

RF TEST REPORT



Report No.: 15070127-FCC-R1

Supersede Report No.: N/A

Applicant	PING COMMUNICATION AS	
Product Name	FIBER GATEWAY (Router)	
Model No.	R3681-W1	
Serial No.	R3601-W1, R3621-W1, R3641-W1	
Test Standard	FCC Part 15.247: 2014, ANSI C63.10: 2013	
Test Date	January 05 to February 13, 2015	
Issue Date	February 27, 2015	
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"/>
Dustin Wang Test Engineer	Alex Liu Checked By	
<p>This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only</p>		

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
15070127-FCC-R1	NONE	Original	February 27, 2015

2. Customer information

Applicant Name	PING COMMUNICATION AS
Applicant Add	Postboks 160, 2001 Lillestrom Norway
Manufacturer	PING COMMUNICATION AS
Manufacturer Add	Postboks 160, 2001 Lillestrom Norway

3. Test site information

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.	718246
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

4. Equipment under Test (EUT) Information

Description of EUT: FIBER GATEWAY (Router)

Main Model: R3681-W1

Serial Model: R3601-W1, R3621-W1, R3641-W1

Date EUT received: January 05, 2015

Test Date(s): January 05 to February 13, 2015

Equipment Category : DTS

Antenna Gain: WIFI: 3 dBi

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

RF Operating Frequency (ies):
 WIFI:802.11b/g/n(20M): 2412-2462 MHz
 WIFI:802.11n(40M): 2422-2452 MHz

802.11b: 18.33 dBm

802.11g: 12.51 dBm

Max. Output Power:
 802.11n(20M): 13.03 dBm
 802.11n(40M): 10.27 dBm

Number of Channels:
 WIFI :802.11b/g/n(20M): 11CH
 WIFI :802.11n(40M): 7CH

Port: USB Port, WAN Port, LAN Port, RJ11 Port, SFP Port

R3681-W1, R3641-W1 Powered by adaptor;

Model:GP304U-120-200;

Input:100-240V~1.0 A 50/60Hz

Input Power: Output:12.0V DC2.0A

R3621-W1, R3601-W1 Powered by adaptor;

Model:G0616U-120-100;

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Input:100-240V~0.5 A 50/60Hz

Output:12.0V DC1.0A

Trade Name : PINGCOM

GPRS/EGPRS Multi-slot class N/A

FCC ID: 2ADH4R36X1

Note 1: In this report, we have chosen the main model R3681-W1 for testing. R3641-W1, R3621-W1 and R3601-W1 are the abbreviated visions of R3681-W1. But R3681-W1 and R3641-W1 are powered by the adaptor with model name GP304U-120-200. R3621-W1 and R3601-W1 are powered by the adaptor with model name G0616U-120-100. These tests (AC Power Line Conducted Emissions and Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands below 1GHz) shall be performed against due to the difference between adaptors. The difference among them was explained in the declaration letter.

Note 2: This is the amended report application (15070127-FCC-R1) of the device, the original submission (14070736-FCC-R1) was granted on Feb. 13rd, 2015. The difference between the original device and the current one are only for different Model Name, Trade Name, the information of Applicat & Manufacturer.

All above were explained in the attached Declaration Letter. And based on the letter the difference between them will not affect any test items, so in this report we didn't revised any test data and photos, so the following test data and photos please refer to report 14070736-FCC-R1.

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 Non-Restricted Frequency Bands	Compliance
§15.207 (a),	AC Power Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	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 two same antennas:

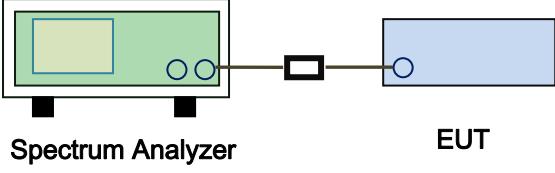
Two permanently attached PIFA antennas for WIFI, and the gain of one antenna is 3 dBi, so the total gain is 6 dBi.

The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 DTS (6 dB&20 dB) Channel Bandwidth

Temperature	24°C
Relative Humidity	57%
Atmospheric Pressure	1007mbar
Test date :	January 26, 2014
Tested By :	Dustin Wang

Spec	Item	Requirement	Applicable
§ 15.247(a)(2) RSS Gen(4.6.1)	a)	6dB BW \geq 500kHz;	<input checked="" type="checkbox"/>
	b)	99% BW: For FCC reference only; required by IC.	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
Test Procedure	<p>558074 D01 DTS MEAS Guidance v03r02, 8.1 DTS bandwidth</p> <p><u>6dB bandwidth</u></p> <ul style="list-style-type: none"> a) Set RBW = 100 kHz. b) Set the video bandwidth (VBW) \geq 3 \times RBW. c) Detector = Peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. <p><u>20dB bandwidth</u></p> <p>C63.10 Occupied Bandwidth (OBW=20dB bandwidth)</p> <ol style="list-style-type: none"> 1. Set RBW = 1%-5% OBW. 2. Set the video bandwidth (VBW) \geq 3 x RBW. 3. Set the span range between 2 times and 5 times of the OBW. 4. Sweep time=Auto, Detector=PK, Trace=Max hold. 5. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce the worst- 		

	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

6dB Bandwidth measurement result

Type	Test mode	CH	Freq (MHz)	Result (MHz)		Limit (MHz)	Result
				Antenna 1	Antenna 2		
6dB BW	802.11b	Low	2412	9.095	10.128	≥ 0.5	Pass
		Mid	2437	9.686	9.138	≥ 0.5	Pass
		High	2462	8.875	9.162	≥ 0.5	Pass
	802.11g	Low	2412	16.583	16.525	≥ 0.5	Pass
		Mid	2437	16.546	16.554	≥ 0.5	Pass
		High	2462	16.559	16.561	≥ 0.5	Pass
	802.11n (20M)	Low	2412	17.694	17.677	≥ 0.5	Pass
		Mid	2437	17.684	17.654	≥ 0.5	Pass
		High	2462	17.672	17.385	≥ 0.5	Pass
	802.11n (40M)	Low	2422	36.421	36.421	≥ 0.5	Pass
		Mid	2437	36.254	36.509	≥ 0.5	Pass
		High	2452	36.382	36.429	≥ 0.5	Pass

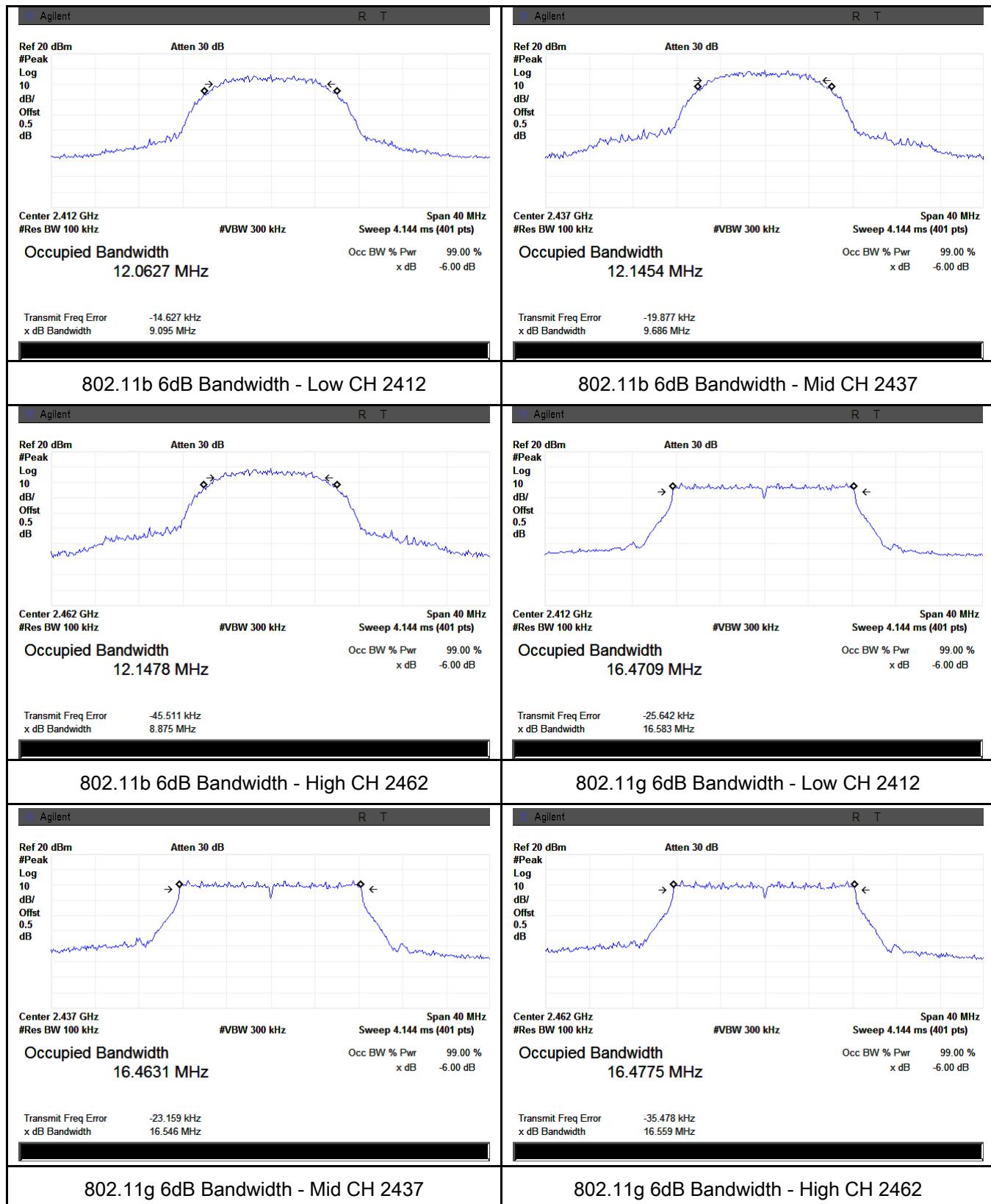
20 dB Bandwidth measurement result

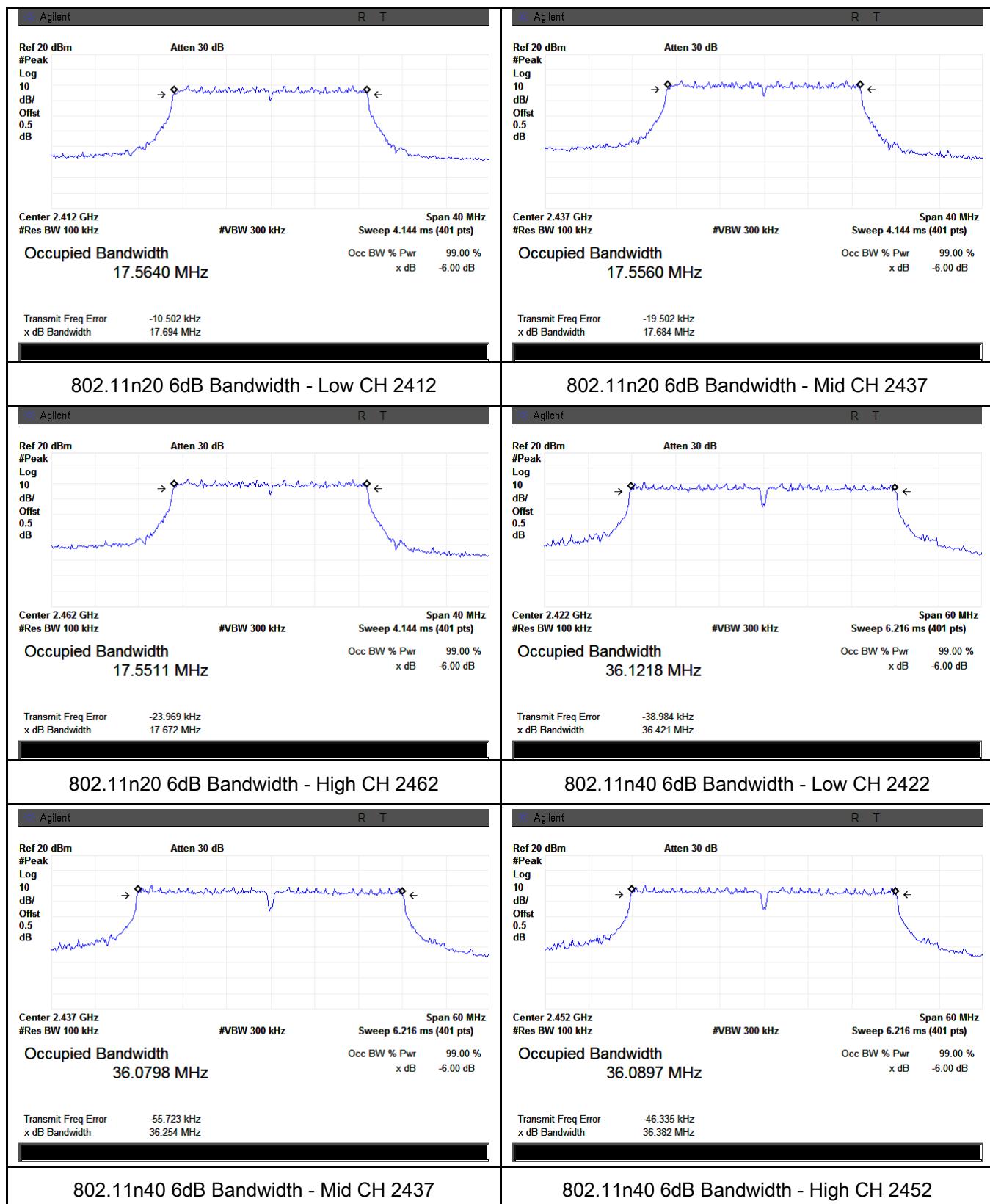
Type	Test mode	CH	Freq (MHz)	Result (MHz)		Limit (MHz)	Result
				Antenna 1	Antenna 2		
20dB BW	802.11b	Low	2412	14.127	14.170	≥ 0.5	Pass
		Mid	2437	14.159	14.187	≥ 0.5	Pass
		High	2462	14.145	14.170	≥ 0.5	Pass
	802.11g	Low	2412	18.642	18.796	≥ 0.5	Pass
		Mid	2437	18.698	18.604	≥ 0.5	Pass
		High	2462	18.699	18.607	≥ 0.5	Pass
	802.11n (20M)	Low	2412	19.241	19.211	≥ 0.5	Pass
		Mid	2437	19.308	19.177	≥ 0.5	Pass
		High	2462	19.203	19.076	≥ 0.5	Pass
	802.11n (40M)	Low	2422	40.670	40.662	≥ 0.5	Pass
		Mid	2437	40.822	40.601	≥ 0.5	Pass
		High	2452	40.778	40.433	≥ 0.5	Pass

Test Plots

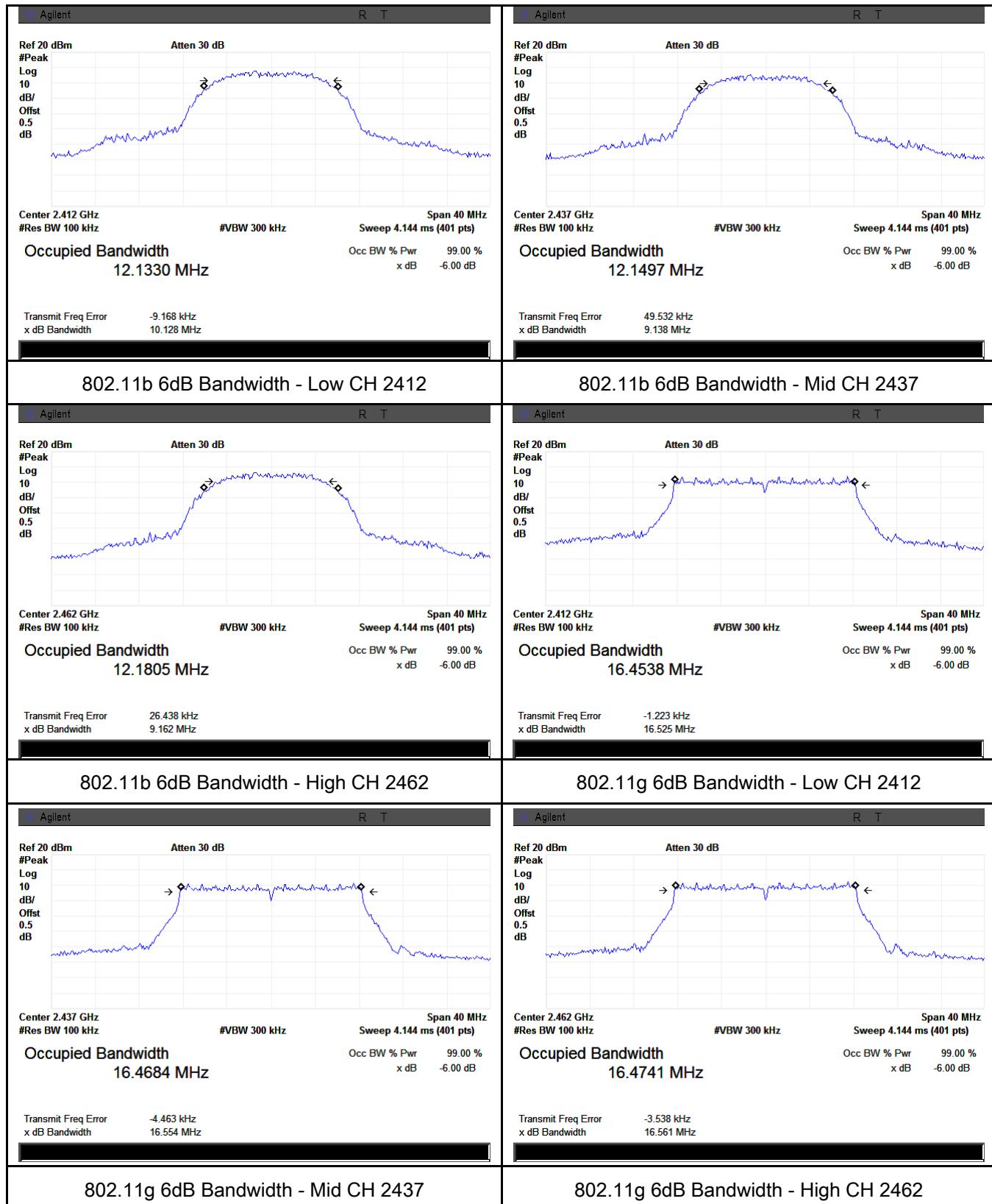
6dB Bandwidth measurement result

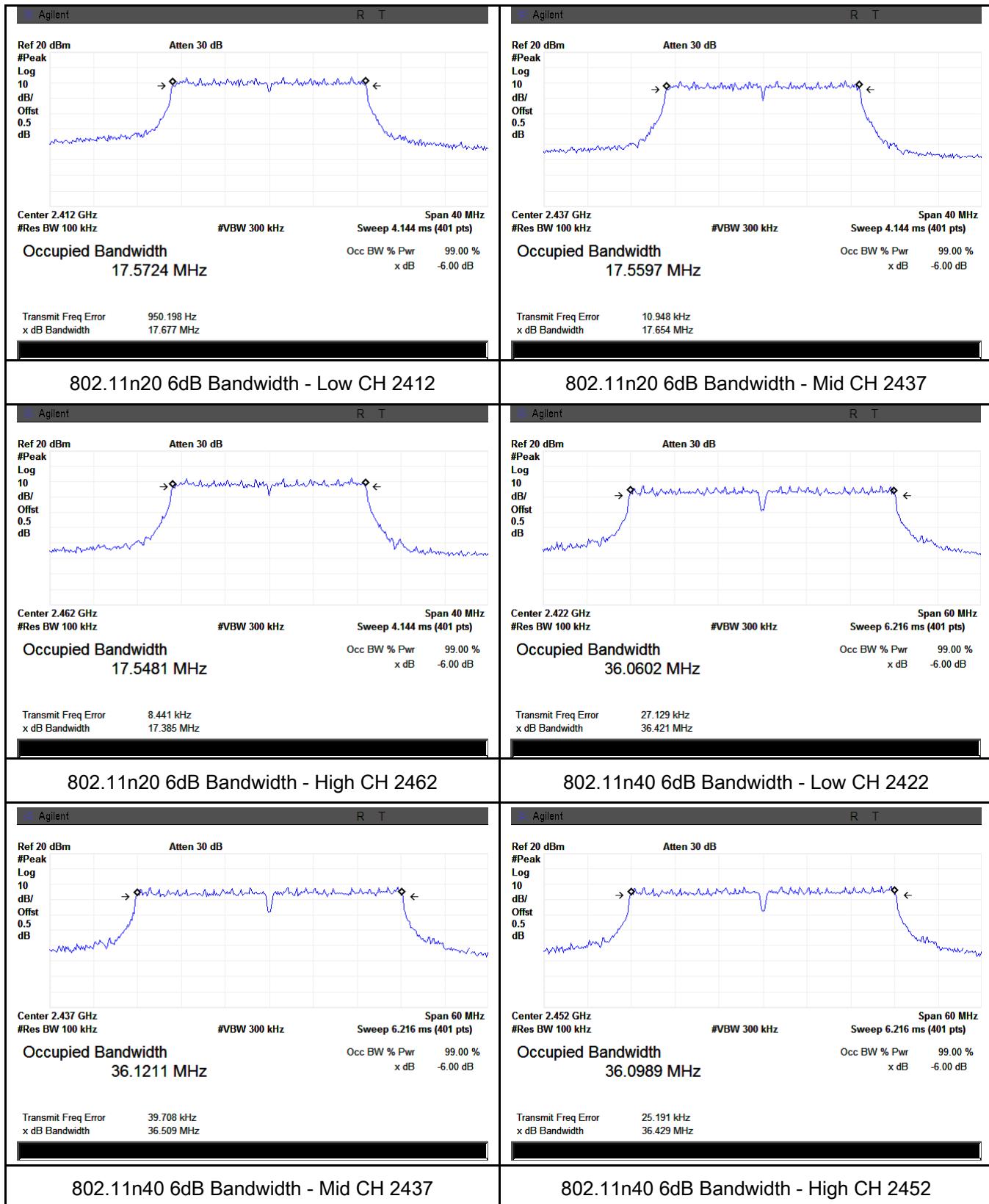
Antenna 1:





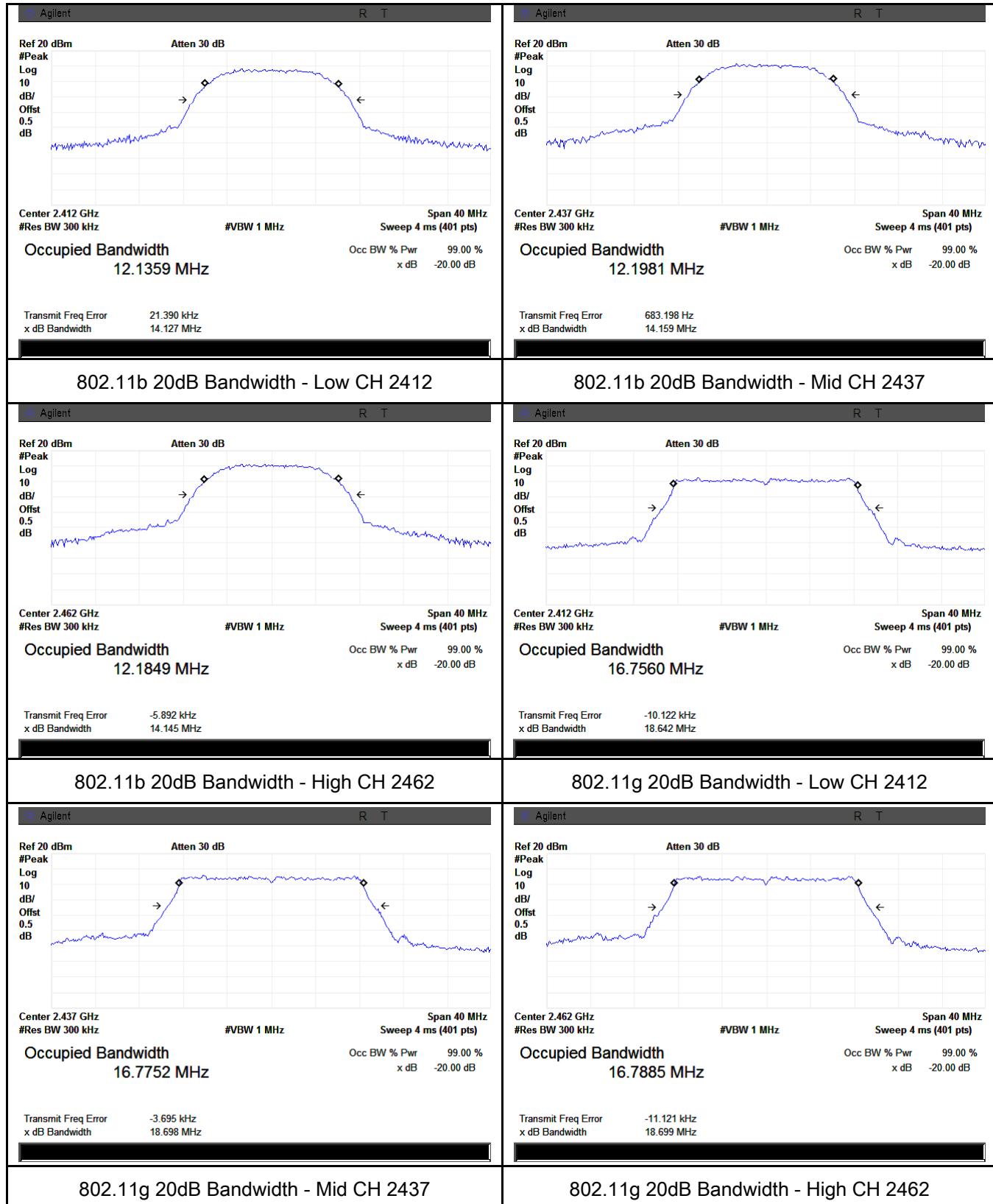
Antenna 2:

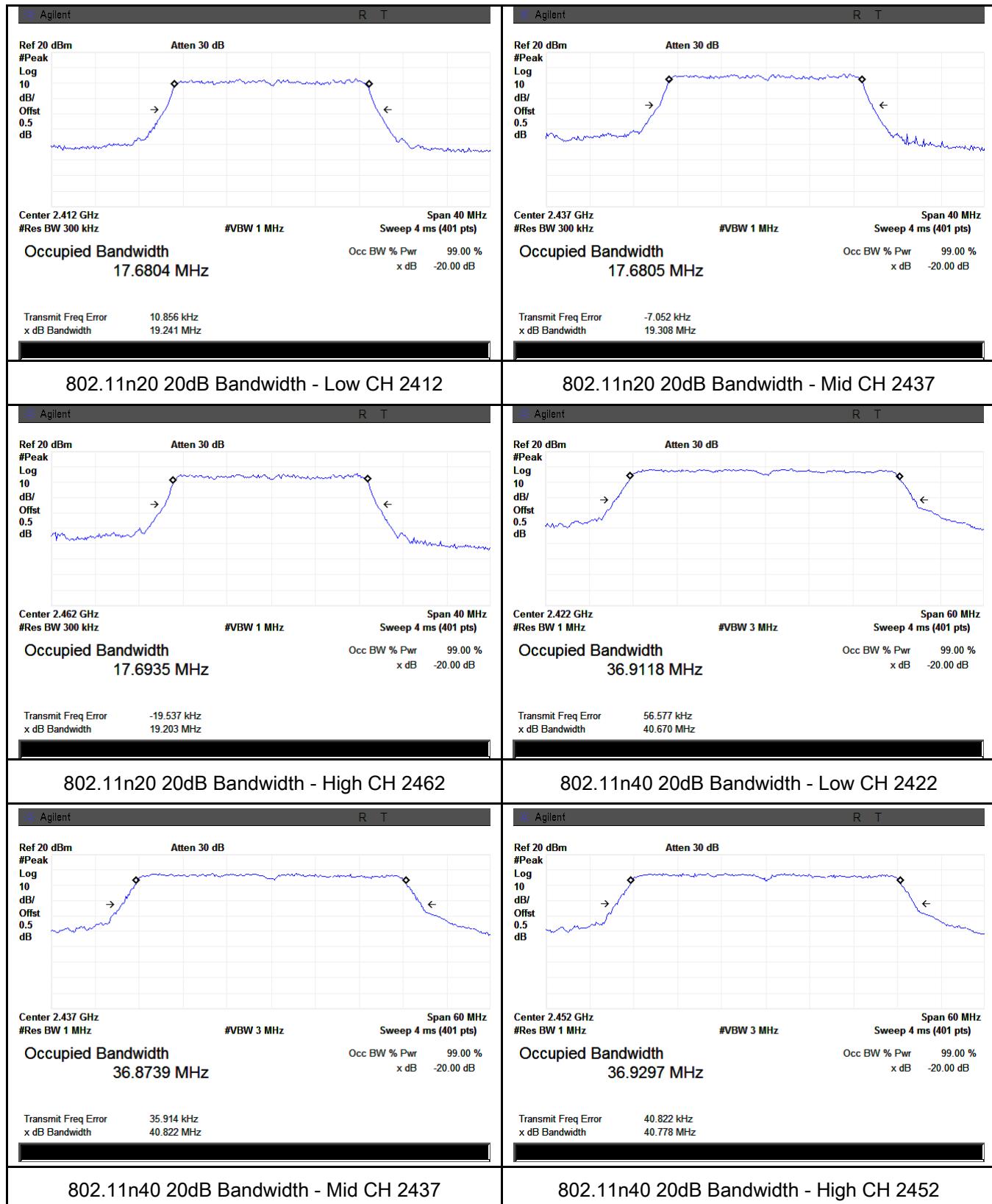




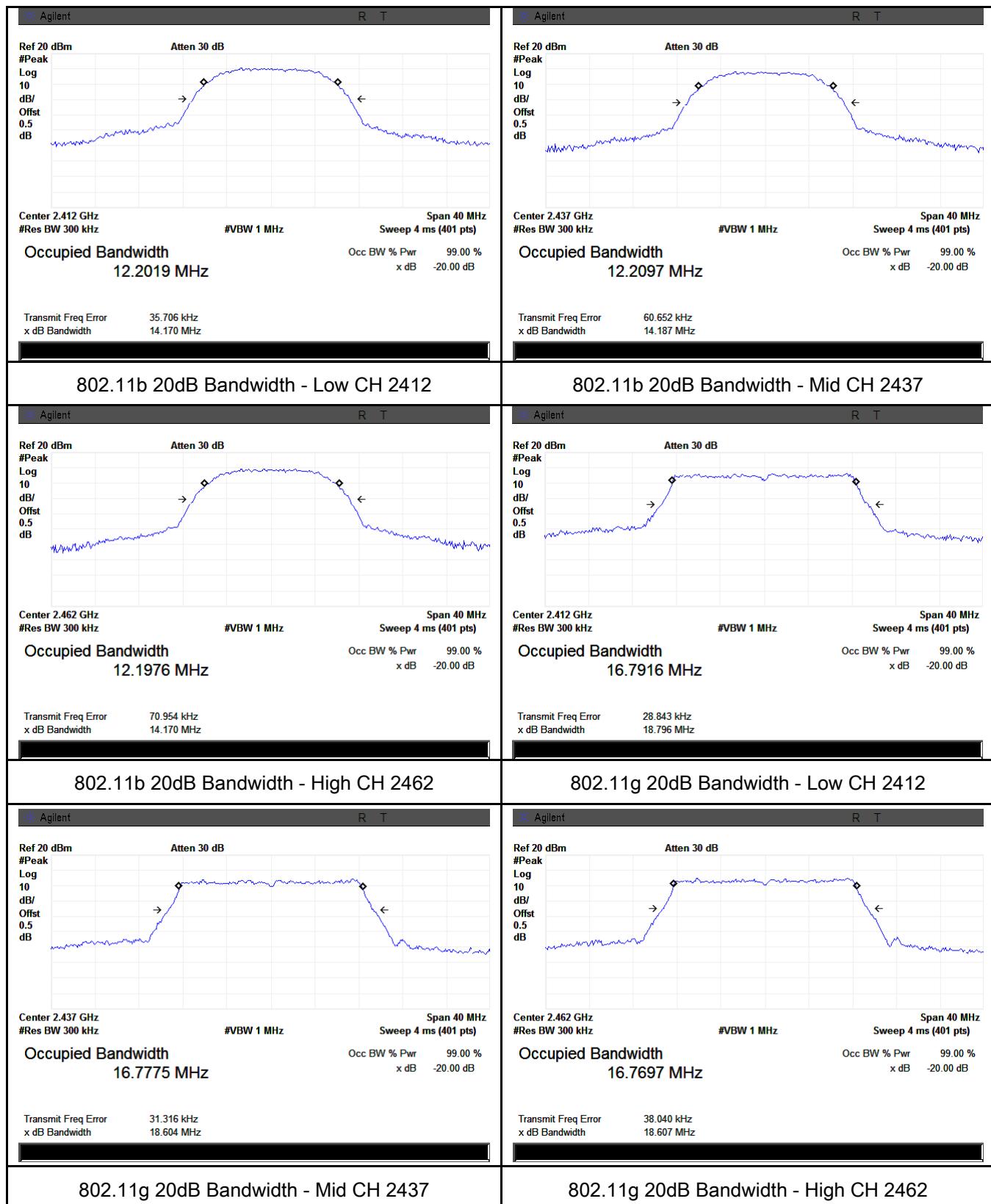
20 dB Bandwidth measurement result

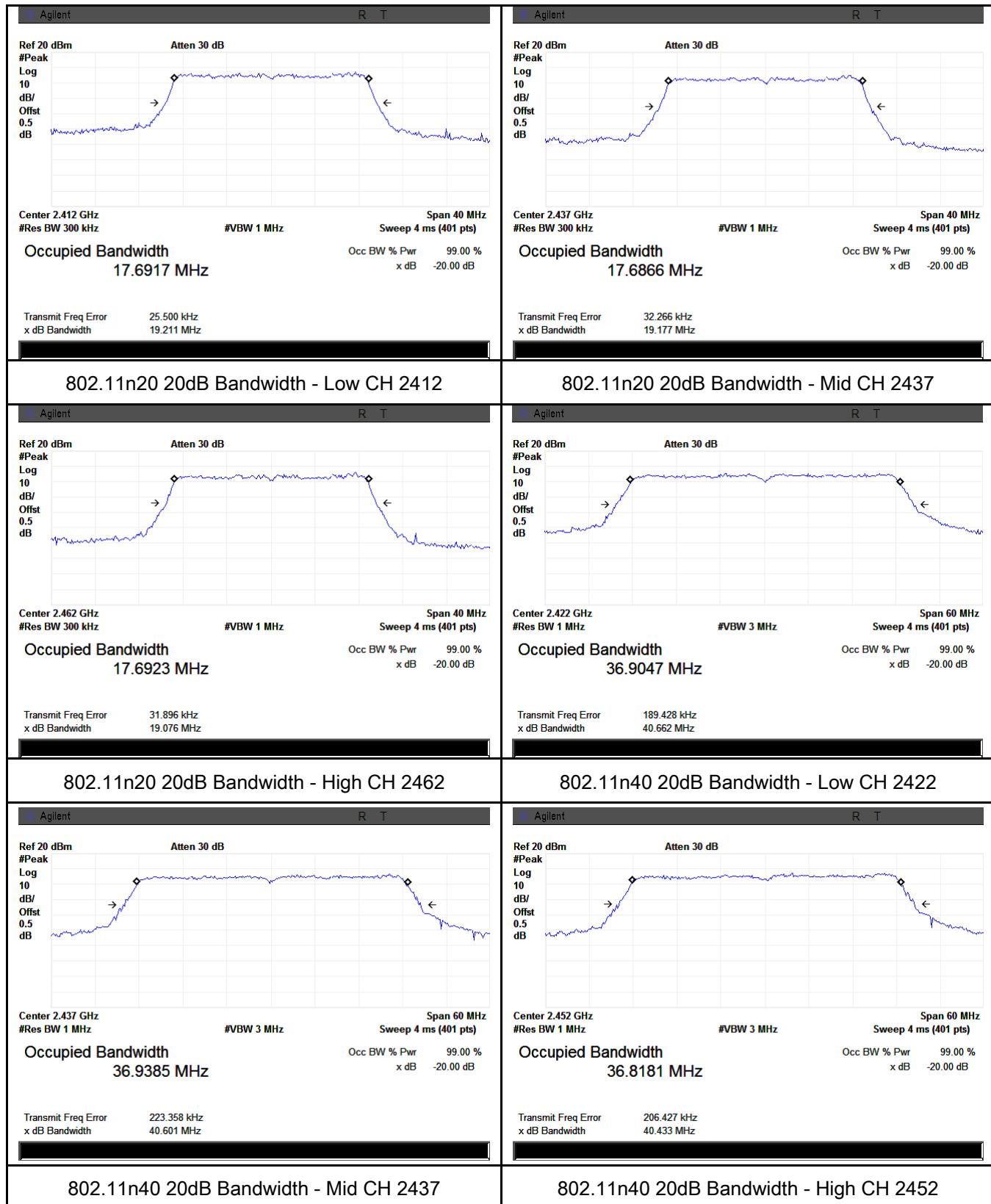
Antenna 1:





Antenna 2:

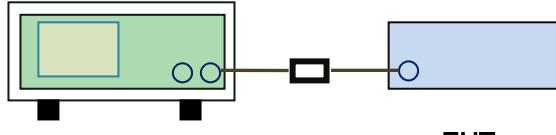




6.3 Maximum Output Power

Temperature	24°C
Relative Humidity	57%
Atmospheric Pressure	1007mbar
Test date :	January 26, 2014
Tested By :	Dustin Wang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (2), 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)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: \leq 1 Watt	<input checked="" type="checkbox"/>
Test Setup		 Spectrum Analyzer EUT	
Test Procedure		<p>558074 D01 DTS MEAS Guidance v03r02, 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 x 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 power control level for the entire duration of every sweep. If the EUT transmits 	

