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SAR TEST REPORT

Product Name	VR All-In-One Headset
Trademark	PICO
Model and /or type reference	A7Q10
FCC ID	2A5NV-A7Q10
Applicant´s name / address	Qingdao Chuangjian Weilai Technology Co., Ltd Room 401, 4th Floor, Building 3, Qingdao Research Institute, 393 Songling Road, Laoshan District, Qingdao City, Shandong Province, P.R.China
Test method requested, standard	FCC 47CFR §2.1093 IEEE Std 1528-2013 ANSI C95.1:2019
Maximum SAR	Head SAR: Standalone SAR **1.29** W/kg; Simultaneous SAR **1.388** W/kg Limbs SAR: Standalone SAR **3.62** W/kg; Simultaneous SAR **3.677** W/kg
Verdict Summary	IN COMPLIANCE
Tested by (name / position & signature)	Tim Cao/Project Engineer
Approved by (name / position & signature)	Jack Zhang/ Manager
Date of issue	2023-05-08
Report version	V1.3
Report template No	Template_FCC SAR-RF-V1.0
FCC Designation Number	CN1199

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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.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

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)	Jan. 04, 2023
Date (start test)	Jan. 11, 2023
Date (finish test)	May. 08, 2023

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
2310083R-RF-US-P03V01	V1.0	Initial issue of report.	Mar. 29, 2023
2310083R-RF-US-P03V01	V1.1	Added notes about RU for 802.11ax, as well as added power setpoint and Duty Cycle test data. Added references to the KDB 248227 standard. and updated BS IEC/IEEE 62209-1528. V1.0 has expired.	Apr. 11, 2023
2310083R-RF-US-P03V01	V1.2	Page14 revised the description of RU, and Page7 added modulation types. and changed the IEEE Std-1528 standard. V1.1 has expired.	Apr. 21, 2023
2310083R-RF-US-P03V01	V1.3	The 5150-5250MHz and 5725-5850MHz bands are brand new tests, V1.2 has expired.	May. 08, 2023

REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. This report is based on FCC: 2A5NV-A7H10, new sample with BLE chip removed and non-RF circuit material replaced with equivalent. New samples 5150 - 5250MHz and 5725 - 5850MHz have increased RF output power and we evaluate all tests to comply with FCC Part 2.1093; for 5250 - 5350MHz and 5470-5725MHz, the output power data refers to the original data, and the SAR needs a new test. 5250 - 5350MHz and 5470 - 5725MHz test data from FCC: 2A5NV-A7H10.
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 Information.

1 General Information

1.1 General Description of the Item(s)

Product Name..... :	VR All-In-One Headset
Model No. ..... :	A7Q10
Trademark ..... :	PICO
FCC ID ..... :	2A5NV-A7Q10
Hardware Version ..... :	R2
Software Version ..... :	198
Manufacturer ..... :	Qingdao Chuangjian Weilai Technology Co., Ltd
Manufacturer address ..... :	Room 401, 4th Floor, Building 3, Qingdao Research Institute, 393 Songling Road, Laoshan District, Qingdao City, Shandong Province, P.R.China

Wireless specification ..... :	802.11b/g/n/ax For 2.4G Wi-Fi
Operating frequency range(s) .....:	802.11b/g/n/ax(20MHz): 2412~2462MHz 802.11n/ax(40MHz): 2422~2452MHz
Type of Modulation ..... :	802.11b: DSSS-DBPSK, DQPSK, CCK 802.11g/n/ax: OFDM-BPSK, QPSK, 16QAM, 64QAM,1024QAM,OFDMA
Number of channels..... :	802.11b/g/n/ax(20MHz): 11 802.11n/ax(40MHz): 7

Wireless specifiction ..... :	802.11a/n/ac/ax For 5G Wi-Fi					
Type of Modulation ..... :	OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM,1024QAM,OFDMA					
Transmit modes..... :	☒	802.11a	☒	802.11n(20MHz)	☒	802.11n(40MHz)
	☒	802.11ac(20MHz)	☒	802.11ac(40MHz)	☒	802.11ac(80MHz)
	☒	802.11ax(20MHz)	☒	802.11ax(40MHz)	☒	802.11ax(80MHz)
Frequency Range ..... :	☒	5150MHz~5250MHz	☐	Ooutdoor access point		
			☐	RF Module		
			☐	Fixed point-to-point AP		
			☒	Mobile and Portable Client		
	☒	5250MHz~5350MHz				

	☒	5470MHz~5725MHz	☒	With TDWR Channels
			☐	Without TDWR Channels
	☒	5725MHz~5850MHz		
Date Rate ..... :	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps 802.11ax: up to 1200Mbps			
Number of channels..... :	802.11a/n/ac/ax(20MHz): 24 802.11n/ac/ax(40MHz): 11 802.11ac/ax(80MHz): 5			

Wireless specification ..... :	Bluetooth V3.0					
Operating frequency range(s) ..... :	2400~2483.5MHz					
Type of Modulation ..... :	GFSK					
PHYs..... :	☒	GFSK	☒	Pi/4 DQPSK	☒	8DPSK
Data Rate ..... :	☒	1Mbit/s	☒	2Mbit/s	☒	3Mbit/s
Number of channel ..... :	79					

Wireless specifiction ..... :	Bluetooth 5.2					
Operating frequency range(s)	2402~2480MHz					
Type of Modulation ..... :	GFSK					
PHYs..... :	☒	LE 1M	☒	LE 2M	☒	LE Coded S=2/8
Data Rate ..... :	☒	1Mbit/s	☒	2Mbit/s	☒	500/125 Kbit/s
Number of channel ..... :	40					

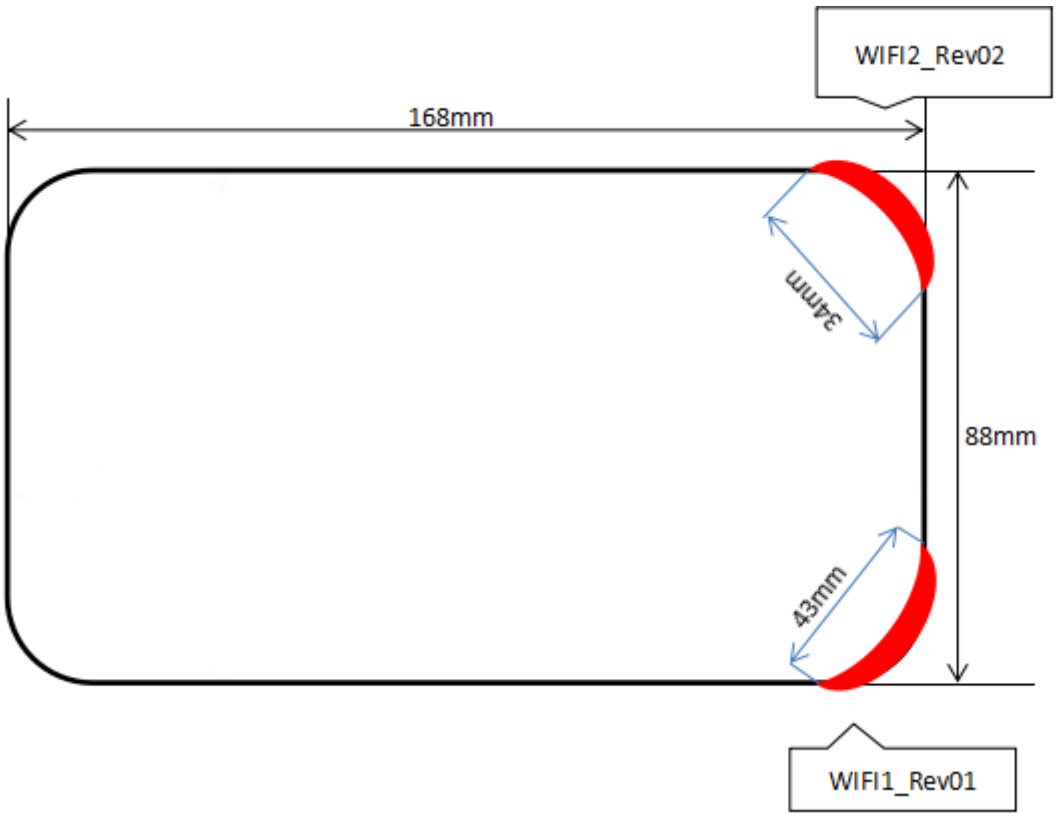
Rated power supply .....:	Voltage and Frequency	
	☐	AC: 220 - 240 V, 50/60 Hz
	☐	AC: 100 - 240 V, 50/60 Hz
	☒	HMD: 5.0VDC 3.0A / 9.0VDC 3A
	☒	Battery:3.85V
	☒	Adapter: ……
Adapter model (optional).....:	Model: A138A-120150U-US3; A860-120150-U-US1	
	Input: 100-240V~50/60Hz,0.5A Output: 5V 3A/9V 2A/12V 1.5A	
Mounting position.....:	☐	Tabletop equipment
	☐	Wall/Ceiling mounted equipment
	☐	Floor standing equipment
	☒	Head-mounted equipment
	☐	Other:

1.2 Antenna Information

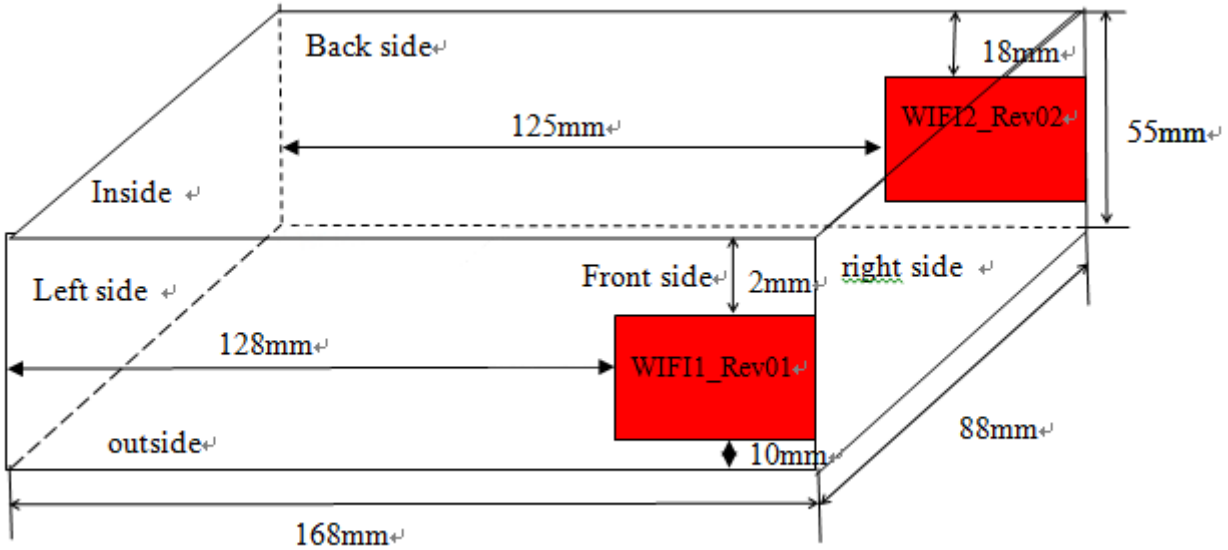
Antenna Delivery ..... :	☒	1TX + 1RX		
	☒	2TX + 2RX		
	☐	Others:……		
Antenna technology ..... :	☒	SISO		
	☒	MIMO	☒	CDD
			☐	Beam-forming
Antenna Type ..... :	☐	External	☐	Dipole
			☐	Sectorized
	☒	Internal	☐	Ceramic Chip
			☐	PIFA
			☒	FPC
			☐	Others……..

1.3 Antenna location map

Edge inside (Close to the face)



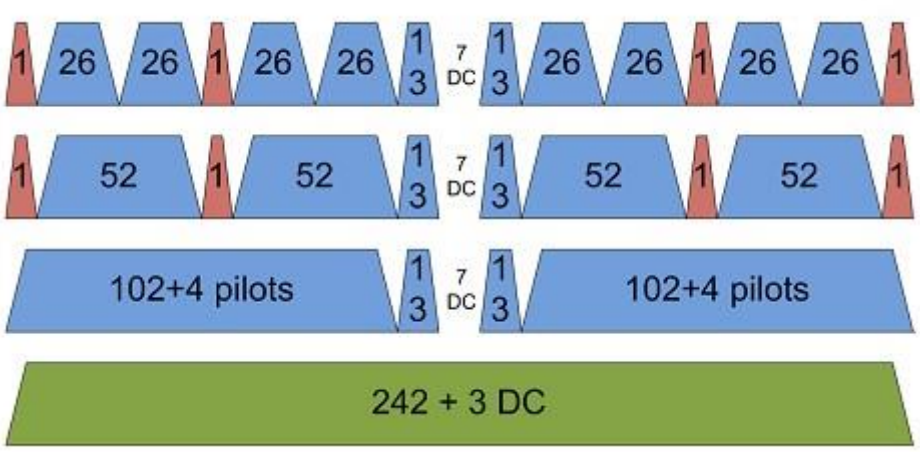
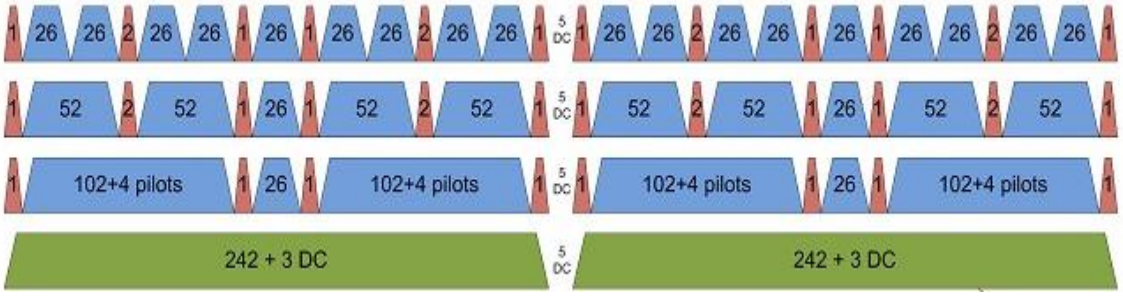
Graphic model



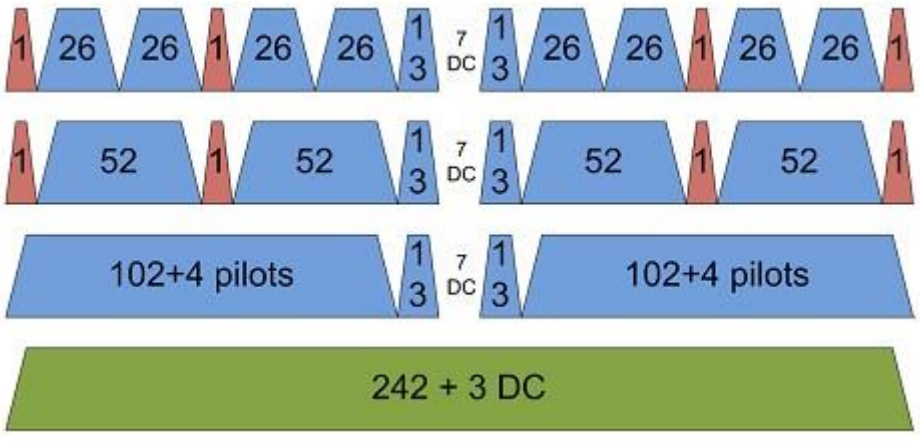
Antenna 1 （WiFi+BT）	exclusion
Inside 2 mm <25mm	no
Outside 10 mm	no
Back 88mm	yes
Front 0mm	no
Left 128mm	yes
Right 0mm	no
Antenna 2 (WIFI)	exclusion
Inside 2 mm <25mm	no
Outside 10 mm	no
Front 88mm	yes
Back 0mm	no
Left 125mm	yes
Right 0mm	no

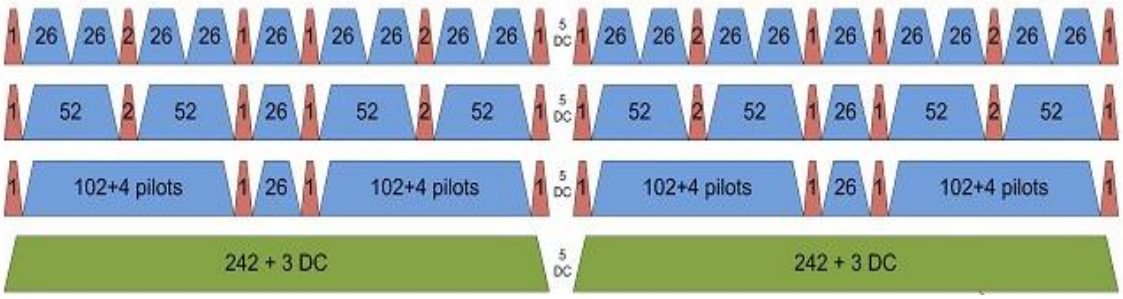
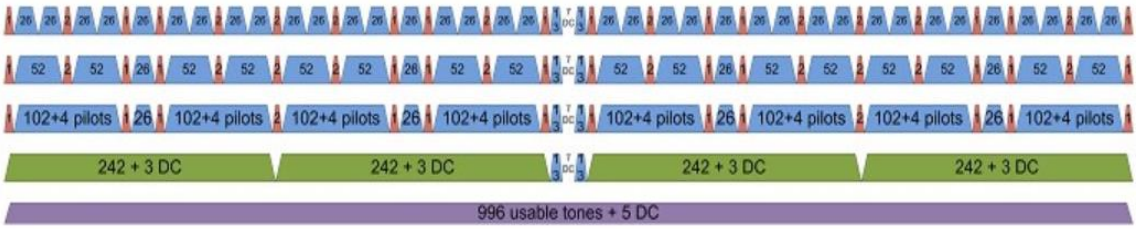
1.4 802.11ax RU configurations:

For 2.4G Wi-Fi

Bandwidth	RU all configurations
20MHz	
40MHz	

For 5G Wi-Fi

Bandwidth	RU all configurations
20MHz	

40MHz	
80MHz	

Note:

1. For partial RU test data, please refer to FCC ID: 2A5NV-A7H10.
2. The output power of partial RU is lower than that of full RU, so we did not evaluate the test for partial RU.

1.5 Power setting in test

Mode	Channel	Frequency (MHz)	Power setting		
			SISO:ANT1	SISO:ANT2	CDD:ANT1+2
802.11b	01	2412	14	14	14
	06	2437	14	14	14
	11	2462	14	14	14
802.11g	01	2412	14	14	14
	06	2437	14	14	14
	11	2462	14	14	14
802.11n(20MHz)	01	2412	14	14	14
	06	2437	14	14	14
	11	2462	14	14	14
802.11n(40MHz)	03	2422	14	14	14
	06	2437	14	14	14
	09	2452	14	14	14
802.11ax(20MHz)	01	2412	14	14	14
	06	2437	14	14	14
	11	2462	14	14	14
802.11ax(40MHz)	03	2422	14	14	14
	06	2437	14	14	14
	09	2452	14	14	14

Mode	Channel	Frequency (MHz)	Power setting		
			SISO:ANT1	SISO:ANT2	CDD:ANT1+2
802.11a	36	5180	19	19	14.5
	44	5220	19	19	14.5
	48	5240	19	19	15
	52	5260	15	15	10
	60	5300	15	15	10
	64	5320	15	15	10
	100	5500	15	15	10
	116	5580	15	15	10
	140	5700	15	15	10
	149	5745	18	18	18
	157	5785	18	18	18

	165	5825	18	18	18
802.11n(20MHz)	36	5180	19	19	14.5
	44	5220	19	19	14.5
	48	5240	19	19	15
	52	5260	15	15	10
	60	5300	15	15	10
	64	5320	15	15	10
	100	5500	15	15	10
	116	5580	15	15	10
	140	5700	15	15	10
	149	5745	18	18	18
	157	5785	18	18	18
	165	5825	18	18	18
802.11n(40MHz)	38	5190	19	19	16
	46	5230	19	19	16
	54	5270	15	15	10
	62	5310	15	15	10
	102	5510	15	15	10
	118	5590	15	15	10
	134	5670	15	15	10
	151	5755	18	18	18
	159	5795	18	18	18
802.11ac(20MHz)	36	5180	19	19	14.5
	44	5220	19	19	14.5
	48	5240	19	19	15
	52	5260	15	15	10
	60	5300	15	15	10
	64	5320	15	15	10
	100	5500	15	15	10
	116	5580	15	15	10
	140	5700	15	15	10
	149	5745	16	16	16
	157	5785	16	16	16
	165	5825	16	16	16
802.11ac(40MHz)	38	5190	19	19	16
	46	5230	19	19	16

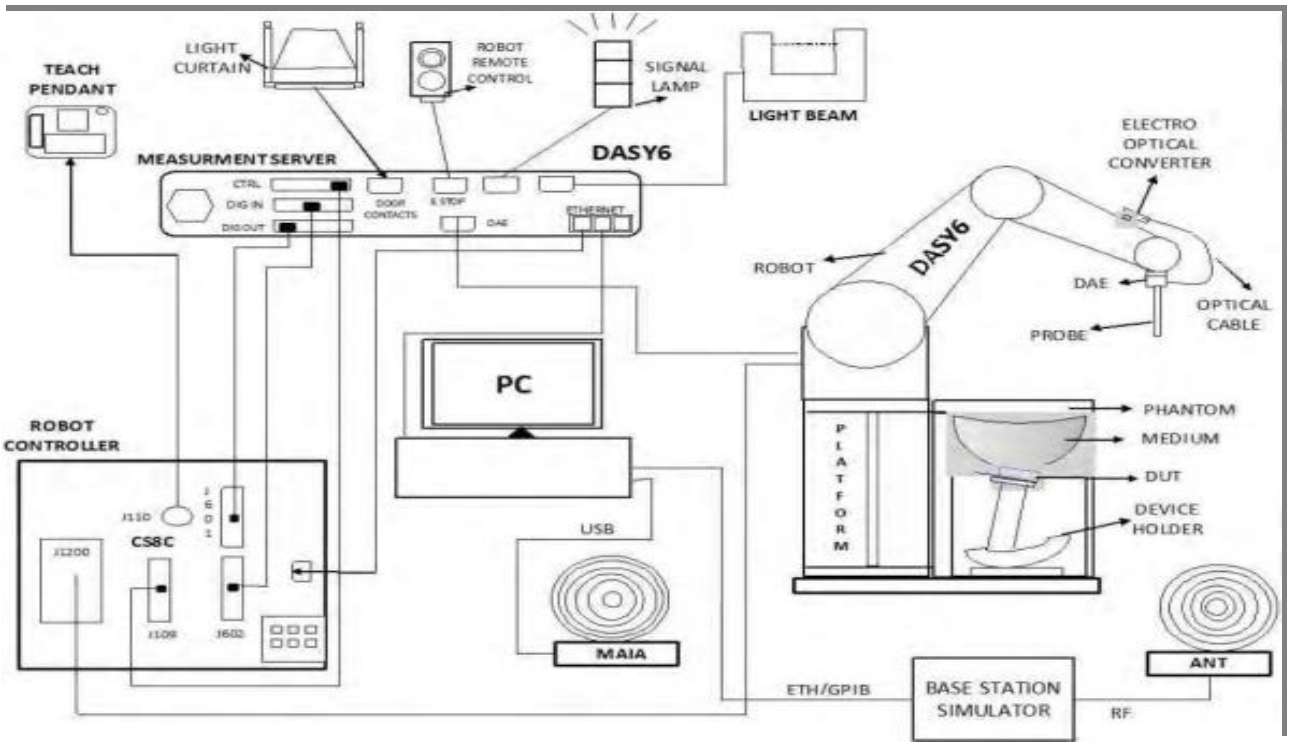
	54	5270	15	15	10
	62	5310	15	15	10
	102	5510	15	15	10
	118	5590	15	15	10
	134	5670	15	15	10
	151	5755	16	16	16
	159	5795	16	16	16
802.11ac(80MHz)	42	5210	19	19	16
	58	5290	15	15	10
	106	5530	15	15	10
	155	5775	16	16	16
802.11ax(20MHz)	36	5180	19	19	14.5
	44	5220	19	19	14.5
	48	5240	19	19	15
	52	5260	15	15	10
	60	5300	15	15	10
	64	5320	15	15	10
	100	5500	15	15	10
	116	5580	15	15	10
	140	5700	15	15	10
	149	5745	16	16	16
	157	5785	16	16	16
	165	5825	16	16	16
802.11ax(40MHz)	38	5190	19	19	16
	46	5230	19	19	16
	54	5270	15	15	10
	62	5310	15	15	10
	102	5510	15	15	10
	118	5590	15	15	10
	134	5670	15	15	10
	151	5755	16	16	16
	159	5795	16	16	16
802.11ax(80MHz)	42	5210	19	19	16
	58	5290	15	15	10
	106	5530	15	15	10
	155	5775	16	16	16

Mode	Channel	Frequency (MHz)	Power Setting
DH5	00	2402	11
	39	2441	11
	78	2480	11
2DH5	00	2402	11
	39	2441	11
	78	2480	11
3DH5	00	2402	11
	39	2441	11
	78	2480	11

Mode	Channel	Frequency (MHz)	Power setting
LE_1Mbps	00	2402	11
	19	2440	11
	39	2480	11
LE_2Mbps	00	2402	Default
	19	2440	Default
	39	2480	Default
LE_Coded S=2	00	2402	Default
	19	2440	Default
	39	2480	Default
LE_Coded S=8	00	2402	Default
	19	2440	Default
	39	2480	Default

2 SAR MEASUREMENT SYSTEM

2.1 DASY6 System Description



The DASY6 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 DASY6 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 Std-1528, EN 50566, 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 $10mm^2$ 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 Std-1528 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/m^3 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, DASY6 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 Std-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 DASY6 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 Std-1528, etc.) under ISO 17025. The calibration data are in Appendix D.

