DEKRA Testing and Certification (Suzhou) Co., Ltd.
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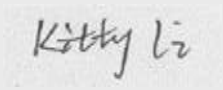
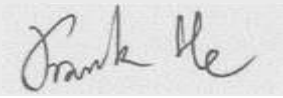
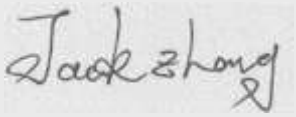
Test report No:
2090075R-RF-US-P03V01

SAR TEST REPORT

Product Name	Barcode Scanner
Trademark	Honeywell
Model and /or type reference	8690i
FCC ID	HD5-8690A
IC	1693B-8690A
FCC Designation Number	CN1199
ISED CAB identifier	CN0040
Applicant's name / address	HONEYWELL INTERNATIONAL INC Honeywell Safety and Productivity Solutions 9680 OLD BAILES RD FORT MILL SC 29707-7539,USA
Test method requested, standard	FCC KDB Publication 248227 D01v02r02 FCC KDB Publication 447498 D01v06 FCC KDB Publication 865664 D01v01r04 IEEE Std. 1528-2013 FCC 47CFR §2.1093 ANSI C95.1-2005 RSS 102: Issue 5 EN 62209-2: 2010
Test Result	Max. SAR Measurement (10g) 2.4G Wifi: 0.477 W/kg 5G Wifi: 1.280 W/kg Bluetooth: 0.050 W/kg RFID: 0.095 W/kg 5G Wifi + RFID: 1.375 W/kg
Verdict Summary	IN COMPLIANCE
Documented By (name / position &	Kitty Li/Project Assistant

signature)	
Reviewed by (name / position & signature)	Frank He/Technical Supervisor 
Approved by (name / position & signature)	Jack Zhang/Supervisor 
Date of issue	2020-10-28
Report template No	Template_FCC SAR-RF-V1.0

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COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.
In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and Maintenance program for its measurement equipment.

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

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

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GENERAL CONDITIONS

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	Sept. 02, 2020
Date (start test)	Sept. 09, 2020
Date (finish test)	Sept. 28, 2020

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

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	18 °C – 25 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
2090075R-RF-US-P03V01	V1.0	Initial issue of report.	2020-10-28

REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with FCC KDB Publication 248227 D01v02r02, FCC KDB Publication 447498 D01v06, FCC KDB Publication 865664 D01v01r04, IEEE Std. 1528-2013, FCC 47CFR §2.1093, ANSI C95.1-2005, RSS 102: Issue 5, EN 62209-2: 2010.
3. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.
4. The test results presented in this report relate only to the object tested.
5. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
6. This report will not be used for social proof function in China market.
7. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:
   - Chapter 1.1 General Description of the Item(s);
   - Chapter 1.2 Antenna Informaion;
   - Chapter 1.3 Channel List.

1 General Information

1.1 General Description of the Item(s)

Product Name.....:	Barcode Scanner
Model No. .....:	8690i
Trademark .....:	Honeywell
FCC ID.....:	HD5-8690A
IC .....:	1693B-8690A
Manufacturer.....:	1.HONEYWELL INTERNATIONAL INC Honeywell Safety and Productivity Solutions 2.Metro(Suzhou)Technologies Co.,Ltd
Manufacturer Address .....:	1. 9680 OLD BAILES RD FORT MILL SC 29707-7539,USA 2. No.221 Xinghai street China-Singapore Suzhou Industrial Park

Product Name	Barcode Scanner
Model No.	8690i
EUT Voltage	Battery 3.7 V
Wireless specifiction	WIFI 2.4G
Frequency Range	802.11b/g/n(20MHz): 2412~2462MHz 802.11n(40MHz): 2422~2452MHz
Channel Number	802.11b/g/n(20MHz): 11 802.11n(40MHz): 7
Type of Modulation	802.11b: DSSS-DBPSK, DQPSK, CCK
	802.11g/n: OFDM-BPSK, QPSK, 16QAM, 64QAM
Data Rate	802.11b: 1/2/5.5/11 Mbps
	802.11g: 6/9/12/18/24/36/48/54 Mbps
	802.11n: up to 150 Mbps
Channel Control	Auto

Product Name	Barcode Scanner					
Model No.	8690i					
EUT Voltage	Battery 3.7 V					
Wireless specifiction	WIFI 5G					
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps					
	802.11n: up to 150Mbps					
	802.11ac: up to 433.3Mbps					
Channel Control	Auto					
Transmit modes	☒	802.11a	☒	802.11n(20MHz)	☒	802.11n(40MHz)
	☒	802.11ac(20MHz)	☒	802.11ac(40MHz)	☒	802.11ac(80MHz)
Support Bands	☒	5150MHz~5250MHz	☐	Outdoor AP		
			☐	Indoor AP		
			☐	Fixed point-to-point AP		
			☒	Mobile and Portable Client		
	☒	5250MHz~5350MHz				
	☒	For FCC 5470MHz~5725MHz	☒	With TDWR Channels		
			☐	Without TDWR Channels		
	☒	For IC 5470MHz~5725MHz	☐	With TDWR Channels		
			☒	Without TDWR Channels		
	☒	5725MHz~5850MHz				

Product Name	Barcode Scanner
Model No.	8690i
EUT Voltage	Battery 3.7 V
Wireless specifiction	Bluetooth BR+EDR
Frequency Range	2402- 2480 MHz
Channel Number	79
Channel Separation	1MHz
Type of Modulation	GFSK, Pi/4 DQPSK, 8DPSK
Data Rate	1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps(8DPSK)

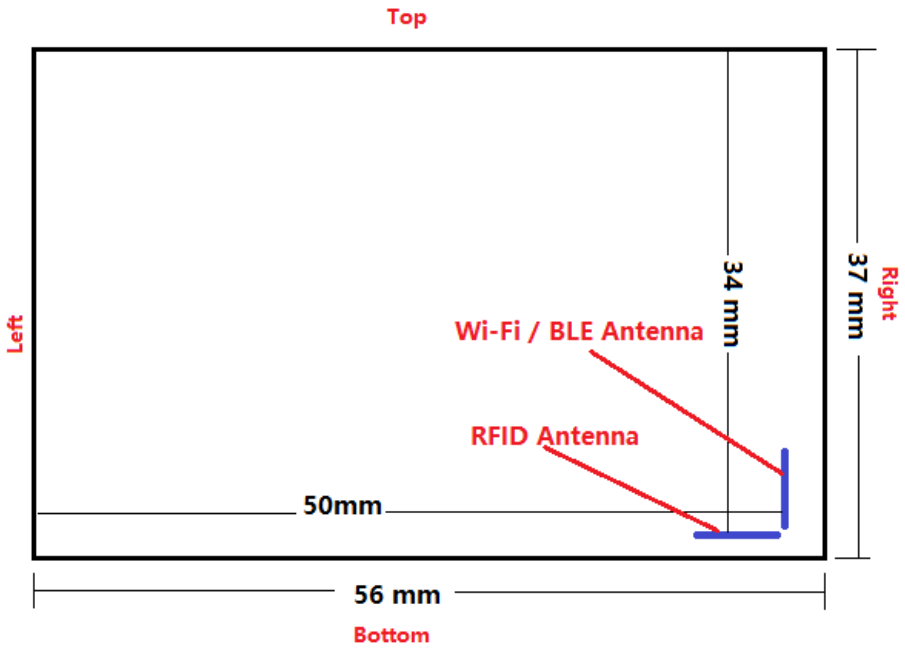
Product Name	Barcode Scanner					
Model No.	8690i					
EUT Voltage	Battery 3.7 V					
Wireless specifiction	Bluetooth LE					
Frequency Range	2402- 2480 MHz					
Channel Number	40					
Channel Separation	2MHz					
Type of Modulation	GFSK					
PHYs	☒	LE 1M	☐	LE 2M	☐	LE Coded S=2/8
Data Rate	☒	1 Mbps	☐	2 Mbps	☐	500/125 Kbps

Rated power supply.....:	Voltage and Frequency	
	☐	AC: 220 – 240 V, 50/60 Hz
	☐	AC: 100 – 240 V, 50/60 Hz
	☐	DC: 12 V
	☒	Battery: 3.7 Vdc
	☐	PoE:
Mounting position.....:	☐	Table top equipment
	☐	Wall/Ceiling mounted equipment
	☐	Floor standing equipment
	☒	Hand-held equipment
	☐	Other:

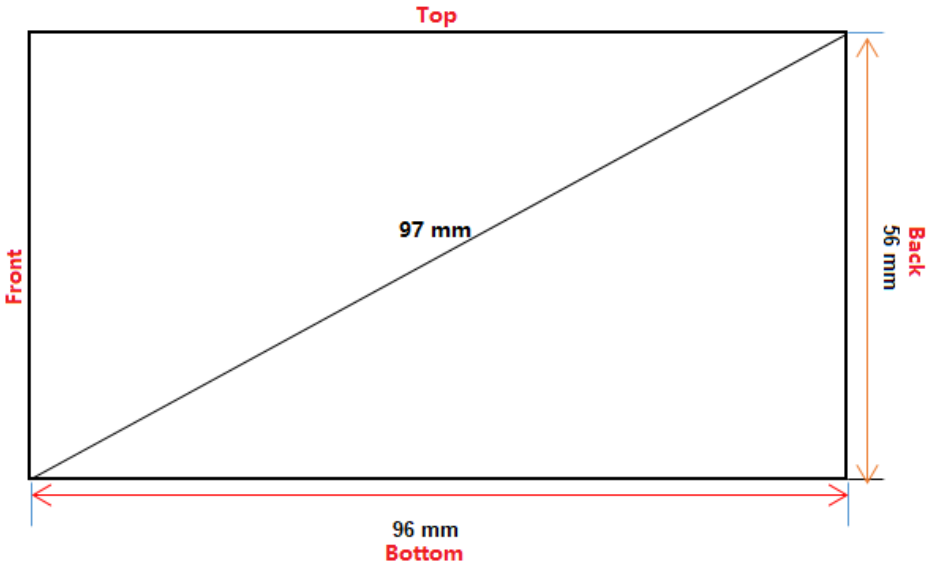
1.2 Antenna Information

Antenna Delivery .....:	☒	1TX + 1RX		
	☐	2TX + 2RX		
	☐	Others:……		
Antenna technology.....:	☒	SISO		
	☐	MIMO	☐	CDD
			☐	Beam-forming
Antenna Type .....:	☐	External	☐	Dipole
			☐	PIFA
			☐	Sectorized
	☒	Internal	☐	Metal antenna
			☒	PCB
			☐	Others……..
Antenna Gain .....:	2400 ~ 2483.5MHz: 0.8 dBi			
	5150 ~ 5850MHz: 2.58 dBi			
	902 ~ 928MHz:		Internal Antenna：-0.85 dBi	
			External Antenna：1.5 dBi	

1.3 Antenna Location



overall diagonal dimension:



1.4 Channel List

IEEE 802.11b/g/n(20MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
001	2412 MHz	002	2417 MHz	003	2422 MHz	004	2427 MHz
005	2432 MHz	006	2437 MHz	007	2442 MHz	008	2447 MHz
009	2452 MHz	010	2457 MHz	011	2462 MHz	--	--

IEEE 802.11n(40MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
003	2422 MHz	004	2427 MHz	005	2432 MHz	006	2437 MHz
007	2442 MHz	008	2447 MHz	009	2452 MHz	--	--

IEEE 802.11a/n/ac(20MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
036	5180 MHz	040	5200 MHz	044	5220 MHz	048	5240 MHz
052	5260 MHz	056	5280 MHz	060	5300 MHz	064	5320 MHz
100	5500 MHz	104	5520 MHz	108	5540 MHz	112	5560 MHz
116	5580 MHz	120	5600 MHz	124	5620 MHz	128	5640 MHz
132	5660 MHz	136	5680 MHz	140	5700 MHz	149	5745 MHz
153	5765 MHz	157	5785 MHz	161	5805 MHz	165	5825 MHz

IEEE 802.11n/ac(40MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
038	5190 MHz	046	5230 MHz	054	5270 MHz	062	5310 MHz
102	5510 MHz	110	5550 MHz	118	5590 MHz	126	5630 MHz
134	5670 MHz	151	5755 MHz	159	5795 MHz	--	--

IEEE 802.11ac(80MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210 MHz	58	5290 MHz	106	5530 MHz	122	5610 MHz
155	5775 MHz	--	--	--	--	--	--

For Bluetooth

Bluetooth Working Frequency of Each Channel: (FHSS)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2403 MHz	02	2404 MHz	03	2405 MHz
04	2406 MHz	05	2407 MHz	06	2408 MHz	07	2409 MHz
08	2410 MHz	09	2411 MHz	10	2412 MHz	11	2413 MHz
12	2414 MHz	13	2415 MHz	14	2416 MHz	15	2417 MHz
16	2418 MHz	17	2419 MHz	18	2420 MHz	19	2421 MHz
20	2422 MHz	21	2423 MHz	22	2424 MHz	23	2425 MHz
24	2426 MHz	25	2427 MHz	26	2428 MHz	27	2429 MHz
28	2430 MHz	29	2431 MHz	30	2432 MHz	31	2433 MHz
32	2434 MHz	33	2435 MHz	34	2436 MHz	35	2437 MHz
36	2438 MHz	37	2439 MHz	38	2440 MHz	39	2441 MHz
40	2442 MHz	41	2443 MHz	42	2444 MHz	43	2445 MHz
44	2446 MHz	45	2447 MHz	46	2448 MHz	47	2449 MHz
48	2450 MHz	49	2451 MHz	50	2452 MHz	51	2453 MHz
52	2454 MHz	53	2455 MHz	54	2456 MHz	55	2457 MHz
56	2458 MHz	57	2459 MHz	58	2460 MHz	59	2461 MHz
60	2462 MHz	61	2463 MHz	62	2464 MHz	63	2465 MHz
64	2466 MHz	65	2467 MHz	66	2468 MHz	67	2469 MHz
68	2470 MHz	69	2471 MHz	70	2472 MHz	71	2473 MHz
72	2474 MHz	73	2475 MHz	74	2476 MHz	75	2477 MHz
76	2478 MHz	77	2479 MHz	78	2480 MHz	N/A	N/A

Bluetooth Working Frequency of Each Channel: (BT 5.0)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz	03	2408 MHz
04	2410 MHz	05	2412 MHz	06	2414 MHz	07	2416 MHz
08	2418 MHz	09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz	15	2432 MHz
16	2434 MHz	17	2436 MHz	18	2438 MHz	19	2440 MHz
20	2442 MHz	21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz	27	2456 MHz
28	2458 MHz	29	2460 MHz	30	2462 MHz	31	2464 MHz
32	2466 MHz	33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz	39	2480 MHz

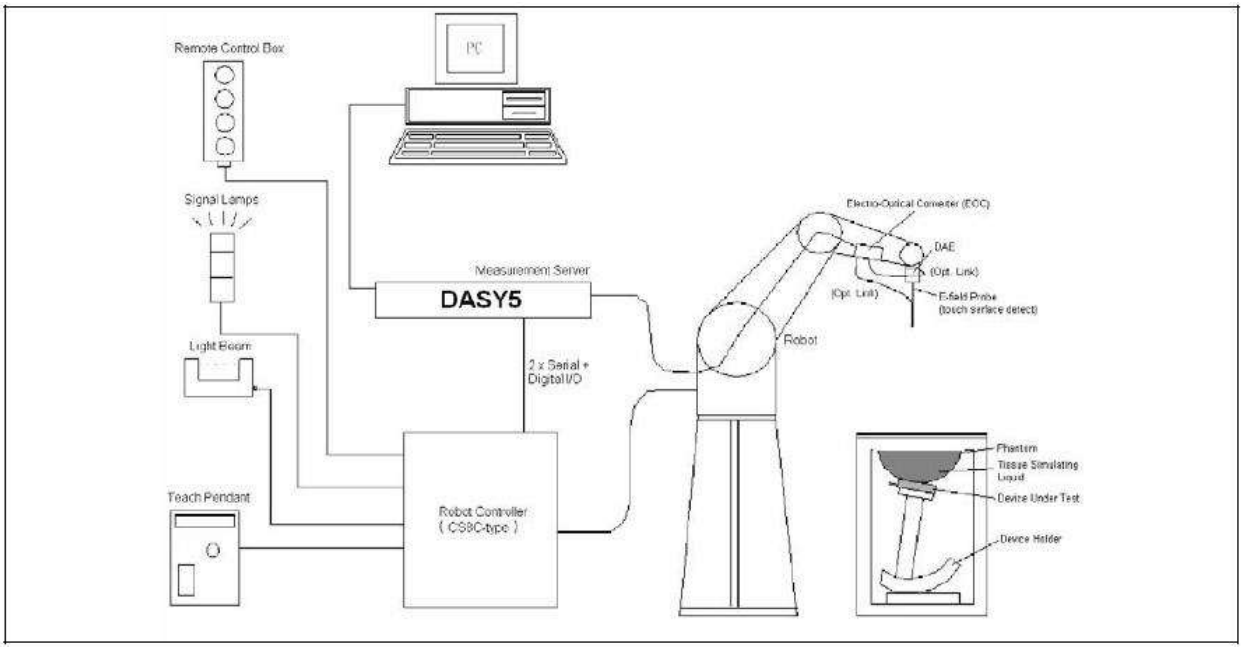
For RFID

Working Frequency of Each Channel: (For RFID)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
14	907.25 MHz	15	907.75 MHz	16	908.25 MHz	17	908.75 MHz
18	909.25 MHz	19	909.75 MHz	20	910.25 MHz	21	910.75 MHz
22	911.25 MHz	23	911.75 MHz	24	912.25 MHz	25	912.75 MHz
26	913.25 MHz	27	913.75 MHz	28	914.25 MHz	29	914.75 MHz
30	915.25 MHz	31	915.25 MHz	32	916.25 MHz	33	916.25 MHz
34	917.25 MHz	35	917.25 MHz	36	918.25 MHz	37	918.25 MHz
38	919.25 MHz	39	919.25 MHz	40	920.25 MHz	41	920.25 MHz

Note: The General Description of the Item, antenna information and Channel List in clause 1 are provided and confirmed by the client.

2 SAR MEASUREMENT SYSTEM

2.1 DASY5 System Description



The DASY5 system for performing compliance tests consists of the following items:
1. A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
3. The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
4. The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
5. A computer running WinXP and the DASY5 software.
6. Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
7. The phantom, the device holder and other accessories according to the targeted measurement.

2.1.1. Applications

Predefined procedures and evaluations for automated compliance testing with all worldwide standards, e.g., IEEE 1528, OET 65, IEC 62209-1, IEC 62209-2, EN 50360, EN 50383, EN62311 and others.

2.1.2. Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 10mm² step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.

When an Area Scan has measured all reachable points, it computes the field maxima found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE 1528-2003 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan).

2.1.3. Zoom Scan (Cube Scan Averaging)

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. A density of 1000 kg/m³ is used to represent the head and Body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1 g cube is 10mm, with the side length of the 10 g cube 21,5mm.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications utilize a physical step of 7x7x7 (5mmx5mmx5mm) providing a volume of 30mm in the X & Y axis, and 30mm in the Z axis.

2.1.4. Uncertainty of Inter-/Extrapolation and Averaging

In order to evaluate the uncertainty of the interpolation, extrapolation and averaged SAR calculation algorithms of the Postprocessor, DASY5 allows the generation of measurement grids which are artificially predefined by analytically based test functions. Therefore, the grids of area scans and zoom scans can be filled with uncertainty test data, according to the SAR benchmark functions of IEEE 1528.The three analytical functions shown in equations as below are used to describe the possible range of the expected SAR distributions for the tested handsets. The field gradients are covered by the spatially flat distribution f1, the spatially steep distribution f3 and f2 accounts for H-field cancellation on the phantom/tissue surface.

$$f_1(x,y,z) = Ae^{-\frac{z}{2a}}\cos^2\left(\frac{\pi}{2}\frac{\sqrt{x'^2+y'^2}}{5a}\right)$$

$$f_2(x,y,z) = Ae^{-\frac{z}{a}}\frac{a^2}{a^2+x'^2}\left(3-e^{-\frac{2z}{a}}\right)\cos^2\left(\frac{\pi}{2}\frac{y'}{3a}\right)$$

$$f_3(x,y,z) = A\frac{a^2}{\frac{a^2}{4}+x'^2+y'^2}\left(e^{-\frac{2z}{a}}+\frac{a^2}{2(a+2z)^2}\right)$$

2.2 DASY5 E-Field Probe

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

SPEAG conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528, EN 62209-1, IEC 62209, etc.) under ISO 17025. The calibration data are in Appendix D**.**

Model	EX3DV4	
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz to 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Overall length: 330 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%.	

2.3 Boundary Detection Unit and Probe Mounting Device

The DASY probes use a precise connector and an additional holder for the probe, consisting of a plastic tube and a flexible silicon ring to center the probe. The connector at the DAE is flexibly mounted and held in the default position with magnets and springs. Two switching systems in the connector mount detect Frontal and lateral probe collisions and trigger the necessary software response.

2.4 DATA Acquisition Electronics (DAE) and Measurement Server

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit.
Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.
The input impedance of the DAE4 is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.

The DASY5 measurement server is based on a PC/104 CPU board with a 400MHz intel ULV Celeron, 128MB chipdisk and 128MB RAM. The necessary circuits for communication with the DAE electronics box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.

2.5 Robot

The DASY5 system uses the high precision robots TX90 XL type out of the newer series from Stäubli SA (France). For the 6-axis controller DASY5 system, the CS8C robot controller version from Stäubli is used. The XL robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller

2.6 Light Beam Unit

The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.
The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.

2.7 Device Holder

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 center 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 permittivity εr =3 and loss tangent 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.

2.8 SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- Left head
- Right head
- Flat phantom

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. 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.

3 TISSUE SIMULATING LIQUID

3.1 The composition of the tissue simulating liquid

INGREDIENT (% Weight)	900MHz Body	2450MHz Body	5250/5600/5750 MHz Body
Water	56.0	73.2	75.68
Salt	0.76	0.01	0.43
Sugar	41.76	0.00	0.00
HEC	1.21	0.00	0.00
Preventol	0.27	0.00	0.00
DGBE	0.00	26.7	4.42
Triton X-100	0.00	0.00	19.47

3.2 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using DASY5 Dielectric Probe Kit and Agilent Vector Network Analyzer E5071C

Body Tissue Simulant Measurement				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		ε_r	σ [s/m]	
900MHz	Reference result ± 5% window	55.0 52.25 to 57.75	1.05 1.00 to 1.10	N/A
	09-21-2020	53.51	1.02	21.0
2450MHz	Reference result ± 5% window	52.7 50.07 to 55.34	1.95 1.85 to 2.05	N/A
	09-21-2020	52.15	1.93	21.0
5250MHz	Reference result ± 5% window	49.0 46.55 to 51.45	5.36 5.09 to 5.63	N/A
	09-21-2020	49.26	5.31	21.0
5600MHz	Reference result ± 5% window	48.5 46.10 to 50.90	5.77 5.48 to 6.06	N/A
	09-21-2020	48.23	5.78	21.0
5750MHz	Reference result ± 5% window	48.3 45.86 to 50.69	5.94 5.65 to 6.24	N/A
	09-21-2020	46.64	6.04	21.0

Body Tissue Simulant Measurement (Test Data: 09-21-2020)								
Frequency [MHz]	Channel	Dielectric Parameters						Tissue Temp. [°C]
		Permittivity ε_r	Conductivity σ	Permittivity Target ε_r	Conductivity Target σ	Delta (ε_r) %	Delta (σ) %	
907.25	Low	53.51	1.02	55.00	1.06	-2.71	-3.77	21.0
913.75	Mid	53.43	1.02	55.00	1.06	-2.85	-3.77	21.0
920.75	High	53.40	1.03	54.99	1.06	-2.89	-2.83	21.0
2412	Low	52.30	1.88	52.75	1.90	-0.85	-1.05	21.0
2437	Mid	52.22	1.90	52.72	1.93	-0.95	-1.55	21.0
2462	High	52.09	1.96	52.68	1.97	-1.12	-0.51	21.0
2480	High	52.03	2.02	52.66	1.99	-1.20	1.51	21.0
5180	Low	49.29	5.20	49.04	5.28	0.51	-1.52	21.0
5190	Low	49.28	5.21	49.03	5.29	0.51	-1.51	21.0
5210	Mid	49.26	5.24	49.07	5.30	0.39	-1.13	21.0
5530	Mid	48.39	5.69	48.61	5.68	-0.45	0.18	21.0
5700	High	47.81	5.94	48.34	5.88	-1.10	1.02	21.0
5745	Low	47.61	6.01	48.28	5.93	-1.39	1.35	21.0
5775	Mid	47.55	6.04	48.23	5.97	-1.41	1.17	21.0

Note:

1. The delta (ε_r) and (σ) are within ±5%, delta SAR value was not calculated in this report.
2. As per IEC 62209-2 Annex F, the SAR correction factor is given by:

   $\Delta SAR = c_\varepsilon \Delta\varepsilon_r + c_\sigma \Delta\sigma$

   For the1g average SAR Cε and Cσ are given by:

   Cε = -7.854x10^-4f^3 + 9.402x10^-3f^2 – 2.742x10^-2f – 0.2026

   Cσ = 9.804x10^-3f^3 – 8.661x10^-2f^2 + 2.981x10^-2f + 0.7829

   Where f is the frequency in GHz.

