

# RF TEST REPORT



Report No.: 17071408-FCC-R-V1

Supersede Report No.: N/A

Applicant	Alcidae Inc.	
Product Name	Visioner	
Model No.	HQC001	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2017, ANSI C63.10: 2013	
Test Date	December 14, 2017 to January 30&February 23, 2018	
Issue Date	February 23, 2018	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification		<input checked="" type="checkbox"/>
Equipment did not comply with the specification		<input type="checkbox"/>
Aaron Liang Test Engineer	David Huang Checked By	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:

**SIEMIC (SHENZHEN-CHINA) LABORATORIES**

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## Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

### Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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## 1. Report Revision History

Report No.	Report Version	Description	Issue Date
17071408-FCC-R	NONE	Original	January 31, 2018
17071408-FCC-R-V1	V1	Updated the band-edge test data	February 23, 2018

## 2. Customer information

Applicant Name	Alcidae Inc.
Applicant Add	Room 809, Building A4, Science park, No. 15, Keyuan Road, Nanshan District Shenzhen China
Manufacturer	Alcidae Inc.
Manufacturer Add	Room 809, Building A4, Science park, No. 15, Keyuan Road, Nanshan District Shenzhen China

### 3. Test site information

Test Lab A:

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	535293
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

Test Lab B:

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China
FCC Test Site No.	694825
IC Test Site No.	4842B-1
Test Software	EZ_EMC(ver.lcp-03A1)

Note: We just perform Radiated Spurious Emission above 18GHz in the test Lab. B.

#### **4. Equipment under Test (EUT) Information**

Description of EUT: Visioner

Main Model: HQC001

Serial Model: N/A

Date EUT received: December 13, 2017

Test Date(s): December 14, 2017 to January 30&February 23, 2018

Equipment Category : DTS

Antenna Gain: WIFI: 2.5dBi

Antenna Type: PCB Antenna

Type of Modulation: 802.11b/g/n: DSSS, OFDM

RF Operating Frequency (ies): WIFI: 802.11b/g/n(20M): 2412-2462 MHz  
802.11b: 4.96dBm  
Max. Output Power: 802.11g: 4.12dBm  
802.11n(20M): 4.10dBm

Number of Channels: WIFI :802.11b/g/n(20M): 11CH

Port: Please refer to the user manual

Adapter:

Input Power: Model: TEKA006-0501000UK  
Input: AC100-240V~50/60Hz,0.2A MAX  
Output: DC 5.0V-1000mA

Trade Name : Alcidae

FCC ID: 2AOJSHQ001

## 5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.247 (a)(2)	DTS (6 dB&20 dB) CHANNEL BANDWIDTH	Compliance
§15.247(b)(3)	Conducted Maximum Output Power	Compliance
§15.247(e)	Power Spectral Density	Compliance
§15.247(d)	Band-Edge & Unwanted Emissions into Restricted Frequency Bands	Compliance
§15.207 (a),	AC Power Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

### Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Band-Edge & Unwanted Emissions into Restricted Frequency Bands and Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-

## **6. Measurements, Examination And Derived Results**

### **6.1 Antenna Requirement**

#### **Applicable Standard**

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### **Antenna Connector Construction**

The EUT has 1 antenna:

A permanently attached PCB antenna for WIFI, the gain is 2.5dBi for WIFI.

**The antenna meets up with the ANTENNA REQUIREMENT.**

**Result:** Compliance.

## 6.2 DTS (6 dB&20 dB) Channel Bandwidth

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1024mbar
Test date :	January 24, 2018
Tested By :	Aaron Liang

	case (i.e., the widest) bandwidth. Unless otherwise specified for an unlicensed wireless device, measure the bandwidth at the 20 dB levels with respect to the reference level.
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

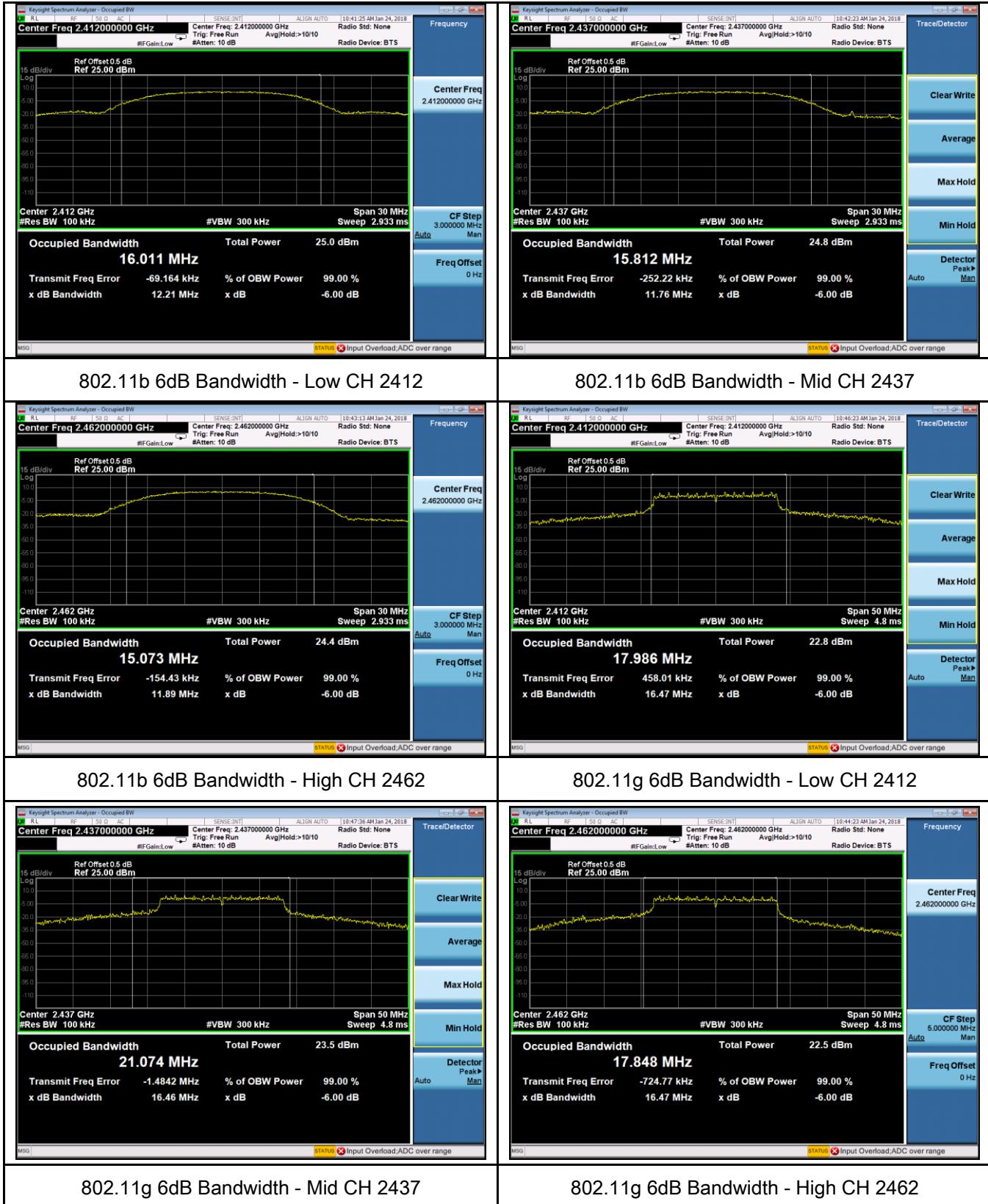
#### Measurement result

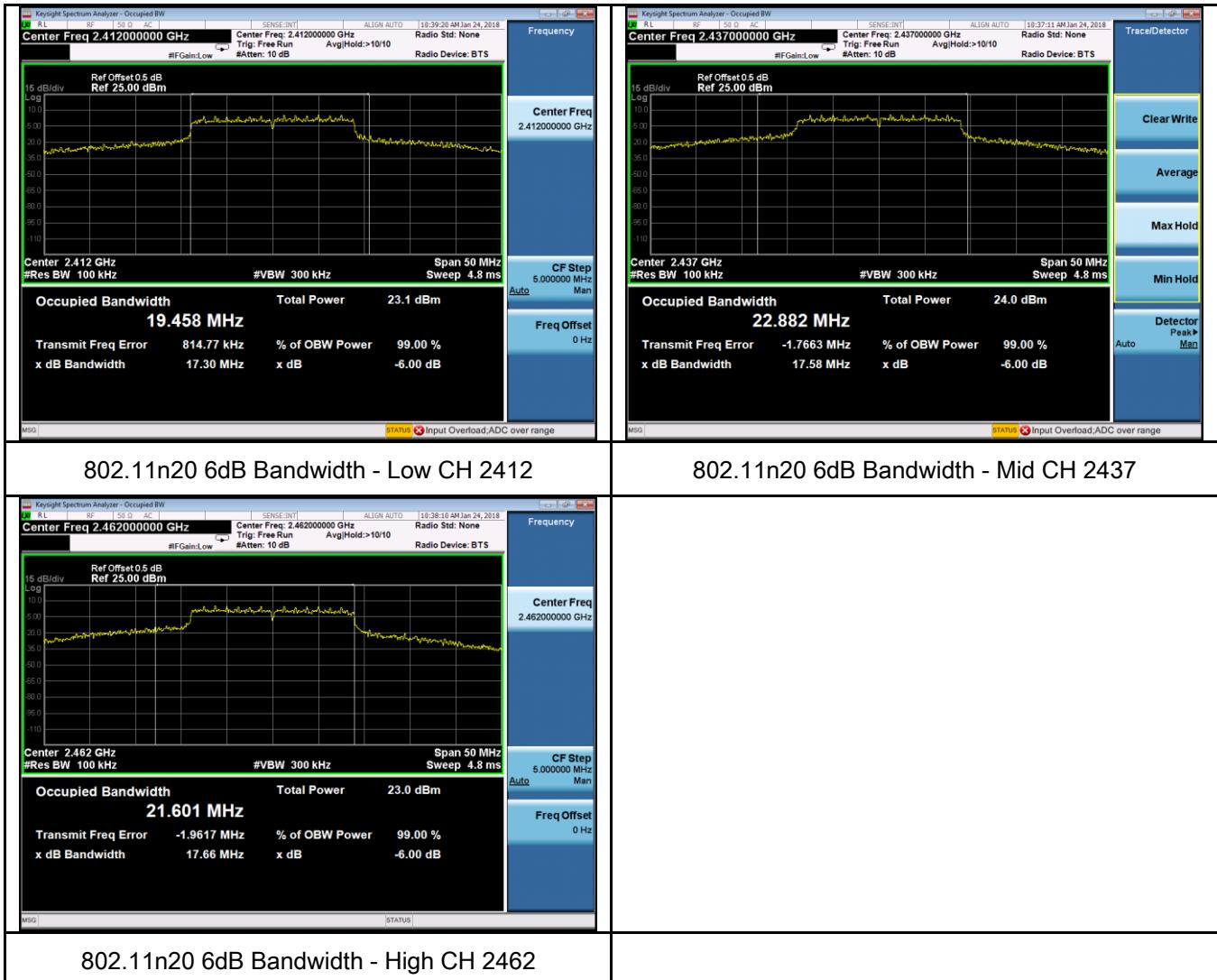
Test mode	CH	Freq (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	12.21	$\geq 0.5$
	Mid	2437	11.76	$\geq 0.5$
	High	2462	11.89	$\geq 0.5$
802.11g	Low	2412	16.47	$\geq 0.5$
	Mid	2437	16.46	$\geq 0.5$
	High	2462	16.47	$\geq 0.5$
802.11n (20M)	Low	2412	17.30	$\geq 0.5$
	Mid	2437	17.58	$\geq 0.5$
	High	2462	17.66	$\geq 0.5$

