

SAR Compliance Test Report

Date of Report:	16/02/2026	Client's Contact person:	Jonas Bergman
Number of pages:	32	Responsible Test engineer:	Ilari Kinnunen
Testing laboratory:	Verkotan Oy Elektroniikkatie 17 90590 Oulu Finland	Client:	Saab AB Stensholmsvägen 20 561 39 Huskvarna Sweden
Tested device:	PCU 2		
Related reports:	-		
Testing has been carried out in accordance with:	47CFR §2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices FCC published RF exposure KDB procedures 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04 447498 D04 Interim General RF Exposure Guidance v01 248227 D01 802.11 Wi-Fi SAR v02r02 IEC/IEEE 62209-1528, 2020 Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices RSS-102, Issue 6, 2023 Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory		
Test Results:	The EUT complies with the requirements in respect of all parameters subject to the test. The test results relate only to devices specified in this document		

Date and signatures:

16.02.2026

Miia Nurkkala

Laboratory Manager

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Device under Test (DUT):

Product:	Personnel Computer Unit
Manufacturer:	Saab AB
Model:	PCU 2
Serial Number:	025751
FCC ID Number:	R4A-PDDPCU2A Contains FCC: XF6-M7DB6
ISED ID Number:	4660D-PDDPCU2A Contains IC: 8407A-M7DB6
Hardware Version:	2689
DUT Number:	03862
Battery Type used in testing:	N/A*
State of the Sample:	Production sample

*Power supply was used during the testing; WLAN continuous TX mode was not possible to use when operating via battery. Power supply was configured to 3.8V.

Testing information:

Testing performed:	18.08.2025
Notes:	-
Document history & changes:	This report replaces FCC ISED_SAR report_PCU_ID7688_13102025. Model changed, FCC and ISED ID changed, hardware version added, simultaneous transmission removed, photos added to separate document.
Document ID:	FCC ISED_SAR report_PCU 2_ID7688_16022026.docx
Temperature °C	22±2 / Controlled
Humidity RH%	30±20 / Controlled
Measurement performed by:	Ilari Kinnunen
FCC Test Firm Designation Number:	FI0005
ISED Company Number:	22218

1.2 Maximum Results

The maximum reported* SAR values for body-worn exposure configuration for transmitting systems are shown in a table below. The device conforms to the requirements of the standards when the maximum reported SAR value is less than or equal to the limit. The SAR limit specified in FCC 47 CFR part 2 (2.1093) and Health Canada's RF exposure guideline, Safety Code 6 for Head/Body SAR_{1g} is 1.6 W/kg.

1.2.1 Standalone SAR

System	Highest Reported* SAR _{1g} [W/kg] in Body-Worn Exposure Condition, 5mm separation distance	Result
2.4 GHz WLAN	0.002	PASS

* Reported SAR Values are scaled to upper limit of power tuning tolerance.

1.2.2 Maximum Drift

Maximum Drift During Measurements	0.48 dB*
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*Larger than 5% drifts included to scaling factors

1.2.3 Measurement Uncertainty

DASY5 System, SAR 1g: 300 MHz – 3 GHz:

Expanded Uncertainty (k=2) 95 %	±22.6 %
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2. DESCRIPTION OF THE DEVICE UNDER TEST (DUT)

The DUT is a Personnel Computer Unit (PCC) that is a part of Personnel Detection Device (PDD) product. The PDD is a target system that detects hits from laser simulated projectiles and in turn simulates the casualty, informs the trainees of results and field effects, log all training events with result, time and position. The DUT supports WLAN 2.4 GHz, Bluetooth Low Energy and proprietary mPM1 wireless technologies. Simultaneous transmission is not supported.

Bluetooth Low Energy antenna gain is 0.712dBi and it is available in the document: RS9116 CC1 Connectivity Module Datasheet v1.0.13

mPM1 antenna gain is -6dBi and it is available in the document: 2200084228 rev A

Device Category	Portable
Exposure Environment	General population uncontrolled

2.1 Supported Frequency Bands and Operational Modes

TX Frequency bands	Modes of Operation	Transmitter Frequency Range [MHz]
	2.4 GHz WLAN	2412 – 2462
	Bluetooth Low Energy	2402 – 2480
	mPM1	916

2.2 Test Exemptions

2.2.1 FCC

300 MHz – 6 GHz, SAR-Based Exemption:

FCC SAR test exemption power threshold is calculated according to 447498 D04 Interim General RF Exposure Guidance, equation B.2 and B.1:

$$P_{th} (mW) = \begin{cases} ERP_{20\text{ cm}} (d / 20\text{ cm})^x & d \leq 20\text{ cm} \\ ERP_{20\text{ cm}} & 20\text{ cm} < d \leq 40\text{ cm} \end{cases} \quad (\text{Equation 1})$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20\text{ cm}} \sqrt{f}} \right) \quad (\text{Equation 2})$$

and frequency f is in GHz, d is the separation distance (cm), and $ERP_{20\text{ cm}}$ is per Equation (B.1) below.

$$ERP_{20\text{ cm}} (mW) = \begin{cases} 2040f & 0.3 \leq f < 1.5\text{ GHz} \\ 3060 & 1.5\text{ GHz} \leq f \leq 6\text{ GHz} \end{cases} \quad (\text{Equation 3})$$

Transmission mode	Frequency [GHz]	Separation distance [cm]	P_{th} [mW]
Bluetooth Low Energy	2.48	0.5	2.7
mPM1	0.916	0.5	8.1

2.2.1.1 SAR-Based Test Exclusion, Maximum Defined Output Power and ERP

According to Appendix B at 447498 D04 Interim General RF Exposure Guidance, the equation (B.2.) defines the thresholds for available maximum time-averaged power or maximum time-averaged ERP, whichever is greater. Since the maximum output power is greater than the ERP for both Bluetooth Low Energy and mPM1, it is used for SAR test exclusion.

