

FCC REPORT

(WIFI)

Applicant: LigoWave LLC

Address of Applicant: 138 Mountain Brook Dr Canton, GA 30115 United States

Equipment Under Test (EUT)

Product Name: Broadband Digital Transmission System

Model No.: NFT 3ac

FCC ID: V2V-AC2800

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of sample receipt: 13 Jun., 2016

Date of Test: 13 Jun., to 27 Dec., 2016

Date of report issued: 27 Dec., 2016

Test Result: PASS*

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

A blue circular stamp with the text "SHENZHEN ZHONGJIAN NANFANG TESTING CO., LTD." around the perimeter and "CCIS" in the center. A handwritten signature in black ink is written over the stamp.

Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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2 Version

Version No.	Date	Description
00	27 Dec., 2016	Original

Tested by:

M. Liang

Test Engineer

Date:

27 Dec., 2016

Reviewed by:

Ryan Lee

Project Engineer

Date:

27 Dec., 2016

3 Contents

	Page
1 COVER PAGE	1
2 VERSION	2
3 CONTENTS	3
4 TEST SUMMARY	4
5 GENERAL INFORMATION	5
5.1 CLIENT INFORMATION	5
5.2 GENERAL DESCRIPTION OF E.U.T	5
5.3 TEST ENVIRONMENT AND MODE	7
5.4 DESCRIPTION OF SUPPORT UNITS	7
5.5 LABORATORY FACILITY	8
5.6 LABORATORY LOCATION	8
5.7 MEASUREMENT UNCERTAINTY	8
5.8 TEST INSTRUMENTS LIST	9
6 TEST RESULTS AND MEASUREMENT DATA	10
6.1 ANTENNA REQUIREMENT	10
6.2 CONDUCTED EMISSION	11
6.3 CONDUCTED OUTPUT POWER	16
6.4 OCCUPY BANDWIDTH	30
6.5 POWER SPECTRAL DENSITY	40
6.6 BAND EDGE	54
6.6.1 Conducted Emission Method	54
6.6.2 Radiated Emission Method	61
6.7 SPURIOUS EMISSION	78
6.7.1 Conducted Emission Method	78
6.7.2 Radiated Emission Method	103
7 TEST SETUP PHOTO	113
8 EUT CONSTRUCTIONAL DETAILS	115

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(3)	Pass
6dB Emission Bandwidth 99% Occupied Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

Pass: The EUT complies with the essential requirements in the standard.

5 General Information

5.1 Client Information

Applicant:	LigoWave LLC
Address of Applicant:	138 Mountain Brook Dr Canton, GA 30115 United States
Manufacturer/ Factory:	LigoWave LLC
Address of Manufacturer/ Factory:	138 Mountain Brook Dr Canton, GA 30115 United States

5.2 General Description of E.U.T.

Product Name:	Broadband Digital Transmission System
Model No.:	NFT 3ac
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(H20)) 2422MHz~2452MHz (802.11n(H40))
Channel numbers:	11 for 802.11b/802.11g/802.11(H20) 7 for 802.11n(H40)
Channel separation:	5MHz
Modulation technology: (IEEE 802.11b)	Direct Sequence Spread Spectrum (DSSS)
Modulation technology: (IEEE 802.11g/802.11n)	Orthogonal Frequency Division Multiplexing(OFDM)
Data speed (IEEE 802.11b):	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
Data speed (IEEE 802.11g):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps
Data speed (IEEE 802.11n):	Up to 150Mbps
Antenna Type:	PIFA Antenna
Antenna gain:	3 dBi,
AC adapter :	Adapter ♂ Model: GRT-POE20-480050A Input: AC100-240V 50/60Hz 0.5A Output: DC 48V, 500mA Adapter ♀ Model: G0720-480-050 Input: AC100-240V 50/60Hz 0.75A Output: DC 48V, 0.5A

Operation Frequency each of channel For 802.11b/g/n(H20)

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

Operation Frequency each of channel For 802.11n(H40)

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

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

802.11b/802.11g/802.11n (H20)

Channel	Frequency
The lowest channel	2412MHz
The middle channel	2437MHz
The Highest channel	2462MHz

802.11n (H40)

Channel	Frequency
The lowest channel	2422MHz
The middle channel	2437MHz
The Highest channel	2452MHz

5.3 Test environment and mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Operation mode	Keep the EUT in continuous transmitting with modulation
The sample was placed 0.8m (below 1GHz)/1.5m (above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	Data rate
802.11b	1Mbps
802.11g	6Mbps
802.11n(H20)	6.5Mbps
802.11n(H40)	13.5Mbps

Final Test Mode:

According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup” 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n(H20) and 13.5 Mbps for 802.11n(H40). Duty cycle setting during the transmission is 100% with maximum power setting for all modulations.

5.4 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
DELL	PC	OPTIPLEX745	N/A	DoC
DELL	MONITOR	E178FPC	N/A	DoC
DELL	KEYBOARD	SK-8115	N/A	DoC
DELL	MOUSE	MOC5UO	N/A	DoC
LigoWave	Passive Gigabit PSE	GRT-480050A	N/A	N/A

5.5 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Registration No.: 817957**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 817957, February 27, 2012.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

5.6 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.

Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,

Bao'an District, Shenzhen, Guangdong, China

Tel: +86-755-23118282

Fax: +86-755-23116366

5.7 Measurement Uncertainty

Items	Expanded Uncertainty (Confidence of 95%)
Conducted Emission (9kHz ~ 30MHz)	2.14 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	4.24 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	4.35 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	4.44 dB (k=2)
Radiated Emission (18GHz ~ 26.5GHz)	4.56 dB (k=2)

5.8 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	3m SAC	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	08-23-2014	08-22-2017
2	BiConiLog Antenna	SCHWARZBECK	VULB9163	CCIS0005	03-25-2016	03-25-2017
3	Horn Antenna	SCHWARZBECK	BBHA9120D	CCIS0006	03-25-2016	03-25-2017
4	Pre-amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	04-01-2016	03-31-2017
5	Pre-amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	04-01-2016	03-31-2017
6	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	04-01-2016	03-31-2017
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	04-01-2016	03-31-2017
8	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP30	CCIS0023	03-28-2016	03-28-2017
9	EMI Test Receiver	Rohde & Schwarz	ESRP7	CCIS0167	03-28-2016	03-28-2017
10	Loop antenna	Laplace instrument	RF300	EMC0701	04-01-2016	03-31-2017
11	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

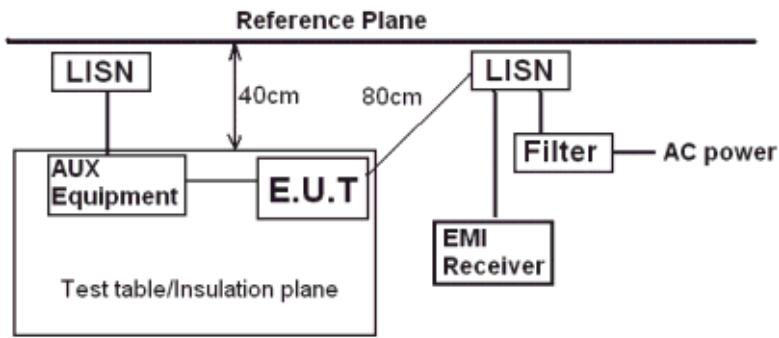
Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	08-23-2014	08-22-2017
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	03-24-2016	03-24-2017
3	LISN	CHASE	MN2050D	CCIS0074	03-26-2016	03-26-2017
4	Coaxial Cable	CCIS	N/A	CCIS0086	04-01-2016	03-31-2017
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

6 Test results and Measurement Data

6.1 Antenna requirement

Standard requirement:	FCC Part 15 C Section 15.203 /247(c)
<i>15.203 requirement:</i> <i>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</i> <i>15.247(c) (1)(i) requirement:</i> <i>(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</i>	
E.U.T Antenna:	
<i>The product is a professionally installed device which has PIFA antenna for the application. The best gain of antenna is 3 dBi.</i>	
3T3R MIMO	
	

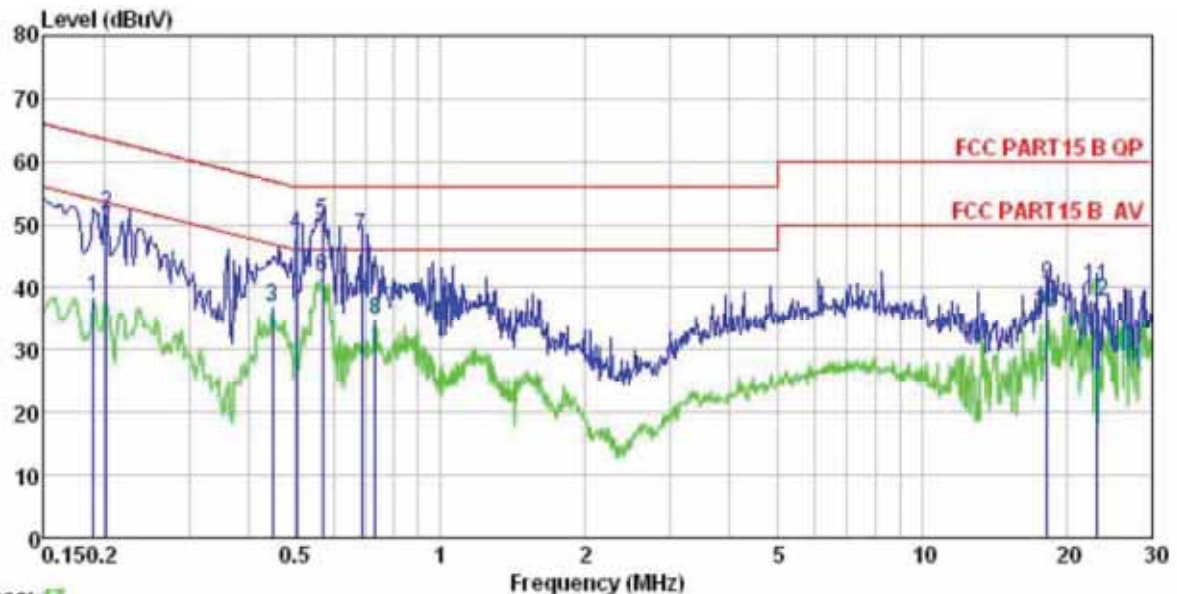
6.2 Conducted Emission

Test Requirement:	FCC Part 15 C Section 15.207		
Test Method:	ANSI C63.4: 2014		
Test Frequency Range:	150 kHz to 30 MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9 kHz, VBW=30 kHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test procedure	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.), which provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.		
Test setup:	 <i>Remark</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m		
Test Instruments:	Refer to section 5.8 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Passed		

Measurement Data:

Adapter ◊ test mode

Neutral:



Trace: 17

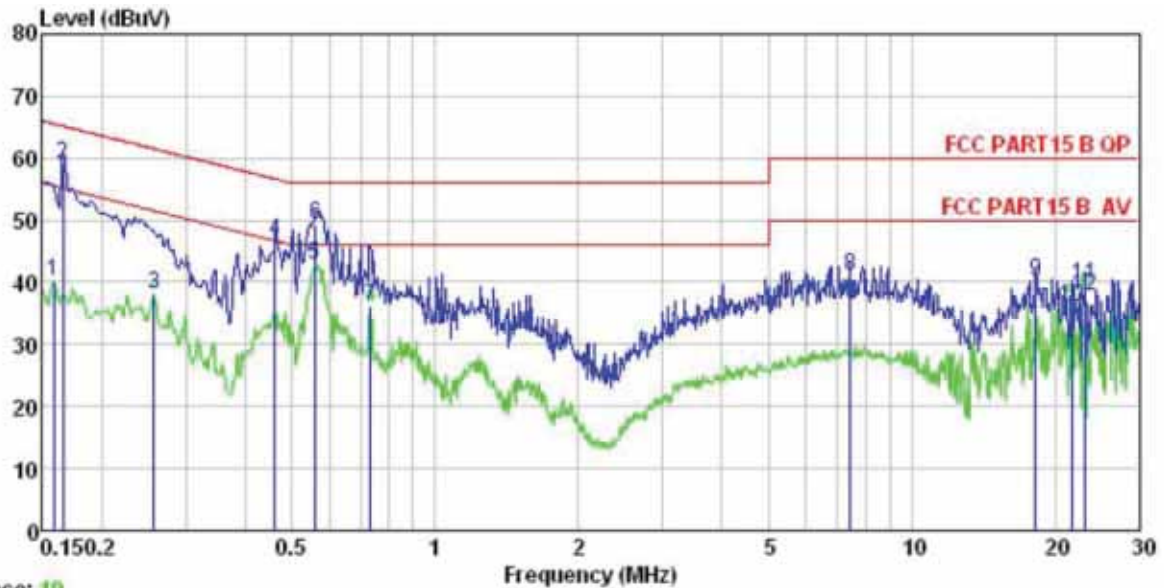
Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN NEUTRAL
 EUT : Broadband Digital Transmission System
 Model : NFI 3ac
 Test Mode : TX mode
 Power Rating : AC 120/60Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: MT
 Remark : 2.4G WiFi(POE:GRT-POE20-480050A)

	Read	LISN	Cable	Limit	Over	
Freq	Level	Factor	Loss	Level	Line	Limit Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB
1	0.190	27.54	0.14	10.76	38.44	54.02 -15.58 Average
2	0.202	40.80	0.15	10.76	51.71	63.54 -11.83 QP
3	0.447	25.87	0.23	10.74	36.84	46.93 -10.09 Average
4	0.502	37.39	0.24	10.76	48.39	56.00 -7.61 QP
5	0.570	39.38	0.27	10.77	50.42	56.00 -5.58 QP
6	0.570	30.52	0.27	10.77	41.56	46.00 -4.44 Average
7	0.686	36.90	0.32	10.77	47.99	56.00 -8.01 QP
8	0.731	23.88	0.32	10.78	34.98	46.00 -11.02 Average
9	18.232	29.21	0.27	10.91	40.39	60.00 -19.61 QP
10	18.232	24.69	0.27	10.91	35.87	50.00 -14.13 Average
11	23.140	29.03	0.25	10.89	40.17	60.00 -19.83 QP
12	23.140	26.55	0.25	10.89	37.69	50.00 -12.31 Average

Notes:

1. An initial pre-scan was performed on the live and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss.

Line:



Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN LINE
 EUT : Broadband Digital Transmission System
 Model : NFI 3ac
 Test Mode : TX mode
 Power Rating : AC 120/60Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: MT
 Remark : 2.4G WiFi(POE:GRI-POE20-480050A)

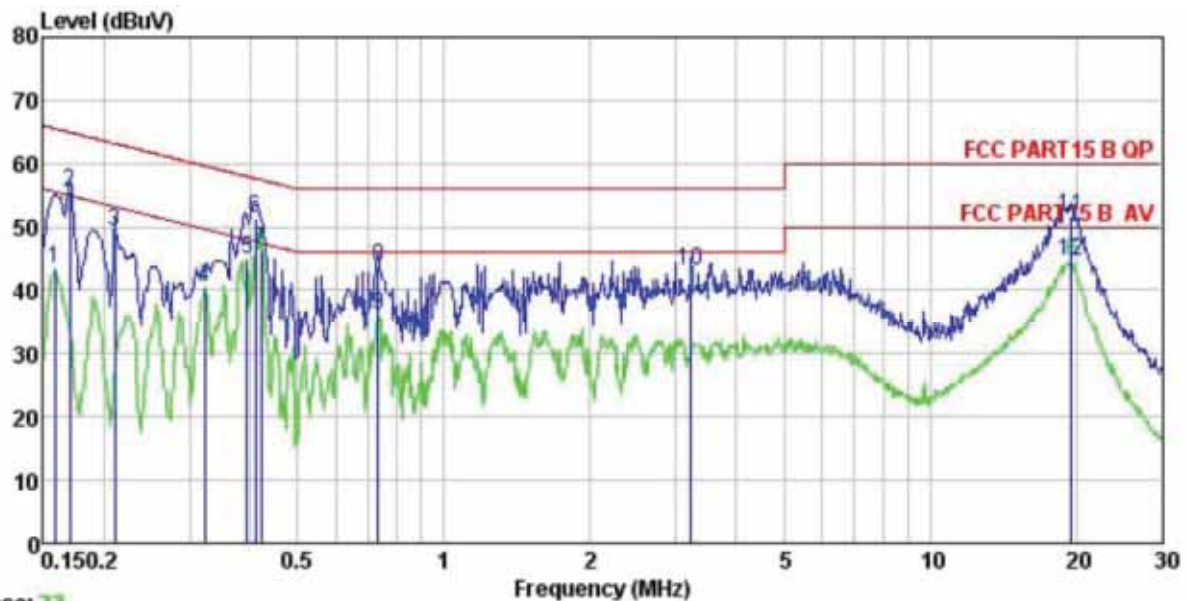
	Freq	Read	LISN	Cable	Level	Limit	Over	
	MHz	dBuV	Factor	Loss	dBuV	dBuV	Limit	Remark
			dB	dB			dB	
1	0.158	29.26	0.14	10.78	40.18	55.56	-15.38	Average
2	0.166	48.11	0.14	10.77	59.02	65.16	-6.14	QP
3	0.258	27.14	0.16	10.75	38.05	51.51	-13.46	Average
4	0.461	35.69	0.24	10.75	46.68	56.67	-9.99	QP
5	0.558	31.86	0.27	10.77	42.90	46.00	-3.10	Average
6	0.561	38.38	0.27	10.77	49.42	56.00	-6.58	QP
7	0.731	24.91	0.31	10.78	36.00	46.00	-10.00	Average
8	7.446	29.78	0.35	10.82	40.95	60.00	-19.05	QP
9	18.232	28.78	0.31	10.91	40.00	60.00	-20.00	QP
10	21.715	24.85	0.35	10.91	36.11	50.00	-13.89	Average
11	23.140	28.36	0.35	10.89	39.60	60.00	-20.40	QP
12	23.140	26.47	0.35	10.89	37.71	50.00	-12.29	Average

Notes:

1. An initial pre-scan was performed on the live and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.

Adapter 0 test mode

Neutral:



Trace: 23

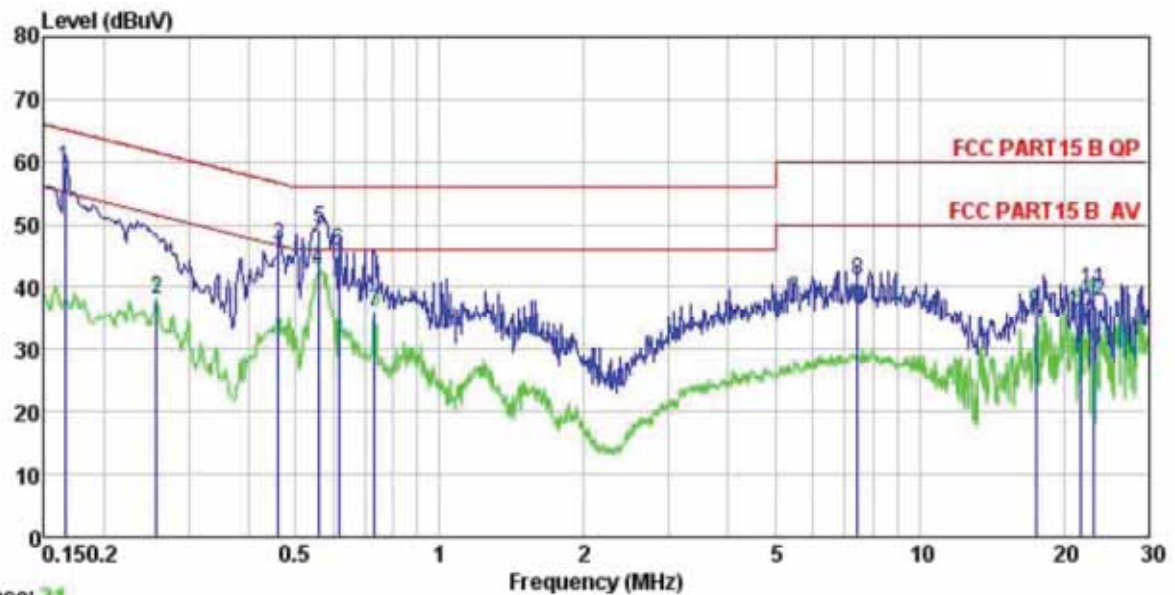
Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN NEUTRAL
 EUT : Broadband Digital Transmission System
 Model : NFI 3ac
 Test Mode : TX mode
 Power Rating : AC 120/60Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: MT
 Remark : 2.4G WiFi(POE:G0720-480-050)

	Freq	Read	LISN	Cable	Limit	Over	
	MHz	Level	Factor	Loss	Line	Limit	Remark
		dBuV	dB	dB	dBuV	dB	
1	0.158	32.39	0.13	10.78	43.30	55.56	-12.26 Average
2	0.170	44.59	0.13	10.77	55.49	64.94	-9.45 QP
3	0.211	38.30	0.16	10.76	49.22	63.18	-13.96 QP
4	0.322	29.63	0.20	10.73	40.56	49.66	-9.10 Average
5	0.393	34.00	0.23	10.72	44.95	47.99	-3.04 Average
6	0.410	40.51	0.23	10.72	51.46	57.64	-6.18 QP
7	0.421	35.45	0.23	10.73	46.41	47.42	-1.01 Average
8	0.731	32.56	0.32	10.78	43.66	56.00	-12.34 QP
9	0.731	24.85	0.32	10.78	35.95	46.00	-10.05 Average
10	3.224	32.00	0.31	10.91	43.22	56.00	-12.78 QP
11	19.532	40.58	0.28	10.93	51.79	60.00	-8.21 QP
12	19.532	33.43	0.28	10.93	44.64	50.00	-5.36 Average

Notes:

1. An initial pre-scan was performed on the live and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.

Line:



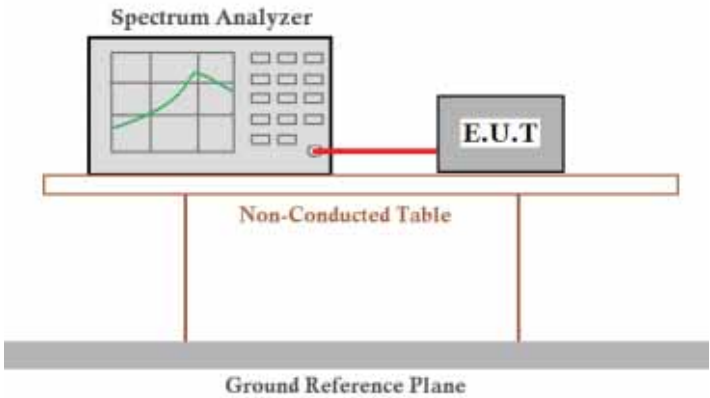
Trace: 21
 Site : CCIS Shielding Room
 Condition : FCC PART15 B QP LISN LINE
 EUT : Broadband Digital Transmission System
 Model : NFT 3ac
 Test Mode : TX mode
 Power Rating : AC 120/60Hz
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa
 Test Engineer: MT
 Remark : 2.4G WiFi(POE:G0720-480-050)

	Freq	Read	LISN	Cable	Level	Limit	Over	
	MHz	dBuV	Factor	Loss	dBuV	dBuV	Limit	Remark
			dB	dB			dB	
1	0.166	48.11	0.14	10.77	59.02	65.16	-6.14	QP
2	0.258	27.14	0.16	10.75	38.05	51.51	-13.46	Average
3	0.461	35.69	0.24	10.75	46.68	56.67	-9.99	QP
4	0.558	31.86	0.27	10.77	42.90	46.00	-3.10	Average
5	0.561	38.38	0.27	10.77	49.42	56.00	-6.58	QP
6	0.617	34.71	0.29	10.77	45.77	56.00	-10.23	QP
7	0.731	24.91	0.31	10.78	36.00	46.00	-10.00	Average
8	7.446	29.78	0.35	10.82	40.95	60.00	-19.05	QP
9	17.475	24.87	0.30	10.91	36.08	50.00	-13.92	Average
10	21.715	24.85	0.35	10.91	36.11	50.00	-13.89	Average
11	23.140	28.36	0.35	10.89	39.60	60.00	-20.40	QP
12	23.140	26.47	0.35	10.89	37.71	50.00	-12.29	Average

Notes:

1. An initial pre-scan was performed on the live and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss.

6.3 Conducted Output Power

Test Requirement:	FCC Part 15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 9.2.2.2
Limit:	30dBm
Test setup:	 The diagram illustrates the test setup for conducted output power measurement. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table, which is supported by two vertical legs. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

Mode	Test CH	Ant. Port	Conducted Output power (dBm)	Total power (dBm)	Limit (dBm)	Result
802.11b	Lowest	TX0	20.66	24.93	30.00	Pass
		TX1	20.01			
		TX2	19.77			
	Middle	TX0	19.70	24.38	30.00	Pass
		TX1	19.80			
		TX2	19.30			
	Highest	TX0	19.32	23.79	30.00	Pass
		TX1	19.20			
		TX2	18.50			
802.11g	Lowest	TX0	22.05	26.11	30.00	Pass
		TX1	21.04			
		TX2	20.81			
	Middle	TX0	24.15	29.02	30.00	Pass
		TX1	24.10			
		TX2	24.49			
	Highest	TX0	22.36	27.02	30.00	Pass
		TX1	22.39			
		TX2	22.00			
802.11n(H20)	Lowest	TX0	18.85	23.06	30.00	Pass
		TX1	18.12			
		TX2	17.82			
	Middle	TX0	24.16	29.08	30.00	Pass
		TX1	24.26			
		TX2	24.51			
	Highest	TX0	22.38	26.95	30.00	Pass
		TX1	22.31			
		TX2	21.81			
802.11n(H40)	Lowest	TX0	17.66	22.52	30.00	Pass
		TX1	17.68			
		TX2	17.91			
	Middle	TX0	24.39	29.08	30.00	Pass
		TX1	24.28			
		TX2	24.27			
	Highest	TX0	22.46	26.74	30.00	Pass
		TX1	21.71			
		TX2	21.69			

Remark:

1. Because the transmit signals are completely uncorrelated, so the Directional gain = G_{ANT} .
2. The directional Gain of antenna is less than 6 dBi, so the limit of power is 30 dBm.

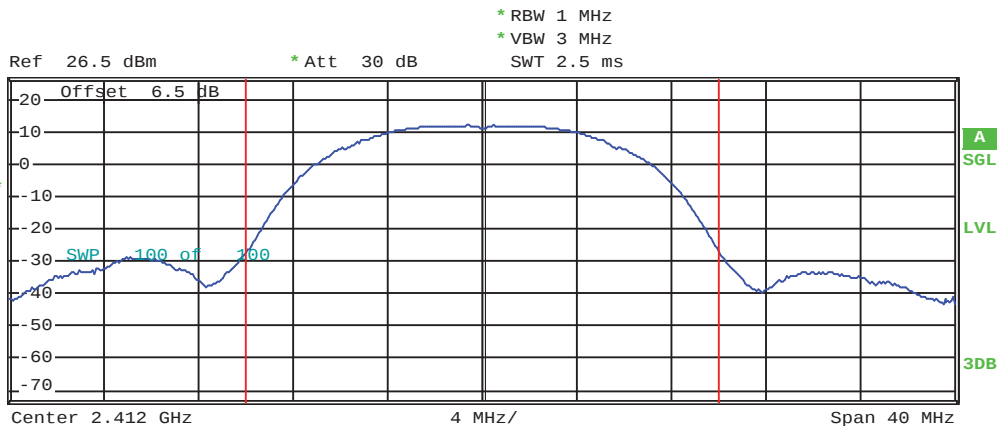
Test plot as follows:

TX0

Test mode: 802.11b



1 RM
MAXH



Tx Channel

Bandwidth

20 MHz

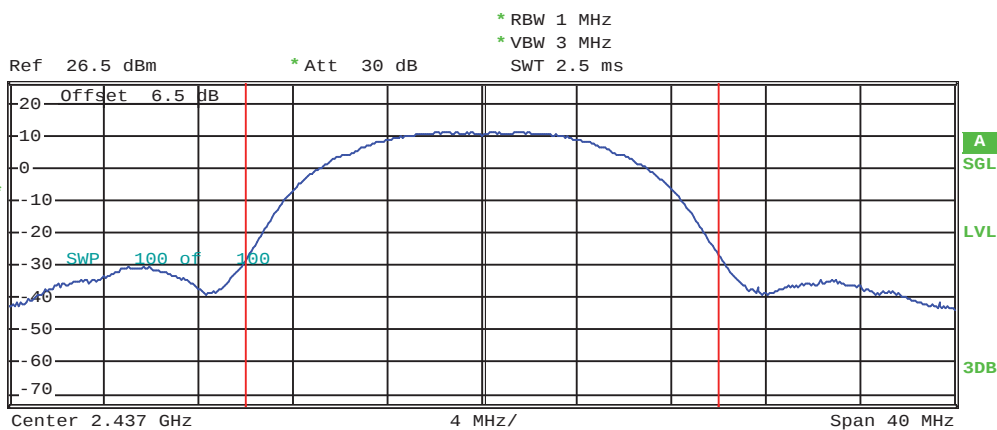
Power

20.66 dBm

Lowest channel



1 RM
MAXH



Tx Channel

Bandwidth

20 MHz

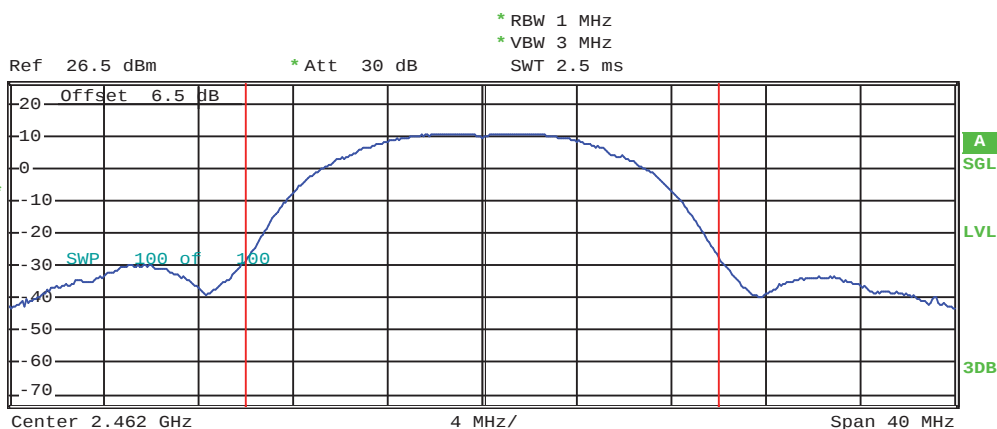
Power

19.70 dBm

Middle channel



1 RM
MAXH



Tx Channel

Bandwidth

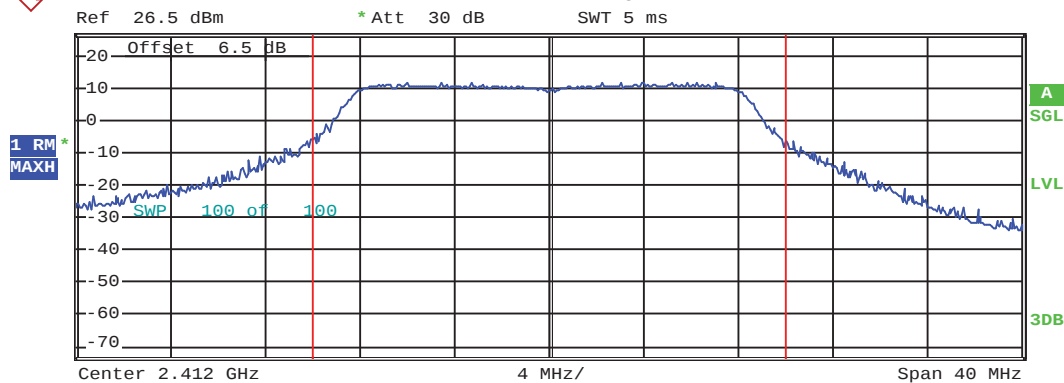
20 MHz

Power

19.32 dBm

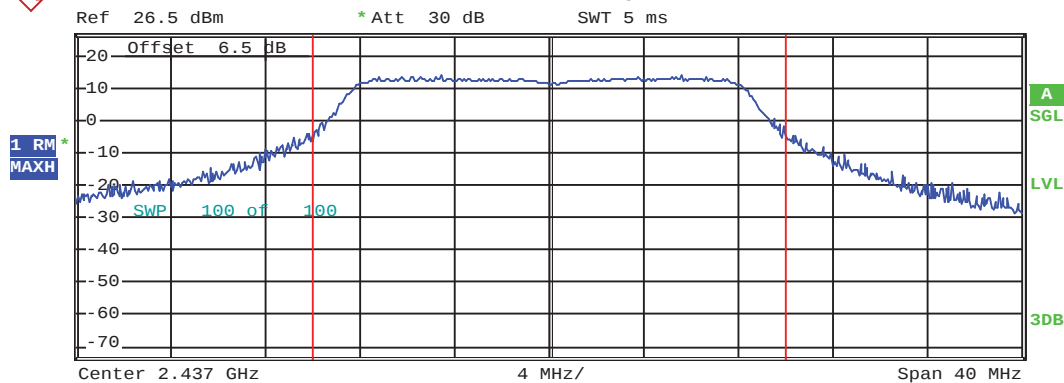
Highest channel

Test mode: 802.11g



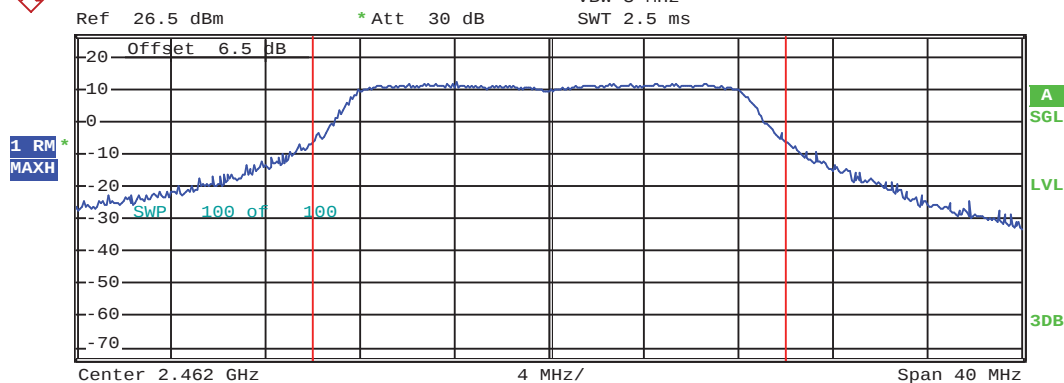
Tx Channel
Bandwidth 20 MHz Power 22.05 dBm