	<p>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

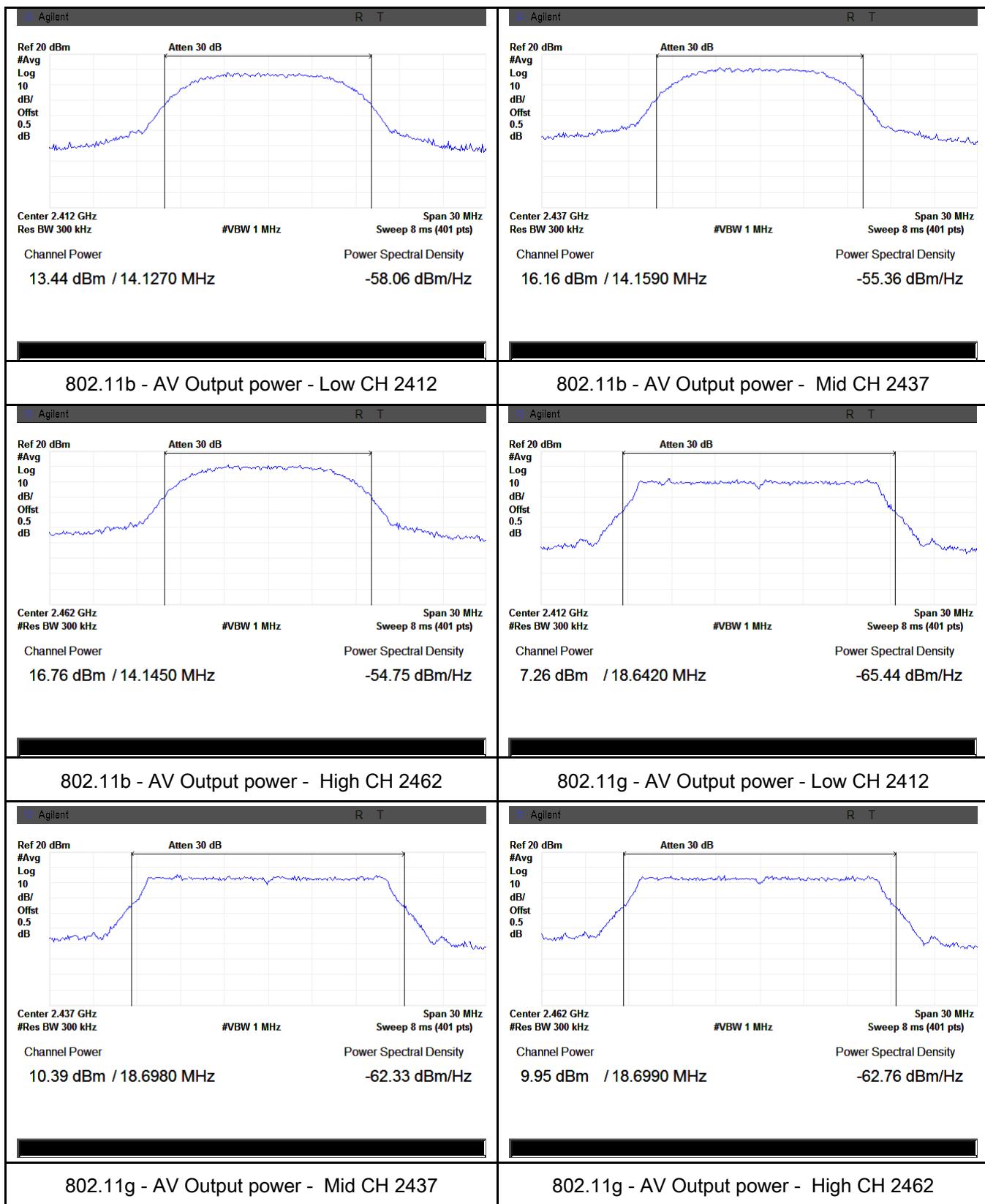
Output Power measurement result

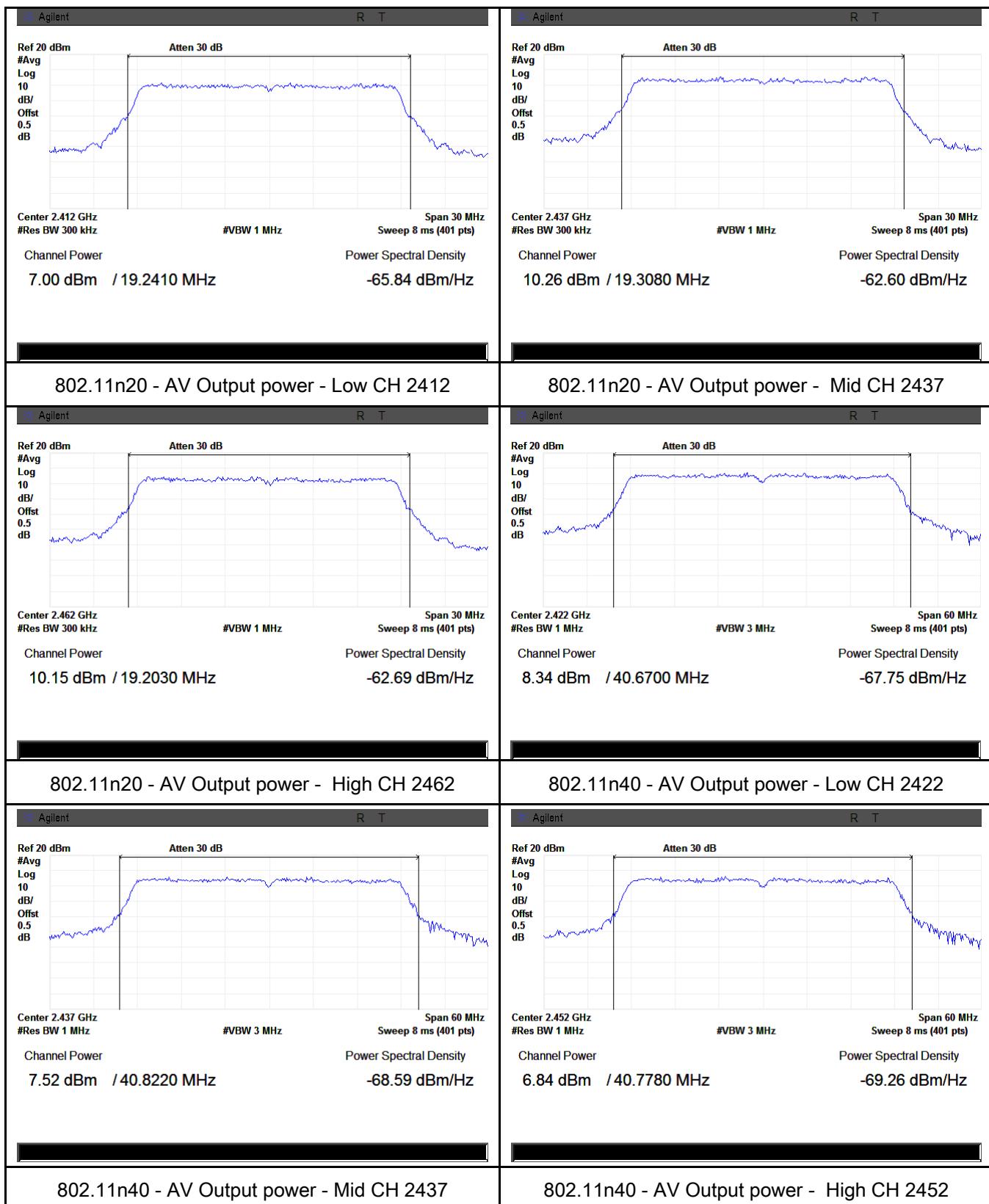
Type	Test mode	CH	Freq (MHz)	Conducted Power (dBm)			Limit (dBm)	Result
				Antenna 1	Antenna 2	Total Power		
Output power	802.11b	Low	2412	13.44	12.88	16.18	30	Pass
		Mid	2437	16.16	14.25	18.32	30	Pass
		High	2462	16.76	13.15	18.33	30	Pass
	802.11g	Low	2412	7.26	8.20	10.77	30	Pass
		Mid	2437	10.39	8.38	12.51	30	Pass
		High	2462	9.95	7.41	11.88	30	Pass
	802.11n (20M)	Low	2412	7.00	7.59	10.31	30	Pass
		Mid	2437	10.26	9.76	13.03	30	Pass
		High	2462	10.15	7.38	11.99	30	Pass
	802.11n (40M)	Low	2422	8.34	4.43	9.82	30	Pass
		Mid	2437	7.52	6.99	10.27	30	Pass
		High	2452	6.84	6.82	9.84	30	Pass

Test Plots

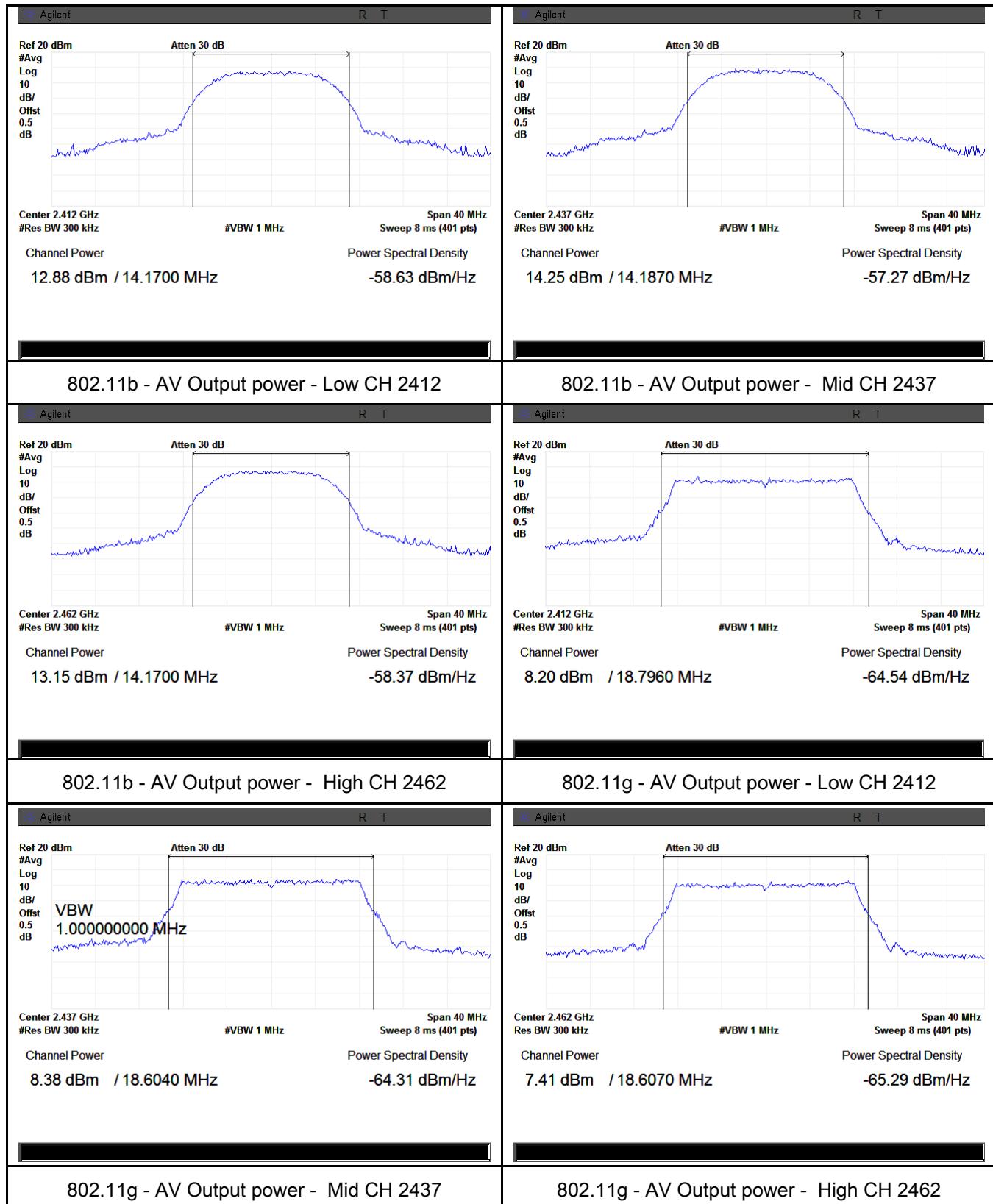
The Average Power

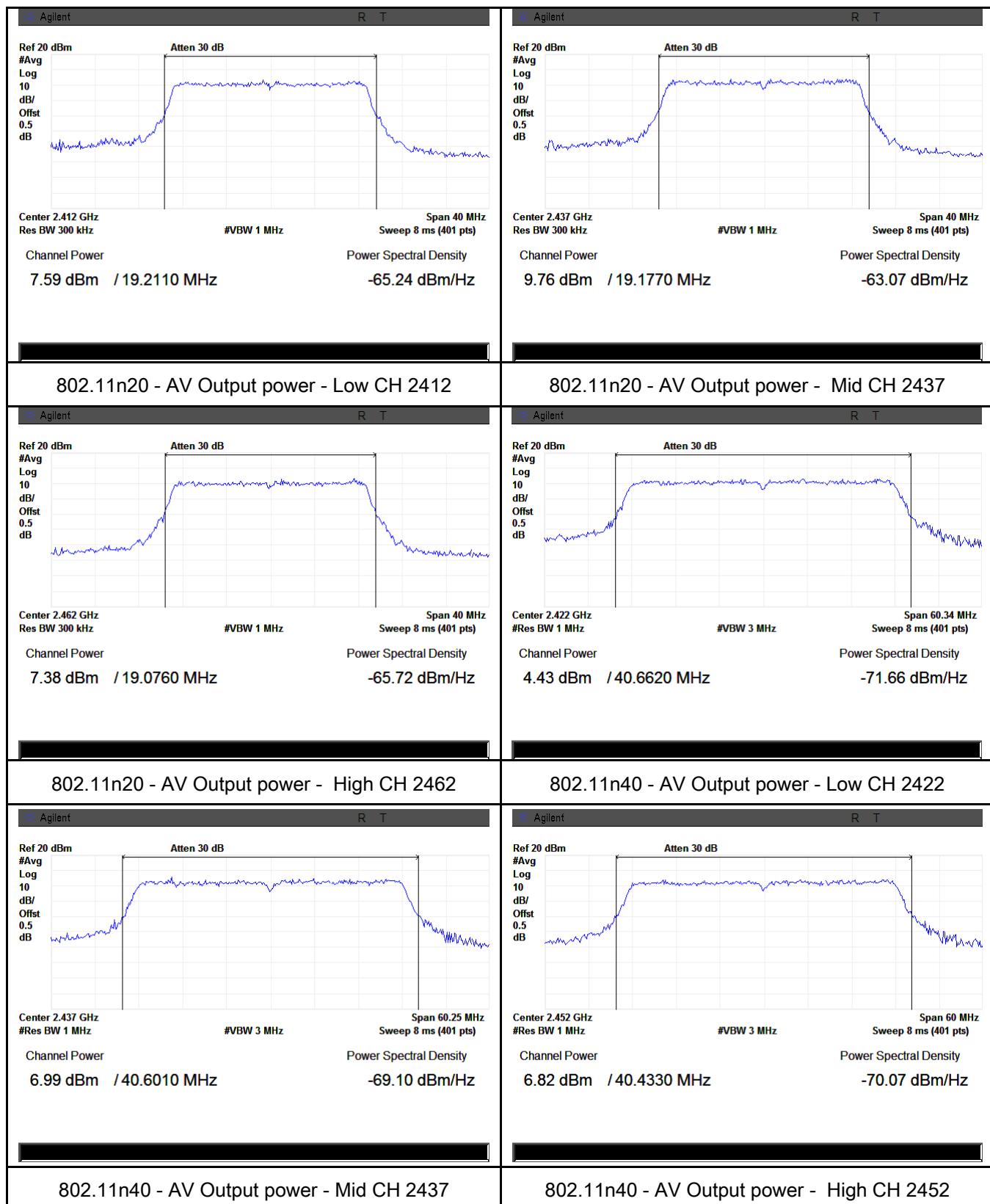
Antenna 1:





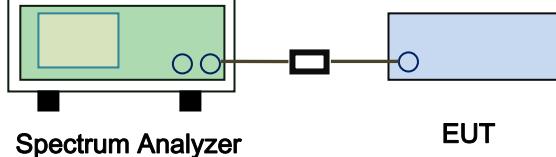
Antenna 2:





6.4 Power Spectral Density

Temperature	25°C
Relative Humidity	58%
Atmospheric Pressure	1008mbar
Test date :	January 27, 2014
Tested By :	Dustin Wang

Spec	Item	Requirement	Applicable
§15.247(e)	a)	The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
Test Procedure	<p>558074 D01 DTS MEAS Guidance v03r02, 10.2 power spectral density method power spectral density measurement procedure</p> <ul style="list-style-type: none"> - a) Set analyzer center frequency to DTS channel center frequency. - b) Set the span to 1.5 times the DTS bandwidth. - c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$. - d) Set the VBW $\geq 3 \times \text{RBW}$. - e) Detector = peak. - f) Sweep time = auto couple. - g) Trace mode = max hold. - h) Allow trace to fully stabilize. - i) Use the peak marker function to determine the maximum amplitude level within the RBW. - j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat. 		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

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

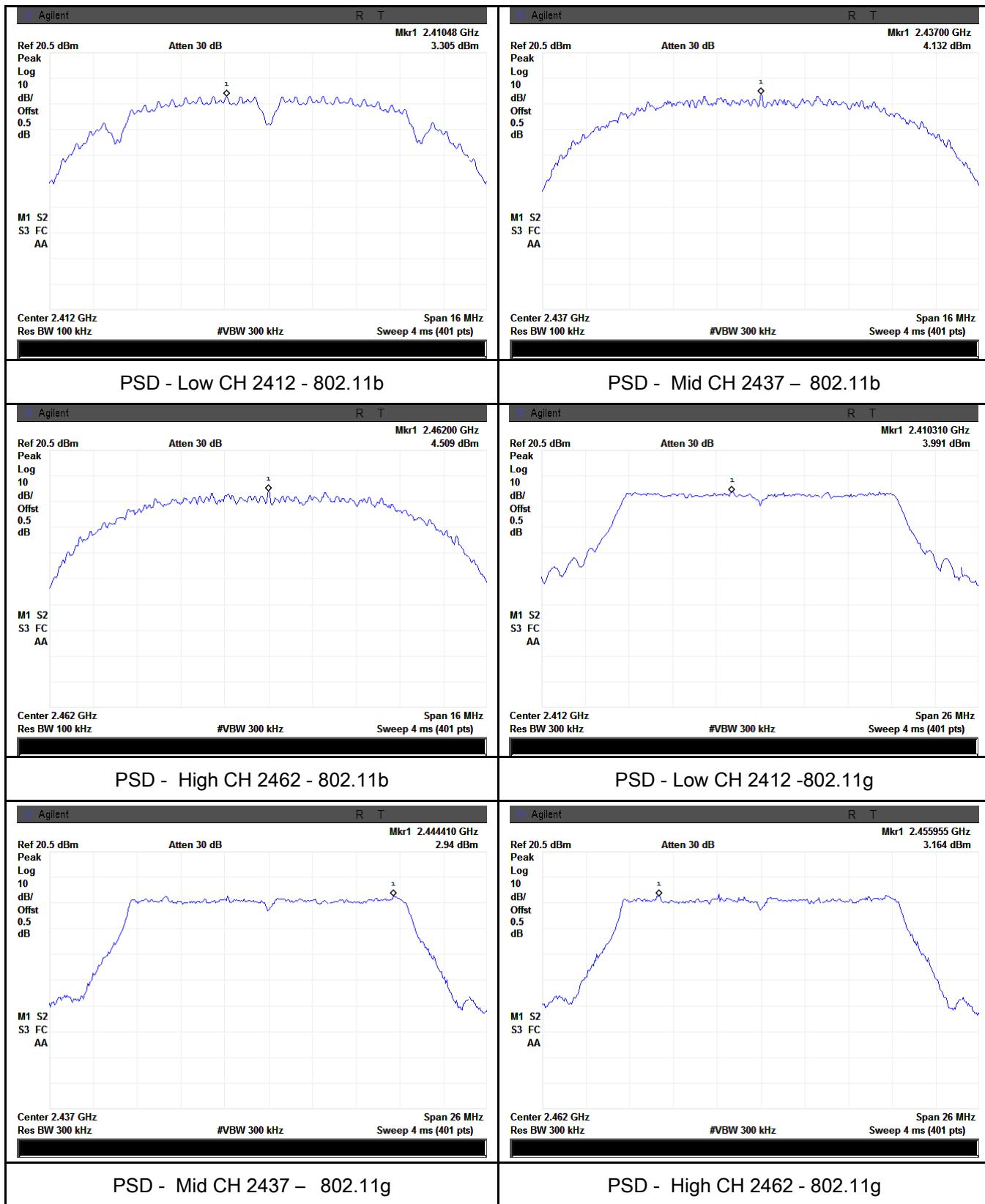
Power Spectral Density measurement result

