TEST REPORT

Report Number: 101845214DAL-002
Project Number: G101845214

Report Issue Date: December 17, 2014

Product Designation: **Fan controller**
Model(s): K3768
FCC: IN2TX44
IC: 3558A-TX44

Standards: **47 CFR Part 15, Subpart C** (15.231 - Periodic operation in the band 40.66-40.70 MHz and above 70 MHz)
RSS-210, Issue:2010/12/01 Issue:8 Low Power License-Exempt Radio communication Devices (All Frequency Bands) - Category I Equipment

Tested by:
Intertek Testing Services NA, Inc.
1809 10th St. Suite 400
Plano, TX 75074 - USA

Client:
Hunter Fan Company
7130 Goodlett Farms Pkwy, Suite 400
Memphis, TN 38016

Report prepared by

Shawn K McGuinness
Senior EMC Assoc. Engineer

Report reviewed by

Bryan Taylor
Team Leader

TABLE OF CONTENTS (OPTIONAL)

1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 3.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complies with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

2 Test Summary

Section	Test full name	Test date	Result
3	Description of Equipment Under Test		
4	System setup including cable interconnection details, support equipment and simplified block diagram		
5	Duty Cycle Determination (FCC 15A - 15.35(c))		Pass
6	Radiated emissions (E-field) for low power intentional radiators		Pass
7	Bandwidth Requirements (FCC 15C - 15.231(c))		Pass
8	Conducted Emissions		Pass
9	Restrictions (FCC 15C - 15.231(a))		Pass

3 Description of Equipment Under Test

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
SimpleConnect Fan Controller	Hunter Fan Company	**K3768**	10771038
SimpleConnect Fan Controller	Hunter Fan Company	**K3768**	10782055

Receive Date:	11-17-2014
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)
The SimpleConnect **K3768** is a blue tooth low energy device (BTLE) indoor overhead fan remote control. EUT simply plugs into a 120VAC/60Hz Wall Receptacle and is operated by a signal from a smartphone.

Transmitter Overview:	
FCC Identifier	**IN2TX44**
IC Identifier	**3558A-TX44**
Frequency Range	433MHz
Modulation	SAW Modulation
Antenna type (15.203)	Integral

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
120VAC	0.018A	60Hz	Single

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	For radiated testing, EUT was programmed to operate at a steady repeat in its normal modulation scheme.
2	For Duty Cycle and BW testing, EUT was programmed to operate in its normal mode and modulation scheme.

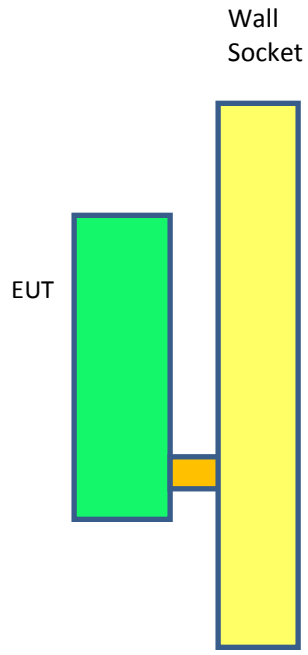
NOTE: During testing EUT was identified by its production project number, 99108.

4 System setup including cable interconnection details, support equipment and simplified block diagram

4.1 Method:

Record the details of EUT cabling, document the support equipment, and show the interconnections in a block diagram.

4.2 EUT Block Diagram:



Data:

ID	Description	Length	Shielding	Ferrites
None				

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
None			

5 Duty Cycle Determination (FCC 15A - 15.35(c))

5.1 Method:

From 47 CFR Part 15, Subpart A (15.35(c)) and RSS-GEN Section 4.5

When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

Determine the period of the pulse train, T, in mSec and record the results. T is defined as the time from the beginning of one pulse train to the beginning of the next pulse train.

Count the number of different types of pulses, N and record the results.

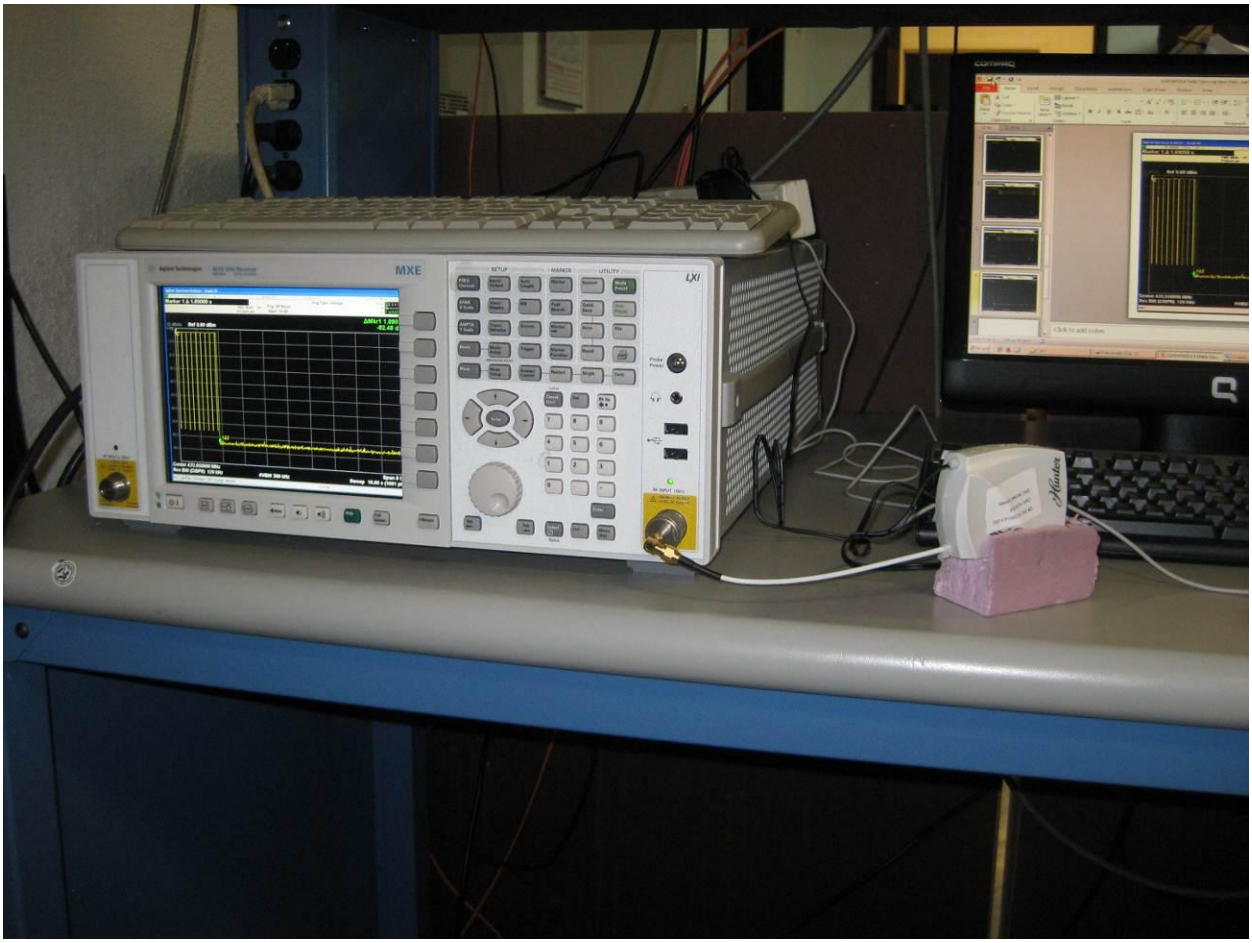
For each of the different types of pulses, count the number of occurrences within one pulse train.

Use the Duty Cycle Correction Factor, DCCF, from the results table and use it to adjust the field strength measurements recorded for radiated emissions.

