

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT**

OF

150Mbps Wireless N USB Module

Model No.: BL-R8188EU1(8188ETV&8188EUS)

FCC ID: S8J-R8188EU1G

Trademark: LB-LINK

Report No.: ED170718037E

Issue Date: July 10, 2017

Prepared for

**Shenzhen Bilian Electronic Co., Ltd.
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Prepared by

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EMTEK(DONGGUAN) CO., LTD.**

VERIFICATION OF COMPLIANCE

Applicant:	Shenzhen Bilian Electronic Co., Ltd. Building B1, Zhongxing Industrial Zone, Juling, Jutang Community, Guanlan street, Bao'an, Shenzhen, Guangdong, P.R.China.
Manufacturer:	Shenzhen Bilian Electronic Co., Ltd. Building B1, Zhongxing Industrial Zone, Juling, Jutang Community, Guanlan street, Bao'an, Shenzhen, Guangdong, P.R.China.
Product Description:	150Mbps Wireless N USB Module
Model Number:	BL-R8188EU1(8188ETV&8188EUS)
Trade Mark:	LB-LINK

We hereby certify that:

The above equipment was tested by EMTEK(DONGGUAN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247(2016).

Date of Test : July 08, 2017 to July 10, 2017

Abby Li

Prepared by : _____

Abby Li/Editor

Tomas Yang

Reviewer : _____

Tomas Yang/Supervisor

Approved & Authorized Signer : _____

Sam Lv

Sam Lv/Manager

Modified Information

Version	Summary	Revision Date	Report No.
Ver.1.0	Original Report	/	ED170718037E

Table of Contents

1. GENERAL INFORMATION	6
1.1 PRODUCT DESCRIPTION	6
1.2 RELATED SUBMITTAL(S) / GRANT(S)	6
1.3 TEST METHODOLOGY	7
1.4 SPECIAL ACCESSORIES	7
1.5 EQUIPMENT MODIFICATIONS	7
1.6 TEST FACILITY	7
2. SYSTEM TEST CONFIGURATION	8
2.1 EUT CONFIGURATION	8
2.2 EUT EXERCISE	8
2.3 TEST PROCEDURE	8
2.4 CONFIGURATION OF TESTED SYSTEM	8
3. DESCRIPTION OF TEST MODES	9
4. SUMMARY OF TEST RESULTS	10
5. CONDUCTED EMISSIONS TEST	11
5.1 MEASUREMENT PROCEDURE	11
5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	11
5.3 MEASUREMENT EQUIPMENT USED	11
5.4 CONDUCTED EMISSION LIMIT	11
5.5 MEASUREMENT RESULT	12
6. RADIATED EMISSION TEST	18
6.1 MEASUREMENT PROCEDURE	18
6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	19
6.3 MEASUREMENT EQUIPMENT USED	20
6.4 RADIATED EMISSION LIMIT	21
6.5 MEASUREMENT RESULT	22
7. 6DB BANDWIDTH TEST	31
7.1 MEASUREMENT PROCEDURE	31
7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	31
7.3 MEASUREMENT EQUIPMENT USED	31
7.4 MEASUREMENT RESULTS	31
8. MAXIMUM PEAK OUTPUT POWER TEST	40
8.1 MEASUREMENT PROCEDURE	40
8.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	40
8.3 MEASUREMENT EQUIPMENT USED	40
8.4 PEAK POWER OUTPUT LIMIT	40
8.5 MEASUREMENT RESULTS	40
9. BAND EDGE TEST	41
9.1 MEASUREMENT PROCEDURE	41
9.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	42
9.3 MEASUREMENT EQUIPMENT USED	42
9.4 MEASUREMENT RESULTS	42
10. POWER DENSITY	47
10.1 TEST EQUIPMENT	47
10.2 MEASURING INSTRUMENTS AND SETTING	47

10.3	TEST PROCEDURES	47
10.4	BLOCK DIAGRAM OF TEST SETUP	47
10.5	LIMIT	47
10.6	TEST RESULT	48
11.	ANTENNA PORT EMISSION	56
11.1	TEST EQUIPMENT	56
11.2	MEASURING INSTRUMENTS AND SETTING	56
11.3	TEST PROCEDURES	56
11.4	BLOCK DIAGRAM OF TEST SETUP	56
11.5	TEST RESULT	56
12.	ANTENNA APPLICATION	63
12.1	ANTENNA REQUIREMENT	63
12.2	RESULT	63

APPENDIX I (PHOTOS OF EUT)(1 PAGES)

1. General Information

1.1 Product Description

Characteristics	Description
Product Name	150Mbps Wireless N USB Module
Model number	BL-R8188EU1(8188ETV&8188EUS)
Input rating	DC 3.3V
Power Supply	PC Input
Modulation	802.11b: DSSS(DBPSK/DQPSK/CCK) 802.11g/n: OFDM(BPSK/QPSK/16QAM/64QAM)
Operating Frequency Range	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 802.11n(HT40)
Number of Channels	11 for 20MHz bandwidth; 7 for 40MHz bandwidth
Transmit Power Max	802.11b: 17.29dBm 802.11g: 16.24dBm 802.11n(HT20): 15.04dBm 802.11n(HT40): 14.24dBm

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	7	2442	11	2462
4	2427	8	2447		

Note:

1. This device is included 802.11b, 802.11g and 802.11n(HT20), 802.11n(HT40) 2.4GHz transceiver function.
2. Channel 1-11 for 802.11b, 802.11g, 802.11n(HT20); Channel 3-9 for 802.11n(HT40)
3. Test of channel was included the lowest middle and highest frequency in lowest data rate and to perform the test, then record on this report.

1.2 Related Submittal(s) / Grant(s)

This submittal(s) (test report) is intended for filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system is compliance with Subpart B is authorized under a DOC procedure.

1.3 Test Methodology

All the test program has follow FCC new test procedure KDB558074 DTS D01 Meas. Guidance v04, Both conducted and radiated testing was performed according to the procedures in ANSI C63.10-2013. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description

EMC Lab : Registered on FCC, July 06, 2016
The Certificate Number is 247565.

Registered on Industry Canada, January 13, 2017
The Certificate Number is 9444A.

Name of Firm : EMTEK(DONGGUAN) CO., LTD.
Site Location : No.281, Guantai Road, Nancheng District,
Dongguan, Guangdong, China

2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. Emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

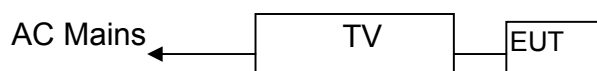


Table 2-1 Equipment Used in Tested System

Item	Equipment	Trademark	Model No.	FCC ID	Note
1.	150Mbps Wireless N USB Module	LB-LINK	BL-R8188EU1(8188ETV&8188EUS)	S8J-R8188EU1G	EUT
2	LED TV	N/A	WD32FBL1001	N/A	Support Equipment

Note:

- (1) Unless otherwise denoted as EUT in 『Remark』 column, device(s) used in tested system is a support equipment.

3. Description of Test Modes

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11b: 1 Mbps; 802.11g: 6 Mbps; 802.11n (HT20): MCS0; 802.11n (HT40): MCS0) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for 802.11 b/g/n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	7	2442	11	2462
4	2427	8	2447		

Frequency and Channel list for 802.11 n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	5	2432	8	2447
4	2427	6	2437	9	2452
		7	2442		

Test Frequency and Channel for 802.11 b/g/n (HT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	6	2437	11	2462

Test Frequency and channel for 802.11 n (HT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	6	2437	9	2452

4. Summary of Test Results

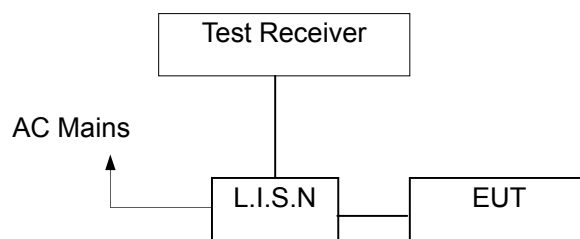
FCC Rules	Description Of Test	Result
§15.247(a)(2)	6dB bandwidth	Pass
§15.247(b)(3)	Max Peak output Power test	Pass
§15.247(e)	Power density	Pass
§15.247(d)	Band edge test	Pass
§15.207	AC Power Conducted Emission	Pass
§15.247(d), §15.209	Radiated Emission	Pass
§15.247(d)	Antenna Port Emission	Pass
§15.247(b)&§15.203	Antenna Application	Pass

5. Conducted Emissions Test

5.1 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.2 Test SET-UP (Block Diagram of Configuration)



5.3 Measurement Equipment Used

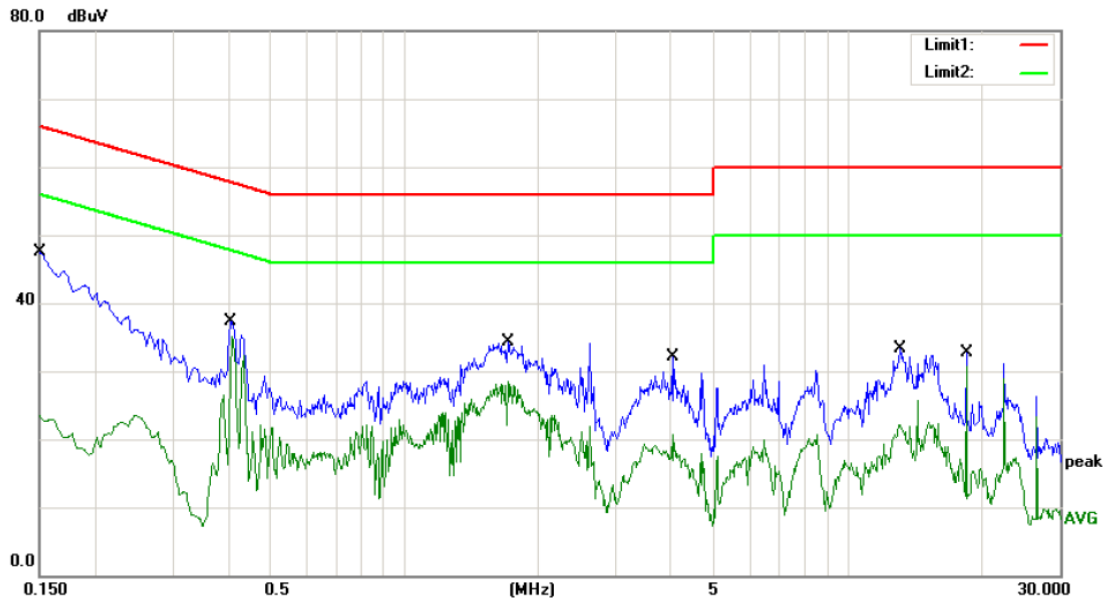
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde&Schwarz	ESCS30	100018	05/16/2017	1 Year
2.	L.I.S.N.	Rohde&Schwarz	ENV216	100017	05/16/2017	1Year
3.	RF Switching Unit	CDS	RSU-M2	38401	05/16/2017	1Year

5.4 Conducted Emission Limit

Conducted Emission Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

- Note:** 1. The lower limit shall apply at the transition frequencies
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

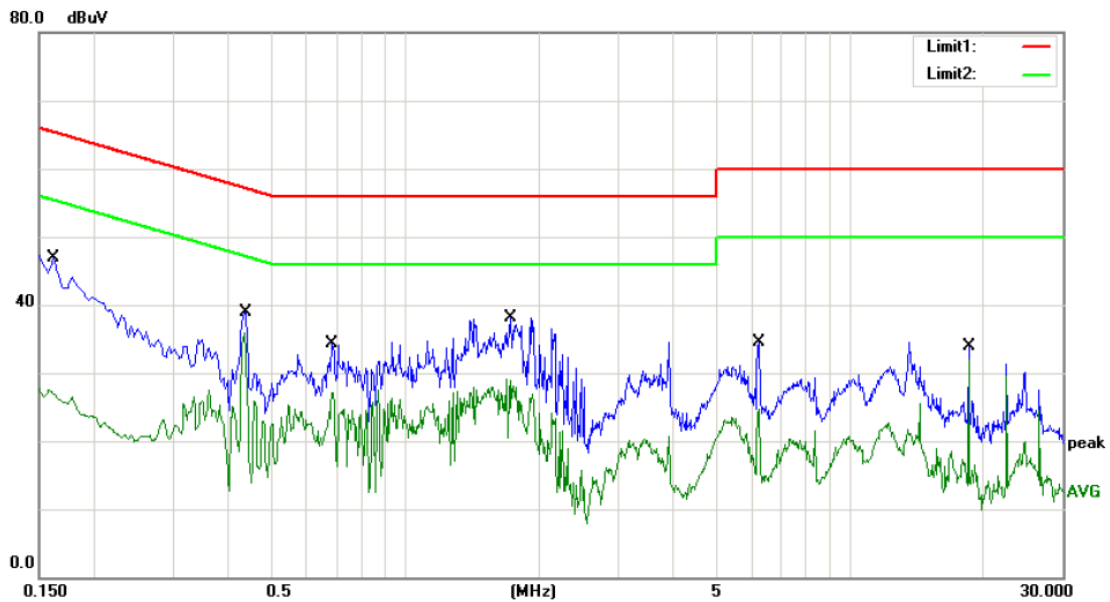
5.5 Measurement Result



Site site #1 Phase: **L1** Temperature: 24
 Limit: (CE)FCC PART 15C_QP Power: PC Input Humidity: 55 %
 Mode: TX 2412
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1500	37.71	9.78	47.49	66.00	-18.51	QP	
2		0.1500	13.70	9.78	23.48	56.00	-32.52	AVG	
3		0.4060	27.57	9.82	37.39	57.73	-20.34	QP	
4	*	0.4060	25.31	9.82	35.13	47.73	-12.60	AVG	
5		1.7140	24.56	9.84	34.40	56.00	-21.60	QP	
6		1.7140	18.72	9.84	28.56	46.00	-17.44	AVG	
7		4.0140	22.24	9.85	32.09	56.00	-23.91	QP	
8		4.0140	10.78	9.85	20.63	46.00	-25.37	AVG	
9		13.0940	23.23	10.06	33.29	60.00	-26.71	QP	
10		13.0940	12.08	10.06	22.14	50.00	-27.86	AVG	
11		18.4340	22.43	10.20	32.63	60.00	-27.37	QP	
12		18.4340	20.56	10.20	30.76	50.00	-19.24	AVG	

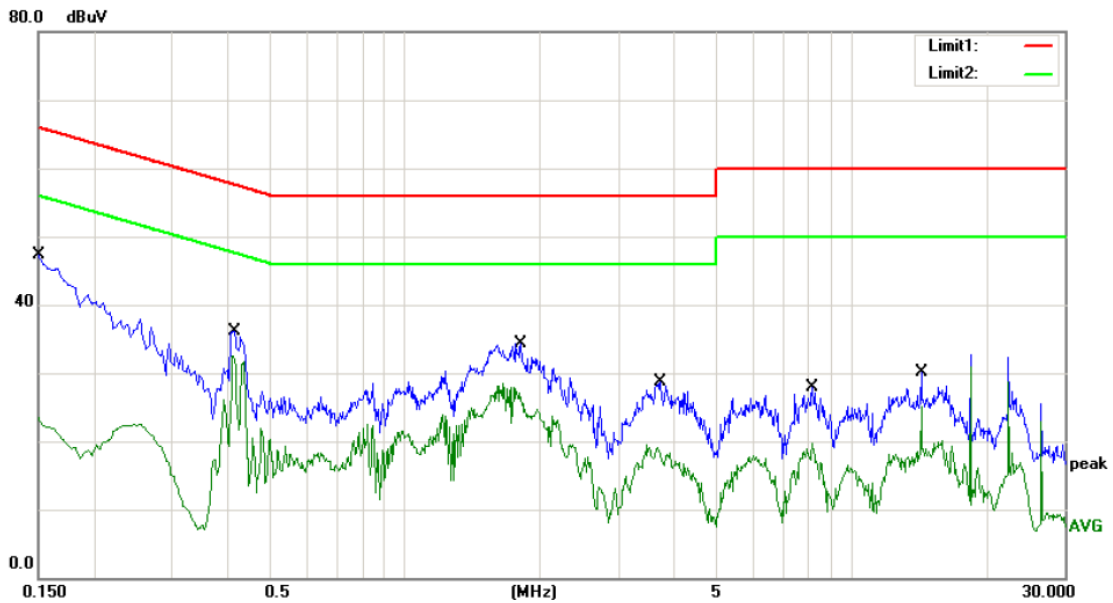
*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Aspen



Site site #1 Phase: **N** Temperature: 24
 Limit: (CE)FCC PART 15C_QP Power: PC Input Humidity: 55 %
 Mode: TX 2412
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1620	37.03	9.78	46.81	65.36	-18.55	QP	
2		0.1620	17.70	9.78	27.48	55.36	-27.88	AVG	
3		0.4380	29.02	9.83	38.85	57.10	-18.25	QP	
4	*	0.4380	26.00	9.83	35.83	47.10	-11.27	AVG	
5		0.6860	24.36	9.84	34.20	56.00	-21.80	QP	
6		0.6860	17.28	9.84	27.12	46.00	-18.88	AVG	
7		1.7340	28.32	9.84	38.16	56.00	-17.84	QP	
8		1.7340	19.20	9.84	29.04	46.00	-16.96	AVG	
9		6.2260	24.71	9.88	34.59	60.00	-25.41	QP	
10		6.2260	14.84	9.88	24.72	50.00	-25.28	AVG	
11		18.4340	23.61	10.20	33.81	60.00	-26.19	QP	
12		18.4340	21.76	10.20	31.96	50.00	-18.04	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Aspen

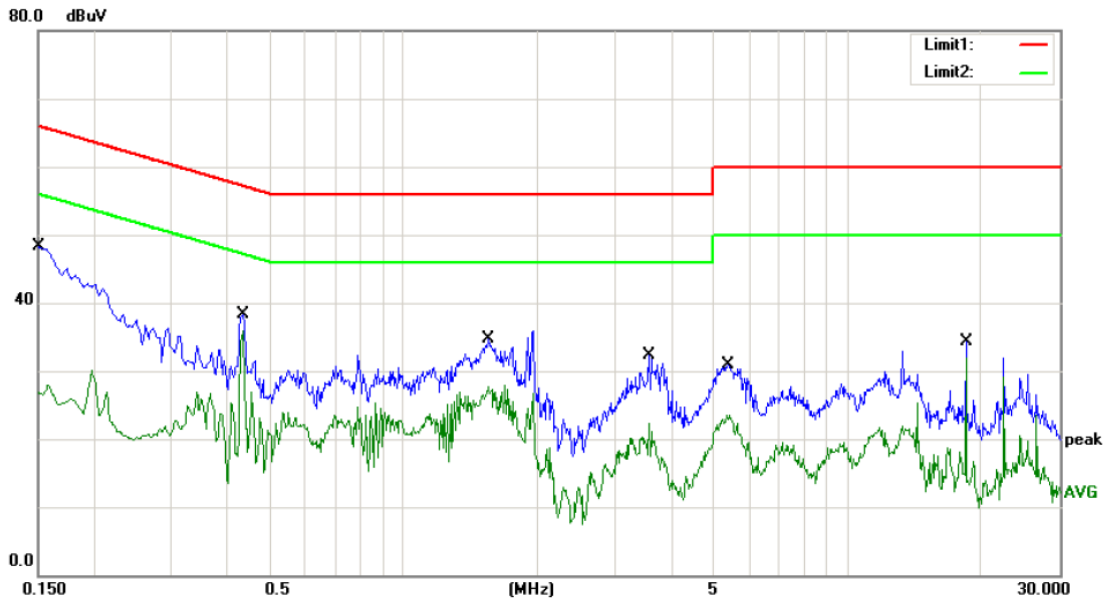


Site site #1
 Limit: (CE)FCC PART 15C_QP
 Mode: TX 2437
 Note:

Phase: L1
 Power: PC Input
 Temperature: 24
 Humidity: 55 %

No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1500	37.48	9.78	47.26	66.00	-18.74	QP	
2	0.1500	13.71	9.78	23.49	56.00	-32.51	AVG	
3	0.4140	26.19	9.83	36.02	57.57	-21.55	QP	
4 *	0.4140	22.74	9.83	32.57	47.57	-15.00	AVG	
5	1.8180	24.51	9.84	34.35	56.00	-21.65	QP	
6	1.8180	18.61	9.84	28.45	46.00	-17.55	AVG	
7	3.7340	18.80	9.85	28.65	56.00	-27.35	QP	
8	3.7340	9.69	9.85	19.54	46.00	-26.46	AVG	
9	8.1660	17.87	9.93	27.80	60.00	-32.20	QP	
10	8.1660	9.67	9.93	19.60	50.00	-30.40	AVG	
11	14.3380	20.10	10.09	30.19	60.00	-29.81	QP	
12	14.3380	14.91	10.09	25.00	50.00	-25.00	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Aspen

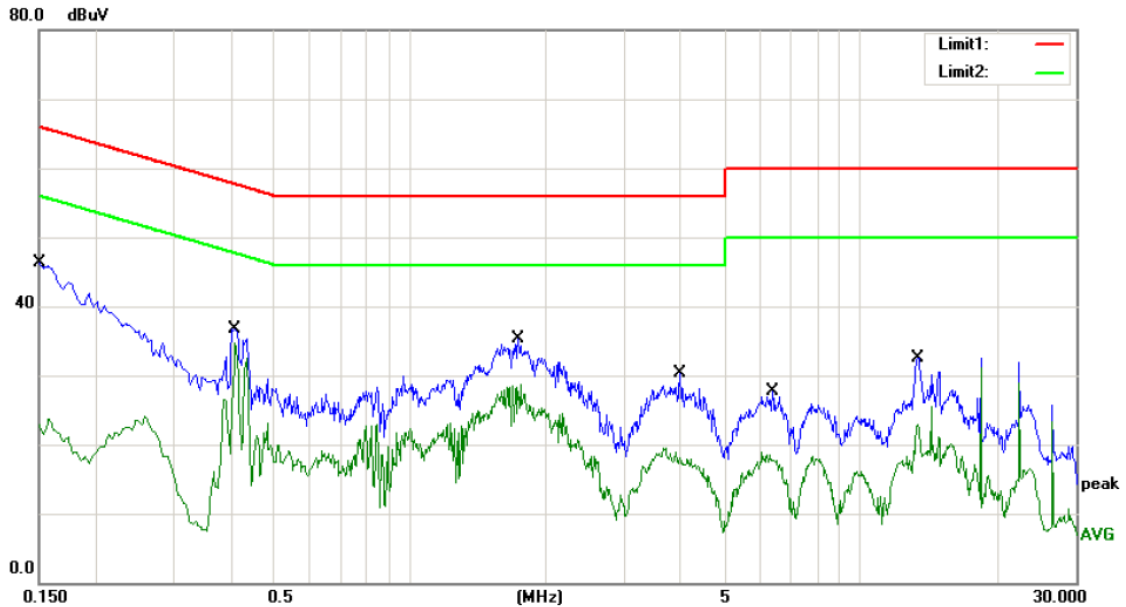


Site site #1
 Limit: (CE)FCC PART 15C_QP
 Mode: TX 2437
 Note:

Phase: N
 Power: PC Input
 Temperature: 24
 Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	38.49	9.78	48.27	66.00	-17.73	QP	
2		0.1500	18.17	9.78	27.95	56.00	-28.05	AVG	
3		0.4340	28.55	9.83	38.38	57.18	-18.80	QP	
4	*	0.4340	26.16	9.83	35.99	47.18	-11.19	AVG	
5		1.5540	24.83	9.84	34.67	56.00	-21.33	QP	
6		1.5540	17.92	9.84	27.76	46.00	-18.24	AVG	
7		3.5780	22.46	9.85	32.31	56.00	-23.69	QP	
8		3.5780	12.49	9.85	22.34	46.00	-23.66	AVG	
9		5.3860	20.98	9.86	30.84	60.00	-29.16	QP	
10		5.3860	13.69	9.86	23.55	50.00	-26.45	AVG	
11		18.4340	24.03	10.20	34.23	60.00	-25.77	QP	
12		18.4340	21.69	10.20	31.89	50.00	-18.11	AVG	

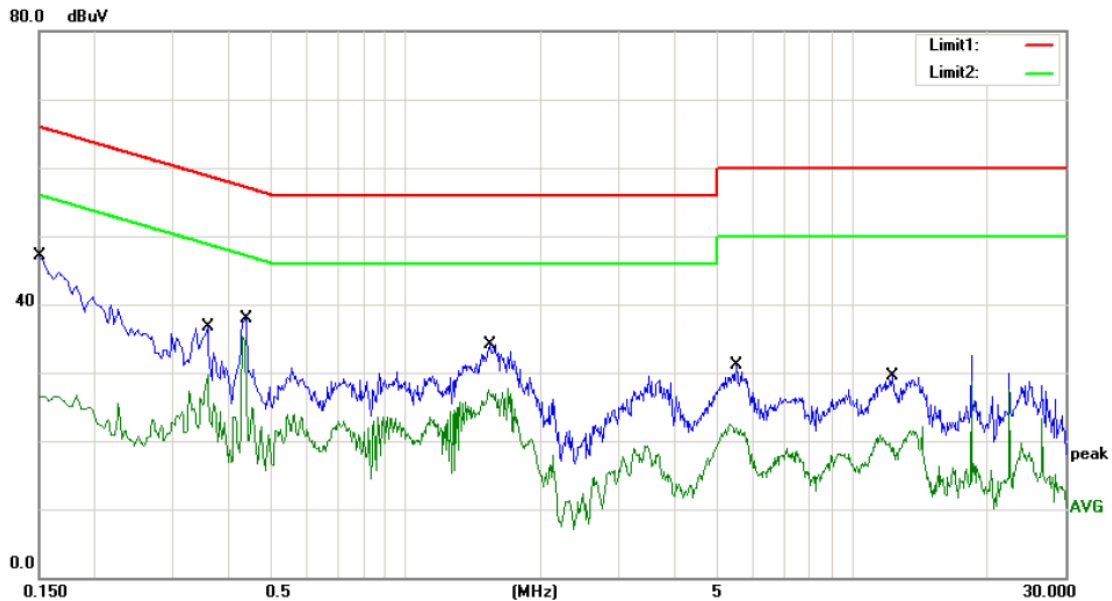
*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Aspen



Site site #1 Phase: **L1** Temperature: 24
 Limit: (CE)FCC PART 15C_QP Power: PC Input Humidity: 55 %
 Mode: TX 2462
 Note:

No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.1500	36.45	9.78	46.23	66.00	-19.77	QP	
2	0.1500	13.99	9.78	23.77	56.00	-32.23	AVG	
3	0.4100	26.95	9.82	36.77	57.65	-20.88	QP	
4 *	0.4100	24.84	9.82	34.66	47.65	-12.99	AVG	
5	1.7380	25.43	9.84	35.27	56.00	-20.73	QP	
6	1.7380	18.77	9.84	28.61	46.00	-17.39	AVG	
7	3.9700	20.47	9.85	30.32	56.00	-25.68	QP	
8	3.9700	9.61	9.85	19.46	46.00	-26.54	AVG	
9	6.3580	17.76	9.89	27.65	60.00	-32.35	QP	
10	6.3580	9.07	9.89	18.96	50.00	-31.04	AVG	
11	13.3380	22.44	10.07	32.51	60.00	-27.49	QP	
12	13.3380	12.81	10.07	22.88	50.00	-27.12	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Aspen



Site site #1 Phase: **N** Temperature: 24
 Limit: (CE)FCC PART 15C_QP Power: PC Input Humidity: 55 %
 Mode: TX 2462
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1500	37.27	9.78	47.05	66.00	-18.95	QP	
2		0.1500	16.82	9.78	26.60	56.00	-29.40	AVG	
3		0.3580	26.95	9.82	36.77	58.77	-22.00	QP	
4		0.3580	19.93	9.82	29.75	48.77	-19.02	AVG	
5		0.4380	28.13	9.83	37.96	57.10	-19.14	QP	
6	*	0.4380	25.43	9.83	35.26	47.10	-11.84	AVG	
7		1.5420	24.34	9.84	34.18	56.00	-21.82	QP	
8		1.5420	17.66	9.84	27.50	46.00	-18.50	AVG	
9		5.4980	21.34	9.86	31.20	60.00	-28.80	QP	
10		5.4980	12.59	9.86	22.45	50.00	-27.55	AVG	
11		12.2700	19.42	10.04	29.46	60.00	-30.54	QP	
12		12.2700	11.40	10.04	21.44	50.00	-28.56	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Aspen

6. Radiated Emission Test

6.1 Measurement Procedure

1. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured was complete.

When spectrum scanned from 30MHz to 1GHz setting resolution bandwidth 120KHz and video bandwidth 300KHz:

EMI Test Receiver	Setting
Attenuation	Auto
RB	120KHz
VB	300KHz
Detector	QP
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

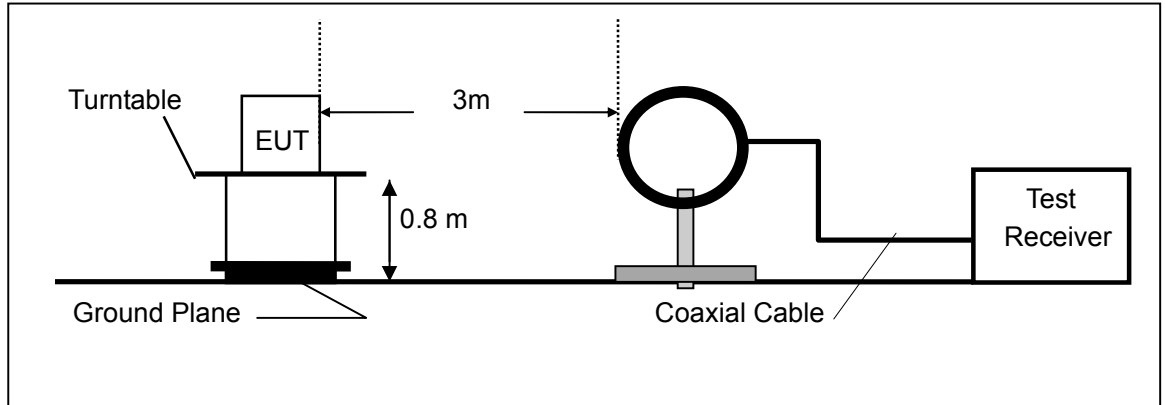
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	3MHz
Detector	Peak
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz:

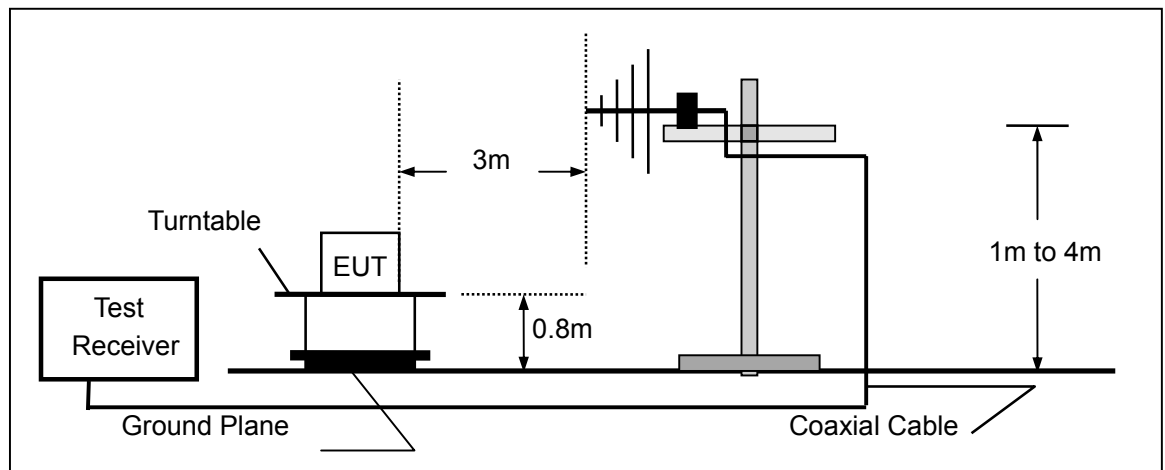
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	10Hz
Detector	Peak
Trace	Max hold

6.2 Test SET-UP (Block Diagram of Configuration)

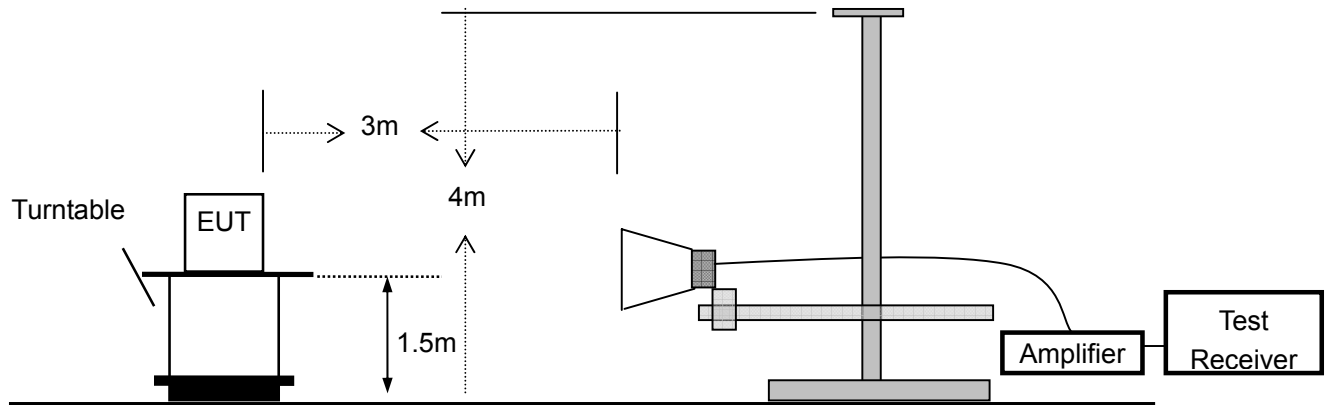
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



6.3 Measurement Equipment Used

Item	Equipment	Manufacturer	Model No.	Serial No.	Characteristics	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	1166.5950.0 3	9KHz-3GHz	05/16/2017	1 Year
2.	Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	05/16/2017	1 Year
3.	Bilog Antenna	Schwarzbeck	VULB9163	000141	25MHz-2GHz	05/16/2017	1 Year
4.	Power Amplifier	CDS	RSU-M352	818	1MHz-1GHz	05/16/2017	1 Year
5.	Power Amplifier	HP	8447F	OPT H64	1GHz-26.5GHz	05/16/2017	1 Year
6.	Color Monitor	SUNSP0	SP-140A	N/A	--	05/16/2017	1 Year
7.	Single Line Filter	JIANLI	XL-3	N/A	--	05/16/2017	1 Year
8.	Single Phase Power Line Filter	JIANLI	DL-2X100B	N/A	--	05/16/2017	1 Year
9.	3 Phase Power Line Filter	JIANLI	DL-4X100B	N/A	--	05/16/2017	1 Year
10.	DC Power Filter	JIANLI	DL-2X50B	N/A	--	05/16/2017	1 Year
11.	Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	05/16/2017	1 Year
12.	Cable	Rosenberger	CIL02	A0783566	9KHz-3GHz	05/16/2017	1 Year
13.	Cable	Rosenberger	RG 233/U	525178	9KHz-3GHz	05/16/2017	1 Year
14.	Signal Analyzer	Rohde & Schwarz	FSV30	103040	9KHz-40GHz	05/16/2017	1 Year
15.	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1272	1GHz-18GHz	05/16/2017	1 Year
16.	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA91703 99	18GHz -26.5GHz	05/16/2017	1 Year
17.	Power Amplifier	LUNAR EM	LNA1G18-4 0	J101000000 81	1GHz-26.5GHz	05/16/2017	1 Year
18.	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	05/16/2017	1 Year
19.	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	05/16/2017	1 Year
20.	Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	05/16/2017	1 Year

6.4 Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

Remark 1. Emission level in dBuV/m=20 log (uV/m)

- :
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

6.5 Measurement Result

Below 30MHz:

All the modulation modes were tested the data of the test mode are recorded in the following pages.

Operation Mode:	TX Mode	Test Date :	July 10, 2017
Frequency Range:	9KHz~30MHz	Temperature :	28°C
Test Result:	PASS	Humidity :	60 %
Measured Distance:	3m	Test By:	WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

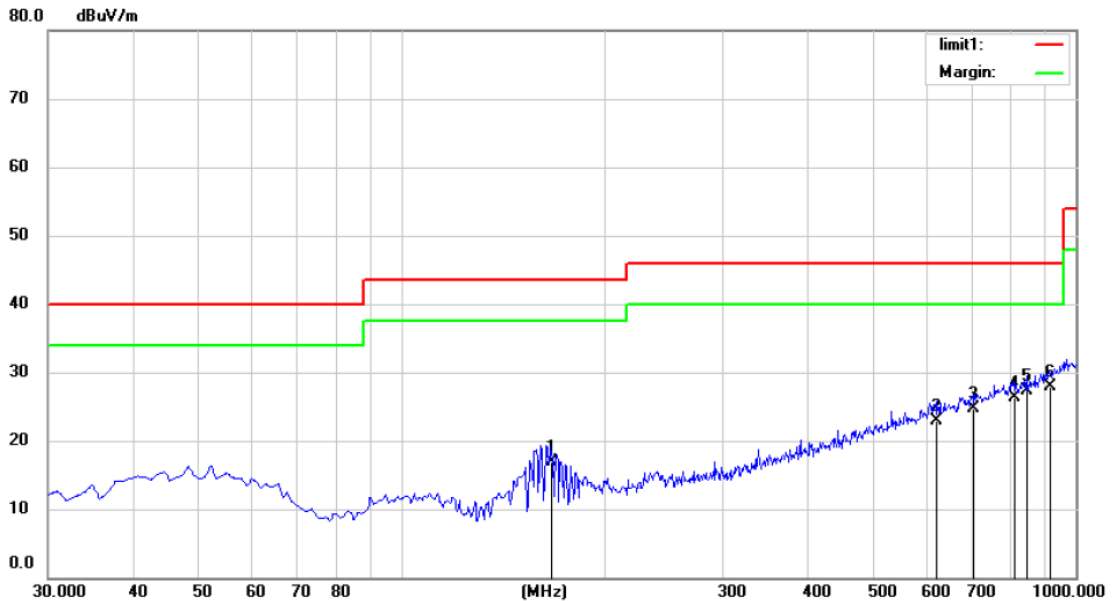
Distance extrapolation factor = $40 \log(\text{Specific distance} / \text{test distance})$ (dB);

Limit line = Specific limits (dBuV) + distance extrapolation factor.

Below 1000MHz:

All the modulation modes were tested the data of the worst mode (TX 802.11g) are recorded in the following pages and the others modulation methods do not exceed the limits.

