

RF TEST REPORT



Report No.: Q181101S007-FCC-R2

Supersede Report No.: N/A

Applicant	Cedar Kingdom Corporation Limited	
Product Name	Tablet	
Model No.	VT701	
Serial No.	N/A	
Test Standard	FCC Part 15.247, ANSI C63.10: 2013	
Test Date	November 05 to December 05, 2018	
Issue Date	December 06, 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	David Huang	
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
Q181101S007-FCC-R2	NONE	Original	December 06, 2018

2. Customer information

Applicant Name	Cedar Kingdom Corporation Limited
Applicant Add	11/F, AXA Centre 151 Gloucester Road, Wanchai, Hong Kong
Manufacturer	Cedar Kingdom Corporation Limited
Manufacturer Add	11/F, AXA Centre 151 Gloucester Road, Wanchai, Hong Kong

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	Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch Laboratories
Lab Address	No. 34, Chenwulu Section, Guantai Rd., Houjie Town, Dongguan City, Guangdong 523942, China
FCC Test Site No.	749762
IC Test Site No.	5936A-1
Test Software	ADT_Radiated_V7.6.15.9.2

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

4. Equipment under Test (EUT) Information

Description of EUT:	Tablet
Main Model:	VT701
Serial Model:	N/A
Date EUT received:	November 05, 2018
Test Date(s):	November 05 to December 05, 2018
Equipment Category :	DTS
Antenna Gain:	GSM850: -0.86dBi PCS1900: 1.42dBi UMTS-FDD Band V: -0.86dBi UMTS-FDD Band II: 1.42dBi WIFI: 1.5dBi Bluetooth/BLE: 1.5dBi GPS: 0.68dBi
Antenna Type:	PIFA Antenna GSM / GPRS: GMSK UMTS-FDD: QPSK 802.11b/g/n: DSSS, OFDM Bluetooth: GFSK, π /4DQPSK, 8DPSK BLE: GFSK GPS:BPSK
RF Operating Frequency (ies):	GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz UMTS-FDD Band V TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz UMTS-FDD Band II TX: 1852.4 ~ 1907.6 MHz; RX: 1932.4 ~ 1987.6 MHz WIFI: 802.11b/g/n(20M): 2412-2462 MHz Bluetooth& BLE: 2402-2480 MHz GPS: 1575.42 MHz

802.11b: 8.27 dBm

Max. Output Power: 802.11g: 8.38 dBm

802.11n(20M): 8.41 dBm

GSM 850: 124CH

PCS1900: 299CH

UMTS-FDD Band V: 102CH

UMTS-FDD Band II: 277CH

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

Bluetooth: 79CH

BLE: 40CH

GPS:1CH

Number of Channels:

Port: Please refer to the user's manual

Adapter :

Model: VT701

Input Power: Input: AC100-240V~50/60Hz,0.5A

Output: DC 5.0V, 2A

Battery :

Spec: 3.7V, 2500mAh/9.25Wh

Trade Name : VIRZO

FCC ID: 2AKQUVZCKVT701

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 2 antennas:

A permanently attached PIFA antenna for Bluetooth/BLE/WIF/GPS, the gain is 1.5dBi for Bluetooth/BLE, the gain is 1.5dBi for WIFI, the gain is 0.68dBi for GPS.

A permanently attached PIFA antenna for GSM/PCS/UMTS, the gain is -0.86dBi for GSM850, 1.42dBi for PCS1900, -0.86dBi for UMTS-FDD Band V, 1.42dBi for UMTS-FDD Band II.

The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 DTS (6 dB&20 dB) Channel Bandwidth

Temperature	24°C
Relative Humidity	54%
Atmospheric Pressure	1020mbar
Test date :	November 29, 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

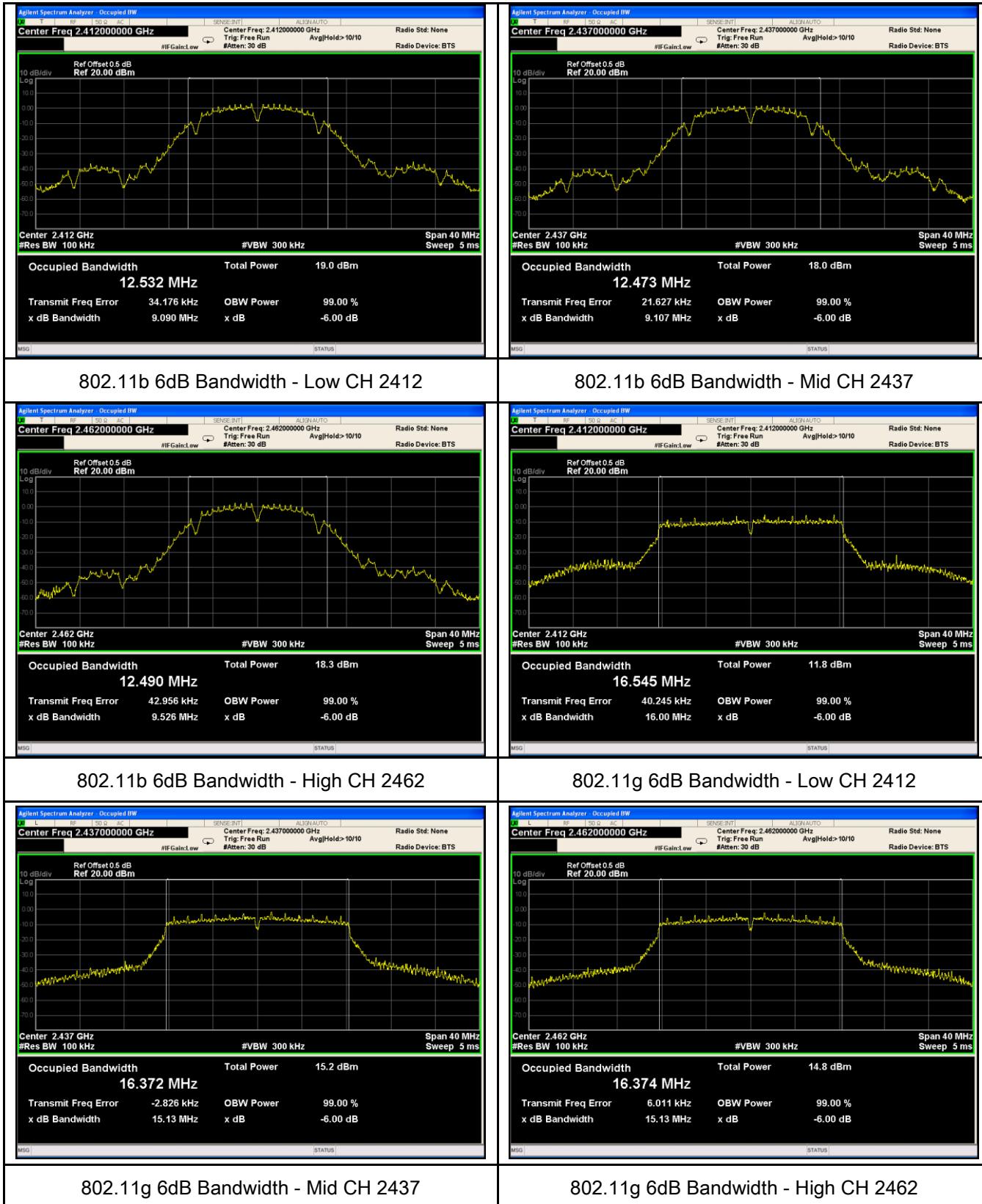
Measurement result

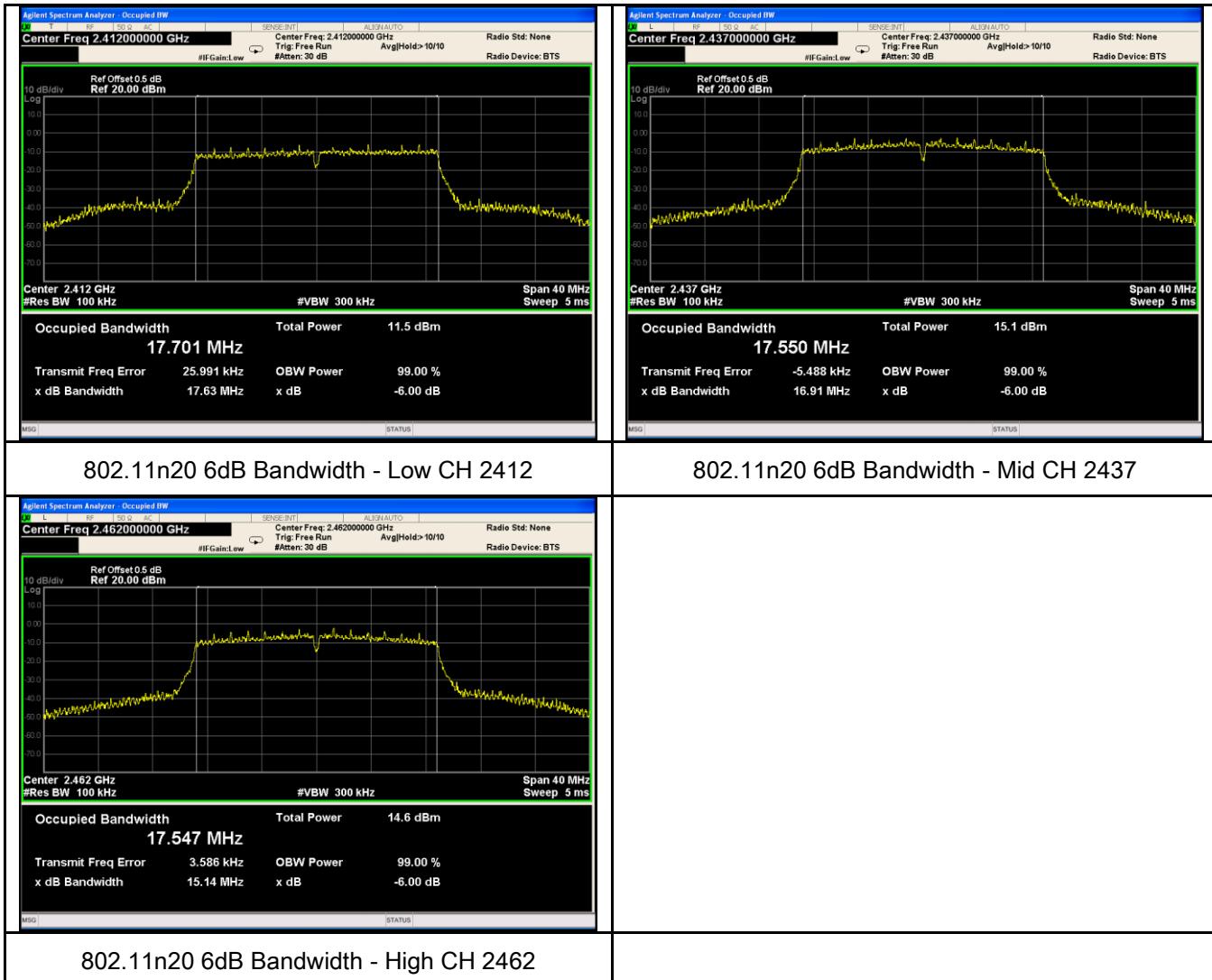
Test mode	CH	Freq (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	9.090	≥ 0.5
	Mid	2437	9.107	≥ 0.5
	High	2462	9.526	≥ 0.5
802.11g	Low	2412	16.00	≥ 0.5
	Mid	2437	15.13	≥ 0.5
	High	2462	15.13	≥ 0.5
802.11n (20M)	Low	2412	17.63	≥ 0.5
	Mid	2437	16.91	≥ 0.5
	High	2462	15.14	≥ 0.5