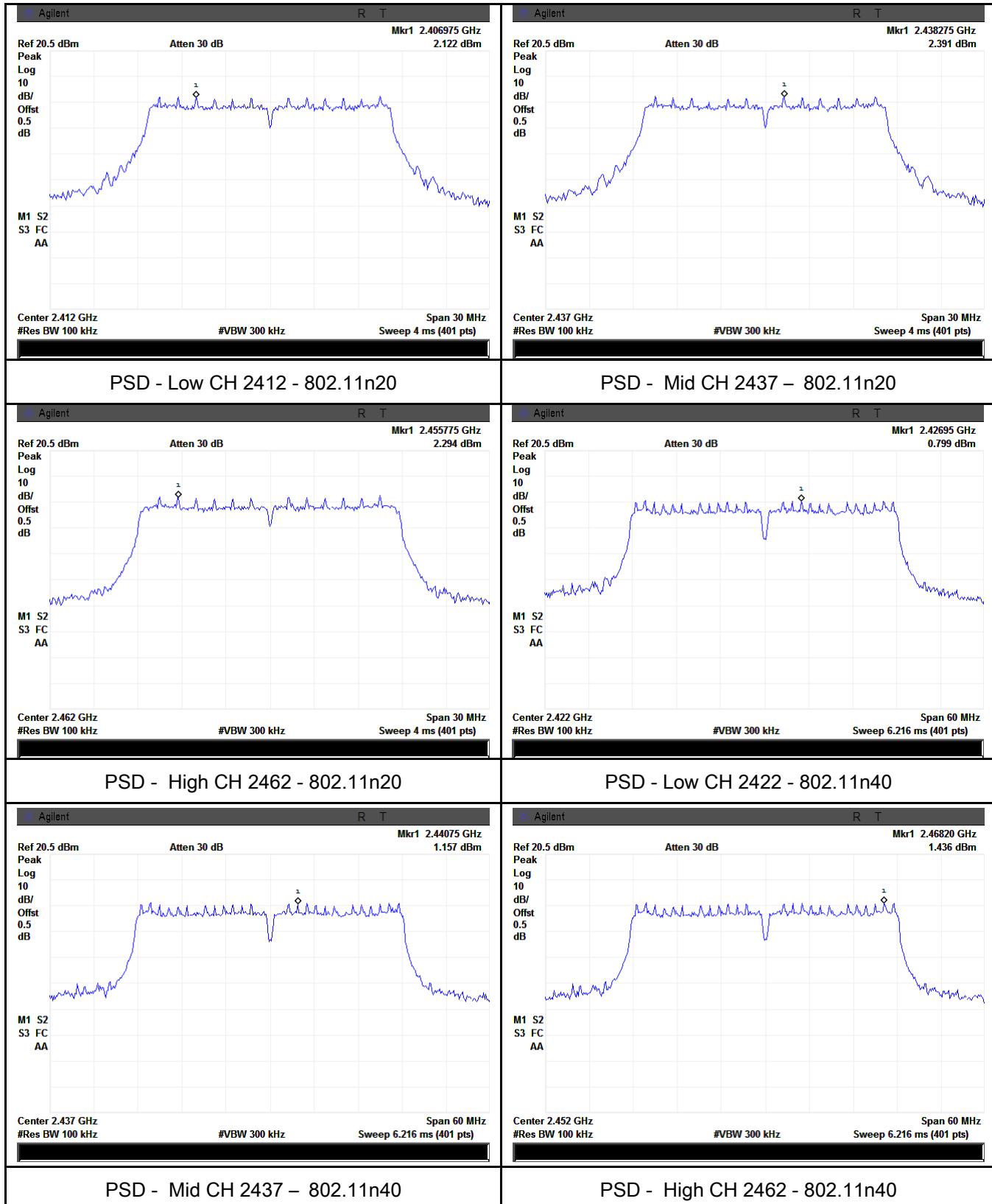
Type	Test mode	CH	Freq (MHz)	PSD (dBm)			Limit (dBm)	Result
				Antenna 1	Antenna 2	Total PSD		
PSD	802.1 1b	Low	2412	3.305	2.082	5.747	8	Pass
		Mid	2437	4.132	3.623	6.895	8	Pass
		High	2462	4.509	3.948	7.248	8	Pass
	802.1 1g	Low	2412	3.991	4.498	7.262	8	Pass
		Mid	2437	2.94	4.655	6.892	8	Pass
		High	2462	3.164	4.411	6.842	8	Pass
	802.1 1n (20M)	Low	2412	2.122	4.748	6.641	8	Pass
		Mid	2437	2.391	3.73	6.122	8	Pass
		High	2462	2.294	4.216	6.371	8	Pass
	802.1 1n (40M)	Low	2422	0.799	1.297	4.065	8	Pass
		Mid	2437	1.157	0.493	3.848	8	Pass
		High	2452	1.436	0.831	4.154	8	Pass

Test Plots

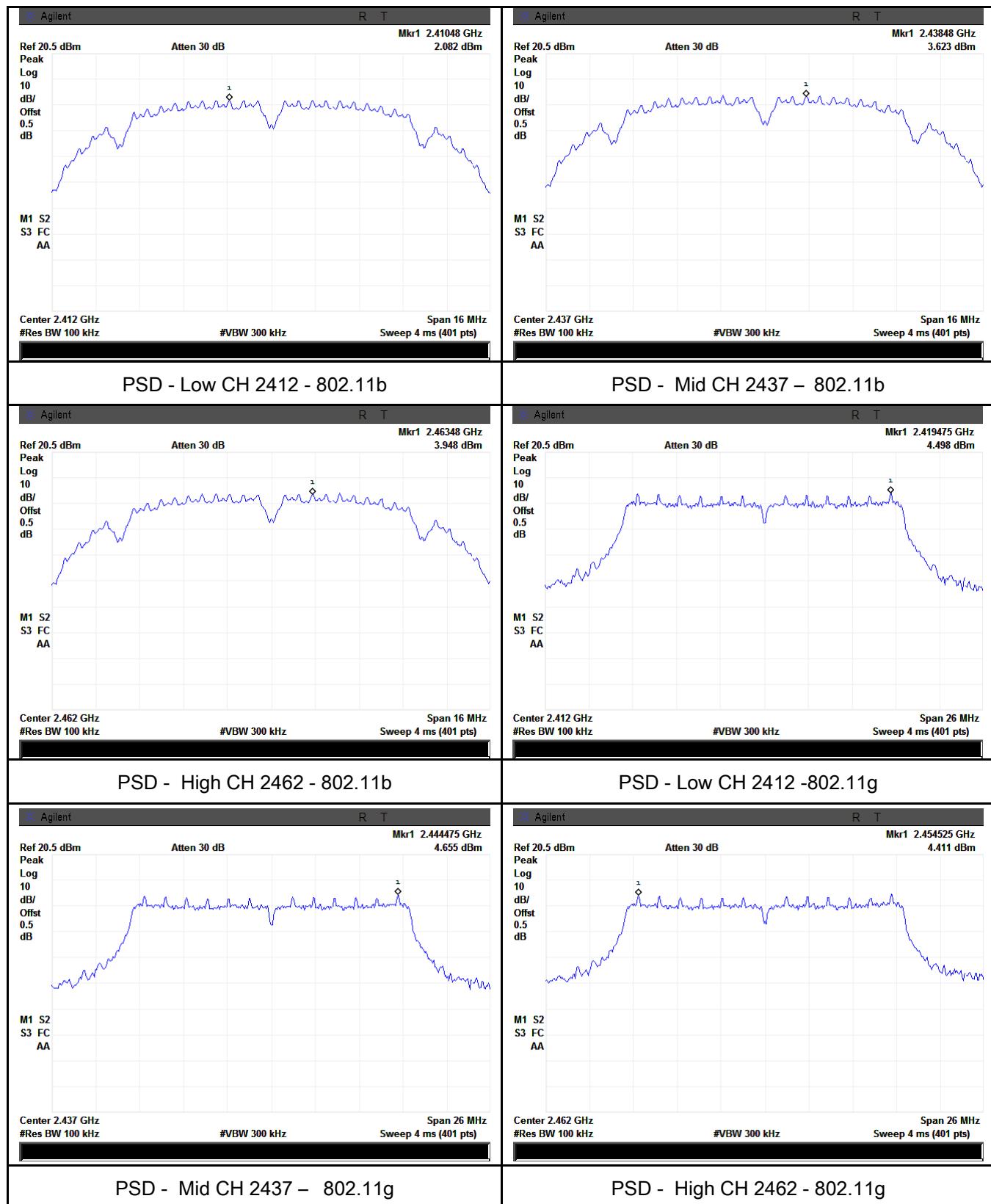
Power Spectral Density measurement result

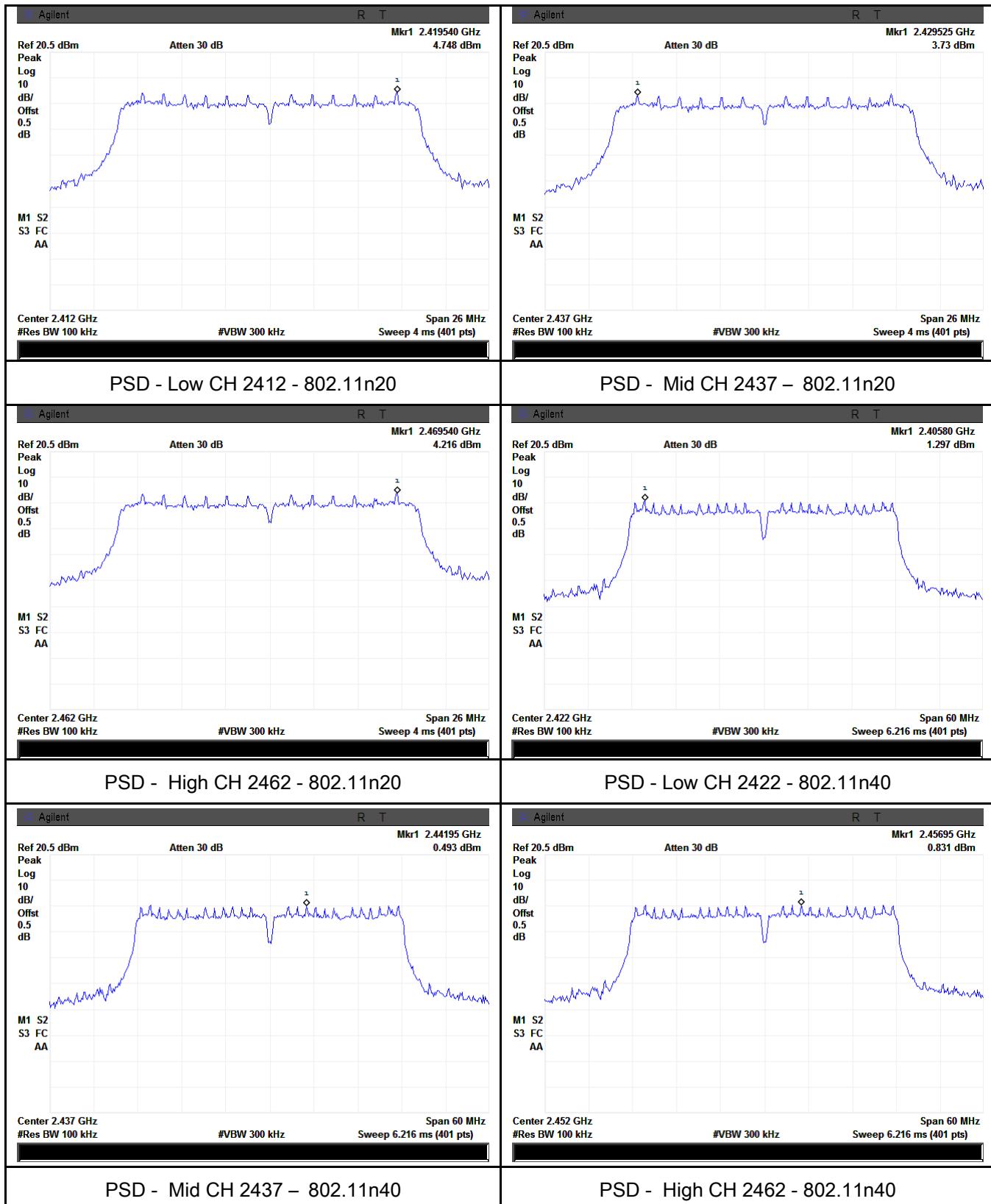
Antenna 1:





Antenna 2:

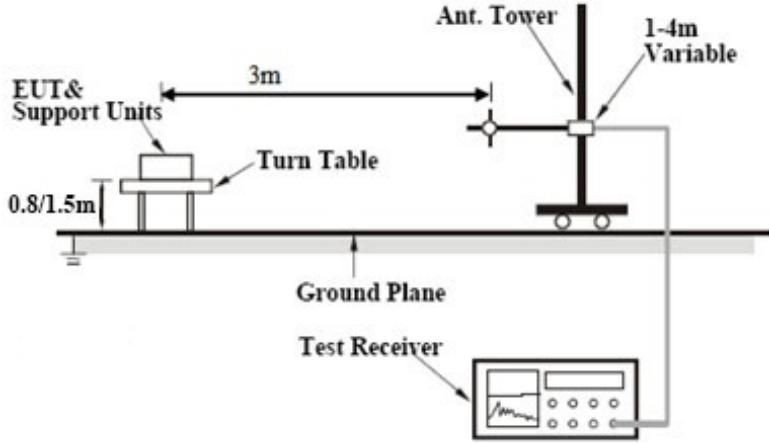




6.5 Band-Edge & Unwanted Emissions into Non-Restricted Frequency Bands

Temperature	24°C
Relative Humidity	57%
Atmospheric Pressure	1007mbar
Test date :	February 13, 2014
Tested By :	Dustin Wang

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			
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. 		

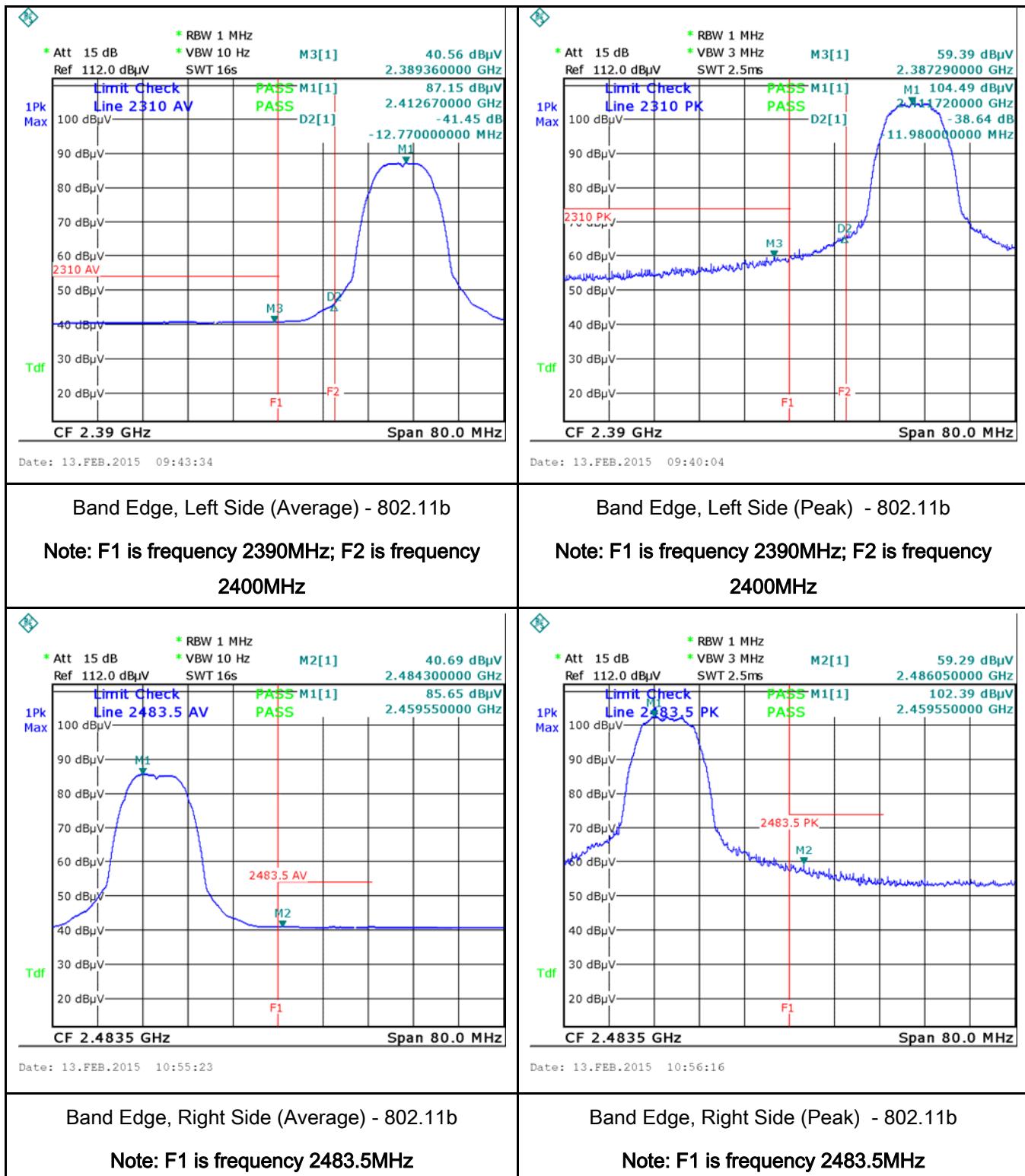
	<ul style="list-style-type: none"> - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: <ul style="list-style-type: none"> a. The resolution 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

