TEST REPORT

Report Number: 104274802MPK-006
Project Number: G104274802
May 18, 2020

Testing performed on the
CONEKT® Reader
Model Number: PCR-620

FCC ID: T8I-CONEKT3
IC: 6504A-CONEKT3

to

FCC Part 15 Subpart C (15.209)
FCC Part 15, Subpart B
Industry Canada RSS-210 Issue 10
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:** May 18, 2020
Aaron Chang

Reviewed by: _____ **Date:** May 18, 2020
Krishna Vemuri

Report No. 104274802MPK-006

Equipment Under Test:	CONEKT® Readers
Model Number:	PCR-620
Serial Number:	SN1
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 (15.209) FCC Part 15, Subpart B Industry Canada RSS-210 Issue 10 Industry Canada ICES-003 Issue 6
Test Site Location:	ITS – Site 1 1365 Adams Drive Menlo Park, CA 94025
Date of Test:	March 15 – April 1, 2020

We attest to the accuracy of this report:

Aaron Chang	Krishna K Vemuri
Project Engineer	EMC Manager

TABLE OF CONTENTS

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.

2.0 General Description

2.1 Product Description

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

CONEKT® MOBILE-READY CONTACTLESS SMARTCARD READER AND KEYPAD

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	PCR-620
FCC Identifier	T8I-CONEKT3
IC Identifier	6504A-CONEKT3
Operating Frequency	125 kHz
Number of Channels	1
Type of Modulation	ASK
Antenna Type	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: May 6, 2020

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	-

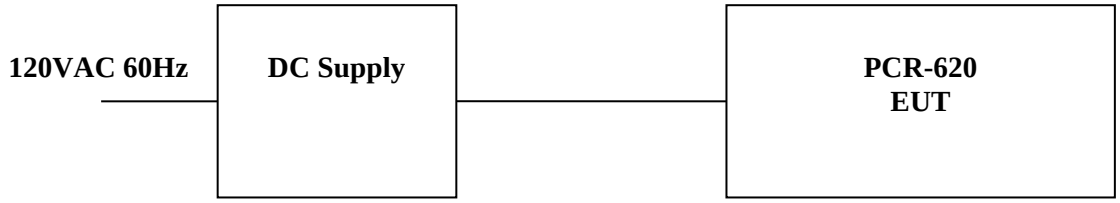
Measurement	Expanded Uncertainty (k=2)		
	0.15 MHz – 30MHz	30 MHz – 1 GHz	1 GHz – 18 GHz
Radiated emissions	-	4.7	5.1 dB
AC mains conducted emissions	2.1 dB	-	-

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 CONEKT® 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

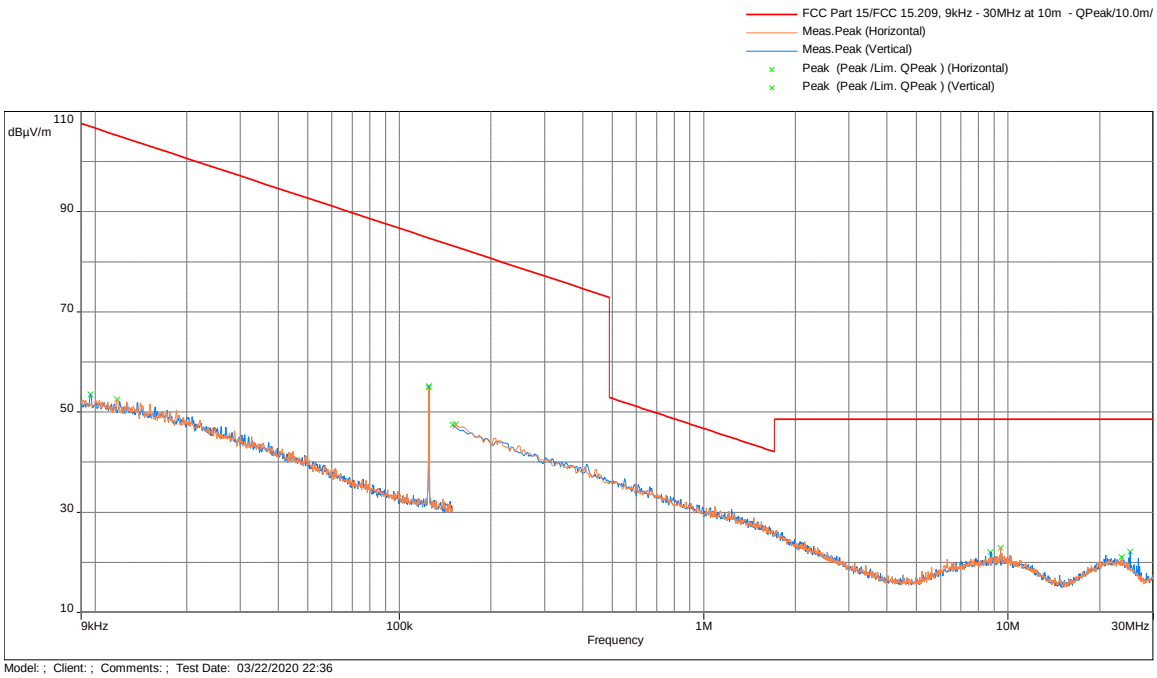
Where FS = Field Strength in dB (μV/m)