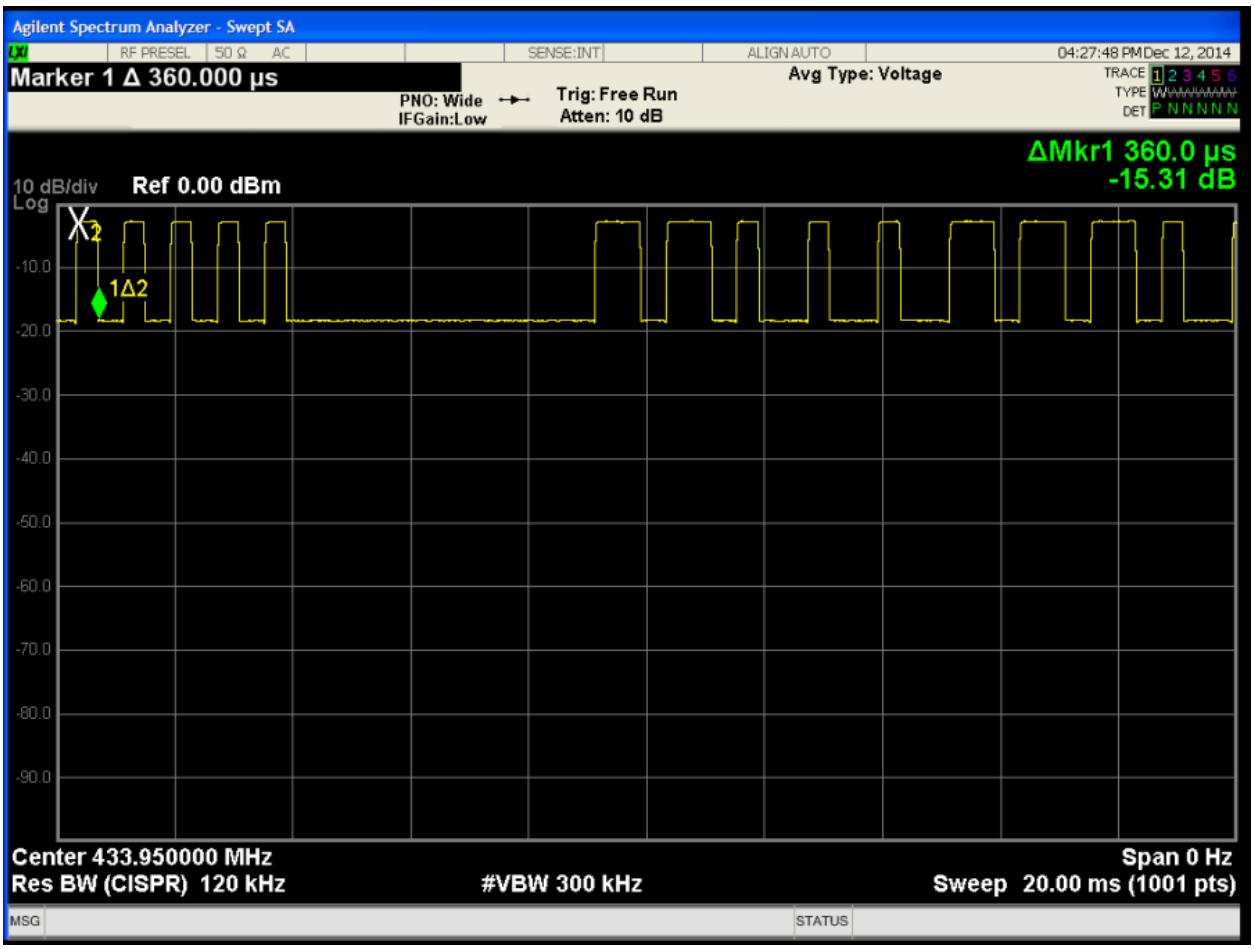
5.2 Test Equipment Used:

Asset ID	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Rental	EMI Receiver rated: 20Hz-8.4GHz	Agilent	N9038A	1168254	10/14/2014	10/14/2015

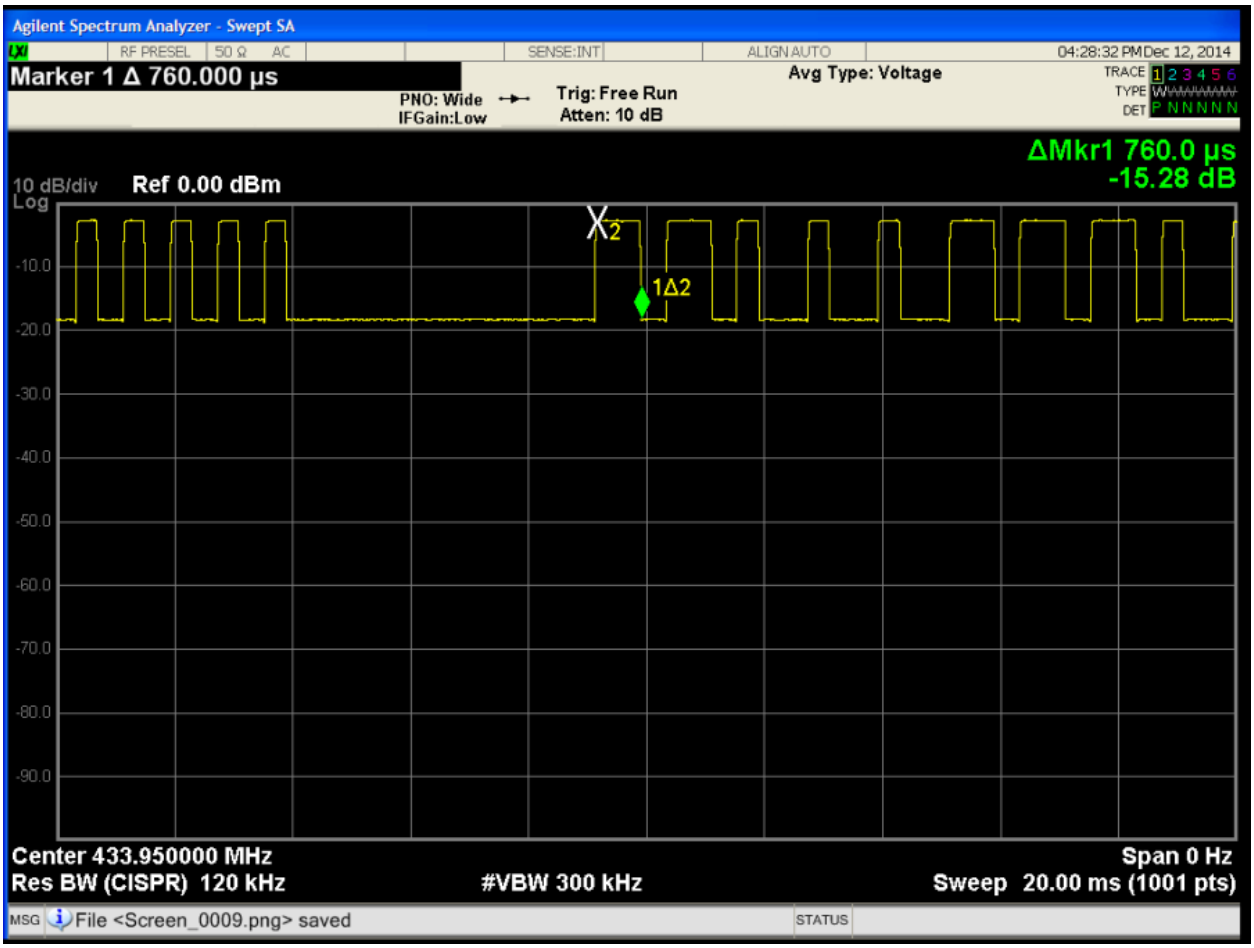
5.3 Setup Photographs:



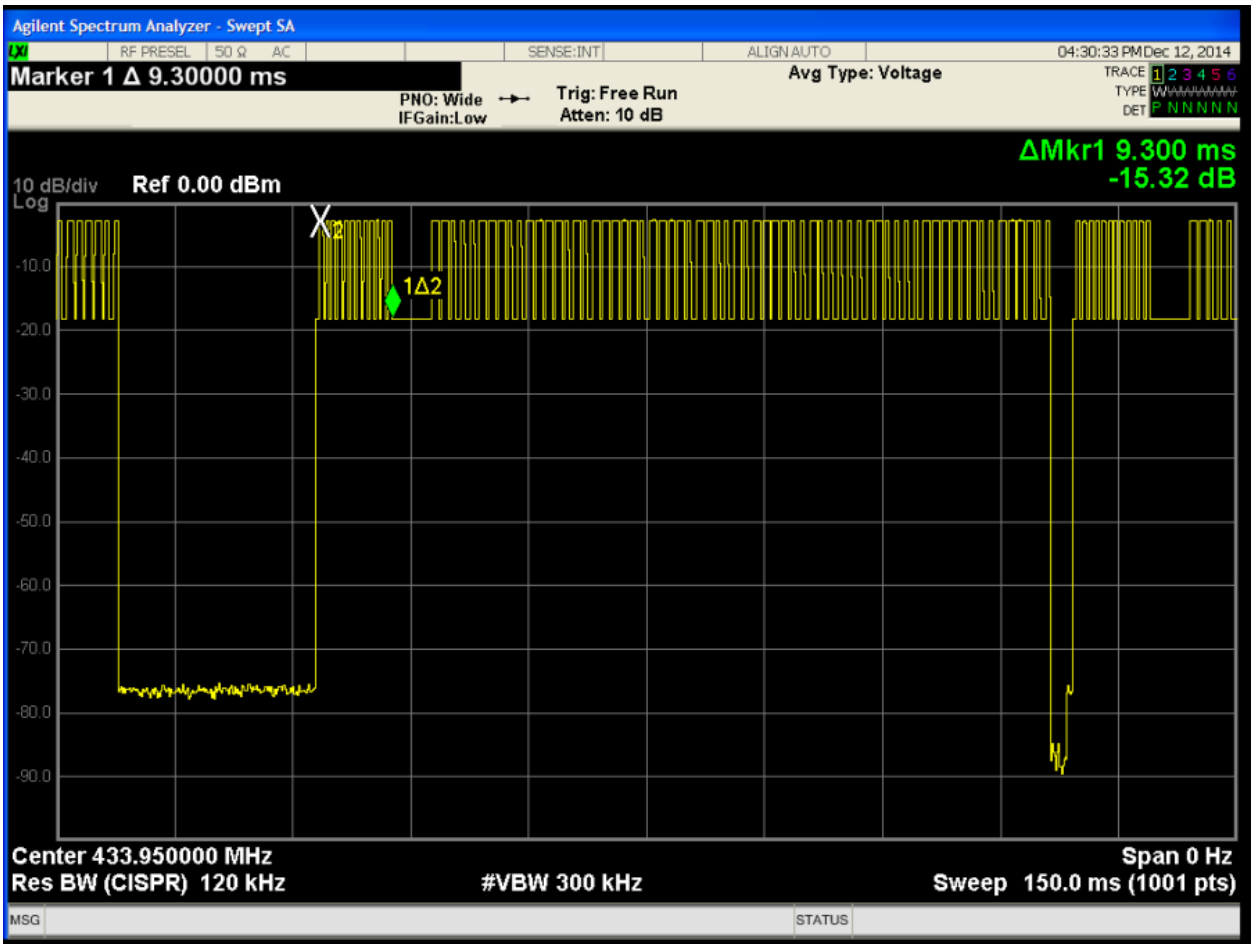
5.4 Plots:



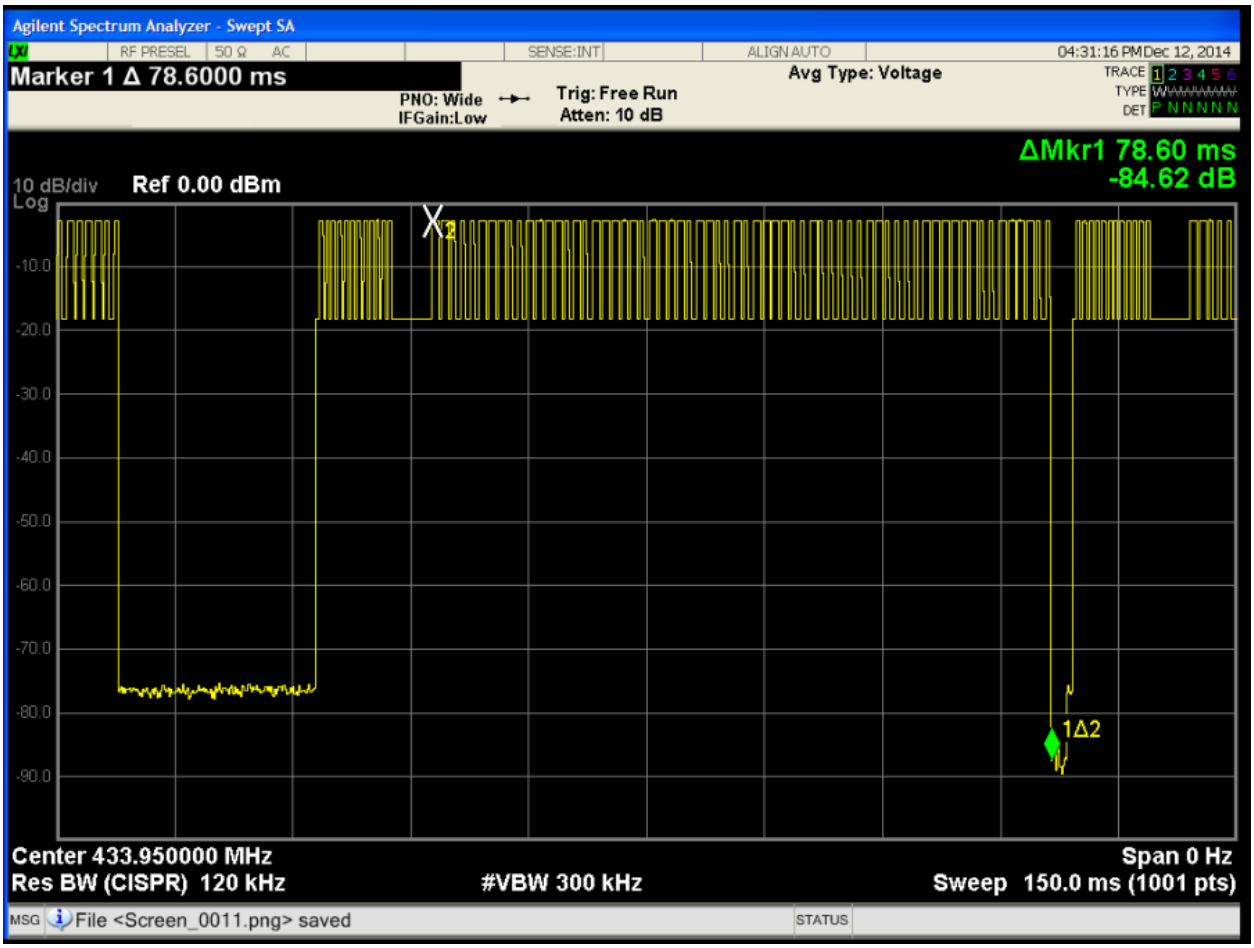
Short Pulse


Agilent Spectrum Analyzer - Swept SA
RF PRESEL
50 Ω AC
SENSE:INT
ALIGN AUTO
04:28:32 PM Dec 12, 2014
Marker 1 Δ 760.000 µs
Avg Type: Voltage
TRACE 1 2 3 4 5 6
TYPE
DET P N N N N N
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 10 dB
ΔMkr1 760.0 µs
-15.28 dB
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
X2
1Δ2
Center 433.950000 MHz
Res BW (CISPR) 120 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 20.00 ms (1001 pts)
MSG
File <Screen_0009.png> saved
STATUS

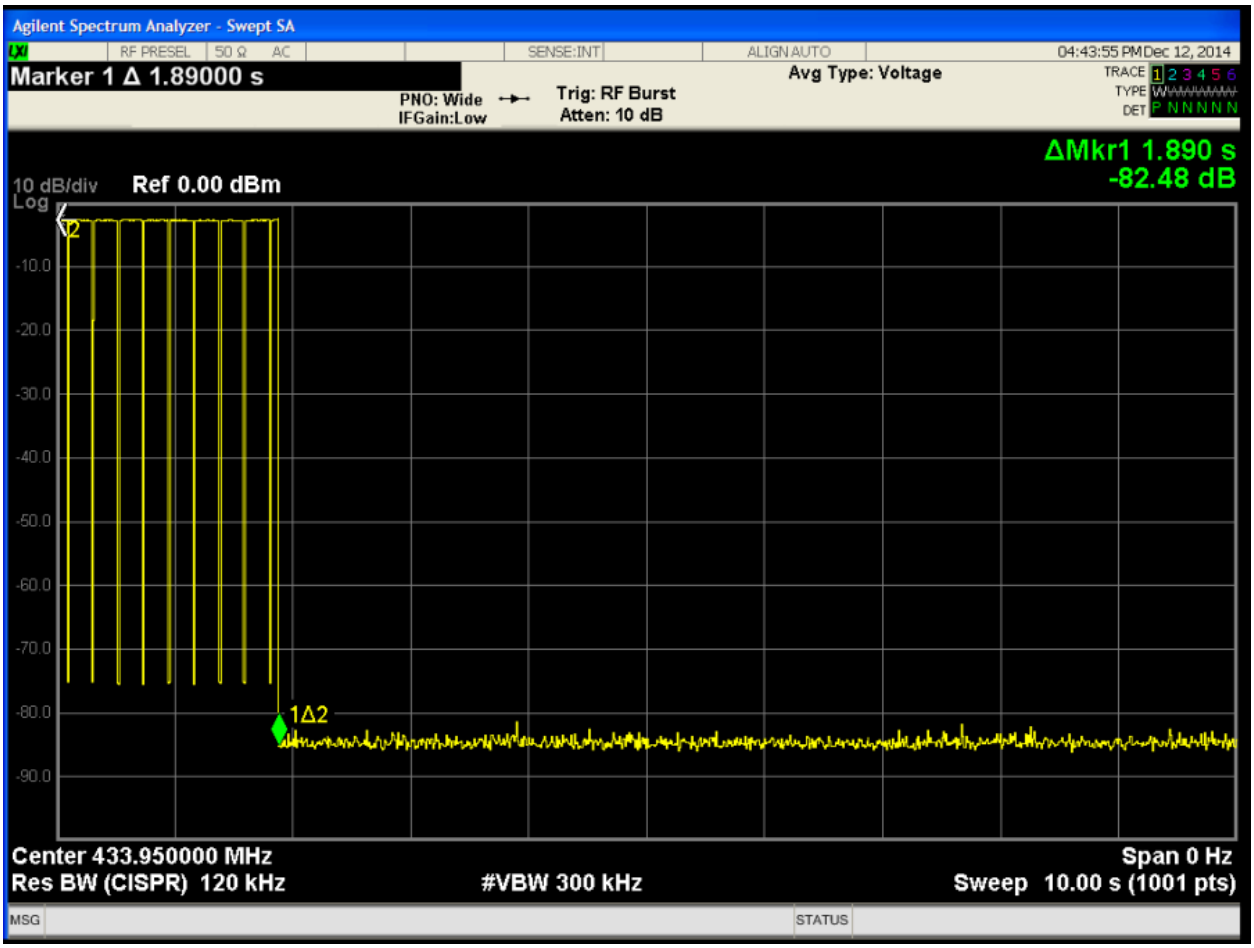
Long Pulse



9.3mSec short burst pulse width of pulse train



78.60mSec long burst pulse width of pulse train



Signal Deactivation.