Lowest channel



Tx Channel
Bandwidth 20 MHz Power 24.15 dBm

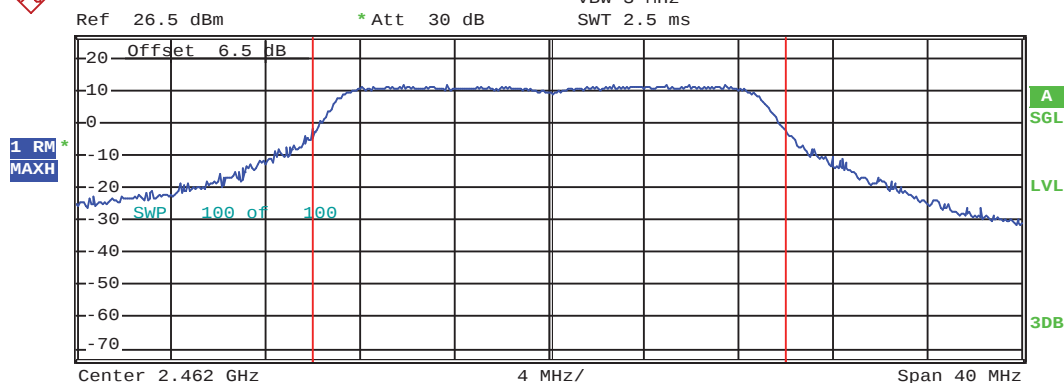
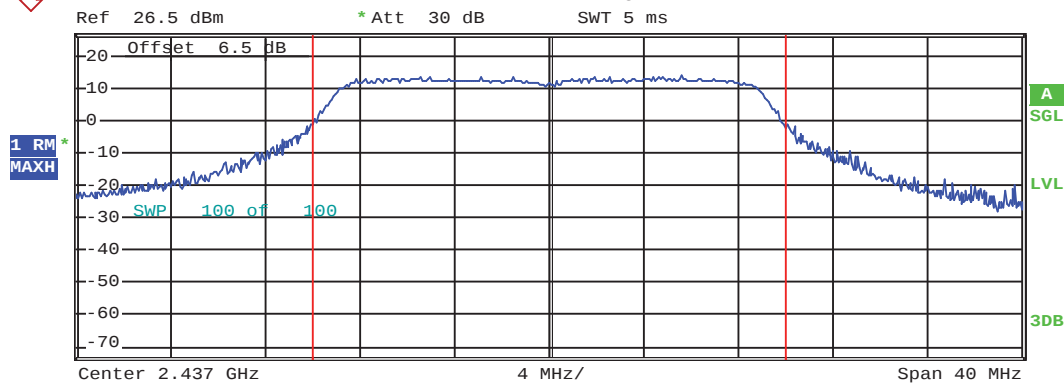
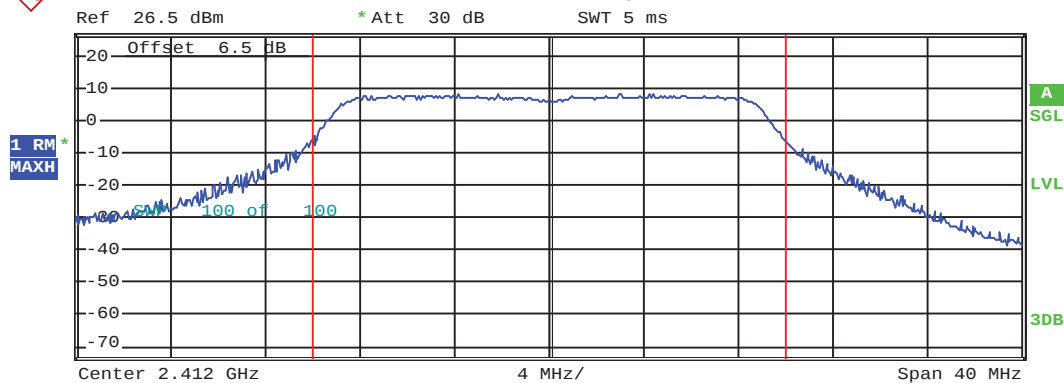
Middle channel



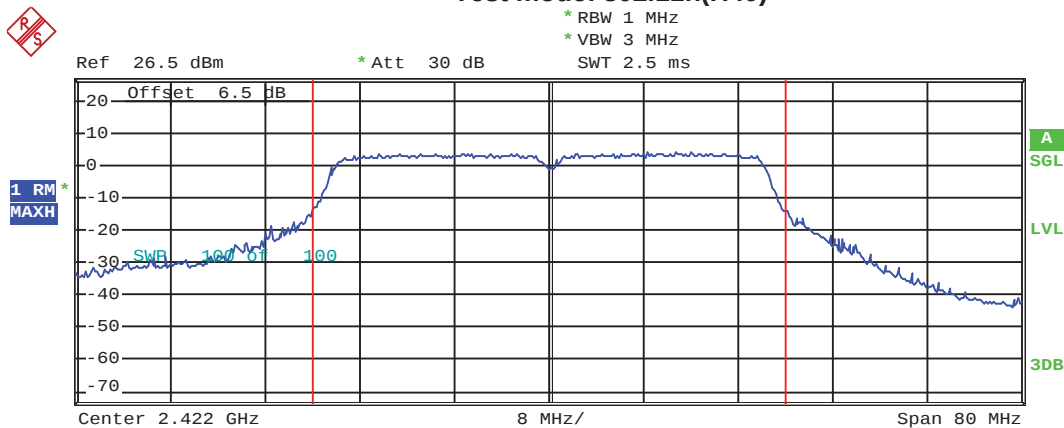
Tx Channel
Bandwidth 20 MHz Power 22.36 dBm

Highest channel

Test mode: 802.11n(H20)

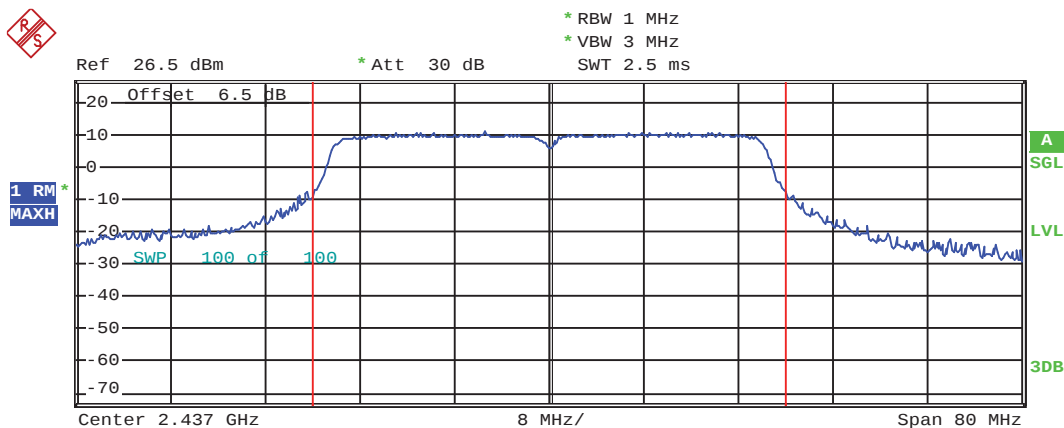


Test mode: 802.11n(H40)



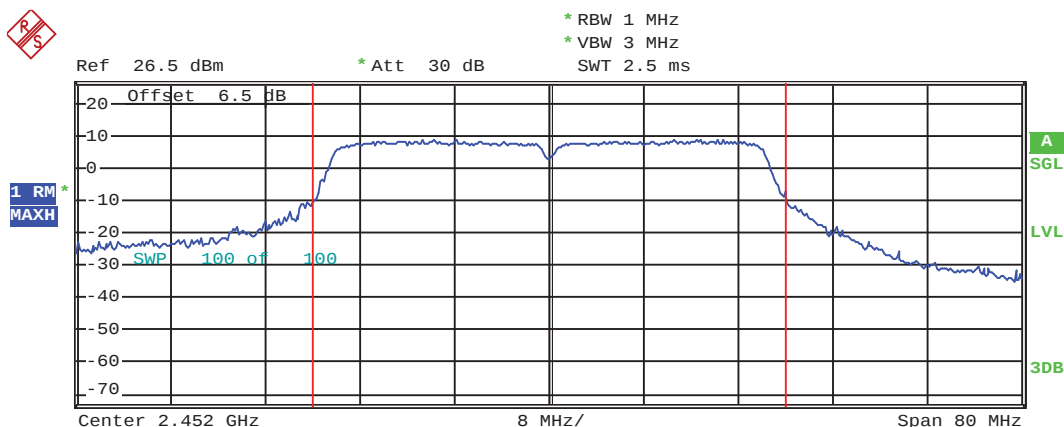
Tx Channel1
Bandwidth 40 MHz Power 17.66 dBm

Lowest channel



Tx Channel1
Bandwidth 40 MHz Power 24.39 dBm

Middle channel



Tx Channel1
Bandwidth 40 MHz Power 22.46 dBm

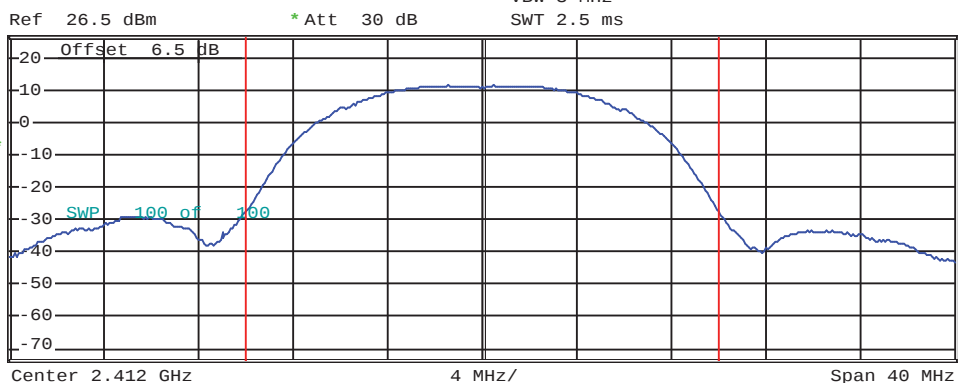
Highest channel

TX1



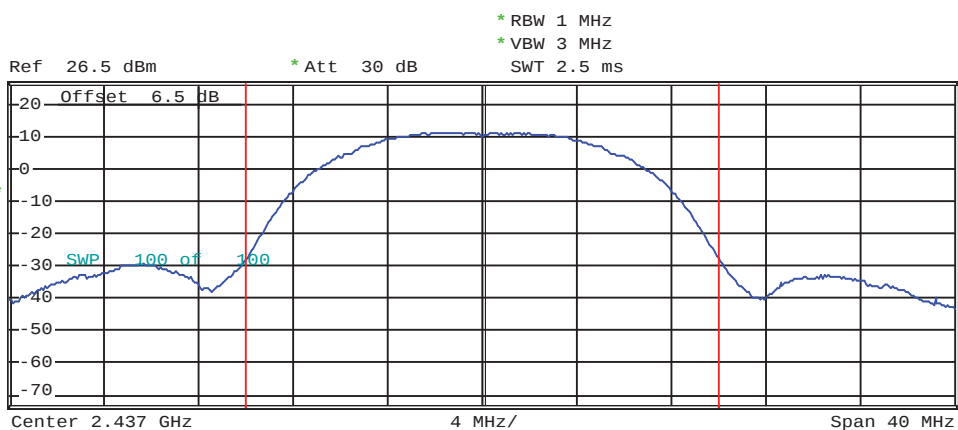
Test mode: 802.11b

* RBW 1 MHz
* VBW 3 MHz
SWT 2.5 ms



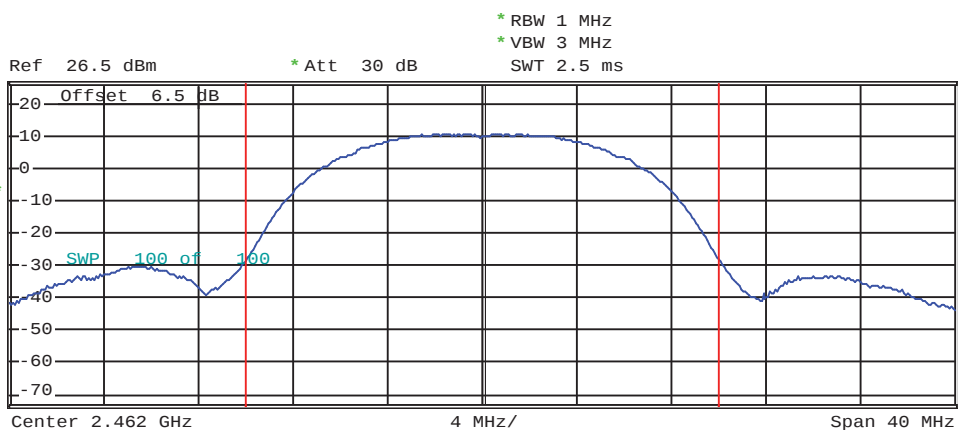
Tx Channel1
Bandwidth 20 MHz Power 20.01 dBm

Lowest channel



Tx Channel1
Bandwidth 20 MHz Power 19.80 dBm

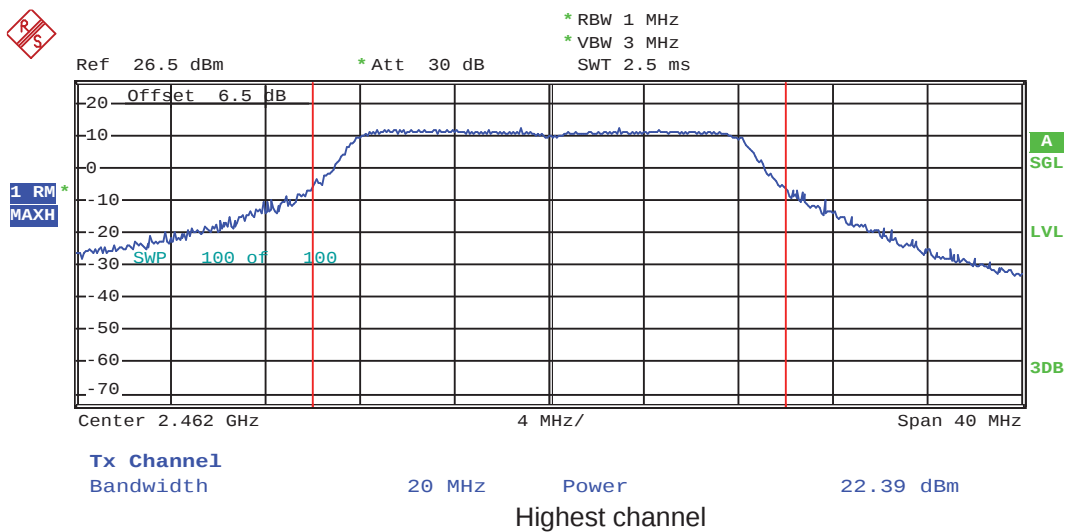
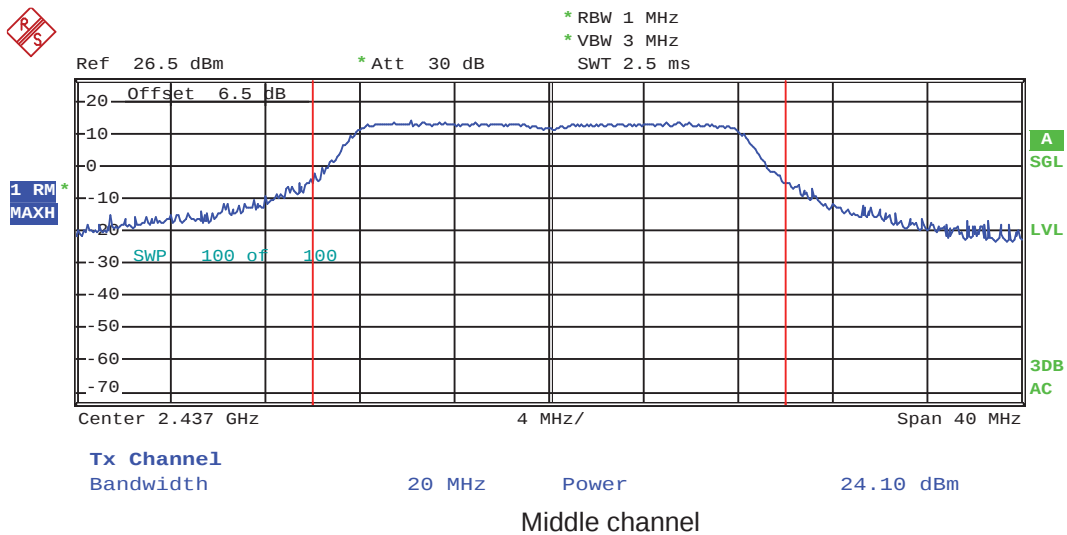
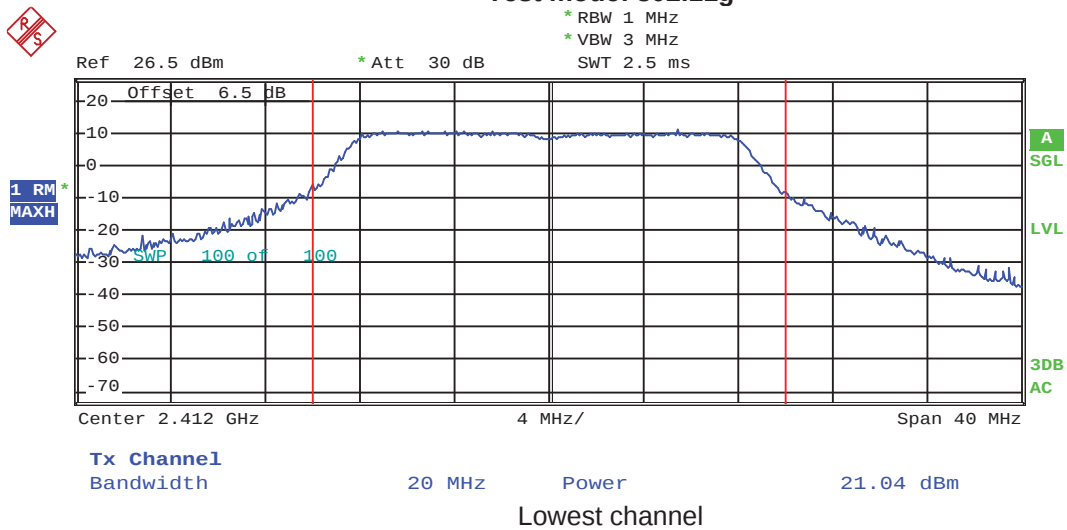
Middle channel



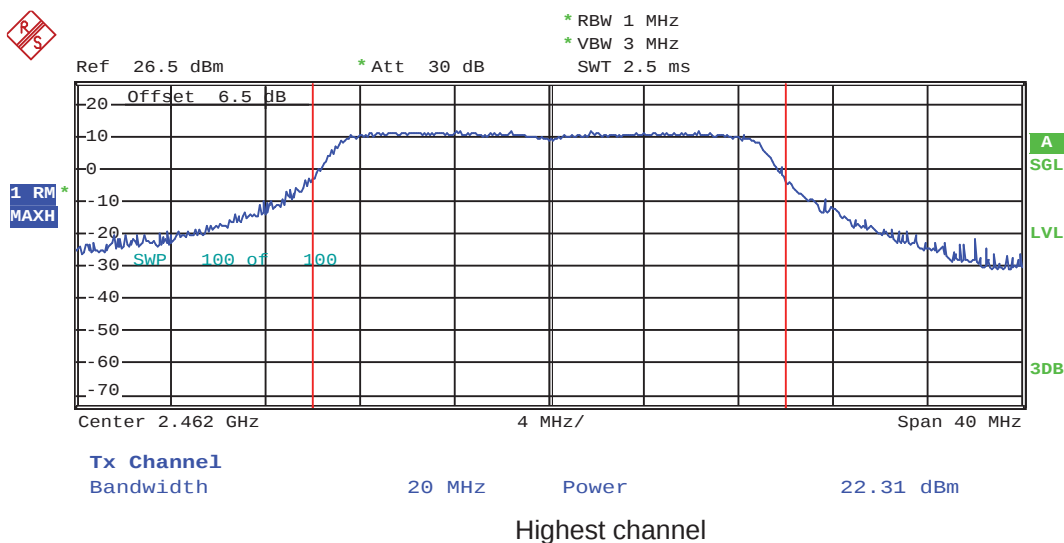
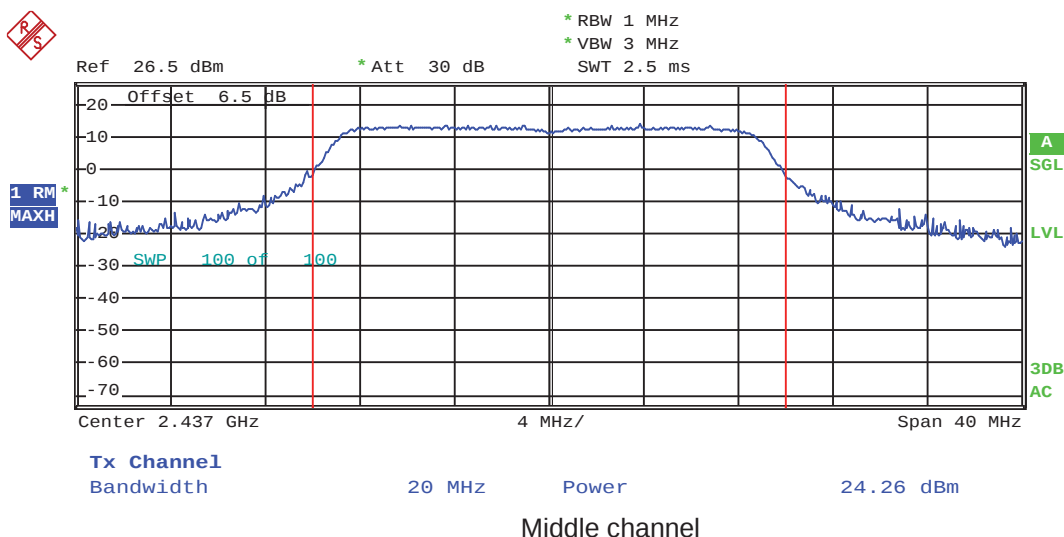
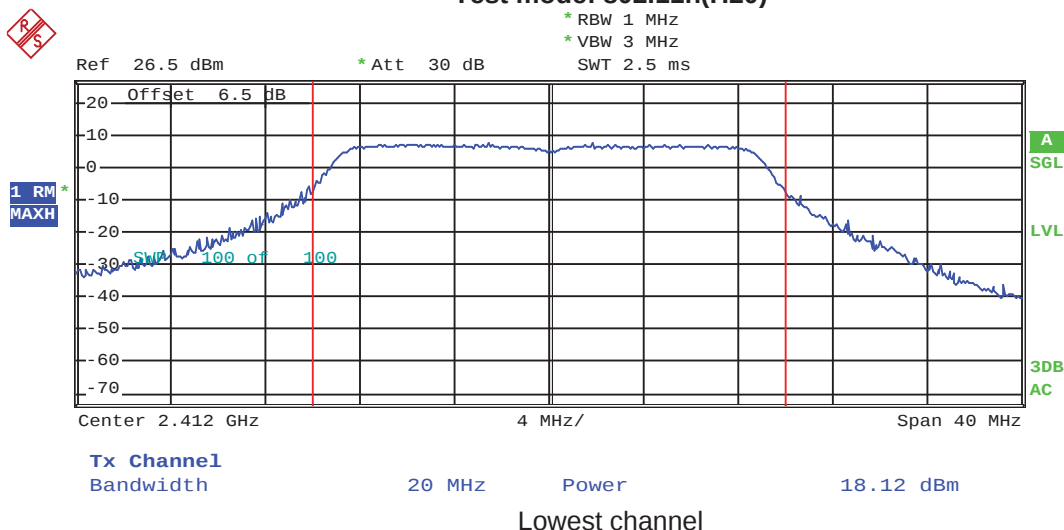
Tx Channel1
Bandwidth 20 MHz Power 19.20 dBm

Highest channel

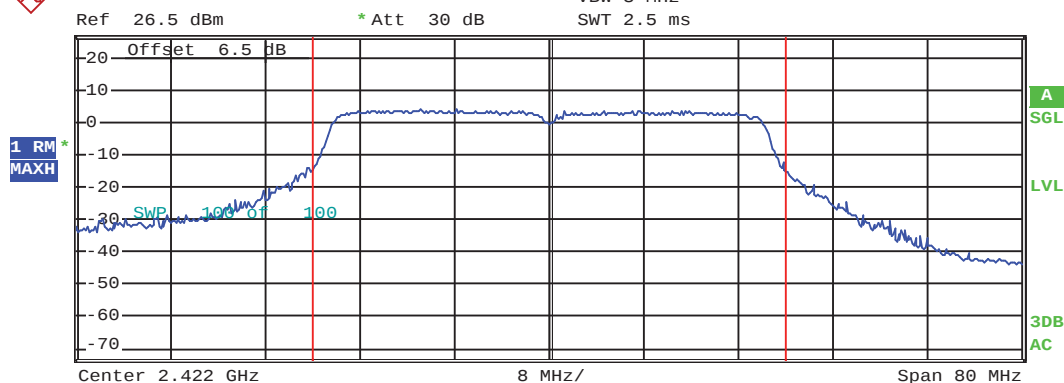
Test mode: 802.11g



Test mode: 802.11n(H20)

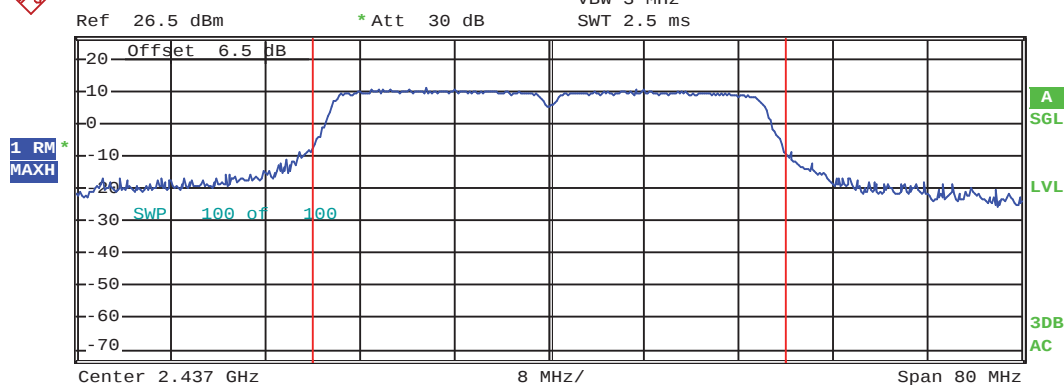


Test mode: 802.11n(H40)



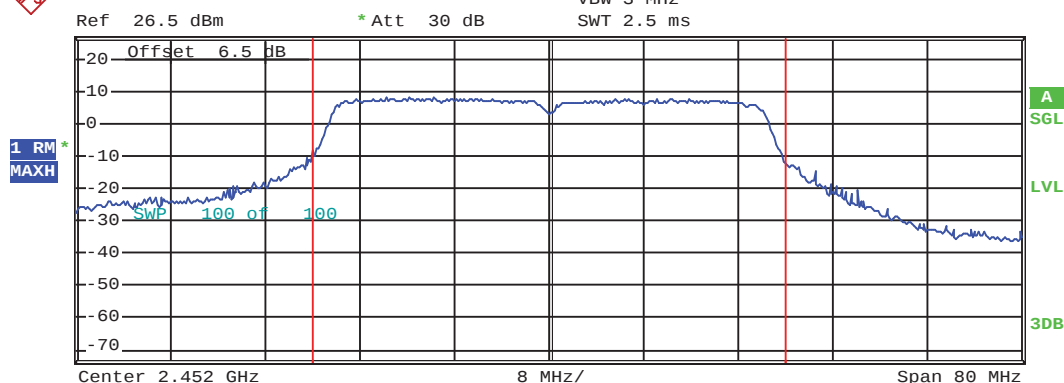
Tx Channel1
Bandwidth 40 MHz Power 17.68 dBm

Lowest channel



Tx Channel1
Bandwidth 40 MHz Power 24.28 dBm

Middle channel



Tx Channel1
Bandwidth 40 MHz Power 21.71 dBm

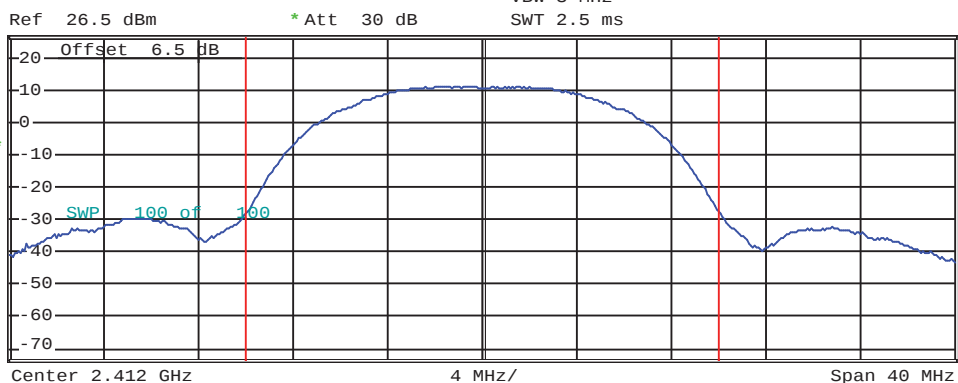
Highest channel

TX2



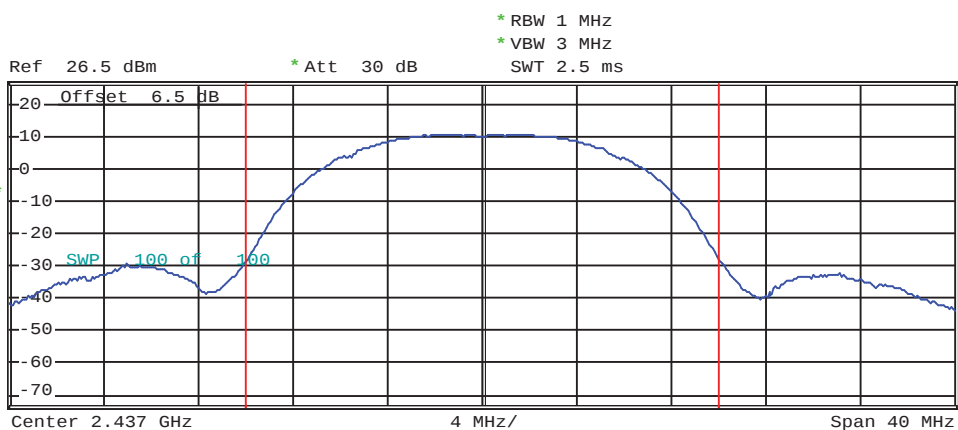
Test mode: 802.11b

* RBW 1 MHz
* VBW 3 MHz
SWT 2.5 ms



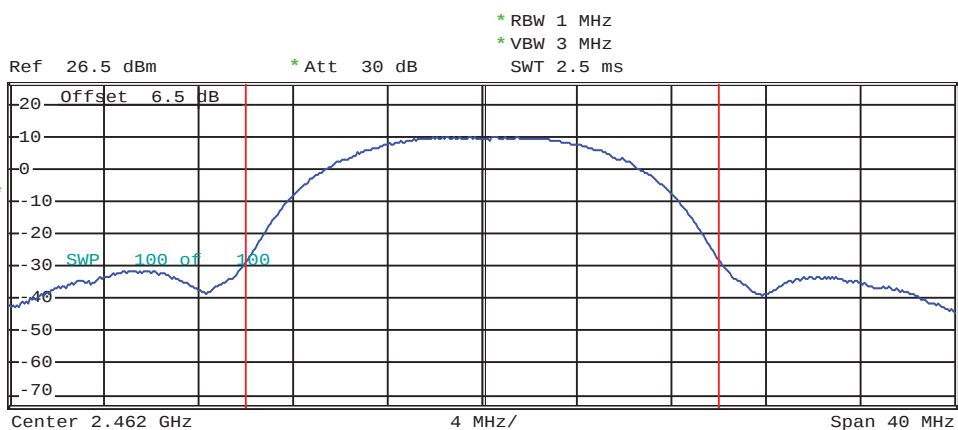
Tx Channel1
Bandwidth 20 MHz Power 19.77 dBm

Lowest channel



Tx Channel1
Bandwidth 20 MHz Power 19.30 dBm

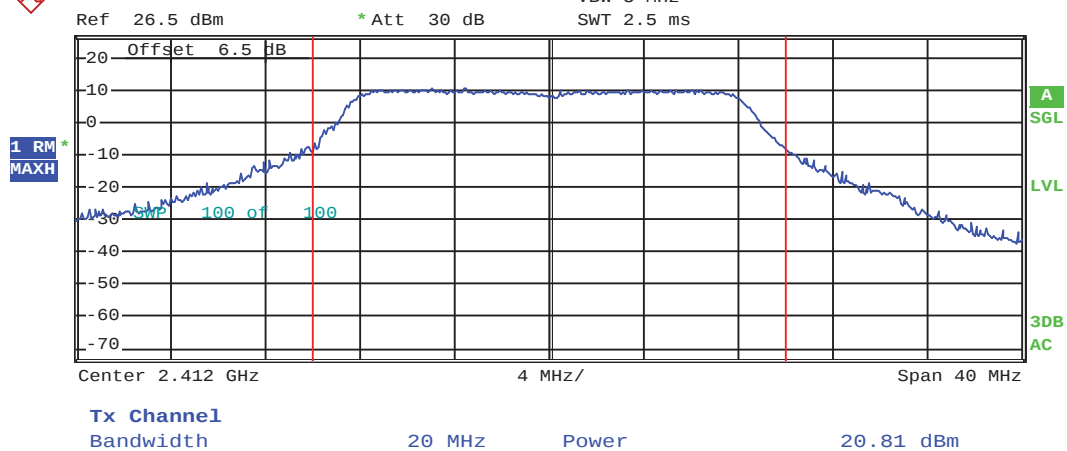
Middle channel



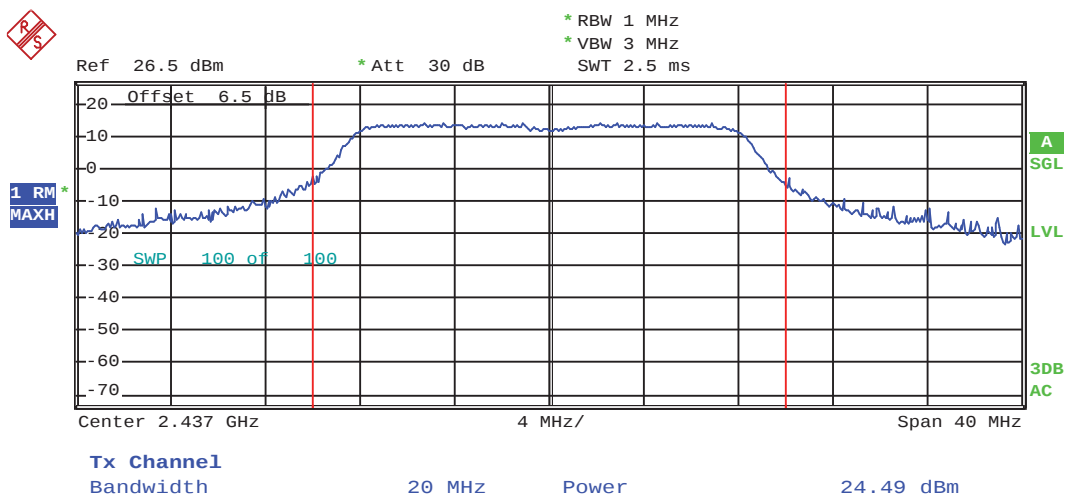
Tx Channel1
Bandwidth 20 MHz Power 18.50 dBm