Transmission mode	Output power [dBm]	Output power [mW]	Power Gain of Antenna, G [dBi]	ERP Output power [dBm]	ERP Output power [mW]	P _{th} [mW]
Bluetooth Low Energy	0	1	0.712	-1.44	0.7	2.7
mPM1	-5	0.3	-6	-13.15	0.05	8.1

The maximum output power of Bluetooth Low Energy and mPM1 are below the SAR test exemption threshold.

2.2.2 ISED

SAR Text Exemptions

SAR test exemption output power limits based on frequency and separation distance are from RSS-102, Issue 6, 2023:

Table 11: Power limits for exemption from routine SAR evaluation based on the separation distance

Frequency (MHz)	≤ 5 mm (mW)	10 mm (mW)	15 mm (mW)	20 mm (mW)	25 mm (mW)	30 mm (mW)	35 mm (mW)	40 mm (mW)	45 mm (mW)	> 50 mm (mW)
≤ 300	45	116	139	163	189	216	246	280	319	362
450	32	71	87	104	124	147	175	208	248	296
835	21	32	41	54	72	96	129	172	228	298
1900	6	10	18	33	57	92	138	194	257	323
2450	3	7	16	32	56	89	128	170	209	245
3500	2	6	15	29	50	72	94	114	134	158
5800	1	5	13	23	32	41	54	74	102	128

Transmission mode	Frequency [MHz]	Minimum separation distance [mm]	Maximum Output Power [dBm]	Maximum Output Power [mW]	Power Gain of Antenna, G [dBi]	EIRP [dBm]	EIRP [mW]	Exemption Limit [mW]
Bluetooth Low Energy	2480	5	0	1	0.712	0.71	1.2	3.0
mPM1	916	5	-5	0.3	-6	-11	0.08	19.9

The maximum EIRP and output power of Bluetooth Low Energy and mPM1 are below the test exemption threshold.

3. OUTPUT POWER

3.1 Maximum specified conducted output power

From the customer, including tune-up tolerances;

2.4GHz WLAN	Max Output Power [dBm]
802.11b	11
802.11g	11
802.11n	11

3.2 Tested conducted power

Measured conducted output power at transmitting antenna connector;

2.4 GHz WLAN:

Standard	Bandwidth [MHz]	Transmission mode	Data rate [Mbps]	Output power [dBm]		
				CH 1 2412 MHz	CH 6 2437 MHz	CH 11 2462 MHz
802.11b	20	DSSS	1	13.62*	13.29*	11.88*

The measured conducted power exceeds the maximum specified power due to use of TX control test software, thus SAR results are overestimations.

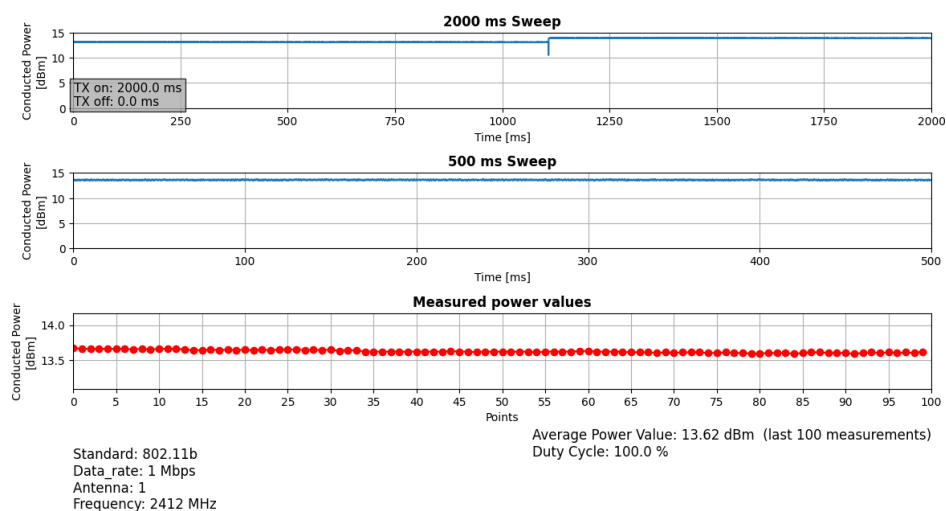


Figure 1 Duty cycle of the DUT.

4. TEST EQUIPMENT

Dasy near field scanning system, manufactured by SPEAG was used for SAR testing. The test system consists of high precision robotics system (Staubli), robot controller, computer, near-field probe, probe alignment sensor, and a phantom containing the tissue equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location of maximum electromagnetic field.