5.5 Data:

Duration of Pulse Train, T (mSec):	81.6
Averaging Interval, A_I (mSec):	81.6
Number of different Pulses, N:	2

	Number ($\#P_x$)	Pulse Width, mSec (PW_x)	Product ($\#P_x$)*(PW_x)
Pulse Width 1	39	0.76	29.64
Pulse Width 2	39	0.093	3.627
Pulse Width 3			
Pulse Width 4			
Pulse Width 5			
Pulse Width 6			
Pulse Width 7			
Pulse Width 8			
Pulse Width 9			
Pulse Width 10			

Duty Cycle:	0.407683824
Duty Cycle Correction Factor, dB:	-7.8

$$T_{on} = (PW_1 * \#P)_1 + (PW_2 * \#P_2) + \cdots + (PW_n * \#P_n)$$

$$DutyCycle = T_{on} \div A_I$$

$$DCCF = 20 * Log_{10}(DutyCycle)$$

6 Radiated emissions (E-field) for low power intentional radiators

6.1 Method

The test method and equipment setup for radiated emissions tests shall follow the guidelines of ANSI C63.4:2003.

Measurements below 1 GHz shall be performed with a quasi-peak detector instrument that meets the requirements of Section One of CISPR 16.

Bandwidths:
30 MHz to 1000 MHz: 120 kHz RBW and 1 MHz VBW
Above 1000 MHz: 1 MHz RBW and 3 MHz VBW

Detectors:
Equal to or less than 1000 MHz: CISPR quasi-peak detector (alternative: peak detector)
Above 1000 MHz: Average detector (applies to average limit)
Above 1000 MHz: Peak detector (applies to peak limit)

Limits:
Equal to or less than 1000 MHz, the limits are specified as quasi-peak. If a peak detector is used, the limit does not change. Above 1000 MHz, the limits are specified as average. The peak limit is 20 dB above the average limit. Both peak and average measurements are required to be reported.

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Frequency range of radiated measurements
For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:

(1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

(3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.

(4) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a)(1) through (a)(3) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this section, whichever is the higher frequency range of investigation.

Measurement antenna requirements:
Below 30 MHz - Loop antenna
30 to 1000 MHz - Biconical, Log Periodic, or equivalent
Above 1000 MHz - Horn or equivalent

Measurements of the radiated field are made with the antenna located at a distance of 3 or 10 meters from the EUT. The limit applied to the measurement shall be appropriate for the test distance. The test distance shall be indicated in the results section.

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

Exploratory tests should be carried out while varying the cable positions to determine the maximum or near-maximum emission levels. During manipulation, cables shall not be placed under or on top of the system test components unless such placement is required by the inherent equipment design.

The antenna shall be adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency. The antenna-to-EUT azimuth shall be varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) shall be varied during the measurements to find the maximum field-strength readings.

If the EUT is handheld, it shall be oriented in each of its orthogonal axes.

If the EUT is intended for tabletop use, it shall be placed on a table whose top is 0.8m above the ground plane. The table shall be constructed of nonconductive materials. Its dimensions are at least 1m by 1.5m, but may be extended for larger EUT.

If EUT is floor standing, the EUT was placed on a horizontal metal ground plane and isolated from the ground plane by up to 12 mm of insulating material.

TEST SITE
The test site for radiated emissions consists of a 3 meter semi-anechoic chamber and is located at Intertek Testing Services NA, Inc. 1809 10th St. Suite 400 Plano, TX 75074 - USA

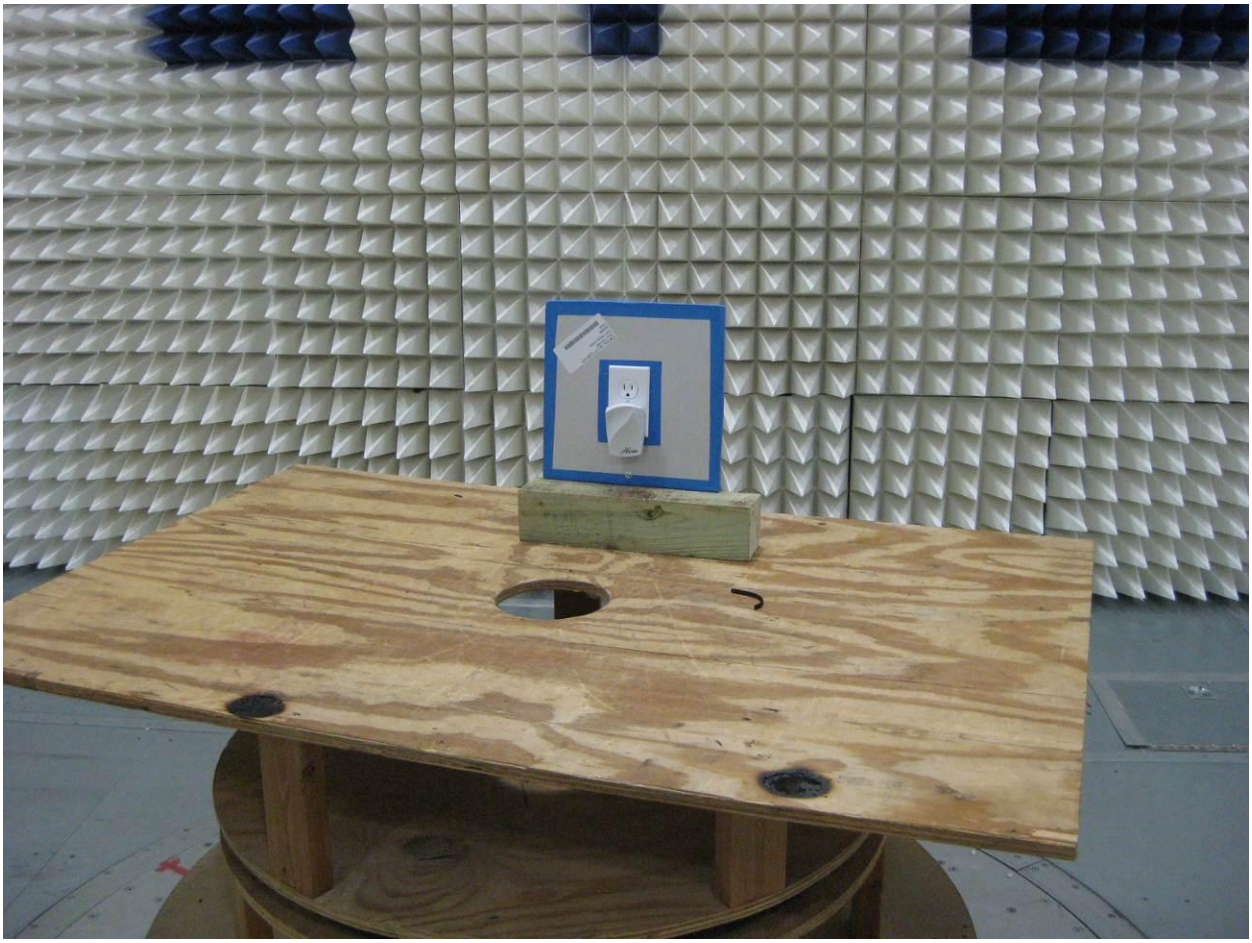
6.2 Test Equipment Used:

Asset #	Description	Manufacturer	Model	Serial Number	Cal Date	Cal Due
77	EMI Receiver rated: 10KHz-7GHz	R & S	ESI 7	100044	04/22/2014	04/22/2015
804	SMA RF CABLE	Insulated Wire Inc.	SPS-2303-720-SPS	804	08/08/2014	08/08/2015
805	SMA RF CABLE	Insulated Wire Inc.	SPS-2303-4250-SPS	804	08/08/2014	08/08/2015
803	SMA RF CABLE	Insulated Wire Inc.	SPS-2301-180-SPS	803	08/08/2014	08/08/2015
238	cable	SemFlex	RF coax cable	none	07/21/2014	07/21/2015
1001	LNA 500 MHz to 18 GHz	Miteq, Inc.	AMF-5D-00501800-28-1	1469795	07/18/2014	07/18/2015
1179	Preamplifier 1-1000MHz 33dB Typical Gain	Com Power	PAM-103	441028	08/05/2014	08/05/2015
1324	Antenna - 20 MHz to 6 GHz	Sunol Sciences	JB6	A101612	03/04/2014	03/04/2015

6.3 Results:

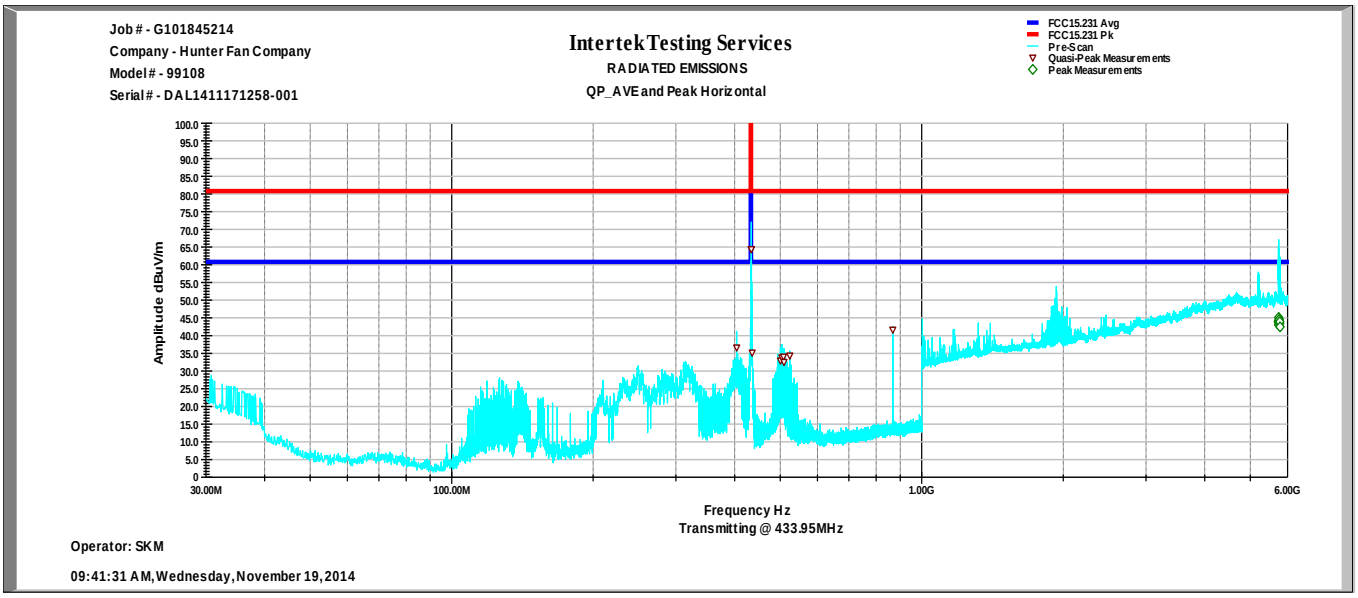
The sample tested was found to Comply.

