DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29 507 456

DEKRA

Test report No:

NIE: 74000RAN.002

Test report
IEEE Std 1528™-2013

(*) Identification of item tested	Sports watch with GNSS and BLE and WLAN connectivity
(*) Trademark	SUUNTO
(*) Model and /or type reference tested	OW222
(*) Other identification of the product	FCC ID: RYPOW222 IC: 5175A-OW222 HW version: D2 SW version: 2.24
(*) Features	GNSS, BLE, WLAN
Manufacturer	Suunto Oy Tammiston kauppatie 7A, 01510 Vantaa, Finland
Test method requested, standard	1. IEEE Std 1528™-2013. 2. FCC 47 CFR Part 2.1093.
Summary	Considering the results of the performed test, the item under test is IN COMPLIANCE with FCC 47CFR Part 2.1093 exposure limits. The maximum 1g volume averaged SAR found during this test have been 0.004 W/kg, for 802.11b mode.
Approved by (name / position & signature)	Miguel Lacave Antennas Lab Manager 2023.03.08 15:10:12 +01'00'
Date of issue	2023-03-07
Report template No	FAN44_00

(*) "Data provided by the client"

ilac-MRA ENAC ENSAYO ISO 17025 Nº51 / LE147

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Uncertainty

Uncertainty (factor k=2) was calculated according to the following documents:

1. DEKRA Testing and Certification S.A.U. internal document PODT000.
2. FCC OET KDB 865664 D01 - SAR Measurement Requirements for 100 MHz to 6 GHz v01r04 (August 2015).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested", "Other identification of the product", "Features" and "Test sample description").

2. Maximum output power, maximum antenna gain, normal use conditions and testing distance information.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: the client

Samples are composed of the following elements:

Sample	Control Nº	Description	Model	Serial Nº	Date of reception
S/01	74000_19.1	Watch Conducted	OW222	22511300119	2023-01-11
S/02	74000_28.1	Watch WLAN SAR	OW222	22511300115	2023-01-11

1. Sample S/01 has undergone the test(s) specified in subclause "Test method requested": Conducted average output power.
2. Sample S/02 has undergone the test(s) specified in subclause "Test method requested": SAR evaluation for Wi-Fi modes.

Test sample description

<table>
<tr><td>Description of product .... :</td><td colspan="3">Sports watch with GNSS and BLE and WLAN connectivity</td></tr>
<tr><td>Software version......................... :</td><td colspan="3">.......</td></tr>
<tr><td>Hardware version .... :</td><td colspan="3">.......</td></tr>
<tr><td rowspan="5">Mounting position .... :</td><td>[ ]</td><td colspan="2">Table top equipment</td></tr>
<tr><td>[ ]</td><td colspan="2">Wall/Ceiling mounted equipment</td></tr>
<tr><td>[ ]</td><td colspan="2">Equipment used next to the ear</td></tr>
<tr><td>[ ]</td><td colspan="2">Hand-held equipment</td></tr>
<tr><td>[X]</td><td colspan="2">Other: wrist worn</td></tr>
<tr><td rowspan="3">Accessories (not part of the test item)... :</td><td>Description</td><td>Type</td><td>Manufacturer</td></tr>
<tr><td>Charging adapter</td><td>---</td><td></td></tr>
<tr><td>USB cable</td><td>---</td><td></td></tr>
</table>

Identification of the client

Suunto Oy

Tammiston kauppatie 7A, 01510 Vantaa, Finland

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2023-01-30
Date (finish)	2023-02-01

Document history

Report number	Date	Description
74000RAN.002	2023-03-07	First release

Environmental conditions

Date	Max. Temp. ºC	Min. Temp. ºC	Max. Hum. %	Min. Hum. %	Limit
From 2023-01-30 to 2023-02-01	22.73	20.01	44.80	30.66	18-25 ºC, 30-70%

Remarks and comments

1. Only the plots of the highest SAR for each test position and mode/band are included in appendix C.
2. The tests have been performed by the technical personnel: Ismael Gamarro.
3. The instrumentation utilized to perform the tests covered in this test report is listed in the following table:

DEKRA Control Number	Equipment	S/N
3630	Dual directional coupler, NARDA model 4227-16	02953
3485	Power amplifier, MITEQ model AMF-4D-00400600-50-30P	1456425
4482	Vector Network Analyzer, Agilent Technologies model N9923A FieldFox	US49470126
3436	Robot controller, Stäubli model CS7MB	F04/50P5A1/C/01
2402	20 dB Attenuator, WEINSCHEL model 75A-20-11	902
3420	Robot, Stäubli model RX60BL	F04/SOP5A1/A/01
3438	Electro-optical converter, SPEAG model EOC3	391
4835	DC Power supply, Agilent model U8002A	MY58500043
3429	Dipole validation kit 2450 MHz, SPEAG model D2450V2	756
8876	Data acquisition device, SPEAG model DAE4	1690
4393	Dual Power meter, Agilent model E4419B	MY45103349
9513	Dosimetric E-field Probe, SPEAG model EX3DV4	7766
4171	Dielectric probe kit, SPEAG model DAK-3.5	1080
9449	Head Tissue Equivalent Liquid for 0.6-10 GHz, SPEAG model HBBL600-10000V6	-
3424	Mounting Device for Hand-held devices,. SPEAG model SD000 HD1 HA	-
4164	Power Sensor 50 MHz-18GHz, R&S model NRP-Z81	100527
4392	Power sensor, Agilent model E9300A	SG41491189
4391	Power sensor, Agilent model E9300A	SG41491203
3847	Measurement server, SPEAG model DASY5 SE UMS 011 BS	1227
3346	Signal RF Generator, R&S model SMU200A	102234
3422	SAM head-body simulator, SPEAG model TWIN SAM V4.0	-
3423	SAR measurement software, SPEAG model DASY52	-
4859	DAK software, SPEAG model DAK V1.10.325.10	-
3453	Temperature and humidity probe, Pico Technology model HUMIDIPROBE	UAL02/077
4170	Digital thermometer, LKM Electronics model DTM3000-Spezial	2989

4. References

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093 and the following FCC Published RF exposure KDB procedures:

- FCC OET KDB 447498 D01 General RF Exposure Guidance v06 (October 2015).
- FCC OET KDB 865664 D01 - SAR Measurement Requirements for 100 MHz to 6 GHz v01r04 (August 2015).
- FCC OET KDB 865664 D02 RF Exposure Reporting v01r02 (October 2015).
- FCC OET KDB 248227 D01 802.11 Wi-Fi SAR v02r02 (October 2015).

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

Summary

FCC 47CFR Part 2.1093	VERDICT			
	N/A	P	F	N/M
802.11b/g/n		P		
Bluetooth Low Energy		P[1]		
1: Technology not subject to testing. Verdict has been determined through RF Exposure assessment (see Appendix B, 2.2 of this document for more details).				

Appendix A: Test configuration

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1. GENERAL INTRODUCTION

1.1. Application Standard

The Federal Communications Commission (FCC) sets the limits for General Population/Uncontrolled exposure to radio frequency electromagnetic fields for transmitting devices designed to be used within 20 centimetres of the body of the user under FCC 47 CFR Part 2.1093 - "Radiofrequency radiation exposure evaluation: portable devices", paragraph (d)(2).

1.2. General requirements

The SAR measurement has been performed continuing the following considerations and environment conditions:

The ambient temperature shall be in the range of 18ºC to 25ºC and the variation shall not exceed +/-2ºC during the test.

The ambient humidity shall be in the range of and 30% - 70%.

The device battery shall be fully charged before each measurement.

1.3. Measurement system requirements

The measurement system used for SAR tests fulfills the procedural and technical requirements described at the reference standards used.

1.4. Phantom requirements

The phantom model for head measurements is a simplified representation of the human anatomy and comprised of material with electrical properties similar to the corresponding tissues in human body. The human model has the following proportions:

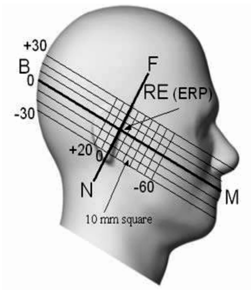


Figure 1: Proportions of Phantom

The shell model is a shaped container and it has the representation shown in the following figure:

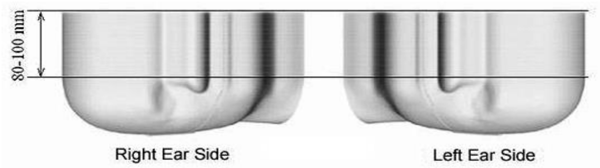


Figure 2: Proportions and shape of Phantom shell

The phantom model for body measurements is an elliptical open-top container with a flat bottom, with the following shape and dimensions:

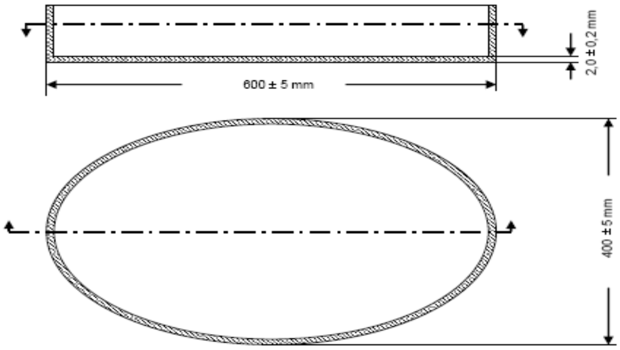


Figure 3: Proportions and shape of Phantom shell

1.5. Measurement Liquids requirements

The liquids used to simulate the human tissues, must fulfill the requirements of the dielectric properties required. These target dielectric properties are indicated into FCC OET KDB 865664 D01 Appendix A.

Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

Table 1: Liquid material requirements

To minimize the effect of reflections on peak spatial-average SAR values, from the upper surface of the tissue equivalent liquid, the depth of the liquid should be at least 15 cm.

Dielectric porperties values of the Tissue Simulant Liquids used for SAR measurements are included in Appendix B, Section 3, of this document.

2. MEASUREMENT SYSTEM

2.1. Measurement System

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

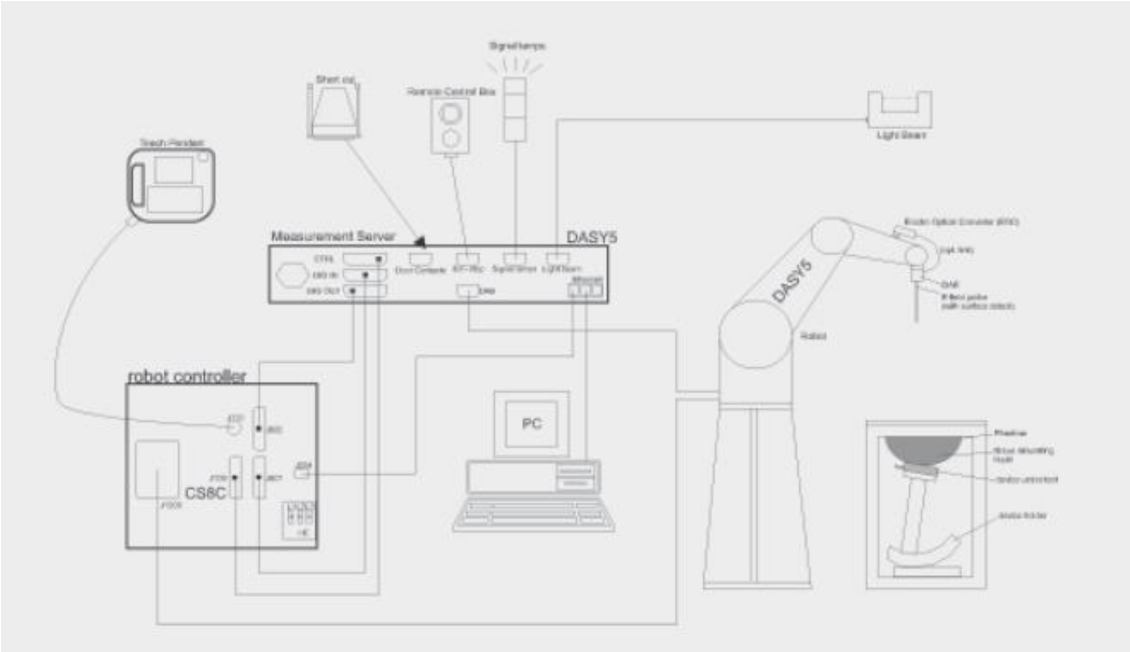


Figure 4: SAR Measurement system

- A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- 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.
- 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.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running the DASY software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

	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 TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
	Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
	Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1.0 mm

	Model	DAE4
	Construction	Signal amplifier, multiplexer, A/D converter, and control logic. Serial optical link communication with DASY4/5 embedded system (fully remote controlled). Two-step probe touch detector for mechanical surface detection and emergency robot stop.
	Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)
	Input Offset Voltage	< 5 µV (with auto zero)
	Input Resistance	200 MOhm
	Input Blas Current	< 50 fA

	Model	Twin SAM
	Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.
	Material	Vinylester, glass fiber reinforced (VE-GF)
	Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
	Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
	Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet
	Filling Volume	Approx. 25 liters
	Wooden Support	SPEAG standard phantom table

	Model	**Mounting Device for Hand-Held Transmitters**
	Construction	In combination with the Twin SAM V5.0/V5.0c or ELI Phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).
	Material	Polyoxymethylene (POM)

Model	**System Validations Kits 450 MHz – 6 GHz**	
Construction	Symmetrical dipole with l/4 balun. Enables measurement of feedpoint impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.	
Frequency	450 MHz to 5800 MHz	
Return Loss	20 dB at specified validation position	

Dimensions (length and overall height in mm)

Product	Dipole length	Overall height
D450V3	290.0	330.0
D750V3	179.0	330.0
D900V2	148.5	340.0
D1800V2	72.5	300.0
D2000V2	65.0	300.0
D2300V2	56.3	290.0
D2450V2	52.0	290.0
D2600V2	49.2	290.0
D3300V2	38.0	285.0
D3500V2	37.0	285.0
D3700V2	34.7	285.0
D3900V2	32.0	280.0
D4200V2	30.1	280.0
D4600V2	27.0	280.0
D4900V2	25.0	280.0
D5GHzV2	20.6	300.0

2.2. Device Holder

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source in 5mm distance, a positioning uncertainty of ±0.5mm would produce a SAR uncertainty of ±20%. An accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions, in which the devices must be measured, are defined by the standards.

