TEST REPORT

Report Number: 103506678MPK-003
Project Number: G103506678
September 18, 2018

Testing performed on the
CONEKT
Model: CSR-35P & CSR-35L
FCC ID: T8I-CONEKT
IC: 6504A-CONEKT
to

FCC Part 15 Subpart C (15.225)
Industry Canada RSS-210 Issue 9

For

Farpointe Data, Inc.

Test Performed by:	Test Authorized by:
Intertek	Farpointe Data, Inc.
1365 Adams Court	232 Santa Ana Ct.
Menlo Park, CA 94025 USA	Sunnyvale, CA 94085 USA

Prepared by: _____ **Date:** September 18, 2018
Anderson Soungpanya

Reviewed by: _____ **Date:** September 18, 2018
Krishna Vemuri

Report No. 103506678MPK-003

Equipment Under Test:	CONEKT
Trade Name:	Farpointe Data, Inc.
Model Number:	CSR-35P & CSR-35L
Serial Number:	0818035
FCC ID:	T8I-CONEKT
IC:	6504A-CONEKT
Applicant:	Farpointe Data, Inc.
Contact:	Kirk Bierach
Address:	232 Santa Ana Ct. Sunnyvale, CA 94085
Country	USA
Tel. Number:	(408) 731-8700
Email	Kirkb@farpointedata.com
Applicable Regulation:	FCC Part 15 Subpart C (15.225) Industry Canada RSS-210 Issue 9
Test Site Location:	ITS – Site 1 1365 Adams Drive Menlo Park, CA 94025
Date of Test:	May 21 – September 11, 2018

We attest to the accuracy of this report:

Anderson Soungpanya	Krishna K Vemuri
EMC Project Engineer	Engineering Team Lead

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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] EUT utilizes an internal Antenna.

2.0 General Description

2.1 Product Description

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

The product covered by this report is a combination Smart Card Reader and BLE Mobile Access Credential Reader (hereafter referred to a “Reader”) device. The Reader is epoxy sealed, suitable for outdoor use and provided with an approved UL Style 2576, 9-conductor, 26-AWG, shielded cable for connection to a Door Access Control Unit.

The Reader is a key component of a physical security access control system, a Reader is based on dual use operating at 13.56Mhz to read RFID technology, and 2.45GHz to read a BLE enabled smartphone. In operation the Reader is capable of reading data stored on smartcard credentials via radio frequency without physical contact, also read data stored on the BLE enabled smartphone with a specialized application program and then passing the data obtained to the physical access control system. Access control systems typically manage and record the movement of individuals through a protected area, such as a locked door.

The model variants for short range or long range BLE credential reading are designated by a P or L in the model name. The read range determination is based upon the Receive Signal Strength Indicator (RSSI) for the device.

Controller Devices:
The reader contains a Host microcontroller, a STM32L100RBT6A that performs control functions to enable or disable the radio controller, performs Host I/O interfacing, and provides for overall reader control.

The radio controller, SM-6350, from Legic, performs the radio baseband functions. Either radio may be turned on or off under processor control. RF signals are generated within the chip, and passed through filter and matching circuits to the etched antennas on the PCB.

Antennas:
The reader has two antennas which are etched onto the PCB. The first is for RFID applications at 13.56MHz, and is composed of a inductive coupling loop antenna. The second is an elliptically polarized dipole antenna for 2.45GHz communications.

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

Overview of the EUT

Applicant name & address	Farpointe Data, Inc. 232 Santa Ana Ct. Sunnyvale, CA 94085 USA
Manufacturer & address	Farpointe Data, Inc. 232 Santa Ana Ct. Sunnyvale, CA 94085 USA
Contact info / Email	Kirk Bierach / Kirkb@farpointedata.com
Model	CSR-35P & CSR-35L
FCC Identifier	T8I-CONEKT
IC Identifier	6504A-CONEKT
Operating Frequency	13.56MHz
Number of Channels	1
Type of Modulation	ASK
Operating Temperature	-20°C to +50°C
Antenna Type	Internal PCB Antenna

EUT receive date: May 21, 2018
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: May 21, 2018
Test completion date: September 11, 2018

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 & RSS-GEN Issue 4.

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).

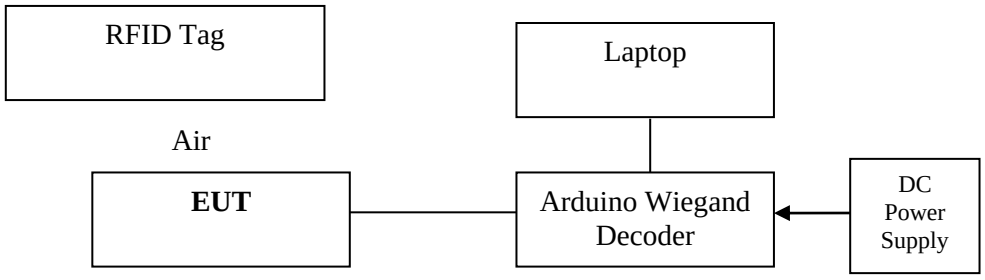
3.0 System Test Configuration

3.1 Support Equipment and description

Support Equipment			
Type	Model #	Quantity	S/N
DC Power Supply	Extech	1	D30030012
RFID Tag	Not Listed	1	N/A
Laptop	Dell Laptop	1	N/A
Arduino Wiegand Decoder	Not Listed	1	MPK1707241613-007

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

The EUT was configured to continuously transmit and looking for tags. This report covers the RFID radio only.

For radiated emission measurements the EUT is placed on a non-conductive table.

CSR-35L and CSR-35P models are electrically identical. Testing was completed on the CSR-35L.

The difference: P is for Presentation mode. L is for long range.

L version is more active to look for BLE credentials.

P version waits for a wakeup signal from the 13.56MHz NFC circuit before sending a BLE poll to communicate with phone.

All RF signals are of same type and power level.

Only difference is logic of message sequencing.

Unit can be ordered pre-configured in either setting.

3.4 Software Exercise Program

The special test mode can be control via external Host Commands using Arduino 1.6.8.

3.5 Mode of Operation during test

EUT was continuously transmitting and reading tags during the tests.

