



Solutions

TEST REPORT

Test Report No.: UL-RPT-RP-15669159-416

Applicant * : Eppendorf SE

Model No. / PMN * : PremiumFeatures

FCC / ISSED ID * : FCC ID: 2AXZD0116800209
IC: 26635-0116800209

HVIN * : 0116 800.209-01

Technology : RFID 13.56 MHz

Test Standard(s) : **FCC Parts 15.207, 15.209(a) & 15.225**
Innovation, Science and Economic Development Canada
Section B.6, Annex B, RSS-210 Issue 11 June 2024 & 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 UL-RPT-RP-15669159-416 Version 1.1 issue date 29 September 2025
Replaces
Test Report UL-RPT-RP-15669159-416 Version 1.0 issue date 21 July 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which is no longer valid.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: Yixiang Lin
Title: Project Engineer
Date: 21 July 2025

Approved by: Rachid Acharkaoui
Title: Operations Manager
Date: 29 September 2025



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:	47CFR15.207 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 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 Strasse. 61, 70327 Stuttgart GERMANY
Test Firm Registration:	399704
Company Number:	22511
CABID:	DE0008

Date information

Order Date:	20 January 2025
EUT arrived:	7 March 2025
Test Dates:	11 March 2025 – 22 May 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.

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:	FCC KDB 174176 D01 Line Conducted FAQ v01r02 August 7, 2025
Title:	AC Power-Line Conducted Emissions Frequently Asked Questions
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:	PremiumFeatures
Serial Number:	SNP06 (normal operation); SNP07 (with terminated antenna)
Hardware Version Number:	1.00
Firmware Version Number:	EMC Firmware v2025-01-31
HVIN:	0116 800.209-01
FVIN:	0116 460.035-00
FCC ID:	FCC ID: 2AXZD0116800209
ISED Certification No.:	IC: 26635-0116800209

3.2. Description of EUT *

The equipment under test was a hardware module with RFID communication with user ID cards.

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):	6.5VDC via AC/DC power supply through Harmony Bus Adapter	
Modulation:	ASK	
Tested Temperature Range:	Minimum	-20 °C
	Maximum	50 °C
Antenna Used:	Integral 2 loop ring antenna	

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	AC/DC Power Supply	Good Will	GPC-1850D	7662217

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	RFID transponder	eppendorf	0116 800.330-01 - EP00000177-01 - RFID Tag A molded	-/-
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 EUT was configured according to the document "2025-02-24 - Test Plan for HW-Module PremiumFeatures.pdf".
- 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.

EUT Power supply:

- The EUT was powered with 120V 60 Hz via the AC/DC power supply through the Harmony Bus Adapter.

Test Mode Activations:

- The RFID 13.56 MHz test mode was activated according to the document "2025-02-24 - Test Plan for HW-Module PremiumFeatures.pdf".

AC Conducted Measurements:

- For AC conducted line emissions measurement the EUT was powered with 120VAC / 60 Hz and also 240 VAC / 60 Hz via the AC/DC Power supply as it is in the range of the supply being used for testing.
- In accordance with FCC KDB 174176 Q5, AC conducted emissions was also performed with EUT RFID 13.56 MHz Antenna terminated (dummy load).
- The Toyo EMI Software EP5/CE Ver 4.4.010 was used for these measurements.

Radiated Measurements:

- The radiated samples with integrated antenna were used for the radiated measurements.
- Before starting final radiated measurements, a worst-case verification with the EUT in standing position & laying position was performed. The EUT in standing position was found to be the worst case.
- 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 AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	Yixiang Lin	Test Date:	22 May 2025
Test Sample Serial Number:	SNP06		
Test Site Identification	SR 7/8		

FCC Reference:	Part 15.207
ISED Reference:	RSS-Gen 8.8
Test Method Used:	ANSI C63.10 Section 6.2 / FCC KDB 174176 RSS-Gen 8.8 and notes below

Environmental Conditions:

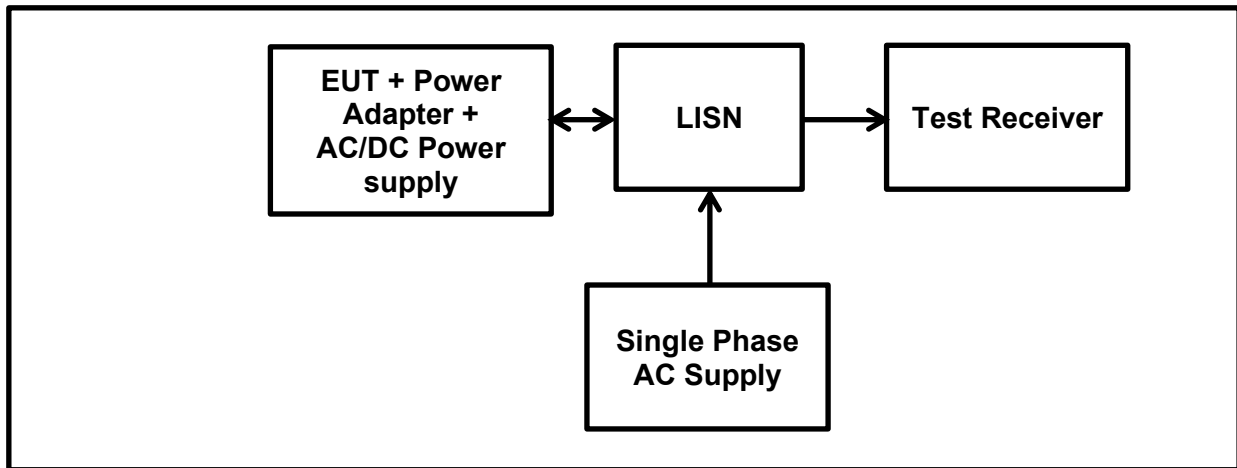
Temperature (°C):	23.5
Relative Humidity (%):	40.5

Settings of the Instrument

Detector	Quasi Peak/ Average
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Note(s):

1. Preliminary measurements were performed at both 50 Hz and 60 Hz supply frequencies. There was no change to the observed emissions. Therefore, the EUT was powered with 120VAC / 60 Hz and also 240 VAC / 60 Hz as it is in the range of the used power supply.
2. As mentioned in FCC KDB 174176 Q5 a suitable dummy load for radio frequency termination used in place of the antenna, which has the same electrical properties as the intended antenna without radiated emissions.
3. Pre-scans were performed, and markers placed on the highest live and neutral measured levels. Final measurements were performed on the marker frequencies and the results entered into tables below.
4. The final measured value, for the given emission, in the table below incorporates the cable loss.
5. All other emissions shown on the pre-scan plot were investigated. Only the highest 6 emissions have been reported in the tables below in accordance with ANSI C63.10 section 6.2.5.
6. Measurements were performed in shielded room (SR7/ 8 Asset Number 1603671). The EUT was placed at a height of 80 cm above the reference ground plane and in a distance of 40 cm from the vertical ground plane at the edge of the table.

Transmitter AC Conducted Spurious Emissions (continued)**Test setup:**

Transmitter AC Conducted Spurious Emissions (continued)**Results: Live / Quasi Peak / 120 VAC 60 Hz / RFID Active**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.560	Live	47.70	60.00	12.30	Carrier
23.322	Live	18.80	60.00	41.20	Complied
27.120	Live	49.60	60.00	10.40	Complied