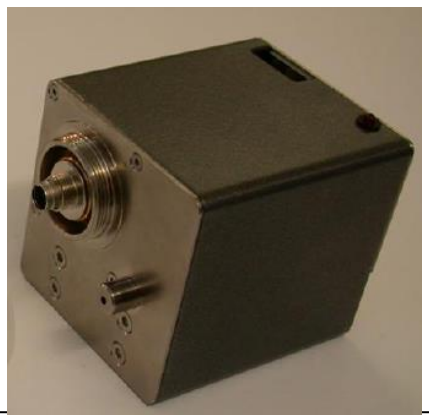
Model	EX3DV4	
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz to 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 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 DASY6 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 DASY6 I/O board, which is directly connected to the PC/104 bus of the CPU board.

2.5 Robot

The DASY6 system uses the high precision robots TX90 XL type out of the newer series from Stäubli SA (France). For the 6-axis controller DASY6 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 DASY6 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 DASY6 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.

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

The DASY6 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

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.

ELI Phantom

The SAM phantom is a fiberglass shell phantom with 2mm shell thickness. It has one measurement areas:

- ELI phantom

The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

3 TISSUE SIMULATING LIQUID

3.1 The composition of the tissue simulating liquid

Simulate 600MHz~10000MHz liquid, manufactured by SPEAG

Table F.1 – Suggested recipes for achieving target dielectric properties, 30 MHz to 900 MHz

Frequency (MHz)	30	50		144		450		835	900	
Recipe source number	3	3	2	2	3	2	4	2	2	4
Ingredients (% by weight)										
De-ionized water	48,30	48,30	53,53	55,12	48,30	48,53	56	50,36	50,31	56
Tween 20			44,70	43,31		49,51		48,39	48,34	
Oxidized mineral oil							44			44
Diethylenglycol monohexylether										
Triton X-100										
Diacetin	50,00	50,00			50,00					
DGBE										
NaCl	1,60	1,60	1,77	1,57	1,60	1,96		1,25	1,35	
Additives and salt	0,10	0,10			0,10					
Measured temperature dependence										
Temp. (°C)			21	21		21	20	21	21	20
$\varepsilon_{\text{liquid temp. unc.}}$ (%)	0,8	0,1			0,1	0,1		0,04	0,04	
$\sigma_{\text{liquid temp. unc.}}$ (%)	2,8	2,8			2,6	4,2		1,6	1,6	

Table F.2 – Suggested recipes for achieving target dielectric properties, 1 800 MHz to 10 000 MHz

Frequency (MHz)	1 800		2 450	4 000	5 000	5 200	5 800	6 000	8 000	10 000
Recipe source number	2	4	4	4	4	1	1	4	5	5
Ingredients (% by weight)										
De-ionized water	54,23	56	56	56	56	65,53	65,53	56	67,8	66,0
Tween	45,27								31,1	33,0
Oxidized mineral oil		44	44	44	44			44		
Diethylenglycol monohexylether						17,24	17,24			
Triton X-100						17,24	17,24			
Diacetin										
DGBE										
NaCl	0,50									
Additives and salt										
Measured temperature dependence										
Temp. (°C)	21	20	20	20	20	22	22	20	20	20
$\varepsilon_{\text{liquid temp. unc.}}$ (%)	0,4					1,7	1,8			
$\sigma_{\text{liquid temp. unc.}}$ (%)	2,3					2,7	2,6			

NOTE 1 Multiple columns under a single frequency indicate optional recipes.

NOTE 2 Recipe source numbers: 1 verified by different labs, 2 Reference [59], 3 developed by IT'IS Foundation, 4 developed by IT'IS Foundation, 5 Reference [60].

NOTE 3 The values of $\varepsilon_{\text{liquid temp. unc.}}$ and $\sigma_{\text{liquid temp. unc.}}$ are liquid temperature uncertainties described in O.9.6, based on measurements of the applicable liquid recipes given above. These are not part of the original publications but have been subsequently developed by the project team.

NOTE 4 The recipes at 8 000 MHz and 10 000 MHz are sufficiently broadband that they cover the frequency range of 6 000 MHz to 10 000 MHz within a tolerance of ±10 % for permittivity and conductivity.

3.2 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using DASY6 Dielectric Probe Kit and Agilent Vector Network Analyzer E5071C

Head Tissue Simulant Measurement				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		ε_r	σ [s/m]	
2450 MHz	Reference result ± 5% window	39.2 37.24 to 41.16	1.80 1.71 to 1.89	N/A
	03-11-2023	38.54	1.86	21.0
2450 MHz	Reference result ± 5% window	39.2 37.24 to 41.16	1.80 1.71 to 1.89	N/A
	05-06-2023	38.54	1.86	21.0
5250 MHz	Reference result ± 5% window	35.9 34.11 to 37.70	4.71 4.47 to 4.95	N/A
	03-21-2023	36.40	4.60	21.0
5250 MHz	Reference result ± 5% window	35.9 34.11 to 37.70	4.71 4.47 to 4.95	N/A
	05-08-2023	36.38	4.60	21.0
5600 MHz	Reference result ± 5% window	35.5 33.73 to 37.28	5.07 4.82 to 5.32	N/A
	05-08-2023	35.81	4.99	21.0
5750 MHz	Reference result ± 5% window	35.4 33.63 to 37.17	5.22 4.96 to 5.48	N/A
	03-23-2023	35.569	5.16	21.0

3.3 Tissue Dielectric Parameters for Head Phantoms

The head tissue dielectric parameters recommended by the IEEE Std-1528 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 IEEE Std-1528 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 IEEE Std-1528.

Target Frequency	Head	
(MHz)	ε_r	σ (S/m)
150	52.3	0.76
300	45.3	0.87
450	43.5	0.87
750	41.9	0.89
835	41.5	0.90
900	41.5	0.97
915	41.5	0.98
1450	40.5	1.20
1610	40.3	1.29
1800 – 2000	40.0	1.40
2450	39.2	1.80
2600	39.0	1.96
3000	38.5	2.40

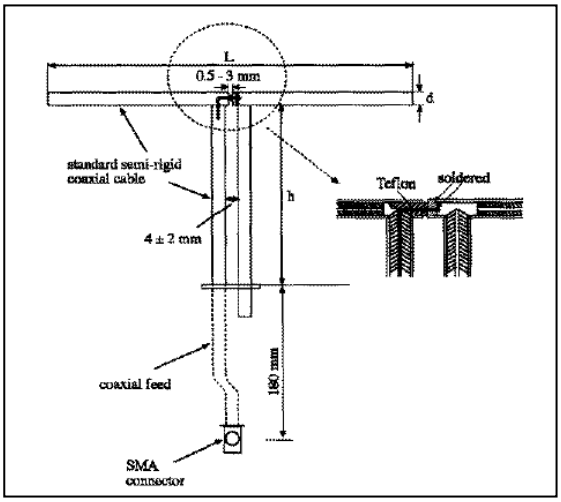
3500	37.9	2.91
4000	37.4	3.43
4500	36.8	3.94
5000	36.2	4.45
5200	36.0	4.66
5600	35.5	5.07
5800	35.3	5.27
6000	35.1	5.48
6500	34.5	6.07
7000	33.9	6.65

(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 Std-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)
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

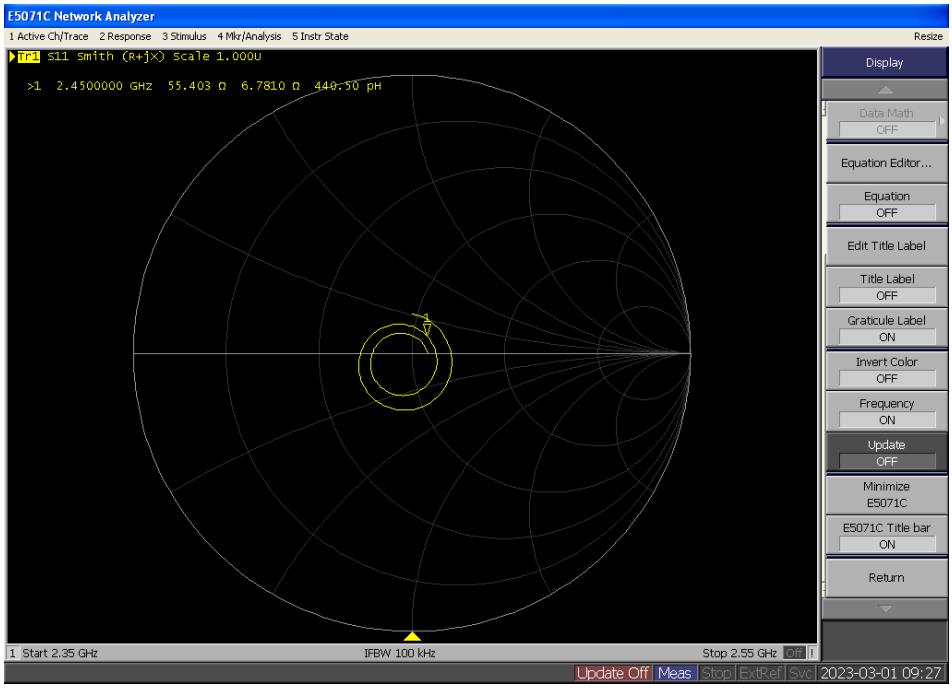
System Performance Check at 2450MHz, 5250MHz, 5600MHz, 5750MHz				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
2450 MHz	Reference result ± 10% window	52.6 47.3 to 57.9	24.3 21.9 to 26.7	N/A
	03-11-2023	48.9	25.1	21.0
2450 MHz	Reference result ± 10% window	52.6 47.3 to 57.9	24.3 21.9 to 26.7	N/A
	05-06-2023	56.8	26.2	21.0
5250 MHz	Reference result ± 10% window	76.0 68.4 to 83.6	21.6 19.44 to 23.76	N/A
	03-21-2023	71.2	21.8	21.0
5250 MHz	Reference result ± 10% window	76.0 68.4 to 83.6	21.6 19.44 to 23.76	N/A
	05-08-2023	75.7	21.5	21.0
5600 MHz	Reference result ± 10% window	79.5 71.6 to 87.5	22.4 20.2 to 24.6	N/A
	05-08-2023	82.0	23.1	21.0
5750 MHz	Reference result ± 10% window	75.7 68.1 to 83.3	22.0 19.8 to 24.2	N/A
	03-23-2023	74.4	22.8	21.0
Note: All SAR values are normalized to 1W forward power.				

4.1.3. Dipole Calibration Data

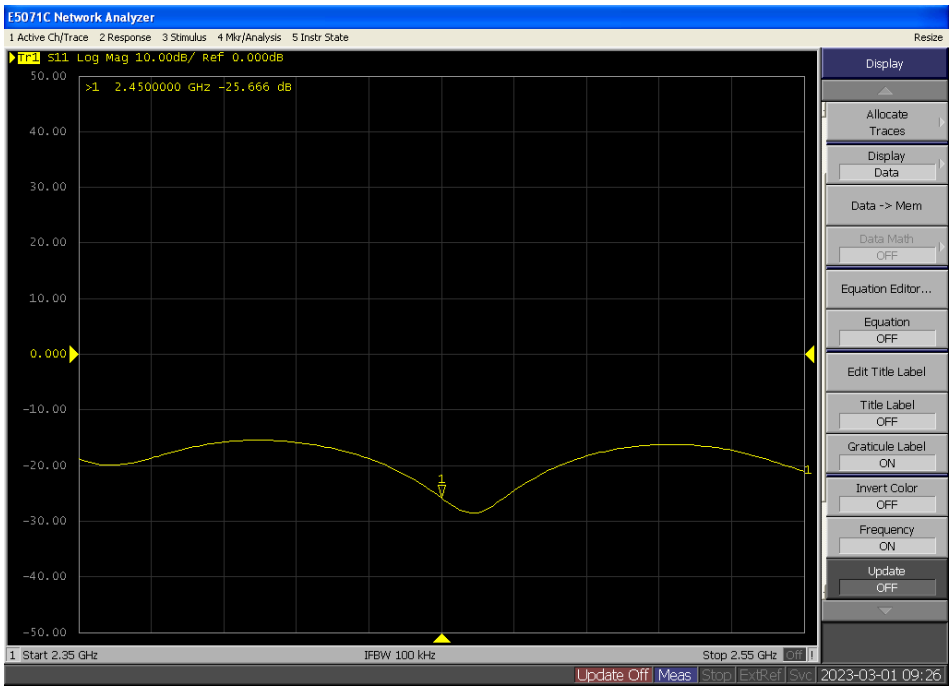
Impedance Plot for D2450V2

2450MHz Head

Calibrated impedance: 54.028 Ω; Measured impedance: 55.403 Ω (within 5Ω)



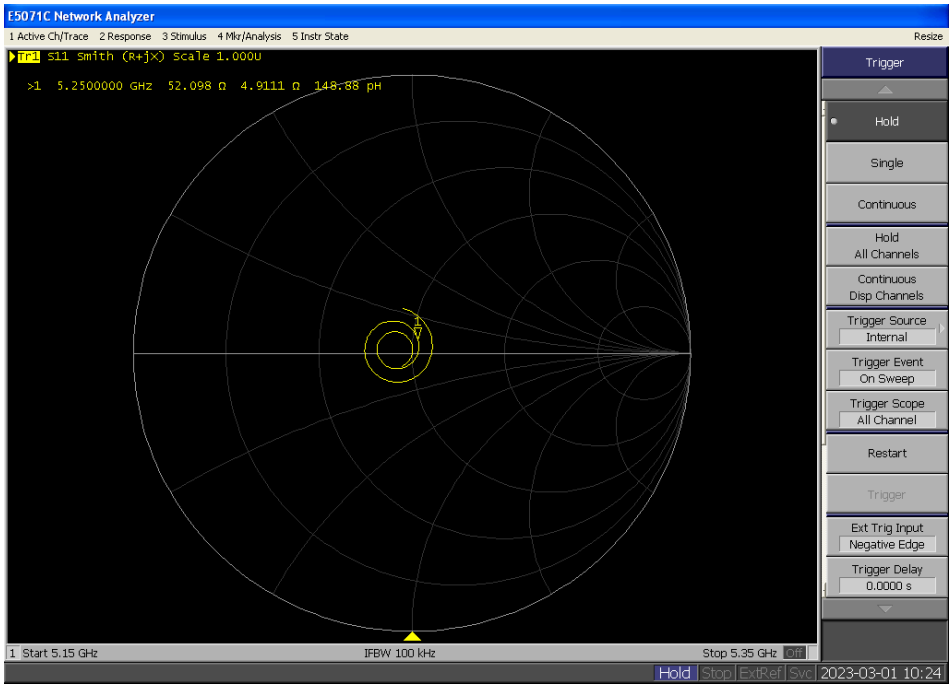
Calibrated return loss: -25.693 dB; Measured impedance: -25.666 dB (within 20%)



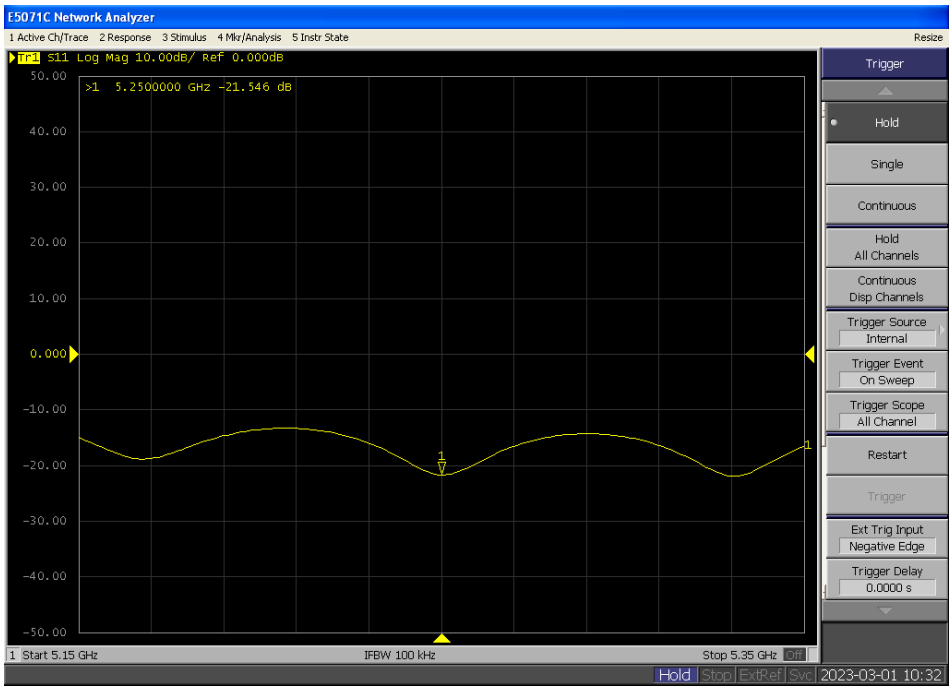
Impedance Plot for D5GHzV2

5250MHz Head

Calibrated impedance: 52.316 Ω; Measured impedance: 52.096 Ω (within 5Ω)



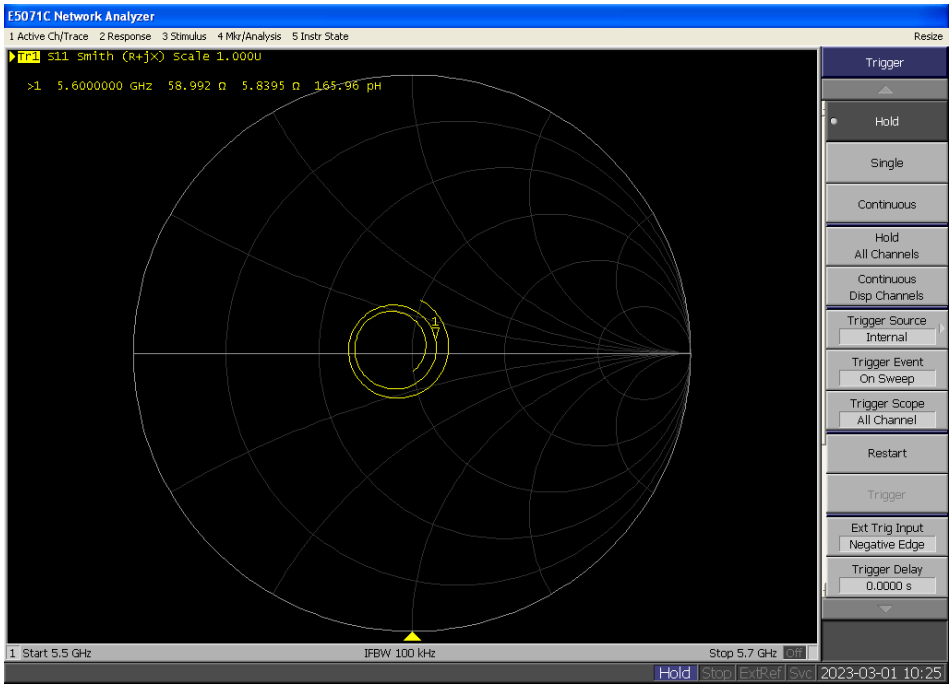
Calibrated return loss: -22.294 dB; Measured impedance: -21.546 dB (within 20%)



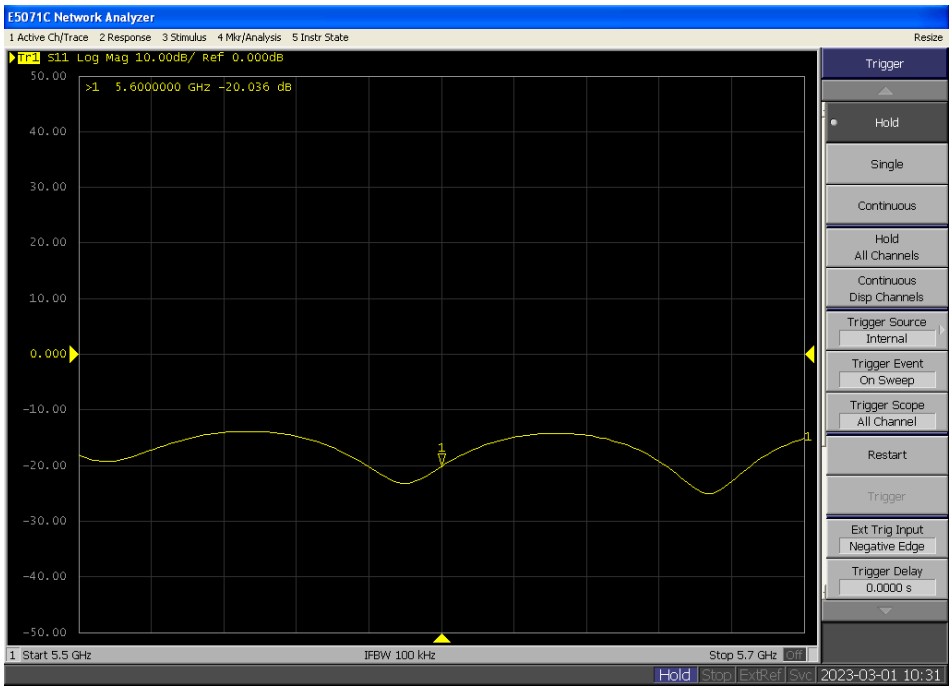
Impedance Plot for D5GHzV2

5600MHz Head

Calibrated impedance: 58.284 Ω; Measured impedance: 59.992 Ω (within 5Ω)



