FCC 47 CFR PART 15 SUBPART C
ISED CANADA RSS-210 ISSUE 9

CERTIFICATION TEST REPORT

FOR

RFID MODULE

MODEL NUMBER: R8XXEA

REPORT NUMBER: R11870434-E2

FCC ID: M9MR8XXEA
IC: 6571A-R8XXEA

ISSUE DATE: 2017-12-07

Prepared for
RF IDEAS, INC.
4020 WINNETKA AVENUE
ROLLING MEADOWS, IL, 60008-1374, USA

Prepared by
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NVLAP TESTING

NVLAP LAB CODE 200246-0

Revision History

Ver.	Issue Date	Revisions	Revised By
1	2017-12-07	Initial Issue	Brian T. Kiewra
2	2017-12-15	Revised cable list in Section 5.8. Revised titles for radiated setups in Section 10.	Brian T. Kiewra

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: RF Ideas, Inc.
4020 Winnetka Avenue
Rolling Meadows, IL, 60008-1374, USA

EUT DESCRIPTION: RFID MODULE

MODEL: R8XXEA

SERIAL NUMBER: OEM-805X2AXU-HPM270: USB84200003
OEM-805X2AXU-HPN 840: GGSPD019242004

DATE TESTED: 2017-10-20 to 2017-11-03

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Pass
ISED RSS-210 Issue 9	Pass
ISED RSS-GEN Issue 4	Pass

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Approved & Released
For UL LLC By:

Jeffrey Moser
Operations Leader
UL – Consumer Technology Division

Prepared By:

Brian T. Kiewra
Project Engineer
UL – Consumer Technology Division

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-210 Issue 9.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Perimeter Park Dr., Suite B, Morrisville, NC 27560, USA.

12 Laboratory Dr., RTP, NC 27709
☐ Chamber A
☐ Chamber C

2800 Suite B Perimeter Park Dr., Morrisville, NC 27560
☒ Chamber NORTH
☒ Chamber SOUTH

The onsite chambers are covered under Industry Canada company address code 2180C with site numbers 2180C -1 through 2180C-4, respectively.

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at http://www.nist.gov/nvlap/.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY	Required by standard
Occupied Channel Bandwidth	2.00%	±5 %
RF output power, conducted	1.3 dB	±1,5 dB
Power Spectral Density, conducted	2.47 dB	±3 dB
Unwanted Emissions, conducted	2.94 dB	±3 dB
All emissions, radiated	5.36 dB	±6 dB
Temperature	2.26 °C	±3 °C
Supply voltages	2.40%	±3 %
Time	3.39%	±5 %

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a RFID Module intended for laptop integration.

5.2. MANUFACTURER'S DESCRIPTION OF MODEL DIFFERENCES

Model number R9XXEA covers manufacturer part numbers OEM-805X2AXU-HPM270 (clamshell antenna) and OEM-805X2AXU-HPN840 (open face antenna). The only difference between the two part numbers is the antenna. Both were tested in this report.

5.3. MAXIMUM OUTPUT POWER

The testing was performed at 3 meter. The HPM270 PK transmitter maximum E-field reading at 30m is 24.27dBuV/m corrected from the 3m reading of 64.27dBuV/m. The HPN840 PK transmitter maximum E-field reading at 30m is 28.56dBuV/m corrected from the 3m reading of 68.56dBuV/m.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The OEM-80X2AXU-HPM270 utilizes one integral loop coil antenna with an area of 0.0015m^2.
The OEM-805X2AXU-HPN840 utilizes one integral loop coil antenna with an area of 0.002m^2.

5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was IBC170903UPX700.H, rev. FCC.
The test utility software used during testing was 20171012, DLL rev. 7.2.28.

5.1. WORST-CASE CONFIGURATION AND MODE

The EUT part numbers were investigated in three orthogonal orientations, X,Y, and Z-axes. It was determined that Y axis was worst-case orientation for both units.

5.2. MODIFICATIONS

No modifications were made during testing.

5.3. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	HP	Elite X2	5CG545482O	NA
Power Supply	KTC	HU10674-13017	WDUVA0CPP9H1G1	NA

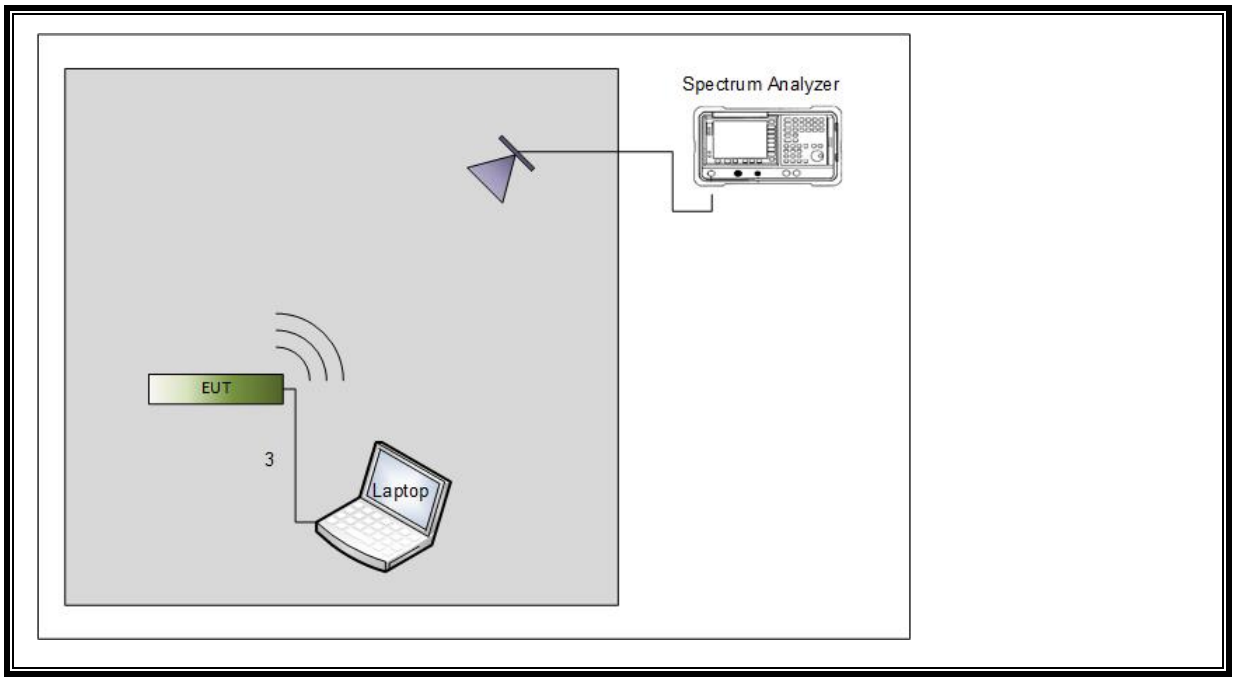
I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
3	Ribbon	1	USB	Ribbon	<3m	Connects to laptop

TEST SETUP

The EUT is connected to a host laptop computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL076	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3476-240	2017-06-12	2018-06-12
139843	Temp/Humid/Pressure Meter	Control Co./Fisher	14-650-118	2016-12-23	2018-12-23
LISN003	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2017-08-22	2018-08-22
PRE0101521 (75141)	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2017-08-23	2018-08-23
TL001	Transient Limiter, 0.009-30MHz	Com-Power	LIT-930A	2017-06-12	2018-06-12
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
MM0167	Multi-meter	Agilent	U1232A	2017-10-21	2018-10-30

Test Equipment Used – Frequency Stability Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
Conducted Room 2					
T177	Spectrum Analyzer	Agilent Technologies	E4446A	2017-03-30	2018-03-30
1100502	Temp/Humid Chamber	Cincinnati Sub-Zero	ZPH-8-3.5-SCT/AC	2017-06-06	2018-06-06
139843	Temp/Humid/Pressure Meter	Control Co./Fisher	14-650-118	2016-12-23	2018-12-23
MM0167	Multi-meter	Agilent	U1232A	2017-10-21	2018-10-30
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - South Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz (Loop Ant.)					
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2016-12-28	2017-12-31
30-1000 MHz					
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2017-06-15	2018-06-15
Gain-Loss Chains					
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2017-09-15	2018-09-15
S-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2017-06-11	2018-06-11
Receiver & Software					
SA0025	Spectrum Analyzer	Agilent	N9030A	2017-04-10	2018-04-10
SA0026 (18-40GHz RSE)	Spectrum Analyzer	Agilent	N9030A	2017-02-17	2018-02-28
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
Additional Equipment used					
s/n 161024887	Environmental Meter	Fisher Scientific	15-077-963	2016-12-23	2018-12-23