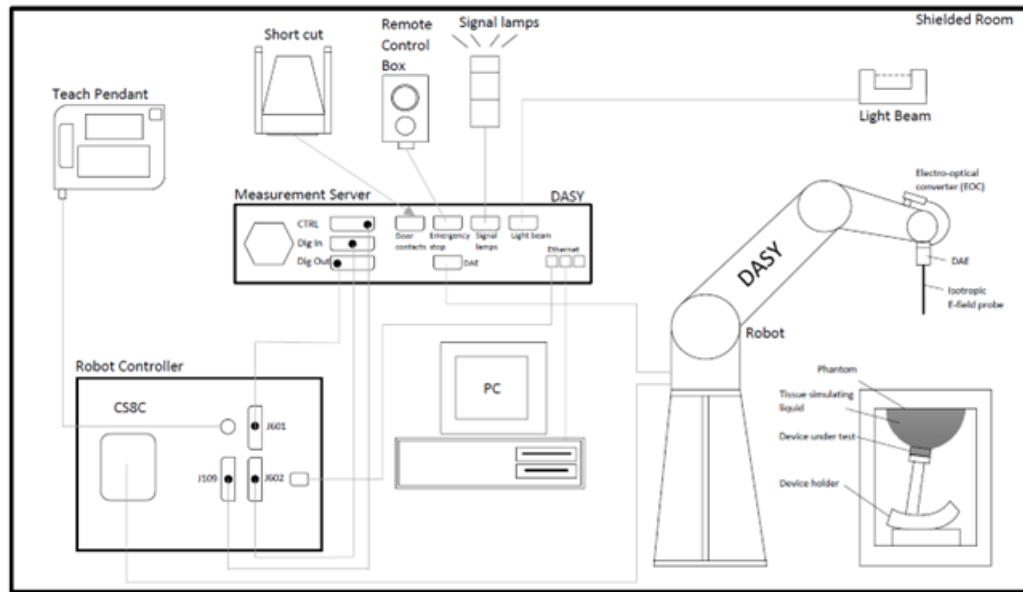


Figure 2 Schematic Laboratory Picture

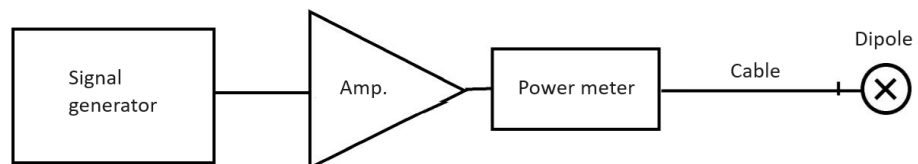


Figure 3. Signal source setup for system check

4.1 Test Equipment List

Test Equipment	Model	Serial Number	Calibration Date	Interval [years]
Amplifier, 800MHz-4200MHz, 10W	10S1G4A	320421	NA	NA
DAE4, converter	DAE4	1332	02/2025	1
DASY5 Software	52.8.8.1258	-	NA	NA
Inline Peak Power Sensor	MA24105A	2102058	11/2024	1
Isotropic DOS probe	EX3DV4	7447	02/2025	1
Network Analyzer	E5071C	MY46102812	05/2025	1
Power Sensor	NRP8S	1419.0006K02-108508-HC	09/2023	2
Signal Analyzer	MS2830A	6201180758	NA	NA
System validation dipole	D2450V2	729	05/2025	3
Vector Signal Generator	MG3710E	6262028675	NA	NA

Main used test system components are listed above. For full equipment list and calibration intervals, please contact the testing laboratory.

4.1.1 Isotropic E-field Probe Type EX3DV4

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Calibration certificate in Appendix D
Frequency	4 MHz to 10 GHz (dosimetry) Linearity: ± 0.2 dB (30 MHz to 10 GHz)
Directivity (typical)	± 0.1 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 μ W/g – >100 mW/g Linearity: ± 0.2 dB (noise: typically <1 μ W/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 mm
Application	General dosimetry up to 6 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

4.2 Phantoms

Modular flat phantom:

The Triple Modular Phantom consists of three identical modules that can be installed and removed separately without emptying the liquid. It is used for compliance testing of small wireless devices in body-worn configurations. The phantom conforms to the requirements of IEC/IEEE 62209-1528 and FCC published RF Exposure KDB Procedures. The shell thickness of the bottom plate is 2 ± 0.2 mm. The dimensions are 308x192x182 mm and filling volume is 9.2 liters giving a filling height of 155 mm.

