

FCC 47 CFR PART 15 SUBPART C
Canada RSS-247 Issue2
Canada RSS-Gen Issue4
TEST REPORT

For

Product Name: Sengled Snap Gen2

Brand Name: sengled

Model No.: AS02-PAR38NAE26

Series Model.:N/A

FCC ID: 2AGN8-AS02PAR38

IC: 20888-AS02PAR38

Test Report Number:

C170913R02-RPW

Issued for

Sengled Co., Ltd.

Room 201/15,Building 1, No.498, Guoshoujing Road, Pilot Free Trade Zone,Shanghai,China

Issued by

Compliance Certification Services Inc.

Kun shan Laboratory

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TESTING CERT #2541.01

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	September 27, 2017	C170913R02-RPW	ALL	N/A

1. TEST RESULT CERTIFICATION

Product Name:	Sengled Snap Gen2
Trade Name:	sengled
Model Name.:	AS02-PAR38NAE26
Series Model:	N/A
Applicant Discrepancy:	Initial
Device Category:	Mobile Device
Date of Test:	September 18~22, 2017
Applicant:	Sengled Co., Ltd. Room 201/15,Building 1, No.498, Guoshoujing Road, Pilot Free Trade Zone,Shanghai,China
Manufacturer:	Sengled Co., Ltd. Room 201/15,Building 1, No.498, Guoshoujing Road, Pilot Free Trade Zone,Shanghai,China
Application Type:	Certification

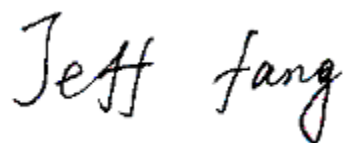
APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted
Canada RSS-247 Issue2	No non-compliance noted
Canada RSS-Gen Issue4	No non-compliance noted

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

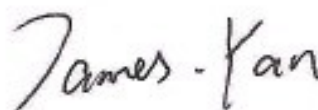
The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:



Jeff.Fang
RF Manager
Compliance Certification Service Inc.

Tested by:



James.Yan
Test Engineer
Compliance Certification Service Inc.

2. EUT DESCRIPTION

Product Name:	Sengled Snap Gen2
Brand Name:	sengled
Model Name:	AS02-PAR38NAE26
Series Model:	N/A
Model Discrepancy:	N/A
Power Supply:	Input:100-120VAC,50/60Hz
Frequency Range:	IEEE 802.11b/g: 2412MHz to 2462 MHz IEEE 802.11n HT20: 2412MHz to 2462 MHz IEEE 802.11n HT40: 2422MHz to 2452 MHz
Average Transmit Power:	IEEE 802.11b mode: 20.39dBm IEEE 802.11g mode: 23.41dBm IEEE 802.11n HT20 mode: 25.95dBm IEEE 802.11n HT40 mode:24.08dBm
Modulation Technique:	IEEE802.11b mode: DSSS (1,2,5.5 and 11 Mbps) IEEE802.11g mode: DSSS /OFDM (6,9,12,18,24,36,48 and 54 Mbps) IEEE802.11n HT20 mode: OFDM (MCS0-MCS7) IEEE802.11n HT40 mode: OFDM (MCS0-MCS7)
Number of Channels:	IEEE 802.11b/g mode: 11 Channels IEEE 802.11n HT20 : 11 Channels IEEE 802.11n HT40 : 7 Channels
Antenna Specification:	PCB Antenna 1 Gain: 6.63 dBi PCB Antenna 2 Gain: 4.83 dBi Directional Gain: 8.83 dBi *

Note: Antenna Directional Gain (dBi) = $10 \cdot \log(10^{Antenna\ 1\ Gain / 10} + 10^{Antenna\ 2\ Gain / 10})$

Remark:

- 1.The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
- 2.This submittal(s) (test report) is intended for **FCC ID:2AGN8-AS02PAR38** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
- 3.This submittal(s) (test report) is intended for **IC:20888-AS02PAR38** filing to comply with Canada RSS-247 Issue 2 and Canada RSS-Gen Issue 4 Rules.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10 2013 and FCC CFR 47 15.207, 15.209 and 15.247.

3.1. EUT CONFIGURATION

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

3.2. EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3. GENERAL TEST PROCEDURES

Conducted Emissions

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

Radiated Emissions

Under 1GHz

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10:2013.

Above 1GHz

The EUT is placed on a turn table, which is 1.5 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10:2013.

3.4. FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.5. DESCRIPTION OF TEST MODES

Test Mode	Ant 1	Ant 2	Ant 1+2
802.11b	✓	✓	x
802.11g	✓	✓	x
802.11n HT20	✓	✓	✓
802.11n HT40	✓	✓	✓

The worst-case data rates:

IEEE802.11b mode:

Channel Low (2412MHz)

Channel Mid (2437MHz)

Channel High (2462MHz) with 1Mbps data rate was chosen for full testing.

IEEE802.11g mode:

Channel Low (2412MHz)

Channel Mid (2437MHz)

Channel High (2462MHz) with 6Mbps data rate was chosen for full testing.

IEEE 802.11n HT20 MHz Channel mode:

Channel Low (2412MHz)

Channel Mid (2437MHz)

Channel High (2462MHz) with MCS0 data rate was chosen for full testing.

IEEE 802.11n HT40 MHz Channel mode:

Channel Low (2422MHz)

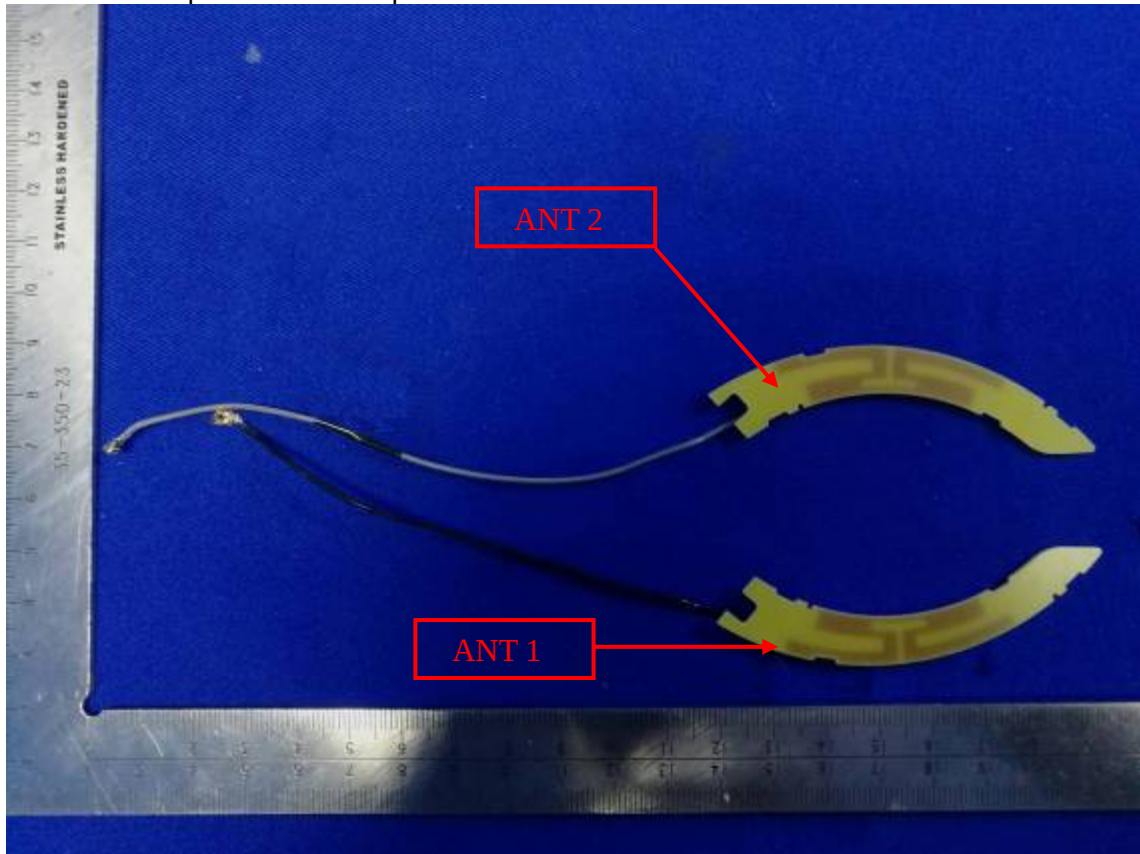
Channel Mid (2437MHz)

Channel High (2452MHz) with MCS0 data rate was chosen for full testing.

3.6. ANTENNA DESCRIPTION

an intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached or an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section”

- * the antenna of this EUT is a unique(PCB Antenna for WiFi).
- * the EUT complies with the requirement of 15.203.



4. INSTRUMENT CALIBRATION

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

Equipment Used for Emissions Measurement

Conducted Emissions Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	RS	FSU26	200789	2017-7-20	2018-7-19
Power meter	Anritsu	ML2495A	1445010	2017-4-26	2018-4-25
Power sensor	Anritsu	MA2411B	1339220	2017-4-26	2018-4-25
Power SPLITTER	Mini-Circuits	ZN2PD-9G	SF078500430	N.C.R	N.C.R
DC Power Supply	AGILENT	E3632A	MY50340053	N.C.R	N.C.R
Temp. / Humidity Gauge	Anymetre	TH603	CCS007	2016-11-1	2017-10-31
Test Software			EZ-EMC		

977 Chamber					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	RS	FSU26	200789	2017-7-20	2018-7-19
EMI Test Receiver	R&S	ESCI	101378	2017-1-5	2018-1-4
Pre-Amplifier	MITEQ	AMF-6F-260400-40-8P	1037496	2016-11-15	2017-11-14
Amplifier	MITEQ	JS41-00101800-32-10P	1675713	2017-7-20	2018-7-19
Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9170	9170-515	2017-3-6	2018-3-5
TRILOG BROADBAND ANTENNA	SCHWARZBECK	VULB9160	9160-3342	2017-5-27	2018-5-26
Loop Antenna	Hengweiyi	39501C	2014012	2017-1-5	2018-1-4
Horn-antenna	SCHWARZBECK	9120D	D:266	2017-3-5	2018-3-4
Horn-antenna	SCHWARZBECK	9120D	D:267	2016-11-10	2017-11-9
Turn Table	CT	CT123	4165	N.C.R	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R	N.C.R
Controller	CT	CT100	95637	N.C.R	N.C.R
Test Software			EZ-EMC		

Conducted Emission					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI TEST RECEIVER	R&S	ESCI	100781	2017-2-28	2018-2-27
V (V-LISN)	SCHWARZBECK	NNLK 8129	8129-143	2016-11-1	2017-10-31
TWO-LINE V-NETWORK	R&S	ENV216	101604	2016-11-1	2017-10-31
Pulse LIMITER	R&S	ESH3-Z2	100524	2017-1-5	2018-1-4
Test Software			EZ-EMC		

Remark: The measurement uncertainty is less than +/- 2.81dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

Expanded Uncertainty (95% CONFIDENCE INTERVAL): K=2

5. FACILITIES AND ACCREDITATIONS

5.1. FACILITIES

All measurement facilities used to collect the measurement data are located at CCS China Kunshan Lab at 10#Weiye Rd, Innovation Park Eco. & Tec. Development Zone Kunshan city JiangSu, (215300), CHINA.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 2013 and CISPR Publication 22.

5.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3. LABORATORY ACCREDITATIONS AND LISTING

FCC –Designation Number: CN1172.

Compliance Certification Services Inc. Kun shan 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 and the Designation Number: CN1172.

Also the test facilities are listed with Industry Canada, Laboratory Division, 2324E-1 for 10m chamber, 2324E-2 for 3m chamber.

5.4. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	47 CFR FCC Part 15/18 (using ANSI C63.10 :2013); VCCI V3; CNS 13438; CNS 13439; CNS 13803; CISPR 11; EN 55011; CISPR 13; EN 55013; CISPR 22:2005; CISPR 22:1997 +A1 :2000+A2 :2002; EN 55022:2006; EN55022 :1998 +A1 :2001+A2 :2003; EN 61000-6-3 (excluding discontinuous interference); EN 61000-6-4; AS/NZS CISPR 22; CAN/CSA-CEI/IEC CISPR 22; EN 61000-3-2; EN 61000-3-3; EN550024; EN 61000-4-2; EN 61000-4-3; EN61000-4-4; EN 61000-4-5; EN 61000-4-6; IEC 61000-4-8; EN 61000-4-11; IEC61000-3-2; IEC61000-3-3; IEC 61000-4-2; IEC 61000-4-3; IEC 61000-4-4; IEC 61000-4-5; IEC 61000-4-6; IEC 61000-4-8; IEC 61000-4-11; EN 300 220-3; EN 300 328; EN 300 330-2; EN 300 440-1; EN 300-440-2; EN 300 893; EN 301 489-01; EN 301 489-3; EN 301 489-07; EN 301 489-17; 47 CFR FCC Part 15, 22, 24	 TESTING CERT #2541.01
USA	FCC	3/10 meter Sites to perform FCC Part 15/18 measurements	 CN1172
Japan	VCCI	3/10 meter Sites and conducted test sites to perform radiated/conducted measurements	VCCI R-1600 C-1707 G-216

* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.

6. SETUP OF EQUIPMENT UNDER TEST

6.1. SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

6.2. SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID
1.	Notebook computer	DELL	Latitude E5430	N/A	N/A

Remark:

2. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
3. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

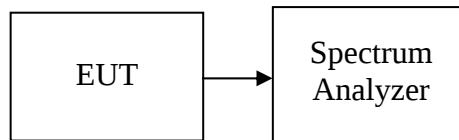
7. FCC PART 15.247 REQUIREMENTS

7.1. 6DB BANDWIDTH

LIMIT

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, and 2400 - 2483.5 MHz bands, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500kHz.

Test Configuration



TEST PROCEDURE

Set the spectrum analyzer as RBW = 100 kHz, VBW = 300 kHz, Sweep = auto couple.

TEST RESULTS

No non-compliance noted

Test Data

IEEE 802.11b mode /Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	8.109	>500	PASS
Mid	2437	8.590		PASS
High	2462	8.590		PASS

IEEE 802.11b mode /Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	9.102	>500	PASS
Mid	2437	9.038		PASS
High	2462	9.038		PASS

IEEE 802.11g mode /Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	15.192	>500	PASS
Mid	2437	15.641		PASS
High	2462	15.641		PASS

IEEE 802.11g mode /Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	12.692	>500	PASS
Mid	2437	12.628		PASS
High	2462	12.692		PASS

IEEE 802.11n HT20 mode / Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	14.167	>500	PASS
Mid	2437	15.064		PASS
High	2462	14.167		PASS

IEEE 802.11n HT20 mode / Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	12.628	>500	PASS
Mid	2437	12.628		PASS
High	2462	14.167		PASS

IEEE 802.11n HT40 mode / Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.250	>500	PASS
Mid	2437	35.673		PASS
High	2452	35.962		PASS

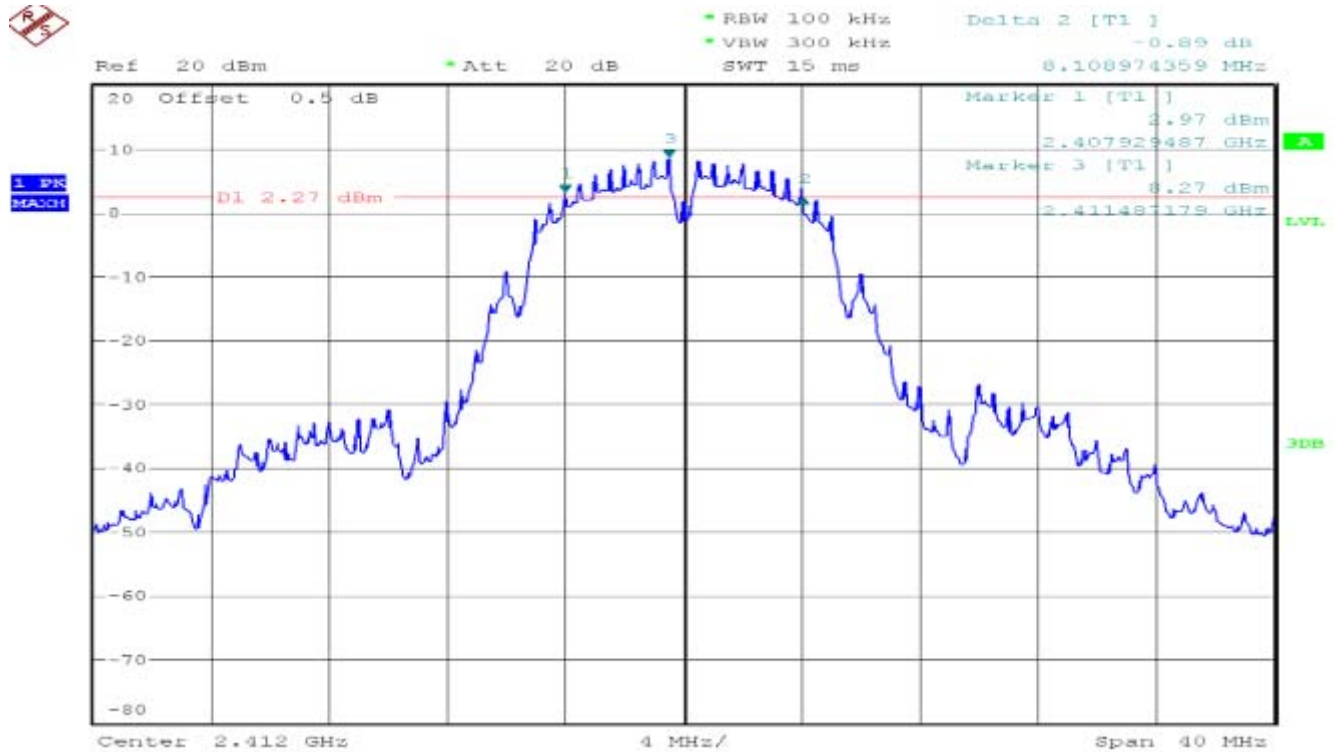
IEEE 802.11n HT40 mode / Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.346	>500	PASS
Mid	2437	35.577		PASS
High	2452	35.865		PASS

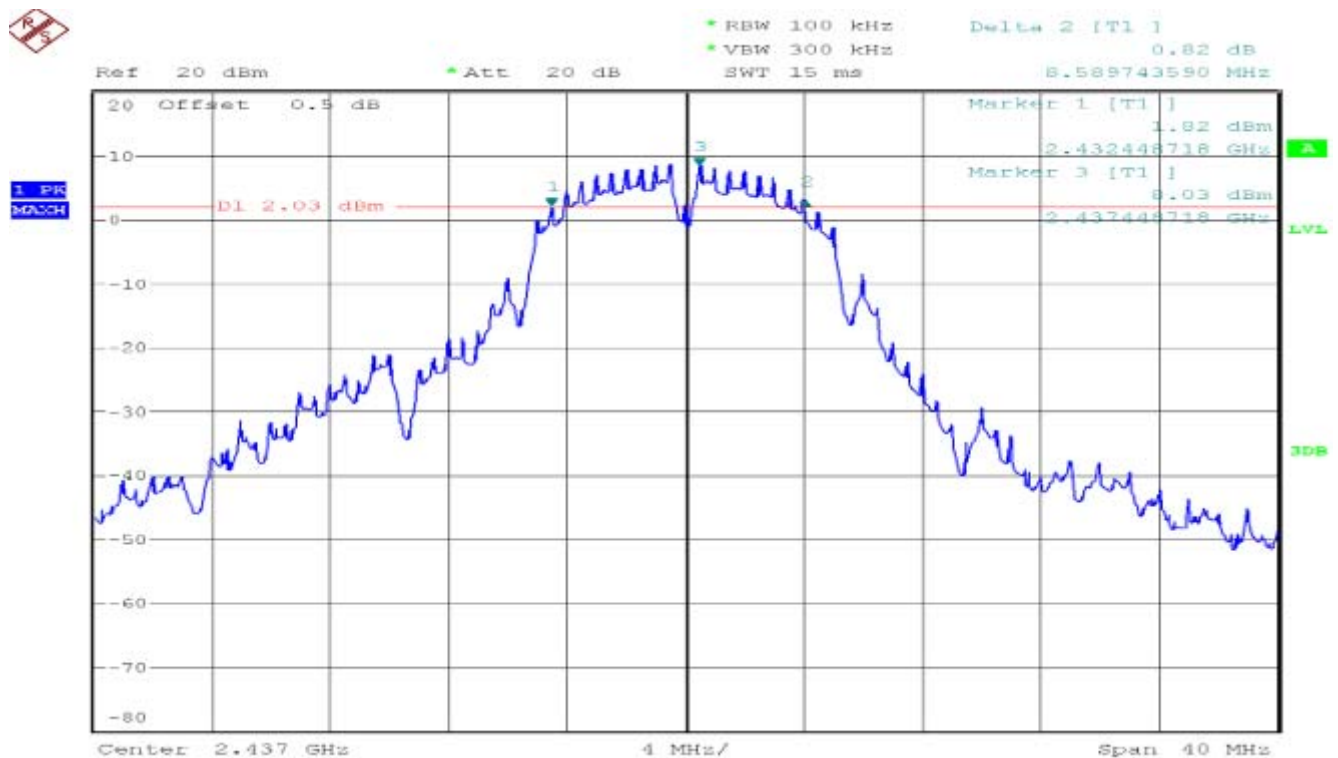
Test Plot

IEEE 802.11b MODE /Chain 0

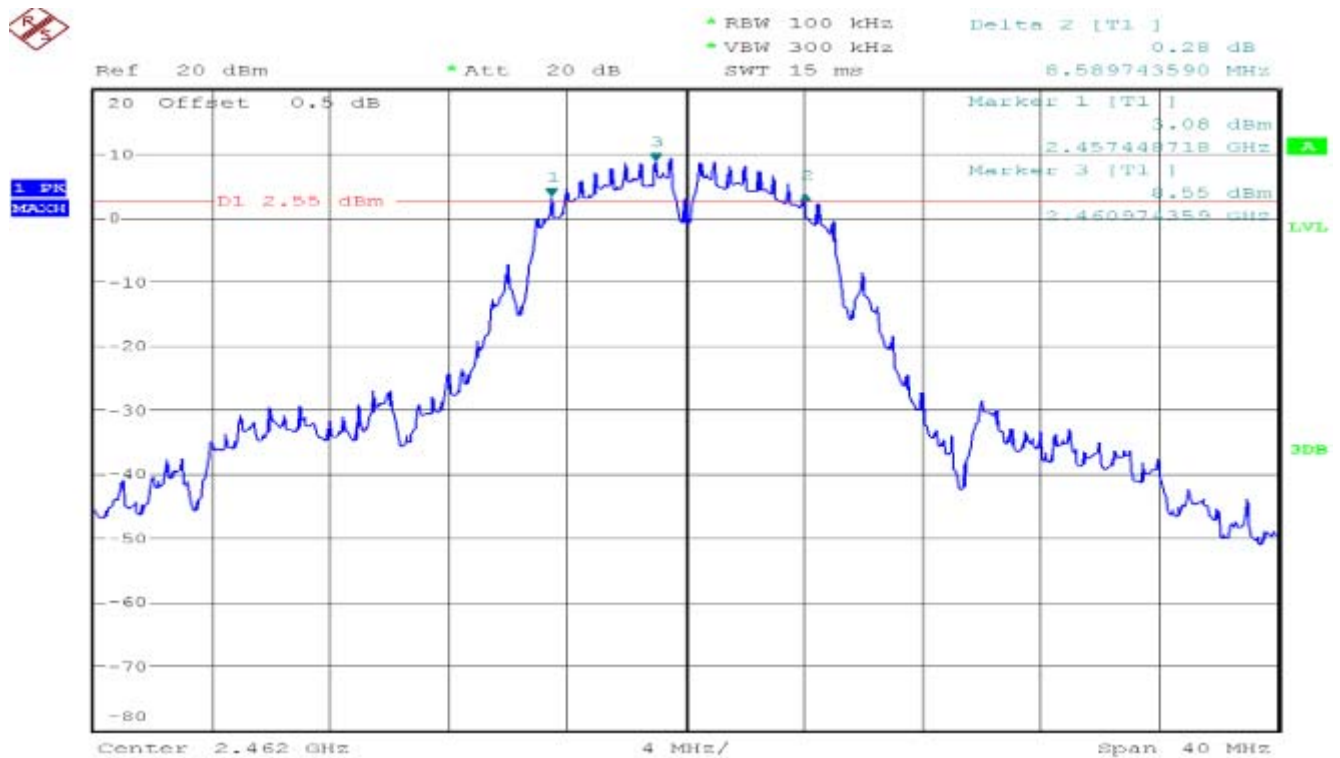
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

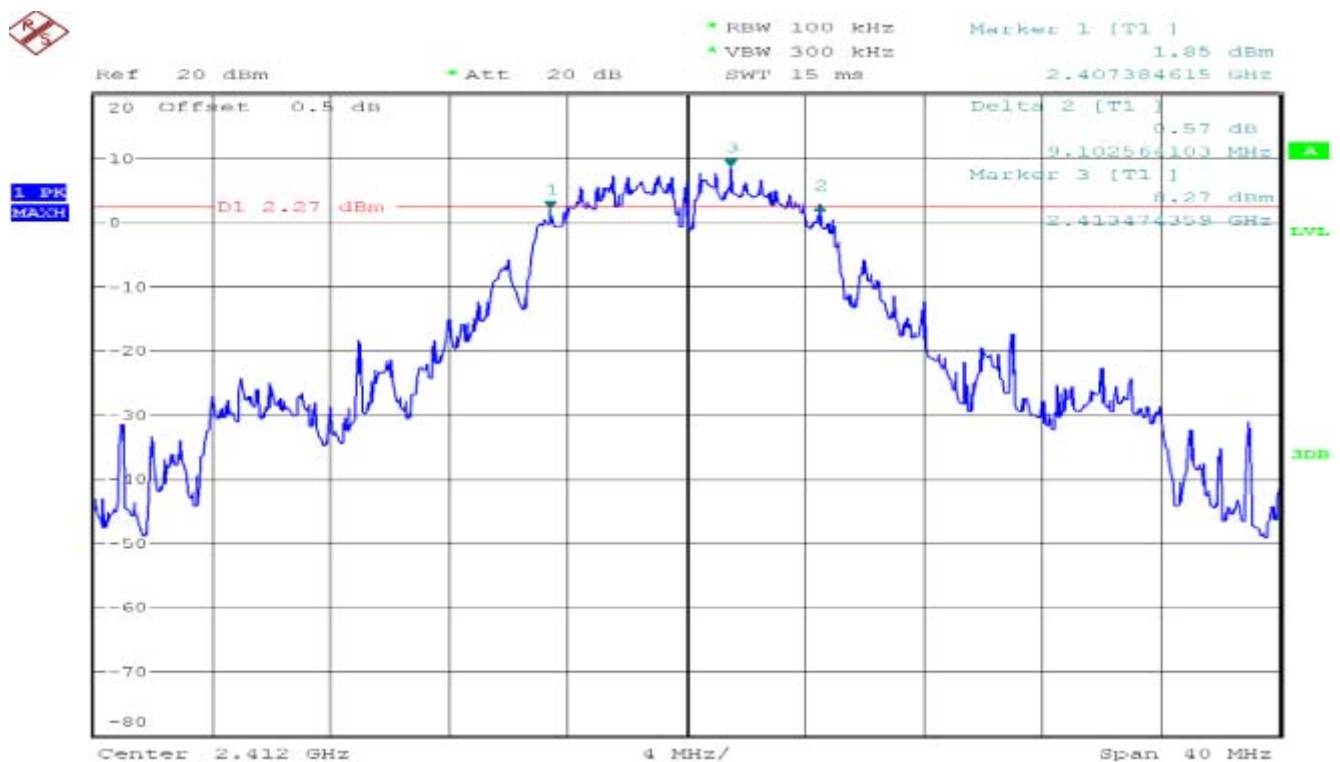


6dB Bandwidth (CH High)