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

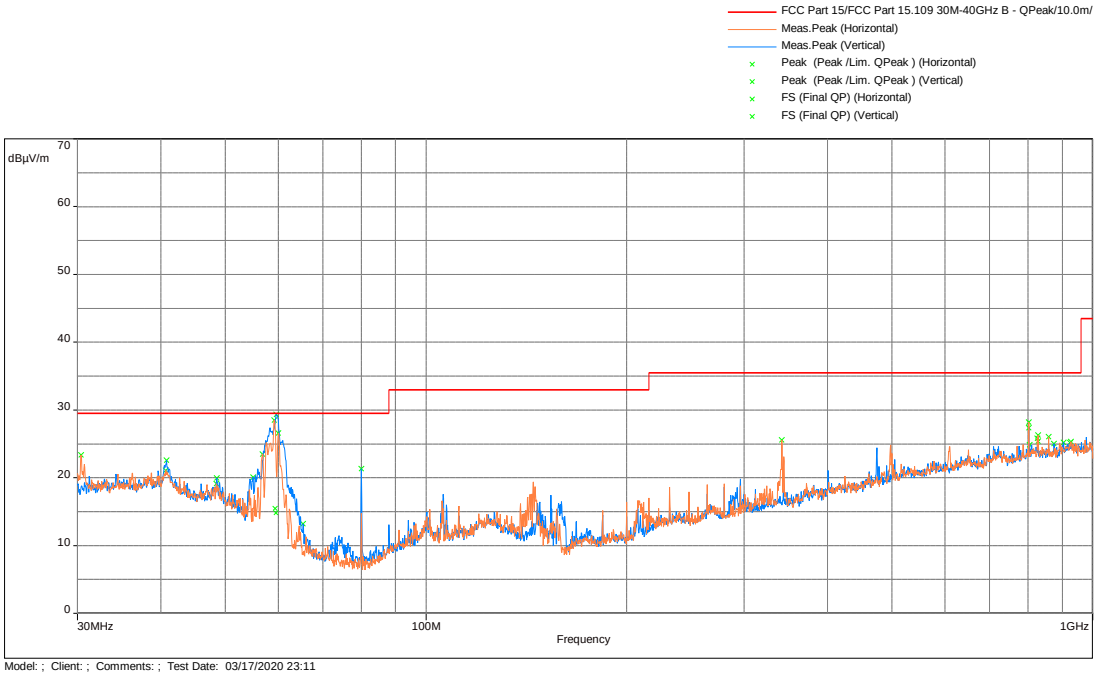
Radiated Spurious Emissions from 9 kHz to 30MHz



Frequency (MHz)	Peak FS @10m dB(uV/m)	Limit@10m dB(uV/m)	Margin dB	Azumith deg	Comment	Correction dB
0.125	55.11	84.76	-29.65	283.25	Perpendicular	32.47
0.125	54.93	84.76	-29.83	0	Parallel	32.47

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

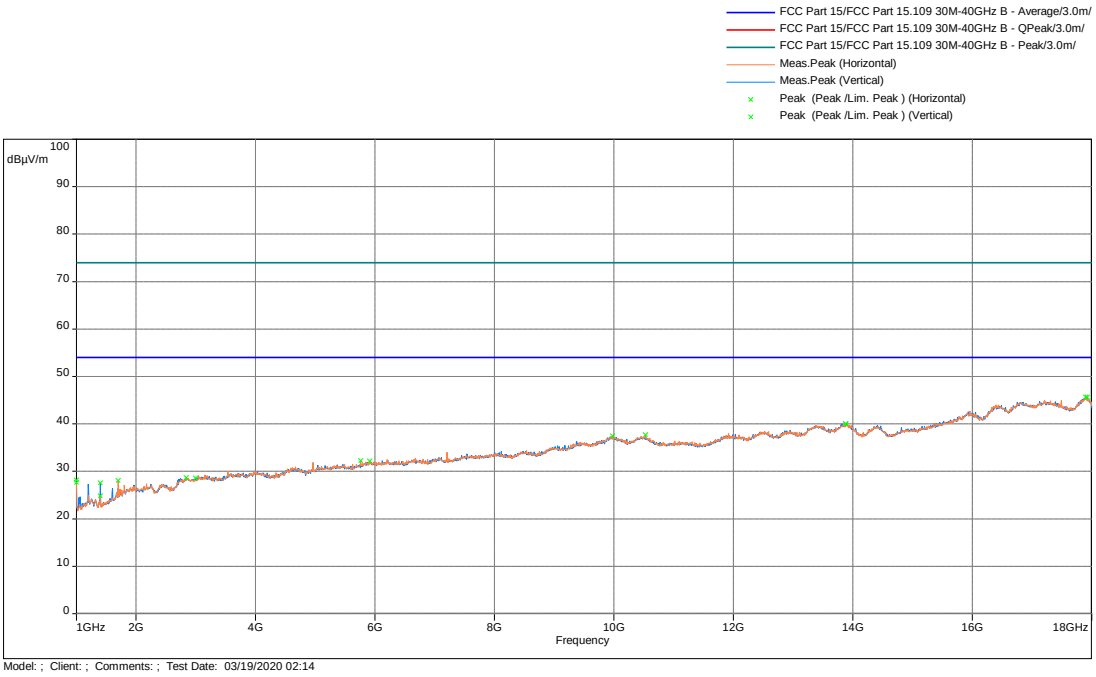
Radiated Spurious Emissions from 30 MHz to 1000 MHz



Freq (MHz)	FS@10m dB(uV/m)	Limit@10m dB(uV/m)	Margin (dB)	Height (m)	Azimuth (deg)	Polarity	RA (dBuV)	Correction (dB)
30.388	23.39	29.5	-6.11	3.98	194.75	Horizontal	-6.67	30.388
40.832	22.6	29.5	-6.9	2.48	66.5	Vertical	-6.57	40.832
56.869	23.5	29.5	-6	3.98	131.25	Horizontal	-13.76	56.869
59.374	15.46	29.5	-14.04	3.72	174.75	Horizontal	-15.02	59.374
59.511	14.82	29.5	-14.68	3.15	328.75	Vertical	-15.06	59.511
60.070	26.59	29.5	-2.91	3.98	131.25	Horizontal	-15.23	60.070

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

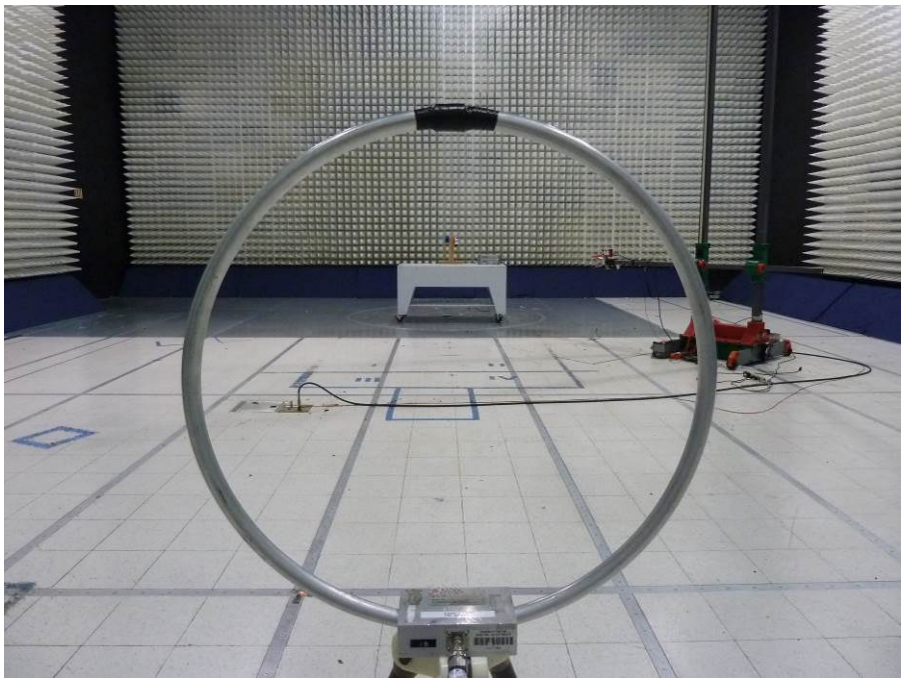
Radiated Spurious Emissions from 1-18 GHz, Peak vs Avg limit