Results: Live / Average / 120 VAC 60 Hz / RFID Active

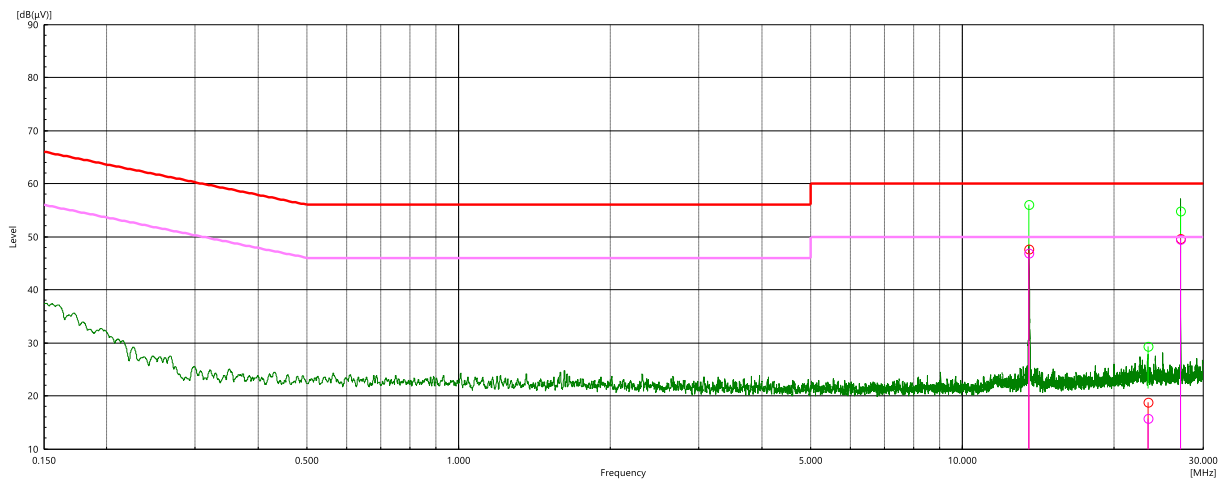
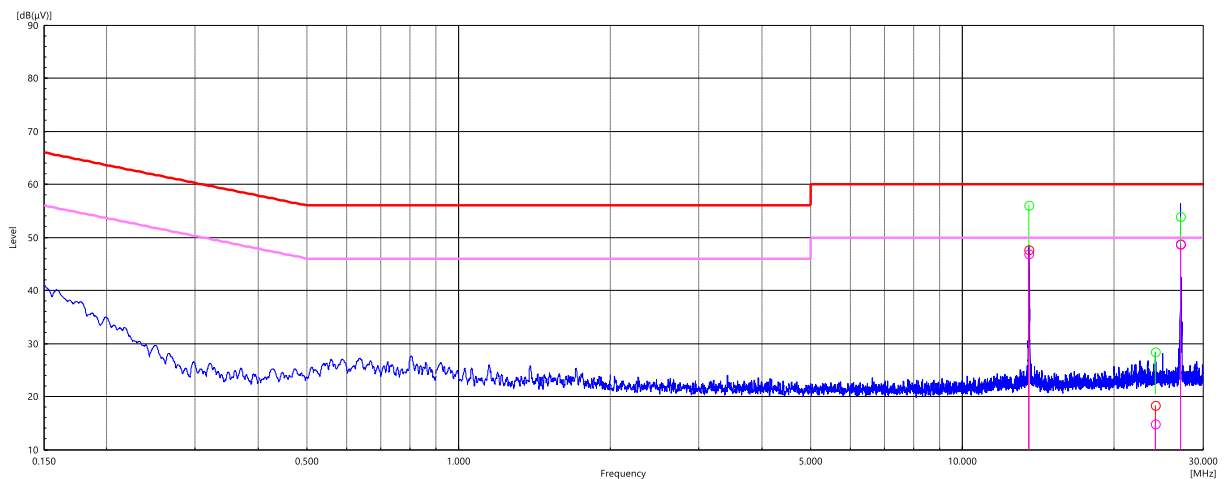
Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.560	Live	46.90	50.00	3.10	Carrier
23.322	Live	15.70	50.00	34.30	Complied
27.120	Live	49.50	50.00	0.50	Complied

Results: Neutral / Quasi Peak / 120 VAC 60 Hz / RFID Active

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.560	Neutral	47.70	60.00	12.30	Carrier
24.180	Neutral	18.30	60.00	41.70	Complied
27.120	Neutral	48.70	60.00	11.30	Complied

Transmitter AC Conducted Spurious Emissions (continued)**Results: Neutral / Average / 120 VAC 60 Hz / RFID Active**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.560	Neutral	46.90	50.00	3.10	Carrier
24.180	Neutral	14.80	50.00	35.20	Complied
27.120	Neutral	48.60	50.00	1.40	Complied

Result: Pass**Plot: Live Line / 120 VAC 60 Hz / RFID Active****Plot: Neutral Line / 120 VAC 60 Hz / RFID Active**

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter AC Conducted Spurious Emissions (continued)**Results: Live / Quasi Peak / 240 VAC 60 Hz / RFID Active**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.560	Live	56.40	50.00	-6.40	Carrier
23.329	Live	19.10	50.00	30.90	Complied
27.121	Live	48.90	50.00	1.10	Complied

Results: Live / Average / 240 VAC 60 Hz / RFID Active

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.56	Live	56.40	50.00	-6.40	Carrier
23.329	Live	19.10	50.00	30.90	Complied
27.121	Live	48.90	50.00	1.10	Complied

Results: Neutral / Quasi Peak / 240 VAC 60 Hz / RFID Active

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.56	Neutral	56.80	60.00	3.20	Carrier
13.404	Neutral	15.90	60.00	44.10	Complied
27.121	Neutral	48.10	60.00	11.90	Complied

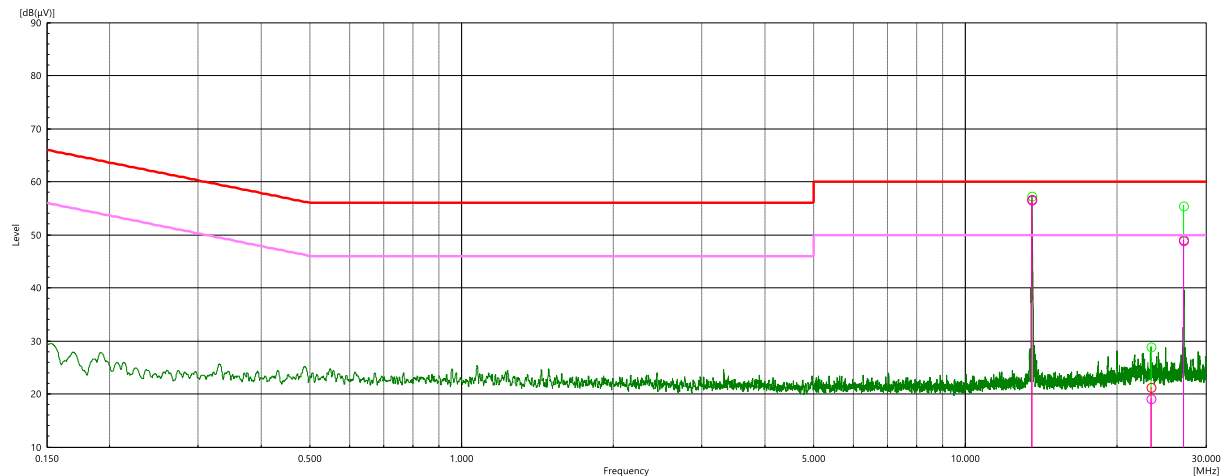
Results: Neutral / Average / 240 VAC 60 Hz / RFID Active

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.56	Neutral	56.60	50.00	-6.60	Carrier
13.404	Neutral	6.40	50.00	43.60	Complied
27.121	Neutral	48.10	50.00	1.90	Complied

Result: Pass

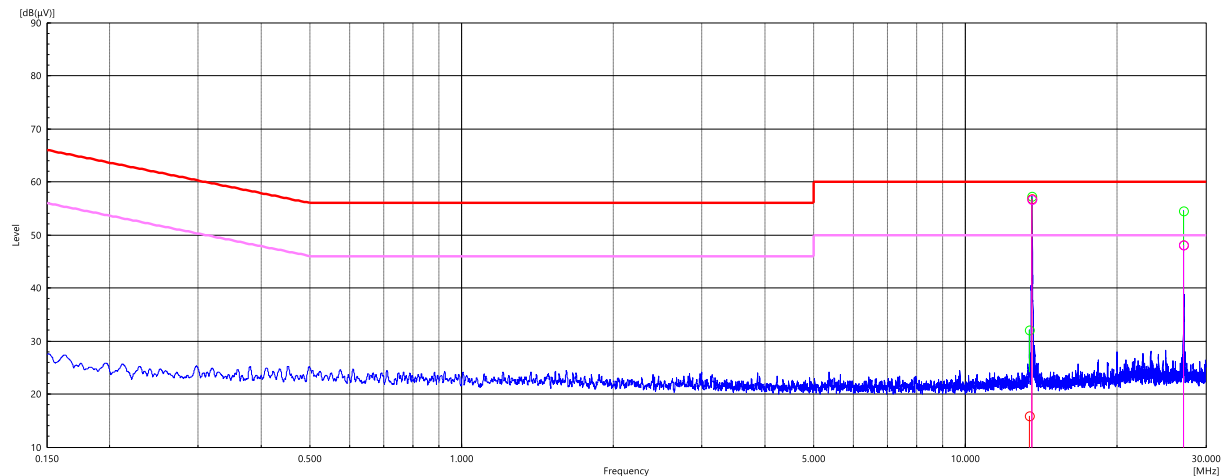
Transmitter AC Conducted Spurious Emissions (continued)

Plot: Live Line / 240 VAC 60 Hz / RFID Active



Note: The plot is a pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Plot: Neutral Line / 240 VAC 60 Hz / RFID Active



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Results: Live / Quasi Peak / 120 VAC 60 Hz / Antenna terminated with Dummy Load