6.4 Setup Photographs:

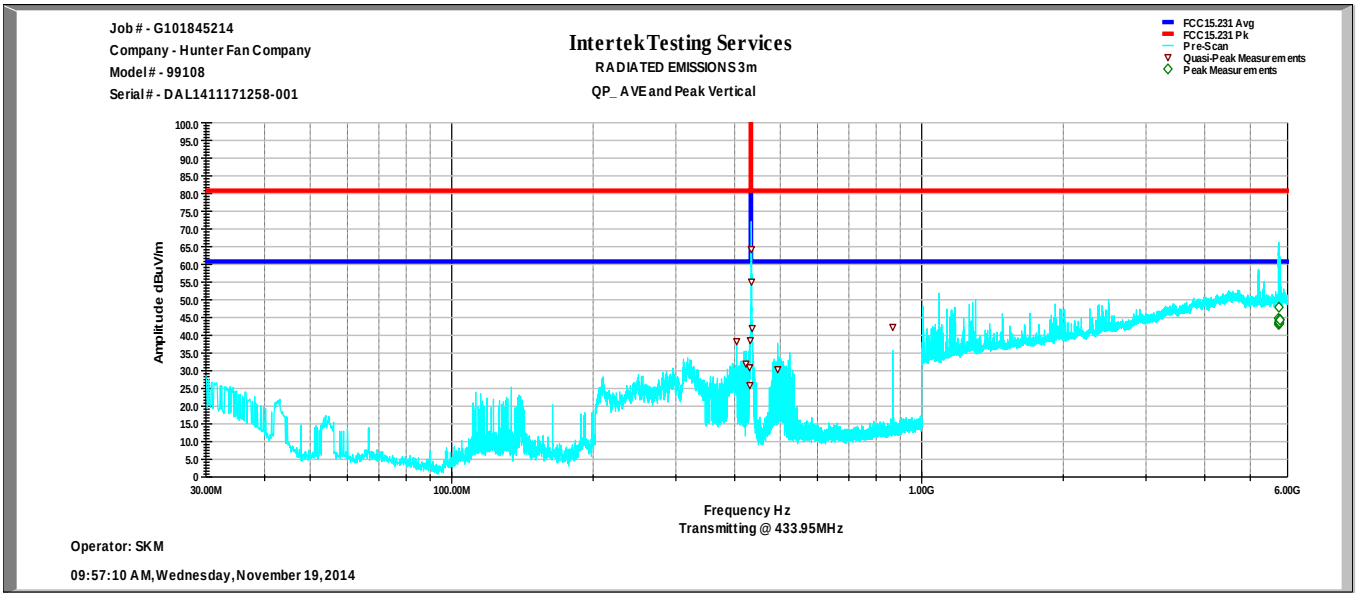


Test setup

6.5 Plots:



Horizontal emissions plot: 30 to 6000 MHz



Vertical emissions plot: 30 to 6000 MHz

6.6 Test Data:

Freq MHz	Antenna Height	Azimuth degrees	Reading (dBuV/m)	Antenna Factors	Pre-Amp Factors	Cable Factors	Duty Cycle Factor	Final	Avg LIMIT	Margin
433.87	208	240	80.7	16.8	35.1	2.1	-7.8	56.6	80.8	-24.2
434.03	100	55	80.7	16.8	35.1	2.1	-7.8	56.6	80.8	-24.2

Fundamental EIRP Data: FCC15.231 Limits (Corrected by Duty Cycle)

Freq MHz	Antenna Height	Azimuth degrees	Reading (dBuV/m)	Antenna Factors	Pre-Amp Factors	Cable Factors	Final	Avg LIMIT	Margin
403.92	117	170	53.8	16	35.2	2	36.6	60.8	-24.2
433.87	208	240	80.7	16.8	35.1	2.1	64.4	80.8	-16.4
434.03	100	55	80.7	16.8	35.1	2.1	64.4	80.8	-16.4
435.76	255	145	51.4	16.8	35.1	2.1	35.2	60.8	-25.6
500.49	234	194	47.9	17.8	35	2.2	32.9	60.8	-27.9
504.11	235	188	48.7	17.8	34.9	2.2	33.8	60.8	-27
507.86	234	170	48.7	18	34.9	2.2	34	60.8	-26.8
509.4	234	169	47.1	18.2	34.9	2.2	32.5	60.8	-28.3
523.95	210	150	48.6	18.4	34.9	2.2	34.3	60.8	-26.5
867.88	138	331	50.1	22.5	33.8	2.9	41.6	60.8	-19.2

Horizontal 30 to 1000MHZ Data: FCC15.231 Limits

Freq MHz	Antenna Height	Azimuth degrees	Reading (dBuV/m)	Antenna Factors	Pre-Amp Factors	Cable Factors	Final	Avg LIMIT	Margin
403.94	152	305	55.5	16	35.2	2	38.3	60.8	-22.5
422.69	153	29	48.7	16.4	35.2	2	31.9	60.8	-28.9
430.19	152	208	47.4	16.6	35.2	2	30.9	60.8	-29.9
430.92	151	209	42.4	16.6	35.1	2.1	25.9	60.8	-34.9
431.84	166	32	55	16.6	35.1	2.1	38.6	60.8	-22.2
434.03	246	228	80.7	16.7	35.1	2.1	64.3	80.8	-16.5
434.45	270	298	71.5	16.7	35.1	2.1	55.1	60.8	-5.7
435.8	151	235	58.4	16.7	35.1	2.1	42	60.8	-18.8
493.95	209	255	45.7	17.5	35	2.2	30.4	60.8	-30.4
867.88	177	55	51	22.2	33.8	2.9	42.3	60.8	-18.5

Vertical 30 to 1000MHZ Data: FCC15.231 Limits

Freq MHz	Antenna Height	Azimuth degrees	Reading (dBuV/m)	Antenna Factors	Pre-Amp Factors	Cable Factors	Final	Avg LIMIT	Margin
5738.08	103	121	28.2	39.4	8.7	39.3	36.5	60.8	-24.3
5740.08	223	140	29.2	39.4	8.7	39.3	37.5	60.8	-23.3
5744.08	104	207	28.4	39.3	8.8	39.3	36.6	60.8	-24.2
5746.58	278	74	28.2	39.3	8.8	39.3	36.4	60.8	-24.4
5752.08	278	220	28.2	39.2	8.8	39.4	36.4	60.8	-24.4
5763.08	104	251	28.2	39.3	8.7	39.4	36.3	60.8	-24.5
5765.08	103	120	28.2	39.3	8.7	39.4	36.3	60.8	-24.5
5770.08	243	151	28.4	39.3	8.6	39.4	36.4	60.8	-24.4
5777.08	102	155	28.1	39.3	8.5	39.4	36	60.8	-24.8
5785.08	342	203	28.2	39.3	8.4	39.4	36.1	60.8	-24.7

Horizontal 1000 to 6000MHZ Data: FCC15.231 Limits

Freq MHz	Antenna Height	Azimuth degrees	Reading (dBuV/m)	Antenna Factors	Pre-Amp Factors	Cable Factors	Final	Avg LIMIT	Margin
5740.08	299	247	28.6	39	8.7	39.3	36.5	60.8	-24.3
5744.58	342	5	28.2	39.1	8.8	39.3	36.2	60.8	-24.6
5746.08	274	113	28.1	39.1	8.8	39.3	36.1	60.8	-24.7
5752.58	150	275	28.2	39.1	8.8	39.4	36.3	60.8	-24.5
5757.58	203	245	28.1	39.1	8.8	39.4	36.1	60.8	-24.7
5763.58	198	294	28.2	39.2	8.7	39.4	36.2	60.8	-24.6
5766.58	125	113	28.4	39.2	8.6	39.4	36.3	60.8	-24.5
5769.58	278	1	28.4	39.2	8.6	39.4	36.3	60.8	-24.5
5778.08	124	2	28.6	39.2	8.5	39.4	36.3	60.8	-24.5
5785.58	342	2	30	39.1	8.4	39.4	37.5	60.8	-23.3

Vertical 1000 to 6000MHZ Data: FCC15.231 Limits

Notes: (a) EUT was rotated through x, y, and z axis to determine maximum emissions and tested at maximum orientation.

