tab)
- P-CPICH: -10 dB
- S-CPICH: Off
- P-SCH: -15 dB
- S-SCH : -15 dB
- P-CCPCH: -12 dB
- S-CCPCH: -12 dB
- PICH : -15 dB
- AICH : -12 dB
- DPDCH : -10 dB
- HS-SCCH : -8 dB
- HS-PDSCH : -3 dB
- E-AGCH : -20 dB
- E-RGCH/E-HICH - 20 dB
- E-RGCH Active: Off

The settings above were stored once for each sub-test and recalled before the measurement.

HSUPA test procedure:

To reach maximum output power in HSUPA mode the following procedures were followed:

3 different TPC patterns were defined:
Set 1: Closed loop with target power 10 dBm
Set 2: Single Pattern+Alternating with binary pattern '11111' for 1 dB steps 'up'
Set 3: Single Pattern+Alternating with binary pattern '00000' for 1 dB steps 'down'

After recalling a certain HSUPA sub-test the HSUPA E-AGCH graph with E-TFCI event counter is displayed. After starting with the closed loop command the power is increased in 1 dB steps by activating pattern set 2 until the UE decreases the transmitted E-TFCI.
At this point set 3 is activated once to reduce the output power to the value at which the original E-TFCI, which is required for the sub-test, appears again.

For conducted power measurements the same steps are repeated in the power menu to read out the corresponding maximum RMS output power with the target E-TFCI.
For SAR measurements it is useful to switch to Code Domain Power vs. Time display.
Here the CMU200 shows relative power values (max. and min.) of each code channel which should roughly correspond to the numerators of the gain factors e.g.:

Sub-test	β_c	β_d	β_{hs}	β_{ec}	β_{ed}
5	15	15	30	24	134

By this way a surveillance of signalling conditions is possible to make sure that HSUPA code channels are active during the complete SAR measurement.

7.1.6 Conducted power measurements WLAN 2450 MHz

802.11b		maximum average conducted output power [dBm]			
Band	Ch	1Mbps	2Mbps	5.5Mbps	11Mbps
2450MHz	1	6.0	6.0	5.9	5.9
	6	5.4	5.4	5.3	5.3
	11	5.6	5.6	5.5	5.5

Table 17: Test results conducted power measurement 802.11b

802.11g		maximum average conducted output power [dBm]							
Band	Ch	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
2450MHz	1	6.1	6.0	5.9	6.0	5.9	5.7	5.7	5.7
	2	6.0	5.9	5.8	5.9	5.8	5.6	5.6	5.6
	6	6.0	5.9	5.8	5.9	5.9	5.7	5.7	5.7
	10	5.7	5.6	5.5	5.5	5.5	5.3	5.3	5.3
	11	5.7	5.6	5.5	5.5	5.5	5.3	5.3	5.3

Table 18: Test results conducted power measurement 802.11g

802.11n HT-20		maximum average conducted output power [dBm]							
Band	Ch	MCS-0 6.5Mbps	MCS-1 13Mbps	MCS-2 19.5Mbps	MCS-3 26Mbps	MCS-4 39Mbps	MCS-5 52Mbps	MCS-6 58.5Mbps	MCS-7 65Mbps
2450MHz	1	6.0	5.9	5.9	5.9	5.8	5.8	5.7	5.5
	2	5.9	5.8	5.8	5.9	5.8	5.8	5.7	5.5
	6	5.8	5.7	5.7	5.8	5.7	5.7	5.6	5.4
	10	5.6	5.5	5.5	5.6	5.4	5.5	5.4	5.2
	11	5.6	5.5	5.5	5.5	5.4	5.4	5.3	5.2

Table 19: Test results conducted power measurement 802.11n HT-20

802.11n HT-40		maximum average conducted output power [dBm]							
Band	Ch	MCS-0 13.5Mbps	MCS-1 27Mbps	MCS-2 40.5Mbps	MCS-3 54Mbps	MCS-4 81Mbps	MCS-5 108Mbps	MCS-6 121.5Mbps	MCS-7 135Mbps
2450MHz	3	4.0	4.3	4.2	4.3	4.3	4.2	4.2	4.2
	6	5.5	5.8	5.7	5.8	5.8	5.7	5.7	5.7
	9	3.6	3.9	3.8	3.9	3.9	3.8	3.8	3.8

Table 20: Test results conducted power measurement 802.11n HT-40

7.1.7 Conducted power measurements WLAN 5 GHz

802.11a		maximum average conducted output power [dBm]							
Band	**Ch**	**6Mbps**	**9Mbps**	**12Mbps**	**18Mbps**	**24Mbps**	**36Mbps**	**48Mbps**	**54Mbps**
5200	36	0.3	0.3	0.2	0.2	0.2	0.2	-0.2	-0.2
	40	0.3	0.3	0.3	0.3	0.2	0.2	-0.2	-0.2
	44	0.3	0.3	0.3	0.2	0.2	0.2	-0.2	-0.2
	48	0.2	0.2	0.2	0.2	0.2	0.2	-0.1	-0.1
5300	52	0.5	0.5	0.4	0.4	0.4	0.4	0.0	-0.1
	56	0.8	0.8	0.7	0.7	0.6	0.6	0.1	0.1
	60	0.9	0.9	0.8	0.8	0.8	0.7	0.2	0.1
	64	1.1	1.1	1.0	1.0	1.0	1.0	0.5	0.4
5600	100	1.7	1.7	1.6	1.6	1.6	1.6	1.1	1.1
	104	1.8	1.8	1.7	1.7	1.7	1.7	1.2	1.2
	108	1.7	1.7	1.7	1.6	1.6	1.6	1.0	0.9
	112	1.8	1.8	1.7	1.7	1.7	1.7	1.2	1.2
	116	2.0	2.0	1.9	1.8	1.8	1.8	1.3	1.2
	120	1.9	1.9	1.8	1.8	1.8	1.8	1.3	1.3
	124	2.1	2.1	2.0	2.0	1.9	1.9	1.4	1.4
	128	2.0	2.0	1.9	1.9	1.9	1.9	1.4	1.3
	132	1.9	1.9	1.8	1.8	1.8	1.8	1.3	1.3
	136	2.2	2.2	2.1	2.1	2.0	2.0	1.5	1.5
	140	2.7	2.7	2.6	2.6	2.6	2.5	2.0	1.9
5800	149	**3.2**	3.2	3.1	3.1	3.1	3.1	2.6	2.5
	153	2.1	2.1	2.0	2.0	2.0	2.0	1.4	1.4
	157	1.3	1.3	1.3	1.2	1.2	1.1	1.6	1.5
	161	1.2	1.2	1.2	1.1	1.1	1.1	1.6	1.5
	165	0.8	0.8	0.7	0.6	0.6	0.6	0.1	0.1

Table 21: Test results conducted power measurement 802.11a

802.11n HT-20 / 802.11ac VHT-20 maximum average conducted output power [dBm]									
Band [MHz]	Ch	MCS-0 6.5Mbps	MCS-1 13Mbps	MCS-2 19.5Mbps	MCS-3 26Mbps	MCS-4 39Mbps	MCS-5 52Mbps	MCS-6 58.5Mbps	MCS-7 65Mbps
5200	36	-0.5	-0.6	-0.3	-0.4	-0.5	-0.1	-0.4	-0.2
	40	-0.7	-0.8	-0.5	-0.5	-0.6	-0.3	-0.5	-0.4
	44	-0.8	-0.7	-0.3	-0.4	-0.4	-0.1	-0.4	-0.1
	48	-0.9	-0.9	-0.6	-0.6	-0.6	-0.4	-0.6	-0.5
5300	52	-0.4	-0.4	-0.1	-0.2	-0.2	-0.1	-0.2	-0.2
	56	-0.1	-0.1	0.2	0.2	0.2	0.5	0.2	0.4
	60	-0.3	-0.4	-0.1	-0.1	-0.1	0.2	-0.1	0.1
	64	-0.1	-0.1	0.2	0.2	0.2	0.5	0.2	0.4
5600	100	0.6	0.6	0.9	0.9	0.8	1.1	0.9	1.0
	104	0.8	0.8	1.1	1.0	1.0	1.3	1.0	1.2
	108	0.7	0.7	1.0	1.0	0.9	1.2	1.0	1.1
	112	0.9	0.9	1.2	1.2	1.2	1.5	1.2	1.3
	116	1.1	1.0	1.3	1.2	1.1	1.3	1.2	1.2
	120	1.4	1.4	1.7	1.7	1.6	1.9	1.7	1.6
	124	1.7	1.6	1.9	1.8	1.8	1.9	1.8	1.7
	128	1.5	1.4	1.7	1.7	1.7	1.8	1.7	1.6
	132	1.4	1.3	1.6	1.6	1.6	1.9	1.6	1.7
	136	1.7	1.6	1.9	1.8	1.8	2.1	1.8	2.0
	140	1.7	1.7	2.0	1.9	1.9	2.1	1.9	1.9
5800	149	1.8	1.8	2.1	2.1	2.1	2.3	2.0	2.2
	153	1.0	-0.9	-0.6	-0.6	-0.7	-0.3	-0.6	-0.4
	157	0.1	0.1	0.4	0.3	0.3	0.7	0.4	0.5
	161	0.0	-0.9	-0.6	-0.7	-0.8	-0.5	-0.6	-0.7
	165	-0.2	-0.2	0.1	0.1	0.0	0.4	0.1	0.2

Table 22: Test results conducted power measurement 802.11n HT-20 / 802.11ac VHT-20

802.11n HT-40 / 802.11ac VHT-40 maximum average conducted output power [dBm]									
Band [MHz]	Ch	MCS-0 13.5Mbps	MCS-1 27Mbps	MCS-2 40.5Mbps	MCS-3 54Mbps	MCS-4 81Mbps	MCS-5 108Mbps	MCS-6 121.5Mbps	MCS-7 135Mbps
5200	38	-2.9	-3.0	-3.0	-3.1	-3.1	-3.1	-2.8	-3.0
	46	-3.3	-3.4	-3.3	-3.3	-3.3	-3.5	-3.1	-3.3
5300	54	-3.3	-3.3	-3.3	-3.4	-3.3	-3.3	-3.2	-3.3
	62	-3.7	-3.6	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5
5600	102	-1.9	-1.8	-1.8	-1.9	-1.9	-1.4	-1.7	-1.7
	110	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.8	-1.8
	118	-1.5	-1.5	-1.5	-1.6	-1.6	-1.6	-1.3	-1.4
	126	-1.4	-1.5	-1.4	-1.5	-1.4	-1.5	-1.3	-1.5
	134	-1.8	-1.9	-1.7	-1.7	-1.7	-1.8	-1.6	-1.7
5800	151	-0.2	-0.2	-0.3	-0.4	-0.3	-0.2	-0.1	-0.2
	159	-1.8	-1.7	-1.7	-1.8	-1.7	-1.9	-1.7	-1.9

Table 23: Test results conducted power measurement 802.11n HT-40 / 802.11ac VHT-40

7.1.1 Conducted average power measurements Bluetooth 2.4 GHz

Channel	Frequency (MHz)	GFSK	upper limit	antenna gain
0	2402	6.3	7.0	-0.4
39	2441	10.0	10.5	5.7
78	2480	**15.4**	16.0	5.1

Table 24: Test results conducted average power measurement Bluetooth 2.4 GHz

7.1.2 Standalone SAR Test Exclusion according to FCC KDB 447498 D01

Standalone SAR test exclusion considerations							
Communication system	freq. (MHz)	distance (mm)	P_{avg}* (dBm)	P_{avg}* (mW)	**threshold$_{1g}$ comparison value**	**SAR$_{1g}$ test exclusion thresholds**	SAR$_{1g}$ test exclusion
WLAN 5.2 GHz	5200	5	1.0	1.3	0.6	7.5	yes
WLAN 5.3 GHz	5300	5	1.5	1.4	0.7	7.5	yes
WLAN 5.6 GHz	5600	5	3.0	2.0	0.9	7.5	yes
WLAN 5.8 GHz	5800	5	3.5	2.2	1.1	7.5	yes

Table 25: Standalone SAR test exclusion considerations

P_{avg}* - maximum possible output power declared by manufacturer

The **10-g SAR test exclusion thresholds** for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]×[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ **7.5** for 10-g extremity SAR, where:

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

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

7.1.3 Standalone SAR Test Exclusion according to RSS-102 Issue 5

Standalone SAR test exclusion considerations						
Communication system	freq. (MHz)	distance (mm)	P_{avg}* (dBm)	P_{avg}* (mW)	**Exemption Limits$_{1g}$ (mW)**	SAR test exclusion
WLAN 5.2 GHz	5200	5	1.0	1.3	2.5	yes
WLAN 5.3 GHz	5300	5	1.5	1.4	2.5	yes
WLAN 5.6 GHz	5600	5	3.0	2.0	2.5	yes
WLAN 5.8 GHz	5800	5	3.5	2.2	2.5	yes

Table 26: Standalone SAR test exclusion considerations

P_{avg}* - maximum possible output power declared by manufacturer. Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power.
For limb-worn devices where the **10g** value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of **2.5**. If the operating frequency of the device is between two frequencies located in Table, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

7.1.4 SAR measurement positions

SAR measurement positions						
mode	front	rear	left edge	right edge	top edge	bottom edge
GSM 850	yes	no	yes	yes	yes	yes
GSM 1900	yes	no	yes	yes	yes	yes
WCDMA FDD II	yes	no	yes	yes	yes	yes
WCDMA FDD V	yes	no	yes	yes	yes	yes
WLAN 2450MHz	yes	no	yes	yes	yes	yes
WLAN 5GHz	yes	no	yes	yes	yes	yes
Bluetooth	yes	no	yes	yes	yes	yes

The edges with less than 2.5 cm distance to the TX antennas need to be tested for hotspot SAR.

