

# FCC REPORT (WIFI)

**Applicant:** 8devices

**Address of Applicant:** Gedimino 47, Kaunas, LT-44242, Lithuania

## Equipment Under Test (EUT)

**Product Name:** Broadband Digital Transmission System

**Model No.:** Jalapeno

**FCC ID:** Z9W-JLP

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

**Date of sample receipt:** 23. May, 2018

**Date of Test:** 23. May, to 17 Jul., 2018

**Date of report issued:** 18 Jul., 2018

**Test Result:** PASS\*

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

Authorized Signature:



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	18 Jul., 2018	Original

Tested by:

Mike.Ou

Date:

18 Jul., 2018

Test Engineer

Reviewed by:

Wimer Chang

Date:

18 Jul., 2018

Project Engineer

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## 4 Test Summary

Test Items	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.*  
*N/A: N/A: Not Applicable.*

## 5 General Information

### 5.1 Client Information

Applicant:	8devices
Address:	Gedimino 47, Kaunas, LT-44242, Lithuania
Manufacturer/ Factory:	8devices
Address:	Gedimino 47, Kaunas, LT-44242, Lithuania

### 5.2 General Description of E.U.T.

Product Name:	Broadband Digital Transmission System
Model No.:	Jalapeno
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20)) 2422MHz~2452MHz (802.11n(HT40))
Channel numbers:	11 for 802.11b/802.11g/802.11(HT20) 7 for 802.11n(HT40)
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 300 Mbps
Antenna Type:	Antenna 0:Ceramic Antenna Antenna 1:Omni Antenna
Antenna gain:	Antenna 0: 3dBi Antenna 1: 10dBi

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		

Note:

- For 802.11n-HT40 mode, the channel number is from 3 to 9;
- Channel 1, 6 & 11 selected for 802.11b/g/n-HT20 as Lowest, Middle and Highest channel, Channel; 3, 6 & 9 selected for 802.11n-HT40 as Lowest, Middle and Highest channel, Channel.

### 5.3 Test environment and test mode

<b>Operating Environment:</b>	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
<b>Test mode:</b>	
Transmitting mode	Keep the EUT in continuous transmitting with modulation
<p>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 &amp; 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.</p> <p>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:</p>	
<b>Per-scan all kind of data rate, the follow list were the worst case.</b>	
Mode	Data rate
802.11b	1Mbps
802.11g	6Mbps
802.11n(HT20)	6.5Mbps
802.11n(HT40)	13.5Mbps

### 5.4 Description of Support Units

The EUT has been tested as an independent unit.

### 5.5 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±2.22 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±2.76 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.28 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.72 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±2.88 dB (k=2)

### 5.6 Laboratory Facility

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

- **FCC - Registration No.: 727551**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.

- **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.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopempdf/4346-01.pdf>

## 5.7 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  
 Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

## 5.8 Test Instruments list

Radiated Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-16-2018	03-15-2019
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-16-2018	03-15-2019
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-16-2018	03-15-2019
EMI Test Software	AUDIX	E3	6.110919b	N/A	N/A
Pre-amplifier	HP	8447D	2944A09358	03-07-2018	03-06-2019
Pre-amplifier	CD	PAP-1G18	11804	03-07-2018	03-06-2019
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-07-2018	03-06-2019
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-07-2018	03-06-2019
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-07-2018	03-06-2019
Cable	MICRO-COAX	MFR64639	K10742-5	03-07-2018	03-06-2019
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-07-2018	03-06-2019

Conducted Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESCI	101189	03-07-2018	03-06-2019
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-07-2018	03-06-2019
LISN	CHASE	MN2050D	1447	03-19-2018	03-18-2019
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2017	07-20-2018
Cable	HP	10503A	N/A	03-07-2018	03-06-2019
EMI Test Software	AUDIX	E3	6.110919b	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)
15.203 requirement: 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.	
15.247(c) (4) requirement: (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	

E.U.T Antenna:										
<i>The product is a professionally installed device which has two types of antennas for the application. The antennas information as below table:</i>										
<table border="1"> <thead> <tr> <th>Antenna No.</th> <th>Antenna Type</th> <th>Antenna Gain (dBi)</th> </tr> </thead> <tbody> <tr> <td>Antenna 0</td> <td>Ceramic Antenna</td> <td>3</td> </tr> <tr> <td>Antenna 1</td> <td>Omni Antenna</td> <td>10</td> </tr> </tbody> </table>		Antenna No.	Antenna Type	Antenna Gain (dBi)	Antenna 0	Ceramic Antenna	3	Antenna 1	Omni Antenna	10
Antenna No.	Antenna Type	Antenna Gain (dBi)								
Antenna 0	Ceramic Antenna	3								
Antenna 1	Omni Antenna	10								

According to above information, the antennas meet the requirements of this section

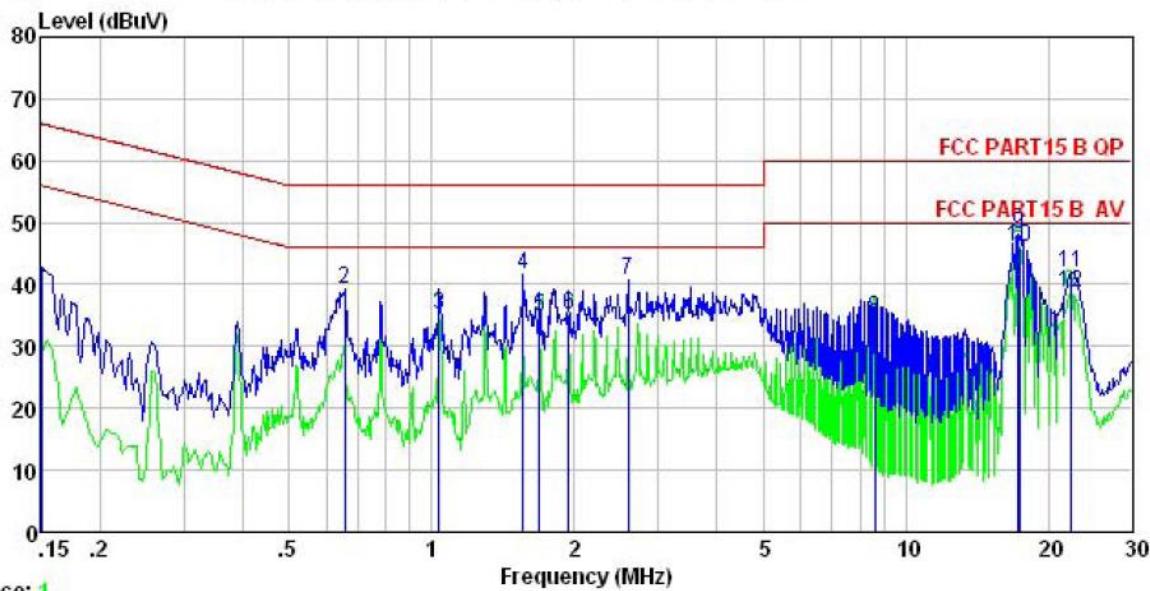
Antenna 0:	Antenna 1:

## 6.2 Conducted Emission

Test Requirement:	FCC Part 15 C Section 15.207		
Test Method:	ANSI C63.10: 2013		
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	<ol style="list-style-type: none"> <li>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.</li> <li>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).</li> <li>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.</li> </ol>		
Test setup:	<p>Reference Plane</p> <p>LISN</p> <p>AUX Equipment</p> <p>E.U.T</p> <p>Test table/Insulation plane</p> <p>EMI Receiver</p> <p>Filter</p> <p>AC power</p> <p>40cm</p> <p>80cm</p> <p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>		
Test Instruments:	Refer to section 5.8 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Passed		

## Measurement Data:3dBi ANT

Test Phase: Neutral



Trace: 1

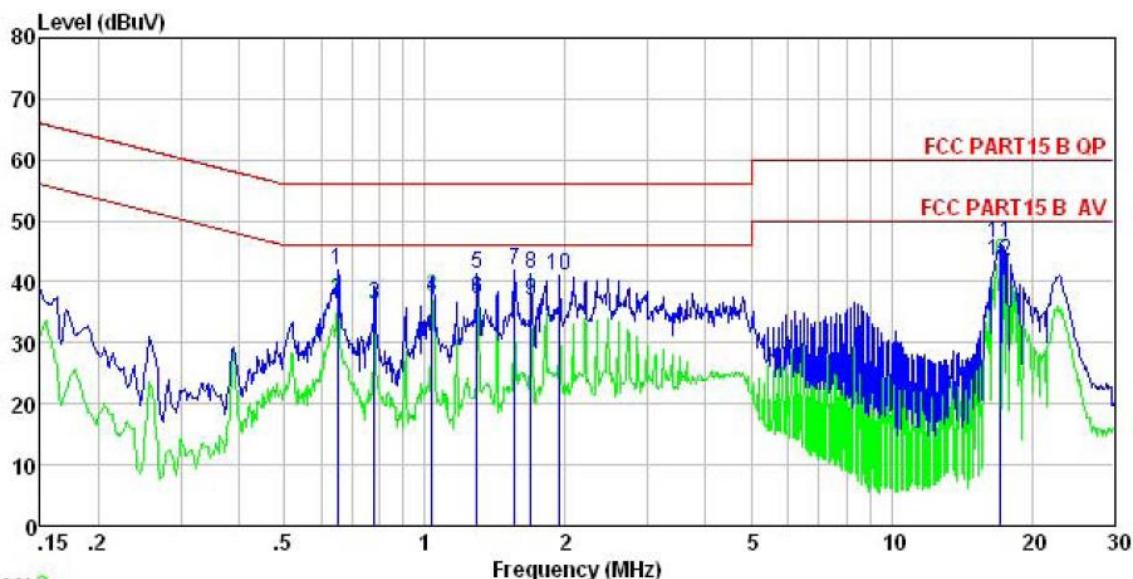
Site : CCIS Shielding Room  
 Condition : FCC PART15 B QP LISN NEUTRAL  
 EUT : Broadband Digital Transmission System  
 Model : Jalapeno  
 Test Mode : 2.4G WIFI Mode  
 Power Rating : AC 120/60Hz  
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa  
 Test Engineer: Mike  
 Remark :

	Read Freq	LISN Level	Cable Factor	Limit Loss	Over Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.150	30.90	0.99	10.78	42.67	66.00	-23.33 QP
2	0.654	27.42	0.97	10.77	39.16	56.00	-16.84 QP
3	1.037	23.42	0.97	10.87	35.26	46.00	-10.74 Average
4	1.560	29.71	0.98	10.93	41.62	56.00	-14.38 QP
5	1.689	23.04	0.98	10.94	34.96	46.00	-11.04 Average
6	1.949	23.10	0.98	10.96	35.04	46.00	-10.96 Average
7	2.594	28.83	0.99	10.93	40.75	56.00	-15.25 QP
8	8.592	22.53	1.02	10.88	34.43	50.00	-15.57 Average
9	17.291	36.31	0.80	10.91	48.02	60.00	-11.98 QP
10	17.383	34.42	0.79	10.92	46.13	50.00	-3.87 Average
11	22.298	30.46	0.68	10.90	42.04	60.00	-17.96 QP
12	22.298	27.15	0.68	10.90	38.73	50.00	-11.27 Average

## Notes:

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

## Test Phase: Line



Trace: 3

Site : CCIS Shielding Room  
 Condition : FCC PART15 B QP LISN LINE  
 EUT : Broadband Digital Transmission System  
 Model : Jalapeno  
 Test Mode : 2.4G WIFI Mode  
 Power Rating : AC 120/60Hz  
 Environment : Temp: 23 °C Huni:56% Atmos:101KPa  
 Test Engineer: Mike  
 Remark :

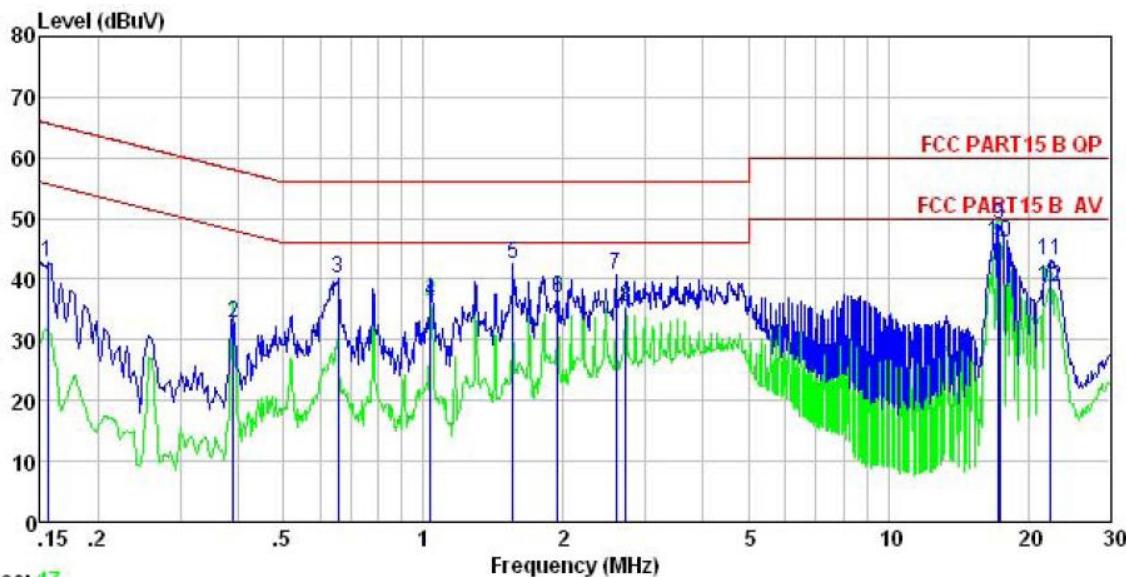
Freq	Read	LISN	Cable	Limit	Over	Remark
	Level	Factor	Loss	Level	Line	
MHz	dBuV	dB	dB	dBuV	dBuV	dB
1	0.651	30.91	0.13	10.77	41.81	56.00 -14.19 QP
2	0.651	25.95	0.13	10.77	36.85	46.00 -9.15 Average
3	0.779	25.48	0.13	10.80	36.41	46.00 -9.59 Average
4	1.037	26.56	0.13	10.87	37.56	46.00 -8.44 Average
5	1.296	30.22	0.13	10.90	41.25	56.00 -14.75 QP
6	1.296	26.11	0.13	10.90	37.14	46.00 -8.86 Average
7	1.560	30.82	0.14	10.93	41.89	56.00 -14.11 QP
8	1.689	30.36	0.14	10.94	41.44	56.00 -14.56 QP
9	1.689	25.70	0.14	10.94	36.78	46.00 -9.22 Average
10	1.949	29.86	0.14	10.96	40.96	56.00 -15.04 QP
11	17.109	35.09	0.30	10.91	46.30	60.00 -13.70 QP
12	17.109	32.12	0.30	10.91	43.33	50.00 -6.67 Average

## Notes:

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

## Measurement Data:10dBi ANT

Test Phase: Neutral



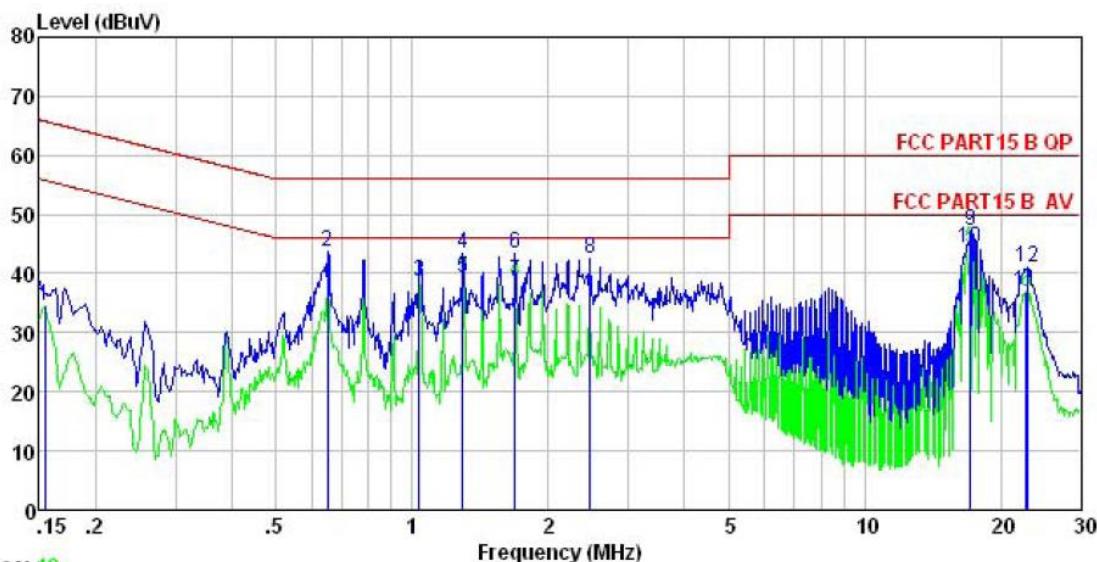
Site : CCIS Shielding Room  
 Condition : FCC PART15 B QP LISN NEUTRAL  
 EUT : Broadband Digital Transmission System  
 Model : Jalapeno  
 Test Mode : 2.4G WIFI Mode  
 Power Rating : AC 120/60Hz  
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa  
 Test Engineer: Mike  
 Remark : 10dBi

	Read Freq	LISN Level	Cable Factor	Limit Loss	Over Line Level	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dB	
1	0.156	31.00	0.98	10.77	42.75	65.69	-22.94 QP
2	0.389	21.57	0.62	10.72	32.91	48.08	-15.17 Average
3	0.654	28.42	0.97	10.77	40.16	56.00	-15.84 QP
4	1.037	24.72	0.67	10.87	36.26	46.00	-9.74 Average
5	1.560	30.71	0.98	10.93	42.62	56.00	-13.38 QP
6	1.949	25.41	0.67	10.96	37.04	46.00	-8.96 Average
7	2.594	28.83	0.99	10.93	40.75	56.00	-15.25 QP
8	2.721	23.96	0.68	10.93	35.57	46.00	-10.43 Average
9	17.291	37.31	0.80	10.91	49.02	60.00	-10.98 QP
10	17.383	34.52	0.69	10.92	46.13	50.00	-3.87 Average
11	22.298	31.46	0.68	10.90	43.04	60.00	-16.96 QP
12	22.298	27.14	0.69	10.90	38.73	50.00	-11.27 Average

## Notes:

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

## Test Phase: Line



Trace: 19

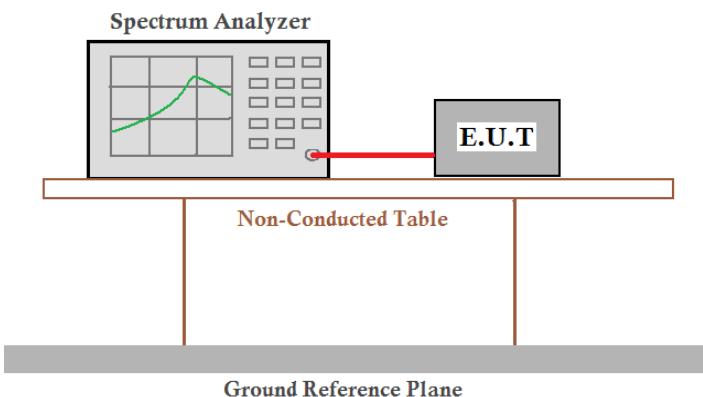
Site : CCIS Shielding Room  
 Condition : FCC PART15 B QP LISN LINE  
 EUT : Broadband Digital Transmission System  
 Model : Jalapeno  
 Test Mode : 2.4G WIFI Mode  
 Power Rating : AC 120/60Hz  
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa  
 Test Engineer: Mike  
 Remark : 10dBi

Freq	Read	LISN	Cable	Limit	Over	Remark	
	Freq	Level	Factor	Loss	Level	Line	Limit
MHz	dBuV		dB	dBuV	dBuV	dB	
1	0.154	23.61	0.18	10.78	34.57	55.78	-21.21 Average
2	0.651	32.91	0.13	10.77	43.81	56.00	-12.19 QP
3	1.037	27.56	0.13	10.87	38.56	46.00	-7.44 Average
4	1.296	32.22	0.13	10.90	43.25	56.00	-12.75 QP
5	1.296	28.11	0.13	10.90	39.14	46.00	-6.86 Average
6	1.689	32.36	0.14	10.94	43.44	56.00	-12.56 QP
7	1.689	27.70	0.14	10.94	38.78	46.00	-7.22 Average
8	2.474	31.31	0.15	10.94	42.40	56.00	-13.60 QP
9	17.109	36.09	0.30	10.91	47.30	60.00	-12.70 QP
10	17.109	33.12	0.30	10.91	44.33	50.00	-5.67 Average
11	22.775	25.75	0.31	10.90	36.96	50.00	-13.04 Average
12	22.896	29.81	0.31	10.89	41.01	60.00	-18.99 QP

## Notes:

4. An initial pre-scan was performed on the live and neutral lines with peak detector.
5. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
6. 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 KDB 558074
Limit:	30dBm(The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.)
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

## Measurement Data:3dBi ANT

Mode	Test CH	Ant. Port	Conducted Output power (dBm)	Total power (dBm)	Limit (dBm)	Result
802.11b	Lowest	TX0	19.27	22.18	30	Pass
		TX1	19.07			
	Middle	TX0	19.19	22.21	30	Pass
		TX1	19.20			
	Highest	TX0	19.25	22.19	30	Pass
		TX1	19.11			
802.11g	Lowest	TX0	19.45	22.34	30	Pass
		TX1	19.20			
	Middle	TX0	19.49	22.47	30	Pass
		TX1	19.43			
	Highest	TX0	19.59	22.54	30	Pass
		TX1	19.46			
802.11n(HT20)	Lowest	TX0	19.37	22.28	30	Pass
		TX1	19.17			
	Middle	TX0	19.31	22.34	30	Pass
		TX1	19.34			
	Highest	TX0	19.50	22.41	30	Pass
		TX1	19.29			
802.11n(HT40)	Lowest	TX0	17.17	20.11	30	Pass
		TX1	17.02			
	Middle	TX0	19.50	22.50	30	Pass
		TX1	19.48			
	Highest	TX0	18.15	21.15	30	Pass
		TX1	18.12			

## Remark:

1. Because transmit signals are correlated, Directional gain =  $G_{ANT} + 10 \log(N_{ANT})$  dBi , So the Directional gain=3 + 10 log(2)=6 dBi
2. The directional Gain of antenna is not greater than 6 dBi , so the limit of power is 30 dBm.

