SAR Compliance Test Report

Date of Report	13/10/2022	**Client's Contact person:**	Laura Vela Reyes
Number of pages:	24	**Responsible Test engineer:**	Kalle Orava
Testing laboratory:	**Verkotan Oy** Elektroniikkatie 17 90590 Oulu Finland	**Client:**	**Rexon Technology Co., LTD.** No. 261 Jenhua Rd. Dali Dist Taichung City 412 Taiwan
Tested device	PJ2+		
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**		
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:

For the contents:

13.10.2022

Miia Nurkkala

Digitaalinen allekirjoittaja: Miia Nurkkala
Päiväys: 2022.10.13 12:18:56 +03'00'

Laboratory Manager

TABLE OF CONTENTS

1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Device under Test (DUT):

Product:	Push-to-Talk radiophone
Manufacturer:	Rexon Technology Co., LTD.
Model:	PJ2+
Serial Number:	0650288-002
FCC ID Number:	I7OPJ22
DUT Number:	21521
Battery Type used in testing:	6 x AA/LR6 1.5V battery
State of the Sample	Production sample

Testing information:

Testing Performed:	6.10.2022 – 7.10.2022
Notes:	-
Document ID:	FCC SAR report_PJ2+_ID5785_12102022.docx
Document history & changes:	Initial version
Temperature °C	22±2 / Controlled
Humidity RH%	30±20 / Controlled
Measurement performed by:	Kalle Orava
FCC Test Firm Designation Number	FI00005

1.2 Maximum Results

The maximum reported* SAR values for body-worn and in Front-of-the-Face configurations for the transmitting system are shown in tables 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_{1g} limit specified in FCC 47 CFR part 2 (2.1093) for body-worn and in Front-of-the-Face configurations is 1.6W/kg.

System	Highest Reported* SAR_{1g}(W/kg) in body-worn Condition, 0mm separation	Result
VHF (118 MHz – 136.975 MHz)	**0.48**	**PASS**

* Reported SAR Values are scaled to maximum theoretical output power.

System	Highest Reported* SAR_{1g}(W/kg) in Front-of-Face Condition, 25mm separation	Result
VHF (118 MHz – 136.975 MHz)	**0.16**	**PASS**

* Reported SAR Values are scaled to maximum theoretical output power.

1.2.1 Maximum Drift

Maximum Drift During Measurements	-0.82dB*

*Drifts >5% have been considered in the scaling factor

1.2.2 Measurement Uncertainty

Expanded Uncertainty (k=2) 95 %	±22.3%

2. DESCRIPTION OF THE DEVICE UNDER TEST (DUT)

The DUT is a Push-to-Talk radiophone, which supports frequency range of 118 MHz – 136.975 MHz.

Device Category	Portable
Exposure Environment	Uncontrolled

2.1 Supported Frequency Bands and Operational Modes

TX Frequency bands	Transmitter Frequency Range (MHz)
VHF	118 – 136.975

3. OUTPUT POWER

3.1 Maximum Output Power

From the Customer, maximum defined output power, including tune-up tolerance;

TX Frequency [MHz]	Max Output Power [dBm]
VHF (118 – 136.975)	32.55

3.2 Tested conducted power

Measured conducted output power at transmitting antenna connector [dBm].

TX Frequency [MHz]	Max Output Power [dBm]
118	32.28
124.325	32.11
130.65	31.94
136.975	32.27

4. TEST EQUIPMENT

Dasy52 near field scanning systems, manufactured by SPEAG were 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.