Deviations, Additions, or Exclusions: None

7 Bandwidth Requirements (FCC 15C - 15.231(c))

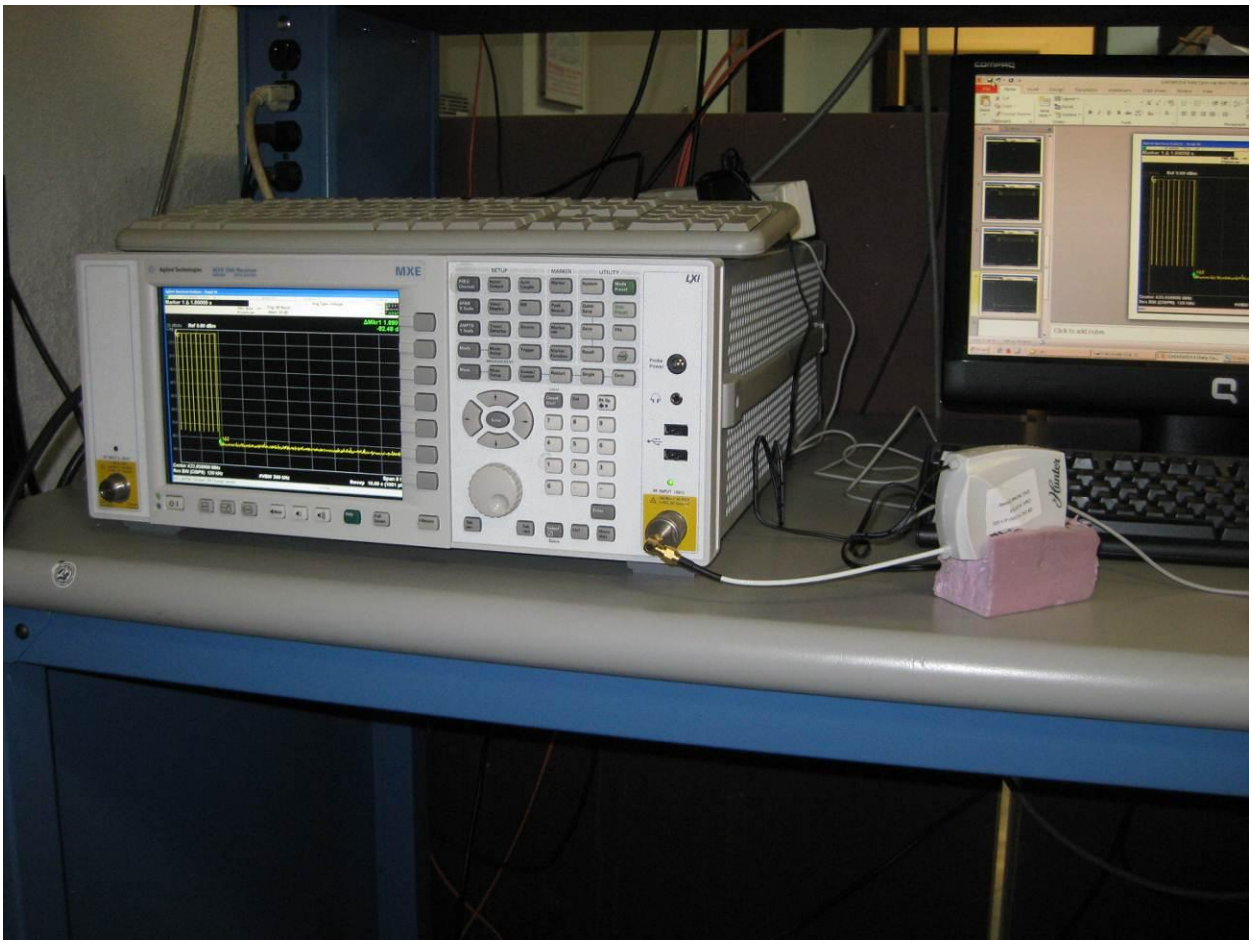
7.1 Method

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
- Center Frequency is set to the fundamental of transmitter.
- Resolution Bandwidth is set to approximately 1% of the emission bandwidth.
- Video Bandwidth is set greater than or equal to the Resolution Bandwidth.

7.2 Test Equipment Used:

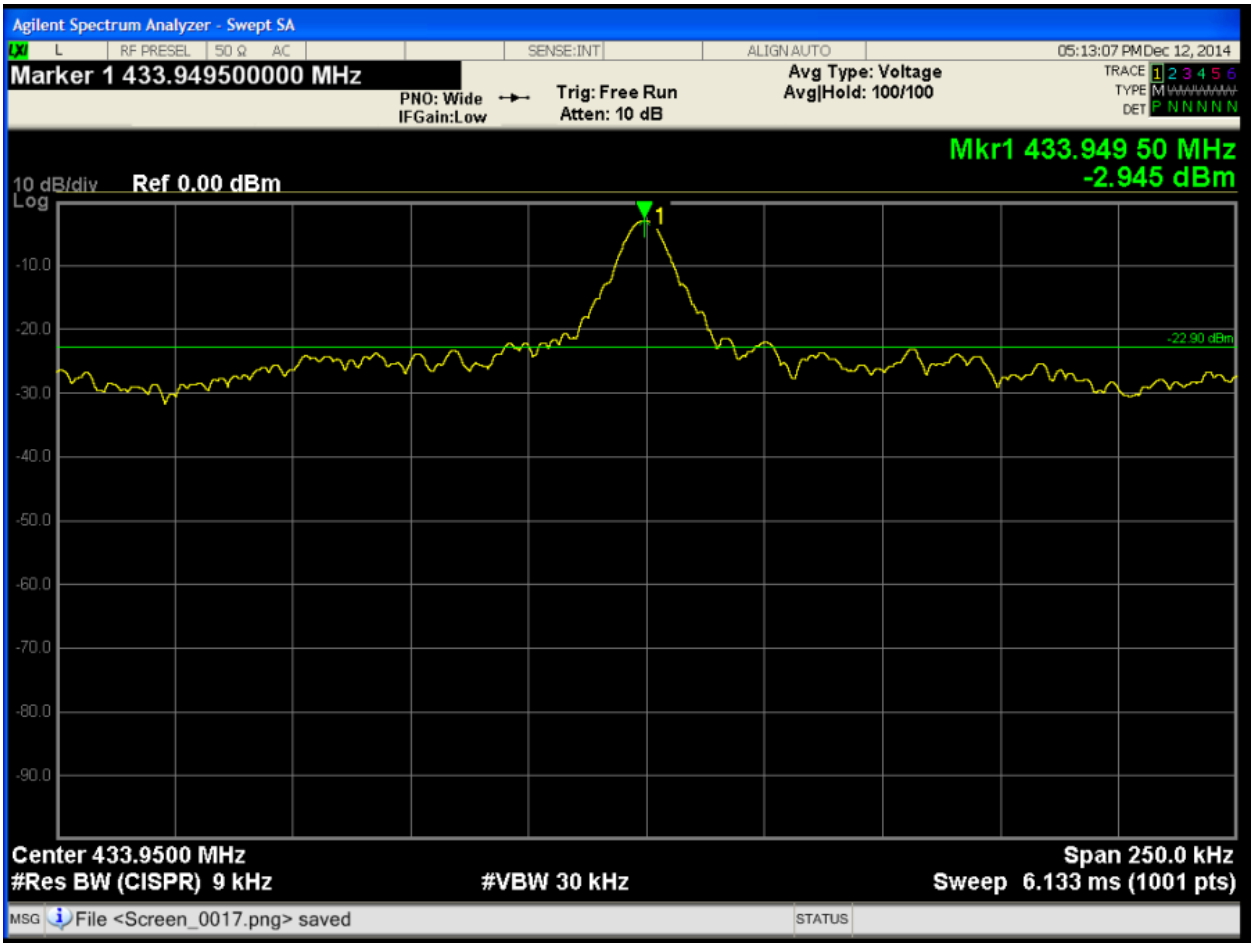
Asset #	Description	Manufacturer	Model	Serial Number	Cal Date	Cal Due
Rental	EMI Receiver rated: 20Hz-8.4GHz	Agilent	N9038A	1168254	10/14/2014	10/14/2015