Highest channel

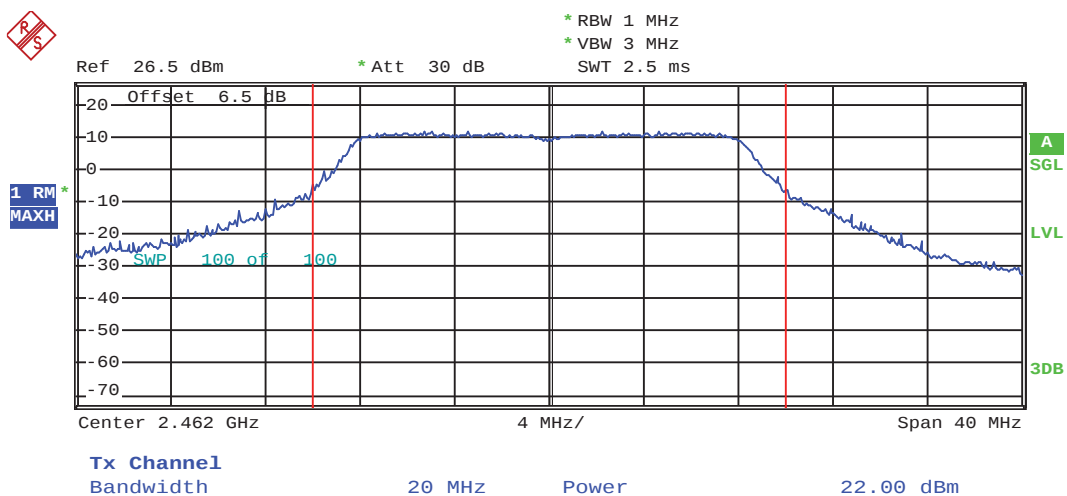
Test mode: 802.11g



Lowest channel

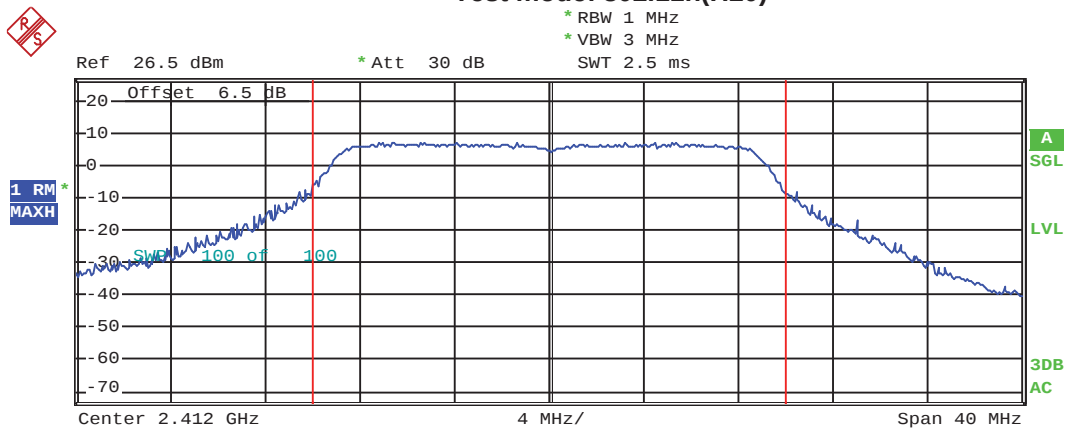


Middle channel



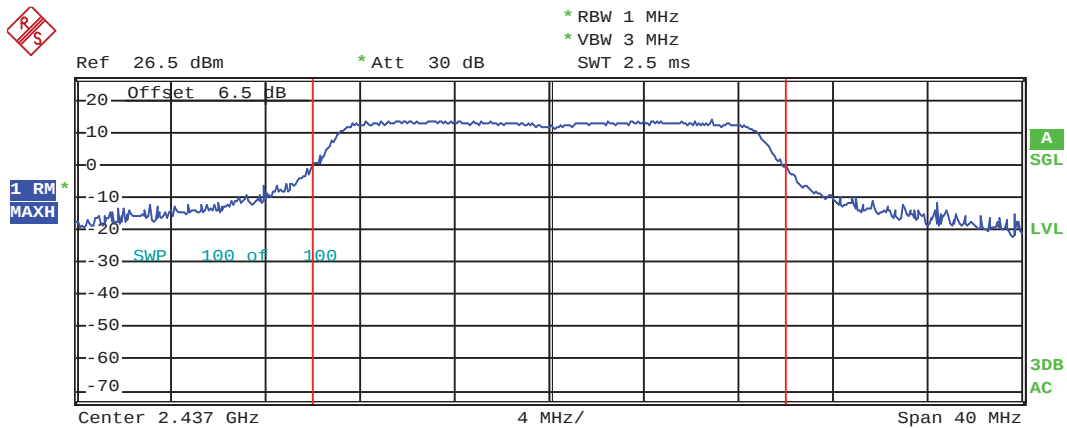
Highest channel

Test mode: 802.11n(H20)



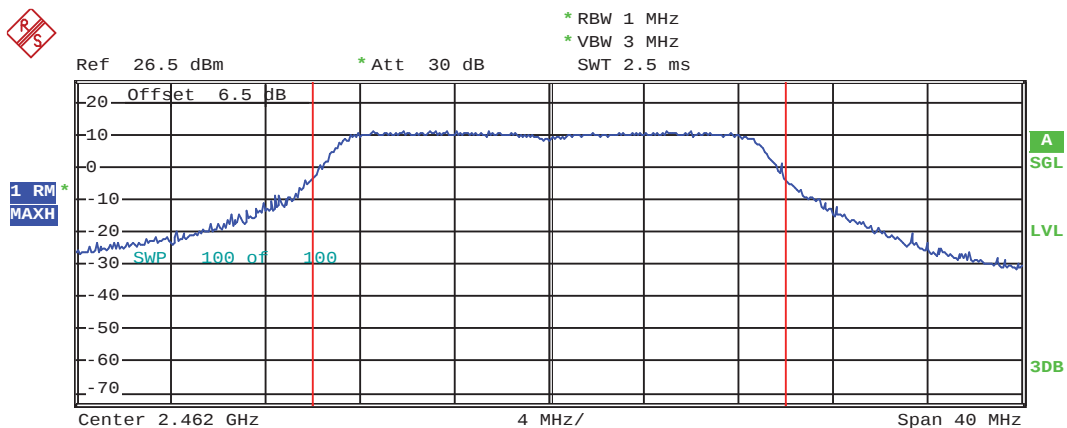
Tx Channel1
Bandwidth 20 MHz Power 17.82 dBm

Lowest channel



Tx Channel1
Bandwidth 20 MHz Power 24.51 dBm

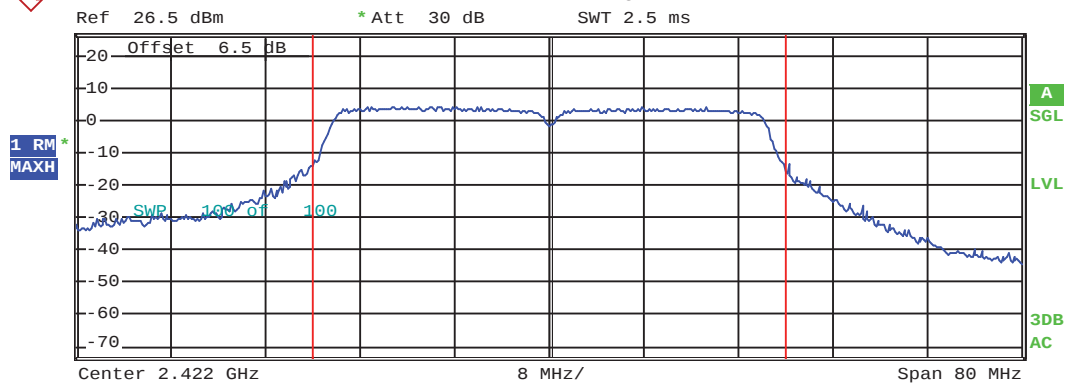
Middle channel



Tx Channel1
Bandwidth 20 MHz Power 21.81 dBm

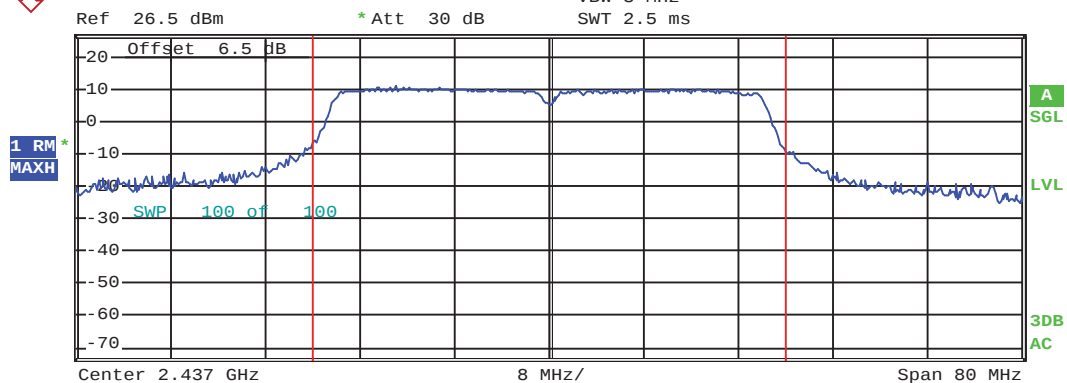
Highest channel

Test mode: 802.11n(H40)



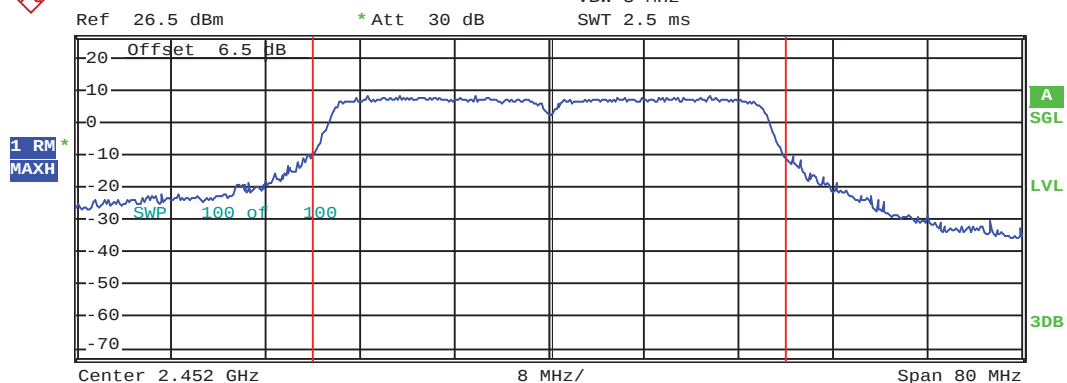
Tx Channel
Bandwidth 40 MHz Power 17.91 dBm

Lowest channel



Tx Channel
Bandwidth 40 MHz Power 24.27 dBm

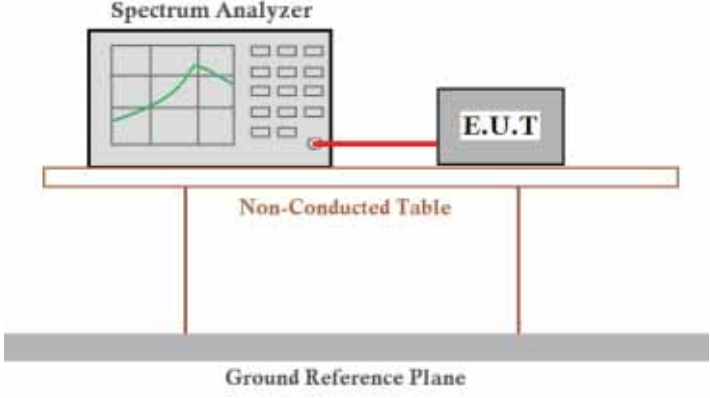
Middle channel



Tx Channel
Bandwidth 40 MHz Power 21.69 dBm

Highest channel

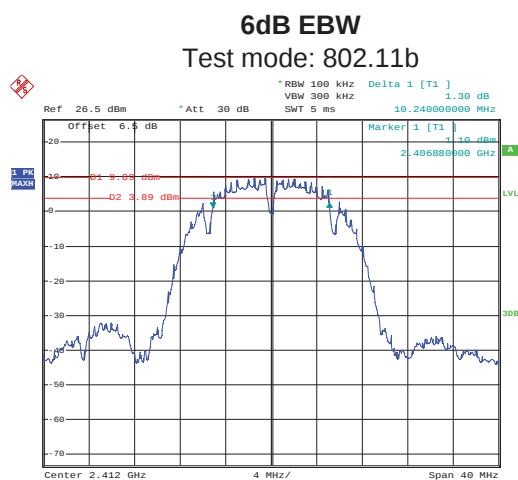
6.4 Occupy Bandwidth

Test Requirement:	FCC Part 15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 8.1
Limit:	>500kHz
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

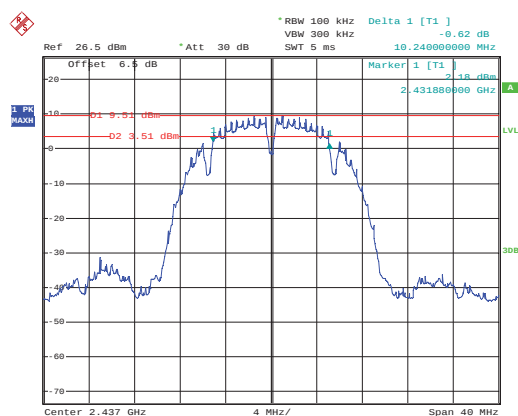
Test CH	6dB Emission Bandwidth (MHz)				Limit(kHz)	Result
	802.11b	802.11g	802.11n(H20)	802.11n(H40)		
Lowest	10.24	16.64	17.76	36.80	>500	Pass
Middle	10.24	16.48	17.76	36.64		
Highest	10.24	16.48	17.76	36.64		
Test CH	99% Occupy Bandwidth (MHz)				Limit(kHz)	Result
	802.11b	802.11g	802.11n(H20)	802.11n(H40)		
Lowest	14.00	16.64	17.76	36.48	N/A	N/A
Middle	13.92	16.64	17.76	36.32		
Highest	13.92	16.64	17.76	36.32		

Test plot as follows:



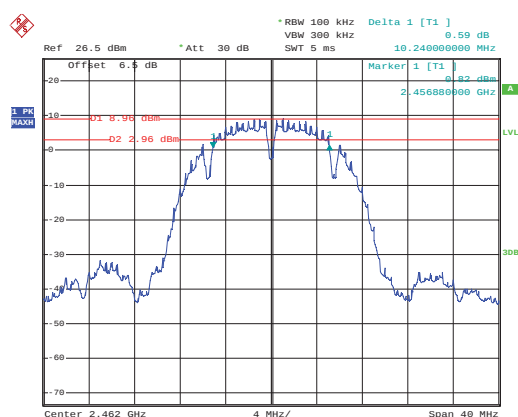
Date: 28.JUN.2016 08:46:11

Lowest channel



Date: 28.JUN.2016 08:47:32

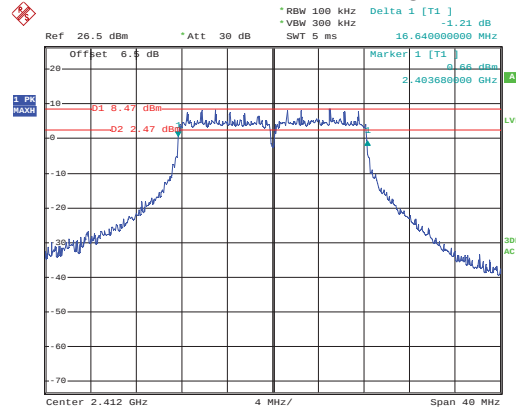
Middle channel



Date: 28.JUN.2016 08:48:42

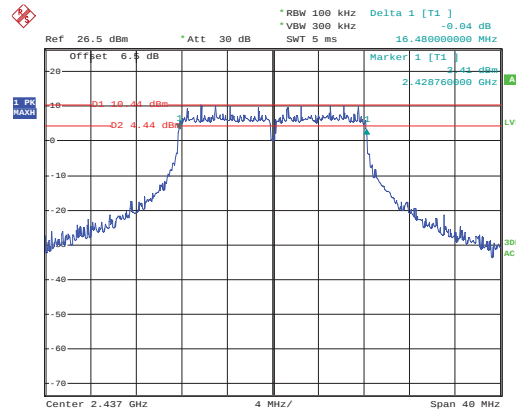
Highest channel

Test mode: 802.11g



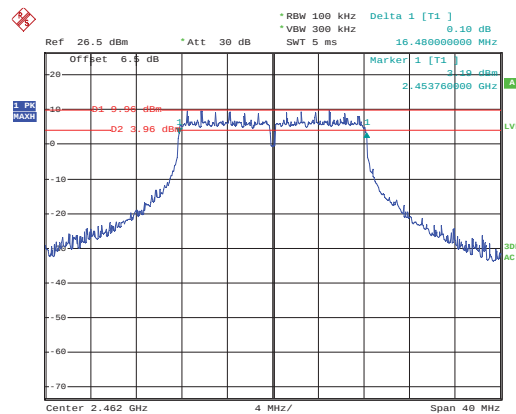
Date: 15.JUN.2016 11:55:42

Lowest channel



Date: 15.JUN.2016 11:56:45

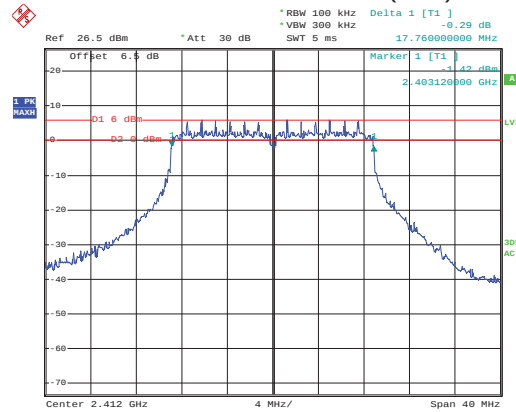
Middle channel



Date: 15.JUN.2016 11:58:37

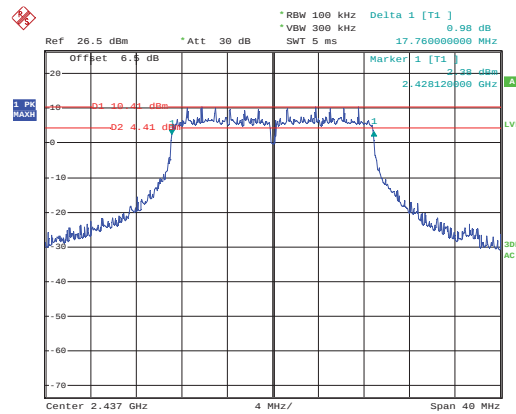
Highest channel

Test mode: 802.11n(H20)



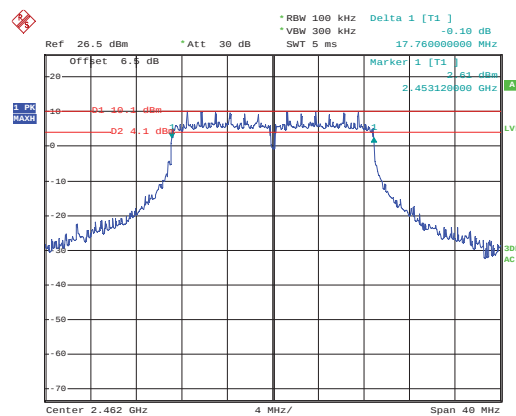
Date: 15.JUN.2016 12:01:32

Lowest channel



Date: 15.JUN.2016 12:03:13

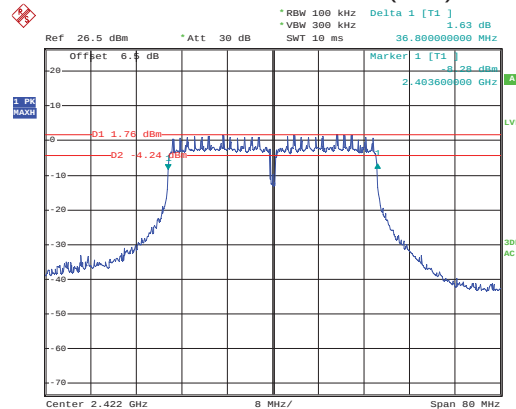
Middle channel



Date: 15.JUN.2016 12:06:21

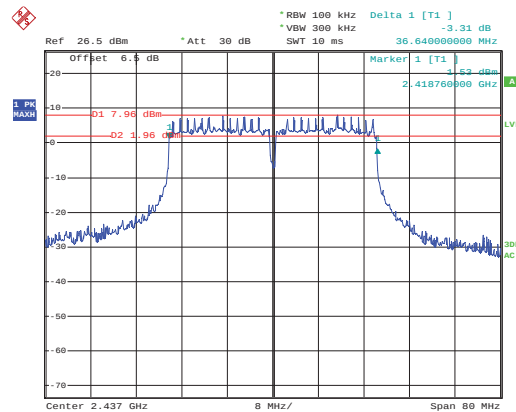
Highest channel

Test mode: 802.11n(H40)



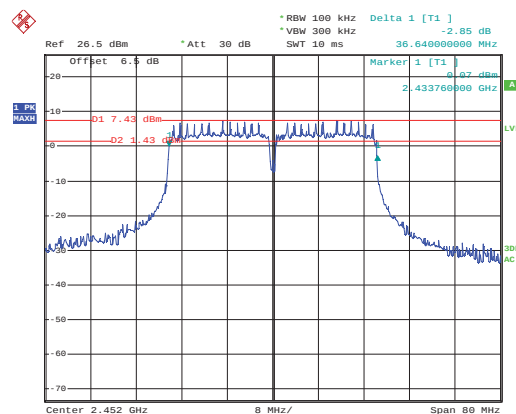
Date: 15.JUN.2016 12:08:40

Lowest channel



Date: 15.JUN.2016 12:10:19

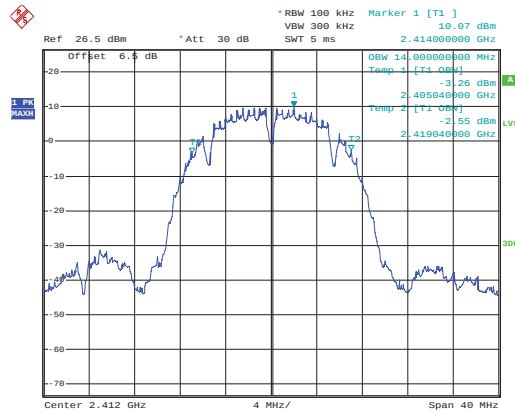
Middle channel



Date: 15.JUN.2016 12:11:50

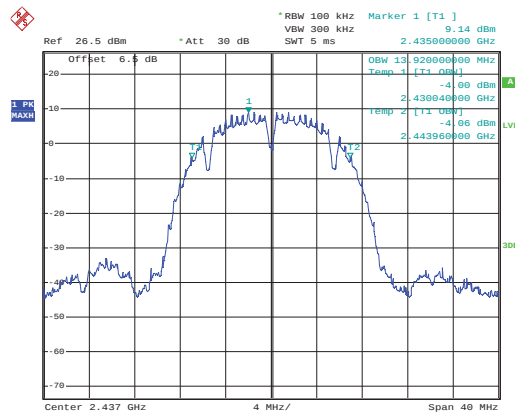
Highest channel

99% OBW Test mode: 802.11b



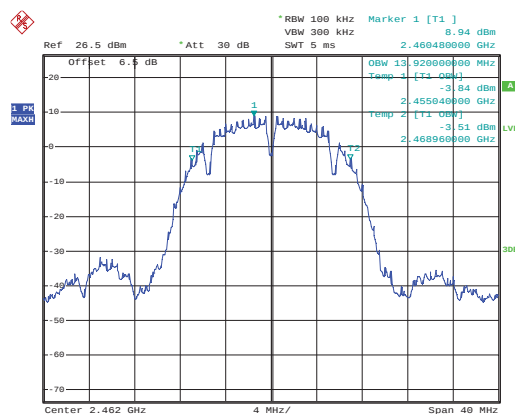
Date: 28.JUN.2016 08:50:36

Lowest channel



Date: 28.JUN.2016 08:50:08

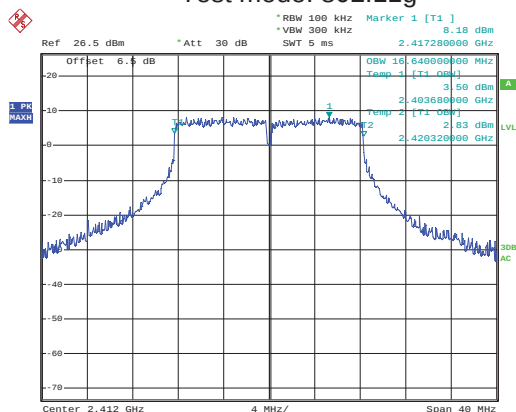
Middle channel



Date: 28.JUN.2016 08:49:40

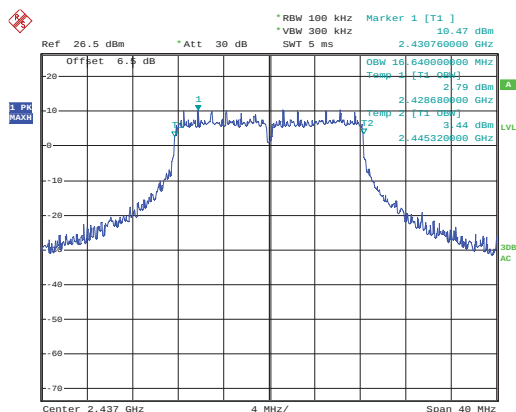
Highest channel

Test mode: 802.11g



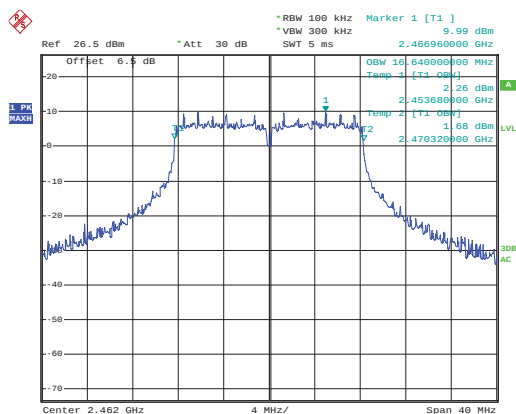
Date: 15.JUN.2016 13:41:00

Lowest channel



Date: 15.JUN.2016 13:41:48

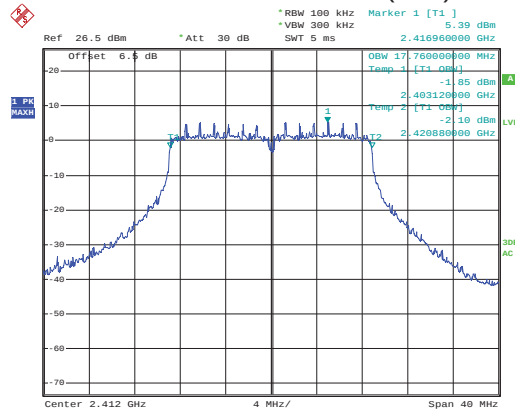
Middle channel



Date: 15.JUN.2016 13:42:41

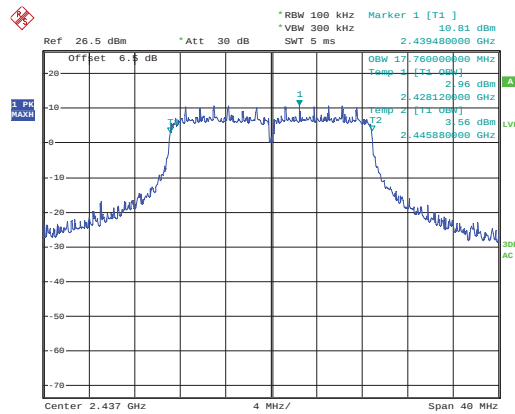
Highest channel

Test mode: 802.11n(H20)



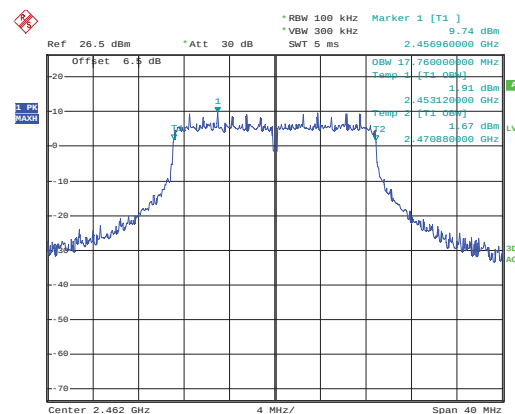
Date: 15.JUN.2016 13:45:49

Lowest channel



Date: 15.JUN.2016 13:44:37

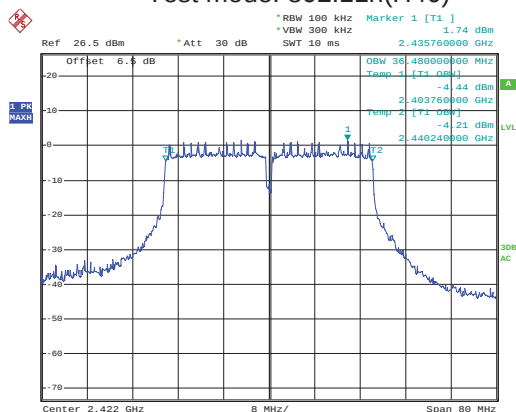
Middle channel



Date: 15.JUN.2016 13:43:13

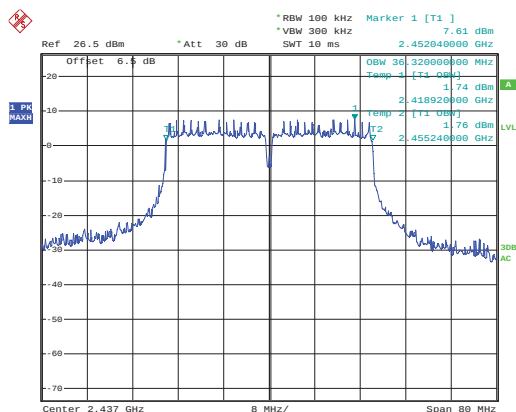
Highest channel

Test mode: 802.11n(H40)



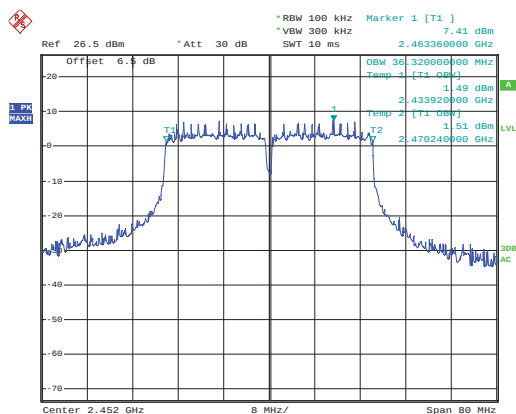
Date: 15.JUN.2016 13:59:42

Lowest channel



Date: 15.JUN.2016 13:58:50

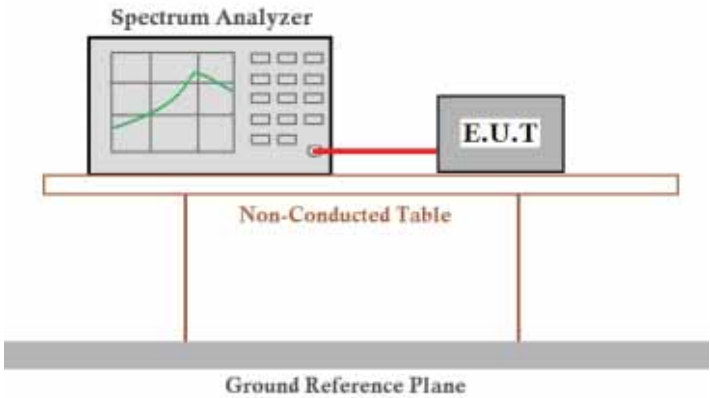
Middle channel



Date: 15.JUN.2016 13:58:03

Highest channel

6.5 Power Spectral Density

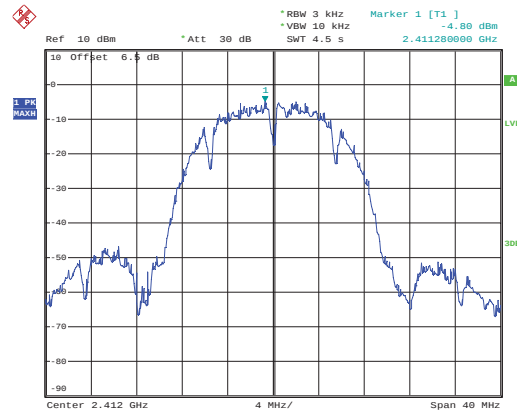
Test Requirement:	FCC Part 15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 10.2
Limit:	8dBm
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

Mode	Test Channel	Ant. Port	PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Result
802.11b	Lowest	TX0	-4.80	-0.07	8.00	Pass
		TX1	-4.46			
		TX2	-5.30			
	Middle	TX0	-5.26	-0.15	8.00	Pass
		TX1	-4.63			
		TX2	-4.91			
	Highest	TX0	-7.00	-1.41	8.00	Pass
		TX1	-5.35			
		TX2	-6.37			
802.11g	Lowest	TX0	-6.36	-1.25	8.00	Pass
		TX1	-5.89			
		TX2	-5.84			
	Middle	TX0	-4.47	0.26	8.00	Pass
		TX1	-4.31			
		TX2	-4.76			
	Highest	TX0	-5.20	-0.10	8.00	Pass
		TX1	-3.51			
		TX2	-6.38			
802.11n(H20)	Lowest	TX0	-9.09	-4.82	8.00	Pass
		TX1	-10.25			
		TX2	-9.50			
	Middle	TX0	-3.87	1.32	8.00	Pass
		TX1	-3.43			
		TX2	-3.09			
	Highest	TX0	-4.78	0.48	8.00	Pass
		TX1	-4.08			
		TX2	-4.05			
802.11n(H40)	Lowest	TX0	-12.53	-7.60	8.00	Pass
		TX1	-11.46			
		TX2	-13.33			
	Middle	TX0	-6.75	-1.27	8.00	Pass
		TX1	-5.34			
		TX2	-6.14			
	Highest	TX0	-6.52	-1.02	8.00	Pass
		TX1	-5.87			
		TX2	-5.10			