Test mode	CH	Freq (MHz)	20dB Bandwidth (MHz)
802.11b	Low	2412	18.12
	Mid	2437	17.83
	High	2462	17.68
802.11g	Low	2412	19.10
	Mid	2437	21.98
	High	2462	19.12
802.11n (20M)	Low	2412	18.96
	Mid	2437	19.55
	High	2462	18.95

## Test Plots

### 6dB Bandwidth measurement result





## 20 dB Bandwidth measurement result



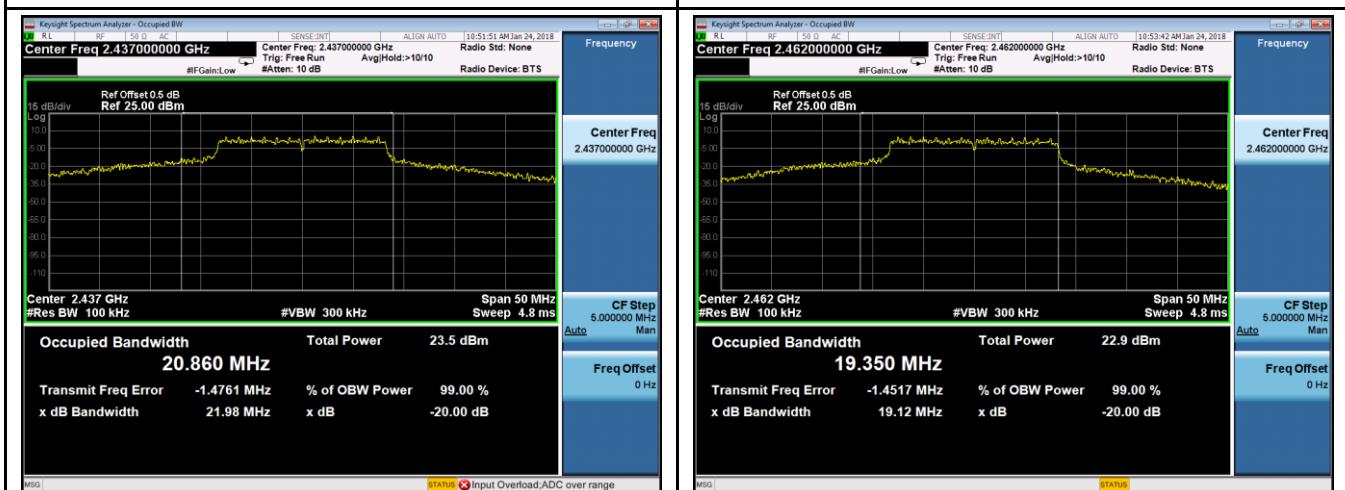
802.11b 20dB Bandwidth - Low CH 2412

802.11b 20dB Bandwidth - Mid CH 2437



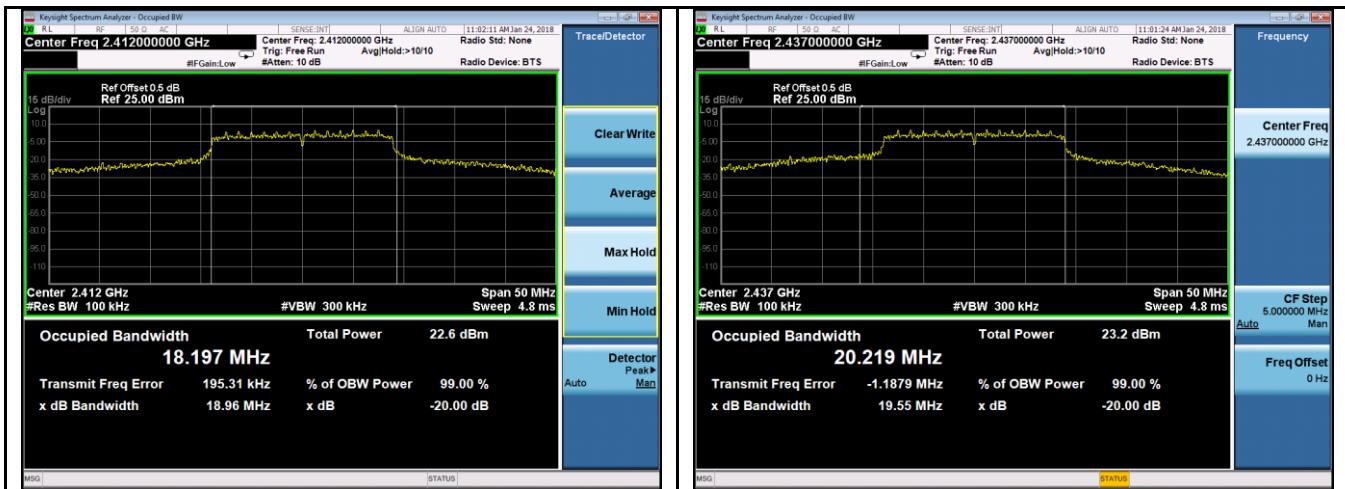
802.11b 20dB Bandwidth - High CH 2462

802.11g 20dB Bandwidth - Low CH 2412



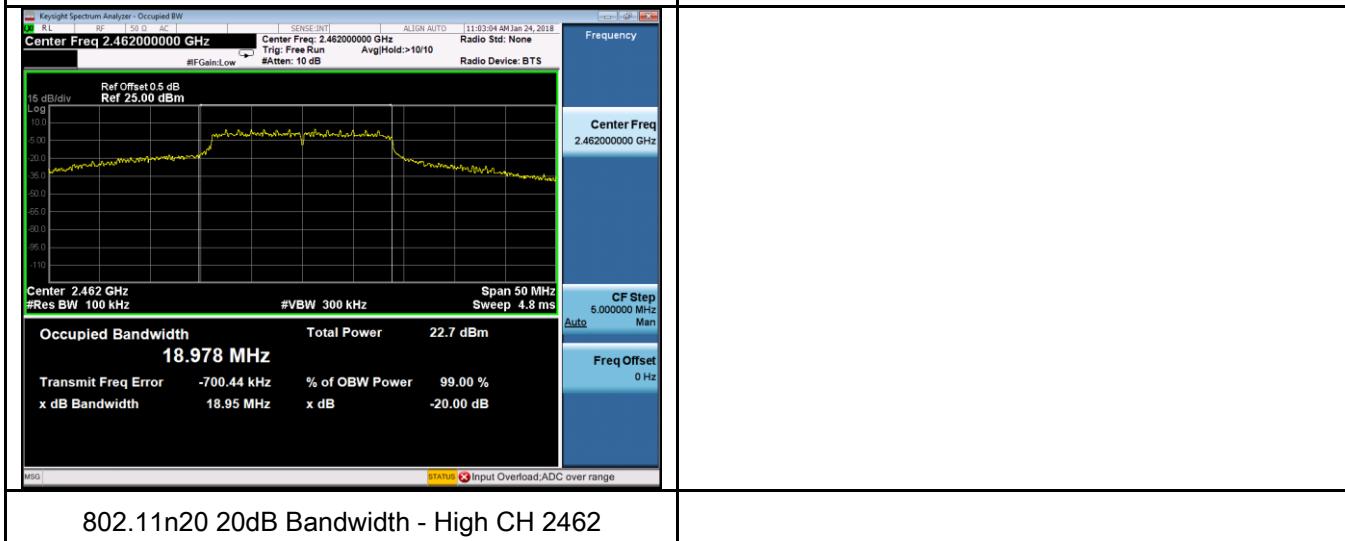
802.11g 20dB Bandwidth - Mid CH 2437

802.11g 20dB Bandwidth - High CH 2462



802.11n20 20dB Bandwidth - Low CH 2412

802.11n20 20dB Bandwidth - Mid CH 2437

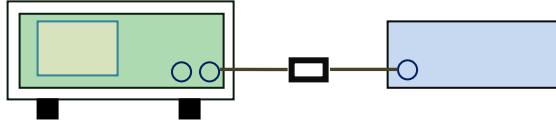


802.11n20 20dB Bandwidth - High CH 2462

### 6.3 Maximum Output Power

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1024mbar
Test date :	January 24, 2018
Tested By :	Aaron Liang

#### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (3), RSS210 (A8.4)	a)	FHSS in 2400-2483.5MHz with $\geq$ 75 channels: $\leq$ 1 Watt	<input type="checkbox"/>
	b)	FHSS in 5725-5850MHz: $\leq$ 1 Watt	<input type="checkbox"/>
	c)	For all other FHSS in the 2400-2483.5MHz band: $\leq$ 0.125 Watt.	<input type="checkbox"/>
	d)	FHSS in 902-928MHz with $\geq$ 50 channels: $\leq$ 1 Watt	<input type="checkbox"/>
	e)	FHSS in 902-928MHz with $\geq$ 25 & $< 50$ channels: $\leq$ 0.25 Watt	<input type="checkbox"/>
	f)	DTS in 902-928MHz, 2400-2483.5MHz: $\leq$ 1 Watt	<input checked="" type="checkbox"/>
Test Setup		 <b>Spectrum Analyzer</b> <b>EUT</b>	
Test Procedure		<p>558074 D01 DTS MEAS Guidance v03r03, 9.1.2 Integrated band power method</p> <p>Maximum output power measurement procedure</p> <ul style="list-style-type: none"> <li>- a) Set span to at least 1.5 times the OBW.</li> <li>- b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.</li> <li>- c) Set VBW <math>\geq</math> 3 x RBW.</li> <li>- d) Number of points in sweep <math>\geq</math> 2 <math>\times</math> span / RBW. (This gives bin-to-bin spacing <math>\leq</math> RBW/2, so that narrowband signals are not lost between frequency bins.)</li> <li>- e) Sweep time = auto.</li> <li>- f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.</li> <li>- g) If transmit duty cycle <math>&lt;</math> 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum</li> </ul>	

	<p>power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle <math>\geq 98\%</math>, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “ free run” .</p> <ul style="list-style-type: none"> <li>- h) Trace average at least 100 traces in power averaging (i.e., RMS) mode.</li> <li>- i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’ s band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.</li> </ul>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data  Yes  N/A

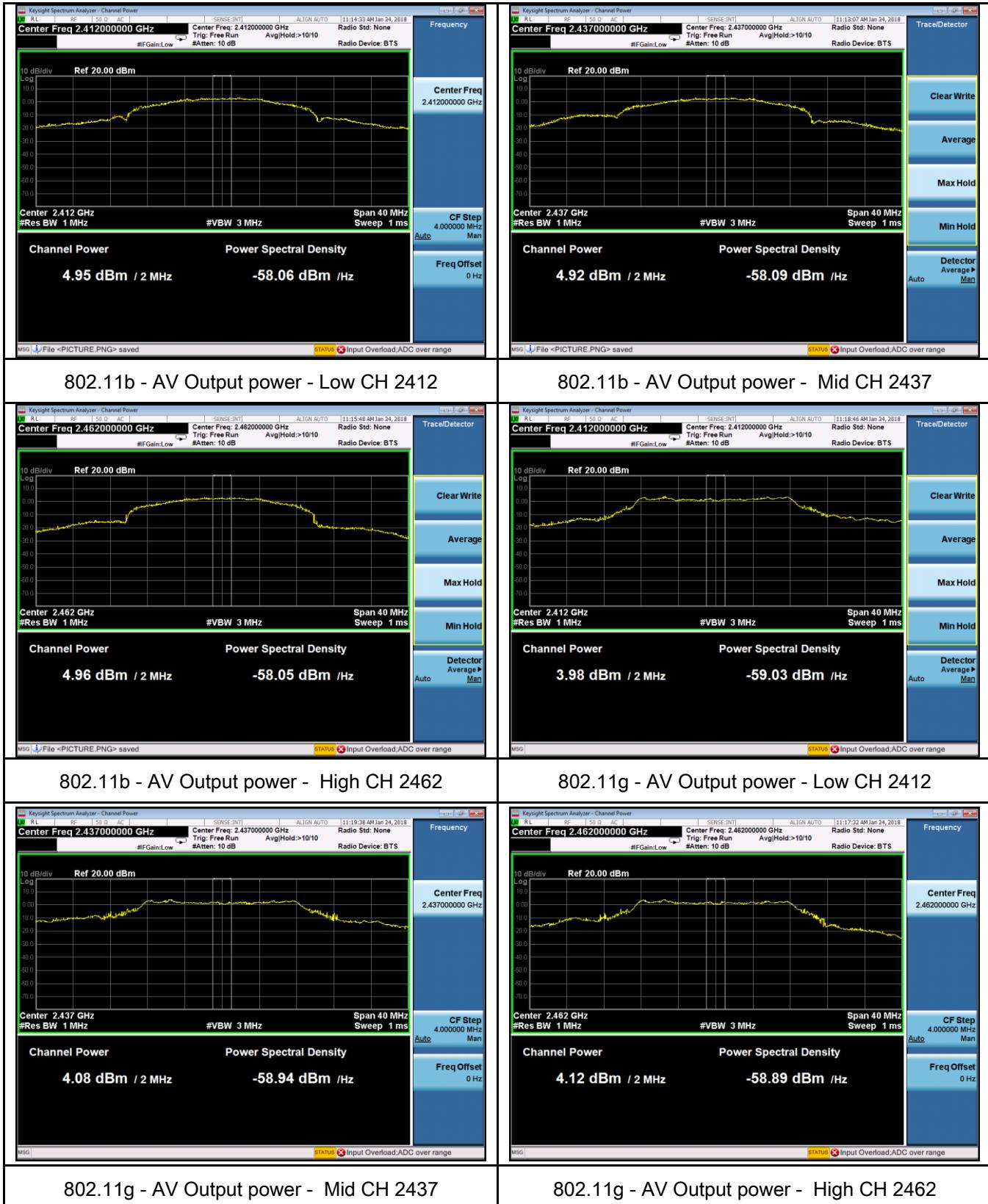
Test Plot  Yes (See below)  N/A

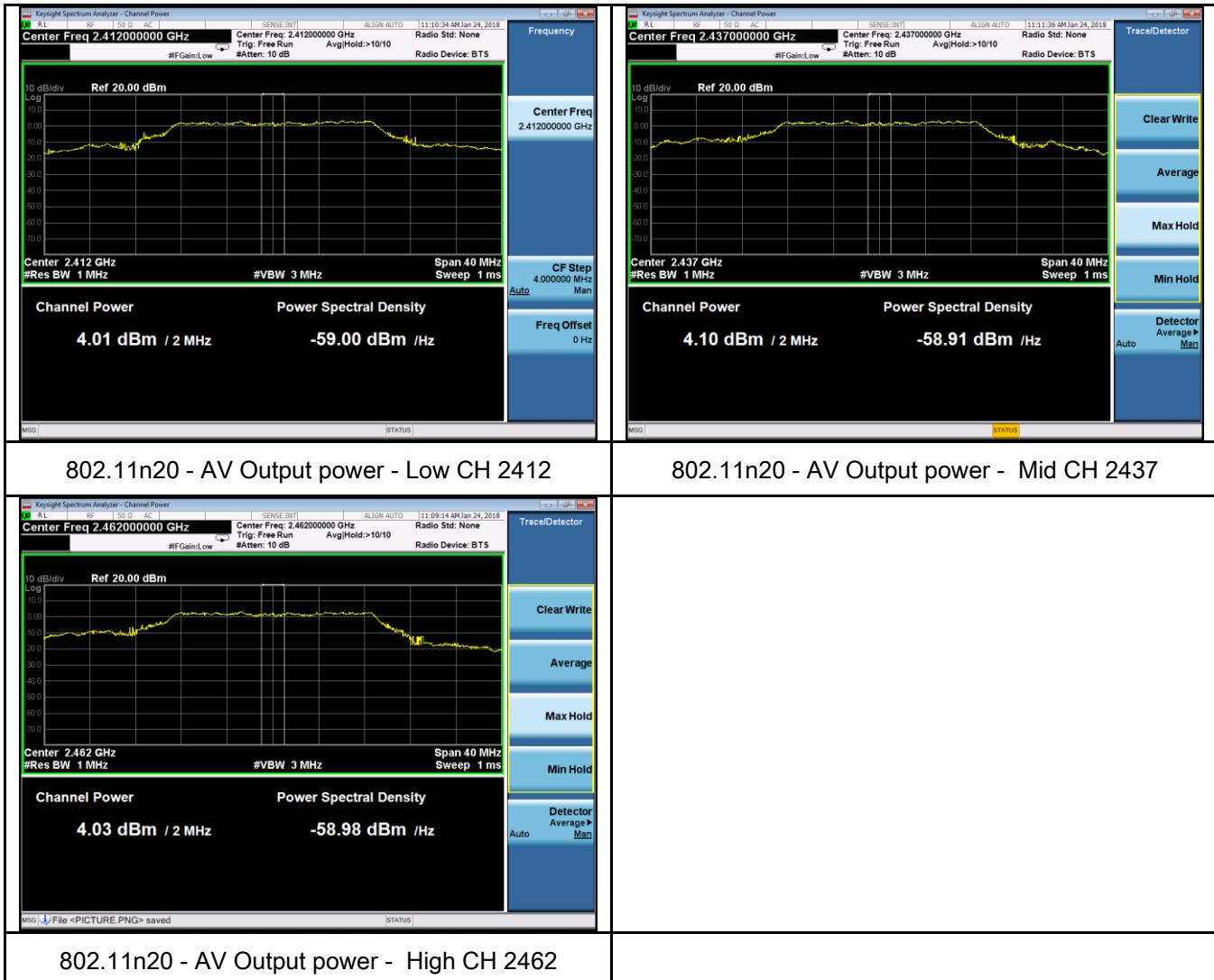
#### Output Power measurement result

Type	Test mode	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Result
Output power	802.11b	Low	2412	4.95	30	Pass
		Mid	2437	4.92	30	Pass
		High	2462	4.96	30	Pass
	802.11g	Low	2412	3.98	30	Pass
		Mid	2437	4.08	30	Pass
		High	2462	4.12	30	Pass
	802.11n (20M)	Low	2412	4.01	30	Pass
		Mid	2437	4.10	30	Pass
		High	2462	4.03	30	Pass