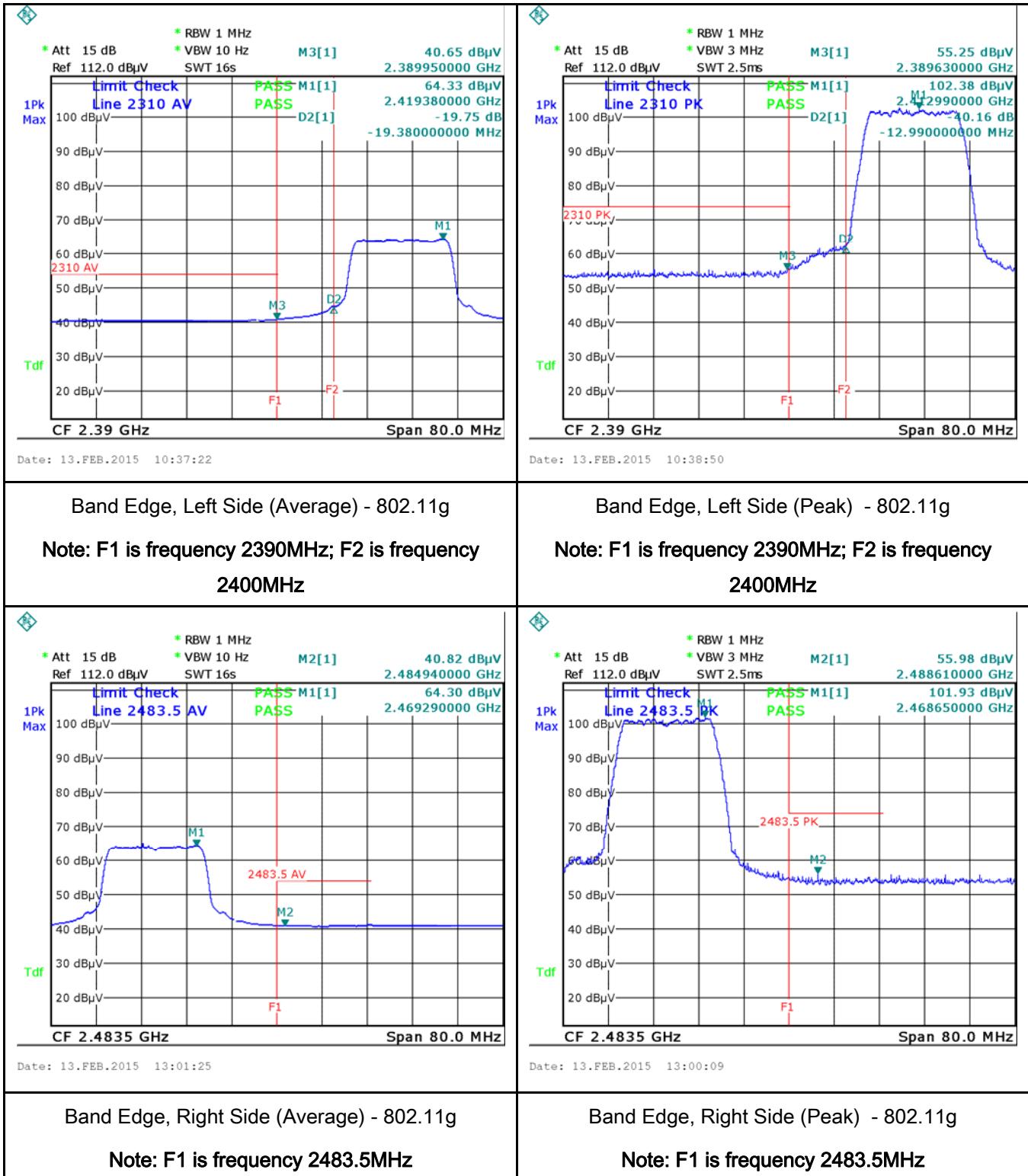
Test Data Yes N/A

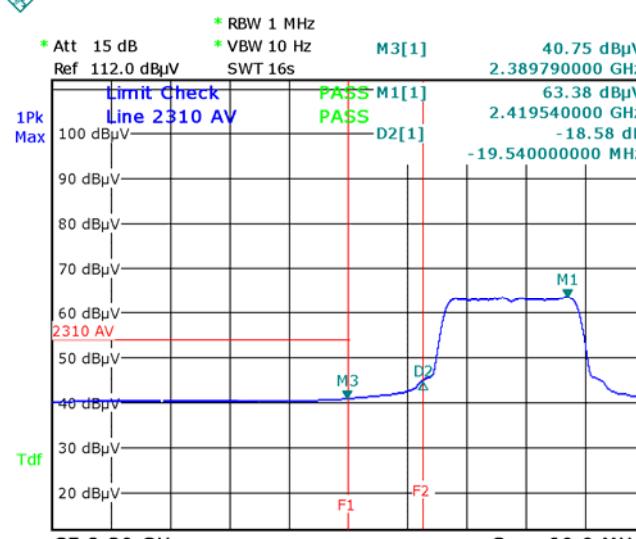
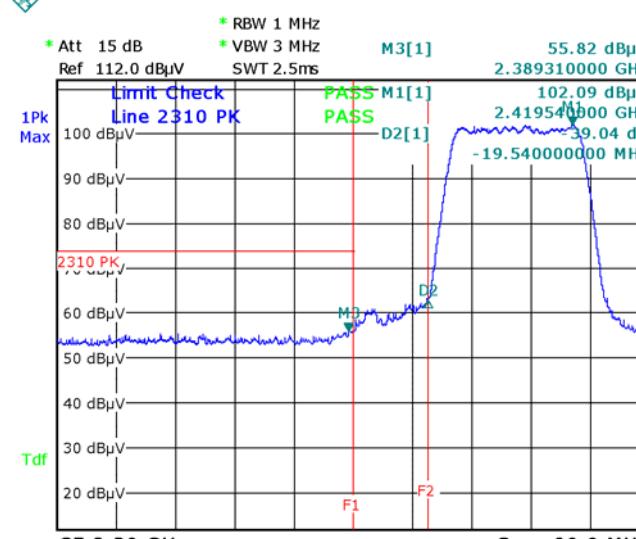
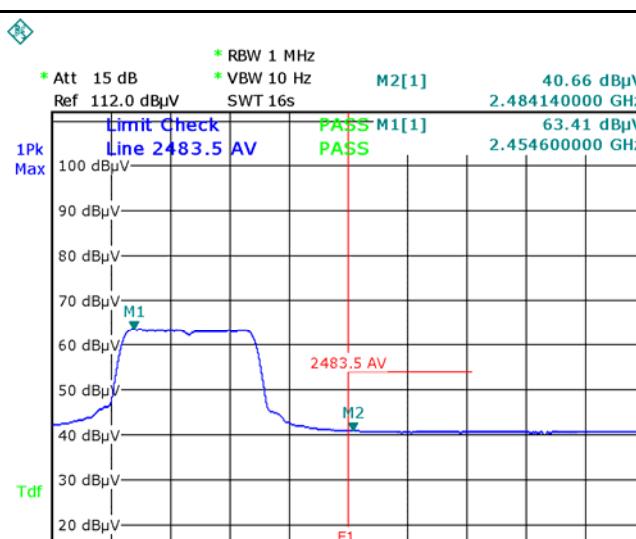
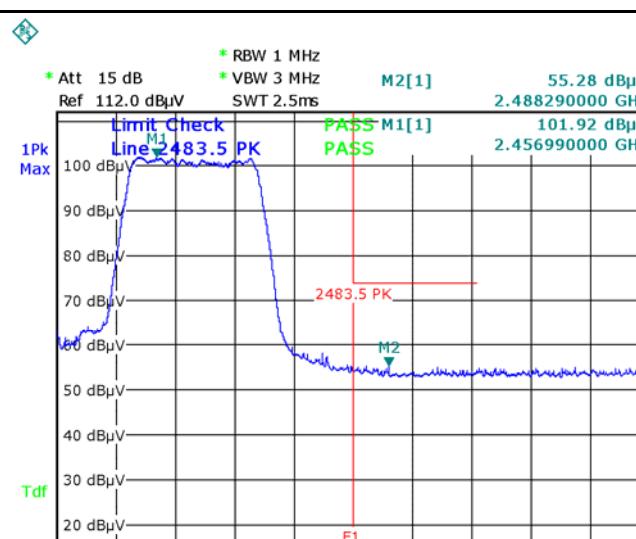
Test Plot Yes (See below) N/A

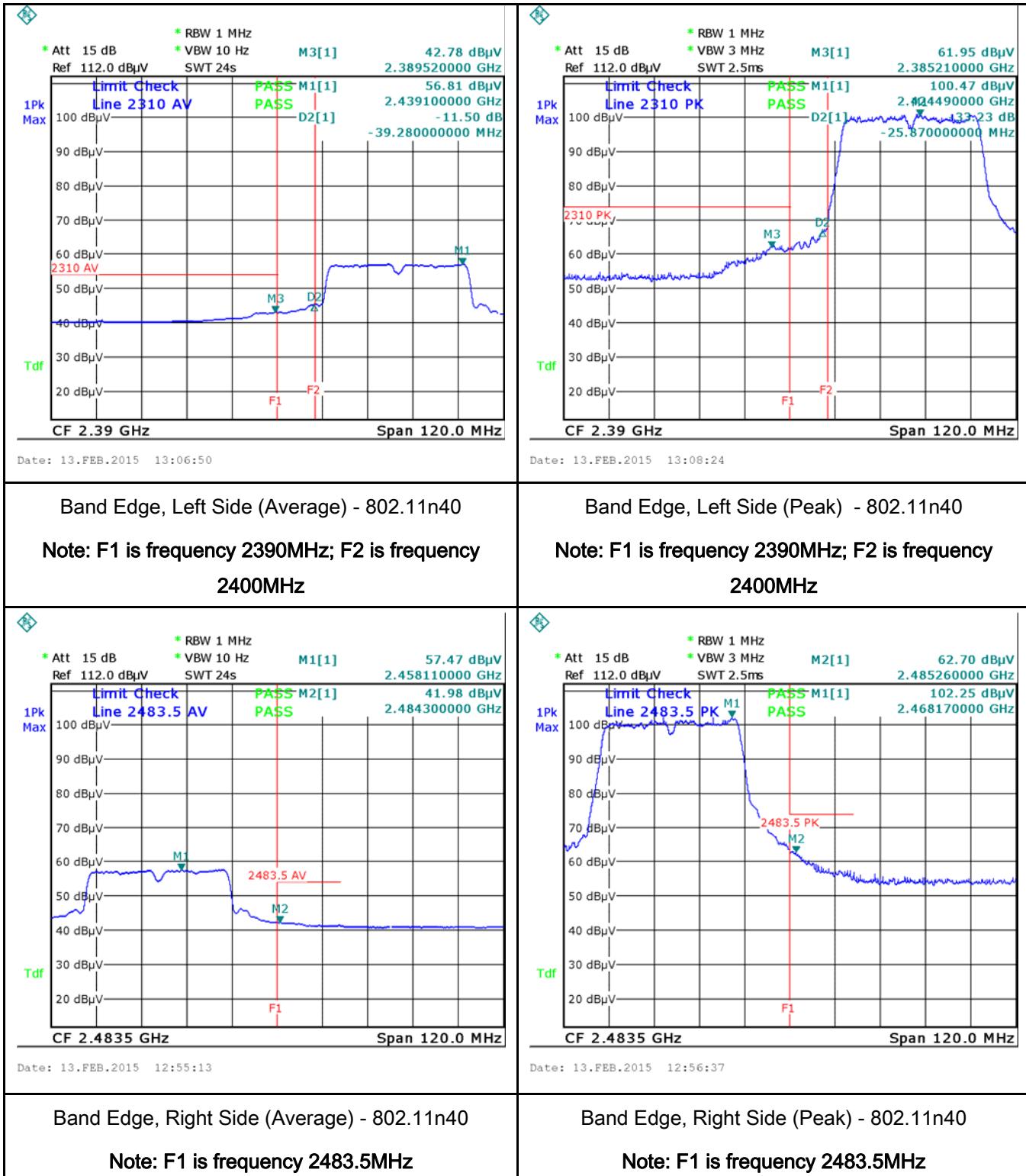
Test Plots

Band Edge measurement result





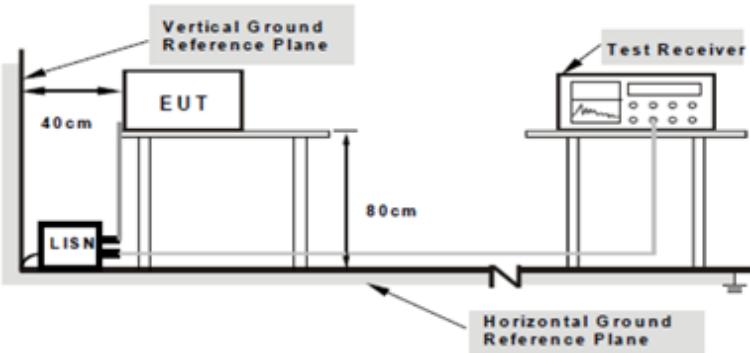
 <p>* RBW 1 MHz * VBW 10 Hz * Att 15 dB Ref 112.0 dBμV M3[1] 40.75 dBμV SWT 16s 2.389790000 GHz</p> <p>1Pk Max 100 dBμV 90 dBμV 80 dBμV 70 dBμV 60 dBμV 50 dBμV 40 dBμV 30 dBμV 20 dBμV</p> <p>Tdf CF 2.39 GHz Span 80.0 MHz</p> <p>Limit Check Line 2310 AV PASS M1[1] 63.38 dBμV PASS D2[1] 2.419540000 GHz -18.58 dB -19.540000000 MHz</p>	 <p>* RBW 1 MHz * VBW 3 MHz * Att 15 dB Ref 112.0 dBμV M3[1] 55.82 dBμV SWT 2.5ms 2.389310000 GHz</p> <p>1Pk Max 100 dBμV 90 dBμV 80 dBμV 70 dBμV 60 dBμV 50 dBμV 40 dBμV 30 dBμV 20 dBμV</p> <p>Tdf CF 2.39 GHz Span 80.0 MHz</p> <p>Limit Check Line 2310 PK PASS M1[1] 102.09 dBμV PASS D2[1] 2.419540000 GHz -39.04 dB -19.540000000 MHz</p>
<p>Date: 13.FEB.2015 10:44:26</p> <p>Band Edge, Left Side (Average) - 802.11n20</p> <p>Note: F1 is frequency 2390MHz; F2 is frequency 2400MHz</p>	<p>Date: 13.FEB.2015 10:43:00</p> <p>Band Edge, Left Side (Peak) - 802.11n20</p> <p>Note: F1 is frequency 2390MHz; F2 is frequency 2400MHz</p>
 <p>* RBW 1 MHz * VBW 10 Hz * Att 15 dB Ref 112.0 dBμV M2[1] 40.66 dBμV SWT 16s 2.484140000 GHz</p> <p>1Pk Max 100 dBμV 90 dBμV 80 dBμV 70 dBμV 60 dBμV 50 dBμV 40 dBμV 30 dBμV 20 dBμV</p> <p>Tdf CF 2.4835 GHz Span 80.0 MHz</p> <p>Limit Check Line 2483.5 AV PASS M1[1] 63.41 dBμV PASS M2[1] 2.454600000 GHz</p>	 <p>* RBW 1 MHz * VBW 3 MHz * Att 15 dB Ref 112.0 dBμV M2[1] 55.28 dBμV SWT 2.5ms 2.488290000 GHz</p> <p>1Pk Max 100 dBμV 90 dBμV 80 dBμV 70 dBμV 60 dBμV 50 dBμV 40 dBμV 30 dBμV 20 dBμV</p> <p>Tdf CF 2.4835 GHz Span 80.0 MHz</p> <p>Limit Check Line 2483.5 PK M1 2483.5 PK PASS M1[1] 101.92 dBμV PASS M2[1] 2.456990000 GHz</p>
<p>Date: 13.FEB.2015 10:49:51</p> <p>Band Edge, Right Side (Average) - 802.11n20</p> <p>Note: F1 is frequency 2483.5MHz</p>	<p>Date: 13.FEB.2015 10:48:23</p> <p>Band Edge, Right Side (Peak) - 802.11n20</p> <p>Note: F1 is frequency 2483.5MHz</p>



6.6 AC Power Line Conducted Emissions

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1006mbar
Test date :	January 05, 2014
Tested By :	Dustin Wang

Requirement(s):

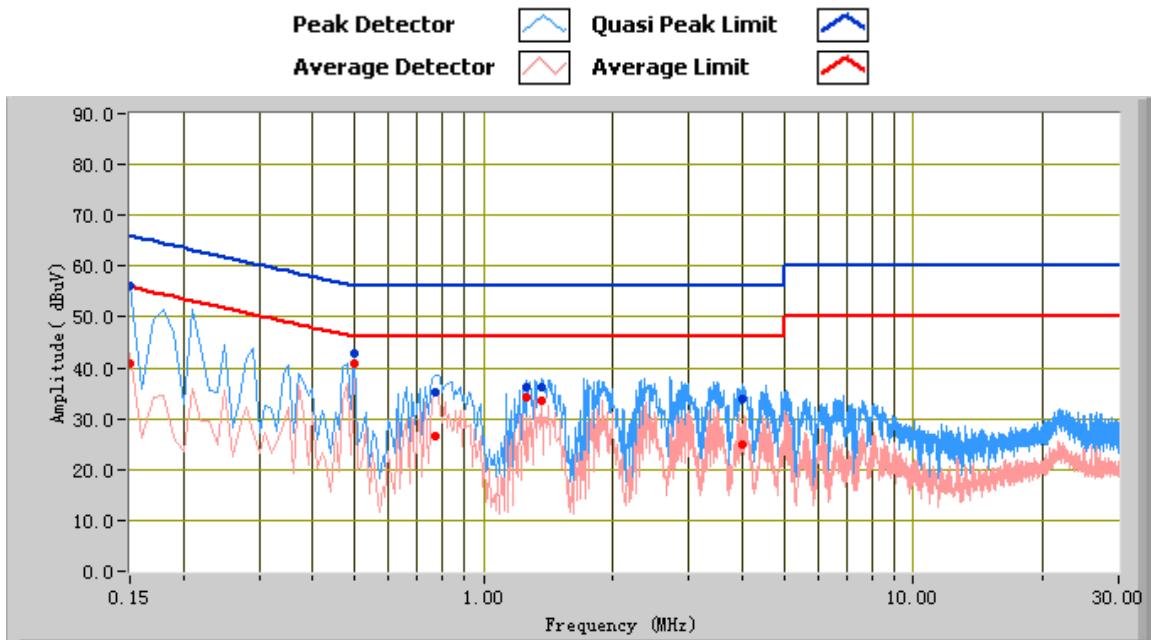
Spec	Item	Requirement	Applicable															
47CFR§15. 207, RSS210 (A8.1)	a)	<p>For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within 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>Frequency ranges (MHz)</th> <th colspan="2">Limit (dBμV)</th> </tr> <tr> <th></th> <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 (dBμV)			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 (dBμV)																	
	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 																	

	coaxial cable. 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: R3681-W1

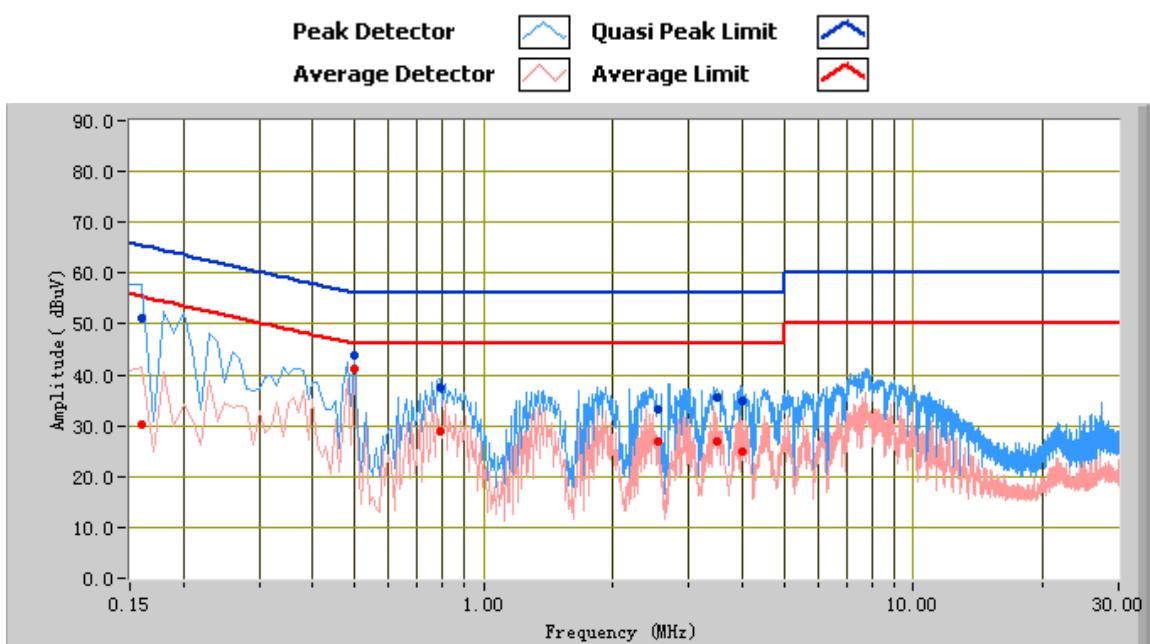


Test Data

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dB μ V)	Limit (dB μ V)	Margin (dB)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Factors (dB)
0.15	56.14	66.00	-9.86	40.87	56.00	-15.13	12.49
0.50	42.74	56.00	-13.26	40.90	46.00	-5.10	10.60
0.77	35.27	56.00	-20.73	26.68	46.00	-19.32	10.41
1.36	36.05	56.00	-19.95	33.46	46.00	-12.54	10.32
1.26	36.29	56.00	-19.71	34.06	46.00	-11.94	10.31
3.98	34.00	56.00	-22.00	25.02	46.00	-20.98	10.81