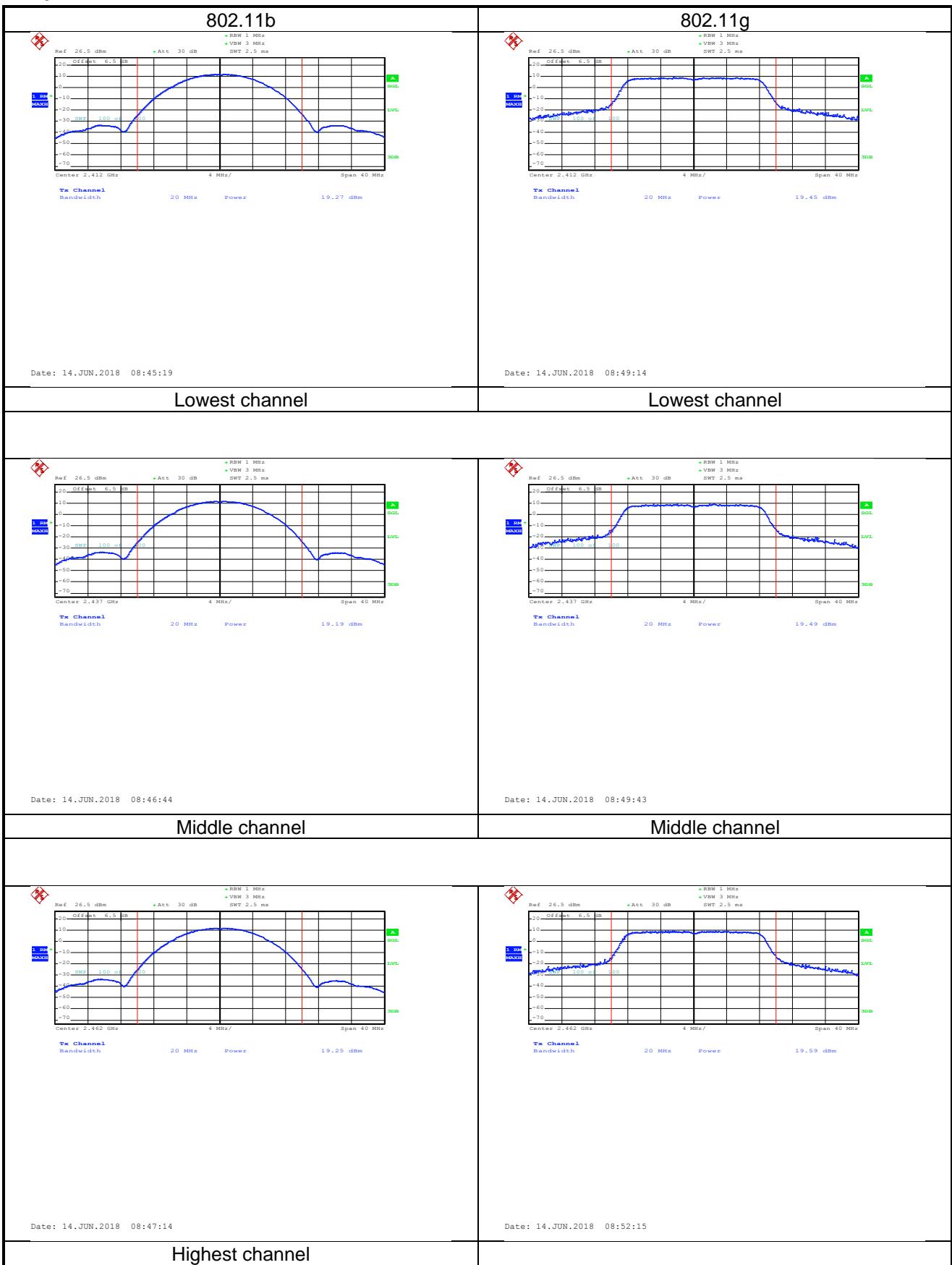
## Measurement Data:10dBi ANT

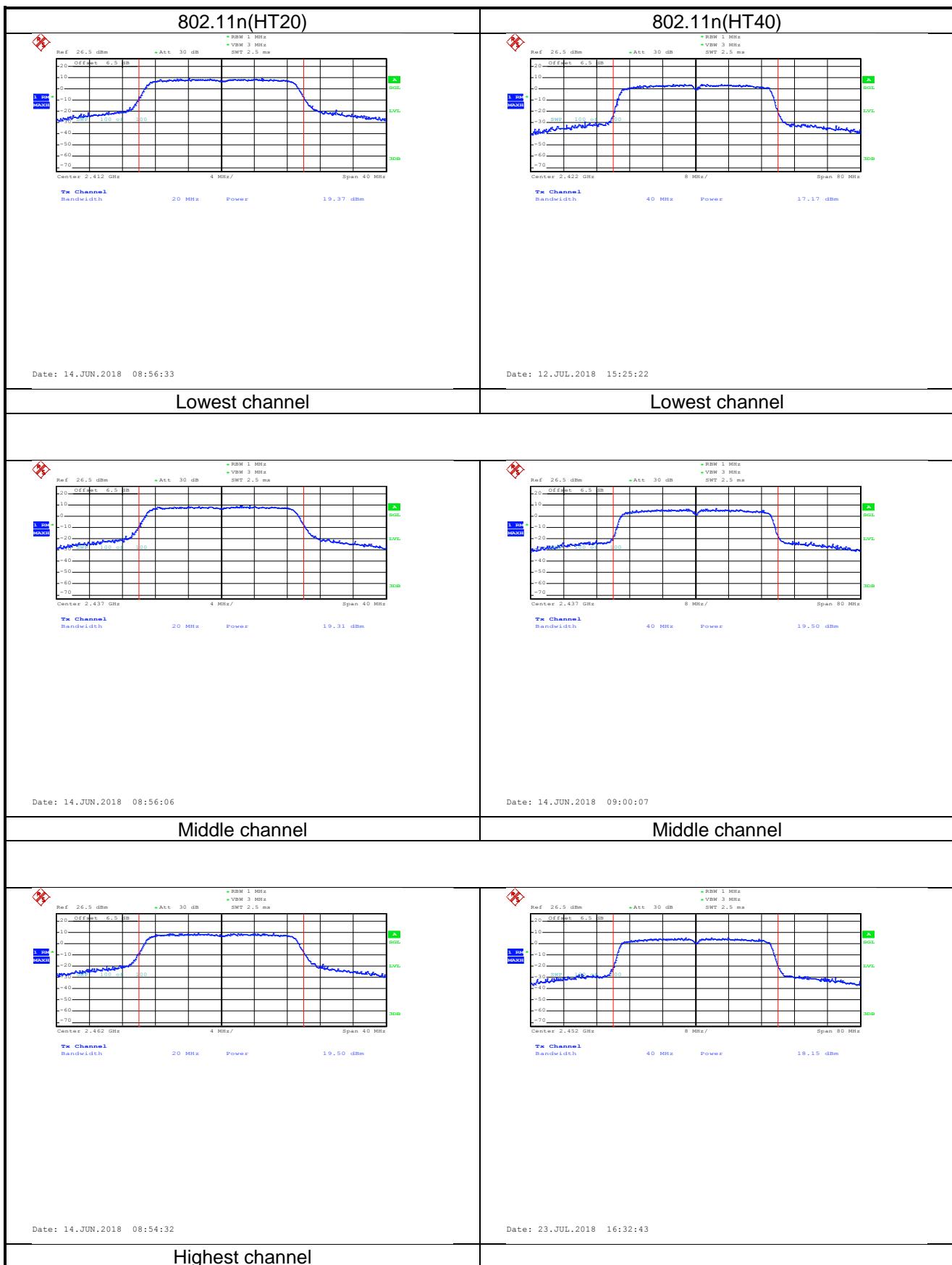
Mode	Test CH	Ant. Port	Conducted Output power (dBm)	Total power (dBm)	Limit (dBm)	Result
802.11b	Lowest	TX0	19.60	22.57	23.00	Pass
		TX1	19.52			
	Middle	TX0	19.77	22.78	23.00	Pass
		TX1	19.77			
	Highest	TX0	19.75	22.78	23.00	Pass
		TX1	19.78			
802.11g	Lowest	TX0	16.47	19.45	23.00	Pass
		TX1	16.40			
	Middle	TX0	19.32	22.27	23.00	Pass
		TX1	19.19			
	Highest	TX0	16.30	19.31	23.00	Pass
		TX1	16.30			
802.11n(HT20)	Lowest	TX0	14.88	18.10	23.00	Pass
		TX1	15.29			
	Middle	TX0	19.24	22.42	23.00	Pass
		TX1	19.57			
	Highest	TX0	15.32	18.20	23.00	Pass
		TX1	15.06			
802.11n(HT40)	Lowest	TX0	13.09	16.17	23.00	Pass
		TX1	13.22			
	Middle	TX0	19.60	22.60	23.00	Pass
		TX1	19.58			
	Highest	TX0	14.34	17.38	23.00	Pass
		TX1	14.40			

## Remark:

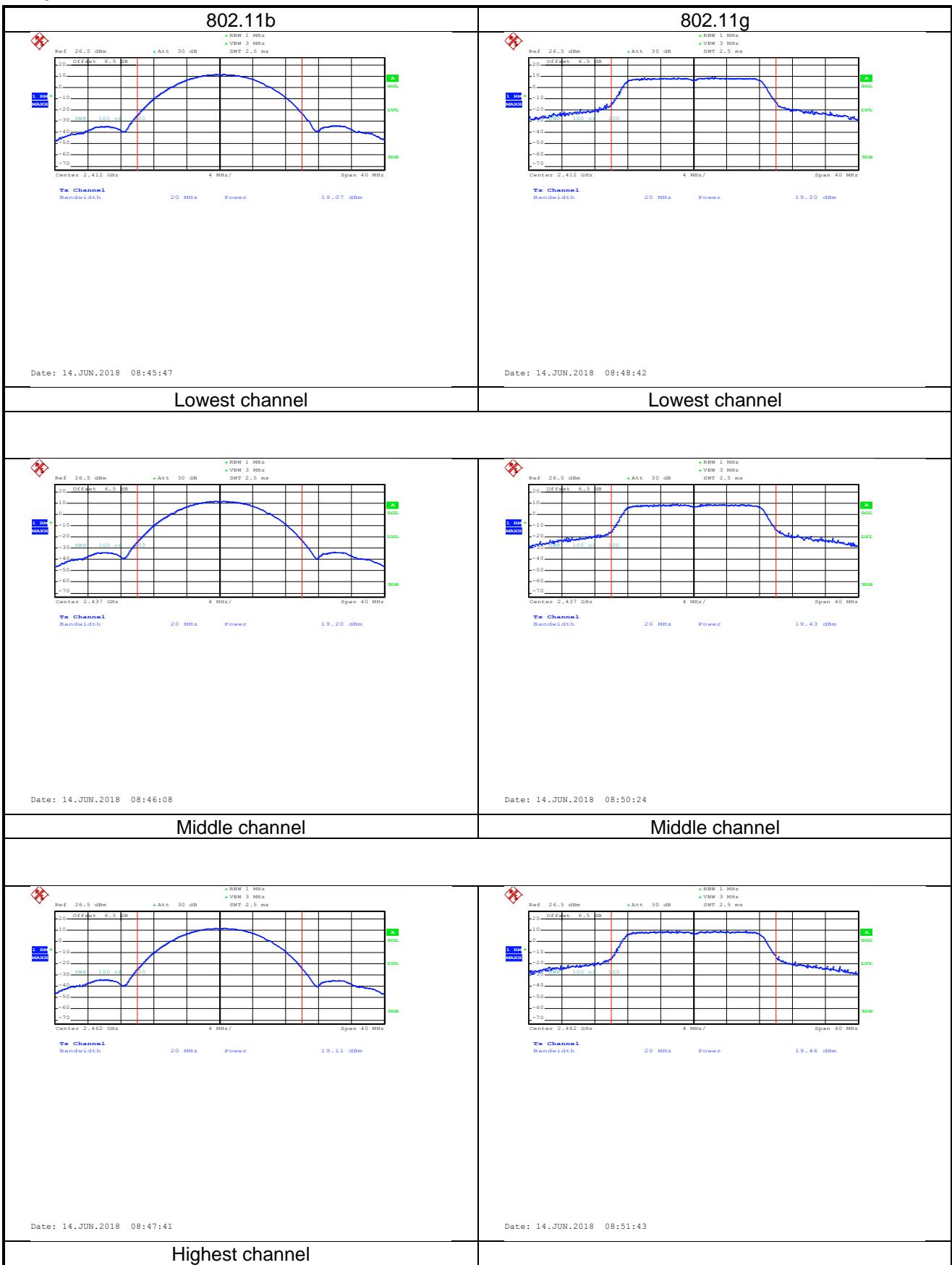
- Because transmit signals are correlated, Directional gain =  $G_{ANT} + 10 \log(N_{ANT})$  dB<sub>i</sub> , So the Directional gain=10 + 10 log(2)=13 dB<sub>i</sub>
- The directional Gain of antenna is greater than 6 dB<sub>i</sub>, so the limit of power is 23.00 dBm.