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz	**(Loop Ant.)**			
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2016-12-28	2017-12-31
	Gain-Loss Chains				
N-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2017-09-15	2018-09-15
	Receiver & Software				
SA0027	Spectrum Analyzer	Agilent	N9030A	2017-03-16	2018-03-16
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
s/n 161024690	Environmental Meter	Fisher Scientific	15-077-963	2016-12-21	2018-12-21

7. OCCUPIED BANDWIDTH

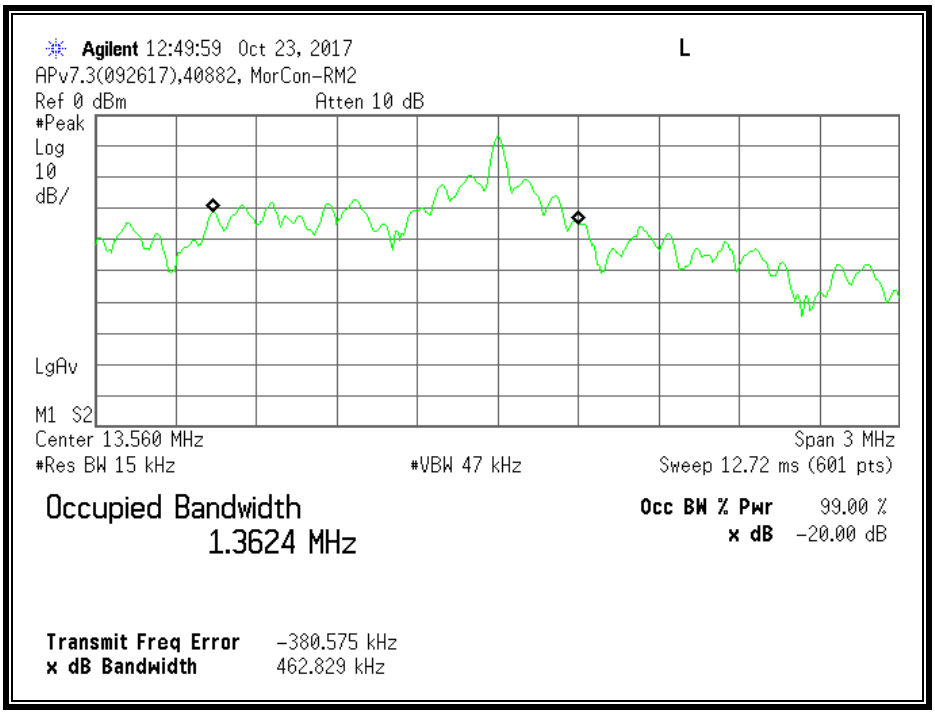
LIMITS

None; for reporting purposes only.

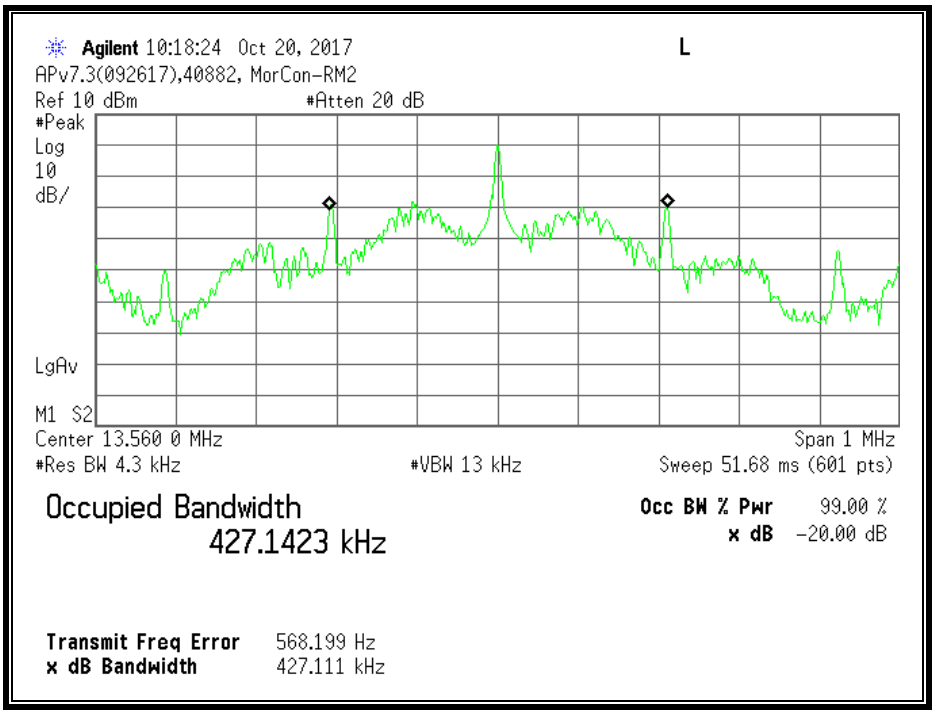
FCC §15.215 (c) and RSS-GEN, ANSI C63.10 Sections 6.9.2 and 6.9.3 were used for the measurement procedure.

RESULTS

	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
HPM270	13.56	0.4628	1.3624



	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
HPN840	13.56	0.4271	0.4271



Test Information
Test Date: 2017-10-23
Project: 11870434
Tested By: Jeffrey Cabrera

8. RADIATED EMISSION

8.1. LIMITS AND PROCEDURE

LIMIT
§15.209
§15.225
IC RSS-210, Annex B.6 (Transmitter)
IC RSS-GEN, Section 7.1.2 (Receiver)

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

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz 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 and shall not exceed the general radiated emission limits in § 15.209 as follows:
§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.
§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

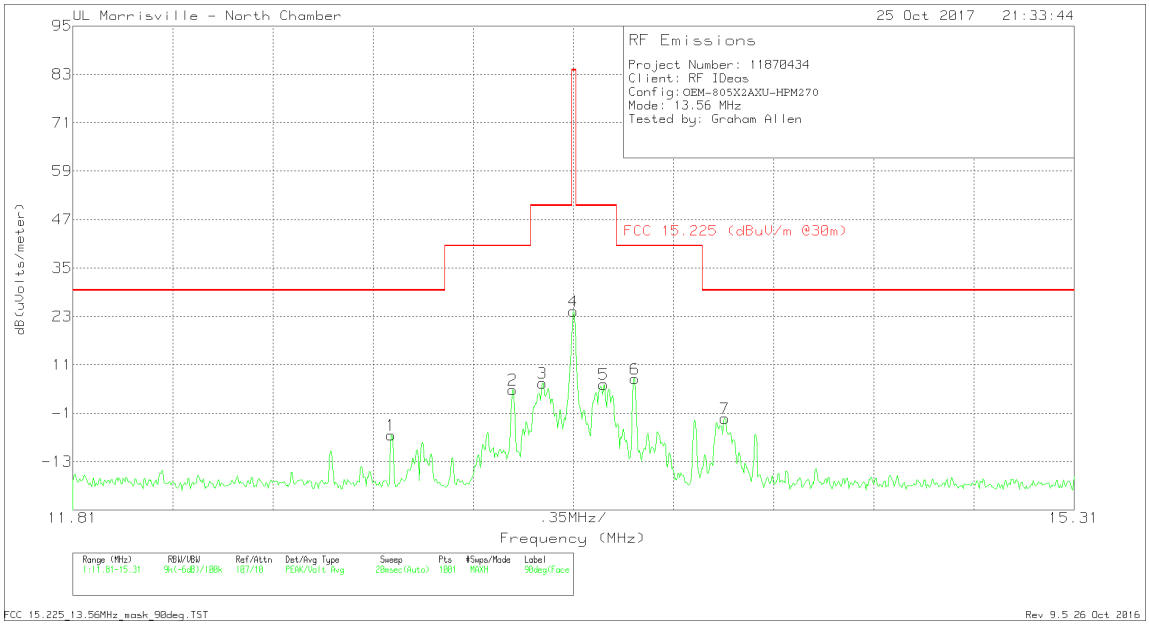
8.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)

Note: All measurements were made at a test distance of 3 m. The limits in the plots and tabular data are the FCC/IC limits extrapolated from the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to the measurement distance to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (specification distance / test distance).

Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against an open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

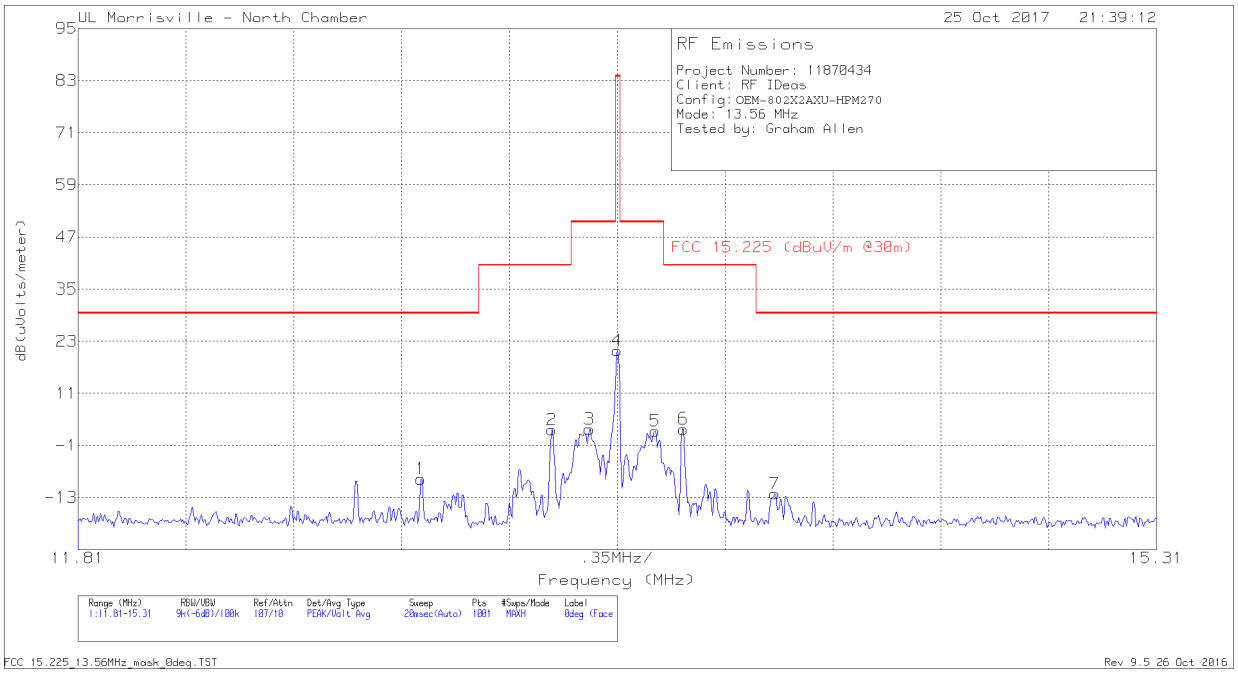
HPM270

Fundamental



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 (dBuV/m @30m)	Margin (dB)	Azimuth (Degs)
1	12.923	22.61	Pk	10.4	.6	-40	-6.39	29.5	-35.89	257
2	13.3465	33.82	Pk	10.4	.6	-40	4.82	40.5	-35.68	257
3	13.4515	35.46	Pk	10.4	.6	-40	6.46	50.5	-44.04	257
4	13.56	53.27	Pk	10.4	.6	-40	24.27	84	-59.73	257
5	13.665	35.17	Pk	10.4	.6	-40	6.17	50.5	-44.33	257
6	13.7735	36.56	Pk	10.4	.6	-40	7.56	40.5	-32.94	257
7	14.0885	26.72	Pk	10.4	.6	-40	-2.28	29.5	-31.78	257

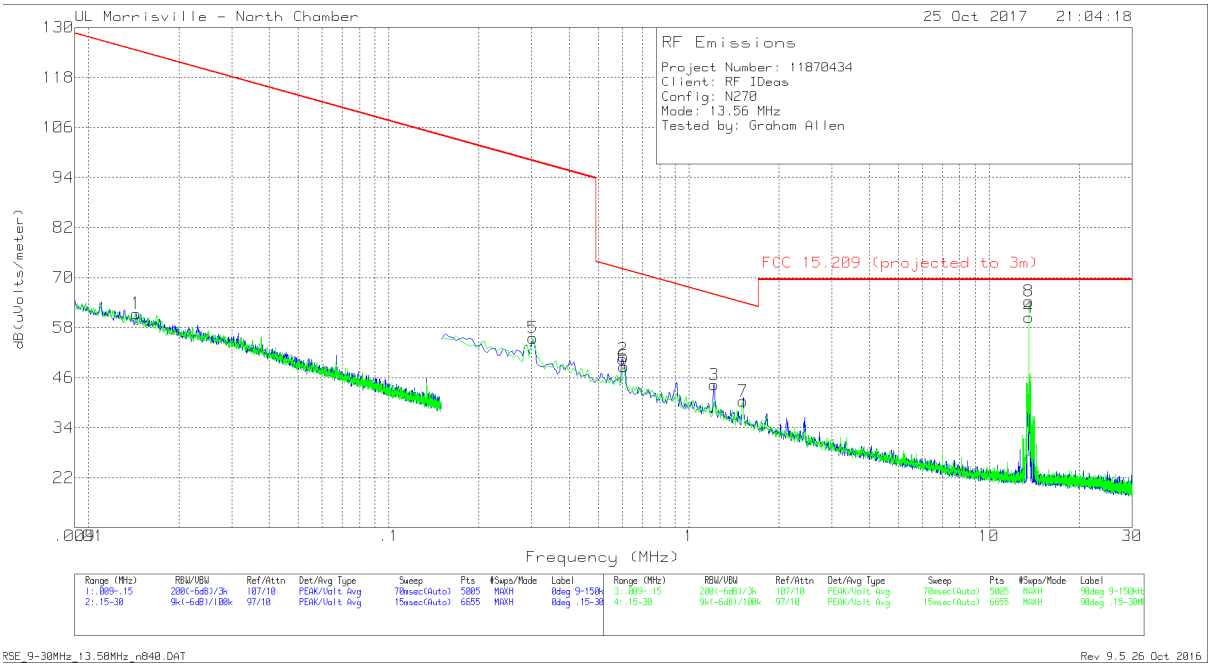
Pk - Peak detector



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 (dBuV/m @30m)	Margin (dB)	Azimuth (Degs)
1	12.923	20.29	Pk	10.4	.6	-40	-8.71	29.5	-38.21	353
2	13.3465	31.58	Pk	10.4	.6	-40	2.58	40.5	-37.92	353
3	13.469	31.75	Pk	10.4	.6	-40	2.75	50.5	-47.75	353
4	13.56	49.86	Pk	10.4	.6	-40	20.86	84	-63.14	353
5	13.6825	31.25	Pk	10.4	.6	-40	2.25	50.5	-48.25	353
6	13.7735	31.79	Pk	10.4	.6	-40	2.79	40.5	-37.71	353
7	14.071	16.82	Pk	10.4	.6	-40	-12.18	29.5	-41.68	353

