

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

OF

150Mbps Wireless N SDIO Module

Model No.: BL-R8782MS1

FCC ID: S8J-R8782MS1

Trademark: LB-LINK

Report No.: KAD150126112E

Issue Date: October 20, 2015

Prepared for

**Shenzhen Bilian Electronic Co., Ltd.
Building B1, Zhongxing Industrial Zone, Juling Jutang Community,
Guanlan street, Bao'an, Shenzhen China**

Prepared by

**DONGGUAN EMTEK CO., LTD.
No.281, Guantai Road, Nancheng District,
Dongguan, Guangdong, China
TEL: 86-769-22807078
FAX: 86-769-22807079**

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DONGGUAN EMTEK CO., LTD.**

VERIFICATION OF COMPLIANCE

Applicant:	Shenzhen Bilian Electronic Co., Ltd. Building B1, Zhongxing Industrial Zone, Juling Jutang Community, Guanlan street, Bao'an, Shenzhen China
Manufacturer:	Shenzhen Bilian Electronic Co., Ltd. Building B1, Zhongxing Industrial Zone, Juling Jutang Community, Guanlan street, Bao'an, Shenzhen China
Product Description:	150Mbps Wireless N SDIO Module
Model Number:	BL-R8782MS1
Trade Mark:	LB-LINK
Date of Test:	January 26, 2015 to October 20, 2015

We hereby certify that:

The above equipment was tested by DONGGUAN EMTEK 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(2014).

Approved By



**Sam Lv / Q.A. Manager
DONGGUAN EMTEK CO., LTD.**

Modified Information

Version	Summary	Revision Date	Report No.
Ver.1.0	Original Report	/	KAD150126112E

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Appendix I (Photos of EUT)(4 pages)

1. General Information

1.1 Product Description

Characteristics	Description
IEEE 802.11 WLAN Mode Supported	☒ 802.11b(20MHz channel bandwidth) ☒ 802.11g(20MHz channel bandwidth) ☒ 802.11n(20MHz channel bandwidth) ☒ 802.11n(40MHz channel bandwidth)
Data Rate	802.11 b:1,2,5.5,11Mbps; 802.11 g:6,9,12,18,24,36,48,54Mbps; 802.11n(HT20):MCS0-MCS7; 802.11n(HT40):MCS0-MCS7; 802.11n(HT40):MCS8-MCS15;
MIMO Mode	802.11n(HT20), 802.11n(HT40)
Modulation	DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n;
Operating Frequency Range	2412-2462MHz for 802.11b/g; 2412-2462MHz for 802.11n(HT20); 2422-2452MHz for 802.11n(HT40);
Number of Channels	11 channels for 802.11b/g; 11 channels for 802.11n(HT20); 7 channels for 802.11n(HT40);
Transmit Power Max	18.42dBm (0.069502W)for 802.11b; 17.04dBm (0.050582W)for 802.11g; 16.43dBm (0.043954W)for 802.11n(HT20); 15.30dBm (0.033884W)for 802.11n(HT40);
Antenna Type	External Antenna or SMD Chip Antenna
Antenna Port	☒ Ant1; ☒ Ant2;
Smart system	☒ SISO for 802.11b/g ☒ MIMO for 802.11n
Antenna Gain	5.0dBi (for per antenna port Max) 8.01dBi for MIMO(ANT1+ANT2 Directional Gain)
Power Supply	DC from PC

Note: for more details, please refer to the User's manual of the EUT.

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 C63.4-2014 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 C63.4-2014.

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 SDIO Module	LB-LINK	BL-R8782MS1	S8J-R8782MS1	EUT

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 has been tested under its typical operating condition.

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): MCS8) 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

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: S8J-R8782MS1 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

The system is compliance with Subpart B is authorized under a DOC procedure

5. Test Methodology

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J

FCC 47 CFR Part 15, Subpart C

FCC KDB 558074 D01 DTS Meas Guidance v03r03

FCC KDB 662911 D01 Multiple Transmitter Output v01

FCC KDB 662911 D02 MIMO With Cross Polarized Antenna V01

6. Test Facility

Site Description

EMC Lab : Accredited by FCC, June 18, 2014
The Certificate Number is 247565

Accredited by Industry Canada, February 19, 2014
The Certificate Number is 9444A

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

7. TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\text{dB}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Power Density	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$
All emission, radiated	$\pm 3\text{dB}$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 0.5^{\circ}\text{C}$
Humidity	$\pm 3\%$

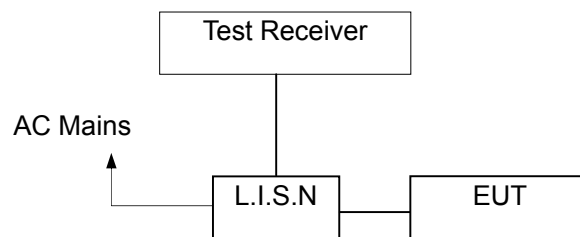
Measurement Uncertainty for a level of Confidence of 95%

8. Conducted Emissions Test

8.1 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.

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde&Schwarz	ESCS30	100018	3/16/2015	1 Year
2.	L.I.S.N.	Rohde&Schwarz	ENV216	100017	3/16/2015	1Year
3.	RF Switching Unit	CDS	RSU-M2	38401	3/16/2015	1Year

8.4 Conducted Emission Limit

Conducted Emission Frequency(MHz)

0.15-0.5

0.5-5.0

5.0-30.0

Quasi-peak

66-56

56

60

Average

56-46

46

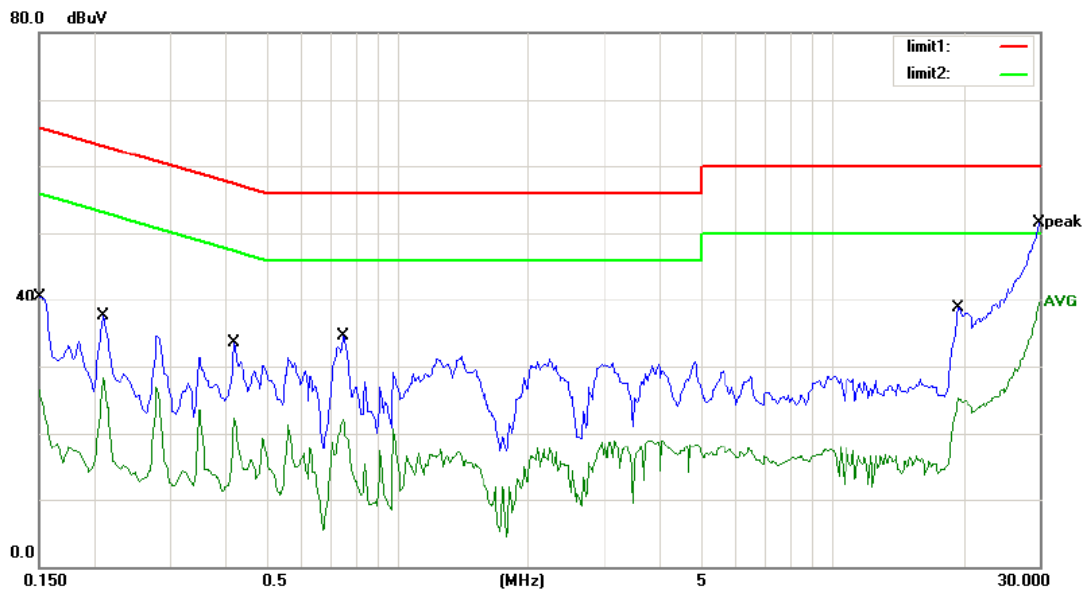
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Note: 1. The lower limit shall apply at the transition frequencies

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

8.5 Measurement Result

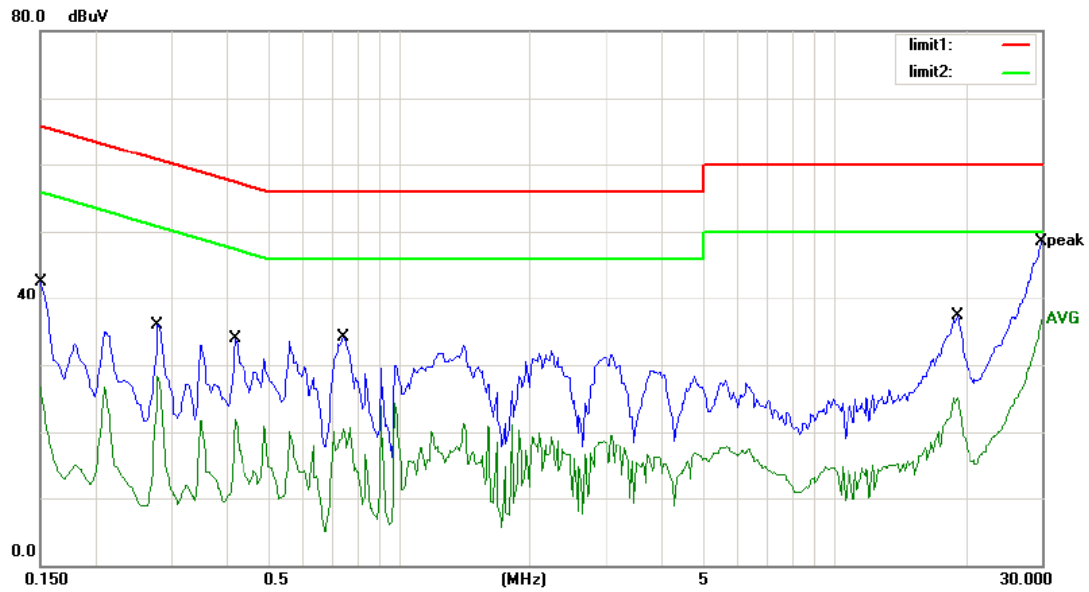
Please refer to following pages.



Site site #1 Phase: **L1** Temperature: 24
 Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 55 %
 Mode: TX
 Note: External Antenna

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	40.57	0.00	40.57	66.00	-25.43	QP	
2		0.1500	26.43	0.00	26.43	56.00	-29.57	AVG	
3		0.2100	37.52	0.00	37.52	63.21	-25.69	QP	
4		0.2100	28.38	0.00	28.38	53.21	-24.83	AVG	
5		0.4200	33.48	0.00	33.48	57.45	-23.97	QP	
6		0.4200	22.26	0.00	22.26	47.45	-25.19	AVG	
7		0.7500	34.45	0.00	34.45	56.00	-21.55	QP	
8		0.7500	22.05	0.00	22.05	46.00	-23.95	AVG	
9		19.5000	38.74	0.00	38.74	60.00	-21.26	QP	
10		19.5000	25.23	0.00	25.23	50.00	-24.77	AVG	
11	*	29.9500	51.52	0.00	51.52	60.00	-8.48	QP	
12		29.9500	39.49	0.00	39.49	50.00	-10.51	AVG	

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

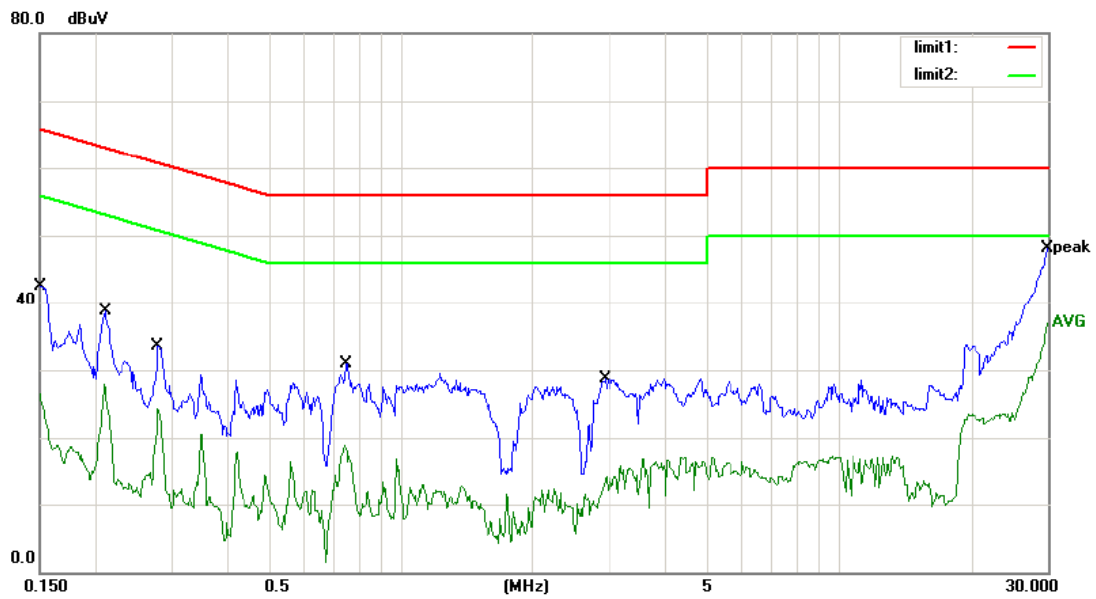


Site site #1
 Limit: (CE)FCC PART 15 class B_QP
 Mode: TX
 Note: External Antenna

Phase: **N**
 Power: AC 120V/60Hz
 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	42.57	0.00	42.57	66.00	-23.43	QP	
2		0.1500	26.64	0.00	26.64	56.00	-29.36	AVG	
3		0.2800	35.92	0.00	35.92	60.82	-24.90	QP	
4		0.2800	28.40	0.00	28.40	50.82	-22.42	AVG	
5		0.4200	33.82	0.00	33.82	57.45	-23.63	QP	
6		0.4200	21.87	0.00	21.87	47.45	-25.58	AVG	
7		0.7450	34.14	0.00	34.14	56.00	-21.86	QP	
8		0.7450	20.62	0.00	20.62	46.00	-25.38	AVG	
9		19.1500	37.23	0.00	37.23	60.00	-22.77	QP	
10		19.1500	25.07	0.00	25.07	50.00	-24.93	AVG	
11	*	29.9750	48.48	0.00	48.48	60.00	-11.52	QP	
12		29.9750	36.61	0.00	36.61	50.00	-13.39	AVG	

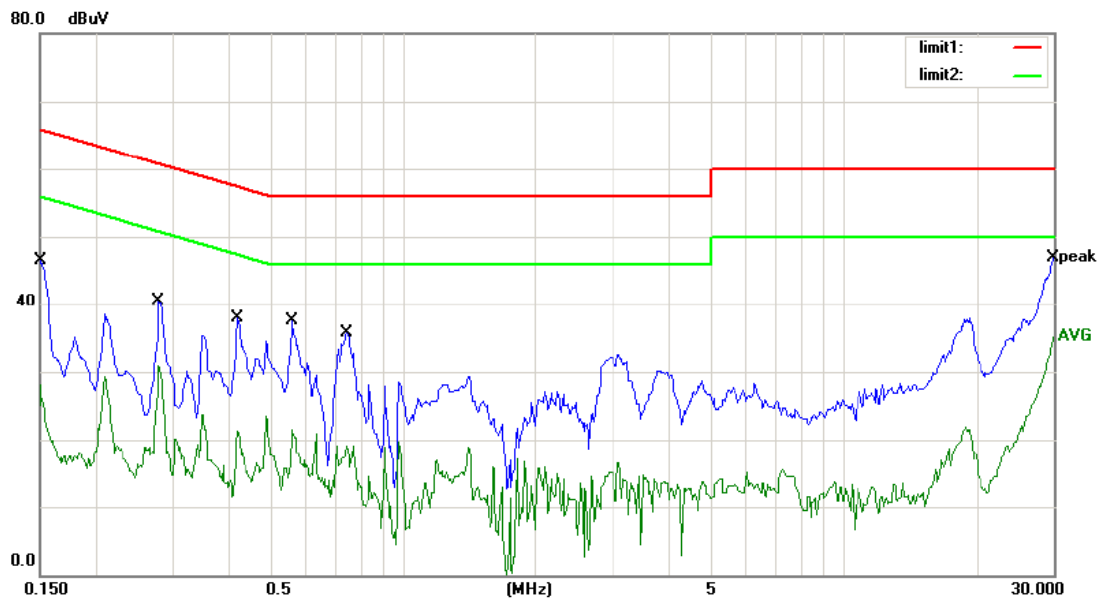
*:Maximum data x:Over limit l:over margin Comment: Factor build in receiver.



Site site #1 Phase: **L1** Temperature: 24
 Limit: (CE) FCC PART 15B_QP Power: AC 120V/60Hz Humidity: 55 %
 Mode: TX
 Note: SMD Chip Antenna

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	39.54	0.00	39.54	66.00	-26.46	QP	
2		0.1500	26.43	0.00	26.43	56.00	-29.57	AVG	
3		0.2106	35.14	0.00	35.14	63.18	-28.04	QP	
4		0.2106	27.88	0.00	27.88	53.18	-25.30	AVG	
5		0.2800	30.25	0.00	30.25	60.82	-30.57	QP	
6		0.2800	24.39	0.00	24.39	50.82	-26.43	AVG	
7		0.7500	27.45	0.00	27.45	56.00	-28.55	QP	
8		0.7500	18.92	0.00	18.92	46.00	-27.08	AVG	
9		2.9305	25.64	0.00	25.64	56.00	-30.36	QP	
10		2.9305	16.75	0.00	16.75	46.00	-29.25	AVG	
11		29.9500	44.14	0.00	44.14	60.00	-15.86	QP	
12	*	29.9500	36.99	0.00	36.99	50.00	-13.01	AVG	

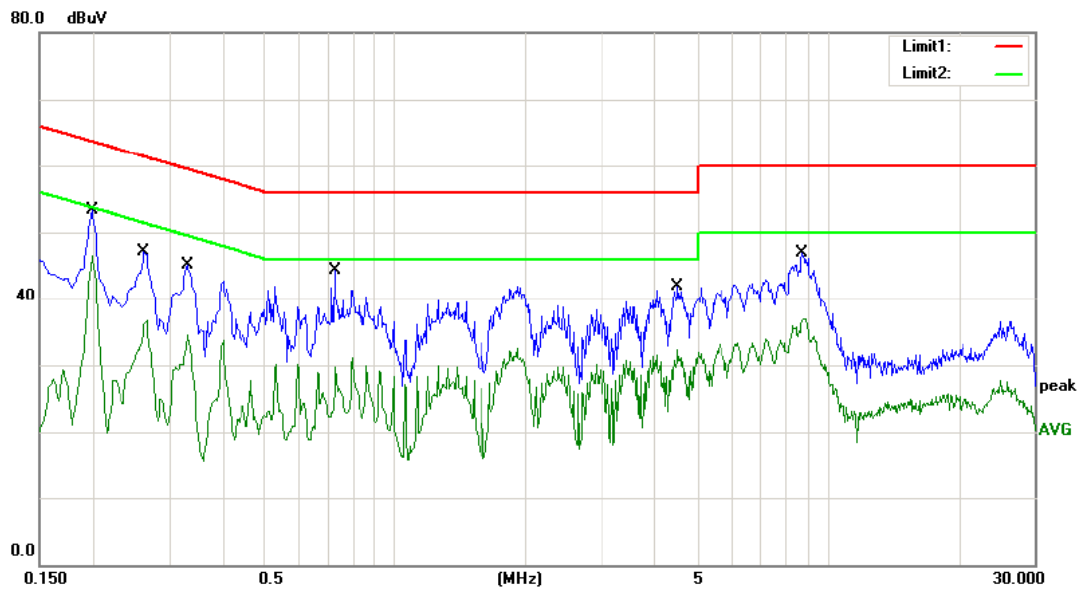
*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.



Site site #1 Phase: **N** Temperature: 24
 Limit: (CE) FCC PART 15B_QP Power: AC 120V/60Hz Humidity: 55 %
 Mode: TX
 Note: SMD Chip Antenna

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV	dBuV	dB		
1		0.1507	42.15	0.00	42.15	65.96	-23.81	QP	
2		0.1507	28.14	0.00	28.14	55.96	-27.82	AVG	
3		0.2800	36.84	0.00	36.84	60.82	-23.98	QP	
4		0.2800	30.90	0.00	30.90	50.82	-19.92	AVG	
5		0.4200	34.74	0.00	34.74	57.45	-22.71	QP	
6		0.4200	23.44	0.00	23.44	47.45	-24.01	AVG	
7		0.5600	33.54	0.00	33.54	56.00	-22.46	QP	
8		0.5600	23.44	0.00	23.44	46.00	-22.56	AVG	
9		0.7450	32.51	0.00	32.51	56.00	-23.49	QP	
10		0.7450	19.20	0.00	19.20	46.00	-26.80	AVG	
11		29.9750	43.52	0.00	43.52	60.00	-16.48	QP	
12	*	29.9750	35.11	0.00	35.11	50.00	-14.89	AVG	

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



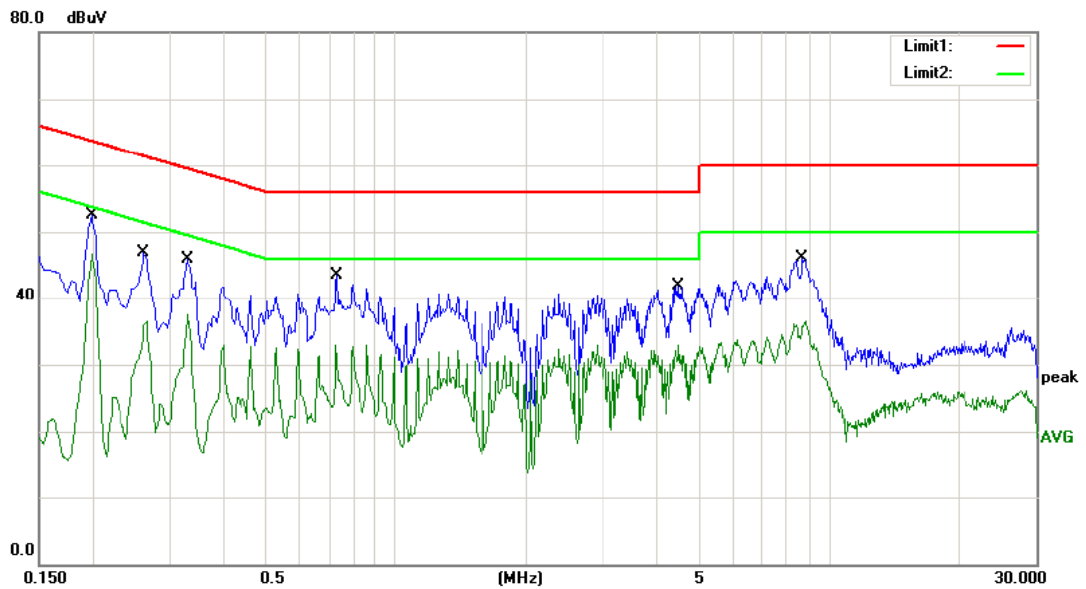
Site site #1
 Limit: (CE)FCC PART 15 class B_QP
 Mode: TX
 Note: External Antenna

Phase: **L1**
 Power: AC 240V/50Hz

Temperature: 24
 Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1980	41.52	10.12	51.64	63.69	-12.05	QP	
2	*	0.1980	36.44	10.12	46.56	53.69	-7.13	AVG	
3		0.2620	34.51	10.14	44.65	61.37	-16.72	QP	
4		0.2620	26.51	10.14	36.65	51.37	-14.72	AVG	
5		0.3300	33.51	10.15	43.66	59.45	-15.79	QP	
6		0.3300	24.28	10.15	34.43	49.45	-15.02	AVG	
7		0.7220	32.41	10.19	42.60	56.00	-13.40	QP	
8		0.7220	20.88	10.19	31.07	46.00	-14.93	AVG	
9		4.4900	29.74	10.11	39.85	56.00	-16.15	QP	
10		4.4900	22.19	10.11	32.30	46.00	-13.70	AVG	
11		8.7260	34.14	10.17	44.31	60.00	-15.69	QP	
12		8.7260	26.76	10.17	36.93	50.00	-13.07	AVG	

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



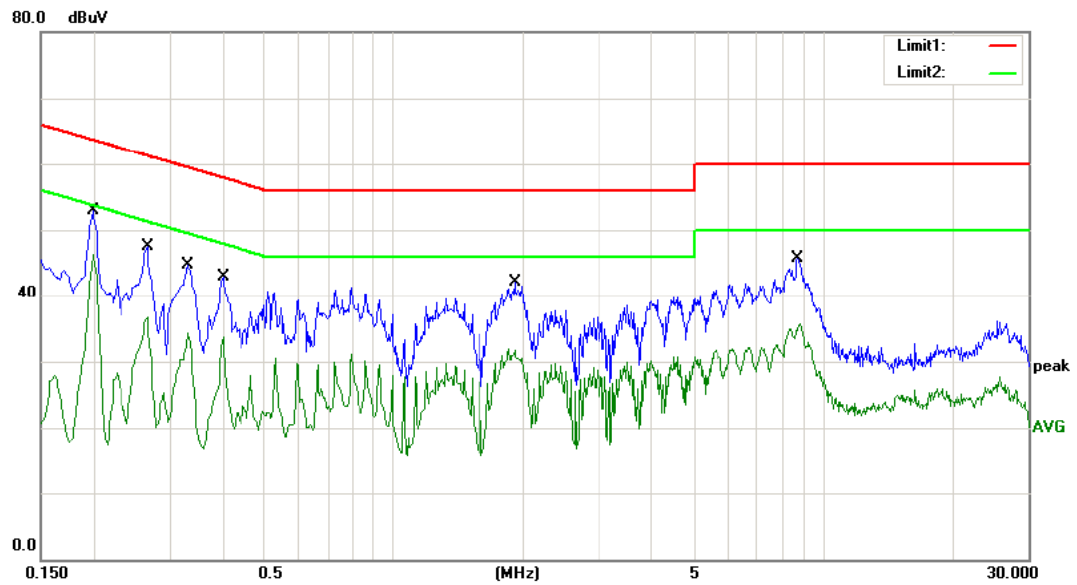
Site: site #1
 Limit: (CE)FCC PART 15 class B_QP
 Mode: TX
 Note: External Antenna

Phase: **N**
 Power: AC 240V/50Hz

Temperature: 24
 Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1980	40.51	10.12	50.63	63.69	-13.06	QP	
2	*	0.1980	36.62	10.12	46.74	53.69	-6.95	AVG	
3		0.2620	34.71	10.14	44.85	61.37	-16.52	QP	
4		0.2620	26.42	10.14	36.56	51.37	-14.81	AVG	
5		0.3300	33.14	10.15	43.29	59.45	-16.16	QP	
6		0.3300	27.29	10.15	37.44	49.45	-12.01	AVG	
7		0.7300	31.41	10.19	41.60	56.00	-14.40	QP	
8		0.7300	22.66	10.19	32.85	46.00	-13.15	AVG	
9		4.4900	29.84	10.11	39.95	56.00	-16.05	QP	
10		4.4900	22.69	10.11	32.80	46.00	-13.20	AVG	
11		8.6620	33.45	10.17	43.62	60.00	-16.38	QP	
12		8.6620	26.42	10.17	36.59	50.00	-13.41	AVG	

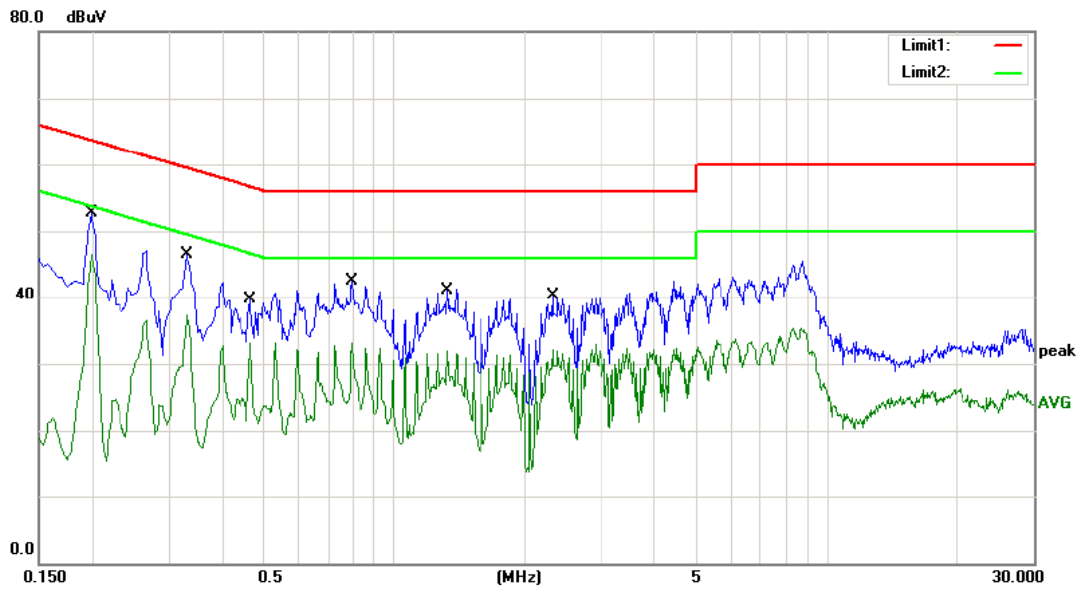
*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator:



Site site #1 Phase: **L1** Temperature: 24
 Limit: (CE)FCC PART 15 class B_QP Power: AC 240V/50Hz Humidity: 55 %
 Mode: TX
 Note: SMD Chip Antenna

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1980	40.15	10.12	50.27	63.69	-13.42	QP	
2	*	0.1980	36.24	10.12	46.36	53.69	-7.33	AVG	
3		0.2660	35.74	10.14	45.88	61.24	-15.36	QP	
4		0.2660	26.63	10.14	36.77	51.24	-14.47	AVG	
5		0.3300	32.14	10.15	42.29	59.45	-17.16	QP	
6		0.3300	24.25	10.15	34.40	49.45	-15.05	AVG	
7		0.3980	30.15	10.17	40.32	57.90	-17.58	QP	
8		0.3980	23.55	10.17	33.72	47.90	-14.18	AVG	
9		1.9140	29.68	10.16	39.84	56.00	-16.16	QP	
10		1.9140	21.80	10.16	31.96	46.00	-14.04	AVG	
11		8.7060	33.45	10.17	43.62	60.00	-16.38	QP	
12		8.7060	25.47	10.17	35.64	50.00	-14.36	AVG	

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



Site: site #1
 Limit: (CE)FCC PART 15 class B_QP
 Mode: TX
 Note: SMD Chip Antenna

Phase: **N**
 Power: AC 240V/50Hz

Temperature: 24
 Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1980	42.54	10.12	52.66	63.69	-11.03	QP	
2	*	0.1980	36.45	10.12	46.57	53.69	-7.12	AVG	
3		0.3300	36.37	10.15	46.52	59.45	-12.93	QP	
4		0.3300	27.19	10.15	37.34	49.45	-12.11	AVG	
5		0.4620	29.53	10.18	39.71	56.66	-16.95	QP	
6		0.4620	22.91	10.18	33.09	46.66	-13.57	AVG	
7		0.7940	32.36	10.18	42.54	56.00	-13.46	QP	
8		0.7940	22.85	10.18	33.03	46.00	-12.97	AVG	
9		1.3220	30.91	10.17	41.08	56.00	-14.92	QP	
10		1.3220	21.81	10.17	31.98	46.00	-14.02	AVG	
11		2.3140	30.15	10.15	40.30	56.00	-15.70	QP	
12		2.3140	21.89	10.15	32.04	46.00	-13.96	AVG	

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

9. Radiated Emission Test

9.1 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:

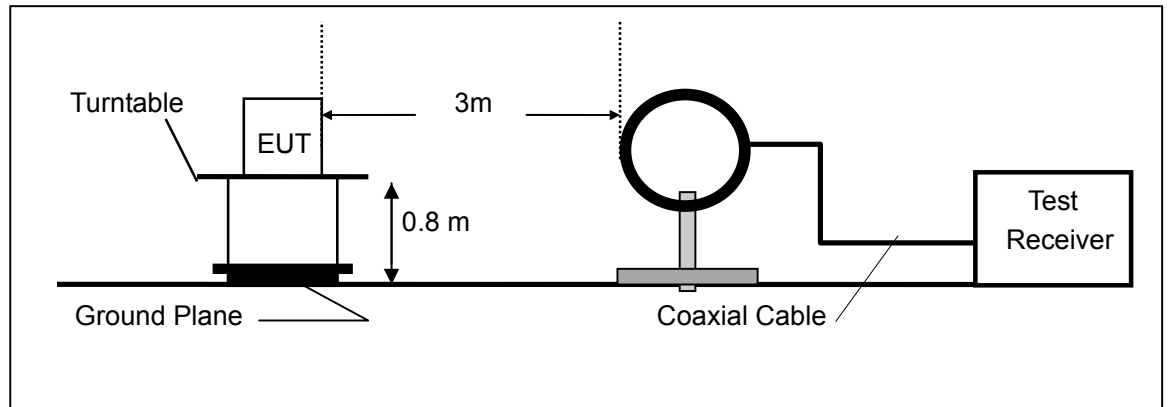
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	3MHz
Detector	Peak
Trace	Max hold

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

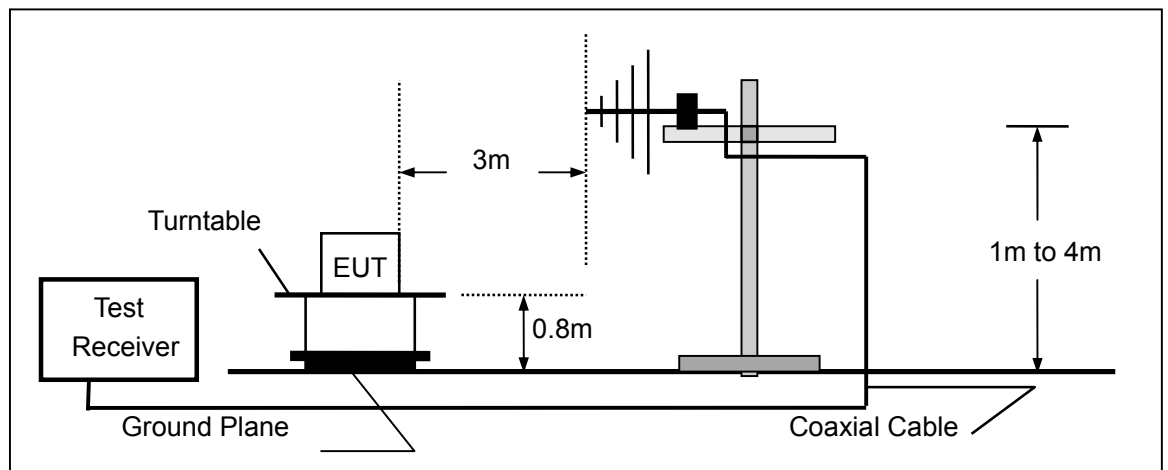
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	10Hz
Detector	Peak
Trace	Max hold

9.2 Test SET-UP (Block Diagram of Configuration)

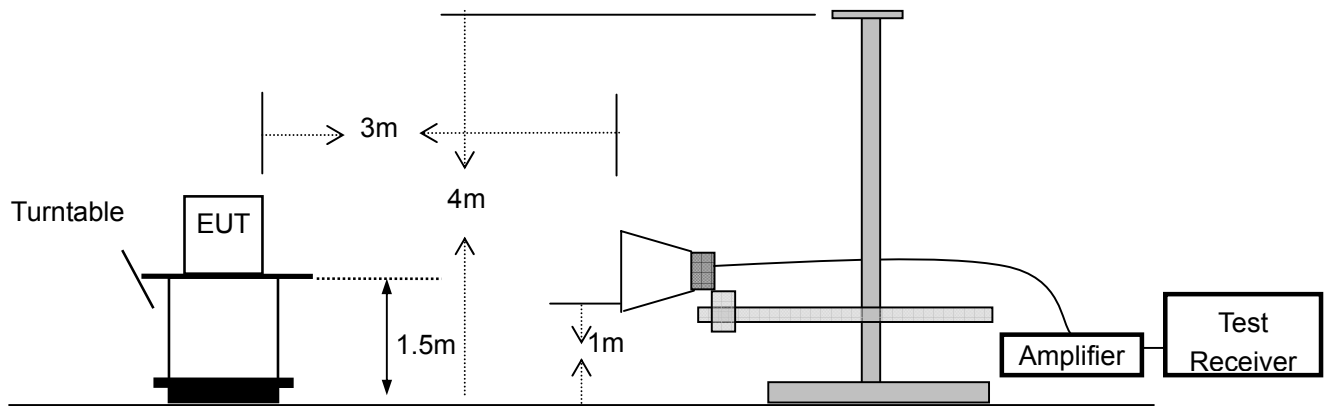
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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



9.3 Measurement Equipment Used

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	1166.5950.03	03/16/2015	1 Year
2.	Bilog Antenna	Schwarzbeck	VULB9163	000141	03/16/2015	1 Year
3.	Power Amplifier	CDS	RSU-M352	818	03/16/2015	1 Year
4.	Power Amplifier	HP	8447F	OPT H64	03/16/2015	1 Year
5.	Color Monitor	SUNSPO	SP-140A	N/A	03/16/2015	1 Year
6.	Single Line Filter	JIANLI	XL-3	N/A	03/16/2015	1 Year
7.	Single Phase Power Line Filter	JIANLI	DL-2X100B	N/A	03/16/2015	1 Year
8.	3 Phase Power Line Filter	JIANLI	DL-4X100B	N/A	03/16/2015	1 Year
9.	DC Power Filter	JIANLI	DL-2X50B	N/A	03/16/2015	1 Year
10.	Cable	Schwarzbeck	PLF-100	549489	03/16/2015	1 Year
11.	Cable	Rosenberger	CIL02	A0783566	03/16/2015	1 Year
12.	Cable	Rosenberger	RG 233/U	525178	03/16/2015	1 Year
13.	Signal Analyzer	Rohde & Schwarz	FSV30	103040	12/29/2014	1 Year
14.	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1272	12/29/2014	1 Year
15.	Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	12/29/2014	1 Year
16.	Cable	H+S	CBL-26	N/A	12/29/2014	1 Year
17.	Cable	H+S	CBL-26	N/A	12/29/2014	1 Year
18.	Cable	H+S	CBL-26	N/A	12/29/2014	1 Year

9.4 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.