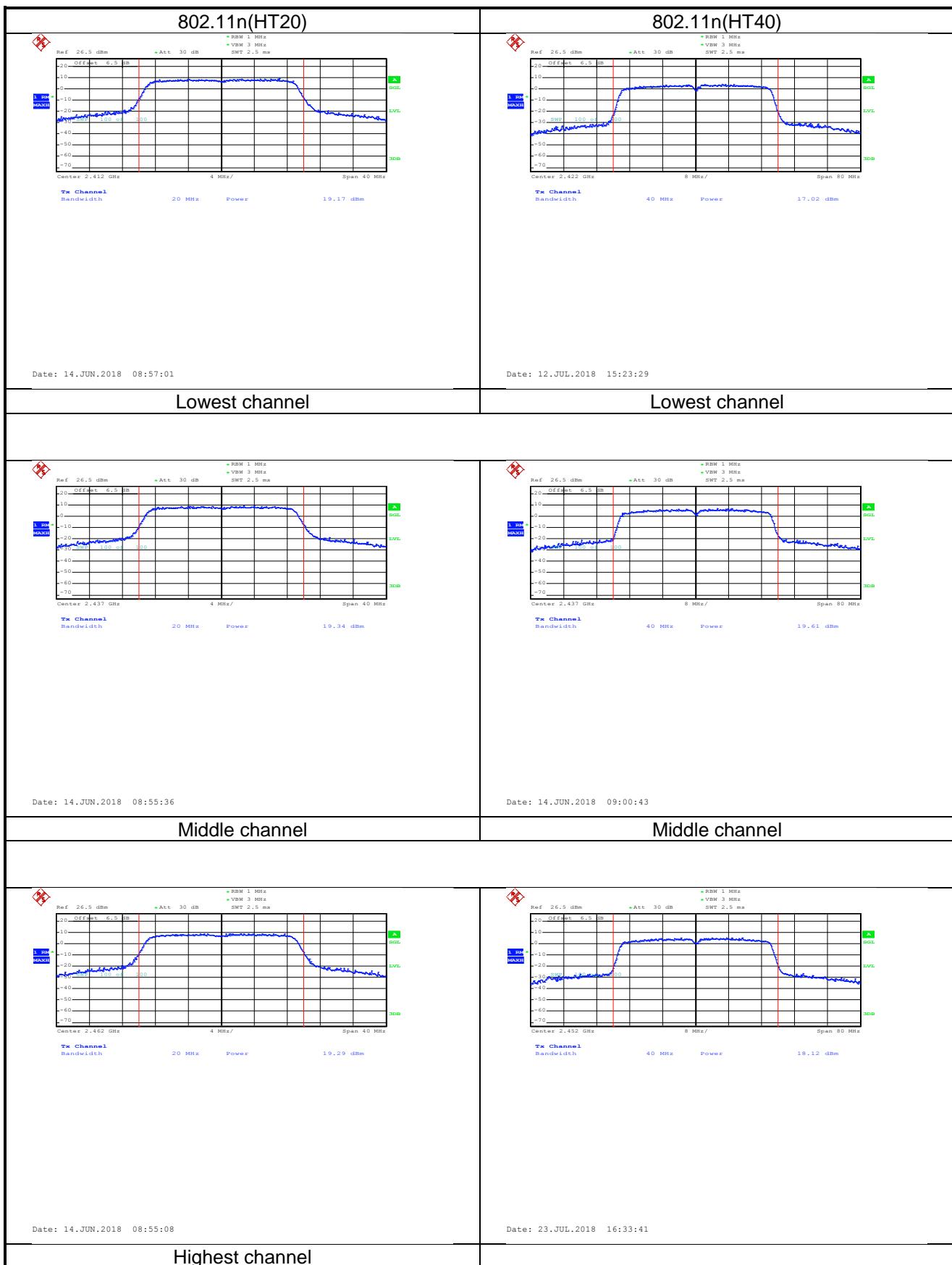
Test plot as follows: 3dBi ANT TX0



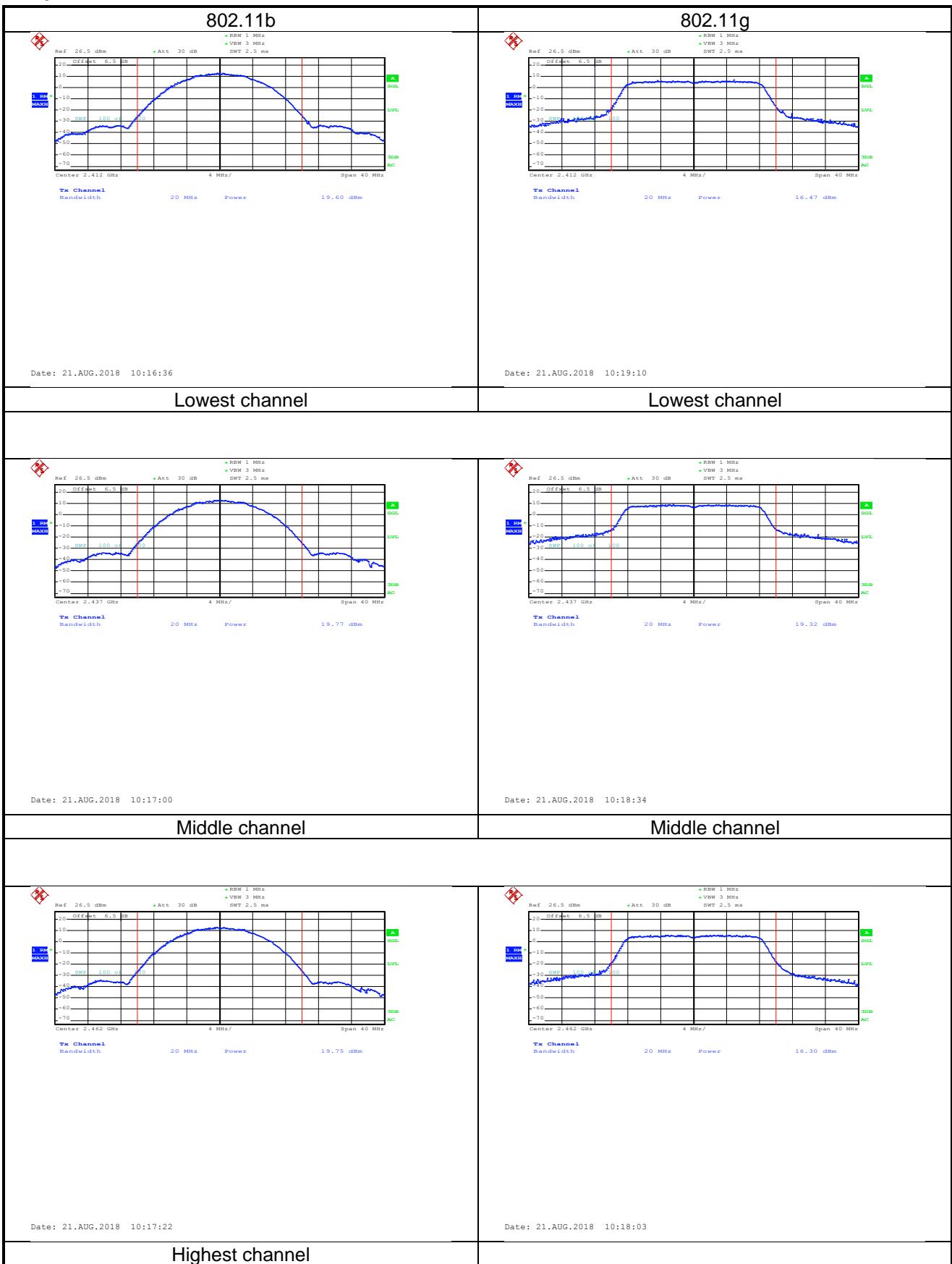


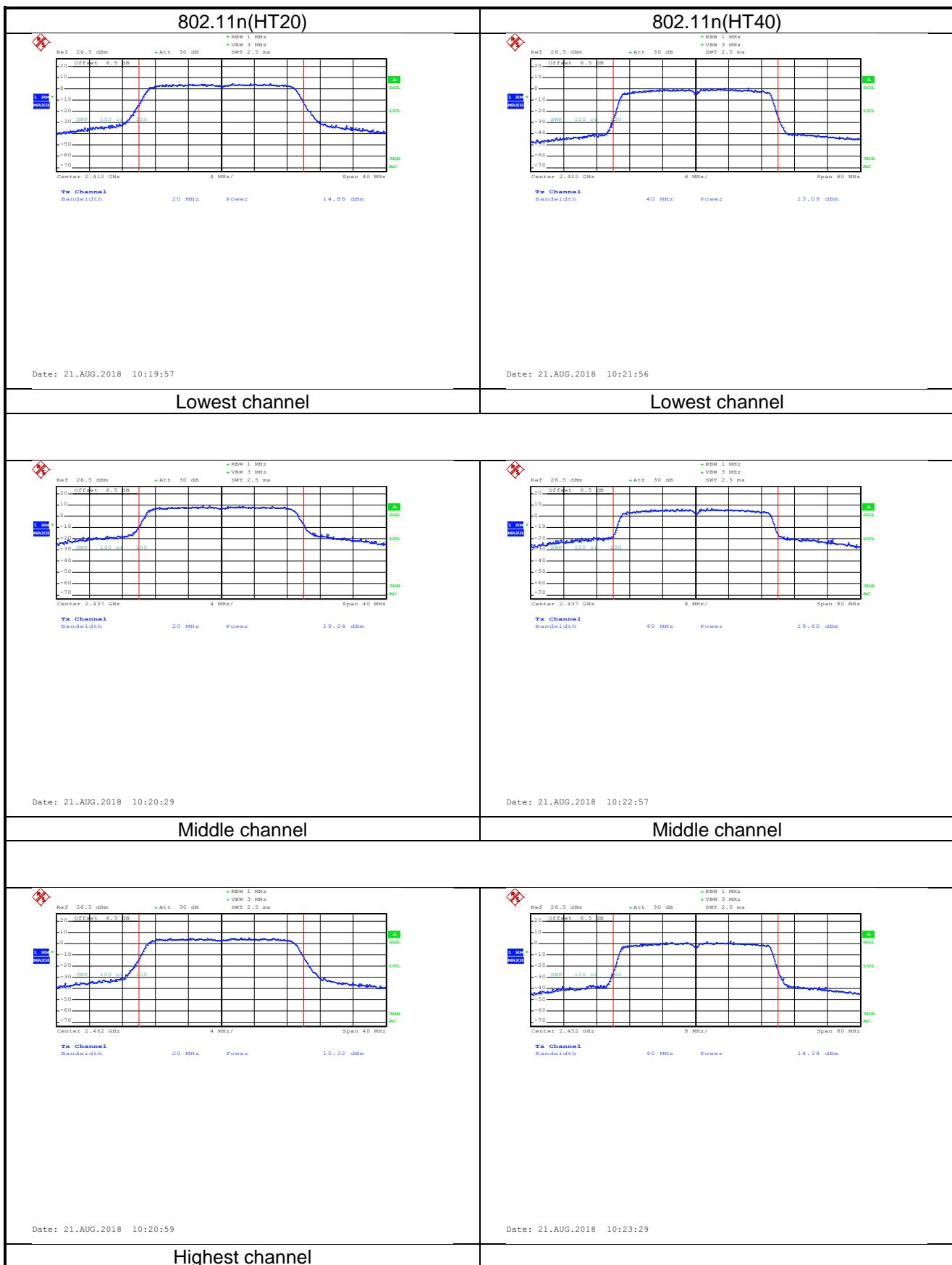
Test plot as follows:3dBi ANT TX1



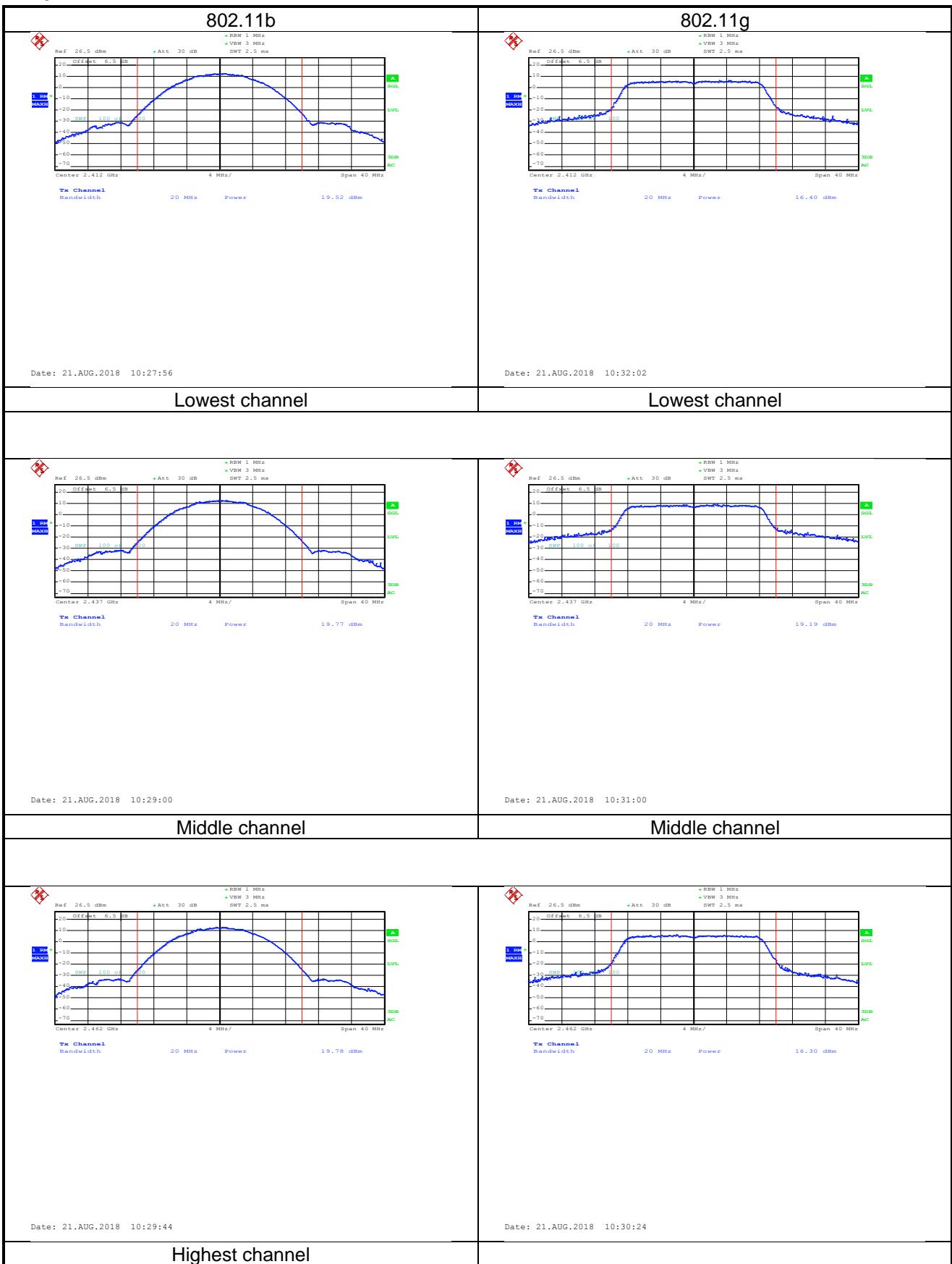


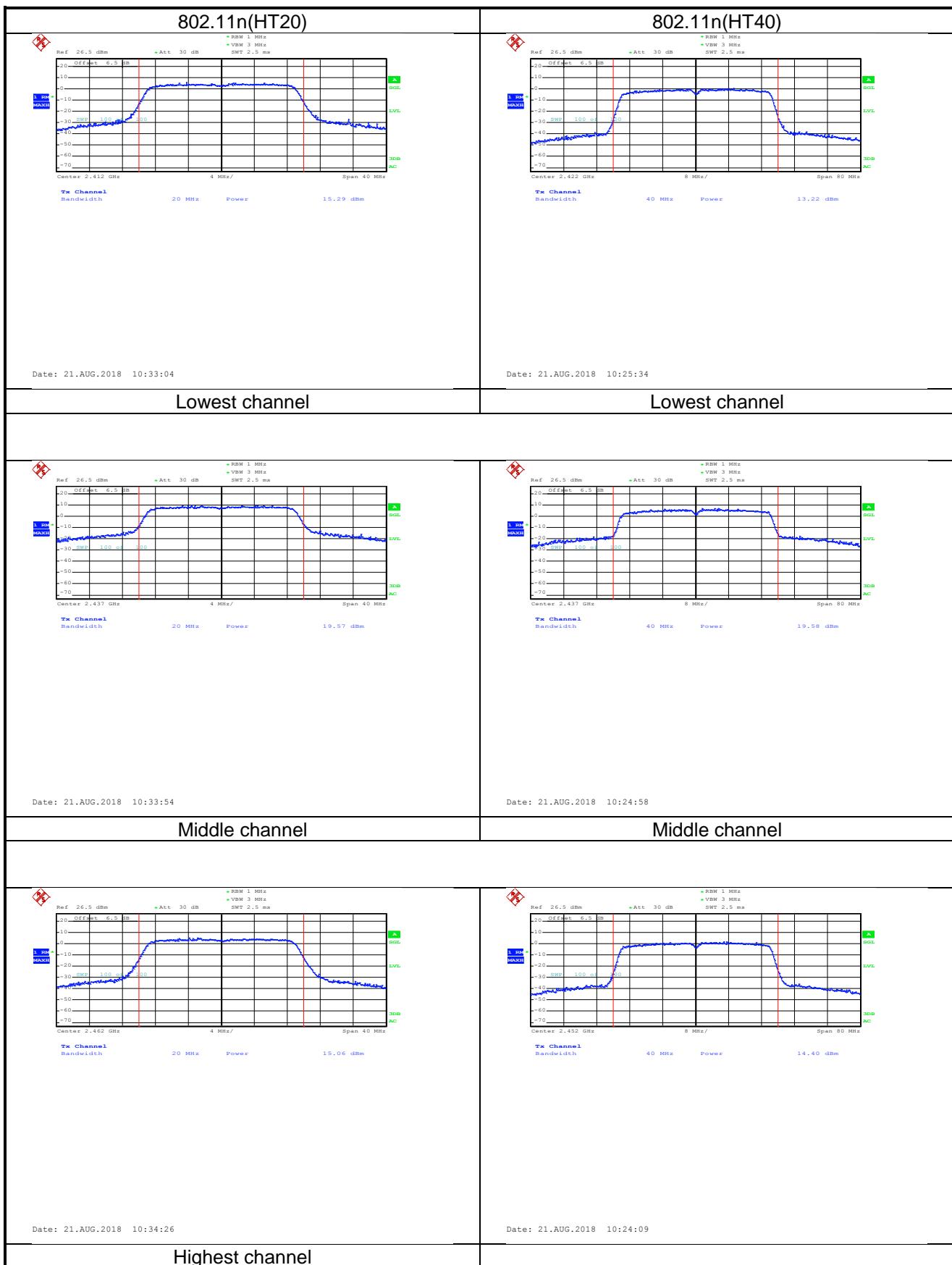
Test plot as follows: 10dBi TX0



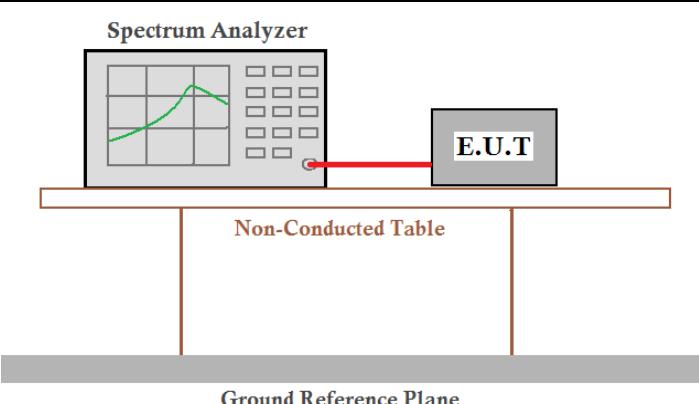


Test plot as follows:10dBi TX1





## 6.4 Occupy Bandwidth

Test Requirement:	FCC Part 15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013 and KDB 558074
Limit:	>500kHz
Test setup:	 <p>The diagram illustrates the test setup for measuring occupy bandwidth. A Spectrum Analyzer is connected to the Equipment Under Test (E.U.T) via a coaxial cable. The entire setup is positioned on a Non-Conducted Table, which is situated above a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

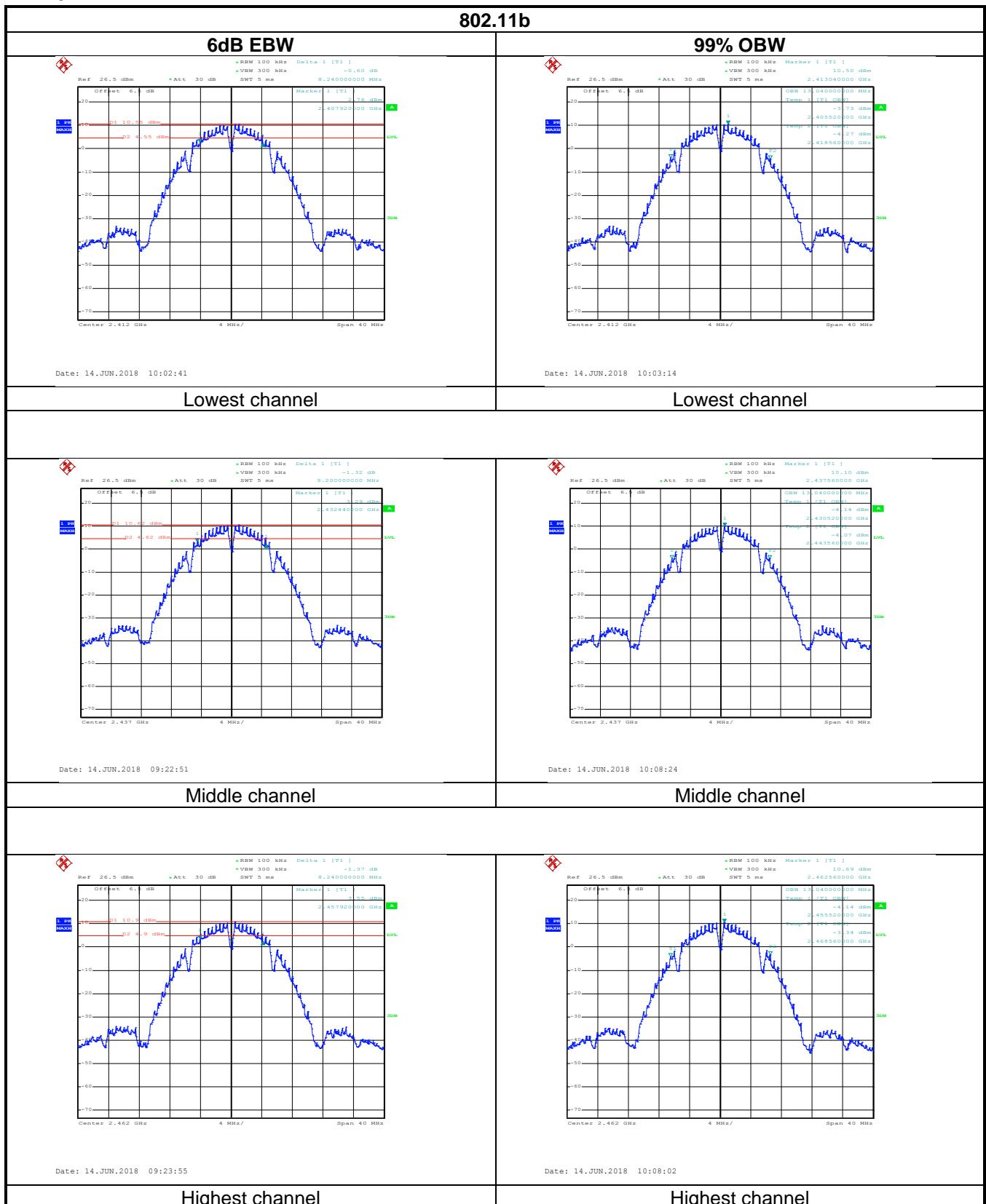
### Measurement Data:TX0

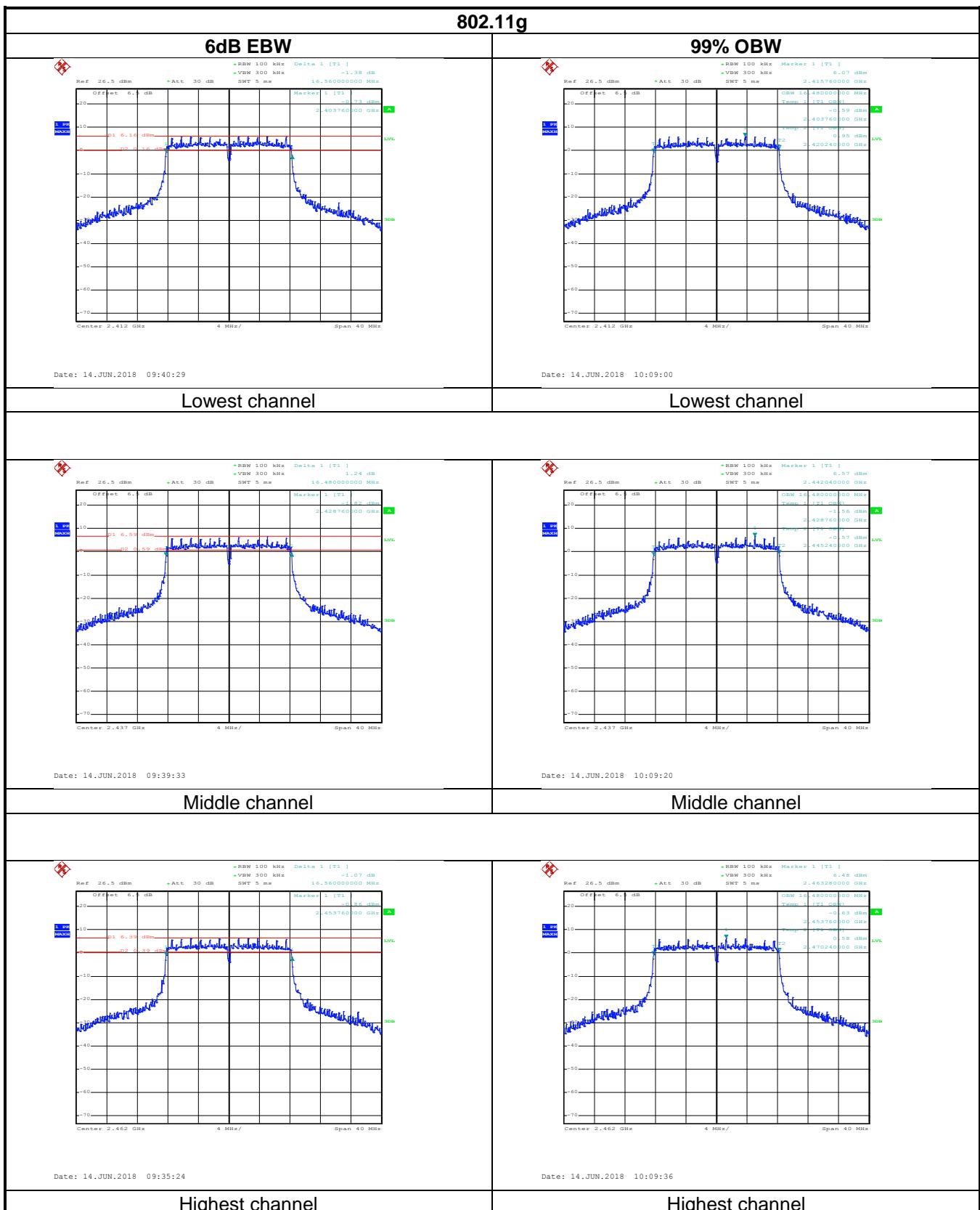
Test CH	6dB Emission Bandwidth (MHz)				Limit(kHz)	Result
	802.11b	802.11g	802.11n(H20)	802.11n(H40)		
Lowest	8.24	16.56	17.76	33.68	>500	Pass
Middle	9.20	16.48	17.76	35.68		
Highest	8.24	16.56	17.76	35.84		
Test CH	99% Occupy Bandwidth (MHz)				Limit(kHz)	Result
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)		
Lowest	13.04	16.48	17.68	36.00	N/A	N/A
Middle	13.04	16.48	17.68	36.00		
Highest	13.04	16.48	17.68	36.00		

