

SAR Compliance Test Report

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Number of pages:	41	Responsible Test engineer:	Kirsi Kyllönen
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Tested device:	Sky-Hero NARFI MkI POLE CAMERA HEAD		
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 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		
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:	31.10.2025		

Miia Nurkkala

Laboratory Manager

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Device under Test (DUT):

Product:	Sky-Hero NARFI MkI pole camera head
Manufacturer:	AXON ENTERPRISE, INC
Model:	NARFI MkI pole camera
Serial Number:	05103AA3L0058, 05103AA4C0432
FCC ID Number:	X4GSH-00005
DUT Number:	3841, 3842
Battery Type used in testing:	Li-Ion Battery
State of the Sample:	Production sample

Testing information:

Testing performed:	11.9.2025 - 01.10.2025
Notes:	-
Document history & changes:	This document replaces FCC_SAR report_Axon Narfi camera ID7541b_22102025.docx. The photo of the device has been removed for the report.
Document ID:	FCC_SAR report_Axon Narfi camera ID7541b_31102025.docx
Temperature °C	22±2 / Controlled
Humidity RH%	30±20 / Controlled
Measurement performed by:	Kirsi Kyllönen
FCC Test Firm Designation Number:	FI0005

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) 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
ISM 915 MHz	0.02	PASS
ISM 5.8 GHz	1.0	PASS

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

1.2.2 Simultaneous Transmission SAR

Highest Simultaneous Transmission SAR	SAR _{10g} [W/kg] in Body-Worn Exposure Condition	Result
ISM 915 MHz + ISM 5.8 GHz	1.02	PASS

1.2.3 Maximum Drift

Maximum Drift During Measurements	-1.1dB*
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*Larger than 5% drifts included to scaling factors

1.2.4 Measurement Uncertainty

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

Expanded Uncertainty (k=2) 95 %	±22.6 %
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DASY5 System, SAR 1g: 3 – 6 GHz:

Expanded Uncertainty (k=2) 95 %	±23.3 %
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2. DESCRIPTION OF THE DEVICE UNDER TEST (DUT)

The DUT is the Sky-Hero by Axon Narfi Mkl wireless tactical pole camera. The DUT can transmit C&C at 915 MHz and video at 5.8 GHz. The C&C and video can transmit simultaneously.

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]
	ISM 915 MHz	902 - 928
	ISM 5.8 GHz	5725 - 5850

3. OUTPUT POWER

3.1 Maximum specified conducted output power

From the customer, including tune-up tolerances;

Technology	Output power [dBm]
ISM 915 MHz	20
ISM 5.8 GHz	13.98

3.2 Tested conducted power

Measured conducted output power at transmitting antenna connector;

Technology	Output Power [dBm]		
	902.75 MHz	915 MHz	927.25 MHz
ISM 915 MHz	17.93	17.8	17.68

For ISM 5.8 GHz the measured conducted power exceeds the maximum specified power on some of the channels due to use of TX control test software, thus SAR results are overestimations on those channels.

Technology	Output Power [dBm]			
	5732 MHz	5769 MHz	5806 MHz	5843 MHz
ISM 5.8 GHz	16.07	15.52	14.39	13.18

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.

