EMI – TEST REPORT

- FCC Part 15.207, 15.209 -

Type / Model Name	:	QPSP2-Z250
Product Description	:	Shoe metal detector for QPS security scanner
Applicant	**:**	Rohde & Schwarz GmbH & Co. KG
Address	:	Mühldorfstraße 15 81614 MÜNCHEN, GERMANY
Manufacturer	**:**	Rohde & Schwarz GmbH & Co. KG
Address	:	Mühldorfstraße 15 81614 MÜNCHEN, GERMANY

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

Test Report No. :	**80154472-04 Rev1**	09. February 2024 Date of issue

Deutsche Akkreditierungsstelle
D-PL-12030-01-03
D-PL-12030-01-04

FCC ID: KVW-QPS201SHOE

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (September 2021)

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September 2021)

Part 15, Subpart C, Section 15.207	Conducted limits
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements

FCC ID: KVW-QPS201SHOE

2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according his/her instructions.

2.3 Photo documentation of the EUT – Detailed photos see ATTACHMENT A

2.4 Equipment type

LF metal detector, mobile equipment

2.5 Short description of the equipment under test (EUT)

The EUT is a shoe metal detector for QPS security scanner.

Number of tested samples: 1
Serial number: 101327

EUT operation mode

The equipment under test was operated during the measurement under the following conditions:

- continuous scan: Tx and Rx units on

EUT configuration

The following peripheral devices and interface cables were connected during the measurements:

- USB cable Model : Commercially available
- All-in-one PC Model : ASUS A4110

2.6 Power supply system utilised

Power supply voltage : 5 V DC (USB)

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3 TEST RESULT SUMMARY

FCC Rule Part	Description	Result
15.207	AC power line conducted emissions	passed
15.209	Spurious emissions	passed

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80154472-04	0	20 September 2023	Initial test report
80154472-04	0	09 February 2024	Removing details for IC testing

The test report with the highest revision number replaces the previous test reports.

3.2 FINAL ASSESSMENT

The equipment under test fulfills the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 16 May 2023

Testing concluded on : 26 July 2023

Checked by:

K. Gegenfurtner

Klaus Gegenfurtner
I confirm the correctness and integrity of this document
2024.02.09 12:26:48 +01'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

I am the author of this document
2024.02.09 11:31:25 +01'00'

Franz-Xaver Schrettenbrunner
Radio Team

FCC ID: KVW-QPS201SHOE

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15 - 35 ° C
Humidity:	30 - 60 %
Atmospheric pressure:	86 - 106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor k = 2. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report on basis of the ETSI Technical Report TR 100 028 Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1 and Part 2. The results are documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
20 dB Bandwidth	Center frequency of EuT	95%	± 2.5 10^{-7}
99% Occupied Bandwidth	Center frequency of EuT	95%	± 2.5 10^{-7}
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	± 3.53 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 3.71 dB
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	± 2.34 dB
Peak conducted output power	902 MHz to 928 MHz	95%	± 0.35 dB
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	± 2.15 dB

4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule (w = 0).
Details can be found in the procedure CSA_B_V50_29.