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
23.335	Live	21.7	60	38.3	Complied
19.160	Live	17.7	60	42.3	Complied
21.661	Live	21.5	60	38.5	Complied

Results: Live / Average / 120 VAC 60 Hz / Antenna terminated with Dummy Load

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
23.335	Live	19.7	50	30.3	Complied
19.160	Live	14.3	50	35.7	Complied
21.661	Live	19.5	50	30.5	Complied

Results: Neutral / Quasi Peak / 120 VAC 60 Hz / Antenna terminated with Dummy Load

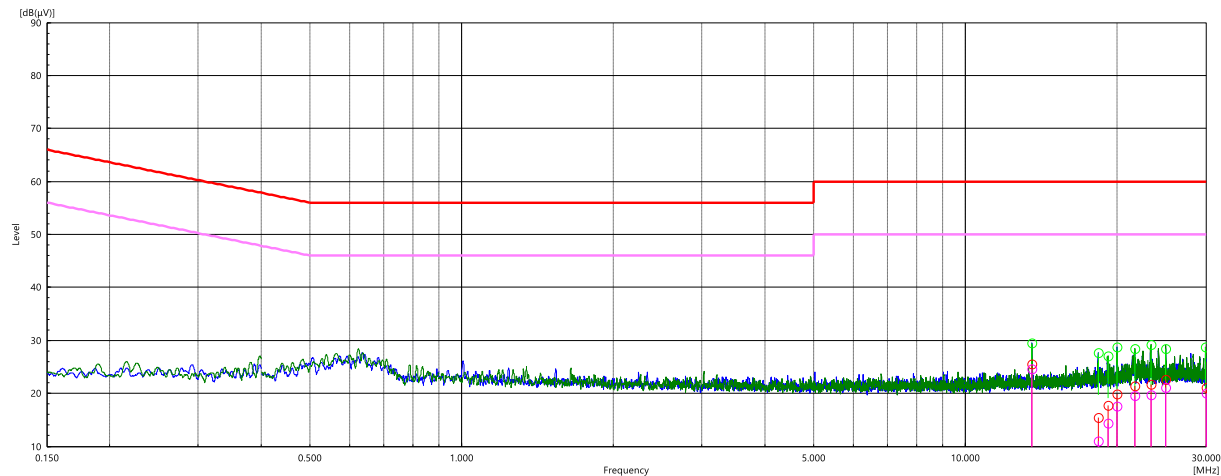
Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.560	Neutral	25.5	60	34.5	Complied
20.004	Neutral	19.8	60	40.2	Complied
25.000	Neutral	22.6	60	37.4	Complied
13.560	Neutral	25.5	60	34.5	Complied
18.345	Neutral	15.4	60	44.6	Complied

Transmitter AC Conducted Spurious Emissions (continued)**Results: Neutral / Average / 120 VAC 60 Hz / Antenna terminated with Dummy Load**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.560	Neutral	24.7	50	25.3	Complied
20.004	Neutral	17.6	50	32.4	Complied
25.000	Neutral	21.1	50	28.9	Complied
18.345	Neutral	10.9	50	39.1	Complied

Result: Pass

Transmitter AC Conducted Spurious Emissions (continued)
Plot: 120 VAC 60 Hz / Antenna terminated with Dummy Load



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter AC Conducted Spurious Emissions (continued)**Results: Live / Quasi Peak / 240 VAC 60 Hz / Antenna terminated with Dummy Load**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
20.000	Live	23.1	60	36.9	Complied
23.335	Live	22.0	60	38.0	Complied
24.996	Live	19.8	60	40.2	Complied
24.177	Live	19.5	60	40.5	Complied

Results: Live / Average / 240 VAC 60 Hz / Antenna terminated with Dummy Load

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
20.000	Live	21.8	50	28.2	Complied
23.335	Live	20.2	50	29.8	Complied
24.996	Live	16.8	50	33.2	Complied
24.177	Live	16.7	50	33.3	Complied

Results: Neutral / Quasi Peak / 240 VAC 60 Hz / Antenna terminated with Dummy Load

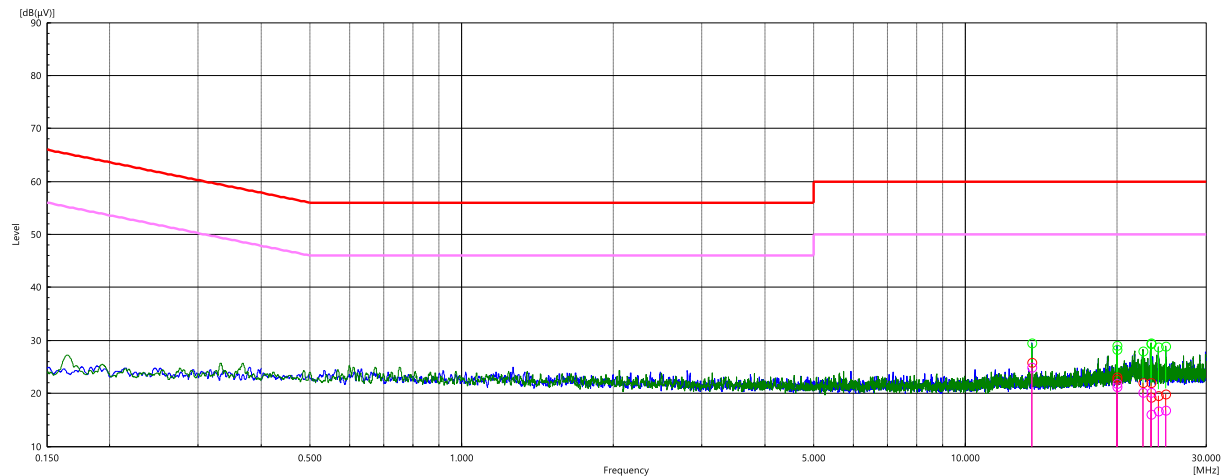
Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.560	Neutral	25.8	60	34.2	Complied
20.001	Neutral	22.7	60	37.3	Complied
23.330	Neutral	19.2	60	40.8	Complied
22.482	Neutral	22.0	60	38.0	Complied

Results: Neutral / Average / 240 VAC 60 Hz / Antenna terminated with Dummy Load

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
13.560	Neutral	25.0	50	25.0	Complied
20.001	Neutral	21.2	50	28.8	Complied
23.330	Neutral	16.0	50	34.0	Complied
22.482	Neutral	20.2	50	29.8	Complied

Result: Pass

Transmitter AC Conducted Spurious Emissions (continued)
Plot: 240 VAC 60 Hz / Antenna terminated with Dummy Load



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

5.2.2. Transmitter 99 % Emission Bandwidth

Test Summary:

Test Engineer:	Yixiang Lin	Test Date:	22 May 2025
Test Sample Serial Number:	SNP06 (normal operation)		
Test Site Identification	SR 9		

ISED Reference:	RSS-Gen 6.7
Test Method Used:	RSS-Gen 6.7

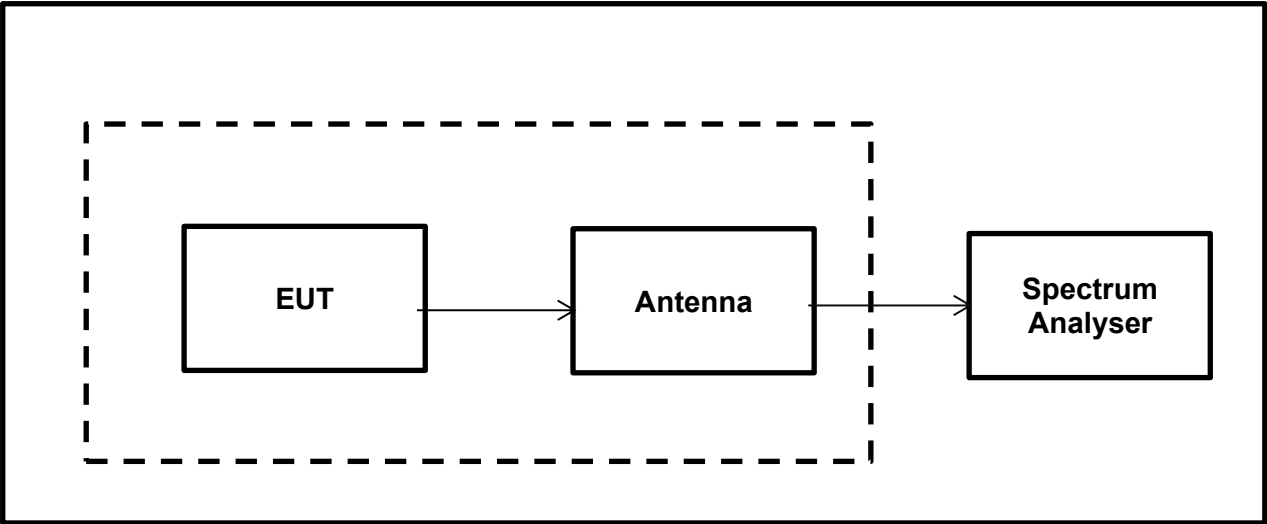
Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	41