7.2 SAR test results

7.2.1 General description of test procedures

- The DUT is tested using CMU 200 communication tester as controller unit to set test channels and maximum output power to the DUT, as well as for measuring the conducted peak power.
- Test positions as described in the tables above are in accordance with the specified test standard.
- Tests in body position were performed in that configuration, which generates the highest time based averaged output power (see conducted power results).
- UMTS was tested in RMC mode with 12.2 kbit/s and TPC bits set to ‘all 1’.
- WLAN was tested in 802.11b mode with 1 MBit/s and 6 MBit/s.
- Required WLAN test channels were selected according to KDB 248227
- According to IEEE 1528 the SAR test shall be performed at middle channel. Testing of top and bottom channel is optional.
- According to KDB 447498 D01 testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
  - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
  - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
  - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
- IEEE 1528-2013 requires the middle channel to be tested first. This generally applies to wireless devices that are designed to operate in technologies with tight tolerances for maximum output power variations across channels in the band. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

7.2.2 Results overview

measured / extrapolated SAR numbers - GSM 850 MHz										
Ch.	Freq. (MHz)	time slots	Position	cond. P_{max} (dBm)		SAR_{10g} (W/kg)		power drift (dB)	liquid (°C)	dist. (mm)
				declared**	meas.	meas.	extrap.			
Move/5000	SN: 163167333191036001230072					IMEI: 355339067210750				
128	824.2	4	top	27.5	26.7	0.544	0.654	-0.06	22.1	0
190	836.6	4	top	27.5	26.6	0.591	0.727	-0.02	22.1	0
251	848.8	4	top	27.5	26.5	**0.599**	**0.754**	0.05	22.1	0
190	836.6	4	bottom	27.5	26.6	0.140	0.172	-0.06	22.1	0
190	836.6	4	left	27.5	26.6	0.160	0.197	-0.08	22.1	0
190	836.6	4	right	27.5	26.6	0.083	0.102	-0.01	22.1	0
190	836.6	4	front	27.5	26.6	0.169	0.208	-0.08	22.1	0
251	848.8	4	top*	27.5	26.5	0.593	0.747	-0.04	22.1	0
Move/3500	SN: 161677313191018601103817					IMEI: 357302070004410				
128	824.2	4	top	27.5	26.7	0.499	0.600	-0.01	22.4	0
190	836.6	4	top	27.5	26.6	0.545	0.670	0.04	22.4	0
251	848.8	4	top	27.5	26.5	**0.573**	**0.721**	0.02	22.4	0

Table 27: Test results SAR GSM 850 MHz (see max. SAR plot in Annex B.1: GSM850 page 50)

* - repeated at the highest SAR measurement according to the FCC KDB 865664
** - maximum possible output power declared by manufacturer.

measured / extrapolated SAR numbers - GSM 1900 MHz										
Ch.	Freq. (MHz)	time slots	Position	cond. P_{max} (dBm)		SAR_{10g} (W/kg)		power drift (dB)	liquid (°C)	dist. (mm)
				declared**	meas.	meas.	extrap.			
Move/5000	SN: 163167333191036001230072					IMEI: 355339067210750				
661	1880.0	4	top	24.5	23.3	0.032	0.042	0.07	22.4	0
661	1880.0	4	bottom	24.5	23.3	0.012	0.015	-0.02	22.4	0
661	1880.0	4	left	24.5	23.3	0.010	0.013	0.01	22.4	0
661	1880.0	4	right	24.5	23.3	0.009	0.012	0.07	22.4	0
661	1880.0	4	front	24.5	23.2	0.051	0.068	0.04	22.4	0
512	1850.2	4	front	24.5	23.3	0.056	0.073	0.01	22.4	0
810	1909.8	4	front	24.5	23.1	**0.064**	**0.088**	0.00	22.4	0
Move/3500	SN: 161677313191018601103817					IMEI: 357302070004410				
661	1880.0	4	front	24.5	23.2	0.061	0.083	-0.03	22.4	0
512	1850.2	4	front	24.5	23.3	0.066	0.087	0.01	22.4	0
810	1909.8	4	front	24.5	23.1	**0.071**	**0.098**	-0.01	22.4	0

Table 28: Test results SAR GSM 1900 MHz (see max. SAR plot Annex B.2: GSM1900 page 52)

** - maximum possible output power declared by manufacturer

measured / extrapolated SAR numbers - UMTS FDD II 1880 MHz										
Ch.	Freq. (MHz)	test cond.	Position	cond. P_{max} (dBm)		SAR_{10g} (W/kg)		power drift (dB)	liquid (°C)	dist. (mm)
				declared**	meas.	meas.	extrap.			
Move/5000	SN: 163167333191036001230072					IMEI: 355339067210750				
9400	1880.0	RMC	top	24.0	23.6	0.088	0.097	0.07	22.4	0
9400	1880.0	RMC	bottom	24.0	23.6	0.024	0.026	-0.09	22.4	0
9400	1880.0	RMC	left	24.0	23.6	0.023	0.025	0.03	22.4	0
9400	1880.0	RMC	right	24.0	23.6	0.022	0.024	0.07	22.4	0
9262	1852.4	RMC	front	24.0	23.1	0.090	0.111	-0.02	22.4	0
9400	1880.0	RMC	front	24.0	23.6	**0.132**	0.145	0.01	22.4	0
9538	1907.6	RMC	front	24.0	23.0	0.118	**0.149**	-0.01	22.4	0
Move/3500	SN: 161677313191018601103817					IMEI: 357302070004410				
9262	1852.4	RMC	front	24.0	23.1	0.109	0.134	-0.01	22.4	0
9400	1880.0	RMC	front	24.0	23.6	**0.144**	**0.158**	-0.15	22.4	0
9538	1907.6	RMC	front	24.0	23.0	0.124	0.156	-0.04	22.4	0

Table 29: Test results SAR UMTS FDD II 1880 MHz (see max. SAR plot Annex B.3: UMTS FDD II page 54)

measured / extrapolated SAR numbers - UMTS FDD V 850 MHz										
Ch.	Freq. (MHz)	test cond.	Position	cond. P_{max} (dBm)		SAR_{10g} (W/kg)		power drift (dB)	liquid (°C)	dist. (mm)
				declared**	meas.	meas.	extrap.			
Move/5000	SN: 163167333191036001230072					IMEI: 355339067210750				
4132	826.4	RMC	top	24.5	24.5	0.506	0.506	0.03	22.1	0
4182	836.4	RMC	top	24.5	24.2	0.567	0.608	0.04	22.1	0
4233	846.6	RMC	top	24.5	24.2	**0.580**	**0.621**	-0.01	22.1	0
4182	836.4	RMC	bottom	24.5	24.2	0.143	0.153	-0.02	22.1	0
4182	836.4	RMC	left	24.5	24.2	0.138	0.148	-0.02	22.1	0
4182	836.4	RMC	right	24.5	24.2	0.133	0.143	0.15	22.1	0
4182	836.4	RMC	front	24.5	24.2	0.197	0.211	-0.05	22.1	0
4233	846.6	RMC	top*	24.5	24.2	0.572	0.613	-0.02	22.1	0
Move/3500	SN: 161677313191018601103817					IMEI: 357302070004410				
4132	826.4	RMC	top	24.5	24.5	0.542	0.542	0.01	22.4	0
4182	836.4	RMC	top	24.5	24.2	0.603	0.646	-0.04	22.4	0
4233	846.6	RMC	top	24.5	24.2	**0.623**	**0.668**	-0.01	22.4	0

Table 30: Test results SAR UMTS FDD V 850 MHz (see max. SAR plot Annex B.4: UMTS FDD V page 57)

* - repeated at the highest SAR measurement according to the FCC KDB 865664
** - maximum possible output power declared by manufacturer

measured / extrapolated SAR numbers - WLAN 2450 MHz											
Ch.	Freq. (MHz)	test cond.	Position	cond. P_{max} (dBm)		SAR_{10g} (W/kg)			power drift (dB)	liquid (°C)	dist. (mm)
				declared**	meas.	meas.	extrap.	100% DF			
Move/5000	SN: 163167333191036001230072					IMEI: 355339067210750					
1	2412	1Mbit/s	top	7.0	6.0	0.020	0.025	0.026	-0.02	22.8	0
1	2412	1Mbit/s	bottom	7.0	6.0	0.004	0.005	0.005	-0.08	22.8	0
1	2412	1Mbit/s	left	7.0	6.0	**0.045**	0.057	0.057	-0.08	22.8	0
6	2437	1Mbit/s	left	7.0	5.4	0.038	0.055	0.055	-0.02	22.8	0
11	2462	1Mbit/s	left	7.0	5.6	0.044	**0.061**	**0.062**	-0.02	22.8	0
1	2412	1Mbit/s	right	7.0	6.0	0.001	0.001	0.001	-0.12	22.8	0
1	2412	1Mbit/s	front	7.0	6.0	0.002	0.003	0.003	0.06	22.8	0
Move/3500	SN: 161677313191018601103817					IMEI: 357302070004410					
11	2462	1Mbit/s	left	7.0	5.6	0.043	0.059	0.060	0.02	22.8	0

Table 31: Test results SAR WLAN 2450 MHz (see max. SAR plot in Annex B.5: WLAN2450 page 59)

** - maximum possible output power declared by manufacturer

measured / extrapolated SAR numbers - Bluetooth 2450 MHz									
Ch.	Freq. (MHz)	Position	cond. P_{max} (dBm)		SAR_{10g} (W/kg)		power drift (dB)	liquid (°C)	dist. (mm)
			declared**	meas.	meas.	extrap.			
Move/5000	SN: 163167333191036001230072				IMEI: 355339067210750				
0	2402	top	7.0	6.3	0.474	0.556	-0.01	22.8	0
39	2441	top	10.5	10.0	0.491	0.550	0.01	22.8	0
78	2480	top	16.0	15.4	**0.542**	**0.621**	0.11	22.8	0
78	2480	bottom	16.0	15.4	0.131	0.150	-0.03	22.8	0
78	2480	left	16.0	15.4	0.049	0.056	-0.09	22.8	0
0	2402	right	7.0	6.3	0.299	0.350	-0.04	22.8	0
39	2441	right	10.5	10.0	0.349	0.391	0.10	22.8	0
78	2480	right	16.0	15.4	0.468	0.536	0.07	22.8	0
78	2480	front	16.0	15.4	0.216	0.247	-0.01	22.8	0
Move/3500	SN: 161677313191018601103817				IMEI: 357302070004410				
78	2480	top	16.0	15.4	**0.580**	**0.664**	-0.05	22.8	0
78	2480	top wc	16.0	15.4	0.575	0.659	-0.01	22.8	0

Table 32: Test results head SAR Bluetooth 2.4 GHz (see max. SAR plot in Annex B.6: Bluetooth 2.4GHz page 60)

* - repeated at the highest SAR measurement according to the FCC KDB 865664
** - maximum possible output power declared by manufacturer

Estimated stand alone SAR.					
Communication system	freq. (GHz)	distance (mm)	P_{avg} (dBm)	P_{avg} (mW)	$estimated_{1-g}$ (W/kg)
WLAN5200	5.2	5	1	1.3	0.077
WLAN5300	5.3	5	1.5	1.4	0.087
WLAN5600	5.6	5	3	2.0	0.126
WLAN5800	5.8	5	3.5	2.2	0.144

Table 28: Estimated stand alone SAR_{max} for WLAN 5GHz

7.2.3 Multiple Transmitter Information

The following tables list information which is relevant for the decision if a simultaneous transmit evaluation is necessary according to FCC KDB 447498D01 General RF Exposure Guidance v05.