9.5 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 :	May 15, 2015
Frequency Range:	9KHz~30MHz	Temperature :	28°C
Test Result:	PASS	Humidity :	60 %
Measured Distance:	3m	Test By:	Andy

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.

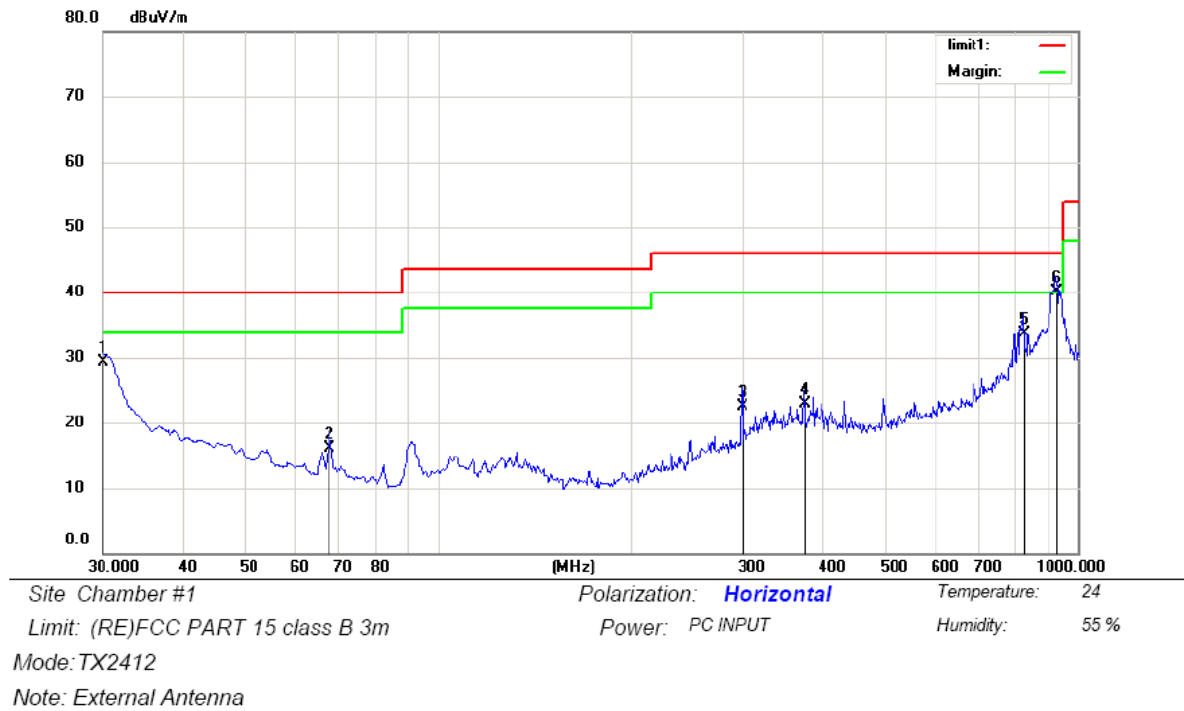
Distance extrapolation factor = $40\log(\text{Specific distance} / \text{test distance})$ (dB);

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

Below 1000MHz:

All the modulation modes were tested the data of the worst mode (ANT1: TX 802.11b) are recorded in the following pages and the others modulation methods do not exceed the limits.

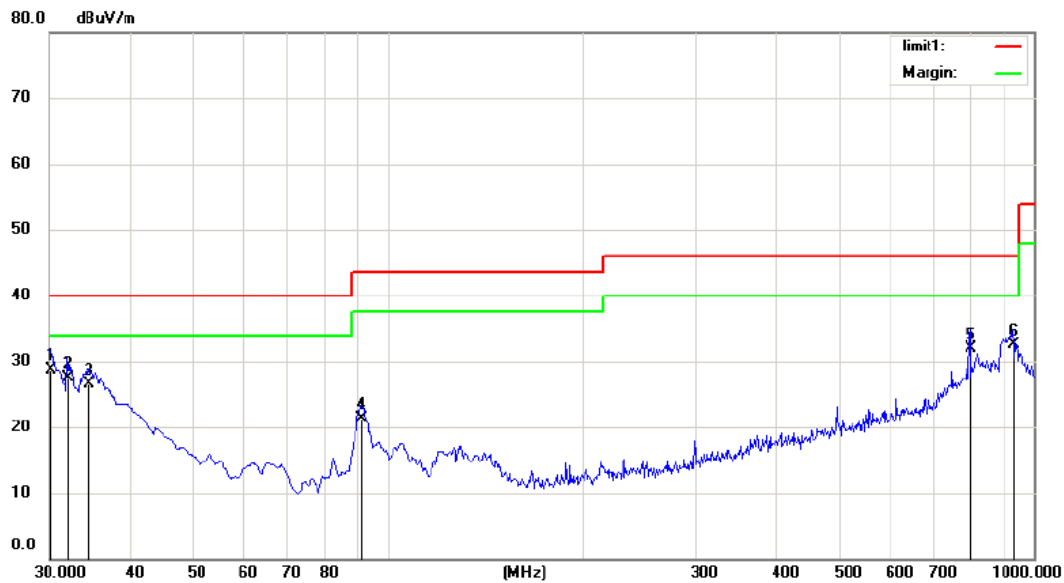
Please refer to the following test plots:



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		30.0000	44.38	-15.15	29.23	40.00	-10.77	QP		
2		67.8300	37.71	-21.57	16.14	40.00	-23.86	QP		
3		298.6900	36.95	-14.42	22.53	46.00	-23.47	QP		
4		373.3800	35.28	-12.33	22.95	46.00	-23.05	QP		
5		825.4000	38.08	-4.45	33.63	46.00	-12.37	QP		
6	*	928.2200	42.72	-2.71	40.01	46.00	-5.99	QP		

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

Operator: QIU

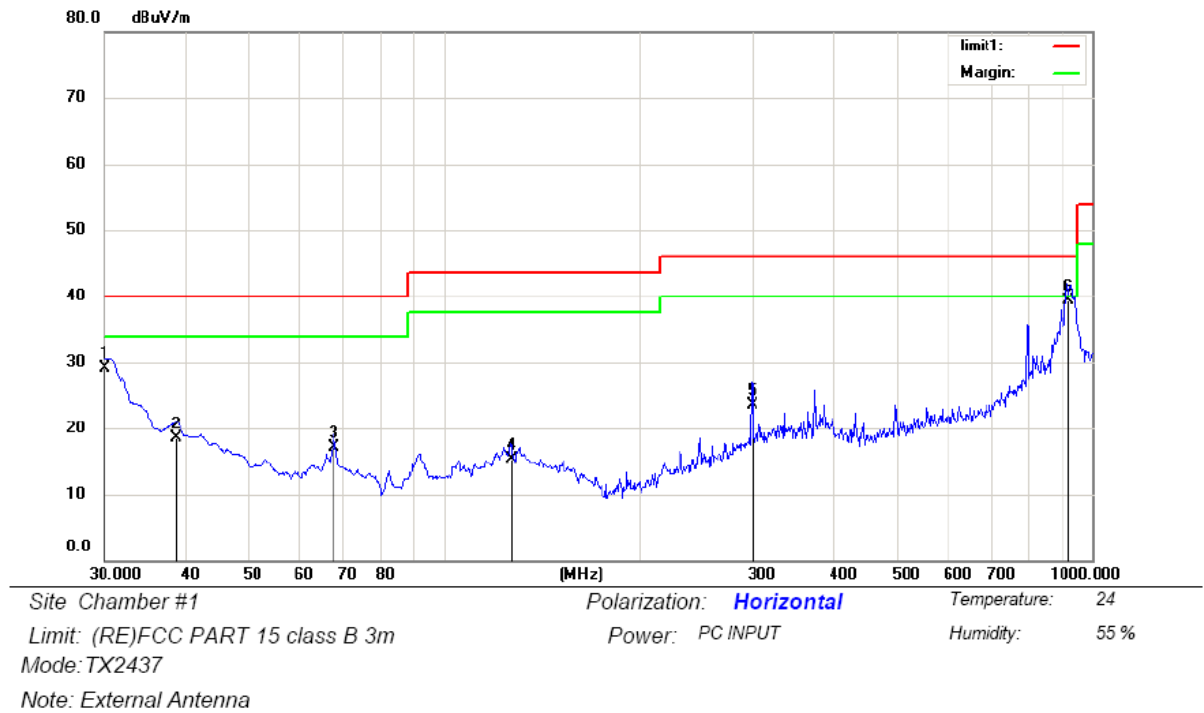


Site Chamber #1
 Limit: (RE)FCC PART 15 class B 3m
 Mode: TX2412
 Note: External Antenna
 Polarization: **Vertical**
 Power: PC INPUT
 Temperature: 24
 Humidity: 55 %

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	*	30.1054	43.90	-15.12	28.78	40.00	-11.22	QP		
2		31.9546	42.15	-14.63	27.52	40.00	-12.48	QP		
3		34.5173	40.71	-14.23	26.48	40.00	-13.52	QP		
4		91.1746	41.98	-20.67	21.31	43.50	-22.19	QP		
5		800.1800	36.96	-5.13	31.83	46.00	-14.17	QP		
6		931.1300	35.03	-2.62	32.41	46.00	-13.59	QP		

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

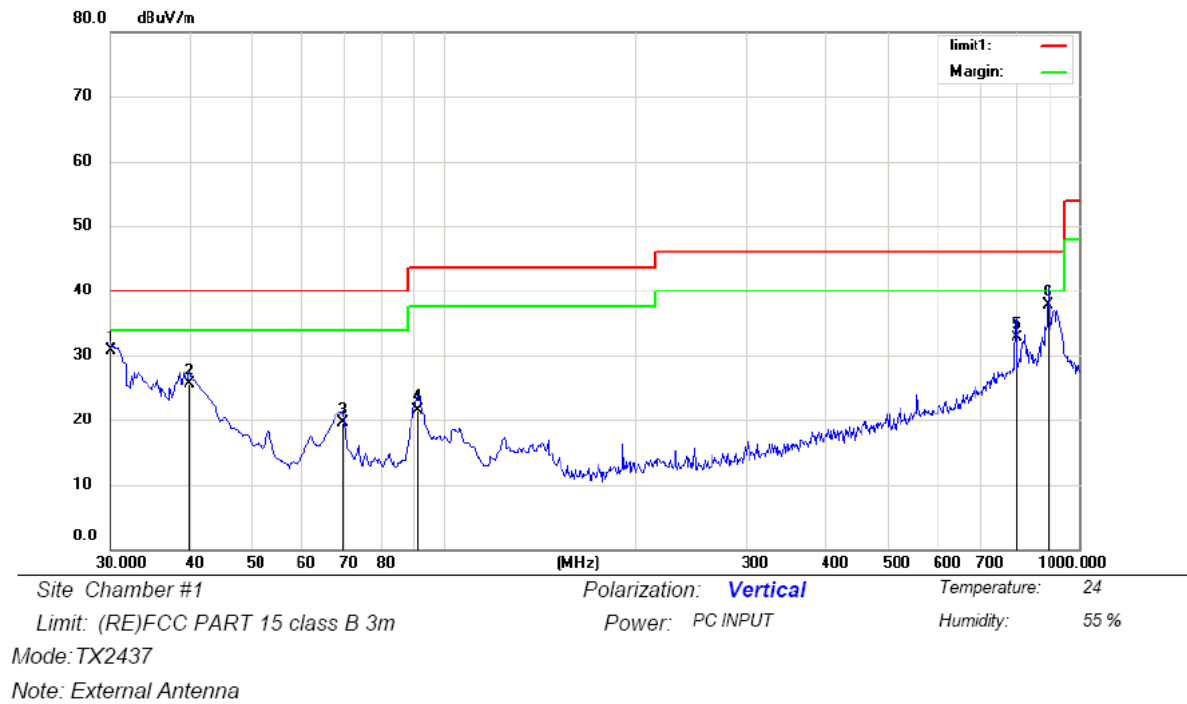
Operator: QIU



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		30.0000	44.18	-15.15	29.03	40.00	-10.97	QP		
2		38.7300	32.34	-13.77	18.57	40.00	-21.43	QP		
3		67.8300	38.73	-21.57	17.16	40.00	-22.84	QP		
4		127.0000	31.62	-16.34	15.28	43.50	-28.22	QP		
5		298.6900	37.90	-14.42	23.48	46.00	-22.52	QP		
6	*	918.5200	42.17	-2.85	39.32	46.00	-6.68	QP		

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

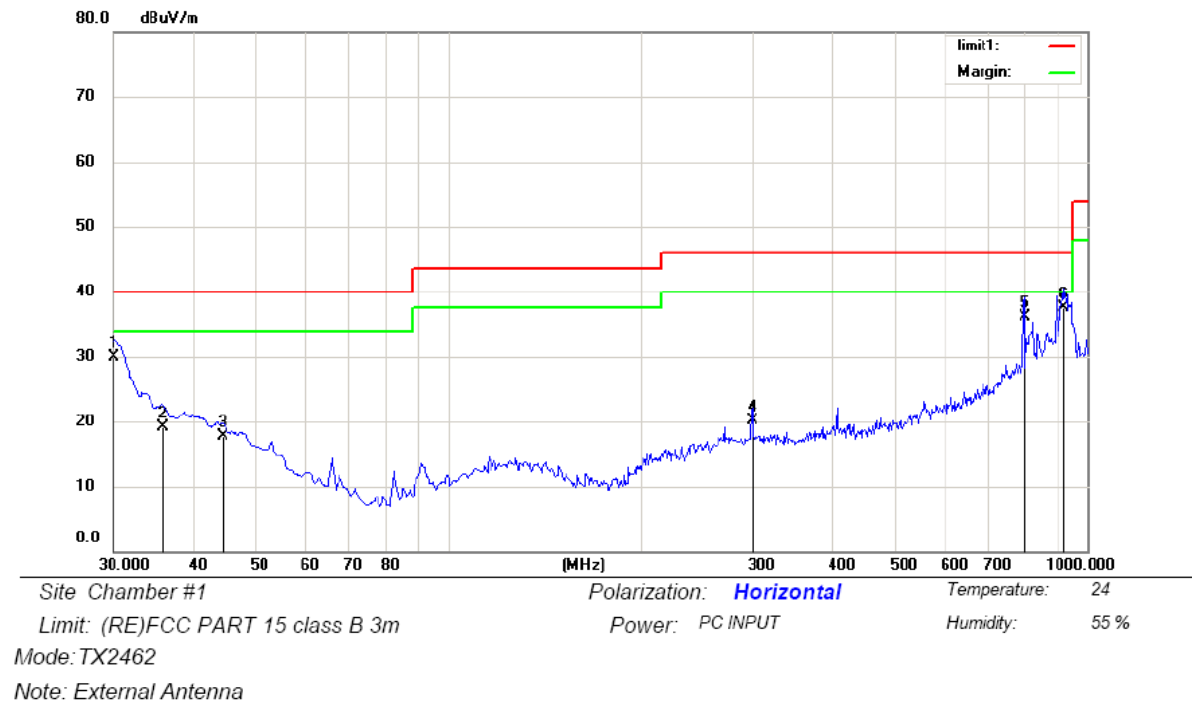
Operator: QIU



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		30.0000	45.91	-15.15	30.76	40.00	-9.24	QP		
2		39.9942	39.11	-13.69	25.42	40.00	-14.58	QP		
3		69.7700	41.60	-22.04	19.56	40.00	-20.44	QP		
4		91.4947	42.21	-20.62	21.59	43.50	-21.91	QP		
5		799.2100	37.95	-5.16	32.79	46.00	-13.21	QP		
6	*	896.2100	41.50	-3.72	37.78	46.00	-8.22	QP		

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

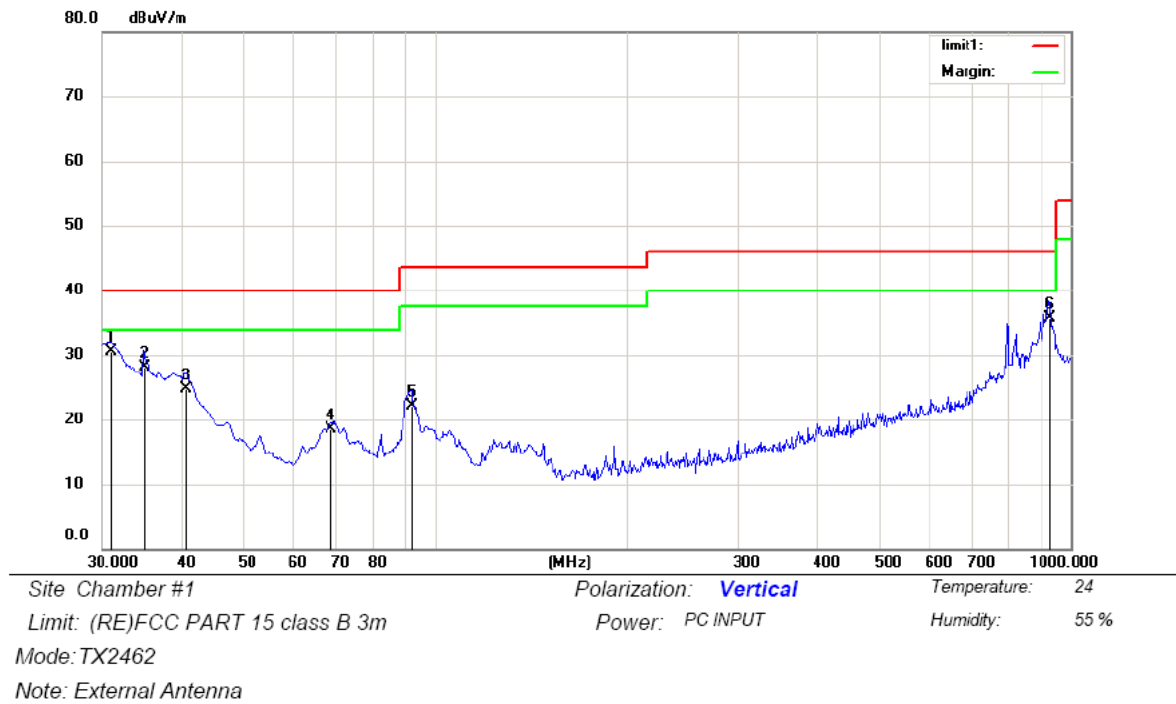
Operator: QIU



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	
1		30.0000	45.03	-15.15	29.88	40.00	-10.12	QP		
2		35.8200	33.27	-14.08	19.19	40.00	-20.81	QP		
3		44.5500	31.19	-13.47	17.72	40.00	-22.28	QP		
4		299.6600	34.37	-14.34	20.03	46.00	-25.97	QP		
5		799.2100	41.29	-5.16	36.13	46.00	-9.87	QP		
6	*	920.4600	40.29	-2.80	37.49	46.00	-8.51	QP		

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

Operator: QIU



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1	*	30.9700	45.37	-14.90	30.47	40.00	-9.53	QP		
2		34.8823	42.34	-14.18	28.16	40.00	-11.84	QP		
3		40.6700	38.34	-13.64	24.70	40.00	-15.30	QP		
4		68.8000	40.36	-21.80	18.56	40.00	-21.44	QP		
5		92.0800	42.60	-20.52	22.08	43.50	-21.42	QP		
6		926.2800	38.41	-2.70	35.71	46.00	-10.29	QP		

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

Operator: QIU

Above 1000MHz:

Operation Mode: 802.11g Lowest

Test Date : May 15, 2015

Freq. (MHz)	Ant. Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4824	V	63.54	48.72	74	54	-10.46	-5.28
7236	V	62.01	47.12	74	54	-11.99	-6.88
9648	V	61.72	46.23	74	54	-12.28	-7.77
12060	V	60.55	45.82	74	54	-13.45	-8.18
14472	V	59.75	44.12	74	54	-14.25	-9.88
16884	V	58.35	43.08	74	54	-15.65	-10.92
4824	H	64.03	47.45	74	54	-9.97	-6.55
7236	H	63.54	46.85	74	54	-10.46	-7.15
9648	H	62.72	45.69	74	54	-11.28	-8.31
12060	H	61.49	44.72	74	54	-12.51	-9.28
14472	H	60.53	43.15	74	54	-13.47	-10.85
16884	H	59.72	42.04	74	54	-14.28	-11.96

Operation Mode: 802.11g Middle

Test Date : May 15, 2015

Freq. (MHz)	Ant. Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4874	V	66.33	45.71	74	54	-7.67	-8.29
7311	V	65.72	45.23	74	54	-8.28	-8.77
9688	V	64.15	44.55	74	54	-9.85	-9.45
12185	V	63.82	43.18	74	54	-10.18	-10.82
14622	V	62.46	42.05	74	54	-11.54	-11.95
17059	V	61.05	41.72	74	54	-12.95	-12.28
4874	H	65.72	46.28	74	54	-8.28	-7.72
7311	H	64.15	45.71	74	54	-9.85	-8.29
9688	H	63.28	44.13	74	54	-10.72	-9.87
12185	H	62.78	43.59	74	54	-11.22	-10.41
14622	H	61.49	42.75	74	54	-12.51	-11.25
17059	H	60.72	41.08	74	54	-13.28	-12.92

Operation Mode: 802.11g Highest

Test Date : May 15, 2015

Freq.	Ant. Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4924	V	67.13	45.71	74	54	-6.87	-8.29
7386	V	66.25	44.23	74	54	-7.75	-9.77
9848	V	65.74	43.18	74	54	-8.26	-10.82
12310	V	64.13	42.95	74	54	-9.87	-11.05
14772	V	63.95	41.05	74	54	-10.05	-12.95
17234	V	62.82	40.38	74	54	-11.18	-13.62
4924	H	66.74	46.82	74	54	-7.26	-7.18
7386	H	65.92	45.15	74	54	-8.08	-8.85
9848	H	64.18	44.02	74	54	-9.82	-9.98
12310	H	63.27	43.92	74	54	-10.73	-10.08
14772	H	62.58	42.71	74	54	-11.42	-11.29
17234	H	61.03	41.13	74	54	-12.97	-12.87

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.

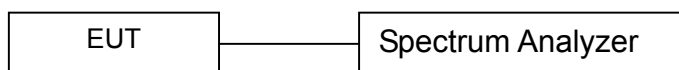
10. 6dB Bandwidth Test

10.1 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.

10.2 Test SET-UP (Block Diagram of Configuration)



10.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSV30	1321.3008K	03/16/2015	03/15/2016
Coaxial Cable	CDS	79254	46107086	03/16/2015	03/15/2016

10.4 Measurement Results

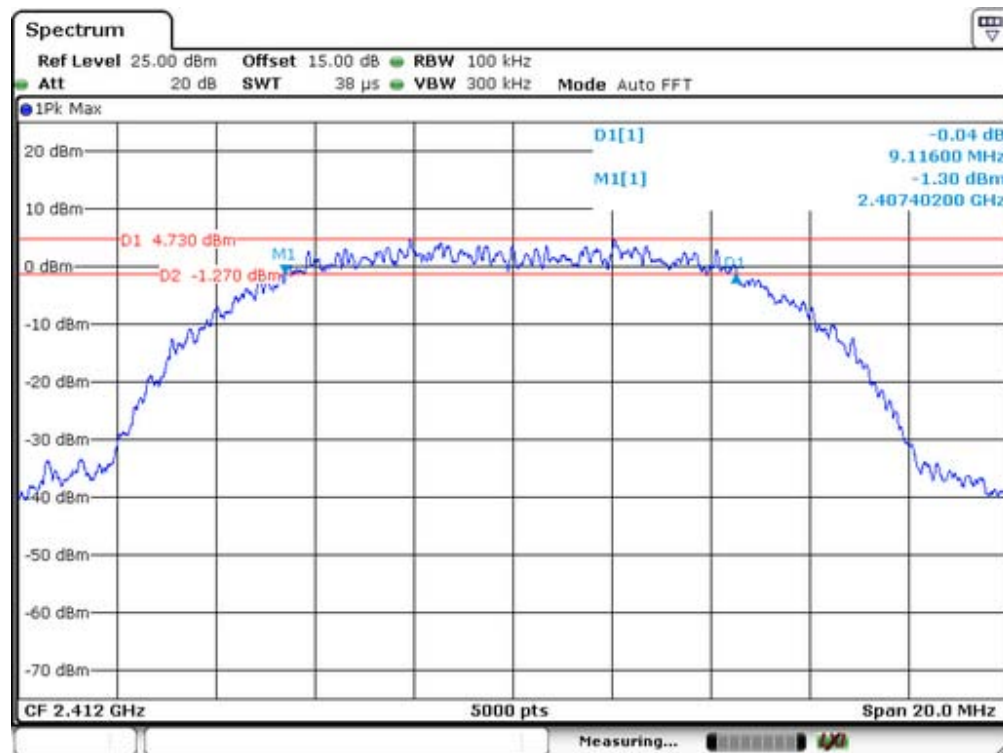
6 Bandwidth Test Data Chart:

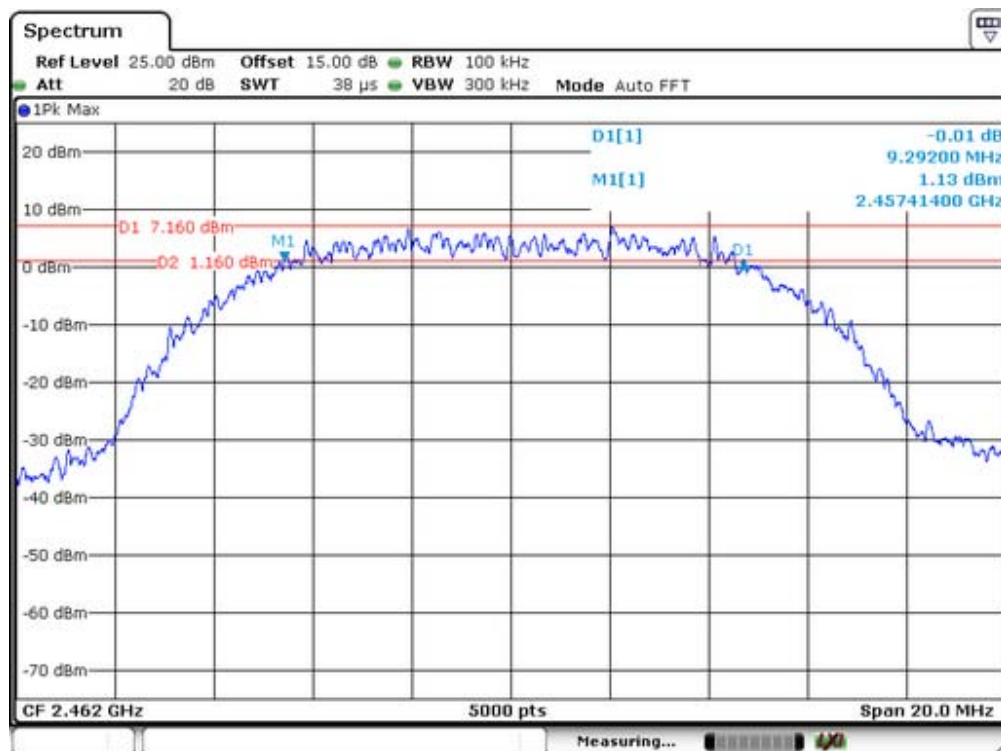
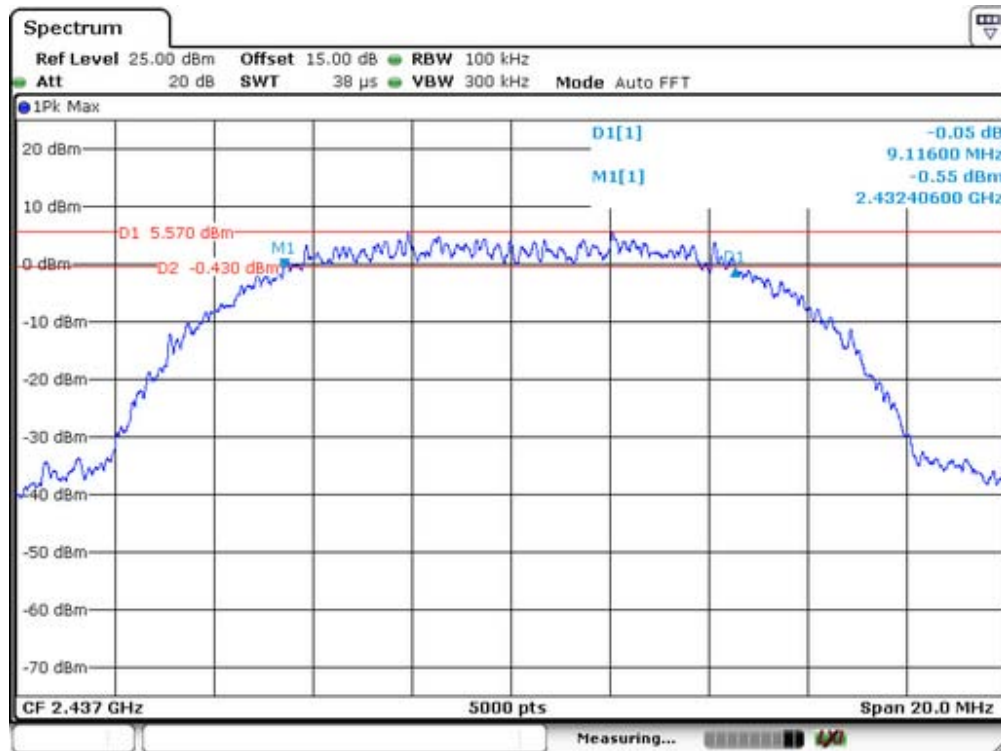
Refer to attached data chart.

Spectrum Detector: PK
 Test By: Andy
 Humidity : 60%

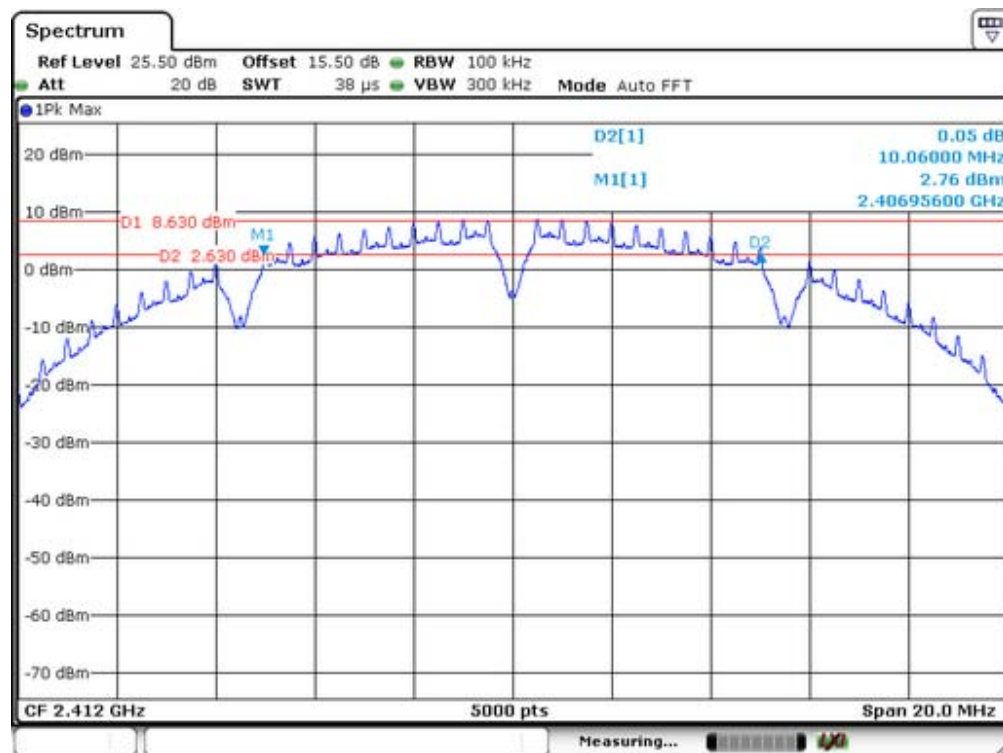
Test Date : May 15, 2015
 Temperature : 28°C

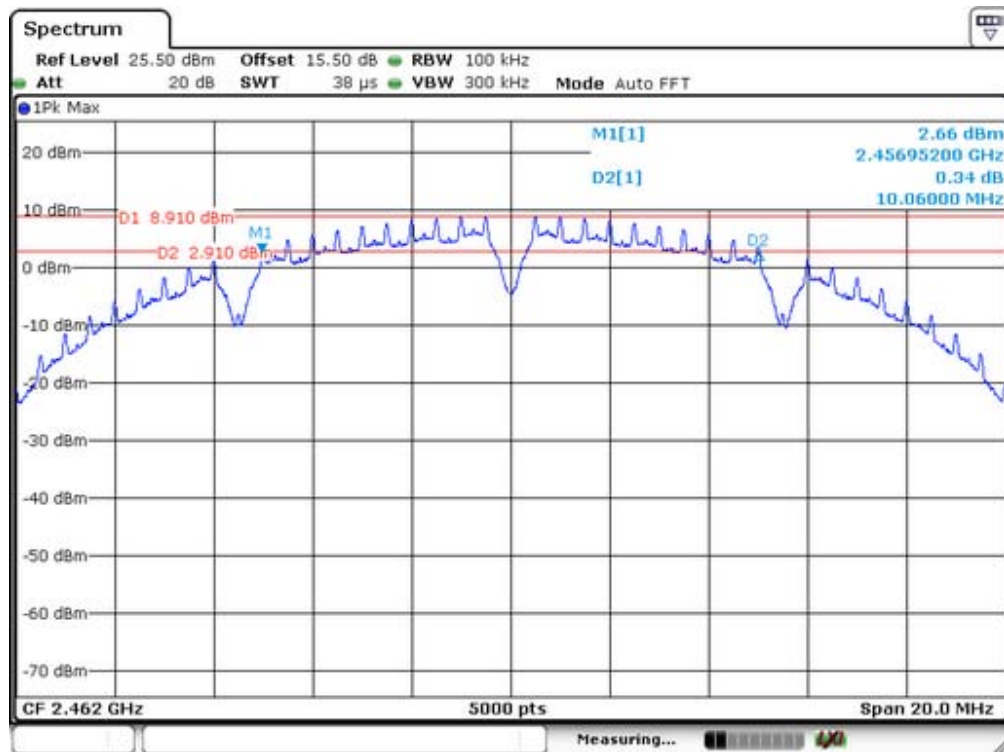
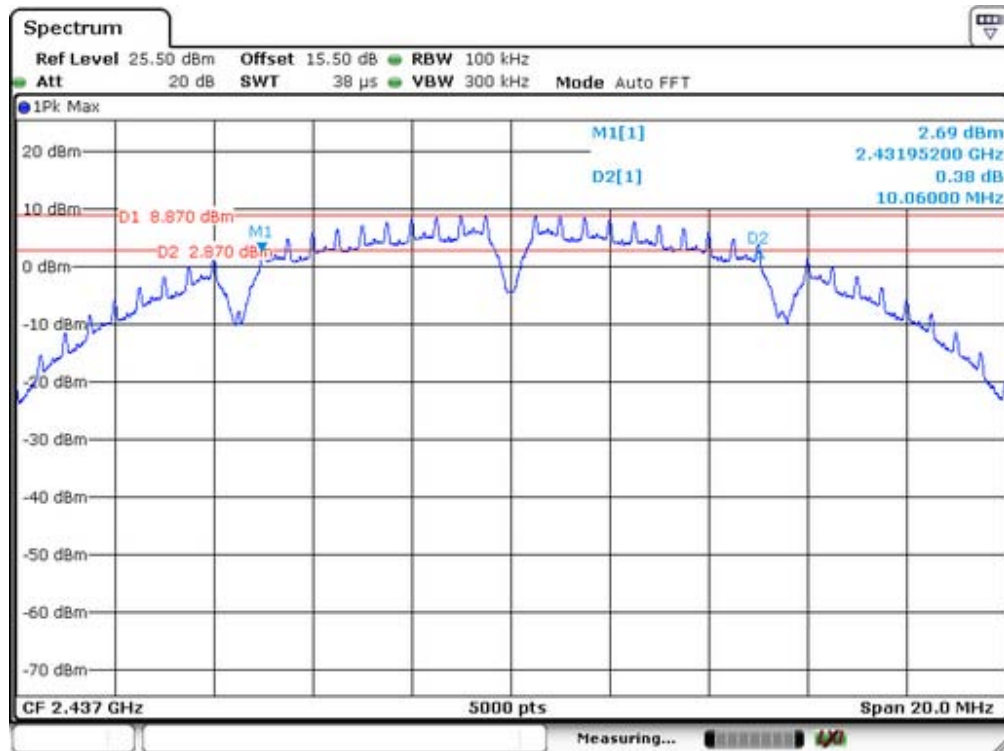
IEEE 802.11b SISO ANT1			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2412	9116	>500	Pass
2437	9116	>500	
2462	9292	>500	