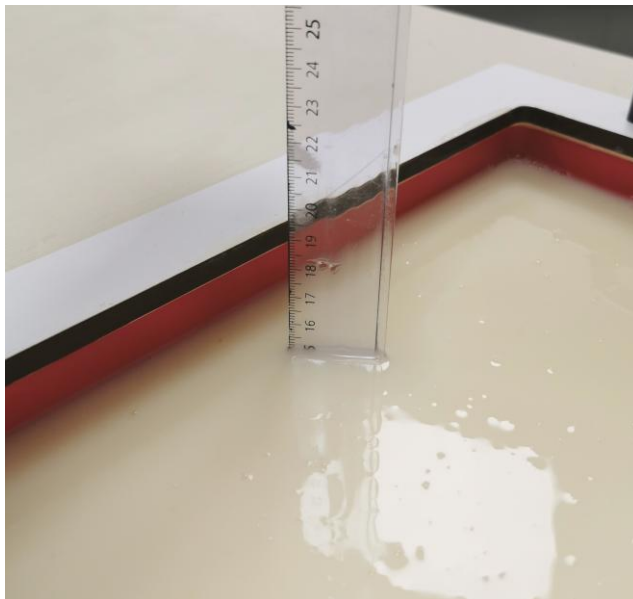


Figure 4 Tissue simulant depth

4.3 Tissue Simulants

Recommended values for the dielectric parameters of the tissue simulants are given in IEC/IEEE 62209-1528 and FCC published RF Exposure KDB Procedures. The dielectric parameters of the used tissue simulants were within $\pm 10\%$ of the recommended values at frequencies under 3 GHz and $\pm 5\%$ at frequencies above 3 GHz. A liquid compensation algorithm was used in DASY with which measured peak average SAR values were corrected for the deviation of used liquid. Depth of the tissue simulant was at least 15.0 cm from the inner surface of the flat phantom.

Tissue simulant liquid Ingredients
Deionized Water, tween, salt

4.4 System Validation Status

Frequency [MHz]	Dipole Type / SN	Probe Type / SN	Calibrated Signal Type	DAE Unit / SN	Dielectric Constant [ϵ']	Conductivity σ [S/m]	Date
2450	D2450V2-758	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	37.65	1.8	03/2025

4.5 System Check

Date	Tissue Type	Tissue Temp. [°C]	Frequency [MHz]	Input Power [mW]	Measured SAR _{1g} [W/kg]	1 W Target SAR _{1g} [W/kg]	1 W Normalized SAR _{1g} [W/kg]	Deviation [%]	Plot #
18.08.2025	WB Head	22	2450	250	12.3	52.08	49.2	-5.5	1

4.6 Tissue Simulant Verification

Date	Tissue Type	Tissue Temp [°C]	Frequency [MHz]	Measured		Target		Deviation	
				Dielectric Constant [ϵ]	Conductivity σ [S/m]	Dielectric Constant [ϵ]	Conductivity σ [S/m]	ϵ [%]	σ [%]
18.08.2025	WB Head	22	2450	39.2	1.80	39.2	1.73	0.1	-3.9
18.08.2025	WB Head	22	2412	39.3	1.77	39.3	1.70	0.0	-3.5
18.08.2025	WB Head	22	2437	39.2	1.79	39.2	1.72	0.0	-3.8
18.08.2025	WB Head	22	2462	39.2	1.81	39.2	1.74	0.0	-4.2

5. TEST PROCEDURE

Test configurations for SAR testing were selected based on conducted power measurements. Low, mid and high frequency channels for the configuration with the highest SAR value were tested as per ISED notice 2016-DRS001.

A control software for WLAN was used to set the DUT to transmit at maximum power. The WLAN transmission modes for testing were selected according to largest channel bandwidth configuration, lowest order modulation and lowest data rate. 2.4GHz WLAN was tested with 802.11b standard with data rate of 1Mbit/s.

Power supply was used during the testing; WLAN continuous TX mode was not possible to use when operating via battery. Power supply was configured to 3.8V.

5.1 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the Dasy system.



Device holder supplied by SPEAG

5.2 Test Positions

5.2.1 Body-worn Configuration, 5mm separation distance

Body SAR was tested from the front, back, left, right, top and bottom side of the device. The device was placed in the SPEAG holder on the top of a Rohacell and lifted towards the phantom until the distance between the phantom and the device was 5mm, except back side where measurements were done at 0mm separation distance due to cable tray providing additional separation to the DUT. The distance between the device and the phantom was kept at 5mm using a separate flat spacer that was removed before the start of the measurements.

Photos of the test positions are presented in appendix A

5.3 Scan Procedures

First, area scans were used for determination of the field distribution. Next, a zoom scan was performed around the highest E-field value to determine the averaged SAR value. Drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan.

5.4 SAR Averaging Methods

The maximum SAR value was averaged over a cube of tissue using interpolation and extrapolation.

The interpolation, extrapolation and maximum search routines within Dasy are all based on the modified Quadratic Shepard's method (Robert J. Renka, "Multivariate Interpolation of Large Sets of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148). The interpolation scheme combines a least-square fitted function method with a weighted average method. A trivariate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighboring points by a least-square method. For the zoom scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics.

In the zoom scan, the interpolation function is used to extrapolate the Peak SAR from the deepest measurement points to the inner surface of the phantom.