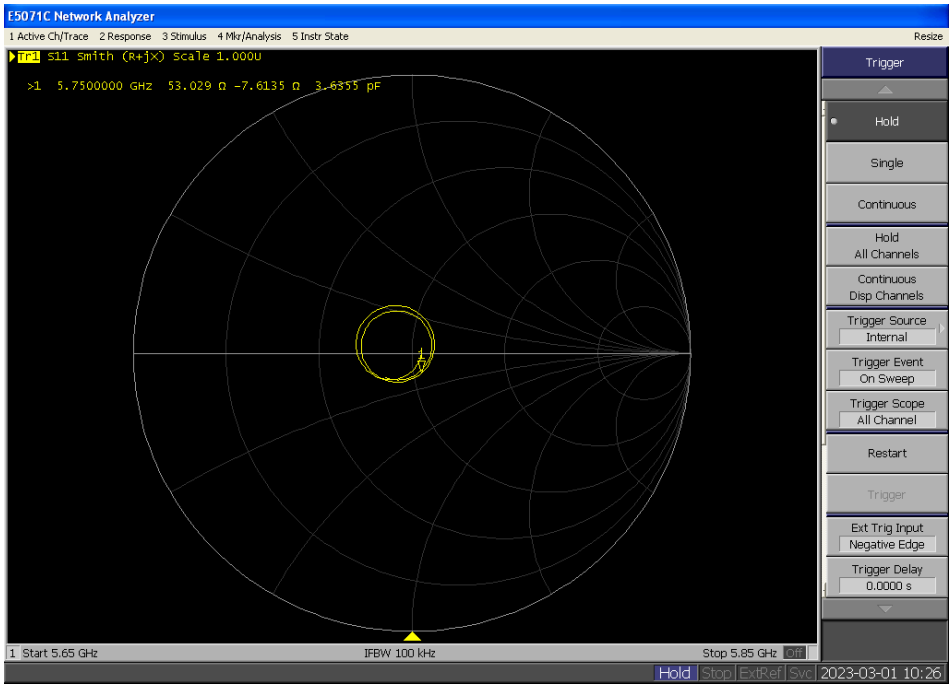
Calibrated return loss: -21.282 dB; Measured impedance: -20.036 dB (within 20%)



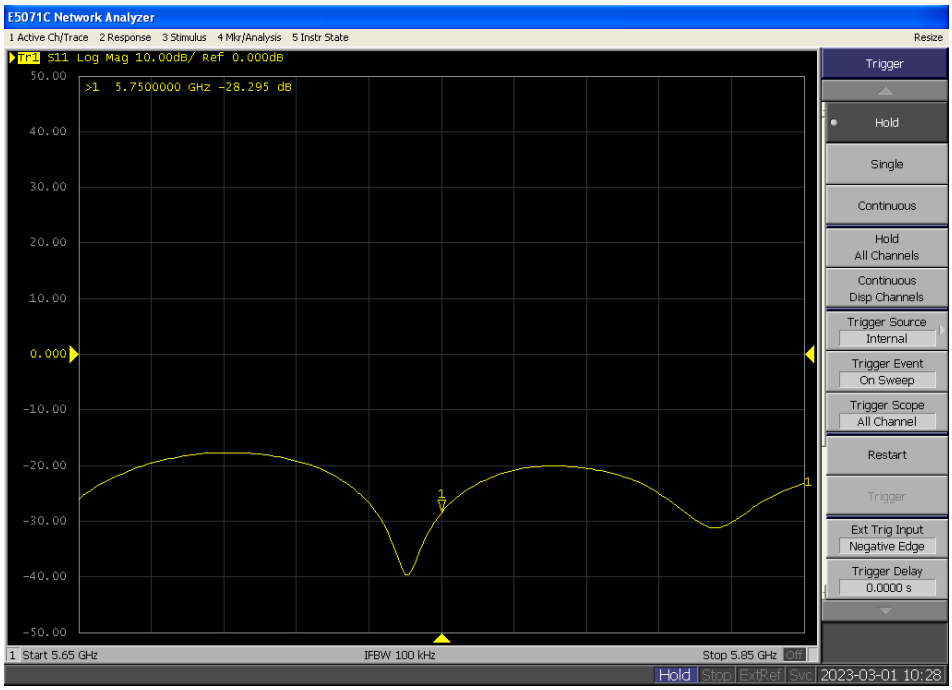
Impedance Plot for D5GHzV2

5750MHz Head

Calibrated impedance: 53.508 Ω; Measured impedance: 53.029 Ω (within 5Ω)



Calibrated return loss: -29.164 dB; Measured impedance: -28.295 dB (within 20%)



Note: Per KDB 450824 D02 requirements for dipole calibration, DEKRA Lab has adopted three years calibration interval. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole;

2. System validation with specific dipole is within 10% of calibrated value;

3. Return-loss is within 20% of calibrated measurement (Show above);

4. Impedance is within 5Ω of calibrated measurement (Show above).

4.2 SAR Measurement Procedure

The DASY 6 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 $1mm^2$) 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 $1mm^3$).

5 SAR EXPOSURE LIMITS

SAR assessments have been made in line with the requirements of IEEE Std-1528, FCC Supplement C, and comply with ANSI/IEEE C95.1 “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)	**1.60 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	D2450V2	839	2024.03.31
Dipole Validation Kits	Speag	D5GHzV2	1078	2024.03.27
SAM Twin Phantom	Speag	SAM	TP-1561/1562	N/A
Device Holder	Speag	SD 000 H01 HA	N/A	N/A
Data Acquisition Electronic	Speag	DAE4	917	2023.12.27
E-Field Probe	Speag	EX3DV4	7761	2023.09.11
SAR Software	Speag	DASY6	V5.2 Build 162	N/A
Power Amplifier	Mini-Circuit	ZVA-183-S+	N657400950	2023.09.09
Dual Directional Coupler	woken	0110A05A82Z-20	CMLC66W1A1	2023.08.18
Tissue fluid test probe	SPEAG	DAK 3.5	1308	2023.08.18
Vector Network	Agilent	E5071C	MY46103316	2023.09.16
Signal Generator	Agilent	E4438C	MY49070163	2023.06.30
Spectrum Analyzer	Agilent	N9010A	MY48030494	2023.12.08
Temperature/Humidity Meter	Zhichen	ZC1-2	N/A	2023.07.06
Temperature Meter	Dretec	O-274	RF-001	2023.09.22

7 MEASUREMENT UNCERTAINTY

DASY6 SAR Uncertainty 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	±5.5%	N	1	1	1	±5.5%	±5.5%	∞
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	±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 (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%	∞
Combined Std. Uncertainty						±10.6%	±10.5%	361
Expanded STD Uncertainty						±21.2%	±21.1%	

DASY6 SAR Uncertainty Measurement uncertainty for 3 GHz to 6 GHz averaged over 1 gram / 10 gram.								
Error Description	Uncert. value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±6.65%	N	1	1	1	±6.65%	±6.65%	∞
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	±6.7%	R	$\sqrt{3}$	1	1	±3.9%	±3.9%	∞
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 (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%	∞
Combined Std. Uncertainty						±12.0%	±12.0%	784
Expanded STD Uncertainty						±24.0%	±23.9%	

8 POWER TEST RESULTS

2.4GHz：

SISO:

Mode	Channel	Test Frequency (MHz)	Conducted Power Output (dBm)		Tune up Power Output (dBm)		Tune up Factor	
			Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
802.11b	1	2412	14.83	14.79	15.0	15.0	1.04	1.05
	6	2437	15.45	15.42	15.5	15.5	1.01	1.02
	11	2462	15.33	15.28	15.5	15.5	1.04	1.05
802.11g	1	2412	14.29	13.98	14.5	14.5	1.05	1.13
	6	2437	14.37	13.97	14.5	14.5	1.03	1.13
	11	2462	14.25	13.95	14.5	14.5	1.06	1.14
802.11n (20MHz)	1	2412	14.49	14.37	14.5	14.5	1.00	1.03
	6	2437	14.37	14.50	14.5	14.5	1.03	1.00
	11	2462	14.41	14.45	14.5	14.5	1.02	1.01
802.11n (40MHz)	3	2422	15.28	15.22	15.5	15.5	1.05	1.07
	6	2437	15.21	15.24	15.5	15.5	1.07	1.06
	9	2452	15.19	15.18	15.5	15.5	1.07	1.08
802.11ac (20MHz)	1	2412	14.38	14.45	14.5	14.5	1.03	1.01
	6	2437	14.29	14.34	14.5	14.5	1.05	1.04
	11	2462	14.31	14.33	14.5	14.5	1.04	1.04
802.11ac	3	2422	15.27	15.31	15.5	15.5	1.05	1.04

(40MHz)	6	2437	15.21	15.27	15.5	15.5	1.07	1.05
	9	2452	15.19	15.25	15.5	15.5	1.07	1.06
802.11ax (20MHz)	1	2412	14.46	14.52	14.5	14.5	1.01	1.00
	6	2437	14.47	14.49	14.5	14.5	1.01	1.00
	11	2462	14.37	14.51	14.5	14.5	1.03	1.00
802.11ax (40MHz)	3	2422	15.17	15.21	15.5	15.5	1.08	1.07
	6	2437	15.16	15.17	15.5	15.5	1.08	1.08
	9	2452	15.14	15.21	15.5	15.5	1.09	1.07

CDD

Mode	Channel	Test Frequency (MHz)	Total Conducted Power (dBm)	Total Tune up Power Output (dBm)	Tune up Factor
802.11g	1	2412	16.95	17.0	1.01
	6	2437	16.89	17.0	1.03
	11	2462	16.90	17.0	1.02
802.11n (20MHz)	1	2412	17.55	18.0	1.11
	6	2437	17.55	18.0	1.11
	11	2462	17.55	18.0	1.11
802.11n (40MHz)	3	2422	18.25	18.5	1.06
	6	2437	18.17	18.5	1.08
	9	2452	18.20	18.5	1.07
802.11ac (20MHz)	1	2412	17.46	17.5	1.01
	6	2437	17.47	17.5	1.01
	11	2462	17.53	18.0	1.11
802.11ac (40MHz)	3	2422	18.23	18.5	1.06
	6	2437	18.24	18.5	1.06
	9	2452	18.22	18.5	1.07
802.11ax (20MHz)	1	2412	17.50	18.0	1.12
	6	2437	17.49	17.5	1.00
	11	2462	17.45	17.5	1.01

802.11ax (40MHz)	3	2422	18.20	18.5	1.07
	6	2437	18.18	18.5	1.08
	9	2452	18.19	18.5	1.07

5GHz 802.11a:

SISO:

Channel	Test Frequency (MHz)	Conducted Power Output (dBm)		Tune up Power Output (dBm)		Tune up Factor	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
36	5180	19.28	19.11	19.50	19.50	1.05	1.09
44	5220	19.10	19.02	19.50	19.50	1.10	1.12
48	5240	18.86	18.80	19.50	19.50	1.16	1.17
52	5260	14.04	13.78	14.50	14.50	1.11	1.18
60	5300	13.84	13.86	14.00	14.00	1.04	1.03
64	5320	13.97	14.01	14.50	14.50	1.13	1.12
100	5500	13.65	13.95	14.00	14.00	1.08	1.01
116	5580	13.74	13.88	14.00	14.00	1.06	1.03
140	5700	13.68	13.81	14.00	14.00	1.08	1.04
149	5745	18.14	18.10	18.50	18.50	1.09	1.10
157	5785	17.89	17.88	18.50	18.50	1.15	1.15
165	5825	17.89	17.85	18.50	18.50	1.15	1.16

CDD

Channel	Test Frequency (MHz)	Total Conducted Power (dBm)	Total Tune up Power Output (dBm)	Tune up Factor
36	5180	17.89	18.50	1.15
44	5220	17.69	18.50	1.21
48	5240	17.97	18.50	1.13
52	5260	12.71	13.00	1.07
60	5300	12.61	13.00	1.09
64	5320	12.65	13.00	1.08
100	5500	12.69	13.00	1.07
116	5580	12.62	13.00	1.09
140	5700	12.70	13.00	1.07
149	5745	20.87	21.00	1.03
157	5785	20.90	21.00	1.02
165	5825	20.82	21.00	1.04

5GHz 802.11n(20MHz):

SISO:

Channel	Test Frequency (MHz)	Conducted Power Output (dBm)		Tune up Power Output (dBm)		Tune up Factor	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
36	5180	19.18	19.10	19.50	19.50	1.08	1.10
44	5220	18.97	18.90	19.50	19.50	1.13	1.15
48	5240	18.73	18.70	19.50	19.50	1.19	1.20
52	5260	14.11	13.83	14.50	14.50	1.09	1.17
60	5300	13.87	13.94	14.00	14.00	1.03	1.01
64	5320	14.05	14.01	14.50	14.50	1.11	1.12
100	5500	13.71	13.98	14.00	14.00	1.07	1.00
116	5580	13.83	13.93	14.00	14.00	1.04	1.02
140	5700	13.71	13.85	14.00	14.00	1.07	1.04
149	5745	17.84	17.75	18.50	18.50	1.16	1.19
157	5785	17.75	17.71	18.50	18.50	1.19	1.20
165	5825	17.71	17.66	18.50	18.50	1.20	1.21

CDD

Channel	Test Frequency (MHz)	Total Conducted Power (dBm)	Total Tune up Power Output (dBm)	Tune up Factor
36	5180	17.72	18.50	1.20
44	5220	17.52	18.50	1.25
48	5240	17.76	18.50	1.19
52	5260	12.72	13.00	1.07
60	5300	12.68	13.00	1.08
64	5320	12.67	13.00	1.08
100	5500	12.67	13.00	1.08
116	5580	12.63	13.00	1.09
140	5700	12.74	13.00	1.06
149	5745	20.84	21.00	1.04
157	5785	20.77	21.00	1.05
165	5825	20.77	21.00	1.05

5GHz 802.11n(40MHz):

SISO:

Channel	Test Frequency (MHz)	Conducted Power Output (dBm)		Tune up Power Output (dBm)		Tune up Factor	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
38	5190	19.57	19.64	20.00	20.00	1.10	1.09
46	5230	19.31	19.27	20.00	20.00	1.17	1.18
54	5270	14.48	14.49	15.00	15.00	1.13	1.12
62	5310	14.31	14.42	14.50	14.50	1.04	1.02
102	5510	14.30	14.35	14.50	14.50	1.05	1.04
118	5590	14.48	14.36	14.50	14.50	1.00	1.03
134	5670	14.47	14.42	14.50	14.50	1.01	1.02
151	5755	17.89	17.78	18.50	18.50	1.15	1.18
159	5795	17.61	17.55	18.50	18.50	1.23	1.24

CDD

Channel	Test Frequency (MHz)	Total Conducted Power (dBm)	Total Tune up Power Output (dBm)	Tune up Factor
38	5190	18.92	19.50	1.14
46	5230	18.87	19.50	1.16
54	5270	12.51	13.00	1.12
62	5310	12.37	12.50	1.03
102	5510	12.46	12.50	1.01
118	5590	12.42	12.50	1.02
134	5670	12.33	12.50	1.04
151	5755	20.95	21.00	1.01
159	5795	20.82	21.00	1.04

5GHz 802.11ac(20MHz):

SISO:

Channel	Test Frequency (MHz)	Conducted Power Output (dBm)		Tune up Power Output (dBm)		Tune up Factor	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
36	5180	19.17	19.10	19.50	19.50	1.08	1.10
44	5220	18.96	18.92	19.50	19.50	1.13	1.14
48	5240	17.72	17.68	18.50	18.50	1.20	1.21
52	5260	14.10	13.84	14.50	14.50	1.10	1.16
60	5300	13.89	13.92	14.00	14.00	1.03	1.02
64	5320	13.98	14.10	14.50	14.50	1.13	1.10
100	5500	13.73	13.98	14.00	14.00	1.06	1.00
116	5580	13.79	13.90	14.00	14.00	1.05	1.02
140	5700	13.70	13.87	14.00	14.00	1.07	1.03
149	5745	15.97	15.88	16.50	16.50	1.13	1.15
157	5785	15.87	15.84	16.50	16.50	1.16	1.16
165	5825	15.85	15.82	16.50	16.50	1.16	1.17

CDD

Channel	Test Frequency (MHz)	Total Conducted Power (dBm)	Total Tune up Power Output (dBm)	Tune up Factor
36	5180	17.62	18.50	1.22
44	5220	17.55	18.50	1.24
48	5240	17.76	18.50	1.19
52	5260	12.74	13.00	1.06
60	5300	12.63	13.00	1.09
64	5320	12.64	13.00	1.09
100	5500	12.68	13.00	1.08
116	5580	12.61	13.00	1.09
140	5700	12.73	13.00	1.06
149	5745	18.74	19.50	1.19
157	5785	19.05	19.50	1.11
165	5825	19.07	19.50	1.10

5GHz 802.11ac(40MHz):

SISO:

Channel	Test Frequency (MHz)	Conducted Power Output (dBm)		Tune up Power Output (dBm)		Tune up Factor	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
38	5190	18.89	18.71	19.50	19.50	1.15	1.20
46	5230	18.83	18.94	19.50	19.50	1.17	1.14
54	5270	14.36	14.40	14.50	14.50	1.03	1.02
62	5310	14.42	14.46	14.50	14.50	1.02	1.01
102	5510	14.41	14.48	14.50	14.50	1.02	1.00
118	5590	14.42	14.31	14.50	14.50	1.02	1.04
134	5670	14.48	14.43	14.50	14.50	1.00	1.02
151	5755	15.98	15.91	16.50	16.50	1.13	1.15
159	5795	15.71	15.67	16.50	16.50	1.20	1.21

CDD

Channel	Test Frequency (MHz)	Total Conducted Power (dBm)	Total Tune up Power Output (dBm)	Tune up Factor
38	5190	18.84	19.50	1.16
46	5230	18.90	19.50	1.15
54	5270	12.48	12.50	1.00
62	5310	12.35	12.50	1.04
102	5510	12.38	12.50	1.03
118	5590	12.39	12.50	1.03
134	5670	12.44	12.50	1.01
151	5755	18.80	19.50	1.17
159	5795	19.03	19.50	1.11

5GHz 802.11ac(80MHz):

SISO:

Channel	Test Frequency (MHz)	Conducted Power Output (dBm)		Tune up Power Output (dBm)		Tune up Factor	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
42	5210	18.98	18.86	19.50	19.50	1.13	1.16
58	5290	14.27	14.31	14.50	14.50	1.05	1.04
106	5530	14.33	14.29	14.50	14.50	1.04	1.05
155	5775	16.00	15.94	16.50	16.50	1.12	1.14

CDD

Channel	Test Frequency (MHz)	Total Conducted Power (dBm)	Total Tune up Power Output (dBm)	Tune up Factor
42	5210	18.87	19.50	1.16
58	5290	12.40	12.50	1.02
106	5530	12.38	12.50	1.03
155	5775	18.61	19.00	1.09

5GHz 802.11ax(20MHz):

SISO:

Channel	Test Frequency (MHz)	Conducted Power Output (dBm)		Tune up Power Output (dBm)		Tune up Factor	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
36	5180	19.22	19.14	19.50	19.50	1.07	1.09
44	5220	19.03	19.01	19.50	19.50	1.11	1.12
48	5240	18.79	18.74	19.50	19.50	1.18	1.19
52	5260	14.07	13.86	14.50	14.50	1.10	1.16
60	5300	13.85	13.89	14.00	14.00	1.04	1.03
64	5320	14.03	14.03	14.50	14.50	1.11	1.11
100	5500	13.71	14.05	14.00	14.00	1.07	0.99
116	5580	13.83	13.97	14.00	14.00	1.04	1.01
140	5700	13.70	13.81	14.00	14.00	1.07	1.04
149	5745	16.21	16.10	16.50	16.50	1.07	1.10
157	5785	16.06	16.03	16.50	16.50	1.11	1.11
165	5825	15.95	15.86	16.50	16.50	1.14	1.16

CDD

Channel	Test Frequency (MHz)	Total Conducted Power (dBm)	Total Tune up Power Output (dBm)	Tune up Factor
36	5180	17.90	18.50	1.15
44	5220	17.70	18.50	1.20
48	5240	17.93	18.50	1.14
52	5260	12.71	13.00	1.07
60	5300	12.61	13.00	1.09
64	5320	12.65	13.00	1.08
100	5500	12.70	13.00	1.07
116	5580	12.64	13.00	1.09
140	5700	12.75	13.00	1.06
149	5745	18.91	19.00	1.02
157	5785	18.87	19.00	1.03
165	5825	18.78	19.00	1.05

5GHz 802.11ax(40MHz):

SISO:

Channel	Test Frequency (MHz)	Conducted Power Output (dBm)		Tune up Power Output (dBm)		Tune up Factor	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
38	5190	18.87	18.90	19.50	19.50	1.16	1.15
46	5230	18.92	18.89	19.50	19.50	1.14	1.15
54	5270	14.41	14.47	14.50	14.50	1.02	1.01
62	5310	14.44	14.34	14.50	14.50	1.01	1.04
102	5510	14.45	14.38	14.50	14.50	1.01	1.03
118	5590	14.36	14.44	14.50	14.50	1.03	1.01
134	5670	14.36	14.46	14.50	14.50	1.03	1.01
151	5755	15.86	15.75	16.50	16.50	1.16	1.19
159	5795	16.15	16.05	16.50	16.50	1.08	1.11

CDD

Channel	Test Frequency (MHz)	Total Conducted Power (dBm)	Total Tune up Power Output (dBm)	Tune up Factor
38	5190	18.76	19.50	1.19
46	5230	18.77	19.50	1.18
54	5270	12.48	12.50	1.00
62	5310	12.41	12.50	1.02
102	5510	12.48	12.50	1.00
118	5590	12.44	12.50	1.01
134	5670	12.43	12.50	1.02
151	5755	18.75	19.00	1.06
159	5795	18.95	19.00	1.01

5GHz 802.11ax(80MHz):

SISO:

Channel	Test Frequency (MHz)	Conducted Power Output (dBm)		Tune up Power Output (dBm)		Tune up Factor	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
42	5210	18.86	18.91	19.50	19.50	1.16	1.15
58	5290	14.23	14.22	14.50	14.50	1.06	1.07
106	5530	14.19	14.09	14.50	14.50	1.07	1.10
155	5775	15.82	15.79	16.00	16.00	1.04	1.05

CDD

Channel	Test Frequency (MHz)	Total Conducted Power (dBm)	Total Tune up Power Output (dBm)	Tune up Factor
42	5210	18.79	19.50	1.18
58	5290	12.40	12.50	1.02
106	5530	12.43	12.50	1.02
155	5775	18.71	19.00	1.07

Bluetooth

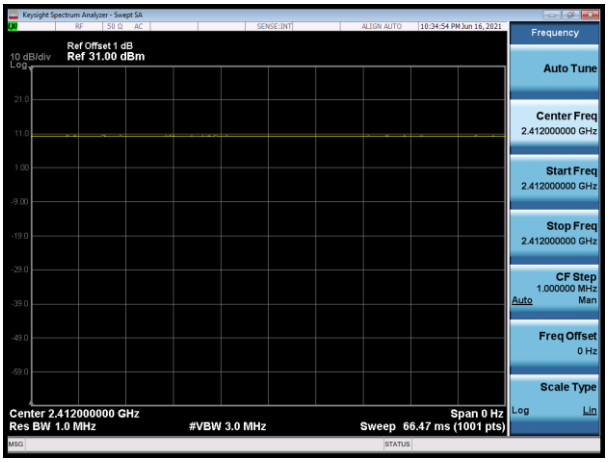
Mode	Channel	Test Frequency (MHz)	Total Conducted Power (dBm)	Total Tune up Power Output (dBm)	Tune up Factor
GFSK	00	2402	18.18	19.50	1.36
	39	2441	18.78	19.50	1.18
	78	2480	18.92	19.50	1.14
Pi/4 DQPSK	00	2402	17.93	19.50	1.44
	39	2441	18.45	19.50	1.27
	78	2480	18.52	19.50	1.25
8DPSK	00	2402	18.32	19.50	1.31
	39	2441	18.93	19.50	1.14
	78	2480	19.03	19.50	1.11
LE 1M	00	2402	17.32	18.50	1.31
	19	2440	18.1	18.50	1.10
	39	2480	18.21	18.50	1.07
LE 2M	00	2402	11.69	13.00	1.35
	19	2440	12.41	13.00	1.15
	39	2480	12.64	13.00	1.09
Code 2	0	2402	11.54	13.00	1.40
	19	2440	12.05	13.00	1.24
	39	2480	12.13	13.00	1.22
Code8	0	2402	11.68	13.00	1.36
	19	2440	12.38	13.00	1.15
	39	2480	12.45	13.00	1.14

Note: For partial RU test data, please refer to FCC ID: 2A5NV-A7H10.