reported SAR WWAN, BT and WLAN 2.4GHz, ΣSAR_{10g} evaluation					
Frequency band	Position	SAR_{max} /W/kg			ΣSAR
		WWAN	BT	WLAN	<4W/kg
GSM 850	top	0.754	0.664	0.026	1.444
	bottom	0.172	0.150	0.005	0.327
	left	0.197	0.056	0.062	0.315
	right	0.102	0.536	0.001	0.639
	front	0.208	0.247	0.003	0.458
GSM 1900	top	0.042	0.664	0.026	0.732
	bottom	0.015	0.150	0.005	0.170
	left	0.013	0.056	0.062	0.131
	right	0.012	0.536	0.001	0.549
	front	0.098	0.247	0.003	0.348
UMTS FDD II	top	0.097	0.664	0.026	0.787
	bottom	0.026	0.150	0.005	0.181
	left	0.025	0.056	0.062	0.143
	right	0.024	0.536	0.001	0.561
	front	0.158	0.247	0.003	0.408
UMTS FDD V	top	0.668	0.664	0.026	1.358
	bottom	0.153	0.150	0.005	0.308
	left	0.148	0.056	0.062	0.266
	right	0.143	0.536	0.001	0.680
	front	0.211	0.247	0.003	0.461

Table 33: SAR_{max} WWAN, BT and **WLAN 2.4GHz**, ΣSAR_{10g} evaluation.

reported SAR WWAN, BT and WLAN 5GHz, ΣSAR_{10g} evaluation					
Frequency band	Position	SAR_{max} /W/kg			ΣSAR
		WWAN	BT	WLAN	<4W/kg
GSM 850	top	0.754	0.664	0.144	1.562
	bottom	0.172	0.150	0.144	0.466
	left	0.197	0.056	0.144	0.397
	right	0.102	0.536	0.144	0.782
	front	0.208	0.247	0.144	0.599
GSM 1900	top	0.042	0.664	0.144	0.850
	bottom	0.015	0.150	0.144	0.309
	left	0.013	0.056	0.144	0.213
	right	0.012	0.536	0.144	0.692
	front	0.098	0.247	0.144	0.489
UMTS FDD II	top	0.097	0.664	0.144	0.905
	bottom	0.026	0.150	0.144	0.320
	left	0.025	0.056	0.144	0.225
	right	0.024	0.536	0.144	0.704
	front	0.158	0.247	0.144	0.549
UMTS FDD V	top	0.668	0.664	0.144	1.476
	bottom	0.153	0.150	0.144	0.447
	left	0.148	0.056	0.144	0.348
	right	0.143	0.536	0.144	0.823
	front	0.211	0.247	0.144	0.602

Table 34: SAR_{max} WWAN, BT and **WLAN 5GHz**, ΣSAR_{10g} evaluation.

Conclusion:

ΣSAR < 4 W/kg, therefore simultaneous transmissions SAR measurement with the enlarged zoom scan measurement and volume scan post-processing procedures is **not** required.

8 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

Equipment	Type	Manufacturer	Serial No.	Last Calibration	Frequency (months)
Dosimetric E-Field Probe	ES3DV3	Schmid & Partner Engineering AG	3320	January 14, 2016	12
Dosimetric E-Field Probe	EX3DV4	Schmid & Partner Engineering AG	3944	August 23, 2016	12
835 MHz System Validation Dipole	D835V2	Schmid & Partner Engineering AG	4d153	May 12, 2015	24
1900 MHz System Validation Dipole	D1900V2	Schmid & Partner Engineering AG	5d009	May 13, 2015	24
2450 MHz System Validation Dipole	D2450V2	Schmid & Partner Engineering AG	710	August 15, 2016	24
Data acquisition electronics	DAE3V1	Schmid & Partner Engineering AG	413	January 11, 2016	12
Data acquisition electronics	DAE3V1	Schmid & Partner Engineering AG	477	May 11, 2016	12
Software	DASY52 52.8.7	Schmid & Partner Engineering AG	---	N/A	--
Triple Modular Flat Phantom V5.1	QD 000 P51 C	Schmid & Partner Engineering AG	1154	N/A	--
Universal Radio Communication Tester	CMU 200	Rohde & Schwarz	106826	February 11, 2015	24
Bluetooth Tester	CBT	Rohde & Schwarz	100313	September 22, 2016	24
Network Analyser 300 kHz to 6 GHz	8753ES	Hewlett Packard)*	US39174436	January 28, 2016	24
Dielectric Probe Kit	85070C	Hewlett Packard	US99360146	N/A	12
Signal Generator	8671B	Hewlett Packard	2823A00656	January 31, 2017	24
Amplifier	25S1G4 (25 Watt)	Amplifier Reasearch	20452	N/A	--
Power Meter	NRP	Rohde & Schwarz	101367	January 31, 2017	24
Power Meter Sensor	NRP Z22	Rohde & Schwarz	100227	January 31, 2017	12
Power Meter Sensor	NRP Z22	Rohde & Schwarz	100234	January 31, 2017	12
Directional Coupler	778D	Hewlett Packard	19171	January 31, 2017	12

)* : Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

9 Observations

No observations exceeding those reported with the single test cases have been made.

Annex A: System performance check

Date/Time: 17.01.2017 10:35:28

SystemPerformanceCheck-D835 MSL 2017-01-17

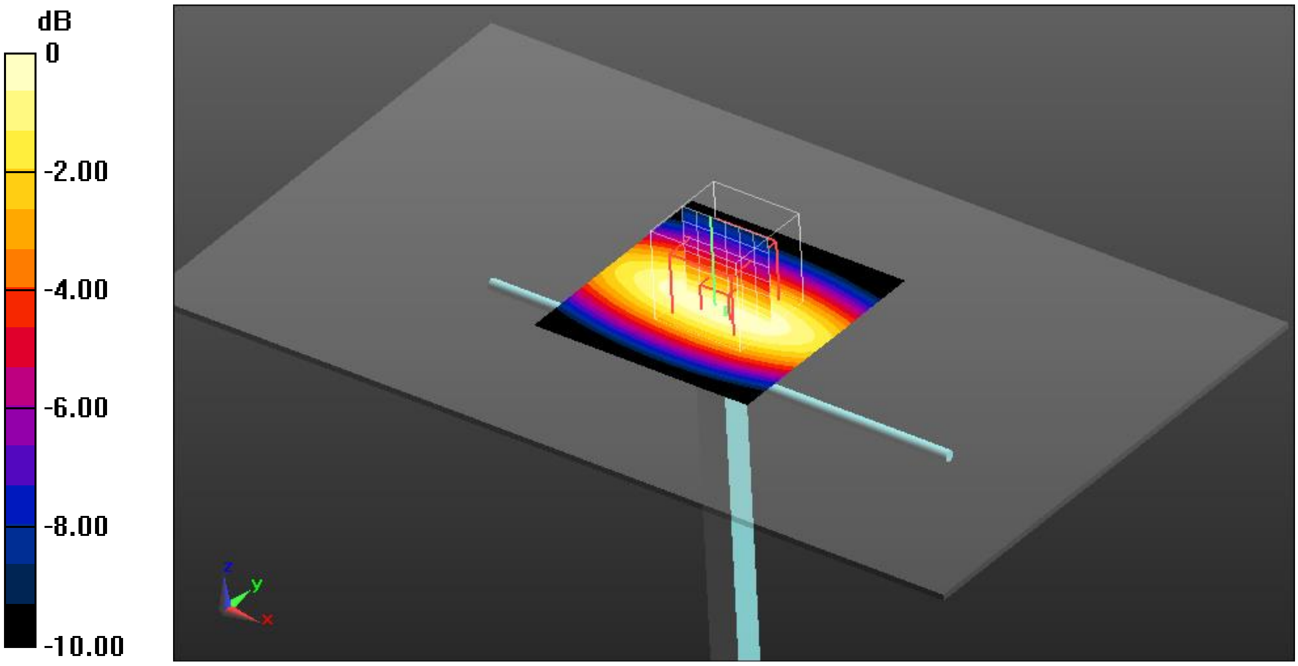
DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d153
Communication System: UID 0, CW (0); Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 835 MHz; σ = 0.966 S/m; ε_r = 53.51; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: EX3DV4 - SN3944; ConvF(10.24, 10.24, 10.24); Calibrated: 23.08.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE3 Sn477; Calibrated: 11.05.2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL835/d=15mm, Pin=1000 mW, dist=1.4mm/Area Scan (51x51x1): Interpolated

grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 12.5 W/kg

MSL835/d=15mm, Pin=1000 mW, dist=1.4mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 120.3 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 14.0 W/kg
SAR(1 g) = 9.55 W/kg; SAR(10 g) = 6.35 W/kg
Maximum value of SAR (measured) = 12.5 W/kg



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

Additional information:
ambient temperature: 22.9°C; liquid temperature: 22.1°C

Date/Time: 08.02.2017 13:34:32

SystemPerformanceCheck-D835 MSL 2017-02-08

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d153

Communication System: UID 0, CW (0); Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: f = 835 MHz; σ = 0.966 S/m; ε_r = 53.51; ρ = 1000 kg/m³

Phantom section: Center Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(6.38, 6.38, 6.38); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL835/d=15mm, Pin=1000 mW, dist=3mm/Area Scan (51x51x1): Interpolated grid:

dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 10.9 W/kg

MSL835/d=15mm, Pin=1000 mW, dist=3mm/Zoom Scan (7x7x7)/Cube 0:

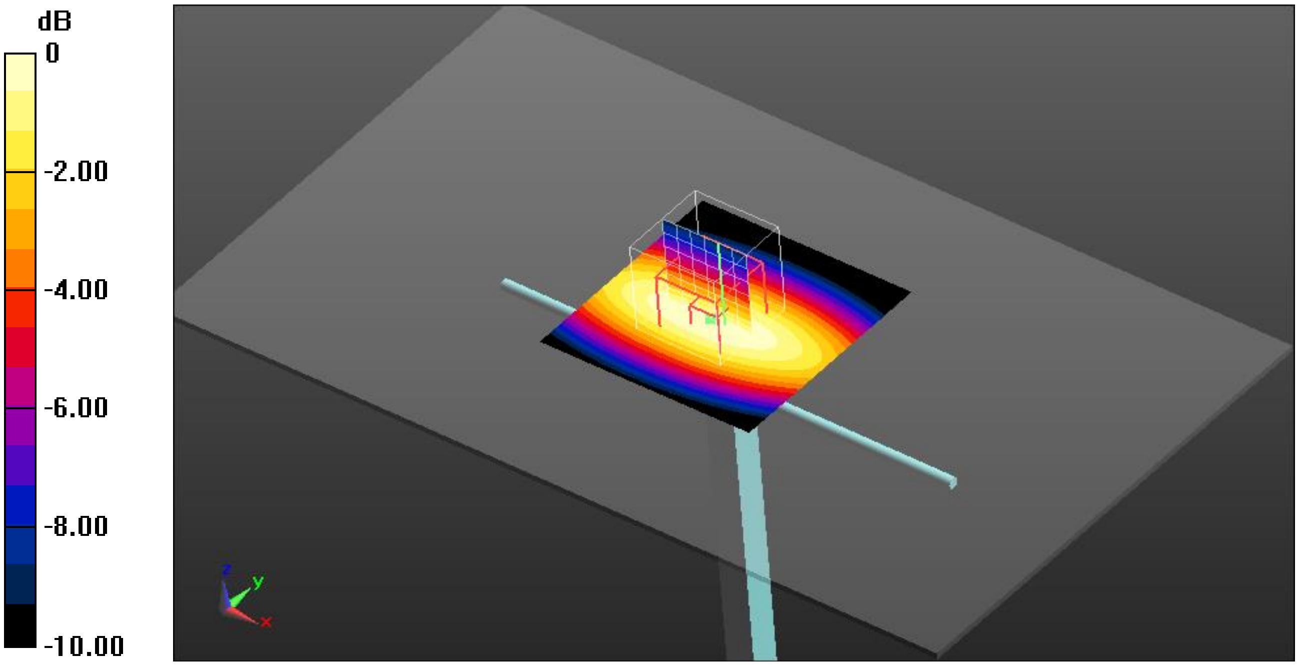
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 110.0 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 13.7 W/kg

SAR(1 g) = 9.38 W/kg; SAR(10 g) = 6.21 W/kg

Maximum value of SAR (measured) = 10.9 W/kg



0 dB = 10.9 W/kg = 10.37 dBW/kg

Additional information:

ambient temperature: 23.3°C; liquid temperature: 22.4°C

Date/Time: 09.02.2017 08:15:14

SystemPerformanceCheck-D1900 MSL 2017-02-09

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d009

Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: f = 1900 MHz; σ = 1.516 S/m; ε_r = 52.904; ρ = 1000 kg/m^3

Phantom section: Center Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(4.85, 4.85, 4.85); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL1900/d=10mm, Pin=1000 mW, dist=3mm/Area Scan (51x51x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 62.1 W/kg

