TEST REPORT

Report Number: 104449567MPK-003
Project Numbers: G104449567, G104274802
Report Issue Date: October 27, 2020

Testing performed on the
MOBILE-READY CONTACTLESS PROXIMITY CARD READER
Model Number: PB3500

FCC ID: T8I-CONEKT4
IC: 6504A-CONEKT4

To`

FCC Part 15 Subpart C (15.209)
Industry Canada RSS-210 Issue 10
FCC Part 15, Subpart B
Industry Canada 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 27, 2020
Anderson Soungpanya

Reviewed by: _____ **Date:** October 27, 2020
Krishna Vemuri

Report No. 104449567MPK-003	
Equipment Under Test:	MOBILE-READY CONTACTLESS PROXIMITY CARD READER
Model Number:	PB3500
Applicant:	Farpointe Data, Inc.
Contact:	Kirk Bierach
Address:	Farpointe Data, Inc. 2195 Zanker Road San Jose, CA 95131
Country:	USA
Tel. Number:	(408) 731-8700
Email:	kirk.bierach@farpointedata.com
Applicable Regulation:	FCC Part 15 Subpart C (15.209) Industry Canada RSS-210 Issue 10 FCC Part 15, Subpart B Industry Canada ICES-003 Issue 6
Date of Test:	May 17, 2020 & October 6 – 9, 2020

We attest to the accuracy of this report:

Anderson Soungpanya
Project Engineer

Krishna K Vemuri
EMC Manager

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1.0 Summary of Tests

TEST	REFERENCE FCC 15C	REFERENCE RSS-210	RESULTS
Radiated Emissions	15.209	RSS 210 (4.3)	Complies
Line Conducted Emissions	15.207	RSS-GEN	Complies
Occupied Bandwidth	15.215(c)	RSS-GEN	Complies
Radiated Emissions from Digital Parts	15.109	ICES-003	Complies
Conducted Emissions from Digital Parts	15.107	ICES-003	Complies
Antenna requirement	15.203	RSS-GEN	Complies[1]

[1] The EUT utilizes an internal Antenna.

EUT receive date: March 15, 2020

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: March 15, 2020

Test completion date: October 09, 2020

The test results in this report pertain only to the item tested.

2.0 General Description

2.1 Product Description

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

CONTACTLESS PROXIMITY CARD READER

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
Model	PB3500
FCC Identifier	T8I-CONEKT4
IC Identifier	6504A-CONEKT4
Operating Frequency	125 kHz
Number of Channels	1
Type of Modulation	ASK
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	-

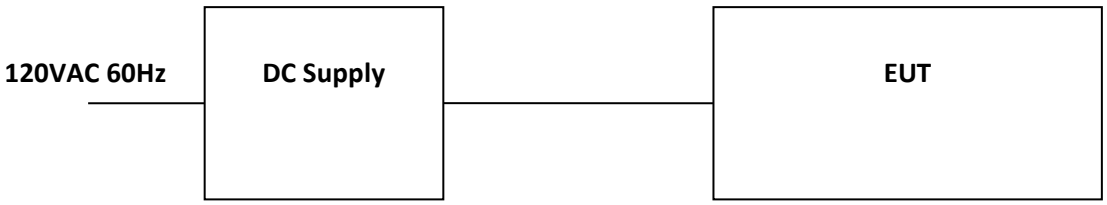
Measurement	Expanded Uncertainty (k=2)		
	0.15 MHz – 30MHz	30 MHz – 1 GHz	1 GHz – 18 GHz
Radiated emissions	-	4.7	5.1 dB
AC mains conducted emissions	2.1 dB	-	-

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	**F** = With Ferrite
U = Unshielded	**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.

125 kHz transmitter is identical to the certification, FCC ID: T8I-CONEKT3 and IC: 6504A-CONEKT3. Test data in section 4.2, were borrowed from original report, 104274802MPK-005. Radiated Emissions were remeasured to show compliance.

3.4 Software Exercise Program

None

3.5 Mode of Operation during test

The MOBILE-READY CONTACTLESS PROXIMITY CARD READERs was set up to continuously transmitting at 125 kHz.

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

§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)

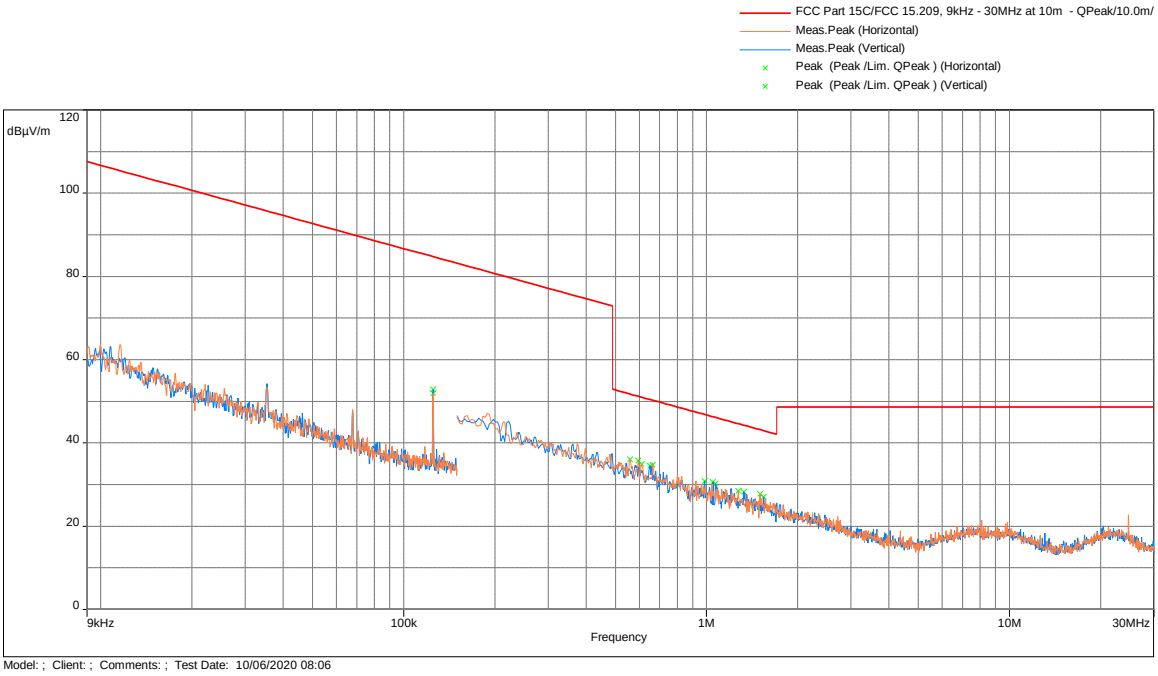
RA = Receiver Amplitude (including preamplifier) in dB (μV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB (1/m)
AG = Amplifier Gain in dB
DCF = Distance Correction Factor

