



Solutions

TEST REPORT

Test Report No.: UL-RPT-RP-15109416-716

Applicant * : Belimo Automation AG
Model No. / PMN * : LINK.10
FCC / ISED ID * : FCC ID: 2ALENLINK10 / IC: 22538-BLMLINK10
HVIN * : 14458
Technology : RFID 13.56 MHz
Test Standard(s) : **FCC Parts 15.207, 15.209(a) & 15.225**
Innovation, Science and Economic Development Canada RSS-210 Issue 11 June 25 Section B.6, Annex B, 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 supersedes Version 1.0 with immediate effect
Test Report No. UL-RPT-RP-15109416-716 Version 1.2, Issue Date 22 August 2025 replaces
Test Report No. UL-RPT-RP-15109416-716 Version 1.1, Issue Date 08 August 2025, which is no longer valid.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

Yixiang Lin

Prepared by: Yixiang Lin
Title: Project Engineer
Date: 22 August 2025

Faiq

Approved by: Muhammad Faiq Khan
Title: Project Engineer
Date: 22 August 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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Table of Contents

1. Customer Information *	4
1.1. Applicant Information	4
1.2. Manufacturer Information	4
2. Summary of Testing.....	5
2.1. General Information	5
Applied Standards	5
Location	5
Date information	5
2.2. Summary of Test Results	6
2.3. Methods and Procedures	6
2.4. Deviations from the Test Specification	6
3. Equipment Under Test (EUT)	7
3.1. Identification of Equipment Under Test (EUT) *	7
3.2. Description of EUT *	7
3.3. Modifications Incorporated in the EUT	7
3.4. Additional Information Related to Testing *	8
3.5. Support Equipment	8
A. Support Equipment (In-house)	8
B. Support Equipment (Manufacturer supplied) *	8
4. Operation and Monitoring of the EUT during Testing	9
4.1. Operating Modes	9
4.2. Configuration and Peripherals	9
5. Measurements, Examinations and Derived Results	10
5.1. General Comments	10
5.2. Test Results	11
5.2.1. Transmitter AC Conducted Spurious Emissions	11
5.2.2. Transmitter 99 % Emission Bandwidth	21
5.2.3. Transmitter 20 dB Bandwidth	23
5.2.4. Transmitter Fundamental Field Strength & Spectrum Mask	25
5.2.5. Transmitter Radiated Spurious Emissions	29
5.2.6. Transmitter Frequency Stability (Temperature & Voltage Variation)	34
6. Measurement Uncertainty	38
7. Used equipment	39
8. Report Revision History	40

1. Customer Information *

1.1.Applicant Information

Company Name:	Belimo Automation AG
Company Address:	Brunnenbachstrasse 1, 8340 Hinwil, Switzerland
Contact Person:	Rodrigue Tayo
Contact E-Mail Address:	Rodrigue.tayo@belimo.ch
Contact Phone No.:	+41 43 843 63 46

1.2.Manufacturer Information

Company Name:	Variosystems srl
Company Address:	Sat Santu-Floresti, Comuna Gruiu, Str. Ungureni, Nr. 103 07118 Judet Ilfov, Romania
Contact Person:	Ildiko Defta
Contact E-Mail Address:	ildiko.defta@variosystems.com
Contact Phone No.:	+40213020826

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 25, 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
Site Registration:	FCC: 399704, ISEDC: 22511
FCC Lab. Designation No.:	DE0019
ISEDC CABID:	DE0008

Date information

Order Date:	20 December 2023
EUT arrived:	10 February 2025
Test Dates:	10 February 2025 to 20 February 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.215(c)	-/-	Transmitter 20 dB Bandwidth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-/-	RSS-Gen 6.7	Transmitter 99% Emission Bandwidth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.225 (a)(b)(c)(d)	RSS-Gen 6.12 / RSS-210 B6	Transmitter Fundamental Field Strength & Spectrum Mask	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.209(a)/15.225(d)	RSS-Gen 6.13 / RSS-210 B6	Transmitter Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.225(e)	RSS-Gen 6.11 / RSS-210 B6	Transmitter Frequency Stability (Temperature & Voltage Variation)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Reference:	FCC KDB 174176 D01 Line Conducted FAQ v01r01 June 3, 2015
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:	Belimo
Model Name / PMN:	LINK.10
Serial Number:	MAC ID: dd:f7:d2:61:6a:c2 (Radiated Test Sample)
Hardware Version Number:	1.3, 14458-00001 A
Firmware Version Number:	1.2.2, NCS2.7.0
HVIN:	14458
FVIN:	N/A
FCC ID:	2ALENLINK10
ISED Certification No.:	22538-BLMLINK10

Brand Name:	Belimo
Model Name / PMN:	LINK.10
Serial Number:	MAC ID: fc:3a92:df:71:8c (Test Sample with terminated antenna)
Hardware Version Number:	1.3, 14458-00001 A
Firmware Version Number:	1.2.2, NCS2.7.0
HVIN:	14458
FVIN:	N/A
FCC ID:	2ALENLINK10
ISED Certification No.:	22538-BLMLINK10

3.2. Description of EUT *

The EUT was a Bluetooth to NFC and USB to MP-Bus converter.

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):	24V DC via AC/DC power supply * Or 5V DC via USB	
Modulation:	ASK	
Tested Temperature Range:	Minimum	-20 °C
	Maximum	+50 °C

*) As per Pre-scans performed to determine the worst-case power supply requirement, the EUT was powered by 24V DC via AC/DC power supply, since it was found out to be the worst-case condition.

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
-	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	Laptop with test tool	Apple	MacBook Air	-/-

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 by default to transmit a continuous modulated carrier with maximum power at 13.56 MHz as soon as it is powered on.

EUT Power supply:

- EUT was powered by 24V DC via AC/DC power supply.

Test Mode Activations:

- The EUT can be connected to the laptop via USB-UART cable. Customer provided instruction "Radio_test_setup_10.02.2025.pdf" to configure the device into respective Continuous transmit and Idle modes.

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 EP9/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 spurious emission measurements "worst case verification" with the EUT in Standing-position & Laying-position was performed by Lab.
- The EUT in standing position was found to be the worst case therefore this report includes relevant results.
- 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:	20 February 2025
Test Sample Serial Number:	MAC ID: dd:f7:d2:61:6a:c2 (Radiated Test Sample)		
Test Sample Serial Number:	MAC ID: fc:3a92:df:71:8c (Test Sample with terminated antenna)		
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:

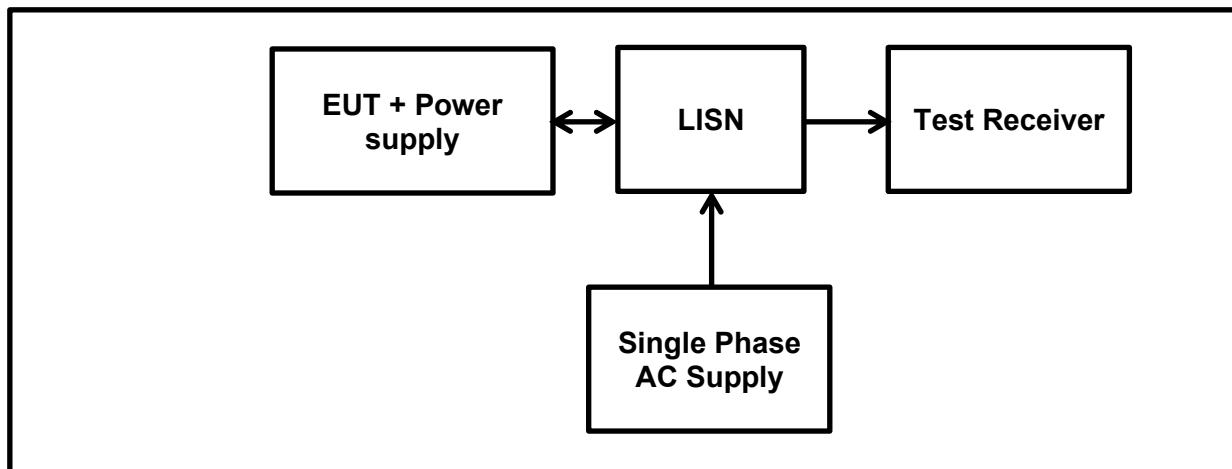
Temperature (°C):	21.0
Relative Humidity (%):	30.0