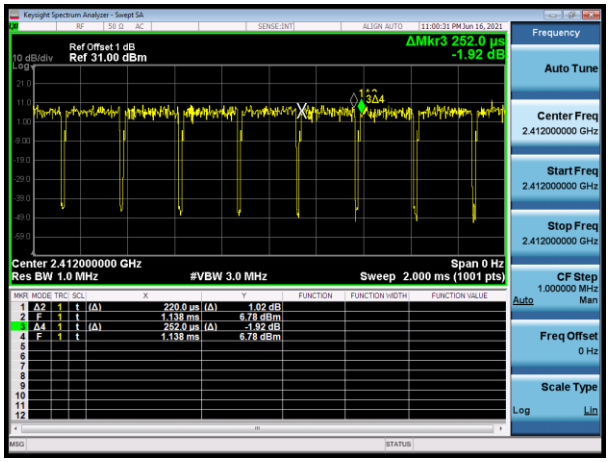
DUTY CYCLE

Test Mode	Tx On (ms)	Tx All (ms)	Duty Cycle (%)	Duty Cycle Factor
2.4GHz 802.11b	N/A	N/A	100.00	1.000
2.4GHz 802.11g	0.22	0.252	87.30	1.150
2.4GHz 802.11n(20MHz)	N/A	N/A	100.00	1.000
2.4GHz 802.11n(40MHz)	N/A	N/A	100.00	1.000
2.4GHz 802.11ax(20MHz)	N/A	N/A	100.00	1.000
2.4GHz 802.11ax(40MHz)	N/A	N/A	100.00	1.000
5GHz 802.11a	1.976	2.003	98.65	1.014
5GHz 802.11n(20MHz)	5.424	5.448	99.56	1.004
5GHz 802.11n(40MHz)	5.388	5.444	98.97	1.010
5GHz 802.11ac(20MHz)	5.424	5.450	99.52	1.005
5GHz 802.11ac(40MHz)	5.392	5.444	99.04	1.010
5GHz 802.11ac(80MHz)	5.382	5.444	98.86	1.012
5GHz 802.11ax(20MHz)	5.440	5.474	99.38	1.006
5GHz 802.11ax(40MHz)	5.402	5.462	98.90	1.011
5GHz 802.11ax(80MHz)	5.386	5.462	98.61	1.014
BT DH5	2.880	3.750	76.80	1.302
BT 2DH5	2.880	3.750	76.80	1.302
BT 3DH5	2.890	3.750	77.07	1.298
BLE	0.390	0.630	61.90	1.616
2LE	0.200	0.620	32.26	3.100
Code2	1.060	1.870	56.68	1.764
Code8	3.100	3.750	82.67	1.210

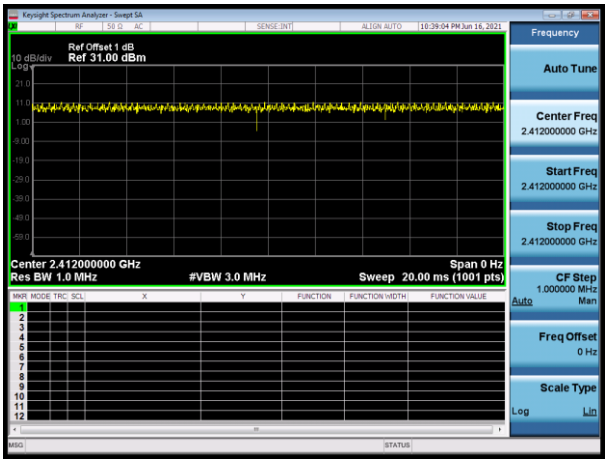
2.4GHz 802.11b 2412MHz



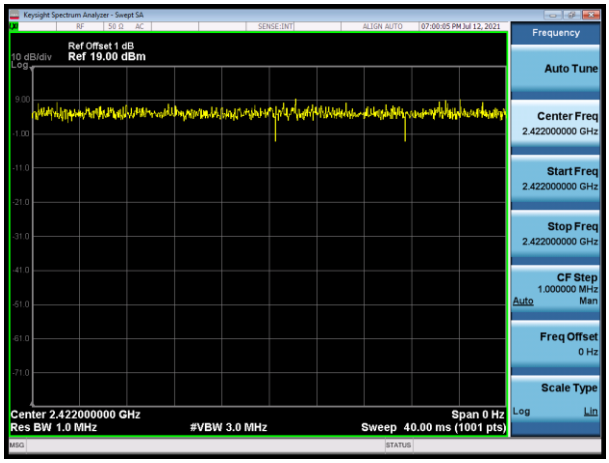
2.4GHz 802.11g 2412MHz



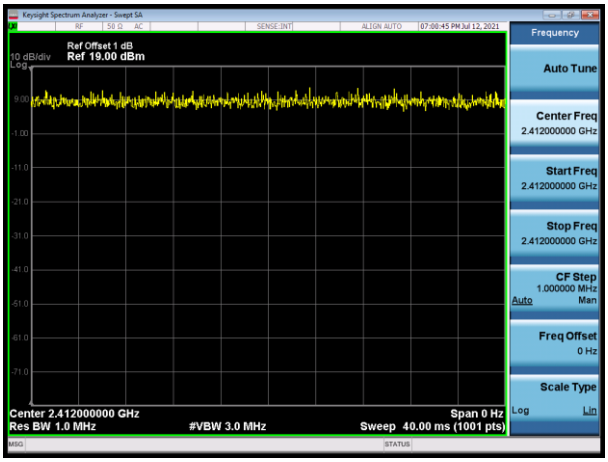
2.4GHz 802.11n(20M) 2412MHz



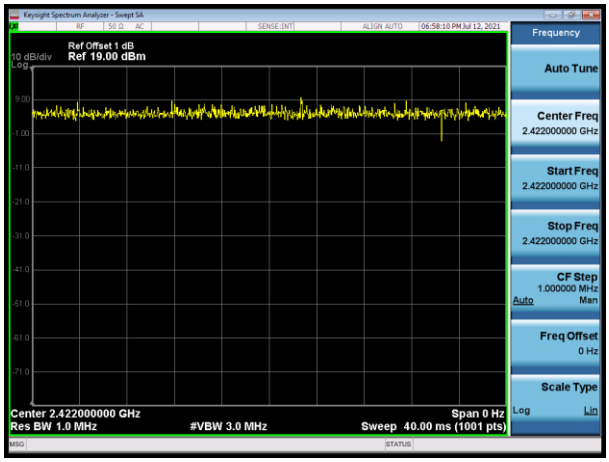
2.4GHz 802.11n(40M) 2422MHz



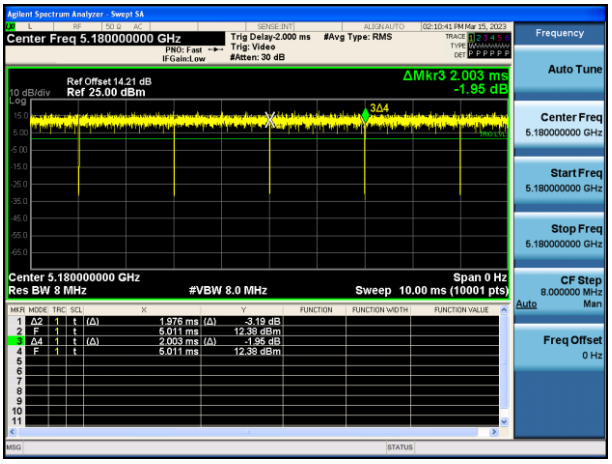
2.4GHz 802.11ax(20M) 2412MHz



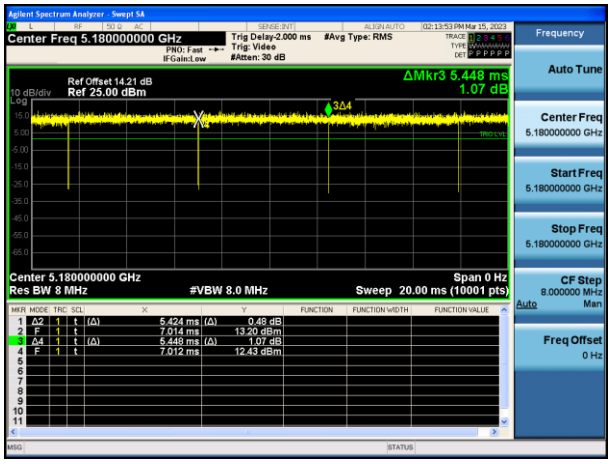
2.4GHz 802.11ax(40M) 2422MHz



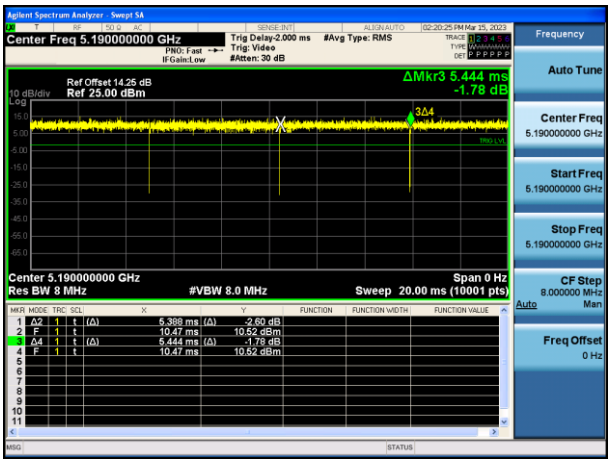
5GHz 802.11a 5180MHz



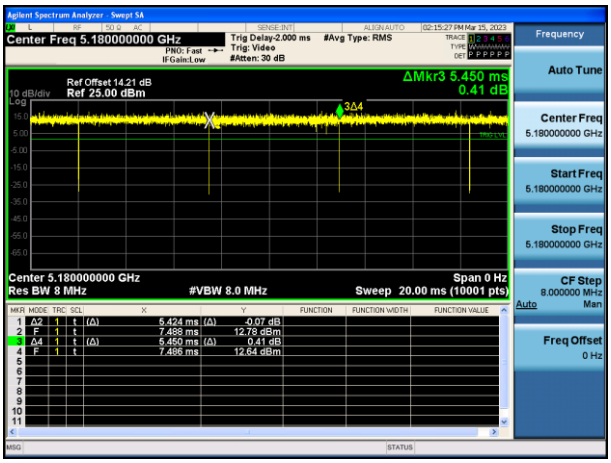
5GHz 802.11n(20M) 5180MHz



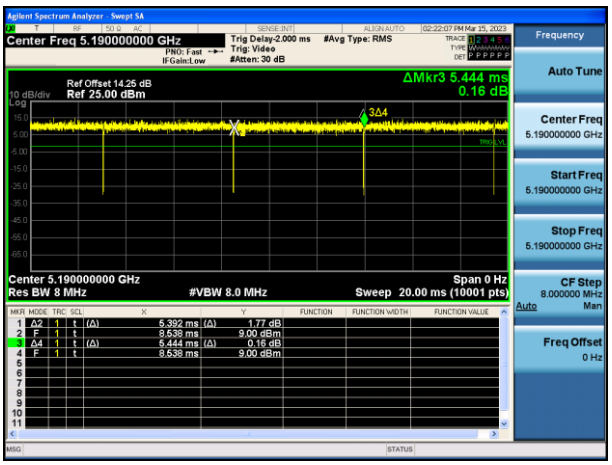
5GHz 802.11n(40M) 5190MHz



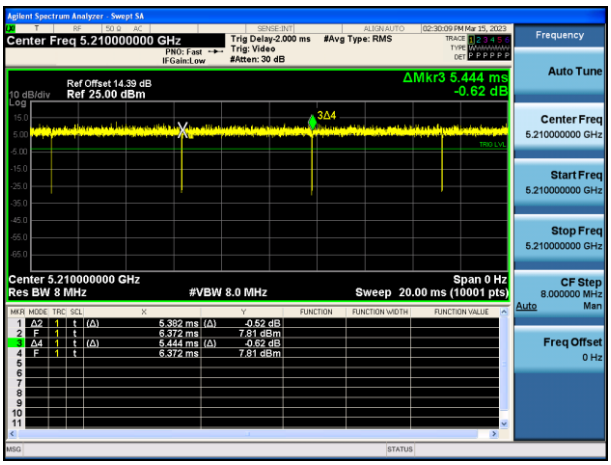
5GHz 802.11ac(20M) 5180MHz



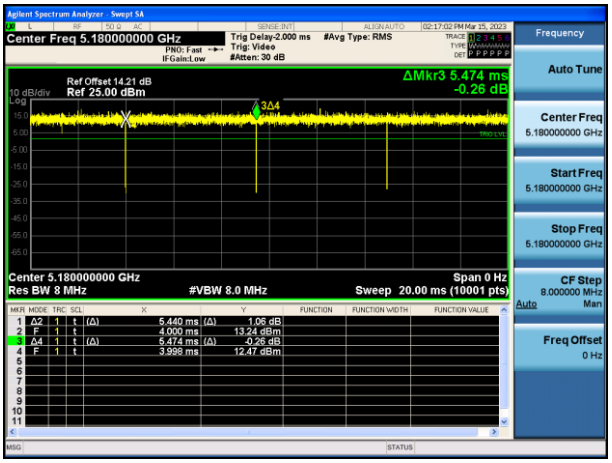
5GHz 802.11ac(40M) 5190MHz



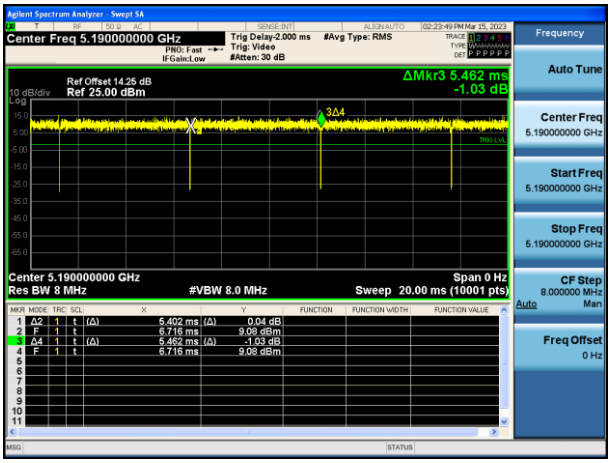
5GHz 802.11ac(80M) 5210MHz



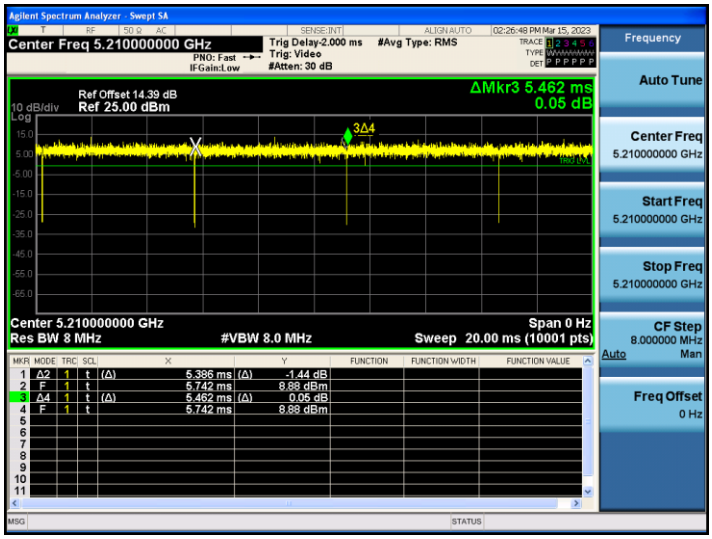
5GHz 802.11ax(20M) 5180MHz



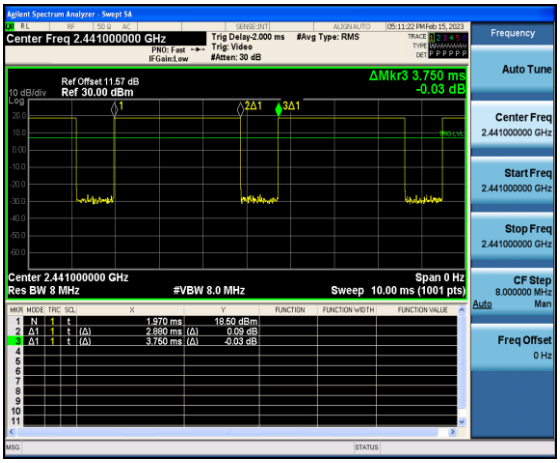
5GHz 802.11ax(40M) 5190MHz



5GHz 802.11ax(80M) 5210MHz



BT DH5 2441MHz



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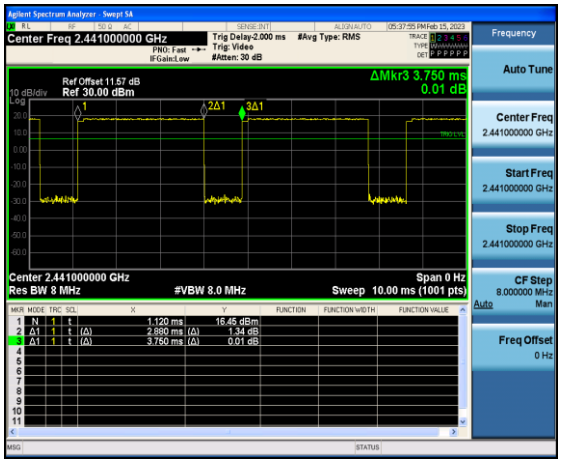
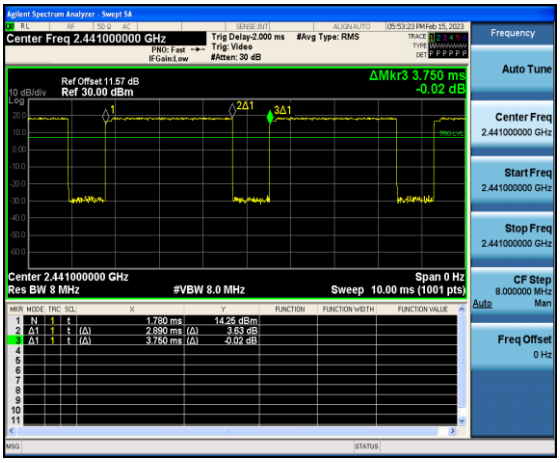
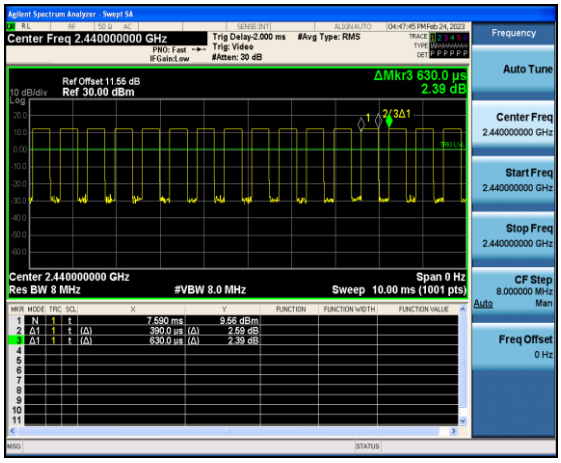