4.5 Measurement protocol for FCC and ISED

4.5.1 GENERAL INFORMATION

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

FCC: DE 0011
ISED: DE0009

4.5.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

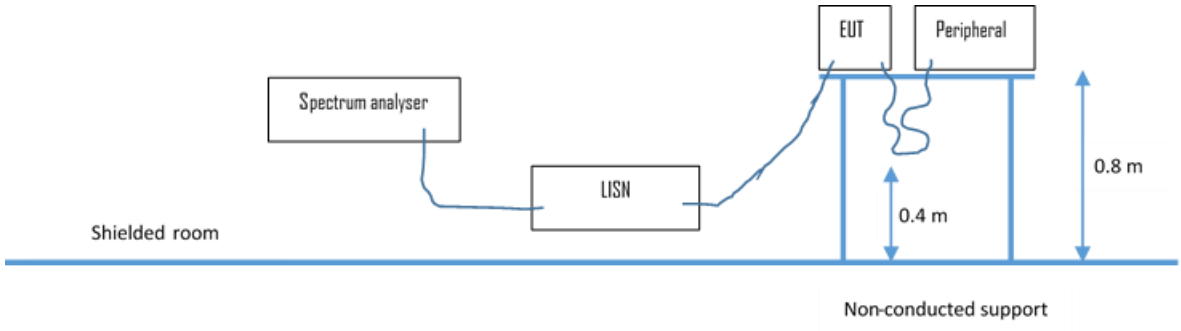
4.5.2.1 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions.

4.5.3 Details of test procedures

4.5.3.1 Conducted emission

Test setup according ANSI C63.10



The final level, expressed in dBμV, is arrived at by taking the reading directly from the Spectrum analyser. This level is compared to the limit.

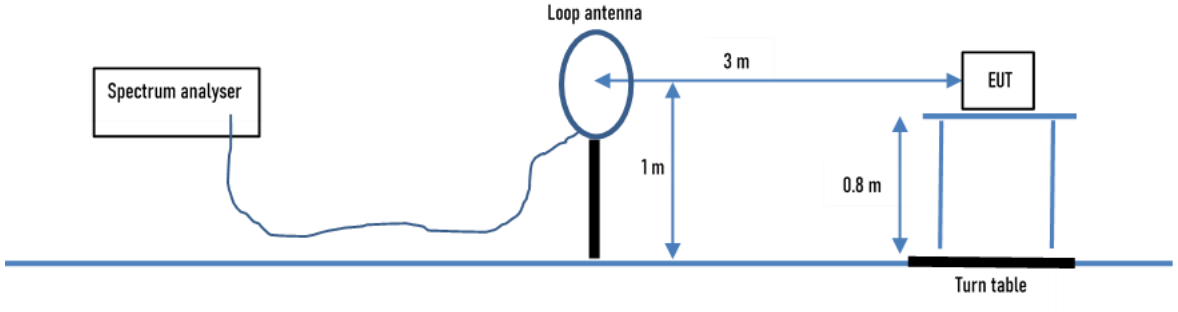
To convert between dBμV and μV, the following conversions apply:

dBμV = 20(log μV)
μV = Inverse log(dBμV/20)

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50 Ω / 50 μH (CISPR 16) characteristics. The receiver is protected by means of an impedance matched pulse limiter connected directly to the RF input. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission is re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

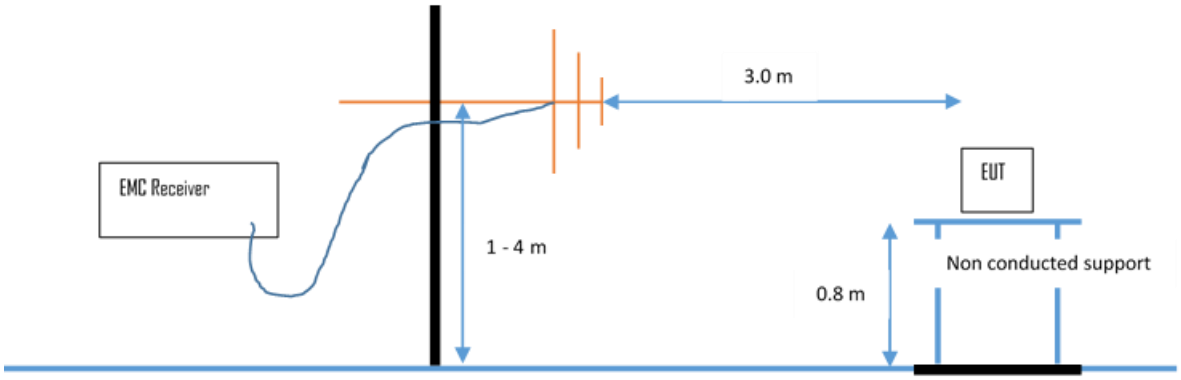
4.5.3.2 Radiated emission

4.5.3.2.1 OATS1 test site (9 kHz - 30 MHz):
Test setup according ANSI C63.10



Emissions from the EUT are measured in the frequency range of 9 MHz to 30 MHz using a tuned receiver and a calibrated loop antenna. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied along the site axis and the EUT is rotated 360 degrees.

