

Sargent Manufacturing Company

TEST REPORT

SCOPE OF WORK

Emissions Testing – Aperio RF Module, Model IN100

REPORT NUMBER

105746284BOX-001.13.56MHz

ISSUE DATE

May 29, 2024

[REVISED DATE]

Original issue

DOCUMENT CONTROL NUMBER

Non-Specific Radio Report Shell Rev. October 2022
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EMISSIONS TEST REPORT (FULL COMPLIANCE)

Report Number: 105746284BOX-001.13.56MHz

Project Number: G105746284

Report Issue Date: May 29, 2024

Model(s) Tested: IN100

Model(s) Partially Tested: None

Model(s) Not Tested but declared equivalent by the client: None

Standards: CFR47 FCC Part 15 Subpart C, Section 15.225: 04/2024
CFR47 FCC Part 15 Subpart C, Section 15.205: 04/2024
CFR47 FCC Part 15 Subpart B, Section 15.109: 04/2024
RSS-210 Issue 10 December 2019
ISED ICES-003 Issue 7 October 2020
RSS-Gen Issue 5 April 2018 +Amendment 1 March 2019

The product contains the following radio modules:
The Limited Module FCC ID containing all 4 radios:

FCC ID: U4A-SCYMCA1K

IC: 6982A-SCYMCA1K

Contains BLE Limited Module

FCC ID: Y88-MBM1CC2640

IC: 9504A-MBM1CC2640

Tested by:
Intertek Testing Services NA, Inc.
70 Codman Hill Road
Boxborough, MA 01719
USA

Client:
Sargent Manufacturing Company
100 Sargent Drive
New Haven, CT 6511
USA

Report prepared by



Kouma Sinn / Senior Staff Engineer

Report reviewed by



Vathana Ven / Senior Staff Engineer

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Table of Contents

1	<i>Introduction and Conclusion</i>	<i>4</i>
2	<i>Test Summary</i>	<i>4</i>
3	<i>Client Information</i>	<i>5</i>
4	<i>Description of Equipment Under Test and Variant Models</i>	<i>5</i>
5	<i>System Setup and Method</i>	<i>7</i>
6	<i>Fundamental Field Strength</i>	<i>8</i>
7	<i>Band Edge Compliance.....</i>	<i>18</i>
8	<i>Transmitter spurious emissions</i>	<i>27</i>
9	<i>Revision History.....</i>	<i>42</i>

1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
3	Client Information	--
4	Description of Equipment Under Test and Variant Models	--
5	System Setup and Method	--
6	Fundamental Field Strength CFR47 FCC Part 15 Subpart C, Section 15.225: 04/2024 RSS-210 Issue 10 December 2019	Pass
7	Band Edge Compliance CFR47 FCC Part 15 Subpart C, Section 15.225: 04/2024 RSS-210 Issue 10 December 2019	Pass
8	Transmitter spurious emissions CFR47 FCC Part 15 Subpart C, Section 15.225: 04/2024 CFR47 FCC Part 15 Subpart B, Section 15.109: 04/2024 RSS-210 Issue 10 December 2019 ISED ICES-003 Issue 7 October 2020	Pass
---	AC Mains Conducted Emissions FCC 47CFR Part 15.107: 04/2024 ISED ICES-003 Issue 7 October 2020	N/A
9	Revision History	--

Notes: The EUT is battery powered. The radio does not transmit simultaneously in normal operation.

3 Client Information

This EUT was tested at the request of:

Client: Sargent Manufacturing Company
100 Sargent Drive
New Haven, CT 6511
USA

Contact: Paul Wehbe
Telephone: 203-498-5536
Email: paul.wehbe@assaabloy.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Sargent Manufacturing Company
100 Sargent Drive
New Haven, CT 6511
USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Electronic access control system with Aperio RF Module (Plastic Enclosure)	Sargent Manufacturing Company	IN100	PCI24082CRAPES0003
Electronic access control system with Aperio RF Module (Metal Enclosure)	Sargent Manufacturing Company	IN100	PCI24081CRAPES0004

Receive Date:	04/02/2024
Received Condition:	Good
Type:	Production
Test Date(s):	04/02/2024-04/03/2024, 04/25/2024

Description of Equipment Under Test (provided by client)

Electronic access control system. It contains the radio modules as below.

The Limited Module FCC ID containing all 4 radios is:

FCC ID: U4A-SCYMCA1K

IC: 6982A-SCYMCA1K

Contains BLE Limited Module

FCC ID: Y88-MBM1CC2640

IC: 9504A-MBM1CC2640

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
9 V (6 x 1.5 V Batteries)	1.5 A	DC	N/A

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Pre-programmed to transmit continuously using HyperTerminal

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	Pre-programmed to transmit continuously using HyperTerminal

13.56 MHz RFID

Radio/Receiver Characteristics	
Frequency Band(s)	See FCC ID # U4A-SCYMCA1K
Modulation Type(s)	See FCC ID # U4A-SCYMCA1K
Maximum Field Strength (Plastic Enclosure)	65.05 dBuV/m at 3 meters
Maximum Field Strength (Metal Enclosure)	61.13 dBuV/m at 3 meters
Test Channels	13.56 MHz
Occupied Bandwidth	See FCC ID # U4A-SCYMCA1K
Frequency Hopper: Number of Hopping Channels	N/A
Frequency Hopper: Channel Dwell Time	N/A
Frequency Hopper: Max interval between two instances of use of the same channel	N/A
MIMO Information (# of Transmit and Receive antenna ports)	N/A
Equipment Type	Limited Module
Antenna Type and Gain	See FCC ID # U4A-SCYMCA1K

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 System Setup and Method

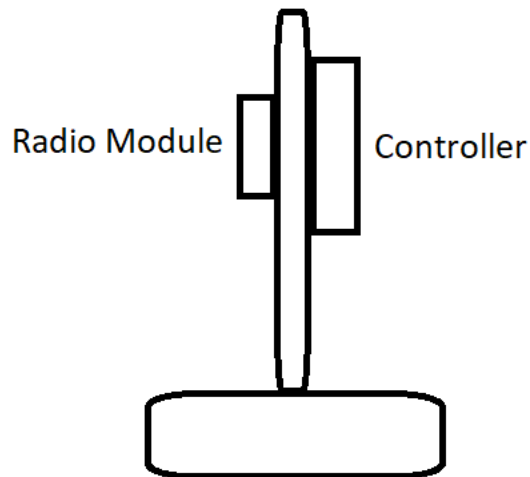
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
--	None	N/A	N/A	N/A	N/A

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
None			

5.1 Method:

Configuration as required by ANSI C63.10-2013 and RSS-Gen Issue 5 April 2018.

5.2 EUT Block Diagram:



6 Fundamental Field Strength

6.1 Method

Tests are performed in accordance with ANSI C63.10 and RSS-Gen.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

6.2 Limits:

Limits – FCC Part §15.225 (a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Notes: The limits for RSS-210 are the same as the FCC limits above.

6.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/27/2024	03/27/2025
IW001'	2 meter cable	Insulated Wire	2801-NPS	001	07/19/2023	07/19/2024
HS001'	DC-18GHz cable 1.5m long	Huber & Suhner	SucoFlex 106A	HS001	01/30/2024	01/30/2025
HS002'	DC-18GHz cable 1.5M long	Huber & Suhner	SucoFlex 106A	HS002	07/19/2023	07/19/2024
145-408'	10m Chamber - 3m Track B In-floor Cable	Huber + Suhner	sucoflex 106-11000mm	001	07/19/2023	07/19/2024
ROS011'	ESW44 receiver 1Hz-44GHz	Rhode and Schwarz	ESW44	103296	06/28/2023	06/28/2024
145-019'	Active Loop Antenna (9 KHz to 30 MHz)	EMCO	6502/1	9902-3267	03/05/2024	03/05/2025

Software Utilized:

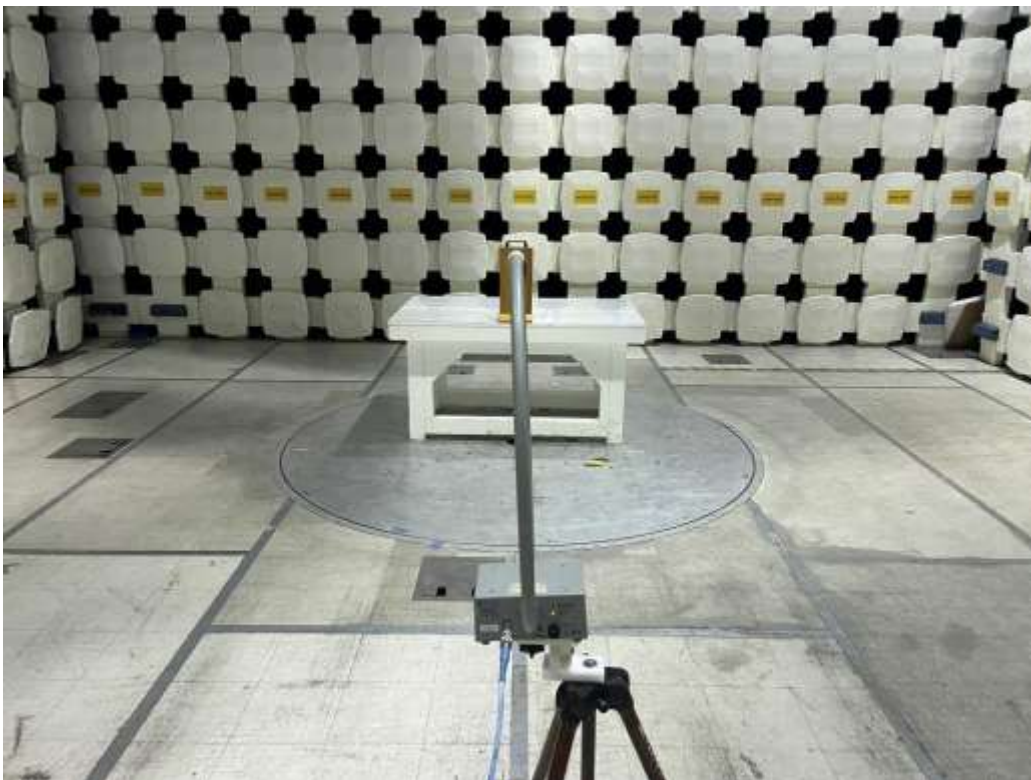
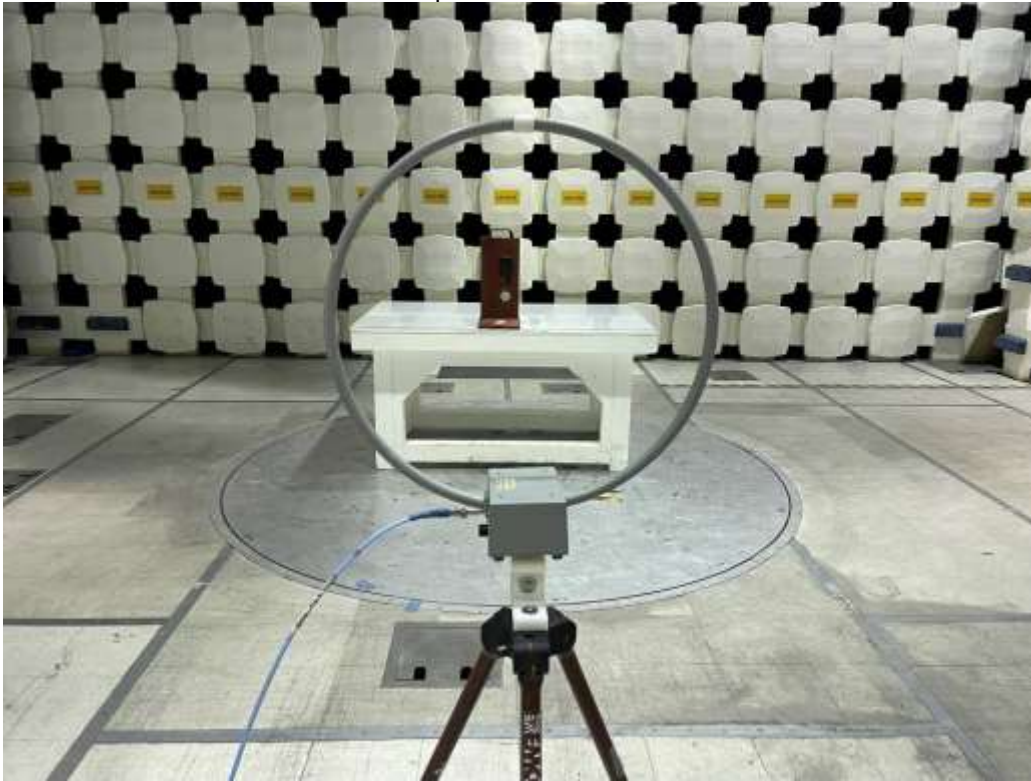
Name	Manufacturer	Version
None	N/A	N/A