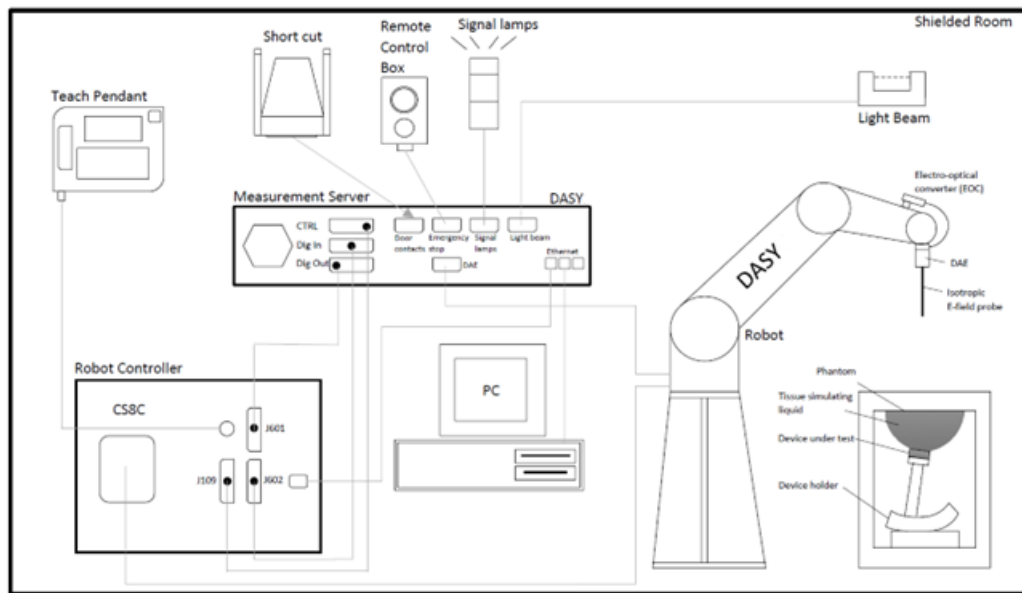


Figure 1 Schematic Laboratory Picture

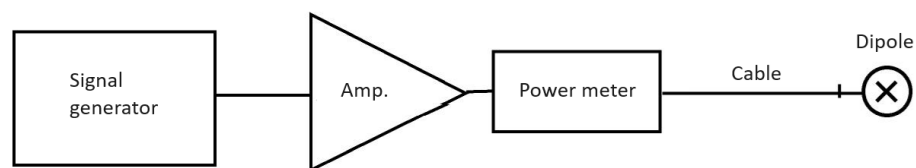


Figure 2. Signal source setup for system check

4.1 Test Equipment List

Test Equipment	Model	Serial Number	Calibration Date	Interval [years]
Amplifier, 500-8000MHz	ZX60-83LN12+	NA	NA	NA
Amplifier, 800MHz-4200MHz, 10W	10S1G4A	320421	NA	NA
DAE4, converter	DAE4	1332	02/2025	1
DAE4, converter	DAE4	710	10/2024	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
Power Sensor	NRP8S	1419.0006K02-108509-Zh	03/2024	2
Signal Analyzer	MS2692A	6201030300	10/2024	1
Signal Analyzer	MS2830A	6201180758	NA	NA
System validation dipole	D5GHzV2	1014	12/2024	3
System validation dipole	D835V2	448	03/2023	3

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

Dipole calibration period supporting data:

		Measured on 09/2024			Calibrated		
Dipole and Serial Number	Frequency [MHz]	Return Loss [dB]	Impedance [Ω]		Return Loss [dB]	Impedance [Ω]	
D835V2-SN:448	835	-23.0	43.6	-1.9	-21.53	42.3	-0.1

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.

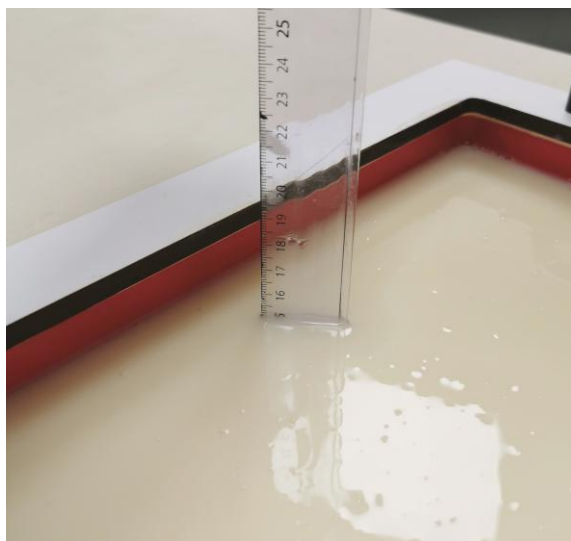


Figure 3 Tissue simulant depth

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 3GHz and $\pm 5\%$ at frequencies above 3GHz. 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
5750	D5GHzV2 - 1014	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	34.13	5.1	03/2025
835	D835V2 - 455	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	41.24	0.92	03/2025

4.5 System Check

Date	Tissue Type	Tissue Temp. [°C]	Frequency [MHz]	Input Power [mW]	Measured SAR1g [W/kg]	1W Target SAR1g [W/kg]	1W Normalized SAR1g [W/kg]	Deviation [%]	Plot #
10.09.2025	WB Head	21.3	835	250	2.51	9.36	10.04	7.3	1
30.09.2025	WB Head	21.6	5750	100	6.85	75.58	68.5	-9.4	2

4.5.1 Tissue Simulant Verification

Date	Tissue Type	Tissue Temp [°C]	Frequency [MHz]	Measured		Target		Deviation	
				Dielectric Constant [ϵ']	Conductivity σ [S/m]	Dielectric Constant [ϵ'] Target	Conductivity σ [S/m] Target	ϵ [%]	σ [%]
10.09.2025	WB Head	22	835	43.12	0.94	41.5	0.9	3.9	5.0
10.09.2025	WB Head	22	902.75	42.81	0.97	41.49	0.97	3.2	-0.2
10.09.2025	WB Head	22	915	42.75	0.97	41.47	0.98	3.1	-0.2
10.09.2025	WB Head	22	927.25	42.7	0.98	41.45	0.98	3.0	-0.2
30.09.2025	WB Head	21.9	5732	36.82	5.08	35.37	5.2	4.1	-2.3
30.09.2025	WB Head	21.9	5750	36.8	5.1	35.35	5.22	4.1	-2.3
30.09.2025	WB Head	21.9	5769	36.78	5.11	35.33	5.24	4.1	-2.4
30.09.2025	WB Head	21.9	5843	36.67	5.19	35.26	5.32	4.0	-2.3

5. TEST PROCEDURE

Test configurations for SAR testing were selected based on conducted power measurements. A control software for ISM bands was used to set the DUT to transmit at maximum power.

