TEST REPORT

Report Number: 104775092MPK-002
Project Number: G104775092
Issue Date: October 14, 2021

Testing performed on
SRD™ Access Control Reader
Model: SRD

FCC ID: T8I-SRD001
IC: 6504A-SRD001

to

FCC Part 15 Subpart C (15.225)
ISED RSS-210 Issue 10
FCC Part 15, Subpart B
ISED ICES-003

For

Farpointe Data, Inc.

Test Performed by:	Test Authorized by:
Intertek	Farpointe Data, Inc.
1365 Adams Court	2195 Zanker Road
Menlo Park, CA 94025 USA	San Jose, CA 95131 USA

Prepared by: _____ **Date:** October 14, 2021
Amar Kacel

Reviewed by: _____ **Date:** October 14, 2021
Krishna Vemuri

intertek
Total Quality. Assured.

Report No. 104274811MPK-006

Equipment Under Test:	SRD™ Access Control Reader
Model Number:	SRD
Serial Number:	SN003
Applicant:	Farpointe Data, Inc.
Contact:	Kirk Bierach
Address:	2195 Zanker Road San Jose, CA 95131
Country:	USA
Email:	Kirkbierach@farpointedata.com
Applicable Regulation:	FCC Part 15 Subpart C (15.225) ISED RSS-210 Issue 10 FCC Part 15, Subpart B ISED ICES-003 Issue 7
Test Site Location:	Intertek 1365 Adams Court Menlo Park, CA 94025
Date of Test:	September 08, 2021 to October 01, 2021

We attest to the accuracy of this report:

Amar Kacel
Staff Engineer

Krishna K Vemuri
EMC Manager

TABLE OF CONTENTS

1.0 Summary of Tests

TEST	REFERENCE FCC 15.225	REFERENCE RSS-210	RESULTS
Field Strength of Fundamental	15.225(a)	B.6	Complies
Radiated Emissions Outside the band	15.225(b), 15.225(c), 15.225(d), 15.209	B.6	Complies
Frequency Tolerance of the Carrier	15.225(e)	B.6	Complies
Line Conducted Emissions	15.207	RSS-GEN	Complies
Occupied Bandwidth	15.215	RSS-GEN	Complies
Antenna requirement	15.203	RSS-GEN	Complies[1]

[1] The EUT utilizes an internal Antenna.

EUT receive date: September 08, 2021
EUT receive condition: The EUT was received in good condition with no apparent damage. As declared by the Applicant it is identical to the production units.
Test start date: September 08, 2021
Test completion date: October 01, 2021

2.0 General Description

2.1 Product Description

Farpointe Data, Inc. supplied the following description of the EUT:

SRD™ Mobile-ready contactless smartcard reader and keypad with OSDP support.

For more information, refer to the following product specification, declared by the manufacturer.

Overview of the EUT

Applicant name & address	Farpointe Data, Inc. 2195 Zanker Road San Jose, CA 95131 USA
Contact info / Email	Kirk Bierach / Kirkbierach@farpointedata.com
Equipment Under Test	SRD™ Access Control Reader
Model	SRD
FCC Identifier	T8I-SRD001
IC Identifier	6504A-SRD001
Operating Frequency	13.56 MHz
Number of Channels	1
Type of Modulation	ASK Modulation
Antenna Type	Internal Antenna

2.2 Related Submittal(s) Grants

None

2.3 Test Methodology

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4: 2014. Radiated tests were performed at an antenna to EUT distance of 10 meters, unless stated otherwise in this test report. All other measurements were made in accordance with the procedures in part 2 of CFR 47 7, ANSI C63.10: 2013, ANSI C63.4-2014 & RSS-GEN Issue 5.

2.4 Test Facility

The radiated emission test site and conducted measurement facility used to collect the data is 10m semi-anechoic chamber located in Menlo Park, California. This test facility and site measurement data have been fully placed on file with the FCC and Industry Canada (Site # 2042L-1).

2.5 Measurement Uncertainty

Compliance with the limits was based on the results of the measurements and doesn't take into account the measurement uncertainty.

Estimated Measurement Uncertainty

Measurement	Expanded Uncertainty (k=2)		
	0.15 MHz – 1 GHz	1 GHz – 2.5 GHz	> 2.5 GHz
RF Power and Power Density – antenna conducted	-	0.7 dB	-
Unwanted emissions - antenna conducted	1.1 dB	1.3 dB	1.9 dB
Bandwidth – antenna conducted	-	30 Hz	-

Measurement	Expanded Uncertainty (k=2)		
	0.15 MHz – 30MHz	30 MHz – 1 GHz	1 GHz – 18 GHz
Radiated emissions	-	4.7	5.1 dB
AC mains conducted emissions	2.1 dB	-	-

3.0 System Test Configuration

3.1 EUT Photo

3.2 Block Diagram of Test Setup

The diagram shown below details the interconnection of the EUT and support equipment. For specific layout, refer to the test configuration photograph in the relevant section of this report.

S = Shielded **U** = Unshielded	**F** = With Ferrite **m** = Length in Meters

3.3 Justification

For radiated emission measurements the EUT is placed on a non-conductive table. The EUT was configured to continuously transmit.

3.4 Software Exercise Program

None

3.5 Mode of Operation during test

The SRD™ Access Control Reader was set up to continuously transmitting at 13.56MHz.

3.6 Modifications required for Compliance

No modifications were made by the manufacturer to bring the EUT into compliance.

3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusion have been made from standard.

4.0 Measurement Results

4.1 Field Strength of Fundamental and Radiated Emissions Outside the band

4.1.1 Requirements

FCC Rules 15.225

a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter (84 dBuV) 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 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 §15.209.

§15.209 Radiated emission limits; general requirements.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

4.1.2 Procedure

Radiated Measurements Below 30 MHz

During the test the EUT is rotated, and the measuring antenna angles are varied during the search for maximum signal level.

Radiated emissions are taken at ten meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Measurements for below 30 MHz were made at 10 meters. Data results below are corrected for distance back to 30 meters.

Radiated Measurements Above 30 MHz

During the test the EUT is rotated, and the measuring antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at ten meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Measurements for above 30 MHz were made at 10 meters.

Radiated emission measurements were performed from 9kHz to 1 GHz.
Analyzer resolution is:

200Hz or greater for 9kHz to 150kHz
9 kHz or greater for 150kHz to 30 MHz
120 kHz or greater for 30MHz to 1000 MHz
For those frequencies quasi-peak detector applies

Data includes of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

Field Strength 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 is as follows:

FS = RA + AF + CF – AG – DCF

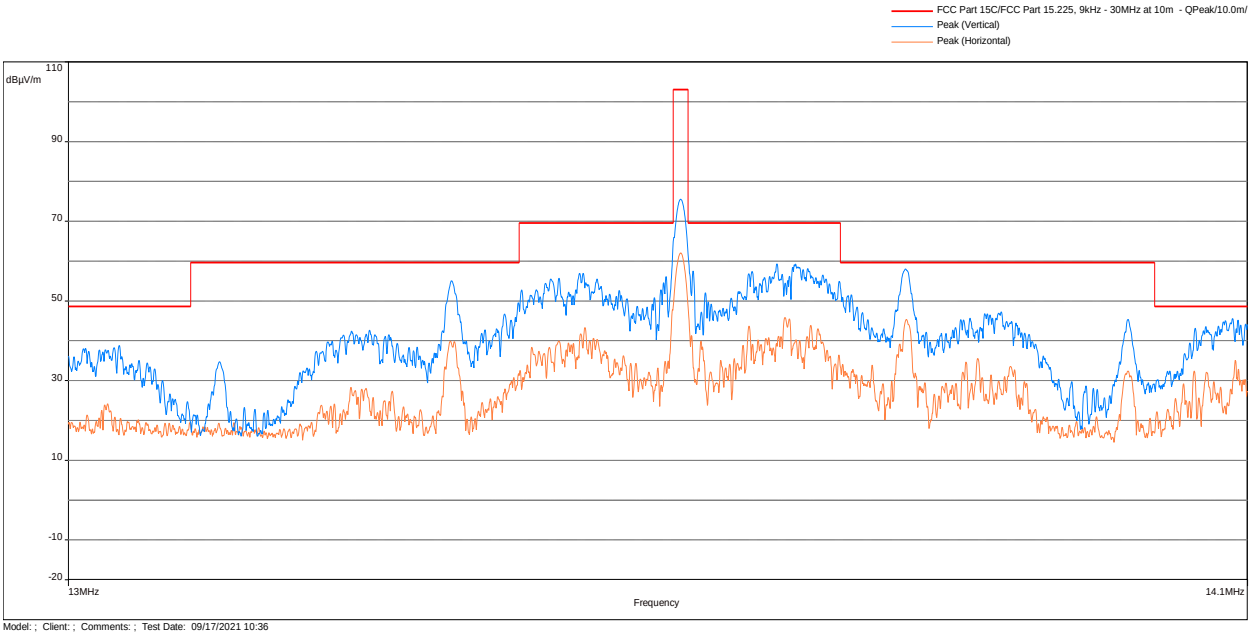
Where FS = Field Strength in dB (μV/m)

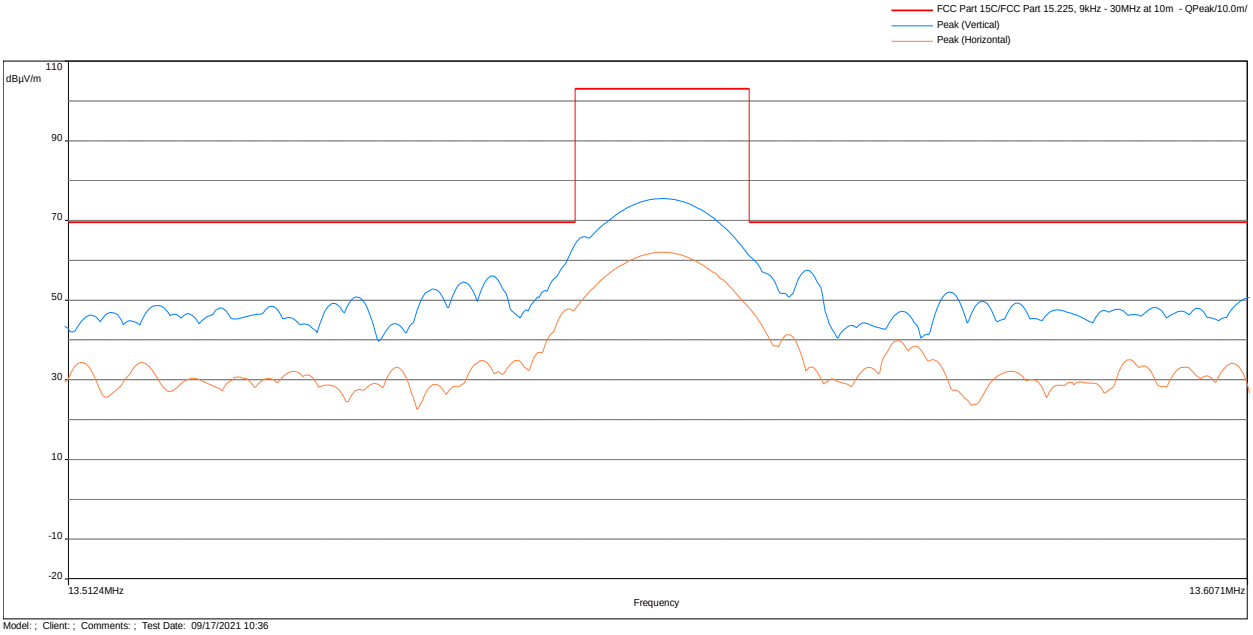
RA = Receiver Amplitude (including preamplifier) in dB (μV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB (1/m)
AG = Amplifier Gain in dB
DCF = Distance Correction Factor

Note: FS was measured with loop antenna below 30MHz

4.1.3 Test Result 15.225 (a)(b)(c)

Measurements were performed at parallel, perpendicular, and horizontal orientation of loop antenna. The worst- case data was presented below.





