



Solutions

TEST REPORT

Test Report No.: UL-RPT-RP-15291383-916

Applicant * : Eppendorf SE

Model No. / PMN * : MotorCap Multi

HMN: SpinPro 6 R

FCC / ISED ID * : Contains FCC ID: 2AXZD0116800152
Contains IC: 26635-0116800152

HVIN * : 0116 800.152-02

Technology : RFID 13.56 MHz

Test Standard(s) : **FCC Parts 15.209(a) & 15.225**
Innovation, Science and Economic Development Canada
Section B.6, Annex B, RSS-210 Issue 11 June 2024, Amendment
(April 2020) & RSS-Gen Issue 5, April 2018, Amendment 2
(February 2021)
For details of applied tests refer to test result summary

1. This test report shall not be reproduced in full or partial, without the written approval of UL International Germany GmbH.
2. The results in this report apply only to the sample tested.
3. The test results in this report are traceable to the national or international standards.
4. Test Report Version 1.1 supersede Version 1.0 with immediate effect
Test Report No. UL-RPT-RP-15291383-916 Version 1.1, Issue Date 31 August 2025 replaces
Test Report No. UL-RPT-RP-15291383-916 Version 1.0, Issue Date 27 August 2025 which is no longer valid.
5. Result of the tested sample: **PASS**
6. All information marked with a (*) were provided by customer / applicant or authorized representative

Prepared by: Abbas Al-Hussainy
Title: Laboratory Engineer
Date: 31 August 2025

Approved by: Rachid Acharkaoui
Title: Operations Manager
Date: 31 August 2025



Deutsche
Akkreditierungsstelle
D-PL-19381-02-00

This laboratory is accredited by DAkkS.
The tests reported herein have been performed in
accordance with its' terms of accreditation.

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1. Customer Information *

1.1.Applicant Information

Company Name:	Eppendorf SE
Company Address:	Barkhausenweg 1, 22339 Hamburg, Germany
Contact Person:	Julia Preu
Contact E-Mail Address:	preu.j@eppendorf.de
Contact Phone No.:	00494053997057

1.2.Manufacturer Information

Company Name:	Eppendorf SE
Company Address:	Barkhausenweg 1, 22339 Hamburg, Germany
Contact Person:	Julia Preu
Contact E-Mail Address:	preu.j@eppendorf.de
Contact Phone No.:	00494053997057

2. Summary of Testing

2.1. General Information

Applied Standards

Specification Reference:	47CFR15.225
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Radio Frequency Devices) - Section 15.225
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) – Section 15.209
Specification Reference:	RSS-Gen Issue 5, April 2018, Amendment 2 (February 2021)
Specification Title:	General Requirements for Compliance of Radio Apparatus
Specification Reference:	RSS-210 Issue 11 June 2024
Specification Title:	Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment Annex B-Devices operating in frequency bands for any application B.6 Band 13.110-14.010 MHz

Location

Location of Testing:	UL International Germany GmbH Hedelfinger Str. 61 70327 Stuttgart Germany
Test Firm Registration:	399704
Company Number:	22511
CABID:	DE0008

Date information

Order Date:	17 May 2024
EUT arrived:	7 March 2025
Test Dates:	01 July 2025
EUT returned:	-/-

2.2. Summary of Test Results

FCC Clause	ISED Clause	Measurement	Complied	Did not comply	Not performed	Not applicable
Part 15.207	RSS-Gen 8.8	Transmitter AC Conducted Emissions	☐	☐	☒	☐
Part 15.215(c)	-/-	Transmitter 20 dB Bandwidth	☐	☐	☒	☐
-/-	RSS-Gen 6.7	Transmitter 99% Emission Bandwidth	☐	☐	☒	☐
Part 15.225 (a)(b)(c)(d)	RSS-Gen 6.12 / RSS-210 B6	Transmitter Fundamental Field Strength & Spectrum Mask	☐	☐	☒	☐
Part 15.209(a)/ 15.225(d)	RSS-Gen 6.13 / RSS-210 B6	Transmitter Radiated Emissions	☒	☐	☐	☐
Part 15.225(e)	RSS-Gen 6.11 / RSS-210 B6	Transmitter Frequency Stability (Temperature & Voltage Variation)	☐	☐	☒	☐

Decision rule:

Where not otherwise specified or communicated in writing, statements of conformity (e.g. Pass/Fail) are established according to the following decision rule: considering the ILAC G8:2019 chapter 4.2.1 (simple acceptance rule). This leads to a maximum 50% of false accept or false reject when the measured value equals the tolerance limit. See ILAC-G8:09/2019 for further details.