## Test Plots

### The Average Power





## 6.4 Power Spectral Density

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1024mbar
Test date :	January 24, 2018
Tested By :	Aaron Liang

Test Data  Yes  N/A

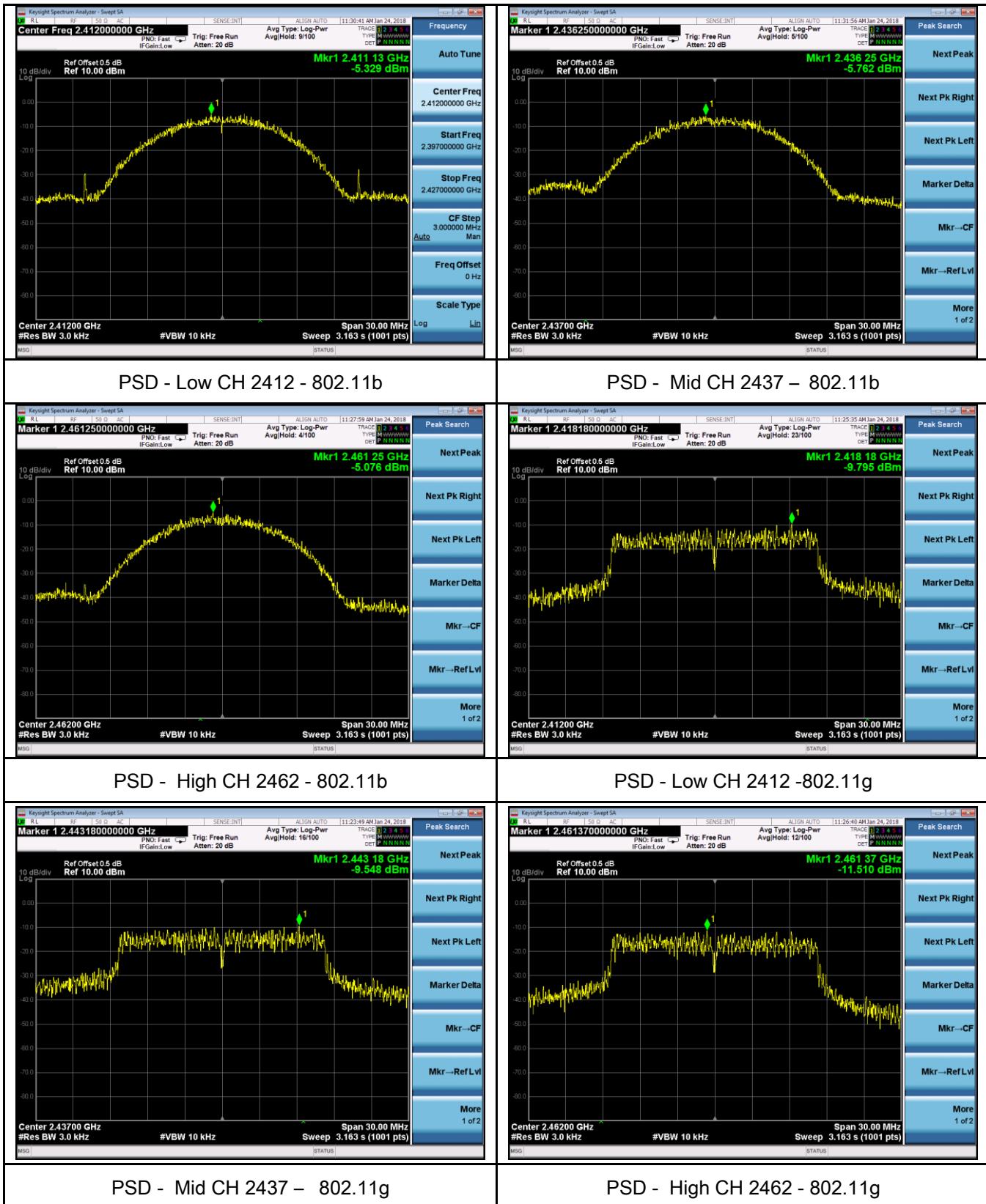
Test Plot  Yes (See below)  N/A

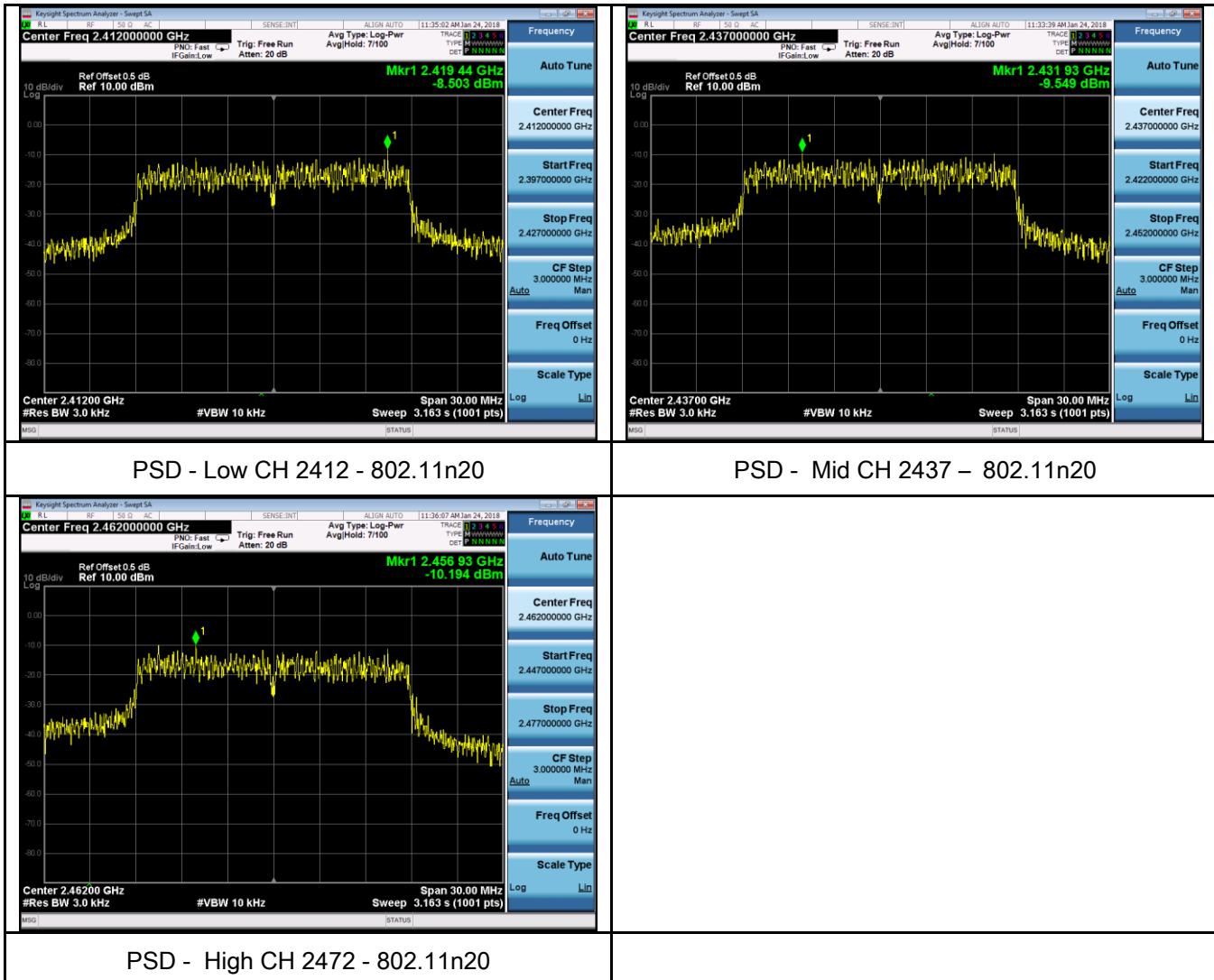
### Power Spectral Density measurement result

Type	Test mode	CH	Freq (MHz)	PSD	Limit (dBm)	Result
				(dBm)		
PSD	802.11b	Low	2412	-5.329	8	Pass
		Mid	2437	-5.762	8	Pass
		High	2462	-5.076	8	Pass
	802.11g	Low	2412	-9.795	8	Pass
		Mid	2437	-9.548	8	Pass
		High	2462	-11.510	8	Pass
	802.11n (20M)	Low	2412	-8.503	8	Pass
		Mid	2437	-9.549	8	Pass
		High	2462	-10.194	8	Pass

## Test Plots

### Power Spectral Density measurement result

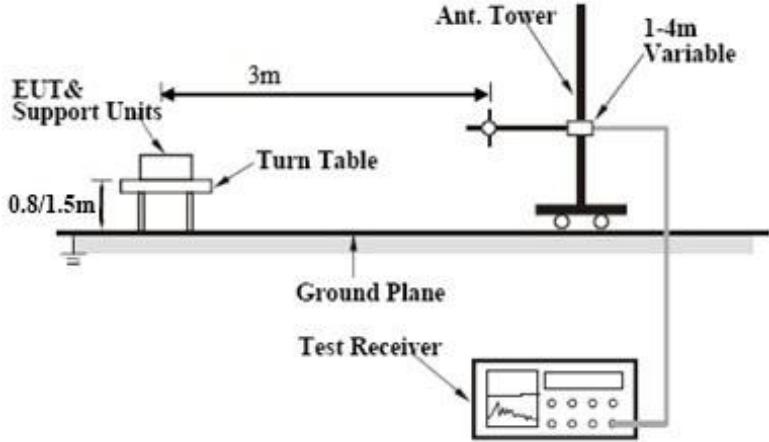




## 6.5 Band-Edge & Unwanted Emissions into Restricted Frequency Bands

Temperature	25°C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	February 23, 2018
Tested By :	Aaron Liang

### Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(d)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.	<input checked="" type="checkbox"/>
Test Setup	 <p>The diagram illustrates the test setup. An 'EUT &amp; Support Units' is positioned on a 'Turn Table' at a height of '0.8/1.5m' from the 'Ground Plane'. A '3m' horizontal distance separates the EUT from an 'Ant. Tower'. The 'Ant. Tower' is mounted on a '1-4m Variable' height adjustable base. A 'Test Receiver' is connected to the tower, with its signal path indicated by a line leading to the receiver unit.</p>		
Test Procedure	<p>Radiated Method Only</p> <ul style="list-style-type: none"> <li>- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.</li> <li>- 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.</li> </ul>		

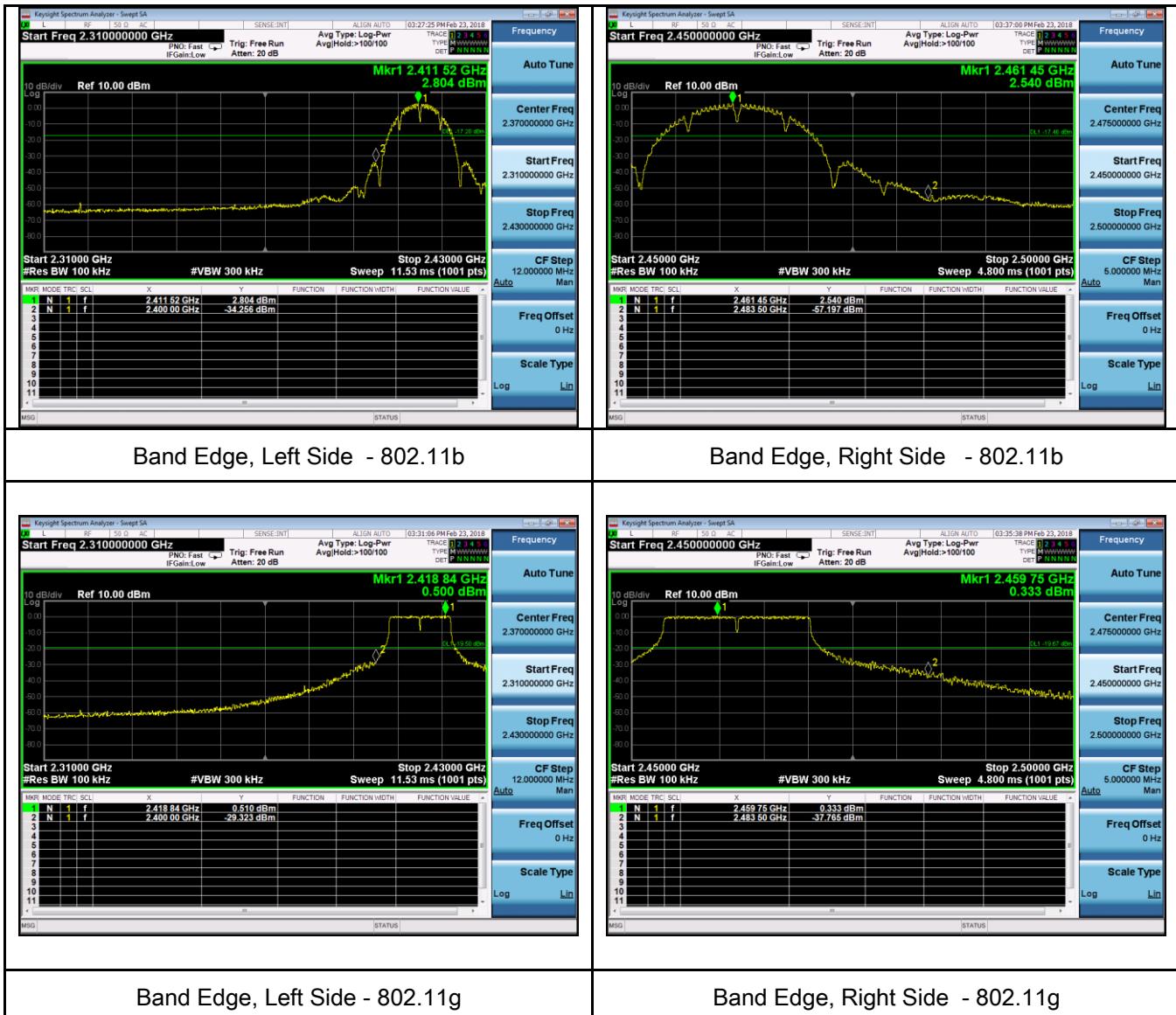
	<ul style="list-style-type: none"> <li>- 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below:           <ul style="list-style-type: none"> <li>a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.</li> <li>b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz.</li> <li>c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz.</li> </ul> </li> <li>- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.</li> <li>- 5. Repeat above procedures until all measured frequencies were complete.</li> </ul>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

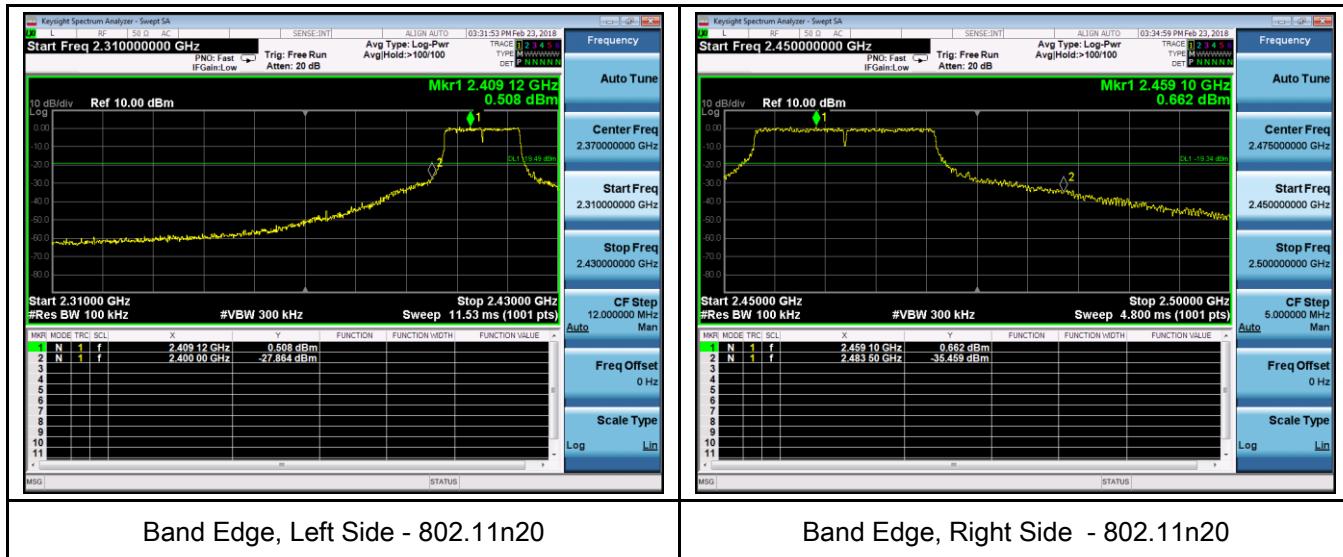
Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

## Test Plots

### Band Edge measurement result



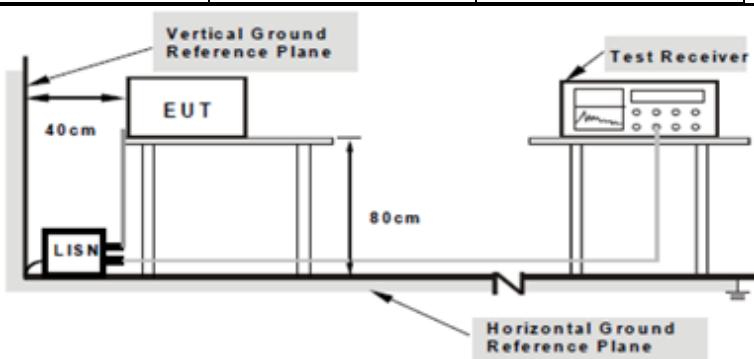


Note: Both Horizontal and vertical polarities were investigated

## 6.6 AC Power Line Conducted Emissions

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1018mbar
Test date :	December 19, 2017
Tested By :	Aaron Liang