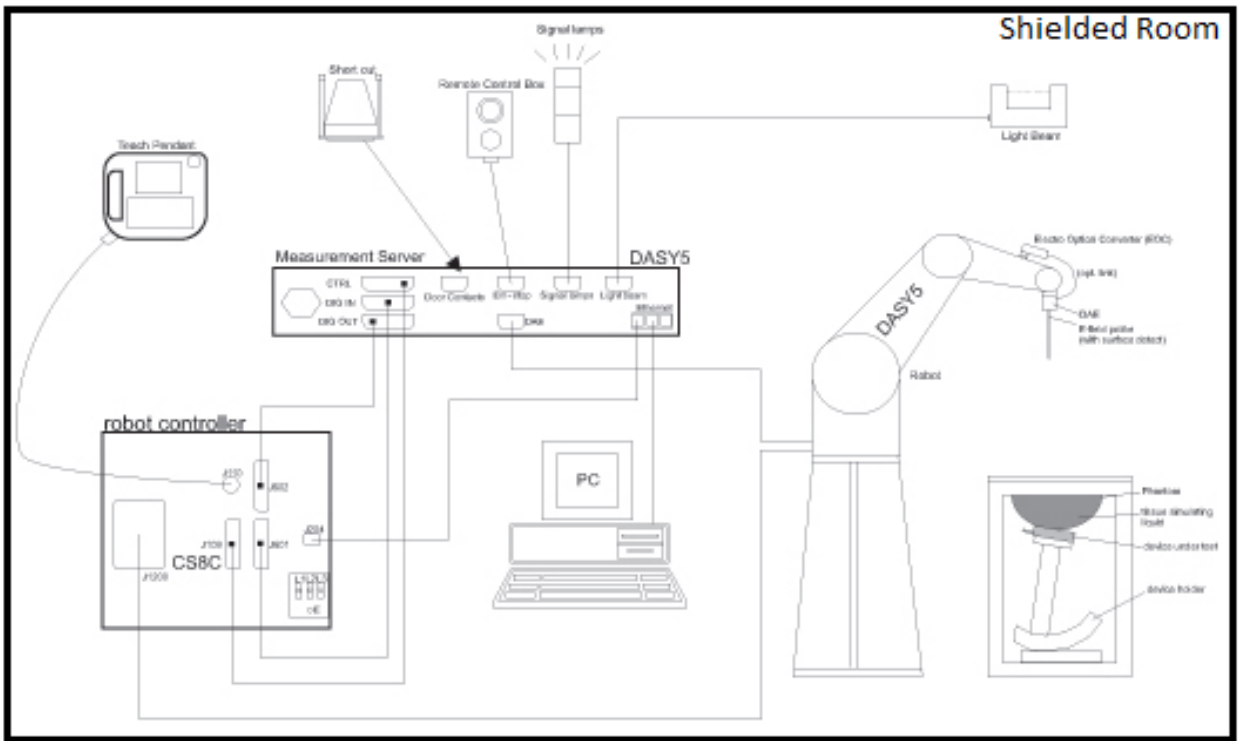


Figure 1 Schematic Laboratory Picture

4.1 Test Equipment List

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

Test Equipment	Model	Serial Number	Calibration Date
DAE	DAE4	1332	02.2022
Probe	EX3DV4	3852	10.2022
Dipole	CLA128	3006	07.2022
DASY5 Software	52.8.8.1258	-	NA
Signal Generator	Anritsu MG3710A	6261911026	02.2022
Power Sensor	NRP-Z11	100265	12.2021
120 MHz Amplifier	NA	NA	NA

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	10 MHz to >6 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g, Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 10 mm Body diameter: 12 mm Tip diameter: 2.5 mm Distance from probe tip to dipole centers: 1.0 mm
Application	General dosimetry up to 6 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

4.2 Phantoms

Eli Phantom:

The phantom used in SAR tests was an ELI phantom, manufactured by SPEAG. ELI phantom is used for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the to the requirements of IEEE 1528 and FCC published RF Exposure KDB Procedures.

4.3 Tissue Simulants

Recommended values for the dielectric parameters of the tissue simulants are given in IEEE 1528 and FCC published RF Exposure KDB Procedures. The dielectric parameters of the used tissue simulants were within ±10% of the recommended values in all frequencies used. A liquid compensation algorithm was used in DASY5 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.

Head 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] Head tissue simulant	Conductivity σ [S/m] Head tissue simulant	Validation Done
							Head tissue simulant
128	CLA 128 - SN: 3006	EX3DV4 - SN: 3852	CW	DAE 4 / 705	49.9	0.75	31/01/2022

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 #
06.10.2022	WB Head	21.0	128	250	0.93	3.48	3.70	6.4	1

4.5.1 Tissue Simulant Verification

				Target		Measured		Deviation	
Date	Tissue Type	Tissue Temp [°C]	Frequency [MHz]	Dielectric Constant [ε] Target	Conductivity σ [S/m] Target	Dielectric Constant [ε]	Conductivity σ [S/m]	ε (%)	σ (%)
06.10.2022	WB Head	22	118	53.02	0.76	49.58	0.73	-6.5	-3.4
06.10.2022	WB Head	22	124.325	52.88	0.76	49.41	0.73	-6.6	-3.1
06.10.2022	WB Head	22	128	52.8	0.76	49.31	0.74	-6.6	-2.9
06.10.2022	WB Head	22	130.65	52.73	0.76	49.23	0.74	-6.6	-2.8
06.10.2022	WB Head	22	136.975	52.59	0.76	49.08	0.74	-6.7	-2.5

5. TEST PROCEDURE

Testing was carried out in accordance with FCC KDB Publications 447498 D04 Interim General RF Exposure Guidance v01.