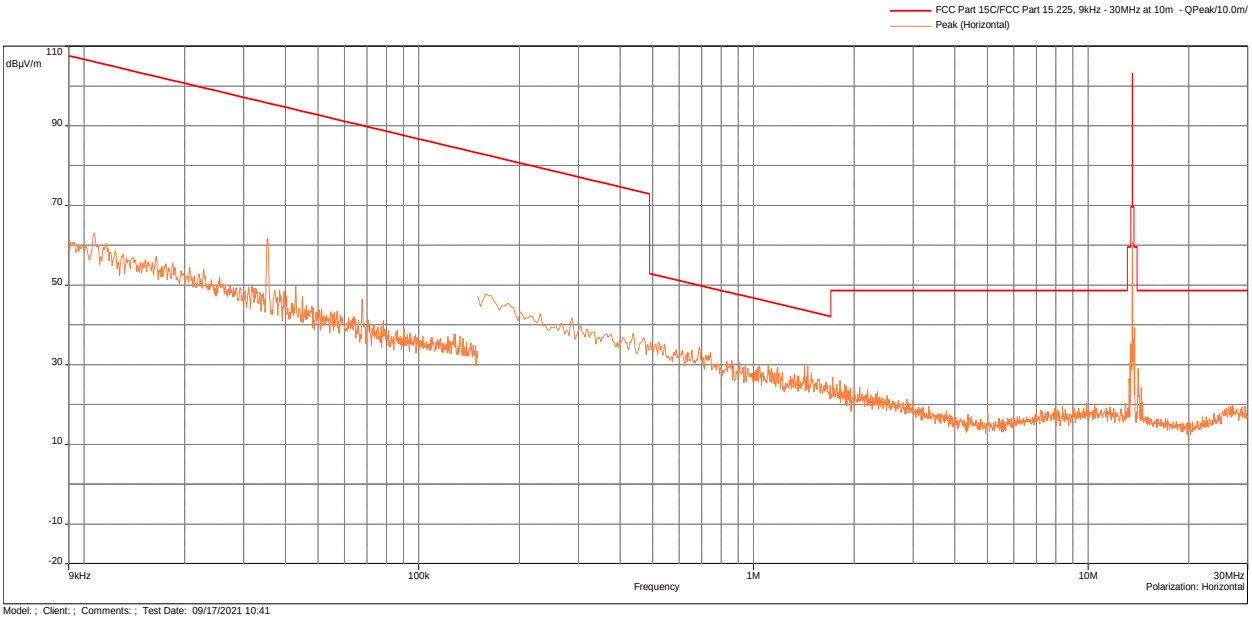
Frequency	Peak FS@10m	Limit@10m	Margin	Comment	Correction
(MHz)	dB(uV/m)	dB(uV/m)	dB		dB
13.56	75.48	103.1	-27.62	Perpendicular	2.72
13.56	62.03	103.1	-41.07	Parallel	2.72
13.35	55.07	59.6	-4.53	Perpendicular	2.70
13.77	58.03	59.6	-1.57	Perpendicular	2.72

Note: Correction = AF+CF–AG- distance correction factor
Distance correction factor=40*$\log_{10}$(limit distance/measured distance)

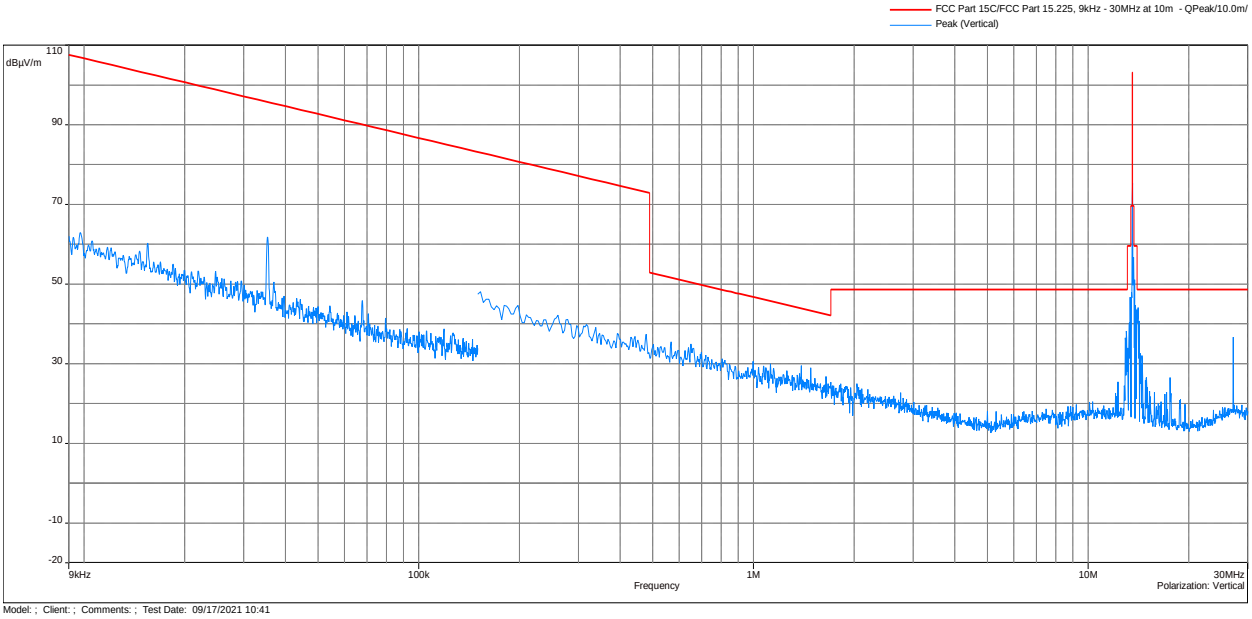
4.1.4 Test Result 15.225 (d) and 15.109

Radiated Spurious Emissions from 9 kHz to 30MHz

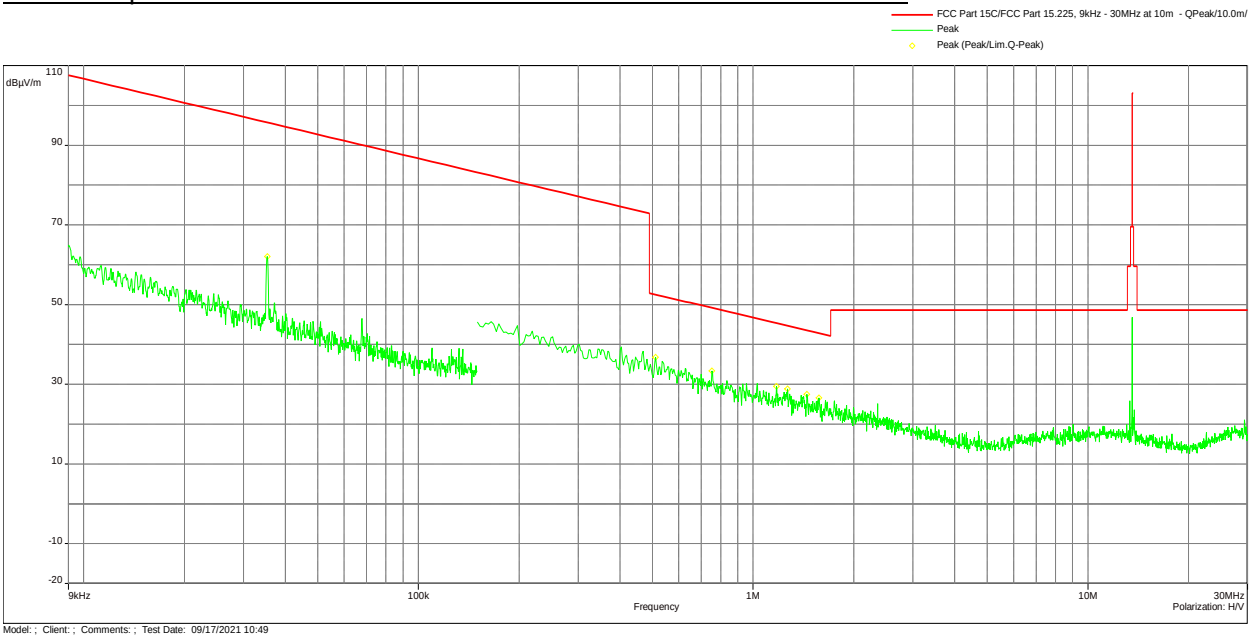
Radiated Spurious Emissions 9kHz - 30 MHz Parallel Antenna Polarization



Radiated Spurious Emissions 9kHz - 30 MHz Perpendicular Antenna Polarization



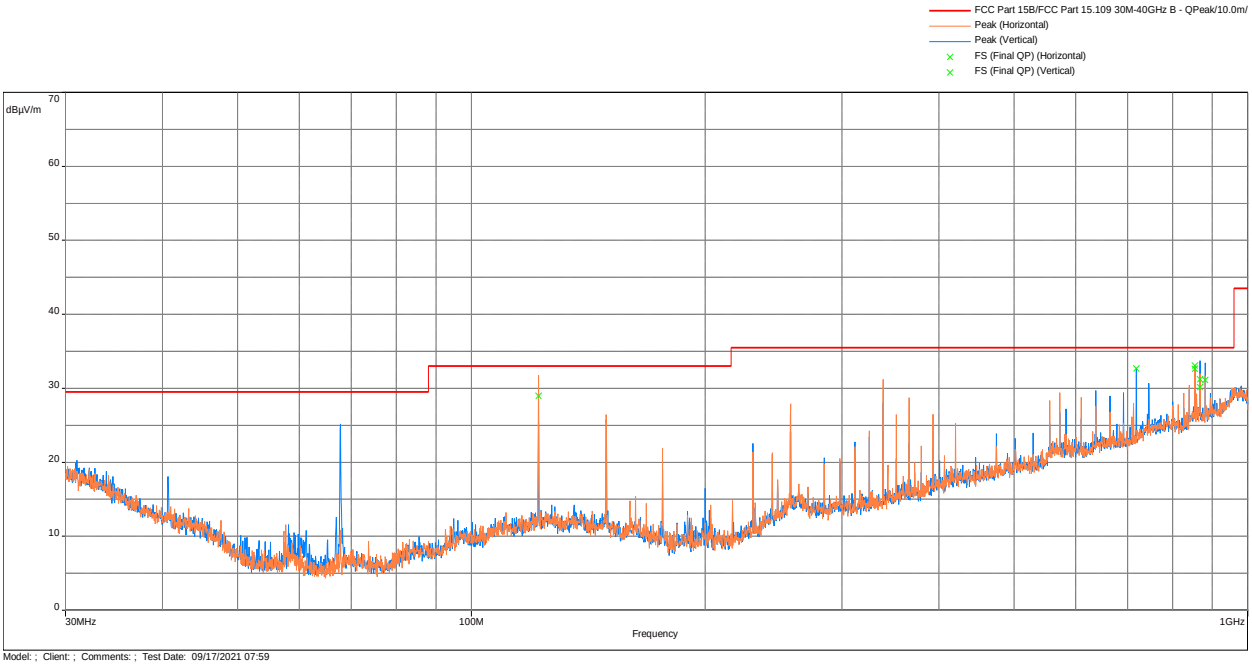
Radiated Spurious Emissions 9kHz - 30 MHz Horizontal Antenna Polarization



Frequency	Peak FS @10m	Limit@10m	Margin	Comment	Correction
(MHz)	dB(uV/m)	dB(uV/m)	dB		dB
14.09891	44.1	48.6	-4.5	Perpendicular	2.73
14.10786	43.85	48.6	-4.75	Perpendicular	2.73
14.06906	41.43	48.6	-7.17	Perpendicular	2.72
14.19443	40.77	48.6	-7.83	Perpendicular	2.75
14.04816	40.46	48.6	-8.14	Perpendicular	2.71
1.45146	29.71	43.49	-13.78	Parallel	12.36
1.42161	29.68	43.67	-13.99	Parallel	12.51
1.490265	28.05	43.27	-15.22	Parallel	12.17
0.690285	34.52	49.93	-15.41	Parallel	17.19
1.108185	29.87	45.83	-15.96	Parallel	13.84
1.179825	29.32	45.29	-15.97	Parallel	13.53
0.035282	61.73	95.74	-34.01	Parallel	42.98
0.035325	61.72	95.73	-34.01	Perpendicular	42.97

Note: Correction = AF+CF–AG- distance correction factor
Distance correction factor=40*$\log_{10}$(limit distance/measured distance)

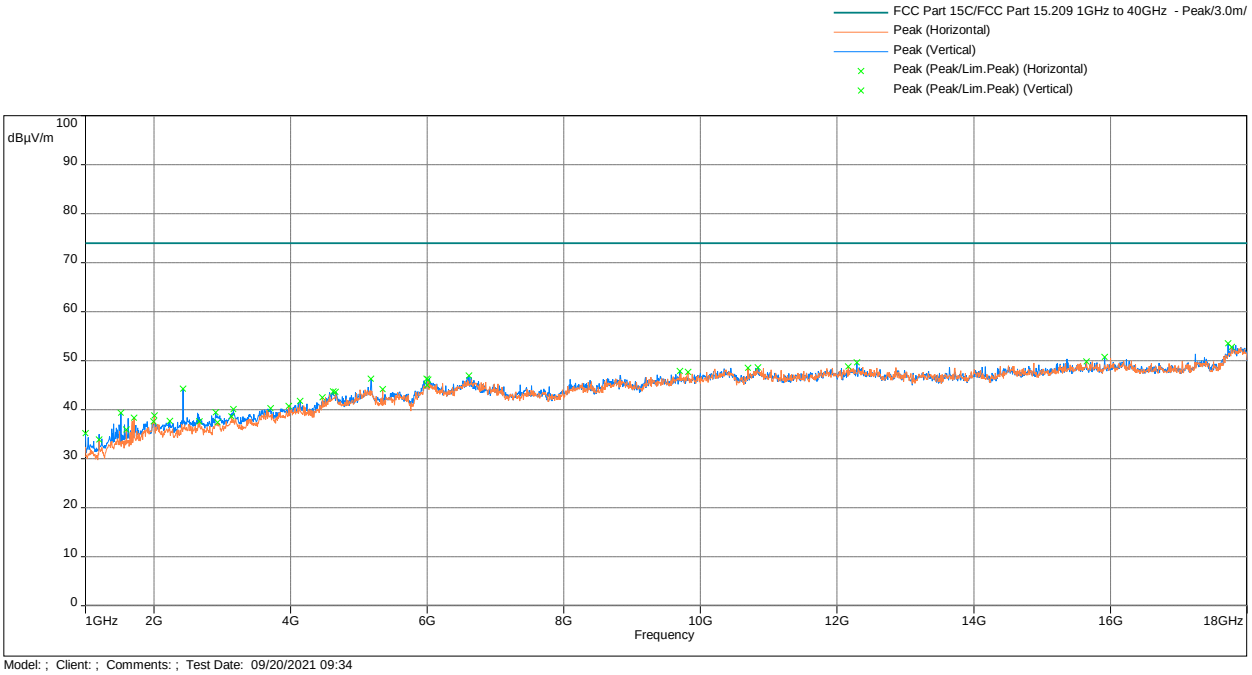
Radiated Spurious Emissions from 30 MHz to 1000 MHz