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 top, bottom, right, left and back sides of the device. The device was placed in the SPEAG holder and lifted towards the phantom until the distance between the phantom and the device was 5mm. 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 separate 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%

Uncertainty Budget According to IEC/IEEE 62209-1528 (Frequency band: 3GHz–6GHz range)								
Symbol	Error Description	Uncert. value	Prob. Dist.	Div.	(c) (1g)	(c) (10g)	Std. Unc. (1g)	Std. Unc. (10g)
Measurement System Errors								
CF	Probe Calibration	±13.1%	N	$\sqrt{2}$	1	1	±6.55%	±6.55%
CF _{drift}	Probe Calibration Drift	±1.7%	R	$\sqrt{3}$	1	1	±1.0%	±1.0%
LIN	Probe Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%
BBS	Broadband Signal	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%
ISO	Probe Isotropy	±7.6%	R	3	1	1	±4.4%	±4.4%
DAE	Other Probe+Electronic	±1.2%	N	1	1	1	±1.2%	±1.2%
AMB	RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Δ_{sys}	Probe Positioning	±0.005mm	N	1	0.29	0.29	±0.2%	±0.2%
DAT	Data Processing	±2.3%	N	1	1	1	±2.3%	±2.3%
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.) ^{DAK}	±2.5%	N	$\sqrt{1}$	0.78	0.71	±2.0%	±1.8%
LIQ(T_{σ})	Conductivity (temp.) ^{BB}	±3.4%	R	$\sqrt{3}$	0.78	0.71	±1.5%	±1.4%
EPS	Phantom Permittivity	±14.0%	R	3	0.25	0.25	±2.0%	±2.0%
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	$\sqrt{1}$	1	1	±3.6%	±3.6%
MOD	DUT Modulation ^m	±2.4%	R	$\sqrt{3}$	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	$\sqrt{1}$	1	0.84	±1.9%	±1.6%
C(R)	SAR scaling ^p	±0.0%	R	3	1	1	±0.0%	±0.0%
u(Δ SAR)	Combined Uncertainty						±11.6%	±11.6%
U	Expanded Uncertainty						±23.3%	±23.1%

7. TEST RESULTS

7.1 SAR Results for Body Exposure Condition with 5mm separation

Band	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 #
ISM 915MHz	902.75	20	17.93	Top	0.00047	NA**	1:1	1.61	0.001	
ISM 915MHz	902.75	20	17.93	Bottom	0.003	-1.07*	1:1	2.06	0.01	
ISM 915MHz	902.75	20	17.93	Left	0.0023	0.61*	1:1	1.85	0.004	
ISM 915MHz	902.75	20	17.93	Right	0.0043	-0.55*	1:1	1.83	0.01	
ISM 915MHz	902.75	20	17.93	Back	0.00087	0.83*	1:1	1.95	0.002	
ISM 915MHz	915	20	17.8	Right	0.0053	-0.49*	1:1	1.86	0.01	
ISM 915MHz	927.25	20	17.68	Right	0.0082	-0.28*	1:1	1.82	0.02	3

*Larger than 5% drifts included to scaling factors

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

Band	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 #
ISM 5.8GHz	5732	13.98	16.07***	Top	0.0368	NA**	1:1	1.00	0.04	
ISM 5.8GHz	5732	13.98	16.07***	Bottom	0.0266	NA**	1:1	1.00	0.03	
ISM 5.8GHz	5732	13.98	16.07***	Left	0.175	-0.51*	1:1	1.00	0.18	
ISM 5.8GHz	5732	13.98	16.07***	Right	0.809	-0.02	1:1	1.00	0.81	
ISM 5.8GHz	5732	13.98	16.07***	Back	0.001	NA**	1:1	1.00	0.001	
ISM 5.8GHz	5769	13.98	15.52***	Right	0.759	-1.1*	1:1	1.00	0.76	
ISM 5.8GHz	5843	13.98	13.18	Right	0.735	-0.52*	1:1	1.36	1.00	4
ISM 5.8GHz repeat measurement	5732	13.98	16.07***	Right	0.815	-0.32*	1:1	1.00	0.82	

*Larger than 5% drifts included to scaling factors

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

***Measured conducted power exceeds the maximum specified power on some of the channels due to use of TX control test software, thus SAR results are overestimations on these channels

7.2 Simultaneous Transmission Analysis

Simultaneous transmission analysis for maximum cellular SAR and maximum ISM 915 MHz and ISM 5.8 GHz are on the table below. Direct summation of SAR results is performed.