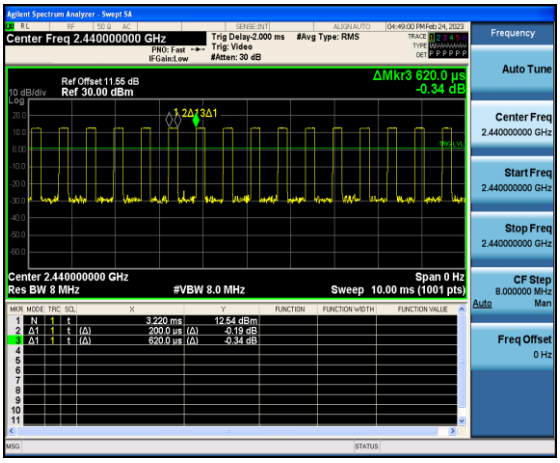
BT 3DH5 2441MHz



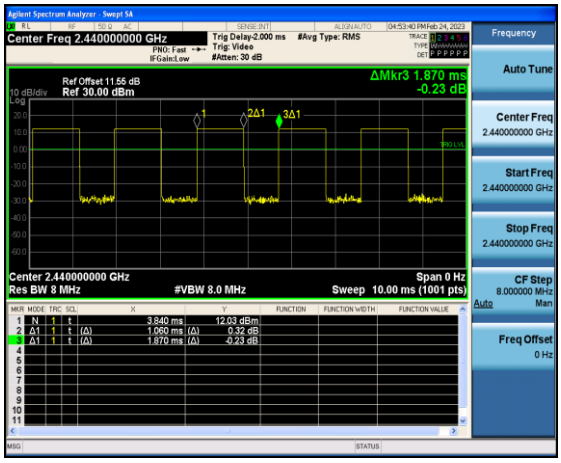
BLE 1M 2440MHz



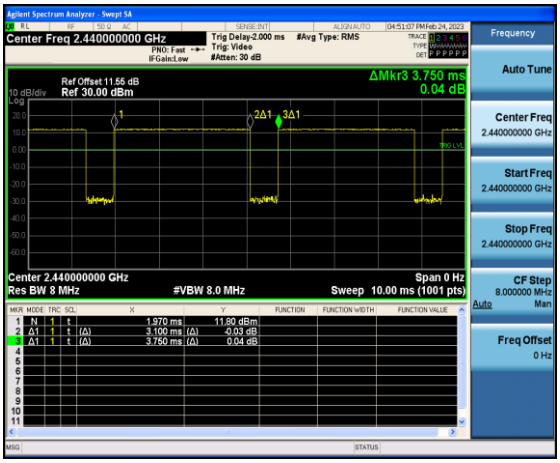
BLE 2M 2440MHz



BLE_500K 2440MHz



BLE 125K 2440MHz



9 SAR TEST RESULTS

9.1 Standalone SAR

Head SAR

Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Tune-up Scaling Factor	Duty Cycle Scaling Factor	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WLAN 2.4G	802.11b 1Mbps	In Side	0	Antenna1	06	2437	1.012	1.000	0.078	0.079
WLAN 2.4G	802.11n HT40-MCS 0	In Side	0	Antenna1+2	03	2422	1.059	1.000	0.077	0.082
WLAN 2.4G	802.11n HT40-MCS 0	In Side	0	Antenna1+2	06	2437	1.079	1.000	0.089	0.096
WLAN 2.4G	802.11n HT40-MCS 0	In Side	0	Antenna1+2	09	2452	1.072	1.000	**0.090**	**0.096**
Bluetooth	8DPSK_3DH5	In Side	0	Antenna1	00	2402	1.312	1.298	0.047	0.080
Bluetooth	8DPSK_3DH5	In Side	0	Antenna1	39	2441	1.140	1.298	0.057	0.084
Bluetooth	8DPSK_3DH5	In Side	0	Antenna1	78	2480	1.114	1.298	**0.068**	**0.098**
WLAN 5.2G	802.11n HT40-MCS 0	In Side	0	Antenna1	38	5190	1.104	1.010	0.893	0.996
WLAN 5.2G	802.11n HT40-MCS 0	In Side	0	Antenna2	38	5190	1.086	1.010	0.911	1.000
WLAN 5.2G	802.11n HT40-MCS 0	In Side	0	Antenna1	46	5230	1.172	1.010	1.070	1.267
WLAN 5.2G	802.11n HT40-MCS 0	In Side	0	Antenna2	46	5230	1.183	1.010	**1.080**	**1.290**
WLAN 5.3G	802.11ac VHT80-MCS 0	In Side	0	Antenna1	58	5290	1.054	1.012	0.546	0.583
WLAN 5.3G	802.11ac VHT80-MCS 0	In Side	0	Antenna2	58	5290	1.045	1.012	0.516	0.546
WLAN 5.6G	802.11ac VHT80-MCS 0	In Side	0	Antenna1	106	5530	1.040	1.012	0.515	0.542
WLAN 5.6G	802.11ac VHT80-MCS 0	In Side	0	Antenna2	106	5530	1.054	1.012	0.521	0.556
WLAN 5.8G	802.11n HT40-MCS 0	In Side	0	Antenna1+2	151	5755	1.012	1.010	0.812	0.830
WLAN 5.8G	802.11n HT40-MCS 0	In Side	0	Antenna1+2	159	5795	1.043	1.010	**0.973**	**1.025**
Reported SAR Repeat Verification										
WLAN 5.2G	802.11n HT40-MCS 0	In Side	0	Antenna1	38	5190	1.104	1.010	0.811	0.904
WLAN 5.2G	802.11n HT40-MCS 0	In Side	0	Antenna2	38	5190	1.086	1.010	0.853	0.936
WLAN 5.2G	802.11n HT40-MCS 0	In Side	0	Antenna1	46	5230	1.172	1.010	0.912	1.080
WLAN 5.2G	802.11n HT40-MCS 0	In Side	0	Antenna2	46	5230	1.183	1.010	0.924	1.104
WLAN 5.8G	802.11n HT40-MCS 0	In Side	0	Antenna1+2	151	5755	1.012	1.010	0.784	0.801
WLAN 5.8G	802.11n HT40-MCS 0	In Side	0	Antenna1+2	159	5795	1.043	1.010	0.809	0.853

Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured

SAR is ⩾0.8W/kg.

2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ⩽ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.

3. The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each

standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures. For "Not required", SAR Test

reduction was applied from KDB 248227 guidance, Sec. 2.1,b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, additional output power measurements were not necessary.

4. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DsSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.

5. Per 201904 TCBC workshops, General principles of FCC KDB Publication 248227 D01 can be applied to determine the SAR Initial Test Configurations and test reduction for 802.11ax SAR testing. For the table below the 802.11ax maximum power is SU (non-OFDMA), and the SU maximum power also higher than RU (OFDMA).

6. The ratio is the difference in percentage between original and repeated measured SAR.

7. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

Limbs SAR

Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Tune-up Scaling Factor	Duty Cycle Scaling Factor	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
WLAN 2.4G	802.11b 1Mbps	In Side	0	Antenna1	06	2437	1.012	1.000	0.0414	0.042
WLAN 2.4G	802.11n HT40 MCS 0	In Side	0	Antenna1+2	03	2422	1.059	1.000	0.0371	0.039
WLAN 2.4G	802.11n HT40 MCS 0	In Side	0	Antenna1+2	06	2437	1.079	1.000	0.0463	0.050
WLAN 2.4G	802.11n HT40 MCS 0	In Side	0	Antenna1+2	09	2452	1.072	1.000	0.0467	0.050
WLAN 2.4G	802.11n HT40 MCS 0	Front	0	Antenna1+2	09	2452	1.072	1.000	**0.331**	**0.355**
WLAN 2.4G	802.11n HT40 MCS 0	Back	0	Antenna1+2	09	2452	1.072	1.000	0.255	0.273
Bluetooth	8DPSK_3DH5	In Side	0	Antenna1	00	2402	1.312	1.298	0.0275	0.047
Bluetooth	8DPSK_3DH5	In Side	0	Antenna1	39	2441	1.140	1.298	0.0329	0.049
Bluetooth	8DPSK_3DH5	In Side	0	Antenna1	78	2480	1.114	1.298	**0.0397**	**0.057**
WLAN 5.2G	802.11n HT40-MCS 0	In Side	0	Antenna1	38	5190	1.104	1.010	0.465	0.519
WLAN 5.2G	802.11n HT40-MCS 0	Out Side	0	Antenna1	38	5190	1.104	1.010	0.207	0.231
WLAN 5.2G	802.11n HT40-MCS 0	Front	0	Antenna1	38	5190	1.104	1.010	0.77	0.859
WLAN 5.2G	802.11n HT40-MCS 0	Right Side	0	Antenna1	38	5190	1.104	1.010	0.581	0.648
WLAN 5.2G	802.11n HT40-MCS 0	In Side	0	Antenna2	38	5190	1.086	1.010	0.469	0.515
WLAN 5.2G	802.11n HT40-MCS 0	Out Side	0	Antenna2	38	5190	1.086	1.010	0.211	0.232
WLAN 5.2G	802.11n HT40-MCS 0	Back	0	Antenna2	38	5190	1.086	1.010	2.78	3.050
WLAN 5.2G	802.11n HT40-MCS 0	Right Side	0	Antenna2	38	5190	1.086	1.010	0.534	0.586
WLAN 5.2G	802.11n HT40-MCS 0	Front	0	Antenna1	46	5230	1.172	1.010	0.8	0.947
WLAN 5.2G	802.11n HT40-MCS 0	Back	0	Antenna2	46	5230	1.183	1.010	**3.03**	**3.620**
WLAN 5.3G	802.11ac-VHT80 MCS 0	In Side	0	Antenna1	58	5290	1.054	1.012	0.252	0.269
WLAN 5.3G	802.11ac-VHT80 MCS 0	In Side	0	Antenna2	58	5290	1.045	1.012	0.238	0.252
WLAN 5.6G	802.11ac-VHT80 MCS 0	In Side	0	Antenna1	106	5530	1.040	1.012	0.243	0.256
WLAN 5.6G	802.11ac-VHT80 MCS 0	In Side	0	Antenna2	106	5530	1.054	1.012	0.245	0.261
WLAN 5.8G	802.11n HT40-MCS 0	Front	0	Antenna1+2	151	5755	1.012	1.010	1.17	1.196
WLAN 5.8G	802.11n HT40-MCS 0	Back	0	Antenna1+2	151	5755	1.012	1.010	**3.41**	**3.486**
WLAN 5.8G	802.11n HT40-MCS 0	Back	0	Antenna1+2	159	5795	1.043	1.010	3.11	3.278
Reported SAR Repeat Verification										
WLAN 5.2G	802.11n HT40-MCS 0	Back	0	Antenna2	38	5190	1.086	1.010	2.53	2.776
WLAN 5.2G	802.11n HT40-MCS 0	Back	0	Antenna2	46	5230	1.183	1.010	2.89	3.453
WLAN 5.8G	802.11n HT40-MCS 0	Front	0	Antenna1+2	151	5755	1.012	1.010	1.17	1.196

WLAN 5.8G	802.11n HT40-MCS 0	Back	0	Antenna1+2	151	5755	1.012	1.010	3.23	3.302
WLAN 5.8G	802.11n HT40-MCS 0	Back	0	Antenna1+2	159	5795	1.043	1.010	3.01	3.172

Note：

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each
standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures. For "Not required", SAR Test
reduction was applied from KDB 248227 guidance, Sec. 2.1,b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, additional output power measurements were not necessary.
4. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DsSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
5. Per 201904 TCBC workshops, General principles of FCC KDB Publication 248227 D01 can be applied to determine the SAR Initial Test Configurations and test reduction for 802.11ax SAR testing. For the table below the 802.11ax maximum power is SU (non-OFDMA), and the SU maximum power also higher than RU (OFDMA).
6. The ratio is the difference in percentage between original and repeated measured SAR.
7. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.
8. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation are multiplied by a factor of 2.5.

9.2 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 D04v01.

9.3 Simultaneous Transmission Analysis

Simultaneous Transmission Scenario with Bluetooth

Simult Tx	5G WLAN SAR (W/kg)	BT SAR (W/kg)	5G+BT SAR (W/kg)
Head	1.290	0.098	1.388
Simult Tx	5G WLAN SAR (W/kg)	BT SAR (W/kg)	5G+BT SAR (W/kg)
Limbs	3.620	0.057	3.677

Appendix A. SAR Validation Data

Date: 11/03/2023

Test Laboratory: DEKRA Lab

System Check Head 2450MHz

DUT: D2450V2; Type: D2450V2

Communication System: UID 0, CW; Communication System Band: D2450; Duty Cycle: 1:1; Frequency: 2450 MHz; Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; εr = 38.535; ρ = 1000 kg/m3 ; Phantom section: Flat Section ; Input Power=250mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(7.57, 7.57, 7.57); Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

System Check Head 2450MHz/Area Scan (7x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 17.36 W/kg

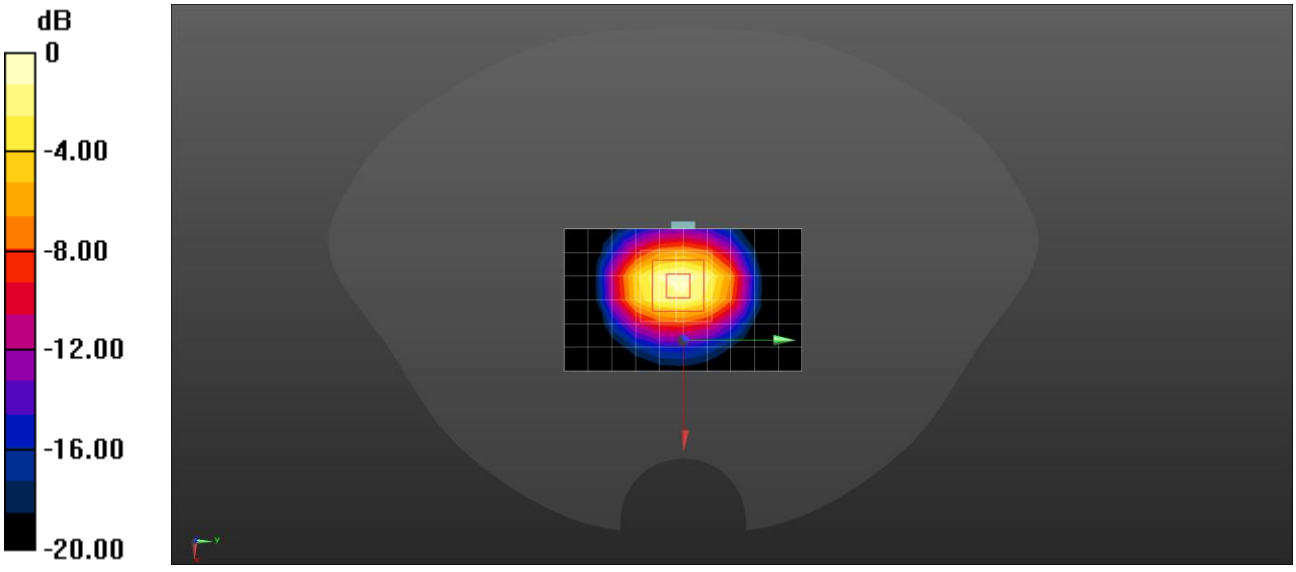
System Check Head 2450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.12 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 19.1 W/kg

SAR(1 g) = 12.23 W/kg; SAR(10 g) = 6.28 W/kg

Maximum value of SAR (measured) = 18.33 W/kg



0 dB = 18.33 W/kg = 19.21 dBW/kg

Date: 21/03/2023

Test Laboratory: DEKRA Lab

System Check Head 5250MHz

DUT: Dipole D5GHzV2; Type: D5GHzV2

Communication System: UID 0, CW (0); Communication System Band: 5GHz; Duty Cycle: 1:1; Frequency: 5250 MHz; Medium parameters used: f = 5250 MHz; σ = 4.595 S/m; εr = 36.4; ρ = 1000 kg/m3 ; Phantom section: Flat Section ; Input Power=100mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(5.3, 5.3, 5.3) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

System Check Head 5600MHz/Area Scan (6x8x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 20.98 W/kg

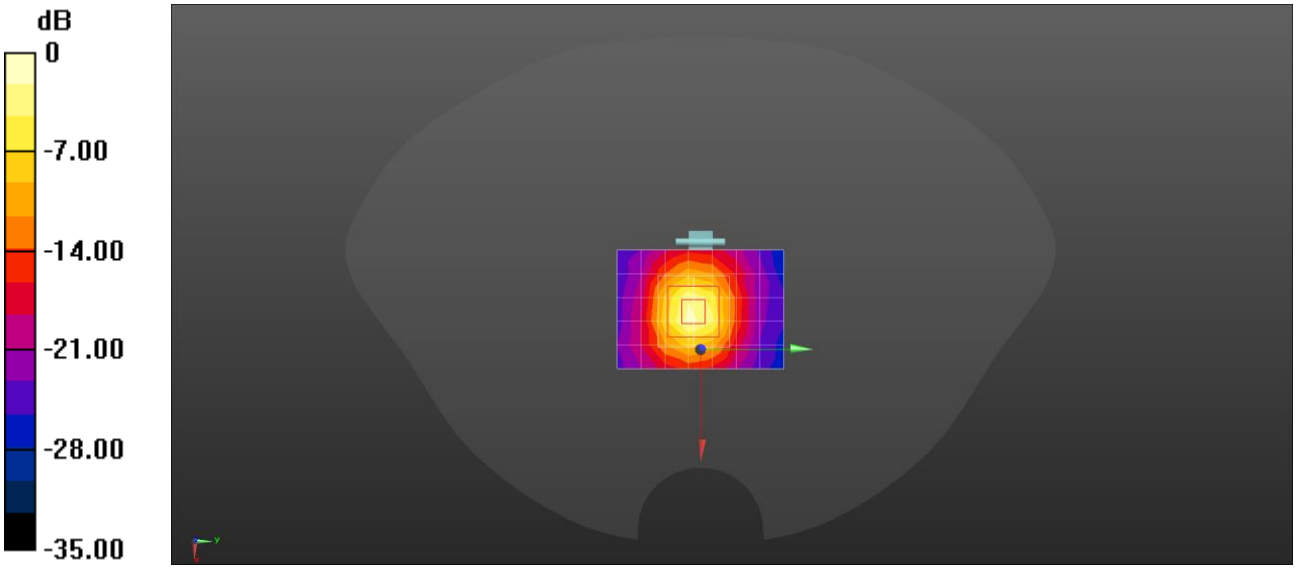
System Check Head 5600MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.58 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 15.5 W/kg

SAR(1 g) = 7.12 W/kg; SAR(10 g) = 2.18 W/kg

Maximum value of SAR (measured) = 13.99 W/kg



0 dB = 13.99 W/kg = 16.01 dBW/kg

Date: 23/03/2023

Test Laboratory: DEKRA Lab

System Check Head 5750MHz

DUT: Dipole D5GHzV2; Type: D5GHzV2

Communication System: UID 0, CW (0); Communication System Band: 5GHz; Duty Cycle: 1:1; Frequency: 5750 MHz; Medium parameters used: f = 5750 MHz; σ = 5.16 S/m; εr = 35.569; ρ = 1000 kg/m3 ; Phantom section: Flat Section ; Input Power=100mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(4.84, 4.84, 4.84); Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

System Check Head 5750MHz/Area Scan (6x8x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 13.49 W/kg

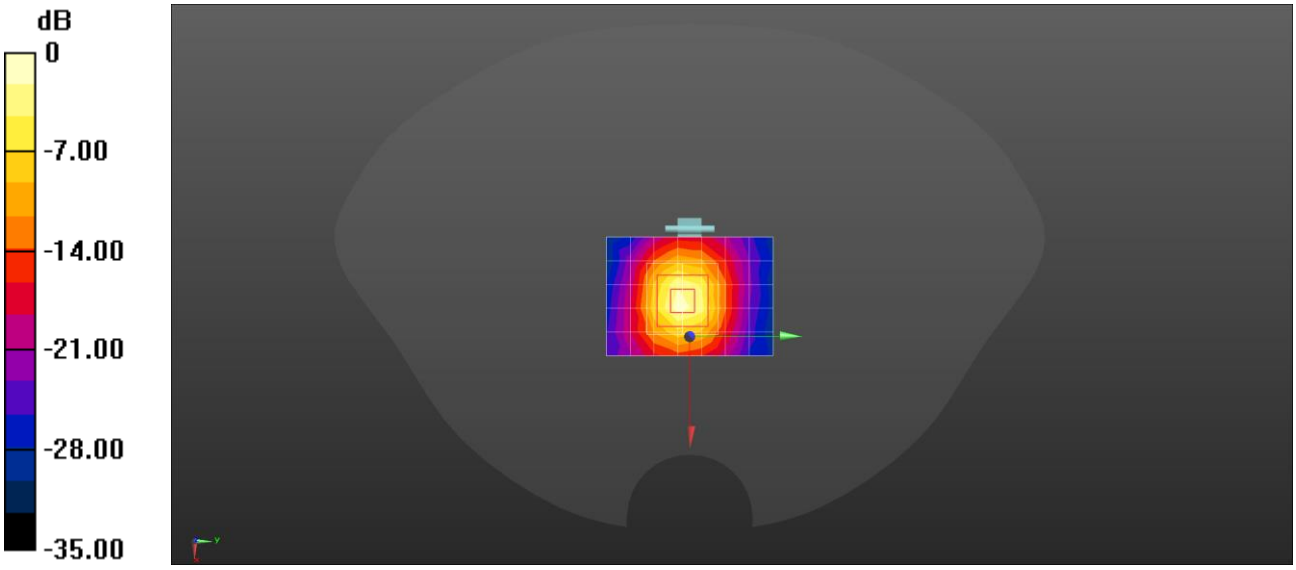
System Check Head 5750MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.73 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 19.9 W/kg

SAR(1 g) = 7.44 W/kg; SAR(10 g) = 2.28 W/kg

Maximum value of SAR (measured) = 14.37 W/kg



0 dB = 14.37 W/kg = 16.40 dBW/kg

Date: 6/5/2023

Test Laboratory:DEKRA Lab

System Check Head 2450MHz

DUT: Dipole D2450V2

Communication System: UID 0, CW; Communication System Band: D2450; Duty Cycle: 1:1; Frequency: 2450 MHz; Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; εr = 38.53; ρ = 1000 kg/m3 ; Phantom section: Flat Section ; Input Power=250mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(7.57, 7.57, 7.57) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (9x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 23.7 W/kg

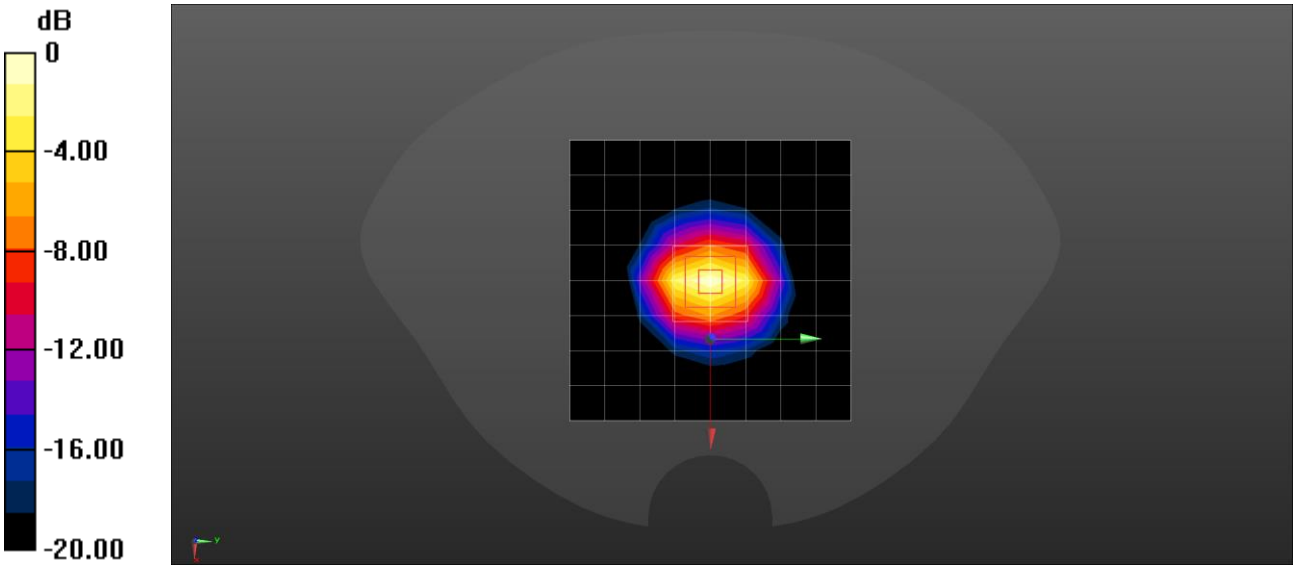
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 93.54 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 29.1 W/kg

SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.56 W/kg

Maximum value of SAR (measured) = 23.8 W/kg



0 dB = 23.8 W/kg = 13.77 dBW/kg

Date: 8/5/2023

Test Laboratory:DEKRA Lab

System Check Head 5250MHz

DUT: Dipole D5GHzV2

Communication System: UID 0, CW (0); Communication System Band: 5GHz; Duty Cycle: 1:1; Frequency: 5250 MHz; Medium parameters used: f = 5250 MHz; σ = 4.6 S/m; εr = 36.383; ρ = 1000 kg/m3 ; Phantom section: Flat Section ; Input Power=100mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(5.3, 5.3, 5.3) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 14.4 W/kg