Note: FS was measured with loop antenna below 30MHz

4.1.3 Test Result

Tested By	Test Date	Results
Anderson Soungpanya	October 6-9, 2020	Complies

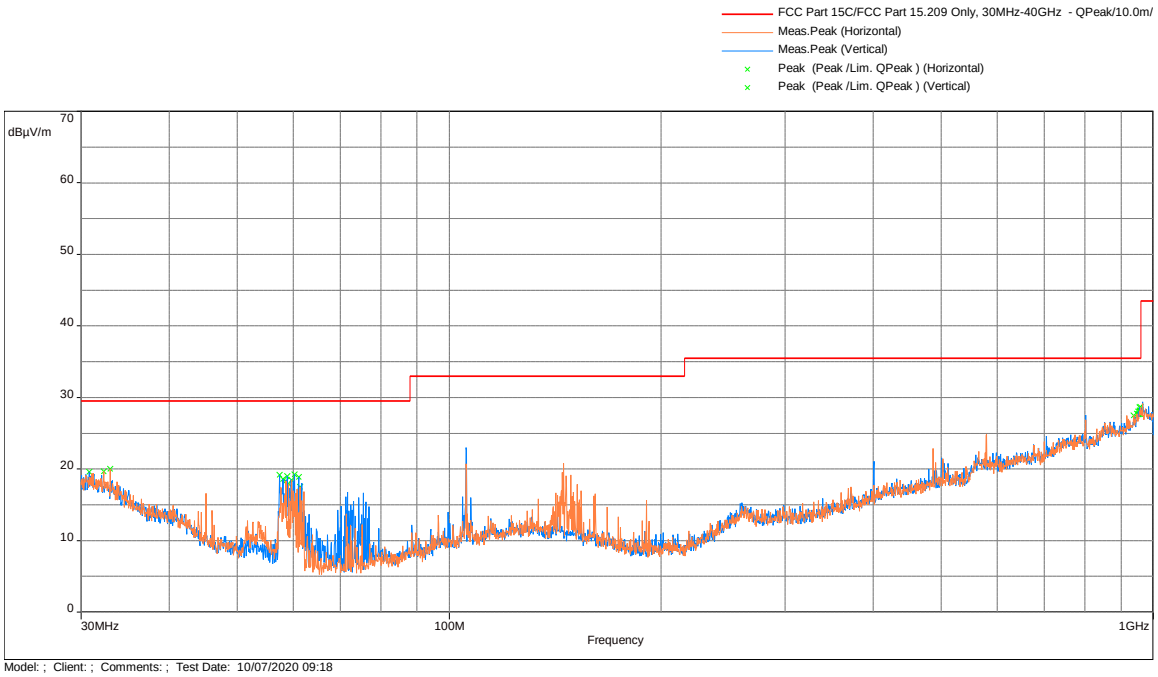
Radiated Spurious Emissions from 9 kHz to 30MHz



Frequency (MHz)	Peak FS @10m dB(uV/m)	Limit@10m dB(uV/m)	Margin dB	Azumith deg	Comment	Correction dB
0.125	52.82	84.76	-31.94	268	Perpendicular	31.56
0.125	51.92	84.76	-32.84	0	Parallel	31.56

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

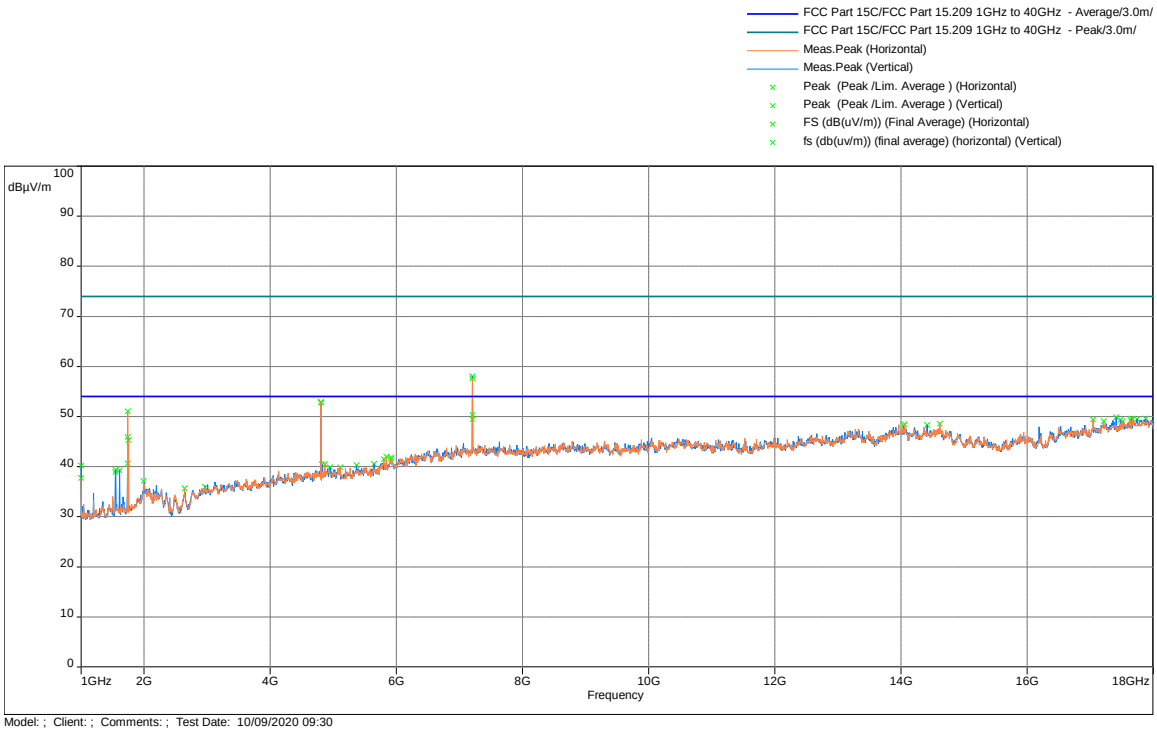
Radiated Spurious Emissions from 30 MHz to 1000 MHz



Frequency (MHz)	Peak FS@10m (dBµV/m)	Limit@10m (dBµV/m)	Peak-Lim (dB)	Height (m)	Angle (°)	Comment	Correction (dB)
33.007	20.04	29.5	-9.46	1.00	109	Horizontal	-10.20
58.647	18.33	29.5	-11.17	1.00	33	Horizontal	-21.83
59.714	18.45	29.5	-11.05	1.00	136	Horizontal	-21.93
61.395	17.53	29.5	-11.97	1.00	64	Horizontal	-21.90
57.418	19.15	29.5	-10.35	4.00	163	Vertical	-21.72
58.873	19.00	29.5	-10.50	4.00	219	Vertical	-21.85
60.264	19.25	29.5	-10.25	4.00	201	Vertical	-21.95
61.169	18.90	29.5	-10.60	4.00	28	Vertical	-21.93