Please refer to the following test plots:

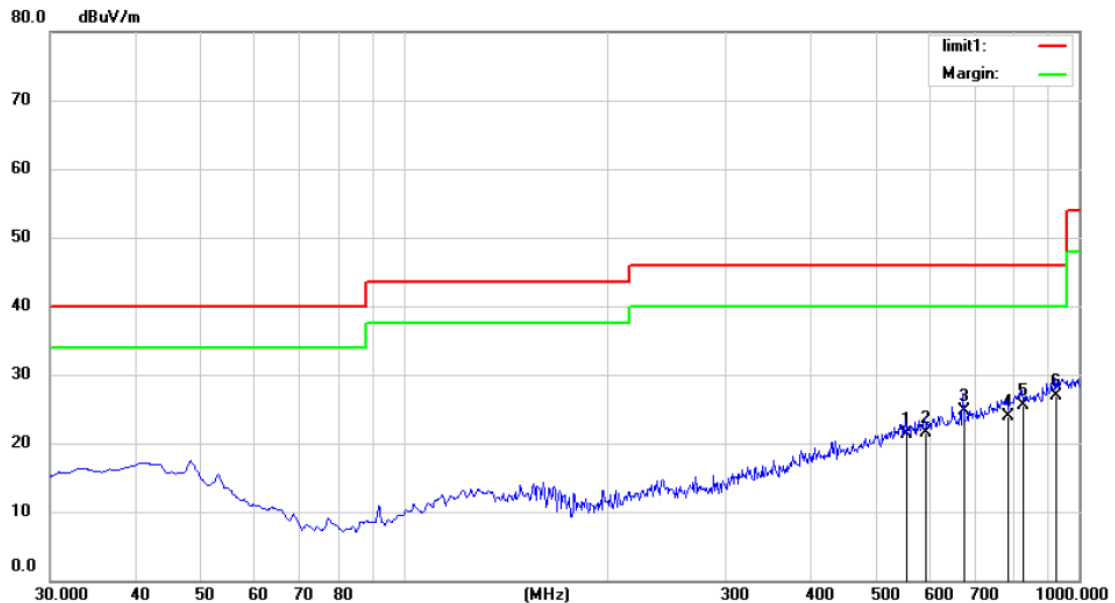


Site Chamber #1 Polarization: *Horizontal* Temperature: 26
 Limit: (RE)FCC PART 15 C 3m Power: PC Input Humidity: 55 %
 Mode:TX2412
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		166.7700	37.20	-20.27	16.93	43.50	-26.57	QP		
2		622.6700	28.65	-5.77	22.88	46.00	-23.12	QP		
3		706.0900	29.12	-4.44	24.68	46.00	-21.32	QP		
4		808.9100	28.60	-2.38	26.22	46.00	-19.78	QP		
5		845.7700	29.25	-1.96	27.29	46.00	-18.71	QP		
6	*	913.6700	28.13	-0.24	27.89	46.00	-18.11	QP		

*:Maximum data x:Over limit !:over margin

Operator: washington

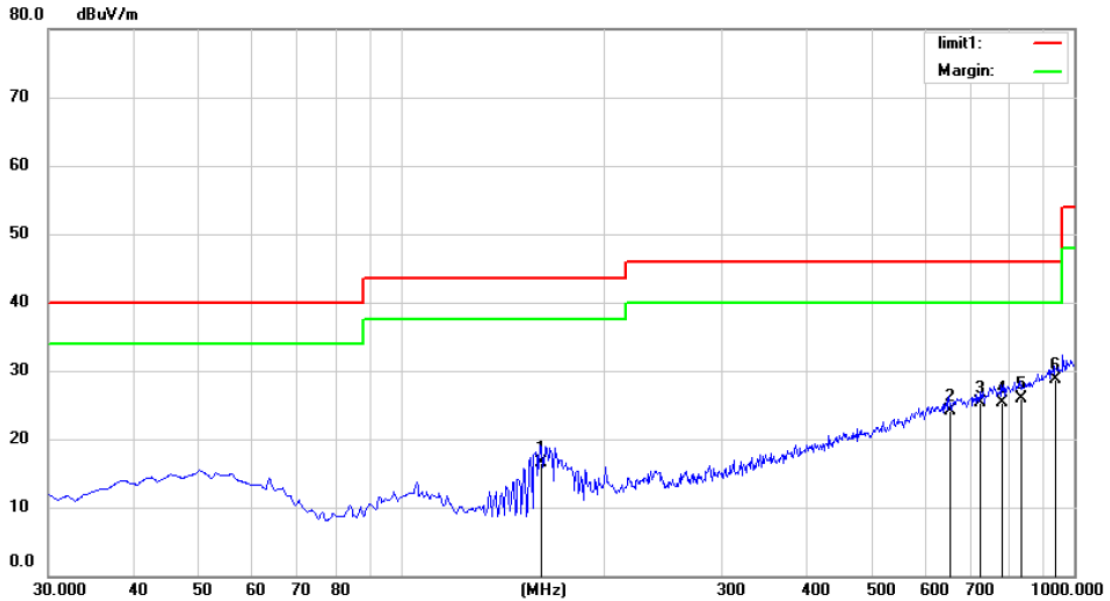


Site Chamber #1 Polarization: *Vertical* Temperature: 26
 Limit: (RE)FCC PART 15 C 3m Power: PC Input Humidity: 55 %
 Mode: TX2412
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		554.7700	29.30	-8.06	21.24	46.00	-24.76	QP		
2		592.6000	28.90	-7.46	21.44	46.00	-24.56	QP		
3		675.0500	31.25	-6.50	24.75	46.00	-21.25	QP		
4		784.6600	28.10	-4.21	23.89	46.00	-22.11	QP		
5		827.3400	28.60	-3.13	25.47	46.00	-20.53	QP		
6	*	925.3100	28.12	-1.19	26.93	46.00	-19.07	QP		

*:Maximum data x:Over limit !:over margin

Operator: washington

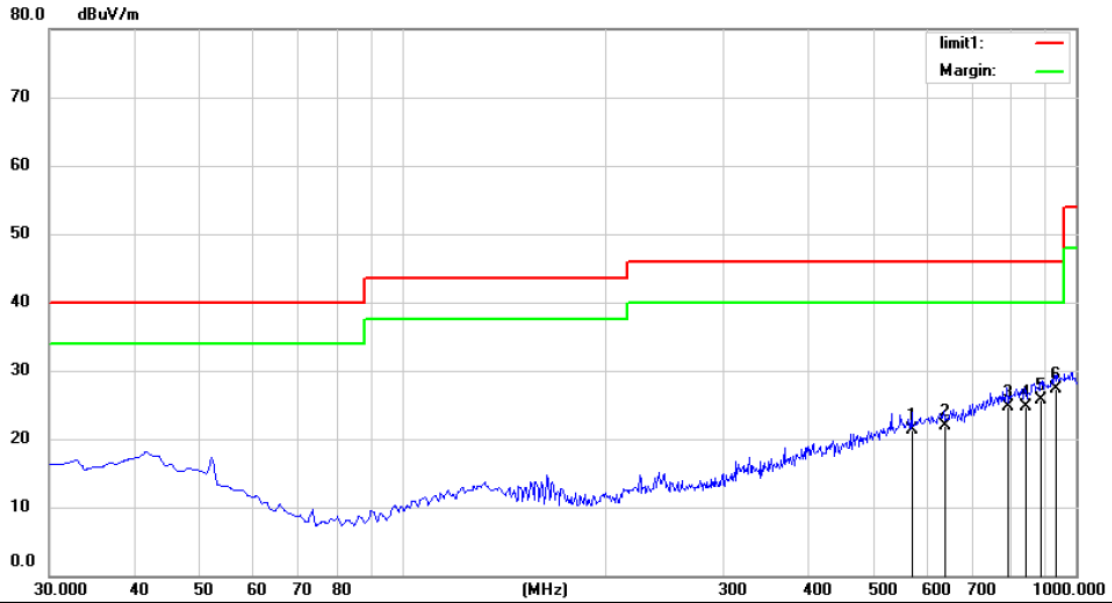


Site Chamber #1 Polarization: *Horizontal* Temperature: 26
 Limit: (RE)FCC PART 15 C 3m Power: PC Input Humidity: 55 %
 Mode: TX2437
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		160.9500	37.12	-20.64	16.48	43.50	-27.02	QP		
2		653.7100	29.35	-5.29	24.06	46.00	-21.94	QP		
3		725.4900	29.35	-4.07	25.28	46.00	-20.72	QP		
4		781.7500	28.23	-2.89	25.34	46.00	-20.66	QP		
5		832.1900	28.12	-2.12	26.00	46.00	-20.00	QP		
6	*	937.9200	28.35	0.41	28.76	46.00	-17.24	QP		

*:Maximum data x:Over limit !:over margin

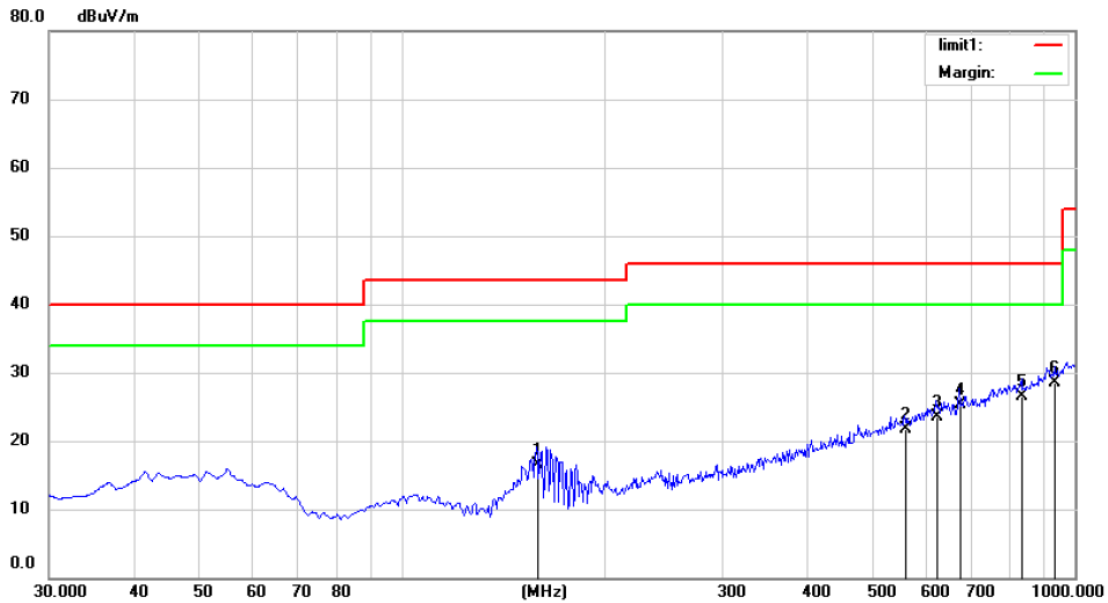
Operator: washington



Site Chamber #1 Polarization: *Vertical* Temperature: 26
 Limit: (RE)FCC PART 15 C 3m Power: PC Input Humidity: 55 %
 Mode: TX2437
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		572.2300	29.11	-7.80	21.31	46.00	-24.69	QP		
2		636.2500	28.90	-7.00	21.90	46.00	-24.10	QP		
3		792.4200	28.65	-3.98	24.67	46.00	-21.33	QP		
4		840.9200	28.00	-3.24	24.76	46.00	-21.24	QP		
5		885.5400	28.45	-2.71	25.74	46.00	-20.26	QP		
6	*	929.1900	28.32	-1.11	27.21	46.00	-18.79	QP		

*:Maximum data x:Over limit !:over margin Operator: washington

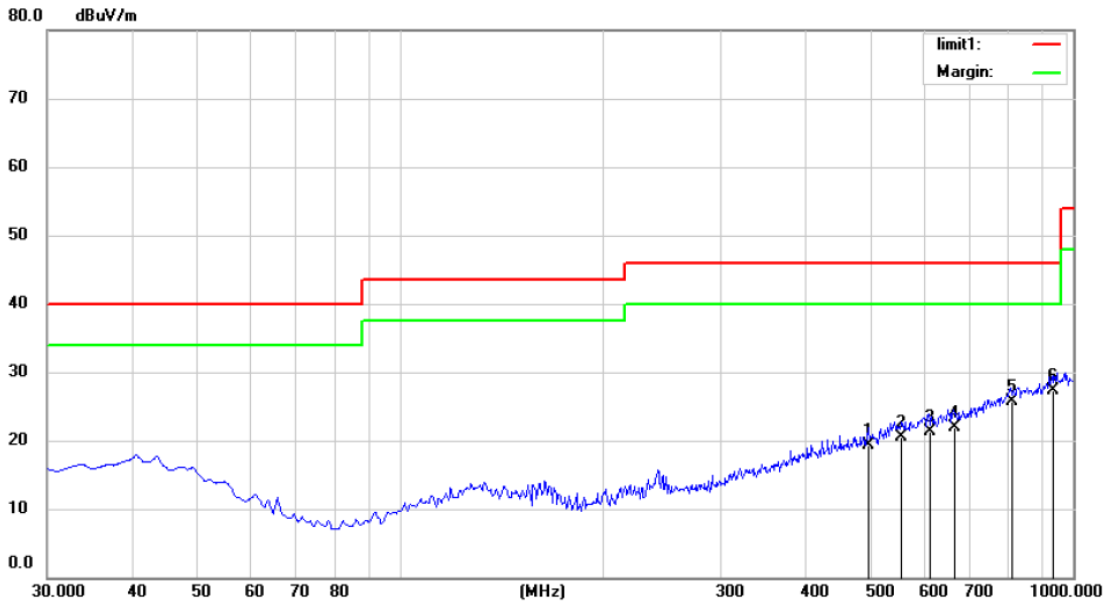


Site Chamber #1 Polarization: *Horizontal* Temperature: 26
 Limit: (RE)FCC PART 15 C 3m Power: PC Input Humidity: 55 %
 Mode: TX2462
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		159.0100	37.25	-20.76	16.49	43.50	-27.01	QP		
2		559.6200	29.12	-7.49	21.63	46.00	-24.37	QP		
3		623.6400	29.35	-5.76	23.59	46.00	-22.41	QP		
4		675.0500	30.25	-5.00	25.25	46.00	-20.75	QP		
5		836.0700	28.65	-2.07	26.58	46.00	-19.42	QP		
6	*	935.0100	28.13	0.33	28.46	46.00	-17.54	QP		

*:Maximum data x:Over limit !:over margin

Operator: washington



Site Chamber #1 Polarization: **Vertical** Temperature: 26
 Limit: (RE)FCC PART 15 C 3m Power: PC Input Humidity: 55 %
 Mode: TX2462
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		497.5400	29.12	-9.74	19.38	46.00	-26.62	QP		
2		556.7100	28.56	-8.03	20.53	46.00	-25.47	QP		
3		611.0300	28.53	-7.27	21.26	46.00	-24.74	QP		
4		664.3800	28.65	-6.65	22.00	46.00	-24.00	QP		
5		808.9100	29.25	-3.45	25.80	46.00	-20.20	QP		
6	*	935.0100	28.32	-0.97	27.35	46.00	-18.65	QP		

*:Maximum data x:Over limit !:over margin Operator: washington

Above 1000MHz:

All the modulation modes were tested the data of the worst mode (TX 802.11b) are recorded in the following pages and the others modulation methods do not exceed the limits.

Operation Mode: 802.11g Lowest Test Date : July 10, 2017

Freq. (MHz)	Ant. Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4824	V	65.67	45.12	74	54	-8.33	-8.88
7236	V	64.12	44.63	74	54	-9.88	-9.37
9648	V	63.25	43.51	74	54	-10.75	-10.49
12060	V	62.17	42.62	74	54	-11.83	-11.38
14472	V	61.29	41.59	74	54	-12.71	-12.41
16884	V	59.41	39.57	74	54	-14.59	-14.43
4824	H	64.33	44.26	74	54	-9.67	-9.74
7236	H	63.86	43.12	74	54	-10.14	-10.88
9648	H	62.93	42.74	74	54	-11.07	-11.26
12060	H	61.58	41.26	74	54	-12.42	-12.74
14472	H	60.67	40.95	74	54	-13.33	-13.05
16884	H	59.74	39.54	74	54	-14.26	-14.46

Operation Mode: 802.11g Middle Test Date : July 10, 2017

Freq. (MHz)	Ant. Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4874	V	65.95	44.32	74	54	-8.05	-9.68
7311	V	64.37	43.26	74	54	-9.63	-10.74
9688	V	63.87	42.96	74	54	-10.13	-11.04
12185	V	62.64	41.58	74	54	-11.36	-12.42
14622	V	61.34	40.82	74	54	-12.66	-13.18
17059	V	60.34	39.75	74	54	-13.66	-14.25
4874	H	64.37	45.16	74	54	-9.63	-8.84
7311	H	63.57	44.82	74	54	-10.43	-9.18
9688	H	62.37	43.46	74	54	-11.63	-10.54
12185	H	61.37	42.47	74	54	-12.63	-11.53
14622	H	60.37	41.94	74	54	-13.63	-12.06
17059	H	59.76	40.37	74	54	-14.24	-13.63

Operation Mode: 802.11g Highest

Test Date : July 10, 2017

Freq. (MHz)	Ant. Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4924	V	66.37	44.26	74	54	-7.63	-9.74
7386	V	65.72	43.52	74	54	-8.28	-10.48
9848	V	64.52	42.22	74	54	-9.48	-11.78
12310	V	63.37	41.98	74	54	-10.63	-12.02
14772	V	62.11	40.36	74	54	-11.89	-13.64
17234	V	61.46	39.67	74	54	-12.54	-14.33
4924	H	65.34	45.28	74	54	-8.66	-8.72
7386	H	64.96	44.86	74	54	-9.04	-9.14
9848	H	63.94	43.95	74	54	-10.06	-10.05
12310	H	62.37	42.95	74	54	-11.63	-11.05
14772	H	61.22	41.62	74	54	-12.78	-12.38
17234	H	60.34	40.16	74	54	-13.66	-13.84

All emissions not reported were more than 20dB below the specified limit or in the noise floor.

- Note:**
- (1) All Readings are Peak Value and AV.
 - (2) Emission Level= Reading Level+Probe Factor +Cable Loss.
 - (3) Data of measurement within this frequency range shown “ – ” in the table above means the reading of emissions are attenuated more than 20Db below the permissible limits or the field strength is too small to be measured.