Notes:

1. As per applicant information a pre-certified Radio module was integrated and therefore only Partial Testing is performed on radiated spurious emission.

2.3. Methods and Procedures

Reference:	FCC: ANSI C63.10-2020 + Cor. 1-2023 / ISED: ANSI C63.10-2020 + Cor. 1-2023 + C63.10a-2024 + Errata to C63.10a-2024
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Reference:	Notice 2020 - DRS0023
Title:	Guidance on magnetic field strength radiated emission measurements (9 kHz – 30 MHz)

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT) *

Brand Name:	eppendorf
Model Name / PMN:	MotorCap Multi
HMN	SpinPro 6 R
Serial Number:	SNK 09
Hardware Version Number:	1.00
Firmware Version Number:	Main Controller (U600) EMC Firmware v0.5.1 (2024-08-15) Safety Controller (U800)
HVIN:	0116 800.152-02
FVIN:	0116 460.030-00
FCC ID:	Contains FCC ID: 2AXZD0116800152
ISED Certification No.:	Contains IC: 26635-0116800152

3.2. Description of EUT *

The equipment under test was a hardware module for RFID communication with rotors with RFID 13.56MHz technology.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing *

Tested Technology:	RFID 13.56 MHz
Category of Equipment:	Transceiver
Channel Spacing:	Single channel device
Transmit Frequency Range:	13.56 MHz
Power supply Requirement(s):	120V AC 60 Hz
Modulation:	ASK

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

A. Support Equipment (In-house)

Item	Description	Brand Name	Model Name or Number	Serial Number
1	-/-	-/-	-/-	-/-

B. Support Equipment (Manufacturer supplied) *

Item	Description	Brand Name	Model Name or Number	Serial Number
1	Communication and Power Adapter	eppendorf	Harmony Bus Adapter	-/-
2	rotor with RFID transponder	eppendorf	FA-45-48-11	-/-
3	CAN and CAN FD Interface for High-Speed USB 2.0	PEAK	PCAN-USB FD	-/-
4	Laptop	Lenovo	X14s	-/-

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- ☒ Continuous transmitting modulated carrier at maximum power in RFID-13.56 MHz test mode.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The customer supplied a document containing the setup instructions "2024-10-10 - Test Plan for HW-Module MotorCapMulti.pdf" and "2025-02-24 - Test Plan for HW-Module PremiumFeatures.pdf" was used to configure the device.
- Preliminary tests were carried out both with and without RFID tag. It was found that the configuration without RFID tag represents the worst-case and was recorded in the test report.

Radiated Measurements:

- The radiated samples with integrated antenna were used for the radiated measurements.
- The EUT was tested with normal installation laying position.
- Radiated measurements below 30 MHz were performed with the EUT positioned on the turn table and rotating 360 degrees while the loop antenna height was set to 100 cm.
- Radiated measurements above 30 MHz were performed with the EUT positioned on the turn table and rotating 360 degrees while the antenna height varies from 1 to 4 m over the measurement frequency range.
- R&S®EMC32 Measurement Software V11.30.00 was used for the radiated spurious emission measurements.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 6 *Measurement Uncertainty* for details.

In accordance with DAkkS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Radiated Spurious Emissions

Test Summary:

Test Engineer:	El Moghrabi Omar	Test Date:	01 July 2025
Test Sample Serial Number:	SNP06		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.225(d) & 15.209(a)
ISED Reference:	RSS-Gen 6.13 / RSS-210 B6
Test Method Used:	ANSI C63.10 Sections 6.3, 6.4
Frequency Range:	9 kHz to 30 MHz

Environmental Conditions:

Temperature (°C):	23.1
Relative Humidity (%):	53.8

Note(s):

- As allowed by ANSI C63.10 clause 5.2 an alternative test site that can demonstrate equivalence to a open area test site may be used. Therefore, the measurement was performed in a Semi Anechoic Chamber. The OATS / SAC comparison data is detailed in section 8. Open-Area-Test Site comparison of this report.
- FCC rule part 15.209(a) specifies limits at 300 m / 30 m in $\mu\text{V/m}$ but RSS GEN specifies limits at 300 m / 30 m in $\mu\text{A/m}$. The relevant limits are the same after accounting for E-field to H-field correction. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table). According to Notice 2020-DRS0023 converting the magnetic field strength into electrical field strength using the following equation while considering free space impedance of 377Ω results in a factor of 51.5 dB Ω .