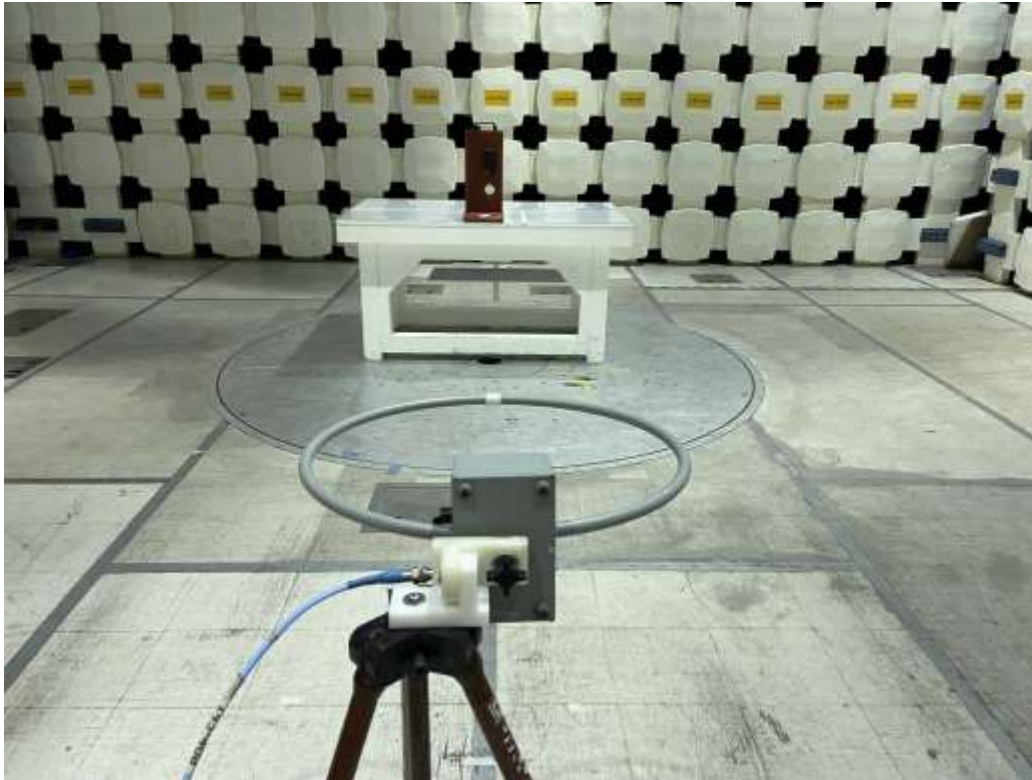
6.4 Results:

The sample tested was found to Comply.

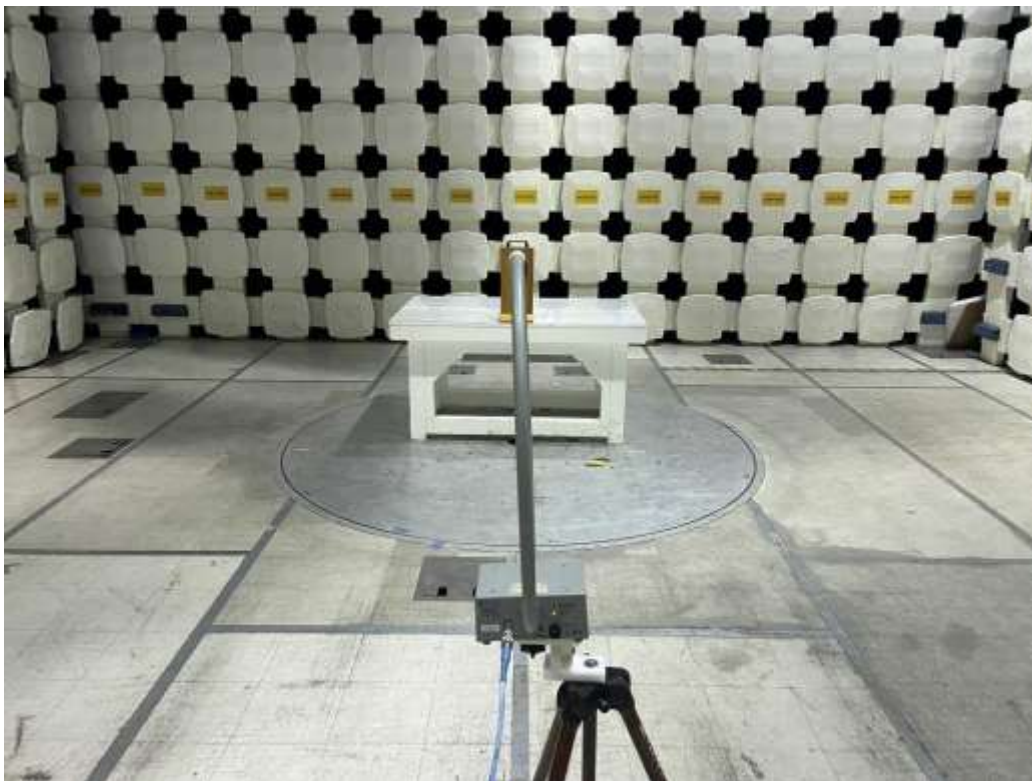
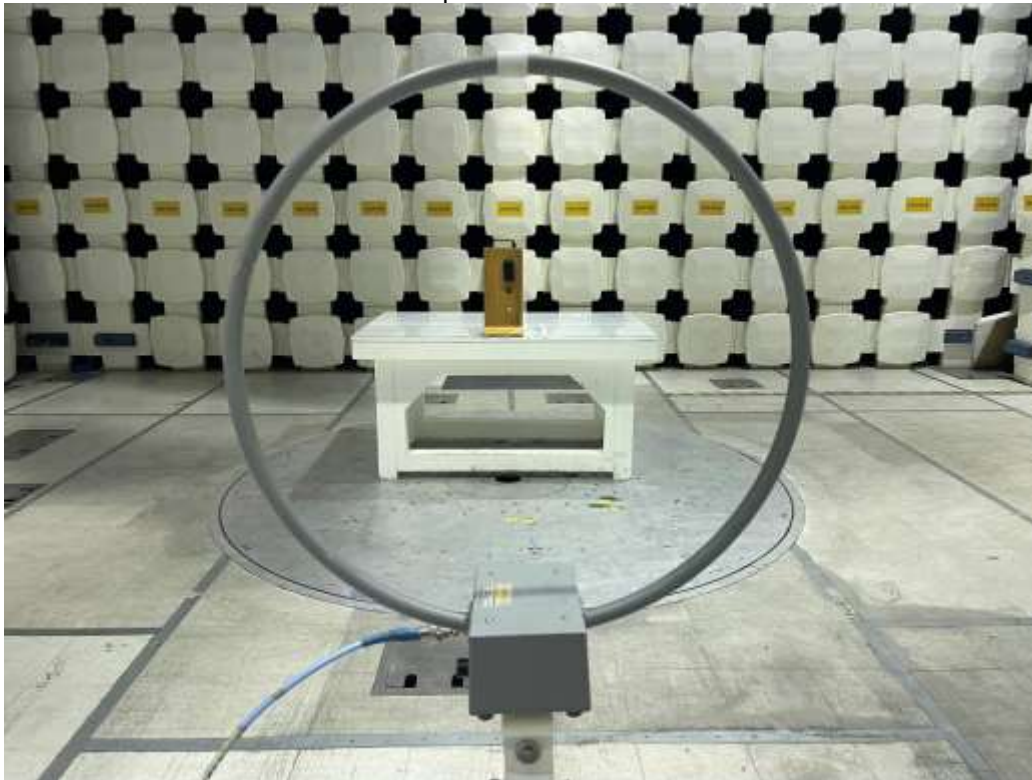
6.5 Setup Photographs:

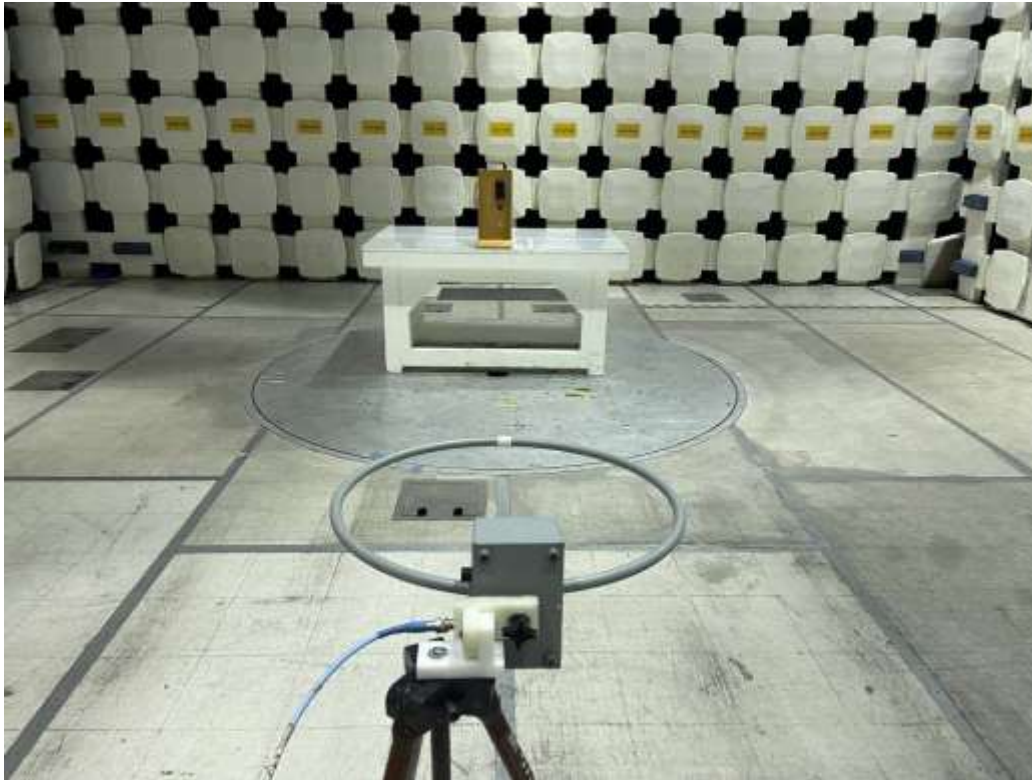
Test Setup With Plastic Enclosure





Test Setup With Metal Enclosure





6.6 Test Data:**13.56 MHz RFID With Plastic Enclosure – Fundamental Field Strength**

Frequency (MHz)	Field Strength at 3 meters (dBuV/m)	Field Strength Limit at 3 meters (dBuV/m)	Results
13.56	65.05	84	Compliance

Limit at 13.56 MHz is 15,848 uV/m or 84 dBuV/m at 30 meter with distance factor of $40 \cdot \log(3/30)$ or 40 dB. The limit at 3 meters = 84 dBuV/m + 40 dB or 84 dBuV/m.