### Requirement(s):

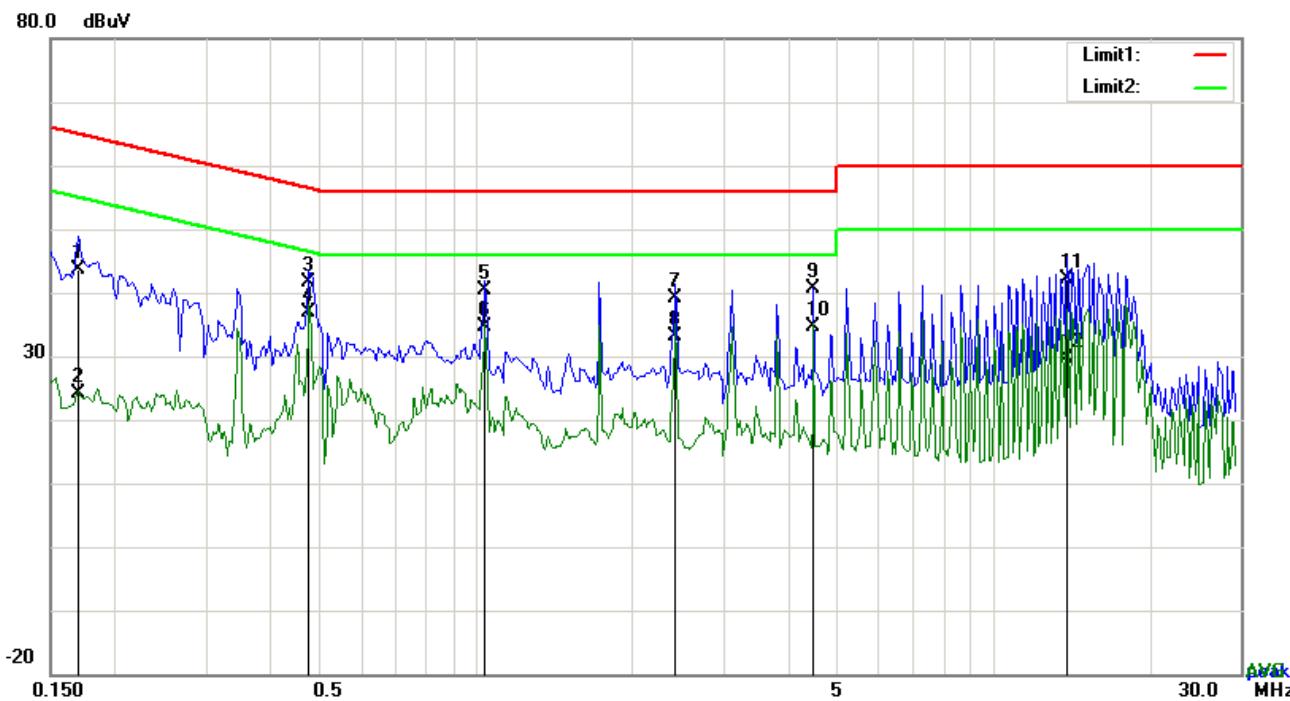
Spec	Item	Requirement	Applicable														
47CFR§15.207, RSS210 (A8.1)	a)	<p>For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu] H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.</p> <table border="1"> <thead> <tr> <th rowspan="2">Frequency ranges (MHz)</th> <th colspan="2">Limit (dB<math>\mu</math>V)</th> </tr> <tr> <th>QP</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15 ~ 0.5</td> <td>66 – 56</td> <td>56 – 46</td> </tr> <tr> <td>0.5 ~ 5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5 ~ 30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>	Frequency ranges (MHz)	Limit (dB $\mu$ V)		QP	Average	0.15 ~ 0.5	66 – 56	56 – 46	0.5 ~ 5	56	46	5 ~ 30	60	50	<input checked="" type="checkbox"/>
Frequency ranges (MHz)	Limit (dB $\mu$ V)																
	QP	Average															
0.15 ~ 0.5	66 – 56	56 – 46															
0.5 ~ 5	56	46															
5 ~ 30	60	50															
Test Setup	 <p><b>Note:</b> 1. Support units were connected to second LISN. 2. Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p>																
Procedure	<ol style="list-style-type: none"> <li>The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.</li> <li>The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.</li> <li>The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss</li> </ol>																

	<p>coaxial cable.</p> <ol style="list-style-type: none"> <li>4. All other supporting equipment were powered separately from another main supply.</li> <li>5. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.</li> <li>7. High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz.</li> <li>8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).</li> </ol>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

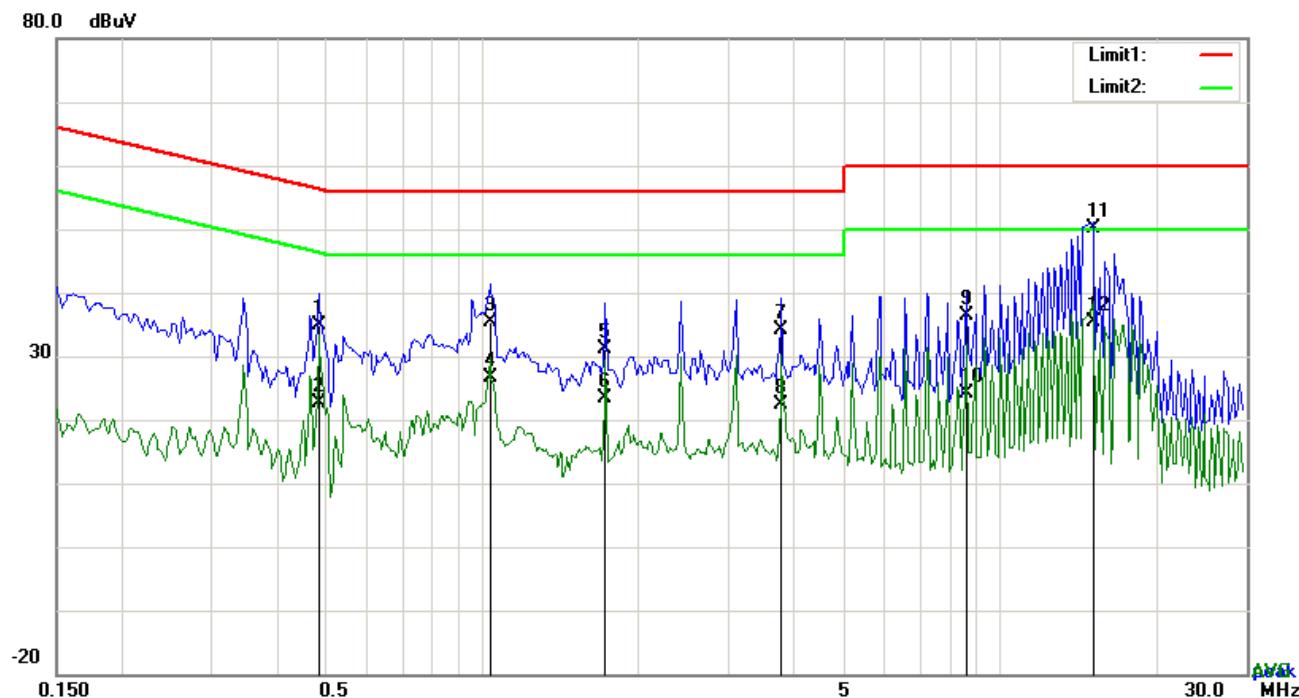
**Test Mode:** Transmitting Mode



Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB)	Result (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
1	L1	0.1695	33.65	QP	10.02	43.67	64.98	-21.31
2	L1	0.1695	14.02	AVG	10.02	24.04	54.98	-30.94
3	L1	0.4737	31.67	QP	10.02	41.69	56.45	-14.76
4	L1	0.4737	26.88	AVG	10.02	36.90	46.45	-9.55
5	L1	1.0392	30.31	QP	10.03	40.34	56.00	-15.66
6	L1	1.0392	24.57	AVG	10.03	34.60	46.00	-11.40
7	L1	2.4237	28.99	QP	10.04	39.03	56.00	-16.97
8	L1	2.4237	23.10	AVG	10.04	33.14	46.00	-12.86
9	L1	4.4976	30.45	QP	10.06	40.51	56.00	-15.49
10	L1	4.4976	24.67	AVG	10.06	34.73	46.00	-11.27
11	L1	13.8420	31.89	QP	10.19	42.08	60.00	-17.92
12	L1	13.8420	19.53	AVG	10.19	29.72	50.00	-20.28

**Test Mode:** Transmitting Mode

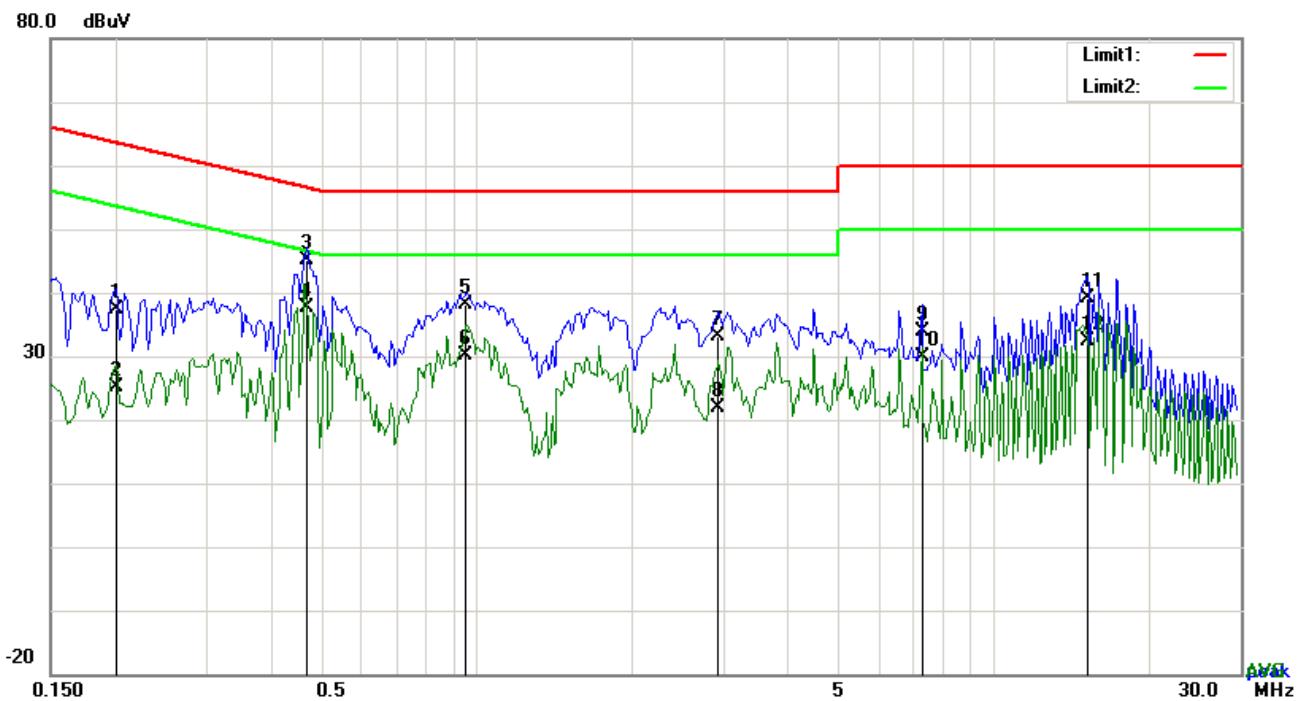


**Test Data**

**Phase Neutral Plot at 120Vac, 60Hz**

No.	P/L	Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB)	Result (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
1	N	0.4815	24.83	QP	10.02	34.85	56.31	-21.46
2	N	0.4815	12.58	AVG	10.02	22.60	46.31	-23.71
3	N	1.0353	25.33	QP	10.03	35.36	56.00	-20.64
4	N	1.0353	16.63	AVG	10.03	26.66	46.00	-19.34
5	N	1.7256	21.10	QP	10.04	31.14	56.00	-24.86
6	N	1.7256	13.29	AVG	10.04	23.33	46.00	-22.67
7	N	3.7956	24.07	QP	10.06	34.13	56.00	-21.87
8	N	3.7956	12.39	AVG	10.06	22.45	46.00	-23.55
9	N	8.6316	26.22	QP	10.12	36.34	60.00	-23.66
10	N	8.6316	13.95	AVG	10.12	24.07	50.00	-25.93
11	N	15.2109	39.90	QP	10.20	50.10	60.00	-9.90
12	N	15.2109	25.21	AVG	10.20	35.41	50.00	-14.59