3.6 Modifications required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product 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, 15.209

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

Date of Test:	May 21, 2018

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

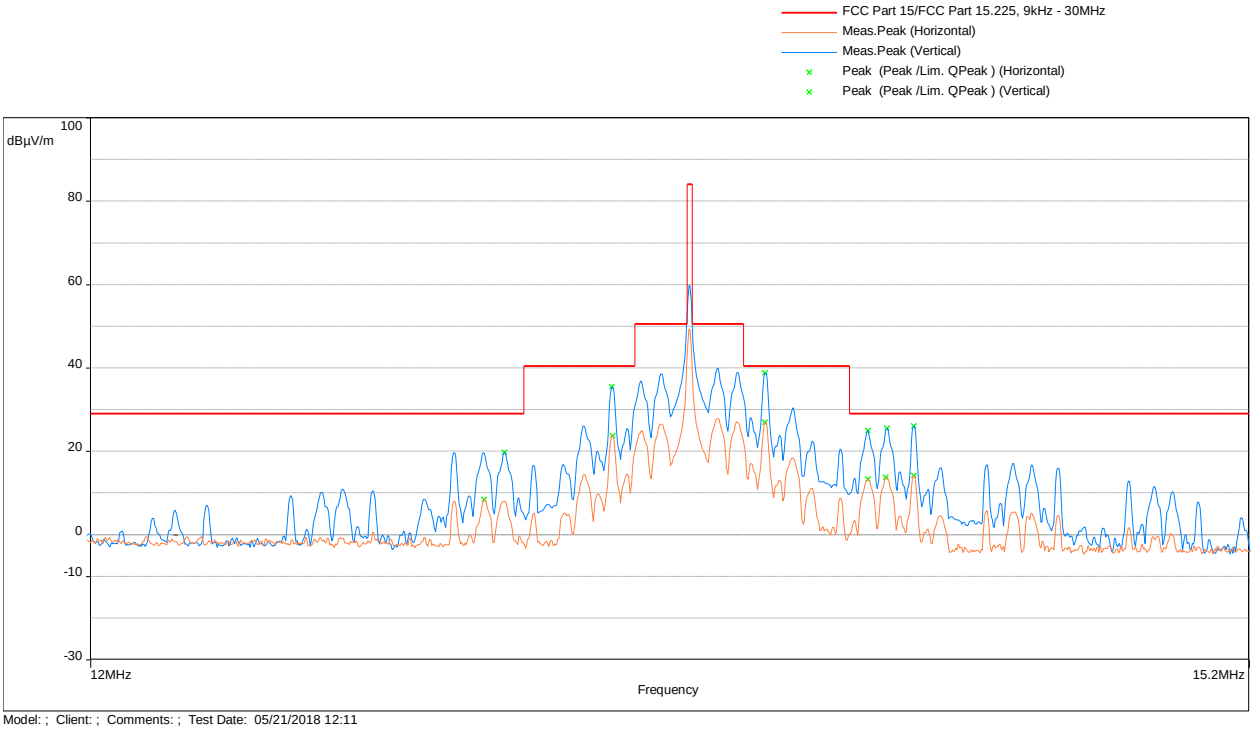
Where FS = Field Strength in dB (μV/m)

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)

The data below shows the significant emission frequencies, the limit and the margin of compliance. Note: Measurements were performed at parallel and perpendicular orientation of loop antenna, and vertical and horizontal orientations of EUT. The worst case data was presented below.

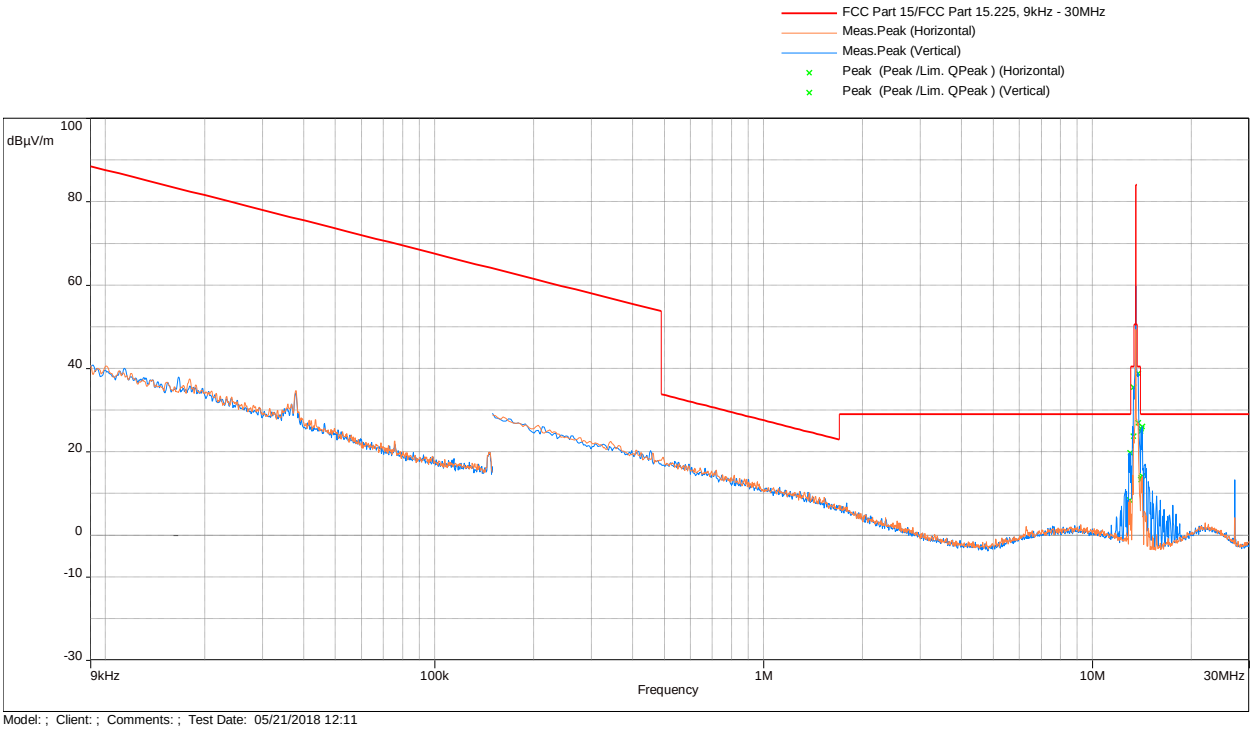


Model: ; Client: ; Comments: ; Test Date: 05/21/2018 12:11

Frequency	Peak FS	Limit@30m	Margin	RA@10m	Correction
(MHz)	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB
13.560	60.01	84	-23.99	75.93	-15.92
13.553	50.18	50.5	-0.32	66.10	-15.92
13.567	50.24	50.5	-0.26	66.16	-15.92