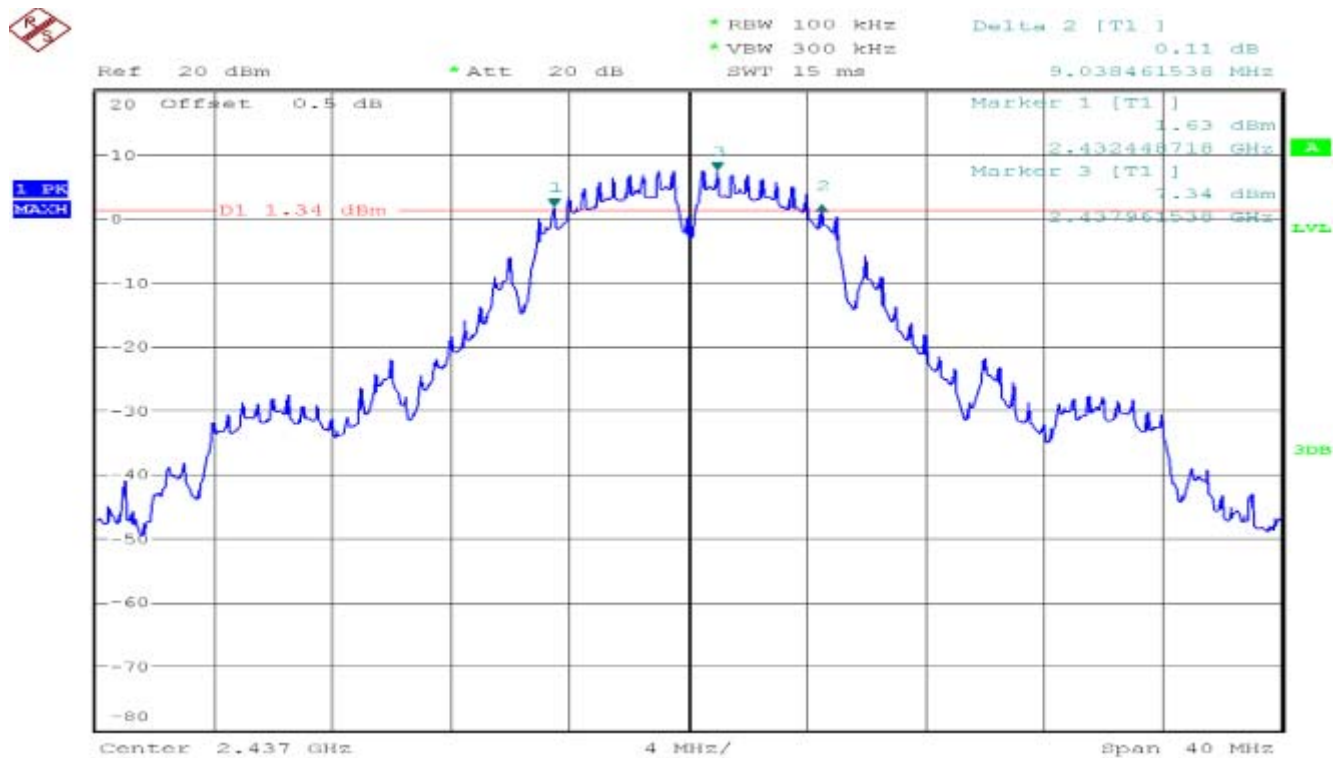


IEEE 802.11b MODE /Chain 1

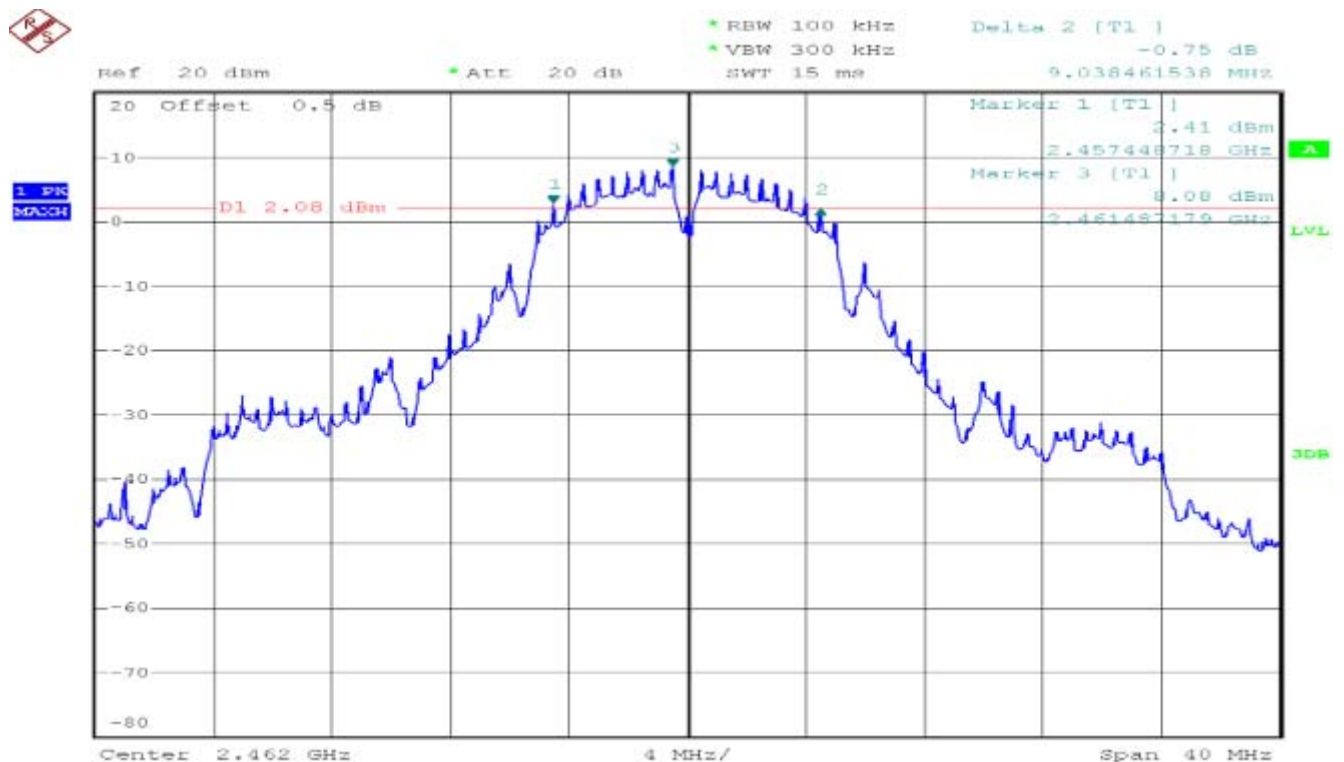
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

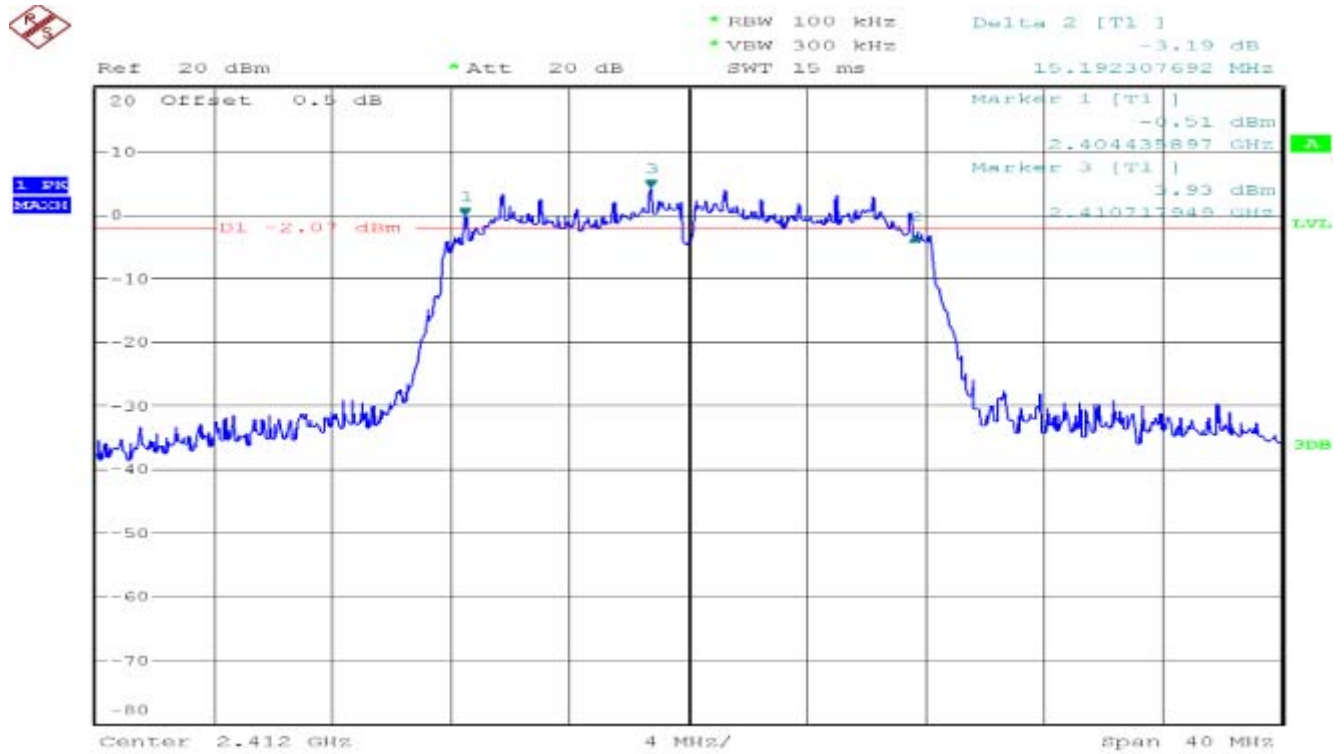


6dB Bandwidth (CH High)

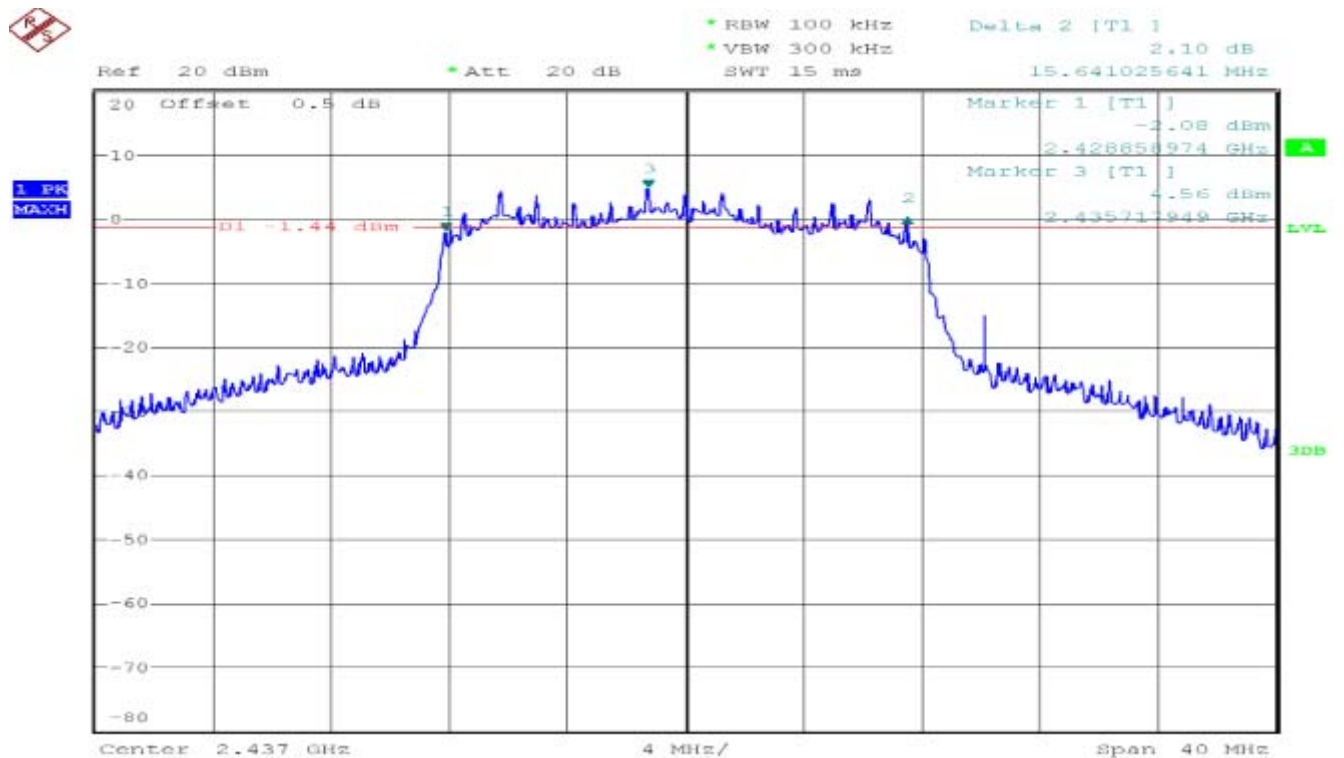


IEEE 802.11g MODE /Chain 0

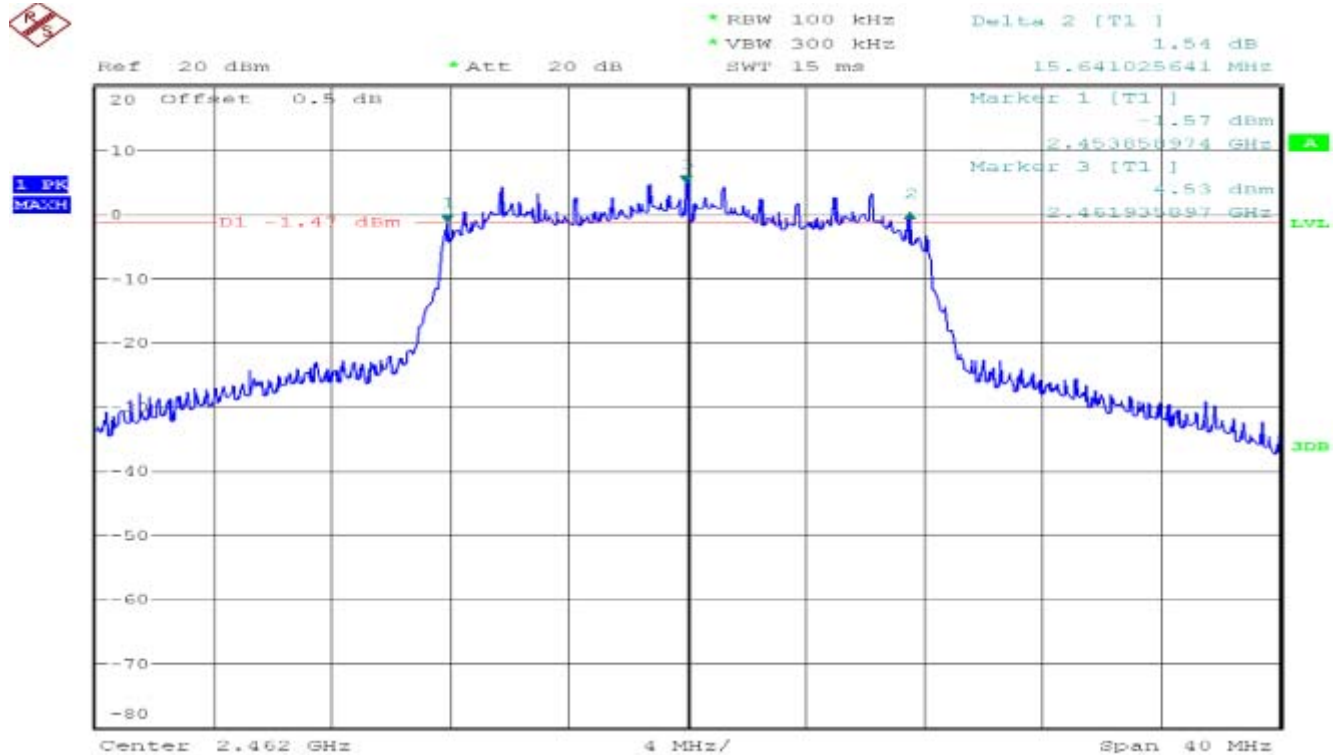
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

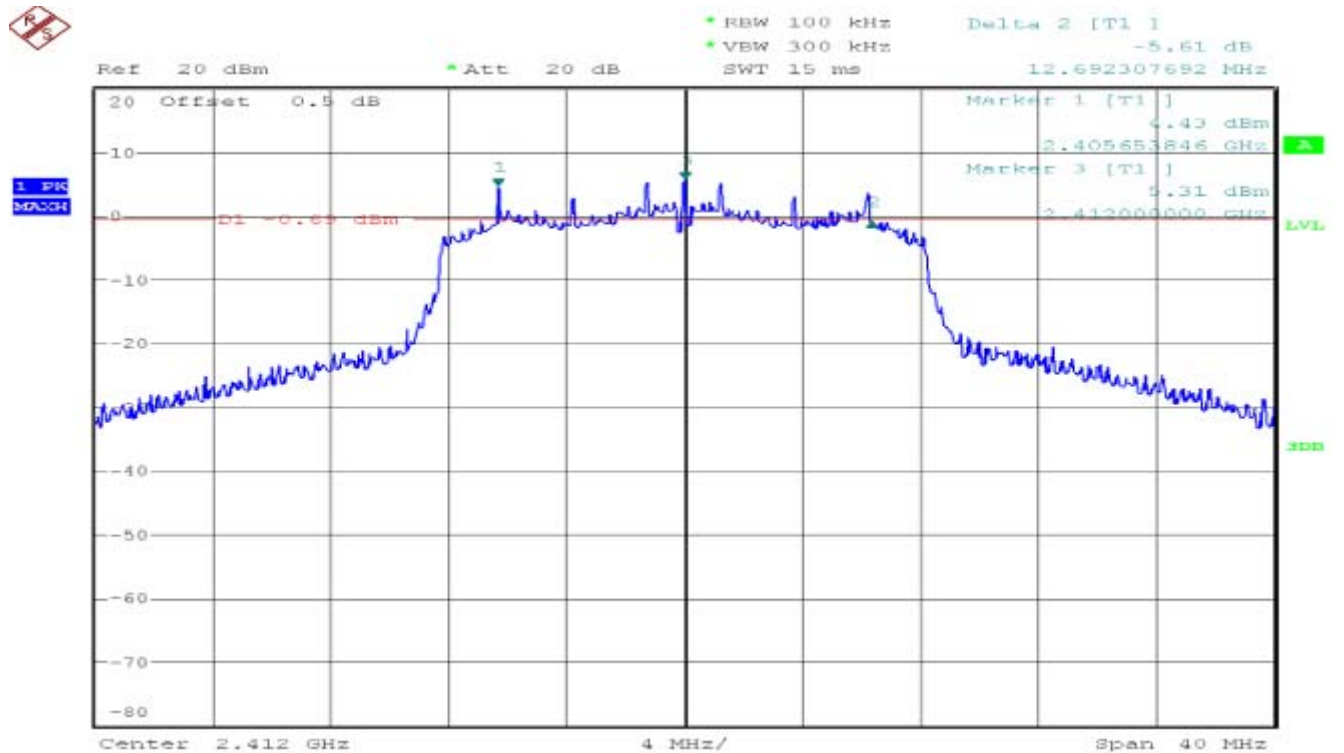


6dB Bandwidth (CH High)

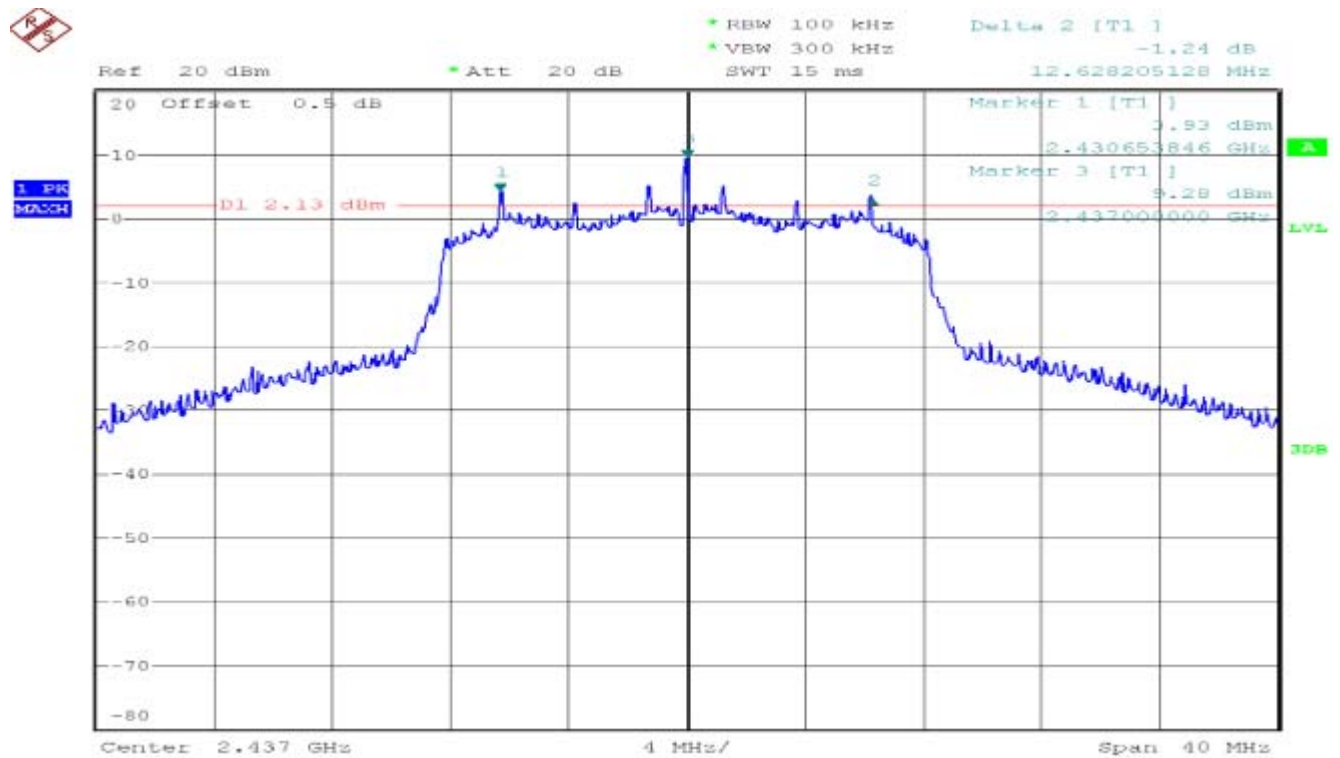


IEEE 802.11g MODE /Chain 1

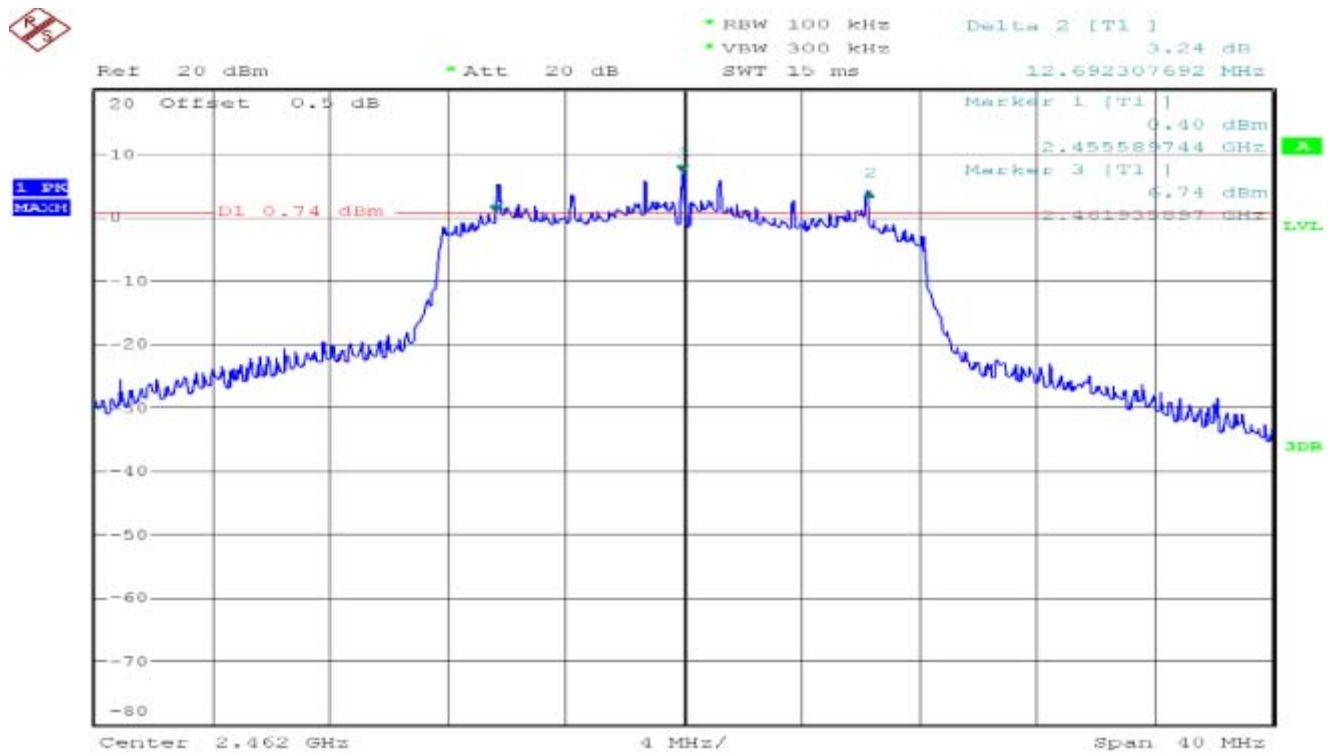
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

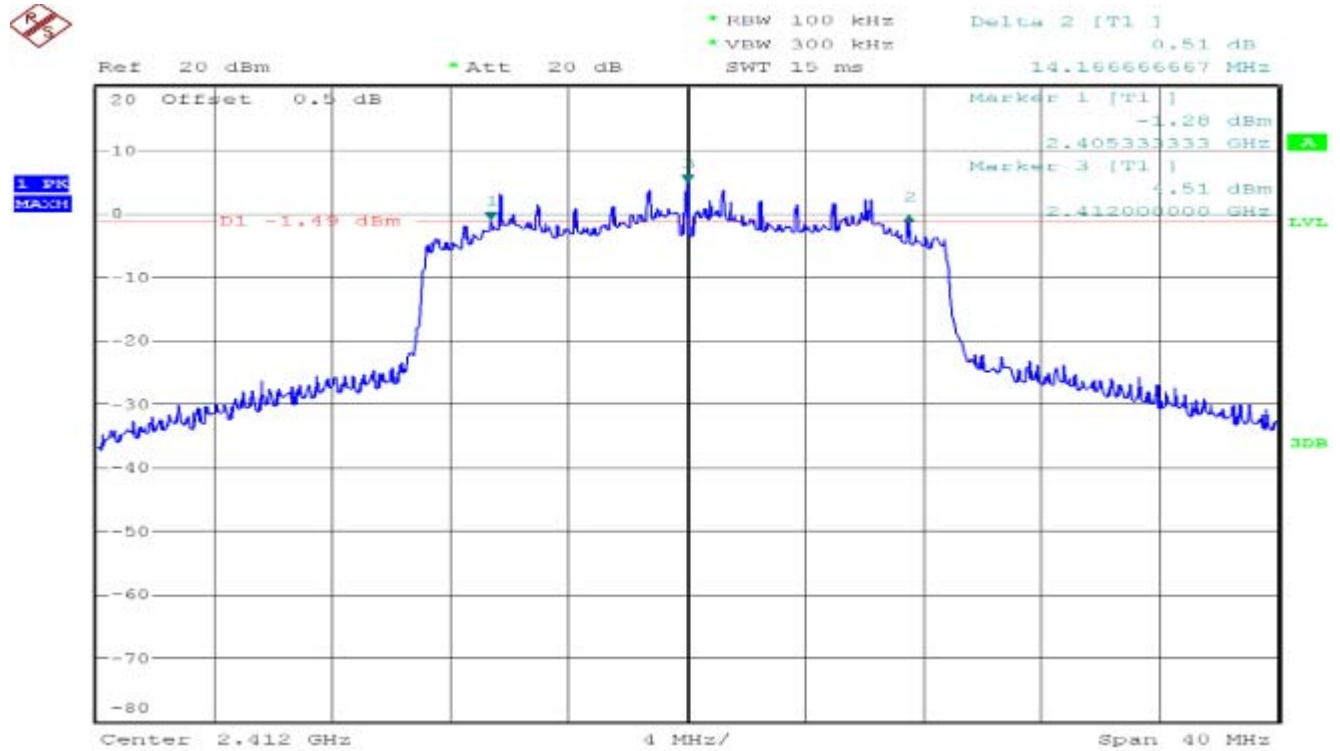


6dB Bandwidth (CH High)

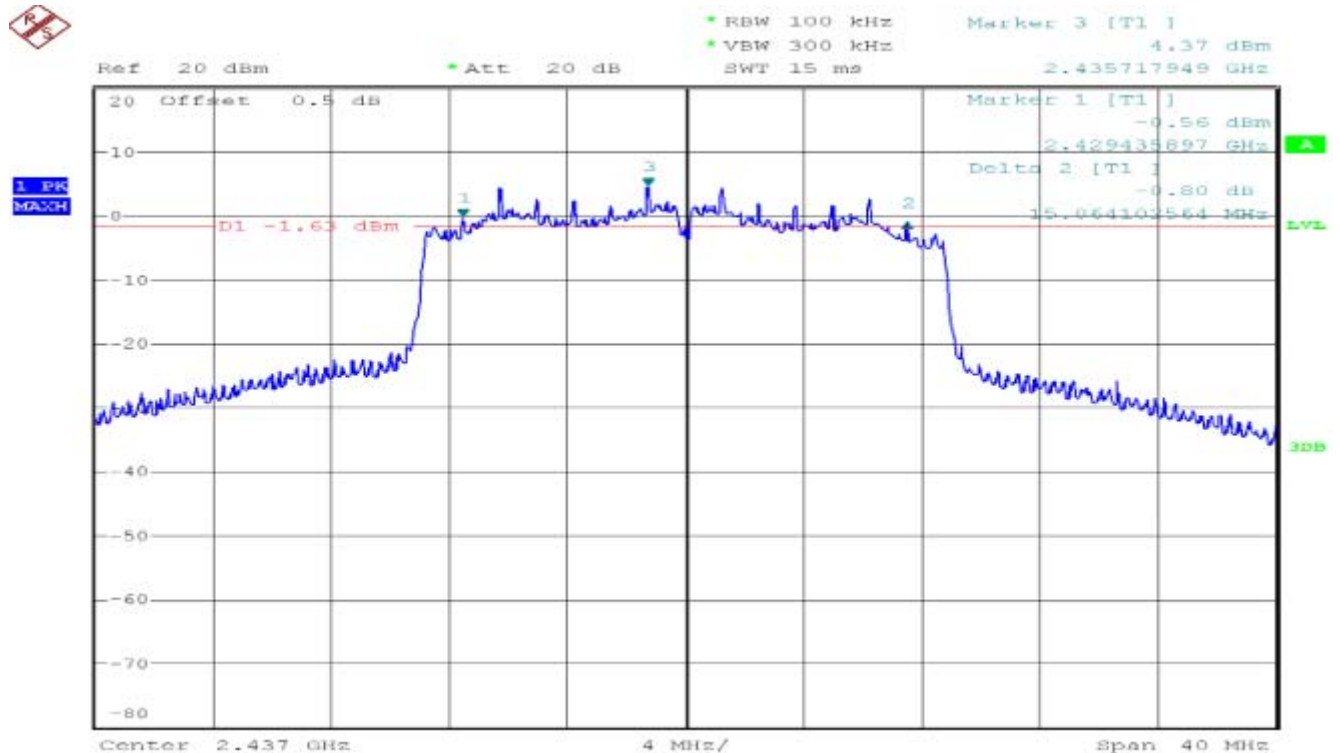


IEEE 802.11n HT20 mode / Chain 0

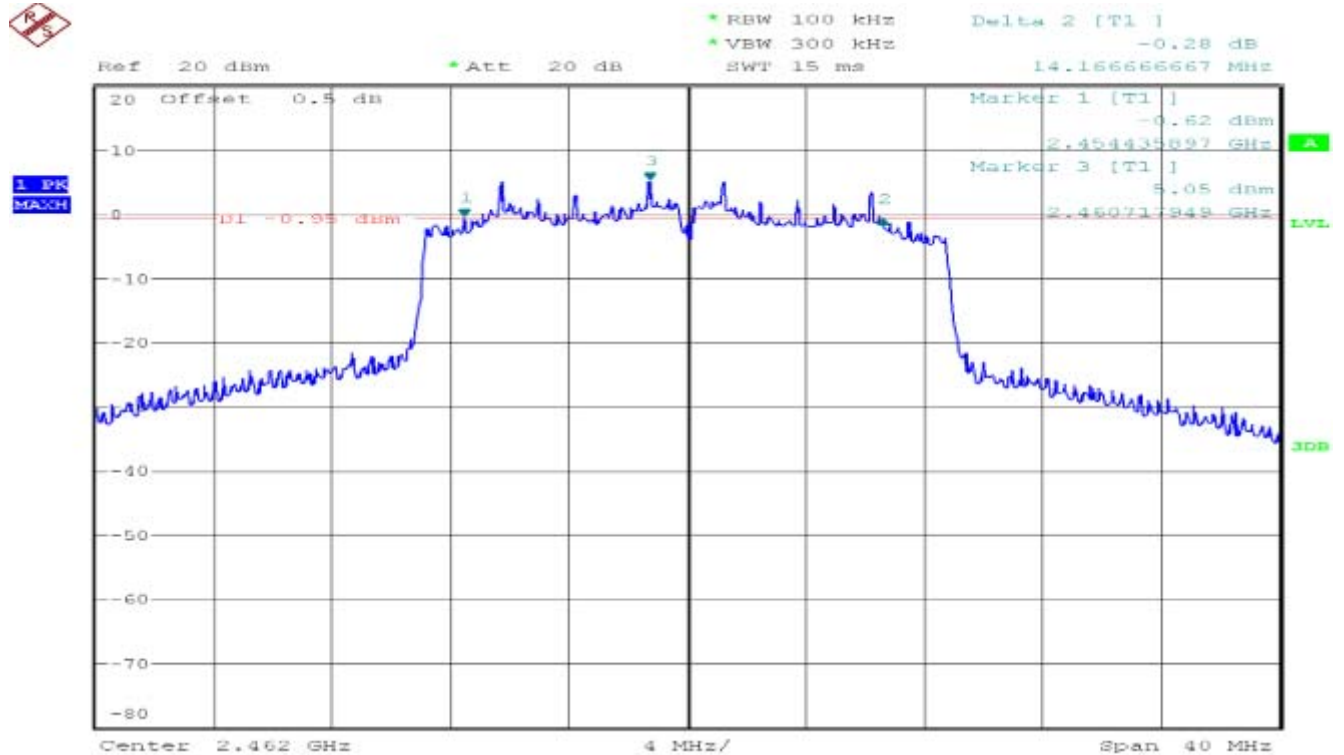
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