MSL1900/d=10mm, Pin=1000 mW, dist=3mm/Zoom Scan (7x7x7)/Cube 0:

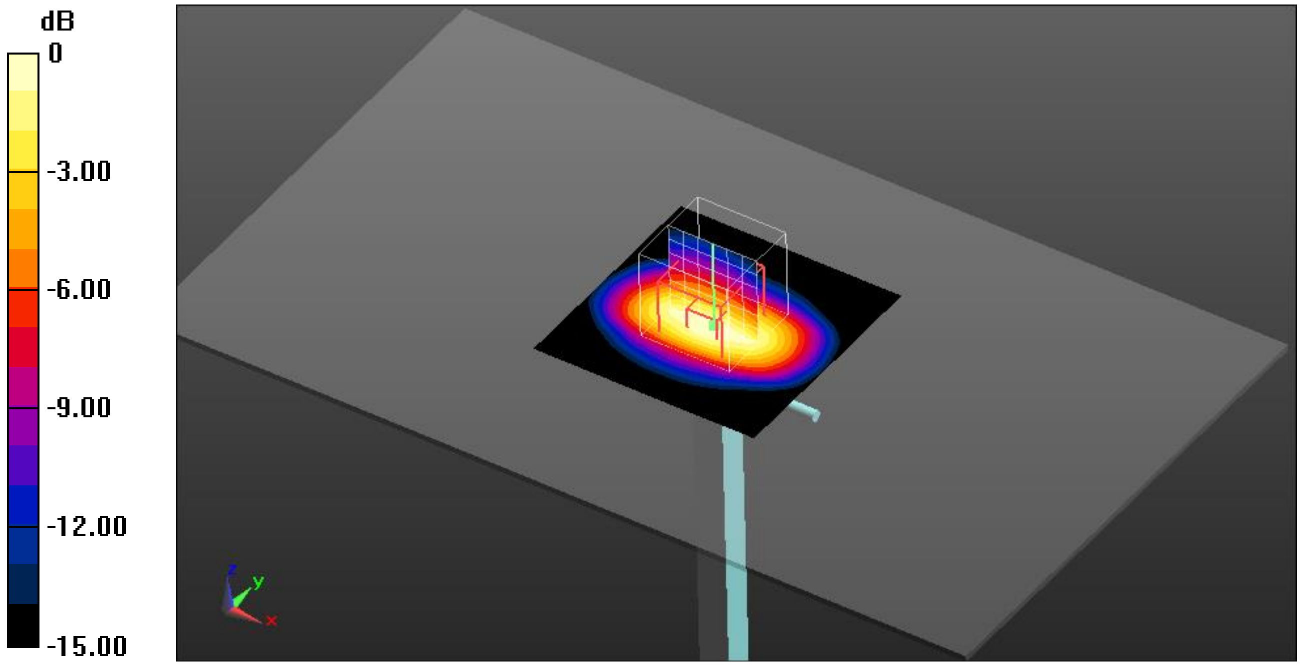
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 190.9 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 71.8 W/kg

SAR(1 g) = 40.6 W/kg; SAR(10 g) = 21.5 W/kg

Maximum value of SAR (measured) = 52.0 W/kg



0 dB = 52.0 W/kg = 17.16 dBW/kg

Additional information:

ambient temperature: 23.1°C; liquid temperature: 22.4°C

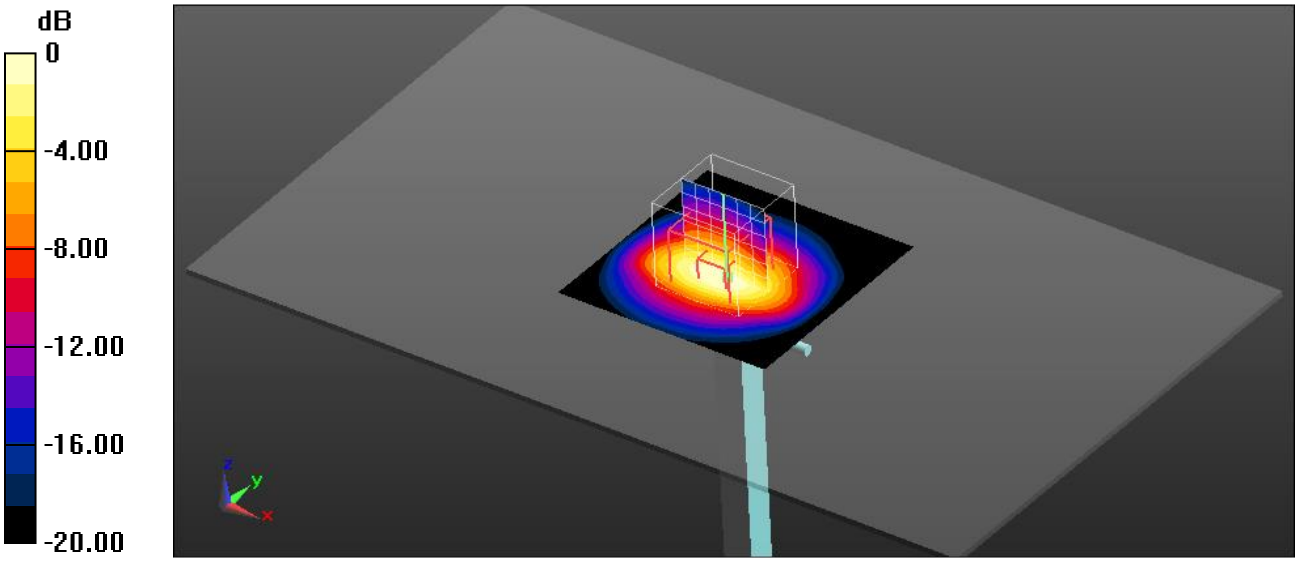
Date/Time: 10.03.2017 09:42:03

SystemPerformanceCheck-D2450 MSL 2017-03-10

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 710
Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2450 MHz; σ = 2.002 S/m; ε_r = 51.647; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.54, 4.54, 4.54); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL2450/d=10mm, Pin=100 mW, dist=3mm/Area Scan (51x51x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 7.58 W/kg

MSL2450/d=10mm, Pin=100 mW, dist=3mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.070 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 10.3 W/kg
SAR(1 g) = 5.07 W/kg; SAR(10 g) = 2.36 W/kg
Maximum value of SAR (measured) = 6.62 W/kg



0 dB = 6.62 W/kg = 8.21 dBW/kg

Additional information:
ambient temperature: 23.7°C; liquid temperature: 22.8°C

Date/Time: 13.03.2017 08:53:55

SystemPerformanceCheck-D2450 MSL 2017-03-13

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 710

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: f = 2450 MHz; σ = 2.002 S/m; ε_r = 51.647; ρ = 1000 kg/m^3

Phantom section: Center Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(4.54, 4.54, 4.54); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL2450/d=10mm, Pin=100 mW, dist=3mm/Area Scan (51x51x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 8.56 W/kg

MSL2450/d=10mm, Pin=100 mW, dist=3mm/Zoom Scan (7x7x7)/Cube 0:

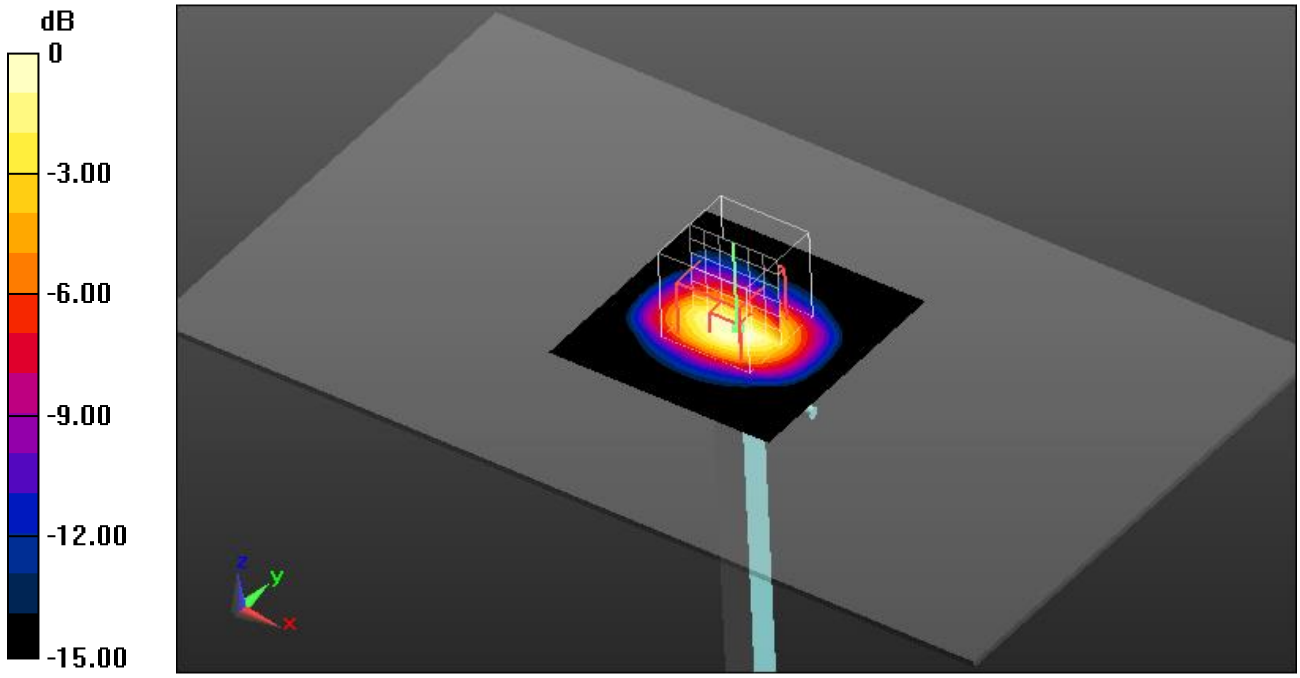
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 60.896 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 11.0 W/kg

SAR(1 g) = 5.26 W/kg; SAR(10 g) = 2.42 W/kg

Maximum value of SAR (measured) = 6.98 W/kg



0 dB = 6.98 W/kg = 8.44 dBW/kg

Additional information:

ambient temperature: 23.7°C; liquid temperature: 22.8°C

Annex B: DASY5 measurement results

SAR plots for **the highest measured SAR** in each exposure configuration, wireless mode and frequency band combination according to FCC KDB 865664 D02

Annex B.1: GSM850

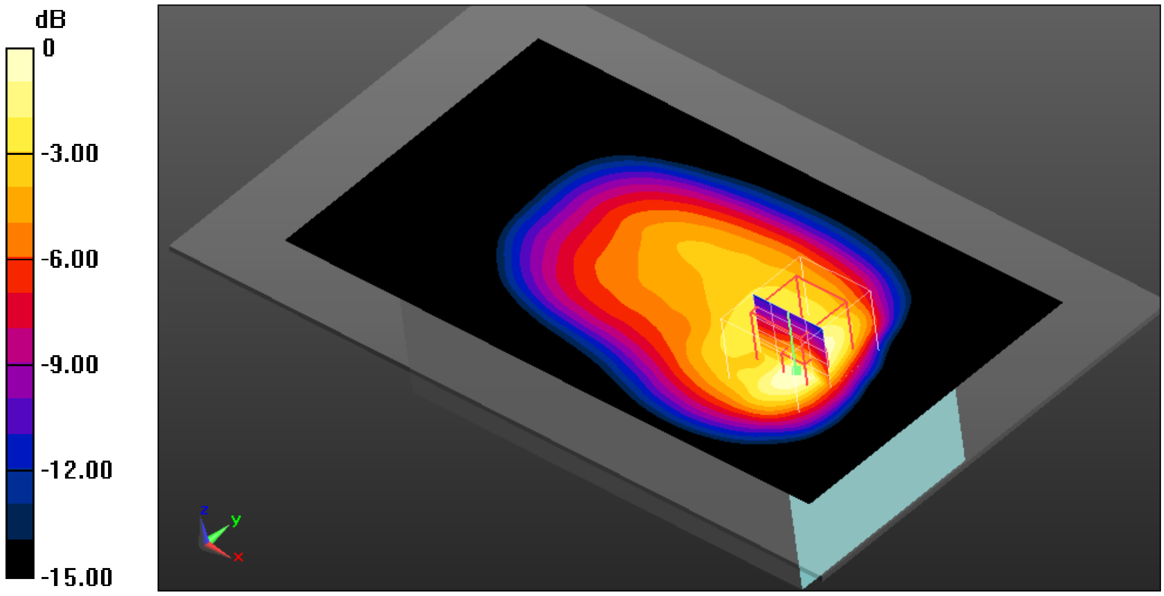
Date/Time: 17.01.2017 15:24:32

FCC-GSM850 - MSL

DUT: Ingenico; Type: Move/5000; Serial: 16316733191036001230072
Communication System: UID 0, GSM/GPRS 4TS (0); Communication System Band: GSM 850; Frequency: 848.8 MHz; Communication System PAR: 3.01 dB; PMF: 1.41416
Medium parameters used: f = 849 MHz; $\sigma = 0.976$ S/m; $\varepsilon_r = 53.349$; $\rho = 1000$ kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: EX3DV4 - SN3944; ConvF(10.24, 10.24, 10.24); Calibrated: 23.08.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 26.0
- Electronics: DAE3 Sn477; Calibrated: 11.05.2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL/Top position - High/Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.85 W/kg