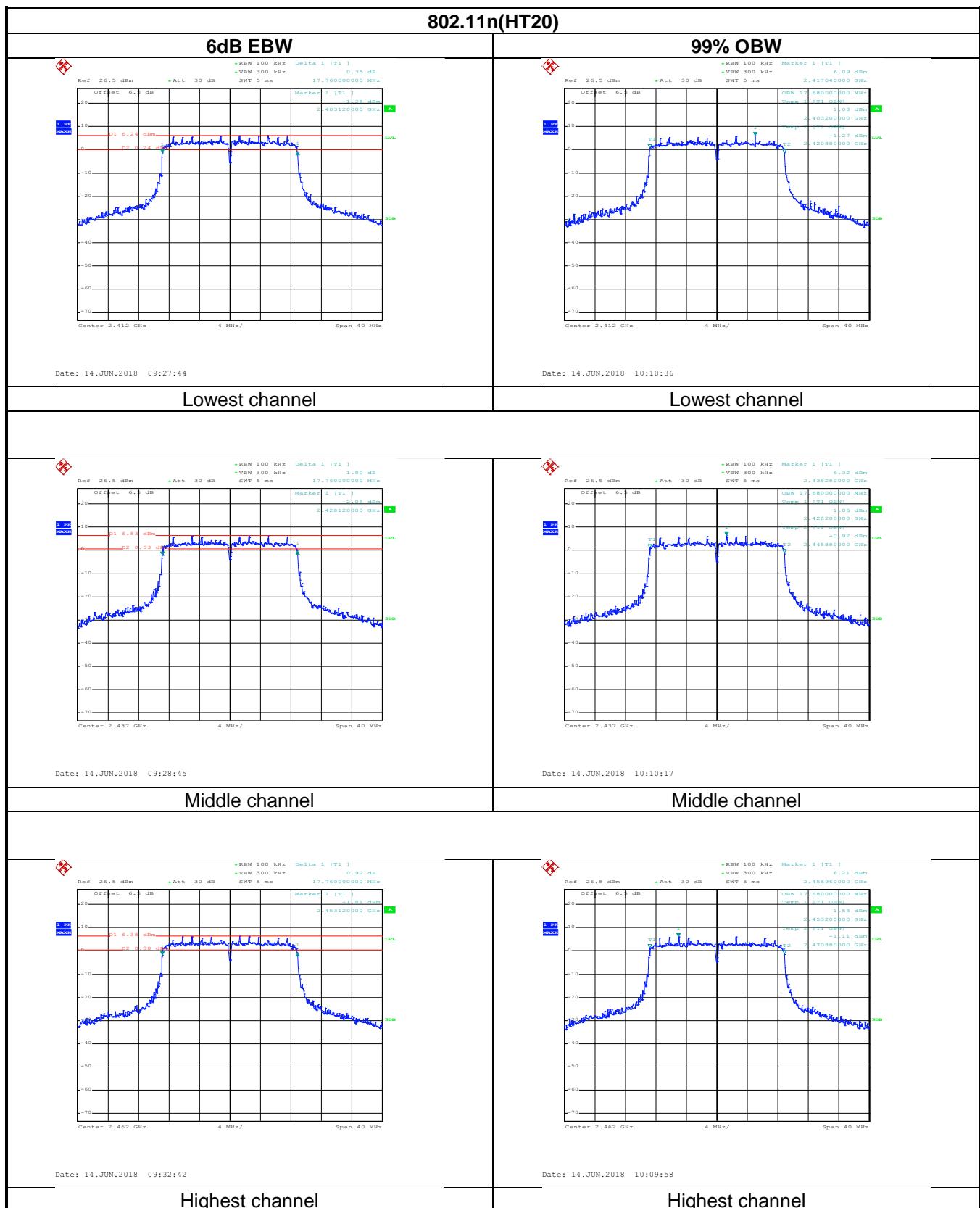
### TX1

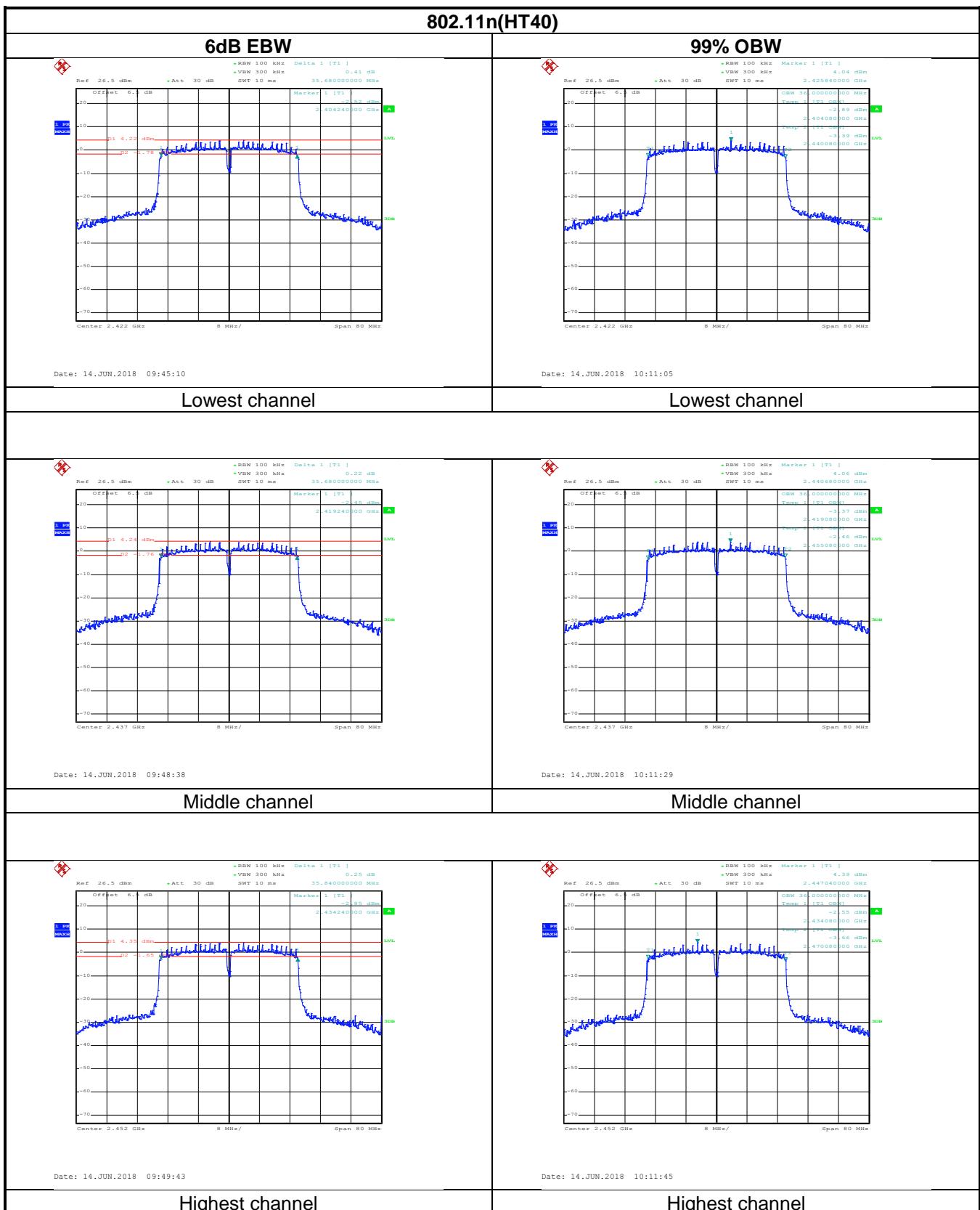
Test CH	6dB Emission Bandwidth (MHz)				Limit(kHz)	Result
	802.11b	802.11g	802.11n(H20)	802.11n(H40)		
Lowest	8.72	16.56	17.76	35.84	>500	Pass
Middle	8.72	16.56	17.76	35.84		
Highest	8.24	16.56	17.76	35.68		
Test CH	99% Occupy Bandwidth (MHz)				Limit(kHz)	Result
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)		
Lowest	13.12	16.48	17.68	36.00	N/A	N/A
Middle	13.04	16.40	17.68	36.00		
Highest	13.04	16.48	17.68	36.00		

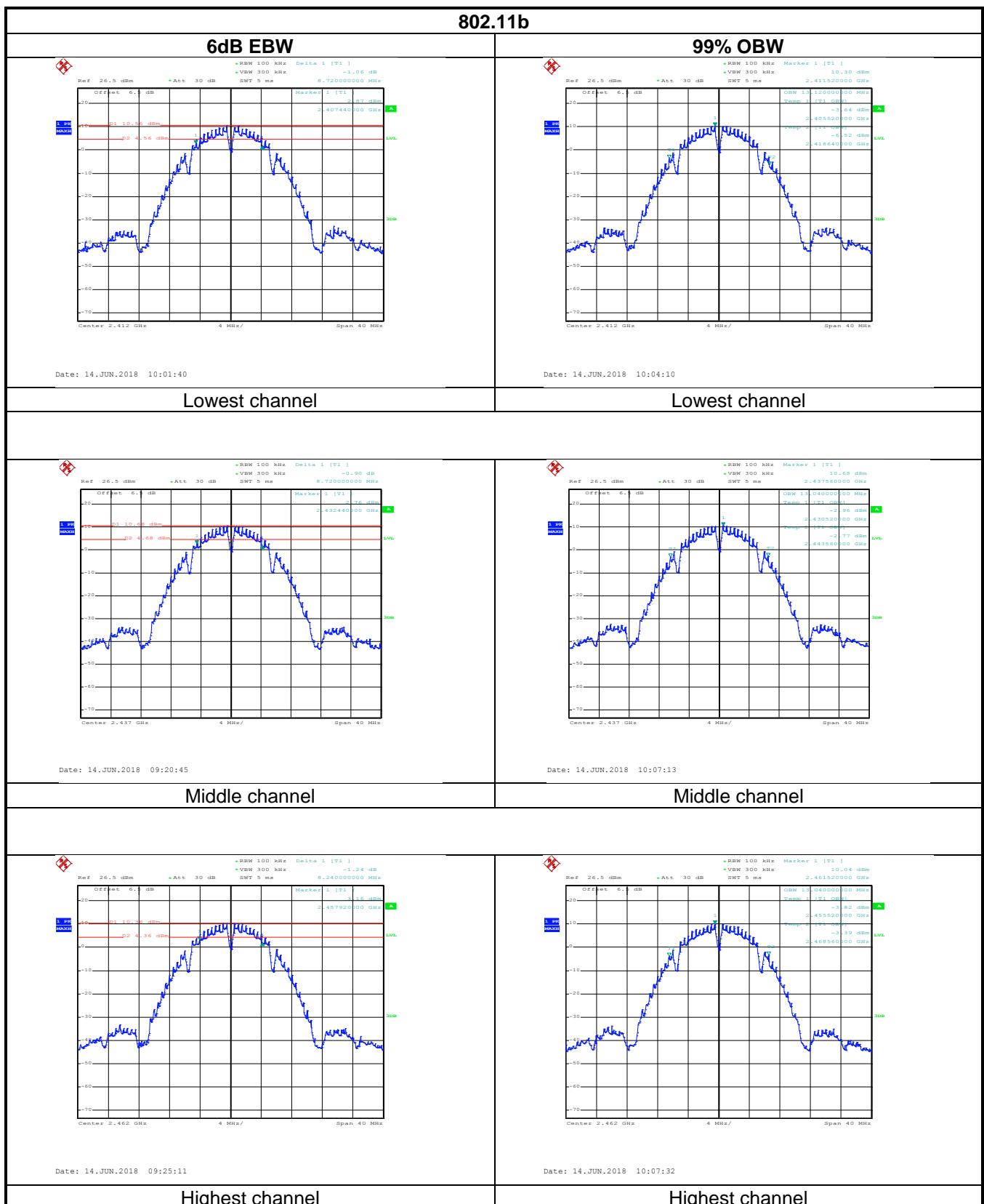
Test plot as follows: TX0

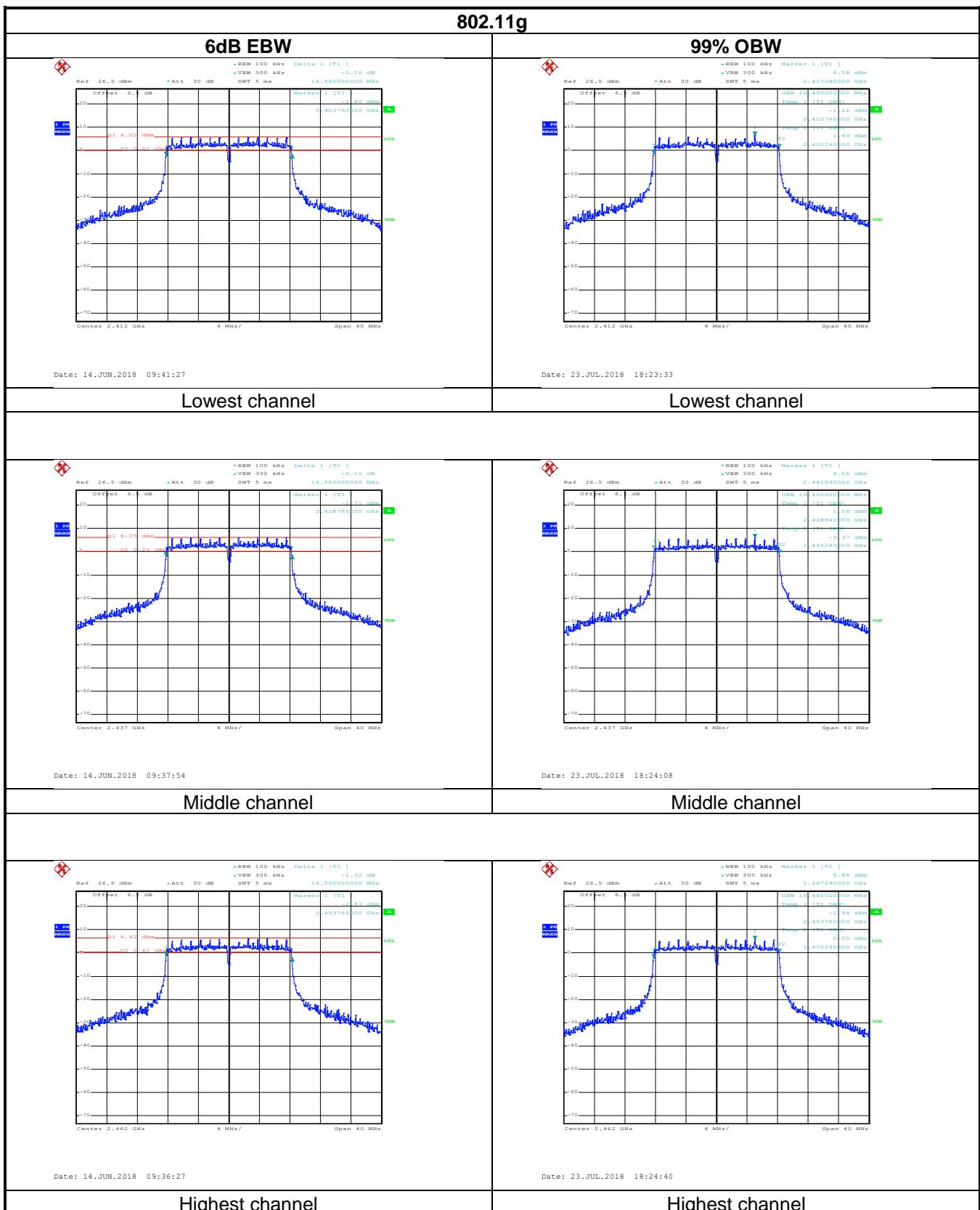


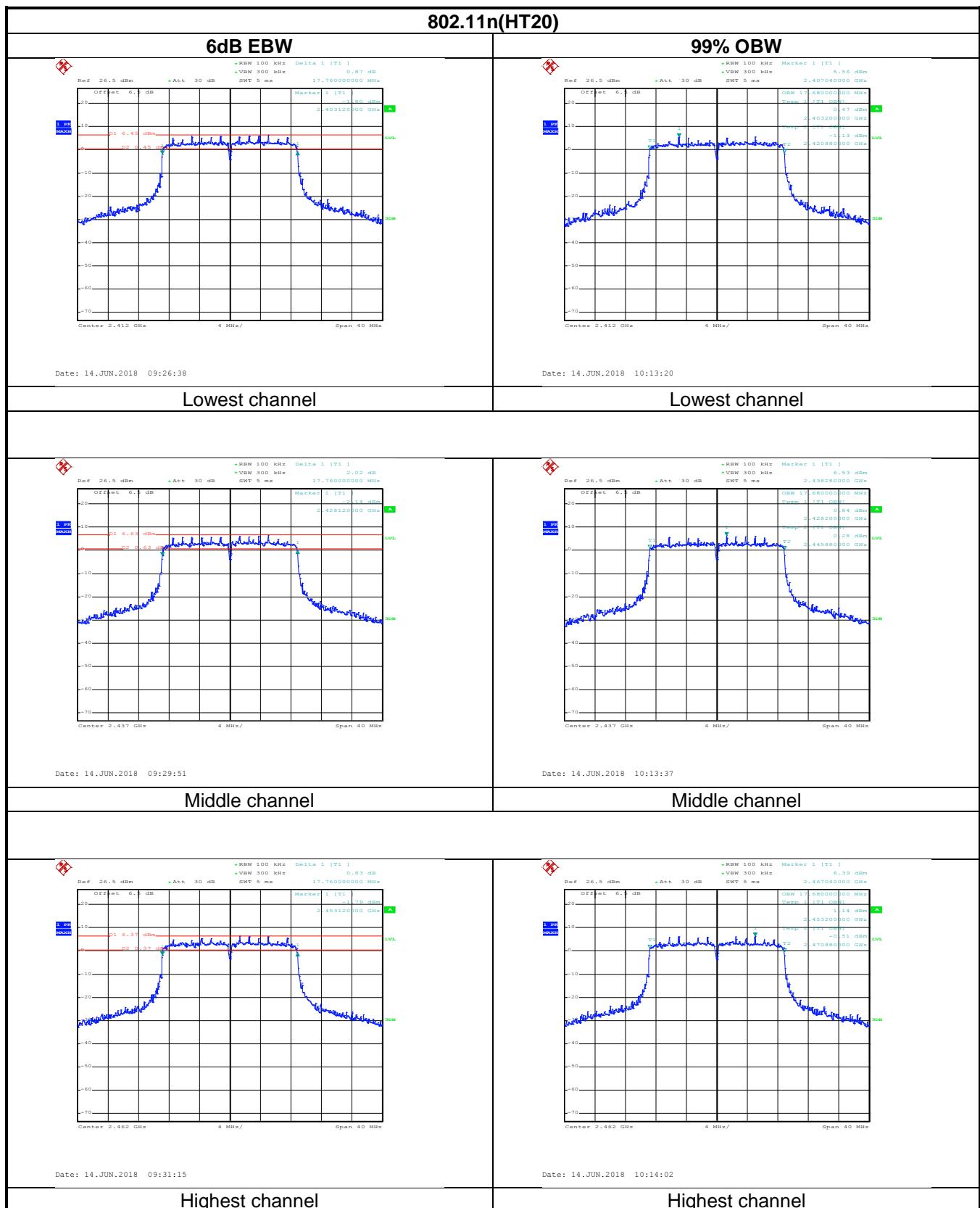


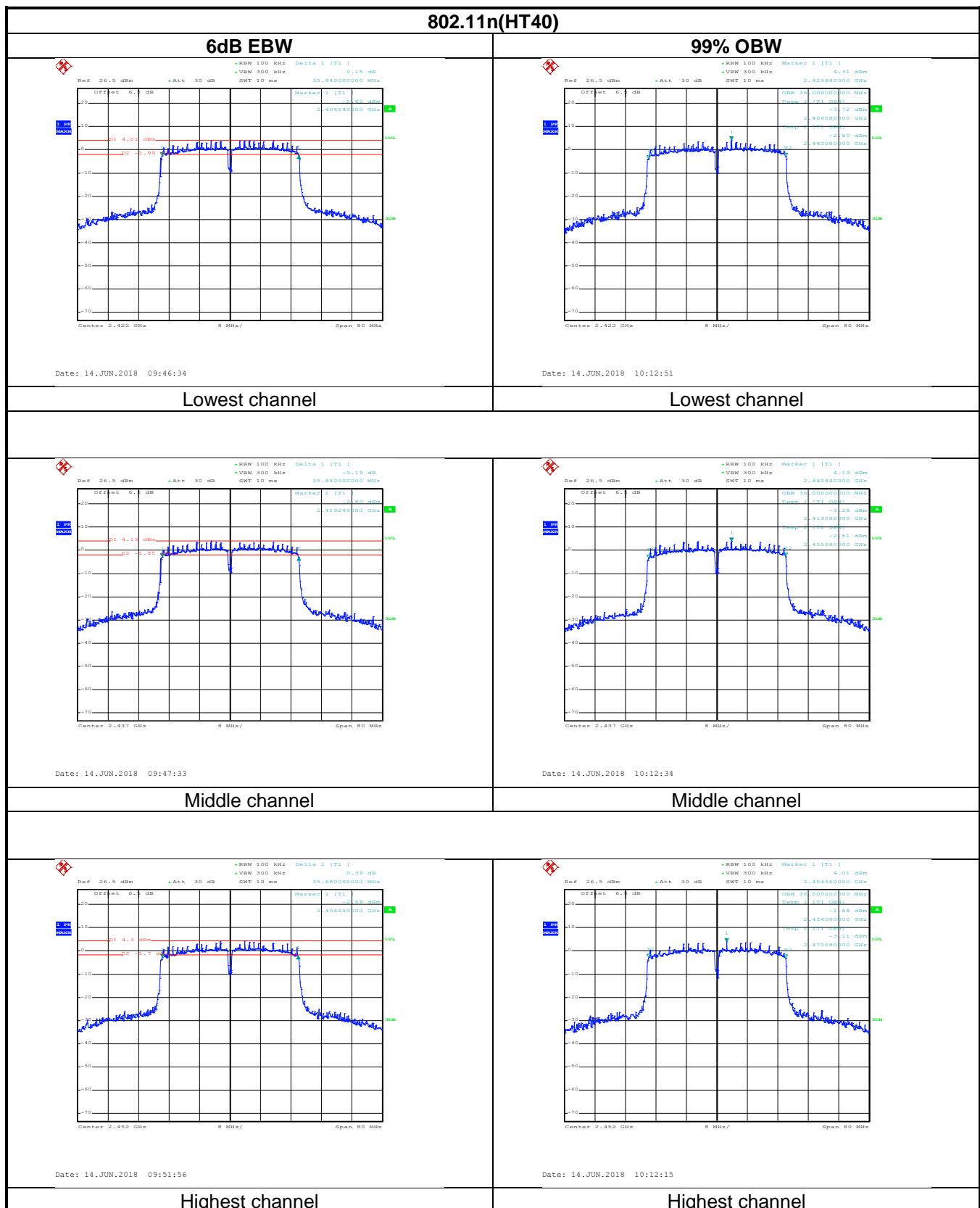




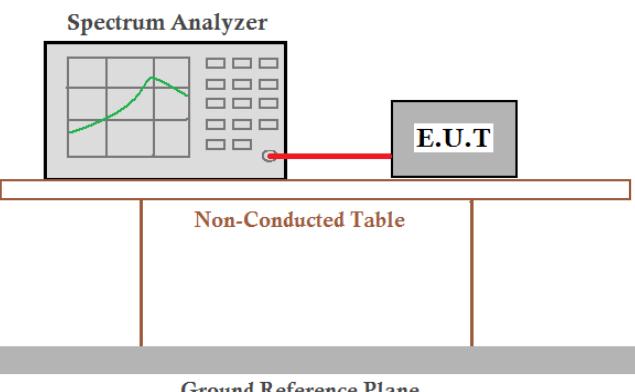
**TX1**








## 6.5 Power Spectral Density

Test Requirement:	FCC Part 15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2013 and KDB 558074
Limit:	8dBm
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