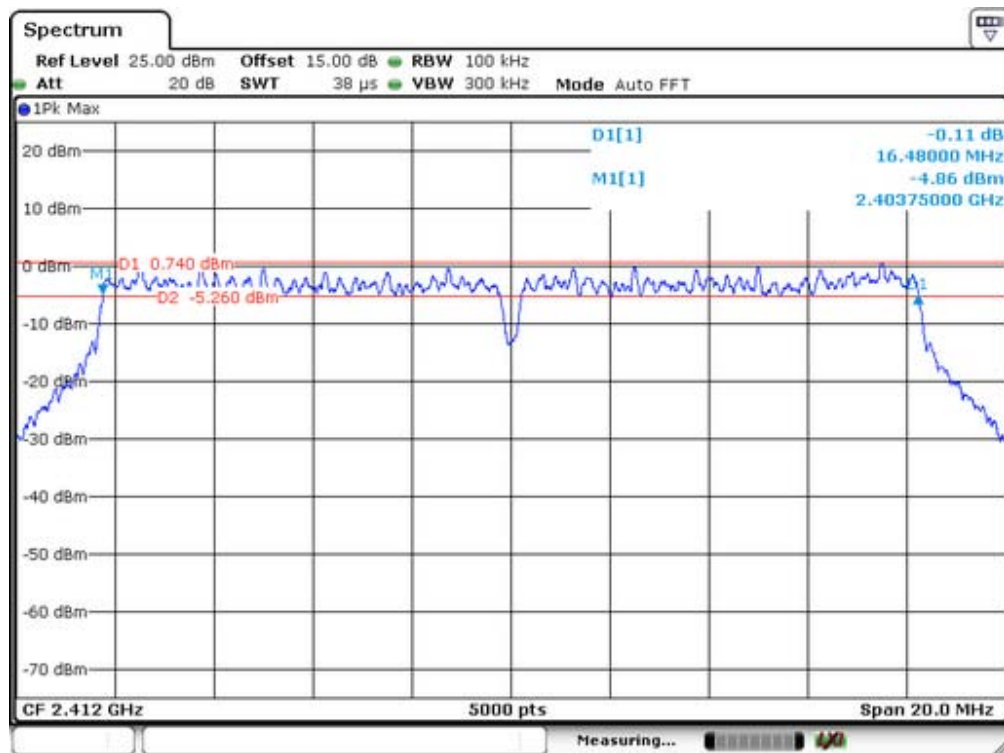


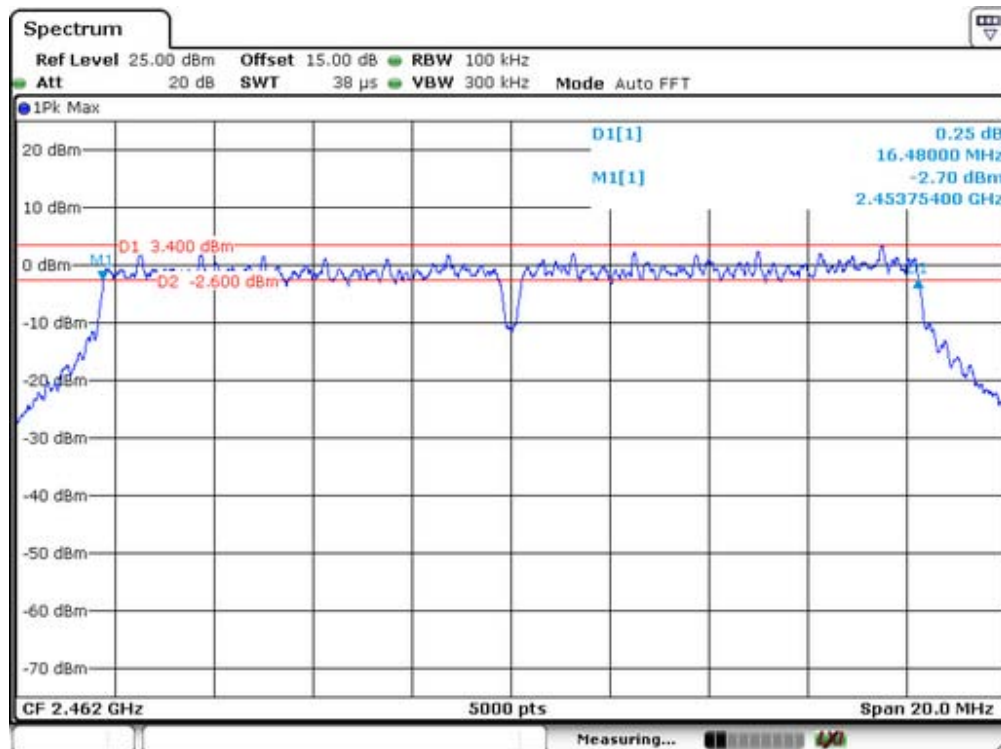
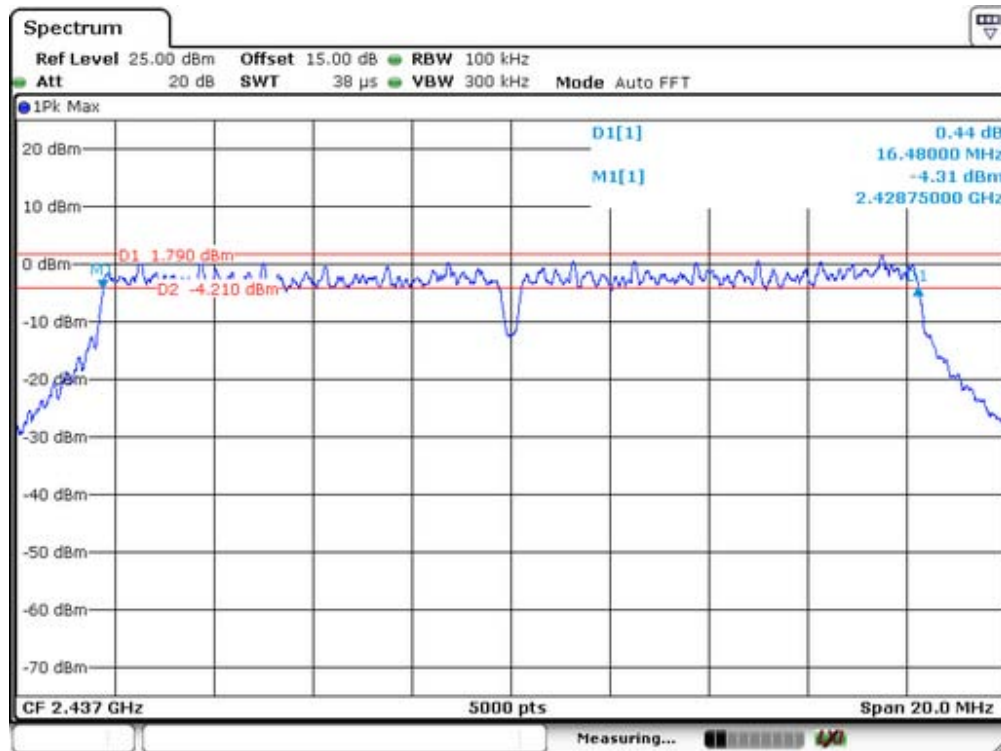
IEEE 802.11b SISO ANT2			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2412	10060	>500	Pass
2437	10060	>500	
2462	10060	>500	



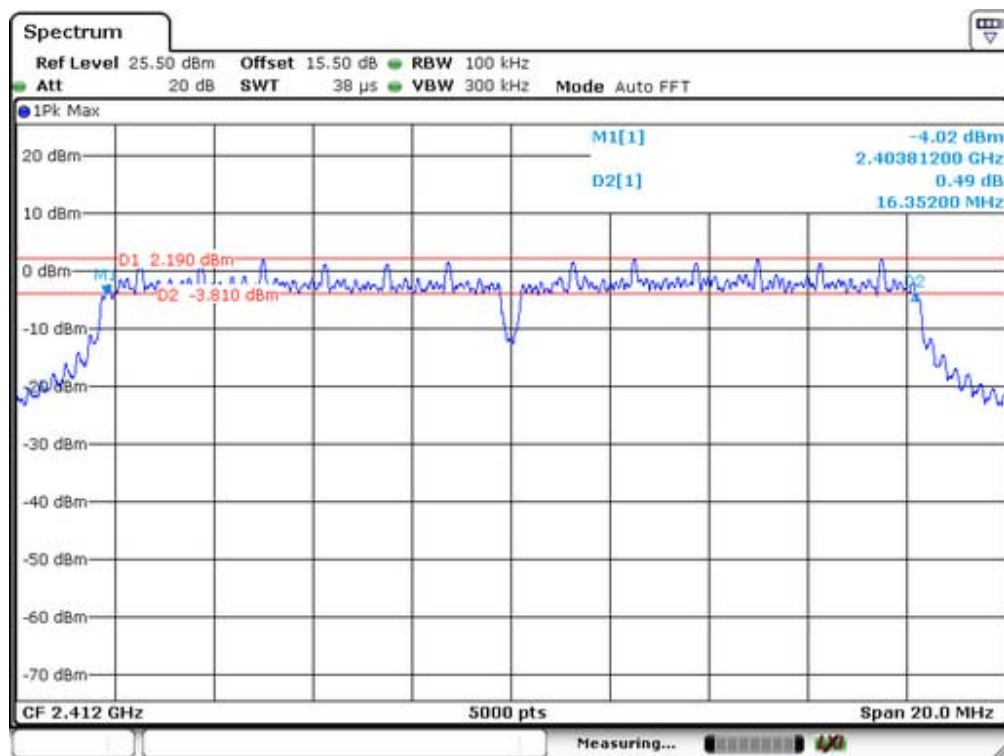


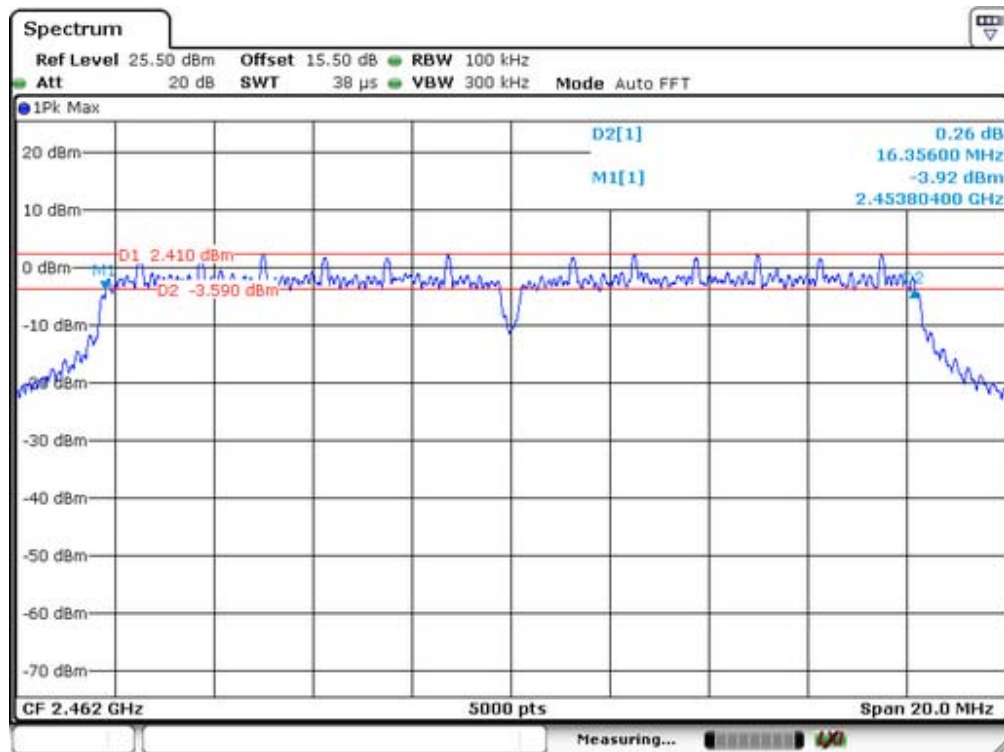
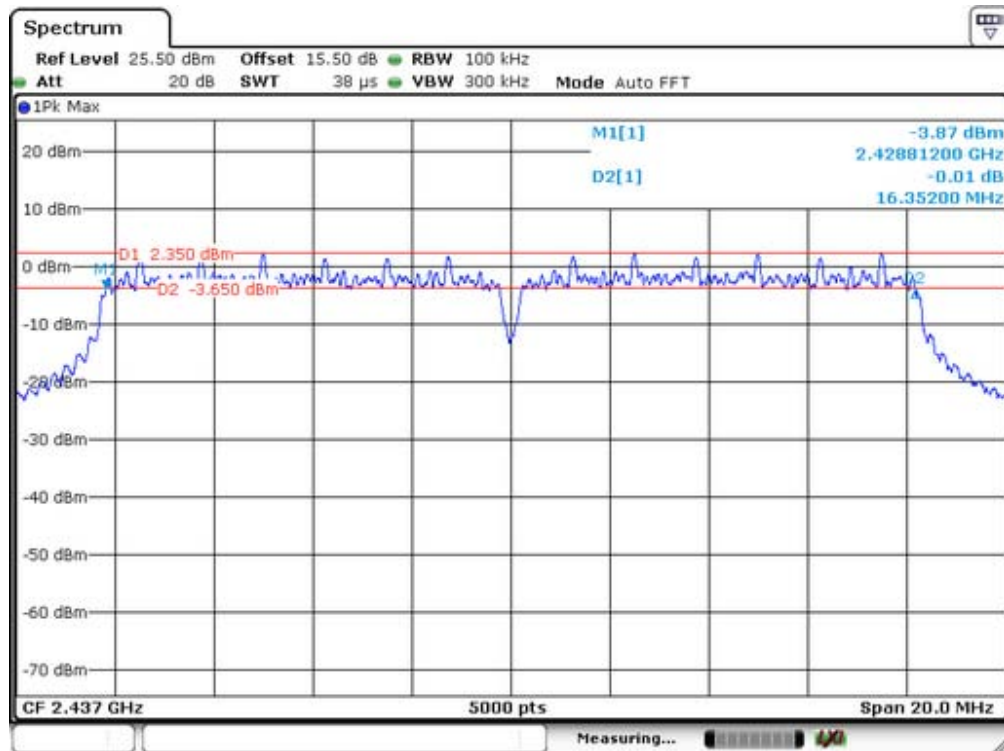
IEEE 802.11g SISO ANT1			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2412	16480	>500	Pass
2437	16480	>500	
2462	16480	>500	





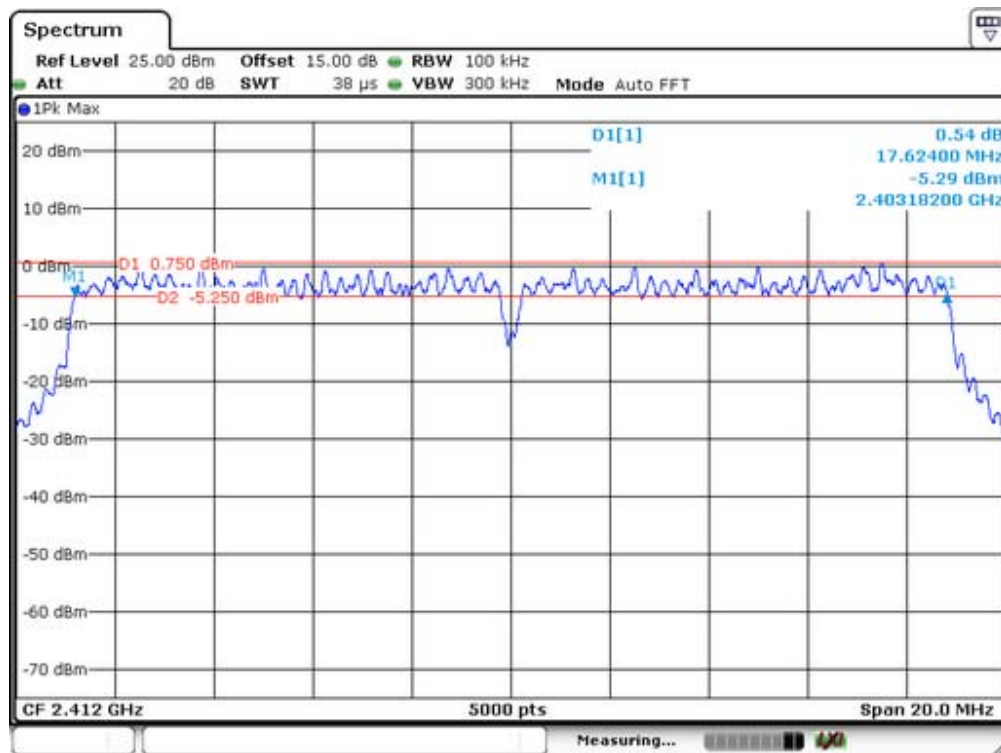
IEEE 802.11g SISO ANT2			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2412	16352	>500	Pass
2437	16352	>500	
2462	16356	>500	

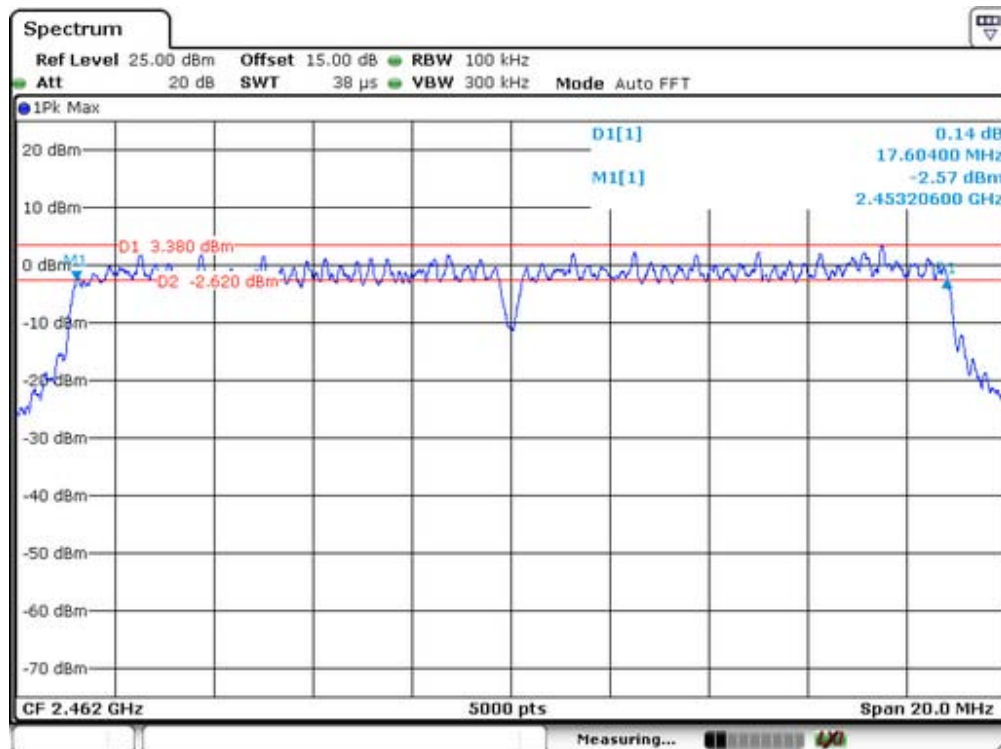
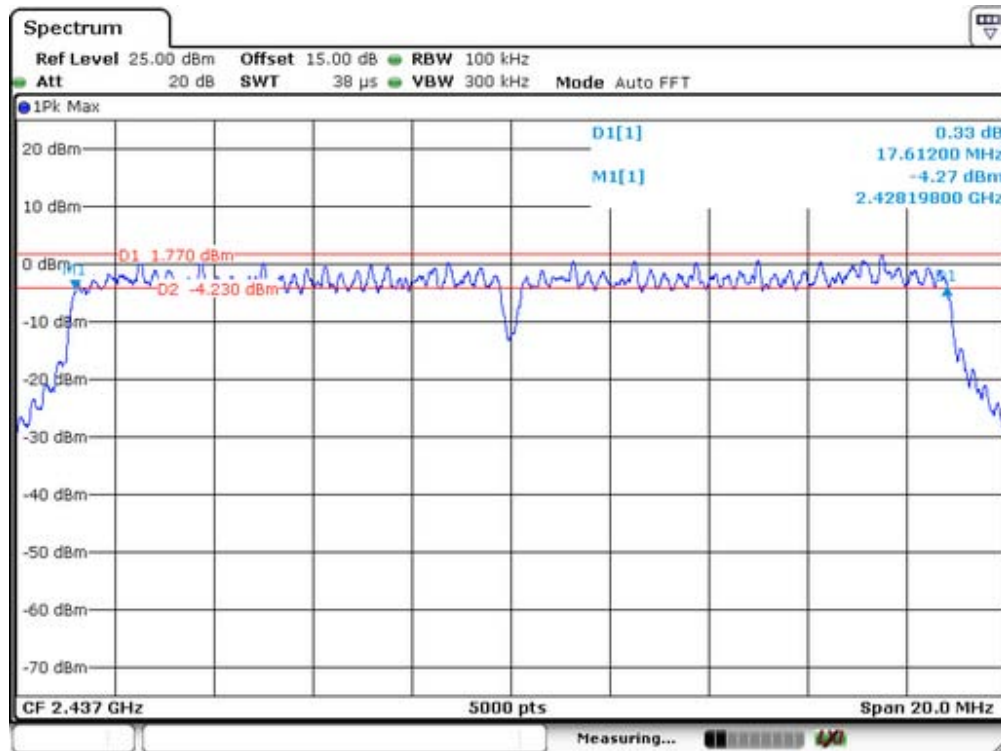




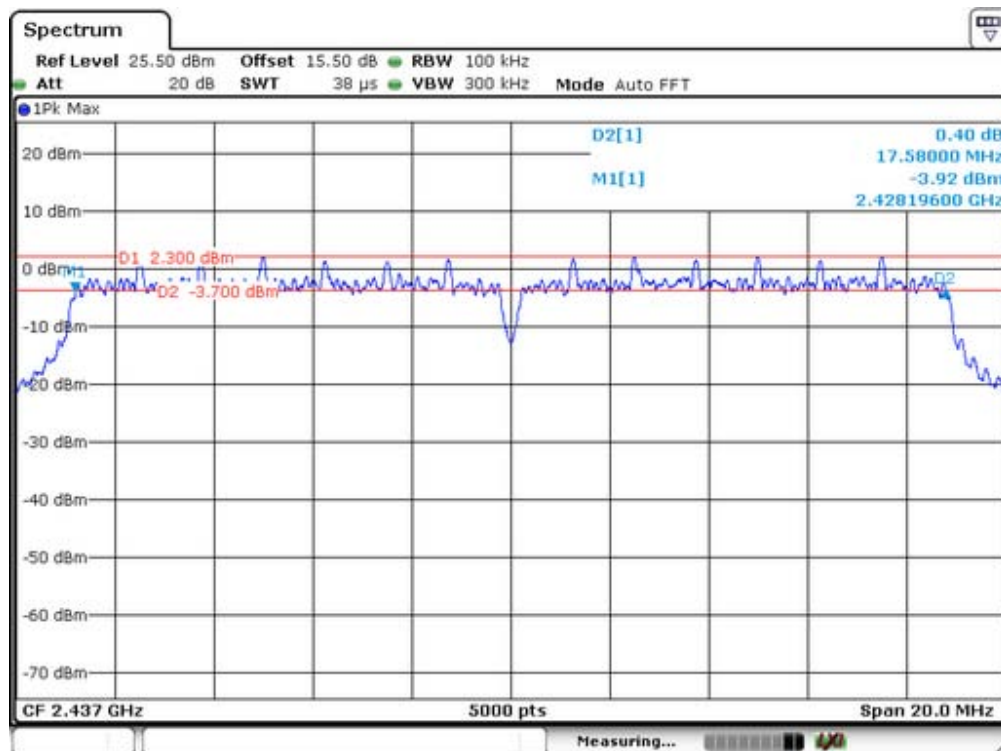
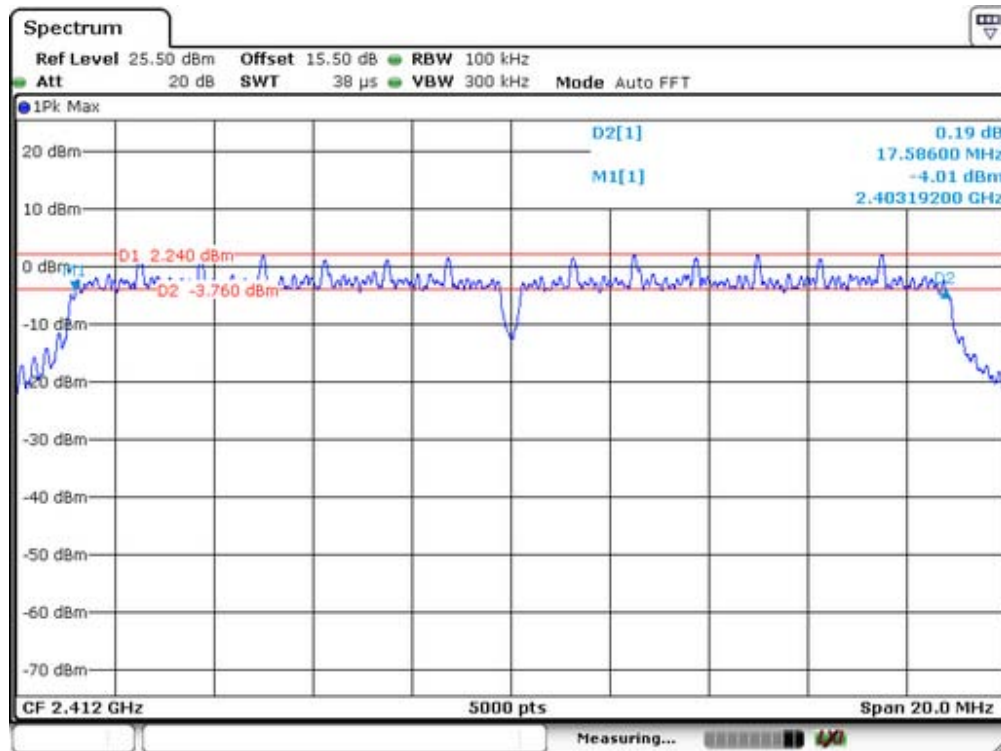
IEEE 802.11n(HT20) MIMO				
Channel frequency (MHz)	Measurement level (KHz)		Required Limit (KHz)	Result
	ANT1	ANT2		
2412	17624	17586	>500	Pass
2437	17612	17580	>500	
2462	17604	17580	>500	

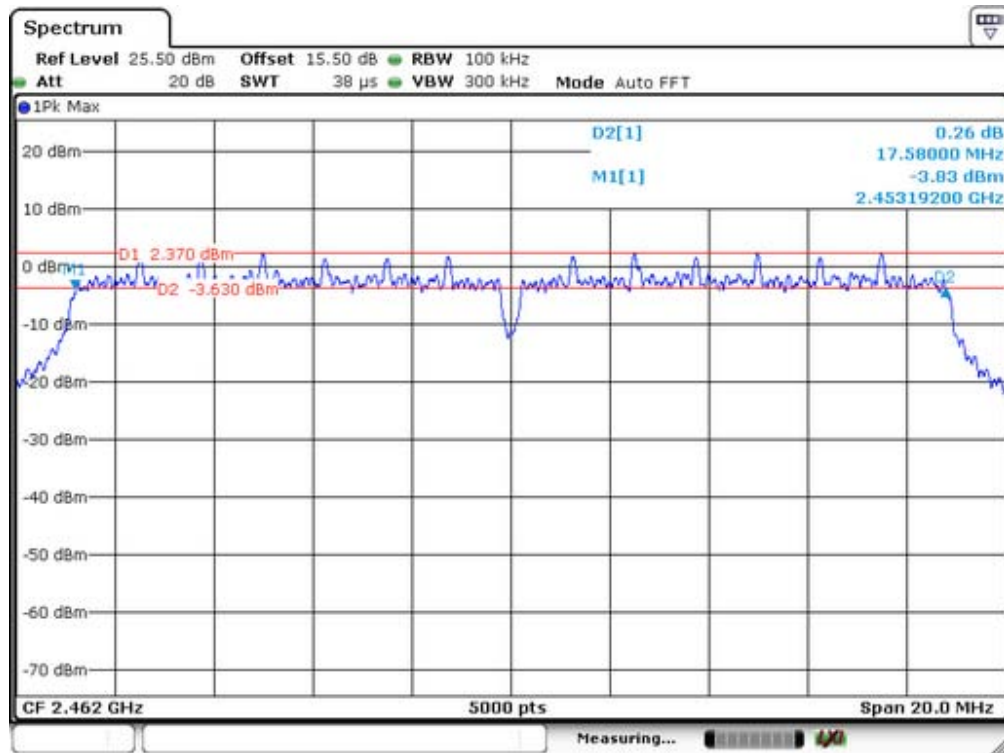
ANT1





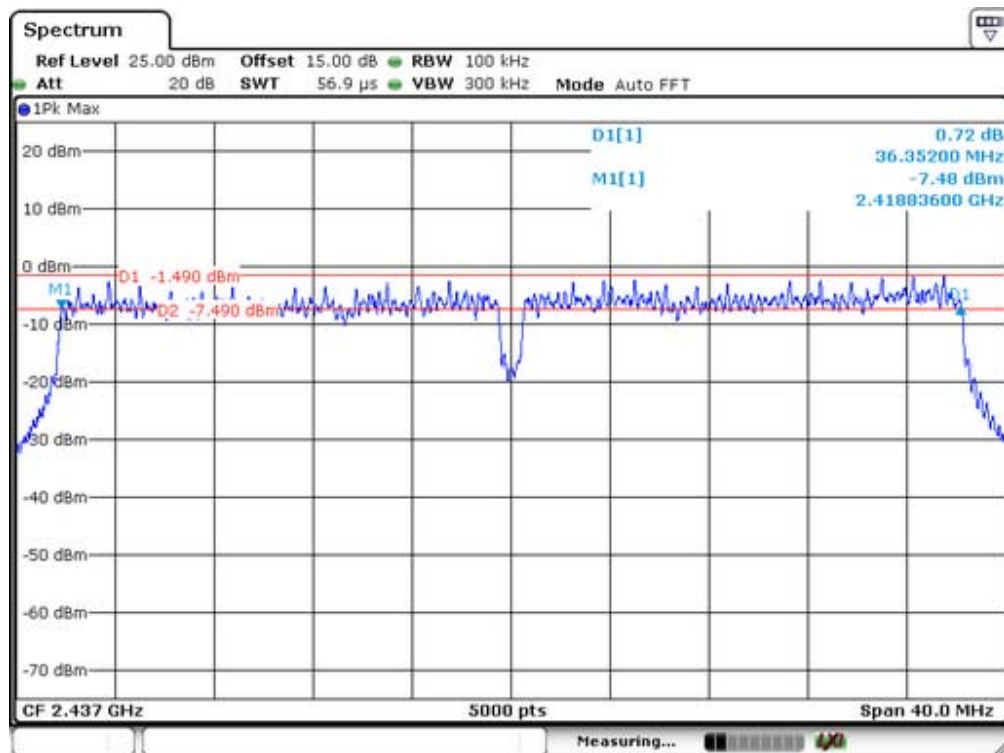
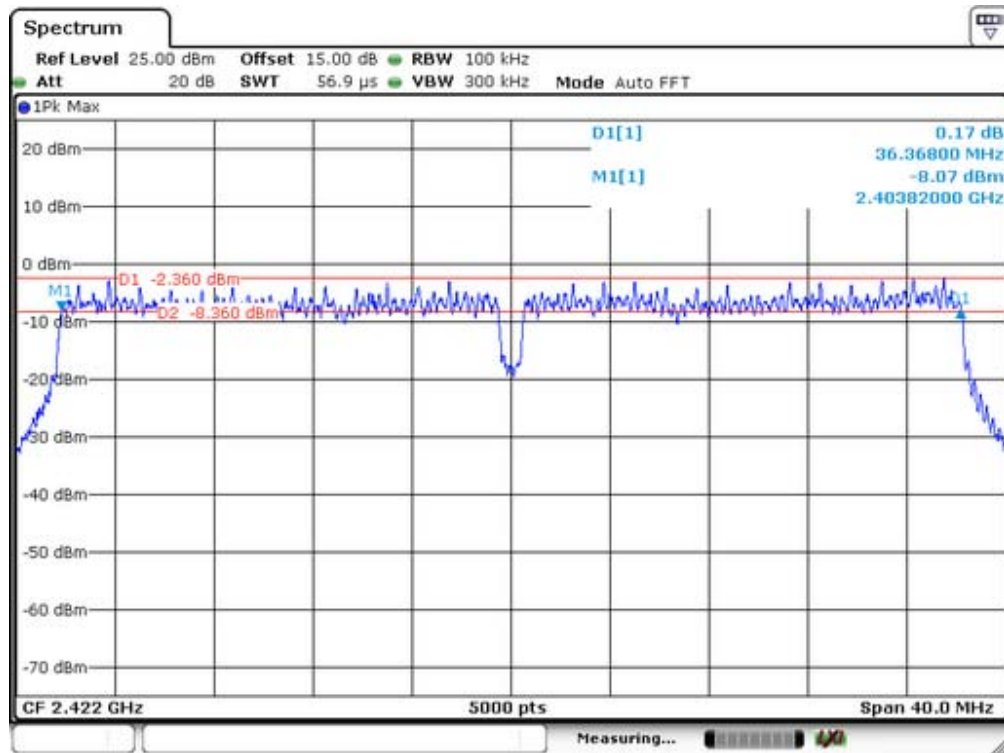
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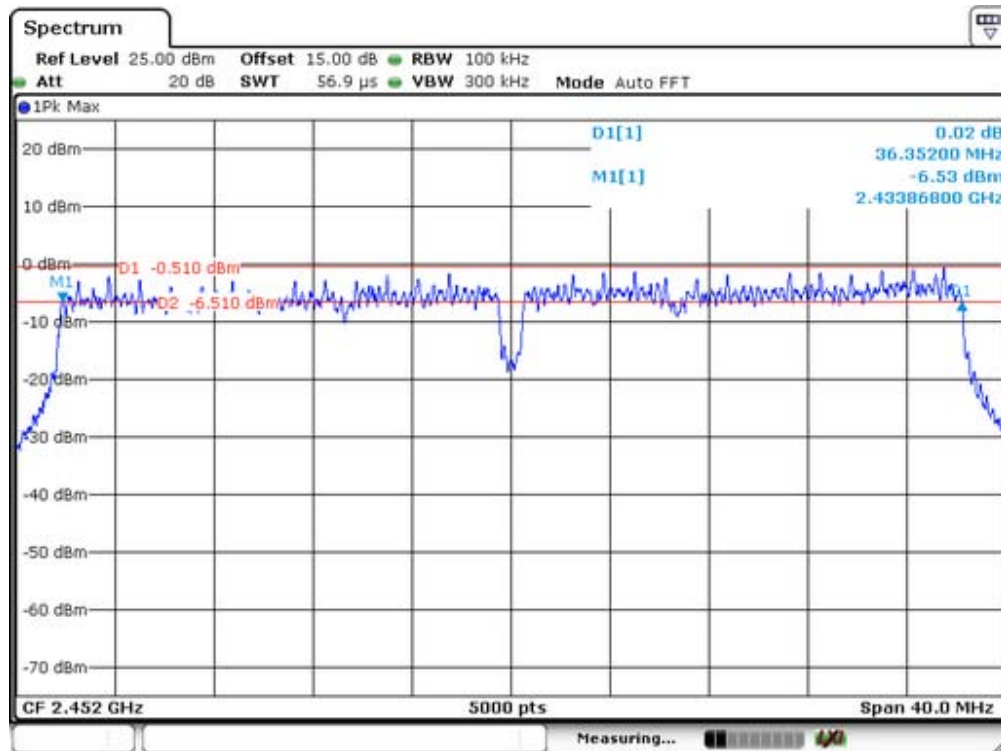




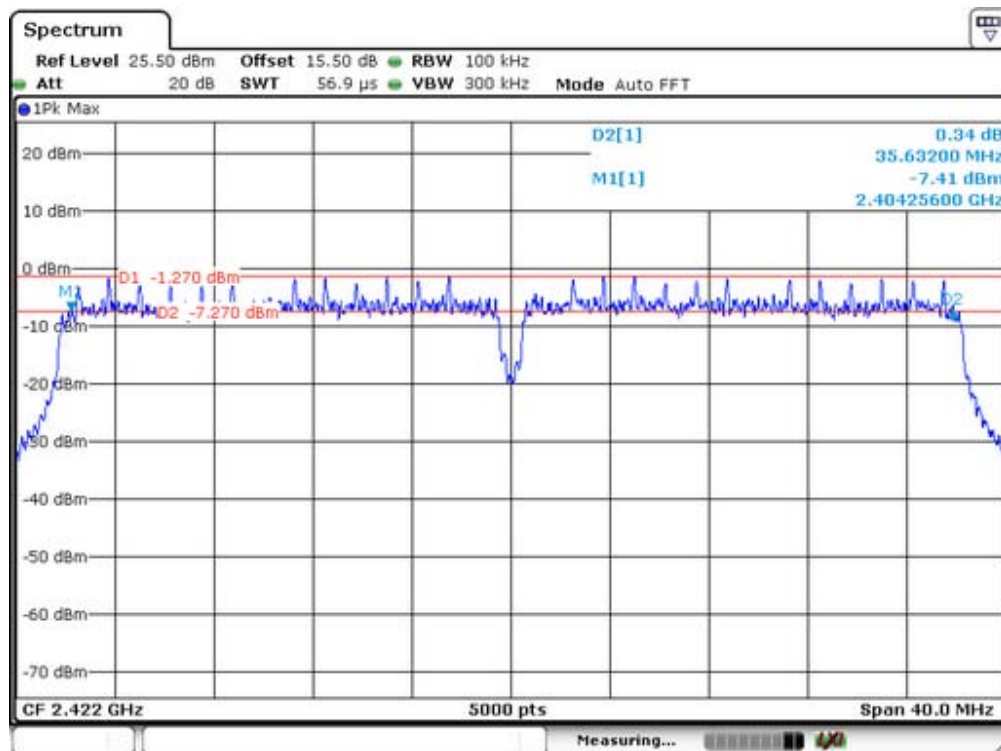
IEEE 802.11n (HT40) MIMO				
Channel frequency (MHz)	Measurement level (KHz)		Required Limit (KHz)	Result
	ANT1	ANT2		
2422	36368	35632	>500	Pass
2437	36352	35544	>500	
2452	36352	35656	>500	

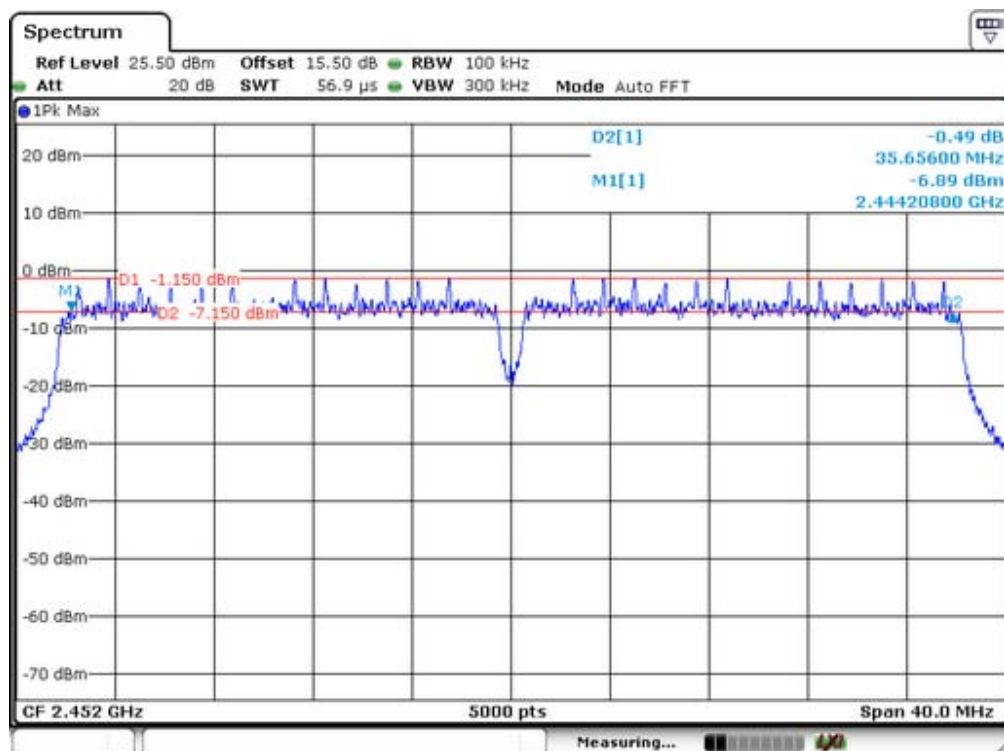
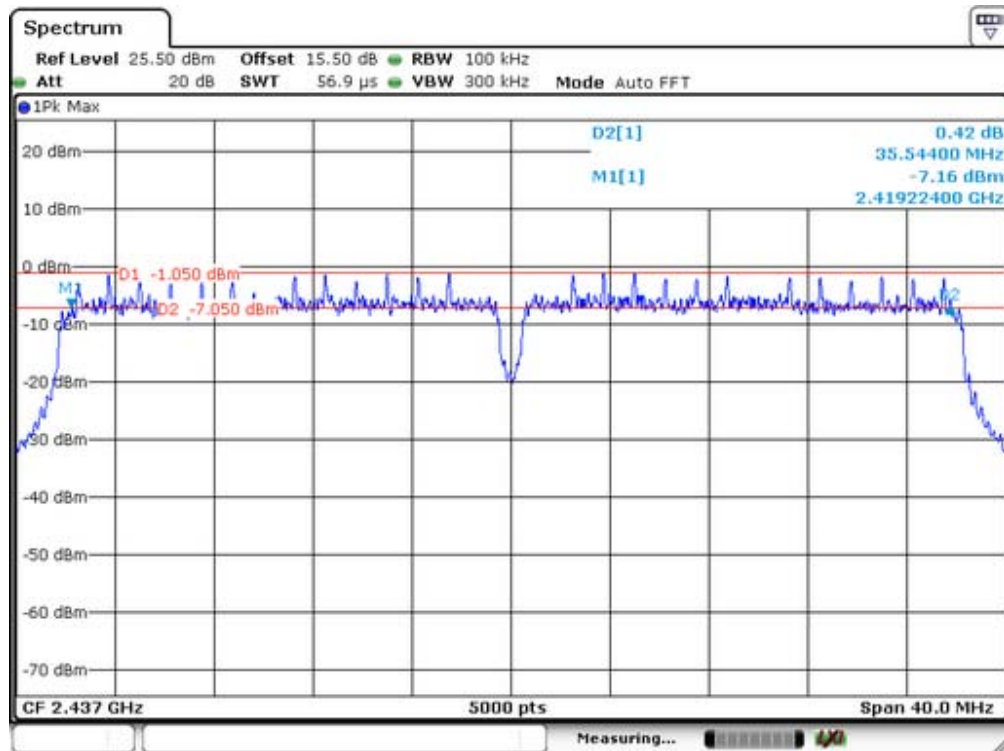
ANT1





ANT2





11. Maximum Peak Output Power Test

11.1 Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r02.
2. The RF output of EUT was connected to the power meter 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. Measure the conducted output power and record the results in the test report.