The DASY 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 centre for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε=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.

2.3. Test Positions of device relative to body

According to the FCC KDB 447498 D01 General RF Exposure Guidance, paragraph "4.2.3.Extremity exposure conditions", a flat phantom must be used if the exposure condition is more conservative than the actual use conditions. For devices with irregular shapes or form factors that do not conform to a flat phantom, and/or unusual operating configurations and exposure conditions, a KDB inquiry is also required to determine the appropriate SAR measurements procedures.

Due to its curved back face, which introduces a separation distance between the flat phantom and the device, and based on a previous FCC Inquiry, a more conservative testing position has been search to perform testing.

Measurements have been performed into the cheek side of the head phantom. Please see "Appendix F – Photographs" for further information.

2.4. Test to be performed

Test shall be performed for each test position previously described, using the channel producing the highest rated output power.

Additionally the other applicable test frequency channels must be measured for the test configuration providing the highest SAR for each applicable transmitting band.

2.5. Description of interpolation/extrapolation scheme

The local SAR inside the Phantom is measured using small dipole sensing elements inside a probe element. The probe tip must not be in contact with the Phantoms surface in order to minimise measurement errors, but the highest local SAR is obtained from measurements at a certain distances from the shell trough extrapolation. The accurate assessment of the maximum SAR averaged over 10 gr. requires a very fine resolution in the three dimensional scanned data array. Since the measurements have to be performed over a limited time, the measured data have to be interpolated to provide an array of sufficient resolution.

The interpolation of 2D area scan is used after the initial area scan, at a fixed distance from the Phantom shell wall. The initial scan data is collected with approx. 15 mm spatial resolution and this interpolation is used to find the location of the local maximum for positioning the subsequent 3D scanning within a 1mm resolution.

For the 3D scan, data is collected on a spatially regular 3D grid having 5 mm steps in both directions. After the data collection by the SAR probe, the data are extrapolated in the depth direction to assign values to points in the 3D array closer to the shell wall. A notional extrapolation value is also assigned to the first point outside the shell wall so that subsequent interpolation schemes will be applicable right up to the shell wall boundary.

2.6. Determination of the largest peak spatial-average SAR

To determine the maximum value of the peak spatial-average SAR of a DUT, all device positions, configurations and operational modes should be tested for each frequency band.

The averaging volume shall be chosen as 1gr. of contiguous tissue. The cubic volumes, over which the SAR measurements are averaged after extrapolation and interpolation, are chosen in order to include the highest values of local SAR.

The maximum SAR level for the DUT will be the maximum level obtained of the performed measurements indicated in the previous points.

2.7. System Check

Prior to the SAR measurements, system verification is done to verify the system accuracy. As IEEE 1528-2013, Annex paragraph 8.2.1 “System Check - Purpose” specifies, a complete SAR evaluation is done using a half-wavelength dipole as source with the frequency of the mid-band channel of the operating band, or within 10% of this channel, whichever is greater.

The measured 1 gr. and 10 gr. SAR should be within 10% of the expected target values specified in the calibration certificate of the dipole, for the specific tissue and frequency used.

3. UNCERTAINTY

According to FCC OET KDB 865664 D01, if the highest measured 1-g SAR is < 1.5 W/kg, SAR measurement uncertainty analysis is not required to be included into SAR report, but it has been included for ISO 17025 accreditation.