MSL/Top position - High/Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 45.191 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 2.14 W/kg
SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.599 W/kg
Maximum value of SAR (measured) = 1.64 W/kg



0 dB = 1.64 W/kg = 2.15 dBW/kg

Additional information:
position or distance of DUT to the phantom: 0 mm
ambient temperature: 22.9°C; liquid temperature: 22.1°C

Date/Time: 08.02.2017 15:02:44

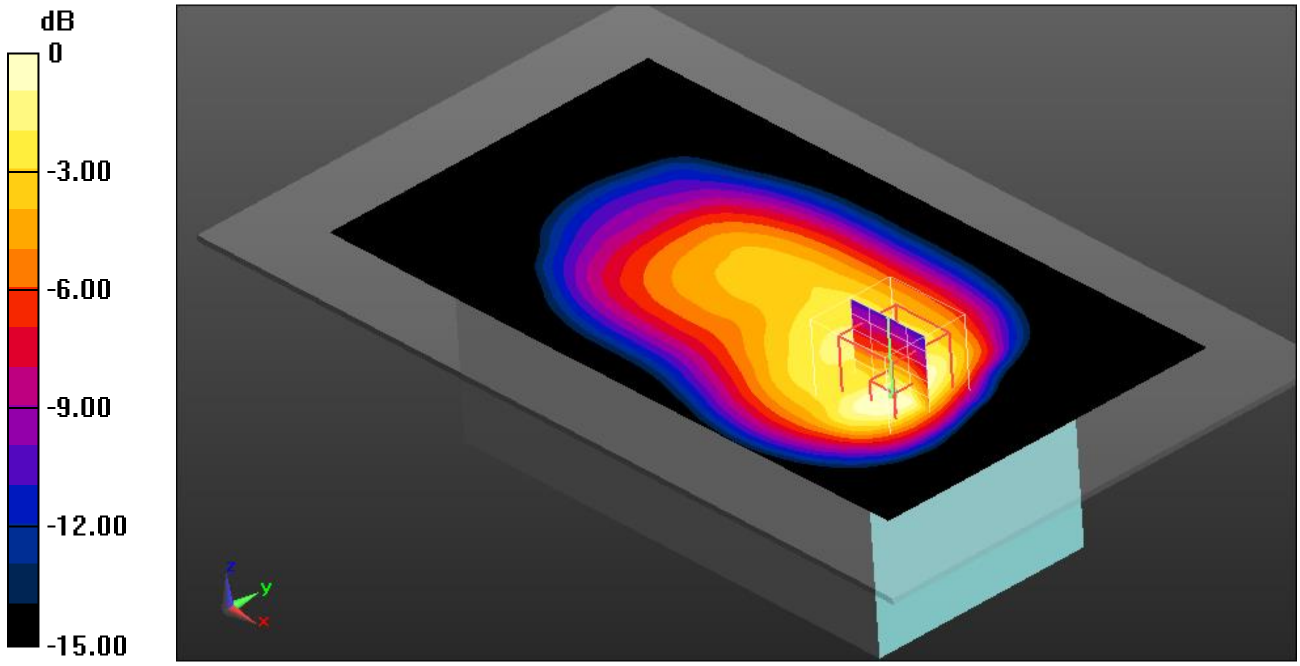
FCC-GSM850 - MSL-Move3500

DUT: Ingenico; Type: Move/3500; Serial: 161677313191018601103817

Communication System: UID 0, GSM/GPRS 4TS (0); Communication System Band: GSM 850; Frequency: 848.8 MHz; Communication System PAR: 3.01 dB; PMF: 1.41416
Medium parameters used: f = 849 MHz; σ = 0.976 S/m; ε_r = 53.349; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(6.38, 6.38, 6.38); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 27.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL/Top position - High/Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.51 W/kg

MSL/Top position - High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.396 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 2.13 W/kg
SAR(1 g) = 1.08 W/kg; SAR(10 g) = 0.573 W/kg
Maximum value of SAR (measured) = 1.27 W/kg



0 dB = 1.27 W/kg = 1.04 dBW/kg

Additional information:
position or distance of DUT to the phantom: 0 mm
ambient temperature: 23.3°C; liquid temperature: 22.4°C

Annex B.2: GSM1900

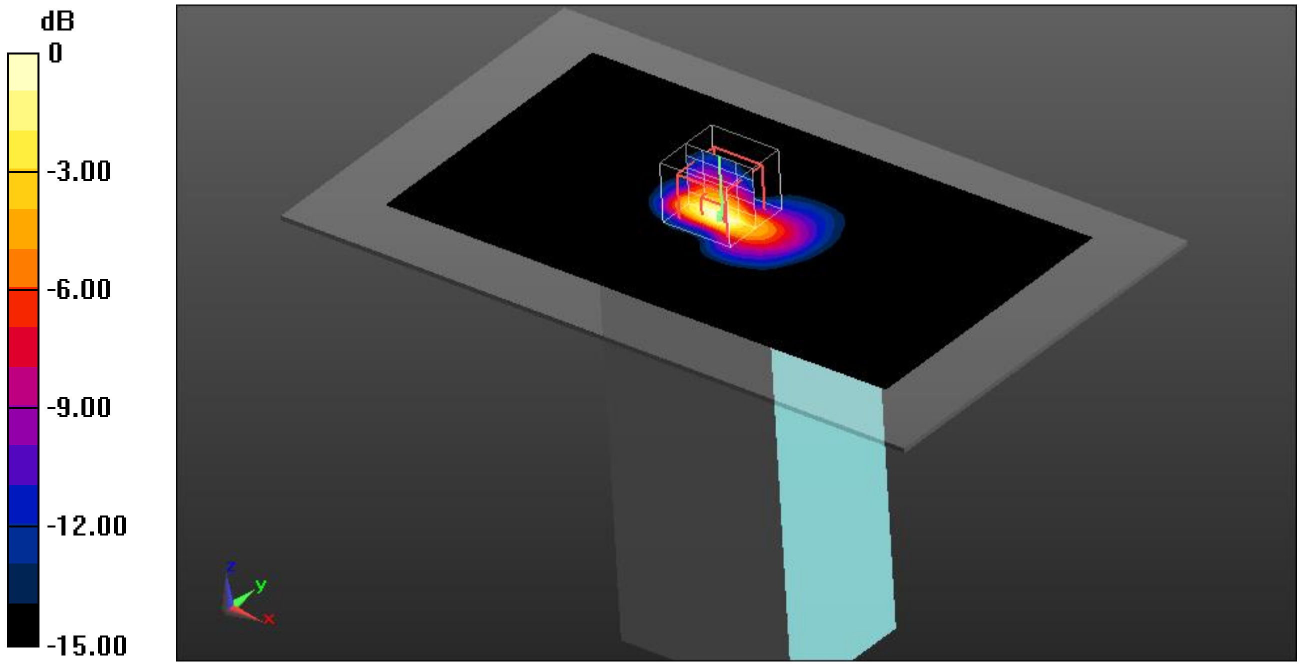
Date/Time: 09.02.2017 12:49:21

FCC-GSM1900 - MSL

DUT: Ingenico; Type: Move/5000; Serial: 16316733319103600123007 2
Communication System: UID 0, GSM/GPRS 4TS (0); Communication System Band: GSM 1900; Frequency: 1909.8 MHz; Communication System PAR: 3.01 dB; PMF: 1.41416
Medium parameters used: f = 1910 MHz; σ = 1.513 S/m; ε_r = 52.906; ρ = 1000 kg/m³
Phantom section: Center Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.85, 4.85, 4.85); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 27.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL/Front position - High/Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.247 W/kg

MSL/Front position - High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 13.024 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.348 W/kg
SAR(1 g) = 0.161 W/kg; SAR(10 g) = 0.064 W/kg
Maximum value of SAR (measured) = 0.236 W/kg



0 dB = 0.236 W/kg = -6.27 dBW/kg

Additional information:
position or distance of DUT to the phantom: 0 mm
ambient temperature: 23.1°C; liquid temperature: 22.4°C

Date/Time: 09.02.2017 12:07:50

FCC-GSM1900 - MSL-Move3500

DUT: Ingenico; Type: Move/3500; Serial: 161677313191018601103817

Communication System: UID 0, GSM/GPRS 4TS (0); Communication System Band: GSM 1900; Frequency: 1909.8 MHz; Communication System PAR: 3.01 dB; PMF: 1.41416

Medium parameters used: f = 1910 MHz; σ = 1.513 S/m; ε_r = 52.906; ρ = 1000 kg/m^3

Phantom section: Center Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(4.85, 4.85, 4.85); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 27.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL/Front position - High/Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.247 W/kg

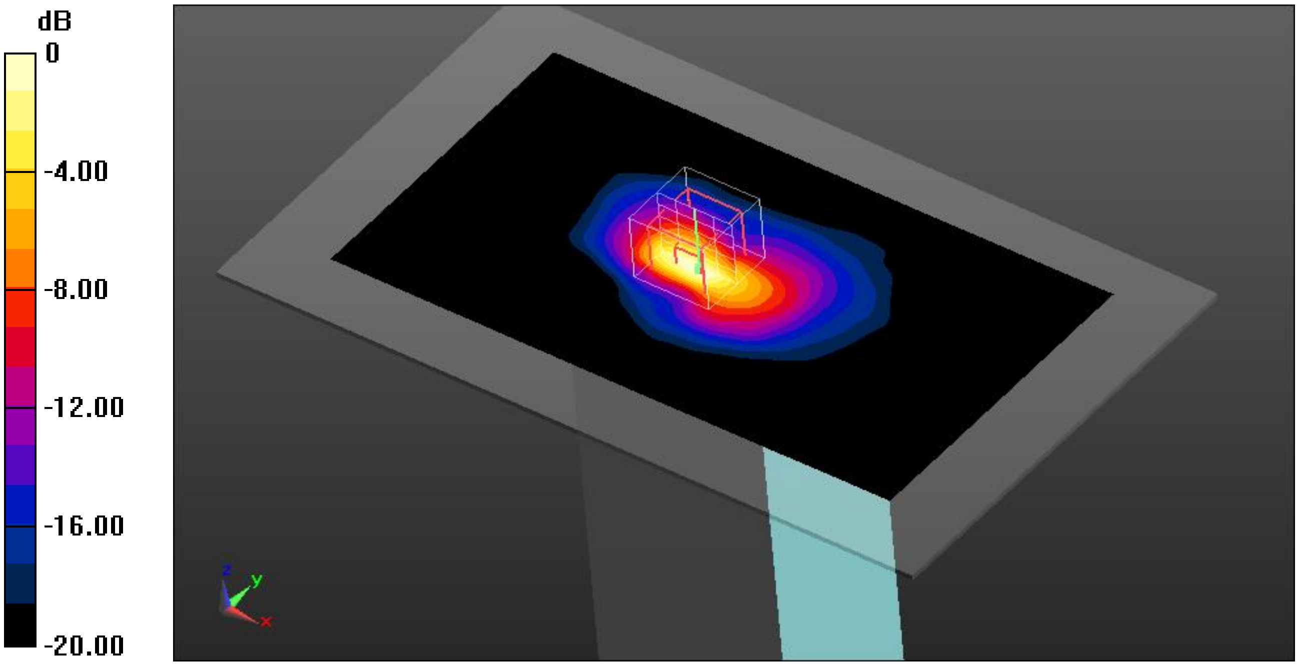
MSL/Front position - High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 12.823 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.405 W/kg