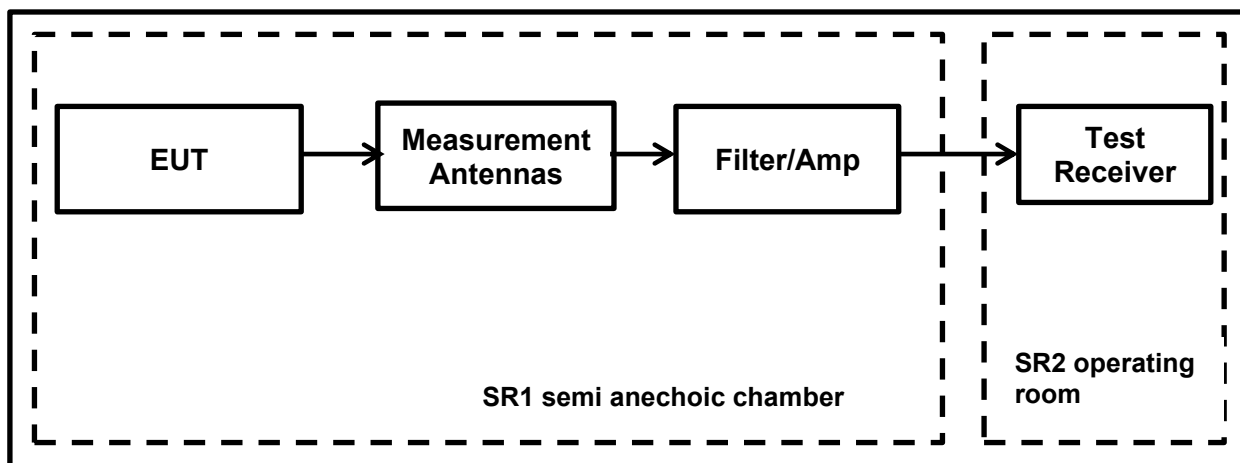
$$AF^E [\text{dB}(\text{m}^{-1})] = AF^H [\text{dB}(\Omega^{-1}\text{m}^{-1})] + Z_0[\text{dB}\Omega]$$

For example, the measurement frequency X KHz resulted in a level of Y dB $\mu\text{V/m}$, which is equivalent to Y -51.5 = Z dB $\mu\text{A/m}$, which has the same margin, W dB, to the corresponding RSS-GEN Section 8.9, Table 6 limit as it has to the 15.209(a) limit.

- The limits are specified at a test distances of 30 m & 300 metres. However, as specified in ANSI C63.10 clause 6.4.3, measurements may be performed at a closer distance and the measured level extrapolated to the specified measurement distance using the method described in clauses 6.4.4, specifically sub-clause 6.4.4.1 which specifies that the measured level shall be extrapolated to the specified distance by conservatively presuming that the field strength decays at 40 dB/decade. Therefore, measurements were performed at a measurement distance of 3 m.
- The measured values at 3 m were extrapolated to the required measurement distances of 300 m and 30 m and compared the specified limits at those distances as follows:
 - 9 kHz- 490 kHz: measured value extrapolated from 3 m to 300 m by subtracting 80 dB at 40 dB /decade.
 - 490 kHz-30 MHz: measured value extrapolated from 3 m to 30 m by subtracting 40 dB at 40 dB /decade.