Uncertainty for 300 MHz – 3 GHz

ERROR SOURCES (source of uncertainty)	**Uncertainty value (%)**	**Prob. Dist.**	**Div.**	***ci (1g)***	***ci (10g)***	***Standard uncertainty (1g) (%)***	***Standard uncertainty (10g) (%)***
Measurement Equipment							
Probe Calibration	13.30%	N	2	1	1	6.65%	6.65%
Probe calibration drift	1.70%	R	√3	1	1	0.98%	0.98%
Axial Isotropy	4.70%	R	√3	0.7	0.7	1.90%	1.90%
Hemisferical Isotropy	9.60%	R	√3	0.7	0.7	3.88%	3.88%
Boundary effect	1.00%	R	√3	1	1	0.58%	0.58%
Linearity	4.70%	R	√3	1	1	2.71%	2.71%
System Detection limits	0.25%	R	√3	1	1	0.14%	0.14%
Probe modulation response	4.80%	N	1	1	1	4.80%	4.80%
Readout electronics	0.30%	N	1	1	1	0.30%	0.30%
Response time	1.01%	R	√3	1	1	0.58%	0.58%
Integration time	2.60%	R	√3	1	1	1.50%	1.50%
RF Ambient noise	3.00%	R	√3	1	1	1.73%	1.73%
RF Ambient reflections	3.00%	R	√3	1	1	1.73%	1.73%
Probe positioner mech. restrictions	0.40%	R	√3	1	1	0.23%	0.23%
Probe positioning with respect to phantom shell	2.90%	R	√3	1	1	1.67%	1.67%
Max. SAR Eval.	2.00%	R	√3	1	1	1.15%	1.15%
Test Sample Related							
Device holder uncertainty	3.60%	N	1	1	1	3.60%	3.60%
Test sample positioning	2.90%	N	1	1	1	2.90%	2.90%
Drift of output power	2.50%	N	1	1	1	2.50%	2.50%
System Validation source (dipole)							
Deviation of experimental dipole from numerical dipole	0.00%	N	1	0	0	0.00%	0.00%
Input power and SAR drift measurement	2.00%	R	√3	1	1	1.15%	1.15%
Dipole axis to liquid distance	3.40%	R	√3	1	1	1.96%	1.96%
Phantom and Setup							
Phantom uncertainty (shape and thickness tolerances)	6.10%	R	√3	1	1	3.52%	3.52%
Algorithm for correcting SAR for deviations in permittivity and conductivity	1.90%	N	1	1	0.84	1.90%	1.60%
Liquid conductivity (meas.)	3.57%	N	1	0.78	0.71	2.79%	2.54%
Liquid permittivity (meas.)	3.57%	N	1	0.26	0.26	0.93%	0.93%
Liquid conductivity – temperature uncertainty	2.30%	R	√3	0.78	0.71	1.04%	0.94%
Liquid permittivity – temperature uncertainty	0.36%	R	√3	0.23	0.26	0.05%	0.05%
Combined standard uncertainty (Validation antenna)	$u_c = \sqrt{\sum_{1=1}^{m} c_i^2 \cdot u_i^2}$					9.88%	9.75%
Expanded uncertainty (confidence interval of 95%)	*ue =2.00 uc*					**19.77%**	**19.51%**
Combined standard uncertainty (DUT)	$u_c = \sqrt{\sum_{1=1}^{m} c_i^2 \cdot u_i^2}$					12.68%	12.58%
Expanded uncertainty (confidence interval of 95%)	*ue =2.00 uc*					**25.36%**	**25.16%**

Table 2: Uncertainty Assessment for 300 MHz - 3 GHz.

4. SAR LIMIT

Having a worst-case measurement, the SAR limit is valid for general population/uncontrolled exposure.

The SAR values have to be averaged over a mass of 1 gr. (SAR 1 gr.) with the shape of a cube and averaged over a mass of 10 gr (Extremity SAR 10 gr). These levels could not exceed the values indicated in the application Standard:

Standard	Exposure	SAR	SAR Limit (W/kg)
FCC 47 CFR Part 1.1310, Paragraph (c)	General population/Uncontrolled	SAR 1-g.	1.6
FCC 47 CFR Part 1.1310, Paragraph (c)	General population/Uncontrolled Extremity	SAR 10-g.	4.0

Table 3: SAR limit

5. DEVICE UNDER TEST

5.1. Dimensions

Dimensions	Millimetres
Width x Height x Depth	53.0 x 53.0 x 15.0
Overall Diagonal:	75.0

Table 4: DUT dimensions

5.2. Wireless Technology

Wireless Technology	Frequency Bands	Modes	Duty Cycle used for SAR testing
Wi-Fi	2.4 GHz	- 802.11b/g/n (20 MHz)	- 802.11b/g/n (20 MHz): 93 %
Bluetooth	2.4 GHz	- Bluetooth Low Energy	SAR Low-Power Exclusion compliant

Table 5: Supported modes

5.3. Simultaneous Transmission

The DUT does not support simultaneous transmission.

Appendix B: Test results

Index

1. TEST CONDITIONS

1.1. Power supply (V):

V_n = 5.0 V rechargeable battery

Type of power supply = DC Voltage from rechargeable 5.0 V battery.

1.2. Temperature (ºC):

Tn = +20.00 to +25.00

The subscript n indicates normal test conditions.