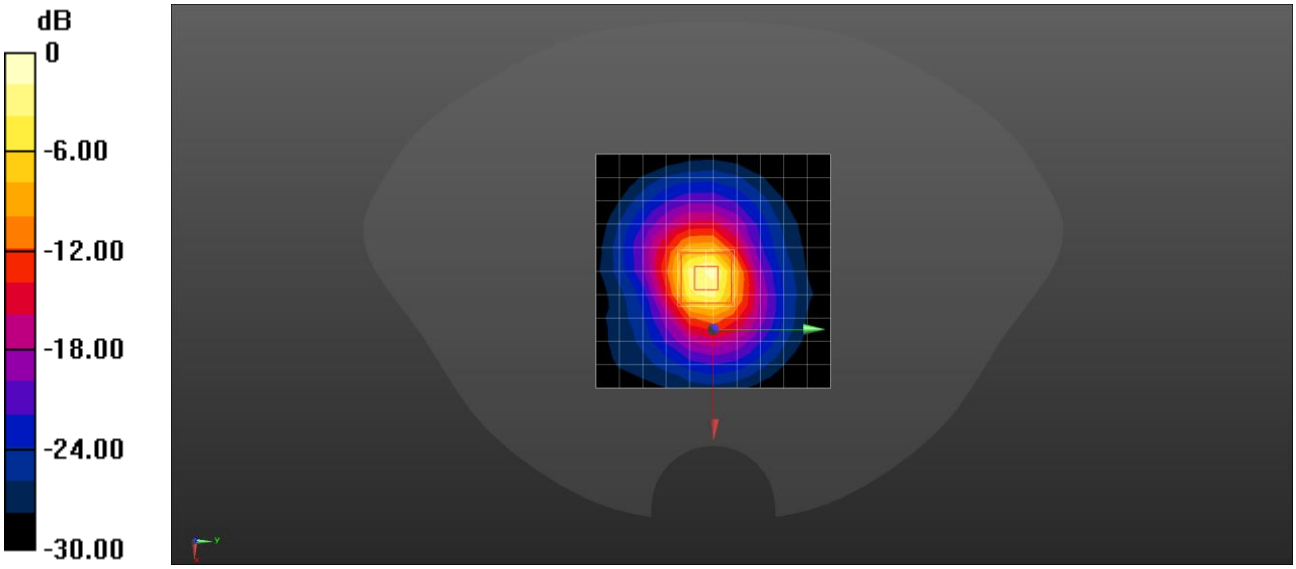
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 39.24 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 30.0 W/kg

SAR(1 g) = 7.57 W/kg; SAR(10 g) = 2.15 W/kg

Maximum value of SAR (measured) = 19.2 W/kg



0 dB = 19.2 W/kg = 12.83 dBW/kg

Date: 8/5/2023

Test Laboratory:DEKRA Lab

System Check Head 5600MHz

DUT: Dipole D5GHzV2

Communication System: UID 0, CW (0); Communication System Band: 5GHz; Duty Cycle: 1:1; Frequency: 5600 MHz; Medium parameters used: f = 5600 MHz; σ = 4.989 S/m; εr = 35.81; ρ = 1000 kg/m3 ; Phantom section: Flat Section ; Input Power=250mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(4.7, 4.7, 4.7) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 16.4 W/kg

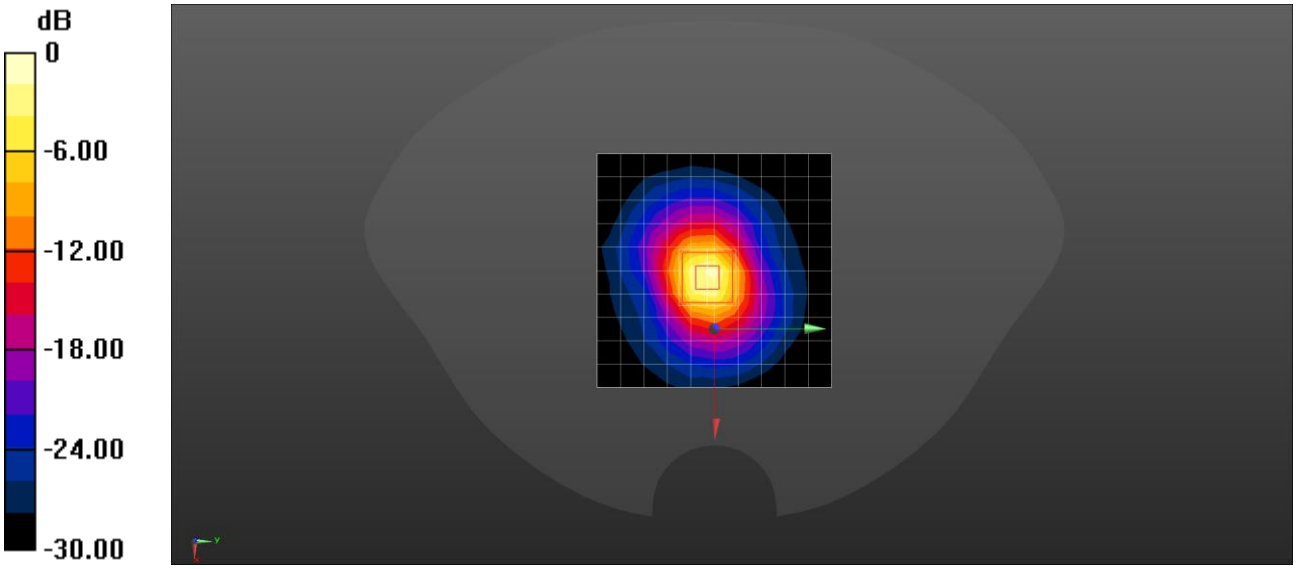
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 62.92 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 35.0 W/kg

SAR(1 g) = 8.2 W/kg; SAR(10 g) = 2.31 W/kg

Maximum value of SAR (measured) = 21.3 W/kg



0 dB = 21.3 W/kg = 13.28 dBW/kg

Appendix B. SAR Test Data

Head SAR

Date: 11/3/2023

Test Laboratory: DEKRA Lab

Bluetooth_DH5_CH78_2480MHz_In Side

DUT: VR

Communication System: UID 0, Bluetooth (0); Communication System Band: BDR+EDR; Duty Cycle: 1:1;

Frequency: 2480 MHz; Medium parameters used: f = 2480 MHz; σ = 1.893 S/m; εr = 38.436; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ; Input Power=250mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(7.57, 7.57, 7.57) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

CH78/Area Scan (11x11x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.0961 W/kg

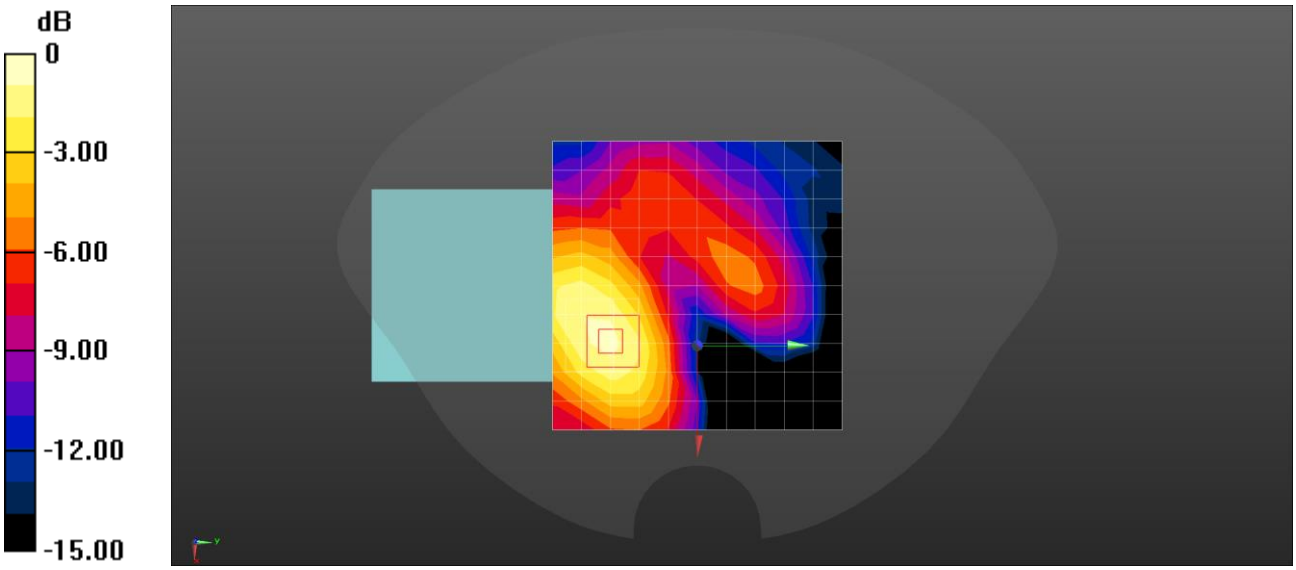
CH78/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.954 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.137 W/kg

SAR(1 g) = 0.0680 W/kg; SAR(10 g) = 0.0397 W/kg

Maximum value of SAR (measured) = 0.111 W/kg



0 dB = 0.111 W/kg = -9.55 dBW/kg

Date: 21/3/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_802.11n(40M)_CH46_5230MHz_In Side_Ant1

DUT: VR

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11n(40M); Duty Cycle: 1:1;

Frequency: 5230 MHz; Medium parameters used: f = 5230 MHz; σ = 4.569 S/m; εr = 36.45; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ; Input Power=100mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(5.3, 5.3, 5.3) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

CH46/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 2.19 W/kg

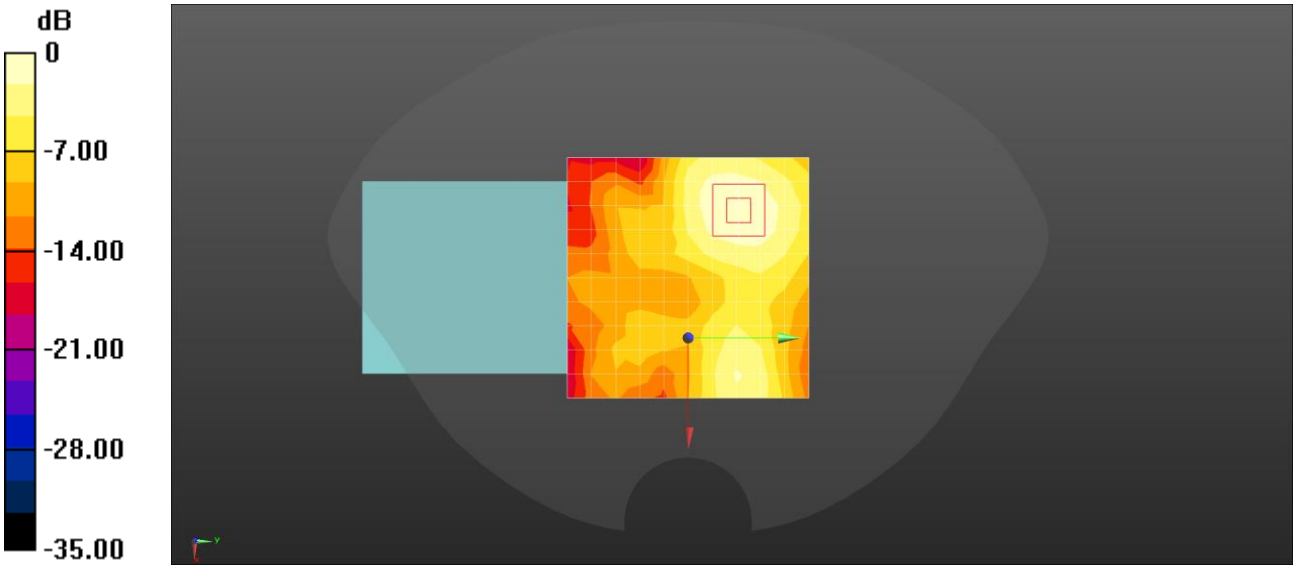
CH46/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 8.166 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 3.27 W/kg

SAR(1 g) = 1.07 W/kg; SAR(10 g) = 0.465 W/kg

Maximum value of SAR (measured) = 2.20 W/kg



0 dB = 2.20 W/kg = 3.42 dBW/kg

Date: 21/3/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_802.11n(40M)_CH46_5230MHz_In Side_Ant2

DUT: VR

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11n(40M); Duty Cycle: 1:1;

Frequency: 5230 MHz; Medium parameters used: f = 5230 MHz; σ = 4.569 S/m; εr = 36.45; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ; Input Power=100mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(5.3, 5.3, 5.3); Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

CH46/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 2.19 W/kg

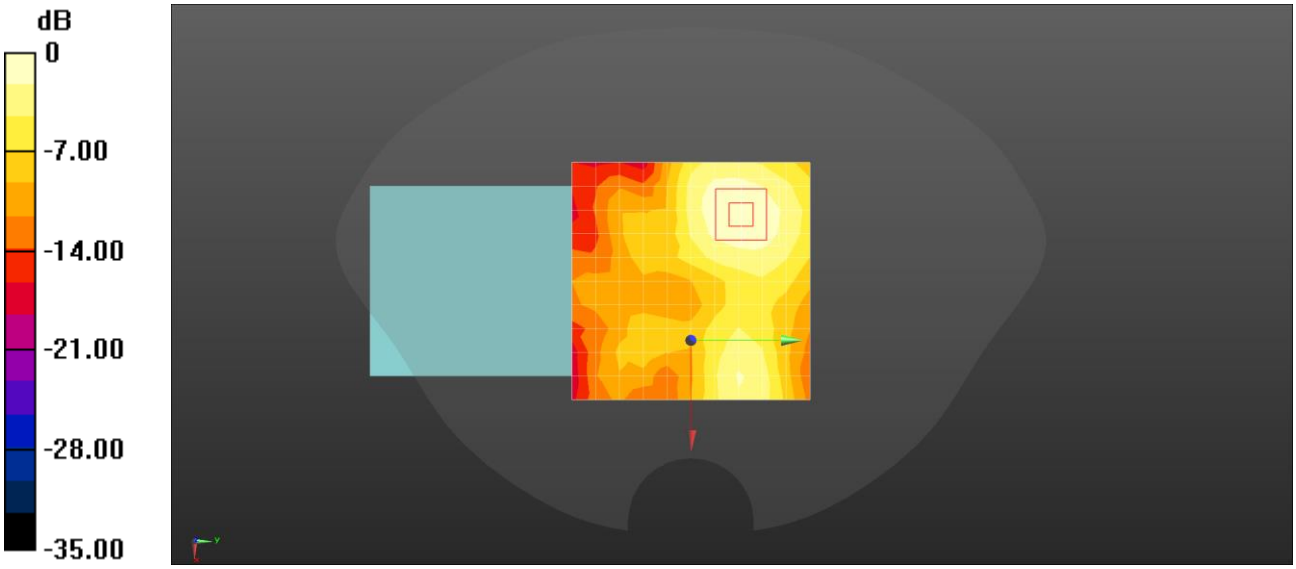
CH46/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 8.376 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 3.32 W/kg

SAR(1 g) = 1.08 W/kg; SAR(10 g) = 0.469 W/kg

Maximum value of SAR (measured) = 2.22 W/kg



0 dB = 2.22 W/kg = 3.46 dBW/kg

Date: 23/3/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_802.11n(40M)_CH151_5755MHz_In Side_Ant1+2

DUT: VR

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11n(40M); Duty Cycle: 1:1;

Frequency: 5755 MHz; Medium parameters used: f = 5755 MHz; σ = 5.168 S/m; εr = 35.557; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ; Input Power=100mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(4.84, 4.84, 4.84); Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

CH151/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 1.61 W/kg

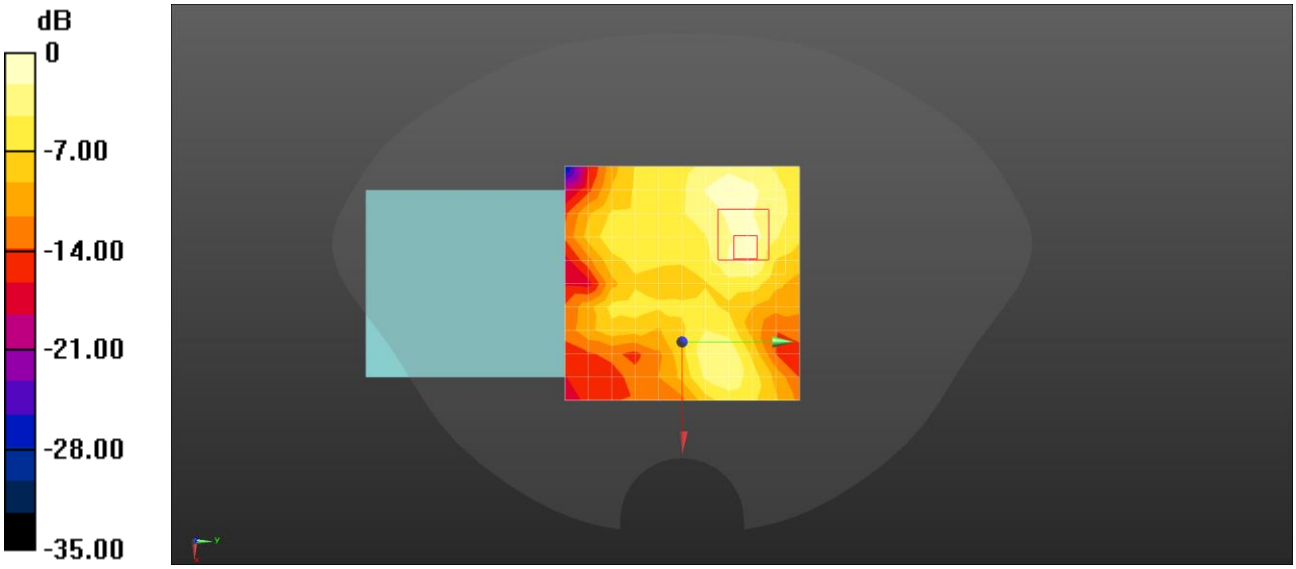
CH151/Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 8.857 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 3.26 W/kg

SAR(1 g) = 0.812 W/kg; SAR(10 g) = 0.280 W/kg

Maximum value of SAR (measured) = 1.99 W/kg



0 dB = 1.99 W/kg = 2.99 dBW/kg

Date: 23/3/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_802.11n(40M)_CH159_5795MHz_In Side_Ant1+2

DUT: VR

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11n(40M); Duty Cycle: 1:1;

Frequency: 5795 MHz; Medium parameters used: f = 5795 MHz; σ = 5.206 S/m; εr = 35.517; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ; Input Power=100mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(4.84, 4.84, 4.84); Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

CH151/Area Scan (12x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 1.82 W/kg

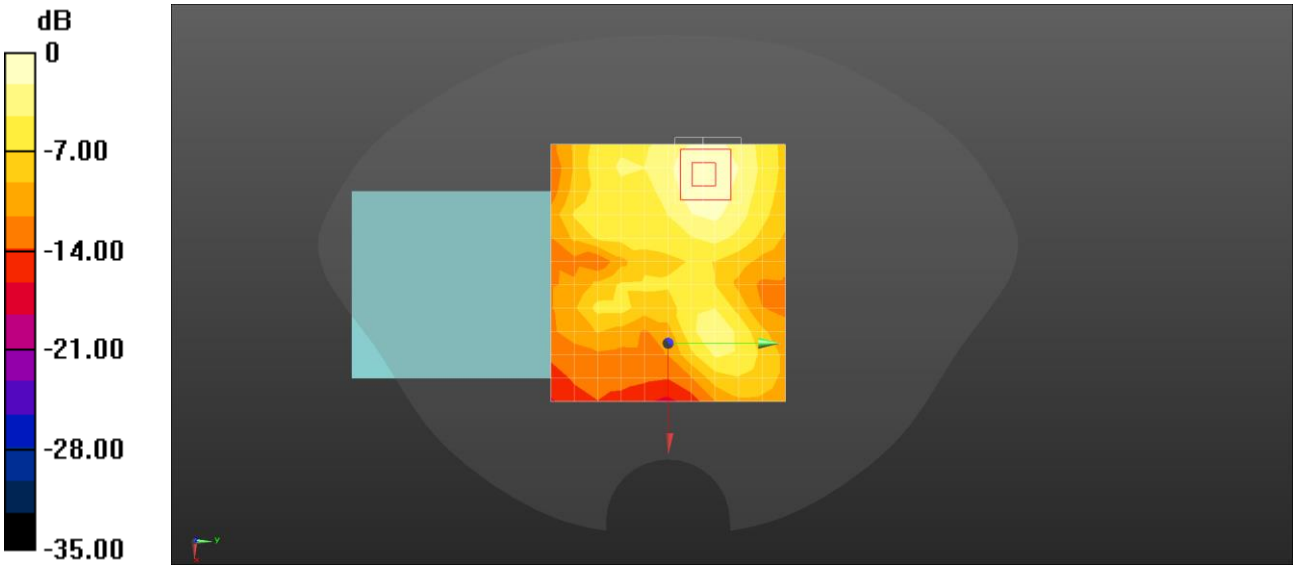
CH151/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 10.11 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 3.22 W/kg

SAR(1 g) = 0.973 W/kg; SAR(10 g) = 0.363 W/kg

Maximum value of SAR (measured) = 1.97 W/kg



0 dB = 1.97 W/kg = 2.94 dBW/kg

Date: 6/5/2023

Test Laboratory: DEKRA Lab

WLAN 2.4GHz_802.11n_HT40 MCS 0_CH09_2452MHz_In Side_Ant1+2

DUT: VR;

Communication System: UID 0, WIFI 2.4G (0); Communication System Band: 802.11n; Duty Cycle: 1:1;

Frequency: 2452 MHz; Medium parameters used: f = 2452 MHz; σ = 1.862 S/m; εr = 38.527; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ;

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(7.57, 7.57, 7.57) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (11x11x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.123 W/kg

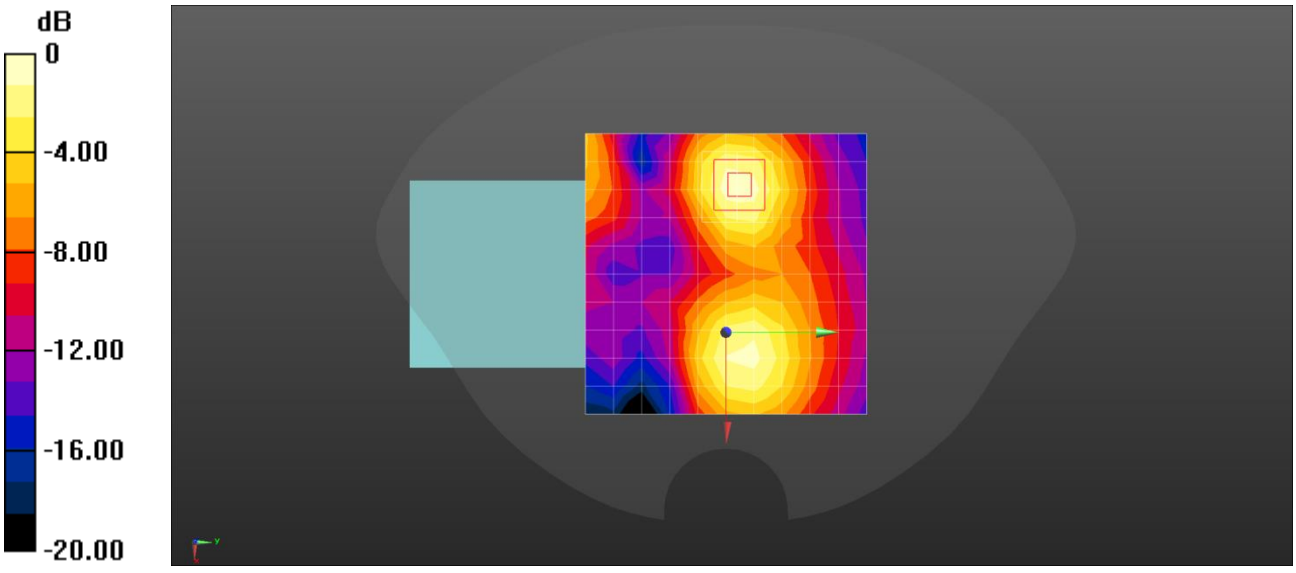
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.609 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.175 W/kg