Body Tissue Simulant Measurement (Test Data: 09-21-2020)							
Frequency [MHz]	Channel	Dielectric Parameters					Tissue Temp. [°C]
		Delta (ε_r) %	Delta (σ) %	Cε	Cσ	Delta SAR%	
907.25	Low	-2.71	-3.77	-0.22	0.75	-2.22	21.0
913.75	Mid	-2.85	-3.77	-0.22	0.75	-2.18	21.0
920.75	High	-2.89	-2.83	-0.22	0.74	-1.47	21.0
2412	Low	-0.85	-1.05	-0.23	0.49	-0.32	21.0
2437	Mid	-0.95	-1.55	-0.22	0.48	-0.54	21.0
2462	High	-1.12	-0.51	-0.22	0.48	0.01	21.0
2480	High	-1.20	1.51	-0.22	0.47	0.98	21.0
5180	Low	0.51	-1.52	-0.20	-0.02	-0.07	21.0
5190	Low	0.51	-1.51	-0.20	-0.02	-0.07	21.0
5210	Low	0.39	-1.13	-0.20	-0.03	-0.05	21.0
5220	Mid	-0.45	0.18	-0.20	-0.04	0.08	21.0
5530	Mid	-1.10	1.02	-0.20	-0.05	0.17	21.0
5745	Low	-1.39	1.35	-0.20	-0.05	0.21	21.0
5775	Mid	-1.41	1.17	-0.20	-0.05	0.23	21.0

Note: The ΔSAR refers to the percent change in SAR relative to the percent change in dielectric properties versus the target values. Anegative ΔSAR would translate to a lower measured SAR value than what would be measured if using dielectric properties equal to the target values. A positive ΔSAR would translate to a higher measured SAR value than what would be measured if using dielectric properties equal to the target values. SAR correction shall not be made when the ΔSAR has a positive sign to provide a conservative SAR value.The SAR is only corrected when ΔSAR has a negative sign.

3.3 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and Body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

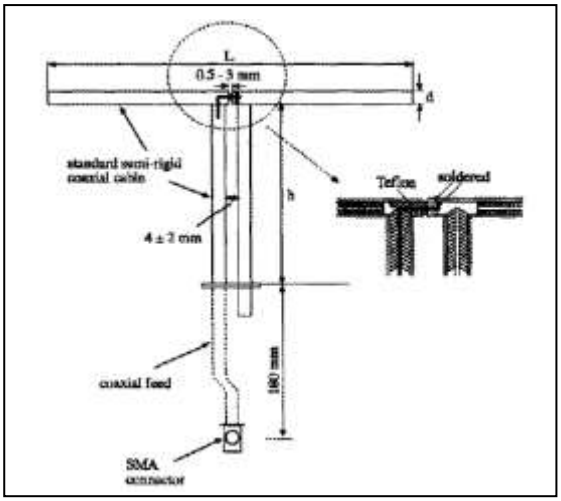
Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	**55.0**	**1.05**
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	**52.7**	**1.95**
3000	38.5	2.40	52.0	2.73
5800	35.3	5.07	**48.2**	**6.00**

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

4 SAR MEASUREMENT PROCEDURE

4.1 SAR System Validation

4.1.1. Validation Dipoles



The dipoles used is based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of both IEEE and FCC Supplement C. the table below provides details for the mechanical and electrical specifications for the dipoles.

Frequency	L (mm)	h (mm)	d (mm)
900MHz	149.0	83.3	3.6
2450MHz	53.5	30.4	3.6
5250MHz	20.6	14.2	3.6
5600MHz	20.6	14.2	3.6
5750MHz	20.6	14.2	3.6

4.1.2. Validation Result

System Performance Check Body at 2450MHz, 5250MHz, 5600MHz and 5750MHz Validation Dipole: D2450V2, SN: 839; D5GHzV2, SN: 1078				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
900 MHz	Reference result ± 10% window	11.1 9.99 to 12.21	7.23 6.51 to 7.95	N/A
	09-21-2020	10.04	6.64	21.0
2450 MHz	Reference result ± 10% window	51.2 46.08 to 56.32	23.6 21.24 to 25.96	N/A
	09-21-2020	50.4	23.48	21.0
5250 MHz	Reference result ± 10% window	75.5 67.95 to 83.05	21.6 19.44 to 23.76	N/A
	10-19-2020	86.1	23.2	21.0
5600 MHz	Reference result ± 10% window	79.7 71.73 to 87.67	23.0 20.7 to 25.3	N/A
	10-19-2020	72.2	21.3	21.0
5750 MHz	Reference result ± 10% window	78.6 70.74 to 86.46	22.4 20.16 to 24.64	N/A
	10-19-2020	74.6	23.3	21.0
Note: All SAR values are normalized to 1W forward power.				

4.2 SAR Measurement Procedure

The DASY 5 calculates SAR using the following equation,

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

σ: represents the simulated tissue conductivity

ρ: represents the tissue density

The EUT is set to transmit at the required power in line with product specification, at each frequency relating to the LOW, MID, and HIGH channel settings.

Pre-scans are made on the device to establish the location for the transmitting antenna, using a large area scan in either air or tissue simulation fluid.

The EUT is placed against the Universal Phantom where the maximum area scan dimensions are larger than the physical size of the resonating antenna. When the scan size is not large enough to cover the peak SAR distribution, it is modified by either extending the area scan size in both the X and Y directions, or the device is shifted within the predefined area.

The area scan is then run to establish the peak SAR location (interpolated resolution set at 1mm²) which is then used to orient the center of the zoom scan. The zoom scan is then executed and the 1g and 10g averages are derived from the zoom scan volume (interpolated resolution set at 1mm³).

4.3 SAR Measurement Procedure

4.3.1. Duty Factor Control

Unless it is permitted by specific KDB procedures or continuous transmission is specifically restricted by the device, the reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

4.3.2. Initial Test Position SAR Test Reduction Procedure

DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.16 The initial test position procedure is described in the following:

When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (reMaining) test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band. SAR is also not required for that exposure configuration in the subsequent test configuration(s).

a) When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest extrapolated or estimated 1-g SAR conditions determined by area scans or next closest/smallest test separation distance and maximum RF coupling test positions based on manufacturer justification, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions (left, right, touch, tilt or subsequent surfaces and Edges) are tested.

b) For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
Additional power measurements may be required for this step, which should be limited to those necessary for identifying the subsequent highest output power channels.

5 SAR EXPOSURE LIMITS

SAR assessments have been made in line with the requirements of IEEE-1528, FCC Supplement C, and comply with ANSI/IEEE C95.1-1992 “Uncontrolled Environments” limits. These limits apply to a location which is deemed as “Uncontrolled Environment” which can be described as a situation where the general public may be exposed to an RF source with no prior knowlEdge or control over their exposure.

Limits for General Population/Uncontrolled Exposure (W/kg)

Type Exposure	Uncontrolled Environment Limit
Spatial Peak SAR (1g cube tissue for brain or Body)	**1.6 W/kg**
Spatial Average SAR (whole Body)	**0.08 W/kg**
Spatial Peak SAR (10g for hands, feet, ankles and wrist)	**4.00 W/kg**

6 TEST EQUIPMENT LIST

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
Stäubli Robot TX60L	Stäubli	TX60L	F10/5C90A1/A/01	N/A
Controller	Stäubli	SP1	S-0034	N/A
Dipole Validation Kits	Speag	D900V2	1d096	2022.03.27
Dipole Validation Kits	Speag	D2450V2	839	2021.03.24
Dipole Validation Kits	Speag	D5GHzV2	1078	2021.03.21
SAM Twin Phantom	Speag	SAM	TP-1561/1562	N/A
ELI1 Phantom	Speag	QDOVA002AA	TP:2106	N/A
Device Holder	Speag	SD 000 H01 HA	N/A	N/A
Data Acquisition Electronic	Speag	DAE4	1220	2021.04.26
E-Field Probe	Speag	EX3DV4	3710	2021.04.20
SAR Software	Speag	DASY5	V5.2 Build 162	N/A
Power Amplifier	Mini-Circuit	ZVA-183-S+	N657400950	N/A
Directional Coupler	Agilent	778D	20160	N/A
Vector Network	Agilent	E5071C	MY48367267	2021.03.09
Signal Generator	Agilent	E4438C	MY49070163	2021.03.09
Spectrum Analyzer	Agilent	N9010A	MY48030494	2021.08.24
Temperature/Humidity Meter	Zhichen	ZC1-2	N/A	2021.04.16
Temperature Meter	Dretec	O-274	RF-001	2020.11.05

7 MEASUREMENT UNCERTAINTY

DASY5 Uncertainty according to IEEE std. 1528-2013 Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram / 10 gram.								
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) veff
Measurement System								
Probe Calibration	±6.0%	N	1	1	1	±6.0%	±6.0%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (target)	±5.0%	R	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Permittivity (target)	±5.0%	R	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Std. Uncertainty						±11.0%	±10.8%	387
Expanded STD Uncertainty						±22.0%	±21.5%	

DASY5 Uncertainty according to IEEE std. 1528-2013 Measurement uncertainty for 3 GHz to 6 GHz averaged over 1 gram / 10 gram.								
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) veff
Measurement System								
Probe Calibration	±6.55%	N	1	1	1	±6.55%	±6.55%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±2.0%	R	$\sqrt{3}$	1	1	±1.2%	±1.2%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Probe Positioning	±9.9%	R	$\sqrt{3}$	1	1	±5.7%	±5.7%	∞
Max. SAR Eval.	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (target)	±5.0%	R	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Permittivity (target)	±5.0%	R	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Std. Uncertainty						±12.8%	±12.6%	330
Expanded STD Uncertainty						±25.6%	±25.2%	

Measurement uncertainty evaluation template for system repeatability

Measurement uncertainty for 30 MHz to 6 GHz averaged over 1 gram / 10 gram.

Error Description	Uncert. Value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) veff
Measurement System								
Probe Calibration	±6.5%	N	1	1	1	±6.5%	±6.5%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±2.0%	R	$\sqrt{3}$	0	0	±1.2%	±1.2%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
Modulation Response	±2.4%	R	$\sqrt{3}$	0	0	±1.4%	±1.4%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	0	0	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	0	0	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	0	0	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	0	0	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	0	0	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	0	0	±1.7%	±1.7%	∞
Probe Positioner	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Probe Positioning	±6.7%	R	$\sqrt{3}$	1	1	±3.9%	±3.9%	∞
Post-processing	±4.0%	R	$\sqrt{3}$	0	0	±2.3%	±2.3%	∞
Test Sample Related								
Test Sample Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±0.0%	R	$\sqrt{3}$	1	1	±0.0%	±0.0%	∞
Power Scaling	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±7.9%	R	$\sqrt{3}$	1	1	±4.6%	±4.6%	∞
SAR correction	±1.9%	R	$\sqrt{3}$	1	1	±1.1%	±0.9%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.26	0.26	±0.6%	±0.7%	∞
Temp. unc. - Conductivity	±5.2%	R	$\sqrt{3}$	0.78	0.71	±2.3%	±2.1%	∞
Temp. unc. - Permittivity	±0.8%	R	$\sqrt{3}$	0.23	0.26	±0.1%	±0.1%	∞
Combined Std. Uncertainty						±12.8%	±12.7%	748
Expanded STD Uncertainty						±25.6%	±25.4%	

8 CONDUCTED POWER MEASUREMENT

2.4GHz WLAN Duty Cycle

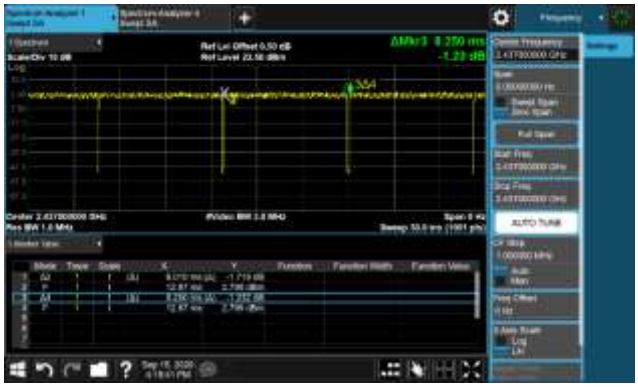
Test Mode	Tx On (ms)	Tx Off (ms)	Tx On + Tx Off (ms)	Duty Cycle (%)
802.11b	--		--	100.00
802.11g	19.98	0.18	20.16	99.11
802.11n(20MHz)	16.65	0.25	16.90	98.52
802.11n(40MHz)	8.01	0.24	8.25	97.09

802.11b

802.11g

802.11n(20MHz)

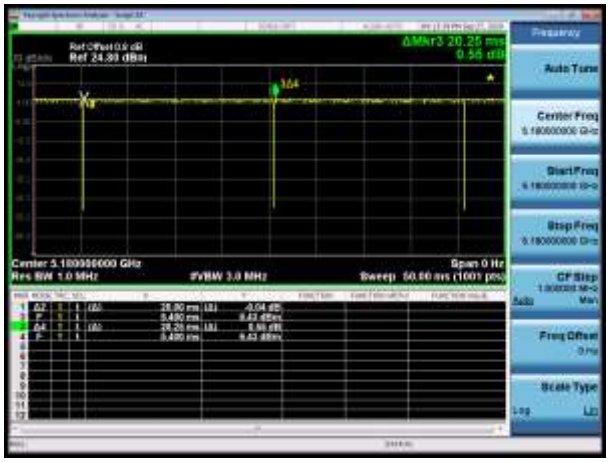
802.11n(40MHz)



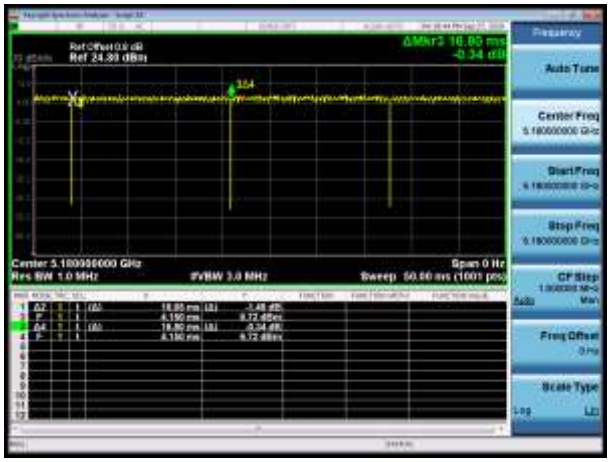
5GHz WLAN Duty Cycle

Test Mode	Tx On (ms)	Tx Off (ms)	Tx On + Tx Off (ms)	Duty Cycle (%)
802.11a	20.00	0.25	20.25	98.77
802.11n(20MHz)	16.65	0.15	16.80	99.11
802.11n(40MHz)	8.04	0.12	8.16	98.53
802.11ac(20MHz)	16.65	0.20	16.85	98.81
802.11ac(40MHz)	8.02	0.16	8.18	98.04
802.11ac(80MHz)	3.71	0.14	3.85	96.36

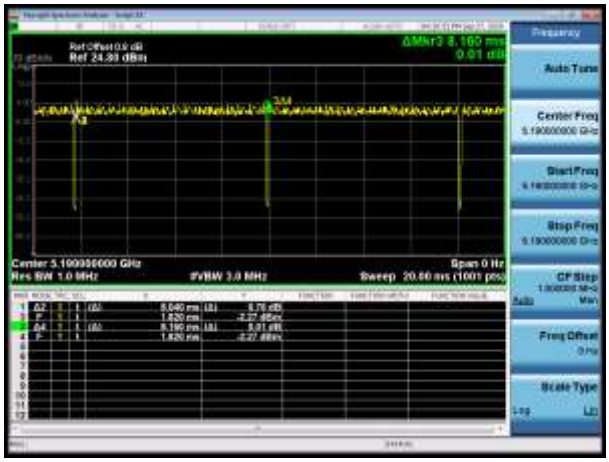
802.11a



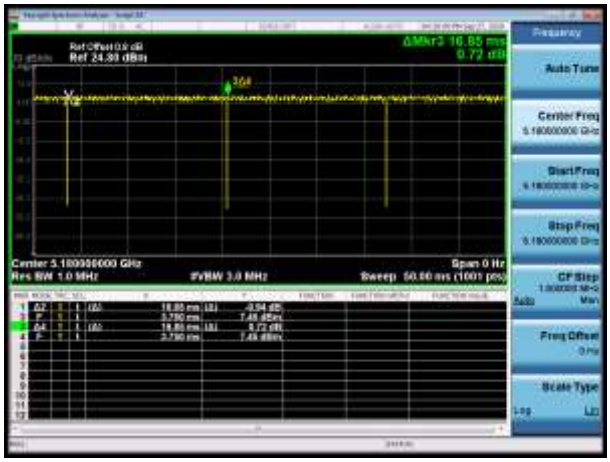
802.11 n(20MHz)

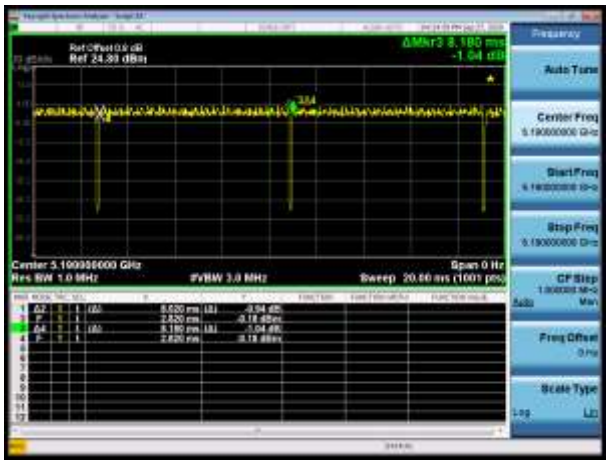
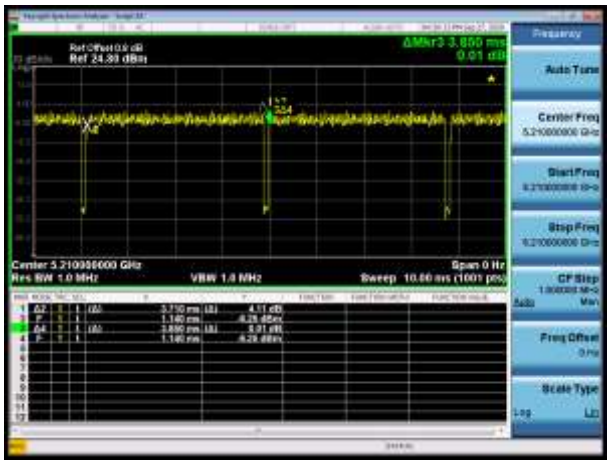


802.11 n(40MHz)



802.11 ac(20MHz)



802.11 ac(40MHz)	802.11 ac(80MHz)
	

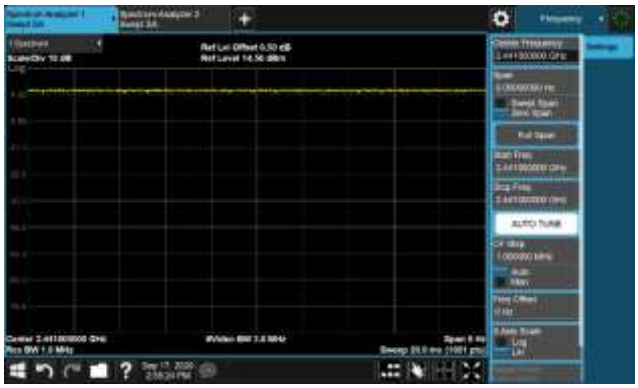
Bluetooth Duty Cycle

Test Mode	Tx On (ms)	Tx Off (ms)	Tx On + Tx Off (ms)	Duty Cycle (%)
DH5	--	--	--	100.00
2DH5	--	--	--	100.00
3DH5	--	--	--	100.00
LE_1M	0.403	0.222	0.625	64.48

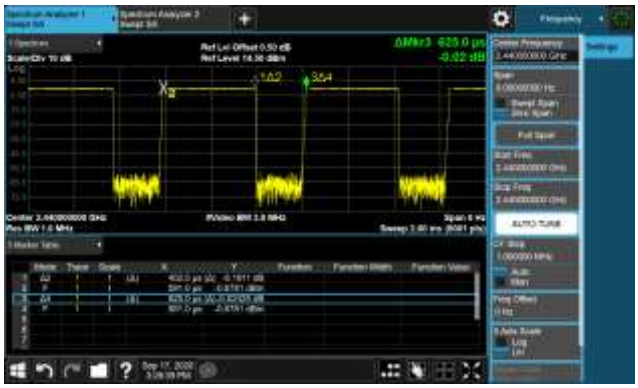
DH5

2DH5

3DH5



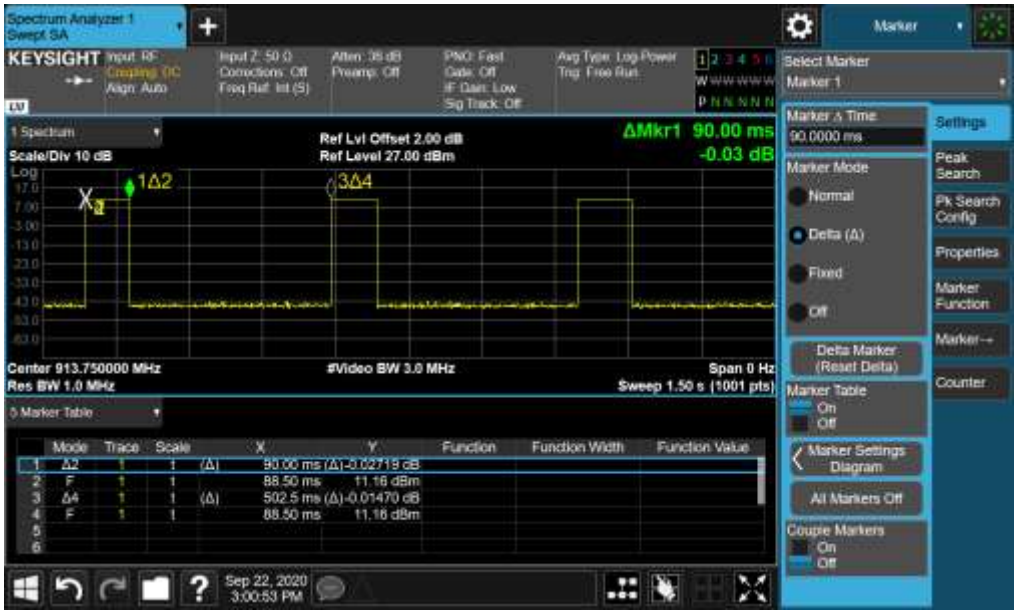
LE_1M



RFID Duty Cycle

Test Mode	Tx On (ms)	Tx Off (ms)	Period (ms)	Duty Cycle (%)
ASK	90.00	412.50	100.00	90%

ASK



For 2.4G:

Test Mode	Test Conditions	Frequency (MHz)	Avg. Power (dBm)	Duty cycle (%)	Tune-up Power (dBm)	Scaling Factor
802.11b	Tnom (25℃)	2412	17.08	100.00	17.5	1.102
		2437	19.79	100.00	20.0	1.050
		2462	17.68	100.00	18.0	1.076
802.11g	Tnom (25℃)	2412	21.84	99.11	22.0	1.037
		2437	24.24	99.11	24.5	1.061
		2462	22.37	99.11	22.5	1.030
802.11n(20MHz)	Tnom (25℃)	2412	22.31	98.52	22.5	1.046
		2437	24.47	98.52	25.0	1.131
		2462	22.61	98.52	23.0	1.095
802.11n(40MHz)	Tnom (25℃)	2422	21.90	97.09	22.5	1.148
		2437	23.96	97.09	24.5	1.132
		2452	23.28	97.09	23.5	1.052

For 5G

Test Mode	Test Conditions	Frequency (MHz)	Avg. Power (dBm)	Duty cycle (%)	Tune-up Power (dBm)	Scaling Factor
802.11a	Tnom (25℃)	5180	13.02	98.77	13.5	1.117
		5220	12.52	98.77	13.0	1.117
		5240	12.58	98.77	13.0	1.102
		5260	12.39	98.77	12.5	1.026
		5300	11.96	98.77	12.5	1.132
		5320	11.71	98.77	12.0	1.069
		5500	12.52	98.77	13.0	1.117
		5580	13.61	98.77	14.0	1.094
		5700	14.39	98.77	14.5	1.026
		5745	13.82	98.77	14.0	1.042
		5785	13.43	98.77	14.0	1.140
		5825	13.26	98.77	13.5	1.057
802.11n(20MHz)	Tnom (25℃)	5180	13.16	99.11	13.5	1.081
		5220	12.58	99.11	13.0	1.102
		5240	12.57	99.11	13.0	1.104
		5260	12.34	99.11	12.5	1.038
		5300	11.95	99.11	12.5	1.135
		5320	11.72	99.11	12.0	1.067
		5500	12.41	99.11	13.0	1.146
		5580	13.56	99.11	14.0	1.107
		5700	14.31	99.11	14.5	1.045
		5745	13.79	99.11	14.0	1.050
		5785	13.35	99.11	13.5	1.035
		5825	13.17	99.11	13.5	1.079

Test Mode	Test Conditions	Frequency (MHz)	Avg. Power (dBm)	Duty cycle (%)	Tune-up Power (dBm)	Scaling Factor
802.11n(40MHz)	Tnom (25℃)	5190	13.83	98.53	14.0	1.040
		5230	13.53	98.53	14.0	1.114
		5270	13.04	98.53	13.5	1.112
		5310	12.61	98.53	13.0	1.094
		5510	13.12	98.53	13.5	1.091
		5550	13.58	98.53	14.0	1.102
		5670	15.04	98.53	15.5	1.112
		5755	14.35	98.53	14.5	1.035
		5795	14.18	98.53	14.5	1.076
802.11ac (20MHz)	Tnom (25℃)	5180	13.21	98.81	13.5	1.069
		5220	12.52	98.81	13.0	1.117
		5240	12.54	98.81	13.0	1.112
		5260	12.31	98.81	12.5	1.045
		5300	11.91	98.81	12.5	1.146
		5320	11.69	98.81	12.0	1.074
		5500	12.41	98.81	13.0	1.146
		5580	13.55	98.81	14.0	1.109
		5700	14.34	98.81	14.5	1.038
		5745	13.76	98.81	14.0	1.057
		5785	13.37	98.81	13.5	1.030
		5825	13.16	98.81	13.5	1.081