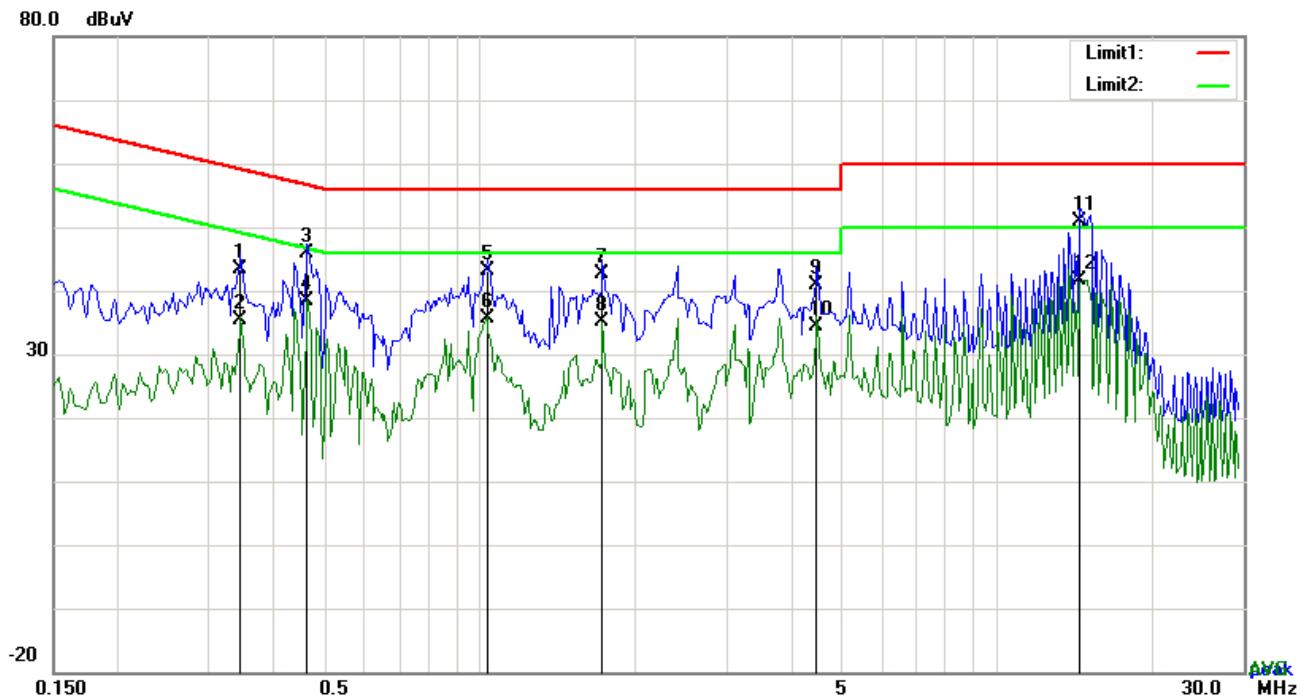
**Test Mode:** Transmitting Mode



Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB)	Result (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
1	L1	0.2007	27.42	QP	10.03	37.45	63.58	-26.13
2	L1	0.2007	15.17	AVG	10.03	25.20	53.58	-28.38
3	L1	0.4698	35.01	QP	10.03	45.04	56.52	-11.48
4	L1	0.4698	27.59	AVG	10.03	37.62	46.52	-8.90
5	L1	0.9573	28.03	QP	10.03	38.06	56.00	-17.94
6	L1	0.9573	20.12	AVG	10.03	30.15	46.00	-15.85
7	L1	2.9307	22.96	QP	10.05	33.01	56.00	-22.99
8	L1	2.9307	11.71	AVG	10.05	21.76	46.00	-24.24
9	L1	7.2588	23.73	QP	10.11	33.84	60.00	-26.16
10	L1	7.2588	19.89	AVG	10.11	30.00	50.00	-20.00
11	L1	15.2109	28.79	QP	10.23	39.02	60.00	-20.98
12	L1	15.2109	22.08	AVG	10.23	32.31	50.00	-17.69

**Test Mode:** Transmitting Mode



**Test Data**

**Phase Neutral Plot at 240Vac, 60Hz**

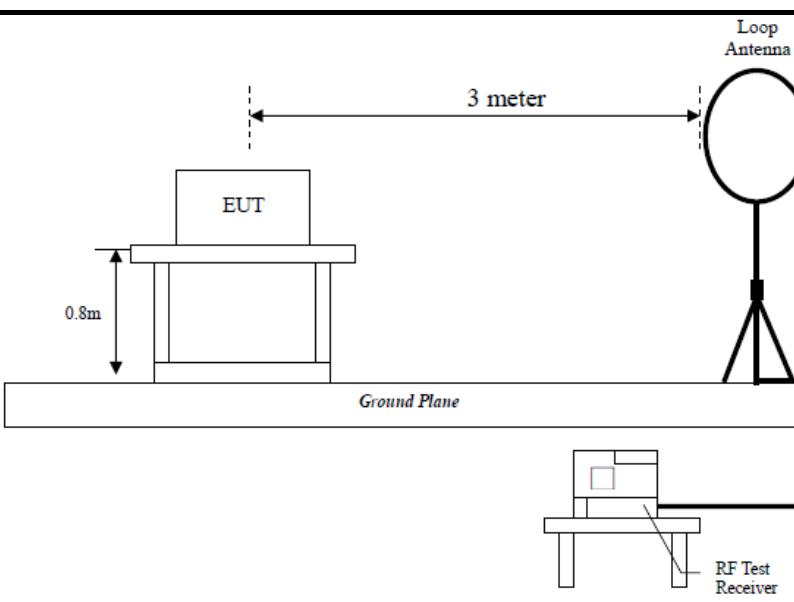
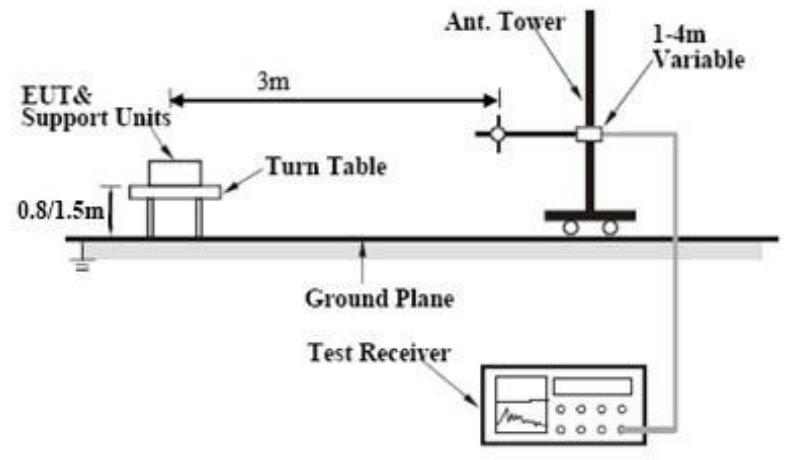
No.	P/L	Frequency (MHz)	Reading (dB $\mu$ V)	Detector	Corrected (dB)	Result (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
1	N	0.3450	33.35	QP	10.02	43.37	59.08	-15.71
2	N	0.3450	25.48	AVG	10.02	35.50	49.08	-13.58
3	N	0.4659	35.84	QP	10.02	45.86	56.59	-10.73
4	N	0.4659	28.35	AVG	10.02	38.37	46.59	-8.22
5	N	1.0353	33.18	QP	10.03	43.21	56.00	-12.79
6	N	1.0353	25.62	AVG	10.03	35.65	46.00	-10.35
7	N	1.7295	32.68	QP	10.04	42.72	56.00	-13.28
8	N	1.7295	25.15	AVG	10.04	35.19	46.00	-10.81
9	N	4.4898	30.89	QP	10.06	40.95	56.00	-15.05
10	N	4.4898	24.25	AVG	10.06	34.31	46.00	-11.69
11	N	14.5128	40.71	QP	10.19	50.90	60.00	-9.10
12	N	14.5128	31.54	AVG	10.19	41.73	50.00	-8.27

## 6.7 Radiated Spurious Emissions & Restricted Band

Temperature	25°C
Relative Humidity	57%
Atmospheric Pressure	1018mbar
Test date :	December 19, 2017
Tested By :	Aaron Liang

