SAR TEST REPORT

for

Razer Inc.

Notebook PC

Model No.: RZ09-0239

FCC ID: RWO-RZ090239

The MAX SAR(1g)	
Body SAR	0.797W/Kg

Prepared for : Razer Inc.
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Report No. : 4788146393

Date of Test : Sep.08, 2017

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SAR TEST REPORT

Applicant : Razer Inc.

Manufacturer : Razer Inc.

Product : Notebook PC

(A) Model No. : RZ09-0239

(B) Serial No. : N/A

(C) Test Voltage : AC 120V/60Hz

Measurement Standard Used:

· FCC 47 CFR Part 2 (2.1093)
· IEEE C95.1-1999
· IEEE 1528-2013
· FCC OET Bulletin 65 Supplement C (Edition 01-01)
· FCC KDB 447498 D01 v06
· FCC KDB 248227 D01 v02r02
· FCC KDB 616217 D04 v01r02
· FCC KDB 865664 D01/D02

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Date of Test : Sep.08, 2017 Report of date: Sep.21, 2017

Prepared by : James Qin / Engineer Reviewed by : Shawn Wen/ Laboratory Leader

Approved & Authorized Signer : Stephen Guo / Laboratory Manager

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Product Name	:	Notebook PC
Model No.	:	RZ09-0239
Radio	:	IEEE802.11 a/b/g/n/ac; Bluetooth V3.0+EDR; Bluetooth V4.1
Operation Frequency	:	IEEE 802.11a: 5180MHz—5240MHz; 5260MHz—5320MHz 5500MHz—5700MHz; 5745MHz—5825MHz IEEE 802.11ac VHT20: 5180MHz—5240MHz; 5260MHz—5320MHz 5500MHz—5700MHz; 5745MHz—5825MHz IEEE 802.11ac VHT40: 5190MHz—5230MHz; 5270MHz—5310MHz 5510MHz—5670MHz; 5755MHz—5795MHz IEEE 802.11ac VHT80: 5210MHz, 5290MHz; 5530MHz—5690MHz; 5775MHz IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE802.11nHT20: 2412MHz—2462MHz; 5180MHz—5240MHz; 5260MHz—5320MHz 5500MHz—5700MHz; 5745MHz—5825MHz IEEE802.11nHT40: 2422MHz—2452MHz; 5190MHz—5230MHz; 5270MHz—5310MHz 5510MHz—5670MHz; 5755MHz—5795MHz Bluetooth : 2402-2480MHz
Modulation Technology	:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11a/g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac VHT20, VHT40, VHT80: OFDM(16QAM, 64QAM, 256QAM, QPSK, BPSK) IEEE 802.11n HT20, HT40: OFDM (64QAM, 16QAM,QPSK,BPSK) Bluetooth V3.0+EDR: GFSK, π/4DQPSK,8-DPSK Bluetooth V4.1:GFSK

Antenna Gain	Assembly	: Antenna Type: PIFA Bluetooth: 1.89dBi WIFI 2.4GHz:ANT 0: 1.89dBi; ANT 1: 3.08dBi WIFI 5GHz: Band 1: ANT 0: 2.91dBi; ANT 1: 2.96dBi Band 2: ANT 0: 3.08dBi; ANT 1: 2.96dBi Band 3: ANT 0: 1.61dBi; ANT 1: 2.99dBi Band 4: ANT 0: 3.16dBi; ANT 1: 2.88dBi
Applicant		: Razer Inc. 201 3rd Street, Suite 900, San Francisco, CA 94103
Manufacturer		: Razer Inc. 201 3rd Street, Suite 900, San Francisco, CA 94103
Factory		: BYD Precision Manufacture Co., Ltd No.3001, Bao He Road, Baolong Industrial, Longgang Street, Longgang Zone, Shenzhen, 518116, P.R., China
Power Adaptor		: Manufacturer: Razer Inc. M/N: RC30-0239 Input: 100-240Vac; 50/60Hz, 2.0A Output: 20V; 3.25A DC Cable: Shielded, Undetachable, 2.0m
Power Cable		: Unshielded, Detachable, 1.0m
Date of Test		: Sep.08, 2017
Date of Receipt		: Aug.28, 2017

2. GENERAL DESCRIPTION

2.1. Product Description For EUT

[None]

2.2. Applied Standards

The Specific Absorption Rate (SAR) testing specification, method and procedure for this device is in accordance with the following standards:

· FCC 47 CFR Part 2 (2.1093)
· IEEE C95.1-1999
· IEEE 1528-2013
· FCC OET Bulletin 65 Supplement C (Edition 01-01)
· FCC KDB 447498 D01 v06
· FCC KDB 248227 D01 v02r02
· FCC KDB 616217 D04 v01r02
· FCC KDB 865664 D01/D02

2.3. Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

2.4. Test Conditions

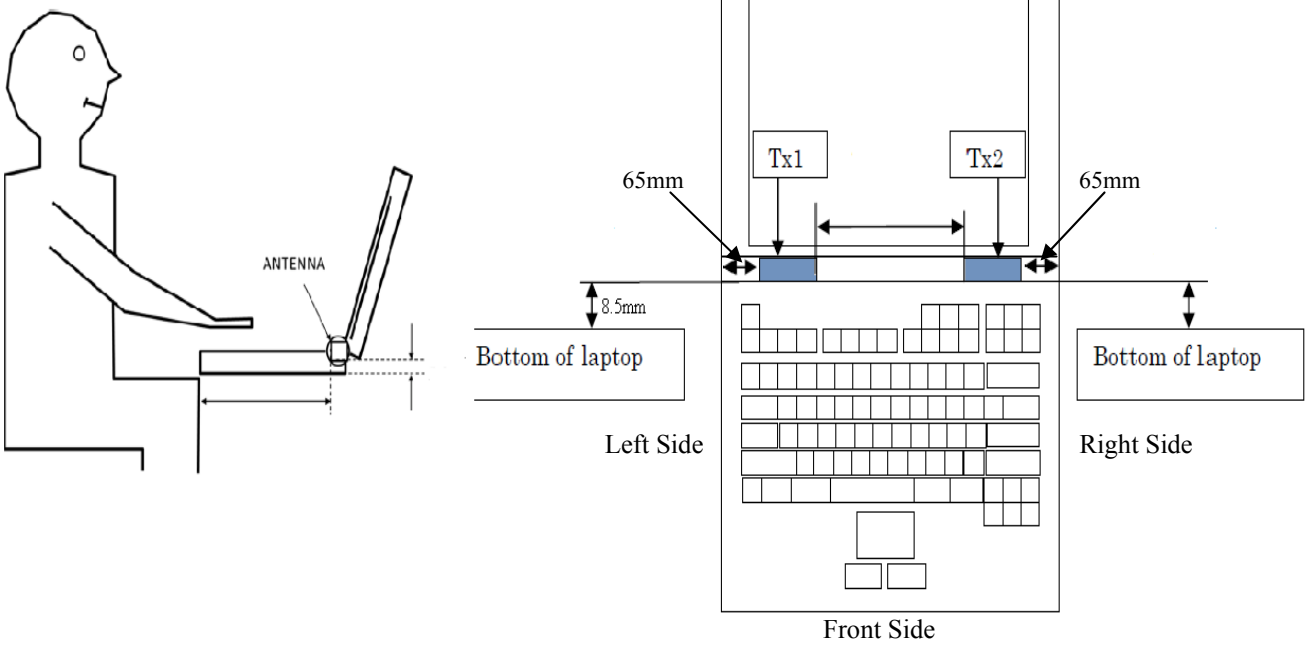
2.4.1. **Ambient Condition**

Ambient Temperature	20 to 24 ℃
Humidity	< 60 %

2.4.2. **Test Configuration**

The distance between the EUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30dB smaller than the output power of EUT. The EUT was set from the emulator to radiate maximum output power during all tests.

2.5. Exposure Positions Consideration



WiFi Antenna	802.11 a/b/g/nHT20/nHT40/acVHT20/ acVHT40/acVHT80

Note:

1. The distance from the WLAN antenna to the top surface is 4.7mm.
2. The diagonal of the screen is larger than 20cm.

Sides for Body SAR tests Test distance: 0 mm						
Band	Screen Back	Front	Top	Bottom	Right	Left
WLAN 2.4GHz	✓	X	X	✓	X	X
WLAN 5GHz	✓	X	X	✓	X	X

Note:

1. Per KDB447498 Appendix B, The side which has a distance to the WLAN antenna is more than 60mm can be exclude from SAR evaluation.

At test separation distance 60mm:

Frequency (MHz)	SAR test exclusion threshold	Max Output power(dBm)	Sides more than 60mm distance from Antenna can be Excused ?
2450	196mW(22.9dBm)	15.91	Yes
5200	166mW(22.2dBm)	15.38	Yes
5400	165mW(22.17dBm)	15.21	Yes
5800	162mW(22.10dBm)	15.10	Yes

2.6. Standalone SAR Test Exclusion Considerations

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied. The 1-g SAR test exclusion threshold 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, 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

According to the KDB447498 appendix A, the SAR test exclusion threshold for 2450MHz at 5mm test separation distances is 10 mW,5.2GHz is 7 mW, 5.4GHz and 5.8GHz is 6mW

Appendix A

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table.

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

Standalone SAR test exclusion considerations

Band/Mode	F(GHz)	SAR test exclusion threshold (mW)	RF output power		SAR test exclusion
			dBm	mW	
Bluetooth	2.441	10	2.71	1.87	YES
2.4GHz WLAN	2.45	10	15.91	38.99	NO
5.2GHz WLAN	5.2&5.3	7	15.38	34.51	NO
5.5GHz WLAN	5.5	6	15.21	33.19	NO
5.8GHz WLAN	5.8	6	15.10	32.36	NO

2.7. EUT Configuration and operation conditions for test.

(EUT: Notebook PC)

2.8. Test Equipments

Name of equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
ENA Network Analyzer	Keysight	E5080A	MY55100583	February 12, 2018
Dielectric Probe kit	SPEAG	SM DAK 040 SA	1155	NCR
DC power supply	Keysight	E36103A	MY55350020	February 9, 2018
Signal Generator	Rohde & Schwarz	SME06	837633\001	May 16, 2018
BI-Directional Coupler	WERLATONE	C8060-102	3423	February 12, 2018
Peak and Average Power Sensor	Keysight	E9323A	MY55440013	February 12, 2018
Peak and Average Power Sensor	Keysight	E9323A	MY55420006	February 12, 2018
Dual Channel PK Power Meter	Keysight	N1912A	MY55416024	February 12, 2018
Amplifier	CORAD TECHNOLOGY LTD	AMF-4D-00400 600-50-30P	1983561	NCR
Dosimetric E-Field Probe	SPEAG	EX3DV4	7383	December 26, 2018
Data Acquisition Electronic	SPEAG	DAE3	427	December 08, 2018
Dipole Kit 2.45 GHz	SPEAG	D2450V2	977	January 13, 2018
Dipole Kit 5 GHz	SPEAG	D5GHzV2	1231	January 12, 2018
Software	SPEAG	DASY52	N/A	NCR
Thermometer	Control Company	4242	150709653	February 12, 2018
Thermometer	VICTOR	VC230	/	February 12, 2018
Note:NCR means no calibration required(calibrated with system).				

Note: Dipole antenna calibration interval is 3 year, annual check result to be follow (Refer to KDB 865664, Dipole calibration)

2.9. Laboratory Environment

Temperature	Min:20℃,Max.25℃
Relative humidity	Min. = 30%, Max. = 70%
Note: Ambient noise is checked and found very low and in compliance with requirement of standards.	

2.10. Measurement Uncertainty

Test Item	Uncertainty
Uncertainty for SAR test	1g: 21.14
	10g: 20.64
Uncertainty for test site temperature and humidity	0.6℃

Source	Type	Uncertainly Value (%)	Probability Distribution	K	C1(1g)	C1(10g)	Standard uncertainty ui(%)1g	Standard uncertainty ui(%)10g	Degree of freedom Veff or Vi
Measurement system repetivity	A	0.5	N	1		1	0.5	0.5	9
Probe calibration	B	5.9	N	1	1	1	5.9	5.9	∞
Isotropy	B	4.7	R	√3	1	1	2.7	2.7	∞
Linearity	B	4.7	R	√3	1	1	2.7	2.7	∞
Probe modulation response	B	0	R	√3	1	1	0	0	∞
Detection limits	B	1.0	R	√3	1	1	0.6	0.6	∞
Boundary effect	B	1.9	R	√3	1	1	1.1	1.1	∞
Readout electronics	B	1.0	N	1	1	1	1.0	1.0	∞
Response time	B	0	R	√3	1	1	0	0	∞
Integration time	B	4.32	R	√3	1	1	2.5	2.5	∞
RF ambient conditions – noise	B	0	R	√3	1	1	0	0	∞
RF ambient conditions – reflections	B	3	R	√3	1	1	1.73	1.73	∞
Probe positioner mech. restrictions	B	0.4	R	√3	1	1	0.2	0.2	∞
Probe positioning with respect to phantom shell	B	2.9	R	√3	1	1	1.7	1.7	∞
Post-processing	B	0	R	√3	1	1	0	0	∞
Test sample related									
Device holder uncertainty	A	2.94	N	1	1	1	2.94	2.94	M-1
Test sample positioning	A	4.1	N	1	1	1	4.1	4.1	M-1
Power scaling	B	5.0	R	√3	1	1	2.9	2.9	∞
Drift of output power (measured SAR drift)	B	5.0	R	√3	1	1	2.9	2.9	∞
Phantom and set-up									
Phantom uncertainty (shape and thickness tolerances)	B	4.0	R	√3	1	1	2.3	2.1	∞
Algorithm for correcting SAR for deviations in permittivity and conductivity	B	1.9	N	1	1	0,84	1,9	1,6	∞
Liquid conductivity (meas.)	A	0.55	N	1	0.78	0.71	0.24	0.21	M-1
Liquid permittivity (meas.)	A	0.19	N	1	0.23	0.26	0.09	0.06	M
Liquid permittivity – temperature uncertainty	A	5.0	R	√3	0,78	0,71	1.4	1.1	∞
Liquid conductivity – temperature uncertainty	A	5.0	R	√3	0.23	0,26	1.2	0.8	∞
Combined standard uncertainty	$u_c' = \sqrt{\sum_{i=1}^{25} c_i^2 u_i^2}$						**10.57**	**10.32**	
Expanded uncertainty (95 % conf. interval)	$u_e = 2u_c$		N		K=2		**21.14**	**20.64**	

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

Simulating Liquids for 5 GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	78
Mineral oil	11
Emulsifiers	9
Additives and Salt	2

3. MEASURE PROCEDURES

3.1. General description of test procedures

For the 802.11a/b/g SAR body tests, a communication link is set up with the test mode software for WIFI mode test. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate. Testing at higher data rates is not required when the maximum average output power is less than 0.25dB higher than those measured at the lowest data rate.

802.11b/g operating modes are tested independently according to the service requirements in each frequency band.802.11b/g modes are tested on channels1,6,11;however,if output power reduction is necessary for channels 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels must be tested instead.

SAR is not required for 802.11g channels when the maximum average output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels. When the maximum average output channel in each frequency band is not included in the “default test channels”, the maximum channel should be tested instead of an adjacent “default test channels”, these are referred to as the “required test channels” and are illustrated in table 1.

Please apply the following guidance for SAR testing:

1. Please use a 0 mm (touching) test separation distance on the flat phantom during SAR testing of this device. This separation distance is based on the guidance found in FCC KDB Publication 447498 D01, Section 5.2.3 3)
2. Please utilize a body tissue simulating liquid (TSL) of the appropriate frequency during SAR testing.
3. Please use the guidance found in FCC KDB Publication 447498 D01 to determine which sides of the device need to be tested for SAR.
4. FCC KDB Publication 248227 D01 should be used for selection of the WiFi channels, data rates, etc.

4. SAR MEASUREMENTS SYSTEM

4.1. SAR Measurement Set-up

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

(1) A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
(2) A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage It issue simulating liquid. The probe is equipped with an optical surface detector system.
(3) 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.
(4) A unit to operate the optical surface detector which is connected to the EOC.
(5) 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 DASY5 measurement server.
(6) The DASY5 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 2003.
(7) DASY5 software and SEMCAD data evaluation software.
(8) Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
(9) The generic twin phantom enabling the testing of left-hand and right-hand usage.
(10) The device holder for handheld mobile phones.
(11) Tissue simulating liquid mixed according to the given recipes.
(12) System validation dipoles allowing to validate the proper functioning of the system.

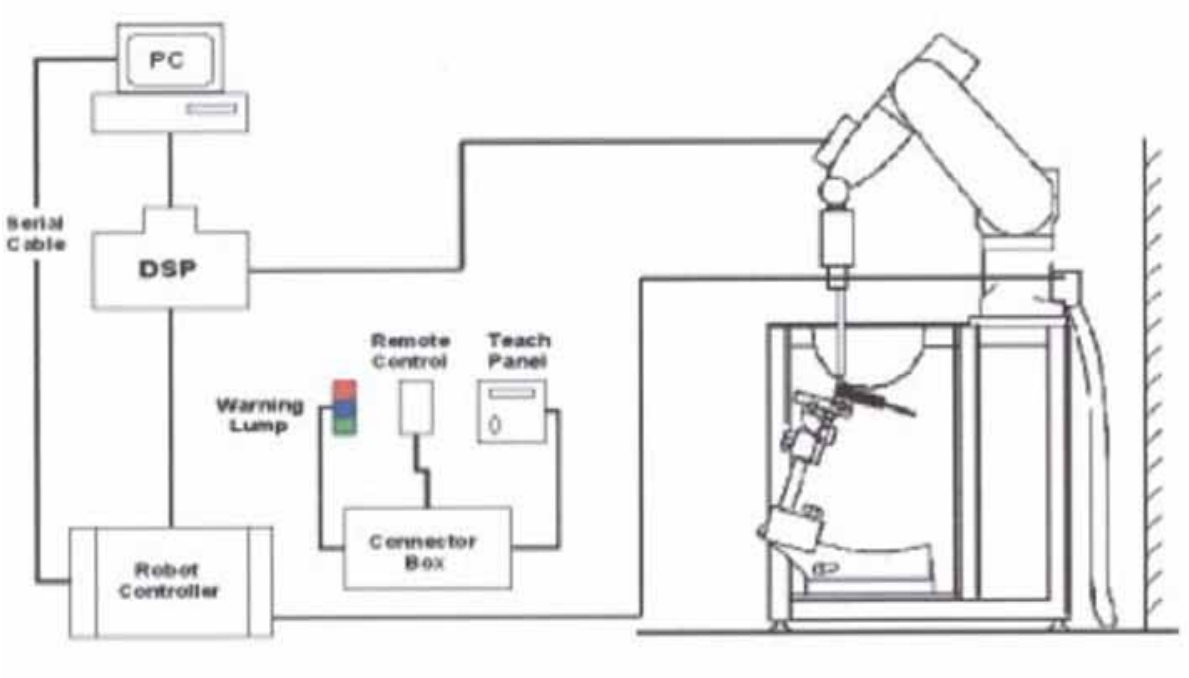


Figure 4.1 SAR Lab Test Measurement Set-up

4.2. ELI Phantom

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2.0 ± 0.2 mm (bottom plate)
Dimensions	Major axis: 600 mm Minor axis: 400 mm
Filling Volume	approx. 30 liters
Wooden Support	SPEAG standard phantom table

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.

Figure 6.2 Top View of Twin Phantom

A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters.

On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

The phantom can be used with the following tissue simulating liquids:

*Water-sugar based liquid
*Glycol based liquids

4.3. Device Holder for SAM Twin Phantom

The SAR in the Phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source in 5 mm distance, a positioning uncertainty of ±0.5mm would produce a SAR uncertainty of ± 20%. An accurate device position is therefore crucial for accurate and repeatable measurement. The position in which the devices must be measured, are defined by the standards.
The DASY5 device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (EPR).
Thus the device needs no repositioning when changing the angles.

The DASY5 device holder has been made out of low-loss POM material having the following dielectric parameters: relative permitti ε_r =3 and loss tange δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

Figure 4.3 Device Holder

4.4. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangul -ar configuration and optimized for dosimetric evaluation.

Figure 4.4 EX3DV4 E-field Probe

4.4.1. EX3DV4 Probe Specification

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available
Frequency	10 MHz to > 6 GHz 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: ± 0.2dB (noise: typically < 1 µW/g)
Dimensions	Overall length: PRS-T2 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
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%.

4.5. E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ±10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\mathbf{SAR} = \mathbf{C}\frac{\Delta T}{\Delta t}$$

Where: Δt = Exposure time (30 seconds),
C = Heat capacity of tissue (brain or muscle),
ΔT = Temperature increase due to RF exposure.
Or

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

Where:
σ = Simulated tissue conductivity,
ρ = Tissue density (kg/m3).

4.6. Scanning procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. 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 EUT’s output power and should vary max. ± 5 %.

The ”surface check“ measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles.

The difference between the optical surface detection and the actual surface depends on the Probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged.

After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

Zoom Scan

Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by 7x7x7 points within a cube whose base is centered around the maxima found in the preceding area scan.

Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY5 system allows evaluations that combine measured data and robot positions, such as:

- · maximum search
- · extrapolation
- · boundary correction
- · peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space.They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 7x7x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

5. DATA STORAGE AND EVALUATION

5.1. Data Storage

The DASY5 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 thedata evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4". 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.

5.2. 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	Normi, ai0, ai1, ai2
	- Conversion factor	ConvFi
	- Diode compression point	Dcpi
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	
	- Density	

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 DASY5 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:

$$Vi = Ui + Ui2 \cdot c\,f / d\,c\,pi$$

With ***Vi*** = compensated signal of channel i (i = x, y, z)

Ui = 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: ***Ei = (Vi / Normi · ConvF)1/2***

H-field probes: ***Hi = (Vi)1/2 · (ai0 + ai1 f + ai2f2) / f***

With ***Vi*** = compensated signal of channel i (i = x, y, z)

Normi = sensor sensitivity of channel i (i = x, y, z)

ConvF = sensitivity enhancement in solution

aij = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

Ei = electric field strength of channel i in V/m

Hi = magnetic field strength of channel i in A/m

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

Etot = (Ex2+ EY2+ Ez2)1/2

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

SAR = (Etot2·) / (· 1000) with

SAR = local specific absorption rate in mW/g

Etot = total field strength in V/m

= conductivity in [mho/m] or [Siemens/m]

= equivalent tissue density in g/cm3

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.

Ppwe = *Etot2 / 3770* or ***Ppwe = Htot2 · 37.7***

with ***Ppwe*** = equivalent power density of a plane wave in mW/cm2

Etot = total electric field strength in V/m

Htot = total magnetic field strength in A/m

6. SYSTEM CHECK

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulates were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulates, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the ANNEX A.

System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system (±10 %).

System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.

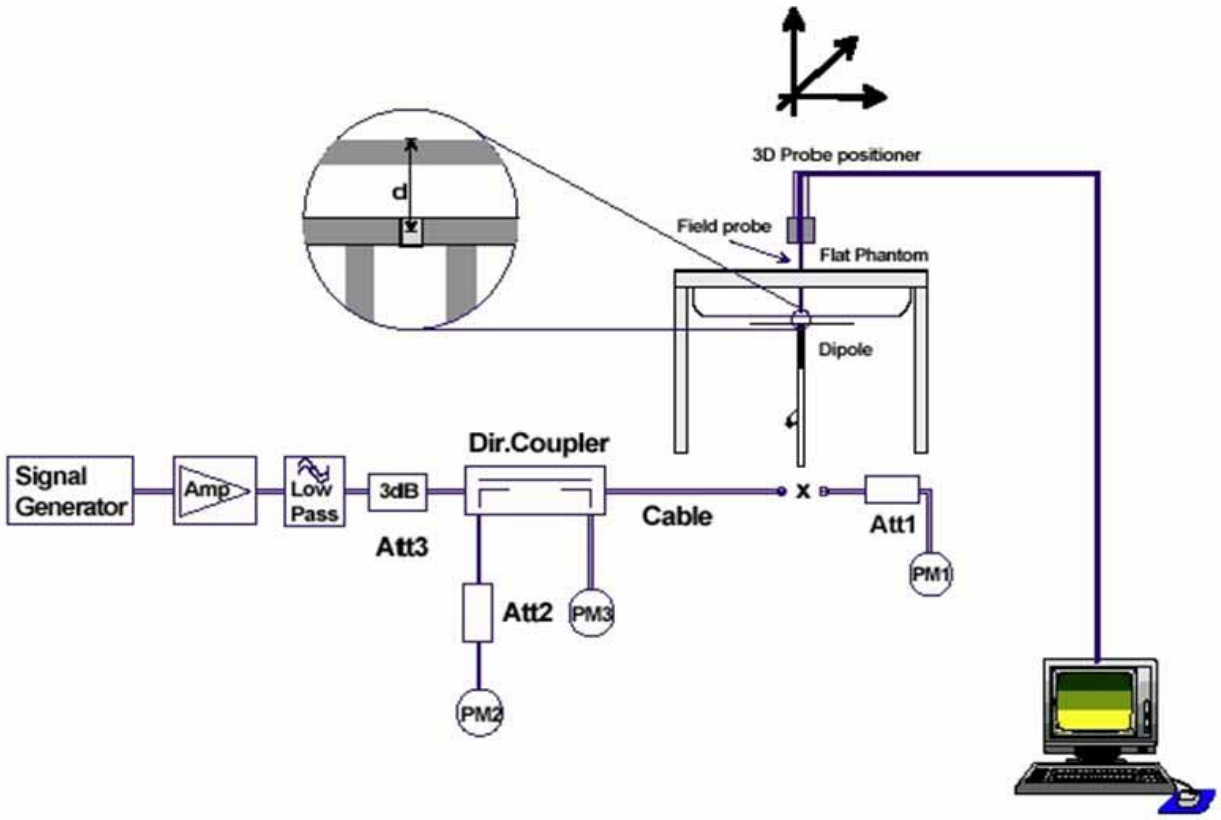


Figure 6.1: System Check Set-up

7. TEST RESULTS

7.1. Duty Cycle

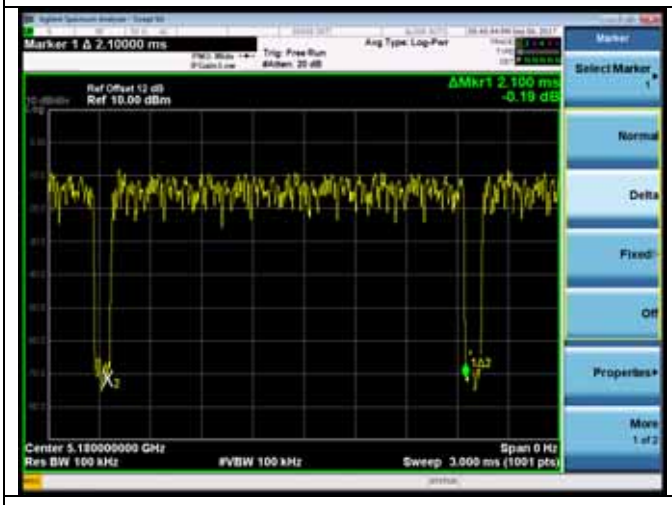
Duty Cycle	
2.4GHz	99.36%
5GHz Band 1	96.41%
5GHz Band 2	96.09%
5GHz Band 3	96.97%
5GHz Band 4	96.00%

Note: Please see the duty cycle test plot in next page.

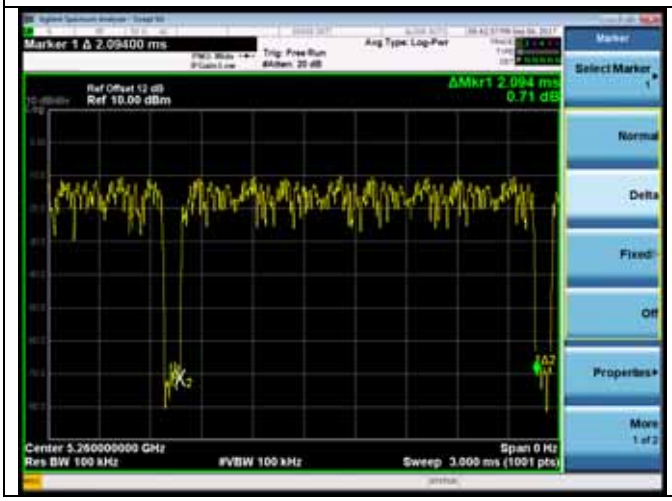
2.4GHz:

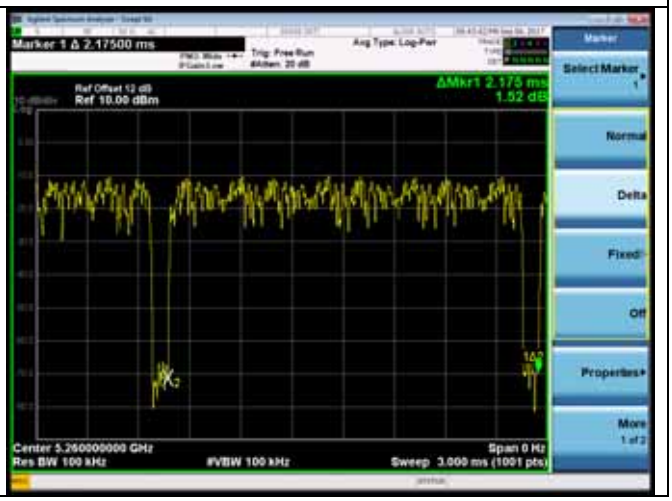
5GHz:

Band 1

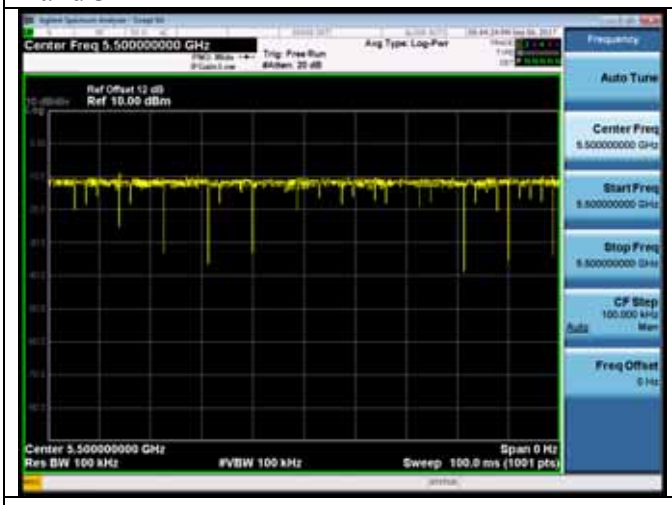


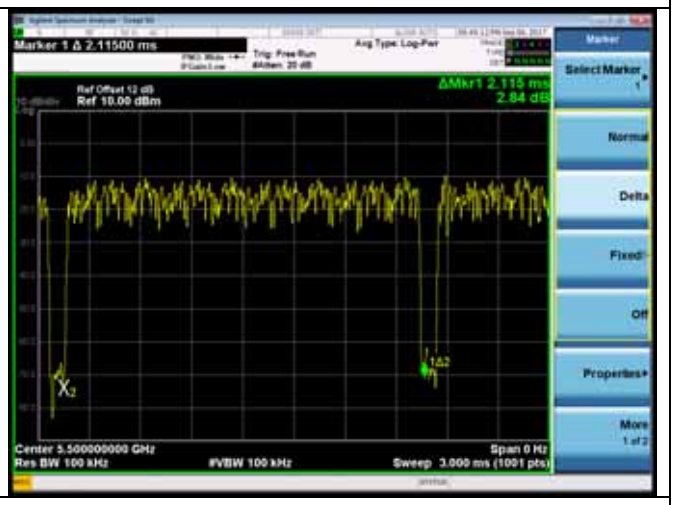
Band 2



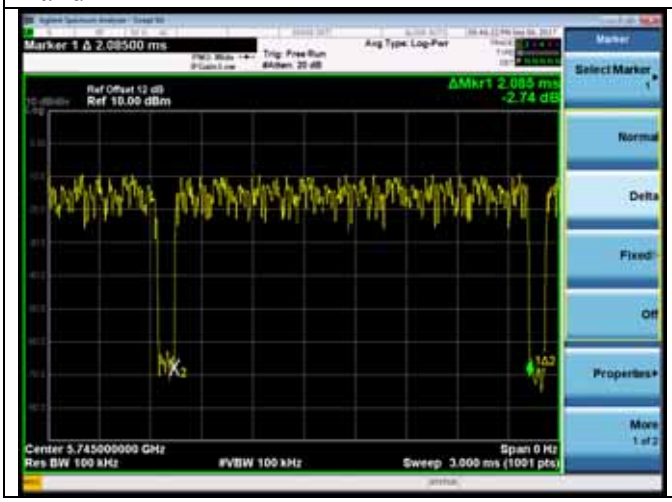


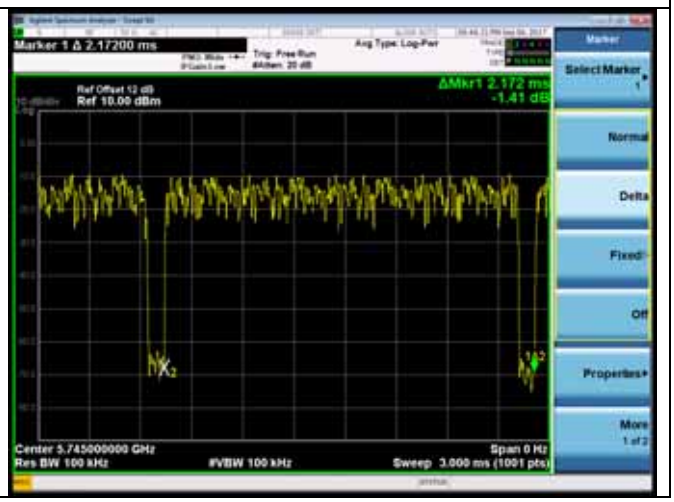
Band 3





Band 4





7.2. Output power

(BT 3.0)

Test Mode	Frequency (MHz)	Output Power (dBm)
GFSK	2402	2.10
	2441	2.14
	2480	2.09
8-DPSK	2402	2.71
	2441	2.34
	2480	2.42

(BT 4.1)

Test Mode	Frequency (MHz)	Output Power (dBm)
GFSK	2402	-1.274
	2440	-0.659
	2480	-0.567

(WIFI 2.4G)

Test Mode	CH	Output Power (dBm)	
		ANT 0	ANT 1
11b	CH1	15.91	14.96
	CH6	15.45	15.48
	CH11	15.64	15.83
11g	CH1	14.87	14.27
	CH6	14.45	14.56
	CH11	14.75	15.04
11n HT20	CH1	10.75	11.17
	CH6	10.13	11.76
	CH11	10.64	12.26
11n HT40	CH3	10.53	11.32
	CH6	10.02	11.48
	CH9	10.22	11.82

Notes:

1. Use the data rate with the maximum output level for the SAR test.
2. BT and WIFI can't transmit at same time.

(WIFI 5GHz)
Band 1

Test Mode	Frequency (MHz)	Output Power (dBm)	
		ANT 0	ANT 1
11a	5180	14.81	15.38
	5200	14.51	15.06
	5240	14.34	14.36
11n HT20	5180	10.80	11.24
	5200	10.53	10.89
	5240	10.19	10.40
11n HT40	5190	10.65	10.92
	5230	10.62	10.28
11ac VHT20	5180	8.55	8.98
	5200	8.18	8.74
	5240	8.26	8.25
11ac VHT40	5190	8.66	8.98
	5230	8.47	8.34
11ac VHT80	5210	8.47	9.05

Band 2

Test Mode	Frequency (MHz)	Output Power (dBm)	
		ANT 0	ANT 1
11a	5260	15.00	14.89
	5300	14.19	14.08
	5320	14.24	14.06
11n HT20	5260	10.89	11.01
	5300	10.38	10.38
	5320	10.44	10.37
11n HT40	5270	10.69	11.20
	5310	10.32	10.76
11ac VHT20	5260	8.52	8.95
	5300	8.40	8.31
	5320	8.45	8.44
11ac VHT40	5270	8.85	9.19
	5310	8.42	8.71
11ac VHT80	5290	8.58	8.95

Band 3

Test Mode	Frequency (MHz)	Output Power (dBm)	
		ANT 0	ANT 1
11a	5500	15.12	14.27
	5600	15.21	14.98
	5700	14.47	14.61
11n HT20	5500	10.54	10.30
	5600	10.87	10.91
	5700	10.86	10.81
11n HT40	5510	10.42	10.51
	5590	10.85	11.24
	5670	10.45	11.39
11ac VHT20	5500	8.57	8.40
	5600	8.92	8.99
	5700	8.57	8.90
11ac VHT40	5510	8.49	8.72
	5590	8.96	9.31
	5670	8.57	9.59
11ac VHT80	5530	8.69	8.85
	5610	8.90	9.47

Band 4

Test Mode	Frequency (MHz)	Output Power (dBm)	
		ANT 0	ANT 1
11a	5745	15.03	15.10
	5785	14.79	14.75
	5825	14.22	14.02
11n HT20	5745	10.49	11.15
	5785	10.17	10.59
	5825	9.56	9.91
11n HT40	5755	10.23	10.95
	5795	10.40	10.22
11ac VHT20	5745	8.56	8.74
	5785	8.26	8.15
	5825	7.63	7.48
11ac VHT40	5755	8.34	8.81
	5795	8.01	8.24
11ac VHT80	5775	8.27	8.78

Notes:

1. Use the data rate with the maximum output level for the SAR test.
2. BT and WIFI can't transmit at same time.

7.3. System Check for Body Tissue simulating liquid

Frequency	Description	SAR(W/kg) (±18.8% for 2450 MHz window) (±24.4% for 5250/5600/5750 MHz window)		Dielectric Parameters (±5% window)		Temp
		1g	10g	εr	σ(s/m)	℃
2450MH	Recommended value	12.9 10.47 — 15.33	5.94 4.83 — 6.45	52.7	1.95	/
	Measurement value 2017-09-08	12.5	5.84	52.327	1.99	22.01
5250MHz	Recommended value	7.62 5.76— 9.49	2.15 1.63 — 2.67	47.88	5.446	/
	Measurement value 2017-09-08	8.66	2.65	48.79	5.33	22.11
5600MHz	Recommended value	7.97 6.03 — 9.14	2.23 1.69— 2.77	47.31	5.798	/
	Measurement value 2017-09-08	8.25	2.49	48.71	5.68	22.07
5750MHz	Recommended value	7.48 5.65 — 9.31	2.11 1.60— 2.62	47.23	5.879	/
	Measurement value 2017-09-08	7	2.13	48.12	5.83	22.13

Note: Recommended Values used derive from the calibration certificate and 250 mW is used as feeding power to the calibrated dipole.

7.4. Test Results

WIFI 2.4G:
ANT 0:

Mode	Channel	Test Position	Output Power		Measured Results		Scaled-1		Scaled-Final		Power Drift (dBm)
			Max. Scaled AV Power (dBm)	Measured AV Power (dBm)	SAR1g (W/kg)	SAR10g (W/kg)	SAR1g (W/kg)	SAR10g (W/kg)	SAR1g (W/kg)	SAR10g (W/kg)	
11b	CH1	Screen Back	16.00	15.91	0.579	0.307	0.591	0.313	0.595	0.315	-0.06
		Bottom			0.711	0.490	0.726	0.500	0.731	0.503	0.13
Conclusion: PASS											
Note : Factor= Max. Scaled AV Power(W)/Measured Power(W) Scaled SAR-1= Measured SAR*Factor Scaled-Final= Scaled SAR-1*(1/Duty Cycle) The Max.Reported SAR : 0.731**W/kg for 1g SAR**											

ANT 1:

Mode	Channel	Test Position	Output Power		Measured Results		Scaled-1		Scaled-Final		Power Drift (dBm)
			Max. Scaled AV Power (dBm)	Measured AV Power (dBm)	SAR1g (W/kg)	SAR10g (W/kg)	SAR1g (W/kg)	SAR10g (W/kg)	SAR1g (W/kg)	SAR10g (W/kg)	
11b	CH11	Screen Back	16.00	15.83	0.737	0.392	0.766	0.408	0.771	0.410	-0.20
		Bottom			0.669	0.443	0.696	0.461	0.700	0.464	0.19
Conclusion: PASS											
Note : Factor= Max. Scaled AV Power(W)/Measured Power(W) Scaled SAR-1= Measured SAR*Factor Scaled-Final= Scaled SAR-1*(1/Duty Cycle) The Max.Reported SAR : 0.771**W/kg for 1g SAR**											

Notes:
1. The Max. Scaled AV power get from measured AV power base on the duty cycle.
2. For 11b, 11g, 11n HT20 mode, choose the channel which has the max output level for test, because the test result is less then 0.8W/kg and Max. Scaled SAR<1.2W/kg, so other channel can be excluded from SAR test.