Note: Correction = AF + CF – Preamp

Radiated Spurious Emissions from 1-18 GHz, Peak vs Peak & Avg Limits



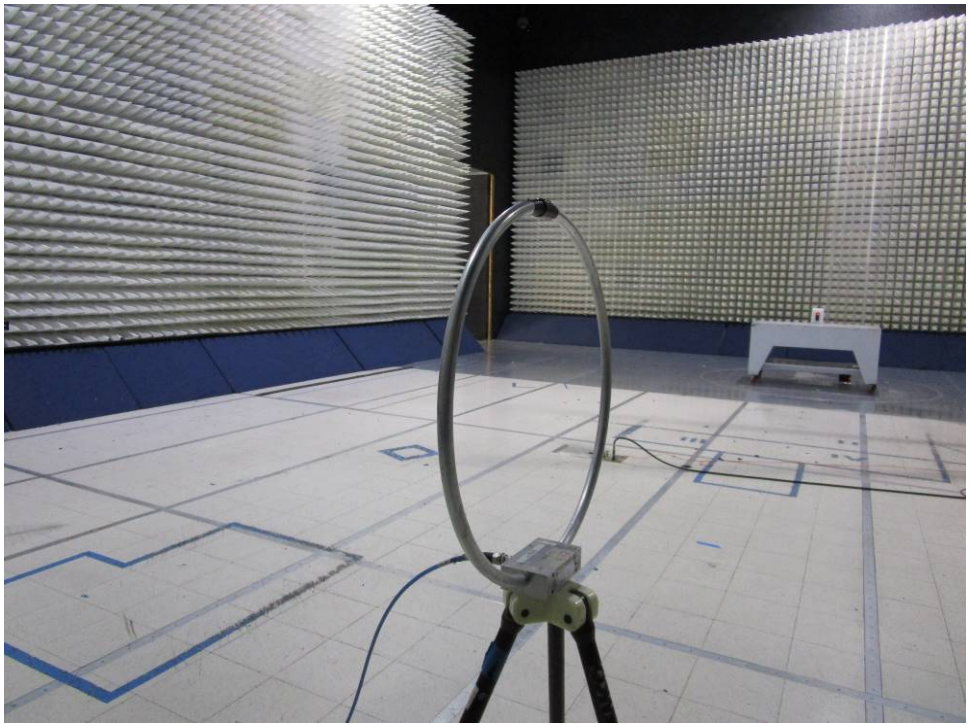
Freq.	Peak FS@3m	Avg Limit@3m	Margin	Angle	Height	Polarity	Correction
MHz	dBµV/m	dBµV/m	dB	deg	m		
7205.305	49.40	54	-4.60	128	3.08	Horizontal	-0.3
7205.304	50.37	54	-3.63	358	2.81	Vertical	-0.3
4803.467	39.44	54	-14.56	133	2.52	Horizontal	-6.06
4803.467	38.16	54	-15.84	289	2.11	Vertical	-6.06

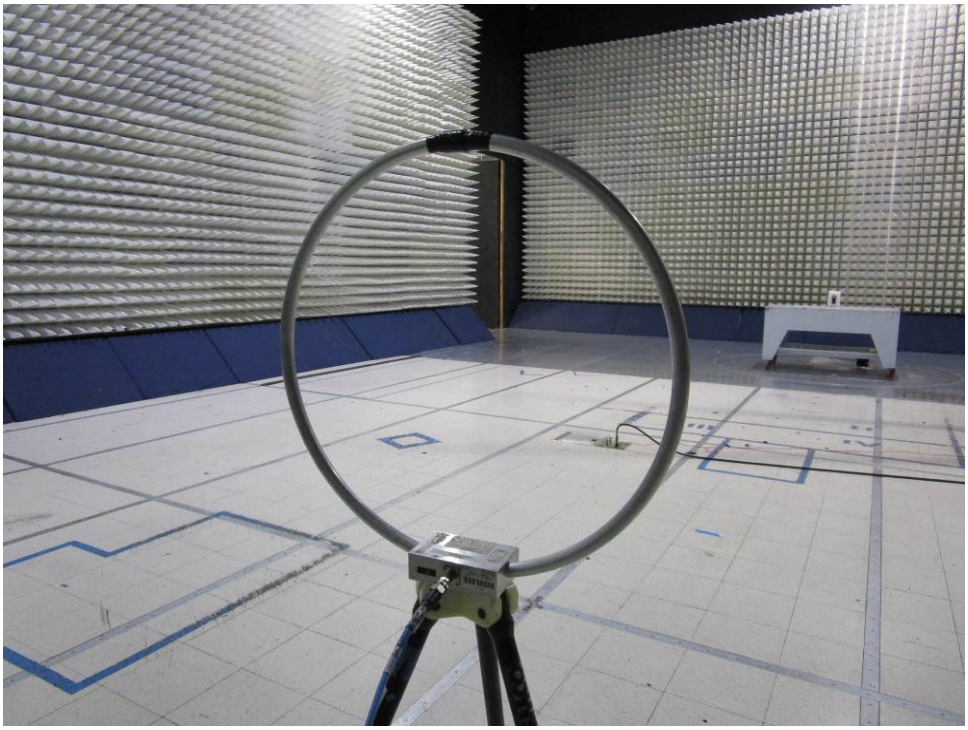
Note: Correction = AF + CF – Preamp

Result	**Complies** by 3.63 dB

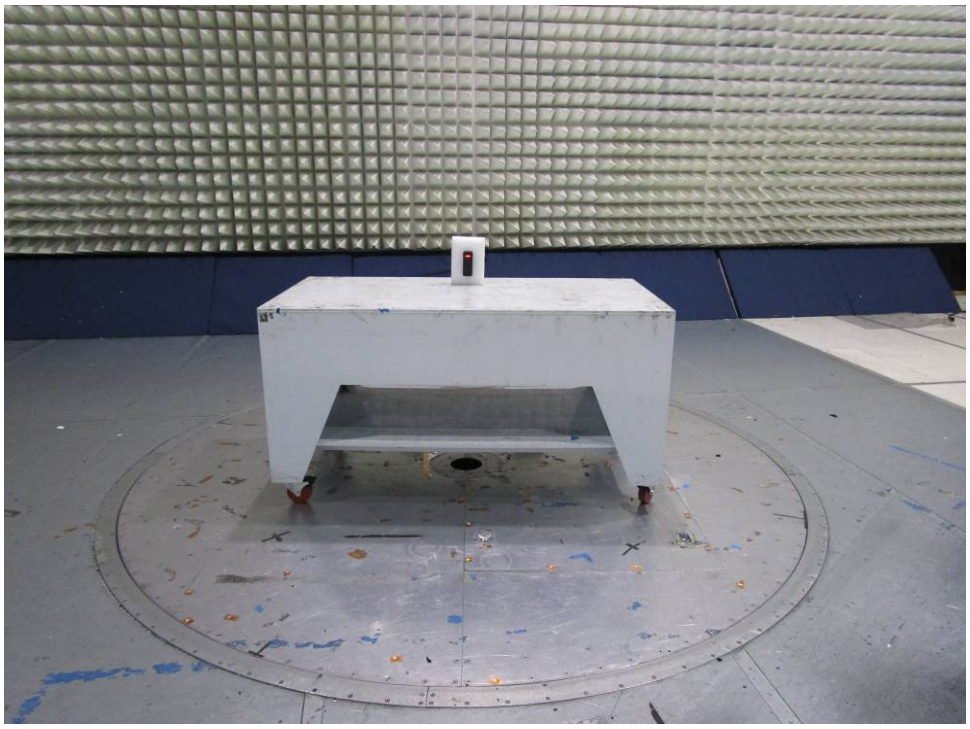
4.1.5 Test Configuration Photographs

The following photographs show the testing configurations used.