Test Mode	Test Conditions	Frequency (MHz)	Avg. Power (dBm)	Duty cycle (%)	Tune-up Power (dBm)	Scaling Factor
802.11ac (40MHz)	Tnom (25℃)	5190	13.85	98.04	14.0	1.035
		5230	13.51	98.04	14.0	1.119
		5270	13.05	98.04	13.5	1.109
		5310	12.58	98.04	13.0	1.102
		5510	13.09	98.04	13.5	1.099
		5550	13.56	98.04	14.0	1.107
		5670	15.02	98.04	15.5	1.117
		5755	14.36	98.04	14.5	1.033
		5795	14.18	98.04	14.5	1.076
802.11ac (80MHz)	Tnom (25℃)	5210	12.86	96.36	13.0	1.033
		5290	12.26	96.36	12.5	1.057
		5530	12.89	96.36	13.0	1.026
		5775	13.61	96.36	14.0	1.094

For BT

Test Mode	Test Conditions	Frequency (MHz)	Avg. Power (dBm)	Duty cycle (%)	Tune-up Power (dBm)	Scaling Factor
DH5	Tnom (25℃)	2402	4.54	100.00	5.0	1.112
		2441	4.54	100.00	5.0	1.112
		2480	4.99	100.00	5.5	1.125
2DH5	Tnom (25℃)	2402	3.88	100.00	4.0	1.028
		2441	3.71	100.00	4.0	1.069
		2480	4.12	100.00	4.5	1.091
3DH5	Tnom (25℃)	2402	4.18	100.00	4.5	1.076
		2441	4.09	100.00	4.5	1.099
		2480	4.44	100.00	5.0	1.138
LE_1M	Tnom (25℃)	2402	-4.65	64.40	-4.5	1.035
		2440	-5.53	64.40	-5.0	1.130
		2480	-2.84	64.40	-2.5	1.082

For RFID:

Test Mode	Test Conditions	Frequency (MHz)	Avg. Power (dBm)	Duty cycle (%)	Tune-up Power (dBm)	Scaling Factor
ASK	Tnom (25℃)	907.25	15.98	90.00	16.5	1.127
		913.75	16.74	90.00	17.0	1.061
		920.75	17.04	90.00	17.5	1.111

9 TEST PROCEDURES

9.1 SAR Test Results Summary

2.4GHz WLAN SAR Measurement									
Ambient Temperature (°C) : 21.5 ± 2			Relative Humidity (%): 52						
Liquid Temperature (°C) : 21.0 ± 2			Depth of Liquid (cm):>15						
Product Name: Scanner									
Limb SAR: Spacing 0mm									
Test Mode	Side	Frequency (MHz)	Frame Power (dBm)	Power Drift (<±0.2)	SAR 10g (W/kg)	Scaling Factor	Duty factor	Scaled SAR 10g (W/kg)	Limit (W/kg)
802.11b	Bottom	2437	19.79	0.19	0.041	1.050	1.00	0.043	4.0
802.11b	Top	2437	19.79	0.15	0.115	1.050	1.00	0.121	4.0
802.11b	Right	2437	19.79	-0.15	0.449	1.050	1.00	0.471	4.0
802.11b	Left	2437	19.79	-0.14	0.021	1.050	1.00	0.022	4.0
802.11b	Front	2437	19.79	0.17	0.003	1.050	1.00	0.003	4.0
802.11b	Back	2437	19.79	0.01	0.006	1.050	1.00	0.006	4.0
802.11b	Right	2412	17.08	0.03	0.433	1.102	1.00	**0.477**	4.0
802.11b	Right	2462	17.68	0.00	0.327	1.076	1.00	0.352	4.0
802.11g	Right	2437	24.24	0.08	0.318	1.061	1.01	0.341	4.0
802.11n (40MHz)	Right	2452	23.28	0.15	0.372	1.052	1.03	0.403	4.0

5GHz WLAN SAR Measurement									
Ambient Temperature (°C) : 21.5 ± 2				Relative Humidity (%): 52					
Liquid Temperature (°C) : 21.0 ± 2				Depth of Liquid (cm):>15					
Product Name: Scanner									
Limb SAR: Spacing 0mm									
Test Mode	Side	Frequency (MHz)	Frame Power (dBm)	Power Drift (<±0.2)	SAR 10g (W/kg)	Scaling Factor	Duty factor	Scaled SAR 10g (W/kg)	Limit (W/kg)
802.11ac (40MHz)	Bottom	5190	13.85	0.08	0.017	1.035	1.04	0.018	4.0
802.11ac (40MHz)	Top	5190	13.85	-0.03	0.446	1.035	1.04	0.480	4.0
802.11ac (40MHz)	Right	5190	13.85	-0.15	0.634	1.035	1.04	0.682	4.0
802.11ac (40MHz)	Left	5190	13.85	0.11	0.040	1.035	1.04	0.043	4.0
802.11ac (40MHz)	Front	5190	13.85	-0.13	0.011	1.035	1.04	0.012	4.0
802.11ac (4s0MHz)	Back	5190	13.85	0.16	0.011	1.035	1.04	0.012	4.0
802.11a	Right	5180	13.02	0.00	0.590	1.117	1.01	0.666	4.0
802.11a	Right	5700	14.39	-0.07	0.737	1.117	1.01	0.831	4.0
802.11a	Right	5745	13.82	0.12	0.713	1.117	1.01	0.804	4.0
802.11ac (80MHz)	Right	5210	12.86	-0.09	0.793	1.033	1.04	0.852	4.0
802.11ac (80MHz)	Right	5530	12.89	0.07	1.200	1.026	1.04	**1.280**	4.0
802.11ac (80MHz)	Right	5775	13.61	-0.11	0.746	1.094	1.04	0.849	4.0

Bluetooth SAR Measurement									
Ambient Temperature (°C) : 21.5 ± 2				Relative Humidity (%): 52					
Liquid Temperature (°C) : 21.0 ± 2				Depth of Liquid (cm):>15					
Product Name: Scanner									
Limb SAR: Spacing 0mm									
Test Mode	Side	Frequency (MHz)	Frame Power (dBm)	Power Drift (<±0.2)	SAR 10g (W/kg)	Scaling Factor	Duty factor	Scaled SAR 10g (W/kg)	Limit (W/kg)
DH5	Side 3	2480	4.99	0.03	0.047	1.074	1.000	**0.050**	4.0

RFID SAR Measurement									
Ambient Temperature (°C) : 21.5 ± 2				Relative Humidity (%): 52					
Liquid Temperature (°C) : 21.0 ± 2				Depth of Liquid (cm):>15					
Product Name: Scanner									
Limb SAR: Spacing 0mm									
Test Mode	Side	Frequency (MHz)	Frame Power (dBm)	Power Drift (<±0.2)	SAR 10g (W/kg)	Scaling Factor	Duty factor	Scaled SAR 10g (W/kg)	Limit (W/kg)
Internal antenna	Side 3	907.25	15.98	0.14	0.071	1.114	1.111	0.088	4.0
Internal antenna	Side 3	913.75	16.74	0.04	0.076	1.114	1.111	0.094	4.0
Internal antenna	Side 3	920.75	17.04	-0.13	0.077	1.114	1.111	**0.095**	4.0
External antenna	Side 3	907.25	15.98	0.14	0.003	1.114	1.111	0.004	4.0
External antenna	Side 3	913.75	16.74	0.04	0.003	1.114	1.111	0.004	4.0
External antenna	Side 3	920.75	17.04	-0.13	0.002	1.114	1.111	0.003	4.0

Note: 1: When the reported SAR of the initial test position is > 0.4 W/kg, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions (Front, Back and Edges) are tested.

2: For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or

all required channels are tested.

3: Reported SAR were scaled to the maximum duty factor to demonstrate compliance per FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02.

4: Tissue correction is only applied when the △SAR is negative value according to NOTICE 2012-DRS0529.

5: * - repeated at the highest measured SAR according to the FCC KDB 865664, Because the ratio of largest to smallest SAR for the original and first repeated measurements is ＜ 1.20, there is no need to second repeated measurement.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps through 4) do not apply
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20

Test Mode	Test Position	Frequency (MHz)	Measured SAR 1g (W/kg)	1st Repeated SAR 1g (W/kg)	Ratio	2nd Repeated SAR 1g (W/kg)	3rd Repeated SAR 1g (W/kg)
802.11ac (80MHz)	Right	5530	1.200	1.193	0.58%	N/A	N/A

9.2 Simultaneous Transmission Analysis

1	WLAN 2.4GHz + RFID
2	WLAN 5GHz + RFID
3	BT + RFID

Simultaneous Transmission of Wi-Fi and other wireless technologies

Mode	WLAN 2.4GHz SAR (W/kg)	WLAN 5GHz SAR (W/kg)	RFID SAR (W/kg)	Simultaneous Transmission	Antenna Pair in mm	Peak location Separation radio
WLAN 2.4GHz + RFID	0.477	--	0.095	0.572	N/A	N/A
WLAN 5GHz + RFID	--	1.280	0.095	1.375	N/A	N/A
Mode	BT SAR (W/kg)		RFID SAR (W/kg)	Simultaneous Transmission	Antenna Pair in mm	Peak location Separation radio
BT + RFID	0.050		0.095	0.145	N/A	N/A

Note: The sum of value is less than 1.6W/kg or The ratio is determined by (SAR1+ SAR2)^1.5/Ri, rounded to two decimal digits, and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for SAR test exclusion.

9.3 Test position and configuration

1. Liquid tissue depth was at least 15.0 cm for all frequencies.
2. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
3. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
4. Reported SAR were scaled to the maximum duty factor to demonstrate compliance per FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02.
5. SAR was performed with the device configured in the positions according to KDB 447498 D01 SAR Procedures for general, Body SAR was performed with the device to phantom separation distance of 10mm.
6. SAR was performed with the device configured in the positions according to KDB 447498 D01 SAR Procedures for general, Limb SAR was performed with the device to phantom separation distance of 0mm.
7. Because of the Hand-held device, so addition tests are performed at five positions (Front, Back, Top, Right, Left).

WLAN Notes:
When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 1g averaged SAR is <0.8 W/kg, SAR testing on other default channels is not required.

Appendix A. SAR System Validation Data

Date/Time: 21/09/2020

Test Laboratory: DEKRA Lab

System Check body 2450MHz

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2

Communication System: UID 0, CW; Communication System Band: D2450(2450MHz); Duty Cycle: 1:1;

Frequency: 2450 MHz; Medium parameters used: f = 2450 MHz; σ = 1.93 S/m; εr = 52.15; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ; Input Power=250mW

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

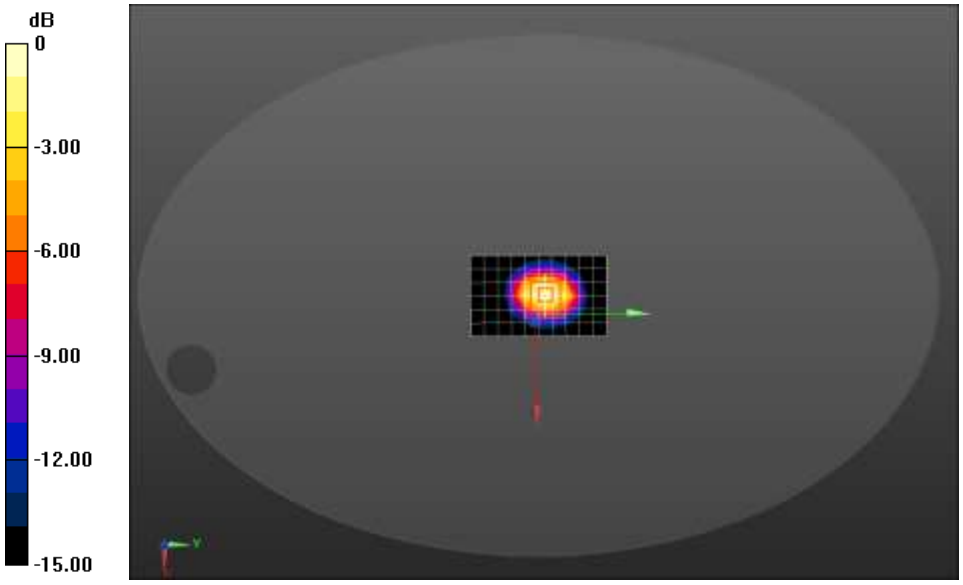
- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/System Check body 2450MHz/Area Scan (7x11x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 13.6 W/kg

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

Reference Value = 84.18 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 25.5 W/kg

SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.87 W/kg Maximum value of SAR (measured) = 14.6 W/kg



0 dB = 14.6 W/kg = 11.64 dBW/kg

Date/Time: 19/10/2020

Test Laboratory: DEKRA Lab

System Check Body 5250MHz

DUT: Dipole D5GHzV2; Type: D5GHzV2

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1; Frequency: 5250 MHz; Medium parameters used: f = 5250 MHz; σ = 5.27 S/m; εr = 49.20; ρ = 1000 kg/m3 ; Phantom section: Flat Section ; Input Power=100mW

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

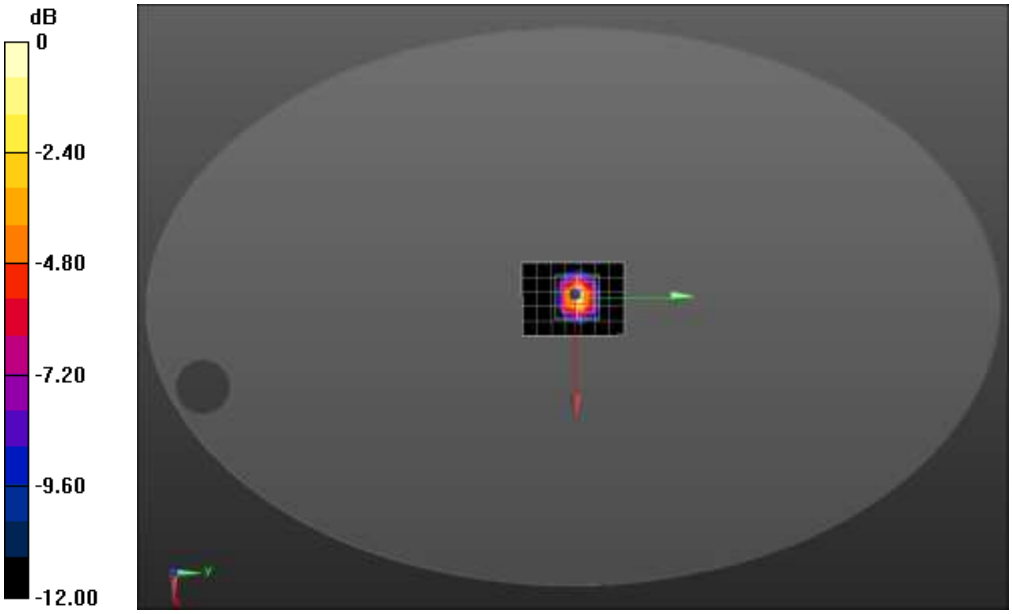
- Probe: EX3DV4 - SN3710; ConvF(4.57, 4.57, 4.57); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/System Check Body 5250MHz/Area Scan (6x8x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 6.81 W/kg

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

Reference Value = 30.13 V/m; Power Drift = 0.15 dB Peak SAR (extrapolated) = 50.4 W/kg

SAR(1 g) = 8.61 W/kg; SAR(10 g) = 2.32 W/kg Maximum value of SAR (measured) = 8.16 W/kg



0 dB = 8.16 W/kg = 9.12 dBW/kg

Date/Time: 19/10/2020

Test Laboratory: DEKRA Lab

System Check Body 5600MHz

DUT: Dipole D5GHzV2; Type: D5GHzV2

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1; Frequency: 5600 MHz; Medium parameters used: f = 5600 MHz; σ = 5.76 S/m; εr = 48.15; ρ = 1000 kg/m3 ; Phantom section: Flat Section ; Input Power=100mW

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

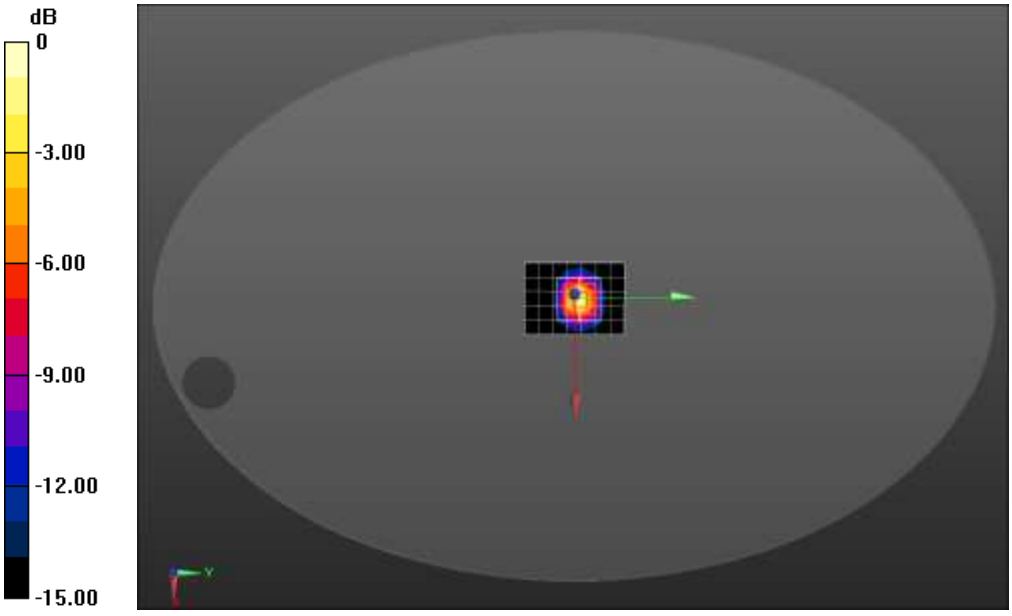
- Probe: EX3DV4 - SN3710; ConvF(3.98, 3.98, 3.98); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/System Check Body 5600MHz/Area Scan (6x8x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 7.17 W/kg

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

Reference Value = 34.03 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 23.6 W/kg

SAR(1 g) = 7.22 W/kg; SAR(10 g) = 2.13 W/kg Maximum value of SAR (measured) = 8.92 W/kg



0 dB = 8.92 W/kg = 9.50 dBW/kg

Date/Time: 19/10/2020

Test Laboratory: DEKRA Lab

System Check Body 5750MHz

DUT: Dipole D5GHzV2; Type: D5GHzV2

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1; Frequency: 5750 MHz; Medium parameters used: f = 5750 MHz; σ = 6.01 S/m; εr = 47.59; ρ = 1000 kg/m3 ; Phantom section: Flat Section ; Input Power=100mW

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

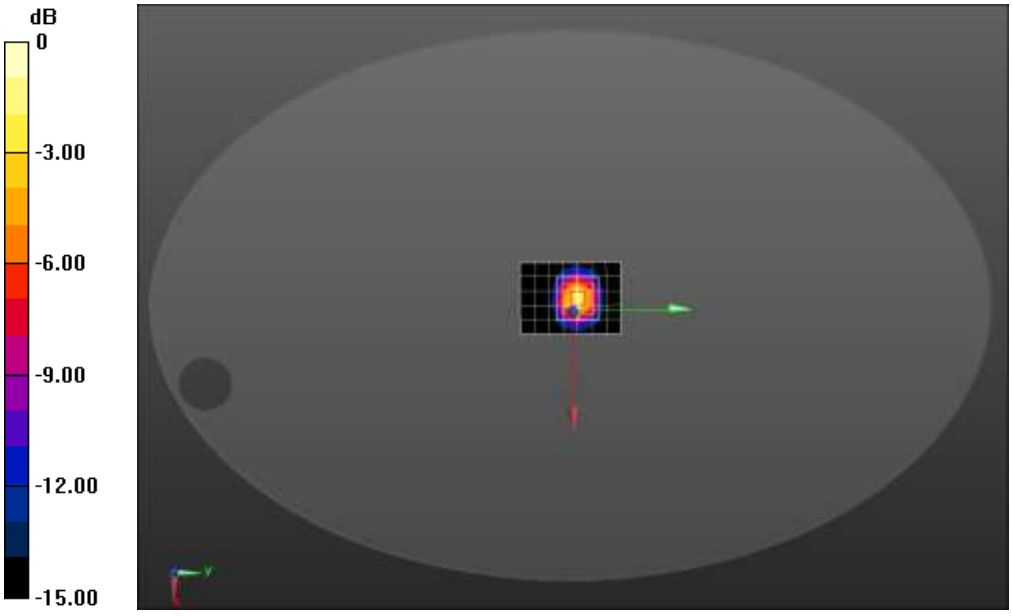
- Probe: EX3DV4 - SN3710; ConvF(4.01, 4.01, 4.01); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/System Check Body 5750MHz/Area Scan (6x8x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 6.81 W/kg

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

Reference Value = 30.57 V/m; Power Drift = 0.11 dB Peak SAR (extrapolated) = 23.8 W/kg

SAR(1 g) = 7.46 W/kg; SAR(10 g) = 2.33 W/kg Maximum value of SAR (measured) = 8.85 W/kg



0 dB = 8.85 W/kg = 9.47 dBW/kg

Date/Time: 26/09/2020

Test Laboratory: DEKRA Lab

System Check Body 900MHz

DUT: Dipole 900 MHz D900V2; Type: D900V2

Communication System: UID 0, CW (0); Communication System Band: D900(900.0MHz); Duty Cycle: 1:1; Frequency: 900 MHz; Medium parameters used: f = 900 MHz; σ = 1.02 S/m; εr = 53.51; ρ = 1000 kg/m3 ; Phantom section: Flat Section ; Input Power=250mW

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

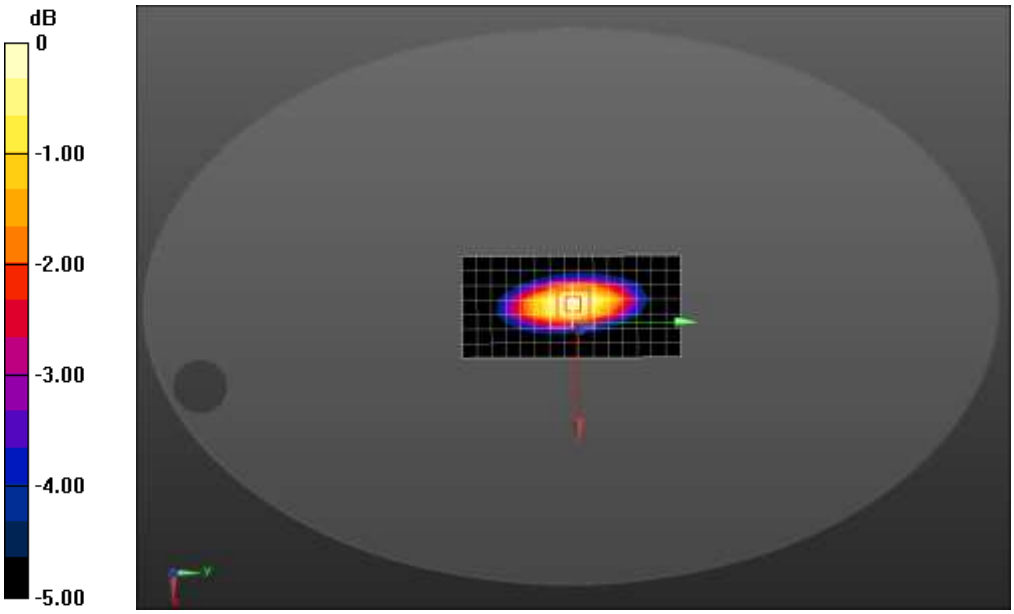
- Probe: EX3DV4 - SN3710; ConvF(9.25, 9.25, 9.25); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/System Check Body 900MHz/Area Scan (8x16x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 2.53 W/kg

Configuration/System Check Body 900MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 51.19 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 3.64 W/kg

SAR(1 g) = 2.51 W/kg; SAR(10 g) = 1.66 W/kg Maximum value of SAR (measured) = 2.60 W/kg