4.5.3.2.2 OATS1 test site (30 MHz - 1 GHz):
Test setup according ANSI C63.10.



Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees. The final level in dBµV/m is calculated by taking the reading from the EMI receiver (Level dBµV) and adding the correction factors and cable loss factor (dB). The FCC limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	-	Limit (dBµV/m)	=	Delta (dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

FCC ID: KVW-QPS201SHOE

5 TEST CONDITIONS AND RESULTS

5.1 Conducted emissions

For test instruments and accessories used, see section 6 Part **A 4**.

5.1.1 Description of the test location

Test location: Shielded Room S2

5.1.2 Photo documentation of the test set-up

5.1.3 Applicable standard

FCC Part 15, Section 15.207.

5.1.4 Description of Measurement

The conducted emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10.

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5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin -12.1 dB at 0.570 MHz

Limit according to FCC Part 15, Section 15.207:

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

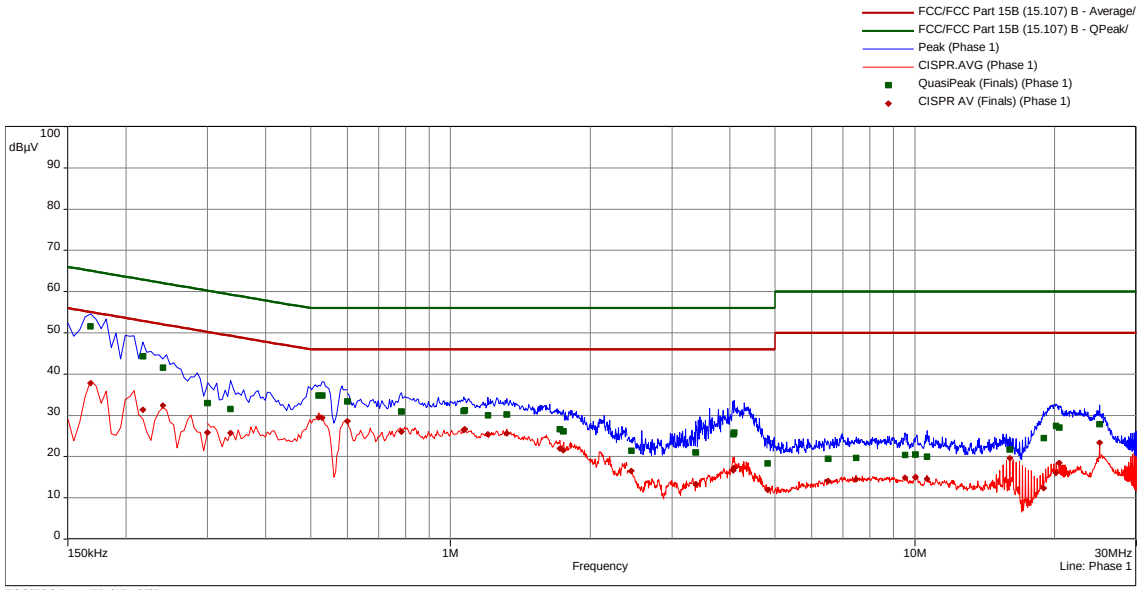
* Decreases with the logarithm of the frequency