11.2 Test SET-UP (Block Diagram of Configuration)



11.3 Measurement Equipment Used

EQUIPMENT TYPE	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power meter	ML2495A	0824006	03/16/2015	03/15/2016
Power sensor	MA2411B	0738172	03/16/2015	03/15/2016

11.4 Peak Power output limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 2400 - 2483.5 MHz bands shall not exceed: 1 Watt (30dBm).

11.5 Measurement Results

Spectrum Detector:	PK	Test Date :	May 15, 2015
Test By:	Andy	Temperature :	28°C
Test Result:	PASS	Humidity :	60%

Operati on Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)			Limit (dBm)	Verdict
			ANT1	ANT2	Sum		
802.11b	1	2412	16.23	13.62	--	30	PASS
	6	2437	17.05	14.05	--	30	PASS
	11	2462	18.42	15.94	--	30	PASS
802.11g	1	2412	15.42	13.26	--	30	PASS
	6	2437	16.23	13.65	--	30	PASS
	11	2462	17.04	14.42	--	30	PASS
802.11n (HT20)	1	2412	13.52	8.74	14.77	28	PASS
	6	2437	14.06	9.06	15.25	28	PASS
	11	2462	15.24	10.22	16.43	28	PASS
802.11n (HT40)	3	2422	11.42	9.13	13.43	28	PASS
	6	2437	12.36	10.12	14.39	28	PASS
	9	2452	13.62	10.36	15.30	28	PASS

Note:

1. For MIMO System of 802.11n(HT20) and 802.11n(HT40), total power is calculated by combining the output power of each antenna according to KDB662911.
2. Antenna 1 Gain: 5dBi, Antenna 2 Gain: 5dBi. For antennas with gains of 6dBi or less, maximum allowed Transmitter output watt(+30dBm)
3. In MIMO, ANT1+ANT2 Directional
Gain= $G_{ANT}+10\log(N)$ dBi= $5+10\log(2)=8.01$ dBi. so the Power limit will reduce to 28dBm(630mW).

12. Band Edge Test

12.1 Measurement Procedure

For Conducted Test

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r02.
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 D01 DTS Meas. Guidance v03r02.
2. 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.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.
6. 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.
7. 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

12.2 Test SET-UP (Block Diagram of Configuration)

As 6.2 Test set up (B) and (C)

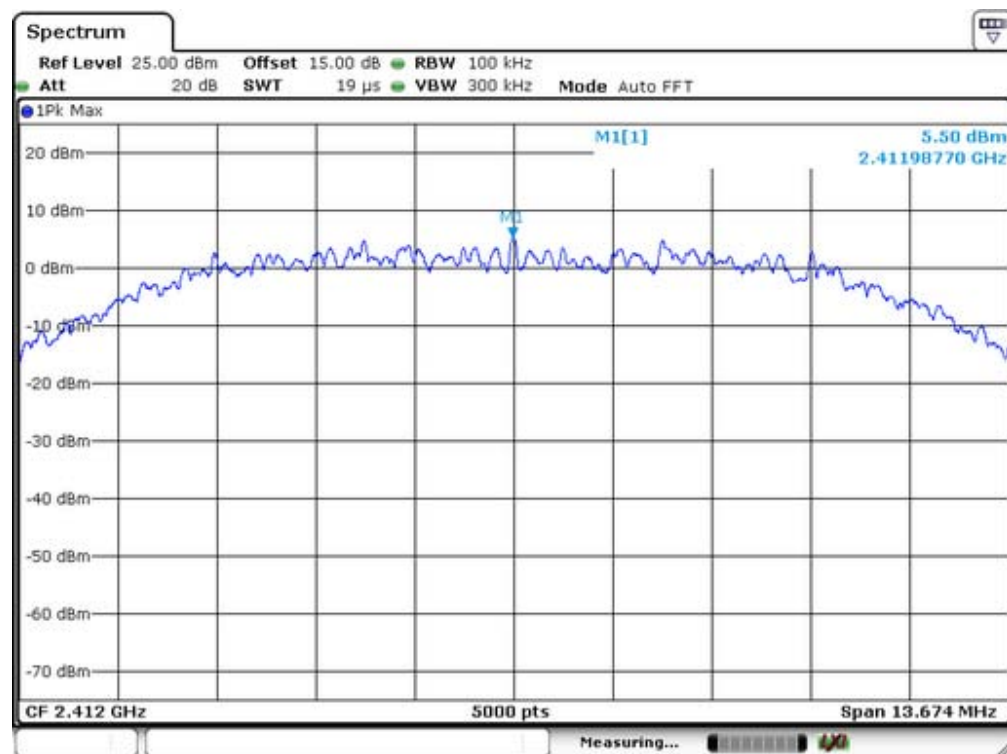
12.3 Measurement Equipment Used

Same as 6.3 Radiated Emission Measurement.

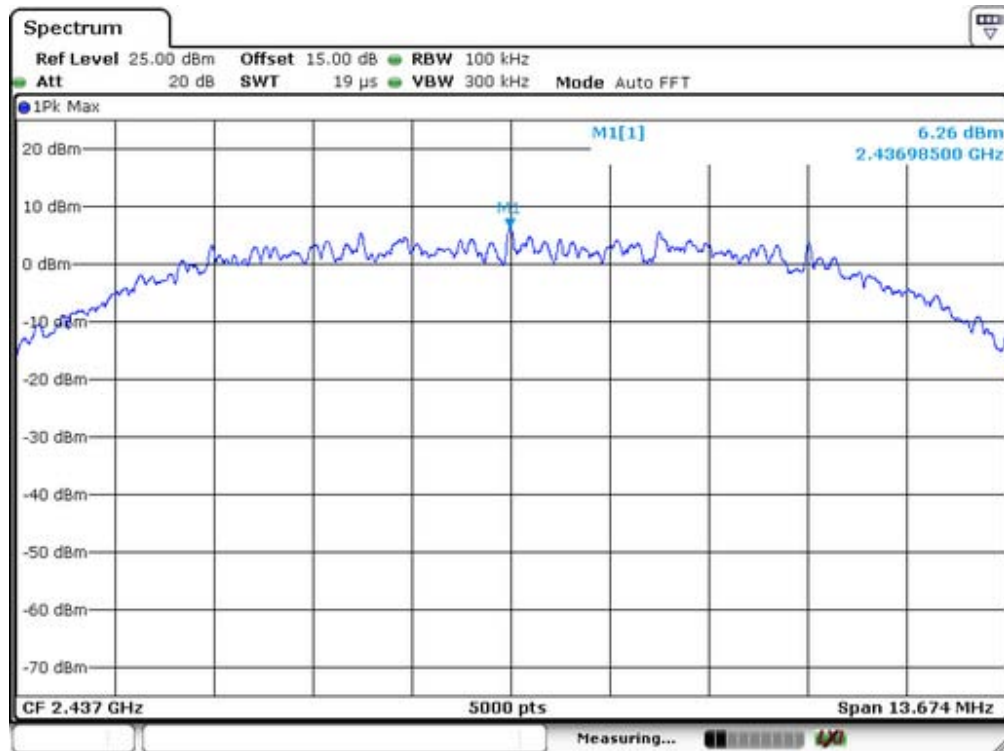
12.4 Measurement Results

1. Conducted Test

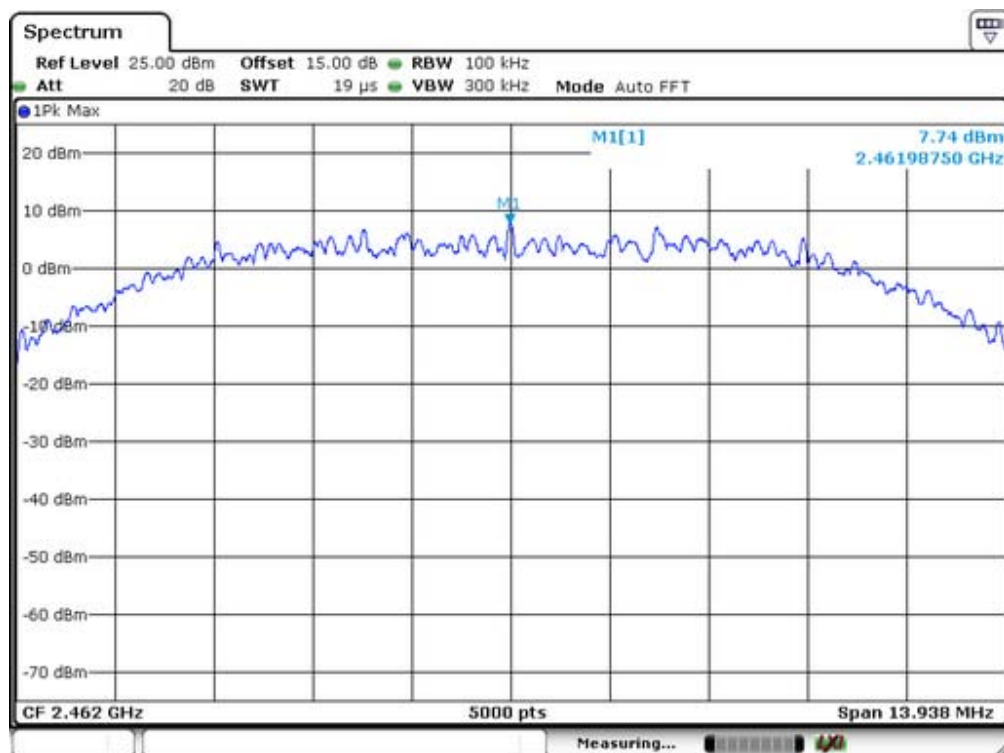
Test Mode: IEEE 802.11b SISO ANT1



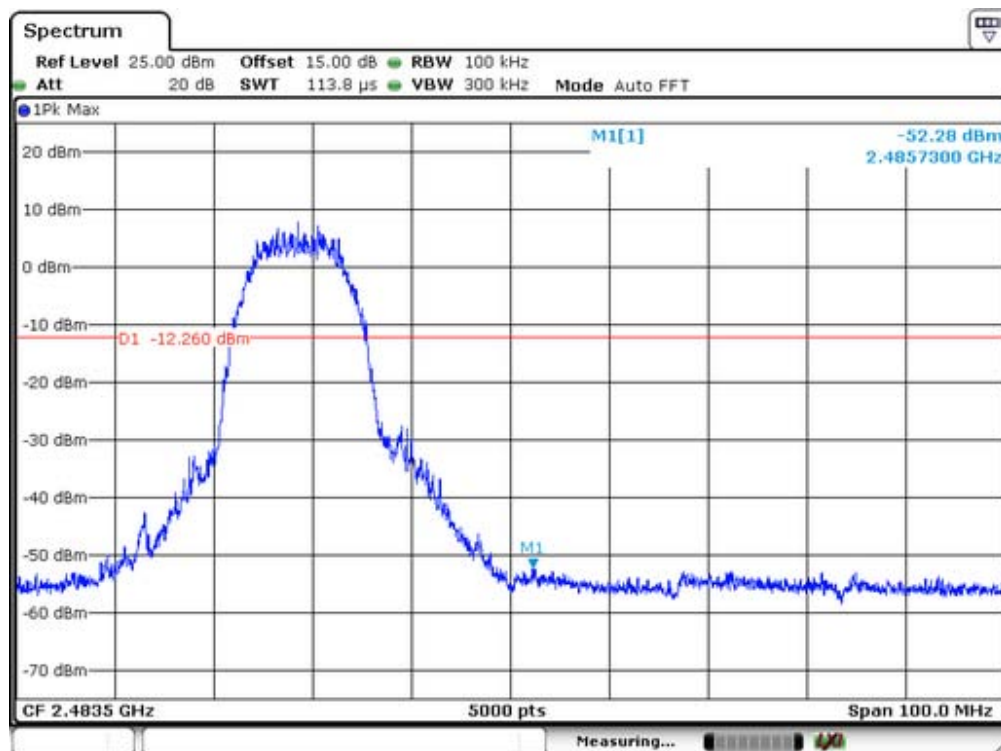
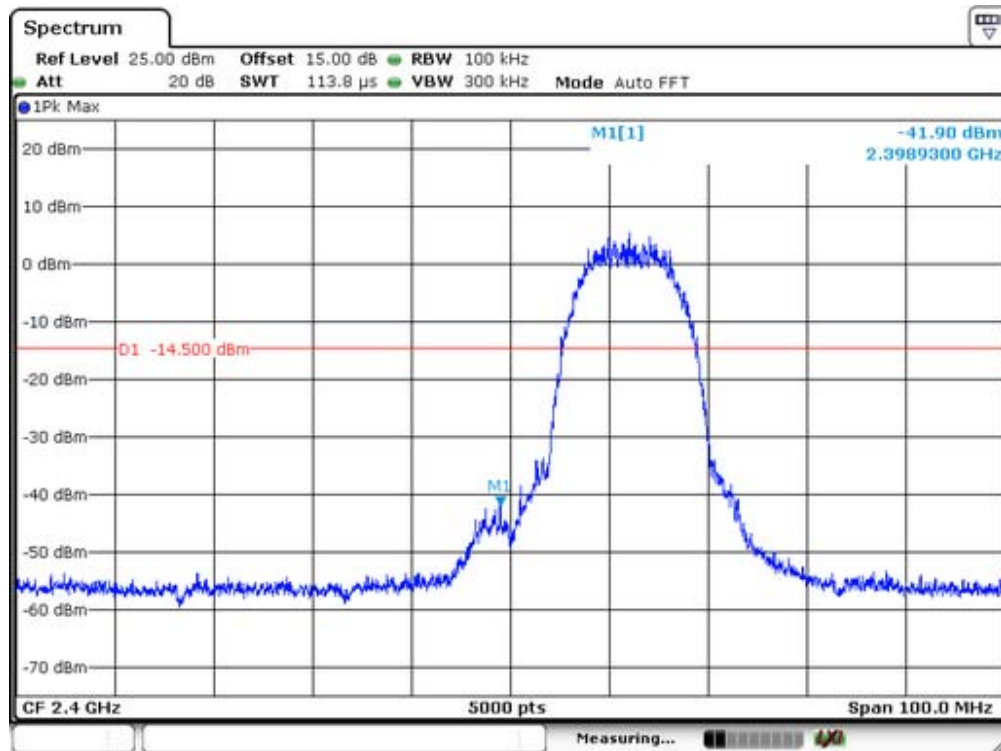
Lowest Channel



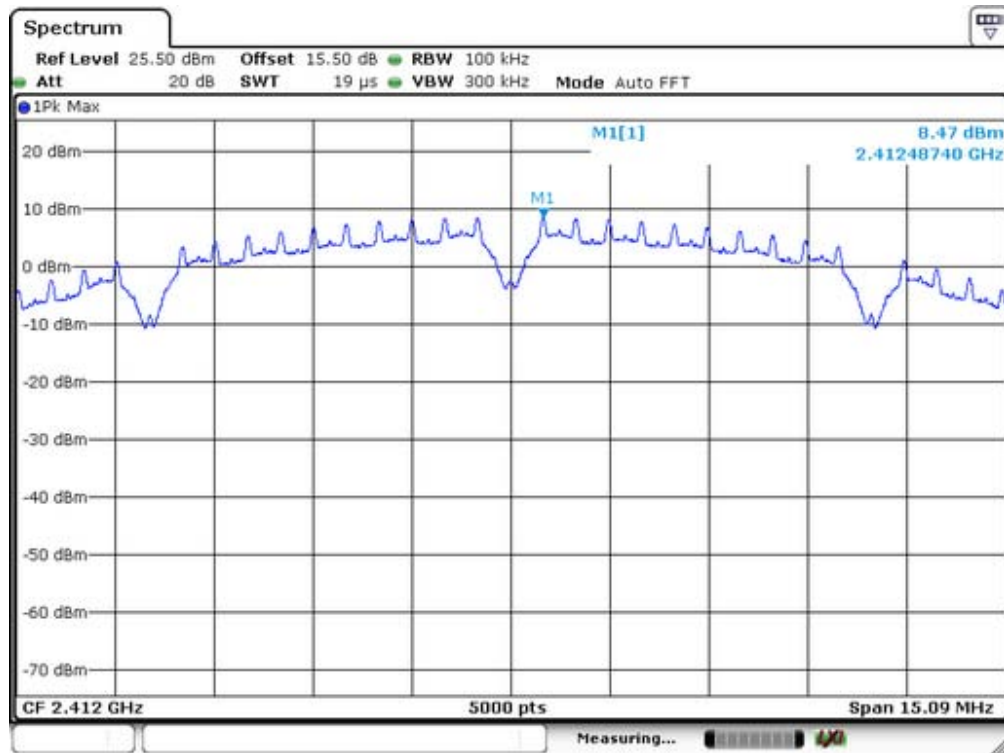
Middle Channel



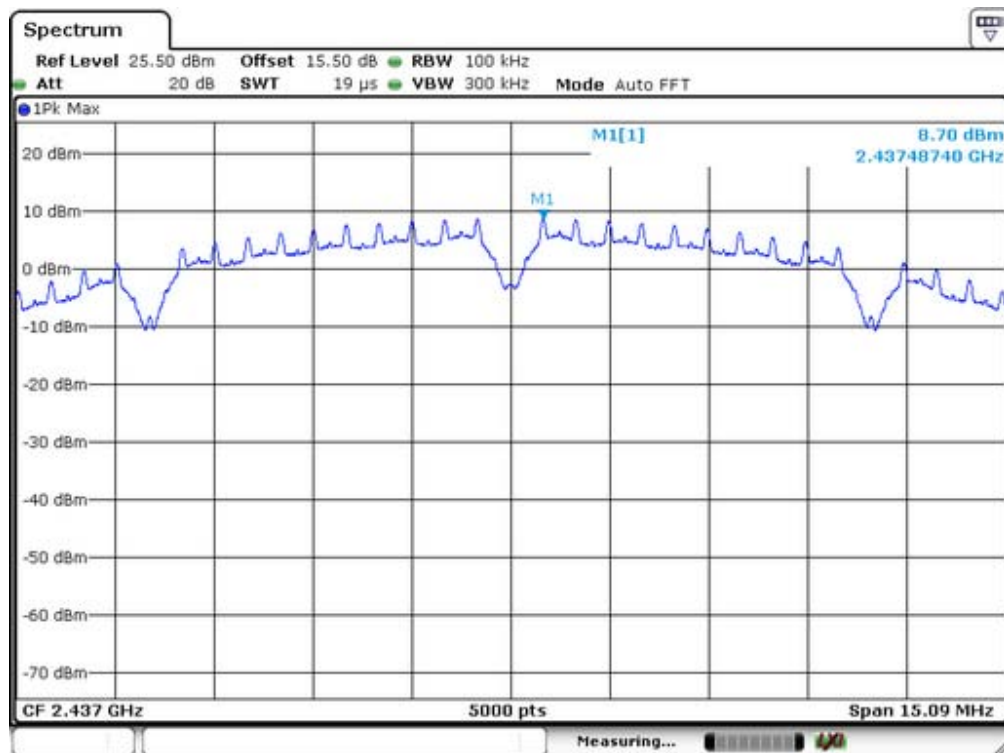
Highest Channel



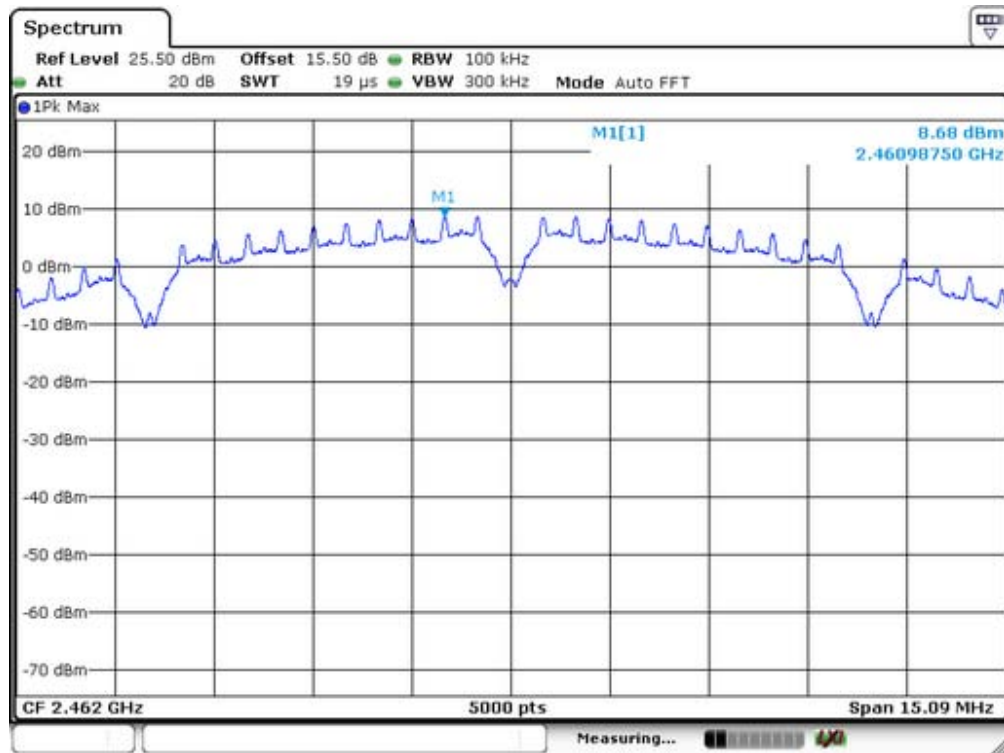
Test Mode: IEEE 802.11b SISO ANT2



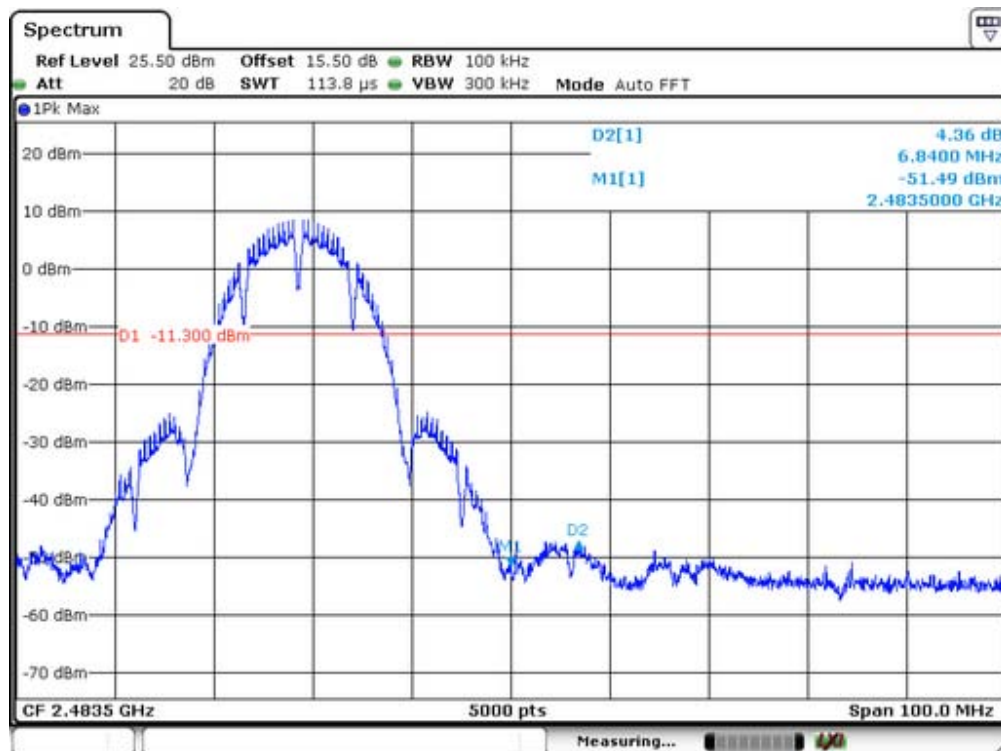
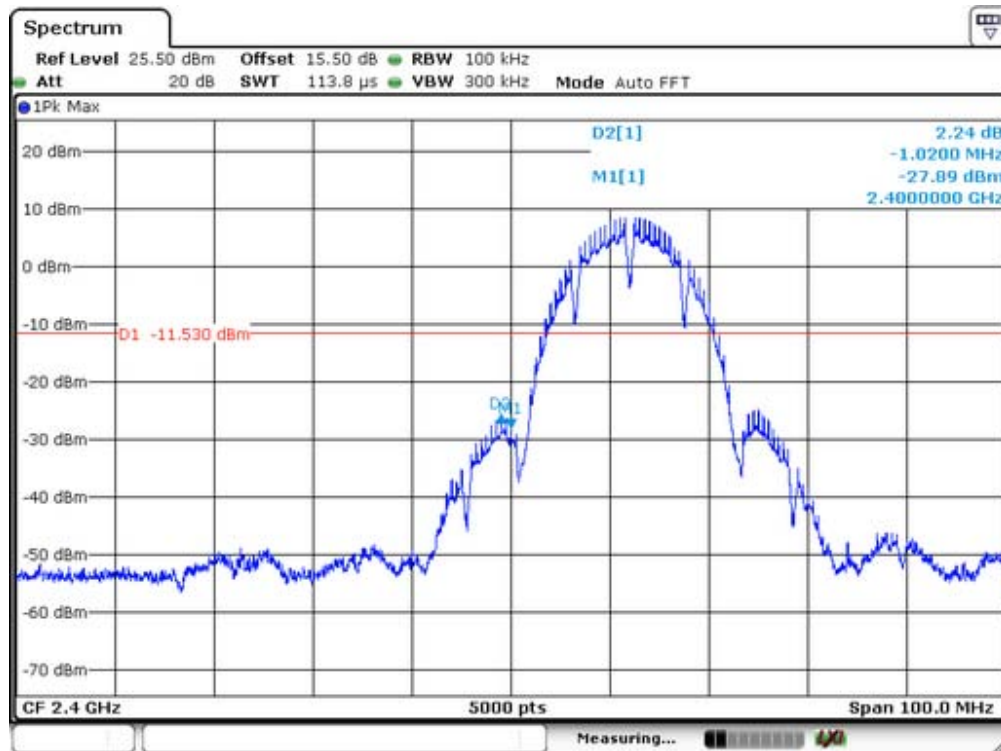
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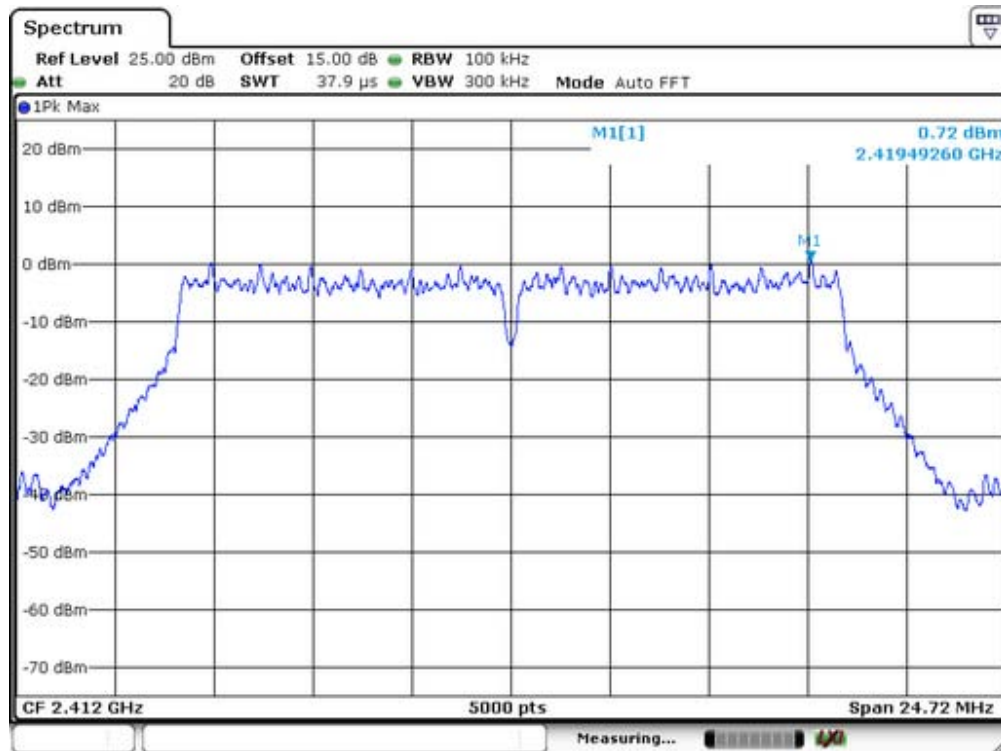
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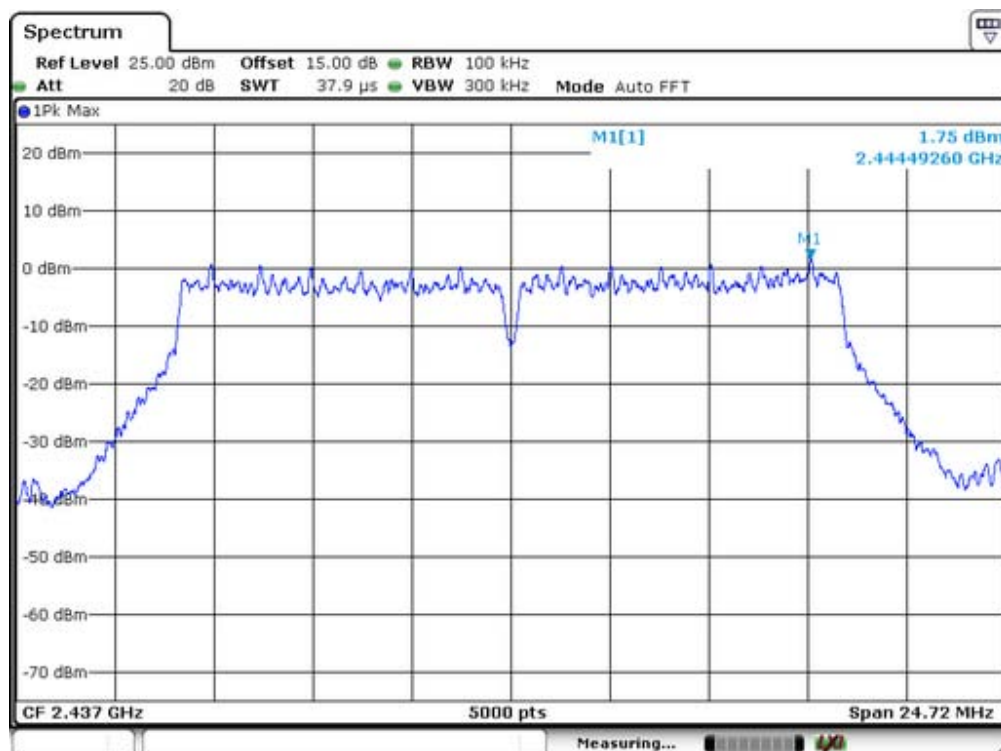
Highest Channel