WIFI 5G:
ANT 0:

Mode	Channel	Test Position	Output Power		Measured Results		Scaled-1		Scaled-Final		Power Drift (dBm)
			Max. Scaled AV Power (dBm)	Measured AV Power (dBm)	SAR1g (W/kg)	SAR10g (W/kg)	SAR1g (W/kg)	SAR10g (W/kg)	SAR1g (W/kg)	SAR10g (W/kg)	
11a	CH36	Screen Back	15.00	14.81	0.662	0.386	0.692	0.403	0.717	0.418	-0.09
		Bottom			0.632	0.359	0.660	0.375	0.685	0.389	0.12
	CH52	Screen Back	15.00	15.00	0.200	0.075	0.200	0.075	0.208	0.075	0.03
		Bottom			0.686	0.344	0.686	0.344	0.714	0.358	0.11
	CH60	Screen Back	14.50	14.19	0.576	0.222	0.619	0.238	0.644	0.248	0.17
		Bottom			0.657	0.390	0.706	0.419	0.734	0.436	0.14
	CH112	Screen Back	14.50	14.07	0.363	0.149	0.401	0.365	0.413	0.170	0.02
		Bottom			0.684	0.347	0.731	0.371	0.754	0.395	0.11
	CH120	Screen Back	15.50	15.21	0.345	0.137	0.369	0.146	0.380	0.151	0.13
		Bottom			0.708	0.260	0.757	0.278	0.781	0.287	0.04
	CH149	Screen Back	15.50	15.03	0.387	0.158	0.431	0.176	0.449	0.183	0.17
		Bottom			0.679	0.323	0.757	0.360	0.788	0.375	-0.17
	CH165	Screen Back	14.50	14.22	0.387	0.159	0.413	0.170	0.430	0.177	0.03
		Bottom			0.685	0.331	0.731	0.353	0.761	0.368	0.10
Conclusion: PASS											
Note : Factor= Max. Scaled AV Power(W)/Measured Power(W) Scaled SAR-1= Measured SAR*Factor Scaled-Final= Scaled SAR-1*(1/Duty Cycle) The Max.Reported SAR : 0.788**W/kg for 1g SAR**											

ANT 1:

Mode	Channel	Test Position	Output Power		Measured Results		Scaled-1		Scaled-Final		Power Drift (dBm)
			Max. Scaled AV Power (dBm)	Measured AV Power (dBm)	SAR1g (W/kg)	SAR10g (W/kg)	SAR1g (W/kg)	SAR10g (W/kg)	SAR1g (W/kg)	SAR10g (W/kg)	
11a	CH36	Screen Back	15.50	15.38	0.747	0.316	0.768	0.325	0.797	0.337	0.11
		Bottom			0.701	0.351	0.721	0.361	0.747	0.374	-0.07
	CH52	Screen Back	15.00	14.89	0.183	0.077	0.188	0.079	0.195	0.082	-0.13
		Bottom			0.460	0.147	0.472	0.151	0.491	0.157	0.05
	CH60	Screen Back	14.50	14.08	0.184	0.080	0.203	0.088	0.211	0.092	0.20
		Bottom			0.426	0.143	0.469	0.158	0.488	0.164	0.12
	CH112	Screen Back	14.50	14.05	0.308	0.152	0.342	0.169	0.352	0174	0.10
		Bottom			0.114	0.063	0.126	0.070	0.130	0.072	0.18
	CH120	Screen Back	15.00	14.98	0.289	0.128	0.290	0.129	0.299	0.133	0.13
		Bottom			0.361	0.212	0.363	0.213	0.374	0.220	0.17
	CH149	Screen Back	15.50	15.10	0.253	0.121	0.277	0.133	0.289	0.138	0.15
		Bottom			0.390	0.267	0.428	0.293	0.445	0.305	0.11
	CH165	Screen Back	14.50	14.02	0.248	0.122	0.277	0.136	0.289	0.142	0.14
		Bottom			0.417	0.280	0.466	0.313	0.485	0.326	-0.19
Conclusion: PASS											
Note : Factor= Max. Scaled AV Power(W)/Measured Power(W) Scaled SAR-1= Measured SAR*Factor Scaled-Final= Scaled SAR-1*(1/Duty Cycle) The Max.Reported SAR : 0.797**W/kg for 1g SAR**											

Notes:

1. The Max. Scaled AV power get from measured AV power base on the duty cycle.
2. 11a mode has the Max. output power can pare with other mode.
3. For 11a mode, choose the channel which has the max output level for test, because the test result is less then 0.8W/kg, so other channel can be excluded from SAR test.
4. The SAR Evaluation for simultaneously can be excluded since ANT0 Max. SAR+ ANT1 Max. SAR less than 1.6W/kg.

7.5. Dielectric Performance for Body Tissue simulating liquid

Frequency	Description	Dielectric Parameters (±5% window)		Temp
		εr	σ(s/m)	℃
2450MH	Recommended value	52.7	1.95	/
	Measurement value 2017-09-08	52.327	1.99	22.01
5250MHz	Recommended value	47.88	5.446	/
	Measurement value 2017-09-08	48.79	5.33	22.11
5600MHz	Recommended value	47.31	5.798	/
	Measurement value 2017-09-08	48.71	5.68	22.07
5750MHz	Recommended value	47.23	5.879	/
	Measurement value 2017-09-08	48.12	5.83	22.13

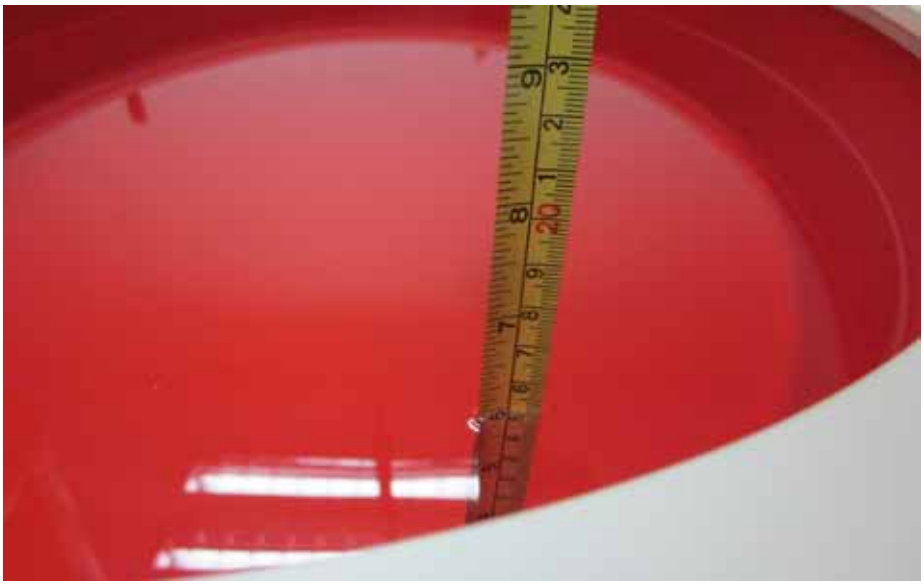


Figure 4.4: Liquid depth in the Flat Phantom

8. ANNEX A: SYSTEM CHECK RESULTS

Date/Time: 08/09/2017 15:40:17

CW 2450

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:977

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

Medium parameters used: f = 2450 MHz; σ = 1.99 S/m; ε_r = 52.327; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(7.35, 7.35, 7.35);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CW 2450MHz/Area Scan (61x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 16.6 W/kg

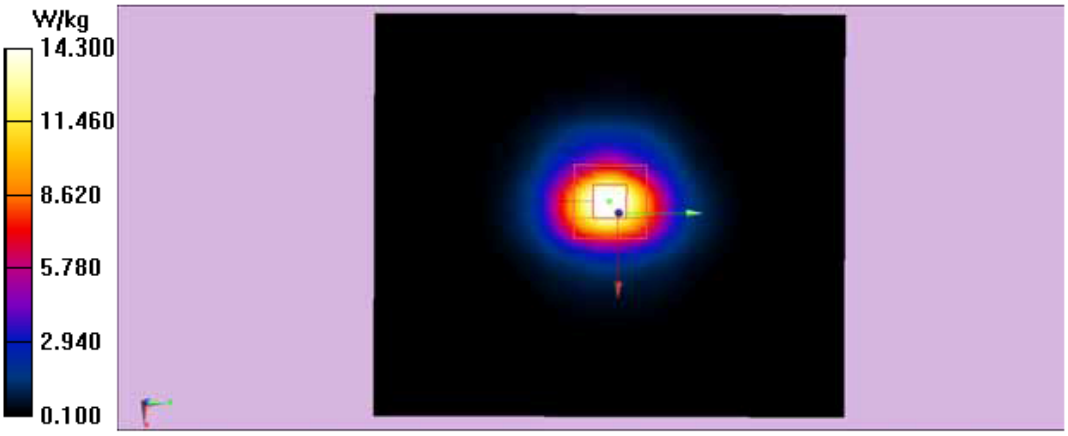
Configuration/CW 2450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 79.77 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 25.7 W/kg

SAR(1 g) = 12.5 W/kg; SAR(10 g) = 5.84 W/kg

Maximum value of SAR (measured) = 14.3 W/kg



Date/Time: 08/09/2017 11:34:36

CW 5250

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1231

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5250 MHz;Communication System PAR: 0 dB

Medium parameters used (interpolated): f = 5250 MHz; σ = 5.33 S/m; ε_r = 48.79; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.44, 5.44, 5.44);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CW 5250MHz/Area Scan (61x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 7.37 W/kg

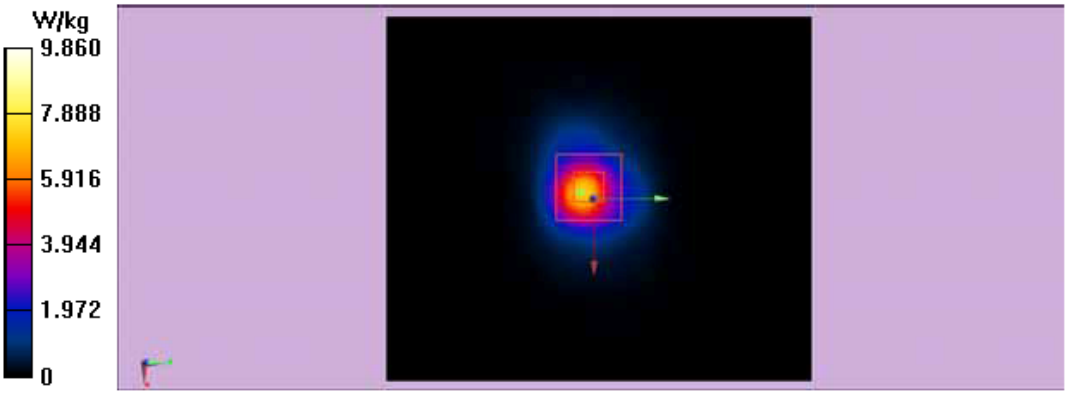
Configuration/CW 5250MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 42.21 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 27.9 W/kg

SAR(1 g) = 8.66 W/kg; SAR(10 g) = 2.65 W/kg

Maximum value of SAR (measured) = 9.86 W/kg



Date/Time: 08/09/2017 13:19:01

CW 5600

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1231

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5600 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5600 MHz; σ = 5.68 S/m; ε_r = 48.71; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.25, 4.25, 4.25);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CW 5600MHz/Area Scan (61x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 6.99 W/kg

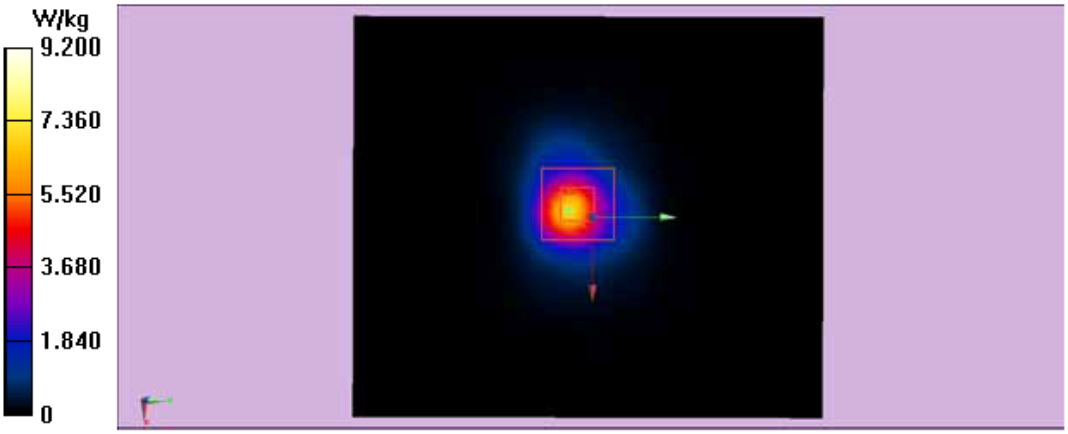
Configuration/CW 5600MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 37.57 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 27.7 W/kg

SAR(1 g) = 8.25 W/kg; SAR(10 g) = 2.49 W/kg

Maximum value of SAR (measured) = 9.20 W/kg



Date/Time: 08/09/2017 13:43:22

CW 5750

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1231

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5750 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5750 MHz; σ = 5.83 S/m; ε_r = 48.12; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.33, 4.33, 4.33);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CW 5750MHz/Area Scan (61x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 5.92 W/kg

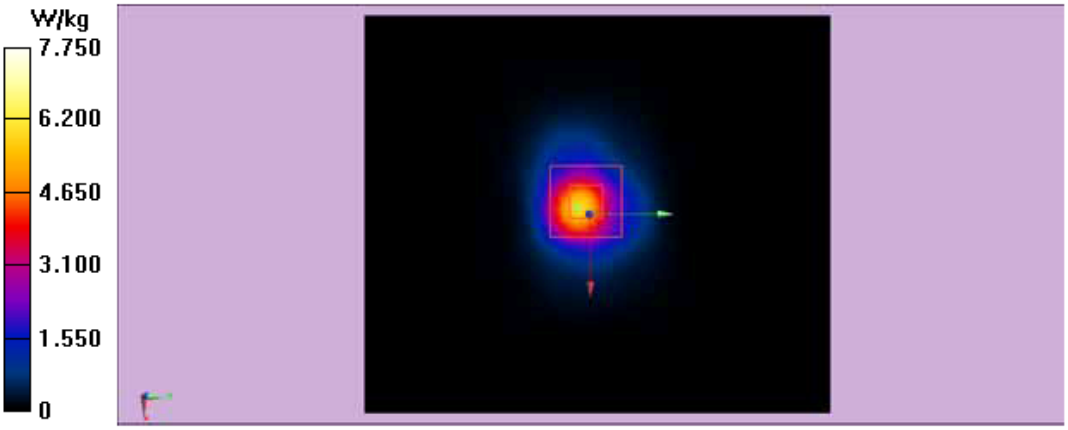
Configuration/CW 5750MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 33.99 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 23.9 W/kg

SAR(1 g) = 7 W/kg; SAR(10 g) = 2.13 W/kg

Maximum value of SAR (measured) = 7.75 W/kg



9. ANNEX B: GRAPH RESULTS WITH BANDS OF WATCH

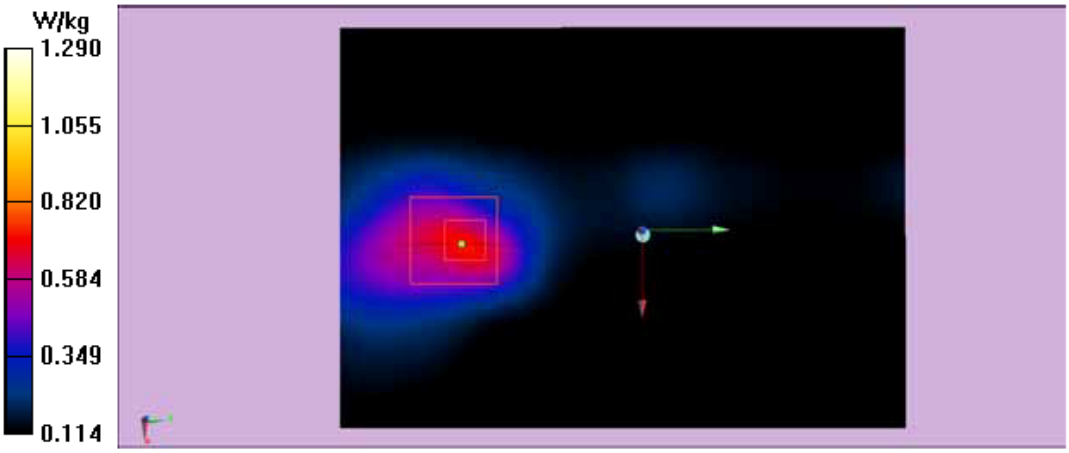
WIFI 2.4G
ANT 0:

Date: 07/09/2017

11b CH1(2412MHz Bottom)
EUT: Notebook M/N: RZ09-0239
Communication System: UID 0, IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps) (0);
Communication System Band: ISM 2.4GHz Band (2400.0-2483.5MHz); Frequency: 2412 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2412 MHz; σ = 1.931 S/m; ε_r = 56.485; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(7.35, 7.35, 7.35); Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH1(2412MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm
Maximum value of SAR (interpolated) = 0.729 W/kg
Configuration/CH1(2412MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.39 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 3.21 W/kg
SAR(1 g) = 0.711 W/kg; SAR(10 g) = 0.490 W/kg
Maximum value of SAR (measured) = 1.29 W/kg



Date: 07/09/2017

11b CH1(2412MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps) (0); Communication System Band: ISM 2.4GHz Band (2400.0-2483.5MHz); Frequency: 2412 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 2412 MHz; σ = 1.931 S/m; ε_r = 56.485; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(7.35, 7.35, 7.35); Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH1(2412MHz Screen Back)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.574 W/kg

Configuration/CH1(2412MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

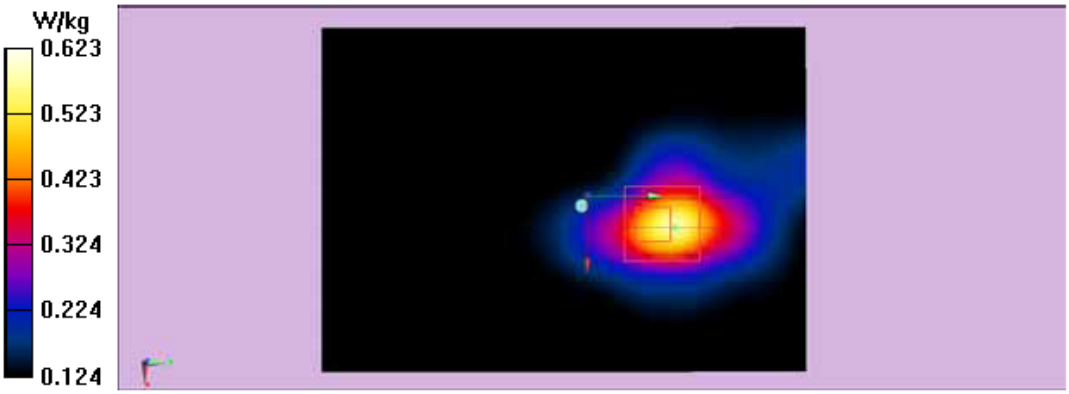
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.062 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.49 W/kg

SAR(1 g) = 0.579 W/kg; SAR(10 g) = 0.307 W/kg

Maximum value of SAR (measured) = 0.623 W/kg



WIFI 2.4G
ANT 1:

Date: 07/09/2017

11b CH11(2462MHz Bottom)

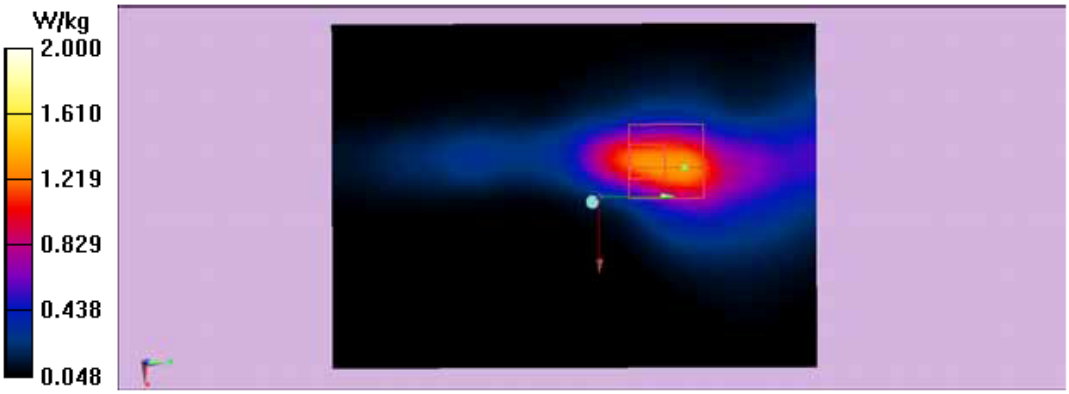
EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps) (0);
Communication System Band: ISM 2.4GHz Band (2400.0-2483.5MHz); Frequency: 2462 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 2462 MHz; σ = 2.01 S/m; ε_r = 56.306; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(7.35, 7.35, 7.35); Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH11(2462MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm
Maximum value of SAR (interpolated) = 1.33 W/kg

Configuration/CH11(2462MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.15 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 4.51 W/kg
SAR(1 g) = 0.669 W/kg; SAR(10 g) = 0.443 W/kg
Maximum value of SAR (measured) = 2.00 W/kg



Date: 07/09/2017

11b CH11(2462MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps) (0); Communication System Band: ISM 2.4GHz Band (2400.0-2483.5MHz); Frequency: 2462 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 2462 MHz; σ = 2.01 S/m; ε_r = 56.306; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(7.35, 7.35, 7.35); Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH11(2462MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.755 W/kg