Device was measured with four different channels and two positions. Both positions were measured with the channel which gave the highest conducted output power. Rest of the channels were then measured with the position which resulted highest SAR for the maximum conducted channel.

5.1 Test Positions

5.1.1 Front-of-Face Configuration, 25mm separation distance

Device was lifted towards the phantom until the distance between the phantom and the device was 25mm.
Photos of the test positions are presented in APPENDIX A.

5.1.2 Body-worn Configuration, 0mm separation distance

Device was lifted towards the phantom until the distance between the phantom and the device was 0mm.
Photos of the test positions are presented in APPENDIX A.

5.2 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. Power drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan.

5.3 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 Dasy52 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 IEEE 1528-2013 and IEC 62209-1/201x
(0.3 - 3 GHz range)

Error Description	Uncert. value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±6.0 %	N	1	1	1	±6.0 %	±6.0 %	∞
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	$\sqrt{3}$	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Modulation Response^{m}	±2.4 %	R	$\sqrt{3}$	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	$\sqrt{3}$	1	1	±1.5 %	±1.5 %	∞
RF Ambient Noise	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
RF Ambient Reflections	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.4 %	R	$\sqrt{3}$	1	1	±0.2 %	±0.2 %	∞
Probe Positioning	±2.9 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Max. SAR Eval.	±2.0 %	R	$\sqrt{3}$	1	1	±1.2 %	±1.2 %	∞
Test Sample Related								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	$\sqrt{3}$	1	1	±2.9 %	±2.9 %	∞
Power Scaling^{p}	±0 %	R	$\sqrt{3}$	1	1	±0.0 %	±0.0 %	∞
Phantom and Setup								
Phantom Uncertainty	±6.1 %	R	$\sqrt{3}$	1	1	±3.5 %	±3.5 %	∞
SAR correction	±1.9 %	R	$\sqrt{3}$	1	0.84	±1.1 %	±0.9 %	∞
Liquid Conductivity (mea.)^{DAK}	±2.5 %	R	$\sqrt{3}$	0.78	0.71	±1.1 %	±1.0 %	∞
Liquid Permittivity (mea.) ^{DAK}	±2.5 %	R	$\sqrt{3}$	0.26	0.26	±0.3 %	±0.4 %	∞
Temp. unc. - Conductivity ^{BB}	±3.4 %	R	$\sqrt{3}$	0.78	0.71	±1.5 %	±1.4 %	∞
Temp. unc. - Permittivity ^{BB}	±0.4 %	R	$\sqrt{3}$	0.23	0.26	±0.1 %	±0.1 %	∞
Combined Std. Uncertainty						±11.2 %	±11.1 %	361
Expanded STD Uncertainty						**±22.3 %**	**±22.2 %**	

7. TEST RESULTS

7.1.1 SAR Results for body-worn Condition with 0 mm separation distance:

VHF:

Frequency [MHz]	Maximum Power [dBm]	Conducted Power [dBm]	Test position	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle [%]	Reported SAR1g [W/kg]	Plot #
118	32.55	32.28	Back, 0mm	0.26	-0.82	1.29	100	0.33	
124.325	32.55	32.11	Back, 0mm	0.10	-0.15	1.11	100	0.11	
130.65	32.55	31.94	Back, 0mm	0.03	-0.14	1.15	100	0.04	
136.975	32.55	32.27	Back, 0mm	0.40	-0.49	1.19	100	0.48	2

7.1.2 SAR Results for Front-of-Face Condition with 25 mm separation distance:

VHF:

Frequency [MHz]	Maximum Power [dBm]	Conducted Power [dBm]	Test position	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle [%]	Reported SAR1g [W/kg]	Plot #
118	32.55	32.28	Front of Face, 25mm	0.12	-0.76	1.27	100	0.16	3

APPENDIX A: PHOTOS OF THE DUT

Dimensions of the DUT is 230 x 60 x 40 mm.