Test mode	CH	Freq (MHz)	20dB Bandwidth (MHz)
802.11b	Low	2412	14.29
	Mid	2437	14.27
	High	2462	14.27
802.11g	Low	2412	18.52
	Mid	2437	18.70
	High	2462	18.76
802.11n (20M)	Low	2412	19.13
	Mid	2437	18.92
	High	2462	19.11

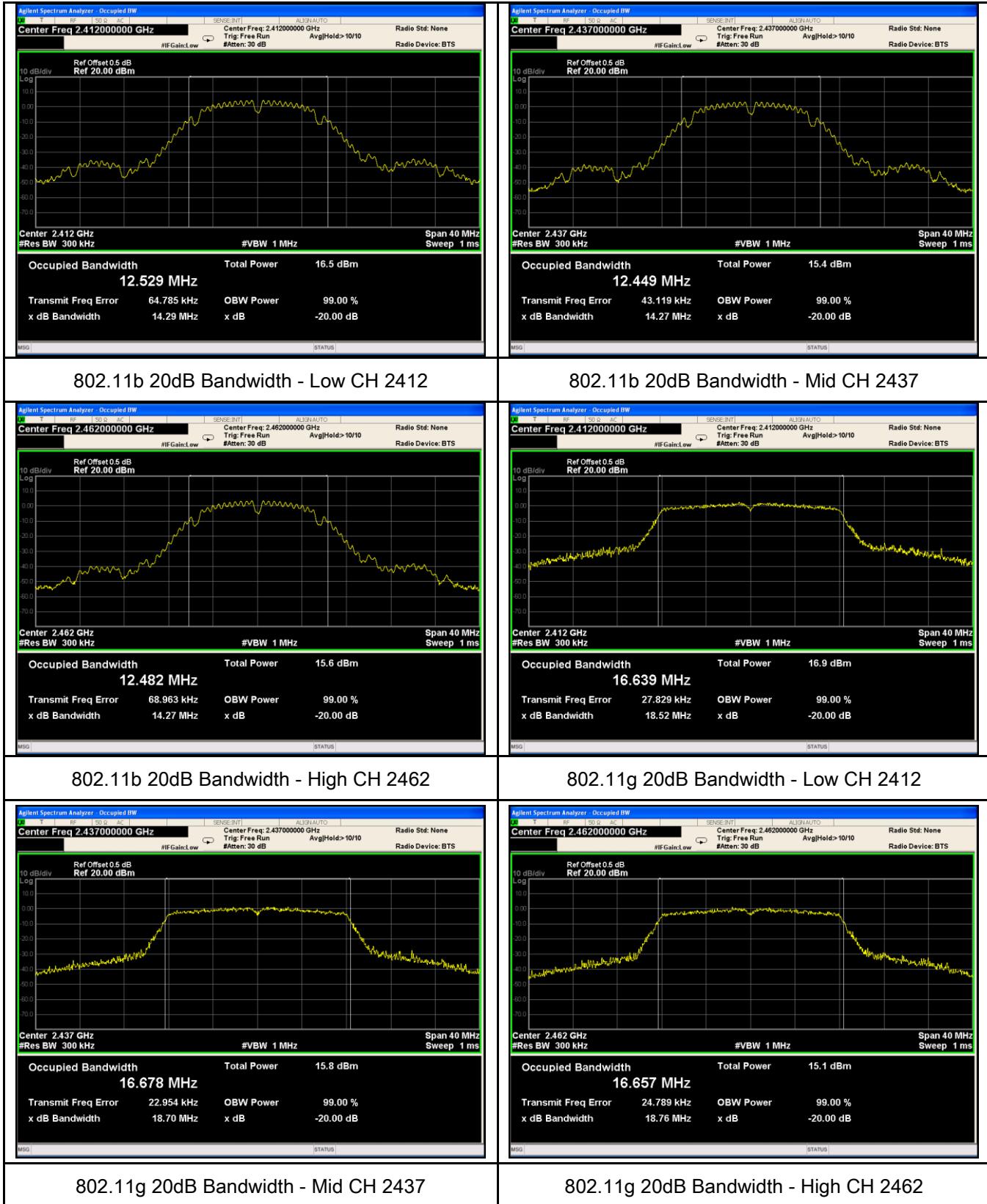
Test Plots

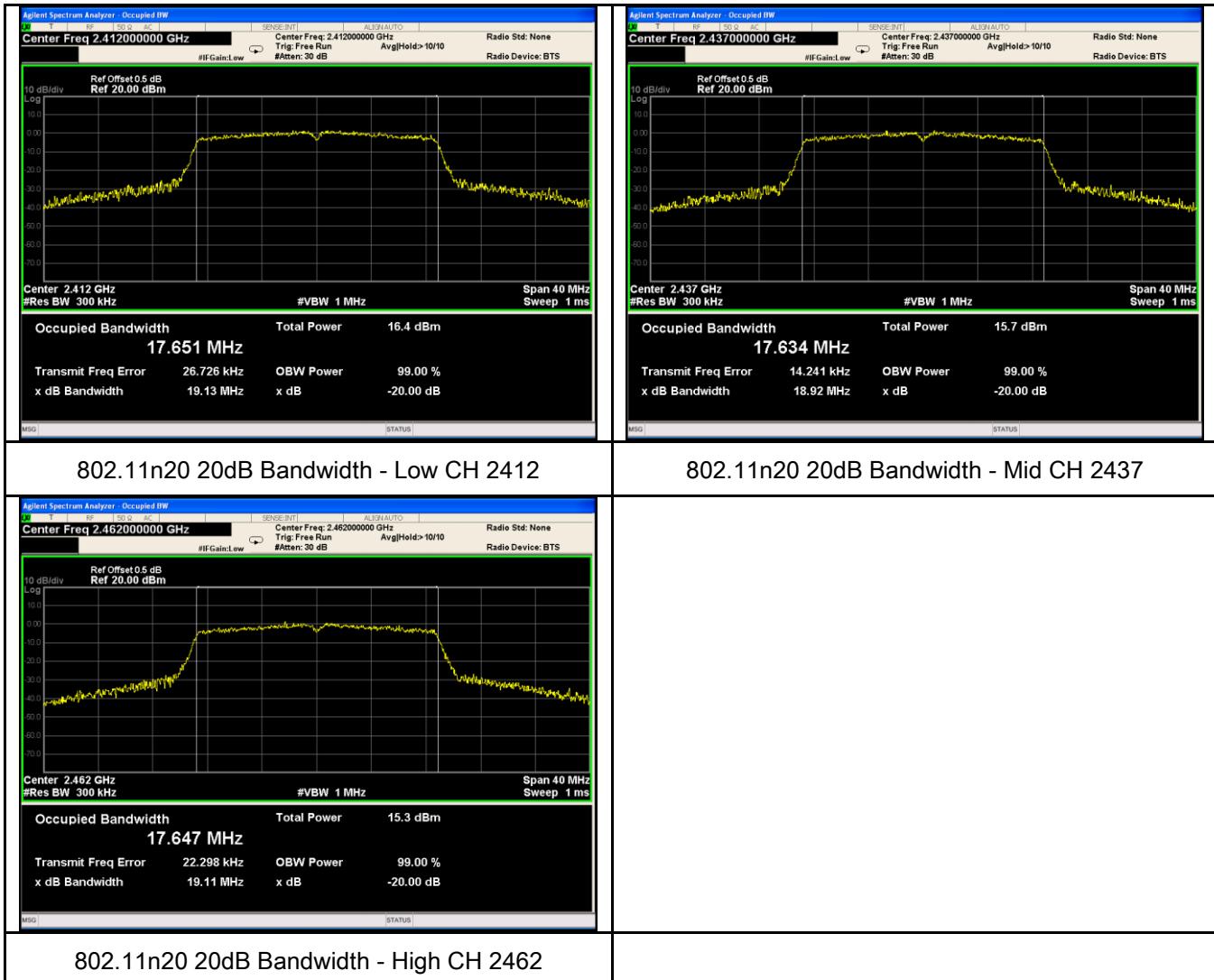
6dB Bandwidth measurement result





20 dB Bandwidth measurement result

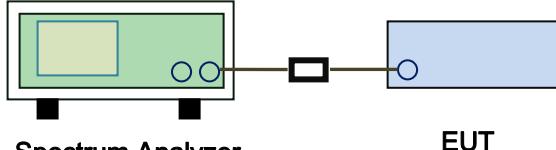




6.3 Maximum Output Power

Temperature	24°C
Relative Humidity	54%
Atmospheric Pressure	1020mbar
Test date :	November 29, 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		 Spectrum Analyzer EUT	
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"> - a) Set span to at least 1.5 times the OBW. - b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz. - c) Set VBW \geq 3 x RBW. - d) Number of points in sweep \geq 2 \times span / RBW. (This gives bin-to-bin spacing \leq RBW/2, so that narrowband signals are not lost between frequency bins.) - e) Sweep time = auto. - f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode. - g) If transmit duty cycle $<$ 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum 	

	<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 $\geq 98\%$, 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"> - h) Trace average at least 100 traces in power averaging (i.e., RMS) mode. - 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.
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A