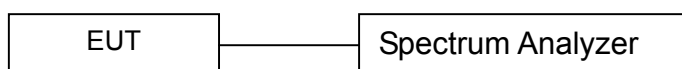
7. 6dB Bandwidth Test

7.1 Measurement Procedure

The EUT was operating in IEEE 802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40) mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequency) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.2 Test SET-UP (Block Diagram of Configuration)



7.3 Measurement Equipment Used

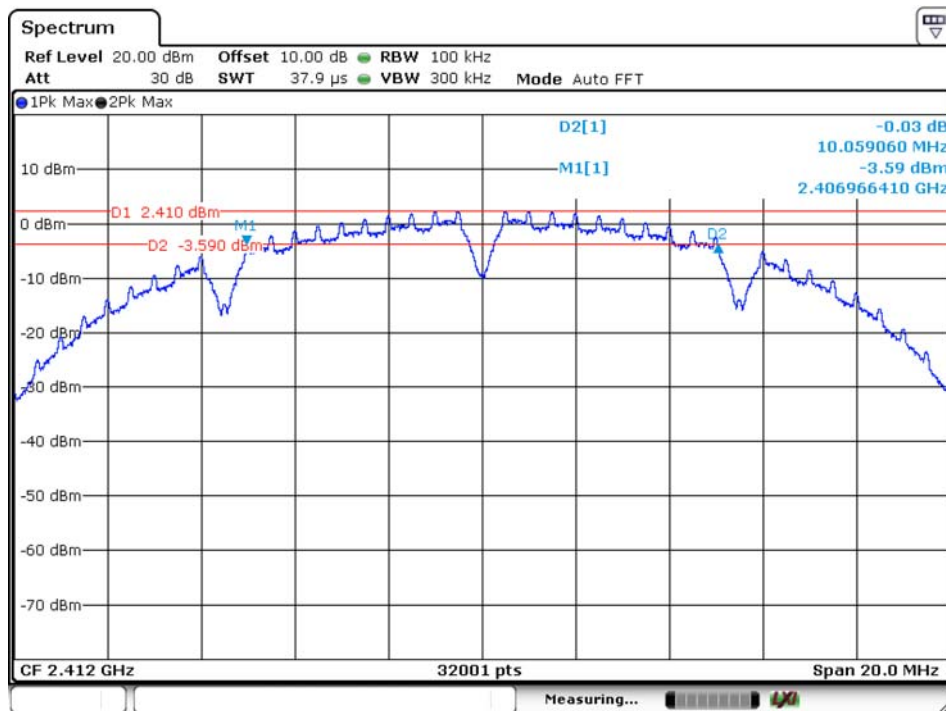
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	FSV30	1321.3008K	05/16/2017	05/15/2018

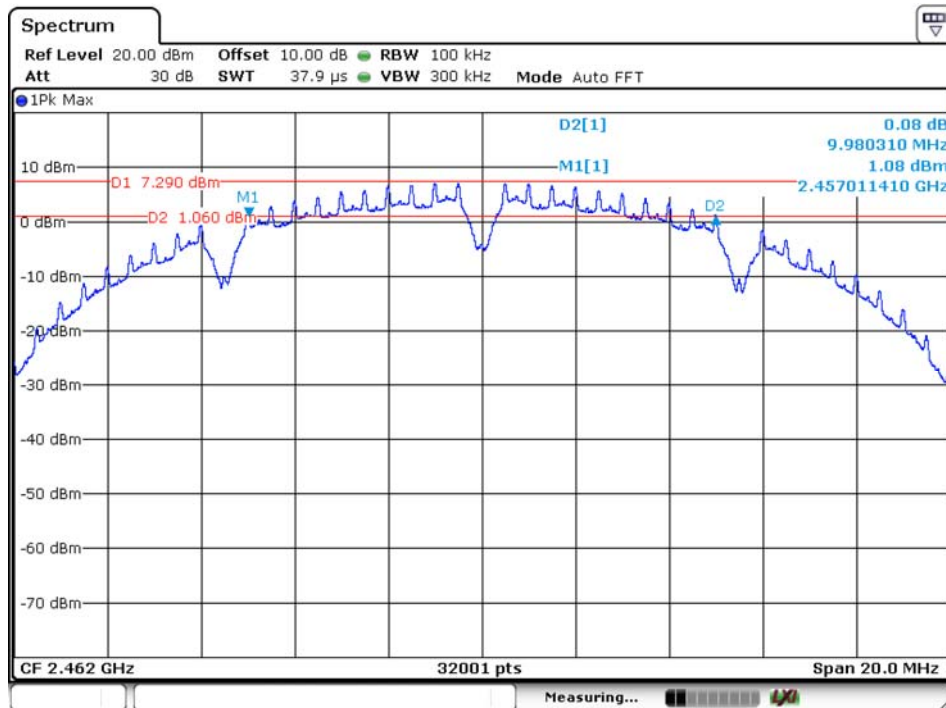
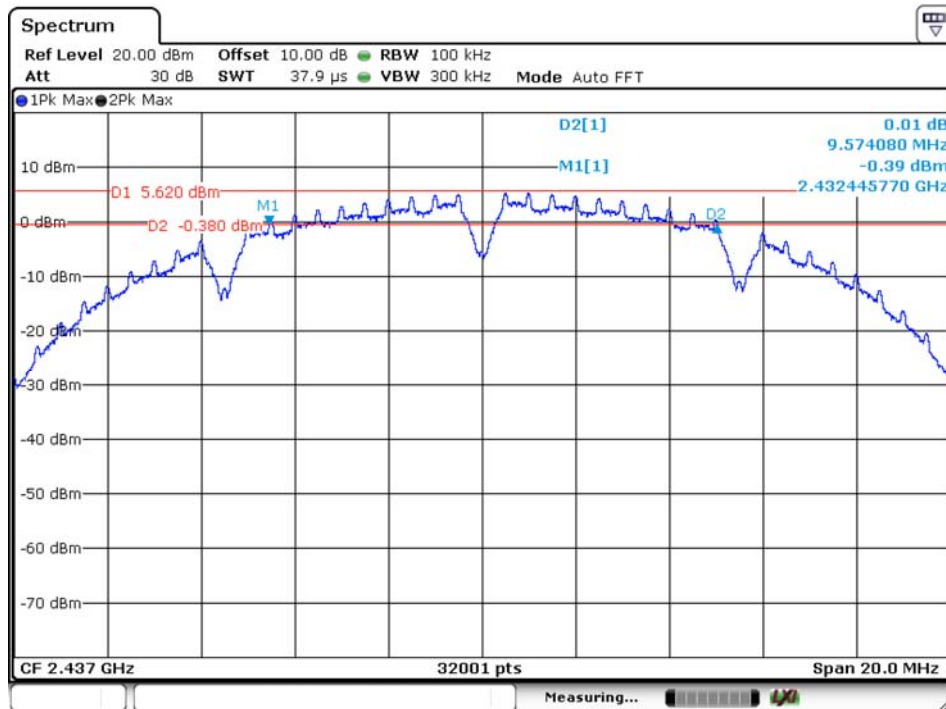
7.4 Measurement Results

6 Bandwidth Test Data Chart:

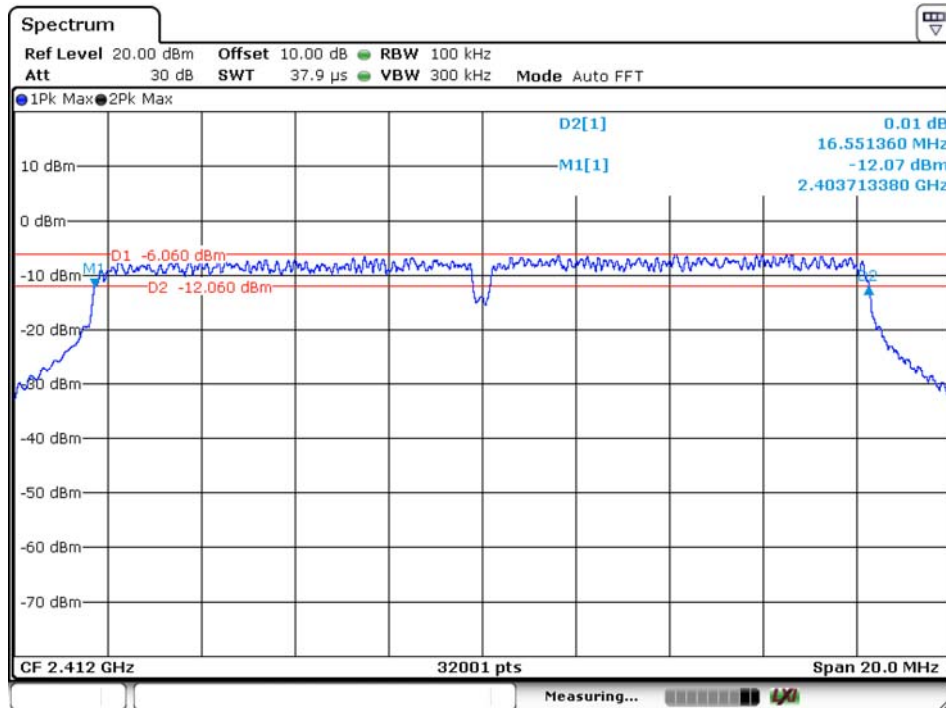
Refer to attached data chart.

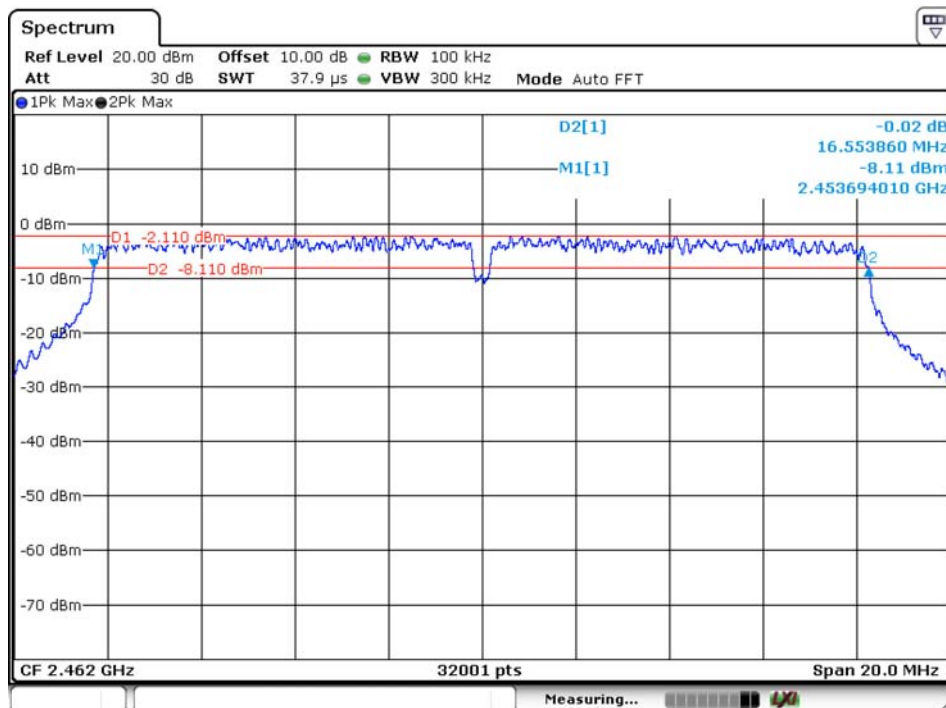
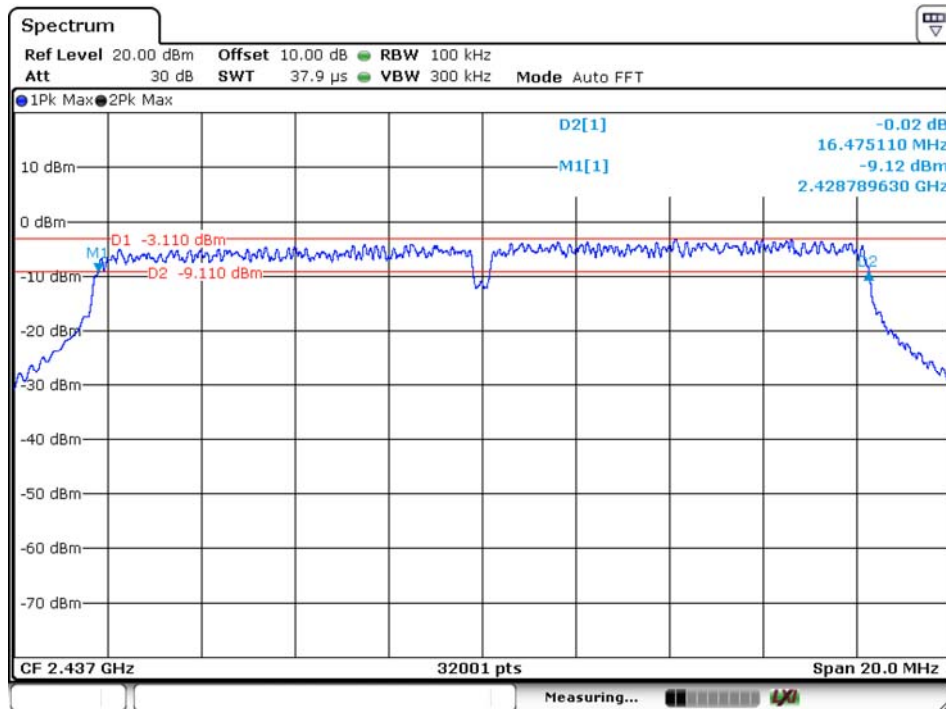
IEEE 802.11b			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2412	10059	>500	Pass
2437	9574	>500	
2462	9980	>500	



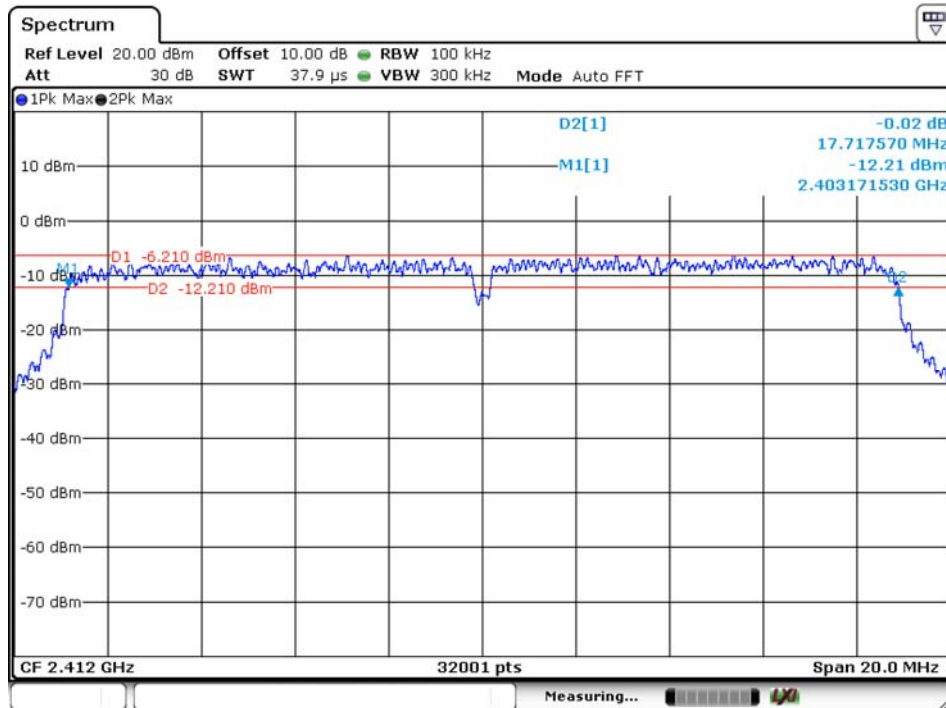


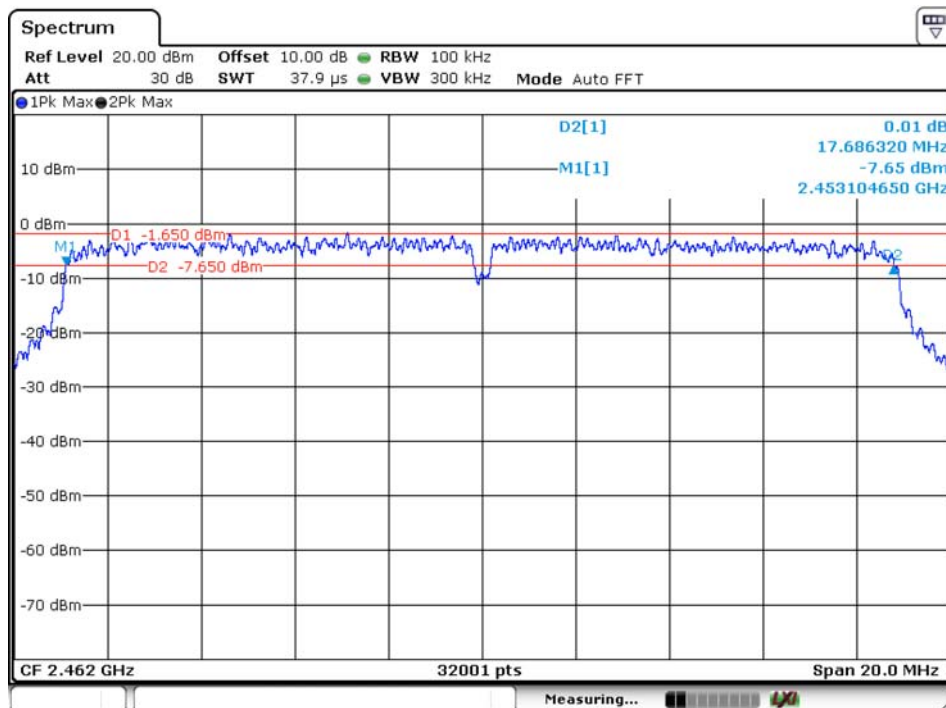
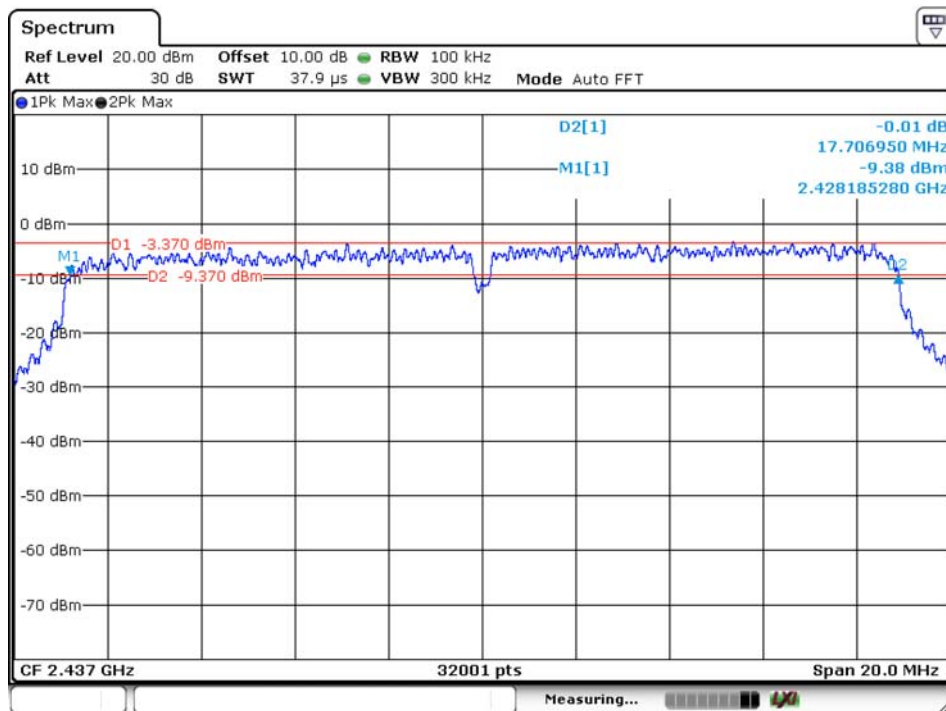
IEEE 802.11g			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2412	16551	>500	Pass
2437	16475	>500	
2462	16554	>500	