1.3. DUT information and test-site configurations

All supported modes were tested for body exposure (10-g extremity SAR). The device under test was placed with its back face against the head phantom surface into the right cheek zone (See position Back face, from “Appendix F – Photographs”).

1.4. Test signal, Output Power and Frequencies

For the 802.11b/g/n modes, the device was put into operation by using a proprietary test mode supplied by the manufacturer, setting the maximum output power for each mode. The duty cycle was set to maximum (aprox. 100%).

In all operating bands and test positions, the measurements were performed using the channel producing the highest rated output power.

In each band, for those positions where the maximum averaged SAR was found, measurements were performed on the other applicable test frequency channels except those with applicable test reductions.

A fully charged battery was used for every test sequence. In all operating bands and test positions, the measurements were performed on the middle channel. In each band, for those positions where the maximum averaged SAR was found, measurements were performed on the remaining required channels except those with applicable test reductions.

The actual SAR sample does not have accessible antenna connectors for conducted measurements, so the conducted average output power was measured using others identical samples (S/01) provided by the manufacturer with auxiliary external connectors that make the measurements representative and applicable for all the tested samples. See ‘usage of samples’ paragraph of this report.

The maximum conducted time-averaged power of the device for each mode was measured with a power sensor R&S NRP-Z81.

The target power alignments, including tune-up tolerance, for RF components declared by the manufacturer for each supported technology are:

Band	Output Power (dBm)	Transmission Mode			
		802.11b	802.11g	802.11n	Bluetooth LE
2.45 GHz	Maximum	7.0	7.0	7.0	0.0

2. CONDUCTED AVERAGE POWER MEASUREMENTS

2.1. WLAN

WLAN Mode	Band	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Duty Cycle (%)	Average Output Power (dBm)
802.11b	2.4 GHz	20.00	1	2412.00	1 Mbps	93.00	6.65
802.11b	2.4 GHz	20.00	6	2437.00	1 Mbps	93.00	5.51
802.11b	2.4 GHz	20.00	11	2462.00	1 Mbps	93.00	5.94
802.11g	2.4 GHz	20.00	1	2412.00	6 Mbps	93.00	6.19
802.11g	2.4 GHz	20.00	6	2437.00	6 Mbps	93.00	5.08
802.11g	2.4 GHz	20.00	11	2462.00	6 Mbps	93.00	5.47
802.11n	2.4 GHz	20.00	1	2412.00	HT0	93.00	5.96
802.11n	2.4 GHz	20.00	6	2437.00	HT0	93.00	5.01
802.11n	2.4 GHz	20.00	11	2462.00	HT0	93.00	5.38

2.2. BLUETOOTH LOW ENERGY

Based on paragraph “4.3.1 Standalone SAR test exclusion considerations” of the KDB 447498 D01 - General RF Exposure Guidance:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)]≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR

Protocol	Max. Declared Output Power		Min. Test separation distance (mm)	Frequency (GHz)	Result	Test Exclusion
	(dBm)	(mW)				
Bluetooth LE	0.0	1.0	5	2.402 - 2.480	0.315	√

The computed value for Bluetooth is < 7.5, so Bluetooth mode qualifies for Standalone SAR test exclusion for 1-g SAR and 10-g SAR.

3. TISSUE PARAMETERS MEASUREMENTS

Frequency (MHz)	Target Head Tissue		Measured Head Tissue		Deviation %		Measured Date
	Permittivity ε	Conductivity σ [S/m]	Permittivity ε	Conductivity σ [S/m]	Permittivity ε	Conductivity σ [S/m]	
2450	39.20	1.80	40.00	1.80	2.04	-0.21	2023-01-30

Note: The dielectric properties have been measured by the contact probe method at 22° C.

- <u>Composition / Information on ingredients</u>

<u>Head Tissue Simulation Liquids HBBL600-6000V6</u>

Aqueos solution with surfactants and inhibitors, exact percentage concentration of components is withheld as a trade secret by the manufacturer. Contains:

Ehtanediol	<5.2 %
Sodium petroleum sulfonate	<2.9 %
Hexylene Glycol / 2 – Methyl-pentane-2,4-diol	<2.9 %
Alkoxylated alcohol, > C_{16}	<2.0 %

4. SYSTEM CHECK MEASUREMENTS

Execution Date	Frequency (MHz)	Exposure Conditions	SAR over	Fast SAR (W/Kg)	SAR (W/Kg)	1 W Target SAR (W/Kg)	1 W Nor. SAR (W/Kg)	Drift (%)
2023-01-30	2450	Head	1-g	13.50	13.00	54.10	52.00	-3.88
2023-01-30	2450	Head	10-g	6.26	5.96	25.30	23.84	-5.77