0 dB = 2.60 W/kg = 4.15 dBW/kg

Appendix B. SAR measurement Data

2.4G Wifi

Date/Time: 22/09/2020

Test Laboratory: DEKRA Lab

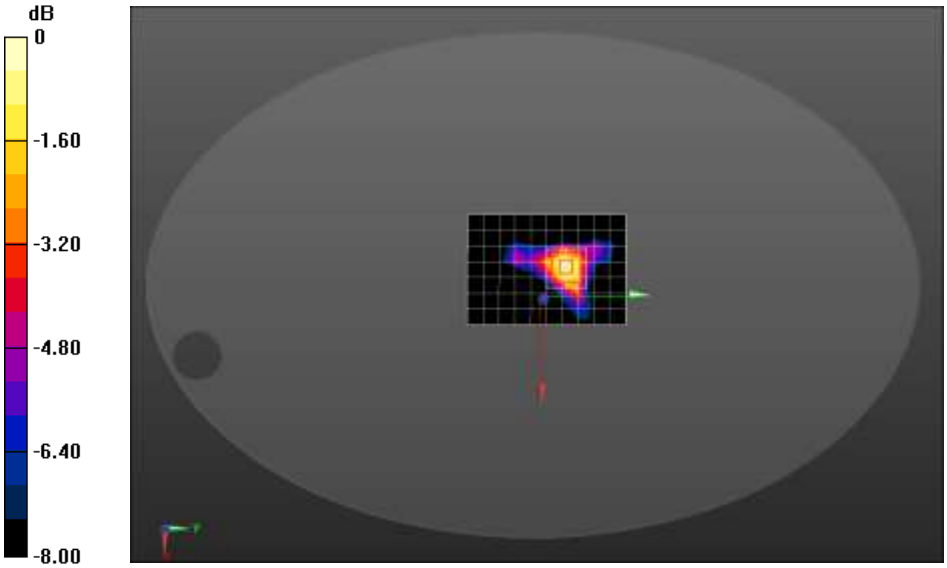
802.11b 2437MHz Body Bottom

DUT: Scanner; Type: 8690i

Communication System: UID 0, Wi-Fi (0); Communication System Band: 802.11b; Duty Cycle: 1:1.0;
Frequency: 2437 MHz; Medium parameters used: f = 2437 MHz; σ = 1.9 S/m; εr = 52.22; ρ = 1000 kg/m3 ;
Phantom section: Flat Section
Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0 DASY5 Configuration:

- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11b 2437MHz Body Bottom/Area Scan (8x11x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.0792 W/kg
Configuration/802.11b 2437MHz Body Bottom/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 1.121 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.137 W/kg
SAR(1 g) = 0.076 W/kg; SAR(10 g) = 0.041 W/kg Maximum value of SAR (measured) = 0.0847 W/kg



0 dB = 0.0847 W/kg = -10.72 dBW/kg

Date/Time: 22/09/2020

Test Laboratory: DEKRA Lab

802.11b 2437MHz Body Top

DUT: Scanner; Type: 8690i

Communication System: UID 0, Wi-Fi (0); Communication System Band: 802.11b; Duty Cycle: 1:1.0;

Frequency: 2437 MHz; Medium parameters used: f = 2437 MHz; σ = 1.9 S/m; εr = 52.22; ρ = 1000 kg/m3 ;

Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0 DASY5 Configuration:

- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

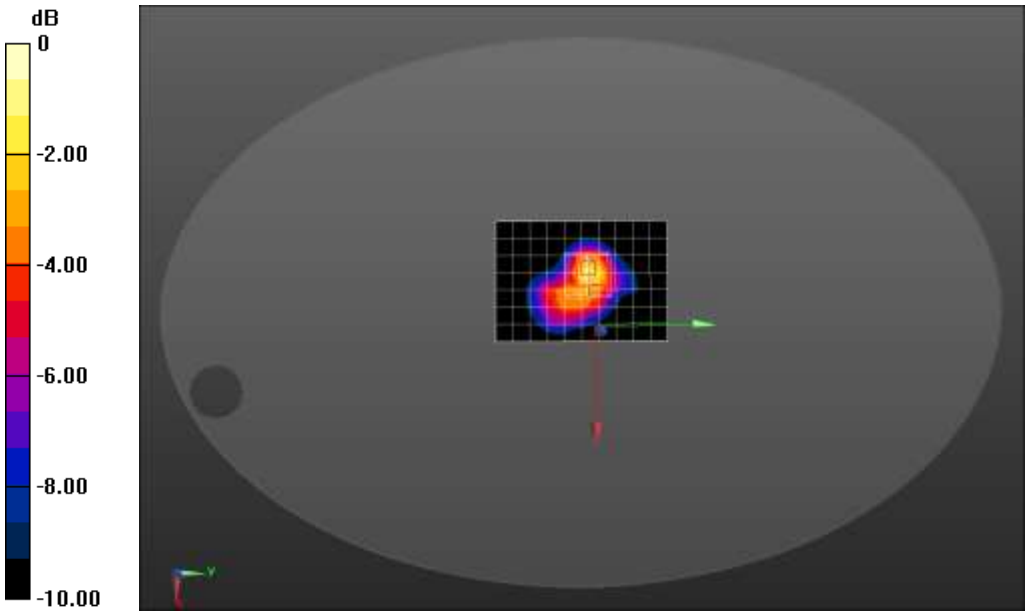
Configuration/802.11b 2437MHz Body Top/Area Scan (8x11x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.267 W/kg

Configuration/802.11b 2437MHz Body Top/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 8.064 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.712 W/kg

SAR(1 g) = 0.286 W/kg; SAR(10 g) = 0.115 W/kg Maximum value of SAR (measured) = 0.347 W/kg



0 dB = 0.347 W/kg = -4.60 dBW/kg

Date/Time: 22/09/2020

Test Laboratory: DEKRA Lab

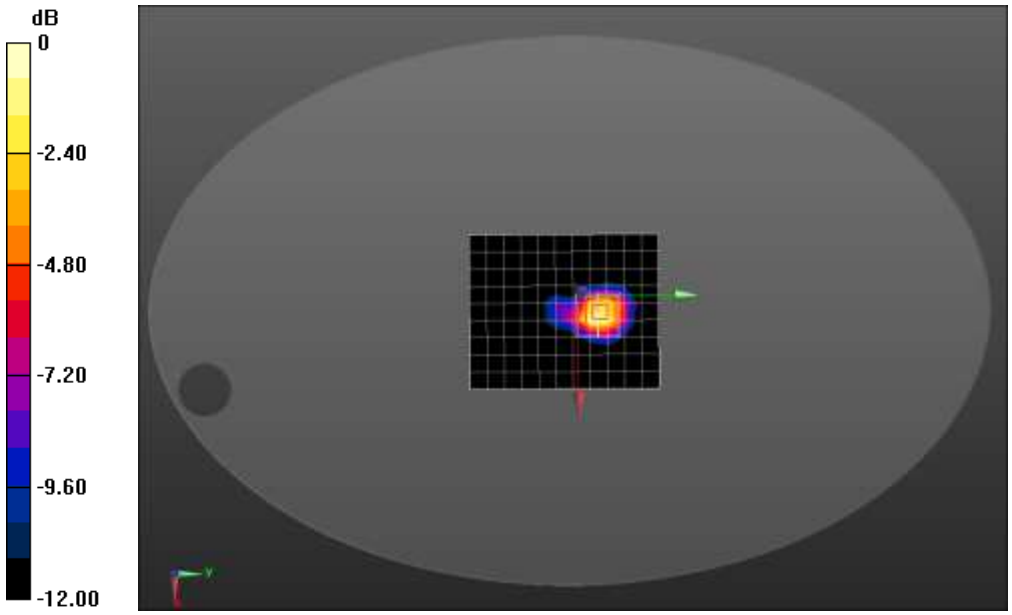
802.11b 2437MHz Body Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, Wi-Fi (0); Communication System Band: 802.11b; Duty Cycle: 1:1.0;
Frequency: 2437 MHz; Medium parameters used: f = 2437 MHz; σ = 1.9 S/m; εr = 52.22; ρ = 1000 kg/m3 ;
Phantom section: Flat Section
Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0 DASY5 Configuration:

- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11b 2437MHz Body Right/Area Scan (10x12x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 1.00 W/kg
Configuration/802.11b 2437MHz Body Right/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 10.28 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 2.19 W/kg
SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.449 W/kg Maximum value of SAR (measured) = 1.11 W/kg



0 dB = 1.11 W/kg = 0.45 dBW/kg

Date/Time: 22/09/2020

Test Laboratory: DEKRA Lab

802.11b 2437MHz Body Left

DUT: Scanner; Type: 8690i

Communication System: UID 0, Wi-Fi (0); Communication System Band: 802.11b; Duty Cycle: 1:1.0;

Frequency: 2437 MHz; Medium parameters used: f = 2437 MHz; σ = 1.9 S/m; εr = 52.22; ρ = 1000 kg/m3 ;

Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

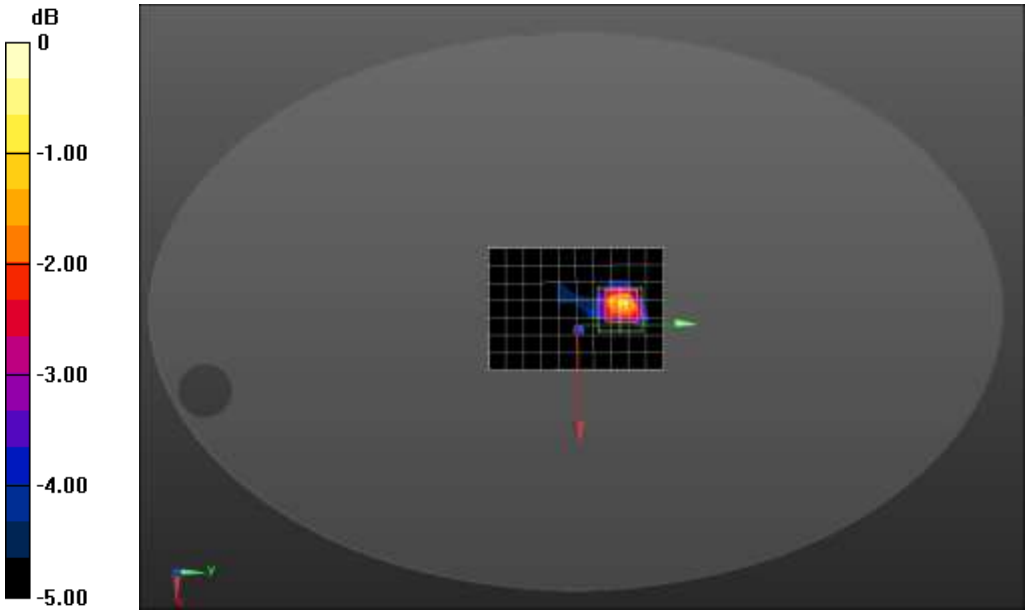
Configuration/802.11b 2437MHz Body Left/Area Scan (8x11x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.0423 W/kg

Configuration/802.11b 2437MHz Body Left/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 2.956 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.0750 W/kg

SAR(1 g) = 0.042 W/kg; SAR(10 g) = 0.021 W/kg Maximum value of SAR (measured) = 0.0468 W/kg



0 dB = 0.0468 W/kg = -13.30 dBW/kg

Date/Time: 22/09/2020

Test Laboratory: DEKRA Lab

802.11b 2437MHz Body Front

DUT: Scanner; Type: 8690i

Communication System: UID 0, Wi-Fi (0); Communication System Band: 802.11b; Duty Cycle: 1:1.0;

Frequency: 2437 MHz; Medium parameters used: f = 2437 MHz; σ = 1.9 S/m; εr = 52.22; ρ = 1000 kg/m3 ;

Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

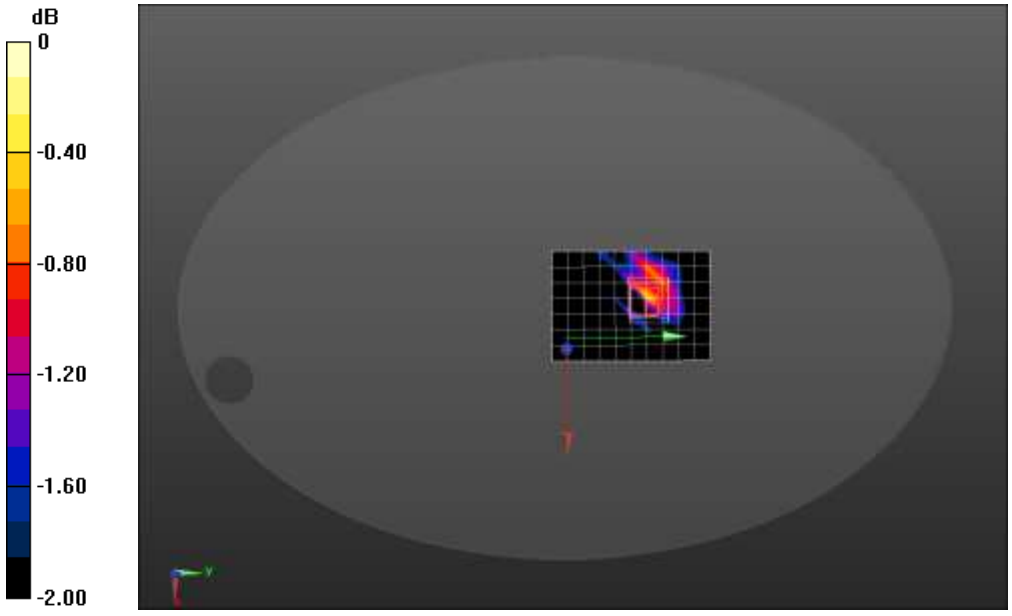
- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11b 2437MHz Body Front/Area Scan (8x11x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.00610 W/kg

Configuration/802.11b 2437MHz Body Front/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 0.6620 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.00716 W/kg

SAR(1 g) = 0.00507 W/kg; SAR(10 g) = 0.00298 W/kg Maximum value of SAR (measured) = 0.00664 W/kg



0 dB = 0.00664 W/kg = -21.78 dBW/kg

Date/Time: 22/09/2020

Test Laboratory: DEKRA Lab

802.11b 2437MHz Body Back

DUT: Scanner; Type: 8690i

Communication System: UID 0, Wi-Fi (0); Communication System Band: 802.11b; Duty Cycle: 1:1.0;

Frequency: 2437 MHz; Medium parameters used: f = 2437 MHz; σ = 1.9 S/m; εr = 52.22; ρ = 1000 kg/m3 ;

Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

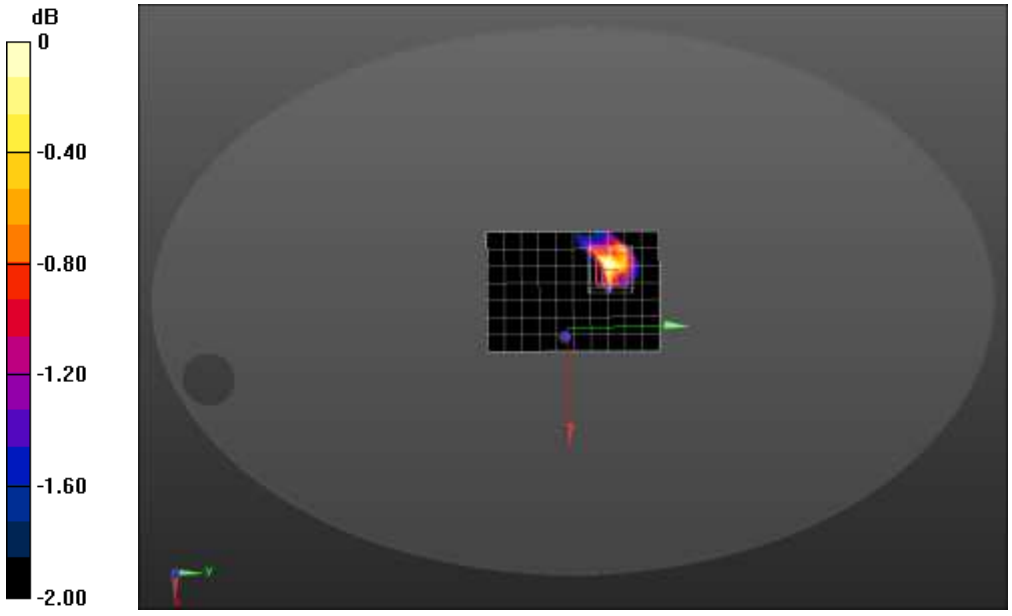
- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11b 2437MHz Body Back/Area Scan (8x11x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.0129 W/kg

Configuration/802.11b 2437MHz Body Back/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 1.159 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.0200 W/kg

SAR(1 g) = 0.011 W/kg; SAR(10 g) = 0.00619 W/kg Maximum value of SAR (measured) = 0.0122 W/kg



0 dB = 0.0122 W/kg = -19.14 dBW/kg

Date/Time: 22/09/2020

Test Laboratory: DEKRA Lab

802.11b 2412MHz Body Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, Wi-Fi (0); Communication System Band: 802.11b; Duty Cycle: 1:1.0;

Frequency: 2412 MHz; Medium parameters used: f = 2412 MHz; σ = 1.88 S/m; εr = 52.3; ρ = 1000 kg/m3 ;

Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

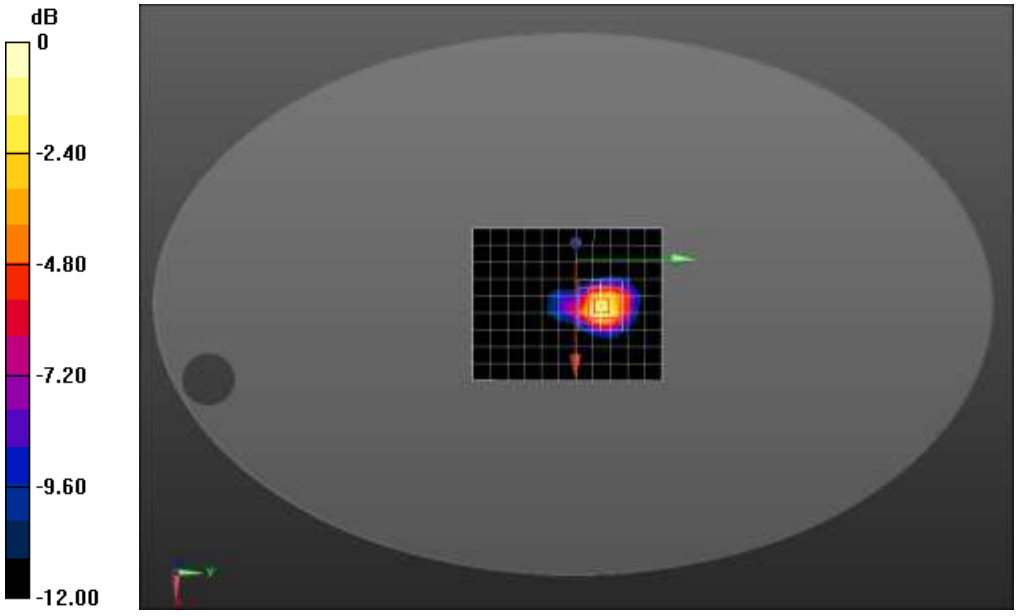
- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11b 2412MHz Body Right/Area Scan (10x12x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.940 W/kg

Configuration/802.11b 2412MHz Body Right/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 9.991 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 2.19 W/kg

SAR(1 g) = 0.974 W/kg; SAR(10 g) = 0.433 W/kg Maximum value of SAR (measured) = 1.06 W/kg



0 dB = 1.06 W/kg = 0.25 dBW/kg

Date/Time: 23/09/2020

Test Laboratory: DEKRA Lab

802.11b 2462MHz Body Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, Wi-Fi (0); Communication System Band: 802.11b; Duty Cycle: 1:1.0;

Frequency: 2462 MHz; Medium parameters used: f = 2462 MHz; σ = 1.96 S/m; εr = 52.09; ρ = 1000 kg/m3 ;

Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

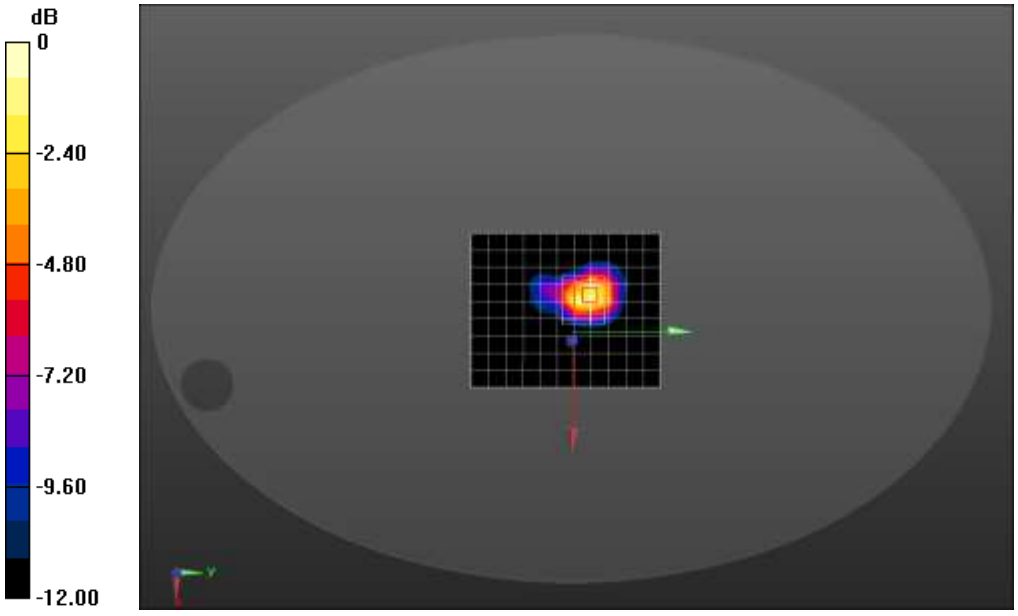
- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11b 2462MHz Body Right/Area Scan (10x12x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.641 W/kg

Configuration/802.11b 2462MHz Body Right/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 14.38 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 0.709 W/kg; SAR(10 g) = 0.327 W/kg Maximum value of SAR (measured) = 0.793 W/kg



0 dB = 0.793 W/kg = -1.01 dBW/kg

Date/Time: 23/09/2020

Test Laboratory: DEKRA Lab

802.11g 2437MHz Body Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, Wi-Fi (0); Communication System Band: 802.11g; Duty Cycle: 1:1.0;

Frequency: 2437 MHz; Medium parameters used: f = 2437 MHz; σ = 1.9 S/m; εr = 52.22; ρ = 1000 kg/m3 ;

Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

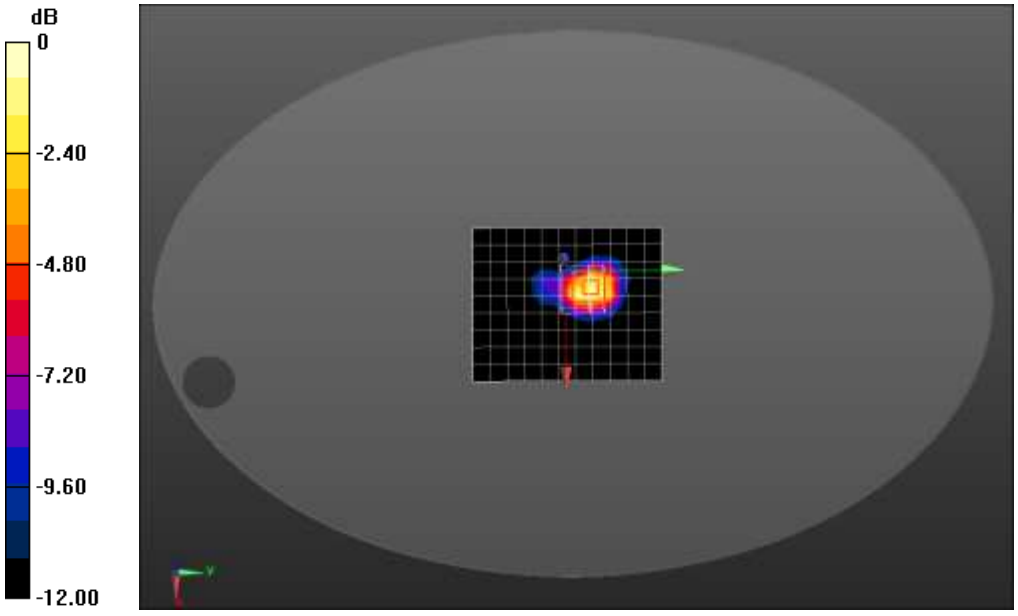
- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11g 2437MHz Body Right/Area Scan (10x12x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.614 W/kg

Configuration/802.11g 2437MHz Body Right/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 14.27 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 1.46 W/kg

SAR(1 g) = 0.691 W/kg; SAR(10 g) = 0.318 W/kg Maximum value of SAR (measured) = 0.778 W/kg



0 dB = 0.778 W/kg = -1.09 dBW/kg

Date/Time: 23/09/2020

Test Laboratory: DEKRA Lab

802.11n(40MHz) 2452MHz Body Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, Wi-Fi (0); Communication System Band: 802.11n(40MHz); Duty Cycle: 1:1.0; Frequency: 2452 MHz; Medium parameters used: f = 2452 MHz; σ = 1.93 S/m; εr = 52.15; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

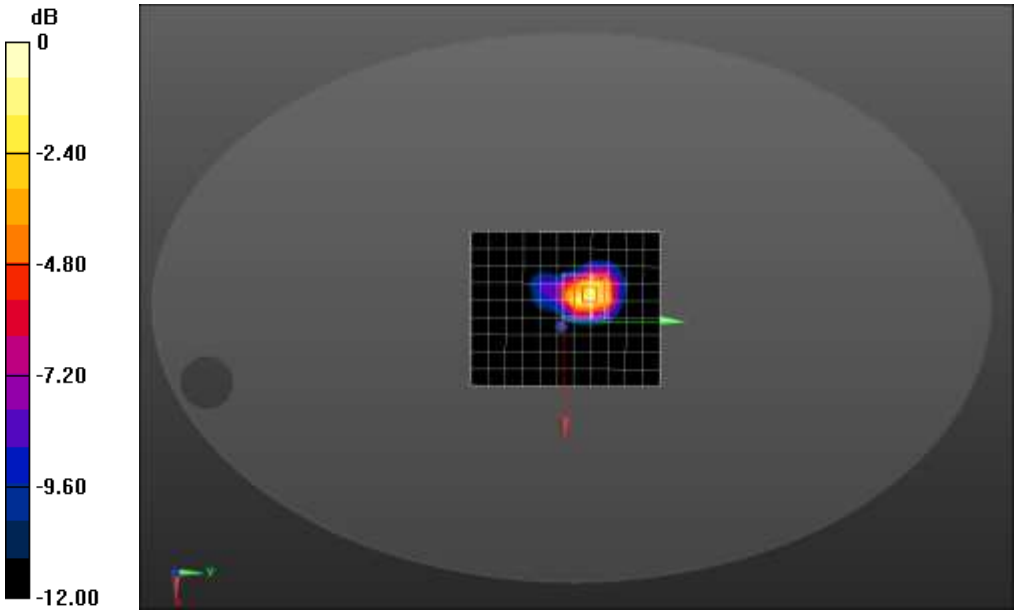
- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11n(40MHz) 2452MHz Body Right/Area Scan (10x12x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.713 W/kg