6. MEASUREMENT UNCERTAINTY

Uncertainty Budget According to IEC/IEEE 62209-1528 (Frequency band: 300MHz–3GHz range)								
Symbol	Error Description	Uncert. value	Prob. Dist.	Div.	(c _i) (1g)	(c _i) (10g)	Std. Unc. (1g)	Std. Unc. (10g)
Measurement System Errors								
CF	Probe Calibration	±13.3%	N	√2	1	1	±6.7%	±6.7%
CF _{drift}	Probe Calibration Drift	±1.7%	R	√3	1	1	±1.0%	±1.0%
LIN	Probe Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%
BBS	Broadband Signal	±2.8%	R	√3	1	1	±1.6%	±1.6%
ISO	Probe Isotropy	±7.6%	R	3	1	1	±4.4%	±4.4%
DAE	Other Probe+Electronic	±0.8%	N	1	1	1	±0.8%	±0.8%
AMB	RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Δ _{sys}	Probe Positioning	±0.006mm	N	1	0.14	0.14	±0.10%	±0.10%
DAT	Data Processing	±1.2%	N	1	1	1	±1.2%	±1.2%
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.) ^{DAK}	±2.5%	N	√1	0.78	0.71	±2.0%	±1.8%
LIQ(T _σ)	Conductivity (temp.) ^{BB}	±3.3%	R	√3	0.78	0.71	±1.5%	±1.4%
EPS	Phantom Permittivity	±14.0%	R	3	0	0	±0%	±0%
DIS	Distance DUT – TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
D _{xyz}	Device Positioning	±1.0%	N	1	1	1	±1.0%	±1.0%
H	Device Holder	±3.6%	N	√1	1	1	±3.6%	±3.6%
MOD	DUT Modulation ^m	±2.4%	R	√3	1	1	±1.4%	±1.4%
TAS	Time-average SAR	±1.7%	R	3	1	1	±1.0%	±1.0%
RF _{drift}	DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
VAL	Val Antenna Unc. ^{val}	±0.0%	N	1	1	1	±0.0%	±0.0%
RF _{in}	Unc. Input Power ^{val}	±0.0%	N	1	1	1	±0.0%	±0.0%
Correction to the SAR results								
C(ε, σ)	Deviation to Target	±1.9%	N	√1	1	0.84	±1.9%	±1.6%
C(R)	SAR scaling ^p	±0.0%	R	3	1	1	±0.0%	±0.0%
u(ΔSAR)	Combined Uncertainty						±11.3%	±11.2%
U	Expanded Uncertainty						±22.6%	±22.5%

7. TEST RESULTS

7.1 SAR Results for Body Exposure Condition with 5mm separation

2.4GHz WLAN:

Mode	Data Rate [Mbps]	Bandwidth [MHz]	Channel	Frequency [MHz]	Maximum Power [dBm]	Conducted Power [dBm]	Test Position	Measured SAR _{1g} [W/kg]	Power Drift [dB]	Duty Cycle	Scaling Factor	Reported SAR _{1g} [W/kg]	Plot #
802.11b	1	20	1	2412	11	13.62	Front	0.00103	N/A*	1:1	1.00	0.001	
802.11b	1	20	1	2412	11	13.62	Back	0.00137	N/A*	1:1	1.00	0.001	
802.11b	1	20	1	2412	11	13.62	Left	0.0013	N/A*	1:1	1.00	0.001	
802.11b	1	20	1	2412	11	13.62	Right	0.00123	N/A*	1:1	1.00	0.001	
802.11b	1	20	1	2412	11	13.62	Top	0.00186	N/A*	1:1	1.00	0.002	
802.11b	1	20	1	2412	11	13.62	Bottom	0.00172	N/A*	1:1	1.00	0.002	
802.11b	1	20	6	2437	11	13.29	Top	0.0017	0.48	1:1	1.12	0.002	2
802.11b	1	20	11	2462	11	11.88	Top	0.00174	N/A*	1:1	1.00	0.002	

*Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable

** The measured conducted power exceeds the maximum specified power due to use of TX control test software, thus SAR results are overestimations

7.1 IEC/IEEE 62209-1528:2020, Zoom Scan Evaluation

According to IEC/IEEE 62209-1528:2020, subclause 7.4.2 d.4), the zoom scan complies if the peak spatial-average SAR is below 0.1 W/kg, or if the following criteria is met:

1. The smallest horizontal distance from the local SAR peaks to all points 3 dB below the SAR peak is larger than the horizontal grid step.
2. Ratio of SAR at the second measured point (M2) to the SAR at the closest measured point (M1) at the x-y location of the measured maximum is at least 30%.

Zoom scan compliance according to IEC/IEEE 62209-1528:2020 is automatically verified by DASY software and all zoom scans in this test report do pass the criteria. The horizontal distance and Ratio between measurement points M2 and M1 of the highest SAR results are available in Appendix C.