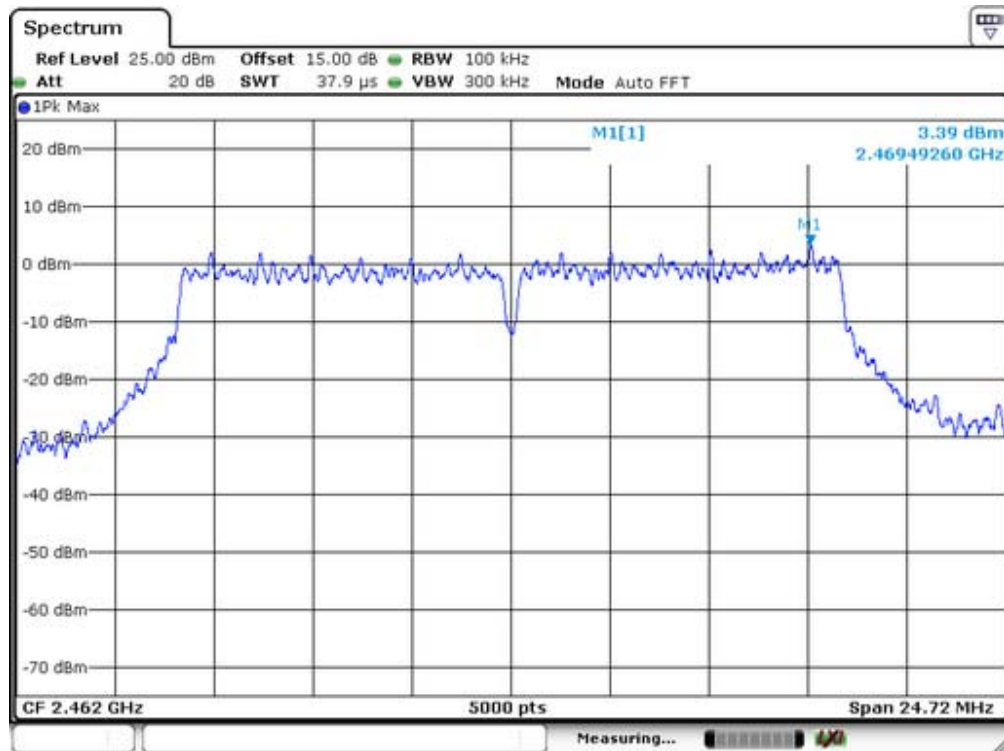
Test Mode: IEEE 802.11g SISO ANT1



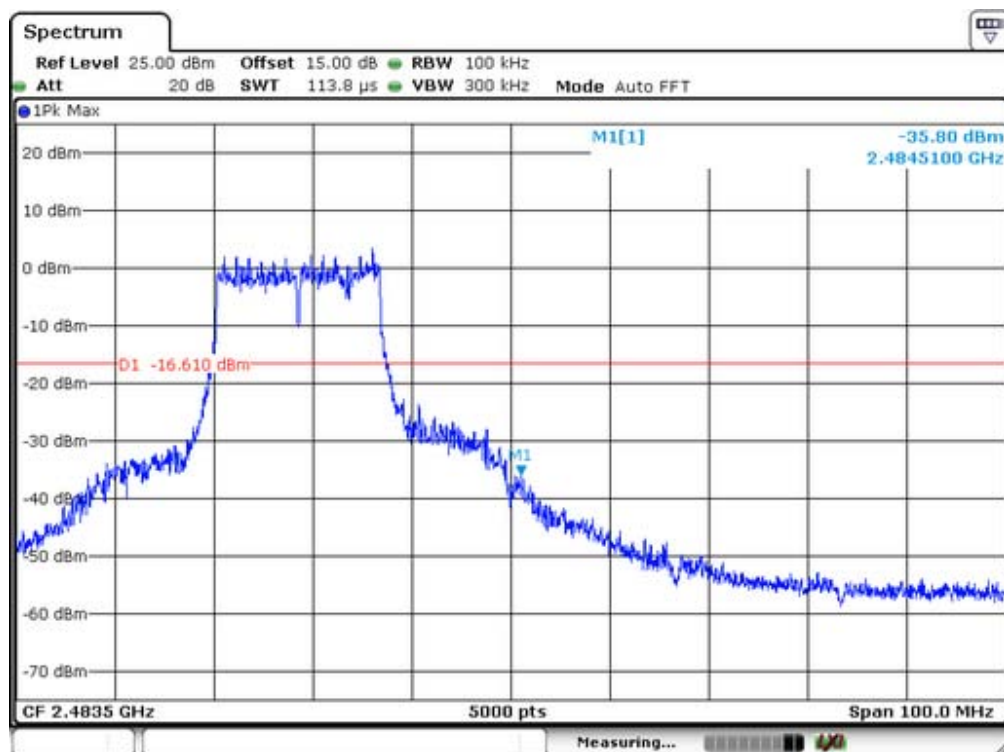
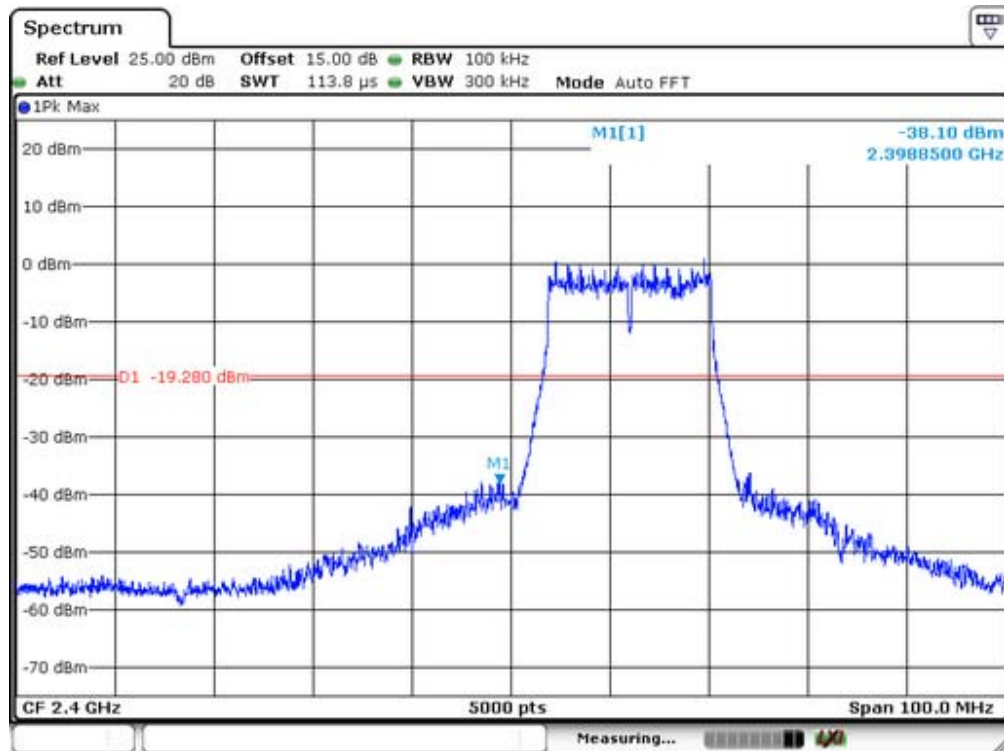
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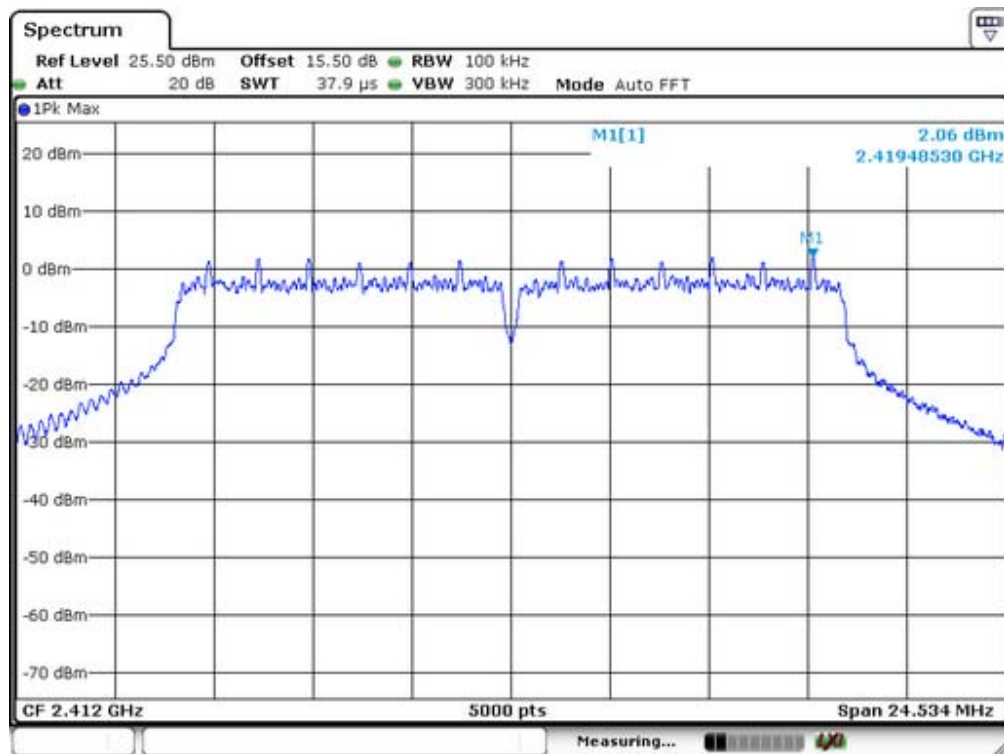
Middle Channel



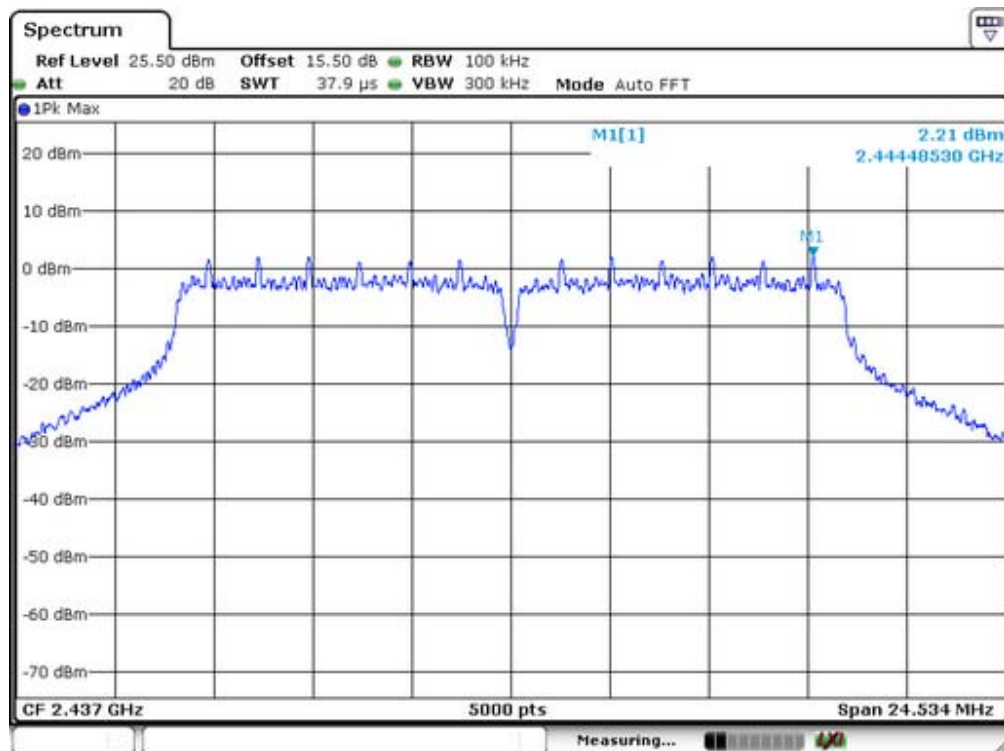
Highest Channel



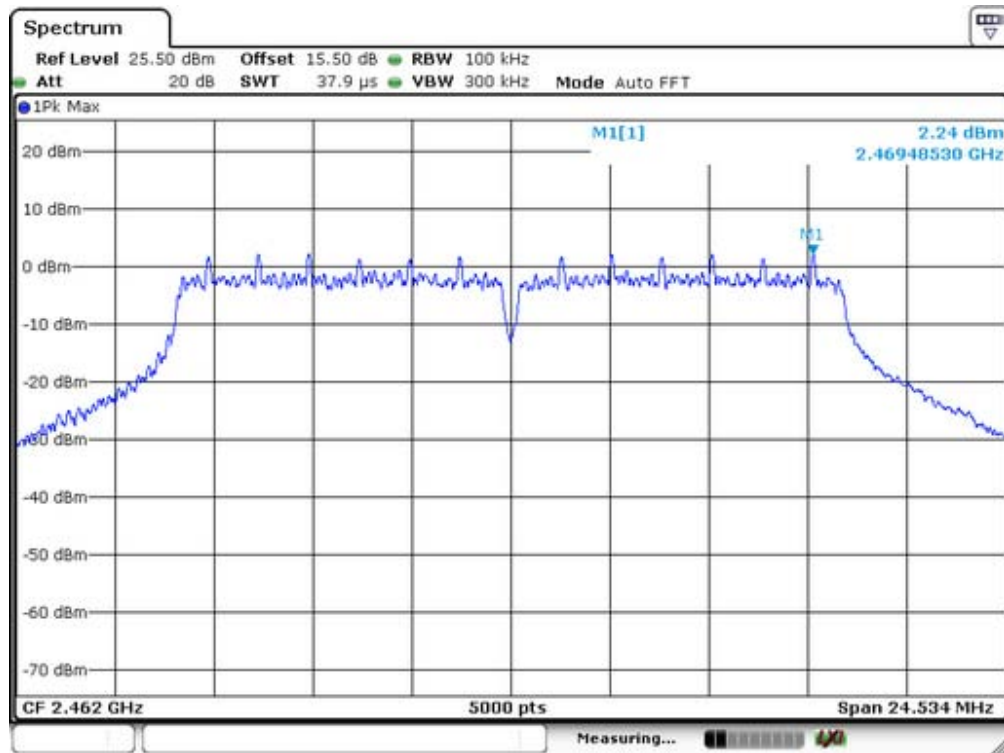
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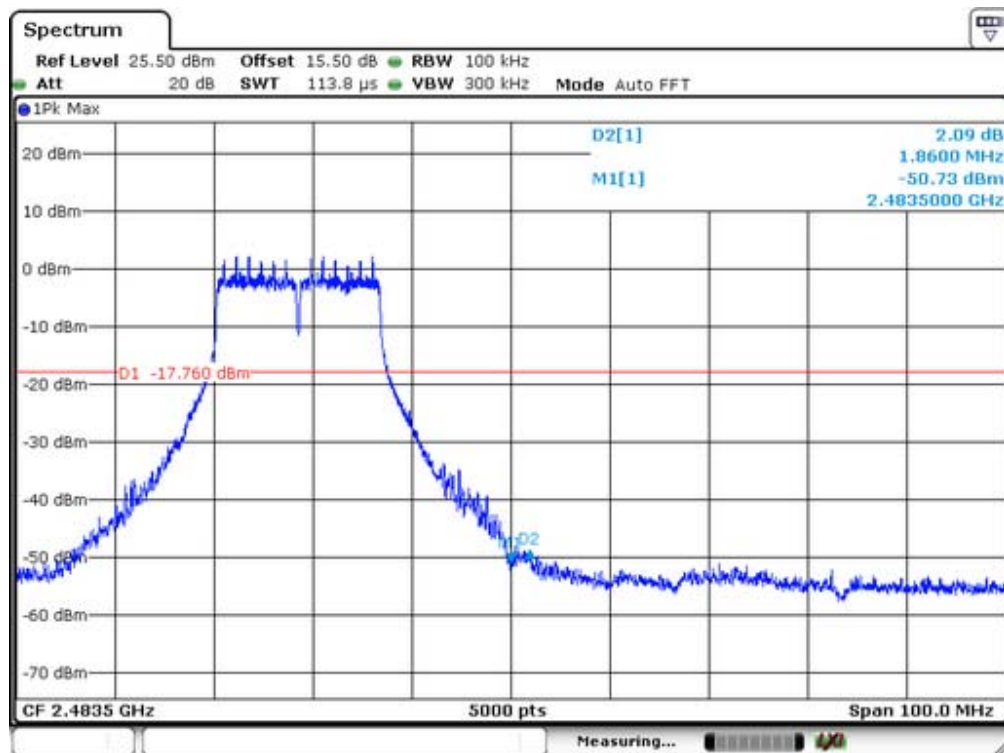
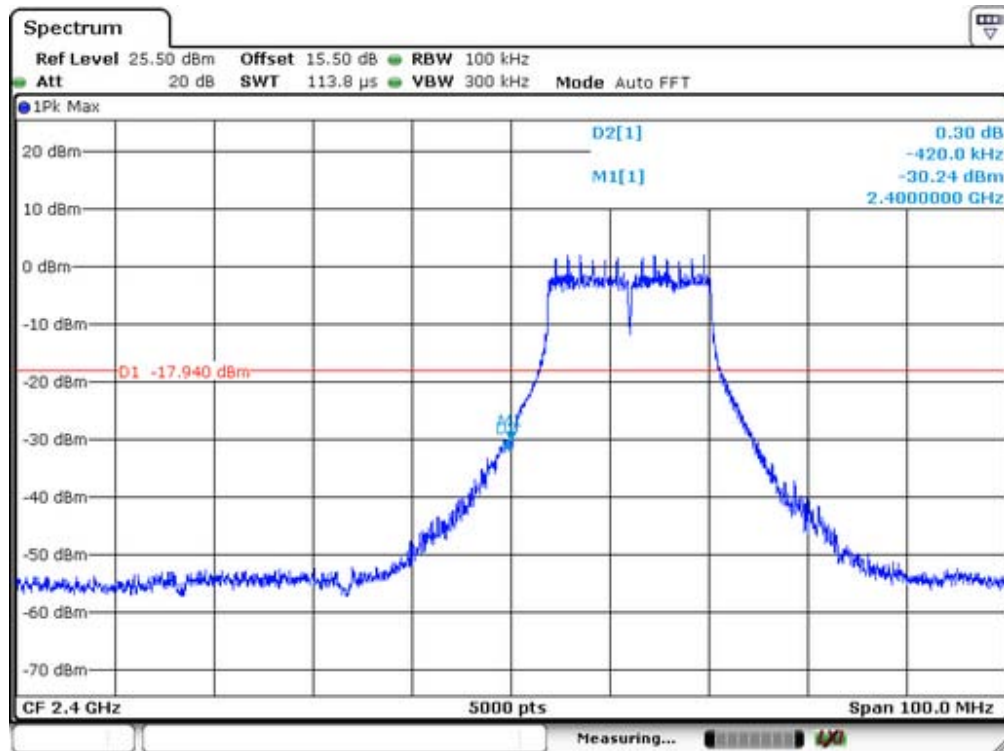
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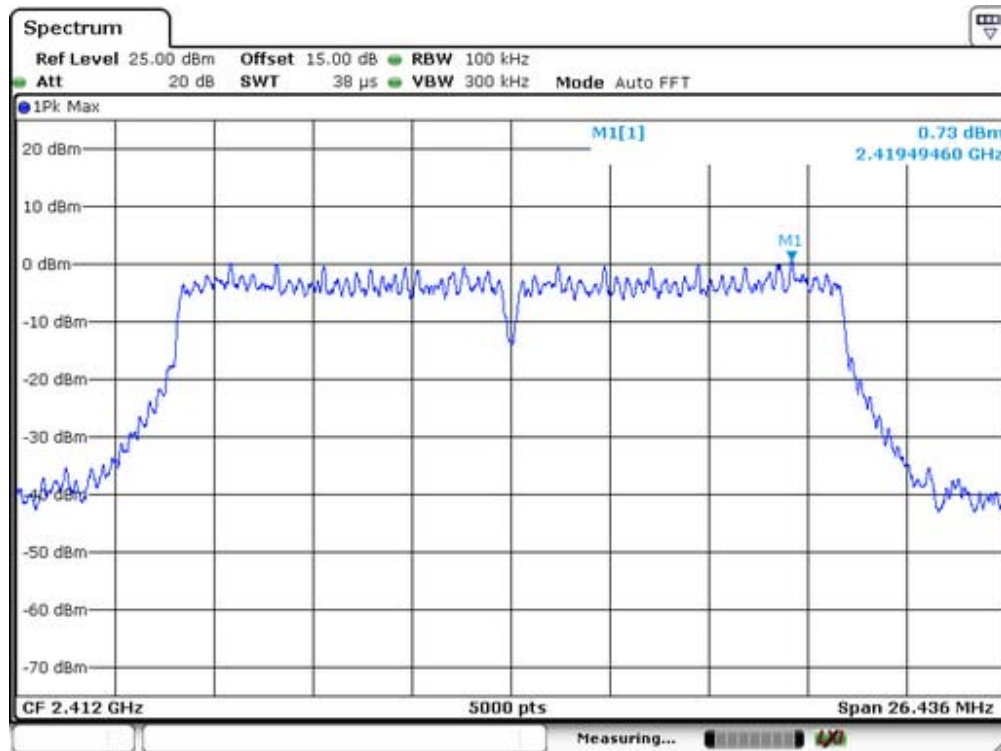
Middle Channel



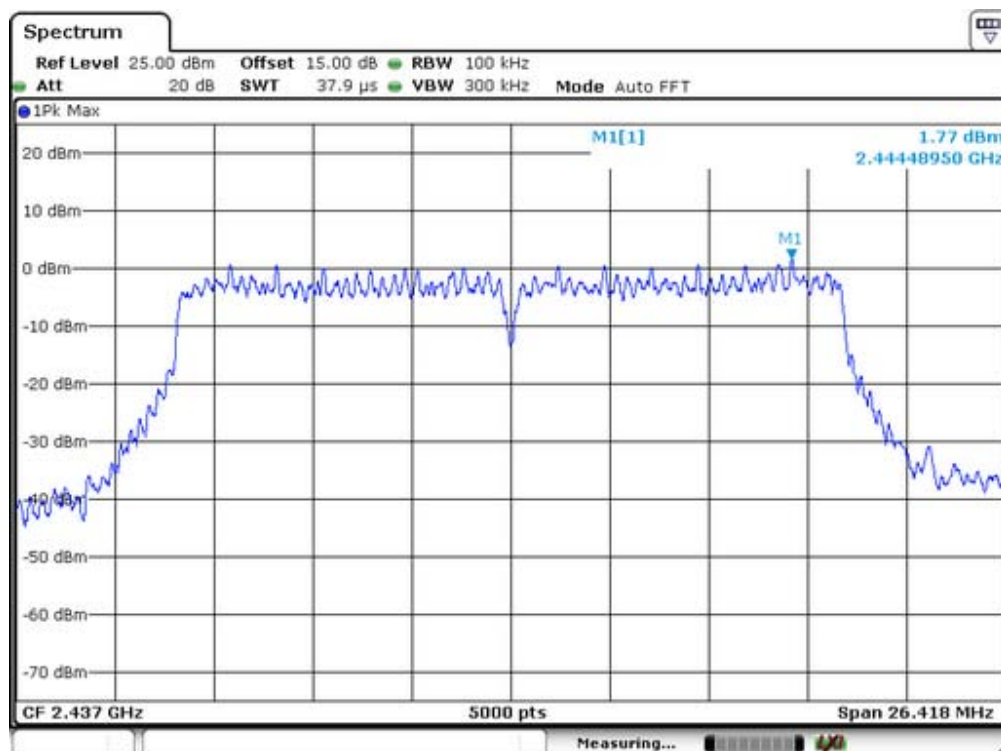
Highest Channel



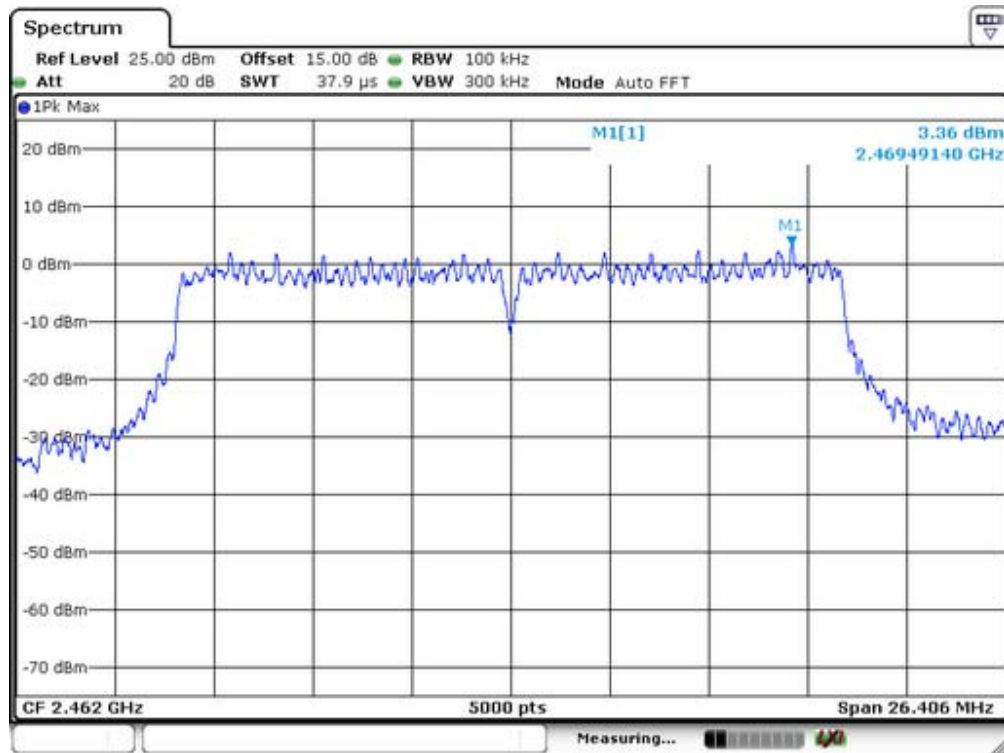
Test Mode: IEEE 802.11n(HT20) MIMO



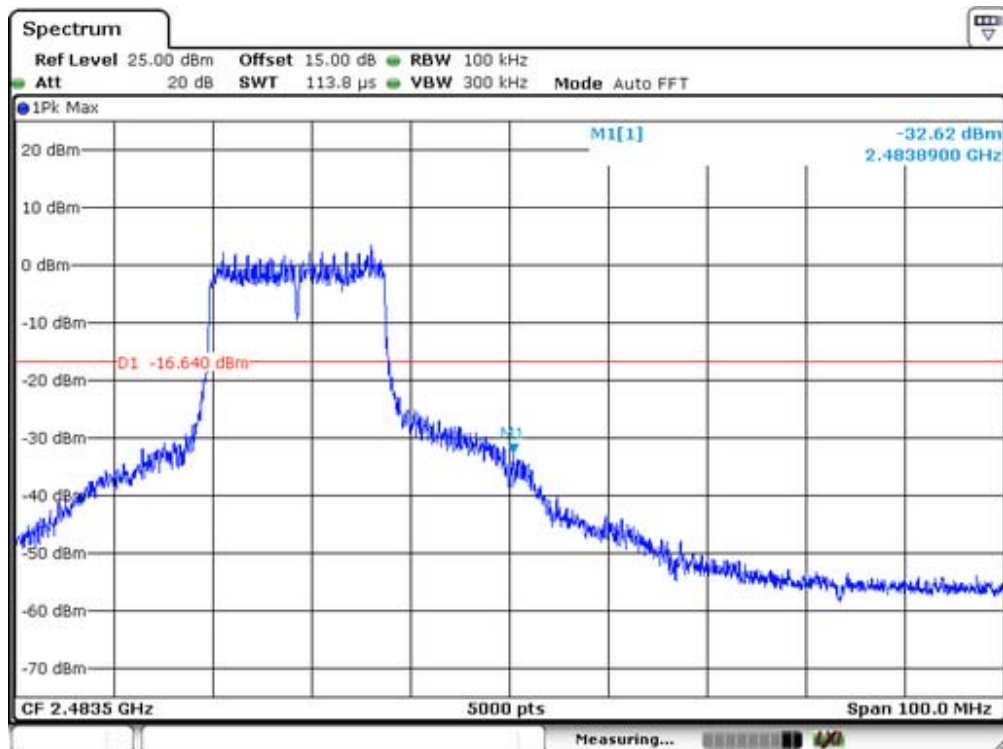
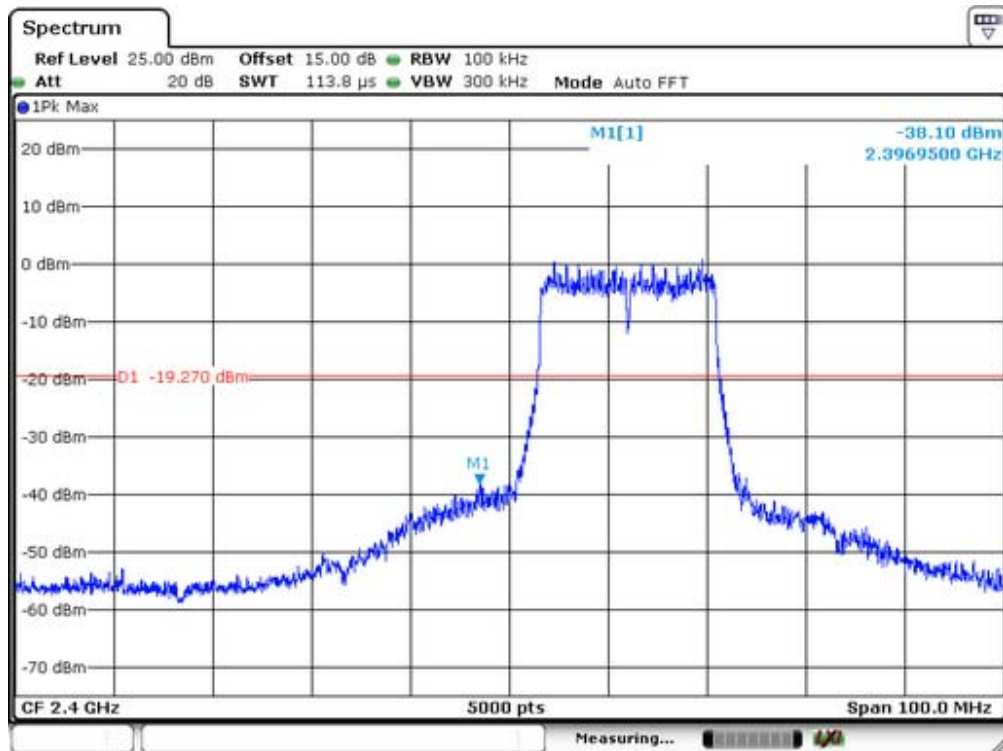
Lowest Channel



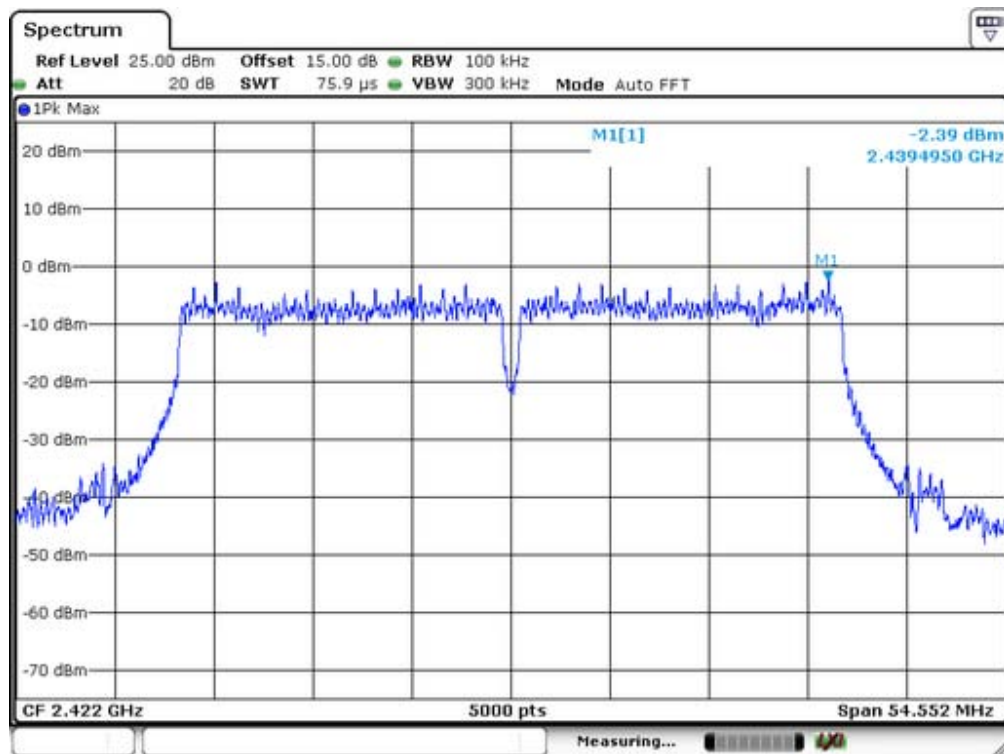
Middle Channel



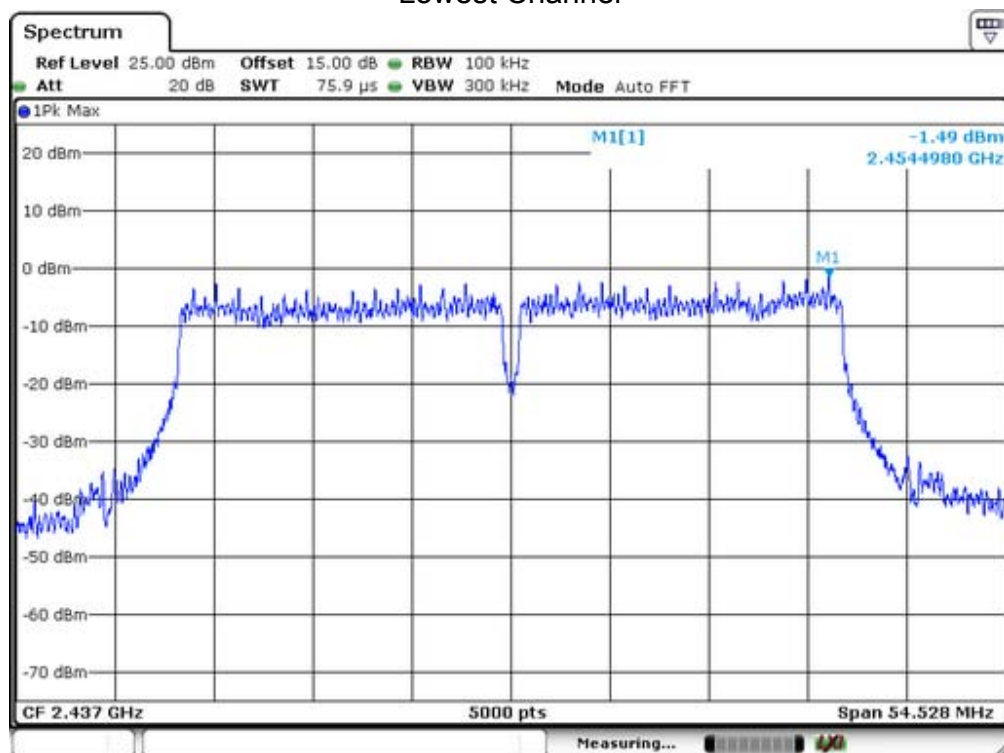
Highest Channel



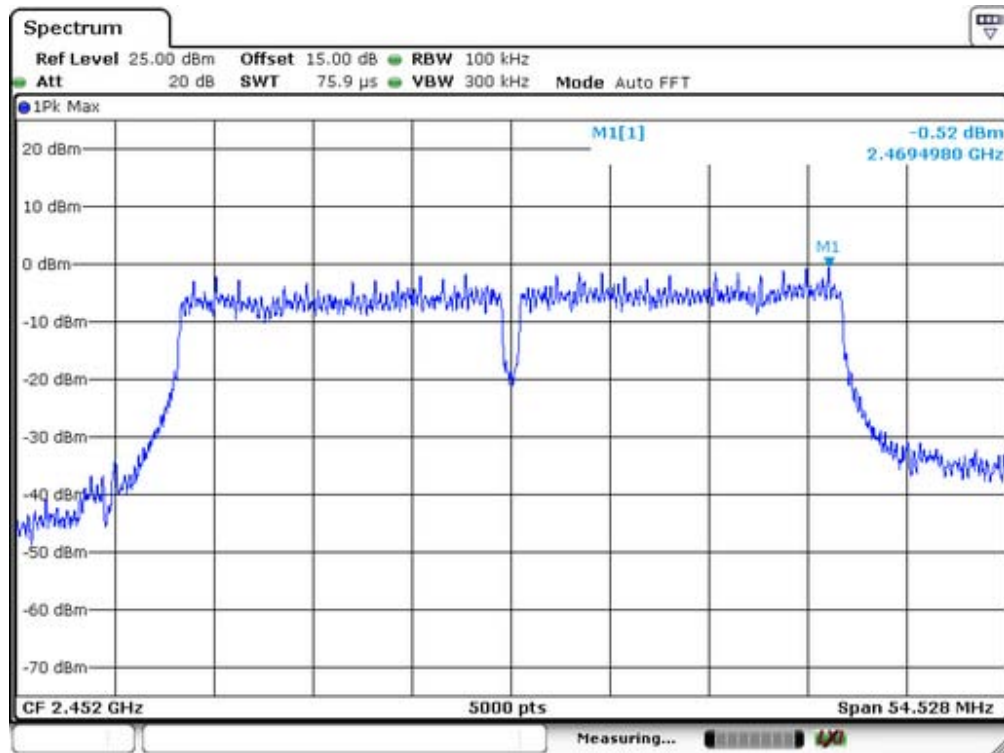
Test Mode: IEEE 802.11n(HT40) MIMO



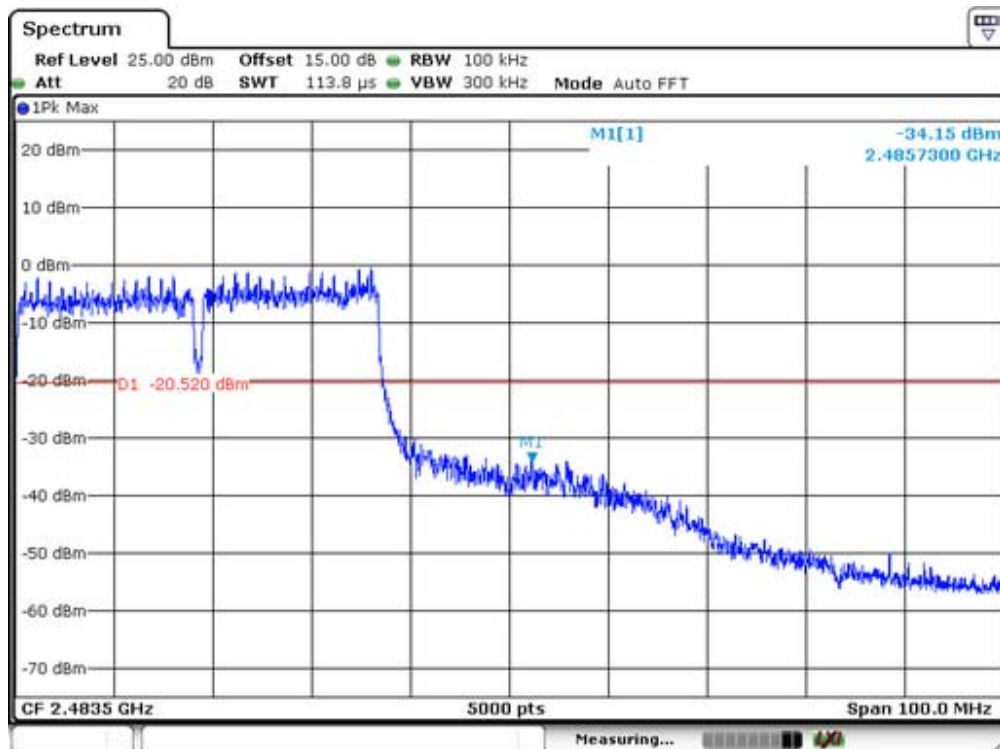
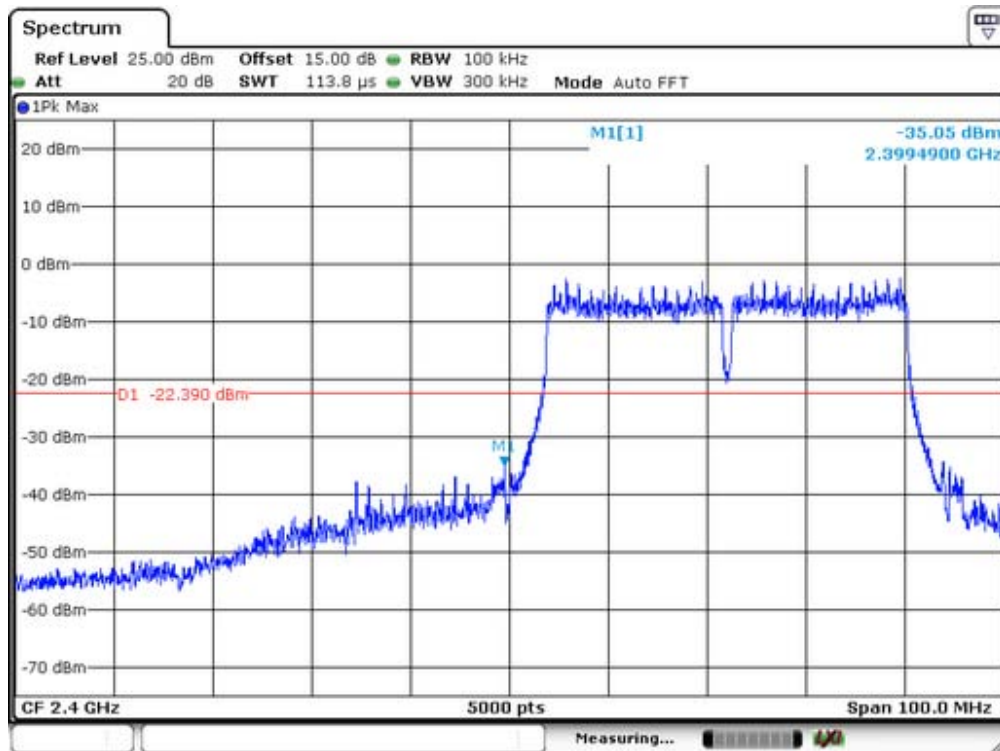
Lowest Channel



Middle Channel



Highest Channel



2. Radiated emission Test

Spectrum Detector: PK/AV Test Date : May 15, 2015
 Test By: Andy Temperature : 28 °C
 Humidity : 65 %

IEEE 802.11b SISO Ant1							
Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
		PK	AV	PK	AV	PK	AV
<2400	H	65.03	44.08	74	54	-8.97	-9.92
<2400	V	62.71	38.72	74	54	-11.29	-15.28
>2483.5	H	66.12	45.12	74	54	-7.88	-8.88
>2483.5	V	60.59	37.44	74	54	-13.41	-16.56

IEEE 802.11b SISO Ant2							
Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
		PK	AV	PK	AV	PK	AV
<2400	H	64.03	45.04	74	54	-9.97	-8.96
<2400	V	60.25	40.28	74	54	-13.75	-13.72
>2483.5	H	65.37	44.13	74	54	-8.63	-9.87
>2483.5	V	59.35	38.72	74	54	-14.65	-15.28

IEEE 802.11g SISO Ant1							
Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
		PK	AV	PK	AV	PK	AV
<2400	H	64.03	45.18	74	54	-9.97	-8.82
<2400	V	60.71	40.35	74	54	-13.29	-13.65
>2483.5	H	65.19	43.19	74	54	-8.81	-10.81
>2483.5	V	59.86	39.72	74	54	-14.14	-14.28

IEEE 802.11g SISO Ant2							
Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
		PK	AV	PK	AV	PK	AV
<2400	H	66.03	44.03	74	54	-7.97	-9.97
<2400	V	60.42	40.72	74	54	-13.58	-13.28
>2483.5	H	65.18	45.18	74	54	-8.82	-8.82
>2483.5	V	58.72	39.26	74	54	-15.28	-14.74

IEEE 802.11n(HT20) MIMO							
Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
		PK	AV	PK	AV	PK	AV
<2400	H	66.13	45.72	74	54	-7.87	-8.28
<2400	V	60.25	40.15	74	54	-13.75	-13.85
>2483.5	H	65.74	45.36	74	54	-8.26	-8.64
>2483.5	V	59.38	38.26	74	54	-14.62	-15.74

IEEE 802.11n(HT40) MIMO							
Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Margin (dB)	
		PK	AV	PK	AV	PK	AV
<2400	H	63.04	44.08	74	54	-10.96	-9.92
<2400	V	59.13	40.72	74	54	-14.87	-13.28
>2483.5	H	64.72	45.36	74	54	-9.28	-8.64
>2483.5	V	58.13	38.26	74	54	-15.87	-15.74

13. Maximum Power Spectral Density

13.1 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSV30	1321.3008K	03/16/2015	03/15/2016
Coaxial Cable	CDS	79254	46107086	03/16/2015	03/15/2016

13.2 Measuring Instruments and Setting

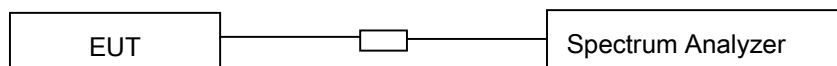
The following table is the setting of spectrum analyzer.