Configuration/802.11n(40MHz) 2452MHz Body Right/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 15.13 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 1.70 W/kg

SAR(1 g) = 0.806 W/kg; SAR(10 g) = 0.372 W/kg Maximum value of SAR (measured) = 0.905 W/kg



0 dB = 0.905 W/kg = -0.43 dBW/kg

5G Wifi

Date/Time: 20/10/2020

Test Laboratory: DEKRA Lab

802.11ac(40MHz) 5190MHz Bottom

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5190 MHz; Medium parameters used: f = 5190 MHz; σ = 5.21 S/m; εr = 49.28; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

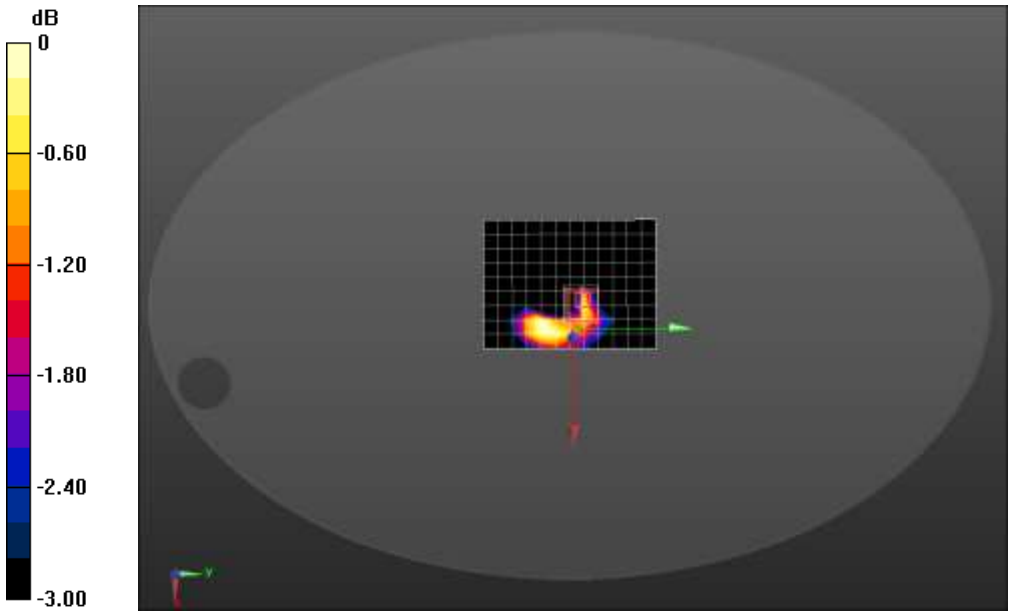
- Probe: EX3DV4 - SN3710; ConvF(4.57, 4.57, 4.57); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11ac(40MHz)5190MHz Body-BottomArea Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 0.0933 W/kg

Configuration/802.11ac(40MHz)5190MHz Body-BottomZoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 2.087 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.175 W/kg

SAR(1 g) = 0.046 W/kg; SAR(10 g) = 0.017 W/kg Maximum value of SAR (measured) = 0.0948 W/kg



0 dB = 0.0948 W/kg = -10.23 dBW/kg

Date/Time: 20/10/2020

Test Laboratory: DEKRA Lab

802.11ac(40MHz) 5190MHz Top

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5190 MHz; Medium parameters used: f = 5190 MHz; σ = 5.21 S/m; εr = 49.28; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

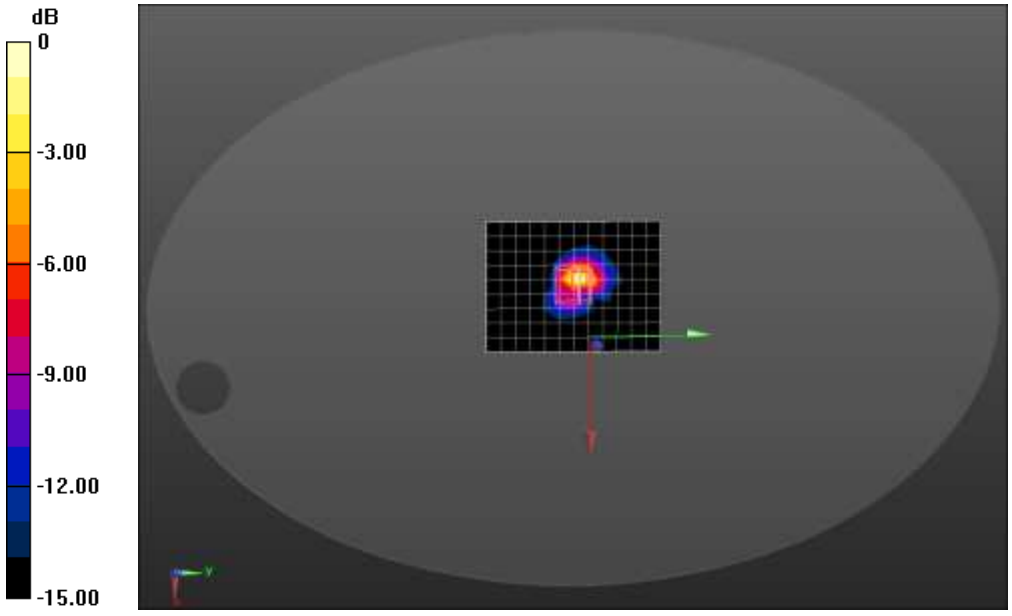
- Probe: EX3DV4 - SN3710; ConvF(4.57, 4.57, 4.57); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11ac(40MHz)5190MHz Body-TopArea Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 3.50 W/kg

Configuration/802.11ac(40MHz)5190MHz Body-TopZoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 7.171 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 7.71 W/kg

SAR(1 g) = 1.78 W/kg; SAR(10 g) = 0.446 W/kg Maximum value of SAR (measured) = 4.03 W/kg



0 dB = 4.03 W/kg = 6.05 dBW/kg

Date/Time: 20/10/2020

Test Laboratory: DEKRA Lab

802.11ac(40MHz) 5190MHz Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5190 MHz; Medium parameters used: f = 5190 MHz; σ = 5.21 S/m; εr = 49.28; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

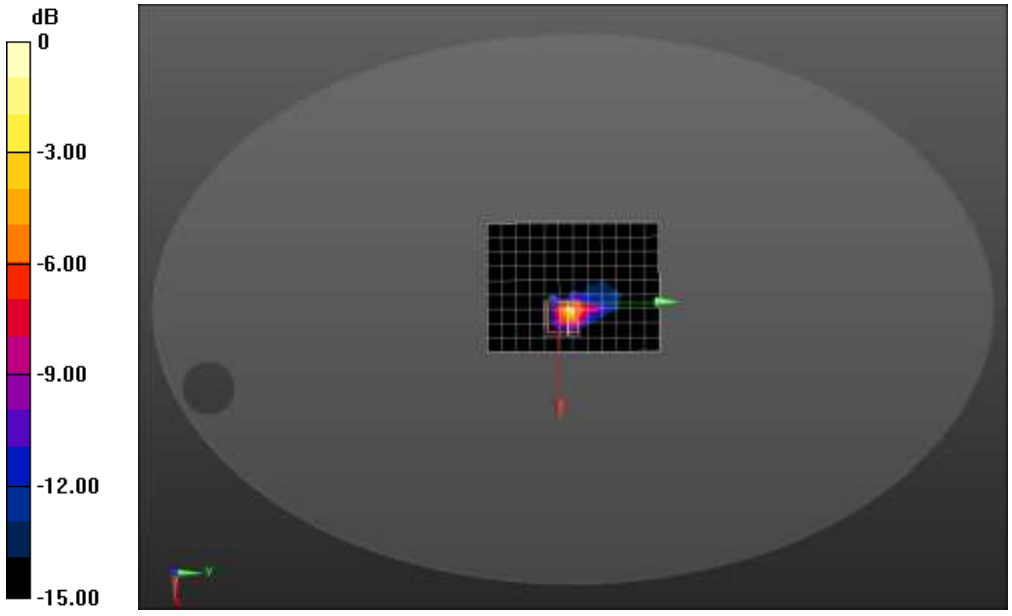
- Probe: EX3DV4 - SN3710; ConvF(4.57, 4.57, 4.57); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11ac(40MHz)5190MHz Body-Right/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 4.99 W/kg

Configuration/802.11ac(40MHz)5190MHz Body-Right/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 23.83 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 14.8 W/kg

SAR(1 g) = 3.08 W/kg; SAR(10 g) = 0.634 W/kg Maximum value of SAR (measured) = 7.48 W/kg



0 dB = 7.48 W/kg = 8.74 dBW/kg

Date/Time: 20/10/2020

Test Laboratory: DEKRA Lab

802.11ac(40MHz) 5190MHz Left

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5190 MHz; Medium parameters used: f = 5190 MHz; σ = 5.21 S/m; εr = 49.28; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

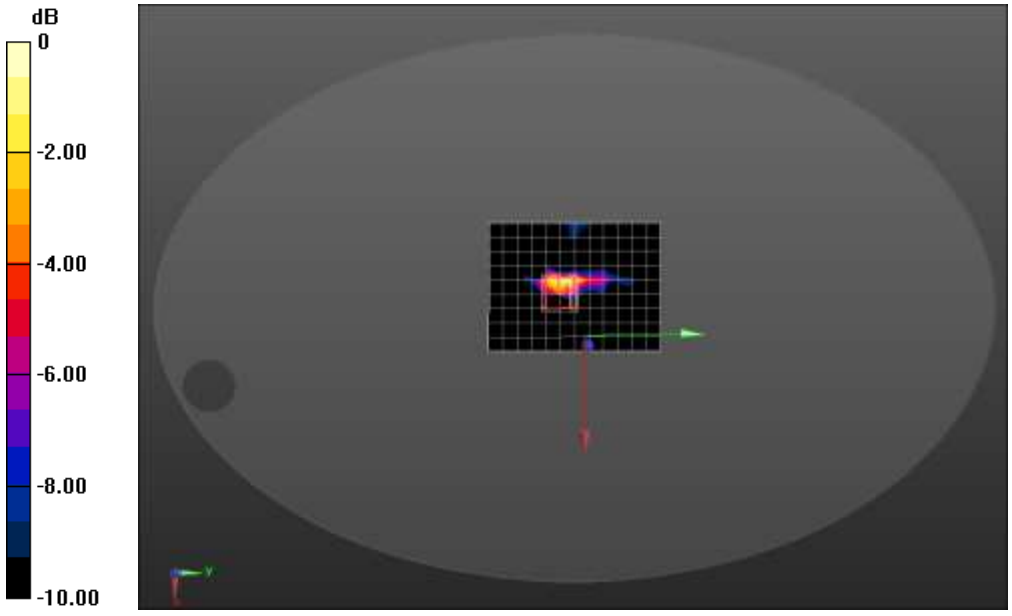
- Probe: EX3DV4 - SN3710; ConvF(4.57, 4.57, 4.57); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11ac(40MHz)5190MHz Body-Left/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 0.273 W/kg

Configuration/802.11ac(40MHz)5190MHz Body-Left/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 0.8660 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.554 W/kg

SAR(1 g) = 0.156 W/kg; SAR(10 g) = 0.040 W/kg Maximum value of SAR (measured) = 0.306 W/kg



0 dB = 0.306 W/kg = -5.14 dBW/kg

Date/Time: 22/10/2020

Test Laboratory: DEKRA Lab

802.11ac(40MHz) 5190MHz Front

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5190 MHz; Medium parameters used: f = 5190 MHz; σ = 5.21 S/m; εr = 49.28; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

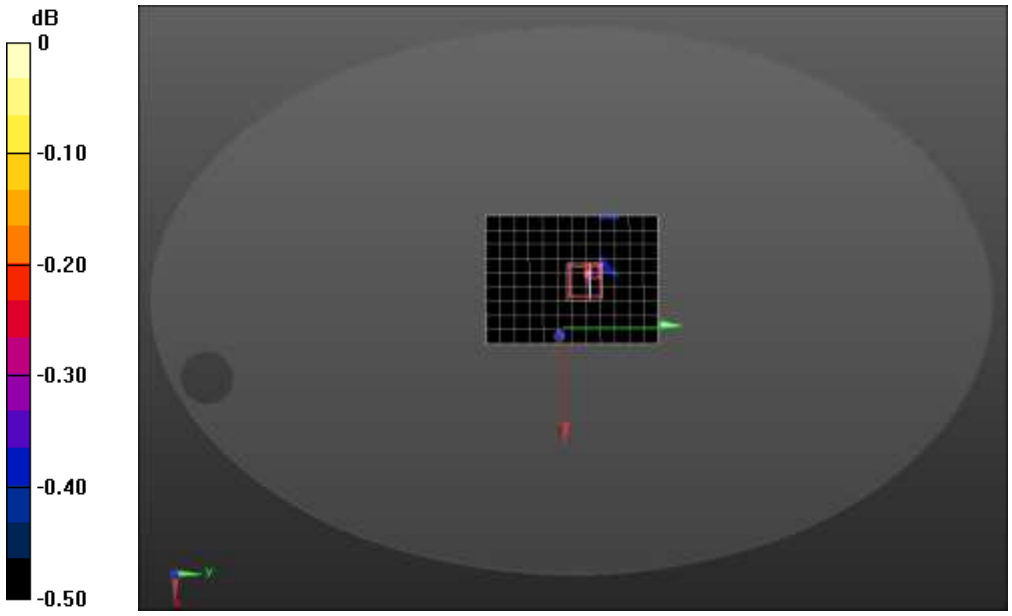
- Probe: EX3DV4 - SN3710; ConvF(4.57, 4.57, 4.57); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11ac(40MHz)5190MHz Body-Front/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 0.0760 W/kg

Configuration/802.11ac(40MHz)5190MHz Body-Front/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 1.510 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 0.125 W/kg

SAR(1 g) = 0.039 W/kg; SAR(10 g) = 0.011 W/kg



0 dB = 0.0760 W/kg = -11.19 dBW/kg

Date/Time: 22/10/2020

Test Laboratory: DEKRA Lab

802.11ac(40MHz) 5190MHz Back

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5190 MHz; Medium parameters used: f = 5190 MHz; σ = 5.21 S/m; εr = 49.28; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

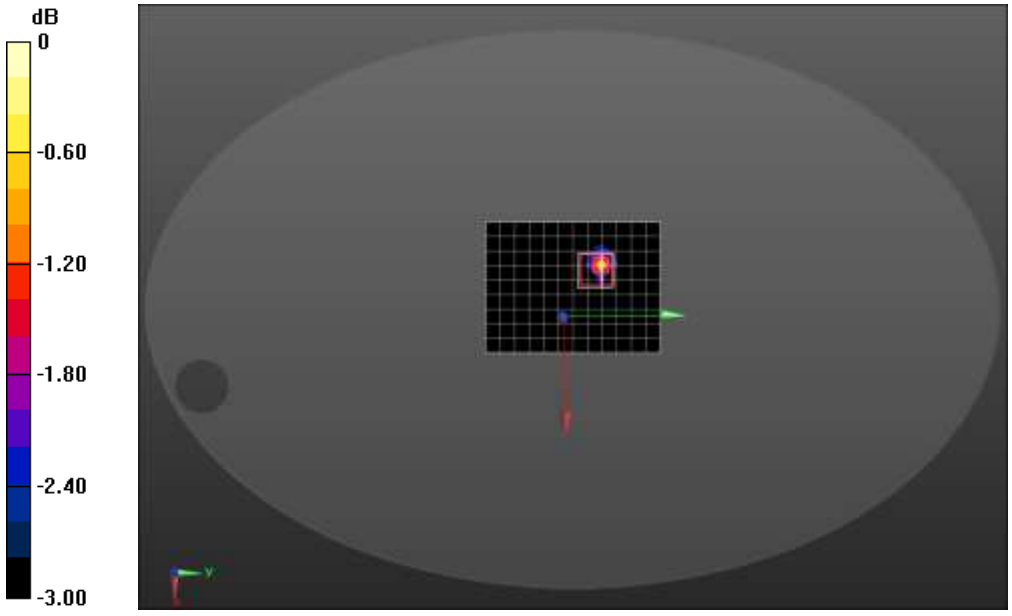
- Probe: EX3DV4 - SN3710; ConvF(4.57, 4.57, 4.57); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11ac(40MHz)5190MHz Body-Back/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 0.0679 W/kg

Configuration/802.11ac(40MHz)5190MHz Body-Back/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 1.119 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.190 W/kg

SAR(1 g) = 0.033 W/kg; SAR(10 g) = 0.011 W/kg Maximum value of SAR (measured) = 0.0702 W/kg



0 dB = 0.0702 W/kg = -11.54 dBW/kg

Date/Time: 20/10/2020

Test Laboratory: DEKRA Lab

802.11a 5180MHz Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5180 MHz; Medium parameters used: f = 5180 MHz; σ = 5.2 S/m; εr = 49.29; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

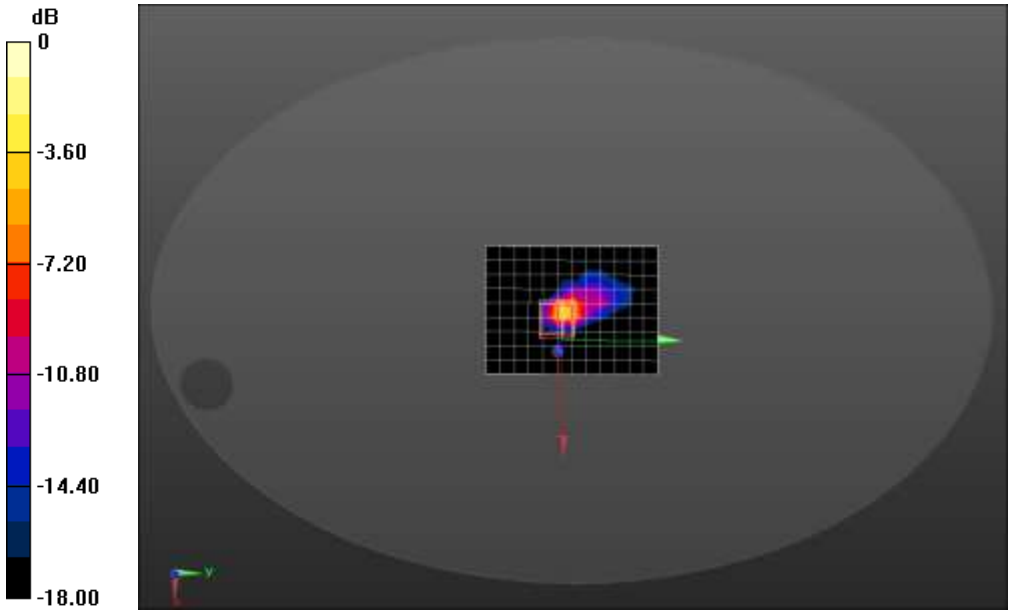
- Probe: EX3DV4 - SN3710; ConvF(4.57, 4.57, 4.57); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11a 5180MHz Body-Right/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 2.81 W/kg

Configuration/802.11a 5180MHz Body-Right/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 24.18 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 13.7 W/kg

SAR(1 g) = 2.9 W/kg; SAR(10 g) = 0.590 W/kg Maximum value of SAR (measured) = 6.66 W/kg



0 dB = 6.66 W/kg = 8.23 dBW/kg

Date/Time: 20/10/2020

Test Laboratory: DEKRA Lab

802.11a 5700MHz Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5700 MHz; Medium parameters used: f = 5700 MHz; σ = 5.94 S/m; εr = 47.81; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

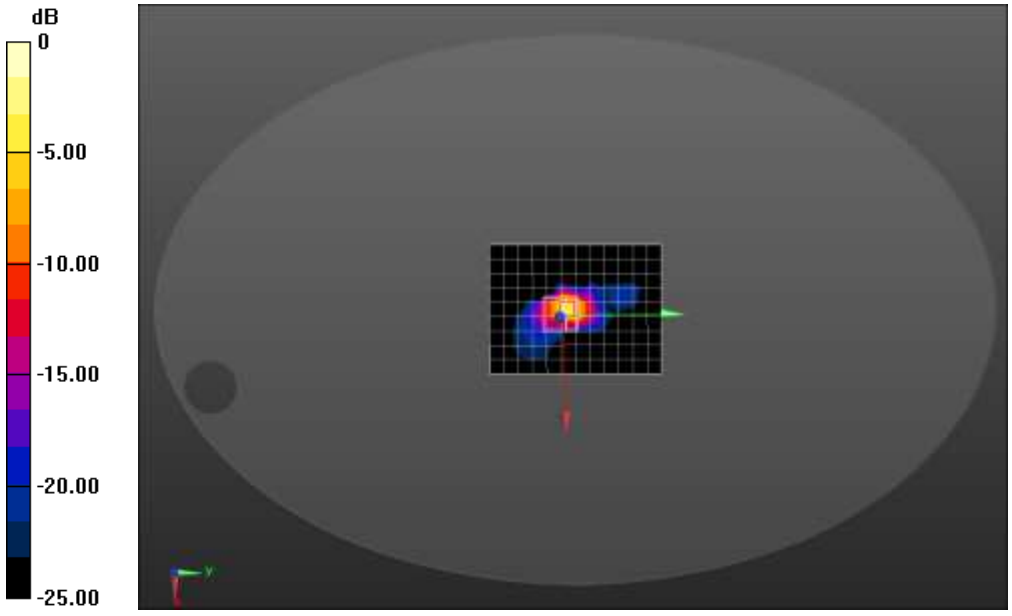
- Probe: EX3DV4 - SN3710; ConvF(3.98, 3.98, 3.98); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11a 5700MHz Body-Right/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 4.15 W/kg

Configuration/802.11a 5700MHz Body-Right/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 24.18 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 18.9 W/kg

SAR(1 g) = 3.61 W/kg; SAR(10 g) = 0.737 W/kg Maximum value of SAR (measured) = 8.90 W/kg



0 dB = 8.90 W/kg = 9.49 dBW/kg

Date/Time: 20/10/2020

Test Laboratory: DEKRA Lab

802.11a 5745MHz Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5745 MHz; Medium parameters used: f = 5745 MHz; σ = 6.01 S/m; εr = 47.61; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

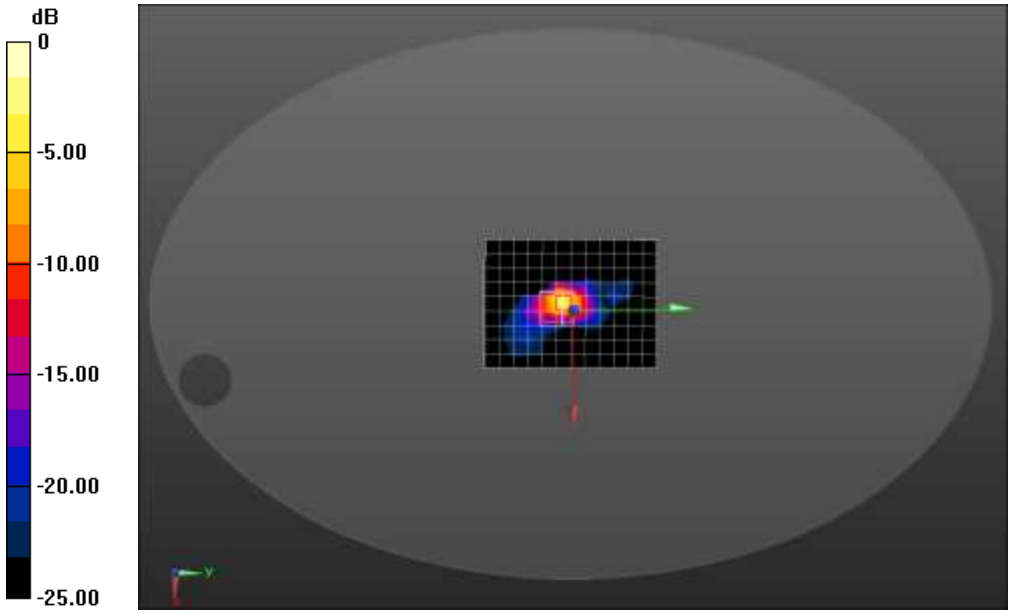
- Probe: EX3DV4 - SN3710; ConvF(4.01, 4.01, 4.01); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11a 5745MHz Body-Right/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 4.26 W/kg

Configuration/802.11a 5745MHz Body-Right/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 23.27 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 18.7 W/kg

SAR(1 g) = 3.51 W/kg; SAR(10 g) = 0.713 W/kg Maximum value of SAR (measured) = 8.65 W/kg



0 dB = 8.65 W/kg = 9.37 dBW/kg

Date/Time: 20/10/2020

Test Laboratory: DEKRA Lab

802.11ac80 5210MHz Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5210 MHz; Medium parameters used: f = 5210 MHz; σ = 5.24 S/m; εr = 49.26; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