Body SAR:

Exposure Condition	Body SAR _{1g} [W/kg]					
	Test Position	Top	Bottom	Left	Right	Back
	ISM 915 MHz	0.001	0.01	0.004	0.02	0.002
	ISM 5.8 GHz	0.04	0.03	0.18	1.0	0.001
SAR Summation:		0.041	0.04	0.184	1.02	0.003

APPENDIX A: PHOTOS OF THE DUT

Appendix A has been provided as separate document FCC_Appendix_A_Axon Narfi camera ID7541b_22102025.

APPENDIX B: SYSTEM CHECK SCAN

Plot 1

Date/Time: 10.9.2025 15.27.04

Test Laboratory: Verkotan Oy

DUT: D835V2 - SN448

Communication System: UID 0, CW (0); Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;
Communication System PAR: 0 dB;
Medium parameters used: $f = 835$ MHz; $\sigma = 0.945$ S/m; $\epsilon_r = 43.115$; $\rho = 1000$ kg/m³
Phantom section: Center Section
Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.84, 8.51, 8.94) @ 835 MHz; Calibrated: 7.2.2025
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 31.0, -4.0$
 - Electronics: DAE4 Sn1332; Calibrated: 5.2.2025
 - Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 835MHz/Zoom Scan (8x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 59.82 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 3.63 W/kg

SAR(1 g) = 2.51 W/kg; SAR(10 g) = 1.64 W/kg (SAR corrected for target medium)

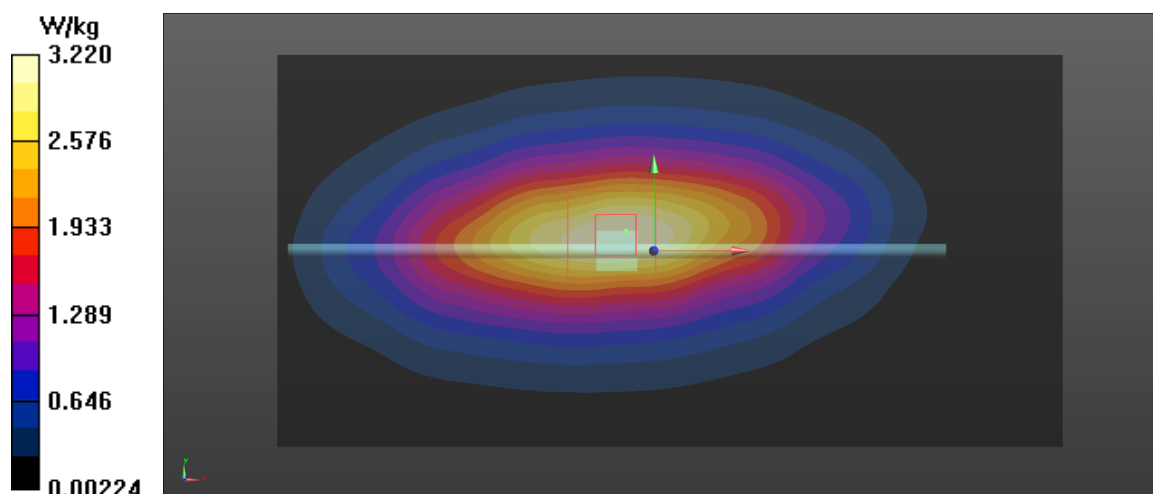
Smallest distance from peaks to all points 3 dB below = 16 mm

Ratio of SAR at M2 to SAR at M1 = 68.7%

Maximum value of SAR (measured) = 3.30 W/kg

Configuration/System Check 835MHz/Area Scan (161x81x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 3.22 W/kg



Plot 2

Date/Time: 30/09/2025 13:14:20

Test Laboratory: Verkotan Oy

DUT: D5GHzV2 - SN1045

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5750 MHz;
Communication System PAR: 0 dB;
Medium parameters used: $f = 5750$ MHz; $\sigma = 5.101$ S/m; $\epsilon_r = 36.798$; $\rho = 1000$ kg/m³
Phantom section: Center Section
Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(4.94, 4.76, 5) @ 5750 MHz; Calibrated: 07/02/2025
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -4.0, 29.0$
 - Electronics: DAE4 Sn710; Calibrated: 08/10/2024
 - Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx;
 - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System check 5750MHz 2/Area Scan (61x101x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 20.6 W/kg