5. MEASUREMENT RESULTS FOR SAR (SPECIFIC ABSORPTION RATE)

5.1. Summary maximum results for 10-g Extremity SAR measurements

Mode	Position/Distance	Channel (Frequency)	Reported SAR 10-g (W/kg)	Limit SAR 10-g (W/kg)
802.11b	Back face 0 mm	CH 11 (2462.0 MHz)	0.004	4.0

5.2. WLAN

Band	Expos. Cond.	Mode	BW (MHz)	Position	Dist (mm)	Ch.	Freq. (MHz)	Duty Cycle (%)	Estim. SAR 1-g (W/kg)	SAR 1-g (W/kg)	Estim. SAR 10-g (W/kg)	SAR 10-g (W/kg)	Power Drift (%)	Scale factor	Report. SAR 1-g (W/kg)	Limit SAR 1-g (W/kg)	Report. SAR 10-g (W/kg)	Limit SAR 10-g (W/kg)	Verdict	Plot No.
2.4 GHz	Extremity	802.11b	20.00	Back Face	5	1	2412.00	100.00	N/A	N/A	0.006	0.003	3.514	1.084	N/A	N/A	0.003	4.000	P	
		802.11g	20.00	Back Face	5	1	2412.00	100.00	N/A	N/A	0.004	0.001	3.276	1.205	N/A	N/A	0.002	4.000	P	
		802.11n	20.00	Back Face	5	1	2412.00	100.00	N/A	N/A	0.005	0.001	0.462	1.271	N/A	N/A	0.001	4.000	P	
		802.11b	20.00	Back Face	5	6	2437.00	100.00	N/A	N/A	0.005	0.002	-2.725	1.409	N/A	N/A	0.002	4.000	P	
		802.11b	20.00	Back Face	5	11	2462.00	100.00	N/A	N/A	0.008	0.003	1.625	1.276	N/A	N/A	0.004	4.000	P	1