Freq (MHz)	FS@10m dB(uV/m)	Limit@10m dB(uV/m)	Margin (dB)	Azimuth (Deg)	Height (m)	Polarity	Correction (dB)
122.038	28.98	33.0	-4.02	214.25	2.75	Horizontal	-14.81
854.279	32.63	35.5	-2.87	74.75	1.00	Horizontal	0.83
867.839	30.15	35.5	-5.35	38.5	1.00	Horizontal	1.07
718.679	32.65	35.5	-2.85	238.25	2.33	Vertical	-2.53
854.280	33.07	35.5	-2.43	10.25	2.12	Vertical	0.83
867.839	31.23	35.5	-4.27	43.75	1.95	Vertical	1.07
881.400	31.09	35.5	-4.41	43.75	2.14	Vertical	1.14

Note: FS = RA + Correction
Correction = AF + CF – Preamp

Radiated Spurious Emissions from 1 to 18 GHz, Peak Scan vs Peak Limits

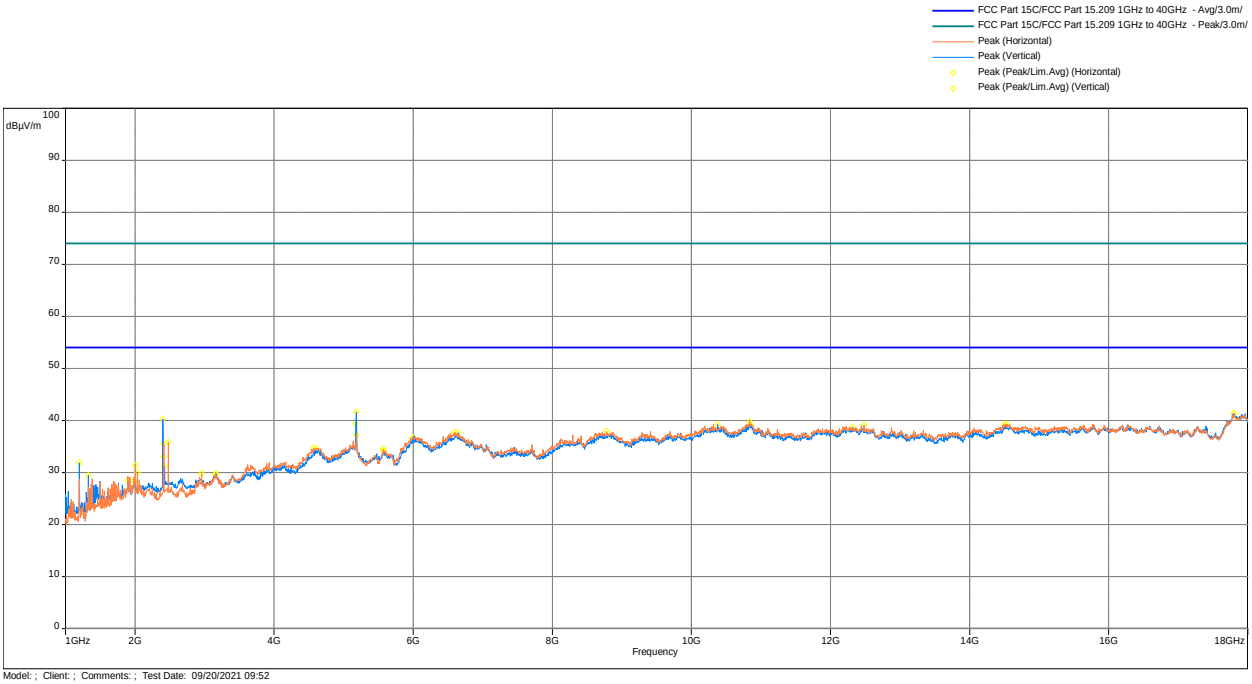


Model: ; Client: ; Comments: ; Test Date: 09/20/2021 09:34

Frequency (MHz)	Peak @3m (dBµV/m)	Lim. Peak @3m (dBµV/m)	Margin dB)	Height (m)	Angle (°)	Comment	Correction (dB)
17720.07	53.55	74	-20.45	1.99	69.75	Vertical	8.47
17773.9	52.82	74	-21.18	1.99	237.5	Horizontal	9.27
15914.1	50.75	74	-23.25	2.99	20.75	Vertical	4.29
15651.73	49.84	74	-24.16	1.99	1.25	Horizontal	4.87
12289.7	49.62	74	-24.38	2.99	62.25	Vertical	2.26
12161.07	48.8	74	-25.2	1.01	205.25	Horizontal	2.09

Note: Correction = AF + CF - Preamp

Radiated Spurious Emissions from 1 to 18 GHz, Average Scan vs Avg and Peak Limits



Frequency (MHz)	Ave @3m (dBµV/m)	Lim. Ave @3m (dBµV/m)	Margin dB)	Height (m)	Angle (°)	Comment	Correction (dB)
5183.133	41.7	54	-12.3	2.01	162.25	Vertical	-3.98
17802.23	41.41	54	-12.59	3.99	0	Vertical	9.61
17803.93	41.38	54	-12.62	2.99	76.75	Horizontal	9.59
2401.367	40.3	54	-13.7	3.01	156.25	Vertical	-11.64
10835.07	39.77	54	-14.23	1.01	204.25	Horizontal	1.5
5172.933	39.41	54	-14.59	3.01	199.5	Vertical	-3.86
14525.2	39.38	54	-14.62	1.01	75	Horizontal	2.46
10376.63	39.25	54	-14.75	1.01	242.25	Vertical	1.85

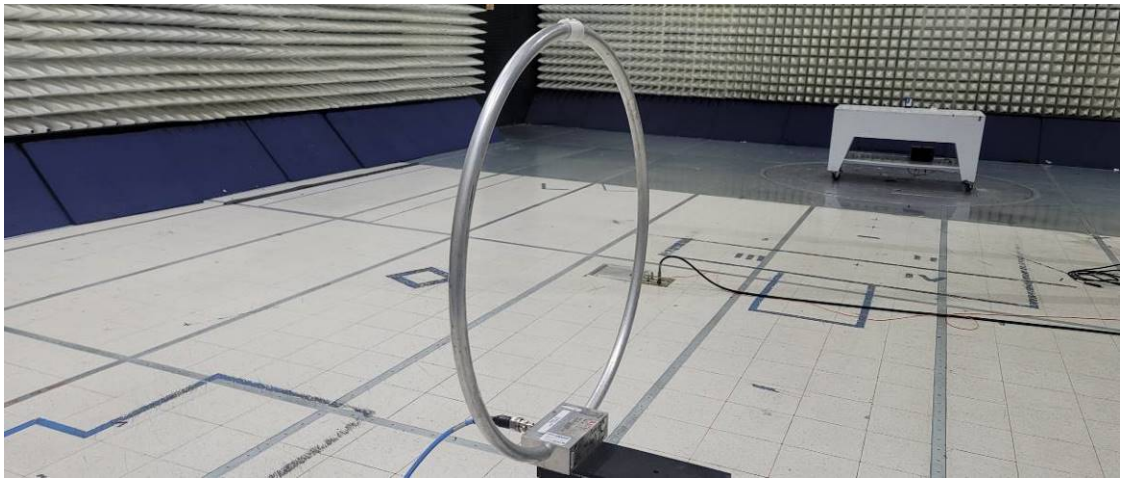
Note: Correction = AF + CF - Preamp

Result	**Complies**

4.1.5 Test Configuration Photographs

The following photographs show the testing configurations used.