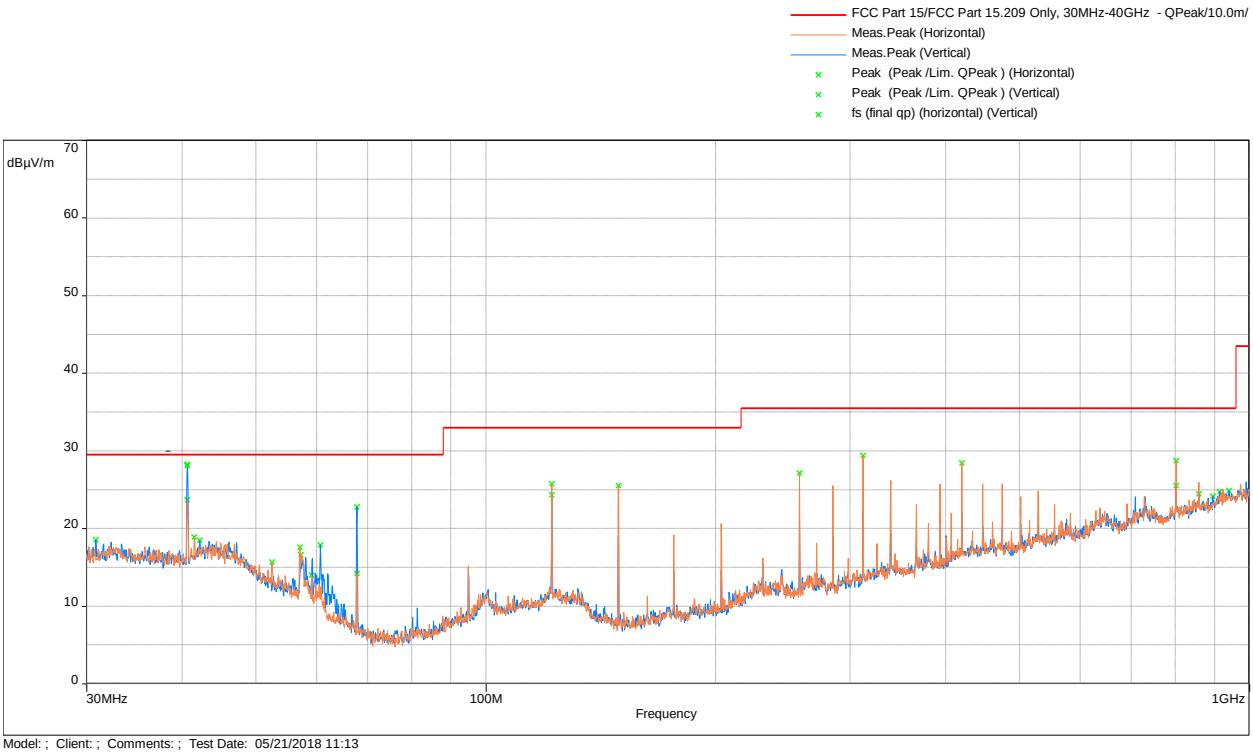
4.1.4 Test Result 15.225 (d)