Settings of the Instrument

RBW/VBW	10 Hz / 30 Hz
Span	2 kHz
Sweep time	Auto
Detector	Peak

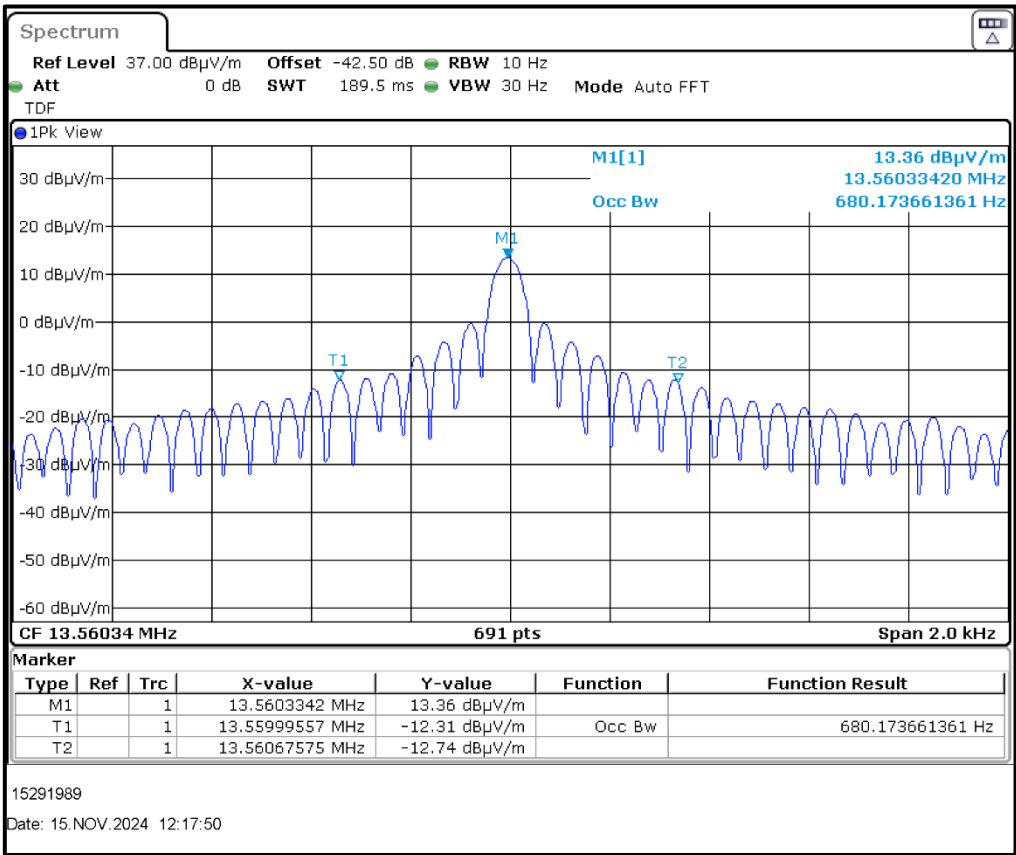
Test Setup:



Transmitter 99 % Emission Bandwidth (continued)

Results: RFID 13.56 MHz

RFID Channel	99% Emission Bandwidth (Hz)
13.56 MHz	680.173



Result: Pass

5.2.3. Transmitter 20 dB Bandwidth

Test Summary:

Test Engineer:	Yixiang Lin	Test Date:	22 May 2025
Test Sample Serial Number:	SNP06 (normal operation)		
Test Site Identification	SR 9		

FCC Reference:	Part 15.215(c)
Test Method Used:	ANSI C63.10 Section 6.9.2

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	41

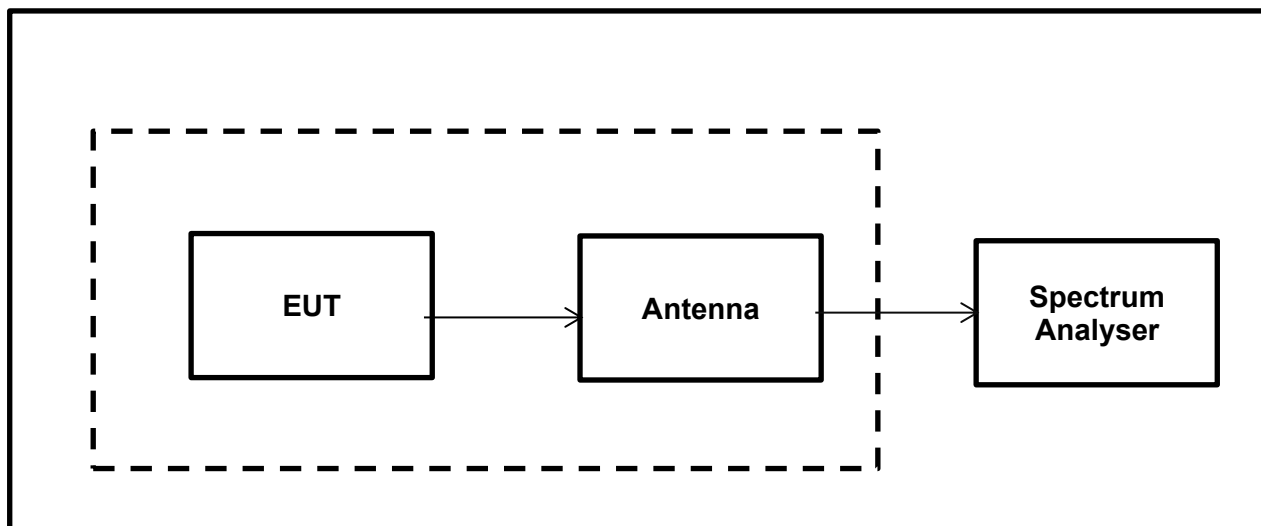
Settings of the Instrument:

RBW/VBW	10 Hz / 30 Hz
Span	2 kHz
Sweep time	Auto
Detector	MaxPeak

Notes:

1. The n dB down function of the spectrum analyzer was set to 20 dB.

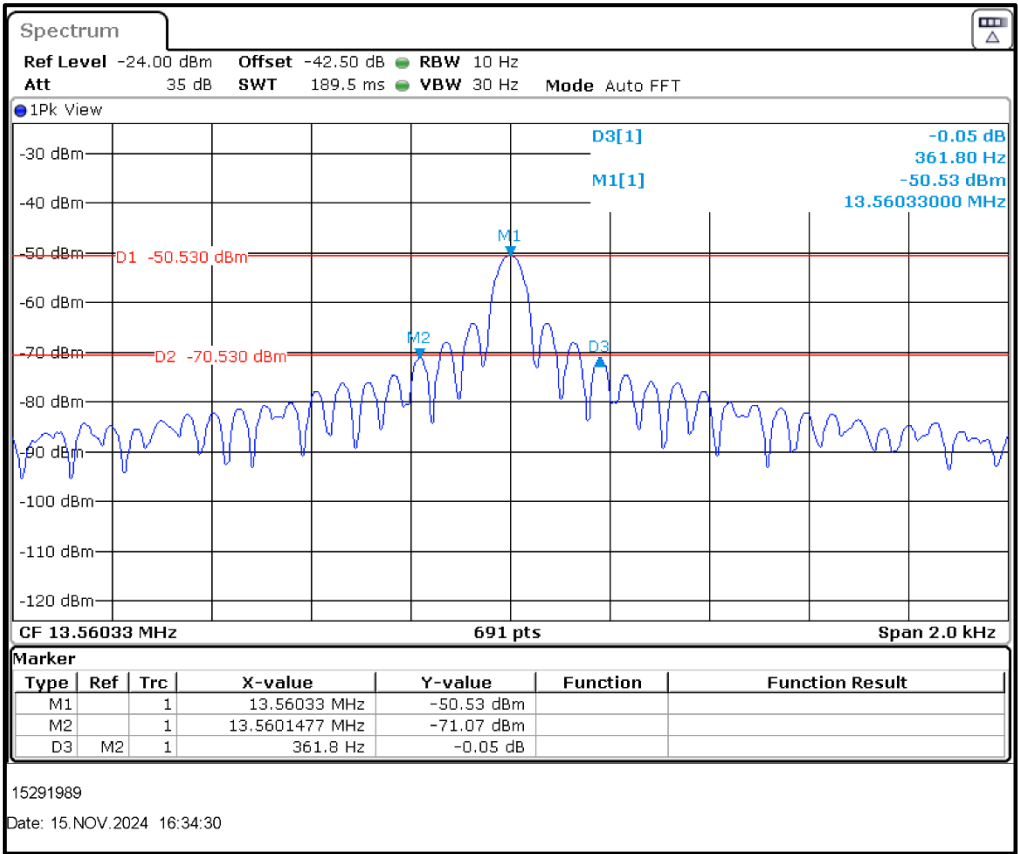
Test Setup:



Transmitter 20 dB Bandwidth (continued)

Results: RFID 13.56 MHz

RFID Channel	20 dB Bandwidth (Hz)
13.56 MHz	361.8



RFID 13.56 MHz

Result: Pass

5.2.4. Transmitter Fundamental Field Strength & Spectrum Mask

Test Summary:

Test Engineer:	El Moghrabi Omar	Test Date:	21 May 2025
Test Sample Serial Number:	SNP06 (normal operation)		
Test Site Identification	SR 1/2		

FCC Reference:	Part 15.225(a)(b)(c)(d)
ISED Reference:	RSS-Gen 6.12 / RSS-210 B.6
Test Method Used:	ANSI C63.10 Section 6.4

Environmental Conditions:

Temperature (°C):	21.1
Relative Humidity (%):	45.2

Note(s):

- The limit is specified at a test distance of 30 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.
- 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 to which the delta of 1.38 dB at 13.56 MHz (as detailed in section 8. Open-Area-Test Site comparison of this report) and for all other frequencies already included in the measured values represented below in the table.
- 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.

- Pre-scan measurements were performed using a spectrum analyser with a peak detector and measurement bandwidth of 10 kHz. The fundamental field strength was maximized by rotating the measurement antenna and EUT. The spectrum analyser was then switched to test receiver mode and the final measurement on the maximized level was performed.
- The emissions shown at frequencies approximately at 13.56 MHz on the plot represent EUT's fundamental field strength for RFID 13.56 MHz.

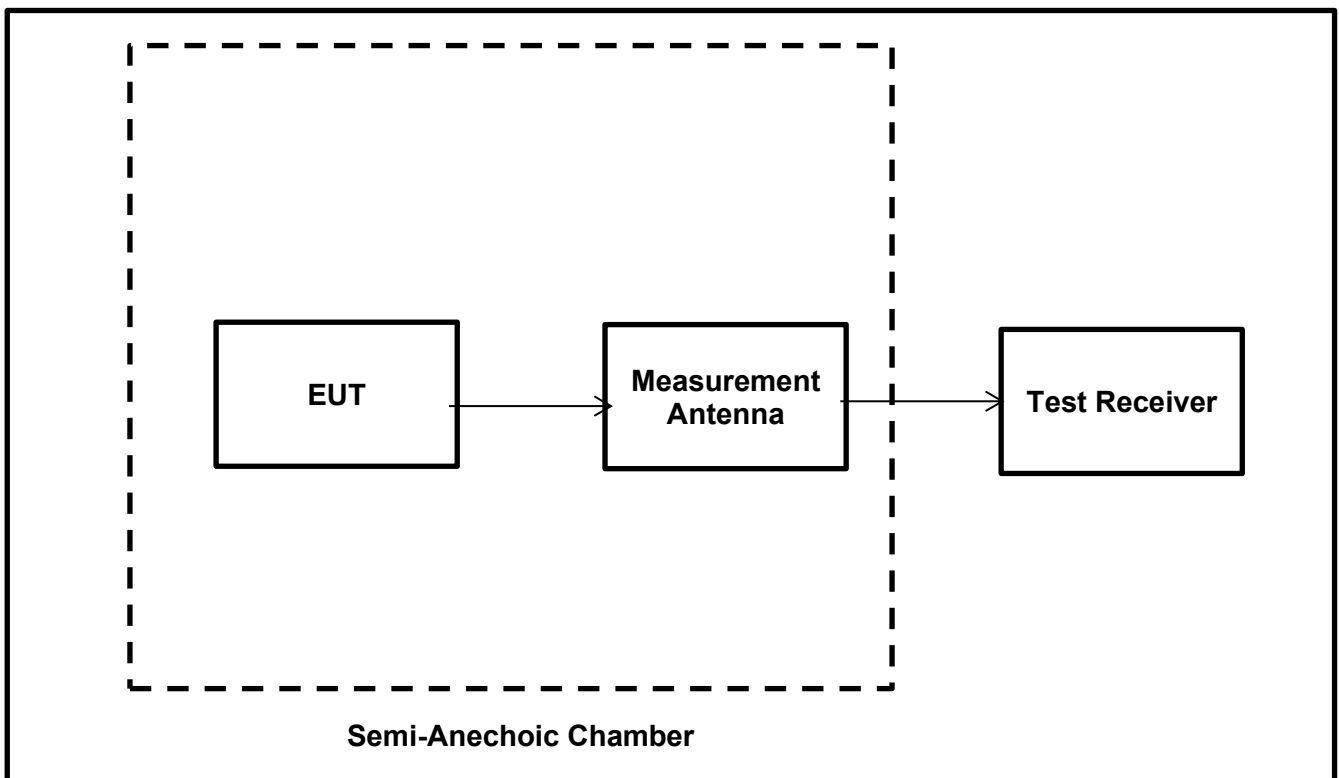
Transmitter Fundamental Field Strength & Spectrum Mask(continued)**Note(s):**

6. The measured values at 3 m were extrapolated to the required measurement distance of 30 m and compared the specified limit at this distances as follows:
- 490 kHz-30 MHz: measured value extrapolated from 3 m to 30 m by subtracting 40 dB at 40 dB /decade.

The results table shows both the measured levels at 3 m and the same measurement values extrapolated to the actual measurement distance for the limits specified at 30 metres.

Conversely, the limit line shown on the spectrum plot was extrapolated to 3 m from 30 m using the 40 dB /decade rule.

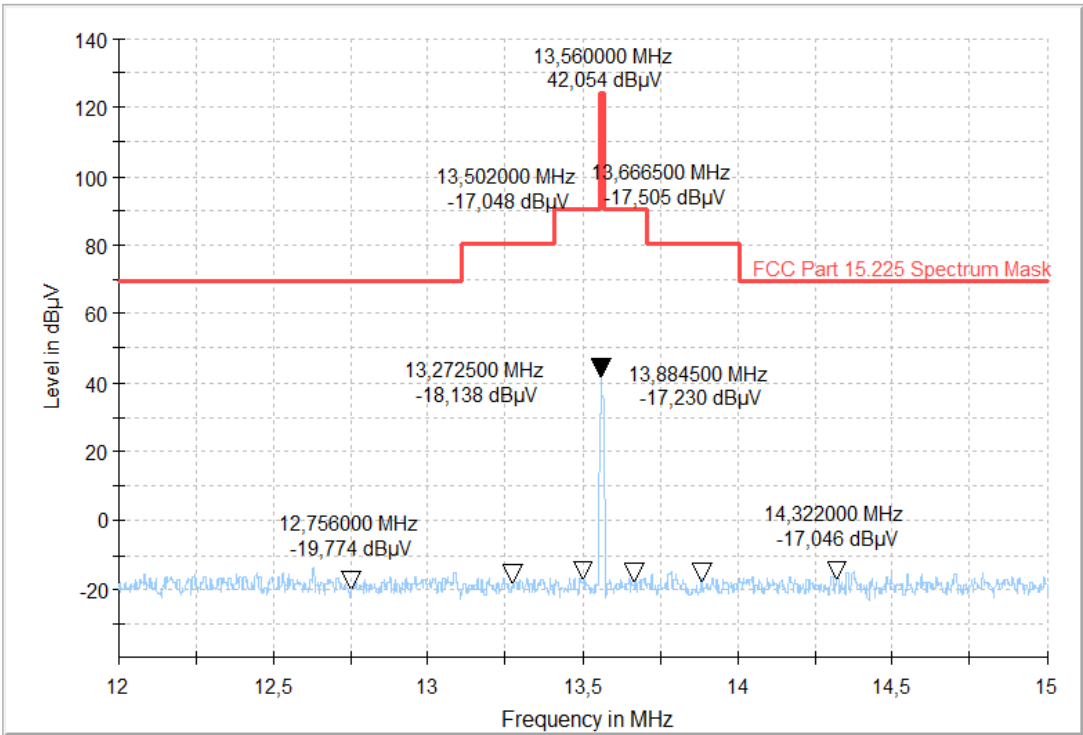
7. For the emissions appearing within the 13.110-14.010 MHz band, compliance with the spectrum mask is shown in accordance with FCC Part 15.225(a)(b)(c) limits and ISSED RSS-210 Annex B.6 a. i, ii and iii.
8. For the emissions appearing outside of the 13.110-14.010 MHz band, compliance with the spectrum mask is shown in accordance with FCC Part 15.225(d) referencing FCC Part 15.209 general radiated emission limits.
9. For the emissions appearing outside of the 13.110-14.010 MHz band, compliance with the spectrum mask is shown in accordance with RSS-210 B.6(a)(iv) referencing RSS-Gen general field strength limits.