7.3 Setup Photographs:

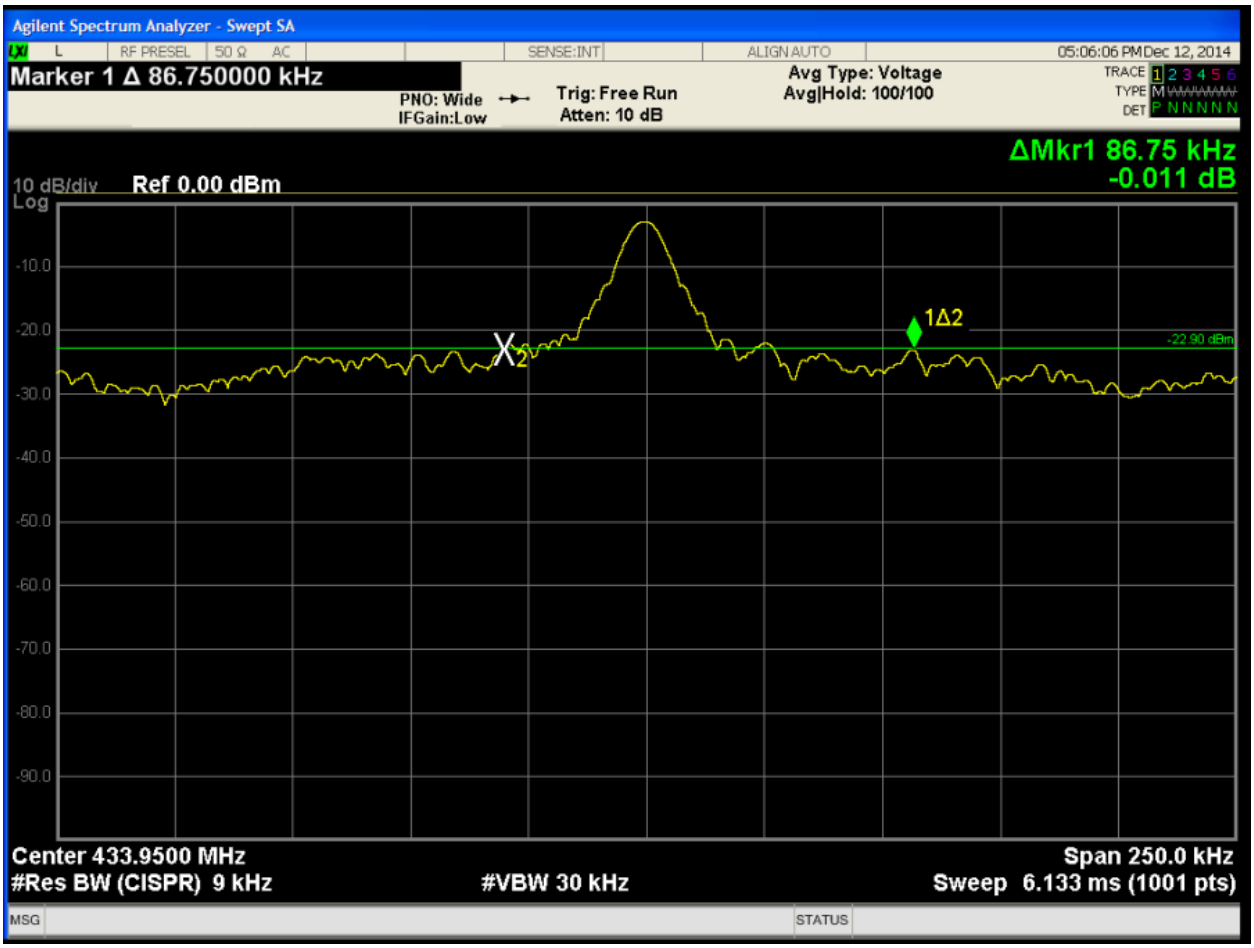


7.4 Plots:

Fundamental Freq	25% Fund BW	Measure 20dB BW	Result
433.95MHz	108.49KHz	86.75KHz	Pass



Peak Value



20dB BW

7.5 Results:

The sample tested was found to Comply.

Deviations, Additions, or Exclusions: None

8 AC Mains Conducted Emissions

8.1 Method

Tests are performed in accordance with CISPR 14-1.

TEST SITE: Vertical Ground Reference Plane

Measurement Uncertainty

For conducted emissions, U_{lab} (3.1 dB in worst case) < U_{CISPR} (3.6 dB), which is the reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculations

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

NF = RF + LF + CF + AF

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

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

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

Example:

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

8.2 Test Equipment Used:

Asset Number	Description	Manufacturer	Model	Serial Number	Cal Date	Cal Due
77	EMI Receiver rated: 10KHz-7GHz	R & S	ESI 7	100044	04/22/2014	04/22/2015
805	SMA RF CABLE	Insulated Wire Inc.	SPS-2303-4250-SPS	805	08/08/2014	08/08/2015
1560	Line Impedance Stabilization Network 9khz to 30MHz	Com-Power Corp	LI-215A	191942	11/27/2013	11/27/2014

Software Utilized:

Name	Manufacturer	Version
Total Integrated Laboratory Environment	**ETS-Lindgren**	**6.0**

8.3 Results:

The sample tested was found to Comply.