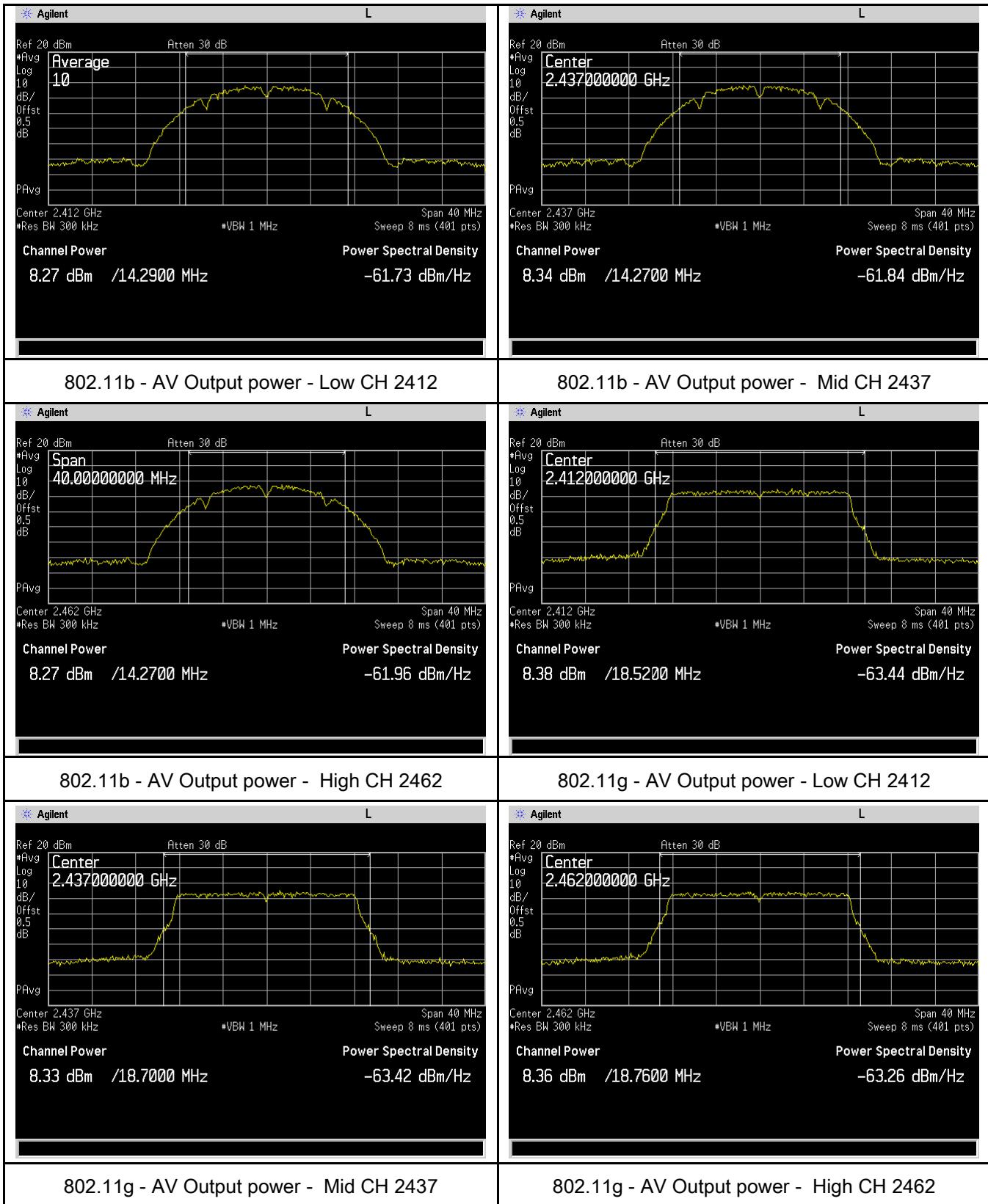
Test Plot Yes (See below) N/A

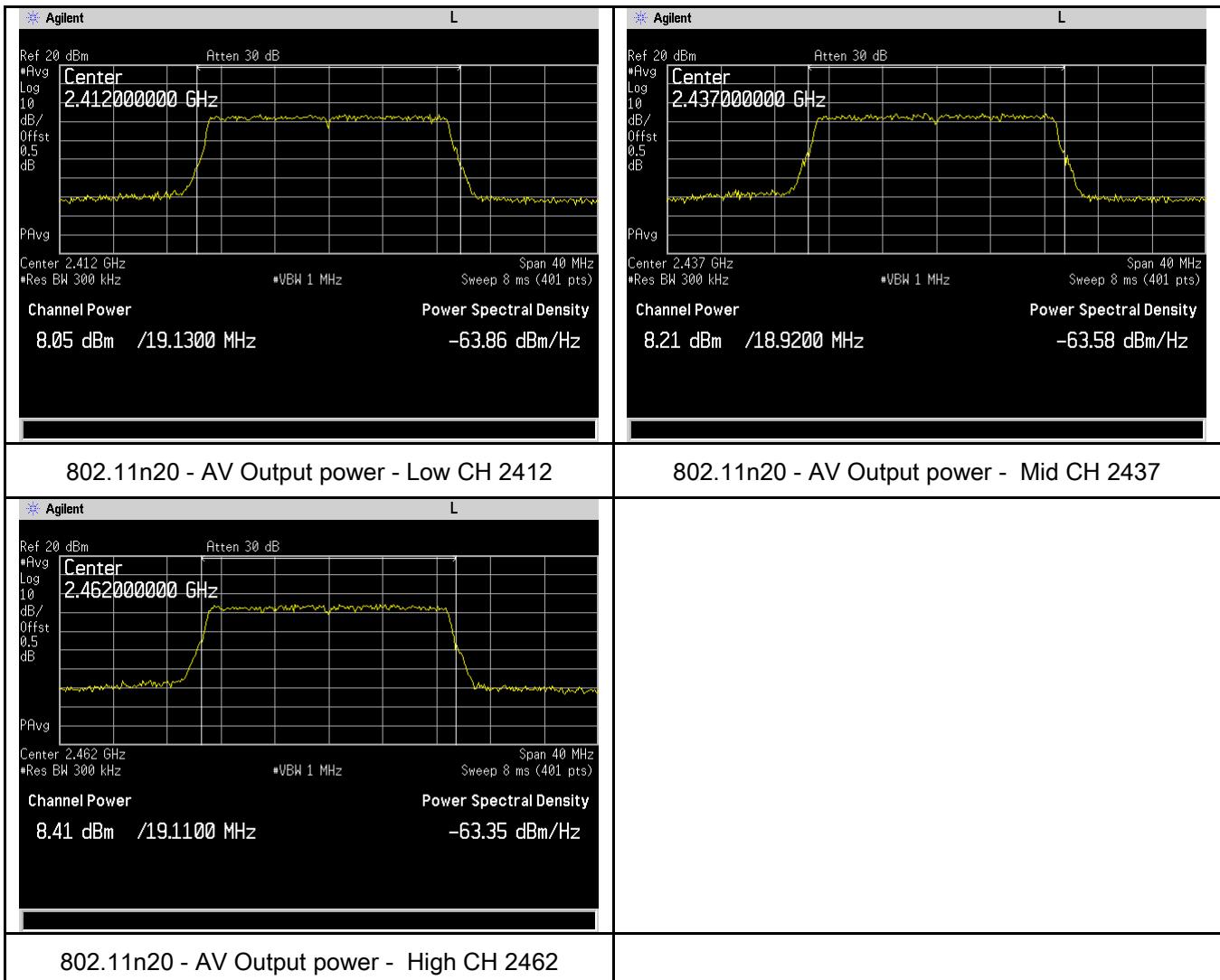
Output Power measurement result

Type	Test mode	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Result
Output power	802.11b	Low	2412	8.27	30	Pass
		Mid	2437	8.34	30	Pass
		High	2462	8.27	30	Pass
	802.11g	Low	2412	8.38	30	Pass
		Mid	2437	8.33	30	Pass
		High	2462	8.36	30	Pass
	802.11n (20M)	Low	2412	8.05	30	Pass
		Mid	2437	8.21	30	Pass
		High	2462	8.41	30	Pass

Test Plots

The Average Power





6.4 Power Spectral Density

Temperature	24°C
Relative Humidity	54%
Atmospheric Pressure	1020mbar
Test date :	November 29, 2018
Tested By :	Aaron Liang

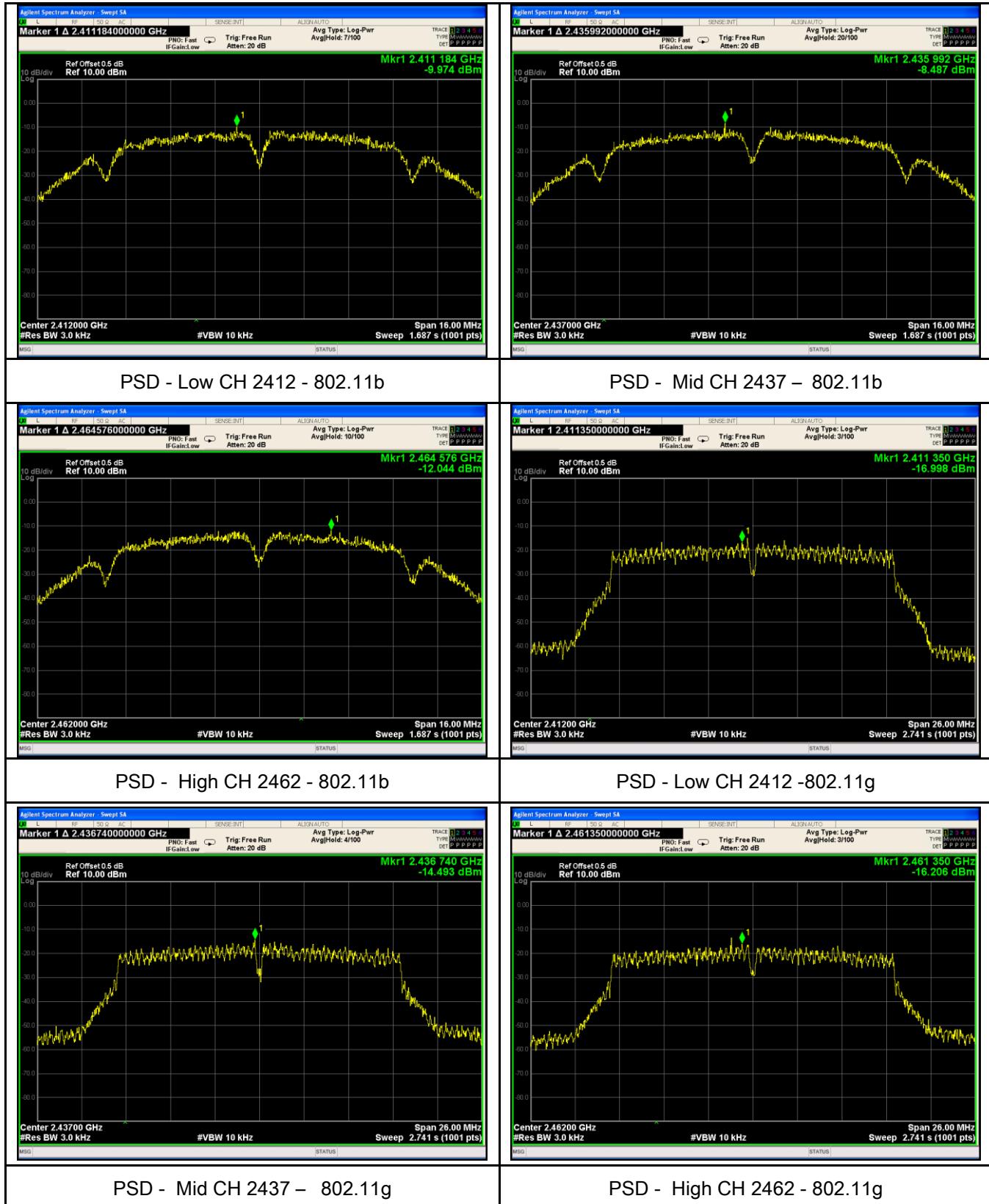
Test Data Yes N/A
 Test Plot Yes (See below) N/A

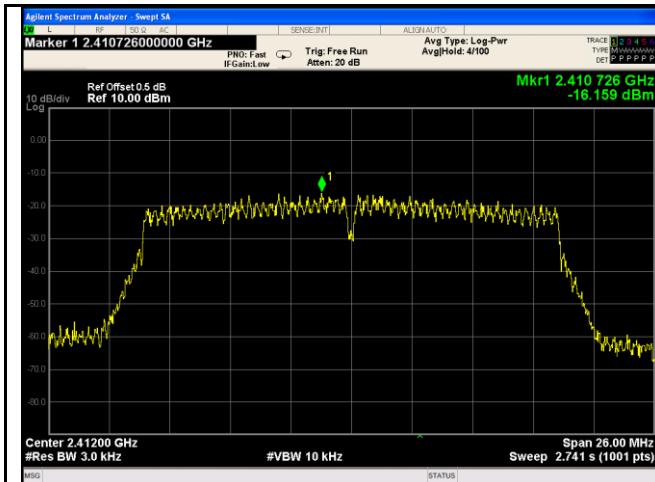
Power Spectral Density measurement result

Type	Test mode	CH	Freq (MHz)	PSD	Limit (dBm)	Result
				(dBm)		
PSD	802.11b	Low	2412	-9.974	8	Pass
		Mid	2437	-8.487	8	Pass
		High	2462	-12.044	8	Pass
	802.11g	Low	2412	-16.998	8	Pass
		Mid	2437	-14.493	8	Pass
		High	2462	-16.206	8	Pass
	802.11n (20M)	Low	2412	-16.159	8	Pass
		Mid	2437	-15.109	8	Pass
		High	2462	-15.024	8	Pass