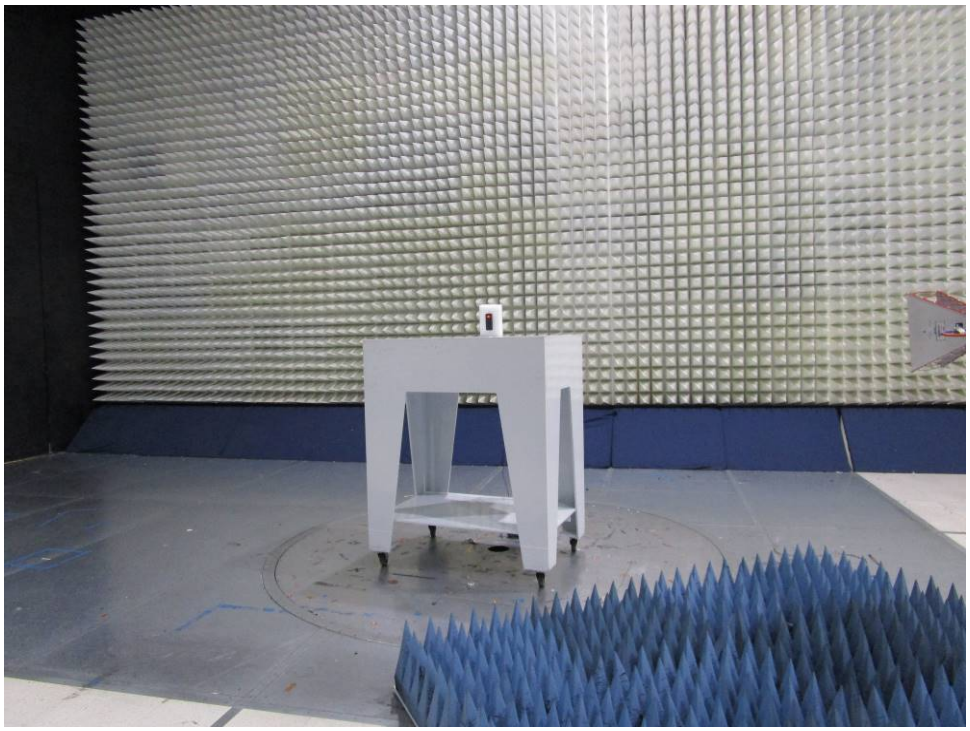


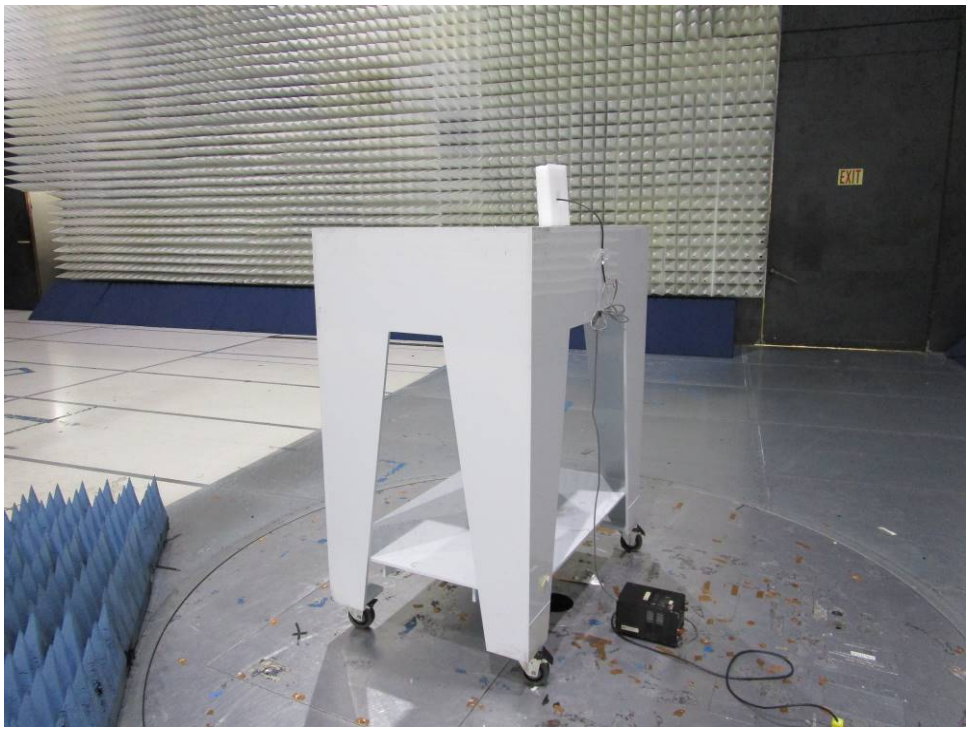
4.1.5 Test Configuration Photographs (Continued)



Electromagnetic Radiated Disturbance Setup Photograph

4.1.5 Test Configuration Photographs (Continued)





4.2 Occupied Bandwidth
FCC 15.215

4.2.1 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.

4.2.2 Procedure

The EUT was setup to transmit in normal operating condition.

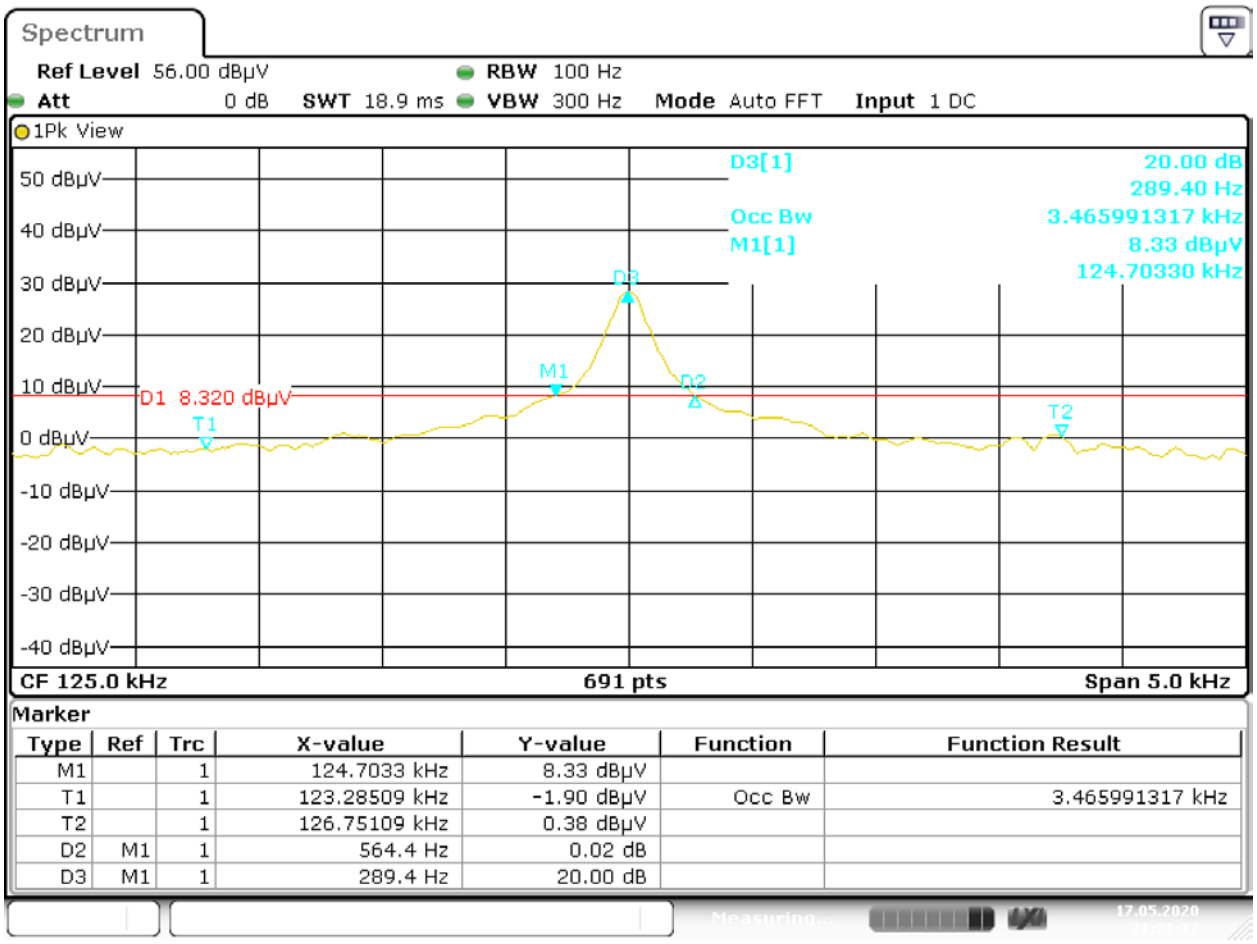
Measurements were made with the loop antenna in close proximity of the EUT. Following the procedures of ANSI 63.10: 2013, the 20dB bandwidth measurements were taken. The following plots show Occupied Bandwidth.