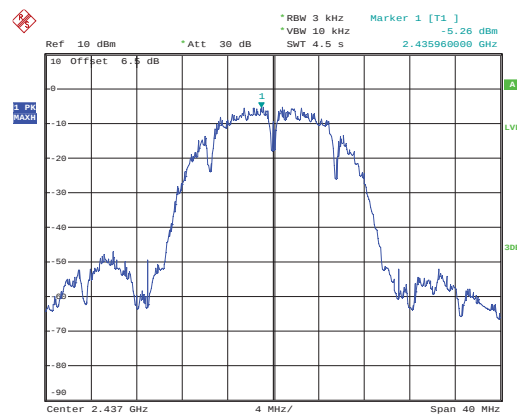
Test plot as follows:
TX0

Test mode: 802.11b



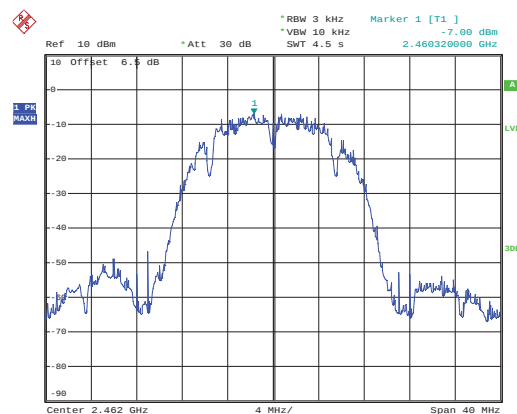
Date: 28.JUN.2016 08:55:38

Lowest channel



Date: 28.JUN.2016 08:56:30

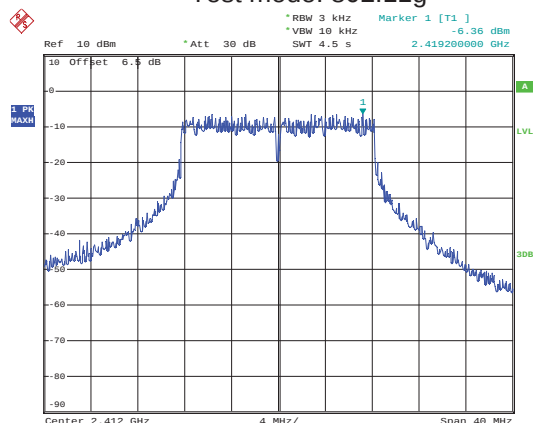
Middle channel



Date: 28.JUN.2016 08:57:26

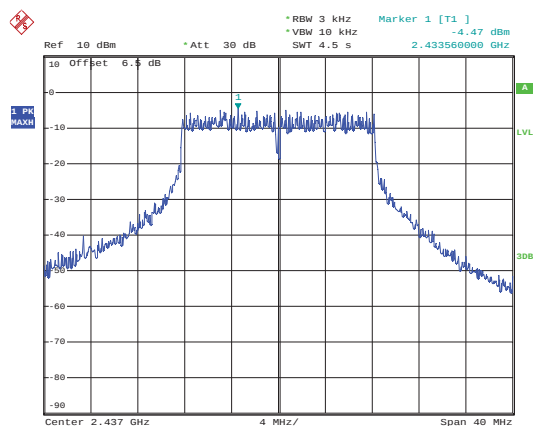
Highest channel

Test mode: 802.11g



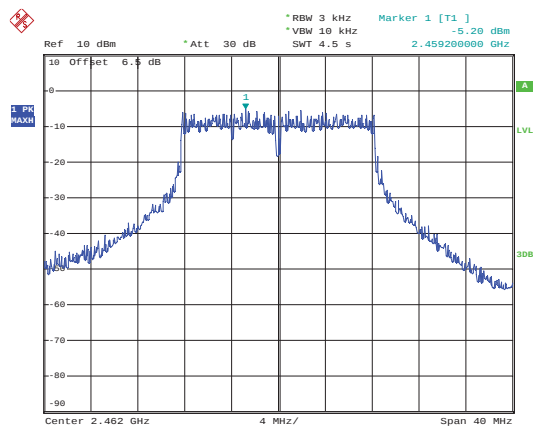
Date: 28.JUN.2016 09:38:58

Lowest channel



Date: 28.JUN.2016 09:42:51

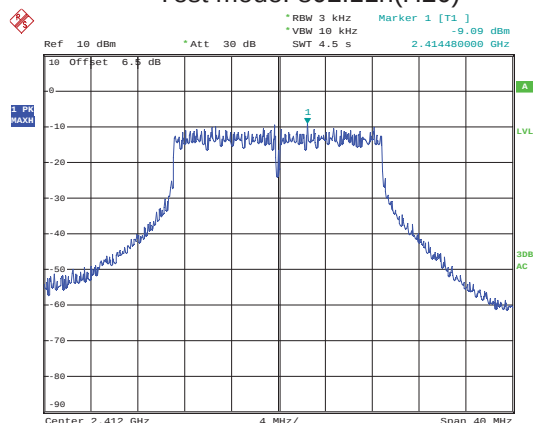
Middle channel



Date: 28.JUN.2016 09:43:28

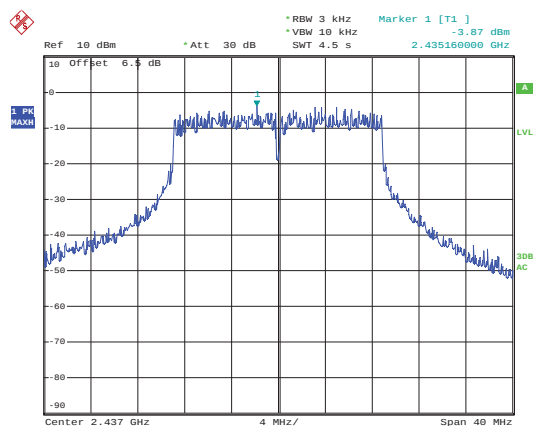
Highest channel

Test mode: 802.11n(H20)



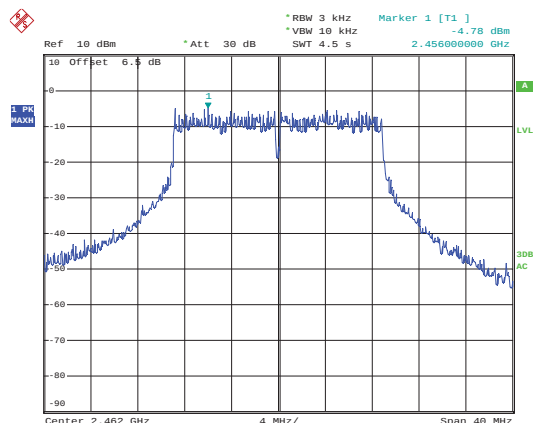
Date: 15.JUN.2016 13:51:37

Lowest channel



Date: 15.JUN.2016 13:52:27

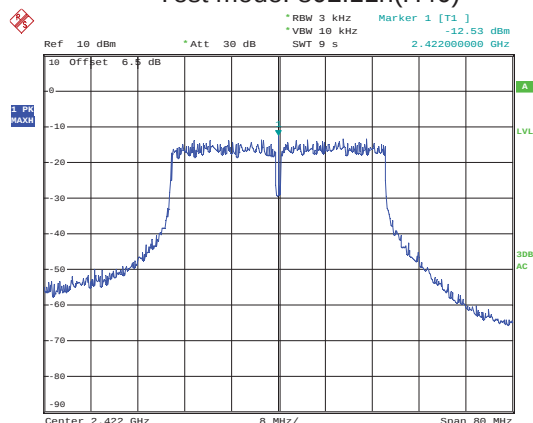
Middle channel



Date: 15.JUN.2016 13:53:14

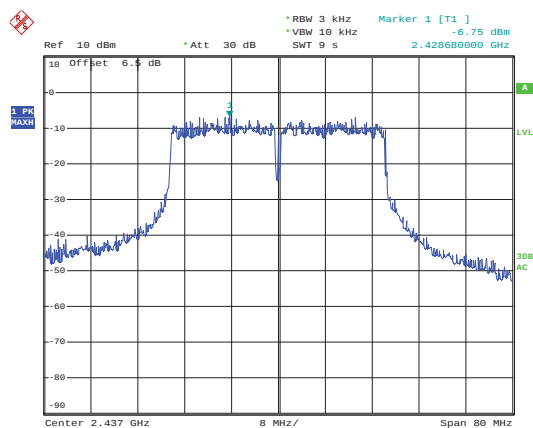
Highest channel

Test mode: 802.11n(H40)



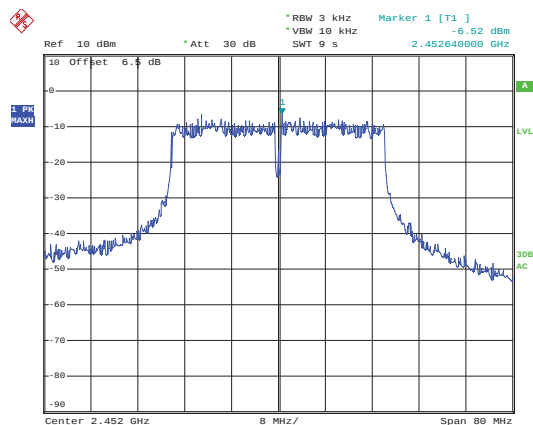
Date: 15.JUN.2016 13:55:08

Lowest channel



Date: 15.JUN.2016 13:55:56

Middle channel

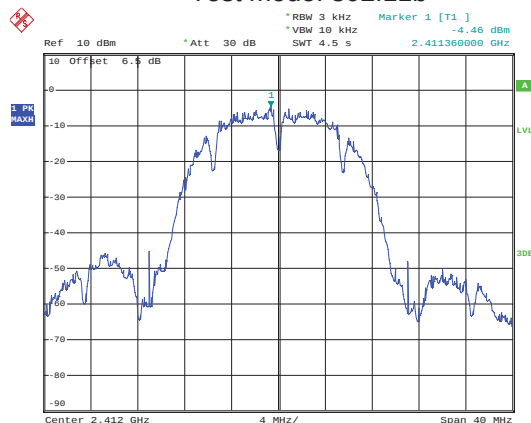


Date: 15.JUN.2016 13:57:25

Highest channel

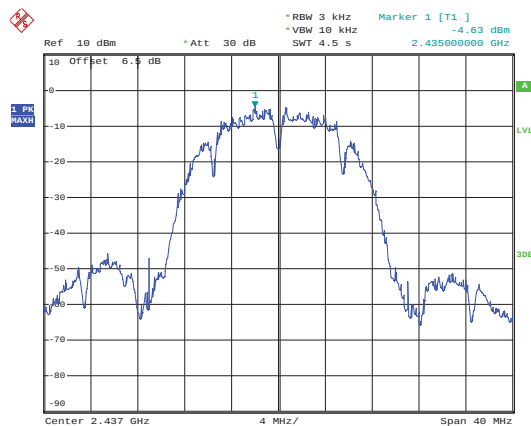
TX1

Test mode: 802.11b



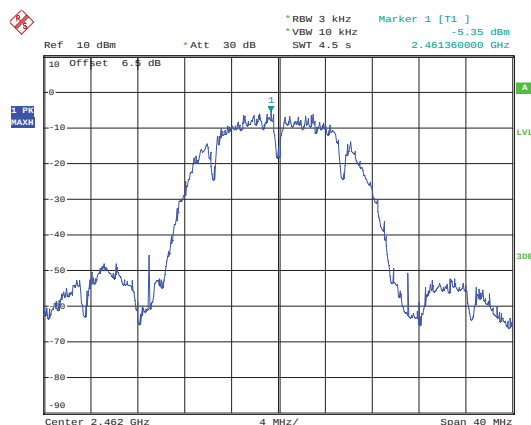
Date: 28.JUN.2016 09:04:05

Lowest channel



Date: 28.JUN.2016 09:04:41

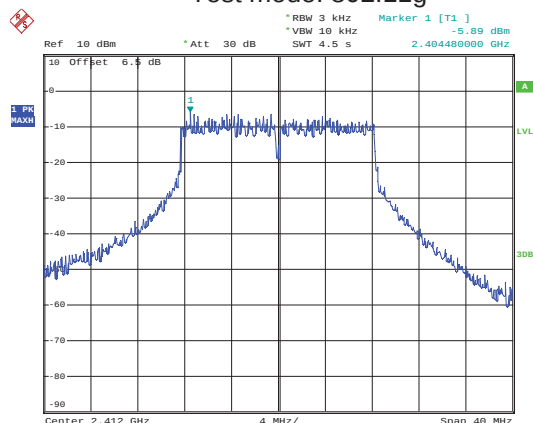
Middle channel



Date: 28.JUN.2016 09:05:14

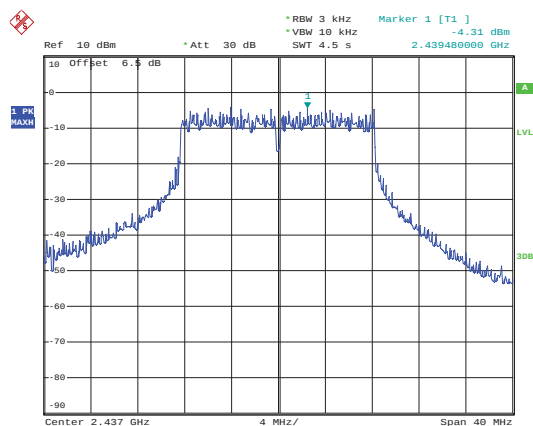
Highest channel

Test mode: 802.11g



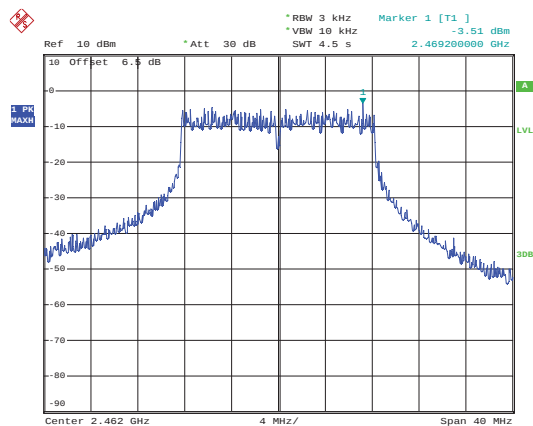
Date: 28.JUN.2016 09:39:42

Lowest channel



Date: 28.JUN.2016 09:42:18

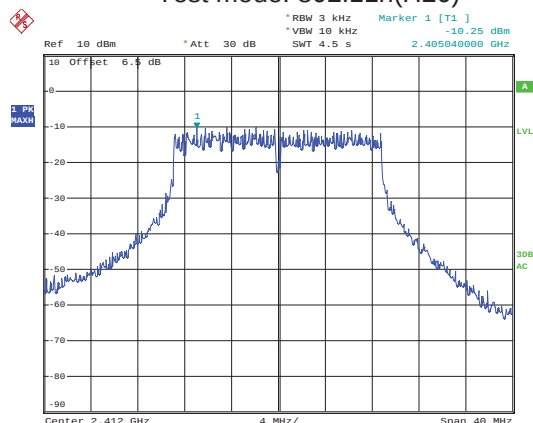
Middle channel



Date: 28.JUN.2016 09:44:11

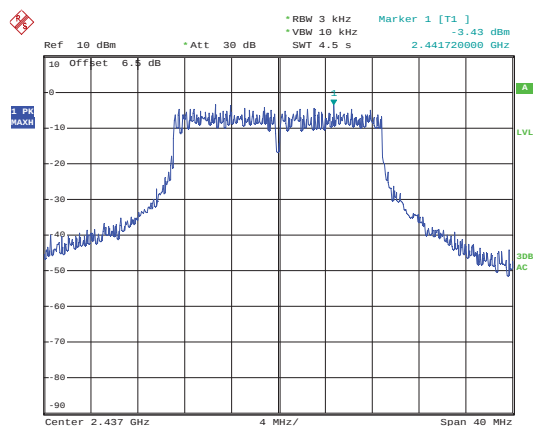
Highest channel

Test mode: 802.11n(H20)



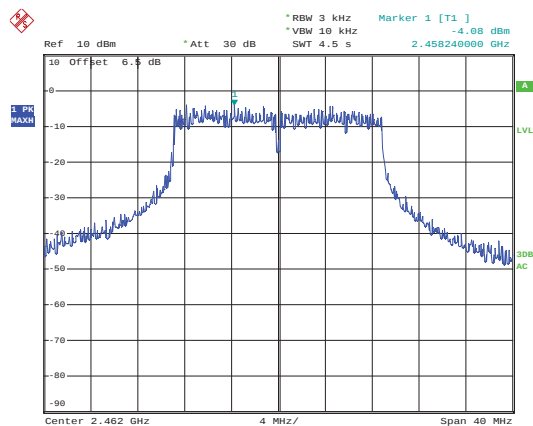
Date: 15.JUN.2016 15:57:19

Lowest channel



Date: 15.JUN.2016 15:56:38

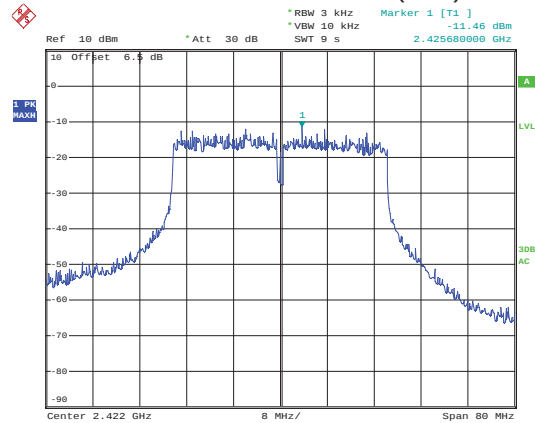
Middle channel



Date: 15.JUN.2016 15:55:54

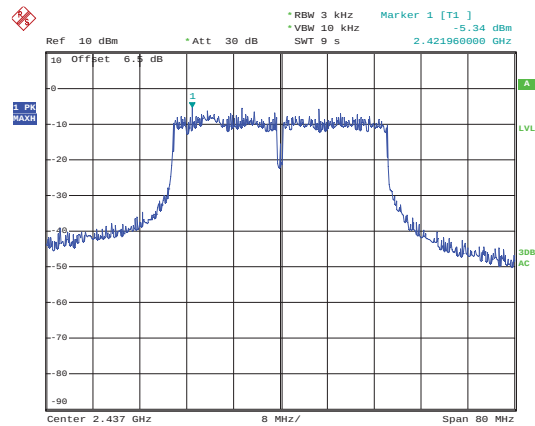
Highest channel

Test mode: 802.11n(H40)



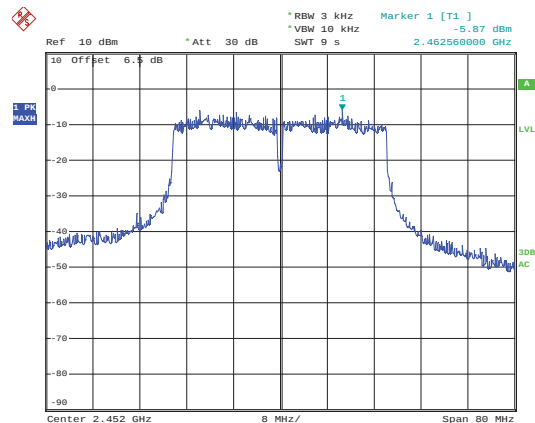
Date: 15.JUN.2016 15:58:59

Lowest channel



Date: 15.JUN.2016 16:00:10

Middle channel

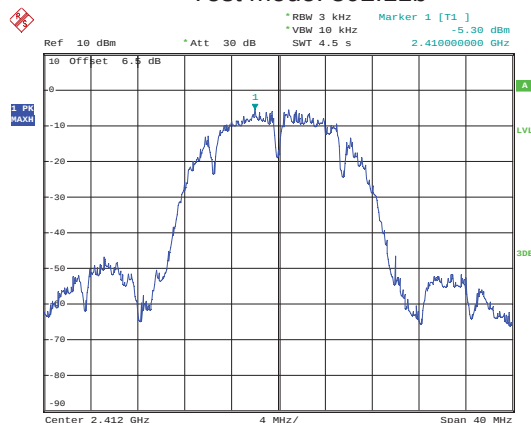


Date: 15.JUN.2016 16:01:00

Highest channel

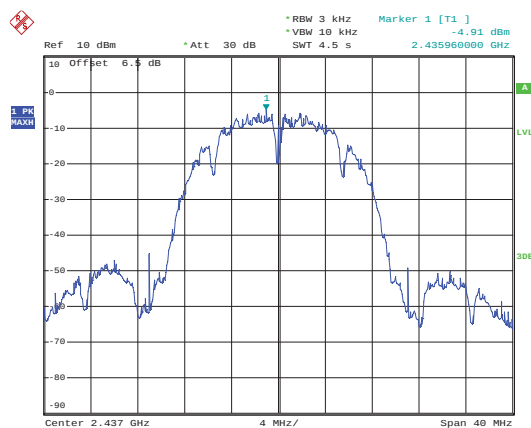
TX2

Test mode: 802.11b



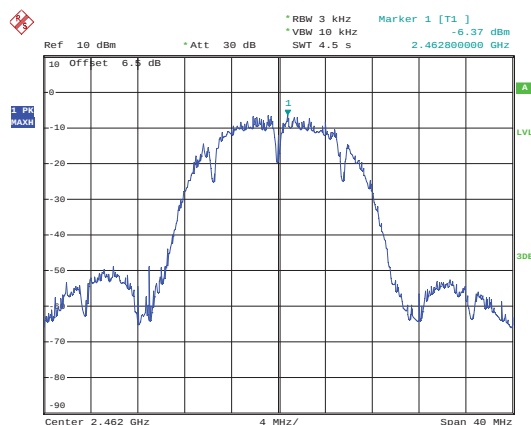
Date: 28.JUN.2016 09:12:38

Lowest channel



Date: 28.JUN.2016 09:11:39

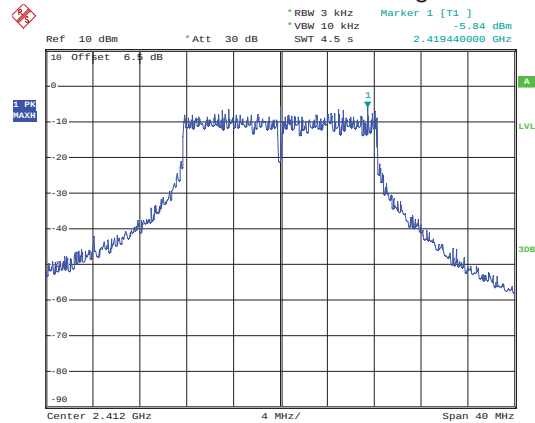
Middle channel



Date: 28.JUN.2016 09:10:59

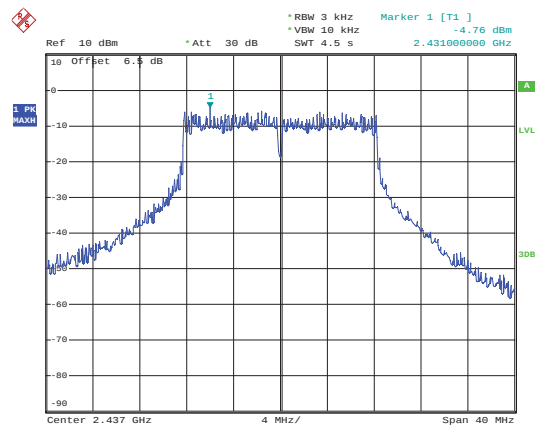
Highest channel

Test mode: 802.11g



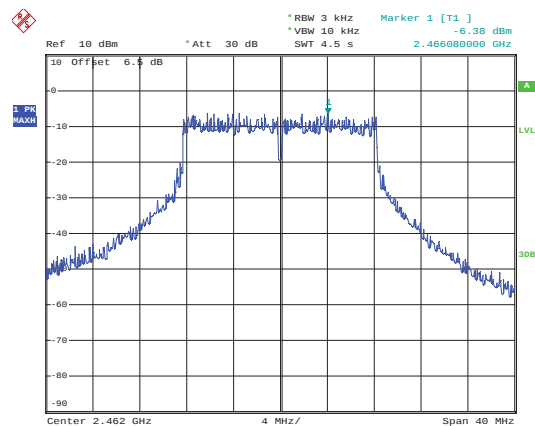
Date: 28.JUN.2016 09:40:13

Lowest channel



Date: 28.JUN.2016 09:41:45

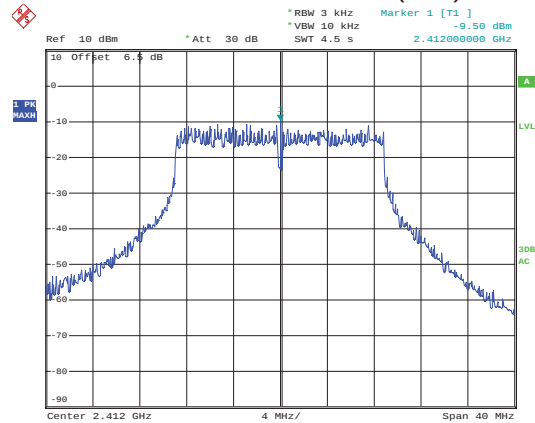
Middle channel



Date: 28.JUN.2016 09:44:39

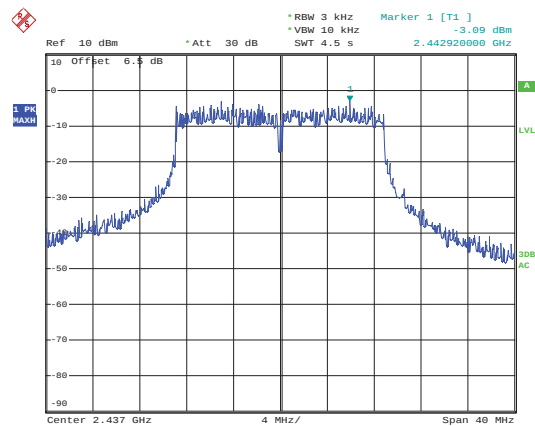
Highest channel

Test mode: 802.11n(H20)



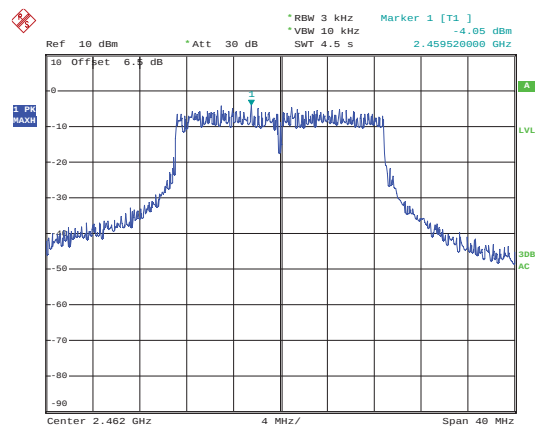
Date: 15.JUN.2016 18:06:08

Lowest channel



Date: 15.JUN.2016 18:05:11

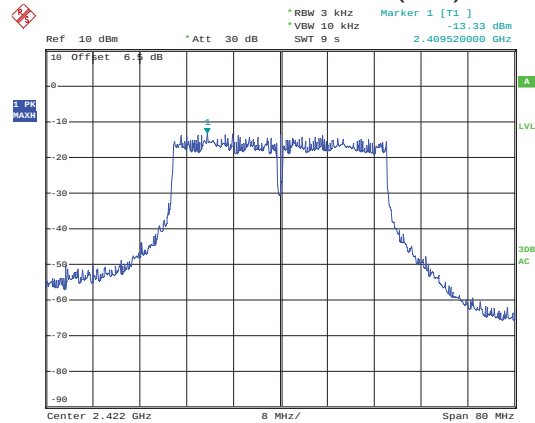
Middle channel



Date: 15.JUN.2016 18:04:15

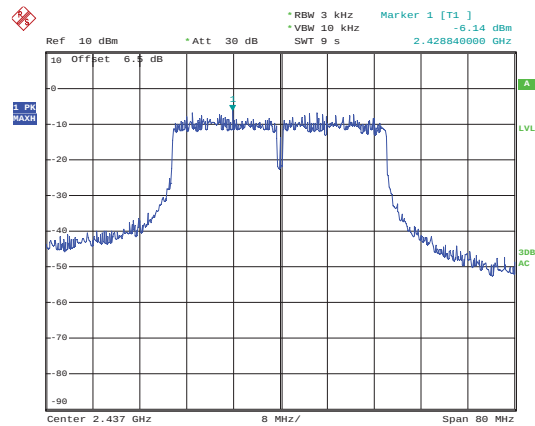
Highest channel

Test mode: 802.11n(H40)



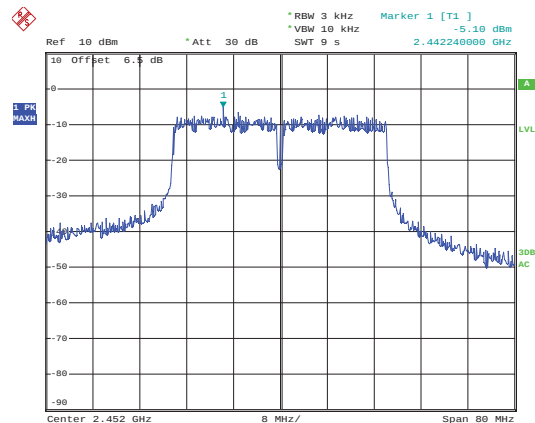
Date: 15.JUN.2016 18:07:23

Lowest channel



Date: 15.JUN.2016 18:08:17

Middle channel

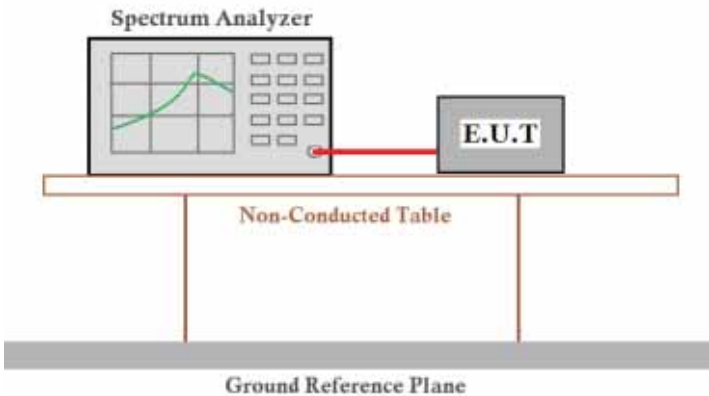


Date: 15.JUN.2016 18:09:17

Highest channel

6.6 Band Edge

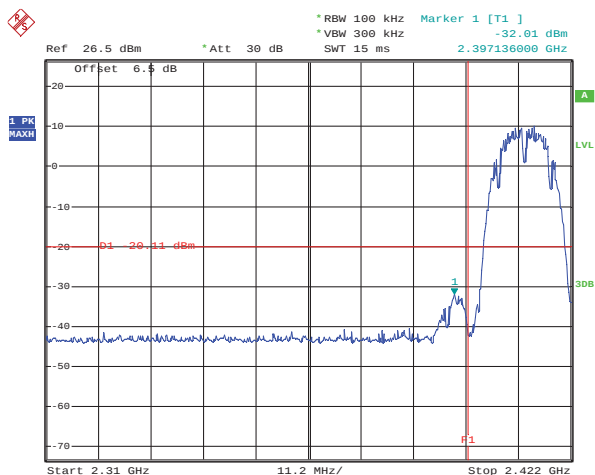
6.6.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 13
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 The diagram illustrates the test setup for conducted emission measurement. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table, which is supported by two vertical legs. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plot as follows:

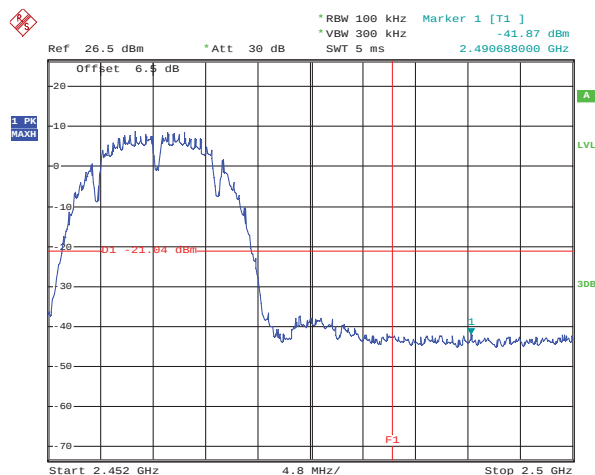
TX0

802.11b



Date: 28.JUN.2016 09:23:33

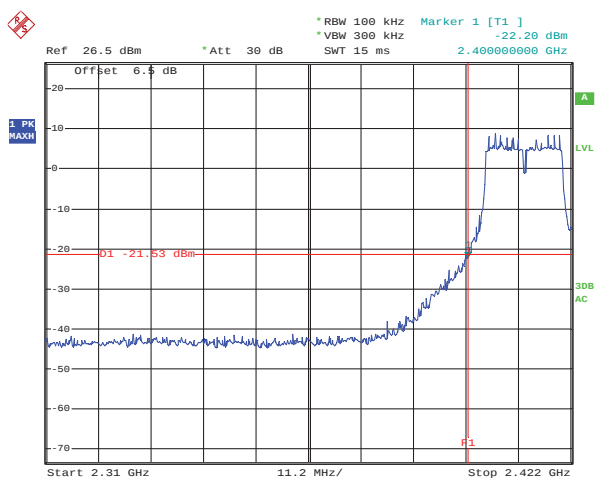
Lowest channel



Date: 28.JUN.2016 09:27:45

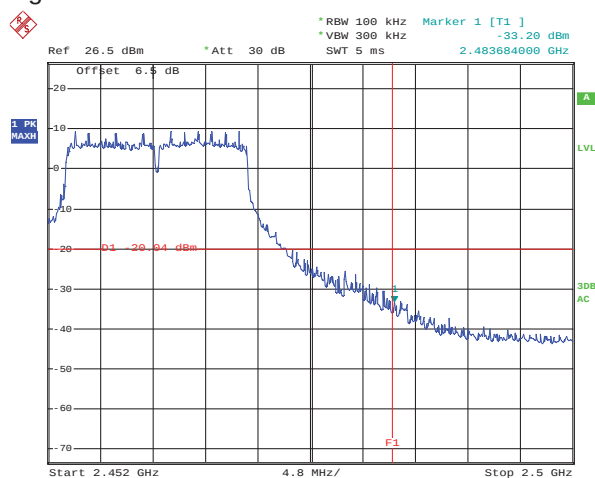
Highest channel

802.11g



Date: 15.JUN.2016 14:41:33

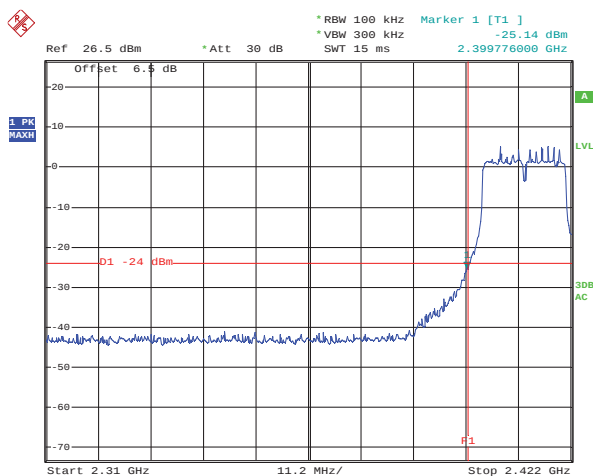
Lowest channel



Date: 15.JUN.2016 14:39:56

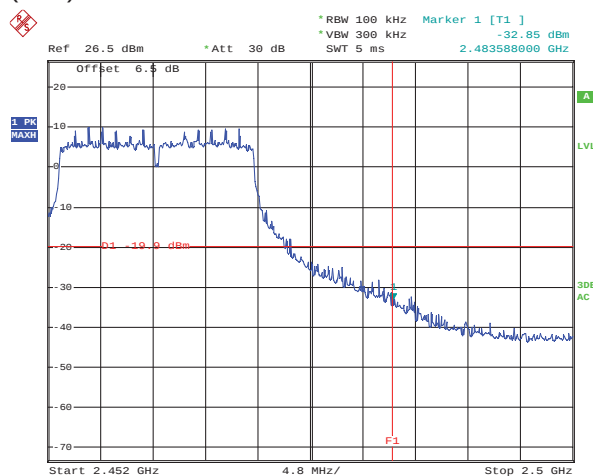
Highest channel

802.11n(H20)



Date: 15.JUN.2016 14:42:43

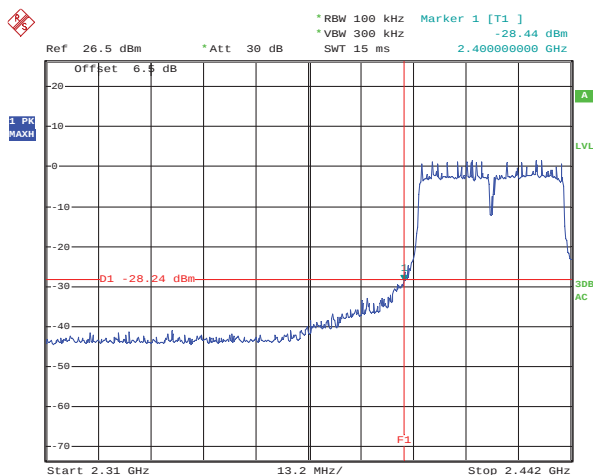
Lowest channel



Date: 15.JUN.2016 14:39:05

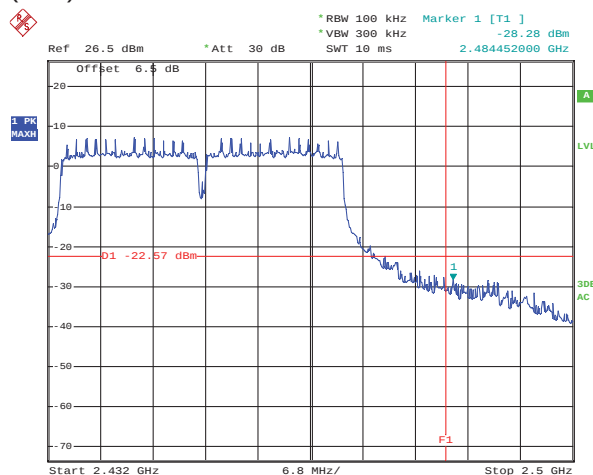
Highest channel

802.11n(H40)