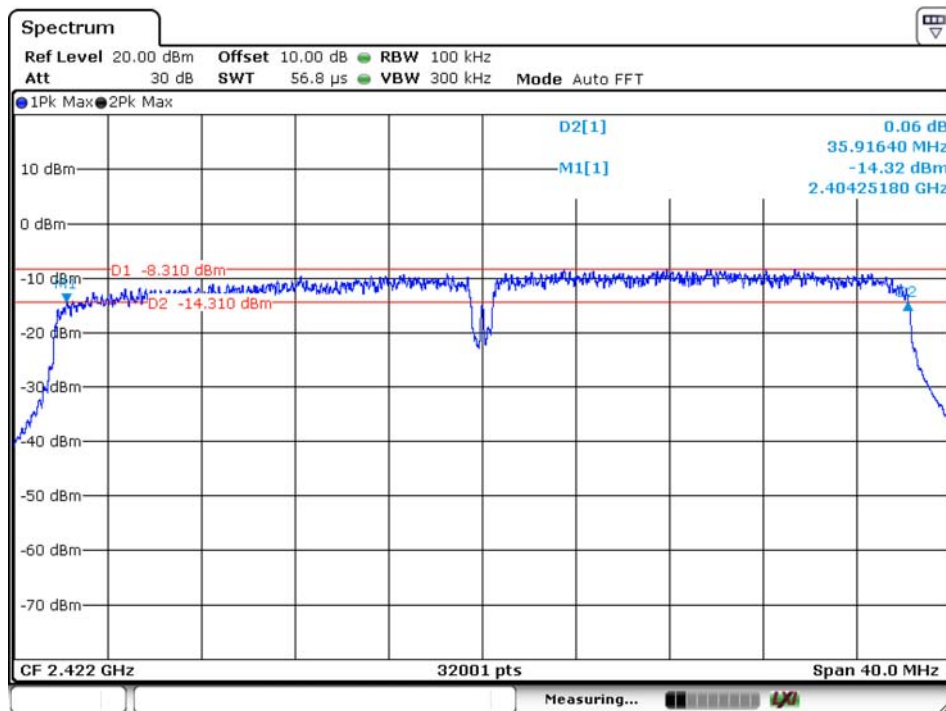


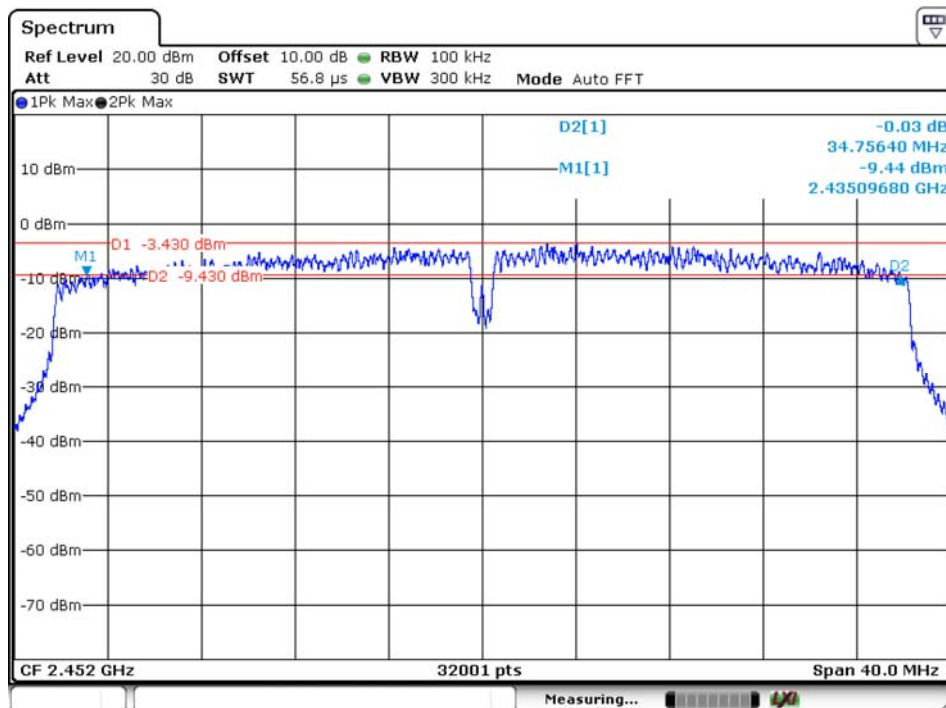
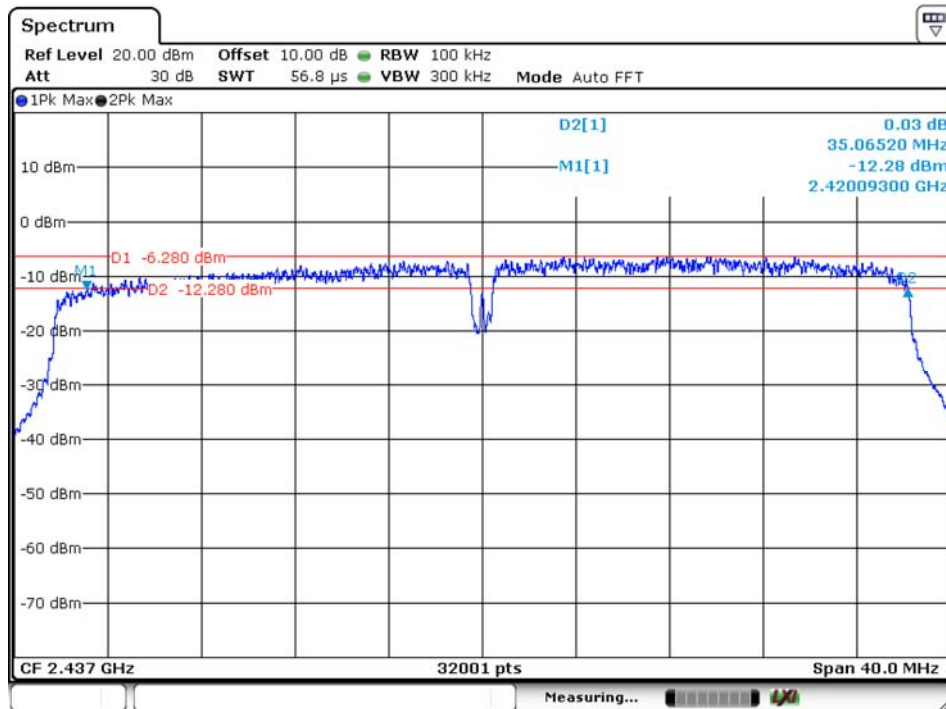
IEEE 802.11n(HT20)			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2412	17718	>500	Pass
2437	17707	>500	
2462	17686	>500	





IEEE 802.11n(HT40)			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2422	35916	>500	Pass
2437	35065	>500	
2452	34756	>500	





8. Maximum Peak Output Power Test

8.1 Measurement Procedure

The maximum peak conducted output power can be measured using a broadband peak RF power meter. The power meter must have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast, average-responding diode type sensor.

- The Transmitter output (antenna port) was connected to the power meter.
- Turn on the EUT and power meter and then record the peak power value.
- Repeat above procedures on all channels needed to be tested.

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used

EQUIPMENT TYPE	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power meter	ML2495A	0824006	05/16/2017	05/15/2018
Power sensor	MA2411B	0738172	05/16/2017	05/15/2018

8.4 Peak Power output limit

The maximum peak power shall be less 1Watt.

8.5 Measurement Results

Spectrum Detector:	PK	Test Date :	July 10, 2017
Test By:	Jack	Temperature :	28°C
Test Result:	PASS	Humidity :	60%

Test Channel	Max Output Power (dBm)				Limit(dBm)	Result
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)		
Lowest	16.58	15.27	15.04	14.24	30	Pass
Middle	17.09	14.03	14.25	13.52		
Highest	17.29	16.24	14.87	14.06		

9. Band Edge Test

9.1 Measurement Procedure

For Conducted Test

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. Measure and record the results in the test report.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

For Radiated emission Test

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v04.
2. The EUT was placed on a styrofoam table which is 1.5m above ground plane.
3. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
4. The EUT was placed on a turntable with 0.8 meter above ground.
5. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.
7. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
8. Repeat above procedures until all frequency measured were complete.

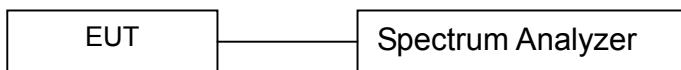
When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz.

EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	3MHz
Detector	Peak
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz.

EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	10Hz
Detector	Peak
Trace	Max hold

9.2 Test SET-UP (Block Diagram of Configuration)



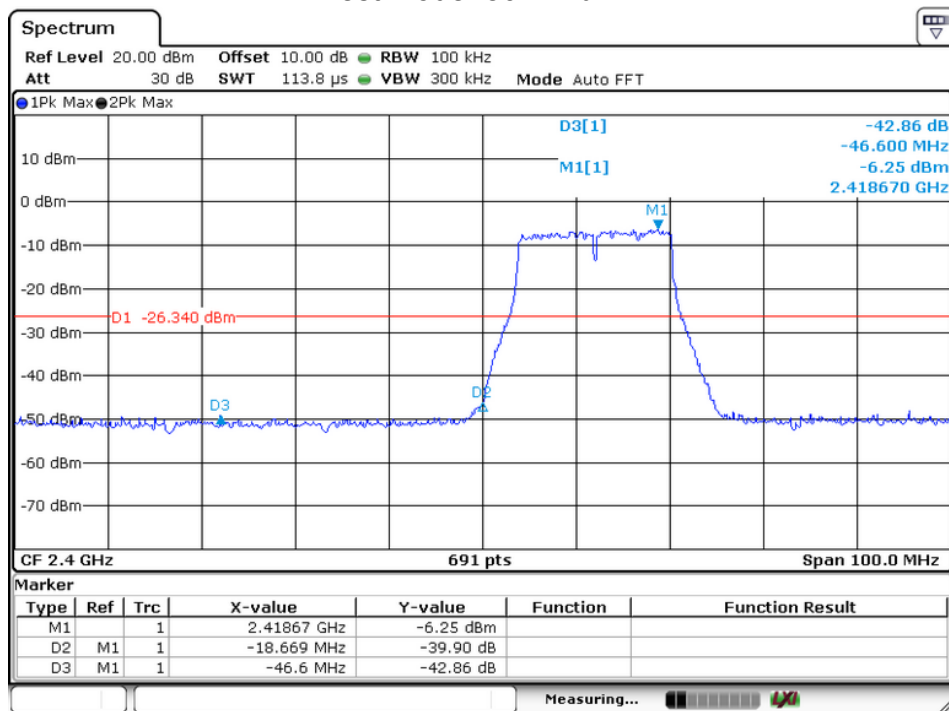
9.3 Measurement Equipment Used

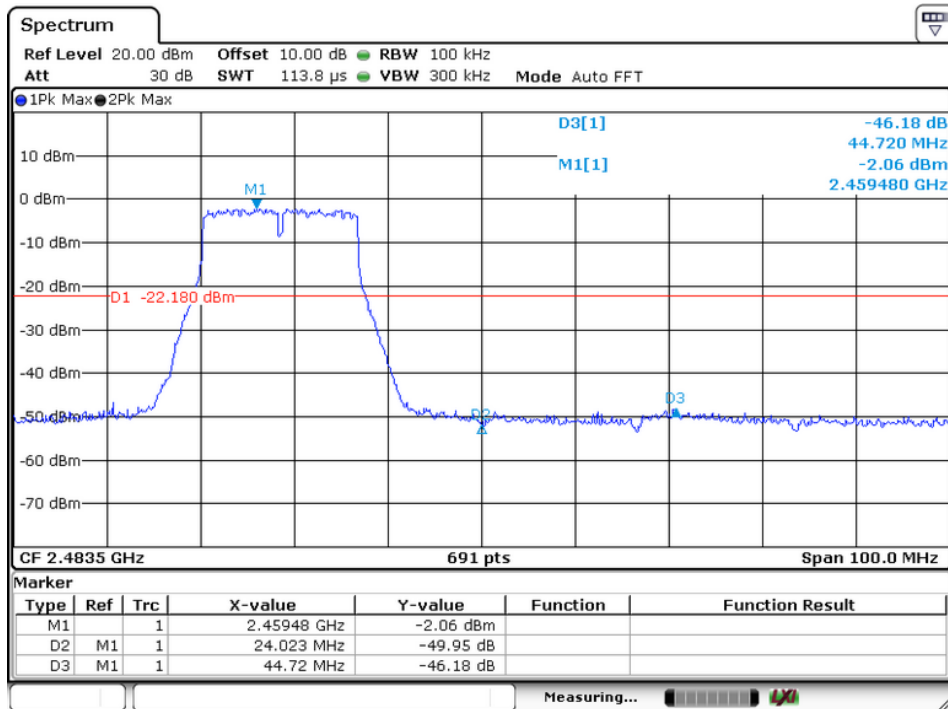
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	FSV30	1321.3008K	05/16/2017	05/15/2018

9.4 Measurement Results

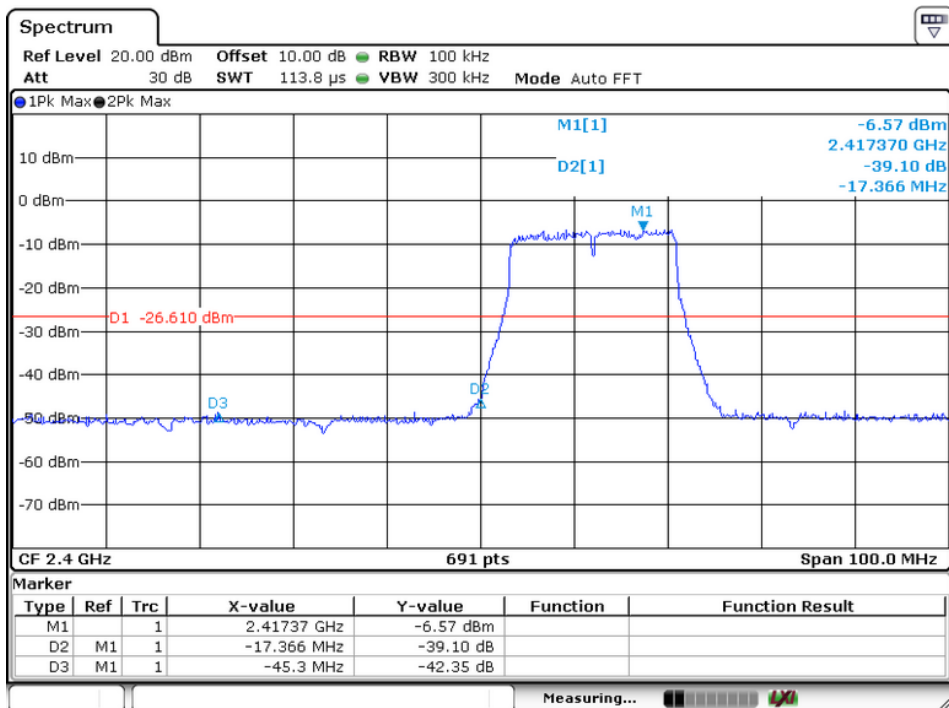
1. Conducted Test

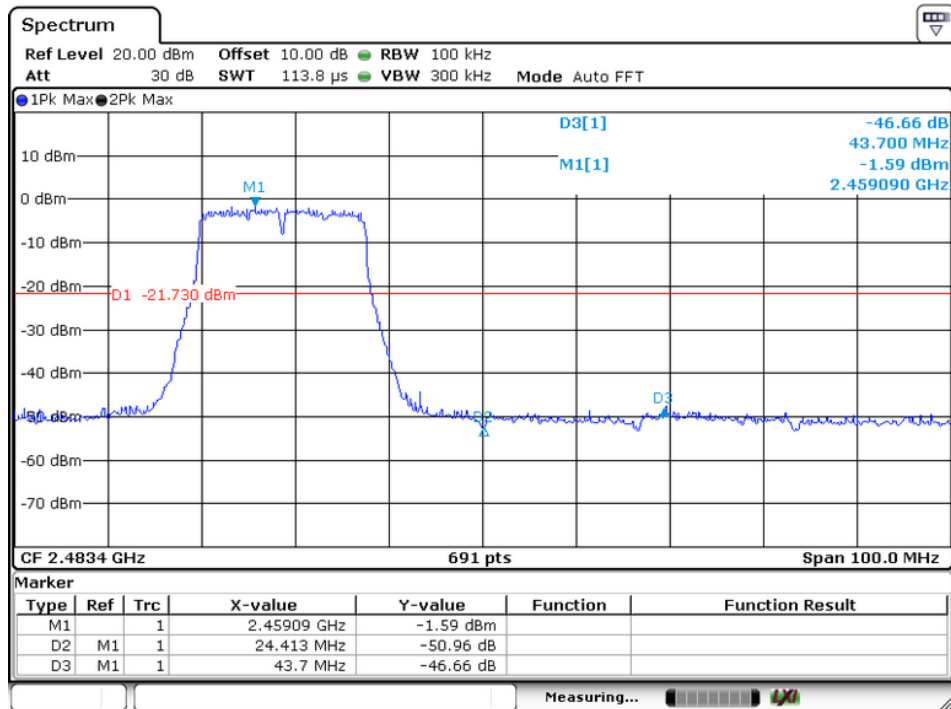
Test mode: 802.11b



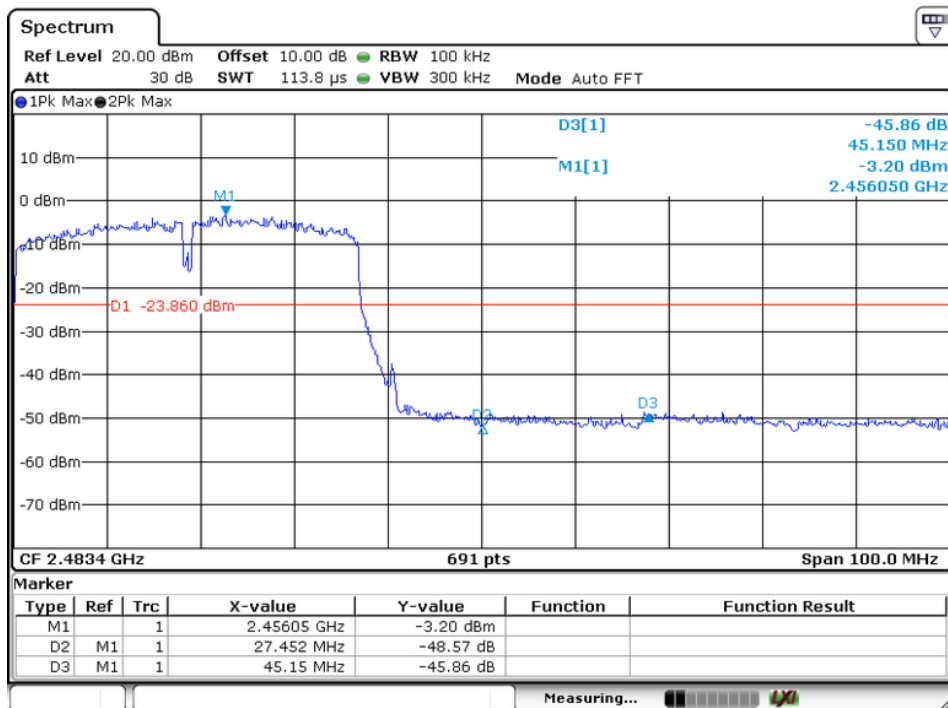


Test mode: 802.11g

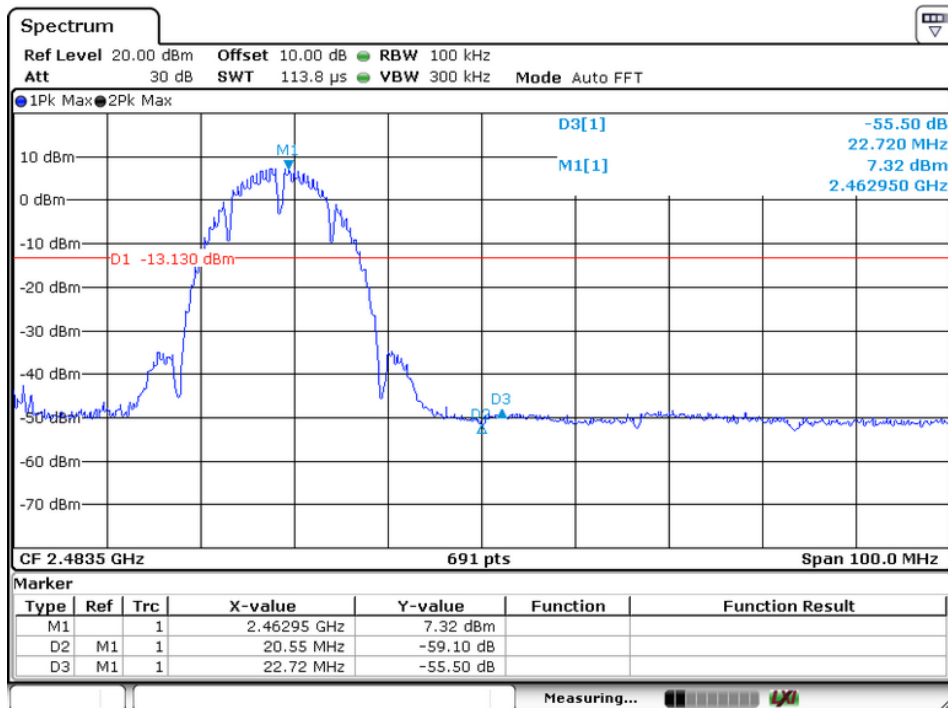
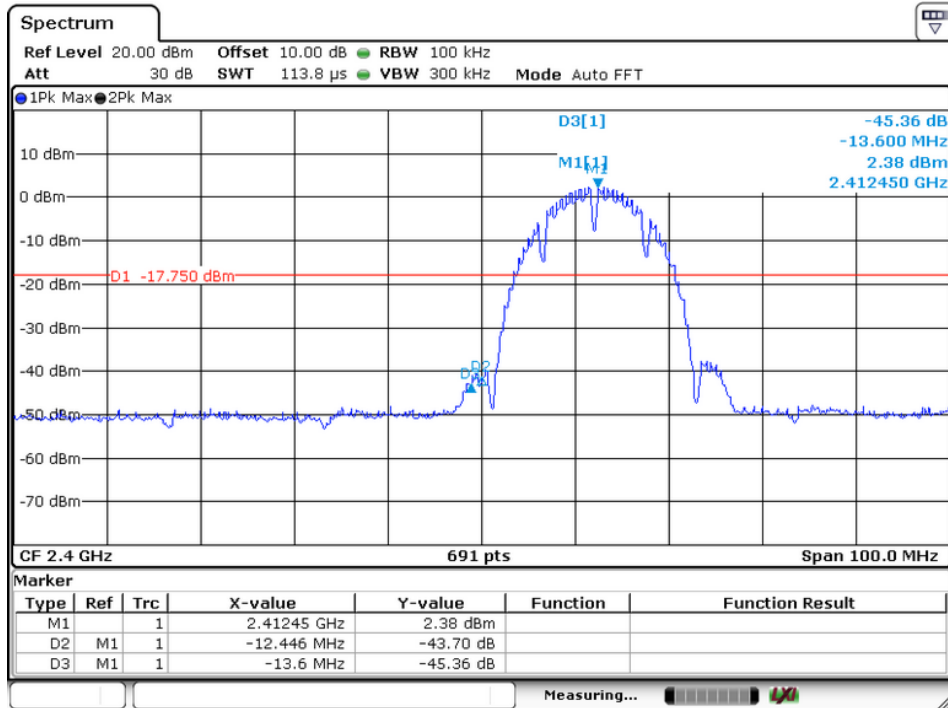