The requirements are **FULFILLED.**

Remarks: For detailed test result please refer to following test protocols

FCC ID: KVW-QPS201SHOE

5.1.6 Test protocol



FCC/FCC Part 15B (15.107)B

freq	QP	margin	limit	AV	margin	limit
MHz	dB(µV)	dB	dB	dB(µV)	dB	dB
0.168	51.6	-13.4	65.1	37.8	-17.3	55.1
0.218	44.4	-18.6	62.9	31.4	-21.5	52.9
0.240	41.6	-20.5	62.1	32.5	-19.6	52.1
0.300	33.0	-27.2	60.2	25.9	-24.4	50.2
0.336	31.6	-27.7	59.3	25.8	-23.5	49.3
0.521	34.9	-21.1	56.0	29.5	-16.5	46.0
0.530	34.9	-21.1	56.0	29.5	-16.5	46.0
0.600	33.5	-22.5	56.0	28.6	-17.4	46.0
0.785	31.0	-25.0	56.0	26.1	-19.9	46.0
1.068	31.1	-24.9	56.0	26.5	-19.5	46.0
1.073	31.3	-24.7	56.0	26.7	-19.3	46.0
1.205	30.1	-25.9	56.0	25.5	-20.5	46.0
1.322	30.3	-25.7	56.0	25.7	-20.4	46.0
1.722	26.7	-29.3	56.0	22.0	-24.0	46.0
1.749	26.2	-29.8	56.0	21.6	-24.4	46.0
2.450	21.5	-34.5	56.0	16.6	-29.4	46.0
3.377	21.1	-34.9	56.0	13.4	-32.6	46.0
4.065	25.4	-30.6	56.0	16.6	-29.4	46.0
4.083	25.9	-30.1	56.0	17.3	-28.7	46.0
4.823	18.4	-37.6	56.0	12.0	-34.0	46.0
6.506	19.5	-40.5	60.0	14.1	-35.9	50.0
7.469	19.8	-40.2	60.0	14.6	-35.4	50.0
9.525	20.4	-39.6	60.0	15.0	-35.1	50.0
10.037	20.5	-39.5	60.0	15.1	-34.9	50.0
10.635	20.0	-40.0	60.0	14.7	-35.3	50.0
16.017	21.8	-38.2	60.0	19.7	-30.3	50.0
18.938	24.6	-35.5	60.0	12.4	-37.6	50.0
20.114	27.5	-32.5	60.0	16.1	-34.0	50.0
20.442	27.1	-32.9	60.0	18.5	-31.5	50.0
25.001	27.9	-32.1	60.0	23.5	-26.6	50.0

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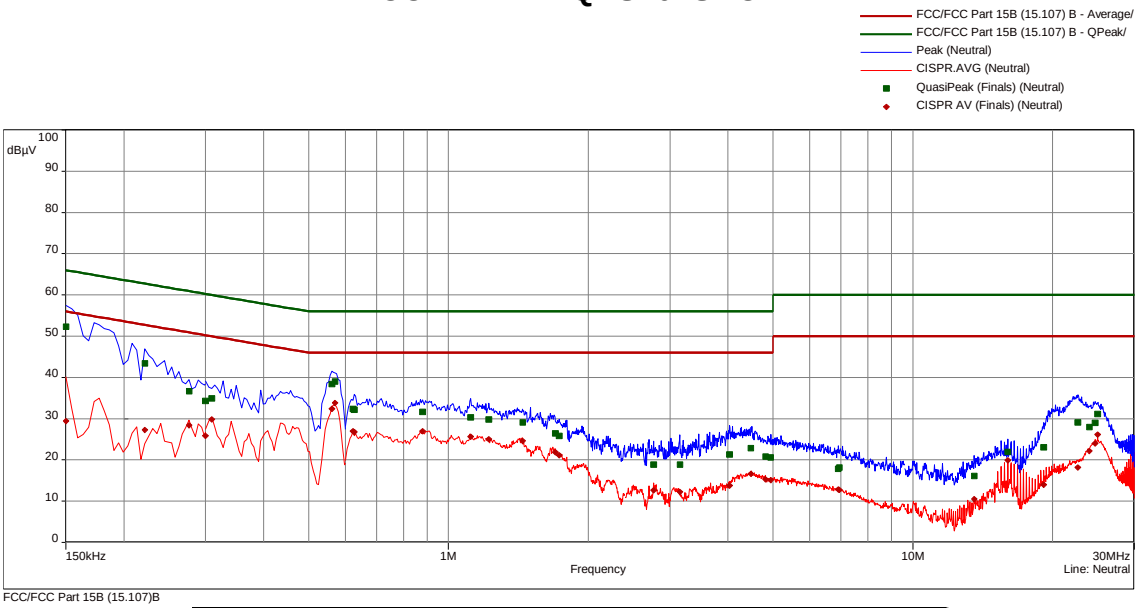