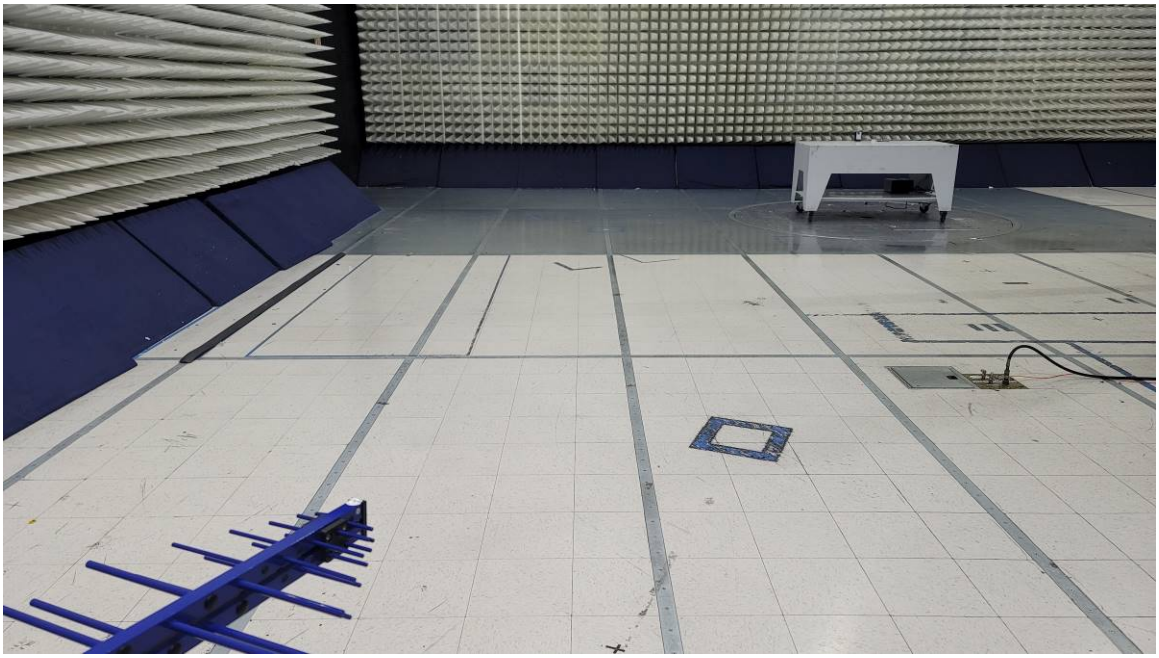
Parallel

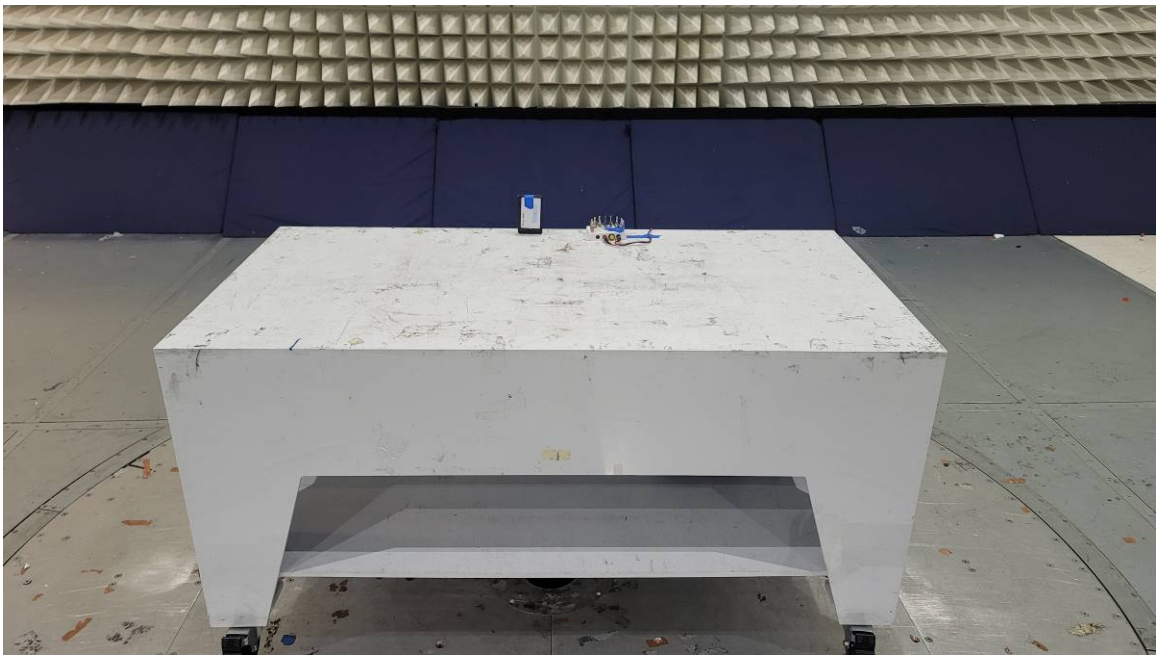


Perpendicular

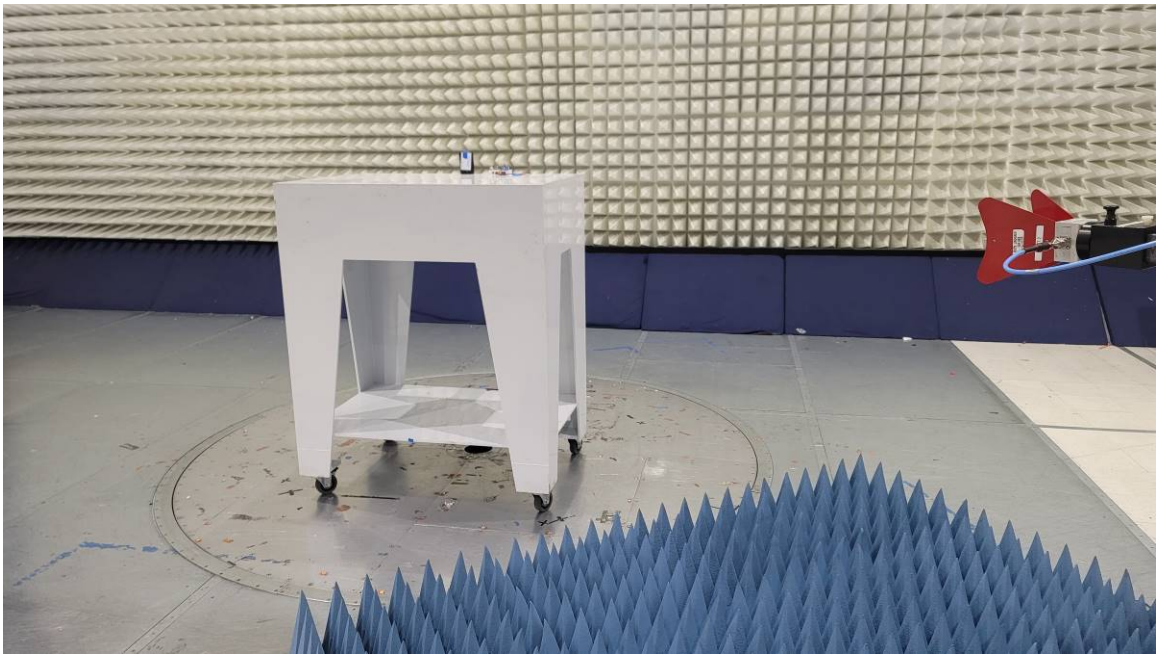
Horizontal

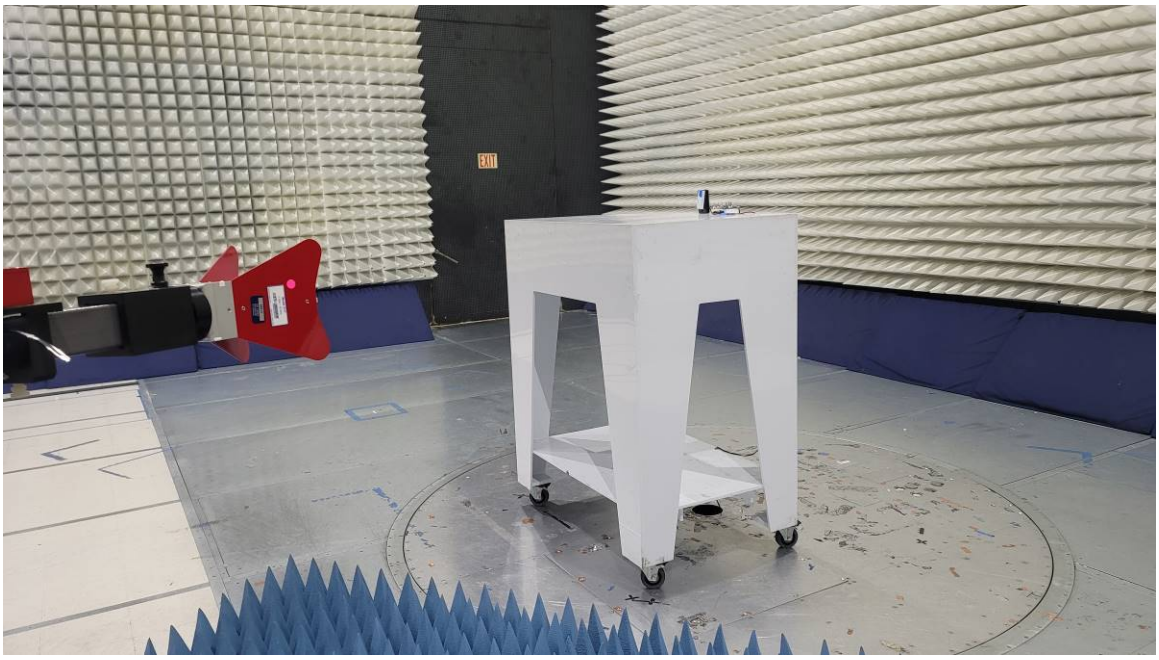
4.1.5 Test Configuration Photographs (Continued)





4.4.4 Test Configuration Photographs (Continued)





4.2 Frequency Tolerance

4.2.1 Requirement

FCC 15.225 (e)

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

4.2.2 Procedure

The EUT was placed in the temperature chamber. The frequency counter was connected to the transmitter output. For each temperature, the carrier frequency was recorded. In addition, the carrier frequency was recorded when the power was set to 13.8 V DC (115% of 12V DC) and to 10.2 V DC (85% of 12V DC).

4.2.3 Test Results 15.225 (e)

Nominal Frequency: 13560000 Hz

Voltage (DC)	Temperature (C)	Measured Frequency (MHz)	Deviation from Reference (MHz)	Deviation (%)
12	-20	13.56008247	0.00015	0.00111
12	-10	13.56004894	0.00012	0.00087
12	0	13.5600036	0.00007	0.00053
12	10	13.55998162	0.00005	0.00037
12	20	13.55993141	0.00000	0.00000
12	30	13.55992553	-0.00001	-0.00004
12	40	13.55990215	-0.00003	-0.00022
12	50	13.55987018	-0.00006	-0.00045
10.2	85%	13.55993181	0.00000	0.00000
13.8	115%	13.55993261	0.00000	0.00001

4.3 Occupied Bandwidth
FCC 15.215

4.3.1 Requirements

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

4.3.2 Procedure

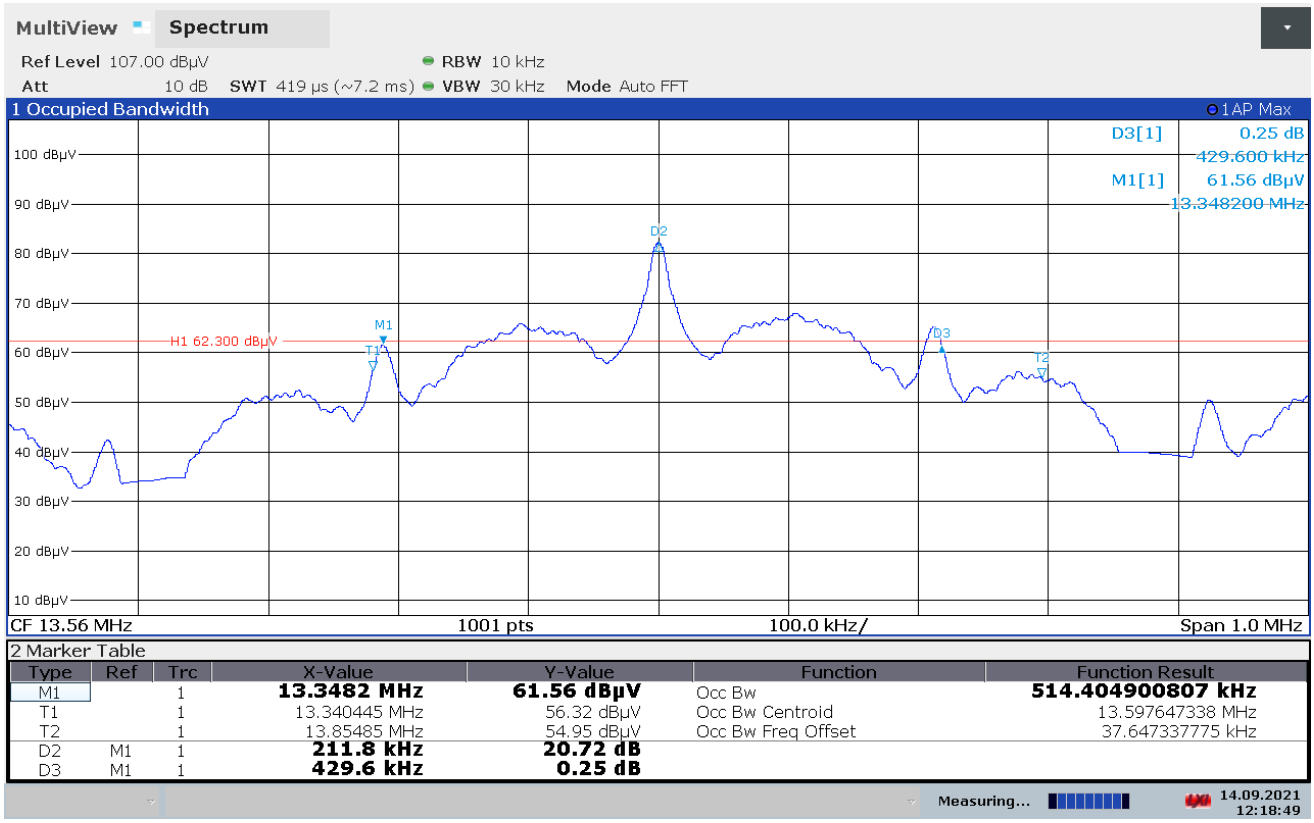
The EUT was setup to transmit in normal operating condition.

Measurements were made with the loop antenna in close proximity of the EUT. Following the procedures of ANSI 63.10: 2013, the 20dB bandwidth measurements were taken. The following plots show Occupied Bandwidth.

4.3.3 Test Results

Frequency (MHz)	-20 dB Channel Bandwidth (kHz)	99% Channel Bandwidth (kHz)
13.56	429.600	514.405

-20dB & 99% Channel Bandwidth Plot



12:18:50 14.09.2021

4.4 AC Line Conducted Emission
FCC Rule 15.207

4.4.1 Requirement

Frequency Band MHz	Class B Limit dB(μV)		Class A Limit dB(μV)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15-0.50	66 to 56 *	56 to 46 *	79	66
0.50-5.00	56	46	73	60
5.00-30.00	60	50	73	60

*Note: *Decreases linearly with the logarithm of the frequency. At the transition frequency the lower limit applies.*

4.4.2 Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

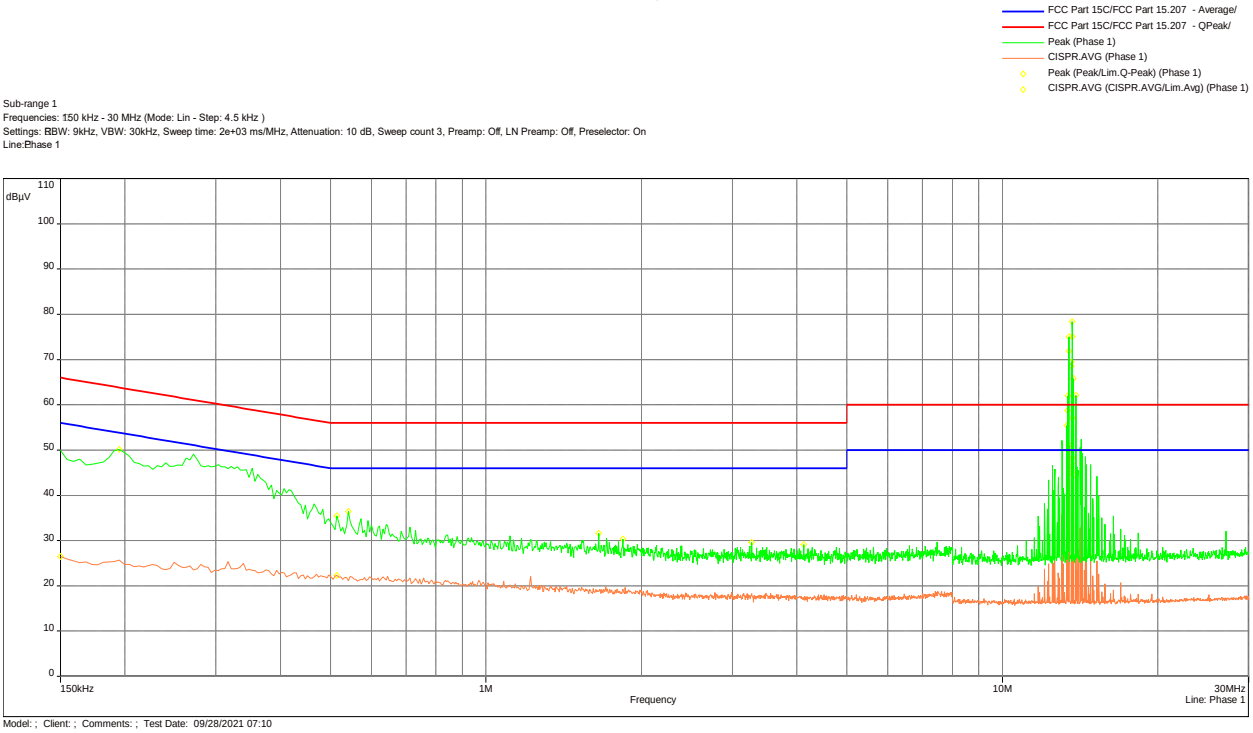
Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

EUT was placed in transmission mode then tested for conducted emissions per 15.207 to ensure the device complies with 15.207. After, the EUT RF was powered off and was measured to show compliance with the 15.107 limits.