SAR(1 g) = 0.183 W/kg; SAR(10 g) = 0.071 W/kg

Maximum value of SAR (measured) = 0.244 W/kg



0 dB = 0.244 W/kg = -6.13 dBW/kg

Additional information:

position or distance of DUT to the phantom: 0 mm

ambient temperature: 23.1°C; liquid temperature: 22.4°C

Annex B.3: UMTS FDD II

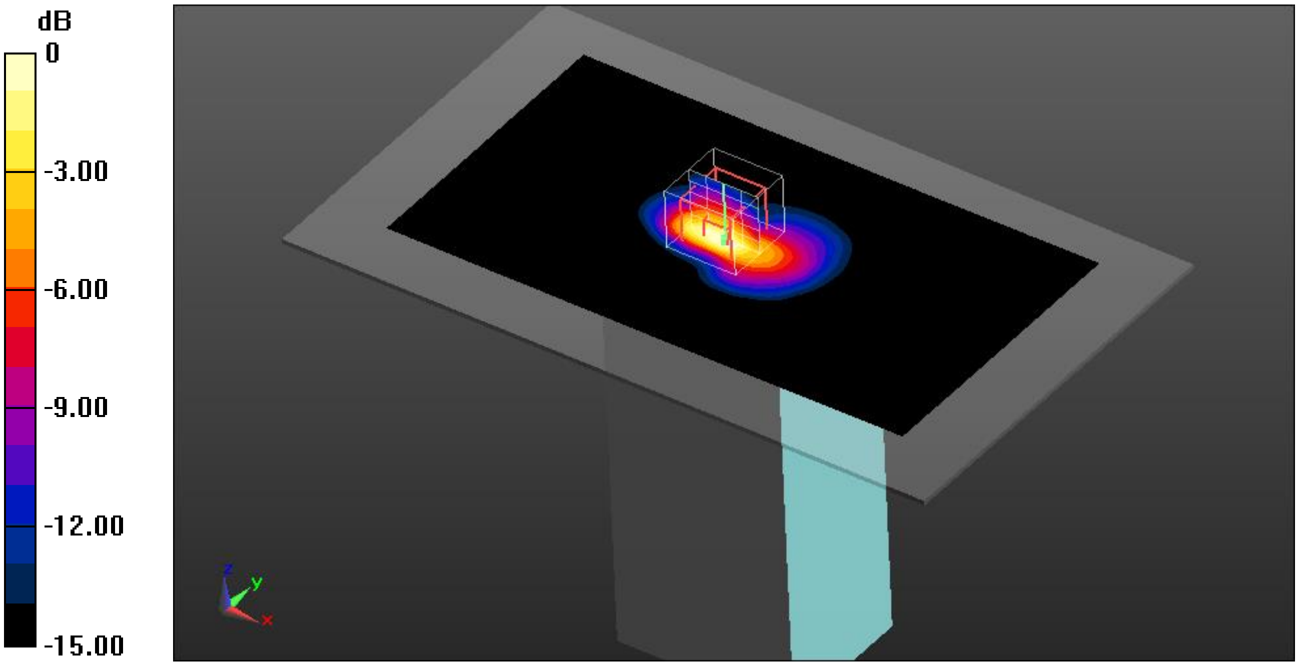
Date/Time: 09.02.2017 09:46:06

FCC-UMTS FDD II - MSL

DUT: Ingenico; Type: Move/5000; Serial: 16316733319103600123 0072
Communication System: UID 0, UMTS FDD (0); Communication System Band: UMTS FDD II; Frequency: 1880 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1880 MHz; σ = 1.493 S/m; ε_r = 52.956; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.85, 4.85, 4.85); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 27.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL/Front side position - Middle/Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.454 W/kg

MSL/Front side position - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 17.567 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.702 W/kg
SAR(1 g) = 0.329 W/kg; SAR(10 g) = 0.132 W/kg
Maximum value of SAR (measured) = 0.430 W/kg



0 dB = 0.430 W/kg = -3.67 dBW/kg

Additional information:
position or distance of DUT to the phantom: 0 mm
ambient temperature: 23.1°C; liquid temperature: 22.4°C

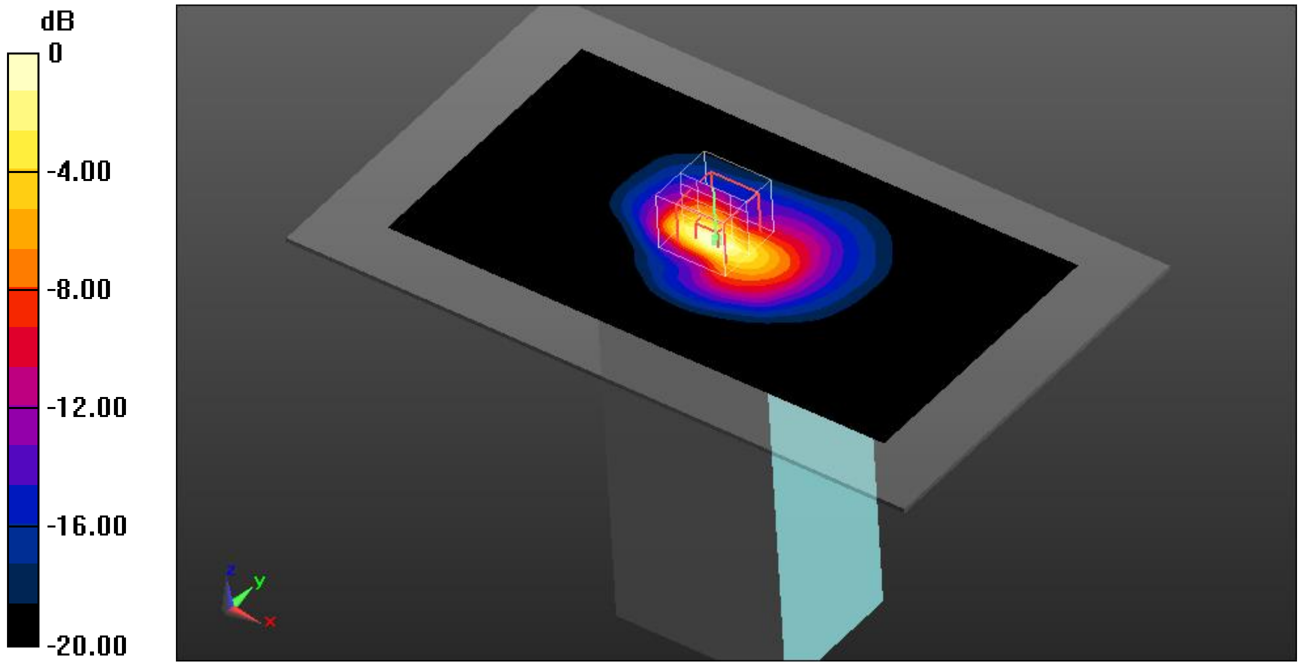
Date/Time: 09.02.2017 10:29:40

FCC-UMTS FDD II - MSL

DUT: Ingenico; Type: Move/5000; Serial: 163167333191036001230072
Communication System: UID 0, UMTS FDD (0); Communication System Band: UMTS FDD II; Frequency: 1907.6 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1908 MHz; σ = 1.513 S/m; ε_r = 52.906; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.85, 4.85, 4.85); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 27.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL/Front position - High/Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.458 W/kg

MSL/Front position - High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 17.010 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.639 W/kg
SAR(1 g) = 0.298 W/kg; SAR(10 g) = 0.118 W/kg
Maximum value of SAR (measured) = 0.411 W/kg



0 dB = 0.411 W/kg = -3.86 dBW/kg

Additional information:
position or distance of DUT to the phantom: 0 mm
ambient temperature: 23.1°C; liquid temperature: 22.4°C

Date/Time: 09.02.2017 11:04:41

FCC-UMTS FDD II - MSL-Move3500

DUT: Ingenico; Type: Move/3500; Serial: 16167731319101860110381 7

Communication System: UID 0, UMTS FDD (0); Communication System Band: UMTS FDD II; Frequency: 1880 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: f = 1880 MHz; σ = 1.493 S/m; ε_r = 52.956; ρ = 1000 kg/m³

Phantom section: Center Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(4.85, 4.85, 4.85); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 27.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL/Front side position - Middle/Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.517 W/kg

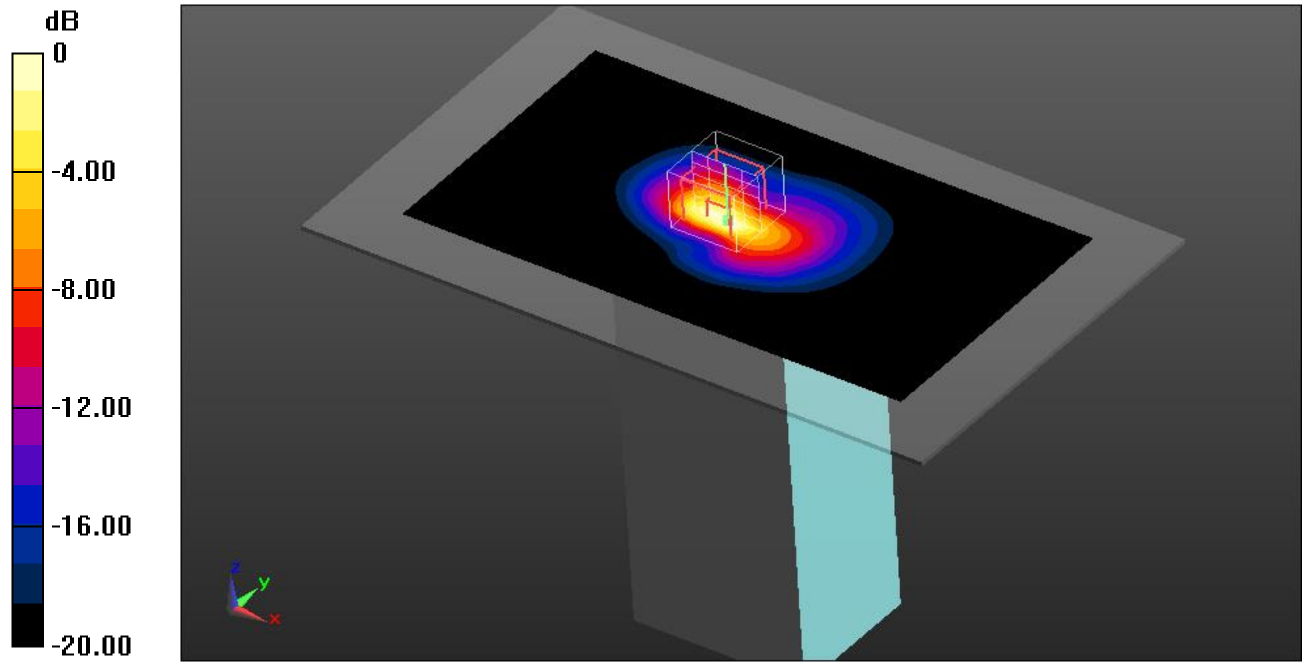
MSL/Front side position - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 18.599 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.820 W/kg

SAR(1 g) = 0.369 W/kg; SAR(10 g) = 0.144 W/kg

Maximum value of SAR (measured) = 0.492 W/kg



0 dB = 0.492 W/kg = -3.08 dBW/kg

Additional information:

position or distance of DUT to the phantom: 0 mm

ambient temperature: 23.1°C; liquid temperature: 22.4°C

Annex B.4: UMTS FDD V

Date/Time: 17.01.2017 12:09:09

FCC-UMTS FDD V - MSL

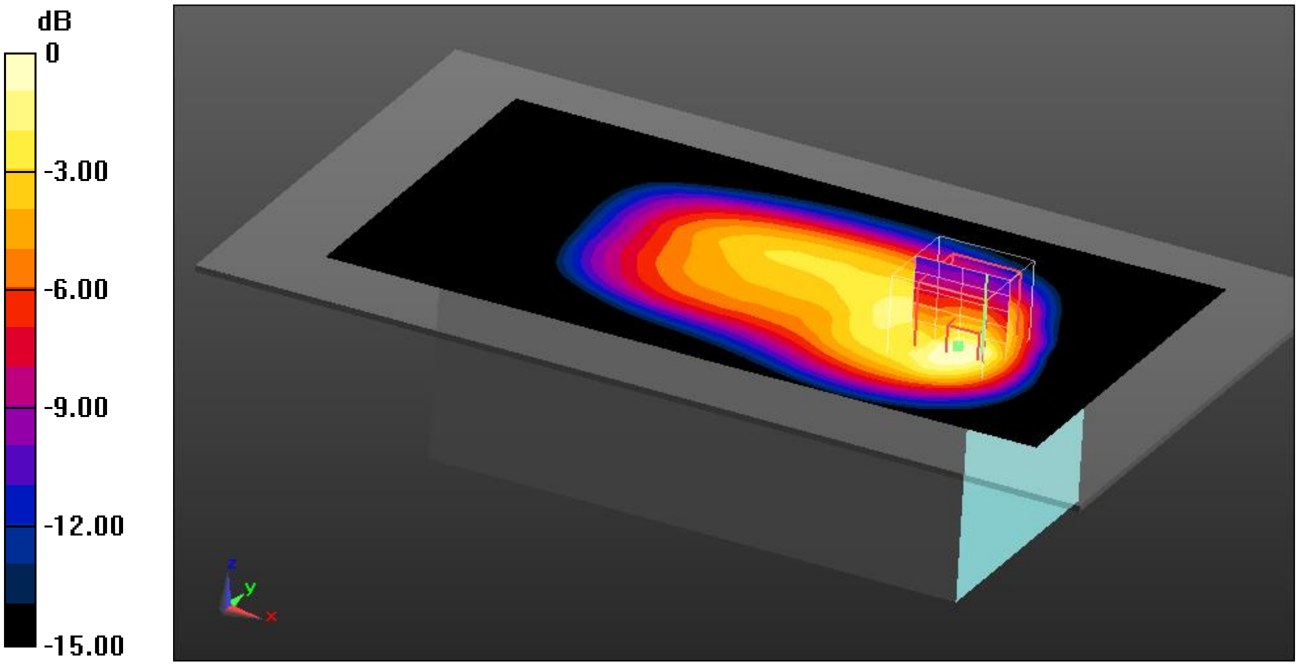
DUT: Ingenico; Type: Move/5000; Serial: 163167333191036001230072
Communication System: UID 0, UMTS FDD (0); Communication System Band: UMTS FDD V; Frequency: 846.6 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 847 MHz; σ = 0.975 S/m; ε_r = 53.345; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: EX3DV4 - SN3944; ConvF(10.24, 10.24, 10.24); Calibrated: 23.08.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 26.0
- Electronics: DAE3 Sn477; Calibrated: 11.05.2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL/Top position - High/Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.66 W/kg