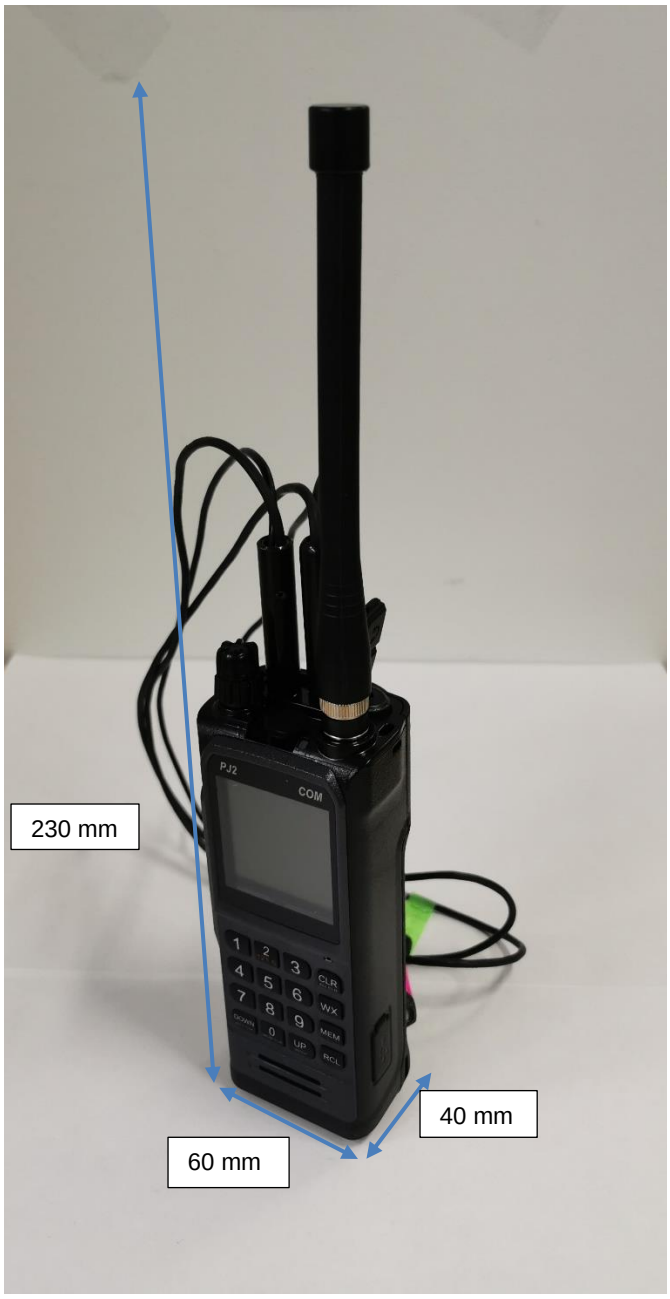


Figure 2. Overview of the DUT

Figure 3. Front side of the DUT

Figure 4. Back side of the DUT

Figure 5. Left side of the DUT

Figure 6. Right side of the DUT

APPENDIX B: SYSTEM CHECK SCAN

Plot 1

Date/Time: 06/10/2022 11:20:12

Test Laboratory: Verkotan Oy

DUT: CLA-128 - SN3006; Type: CLA-128; Serial: SN3006

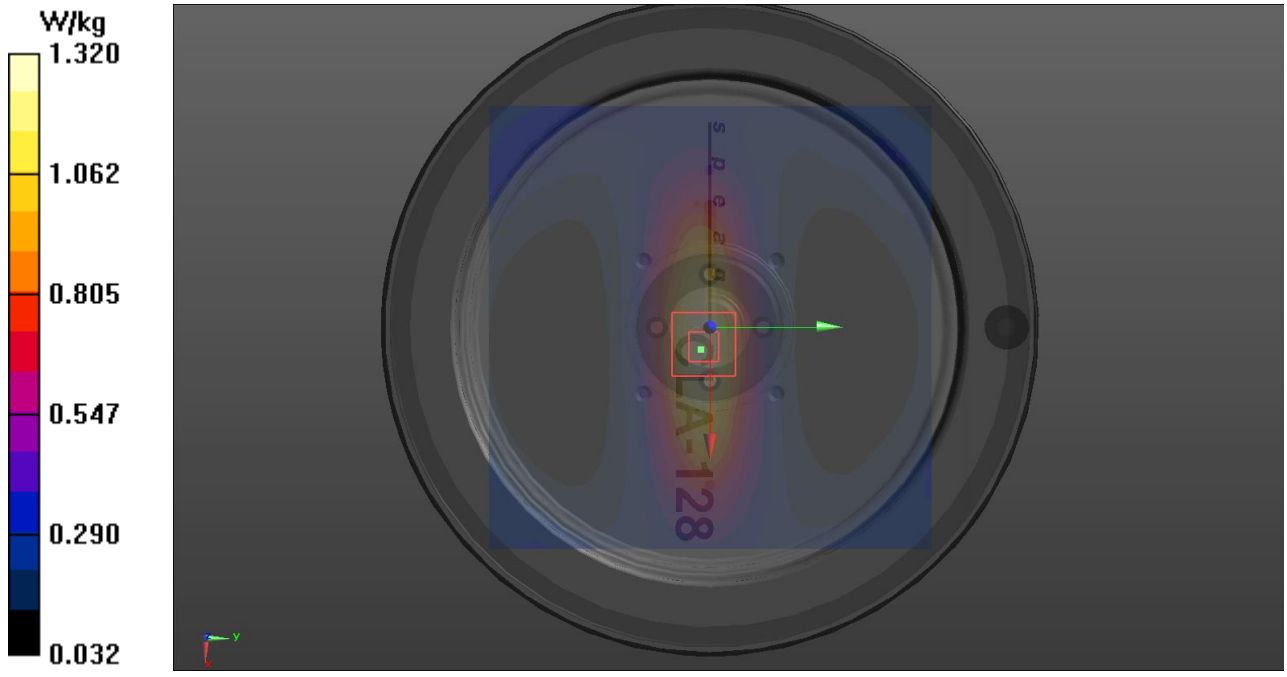
Communication System: UID 0, CW (0); Communication System Band: CLA128 (128.0 MHz); Frequency: 128 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 128 MHz; σ = 0.736 S/m; ε_r = 49.315; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(11.62, 11.62, 11.62) @ 128 MHz; Calibrated: 21/10/2021
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn1332; Calibrated: 23/02/2022
  - Phantom: SAR1_Phantom1_ELl; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System check, 128MHz/Area Scan (101x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.32 W/kg

Configuration/System check, 128MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 35.19 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.62 W/kg