Pk - Peak detector

Spurious Emissions



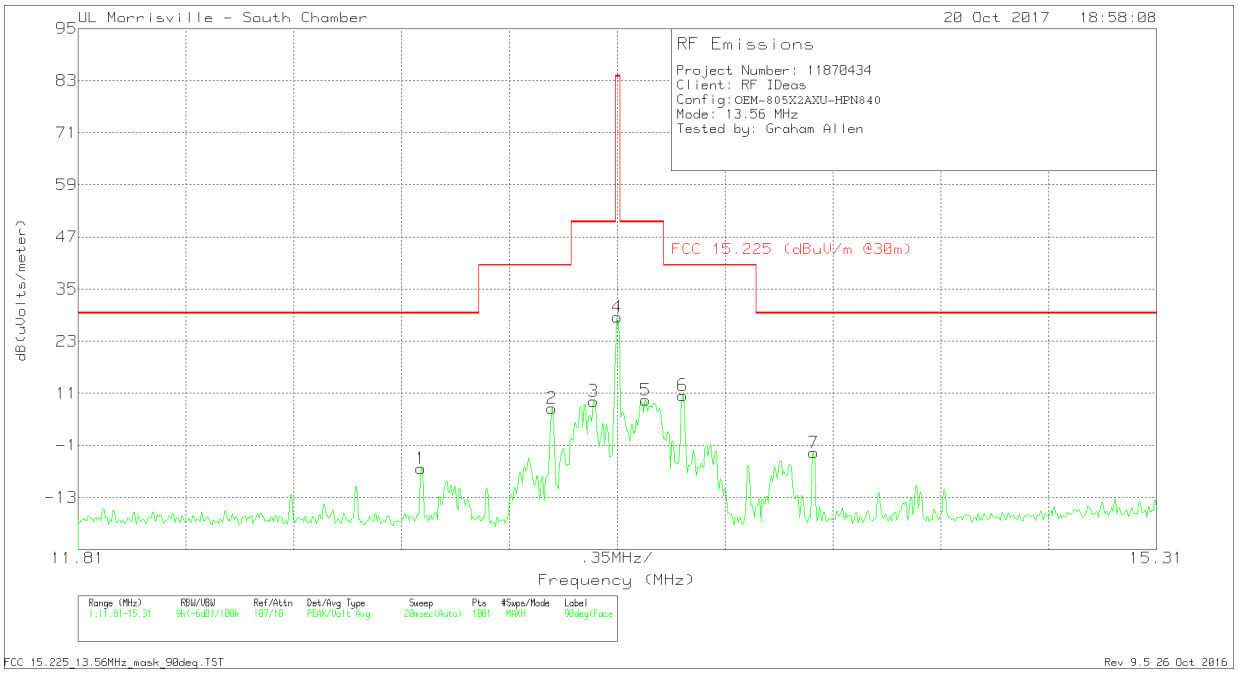
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 (projected to 3m)	Margin (dB)	Azimuth (Degs)	Face
1	.0144	44.88	Pk	16.4	.1	61.38	124.44	-63.06	0-360	On
5	.30252	44.83	Pk	10.6	.1	55.53	97.99	-42.46	0-360	Off
2	.60309	39.55	Pk	10.8	.1	50.45	72	-21.55	0-360	On
6	.60757	37.81	Pk	10.8	.1	48.71	71.93	-23.22	0-360	Off
3	1.21318	33.1	Pk	11	.2	44.3	65.93	-21.63	0-360	On
7	1.51374	29.12	Pk	11	.2	40.32	64	-23.68	0-360	Off
4	13.5599	52.61	Pk	10.4	.6	63.61	69.54	-5.93	247	On
8	13.5599	52.64	Pk	10.4	.6	63.64	69.54	-5.9	269	Off

Pk - Peak detector
Av - Average detection

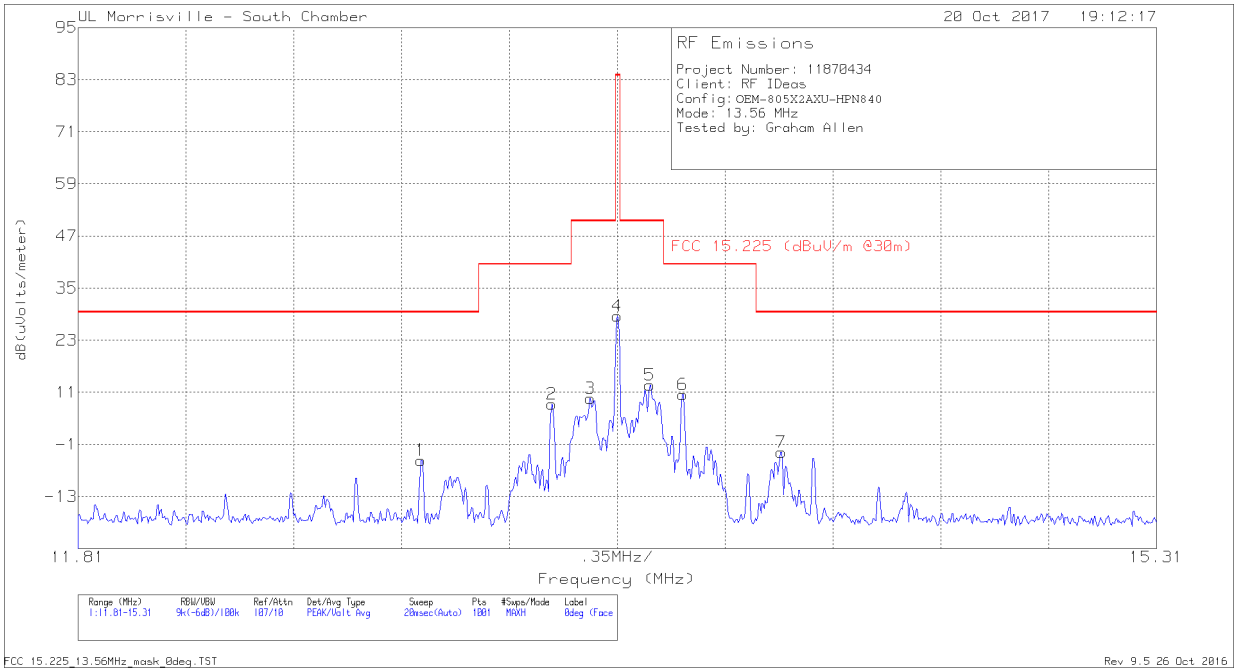
HPN840

Fundamental



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 (dBuV/m @30m)	Margin (dB)	Azimuth (Degs)
1	12.923	22.67	Pk	10.4	.6	-40	-6.33	29.5	-35.83	99
2	13.3465	36.52	Pk	10.4	.6	-40	7.52	40.5	-32.98	99
3	13.483	38.19	Pk	10.4	.6	-40	9.19	50.5	-41.31	99
4	13.56	57.56	Pk	10.4	.6	-40	28.56	84	-55.44	99
5	13.651	38.44	Pk	10.4	.6	-40	9.44	50.5	-41.06	99
6	13.77175	39.51	Pk	10.4	.6	-40	10.51	40.5	-29.99	99
7	14.197	26.34	Pk	10.4	.6	-40	-2.66	29.5	-32.16	99