Test Mode: R3681-W1

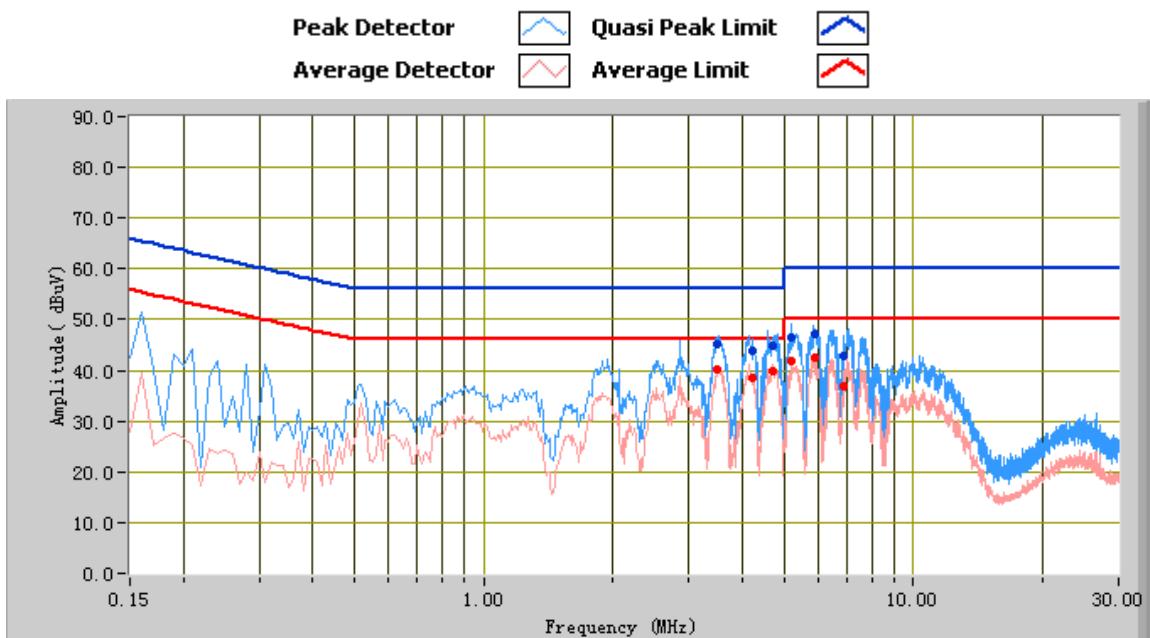


Test Data

Phase Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dB μ V)	Limit (dB μ V)	Margin (dB)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Factors (dB)
2.54	33.29	56.00	-22.71	27.05	46.00	-18.95	10.54
0.16	51.13	65.47	-14.34	30.20	55.47	-25.27	12.43
0.50	43.94	56.00	-12.06	41.31	46.00	-4.69	10.60
0.79	37.63	56.00	-18.37	28.76	46.00	-17.24	10.40
3.50	35.37	56.00	-20.63	27.00	46.00	-19.00	10.71
3.98	34.81	56.00	-21.19	24.97	46.00	-21.03	10.81

Test Mode: R3621-W1

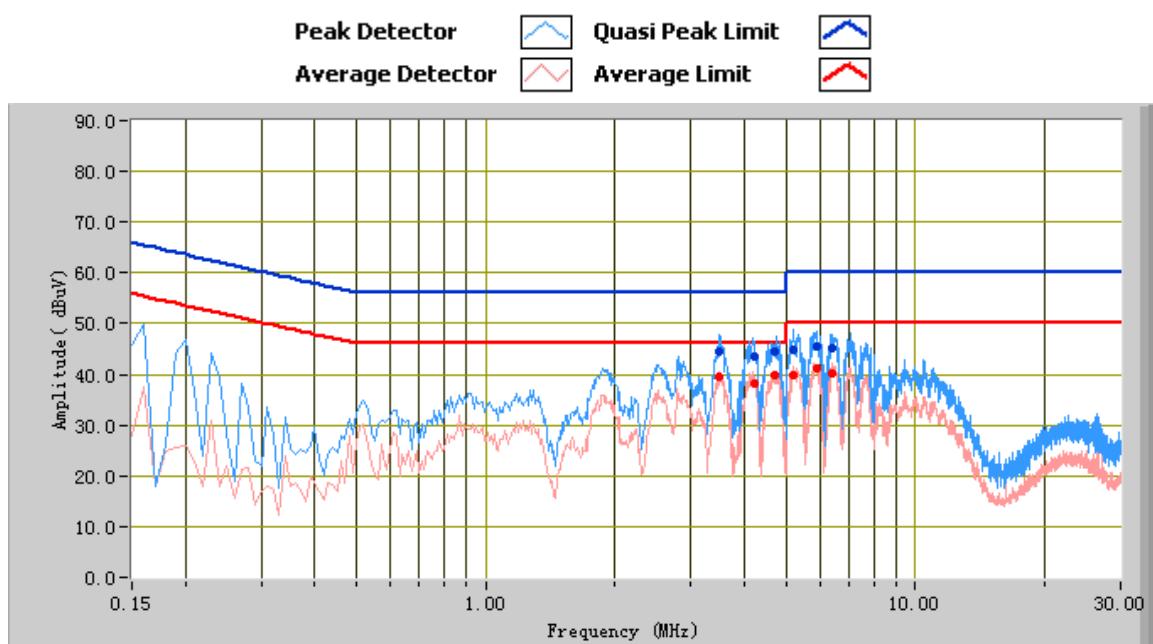


Test Data

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dB μ V)	Limit (dB μ V)	Margin (dB)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Factors (dB)
4.70	44.68	56.00	-11.32	39.93	46.00	-6.07	10.94
4.22	43.85	56.00	-12.15	38.41	46.00	-7.59	10.85
3.50	45.07	56.00	-10.93	40.14	46.00	-5.86	10.71
5.90	47.14	60.00	-12.86	42.43	50.00	-7.57	11.17
5.18	46.57	60.00	-13.43	41.78	50.00	-8.22	11.03
6.86	42.78	60.00	-17.22	36.75	50.00	-13.25	11.35

Test Mode: R3621-W1



Test Data

Phase Neutral Plot at 120Vac, 60Hz

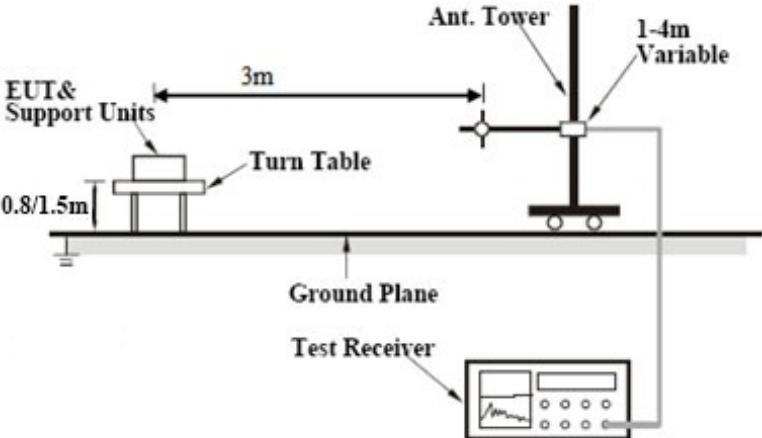
Frequency (MHz)	Quasi Peak (dB μ V)	Limit (dB μ V)	Margin (dB)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Factors (dB)
4.22	43.63	56.00	-12.37	38.20	46.00	-7.80	10.85
3.50	44.41	56.00	-11.59	39.48	46.00	-6.52	10.71
6.38	45.01	60.00	-14.99	40.28	50.00	-9.72	11.26
4.70	44.54	56.00	-11.46	39.84	46.00	-6.16	10.94
5.18	44.67	60.00	-15.33	39.89	50.00	-10.11	11.03
5.90	45.60	60.00	-14.40	41.03	50.00	-8.97	11.17

6.7 Radiated Spurious Emissions

Temperature	24°C
Relative Humidity	57%
Atmospheric Pressure	1007mbar
Test date :	January 06, 2014
Tested By :	Dustin Wang

Requirement(s):

Spec	Item	Requirement	Applicable										
47CFR§15. 247(d), RSS210 (A8.5)	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>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 (μ V/m)	30 – 88	100	88 – 216	150	216 – 960	200	Above 960	500	<input checked="" type="checkbox"/>
Frequency range (MHz)	Field Strength (μ V/m)												
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"/>											

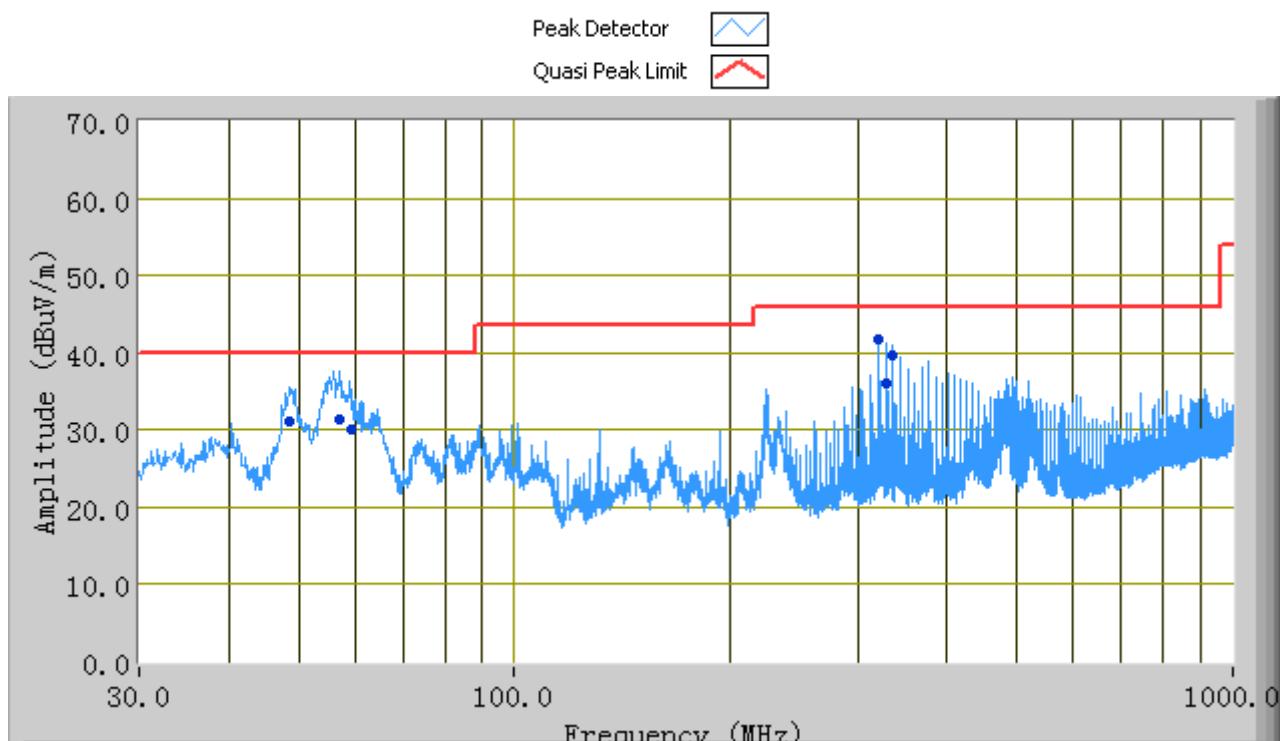
Test Setup	 <p>The diagram illustrates the test setup. A Turn Table holds the EUT & Support Units, which are positioned 0.8/1.5m from the Ground Plane. A vertical Ant. Tower is connected to the turn table via a horizontal bar. The tower has a height adjustment mechanism labeled '1-4m Variable'. A Test Receiver is connected to the tower and displays a spectrum analysis graph.</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. 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. 5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
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 Mode: R3681-W1

(Below 1GHz)



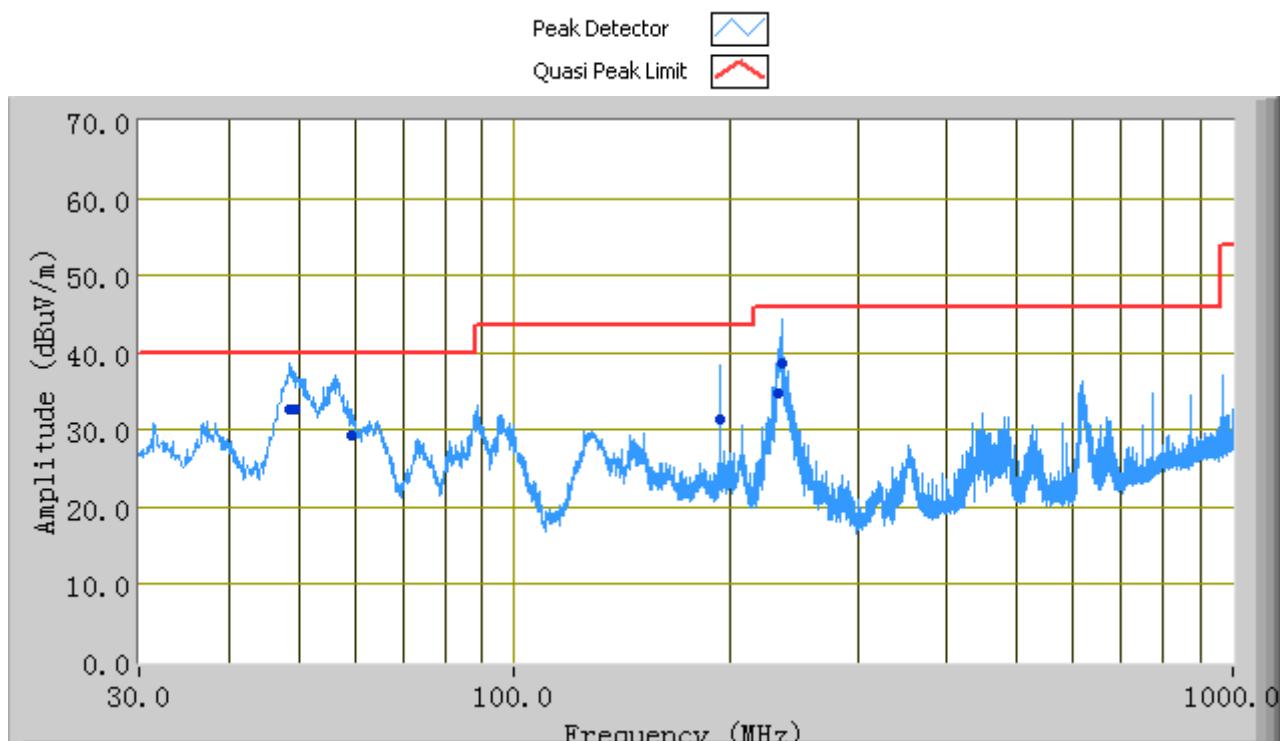
Test Data

Vertical & Horizontal Polarity Plot @3m

Frequency (MHz)	Quasi Peak (dB μ V/m)	Azimuth	Polarity (H/V)	Height (cm)	Factors (dB)	Limit (dB μ V/m)	Margin (dB)
57.07	31.43	0.00	V	106.00	-13.99	40.00	-8.57
320.22	41.80	193.00	H	101.00	-5.94	46.00	-4.20
48.48	31.19	263.00	V	132.00	-13.20	40.00	-8.81
59.12	30.16	211.00	V	120.00	-13.98	40.00	-9.84
328.37	36.07	267.00	H	122.00	-5.64	46.00	-9.93
336.59	39.71	246.00	H	102.00	-5.33	46.00	-6.29

Test Mode: R3621-W1

(Below 1GHz)



Test Data

Vertical & Horizontal Polarity Plot @3m

Frequency (MHz)	Quasi Peak (dB μ V/m)	Azimuth	Polarity (H/V)	Height (cm)	Factors (dB)	Limit (dB μ V/m)	Margin (dB)
48.46	32.76	0.00	V	125.00	-13.25	40.00	-7.24
234.98	38.62	269.00	H	149.00	-7.61	46.00	-7.38
49.57	32.76	342.00	V	150.00	-13.71	40.00	-7.24
193.29	31.48	8.00	V	119.00	-8.37	43.52	-12.04
232.98	34.66	276.00	H	178.00	-7.64	46.00	-11.34
59.18	29.31	327.00	V	100.00	-13.98	40.00	-10.69

Test Mode: Transmitting Mode

(Above 1GHz)

Note: Other modes were verified, only the result of worst case basic rate mode was presented.

Mode: 802.11b

Low Channel (2412 MHz)

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	28.73	AV	V	34	4.87	27.22	40.38	54	-13.62
4824	33.09	AV	H	33.8	4.87	27.22	44.54	54	-9.46
4824	43.09	PK	V	34	4.87	27.22	54.74	74	-19.26
4824	47.28	PK	H	33.8	4.87	27.22	58.73	74	-15.27

Middle Channel (2437 MHz)

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	30.48	AV	V	33.6	4.87	26.52	42.43	54	-11.57
4874	38.31	AV	H	33.8	4.87	26.52	50.46	54	-3.54
4874	43.92	PK	V	33.6	4.87	26.52	55.87	74	-18.13
4874	54.15	PK	H	33.8	4.87	26.52	66.3	74	-7.7

High Channel (2462 MHz)

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	31.12	AV	V	34.6	4.87	26.42	44.17	54	-9.83
4924	39.66	AV	H	34.7	4.87	26.42	52.81	54	-1.19
4924	43.93	PK	V	34.6	4.87	26.42	56.98	74	-17.02
4924	54.77	PK	H	34.7	4.87	26.42	67.92	74	-6.08

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted					
EMI test receiver	ESCS30	8471241027	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191106	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191107	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>
LISN	ISN T800	34373	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/25/2014	09/24/2015	<input checked="" type="checkbox"/>
Transient Limiter	LIT-153	531118	09/02/2014	09/01/2015	<input checked="" type="checkbox"/>
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	09/02/2014	09/01/2015	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
Radiated Emissions					
EMI test receiver	ESL6	100262	09/18/2014	09/17/2015	<input checked="" type="checkbox"/>
Positioning Controller	UC3000	MF780208282	11/20/2014	11/19/2015	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/02/2014	09/01/2015	<input checked="" type="checkbox"/>
Microwave Preamplifier (0.5 ~ 18GHz)	PAM-118	443008	09/02/2014	09/01/2015	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/22/2014	09/21/2015	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/25/2014	09/24/2015	<input checked="" type="checkbox"/>
Universal Radio Communication Tester	CMU200	121393	09/26/2014	09/25/2015	<input checked="" type="checkbox"/>

Annex B. EUT and Test Setup Photographs

Model: R3681-W1

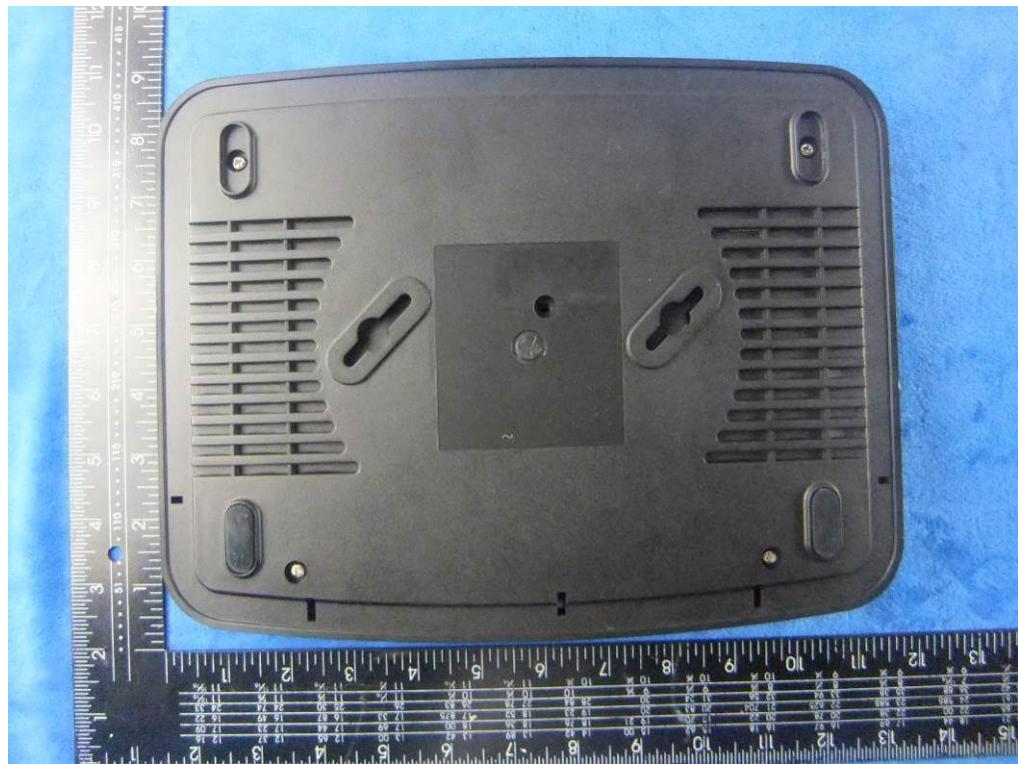
Annex B.i. Photograph EUT External Photo