Radiated Spurious Emissions from 9 kHz to 30MHz



Model: ; Client: ; Comments: ; Test Date: 05/21/2018 12:11

Radiated Spurious Emissions from 30 MHz to 1000 MHz

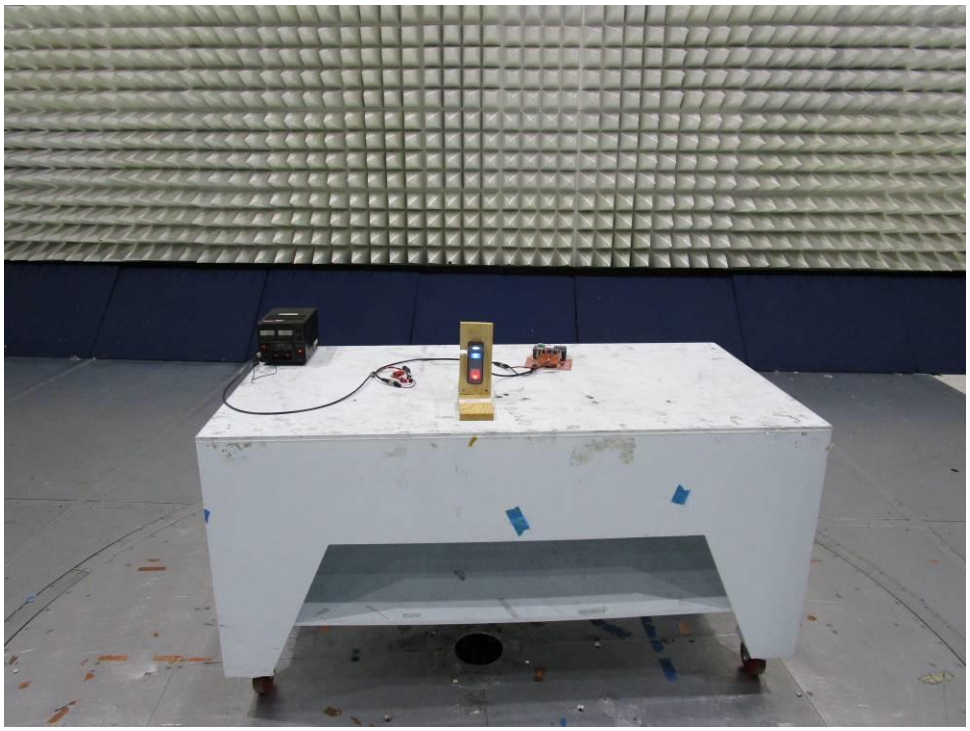


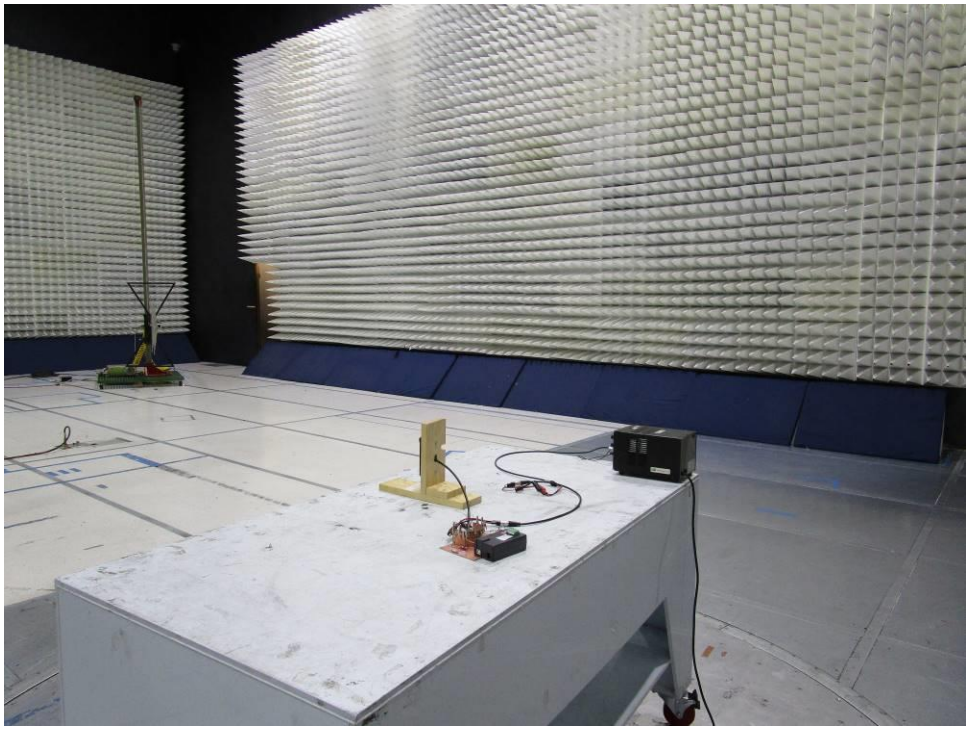
Frequency (MHz)	QPeak (dBµV/m)	Lim. QPeak (dBµV/m)	Margin (dB)	Height (m)	Angle (°)	Comment	Correction (dB)
40.67	28.23	29.5	-1.27	2.00	232	Vertical	-9.35
67.797	22.75	29.5	-6.75	2.11	14	Vertical	-19.38
149.148	25.49	33.0	-7.51	1.78	82	Horizontal	-18.22
257.626	27.10	35.5	-8.4	1.81	98	Horizontal	-13.86
311.882	29.36	35.5	-6.14	1.64	102	Horizontal	-12.16
420.360	28.46	35.5	-7.04	1.23	106	Horizontal	-8.93

Result **Complies** by 1.27 dB

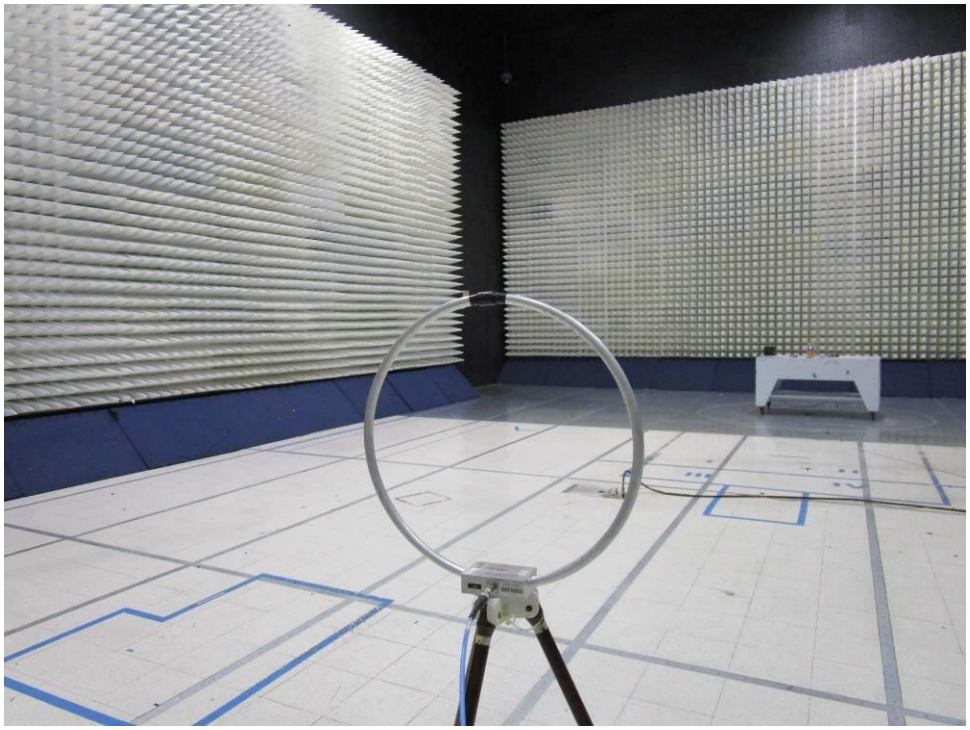
4.1.5 Test Configuration Photographs

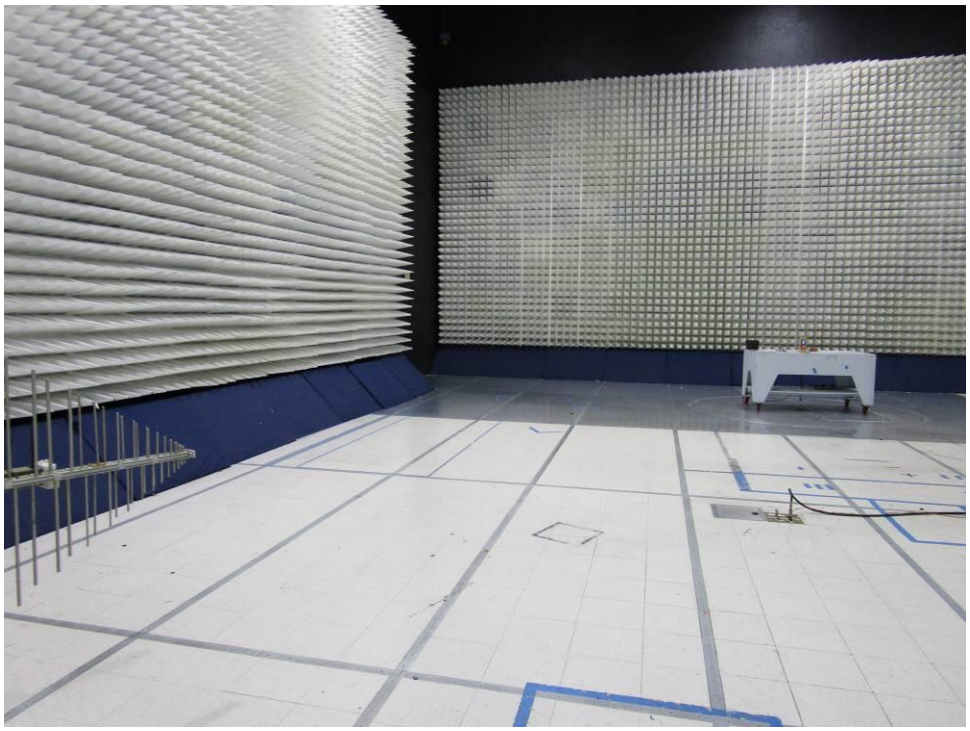
The following photographs show the testing configurations used.





4.1.5 Test Configuration Photographs (Continued)





4.2 AC Line Conducted Emission
FCC Rule 15.207

4.2.1 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.*

4.2.2 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 outside the transmitter fundamental emissions band. After, the EUT antenna is removed from the EUT and only the fundamental emission band was measured to show that the fundamental emission band is in compliance with the 15.207 limits.