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

13.3 Test Procedures

- The transmitter output (antenna port) was connected to the spectrum analyzer.
- Set analyzer center frequency to DTS channel center frequency.
- Set the analyzer span to a minimum of 1.5 times the DTS bandwidth.
- Set the RBW=100KHz. Set the VBW=300KHz
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

13.4 Block Diagram of Test Setup



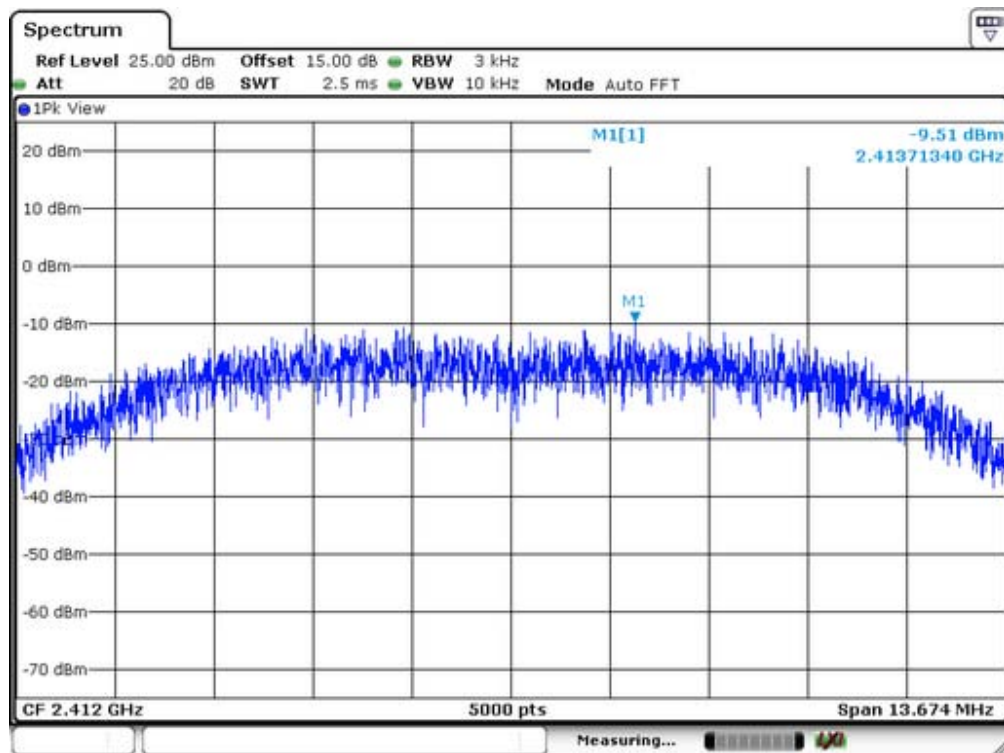
13.5 Limit

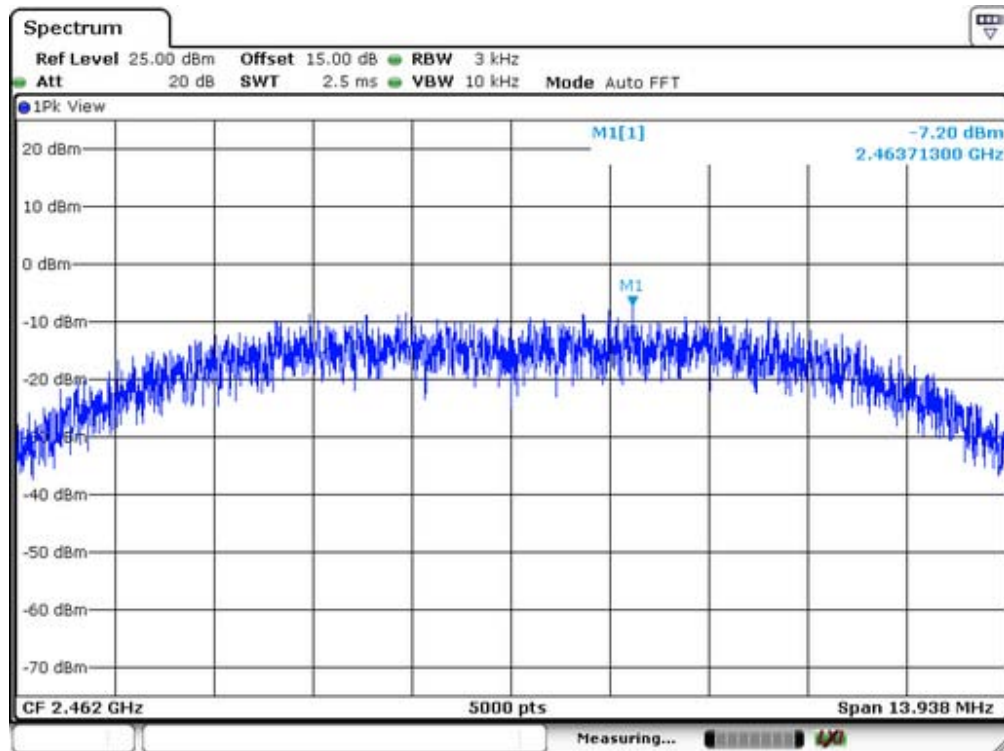
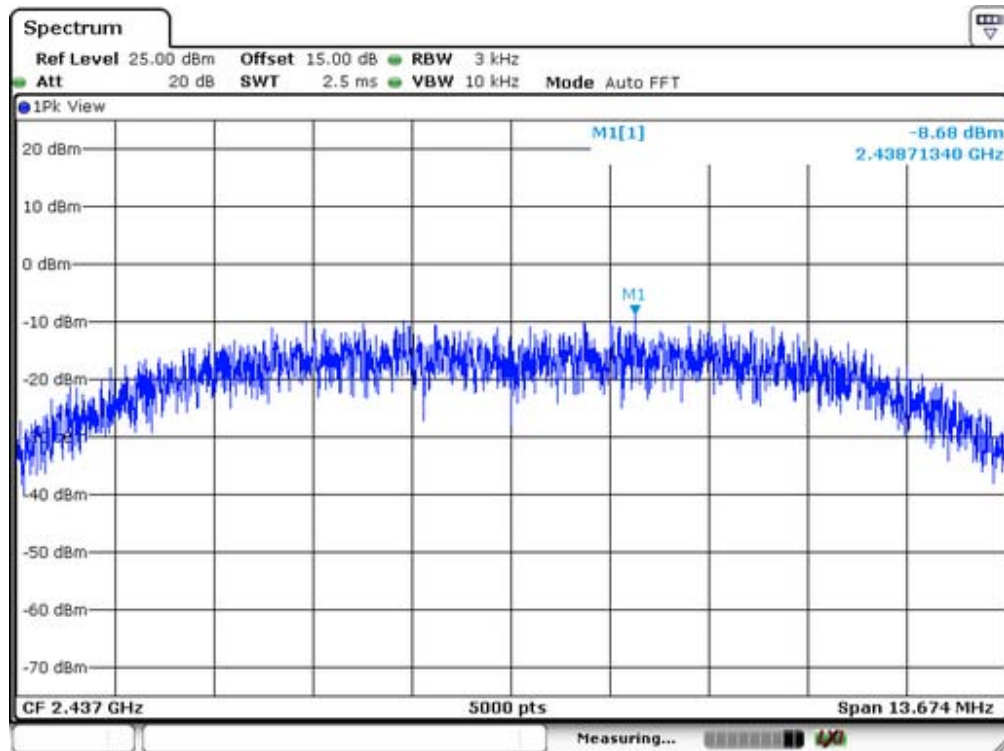
The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3 kHz bandwidth.

13.6 Test Result

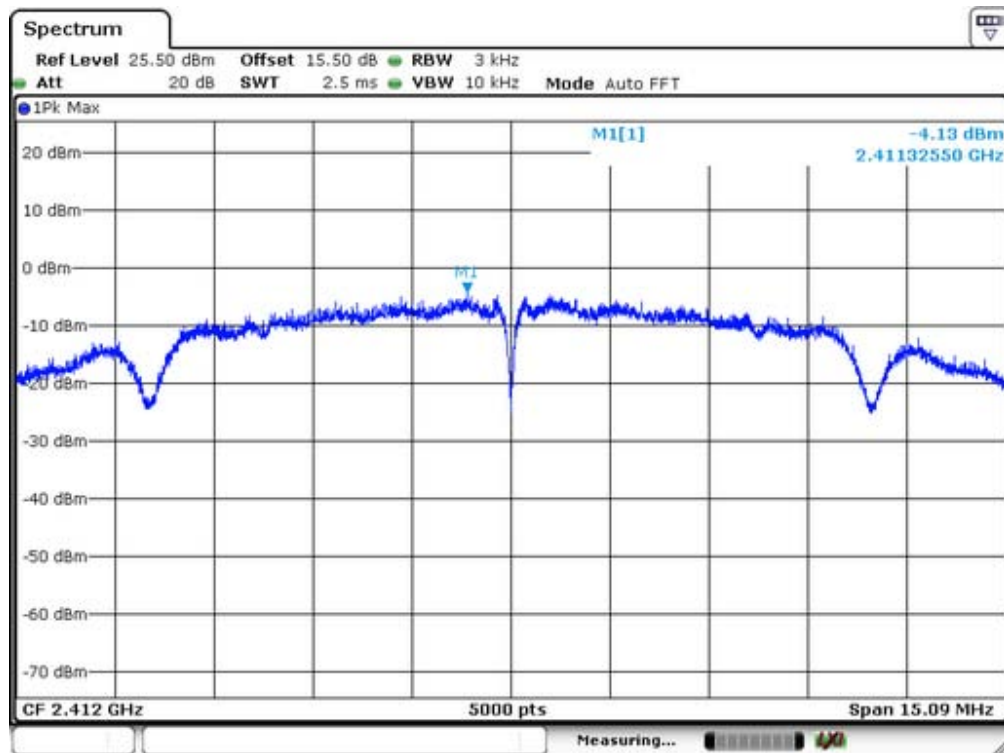
Spectrum Detector: PK Test Date : May 15, 2015
Test By: Andy Temperature : 28°C
Humidity : 60%

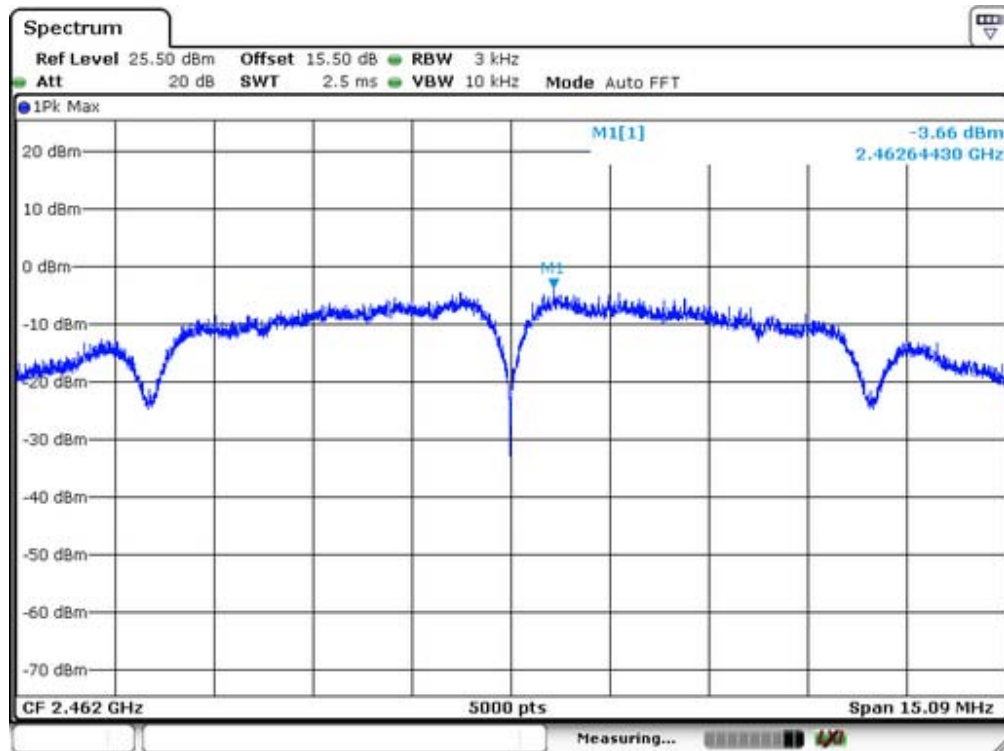
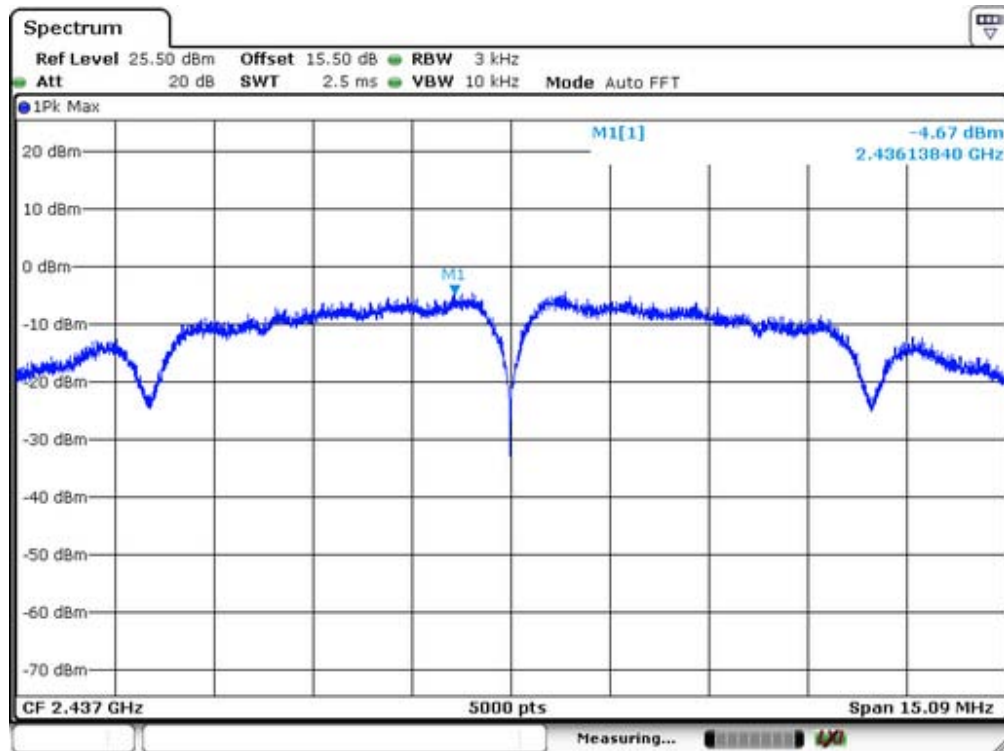
IEEE 802.11b SISO ANT1			
Channel frequency (MHz)	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
2412	-9.51	8	Pass
2437	-8.68		
2462	-7.20		



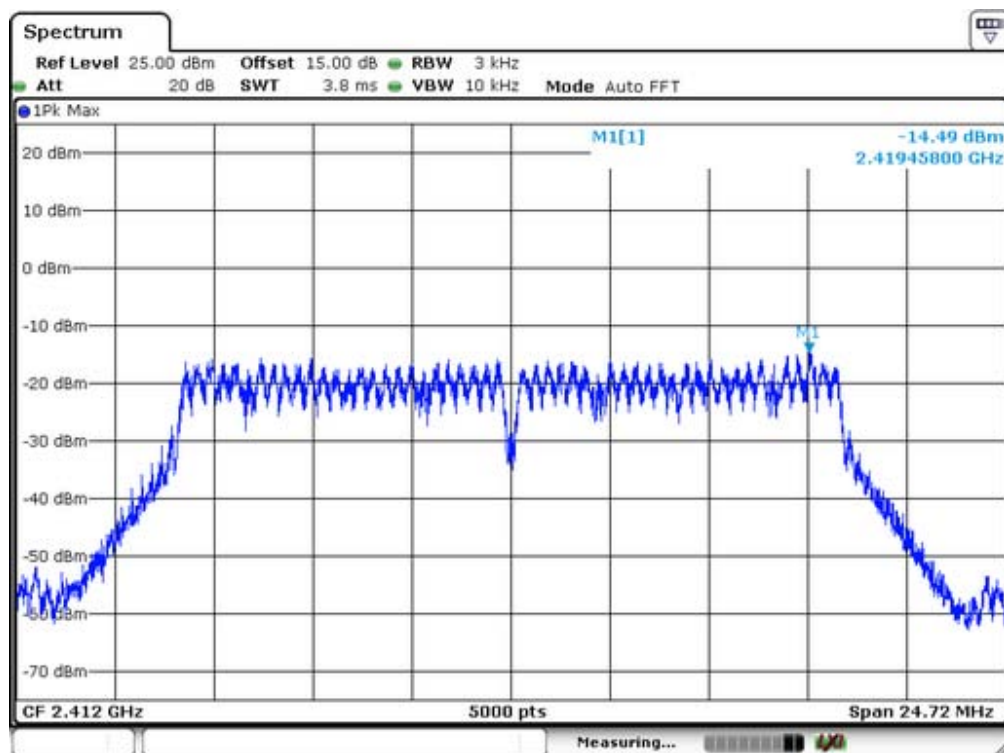


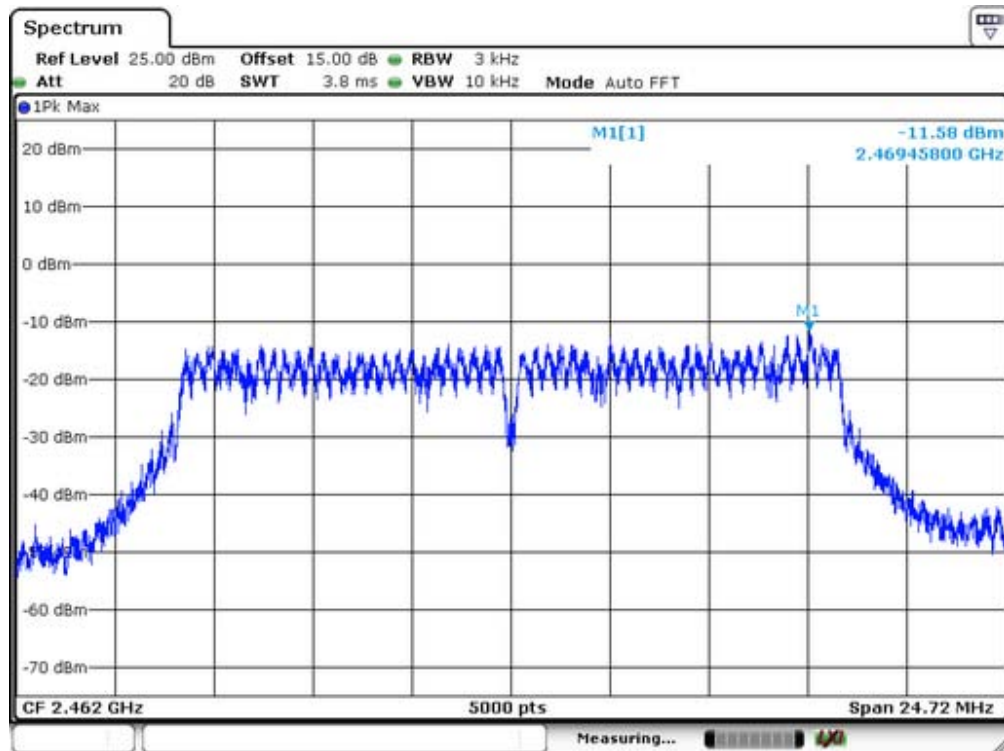
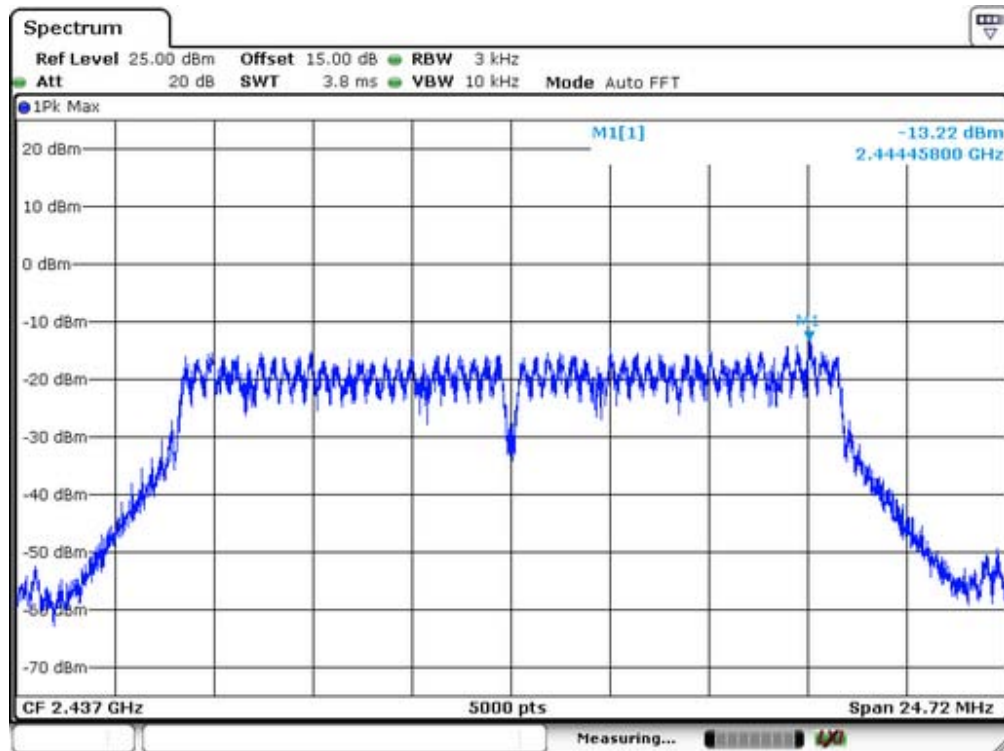
IEEE 802.11b SISO ANT2			
Channel frequency (MHz)	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
2412	-4.13	8	Pass
2437	-4.67		
2462	-3.66		



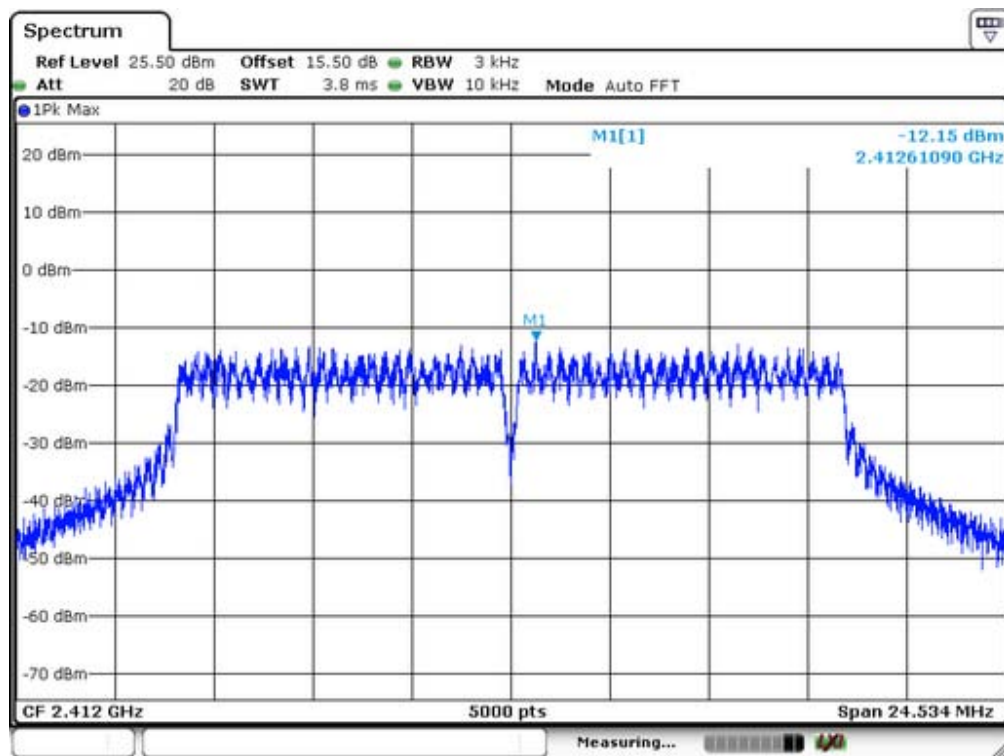


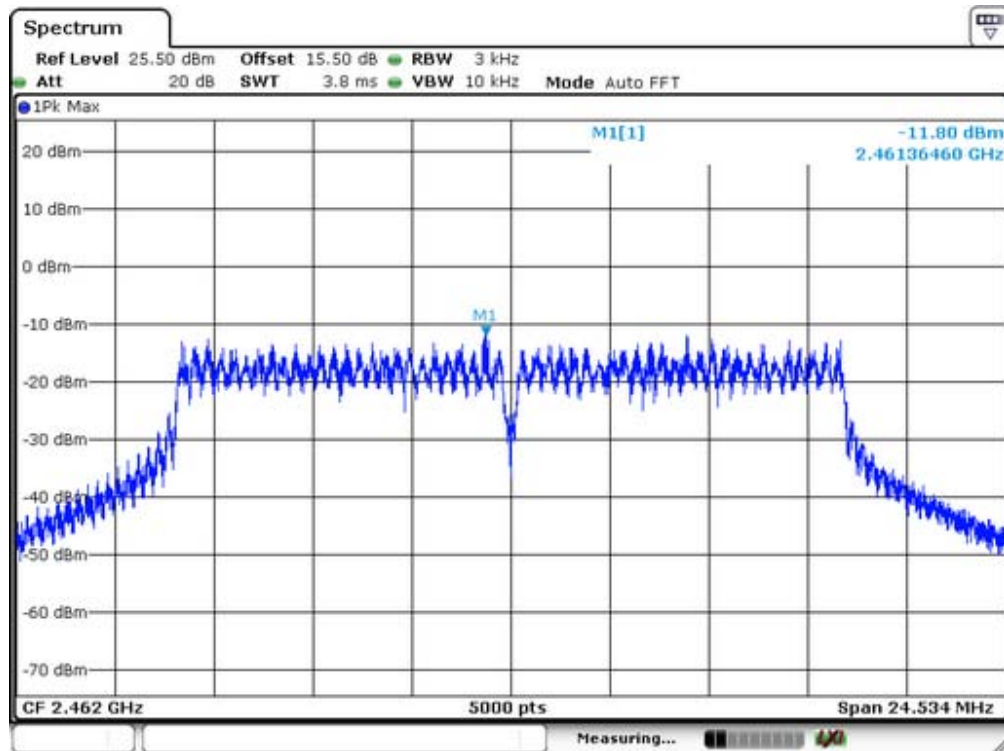
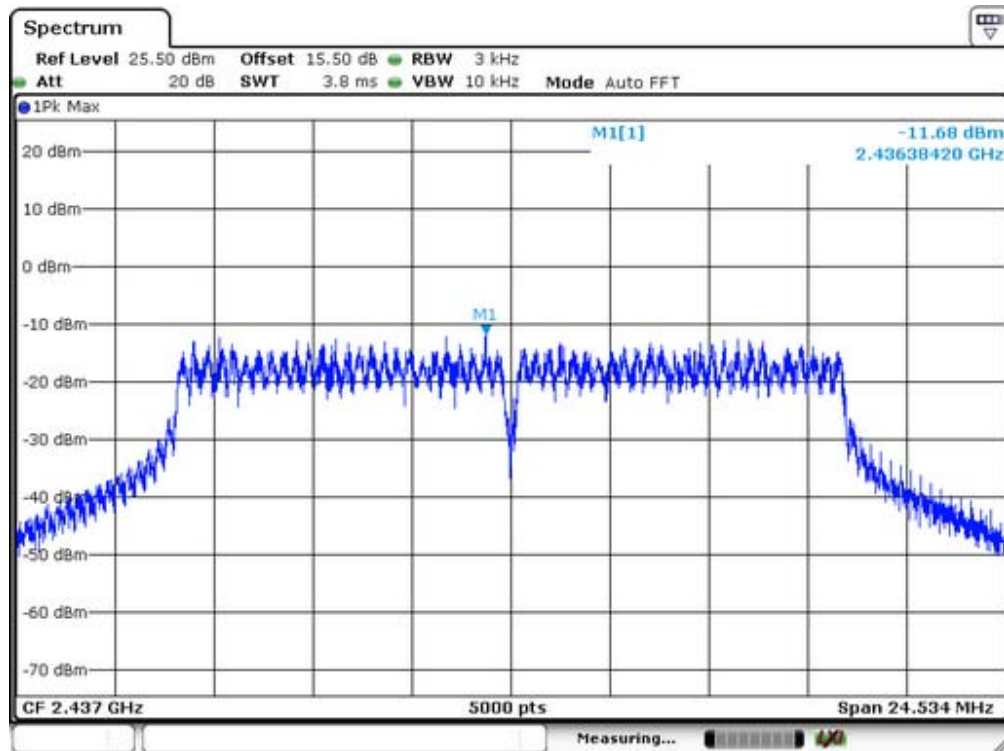
IEEE 802.11g(SISO) ANT1			
Channel frequency (MHz)	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
2412	-14.49	8	Pass
2437	-13.22		
2462	-11.58		





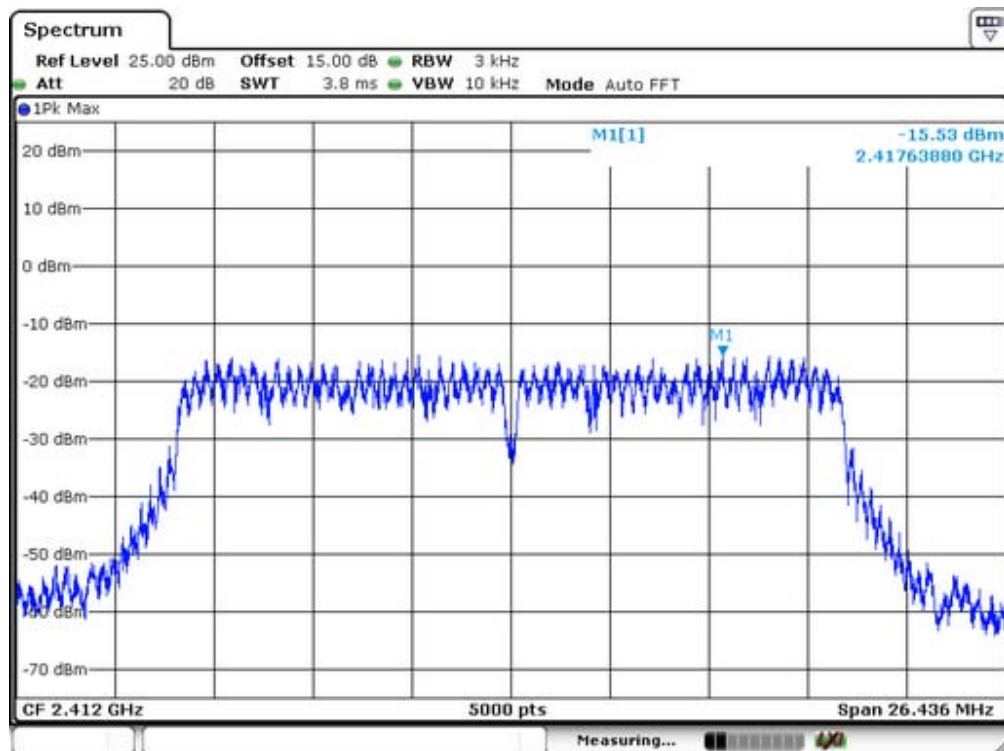
IEEE 802.11g(SISO) ANT2			
Channel frequency (MHz)	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
2412	-12.15	8	Pass
2437	-11.68		
2462	-11.80		