Configuration/System check 5750MHz 2/Zoom Scan 2 2 (8x8x8)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 37.19 V/m; Power Drift = 0.03 dB

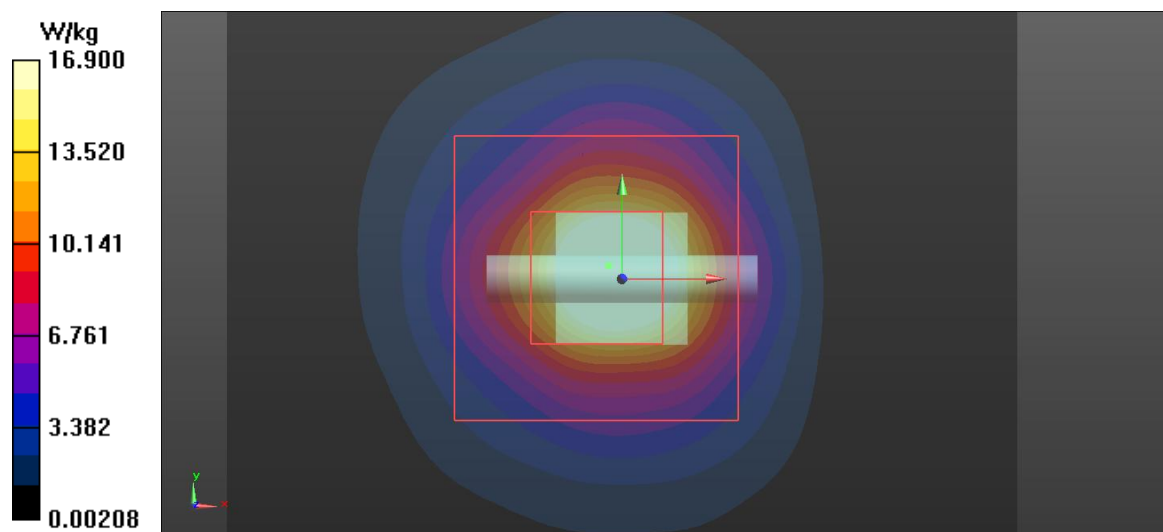
Peak SAR (extrapolated) = 31.8 W/kg

SAR(1 g) = 6.85 W/kg; SAR(10 g) = 1.95 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 4.8 mm

Ratio of SAR at M2 to SAR at M1 = 59.6%

Maximum value of SAR (measured) = 16.9 W/kg



APPENDIX C: MEASUREMENT SCANS

Plot 3

Date/Time: 11/09/2025 13:53:16

Test Laboratory: Verkotan Oy

DUT: AXON Narfi camera

Communication System: UID 0, CW (0); Frequency: 927.25 MHz;

Communication System PAR: 0 dB;

Medium parameters used (interpolated): $f = 927.25$ MHz; $\sigma = 0.979$ S/m; $\epsilon_r = 42.701$; $\rho = 1000$ kg/m³

Phantom section: Center Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.84, 8.51, 8.94) @ 927.25 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;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

FCC 927.25 MHz Right/Area Scan (131x111x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.0133 W/kg

FCC 927.25 MHz Right/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5$ mm, $dy=7.5$ mm, $dz=5$ mm

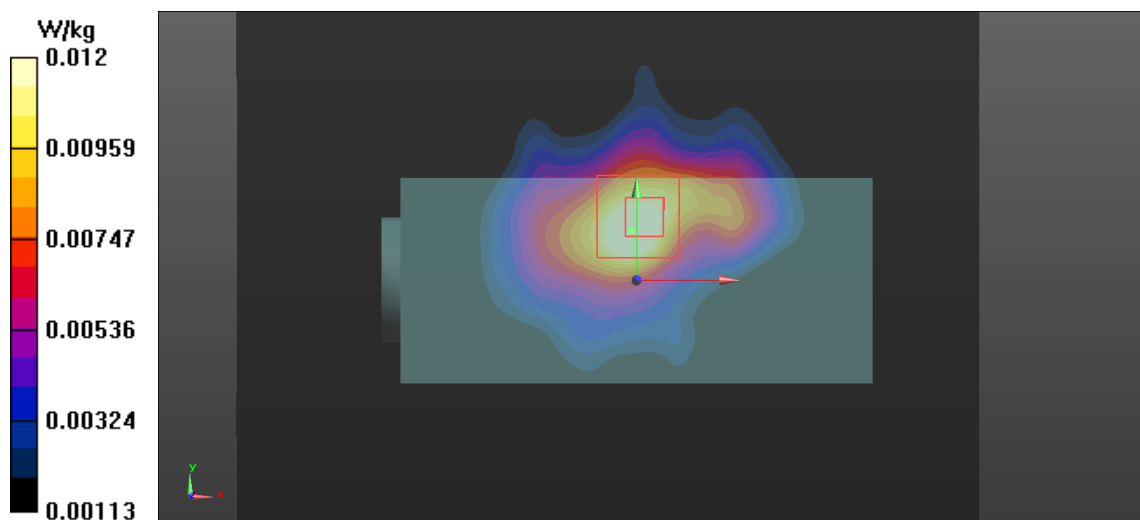
Reference Value = 2.704 V/m; Power Drift = -0.28 dB