Settings of the Instrument

Detector	Quasi Peak/ Average
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Note(s):

1. 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. Prescan was performed with 50 Hz and 60 Hz and emission was found to be similar, final measurement was performed with 60 Hz.
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
0.161	Live	16.20	65.40	49.20	Complied
0.990	Live	10.20	56.00	45.80	Complied
1.879	Live	10.60	56.00	45.40	Complied
12.608	Live	37.30	60.00	22.70	Complied
13.560	Live	62.00	60.00	-2.00	Carrier
27.121	Live	25.20	60.00	34.80	Complied

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

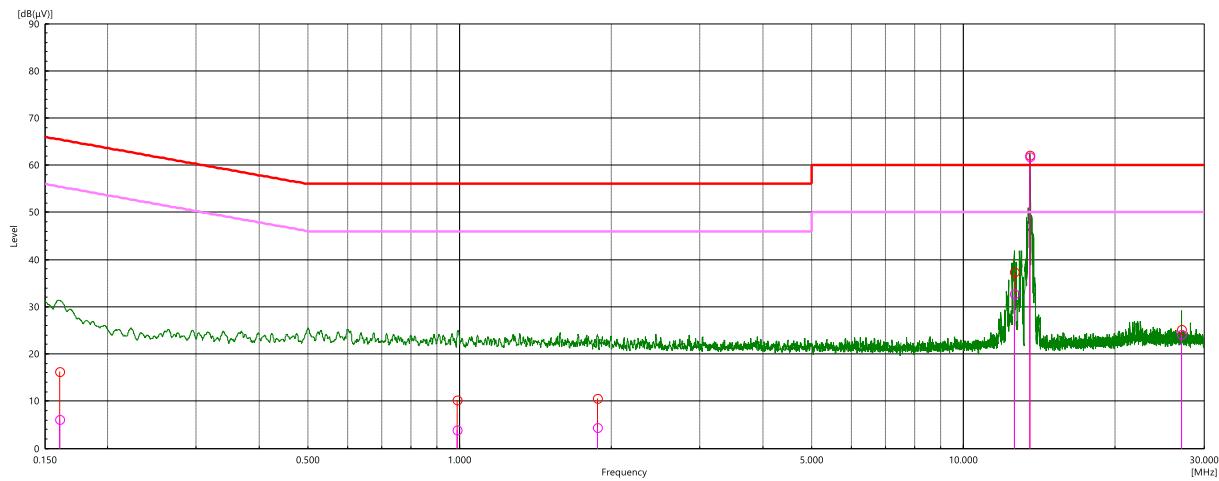
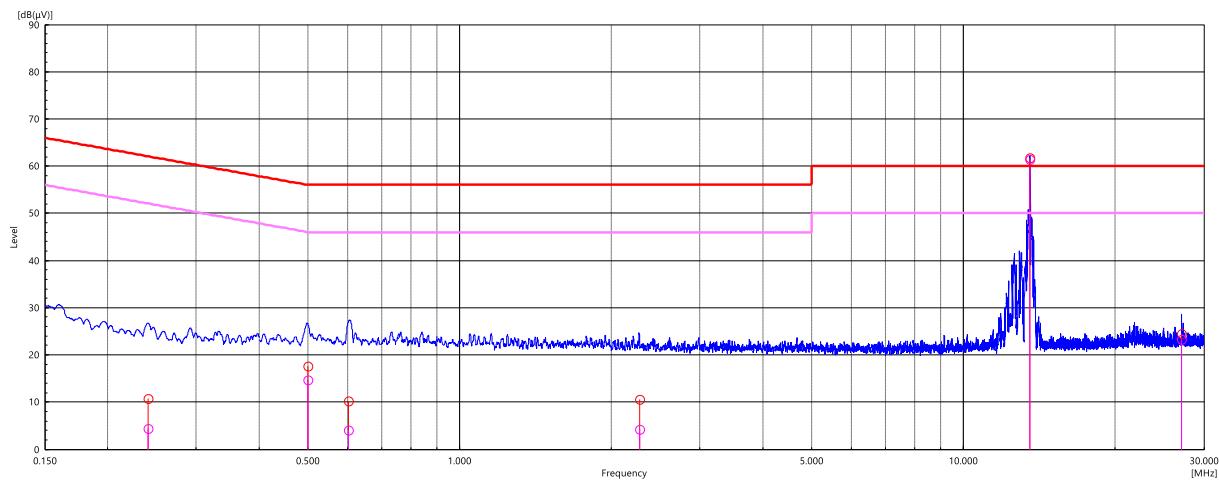
Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.161	Live	6.00	55.40	49.40	Complied
0.990	Live	3.90	46.00	42.10	Complied
1.879	Live	4.30	46.00	41.70	Complied
12.608	Live	32.80	50.00	17.20	Complied
13.560	Live	61.80	50.00	-11.80	Carrier
27.121	Live	24.20	50.00	25.80	Complied

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

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.602	Neutral	10.20	56.00	45.80	Complied
13.560	Neutral	61.70	60.00	-1.70	Carrier
27.121	Neutral	24.50	60.00	35.50	Complied
0.500	Neutral	17.60	56.00	38.40	Complied
0.240	Neutral	10.80	62.10	51.30	Complied
2.276	Neutral	10.50	56.00	45.50	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
0.602	Neutral	4.10	46.00	41.90	Complied
13.560	Neutral	61.40	50.00	-11.40	Carrier
27.121	Neutral	23.30	50.00	26.70	Complied
0.500	Neutral	14.70	46.00	31.30	Complied
0.240	Neutral	4.30	52.10	47.80	Complied
2.276	Neutral	4.30	46.00	41.70	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
0.496	Live	16.10	56.10	40.00	Complied
1.391	Live	10.40	56.00	45.60	Complied
13.560	Live	61.10	60.00	-1.10	Carrier
27.118	Live	20.90	60.00	39.10	Complied
21.402	Live	19.80	60.00	40.20	Complied
0.307	Live	10.80	60.10	49.30	Complied