Test mode: 802.11n(HT20)



Test mode: 802.11n(HT40)



2. Radiated emission Test

Spectrum Detector: PK/AV Test Date : July 10, 2017
 Test By: Andy Temperature : 28 °C
 Humidity : 65 %

IEEE 802.11b							
Frequency (MHz)	Antenna polarization	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
	(H/V)	PK	AV	PK	AV	PK	AV
<2400	H	63.05	43.66	74	54	-10.95	-10.34
<2400	V	59.21	39.2	74	54	-14.79	-14.8
>2483.5	H	64.29	44.12	74	54	-9.71	-9.88
>2483.5	V	60.25	40.29	74	54	-13.75	-13.71

IEEE 802.11g							
Frequency (MHz)	Antenna polarization	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
	(H/V)	PK	AV	PK	AV	PK	AV
<2400	H	65.21	45.12	74	54	-8.79	-8.88
<2400	V	60.23	40.2	74	54	-13.77	-13.8
>2483.5	H	64.12	44.12	74	54	-9.88	-9.88
>2483.5	V	60.29	40.36	74	54	-13.71	-13.64

IEEE 802.11n(HT20)							
Frequency (MHz)	Antenna polarization	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
	(H/V)	PK	AV	PK	AV	PK	AV
<2400	H	63.12	43.62	74	54	-10.88	-10.38
<2400	V	60.95	40.95	74	54	-13.05	-13.05
>2483.5	H	64.12	44.18	74	54	-9.88	-9.82
>2483.5	V	59.21	39.52	74	54	-14.79	-14.48

IEEE 802.11n(HT40)							
Frequency (MHz)	Antenna polarization	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
	(H/V)	PK	AV	PK	AV	PK	AV
<2400	H	63.59	43.12	74	54	-10.41	-10.88
<2400	V	60.25	40.26	74	54	-13.75	-13.74
>2483.5	H	62.36	43.01	74	54	-11.64	-10.99
>2483.5	V	58.69	38.14	74	54	-15.31	-15.86

10. Power Density

10.1 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	FSV30	1321.3008K	05/16/2017	05/15/2018

10.2 Measuring Instruments and Setting

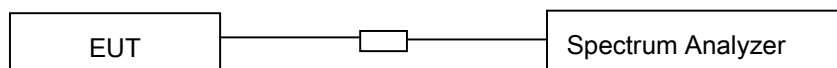
The following table is the setting of spectrum analyzer.

Spectrum analyzer	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS bandwidth.
RB	3KHz
VB	10KHz
Detector	Peak
Trace	Max hold
Sweep Time	Automatic

10.3 Test Procedures

- a. The transmitter output (antenna port) was connected to the spectrum analyzer.
- b. Set analyzer center frequency to DTS channel center frequency.
- c. Set the analyzer span to a minimum of 1.5 times the DTS bandwidth.
- d. Set the RBW=3KHz. Set the VBW=10KHz
- 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.

10.4 Block Diagram of Test Setup



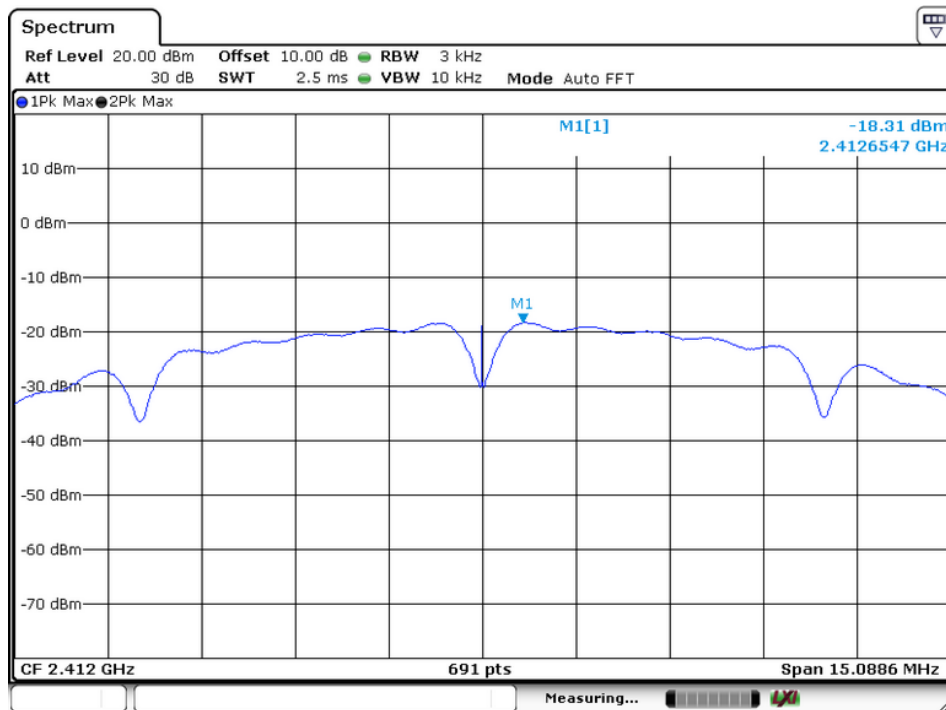
10.5 Limit

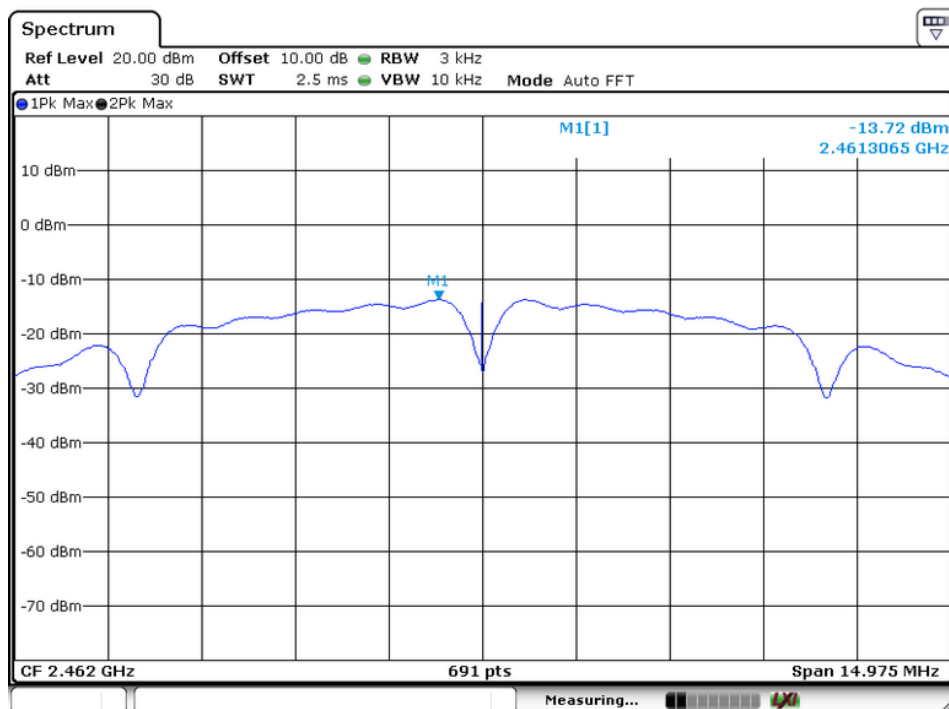
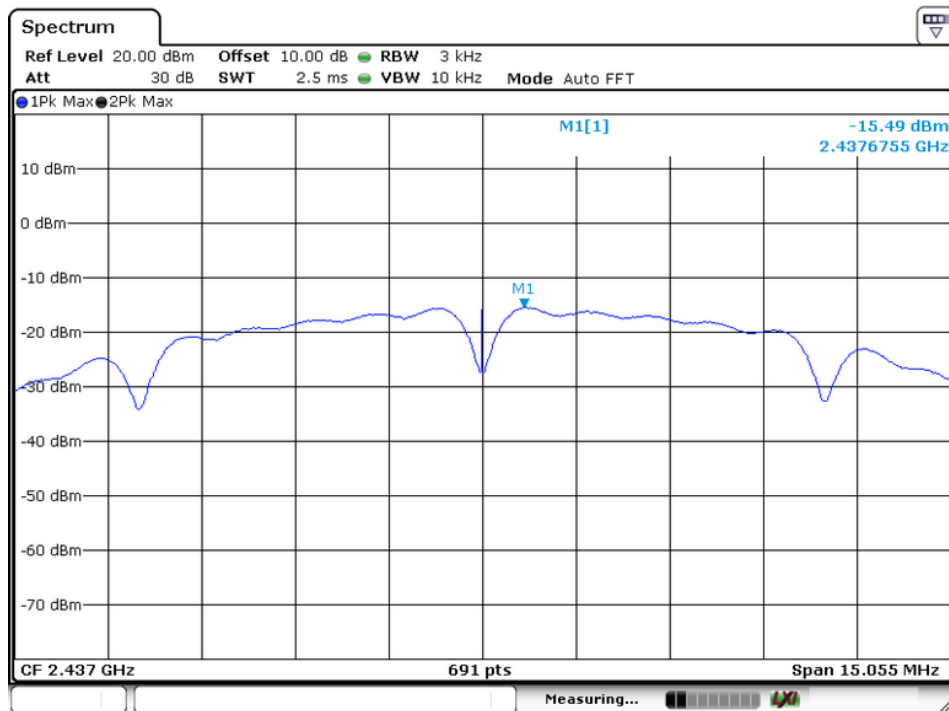
The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3 kHz bandwidth.

10.6 Test Result

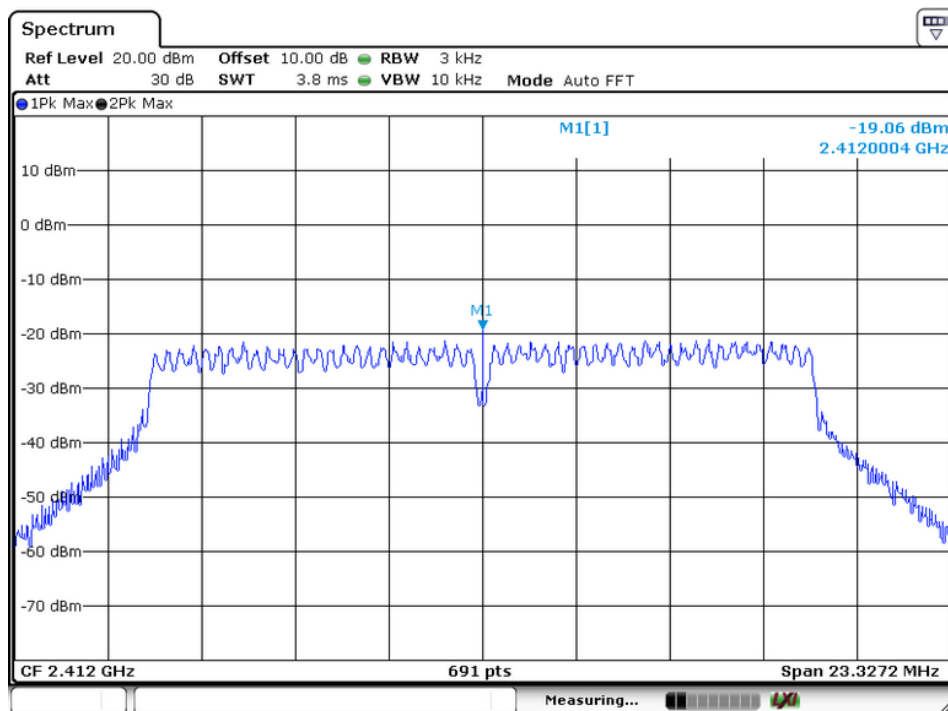
Spectrum Detector: PK Test Date : July 10, 2017
 Test By: Andy Temperature : 28°C
 Humidity : 60%

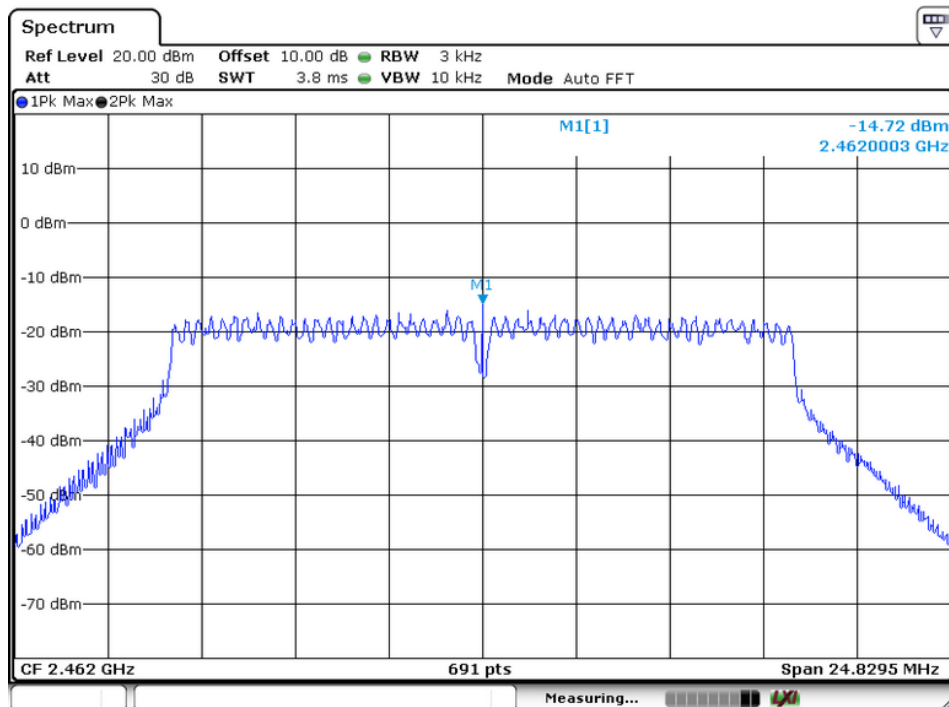
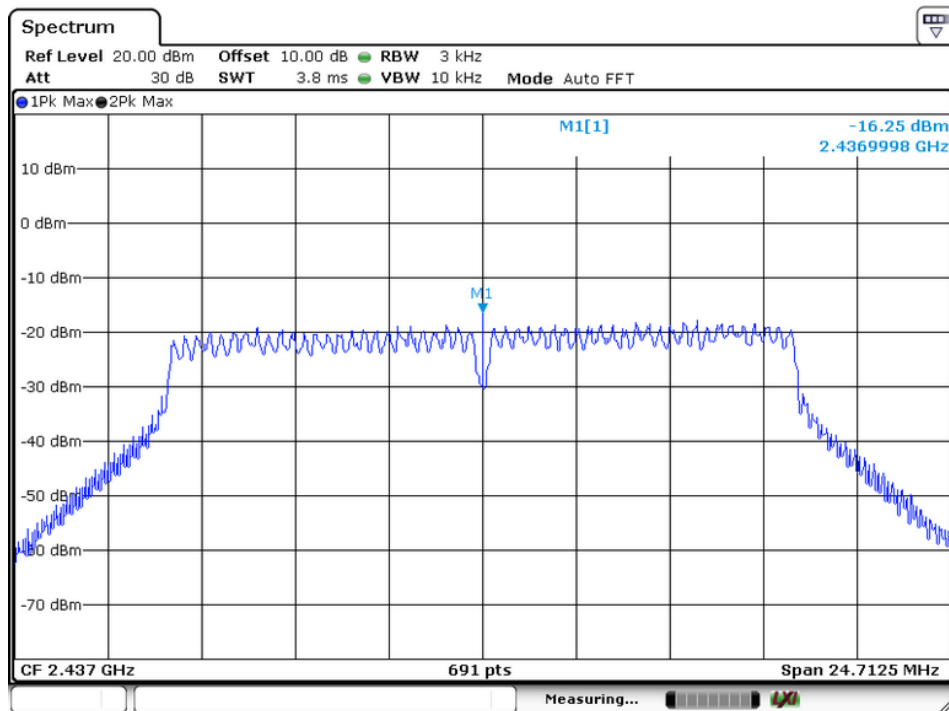
IEEE 802.11b			
Channel frequency (MHz)	Measurement level (dBm)	Limit(dBm)	Result
2412	-18.31	8	Pass
2437	-15.49		
2462	-13.72		