N/A: Not Applicable

Appendix C: Measurement report

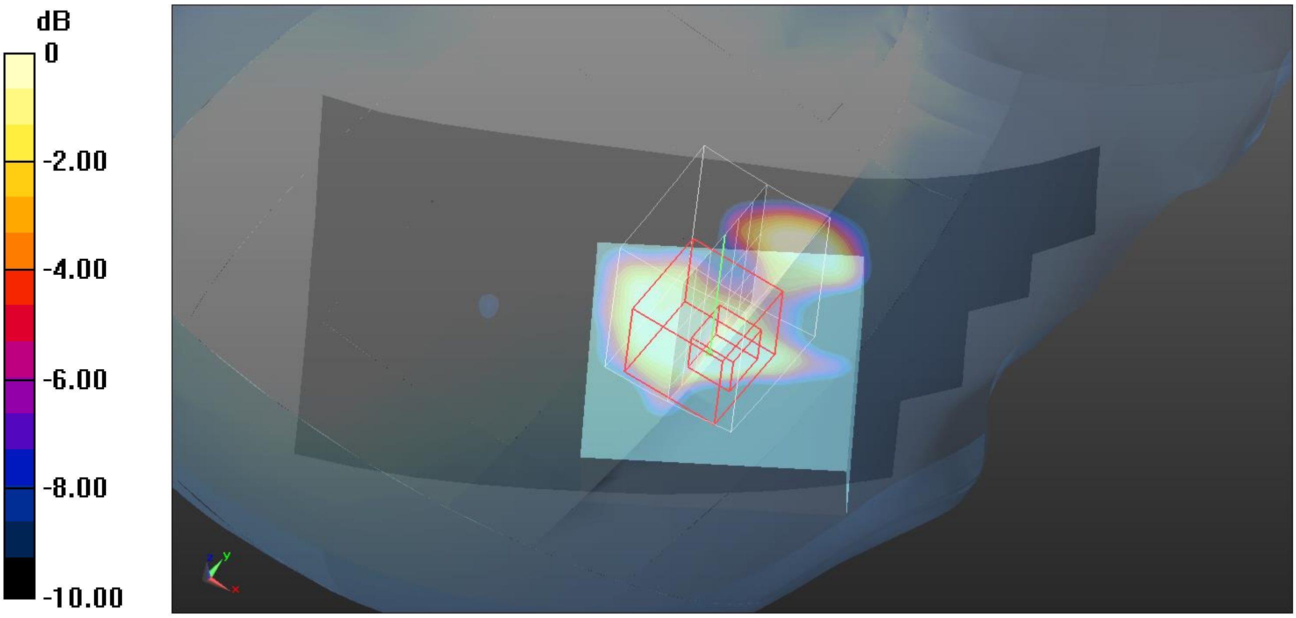
Plot Nº1

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 01/02/2023
DUT: SUUNTO OW222; Type: Sports watch; Serial: 022511300144
Communication System: UID 10415 - AAA, IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle);
Frequency: 2462 MHz; Duty Cycle: 1:1.4243
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.802 S/m; ε_r = 40.008; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY5 Configuration:
- Probe: EX3DV4 - SN7766; ConvF(7.64, 7.64, 7.64) @ 2462 MHz; Calibrated: 18/10/2022
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1690; Calibrated: 13/10/2022
- Phantom: SAM head-body simulator ; Type: Twin SAM V4.0; Serial: ---
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Right Hand Side_30-01-2023/802.11b, CH11, Back face/Area Scan (71x131x1):
Interpolated grid: dx=1.200 mm, dy=1.200 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0342 W/kg

Right Hand Side_30-01-2023/802.11b, CH11, Back face/Zoom Scan (7x7x5)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.012 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.0360 W/kg
SAR(1 g) = 0.011 W/kg; SAR(10 g) = 0.00292 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 15 mm)
Ratio of SAR at M2 to SAR at M1 = 55.8%
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0185 W/kg



0 dB = 0.0185 W/kg = -17.33 dBW/kg

Appendix D: System Validation Report

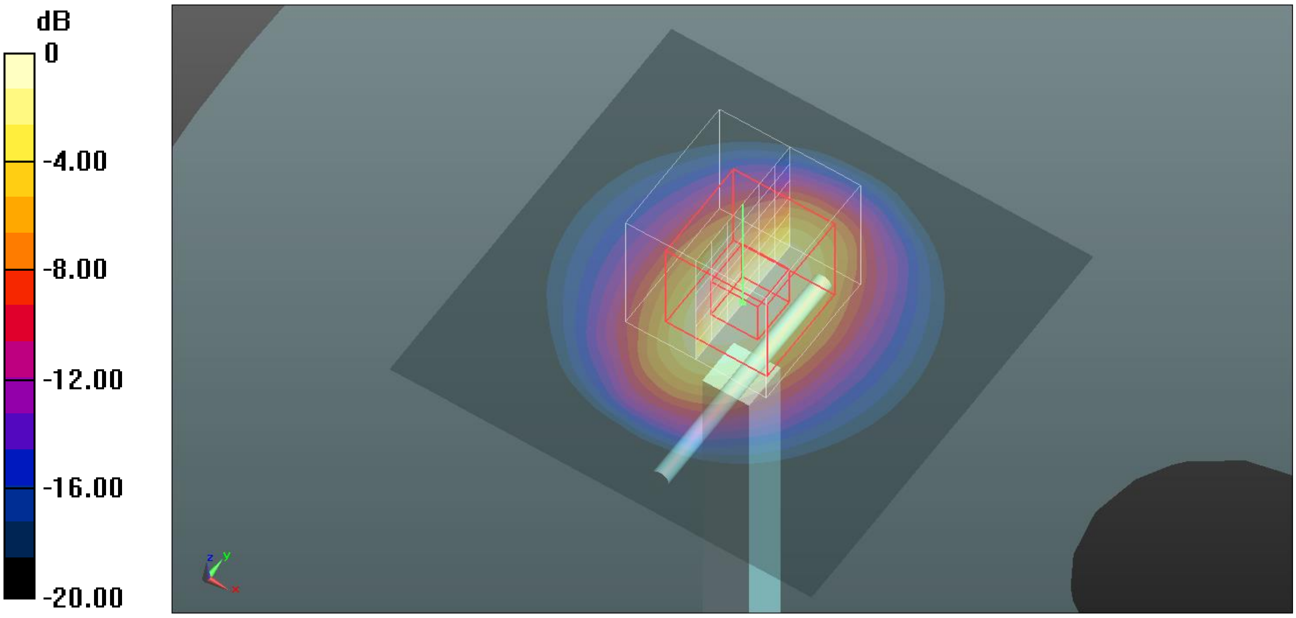
Validation results in 2450 MHz Band for Head TSL

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 30/01/2023
DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:756
Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.8 S/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
- Probe: EX3DV4 - SN7766; ConvF(7.64, 7.64, 7.64) @ 2450 MHz; Calibrated: 18/10/2022
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1690; Calibrated: 13/10/2022
- Phantom: SAM head-body simulator ; Type: Twin SAM V4.0; Serial: ---
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Configuration 2450MHz, 2022-01-30/d=10mm, Pin=250 mW/Area Scan (91x91x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 19.9 W/kg

Configuration 2450MHz, 2022-01-30/d=10mm, Pin=250 mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.6 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 5.96 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 47.7%
Maximum value of SAR (measured) = 20.1 W/kg



0 dB = 20.1 W/kg = 13.03 dBW/kg