Date: 15.JUN.2016 14:36:12

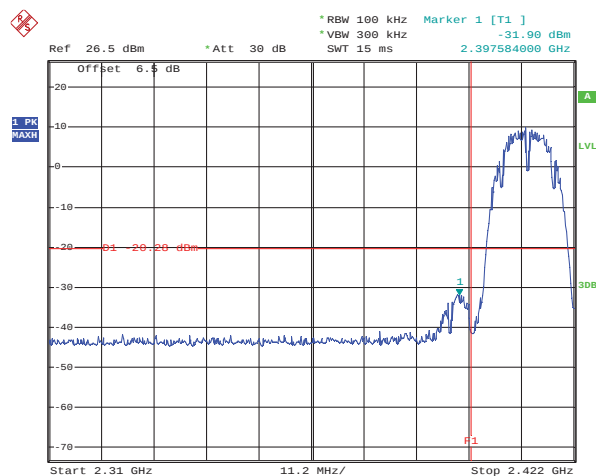
Lowest channel



Date: 15.JUN.2016 14:37:45

Highest channel

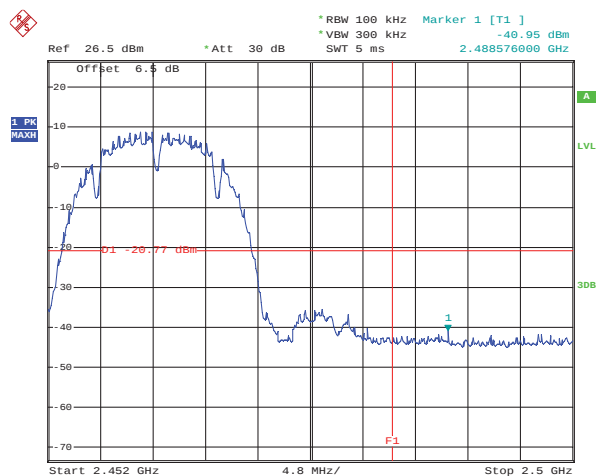
TX1



Date: 28.JUN.2016 09:24:13

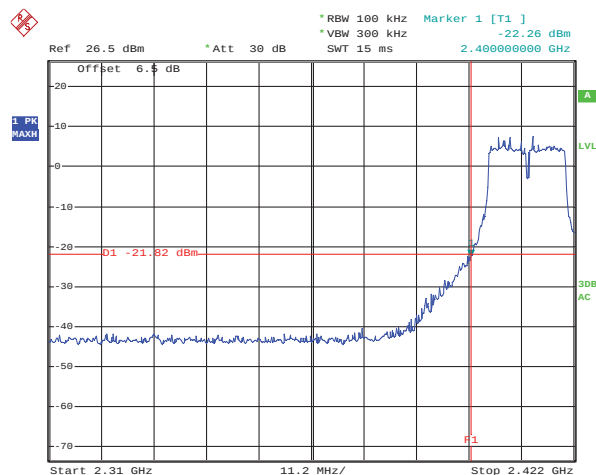
Lowest channel

802.11b



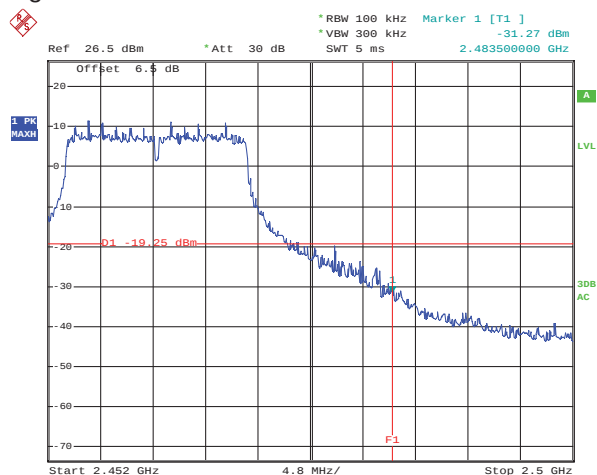
Date: 28.JUN.2016 09:26:56

Highest channel



Date: 15.JUN.2016 16:03:55

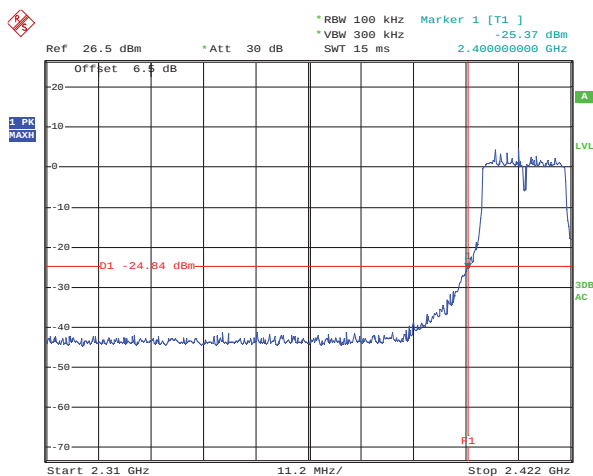
Lowest channel



Date: 15.JUN.2016 16:24:41

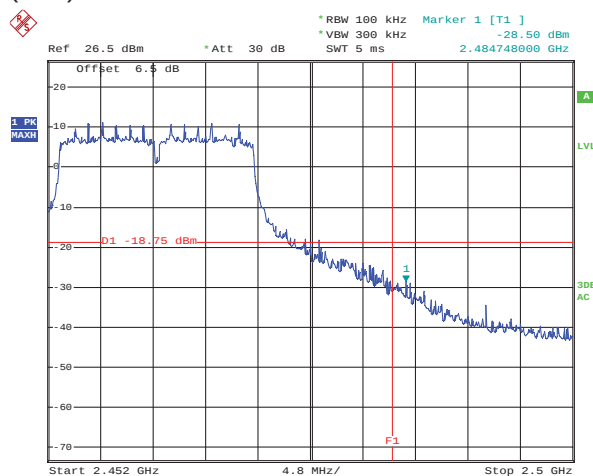
Highest channel

802.11n(H20)



Date: 15.JUN.2016 16:06:16

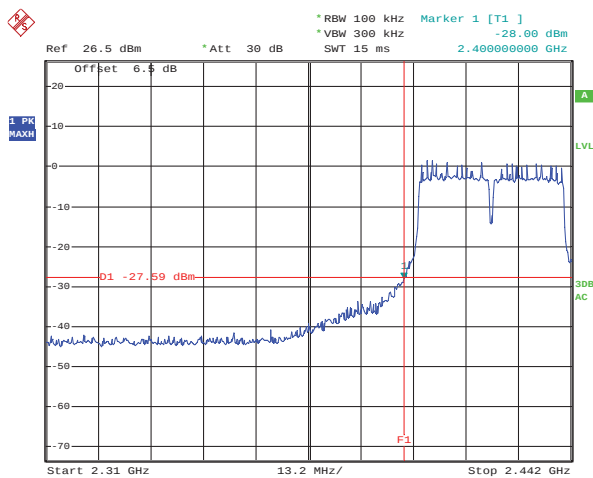
Lowest channel



Date: 15.JUN.2016 16:25:30

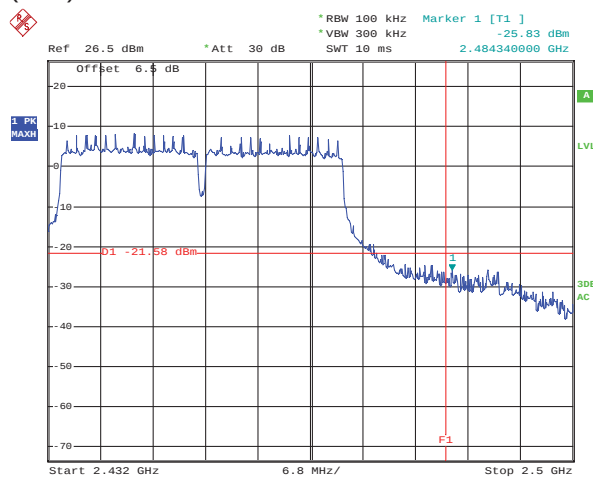
Highest channel

802.11n(H40)



Date: 15.JUN.2016 16:08:58

Lowest channel

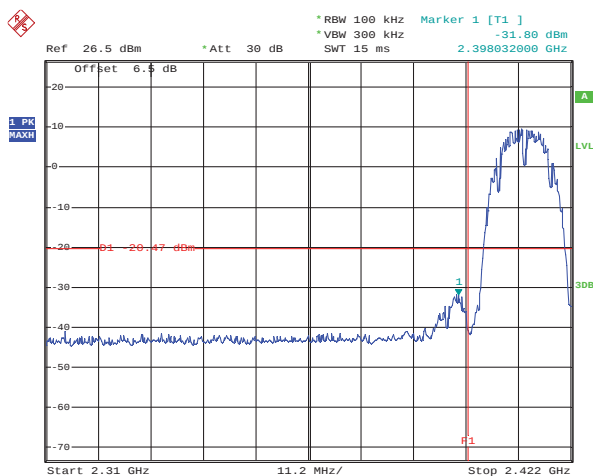


Date: 15.JUN.2016 16:26:25

Highest channel

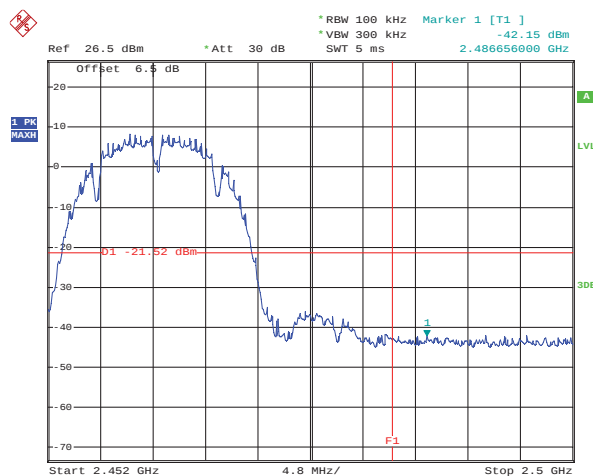
TX2

802.11b



Date: 28.JUN.2016 09:25:16

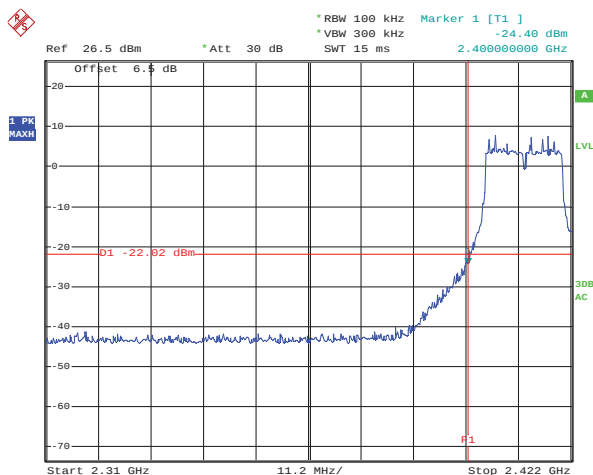
Lowest channel



Date: 28.JUN.2016 09:26:19

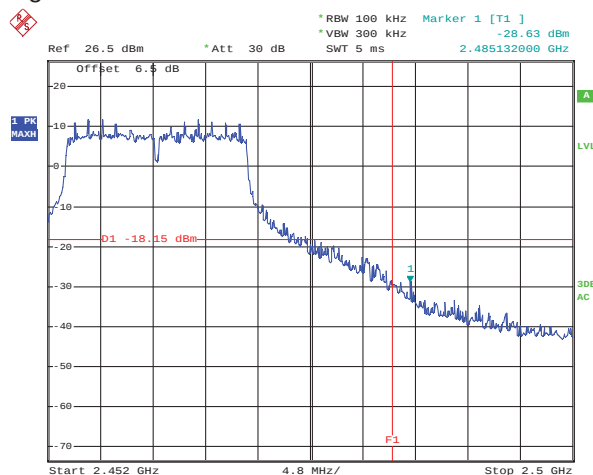
Highest channel

802.11g



Date: 15.JUN.2016 18:12:02

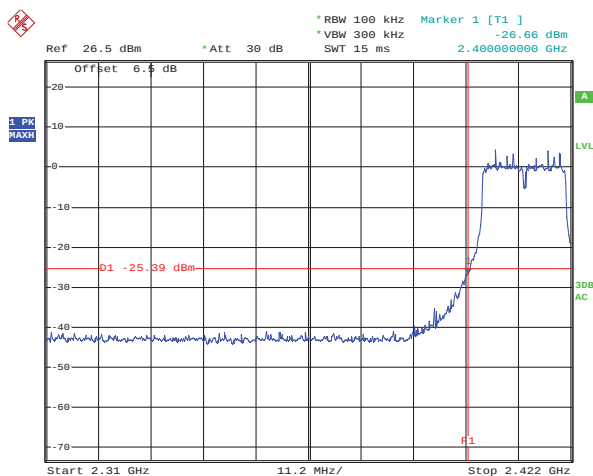
Lowest channel



Date: 15.JUN.2016 18:20:41

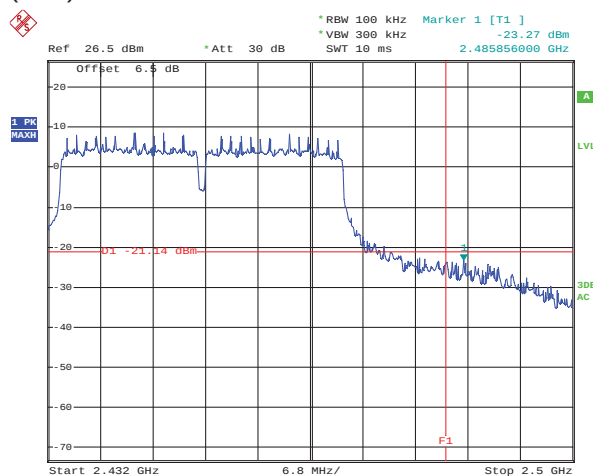
Highest channel

802.11n(H20)



Date: 15.JUN.2016 18:16:00

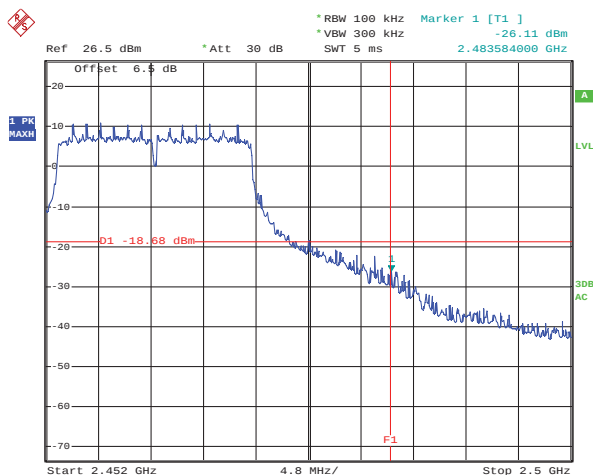
Lowest channel



Date: 15.JUN.2016 18:22:18

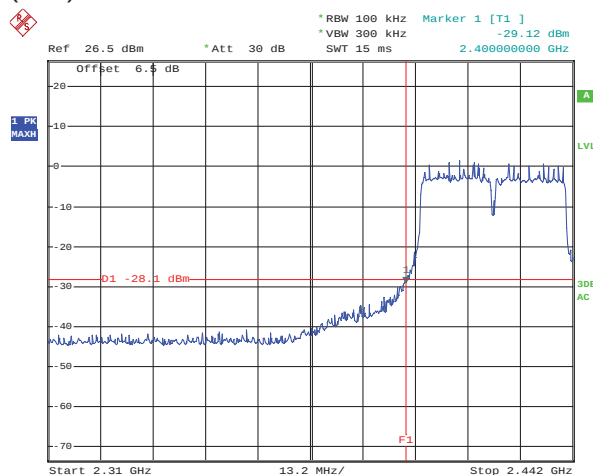
Highest channel

802.11n(H40)



Date: 15.JUN.2016 18:21:23

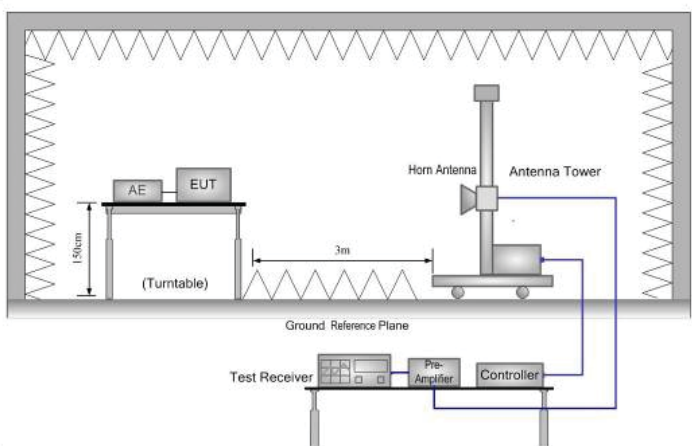
Lowest channel



Date: 15.JUN.2016 18:18:26

Highest channel

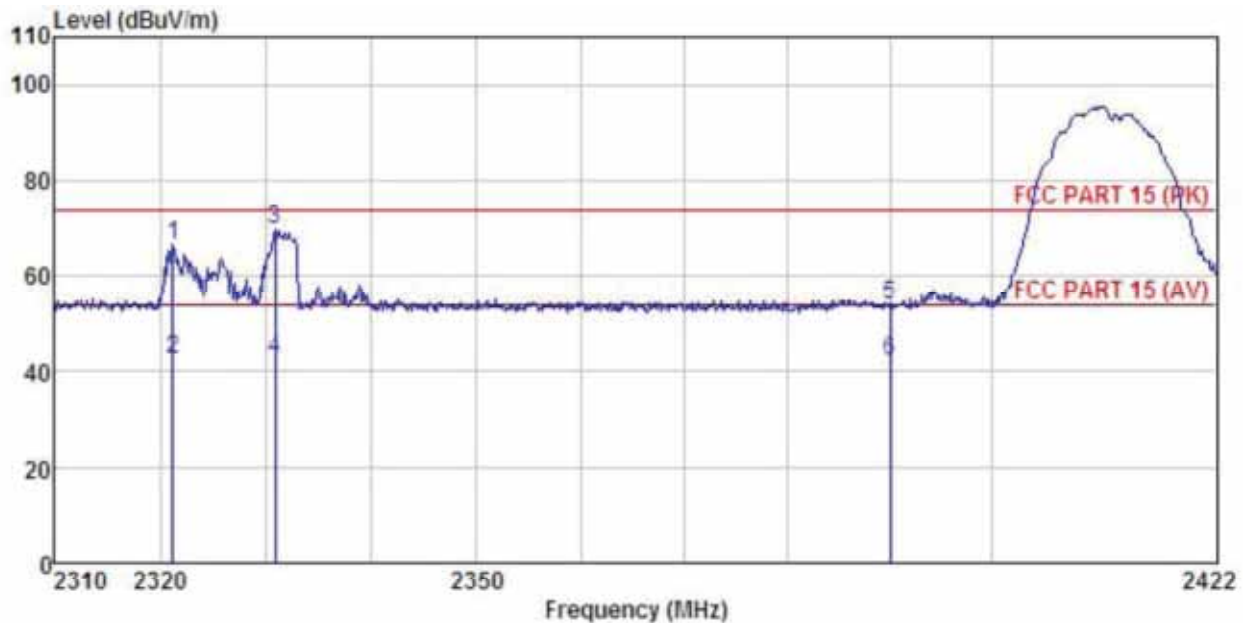
6.6.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013 and KDB 558074v03r05 section 12.1				
Test Frequency Range:	2.3GHz to 2.5GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	Above 1GHz		54.00		Average Value
			74.00		Peak Value
Test Procedure:	1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.				
Test setup:					
Test Instruments:	Refer to section 5.8 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Passed				

802.11b

Test channel: Lowest

Horizontal:



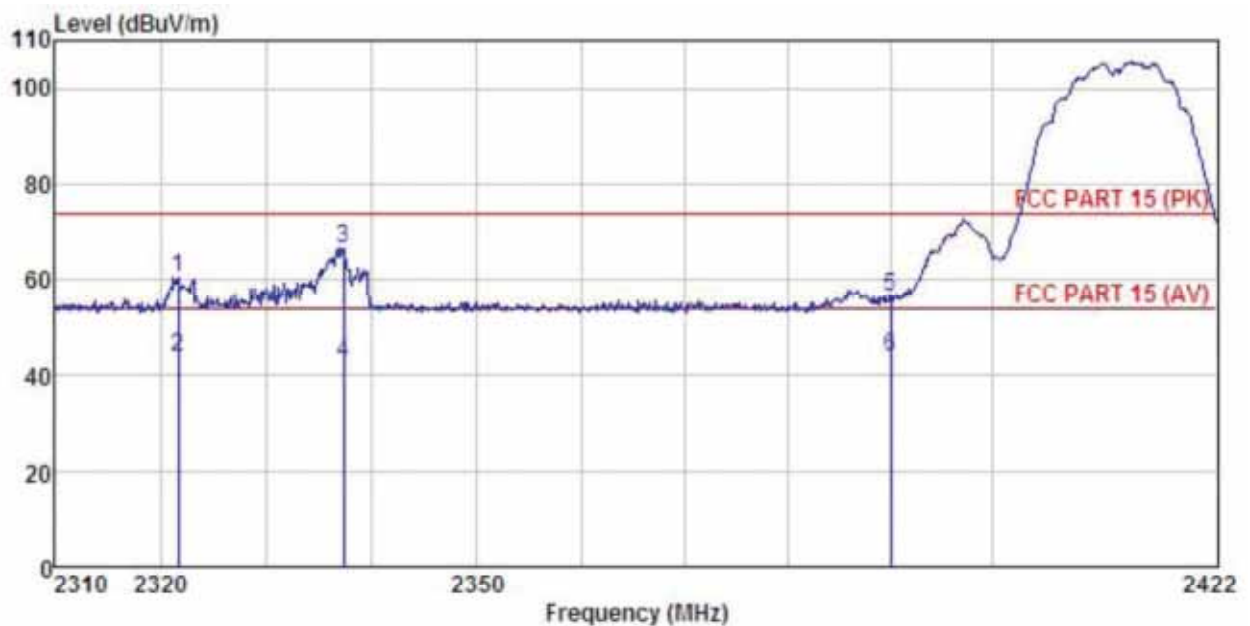
Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11b-L mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2321.183	36.28	23.67	6.48	0.00	66.43	74.00	-7.57	Peak
2	2321.183	12.36	23.67	6.48	0.00	42.51	54.00	-11.49	Average
3	2330.874	39.50	23.67	6.51	0.00	69.68	74.00	-4.32	Peak
4	2330.874	12.63	23.67	6.51	0.00	42.81	54.00	-11.19	Average
5	2390.000	23.80	23.68	6.63	0.00	54.11	74.00	-19.89	Peak
6	2390.000	11.71	23.68	6.63	0.00	42.02	54.00	-11.98	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11b-L mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

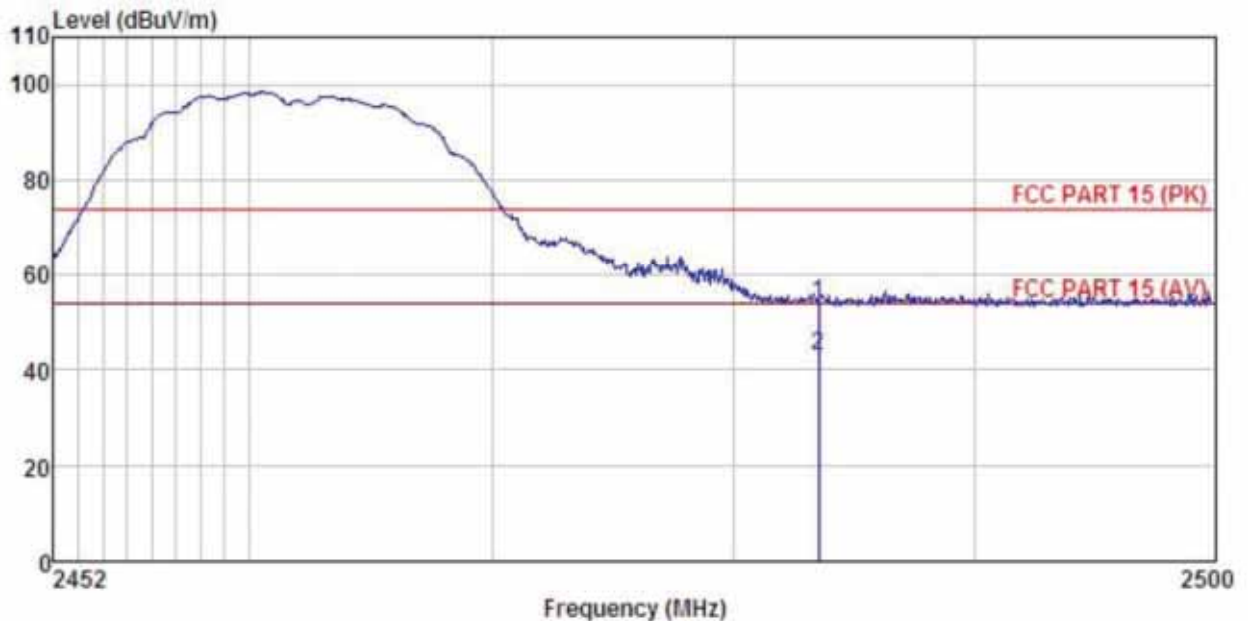
	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss Factor	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB
1	2321.622	30.39	23.67	6.48	0.00	60.54	74.00 -13.46 Peak
2	2321.622	13.59	23.67	6.48	0.00	43.74	54.00 -10.26 Average
3	2337.283	36.52	23.67	6.53	0.00	66.72	74.00 -7.28 Peak
4	2337.283	12.32	23.67	6.53	0.00	42.52	54.00 -11.48 Average
5	2390.000	25.93	23.68	6.63	0.00	56.24	74.00 -17.76 Peak
6	2390.000	13.60	23.68	6.63	0.00	43.91	54.00 -10.09 Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test channel: Highest

Horizontal:



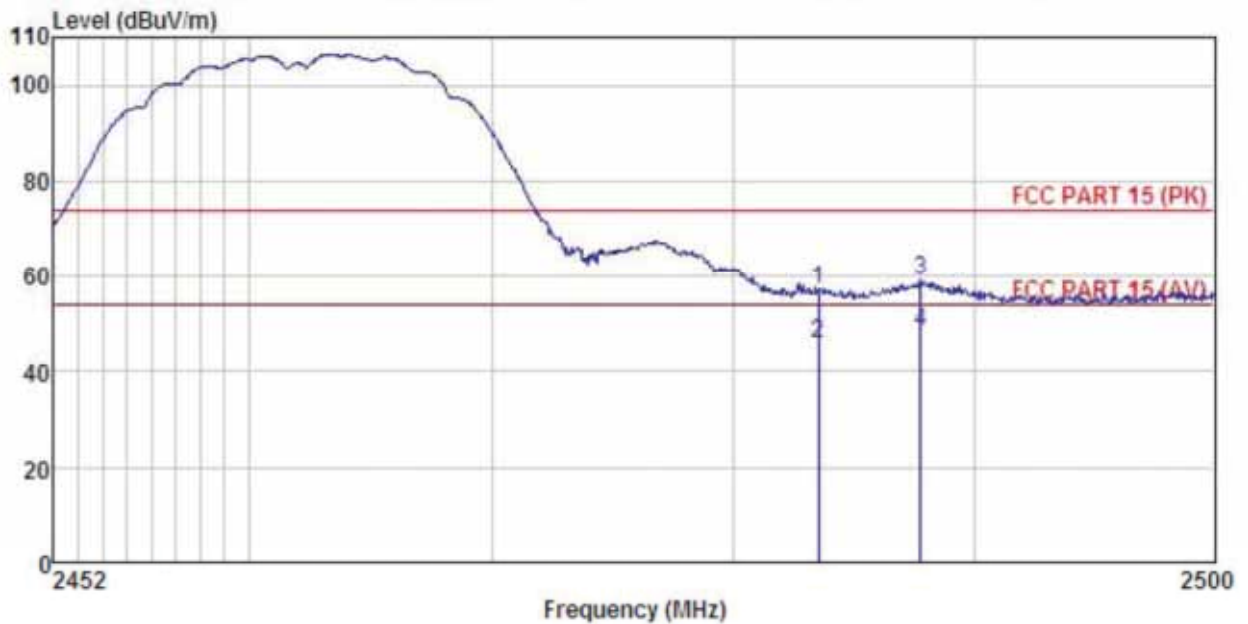
Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11b-H mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	23.50	23.70	6.85	0.00	54.05	74.00	-19.95	Peak
2	2483.500	12.43	23.70	6.85	0.00	42.98	54.00	-11.02	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11b-H mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	26.67	23.70	6.85	0.00	57.22	74.00	-16.78	Peak
2	2483.500	15.45	23.70	6.85	0.00	46.00	54.00	-8.00	Average
3	2487.768	28.65	23.70	6.85	0.00	59.20	74.00	-14.80	Peak
4	2487.768	17.74	23.70	6.85	0.00	48.29	54.00	-5.71	Average

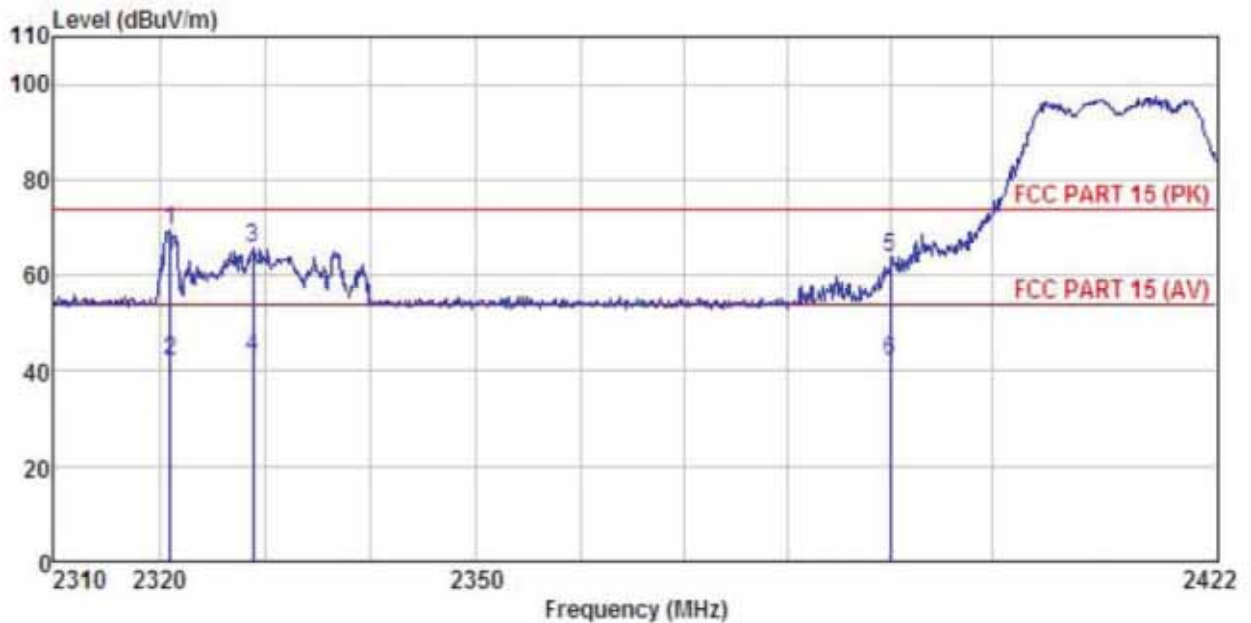
Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11g

Test channel: Lowest

Horizontal:



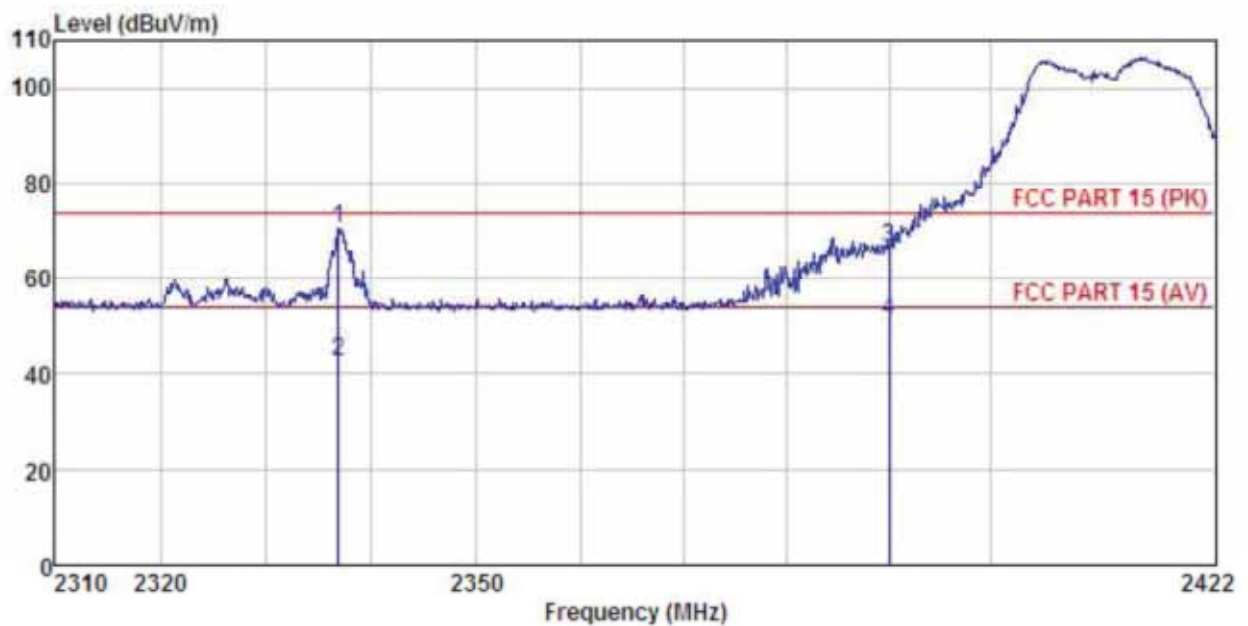
Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11g-L mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	dBuV/m	Line	Limit	Remark
		dBuV	dB/m	dB	dB		dBuV/m	dB	
1	2320.963	39.32	23.67	6.48	0.00	69.47	74.00	-4.53	Peak
2	2320.963	12.25	23.67	6.48	0.00	42.40	54.00	-11.60	Average
3	2328.778	35.61	23.67	6.50	0.00	65.78	74.00	-8.22	Peak
4	2328.778	12.74	23.67	6.50	0.00	42.91	54.00	-11.09	Average
5	2390.000	33.23	23.68	6.63	0.00	63.54	74.00	-10.46	Peak
6	2390.000	11.97	23.68	6.63	0.00	42.28	54.00	-11.72	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11g-L mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

