

FCC TEST REPORT
for
ViewSonic Corporation

Wireless Presentation Gateway Dongle
Model No.: WPG-300, VS16124

Prepared for : ViewSonic Corporation
Address : 10 Pointe Dr. Suite 200. Brea, CA 92821, United States

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited
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Report Number : R011503055E
Date of Test : Mar. 06~ Apr. 10, 2015
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Appendix II (3 Pages)

TEST REPORT

Applicant : ViewSonic Corporation
Manufacturer : ViewSonic Corporation
EUT : Wireless Presentation Gateway Dongle
Model No. : WPG-300, VS16124
Serial No. : N.A.
Trade Mark : ViewSonic
Rating : DC 5V, 1A

Measurement Procedure Used:
FCC Part15 Subpart C, Paragraph 15.247

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Mar. 06~ Apr. 10, 2015

Prepared by : Kebo Zhang
(Tested Engineer / Kebo Zhang)

Reviewer : Amy Ding
(Project Manager / Amy Ding)

Approved & Authorized Signer : Tom Chen
(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : Wireless Presentation Gateway Dongle

Model Number : WPG-300, VS16124
(Note: All samples are the same except the model number and colour, so we prepare "WPG-300" for test only.)

Test Power Supply : DC 5V via USB Port

RF Transmission : 2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20))
Frequency : 2422MHz~2452MHz (802.11n(HT40))

Channels : 11 For (802.11b/802.11g/802.11n(HT20))
7 For (802.11n(HT40))

Modulation : 802.11b: DSSS with DBPSK/DQPSK/CCK
802.11g: OFDM with BPSK/QPSK/16QAM/64QAM
802.11n(HT20): OFDM with BPSK/QPSK/16QAM/64QAM
802.11n(HT40): OFDM with BPSK/QPSK/16QAM/64QAM

Antenna Gain: : 2dBi

Applicant : ViewSonic Corporation
Address : 10 Pointe Dr. Suite 200. Brea, CA 92821, United States

Manufacturer : ViewSonic Corporation
Address : 10 Pointe Dr. Suite 200. Brea, CA 92821, United States

Factory : ViewSonic Corporation
Address : 10 Pointe Dr. Suite 200. Brea, CA 92821, United States

Date of receipt : Mar. 06, 2015

Date of Test : Mar. 06~ Apr. 10, 2015

1.2. Auxiliary Equipment Used during Test

MONITOR : Manufacturer: DELL
M/N: UZ2215Hf
S/N: CN-035VN6-72872-45A-A3AB
Input Rating: AC 100-240V, 50-60Hz, 1.5A
Output Rating: DC 19.5V, 4.62A
TUV-GS FCC CE KCC VCCI

1.3. Description of Test Facility

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

CNAS - LAB Code: L3503

Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

FCC-Registration No.: 752021

Shenzhen Anbotek Compliance Laboratory Limited, 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 752021, July 10, 2013.

IC-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, February 22, 2013.

Test Location

All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC
Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong,
China

1.4. Measurement Uncertainty

Radiation Uncertainty : Ur = 4.1 dB (Horizontal)
Ur = 4.3 dB (Vertical)
Conduction Uncertainty : Uc = 3.4dB

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC Part 15, Paragraph 15.247.

2.1. Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107, 15.207	Conducted Emission Test	PASS	Complies
FCC Part 15, Paragraph 15.247(b)(1)	Peak Output Power	PASS	Complies
FCC Part 15, Paragraph 15.247(a)(2)	6dB Bandwidth	PASS	Complies
FCC Part 15, Paragraph 15.247(c)	100kHz Bandwidth of Frequency Band Edges	PASS	Complies
FCC Part 15, Paragraph 15.209(a)(f)	Spurious Emission	PASS	Complies
FCC Part 15, Paragraph 15.247(a)(1)	Frequency Separation	-	N/A
FCC Part 15, Paragraph 15.247(a)(1)(iii)	Number of Hopping Frequency	-	N/A
FCC Part 15, Paragraph 15.247(a)(1)(iii)	Time of Occupancy	-	N/A
FCC Part 15, Paragraph 15.247(c)	Peak Power Density	PASS	Complies

2.2. Description of Test Modes

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

IEEE802.11b: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 1 Mbps lowest data rate (worst case) are chosen for the final testing.

IEEE802.11g: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6 Mbps lowest data rate (the worst case) are chosen for the final testing.

IEEE802.11n (HT20): Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with MCS 0 Mbps lowest data rate (the worst case) are chosen for the final testing.

IEEE802.11n (HT40): Channel 3(2422MHz), Channel 6(2437MHz) and Channel 9(2452MHz) with MCS 0 Mbps lowest data rate (the worst case) are chosen for the final testing.

2.3. List of channels:

√ - available

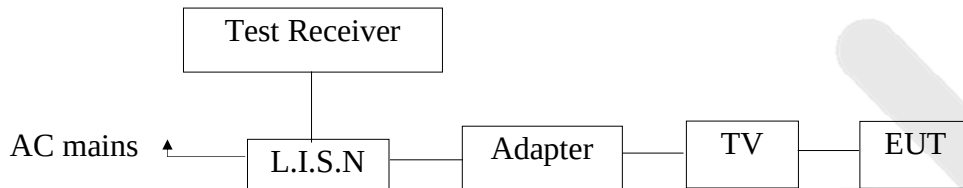
X - tested

Number	Frequency(MHz)		802.11 b/g/n (HT20)	802.11 b/g/n (HT40)
1	2412	√	X	
2	2417	√		
3	2422	√		X
4	2427	√		
5	2432	√		
6	2437	√	X	X
7	2442	√		
8	2447	√		
9	2452	√		X
10	2457	√		
11	2462	√	X	

3. Conducted Emission Test

3.1. Block Diagram of Test Setup

3.1.1. Block diagram of connection between the EUT and simulators



3.2. Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT and simulator as shown as Section 3.1.
- 3.4.2. Turn on the power of all equipment.
- 3.4.3. Let the EUT work in test mode (HDMI, MHL) and measure it.

3.5. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

The frequency range from 150KHz to 30MHz is checked.

The test results are reported on Section 3.6.

3.6. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Apr. 22, 2014	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 22, 2014	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 22, 2014	1 Year

3.7. Power Line Conducted Emission Measurement Results

PASS.

The frequency range from 150KHz to 30 MHz is investigated.

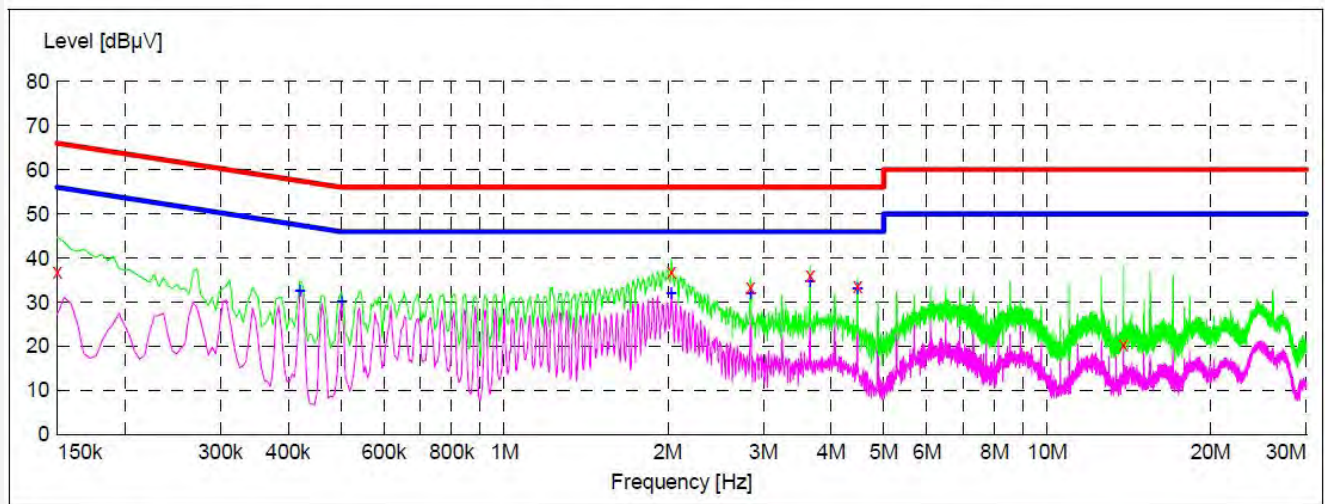
The EUT was tested on (HDMI, MHL) modes, only the worst data of (MHL) is attached in the following pages.

CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room
Operating Condition: MHL
Test Specification: DC 5V via USB Port
Comment: Live Line
Tem:25°C Hum:50%

SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	37.10	20.1	66	28.9	QP	L1	GND
2.030500	37.00	20.3	56	19.0	QP	L1	GND
2.840500	33.50	20.4	56	22.5	QP	L1	GND
3.655000	36.10	20.4	56	19.9	QP	L1	GND
4.469500	33.70	20.5	56	22.3	QP	L1	GND
13.829500	20.50	20.7	60	39.5	QP	L1	GND

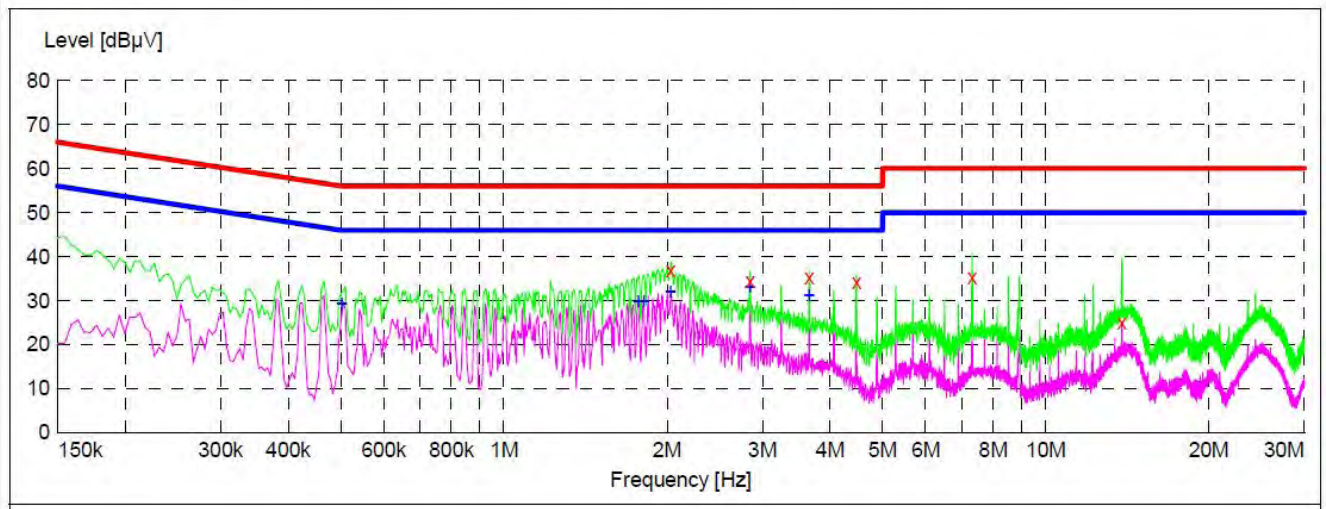
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.420000	32.60	20.1	47	14.8	AV	L1	GND
0.501000	30.20	20.1	46	15.8	AV	L1	GND
2.030500	31.90	20.3	46	14.1	AV	L1	GND
2.845000	32.20	20.4	46	13.8	AV	L1	GND
3.655000	34.90	20.4	46	11.1	AV	L1	GND
4.469500	33.10	20.5	46	12.9	AV	L1	GND

CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room
Operating Condition: MHL
Test Specification: DC 5V via USB Port
Comment: Neutral Line
Tem:25°C Hum:50%

SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
2.030500	37.00	20.3	56	19.0	QP	N	GND
2.845000	34.50	20.4	56	21.5	QP	N	GND
3.655000	35.30	20.4	56	20.7	QP	N	GND
4.469500	34.30	20.5	56	21.7	QP	N	GND
7.313500	35.30	20.5	60	24.7	QP	N	GND
13.834000	25.10	20.7	60	34.9	QP	N	GND

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.501000	29.30	20.1	46	16.7	AV	N	GND
1.769500	29.80	20.3	46	16.2	AV	N	GND
1.810000	30.00	20.3	46	16.0	AV	N	GND
2.030500	32.10	20.3	46	13.9	AV	N	GND
2.845000	33.00	20.4	46	13.0	AV	N	GND
3.659500	31.30	20.4	46	14.7	AV	N	GND

4. FCC Part 15.247 Requirements for DSSS & OFDM Modulation

4.1 Test Setup



4.2 6dB Bandwidth

a. Limit

For the direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

b. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
RBW = 100kHz, VBW $\geq 3 \times$ RBW = 300kHz,
Detector= Peak
Trace mode= Max hold.
Sweep- auto couple.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

20dB Bandwidth:

C63.10

Occupied Bandwidth (OBW=20dB Bandwidth)

1. Set RBW=1%~5% OBW
2. Set the VBW $\geq 3 \times$ RBW
3. Set the span range between 2 times and 5 times of the OBW
4. Sweep Time= Auto
Detector= Peak
Trace= Max hold
5. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce the worst case (i.e. the widest) bandwidth. Unless otherwise specified for an unlicensed wireless device, measure the bandwidth at the -20dB levels with respect to the reference level.

c. Test Setup See 4.1**d. Test Equipment**

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Aug. 08, 2014	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Aug. 08, 2014	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 22, 2014	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 04, 2014	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 24, 2014	1 Year
6.	Pre-amplifier	SONOMA	310N	186860	Aug. 08, 2014	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

e. Test Results

Pass.

f. Test Data
6dB Bandwidth

ANT A

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	10.00	>500	Pass
Mid	2437	10.08		Pass
High	2462	10.08		Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	16.60	>500	Pass
Mid	2437	16.60		Pass
High	2462	16.60		Pass

Test mode: IEEE 802.11n (HT20)

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	17.80	>500	Pass
Mid	2437	17.80		Pass
High	2462	17.80		Pass

Test mode: IEEE 802.11n (HT40)

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2422	36.48	>500	Pass
Mid	2437	36.48		Pass
High	2452	36.48		Pass

Test Plots See the following page.

ANT B

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	10.04	>500	Pass
Mid	2437	10.04		Pass
High	2462	10.04		Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	16.60	>500	Pass
Mid	2437	16.60		Pass
High	2462	16.60		Pass

Test mode: IEEE 802.11n (HT20)

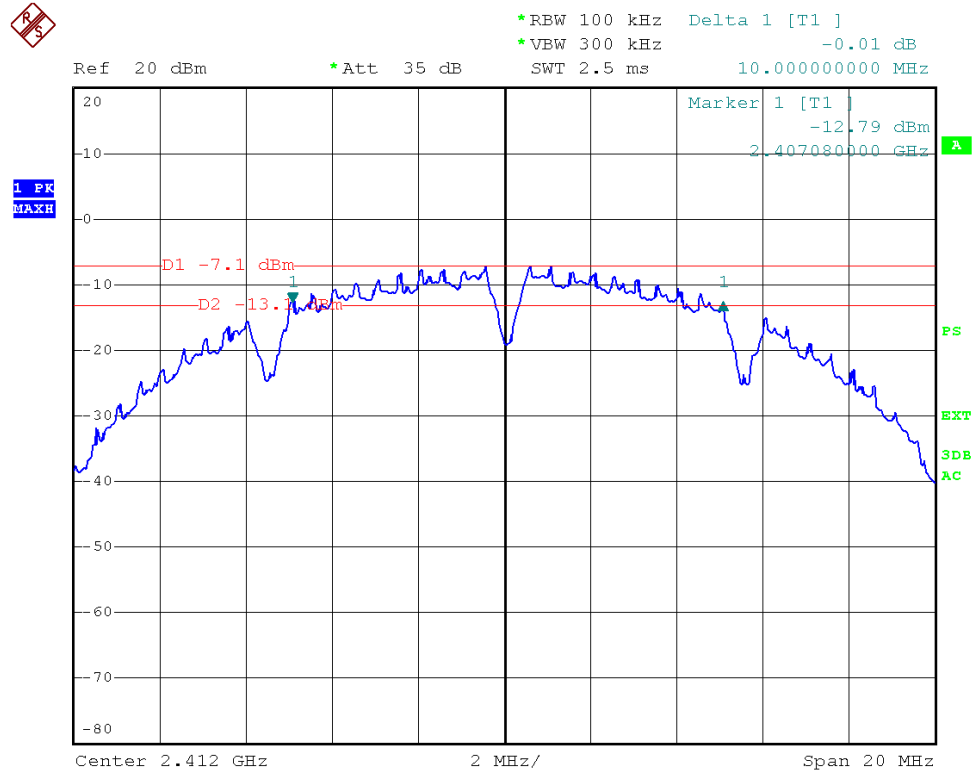
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	17.84	>500	Pass
Mid	2437	17.84		Pass
High	2462	17.84		Pass

Test mode: IEEE 802.11n (HT40)

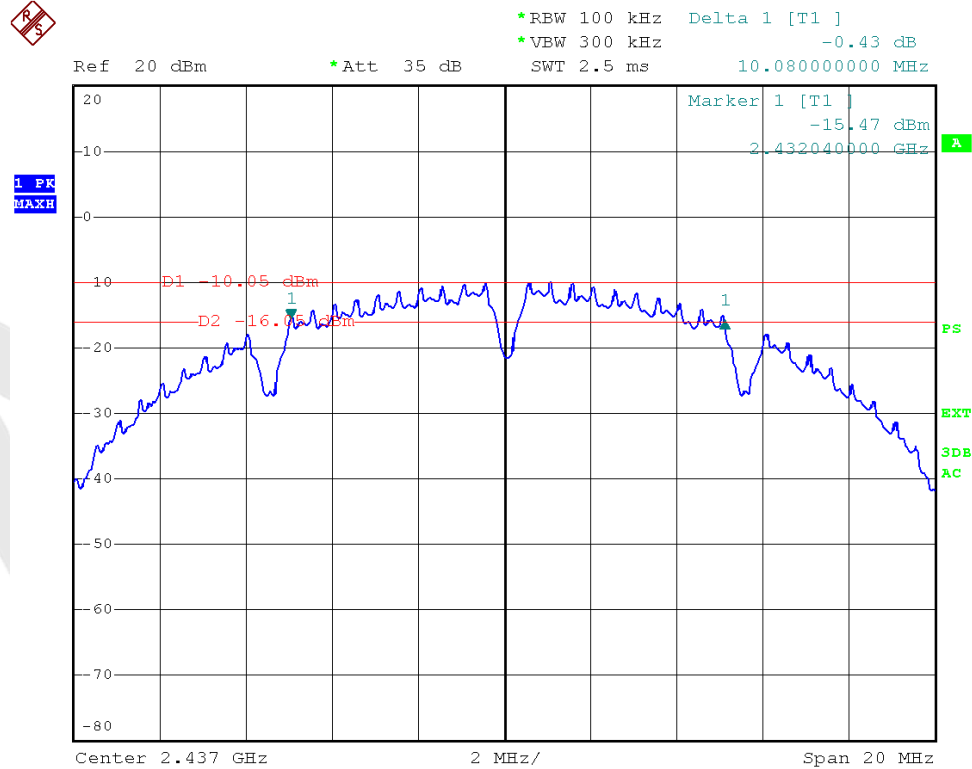
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2422	36.48	>500	Pass
Mid	2437	36.48		Pass
High	2452	36.48		Pass

Test Plots See the following page.