Peak SAR (extrapolated) = 0.0150 W/kg

SAR(1 g) = 0.00819 W/kg; SAR(10 g) = 0.00525 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 = 53.9% Maximum value of SAR (measured) = 0.0117 W/kg



Plot 4

Date/Time: 01/10/2025 11:08:36

Test Laboratory: Verkotan Oy

DUT: AXON Narfi camera

Communication System: UID 0, CW (0); Frequency: 5843 MHz;

Communication System PAR: 0 dB;

Medium parameters used (interpolated): $f = 5843$ MHz; $\sigma = 5.191$ S/m; $\epsilon_r = 36.668$; $\rho = 1000$ kg/m³

Phantom section: Center Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(4.94, 4.76, 5) @ 5843 MHz; Calibrated: 07/02/2025
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), $z = 29.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 08/10/2024
 - Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/FCC 5GHz Right High/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 9.986 V/m; Power Drift = -0.52

Peak SAR (extrapolated) = 7.19 W/kg

SAR(1 g) = 0.735 W/kg; SAR(10 g) = 0.225 W/kg (SAR corrected for target medium)

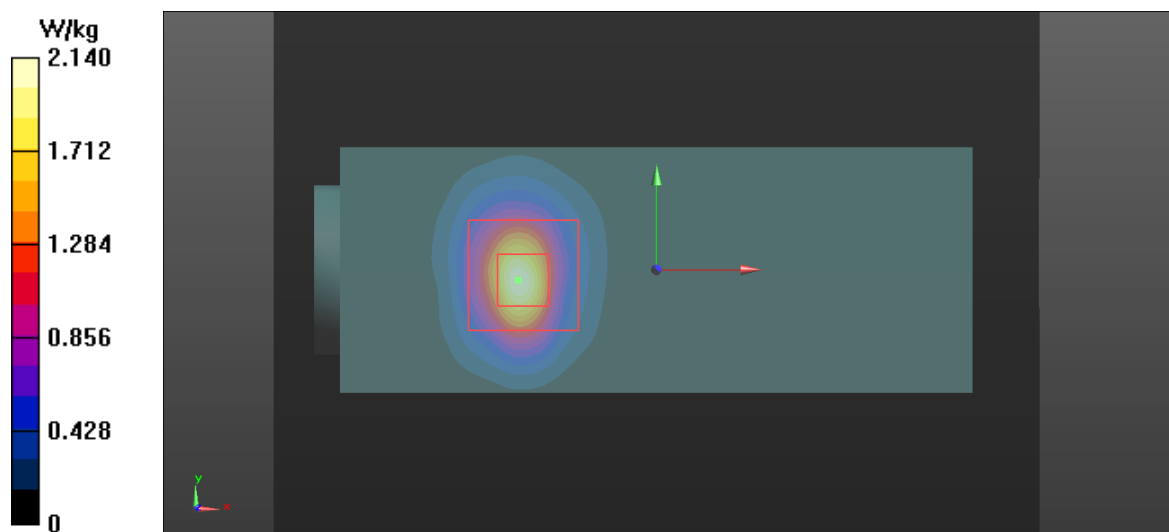
Smallest distance from peaks to all points 3 dB below = 6.4 mm

Ratio of SAR at M2 to SAR at M1 = 60.8%.

Maximum value of SAR (measured) = 1.76 W/kg

Configuration/FCC 5GHz Right High/Area Scan (151x131x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.14 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
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**

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 $(22 \pm 3)^\circ\text{C}$ 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
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.

**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
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:	Sven Kühn	Technical Manager	

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.....+3mV

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

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

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

9. Power Consumption (Typical values for information)

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

**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

Client **Verkotan**
Oulu - Finland

Certificate No: DAE4-710_Oct24

CALIBRATION CERTIFICATE

Object DAE4 - SD 000 D04 BM - SN: 710

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

Calibration date: October 08, 2024

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
Kethley 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-24 (in house check)	In house check: Jan-25
Calibrator Box V2.1	SE UMS 006 AA 1002	23-Jan-24 (in house check)	In house check: Jan-25

Calibrated by:	Name Adrian Gehring	Function Laboratory Technician	Signature
Approved by:	Sven Kühn	Technical Manager	