Test Plots

Power Spectral Density measurement result

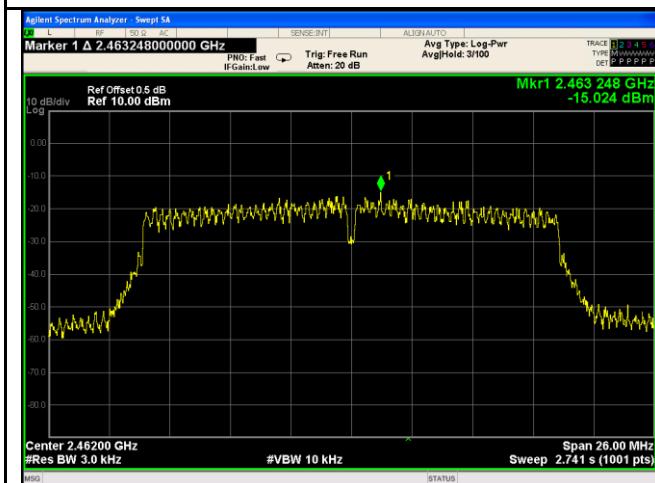




PSD - Low CH 2412 - 802.11n20



PSD - Mid CH 2437 – 802.11n20

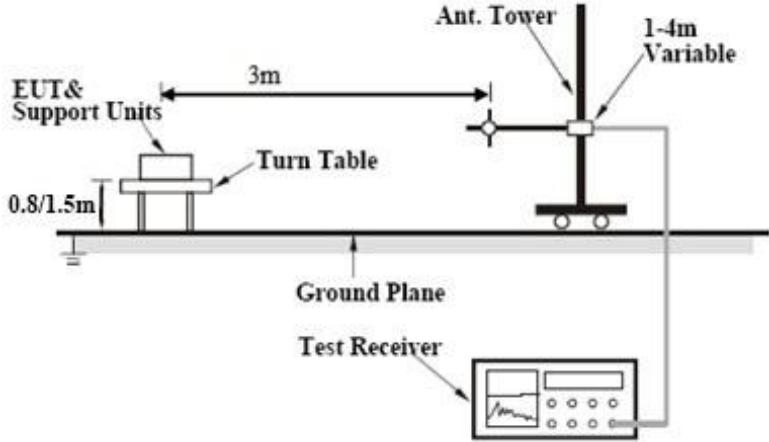


PSD - High CH 2472 - 802.11n20

6.5 Band-Edge & Unwanted Emissions into Restricted Frequency Bands

Temperature	26 °C
Relative Humidity	59%
Atmospheric Pressure	1015mbar
Test date :	December 03, 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 & Support Units' is positioned on a 'Turn Table' at a height of '0.8/1.5m' above a 'Ground Plane'. A 'Test Receiver' is connected to the turn table. A '1-4m Variable' antenna tower is mounted on the turn table, with a horizontal distance of '3m' indicated between the EUT and the tower. The tower is connected to the turn table and the ground plane.</p>		
Test Procedure	<p>Radiated Method Only</p> <ul style="list-style-type: none"> - 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. - 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. 		

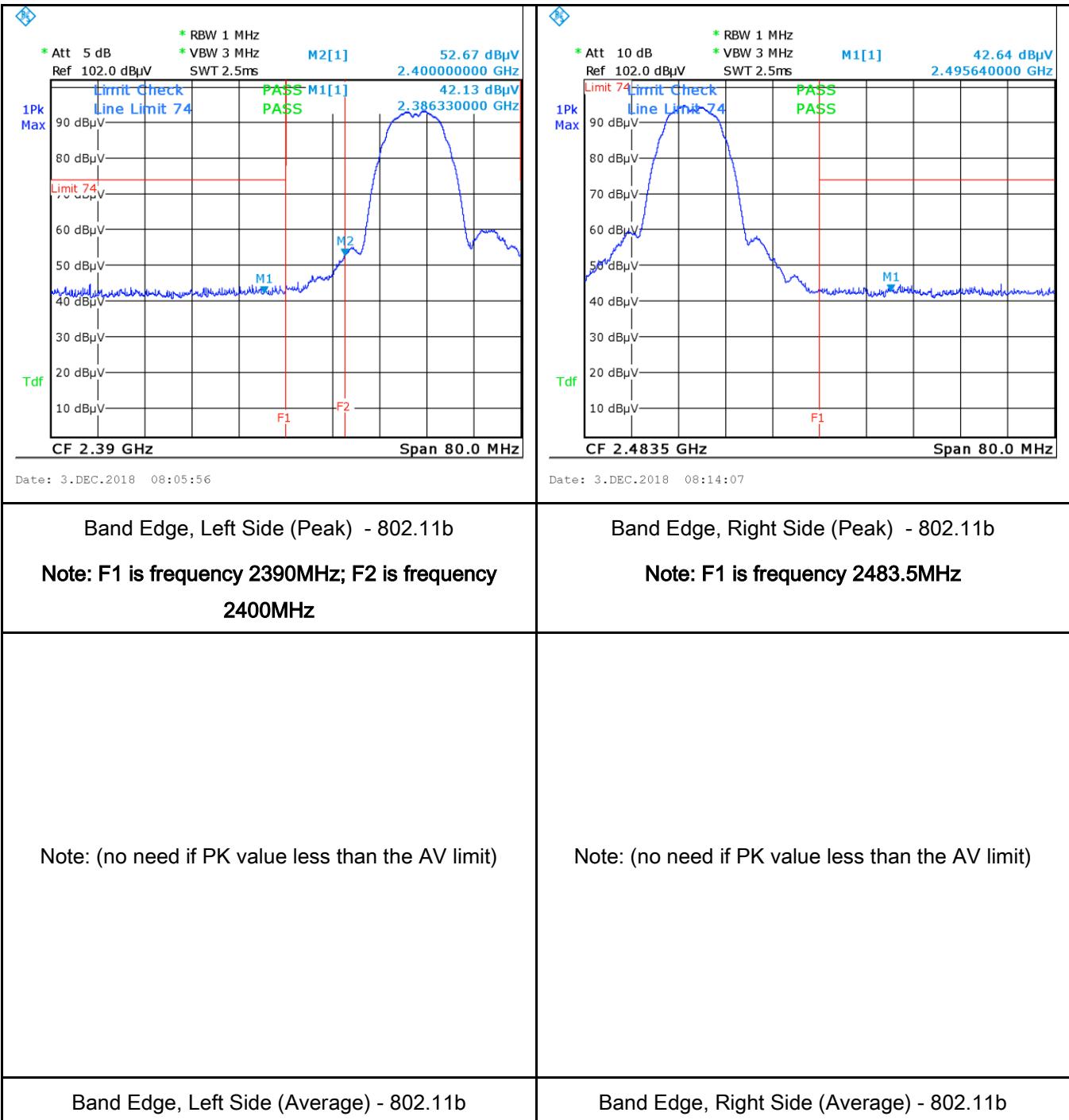
	<ul style="list-style-type: none"> - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: <ul style="list-style-type: none"> a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz. 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. 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. - 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. - 5. Repeat above procedures until all measured frequencies were complete.
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A