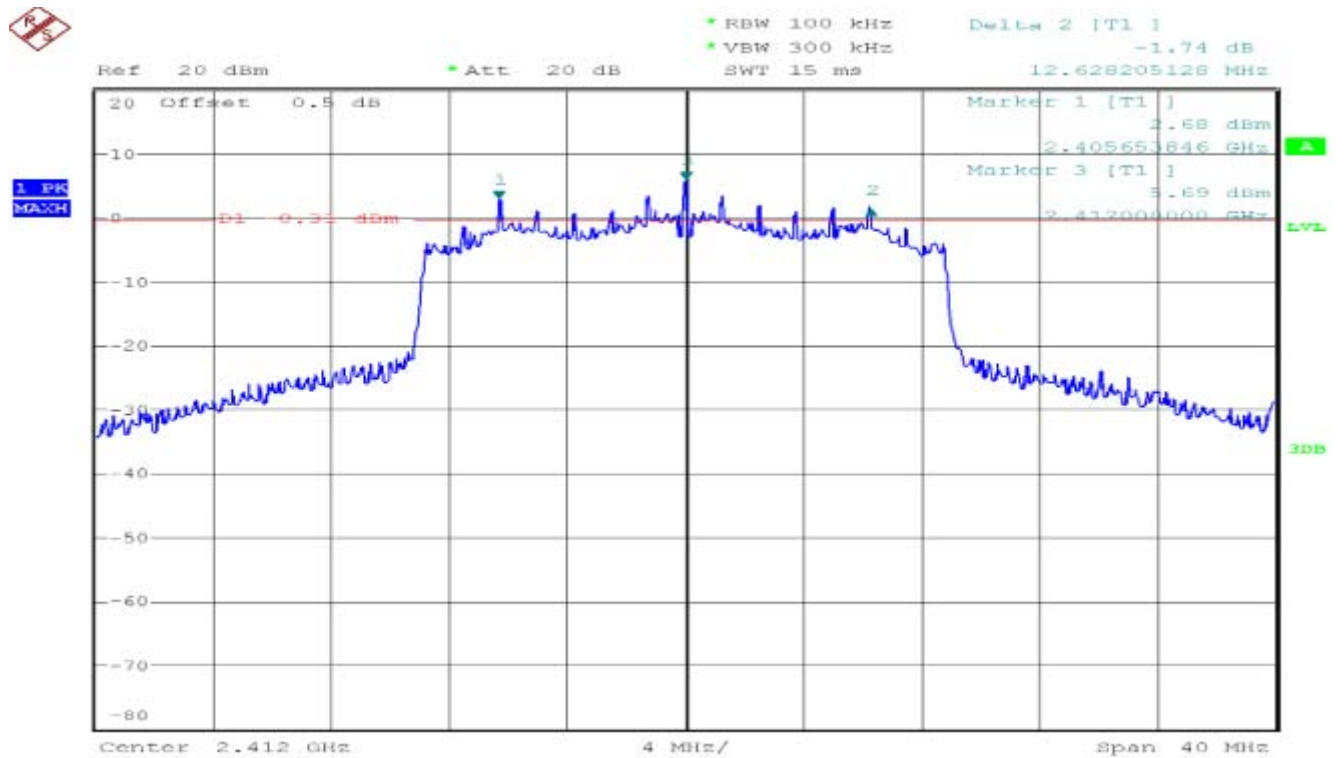


6dB Bandwidth (CH High)

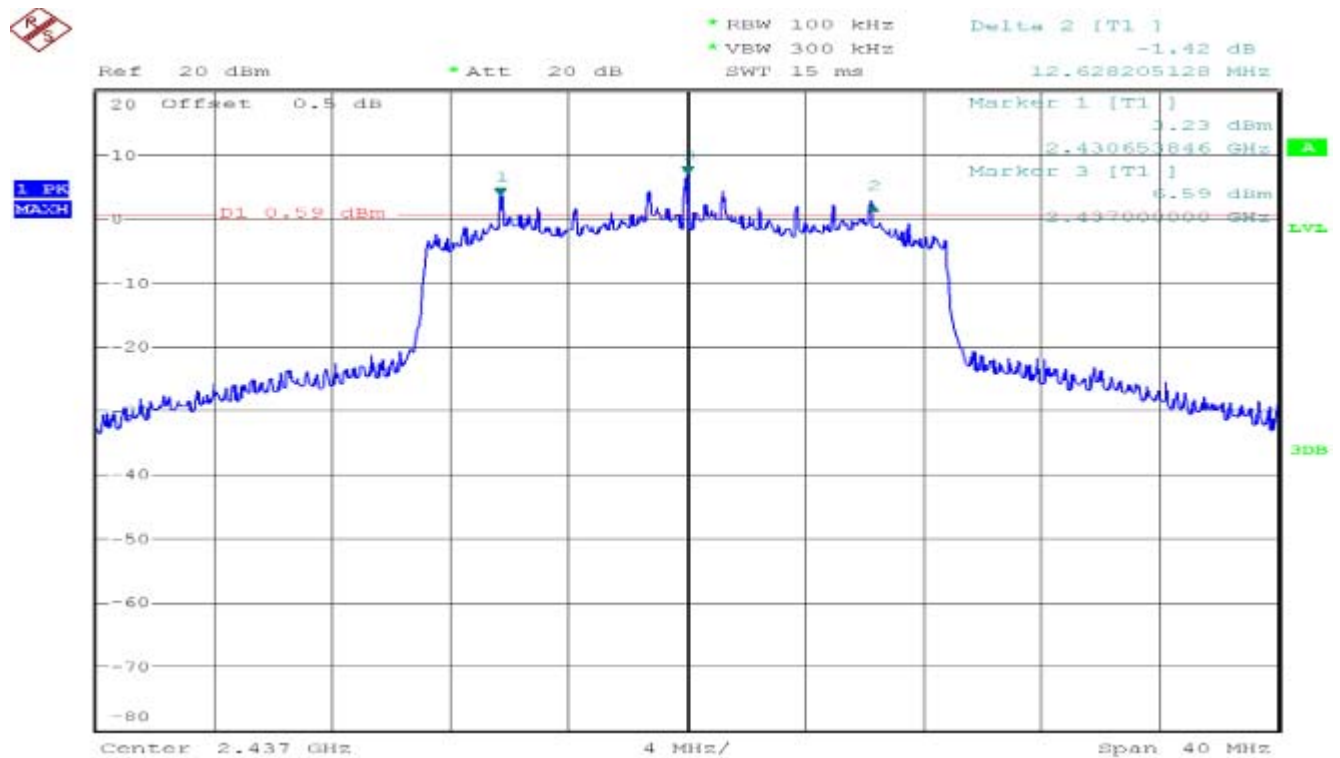


IEEE 802.11n HT20 mode / Chain 1

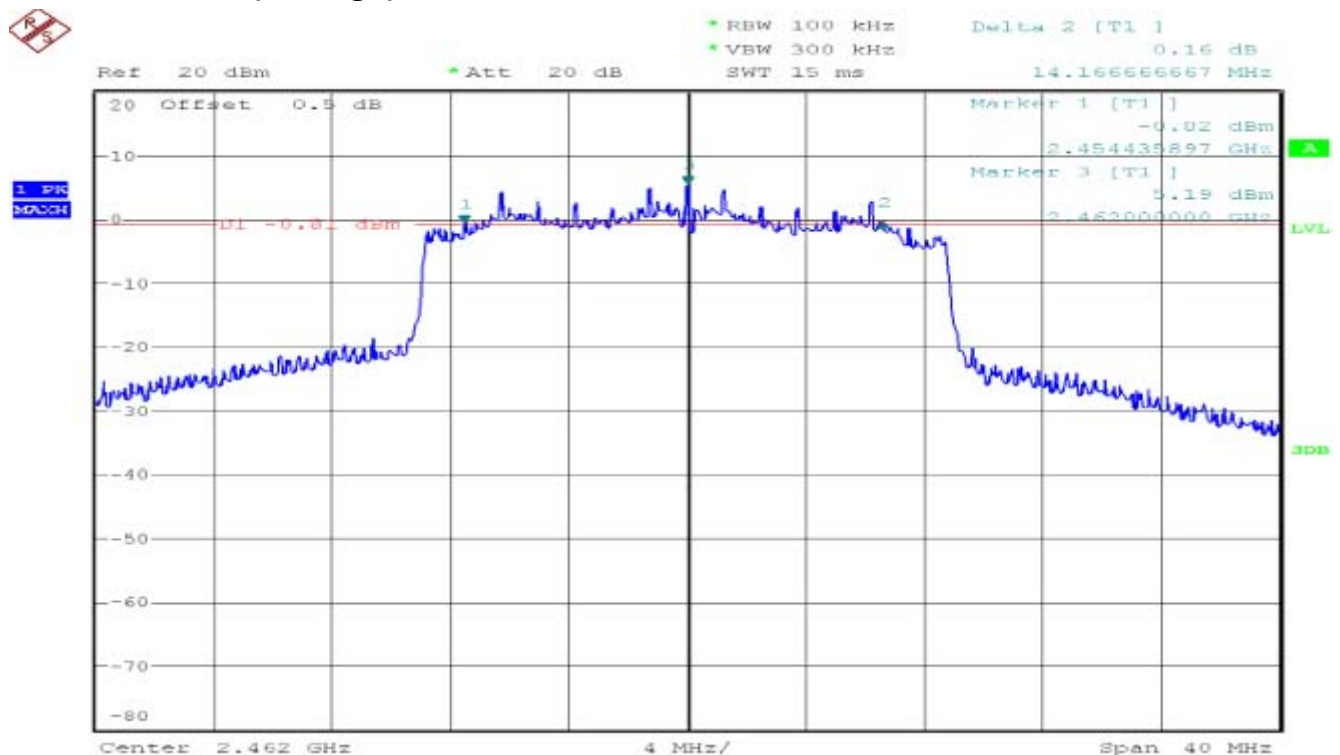
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

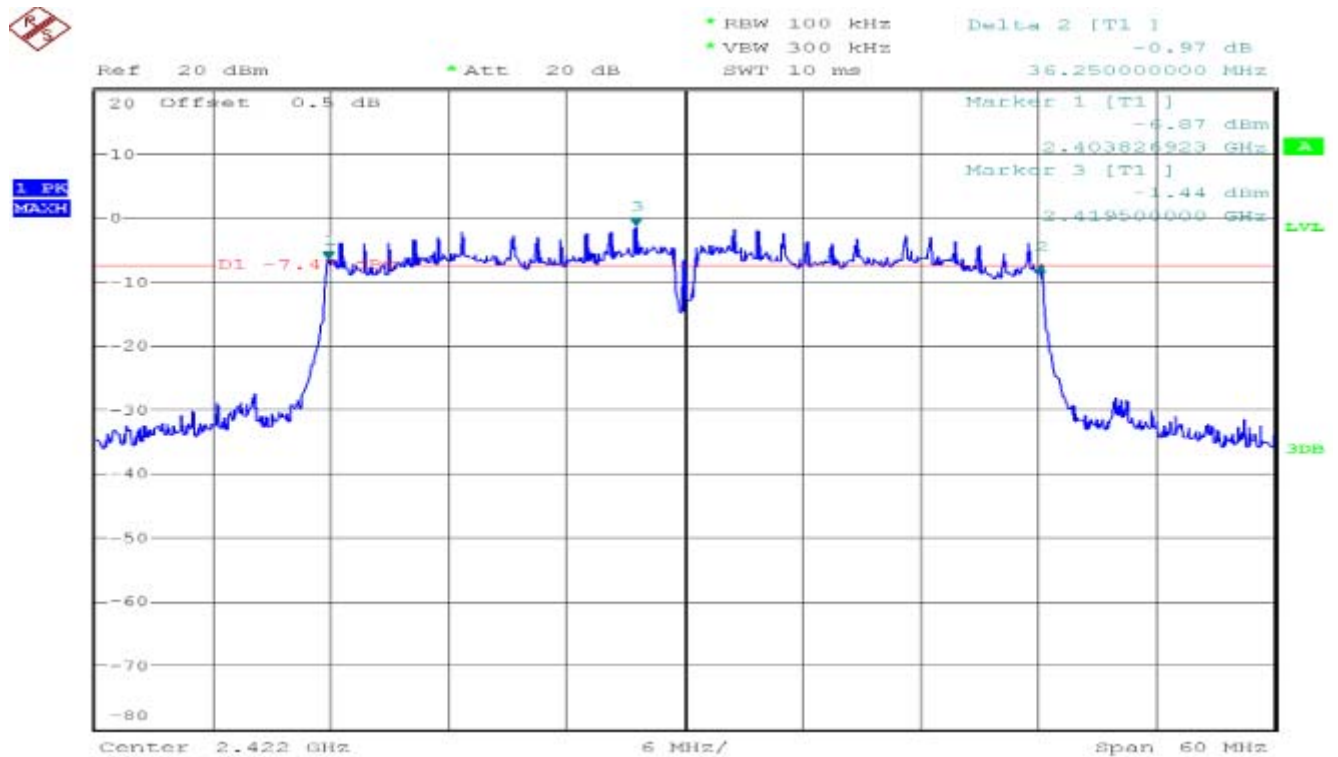


6dB Bandwidth (CH High)

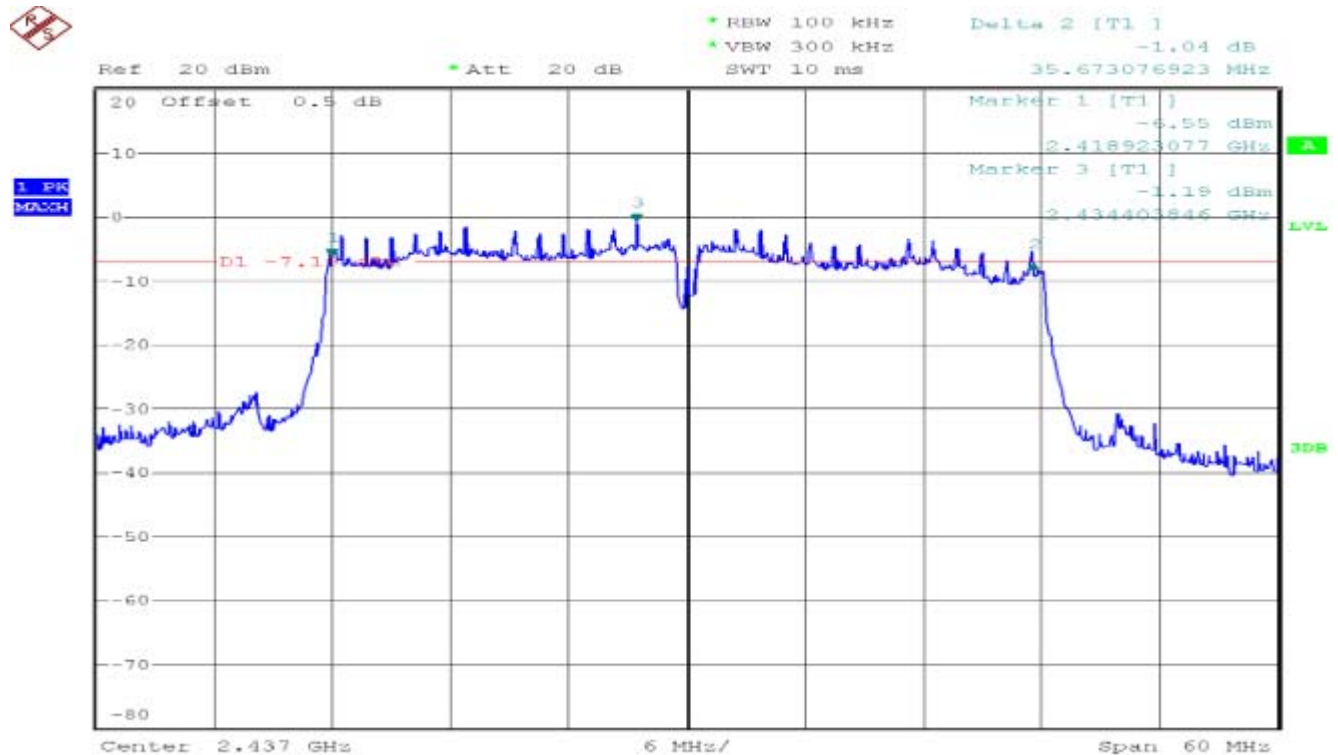


IEEE 802.11n HT40 mode / Chain 0

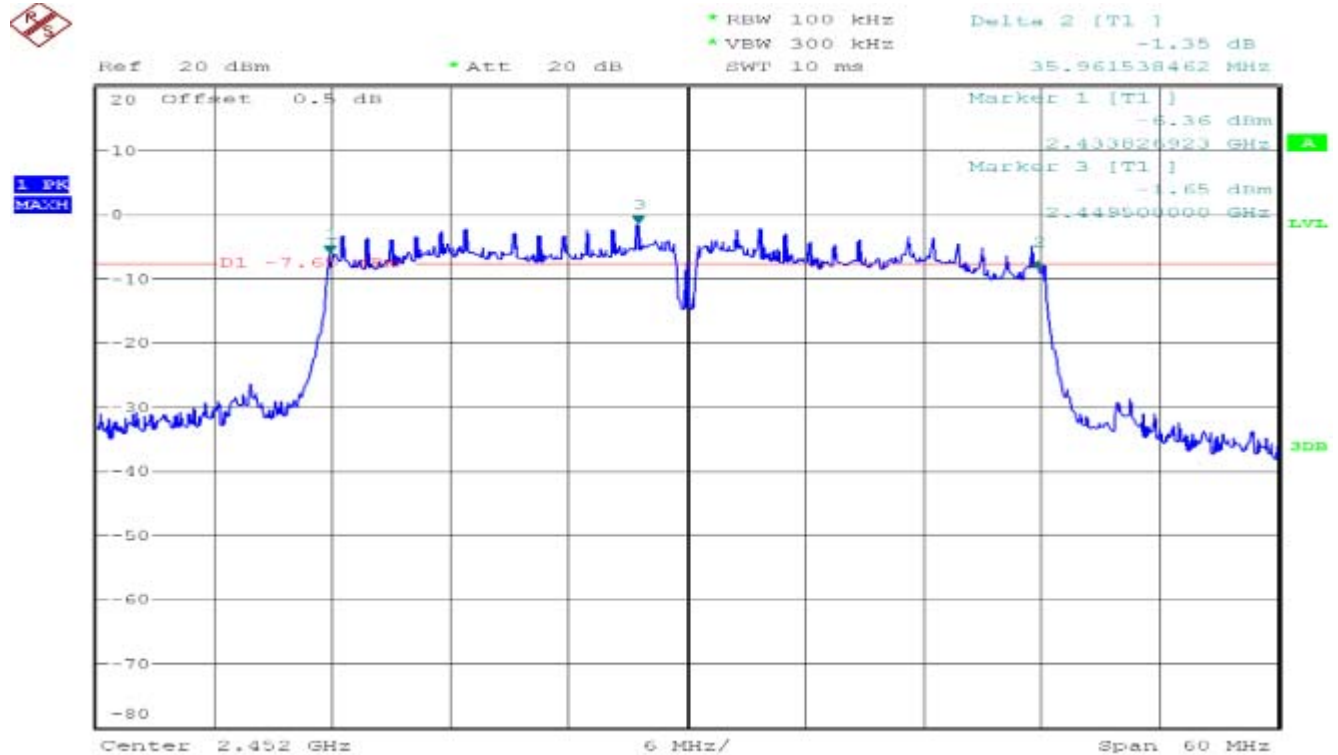
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

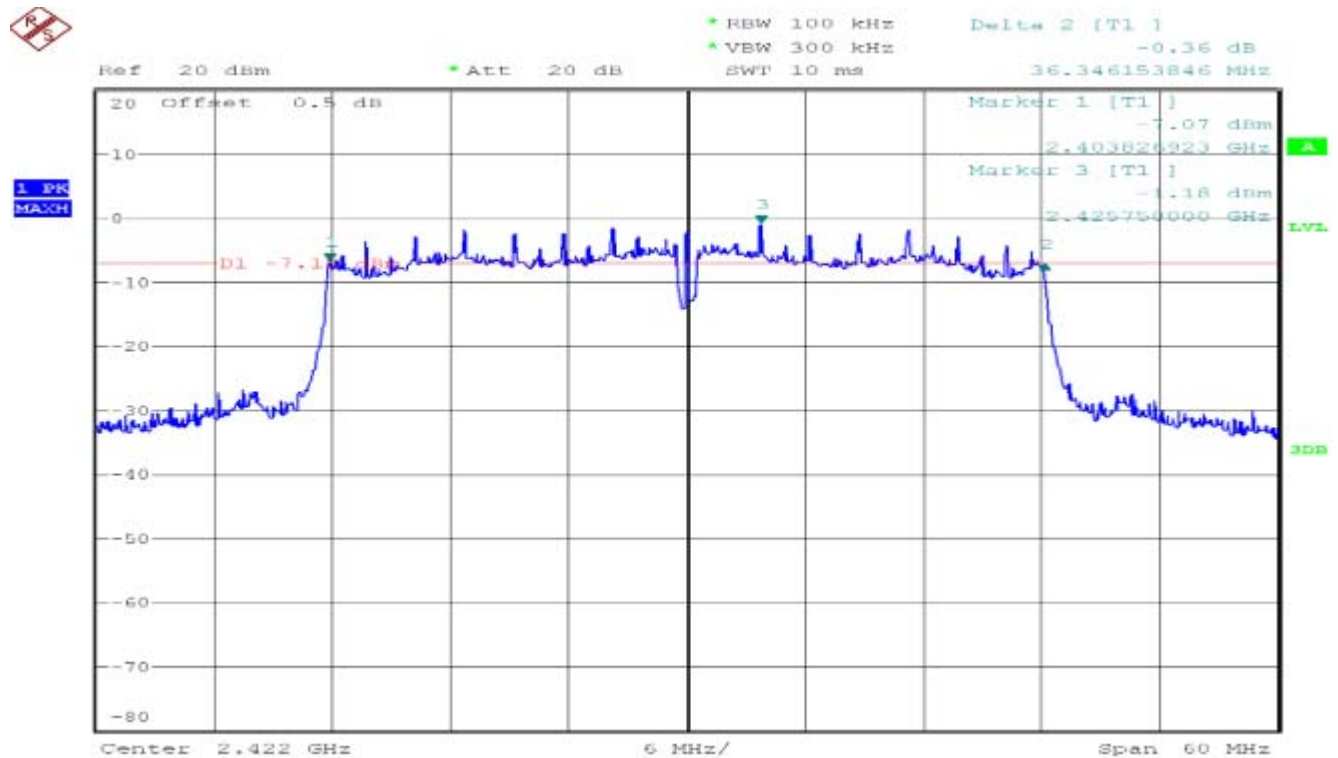


6dB Bandwidth (CH High)

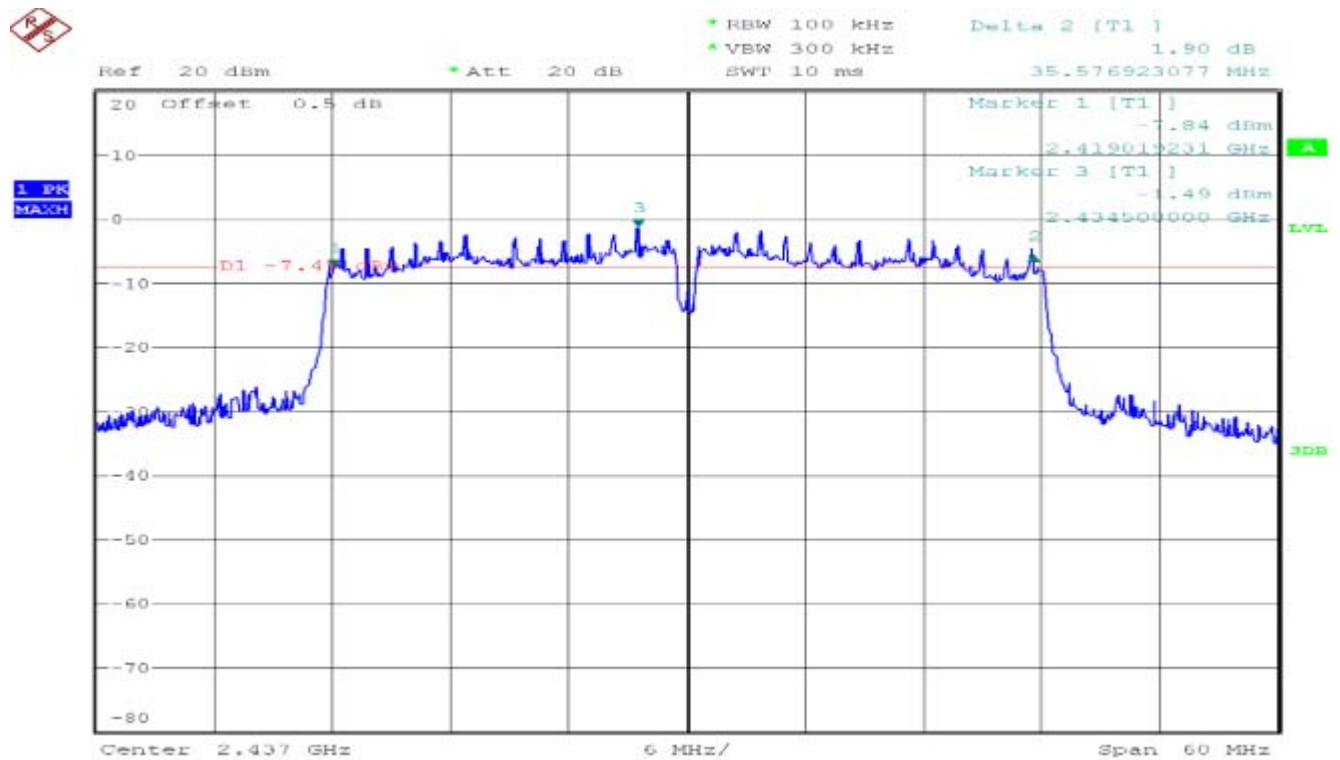


IEEE 802.11n HT40 mode / Chain 1

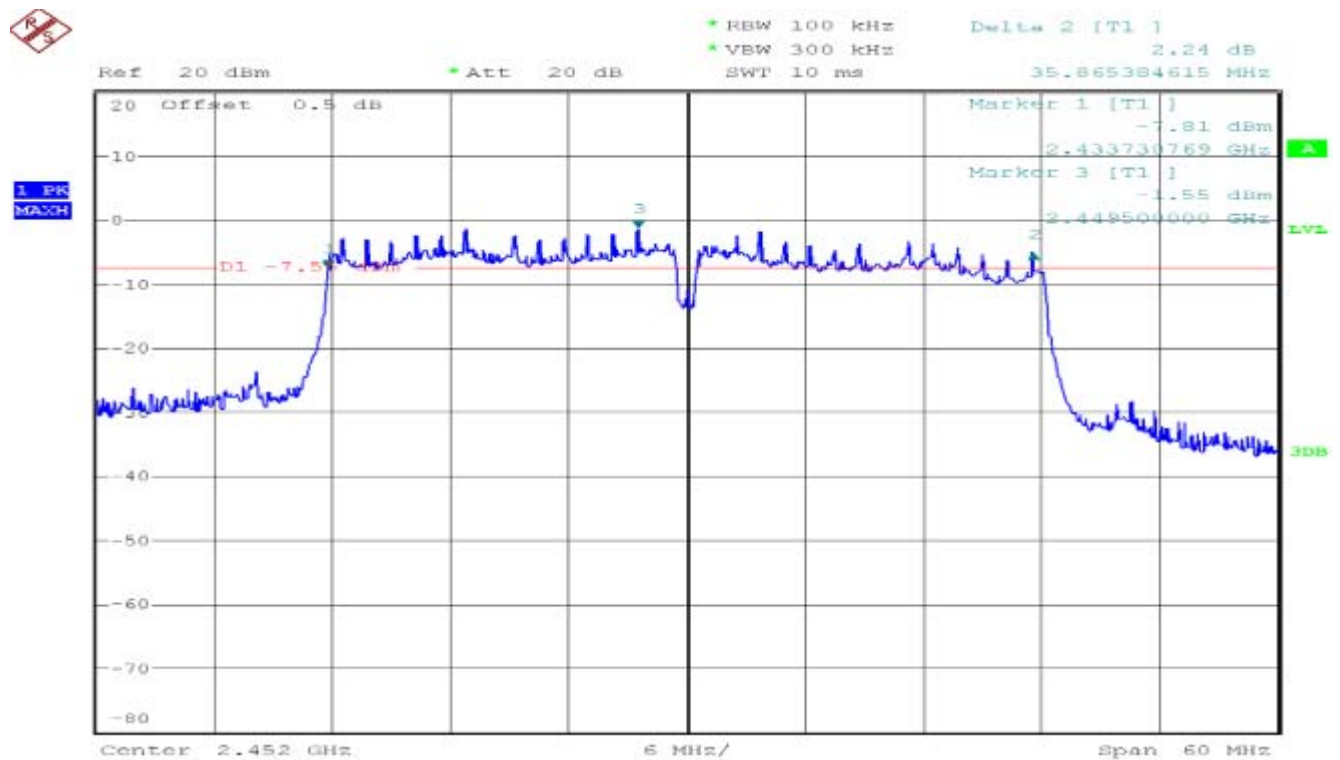
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