APPENDIX A: PHOTOS OF THE DUT

Photos are available in separate document "FCC ISED_APPENDIX A_PCU2_ID7688_10022026.pdf"

APPENDIX B: SYSTEM CHECK SCAN

Plot 1

Date/Time: 18/08/2025 07:16:55

Test Laboratory: Verkotan Oy

DUT: Dipole 2450 MHz D2450V2

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;
Communication System PAR: 0 dB;
Medium parameters used (interpolated): $f = 2450$ MHz; $\sigma = 1.73$ S/m; $\epsilon_r = 39.222$; $\rho = 1000$ kg/m³
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.56, 7.28, 7.65) @ 2450 MHz; Calibrated: 07/02/2025
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -4.0, 31.0$
 - Electronics: DAE4 Sn1332; Calibrated: 05/02/2025
 - Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx;
 - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

System check 2450MHz/Area Scan (71x61x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 19.9 W/kg

System check 2450MHz/Zoom Scan (8x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 108.6 V/m; Power Drift = -0.01 dB

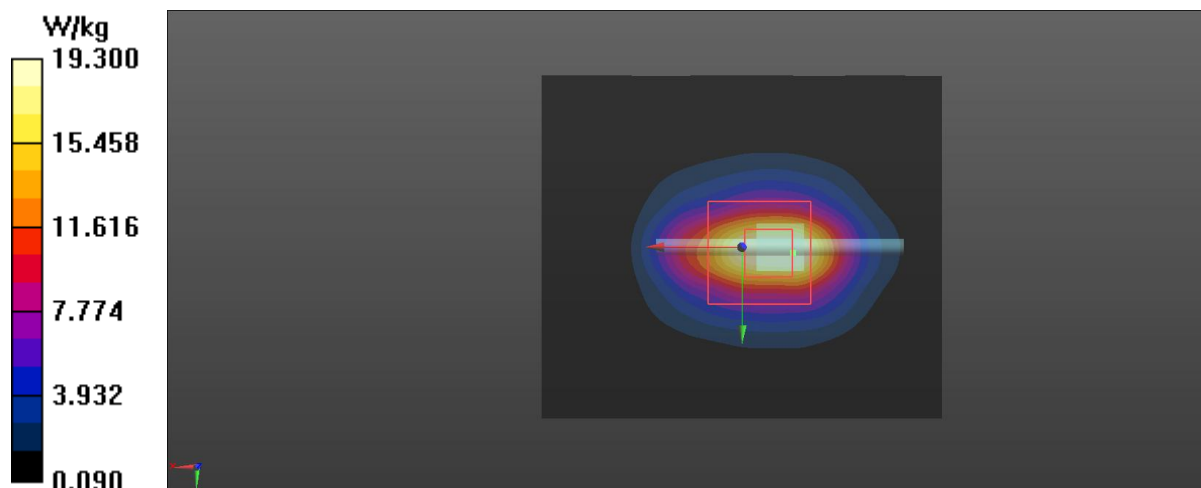
Peak SAR (extrapolated) = 23.0 W/kg

SAR(1 g) = 12.3 W/kg; SAR(10 g) = 5.82 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 = 52.7%

Maximum value of SAR (measured) = 19.3 W/kg



APPENDIX C: MEASUREMENT SCANS

Plot 2

Date/Time: 18/08/2025 13:35:44

Test Laboratory: Verkotan Oy

DUT: PCU 2

Communication System: UID 0, WLAN 2.4 (0); Communication System Band: WLAN2.4GHz; Frequency: 2437 MHz;
Communication System PAR: 0 dB;
Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.721$ S/m; $\epsilon_r = 39.233$; $\rho = 1000$ kg/m³
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.56, 7.28, 7.65) @ 2437 MHz; Calibrated: 07/02/2025
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -4.0, 31.0$
 - Electronics: DAE4 Sn1332; Calibrated: 05/02/2025
 - Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx;
 - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

PCU 2 WLAN 2.4 GHz, 802.11b, 1 Mbps, CH 6, Top 5mm/Area Scan (71x91x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 0.00476 W/kg

PCU 2 WLAN 2.4 GHz, 802.11b, 1 Mbps, CH 6, Top 5mm/Zoom Scan (9x8x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 0.6110 V/m; Power Drift = 0.48 dB

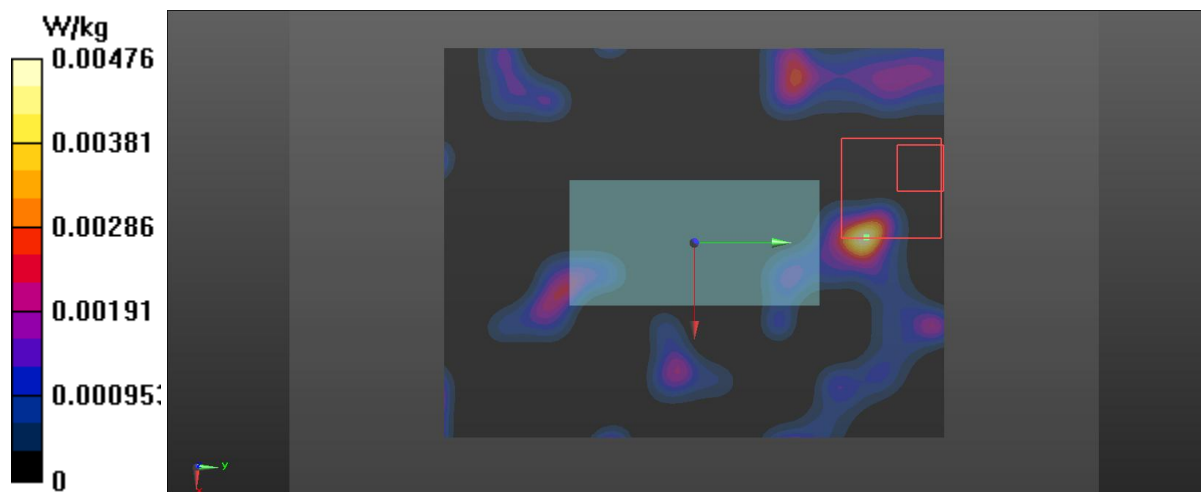
Peak SAR (extrapolated) = 0.00435 W/kg

SAR(1 g) = 0.0017 W/kg; SAR(10 g) = 0.000875 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 52.2%