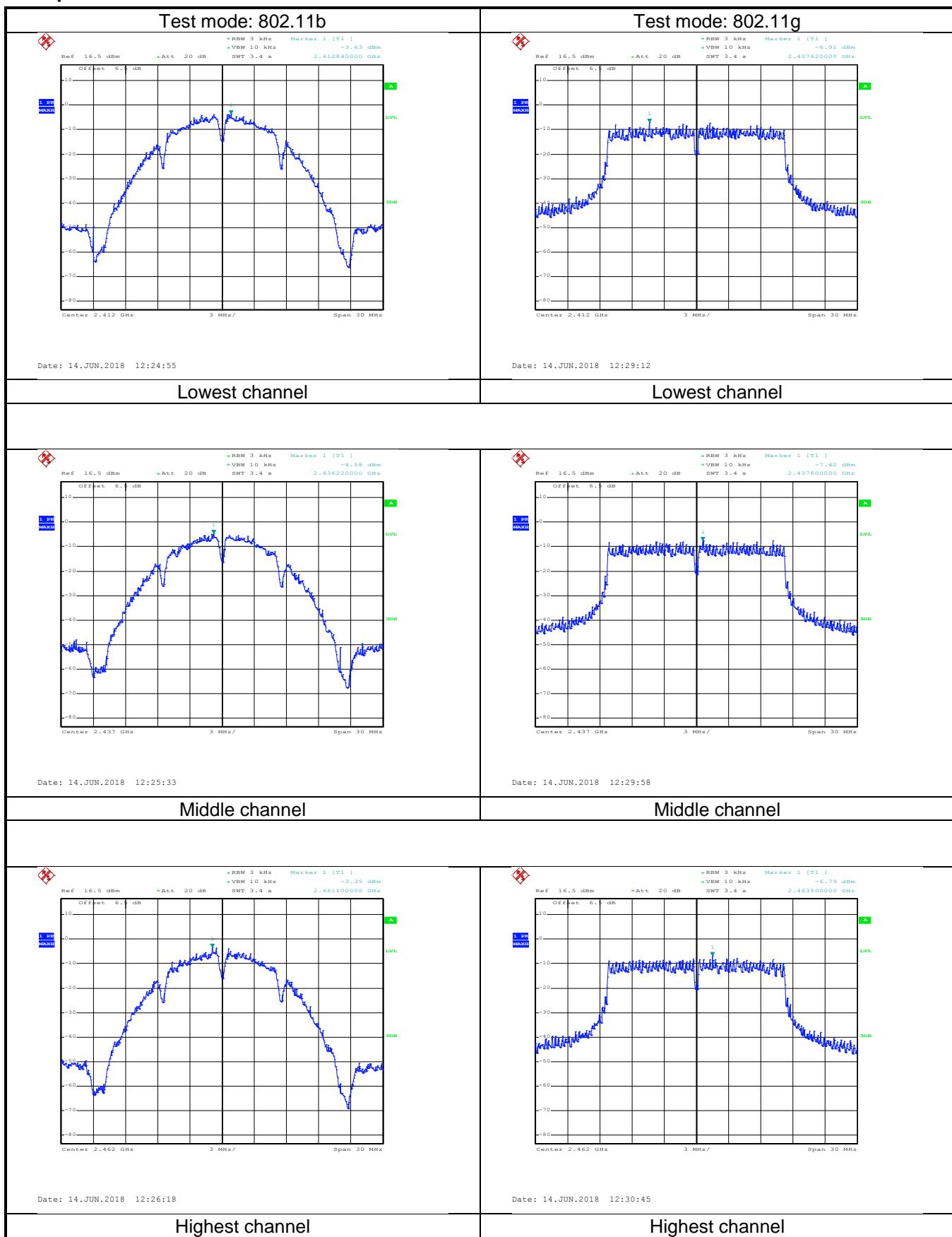
## Measurement Data:3dBi ANT

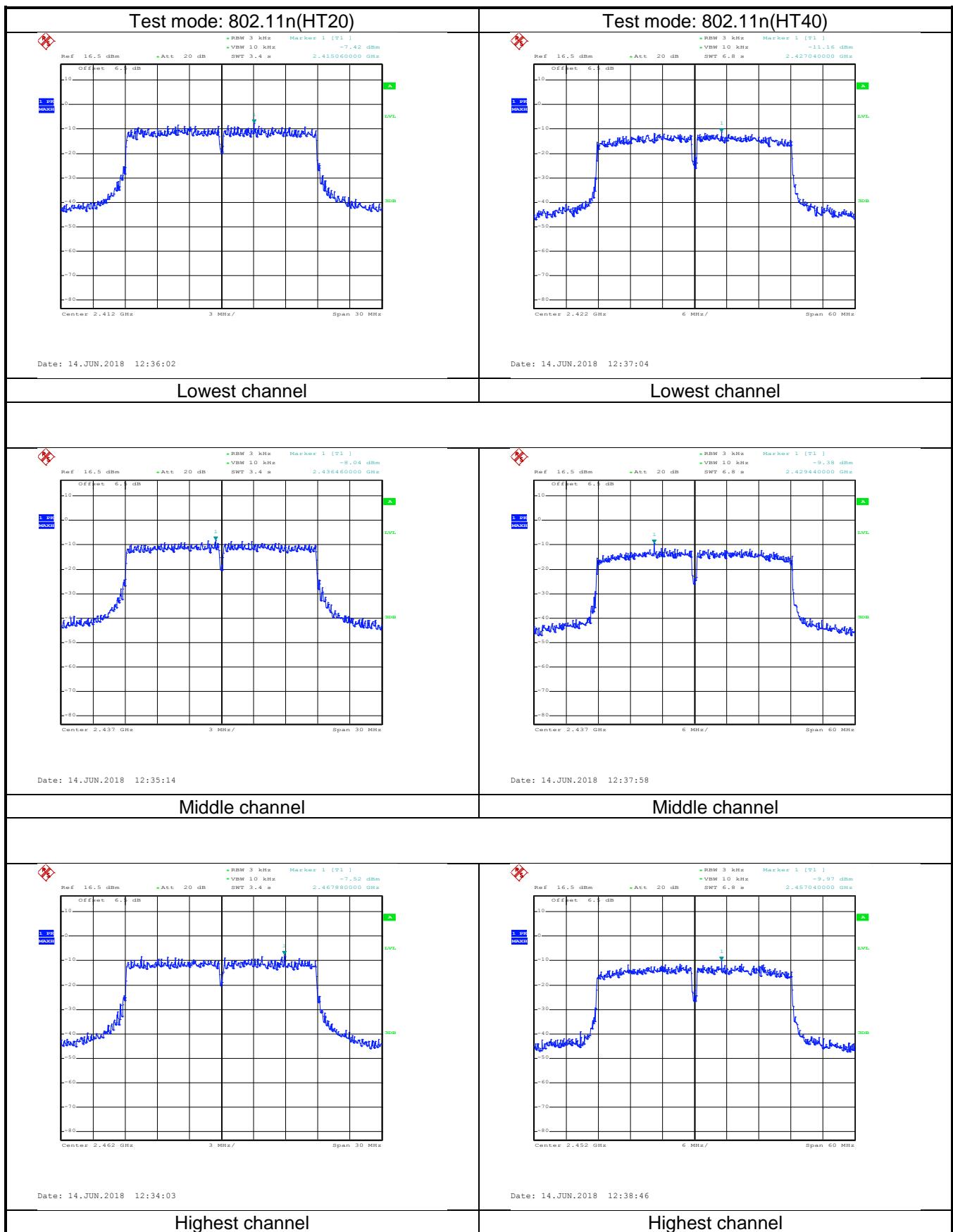
Mode	Test Channel	Ant. Port	PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Result
802.11b	Lowest	TX0	-3.63	-1.22	8.0	Pass
		TX1	-4.93			
	Middle	TX0	-4.58	-1.06	8.0	Pass
		TX1	-3.61			
	Highest	TX0	-3.35	-1.19	8.0	Pass
		TX1	-5.27			
802.11g	Lowest	TX0	-6.91	-4.34	8.0	Pass
		TX1	-7.83			
	Middle	TX0	-7.42	-4.43	8.0	Pass
		TX1	-7.46			
	Highest	TX0	-6.79	-4.23	8.0	Pass
		TX1	-7.74			
802.11n(HT20)	Lowest	TX0	-7.42	-4.76	8.0	Pass
		TX1	-8.16			
	Middle	TX0	-8.04	-4.88	8.0	Pass
		TX1	-7.74			
	Highest	TX0	-7.52	-4.10	8.0	Pass
		TX1	-6.74			
802.11n(HT40)	Lowest	TX0	-11.16	-7.89	8.0	Pass
		TX1	-10.66			
	Middle	TX0	-9.38	-6.46	8.0	Pass
		TX1	-9.57			
	Highest	TX0	-9.97	-7.16	8.0	Pass
		TX1	-10.38			

## Measurement Data:10dBi ANT

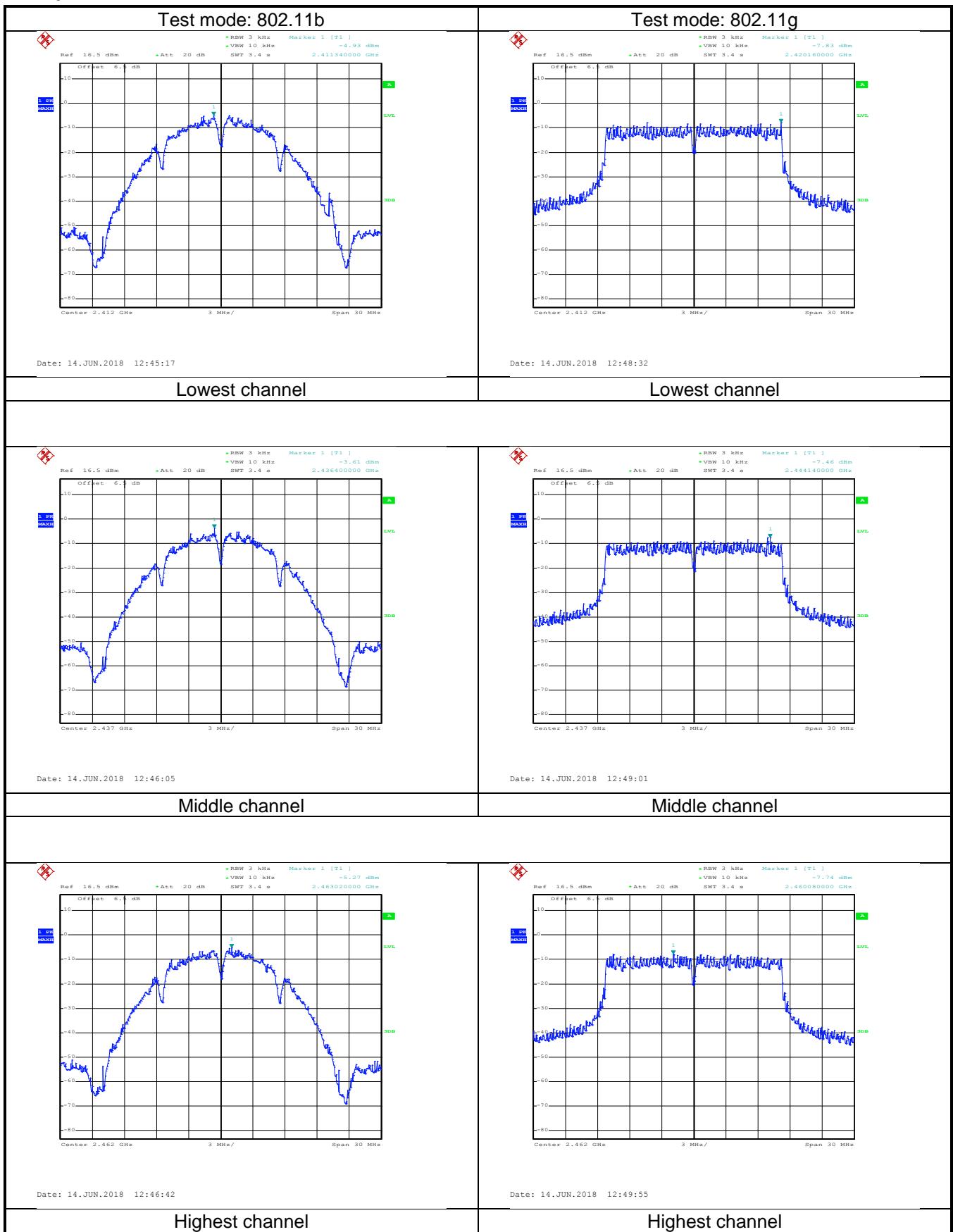
Mode	Test Channel	Ant. Port	PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Result
802.11b	Lowest	TX0	-4.23	-1.15	8.0	Pass
		TX1	-4.09			
	Middle	TX0	-4.63	-1.34	8.0	Pass
		TX1	-4.08			
	Highest	TX0	-4.19	-1.39	8.0	Pass
		TX1	-4.62			
802.11g	Lowest	TX0	-9.84	-6.65	8.0	Pass
		TX1	-9.49			
	Middle	TX0	-7.60	-4.44	8.0	Pass
		TX1	-7.30			
	Highest	TX0	-10.05	-7.44	8.0	Pass
		TX1	-10.89			
802.11n(HT20)	Lowest	TX0	-12.69	-8.92	8.0	Pass
		TX1	-11.29			
	Middle	TX0	-8.22	-5.07	8.0	Pass
		TX1	-7.94			
	Highest	TX0	-12.02	-8.06	8.0	Pass
		TX1	-11.36			
802.11n(HT40)	Lowest	TX0	-15.53	-12.72	8.0	Pass
		TX1	-15.94			
	Middle	TX0	-9.66	-7.48	8.0	Pass
		TX1	-11.51			
	Highest	TX0	-14.22	-12.29	8.0	Pass
		TX1	-16.73			