FCC/FCC Part 15B (15.107)B

freq	QP	margin	limit	AV	margin	limit
MHz	dB(µV)	dB	dB	dB(µV)	dB	dB
0.150	52.4	-13.6	66.0	29.4	-26.6	56.0
0.222	43.4	-19.3	62.7	27.3	-25.5	52.7
0.276	36.7	-24.2	60.9	28.4	-22.5	50.9
0.300	34.4	-25.9	60.2	25.9	-24.4	50.2
0.309	35.0	-25.0	60.0	29.8	-20.2	50.0
0.561	38.4	-17.6	56.0	32.4	-13.6	46.0
0.570	39.1	-16.9	56.0	33.9	-12.1	46.0
0.623	32.4	-23.6	56.0	27.0	-19.1	46.0
0.627	32.2	-23.8	56.0	26.8	-19.2	46.0
0.879	31.7	-24.3	56.0	27.0	-19.0	46.0
1.118	30.3	-25.7	56.0	25.7	-20.3	46.0
1.223	29.8	-26.2	56.0	25.1	-20.9	46.0
1.443	29.2	-26.8	56.0	24.6	-21.4	46.0
1.700	26.5	-29.5	56.0	21.8	-24.2	46.0
1.731	25.9	-30.1	56.0	21.2	-24.8	46.0
2.765	19.0	-37.0	56.0	12.6	-33.4	46.0
3.147	18.9	-37.1	56.0	12.3	-33.7	46.0
4.034	21.4	-34.6	56.0	13.8	-32.2	46.0
4.484	22.9	-33.1	56.0	16.7	-29.3	46.0
4.818	20.9	-35.1	56.0	15.3	-30.7	46.0
4.949	20.7	-35.3	56.0	15.1	-30.9	46.0
6.915	17.9	-42.1	60.0	12.9	-37.1	50.0
6.942	18.2	-41.8	60.0	12.8	-37.2	50.0
13.542	16.1	-43.9	60.0	10.5	-39.5	50.0
16.017	22.0	-38.0	60.0	19.9	-30.1	50.0
19.158	23.1	-36.9	60.0	14.0	-36.0	50.0
22.652	29.2	-30.8	60.0	18.3	-31.8	50.0
23.970	28.0	-32.0	60.0	22.2	-27.9	50.0
24.717	29.1	-30.9	60.0	24.0	-26.0	50.0
25.001	31.2	-28.8	60.0	26.1	-23.9	50.0