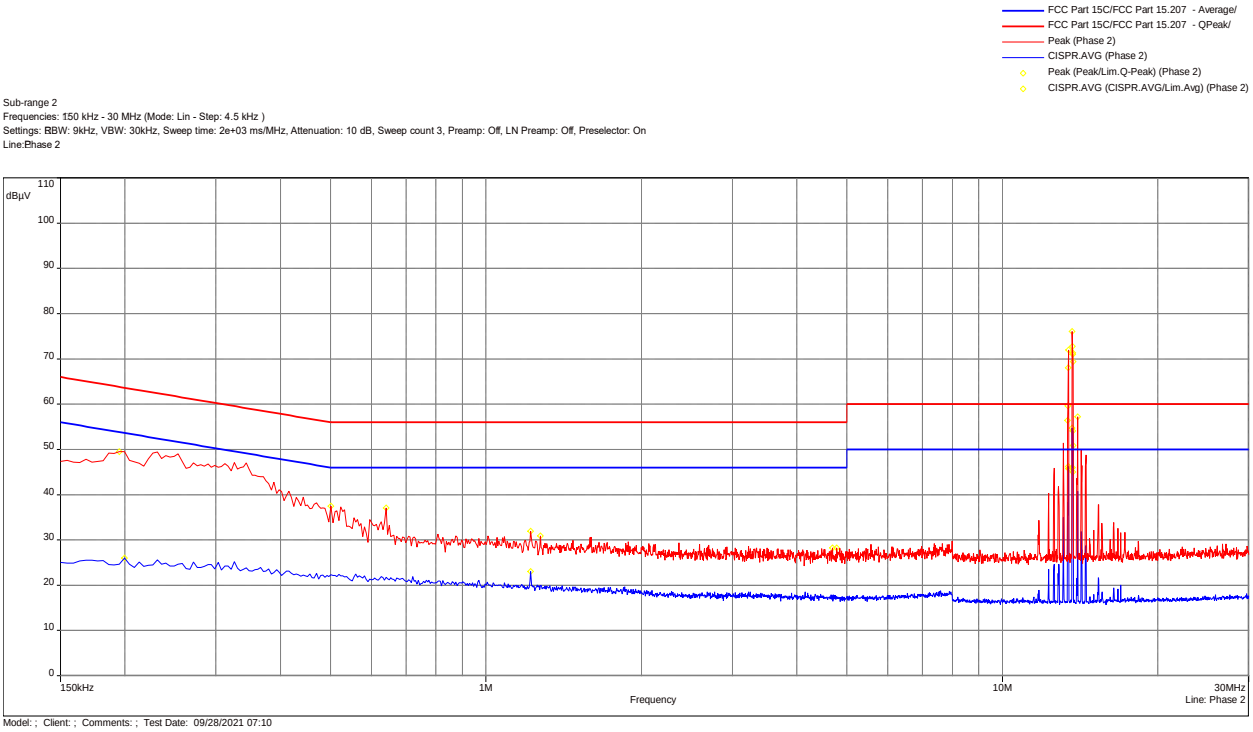
4.4.3 Test Result

15.207, 120VAC 60Hz with RFID On

AC Line Conducted Emission, 120VAC 60Hz Phase 1



AC Line Conducted Emission, 120VAC 60Hz Phase 2



4.4.3 Test Result (Continued)

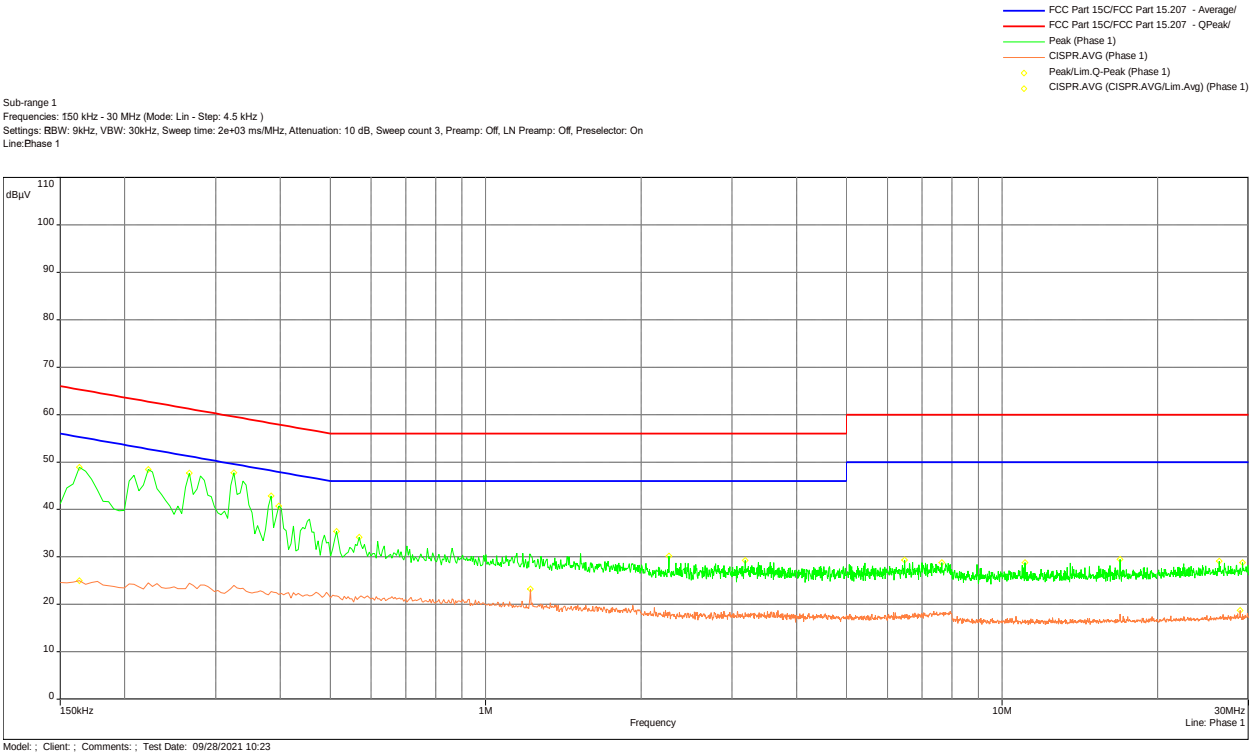
QPeak					
Frequency (MHz)	**QPeak (dBµV)**	**Lim. QPeak (dBµV)**	**QPeak Margin (dBµV)**	**Line**	**Correction (dB)**
0.195	50.19	63.82	-13.63	Phase 1	21.01
0.195	49.54	63.82	-14.28	Phase 2	21.02
0.501	37.46	56	-18.54	Phase 2	20.68
0.5145	35.44	56	-20.56	Phase 1	20.68
0.5415	36.4	56	-19.6	Phase 1	20.67
0.6405	37.11	56	-18.89	Phase 2	20.68
1.221	31.96	56	-24.04	Phase 2	20.68
1.275	30.92	56	-25.08	Phase 2	20.71
1.653	31.61	56	-24.39	Phase 1	20.7
1.842	30.35	56	-25.65	Phase 1	20.72
3.2685	29.59	56	-26.41	Phase 1	20.76
4.128	29.14	56	-26.86	Phase 1	20.8
4.6905	28.22	56	-27.78	Phase 2	20.83
4.776	28.23	56	-27.77	Phase 2	20.83

Average					
Frequency (MHz)	**Average (dBµV)**	**Lim. Averge (dBµV)**	**QPeak Margin (dBµV)**	**Line**	**Correction (dB)**
0.15	26.5	56	-29.5	Phase 1	21.2
0.1995	25.98	53.63	-27.65	Phase 2	21.01
0.5145	22.3	46	-23.7	Phase 1	20.68
1.221	23.05	46	-22.95	Phase 2	20.68

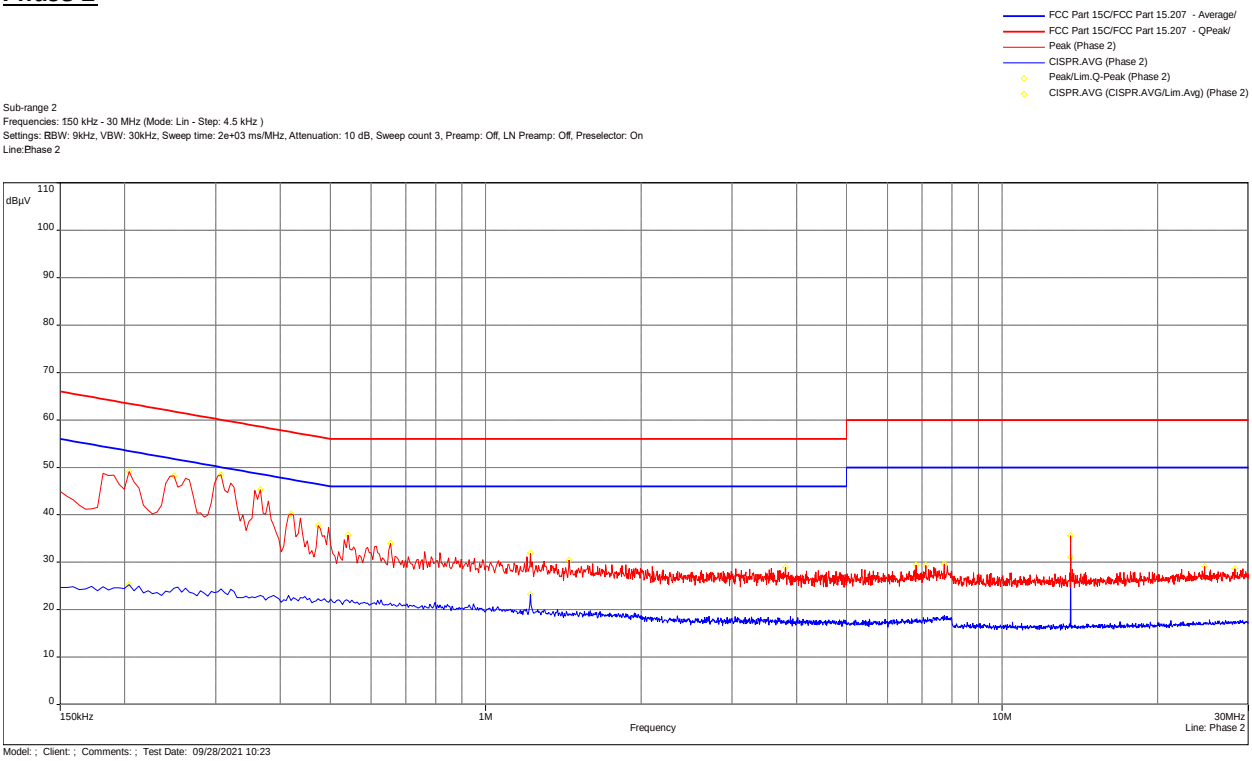
Result	**Complies** by 13.63 dB

15.207, 120VAC 60Hz with RFID antenna Terminated with a Load

Phase 1



Phase 2



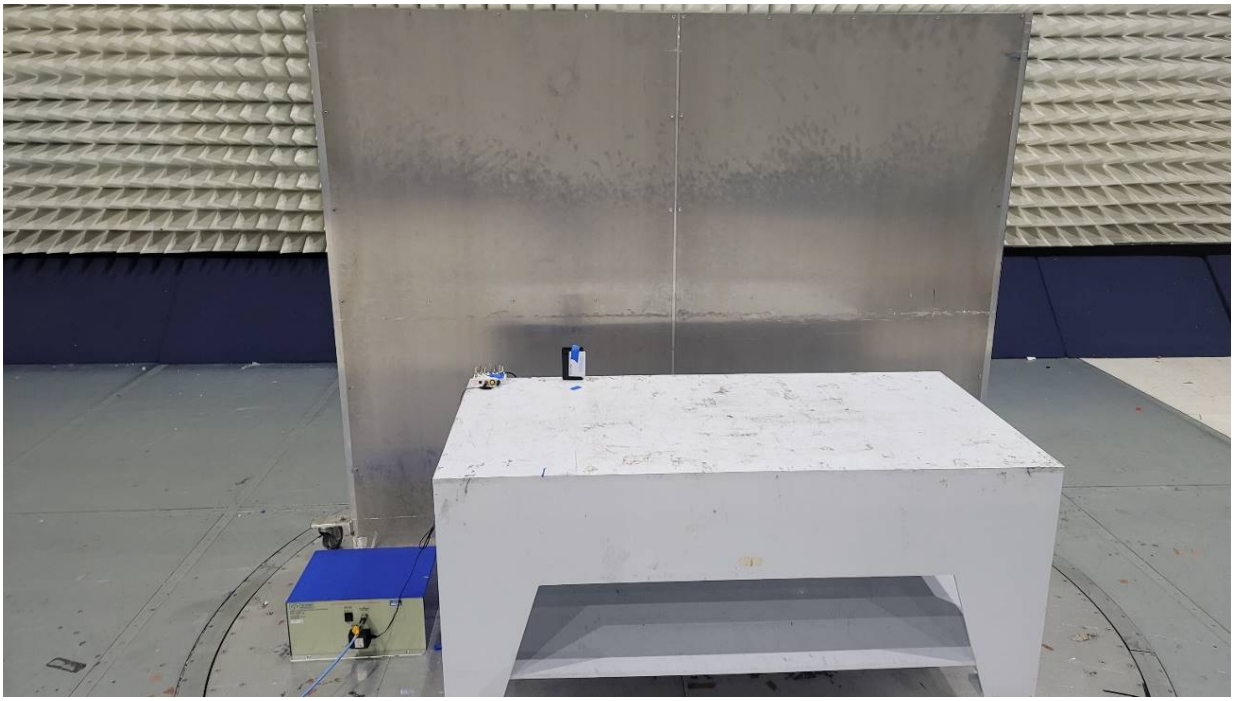
4.4.3 Test Result (Continued)