6dB Bandwidth (CH High)

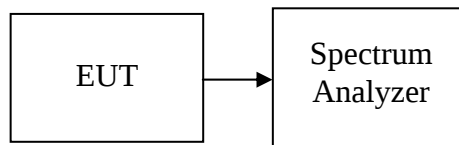


7.2. 99% BANDWIDTH MEASUREMENT

LIMIT

None; for reporting purposes only
RSS-Gen 6.6

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW shall be in the range of 1% to 5% of the occupied bandwidth and VBW shall be approximately 3x RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

TEST RESULTS

No non-compliance noted

Test Data

IEEE 802.11b mode/Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	2412	10.385
Mid	2437	10.385
High	2462	10.513

IEEE 802.11b mode/Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	2412	10.321
Mid	2437	11.923
High	2462	11.410

IEEE 802.11g mode/Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	2412	16.667
Mid	2437	16.667
High	2462	16.603

IEEE 802.11g mode/Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	2412	16.987
Mid	2437	17.051
High	2462	16.987

IEEE 802.11n HT20 mode/Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	2412	17.628
Mid	2437	17.564
High	2462	17.564

IEEE 802.11n HT20 mode/Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	2412	17.628
Mid	2437	17.692
High	2462	17.692

IEEE 802.11n HT40 mode/Chain 0

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	2422	37.019
Mid	2437	36.827
High	2452	37.115

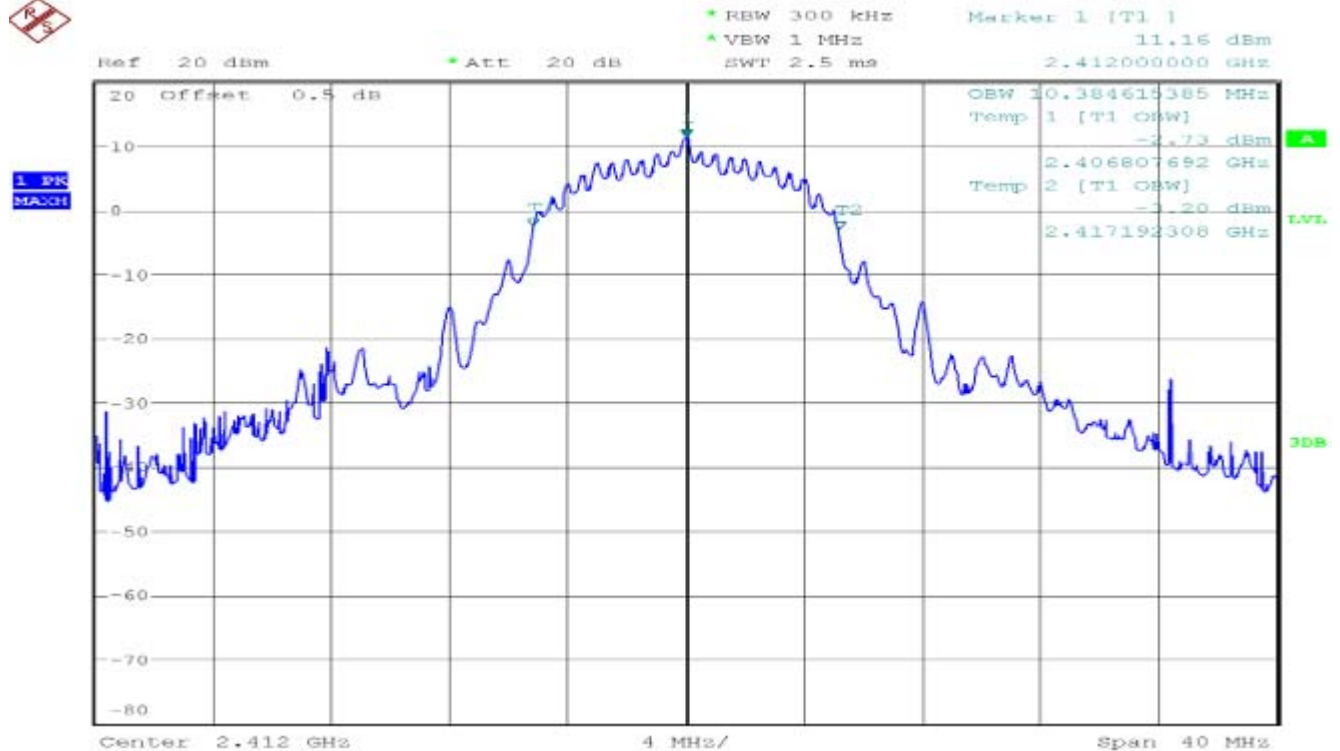
IEEE 802.11n HT40 mode/Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	2422	37.212
Mid	2437	37.019
High	2452	37.212

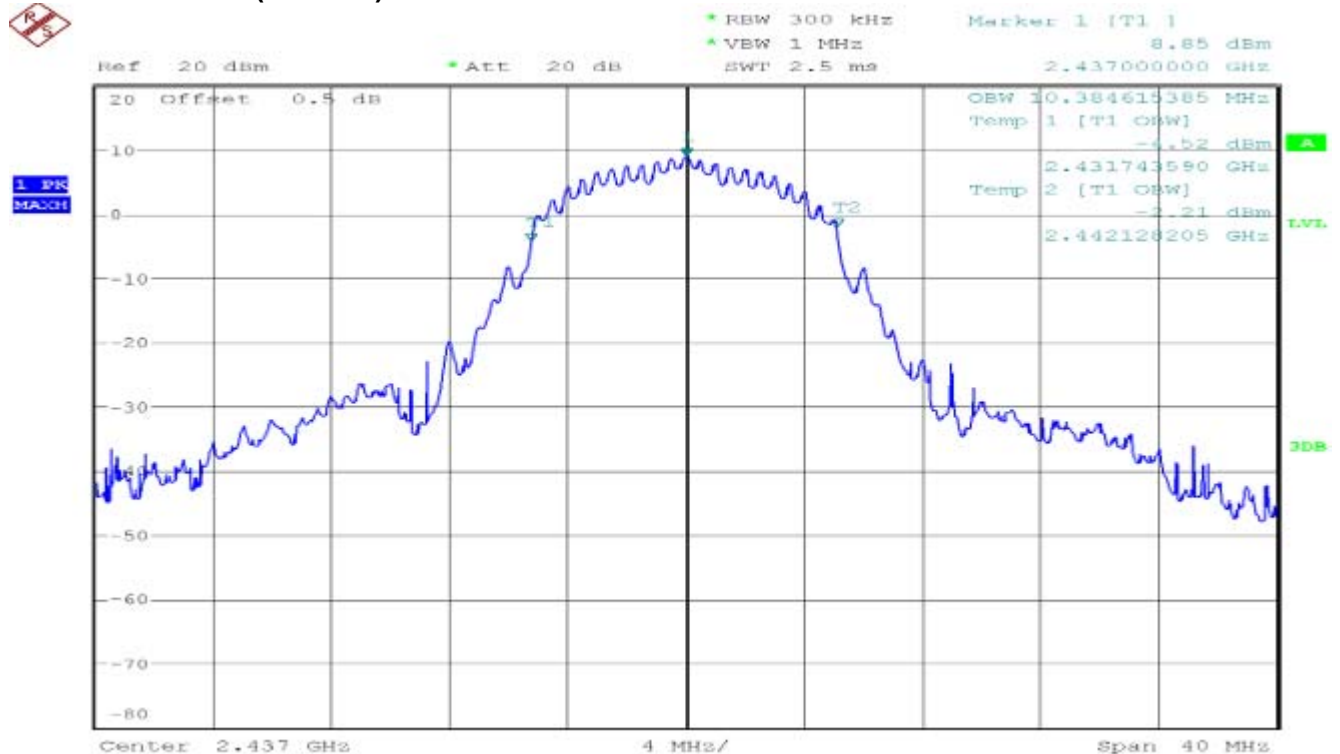
Test Plot

IEEE 802.11b MODE /Chain 0

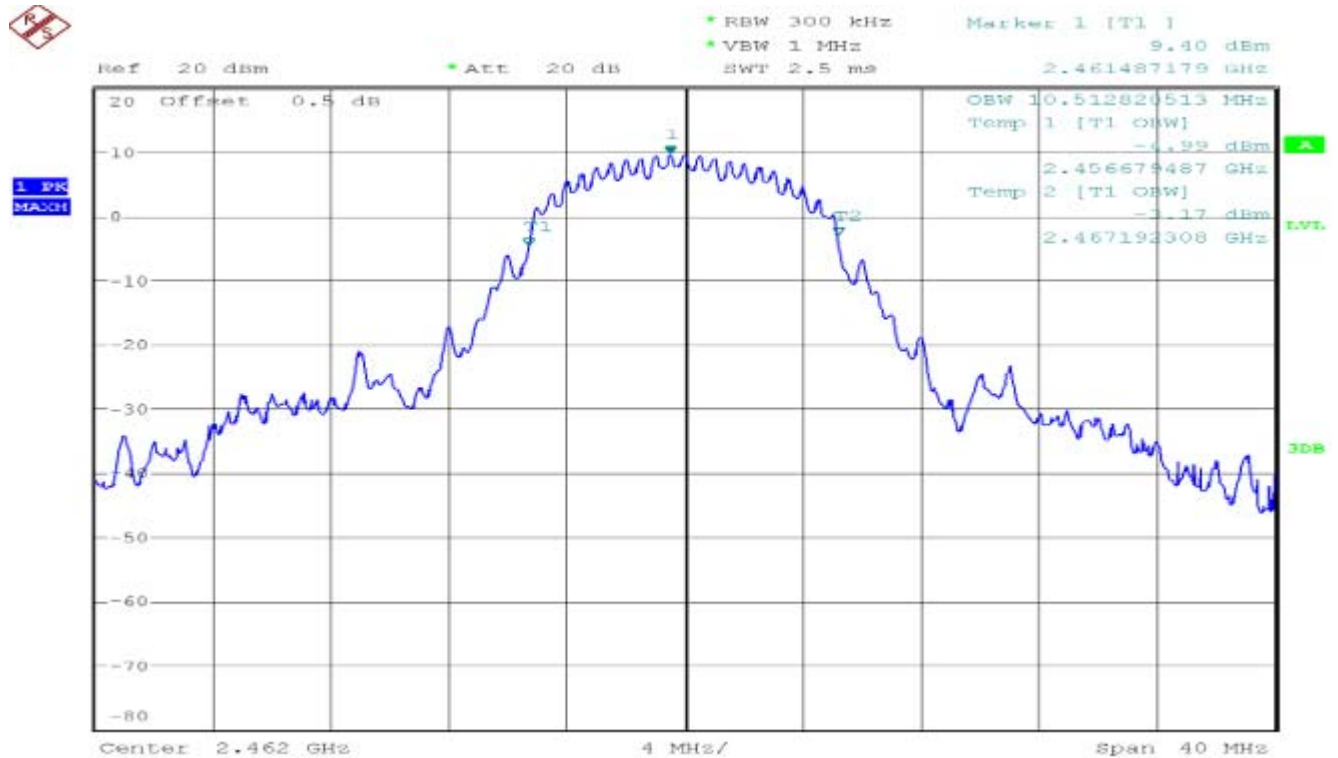
99% Bandwidth (CH Low)



99% Bandwidth (CH Mid)

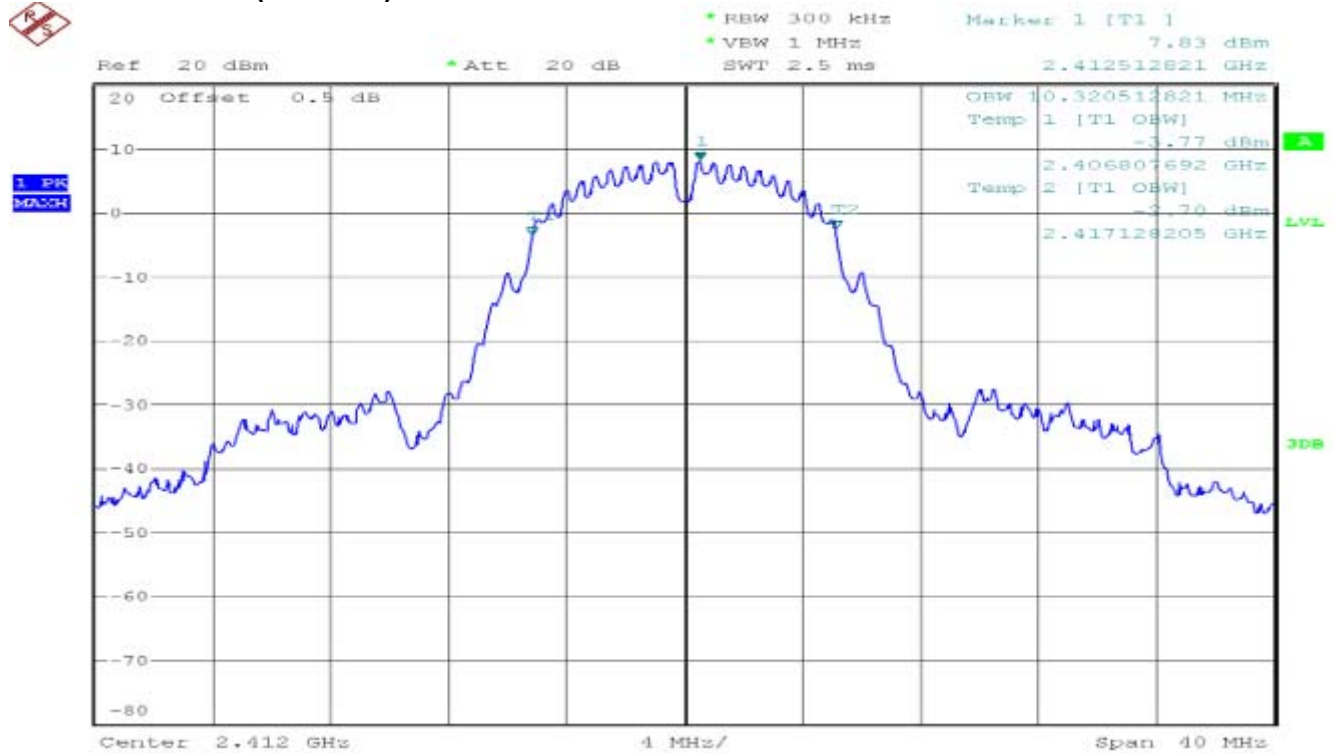


99% Bandwidth(CH High)

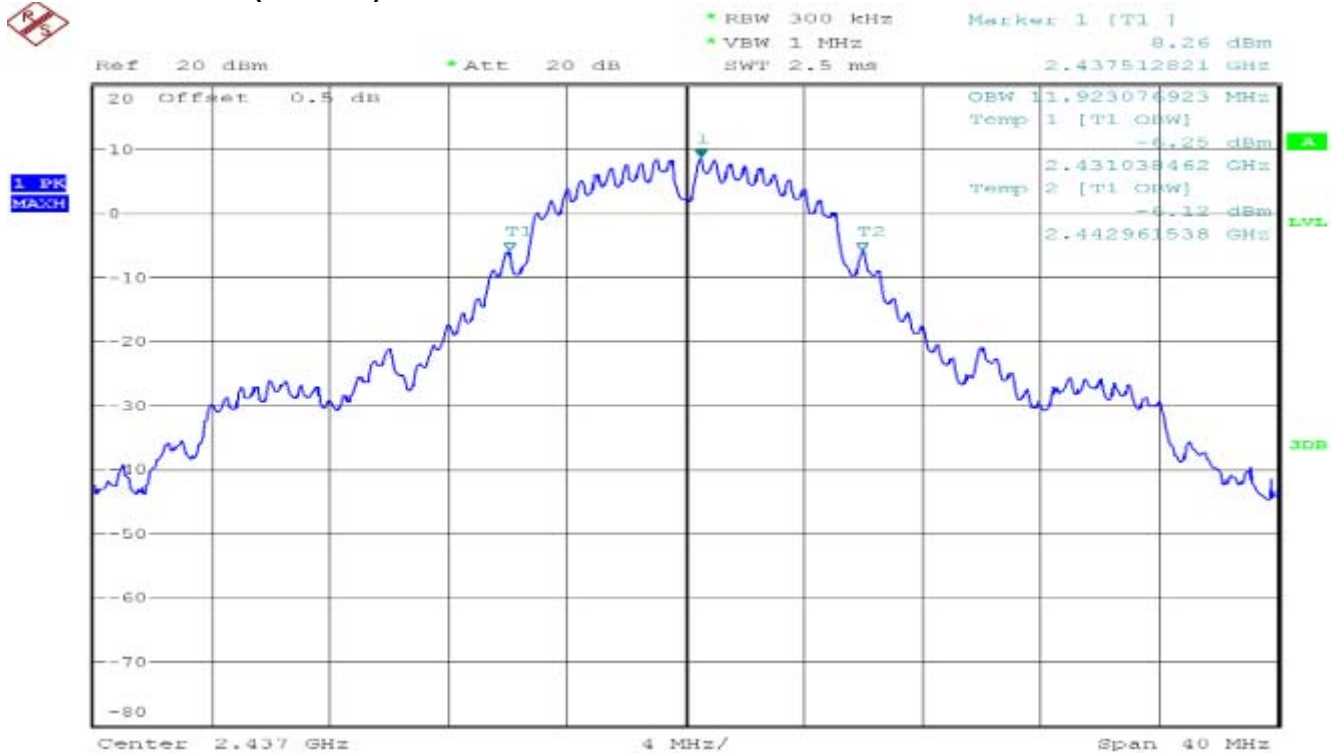


IEEE 802.11b MODE /Chain 1

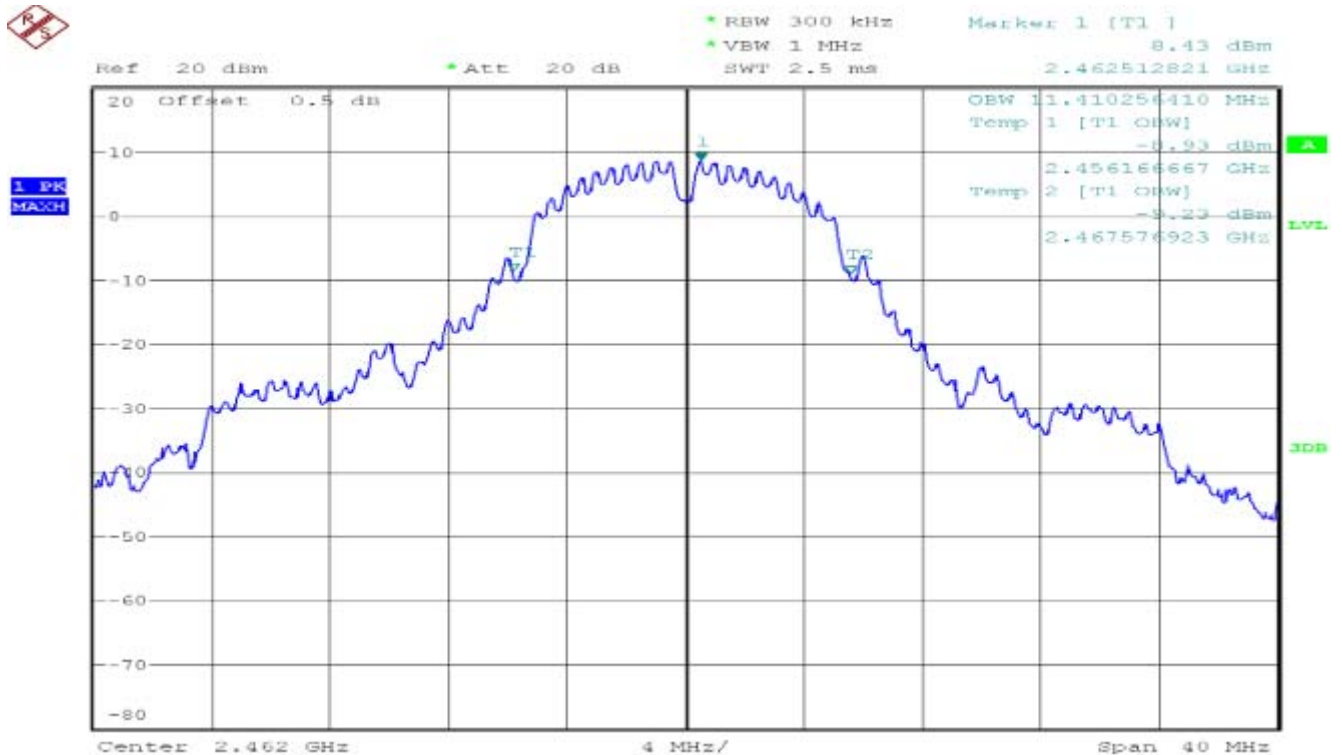
99% Bandwidth (CH Low)



99% Bandwidth (CH Mid)

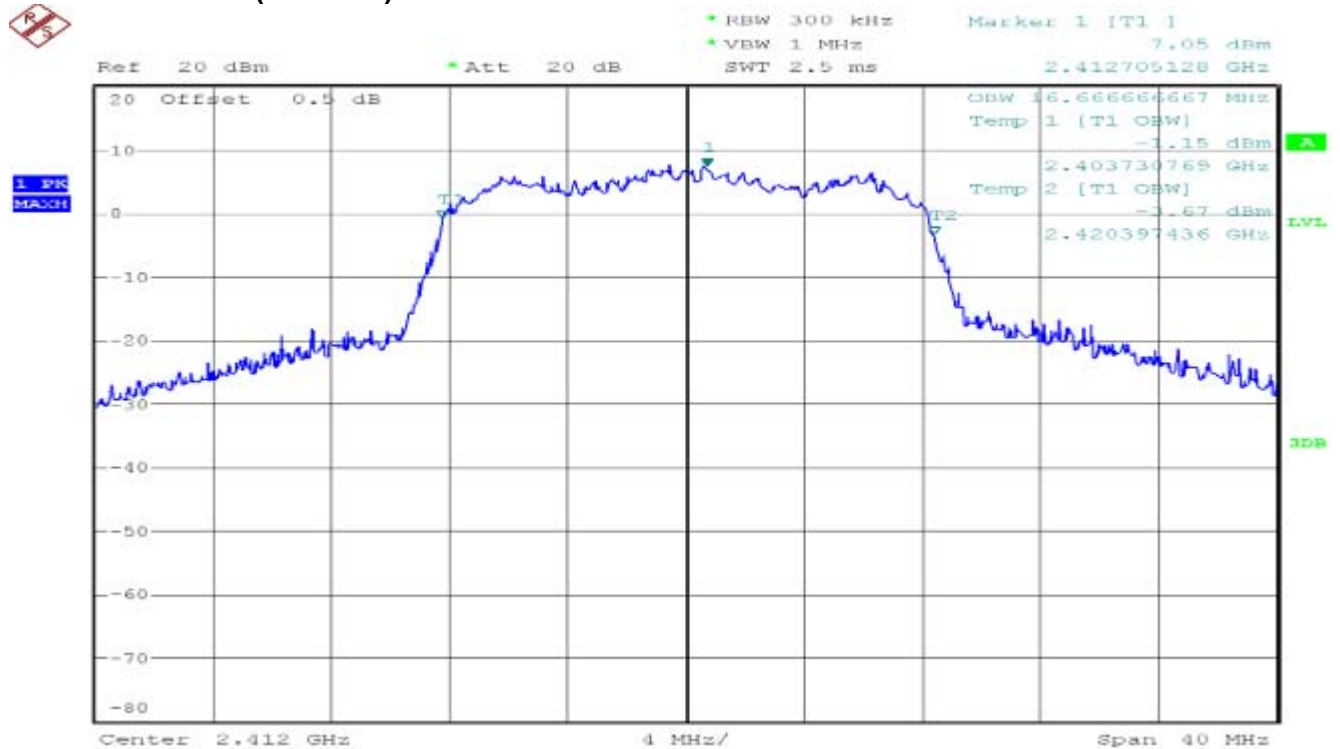


99% Bandwidth(CH High)

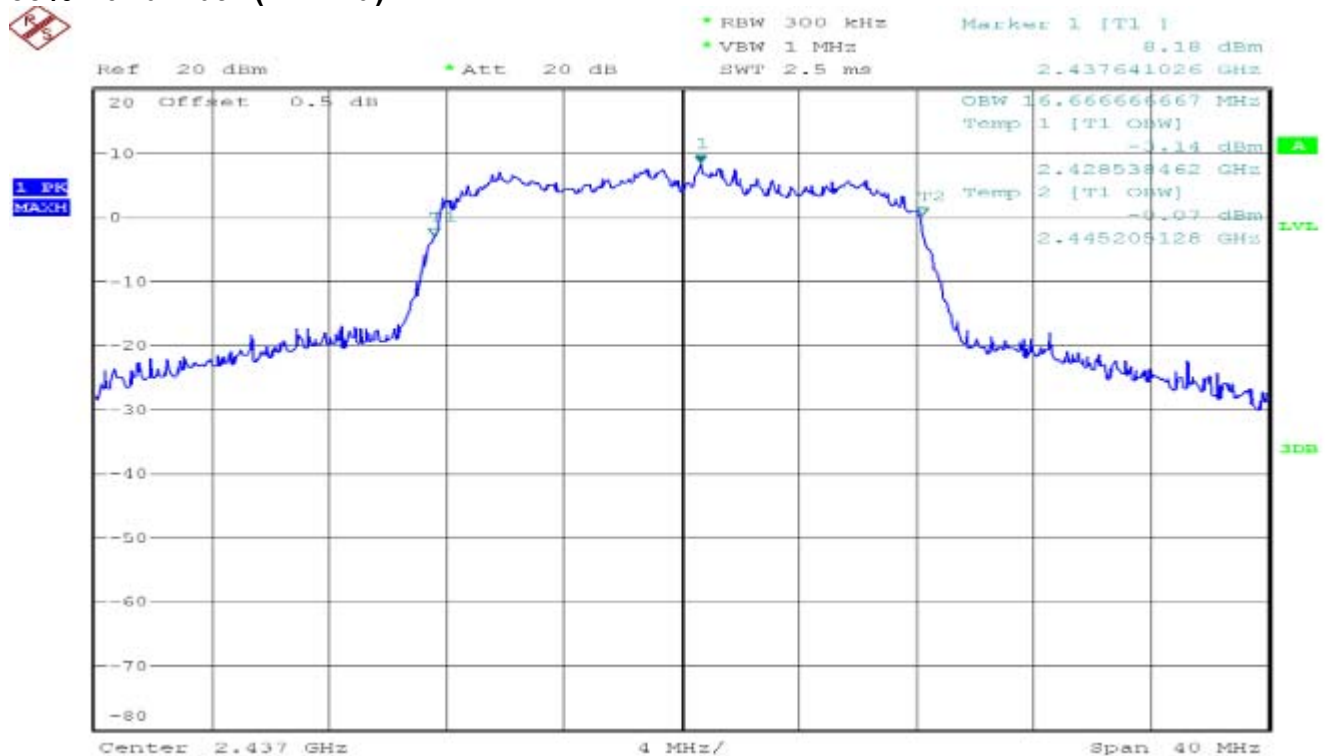


IEEE 802.11g MODE /Chain 0

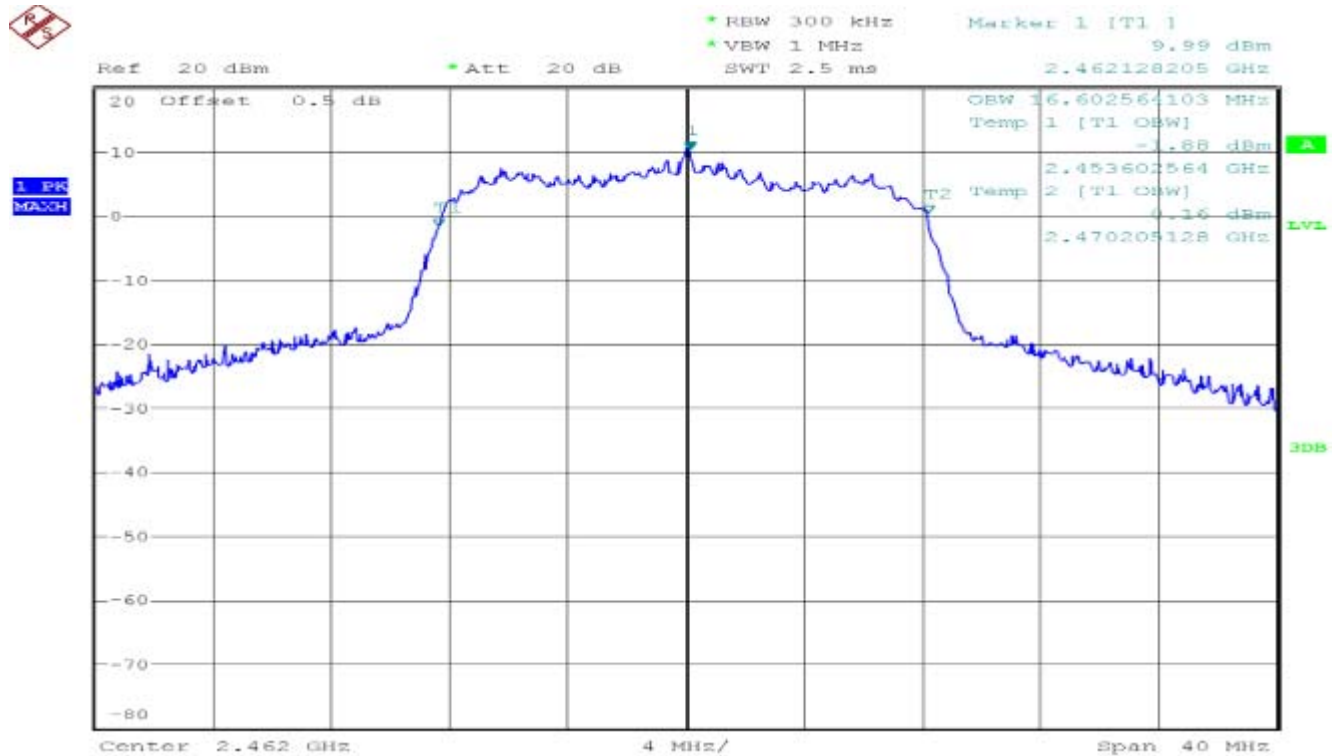
99% Bandwidth (CH Low)



99% Bandwidth (CH Mid)