Maximum value of SAR (measured) = 0.00304 W/kg



APPENDIX D: RELEVANT PAGES FROM PROBE & DAE CALIBRATION REPORTS

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



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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S Swiss Calibration Service

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

Accreditation No.: **SCS 0108**

Client **Verkotan**
Oulu, Finland

Certificate No. **EX-7447_Feb25**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:7447**

Calibration procedure(s) **QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6,
QA CAL-25.v8
Calibration procedure for dosimetric E-field probes**

Calibration date **February 07, 2025**

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	Calibration Date (Certificate No.)	Sched. Cal.
Power Sensor R&S NRP-33T	SN: 100967	28-Mar-24 (No. 217-04038)	Mar-25
Short [S6019] + Attenuator [S6020]	SN: L1119	26-Mar-24 (No. 217-04048)	Mar-25
OCP DAK-12	SN: 1016	24-Sept-24 (No. OCP-DAK12-1016_Sep24)	Sep-25
OCP DAK-3.5	SN: 1249	23-Sept-24 (No. OCP-DAK3.5-1249_Sep24)	Sep-25
Reference Probe EX3DV4	SN: 7349	10-Jan-25 (No. EX3-7349_Jan25)	Jan-26
DAE4	SN: 1301	07-Nov-24 (No. DAE4-1301_Nov24)	Nov-25

Secondary Standards	ID	Check Date (in house)	Sched. Check
ACAP 2020 Calibration Box	SN: L1404	30-Sept-24 (No. Report ACAP2020E-Cave_20240930s)	Sep-25

	Name	Function	Signature
Calibrated by	Paulo Pina	Laboratory Technician	
Approved by	Sven Köhn	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

Issued: February 07, 2025.

Certificate No: EX-7447_Feb25

Page 1 of 9

EX3DV4 - SN:7447

February 07, 2025

Parameters of Probe: EX3DV4 - SN:7447

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k = 2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.42	0.43	0.43	$\pm 10.1\%$
DCP (mV) ^B	95.9	91.9	99.5	$\pm 4.7\%$

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Max Unc ^E k = 2
0	CW	X	0.00	0.00	1.00	0.00	138.6	$\pm 1.7\%$	$\pm 4.7\%$
		Y	0.00	0.00	1.00		141.7		
		Z	0.00	0.00	1.00		135.0		

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

^A The uncertainties of Norm X,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Page 5).

^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.

EX3DV4 - SN:7447

February 07, 2025

Parameters of Probe: EX3DV4 - SN:7447

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	38.6°
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.

EX3DV4 - SN:7447

February 07, 2025

Parameters of Probe: EX3DV4 - SN:7447

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	38.6°
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
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Note: Measurement distance from surface can be increased to 3–4 mm for an Area Scan job.

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



S Schweizerischer Kalibrierdienst
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S Swiss Calibration Service

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

Accreditation No.: **SCS 0108**

Client Verkotan
Oulu - Finland

Certificate No: **DAE4-1332_Feb25**

CALIBRATION CERTIFICATE

Object DAE4 - SD 000 D04 BM - SN: 1332

Calibration procedure(s) QA CAL-06.v30
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: February 05, 2025

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	27-Aug-24 (No:40547)	Aug-25
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Auto DAE Calibration Unit	SE UWS 053 AA 1001	23-Jan-25 (in house check)	In house check: Jan-26
Calibrator Box V2.1	SE UMS 006 AA 1002	23-Jan-25 (in house check)	In house check: Jan-26

Calibrated by:	Name Dominique Steffen	Function Laboratory Technician	Signature
Approved by:	Name Sven Kühn	Function Technical Manager	Signature

Issued: February 5, 2025

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Certificate No: DAE4-1332_Feb25

Page 1 of 5

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 μ V, full range = -100...+300 mV

Low Range: 1LSB = 61 nV, full range = -1+3 mV

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

Calibration Factors	X	Y	Z
High Range	404.388 $\pm$ 0.02% (k=2)	403.789 $\pm$ 0.02% (k=2)	403.986 $\pm$ 0.02% (k=2)
Low Range	4.00058 $\pm$ 1.50% (k=2)	3.97378 $\pm$ 1.50% (k=2)	3.96150 $\pm$ 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	64.5 $^{\circ}$ $\pm$ 1 $^{\circ}$
---	------------------------------------