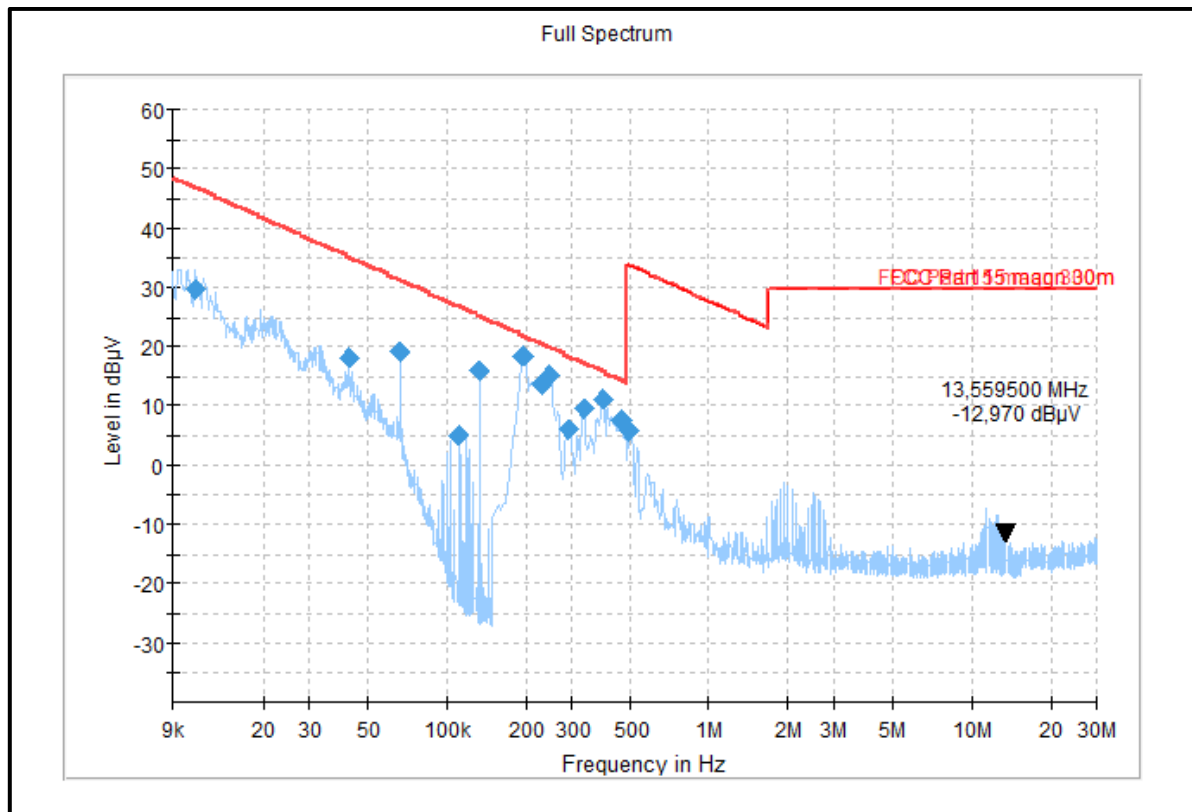
Transmitter Radiated Emissions (continued)**Note(s):**

5. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
6. Measurements below 30 MHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) at a distance of 3 m. The EUT placed on table 80 cm from ground plane in the centre of the chamber turntable. The measurement loop antenna height was at 1 m.
7. The emissions shown at frequencies approximately 13.56 MHz on the 9 kHz to 30 MHz plots are the EUT RFID 13.56 MHz fundamental for the tested channel.
8. Pre-scans were performed, and markers placed on the highest measured levels. The test receiver was set to:
 - Frequency range: 9 kHz-150 kHz : RBW: 300 Hz /VBW: 1 kHz
 - Frequency range: 150 kHz – 30 MHz: RBW: 10 kHz /VBW: 30 kHz
 - Detector: Peak detector
 - Trace Mode: Max Hold
9. Final measurements performed with Quasi-peak detector as per CISPR requirements.

Test Setup:

Transmitter Radiated Emissions (continued)**Results: RFID 13.56 MHz**

Frequency (MHz)	Loop Antenna Orientation	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
0.010974	90° to EUT	29.77	46.78	17.01	Complied
0.042347	90° to EUT	18.24	35.06	16.82	Complied
0.066528	0° to EUT	19.17	31.13	11.96	Complied
0.111507	0° to EUT	5.02	26.65	21.63	Complied
0.133010	0° to EUT	15.76	25.12	9.366	Complied
0.196305	0° to EUT	18.60	21.74	3.14	Complied
0.229380	0° to EUT	13.74	20.39	6.65	Complied
0.245918	0° to EUT	15.37	19.79	4.41	Complied
0.292223	0° to EUT	5.95	18.29	12.34	Complied
0.331913	0° to EUT	9.65	17.18	7.53	Complied
0.394755	0° to EUT	11.90	15.68	4.59	Complied
0.464213	0° to EUT	7.50	14.27	6.77	Complied
0.497288	0° to EUT	5.58	33.67	28.09	Complied