8.4 Setup Photographs:

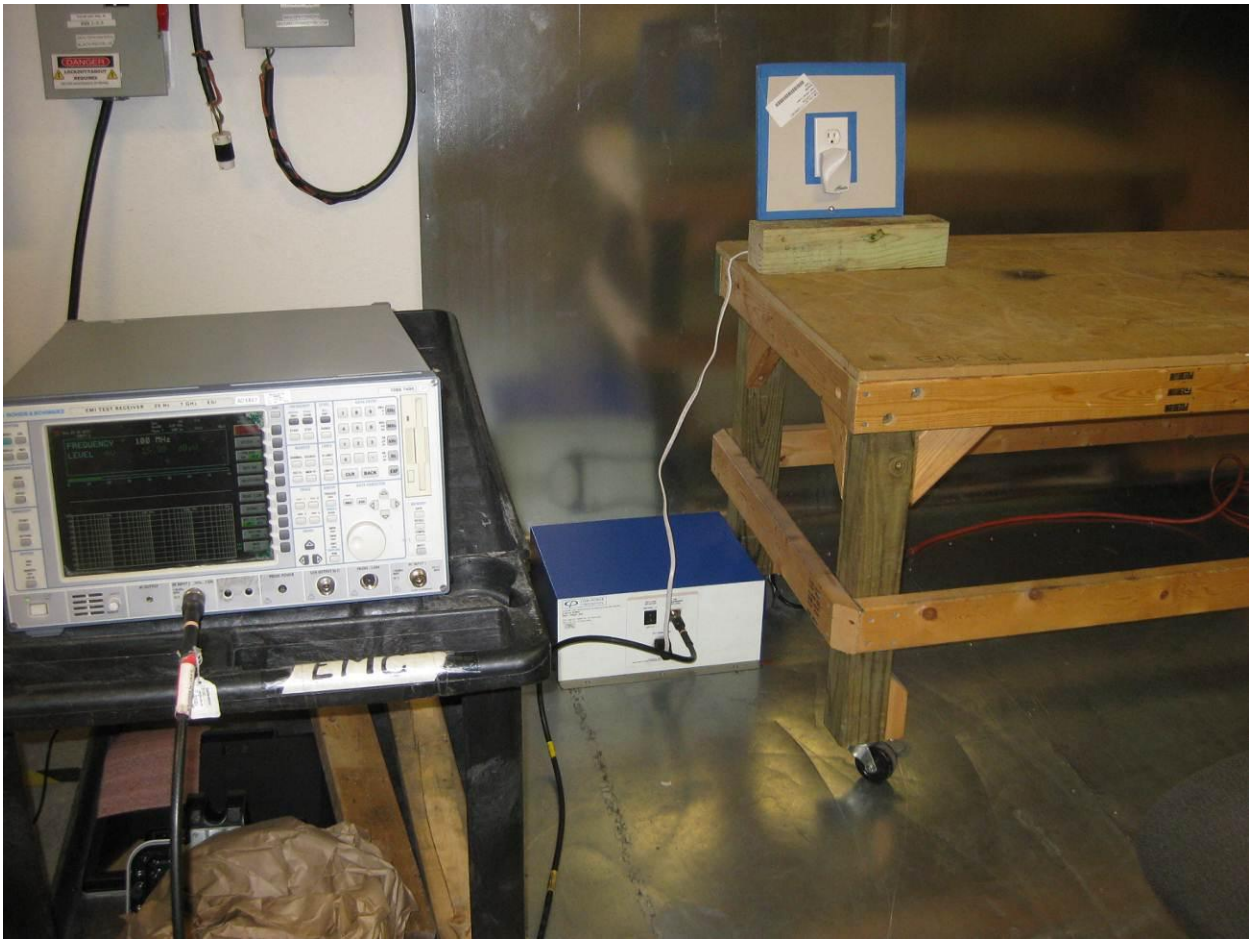


Figure 8-1 Conducted Emissions Test Setup

8.5 Plots/Data:

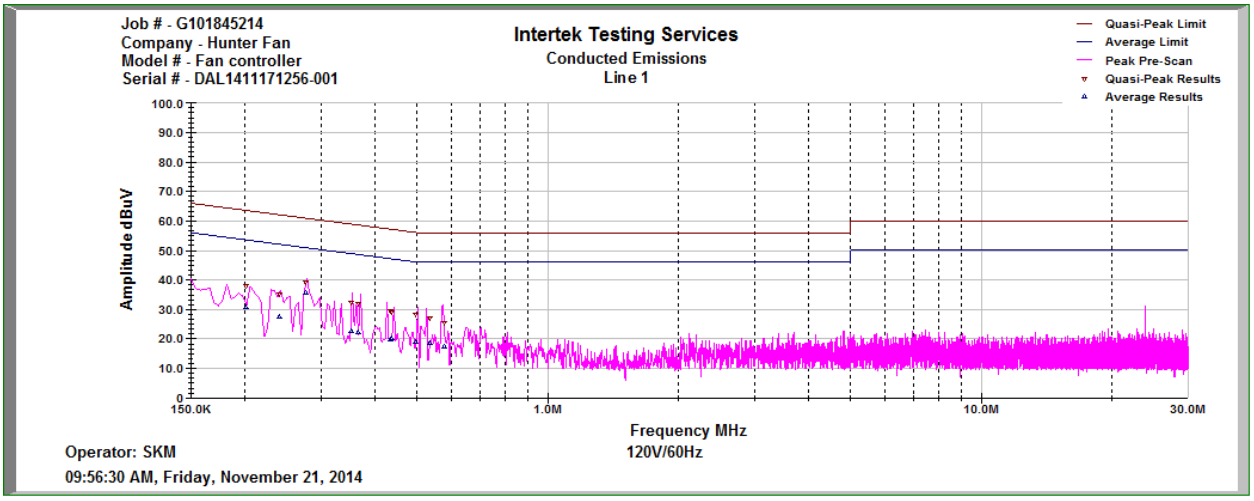


Figure 8-2 Conducted Emissions Line 1

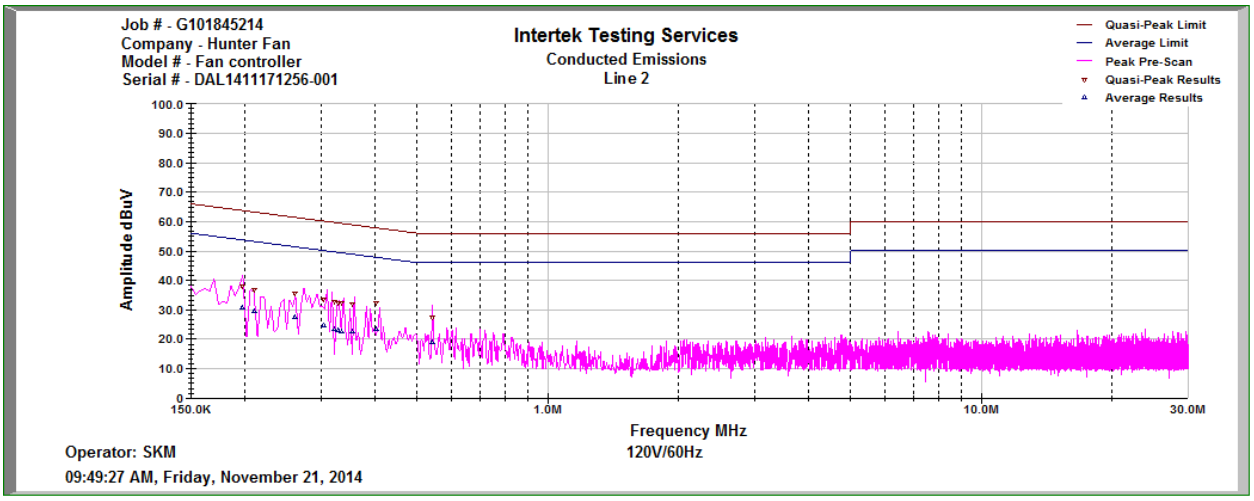


Figure 8-3 Conducted Emissions Line 2

Table 8-1 Conducted Emissions Line 1

Freq. MHz	QP Reading dBuV	Avg Reading dBuV	Cable Factor dB	Lisn Factor dB	Limiter Factor dB	Final QP Reading dBuV	Limit QP dBuV	Margin QP dB	Final Avg dBuV	Limit Avg dBuV	Margin Avg dB
0.2	37.63	30.47	0.02	0.31	0	37.96	63.53	-25.57	30.8	53.53	-22.73
0.24	34.97	27.32	0.02	0.3	0	35.29	62.06	-26.77	27.65	52.06	-24.41
0.28	39.02	35.16	0.02	0.3	0	39.34	60.92	-21.58	35.48	50.92	-15.44
0.35	31.92	22.15	0.02	0.3	0	32.24	58.94	-26.7	22.47	48.94	-26.48
0.37	31.48	21.69	0.02	0.3	0	31.8	58.58	-26.78	22	48.58	-26.58
0.43	29.35	19.4	0.02	0.29	0	29.66	57.19	-27.52	19.71	47.19	-27.48
0.44	28.65	19.85	0.02	0.29	0	28.96	57.12	-28.15	20.16	47.12	-26.95
0.5	27.78	18.47	0.02	0.29	0	28.09	56.07	-27.97	18.78	46.07	-27.28
0.53	26.88	18.21	0.02	0.29	0	27.19	56	-28.81	18.52	46	-27.48
0.58	25.32	17	0.02	0.29	0	25.63	56	-30.37	17.31	46	-28.69

Table 8-2 Conducted Emissions Line 2

Freq. MHz	QP Reading dBuV	Avg Reading dBuV	Cable Factor dB	Lisn Factor dB	Limiter Factor dB	Final QP Reading dBuV	Limit QP dBuV	Margin QP dB	Final Avg dBuV	Limit Avg dBuV	Margin Avg dB
0.2	37.78	30.64	0.02	0.06	0	37.86	63.69	-25.83	30.72	53.69	-22.97
0.21	36.59	29.55	0.02	0.06	0	36.67	63.21	-26.54	29.62	53.21	-23.59
0.26	35.34	27.51	0.02	0.05	0	35.41	61.41	-26	27.58	51.41	-23.83
0.3	33.36	24.57	0.02	0.05	0	33.43	60.14	-26.7	24.64	50.14	-25.5
0.32	32.8	23.45	0.02	0.05	0	32.86	59.65	-26.79	23.52	49.65	-26.14
0.33	32.34	23.07	0.02	0.04	0	32.41	59.52	-27.11	23.14	49.52	-26.38
0.34	32.23	22.69	0.02	0.04	0	32.29	59.32	-27.03	22.75	49.32	-26.57
0.35	31.92	22.39	0.02	0.04	0	31.98	58.85	-26.86	22.45	48.85	-26.39
0.4	32.16	23.18	0.02	0.04	0	32.22	57.82	-25.59	23.24	47.82	-24.57
0.54	27.61	18.76	0.02	0.04	0	27.67	56	-28.33	18.82	46	-27.18

Test Personnel: Shawn McGuinness
Test Date: November 21, 2014
Supervising/Reviewing Engineer: (Where Applicable)
Product Standard: FCC Part 15b
Limit Applied: Class B
Input Voltage: 120VAC/60Hz
Pretest Verification w/ Ambient Signals or BB Source: Yes
Ambient Temperature: 24 ºC
Relative Humidity: 39 %
Atmospheric Pressure: 991 mbars

Deviations, Additions, or Exclusions: None

9 Restrictions (FCC 15C - 15.231(a))

9.1 Method:

15.231(a) The provisions of this section are restricted to periodic operation within the band 40.66-40.70 MHz and above 70 MHz. Except as shown in
paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door
openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with
a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:
(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being
released.
(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to
determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more
than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does
not exceed two seconds per hour.
(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to
signal an alarm, may operate during the pendency of the alarm condition
(5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section,
provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is
released or a transmitter is activated automatically. Such set-up information may include data

9.2 Test Equipment Used:

Asset #	Description	Manufacturer	Model	Serial Number	Cal Date	Cal Due
77	EMI Receiver rated: 10KHz-7GHz	R & S	ESI 7	100044	04/22/2014	04/22/2015
804	SMA RF CABLE	Insulated Wire Inc.	SPS-2303-720-SPS	804	08/08/2014	08/08/2015
805	SMA RF CABLE	Insulated Wire Inc.	SPS-2303-4250-SPS	804	08/08/2014	08/08/2015
803	SMA RF CABLE	Insulated Wire Inc.	SPS-2301-180-SPS	803	08/08/2014	08/08/2015
238	cable	SemFlex	RF coax cable	none	07/21/2014	07/21/2015
1001	LNA 500 MHz to 18 GHz	Miteq, Inc.	AMF-5D-00501800-28-1	1469795	07/18/2014	07/18/2015
1179	Preamplifier 1-1000MHz 33dB Typical Gain	Com Power	PAM-103	441028	08/05/2014	08/05/2015
1324	Antenna - 20 MHz to 6 GHz	Sunol Sciences	JB6	A101612	03/04/2014	03/04/2015

9.3 Restricted Band Data

Antenna Orient	Freq MHz	Antenna Height	Azimuth degrees	Reading (dBuV/m)	Antenna Factors	Pre-Amp Factors	Cable Factors	Avg Final	R/Band LIMIT	R/Band Margin
V	403.94	152	305	55.5	16	35.2	2	38.3	46	-7.7
V	867.88	177	55	51	22.2	33.8	2.9	42.3	46	-3.7

15.231(a)	Response	Requirement
Frequency Range (Mhz, max)		40.66-40.70 MHz and > 70MHz
Frequency Range (MHz, min)		40.66-40.70 MHz and > 70MHz
Transmit only control signal?	Yes	Only control signal allowed
Continuous transmission?	No	No
Voice transmission?	No	No
Video transmission?	No	No
Radio control of toy?	No	No

15.231(a)(1)

Manually operated?	Yes	
Deactivates within 5 seconds?	Yes	Yes
Show plot (10 second sweep)	Yes (See Pg. 10)	Yes

15.231(a)(2)

Automatically operated?	No	
Deactivates within 5 seconds?	NA	Yes

15.231(a)(3)

Periodically transmits at predetermined intervals?	No	Allowed, with restrictions
Polling signals?	No	Allowed, with restrictions
Polling rate and timing	NA	< 2 seconds per hour

15.231(a)(4)

For Emergency Use?	No	Allowed

15.231(a)(5)

Exceed 15.231(a)(1) or (a)(2) requirements?	No	Allowed for professional install

10 Revision History

Revision Level	Date	Report Number	Notes
0	Dec. 17, 2014	101845214DAL-002	Original Issue