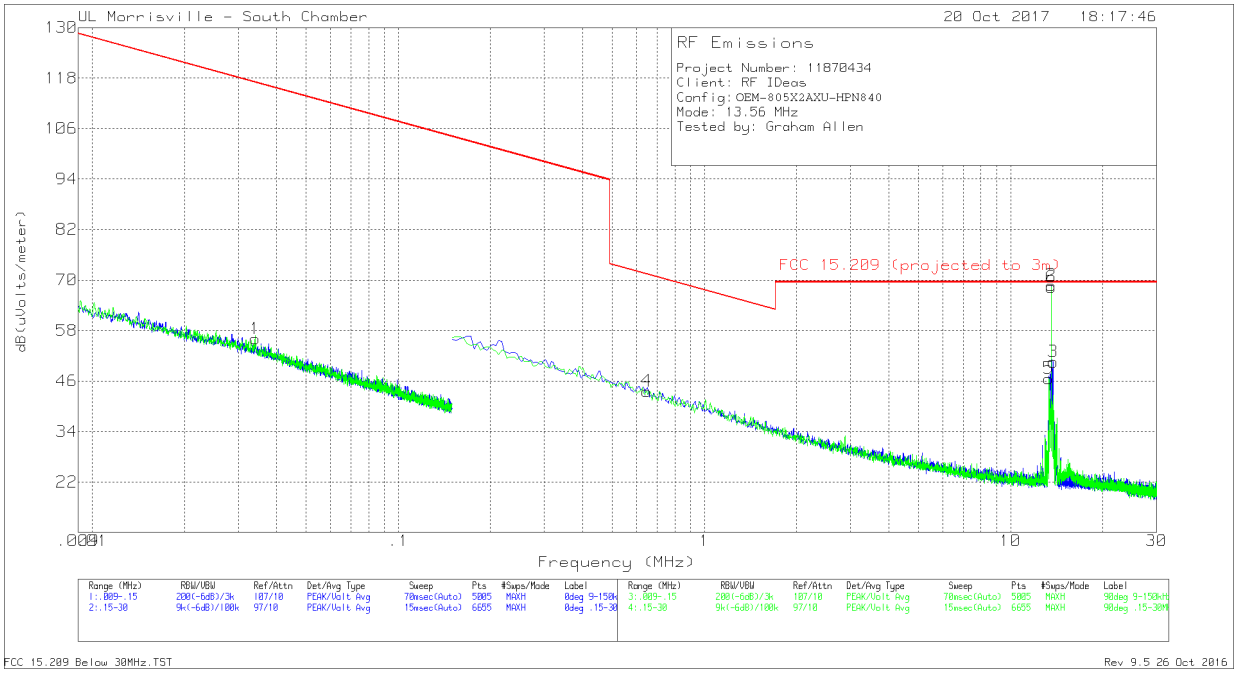
9.
Pk - Peak detector



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 (dBuV/m @30m)	Margin (dB)	Azimuth (Degs)
1	12.923	24.33	Pk	10.4	.6	-40	-4.67	29.5	-34.17	358
2	13.3465	37.23	Pk	10.4	.6	-40	8.23	40.5	-32.27	358
3	13.4725	38.62	Pk	10.4	.6	-40	9.62	50.5	-40.88	358
4	13.56	57.55	Pk	10.4	.6	-40	28.55	84	-55.45	358
5	13.665	41.69	Pk	10.4	.6	-40	12.69	50.5	-37.81	358
6	13.77175	39.49	Pk	10.4	.6	-40	10.49	40.5	-30.01	358
7	14.092	26.16	Pk	10.4	.6	-40	-2.84	29.5	-32.34	358

Pk - Peak detector

Spurious Emissions

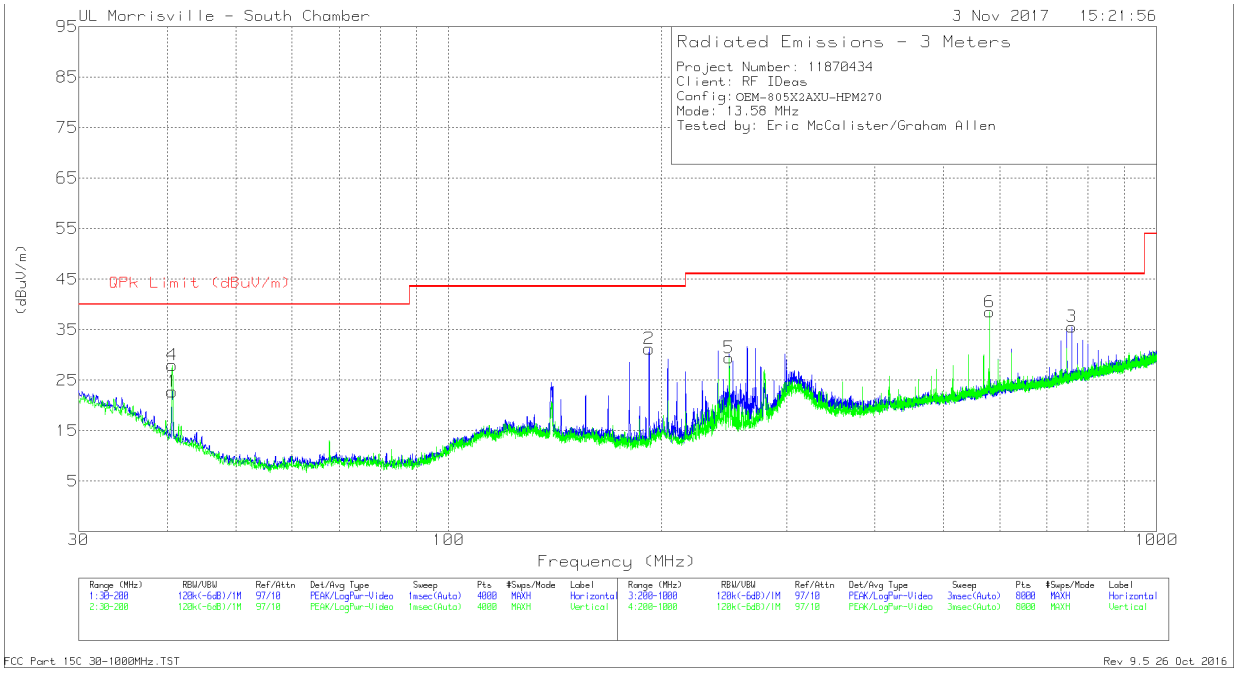


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 (projected to 3m)	Margin (dB)	Azimuth (Degs)	Face
1	.03406	42.81	Pk	13.1	.1	56.01	116.96	-60.95	0-360	Off
4	.64795	32.7	Pk	10.8	.1	43.6	71.37	-27.77	0-360	On
5	13.34781	35.61	Pk	10.4	.6	46.61	69.54	-22.93	0-360	On
2	13.5599	57.38	Pk	10.4	.6	68.38	69.54	-	-	Off
6	13.5599	57.49	Pk	10.4	.6	68.49	69.54	-	-	On
3	13.77174	39.56	Pk	10.4	.6	50.56	69.54	-18.98	0-360	Off

Pk - Peak detector

8.2 TX SPURIOUS EMISSION 30 TO 1000 MHz

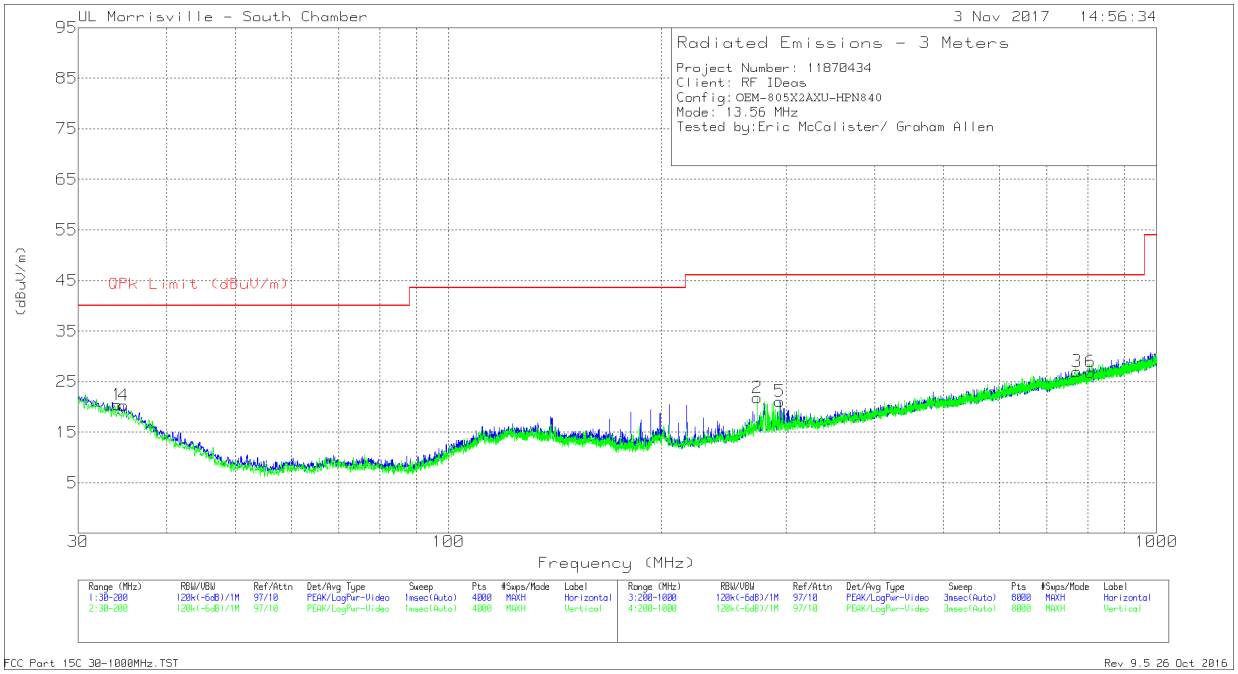
HPM270



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.6703	36.33	Pk	18	-31.6	22.73	40	-17.27	0-360	399	H
2	191.8819	45.32	Pk	16.1	-30.2	31.22	43.52	-12.3	0-360	99	H
3	759.3727	38.08	Pk	25.6	-28.1	35.58	46.02	-10.44	0-360	102	H
5	* 249.0064	43.02	Pk	16.3	-29.9	29.42	46.02	-16.6	0-360	198	V
4	40.6703	41.57	Pk	18	-31.6	27.97	40	-12.03	0-360	101	V
6	581.0495	43.8	Pk	23.4	-28.7	38.5	46.02	-7.52	0-360	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