SAR(1 g) = 0.926 W/kg; SAR(10 g) = 0.594 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 16.3 mm
Ratio of SAR at M2 to SAR at M1 = 57.7%
Maximum value of SAR (measured) = 1.33 W/kg



APPENDIX C: MEASUREMENT SCAN

Plot 2

Date/Time: 07/10/2022 10:05:28

Test Laboratory: Verkotan Oy

DUT: PJ2+;

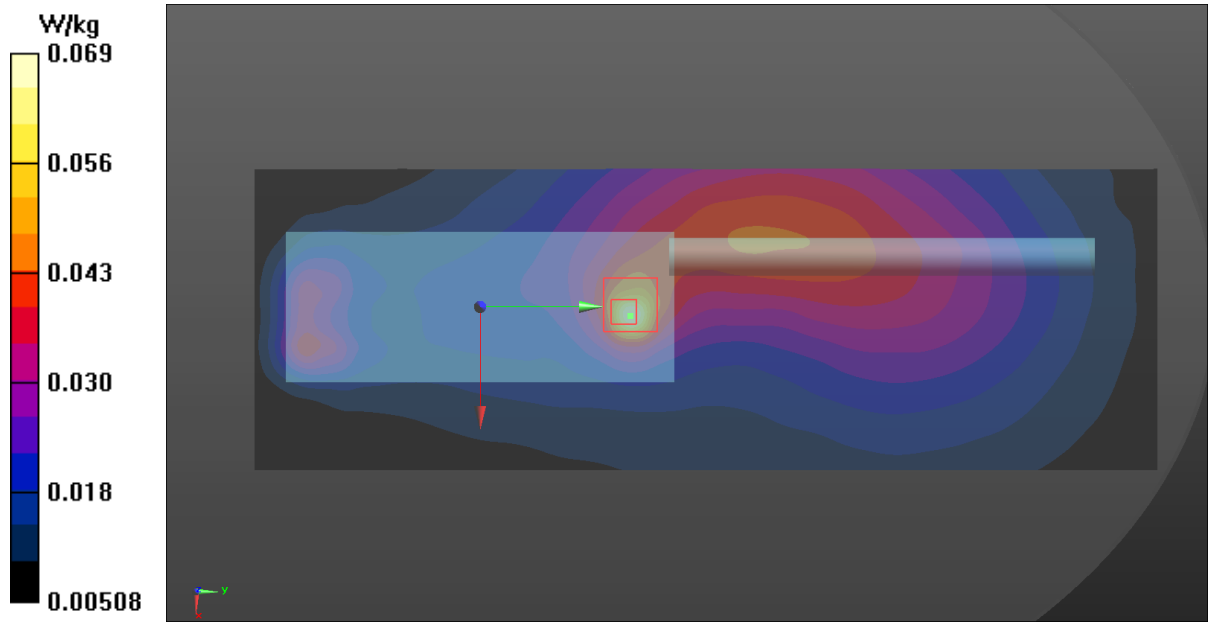
Communication System: UID 0, UHF (0); Communication System Band: PTT; Frequency: 136.975 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 137 MHz; σ = 0.74 S/m; ε_r = 49.08; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(11.62, 11.62, 11.62) @ 136.975 MHz; Calibrated: 21/10/2021
  - 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: 23/02/2022
  - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/PJ2+, 136.975MHz, back, 0mm/Zoom Scan (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.069 V/m; Power Drift = -0.49 dB
Peak SAR (extrapolated) = 0.107 W/kg
SAR(1 g) = 0.040 W/kg; SAR(10 g) = 0.024 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 = 40.5%
Maximum value of SAR (measured) = 0.0686 W/kg