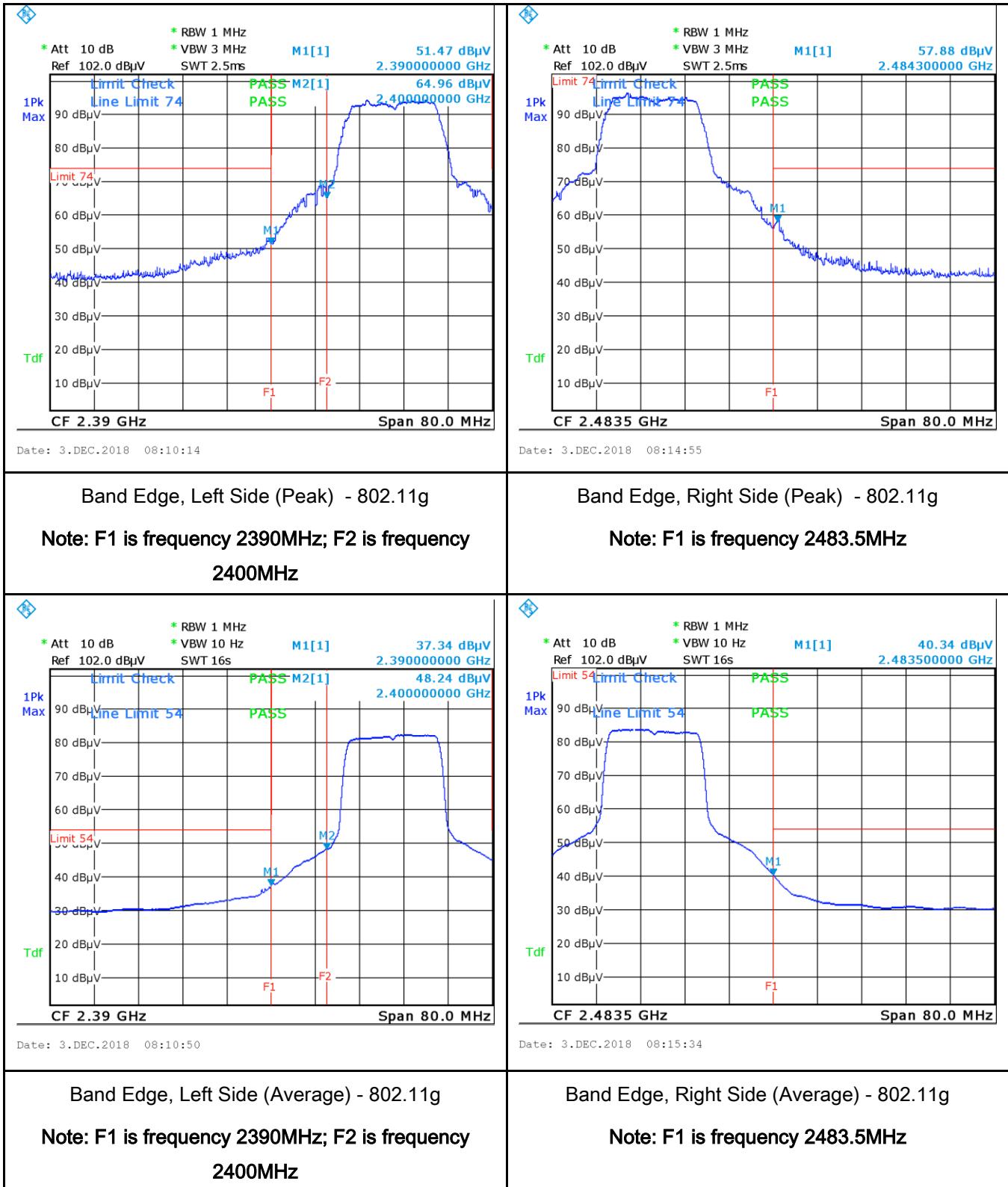
Test Plot Yes (See below) N/A

Test Plots

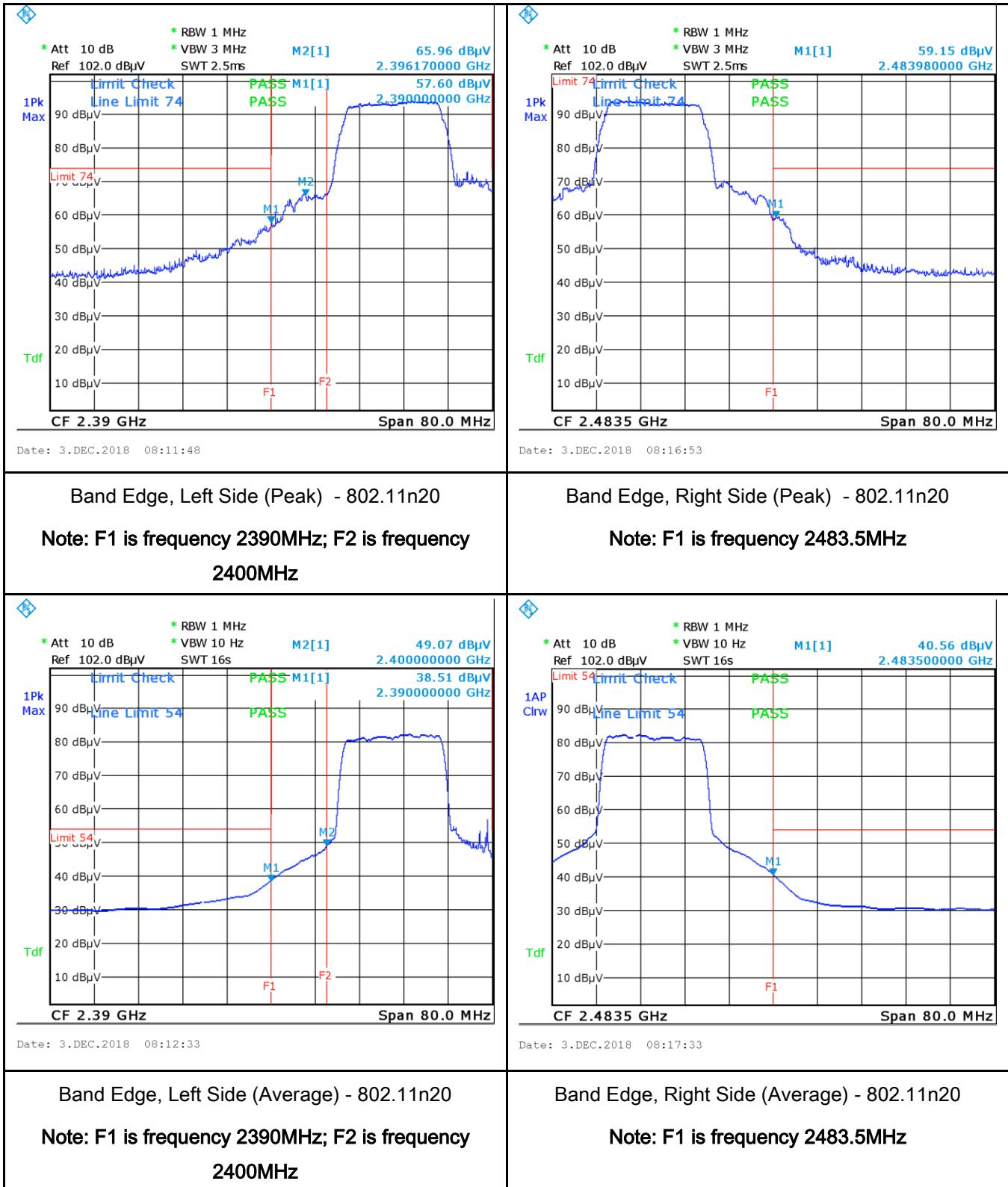
Band Edge measurement result



Note: Both Horizontal and vertical polarities were investigated



Note: Both Horizontal and vertical polarities were investigated

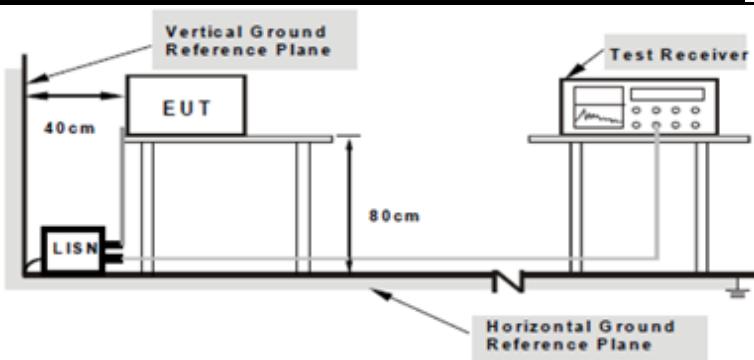


Note: Both Horizontal and vertical polarities were investigated

6.6 AC Power Line Conducted Emissions

Temperature	26 °C
Relative Humidity	59%
Atmospheric Pressure	1015mbar
Test date :	December 03, 2018
Tested By :	Aaron Liang

Requirement(s):

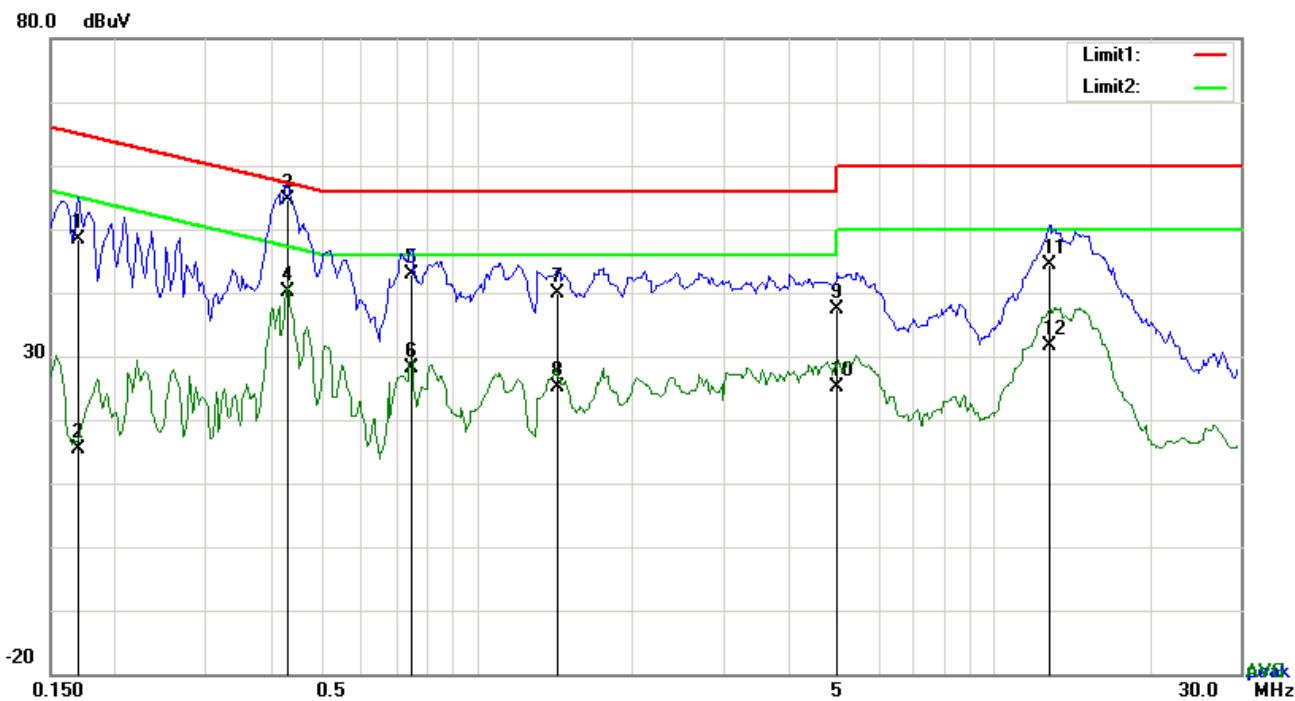
Spec	Item	Requirement	Applicable														
47CFR§15. 207, RSS210 (A8.1)	a)	<p>For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within 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 (dBμV)</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 μ 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 μ V)																
	QP	Average															
0.15 ~ 0.5	66 – 56	56 – 46															
0.5 ~ 5	56	46															
5 ~ 30	60	50															
Test Setup	 <p>Note: 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"> 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. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss 																

	<p>coaxial cable.</p> <ol style="list-style-type: none"> 4. All other supporting equipment were powered separately from another main supply. 5. The EUT was switched on and allowed to warm up to its normal operating condition. 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. 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. 8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data Yes N/A

Test Plot Yes (See below) N/A

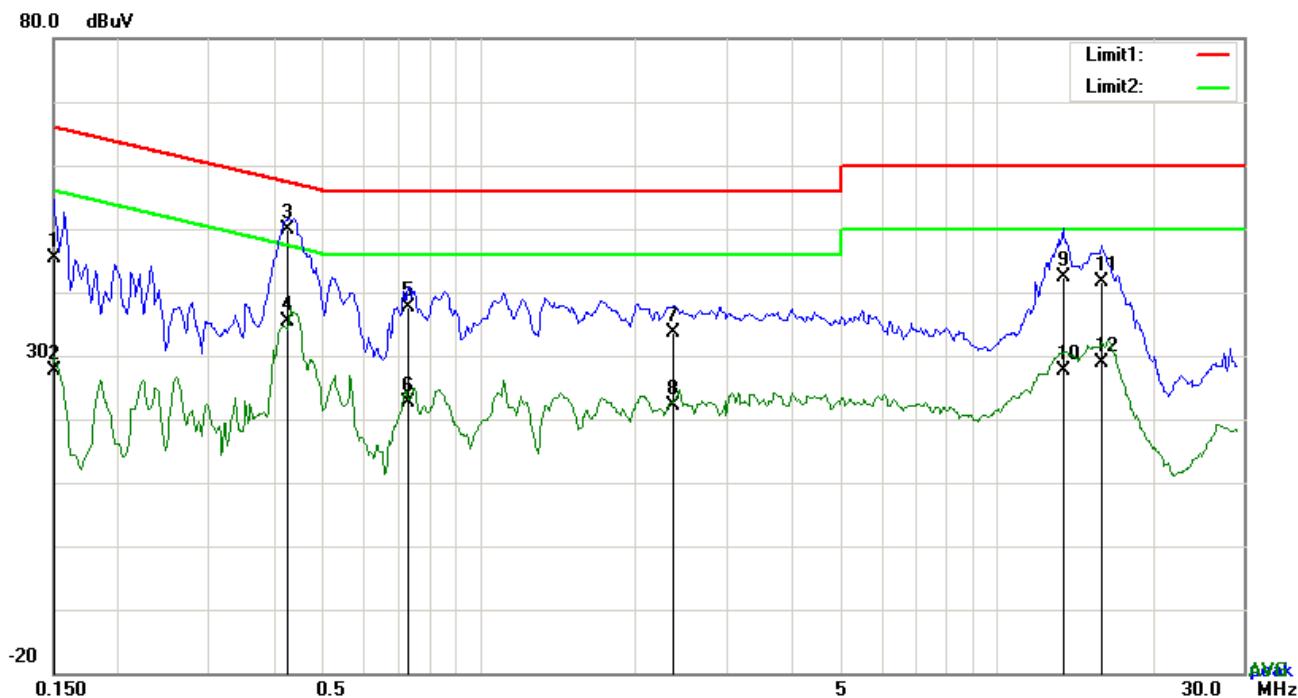
Test Mode: Transmitting Mode



Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)
1	L1	0.1695	38.33	QP	10.03	48.36	64.98	-16.62
2	L1	0.1695	5.28	AVG	10.03	15.31	54.98	-39.67
3	L1	0.4308	44.68	QP	10.03	54.71	57.24	-2.53
4	L1	0.4308	30.14	AVG	10.03	40.17	47.24	-7.07
5	L1	0.7506	32.74	QP	10.03	42.77	56.00	-13.23
6	L1	0.7506	18.10	AVG	10.03	28.13	46.00	-17.87
7	L1	1.4370	29.78	QP	10.04	39.82	56.00	-16.18
8	L1	1.4370	14.99	AVG	10.04	25.03	46.00	-20.97
9	L1	4.9812	27.24	QP	10.08	37.32	56.00	-18.68
10	L1	4.9812	15.16	AVG	10.08	25.24	46.00	-20.76
11	L1	12.8319	34.16	QP	10.19	44.35	60.00	-15.65
12	L1	12.8319	21.56	AVG	10.19	31.75	50.00	-18.25