Plot: 9kHz – 30MHz – Active RFID**Result: Pass**

Transmitter Radiated Emissions (continued)**Test Summary:**

Test Engineer:	El Moghrabi Omar	Test Date:	01 July 2025
Test Sample Serial Number:	SNP06		
Test Site Identification	SR 1/2		

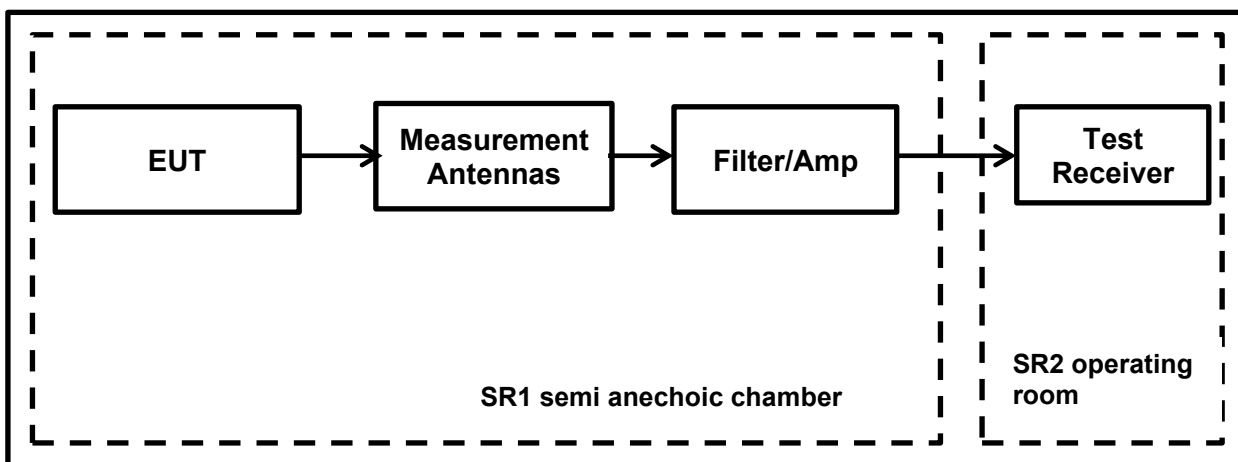
FCC Reference:	Parts 15.225(d) & 15.209(a)
ISED Reference:	RSS-Gen 6.13 / RSS-210 B6
Test Method Used:	ANSI C63.10 Sections 6.3 and 6.5
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	23.1
Relative Humidity (%):	53.8