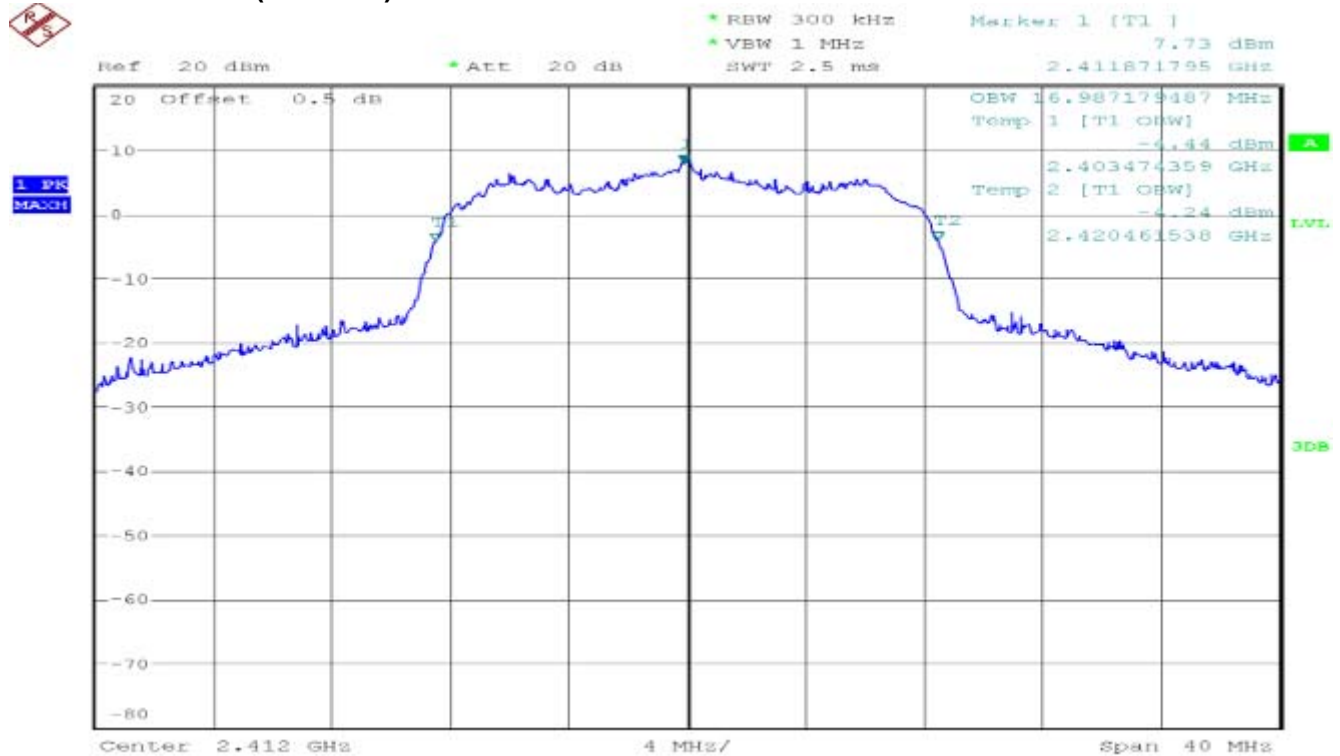


99% Bandwidth(CH High)

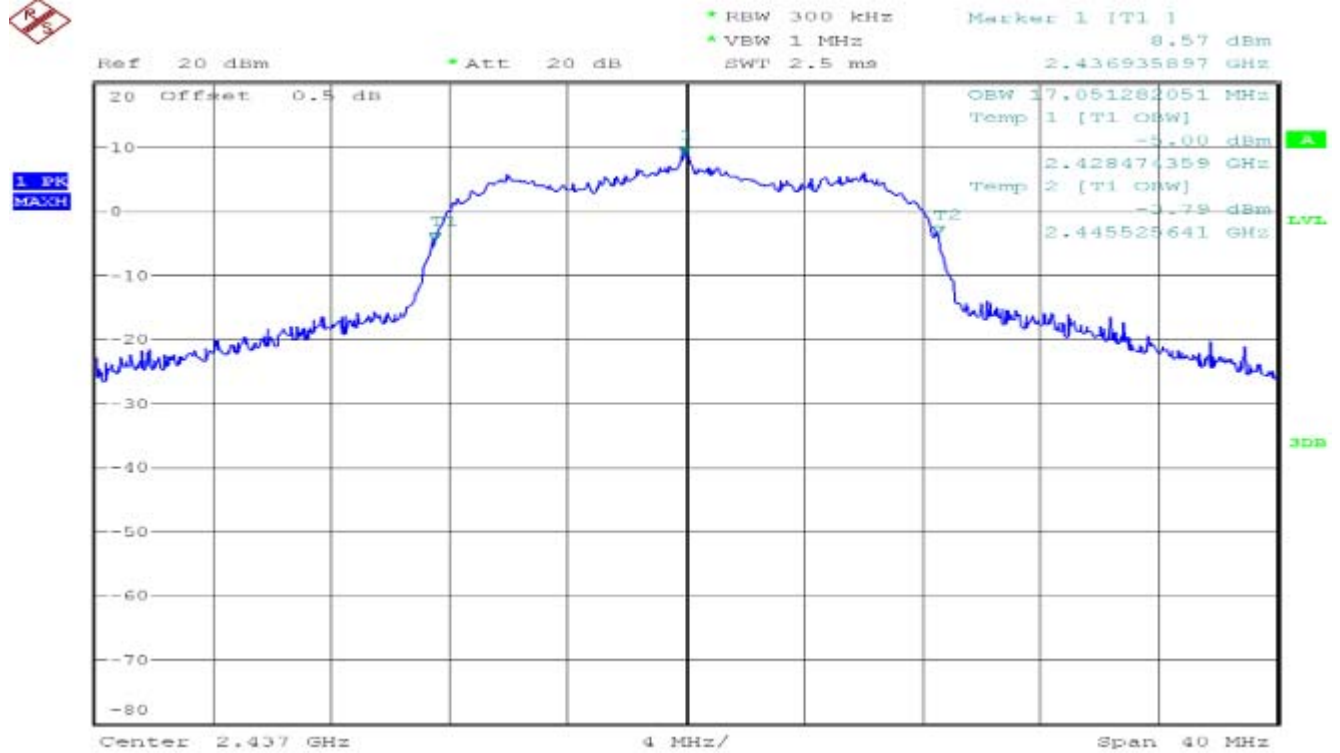


IEEE 802.11g MODE /Chain 1

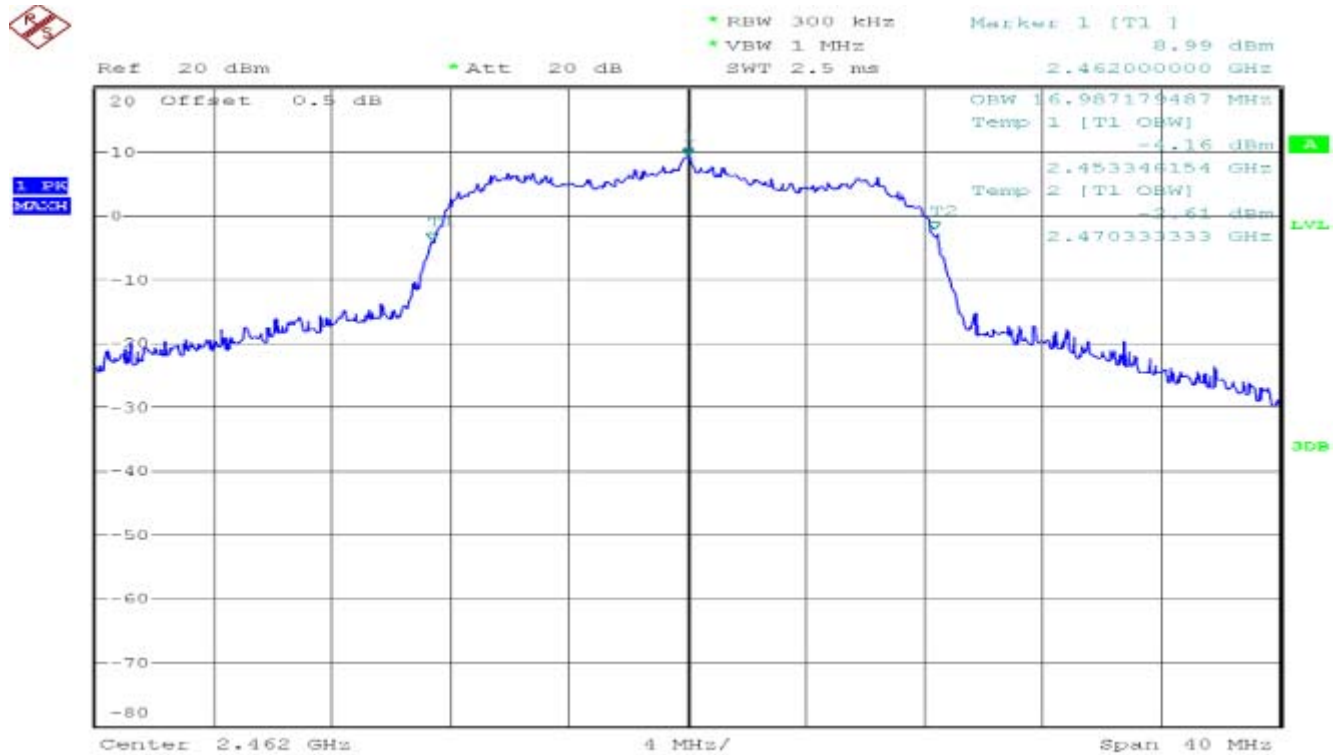
99% Bandwidth (CH Low)



99% Bandwidth (CH Mid)

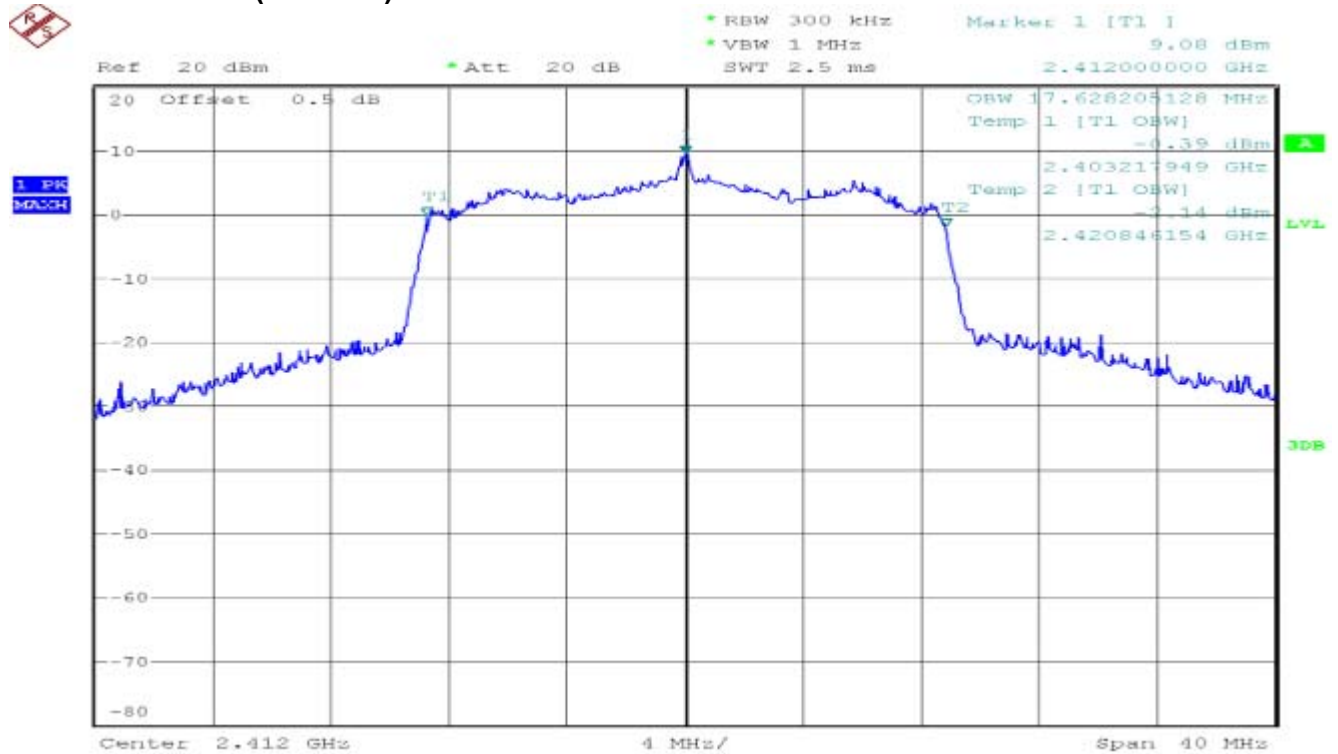


99% Bandwidth(CH High)

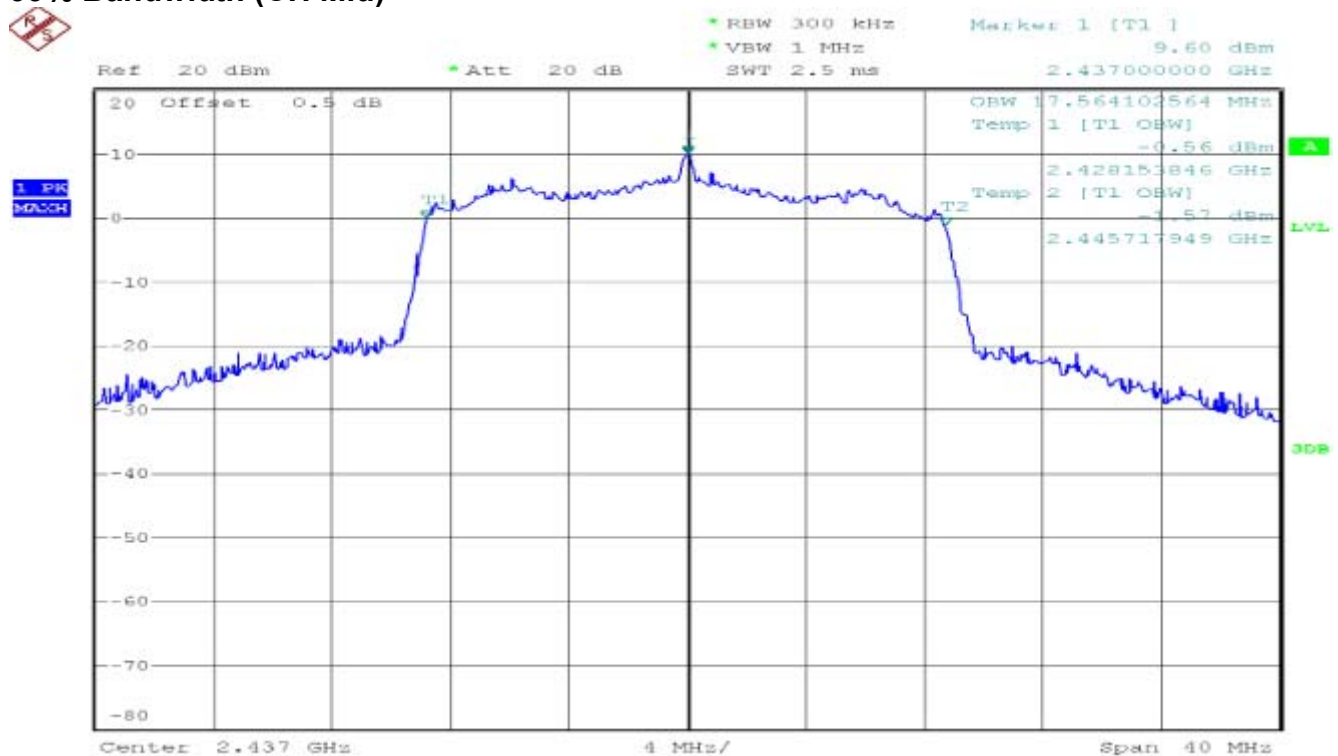


IEEE 802.11n20 MODE /Chain 0

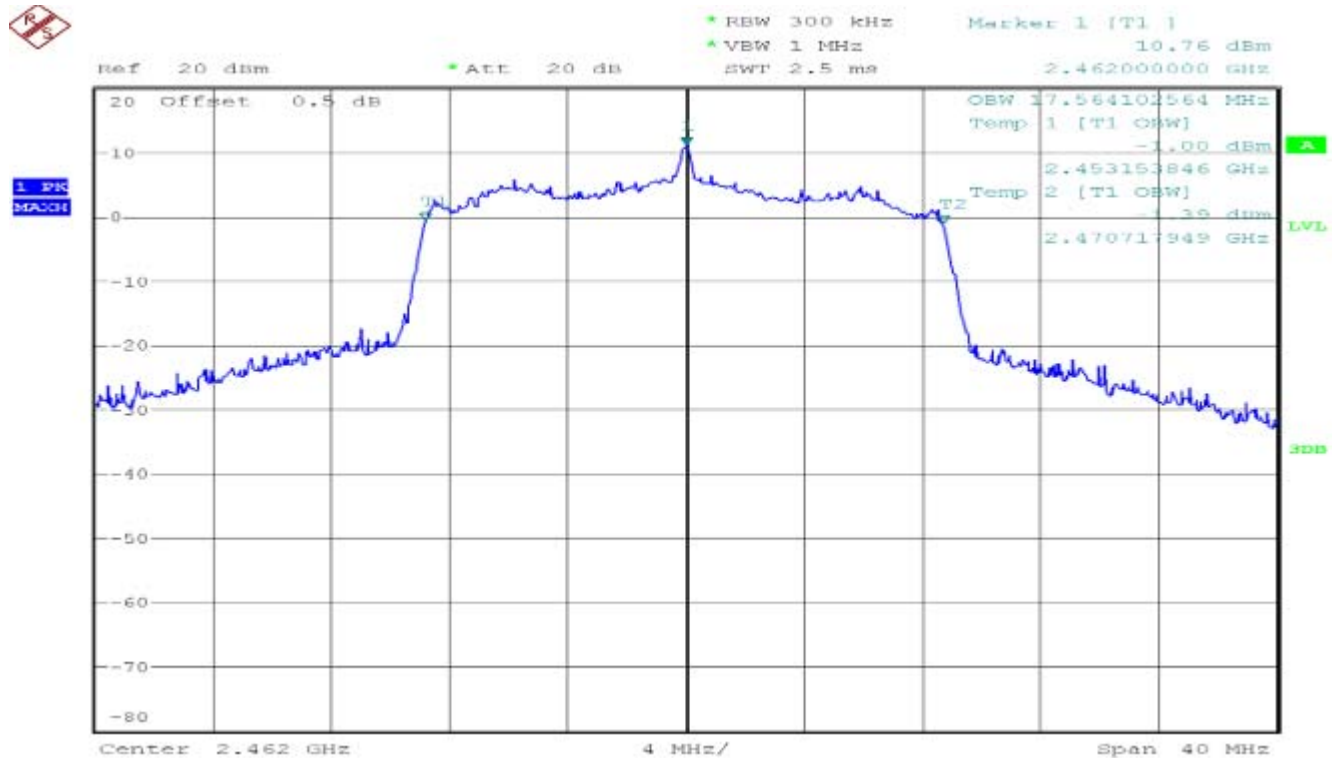
99% Bandwidth (CH Low)



99% Bandwidth (CH Mid)

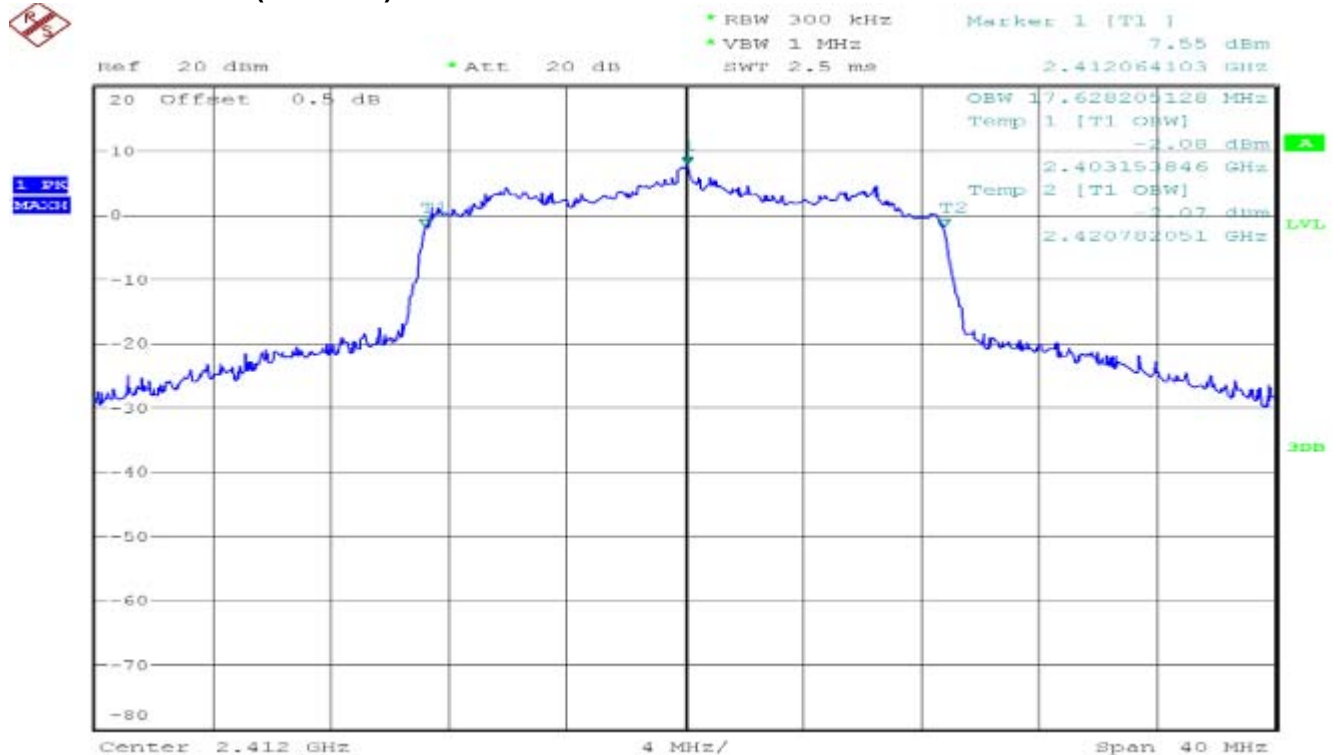


99% Bandwidth(CH High)

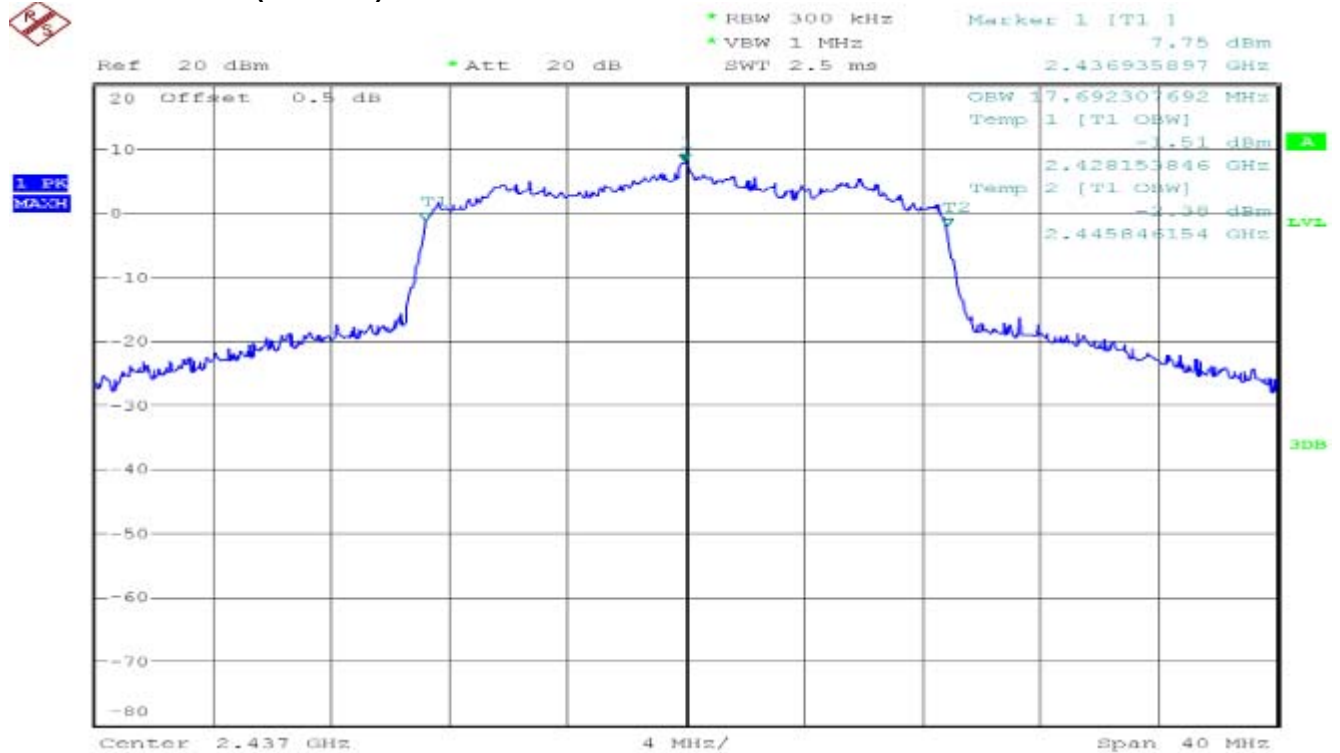


IEEE 802.11n20 MODE /Chain 1

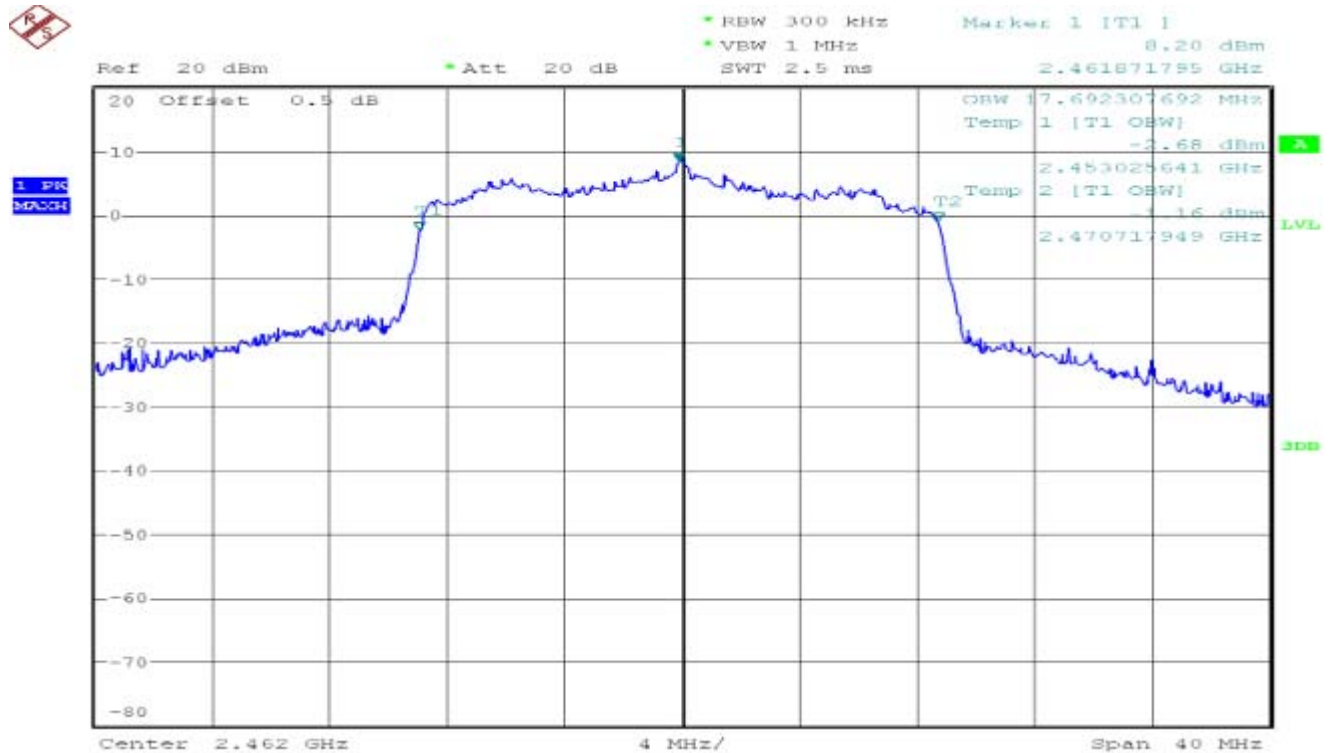
99% Bandwidth (CH Low)



99% Bandwidth (CH Mid)

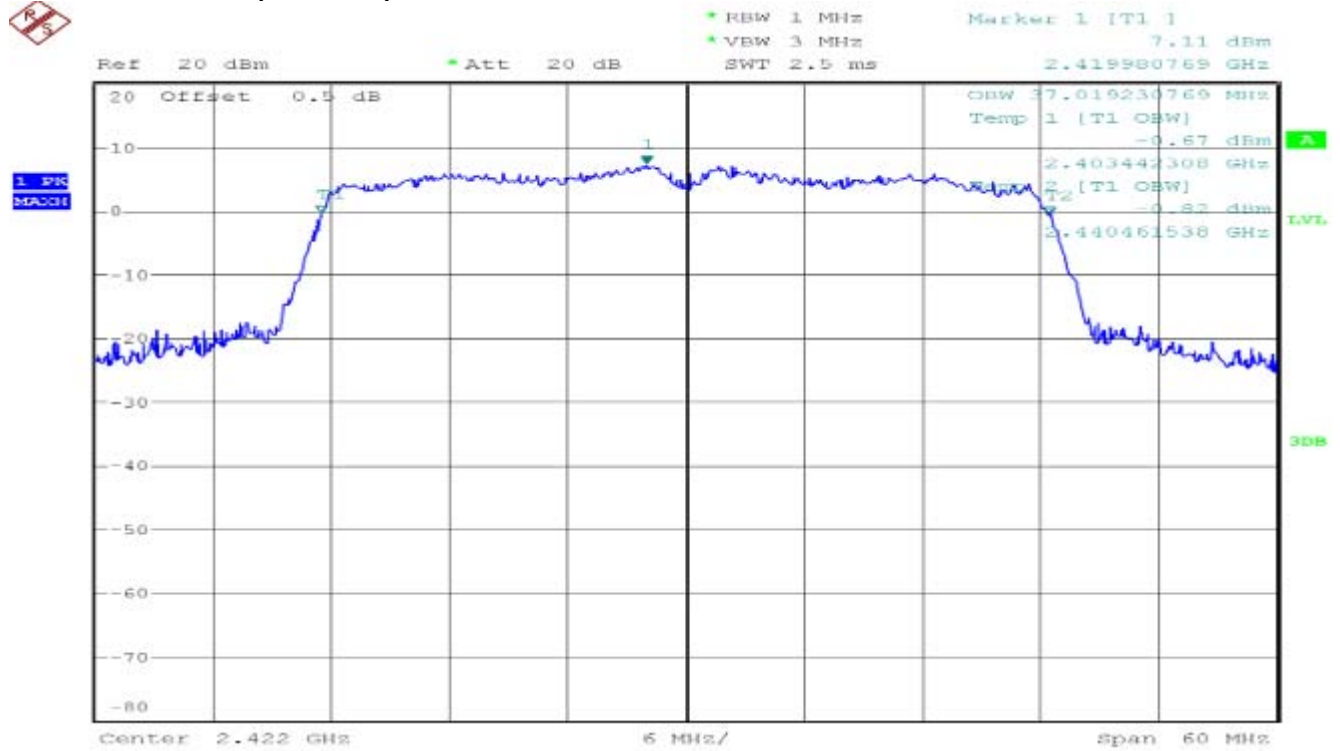


99% Bandwidth(CH High)