4.2.3 Test Results

Tested By	Test Date	Results
Aaron Chang	May 17, 2020	Complies

Frequency (MHz)	-20 dB Channel Bandwidth (kHz)	99% Channel Bandwidth (kHz)
0.125	0.564	3.466

-20dB & 99% Channel Bandwidth Plot



4.3 AC Line Conducted Emission
FCC Rule 15.207, FCC 15.107

4.3.1 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.*

4.3.2 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.

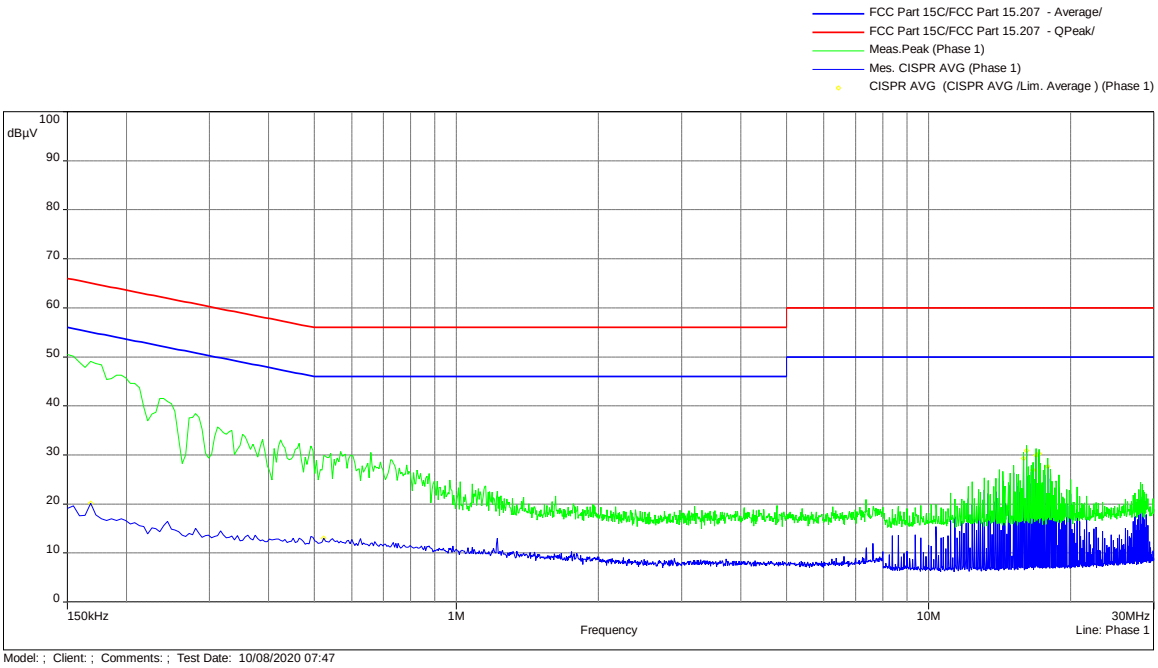
EUT was placed in transmission mode then tested for conducted emissions per 15.207 to ensure the device complies with 15.207 & 15.107.