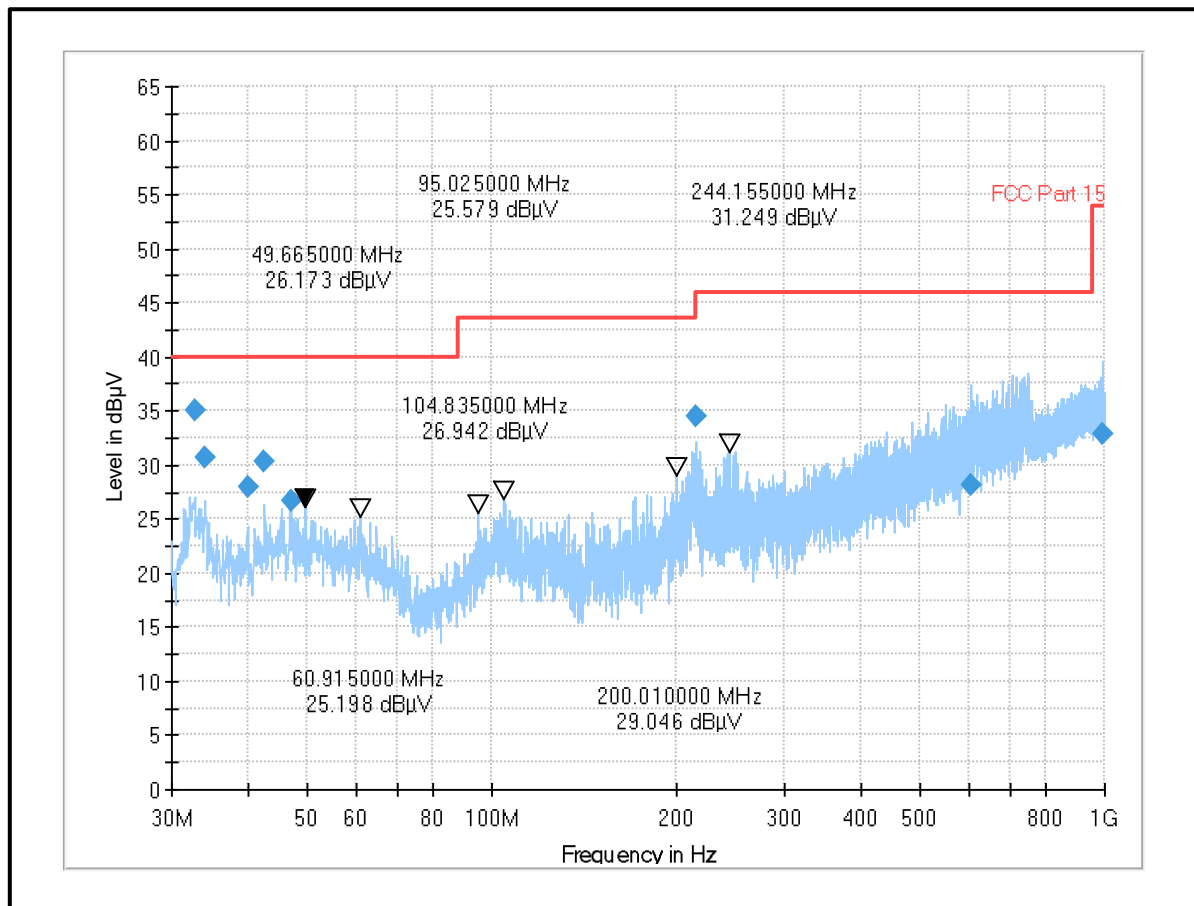
Note(s):

1. Measurements above 30 MHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) at a distance of 3 m. The EUT placed on table 80 cm from ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 m to 4 m.
2. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.
3. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
4. Final measurements were performed on the marker frequencies. The results entered in the table below incorporates the calibrated antenna factor and cable loss. The test receiver resolution bandwidth was set to 120 kHz, using a CISPR quasi-peak detector and span big enough to see the whole emission.

Test Setup:

Transmitter Radiated Emissions (continued)**Results: RFID 13.56 MHz**

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
32.700000	Vertical	35.12	40.00	4.88	Complied
34.005000	Vertical	30.61	40.00	9.39	Complied
39.945000	Vertical	28.01	40.00	11.99	Complied
42.465000	Vertical	30.35	40.00	9.65	Complied
46.920000	Vertical	26.69	40.00	13.31	Complied
214.995000	Horizontal	34.47	43.50	9.03	Complied
605.875000	Horizontal	28.13	46.00	17.87	Complied
996.000000	Vertical	32.82	54.00	21.18	Complied

Plot: 30Mz – 1000MHz – Active RFID**Result: Pass**

6. Measurement Uncertainty

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Confidence Level (%)	Calculated Uncertainty
Radiated Spurious Emissions	95%	±3.10 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Used equipment

Test site: SR 1/2

ID	Manufacturer	Type	Model	Serial	Calibration Date	Cal. Cycle (months)
1	Rohde & Schwarz	Antenna, Loop	HFH2-Z2	831247/012	18/07/2023	36
377	BONN Elektronik	Amplifier, Low Noise Pre	BLMA 0118-1A	025294B	18/07/2023	36
460	Deisel	Turntable	DT 4250 S	n/a	n/a	n/a
465	Schwarzbeck	Antenna, Trilog Broadband	VULB 9163	01691	30/11/2023	36
496	Rohde & Schwarz	Antenna, log. - periodical	HL050	100297	22/08/2022	36
588	Maturo	Controller	NCD	029/7180311	n/a	n/a
669	Rohde & Schwarz	EMI Test Receiver	ESW 44	103087	21/12/2023	36
608	Rohde & Schwarz	Switch Matrix	OSP 120	101227	lab verification	n/a
628	Maturo	Antenna mast	CAM 4.0-P	224/19590716	n/a	n/a
629	Maturo	Kippeinrichtung	KE 2.5-R-M	MAT002	n/a	n/a
-/-	Testo	Thermo-Hygrometer	608-H1	01	lab verification	n/a
328	SPS	AC/DC power distribution system	PAS 5000	A2464 00/2 0200	lab verification	n/a
1603665	Siemens Matsushita Components	semi-anechoic chamber SR1/ 2	-/-	B83117-A1421-T161	n/a	n/a
681	Maturo	Antenna mast, tilting	BAM4.5-P	402/0718.1	n/a	n/a