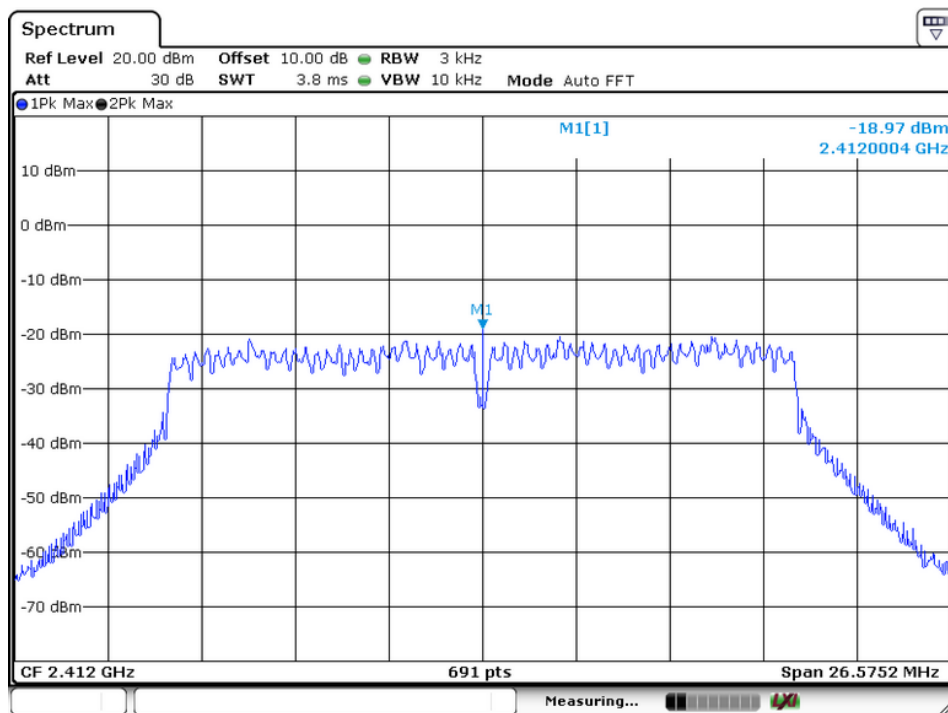


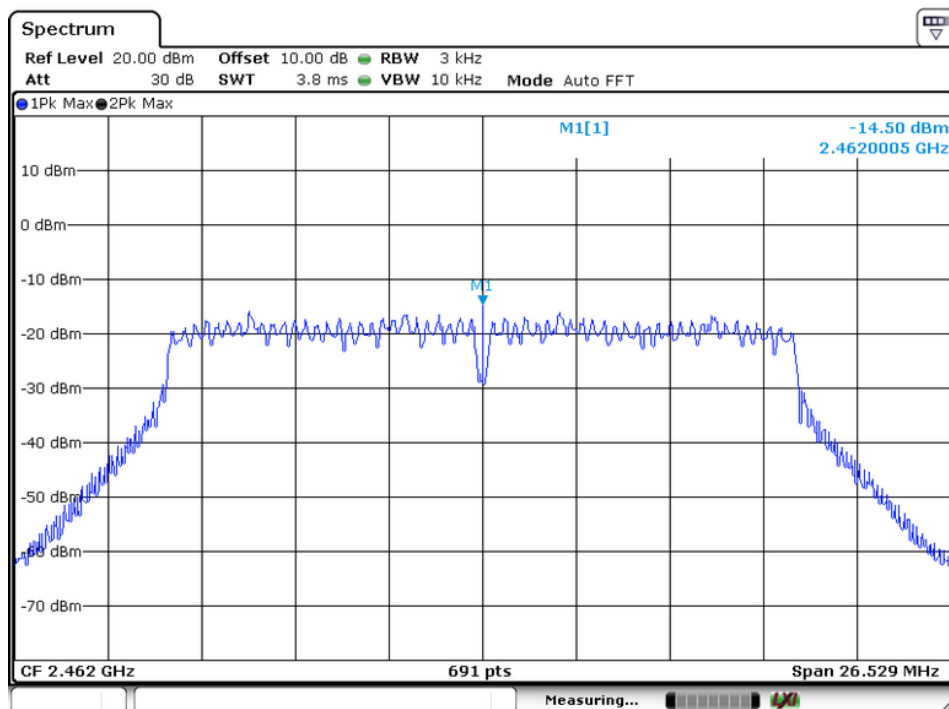
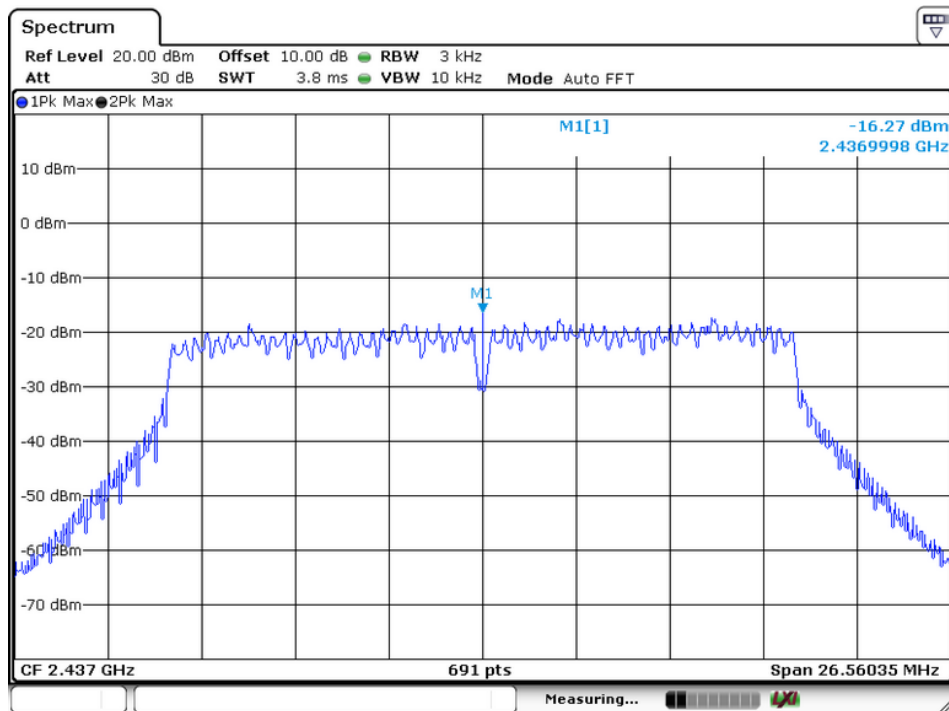
IEEE 802.11g			
Channel frequency (MHz)	Measurement level (dBm)	Limit(dBm)	Result
2412	-19.06	8	Pass
2437	-16.25		
2462	-14.72		



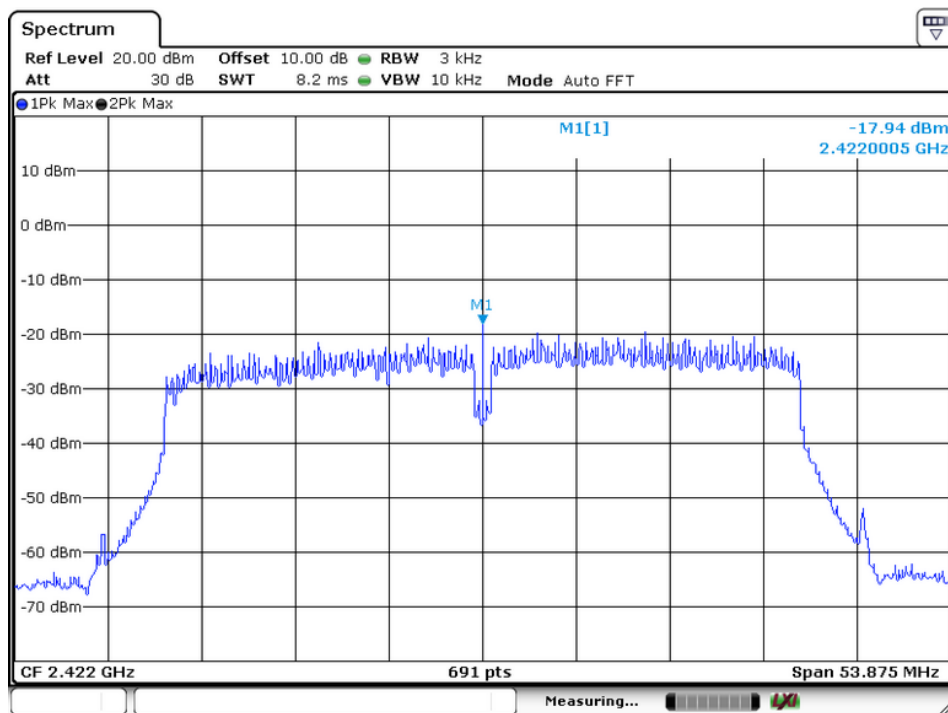


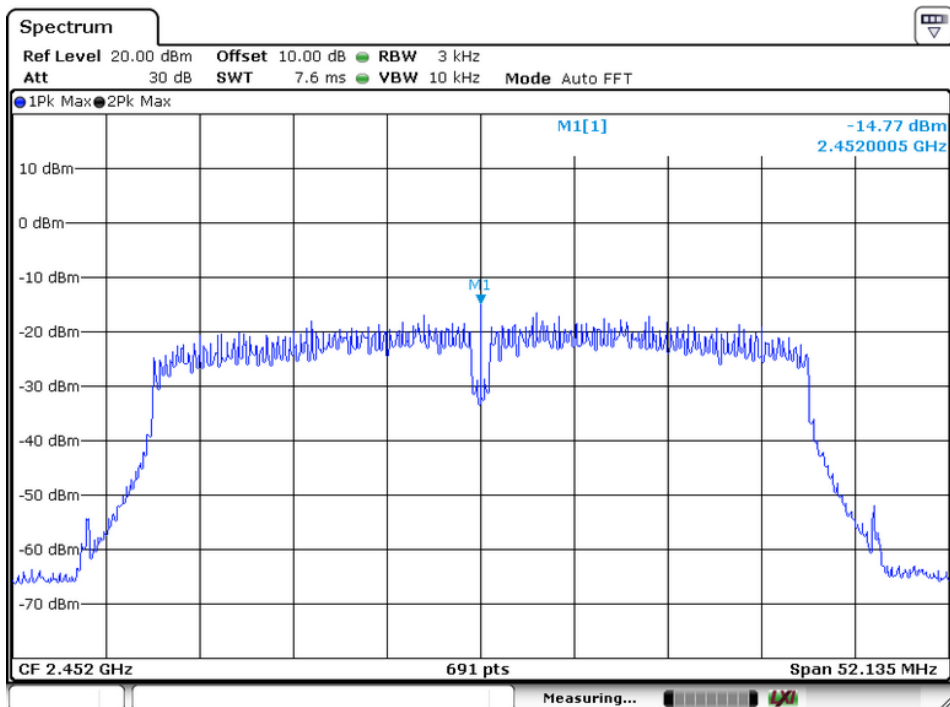
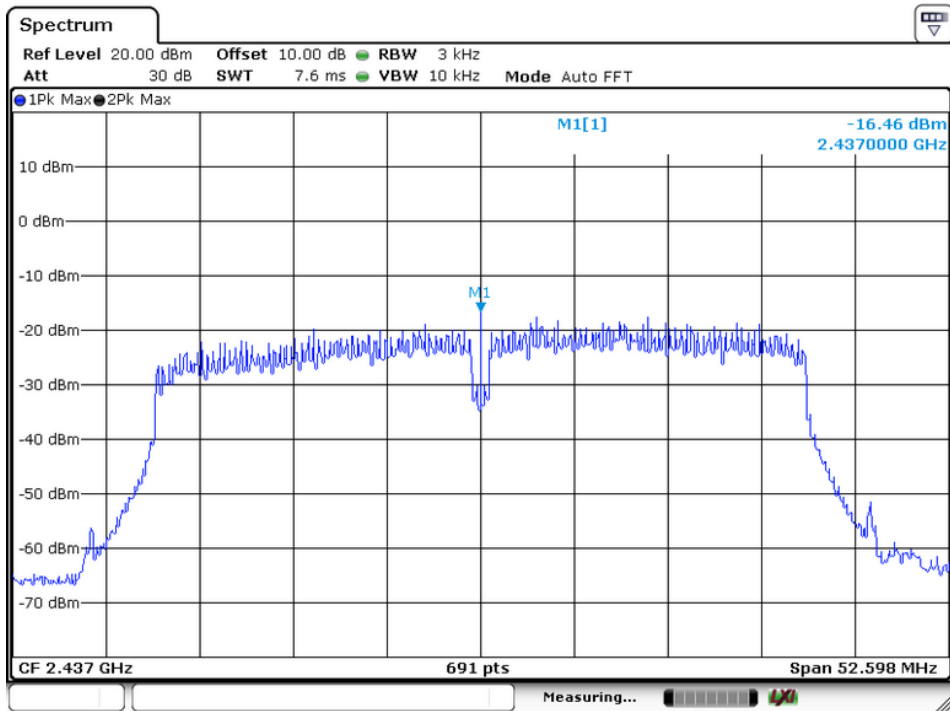
IEEE 802.11n(HT20)			
Channel frequency (MHz)	Measurement level (dBm)	Limit(dBm)	Result
2412	-18.97	8	Pass
2437	-16.27		
2462	-14.50		





IEEE 802.11n(HT40)			
Channel frequency (MHz)	Measurement level (dBm)	Limit(dBm)	Result
2422	-17.94	8	Pass
2437	-16.46		
2452	-14.77		





11. Antenna Port Emission

11.1 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	FSV30	1321.3008K	05/16/2017	05/15/2018

11.2 Measuring Instruments and Setting

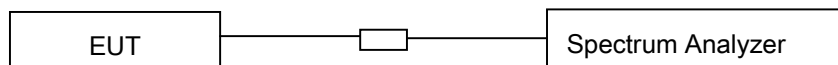
The following table is the setting of spectrum analyzer.

Spectrum analyzer	Setting
Attenuation	Auto
RB	100kHz
VB	300kHz
Detector	Peak
Trace	Max hold

11.3 Test Procedures

The conducted spurious emissions were measured conducted using a spectrum analyzer at low, Middle, and high channels, the limit was determined by attenuation 20dB of the RF peak power output.

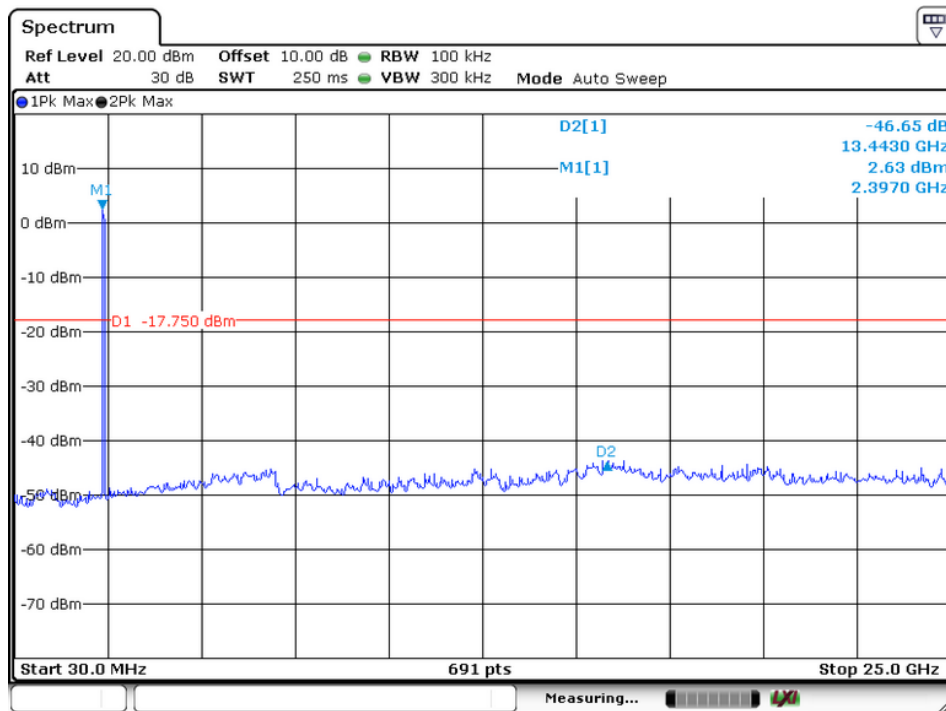
11.4 Block Diagram of Test setup



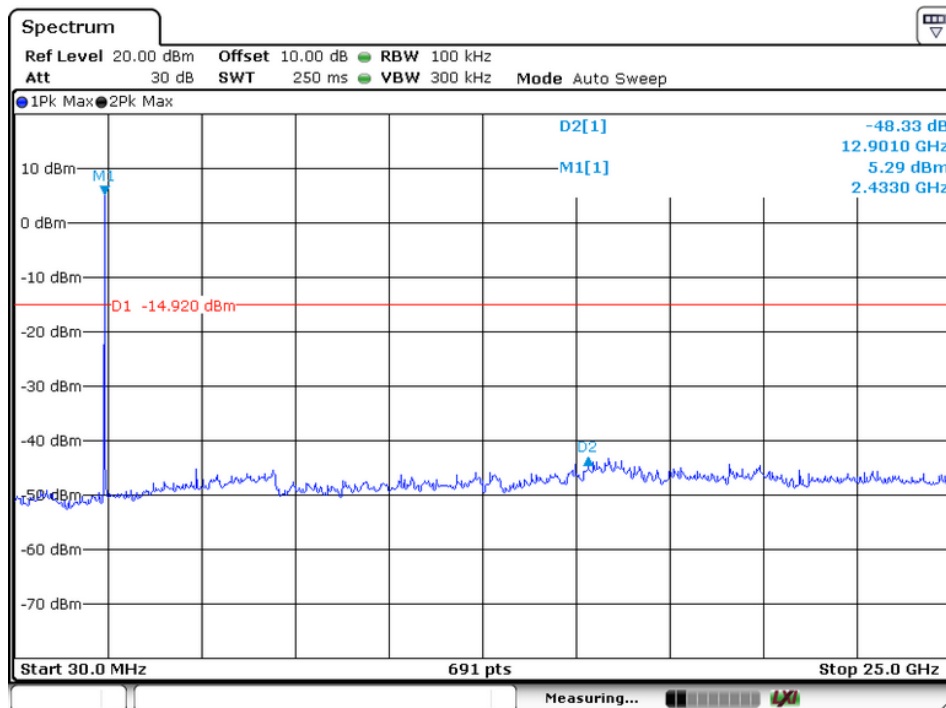
11.5 Test Result

PASS.