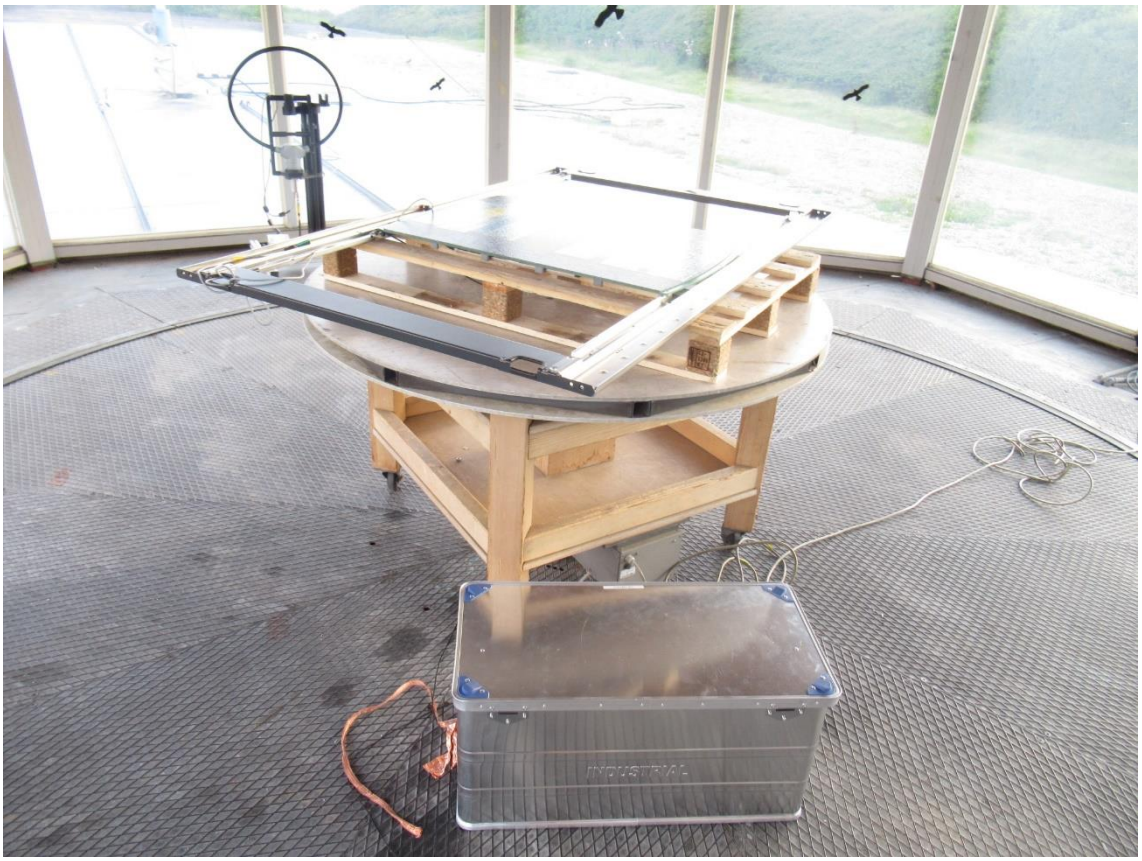
5.2 Spurious emissions

For test instruments and accessories used see section 6 Part **SER 1, SER 2**.

5.2.1 Description of the test location

Test location: OATS 1
Test distance: 3 metres

5.2.2 Photo documentation of the test set-up



FCC ID: KVW-QPS201SHOE

5.2.3 Applicable standard

FCC Part 15, Section 15.209.

5.2.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10.

The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz:	RBW:	200 Hz
150 kHz – 30 MHz:	RBW:	9 kHz
30 MHz – 1000 MHz:	RBW:	120 kHz

Detector: QP (In frequency range 9-90 kHz and 110-490 kHz a linear average detector is used for iSED)

FCC ID: KVW-QPS201SHOE

5.2.5 Test result < 30MHz

FCC

f (MHz)	Level AV@3m (dBµV)	Ant. factor (dB/m)	Field strength AV@3m dB(µV/m)	Distance corr. 3m to 300m (dB)	Corrected level AV@300m dB(µV/m)	Limit AV@300m dB(µV/m)	Delta (dB)
0.130	52.3	20.0	72.3	-80.0	-7.7	25.3	-33.0
0.260	12.2	20.0	32.2	-80.0	-47.8	19.3	-67.1

f (MHz)	Level QP@3m (dBµV)	Ant. factor (dB/m)	Field strength QP@3m dB(µV/m)	Distance corr. 3m to 30m (dB)	Corrected level QP@30m dB(µV/m)	Limit QP@30m dB(µV/m)	Delta (dB)
0.651	28.7	20.0	48.7	-40.0	8.7	31.3	-22.6
1302	12.5	20.0	32.5	-40.0	-7.5	29.5	-37.0
2903	8.1	20.0	28.1	-40.0	-11.9	29.5	-41.4
13666	33.3	20.0	53.3	-40.0	13.3	29.5	-16.2