Configuration/CH11(2462MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

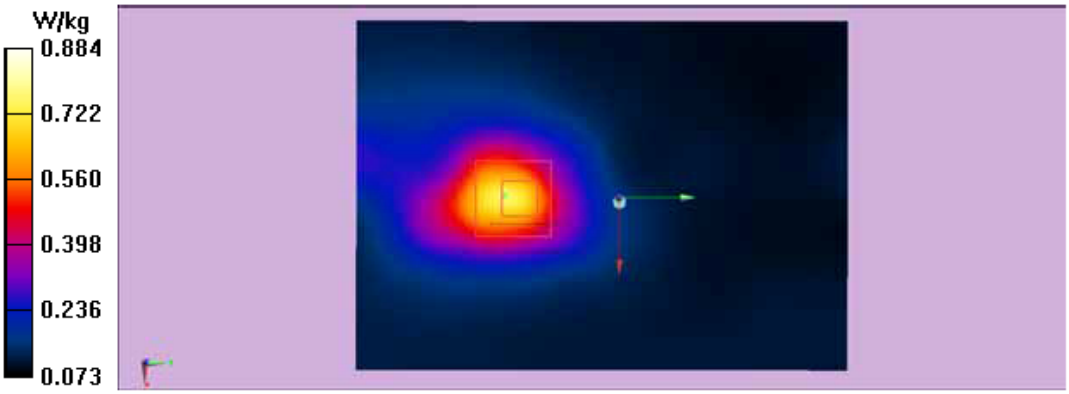
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.572 V/m; Power Drift = -0.20 dB

Peak SAR (extrapolated) = 2.24 W/kg

SAR(1 g) = 0.837 W/kg; SAR(10 g) = 0.392 W/kg

Maximum value of SAR (measured) = 0.884 W/kg



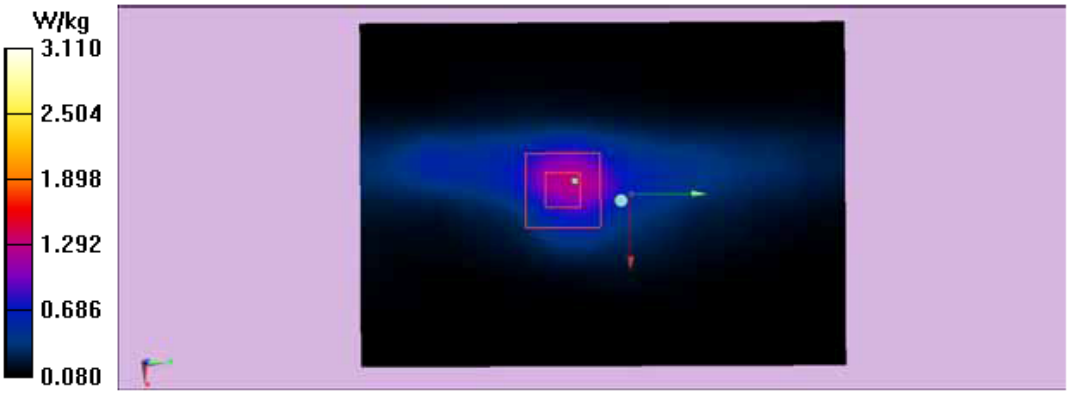
WIFI 5G
ANT 0:

Date: 08/09/2017

11a CH36(5180MHz Bottom)
EUT: Notebook M/N: RZ09-0239
Communication System: UID 0, IEEE 802.11a WiFi 5.2GHz (0); Communication System Band: IEEE 802.11a WiFi 5.2GHz; Frequency: 5180 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 5180 MHz; $\sigma = 4.896$ S/m; $\varepsilon_r = 47.26$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.44, 5.44, 5.44); Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH36(5180MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm
Maximum value of SAR (interpolated) = 1.29 W/kg
Configuration/CH36(5180MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.21 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 7.71 W/kg
SAR(1 g) = 0.632 W/kg; SAR(10 g) = 0.359 W/kg
Maximum value of SAR (measured) = 3.11 W/kg



Date: 08/09/2017

11a CH36(5180MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.2GHz (0); Communication System Band: IEEE 802.11a WiFi 5.2GHz; Frequency: 5180 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5180 MHz; $\sigma = 4.896$ S/m; $\varepsilon_r = 47.26$; $\rho = 1000$ kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.44, 5.44, 5.44); Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH36(5180MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 1.13 W/kg

Configuration/CH36(5180MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

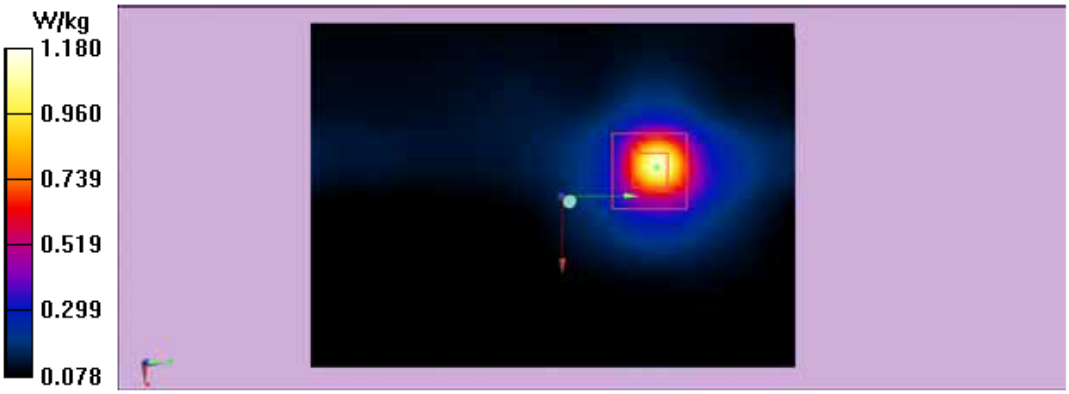
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.224 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 2.77 W/kg

SAR(1 g) = 0.662 W/kg; SAR(10 g) = 0.386 W/kg

Maximum value of SAR (measured) = 1.18 W/kg



Date: 08/09/2017

11a CH52(5260MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.3GHz (0); Communication System Band: IEEE 802.11a WiFi 5.3GHz ; Frequency: 5260 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5260 MHz; σ = 5.235 S/m; ε_r = 49.85; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.09, 5.09, 5.09);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH52(5260MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 1.42 W/kg

Configuration/CH52(5260MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

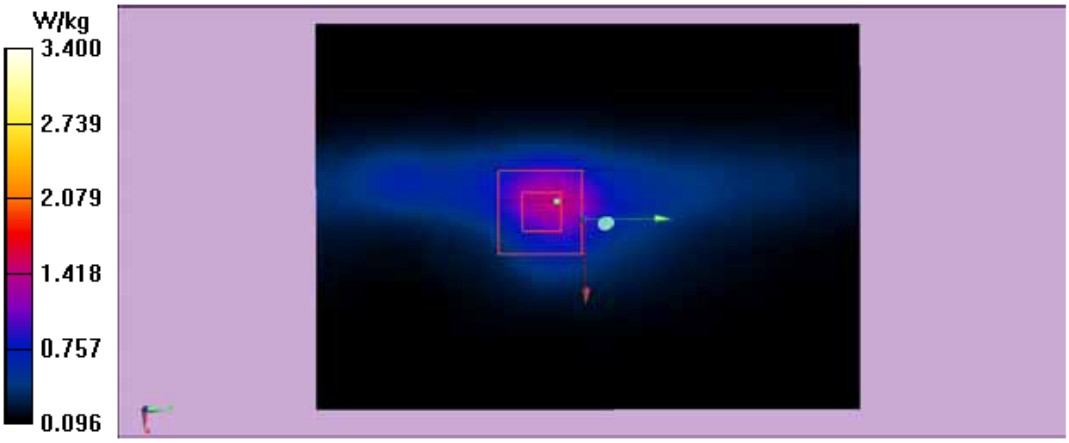
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.57 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 8.43 W/kg

SAR(1 g) = 0.686 W/kg; SAR(10 g) = 0.344 W/kg

Maximum value of SAR (measured) = 3.40 W/kg



Date: 08/09/2017

11a CH52(5260MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.3GHz (0); Communication System Band: IEEE 802.11a WiFi 5.3GHz ; Frequency: 5260 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5260 MHz; σ = 5.235 S/m; ε_r = 49.85; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.09, 5.09, 5.09);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH52(5260MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.196 W/kg

Configuration/CH52(5260MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

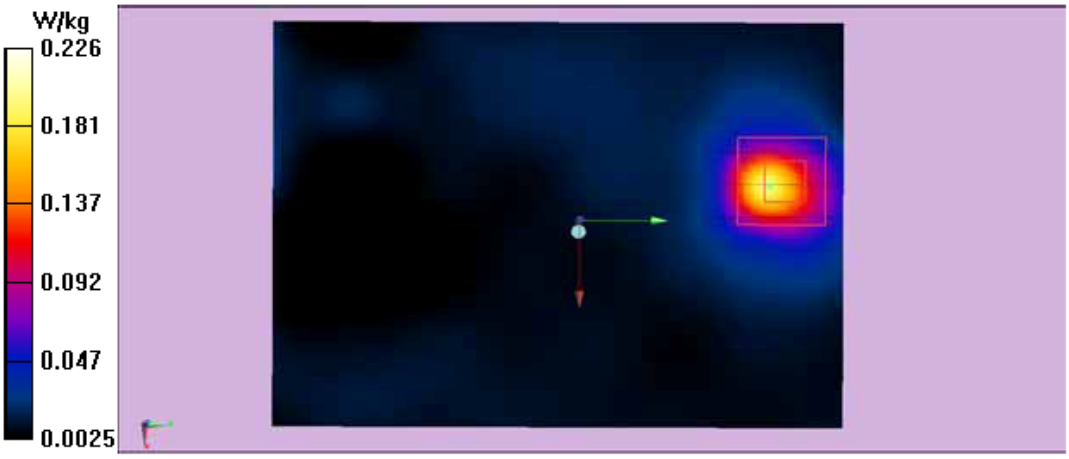
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.171 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.596 W/kg

SAR(1 g) = 0.200 W/kg; SAR(10 g) = 0.075 W/kg

Maximum value of SAR (measured) = 0.226 W/kg



Date: 08/09/2017

11a CH60(5300MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.3GHz (0); Communication System Band: IEEE 802.11a WiFi 5.3GHz ; Frequency: 5300 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5300 MHz; σ = 5.221 S/m; ε_r = 49.90; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.09, 5.09, 5.09);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH60(5300MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.663 W/kg

Configuration/CH60(5300MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

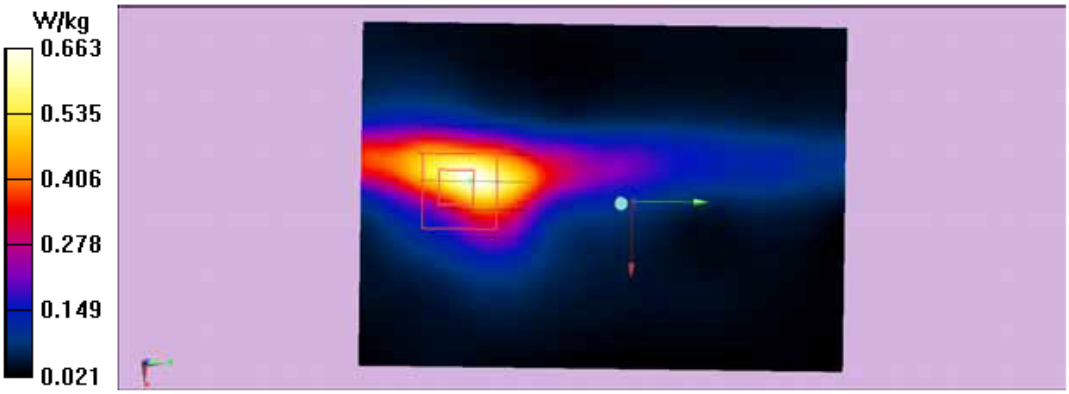
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.805 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 4.61 W/kg

SAR(1 g) = 0.657 W/kg; SAR(10 g) = 0.390 W/kg

Maximum value of SAR (measured) = 1.92 W/kg



Date: 08/09/2017

11a CH60(5300MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.3GHz (0); Communication System Band: IEEE 802.11a WiFi 5.3GHz ; Frequency: 5300 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5300 MHz; σ = 5.221 S/m; ε_r = 49.90; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.09, 5.09, 5.09);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH60(5300MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.513 W/kg

Configuration/CH60(5300MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

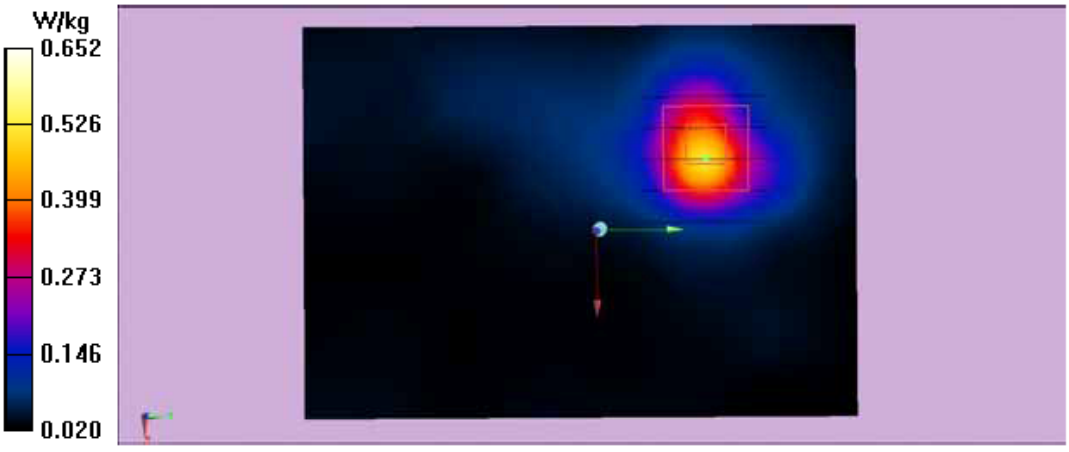
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.847 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 1.66 W/kg

SAR(1 g) = 0.576 W/kg; SAR(10 g) = 0.222 W/kg

Maximum value of SAR (measured) = 0.652 W/kg



Date: 15/09/2017

11a CH112(5560MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.5GHz (0); Communication System Band: IEEE 802.11a WiFi 5.5GHz; Frequency: 5560 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5560 MHz; σ = 5.301 S/m; ε_r = 49.71; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.25, 4.25, 4.25);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH112(5560MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 1.01 W/kg

Configuration/CH112(5560MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

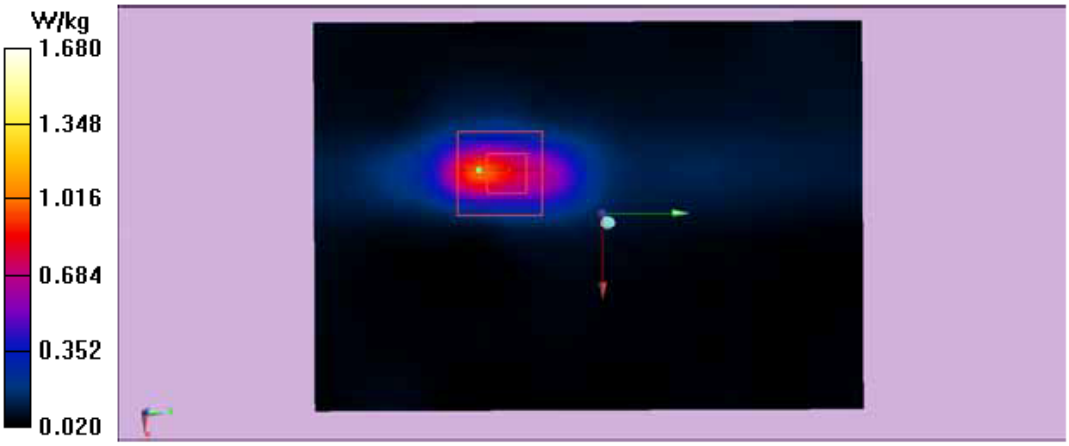
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.858 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 3.33 W/kg

SAR(1 g) = 0.714 W/kg; SAR(10 g) = 0.347 W/kg

Maximum value of SAR (measured) = 1.68 W/kg



Date: 15/09/2017

11a CH112(5560MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.5GHz (0); Communication System Band: IEEE 802.11a WiFi 5.5GHz; Frequency: 5560 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5560 MHz; σ = 5.301 S/m; ε_r = 49.71; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.25, 4.25, 4.25);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH112(5560MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.441 W/kg

Configuration/CH112(5560MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

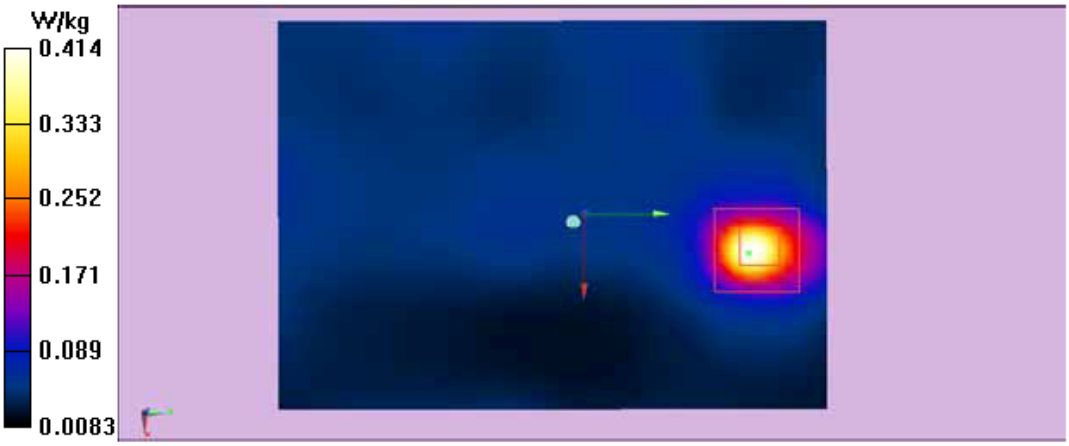
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.327 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.01 W/kg

SAR(1 g) = 0.363 W/kg; SAR(10 g) = 0.149 W/kg

Maximum value of SAR (measured) = 0.414 W/kg



Date: 15/09/2017

11a CH120(5600MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.5GHz (0); Communication System Band: IEEE 802.11a WiFi 5.5GHz; Frequency: 5600 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5600 MHz; σ = 5.350 S/m; ε_r = 49.65; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.25, 4.25, 4.25);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH120(5600MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.337 W/kg

Configuration/CH120(5600MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

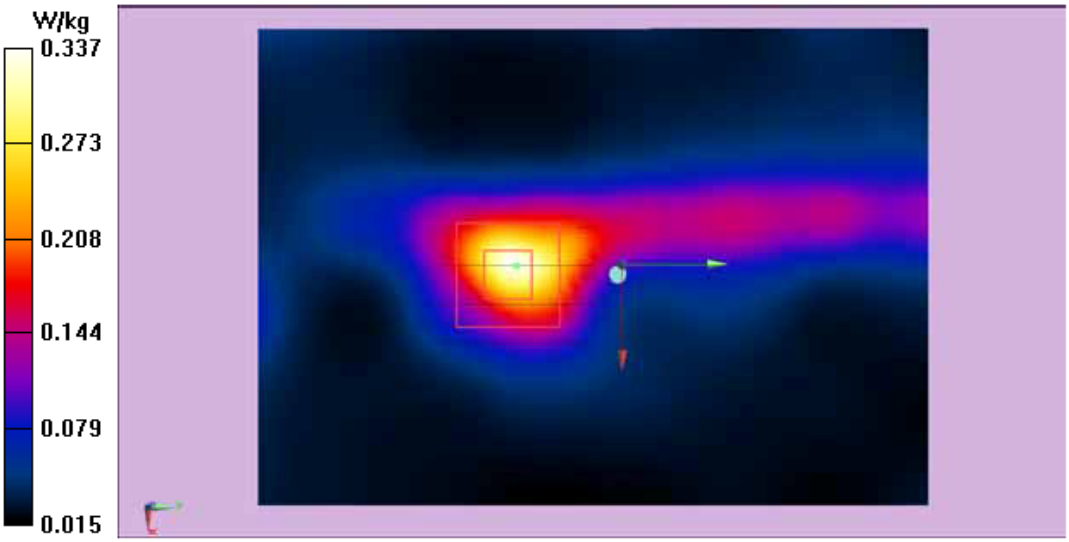
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.467 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 2.51 W/kg

SAR(1 g) = 0.728 W/kg; SAR(10 g) = 0.260 W/kg

Maximum value of SAR (measured) = 1.14 W/kg



Date: 15/09/2017

11a CH120(5600MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.5GHz (0); Communication System Band: IEEE 802.11a WiFi 5.5GHz; Frequency: 5600 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5600 MHz; σ = 5.350 S/m; ε_r = 49.65; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.25, 4.25, 4.25);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH120(5600MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.365 W/kg