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200034.87	1.05	0.00
Channel X	+ Input	20003.48	-0.15	-0.00
Channel X	- Input	-20007.26	1.80	-0.01
Channel Y	+ Input	200036.46	2.50	0.00
Channel Y	+ Input	20003.72	-0.02	-0.00
Channel Y	- Input	-20012.41	-3.41	0.02
Channel Z	+ Input	200037.10	3.38	0.00
Channel Z	+ Input	20003.35	-0.39	-0.00
Channel Z	- Input	-20011.39	-2.23	0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	1999.21	0.33	0.02
Channel X	+ Input	198.42	-0.23	-0.12
Channel X	- Input	-201.16	-0.21	0.11
Channel Y	+ Input	1998.86	0.11	0.01
Channel Y	+ Input	197.94	-0.63	-0.32
Channel Y	- Input	-202.39	-1.25	0.62
Channel Z	+ Input	1998.61	-0.05	-0.00
Channel Z	+ Input	197.95	-0.70	-0.35
Channel Z	- Input	-202.11	-0.89	0.44

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-16.43	-18.36
	- 200	19.28	17.84
Channel Y	200	-22.58	-22.93
	- 200	21.27	21.07
Channel Z	200	-9.80	-9.99
	- 200	9.39	9.03

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	-0.80	-3.50
Channel Y	200	6.54	-	1.86
Channel Z	200	9.07	3.62	-

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	15927	15639
Channel Y	16077	15695
Channel Z	16001	15779

5. Input Offset Measurement

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

	Average (μ V)	min. Offset (μ V)	max. Offset (μ V)	Std. Deviation (μ V)
Channel X	0.70	-0.33	1.44	0.32
Channel Y	-0.39	-1.47	0.48	0.37
Channel Z	-0.10	-1.21	1.34	0.44

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

	Zeroing (k Ω m)	Measuring (M Ω m)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

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

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

9. Power Consumption (Typical values for information)

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

APPENDIX E: RELEVANT PAGES FROM DIPOLE CALIBRATION REPORTS

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SAR Reference Dipole Calibration Report

Ref : ACR.139.5.25.BES.A

VERKOTAN LTD.
ELEKTRONIIKKATIE 17
90590, OULU, FINLAND
SAR REFERENCE DIPOLE
FREQUENCY: 2450 MHZ
SERIAL NO.: D2450V2-729

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 05/16/25



Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

Page: 1/8

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.139.5.25.BES.A

	Name	Function	Date	Signature
Prepared by :	Pedro Ruiz	Technical Manager	5/19/2025	
Checked & approved by:	Pedro Ruiz	Technical Manager	5/19/2025	
Authorized by:	Kim Rutkowski	Quality Manager	5/19/2025	Signed by: 29089547AD17401...

	Customer Name
Distribution :	Verkotan Ltd.

Issue	Name	Date	Modifications
A	Pedro Ruiz	5/19/2025	Initial release

Page: 2/8

Template_ACR.DDD.N.YY.MVGB.ISSUE_SAR Reference Dipole vM

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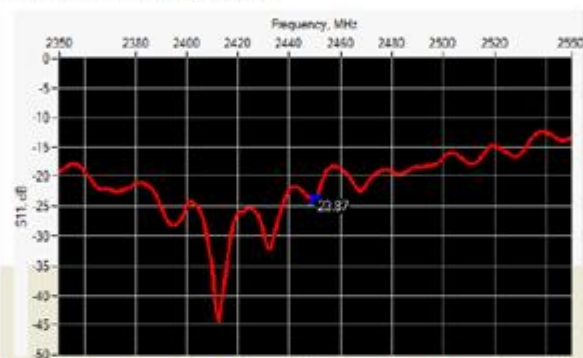
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	51.50 +/- 2%	-	30.40 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
2450	-23.87	-20	44.3Ω - 1.1jΩ

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom by using a prescribed spacer.

6.3.1 SAR with Head Liquid

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Software	OPENSAR V5
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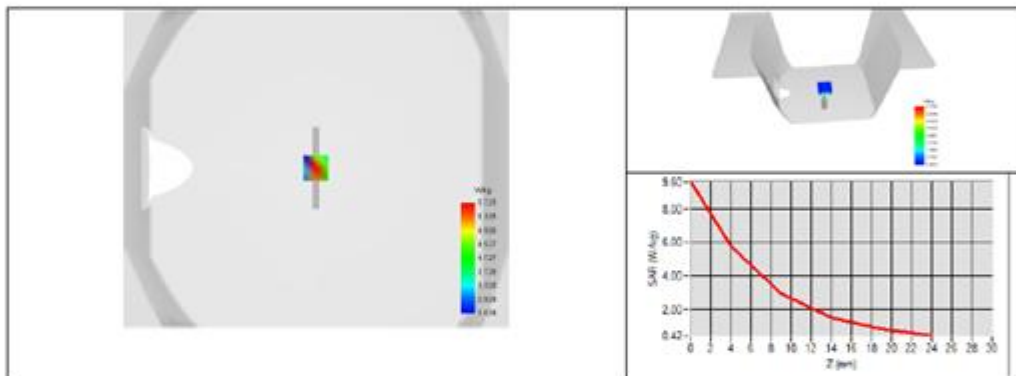


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.139.5.25.BES.A

Phantom	SN 13/09 SAM68
Probe	4424-EPGO-443
Liquid	Head Liquid Values: ϵ_{ps} : 41.6 σ : 1.88
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	2450 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency	1g SAR (W/kg)			10g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
2450 MHz	5.21	52.08	52.40	2.44	24.35	24.00



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