HPN840



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	34.7612	29.4	Pk	22.6	-31.7	20.3	40	-19.7	0-360	198	H
5	293.8122	32.81	Pk	18	-29.7	21.11	46.02	-24.91	0-360	102	H
6	805.9788	28.5	Pk	26.2	-27.8	26.9	46.02	-19.12	0-360	199	H
2	* 272.9095	33.63	Pk	17.9	-29.7	21.83	46.02	-24.19	0-360	199	V
1	34.0811	28.99	Pk	23.1	-31.7	20.39	40	-19.61	0-360	102	V
3	771.3743	29.21	Pk	25.8	-28	27.01	46.02	-19.01	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

9. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207
IC RSS-GEN, Section 7.2.2

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

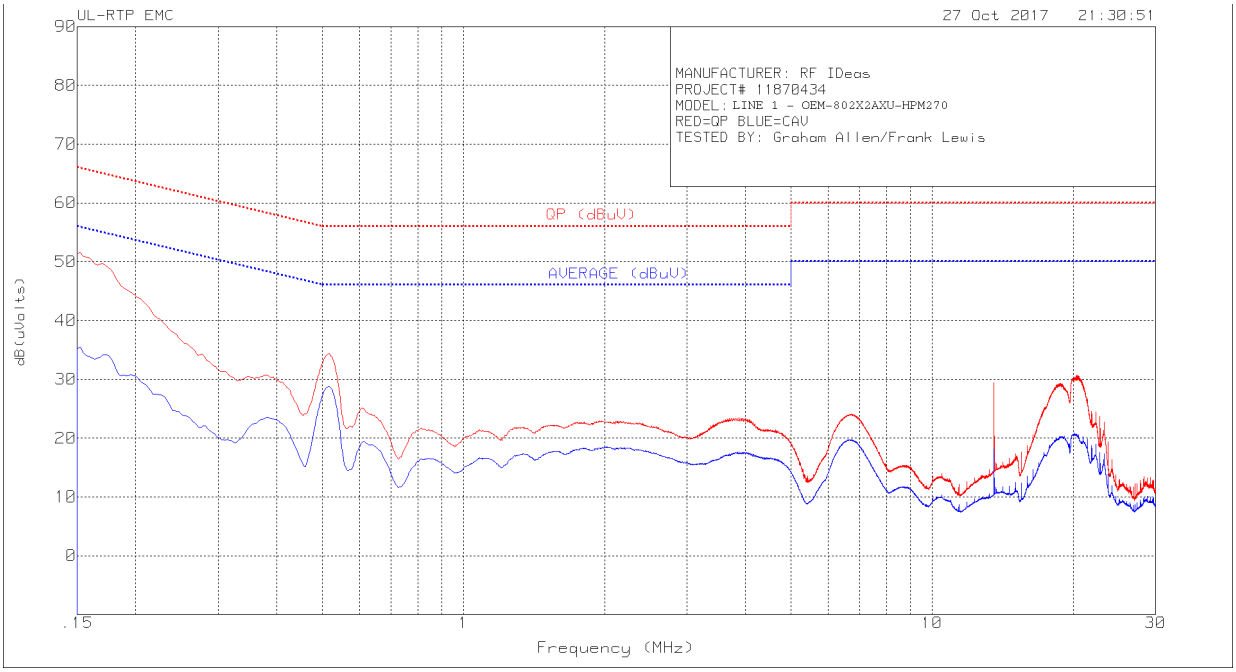
TEST PROCEDURE

ANSI C63.10

RESULTS

No non-compliance noted:

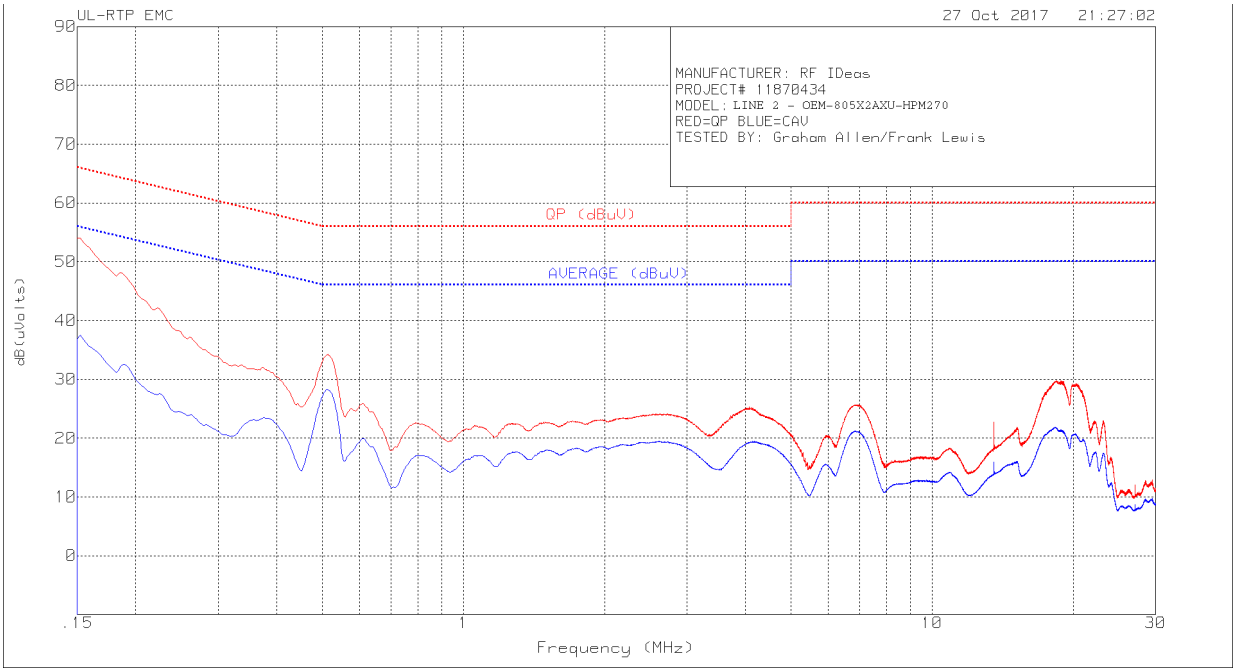
LINE 1 RESULTS – HPM270



Frequency (MHz)	Meter Reading (dBuV)	Det	LISN002_DUE 2018-08-23	ATA508_509 DUE_2018-08-31	Corrected Reading dB(uVolts)	QP (dBuV)	Margin (dB)	AVERAGE (dBuV)	Margin (dB)
.17138	24.64	Ca	.3	9.2	34.14	-	-	54.89	-20.75
.51675	19.47	Ca	.1	9.2	28.77	-	-	46	-17.23
3.73425	8.11	Ca	0	9.2	17.31	-	-	46	-28.69
6.801	10.24	Ca	.1	9.3	19.64	-	-	50	-30.36
13.56	8.47	Ca	.1	9.5	18.07	-	-	50	-31.93
18.58425	10.11	Ca	.2	9.6	19.91	-	-	50	-30.09
20.21888	10.87	Ca	.2	9.6	20.67	-	-	50	-29.33
.16125	40.7	Qp	.3	9.2	50.2	65.4	-15.2	-	-
.51675	25.07	Qp	.1	9.2	34.37	56	-21.63	-	-
3.72525	14.17	Qp	0	9.2	23.37	56	-32.63	-	-
6.80325	14.61	Qp	.1	9.3	24.01	60	-35.99	-	-
13.56	19.82	Qp	.1	9.5	29.42	60	-30.58	-	-
18.56625	19.3	Qp	.2	9.6	29.1	60	-30.9	-	-
20.22	20.49	Qp	.2	9.6	30.29	60	-29.71	-	-