MSL/Top position - High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 44.037 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 2.07 W/kg
SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.580 W/kg
Maximum value of SAR (measured) = 1.52 W/kg



0 dB = 1.52 W/kg = 1.82 dBW/kg

Additional information:
position or distance of DUT to the phantom: 0 mm
ambient temperature: 22.9°C; liquid temperature: 22.1°C

Date/Time: 08.02.2017 16:06:13

FCC-UMTS FDD V - MSL-Move3500

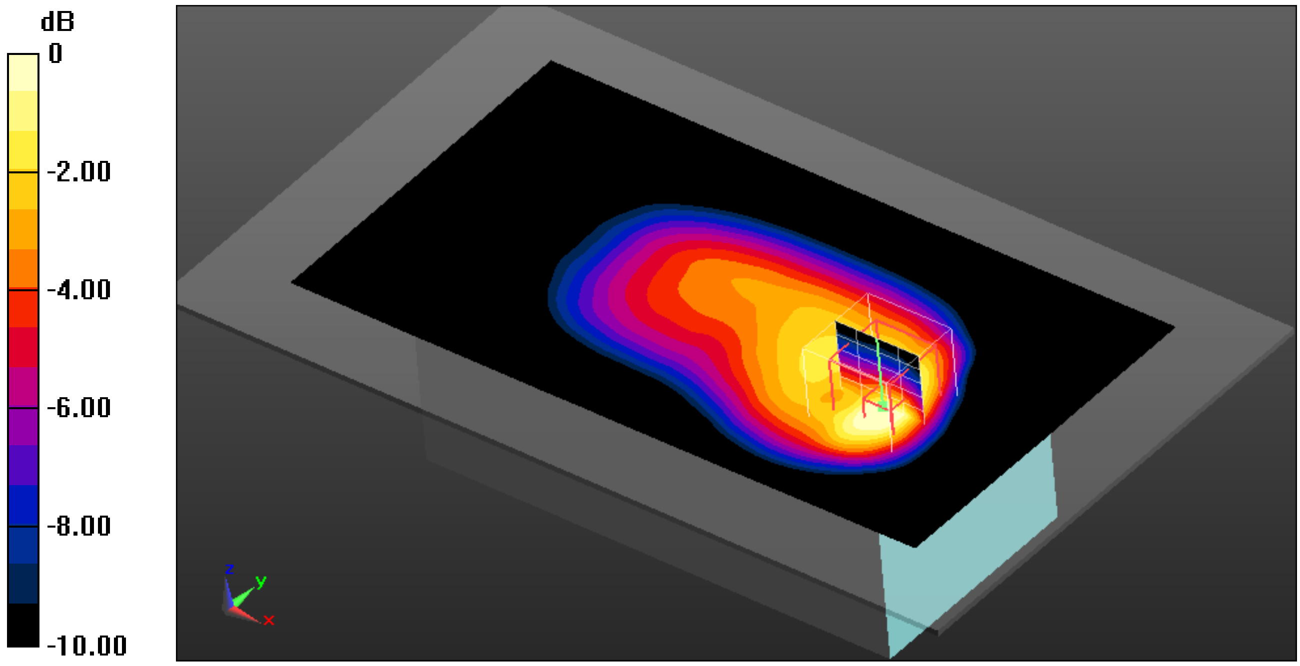
DUT: Ingenico; Type: Move/3500; Serial: 161677313191018601103817
Communication System: UID 0, UMTS FDD (0); Communication System Band: UMTS FDD V; Frequency: 846.6 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 847 MHz; σ = 0.975 S/m; ε_r = 53.345; ρ = 1000 kg/m³
Phantom section: Center Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(6.38, 6.38, 6.38); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 27.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL/Top position - High/Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.66 W/kg

MSL/Top position - High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 41.665 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 2.34 W/kg
SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.623 W/kg
Maximum value of SAR (measured) = 1.38 W/kg



0 dB = 1.38 W/kg = 1.40 dBW/kg

Additional information:
position or distance of DUT to the phantom: 0 mm
ambient temperature: 23.3°C; liquid temperature: 22.4°C

Annex B.5: WLAN2450

Date/Time: 10.03.2017 09:14:08

FCC-WLAN2450 - MSL

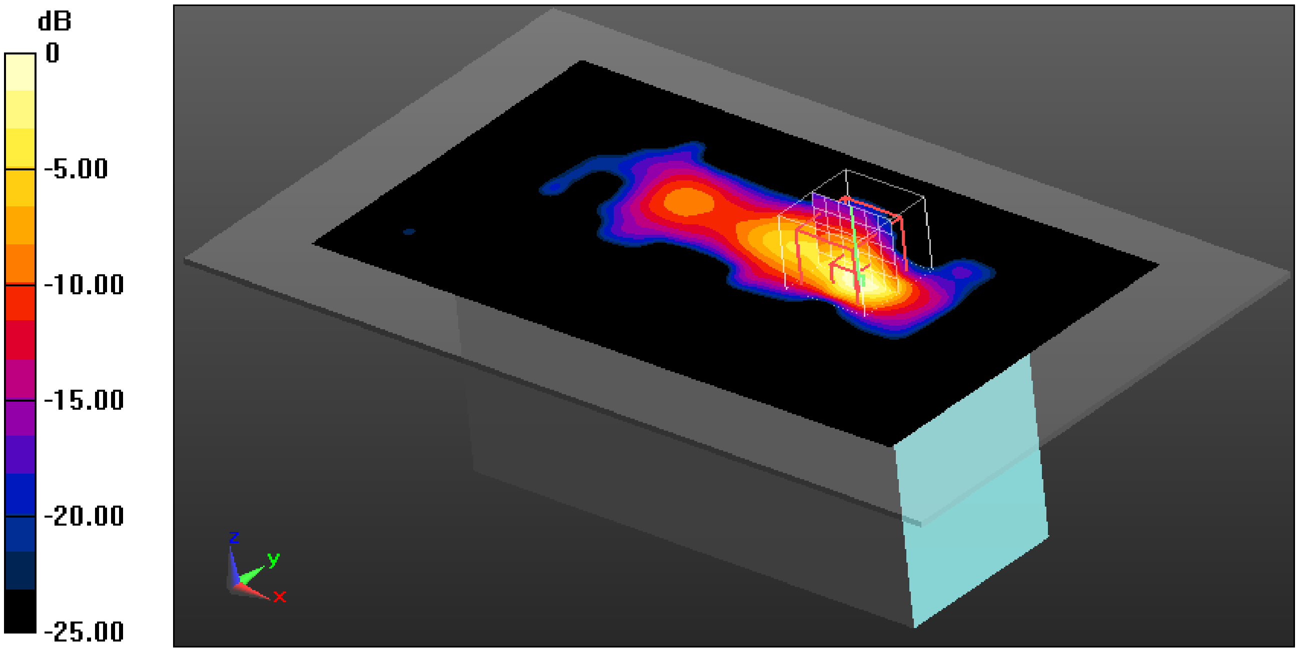
DUT: Ingenico; Type: Move/5000; Serial: 163167333191036001230072
Communication System: UID 0, WLAN 2450 (0); Communication System Band: 2.4 GHz; Frequency: 2462 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2462 MHz; σ = 2.012 S/m; ε_r = 51.545; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.54, 4.54, 4.54); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 27.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL Move5000/Left side position - High/Area Scan (121x221x1): Interpolated grid:

dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.178 W/kg

MSL Move5000/Left side position - High/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.038 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.320 W/kg
SAR(1 g) = 0.123 W/kg; SAR(10 g) = 0.044 W/kg
Maximum value of SAR (measured) = 0.179 W/kg



0 dB = 0.179 W/kg = -7.47 dBW/kg

Additional information:
position or distance of DUT to the phantom: 0 mm
ambient temperature: 23.7°C; liquid temperature: 22.8°C

Annex B.6: Bluetooth 2.4GHz

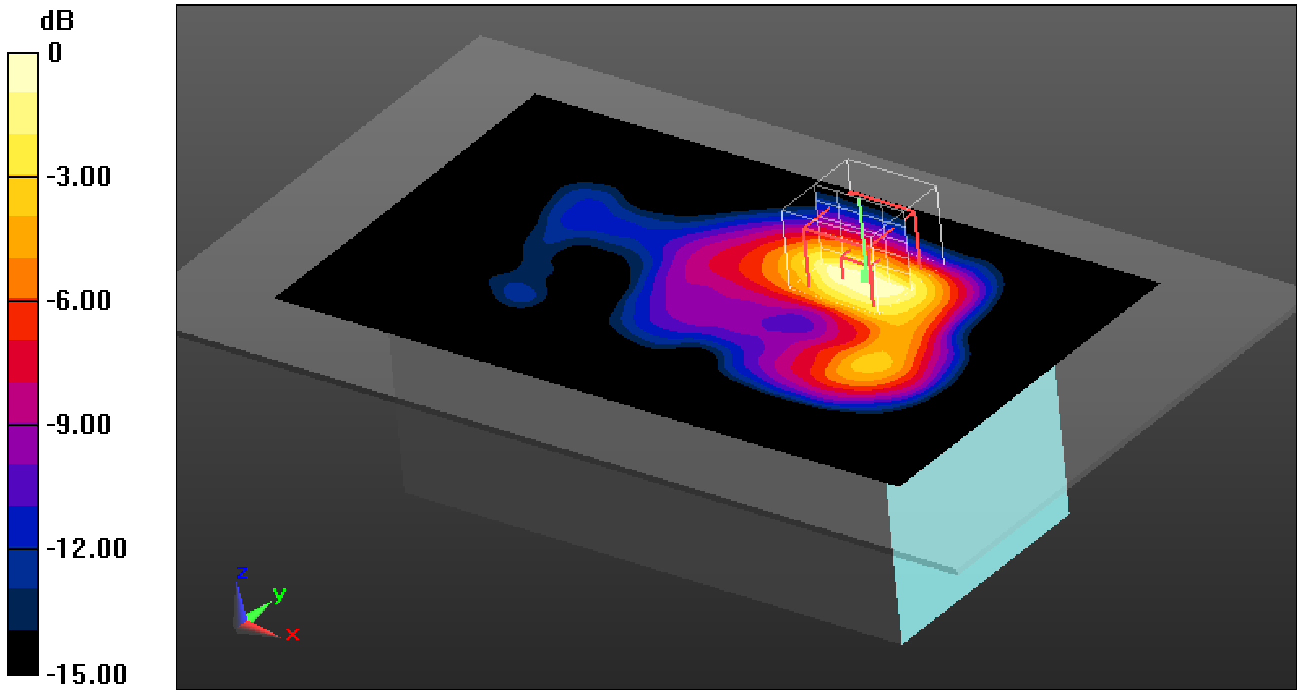
Date/Time: 13.03.2017 15:38:46

FCC-BT2450 - MSL

DUT: Ingenico; Type: Move/3500; Serial: 16167731319101860110381 7
Communication System: UID 0, Bluetooth (0); Communication System Band: BT; Frequency: 2480 MHz; Communication System PAR: 1.16 dB; PMF: 1.14288
Medium parameters used: f = 2480 MHz; σ = 2.033 S/m; ε_r = 51.515; ρ = 1000 kg/m³
Phantom section: Center Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.54, 4.54, 4.54); Calibrated: 12.01.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection), z = 2.0, 27.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1154
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

MSL Move3500/Top side position - High/Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.89 W/kg