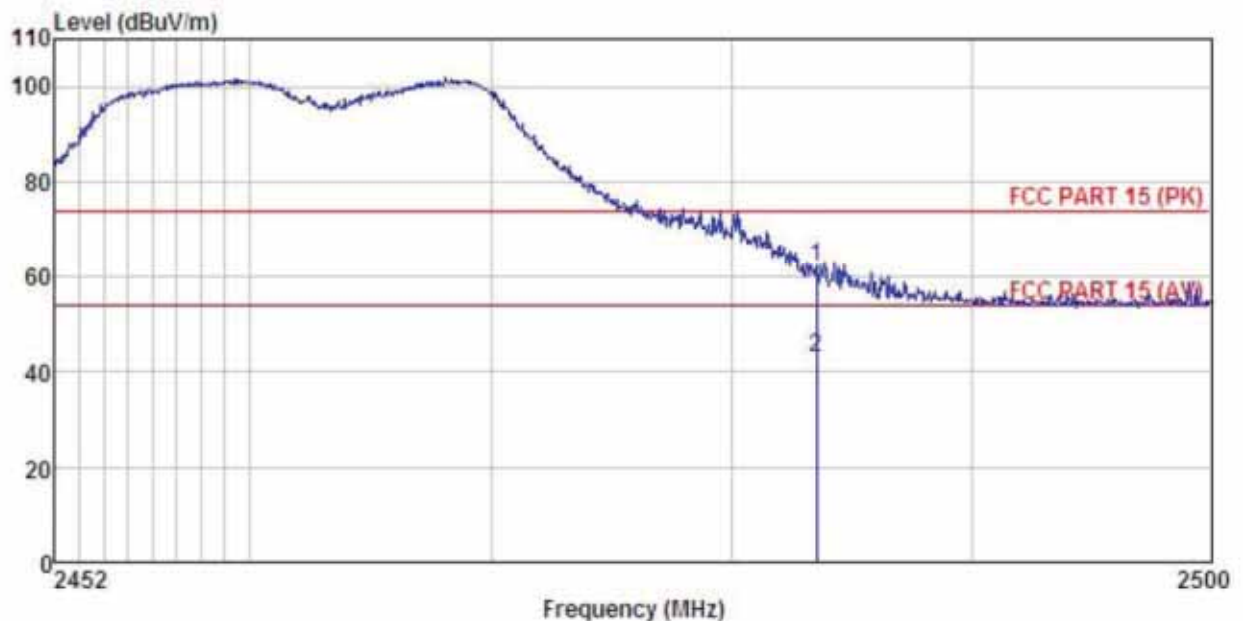
	Freq	ReadAntenna	Cable Preamp		Limit	Over	
		Level Factor	Loss Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB
1	2336.841	40.44	23.67	6.53	0.00	70.64	74.00 -3.36 Peak
2	2336.841	12.39	23.67	6.53	0.00	42.59	54.00 -11.41 Average
3	2390.000	36.25	23.68	6.63	0.00	66.56	74.00 -7.44 Peak
4	2390.000	21.01	23.68	6.63	0.00	51.32	54.00 -2.68 Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test channel: Highest

Horizontal:



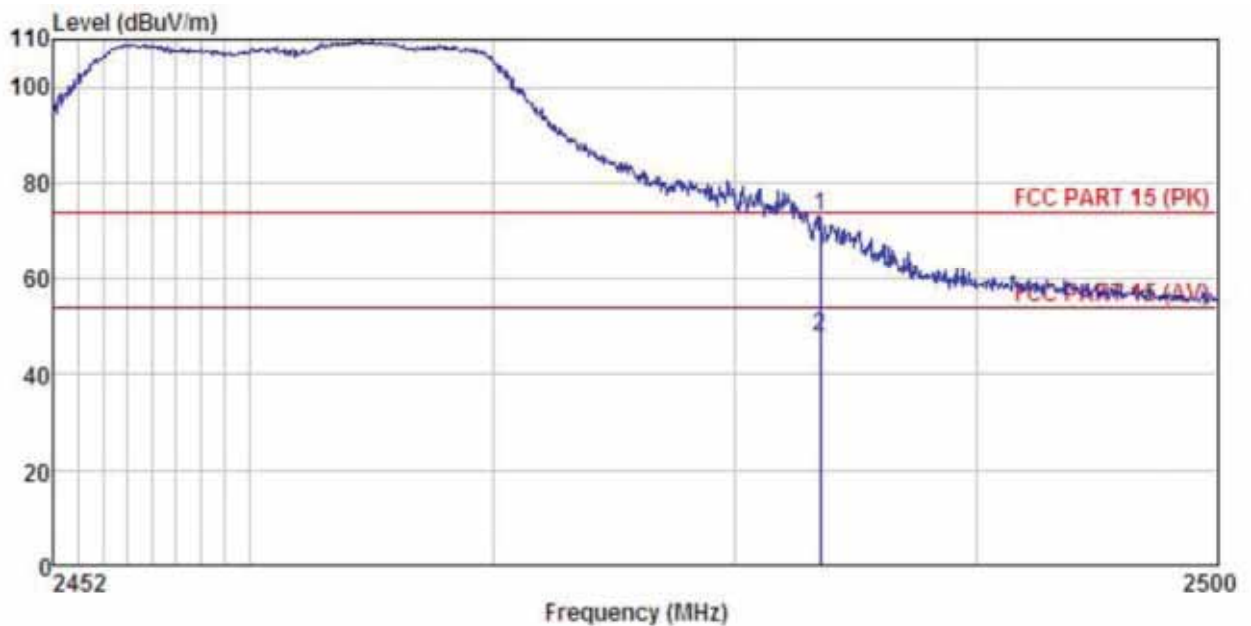
Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11g-H mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5℃ Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	31.60	23.70	6.85	0.00	62.15	74.00	-11.85	Peak
2	2483.500	12.38	23.70	6.85	0.00	42.93	54.00	-11.07	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11g-H mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
		Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	42.35	23.70	6.85	0.00	72.90	74.00	-1.10	Peak
2	2483.500	17.43	23.70	6.85	0.00	47.98	54.00	-6.02	Average

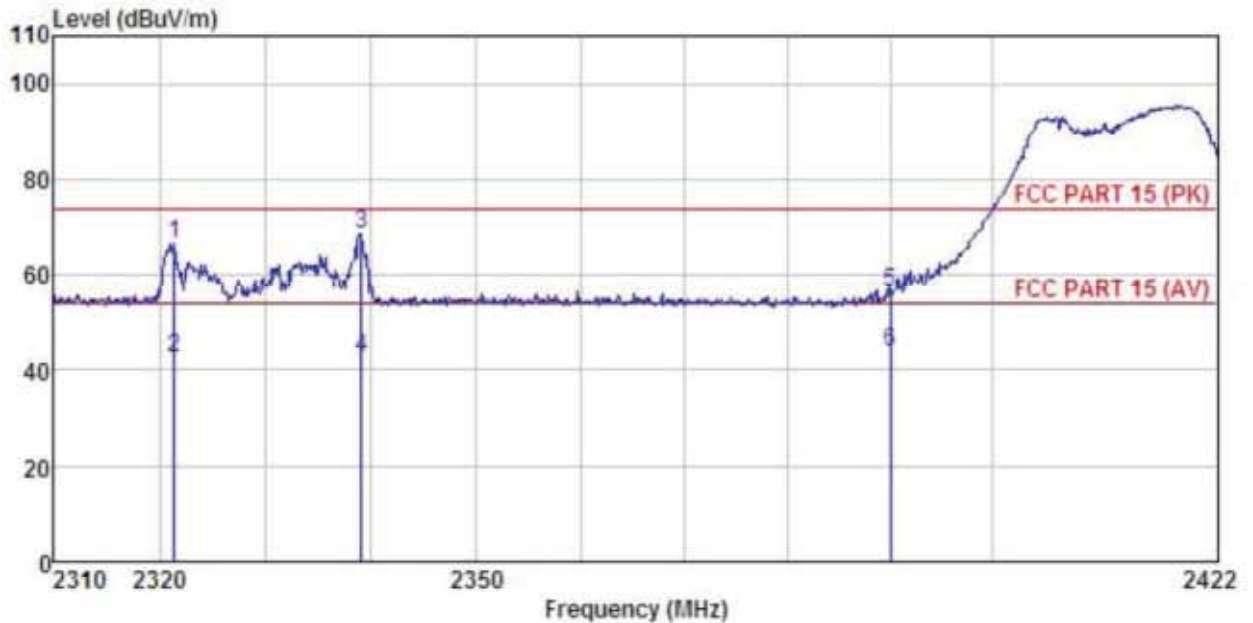
Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11n (H20)

Test channel: Lowest

Horizontal:



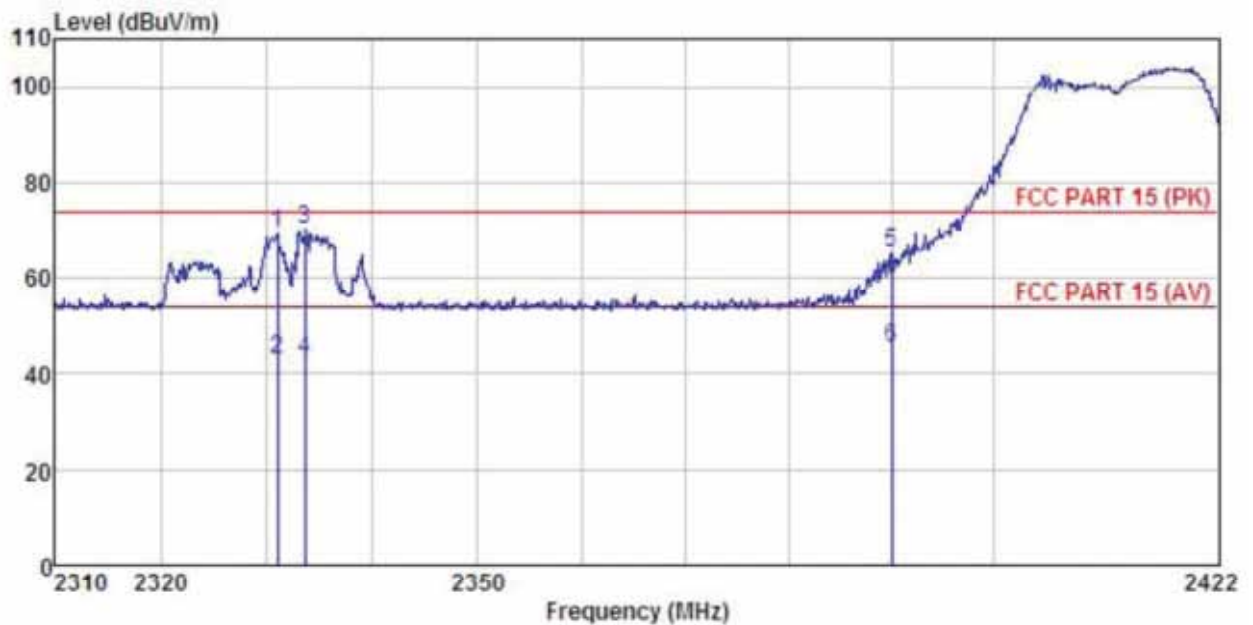
Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11n20-L mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	dBuV/m	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2321.292	36.53	23.67	6.48	0.00	66.68	74.00	-7.32	Peak
2	2321.292	12.27	23.67	6.48	0.00	42.42	54.00	-11.58	Average
3	2339.055	38.51	23.67	6.53	0.00	68.71	74.00	-5.29	Peak
4	2339.055	12.31	23.67	6.53	0.00	42.51	54.00	-11.49	Average
5	2390.000	26.16	23.68	6.63	0.00	56.47	74.00	-17.53	Peak
6	2390.000	13.36	23.68	6.63	0.00	43.67	54.00	-10.33	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11n20-L mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

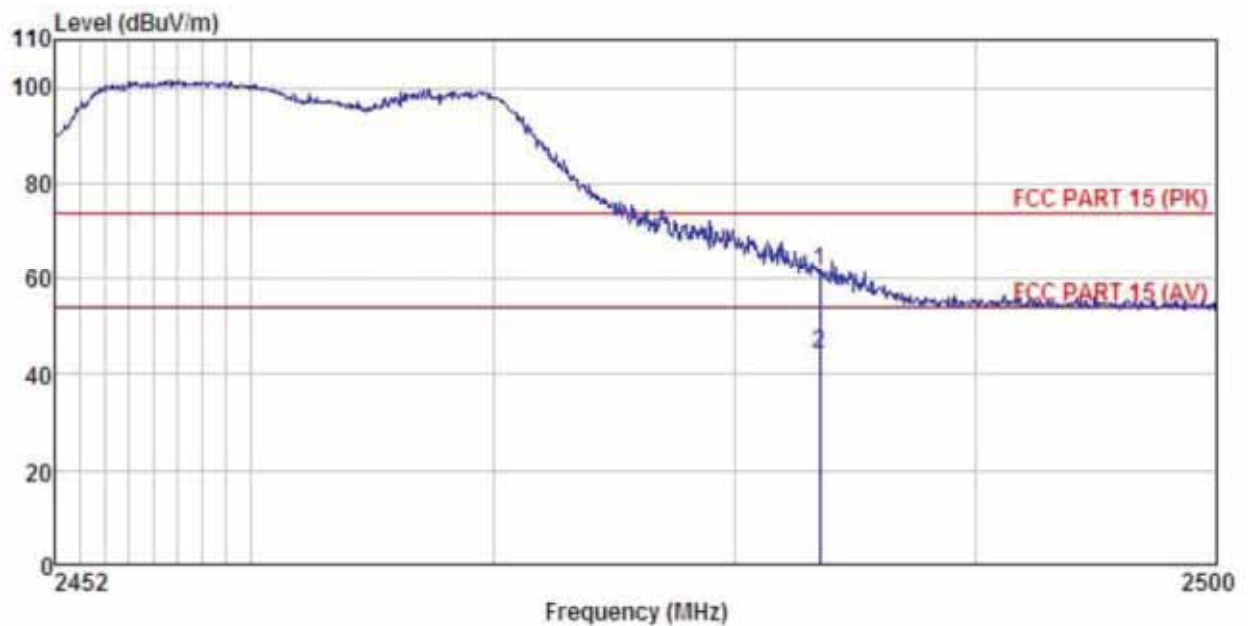
	Read	Antenna	Cable	Preamp		Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2330.984	39.06	23.67	6.51	0.00	69.24	74.00	-4.76 Peak
2	2330.984	12.67	23.67	6.51	0.00	42.85	54.00	-11.15 Average
3	2333.635	39.87	23.67	6.51	0.00	70.05	74.00	-3.95 Peak
4	2333.635	12.68	23.67	6.51	0.00	42.86	54.00	-11.14 Average
5	2390.000	35.01	23.68	6.63	0.00	65.32	74.00	-8.68 Peak
6	2390.000	15.26	23.68	6.63	0.00	45.57	54.00	-8.43 Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test channel: Highest

Horizontal:



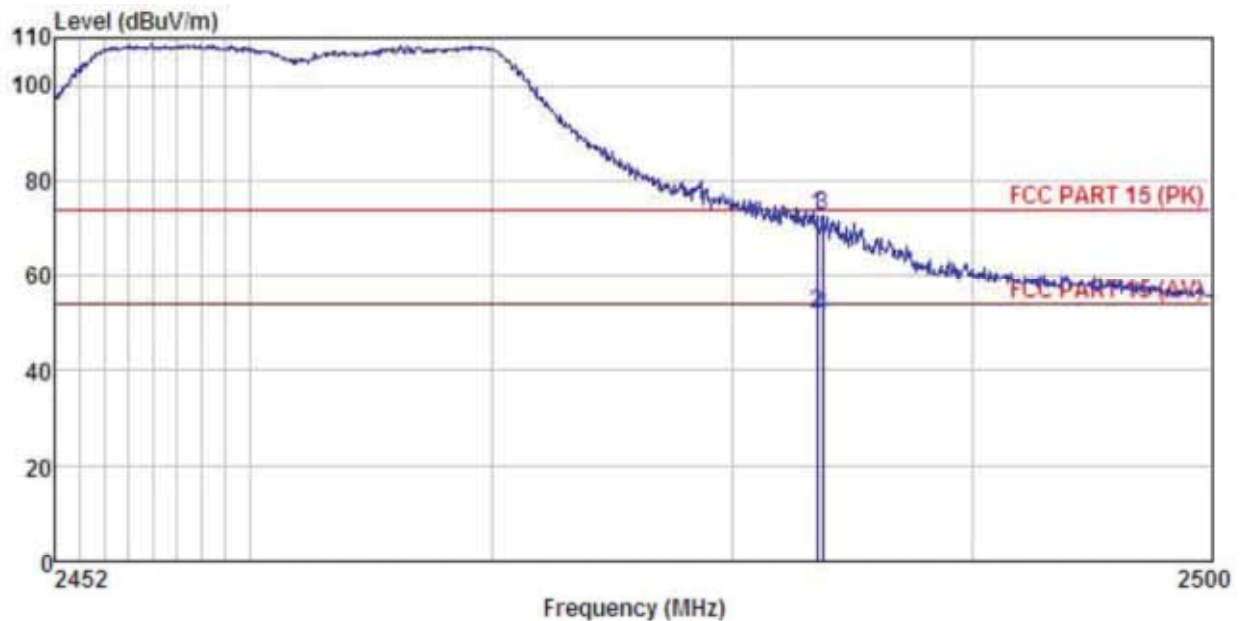
Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11n20-H mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5℃ Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	31.08	23.70	6.85	0.00	61.63	74.00	-12.37	Peak
2	2483.500	13.54	23.70	6.85	0.00	44.09	54.00	-9.91	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11n20-H mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	42.29	23.70	6.85	0.00	72.84	74.00	-1.16	Peak
2	2483.500	21.40	23.70	6.85	0.00	51.95	54.00	-2.05	Average
3	2483.768	41.99	23.70	6.85	0.00	72.54	74.00	-1.46	Peak
4	2483.768	21.11	23.70	6.85	0.00	51.66	54.00	-2.34	Average

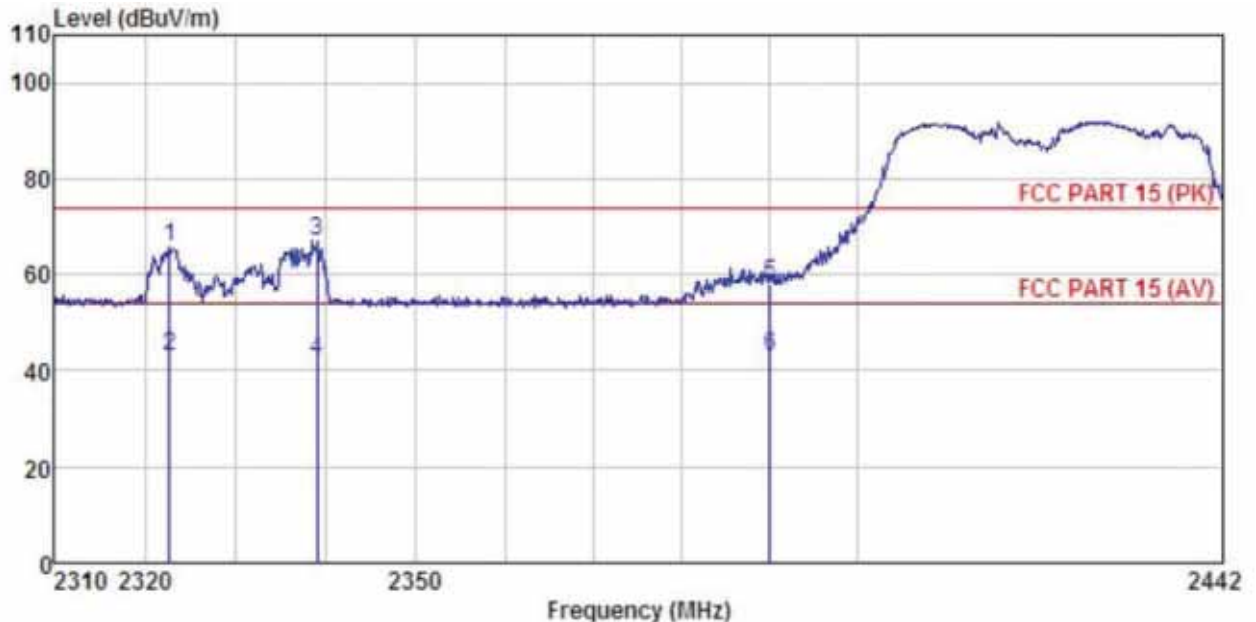
Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

802.11n (H40)

Test channel: Lowest

Horizontal:



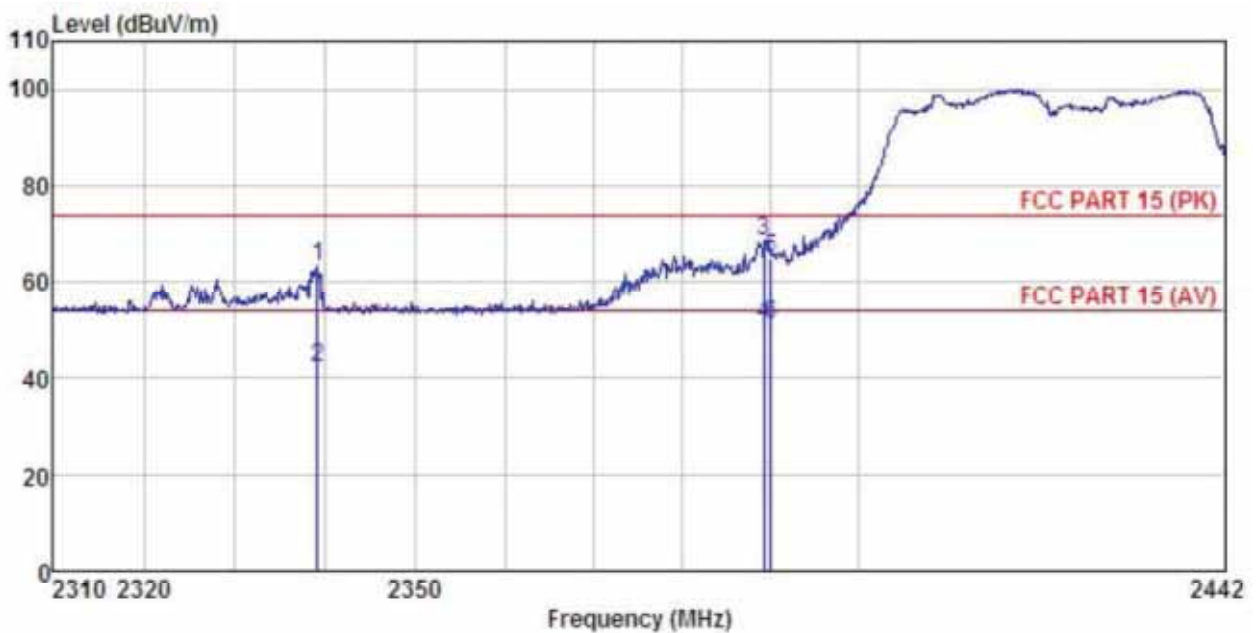
Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11n40-L mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	dBuV/m	Line	Limit	Remark
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2322.614	35.67	23.67	6.50	0.00	65.84	74.00	-8.16	Peak
2	2322.614	12.88	23.67	6.50	0.00	43.05	54.00	-10.95	Average
3	2339.064	36.82	23.67	6.53	0.00	67.02	74.00	-6.98	Peak
4	2339.064	12.09	23.67	6.53	0.00	42.29	54.00	-11.71	Average
5	2390.000	27.74	23.68	6.63	0.00	58.05	74.00	-15.95	Peak
6	2390.000	12.75	23.68	6.63	0.00	43.06	54.00	-10.94	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11n40-L mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

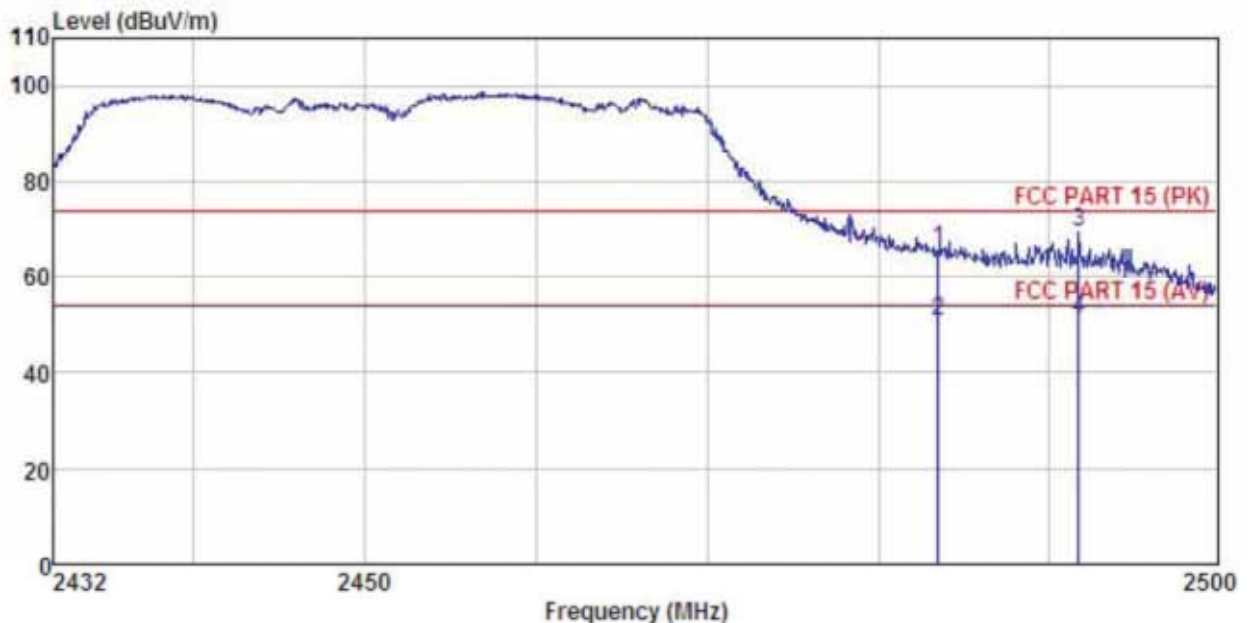
	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	dBuV/m	dBuV/m	Limit	Remark
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2339.194	33.03	23.67	6.53	0.00	63.23	74.00	-10.77	Peak
2	2339.194	12.10	23.67	6.53	0.00	42.30	54.00	-11.70	Average
3	2389.247	38.36	23.68	6.63	0.00	68.67	74.00	-5.33	Peak
4	2389.247	20.83	23.68	6.63	0.00	51.14	54.00	-2.86	Average
5	2390.000	34.62	23.68	6.63	0.00	64.93	74.00	-9.07	Peak
6	2390.000	20.68	23.68	6.63	0.00	50.99	54.00	-3.01	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test channel: Highest

Horizontal:



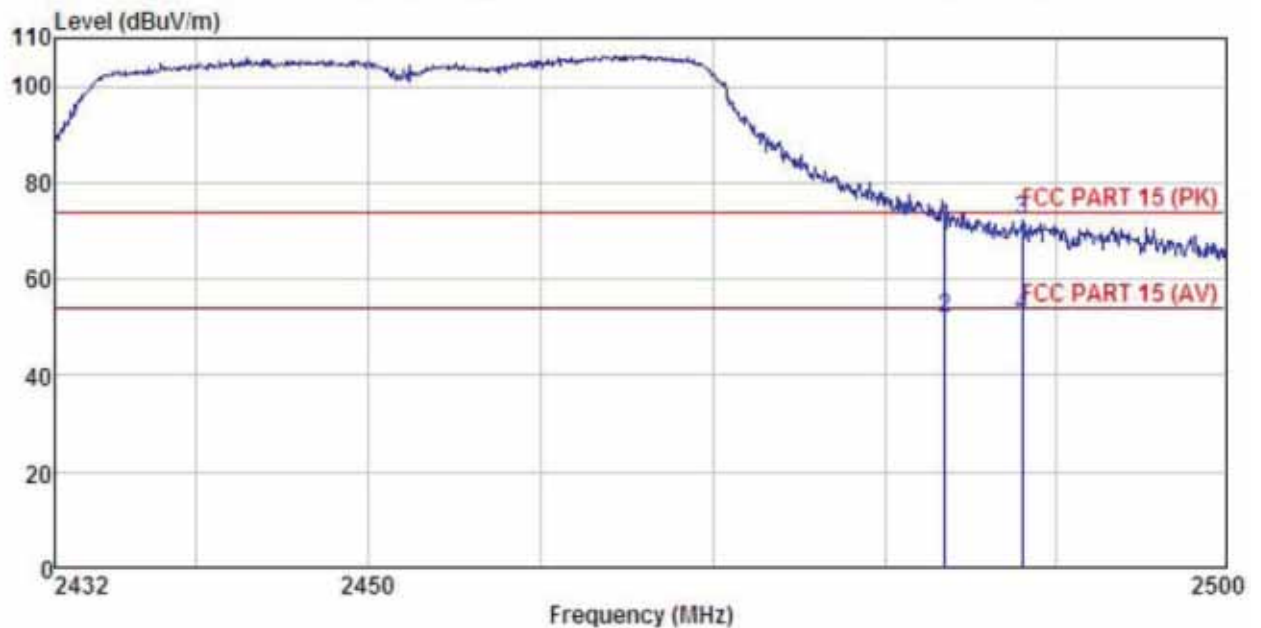
Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11n40-H mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

	Freq	ReadAntenna	Cable Preamp			Limit	Over	
		Level Factor	Loss Factor	Level		Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2483.500	35.07	23.70	6.85	0.00	65.62	74.00	-8.38 Peak
2	2483.500	20.07	23.70	6.85	0.00	50.62	54.00	-3.38 Average
3	2491.809	38.83	23.70	6.86	0.00	69.39	74.00	-4.61 Peak
4	2491.809	20.78	23.70	6.86	0.00	51.34	54.00	-2.66 Average

Remark:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Vertical:



Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 EUT : 2.4GHz Module
 Model : FWBD-2800
 Test mode : 802.11n40-H mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ANT

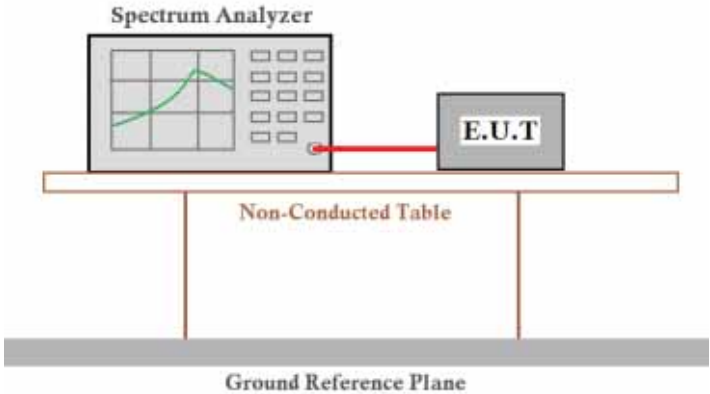
	Freq	ReadAntenna	Cable Preamp		Limit	Over	
	Level Factor	Loss Factor	Level	Line	Limit	Remark	
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m
1	2483.500	40.13	23.70	6.85	0.00	70.68	74.00
2	2483.500	21.57	23.70	6.85	0.00	52.12	54.00
3	2488.033	41.79	23.70	6.85	0.00	72.34	74.00
4	2488.033	21.84	23.70	6.85	0.00	52.39	54.00

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

6.7 Spurious Emission

6.7.1 Conducted Emission Method

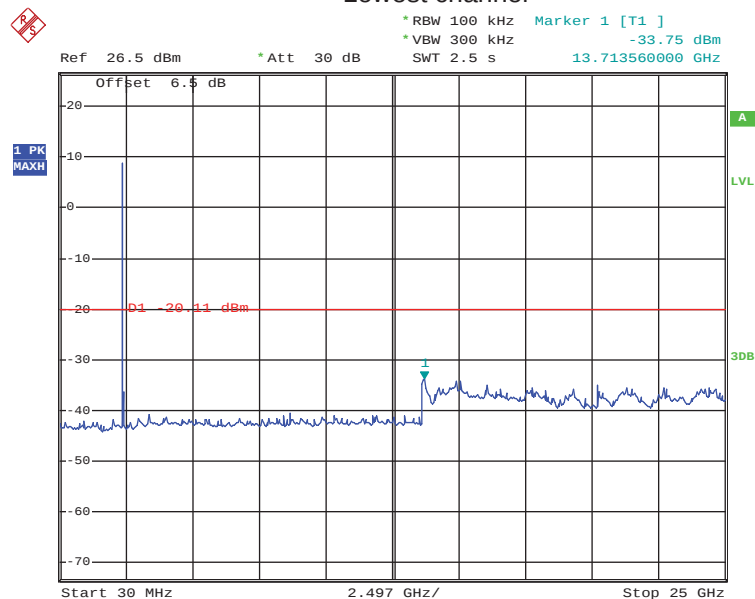
Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 11
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph(b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plot as follows:

TX0

Test mode: 802.11b

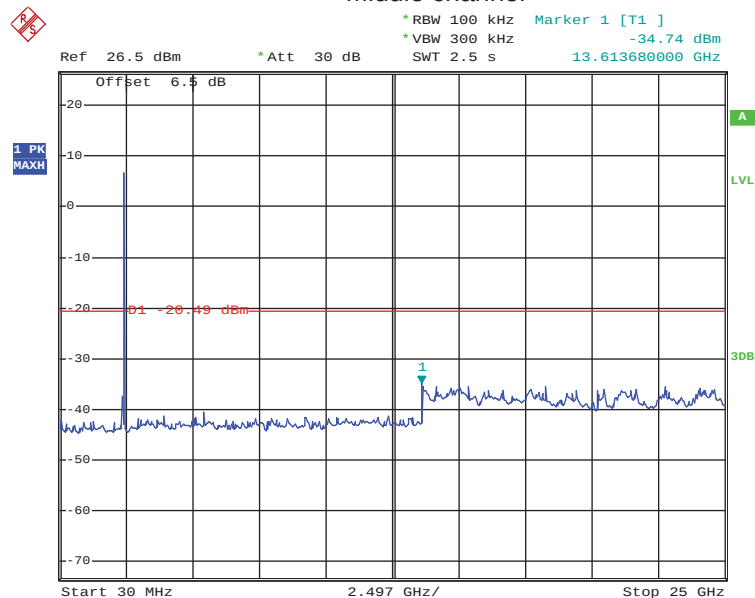
Lowest channel



Date: 28.JUN.2016 09:29:28

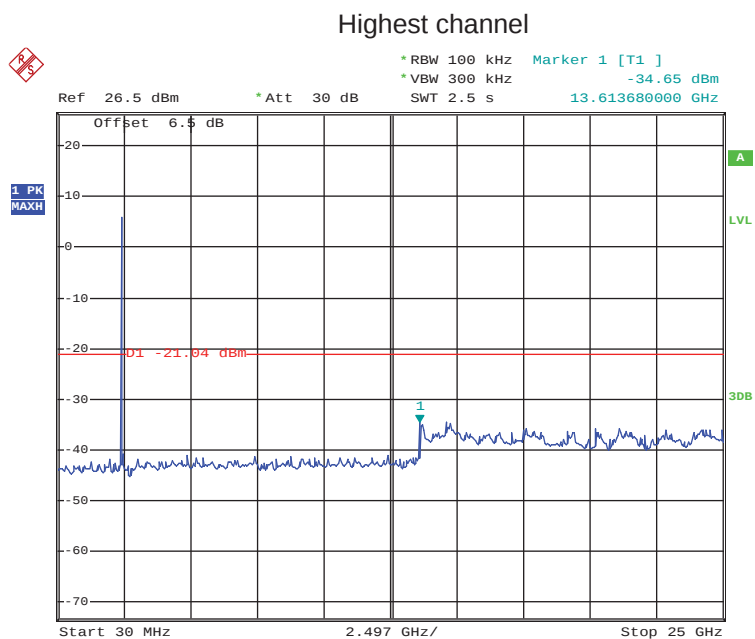
30MHz~25GHz

Middle channel



Date: 28.JUN.2016 09:33:51

30MHz~25GHz

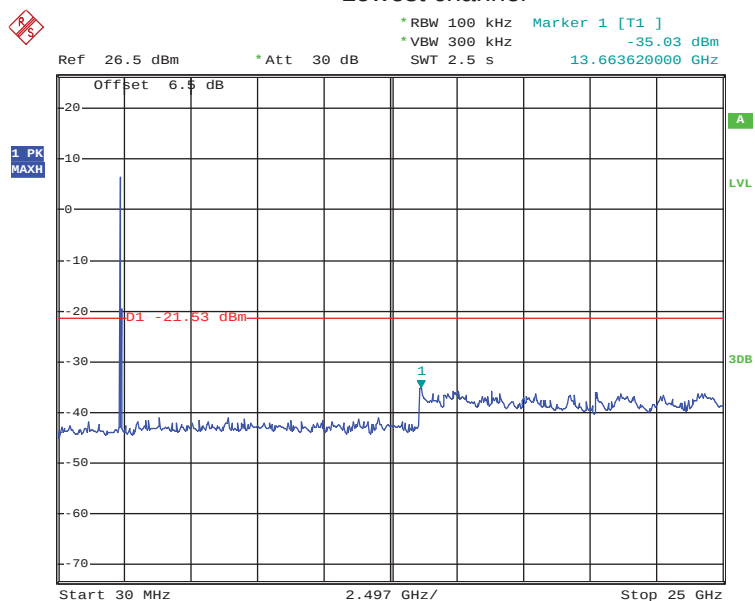


Date: 28.JUN.2016 09:34:36

30MHz~25GHz

Test mode: 802.11g

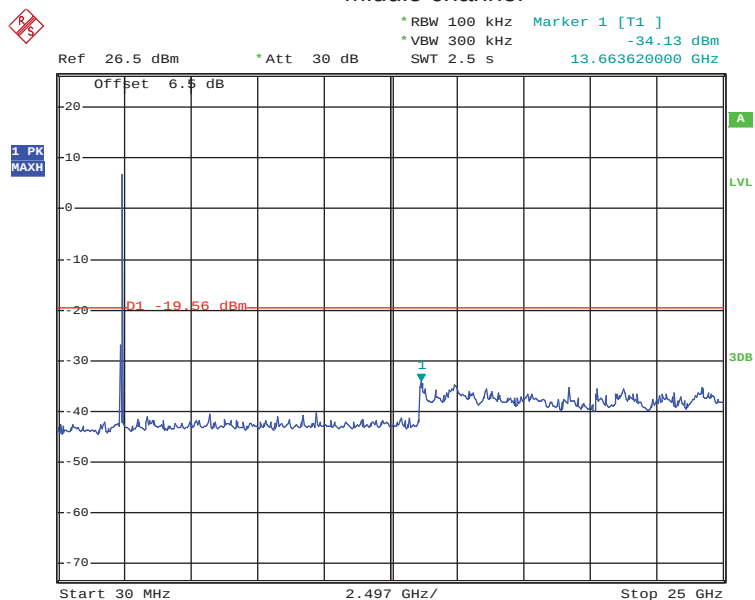
Lowest channel



Date: 16.JUN.2016 10:03:42

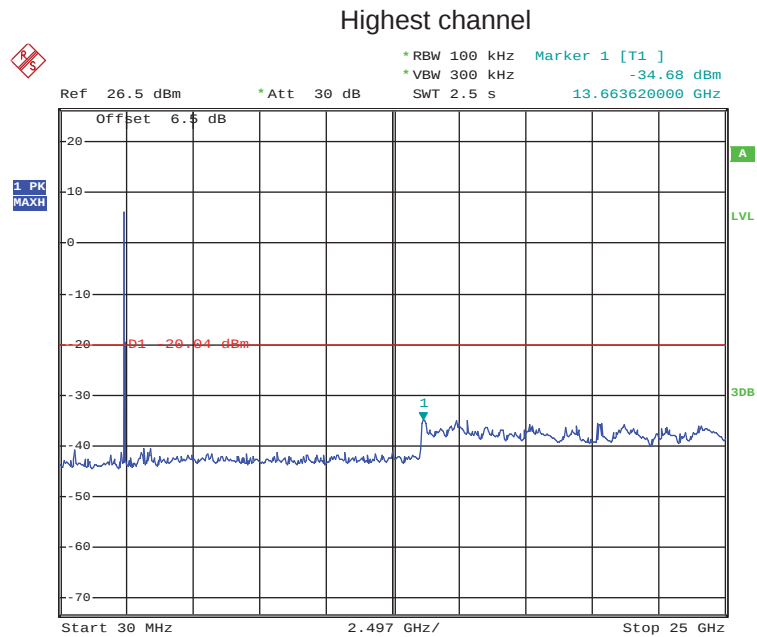
30MHz~25GHz

Middle channel



Date: 16.JUN.2016 10:04:48

30MHz~25GHz

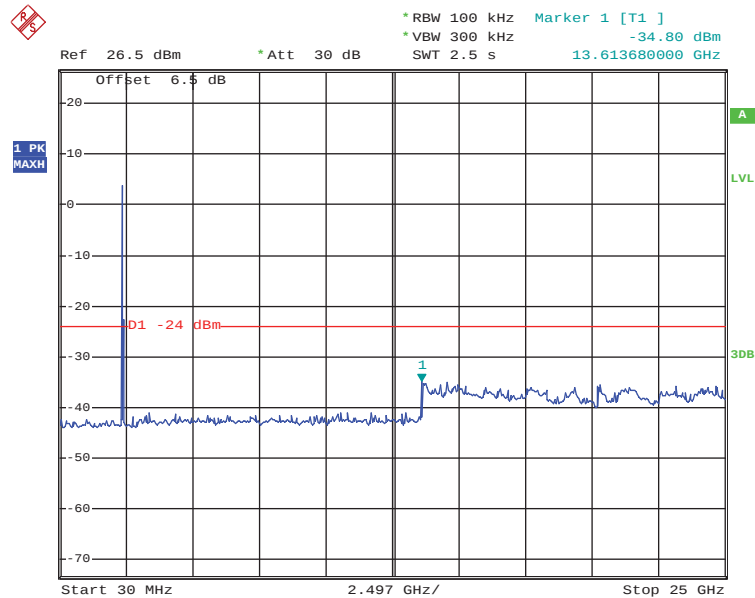


Date: 16.JUN.2016 10:06:02

30MHz~25GHz

Test mode: 802.11n(H20)

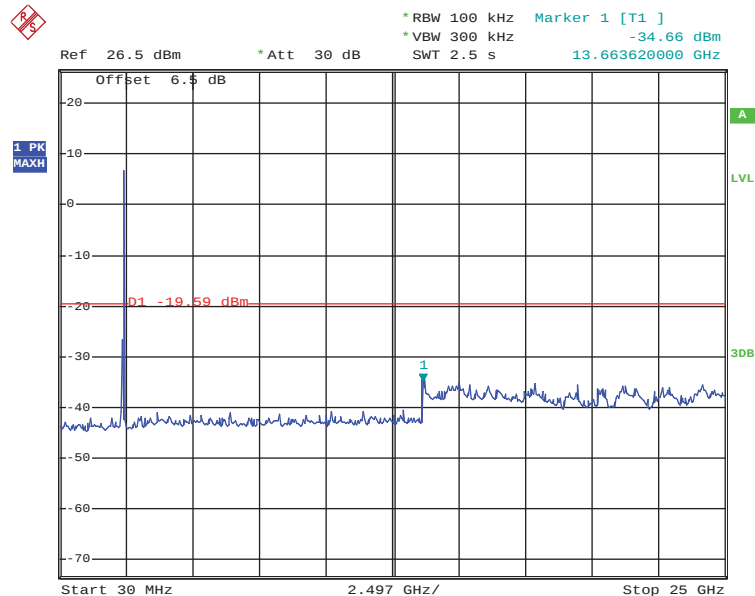
Lowest channel



Date: 16.JUN.2016 10:08:29

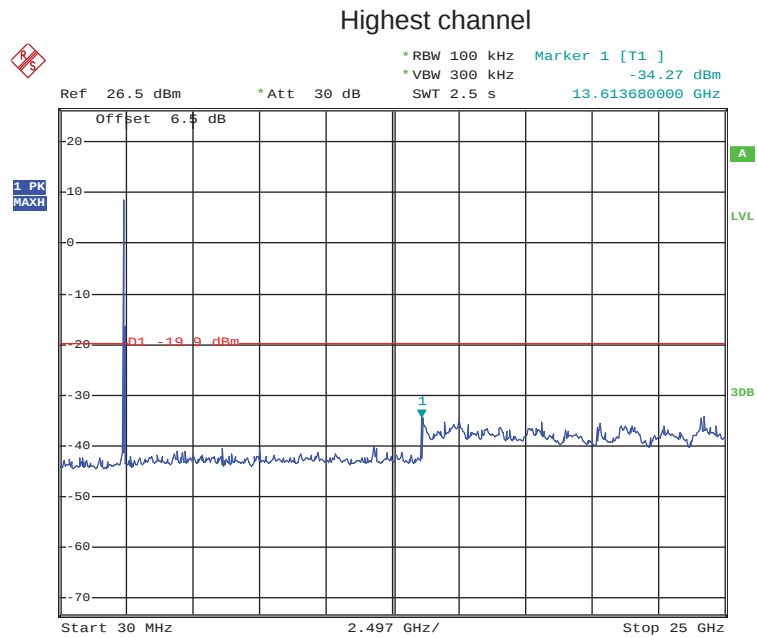
30MHz~25GHz

Middle channel



Date: 16.JUN.2016 10:09:34

30MHz~25GHz

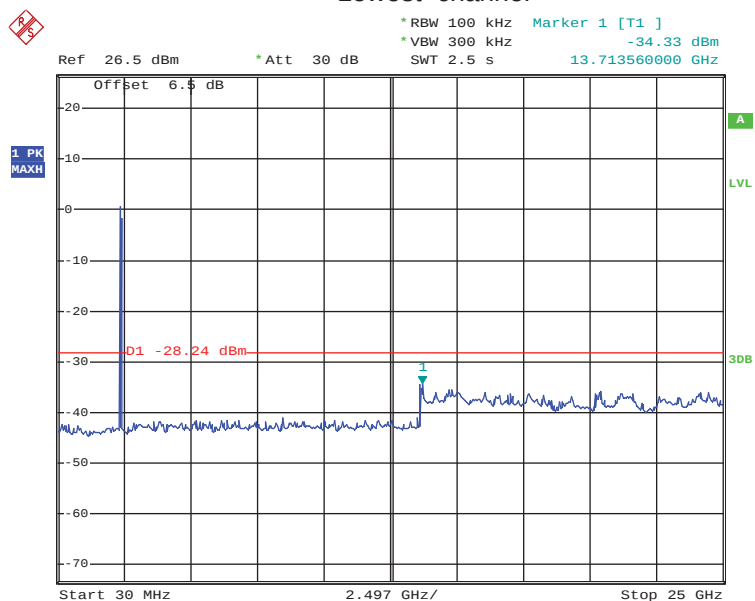


Date: 16.JUN.2016 10:10:23

30MHz~25GHz

Test mode: 802.11n(H40)

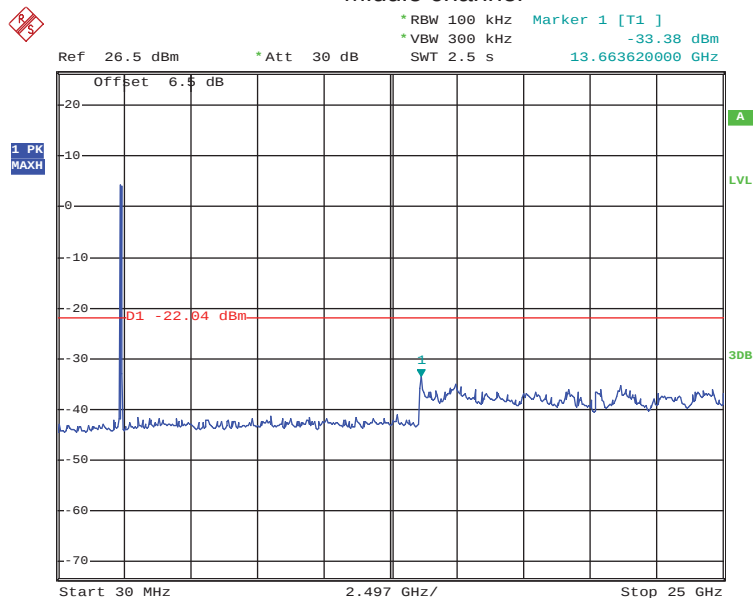
Lowest channel



Date: 16.JUN.2016 10:11:08

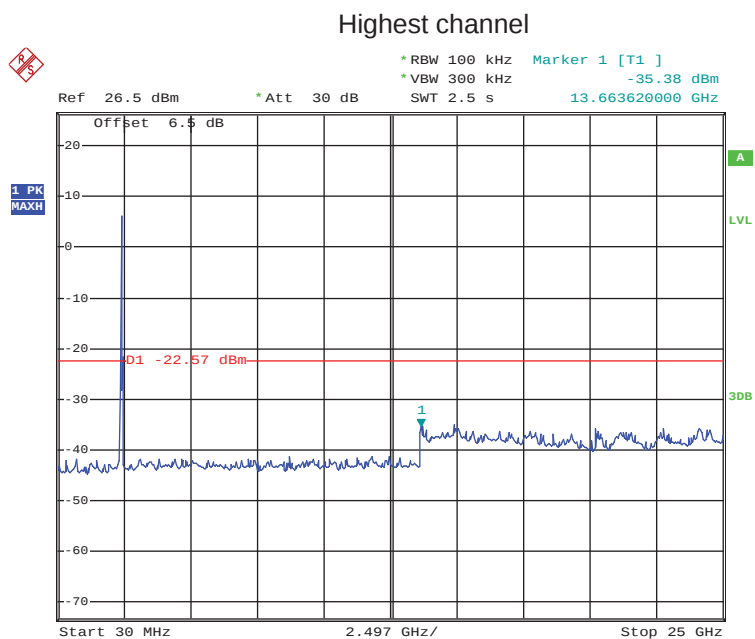
30MHz~25GHz

Middle channel



Date: 16.JUN.2016 10:11:51

30MHz~25GHz



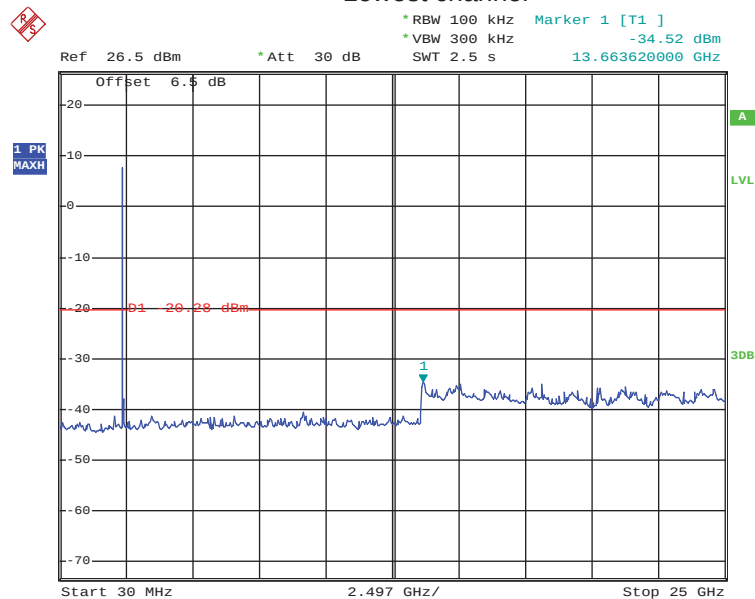
Date: 16.JUN.2016 10:12:32

30MHz~25GHz

TX1

Test mode: 802.11b

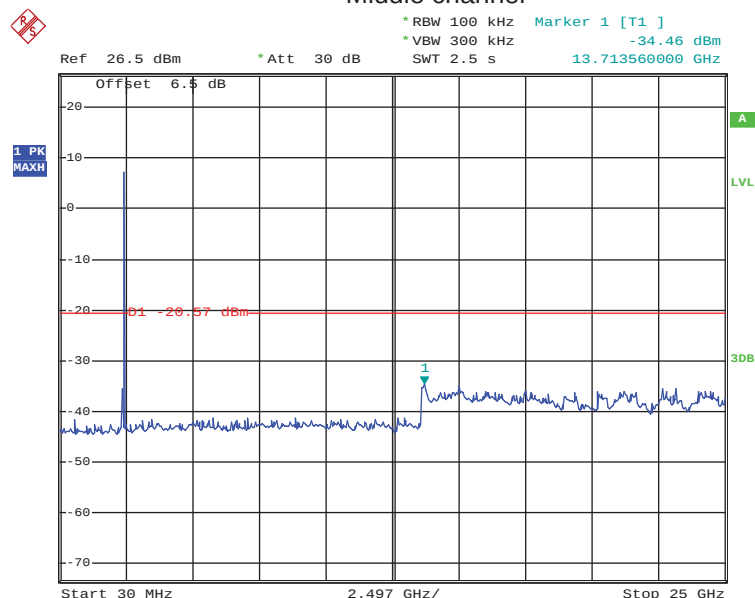
Lowest channel



Date: 28.JUN.2016 09:30:25

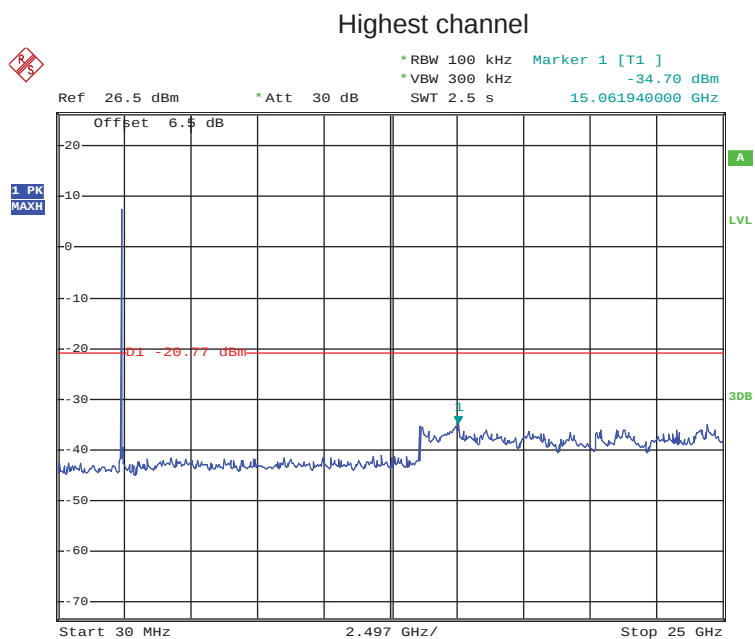
30MHz~25GHz

Middle channel



Date: 28.JUN.2016 09:33:11

30MHz~25GHz

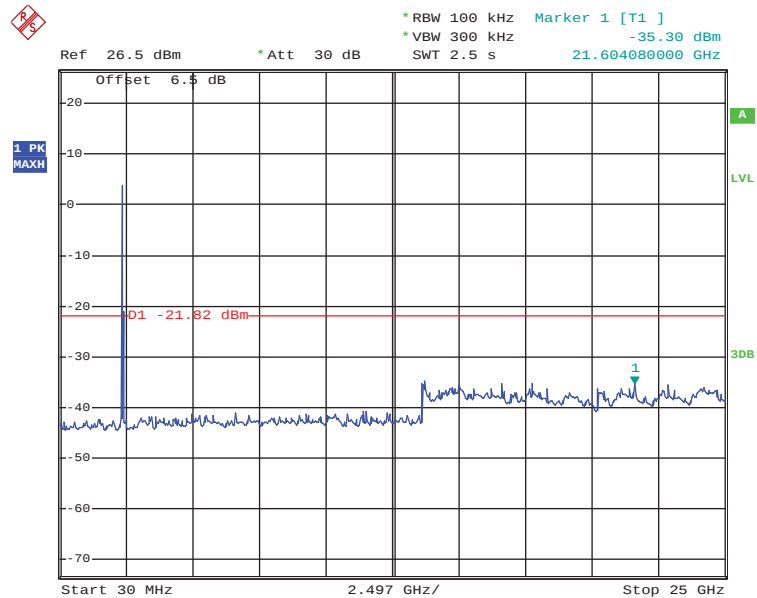


Date: 28.JUN.2016 09:35:23

30MHz~25GHz

Test mode: 802.11g

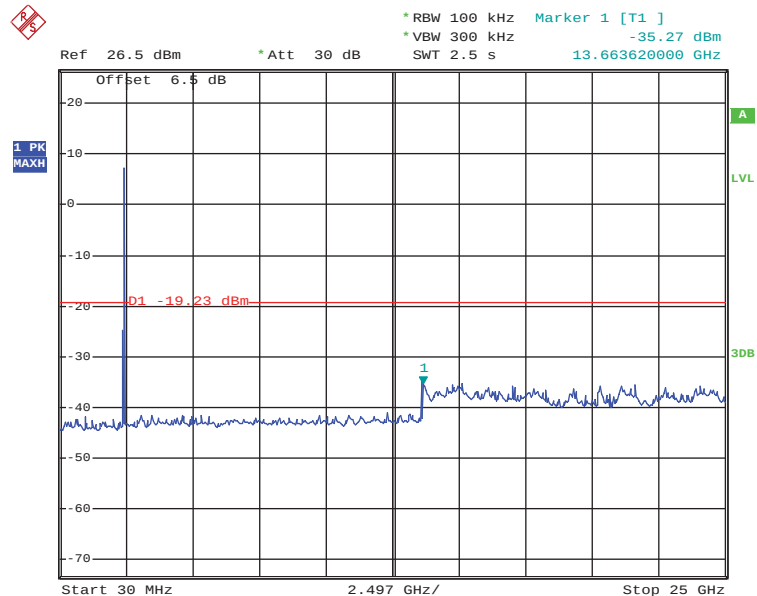
Lowest channel



Date: 16.JUN.2016 10:17:43

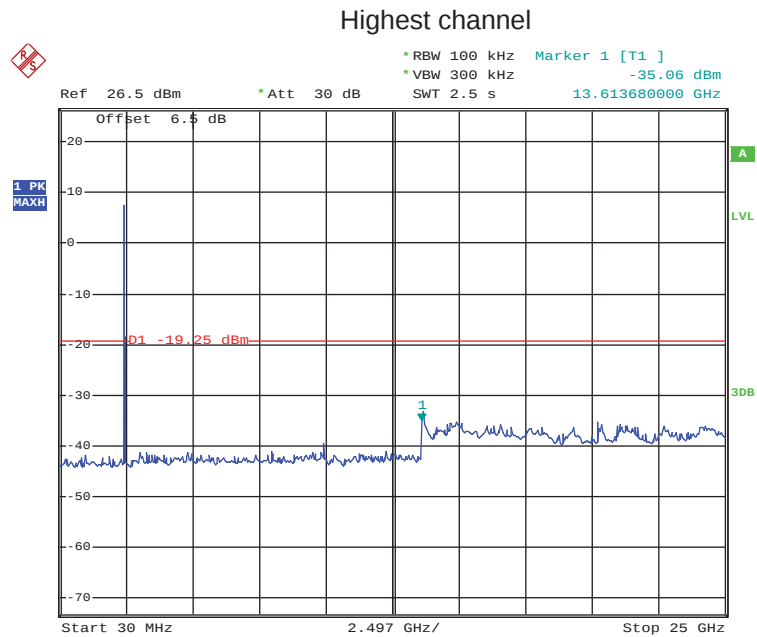
30MHz~25GHz

Middle channel



Date: 16.JUN.2016 10:17:04

30MHz~25GHz

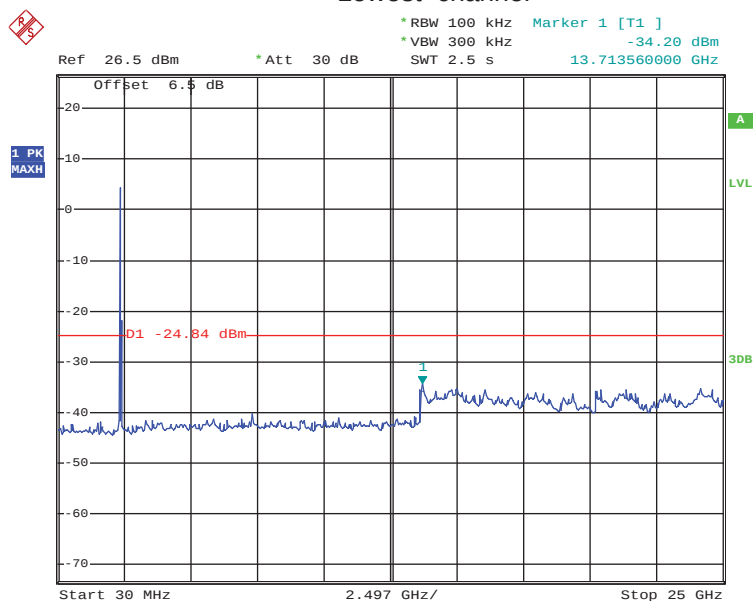


Date: 16.JUN.2016 10:16:19

30MHz~25GHz

Test mode: 802.11n(H20)

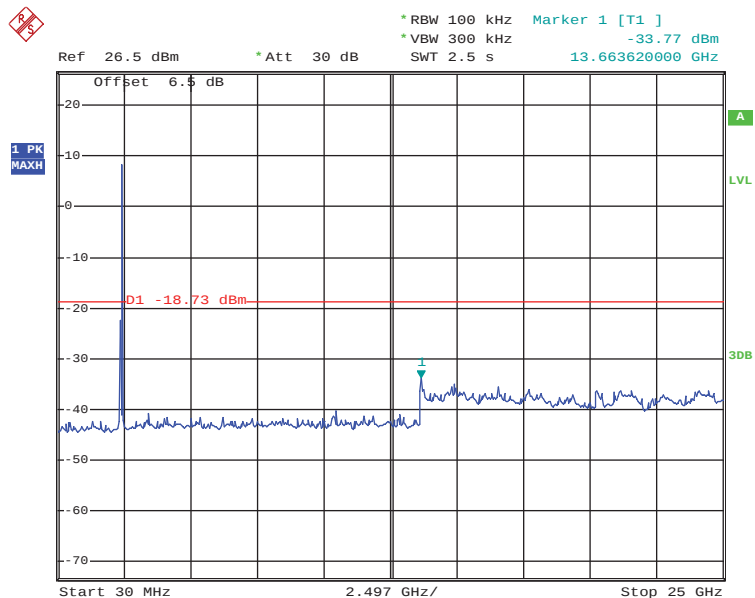
Lowest channel



Date: 16.JUN.2016 10:18:36

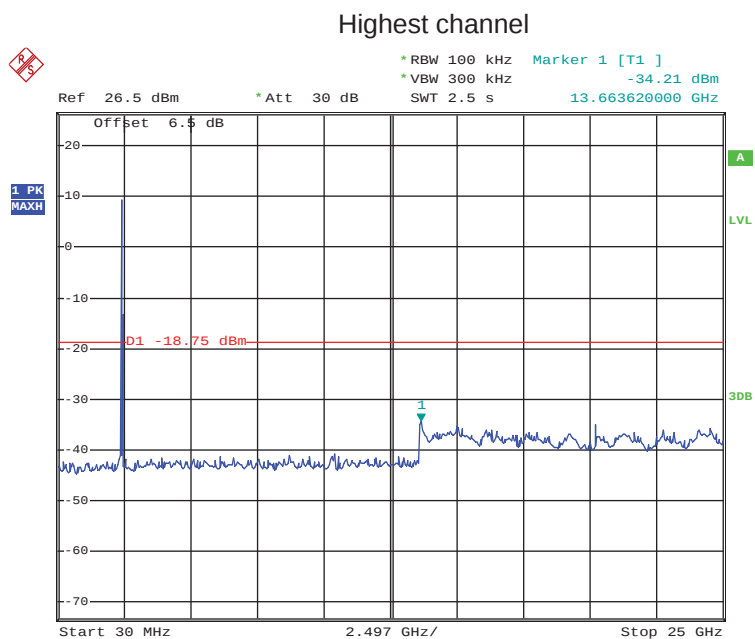
30MHz~25GHz

Middle channel



Date: 16.JUN.2016 10:19:15

30MHz~25GHz

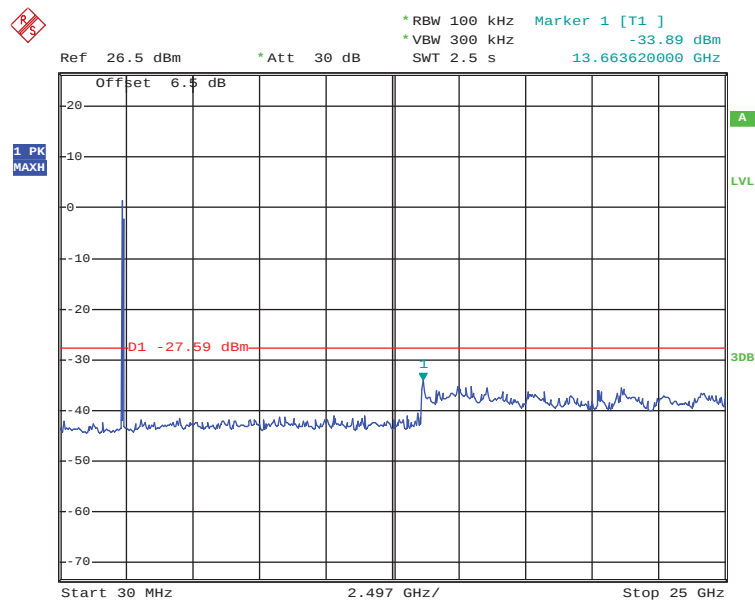


Date: 16.JUN.2016 10:20:00

30MHz~25GHz

Test mode: 802.11n(H40)