13.56 MHz RFID With Metal Enclosure – Fundamental Field Strength

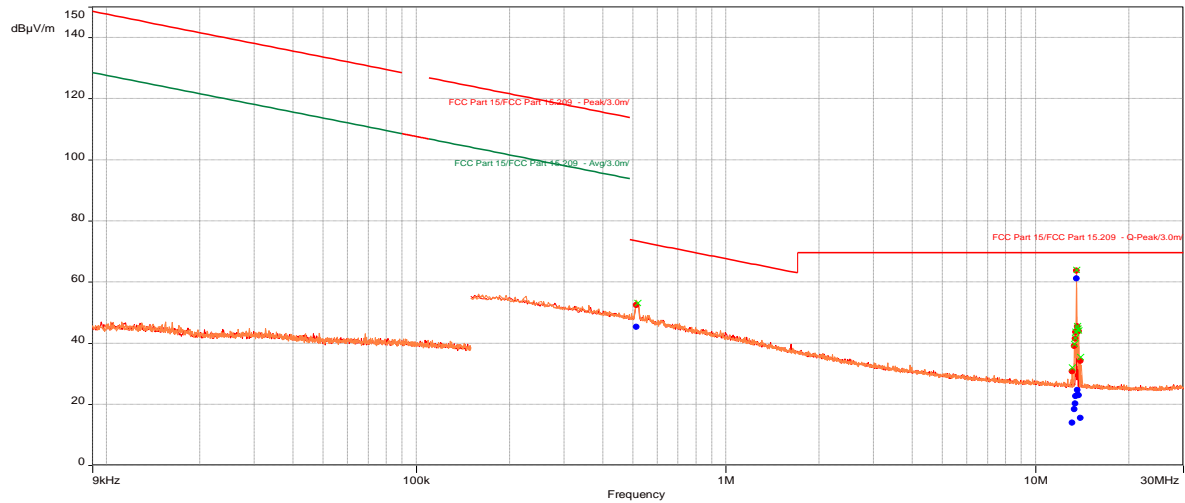
Frequency (MHz)	Field Strength at 3 meters (dBuV/m)	Field Strength Limit at 3 meters (dBuV/m)	Results
13.56	61.13	84	Compliance

Limit at 13.56 MHz is 15,848 uV/m or 84 dBuV/m at 30 meter with distance factor of $40 \cdot \log(3/30)$ or 40 dB. The limit at 3 meters = 84 dBuV/m + 40 dB or 84 dBuV/m.

13.56 MHz RFID With Metal Enclosure, Radiated Fundamental Field Strength at 3m

Test Information:

Date and Time	4/25/2024 7:44:46 PM
Client and Project Number	Sargent Assa Abloy
Engineer	Kouma Sinn
Temperature	23 deg C
Humidity	17 %
Atmospheric Pressure	1014 mbars
Comments	Scan 6_13.56 MHz RFID With Modulation (Metal Enclosure), RE 9kHz-30MHz Loop antenna, Electric Field, 3M Location (FCC 15.209)

Graph:

Results:

Peak (PASS) (10)

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51485	52.46	--	--	77.20	Vertical	9k	0.10	13.25
13.13375	30.79	--	--	358.80	Vertical	9k	0.10	12.04
13.34951	39.03	--	--	23.10	Vertical	9k	0.10	12.03
13.42702	41.54	--	--	0.00	Vertical	9k	0.10	12.02
13.4816	43.66	--	--	0.00	Vertical	9k	0.10	12.01
13.56022	63.81	--	--	12.00	Vertical	9k	0.10	12.01
13.63988	45.48	--	--	17.60	Vertical	9k	0.10	12.00
13.69545	44.28	--	--	6.80	Vertical	9k	0.10	12.00
13.7715	43.96	--	--	17.50	Vertical	9k	0.10	11.99
13.98525	34.25	--	--	1.30	Vertical	9k	0.10	11.97

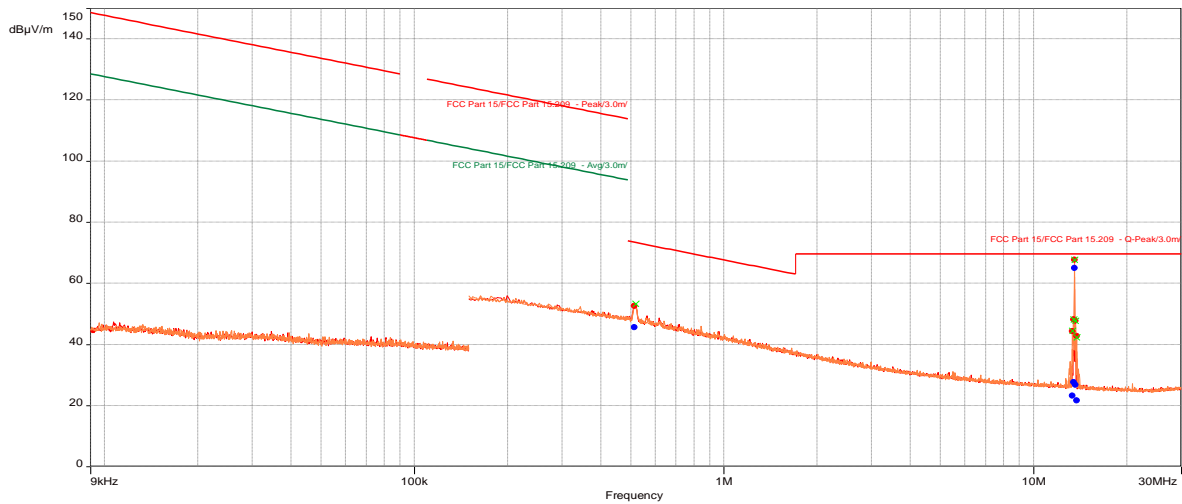
QuasiPeak (PASS) (10)

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51485	45.39	73.38	-27.98	77.20	Vertical	9k	0.10	13.25
13.13375	14.05	69.54	-55.49	358.80	Vertical	9k	0.10	12.04
13.34951	18.40	69.54	-51.14	23.10	Vertical	9k	0.10	12.03
13.42702	20.28	69.54	-49.26	0.00	Vertical	9k	0.10	12.02
13.4816	22.69	69.54	-46.85	0.00	Vertical	9k	0.10	12.01
13.56022	61.13	164.00	-102.87	12.00	Vertical	9k	0.10	12.01
13.63988	24.70	69.54	-44.84	17.60	Vertical	9k	0.10	12.00
13.69545	23.12	69.54	-46.42	6.80	Vertical	9k	0.10	12.00
13.7715	22.93	69.54	-46.61	17.50	Vertical	9k	0.10	11.99
13.98525	15.52	69.54	-54.02	1.30	Vertical	9k	0.10	11.97

13.56 MHz RFID With Plastic Enclosure, Radiated Fundamental Field Strength at 3m

Test Information:

Date and Time	4/25/2024 8:28:20 PM
Client and Project Number	Sargent Assa Abloy
Engineer	Kouma Sinn
Temperature	23 deg C
Humidity	17 %
Atmospheric Pressure	1014 mbars
Comments	Scan 7_13.56 MHz RFID With Modulation (Plastic Enclosure), RE 9kHz-30MHz Loop antenna, Electric Field, 3M Location (FCC 15.209)

Graph:**Results:**

Peak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51541	52.56	--	--	288.90	Vertical	9k	0.10	13.25
13.34783	44.33	--	--	17.50	Vertical	9k	0.10	12.03
13.48271	48.24	--	--	6.60	Vertical	9k	0.10	12.01
13.56011	67.69	--	--	17.60	Vertical	9k	0.10	12.01
13.63729	47.74	--	--	17.50	Vertical	9k	0.10	12.00
13.77072	42.78	--	--	360.00	Vertical	9k	0.10	11.99

QuasiPeak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51541	45.67	73.38	-27.71	288.90	Vertical	9k	0.10	13.25
13.34783	23.28	69.54	-46.26	17.50	Vertical	9k	0.10	12.03
13.48271	27.65	69.54	-41.89	6.60	Vertical	9k	0.10	12.01
13.56011	65.05	164.00	-98.95	17.60	Vertical	9k	0.10	12.01
13.63729	26.84	69.54	-42.70	17.50	Vertical	9k	0.10	12.00
13.77072	21.75	69.54	-47.79	360.00	Vertical	9k	0.10	11.99

Intertek

Report Number: 105746284BOX-001.13.56MHz

Issued: 05/29/2024

Product Standard: CFR47 FCC Part 15.225, RSS-210				Limit applied: See Report Section 6.2			
Test Date	Test Personnel/ Initials	Supervising Engineer/ Initials	Input Voltage	Mode	Atmospheric Data		
					Temp C°	Relative Humidity %	Atmospheric Pressure mbar
04/25/2024	Kouma Sin <i>KPS</i>	Vathana F. Ven <i>VSV</i>	Internal battery	Continuous transmitting	23	17	1014

Deviations, Additions, or Exclusions: None

7 Band Edge Compliance

7.1 Method

Tests are performed in accordance with ANSI C63.10 and RSS-Gen.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

7.2 Limit

15.225 (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters, (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters, (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters, (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emissions limits in 15.209.

Notes: The limits for RSS-210 are the same as the FCC limits above.

7.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007	Weather Station Vantage Vue	Davis	6250	MS191212003	03/27/2024	03/27/2025
IW001'	2 meter cable	Insulated Wire	2801-NPS	001	07/19/2023	07/19/2024
HS001'	DC-18GHz cable 1.5m long	Huber & Suhner	SucoFlex 106A	HS001	01/30/2024	01/30/2025
HS002'	DC-18GHz cable 1.5M long	Huber & Suhner	SucoFlex 106A	HS002	07/19/2023	07/19/2024
145-408'	10m Chamber - 3m Track B In-floor Cable	Huber + Suhner	sucoflex 106-11000mm	001	07/19/2023	07/19/2024
ROS011'	ESW44 receiver 1Hz-44GHz	Rhode and Schwarz	ESW44	103296	06/28/2023	06/28/2024
145-019'	Active Loop Antenna (9 KHz to 30 MHz)	EMCO	6502/1	9902-3267	03/05/2024	03/05/2025

Software Utilized:

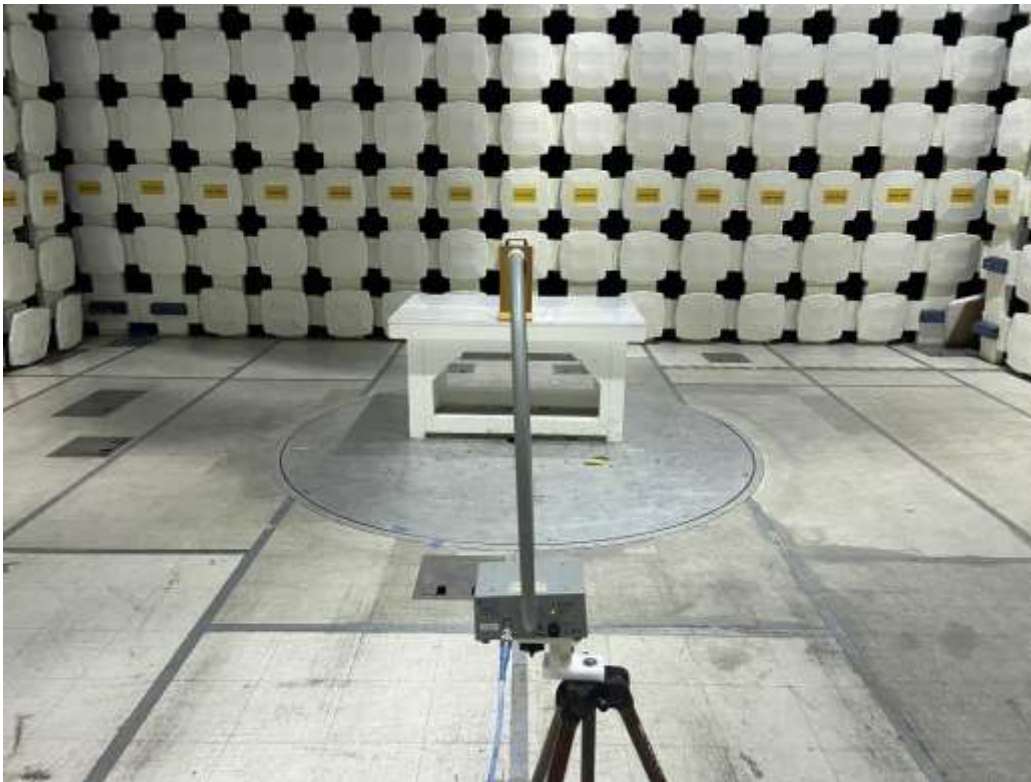
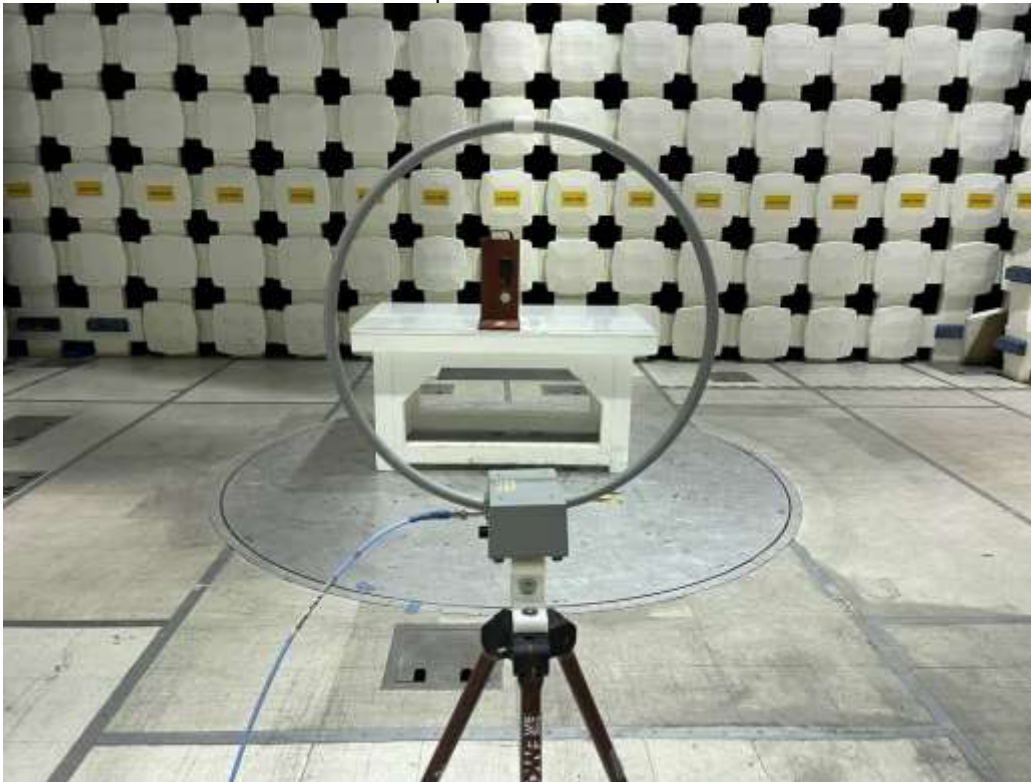
Name	Manufacturer	Version
None	N/A	N/A

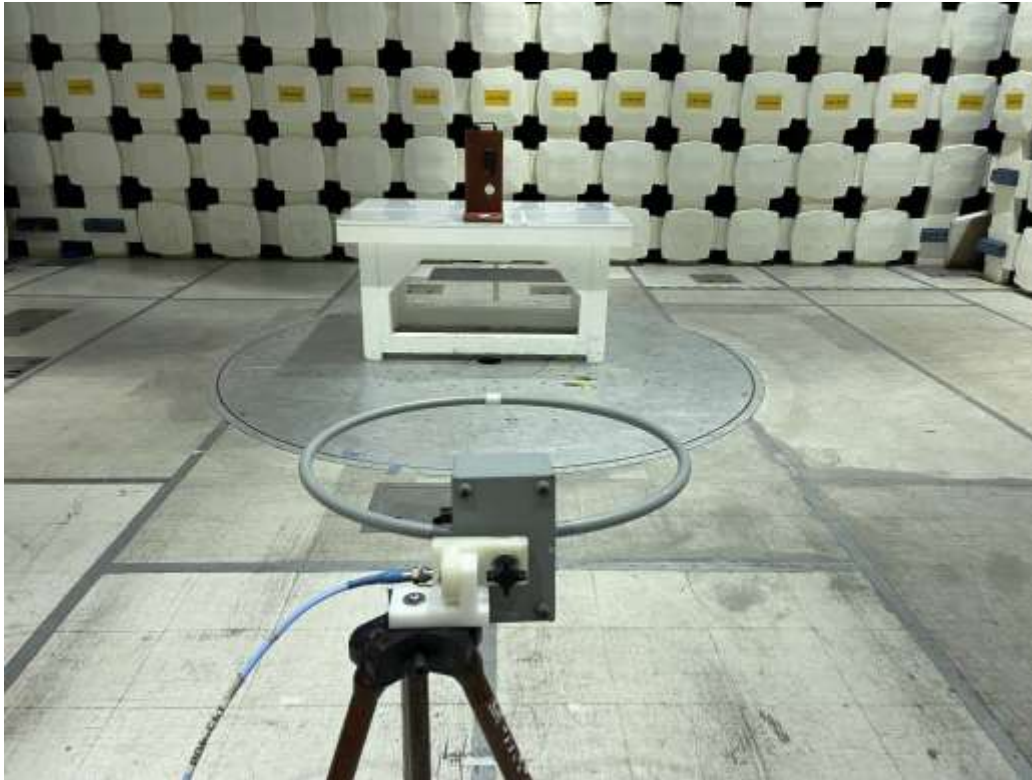
7.4 Results:

The sample tested was found to Comply.

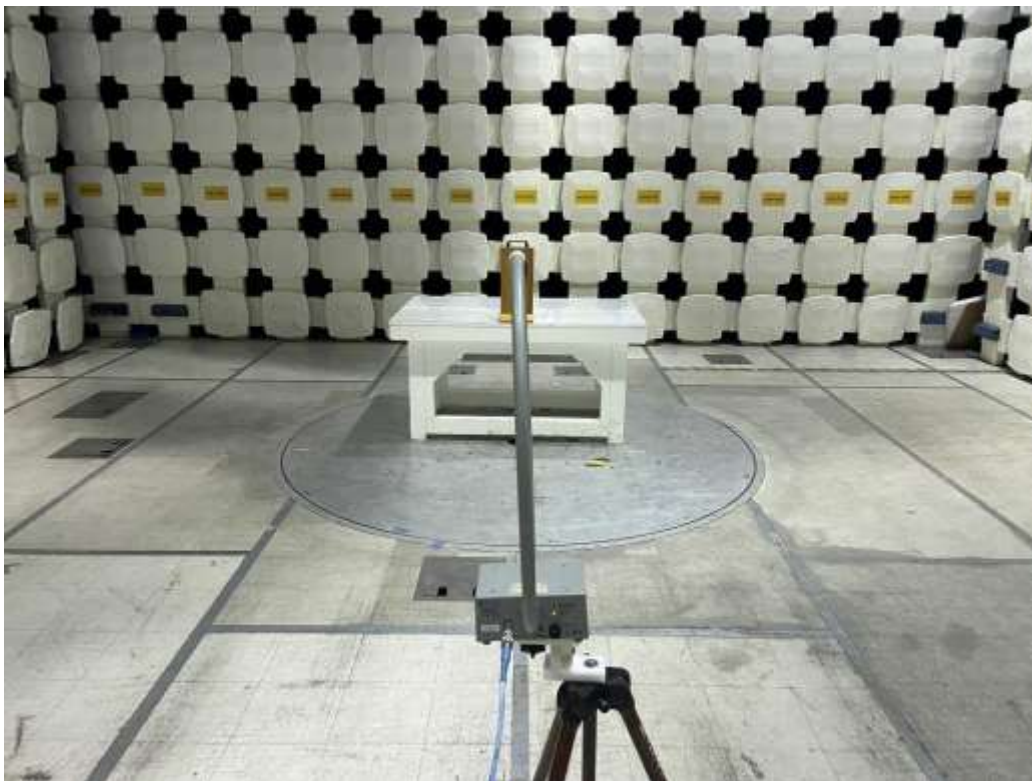
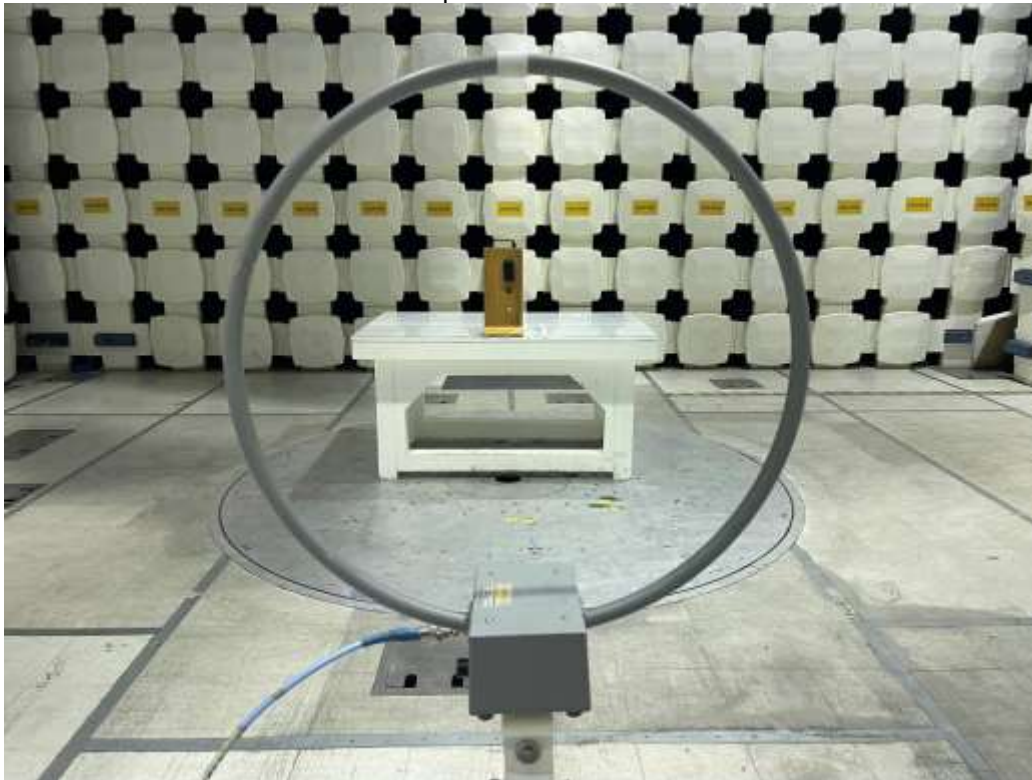
7.5 Setup Photographs:

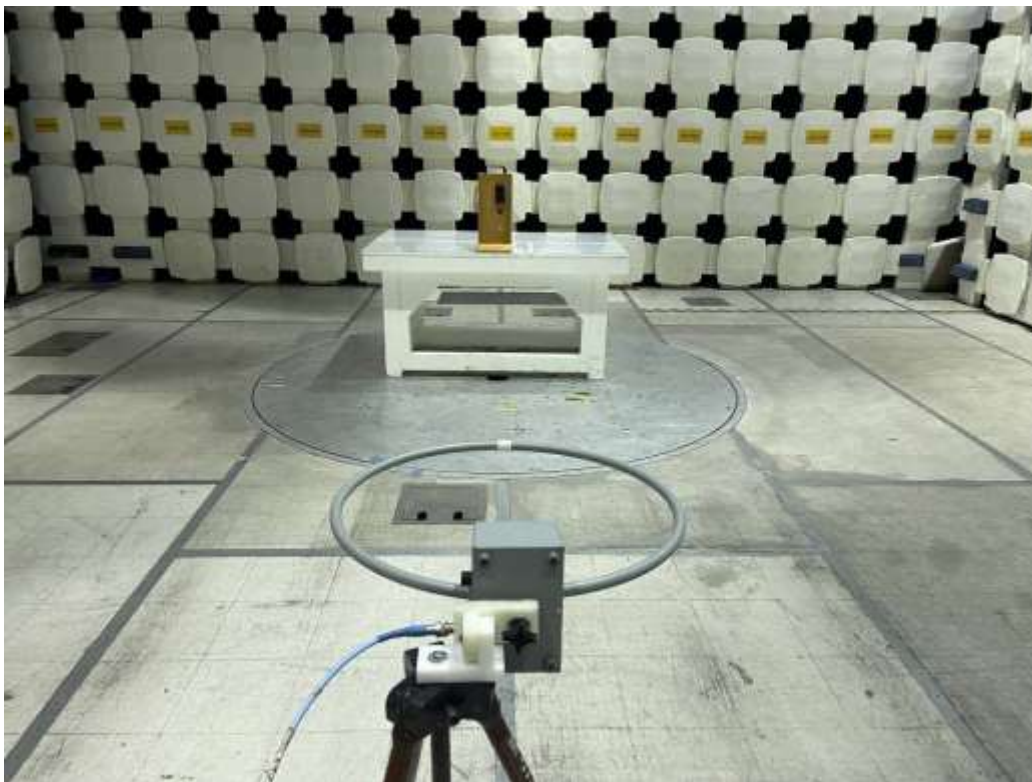
Test Setup With Plastic Enclosure





Test Setup With Metal Enclosure





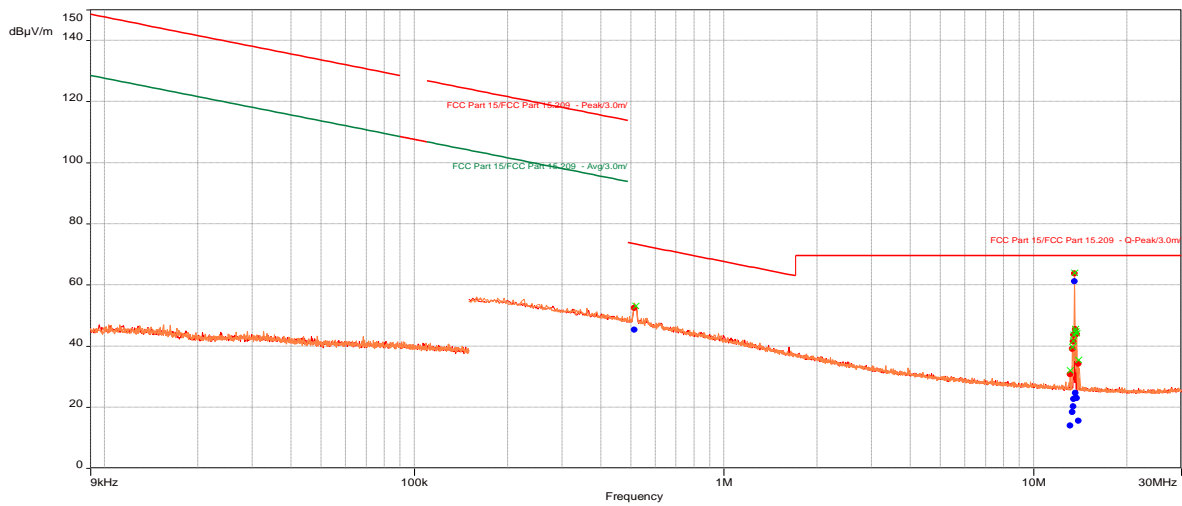
7.6 Test Data:

13.56 MHz RFID With Metal Enclosure, Radiated Band Edge Emissions at 3m

Test Information:

Date and Time	4/25/2024 7:44:46 PM
Client and Project Number	Sargent Assa Abloy
Engineer	Kouma Sinn
Temperature	23 deg C
Humidity	17 %
Atmospheric Pressure	1014 mbars
Comments	Scan 6_ 13.56 MHz RFID With Modulation (Metal Enclosure), RE 9kHz-30MHz Loop antenna, Electric Field, 3M Location (FCC 15.209)

Graph:



Results:

Peak (PASS) (10)

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51485	52.46	--	--	77.20	Vertical	9k	0.10	13.25
13.13375	30.79	--	--	358.80	Vertical	9k	0.10	12.04
13.34951	39.03	--	--	23.10	Vertical	9k	0.10	12.03
13.42702	41.54	--	--	0.00	Vertical	9k	0.10	12.02
13.4816	43.66	--	--	0.00	Vertical	9k	0.10	12.01
13.56022	63.81	--	--	12.00	Vertical	9k	0.10	12.01
13.63988	45.48	--	--	17.60	Vertical	9k	0.10	12.00
13.69545	44.28	--	--	6.80	Vertical	9k	0.10	12.00
13.7715	43.96	--	--	17.50	Vertical	9k	0.10	11.99
13.98525	34.25	--	--	1.30	Vertical	9k	0.10	11.97

QuasiPeak (PASS) (10)

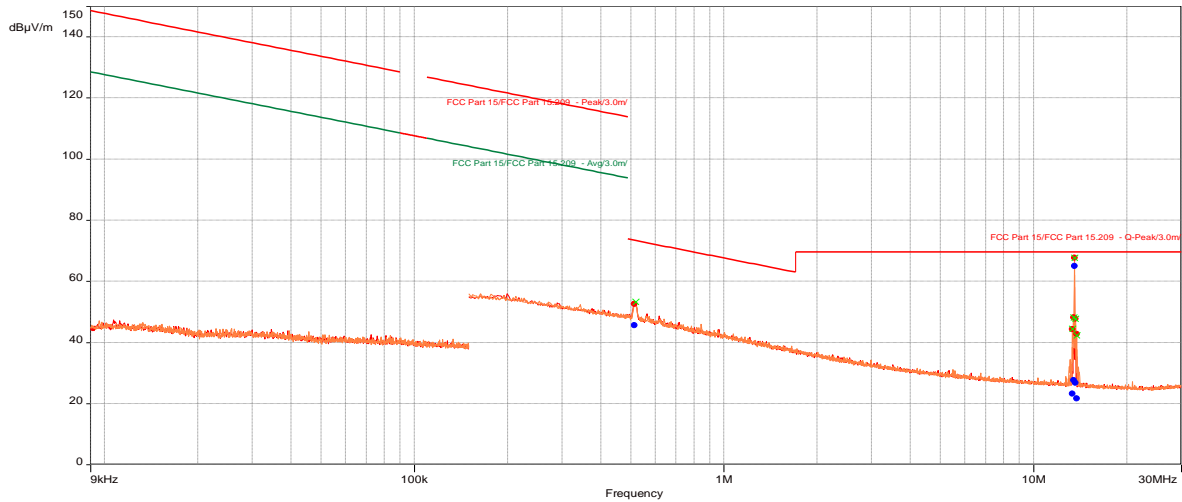
Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51485	45.39	73.38	-27.98	77.20	Vertical	9k	0.10	13.25
13.13375	14.05	69.54	-55.49	358.80	Vertical	9k	0.10	12.04
13.34951	18.40	69.54	-51.14	23.10	Vertical	9k	0.10	12.03
13.42702	20.28	69.54	-49.26	0.00	Vertical	9k	0.10	12.02
13.4816	22.69	69.54	-46.85	0.00	Vertical	9k	0.10	12.01
13.56022	61.13	164.00	-102.87	12.00	Vertical	9k	0.10	12.01
13.63988	24.70	69.54	-44.84	17.60	Vertical	9k	0.10	12.00
13.69545	23.12	69.54	-46.42	6.80	Vertical	9k	0.10	12.00
13.7715	22.93	69.54	-46.61	17.50	Vertical	9k	0.10	11.99
13.98525	15.52	69.54	-54.02	1.30	Vertical	9k	0.10	11.97

Notes: Since the fundamental and band edge emissions meet FCC Part 15.209 limits, the band edge emissions deem to meet the band edge emissions limits in FCC Part 15.225.

13.56 MHz RFID With Plastic Enclosure, Radiated Band Edge Emissions at 3m

Test Information:

Date and Time	4/25/2024 8:28:20 PM
Client and Project Number	Sargent Assa Abloy
Engineer	Kouma Sinn
Temperature	23 deg C
Humidity	17 %
Atmospheric Pressure	1014 mbars
Comments	Scan 7_13.56 MHz RFID With Modulation (Plastic Enclosure), RE 9kHz-30MHz Loop antenna, Electric Field, 3M Location (FCC 15.209)

Graph:**Results:**

Peak (PASS) (6)

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51541	52.56	--	--	288.90	Vertical	9k	0.10	13.25
13.34783	44.33	--	--	17.50	Vertical	9k	0.10	12.03
13.48271	48.24	--	--	6.60	Vertical	9k	0.10	12.01
13.56011	67.69	--	--	17.60	Vertical	9k	0.10	12.01
13.63729	47.74	--	--	17.50	Vertical	9k	0.10	12.00
13.77072	42.78	--	--	360.00	Vertical	9k	0.10	11.99

QuasiPeak (PASS) (6)

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51541	45.67	73.38	-27.71	288.90	Vertical	9k	0.10	13.25
13.34783	23.28	69.54	-46.26	17.50	Vertical	9k	0.10	12.03
13.48271	27.65	69.54	-41.89	6.60	Vertical	9k	0.10	12.01
13.56011	65.05	164.00	-98.95	17.60	Vertical	9k	0.10	12.01
13.63729	26.84	69.54	-42.70	17.50	Vertical	9k	0.10	12.00
13.77072	21.75	69.54	-47.79	360.00	Vertical	9k	0.10	11.99

Notes: Since the fundamental and band edge emissions meet FCC Part 15.209 limits, the band edge emissions deem to meet the band edge emissions limits in FCC Part 15.225.

Intertek

Report Number: 105746284BOX-001.13.56MHz

Issued: 05/29/2024

Product Standard: CFR47 FCC Part 15.225, RSS-210					Limit applied: See Report Section 7.2		
Test Date	Test Personnel/ Initials	Supervising Engineer/ Initials	Input Voltage	Mode	Atmospheric Data		
					Temp C°	Relative Humidity %	Atmospheric Pressure mbar
04/25/2024	Kouma Sin <i>KPS</i>	Vathana F. Ven <i>VSV</i>	Internal battery	Continuous transmitting	23	17	1014

Deviations, Additions, or Exclusions: None

8 Transmitter spurious emissions

8.1 Method

Tests are performed in accordance with ANSI C63.10, ANSI C63.4. and RSS-Gen.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucisp
Radiated Emissions, 10m	30-1000 MHz	4.6dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	5.3 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.5 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	5.0 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	5.0 dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where

FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This

value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 52.0 dB μ V

AF = 7.4 dB/m

CF = 1.6 dB

AG = 29.0 dB

FS = 32 dB μ V/m

To convert from dB μ V to μ V or mV the following was used:

UF = $10^{(NF / 20)}$ where UF = Net Reading in μ V

NF = Net Reading in dB μ V

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0

UF = $10^{(32 \text{ dB}\mu\text{V} / 20)} = 39.8 \mu\text{V/m}$

Alternately, when BAT-EMC Emission Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. The “Correction” includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the “Level” column.

8.2 Limits

Limits – FCC Part §15.225 (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters, (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters, (d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in FCC Part §15.209.

Notes: The limits for RSS-210 are the same as the FCC limits above.