MSL Move3500/Top side position - High/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 28.385 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 2.53 W/kg
SAR(1 g) = 1.19 W/kg; SAR(10 g) = 0.580 W/kg
Maximum value of SAR (measured) = 1.51 W/kg



0 dB = 1.51 W/kg = 1.79 dBW/kg

Additional information:
position or distance of DUT to the phantom: 0 mm
ambient temperature: 23.7°C; liquid temperature: 22.8°C

Annex B.7: Liquid depth

Photo 1: Liquid depth 850 MHz body simulating liquid

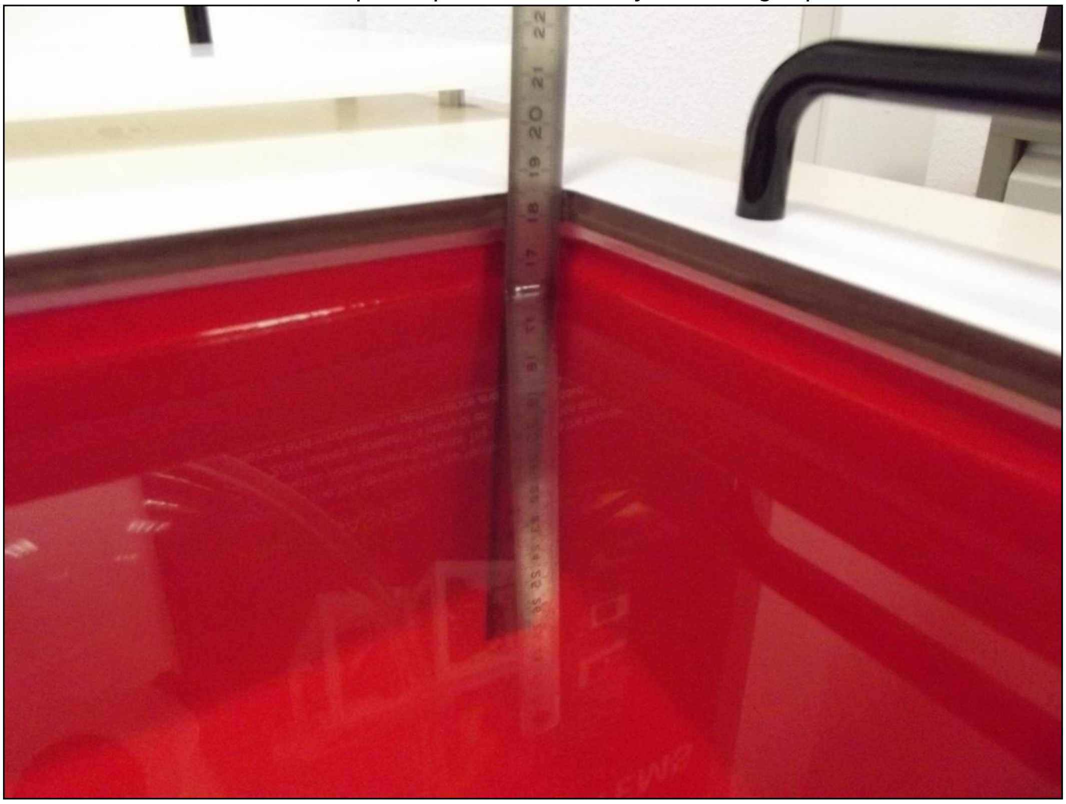


Photo 2: Liquid depth 1900 MHz body simulating liquid

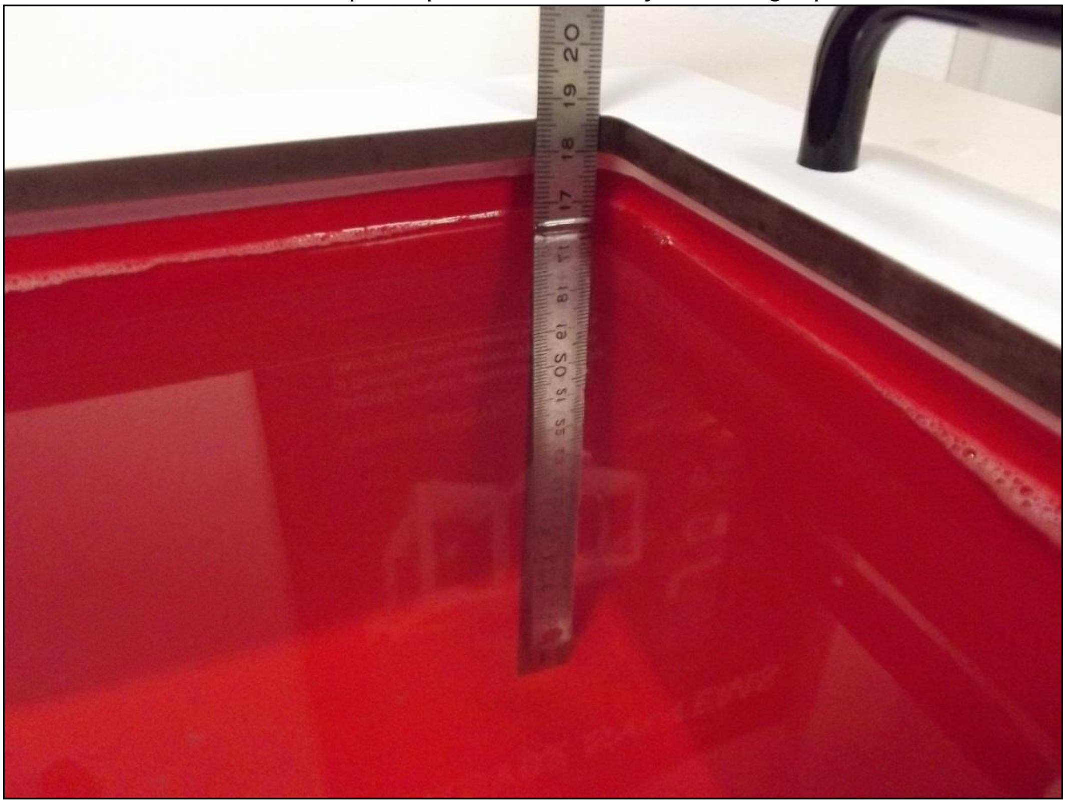
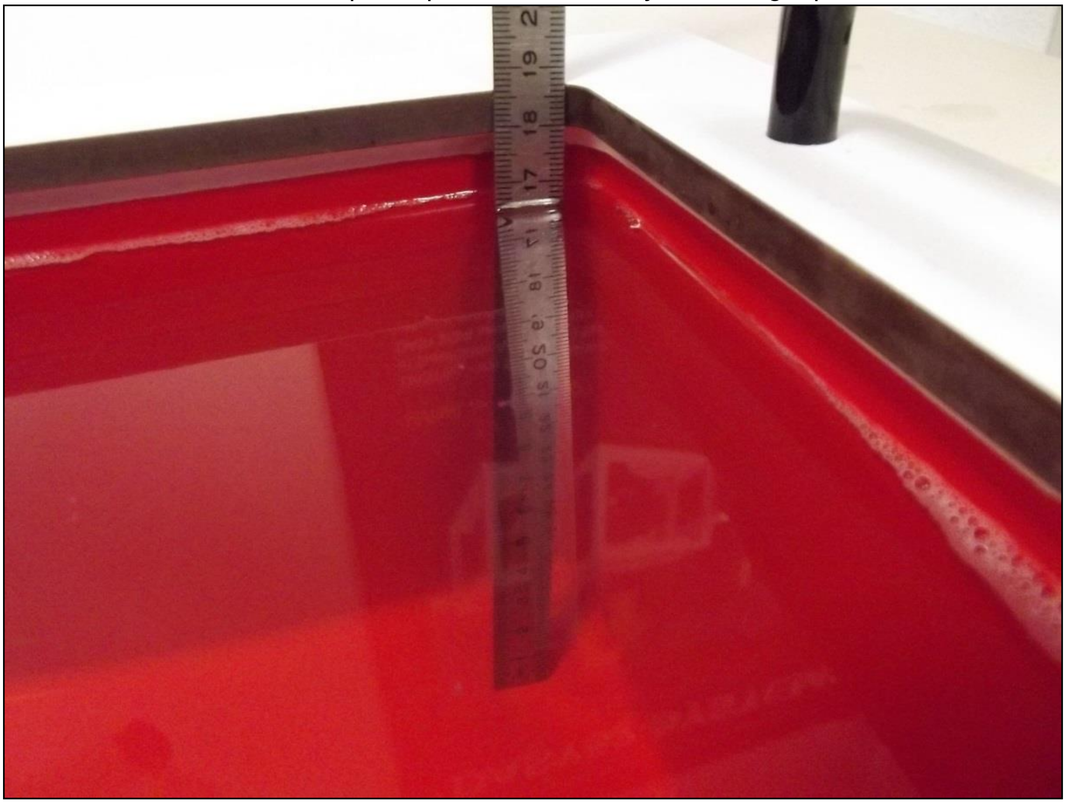


Photo 3: Liquid depth 2450 MHz body simulating liquid



Annex C: Photo documentation

Photo documentation is described in the additional document:

Appendix to test report no. 1-2648/16-01-07-A Photo documentation

Annex D: Calibration parameters

Calibration parameters are described in the additional document:

Appendix to test report no. 1-2648/16-01-07-A
Calibration data, Phantom certificate
and detail information of the DASY5 System

Annex E: RF Technical Brief Cover Sheet acc. to RSS-102 Annex A

1. COMPANY NUMBER: **2586D**

2. PRODUCT MARKETING NAME (PNM): Move/Series

3. HARDWARE VERSION IDENTIFICATION NO. (HVIN): Move/5000 CL/3G/WiFi/BT; Move/3500 CL/3G/WiFi/BT

4. FIRMWARE VERSION IDENTIFICATION NO. (FVIN): ---

5. HOST MARKETING NAME (HMN): ---

6. IC CERTIFICATION NUMBER: 2586D-M50CL3GWIBT

7. APPLICANT: **Ingenico Group**

8. SAR/RF EXPOSURE TEST LABORATORY: **CTC advanced GmbH**

9. TYPE OF EVALUATION:

(a) SAR Evaluation: **Device is not Used in the Vicinity of the Human Head**

(b) SAR Evaluation: **No Body-Worn Device**

(c) SAR_{10g} Evaluation: **Limb-Worn Device**

- Multiple transmitters: Yes ☒ No ☐
- Evaluated against exposure limits: General Public Use ☒ Controlled Use ☐
- Duty cycle used in evaluation: 50 %
- Standard used for evaluation:

Test Standard	Version	FCC KDBs	Version
IEEE 1528-2013 RSS-102 Issue 5 Canada's Safety Code No. 6 IEEE Std. C95-3 IEEE Std. C95-1 IEC 62209-2	2014-06 2015-04 2015-03 2002 2005 2010	KDB 865664D01v01r03 KDB 447498D01v05r02 KDB 648474D04v01r02 KDB 941225D01v03 KDB 248227D01v02r01	February 7, 2014 February 7, 2014 December 4, 2013 October 16, 2014 June 8, 2015

- SAR_{10g} value: **0.754 W/kg**. Measured ☒ Computed ☐ Calculated ☐

Annex E.1: Declaration of RF Exposure Compliance Annex B

ATTESTATION: I attest that the information provided in Annex E: is correct; that a Technical Brief was prepared and the information it contains is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed and that the device meets the SAR and/or RF exposure limits of RSS-102.

Signature:

cn=Alexander Hnatovskiy, o=CTC advanced GmbH, ou=HNA-161129, email=Alexander.Hnatovskiy@ctcadvanced.com, c=DE
2017.04.10 11:12:57 +02'00'

NAME: **Alexander Hnatovskiy**

TITLE: Dipl.-Ing. (FH)

COMPANY: CTC advanced GmbH

PRODUCT MARKETING NAME (PMN): Move/Series

HARDWARE VERSION IDENTIFICATION NO. (HVIN): Move/5000 CL/3G/WiFi/BT; Move/3500 CL/3G/WiFi/BT

FIRMWARE VERSION IDENTIFICATION NO. (FVIN): ---

HOST MARKETING NAME (HMN): ---

IC CERTIFICATION NUMBER: 2586D-M50CL3GWIBT

Annex F: Document History

Version	Applied Changes	Date of Release
	Initial Release	2017-03-22
-A	Summary Table changed on page 8.	2017-04-10

Annex G: Further Information

Glossary

DTS	-	Distributed Transmission System
DUT	-	Device under Test
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
PCE	-	Personal Consumption Expenditure
OET	-	Office of Engineering and Technology
SAR	-	Specific Absorption Rate
S/N	-	Serial Number
SW	-	Software
UNII	-	Unlicensed National Information Infrastructure