Test Mode: Transmitting Mode

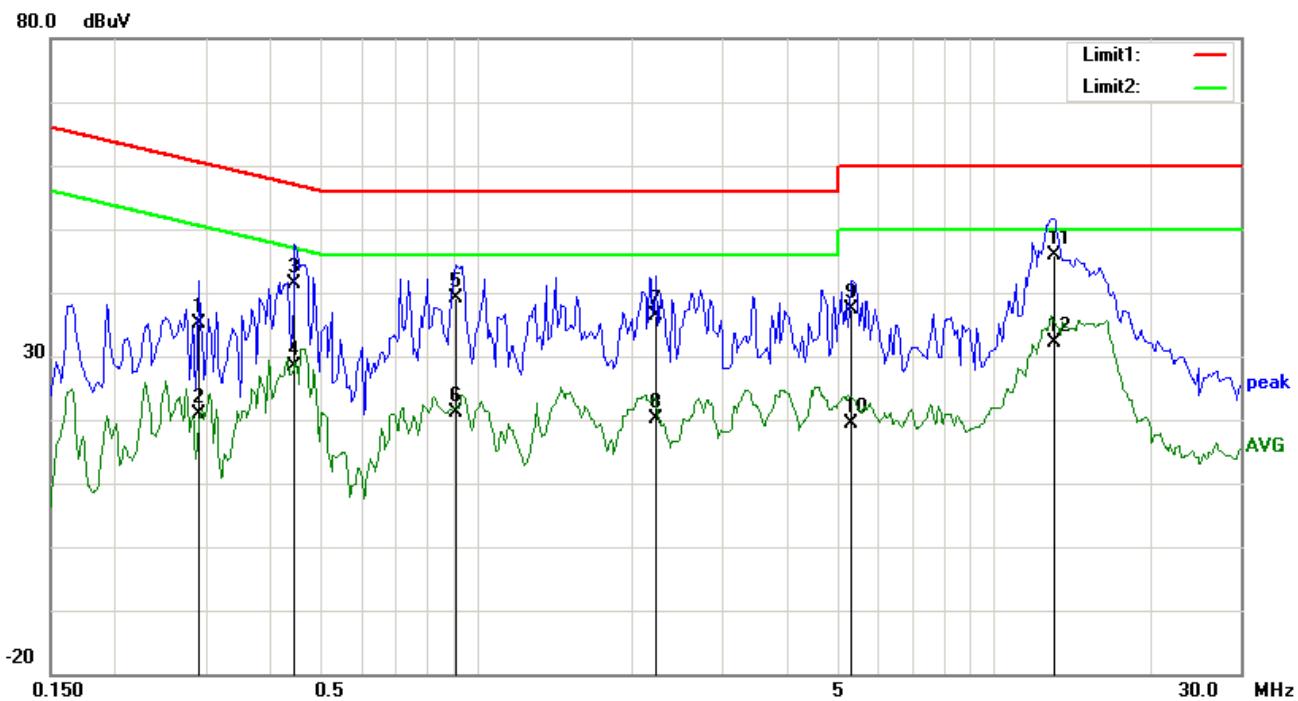


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)
1	N	0.1500	35.28	QP	10.02	45.30	66.00	-20.70
2	N	0.1500	17.58	AVG	10.02	27.60	56.00	-28.40
3	N	0.4269	39.87	QP	10.02	49.89	57.31	-7.42
4	N	0.4269	25.42	AVG	10.02	35.44	47.31	-11.87
5	N	0.7311	27.73	QP	10.02	37.75	56.00	-18.25
6	N	0.7311	12.72	AVG	10.02	22.74	46.00	-23.26
7	N	2.3613	23.47	QP	10.04	33.51	56.00	-22.49
8	N	2.3613	12.05	AVG	10.04	22.09	46.00	-23.91
9	N	13.4208	32.18	QP	10.18	42.36	60.00	-17.64
10	N	13.4208	17.56	AVG	10.18	27.74	50.00	-22.26
11	N	15.9441	31.50	QP	10.21	41.71	60.00	-18.29
12	N	15.9441	18.75	AVG	10.21	28.96	50.00	-21.04

Test Mode: Transmitting Mode

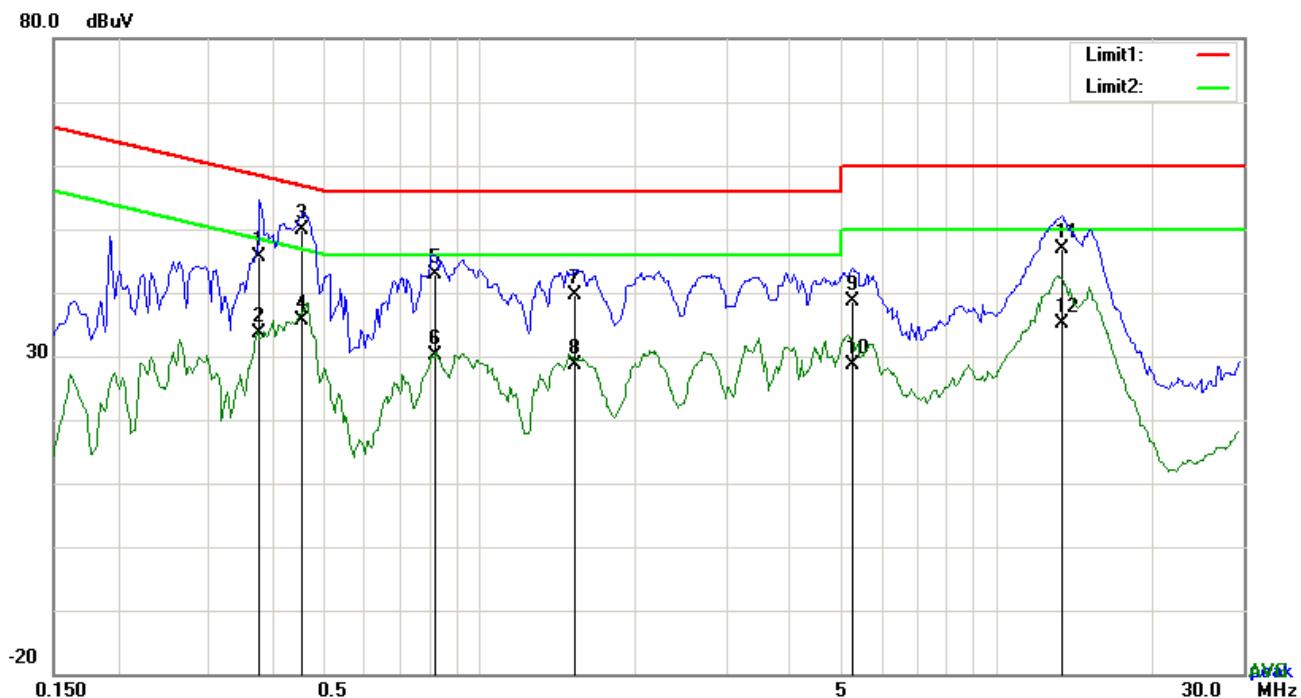


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)
1	L1	0.2904	25.01	QP	10.03	35.04	60.51	-25.47
2	L1	0.2904	10.85	AVG	10.03	20.88	50.51	-29.63
3	L1	0.4464	31.34	QP	10.03	41.37	56.94	-15.57
4	L1	0.4464	18.41	AVG	10.03	28.44	46.94	-18.50
5	L1	0.9105	29.14	QP	10.03	39.17	56.00	-16.83
6	L1	0.9105	11.19	AVG	10.03	21.22	46.00	-24.78
7	L1	2.2287	26.35	QP	10.05	36.40	56.00	-19.60
8	L1	2.2287	10.17	AVG	10.05	20.22	46.00	-25.78
9	L1	5.3010	27.31	QP	10.08	37.39	60.00	-22.61
10	L1	5.3010	9.34	AVG	10.08	19.42	50.00	-30.58
11	L1	13.0971	35.79	QP	10.20	45.99	60.00	-14.01
12	L1	13.0971	22.00	AVG	10.20	32.20	50.00	-17.80

Test Mode: Transmitting Mode



Test Data

Phase Neutral Plot at 240Vac, 60Hz

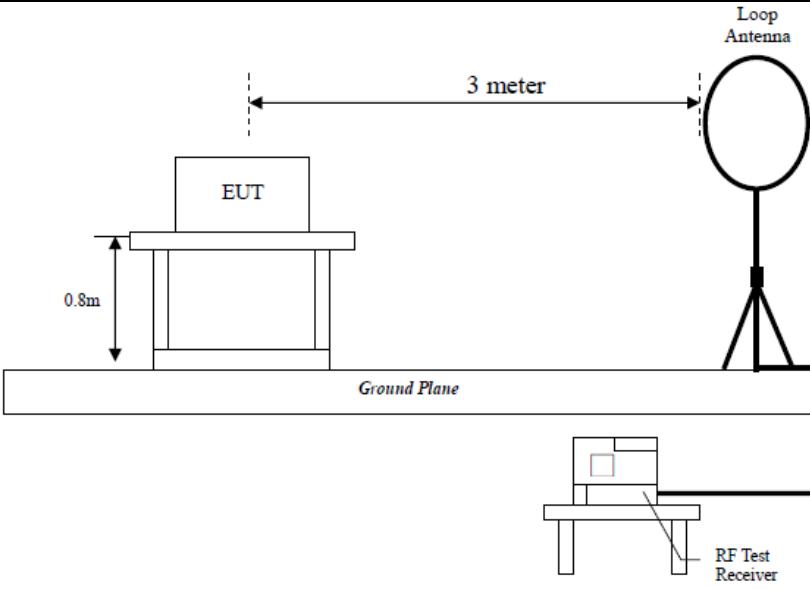
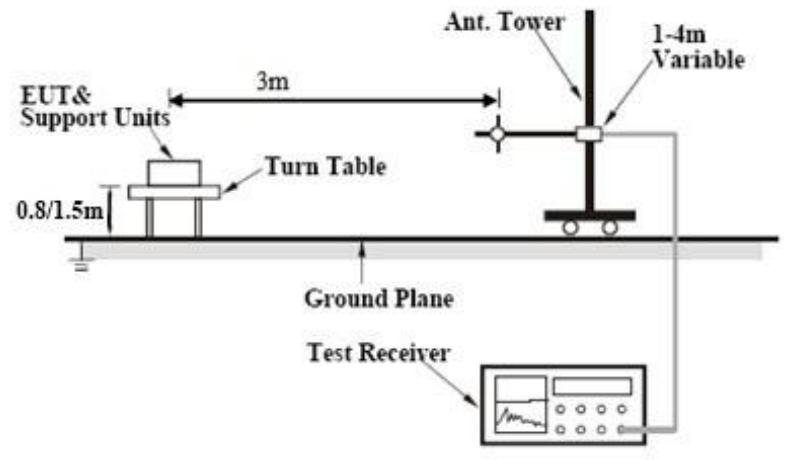
No.	P/L	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)
1	N	0.3762	35.71	QP	10.02	45.73	58.36	-12.63
2	N	0.3762	23.52	AVG	10.02	33.54	48.36	-14.82
3	N	0.4542	39.85	QP	10.02	49.87	56.80	-6.93
4	N	0.4542	25.54	AVG	10.02	35.56	46.80	-11.24
5	N	0.8247	32.95	QP	10.03	42.98	56.00	-13.02
6	N	0.8247	20.12	AVG	10.03	30.15	46.00	-15.85
7	N	1.5345	29.68	QP	10.04	39.72	56.00	-16.28
8	N	1.5345	18.64	AVG	10.04	28.68	46.00	-17.32
9	N	5.2542	28.65	QP	10.07	38.72	60.00	-21.28
10	N	5.2542	18.67	AVG	10.07	28.74	50.00	-21.26
11	N	13.3623	36.75	QP	10.18	46.93	60.00	-13.07
12	N	13.3623	24.93	AVG	10.18	35.11	50.00	-14.89

6.7 Radiated Spurious Emissions & Restricted Band

Temperature	26 °C
Relative Humidity	59%
Atmospheric Pressure	1015mbar
Test date :	December 03, 2018
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 (μV/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 (μV/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 (μV/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 vertical dimension of 0.8m is indicated between the EUT and the ground plane.</p>  <p>The diagram shows a turn table setup. The EUT and support units are placed on a turn table, which is positioned on a ground plane. The turn table has a height of 0.8/1.5m. An antenna tower is positioned 3m away from the EUT. The antenna height is adjustable between 1-4m. A test receiver is connected to the antenna tower.</p>
Procedure	<ol style="list-style-type: none"> 1. The EUT was switched on and allowed to warm up to its normal operating condition. 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"> a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz. 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.