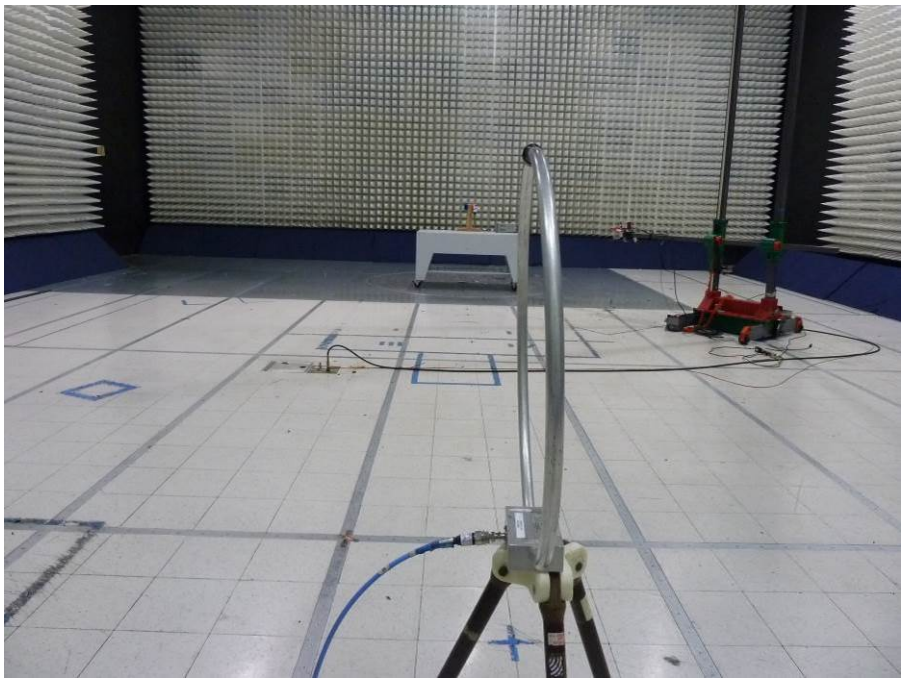


Result	**Complies** by 2.91 dB

4.1.5 Test Configuration Photographs

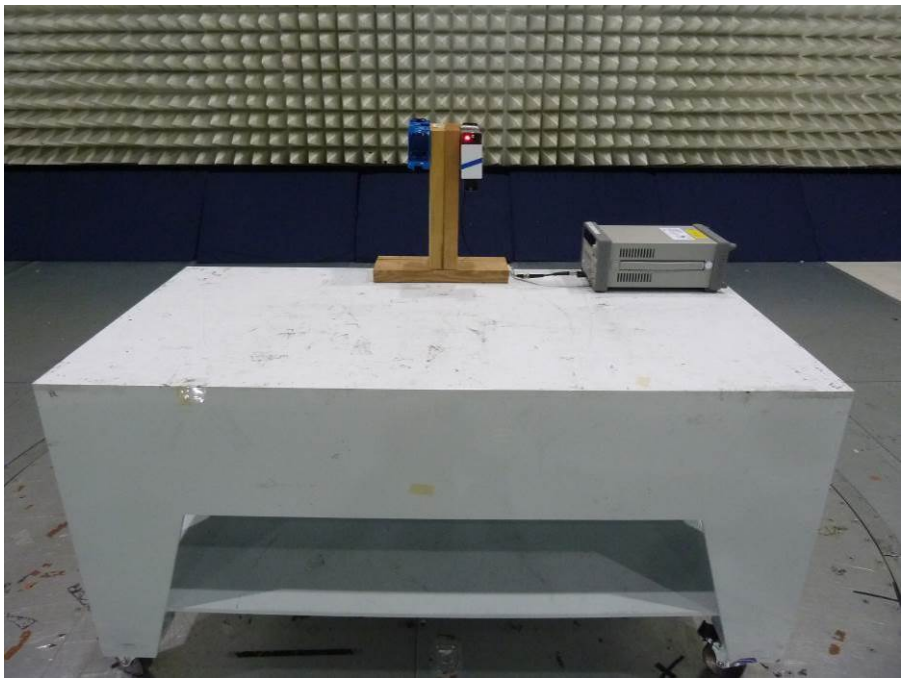
The following photographs show the testing configurations used.