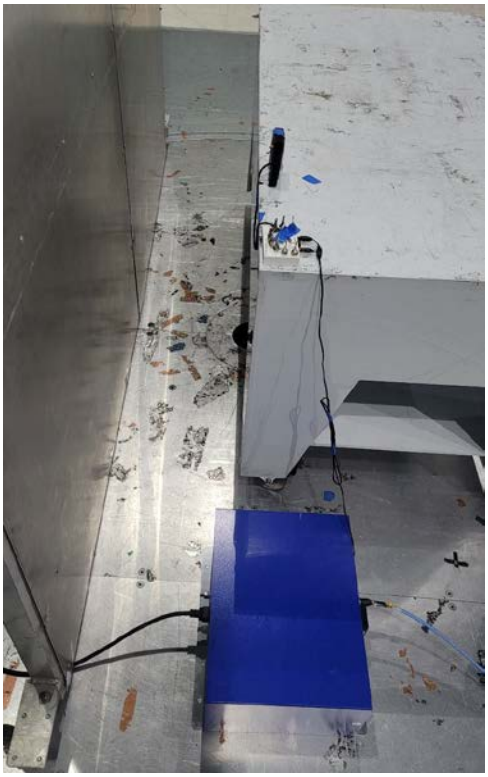
QPeak					
Frequency (MHz)	**QPeak (dBµV)**	**Lim. QPeak (dBµV)**	**QPeak Margin (dBµV)**	**Line**	**Correction (dB)**
0.3075	48.41	60.04	-11.63	Phase 2	20.77
0.3255	47.71	59.57	-11.85	Phase 1	20.74
0.366	45.31	58.59	-13.28	Phase 2	20.76
0.267	47.66	61.21	-13.55	Phase 1	20.83
0.249	48.23	61.79	-13.56	Phase 2	20.88
0.204	49.13	63.45	-14.32	Phase 2	20.99
0.222	48.42	62.74	-14.32	Phase 1	20.89
0.384	42.86	58.19	-15.33	Phase 1	20.69
0.1635	48.87	65.28	-16.41	Phase 1	21.17
0.3975	40.7	57.91	-17.2	Phase 1	20.73
0.42	40.23	57.45	-17.22	Phase 2	20.72
0.474	37.77	56.44	-18.67	Phase 2	20.68
0.5415	35.73	56	-20.27	Phase 2	20.68
0.5145	35.37	56	-20.63	Phase 1	20.68
0.5685	34.14	56	-21.86	Phase 1	20.66
0.654	34	56	-22	Phase 2	20.67
1.221	31.95	56	-24.05	Phase 2	20.68
13.5645	35.6	60	-24.4	Phase 2	21.12
1.4505	30.48	56	-25.52	Phase 2	20.7

Average					
Frequency (MHz)	**Average (dBµV)**	**Lim. Averge (dBµV)**	**QPeak Margin (dBµV)**	**Line**	**Correction (dB)**
13.5645	31.12	50	-18.88	Phase 2	21.12
1.221	23.25	46	-22.75	Phase 2	20.68
1.221	23.22	46	-22.78	Phase 1	20.67
0.204	25.29	53.45	-28.16	Phase 2	20.99
0.1635	24.97	55.28	-30.31	Phase 1	21.17
28.923	18.75	50	-31.25	Phase 1	21.26

Result	**Complies** by 11.63 dB

4.4.4 Test Configuration Photographs FCC Rule 15.207.





4.5 Radiated Emissions on Digital Parts

FCC Ref: 15.109, ICES 003

4.5.1 Test Limit

Limits for Electromagnetic Radiated Emissions FCC Section 15.109(b), ICES 003*, RSS GEN

Frequency (MHz)	Class A at 10m dB(μV/m)	Class B at 3m dB(μV/m)
30-88	39	40.0
88-216	43.5	43.5
216-960	46.4	46.0
Above 960	49.5	54.0

* According to FCC Part 15.109(g) an alternative to the radiated emission limits shown above, digital devices may be shown to comply with the limit of CISPR Pub. 22

4.5.2 Procedures

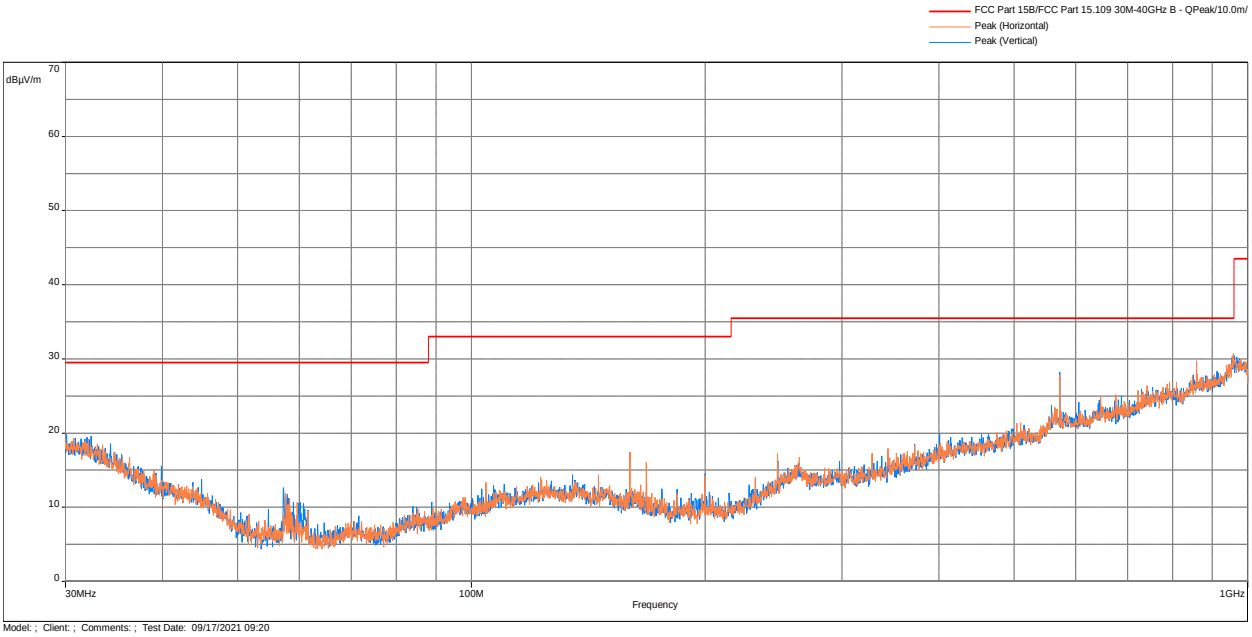
Radiated measurements were taken. 120 kHz resolution bandwidth was used from 30 MHz - 1 GHz. 1 MHz resolution bandwidth was used for measurements done above 1 GHz. All plots are corrected for cable loss, antenna factor, and preamp.

Radiated emission measurements were performed from 30 MHz to 18000 MHz. The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Measurements recorded in this section were made with the Transmitter in Rx mode and RFID in Standby mode.

4.5.3 Test Results

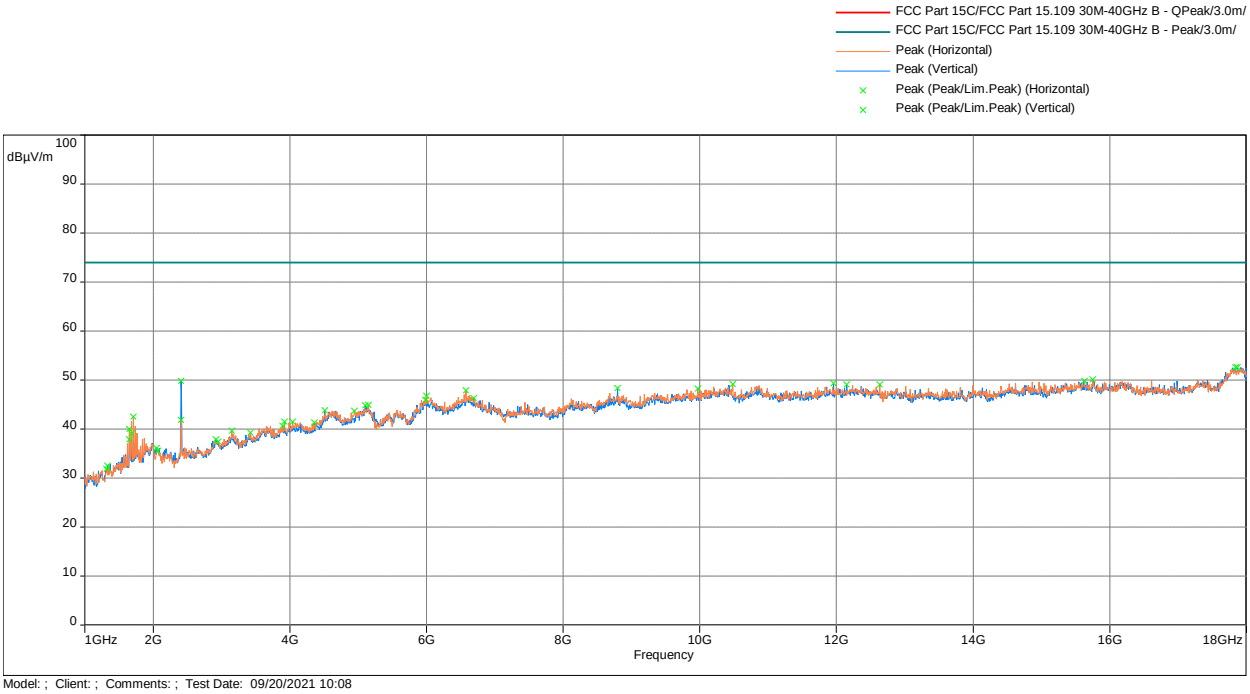
FCC Part 15 Subpart B and ICES-003, Radiated Spurious Emissions from 30 MHz to 1000 MHz



Freq (MHz)	FS@10m dB(uV/m)	Limit@10m dB(uV/m)	Margin (dB)	Azimuth (Deg)	Height (m)	Polarity	Correction (dB)
957.6757	30.74	35.5	-4.76	145.5	0.99	Horizontal	3.95
959.745	30.48	35.5	-5.02	101.75	2	Vertical	4.09
954.798	30.34	35.5	-5.16	268.25	0.99	Horizontal	3.82
953.925	30.19	35.5	-5.31	0	4	Vertical	3.80
30.097	19.84	29.5	-9.66	250.5	3	Vertical	-8.46
32.360	19.6	29.5	-9.9	224.25	4	Vertical	-9.55
39.247	14.32	29.5	-15.18	75.25	4	Horizontal	-13.09

Note: FS = RA + Correction
Correction = AF + CF – Preamp

FCC Part 15 Subpart B and ICES-003, Radiated Disturbance, 1 – 18 GHz, Peak Scan vs Peak Limits

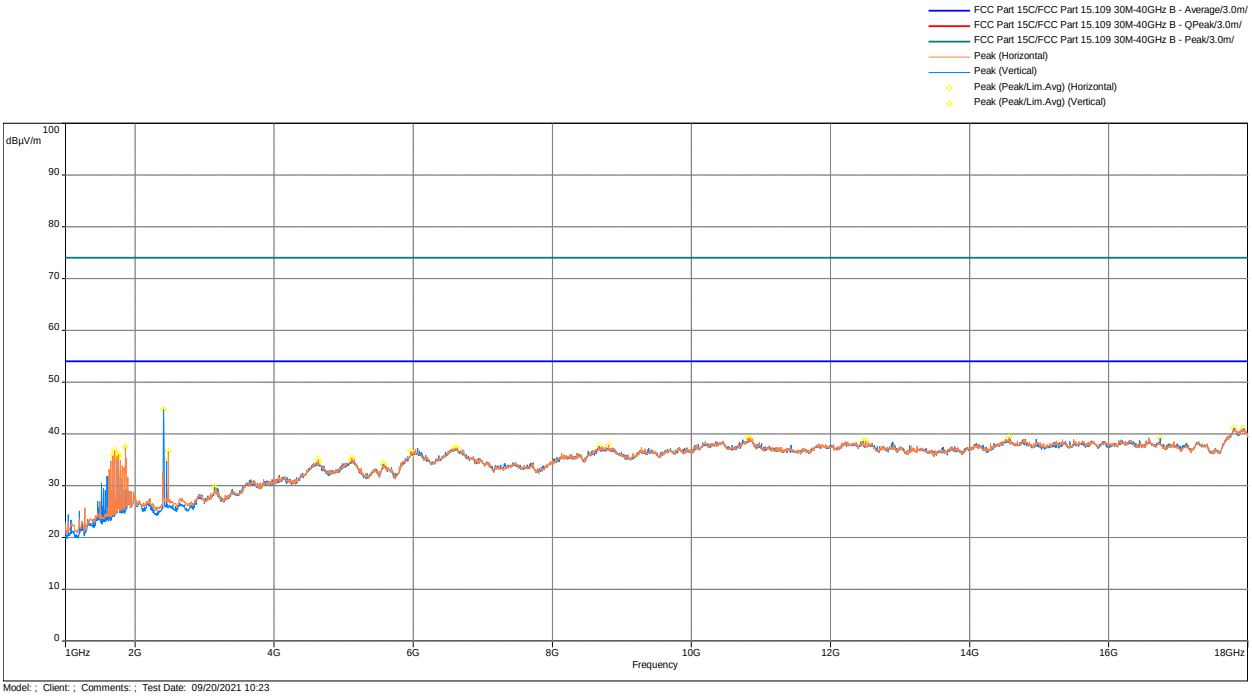


Model: ; Client: ; Comments: ; Test Date: 09/20/2021 10:08

Frequency (MHz)	Peak @3m (dBµV/m)	Lim. Peak @3m (dBµV/m)	Margin dB)	Height (m)	Angle (°)	Comment	Correction (dB)
17870.8	52.63	74	-21.37	1.01	103.5	Vertical	9.19
17843.6	52.57	74	-21.43	3.01	301.5	Horizontal	9.31
15749.77	50.09	74	-23.91	2.01	164	Horizontal	4.71
15627.37	49.85	74	-24.15	1.99	262.75	Vertical	4.87
2410.433	49.83	74	-24.17	1.01	303.25	Vertical	-11.46
11954.23	49.32	74	-24.68	2.99	206.5	Vertical	1.94
10485.43	49.18	74	-24.82	1.01	111.25	Horizontal	1.55
12635.37	49.13	74	-24.87	1.01	269.5	Horizontal	2.57

Note: Correction = AF + CF - Preamp

FCC Part 15 Subpart B and ICES-003, Radiated Disturbance, 1 – 18 GHz, Avg Scan vs Peak & Avg Limits