Test Setup:

Transmitter Fundamental Field Strength & Spectrum Mask (continued)**Results: RFID 13.56 MHz**

Frequency Band (MHz)	Emission Frequency (MHz)	Loop Antenna Orientation	Max Peak Emission Level at 3 m (dB μ V/m)	Extrapolated Max Peak Level (dBuV/m)	Limit (dB μ V/m)	Limit Distance (m)	Margin (dB)	Result
12.000 to 13.110	12.756	0° to EUT	-19.774	-59.774	29.5	30	89.274	Complied
13.110 to 13.410	13.272	0° to EUT	-18.138	-58.138	40.50	30	98.638	Complied
13.410 to 13.553	13.502	0° to EUT	-17.048	-57.048	50.50	30	107.548	Complied
13.553 to 13.567	13.56	0° to EUT	42.054	2.054	84	30	81.946	Complied
13.567 to 13.710	13.666	0° to EUT	-17.505	-57.505	50.50	30	108.005	Complied
13.710 to 14.010	13.884	0° to EUT	-17.23	-57.23	40.50	30	97.73	Complied
14.010 to 15.000	14.322	0° to EUT	-17.046	-57.046	29.5	30	86.546	Complied

Transmitter Fundamental Field Strength & Spectrum Mask (continued)
Plot: RFID 13.56 MHz



Fundamental field strength and spectrum mask / measured at 3 metres/ measured in a semi-anechoic chamber

Result: Pass

5.2.5. Transmitter Radiated Spurious Emissions**Test Summary:**

Test Engineer:	Yixiang Lin	Test Date:	21 May 2025
Test Sample Serial Number:	SNP06 (normal operation)		
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):	21.1
Relative Humidity (%):	45.2

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 available upon request.
- 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 .

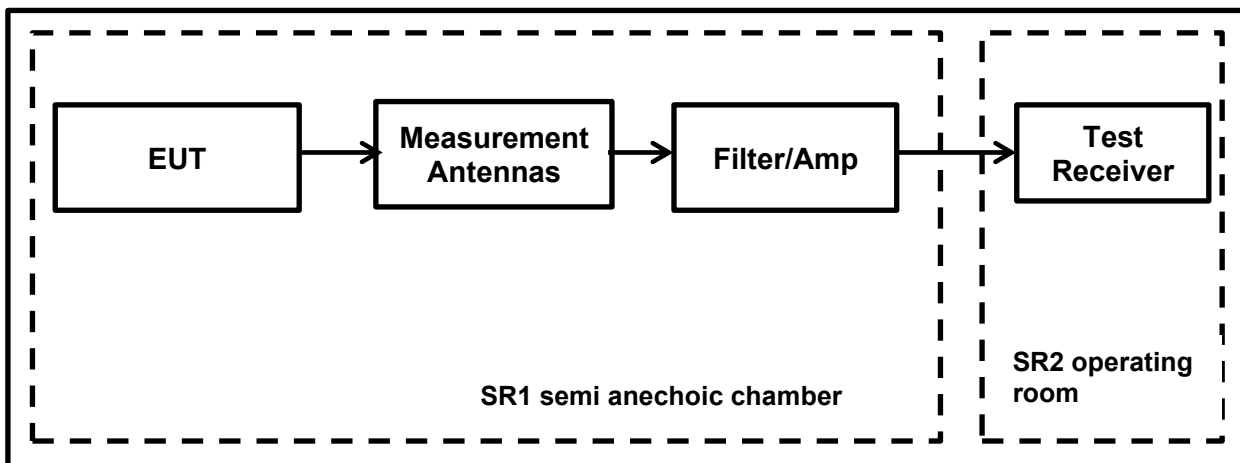
$$AF^E [\text{dB}(\text{m}^{-1})] = AF^H [\text{dB}(\Omega^{-1}\text{m}^{-1})] + Z_0[\text{dB}\Omega]$$

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.
- 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.
- 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.

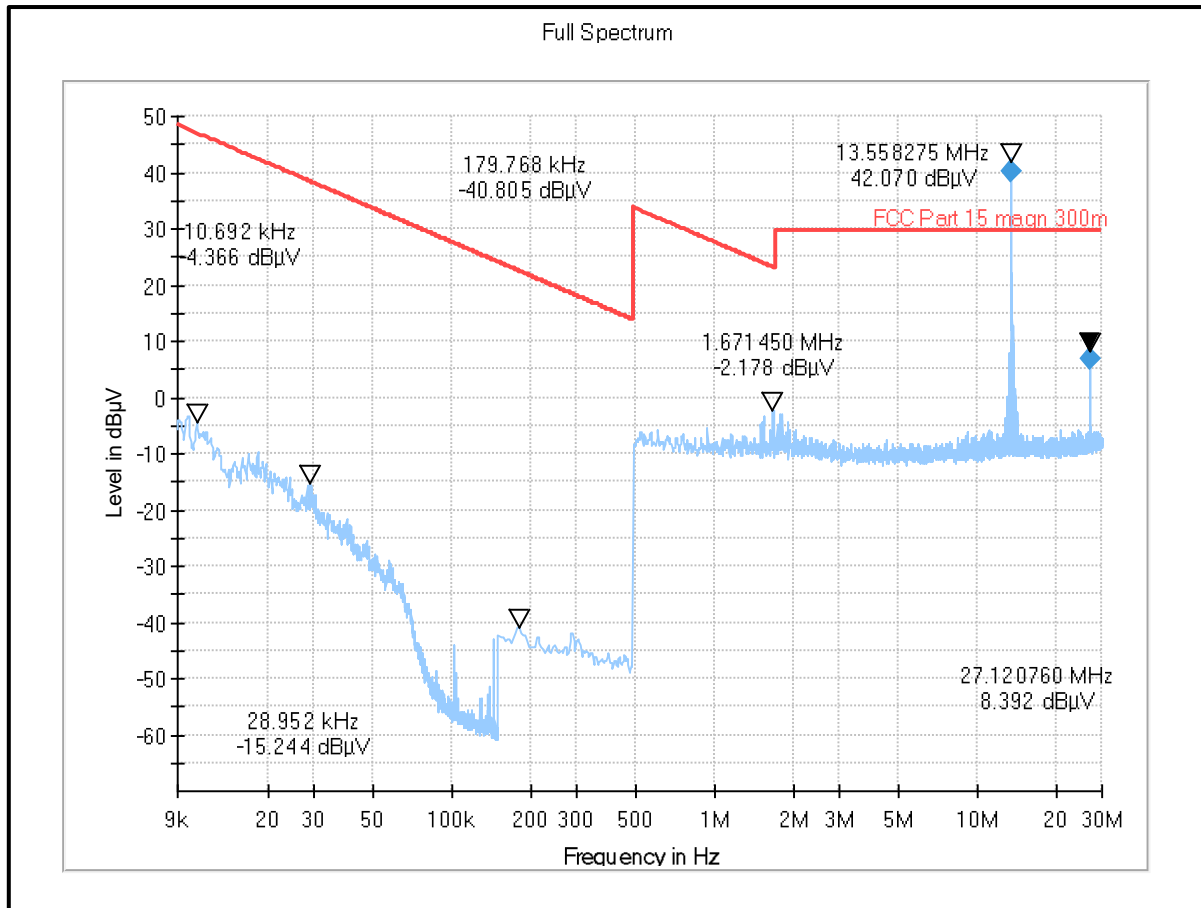
Transmitter Radiated Emissions (continued)**Note(s):**

6. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
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:
9. Frequency range: 9 kHz-150 kHz : RBW: 300 Hz /VBW: 1 kHz
10. Frequency range: 150 kHz – 30 MHz: RBW: 10 kHz /VBW: 30 kHz
11. Detector: Peak detector
12. Trace Mode: Max Hold
13. Final measurements performed with Quasi-peak detector as per CISPR requirements.
14. The emission shown approximately at 13.56 MHz on the plot is the EUT fundamental.

Test Setup:

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

Frequency (MHz)	Loop Antenna Orientation	Extrapolated Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
27.121	90° to EUT	6.93	29.5	22.57	Complied

Plot: 9kHz – 30MHz – Active RFID

Note: The plot is pre-scan and for indication purposes only. For final measurements, see accompanying table.