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

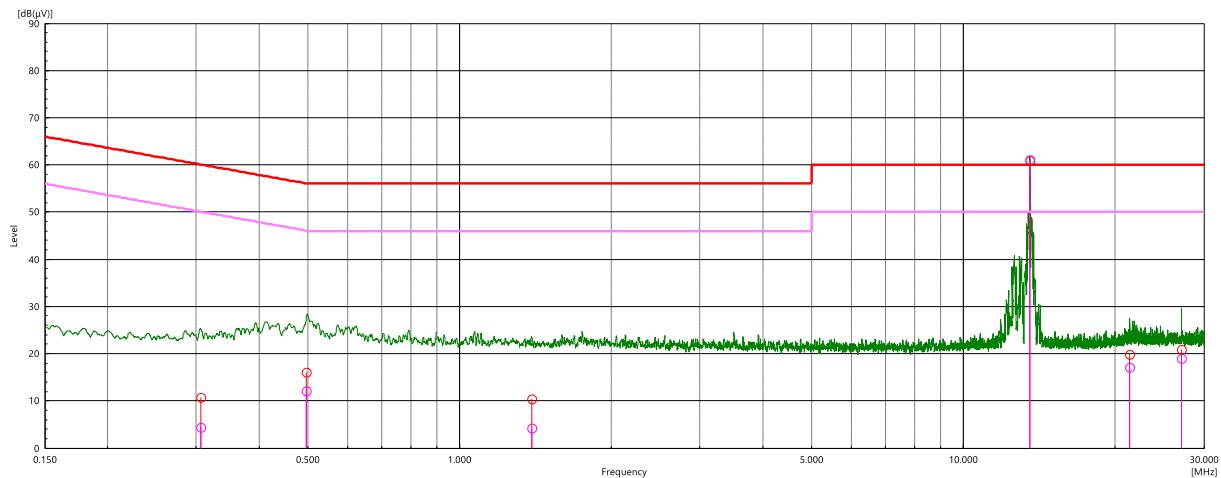
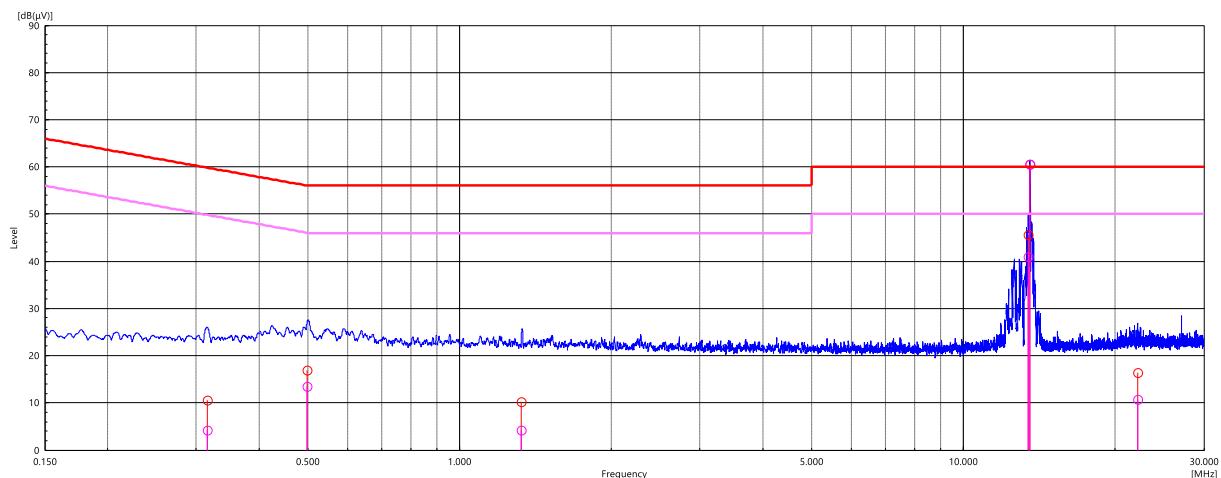
Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.496	Live	12.10	46.10	34.00	Complied
1.391	Live	4.30	46.00	41.70	Complied
13.560	Live	61.00	50.00	-11.00	Carrier
27.118	Live	19.00	50.00	31.00	Complied
21.402	Live	17.10	50.00	32.90	Complied
0.307	Live	4.50	50.10	45.60	Complied

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

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.315	Neutral	10.50	59.80	49.30	Complied
0.498	Neutral	16.90	56.00	39.10	Complied
1.326	Neutral	10.30	56.00	45.70	Complied
13.455	Neutral	45.60	60.00	14.40	Complied
13.560	Neutral	60.60	60.00	-0.60	Carrier
22.14	Neutral	16.30	60.00	43.70	Complied

Transmitter AC Conducted Spurious Emissions (continued)**Results: Neutral / Average / 240 VAC 60 Hz / RFID Active**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.315	Neutral	4.20	49.80	45.60	Complied
0.498	Neutral	13.40	46.00	32.60	Complied
1.326	Neutral	4.30	46.00	41.70	Complied
13.455	Neutral	41.00	50.00	9.00	Complied
13.560	Neutral	60.50	50.00	-10.50	Carrier
22.140	Neutral	10.70	50.00	39.30	Complied

Result: Pass**Plot: Live Line / 240 VAC 60 Hz / RFID Active****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.

Transmitter AC Conducted Spurious Emissions (continued)**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
-	Live	-	-	-	-

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
-	Live	-	-	-	-

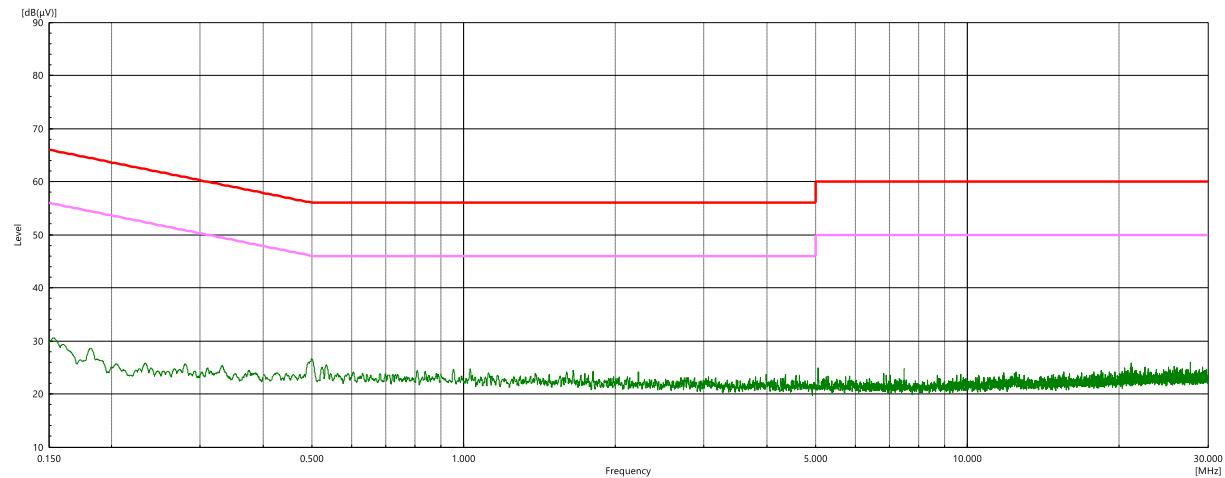
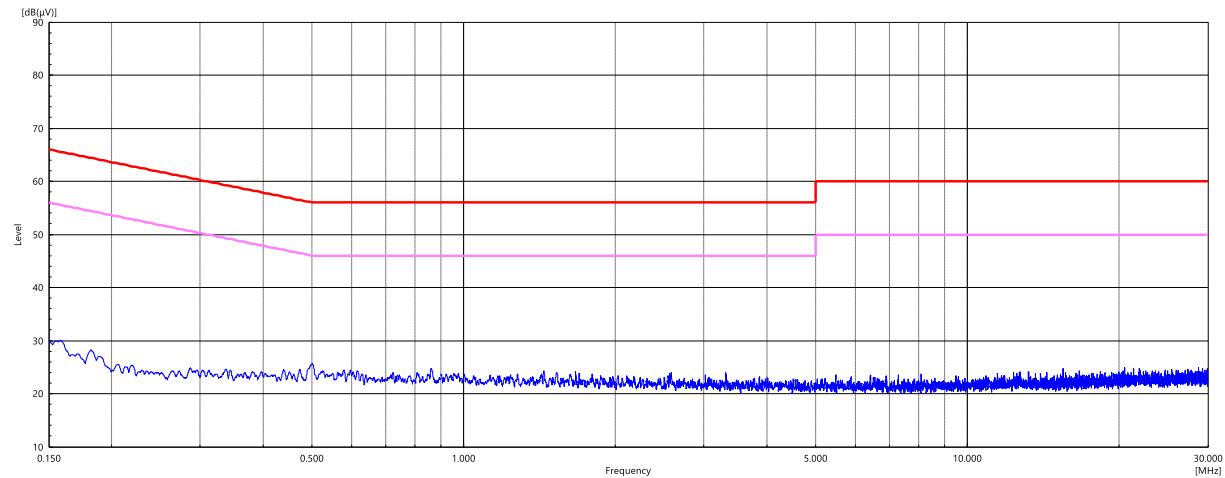
Results: Neutral / Quasi Peak / 120 VAC 60 Hz / Antenna terminated with Dummy Load