Configuration/CH120(5600MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

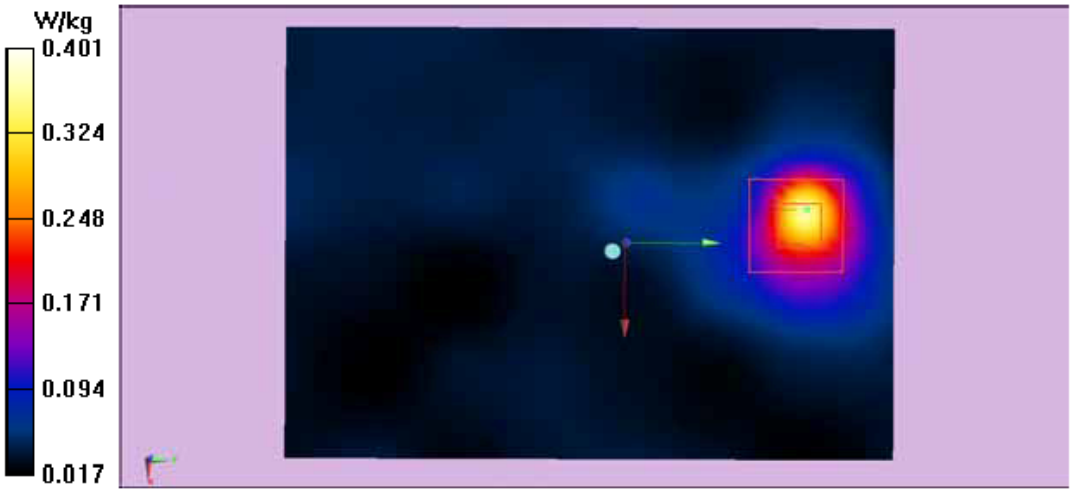
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.142 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.981 W/kg

SAR(1 g) = 0.345 W/kg; SAR(10 g) = 0.137 W/kg

Maximum value of SAR (measured) = 0.401 W/kg



Date: 16/09/2017

11a CH149(5745MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.8GHz (0); Communication System Band: IEEE 802.11a WiFi 5.8GHz ; Frequency: 5745 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5745 MHz; σ = 5.713 S/m; ε_r = 48.21; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.33, 4.33, 4.33);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH149(5745MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.419 W/kg

Configuration/CH149(5745MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

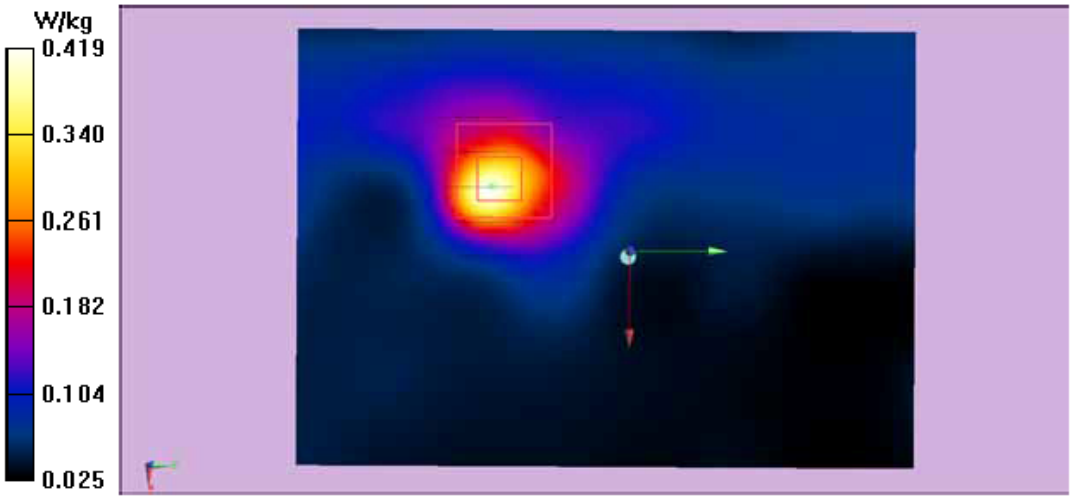
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.547 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 3.11 W/kg

SAR(1 g) = 0.703 W/kg; SAR(10 g) = 0.323 W/kg

Maximum value of SAR (measured) = 1.49 W/kg



Date: 16/09/2017

11a CH149(5745MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.8GHz (0); Communication System Band: IEEE 802.11a WiFi 5.8GHz ; Frequency: 5745 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5745 MHz; σ = 5.713 S/m; ε_r = 48.21; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.33, 4.33, 4.33);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH149(5745MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.457 W/kg

Configuration/CH149(5745MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

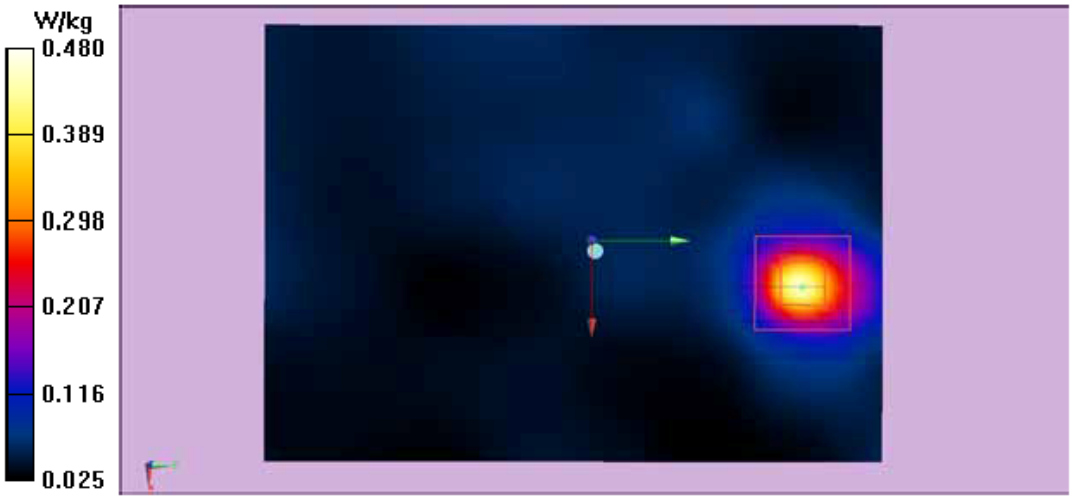
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.214 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.387 W/kg; SAR(10 g) = 0.158 W/kg

Maximum value of SAR (measured) = 0.480 W/kg



Date: 16/09/2017

11a CH165(5825MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.8GHz (0); Communication System Band: IEEE 802.11a WiFi 5.8GHz ; Frequency: 5825 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5825 MHz; σ = 6.102 S/m; ε_r = 47.81; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.33, 4.33, 4.33);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH165(5825MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.465 W/kg

Configuration/CH165(5825MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

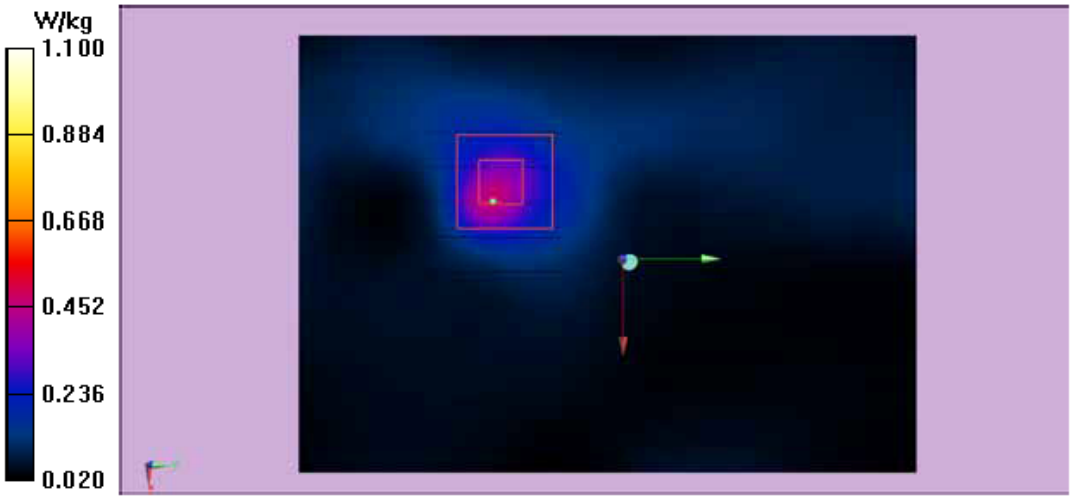
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.192 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 2.89 W/kg

SAR(1 g) = 0.685 W/kg; SAR(10 g) = 0.331 W/kg

Maximum value of SAR (measured) = 1.10 W/kg



Date: 16/09/2017

11a CH165(5825MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.8GHz (0); Communication System Band: IEEE 802.11a WiFi 5.8GHz ; Frequency: 5825 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5825 MHz; σ = 6.102 S/m; ε_r = 47.81; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.33, 4.33, 4.33);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH165(5825MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.394 W/kg

Configuration/CH165(5825MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

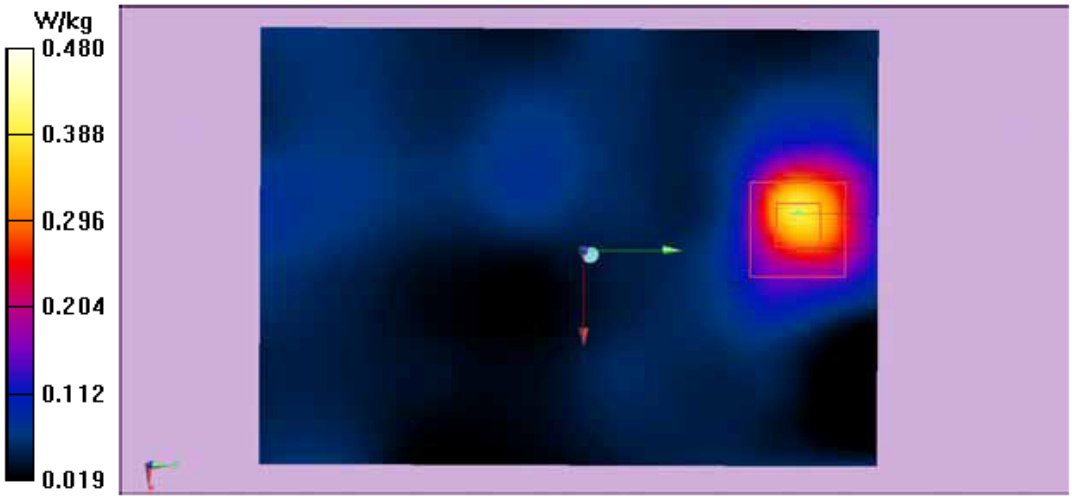
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.170 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.04 W/kg

SAR(1 g) = 0.387 W/kg; SAR(10 g) = 0.159 W/kg

Maximum value of SAR (measured) = 0.480 W/kg



WIFI 5G
ANT 1:

Date: 08/09/2017

11a CH36(5180MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.2GHz (0); Communication System Band: IEEE 802.11a WiFi 5.2GHz; Frequency: 5180 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5180 MHz; $\sigma = 4.896$ S/m; $\varepsilon_r = 47.26$; $\rho = 1000$ kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.44, 5.44, 5.44);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/CH36(5180MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 1.06 W/kg

Configuration/CH36(5180MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

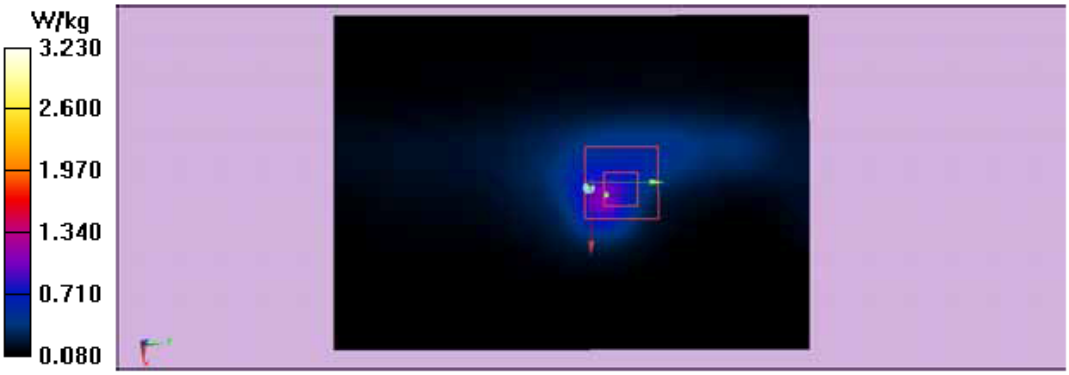
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.12 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 7.03 W/kg

SAR(1 g) = 0.701 W/kg; SAR(10 g) = 0.351 W/kg

Maximum value of SAR (measured) = 3.23 W/kg



Date: 08/09/2017

11a CH36(5180MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.2GHz (0); Communication System Band: IEEE 802.11a WiFi 5.2GHz; Frequency: 5180 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5180 MHz; $\sigma = 4.896$ S/m; $\varepsilon_r = 47.26$; $\rho = 1000$ kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.44, 5.44, 5.44);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH36(5180MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.812 W/kg

Configuration/CH36(5180MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

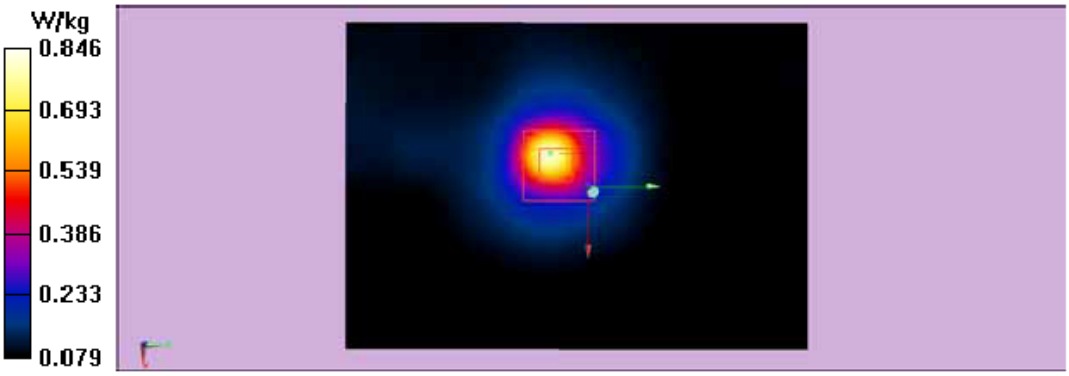
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.228 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 2.10 W/kg

SAR(1 g) = 0.747 W/kg; SAR(10 g) = 0.316 W/kg

Maximum value of SAR (measured) = 0.846 W/kg



Date: 08/09/2017

11a CH52(5260MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.3GHz (0); Communication System Band: IEEE 802.11a WiFi 5.3GHz ; Frequency: 5260 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5260 MHz; σ = 5.235 S/m; ε_r = 49.85; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.09, 5.09, 5.09);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH52(5260MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.142 W/kg

Configuration/CH52(5260MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

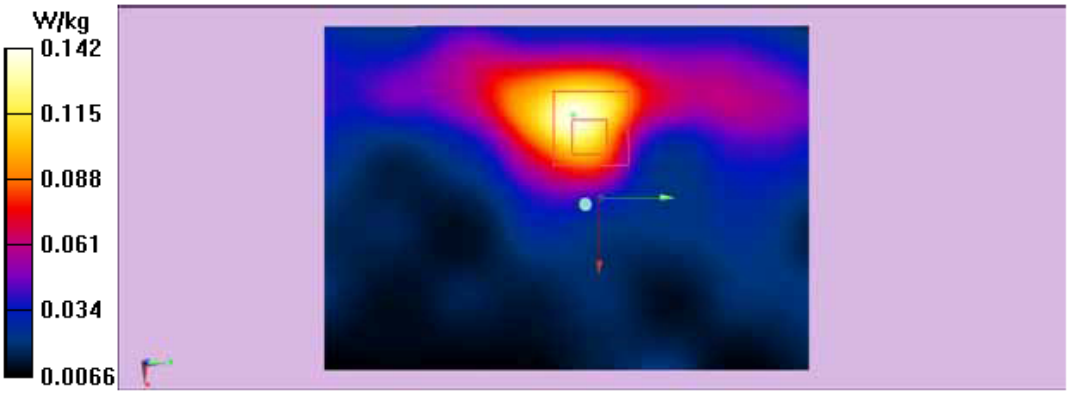
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.388 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.36 W/kg

SAR(1 g) = 0.460 W/kg; SAR(10 g) = 0.147 W/kg

Maximum value of SAR (measured) = 0.586 W/kg



Date: 08/09/2017

11a CH52(5260MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.3GHz (0); Communication System Band: IEEE 802.11a WiFi 5.3GHz ; Frequency: 5260 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5260 MHz; σ = 5.235 S/m; ε_r = 49.85; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.09, 5.09, 5.09);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH52(5260MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.136 W/kg

Configuration/CH52(5260MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

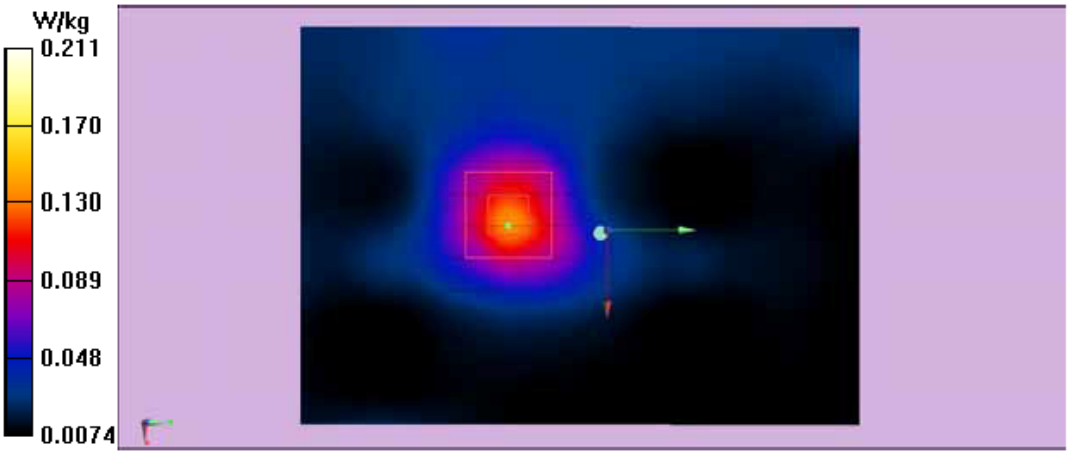
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.620 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 0.503 W/kg

SAR(1 g) = 0.183 W/kg; SAR(10 g) = 0.077 W/kg

Maximum value of SAR (measured) = 0.211 W/kg



Date: 08/09/2017

11a CH60(5300MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.3GHz (0); Communication System Band: IEEE 802.11a WiFi 5.3GHz ; Frequency: 5300 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5300 MHz; σ = 5.221 S/m; ε_r = 49.90; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.09, 5.09, 5.09);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH60(5300MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.154 W/kg

Configuration/CH60(5300MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

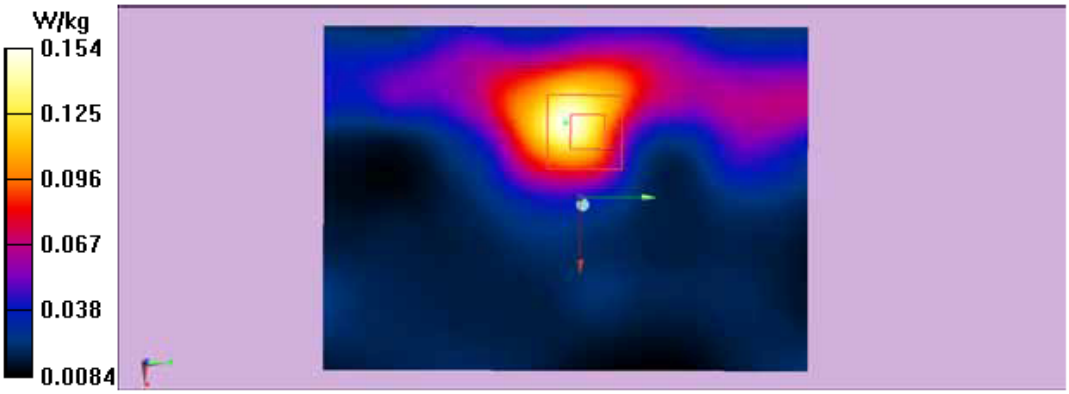
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.316 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.23 W/kg

SAR(1 g) = 0.426 W/kg; SAR(10 g) = 0.143 W/kg

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



Date: 08/09/2017

11a CH60(5300MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.3GHz (0); Communication System Band: IEEE 802.11a WiFi 5.3GHz ; Frequency: 5300 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5300 MHz; σ = 5.221 S/m; ε_r = 49.90; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(5.09, 5.09, 5.09);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH60(5300MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.165 W/kg