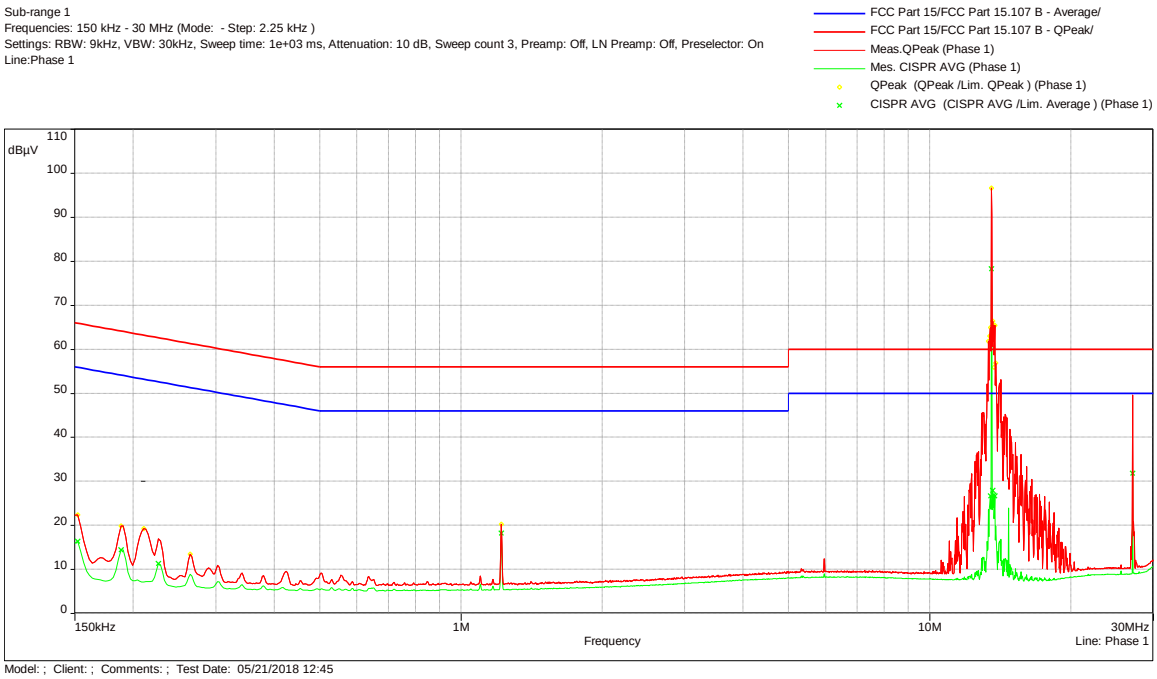
Equipment setup for conducted disturbance tests followed.