Tested By	Test Date	Results
Anderson Soungpanya	October 8, 2020	Complies

4.3.3 Test Result

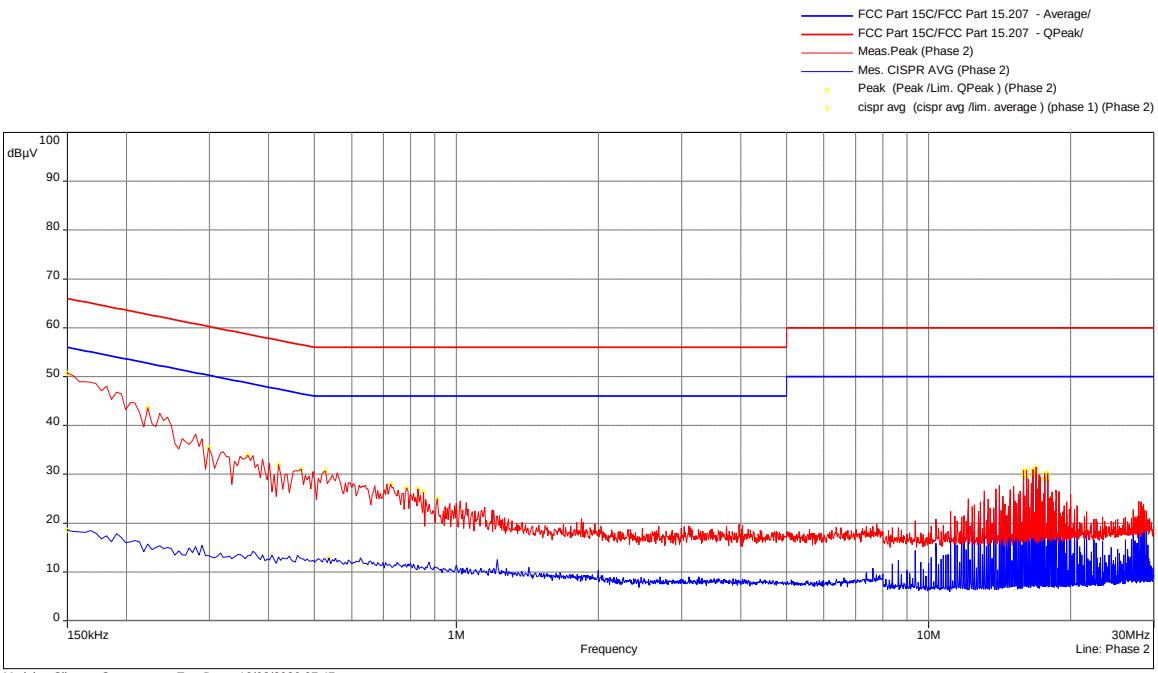
15.107 & 15.207

AC Line Conducted Emission, 120VAC 60Hz Phase 1



Model: ; Client: ; Comments: ; Test Date: 10/08/2020 07:47

AC Line Conducted Emission, 120VAC 60Hz Phase 2



Model: ; Client: ; Comments: ; Test Date: 10/08/2020 07:47

4.3.3 Test Result (Continued)

Quasi Peak Table

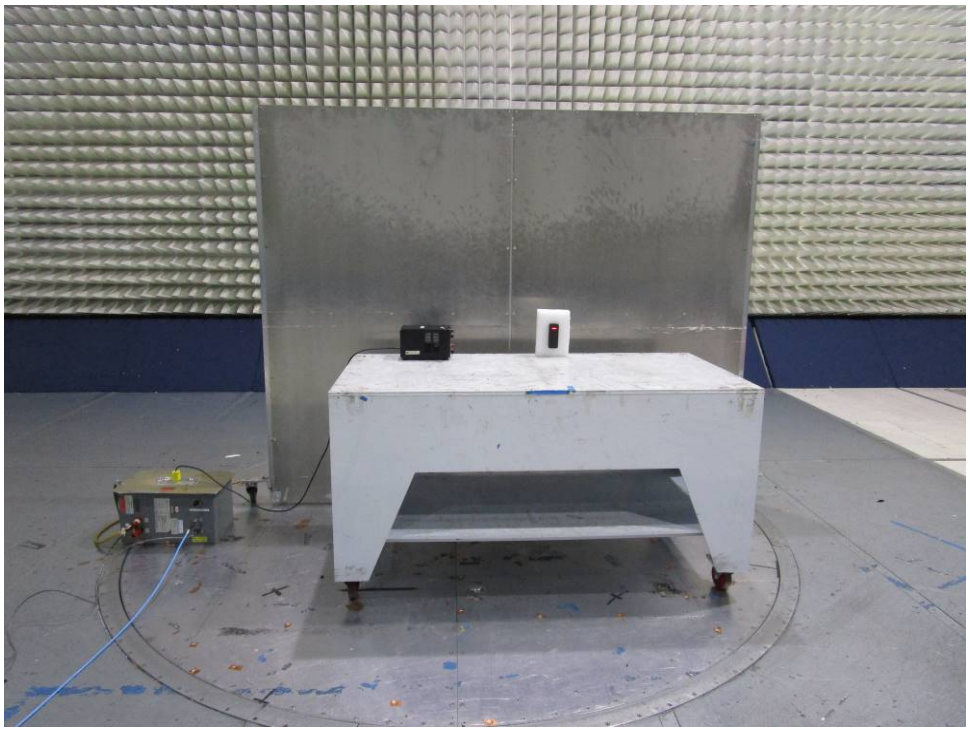
Frequency (MHz)	Peak (dBµV)	Lim. QPeak (dBµV)	Peak-Lim (dB)	Comment	Correction (dB)
0.150	50.47	66	-15.53	Phase 1	10.97
0.150	50.74	66	-15.26	Phase 2	10.98
0.222	43.68	62.74	-19.07	Phase 2	10.97
0.2355	41.55	62.25	-20.7	Phase 1	10.97
0.2805	38.41	60.8	-22.39	Phase 1	10.97
0.2985	35.39	60.28	-24.89	Phase 2	10.97
0.312	35.67	59.92	-24.24	Phase 1	10.97
0.3615	33.9	58.69	-24.79	Phase 2	10.97
0.42	32.02	57.45	-25.43	Phase 2	10.97
0.4245	33.03	57.36	-24.33	Phase 1	10.98
0.4695	31.04	56.52	-25.49	Phase 2	10.97
0.492	31.89	56.13	-24.25	Phase 1	10.98
0.5055	28.93	56	-27.07	Phase 1	10.98
0.528	30.66	56	-25.34	Phase 2	10.98
0.5415	30.31	56	-25.69	Phase 1	10.99
0.5685	30.7	56	-25.3	Phase 1	11
0.6585	30.5	56	-25.5	Phase 1	11.03
0.726	29.04	56	-26.96	Phase 1	11.03
0.726	28.05	56	-27.95	Phase 2	11.02
0.7845	27.21	56	-28.79	Phase 2	11
0.825	26.92	56	-29.08	Phase 1	11
0.8295	27.03	56	-28.97	Phase 2	11
0.852	26.3	56	-29.7	Phase 2	11
0.9105	25.02	56	-30.98	Phase 2	11.01
15.873	30.49	60	-29.51	Phase 1	11.3
15.873	30.8	60	-29.2	Phase 2	11.3
16.125	30.86	60	-29.14	Phase 2	11.32
16.125	31.98	60	-28.02	Phase 1	11.32
16.6245	28.47	60	-31.53	Phase 1	11.38
16.6245	30.97	60	-29.03	Phase 2	11.38
16.8765	31.42	60	-28.58	Phase 2	11.41
16.8765	31.28	60	-28.72	Phase 1	11.41
17.124	31.18	60	-28.82	Phase 1	11.43
17.6235	30.26	60	-29.74	Phase 2	11.44
17.8755	29.39	60	-30.61	Phase 1	11.46
17.8755	30.19	60	-29.81	Phase 2	11.45

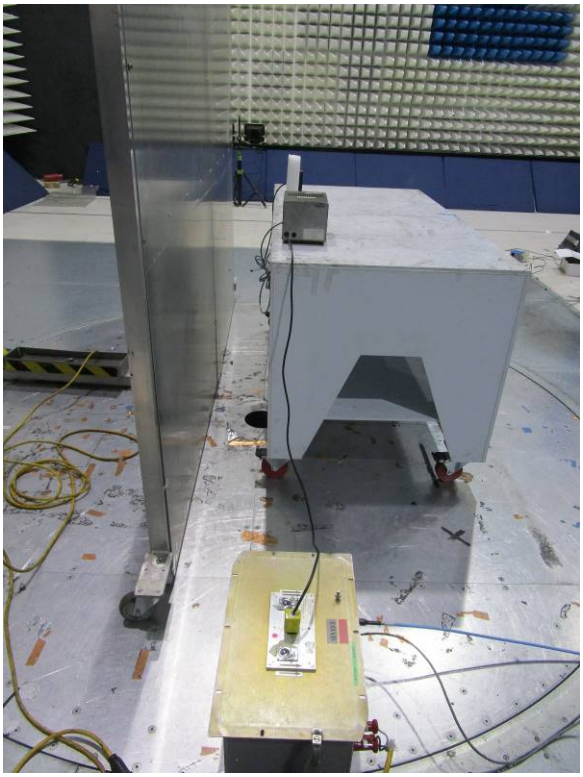
Average Table

Frequency (MHz)	CISPR AVG (dBµV)	Lim. Average (dBµV)	CISPR AVG-Lim (dB)	Comment	Correction (dB)
0.150	18.55	56	-37.45	Phase 2	10.98
0.168	20.15	55.06	-34.91	Phase 1	10.97
0.5235	13.06	46	-32.94	Phase 1	10.99
0.537	12.88	46	-33.12	Phase 2	10.99
15.873	29.32	50	-20.68	Phase 1	11.3
15.873	29.67	50	-20.33	Phase 2	11.3
16.125	30.85	50	-19.15	Phase 1	11.32
16.125	29.56	50	-20.44	Phase 2	11.32
16.6245	26.88	50	-23.12	Phase 1	11.38
16.6245	29.74	50	-20.26	Phase 2	11.38
16.8765	29.92	50	-20.08	Phase 1	11.41
16.8765	30.51	50	-19.49	Phase 2	11.41
17.124	30.27	50	-19.73	Phase 1	11.43
17.6235	29.09	50	-20.91	Phase 2	11.44
17.8755	28.89	50	-21.11	Phase 2	11.45
17.8755	27.6	50	-22.4	Phase 1	11.46

Results	**Complies**

4.3.4 Test Configuration Photographs





4.4 Radiated Emissions on Digital Parts

FCC Ref: 15.109, ICES 003, RSS Gen

4.4.1 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

4.4.2 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.