Issued: October 8, 2024

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

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.....+3mV

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

Calibration Factors	X	Y	Z
High Range	403.516 $\pm$ 0.02% (k=2)	403.660 $\pm$ 0.02% (k=2)	403.819 $\pm$ 0.02% (k=2)
Low Range	3.95411 $\pm$ 1.50% (k=2)	3.95889 $\pm$ 1.50% (k=2)	3.98306 $\pm$ 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	348.0 $^{\circ}$ $\pm$ 1 $^{\circ}$
---	-------------------------------------

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	199994.95	-1.48	-0.00
Channel X + Input	20001.60	-1.14	-0.01
Channel X - Input	-20001.44	0.80	-0.00
Channel Y + Input	199996.63	0.27	0.00
Channel Y + Input	20004.20	1.57	0.01
Channel Y - Input	-19997.46	4.93	-0.02
Channel Z + Input	199995.21	-1.18	-0.00
Channel Z + Input	19999.61	-3.06	-0.02
Channel Z - Input	-20000.68	1.78	-0.01

Low Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	2001.81	0.73	0.04
Channel X + Input	200.91	-0.47	-0.24
Channel X - Input	-198.47	-0.04	0.02
Channel Y + Input	1999.80	-1.28	-0.06
Channel Y + Input	200.97	-0.28	-0.14
Channel Y - Input	-199.16	-0.68	0.34
Channel Z + Input	2000.64	-0.39	-0.02
Channel Z + Input	200.94	-0.26	-0.14
Channel Z - Input	-199.33	-0.75	0.38

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	20.56	19.51
	- 200	-18.62	-20.05
Channel Y	200	3.23	2.88
	- 200	-3.07	-3.85
Channel Z	200	5.80	6.45
	- 200	-6.94	-7.09

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	-	-2.42	-1.61
Channel Y	200	6.38	-	-0.48
Channel Z	200	5.09	3.97	-

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	16577	14801
Channel Y	15687	15615
Channel Z	16047	13825

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	-0.91	-2.77	0.85	0.66
Channel Y	-0.37	-1.85	1.16	0.63
Channel Z	0.25	-1.49	2.68	0.65

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



SAR Reference Dipole Calibration Report

Ref : ACR.68.6.23.BES.A

VERKOTAN OY
ELEKTRONIIKKATIE 17
90590, OULU, FINLAND
SAR REFERENCE DIPOLE
FREQUENCY: 835 MHZ
SERIAL NO.: 448

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

Calibration date: 03/09/2023




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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.006.23.005.A

	Name	Function	Date	Signature
Prepared by :	Cyrille ONNEE	Measurement Responsible	3/9/2023	
Checked & approved by:	Jérôme Luc	Technical Manager	3/9/2023	
Authorized by:	Yann Toutain	Laboratory Director	3/9/2023	

Yann
Toutain ID

Signature numérique
de Yann Toutain ID
Date : 2023.03.09
15:03:27 +01'00'

	Customer Name
Distribution :	Verkotan Oy

Issue	Name	Date	Modifications
A	Cyrille ONNEE	3/9/2023	Initial release

Page: 2/8

Template: ACR.006.23.005.A, MTVG.005.01, SAR Reference Dipole v1.
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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.68.623.BES.A

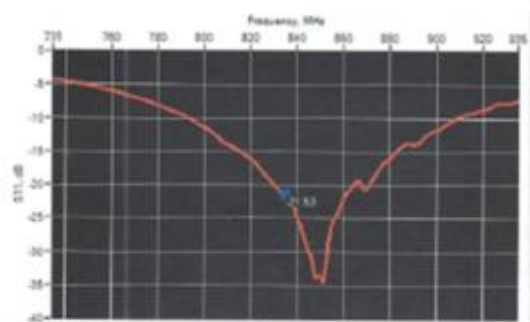
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	161.00 +/- 2%	-	89.80 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
835	-21.53	-20	42.3Ω - 0.1jΩ

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.

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.

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Template: ACR.DDD.N.YE.MHGR.ISSUE, SAR Reference Dipole v1.

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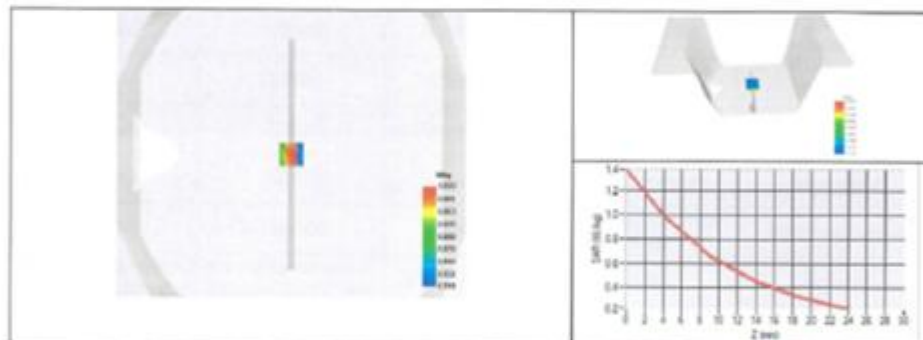