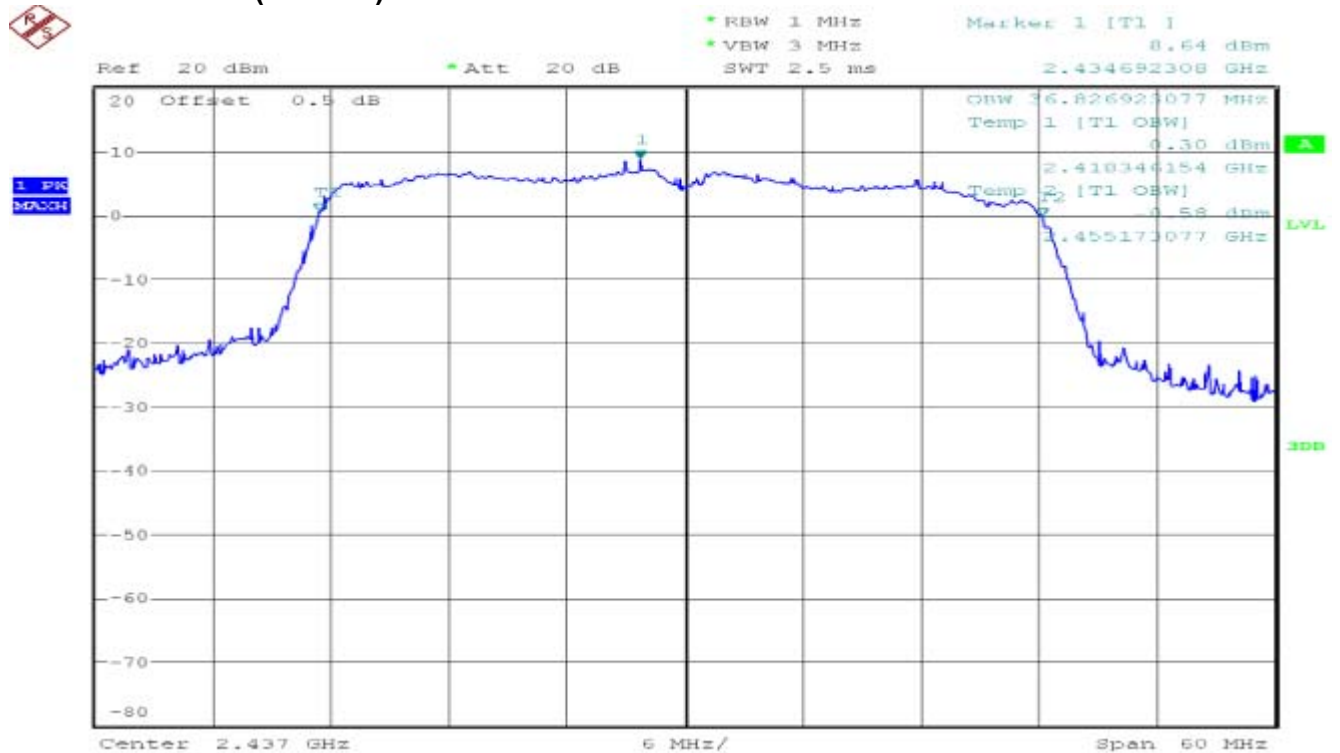


IEEE 802.11n40 MODE /Chain 0

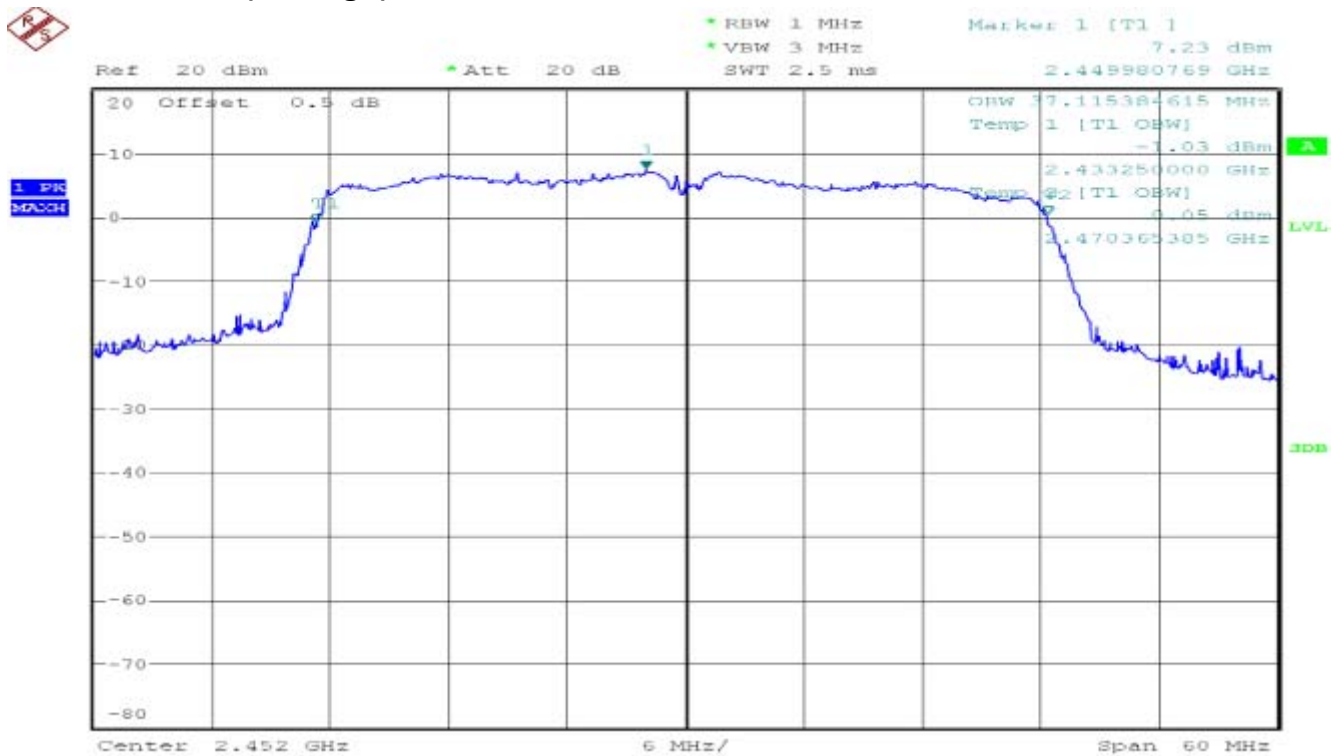
99% Bandwidth (CH Low)



99% Bandwidth (CH Mid)

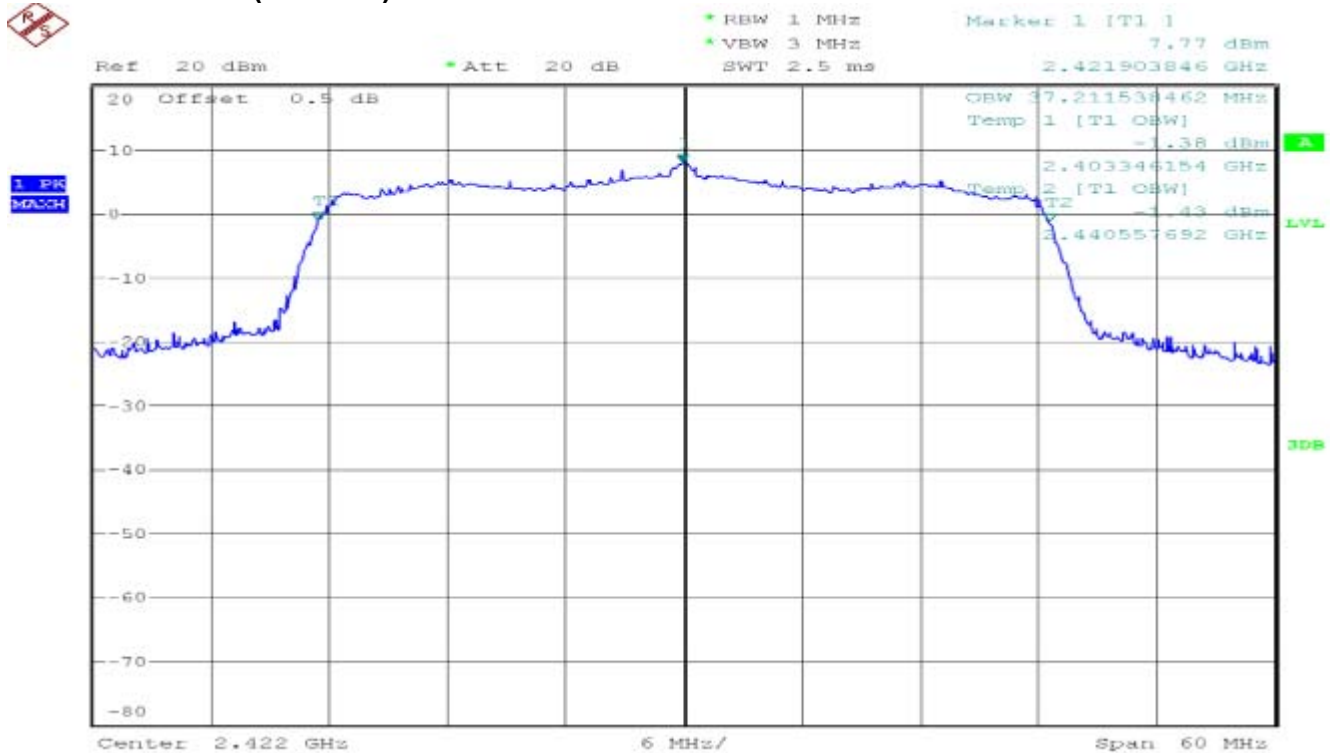


99% Bandwidth(CH High)

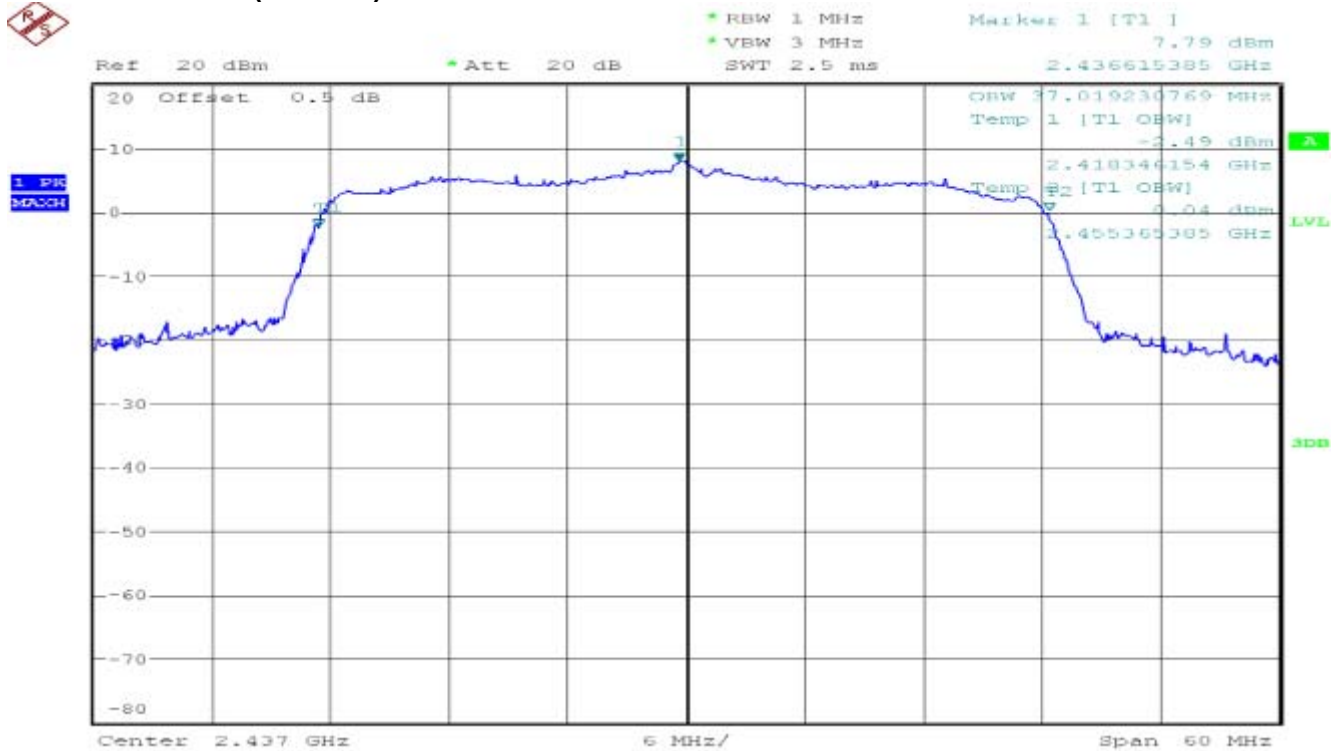


IEEE 802.11n40 MODE /Chain 1

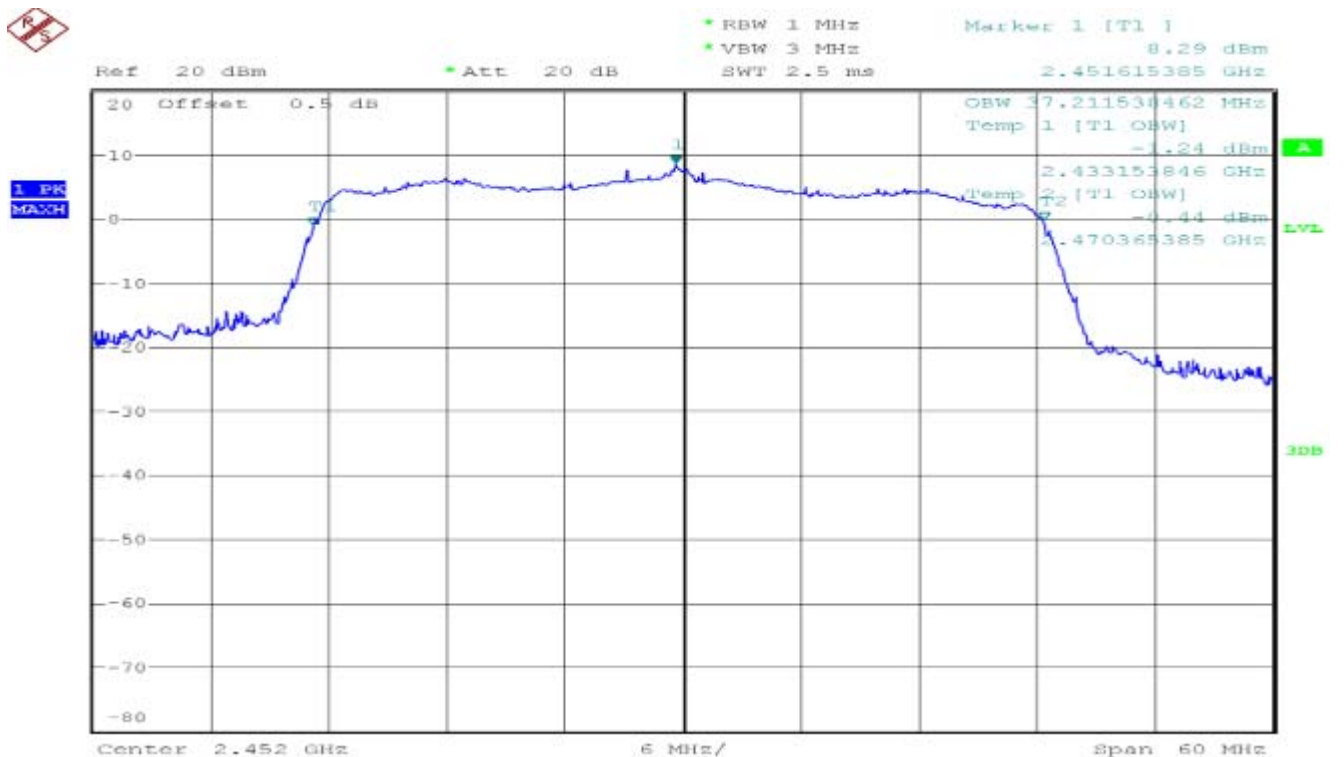
99% Bandwidth (CH Low)



99% Bandwidth (CH Mid)



99% Bandwidth(CH High)



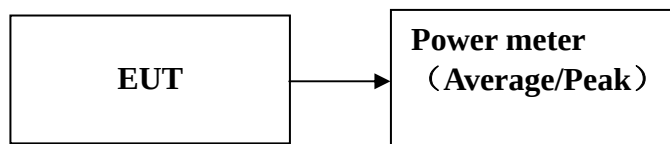
7.3. PEAK POWER

LIMIT

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

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, and 2400-2483.5 MHz: 1 Watt.
2. According to §15.247(b)(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.

Test Configuration



TEST PROCEDURE

1. The EUT transmitter output is connected to the Power meter.
The Power meter is set to the peak power detection.
2. The testing follows the Measurement Procedure FCC KDB No. 558074 D01 DTS Meas. Guidance v04. 9.1.3 PKPM1 Peak-reading power meter method.

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 0 Limit* (dBm)	Chain 1 Limit (dBm)
Low	2412	20.15	18.96	29.37	30
Mid	2437	20.39	19.45	29.37	30
High	2462	20.19	20.29	29.37	30

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 0 Limit* (dBm)	Chain 1 Limit (dBm)
Low	2412	21.87	21.74	29.37	30
Mid	2437	22.49	22.23	29.37	30
High	2462	23.19	23.41	29.37	30

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit** (dBm)
Low	2412	21.45	21.12	24.30	27.17
Mid	2437	21.89	21.75	24.83	27.17
High	2462	22.87	23.00	25.95	27.17

Test mode: IEEE 802.11n HT40 mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit** (dBm)
Low	2422	19.96	19.89	22.94	27.17
Mid	2437	20.96	20.30	23.65	27.17
High	2452	20.90	21.23	24.08	27.17

Remark: 1.Limit*=30dBm-(Antenna 1 Gain-6)=30dBm-(6.63-6)dB=29.37dBm

2.Limit**=30dBm-(Total Gain -6)=30dBm-(8.83-6)dB=27.17dBm

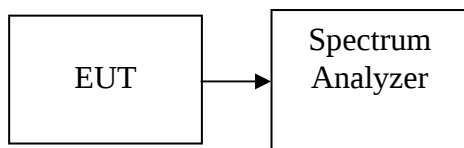
3.Total Output Power (dBm) = $10 \cdot \log(10^{(\text{Chain 0 Output Power} / 10)} + 10^{(\text{Chain 1 Output Power} / 10)})$

7.4. PEAK POWER SPECTRAL DENSITY

LIMIT

1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3 kHz, VBW = 10 kHz, Span = 1.5 times the DTS bandwidth, Sweep = auto
3. Record the max reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Limit (dBm)	Result
Low	2412	-5.64	-5.75	8.00	PASS
Mid	2437	-6.22	-6.25	8.00	PASS
High	2462	-5.98	-5.86	8.00	PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Limit (dBm)	Result
Low	2412	-11.59	-9.80	8.00	PASS
Mid	2437	-9.77	-9.97	8.00	PASS
High	2462	-9.84	-9.77	8.00	PASS

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Result
Low	2412	-11.94	-11.14	-8.51	8.00	PASS
Mid	2437	-10.58	-10.62	-7.59	8.00	PASS
High	2462	-10.62	-10.43	-7.51	8.00	PASS

Test mode: IEEE 802.11n HT40 mode

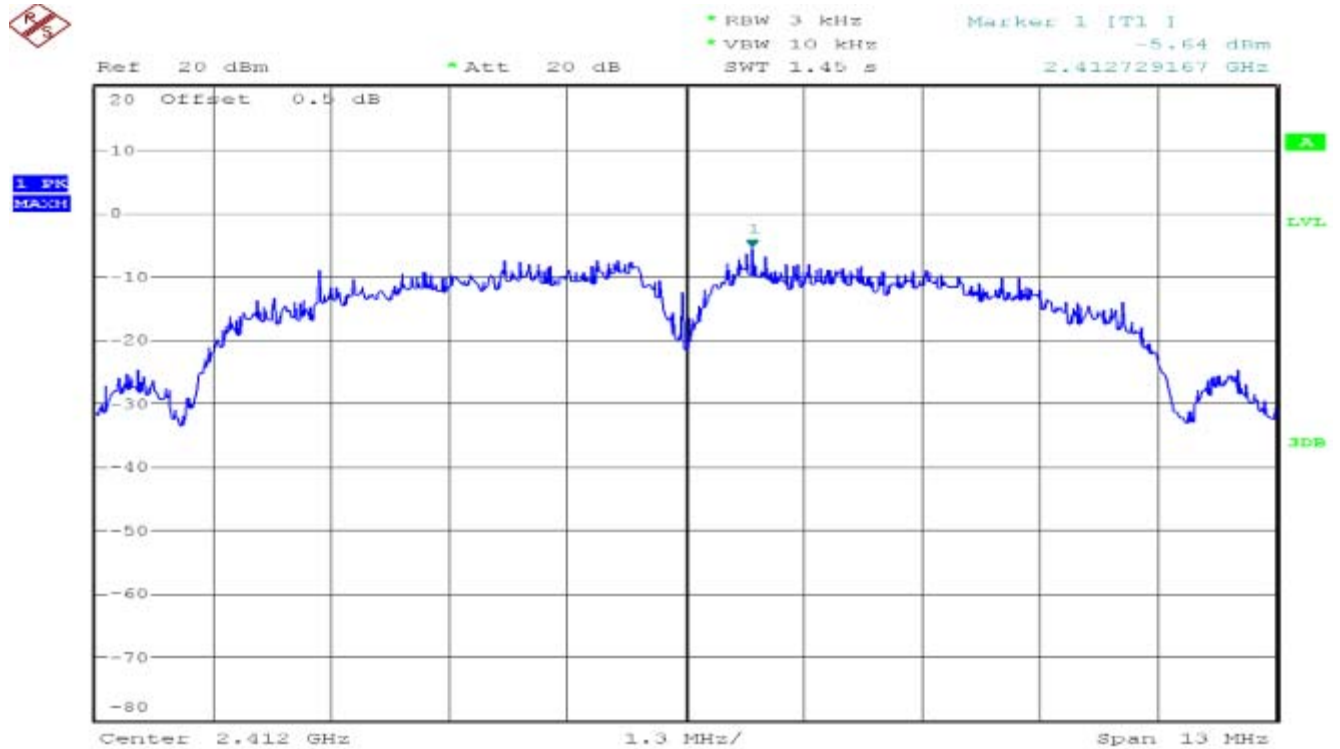
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Total PPSD (dBm)	Limit (dBm)	Result
Low	2422	-17.13	-15.49	-13.22	8.00	PASS
Mid	2437	-15.24	-16.80	-12.94	8.00	PASS
High	2452	-16.46	-16.13	-13.28	8.00	PASS

Remark: Total PPSD (dBm) = $10 \cdot \log(10^{\text{Chain 0 PPSD} / 10} + 10^{\text{Chain 1 PPSD} / 10})$

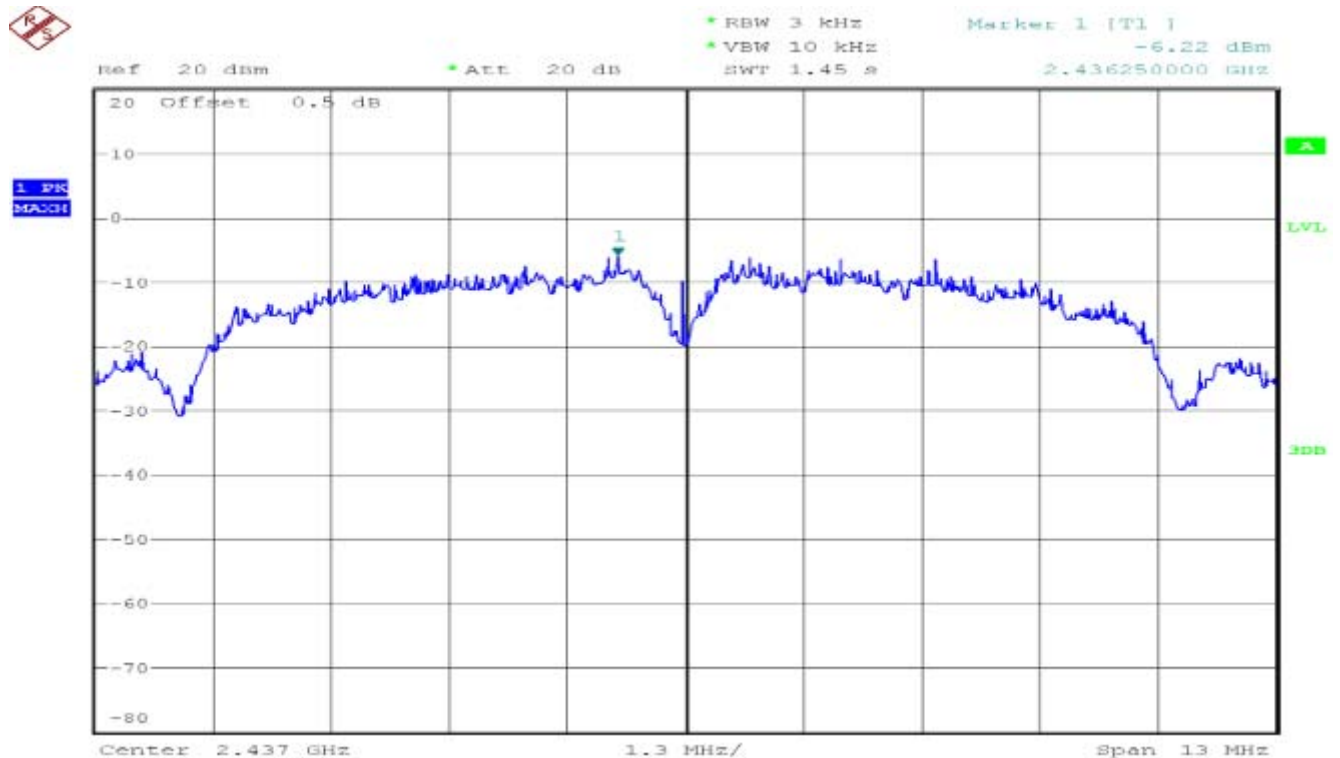
Test Plot

IEEE 802.11b mode/Chain 0

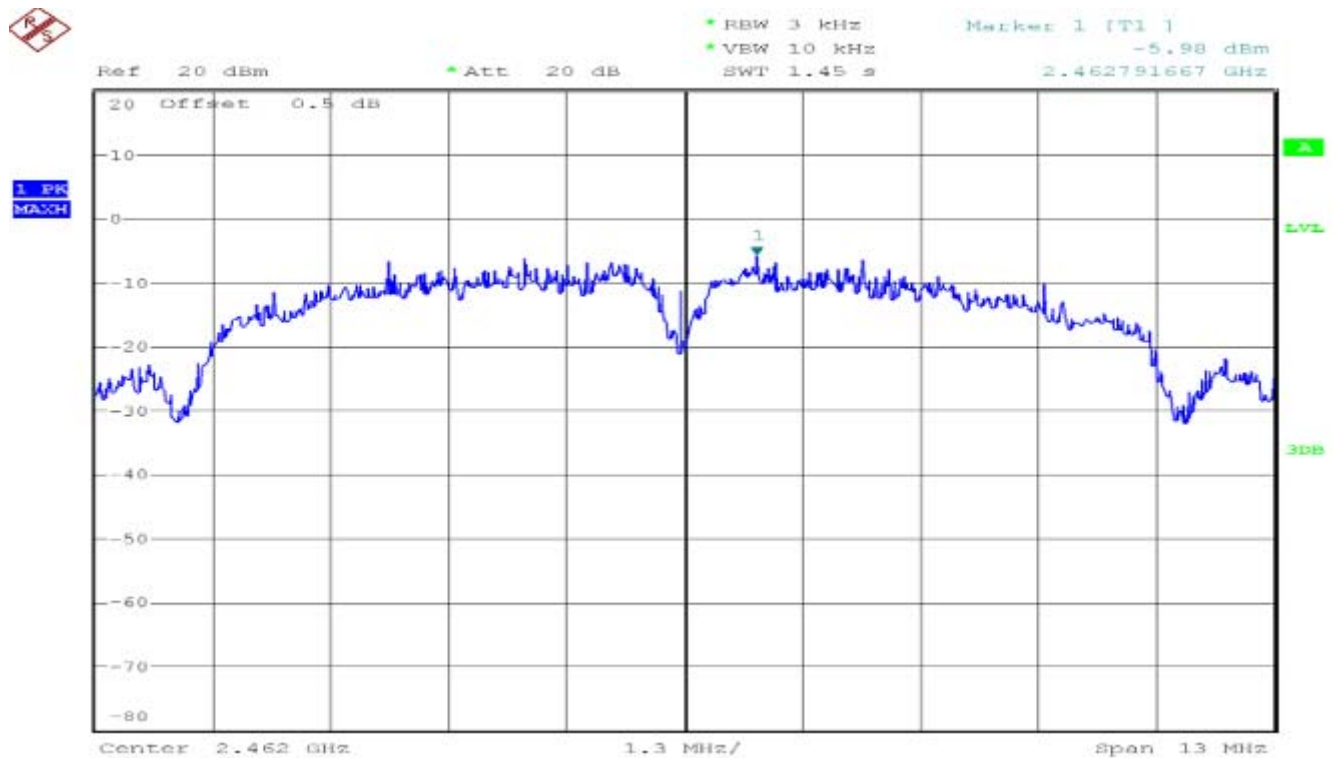
PPSD (CH Low)



PPSD(CH Mid)