8.3 Test Equipment Used:

Test equipment used from 9 kHz-30 MHz

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/27/2024	03/27/2025
IW001'	2 meter cable	Insulated Wire	2801-NPS	001	07/19/2023	07/19/2024
HS001'	DC-18GHz cable 1.5m long	Huber & Suhner	SucoFlex 106A	HS001	01/30/2024	01/30/2025
HS002'	DC-18GHz cable 1.5M long	Huber & Suhner	SucoFlex 106A	HS002	07/19/2023	07/19/2024
145-408'	10m Chamber - 3m Track B In-floor Cable	Huber + Suhner	sucoflex 106-11000mm	001	07/19/2023	07/19/2024
ROS011'	ESW44 receiver 1Hz-44GHz	Rhode and Schwarz	ESW44	103296	06/28/2023	06/28/2024
145-019'	Active Loop Antenna (9 KHz to 30 MHz)	EMCO	6502/1	9902-3267	03/05/2024	03/05/2025

Test equipment used from 30-1000 MHz

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/27/2024	03/27/2025
IW001'	2 meter cable	Insulated Wire	2801-NPS	001	07/19/2023	07/19/2024
145-406'	10m Track A In-floor Cable #1	Huber + Suhner	sucoflex 160-19220mm	001	07/19/2023	07/19/2024
145-414'	Cable 145-414	Huber + Suhner	3m Track A cable	145-414	07/19/2023	07/19/2024
147-326'	Immunity Cable	Huber + Suhner	Sucoflex 106	233089-005	07/19/2023	07/19/2024
PRE11'	50dB gain pre-amp	Pasternack	PRE11	PRE11	09/15/2023	09/15/2024
145106'	Bilog Antenna (30MHz - 5GHz)	Sunol Sciences	JB5	A111003	09/14/2023	09/14/2024
ROS011'	ESW44 receiver 1Hz-44GHz	Rhode and Schwarz	ESW44	103296	06/28/2023	06/28/2024

Software Utilized:

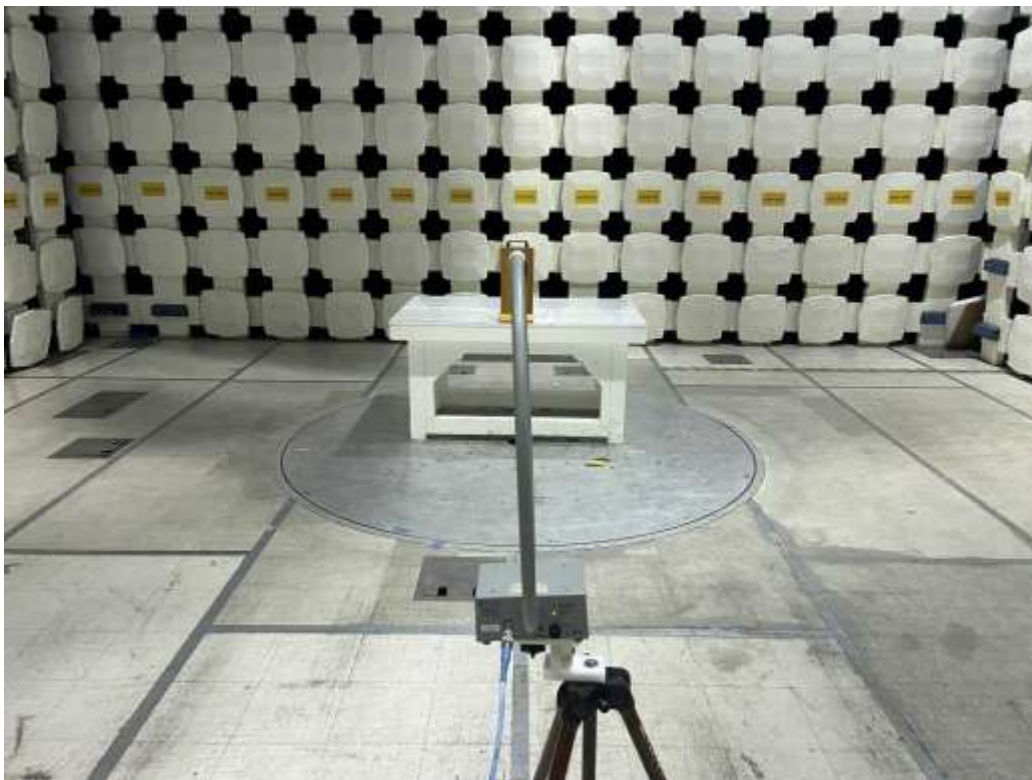
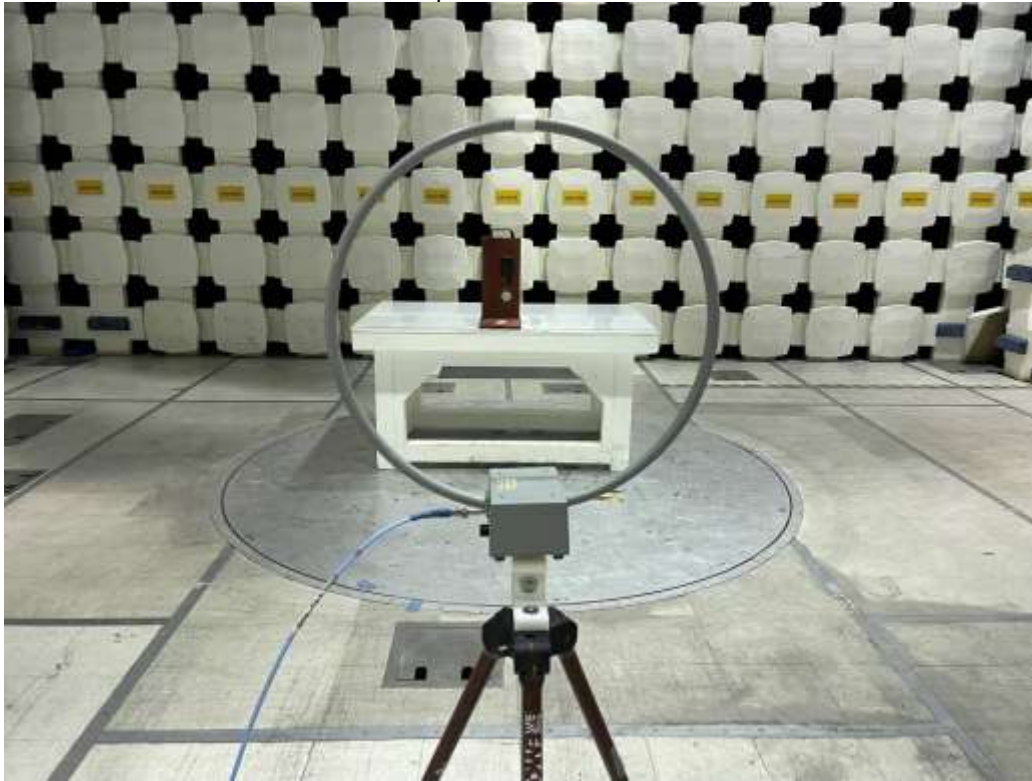
Name	Manufacturer	Version
BAT-EMC	Nexio	2022.0.27.0

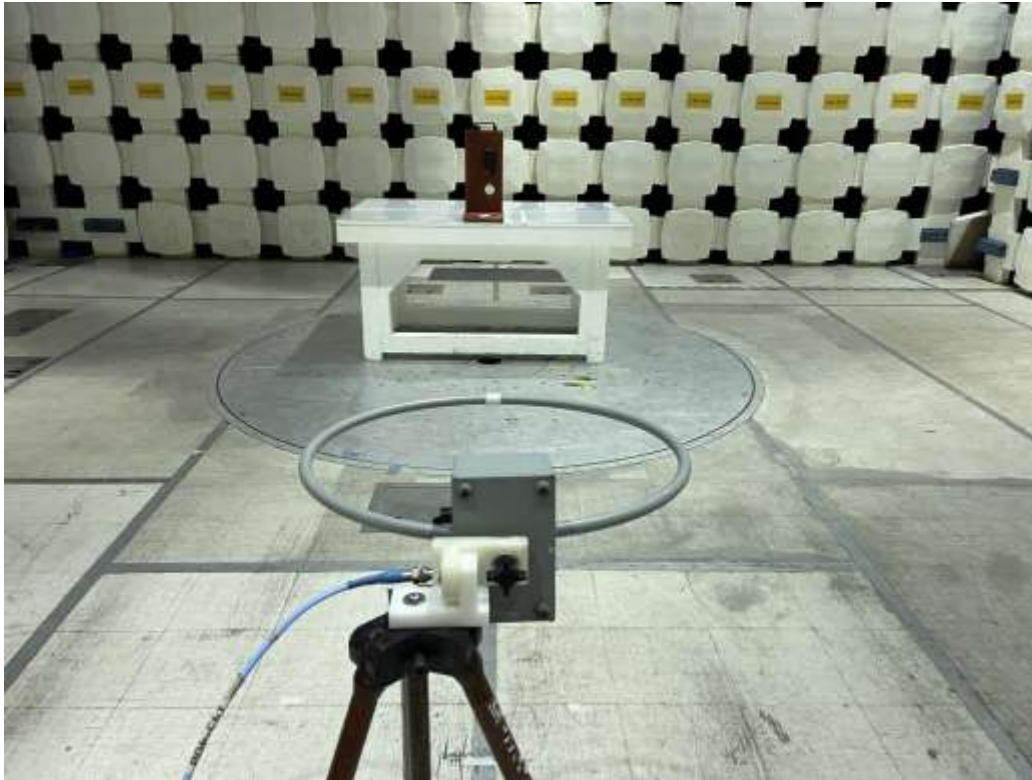
8.4 Results:

The sample tested was found to Comply.

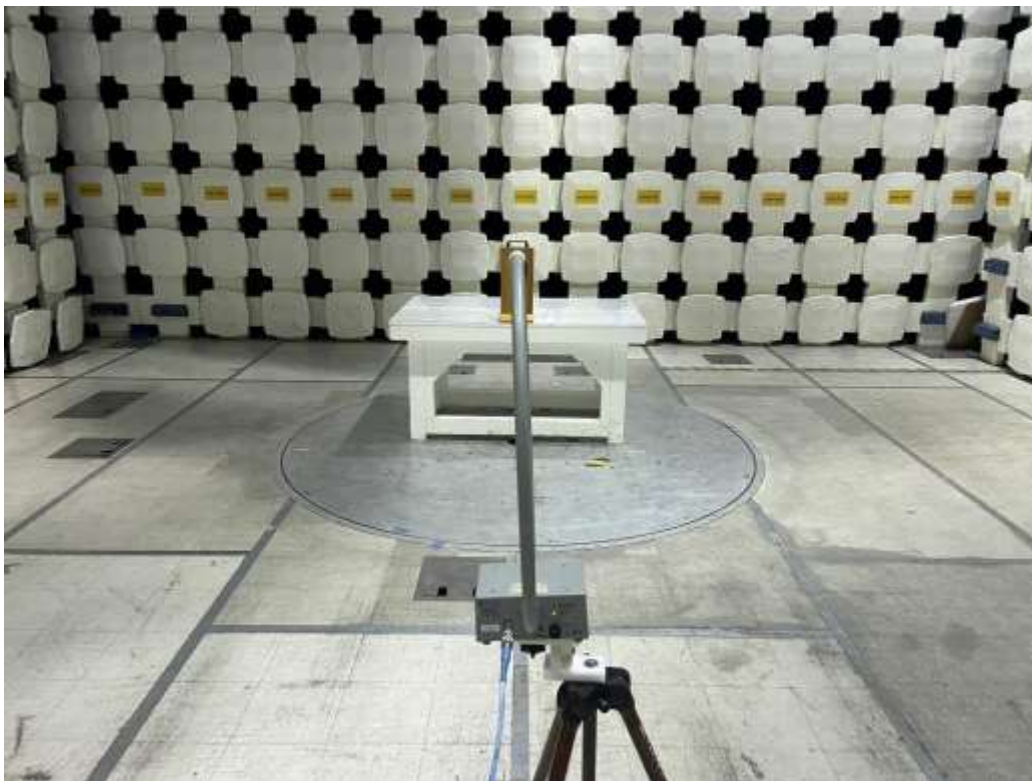
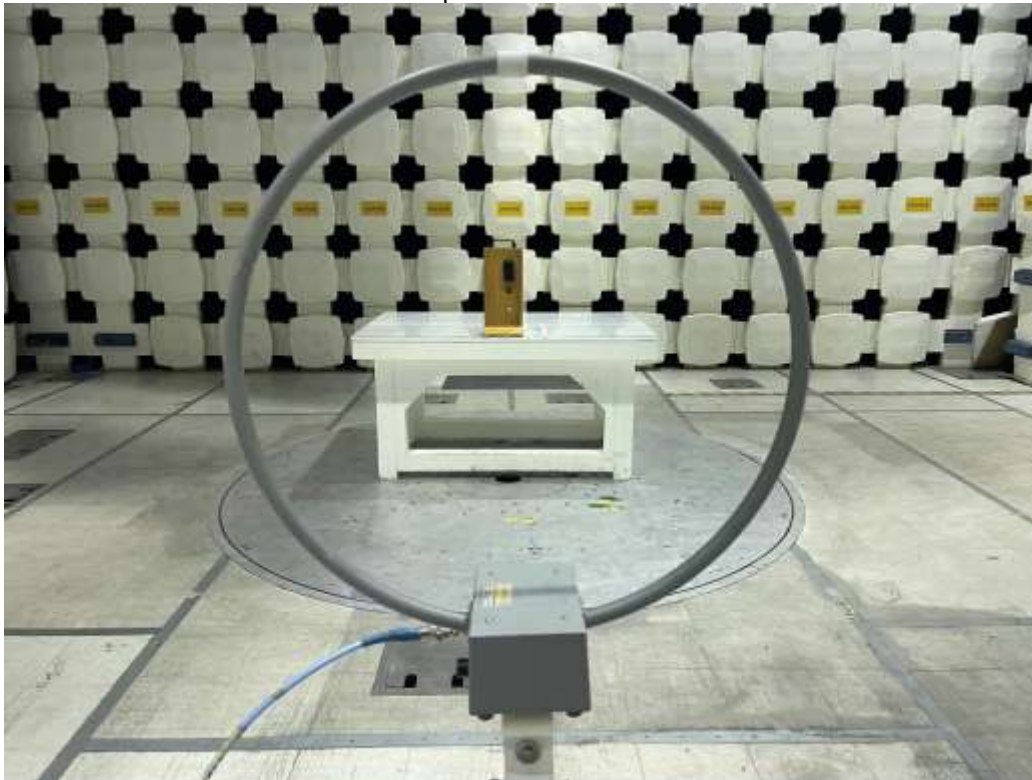
8.5 Setup Photographs:

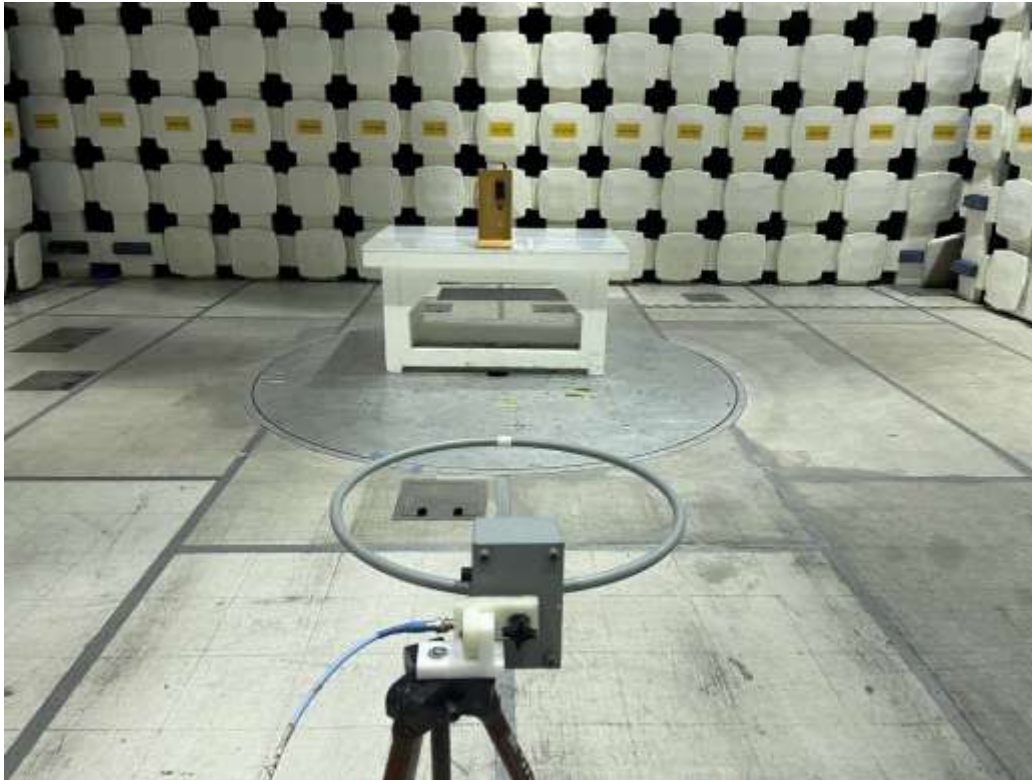
Test Setup With Plastic Enclosure



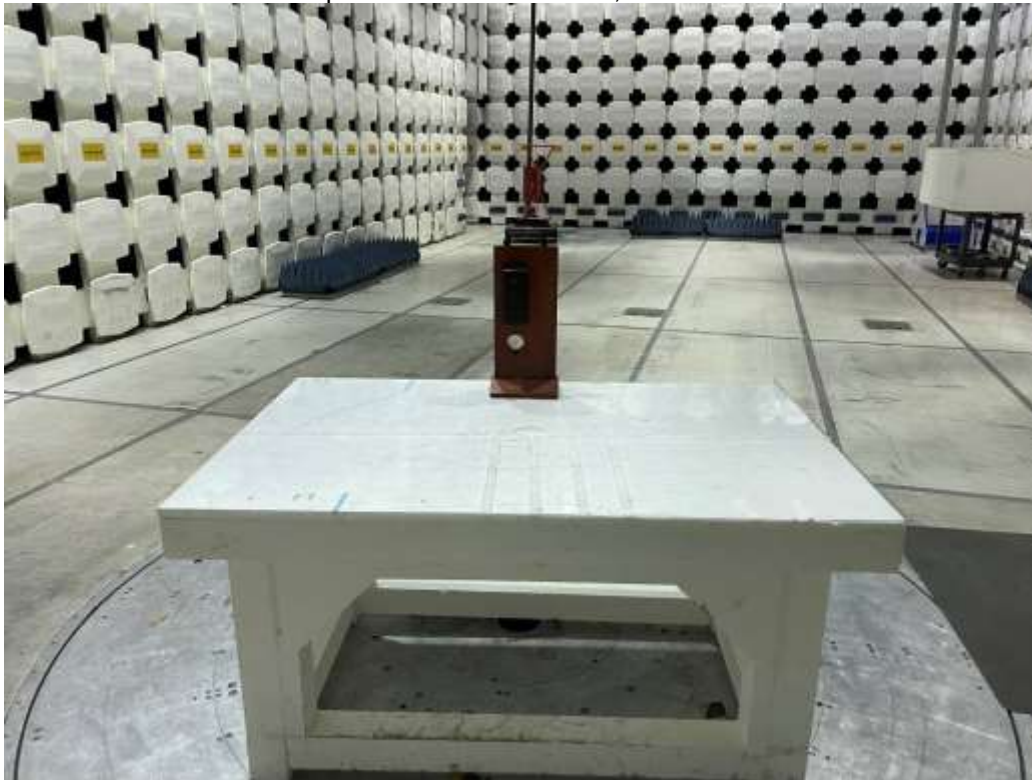


Test Setup With Metal Enclosure





Test Setup With Plastic Enclosure, RE 30-1000 MHz



Test Setup With Metal Enclosure, RE 30-1000 MHz



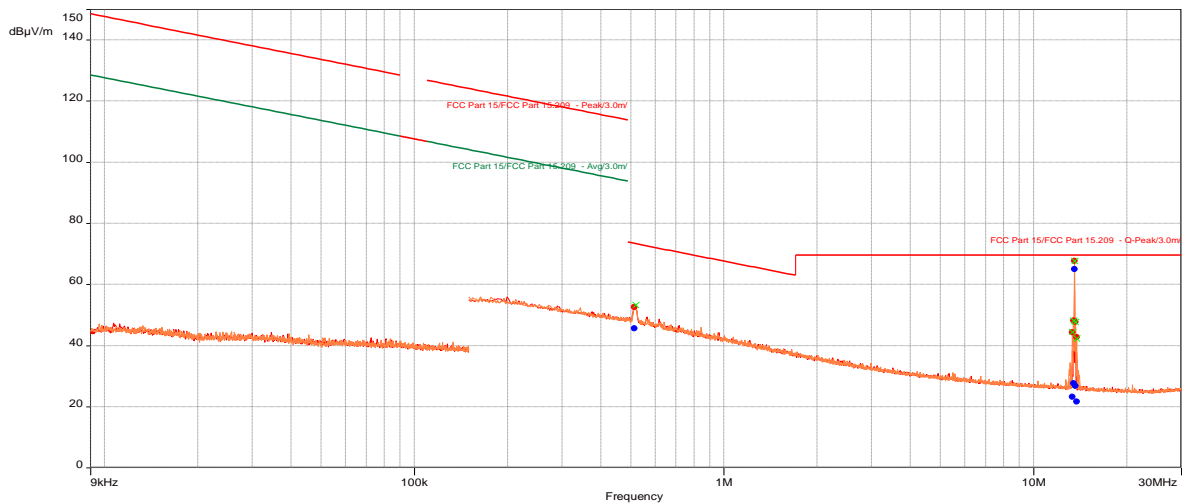
8.6 Plots/Data:

13.56 MHz RFID With Plastic Enclosure, RE 9 kHz-30 MHz

Test Information:

Date and Time	4/25/2024 8:28:20 PM
Client and Project Number	Sargent Assa Abloy
Engineer	Kouma Sinn
Temperature	23 deg C
Humidity	17 %
Atmospheric Pressure	1014 mbars
Comments	Scan 7_13.56 MHz RFID With Modulation (Plastic Enclosure), RE 9kHz-30MHz Loop antenna, Electric Field, 3M Location (FCC 15.209)

Graph:



Results:

Peak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51541	52.56	--	--	288.90	Vertical	9k	0.10	13.25
13.34783	44.33	--	--	17.50	Vertical	9k	0.10	12.03
13.48271	48.24	--	--	6.60	Vertical	9k	0.10	12.01
13.56011	67.69	--	--	17.60	Vertical	9k	0.10	12.01
13.63729	47.74	--	--	17.50	Vertical	9k	0.10	12.00
13.77072	42.78	--	--	360.00	Vertical	9k	0.10	11.99

QuasiPeak (PASS) (6)

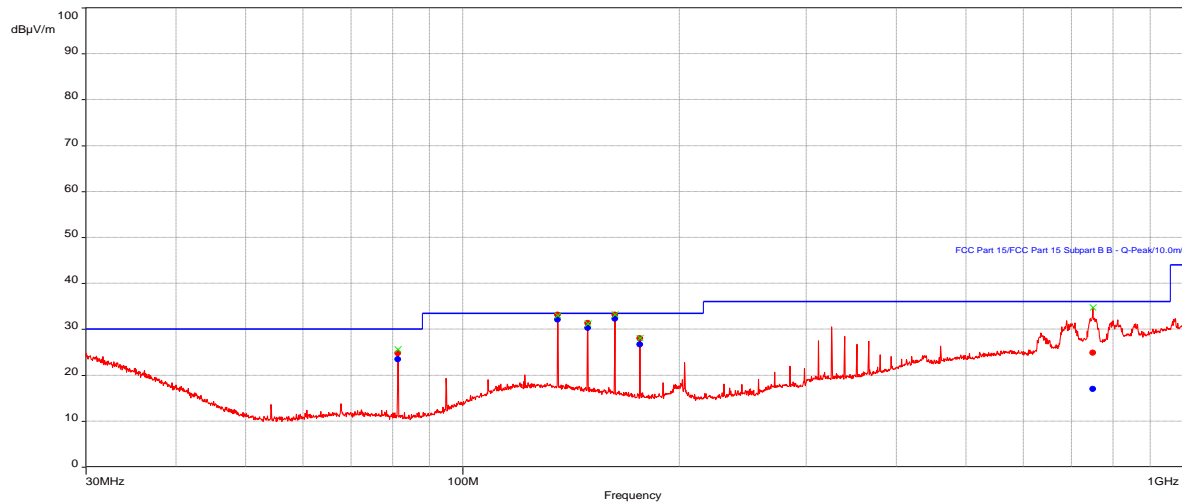
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51541	45.67	73.38	-27.71	288.90	Vertical	9k	0.10	13.25
13.34783	23.28	69.54	-46.26	17.50	Vertical	9k	0.10	12.03
13.48271	27.65	69.54	-41.89	6.60	Vertical	9k	0.10	12.01
13.56011	65.05	164.00	-98.95	17.60	Vertical	9k	0.10	12.01
13.63729	26.84	69.54	-42.70	17.50	Vertical	9k	0.10	12.00
13.77072	21.75	69.54	-47.79	360.00	Vertical	9k	0.10	11.99

Notes: The fundamental frequency at 13.56 MHz signal applied FCC Part 15.225 limits while all spurious emissions applied FCC Part 15.209 limits.