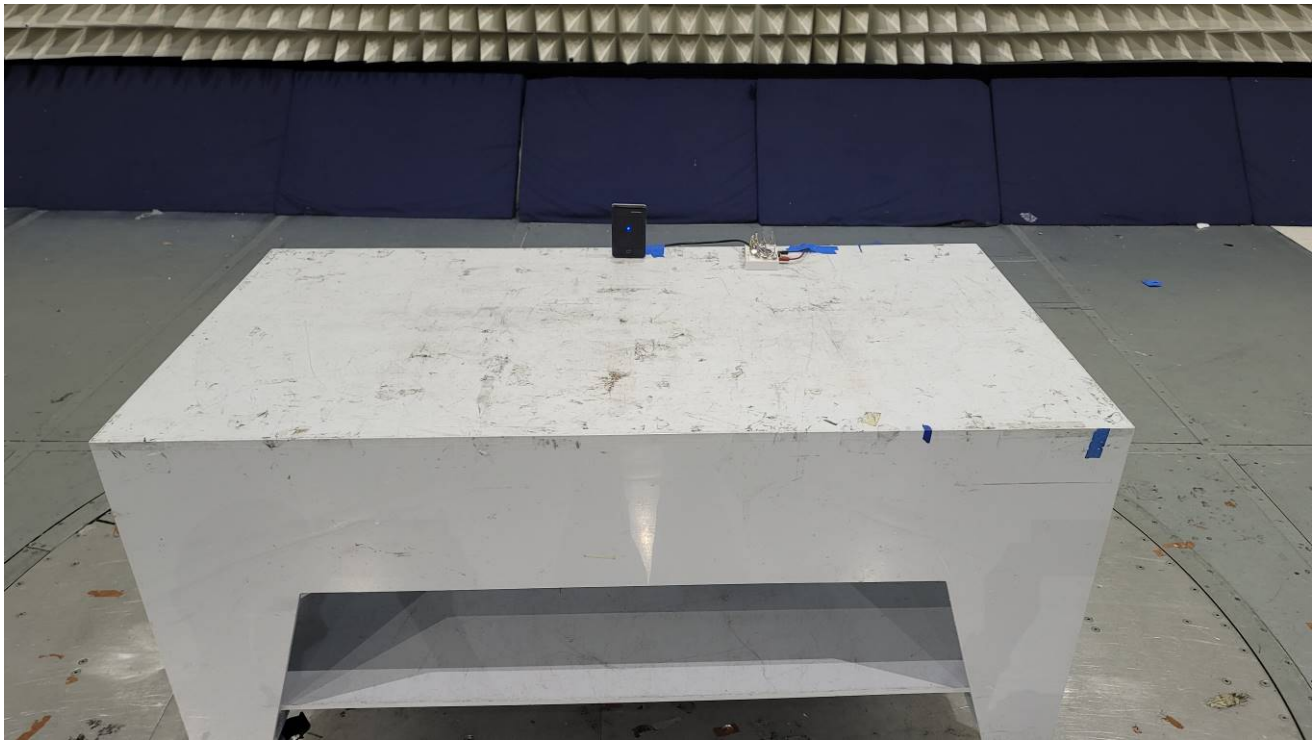


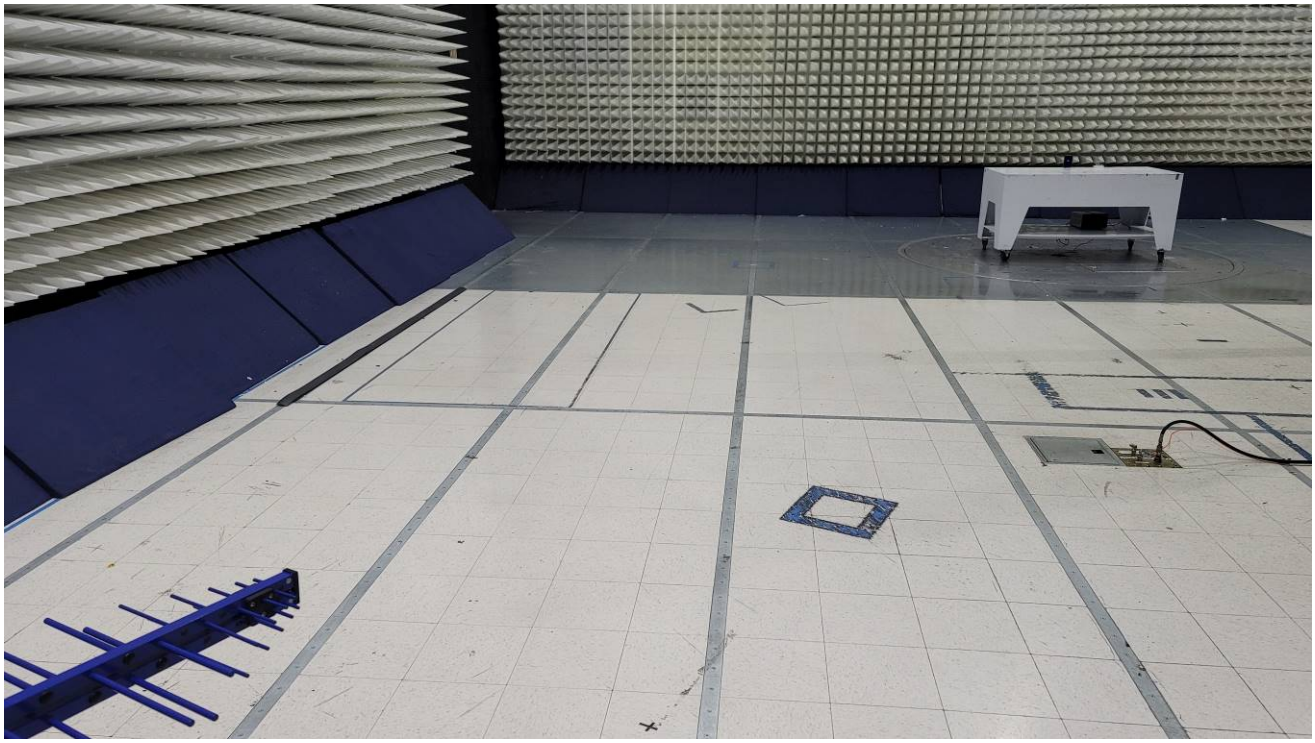
Frequency (MHz)	Ave @3m (dBµV/m)	Lim. Ave @3m (dBµV/m)	Margin dB)	Height (m)	Angle (°)	Comment	Correction (dB)
2408.733	44.72	54	-9.28	3.99	290.5	Vertical	-11.5
17801.67	41.17	54	-12.83	3.01	240.5	Vertical	9.61
17932.57	41.14	54	-12.86	1.01	0	Horizontal	8.78
14568.27	39.41	54	-14.59	3.01	118.75	Horizontal	2.32
16741.43	39.22	54	-14.78	3.01	0	Vertical	4.1
10816.37	39.22	54	-14.78	3.01	161.5	Horizontal	1.57
10846.4	39.11	54	-14.89	1.01	285.75	Vertical	1.47
12506.17	38.67	54	-15.33	3.99	241.75	Horizontal	2.38

Note: Correction = AF + CF - Preamp

Result	**Complies**

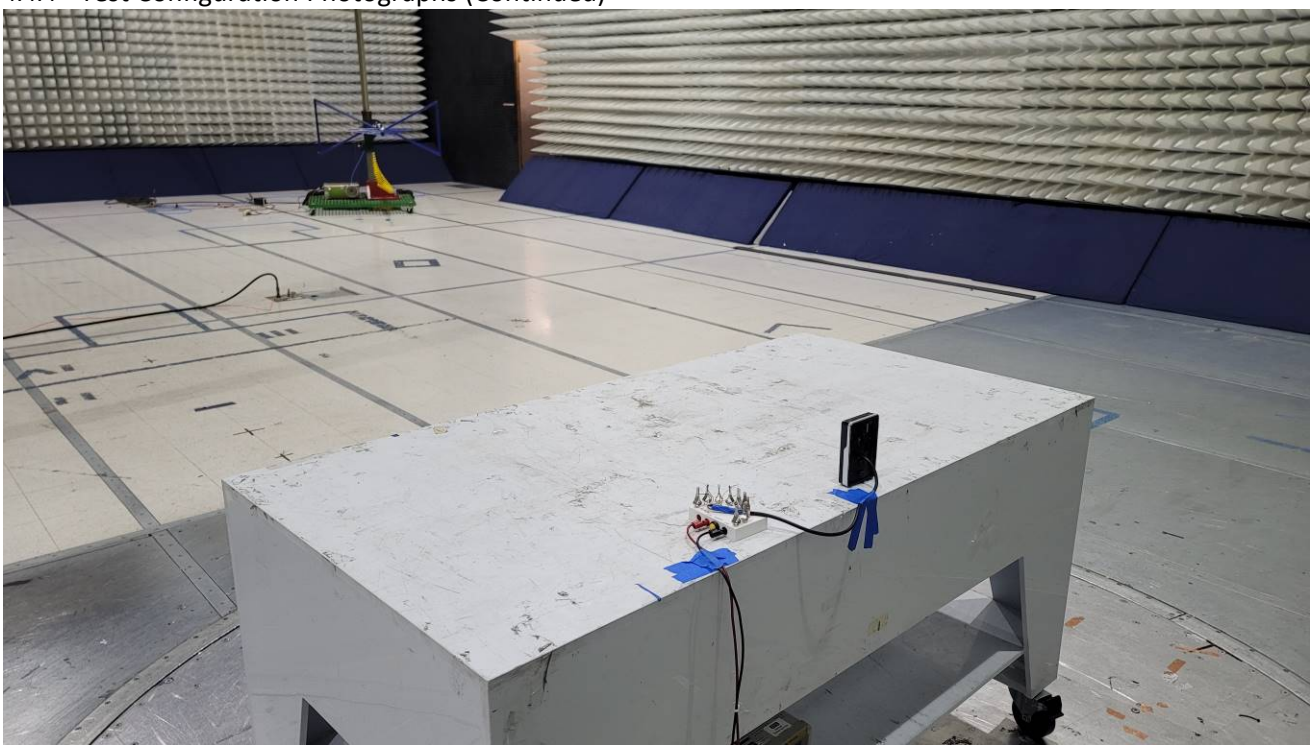
4.4.4 Test Configuration Photographs FCC Part 15 Subpart B

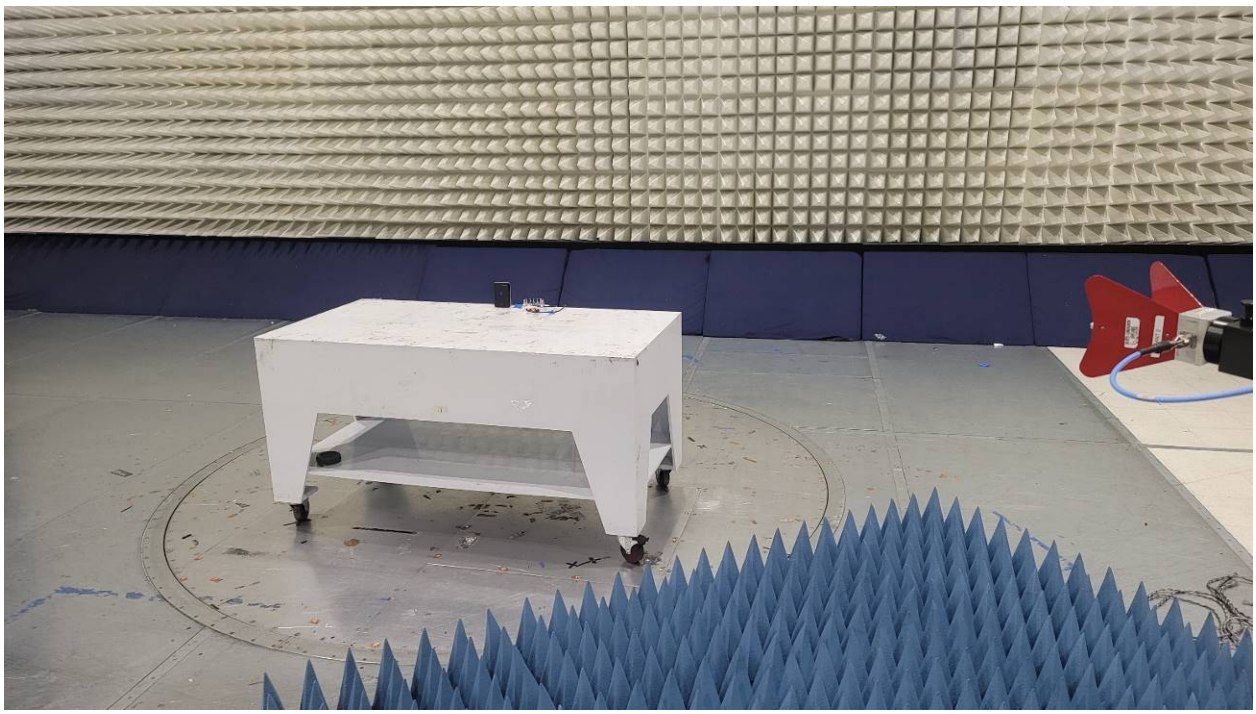




Electromagnetic Radiated Disturbance Setup Photograph

4.4.4 Test Configuration Photographs (Continued)





4.6 Conducted Emissions on Digital Parts
FCC Ref: 15.107, ICES 003

4.6.1 Method

Tests are performed in accordance with ANSI 63.4.

TEST SITE: 10m ALSE

10m ALSE**:** The test facility is located at 1365 Adams Court, Menlo Park, California. The test site is a 10-meter semi-anechoic chamber. The site meets the characteristics of ANSI C63.4:2014.

The A2LA certificate number for this site is 1755-01

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
AC Line Conducted Emissions	150 kHz - 30 MHz	2.1 dB	3.4dB

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 32.