EUT-AII



Top View of EUT



Bottom View of EUT



Front View of EUT

Test Report No.	15070127-FCC-R1
Page	53 of 73



Rear View of EUT



Left View of EUT

Test Report No.	15070127-FCC-R1
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Right View of EUT

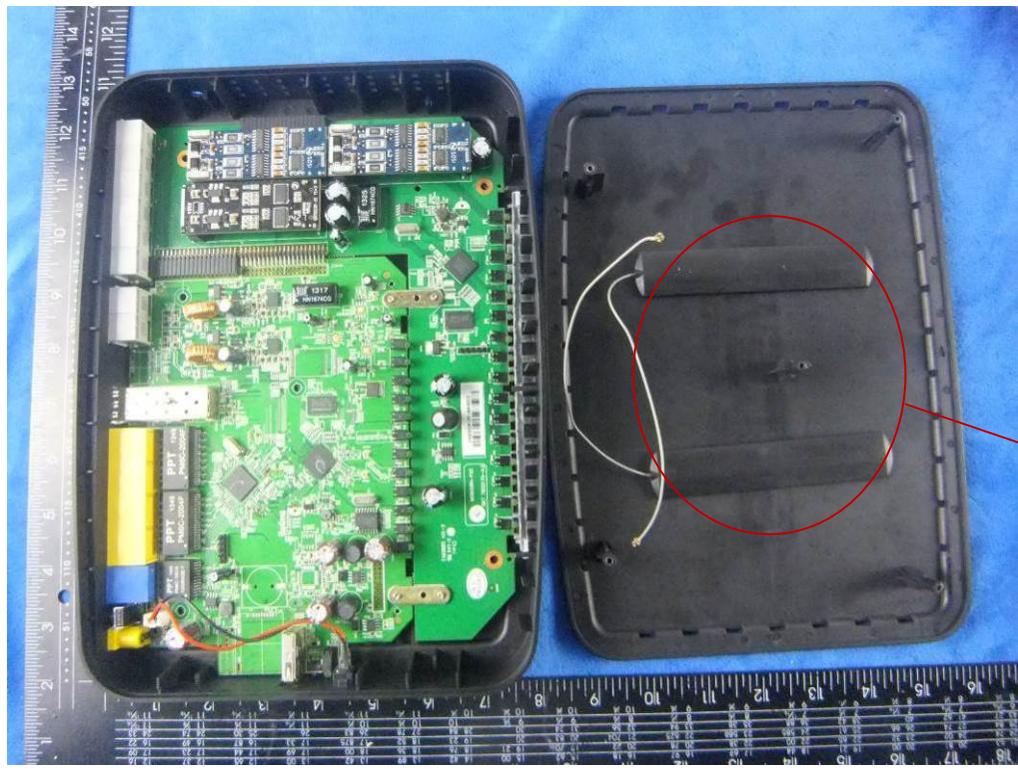


View of Adaptor

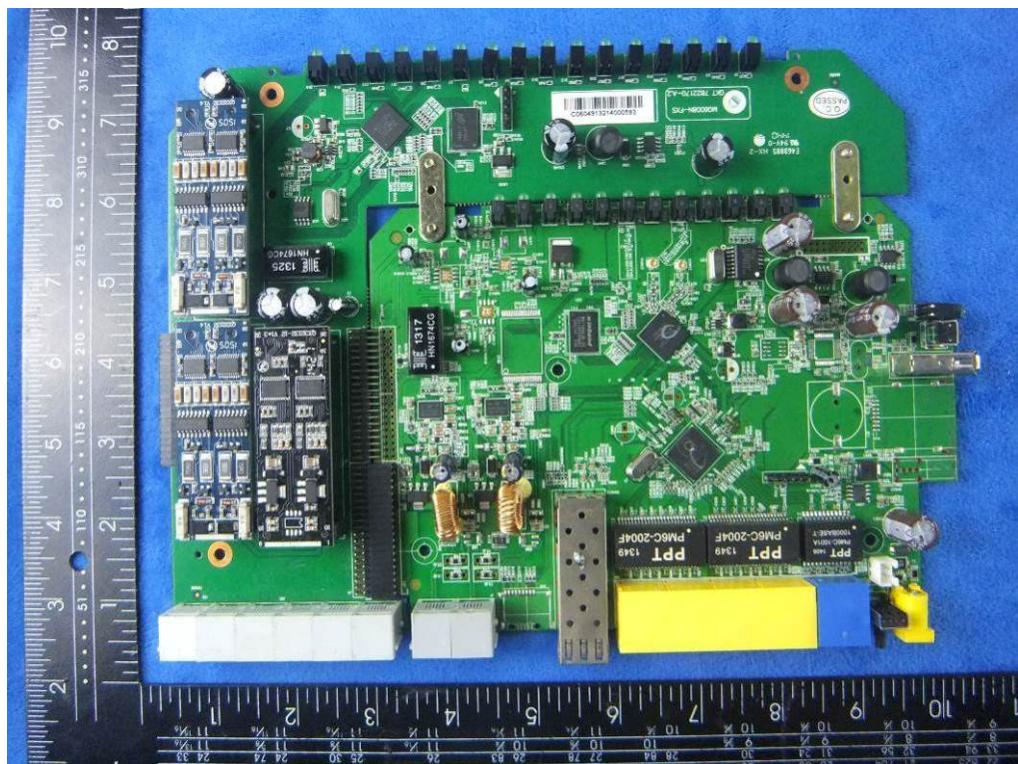


View of Adaptor's Label

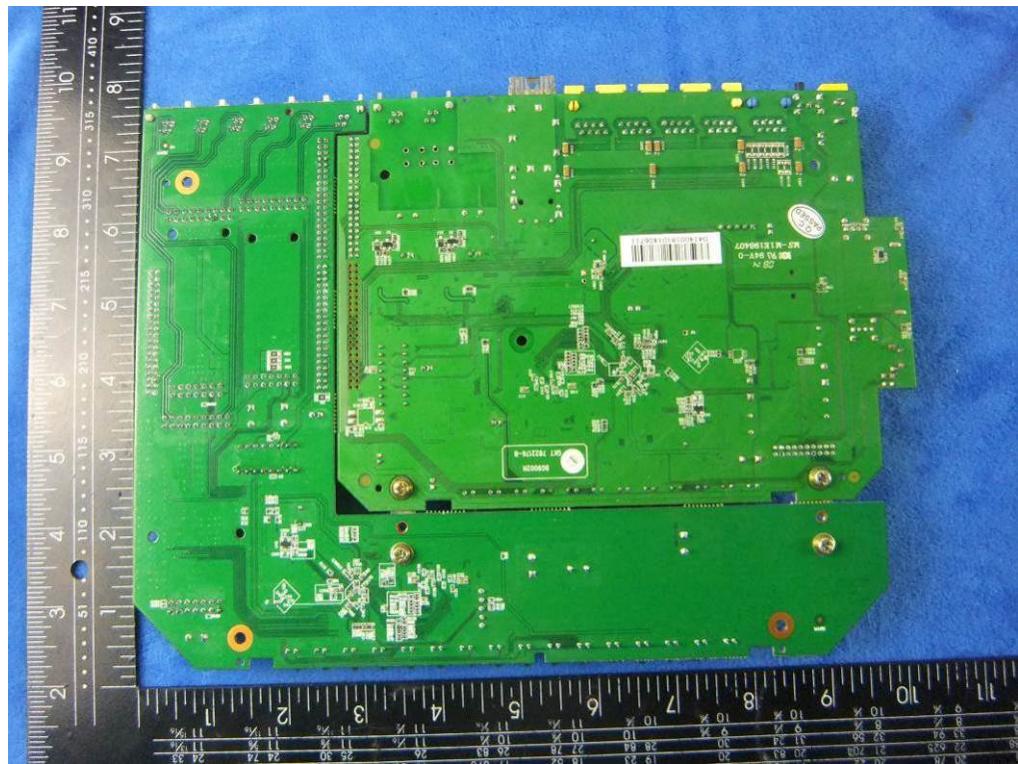
Annex B.ii. Photograph EUT Internal Photo



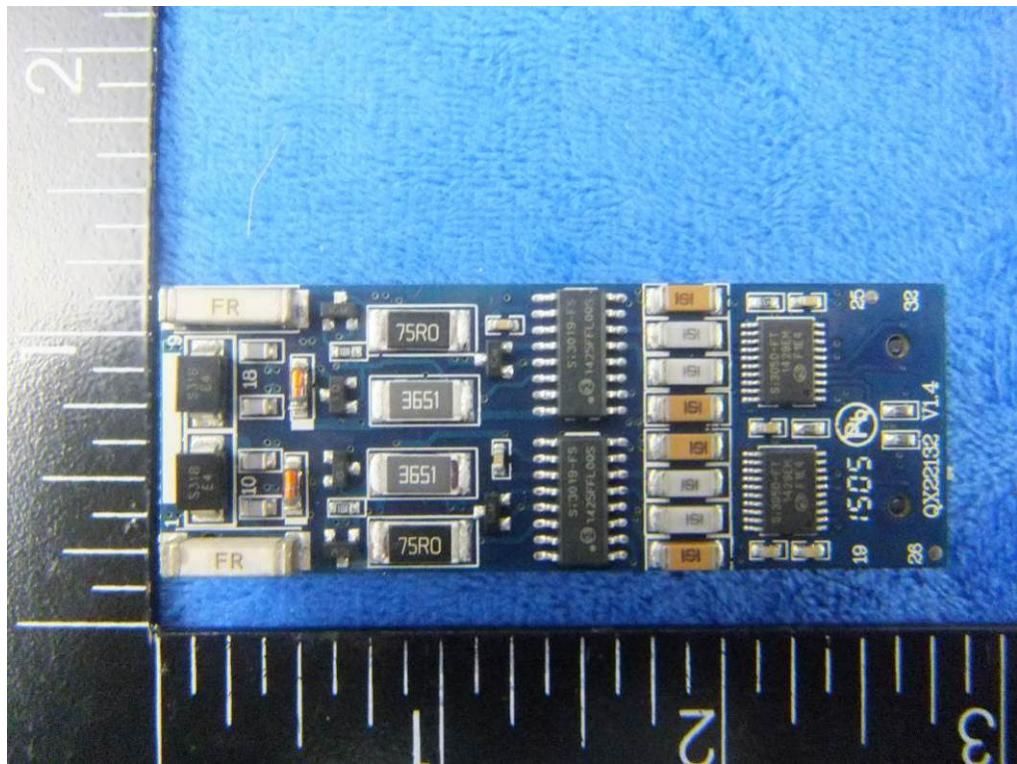
Uncover View of EUT



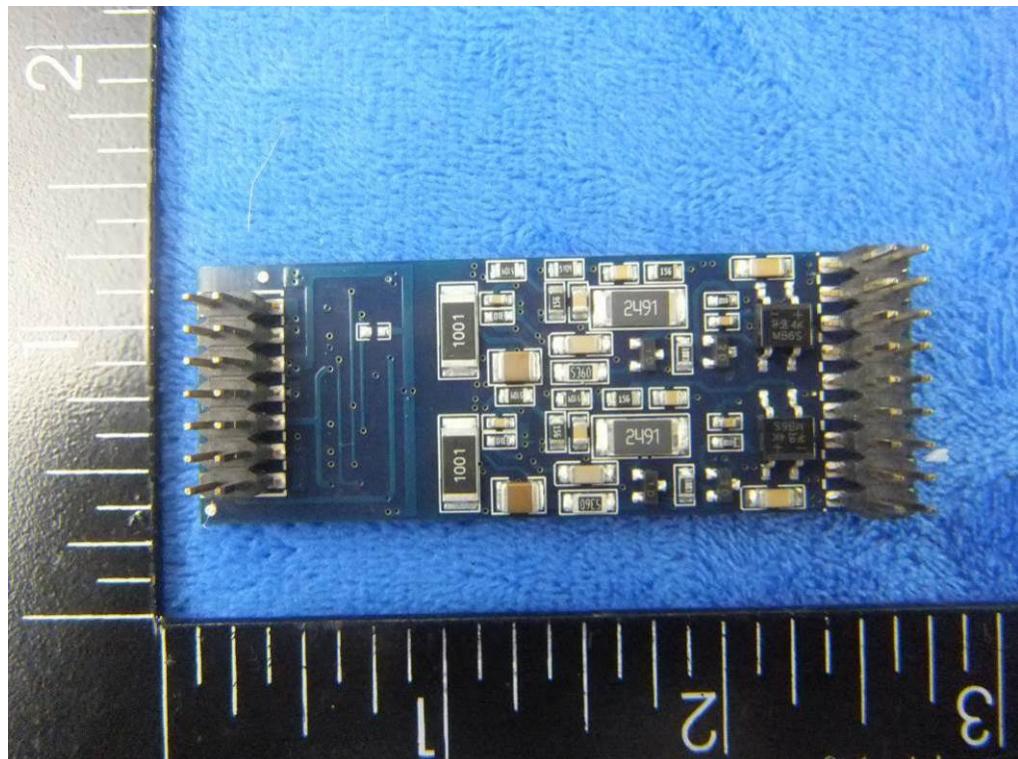
Top View of Mainboard



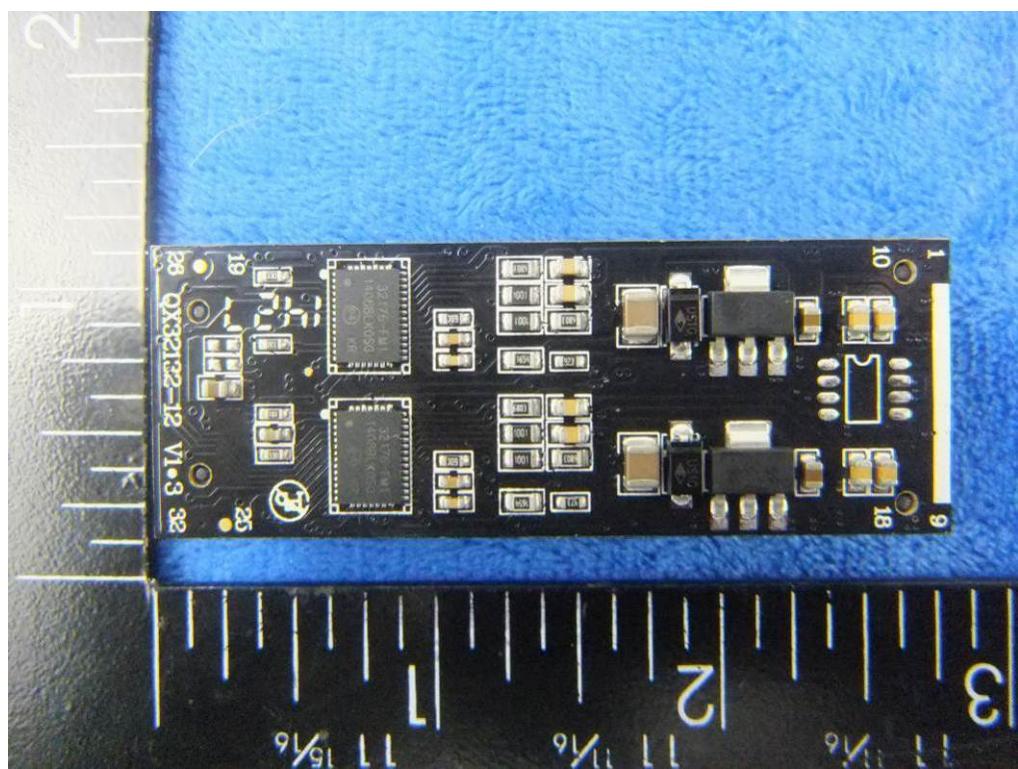
Bottom View of Mainboard



Top View of FXO Board

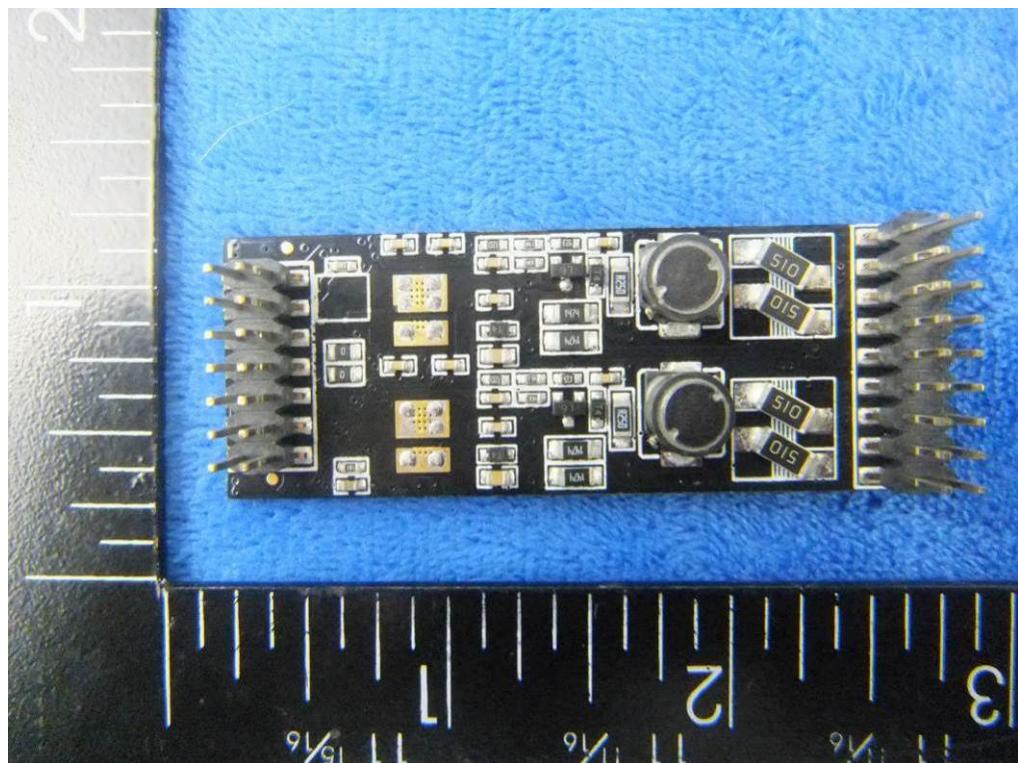


Bottom View of FXO Board



Top View of FXS Board

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Bottom View of FXS Board

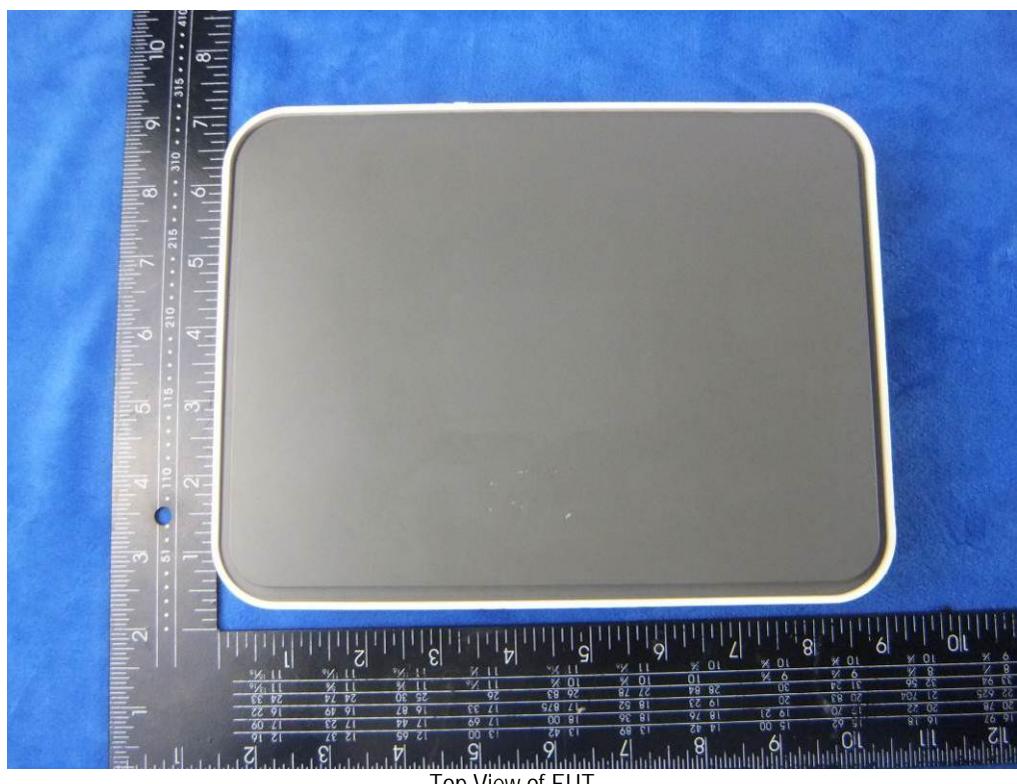
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Model: R3621-W1