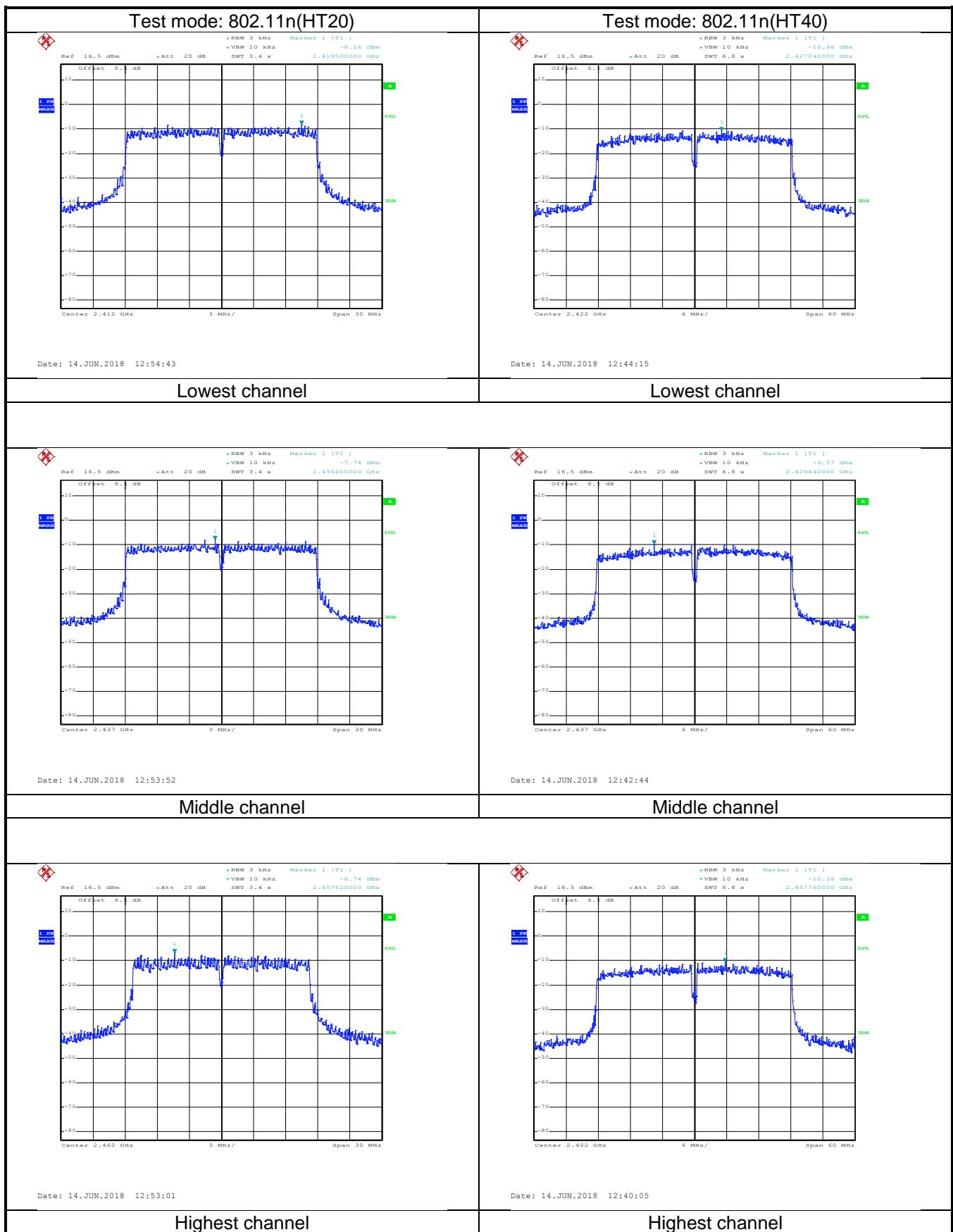
Test plot as follows:3dBi ANT TX0



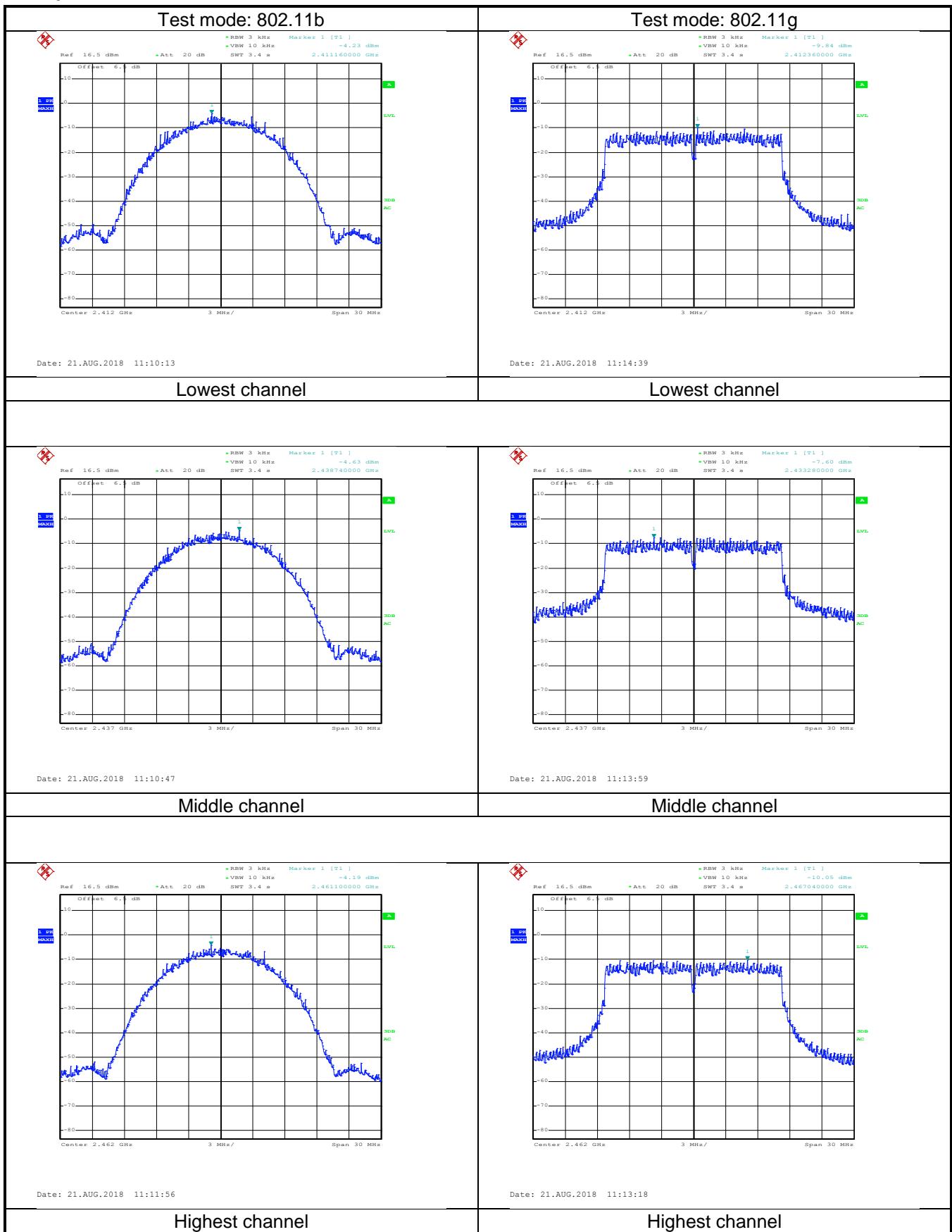


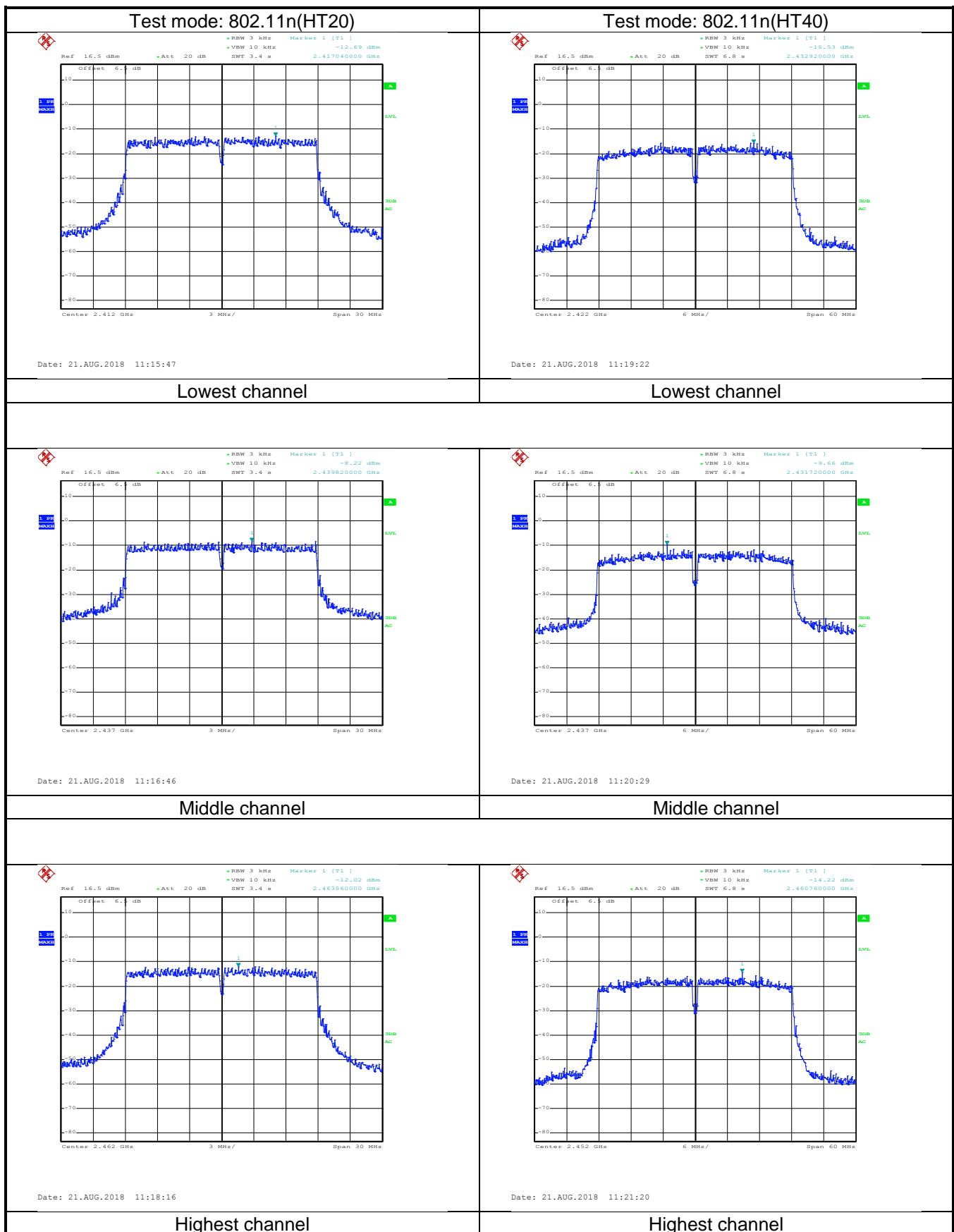
**Test plot as follows: 3dBi ANT TX1**



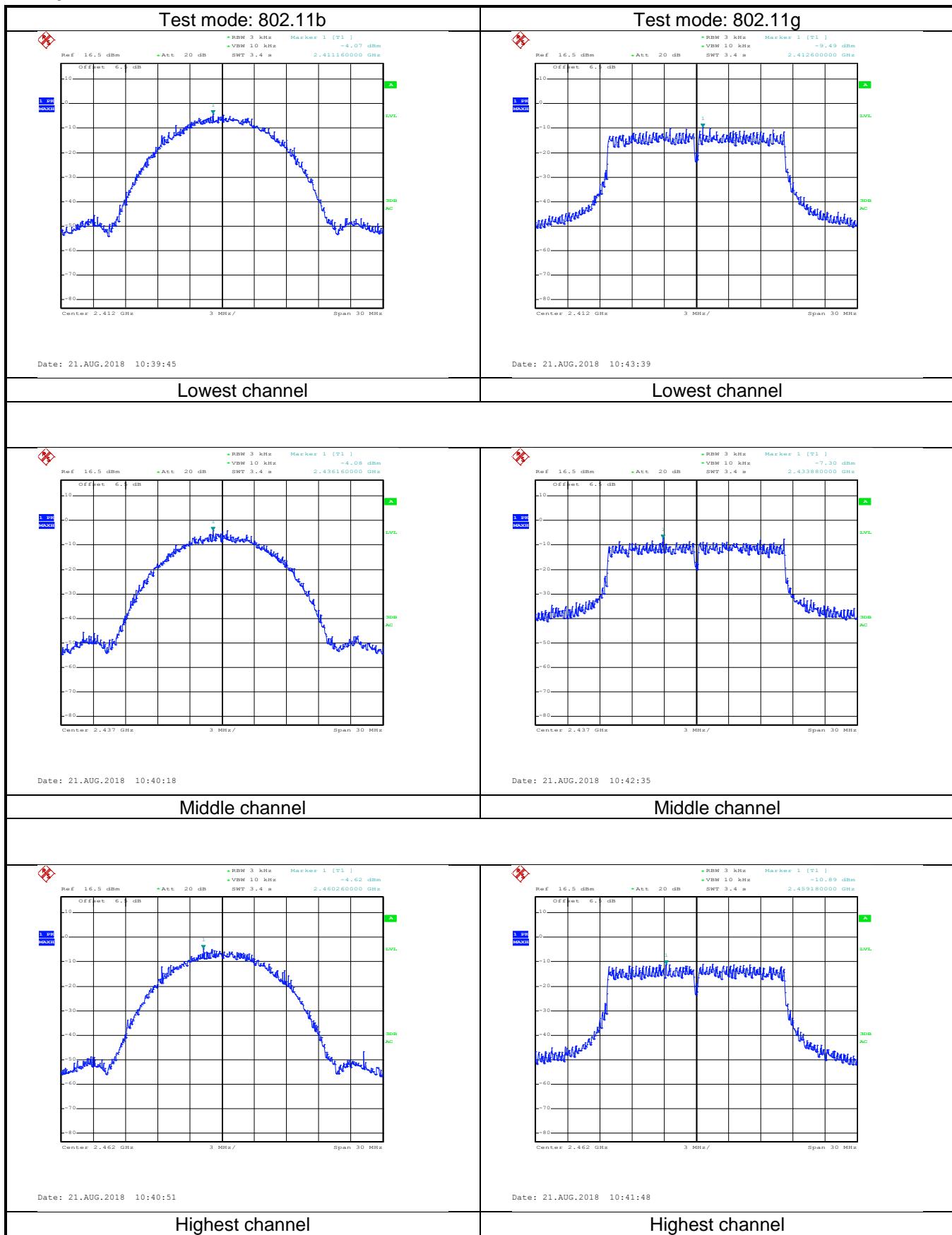


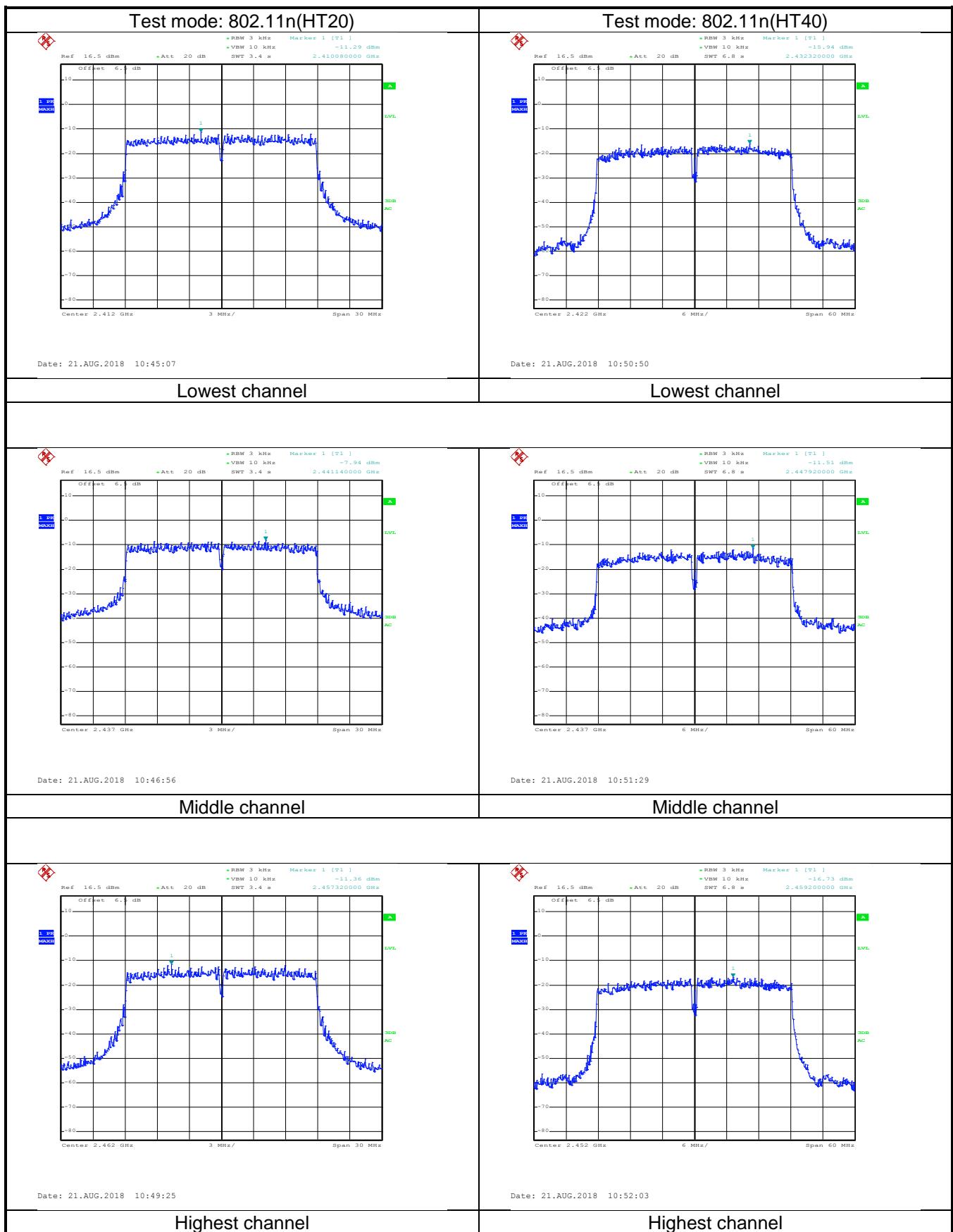
Test plot as follows:10dBi ANT TX0





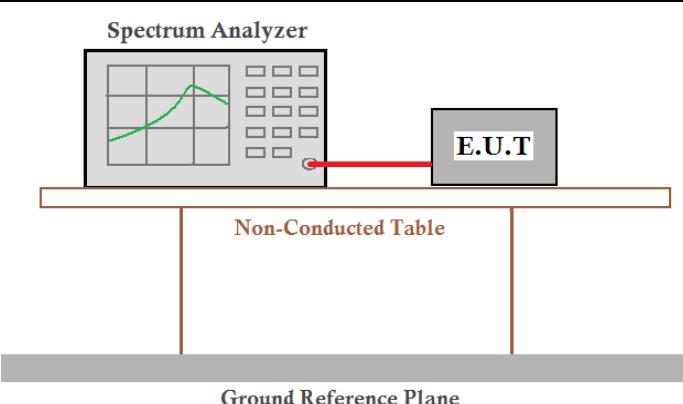
Test plot as follows:10dBi ANT TX1



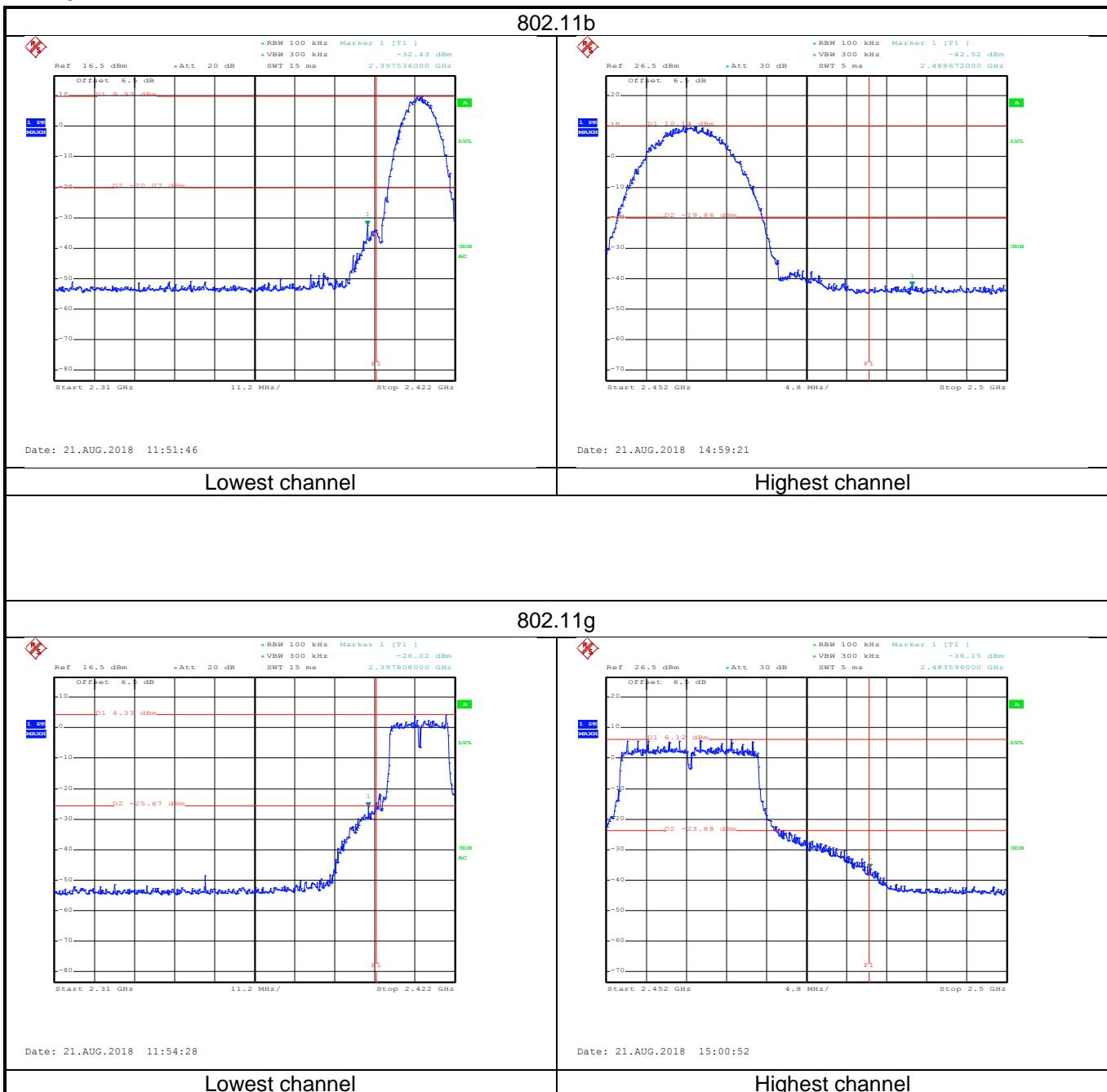


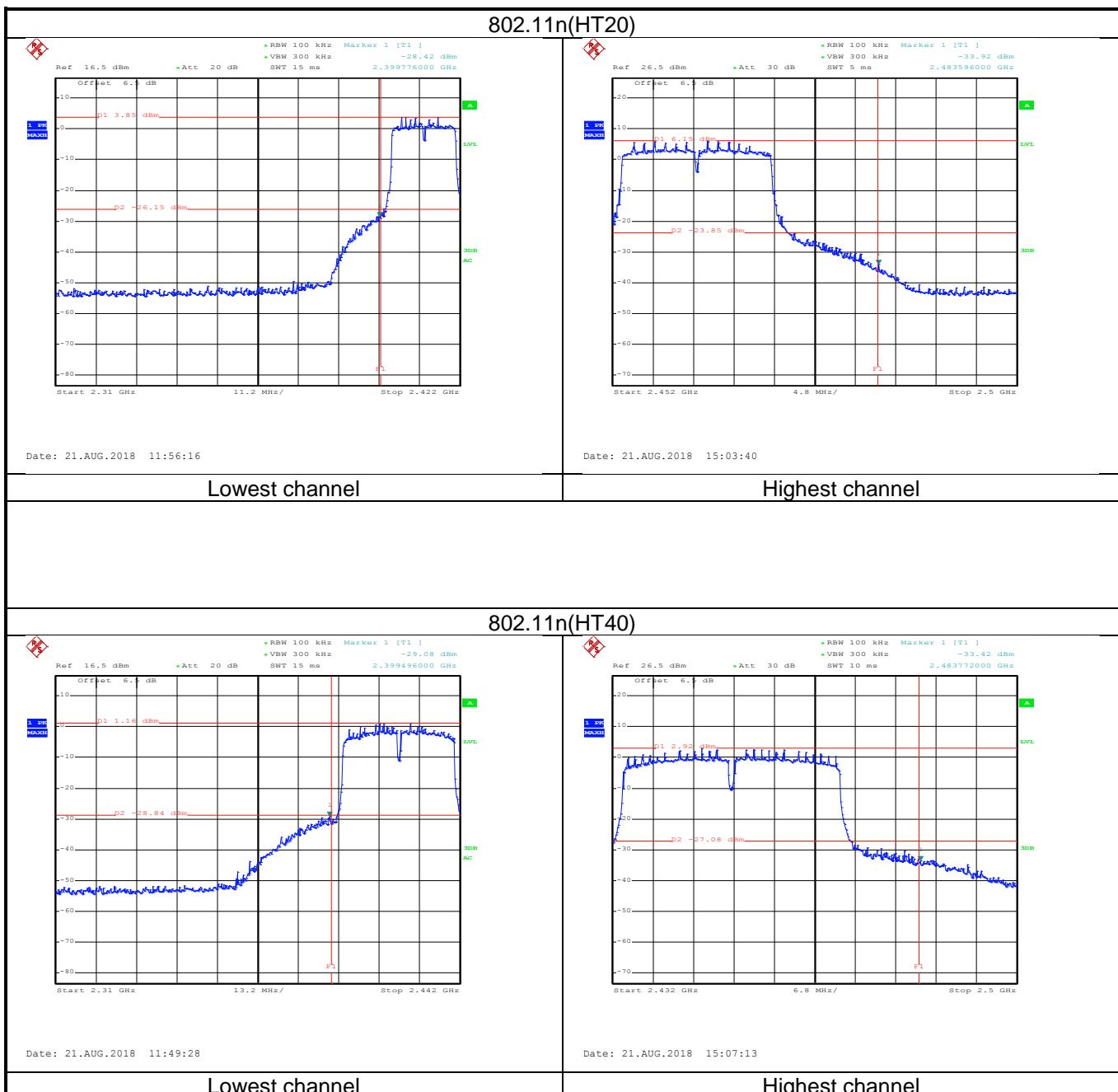
## 6.6 Band Edge

### 6.6.1 Conducted Emission Method

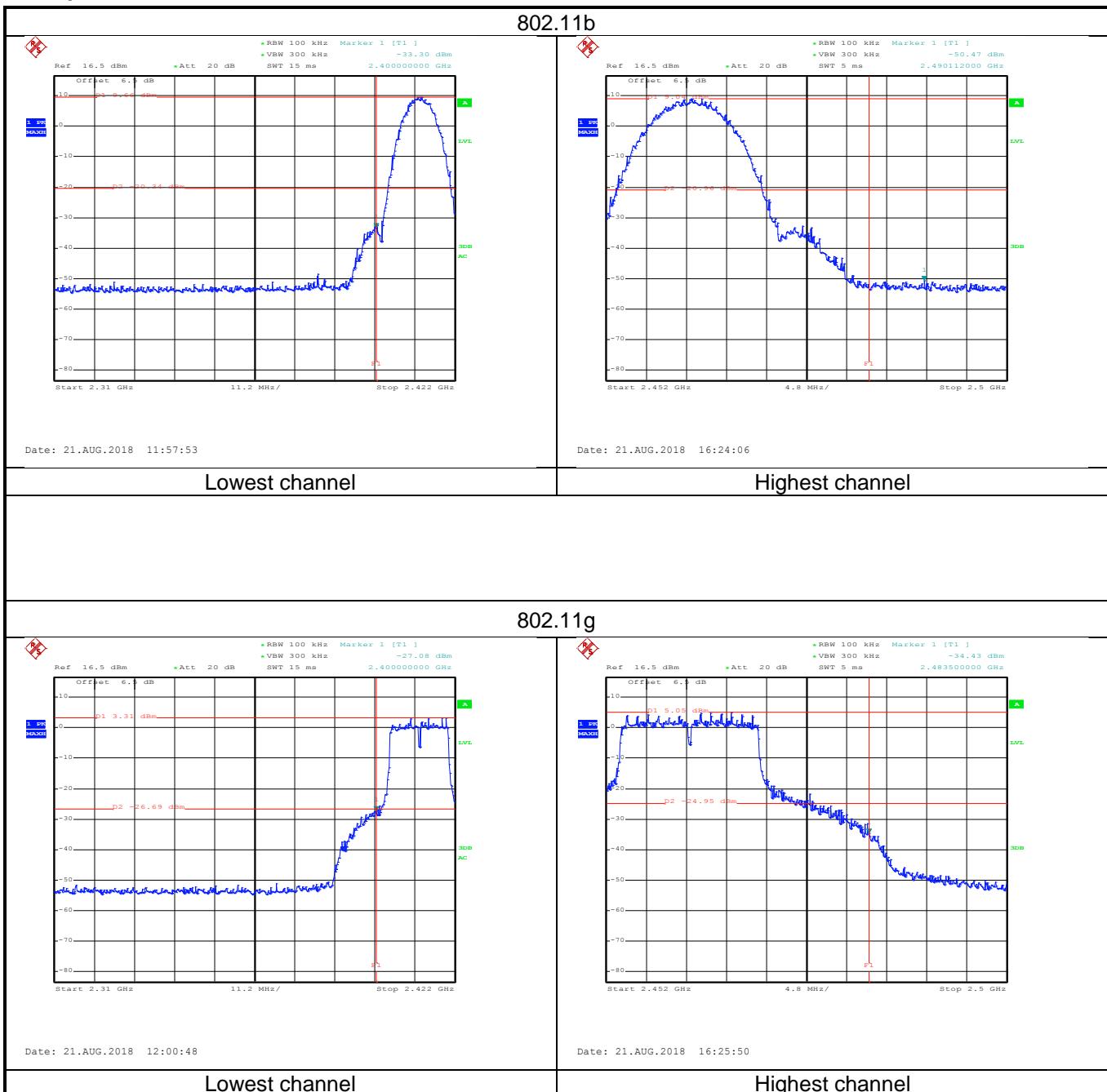
Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB 558074
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at 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:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