SAR(1 g) = 0.090 W/kg; SAR(10 g) = 0.047 W/kg

Maximum value of SAR (measured) = 0.141 W/kg



0 dB = 0.141 W/kg = -8.51 dBW/kg

Date: 8/5/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_802.11ac VHT80 MCS 0_CH58_5290MHz_In Side_Ant1

DUT: VR;

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11ac; Duty Cycle: 1:1;

Frequency: 5290 MHz; Medium parameters used : f = 5290 MHz; σ = 4.637 S/m; εr = 36.335; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ;

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(5.3, 5.3, 5.3) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 20/3/2023
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 1.29 W/kg

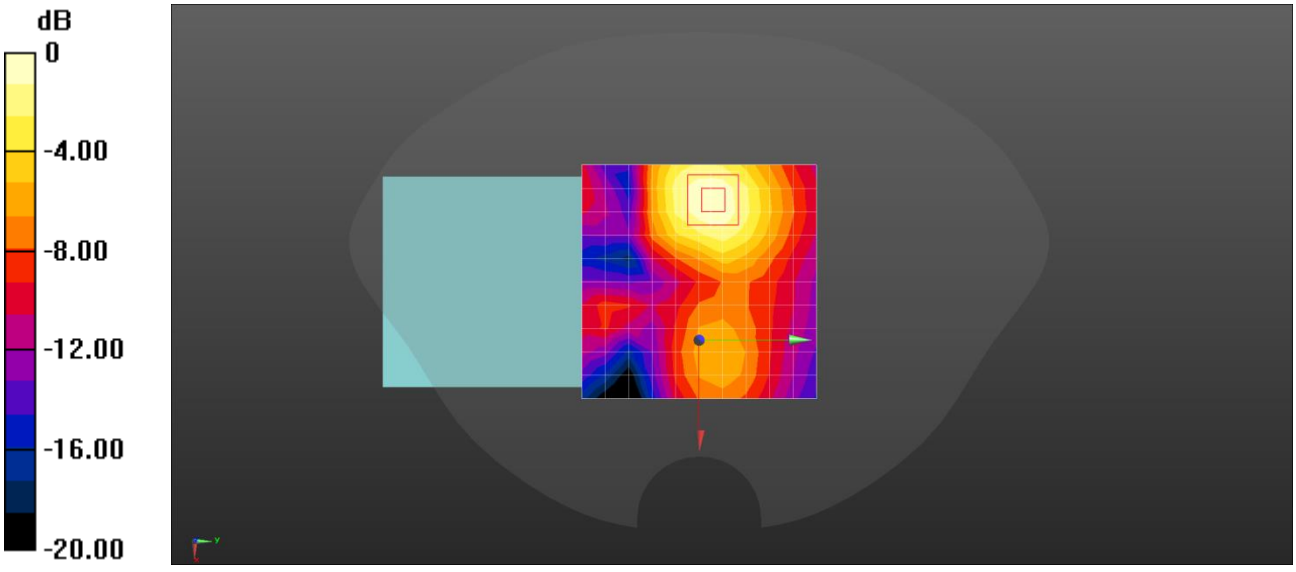
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 7.029 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 2.00 W/kg

SAR(1 g) = 0.546 W/kg; SAR(10 g) = 0.252 W/kg

Maximum value of SAR (measured) = 1.39 W/kg



0 dB = 1.39 W/kg = 1.43 dBW/kg

Date: 8/5/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_802.11ac_VHT80 MCS 0_CH106_5530MHz_In Side_Ant2

DUT: VR;

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11ac; Duty Cycle: 1:1;

Frequency: 5530 MHz; Medium parameters used: f = 5530 MHz; σ = 4.909 S/m; εr = 35.932; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ;

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(4.7, 4.7, 4.7) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 20/3/2023
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (11x11x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.906 W/kg

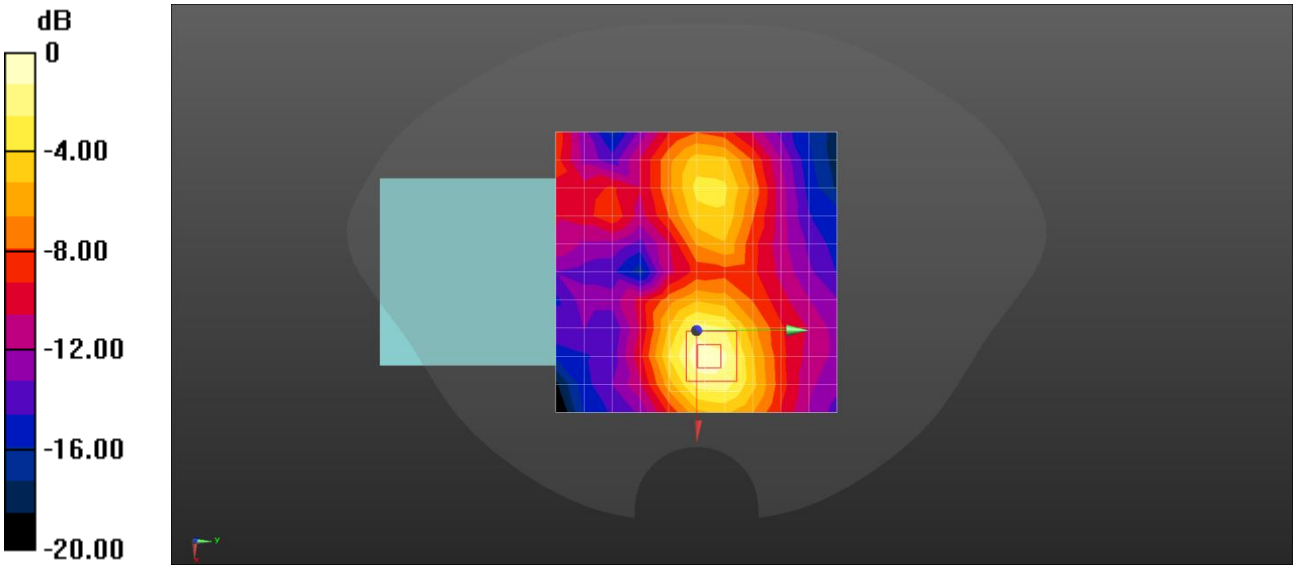
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.750 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.521 W/kg; SAR(10 g) = 0.245 W/kg

Maximum value of SAR (measured) = 0.955 W/kg



0 dB = 0.955 W/kg = -0.20 dBW/kg

Limbs SAR

Date: 11/3/2023

Test Laboratory: DEKRA Lab

Bluetooth_DH5_CH78_2480MHz_In Side

DUT: VR

Communication System: UID 0, Bluetooth (0); Communication System Band: BDR+EDR; Duty Cycle: 1:1;

Frequency: 2480 MHz; Medium parameters used: f = 2480 MHz; σ = 1.893 S/m; εr = 38.436; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ; Input Power=250mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(7.57, 7.57, 7.57) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

CH78/Area Scan (11x11x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.0961 W/kg

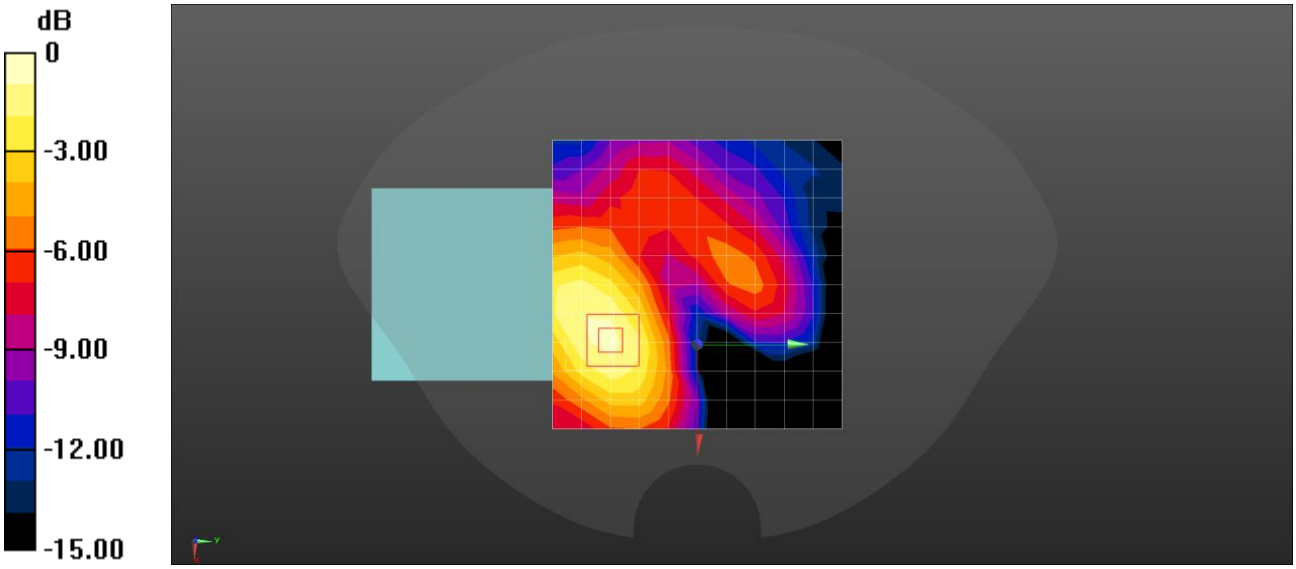
CH78/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.954 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.137 W/kg

SAR(1 g) = 0.0680 W/kg; SAR(10 g) = 0.0397 W/kg

Maximum value of SAR (measured) = 0.111 W/kg



0 dB = 0.111 W/kg = -9.55 dBW/kg

Date: 21/3/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_802.11n(40M)_CH46_5230MHz_Front_Ant1

DUT: VR

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11n(40M); Duty Cycle: 1:1;

Frequency: 5230 MHz; Medium parameters used: f = 5230 MHz; σ = 4.569 S/m; εr = 36.45; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ; Input Power=100mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(5.3, 5.3, 5.3) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

CH46/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 5.40 W/kg

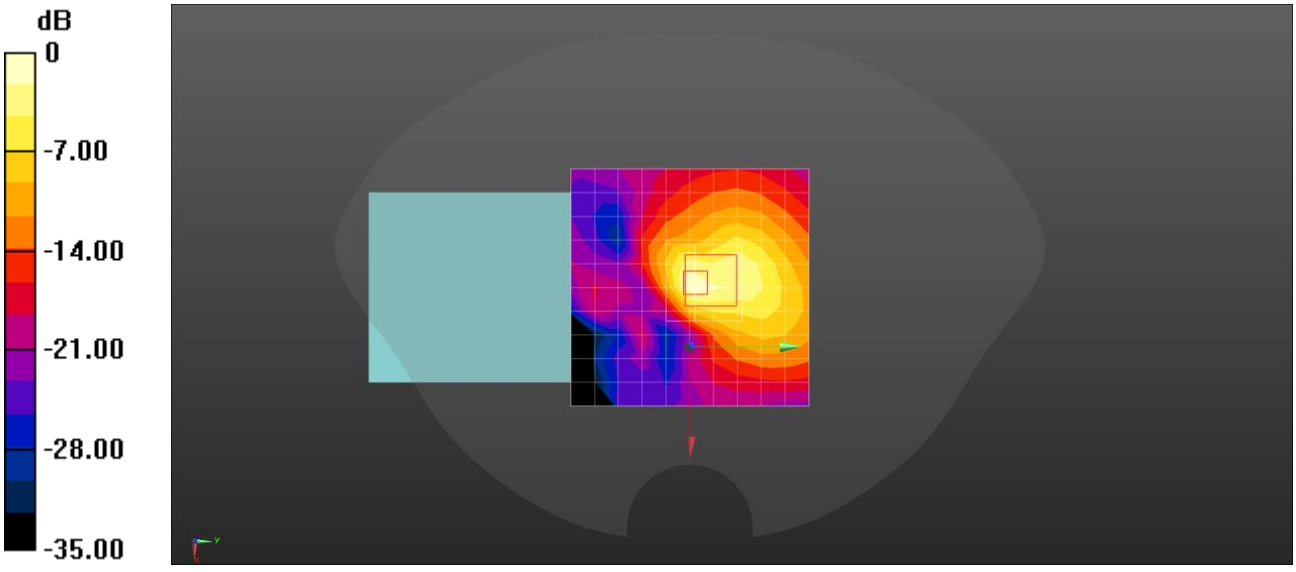
CH46/Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 37.96 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 9.06 W/kg

SAR(1 g) = 2.46 W/kg; SAR(10 g) = 0.800 W/kg

Maximum value of SAR (measured) = 5.97 W/kg



0 dB = 5.97 W/kg = 7.76 dBW/kg

Date: 21/3/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_8802.11n(40M)_CH46_5230MHz_Back_Ant2

DUT: VR

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11n(40M); Duty Cycle: 1:1;

Frequency: 5230 MHz; Medium parameters used: f = 5230 MHz; σ = 4.569 S/m; εr = 36.45; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ; Input Power=100mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(5.3, 5.3, 5.3) @ 5230 MHz; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

CH46/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 16.7 W/kg

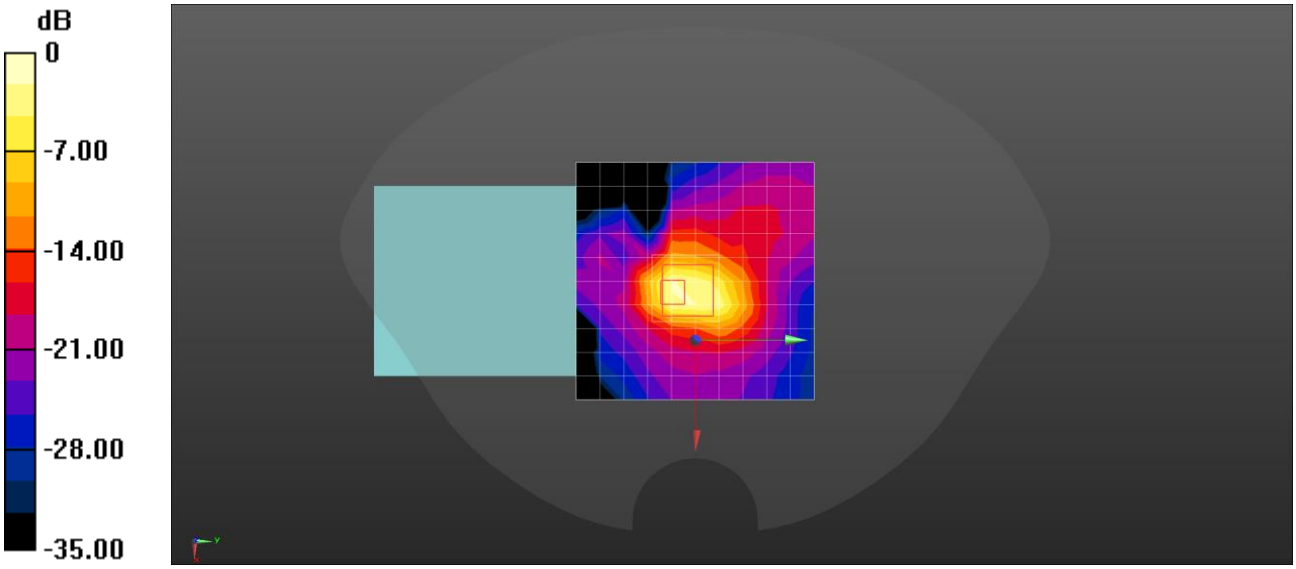
C**H46/Zoom Scan (8x8x7)/Cube 0: Measurement grid:** dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.92 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 47.5 W/kg

SAR(1 g) = 9.68 W/kg; SAR(10 g) = 3.03 W/kg

Maximum value of SAR (measured) = 27.7 W/kg



0 dB = 27.7 W/kg = 14.42 dBW/kg

Date: 23/3/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_802.11n(40M)_CH151_5755MHz_Back_Ant1+2

DUT: VR

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11n(40M); Duty Cycle: 1:1;

Frequency: 5755 MHz; Medium parameters used: f = 5755 MHz; σ = 5.168 S/m; εr = 35.557; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ; Input Power=100mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(4.84, 4.84, 4.84) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

CH151/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 40.1 W/kg

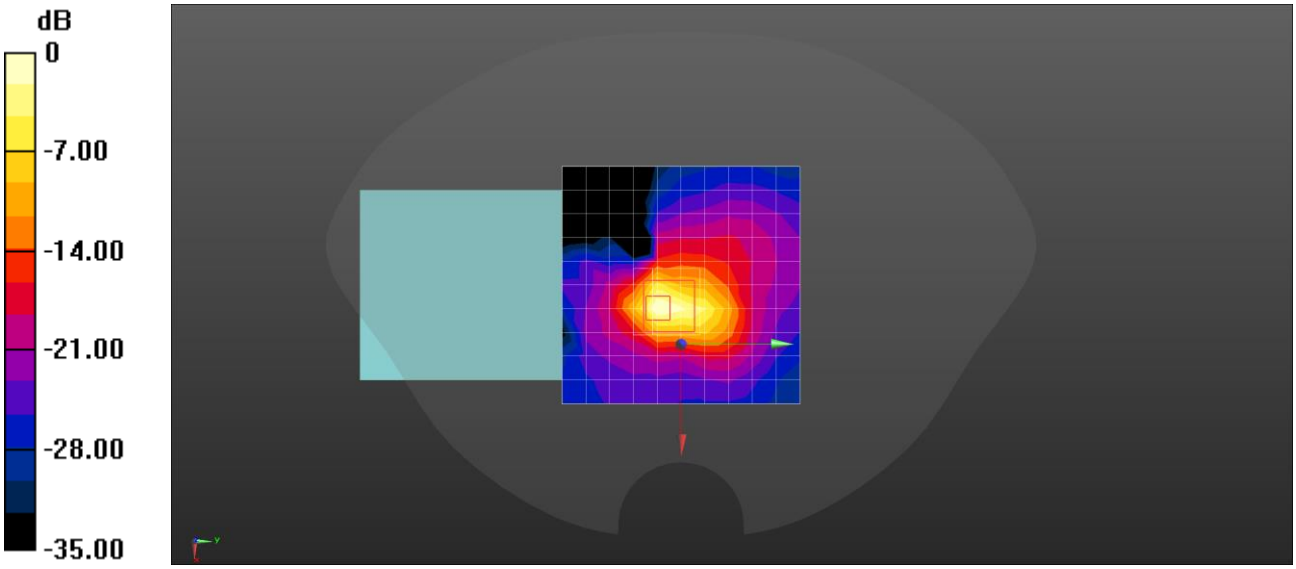
CH151/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 30.61 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 69.8 W/kg

SAR(1 g) = 12.9 W/kg; SAR(10 g) = 3.12 W/kg

Maximum value of SAR (measured) = 36.1 W/kg



0 dB = 36.1 W/kg = 15.58 dBW/kg

Date: 23/3/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_802.11n(40M)_CH151_5755MHz_Front_Ant1+2

DUT: VR

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11n(40M); Duty Cycle: 1:1;

Frequency: 5755 MHz; Medium parameters used: f = 5755 MHz; σ = 5.168 S/m; εr = 35.557; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ; Input Power=100mW

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(4.84, 4.84, 4.84) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

CH151/Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 8.86 W/kg

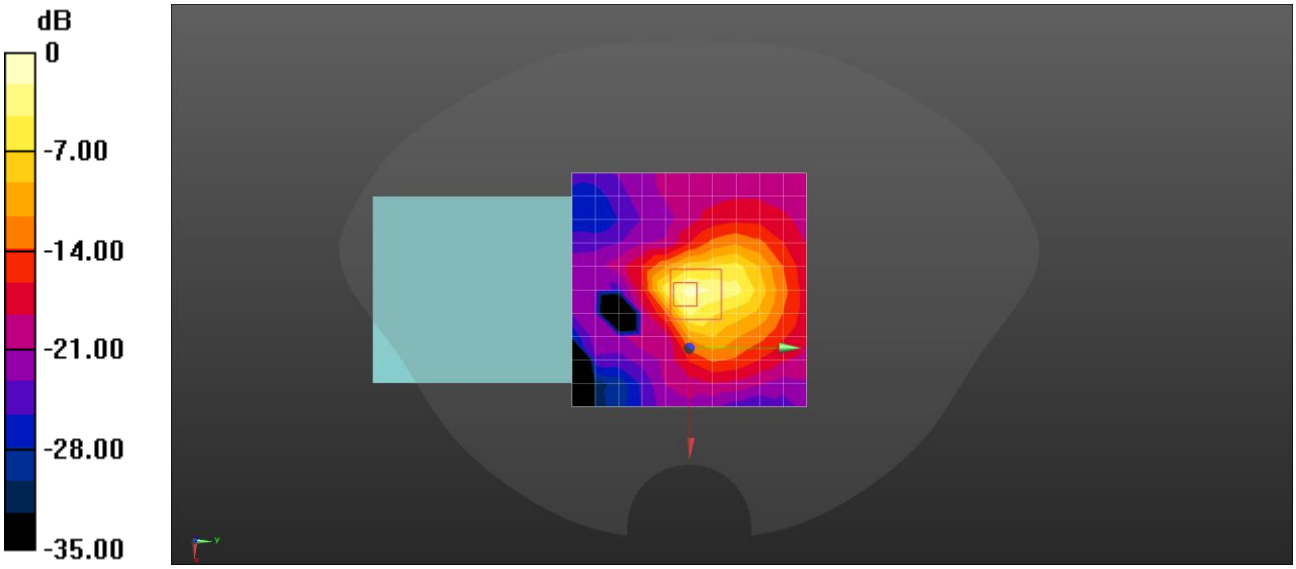
CH151/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 46.50 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 18.0 W/kg

SAR(1 g) = 4.13 W/kg; SAR(10 g) = 1.17 W/kg

Maximum value of SAR (measured) = 11.1 W/kg



0 dB = 11.1 W/kg = 10.45 dBW/kg

Date: 8/5/2023

Test Laboratory: DEKRA Lab

WLAN 2.4GHz_802.11n_HT40 MCS 0_CH09_2452MHz_Front_Ant1+2

DUT: VR;

Communication System: UID 0, WIFI 2.4G (0); Communication System Band: 802.11n; Duty Cycle: 1:1;

Frequency: 2452 MHz; Medium parameters used: f = 2452 MHz; σ = 1.862 S/m; εr = 38.527; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ;

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(7.57, 7.57, 7.57) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn917; Calibrated: 28/12/2022
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (11x13x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 1.22 W/kg