8. Open-Area-Test Site comparison

GPS coordinates

Latitude: 48.765746, Longitude: 9.250684



Open-Area-Test Site comparison (continued)

The following listed equipment was used for the measurement:

Manufacturer	Type	Model	Frequency Range
Rohde & Schwarz	Signal generator	SML03	9 kHz – 30 MHz
Rohde & Schwarz	Receiver, EMI Test	ESIB7	20 Hz – 7 GHz
Rohde & Schwarz	Antenna, Loop	HFH2-Z2	1 kHz – 30 MHz
ETS LINDGREN	Antenna, Loop	6512	1 kHz – 30 MHz
HUBER+SUHNER	RF Cable	-/-	-/-
Elspec	BNC Cable	-/-	-/-

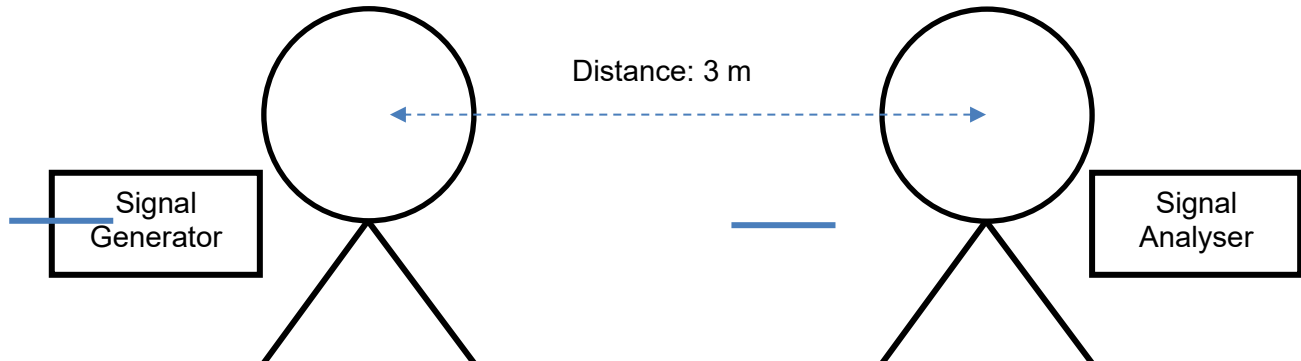
The transmit signal to the ETS Lindgren loop antenna is supplied by the SML signal generator.

The distance of the transmit and receive antenna was 3 m. No other distances can be achieved in SR1 so 10 m and 30 m distances are not possible. Due to this no comparison is possible.

The Results are valid for equipment which is not larger as the loop antenna which represents in the comparison the EUT.

If an EUT is bigger measurements on an OATS are needed.

The measurement was performed on the lowest frequency 9 kHz and was increased by 10 kHz Steps up to 100 kHz. Then the step size was 100 kHz up to 1000 kHz. From 1 MHz up to the last frequency of 30 MHz the step size was 1 MHz. The HFH2-Z2 loop antenna placed at 80 cm height was used as the receive antenna. The intercepted RF signal from this antenna was measured with the ESIB7 Test Receiver and the values were recorded accordingly.



Open-Area-Test Site comparison (continued)

Numeric values:

Frequency (MHz)	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.125	0.20
SR1 Measured power (dBμV)	87.91	87.22	87.01	86.98	86.40	86.32	85.98	85.20	84.30	83.80	82.96	82.55
OATS Measured power (dBμV)	86.22	87.42	87.50	86.49	86.01	85.39	84.32	84.29	84.20	83.10	83.60	82.32
Delta (dB)	-1.69	0.20	0.49	-0.49	-0.39	-0.93	-1.66	-0.91	-0.10	-0.70	0.64	-0.23