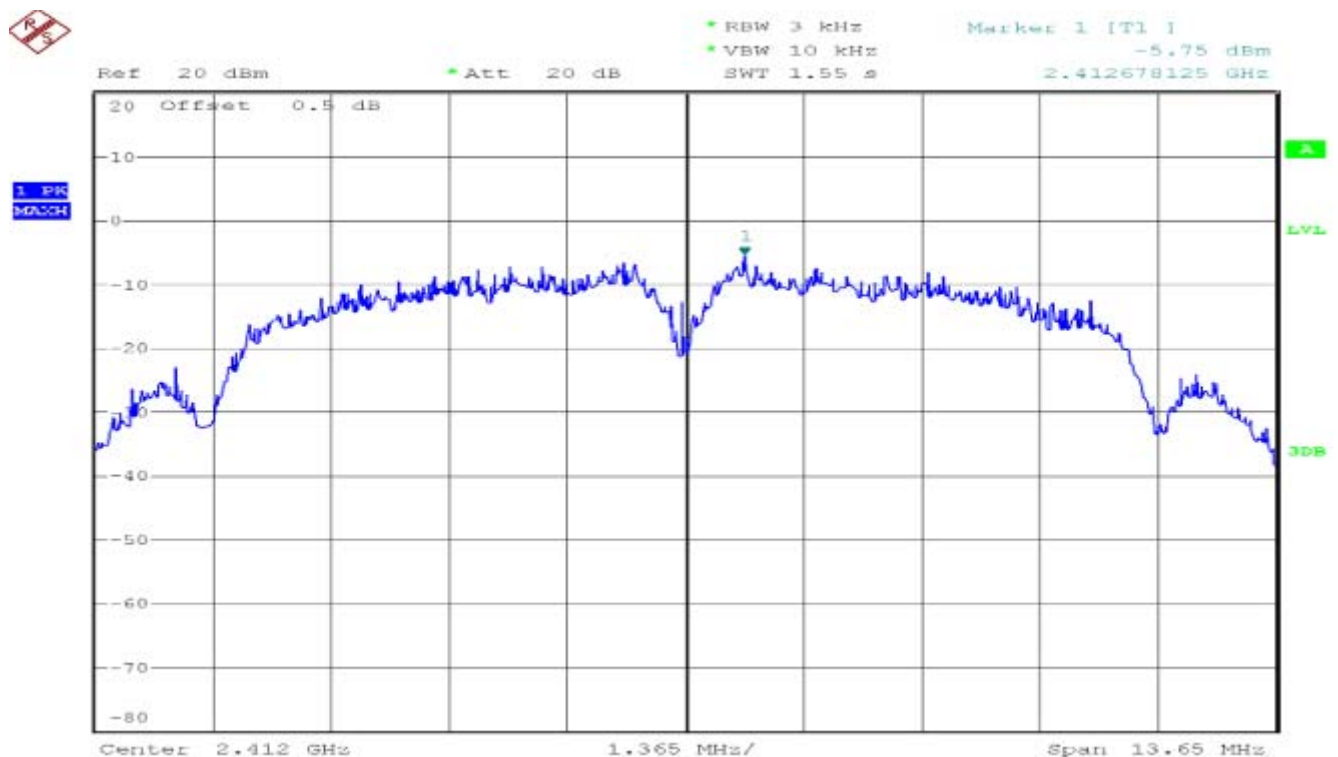


PPSD (CH High)

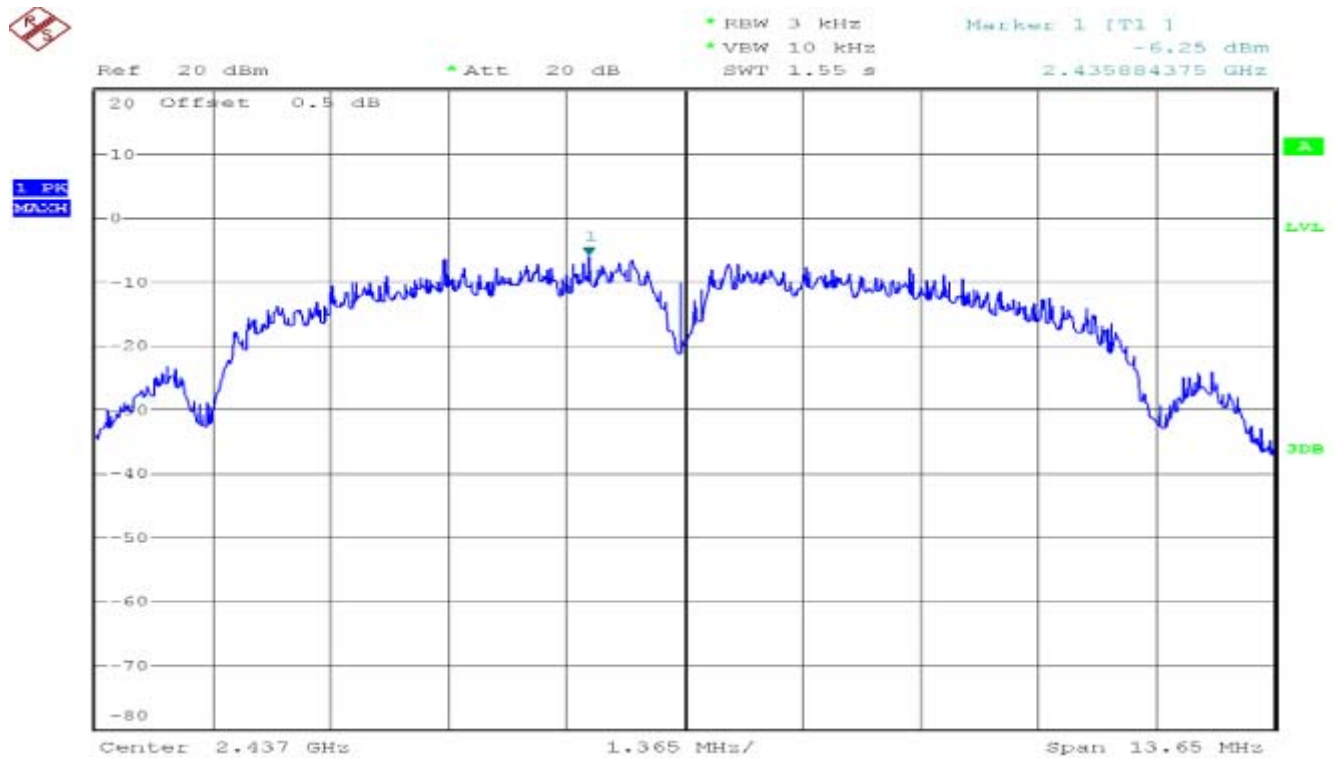


IEEE 802.11b mode/Chain 1

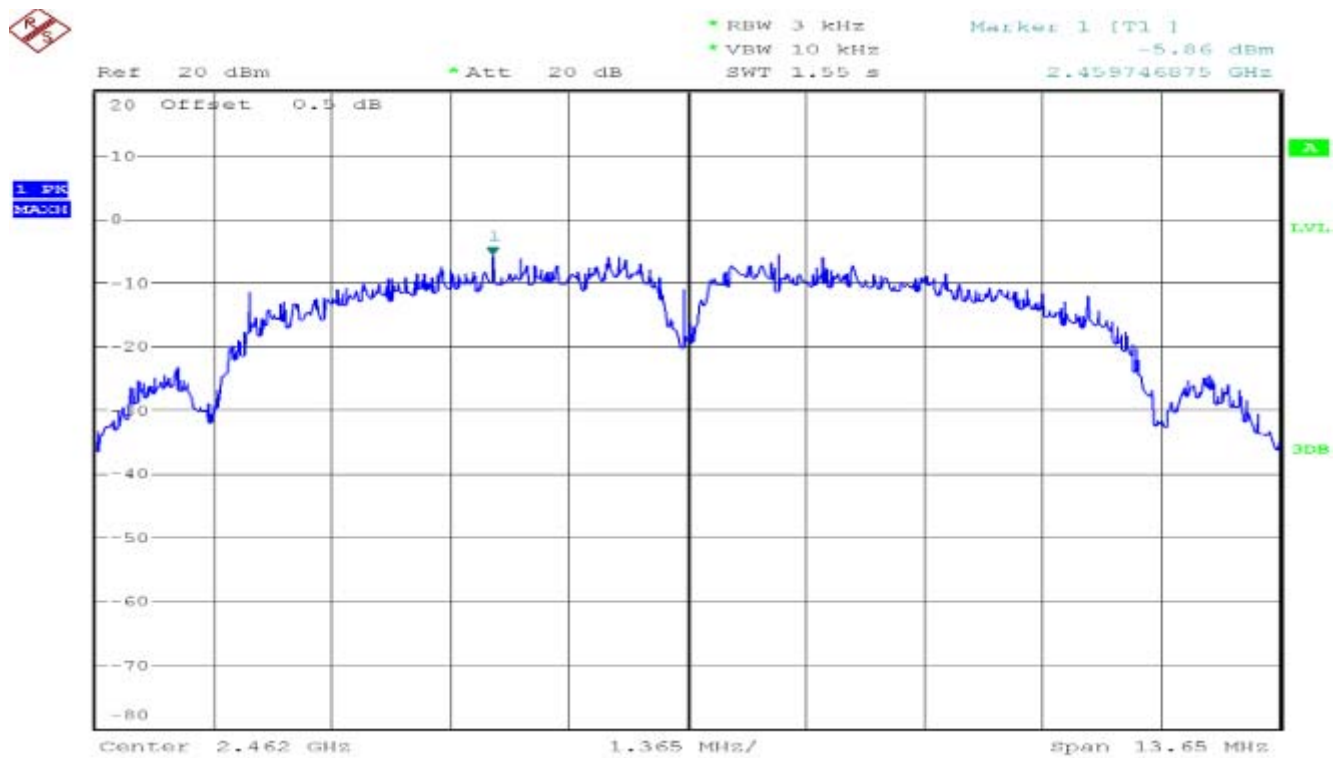
PPSD (CH Low)



PPSD(CH Mid)

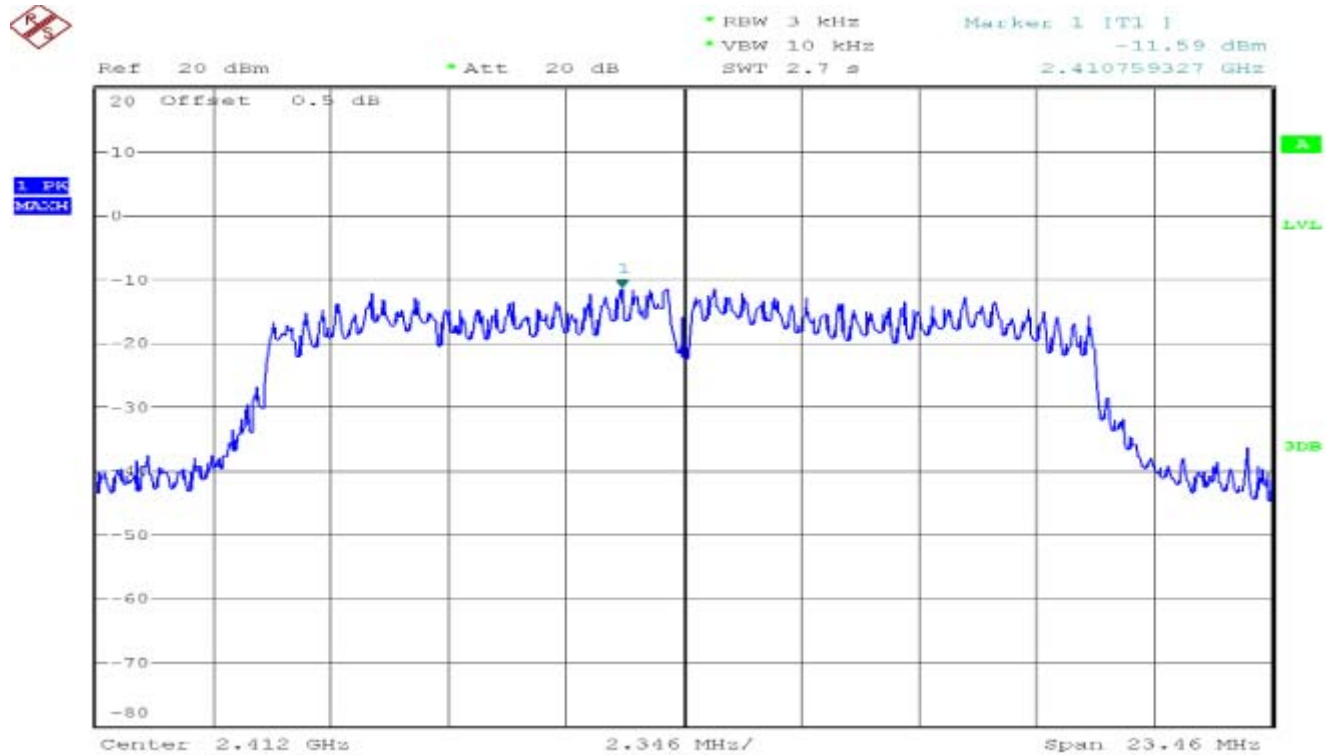


PPSD (CH High)

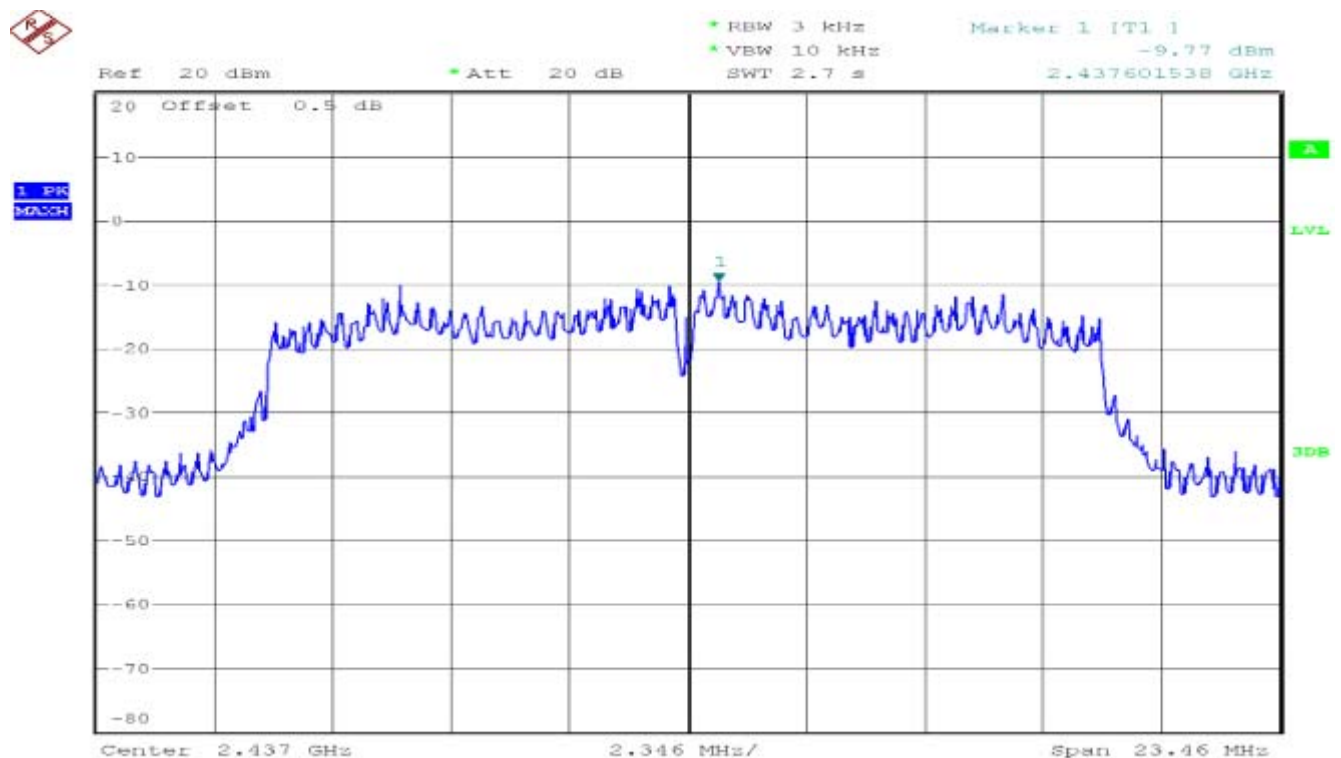


IEEE 802.11g mode/Chain 0

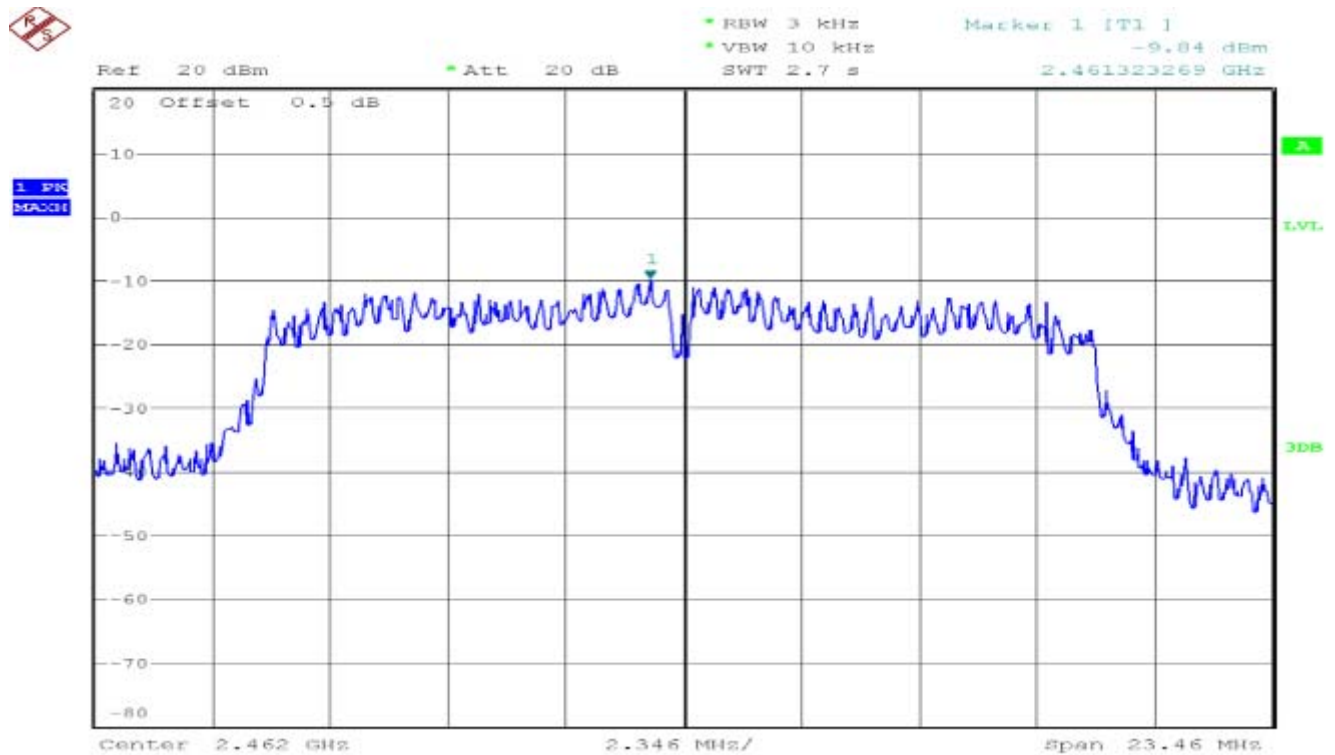
PPSD (CH Low)



PPSD (CH Mid)

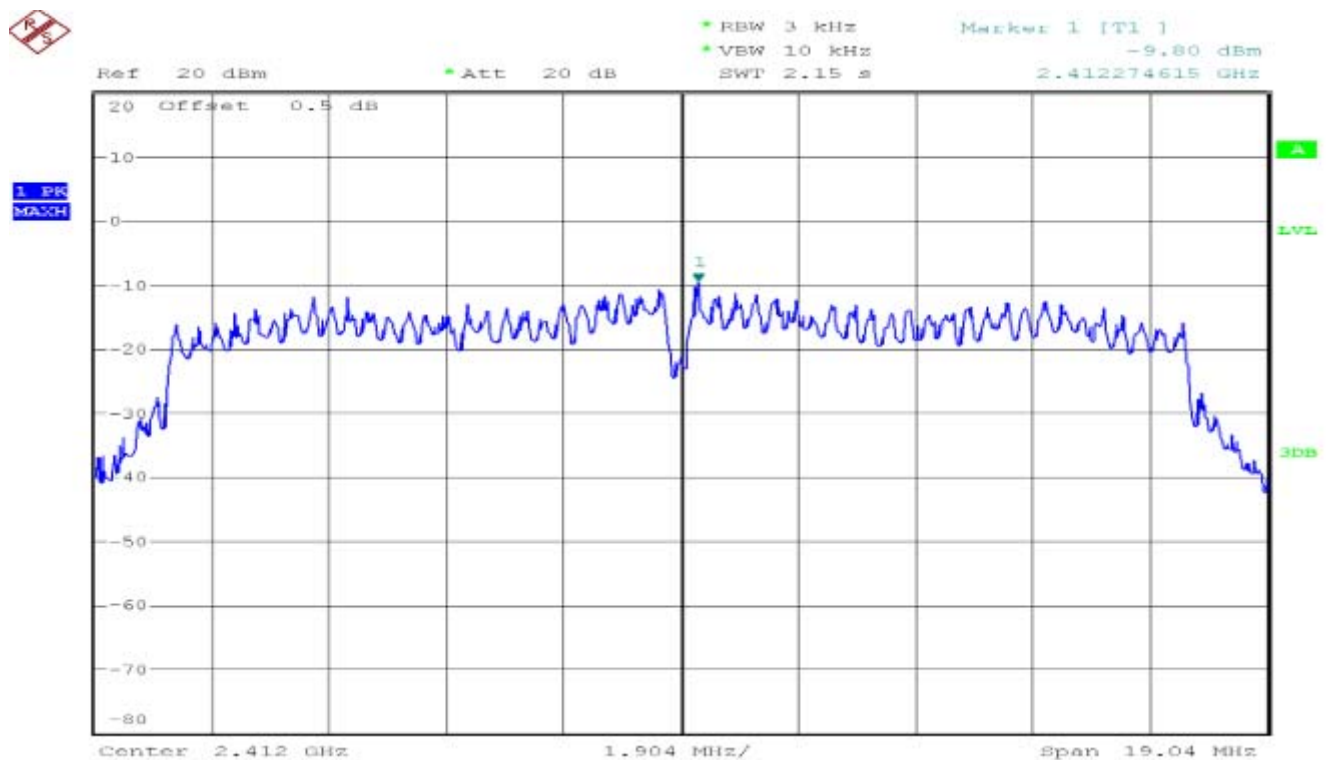


PPSD (CH High)

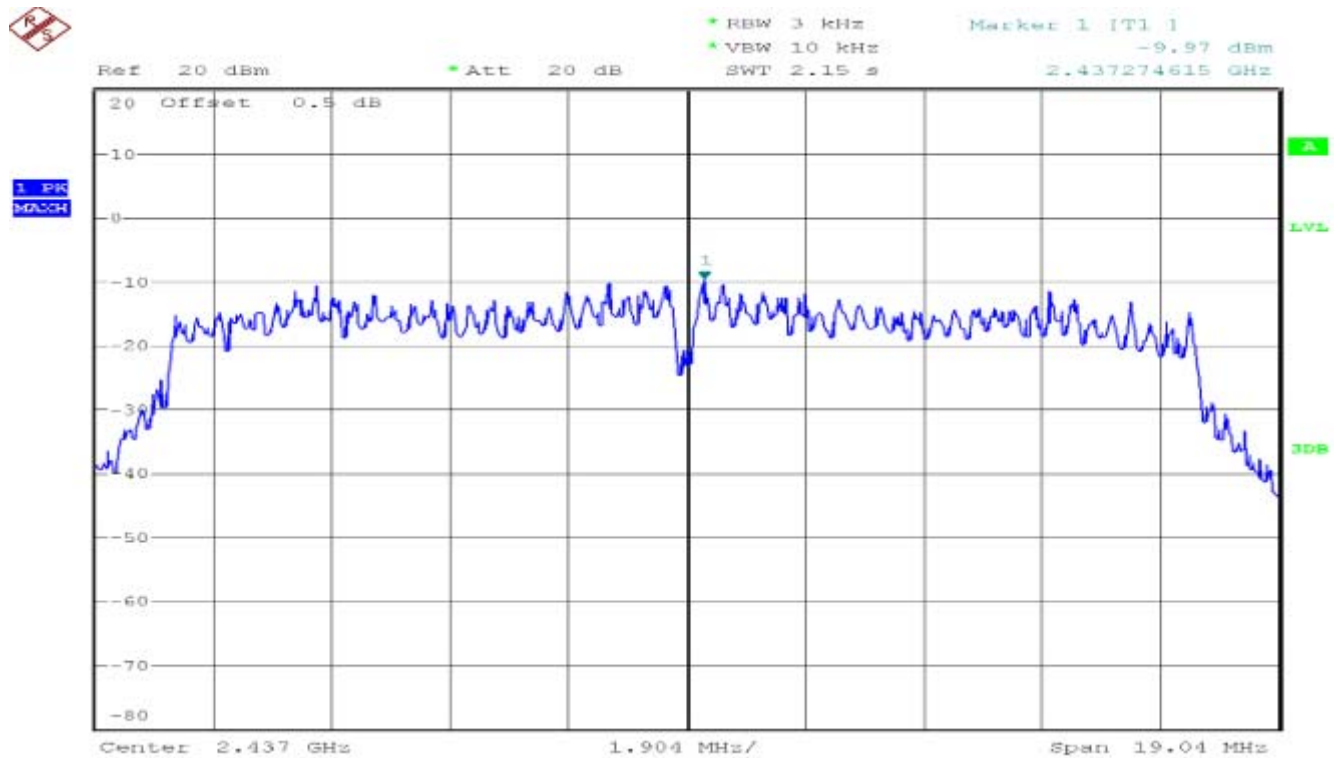


IEEE 802.11g mode/Chain 1

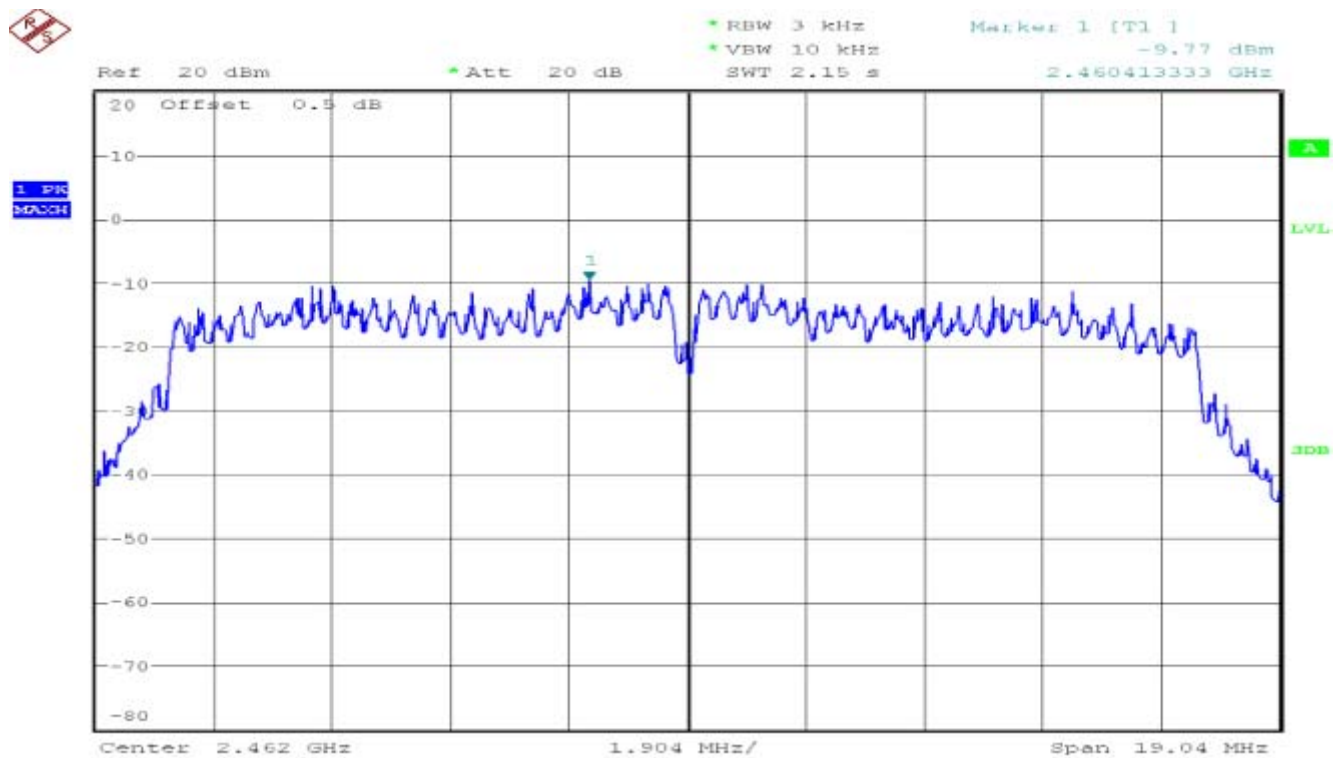
PPSD (CH Low)



PPSD (CH Mid)

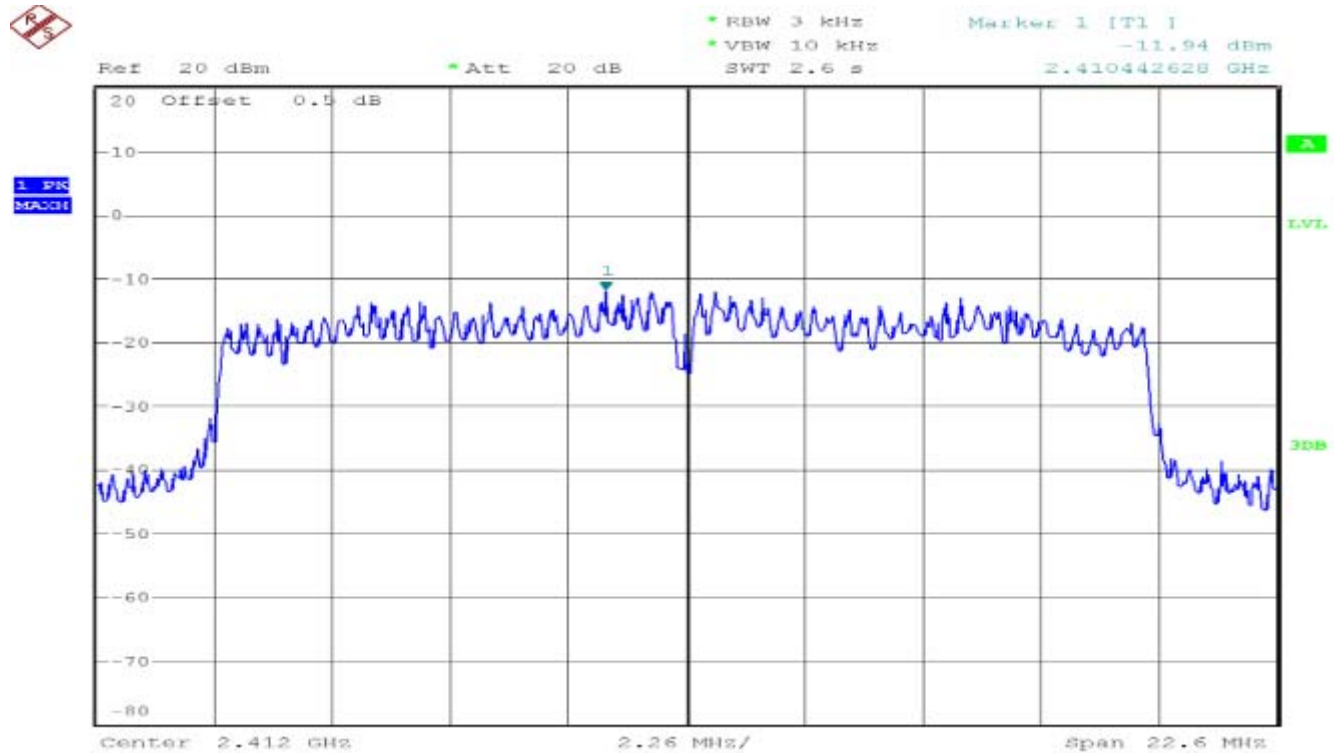


PPSD (CH High)