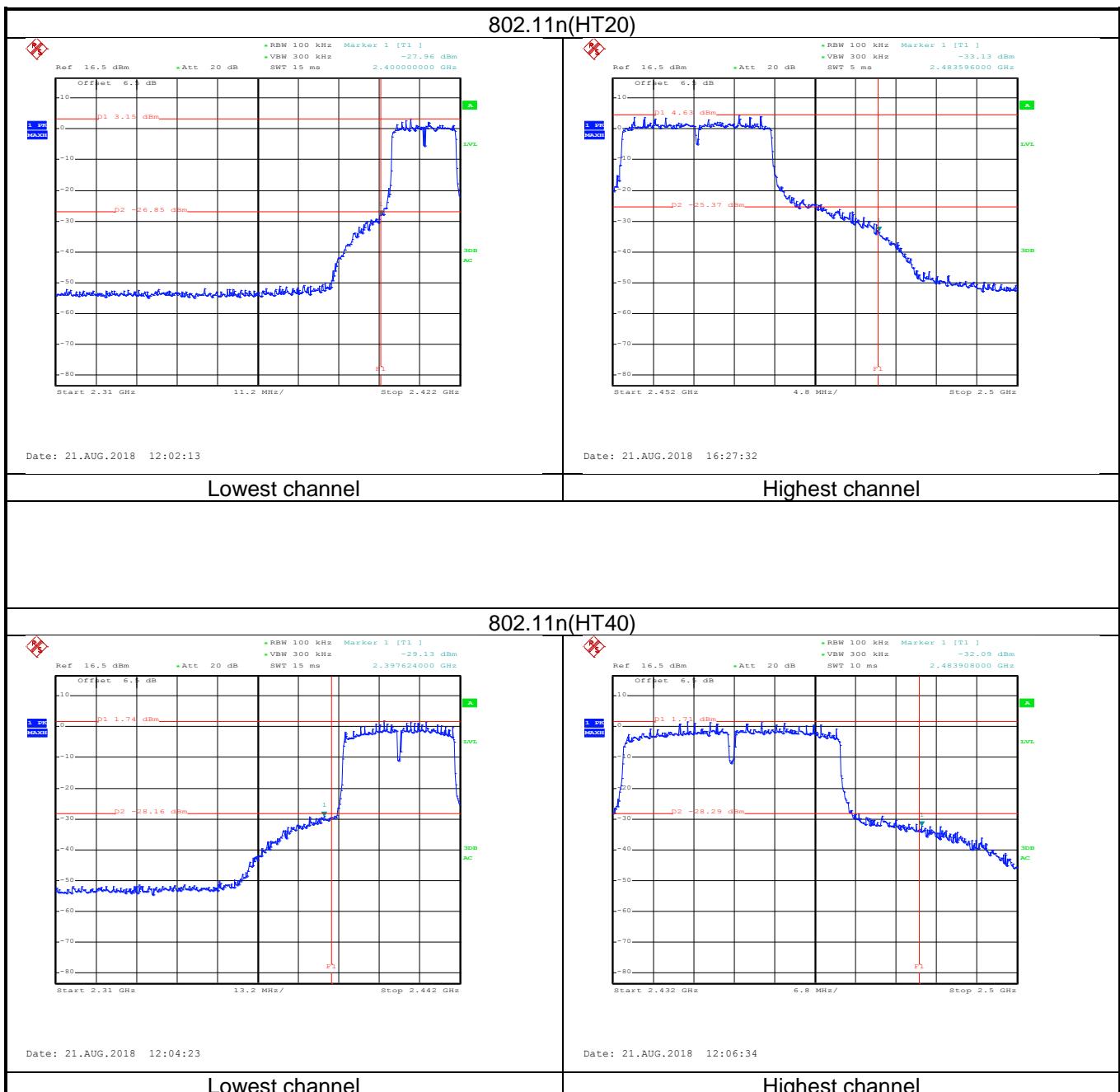
Test plot as follows:3dBi ANT TX0



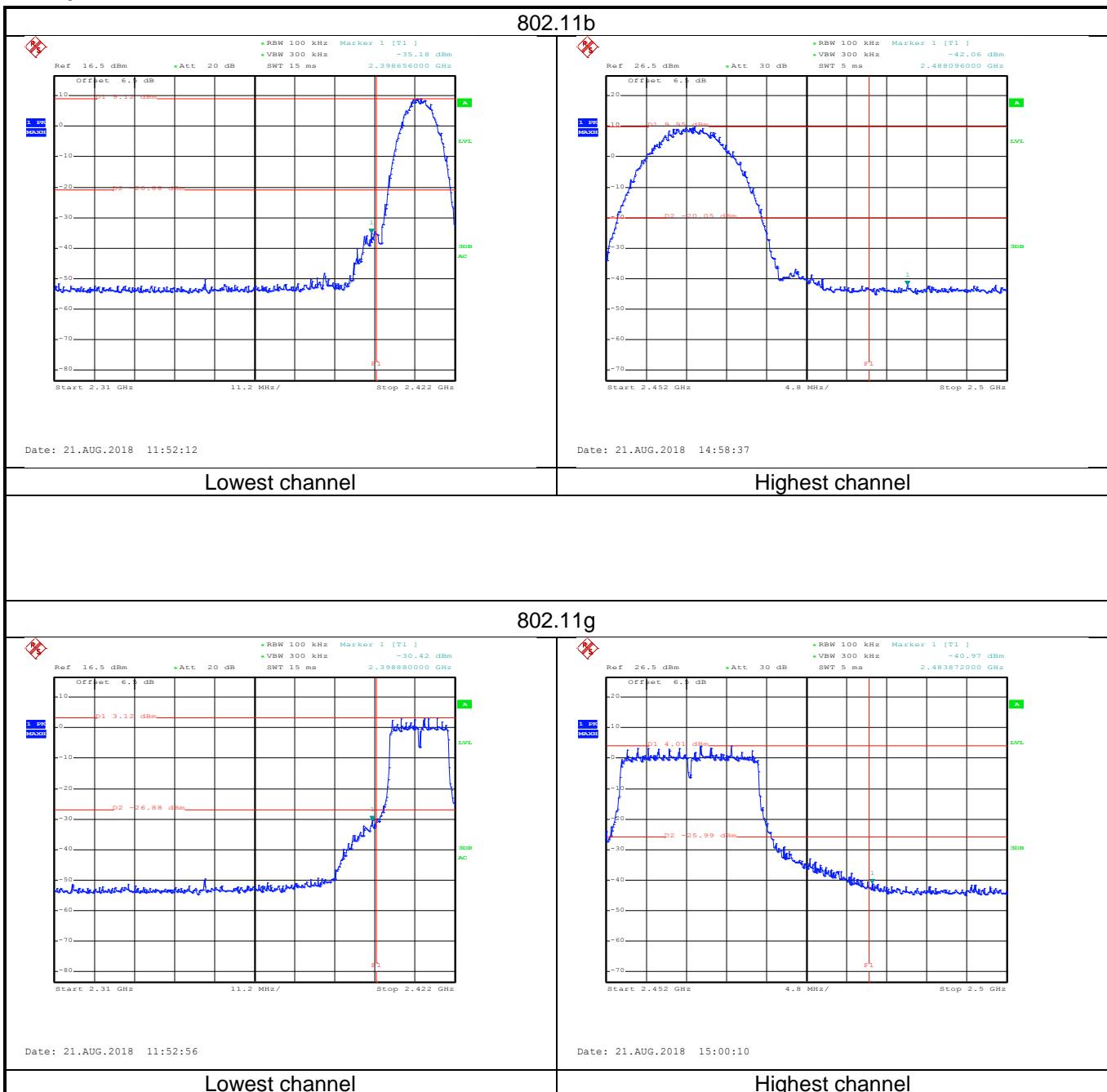


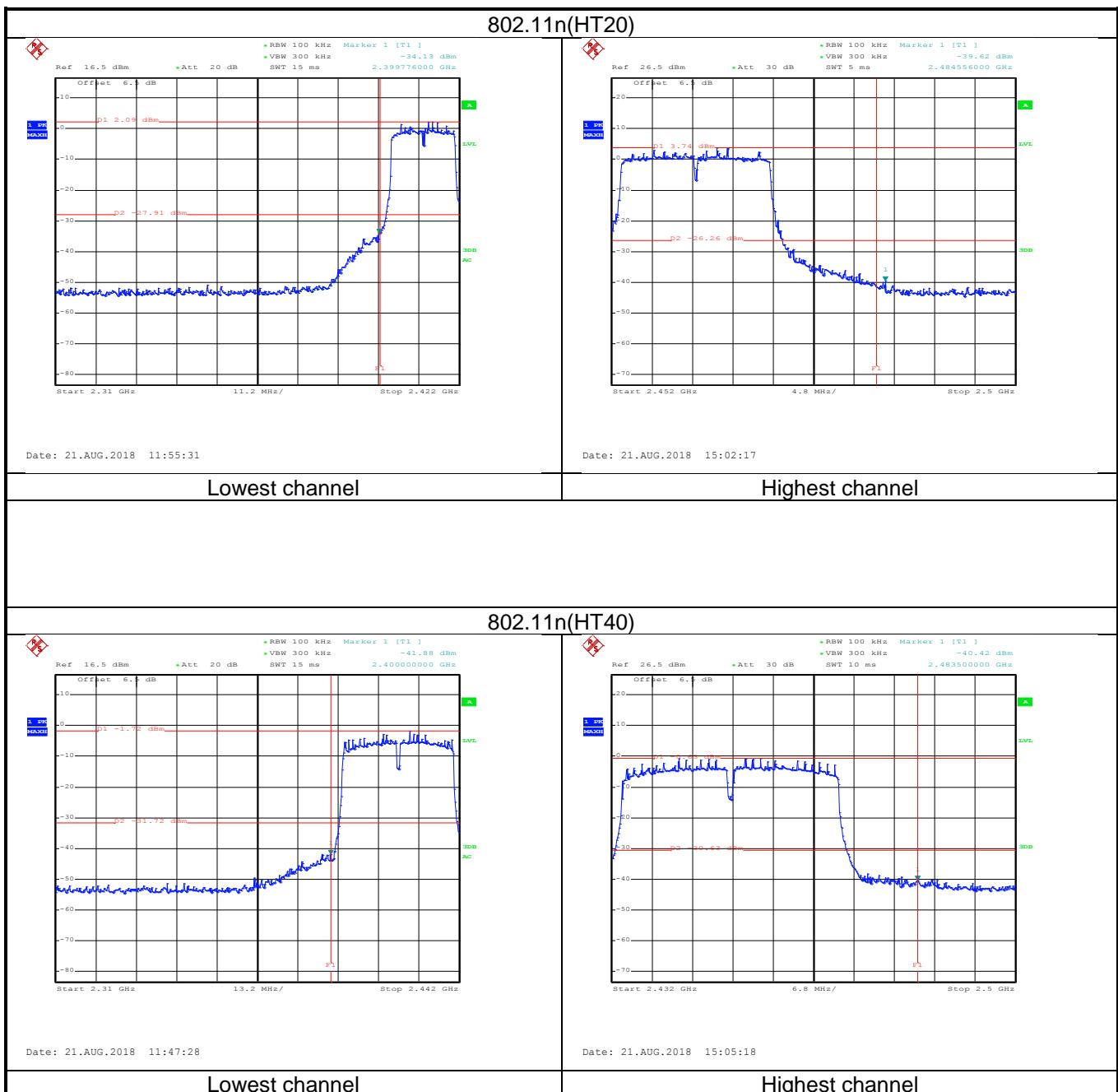
Test plot as follows:3dBi ANT TX1



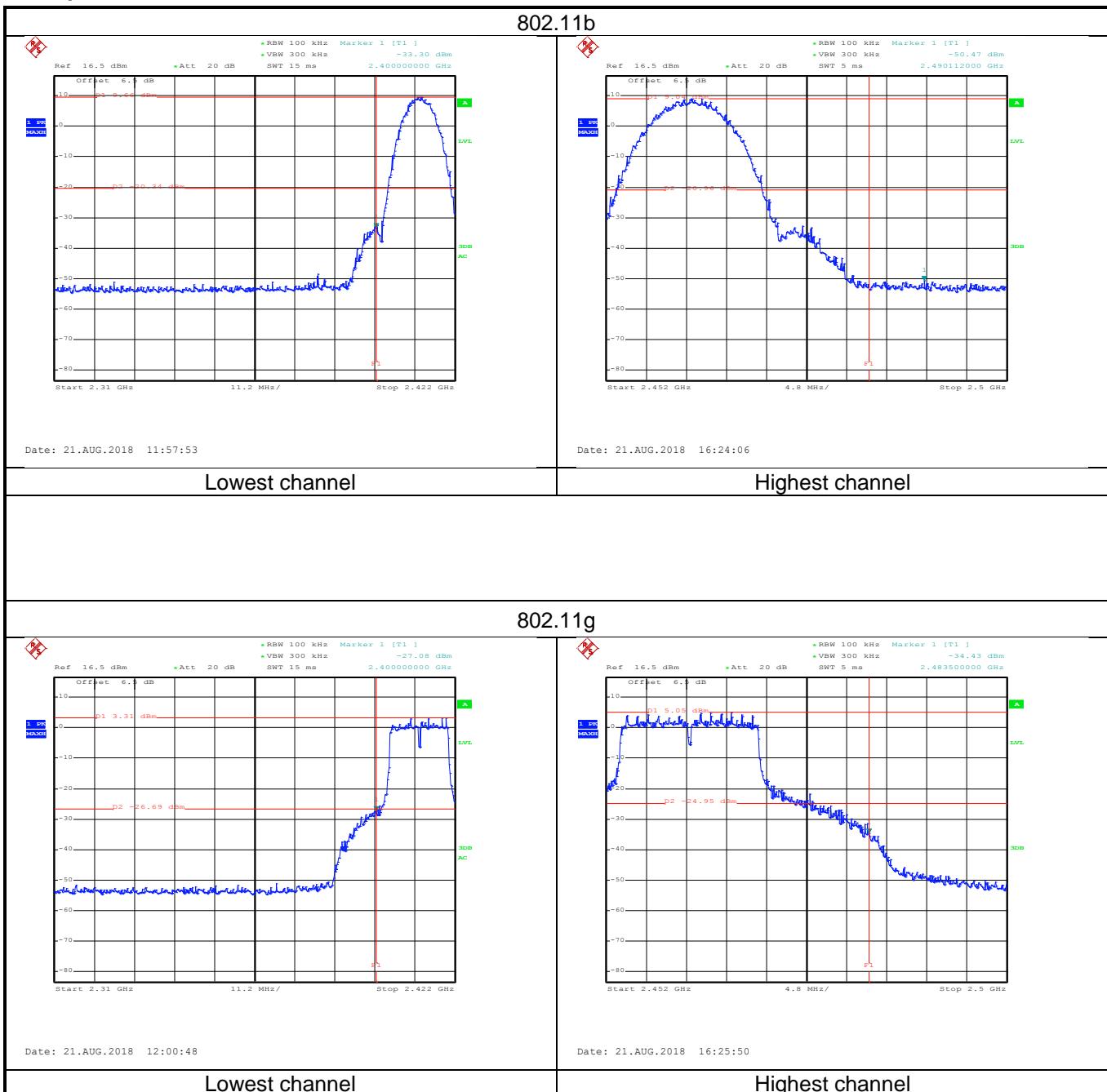


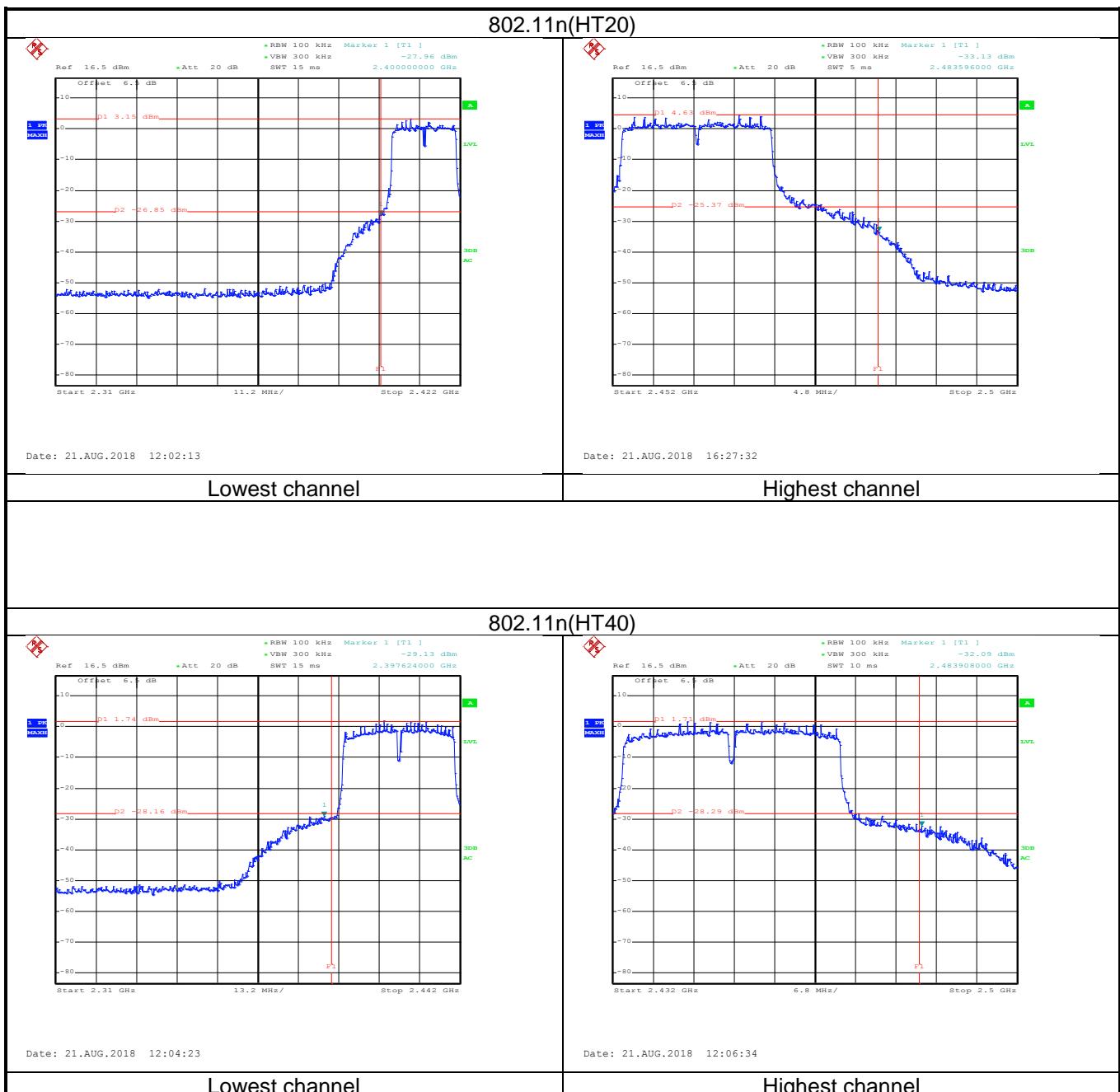
Test plot as follows:10dBi ANT TX0



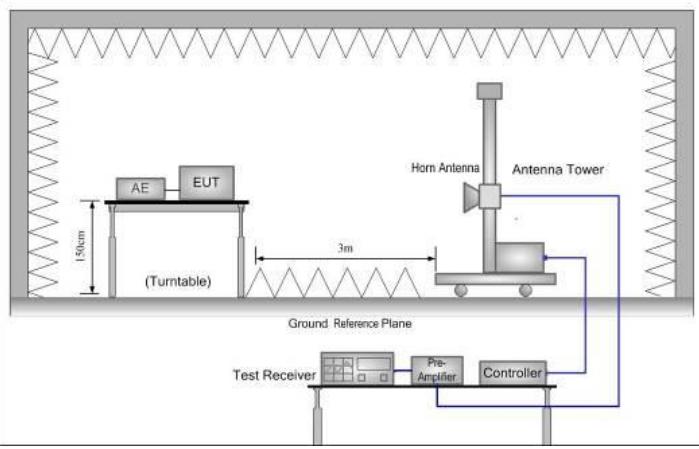


Test plot as follows:10dBi ANT TX1





### 6.6.2 Radiated Emission Method

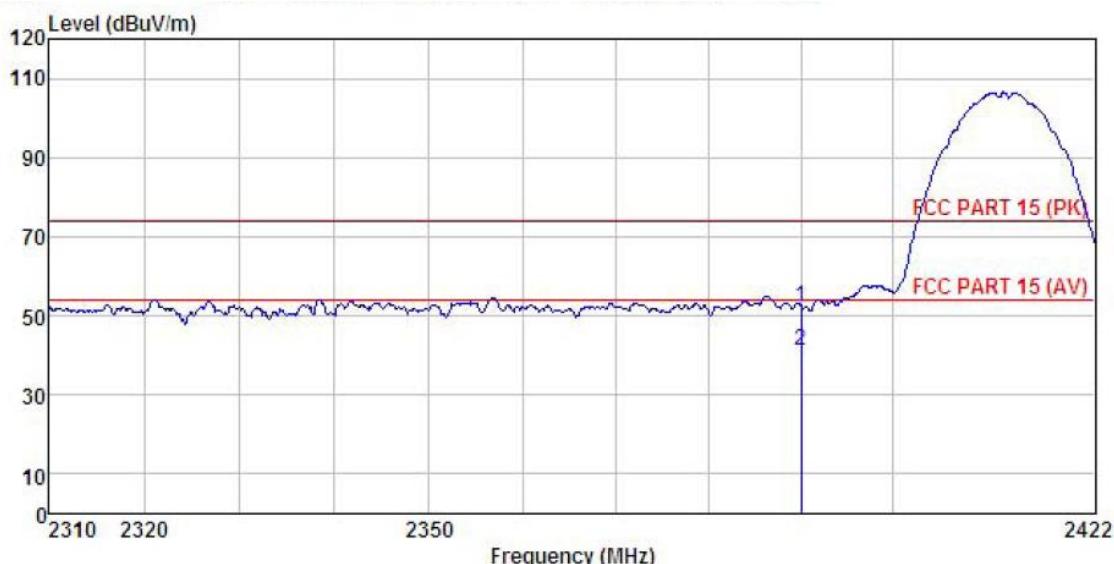
Test Requirement:	FCC Part 15 C Section 15.209 and 15.205										
Test Method:	ANSI C63.10: 2013 and KDB 558074										
Test Frequency Range:	2.3GHz to 2.5GHz										
Test Distance:	3m										
Receiver setup:	Frequency	Detector	RBW	VBW	Remark						
	Above 1GHz	Peak	1MHz	3MHz	Peak Value						
Limit:	Frequency	Limit (dBuV/m @3m)		Remark							
	Above 1GHz	54.00		Average Value							
Test Procedure:		<ol style="list-style-type: none"> <li>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.</li> <li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>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.</li> <li>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.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>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.</li> </ol>									
Test setup:											
Test Instruments:	Refer to section 5.8 for details										
Test mode:	Refer to section 5.3 for details										
Test results:	Passed										

## 3dBi ANT

802.11b

Test channel: Lowest channel

Test Polarization: Horizontal



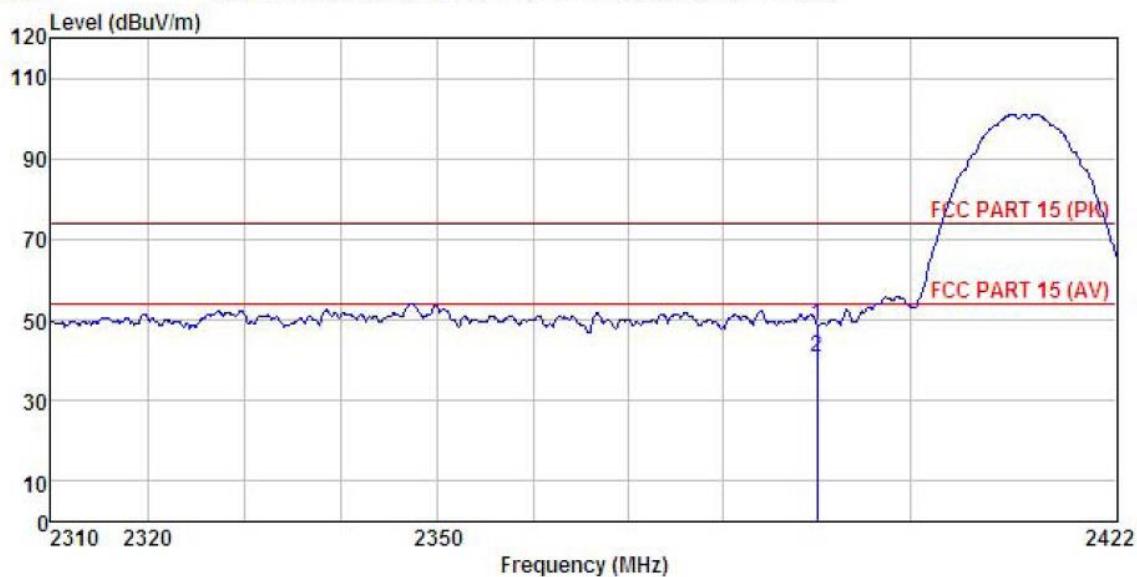
Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL  
 EUT : Broadband Digital Transmission System  
 Model : Jalapeno  
 Test mode : 802.11.b-L mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.5°C Humi:55%  
 Test Engineer: Mike  
 Remark :

	ReadAntenna Level	Cable Loss	Preamp Factor	Limit Level	Line Limit	Over Remark	
Freq	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1	2390.000	20.04	27.37	4.69	0.00	52.10	74.00 -21.90 Peak
2	2390.000	9.11	27.37	4.69	0.00	41.17	54.00 -12.83 Average

## Remark:

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

## Test Polarization: Vertical



Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
EUT : Broadband Digital Transmission System  
Model : Jalapeno  
Test mode : 802.11.b-L mode  
Power Rating : AC 120V/60Hz  
Environment : Temp:25.5°C Huni:55%  
Test Engineer: Mike  
Remark :

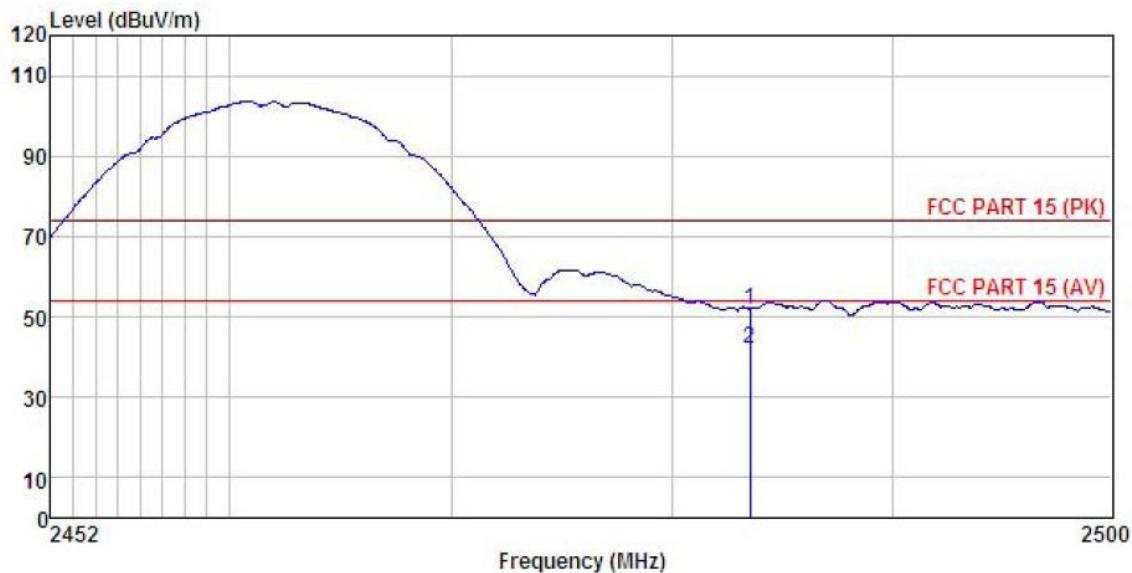
	ReadAntenna Freq	Level MHz	Antenna Factor	Cable Loss dB	Preamp Factor	Limit dB	Over Line dBuV/m	Over Limit dBuV/m	Over Remark
1	2390.000	16.73	27.37	4.69	0.00	48.79	74.00	-25.21	Peak