Qp - Quasi-Peak detector
Ca - CISPR average detection

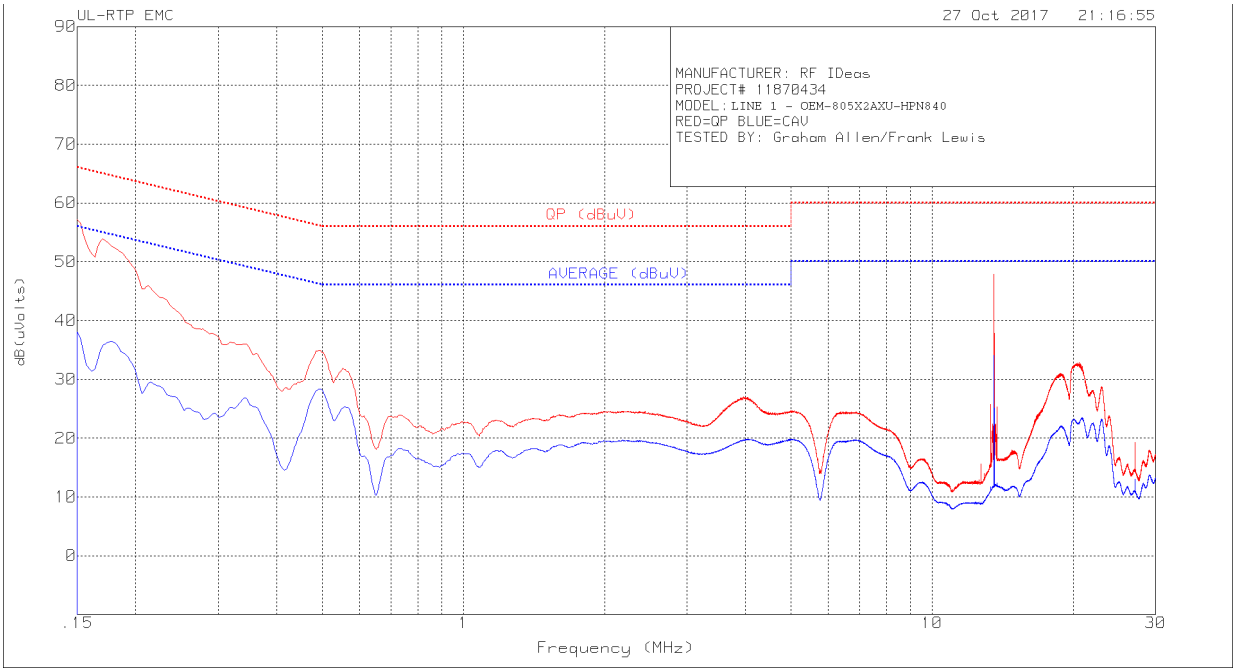
LINE 2 RESULTS – HPM270



Frequency (MHz)	Meter Reading (dBuV)	Det	LISN002_DUE 2018-08-23	ATA508_509 DUE_2018-08-31	Corrected Reading dB(uVolts)	QP (dBuV)	Margin (dB)	AVERAGE (dBuV)	Margin (dB)
.15225	27.89	Ca	.4	9.2	37.49	-	-	55.88	-18.39
.5145	18.93	Ca	.1	9.2	28.23	-	-	46	-17.77
4.00875	9.7	Ca	0	9.3	19	-	-	46	-27
6.86288	11.79	Ca	.1	9.3	21.19	-	-	50	-28.81
18.10725	11.9	Ca	.1	9.6	21.6	-	-	50	-28.4
20.526	10.16	Ca	.2	9.6	19.96	-	-	50	-30.04
.15225	44.43	Qp	.4	9.2	54.03	65.88	-11.85	-	-
.5145	24.96	Qp	.1	9.2	34.26	56	-21.74	-	-
4.0065	15.75	Qp	0	9.3	25.05	56	-30.95	-	-
6.864	16.22	Qp	.1	9.3	25.62	60	-34.38	-	-
18.105	19.58	Qp	.1	9.6	29.28	60	-30.72	-	-
20.52825	19.03	Qp	.2	9.6	28.83	60	-31.17	-	-

Qp - Quasi-Peak detector
Ca - CISPR average detection

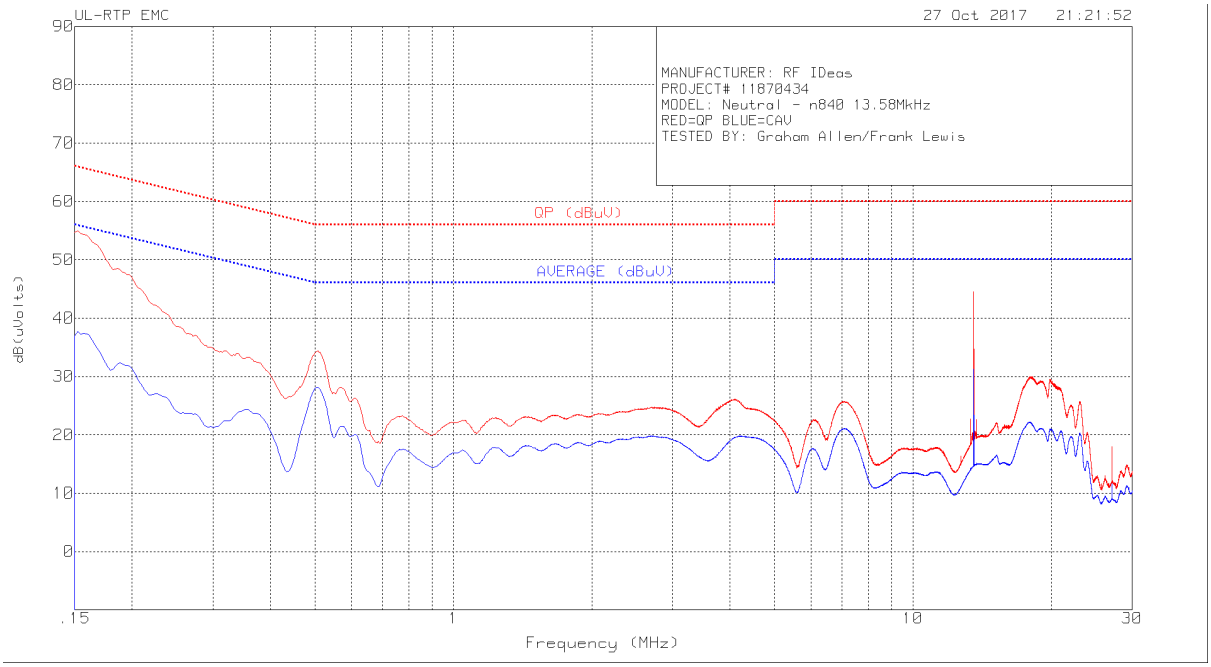
LINE 1 RESULTS - HPN840



Frequency (MHz)	Meter Reading (dBuV)	Det	LISN002_DUE 2018-08-23	ATA508_509 DUE_2018-08-31	Corrected Reading dB(uVolts)	QP (dBuV)	Margin (dB)	AVERAGE (dBuV)	Margin (dB)
.177	26.89	Ca	.3	9.2	36.39	-	-	54.63	-18.24
.492	19.05	Ca	.1	9.2	28.35	-	-	46.13	-17.78
3.9165	10.26	Ca	0	9.3	19.56	-	-	46	-26.44
6.693	10.22	Ca	.1	9.3	19.62	-	-	50	-30.38
13.56	24.45	Ca	.1	9.5	34.05	-	-	50	-15.95
20.364	12.86	Ca	.2	9.6	22.66	-	-	50	-27.34
23.12925	12.8	Ca	.2	9.6	22.6	-	-	50	-27.4
.17025	44.44	Qp	.3	9.2	53.94	64.95	-11.01	-	-
.49425	25.65	Qp	.1	9.2	34.95	56.1	-21.15	-	-
3.912	17.51	Qp	0	9.3	26.81	56	-29.19	-	-
6.675	14.96	Qp	.1	9.3	24.36	60	-35.64	-	-
13.56	38.27	Qp	.1	9.5	47.87	60	-12.13	-	-
20.35275	22.88	Qp	.2	9.6	32.68	60	-27.32	-	-
23.136	18.22	Qp	.2	9.6	28.02	60	-31.98	-	-