	<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	Different RF configuration has been evaluated but not much difference was found. The data presented here is the worst case data with EUT under 802.11n – HT20-2437MHz mode.
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
------------	-------------------

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:

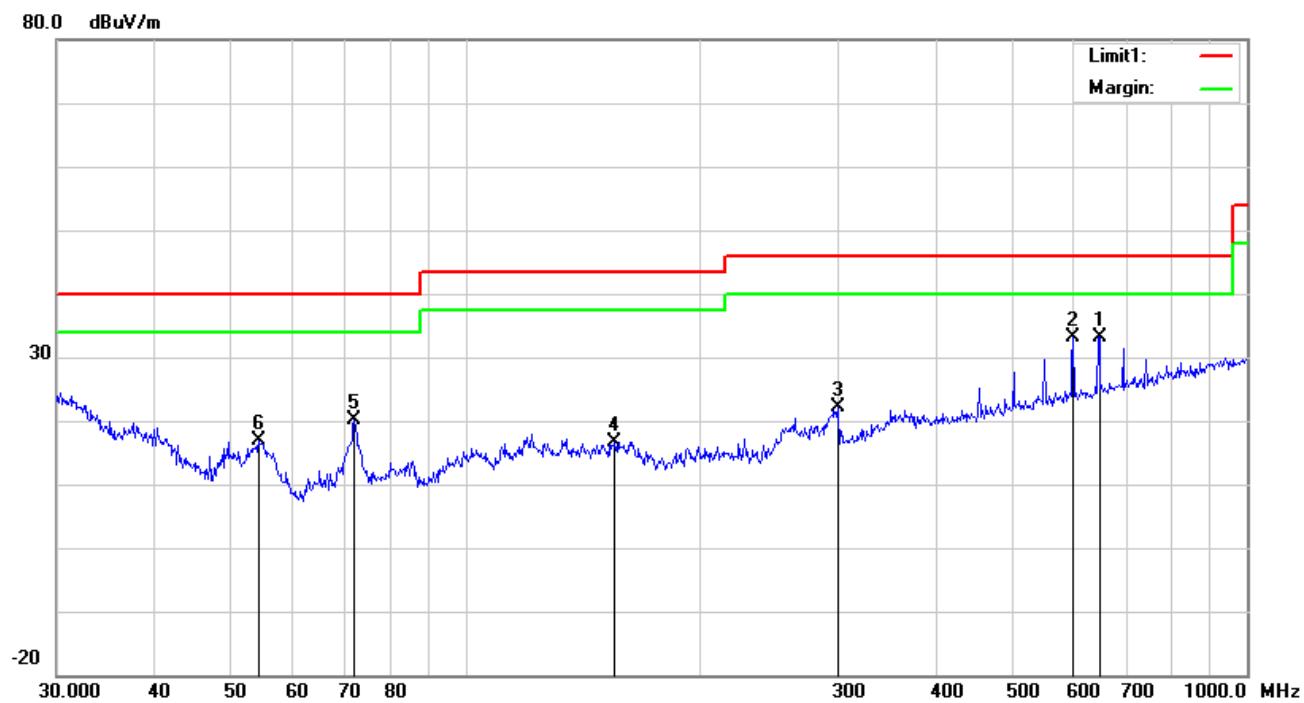
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

Test Mode: Transmitting Mode

30MHz -1GHz

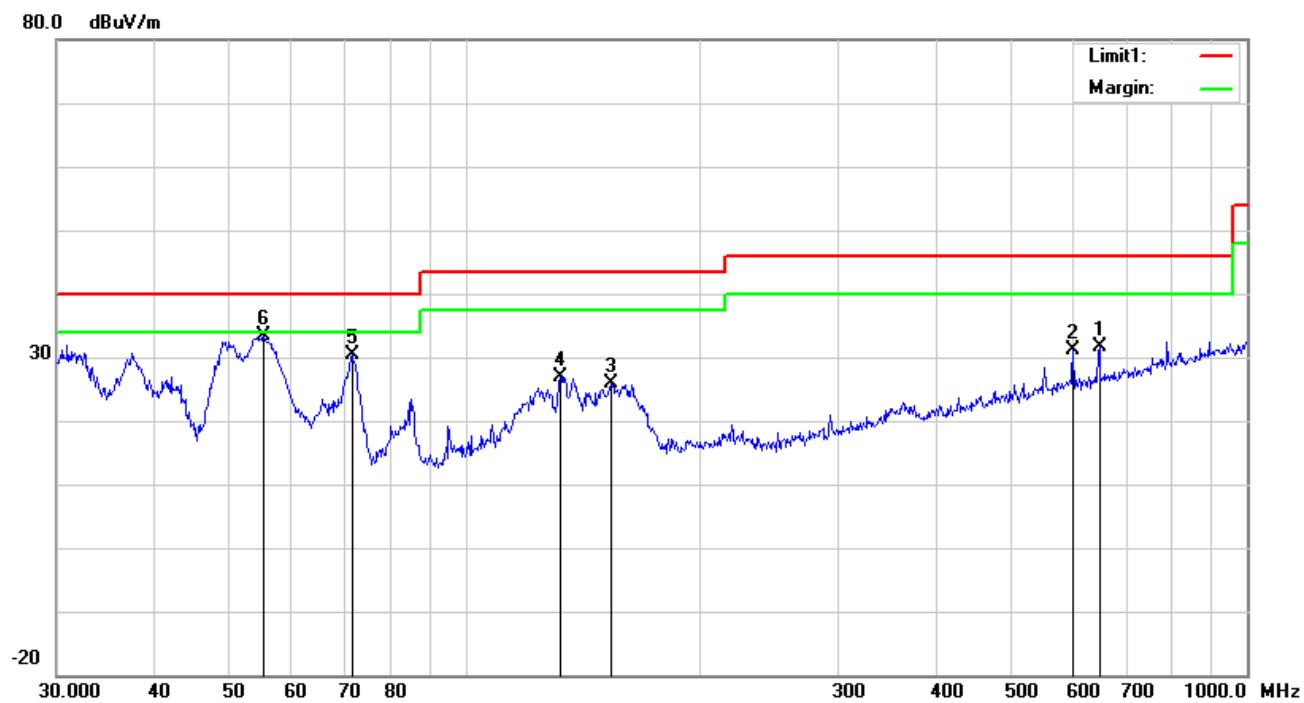


Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	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	647.3856	32.45	19.62	21.48	2.62	33.21	46.00	-12.79	100	141
2	H	599.3213	33.01	19.09	21.58	2.49	33.01	46.00	-12.99	100	267
3	H	299.3158	28.95	13.57	22.29	1.79	22.02	46.00	-23.98	100	170
4	H	155.3644	25.04	12.60	22.30	1.37	16.71	43.50	-26.79	100	171
5	H	72.0843	33.81	7.76	22.39	0.97	20.15	40.00	-19.85	200	0
6	H	54.4516	30.62	7.91	22.39	0.78	16.92	40.00	-23.08	100	243

30MHz -1GHz



Test Data

Horizontal Polarity Plot @3m

N o.	P/ L	Frequency	Reading	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	647.3856	30.81	19.62	21.48	2.62	31.57	46.00	-14.43	100	12
2	V	599.3213	31.15	19.09	21.58	2.49	31.15	46.00	-14.85	100	23
3	V	153.7385	34.19	12.60	22.31	1.36	25.84	43.50	-17.66	100	27
4	V	132.2206	35.01	13.11	22.39	1.22	26.95	43.50	-16.55	100	207
5	V	71.5806	44.13	7.77	22.39	0.97	30.48	40.00	-9.52	100	196
6	V	55.2207	47.17	7.83	22.40	0.78	33.38	40.00	-6.62	100	22

Above 1GHz

Test Mode:	Transmitting Mode
------------	-------------------

Low Channel (2412 MHz) (g mode worst case)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4824	48.59	AV	V	33.39	7.22	48.46	40.74	54	-13.26
4824	45.47	AV	H	33.39	7.22	48.46	37.62	54	-16.38
4824	66.8	PK	V	33.39	7.22	48.46	58.95	74	-15.05
4824	67.51	PK	H	33.39	7.22	48.46	59.66	74	-14.34
8632	28.06	AV	V	39.88	13.38	46.93	34.39	54	-19.61
8632	19.97	AV	H	39.88	13.38	46.93	26.3	54	-27.7
8632	38.21	PK	V	39.88	13.38	46.93	44.54	74	-29.46
8632	48.44	PK	H	39.88	13.38	46.93	54.77	74	-19.23

Middle Channel (2437 MHz) (b mode worst case)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4874	43.4	AV	V	33.62	7.53	48.36	36.19	54	-17.81
4874	46.11	AV	H	33.62	7.53	48.36	38.9	54	-15.1
4874	67.8	PK	V	33.62	7.53	48.36	60.59	74	-13.41
4874	63.62	PK	H	33.62	7.53	48.36	56.41	74	-17.59
11082	21.79	AV	V	40.41	12.38	46.65	27.93	54	-26.07
11082	25.44	AV	H	40.41	12.38	46.65	31.58	54	-22.42
11082	42.3	PK	V	40.41	12.38	46.65	48.44	74	-25.56
11082	41.98	PK	H	40.41	12.38	46.65	48.12	74	-25.88

High Channel (2462 MHz) (n20 mode worst case)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4924	46.96	AV	V	33.74	7.78	48.34	40.14	54	-13.86
4924	44.3	AV	H	33.74	7.78	48.34	37.48	54	-16.52
4924	65.27	PK	V	33.74	7.78	48.34	58.45	74	-15.55
4924	66.89	PK	H	33.74	7.78	48.34	60.07	74	-13.93
17812	9.51	AV	V	42.81	18.71	45.35	25.68	54	-28.32
17812	12.6	AV	H	42.81	18.71	45.35	28.77	54	-25.23
17812	30.76	PK	V	42.81	18.71	45.35	46.93	74	-27.07
17812	30.98	PK	H	42.81	18.71	45.35	47.15	74	-26.85

Note:

- 1, The testing has been conformed to $10 \times 2462\text{MHz} = 24,620\text{MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.
- 4, The radiated spurious test above 18GHz is subcontracted to Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch Laboratories and found 30dB below the limit at least.