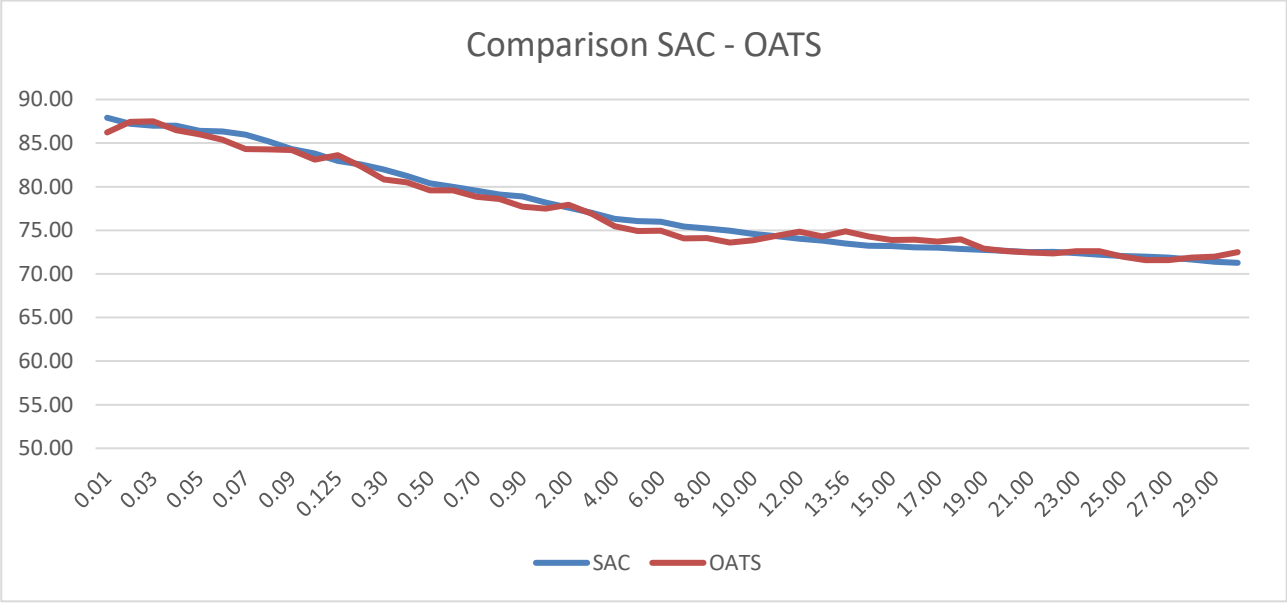
Frequency (MHz)	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	2.00	3.00	4.00	5.00
SR1 Measured power (dBμV)	81.98	81.23	80.39	80.00	79.53	79.10	78.87	78.20	77.60	77.01	76.32	76.04
OATS Measured power (dBμV)	80.84	80.49	79.58	79.58	78.85	78.59	77.69	77.50	77.91	76.90	75.45	74.90
Delta (dB)	-1.14	-0.74	-0.81	-0.42	-0.68	-0.51	-1.18	-0.70	0.31	-0.11	-0.87	-1.14

Frequency (MHz)	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	13.56	14.00	15.00	16.00
SR1 Measured power (dBμV)	75.98	75.43	75.20	74.97	74.59	74.32	74.05	73.83	73.50	73.22	73.20	73.05
OATS Measured power (dBμV)	74.94	74.09	74.11	73.58	73.87	74.38	74.84	74.31	74.88	74.29	73.90	73.93
Delta (dB)	-1.04	-1.34	-1.09	-1.39	-0.72	0.06	0.79	0.48	1.38	1.07	0.70	0.88

Frequency (MHz)	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00
SR1 Measured power (dBμV)	73.00	72.86	72.74	72.64	72.50	72.52	72.39	72.20	72.04	71.97	71.86	71.64	71.41	71.27
OATS Measured power (dBμV)	73.70	73.98	72.90	72.60	72.45	72.34	72.59	72.59	71.97	71.59	71.58	71.88	71.98	72.49
Delta (dB)	0.70	1.12	0.16	-0.04	-0.05	-0.18	0.20	0.39	-0.07	-0.38	-0.28	0.24	0.57	1.22

Open-Area-Test Site comparison (continued)

Graph



Conclusion: Maximum difference is 1.69 dB @ 9 kHz

9. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	22	-	Initial Version
1.1	1,5,21,22		Update the HMN number Update the ANSI standard reference version Remove the setup photos chapter to be on separate document

--- END OF TEST REPORT ---