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
-	Neutral	-	-	-	-

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
-	Neutral	-	-	-	-

Result: Pass

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

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
-	Live	-	-	-	-

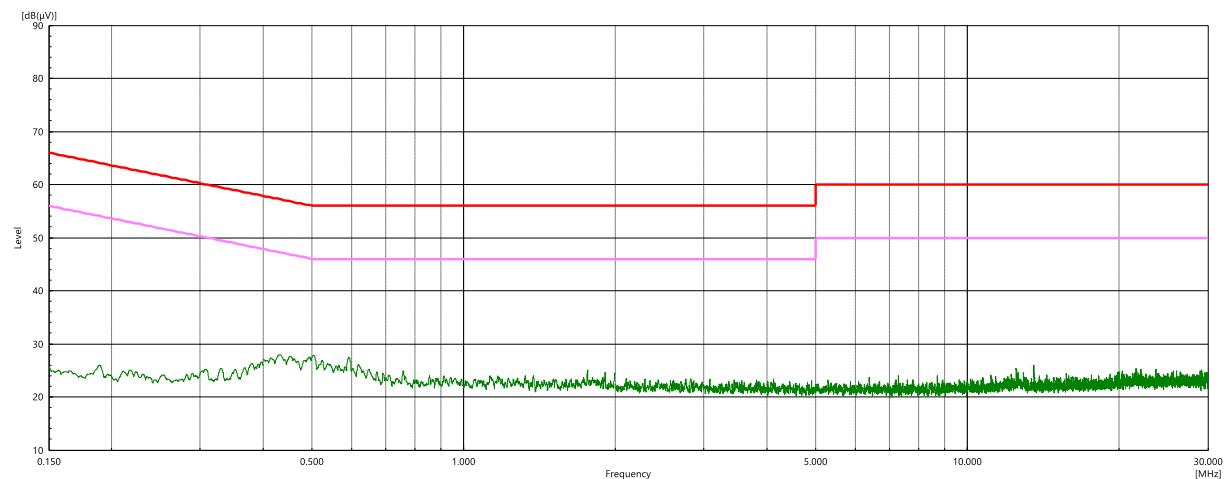
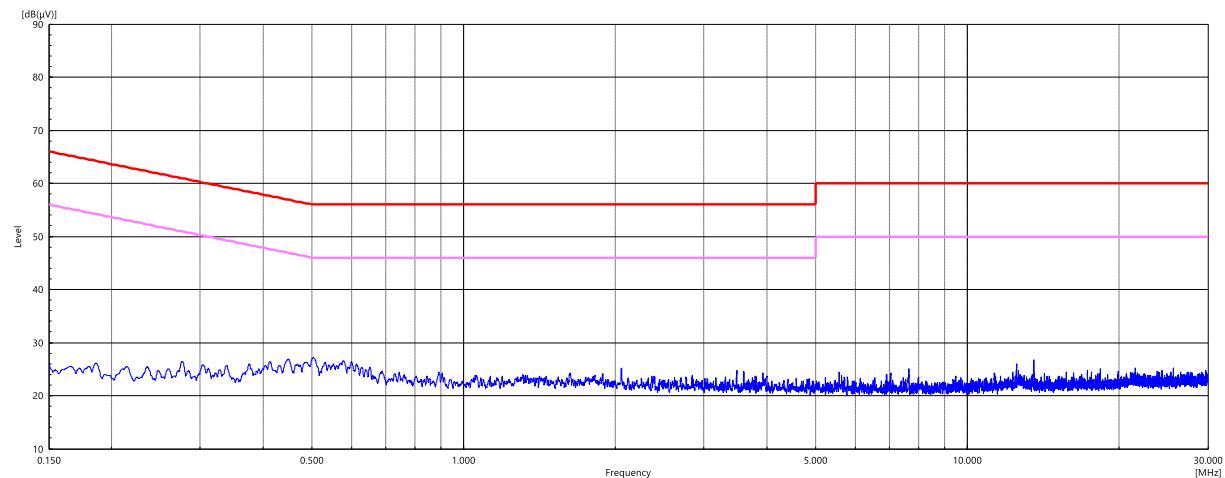
Results: Neutral / Quasi Peak / 240 VAC 60 Hz / Antenna terminated with Dummy Load

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
-	Neutral	-	-	-	-

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
-	Neutral	-	-	-	-

Result: Pass

Transmitter AC Conducted Spurious Emissions (continued)**Plot: Live Line / 240 VAC 60 Hz / Antenna terminated with Dummy Load****Plot: Neutral Line / 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:	18 February 2025
Test Sample Serial Number:	MAC ID: dd:f7:d2:61:6a:c2 (Radiated Test Sample)		
Test Site Identification	SR 9		

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

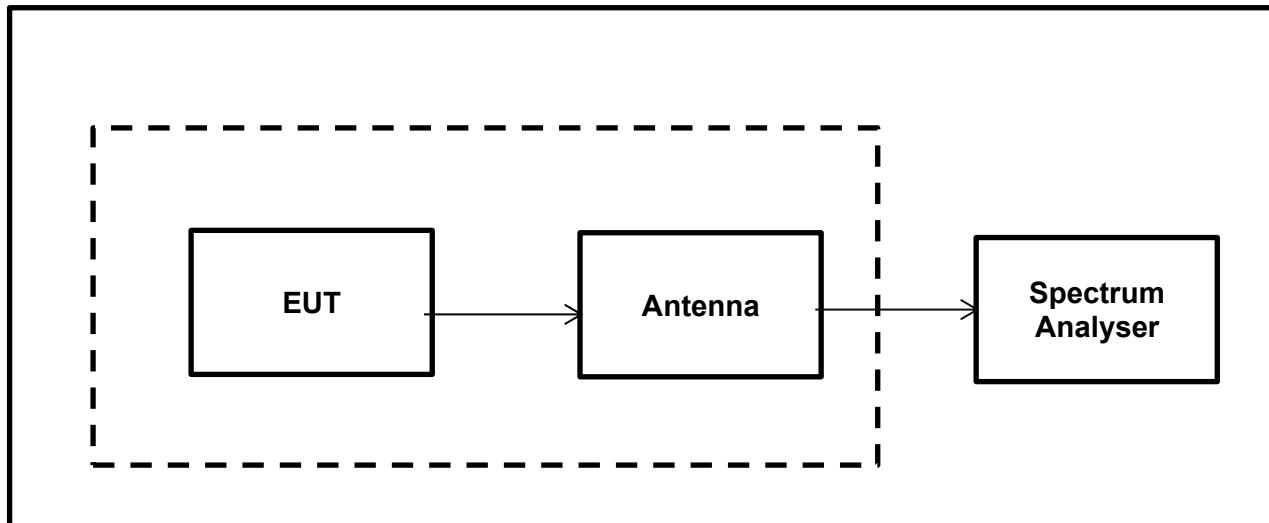
Environmental Conditions:

Temperature (°C):	20.7
Relative Humidity (%):	39.6

Settings of the Instrument

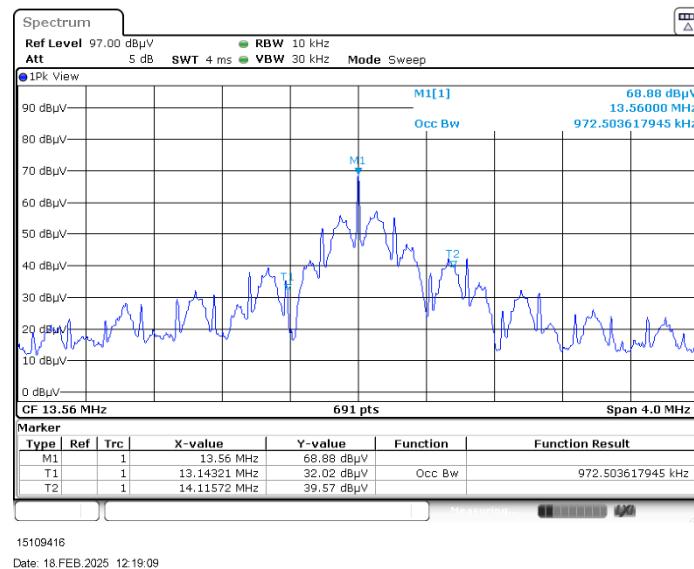
RBW/VBW	10 kHz / 30 kHz
Span	4 MHz
Sweep time	Auto
Detector	MaxPeak

Test Setup:



Transmitter 99 % Emission Bandwidth (continued)**Results: RFID 13.56 MHz**

RFID Channel	99% Emission Bandwidth (kHz)
13.56 MHz	972.503

**Result: Pass**

5.2.3. Transmitter 20 dB Bandwidth

Test Summary:

Test Engineer:	Yixiang Lin	Test Date:	18 February 2025
Test Sample Serial Number:	MAC ID: dd:f7:d2:61:6a:c2 (Radiated Test Sample)		
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):	20.7
Relative Humidity (%):	39.6