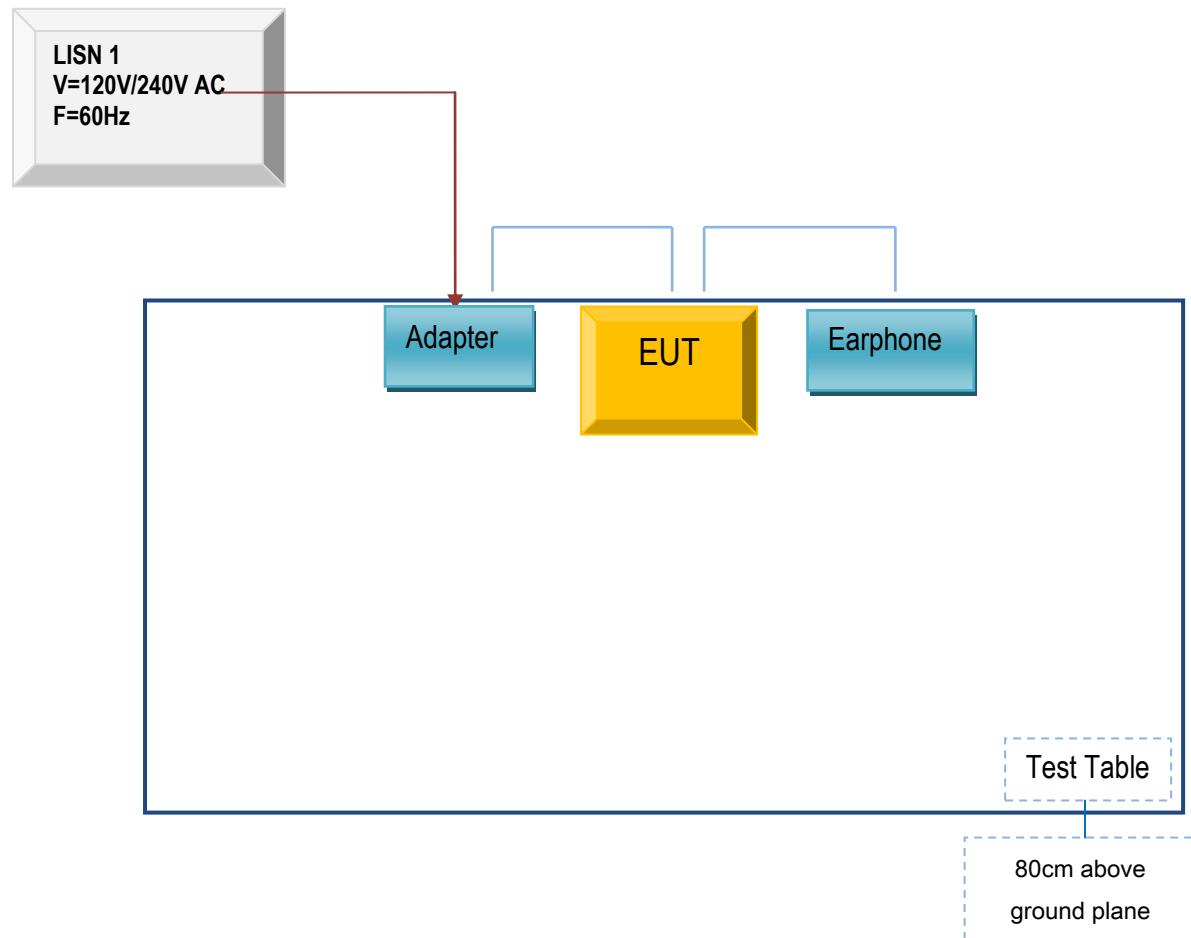
Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due
AC Line Conducted Emissions				
EMI test receiver	ESCS30	8471241027	01/05/2018	01/04/2019
Artificial Mains Network	8127	8127713	01/05/2018	01/04/2019
ISN	ISN T800	34373	01/05/2018	01/04/2019
Radiated Emissions				
EMI test receiver	ESL6	1300.5001K06-100262-eQ	01/05/2018	01/04/2019
Active Antenna	AL-130	121031	02/08/2018	02/07/2019
3m Semi-anechoic Chamber	9m*6m*6m	N/A	10/18/2018	10/17/2019
Signal Amplifier	8447E	443008	01/25/2018	01/24/2019
MXA signal analyzer	N9020A	MY49100060	01/05/2018	01/04/2019
Horn Antenna	HAH-118	71259	01/26/2018	01/25/2019
Horn Antenna	HAH-118	71283	02/02/2018	02/01/2019
AMPLIFIER	EM01G26G	60613	01/25/2018	01/24/2019
AMPLIFIER	Emc012645	980077	01/05/2018	01/04/2019
Bilog Antenna (30MHz~6GHz)	JB6	A110712	02/08/2018	02/07/2019
RF Conducted				
DC Power Supply	E3640A	MY40004013	01/05/2018	01/04/2019
MXA Signal Analyzer	N9020A	MY49100060	01/05/2018	01/04/2019
MXG Vector Signal Generator	N5182A	MY50140530	01/05/2018	01/04/2019
Series Signal Generator	E4421B	US40051152	05/12/2018	05/11/2019
RF control unit	JS0806-0806-2	188060112	04/25/2018	04/24/2019
Wireless Connectivity Tester	CMW270	1201.0002K75-101601-PE	04/25/2018	04/24/2019
Weinschel	1580-1	TL177	01/05/2018	01/04/2019
Universal Radio Communica	CMU200	121393	02/11/2018	02/10/2019

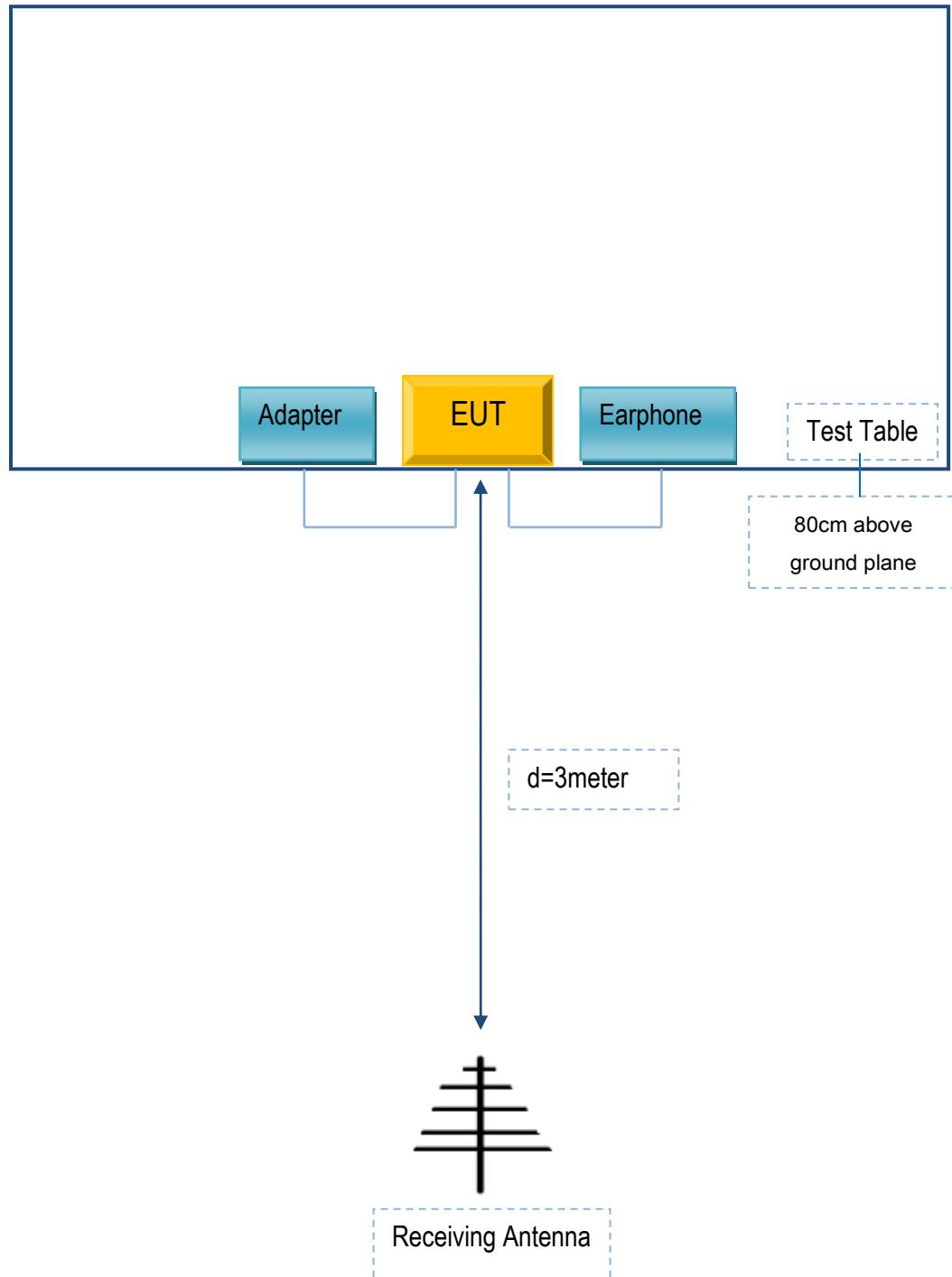
Annex B. TEST SETUP AND SUPPORTING EQUIPMENT

Annex B.i. TEST SET UP BLOCK

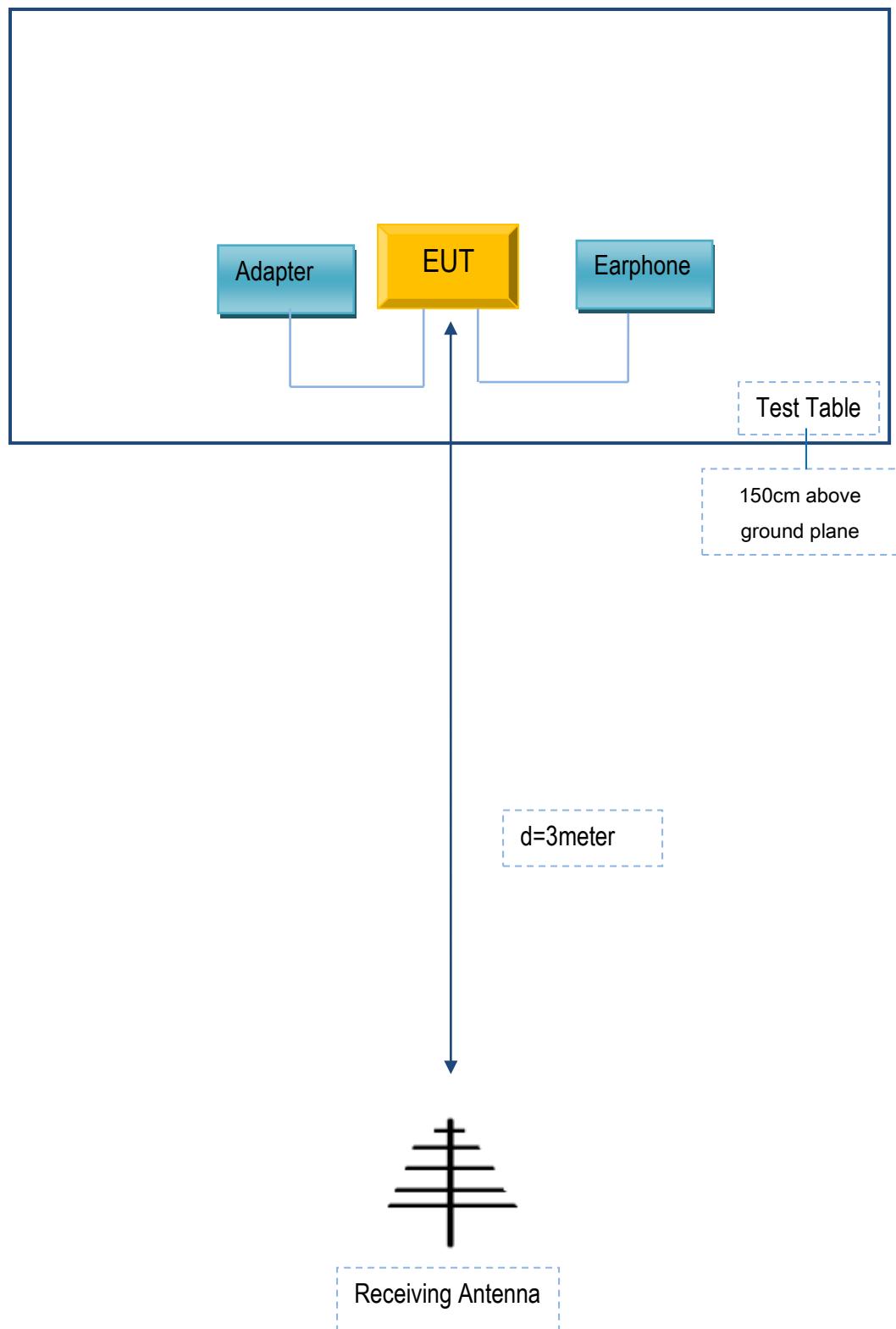
Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions (Below 1GHz) .



Block Configuration Diagram for Radiated Emissions (Above 1GHz) .



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Cedar Kingdom Corporation Limited	Adapter	VT701	N/A
Cedar Kingdom Corporation Limited	Earphone	VT701	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	N/A

Annex C. User Manual / Block Diagram / Schematics / Partlist/ DECLARATION OF SIMILARITY

Please see the attachment