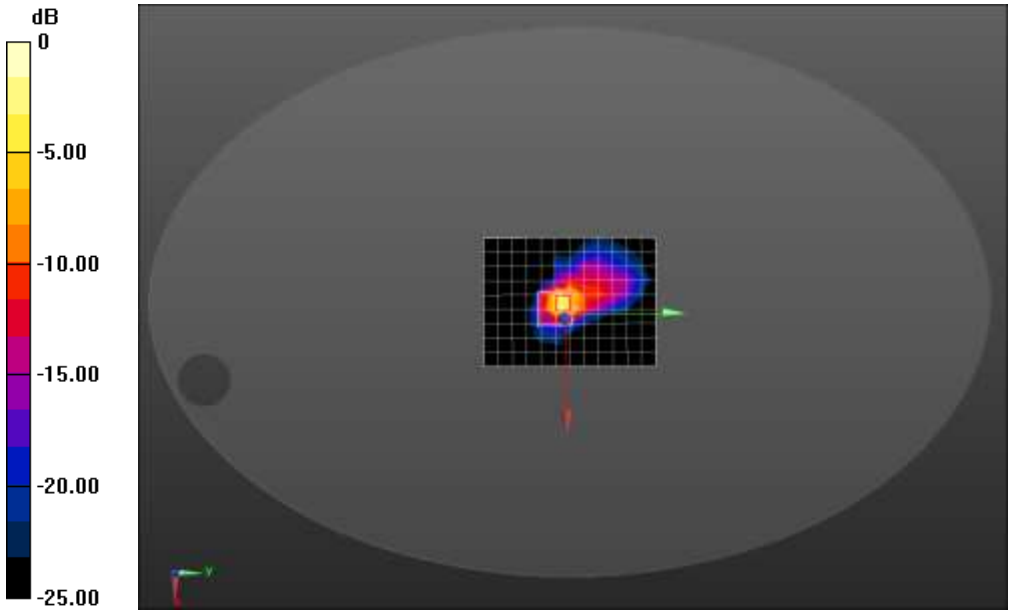
- Probe: EX3DV4 - SN3710; ConvF(4.01, 4.01, 4.01); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11ac80 5210MHz Body-Right/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 3.45 W/kg

Configuration/802.11ac80 5210MHz Body-Right/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 26.72 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 3.86 W/kg; SAR(10 g) = 0.793 W/kg Maximum value of SAR (measured) = 9.07 W/kg



0 dB = 9.07 W/kg = 9.58 dBW/kg

Date/Time: 20/10/2020

Test Laboratory: DEKRA Lab

802.11ac(80MHz) 5530MHz Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5530 MHz; Medium parameters used: f = 5530 MHz; σ = 5.69 S/m; εr = 48.39; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

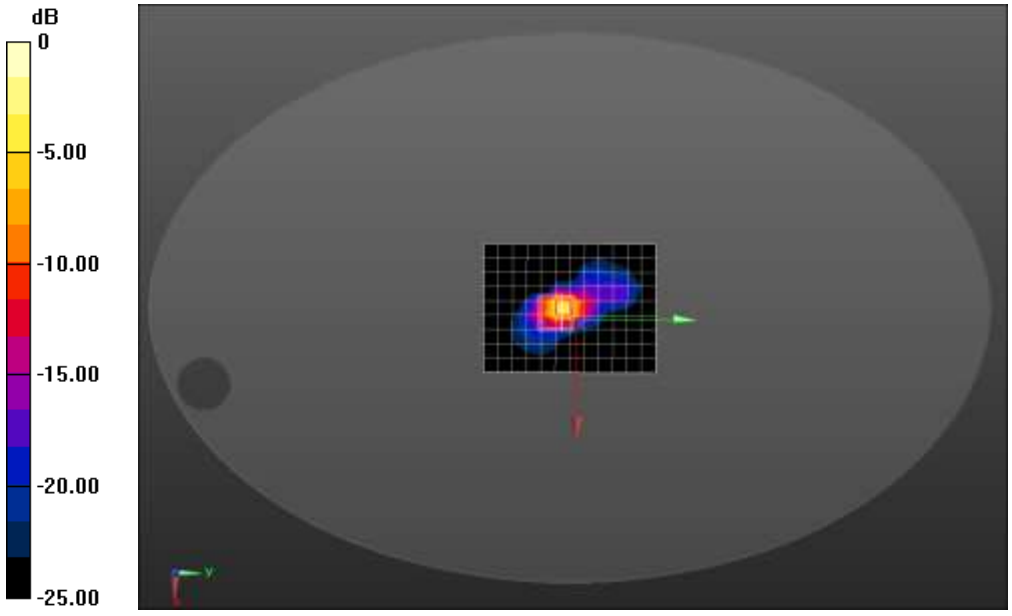
- Probe: EX3DV4 - SN3710; ConvF(4.01, 4.01, 4.01); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11ac(80MHz) 5530MHz Body-Right/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 6.08 W/kg

Configuration/802.11ac(80MHz) 5530MHz Body-Right/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 31.43 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 30.1 W/kg

SAR(1 g) = 5.88 W/kg; SAR(10 g) = 1.2 W/kg Maximum value of SAR (measured) = 14.1 W/kg



0 dB = 14.1 W/kg = 11.49 dBW/kg

Date/Time: 20/10/2020

Test Laboratory: DEKRA Lab

802.11ac80 5775MHz Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5775 MHz; Medium parameters used: f = 5775 MHz; σ = 6.04 S/m; εr = 47.55; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

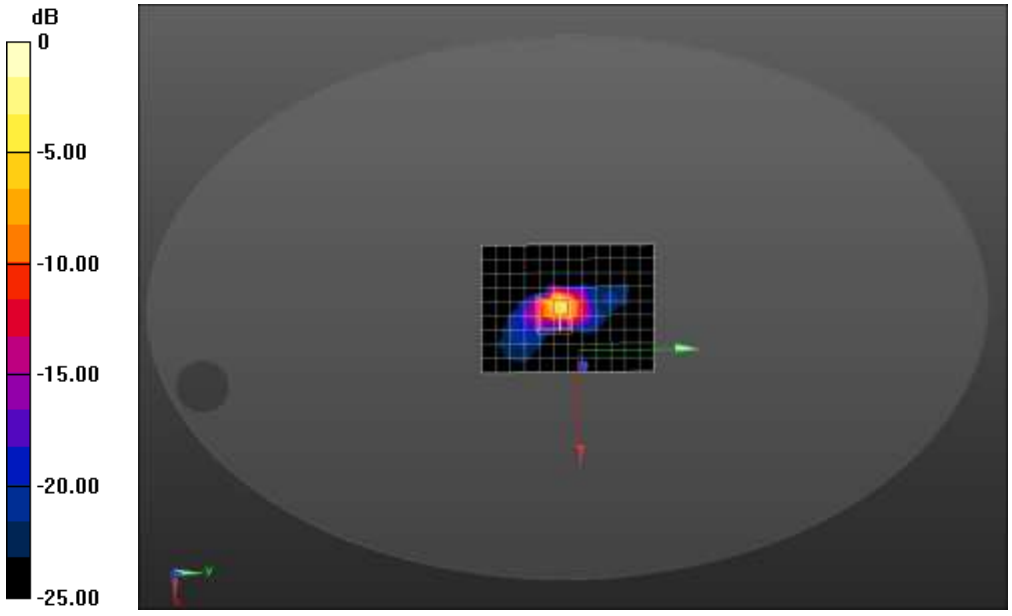
- Probe: EX3DV4 - SN3710; ConvF(4.01, 4.01, 4.01); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11ac80 57750MHz Body-Right/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 4.52 W/kg

Configuration/802.11ac80 57750MHz Body-Right/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 24.41 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 19.8 W/kg

SAR(1 g) = 3.65 W/kg; SAR(10 g) = 0.746 W/kg Maximum value of SAR (measured) = 8.93 W/kg



0 dB = 8.93 W/kg = 9.51 dBW/kg

Date/Time: 25/09/2020

Test Laboratory: DEKRA Lab

BT DH5 2480MHz Body Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, Bluetooth (0); Communication System Band: ISM Band; Duty Cycle: 1:1.0;

Frequency: 2480 MHz; Medium parameters used: f = 2480 MHz; σ = 2.02 S/m; εr = 52.03; ρ = 1000 kg/m3 ;

Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

- Probe: EX3DV4 - SN3710; ConvF(7.37, 7.37, 7.37); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

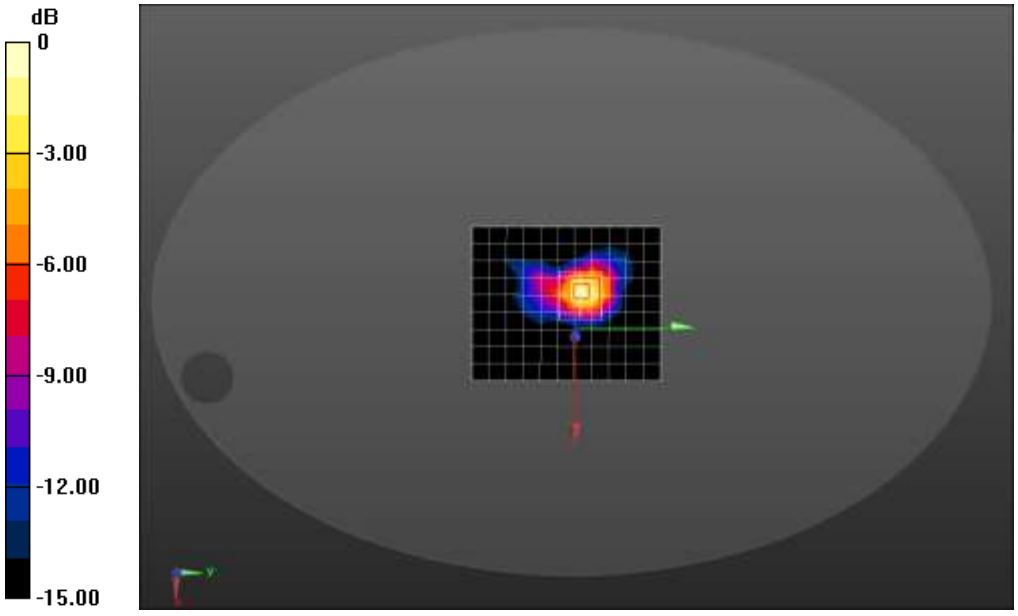
Configuration/BT DH5 2480MHz Right/Area Scan (10x12x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.105 W/kg

Configuration/BT DH5 2480MHz Right/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 6.043 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.234 W/kg

SAR(1 g) = 0.101 W/kg; SAR(10 g) = 0.047 W/kg Maximum value of SAR (measured) = 0.110 W/kg



0 dB = 0.110 W/kg = -9.59 dBW/kg

RFID Internal Antenna

Date/Time: 27/09/2020

Test Laboratory: DEKRA Lab

RFID 907.25MHz Body Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, Custom system (0); Communication System Band: 1; Duty Cycle: 1:1.0; Frequency: 907.25 MHz; Medium parameters used: f = 907.25 MHz; σ = 0.99 S/m; εr = 53.47; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

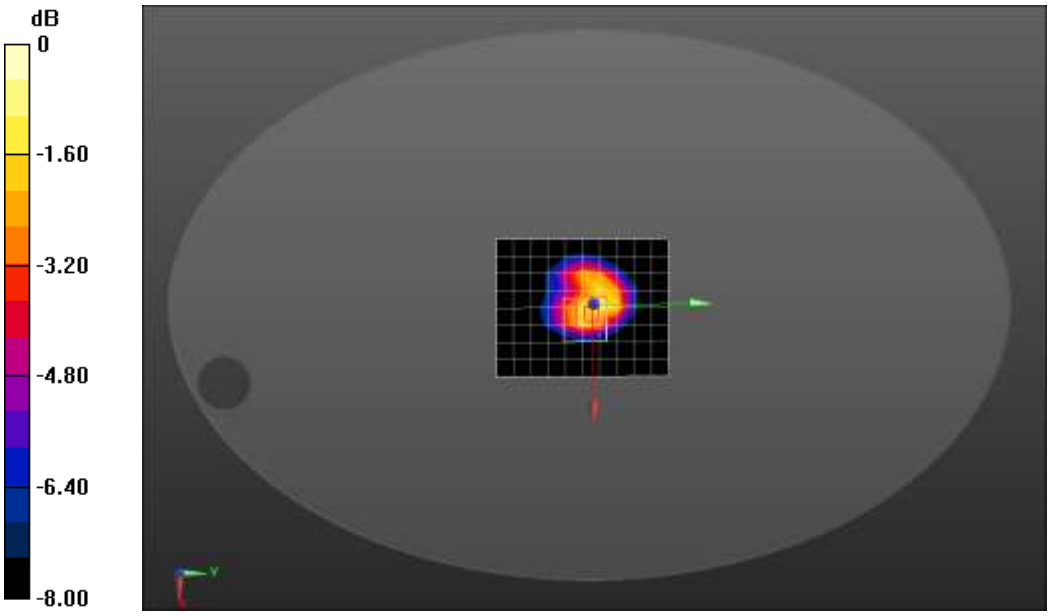
- Probe: EX3DV4 - SN3710; ConvF(9.25, 9.25, 9.25); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/RFID 907.25MHz -Right/Area Scan (9x11x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.116 W/kg

Configuration/RFID 907.25MHz -Right/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 10.74 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.279 W/kg

SAR(1 g) = 0.123 W/kg; SAR(10 g) = 0.071 W/kg Maximum value of SAR (measured) = 0.153 W/kg



0 dB = 0.153 W/kg = -8.15 dBW/kg

Date/Time: 27/09/2020

Test Laboratory: DEKRA Lab

RFID 913.75MHz Body Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, Custom system (0); Communication System Band: 1; Duty Cycle: 1:1.0;

Frequency: 913.75 MHz; Medium parameters used: f = 913.75 MHz; σ = 1 S/m; εr = 53.41; ρ = 1000 kg/m3 ;

Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

- Probe: EX3DV4 - SN3710; ConvF(9.25, 9.25, 9.25); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

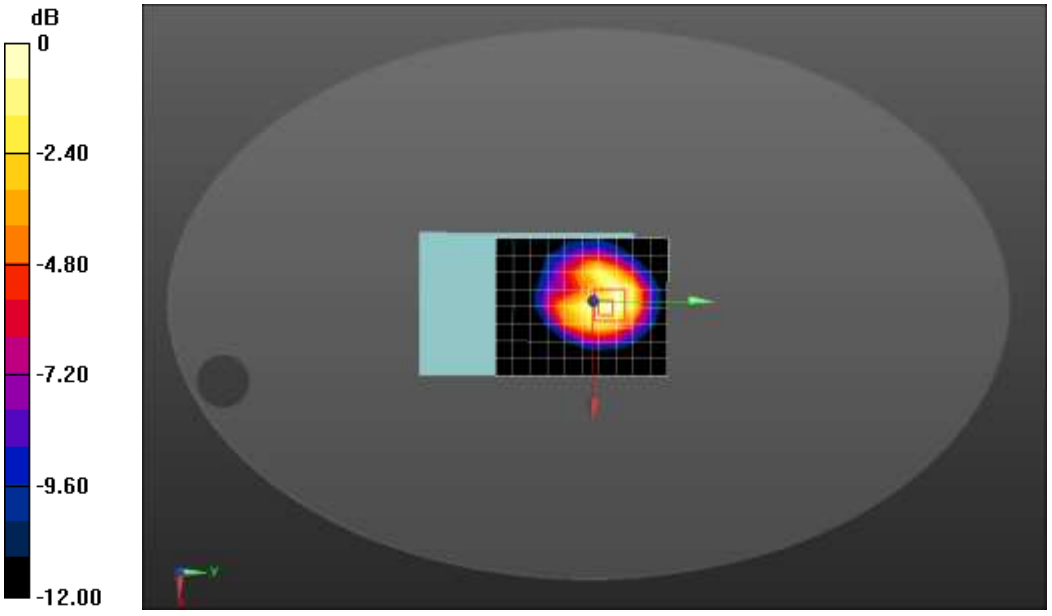
Configuration/RFID 913.75MHz -Right/Area Scan (9x11x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.144 W/kg

Configuration/RFID 913.75MHz -Right/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 10.32 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.296 W/kg

SAR(1 g) = 0.127 W/kg; SAR(10 g) = 0.076 W/kg Maximum value of SAR (measured) = 0.146 W/kg



0 dB = 0.146 W/kg = -8.36 dBW/kg

Date/Time: 27/09/2020

Test Laboratory: DEKRA Lab

RFID 920.75MHz Body Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, Custom system (0); Communication System Band: 1; Duty Cycle: 1:1.0; Frequency: 920.75 MHz; Medium parameters used: f = 920.75 MHz; σ = 1.01 S/m; εr = 53.37; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

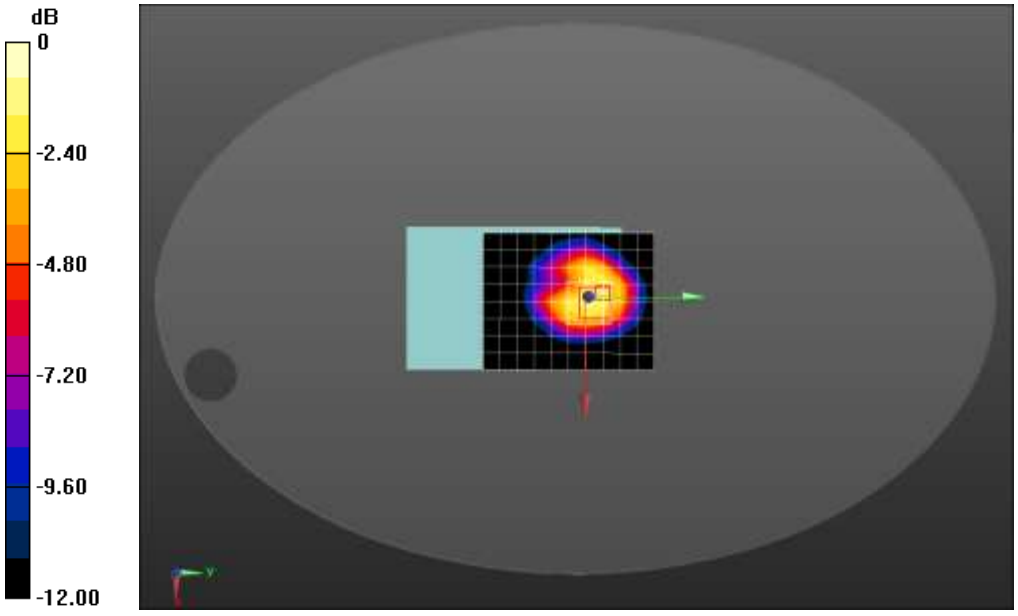
- Probe: EX3DV4 - SN3710; ConvF(9.25, 9.25, 9.25); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/RFID 920.75MHz -Right/Area Scan (9x11x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.131 W/kg

Configuration/RFID 920.75MHz -Right/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 9.784 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 0.295 W/kg

SAR(1 g) = 0.134 W/kg; SAR(10 g) = 0.077 W/kg Maximum value of SAR (measured) = 0.164 W/kg



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

RFID External Antenna

Date/Time: 15/10/2020

Test Laboratory: DEKRA Lab

RFID 907.25MHz Body

DUT: Scanner; Type: 8690i

Communication System: UID 0, Custom system (0); Communication System Band: 1; Duty Cycle: 1:1.0; Frequency: 907.25 MHz; Medium parameters used: f = 907.25 MHz; σ = 1.01 S/m; εr = 53.46; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

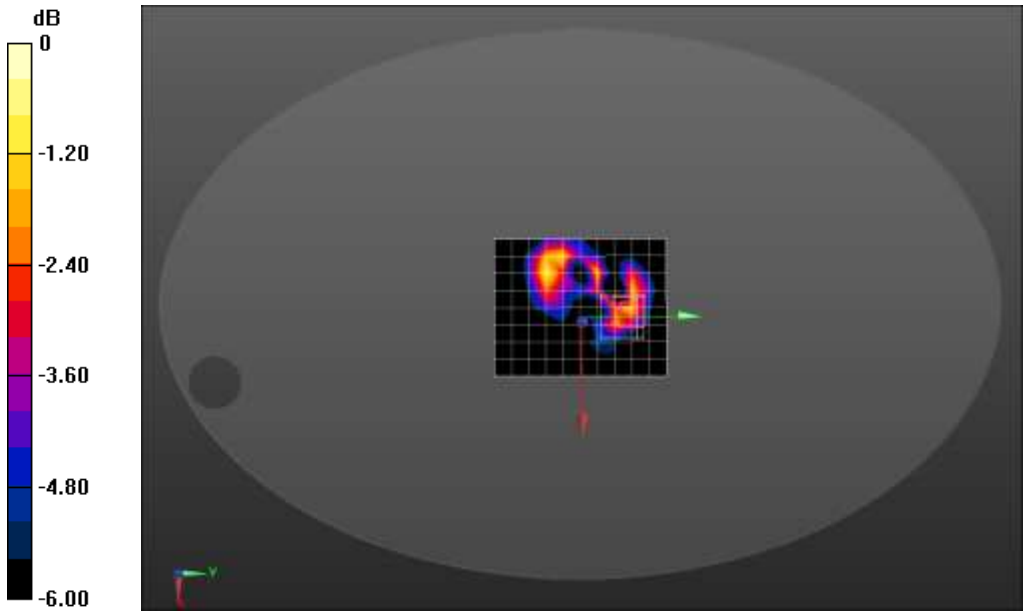
- Probe: EX3DV4 - SN3710; ConvF(9.25, 9.25, 9.25); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/RFID 907.25MHz/Area Scan (9x11x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.00545 W/kg

Configuration/RFID 907.25MHz/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 1.183 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.0110 W/kg

SAR(1 g) = 0.00535 W/kg; SAR(10 g) = 0.00285 W/kg Maximum value of SAR (measured) = 0.00658 W/kg



0 dB = 0.00658 W/kg = -21.82 dBW/kg

Date/Time: 15/10/2020

Test Laboratory: DEKRA Lab

RFID 913.75MHz Body

DUT: Scanner; Type: 8690i

Communication System: UID 0, Custom system (0); Communication System Band: 1; Duty Cycle: 1:1.0; Frequency: 913.75 MHz; Medium parameters used: f = 913.75 MHz; σ = 1.02 S/m; εr = 53.43; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

- Probe: EX3DV4 - SN3710; ConvF(9.25, 9.25, 9.25); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

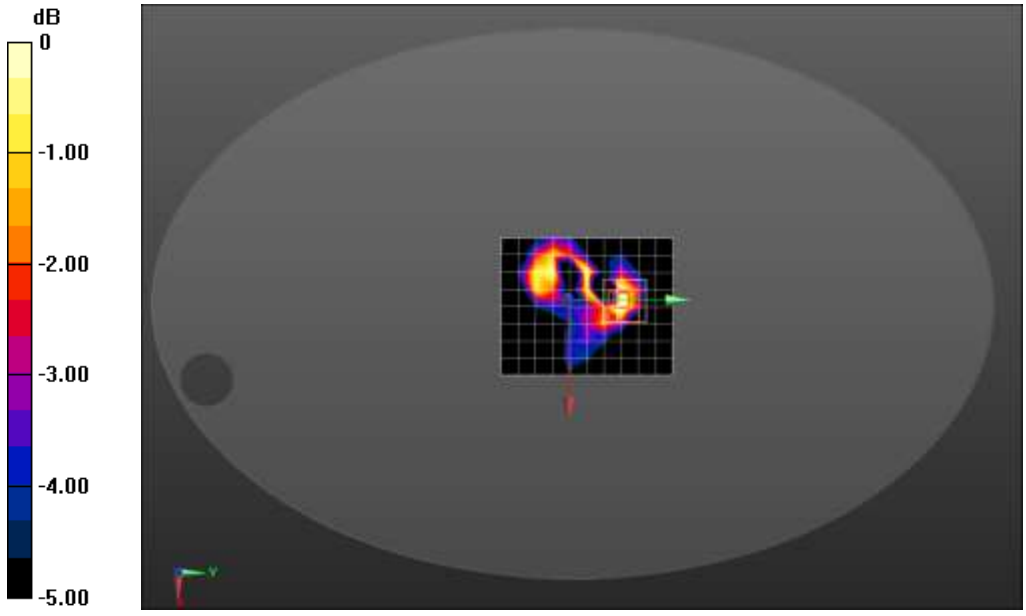
Configuration/RFID 913.755MHz/Area Scan (9x11x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.00817 W/kg

Configuration/RFID 913.755MHz/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 1.931 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.0100 W/kg

SAR(1 g) = 0.00613 W/kg; SAR(10 g) = 0.00336 W/kg Maximum value of SAR (measured) = 0.00687 W/kg



0 dB = 0.00687 W/kg = -21.63 dBW/kg

Date/Time: 15/10/2020

Test Laboratory: DEKRA Lab

RFID 920.75MHz Body

DUT: Scanner; Type: 8690i

Communication System: UID 0, Custom system (0); Communication System Band: 1; Duty Cycle: 1:1.0;

Frequency: 920.75 MHz; Medium parameters used: f = 920.75 MHz; σ = 1.03 S/m; εr = 53.4; ρ = 1000 kg/m3 ;

Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

- Probe: EX3DV4 - SN3710; ConvF(9.25, 9.25, 9.25); Calibrated: 21/04/2020;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