Configuration/PJ2+, 136.975MHz, back, 0mm/Area Scan (81x241x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0687 W/kg



Plot 3

Date/Time: 06/10/2022 13:21:00

Test Laboratory: Verkotan Oy

DUT: PJ2+;

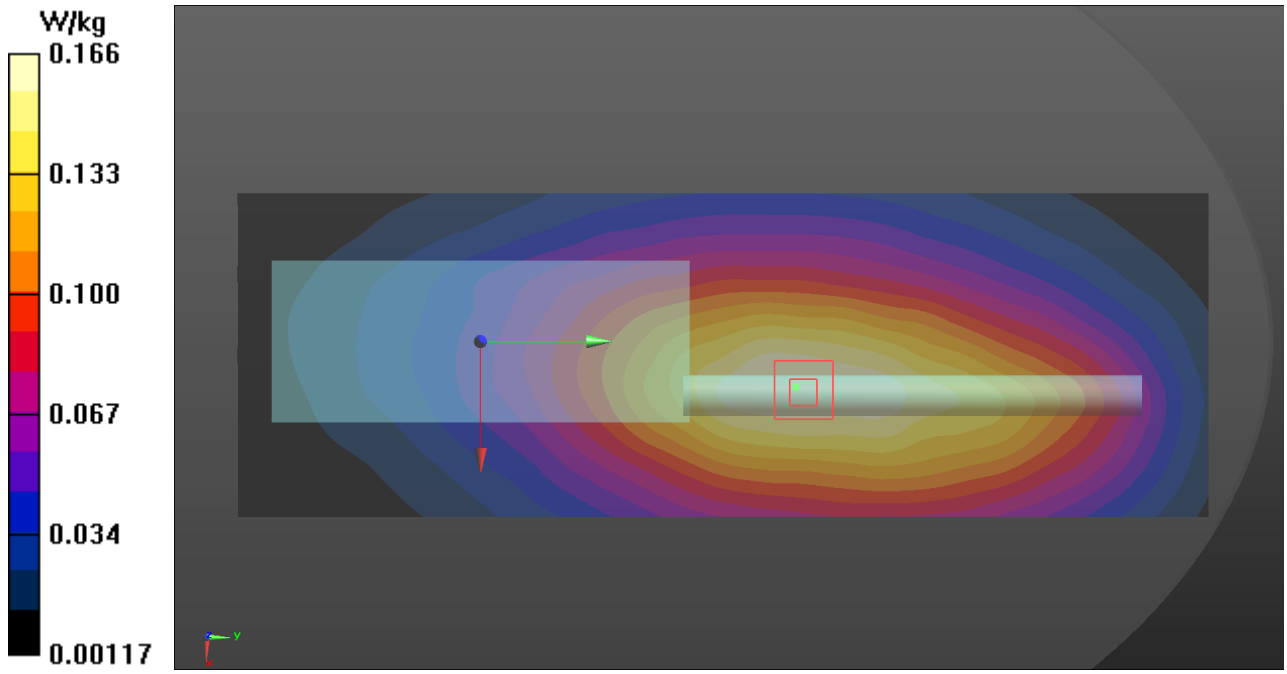
Communication System: UID 0, UHF (0); Communication System Band: PTT; Frequency: 118 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 118 MHz; σ = 0.731 S/m; ε_r = 49.58; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(11.62, 11.62, 11.62) @ 118 MHz; Calibrated: 21/10/2021
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn1332; Calibrated: 23/02/2022
  - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/PJ2+, 118MHz, Front of Face, 25mm/Area Scan (81x241x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.166 W/kg