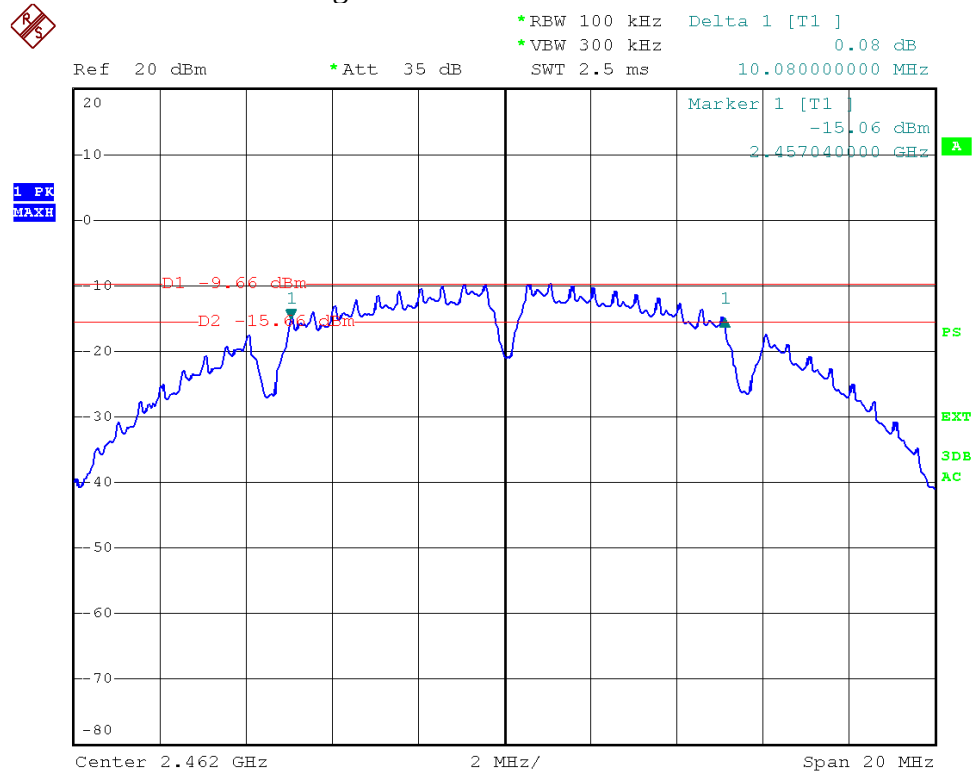
ANT A
Test Mode: 802.11b---Low



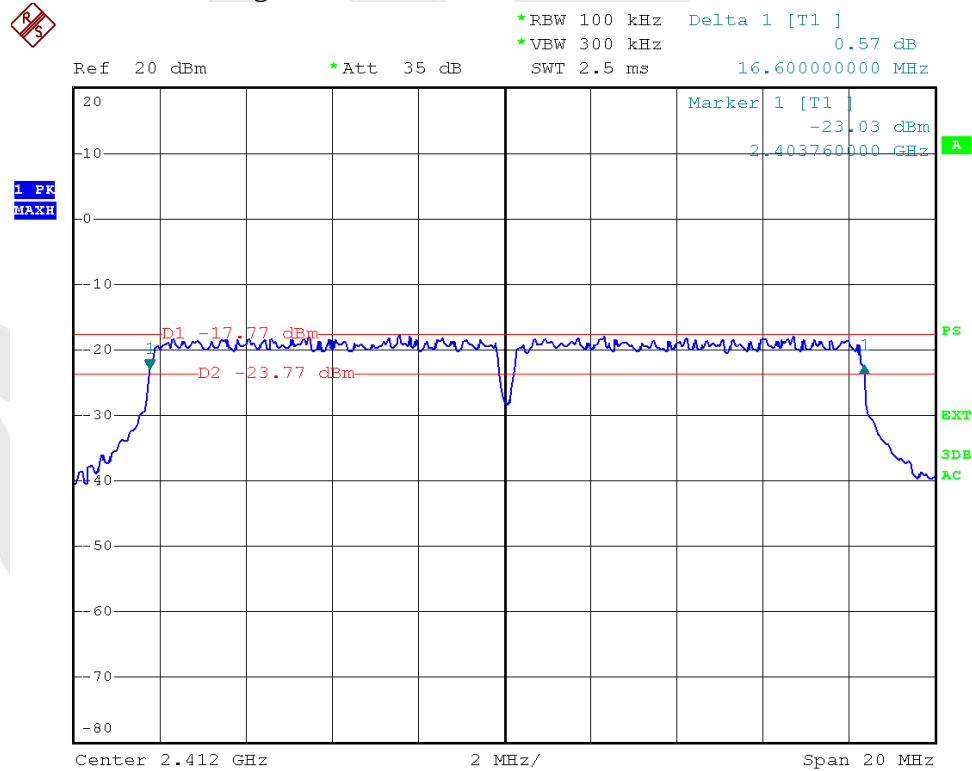
Test Mode: 802.11b---Mid



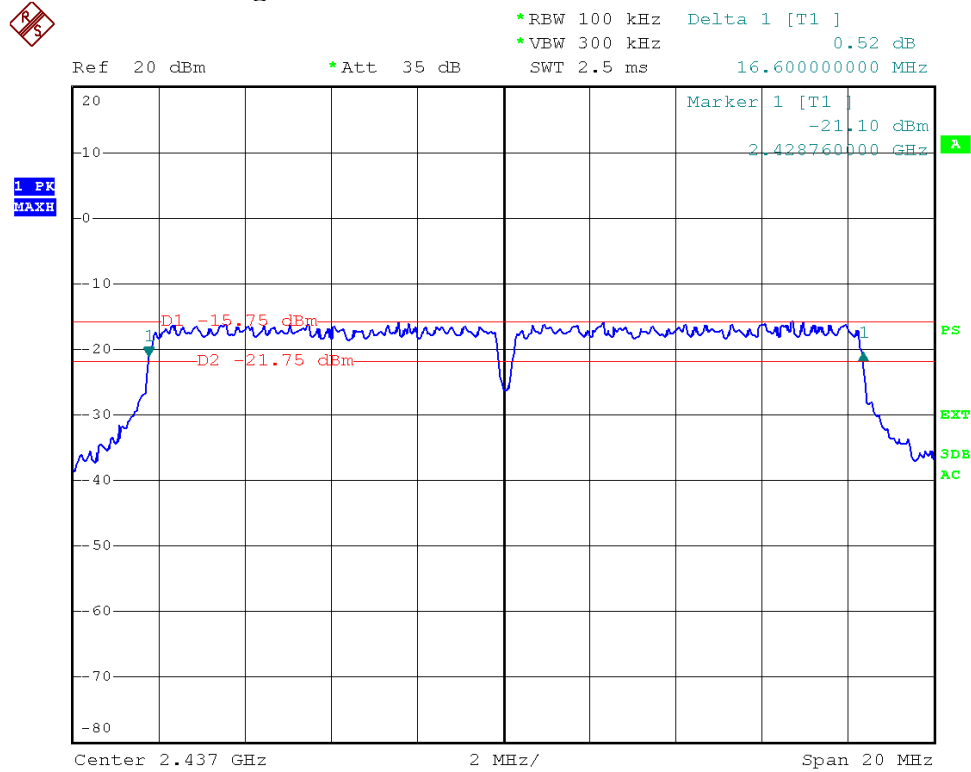
Test Mode: 802.11b---High



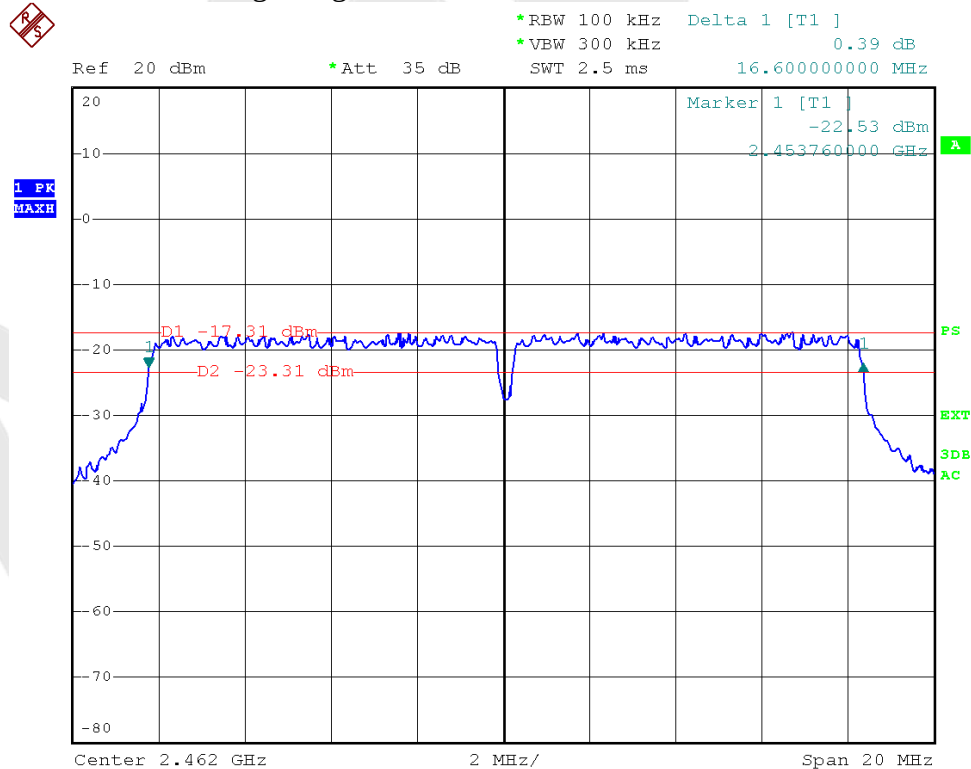
Test Mode: 802.11g---Low



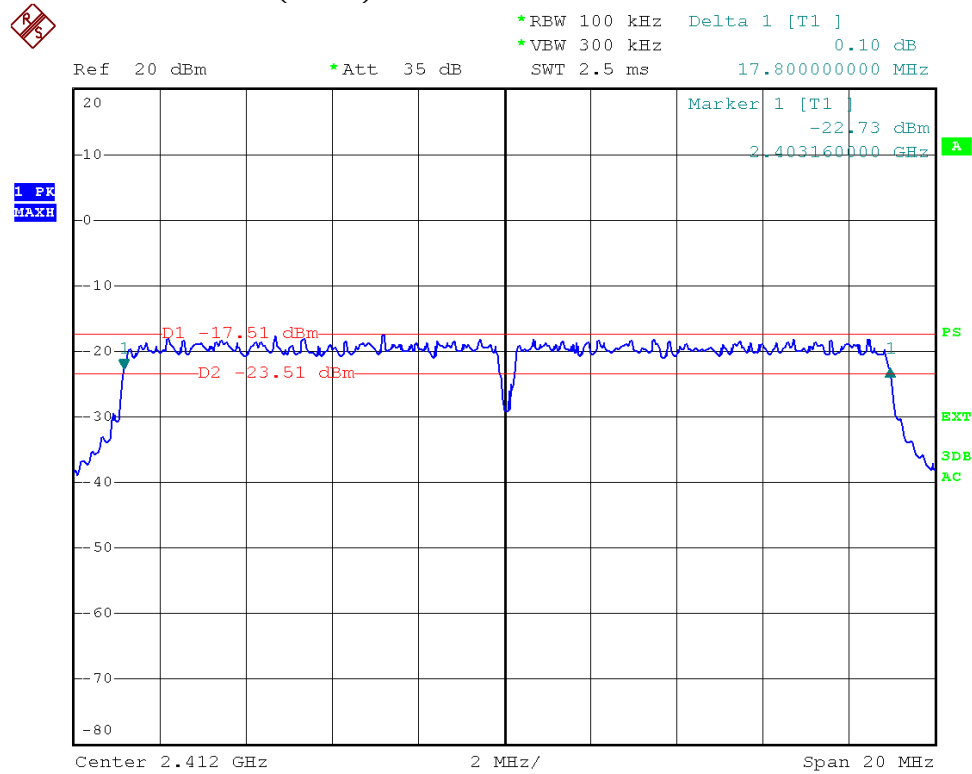
Test Mode: 802.11g---Mid



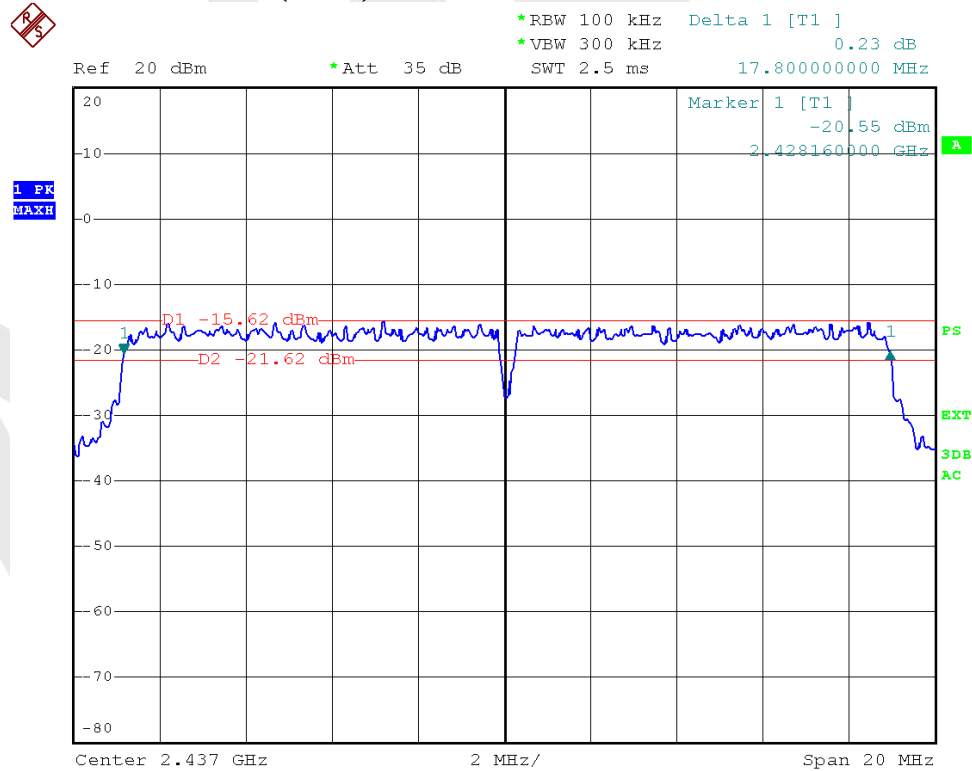
Test Mode: 802.11g---High



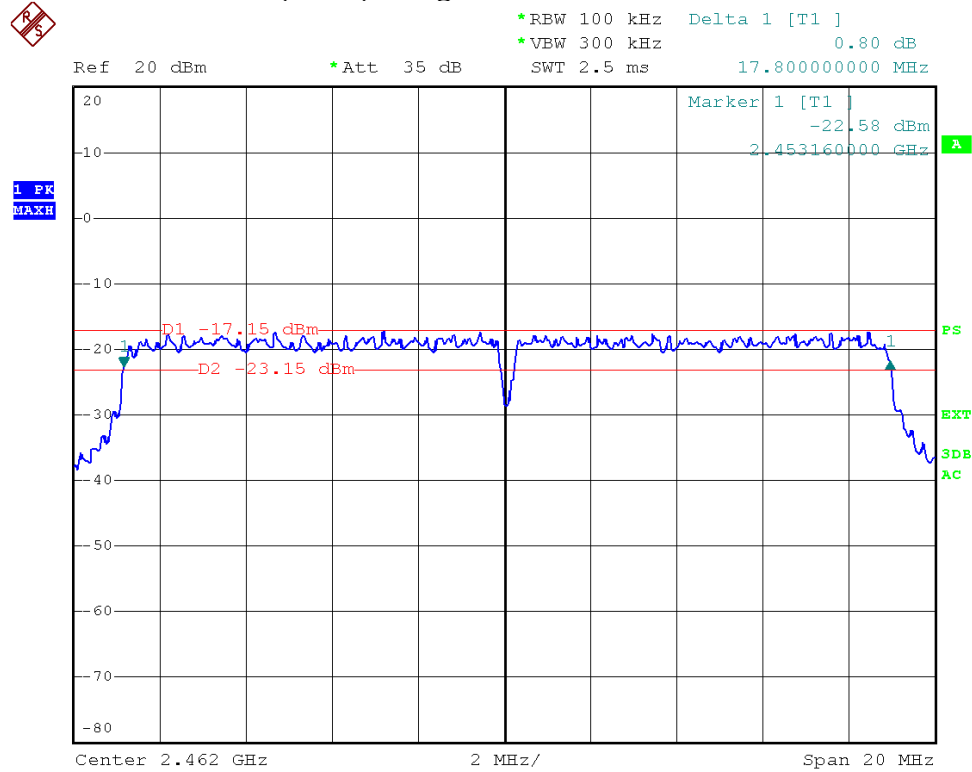
Test Mode: 802.11n (HT20)---Low



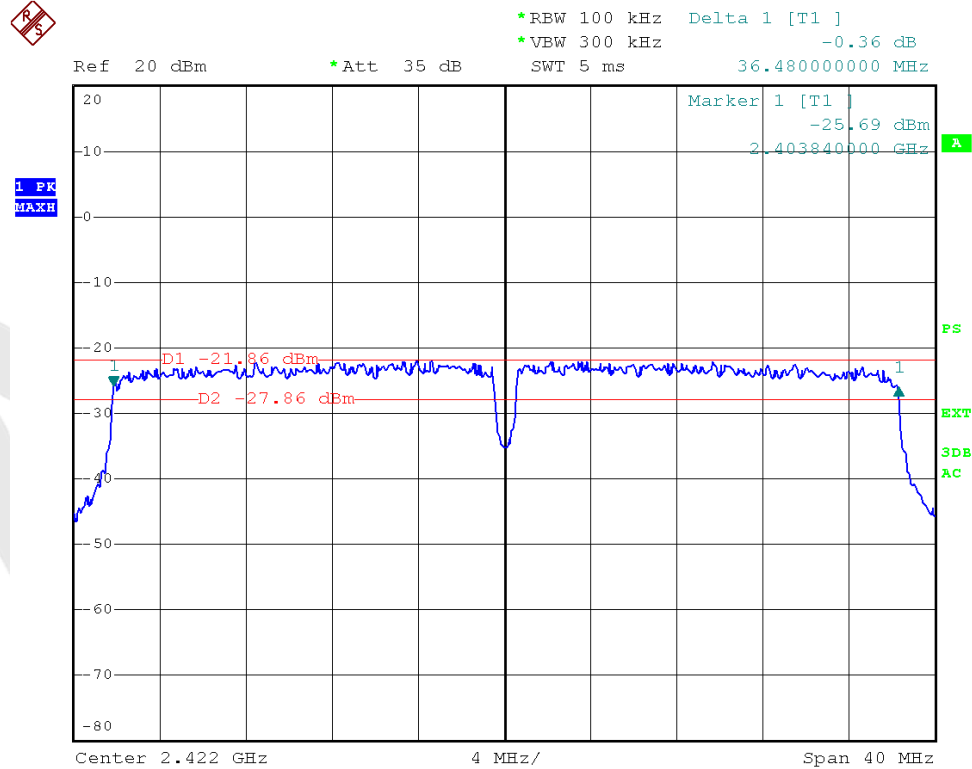
Test Mode: 802.11n (HT20)---Mid



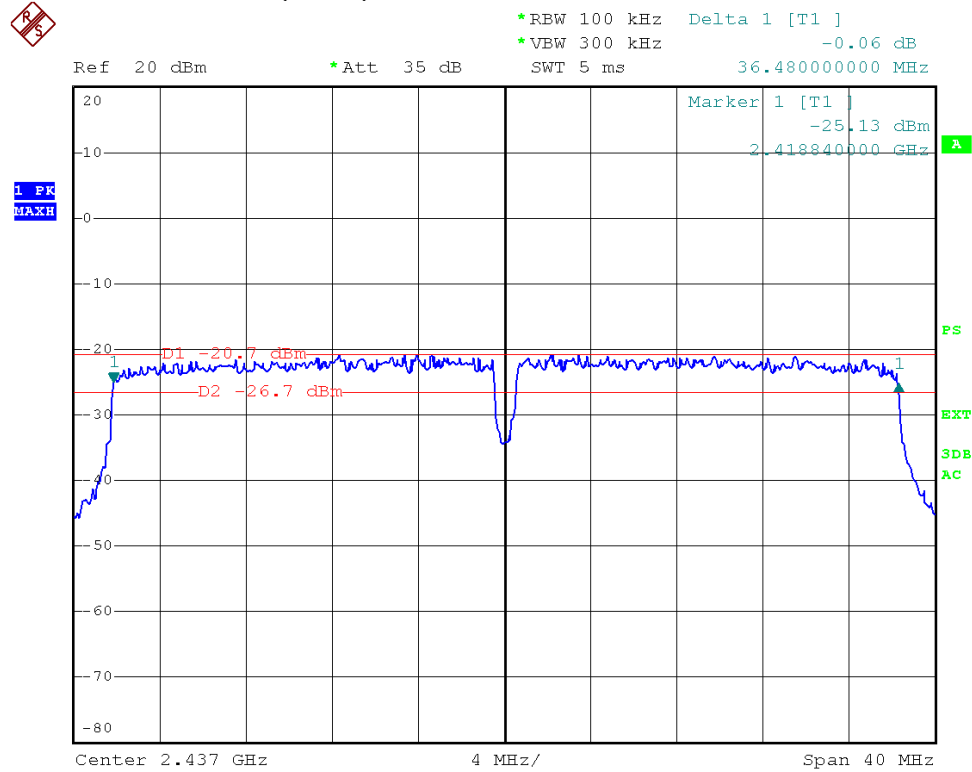
Test Mode: 802.11n (HT20)---High



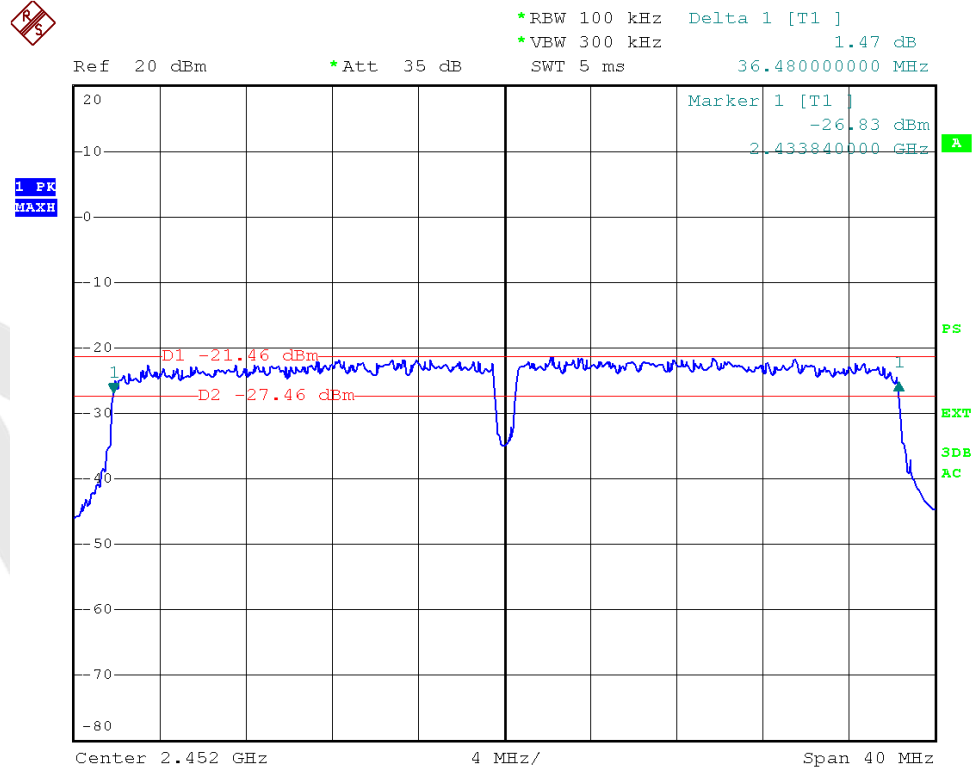
Test Mode: 802.11n (HT40)---Low



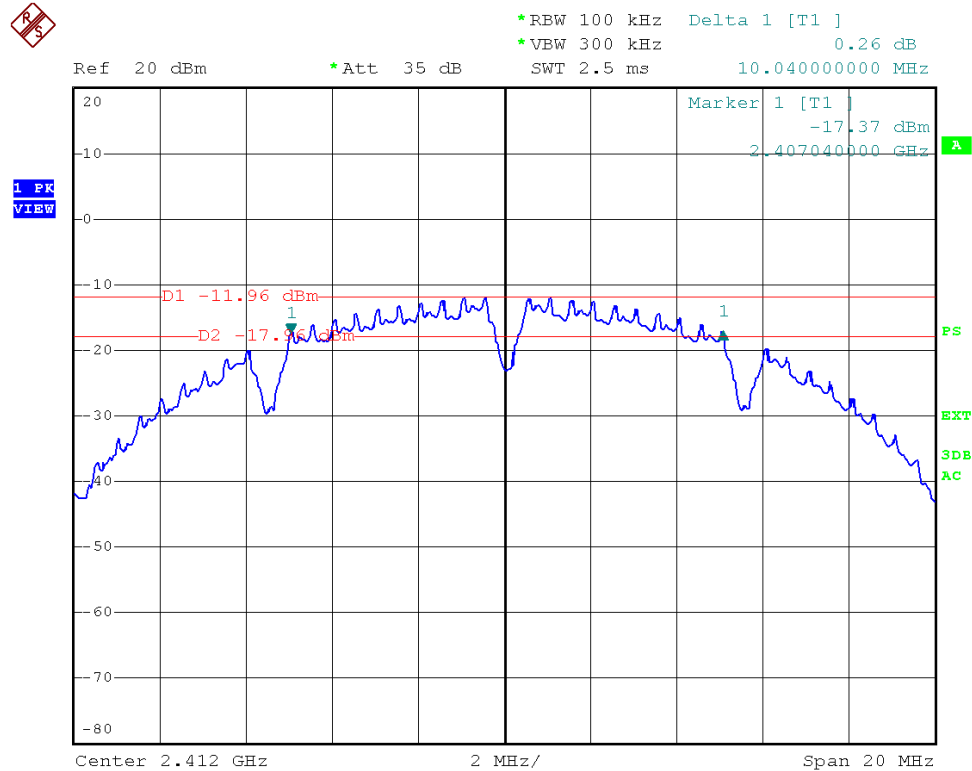
Test Mode: 802.11n (HT40)---Mid



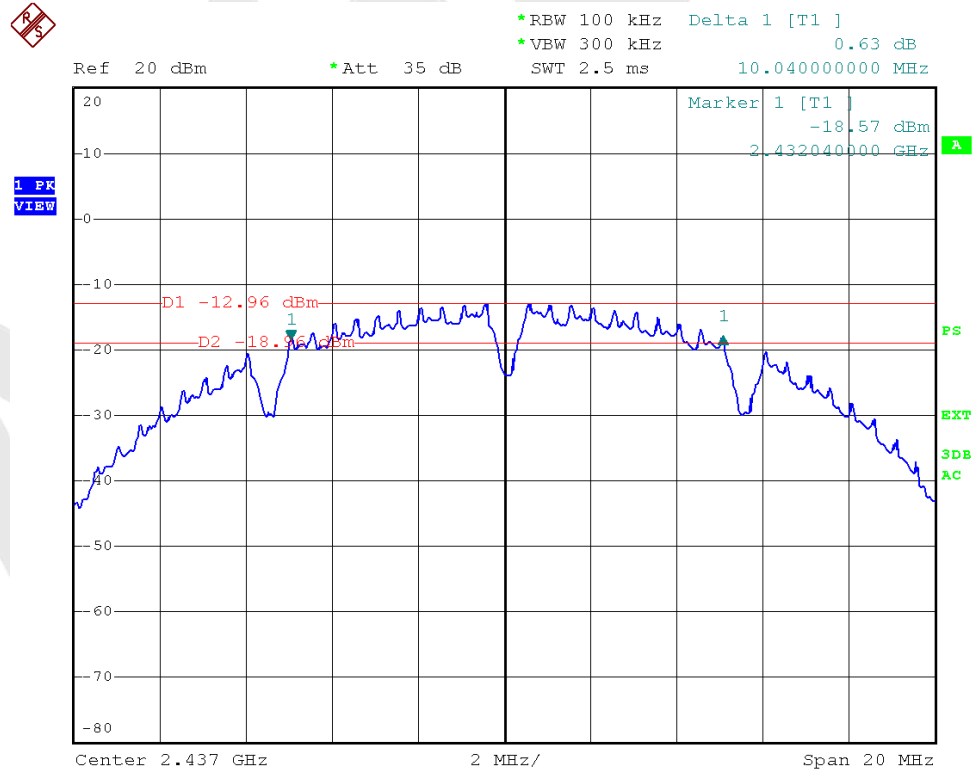
Test Mode: 802.11n (HT40)---High



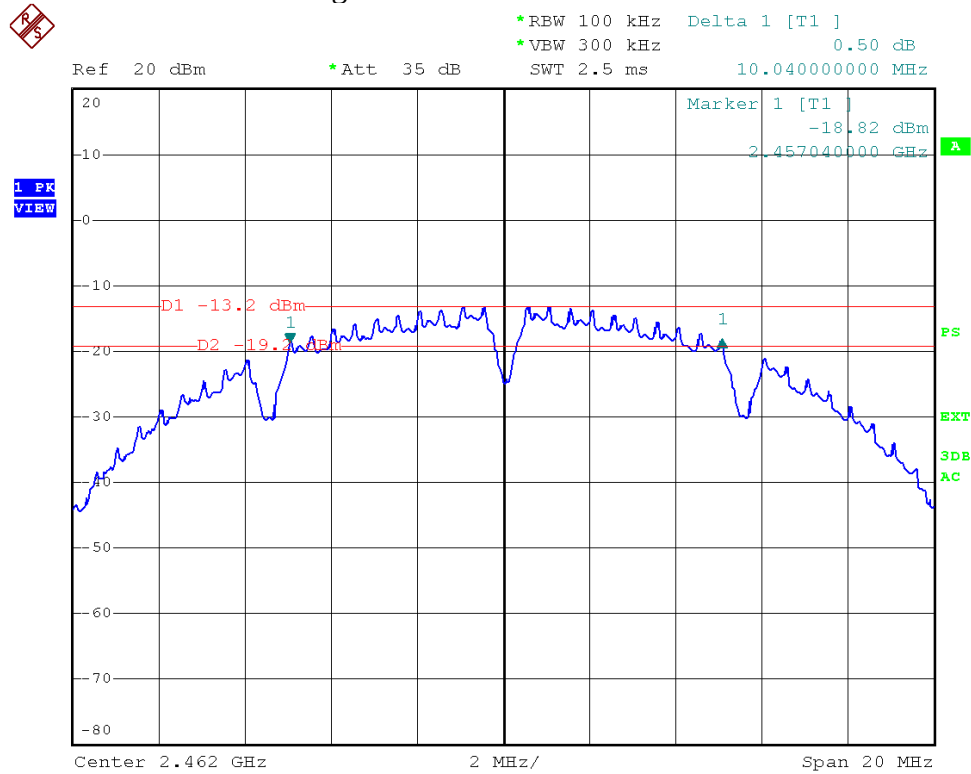
ANT B
Test Mode: 802.11b---Low



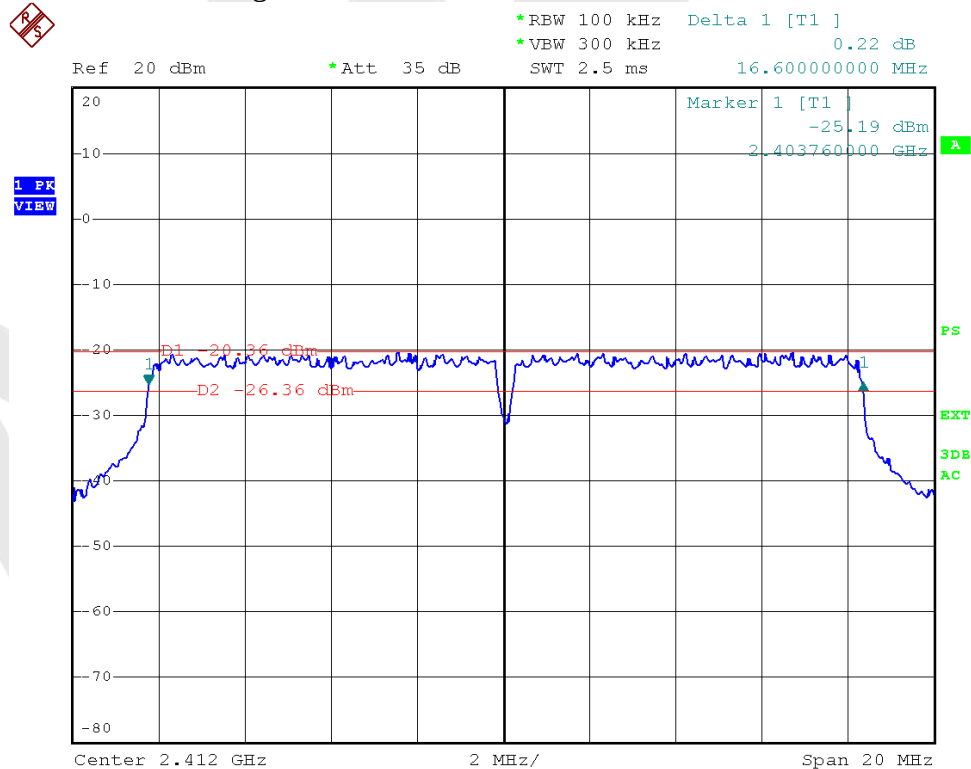
Test Mode: 802.11b---Mid



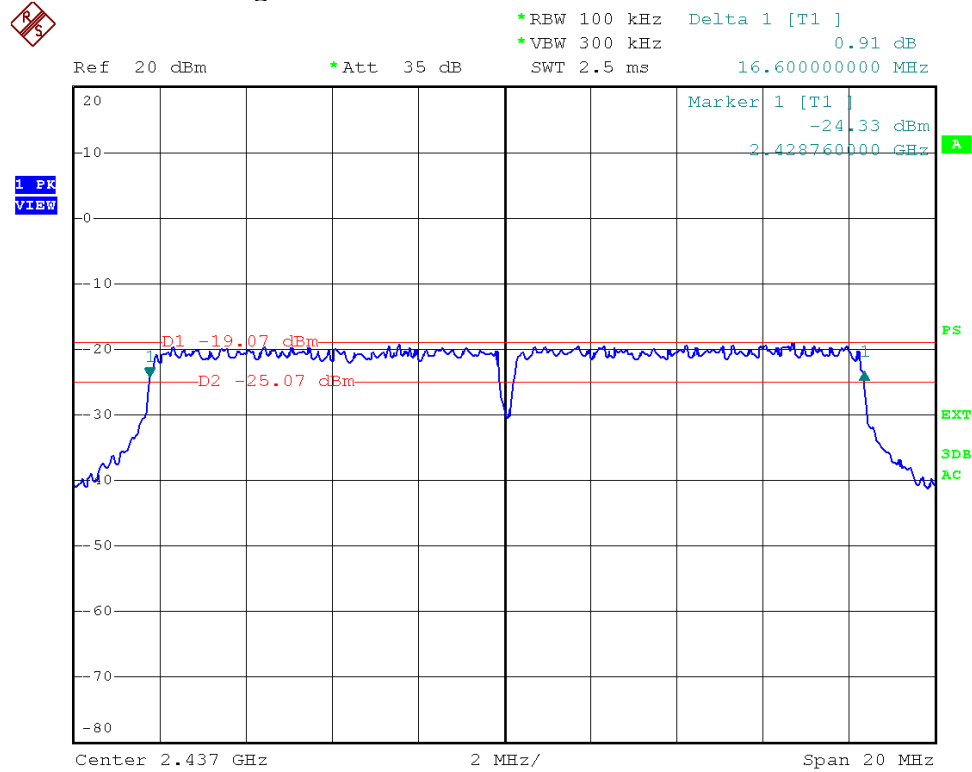
Test Mode: 802.11b---High



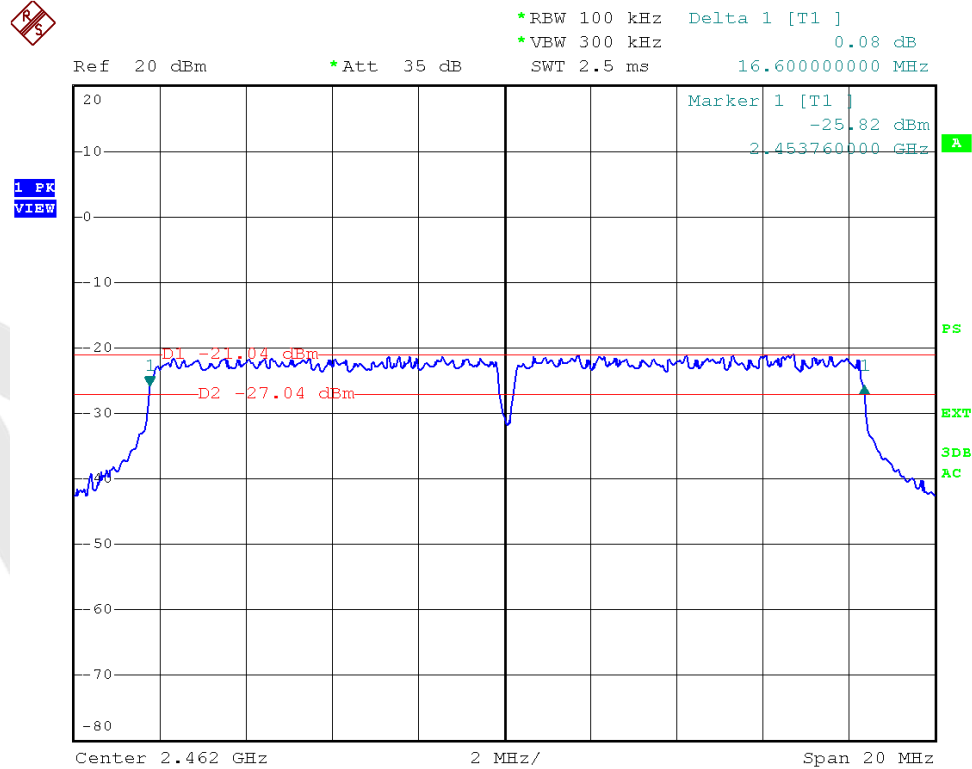
Test Mode: 802.11g---Low



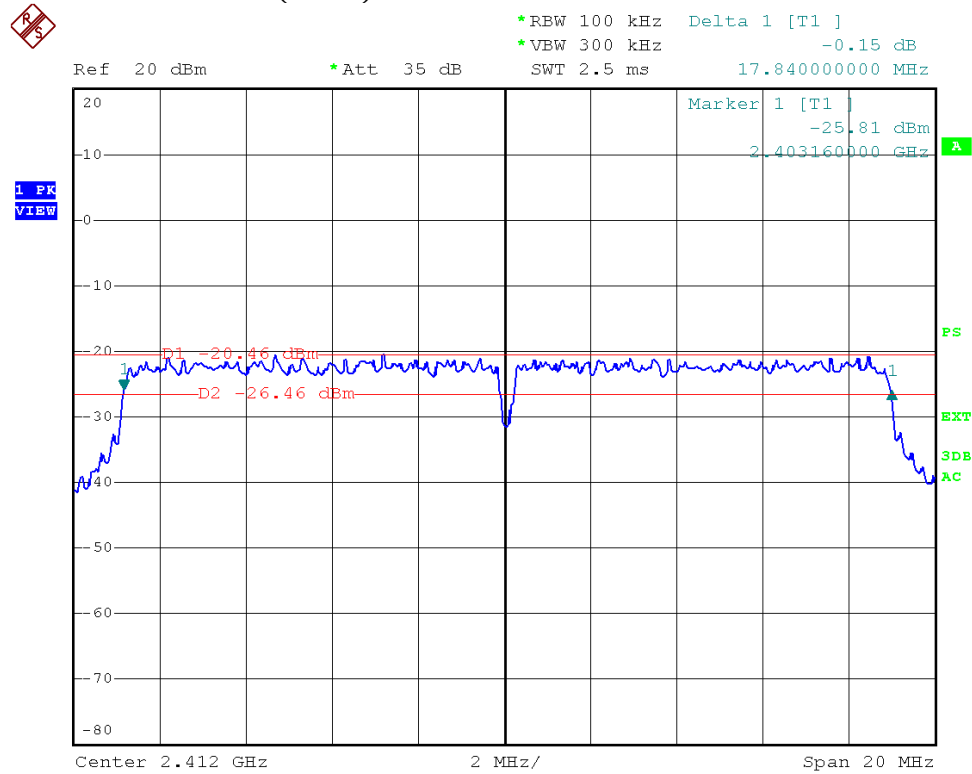
Test Mode: 802.11g---Mid



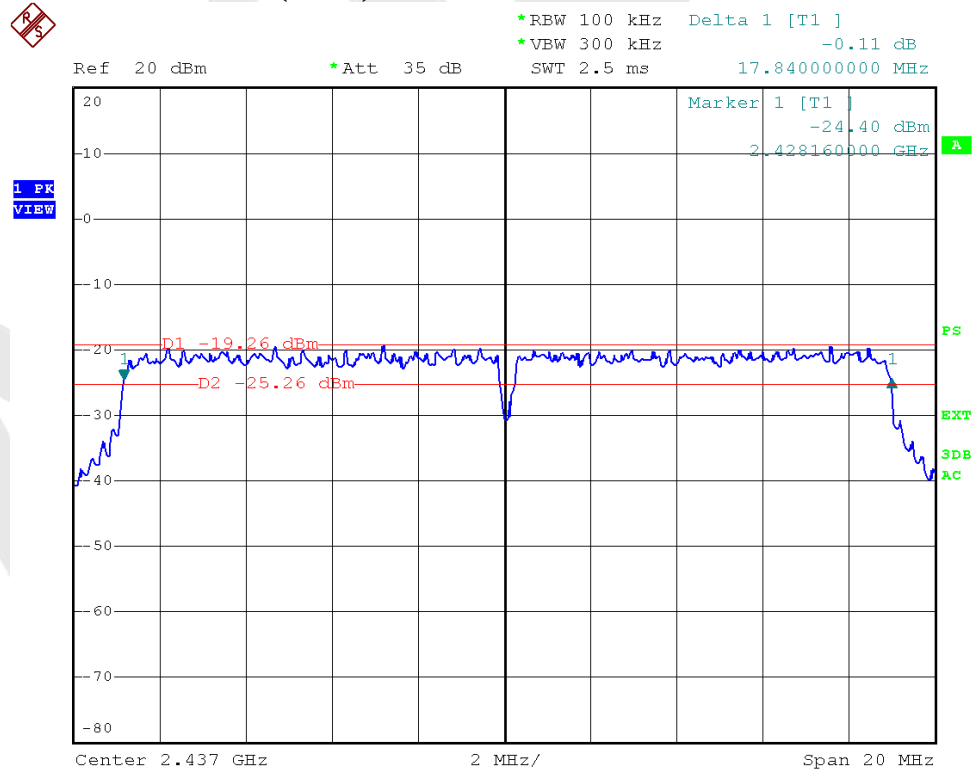
Test Mode: 802.11g---High



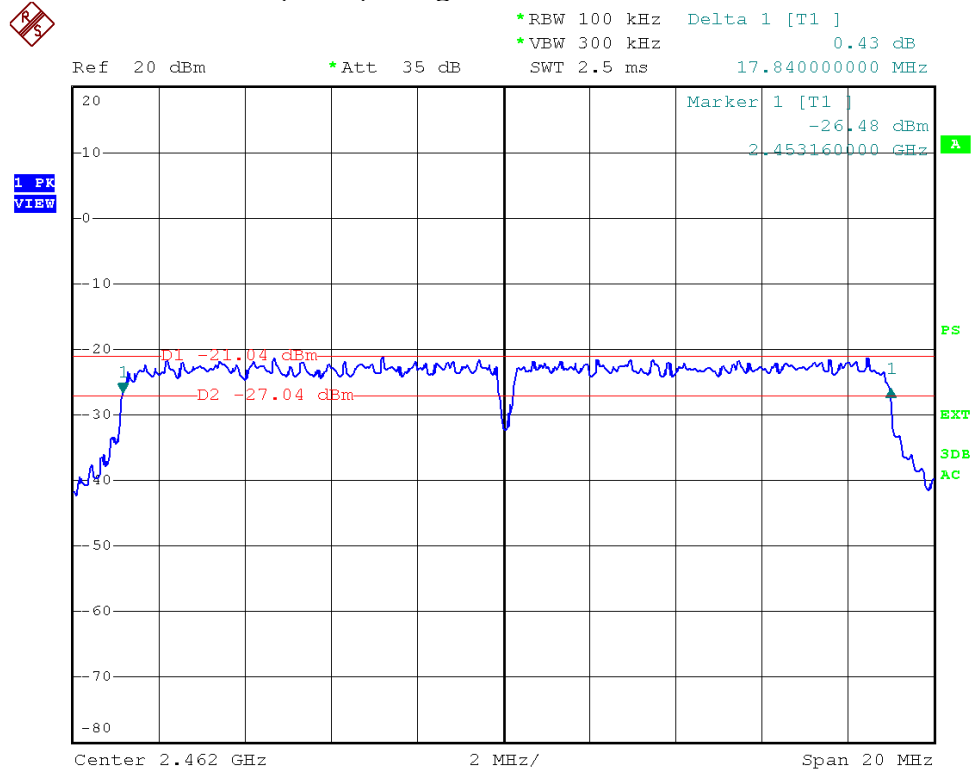
Test Mode: 802.11n (HT20)---Low



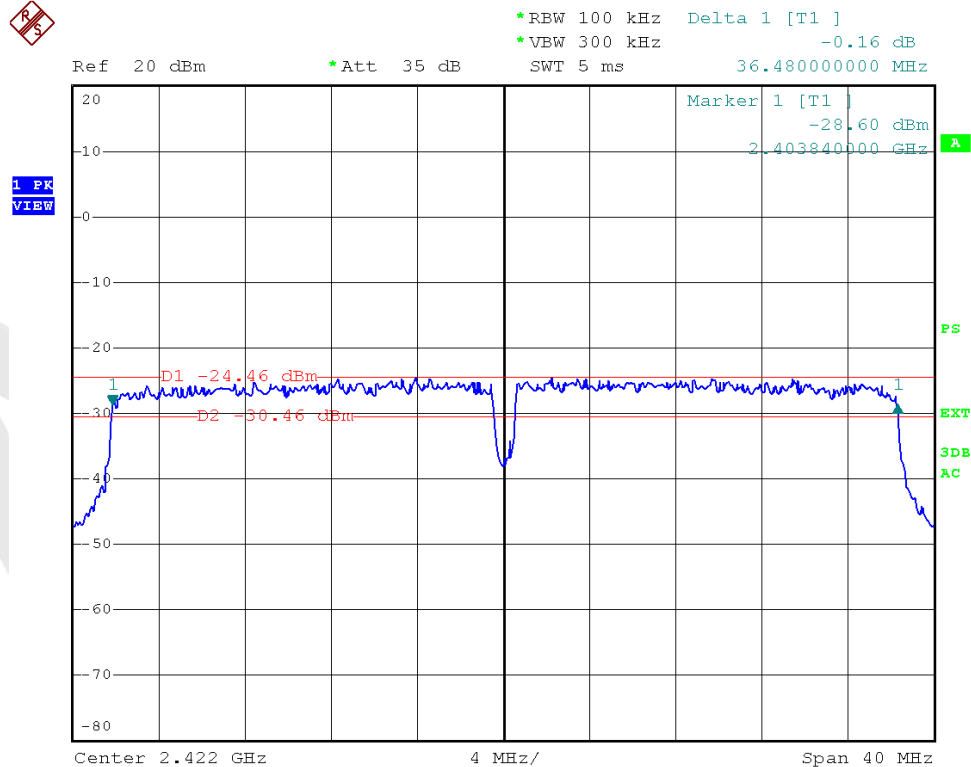