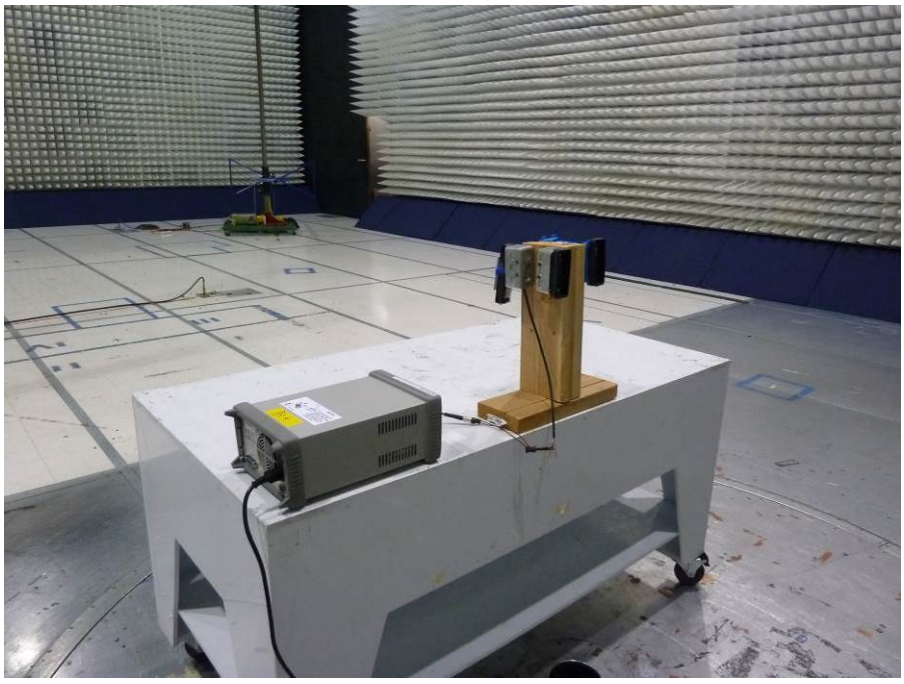




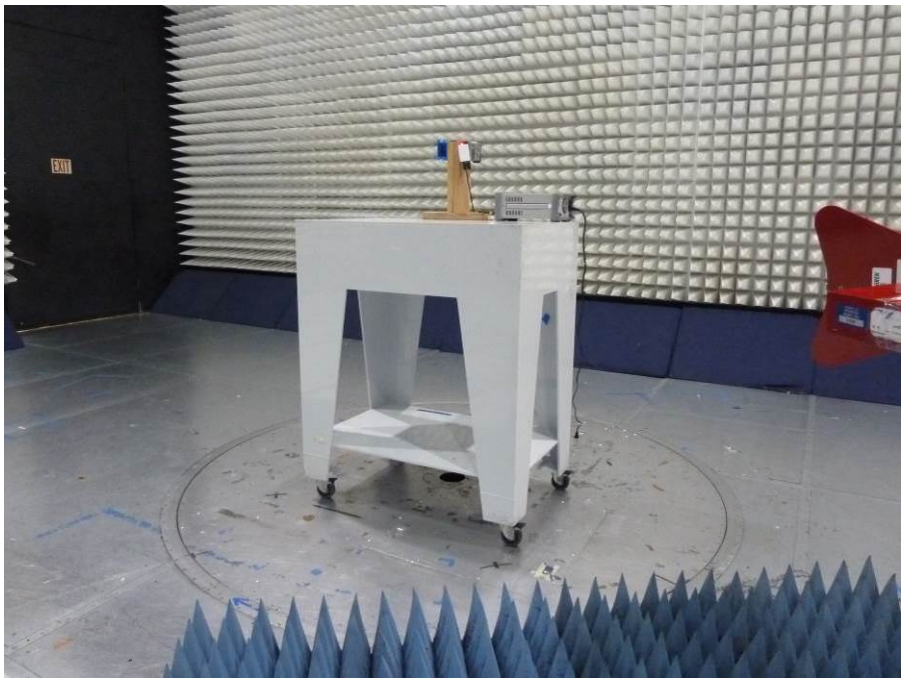
Electromagnetic Radiated Disturbance Setup Photograph

4.1.5 Test Configuration Photographs (Continued)





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

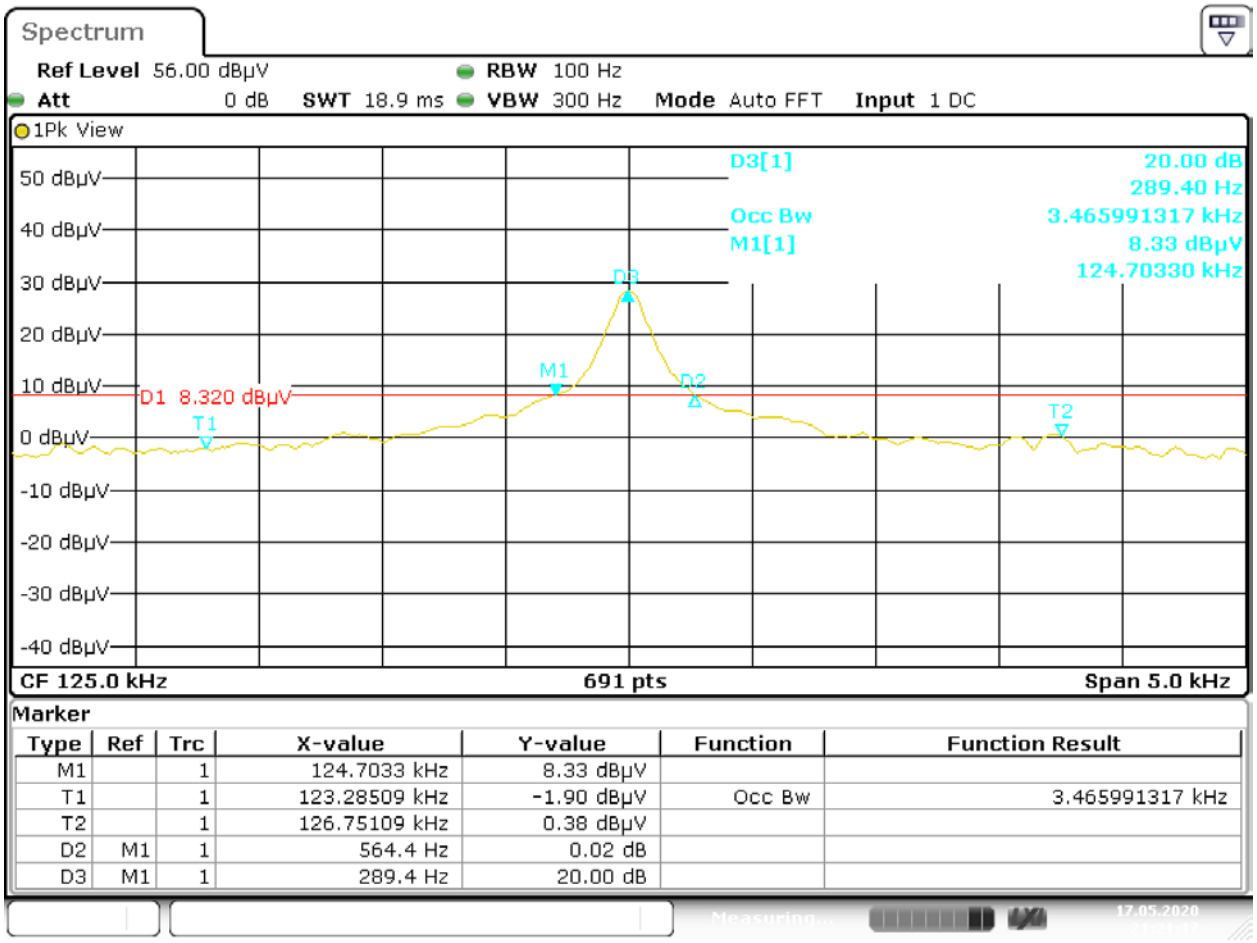
The EUT was setup to transmit in normal operating condition.