Configuration/PJ2+, 118MHz, Front of Face, 25mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.52 V/m; Power Drift = -0.76 dB
Peak SAR (extrapolated) = 0.181 W/kg
SAR(1 g) = 0.124 W/kg; SAR(10 g) = 0.096 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 = 68.9%
Maximum value of SAR (measured) = 0.156 W/kg



APPENDIX D: RELEVANT PAGES FROM PROBE CALIBRATION

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 **Certificate No: EX3-3852_Oct21**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3852

Calibration procedure(s): QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v6, QA CAL-23.v5, QA CAL-25.v7
Calibration procedure for dosimetric E-field probes

Calibration date: October 21, 2021

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: CC2552 (20x)	09-Apr-21 (No. 217-03343)	Apr-22
DAE4	SN: 660	23-Dec-20 (No. DAE4-660_Dec20)	Dec-21
Reference Probe ES3DV2	SN: 3013	30-Dec-20 (No. ES3-3013_Dec20)	Dec-21
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-20)	In house check: Jun-22
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-22

	Name	Function	Signature
Calibrated by:	Jeffrey Katzman	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 23, 2021

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3852

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.41	0.39	0.46	± 10.1 %
DCP (mV)[B]	100.3	100.7	98.7	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max dev.	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	144.7	±2.5 %	± 4.7 %
		Y	0.0	0.0	1.0		136.0		
		Z	0.0	0.0	1.0		132.6		

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] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3852

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-52.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3852

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
30	55.0	0.75	13.53	13.53	13.53	0.00	1.00	± 13.3 %
64	54.2	0.75	12.08	12.08	12.08	0.00	1.00	± 13.3 %
128	52.8	0.76	11.62	11.62	11.62	0.00	1.00	± 13.3 %
220	49.0	0.81	11.12	11.12	11.12	0.00	1.00	± 13.3 %
450	43.5	0.87	10.16	10.16	10.16	0.16	1.30	± 13.3 %
1300	40.8	1.14	8.79	8.79	8.79	0.27	0.80	± 12.0 %
1450	40.5	1.20	8.68	8.68	8.68	0.33	0.80	± 12.0 %
1640	40.2	1.31	8.48	8.48	8.48	0.26	0.86	± 12.0 %
3500	37.9	2.91	6.90	6.90	6.90	0.30	1.35	± 13.1 %
3700	37.7	3.12	6.70	6.70	6.70	0.30	1.35	± 13.1 %
3900	37.5	3.32	6.44	6.44	6.44	0.40	1.60	± 13.1 %
4100	37.2	3.53	6.25	6.25	6.25	0.40	1.60	± 13.1 %
5250	35.9	4.71	4.90	4.90	4.90	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.61	4.61	4.61	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.69	4.69	4.69	0.40	1.80	± 13.1 %

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

APPENDIX E: RELEVANT PAGES FROM DIPOLE 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

Certificate No: **CLA128-3006_Jul22**

CALIBRATION CERTIFICATE

Object: CLA128 - SN: 3006

Calibration procedure(s): QA CAL-15.v9
Calibration Procedure for SAR Validation Sources below 700 MHz

Calibration date: July 18, 2022

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: CC2552 (20x)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 3877	31-Dec-21 (No. EX3-3877_Dec21)	Dec-22
DAE4	SN: 654	26-Jan-22 (No. DAE4-654_Jan22)	Jan-23

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

	Name	Function	Signature
Calibrated by:	Aldonia Georgiadou	Laboratory Technician	
Approved by:	Niels Kuster	Quality Manager	

Issued: July 20, 2022

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
EUT Positioning	Touch Position	
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	128 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	52.8	0.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	51.0 ± 6 %	0.74 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	1 W input power	3.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**3.41 W/kg ± 18.4 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	1 W input power	2.24 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**2.27 W/kg ± 18.0 % (k=2)**