13.56 MHz RFID With Plastic Enclosure, RE 30-1000 MHz

Test Information:

Date and Time	4/3/2024 9:02:20 AM
Client and Project Number	Sargent Assa Abloy
Engineer	Kouma Sinn
Temperature	22 deg C
Humidity	28 %
Atmospheric Pressure	1004 mbars
Comments	Scan 8a: 13.56 MHz RFID (Plastic Enclosure), RE 30-1000 MHz

Graph:**Results:**

Peak (6)

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Meas.Time (s)	Correction (dB)
81.3645	24.80	--	--	169.70	4.00	Vertical	120k	20	-25.48
135.594	33.20	--	--	360.00	1.39	Vertical	120k	20	-18.76
149.1555	31.40	--	--	0.00	1.00	Vertical	120k	20	-19.55
162.717	33.22	--	--	1.40	1.38	Vertical	120k	20	-20.06
176.286	28.03	--	--	6.70	1.00	Vertical	120k	20	-20.77
749.4972	24.94	--	--	229.20	1.00	Vertical	120k	20	-8.62

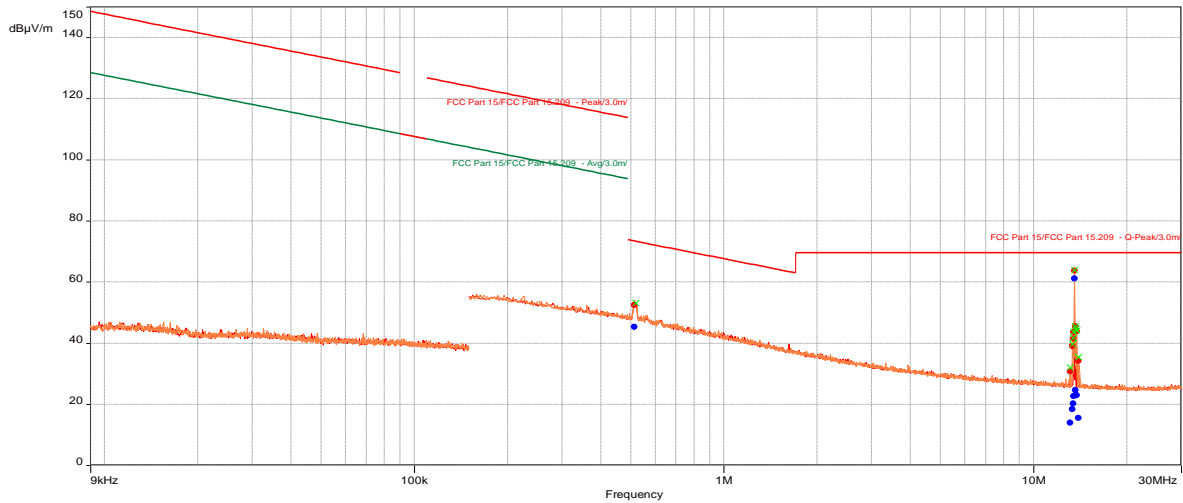
QuasiPeak (PASS) (6)

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Meas.Time (s)	Correction (dB)
81.3645	23.49	30.00	-6.51	169.70	4.00	Vertical	120k	20	-25.48
135.594	32.13	33.50	-1.37	360.00	1.39	Vertical	120k	20	-18.76
149.1555	30.31	33.50	-3.19	0.00	1.00	Vertical	120k	20	-19.55
162.717	32.37	33.50	-1.13	1.40	1.38	Vertical	120k	20	-20.06
176.286	26.71	33.50	-6.79	6.70	1.00	Vertical	120k	20	-20.77
749.4972	17.00	36.00	-19.00	229.20	1.00	Vertical	120k	20	-8.62

13.56 MHz RFID With Metal Enclosure, RE 9 kHz-30 MHz

Test Information:

Date and Time	4/25/2024 7:44:46 PM
Client and Project Number	Sargent Assa Abloy
Engineer	Kouma Sinn
Temperature	23 deg C
Humidity	17 %
Atmospheric Pressure	1014 mbars
Comments	Scan 6_13.56 MHz RFID With Modulation (Metal Enclosure), RE 9kHz-30MHz Loop antenna, Electric Field, 3M Location (FCC 15.209)

Graph:

Results:

Peak (PASS) (10)

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51485	52.46	--	--	77.20	Vertical	9k	0.10	13.25
13.13375	30.79	--	--	358.80	Vertical	9k	0.10	12.04
13.34951	39.03	--	--	23.10	Vertical	9k	0.10	12.03
13.42702	41.54	--	--	0.00	Vertical	9k	0.10	12.02
13.4816	43.66	--	--	0.00	Vertical	9k	0.10	12.01
13.56022	63.81	--	--	12.00	Vertical	9k	0.10	12.01
13.63988	45.48	--	--	17.60	Vertical	9k	0.10	12.00
13.69545	44.28	--	--	6.80	Vertical	9k	0.10	12.00
13.7715	43.96	--	--	17.50	Vertical	9k	0.10	11.99
13.98525	34.25	--	--	1.30	Vertical	9k	0.10	11.97

QuasiPeak (PASS) (10)

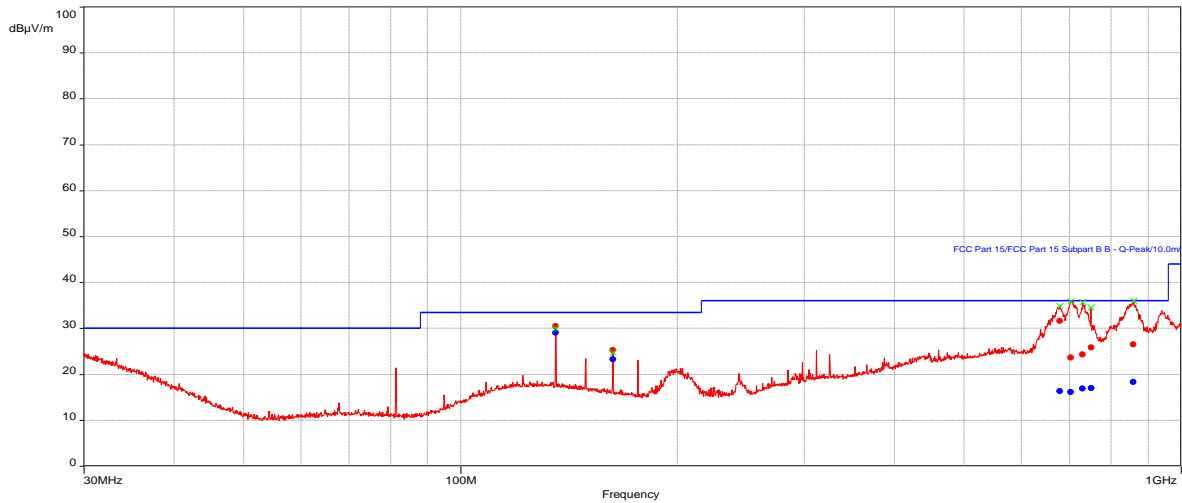
Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Pol.	RBW	Meas.Time	Correction (dB)
0.51485	45.39	73.38	-27.98	77.20	Vertical	9k	0.10	13.25
13.13375	14.05	69.54	-55.49	358.80	Vertical	9k	0.10	12.04
13.34951	18.40	69.54	-51.14	23.10	Vertical	9k	0.10	12.03
13.42702	20.28	69.54	-49.26	0.00	Vertical	9k	0.10	12.02
13.4816	22.69	69.54	-46.85	0.00	Vertical	9k	0.10	12.01
13.56022	61.13	164.00	-102.87	12.00	Vertical	9k	0.10	12.01
13.63988	24.70	69.54	-44.84	17.60	Vertical	9k	0.10	12.00
13.69545	23.12	69.54	-46.42	6.80	Vertical	9k	0.10	12.00
13.7715	22.93	69.54	-46.61	17.50	Vertical	9k	0.10	11.99
13.98525	15.52	69.54	-54.02	1.30	Vertical	9k	0.10	11.97

Notes: The fundamental frequency at 13.56 MHz signal applied FCC Part 15.225 limits while all spurious emissions applied FCC Part 15.209 limits.

13.56 MHz RFID With Metal Enclosure, RE 30-1000 MHz

Test Information:

Date and Time	4/3/2024 9:46:14 AM
Client and Project Number	Sargent Assa Abloy
Engineer	Kouma Sinn
Temperature	22 deg C
Humidity	28 %
Atmospheric Pressure	1004 mbars
Comments	Scan 9: 13.56 MHz RFID (Metal Enclosure), RE 30-1000 MHz

Graph:**Results:****Peak (7)**

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Meas.Time (s)	Correction (dB)
135.603	30.55	--	--	360.00	1.00	Vertical	120k	20	-18.76
162.72	25.25	--	--	360.00	1.00	Vertical	120k	20	-20.06
678.38	31.66	--	--	81.60	2.67	Vertical	120k	20	-10.07
702.8125	23.64	--	--	44.90	1.00	Vertical	120k	20	-9.51
729.7767	24.38	--	--	181.00	2.99	Vertical	120k	20	-8.71
750.2604	25.82	--	--	298.90	3.29	Vertical	120k	20	-8.64
858.898	26.57	--	--	120.80	3.75	Vertical	120k	20	-6.54

QuasiPeak (PASS) (7)

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Meas.Time (s)	Correction (dB)
135.603	29.14	33.50	-4.36	360.00	1.00	Vertical	120k	20	-18.76
162.72	23.26	33.50	-10.24	360.00	1.00	Vertical	120k	20	-20.06
678.38	16.35	36.00	-19.65	81.60	2.67	Vertical	120k	20	-10.07
702.8125	16.21	36.00	-19.79	44.90	1.00	Vertical	120k	20	-9.51
729.7767	16.94	36.00	-19.06	181.00	2.99	Vertical	120k	20	-8.71
750.2604	17.06	36.00	-18.94	298.90	3.29	Vertical	120k	20	-8.64
858.898	18.39	36.00	-17.61	120.80	3.75	Vertical	120k	20	-6.54

Product Standard: CFR47 FCC Part 15 15.225, RSS-210				Limit applied: See Report Section 8.2 Pretest Verification w/BB source: Yes			
Test Date	Test Personnel/ Initials	Supervising Engineer/ Initials	Input Voltage	Mode	Atmospheric Data		
					Temp C°	Relative Humidity %	Atmospheric Pressure mbar
04/03/2024	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	22	28	1004
04/25/2024	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	23	17	1014

Deviations, Additions, or Exclusions: None

9 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	05/29/2024	105746284BOX-001.13.56MHz	KPS <i>KPS</i>	VFV <i>VFV</i>	Original Issue