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

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.

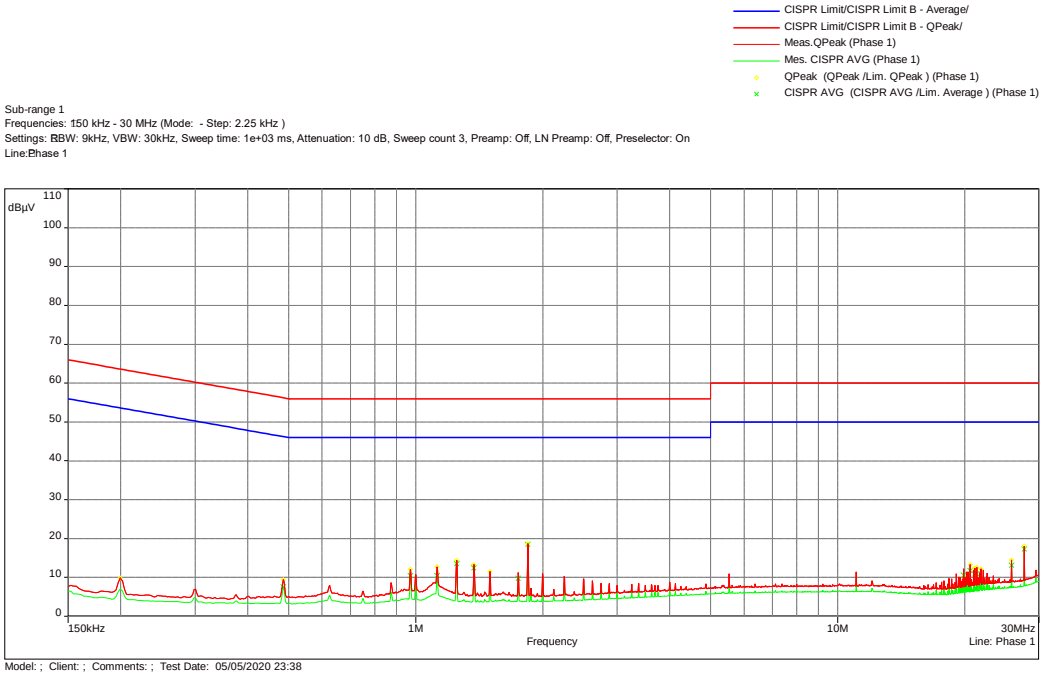
Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