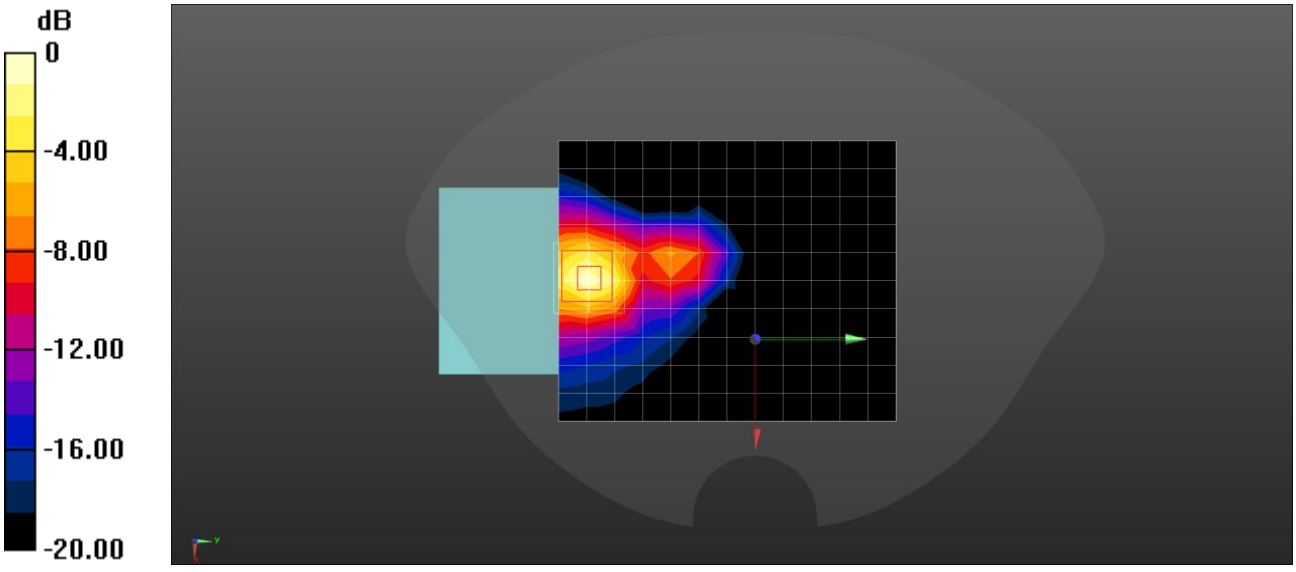
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.977 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 1.56 W/kg

SAR(1 g) = 0.734 W/kg; SAR(10 g) = 0.331 W/kg

Maximum value of SAR (measured) = 1.25 W/kg



0 dB = 1.25 W/kg = 0.97 dBW/kg

Date: 8/5/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_802.11ac VHT80 MCS 0_CH58_5290MHz_In Side_Ant1

DUT: VR;

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11ac; Duty Cycle: 1:1;

Frequency: 5290 MHz; Medium parameters used : f = 5290 MHz; σ = 4.637 S/m; εr = 36.335; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ;

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(5.3, 5.3, 5.3) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 20/3/2023
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (11x11x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 1.29 W/kg

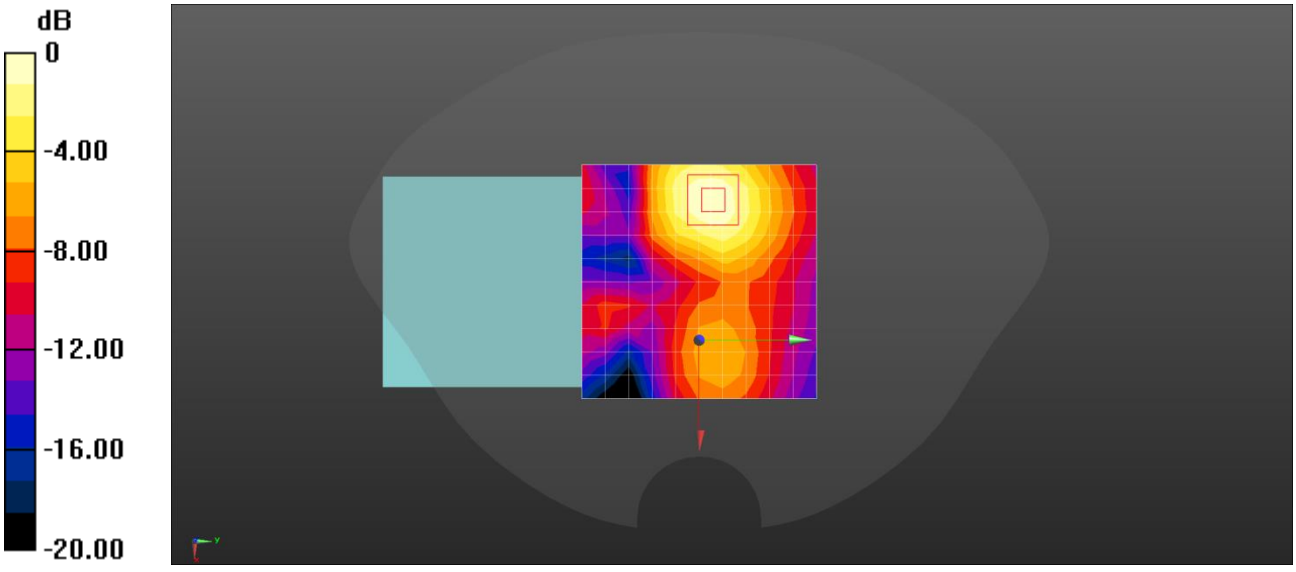
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 7.029 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 2.00 W/kg

SAR(1 g) = 0.546 W/kg; SAR(10 g) = 0.252 W/kg

Maximum value of SAR (measured) = 1.39 W/kg



0 dB = 1.39 W/kg = 1.43 dBW/kg

Date: 8/5/2023

Test Laboratory: DEKRA Lab

WLAN 5GHz_802.11ac_VHT80 MCS 0_CH106_5530MHz_In Side_Ant2

DUT: VR;

Communication System: UID 0, WIFI 5G (0); Communication System Band: 802.11ac; Duty Cycle: 1:1;

Frequency: 5530 MHz; Medium parameters used: f = 5530 MHz; σ = 4.909 S/m; εr = 35.932; ρ = 1000 kg/m3 ;

Phantom section: Flat Section ;

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7761; ConvF(4.7, 4.7, 4.7) ; Calibrated: 12/9/2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1220; Calibrated: 20/3/2023
- Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP-1562
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (11x11x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.906 W/kg

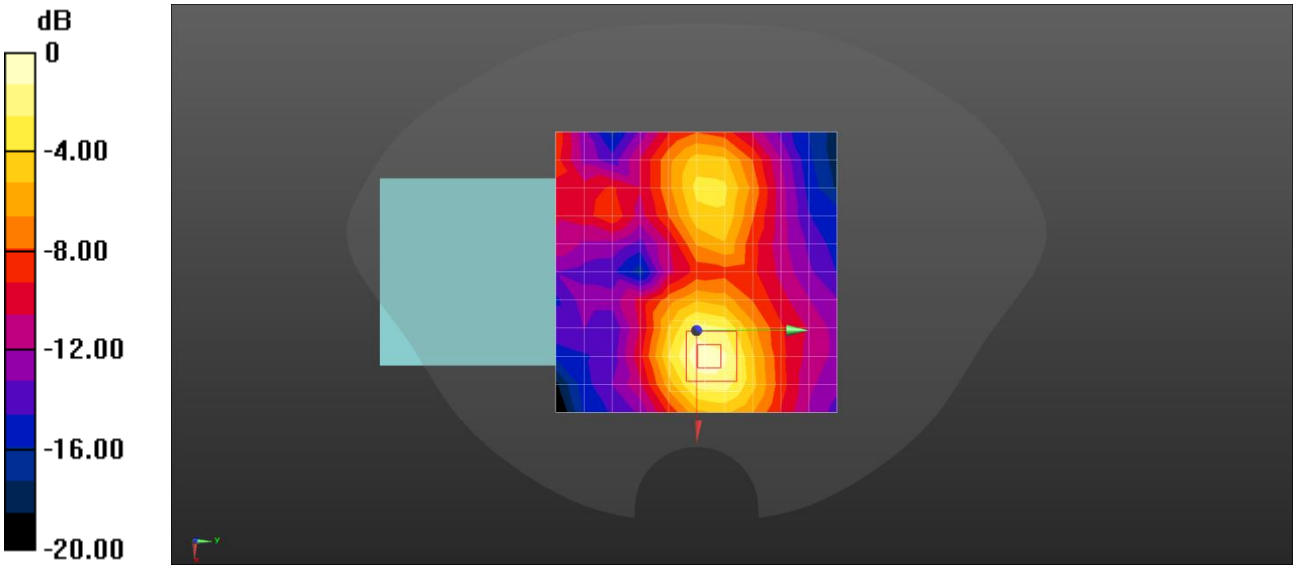
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.750 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.521 W/kg; SAR(10 g) = 0.245 W/kg

Maximum value of SAR (measured) = 0.955 W/kg



0 dB = 0.955 W/kg = -0.20 dBW/kg

Note：

We evaluated all tests and only represented the test charts with the worst data.

Appendix C. Probe Calibration Data

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

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

Accreditation No.: SCS 0108

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

Client: **Dekra-CN (Auden)** Certificate No: **EX-7761_Sep22**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:7761
Calibration procedure(s)	QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v6, QA CAL-23.v5, QA CAL-25.v7 Calibration procedure for dosimetric E-field probes
Calibration date	September 12, 2022

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
OCP DAK-3.5 (weighted)	SN: 1249	20-Oct-21 (OCP-DAK3.5-1249_Oct21)	Oct-22
OCP DAK-12	SN: 1016	20-Oct-21 (OCP-DAK12-1016_Oct21)	Oct-22
Reference 20 dB Attenuator	SN: CC2552 (20x)	04-Apr-22 (No. 217-03527)	Apr-23
DAE4	SN: 660	13-Oct-21 (No. DAE4-660_Oct21)	Oct-22
Reference Probe ES3DV2	SN: 3013	27-Dec-21 (No. ES3-3013_Dec21)	Dec-22

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-22)	In house check: Jun-24
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-22

	Name	Function	Signature
Calibrated by	Jeton Kastrati	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: September 12, 2022

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

Certificate No: EX-7761_Sep22 Page 1 of 22

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

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

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

Accreditation No.: SCS 0108

Glossary

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

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices – Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) 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 $\vartheta = 0$ ($f \le 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal. DCP does not depend on frequency nor media.
- *PAR*: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \le 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ±50 MHz to ±100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Parameters of Probe: EX3DV4 - SN:7761

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm ($\mu V/(V/m)^2$) [A]	0.65	0.60	0.64	±10.1%
DCP (mV) [B]	111.9	113.5	107.3	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B $dB\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	162.6	±3.3%	±4.7%
		Y	0.00	0.00	1.00		166.9		
		Z	0.00	0.00	1.00		145.2		
10352	Pulse Waveform (200Hz, 10%)	X	1.37	60.00	5.95	10.00	60.0	±3.9%	±9.6%
		Y	1.57	60.60	6.19		60.0		
		Z	1.54	60.81	6.52		60.0		
10353	Pulse Waveform (200Hz, 20%)	X	0.85	60.00	4.84	6.99	80.0	±2.9%	±9.6%
		Y	0.91	60.00	4.94		80.0		
		Z	0.85	60.00	5.05		80.0		
10354	Pulse Waveform (200Hz, 40%)	X	0.11	131.69	0.01	3.98	95.0	±2.8%	±9.6%
		Y	0.57	60.00	3.83		95.0		
		Z	2.00	64.00	5.00		95.0		
10355	Pulse Waveform (200Hz, 60%)	X	6.77	159.89	3.78	2.22	120.0	±1.9%	±9.6%
		Y	13.12	151.80	4.39		120.0		
		Z	10.56	155.82	12.29		120.0		
10387	QPSK Waveform, 1 MHz	X	0.48	60.85	9.80	1.00	150.0	±5.0%	±9.6%
		Y	0.47	61.25	10.37		150.0		
		Z	0.58	61.90	10.43		150.0		
10388	QPSK Waveform, 10 MHz	X	1.30	64.55	12.93	0.00	150.0	±1.3%	±9.6%
		Y	1.19	63.97	12.67		150.0		
		Z	1.27	63.69	12.66		150.0		
10396	64-QAM Waveform, 100 kHz	X	1.66	64.32	15.84	3.01	150.0	±1.1%	±9.6%
		Y	1.77	65.10	15.87		150.0		
		Z	1.61	63.48	15.45		150.0		
10399	64-QAM Waveform, 40 MHz	X	2.80	65.73	14.57	0.00	150.0	±2.9%	±9.6%
		Y	2.68	65.42	14.39		150.0		
		Z	2.75	65.13	14.31		150.0		
10414	WLAN CCDF, 64-QAM, 40 MHz	X	3.86	65.51	14.92	0.00	150.0	±5.1%	±9.6%
		Y	3.85	65.99	15.06		150.0		
		Z	4.02	65.78	15.10		150.0		

Note: For details on UID parameters see Appendix

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

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

Parameters of Probe: EX3DV4 - SN:7761

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 ms V^{-2}	T2 ms V^{-1}	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
x	11.8	85.35	33.24	5.48	0.00	4.93	0.51	0.00	1.01
y	10.4	72.34	31.28	6.90	0.00	4.90	0.72	0.00	1.00
z	12.9	93.91	33.47	5.21	0.00	4.94	0.00	0.06	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	-153.7°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Note: Measurement distance from surface can be increased to 3–4 mm for an *Area Scan* job.

Parameters of Probe: EX3DV4 - SN:7761

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc ($k = 2$)
450	43.5	0.87	10.36	10.36	10.36	0.16	1.30	±13.3%
750	41.9	0.89	9.84	9.84	9.84	0.50	0.85	±12.0%
835	41.5	0.90	9.66	9.66	9.66	0.30	1.12	±12.0%
900	41.5	0.97	9.45	9.45	9.45	0.44	0.84	±12.0%
1750	40.1	1.37	8.65	8.65	8.65	0.28	0.86	±12.0%
1900	40.0	1.40	8.34	8.34	8.34	0.24	0.86	±12.0%
2100	39.8	1.49	7.93	7.93	7.93	0.32	0.90	±12.0%
2300	39.5	1.67	7.92	7.92	7.92	0.32	0.90	±12.0%
2450	39.2	1.80	7.57	7.57	7.57	0.38	0.90	±12.0%
2600	39.0	1.96	7.32	7.32	7.32	0.43	0.90	±12.0%
3300	38.2	2.71	6.88	6.88	6.88	0.30	1.35	±13.1%
3500	37.9	2.91	6.83	6.83	6.83	0.30	1.35	±13.1%
3700	37.7	3.12	6.55	6.55	6.55	0.30	1.35	±13.1%
3900	37.5	3.32	6.22	6.22	6.22	0.40	1.50	±13.1%
4100	37.2	3.53	6.05	6.05	6.05	0.40	1.50	±13.1%
4200	37.1	3.63	6.00	6.00	6.00	0.40	1.70	±13.1%
4400	36.9	3.84	5.94	5.94	5.94	0.40	1.70	±13.1%
4600	36.7	4.04	5.85	5.85	5.85	0.40	1.70	±13.1%
4800	36.4	4.25	5.83	5.83	5.83	0.40	1.80	±13.1%
4950	36.3	4.40	5.60	5.60	5.60	0.40	1.80	±13.1%
5250	35.9	4.71	5.30	5.30	5.30	0.40	1.80	±13.1%
5600	35.5	5.07	4.70	4.70	4.70	0.40	1.80	±13.1%
5750	35.4	5.22	4.84	4.84	4.84	0.40	1.80	±13.1%

[C] Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz and below ±2% for frequencies between 3–6 GHz at any distance larger than half the probe tip diameter from the boundary.

Parameters of Probe: EX3DV4 - SN:7761

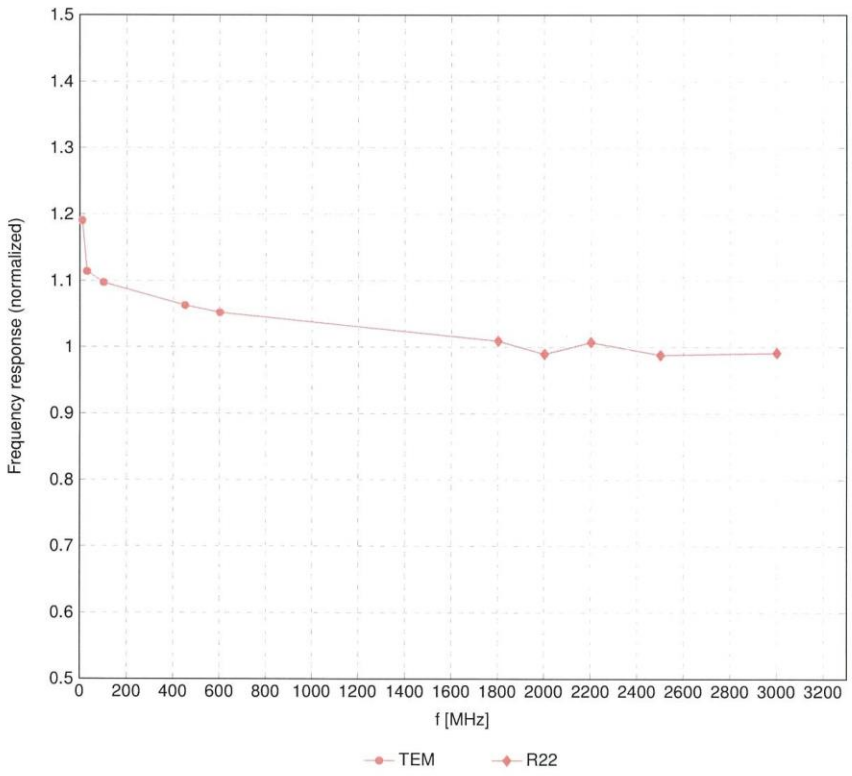
Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc ($k = 2$)
6500	34.5	6.07	5.05	5.05	5.05	0.20	2.50	±18.6%

[C] Frequency validity at 6.5 GHz is −600/+700 MHz, and ±700 MHz at or above 7 GHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies 6–10 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. 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; below ±2% for frequencies between 3–6 GHz; and below ±4% for frequencies between 6–10 GHz at any distance larger than half the probe tip diameter from the boundary.

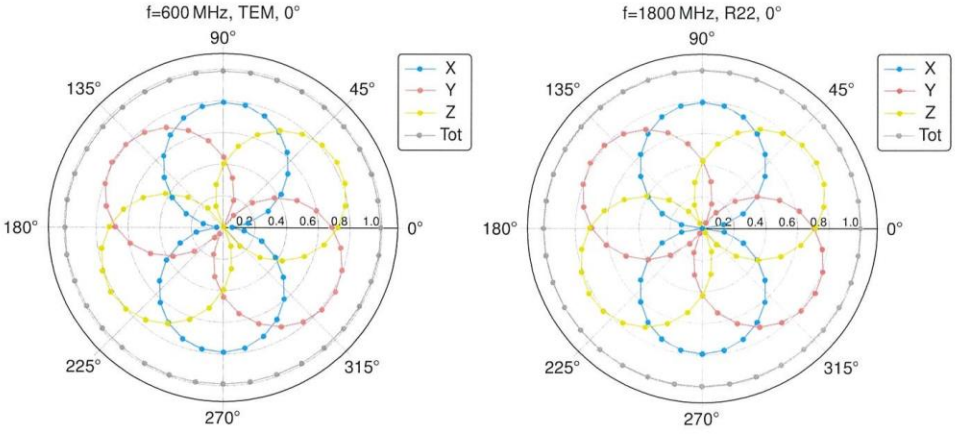
Frequency Response of E-Field

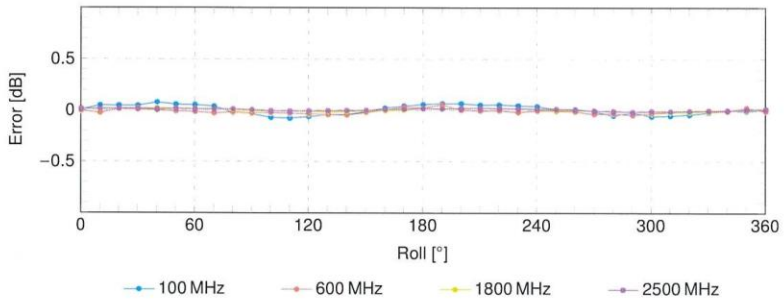
(TEM-Cell:ifi110 EXX, Waveguide:R22)



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

Receiving Pattern (ϕ), $\vartheta = 0°$

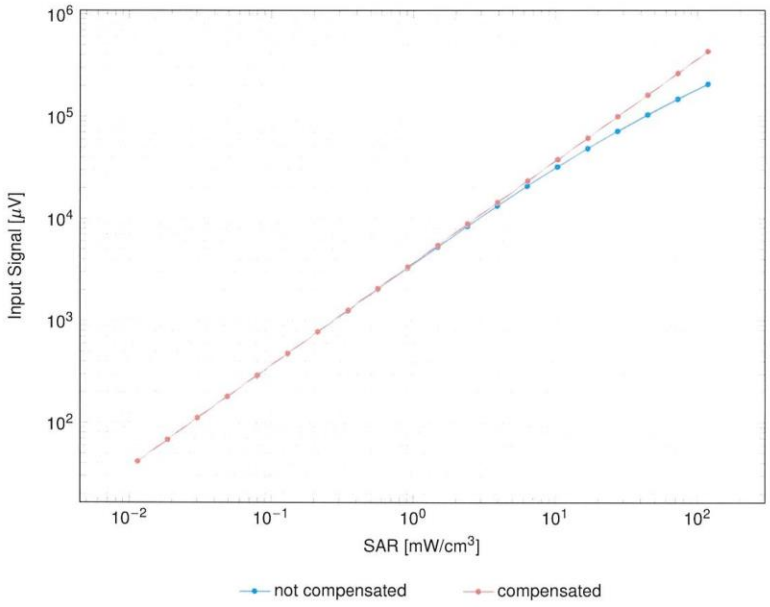


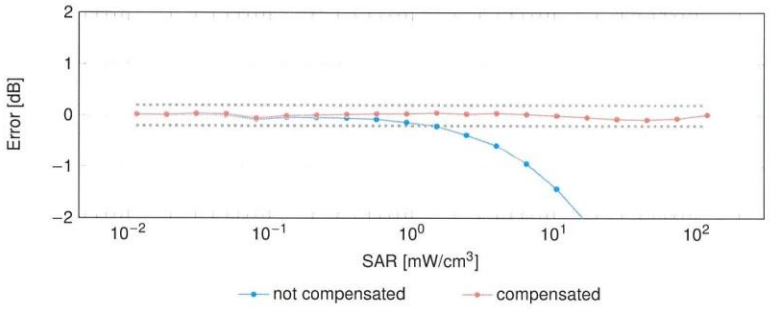


Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)

Dynamic Range f(SAR_{head})

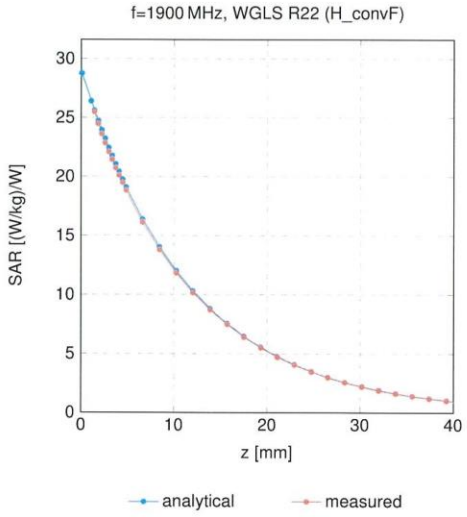
(TEM cell, f_{eval} = 1900 MHz)





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

Conversion Factor Assessment



Deviation from Isotropy in Liquid