ISED

f (MHz)	Level AV@3m (dBµA)	Ant. factor (dB/m)	Field strength AV@3m dB(µA/m)	Distance corr. 3m to 300m (dB)	Corrected level AV@300m dB(µA/m)	Limit AV@300m dB(µA/m)	Delta (dB)
0.130	0.8	20.0	28.8	-80.0	-51.2	-26.2	-25.0
0.260	-39.3	20.0	-19.3	-80.0	-99.3	-32.2	-67.1

f (MHz)	Level QP@3m (dBµA)	Ant. factor (dB/m)	Field strength QP@3m dB(µA/m)	Distance corr. 3m to 30m (dB)	Corrected level QP@30m dB(µA/m)	Limit QP@30m dB(µA/m)	Delta (dB)
0.651	-22.8	20.0	-2.8	-40.0	-42.8	-20.2	-22.6
1302	-39.0	20.0	-19.0	-40.0	-59.0	-22.0	-37.0
2903	-42.9	20.0	-22.9	-40.0	-62.9	-22.0	-40.9
13666	-18.2	20.0	1.8	-40.0	-41.8	-22.0	-19.8

5.2.6 Test result 30 MHz < f < 1 GHz

Frequency (MHz)	Reading Vert. (dBµV)	Reading Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBµV/m)	Level Hor. (dBµV/m)	Limit (dBµV/m)	Dlimit (dB)
84.63	25.2	19.5	13.7	13.6	38.9	33.1	40.0	-1.1
175.00	17.5	21.3	18.7	18.2	36.2	39.5	43.5	-4.0
325.00	4.8	9.1	21.0	21.5	25.8	30.6	46.0	-15.4
375.00	-1.1	4.7	22.5	22.9	21.4	27.6	46.0	-18.4
700.00	-1.3	-2.3	29.8	30.3	28.5	28.0	46.0	-17.5
825.00	-1.3	-0.9	31.9	32.3	30.6	31.4	46.0	-14.6

Note: The correction factor includes cable loss and antenna factor.

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Limit according to FCC Part 15 Subpart 15.209(a)

Frequency	Field strength of spurious emissions		Measurement distance
(MHz)	(µV/m)	dB(µV/m)	(metres)
0.009 - 0.490	2400/F(kHz)	--	300
0.490 - 1.705	24000/F (kHz)	--	30
1.705 - 30.0	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

The requirements are **FULFILLED.**

Remarks: None.

FCC ID: KVW-QPS201SHOE

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	BAT-EMC 2022.0.23.0	01-02/68-13-001				
	ESCI	02-02/03-15-001	03/07/2024	03/07/2023		
	ESH 2 - Z 5	02-02/20-05-004	13/10/2025	13/10/2022	17/10/2023	17/04/2023
	N-4000-BNC	02-02/50-05-138				
	ESH 3 - Z 2	02-02/50-05-155	09/11/2025	09/11/2022	25/01/2024	25/07/2023
SER 1	ESCI	02-02/03-05-005	30/01/2024	30/01/2023		
	HFH 2 - Z 2	02-02/24-15-001				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
SER 2	ESVS 30	02-02/03-05-006	27/07/2024	27/07/2023		
	VULB 9168	02-02/24-05-005	20/04/2024	20/04/2023	03/05/2024	03/05/2023
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
	50F-003 N 3 dB	02-02/50-21-010				

The tests for A4 were performed on 26th May 2023
The tests for SER 2 were performed on 30th May 2023