Sample Calculations

The following is how net line-conducted readings were determined:

NF = RF + LF + CF + AF
Where NF = Net Reading in dBμV
RF = Reading from receiver in dBμV
LF = LISN or ISN Correction Factor in dB
CF = Cable Correction Factor in dB
AF = Attenuator Loss Factor in dB

To convert from dBμV to μV or mV the following was used:

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

Example:

NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV
UF = $10^{(49.1\ dB\mu V / 20)}$ = 285.1 μV/m

Test Equipment Used:

See Section 5.0 for specific equipment used for this test.

Software Utilized:

Name	Manufacturer	Version
BAT-EMC	NEXIO	3.20.0.23

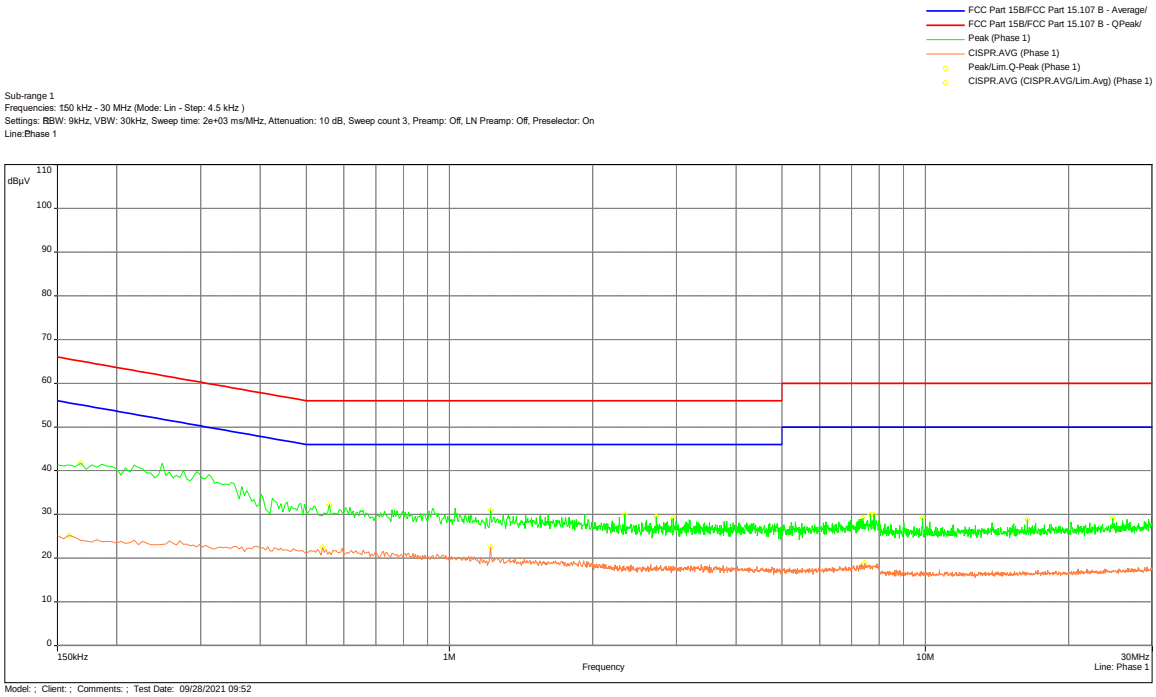
Results:

The sample tested was found to comply.

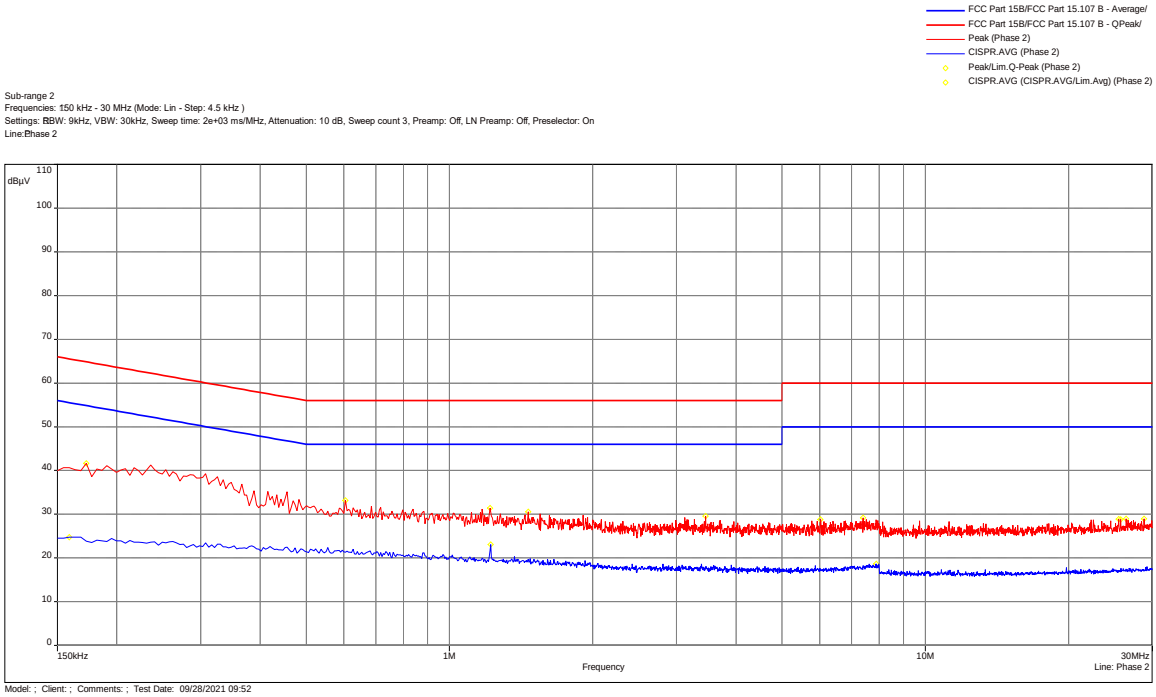
4.6.2 Test Results

Conducted Disturbance, FCC Part 15 Subpart B, ICES-003, 120V 60Hz

Phase 01



Phase 02



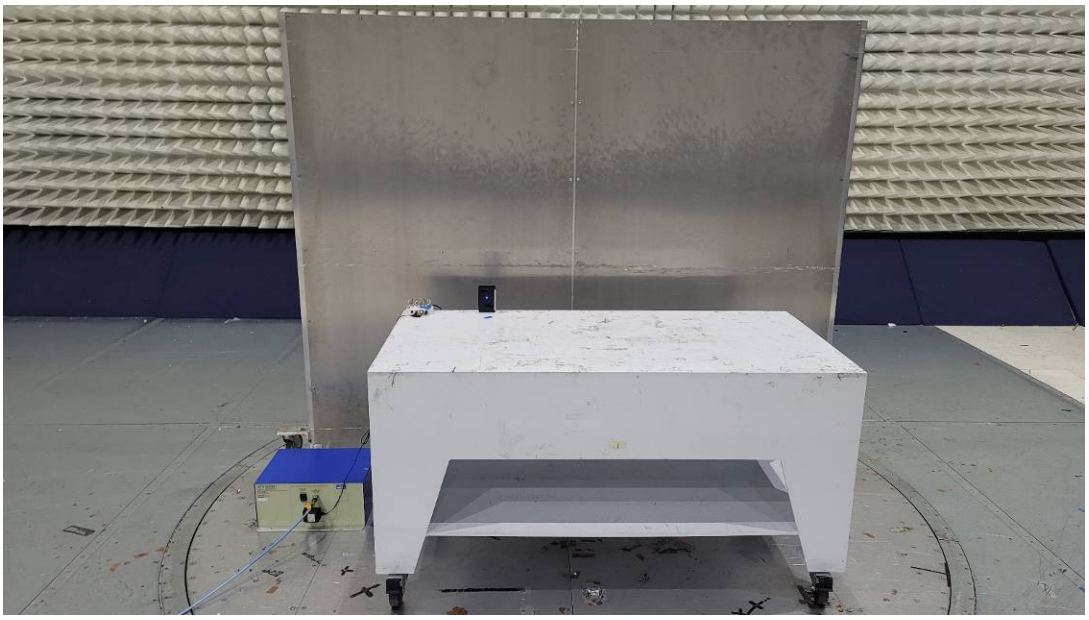
4.6.3 Test Result (Continued)

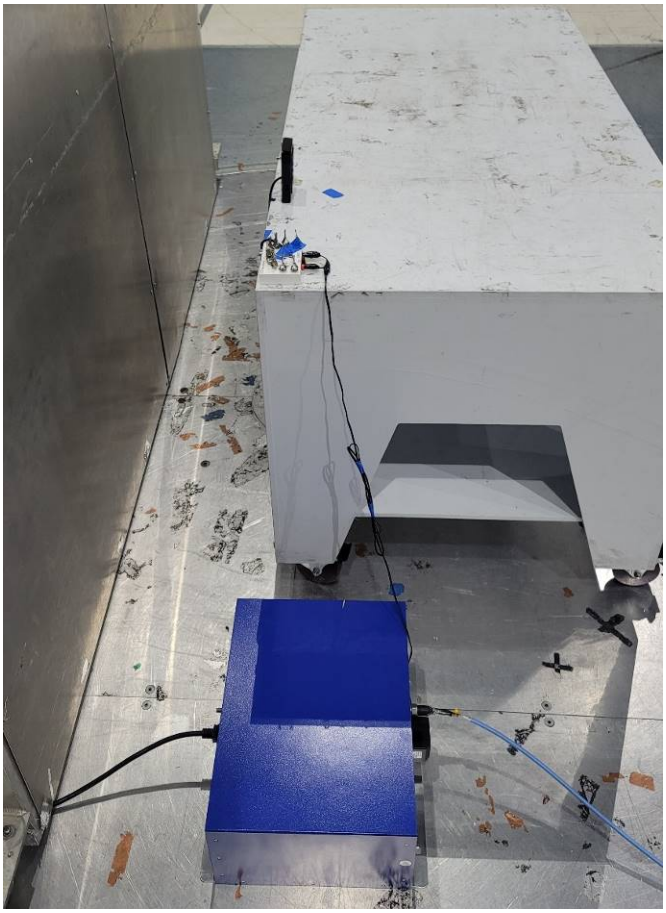
QPeak					
Frequency (MHz)	**QPeak (dBµV)**	**Lim. QPeak (dBµV)**	**QPeak Margin (dBµV)**	**Line**	**Correction (dB)**
0.6045	33.16	56	-22.84	Phase 2	20.68
0.1725	41.62	64.84	-23.22	Phase 2	21.15
0.168	41.73	65.06	-23.33	Phase 1	21.14
0.5595	32.21	56	-23.79	Phase 1	20.67
1.2165	31.42	56	-24.58	Phase 2	20.68
1.221	30.96	56	-25.04	Phase 1	20.67
1.464	30.59	56	-25.41	Phase 2	20.7
2.337	30.04	56	-25.96	Phase 1	20.71
3.453	29.58	56	-26.42	Phase 2	20.79

Average					
Frequency (MHz)	**Average (dBµV)**	**Lim. Averge (dBµV)**	**QPeak Margin (dBµV)**	**Line**	**Correction (dB)**
1.221	23.08	46	-22.92	Phase 2	20.68
1.221	22.57	46	-23.43	Phase 1	20.67
0.5415	22.48	46	-23.52	Phase 1	20.67
0.159	25.19	55.52	-30.33	Phase 1	21.17
0.159	24.77	55.52	-30.74	Phase 2	21.19
7.458	18.86	50	-31.14	Phase 1	20.92

Result	**Complies** by 22.84 dB

4.6.4 Setup Photographs FCC Part 15 Subpart B





5.0 List of test equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Asset #	Cal Int	Cal Due
EMI Test Receiver 40GHz	Rohde & Schwarz	ESU40	ITS 00961	12	03/09/2022
9kHz - 30MHz Passive Loop Antenna	EMCO	6512	ITS 001598	12	06/21/2022
1-18GHz Horn Antenna Red	ETS Lindgren	3117-PA	ITS 01636	12	12/17/2021
Bilog Antenna 30MHz - 1GHz	Teseq	CBL 6111D	ITS 01058	12	11/12/2021
9kHz-1GHz Pre-amplifier	Sonoma Instrument	310N	ITS 01714	12	11/13/2021
10kHz - 1GHz 3 meter RF Cable	TRU Corp.	TRU Core 300	ITS 01465	12	09/14/2022
10kHz - 1GHz 15 meter RF Cable	TRU Corp.	TRU Core 300	ITS 01470	12	09/14/2022
1-18GHz RF CABLE METER	TRU Corp.	TRU Core 300	ITS 01330	12	06/29/2022
1-40GHz RF Cable (SMA type	MEGAPHASE	EMC1-K1K1-236	ITS 01903	12	03/03/2022
Spectrum Analyzer 20hz-26.5ghz	Rohde & Schwarz	FSU	ITS 00913	12	05/24/2022
10kHz-1GHz 2 meter RF Cable	TRU Corp.	TRU Core 300	ITS 01339	12	09/14/2022
10kHz-1GHz 11 meter RF Cable	TRU Corp.	TRU Core 300	ITS 01335	12	09/14/2022
10kHz-1GHz 6 meter RF Cable	TRU Corp.	TRU Core 300	ITS 01333	12	04/28/2022
150kHz to 30MHz LISN	Com-Power	LIN-115A	ITS 01283	12	05/22/2022
Humidity Temperature Test Chamber	ESPEC	BTX-475	01436	12	10/20/2021
2Hz-43.5GHz Signal and Spectrum Analyzer	Rohde & Schwarz	FSW43	01818	12	07/16/2022
LOOP SENSOR	Solar Electronics	7334-1	001608	12	11/10/2021

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
BAT-EMC	Nexio	3.20.0.23	Intertek Emissions Template.bpp

6.0 Document History

Revision/ Job Number	Writer Initials	Reviewer Initials	Date	Change
1.0 / G104775092	AK	KV	October 14, 2021	Original document