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

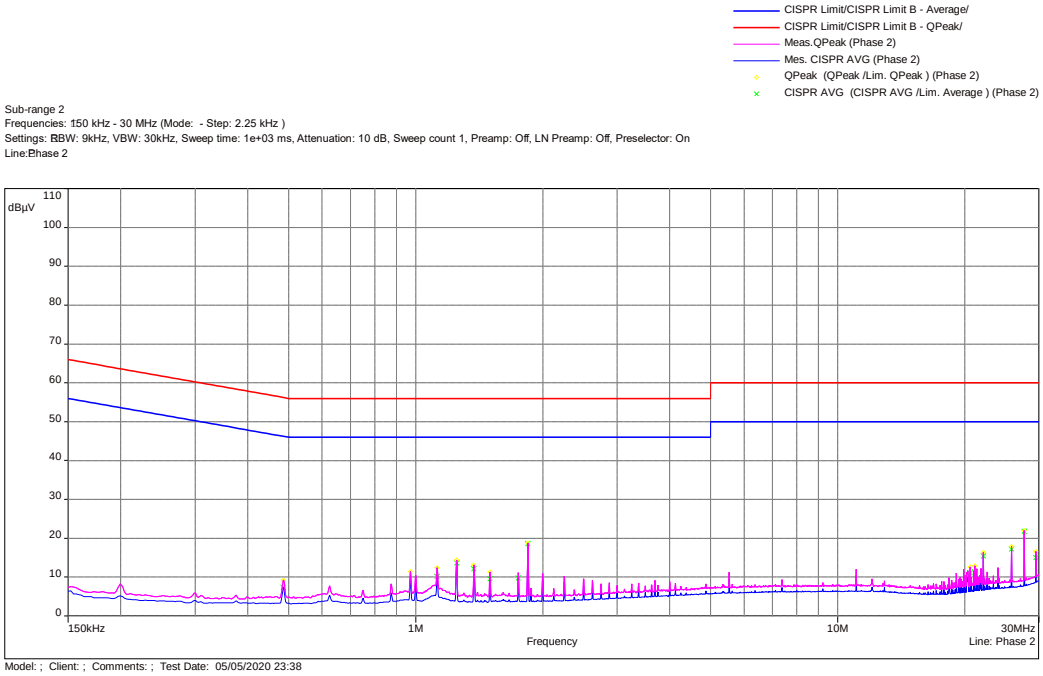
4.3.3 Test Result

15.107 & 15.207

AC Line Conducted Emission, 120VAC 60Hz Phase 1



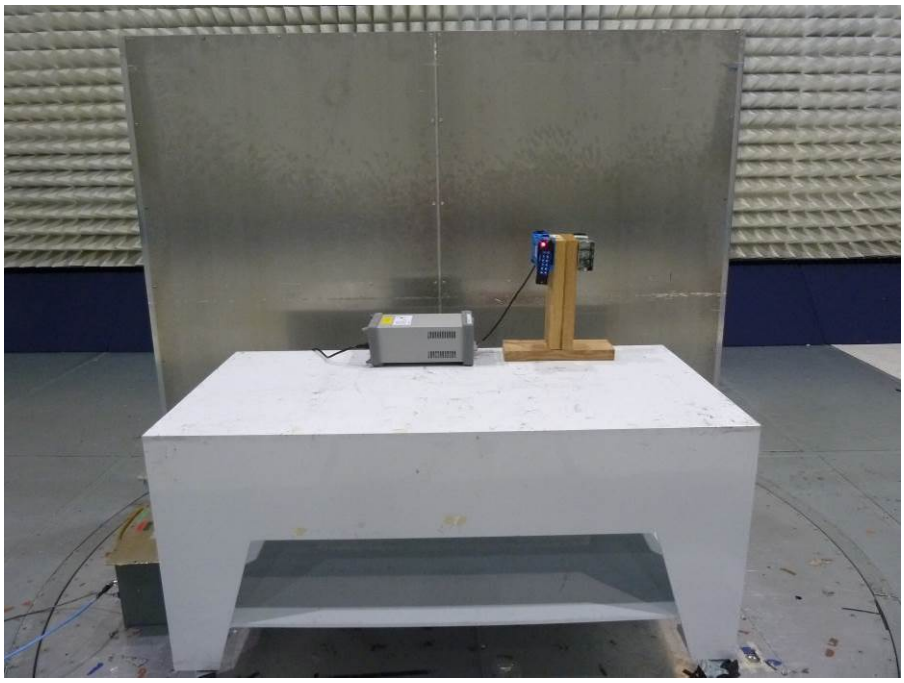
AC Line Conducted Emission, 120VAC 60Hz Phase 2

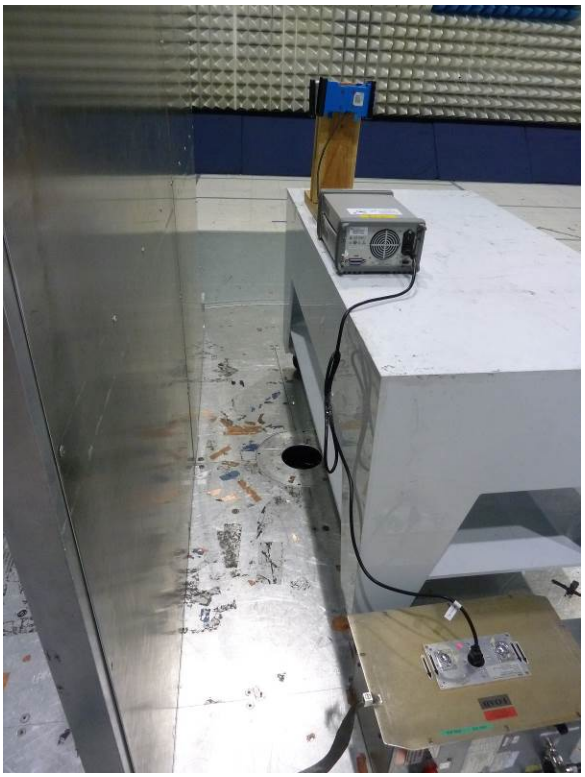


4.3.3 Test Result (Continued)

Frequency (MHz)	CISPR AVG (dBµV)	QPeak (dBµV)	Lim. Average (dBµV)	Lim. QPeak (dBµV)	CISPR AVG-Lim (dB)	QPeak-Lim (dB)	Comment	Correction (dB)
0.485	7.61	9.47	46.25	56.25	-38.64	-46.78	Phase 1	10.12
0.485	7.34	9.22	46.25	56.25	-38.9	-47.03	Phase 2	10.12
0.971	10.42	12.13	46	56	-35.58	-43.87	Phase 1	10.14
1.124	10.12	12.42	46	56	-35.88	-43.58	Phase 2	10.15
1.124	10.42	12.72	46	56	-35.58	-43.28	Phase 1	10.15
1.250	13.5	14.45	46	56	-32.5	-41.55	Phase 1	10.14
1.250	13.57	14.39	46	56	-32.43	-41.61	Phase 2	10.14
1.374	12.4	13.36	46	56	-33.6	-42.64	Phase 1	10.16
1.374	12.1	13.14	46	56	-33.9	-42.86	Phase 2	10.16
1.500	9.58	11.37	46	56	-36.42	-44.63	Phase 2	10.16
1.844	18.54	18.75	46	56	-27.46	-37.25	Phase 2	10.19
1.844	18.45	18.7	46	56	-27.55	-37.3	Phase 1	10.19
20.625	11.06	12.58	50	60	-38.94	-47.42	Phase 2	10.87
20.625	11.72	13.28	50	60	-38.28	-46.72	Phase 1	10.87
21.125	11.3	12.97	50	60	-38.7	-47.03	Phase 2	10.89
21.125	10.86	12.4	50	60	-39.14	-47.6	Phase 1	10.89
21.374	10.97	12.61	50	60	-39.03	-47.39	Phase 1	10.89
22.135	15.45	16.37	50	60	-34.55	-43.63	Phase 2	10.92
25.825	13.08	14.48	50	60	-36.92	-45.52	Phase 1	11.05
25.825	17.18	17.85	50	60	-32.82	-42.15	Phase 2	11.05
27.670	17.31	18.07	50	60	-32.69	-41.93	Phase 1	11.07
27.670	21.75	21.95	50	60	-28.25	-38.05	Phase 2	11.07
29.513	14.98	16.61	50	60	-35.02	-43.39	Phase 2	11.06

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

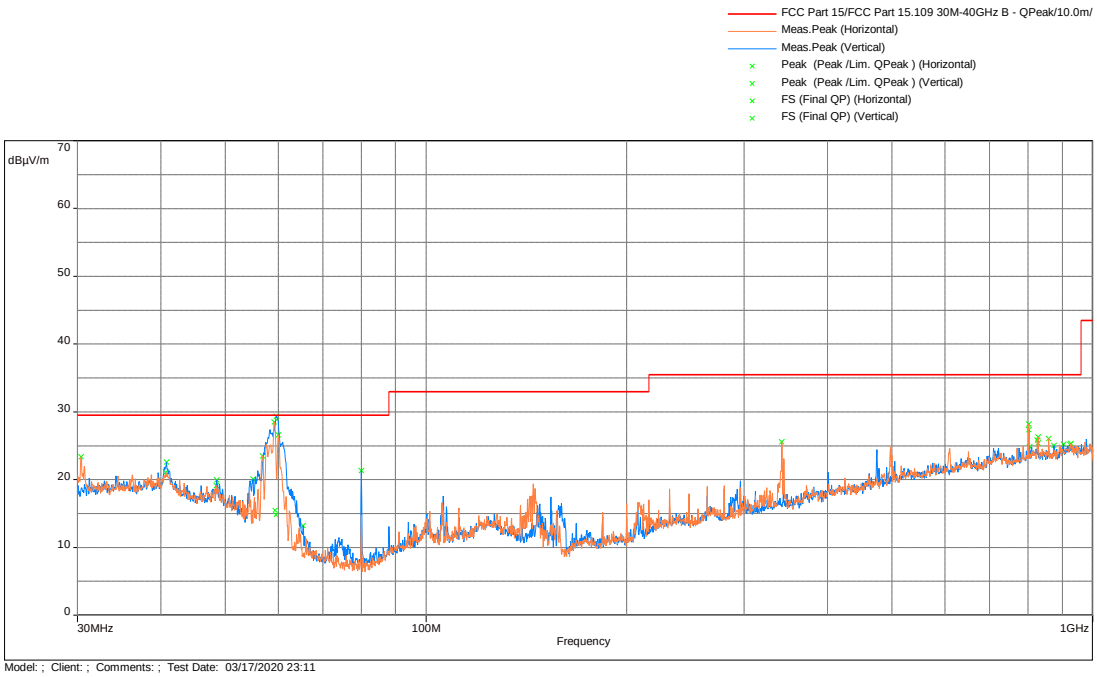
Radiated measurements were taken. 120 kHz resolution bandwidth was used from 30 MHz - 1 GHz. 1 MHz resolution bandwidth was used for measurements done above 1 GHz. All plots are corrected for cable loss, antenna factor, and preamp.