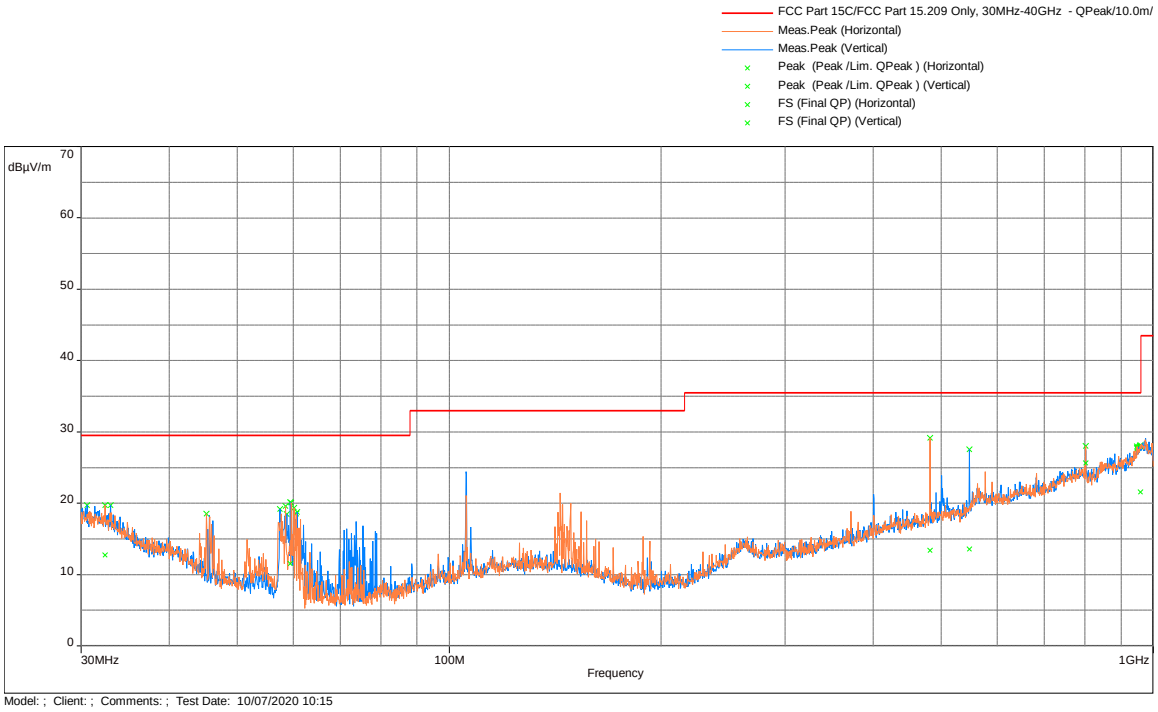
Radiated emission measurements were performed from 30 MHz to 18000 MHz. The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Measurements recorded in this section were made with the Transmitter in Tx mode.

4.4.3 Test Results

Tested By	Test Date	Results
Anderson Soungpanya	October 7-9, 2020	Complies

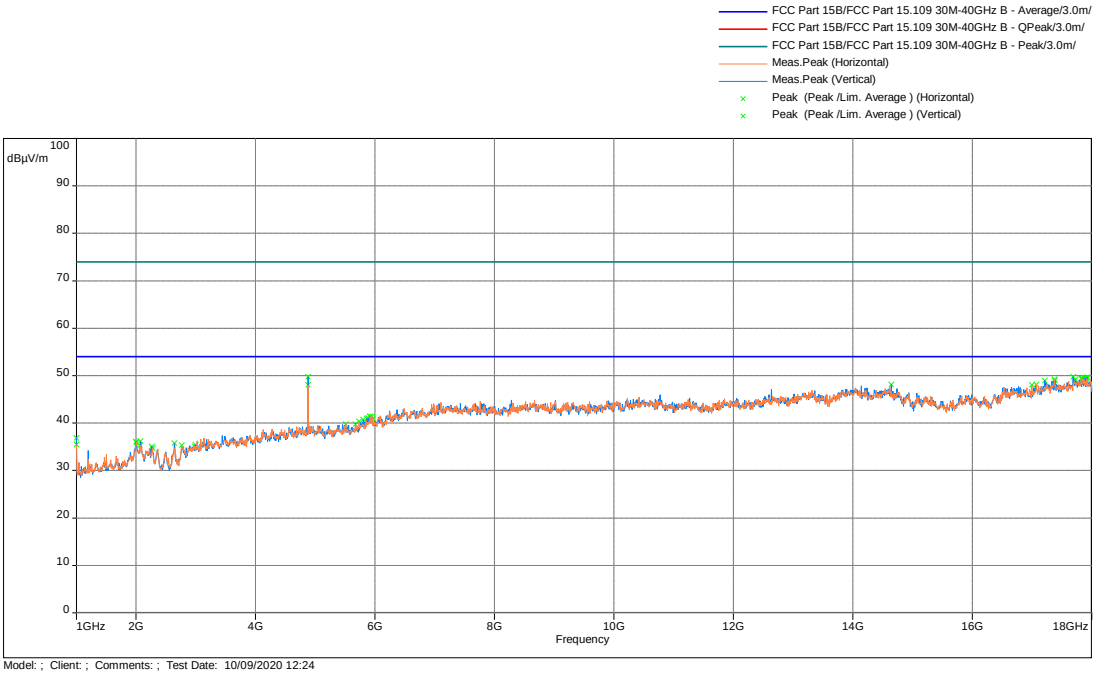
FCC Part 15 Subpart B and ICES-003, Radiated Disturbance, 30 MHz to 1000 MHz



Freq (MHz)	FS@10m dB(uV/m)	Limit@10m dB(uV/m)	Margin (dB)	Azimuth (deg)	Height (m)	Polarity	RA (dBuV)	Correction (dB)
32.41567	12.74	29.5	-16.76	352	1.64	Horizontal	22.67	-9.91
481.9898	13.39	35.5	-22.11	96	2.46	Horizontal	21.76	-8.37
801.8162	25.65	35.5	-9.85	49	1.45	Horizontal	28.05	-2.40
958.8526	21.54	35.5	-13.96	280	3.04	Horizontal	19.47	2.05
59.49762	11.51	29.5	-17.99	133	3.51	Vertical	33.42	-21.91
547.8511	13.56	35.5	-21.94	230	1.80	Vertical	20.78	-7.20