Configuration/CH60(5300MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

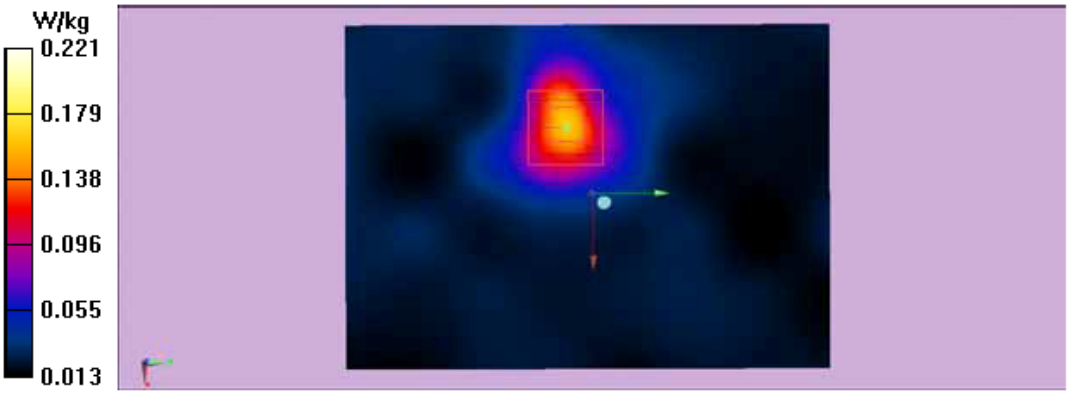
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.100 V/m; Power Drift = 0.20 dB

Peak SAR (extrapolated) = 0.502 W/kg

SAR(1 g) = 0.184 W/kg; SAR(10 g) = 0.080 W/kg

Maximum value of SAR (measured) = 0.221 W/kg



Date: 15/09/2017

11a CH112(5560MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.5GHz (0); Communication System Band: IEEE 802.11a WiFi 5.5GHz; Frequency: 5560 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5560 MHz; σ = 5.301 S/m; ε_r = 49.71; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.25, 4.25, 4.25);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH112(5560MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.128 W/kg

Configuration/CH112(5560MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

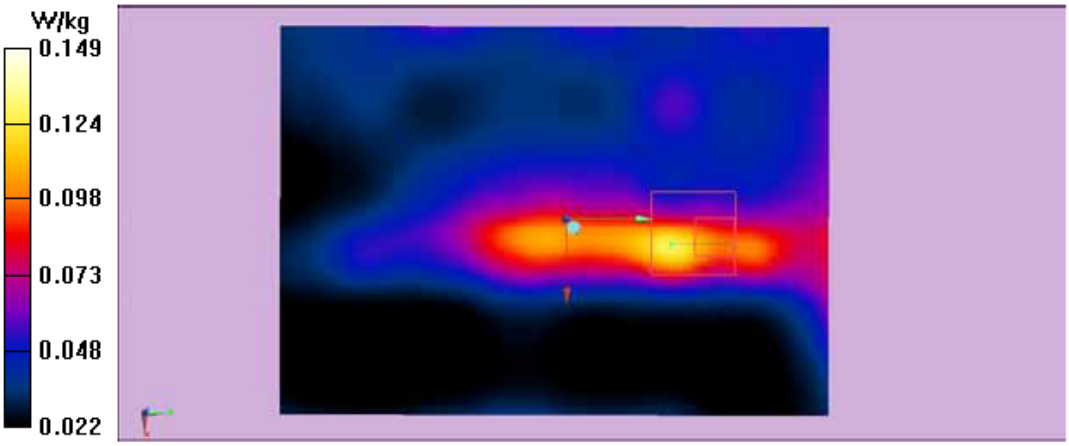
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.494 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 0.275 W/kg

SAR(1 g) = 0.114 W/kg; SAR(10 g) = 0.063 W/kg

Maximum value of SAR (measured) = 0.149 W/kg



Date: 15/09/2017

11a CH112(5560MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.5GHz (0); Communication System Band: IEEE 802.11a WiFi 5.5GHz; Frequency: 5560 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5560 MHz; σ = 5.301 S/m; ε_r = 49.71; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.25, 4.25, 4.25);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH112(5560MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.320 W/kg

Configuration/CH112(5560MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

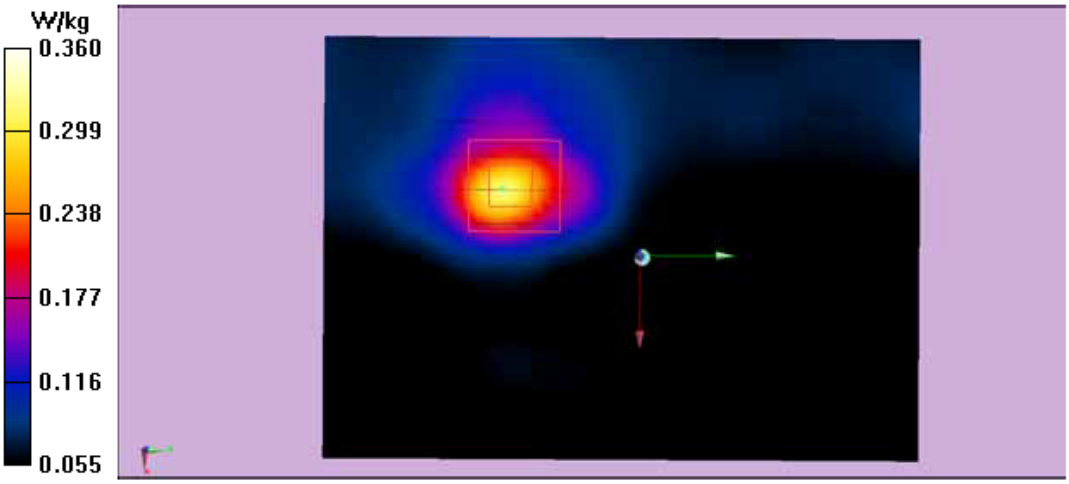
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.467 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 0.789 W/kg

SAR(1 g) = 0.308 W/kg; SAR(10 g) = 0.152 W/kg

Maximum value of SAR (measured) = 0.360 W/kg



Date: 15/09/2017

11a CH120(5600MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.5GHz (0); Communication System Band: IEEE 802.11a WiFi 5.5GHz; Frequency: 5600 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5600 MHz; σ = 5.350 S/m; ε_r = 49.65; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.25, 4.25, 4.25);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH120(5600MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.592 W/kg

Configuration/CH120(5600MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

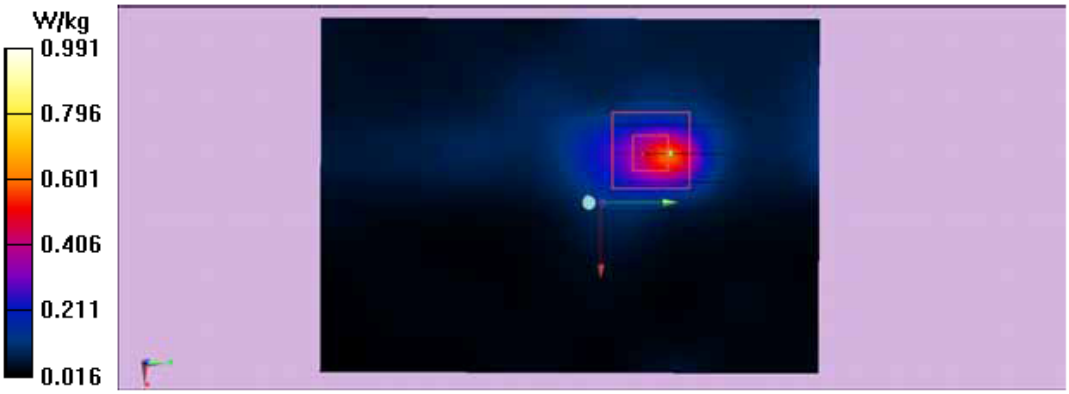
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.427 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 1.91 W/kg

SAR(1 g) = 0.361 W/kg; SAR(10 g) = 0.212 W/kg

Maximum value of SAR (measured) = 0.991 W/kg



Date: 15/09/2017

11a CH120(5600MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.5GHz (0); Communication System Band: IEEE 802.11a WiFi 5.5GHz; Frequency: 5600 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5600 MHz; σ = 5.350 S/m; ε_r = 49.65; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.25, 4.25, 4.25);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH120(5600MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.291 W/kg

Configuration/CH120(5600MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

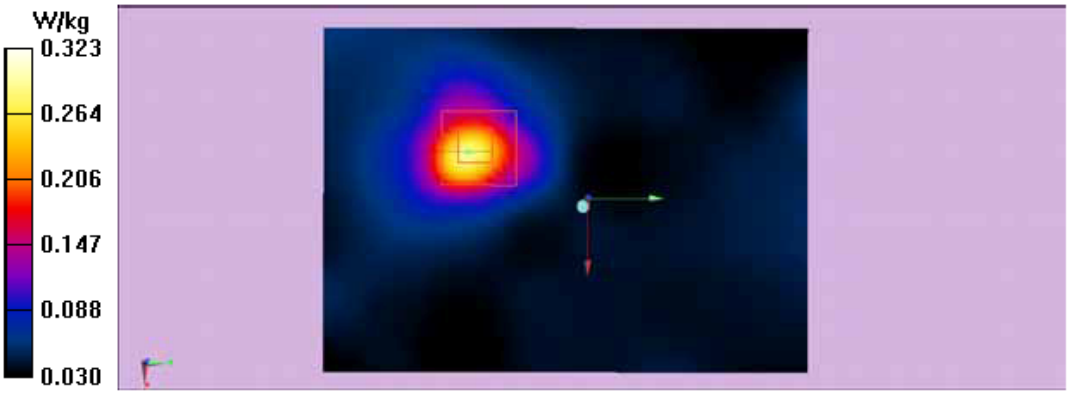
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.356 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.788 W/kg

SAR(1 g) = 0.287 W/kg; SAR(10 g) = 0.128 W/kg

Maximum value of SAR (measured) = 0.323 W/kg



Date: 16/09/2017

11a CH149(5745MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.8GHz (0); Communication System Band: IEEE 802.11a WiFi 5.8GHz ; Frequency: 5745 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5745 MHz; σ = 5.713 S/m; ε_r = 48.21; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.33, 4.33, 4.33);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH149(5745MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.400 W/kg

Configuration/CH149(5745MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

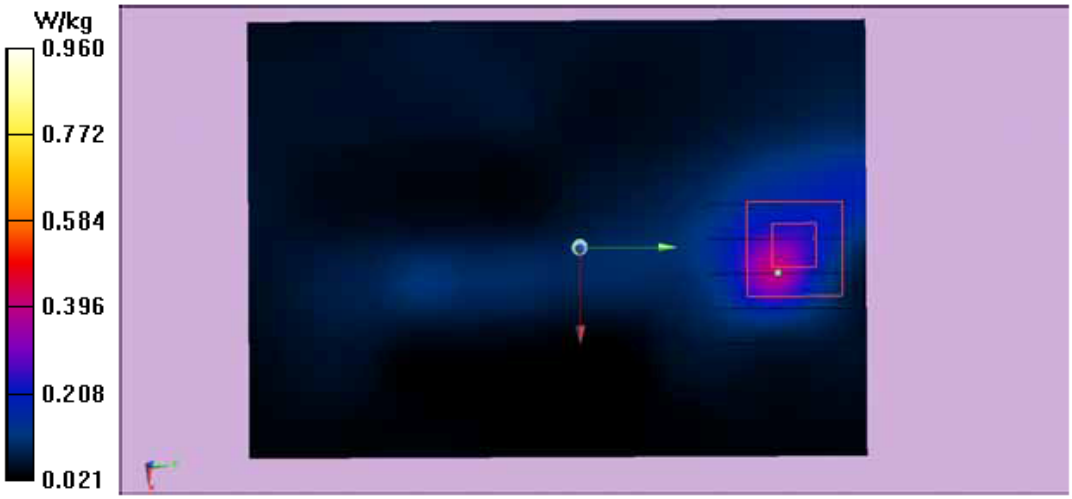
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.203 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 2.26 W/kg

SAR(1 g) = 0.390 W/kg; SAR(10 g) = 0.267 W/kg

Maximum value of SAR (measured) = 0.960 W/kg



Date: 16/09/2017

11a CH149(5745MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.8GHz (0); Communication System Band: IEEE 802.11a WiFi 5.8GHz ; Frequency: 5745 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5745 MHz; σ = 5.713 S/m; ε_r = 48.21; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.33, 4.33, 4.33);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH149(5745MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.257 W/kg

Configuration/CH149(5745MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

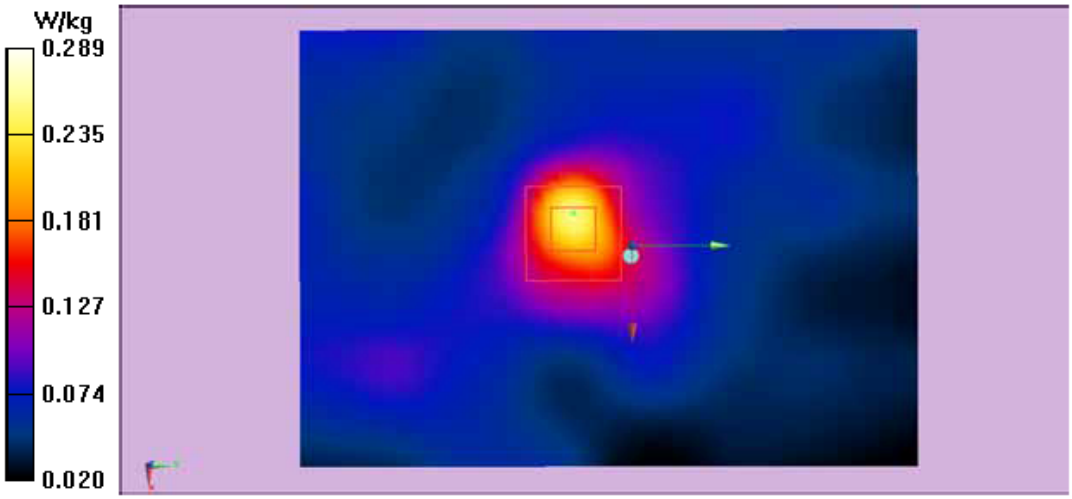
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.166 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.664 W/kg

SAR(1 g) = 0.253 W/kg; SAR(10 g) = 0.121 W/kg

Maximum value of SAR (measured) = 0.289 W/kg



Date: 16/09/2017

11a CH165(5825MHz Bottom)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.8GHz (0); Communication System Band: IEEE 802.11a WiFi 5.8GHz ; Frequency: 5825 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5825 MHz; σ = 6.102 S/m; ε_r = 47.81; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.33, 4.33, 4.33);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH165(5825MHz Bottom)/Area Scan (51x71x1): Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.400 W/kg

Configuration/CH165(5825MHz Bottom)/Zoom Scan (5x5x7)/Cube 0:

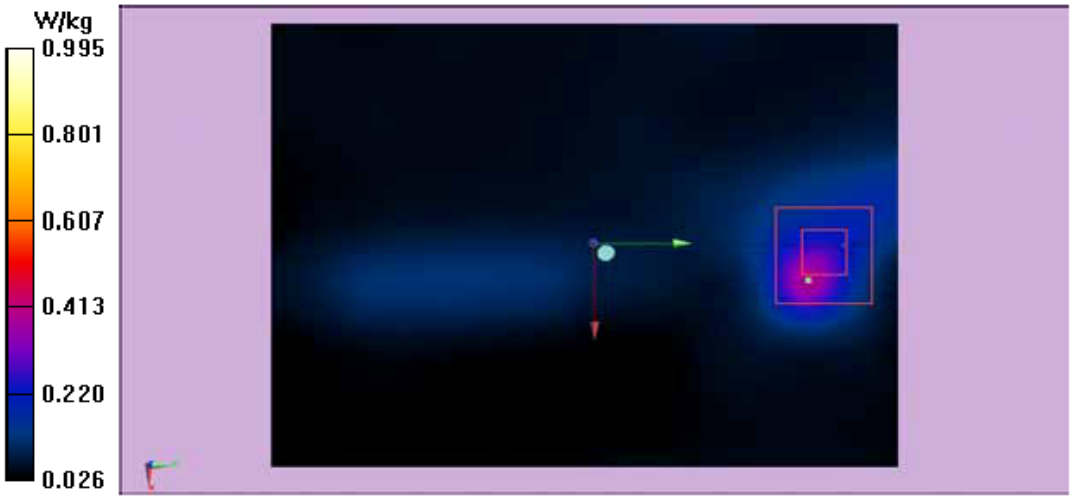
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.539 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 2.36 W/kg

SAR(1 g) = 0.417 W/kg; SAR(10 g) = 0.280 W/kg

Maximum value of SAR (measured) = 0.995 W/kg



Date: 16/09/2017

11a CH165(5825MHz Screen Back)

EUT: Notebook M/N: RZ09-0239

Communication System: UID 0, IEEE 802.11a WiFi 5.8GHz (0); Communication System Band: IEEE 802.11a WiFi 5.8GHz ; Frequency: 5825 MHz;Communication System PAR: 0 dB

Medium parameters used: f = 5825 MHz; σ = 6.102 S/m; ε_r = 47.81; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7383; ConvF(4.33, 4.33, 4.33);Calibrated: 2016/12/27;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 2016/12/9
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 1235
- DASY52 52.10.0(1442); SEMCAD X Version 14.6.10 (7313)

Configuration/CH165(5825MHz Screen Back)/Area Scan (51x71x1):

Interpolated grid: dx=2.000 mm, dy=2.000 mm

Maximum value of SAR (interpolated) = 0.269 W/kg

Configuration/CH165(5825MHz Screen Back)/Zoom Scan (5x5x7)/Cube 0:

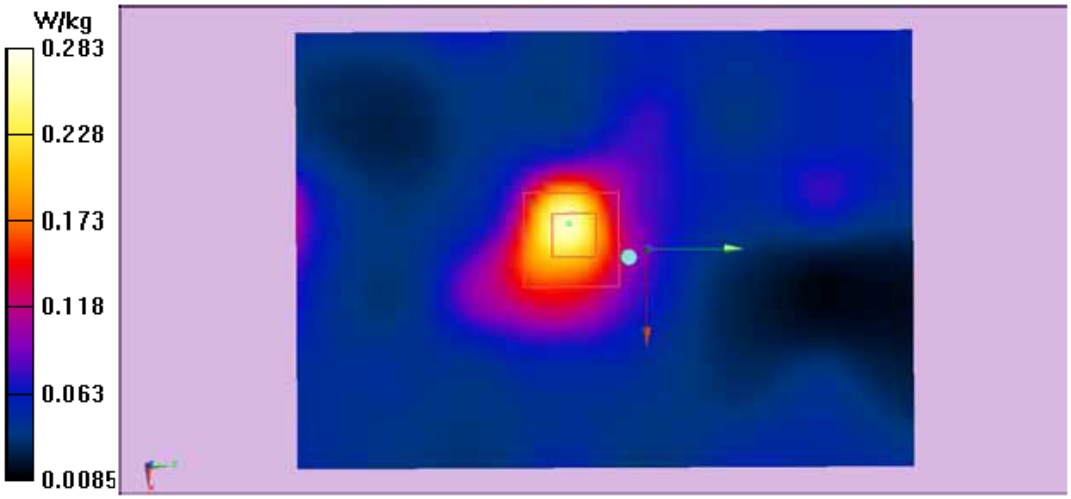
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.972 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.720 W/kg

SAR(1 g) = 0.248 W/kg; SAR(10 g) = 0.122 W/kg

Maximum value of SAR (measured) = 0.283 W/kg



10. ANNEX C: DASY CABLIBRATION CERTIFICATE

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info@speag.com, http://www.speag.com

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IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:
To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

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中国认可 国际互认 校准 CALIBRATION CNAS L0570

Client UL Certificate No: Z16-97247

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:7383
Calibration Procedure(s)	FD-Z11-004-01 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	December 27, 2016

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Power sensor NRP-Z91	101547	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Power sensor NRP-Z91	101548	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Reference10dBAttenuator	18N50W-10dB	13-Mar-16(CTTL,No.J16X01547)	Mar-18
Reference20dBAttenuator	18N50W-20dB	13-Mar-16(CTTL, No.J16X01548)	Mar-18
Reference Probe EX3DV4	SN 7433	26-Sep-16(SPEAG,No.EX3-7433_Sep16)	Sep-17
DAE4	SN 1331	21-Jan-16(SPEAG, No.DAE4-1331_Jan16)	Jan -17
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
SignalGeneratorMG3700A	6201052605	27-Jun-16 (CTTL, No.J16X04776)	Jun-17
Network Analyzer E5071C	MY46110673	26-Jan-16 (CTTL, No.J16X00894)	Jan -17

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: December 31, 2016

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005

c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010

d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

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

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Probe EX3DV4

SN: 7383

Calibrated: December 27, 2016

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7383

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(μV/(V/m)^2)^A	0.39	0.48	0.51	±10.8%
DCP(mV)^B	97.7	97.3	101.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	168.0	±2.5%
		Y	0.0	0.0	1.0		189.9	
		Z	0.0	0.0	1.0		196.8	