Annex B.i. Photograph EUT External Photo

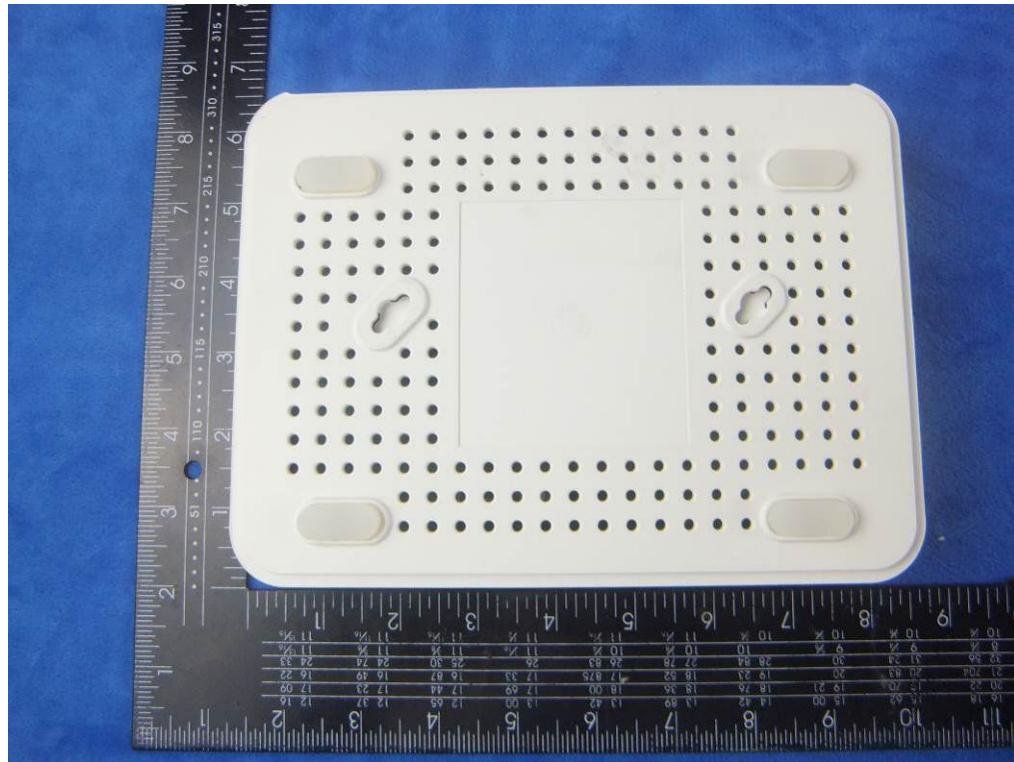


EUT-All



Top View of EUT

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Bottom View of EUT



Front View of EUT

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Rear View of EUT



Left View of EUT

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Right View of EUT



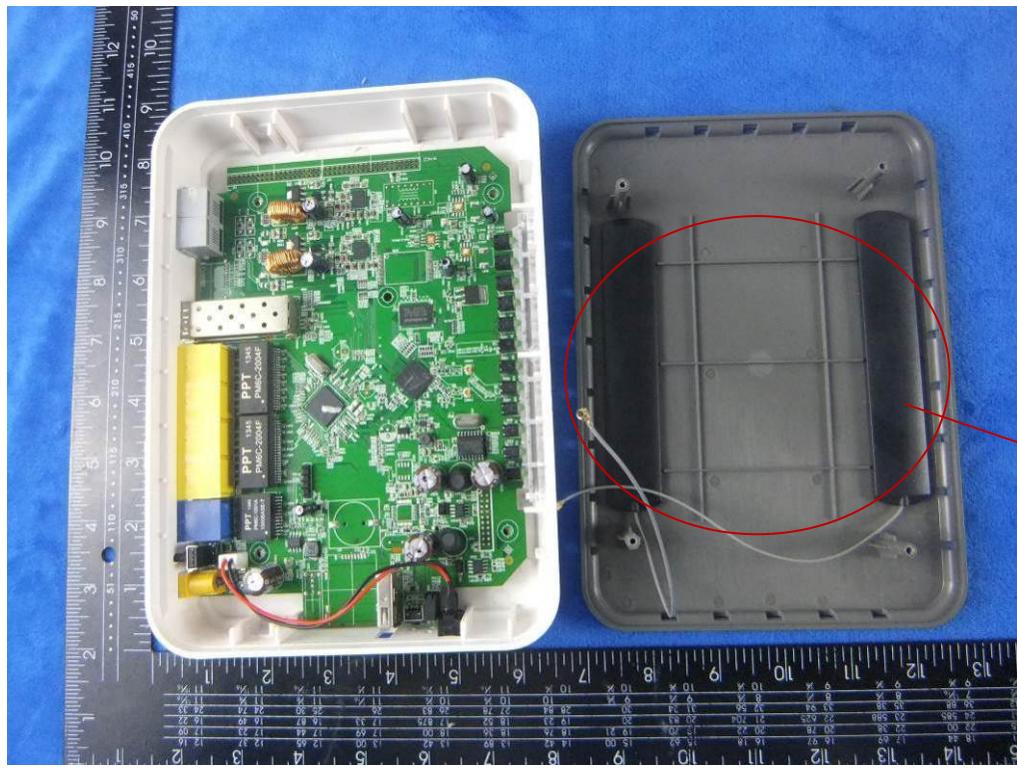
View of Adaptor

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View of Adaptor's Label

Annex B.ii. Photograph EUT Internal Photo



Uncover View of EUT



Top View of Mainboard

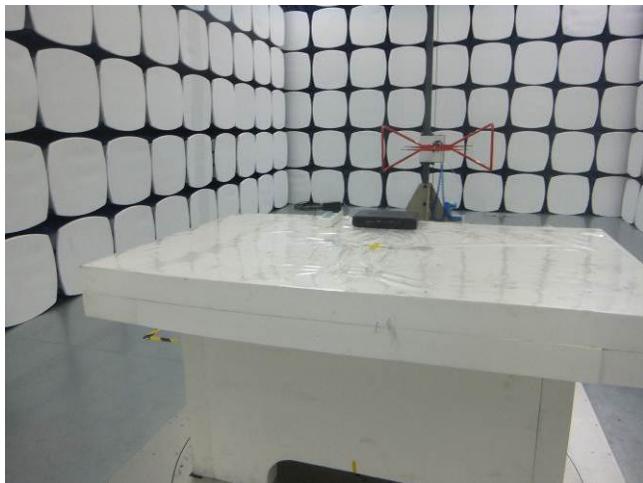
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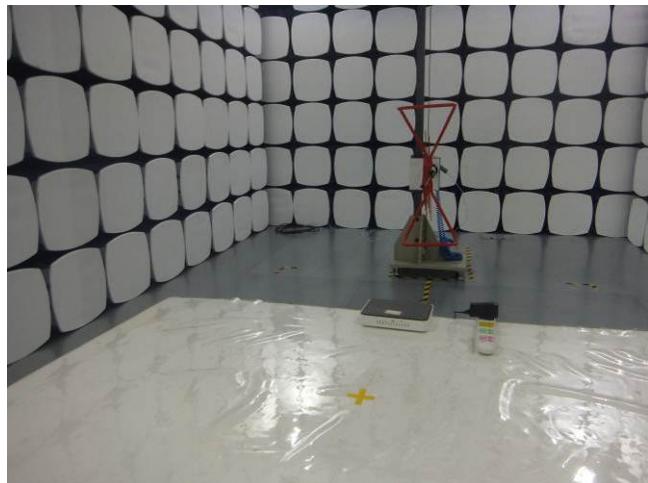
Bottom View of Mainboard

Annex B.iii. Photograph: Test Setup Photo

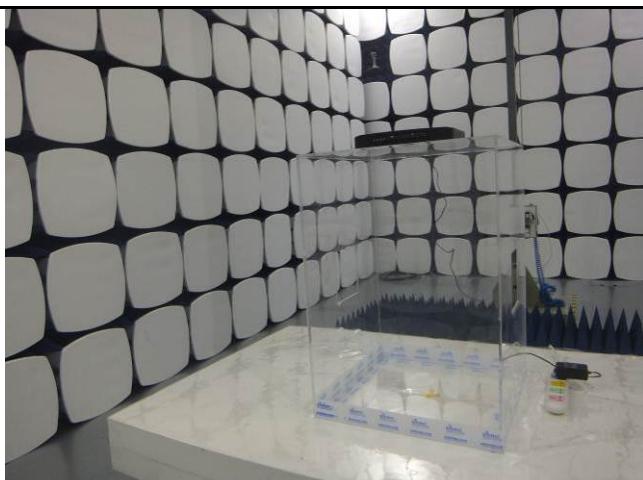
 A photograph showing a wooden table in a laboratory setting. On the table, there is a black rectangular device connected to various cables. To the left of the table, a blue power source unit is connected to the device and to a wall outlet. The floor is grey concrete, and there are some red and yellow safety markers on the floor near the table.	 A photograph taken from the side of the same setup. It shows the black rectangular device on the wooden table, with its cables running along the edge of the table towards the back. A power strip and other equipment are visible on the table surface.
R3681-W1 Conducted Emissions Test Setup Front View	R3681-W1 Conducted Emissions Test Setup Side View
 A photograph showing a wooden table in a laboratory setting. On the table, there is a silver rectangular device connected to various cables. To the left of the table, a blue power source unit is connected to the device and to a wall outlet. The floor is grey concrete, and there are some red and yellow safety markers on the floor near the table.	 A photograph taken from the side of the same setup. It shows the silver rectangular device on the wooden table, with its cables running along the edge of the table towards the back. A power strip and other equipment are visible on the table surface.
R3621-W1 Conducted Emissions Test Setup Front View	R3621-W1 Conducted Emissions Test Setup Side View



R3681-W1 Radiated Spurious Emissions Test Setup
Below 1GHz



R3621-W1 Radiated Spurious Emissions Test Setup
Below 1GHz

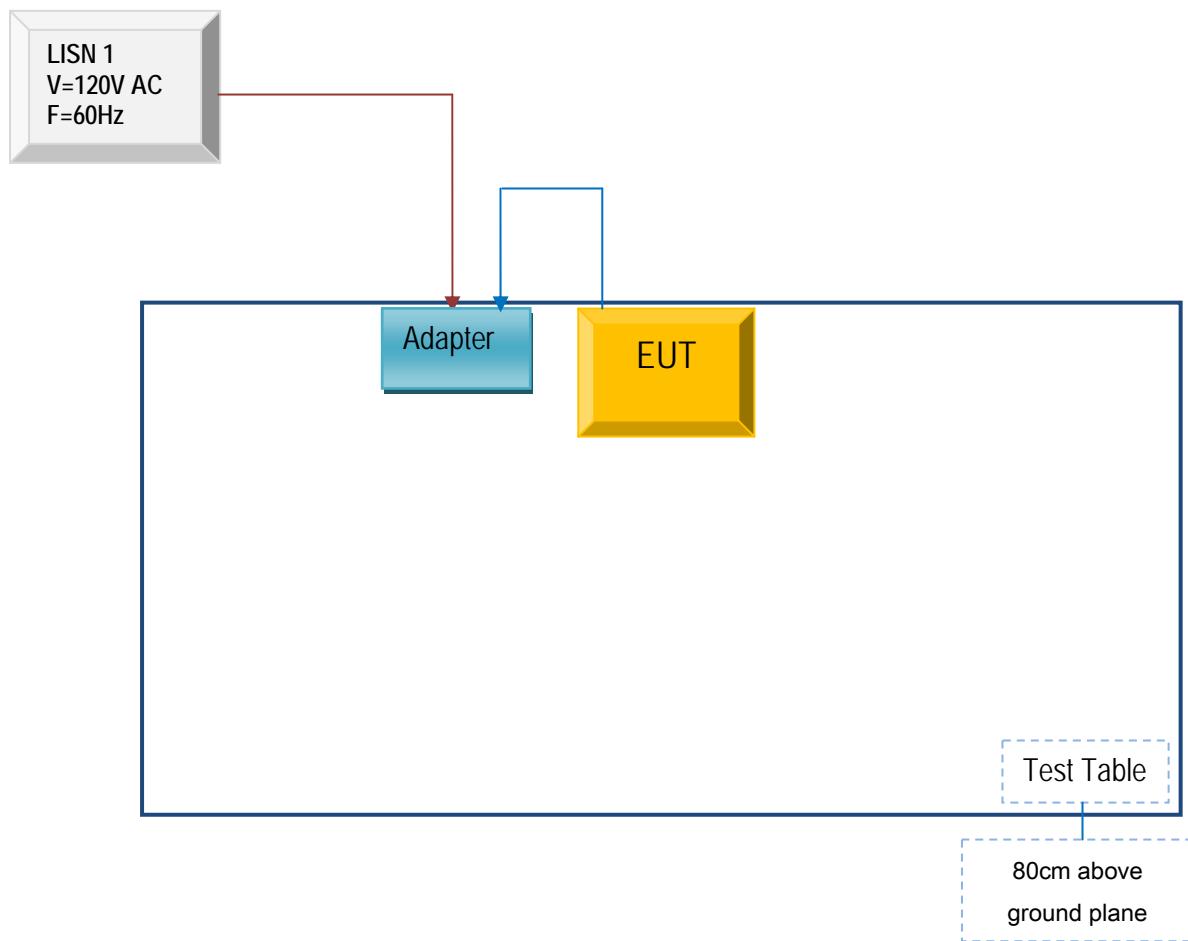


R3681-W1 Radiated Spurious Emissions Test Setup
Above 1GHz

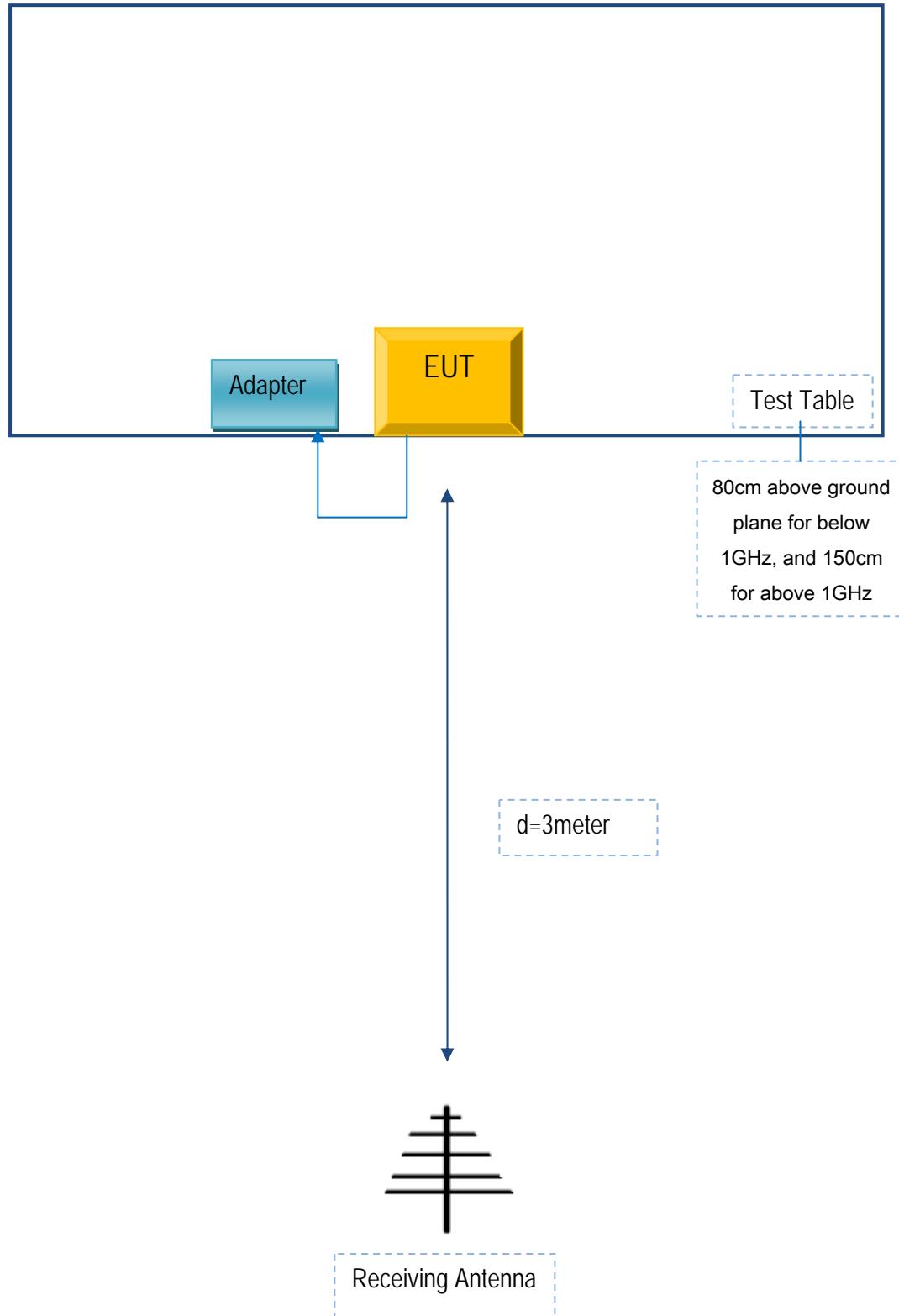
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

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

Manufacturer	Equipment Description	Model	Calibration Date	Calibration Due Date
N/A	N/A	N/A	N/A	N/A

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Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see attachment

Annex E. DECLARATION OF SIMILARITY

PINGCOM COMMUNICATIONS
 Postboks 160, 2001 Lillestrøm Norway
 Tel: +4143 5083324 E-mail: faton.ramadani@pingcom.net

Declaration Letter

For our business issue and marketing requirement, we would like to list 4 models on these reports, as following:

Model No: R3681-W1; R3641-W1; R3621-W1; R3601-W1.

We declare that, R3681-W1, R3641-W1, R3621-W1 and R3601-W1, the difference of these is listed as below:

Main Model No.	Series Model No.	Difference
R3681-W1	R3641-W1, R3621-W1 R3601-W1	R3681-W1 has 8FXO/FXS Port; R3641-W1 has 4 FXO/FXS Port; R3621-W1 has 2 FXS Port; R3601 -W1 has no FXO/FXS Port. R3641-W1, R3621-W1 and R3601-W1 are the abbreviated visions of R3681-W1. According to market requirements, there maybe other differences such as color, logo, shape, design, etc. But R3681-W1 and R3641-W1 are powered by adaptor with model name: GP304U-120-200. R3621-W1 and R3601-W1 are powered by adaptor with model name: G0616U-120-100

Thank you!

Sincerely

PING COMMUNICATION AS
 POSTBOKS 160
 2001 LILLESTRØM

Signature: *Ramadani*
 Job Title: *Product Manager*