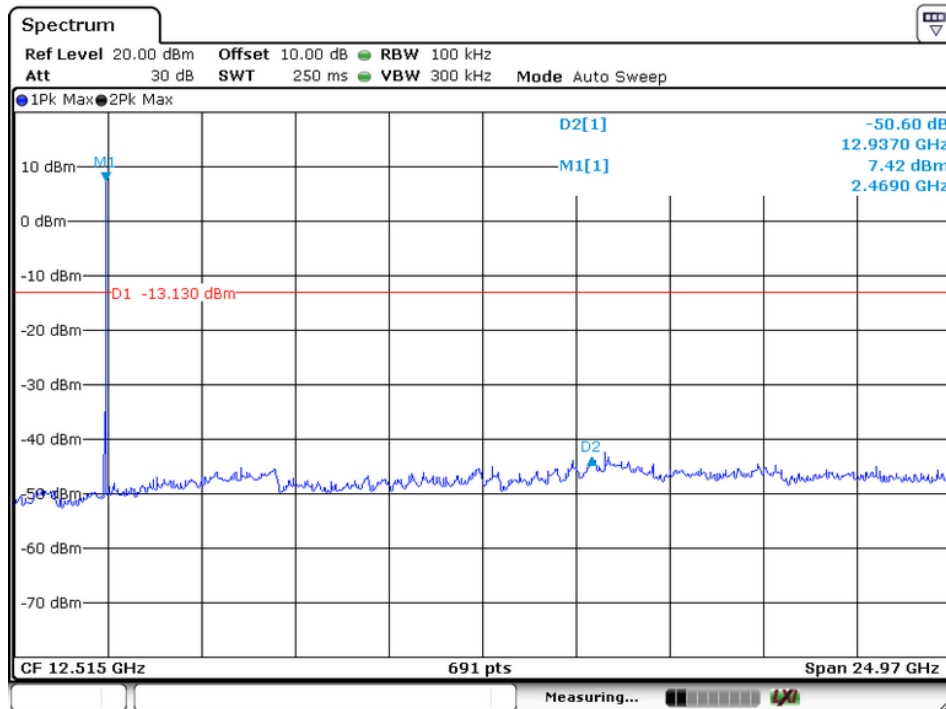
Test Mode: 802.11b



Lowest Channel

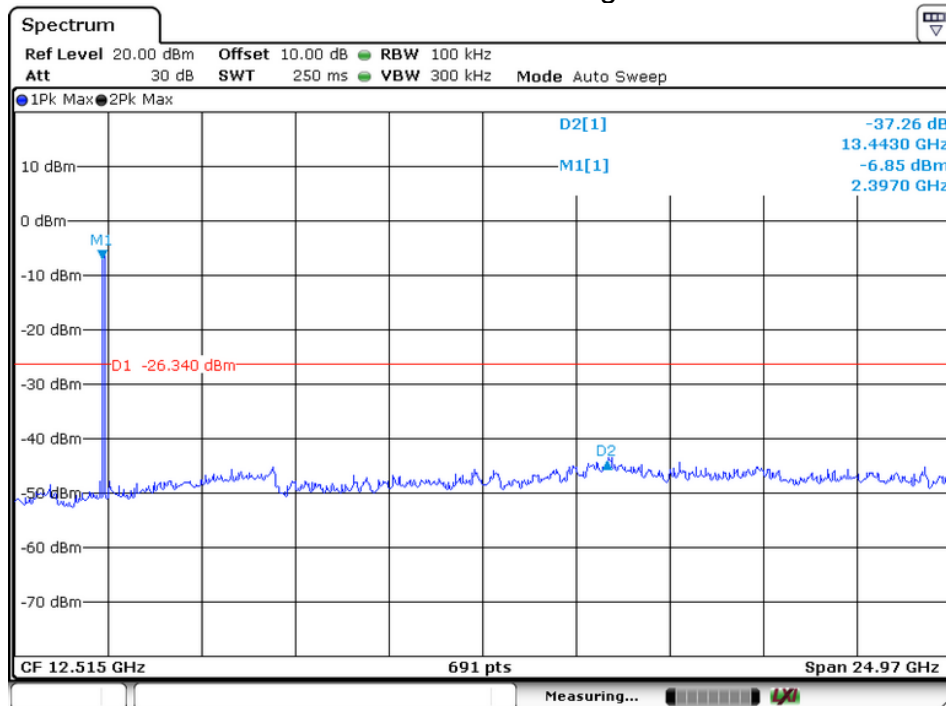


Middel Channel

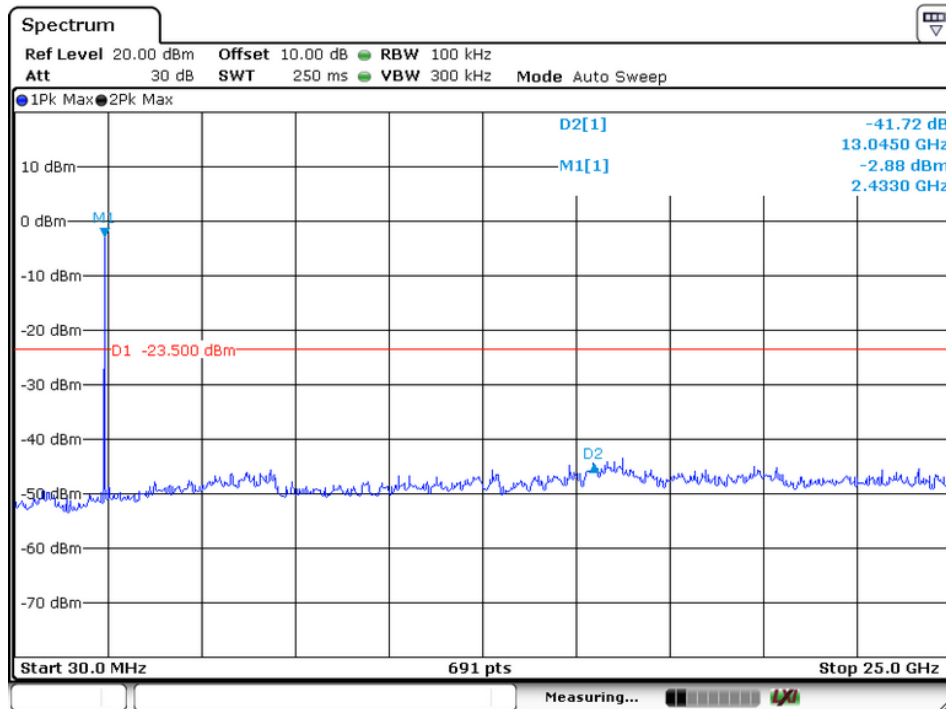


Highest Channel

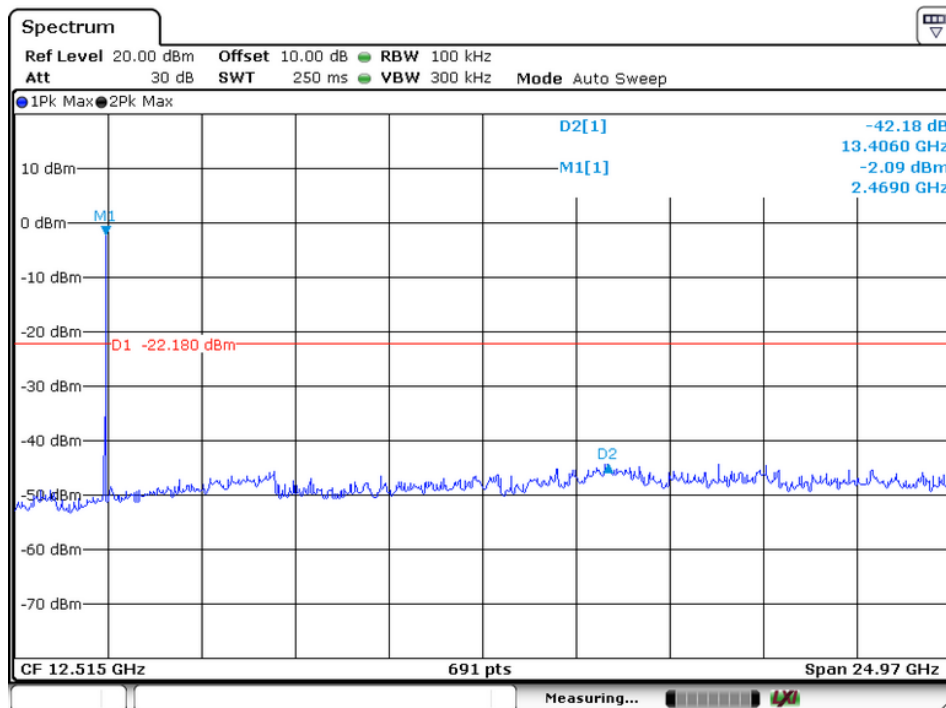
Test Mode: 802.11g



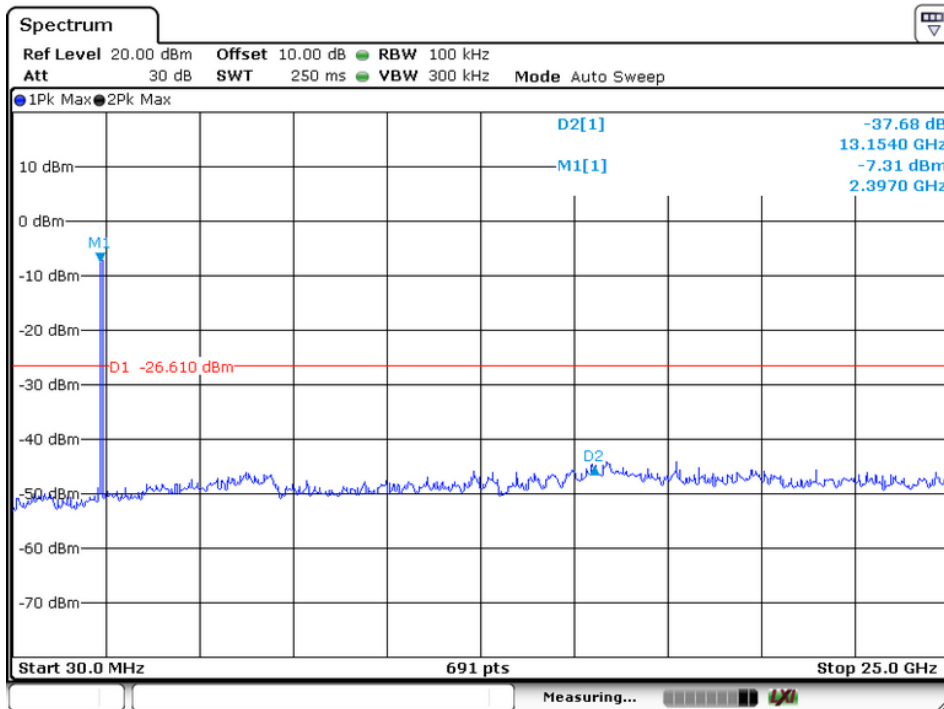
Lowest Channel



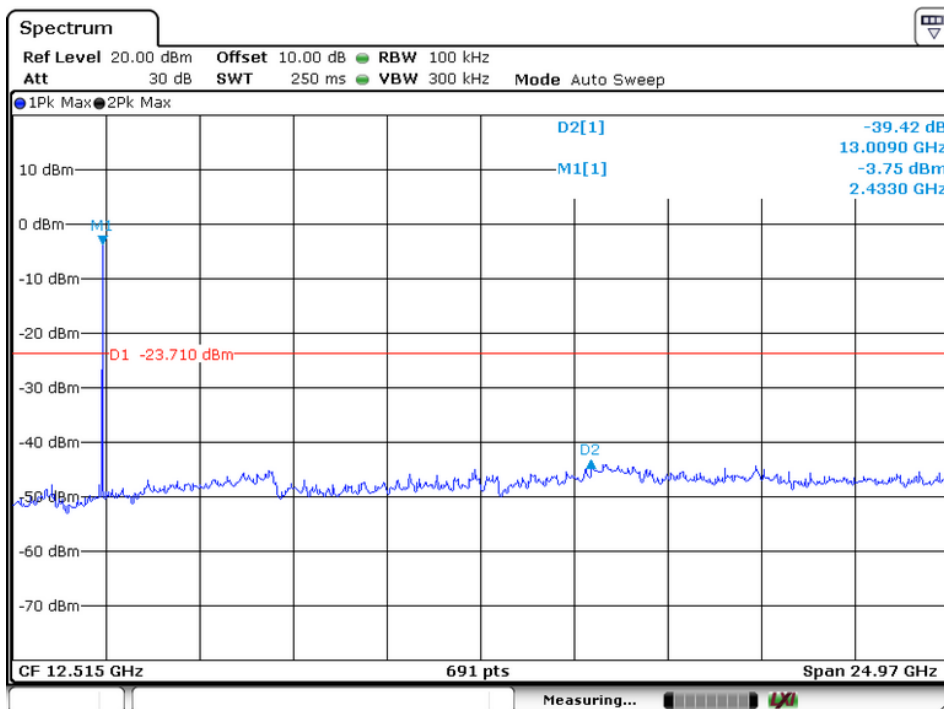
Middle Channel



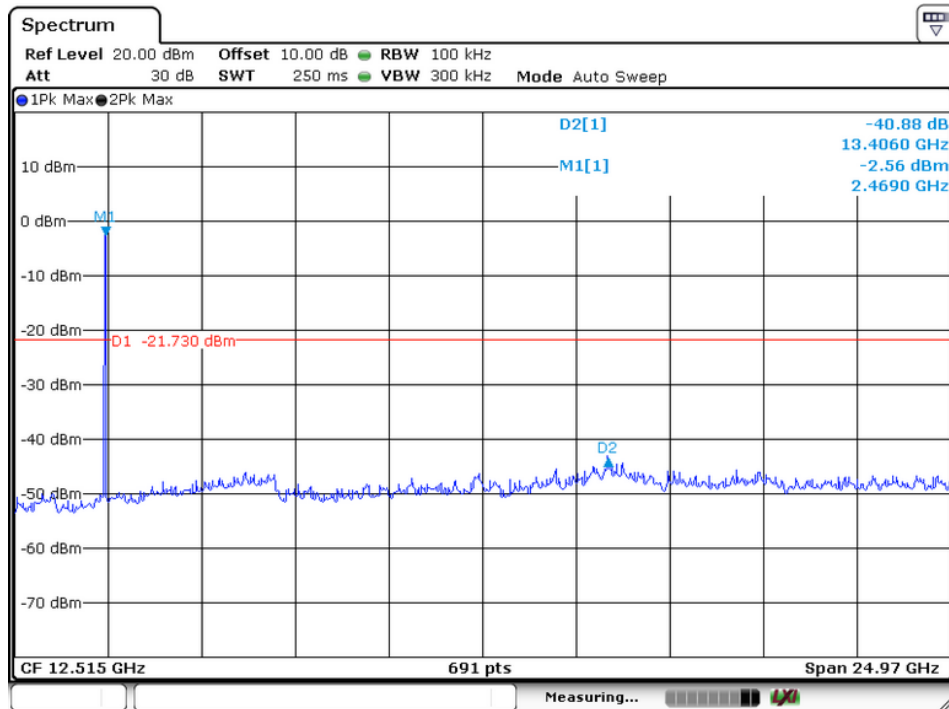
Highest Channel
 Test Mode: 802.11n(HT20)



Lowest Channel

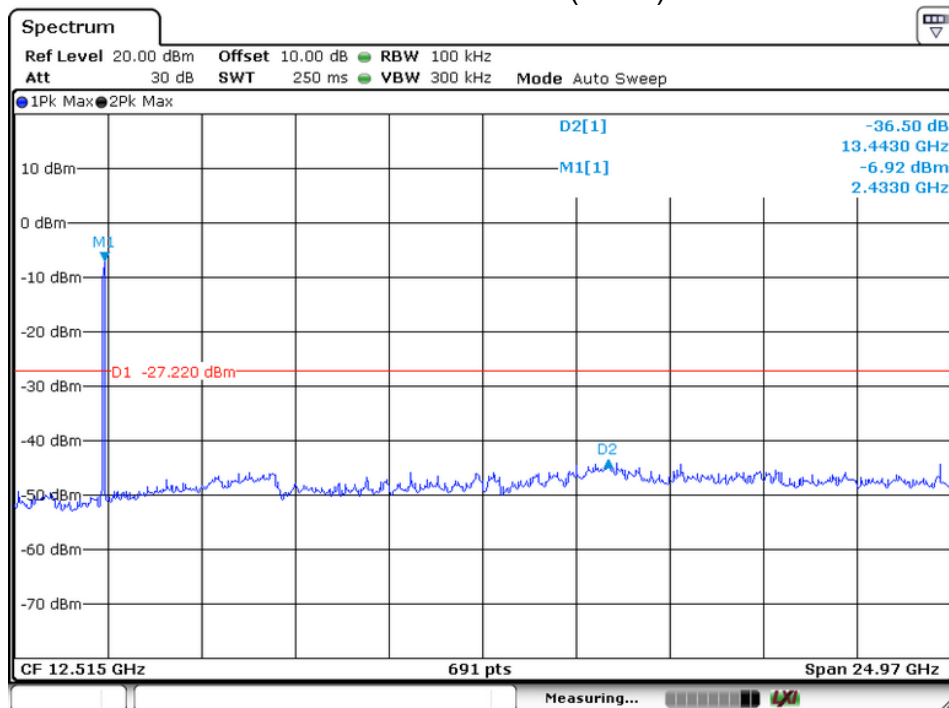


Middle Channel

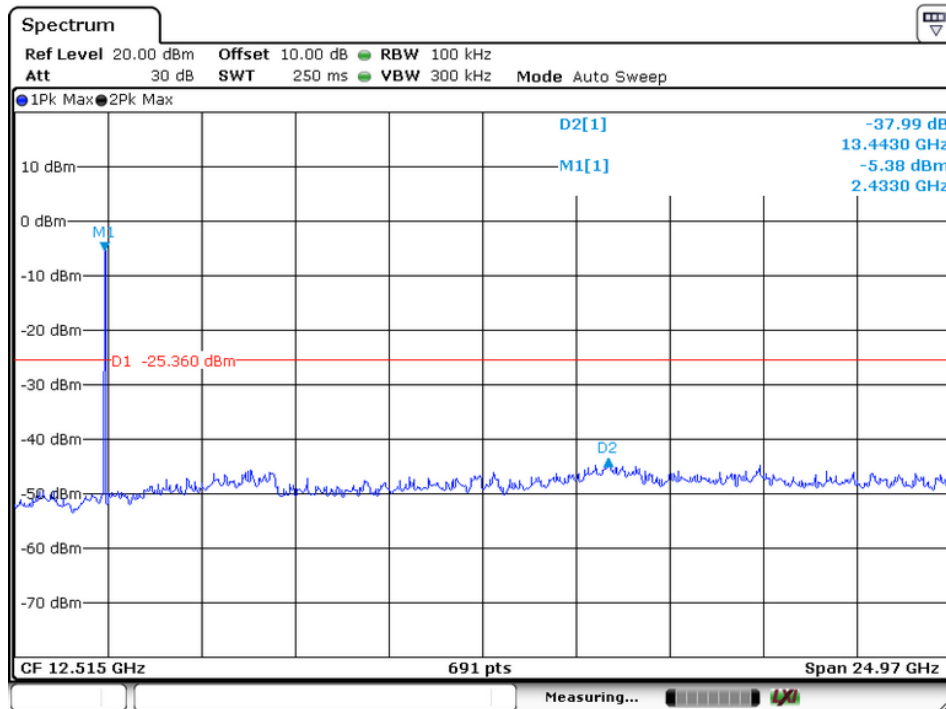


Highest Channel

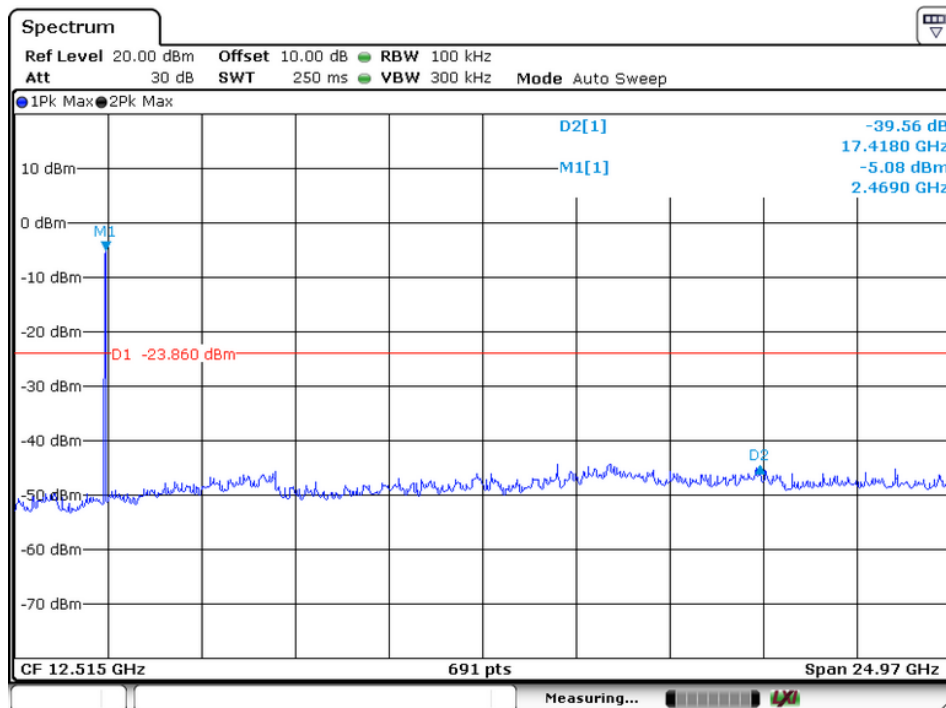
Test Mode: 802.11n(HT40)



Lowest Channel



Middle Channel



Highest Channel

12. Antenna Application

12.1 Antenna Requirement

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if 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 6dBi.

12.2 Result

The EUT has no antenna, and the antenna gain of support external antenna is 2dBi so it meets the requirement.

APPENDIX I (PHOTOS OF EUT)