2	2390.000	8.84	27.37	4.69	0.00	40.90	54.00	-13.10	Average

## Remark:

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

**Test channel: Highest channel**

Test Polarization: Horizontal



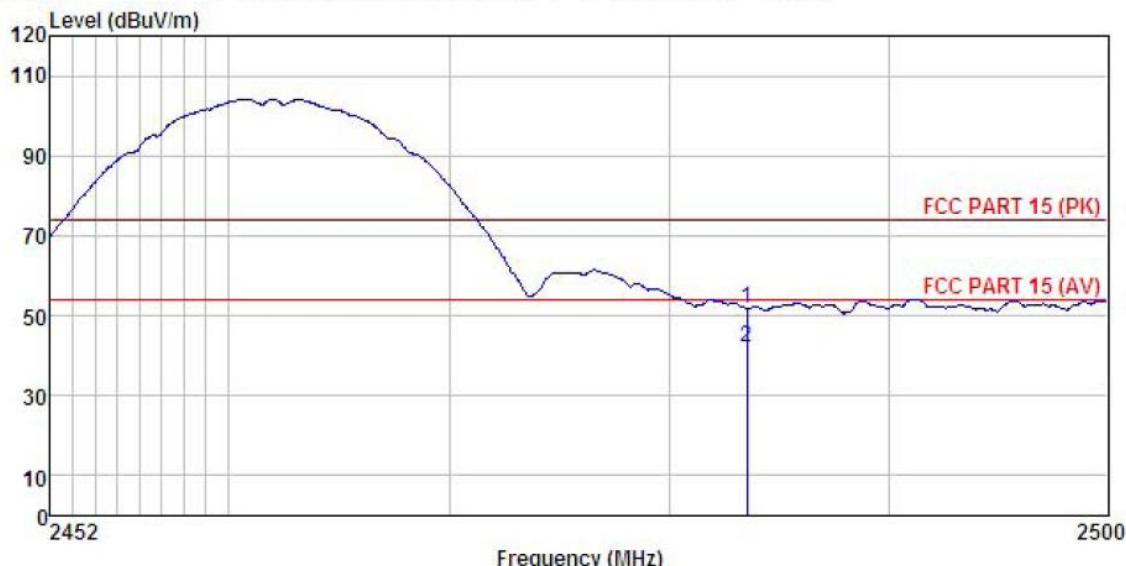
Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL  
 EUT : Broadband Digital Transmission System  
 Model : Jalapeno  
 Test mode : 802.11b-H mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.5°C Huni:55%  
 Test Engineer: Mike  
 Remark :

Freq	ReadAntenna		Cable	Preamp	Limit	Over	Remark
	Level	Factor	Loss	Factor			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 2483.500	19.63	27.57	4.81	0.00	52.01	74.00	-21.99 Peak
2 2483.500	9.86	27.57	4.81	0.00	42.24	54.00	-11.76 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 Polarization: Vertical



Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
EUT : Broadband Digital Transmission System  
Model : Jalapeno  
Test mode : 802.11b-H mode  
Power Rating : AC 120V/60Hz  
Environment : Temp:25.5°C Humi:55%  
Test Engineer: Mike  
Remark :

Freq	ReadAntenna Level	Cable Factor	Preampl Loss	Preamp Factor	Limit Level	Line Limit	Over Line	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	19.48	27.57	4.81	0.00	51.86	74.00	-22.14 Peak
2	2483.500	9.79	27.57	4.81	0.00	42.17	54.00	-11.83 Average

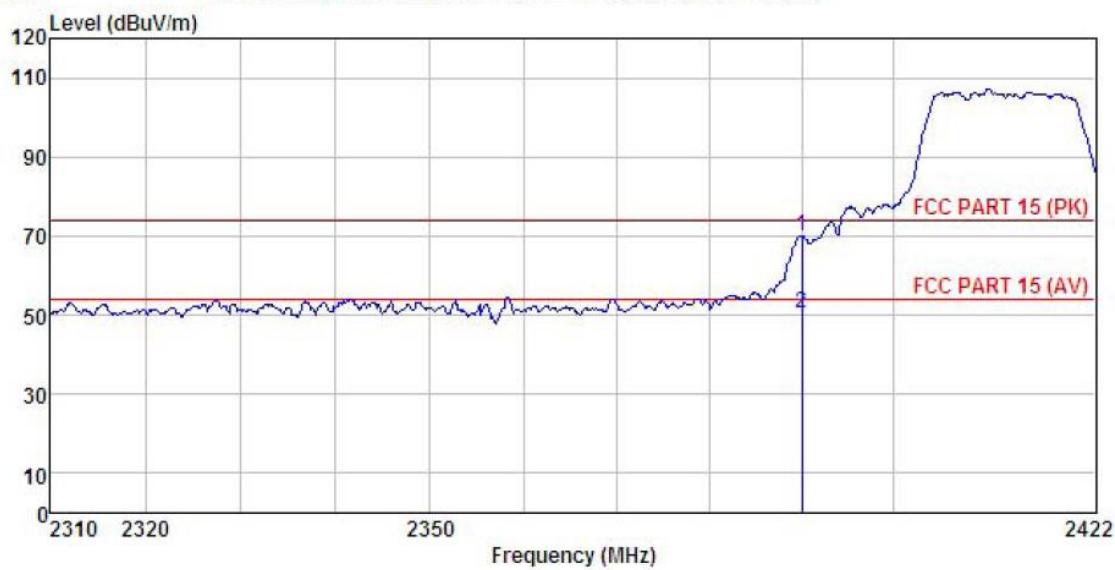
## Remark:

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 channel

Test Polarization: Horizontal



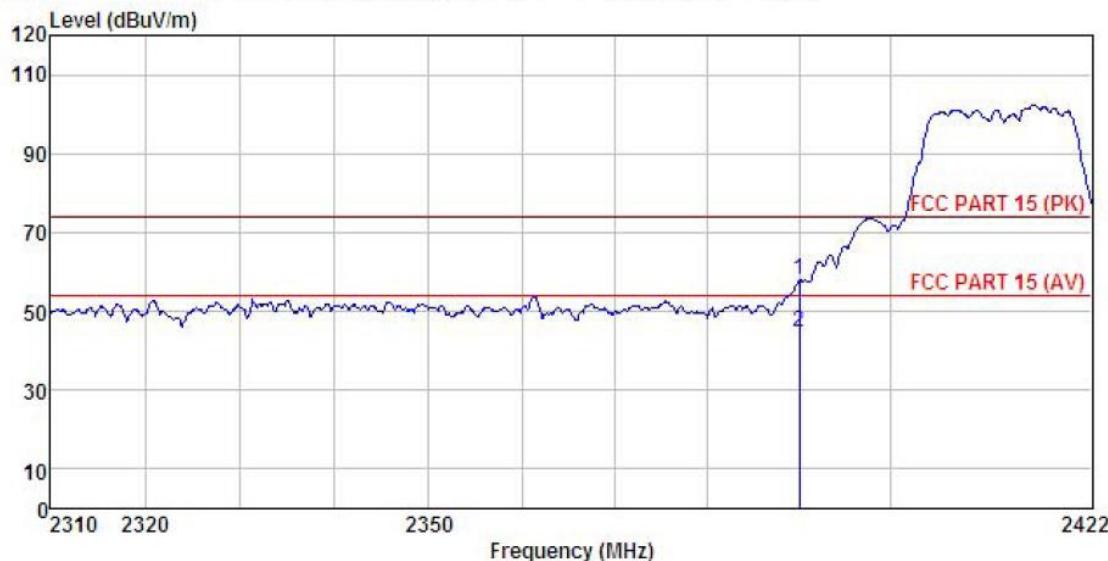
Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL  
EUT : Broadband Digital Transmission System  
Model : Jalapeno  
Test mode : 802.11g-L mode  
Power Rating : AC 120V/60Hz  
Environment : Temp:25.5°C Huni:55%  
Test Engineer: Mike  
Remark :

	ReadAntenna Level	Cable Loss	Preampl Factor	Limit Level	Line Limit	Over Remark	
Freq	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2390.000	37.99	27.37	4.69	0.00	70.05	74.00 -3.95 Peak
2	2390.000	18.37	27.37	4.69	0.00	50.43	54.00 -3.57 Average

## Remark:

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

## Test Polarization: Vertical



Site : 3m chamber  
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
EUT : Broadband Digital Transmission System  
Model : Jalapeno  
Test mode : 802.11g-L mode  
Power Rating : AC 120V/60Hz  
Environment : Temp:25.5°C Huni:55%  
Test Engineer: Mike  
Remark :

Freq	ReadAntenna Level	Cable Factor	Preamp Loss	Avg	Limit Level	Line Limit	Over Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 2390.000	25.87	27.37	4.69	0.00	57.93	74.00	-16.07 Peak
2 2390.000	12.59	27.37	4.69	0.00	44.65	54.00	-9.35 Average

## Remark:

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