Test Mode: 802.11n (HT20)---Mid



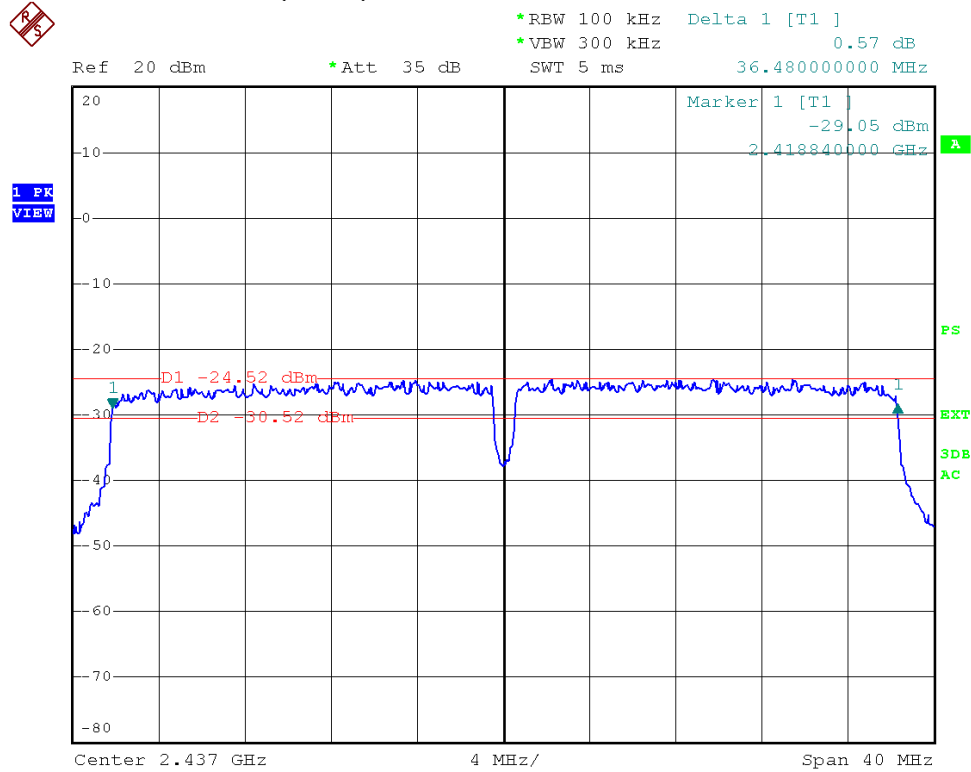
Test Mode: 802.11n (HT20)---High



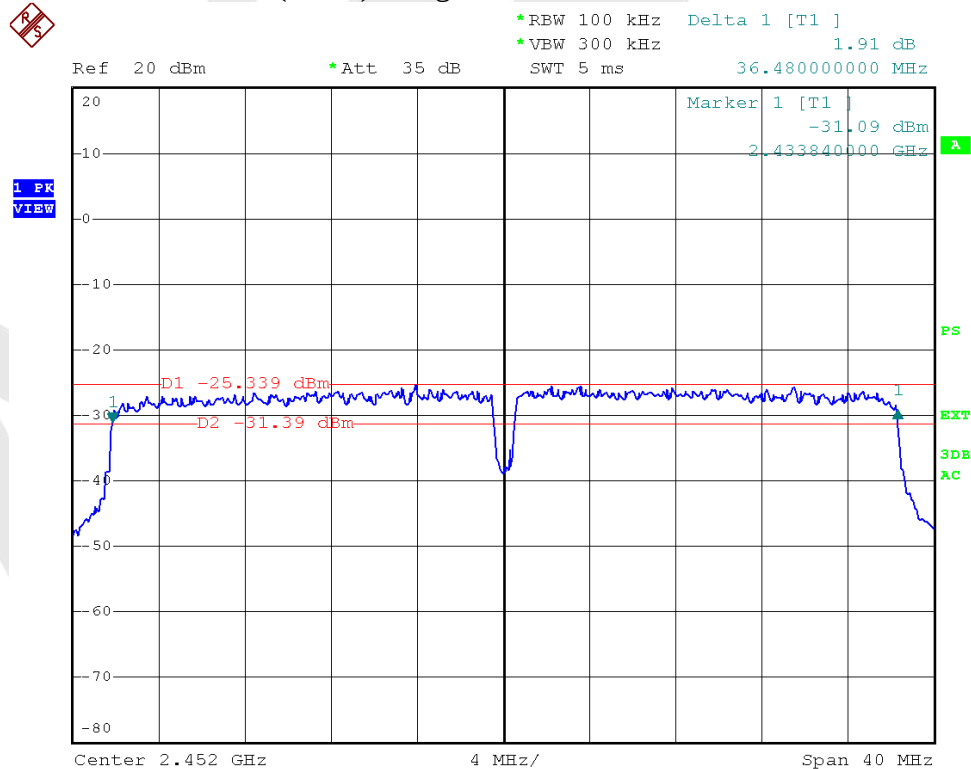
Test Mode: 802.11n (HT40)---Low



Test Mode: 802.11n (HT40)---Mid



Test Mode: 802.11n (HT40)---High



20dB Bandwidth

ANT A

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2412	18.40	Pass
Mid	2437	18.48	Pass
High	2462	18.32	Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2412	23.68	Pass
Mid	2437	23.76	Pass
High	2462	23.60	Pass

Test mode: IEEE 802.11n (HT20)

Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2412	24.32	Pass
Mid	2437	24.32	Pass
High	2462	24.24	Pass

Test mode: IEEE 802.11n (HT40)

Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2422	42.88	Pass
Mid	2437	42.88	Pass
High	2452	42.56	Pass

Test Plots See the following page.

ANT B

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2412	18.48	Pass
Mid	2437	18.40	Pass
High	2462	18.40	Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2412	23.68	Pass
Mid	2437	23.68	Pass
High	2462	23.60	Pass

Test mode: IEEE 802.11n (HT20)

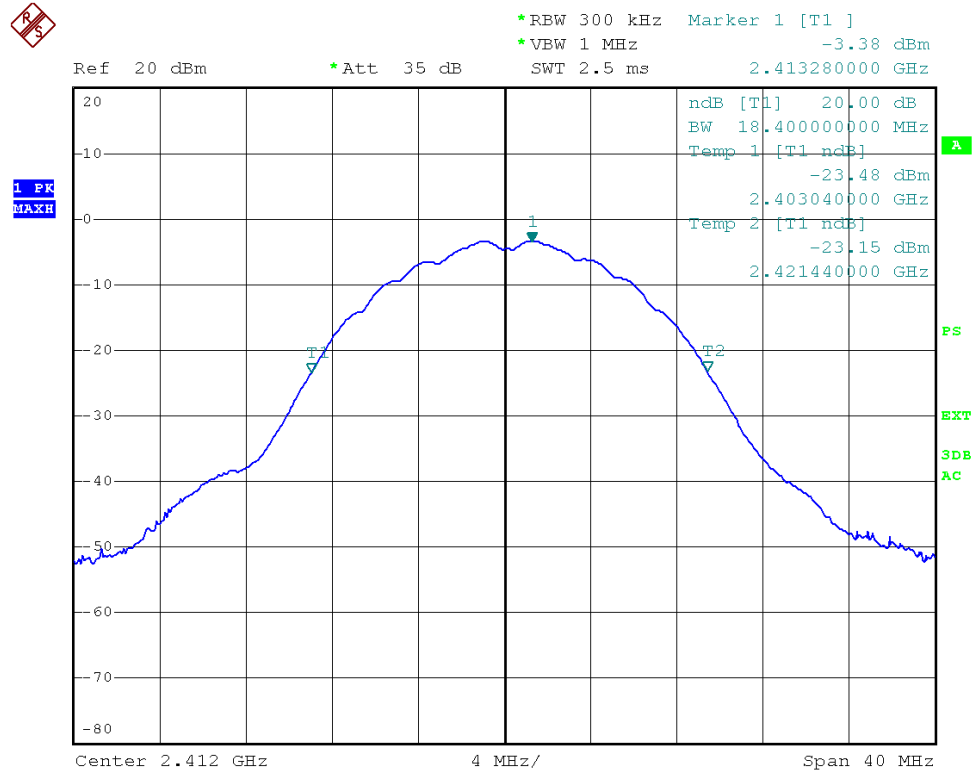
Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2412	24.24	Pass
Mid	2437	24.24	Pass
High	2462	24.32	Pass

Test mode: IEEE 802.11n (HT40)

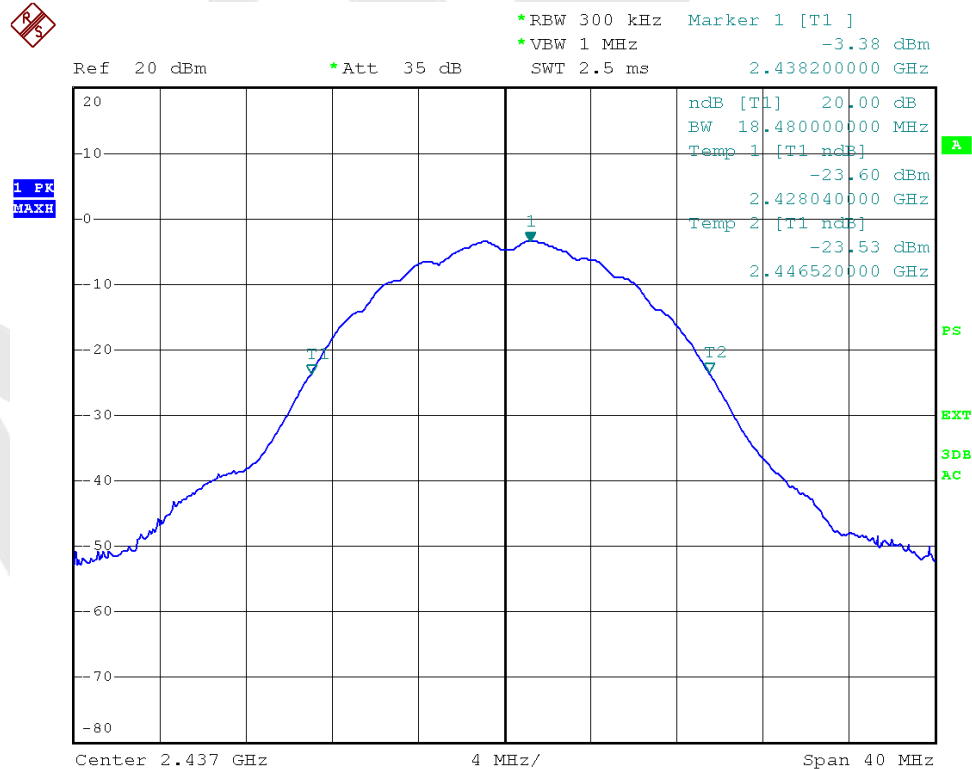
Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2422	42.88	Pass
Mid	2437	42.88	Pass
High	2452	42.88	Pass

Test Plots See the following page.