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

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

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7383

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz][C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
750	41.9	0.89	10.08	10.08	10.08	0.30	0.70	±12%
835	41.5	0.90	9.69	9.69	9.69	0.13	1.45	±12%
900	41.5	0.97	9.81	9.81	9.81	0.13	1.41	±12%
1450	40.5	1.20	8.90	8.90	8.90	0.17	1.05	±12%
1810	40.0	1.40	8.17	8.17	8.17	0.25	1.02	±12%
1900	40.0	1.40	8.26	8.26	8.26	0.21	1.21	±12%
2100	39.8	1.49	8.34	8.34	8.34	0.16	1.36	±12%
2300	39.5	1.67	7.78	7.78	7.78	0.45	0.77	±12%
2450	39.2	1.80	7.45	7.45	7.45	0.28	1.27	±12%
2600	39.0	1.96	7.35	7.35	7.35	0.33	1.09	±12%
3500	37.9	2.91	6.92	6.92	6.92	0.32	1.64	±13%
3700	37.7	3.12	6.58	6.58	6.58	0.38	1.25	±13%
5250	35.9	4.71	5.20	5.20	5.20	0.35	1.50	±13%
5600	35.5	5.07	4.69	4.69	4.69	0.40	1.50	±13%
5750	35.4	5.22	4.90	4.90	4.90	0.40	1.50	±13%

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

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

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

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7383

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz][C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
750	55.5	0.96	10.40	10.40	10.40	0.40	0.82	±12%
835	55.2	0.97	10.13	10.13	10.13	0.15	1.58	±12%
900	55.0	1.05	10.14	10.14	10.14	0.19	1.35	±12%
1450	54.0	1.30	8.71	8.71	8.71	0.12	1.49	±12%
1810	53.3	1.52	8.10	8.10	8.10	0.15	1.58	±12%
1900	53.3	1.52	8.01	8.01	8.01	0.17	1.41	±12%
2100	53.2	1.62	8.32	8.32	8.32	0.16	1.63	±12%
2300	52.9	1.81	7.83	7.83	7.83	0.33	1.21	±12%
2450	52.7	1.95	7.63	7.63	7.63	0.38	1.05	±12%
2600	52.5	2.16	7.55	7.55	7.55	0.38	1.03	±12%
3500	51.3	3.31	6.57	6.57	6.57	0.41	1.53	±13%
3700	51.0	3.55	6.58	6.58	6.58	0.40	1.85	±13%
5250	48.9	5.36	4.63	4.63	4.63	0.46	1.90	±13%
5600	48.5	5.77	3.99	3.99	3.99	0.50	1.95	±13%
5750	48.3	5.94	4.33	4.33	4.33	0.52	2.00	±13%

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

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

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

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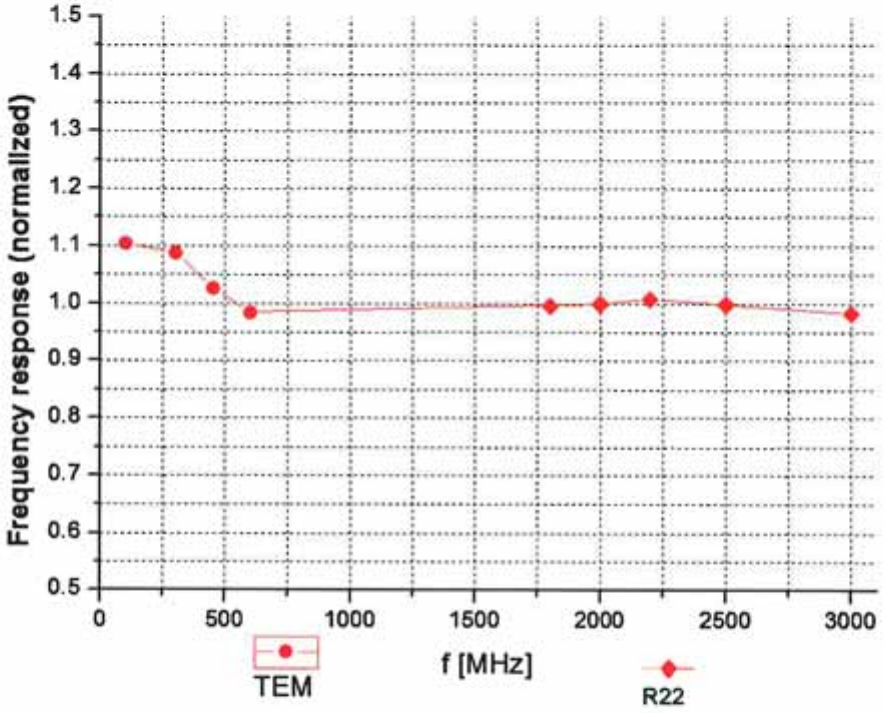
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±7.5% (k=2)

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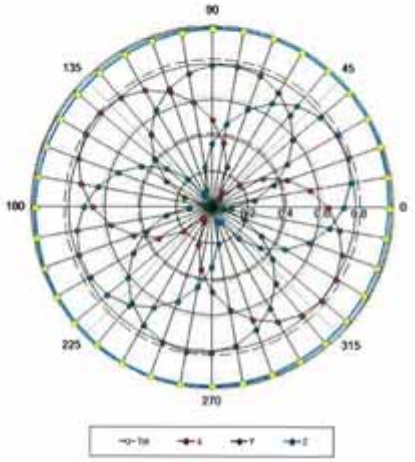
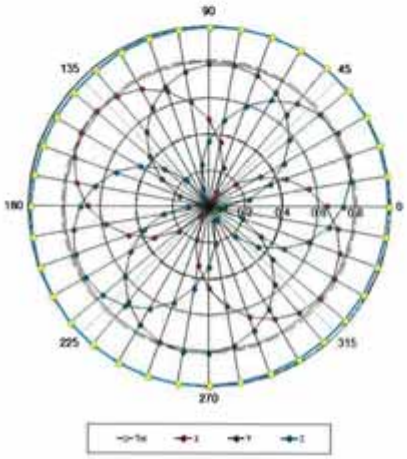
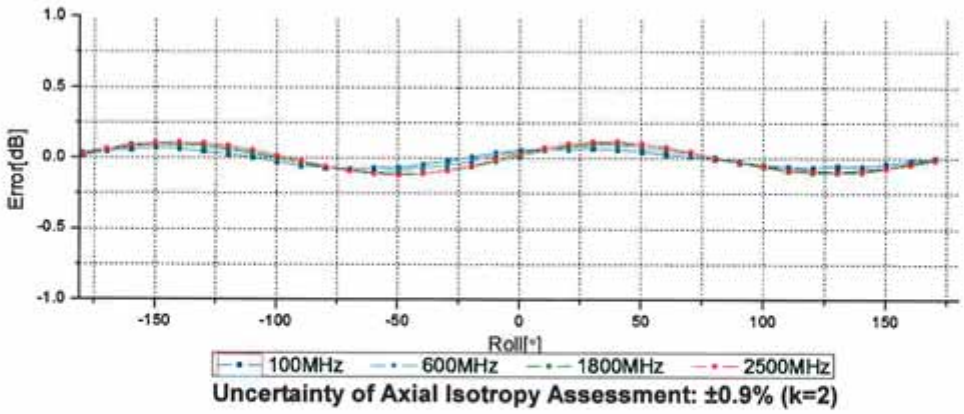
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





Uncertainty of Axial Isotropy Assessment: ±0.9% (k=2)

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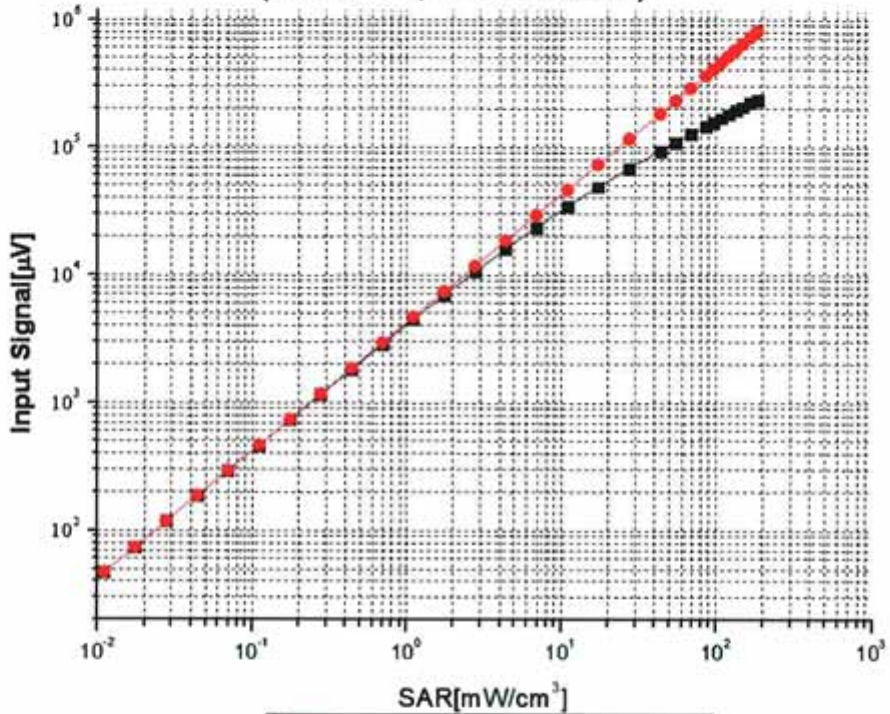
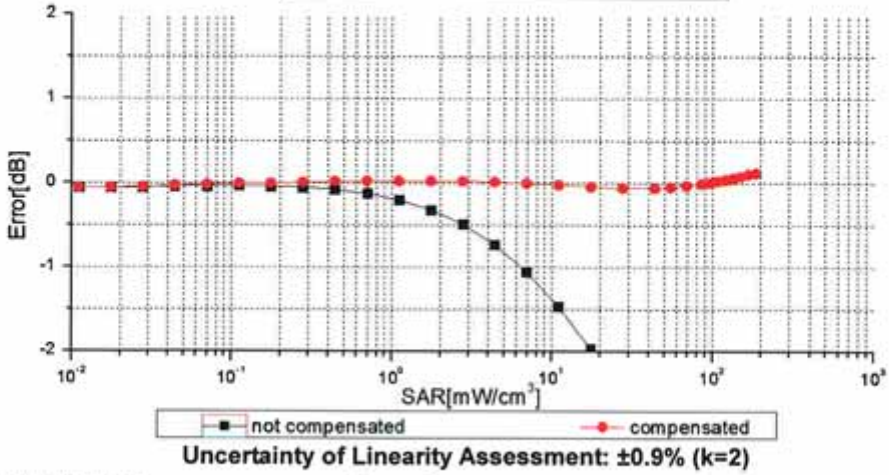
Dynamic Range f(SAR_{head})
(TEM cell, f = 900 MHz)





Uncertainty of Linearity Assessment: ±0.9% (k=2)

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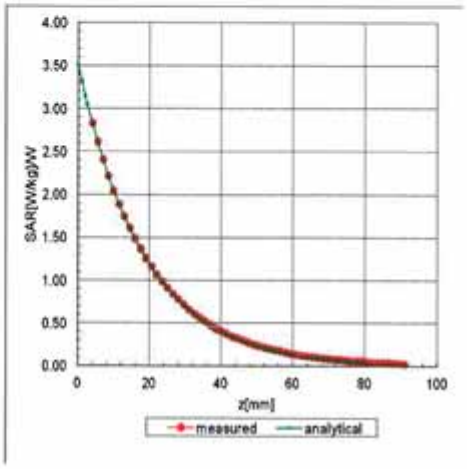
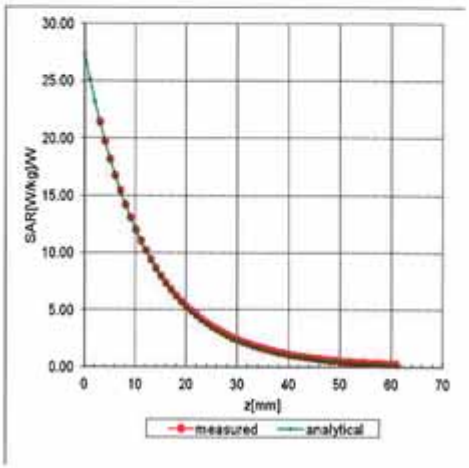
Conversion Factor Assessment

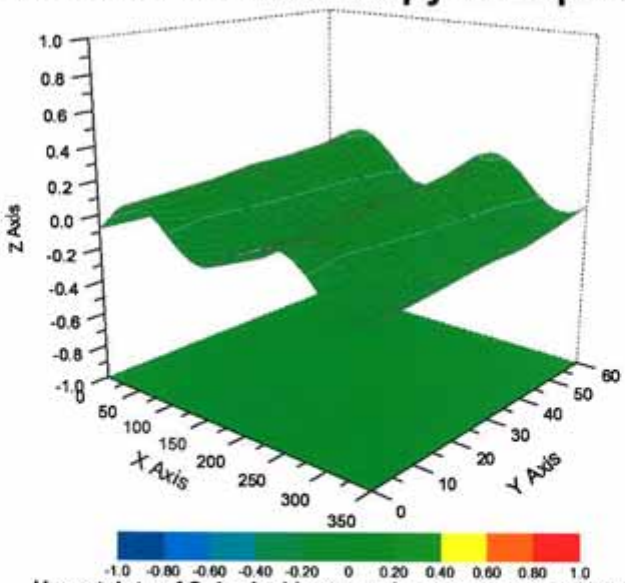
f=900 MHz, WGLS R9(H_convF)



f=1810 MHz, WGLS R22(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±2.8% (K=2)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7383

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	127.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

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CNAS L0570

Client : UL Certificate No: Z16-97246

CALIBRATION CERTIFICATE

Object	DAE3 - SN: 427
Calibration Procedure(s)	FD-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	December 09, 2016

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	27-June-16 (CTTL, No:J16X04778)	June-17

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: December 10, 2016

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Glossary:

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters:

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.

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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV
Low Range: 1LSB = 61nV , full range = -1.....+3mV

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

Calibration Factors	X	Y	Z
High Range	404.093 ± 0.15% (k=2)	403.247 ± 0.15% (k=2)	404.055 ± 0.15% (k=2)
Low Range	3.95614 ± 0.7% (k=2)	3.99327 ± 0.7% (k=2)	4.00212 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	183° ± 1 °

Calibration Laboratory of
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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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S Swiss Calibration Service

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

Accreditation No.: SCS 0108

Client UL (Song Shan Lake) Branch

Certificate No: D2450V2-977_Jan16/2

CALIBRATION CERTIFICATE (Replacement of No:D2450V2-977_Jan16)

Object	D2450V2 - SN: 977
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	January 14, 2016

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	US37292783	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	MY41092317	07-Oct-15 (No. 217-02223)	Oct-16
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe EX3DV4	SN: 7349	31-Dec-15 (No. EX3-7349_Dec15)	Dec-16
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100972	15-Jun-15 (in house check Jun-15)	In house check: Jun-18
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

Issued: March 14, 2016

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.23 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.5 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.2 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.2 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**51.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.3 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.3 Ω + 5.3 jΩ
Return Loss	- 23.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	52.1 Ω + 7.0 jΩ
Return Loss	- 22.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 30, 2014

DASY5 Validation Report for Head TSL

Date: 14.01.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz ; Type: D2450V2; Serial: D2450V2 - SN: 977

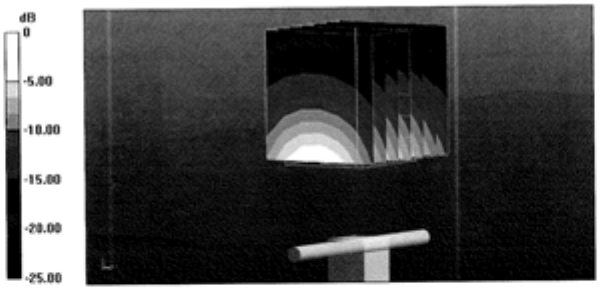
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.88 S/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.76, 7.76, 7.76); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

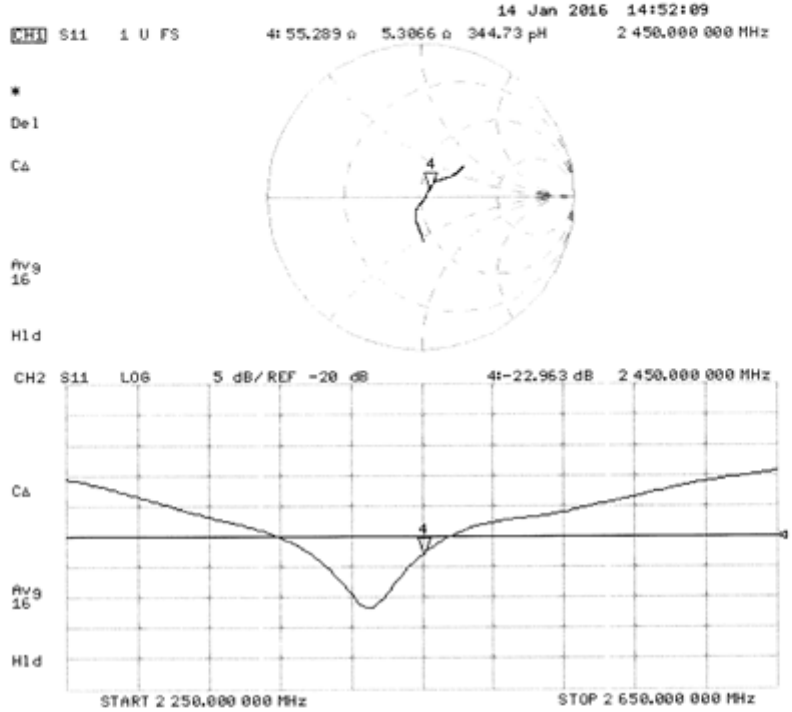
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 113.8 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 27.7 W/kg
SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.23 W/kg
Maximum value of SAR (measured) = 22.1 W/kg



0 dB = 22.1 W/kg = 13.44 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 14.01.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz ; Type: D2450V2; Serial: D2450V2 - SN: 977

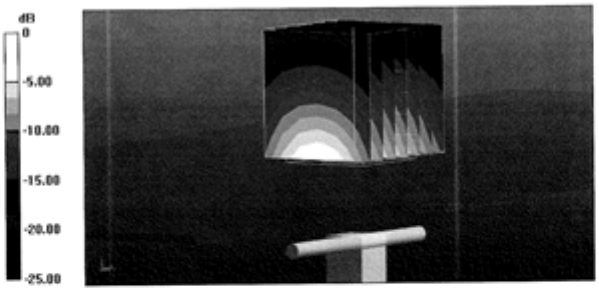
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.79, 7.79, 7.79); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

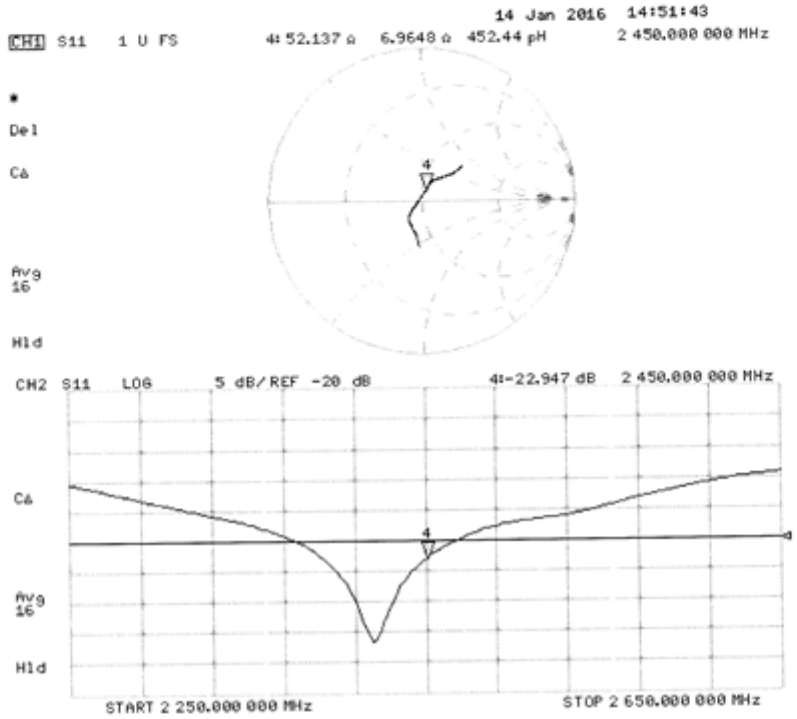
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.4 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 26.5 W/kg
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.14 W/kg
Maximum value of SAR (measured) = 21.6 W/kg