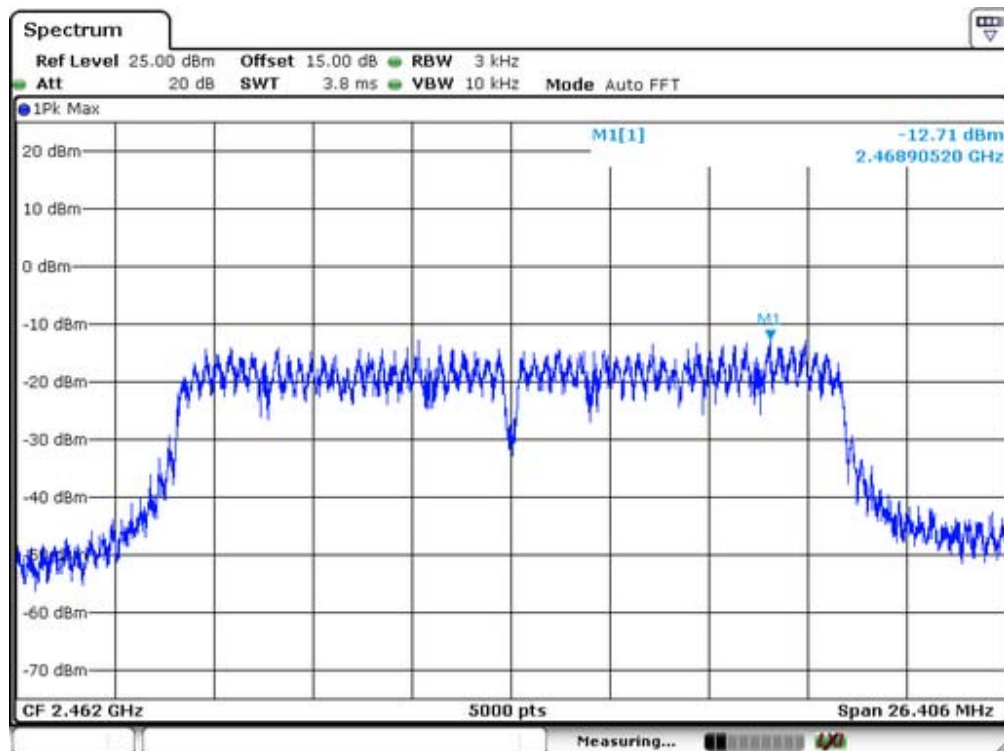
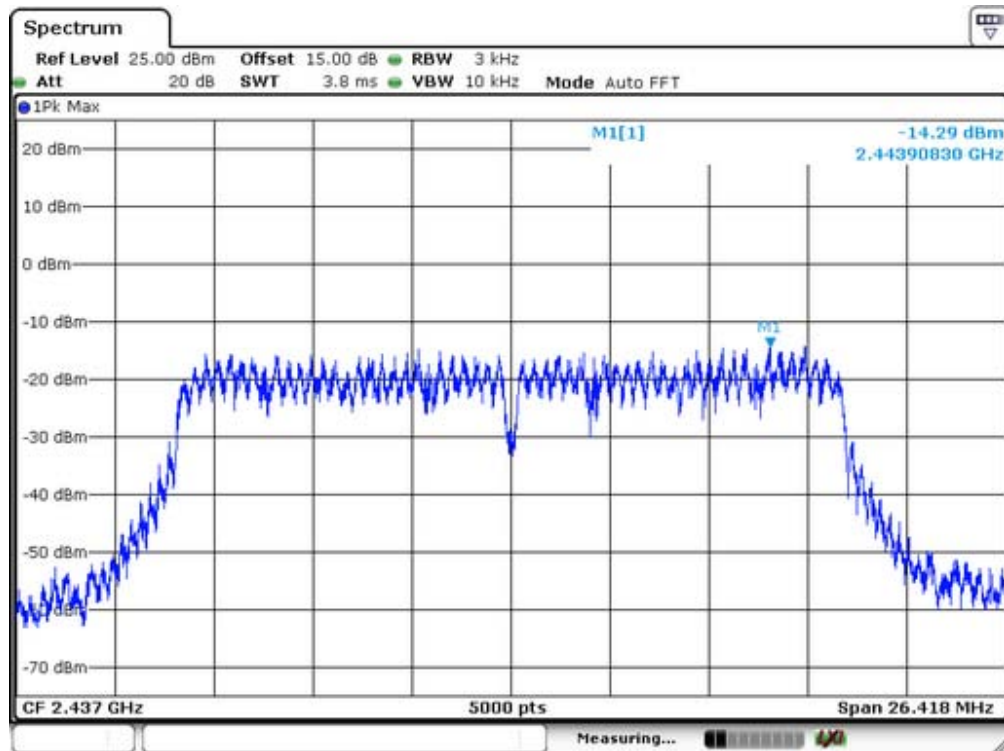




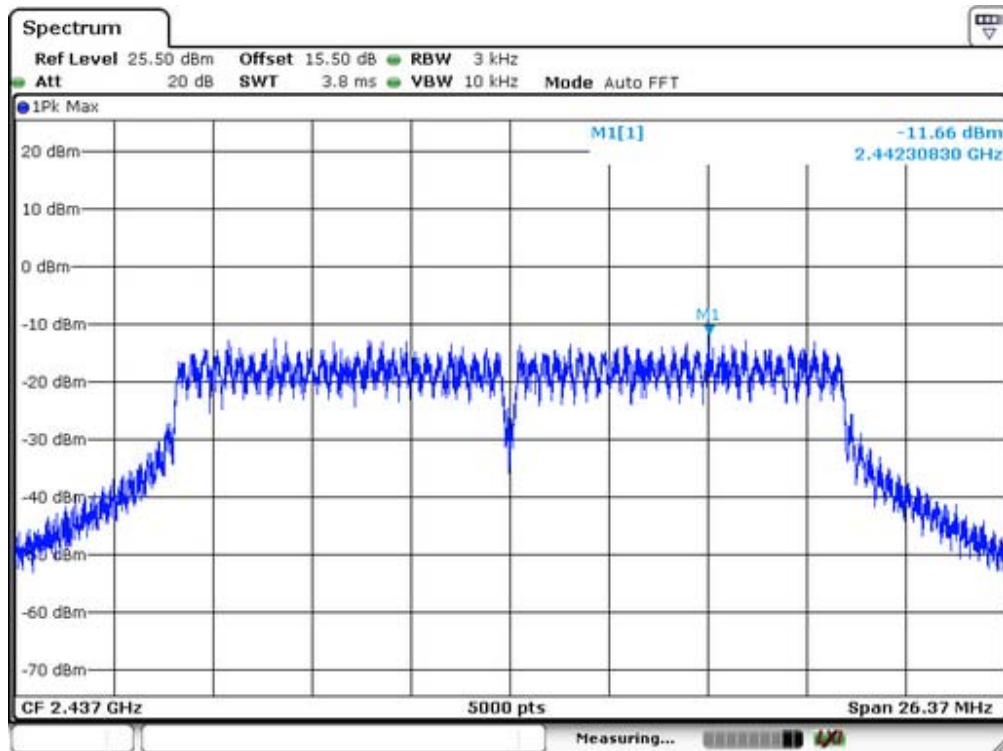
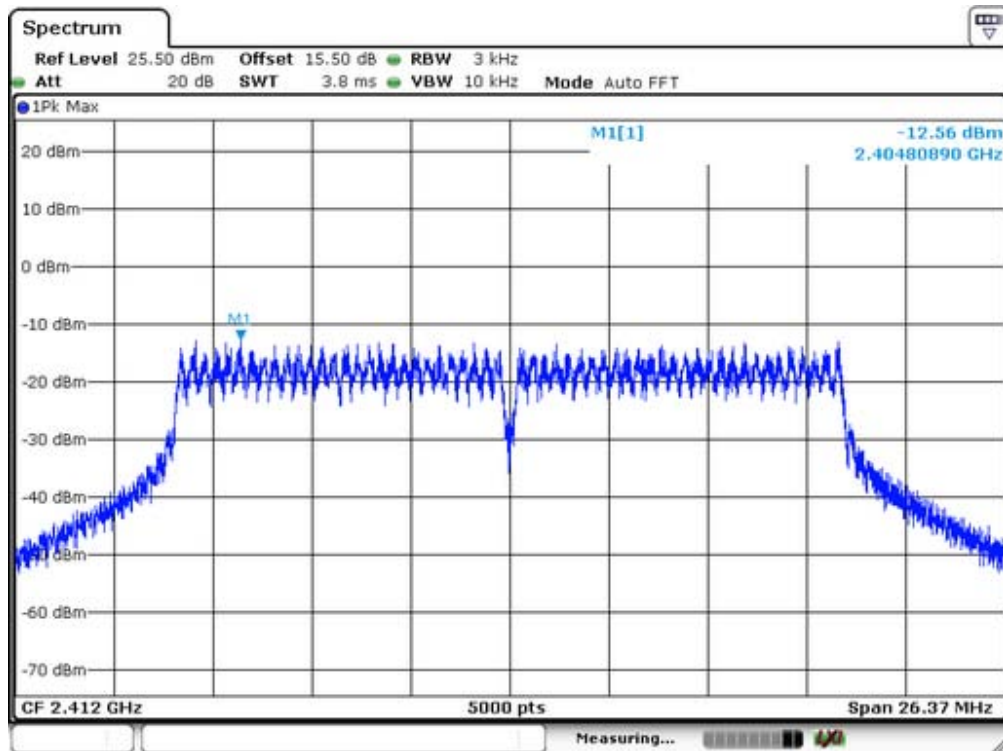
IEEE 802.11n(HT20) MIMO(Antenna Gain=8.01dBi)					
Channel frequency (MHz)	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
	ANT1	ANT2	Total		
2412	-15.53	-12.56	-10.79	6	Pass
2437	-14.29	-11.66	-9.77		
2462	-12.71	-12.00	-9.33		
Note: In MIMO, ANT1+ANT2 Directional Gain= $G_{ant}+10\text{Log}(\text{N})\text{dBi}=5+10\text{Log}(2)=8.01\text{dBi}$. Directional Gain was according to KDB662911.					

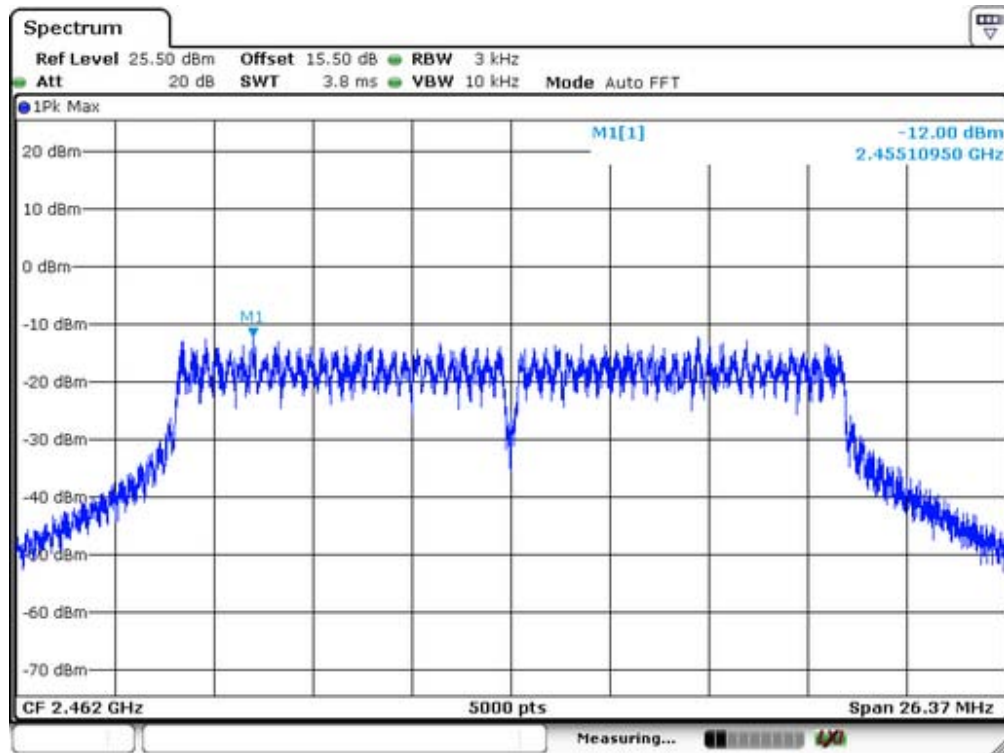
ANT1





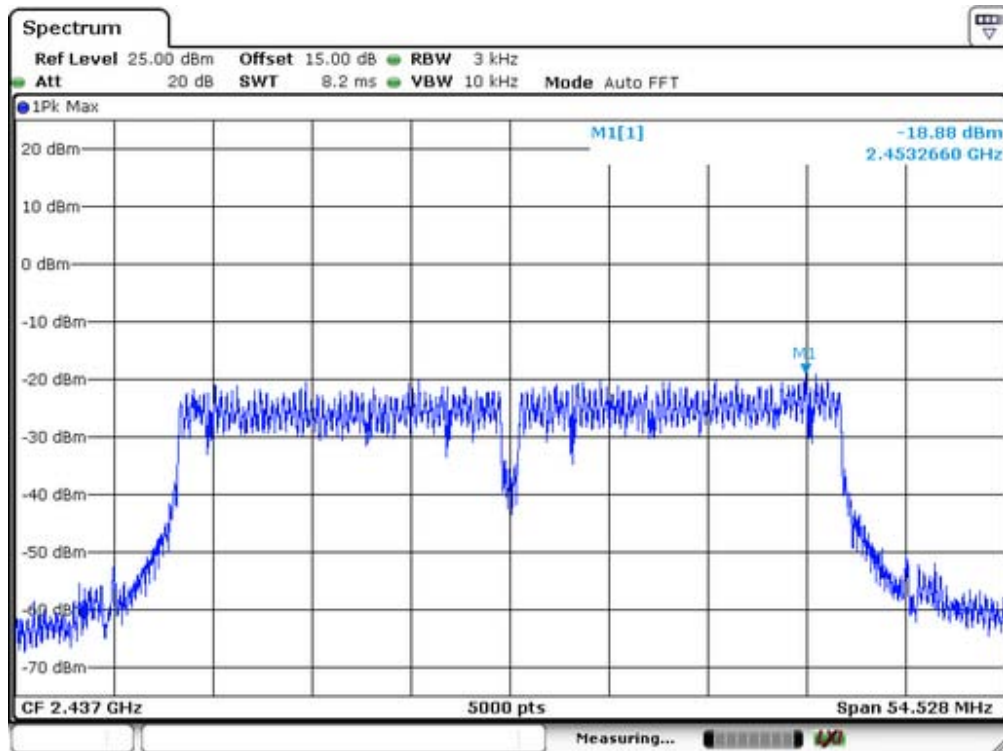
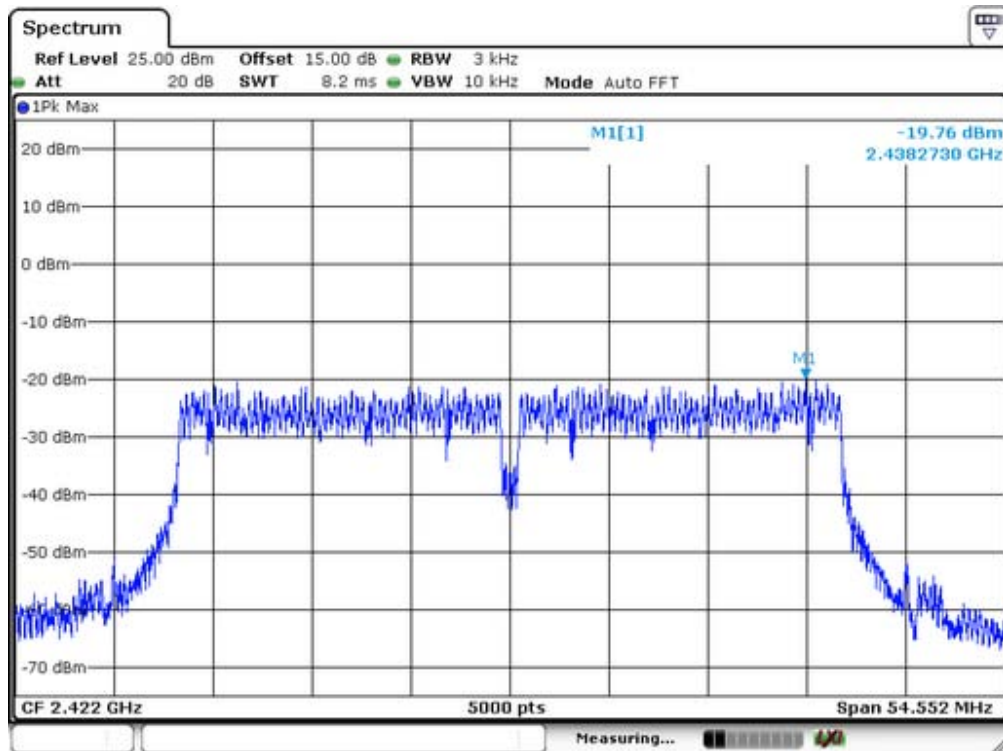
ANT2

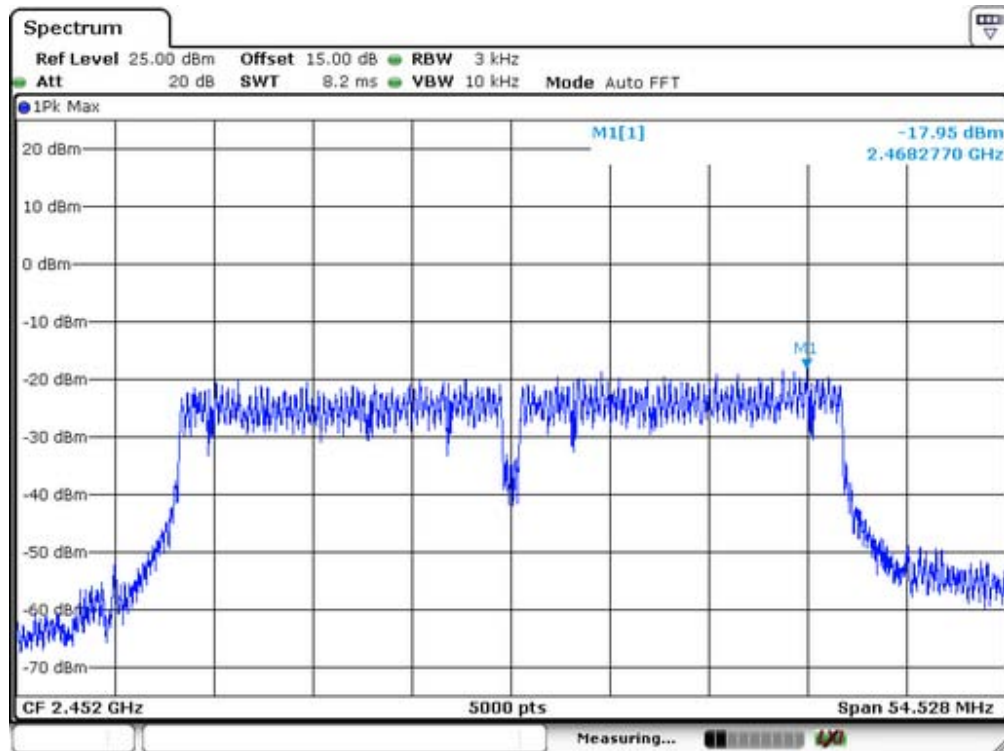




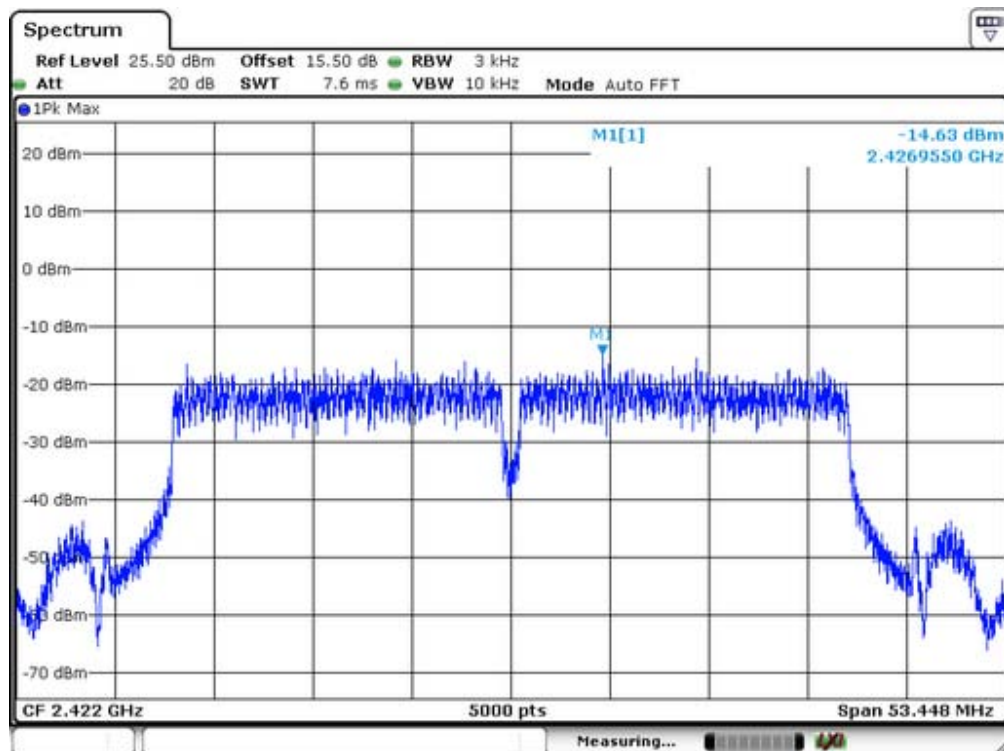
IEEE 802.11n(HT40) MIMO(Antenna Gain=8.01dBi)					
Channel frequency (MHz)	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
	Ant 1	Ant 2	Total		
2422	-19.76	-14.63	-13.47	6	Pass
2437	-18.88	-15.79	-14.06		
2452	-17.95	-15.79	-13.73		
Note: In MIMO, ANT1+ANT2 Directional Gain= $G_{ant}+10\text{Log}(N)\text{dBi}=5+10\text{Log}(2)=8.01\text{dBi}$. Directional Gain was according to KDB662911.					

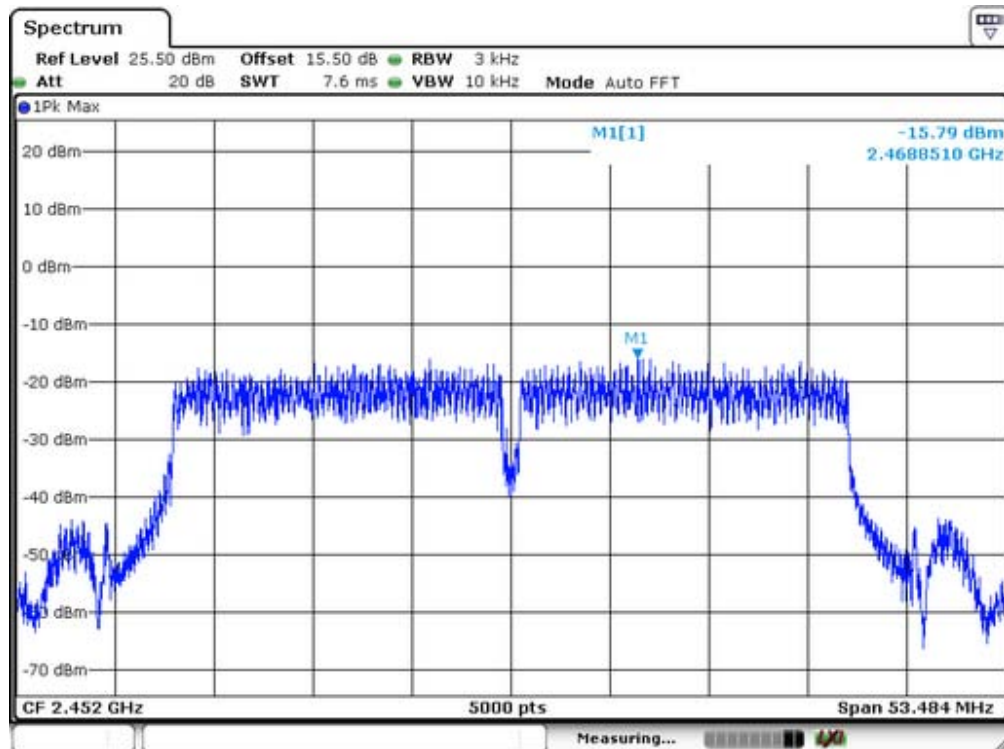
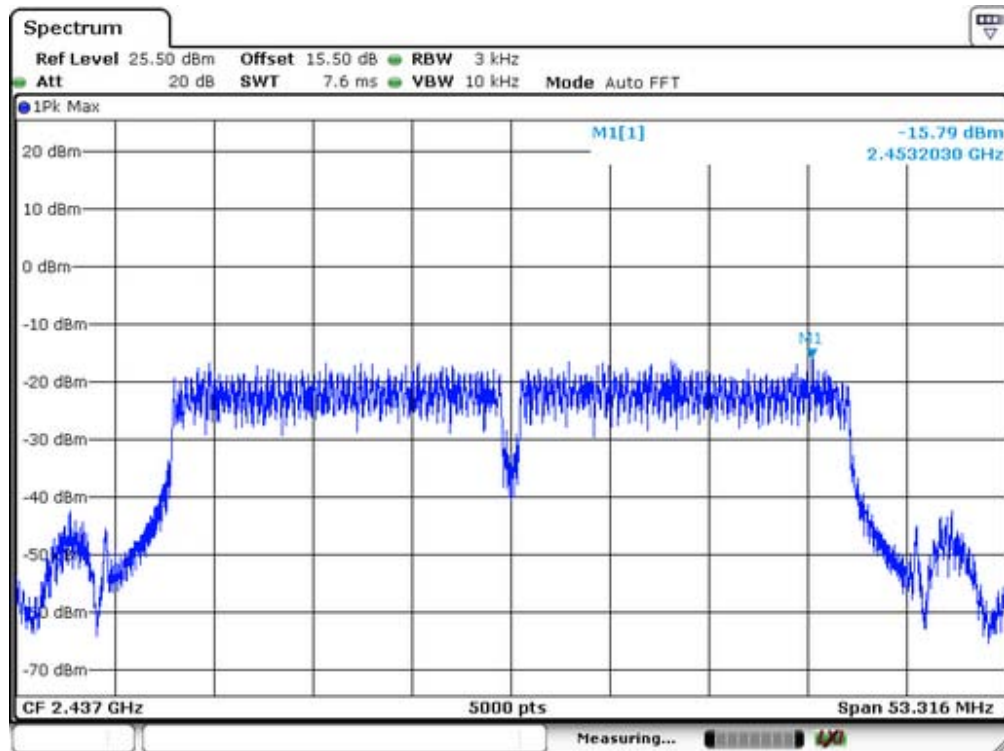
ANT1





ANT2





14. Antenna Port Emission

14.1 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSV30	1321.3008K	03/16/2015	03/15/2016
Coaxial Cable	CDS	79254	46107086	03/16/2015	03/15/2016

14.2 Measuring Instruments and Setting

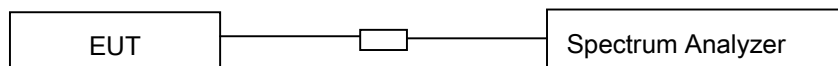
The following table is the setting of spectrum analyzer.

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

14.3 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.

14.4 Block Diagram of Test setup

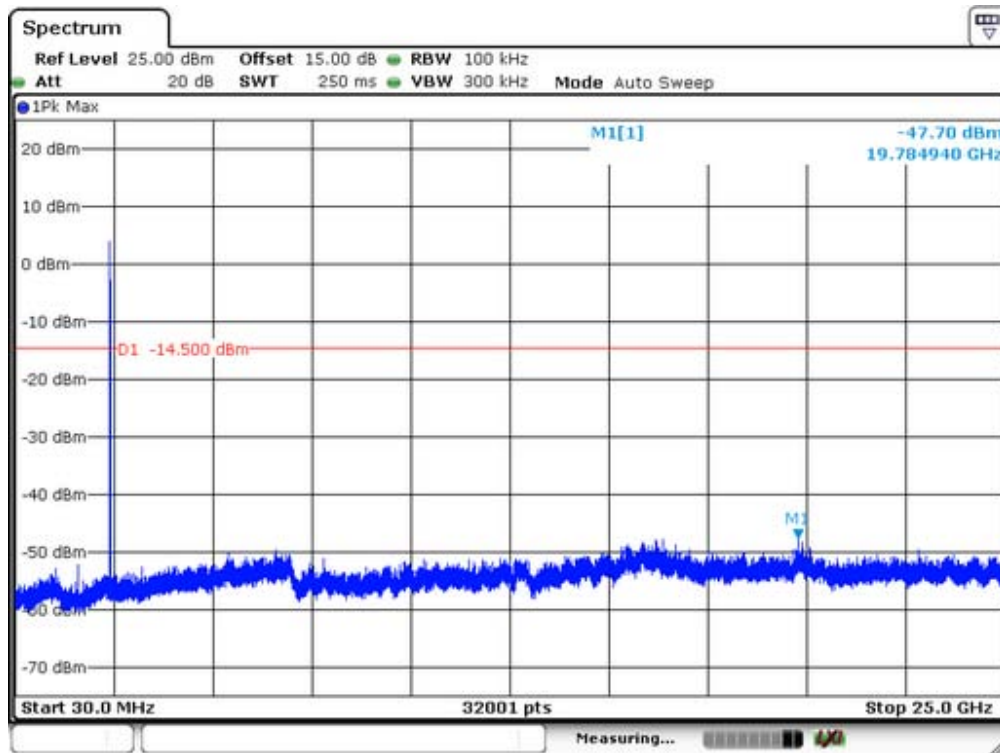


14.5 Test Result

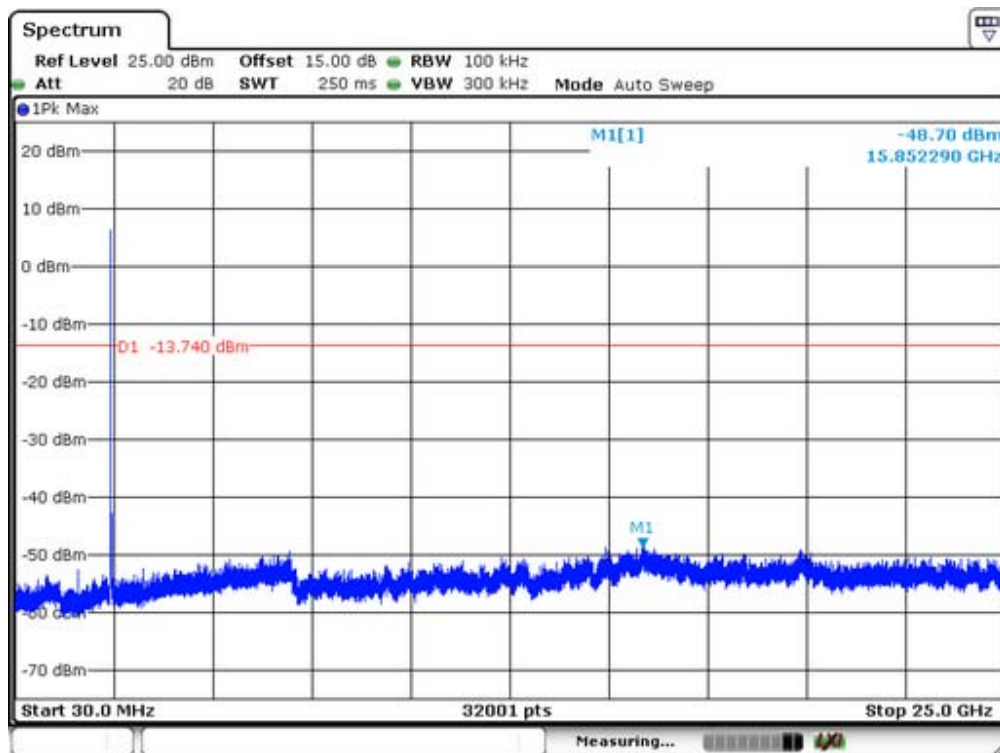
PASS.

Please refer to the following pages.