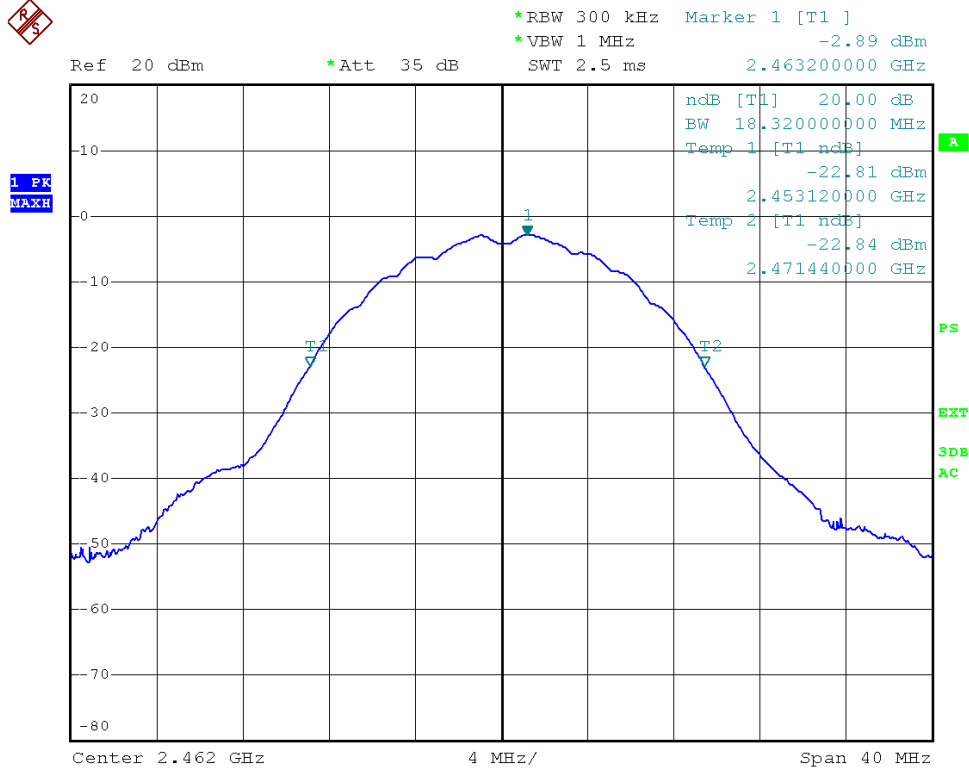
ANT A
Test Mode: 802.11b---Low



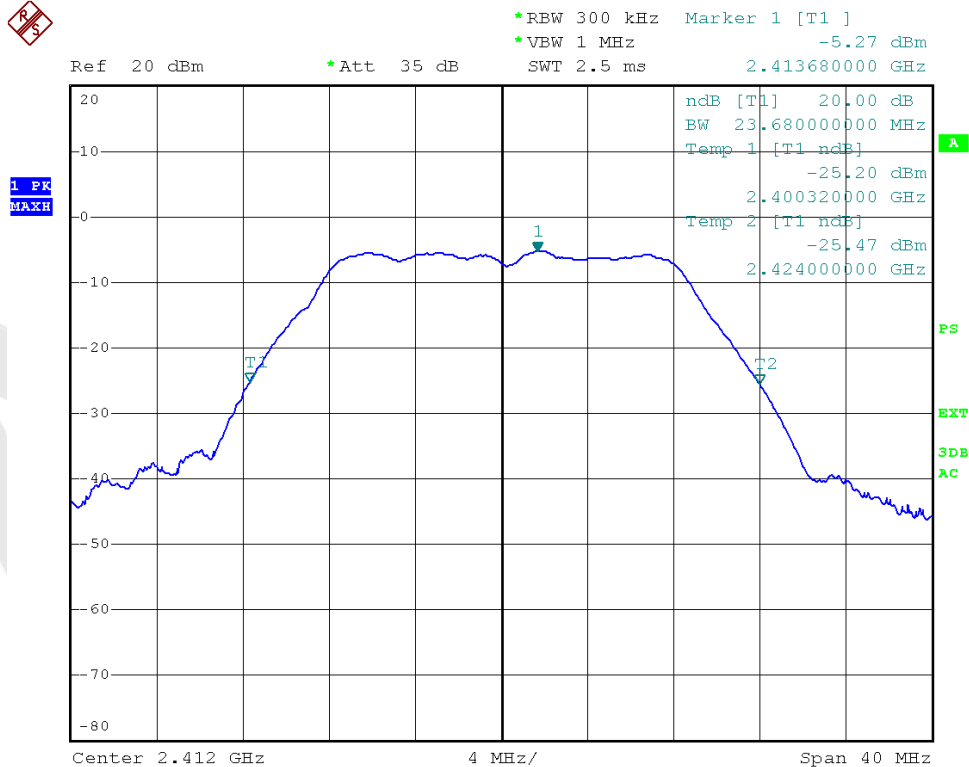
Test Mode: 802.11b---Mid



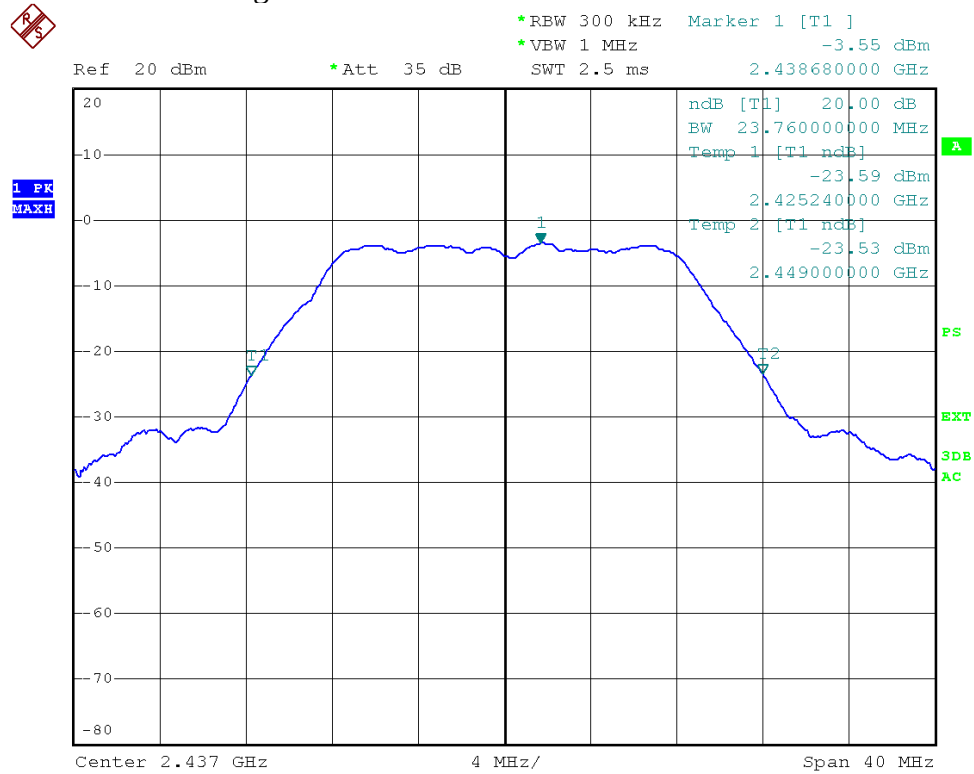
Test Mode: 802.11b---High



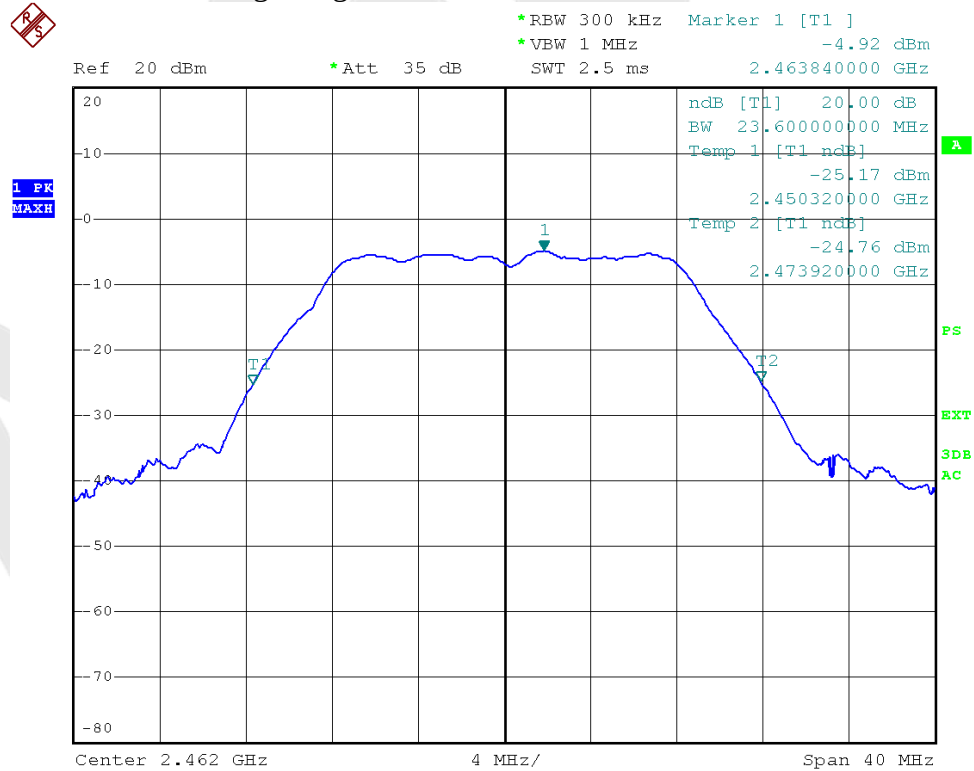
Test Mode: 802.11g---Low



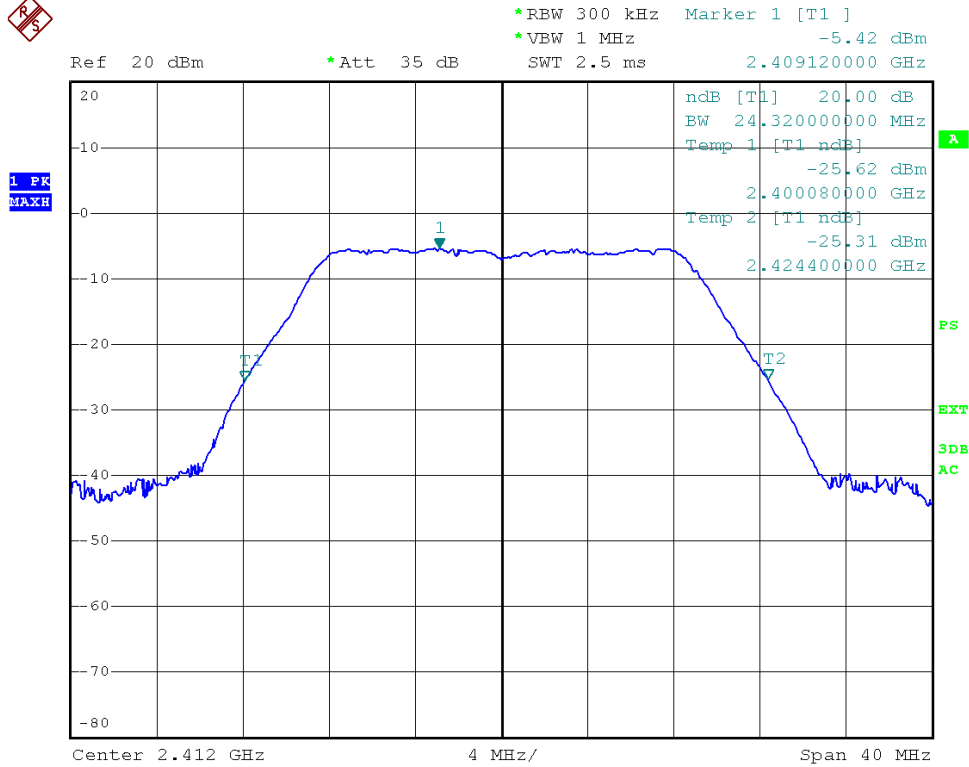
Test Mode: 802.11g---Mid



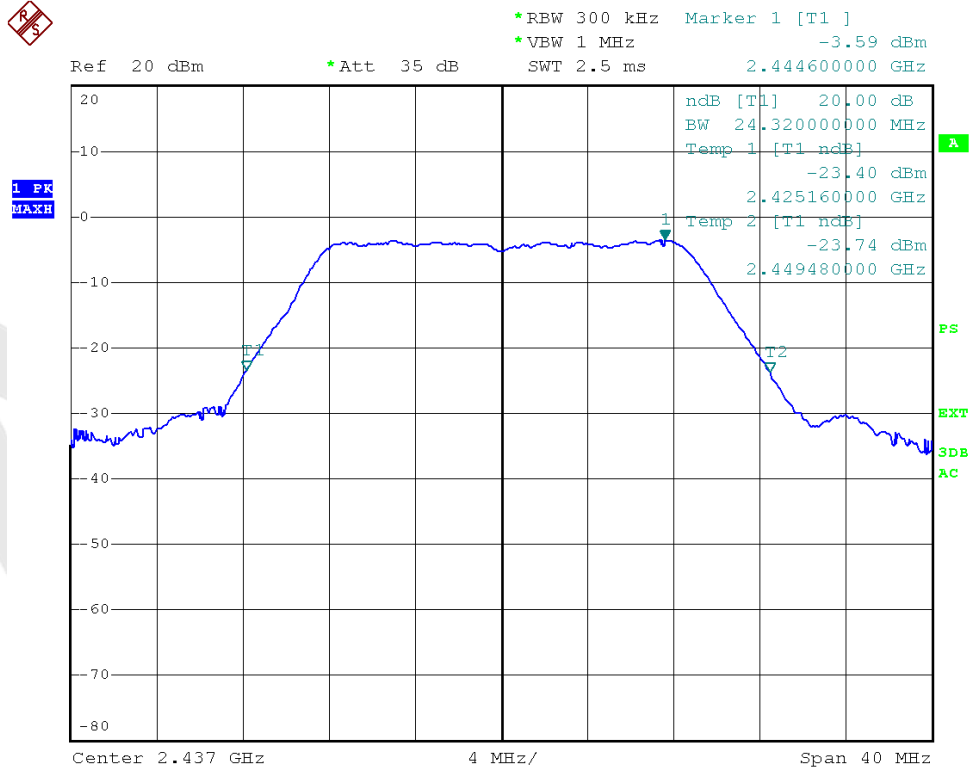
Test Mode: 802.11g---High



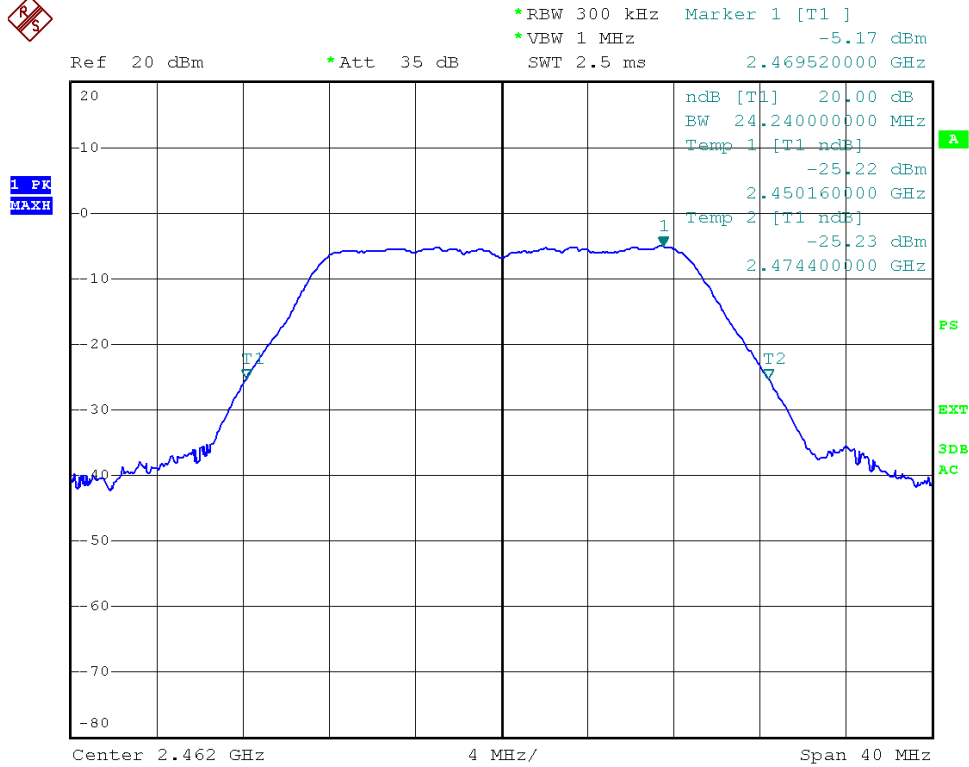
Test Mode: 802.11n (HT20)---Low



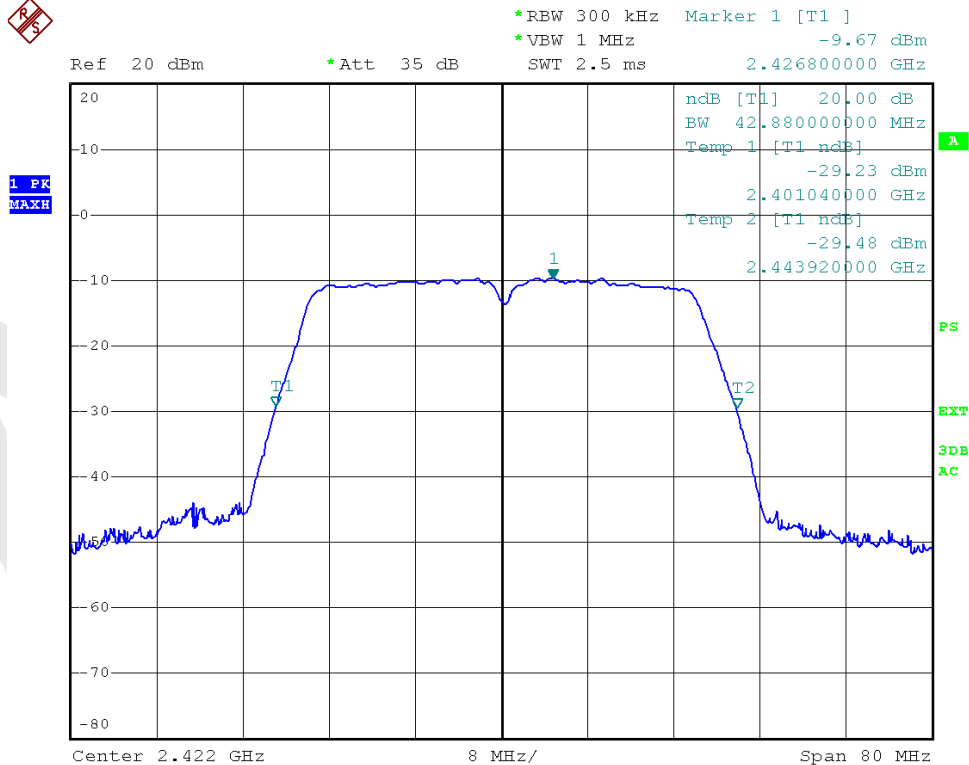
Test Mode: 802.11n (HT20)---Mid



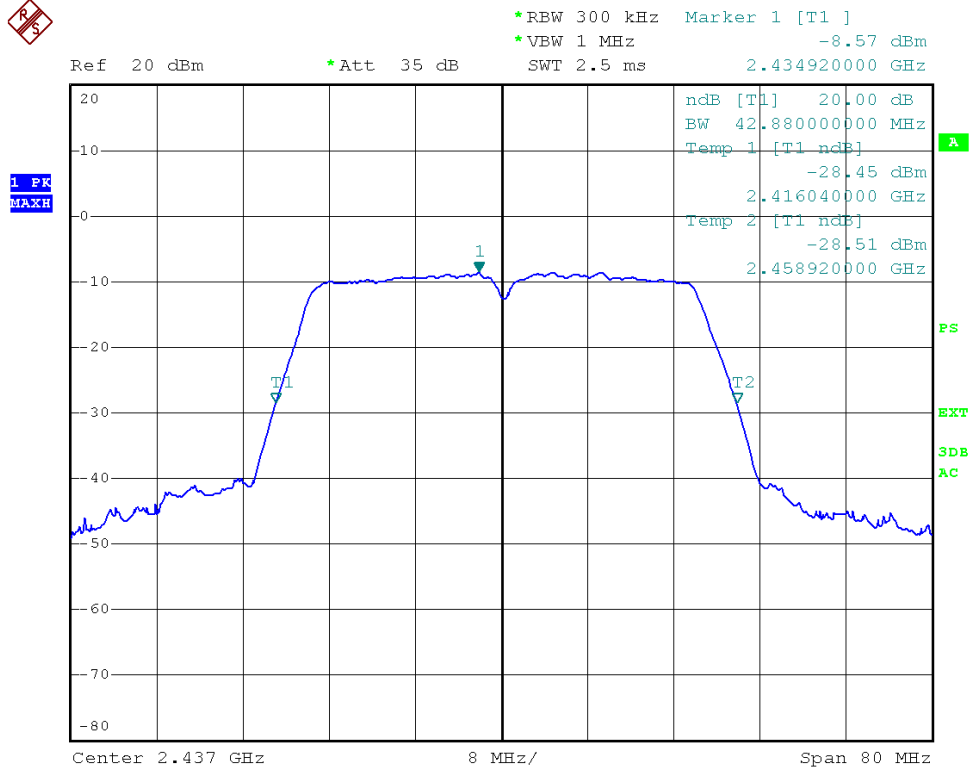
Test Mode: 802.11n (HT20)---High



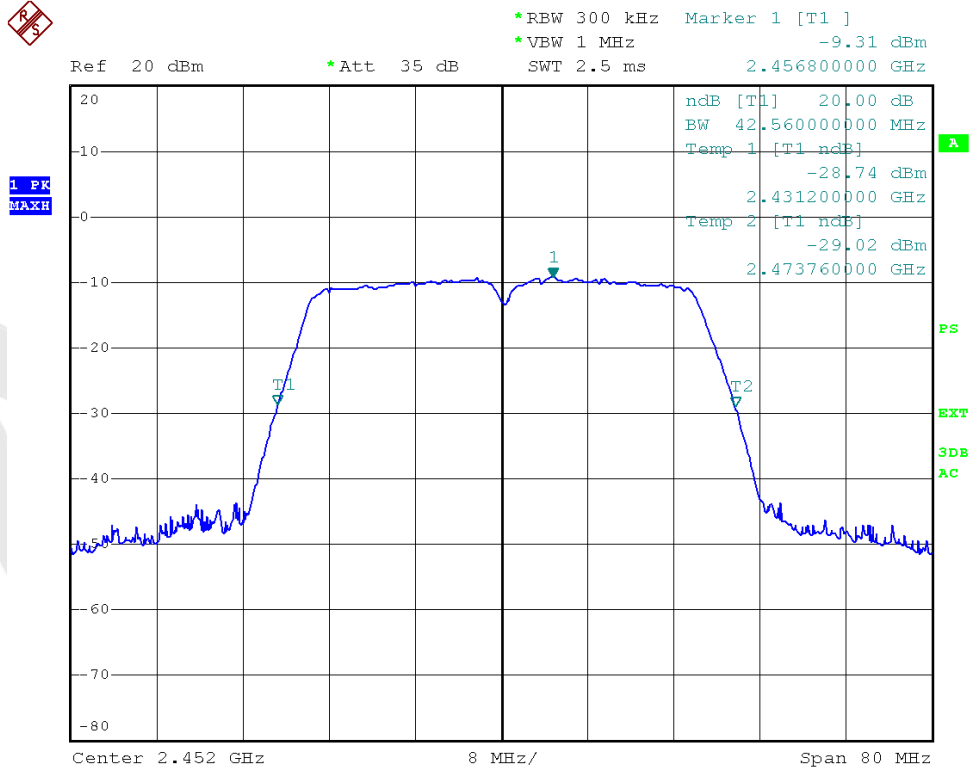
Test Mode: 802.11n (HT40)---Low



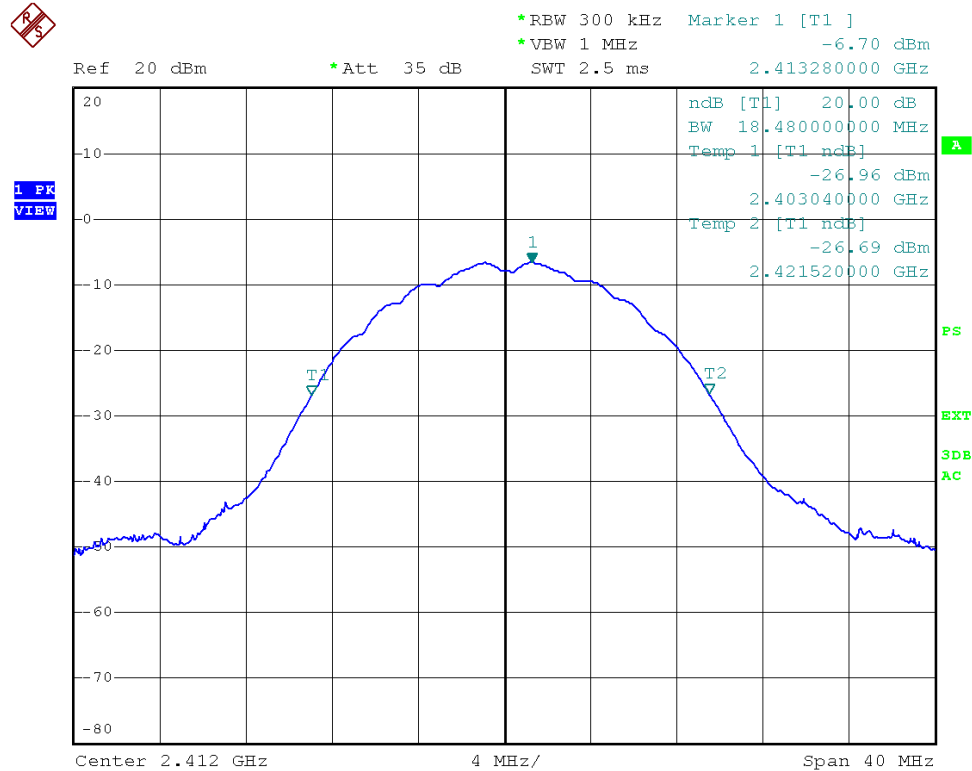
Test Mode: 802.11n (HT40)---Mid



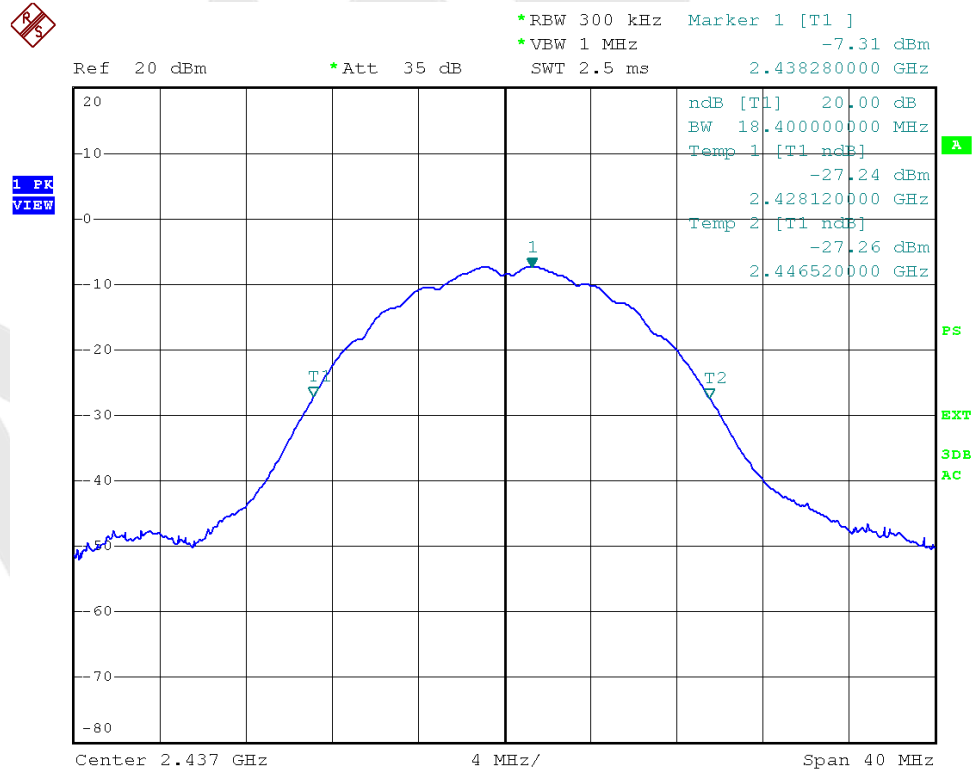
Test Mode: 802.11n (HT40)---High



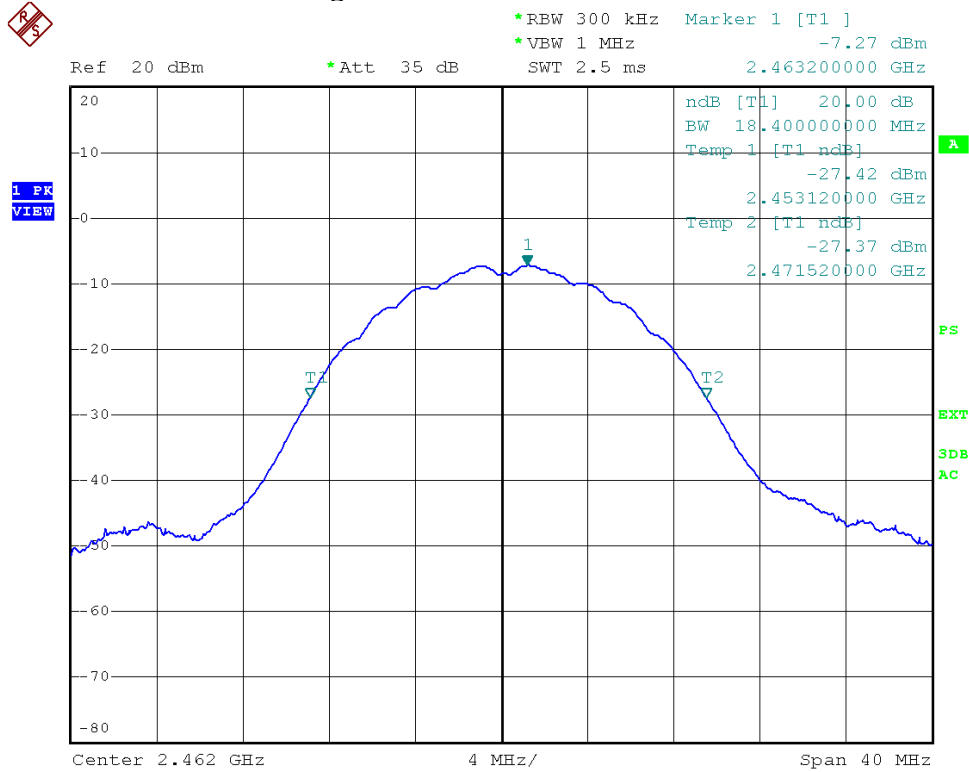
ANT B
Test Mode: 802.11b---Low



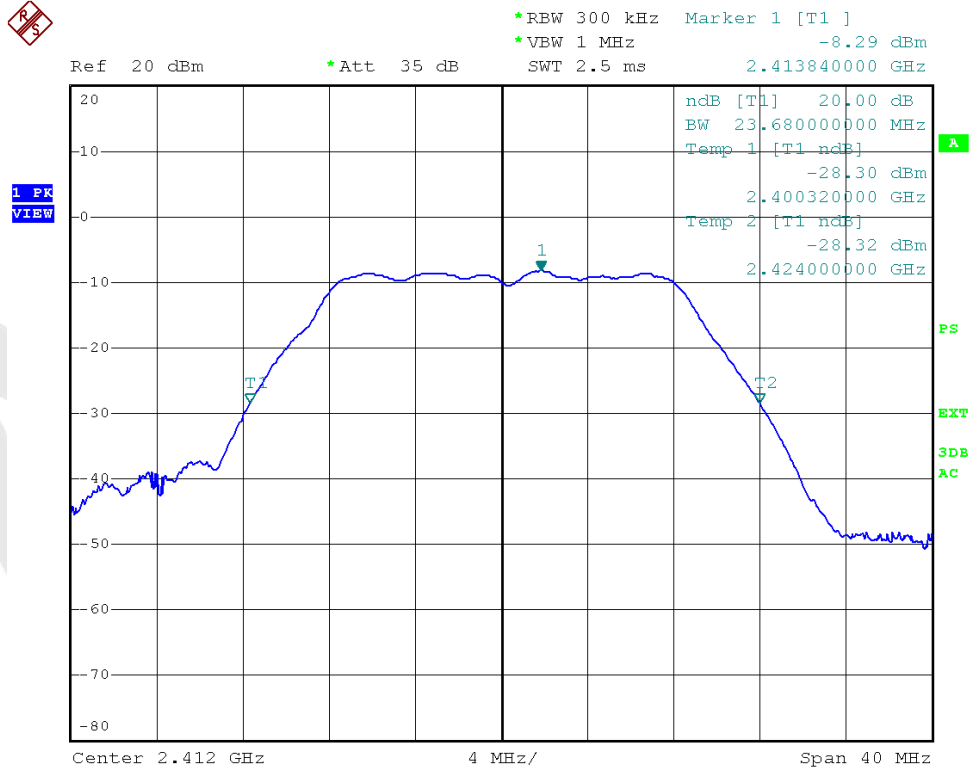
Test Mode: 802.11b---Mid



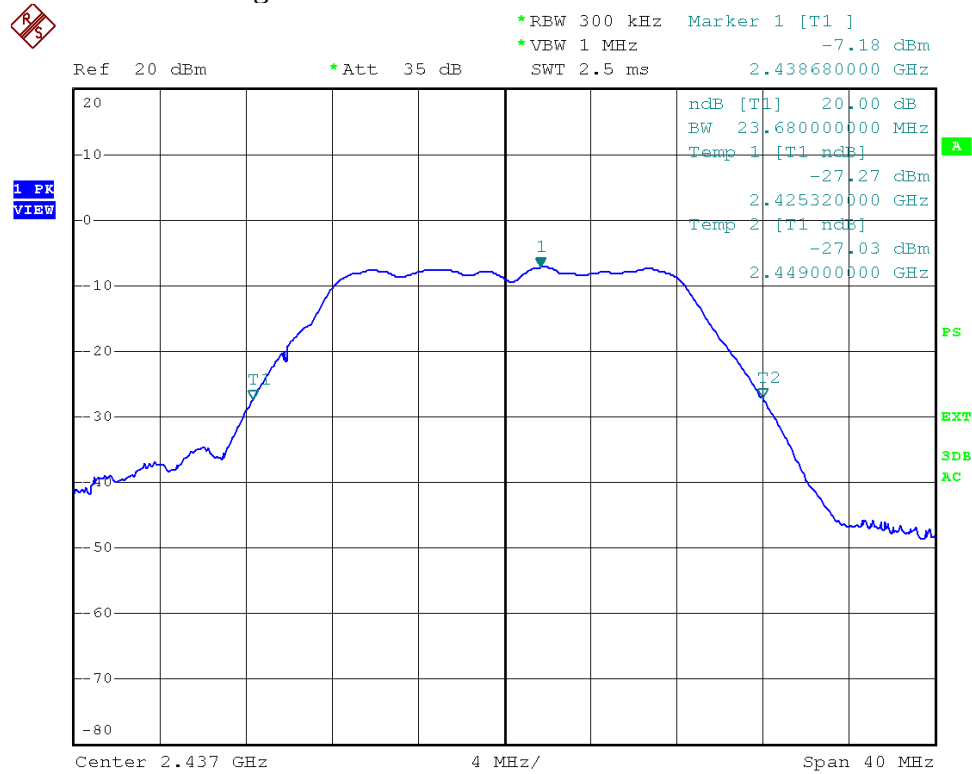
Test Mode: 802.11b---High



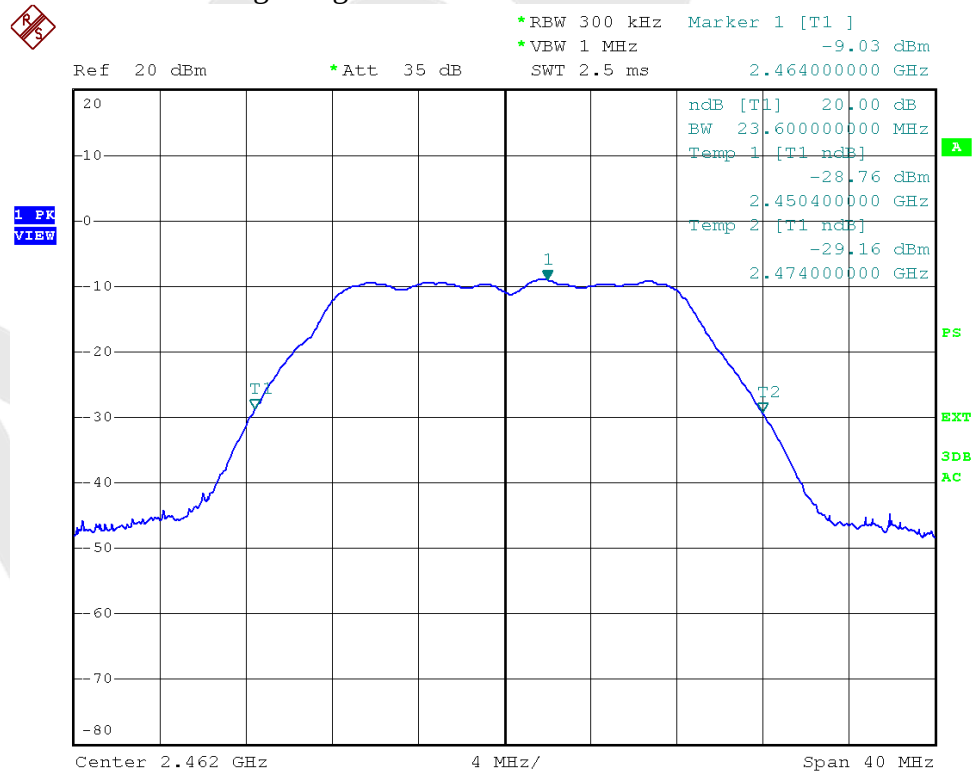
Test Mode: 802.11g---Low



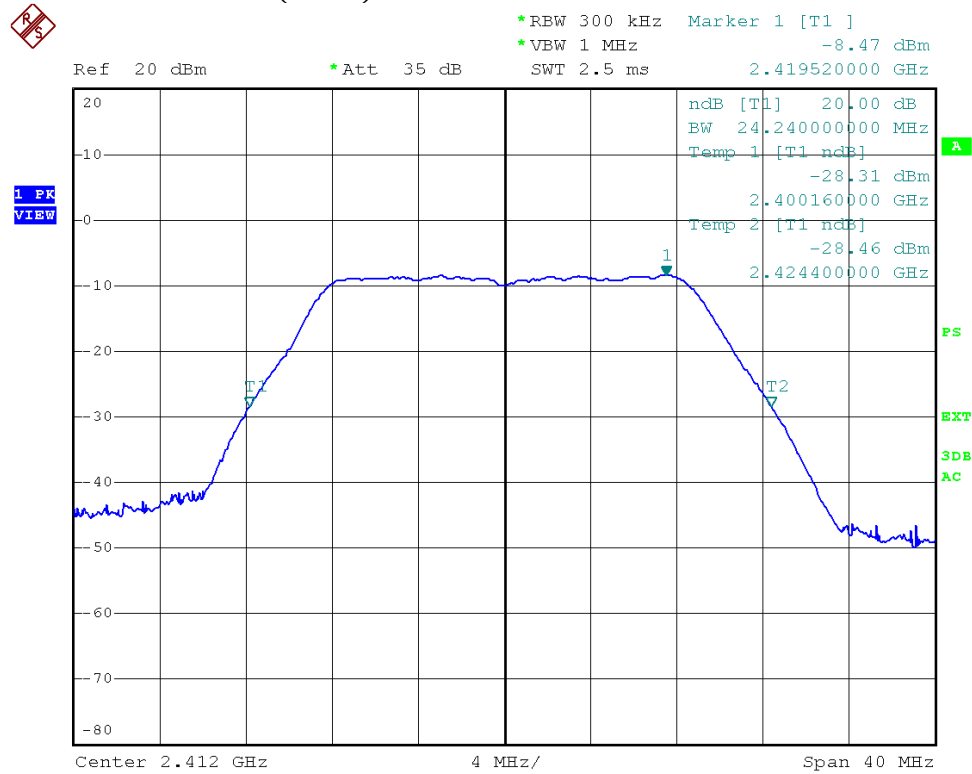
Test Mode: 802.11g---Mid



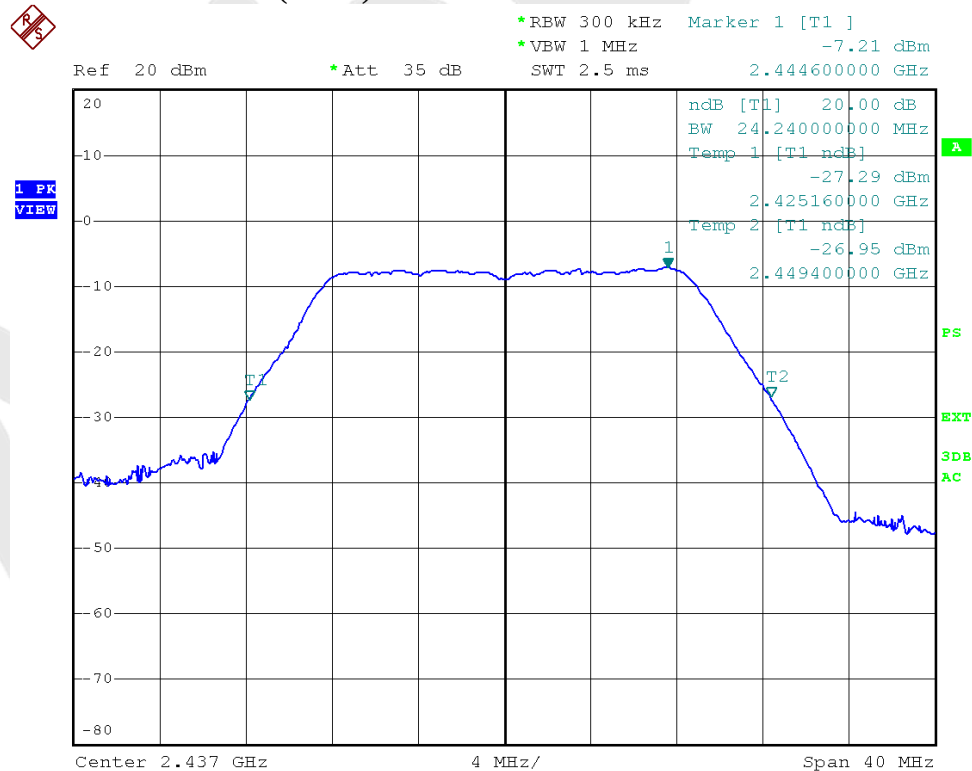
Test Mode: 802.11g---High



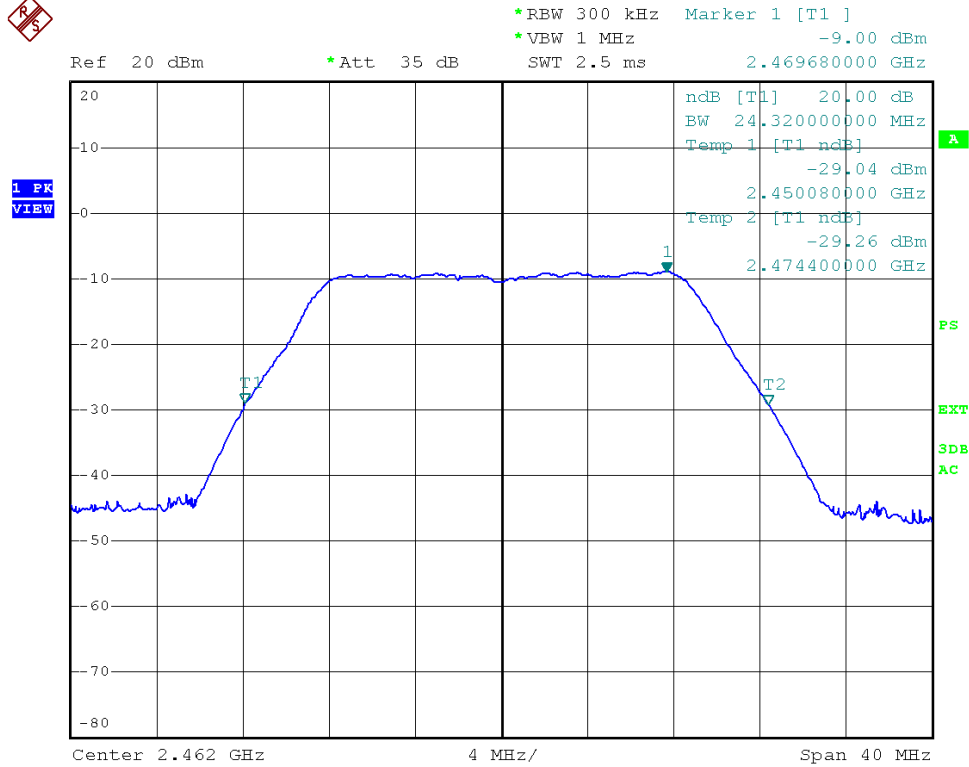
Test Mode: 802.11n (HT20)---Low



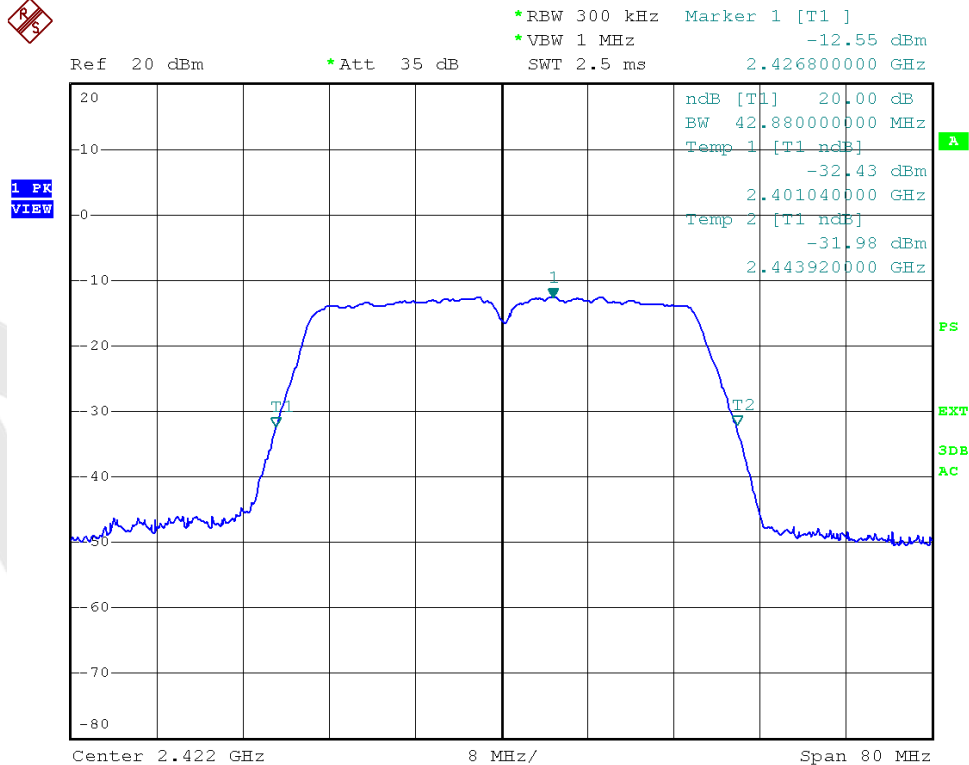
Test Mode: 802.11n (HT20)---Mid



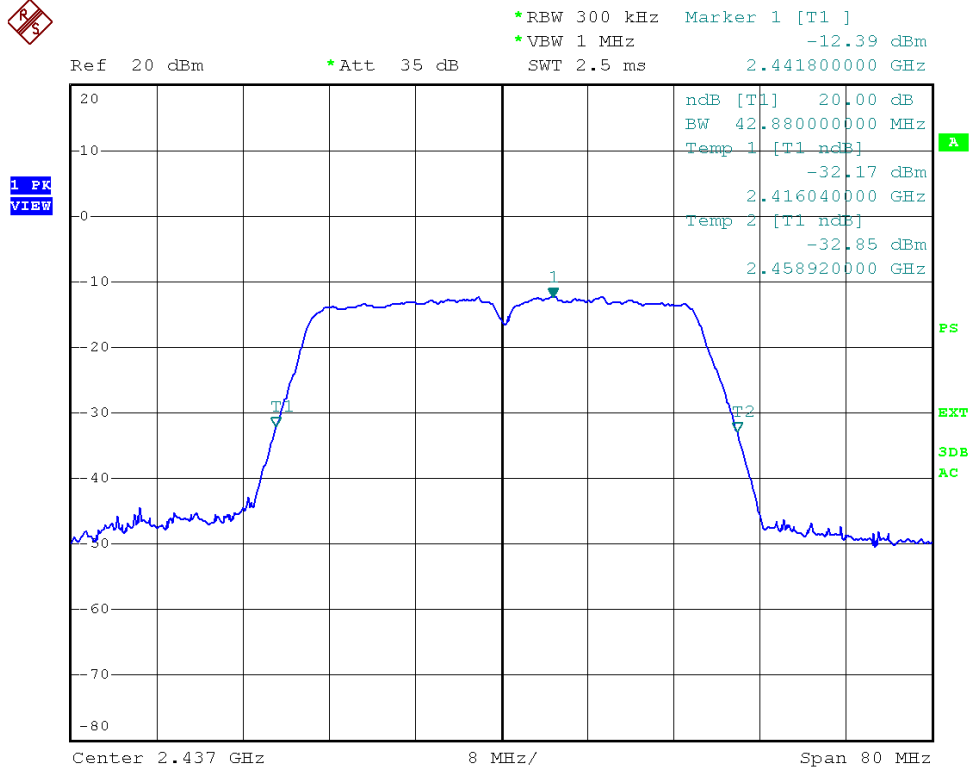
Test Mode: 802.11n (HT20)---High



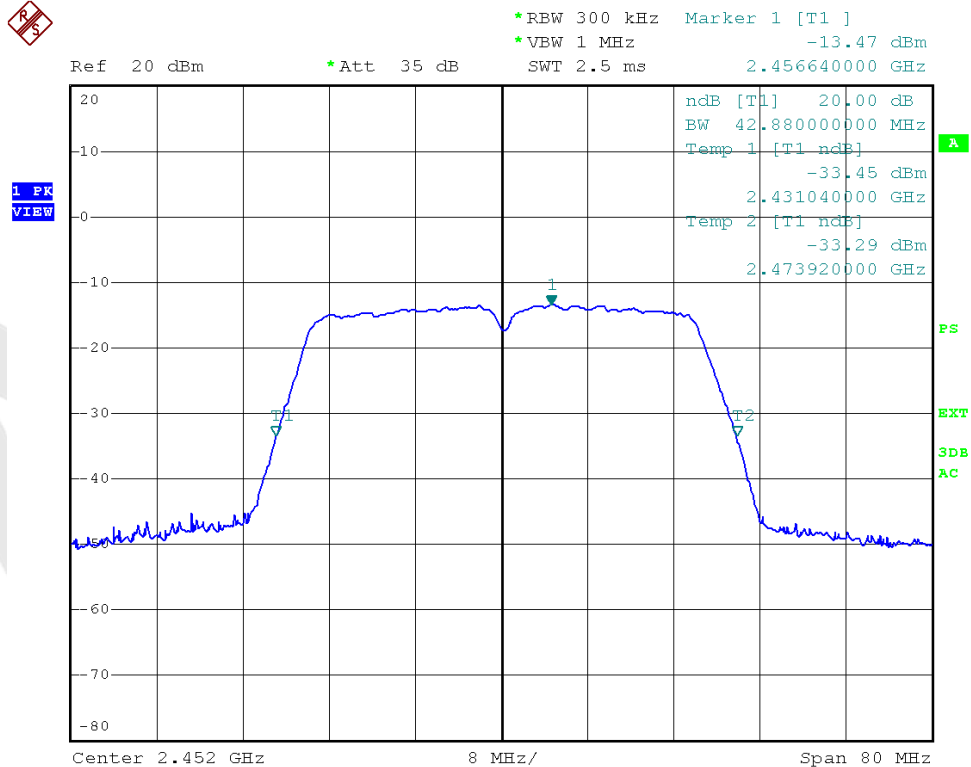
Test Mode: 802.11n (HT40)---Low



Test Mode: 802.11n (HT40)---Mid



Test Mode: 802.11n (HT40)---High



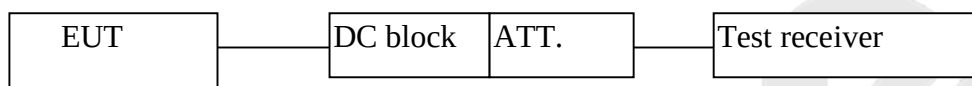
4.3. Maximum Output Power Test

a. Limit

The maximum peak output power of the intentional radiator shall not exceed the following:

1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt (30dBm).
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antenna of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

b. Configuration of Measurement



c. Data Rates

IEEE802.11b: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 1 Mbps data rate (worst case) are chosen for the final testing.

IEEE802.11g: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6 Mbps data rate (the worst case) are chosen for the final testing.

IEEE802.11n (HT20: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6.5Mbps data rate (the worst case) are chosen for the final testing.

IEEE802.11n (HT40: Channel 3(2422MHz), Channel 6(2437MHz) and Channel 9(2452MHz) with 13.5Mbps data rate (the worst case) are chosen for the final testing.

d. Test Procedure

This test was according the kDB 558074 9.2.2:

1. Set span to at least 1.5 times the OBW.
2. Set the RBW =1~5% of the OBW, not to exceed 1MHz.
3. Set VBW $\geq 3 \times$ RBW.
4. Detector = Average.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

e. Test Equipment

Same as the equipment listed in 4.2.

f. Test Results

Pass.

g. Test Data

Antenna A Gain= 2 dBi

Antenna B Gain= 2 dBi

Array Gain= 5 dBi= $10 \cdot \log((10^{(2/10)} + (10^{(2/10)})))$

ANT A

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2412	7.84	30	1	Pass
Mid	2437	7.82			Pass
High	2462	8.08			Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2412	4.76	30	1	Pass
Mid	2437	6.65			Pass
High	2462	5.14			Pass

Test mode: IEEE 802.11n (HT20)

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2412	4.92	30	1	Pass
Mid	2437	6.72			Pass
High	2462	5.21			Pass

Test mode: IEEE 802.11n (HT40)

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2422	3.40	30	1	Pass
Mid	2437	4.35			Pass
High	2452	3.73			Pass

ANT B

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2412	12.17	30	1	Pass
Mid	2437	12.86			Pass
High	2462	12.42			Pass

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2412	11.01	30	1	Pass
Mid	2437	11.16			Pass
High	2462	11.55			Pass

Test mode: IEEE 802.11n (HT20)

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2412	11.93	30	1	Pass
Mid	2437	11.12			Pass
High	2462	14.38			Pass

Test mode: IEEE 802.11n (HT40)

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2422	10.51	30	1	Pass
Mid	2437	10.61			Pass
High	2452	10.92			Pass

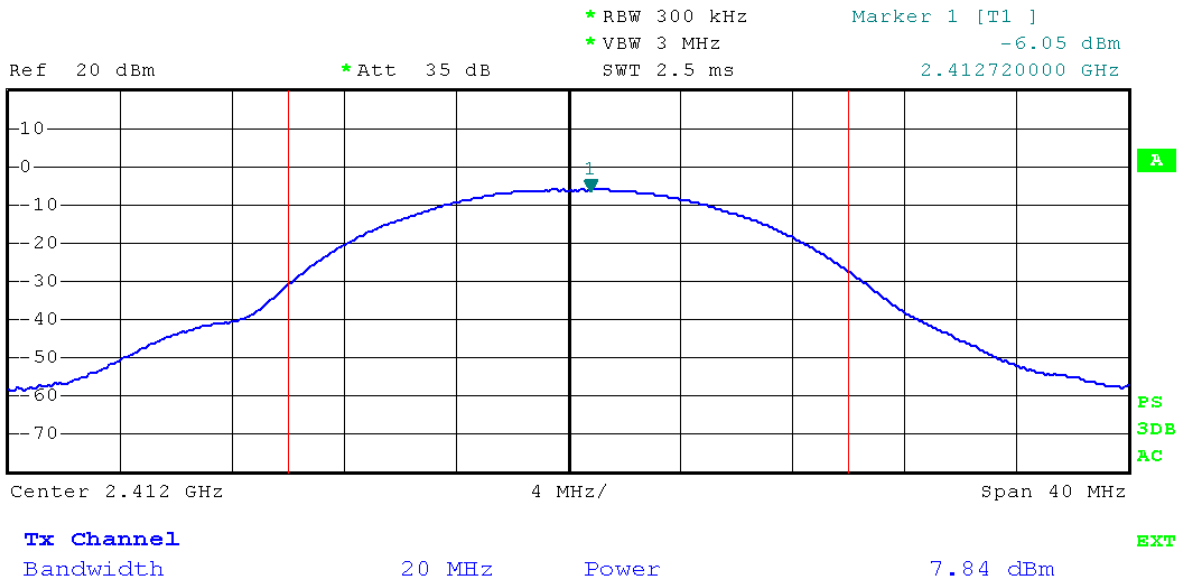
Channel	Channel Frequency (MHz)	ANT A Output Power (dBm)	ANT B Output Power (dBm)	Data Rate (Mbps)	MIMO Output Power (dBm)	Limit (dBm)
802.11n (20M MIMO) mode						
Low	2412	4.92	11.93	MCS0	12.72	30
Middle	2437	6.72	11.12	MCS0	12.47	30
High	2462	5.21	14.38	MCS0	14.88	30
802.11n (40M MIMO) mode						
Low	2422	3.40	10.51	MCS0	11.28	30
Middle	2437	4.35	10.61	MCS0	11.53	30
High	2452	3.73	10.92	MCS0	11.68	30