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.68.623.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPG0333
Liquid	Head Liquid Values: $\epsilon_p = 44.1$ $\sigma = 0.89$
Distance between dipole center and liquid	15.0 mm
Area scan resolution	$dx = 8\text{mm}/dy = 8\text{mm}$
Zoon Scan Resolution	$dx = 8\text{mm}/dy = 8\text{mm}/dz = 5\text{mm}$
Frequency	835 MHz
Input power	20 dBm
Liquid Temperature	20 $\pm$ 1 $^{\circ}\text{C}$
Lab Temperature	20 $\pm$ 1 $^{\circ}\text{C}$
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
835 MHz	0.94	9.36	9.56	0.61	6.05	6.22



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SAR Reference Dipole Calibration Report

Ref : ACR.348.13.24.BES.A

VERKOTAN LTD.
ELEKTRONIIKKATIE 17
90590, OULU, FINLAND
SAR REFERENCE DIPOLE
FREQUENCY: 5200-5800 MHZ
SERIAL NO.: D5GHZV2 SN:1014

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

Calibration date: 12/11/24



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.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.348.1324.BES.A

	Name	Function	Date	Signature
Prepared by :	Pedro Ruiz	Technical Manager	12/16/2024	
Checked & approved by:	Pedro Ruiz	Technical Manager	12/16/2024	
Authorized by:	Geraldine Toutain	Quality Manager	12/20/2024	

DocuSigned by:
Geraldine TOUTAIN
A1C0A091C0B54E1A

	Customer Name
Distribution :	Verkotan Ltd.

Issue	Name	Date	Modifications
A	Pedro Ruiz	12/16/2024	Initial release

Page: 2/0

Template: ACR.DDD.N.YY.MYGB.ISSUE_SAR Reference Dipole vM

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.348.13.24.BES.A

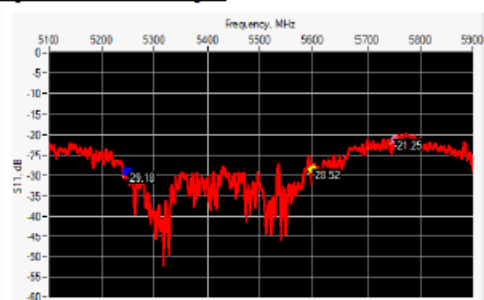
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	20.60 +/- 2%	-	40.30 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
5250	-29.18	-20	$47.3\Omega + 2.0j\Omega$
5600	-28.52	-20	$49.9\Omega - 3.7j\Omega$
5750	-21.25	-20	$42.1\Omega - 0.6j\Omega$

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
Phantom	SN 13/09 SAM68
Probe	SN 36/23 EPG0431

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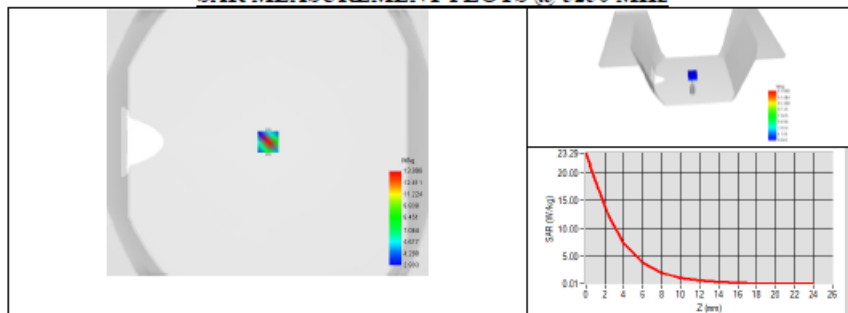
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.348.13.24.BES.A

Liquid	Head Liquid Values @ 5250 MHz: ϵ_p' : 35.2 sigma : 4.66 Head Liquid Values @ 5600 MHz: ϵ_p' : 34.1 sigma : 4.99 Head Liquid Values @ 5750 MHz: ϵ_p' : 33.7 sigma : 5.20
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=4mm/dy=4mm/dz=2mm$
Frequency	5250 MHz 5600 MHz 5750 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
5250 MHz	7.55	75.47	77.00	2.18	21.84	22.1
5600 MHz	8.54	85.38	78.30	2.49	24.90	23.20
5750 MHz	7.56	75.58	78.1	2.20	21.96	22.3

SAR MEASUREMENT PLOTS @ 5250 MHz



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