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

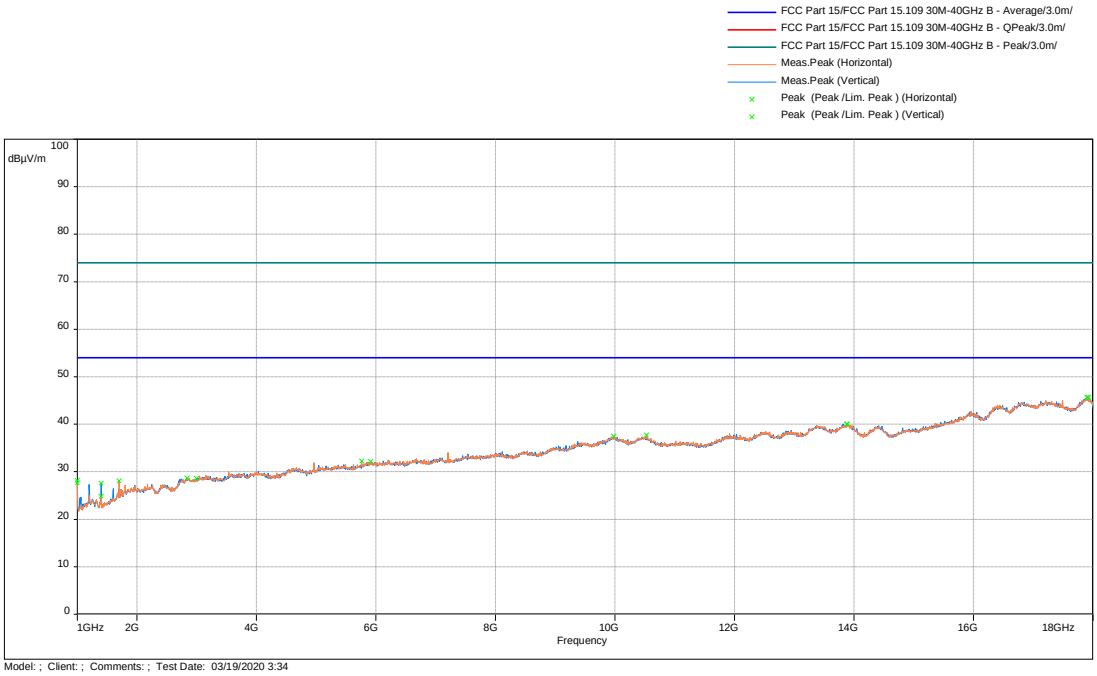
FCC Part 15 Subpart B and ICES-003, Radiated Disturbance, 30 MHz to 1000 MHz



Freq (MHz)	FS dB(uV/m)	Limit dB(uV/m)	Margin (dB)	Height (m)	Azimuth (deg)	Polarity	RA (dBuV)	Correction (dB)
30.388	23.39	29.5	-6.11	3.98	194.75	Horizontal	-6.67	30.388
40.832	22.6	29.5	-6.9	2.48	66.5	Vertical	-6.57	40.832
56.869	23.5	29.5	-6	3.98	131.25	Horizontal	-13.76	56.869
59.374	15.46	29.5	-14.04	3.72	174.75	Horizontal	-15.02	59.374
59.511	14.82	29.5	-14.68	3.15	328.75	Vertical	-15.06	59.511
60.070	26.59	29.5	-2.91	3.98	131.25	Horizontal	-15.23	60.070

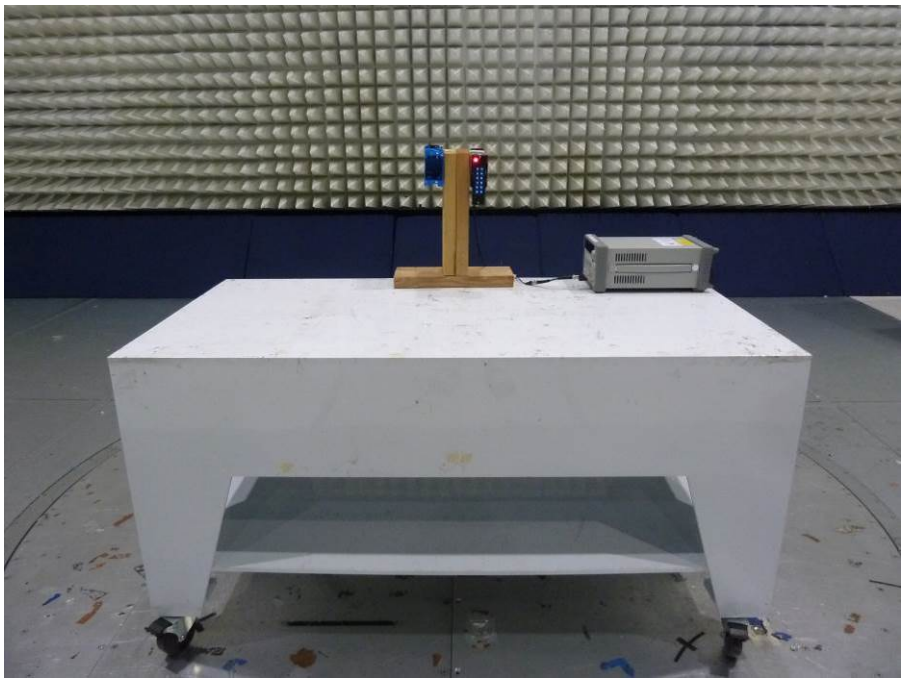
Note: FS = RA + Correction
Correction = AF + CF – Preamp