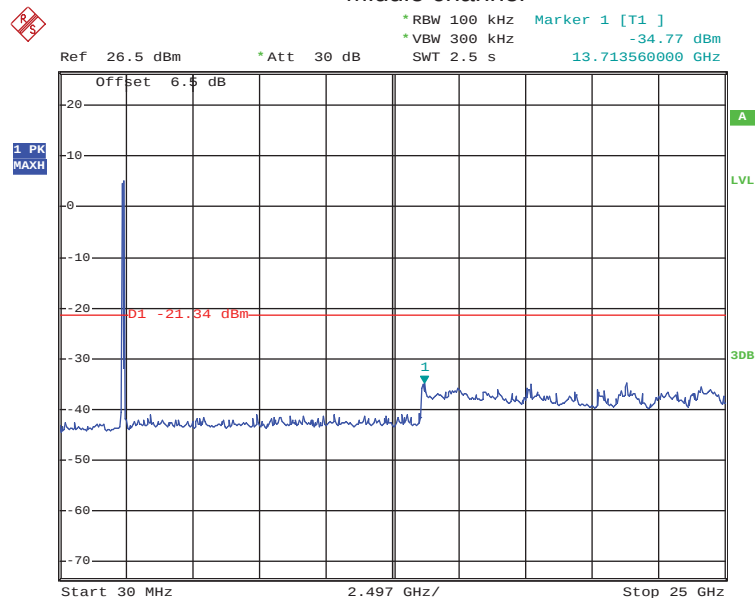
Lowest channel



Date: 16.JUN.2016 10:20:50

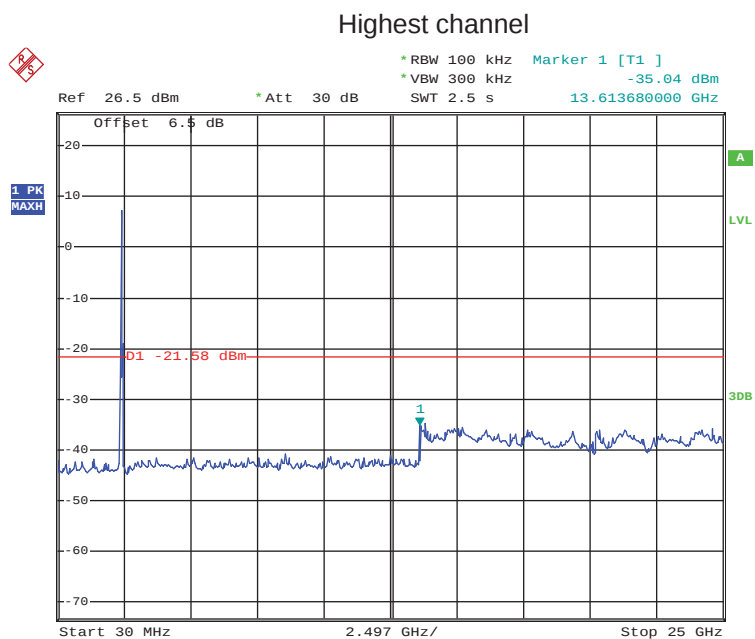
30MHz~25GHz

Middle channel



Date: 16.JUN.2016 10:21:59

30MHz~25GHz



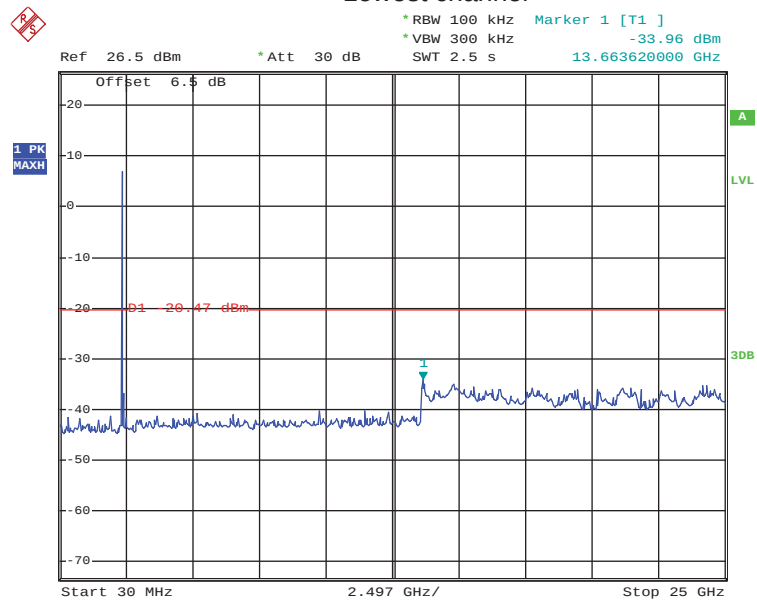
Date: 16.JUN.2016 10:22:45

30MHz~25GHz

TX2

Test mode: 802.11b

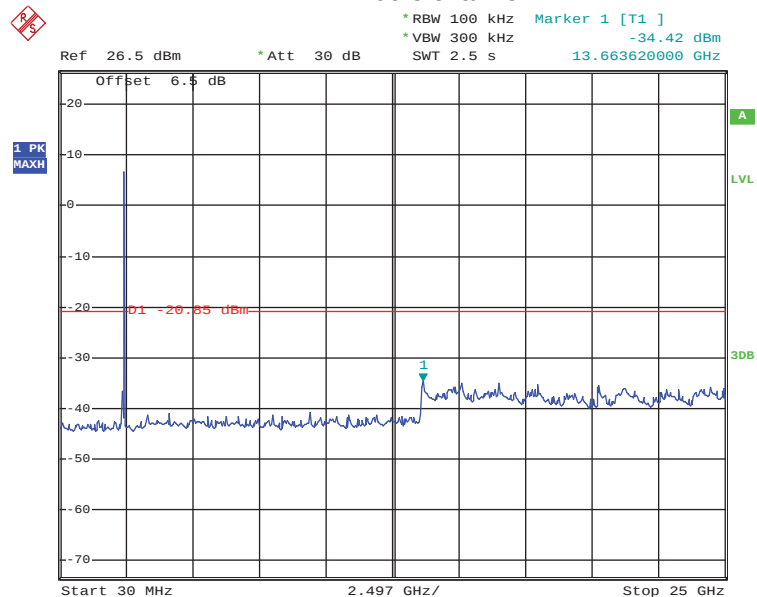
Lowest channel



Date: 28.JUN.2016 09:31:18

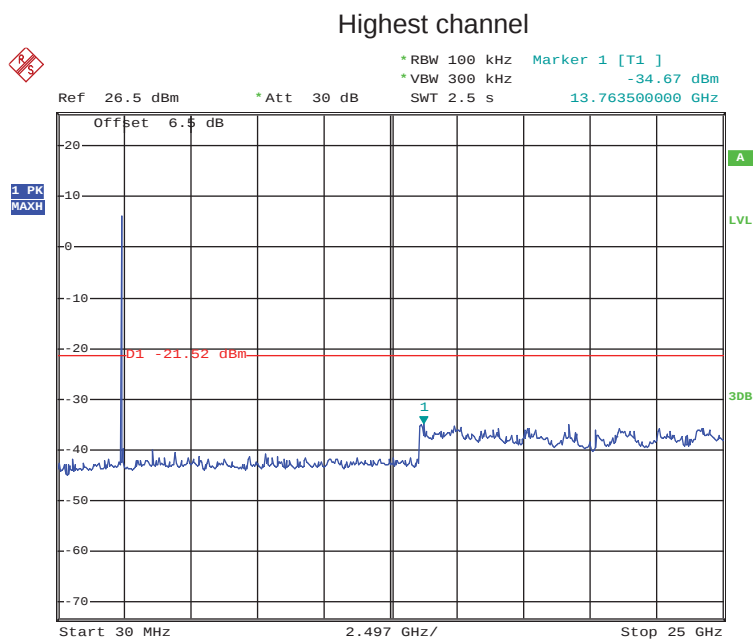
30MHz~25GHz

Middle channel



Date: 28.JUN.2016 09:32:18

30MHz~25GHz

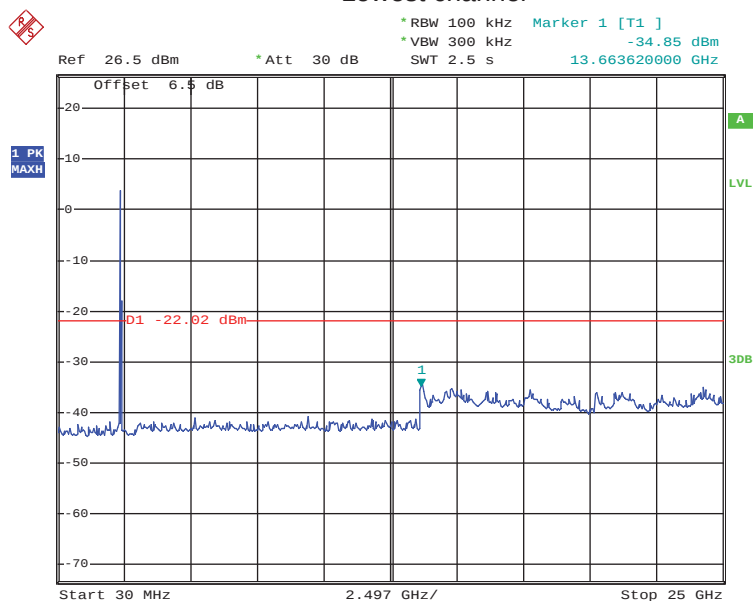


Date: 28.JUN.2016 09:36:19

30MHz~25GHz

Test mode: 802.11g

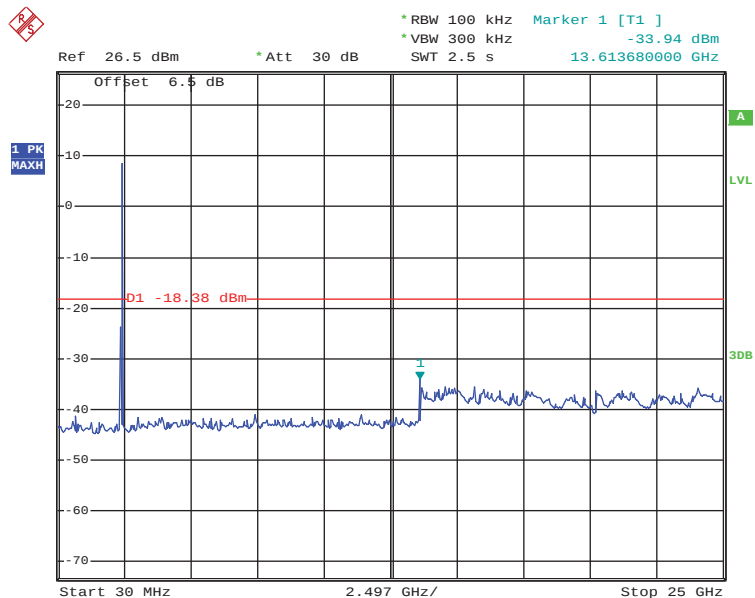
Lowest channel



Date: 16.JUN.2016 10:28:27

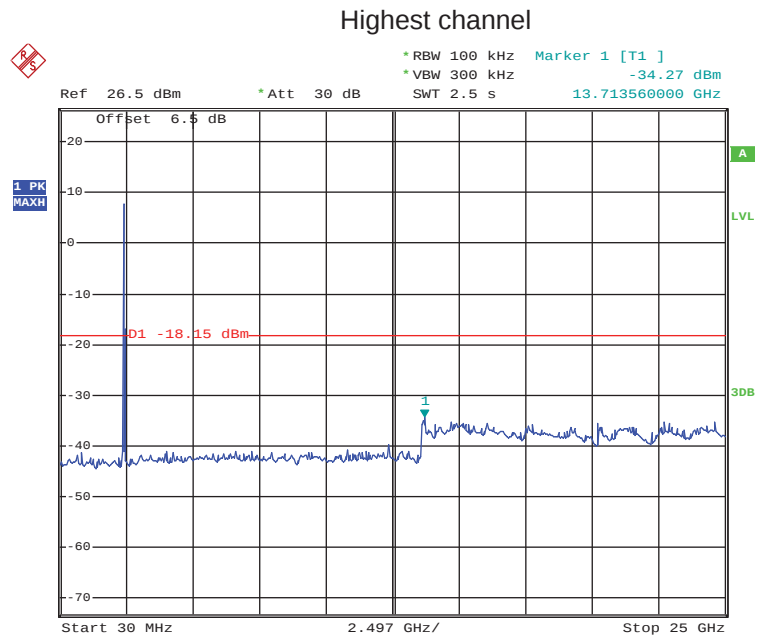
30MHz~25GHz

Middle channel



Date: 16.JUN.2016 10:27:48

30MHz~25GHz

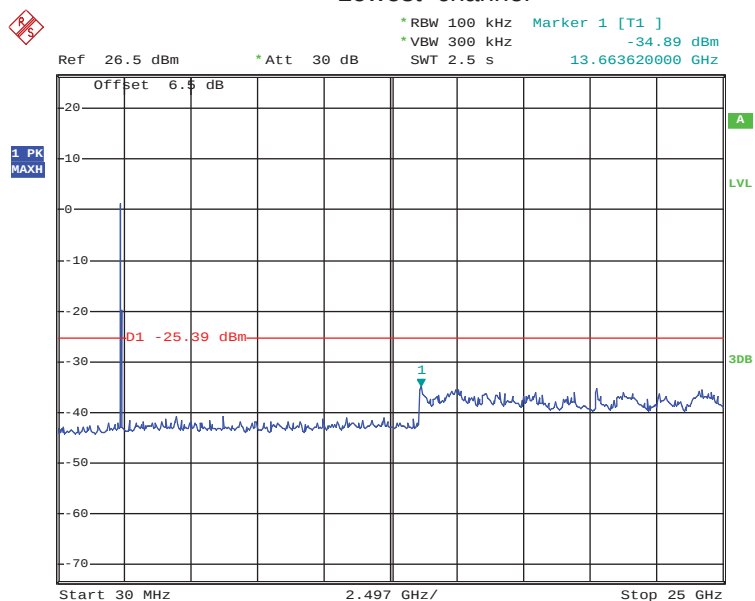


Date: 16.JUN.2016 10:26:59

30MHz~25GHz

Test mode: 802.11n(H20)

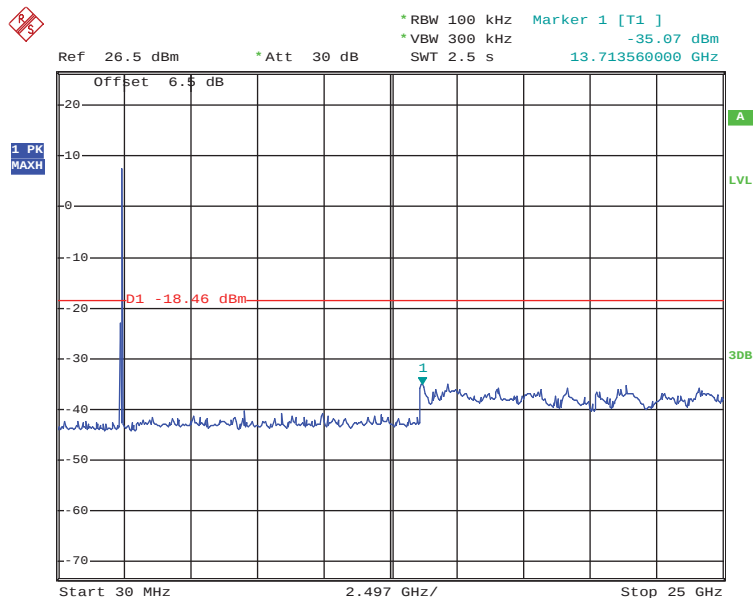
Lowest channel



Date: 16.JUN.2016 10:29:16

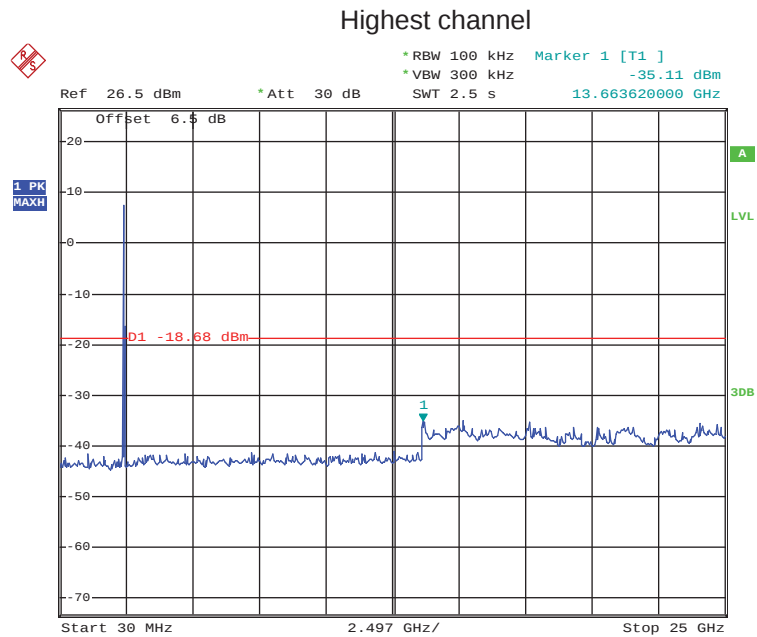
30MHz~25GHz

Middle channel



Date: 16.JUN.2016 10:30:19

30MHz~25GHz

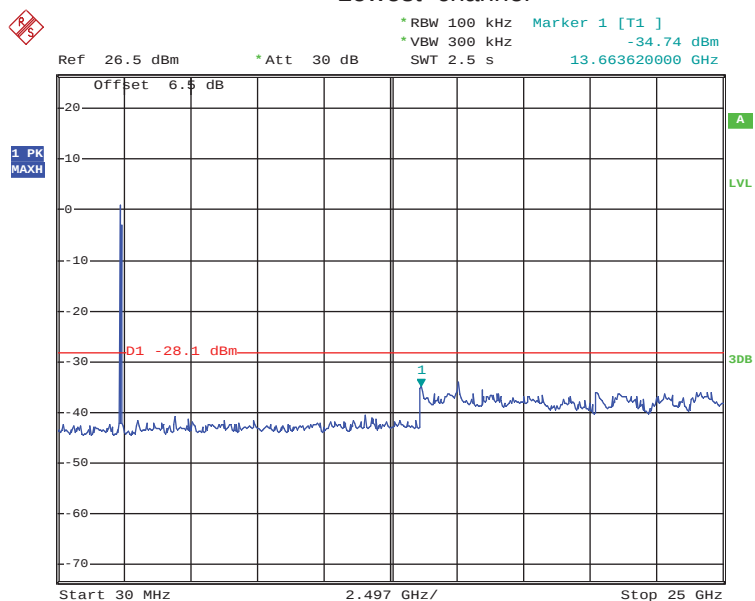


Date: 16.JUN.2016 10:30:57

30MHz~25GHz

Test mode: 802.11n(H40)

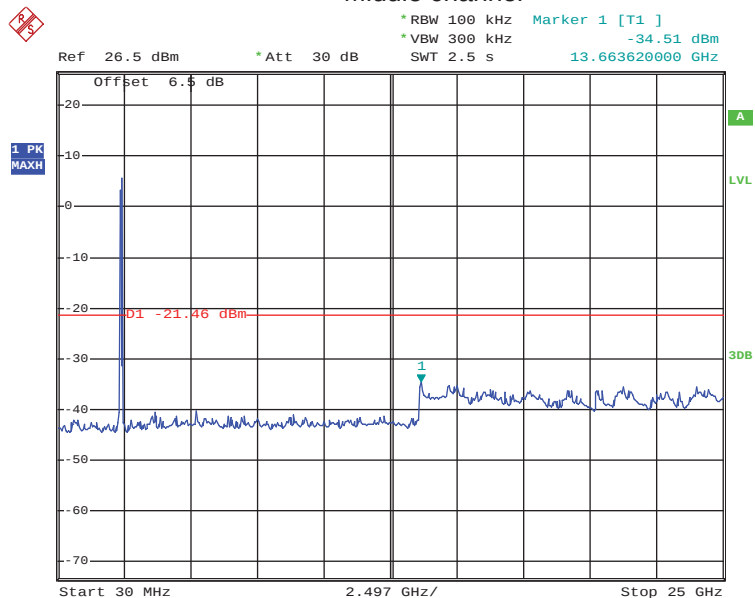
Lowest channel



Date: 16.JUN.2016 10:31:42

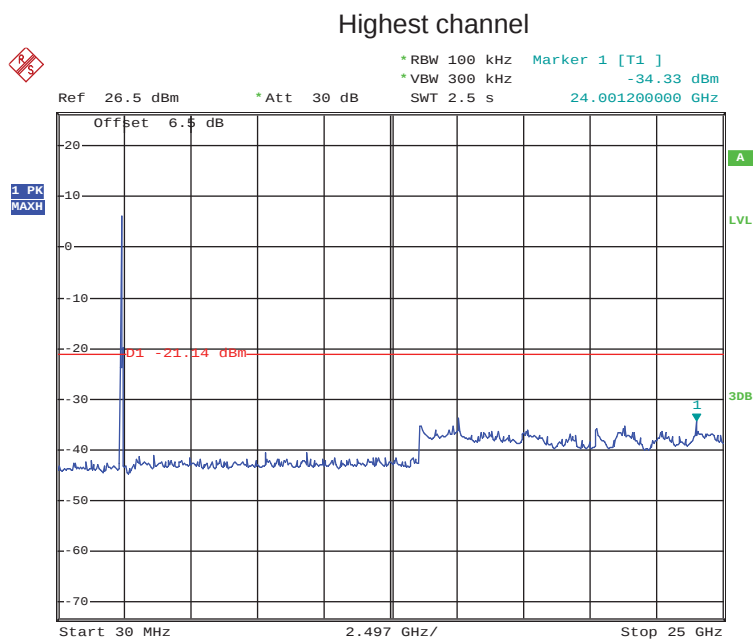
30MHz~25GHz

Middle channel



Date: 16.JUN.2016 10:32:28

30MHz~25GHz

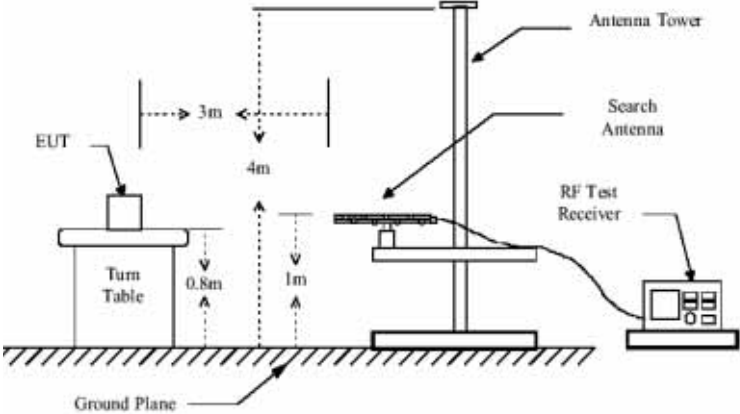
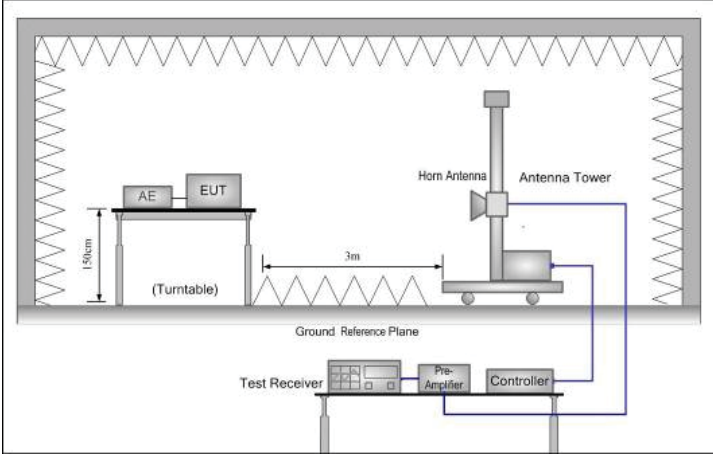


Date: 16.JUN.2016 10:33:11

30MHz~25GHz

6.7.2 Radiated Emission Method

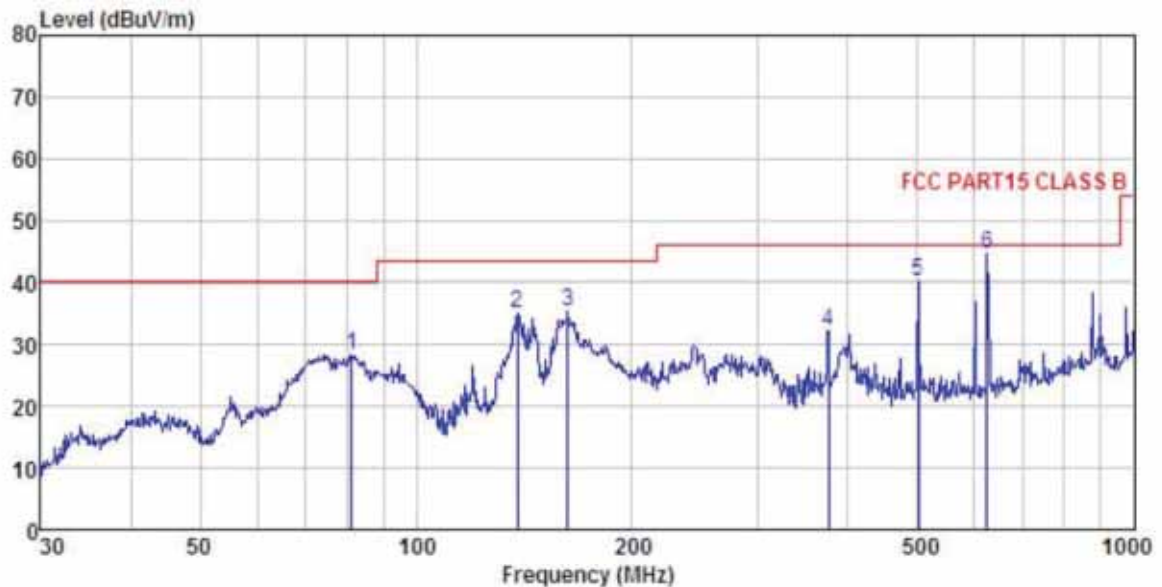
Test Requirement:	FCC Part 15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Above 1GHz		54.0		Average Value
			74.0		Peak Value
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.				

Test setup:	Below 1GHz  Above 1GHz 
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case. 2. 9 kHz to 30MHz is too low, so only shows the data of above 30MHz in this report.

Below 1GHz

Adapter ◊ test mode

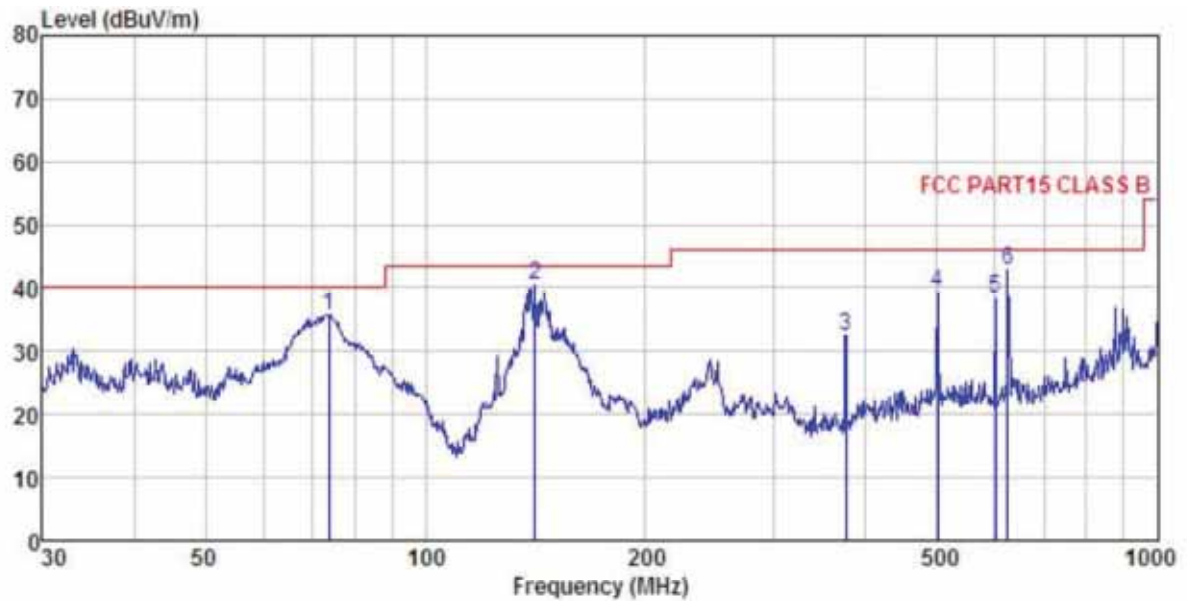
Horizontal:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M3G) HORIZONTAL
 Pro :
 EUT : Broadband Digital Transmission System
 Model : NFI 3ac
 Test mode : 2.4G-Wifi TX mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ant(adapter:GRT-POE20-480050A)

Freq	ReadAntenna	Cable	Preamp	Limit	Over		
Level	Factor	Loss	Factor	Level	Line	Limit Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
81.212	49.63	6.73	1.69	29.63	28.42	40.00	-11.58 QP
138.387	50.32	11.81	2.38	29.28	35.23	43.50	-8.27 QP
162.611	52.00	9.87	2.61	29.11	35.37	43.50	-8.13 QP
375.939	42.66	15.09	3.09	28.68	32.16	46.00	-13.84 QP
501.179	48.62	16.80	3.63	28.96	40.09	46.00	-5.91 QP
625.078	50.82	18.64	3.90	28.86	44.50	46.00	-1.50 QP

Vertical:

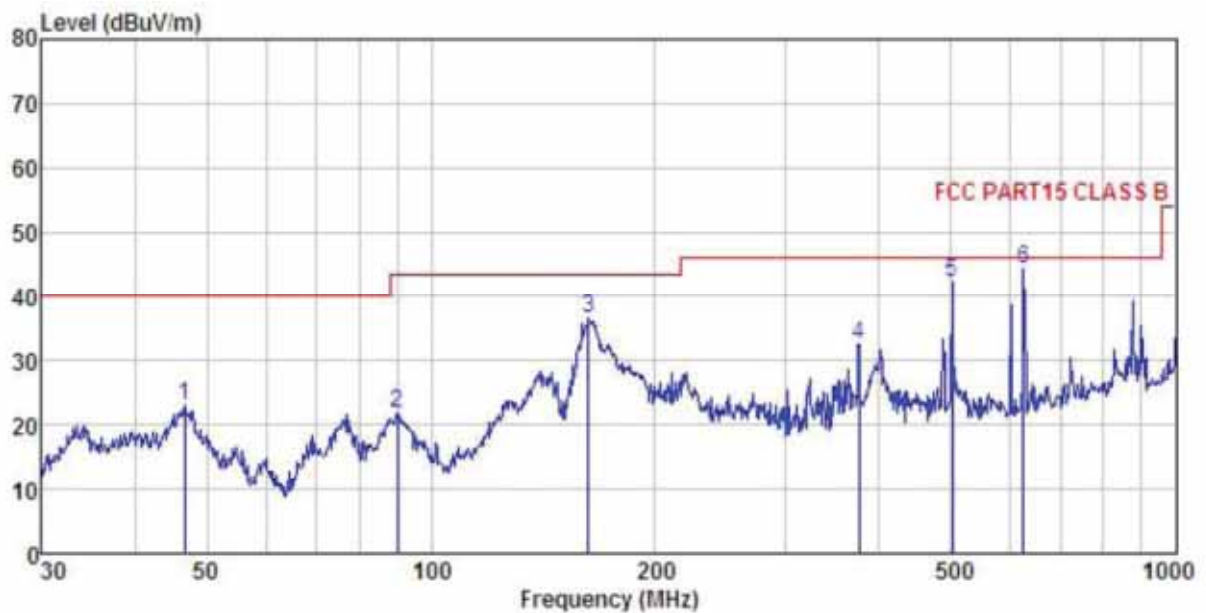


Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M3G) VERTICAL
 Pro :
 EUT : Broadband Digital Transmission System
 Model : NFI 3ac
 Test mode : 2.4G-Wifi TX mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ant(adapter:GRT-POE20-480050A)

	Freq	Level	Antenna Factor	Cable Loss	Preamp Gain	Limit	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	73.876	57.52	6.40	1.61	29.69	35.84	40.00	-4.16 QP
2	141.330	55.60	11.56	2.42	29.27	40.31	43.50	-3.19 QP
3	375.939	43.00	15.09	3.09	28.68	32.50	46.00	-13.50 QP
4	501.179	47.82	16.80	3.63	28.96	39.29	46.00	-6.71 QP
5	601.427	44.83	18.50	3.94	28.93	38.34	46.00	-7.66 QP
6	625.078	49.19	18.64	3.90	28.86	42.87	46.00	-3.13 QP

Adapter 0 test mode

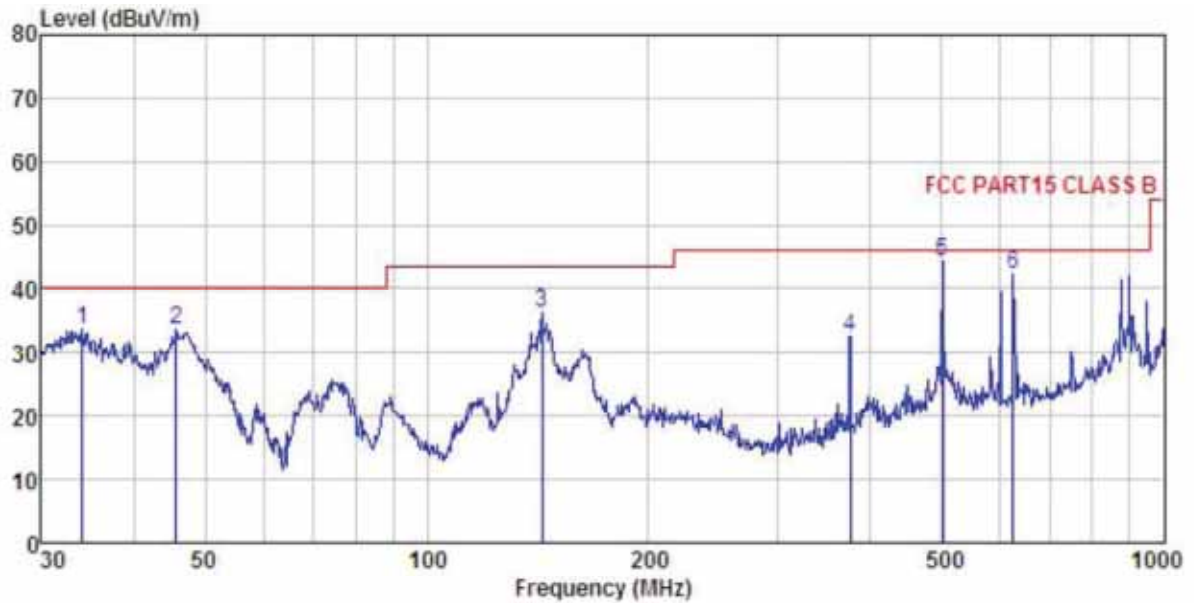
Horizontal:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M3G) HORIZONTAL
 Pro :
 EUT : Broadband Digital Transmission System
 Model : NFT 3ac
 Test mode : 2.4G-Wifi TX mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ant (adapter :G0720-480-050)

		ReadAntenna	Cable	Preamp		Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	46.666	34.78	16.83	1.28	29.85	23.04	40.00	-16.96 QP
2	90.220	41.15	8.20	2.03	29.57	21.81	43.50	-21.69 QP
3	162.611	53.35	9.87	2.61	29.11	36.72	43.50	-6.78 QP
4	375.939	43.04	15.09	3.09	28.68	32.54	46.00	-13.46 QP
5	501.179	50.85	16.80	3.63	28.96	42.32	46.00	-3.68 QP
6	625.078	50.58	18.64	3.90	28.86	44.26	46.00	-1.74 QP

Vertical:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M3G) VERTICAL
 Pro :
 EUT : Broadband Digital Transmission System
 Model : NFI 3ac
 Test mode : 2.4G-Wifi TX mode
 Power Rating : AC120V/60Hz
 Environment : Temp:25.5°C Humi:55%
 Test Engineer: MT
 Remark : 3dBi ant (adapter :G0720-480-050)

	Freq	Read	Antenna	Cable	Preamp	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	34.037	48.48	14.20	0.98	29.96	33.70	40.00	-6.30 QP
2	45.695	44.85	17.28	1.29	29.85	33.57	40.00	-6.43 QP
3	143.326	51.70	11.34	2.44	29.25	36.23	43.50	-7.27 QP
4	375.939	43.01	15.09	3.09	28.68	32.51	46.00	-13.49 QP
5	501.179	52.77	16.80	3.63	28.96	44.24	46.00	-1.76 QP
6	625.078	48.50	18.64	3.90	28.86	42.18	46.00	-3.82 QP

Above 1GHz

Test mode: 802.11b			Test channel: Lowest			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4824.00	55.09	36.12	10.60	40.22	61.59	74.00	-12.41	Vertical
4824.00	44.62	36.12	10.60	40.22	51.12	74.00	-22.88	Horizontal
Test mode: 802.11b			Test channel: Lowest			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4824.00	46.47	36.12	10.60	40.22	52.97	54.00	-1.03	Vertical
4824.00	38.47	36.12	10.60	40.22	44.97	54.00	-9.03	Horizontal

Test mode: 802.11b			Test channel: Middle			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	54.13	36.32	10.64	40.15	60.94	74.00	-13.06	Vertical
4874.00	45.10	36.32	10.64	40.15	51.91	74.00	-22.09	Horizontal
Test mode: 802.11b			Test channel: Middle			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	45.31	36.32	10.64	40.15	52.12	54.00	-1.88	Vertical
4874.00	38.54	36.32	10.64	40.15	45.35	54.00	-8.65	Horizontal

Test mode: 802.11b			Test channel: Highest			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4924.00	53.10	36.58	10.70	40.08	60.30	74.00	-13.70	Vertical
4924.00	47.62	36.58	10.70	40.08	54.82	74.00	-19.18	Horizontal
Test mode: 802.11b			Test channel: Highest			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4924.00	45.79	36.58	10.70	40.08	52.99	54.00	-1.01	Vertical
4924.00	36.24	36.58	10.70	40.08	43.44	54.00	-10.56	Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test mode: 802.11g			Test channel: Lowest			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4824.00	48.12	36.12	10.60	40.22	54.62	74.00	-19.38	Vertical
4824.00	45.13	36.12	10.60	40.22	51.63	74.00	-22.37	Horizontal
Test mode: 802.11g			Test channel: Lowest			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4824.00	35.35	36.12	10.60	40.22	41.85	54.00	-12.15	Vertical
4824.00	35.64	36.12	10.60	40.22	42.14	54.00	-11.86	Horizontal

Test mode: 802.11g			Test channel: Middle			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	44.45	36.32	10.64	40.15	51.26	74.00	-22.74	Vertical
4874.00	43.15	36.32	10.64	40.15	49.96	74.00	-24.04	Horizontal
Test mode: 802.11g			Test channel: Middle			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	34.65	36.32	10.64	40.15	41.46	54.00	-12.54	Vertical
4874.00	33.65	36.32	10.64	40.15	40.46	54.00	-13.54	Horizontal

Test mode: 802.11g			Test channel: Highest			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4924.00	48.94	36.58	10.70	40.08	56.14	74.00	-17.86	Vertical
4924.00	45.31	36.58	10.70	40.08	52.51	74.00	-21.49	Horizontal
Test mode: 802.11g			Test channel: Highest			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4924.00	37.00	36.58	10.70	40.08	44.20	54.00	-9.80	Vertical
4924.00	35.69	36.58	10.70	40.08	42.89	54.00	-11.11	Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test mode: 802.11n(H20)			Test channel: Lowest			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4824.00	44.62	36.12	10.60	40.22	51.12	74.00	-22.88	Vertical
4824.00	44.32	36.12	10.60	40.22	50.82	74.00	-23.18	Horizontal
Test mode: 802.11n(H20)			Test channel: Lowest			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4824.00	34.25	36.12	10.60	40.22	40.75	54.00	-13.25	Vertical
4824.00	34.10	36.12	10.60	40.22	40.60	54.00	-13.40	Horizontal

Test mode: 802.11n(H20)			Test channel: Middle			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	47.19	36.32	10.64	40.15	54.00	74.00	-20.00	Vertical
4874.00	44.47	36.32	10.64	40.15	51.28	74.00	-22.72	Horizontal
Test mode: 802.11n(H20)			Test channel: Middle			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	36.52	36.32	10.64	40.15	43.33	54.00	-10.67	Vertical
4874.00	34.21	36.32	10.64	40.15	41.02	54.00	-12.98	Horizontal

Test mode: 802.11n(H20)			Test channel: Highest			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4924.00	48.60	36.58	10.70	40.08	55.80	74.00	-18.20	Vertical
4924.00	45.21	36.58	10.70	40.08	52.41	74.00	-21.59	Horizontal
Test mode: 802.11n(H20)			Test channel: Highest			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4924.00	36.80	36.58	10.70	40.08	44.00	54.00	-10.00	Vertical
4924.00	36.78	36.58	10.70	40.08	43.98	54.00	-10.02	Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamp Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test mode: 802.11n(H40)			Test channel: Lowest			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4844.00	44.35	36.19	10.61	40.19	50.96	74.00	-23.04	Vertical
4844.00	43.88	36.19	10.61	40.19	50.49	74.00	-23.51	Horizontal
Test mode: 802.11n(H40)			Test channel: Lowest			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4844.00	35.26	36.19	10.61	40.19	41.87	54.00	-12.13	Vertical
4844.00	34.63	36.19	10.61	40.19	41.24	54.00	-12.76	Horizontal

Test mode: 802.11n(H40)			Test channel: Middle			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	43.50	36.25	10.64	40.17	50.22	74.00	-23.78	Vertical
4874.00	43.94	36.25	10.64	40.17	50.66	74.00	-23.34	Horizontal
Test mode: 802.11n(H40)			Test channel: Middle			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	33.65	36.25	10.64	40.17	40.37	54.00	-13.63	Vertical
4874.00	33.71	36.25	10.64	40.17	40.43	54.00	-13.57	Horizontal

Test mode: 802.11n(H40)			Test channel: Highest			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4904.00	44.68	36.51	10.69	40.10	51.78	74.00	-22.22	Vertical
4904.00	44.13	36.51	10.69	40.10	51.23	74.00	-22.77	Horizontal
Test mode: 802.11n(H40)			Test channel: Highest			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4904.00	34.58	36.51	10.69	40.10	41.68	54.00	-12.32	Vertical
4904.00	34.64	36.51	10.69	40.10	41.74	54.00	-12.26	Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.