### Requirement(s):

Spec	Item	Requirement	Applicable																
47CFR§15. 247(d), RSS210	a)	<p>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges</p> <table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength (<math>\mu</math>V/m)</th> </tr> </thead> <tbody> <tr> <td>0.009~0.490</td> <td>2400/F(KHz)</td> </tr> <tr> <td>0.490~1.705</td> <td>24000/F(KHz)</td> </tr> <tr> <td>1.705~30.0</td> <td>30</td> </tr> <tr> <td>30 – 88</td> <td>100</td> </tr> <tr> <td>88 – 216</td> <td>150</td> </tr> <tr> <td>216~960</td> <td>200</td> </tr> <tr> <td>Above 960</td> <td>500</td> </tr> </tbody> </table>	Frequency range (MHz)	Field Strength ( $\mu$ V/m)	0.009~0.490	2400/F(KHz)	0.490~1.705	24000/F(KHz)	1.705~30.0	30	30 – 88	100	88 – 216	150	216~960	200	Above 960	500	<input checked="" type="checkbox"/>
Frequency range (MHz)	Field Strength ( $\mu$ V/m)																		
0.009~0.490	2400/F(KHz)																		
0.490~1.705	24000/F(KHz)																		
1.705~30.0	30																		
30 – 88	100																		
88 – 216	150																		
216~960	200																		
Above 960	500																		
	b)	<p>For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required</p> <p><input checked="" type="checkbox"/> 20 dB down <input type="checkbox"/> 30 dB down</p>	<input checked="" type="checkbox"/>																
	c)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	<input checked="" type="checkbox"/>																

Test Setup	 <p>The diagram shows the test setup. An EUT (Equipment Under Test) is placed on a turntable, which is positioned on a ground plane. A loop antenna is positioned 3 meters away from the EUT. An RF test receiver is connected to the loop antenna. A detailed view of the EUT and support units on the turntable is also shown.</p>  <p>The diagram shows the antenna tower setup. The EUT and support units are on a turntable, 3 meters away from an antenna tower. The antenna tower has a height of 1-4 meters and is variable. A test receiver is connected to the antenna tower.</p>
Procedure	<ol style="list-style-type: none"> <li>1. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:             <ol style="list-style-type: none"> <li>a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>b. The EUT was then rotated to the direction that gave the maximum emission.</li> <li>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> </li> <li>3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.</li> <li>4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz.</li> </ol>

	<p>The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz.</p> <p>5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</p>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

## Test Result:

Test Mode:	Transmitting Mode
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Frequency range: 9KHz - 30MHz

Freq. (MHz)	Detection value	Factor (dB/m)	Reading (dBuV/m)	Result (dBuV/m)	Limit@3m (dBuV/m)	Margin (dB)
--	--	--	--	--	--	>20
--	--	--	--	--	--	>20

Note:

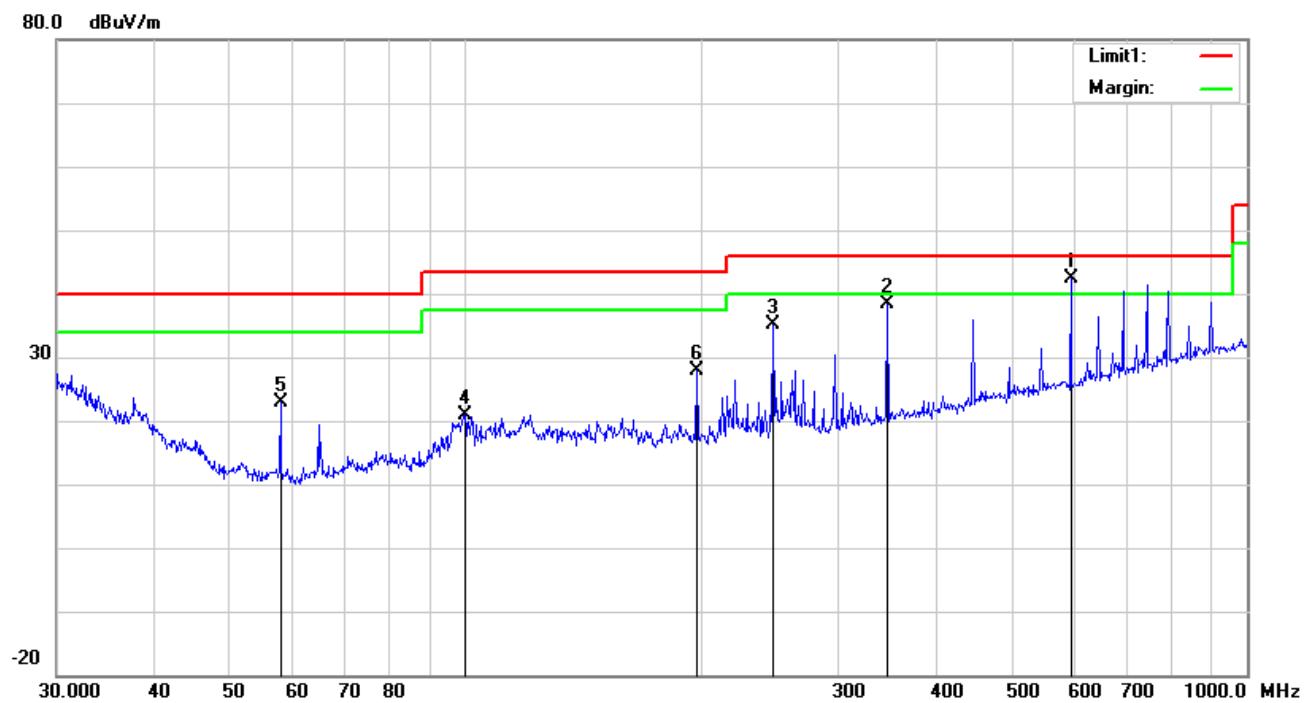
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

**Test Mode:** Transmitting Mode

**30MHz -1GHz**

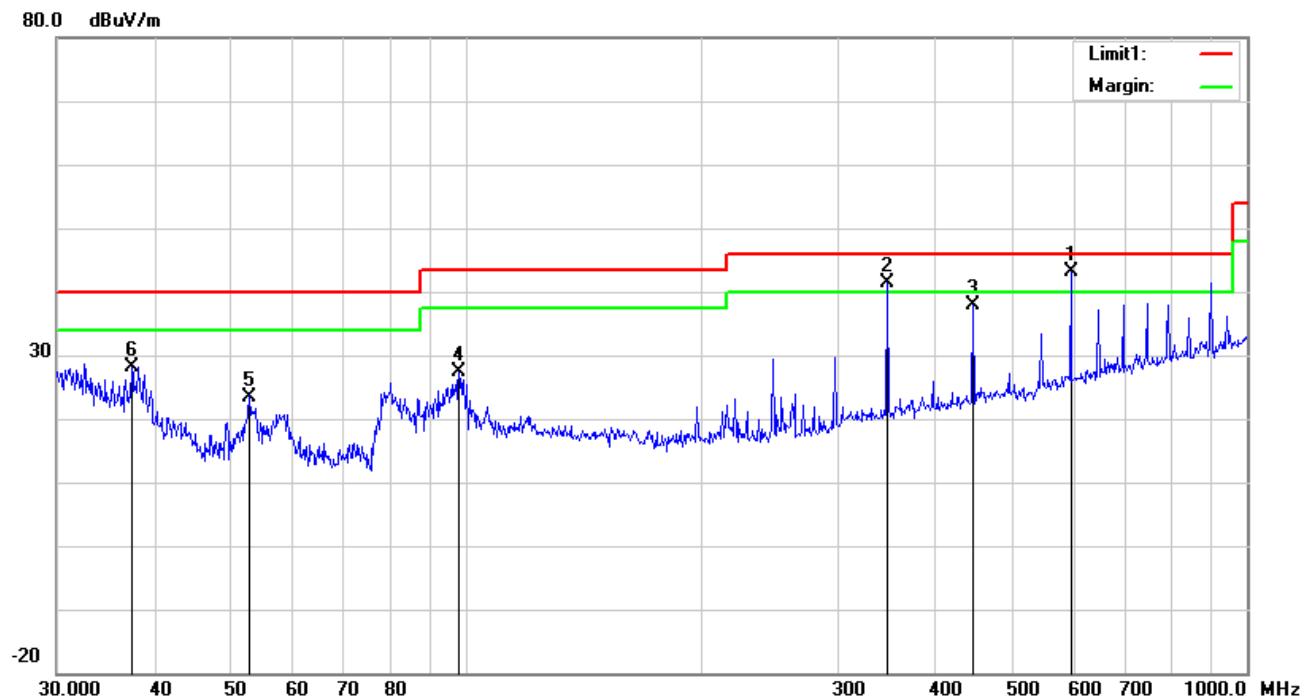


### Test Data

#### Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detect or	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degr ee
		(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( )
1	H	595.1329	42.37	peak	19.03	21.59	2.49	42.30	46.00	-3.70	100	52
2	H	346.8092	44.01	peak	14.58	22.16	2.02	38.45	46.00	-7.55	100	155
3	H	247.6819	44.29	peak	11.43	22.29	1.69	35.12	46.00	-10.88	100	257
4	H	99.8777	31.75	peak	10.37	22.32	1.12	20.92	43.50	-22.58	100	94
5	H	57.9993	36.89	peak	7.52	22.40	0.76	22.77	40.00	-17.23	100	33
6	H	197.8928	36.63	peak	11.98	22.37	1.54	27.78	43.50	-15.72	100	60

### 30MHz -1GHz



### Test Data

Horizontal Polarity Plot @3m

N o.	P/ L	Frequency	Reading	Detect or	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degr ee
		(MHz)	(dBuV/m )		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( )
1	V	595.1329	43.26	peak	19.03	21.59	2.49	43.19	46.00	-2.81	100	231
2	V	346.8092	47.01	peak	14.58	22.16	2.02	41.45	46.00	-4.55	100	343
3	V	446.4141	41.15	peak	16.63	21.92	2.12	37.98	46.00	-8.02	100	53
4	V	98.1419	38.69	peak	9.95	22.32	1.07	27.39	43.50	-16.11	100	253
5	V	52.9453	37.02	peak	8.08	22.39	0.79	23.50	40.00	-16.50	100	318
6	V	37.4165	33.90	peak	15.79	22.26	0.77	28.20	40.00	-11.80	100	163