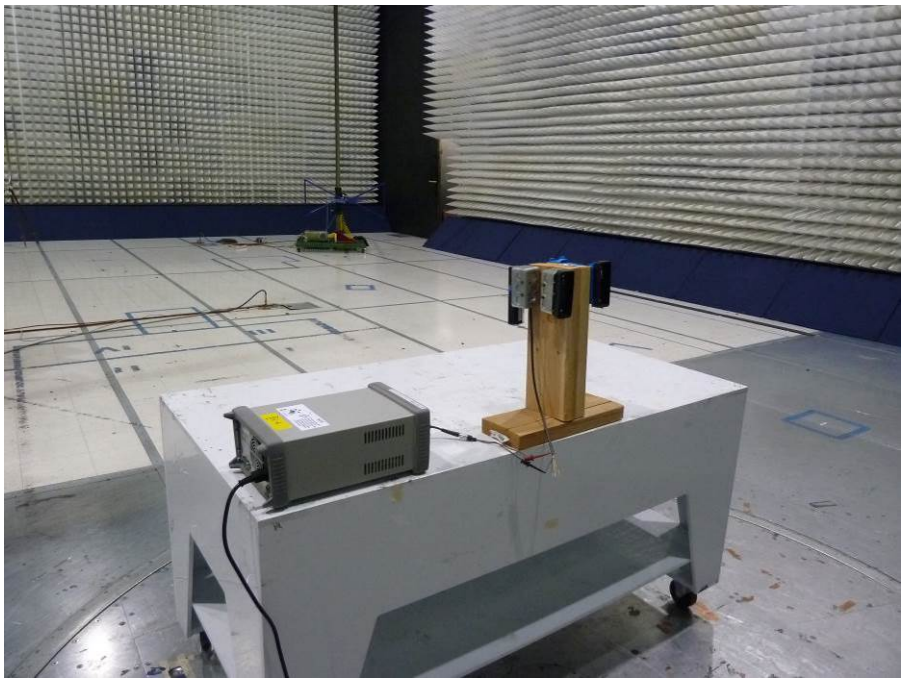
FCC Part 15 Subpart B and ICES-003, Radiated Disturbance, 1 – 18 GHz, Peak vs Avg Limits



Results	**Complies** by 2.91 dB for FCC Part 15 Subpart B and ICES-003

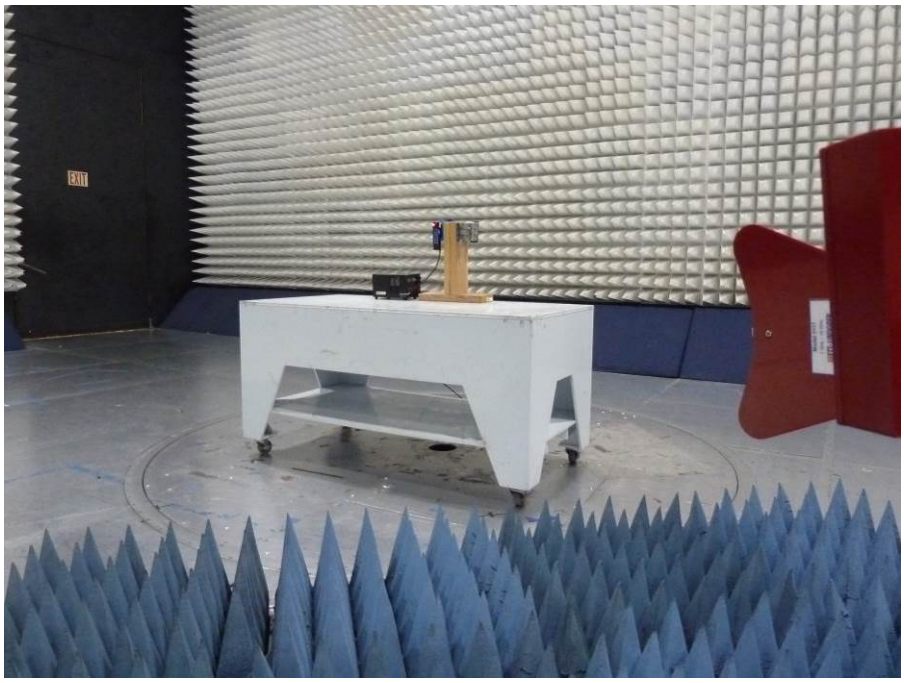
4.4.4 Test Configuration Photographs





Electromagnetic Radiated Disturbance Setup Photograph

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 No.	Calibration	Cal Due
EMI Receiver	Rohde and Schwarz	ESR	ITS 01607	12	10/23/20
EMI Receiver	Rohde and Schwarz	ESU40	ITS 00961	12	11/07/20
Pre-Amplifier	Sonoma Instrument	310N	ITS 01493	12	02/07/21
BI-Log Antenna	Antenna Research	LPB-2513	ITS 00355	12	04/24/20
Passive Loop Antenna	EMCO	6512	ITS 01598	12	10/22/20
Active Horn Antenna	ETS-Lindgren	3117-PA	ITS 01365	12	07/08/20
Loop Sensor	Solar Electronics	7334-1	ITS 01608	12	10/09/20
RF Cable	TRU Corporation	TRU CORE 300	ITS 01462	12	08/27/20
RF Cable	TRU Corporation	TRU CORE 300	ITS 01465	12	08/27/20
RF Cable	TRU Corporation	TRU CORE 300	ITS 01470	12	08/27/20
RF Cable	TRU Corporation	TRU CORE 300	ITS 01342	12	10/07/20
Notch Filter	MICRO-TRONICS	BRM50702	ITS 01166	12	05/14/20
RF Cable	Mega Phase	EMC1-K1K1-236	ITS 01537	12	04/17/21

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
BAT-EMC	Nexio	3.17.0.10	Farpointe_3-17-2020.bpp

6.0 Document History

Revision/ Job Number	Writer Initials	Reviewer Initials	Date	Change
1.0 / G104274802	AC	KV	May 18, 2020	Original document