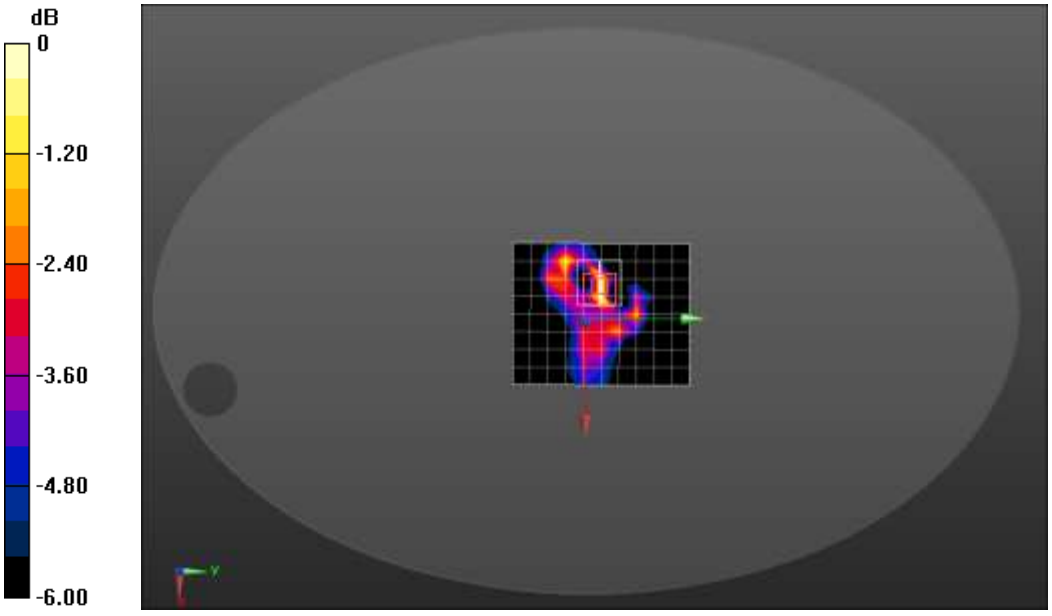
Configuration/RFID 920.75MHz/Area Scan (9x11x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.00882 W/kg

Configuration/RFID 920.75MHz/Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm Reference Value = 2.279 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.0190 W/kg

SAR(1 g) = 0.00678 W/kg; SAR(10 g) = 0.00241 W/kg Maximum value of SAR (measured) = 0.00911 W/kg



0 dB = 0.00911 W/kg = -20.40 dBW/kg

Repeated test：

Date/Time: 21/10/2020

Test Laboratory: DEKRA Lab

802.11ac(80MHz) 5530MHz body Right

DUT: Scanner; Type: 8690i

Communication System: UID 0, CW (0); Communication System Band: 5GHz(5000.0-6000.0MHz); Duty Cycle: 1:1.0; Frequency: 5530 MHz; Medium parameters used: f = 5530 MHz; σ = 5.69 S/m; εr = 48.39; ρ = 1000 kg/m3 ; Phantom section: Flat Section

Ambient temperature (℃): 21.5, Liquid temperature (℃): 21.0

DASY5 Configuration:

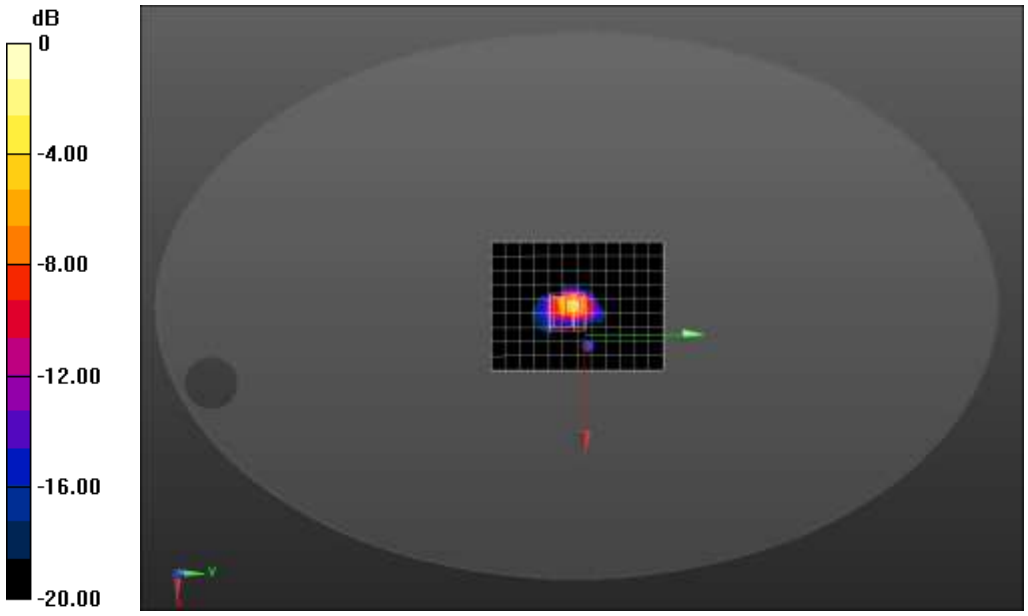
- Probe: EX3DV4 - SN3710; ConvF(3.98, 3.98, 3.98); Calibrated: 21/04/2020;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 27/04/2020
- Phantom: ELI1; Type: QDOVA002AA; Serial: TP:2106
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/802.11ac(80MHz) 5530MHz Body-Right/Area Scan (10x13x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 5.94 W/kg

Configuration/802.11ac(80MHz) 5530MHz Body-Right/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 31.29 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 29.79 W/kg

SAR(1 g) = 5.86 W/kg; SAR(10 g) = 1.193 W/kg Maximum value of SAR (measured) = 13.75 W/kg



0 dB = 13.9W/kg = 11.43 dBW/kg

Appendix C. Probe Calibration Data

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CALIBRATION
CNAS L0570

Client Dekra-CN Certificate No: Z20-60135

CALIBRATION CERTIFICAT

Object	EX3DV4 - SN : 3710
Calibration Procedure(s)	FF-Z11-004-01 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	April 21, 2020

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	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Power sensor NRP-Z91	101547	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Power sensor NRP-Z91	101548	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Reference 10dBAttenuator	18N50W-10dB	10-Feb-20(CTTL, No.J20X00525)	Feb-22
Reference 20dBAttenuator	18N50W-20dB	10-Feb-20(CTTL, No.J20X00526)	Feb-22
Reference Probe EX3DV4	SN 7307	24-May-19(SPEAG, No.EX3-7307_May19/2)	May-20
DAE4	SN 1525	26-Aug-19(SPEAG, No.DAE4-1525_Aug19)	Aug-20

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGenerator MG3700A	6201052605	18-Jun-19(CTTL, No.J19X05127)	Jun-20
Network Analyzer E5071C	MY46110673	10-Feb-20(CTTL, No.J20X00515)	Feb-21

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: April 23, 2020

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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, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
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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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3710

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (*k*=2)
Norm(μV/(V/m)²)[A]	0.37	0.41	0.49	±10.0%
DCP(mV)[B]	102.3	103.2	102.3	

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	142.8	±2.4%
		Y	0.0	0.0	1.0		147.1	
		Z	0.0	0.0	1.0		170.0	

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 E²-field uncertainty inside TSL (see Page 4 and Page 5).
[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:3710

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	9.55	9.55	9.55	0.40	0.75	±12.1%
835	41.5	0.90	9.28	9.28	9.28	0.14	1.38	±12.1%
900	41.5	0.97	9.27	9.27	9.27	0.14	1.39	±12.1%
1810	40.0	1.40	7.91	7.91	7.91	0.18	1.16	±12.1%
1900	40.0	1.40	7.80	7.80	7.80	0.21	1.10	±12.1%
2450	39.2	1.80	7.42	7.42	7.42	0.46	0.76	±12.1%
2600	39.0	1.96	7.13	7.13	7.13	0.35	0.98	±12.1%
3500	37.9	2.91	6.83	6.83	6.83	0.45	0.94	±13.3%
5250	35.9	4.71	5.18	5.18	5.18	0.45	1.65	±13.3%
5600	35.5	5.07	4.66	4.66	4.66	0.50	1.40	±13.3%
5750	35.4	5.22	4.77	4.77	4.77	0.50	1.45	±13.3%

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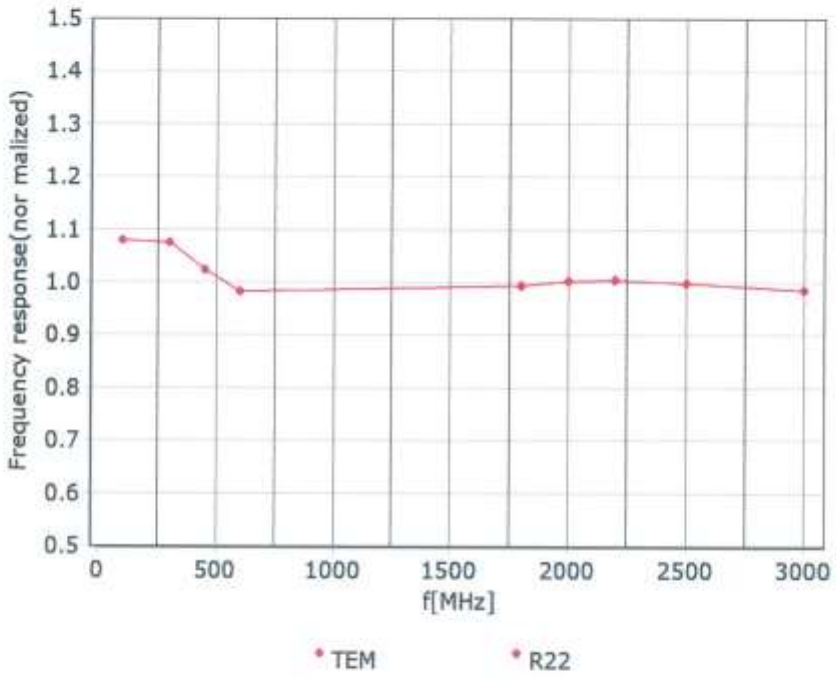
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±7.4% (*k*=2)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3710

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz][C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
750	55.5	0.96	9.65	9.65	9.65	0.40	0.80	±12.1%
835	55.2	0.97	9.31	9.31	9.31	0.17	1.41	±12.1%
900	55.0	1.05	9.25	9.25	9.25	0.23	1.14	±12.1%
1810	53.3	1.52	7.66	7.66	7.66	0.17	1.37	±12.1%
1900	53.3	1.52	7.59	7.59	7.59	0.19	1.32	±12.1%
2450	52.7	1.95	7.37	7.37	7.37	0.50	0.81	±12.1%
2600	52.5	2.16	7.18	7.18	7.18	0.62	0.72	±12.1%
3500	52.3	3.31	6.36	6.36	6.36	0.40	1.20	±13.3%
5250	48.9	5.36	4.57	4.57	4.57	0.50	1.75	±13.3%
5600	48.5	5.77	3.98	3.98	3.98	0.60	1.65	±13.3%
5750	48.3	5.94	4.01	4.01	4.01	0.60	1.65	±13.3%

[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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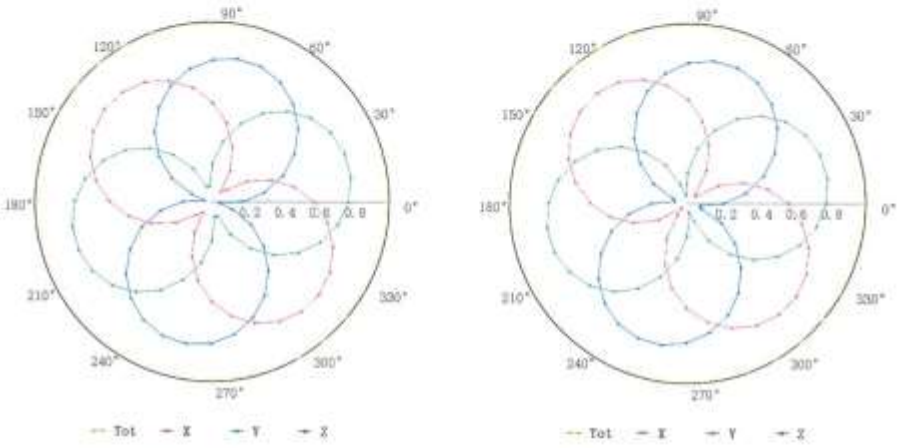
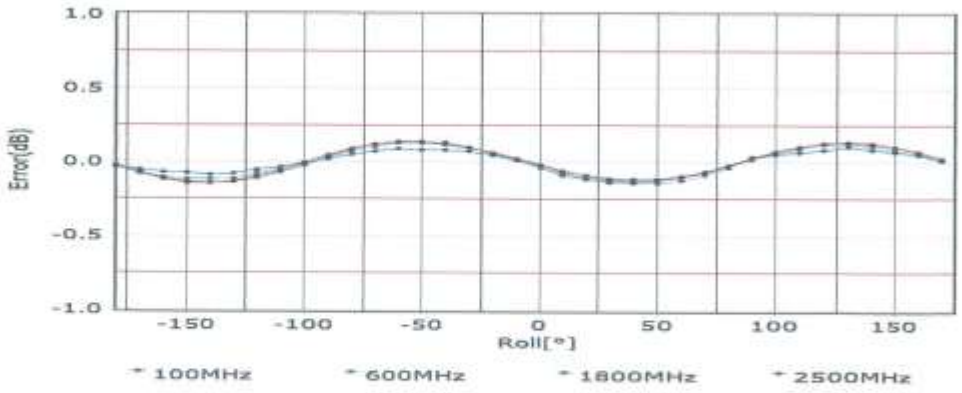
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM **f=1800 MHz, R22**





Uncertainty of Axial Isotropy Assessment: ±1.2% (*k*=2)

Certificate No:Z20-60135 Page 7 of 10

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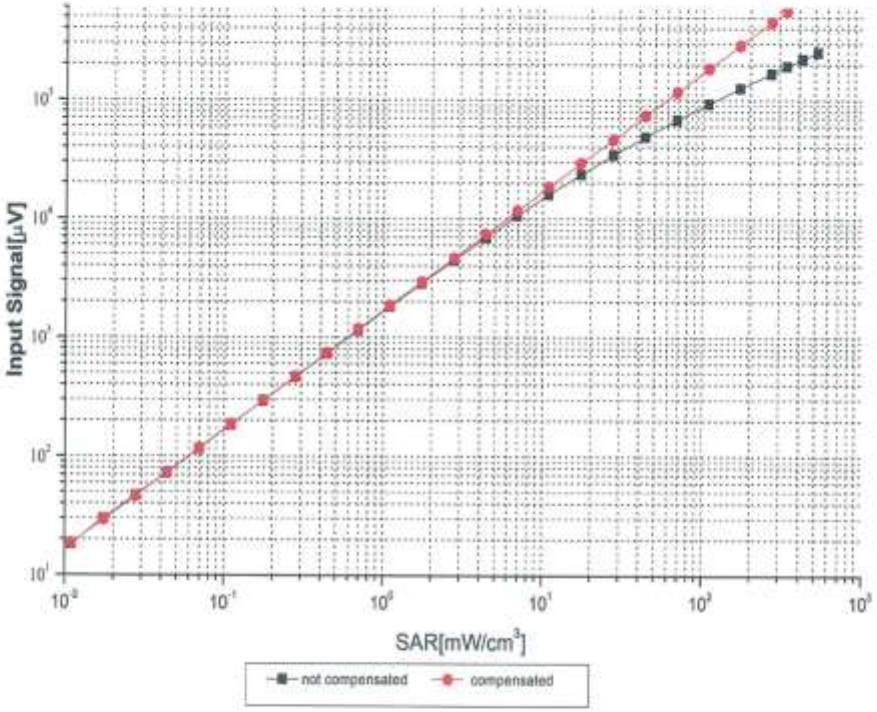
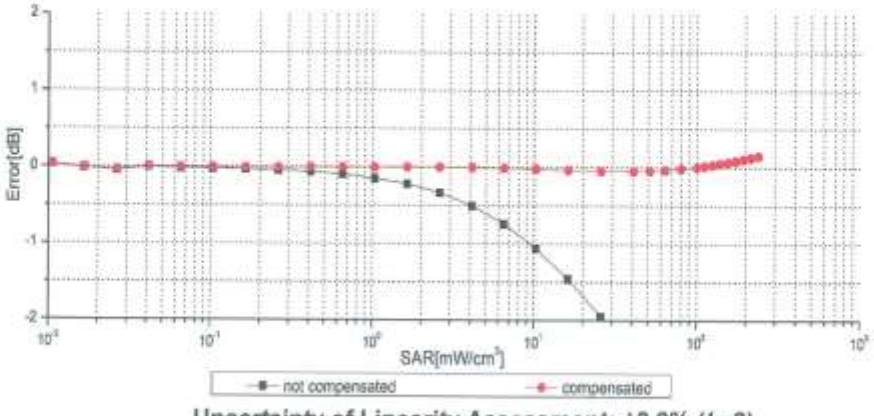
Dynamic Range f(SAR$_{head}$)
(TEM cell, f = 900 MHz)





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

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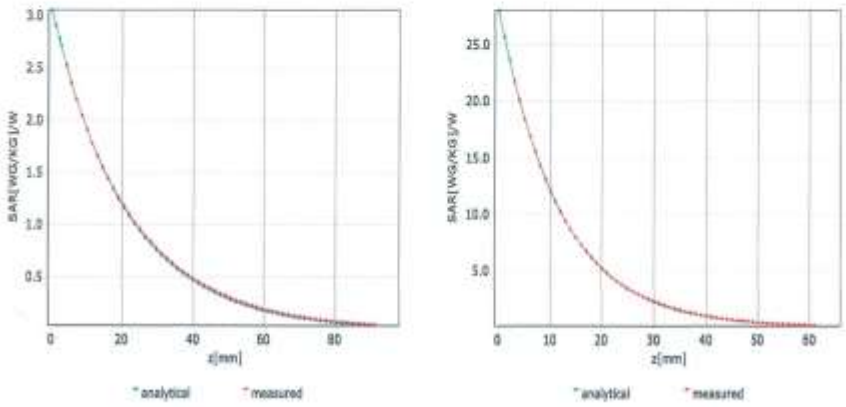
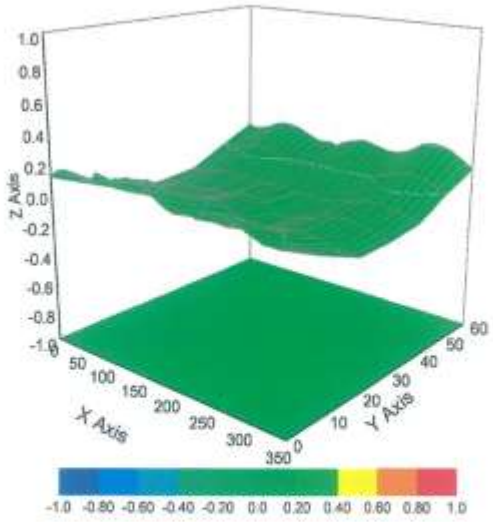
Conversion Factor Assessment

f=750 MHz,WGLS R9(H_convF) f=1810 MHz,WGLS R22(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±3.2% (*k*=2)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3710

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	81.2
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	10mm
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

Appendix D. Dipole Calibration Data

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CNAS 中国认可 国际互认 校准 CALIBRATION CNAS L0570

Client Dekra-CN Certificate No: Z19-60093

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 839
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	March 25, 2019

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	106277	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Power sensor NRP8S	104291	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1331	06-Feb-19(SPEAG,No.DAE4-1331_Feb19)	Feb-20
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzer E5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: March 28, 2019

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

Certificate No: Z19-60093 Page 1 of 8

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, 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%.

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Measurement Conditions

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

DASY Version	DASY52	52.10.2.1495
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
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	39.6 ± 6 %	1.84 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	12.9 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**51.2 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.92 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.6 W/kg ± 18.7 % (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	53.8 ± 6 %	2.00 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.8 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.89 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.5 W/kg ± 18.7 % (k=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.3Ω+ 4.84 jΩ
Return Loss	- 24.9dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.5Ω+ 8.02 jΩ
Return Loss	- 24.3dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.026 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

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DASY5 Validation Report for Head TSL Date: 03.25.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 839

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.841 S/m; ε_r = 39.63; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.62, 7.62, 7.62) @ 2450 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

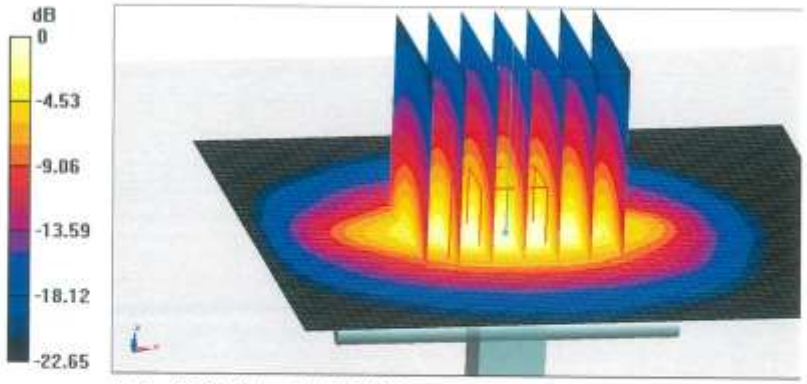
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 103.8 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 27.6 W/kg

SAR(1 g) = 12.9 W/kg; SAR(10 g) = 5.92 W/kg

Maximum value of SAR (measured) = 22.0 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

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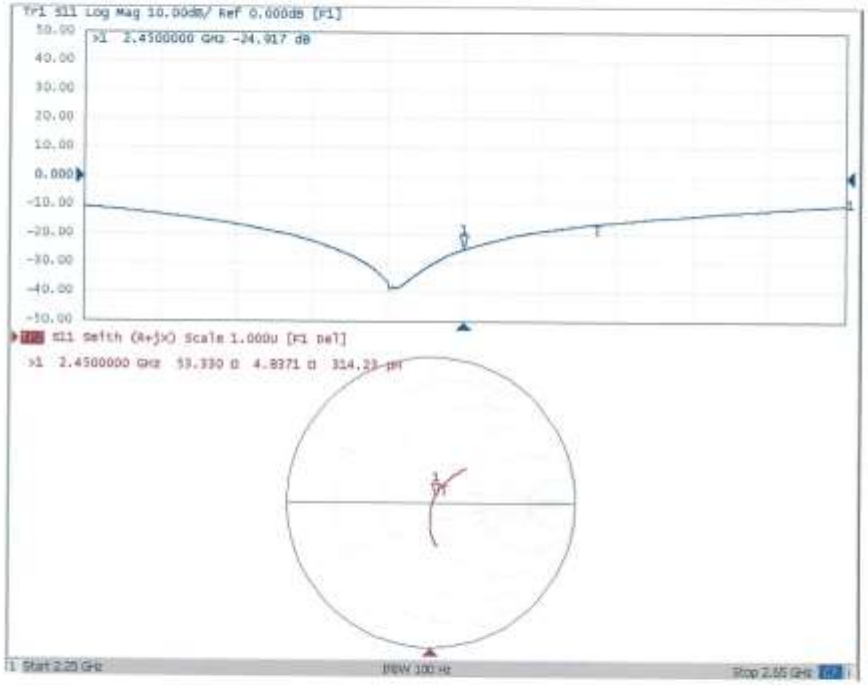
Impedance Measurement Plot for Head TSL



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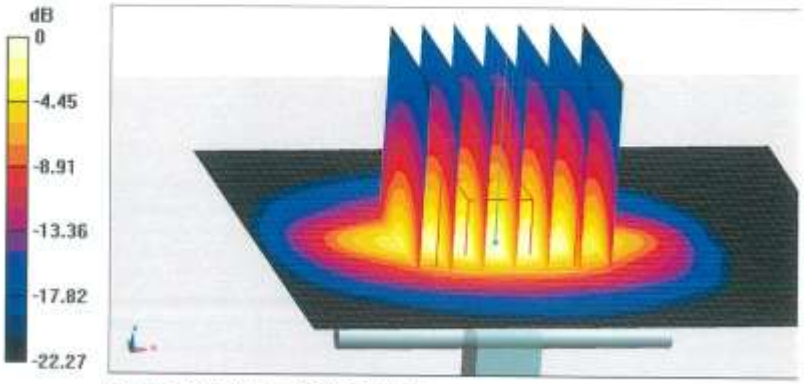
DASY5 Validation Report for Body TSL Date: 03.25.2019
Test Laboratory: CTTL, Beijing, China
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 839
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 2.003 S/m; ε_r = 53.78; ρ = 1000 kg/m3
Phantom section: Center Section
DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.79, 7.79, 7.79) @ 2450 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.90 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 27.0 W/kg
SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.89 W/kg
Maximum value of SAR (measured) = 21.4 W/kg



0 dB = 21.4 W/kg = 13.30 dBW/kg

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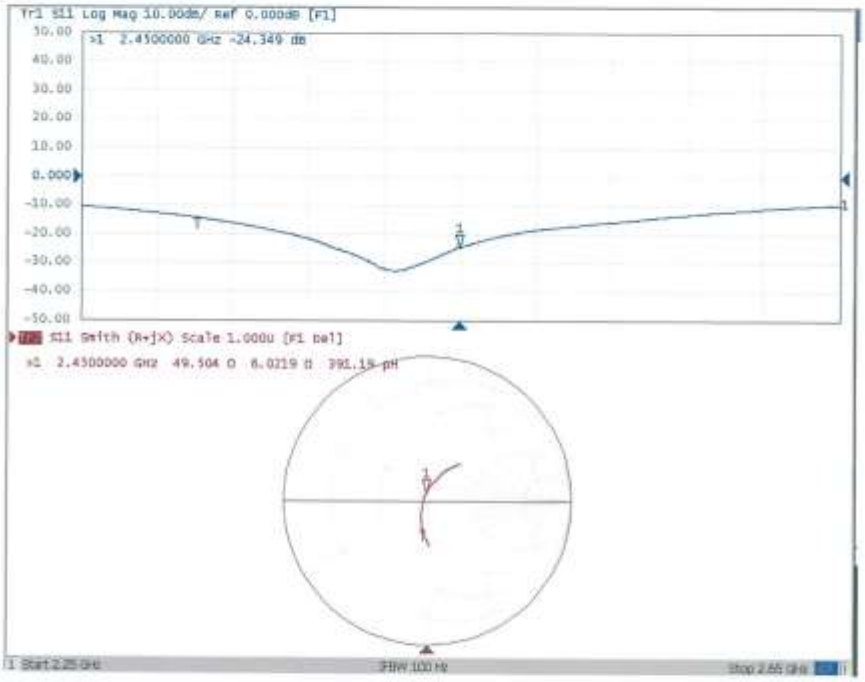
Impedance Measurement Plot for Body TSL



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CNAS L0570

Client Dekra-CN Certificate No: Z19-60096

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN: 1078
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	March 22, 2019

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	106277	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Power sensor NRP8S	104291	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
ReferenceProbe EX3DV4	SN 7514	27-Aug-18(SPEAG,No.EX3-7514_Aug18/2)	Aug-19
DAE4	SN 1331	06-Feb-19(SPEAG,No.DAE4-1331_Feb19)	Feb-20
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzerE5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: March 26, 2019

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, 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%.