ANT A

Test Mode: 802.11b---Low



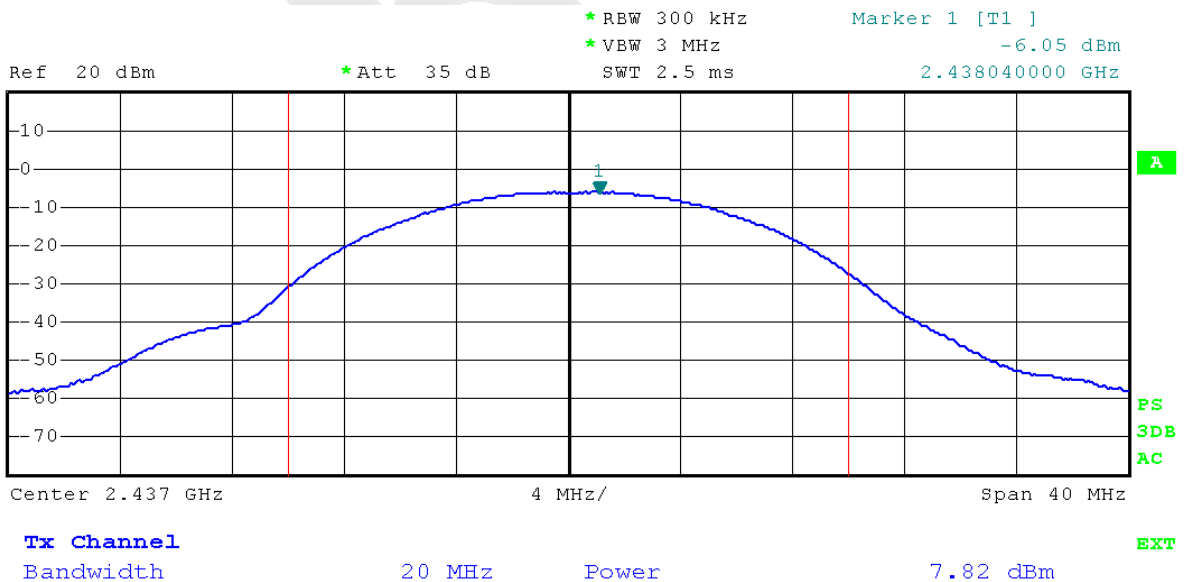
1 RM *
MAXH



Test Mode: 802.11b---Mid



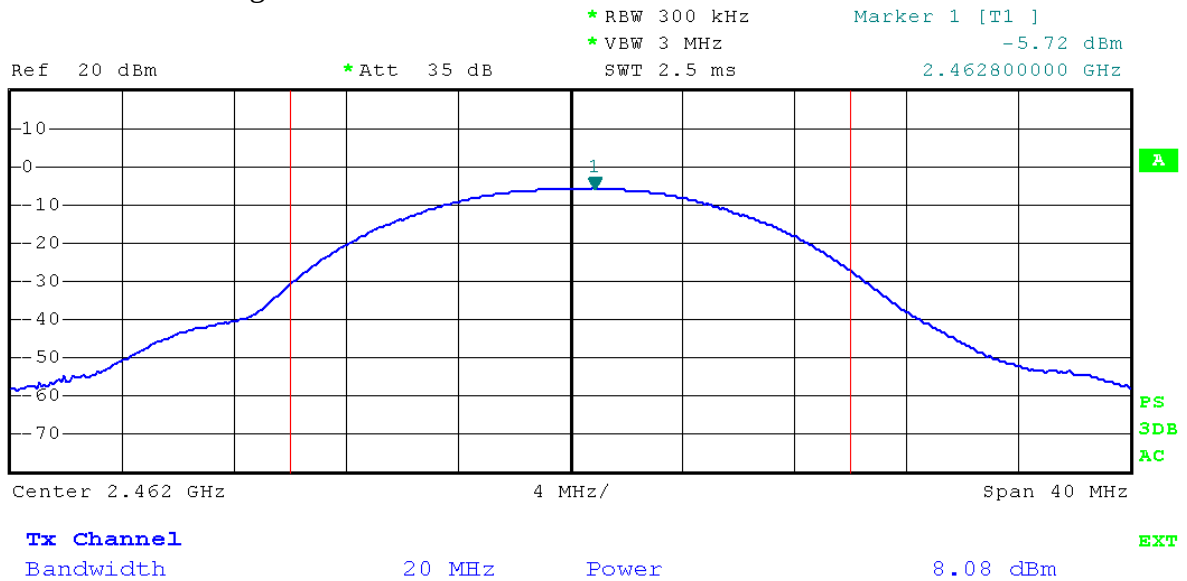
1 RM *
MAXH



Test Mode: 802.11b---High



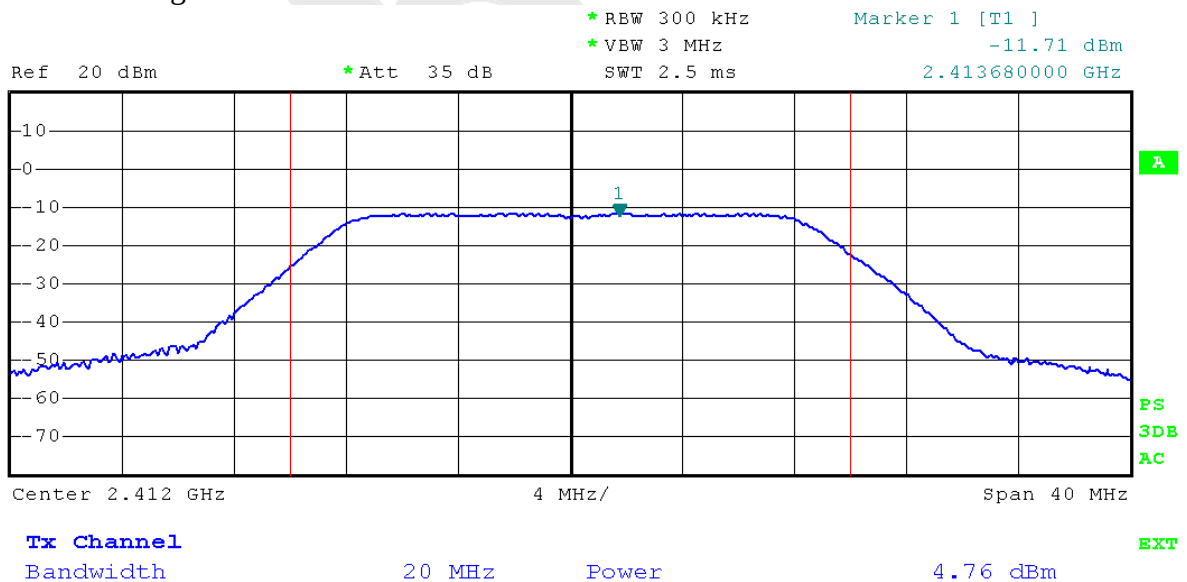
1 RM
MAXH



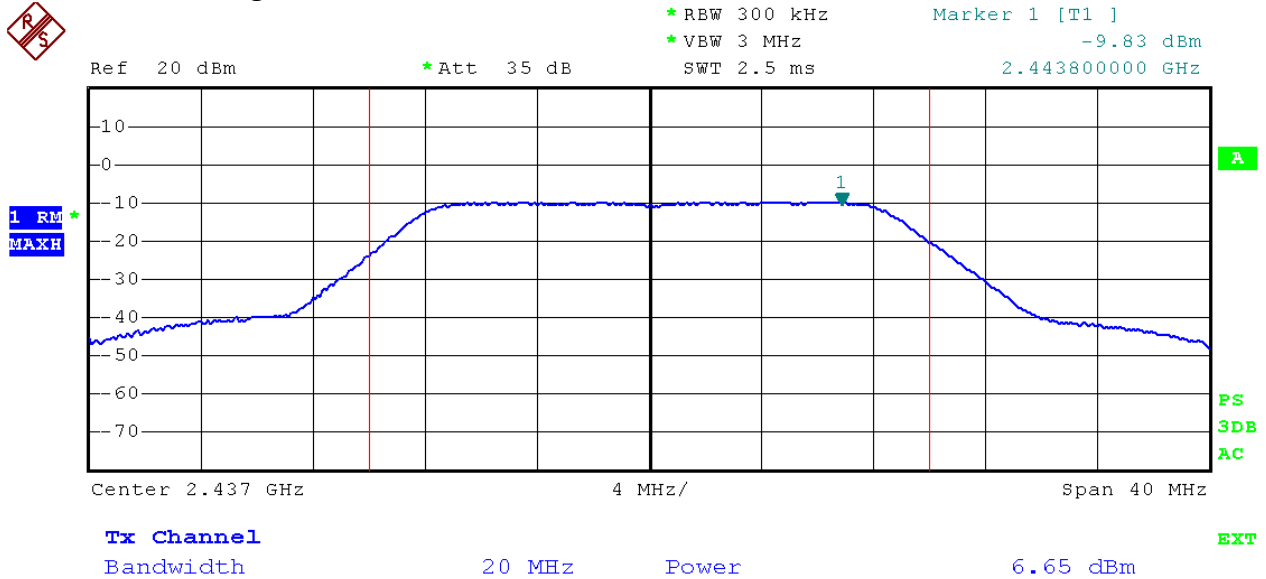
Test Mode: 802.11g---Low



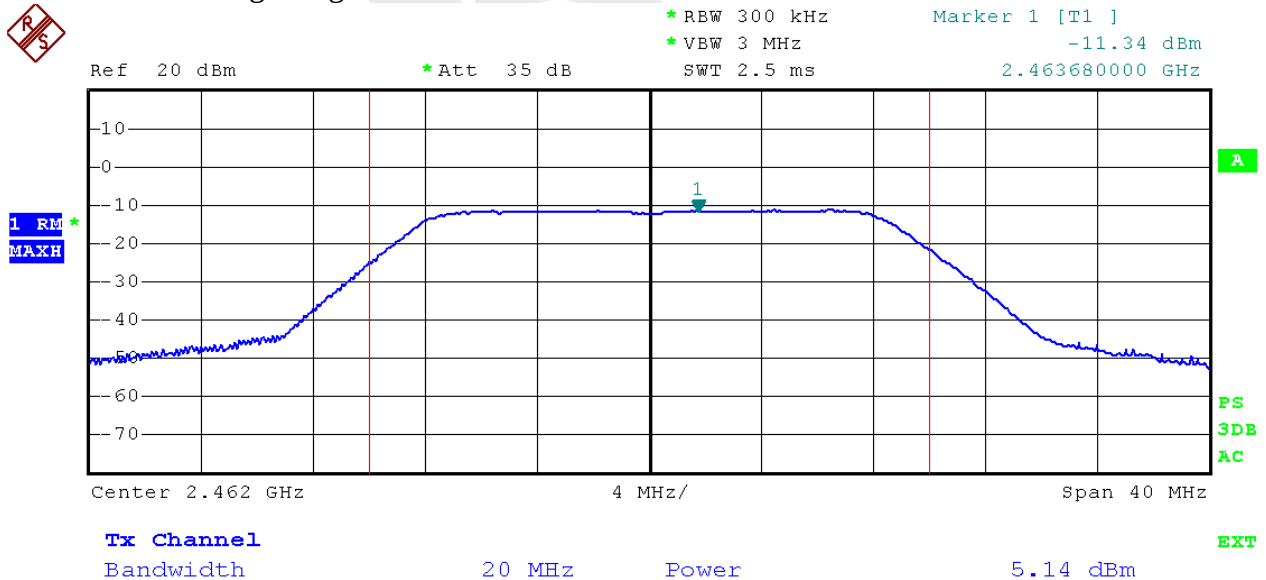
1 RM
MAXH



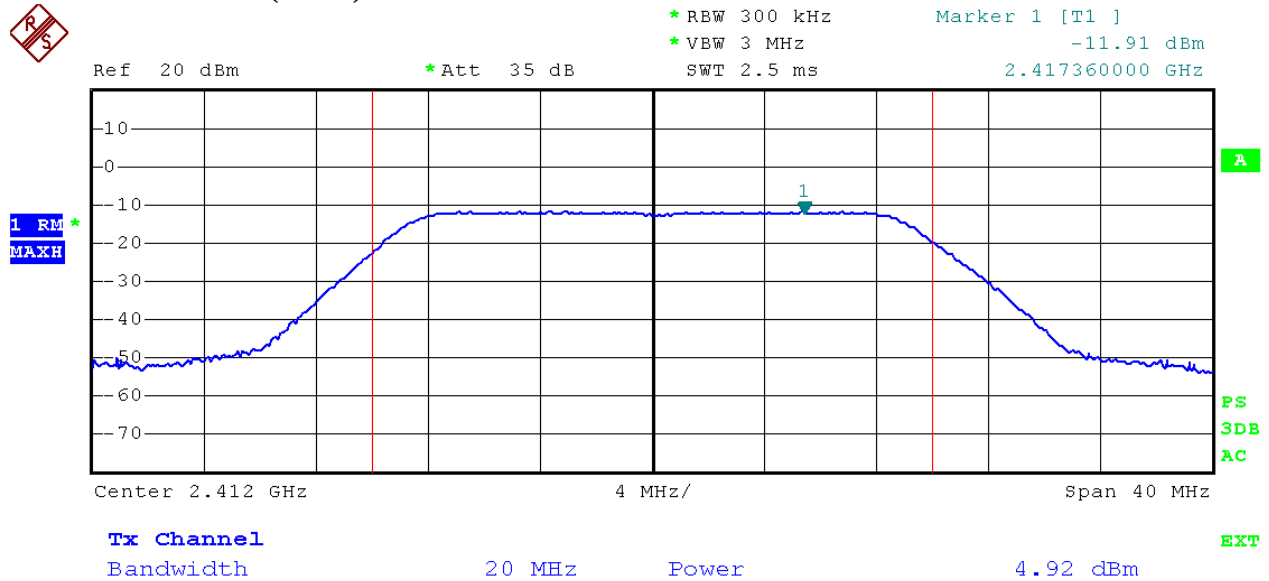
Test Mode: 802.11g---Mid



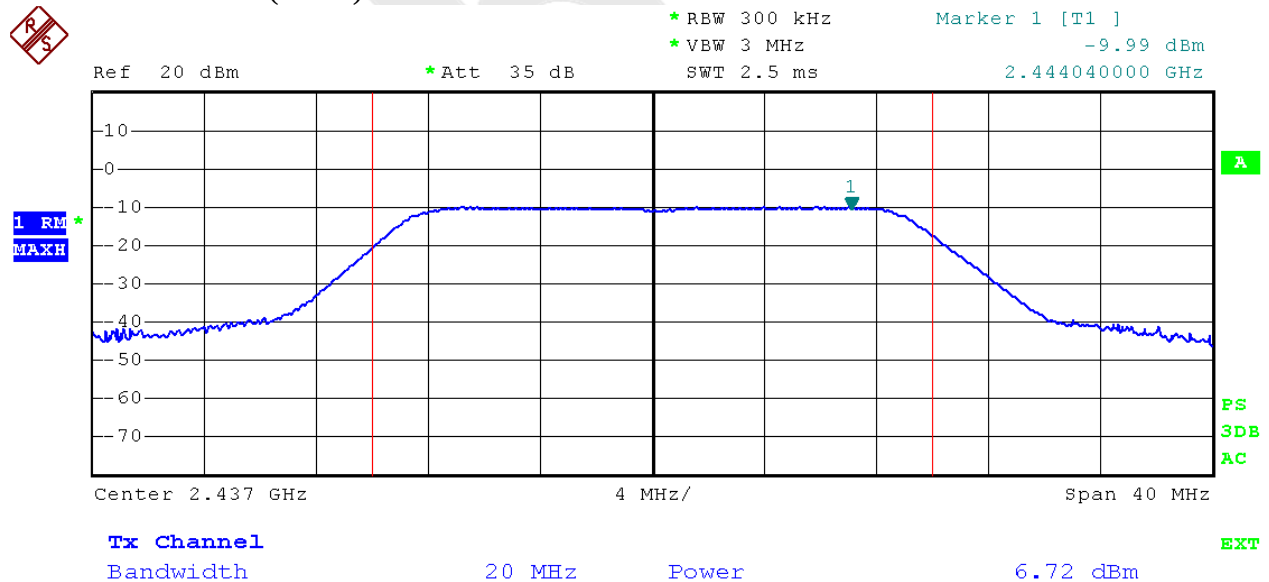
Test Mode: 802.11g---High



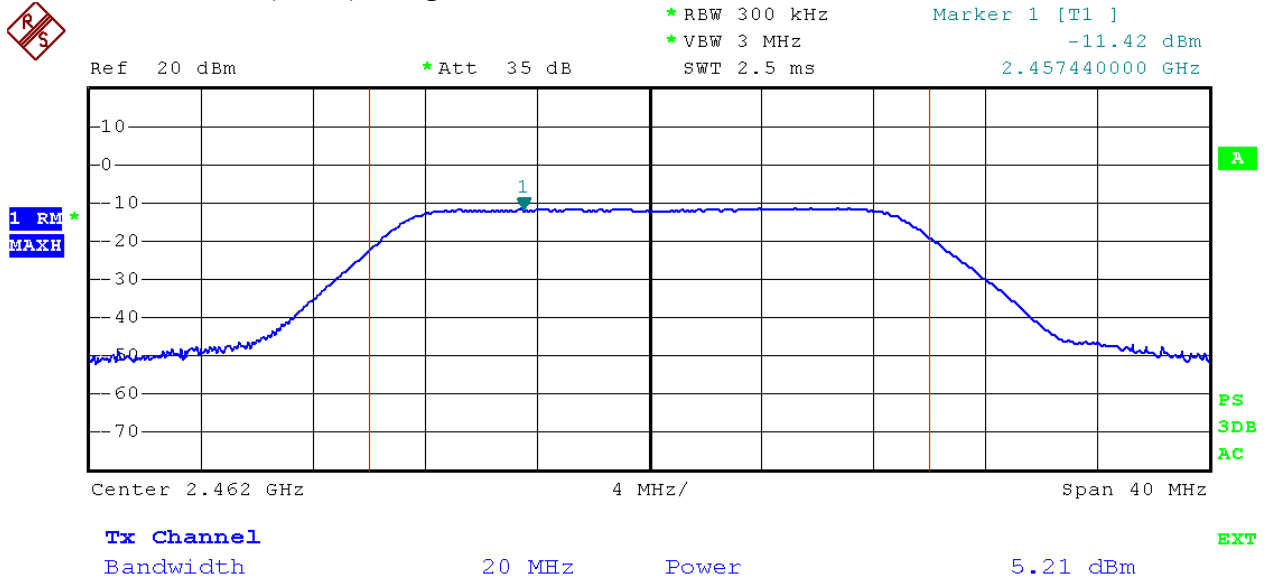
Test Mode: 802.11n(HT20)---Low



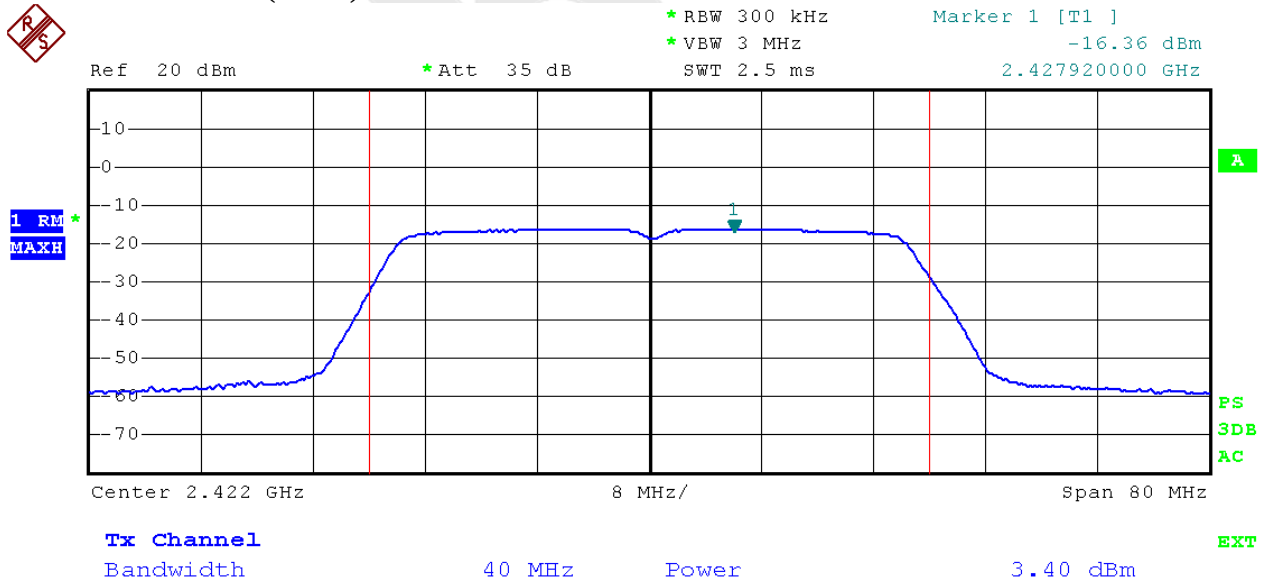
Test Mode: 802.11n(HT20)---Mid



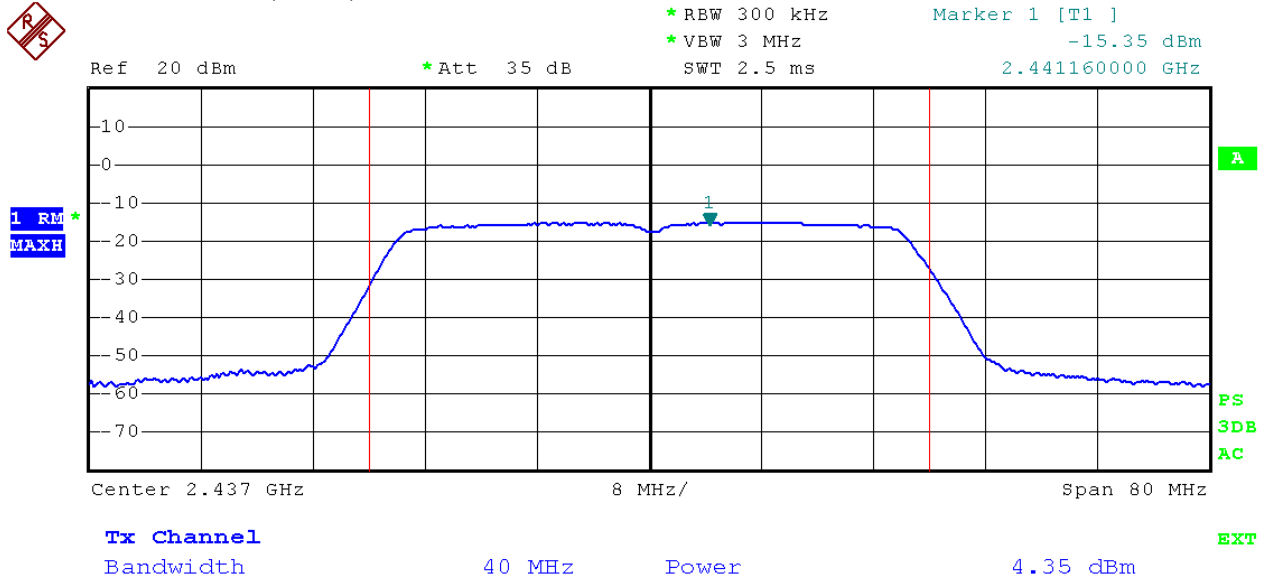
Test Mode: 802.11n(HT20)---High



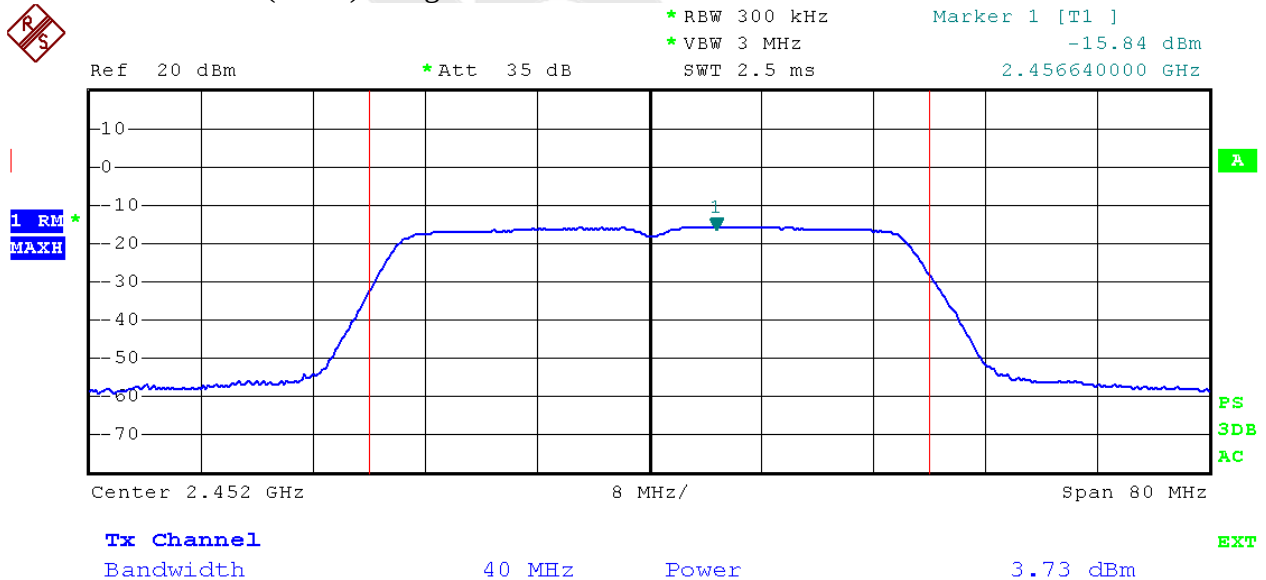
Test Mode: 802.11n(HT40)---Low



Test Mode: 802.11n(HT40)---Mid

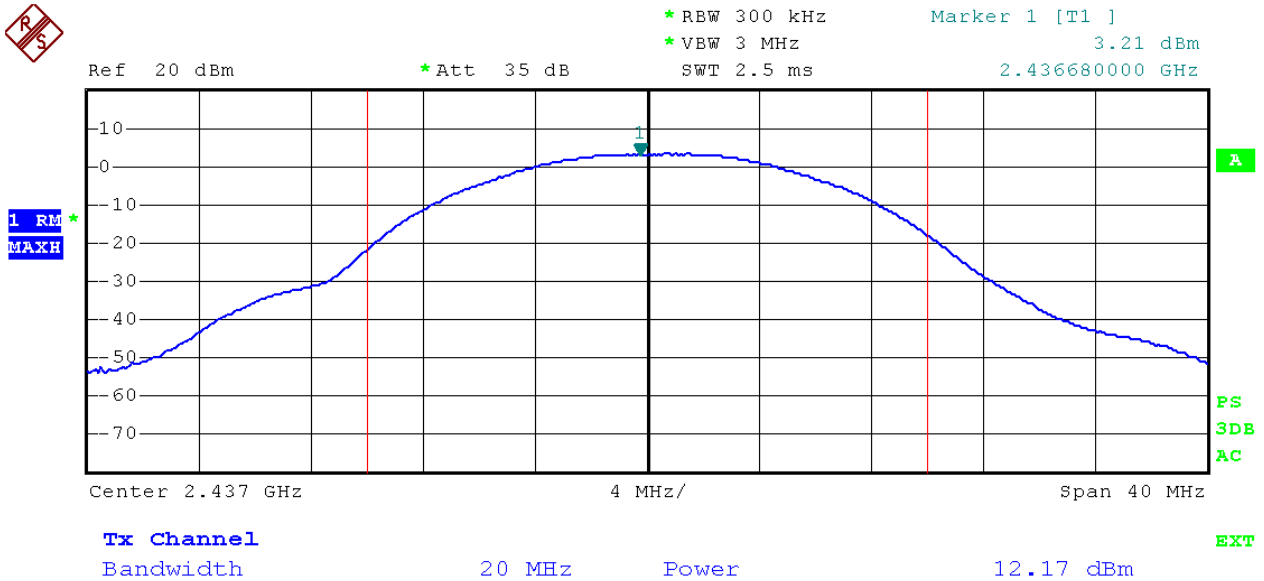


Test Mode: 802.11n(HT40)---High

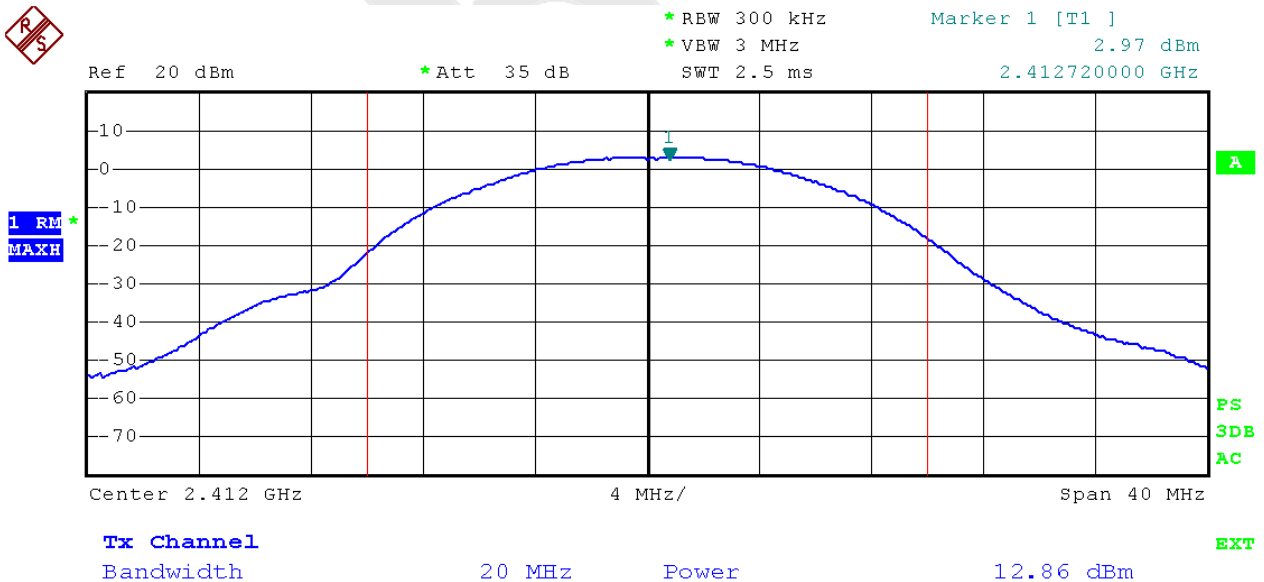


ANT B

Test Mode: 802.11b---Low



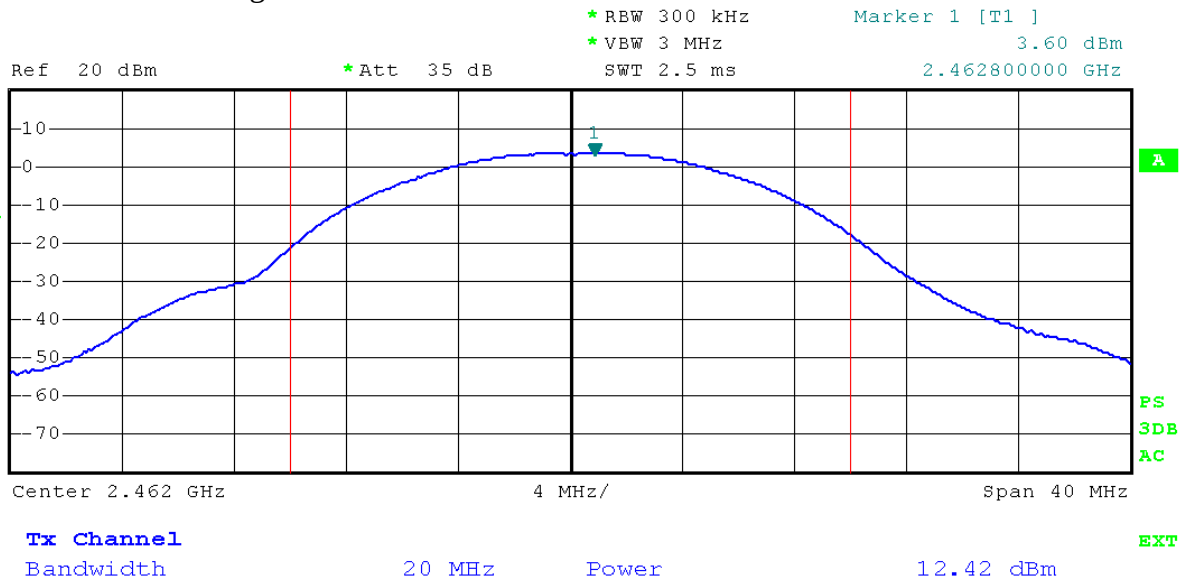
Test Mode: 802.11b---Mid



Test Mode: 802.11b---High



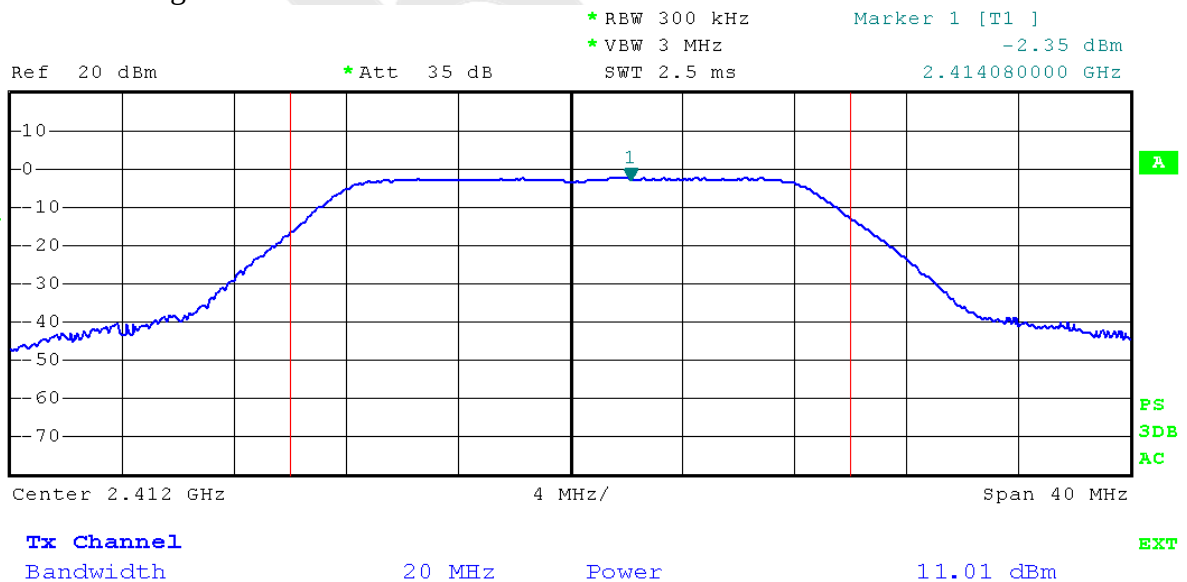
1 RM
MAXH



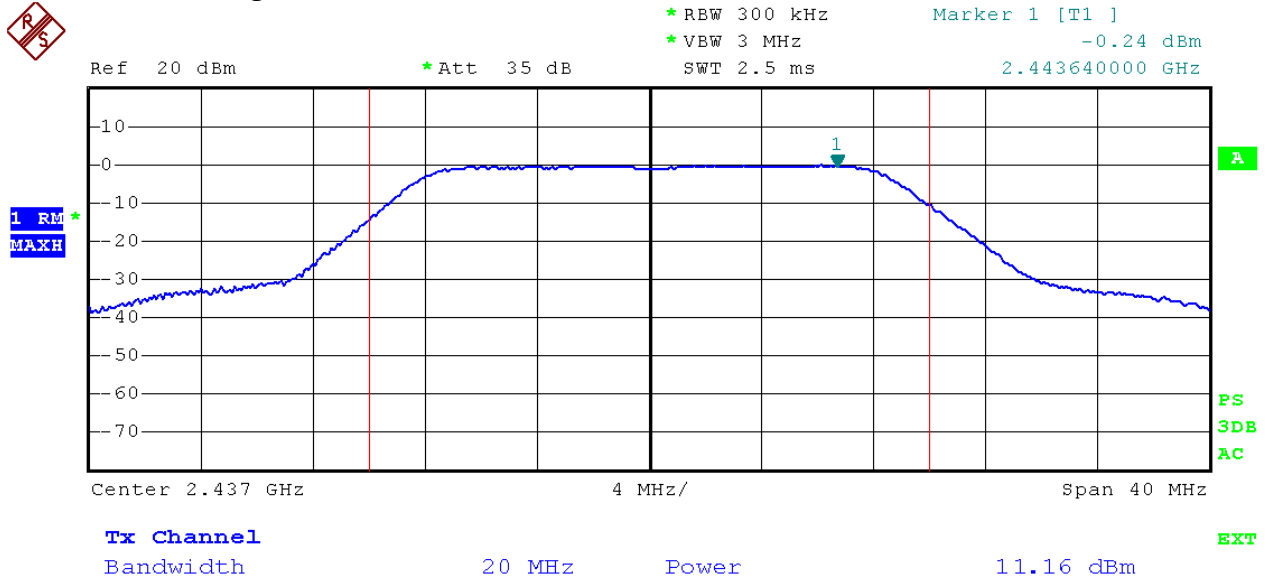
Test Mode: 802.11g---Low



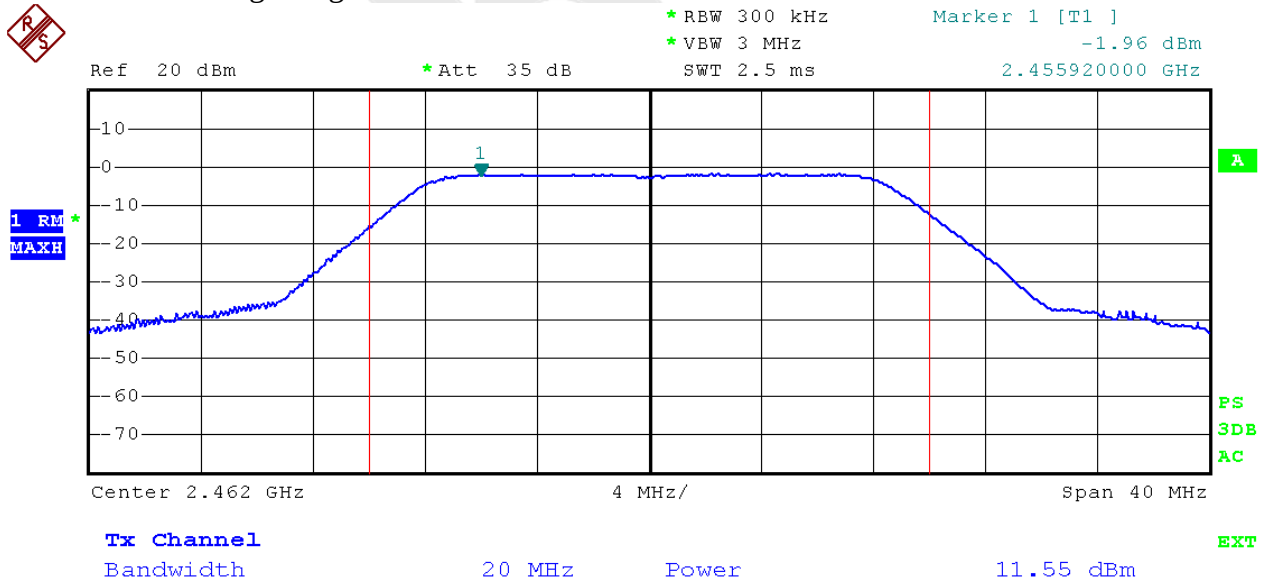
1 RM
MAXH



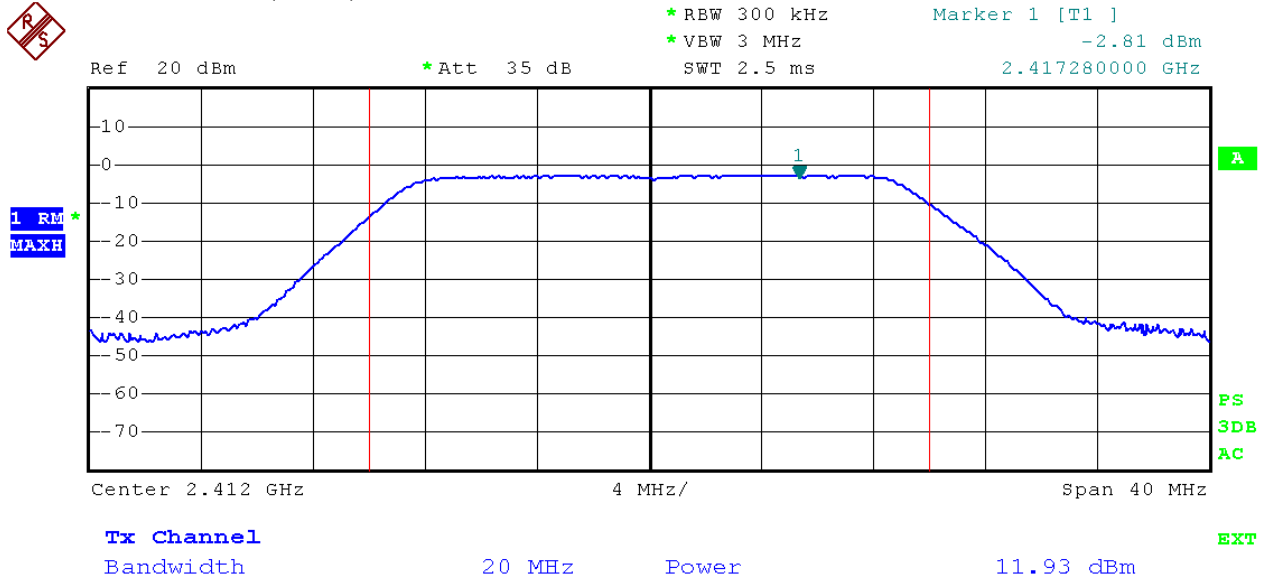
Test Mode: 802.11g---Mid



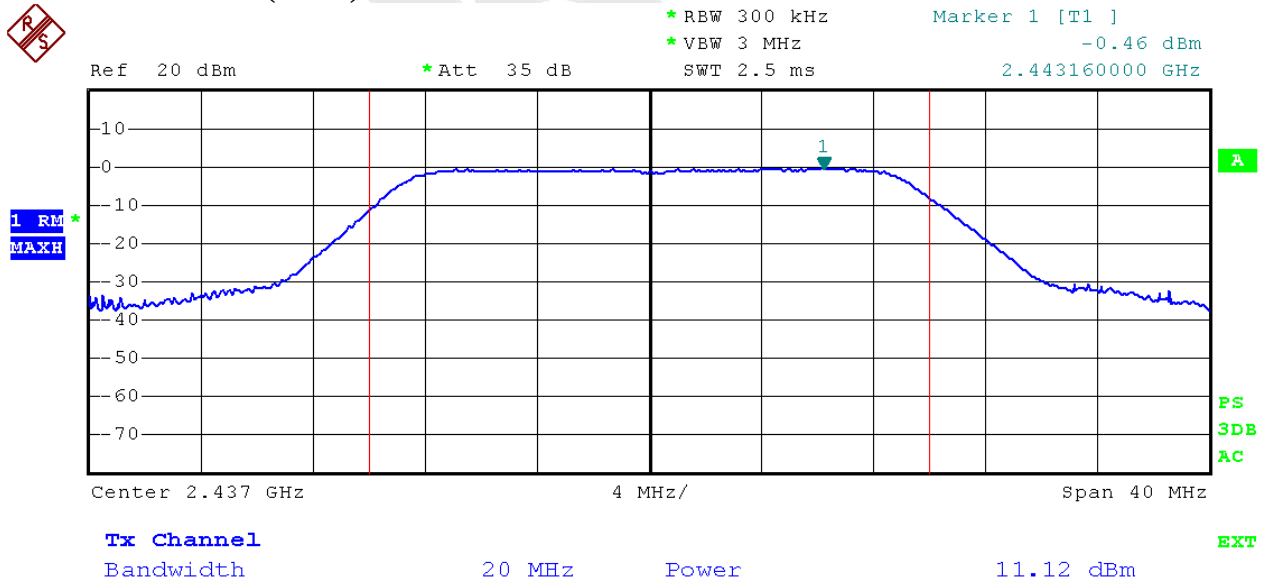
Test Mode: 802.11g---High



Test Mode: 802.11n(HT20)---Low



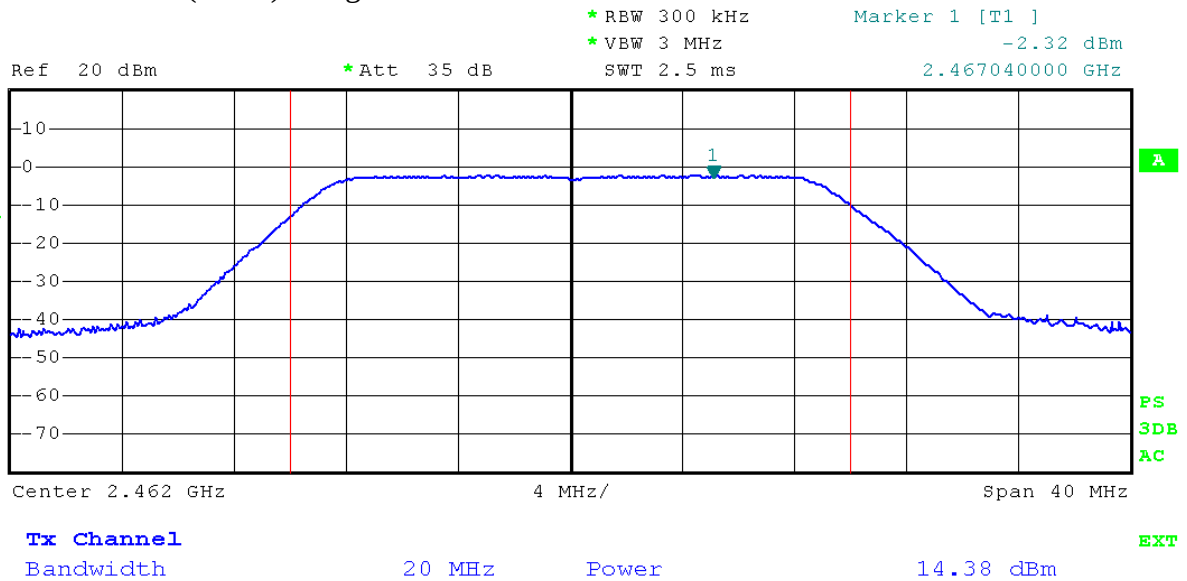
Test Mode: 802.11n(HT20)---Mid



Test Mode: 802.11n(HT20)---High



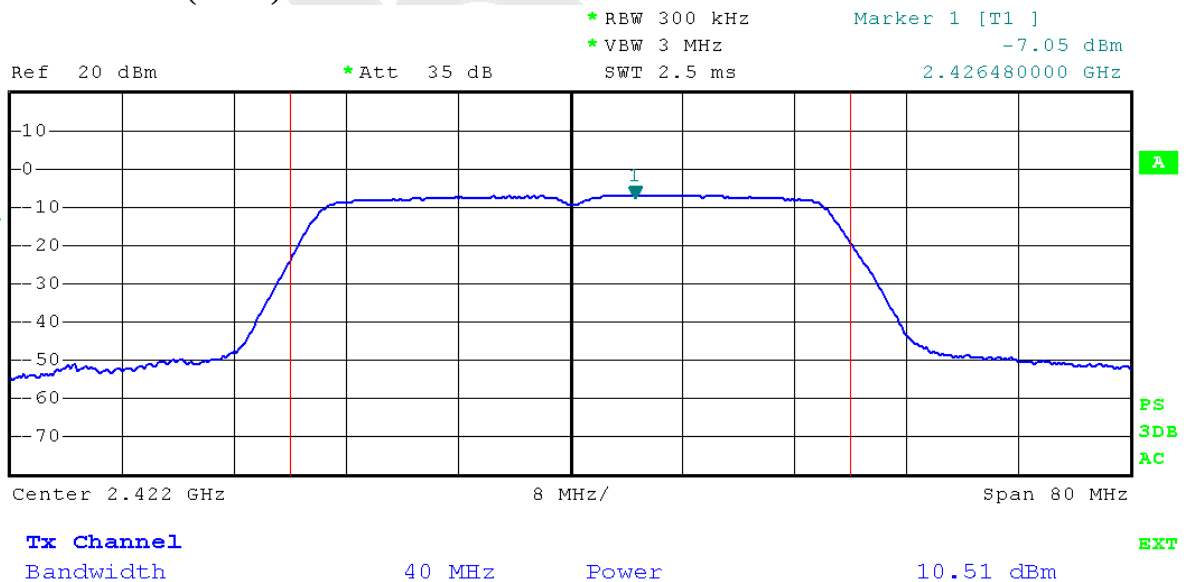
1 RM
MAXH



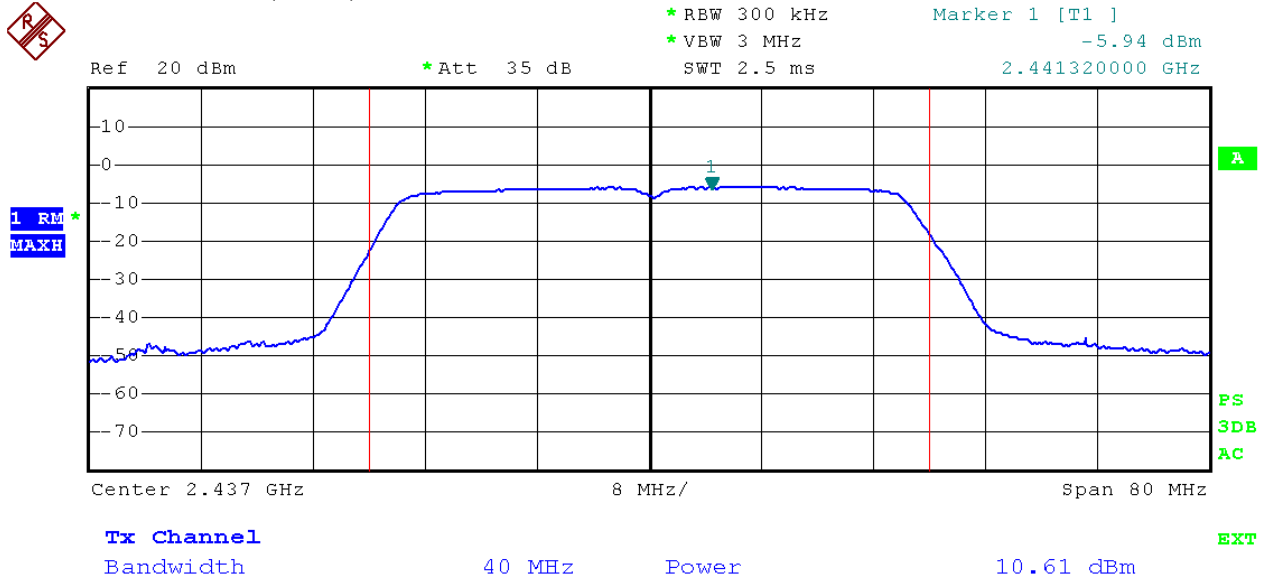
Test Mode: 802.11n(HT40)---Low



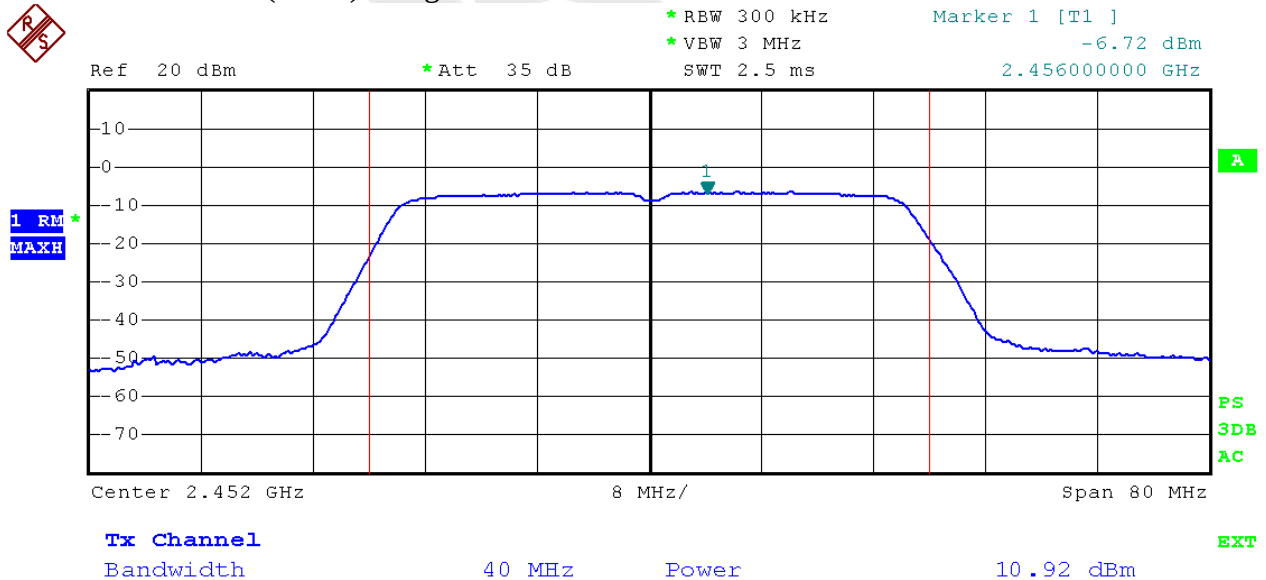
1 RM
MAXH



Test Mode: 802.11n(HT40)---Mid



Test Mode: 802.11n(HT40)---High



4.4. Band Edges Measurement

a. Limit

According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

b. Test Procedure

1. Conducted Method:

- 1) Set RBW=100KHz, VBW=300KHz
- 2) Detector=peak
- 3) Sweep time= auto
- 4) Trace mode=max hold.

1) For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane. The EUT is tested in 9*6*6 Chamber.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane. The EUT is tested in 9*6*6 Chamber.

2) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

3) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

4) Set both RBW and VBW of spectrum analyzer to 100kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT. If pass then set Spectrum Analyzer as below:

For below 1GHz:

The resolution bandwidth and video bandwidth of test receiver/ spectrum analyzer is 120kHz.

Detector: **Quasi-Peak**

For above 1GHz Peak measurement:

The resolution bandwidth of test receiver/ spectrum analyzer is 1MHz and video bandwidth is 3MHz.

Detector: **Peak**

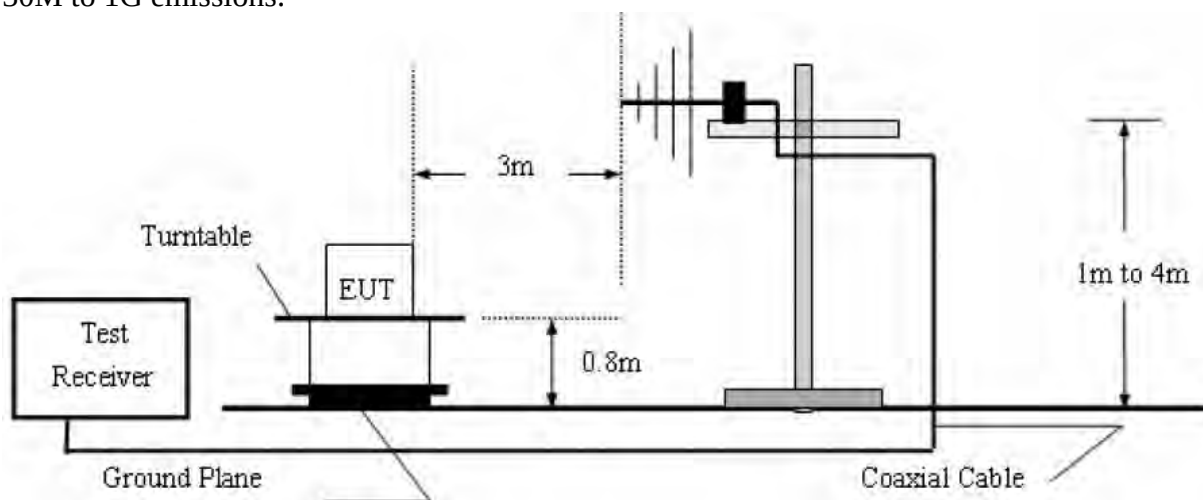
For above 1GHz average measurement:

The resolution bandwidth of test receiver/ spectrum analyzer is 1MHz and the video bandwidth is 10Hz.