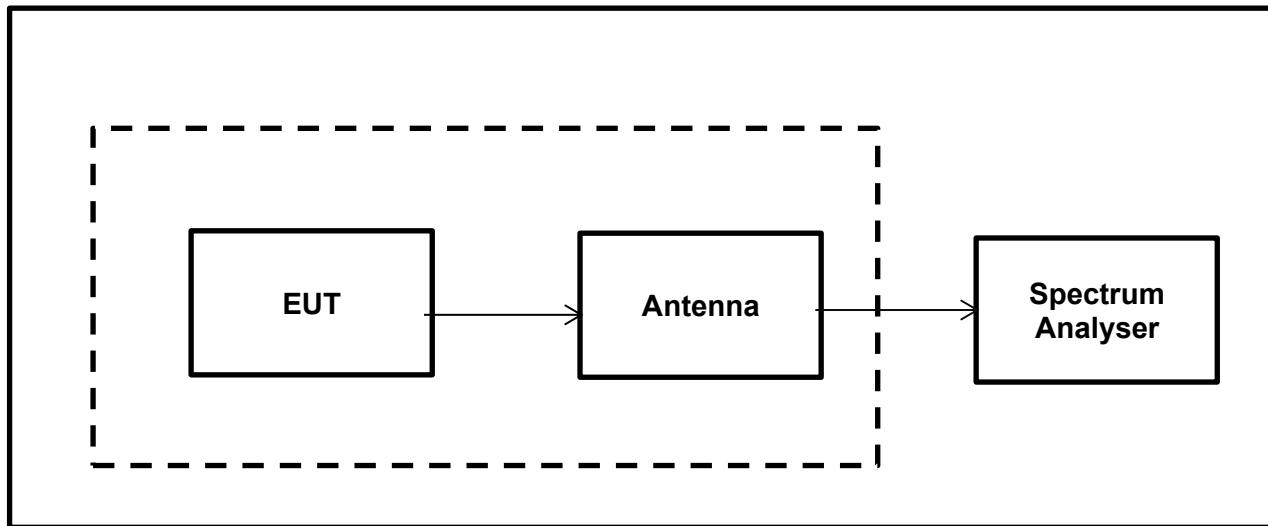
Settings of the Instrument:

RBW/VBW	10 kHz / 30 kHz
Span	1.5 MHz
Sweep time	Auto
Detector	Peak

Notes:

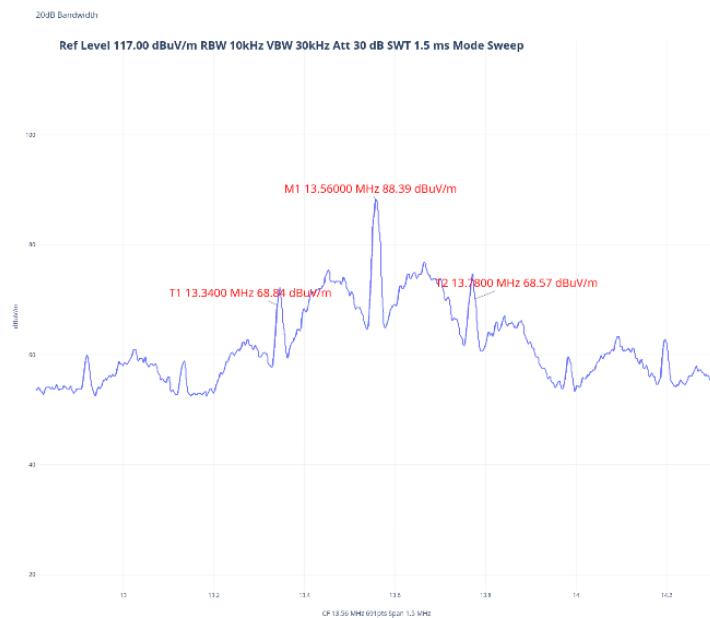
1. The n dB down function of the spectrum analyzer was set to 20 dB.

Test Setup:



Transmitter 20 dB Bandwidth (continued)**Results: RFID 13.56 MHz**

RFID Channel	20 dB Bandwidth (kHz)
13.56 MHz	440

**Result: Pass**

5.2.4. Transmitter Fundamental Field Strength & Spectrum Mask

Test Summary:

Test Engineer:	Yixiang Lin	Test Date:	11 February 2025
Test Sample Serial Number:	MAC ID: dd:f7:d2:61:6a:c2 (Radiated Test Sample)		
Test Site Identification	SR 1/2		

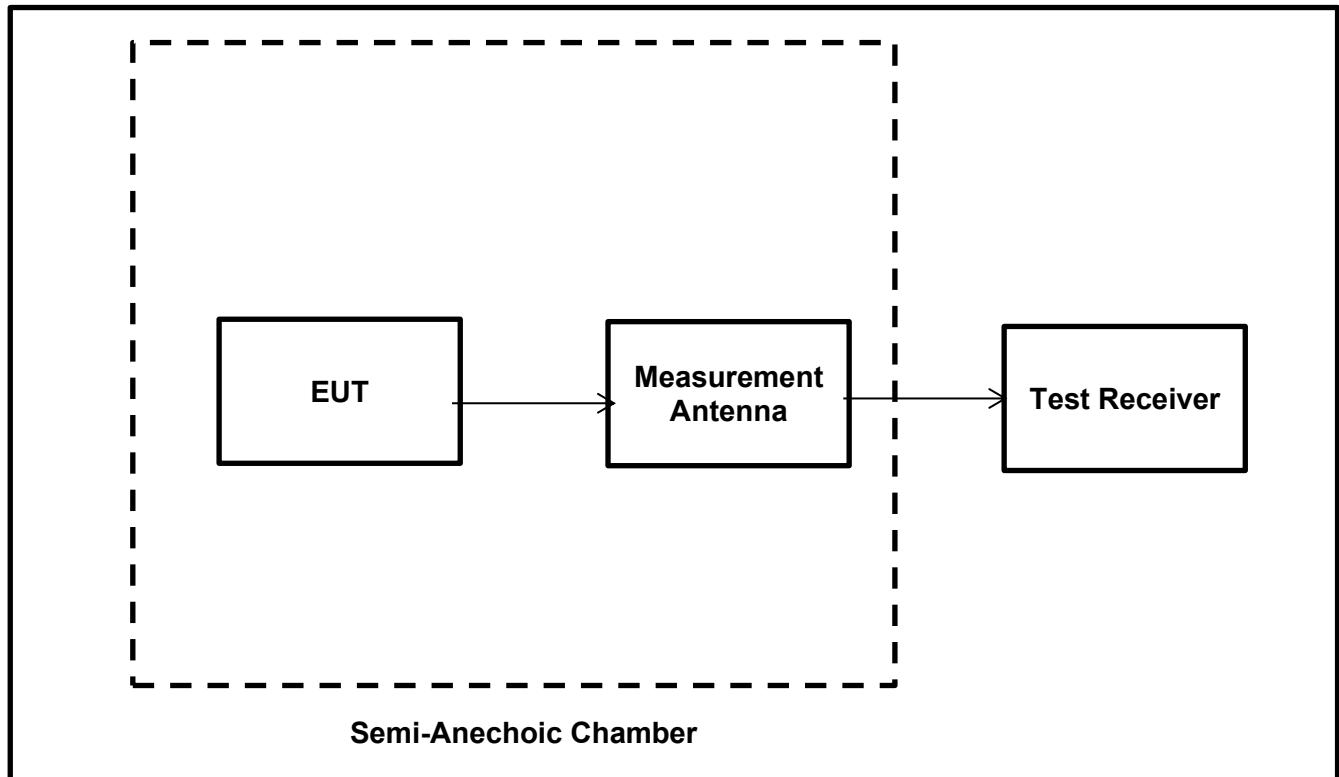
FCC Reference:	Part 15.225(a)(b)(c)(d)
ISED Reference:	RSS-Gen 6.12 / RSS-210 B.6
Test Method Used:	ANSI C63.10 Section 6.4

Environmental Conditions:

Temperature (°C):	21.3
Relative Humidity (%):	46.1

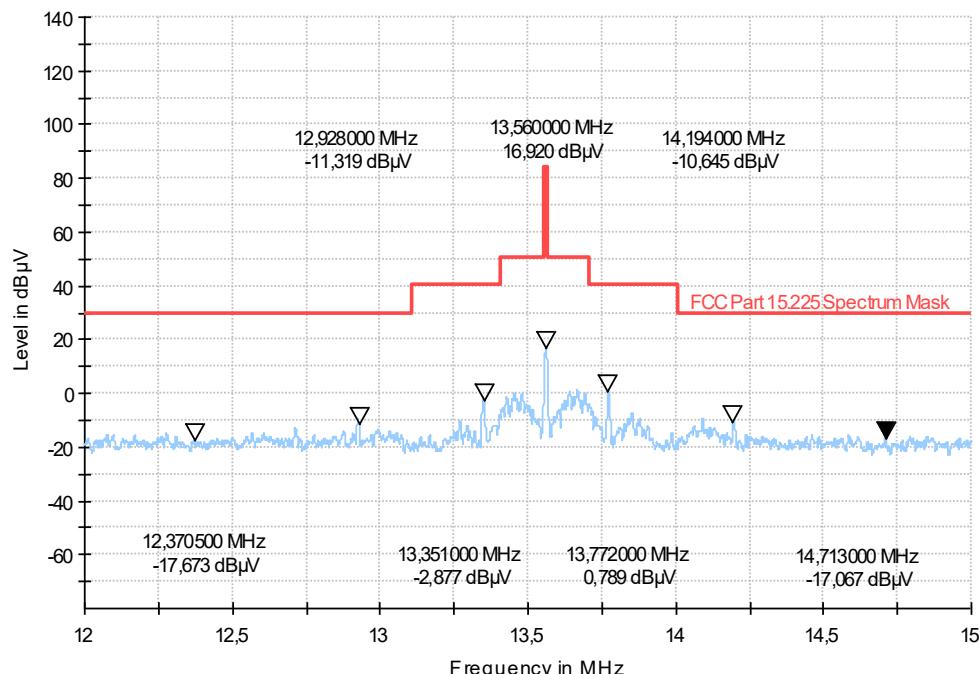
Note(s):

1. 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.
2. 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.
3. 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.
4. Compliance with the spectrum mask is shown by final measurements performed in a semi-anechoic chamber. For the field strength measurements in a semi-anechoic chamber, a transducer factor on the measuring instrument was used to extrapolate the results at 3 m to a distance of 30 m. A distance extrapolation factor of 40 dB was used.
5. 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)(d) limits.
6. The emissions shown at frequencies approximately at 13.56 MHz on the plot represent EUT's fundamental field strength for RFID 13.56 MHz.
7. 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.
8. 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.

Transmitter Fundamental Field Strength & Spectrum Mask(continued)**Test Setup:**

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

Frequency Band (MHz)	Emission Frequency (MHz)	Loop Antenna Orientation	MaxPeak Emission Level (dB μ V/m) <small>Note 4</small>	Limit at 30 m (dB μ V/m)	Margin (dB)	Result
-	-	-	-	-	-	-

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:	11 February 2025
Test Sample Serial Number:	MAC ID: dd:f7:d2:61:6a:c2 (Radiated Test Sample)		
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 C63.10:2013 Sections 6.3, 6.4
Frequency Range:	9 kHz to 30 MHz

Environmental Conditions:

Temperature (°C):	21.3
Relative Humidity (%):	46.1

Note(s):

1. 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 correlation data between semi-anechoic chamber and an open field test site is available upon request.
2. FCC rule part 15.209(a) specifies limits at 300 m / 30 m in μ V/m but RSS GEN specifies limits at 300 m / 30 m in μ 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 377 Ω results in a factor of 51.5 $\text{dB}\Omega$.

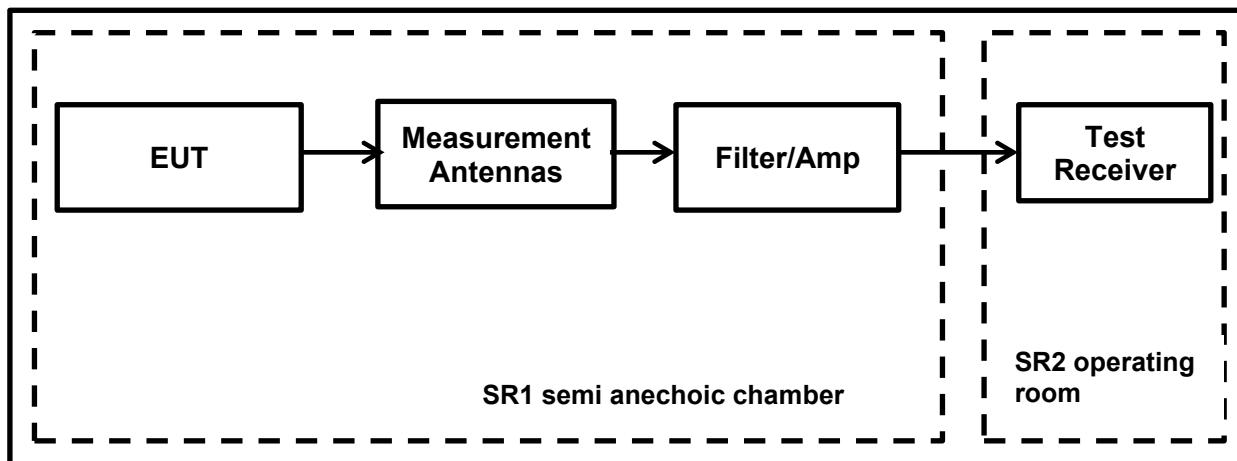
$$AF^E [\text{dB}(\text{m}^{-1})] = AF^H [\text{dB}(\Omega^{-1}\text{m}^{-1})] + Z_0 [\text{dB}\Omega]$$

For example, the measurement frequency X KHz resulted in a level of Y dB μ V/m, which is equivalent to $Y - 51.5 = Z$ dB μ 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.

3. 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.
4. 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.
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.

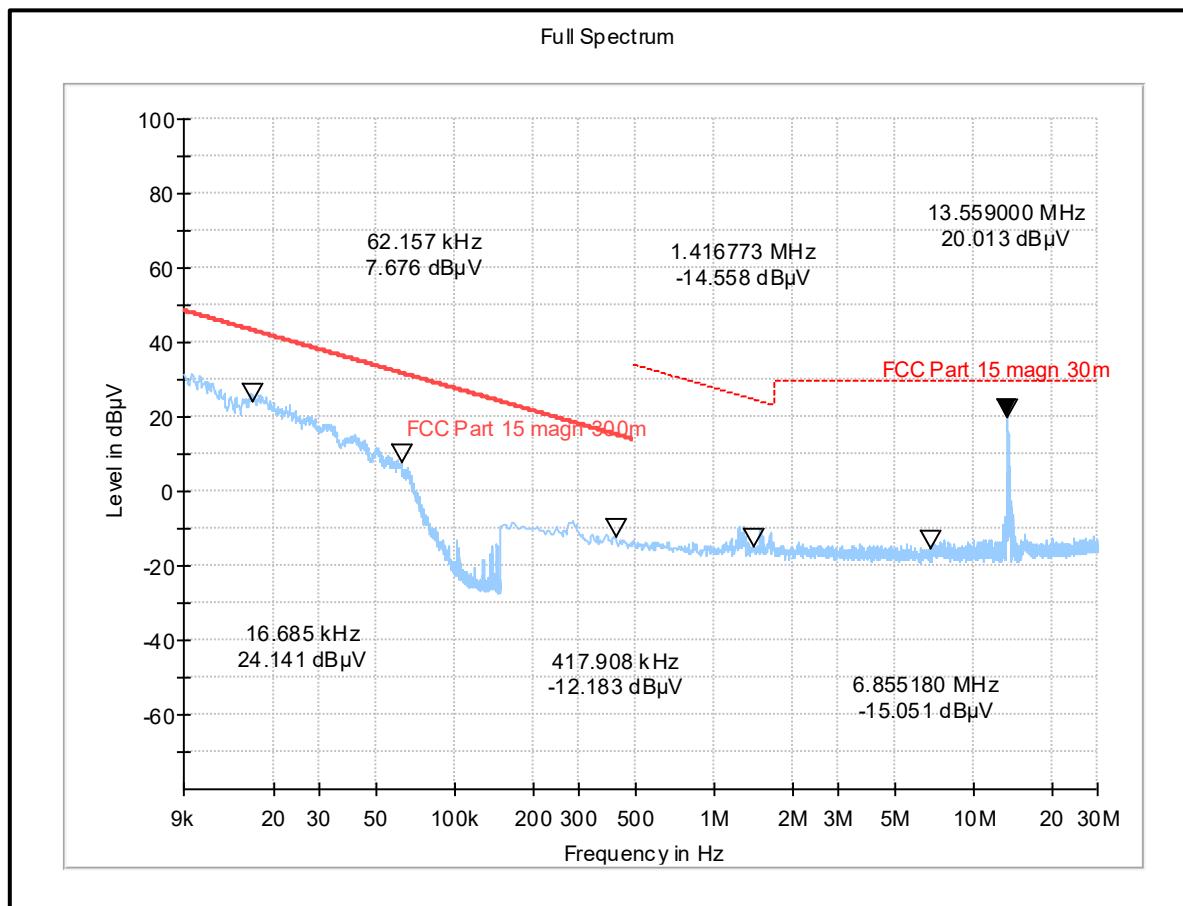
Transmitter Radiated Emissions (continued)**Note(s):**