Date of Test:	May 21, 2018

4.2.3 Test Result

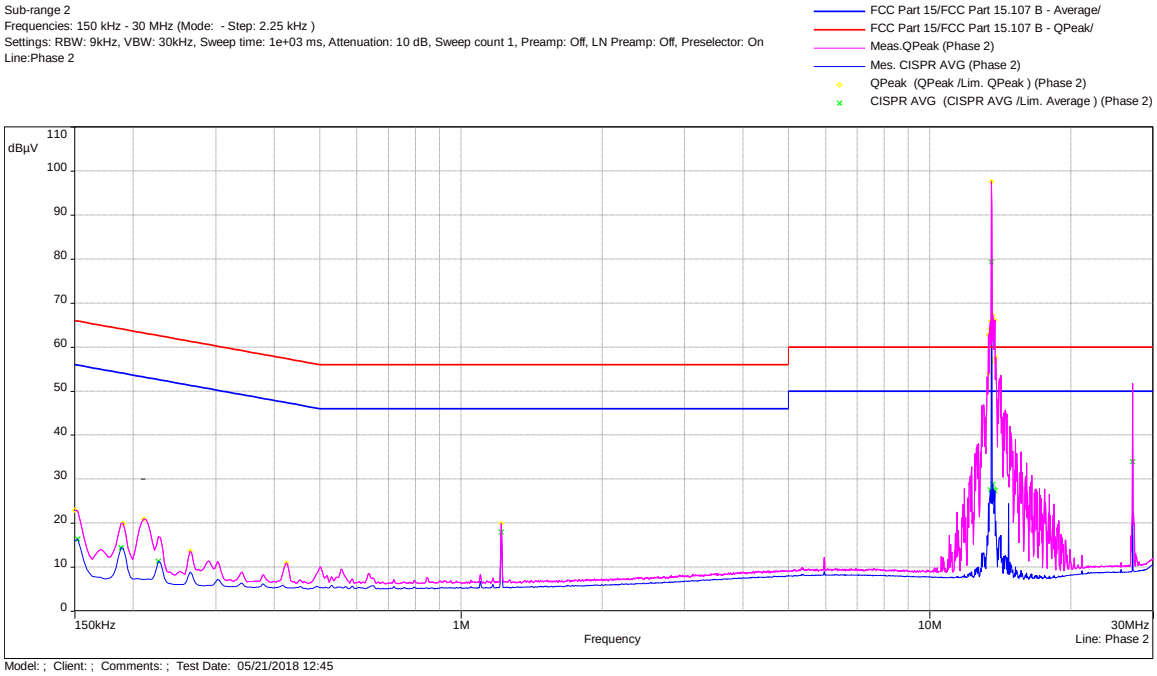
AC Line Conducted Emission

Phase 1



Model: ; Client: ; Comments: ; Test Date: 05/21/2018 12:45

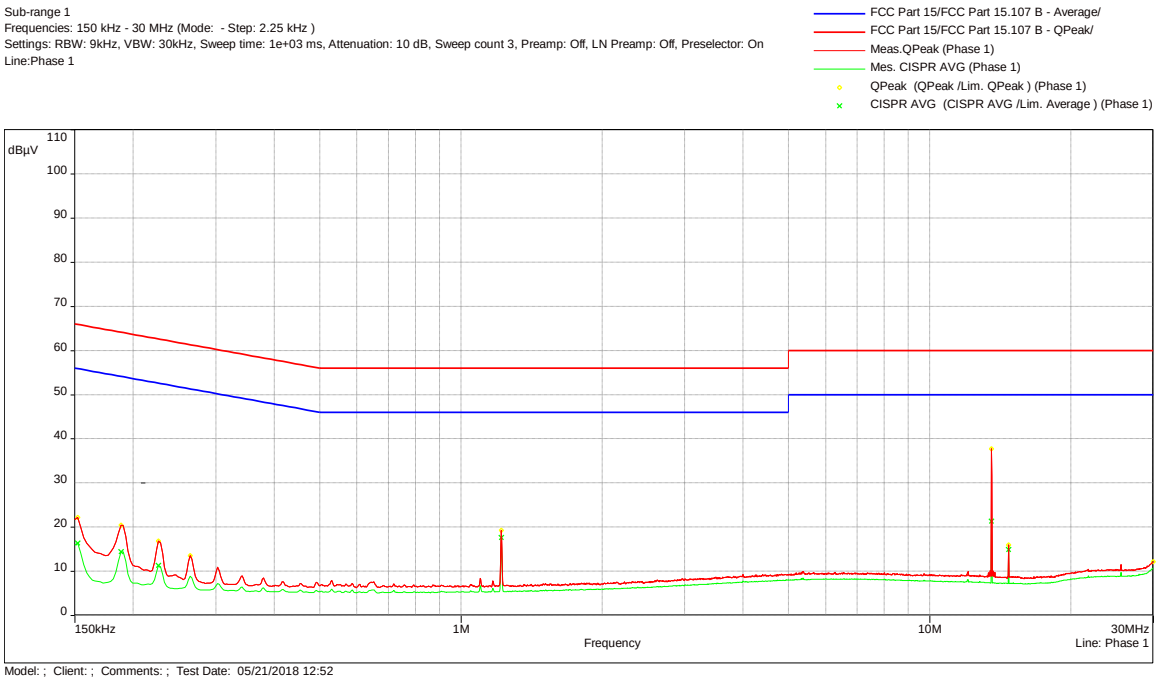
Phase 2



Model: ; Client: ; Comments: ; Test Date: 05/21/2018 12:45

Tested with RFID Antenna removed and terminated

Phase 1



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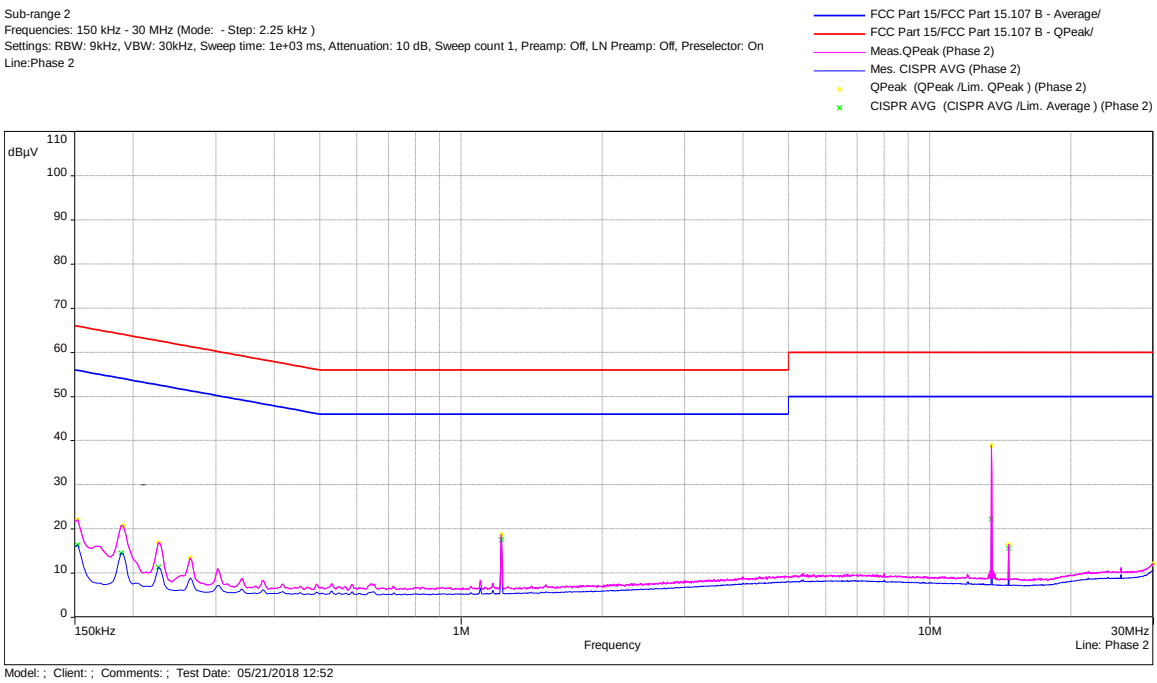
Phase 2



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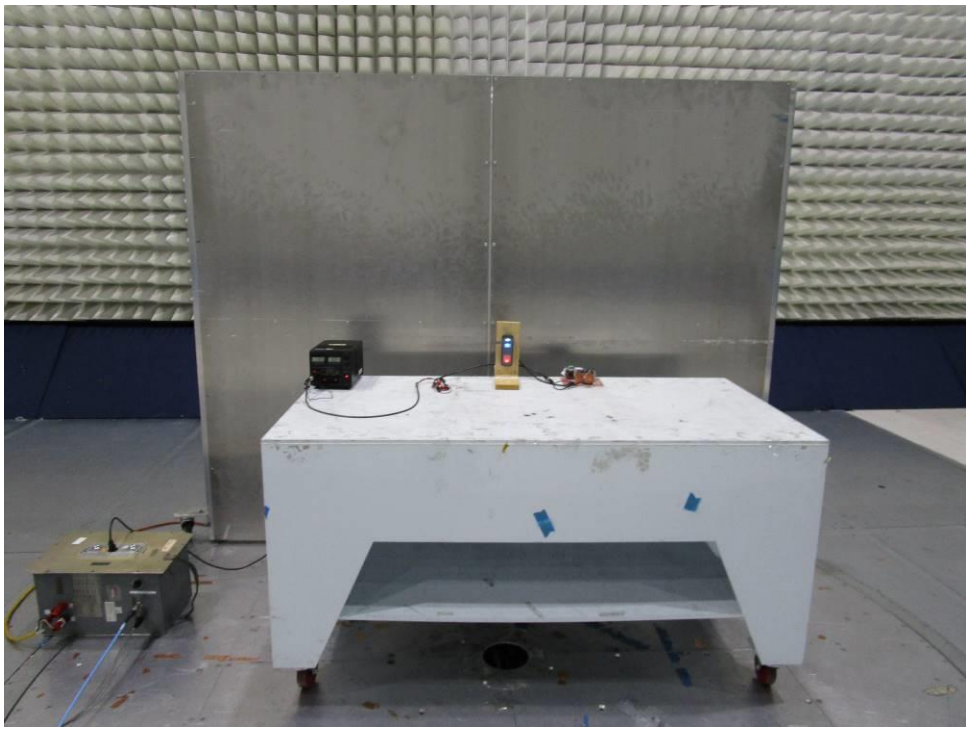
Quasi Peak Table					
Frequency (MHz)	QPeak (dBµV)	Lim. QPeak (dBµV)	QPeak-Lim (dB)	Phase	Correction (dB)
0.152	21.92	65.88	-43.95	Phase 1	11.51
0.152	21.73	65.88	-44.15	Phase 2	11.51
0.188	19.97	64.11	-44.14	Phase 1	11.53
0.191	19.81	64.11	-44.31	Phase 2	11.53
0.227	16.90	62.58	-45.68	Phase 1	11.55
0.227	16.79	62.58	-45.79	Phase 2	11.55
0.265	13.54	61.28	-47.74	Phase 1	11.56
0.265	13.46	61.28	-47.82	Phase 2	11.56
1.221	20.37	56.00	-35.63	Phase 1	11.62
1.221	20.52	56.00	-35.48	Phase 2	11.62
13.560	26.23	60.00	-33.77	Phase 2	11.95
13.560	25.61	60.00	-34.39	Phase 1	11.95
14.746	11.94	60.00	-48.06	Phase 2	12.05
14.746	16.44	60.00	-43.56	Phase 2	11.95
29.974	12.13	60.00	-47.87	Phase 1	12.05
29.983	12.06	60.00	-47.94	Phase 2	12.05