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Measurement Conditions

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

DASY Version	DASY52	52.10.2.1495
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 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	34.8 ± 6 %	4.65 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °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	7.60 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**75.5 W/kg ± 24.4 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.6 W/kg ± 24.2 % (k=2)**

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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	34.5 ± 6 %	5.06 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.7 W/kg ± 24.4 % (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	**23.0 W/kg ± 24.2 % (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	34.4 ± 6 %	5.24 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.90 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.6 W/kg ± 24.4 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.4 W/kg ± 24.2 % (k=2)**

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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	48.2 ± 6 %	5.45 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.38 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**73.6 W/kg ± 24.4 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 W/kg ± 24.2 % (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	47.6 ± 6 %	5.91 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.75 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**77.3 W/kg ± 24.4 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.20 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.9 W/kg ± 24.2 % (k=2)**

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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	47.2 ± 6 %	6.11 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °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	7.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**74.4 W/kg ± 24.4 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 W/kg ± 24.2 % (k=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	52.1Ω - 4.23jΩ
Return Loss	- 26.7dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	59.2Ω - 3.00jΩ
Return Loss	- 21.1dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	51.9Ω + 2.48jΩ
Return Loss	- 30.3dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	50.7Ω - 3.30jΩ
Return Loss	- 29.5dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	58.8Ω - 1.83jΩ
Return Loss	- 21.7dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	53.0Ω + 4.58jΩ
Return Loss	- 25.5dB

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General Antenna Parameters and Design

Electrical Delay (one direction)	1.062 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

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DASY5 Validation Report for Head TSL Date: 03.20.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1078

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz,

Medium parameters used: f = 5250 MHz; σ = 4.652 S/m; ε_r = 34.84; ρ = 1000 kg/m3, Medium parameters used: f = 5600 MHz; σ = 5.063 S/m; ε_r = 34.48; ρ = 1000 kg/m3, Medium parameters used: f = 5750 MHz; σ = 5.236 S/m; ε_r = 34.35; ρ = 1000 kg/m3,

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(5.02, 5.02, 5.02) @ 5250 MHz; Calibrated: 8/27/2018, ConvF(4.41, 4.41, 4.41) @ 5600 MHz; Calibrated: 8/27/2018, ConvF(4.47, 4.47, 4.47) @ 5750 MHz; Calibrated: 8/27/2018,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.01 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 31.1 W/kg
SAR(1 g) = 7.6 W/kg; SAR(10 g) = 2.18 W/kg
Maximum value of SAR (measured) = 17.8 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 68.43 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 35.7 W/kg
SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.32 W/kg
Maximum value of SAR (measured) = 19.5 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.10 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 36.7 W/kg
SAR(1 g) = 7.9 W/kg; SAR(10 g) = 2.26 W/kg
Maximum value of SAR (measured) = 19.0 W/kg

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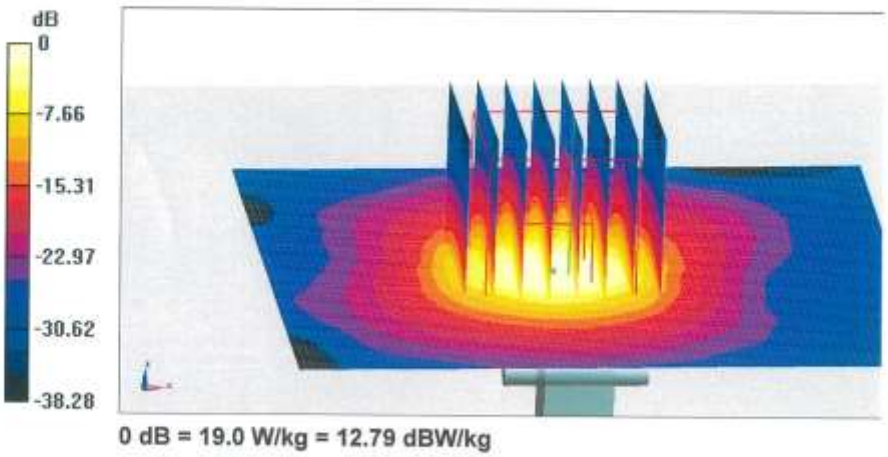

0 dB = 19.0 W/kg = 12.79 dBW/kg

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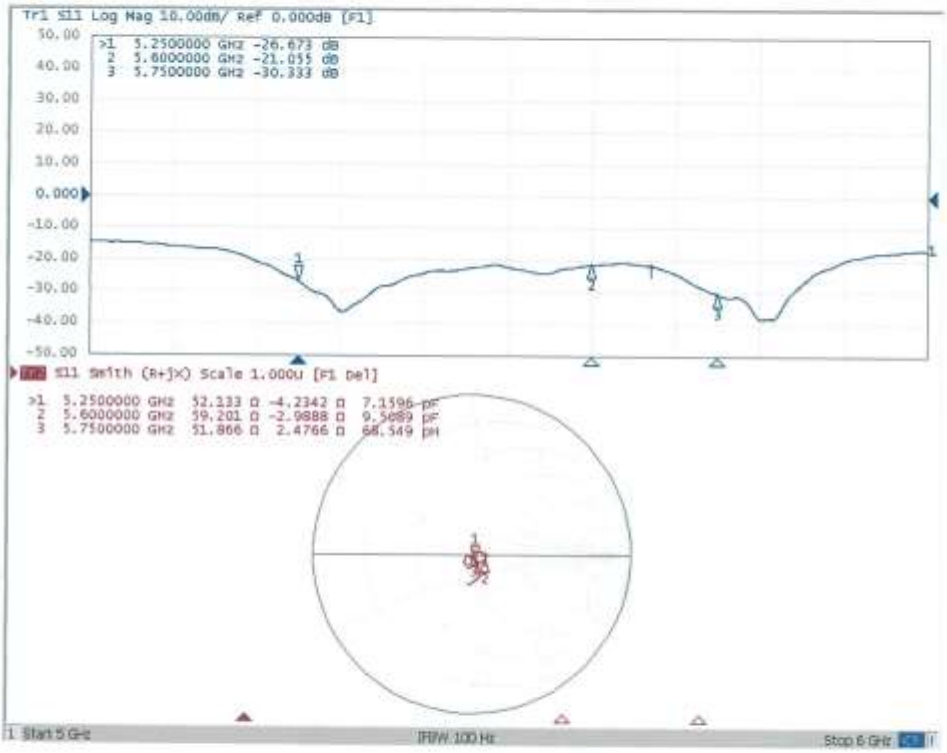
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 03.21.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1078

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz,

Medium parameters used: f = 5250 MHz; σ = 5.446 S/m; εr = 48.2; ρ = 1000 kg/m3, Medium parameters used: f = 5600 MHz; σ = 5.906 S/m; εr = 47.56; ρ = 1000 kg/m3, Medium parameters used: f = 5750 MHz; σ = 6.107 S/m; εr = 47.22; ρ = 1000 kg/m3,

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(4.54, 4.54, 4.54) @ 5250 MHz; Calibrated: 8/27/2018, ConvF(4, 4, 4) @ 5600 MHz; Calibrated: 8/27/2018, ConvF(3.98, 3.98, 3.98) @ 5750 MHz; Calibrated: 8/27/2018,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 59.53 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 29.8 W/kg
SAR(1 g) = 7.38 W/kg; SAR(10 g) = 2.1 W/kg
Maximum value of SAR (measured) = 17.1 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 61.54 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 34.1 W/kg
SAR(1 g) = 7.75 W/kg; SAR(10 g) = 2.2 W/kg
Maximum value of SAR (measured) = 18.9 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 60.01 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 34.6 W/kg
SAR(1 g) = 7.46 W/kg; SAR(10 g) = 2.1 W/kg
Maximum value of SAR (measured) = 19.0 W/kg

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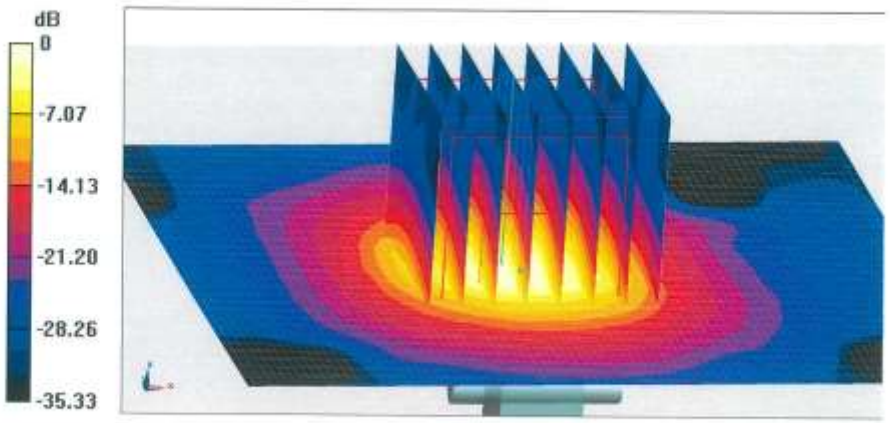

0 dB = 19.0 W/kg = 12.79 dBW/kg

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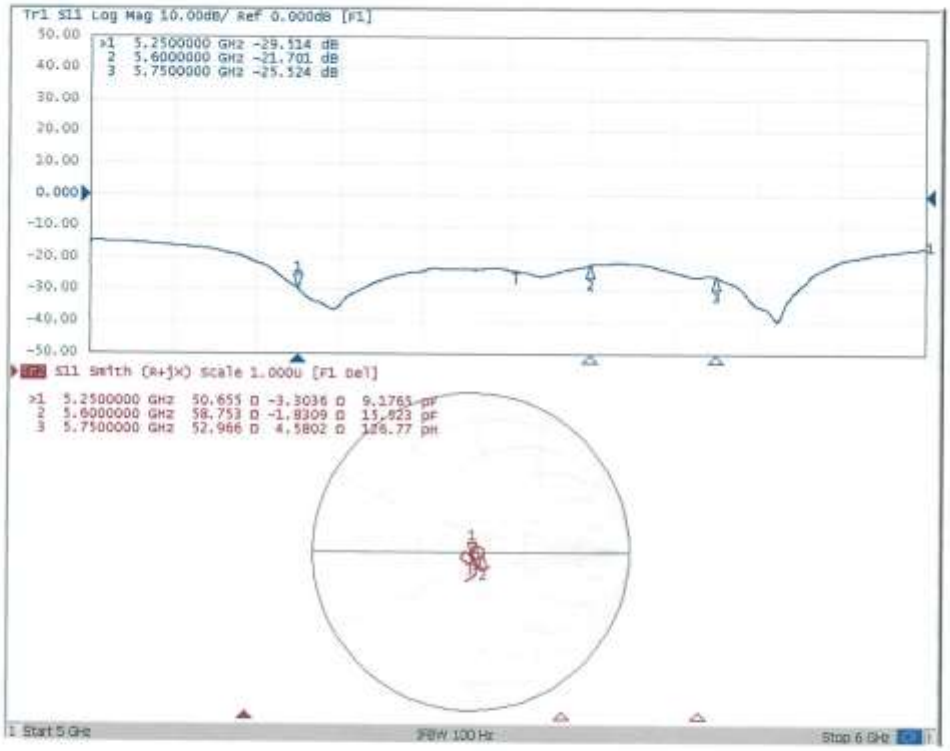
Impedance Measurement Plot for Body TSL



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CNAS L0570

Client **Dekra-CN** **Certificate No: Z19-60089**

CALIBRATION CERTIFICATE

Object	D900V2 - SN:1d096
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	March 28, 2019

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	106277	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Power sensor NRP8S	104291	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1331	06-Feb-19(SPEAG,No.DAE4-1331_Feb19)	Feb-20
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzer E5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: March 30, 2019

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, 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%.

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Measurement Conditions

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

DASY Version	DASY52	52.10.2.1495
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.6 ± 6 %	0.97 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.65 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**10.7 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.75 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**7.05 W/kg ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.6 ± 6 %	1.02 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.69 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**11.1 W /kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.77 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**7.23 W/kg ± 18.7 % (k=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.3Ω- 1.94jΩ
Return Loss	- 33.6dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.4Ω- 2.26jΩ
Return Loss	- 29.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.278 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

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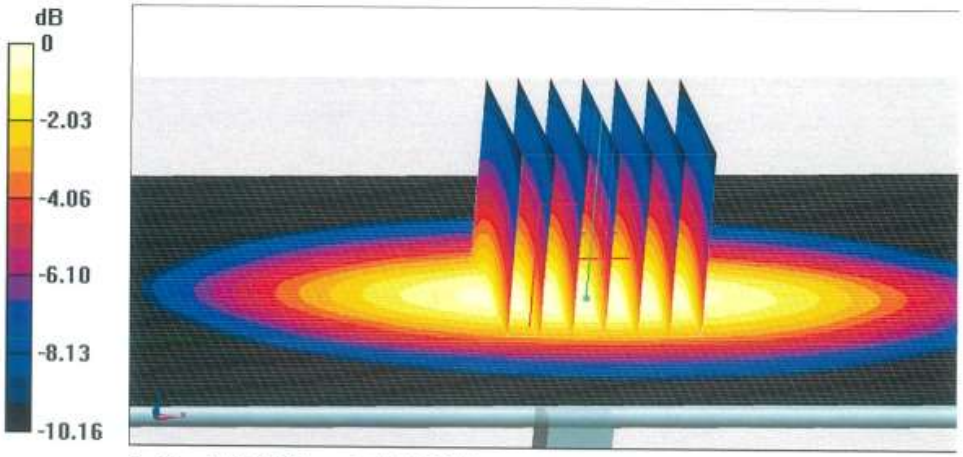
DASY5 Validation Report for Head TSL Date: 03.27.2019
Test Laboratory: CTTL, Beijing, China
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 1d096
Communication System: UID 0, CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 0.965 S/m; ε_r = 42.62; ρ = 1000 kg/m3
Phantom section: Right Section
DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.66, 9.66, 9.66) @ 900 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.17 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.96 W/kg
SAR(1 g) = 2.65 W/kg; SAR(10 g) = 1.75 W/kg
Maximum value of SAR (measured) = 3.52 W/kg



0 dB = 3.52 W/kg = 5.47 dBW/kg

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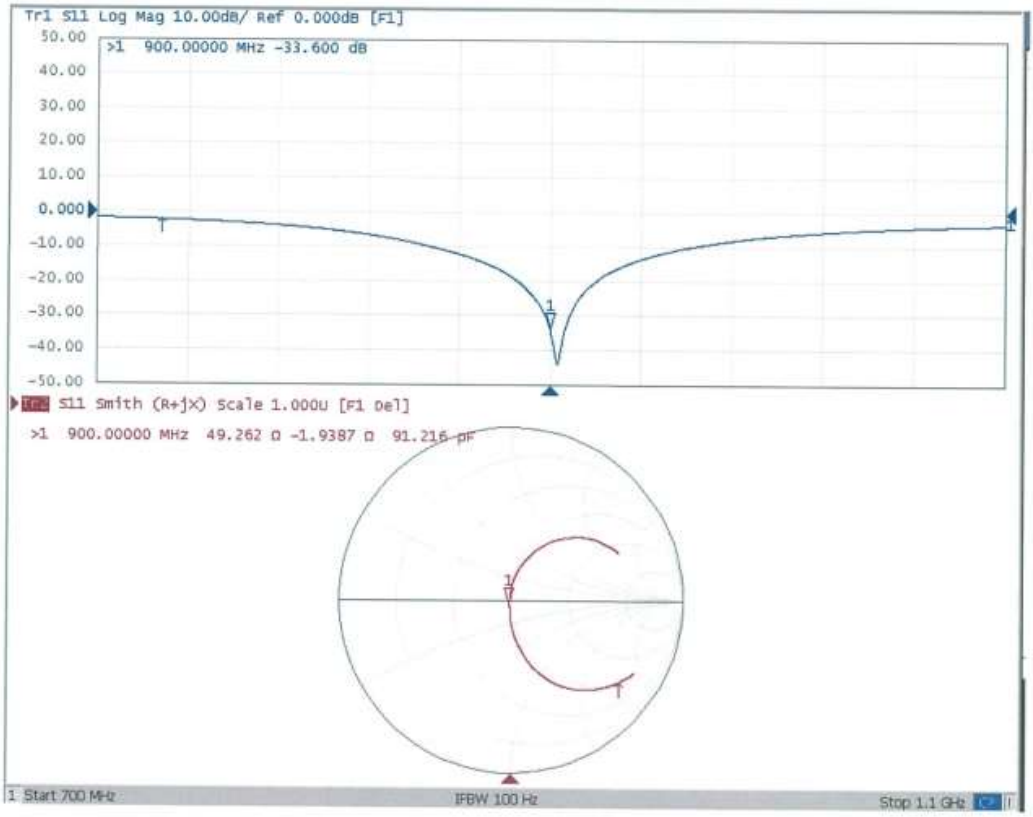
Impedance Measurement Plot for Head TSL



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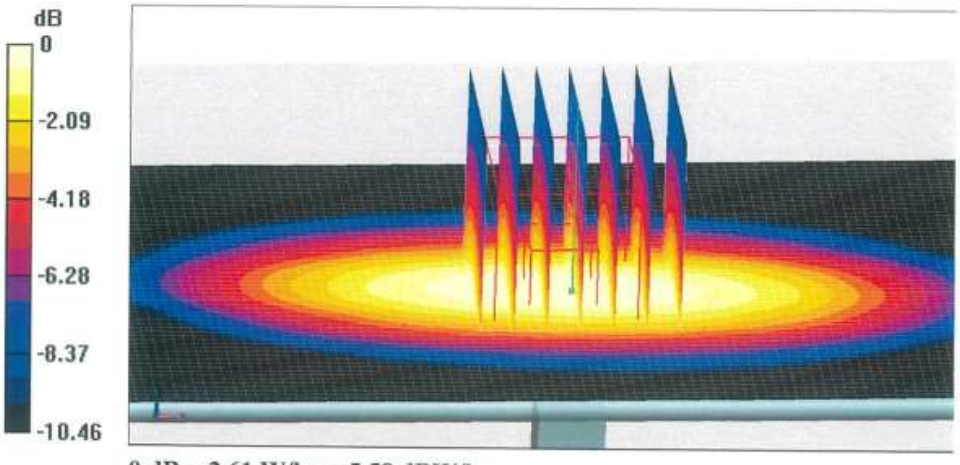
DASY5 Validation Report for Body TSL Date: 03.27.2019
Test Laboratory: CTTL, Beijing, China
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 1d096
Communication System: UID 0, CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 1.021 S/m; ε_r = 56.57; ρ = 1000 kg/m3
Phantom section: Center Section
DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.57, 9.57, 9.57) @ 900 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.72 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 4.09 W/kg
SAR(1 g) = 2.69 W/kg; SAR(10 g) = 1.77 W/kg
Maximum value of SAR (measured) = 3.61 W/kg



0 dB = 3.61 W/kg = 5.58 dBW/kg

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CALIBRATION LABORATORY

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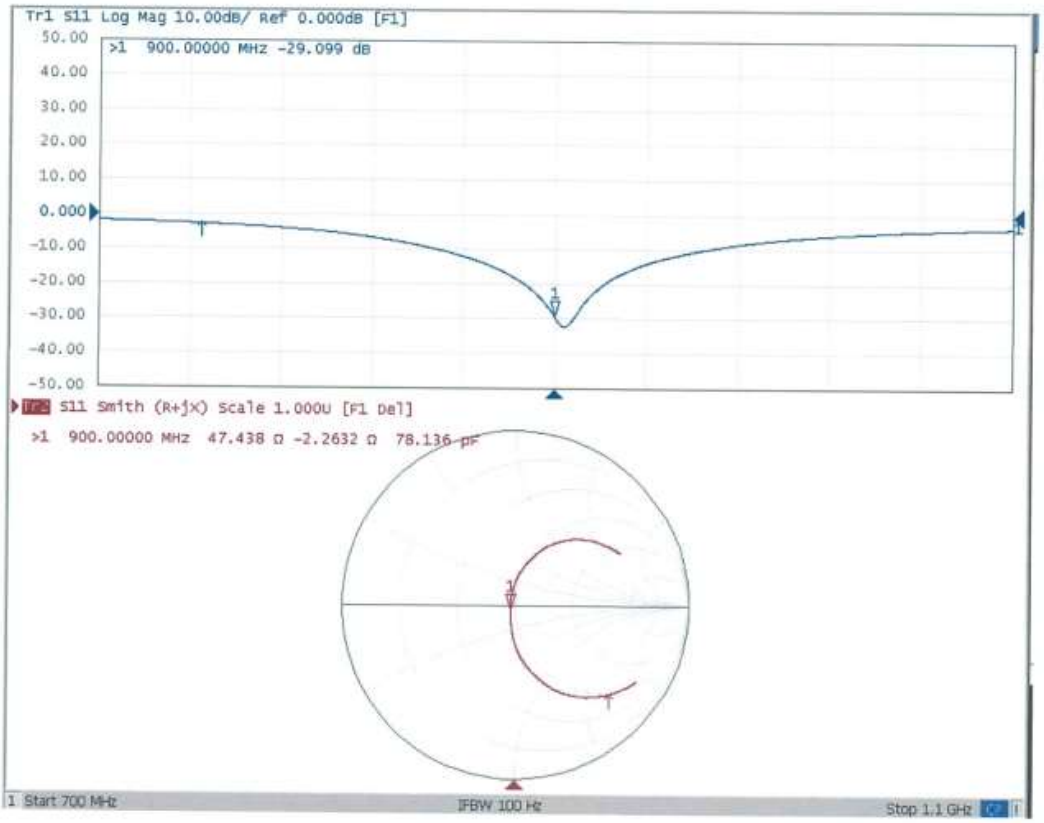
Impedance Measurement Plot for Body TSL



Appendix E. DAE Calibration Data

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IMPORTANT NOTICE

USAGE OF THE DAE4

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 fixed 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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Accreditation No.: SCS 0108

Client Dekra CN (Auden) **Certificate No:** DAE4-1220_Apr20

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BM - SN: 1220
Calibration procedure(s)	QA CAL-06.v30 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	April 27, 2020

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	03-Sep-19 (No:25949)	Sep-20
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	09-Jan-20 (in house check)	In house check: Jan-21
Calibrator Box V2.1	SE UMS 006 AA 1002	09-Jan-20 (in house check)	In house check: Jan-21

	Name	Function	Signature
Calibrated by:	Eric Hainfeld	Laboratory Technician	
Approved by:	Sven Kühn	Deputy Manager	i.V.

Issued: April 27, 2020

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

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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 following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

Calibration Factors	X	Y	Z
High Range	405.230 ± 0.02% (k=2)	404.950 ± 0.02% (k=2)	404.182 ± 0.02% (k=2)
Low Range	3.97907 ± 1.50% (k=2)	3.99574 ± 1.50% (k=2)	3.98653 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	176.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200036.94	3.19	0.00
Channel X	+ Input	20006.94	1.76	0.01
Channel X	- Input	-20004.05	2.18	-0.01
Channel Y	+ Input	200035.19	1.43	0.00
Channel Y	+ Input	20005.00	-0.04	-0.00
Channel Y	- Input	-20008.08	-1.69	0.01
Channel Z	+ Input	200034.88	1.14	0.00
Channel Z	+ Input	20004.33	-0.70	-0.00
Channel Z	- Input	-20006.41	0.03	-0.00

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.73	-0.19	-0.01
Channel X	+ Input	200.42	-0.56	-0.28
Channel X	- Input	-199.46	-0.51	0.26
Channel Y	+ Input	2001.06	0.27	0.01
Channel Y	+ Input	199.67	-1.18	-0.59
Channel Y	- Input	-200.11	-1.02	0.51
Channel Z	+ Input	2000.50	-0.23	-0.01
Channel Z	+ Input	200.06	-0.76	-0.38
Channel Z	- Input	-200.08	-0.96	0.48

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	9.57	7.80
	- 200	-7.56	-9.19
Channel Y	200	-8.07	-8.41
	- 200	6.45	6.68
Channel Z	200	12.95	12.21
	- 200	-13.67	-14.19

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	1.05	-3.73
Channel Y	200	7.34	-	2.47
Channel Z	200	9.45	5.59	-

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	15875	14293
Channel Y	16017	16505
Channel Z	15702	15823

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.72	-0.26	1.80	0.43
Channel Y	-0.24	-1.36	1.77	0.44
Channel Z	-0.54	-1.64	0.95	0.44

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

The End