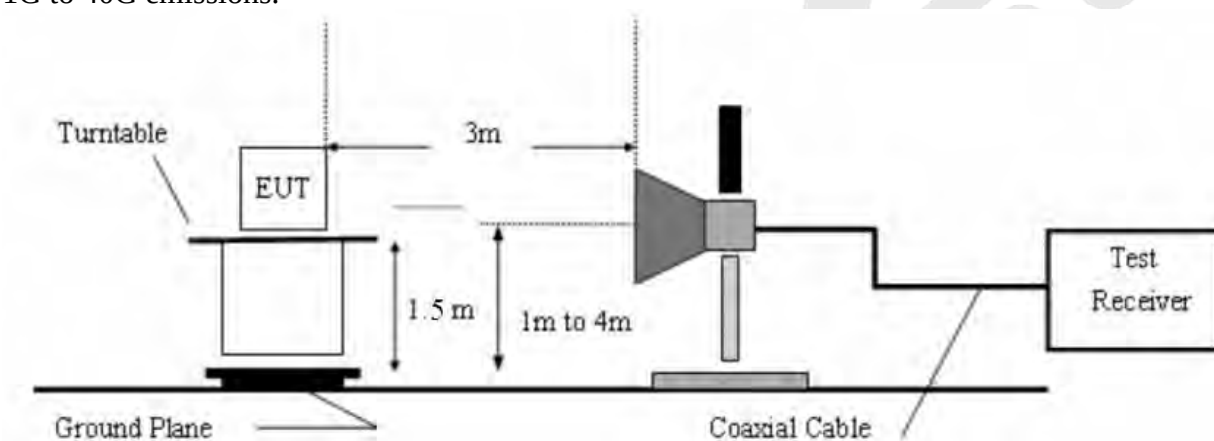
Detector: **Peak**

5) Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

30M to 1G emissions:



1G to 40G emissions:



c. Test Equipment

Same as the equipment listed in 4.2.

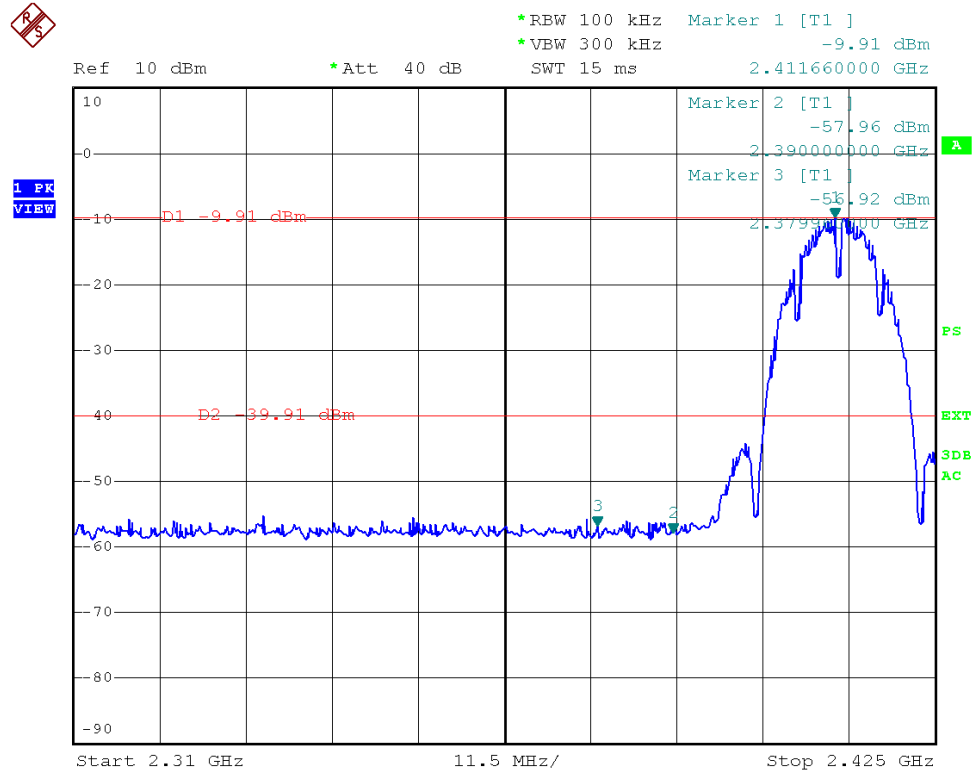
d. Test Results

Pass.

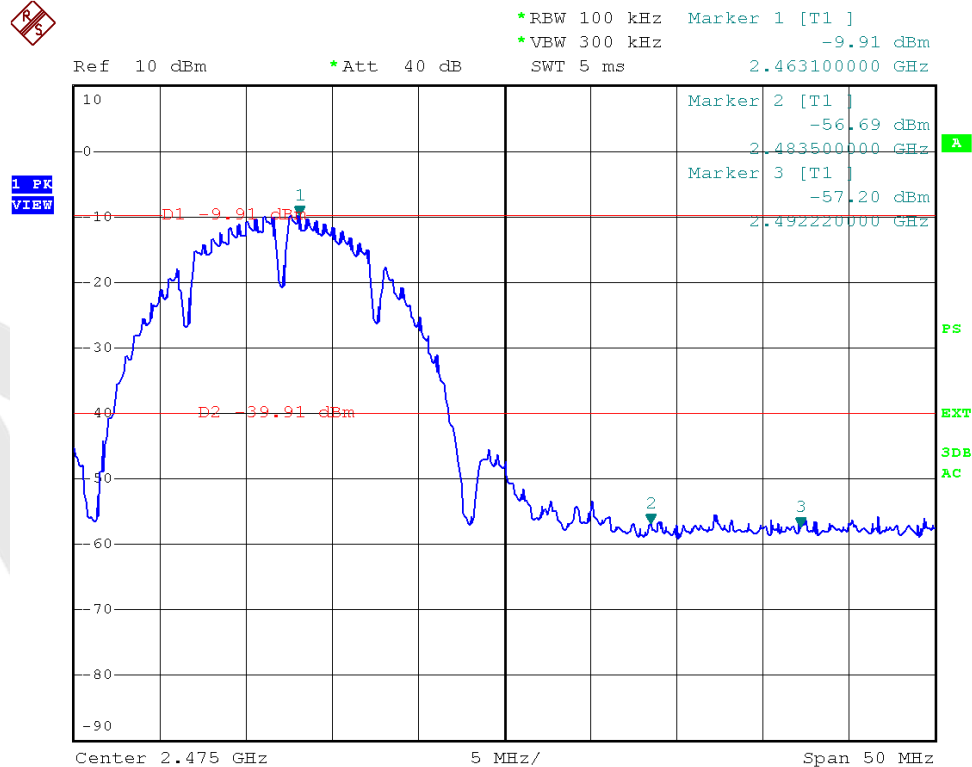
e. Test Plots

See the following page.

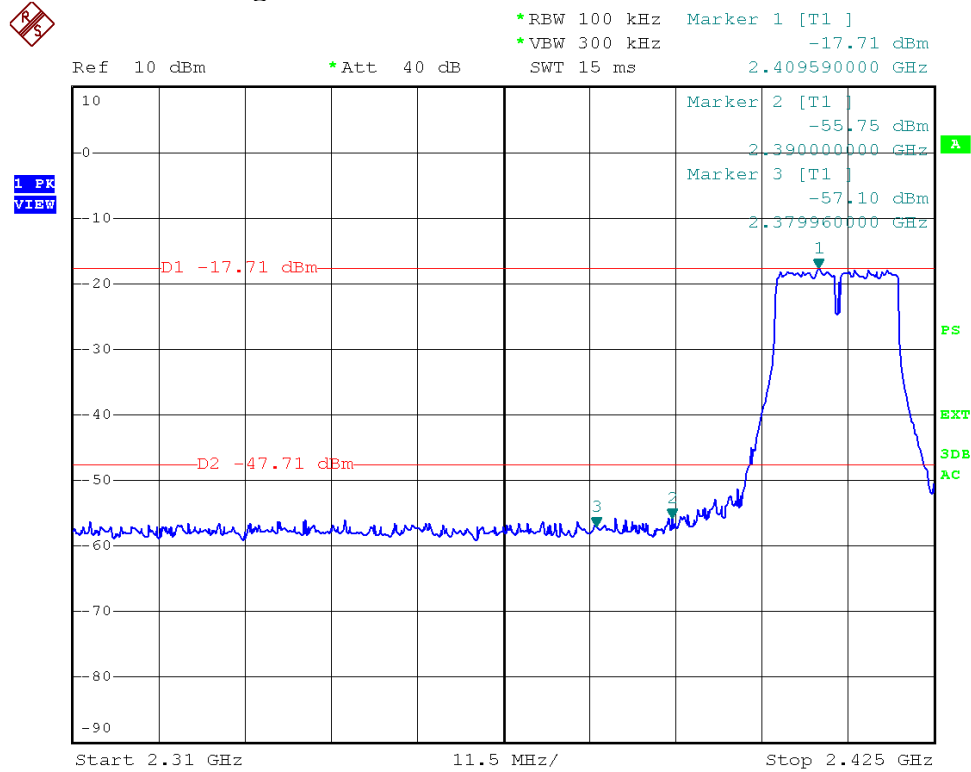
ANTA
Test Mode: 802.11b ---Low



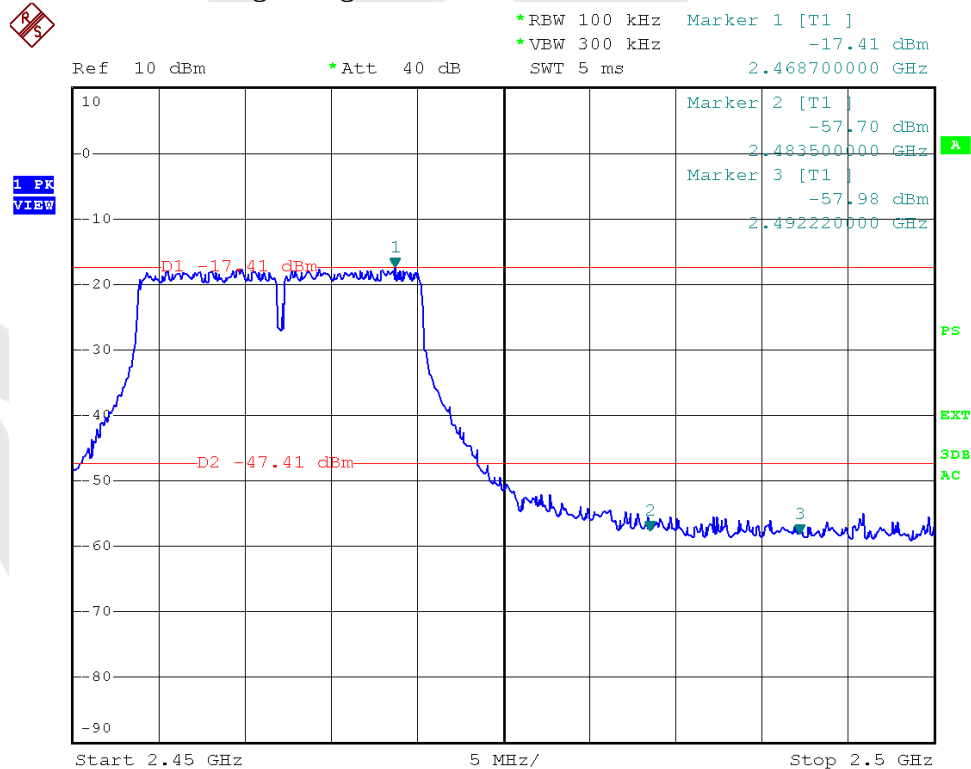
Test Mode: 802.11b ---High



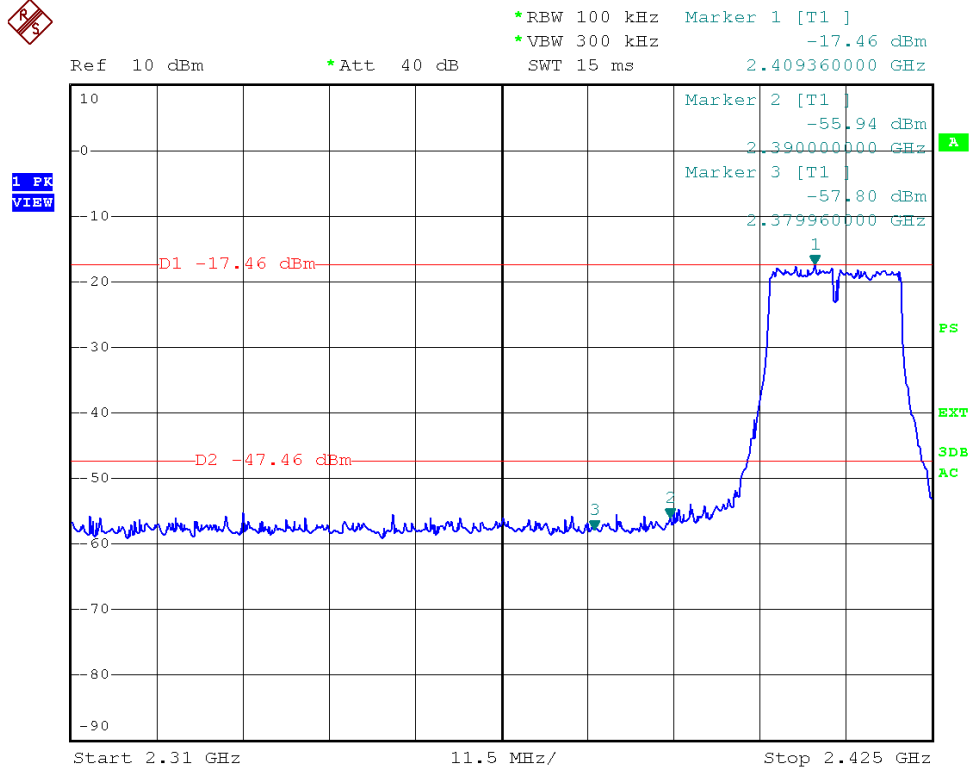
Test Mode: 802.11g ---Low



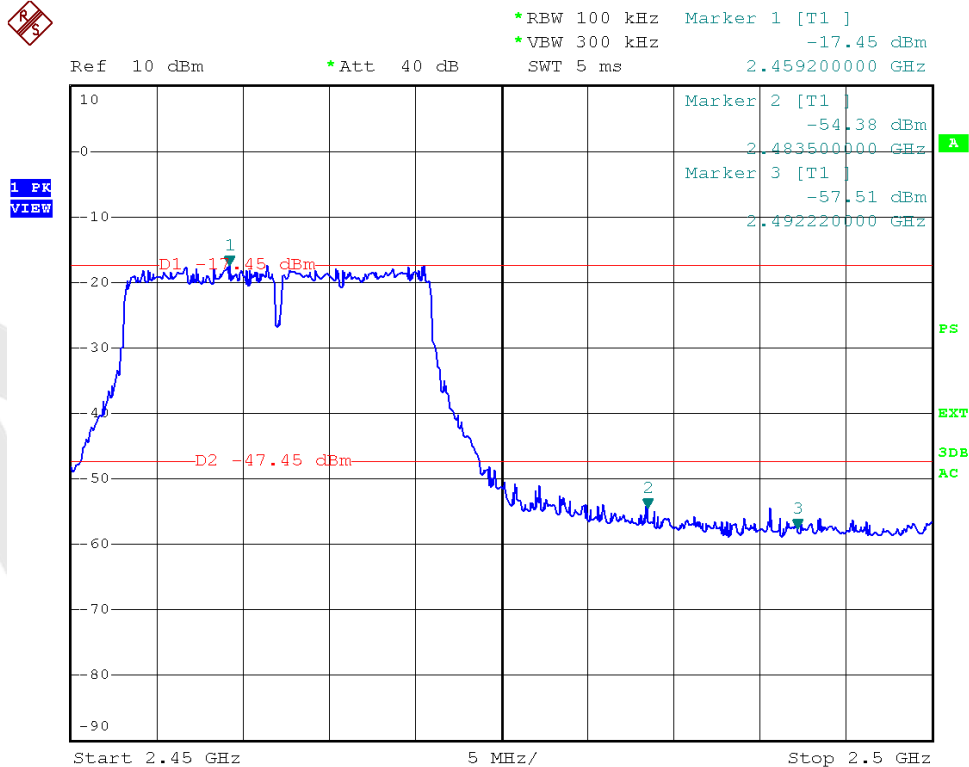
Test Mode: 802.11g ---High



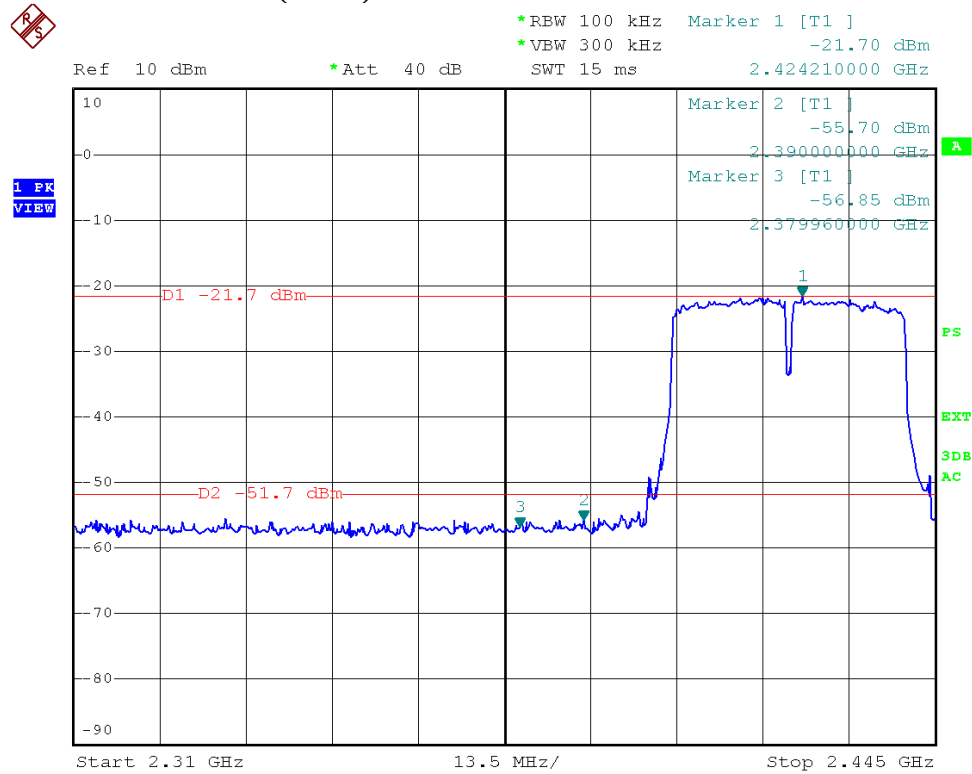
Test Mode: 802.11n (HT20) ---Low



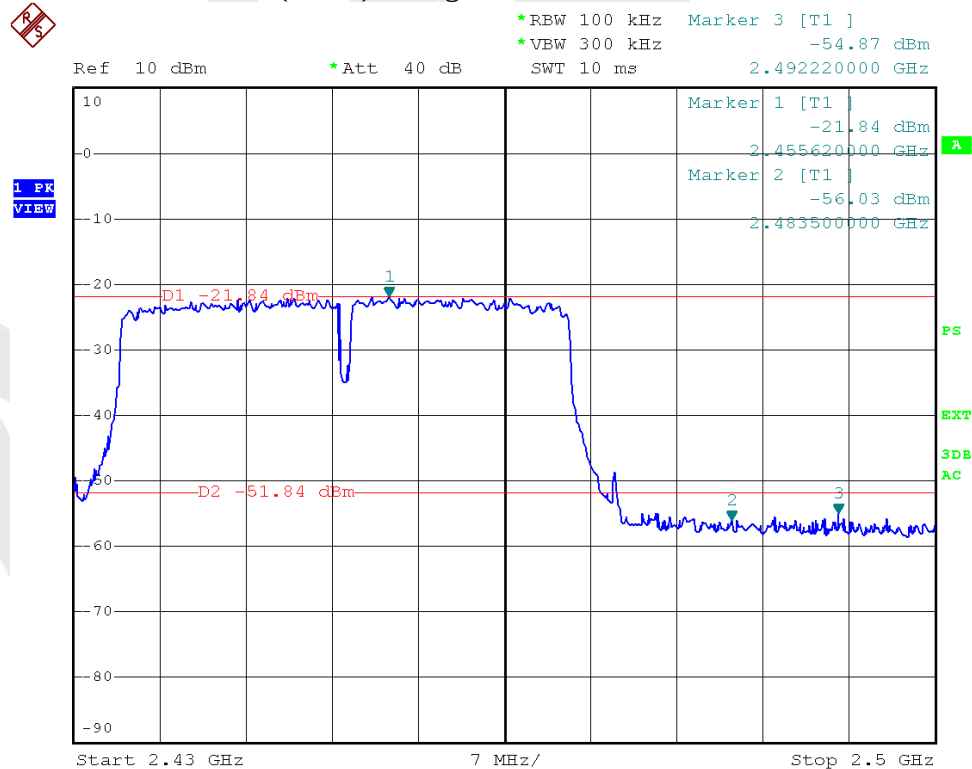
Test Mode: 802.11n (HT20)---High



Test Mode: 802.11n (HT40) ---Low

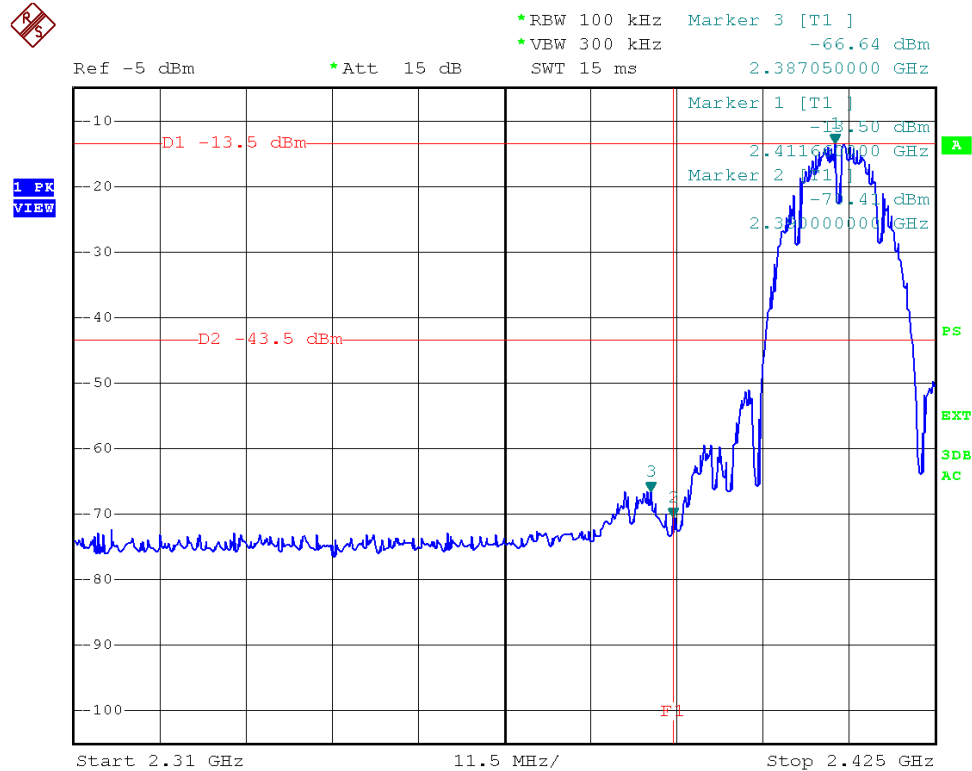


Test Mode: 802.11n (HT40) ---High

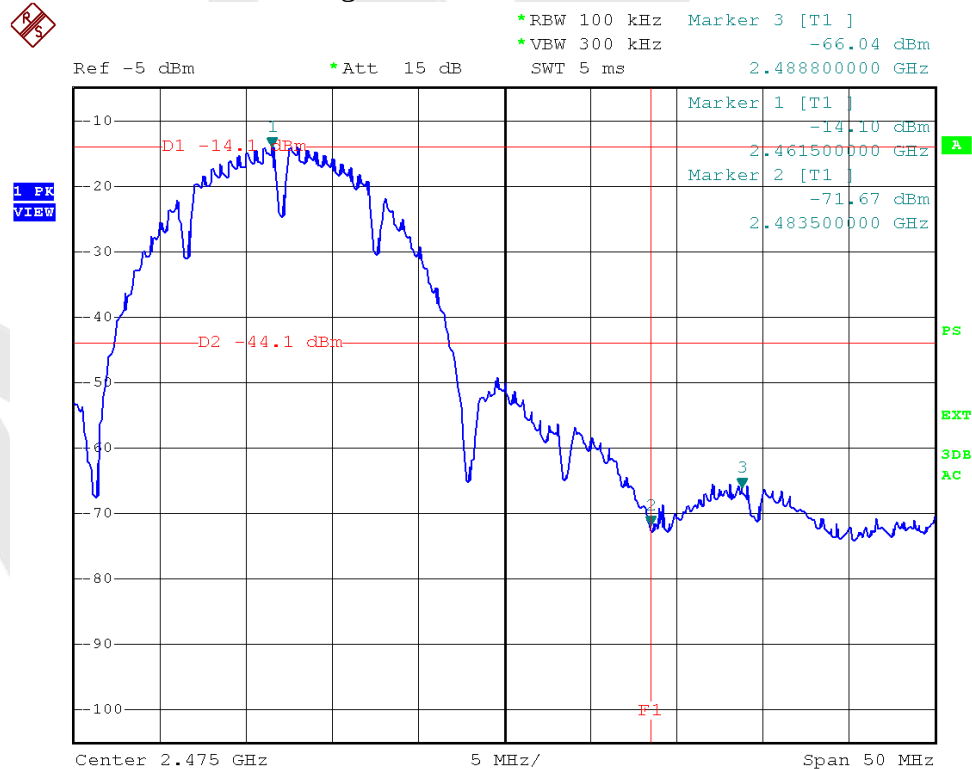


ANTB

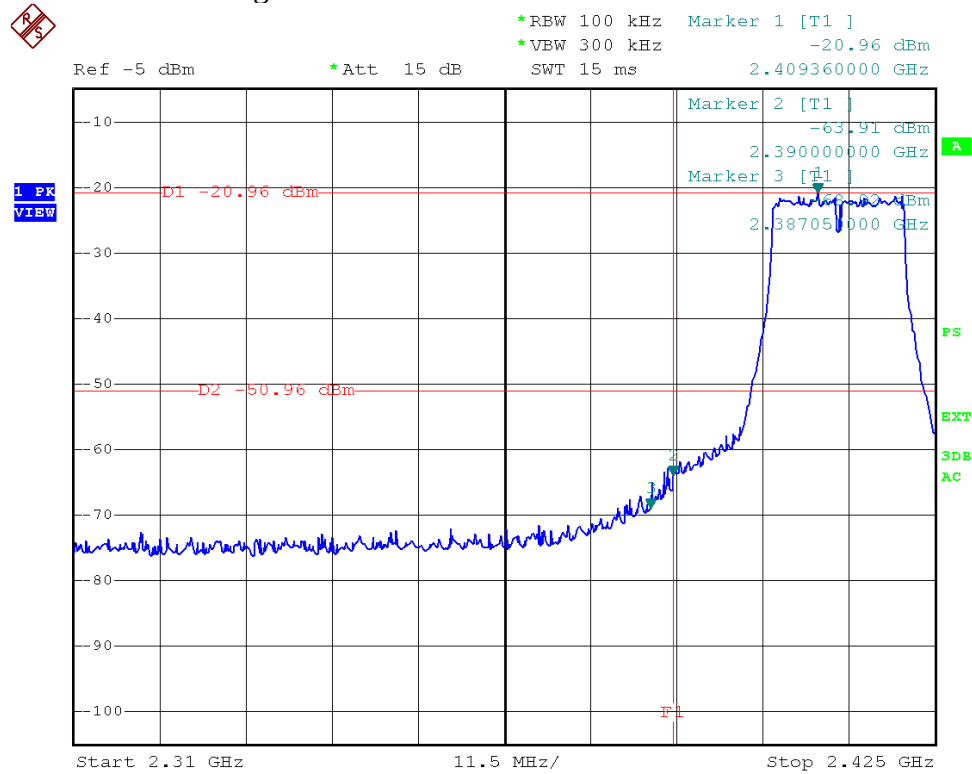
Test Mode: 802.11b ---Low



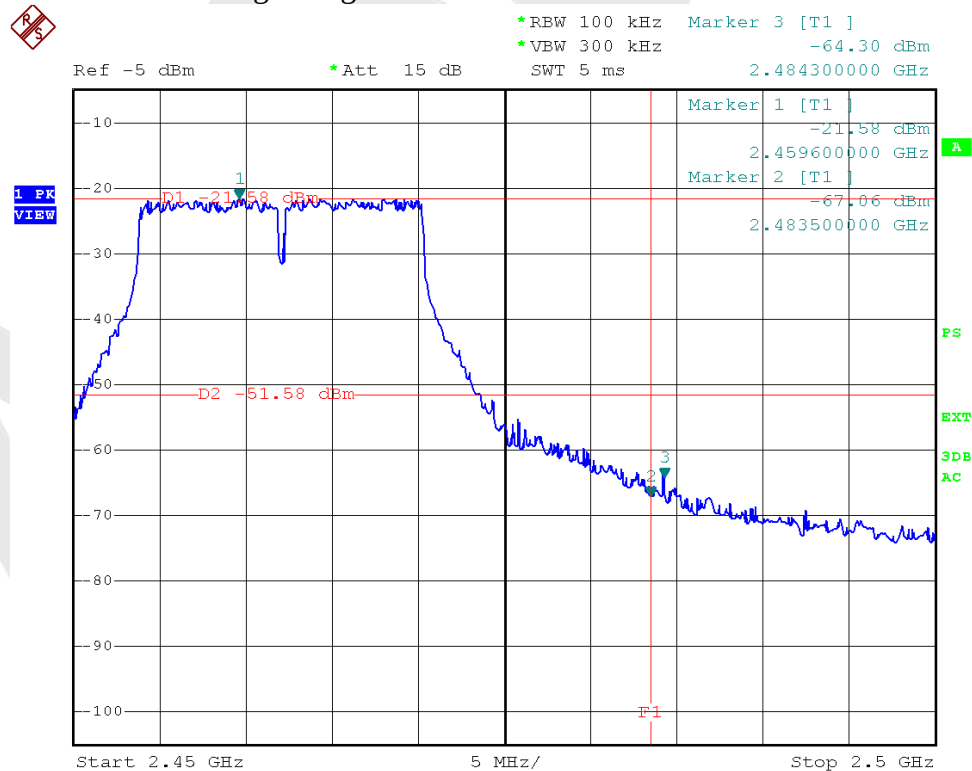
Test Mode: 802.11b ---High



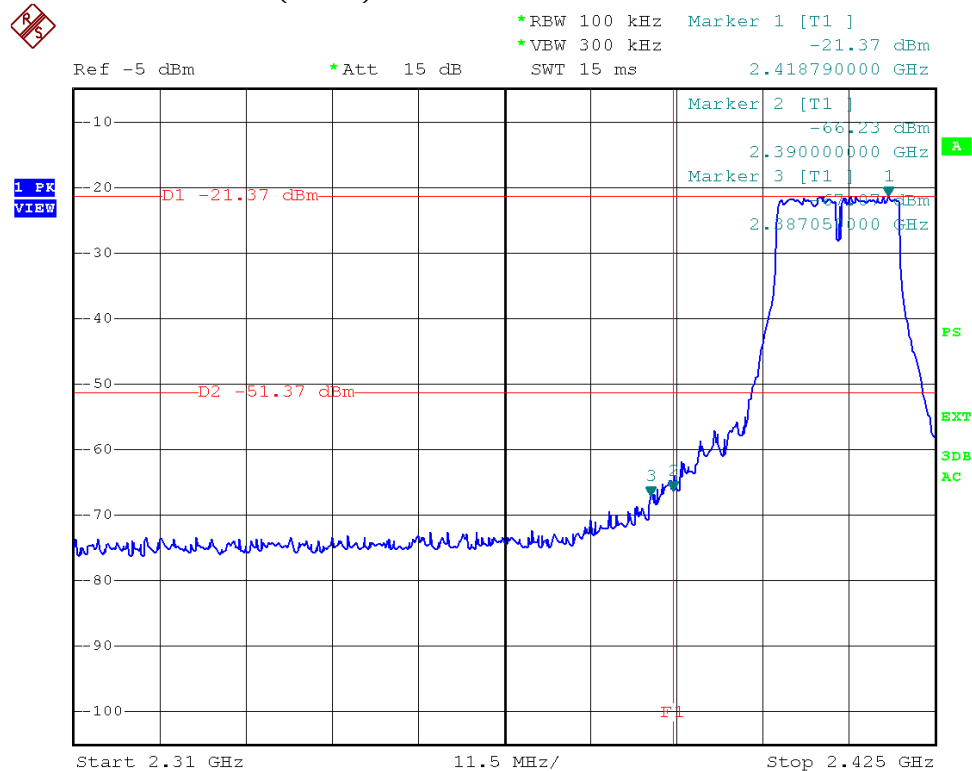
Test Mode: 802.11g ---Low



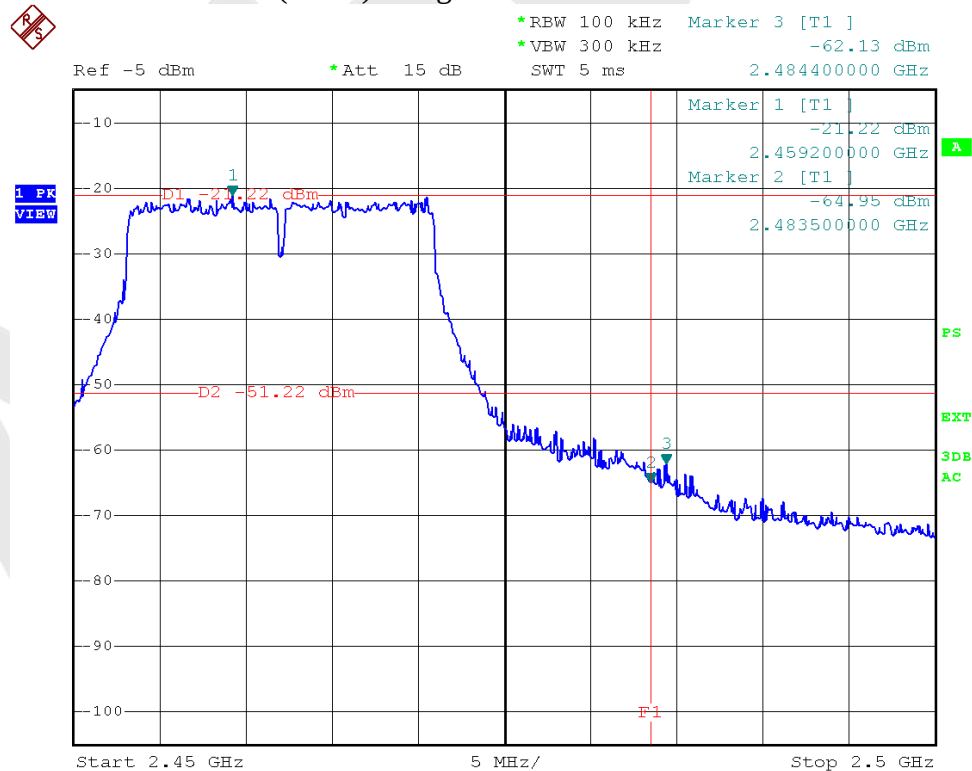
Test Mode: 802.11g ---High



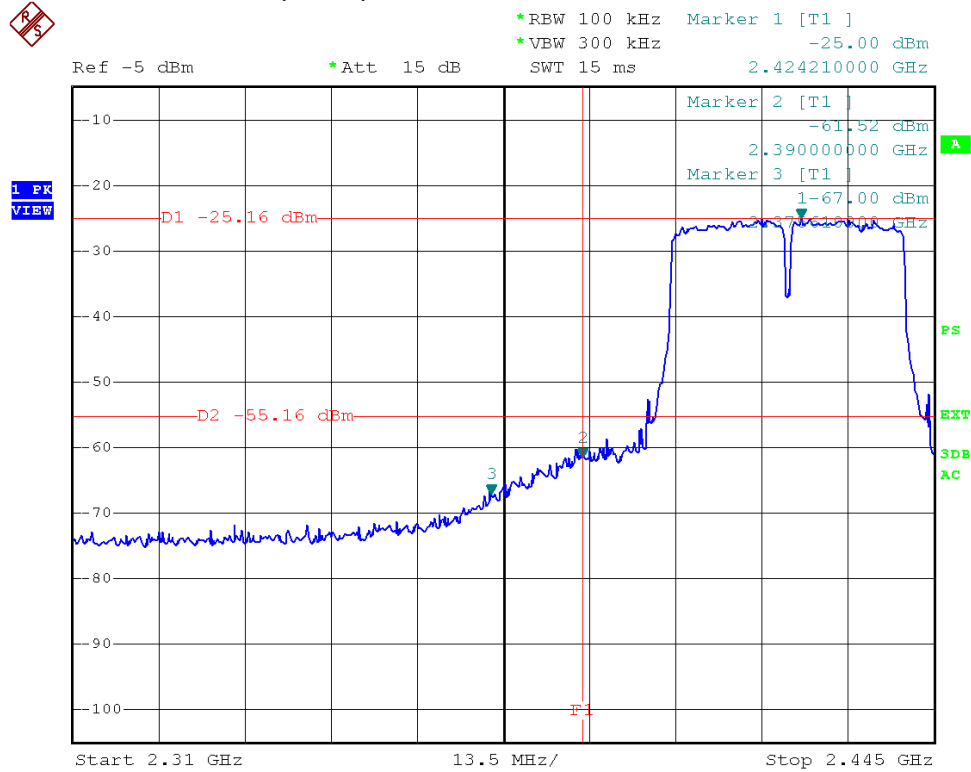
Test Mode: 802.11n (HT20) ---Low



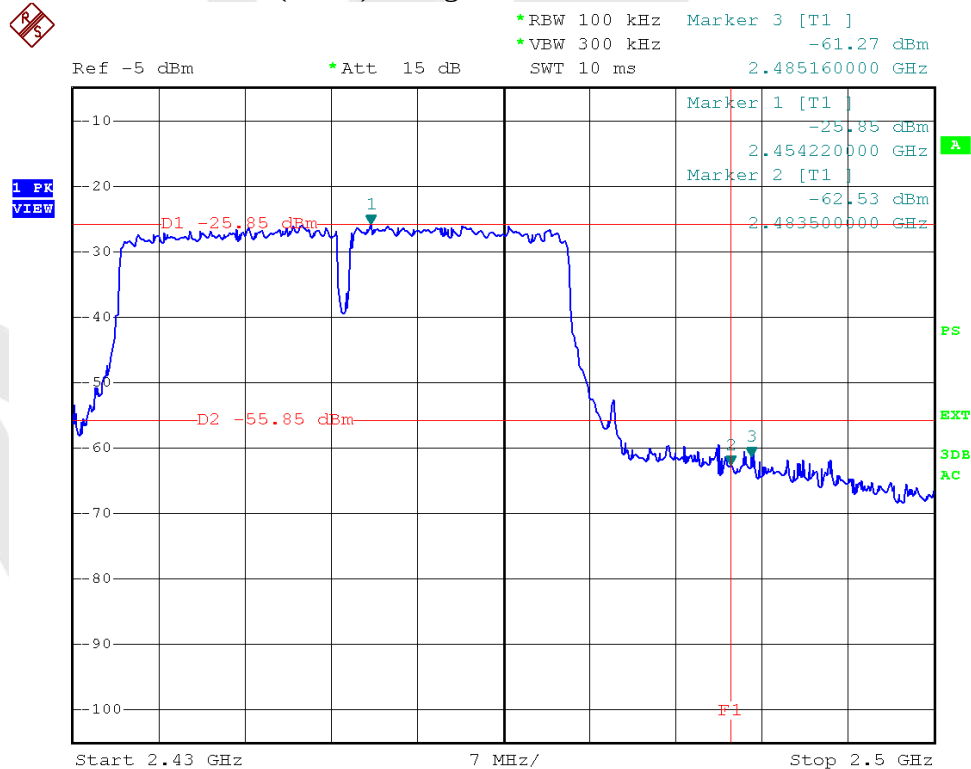
Test Mode: 802.11n (HT20)---High



Test Mode: 802.11n (HT40) ---Low



Test Mode: 802.11n (HT40) ---High



ANT A

Test Mode: 802.11b

2412MHz

Horizontal-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2370.225	36.91	-2.56	34.35	74.00	-39.65	peak			
2	2390.000	40.11	-2.51	37.60	74.00	-36.40	peak			
3	2400.000	62.51	-2.49	60.02	74.00	-13.98	peak			