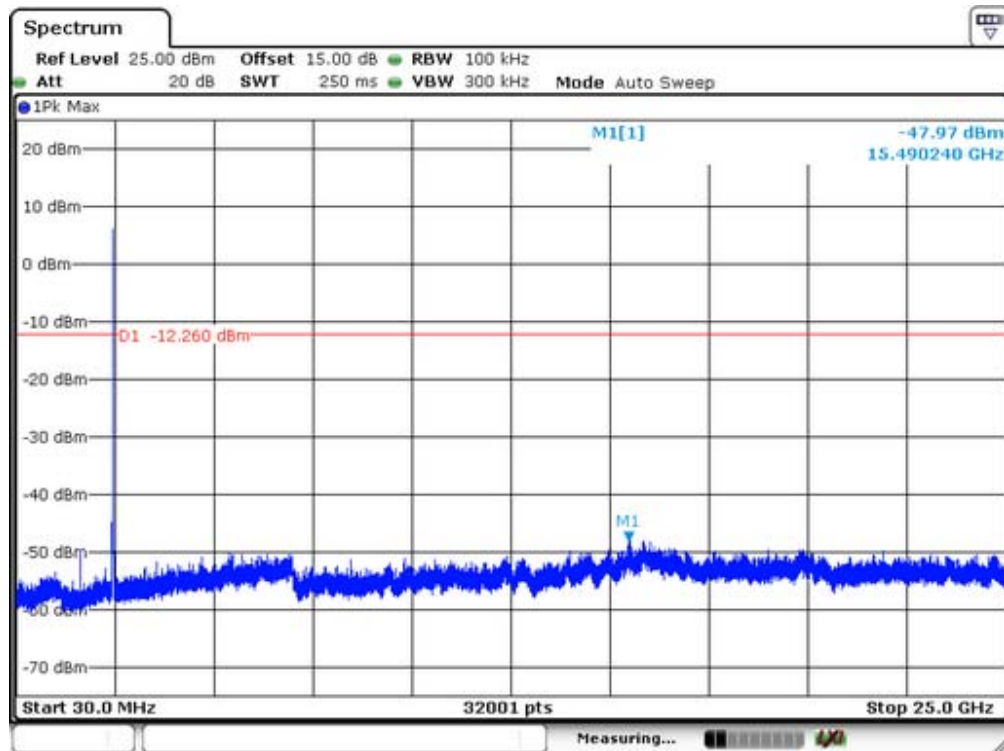
Test Mode: IEEE 802.11b SISO ANT1



Lowest Channel

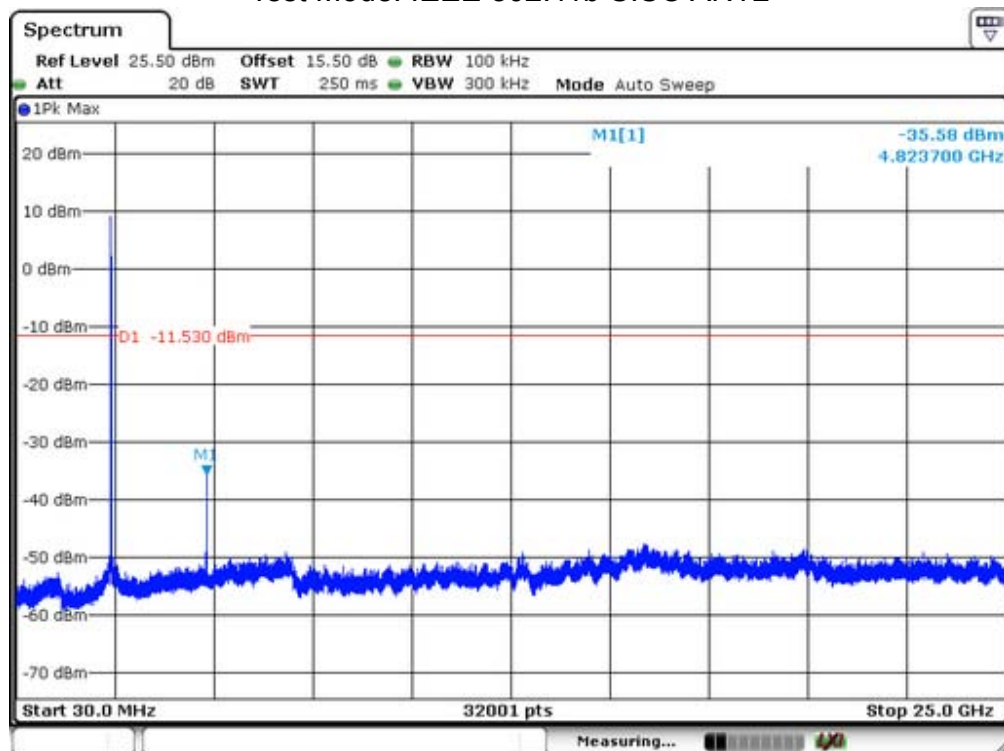


Middel Channel

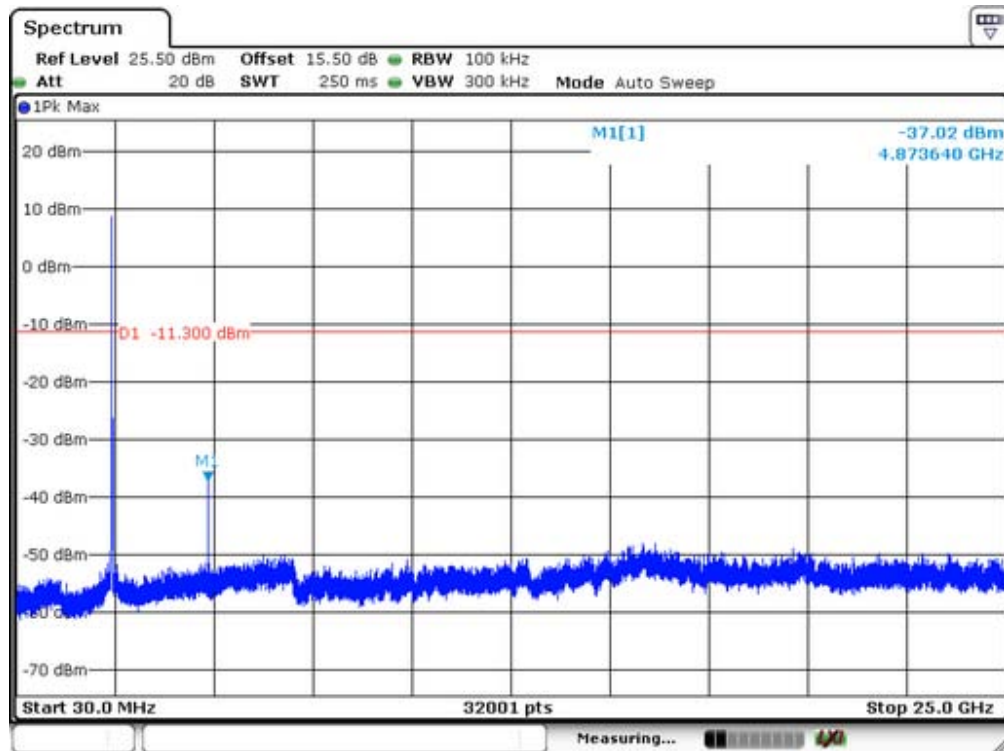


Highest Channel

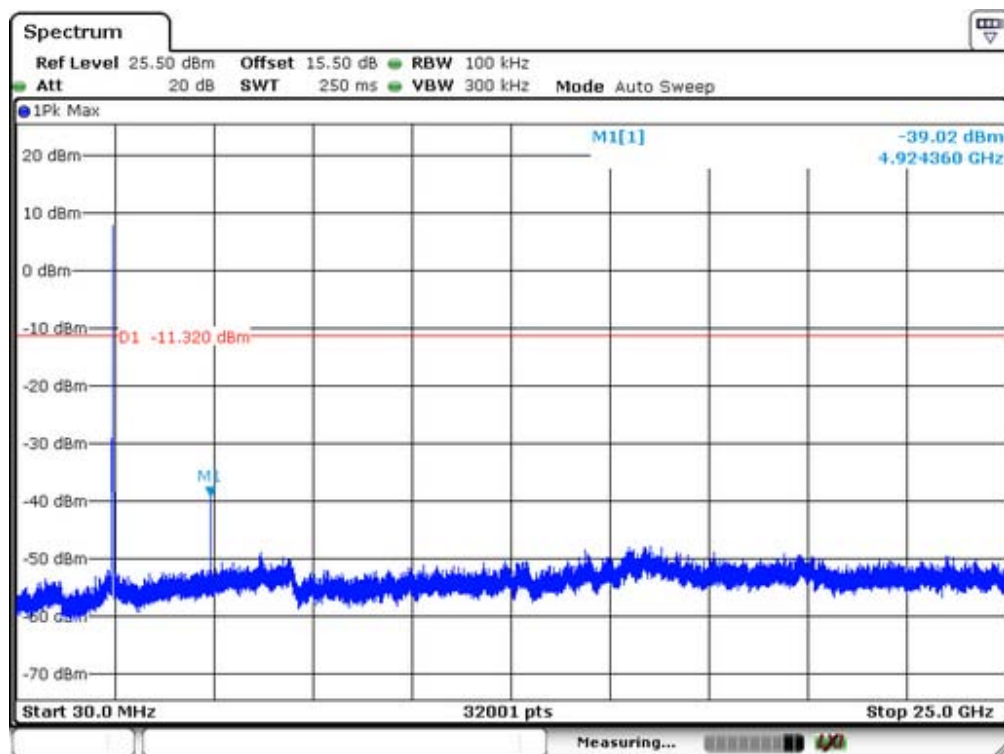
Test Mode: IEEE 802.11b SISO ANT2



Lowest Channel

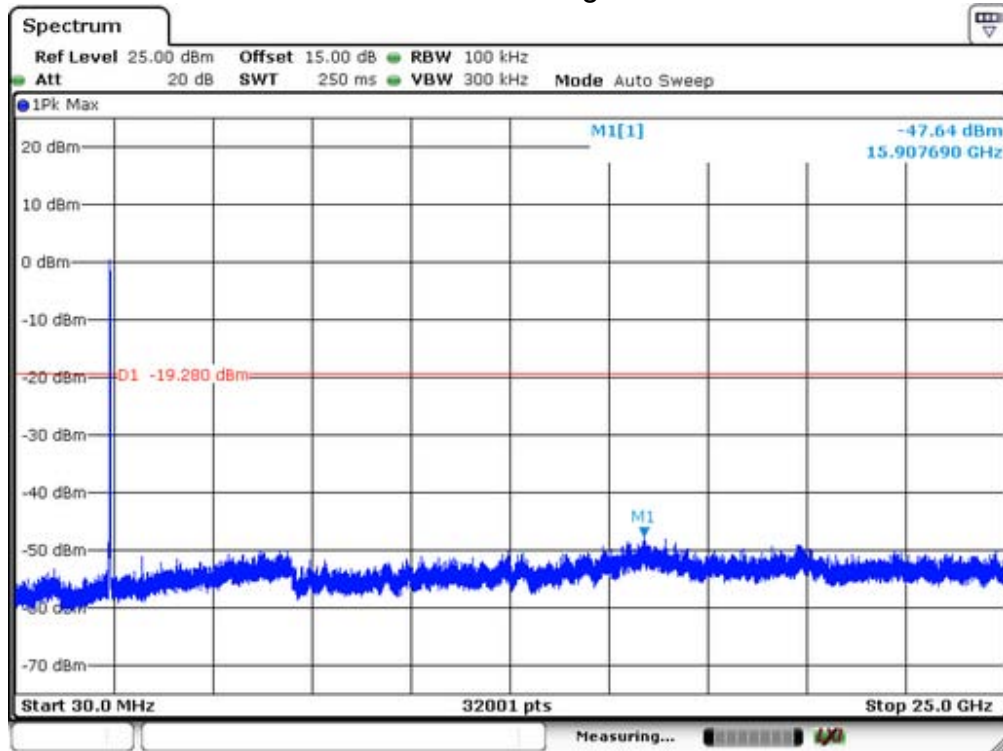


Middel Channel

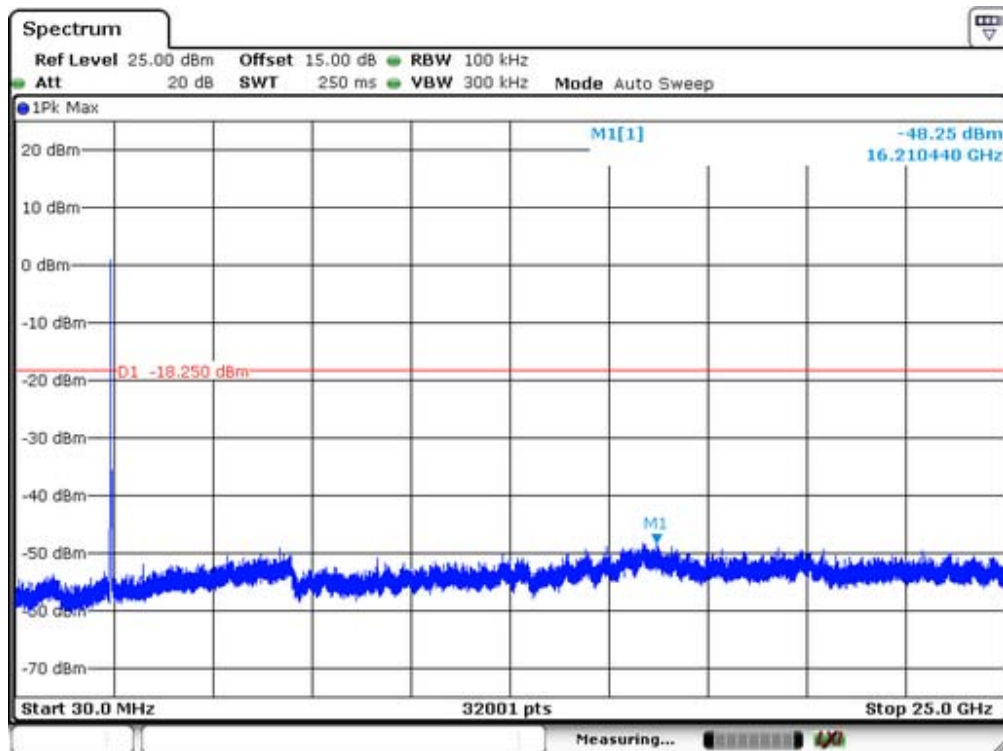


Highest Channel

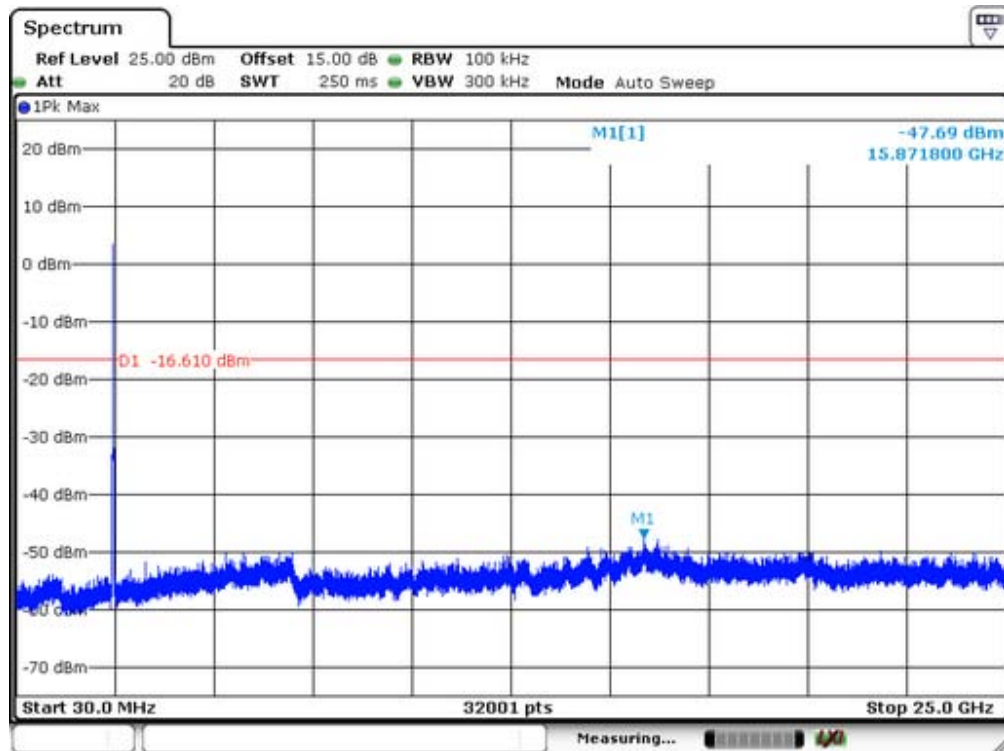
Test Mode: IEEE 802.11g SISO ANT1



Lowest Channel

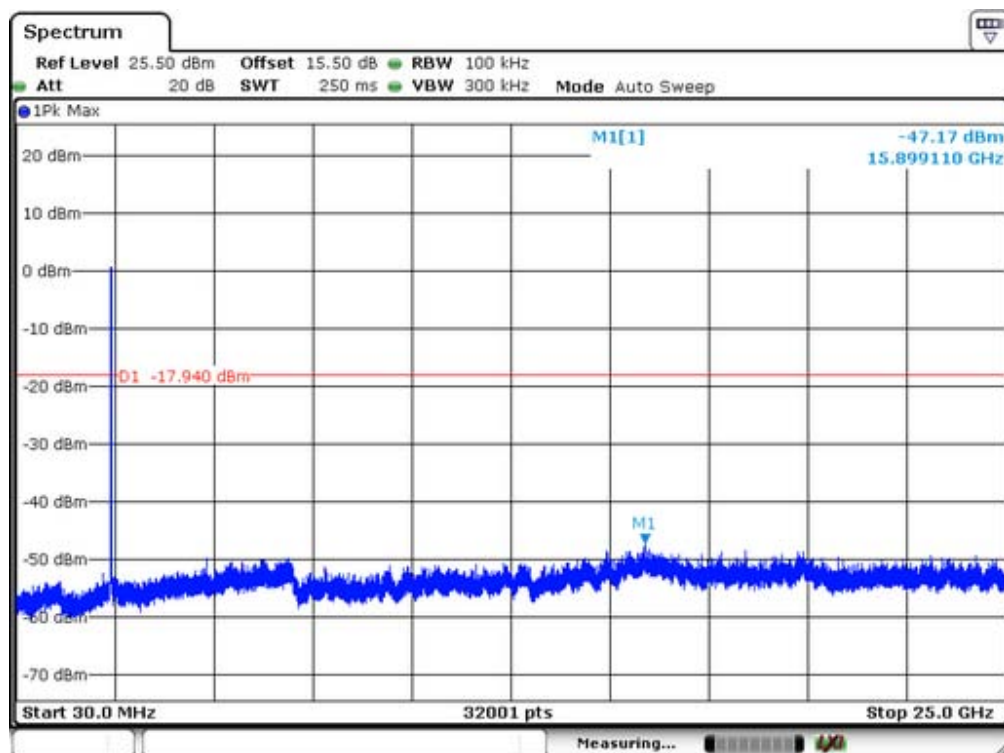


Middle Channel

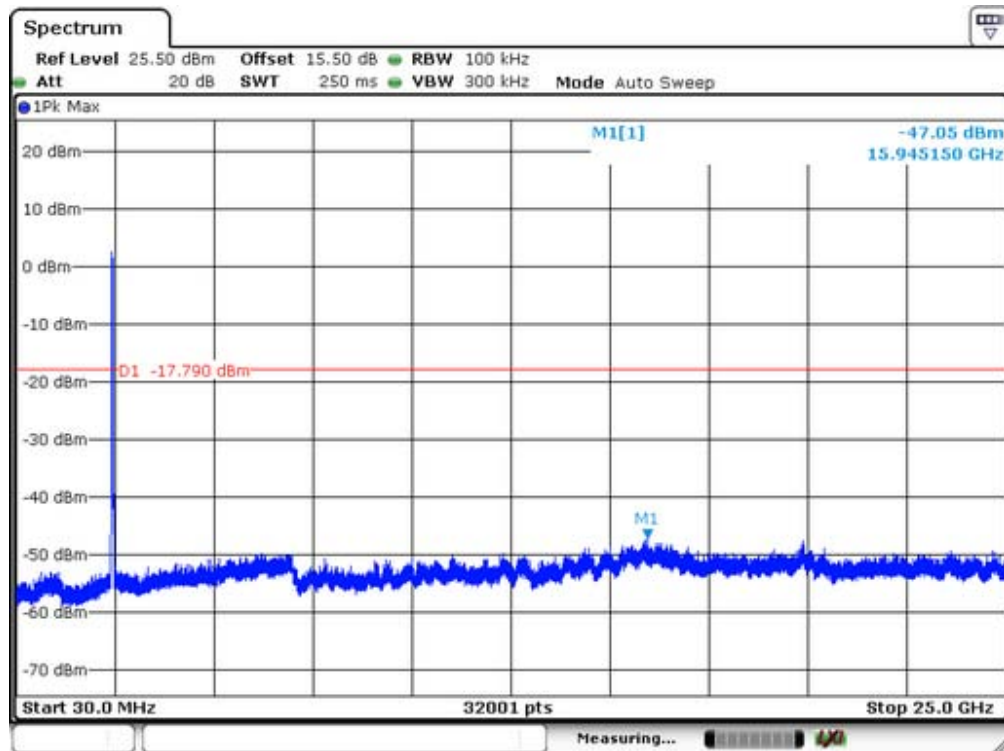


Highest Channel

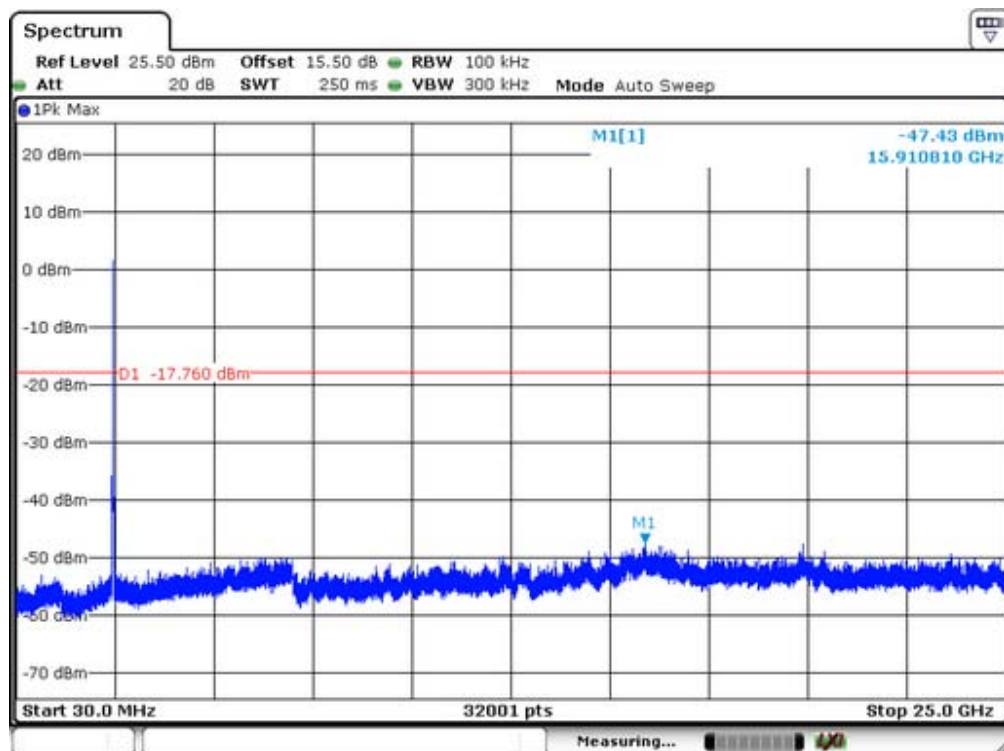
Test Mode: IEEE 802.11g SISO ANT2



Lowest Channel

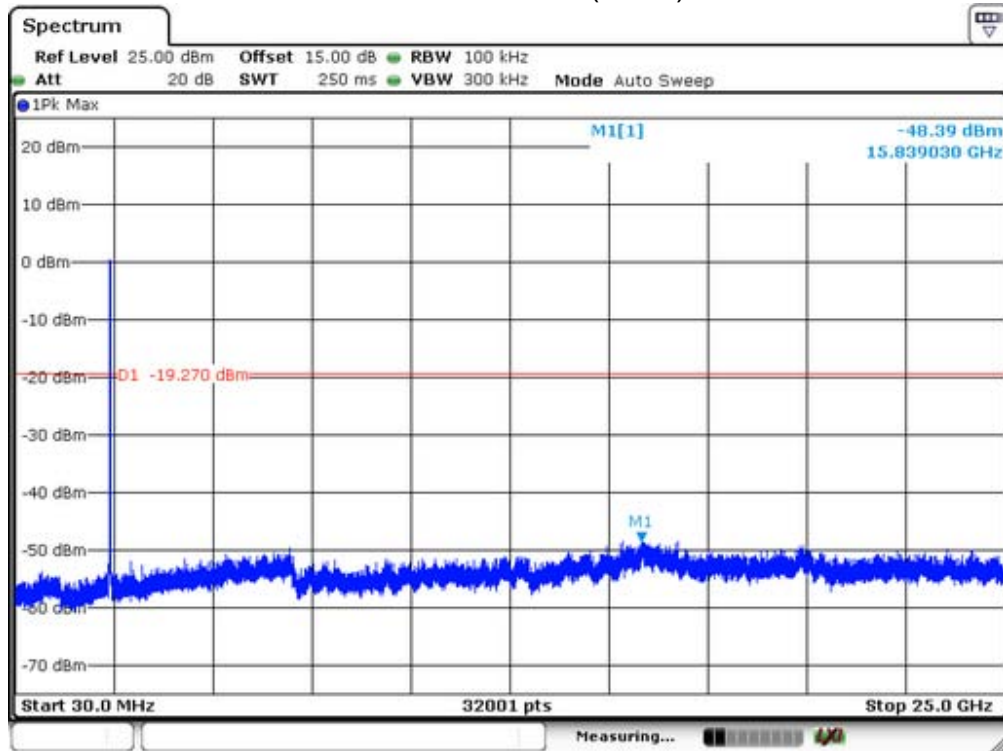


Middle Channel

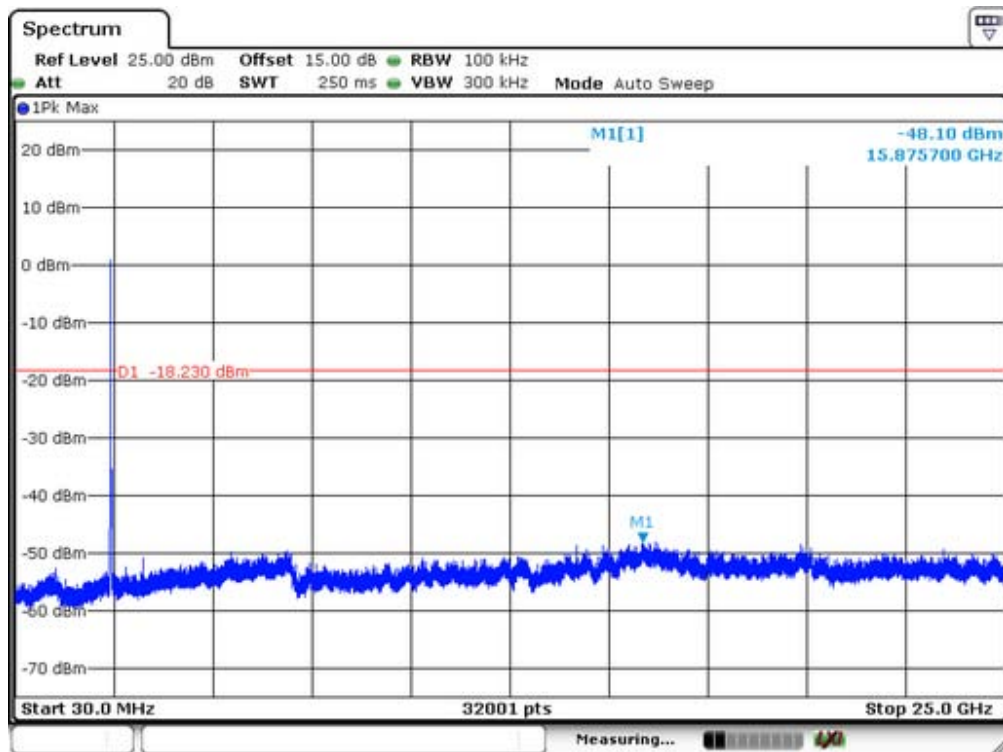


Highest Channel

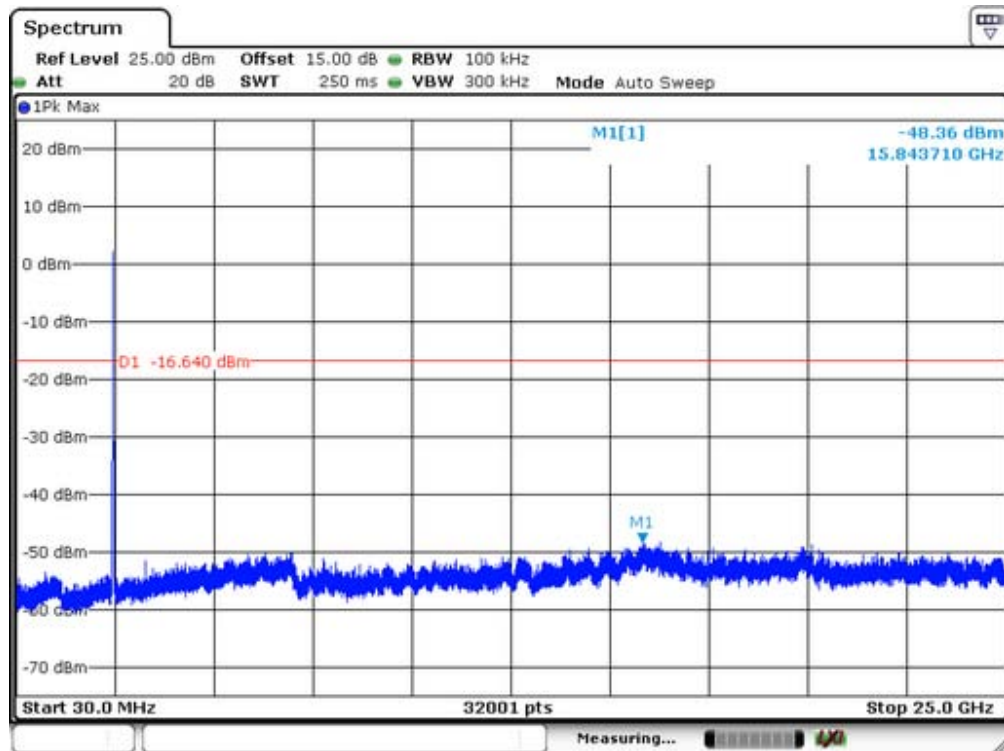
Test Mode: IEEE 802.11n(HT20) MIMO



Lowest Channel

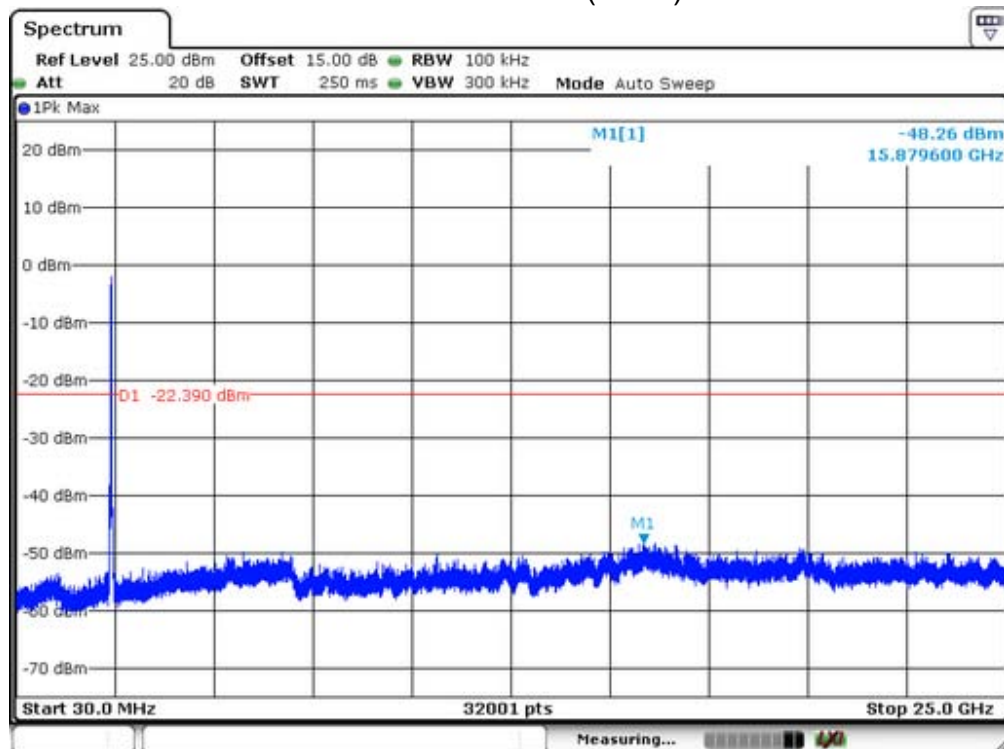


Middle Channel

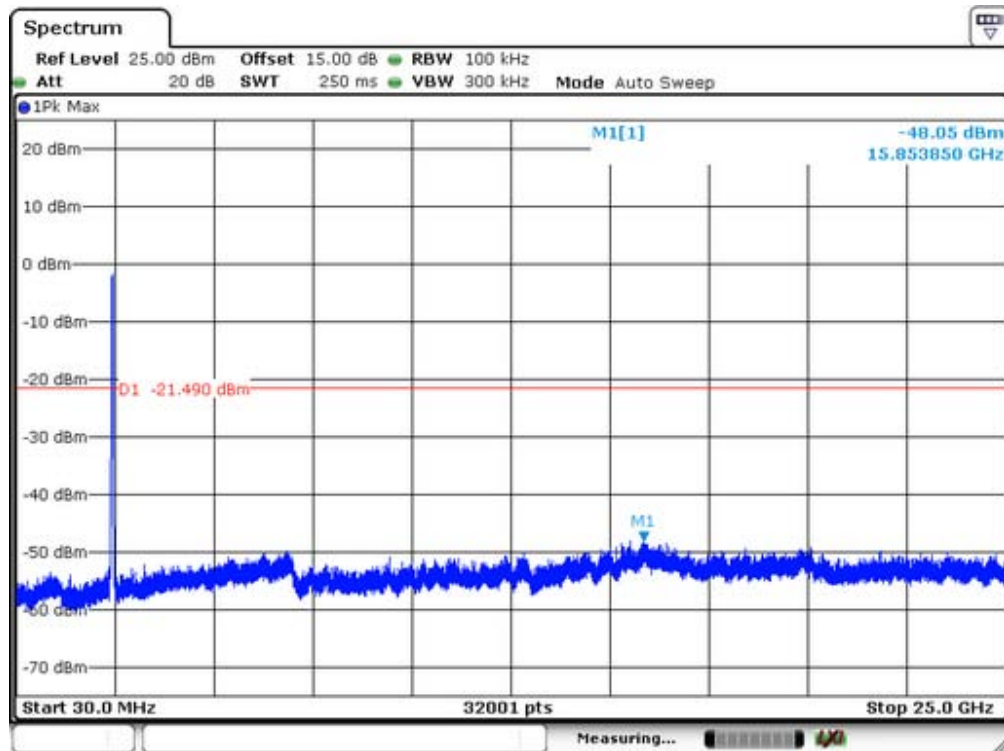


Highest Channel

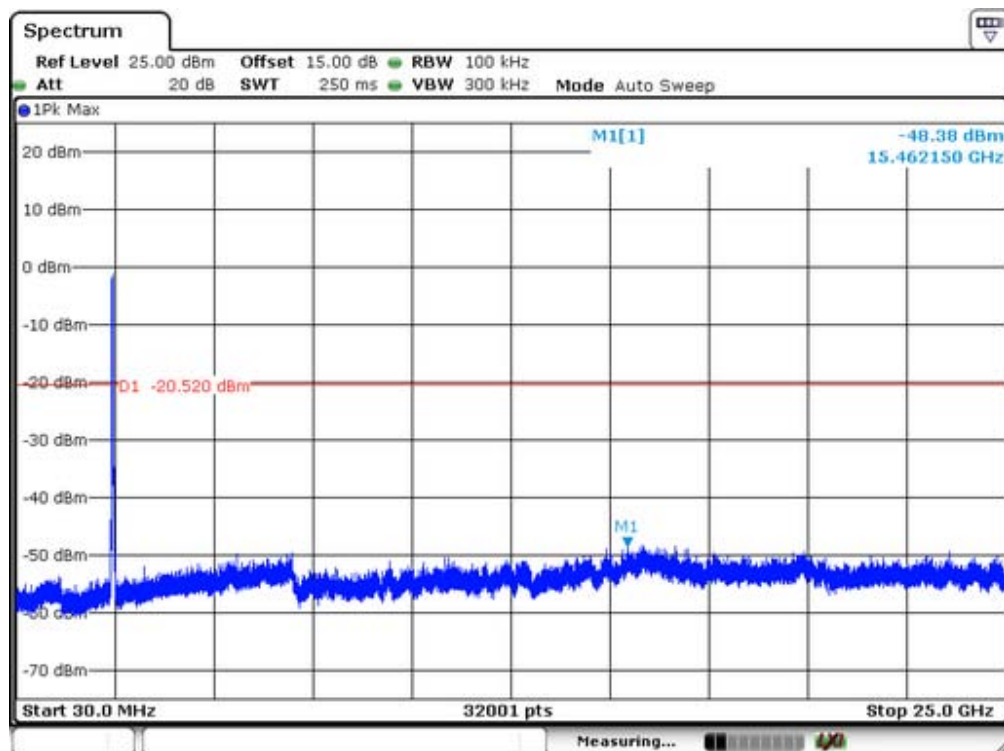
Test Mode: IEEE802.11n(HT40) MIMO



Lowest Channel



Middle Channel



Highest Channel

15. Antenna Application

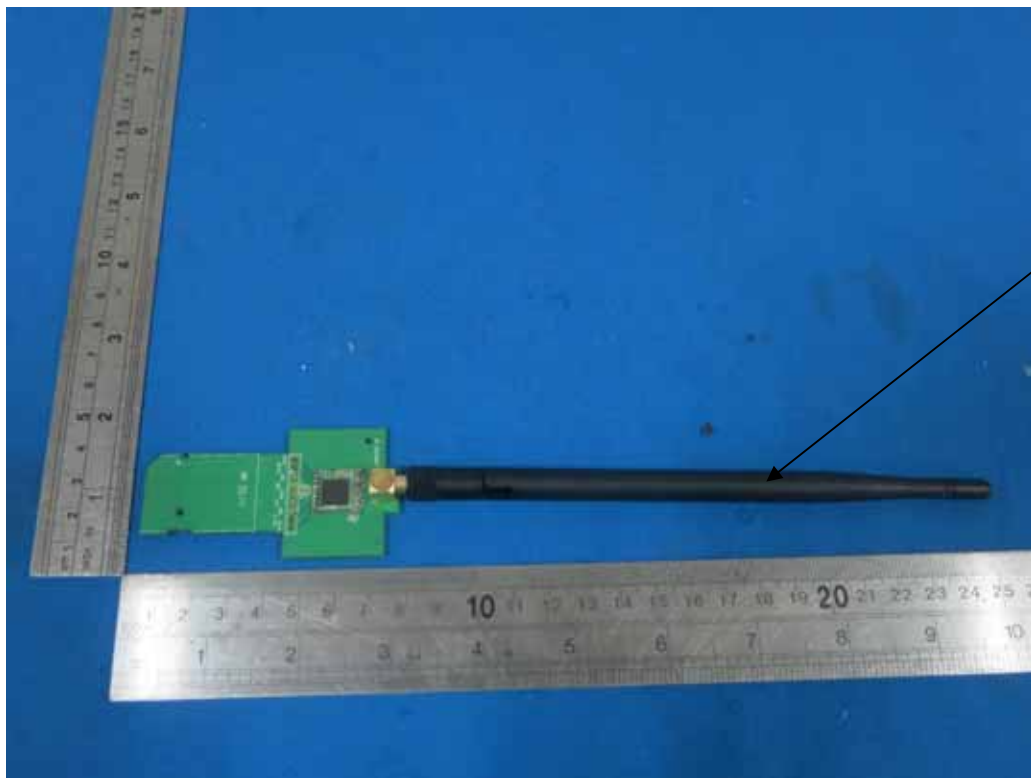
15.1 Antenna Requirement

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.

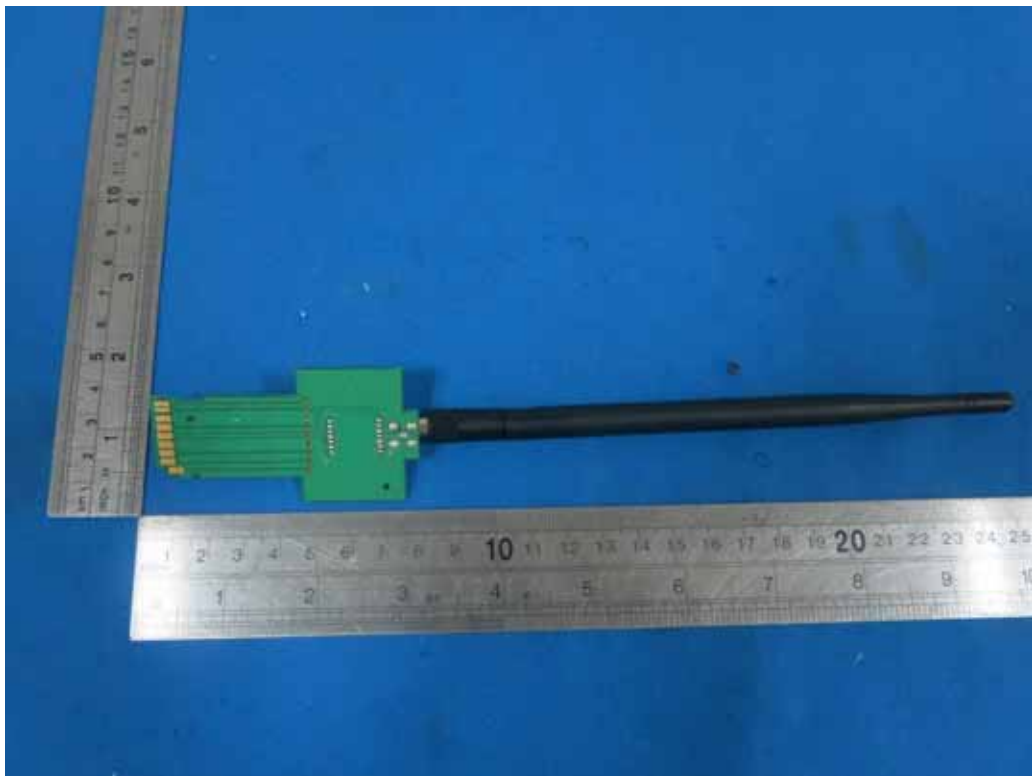
15.2 Result

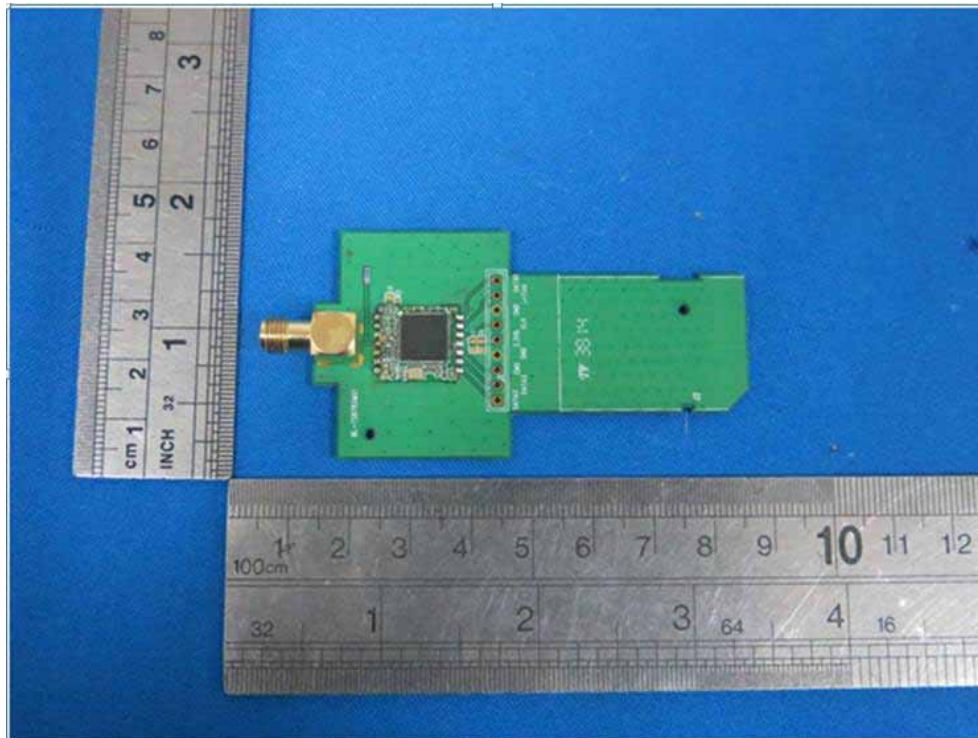
The EUT'S antenna, permanent attached antenna, is external antenna or SMD chip antenna. The antenna's gain is 5dBi and meets the requirement.

APPENDIX I (PHOTOS OF EUT)



External Antenna





SMD Chip Antenna