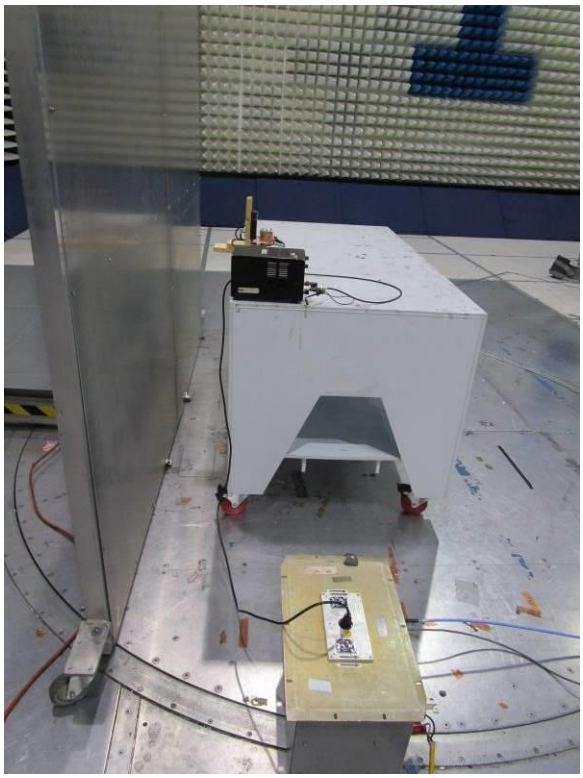
Average Table					
Frequency (MHz)	AVG (dBµV)	Lim. Average (dBµV)	AVG-Lim (dB)	Phase	Correction (dB)
0.152	16.32	55.88	-39.55	Phase 1	11.51
0.152	16.29	55.88	-39.59	Phase 2	11.51
0.188	14.42	54.11	-39.69	Phase 2	11.53
0.188	14.42	54.11	-39.70	Phase 1	11.53
0.227	11.24	52.58	-41.34	Phase 2	11.55
0.227	11.27	52.58	-41.31	Phase 1	11.55
1.221	19.29	46.00	-26.71	Phase 2	11.62
1.221	19.06	46.00	-26.94	Phase 1	11.62
13.560	26.28	50.00	-23.72	Phase 2	11.95
13.560	25.63	50.00	-24.37	Phase 1	11.95
14.746	15.60	50.00	-34.40	Phase 2	11.95
14.746	14.88	50.00	-35.12	Phase 1	11.95

Result	**Complies** by 23.72 dB

4.2.4 Test Configuration Photographs

The following photographs show the testing configurations used.





4.3 Frequency Tolerance

4.3.1 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.

4.3.2 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).

Date of Test:	September 11, 2018

4.3.3 Test Results 15.225 (e)

Nominal Frequency: 13560000 Hz

Voltage (DC)	Temperature (ºC)	Measured Frequency (Hz)	Deviation from Reference (Hz)	Deviation (%)
12	-20	13559983	17	0.000128
12	-10	13559936	64	0.000469
12	0	13559883	117	0.000862
12	10	13559844	156	0.001152
12	20	13559789	211	0.001553
12	30	13559843	157	0.001158
12	40	13559864	136	0.001000
12	50	13559878	122	0.000899
10.2	20	13559851	149	0.001101
13.8	20	13559878	122	0.000899

4.4 Occupied Bandwidth
FCC 15.215

4.4.1 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.

4.4.2 Procedure

The EUT was setup to transmit in normal operating condition.

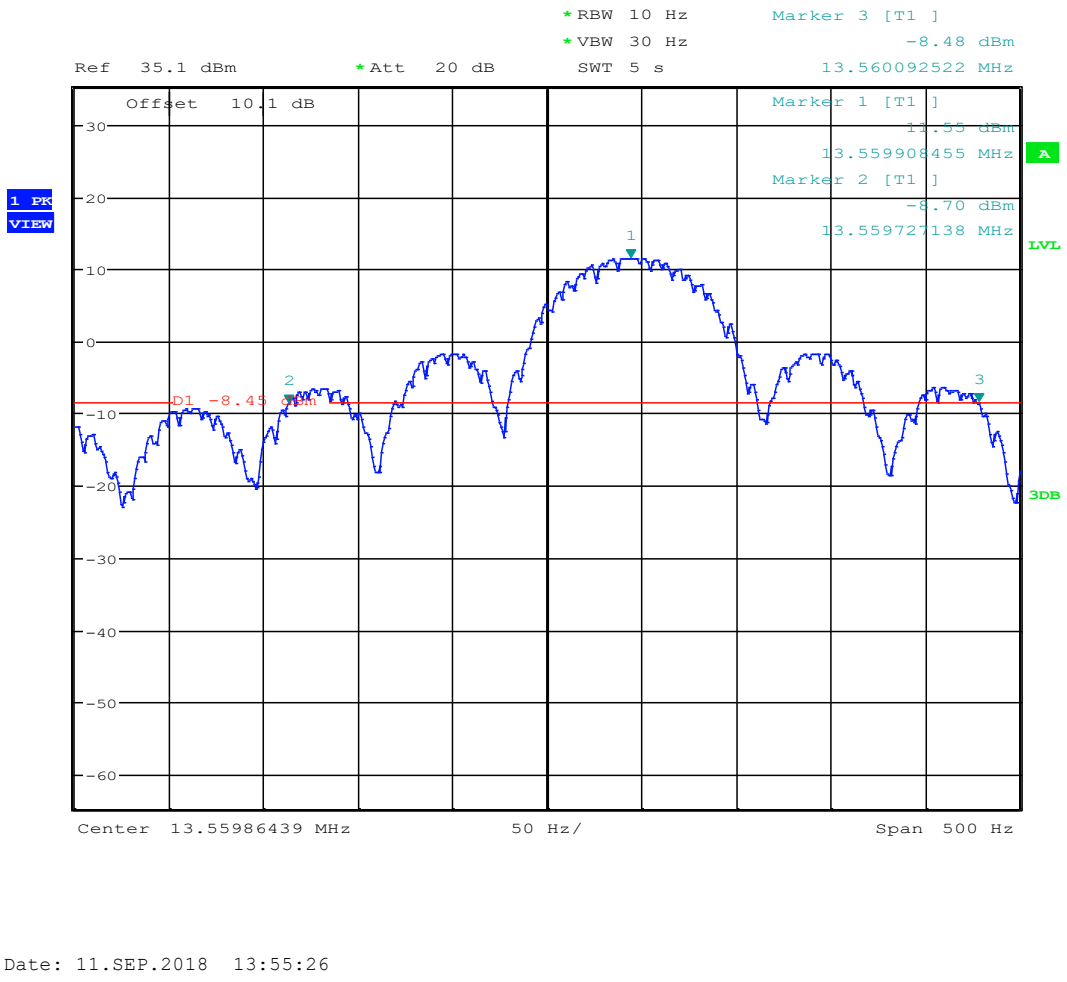
Measurements were made with the loop antenna in close proximity of the EUT. Following the procedures of ANSI 63.10, the 20dB bandwidth measurements were taken. The following plots show Occupied Bandwidth.