Horizontal-AV:



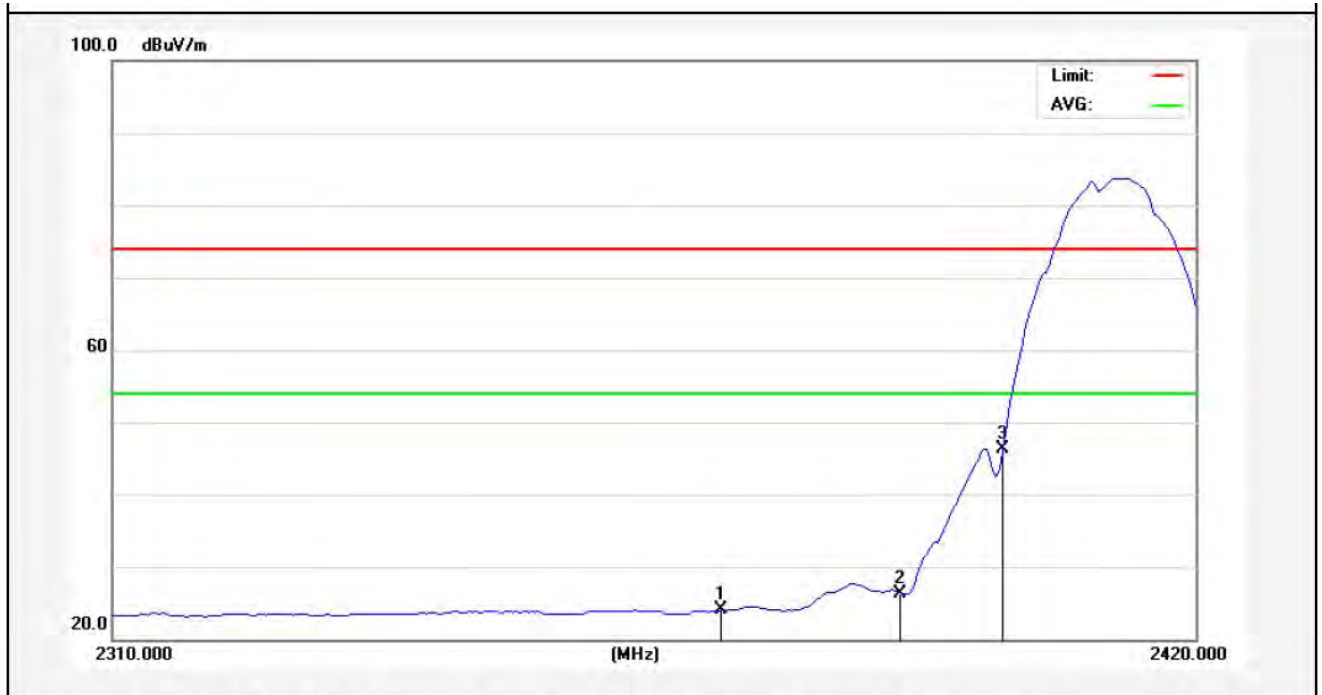
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2374.075	28.47	-2.55	25.92	54.00	-28.08	AVG			
2	2390.000	33.07	-2.51	30.56	54.00	-23.44	AVG			
3	2400.000	49.36	-2.49	46.87	54.00	-7.13	AVG			

Test Mode: 802.11b
2412MHz
Vertical-PEAK:



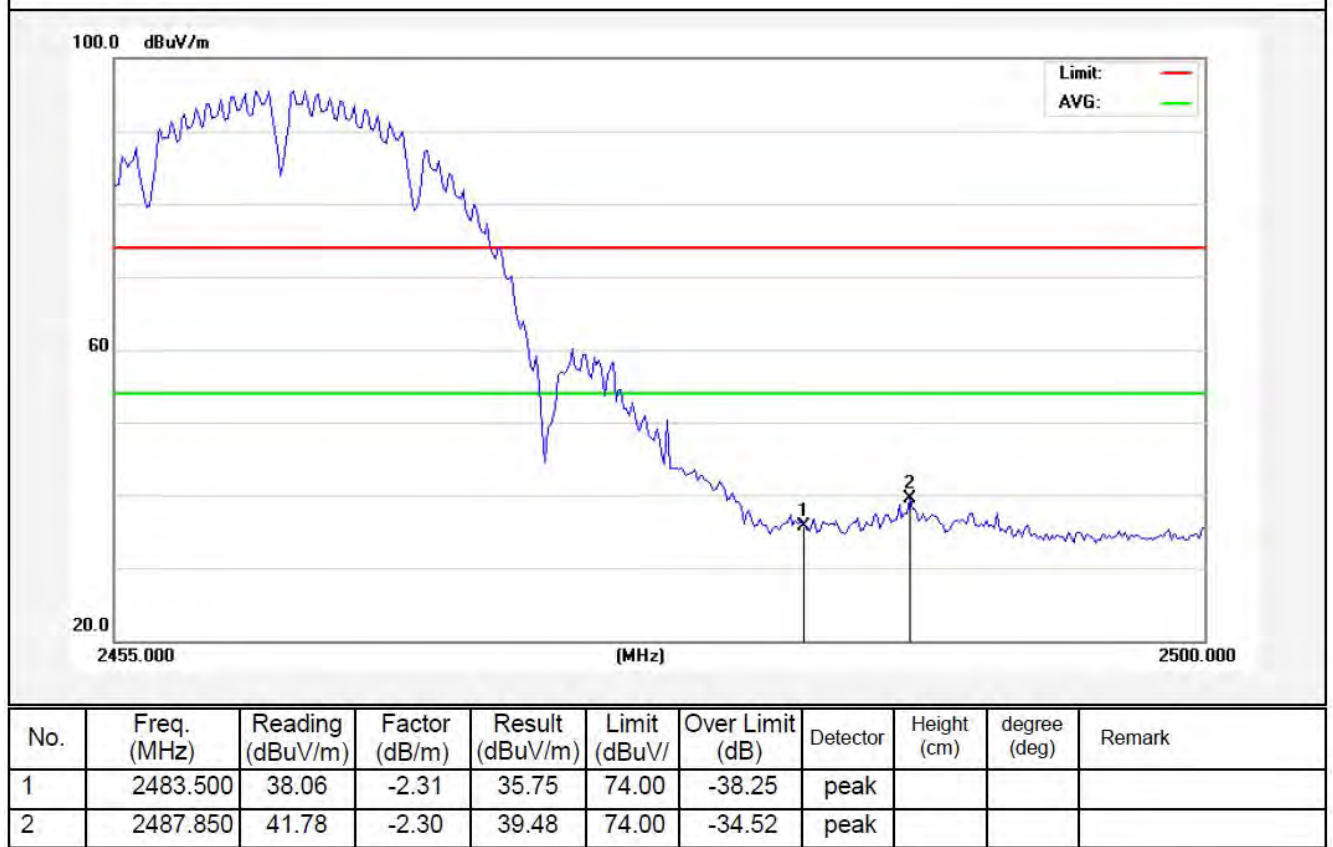
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2374.075	37.99	-2.55	35.44	74.00	-38.56	peak			
2	2390.000	37.69	-2.51	35.18	74.00	-38.82	peak			
3	2400.000	58.19	-2.49	55.70	74.00	-18.30	peak			

Vertical-AV:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2371.325	26.64	-2.56	24.08	54.00	-29.92	AVG			
2	2390.000	28.84	-2.51	26.33	54.00	-27.67	AVG			
3	2400.000	48.73	-2.49	46.24	54.00	-7.76	AVG			

Test Mode: 802.11b
2462MHz
Horizontal-PEAK:

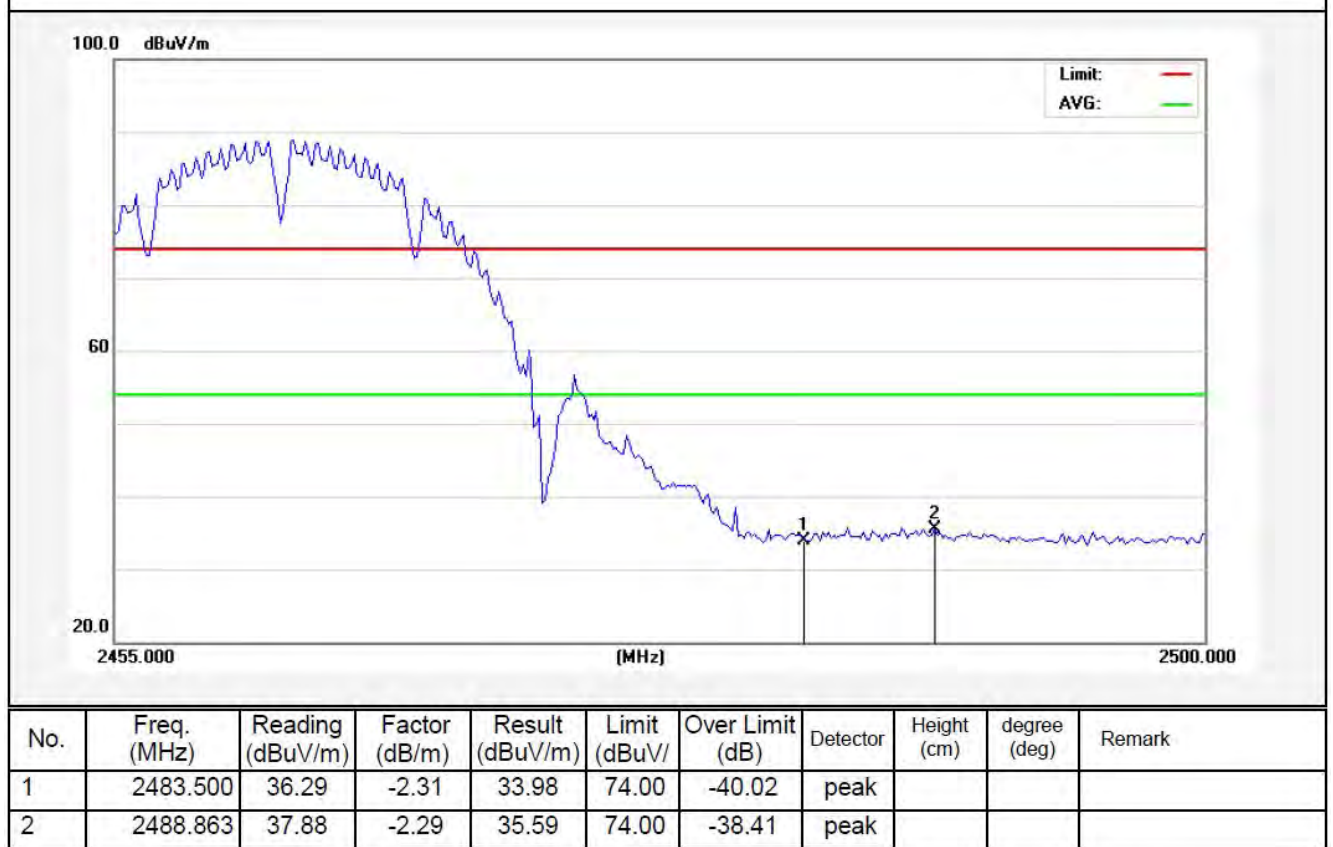


Horizontal-AV:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	27.39	-2.31	25.08	54.00	-28.92	AVG			
2	2488.075	29.32	-2.30	27.02	54.00	-26.98	AVG			

Test Mode: 802.11b
2462MHz
Vertical-PEAK:



Vertical-AV:



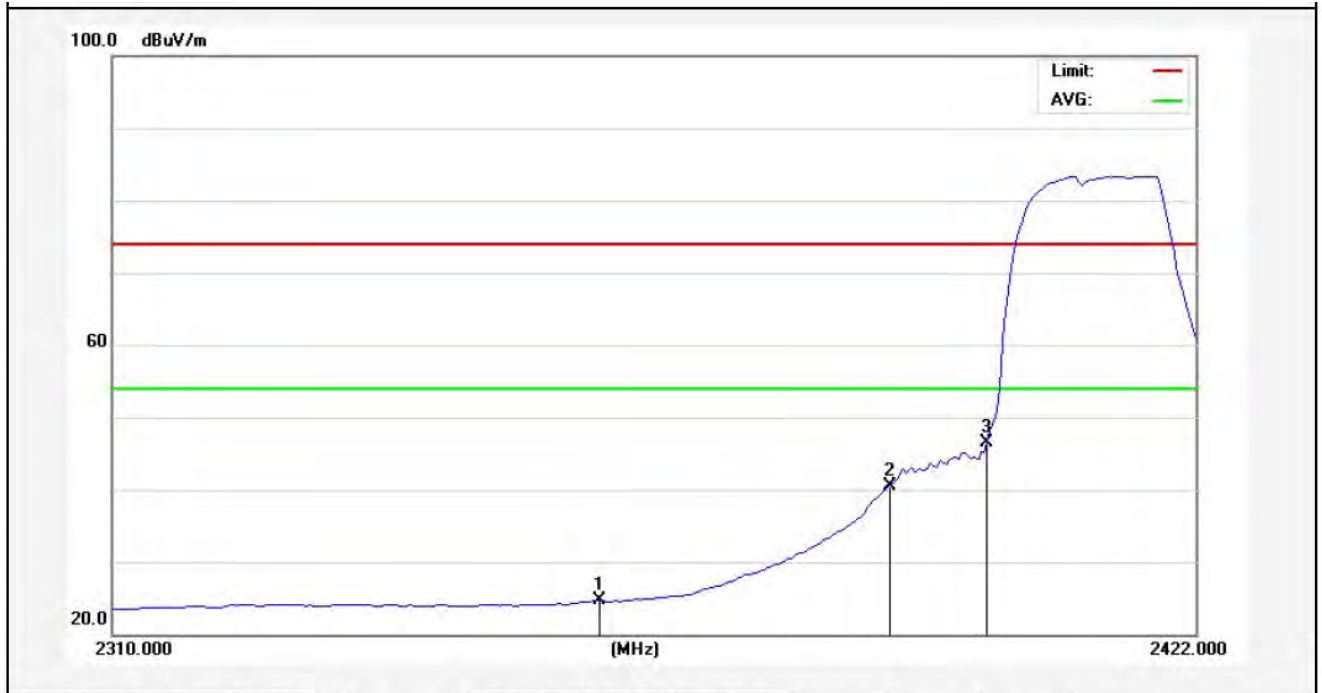
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	27.27	-2.31	24.96	54.00	-29.04	AVG			
2	2487.850	28.61	-2.30	26.31	54.00	-27.69	AVG			

Test Mode: 802.11g
2412MHz
Horizontal-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2380.560	43.98	-2.54	41.44	74.00	-32.56	peak			
2	2390.000	50.78	-2.51	48.27	74.00	-25.73	peak			
3	2400.000	63.74	-2.49	61.25	74.00	-12.75	peak			

Horizontal-AV:



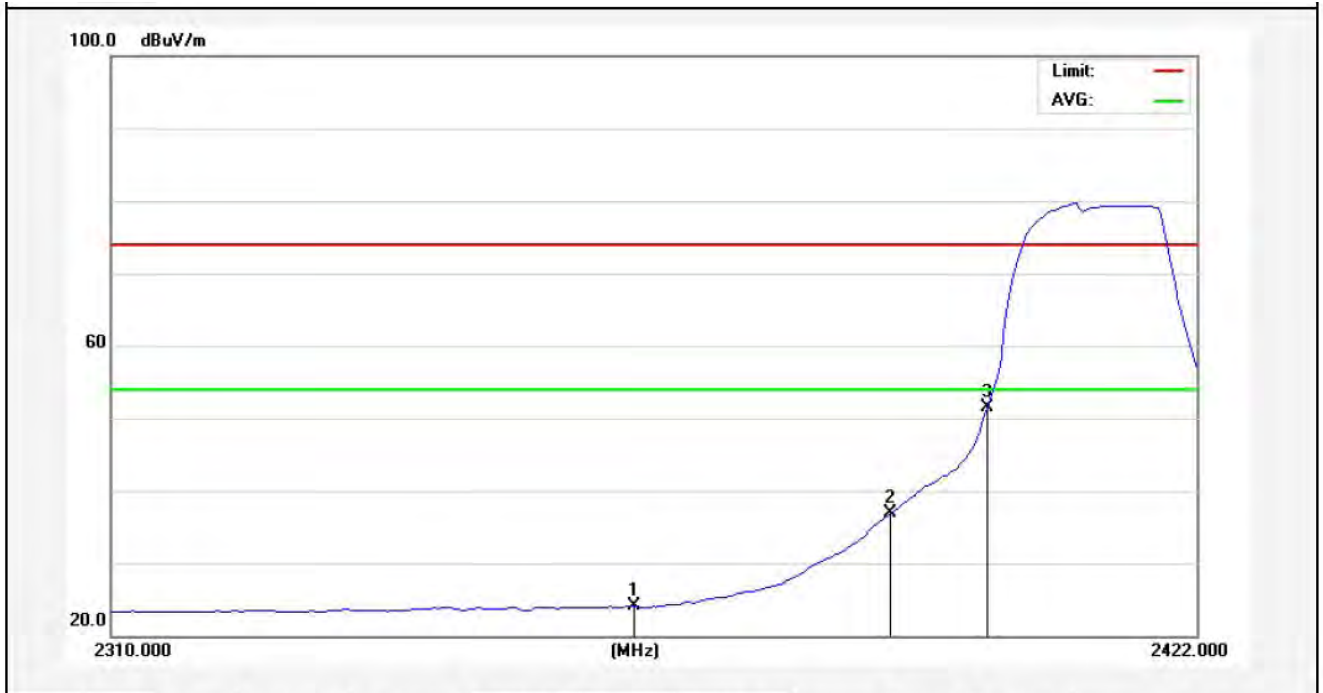
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2359.840	27.24	-2.58	24.66	54.00	-29.34	AVG			
2	2390.000	43.11	-2.51	40.60	54.00	-13.40	AVG			
3	2400.000	49.03	-2.49	46.54	54.00	-7.46	AVG			

Test Mode: 802.11g
2412MHz
Vertical-PEAK:



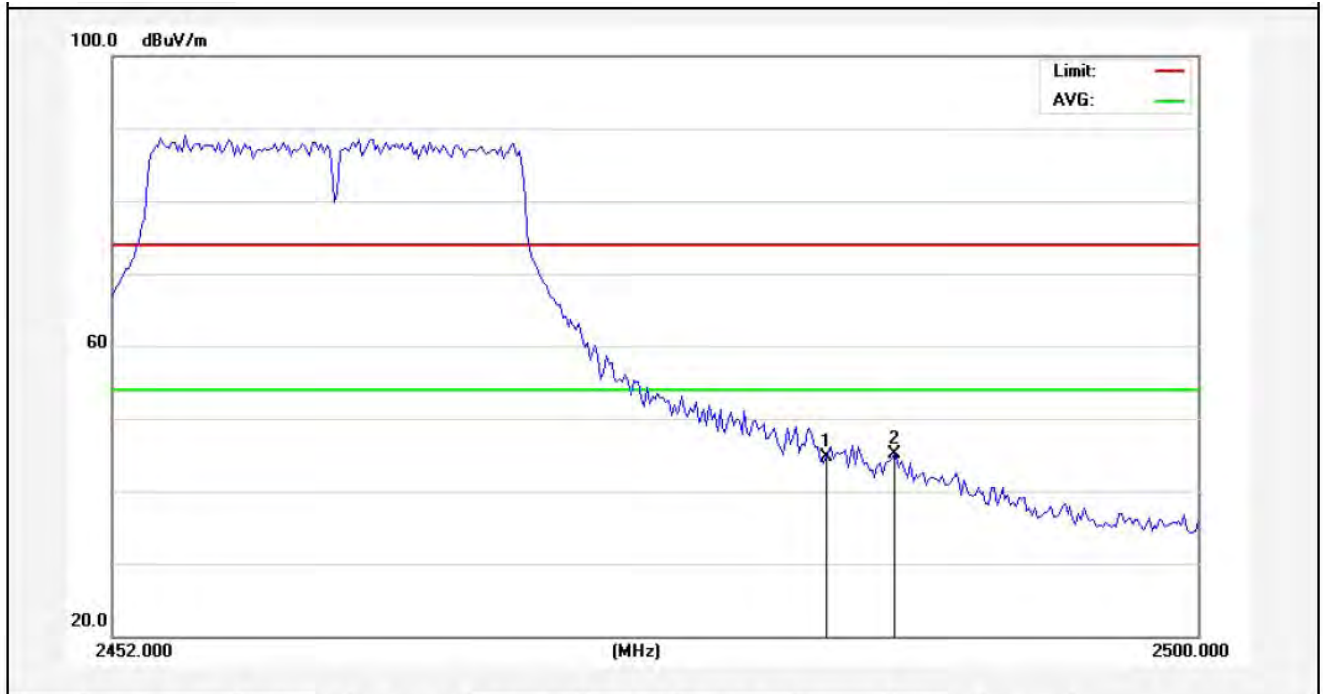
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2358.160	37.98	-2.58	35.40	74.00	-38.60	peak			
2	2390.000	46.92	-2.51	44.41	74.00	-29.59	peak			
3	2400.000	58.14	-2.49	55.65	74.00	-18.35	peak			

Vertical-AV:



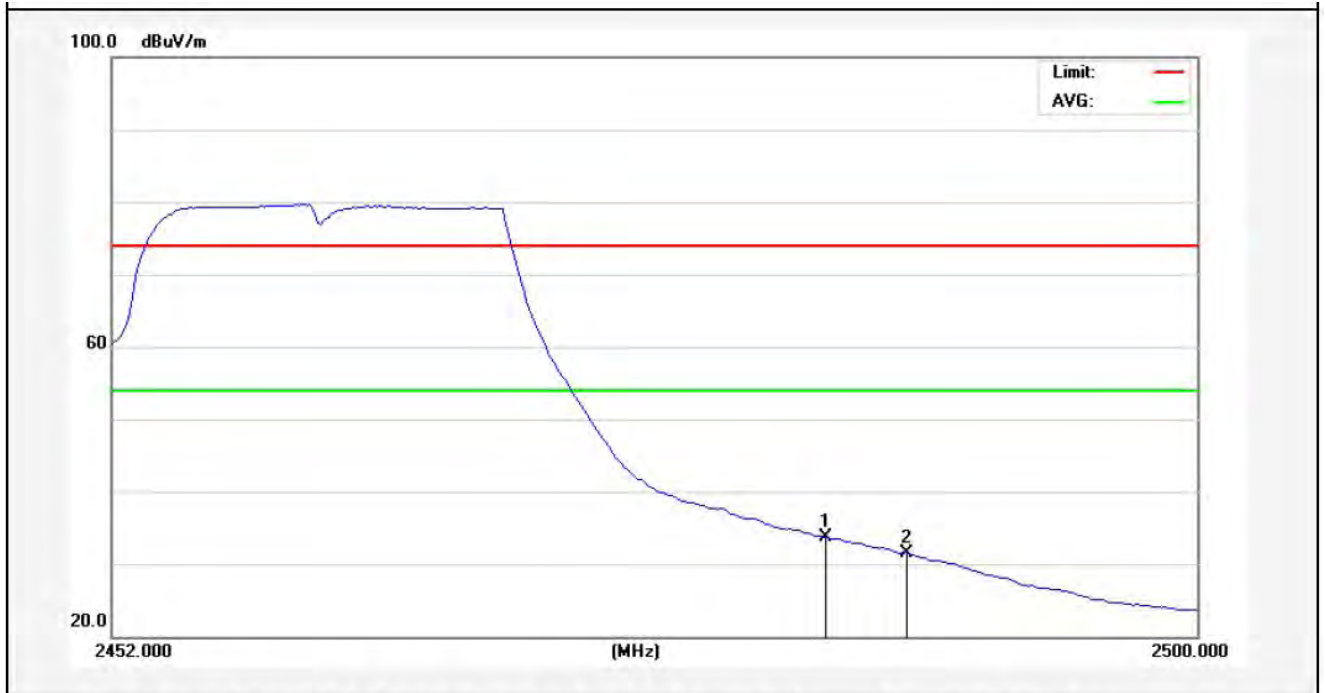
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2363.480	26.69	-2.57	24.12	54.00	-29.88	AVG			
2	2390.000	39.39	-2.51	36.88	54.00	-17.12	AVG			
3	2400.000	53.98	-2.49	51.49	54.00	-2.51	AVG			

Test Mode: 802.11g
2462MHz
Horizontal-PEAK:



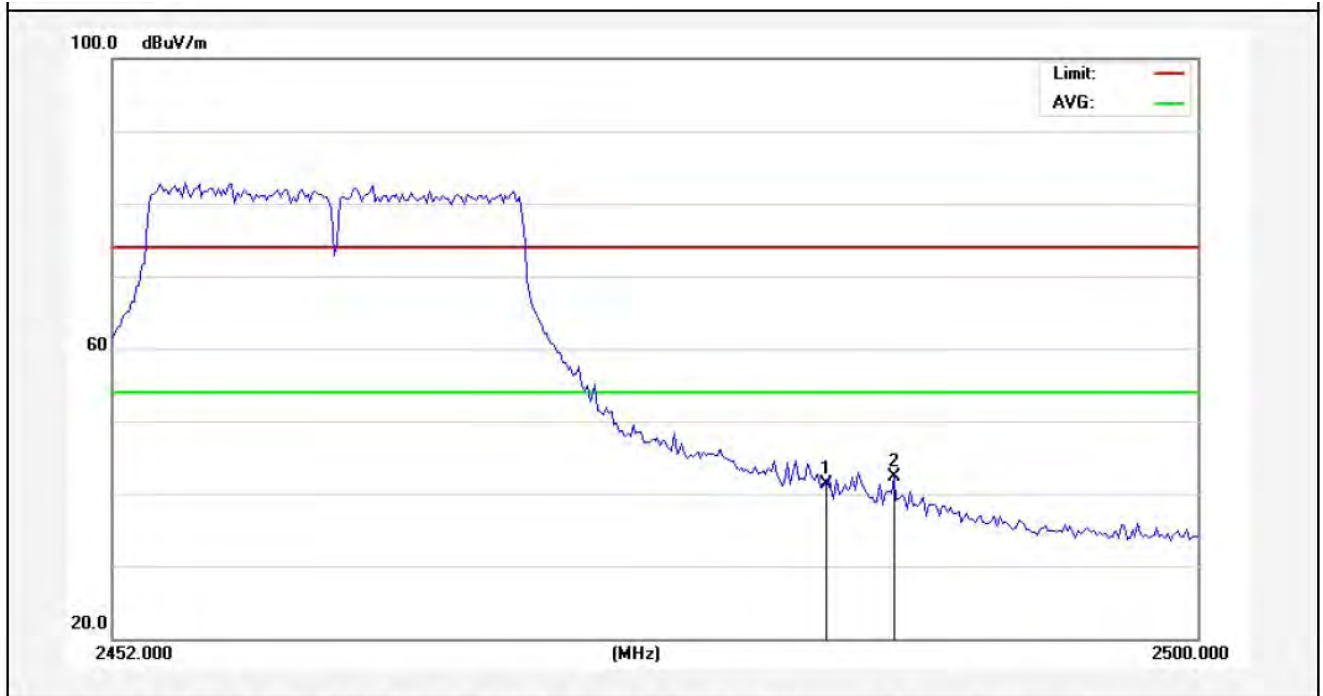
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	46.93	-2.31	44.62	74.00	-29.38	peak			
2	2486.560	47.48	-2.30	45.18	74.00	-28.82	peak			

Horizontal-AV:



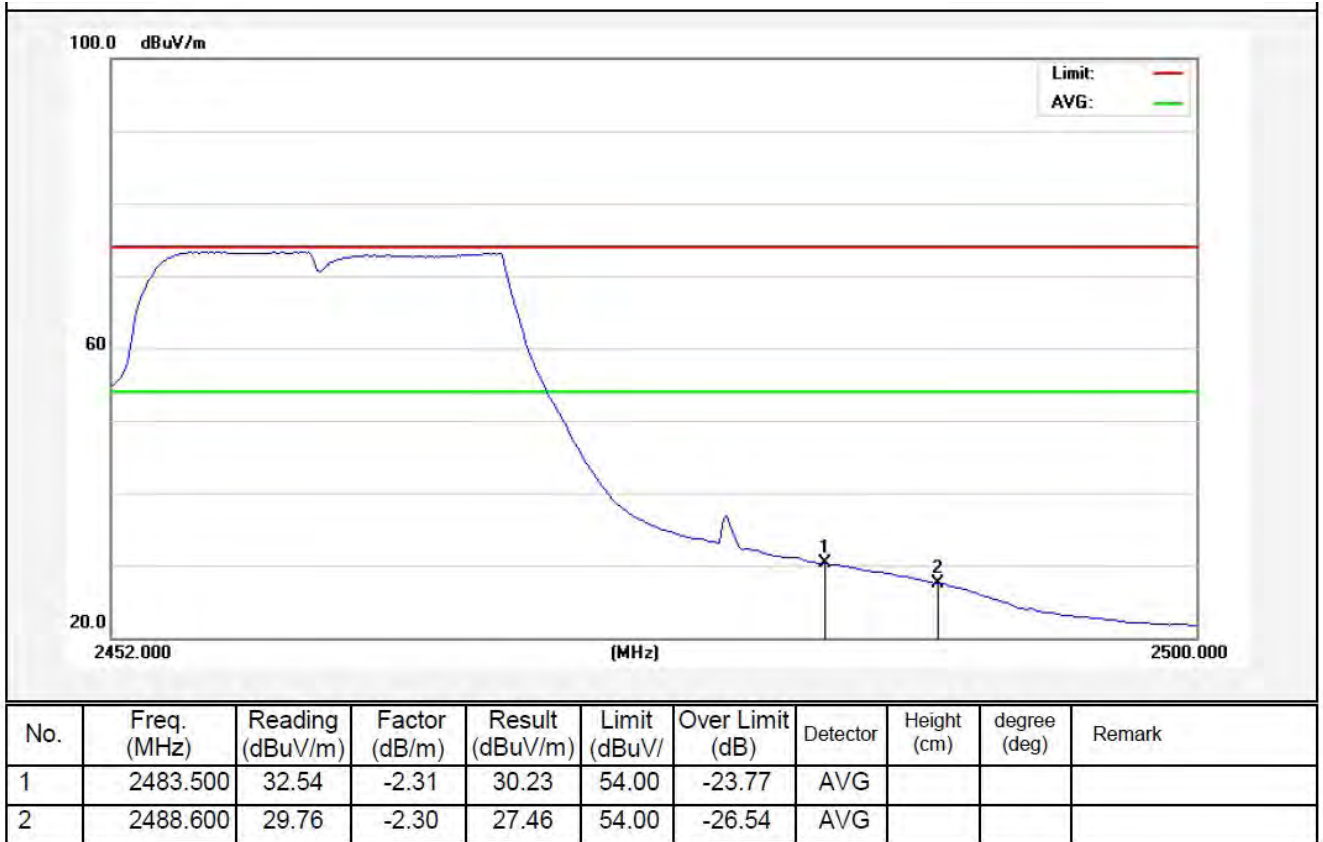
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	36.00	-2.31	33.69	54.00	-20.31	AVG			
2	2487.160	33.76	-2.30	31.46	54.00	-22.54	AVG			

Test Mode: 802.11g
2462MHz
Vertical-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	43.57	-2.31	41.26	74.00	-32.74	peak			
2	2486.560	44.56	-2.30	42.26	74.00	-31.74	peak			

Vertical-AV:



Test Mode: 802.11n (HT20)

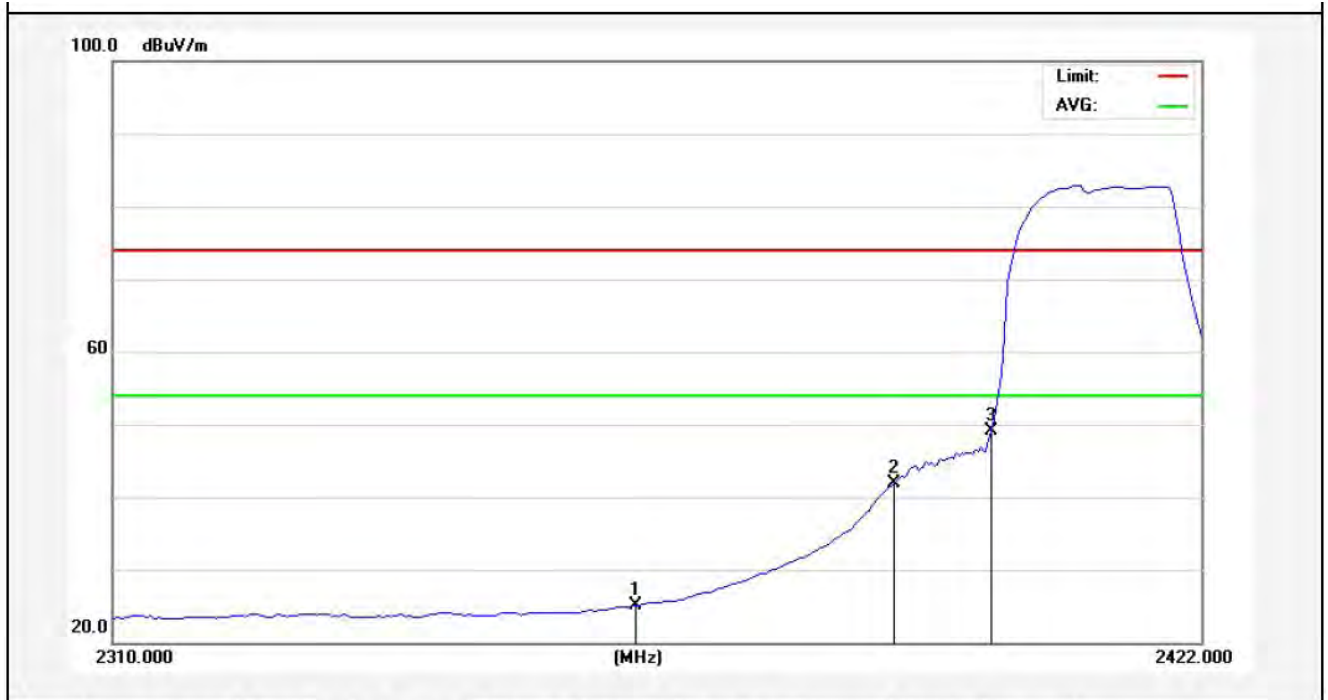
2412MHz

Horizontal-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2375.240	42.11	-2.55	39.56	74.00	-34.44	peak			
2	2390.000	53.18	-2.51	50.67	74.00	-23.33	peak			
3	2400.000	63.07	-2.49	60.58	74.00	-13.42	peak			

Horizontal-AV:



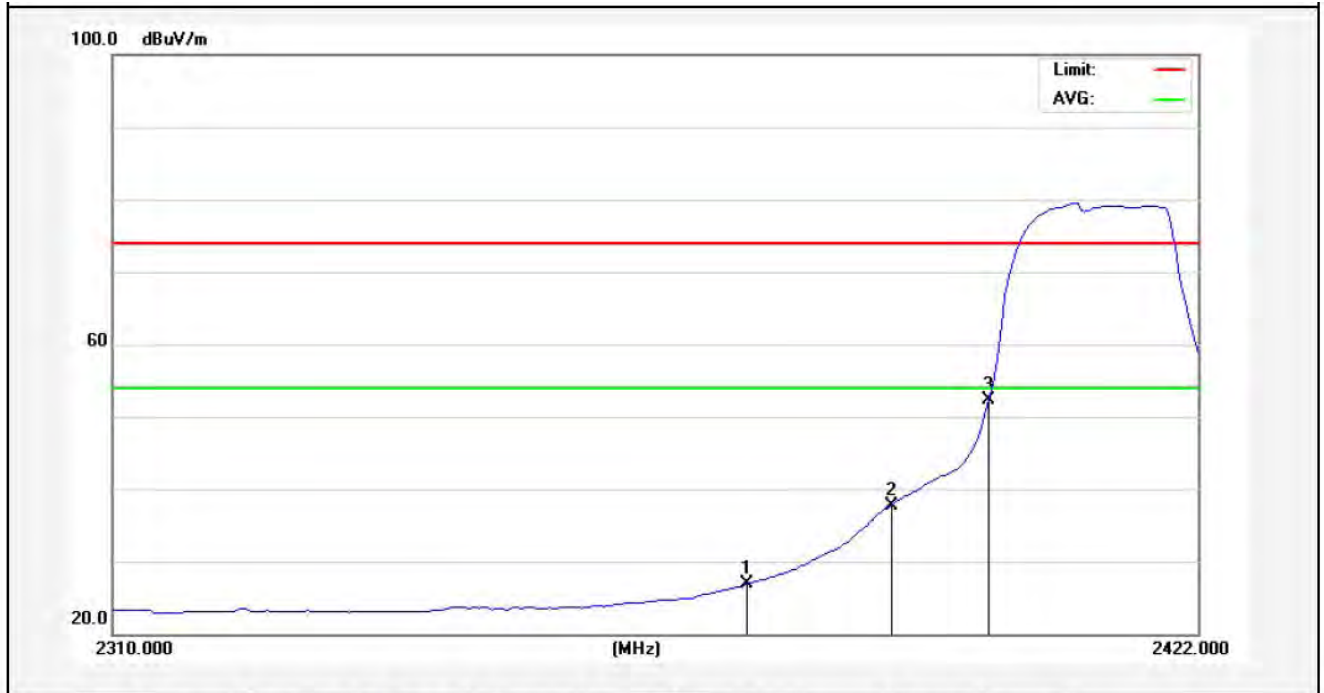
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2363.200	27.74	-2.57	25.17	54.00	-28.83	AVG			
2	2390.000	44.34	-2.51	41.83	54.00	-12.17	AVG			
3	2400.000	51.57	-2.49	49.08	54.00	-4.92	AVG			

Test Mode: 802.11n (HT20)
2412MHz
Vertical-PEAK:



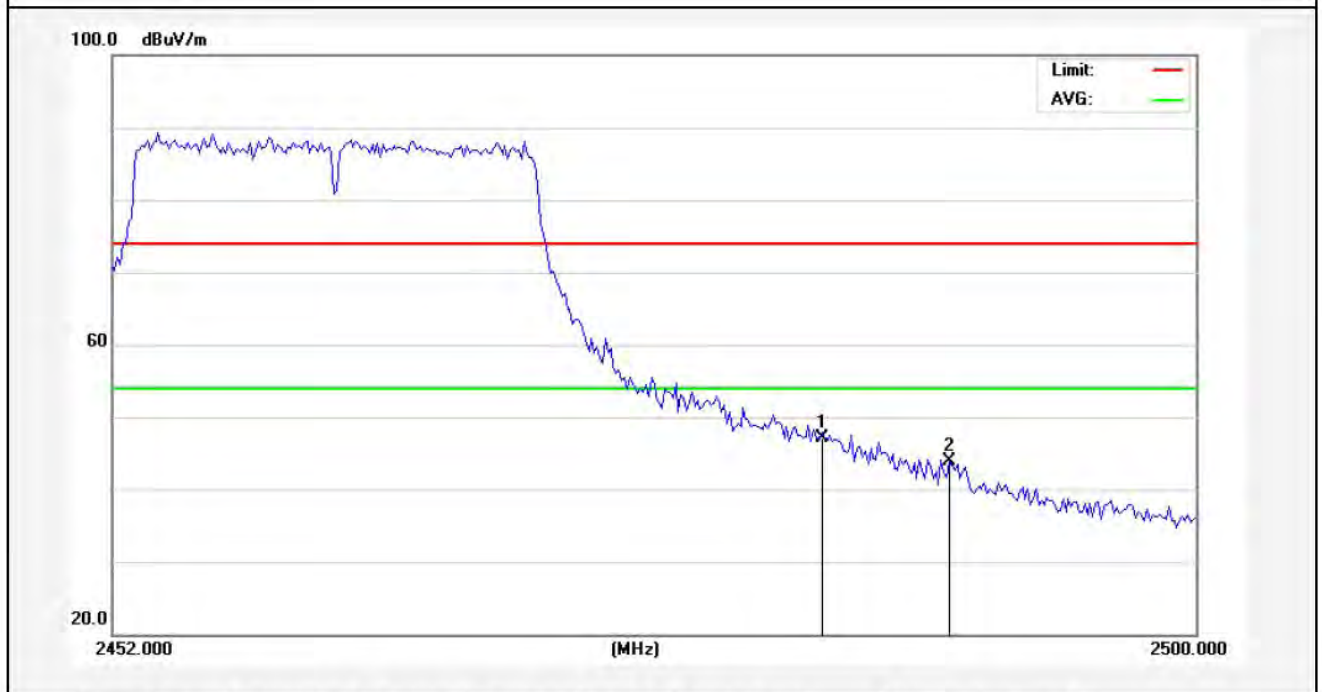
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2374.960	39.71	-2.55	37.16	74.00	-36.84	peak			
2	2390.000	48.17	-2.51	45.66	74.00	-28.34	peak			
3	2400.000	58.93	-2.49	56.44	74.00	-17.56	peak			

Vertical-AV:



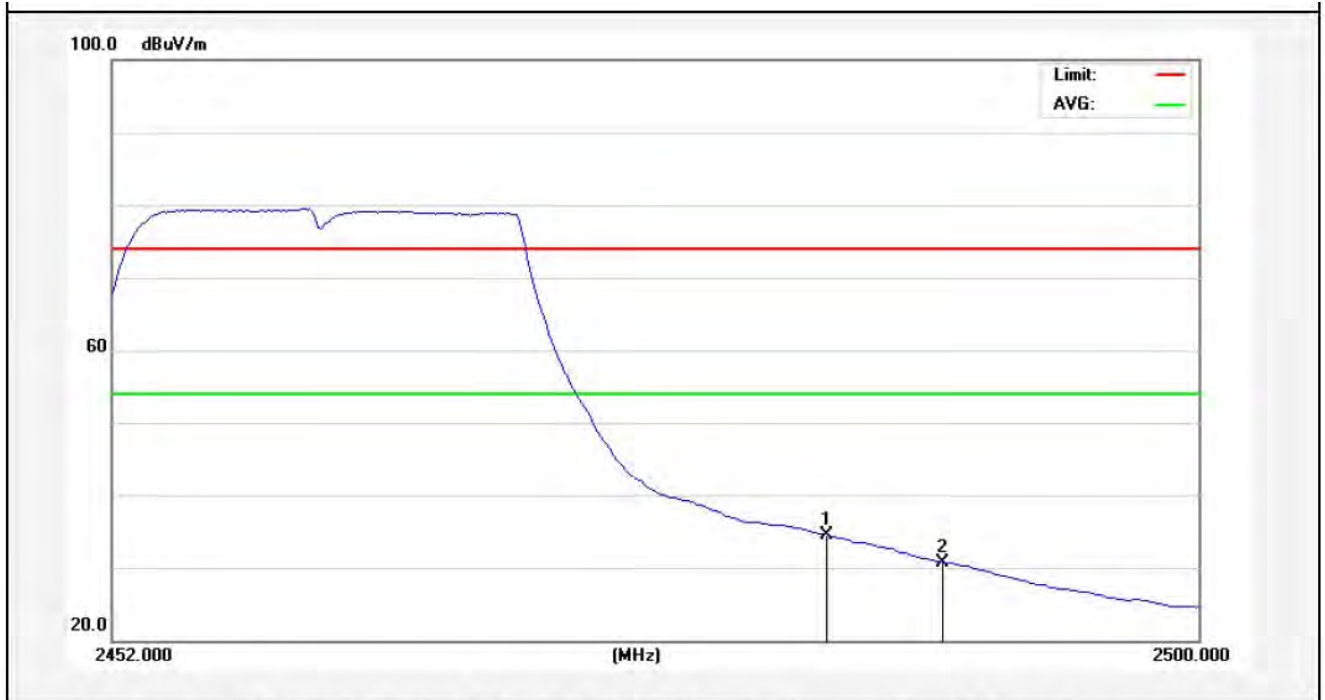
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2374.960	29.38	-2.55	26.83	54.00	-27.17	AVG			
2	2390.000	40.25	-2.51	37.74	54.00	-16.26	AVG			
3	2400.000	54.70	-2.49	52.21	54.00	-1.79	AVG			

Test Mode: 802.11n (HT20)
2462MHz
Horizontal-PEAK:



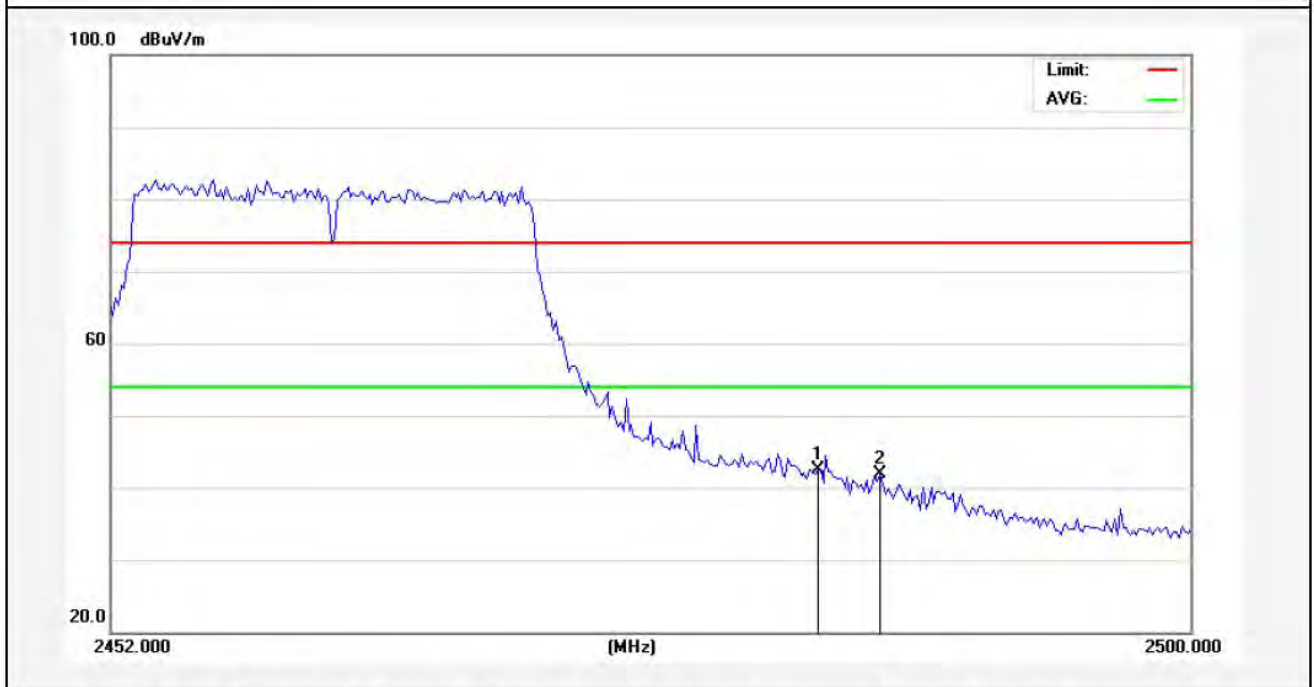
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	49.46	-2.31	47.15	74.00	-26.85	peak			
2	2489.080	46.27	-2.29	43.98	74.00	-30.02	peak			

Horizontal-AV:



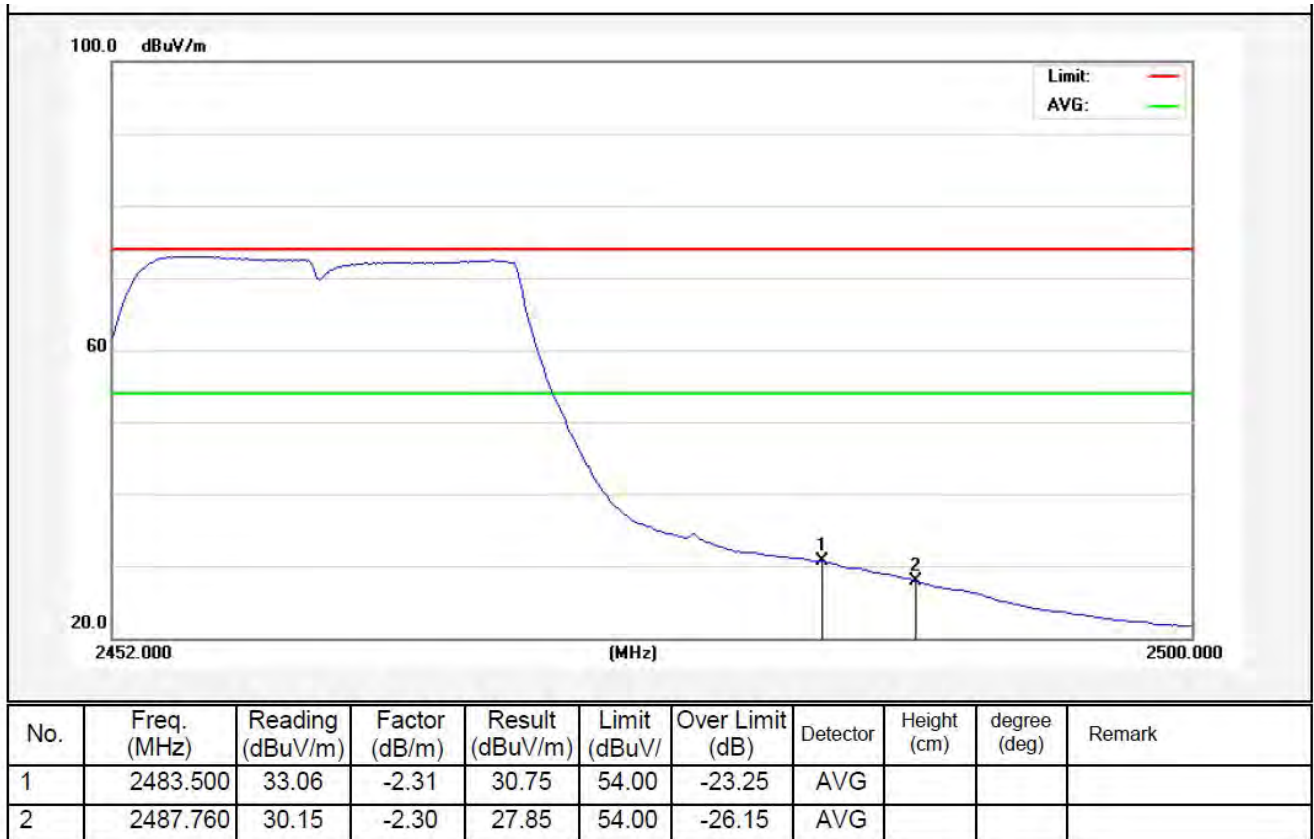
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	36.91	-2.31	34.60	54.00	-19.40	AVG			
2	2488.720	33.06	-2.30	30.76	54.00	-23.24	AVG			

Test Mode: 802.11n (HT20)
2462MHz
Vertical-PEAK:

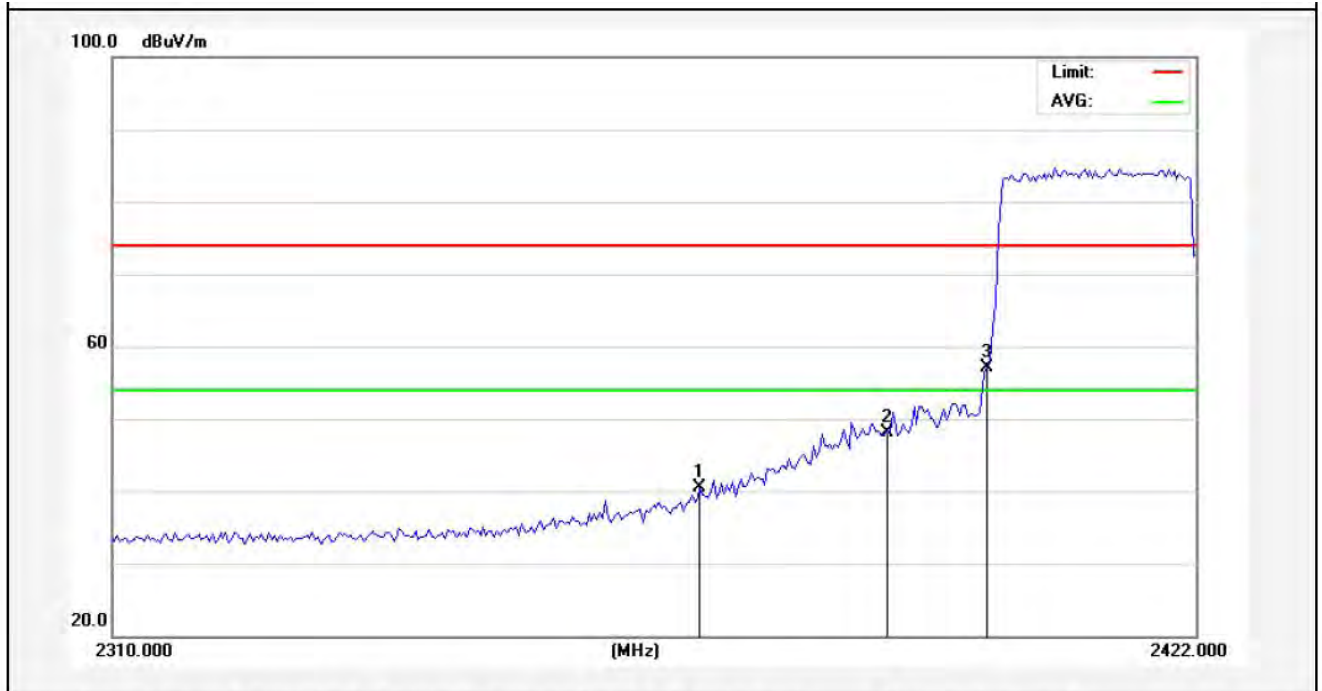


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	44.79	-2.31	42.48	74.00	-31.52	peak			
2	2486.200	44.18	-2.30	41.88	74.00	-32.12	peak			

Vertical-AV:

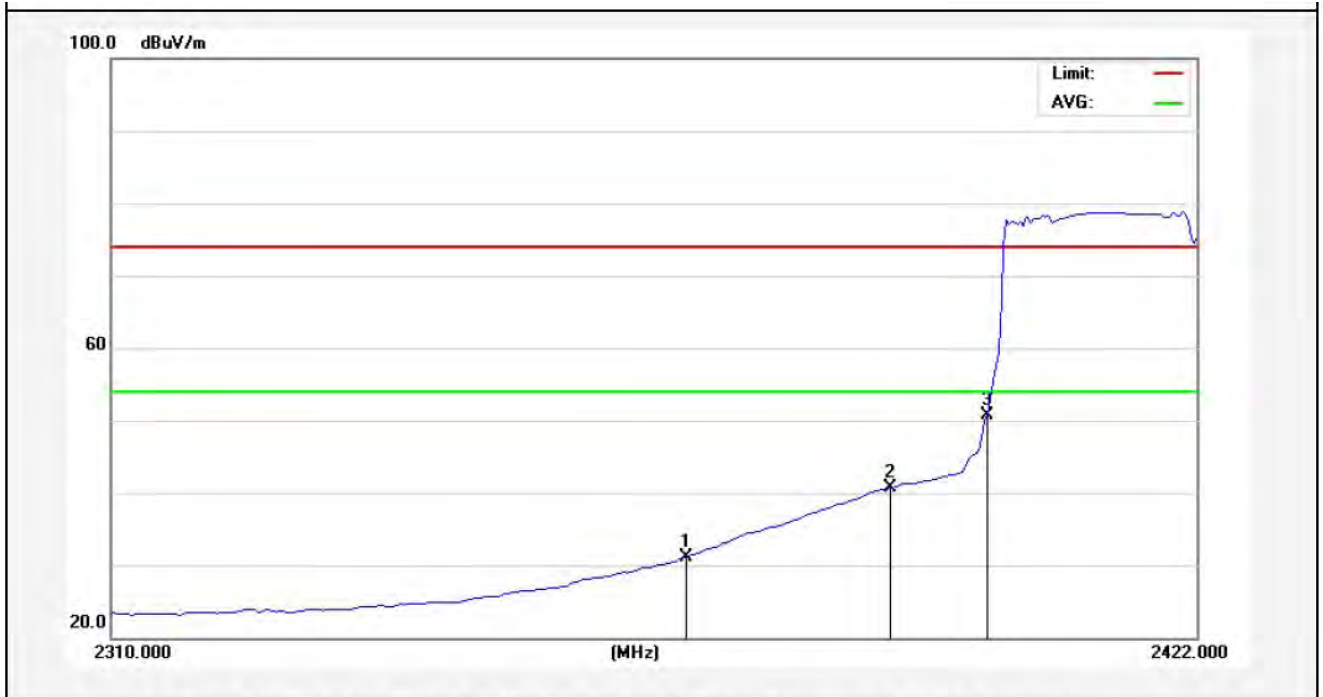


Test Mode: 802.11n (HT40)
2422MHz
Horizontal-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2370.200	43.11	-2.56	40.55	74.00	-33.45	peak			
2	2390.000	50.56	-2.51	48.05	74.00	-25.95	peak			
3	2400.000	59.69	-2.49	57.20	74.00	-16.80	peak			

Horizontal-AV:

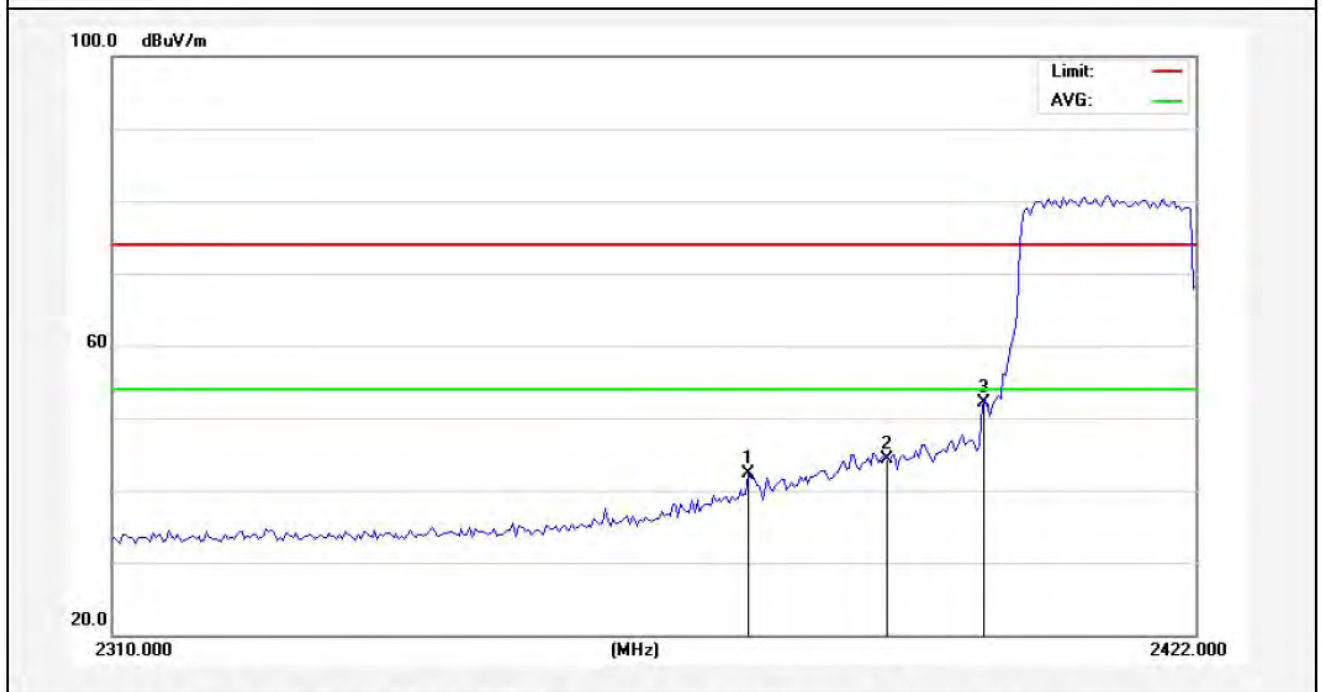


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2368.520	33.64	-2.56	31.08	54.00	-22.92	AVG			
2	2390.000	43.15	-2.51	40.64	54.00	-13.36	AVG			
3	2400.000	53.27	-2.49	50.78	54.00	-3.22	AVG			

Test Mode: 802.11n (HT40)

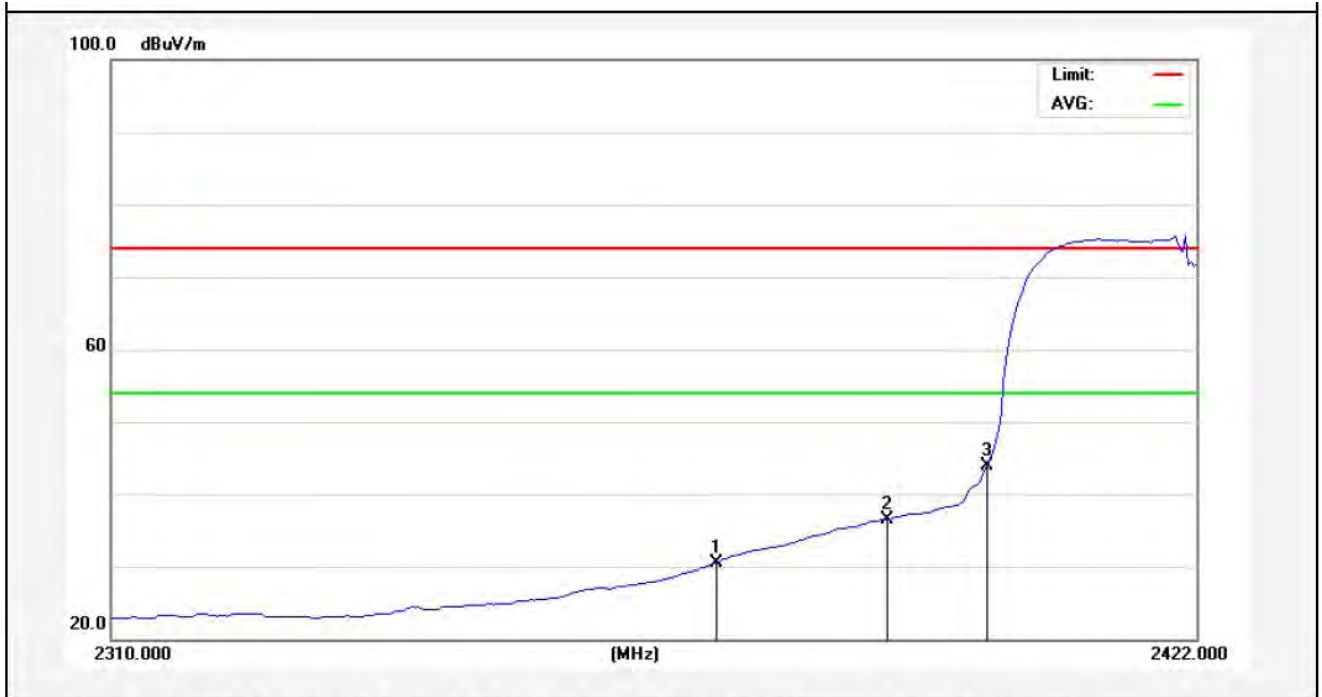
2422MHz

Vertical-PEAK:



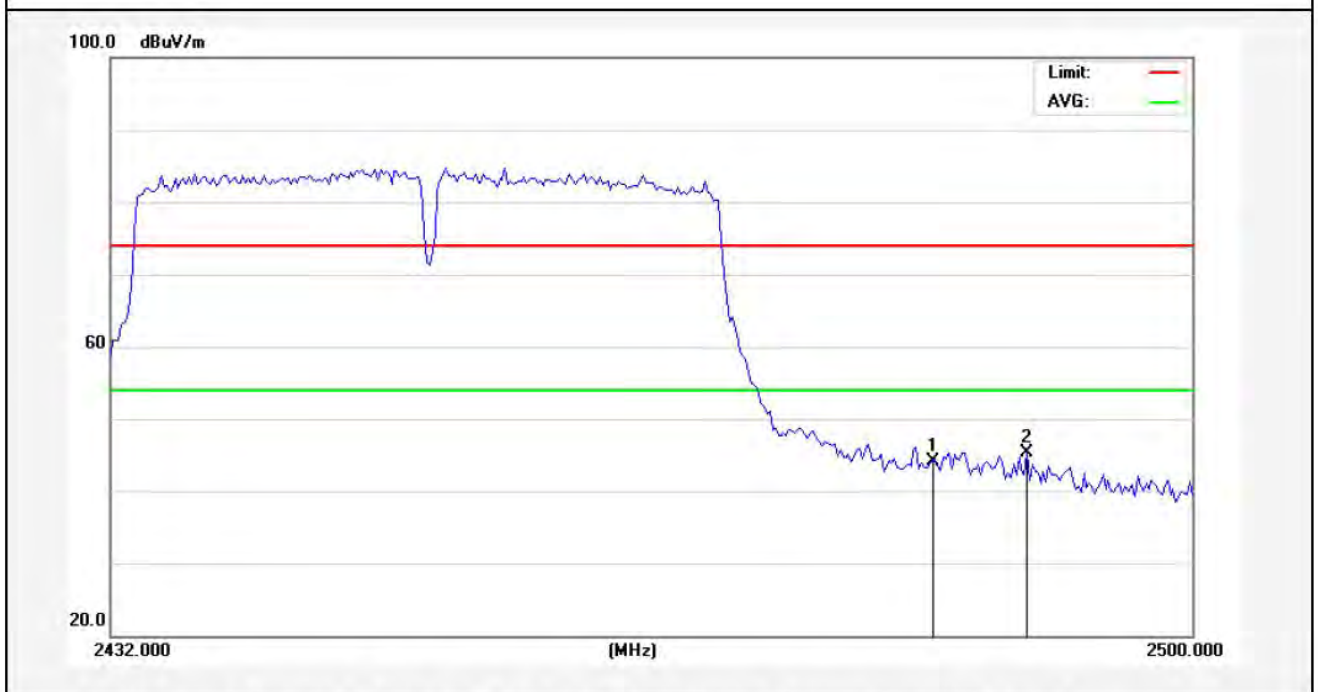
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2375.240	44.82	-2.55	42.27	74.00	-31.73	peak			
2	2390.000	46.86	-2.51	44.35	74.00	-29.65	peak			
3	2400.000	54.68	-2.49	52.19	74.00	-21.81	peak			

Vertical-AV:



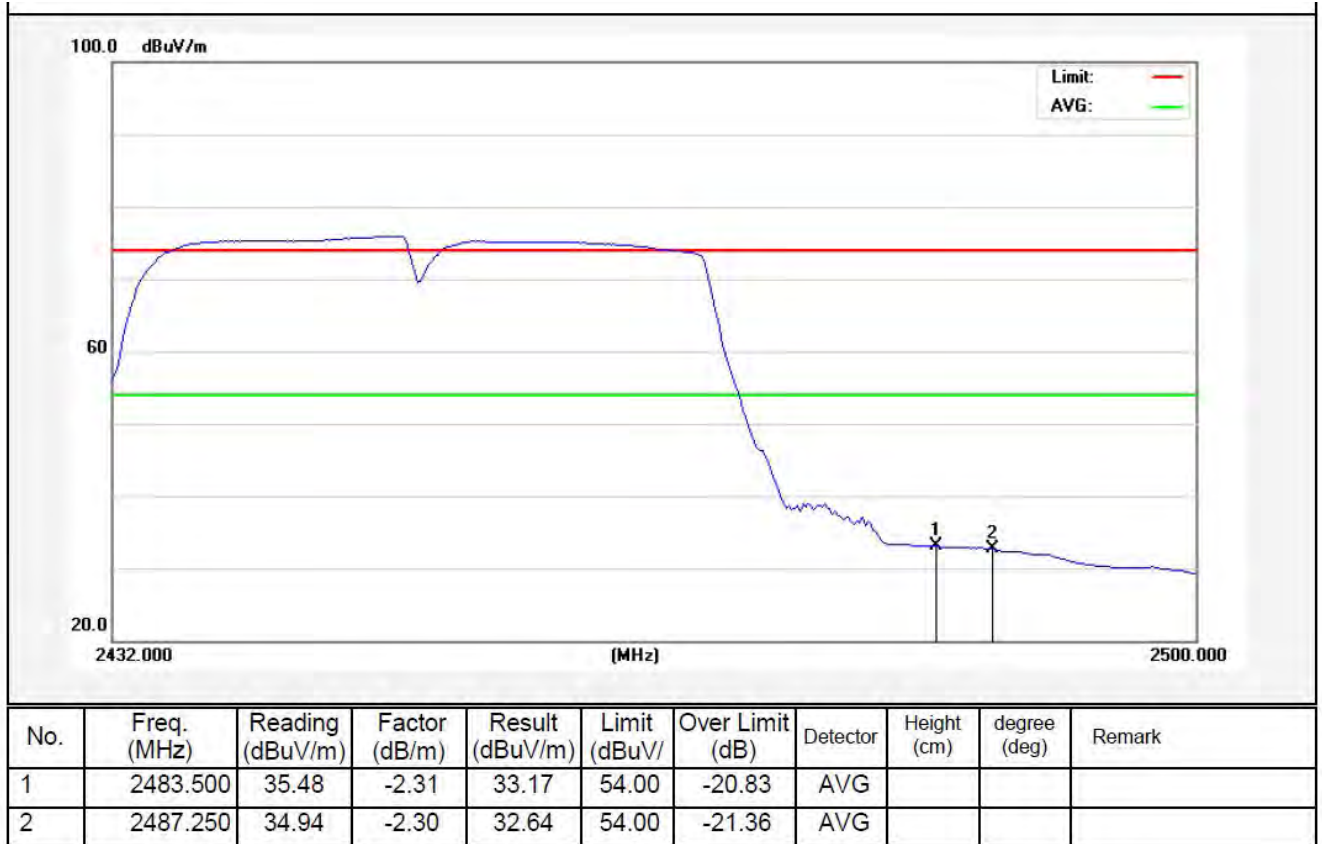
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2371.600	33.03	-2.56	30.47	54.00	-23.53	AVG			
2	2390.000	39.04	-2.51	36.53	54.00	-17.47	AVG			
3	2400.000	46.30	-2.49	43.81	54.00	-10.19	AVG			

Test Mode: 802.11n (HT40)
2452MHz
Horizontal-PEAK:

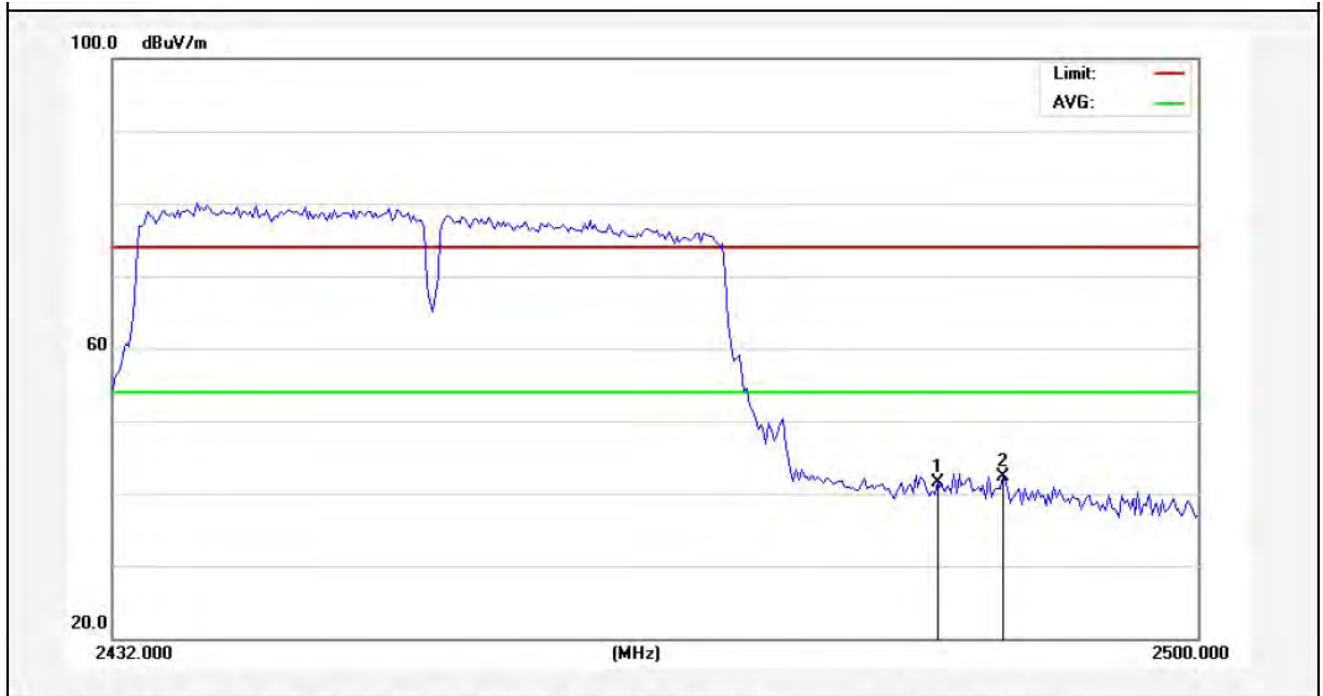


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	46.39	-2.31	44.08	74.00	-29.92	peak			
2	2489.630	47.57	-2.29	45.28	74.00	-28.72	peak			

Horizontal-AV:



Test Mode: 802.11n (HT40)
2452MHz
Vertical-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	43.80	-2.31	41.49	74.00	-32.51	peak			
2	2487.760	44.57	-2.30	42.27	74.00	-31.73	peak			

Vertical-AV:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	32.57	-2.31	30.26	54.00	-23.74	AVG			
2	2488.440	31.58	-2.30	29.28	54.00	-24.72	AVG			

ANT B

Test Mode: 802.11b

2412MHz

Horizontal-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2386.450	46.94	-2.52	44.42	74.00	-29.58	peak			
2	2390.000	42.73	-2.51	40.22	74.00	-33.78	peak			
3	2400.000	61.67	-2.49	59.18	74.00	-14.82	peak			