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
-	-	-	-	-	-

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

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

Test Engineer:	Yixiang Lin	Test Date:	11 February 2025
Test Sample Serial Number:	MAC ID: dd:f7:d2:61:6a:c2 (Radiated Test Sample)		
Test Site Identification	SR 1/2		

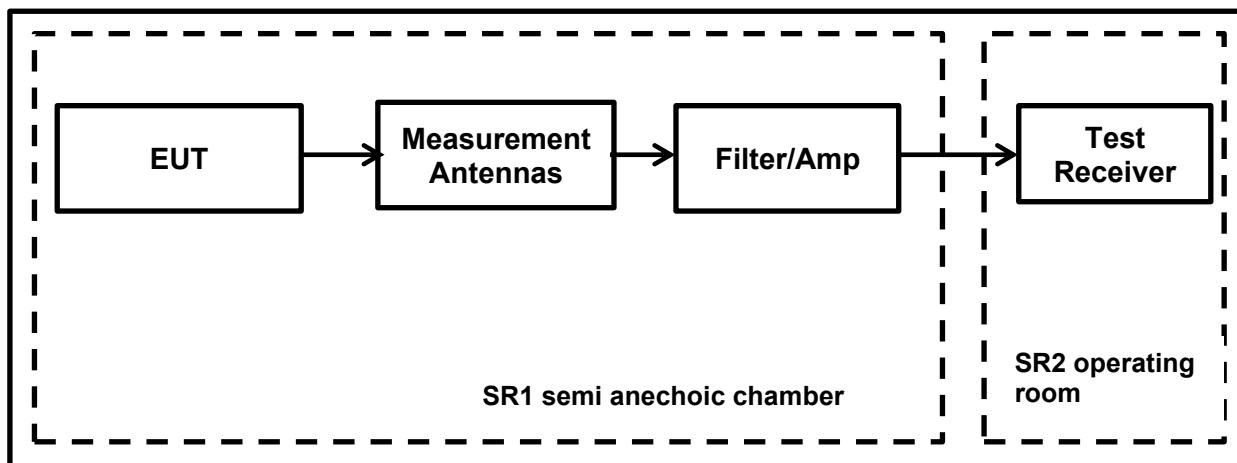
FCC Reference:	Parts 15.225(d) & 15.209(a)
ISED Reference:	RSS-Gen 6.13 / RSS-210 B6
Test Method Used:	ANSI C63.10:2013 Sections 6.3 and 6.5
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	21.3
Relative Humidity (%):	46.1

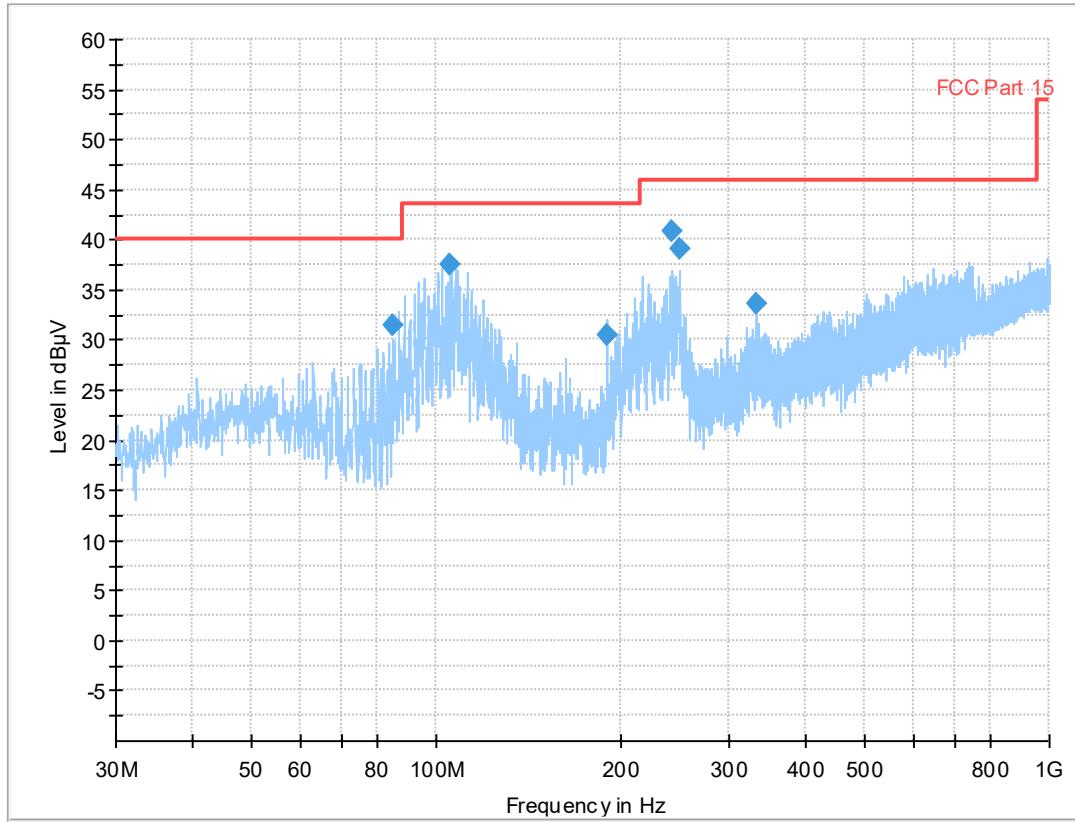
Note(s):

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
85.170000	Vertical	31.37	40.00	8.63	Complied
105.600000	Vertical	37.47	43.50	6.03	Complied
189.795000	Vertical	30.57	43.50	12.93	Complied
242.445000	Vertical	40.82	46.00	5.18	Complied
250.050000	Vertical	39.14	46.00	6.86	Complied
333.300000	Vertical	33.65	46.00	12.35	Complied

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

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

Test Engineer:	Yixiang Lin	Test Date:	11 February 2025
Test Sample Serial Number:	MAC ID: dd:f7:d2:61:6a:c2 (Radiated Test Sample)		
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:

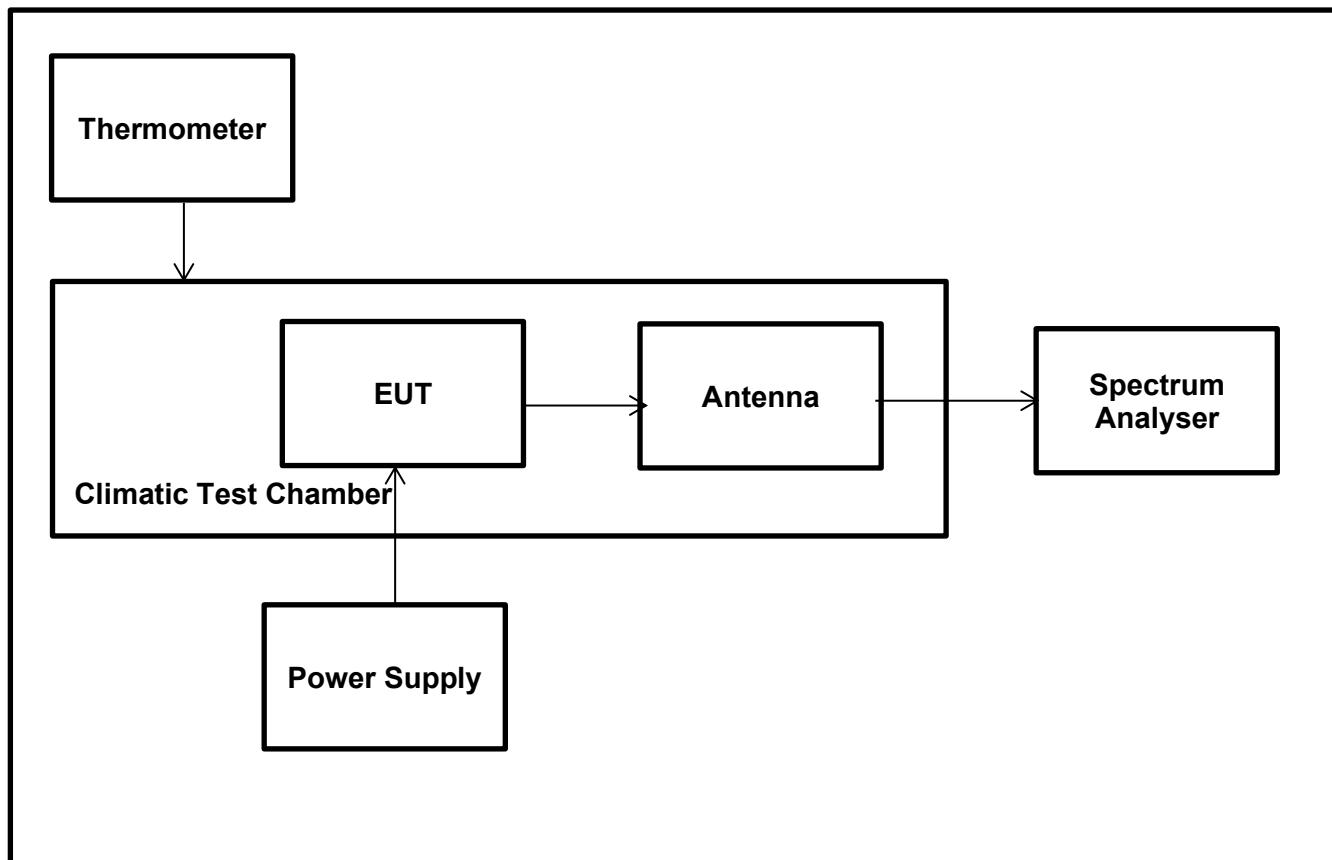
Ambient Temperature (°C):	20.7
Ambient Relative Humidity (%):	39.6

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 DC input ports and with variating 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	13.560683100	0.005037611	50.38	± 0.01	± 100	Complied
	at 2 minutes	13.560688900	0.005080383	50.80	± 0.01	± 100	Complied
	at 5 minutes	13.560608310	0.004486062	44.86	± 0.01	± 100	Complied
	at 10 minutes	13.560688900	0.005080383	50.80	± 0.01	± 100	Complied
-10	at 0 minutes	13.560659900	0.004866519	48.67	± 0.01	± 100	Complied
	at 2 minutes	13.560671500	0.004952065	49.52	± 0.01	± 100	Complied
	at 5 minutes	13.560671500	0.004952065	49.52	± 0.01	± 100	Complied
	at 10 minutes	13.560677300	0.004994838	49.95	± 0.01	± 100	Complied
0	at 0 minutes	13.560596200	0.004396755	43.97	± 0.01	± 100	Complied
	at 2 minutes	13.560648300	0.004780973	47.81	± 0.01	± 100	Complied
	at 5 minutes	13.560648300	0.004780973	47.81	± 0.01	± 100	Complied
	at 10 minutes	13.560648300	0.004780973	47.81	± 0.01	± 100	Complied
+10	at 0 minutes	13.560590400	0.004353982	43.54	± 0.01	± 100	Complied
	at 2 minutes	13.560578900	0.004269174	42.69	± 0.01	± 100	Complied
	at 5 minutes	13.560590400	0.004353982	43.54	± 0.01	± 100	Complied
	at 10 minutes	13.560590400	0.004353982	43.54	± 0.01	± 100	Complied
+20	at 0 minutes	13.560515200	0.003799410	37.99	± 0.01	± 100	Complied
	at 2 minutes	13.560515200	0.003799410	37.99	± 0.01	± 100	Complied
	at 5 minutes	13.560515200	0.003799410	37.99	± 0.01	± 100	Complied
	at 10 minutes	13.560509400	0.003756637	37.57	± 0.01	± 100	Complied
+30	at 0 minutes	13.560526800	0.003884956	38.85	± 0.01	± 100	Complied
	at 2 minutes	13.560521000	0.003842183	38.42	± 0.01	± 100	Complied
	at 5 minutes	13.560521000	0.003842183	38.42	± 0.01	± 100	Complied
	at 10 minutes	13.560509400	0.003756637	37.57	± 0.01	± 100	Complied
+40	at 0 minutes	13.560526800	0.003884956	38.85	± 0.01	± 100	Complied
	at 2 minutes	13.560521000	0.003842183	38.42	± 0.01	± 100	Complied
	at 5 minutes	13.560503600	0.003713864	37.14	± 0.01	± 100	Complied
	at 10 minutes	13.560492000	0.003628319	36.28	± 0.01	± 100	Complied
+50	at 0 minutes	13.560486300	0.003586283	35.86	± 0.01	± 100	Complied
	at 2 minutes	13.560480500	0.003543510	35.44	± 0.01	± 100	Complied
	at 5 minutes	13.560474700	0.003500737	35.01	± 0.01	± 100	Complied
	at 10 minutes	13.560463100	0.003415192	34.15	± 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	20.4	13.560503600	0.003714	37.14	± 0.01	± 100	Complied
Rated Primary Supply Voltage	24	13.560503600	0.003714	37.14	± 0.01	± 100	Complied
115% of Rated Primary Supply Voltage	27.6	13.560486300	0.003586	35.86	± 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
495	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
591	Rohde & Schwarz	Receiver	ESU 40	100244/040	09/07/2024	12
607	Schwarzbeck	Antenna broadband horn antenna	BBHA 9170	9170-561	13/05/2024	36
669	Rohde & Schwarz	EMI Test Receiver	ESW 44	103087	21/12/2023	18
694	Rohde & Schwarz	Signal Analyzer	FSW 50	101847	10/05/2024	12
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
22	Rohde & Schwarz	Artificial Mains	ESH3-Z5	831767/014	09.07.2024	12
23	Rohde & Schwarz	Artificial Mains	ESH3-Z5	831767/013	09.07.2024	12
215	Rohde & Schwarz	Artificial Mains Network	ESH2-Z5	879675/002	09.07.2024	24
349	Rohde & Schwarz	Receiver, EMI Test	ESIB7	836697/009	09.07.2024	12
351	Rohde & Schwarz	network, Artificial Mains	ESH3-Z5	862770/018	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	12/07/2023	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	Page No(s)	Clause	Details
	7	3.1	Correction of FVIN
	11	5.2.1	Notes updated
	21	5.2.2	Correction of settings
	24	5.2.3	Plot updated
	32	5.2.5	Notes updated
	35	5.2.6	Test setup plot updated
Test Report Version 1.1 supersedes Version 1.0 with immediate effect			
Test Report No. UL-RPT-RP-15109416-716 Version 1.2, Issue Date 22 August 2025 replaces			
Test Report No. UL-RPT-RP-15109416-716 Version 1.1, Issue Date 08 August 2025, which is no longer valid.			
1.2	Page No(s)	Clause	Details
	8	3.4	Table and notes updated

--- END OF TEST REPORT ---