Date of Test:	September 11, 2018

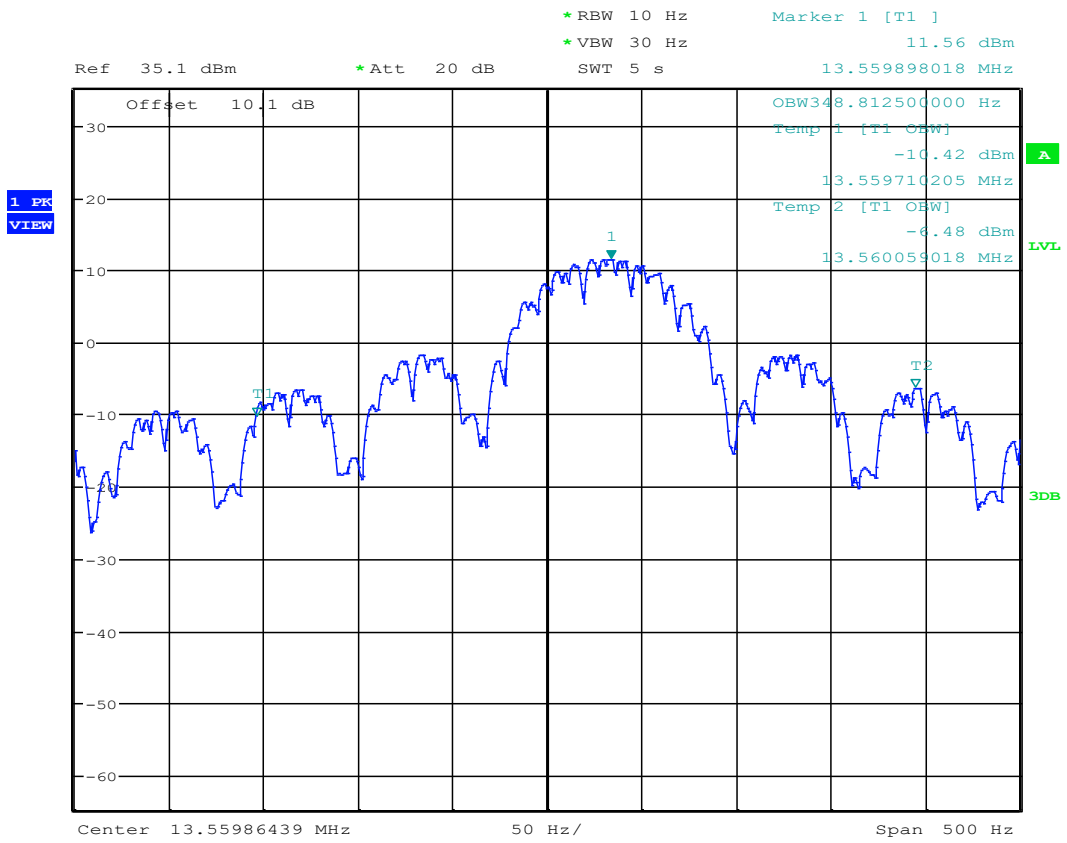
4.4.3 Test Results

Frequency (MHz)	20-dB Channel Bandwidth (Hz)	99% Channel Bandwidth (Hz)
13.56	365.38	348.81

Plot 4.1 -20dB Bandwidth



Plot 4.2 99% Bandwidth



Date: 11.SEP.2018 13:47:41

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 Interval	Cal Due
Passive Loop Antenna	EMCO	6512	ITS 01598	12	10/10/18
Passive Loop Antenna	Solar Electronics	7334-1	ITS 001608	12	09/26/18
Pre-Amplifier	Sonoma Instrument	310	ITS 01493	12	10/20/18
EMI Receiver	Rohde and Schwarz	ESR7	ITS 01607	12	10/09/18
BI-Log Antenna	Antenna Research	LPB-2513	ITS 00355	12	02/21/19
LISN	FCC	FCC-LISN-PA-NEMA-5-15	ITS 00552	12	11/14/18
RE Cable	TRU Corporation	TRU CORE 300	ITS 1462	12	08/19/18
RE Cable	TRU Corporation	TRU CORE 300	ITS 1465	12	08/19/18
RE Cable	TRU Corporation	TRU CORE 300	ITS 1470	12	08/19/18
Transient Limiter	COM-POWER	LIT-153A	ITS 1452	12	06/19/18
Humidity Temperature Test Chamber	ESPEC	BTX-475	ITS 1436	12	09/14/18

* Calibration performed by ITS prior to the test. # Calibration not required

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
BAT-EMC	Nexio	3.16.0.64	Farpointe_G103506678

6.0 Document History

Revision/ Job Number	Writer Initials	Reviewers Initials	Date	Change
1.0 / G103506678	AS	KV	May 30, 2018	Original document
2.0 / G103506678	AS	KV	September 18, 2018	Added sections 4.3 and 4.4.

END OF REPORT