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

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

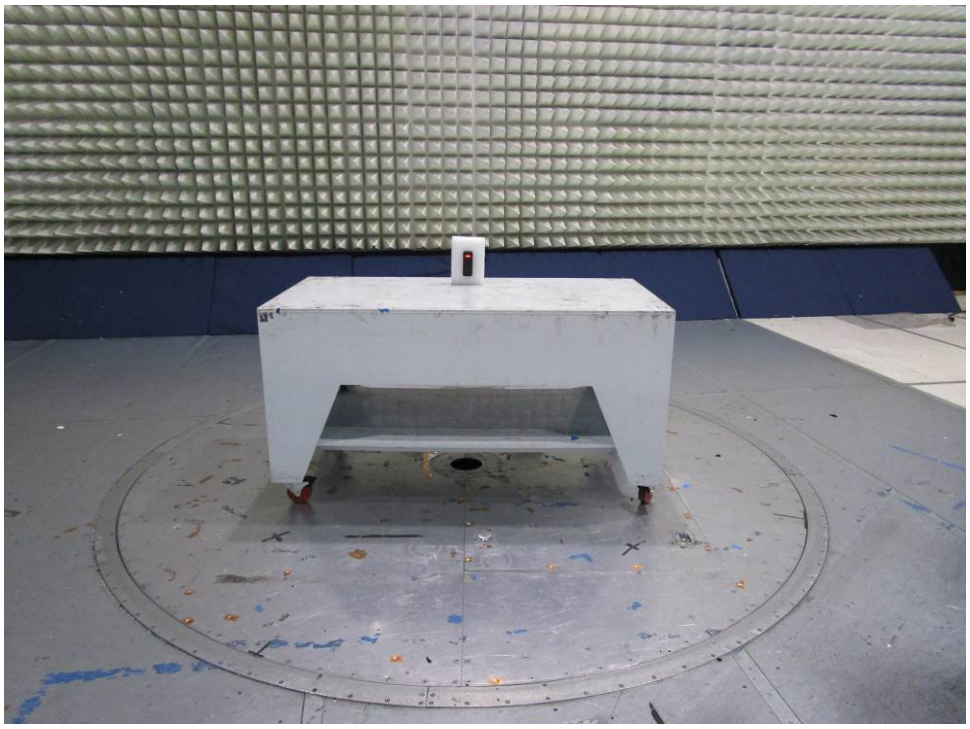


Frequency (MHz)	Peak@3m (dBµV/m)	Lim. @3m Average (dBµV/m)	Peak-Lim (dB)	Height (m)	Angle (°)	Comment	Correction (dB)
4881.667	49.79	54	-4.21	1.51	312.75	Vertical	-5.84
4881.667	48.05	54	-5.95	2.52	48.75	Horizontal	-5.84

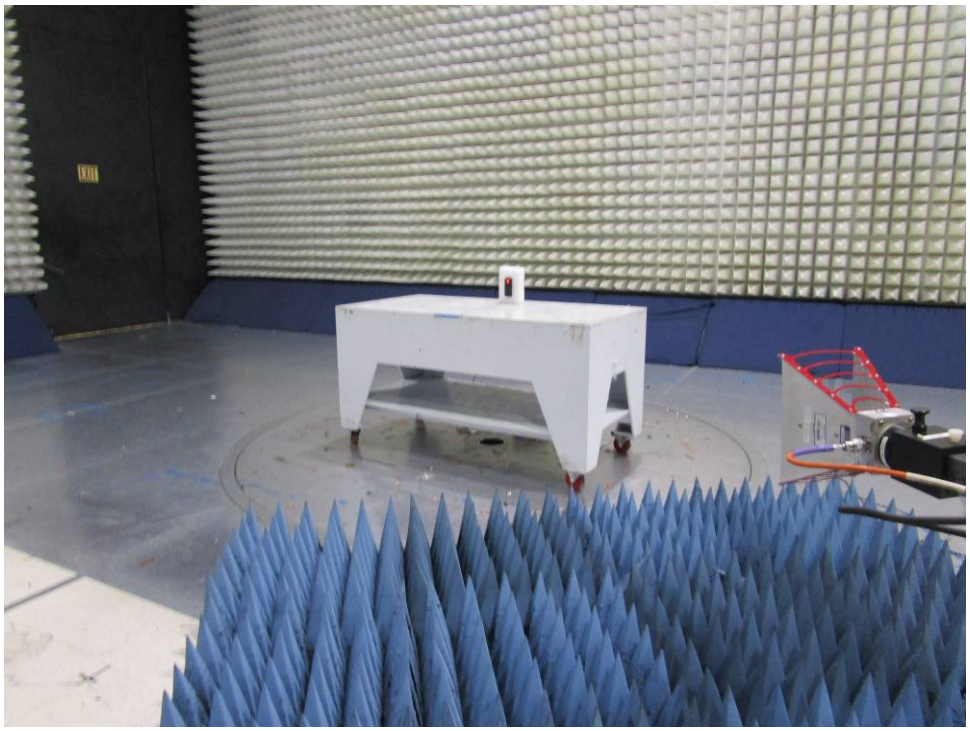
Note: Correction = AF + CF – Preamp

Results	**Complies** by 4.21 dB for FCC Part 15 Subpart B and ICES-003

4.4.4 Test Configuration Photographs



4.4.4 Test Configuration Photographs (Continued)



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 Receiver	Rohde and Schwarz	ESR7	ITS 01607	12	10/23/20
EMI Receiver	Rohde and Schwarz	ESU40	ITS 00961	12	11/07/20
1-18GHz Preamplifier	uComp Nordic	MCN-40-001018002510P	ITS 01817	12	04/16/21
Horn Antenna	ETS-Lindgren	3115	ITS 00982	12	04/21/21
Loop Antenna	EMCO	6512	ITS 01598	12	10/22/20
BI-Log Antenna	Teseq	CBL611D	ITS 01058	12	10/19/20
Pre-Amplifier	Sonoma Instrument	310N	ITS 01493	12	02/07/21
RF Cable	TRU Corporation	TRU CORE 300	ITS 01462	12	09/01/21
RF Cable	TRU Corporation	TRU CORE 300	ITS 01465	12	09/01/21
RF Cable	TRU Corporation	TRU CORE 300	ITS 01470	12	09/01/21
RF Cable	TRU Corporation	TRU CORE 300	ITS 01342	12	09/01/21
Notch Filter	MICRO-TRONICS	BRM50702	ITS 01166	12	06/11/21
RF Cable	Mega Phase	EMC1-K1K1-236	ITS 01537	12	04/17/21
RF Cable	Mega Phase	TM40-K1K1-19	ITS 01155	12	04/17/21

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
BAT-EMC	Nexio	3.19.1.19	Farpointe_PB.bpp
RS Commander	Rohde Schwarz	1.6.4	Not Applicable (Screen grabber)

6.0 Document History

Revision/ Job Number	Writer Initials	Reviewer Initials	Date	Change
1.0 / G104274802	AS	KV	October 27, 2020	Original document

END OF REPORT