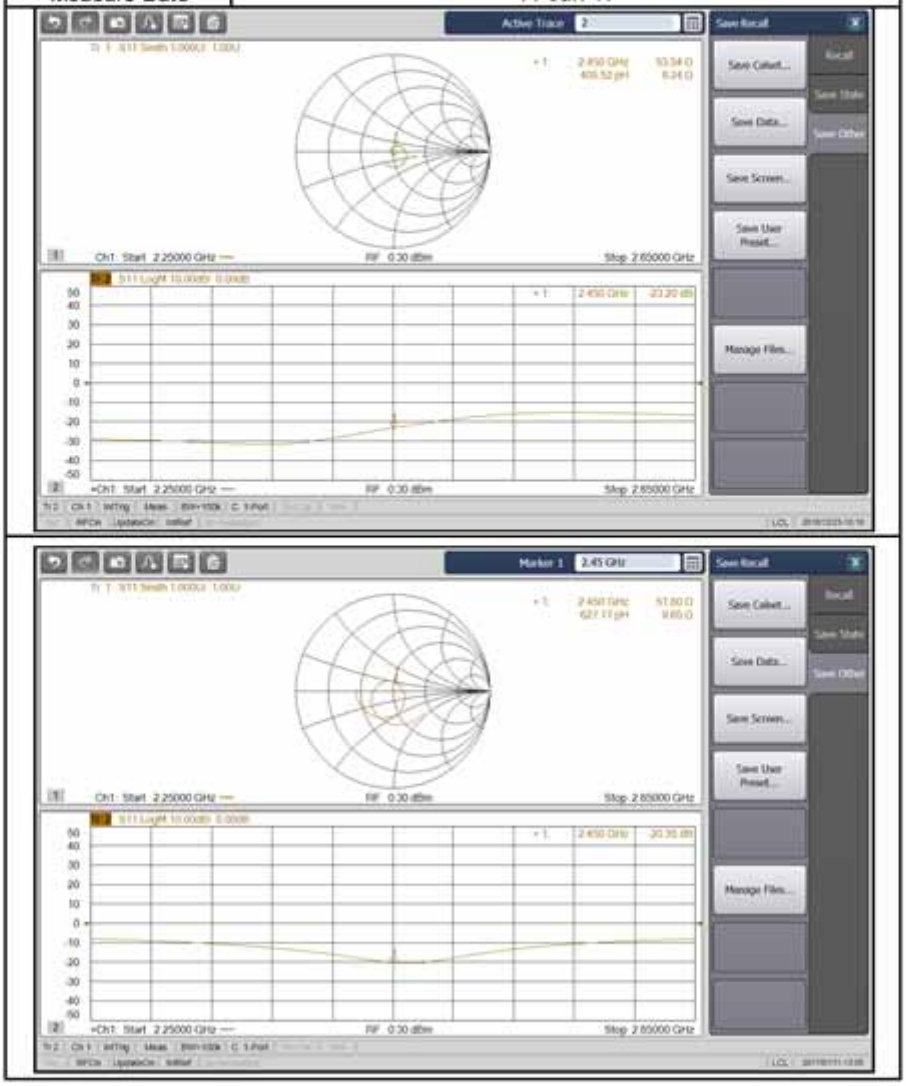


0 dB = 21.6 W/kg = 13.34 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole2450 Head TSL	Target Value		Measure Value		Difference	
	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)
Impedance	55.3	5.3	53.5	6.2	-1.8	0.9
Return loss(dB)	-23.0		-23.2		0.9%	
Measure Date	23-Dec-16					
Dipole2450 Body TSL	Target Value		Measure Value		Difference	
	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)
Impedance	52.1	7.0	51.8	9.7	-0.3	2.7
Return loss(dB)	-22.9		-20.4		-11.1%	
Measure Date	11-Jan-17					



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Accreditation No.: SCS 0108

Client UL (Song Shan Lake) Branch

Certificate No: D5GHzV2-1231_Jan16/2

CALIBRATION CERTIFICATE (Replacement of No:D5GHzV2-1231_Jan16)

Object	D5GHzV2 - SN: 1231
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	January 13, 2016

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	US37292783	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	MY41092317	07-Oct-15 (No. 217-02223)	Oct-16
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe EX3DV4	SN: 3503	31-Dec-15 (No. EX3-3503_Dec15)	Dec-16
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100972	15-Jun-15 (in house check Jun-15)	In house check: Jun-18
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

Issued: March 14, 2016

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.3 ± 6 %	4.61 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.32 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.1 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.8 ± 6 %	4.97 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.8 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.0 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.6 ± 6 %	5.13 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.21 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.2 ± 6 %	5.40 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.66 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.4 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.6 ± 6 %	5.87 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**80.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.27 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.5 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.3 ± 6 %	6.09 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.76 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**77.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.5 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	49.3 Ω - 5.8 jΩ
Return Loss	- 24.6 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	50.5 Ω - 0.8 jΩ
Return Loss	- 40.8 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	56.6 Ω + 0.9 jΩ
Return Loss	- 24.1 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	48.6 Ω - 4.0 jΩ
Return Loss	- 27.3 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	50.8 Ω + 1.4 jΩ
Return Loss	- 35.7 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	56.9 Ω + 3.0 jΩ
Return Loss	- 23.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.195 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 04, 2015

DASY5 Validation Report for Head TSL

Date: 12.01.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1231

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.61 S/m; ε_r = 35.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 4.97 S/m; ε_r = 34.8; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 5.13 S/m; ε_r = 34.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

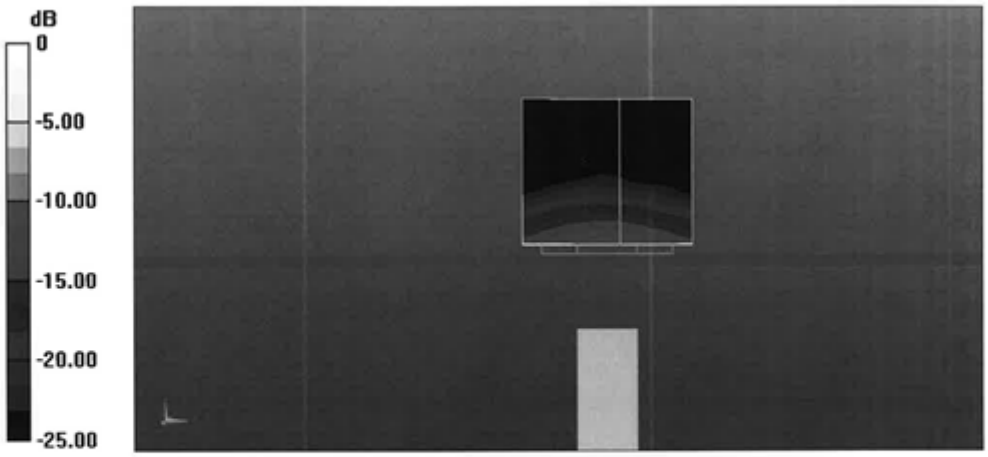
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.53, 5.53, 5.53); Calibrated: 31.12.2015, ConvF(4.99, 4.99, 4.99); Calibrated: 31.12.2015, ConvF(4.95, 4.95, 4.95); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 74.26 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 29.6 W/kg
SAR(1 g) = 8.08 W/kg; SAR(10 g) = 2.32 W/kg
Maximum value of SAR (measured) = 18.6 W/kg

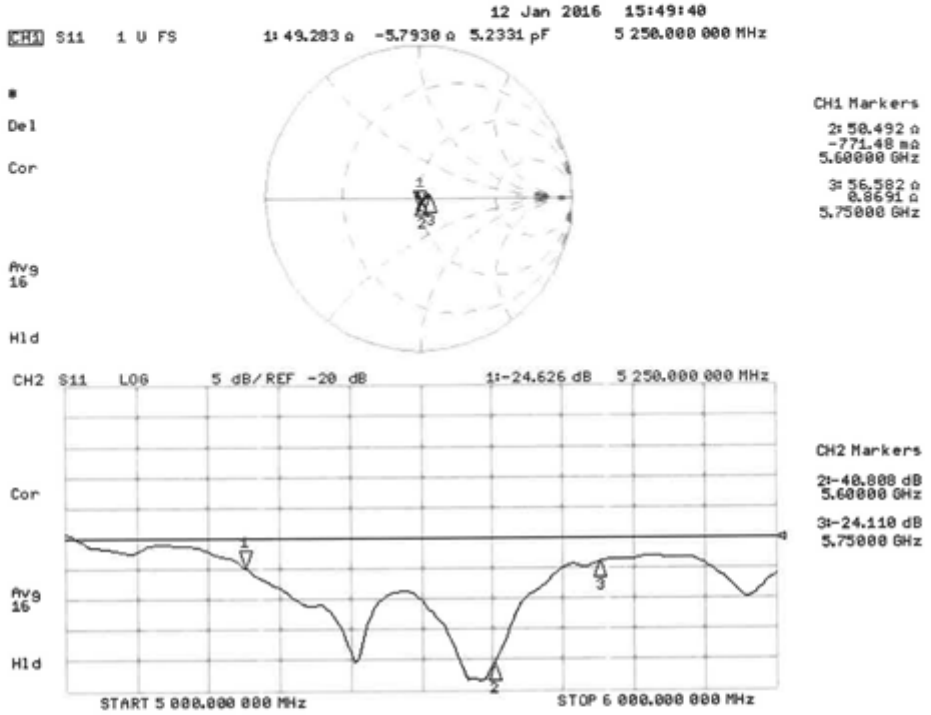
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 74.04 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 33.3 W/kg
SAR(1 g) = 8.42 W/kg; SAR(10 g) = 2.41 W/kg
Maximum value of SAR (measured) = 19.9 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.59 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 33.9 W/kg
SAR(1 g) = 8.21 W/kg; SAR(10 g) = 2.33 W/kg
Maximum value of SAR (measured) = 19.8 W/kg



0 dB = 18.6 W/kg = 12.70 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.01.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1231

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.4 S/m; ε_r = 47.2; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 5.87 S/m; ε_r = 46.6; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 6.09 S/m; ε_r = 46.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

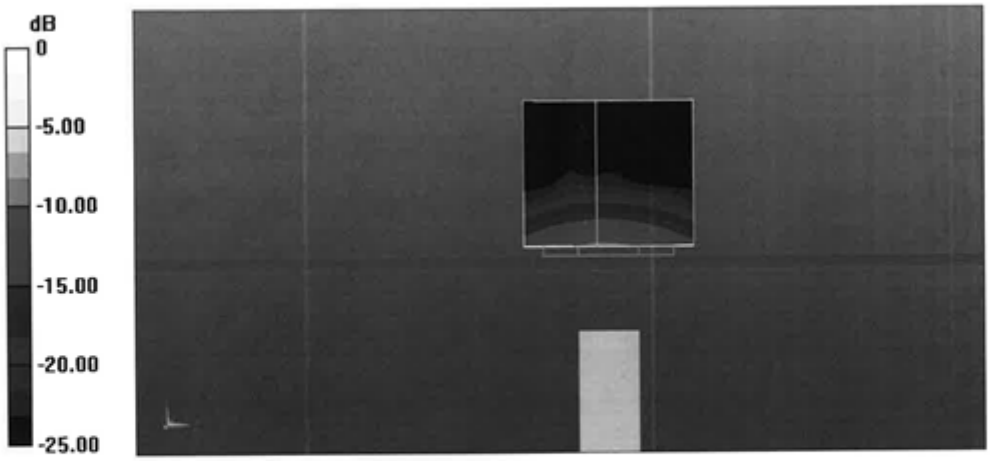
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.85, 4.85, 4.85); Calibrated: 31.12.2015, ConvF(4.35, 4.35, 4.35); Calibrated: 31.12.2015, ConvF(4.3, 4.3, 4.3); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.92 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 7.66 W/kg; SAR(10 g) = 2.16 W/kg
Maximum value of SAR (measured) = 17.4 W/kg

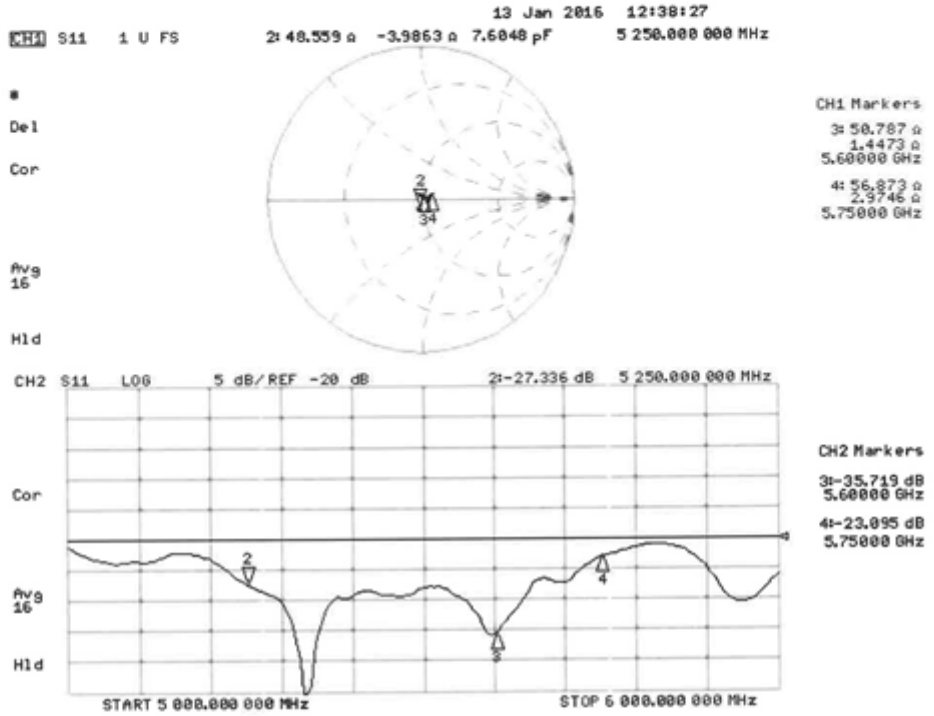
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 68.32 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 33.8 W/kg
SAR(1 g) = 8.1 W/kg; SAR(10 g) = 2.27 W/kg
Maximum value of SAR (measured) = 19.3 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.32 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 33.5 W/kg
SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 18.7 W/kg

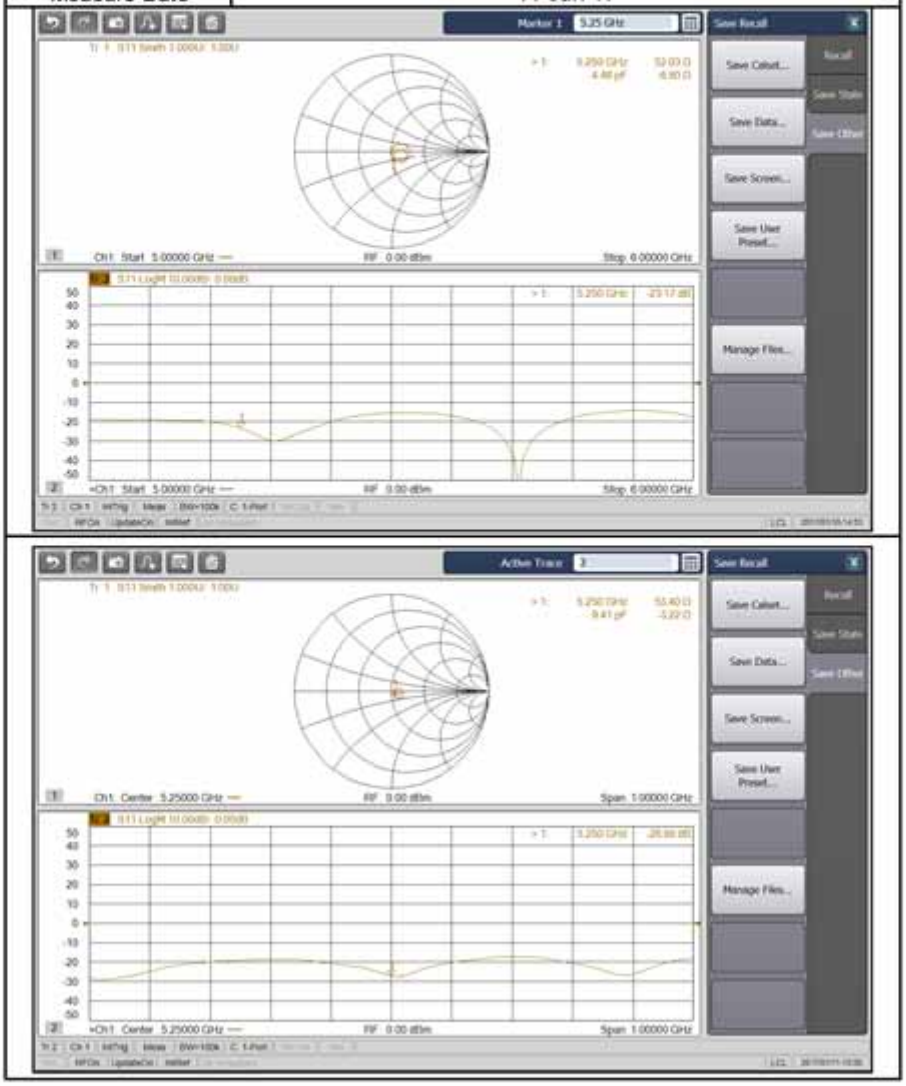


0 dB = 17.4 W/kg = 12.41 dBW/kg

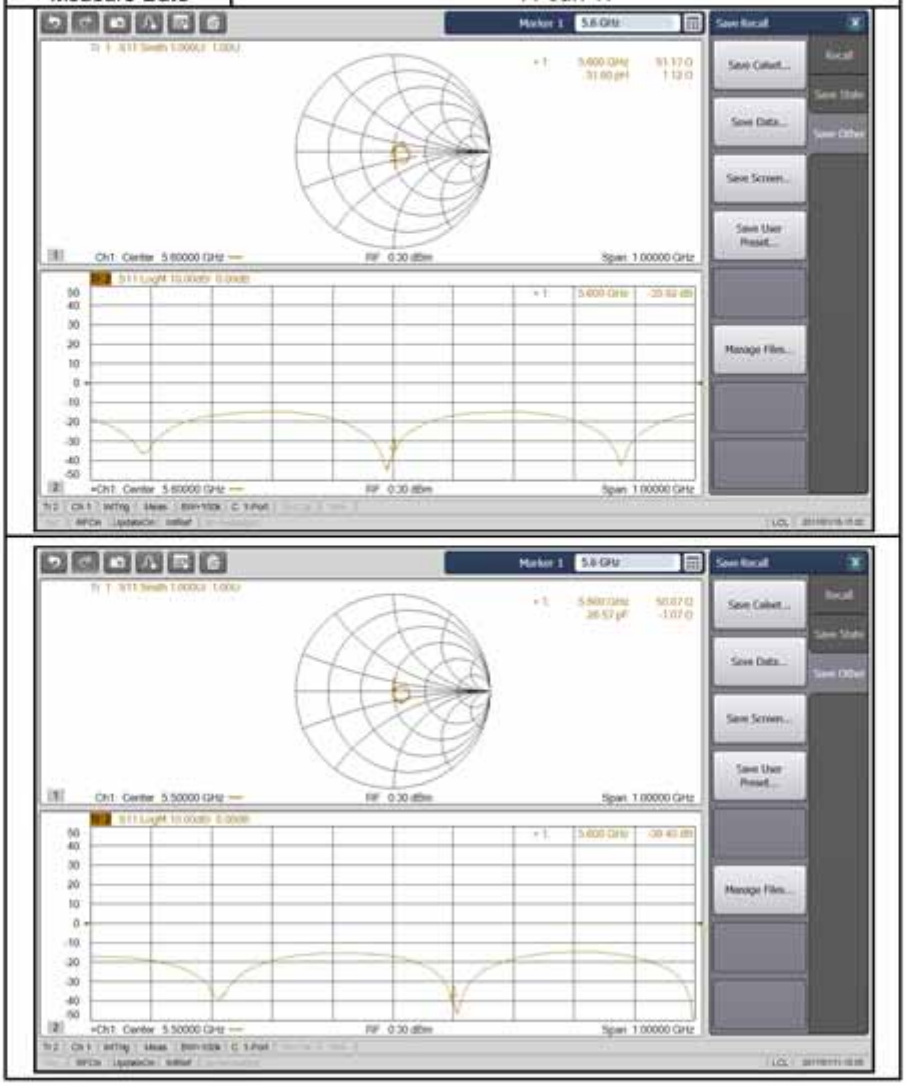
Impedance Measurement Plot for Body TSL



Dipole5250 Head TSL	Target Value		Measure Value		Difference	
	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)
Impedance	49.3	-5.8	52.0	-6.8	2.7	-1.0
Return loss(dB)	-24.6		-23.2		-5.8%	
Measure Date	10-Jan-17					
Dipole5250 Body TSL	Target Value		Measure Value		Difference	
	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)
Impedance	48.6	-4.0	53.4	-3.2	4.8	0.8
Return loss(dB)	-27.3		-26.9		-1.5%	
Measure Date	11-Jan-17					



Dipole5600 Head TSL	Target Value		Measure Value		Difference	
	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)
Impedance	50.5	-0.8	51.2	1.1	0.7	1.9
Return loss(dB)	-40.8		-35.9		-12.0%	
Measure Date	10-Jan-17					
Dipole5600 Body TSL	Target Value		Measure Value		Difference	
	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)
Impedance	50.8	1.4	50.1	-1.1	-0.7	-2.5
Return loss(dB)	-35.7		-39.4		10.4%	
Measure Date	11-Jan-17					



Dipole5750 Head TSL	Target Value		Measure Value		Difference	
	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)
Impedance	56.6	0.9	56.2	1.2	-0.4	0.3
Return loss(dB)	-24.1		-24.6		2.0%	
Measure Date	10-Jan-17					
Dipole5750 Body TSL	Target Value		Measure Value		Difference	
	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)	R(Ω)	X(jΩ)
Impedance	56.9	3.0	56.1	5.1	-0.8	2.1
Return loss(dB)	-23.1		-22.6		-2.4%	
Measure Date	11-Jan-17