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 2 RESULTS – HPN840



Frequency (MHz)	Meter Reading (dBuV)	Det	LISN002_DUE 2018-08-23	ATA508_509 DUE_2018-08-31	Corrected Reading dB(uVolts)	QP (dBuV)	Margin (dB)	AVERAGE (dBuV)	Margin (dB)
.15225	28.09	Ca	.4	9.2	37.69	-	-	55.88	-18.19
.50438	18.82	Ca	.1	9.2	28.12	-	-	46	-17.88
1.0455	8.2	Ca	0	9.2	17.4	-	-	46	-28.6
4.00875	9.77	Ca	0	9.3	19.07	-	-	46	-26.93
7.24988	11.23	Ca	.1	9.4	20.73	-	-	50	-29.27
13.56	21.63	Ca	.1	9.5	31.23	-	-	50	-18.77
19.94663	11.23	Ca	.2	9.6	21.03	-	-	50	-28.97
.15225	45.36	Qp	.4	9.2	54.96	65.88	-10.92	-	-
.50775	25.04	Qp	.1	9.2	34.34	56	-21.66	-	-
1.05563	13.32	Qp	0	9.2	22.52	56	-33.48	-	-
4.0065	16.53	Qp	0	9.3	25.83	56	-30.17	-	-
7.24875	15.87	Qp	.1	9.4	25.37	60	-34.63	-	-
13.56	34.88	Qp	.1	9.5	44.48	60	-15.52	-	-
19.9455	19.59	Qp	.2	9.6	29.39	60	-30.61	-	-

Qp - Quasi-Peak detector
Ca - CISPR average detection

10. FREQUENCY STABILITY

LIMIT

§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.

RSS-210 Annex B.6: Carrier frequency stability shall be maintained to ±0.01% (±100 ppm).

TEST PROCEDURE

C63.10

RESULTS – HPM270

No non-compliance noted.

Startup

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz				
Power Supply (Vdc)	Environment Temperature (ºC)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
5.00	50	13.5599230	4.204	± 100
5.00	40	13.5599350	3.319	± 100
5.00	30	13.5599350	3.319	± 100
5.00	***20***	***13.5599800***	***0.000***	***± 100***
5.00	10	13.5599670	0.959	± 100
5.00	0	13.5600600	-5.900	± 100
5.00	-10	13.5600870	-7.891	± 100
5.00	-20	13.5600210	-3.024	± 100
4.50	20	13.5599800	0.000	± 100
5.5	20	13.5600000	-1.475	± 100

2 Minutes

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz				
Power Supply (Vdc)	**Environment Temperature (ºC)**	**Frequency Deviation Measureed with Time Elapse**		
		(MHz)	**Delta (ppm)**	**Limit (ppm)**
5.00	50	13.5599230	5.678	± 100
5.00	40	13.5599380	4.572	± 100
5.00	30	13.5599350	4.794	± 100
5.00	***20***	***13.5600000***	***0.000***	***± 100***
5.00	10	13.5599670	2.434	± 100
5.00	0	13.5600550	-4.056	± 100
5.00	-10	13.5600650	-4.794	± 100
5.00	-20	13.5600060	-0.442	± 100
4.50	20	13.5599800	1.475	± 100
5.5	20	13.5600000	0.000	± 100

5 Minutes

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz				
Power Supply (Vdc)	**Environment Temperature (ºC)**	**Frequency Deviation Measureed with Time Elapse**		
		(MHz)	**Delta (ppm)**	**Limit (ppm)**
5.00	50	13.5599210	4.351	± 100
5.00	40	13.5599350	3.319	± 100
5.00	30	13.5599380	3.097	± 100
5.00	***20***	***13.5599800***	***0.000***	***± 100***
5.00	10	13.5600570	-5.678	± 100
5.00	0	13.5600500	-5.162	± 100
5.00	-10	13.5601010	-8.923	± 100
5.00	-20	13.5600160	-2.655	± 100
4.50	20	13.5598000	13.274	± 100
5.5	20	13.5599600	1.475	± 100

10 Minutes

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz				
Power Supply (Vdc)	**Environment Temperature (ºC)**	**Frequency Deviation Measureed with Time Elapse**		
		(MHz)	**Delta (ppm)**	**Limit (ppm)**
5.00	50	13.5599210	4.351	± 100
5.00	40	13.5599350	3.319	± 100
5.00	30	13.5599380	3.097	± 100
5.00	***20***	***13.5599800***	***0.000***	***± 100***
5.00	10	13.5600570	-5.678	± 100
5.00	0	13.5600500	-5.162	± 100
5.00	-10	13.5601010	-8.923	± 100
5.00	-20	13.5600160	-2.655	± 100
4.50	20	13.5598000	13.274	± 100
5.5	20	13.5599600	1.475	± 100

RESULTS – HPN840 RESULTS

No non-compliance noted.

Startup

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz				
Power Supply (Vdc)	**Environment Temperature (ºC)**	**Frequency Deviation Measureed with Time Elapse**		
		(MHz)	**Delta (ppm)**	**Limit (ppm)**
5.00	50	13.5599230	4.204	± 100
5.00	40	13.5599350	3.319	± 100
5.00	30	13.5599350	3.319	± 100
5.00	***20***	***13.5599800***	***0.000***	***± 100***
5.00	10	13.5599670	0.959	± 100
5.00	0	13.5600600	-5.900	± 100
5.00	-10	13.5600870	-7.891	± 100
5.00	-20	13.5600210	-3.024	± 100
4.50	20	13.5599800	0.000	± 100
5.5	20	13.5600000	-1.475	± 100

2 Minutes

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz				
Power Supply (Vdc)	**Environment Temperature (ºC)**	**Frequency Deviation Measureed with Time Elapse**		
		(MHz)	**Delta (ppm)**	**Limit (ppm)**
5.00	50	13.5599230	5.678	± 100
5.00	40	13.5599380	4.572	± 100
5.00	30	13.5599350	4.794	± 100
5.00	***20***	***13.5600000***	***0.000***	***± 100***
5.00	10	13.5599670	2.434	± 100
5.00	0	13.5600550	-4.056	± 100
5.00	-10	13.5600650	-4.794	± 100
5.00	-20	13.5600060	-0.442	± 100
4.50	20	13.5599800	1.475	± 100
5.5	20	13.5600000	0.000	± 100

5 Minutes

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz				
Power Supply (Vdc)	Environment Temperature (ºC)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
5.00	50	13.5599210	4.351	± 100
5.00	40	13.5599350	3.319	± 100
5.00	30	13.5599380	3.097	± 100
5.00	***20***	***13.5599800***	***0.000***	***± 100***
5.00	10	13.5600570	-5.678	± 100
5.00	0	13.5600500	-5.162	± 100
5.00	-10	13.5601010	-8.923	± 100
5.00	-20	13.5600160	-2.655	± 100
4.50	20	13.5598000	13.274	± 100
5.5	20	13.5599600	1.475	± 100

10 Minutes

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz				
Power Supply (Vdc)	Environment Temperature (ºC)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
5.00	50	13.5599210	4.351	± 100
5.00	40	13.5599350	3.319	± 100
5.00	30	13.5599380	3.097	± 100
5.00	***20***	***13.5599800***	***0.000***	***± 100***
5.00	10	13.5600570	-5.678	± 100
5.00	0	13.5600500	-5.162	± 100
5.00	-10	13.5601010	-8.923	± 100
5.00	-20	13.5600160	-2.655	± 100
4.50	20	13.5598000	13.274	± 100
5.5	20	13.5599600	1.475	± 100

TEST INFORMATION
Test Date: 2017-10-20
Project No: 11870434
Tested by: Jeffrey Cabrera