Result: Pass

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

Test Engineer:	Yixiang Lin	Test Date:	21 March 2025
Test Sample Serial Number:	SNP06 (normal operation)		
Test Site Identification	SR 1/2		

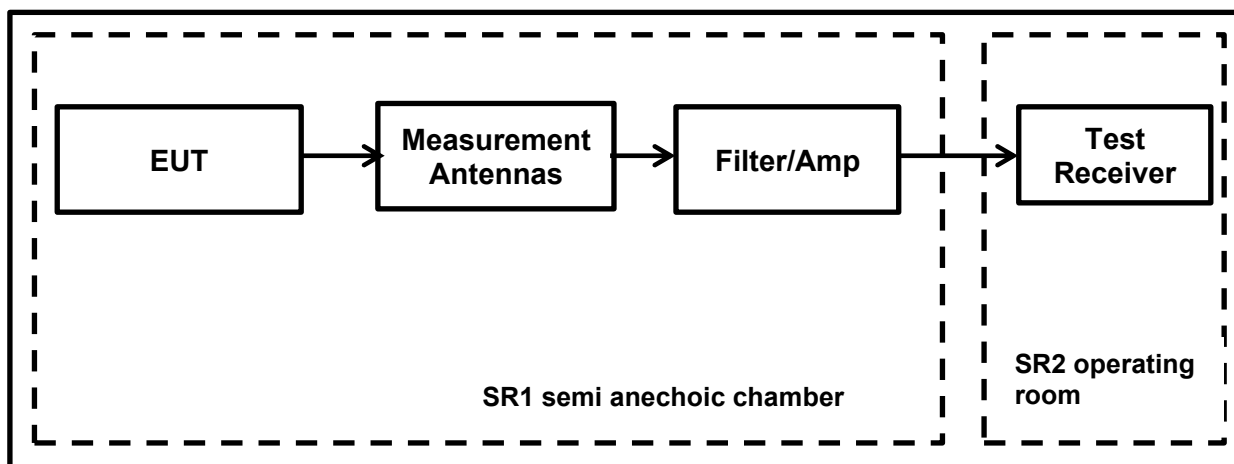
FCC Reference:	Parts 15.225(d) & 15.209(a)
ISED Reference:	RSS-Gen 6.13 / RSS-210 B6
Test Method Used:	ANSI C63.10 Sections 6.3 and 6.5
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	21.1
Relative Humidity (%):	45.2

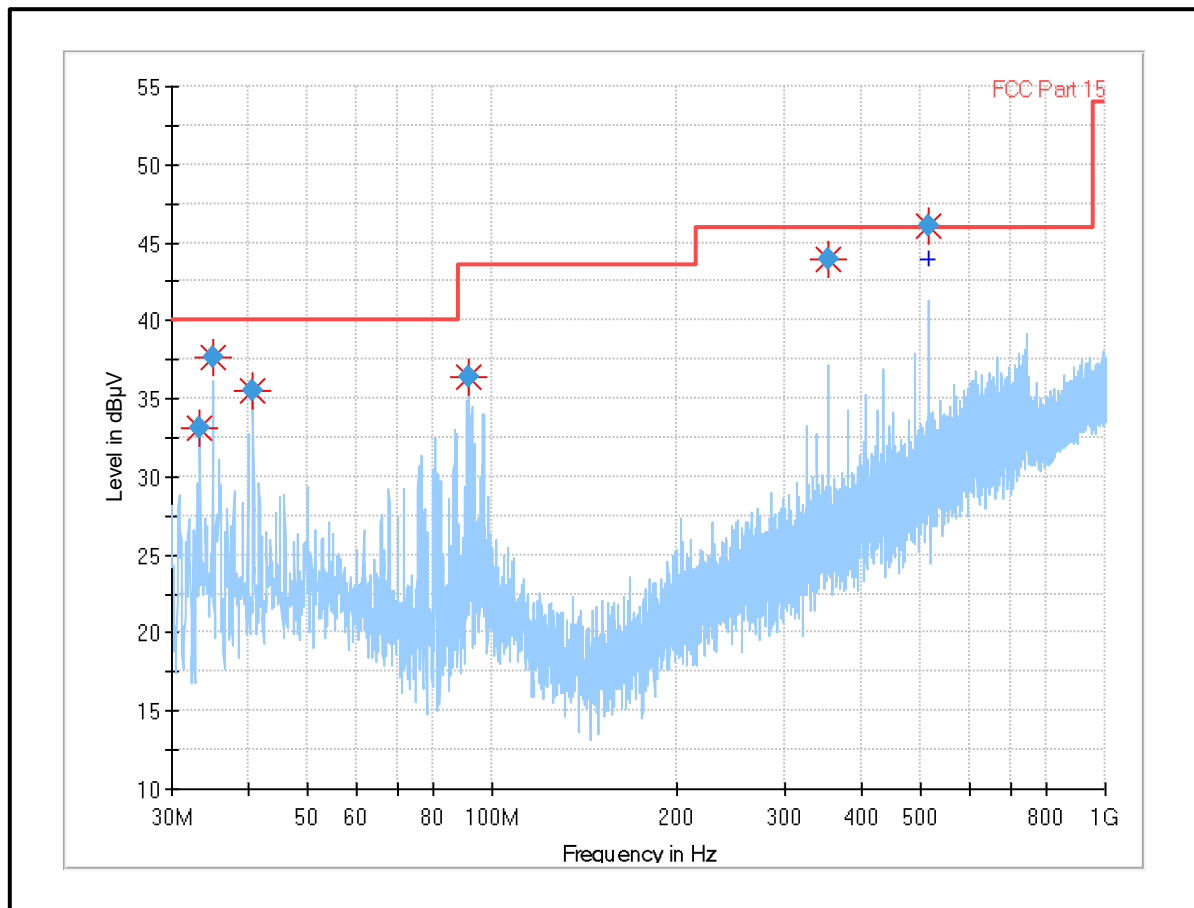
Note(s):

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
33.330000	Vertical	31.65	40.00	8.35	Complied
34.995000	Vertical	36.51	40.00	3.49	Complied
40.665000	Vertical	34.32	40.00	5.68	Complied
91.650000	Vertical	35.77	43.50	7.73	Complied
352.566667	Vertical	42.52	46.00	3.48	Complied
515.291667	Vertical	43.85	46.00	2.15	Complied

Plot: 30MHz – 1000MHz – Active RFID

Note: The plot is pre-scan and for indication purposes only. For final measurements, see accompanying table.

Result: Pass

5.2.6. Transmitter Frequency Stability (Temperature & Voltage Variation)**Test Summary:**

Test Engineer:	Yixiang Lin	Test Date:	22 March 2025
Test Sample Serial Number:	SNP06 (normal operation)		
Test Site Identification	SR 9		

FCC Reference:	Part 15.225(e)
ISED Reference:	RSS-Gen 6.11 / RSS-210 B6
Test Method Used:	ANSI C63.10 Sections 6.8.1 and 6.8.2

Environmental Conditions:

Ambient Temperature (°C):	21.5
Ambient Relative Humidity (%):	42.0

Settings of the Instrument

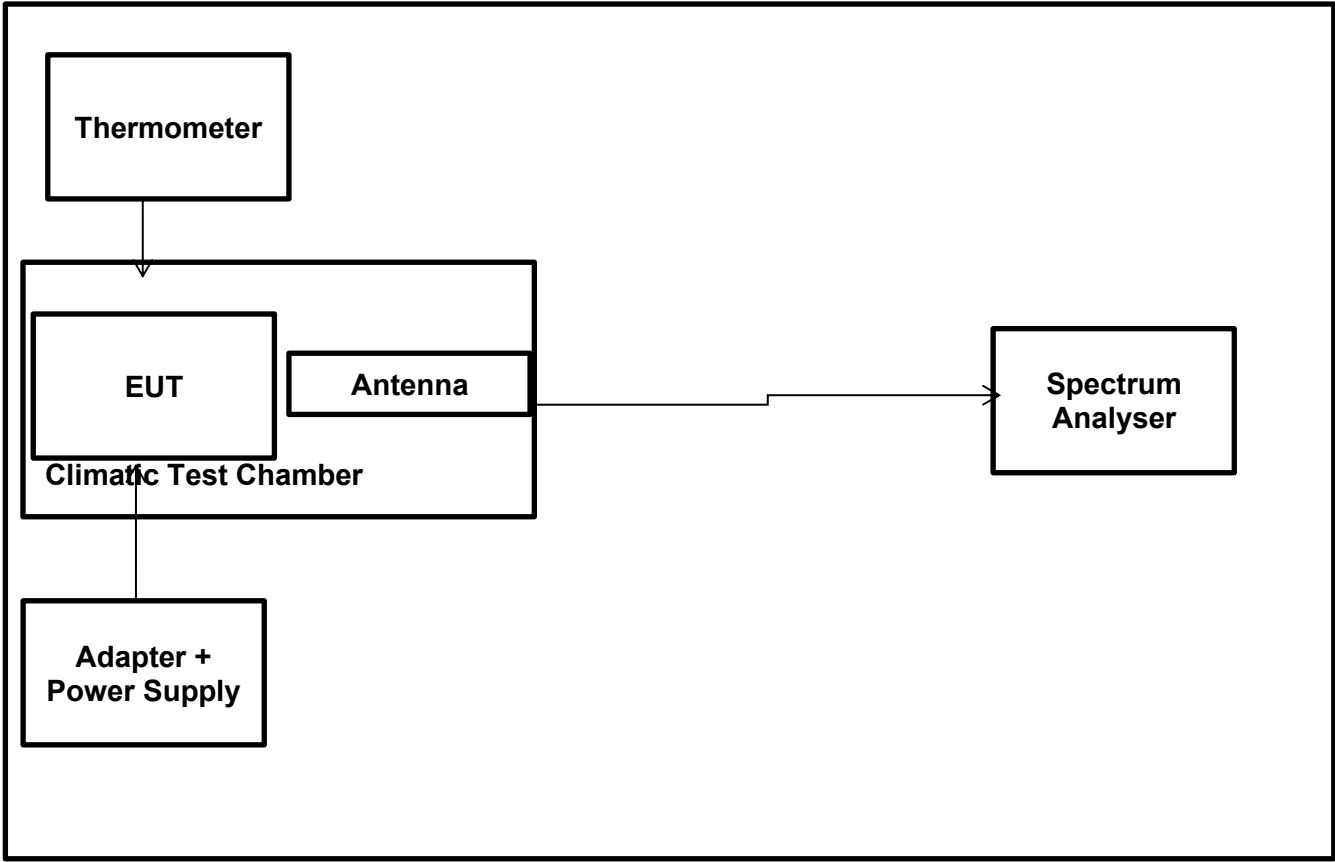
RBW/VBW	30 Hz/30 kHz
Span	3 kHz
Sweep Time	Auto
Sweep Mode	Single Sweep
Detector	Peak
Marker Function	Signal Count

Note(s):

1. The EUT was kept inside the environmental/climatic test chamber. The tests were performed with extreme temperature & extreme voltage variations.
2. The temperature variations were monitored throughout the tests using a calibrated digital thermometer. The voltage variations were monitored throughout the tests using a calibrated digital multimeter.
3. Voltage variations tests done with AC/DC laboratory power supply connected directly to input ports and with varying the input voltage.
4. For accurate measurement of frequency deviations, Signal Count / frequency counter function was activated on the spectrum analyser.
5. The applicant's declared operating frequency 13.560 MHz was used as reference frequency.
6. The difference between operating /reference frequency & measured frequency was reported as a frequency error.
7. The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ or 100 ppm of the operating frequency

Transmitter Frequency Stability (Temperature & Voltage Variation) (continued)

Test Setup:



Transmitter Frequency Stability (Temperature & Voltage Variation) (continued)**Results: RFID 13.56 MHz / Temperature Variations**

Extreme Temperature (°C)	Time after EUT Power-up	Measured Frequency (MHz)	Frequency Error		Frequency Error Limits		Result
			%	ppm	%	ppm	
-20	at 0 minutes	13.560126105	0.000929978	9.30	± 0.01	± 100	Complied
	at 2 minutes	13.560126847	0.000935450	9.35	± 0.01	± 100	Complied
	at 5 minutes	13.560126305	0.000931453	9.31	± 0.01	± 100	Complied
	at 10 minutes	13.560128881	0.000950450	9.50	± 0.01	± 100	Complied
-10	at 0 minutes	13.560127965	0.000943695	9.44	± 0.01	± 100	Complied
	at 2 minutes	13.560128130	0.000944912	9.45	± 0.01	± 100	Complied
	at 5 minutes	13.560128037	0.000944226	9.44	± 0.01	± 100	Complied
	at 10 minutes	13.560127128	0.000937522	9.38	± 0.01	± 100	Complied
0	at 0 minutes	13.560126595	0.000933591	9.34	± 0.01	± 100	Complied
	at 2 minutes	13.560127143	0.000937633	9.38	± 0.01	± 100	Complied
	at 5 minutes	13.560124816	0.000920472	9.20	± 0.01	± 100	Complied
	at 10 minutes	13.560127671	0.000941527	9.42	± 0.01	± 100	Complied
+10	at 0 minutes	13.560127614	0.000941106	9.41	± 0.01	± 100	Complied
	at 2 minutes	13.560127773	0.000942279	9.42	± 0.01	± 100	Complied
	at 5 minutes	13.560126000	0.000929204	9.29	± 0.01	± 100	Complied
	at 10 minutes	13.560128893	0.000950538	9.51	± 0.01	± 100	Complied
+20	at 0 minutes	13.560127818	0.000942611	9.43	± 0.01	± 100	Complied
	at 2 minutes	13.560128154	0.000945088	9.45	± 0.01	± 100	Complied
	at 5 minutes	13.560126328	0.000931622	9.32	± 0.01	± 100	Complied
	at 10 minutes	13.560127544	0.000940590	9.41	± 0.01	± 100	Complied
+30	at 0 minutes	13.560128633	0.000948621	9.49	± 0.01	± 100	Complied
	at 2 minutes	13.560127026	0.000936770	9.37	± 0.01	± 100	Complied
	at 5 minutes	13.560127604	0.000941032	9.41	± 0.01	± 100	Complied
	at 10 minutes	13.560126684	0.000934248	9.34	± 0.01	± 100	Complied
+40	at 0 minutes	13.560128112	0.000944779	9.45	± 0.01	± 100	Complied
	at 2 minutes	13.560129358	0.000953968	9.54	± 0.01	± 100	Complied
	at 5 minutes	13.560128679	0.000948960	9.49	± 0.01	± 100	Complied
	at 10 minutes	13.560127780	0.000942330	9.42	± 0.01	± 100	Complied
+50	at 0 minutes	13.560127999	0.000943945	9.44	± 0.01	± 100	Complied
	at 2 minutes	13.560127507	0.000940317	9.40	± 0.01	± 100	Complied
	at 5 minutes	13.560126269	0.000931187	9.31	± 0.01	± 100	Complied
	at 10 minutes	13.560126647	0.000933975	9.34	± 0.01	± 100	Complied

Result: **Pass**

Transmitter Frequency Stability (Temperature & Voltage Variation) (continued)**Results: RFID 13.56 MHz / Voltage Variations**

Extreme DC Voltage Conditions	Extreme DC Voltage (V)	Measured Frequency (MHz)	Frequency Error		Frequency Error Limits		Result
			%	ppm	%	ppm	
85% of Rated Primary Supply Voltage	5.525	13.560369342	0.002724	27.24	± 0.01	± 100	Complied
Rated Primary Supply Voltage	6.5	13.560196800	0.001451	14.51	± 0.01	± 100	Complied
115% of Rated Primary Supply Voltage	7.475	13.560127818	0.000943	9.43	± 0.01	± 100	Complied

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
AC Conducted Spurious Emissions	95%	± 2.49 dB
20 dB Bandwidth	95%	± 0.87 %
99% Emission Bandwidth	95%	± 0.87 %
Fundamental Field Strength	95%	± 3.10 dB
Radiated Spurious Emissions	95%	± 3.10 dB
Frequency Stability	95%	± 92 Hz

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	24
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

Test site: SR 7/8

ID	Manufacturer	Type	Model	Serial No.	Calibration Date	Cal. Cycle
23	Rohde & Schwarz	Artificial Mains	ESH3-Z5	831767/013	09.07.2024	12
349	Rohde & Schwarz	Receiver, EMI Test	ESIB7	836697/009	18.07.2024	12

Test site SR 9

ID	Manufacturer	Type	Model	Serial	Calibration Date	Cal. Cycle (months)
625	Schwarzbeck	Antenna, H-field	HFSL 7101	109	lab verification only relative measurements	n/a
637	Rohde & Schwarz	Spectrum Analyser	FSV40	101587	18/07/2023	36
-/-	Testo	Thermo-Hygrometer	608-H1	07	lab verification	n/a
645	Weiss Umwelttechnik	Climatic Chamber	LabEvent T/110/70/3	5822619794 0010	lab verification	n/a
327	SPS	AC/DC power distribution system	PAS 5000	A2464 00/1 0200	lab verification	n/a

8. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version
1.1	P27,P28,	2.1, 5.2.4 7	Update the Spectrum mask plot with measurement done at 3 m and extrapolated to 30 meters.

--- END OF TEST REPORT ---