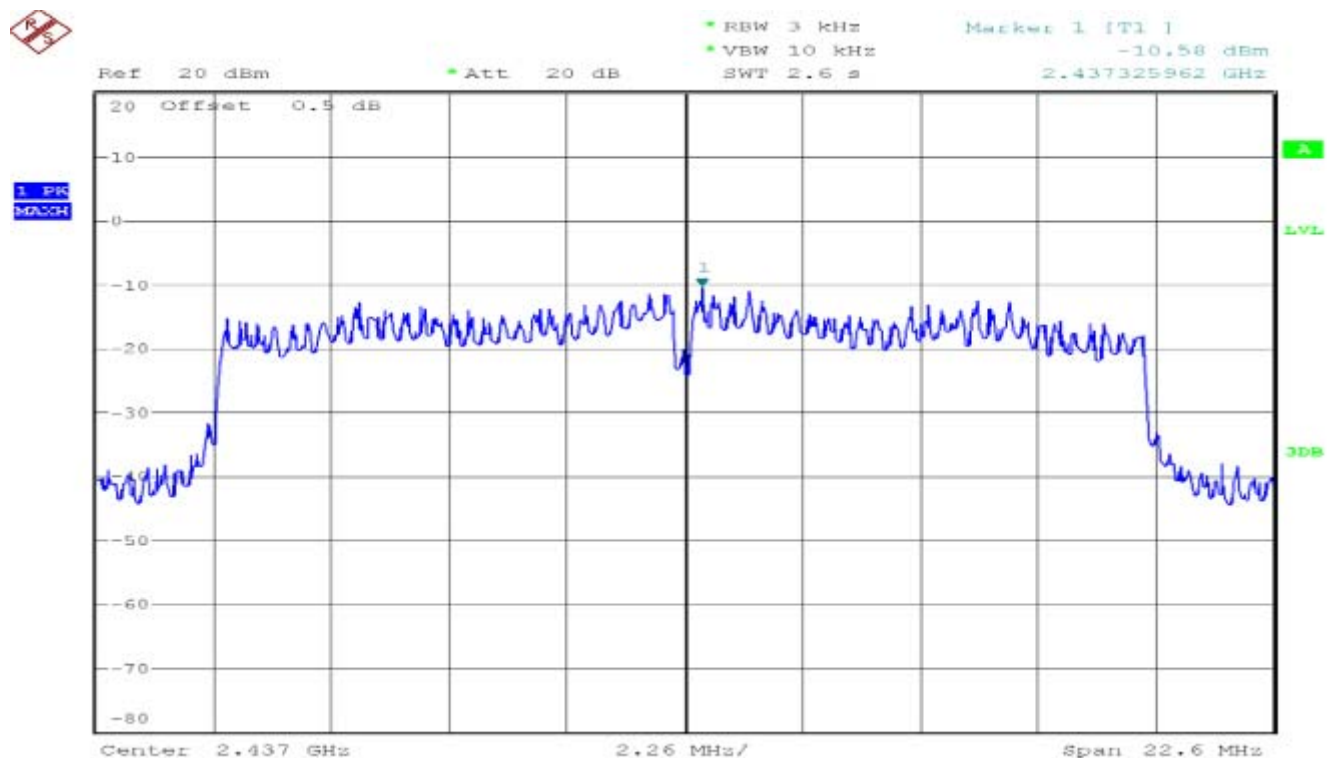


IEEE 802.11n HT20 mode/Chain 0

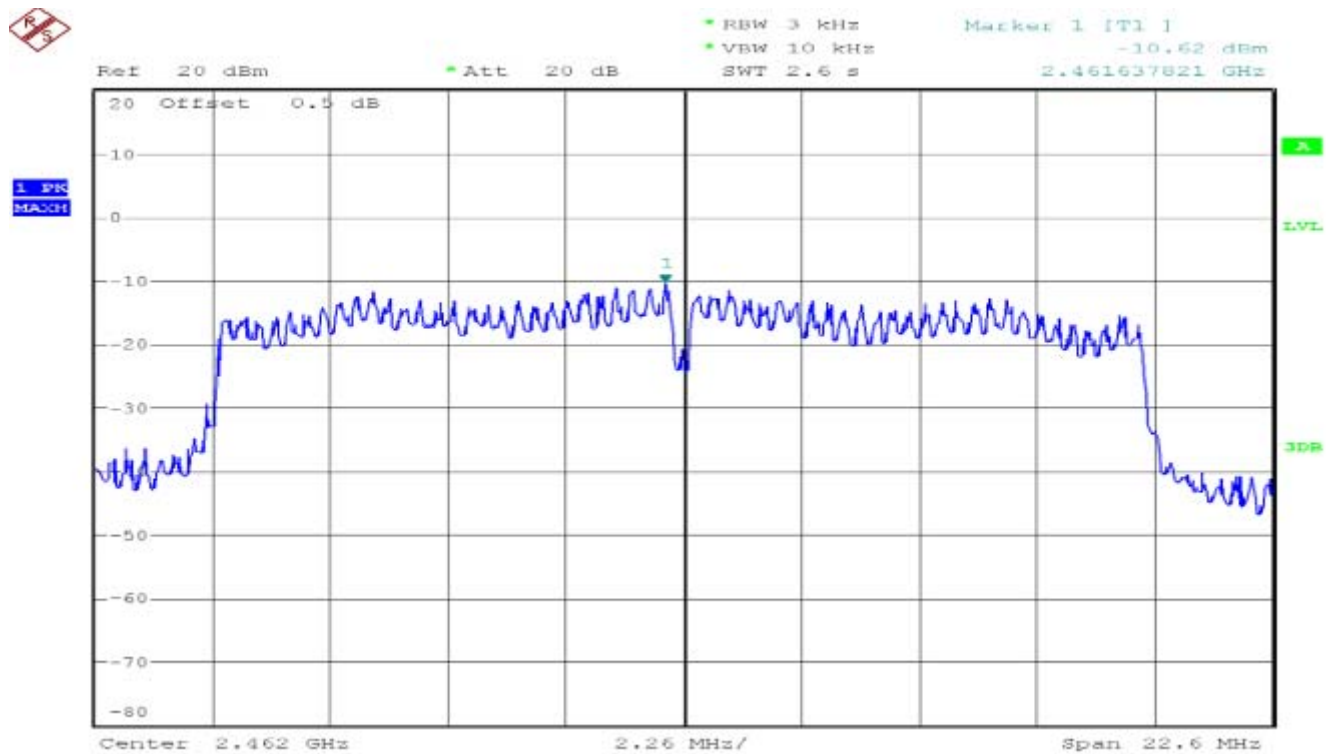
PPSD (CH Low)



PPSD (CH Mid)

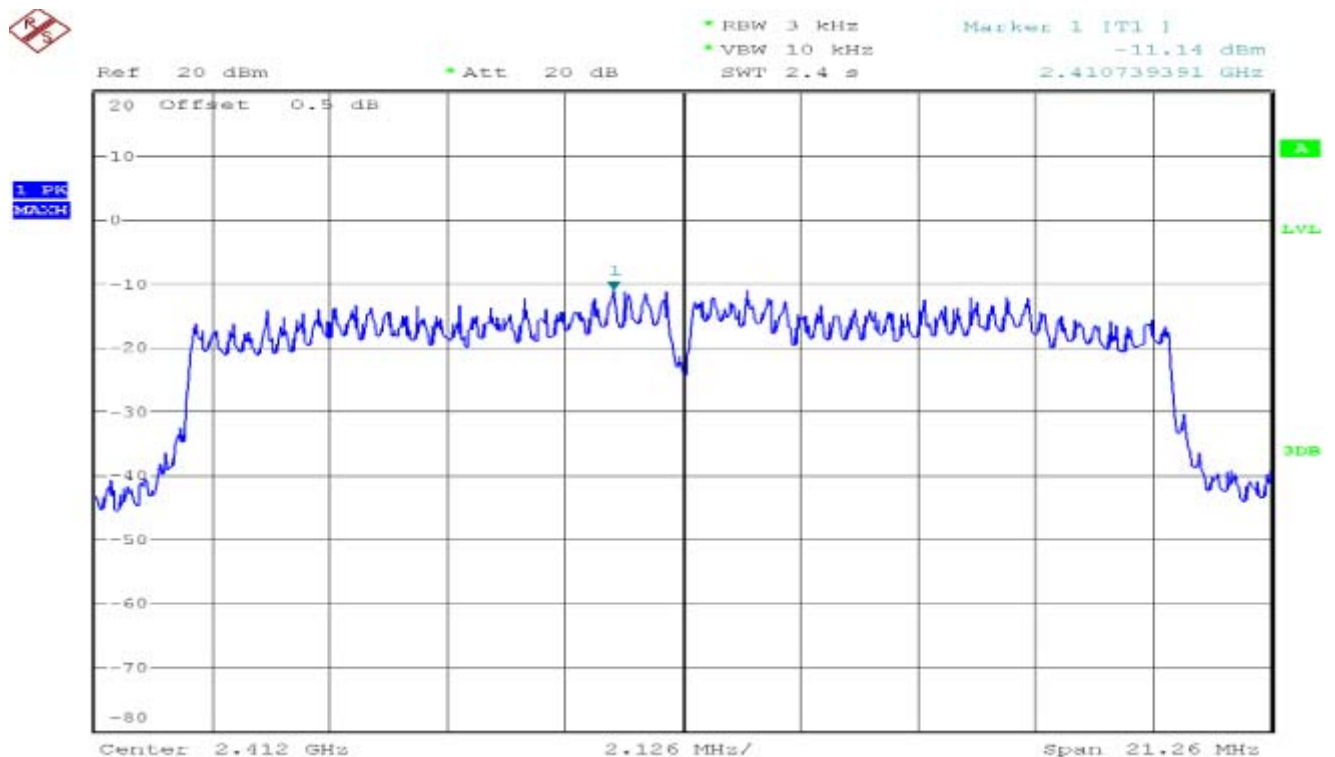


PPSD (CH High)

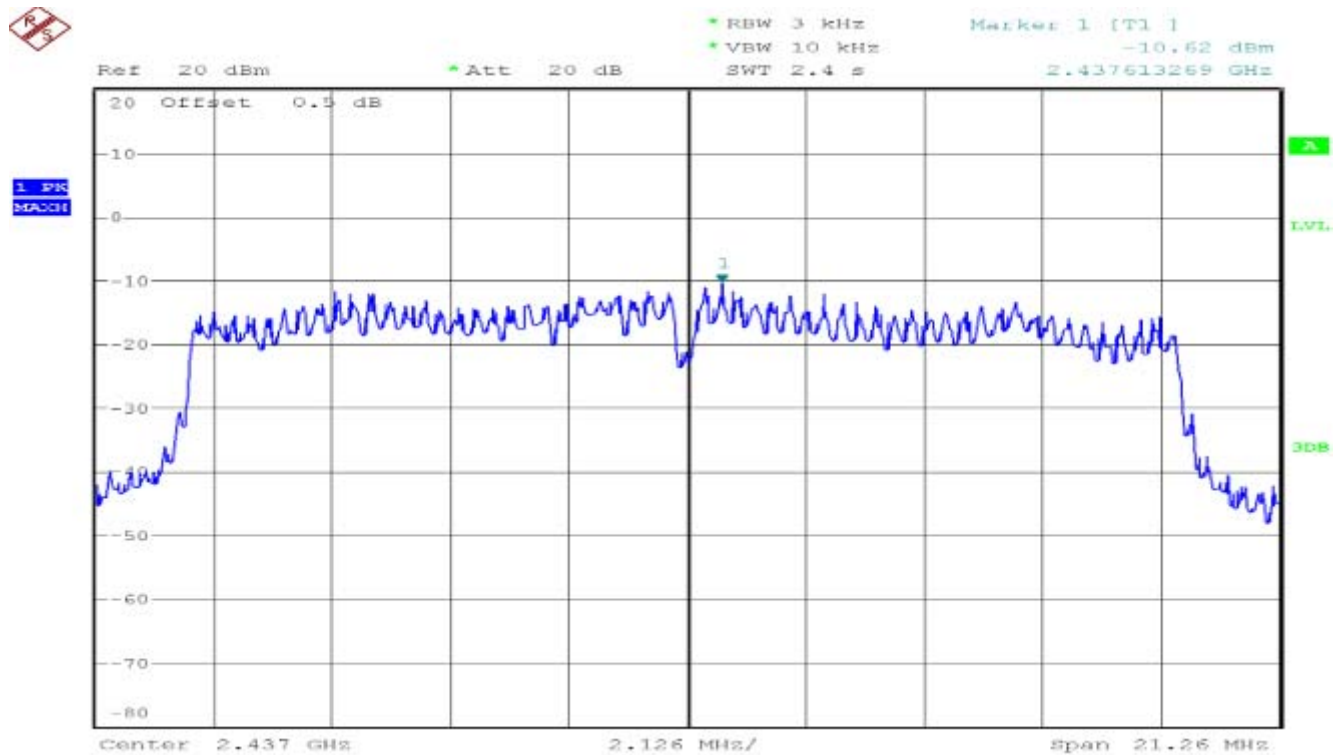


IEEE 802.11n HT20 mode/Chain 1

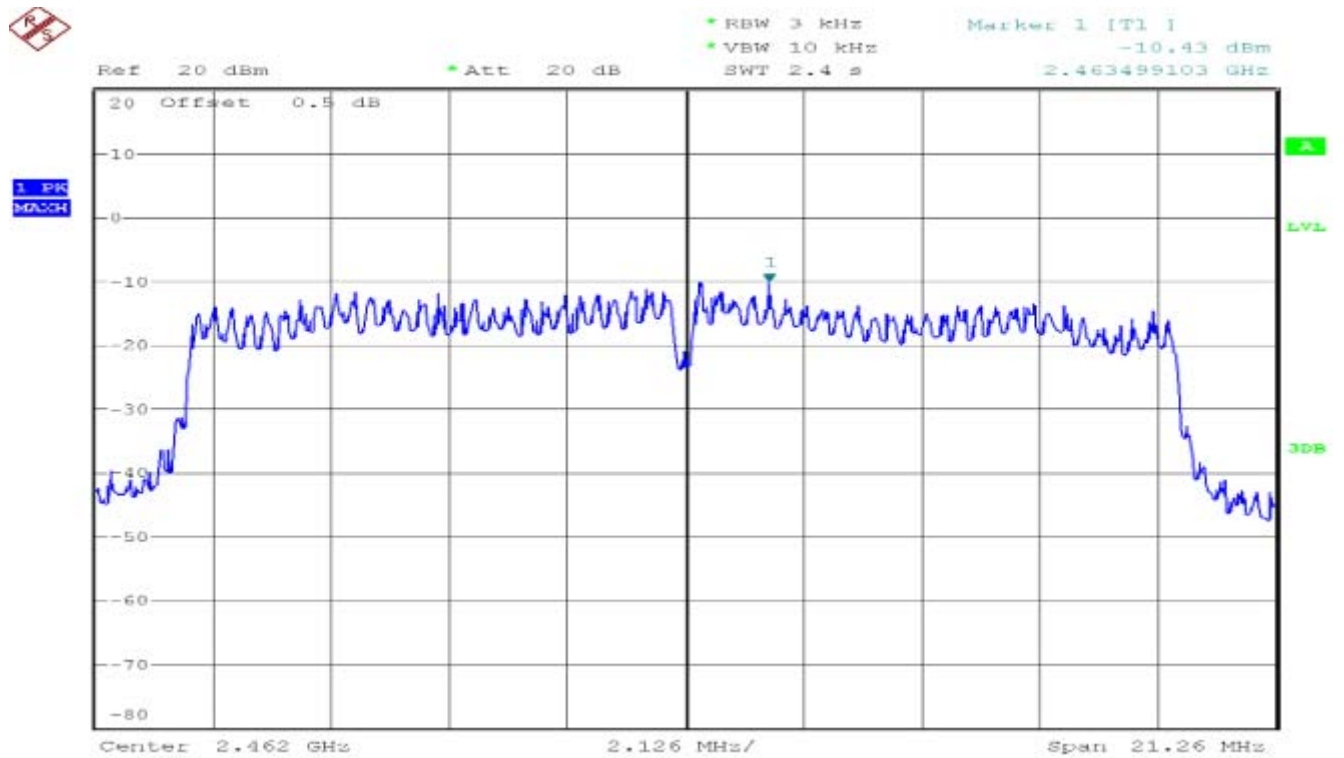
PPSD (CH Low)



PPSD (CH Mid)

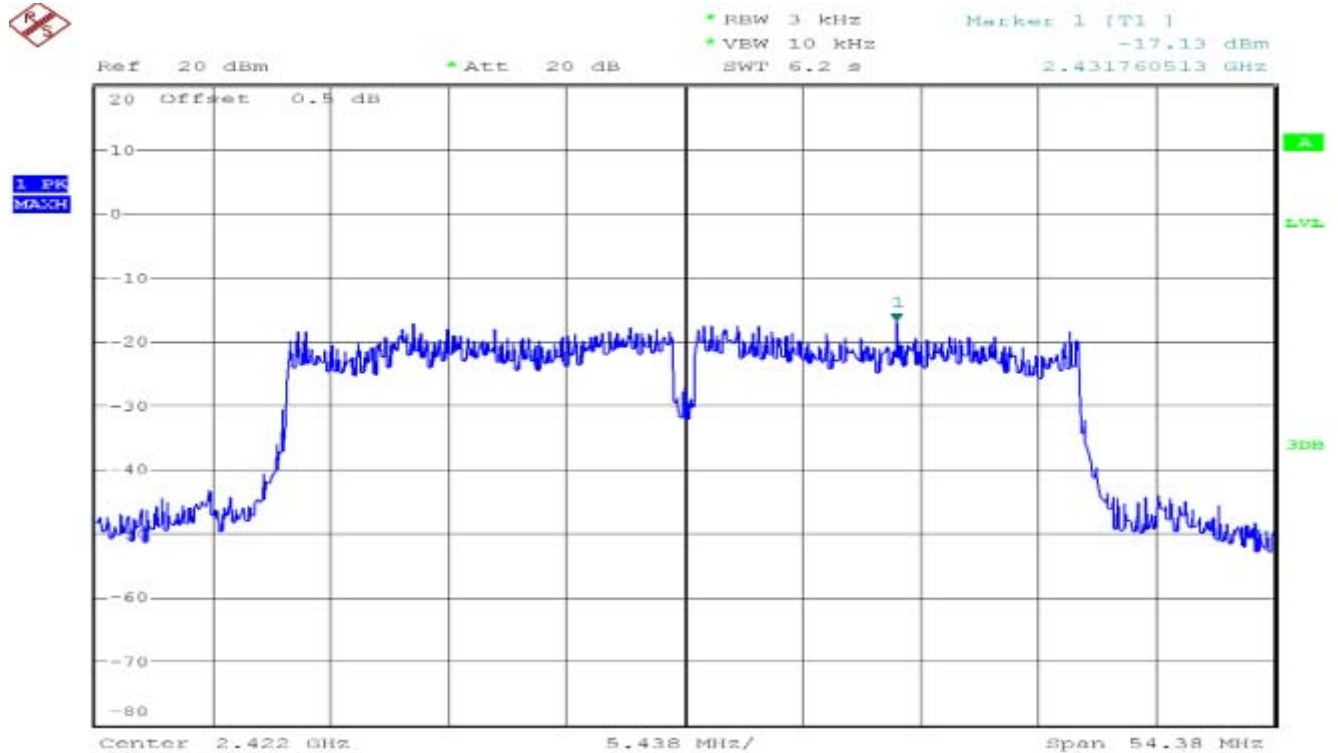


PPSD (CH High)

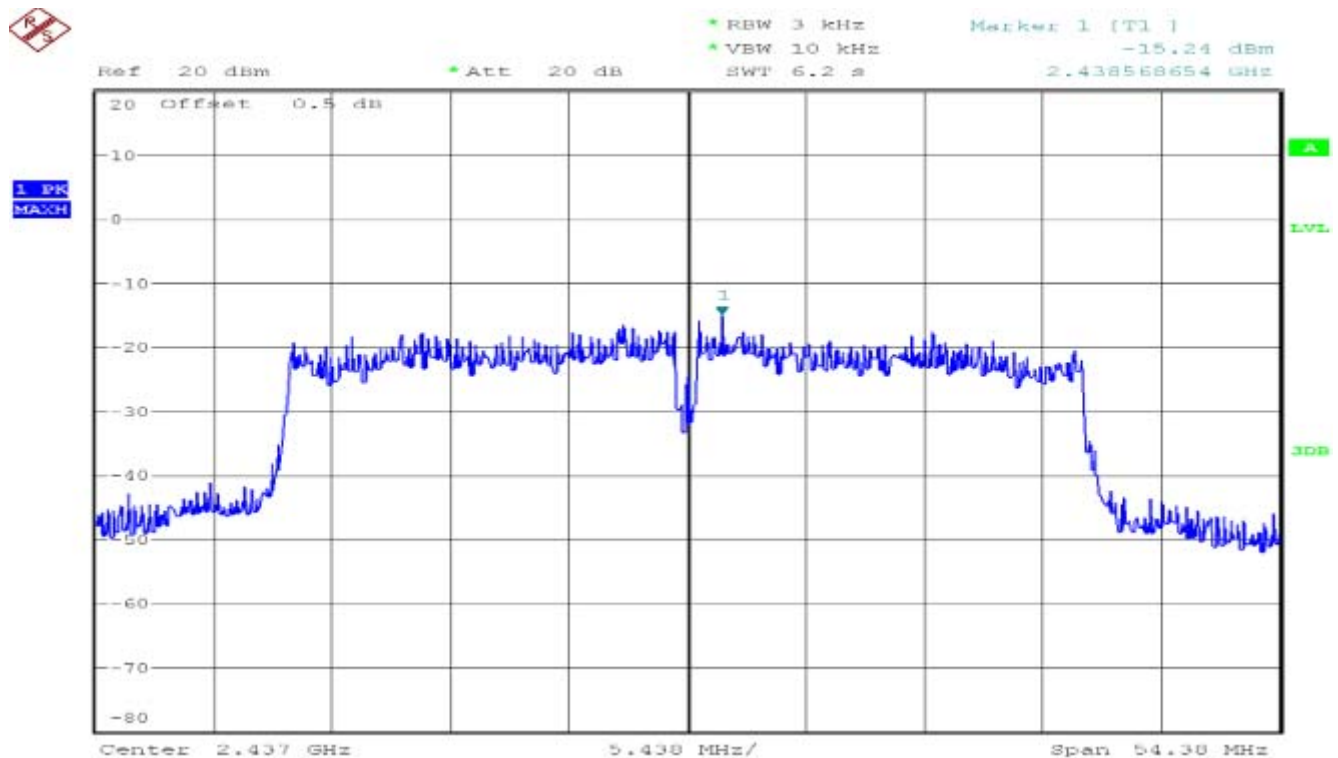


IEEE 802.11n HT40 mode/Chain 0

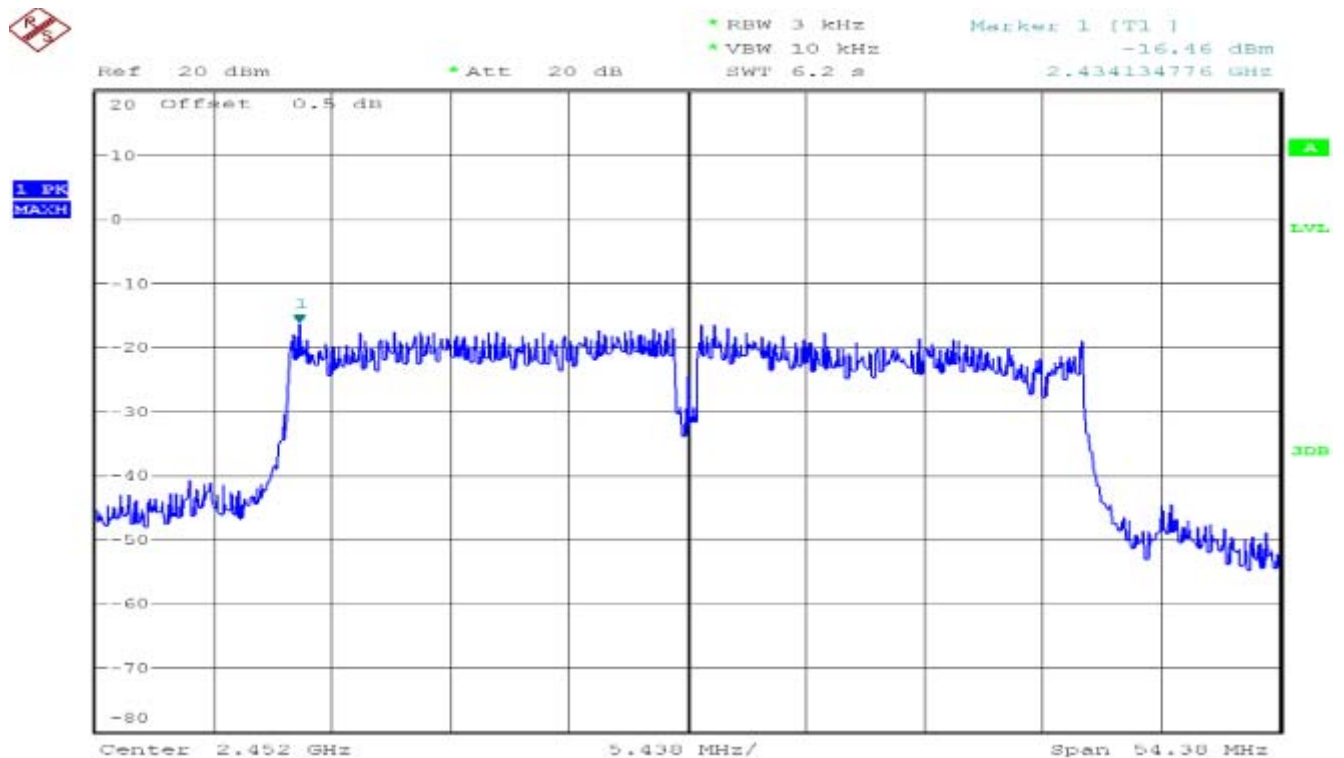
PPSD (CH Low)



PPSD (CH Mid)

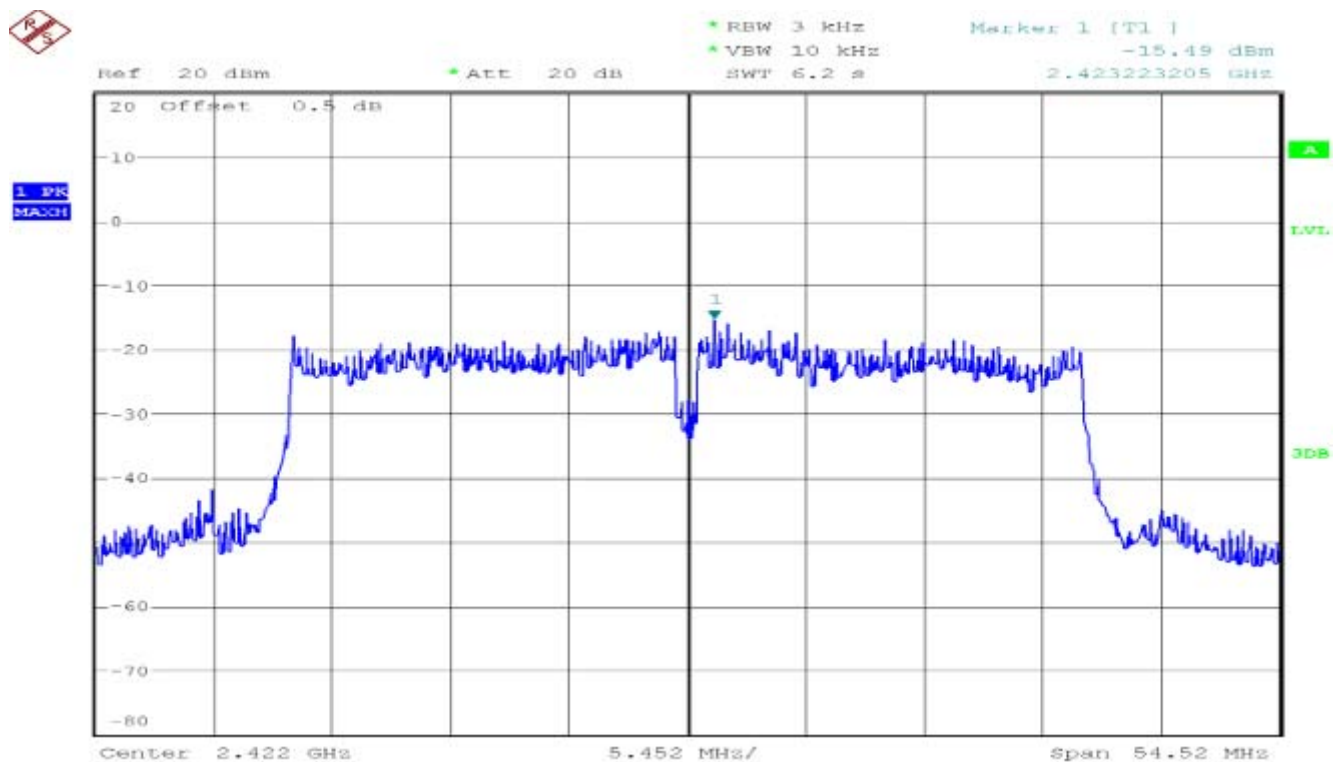


PPSD (CH High)

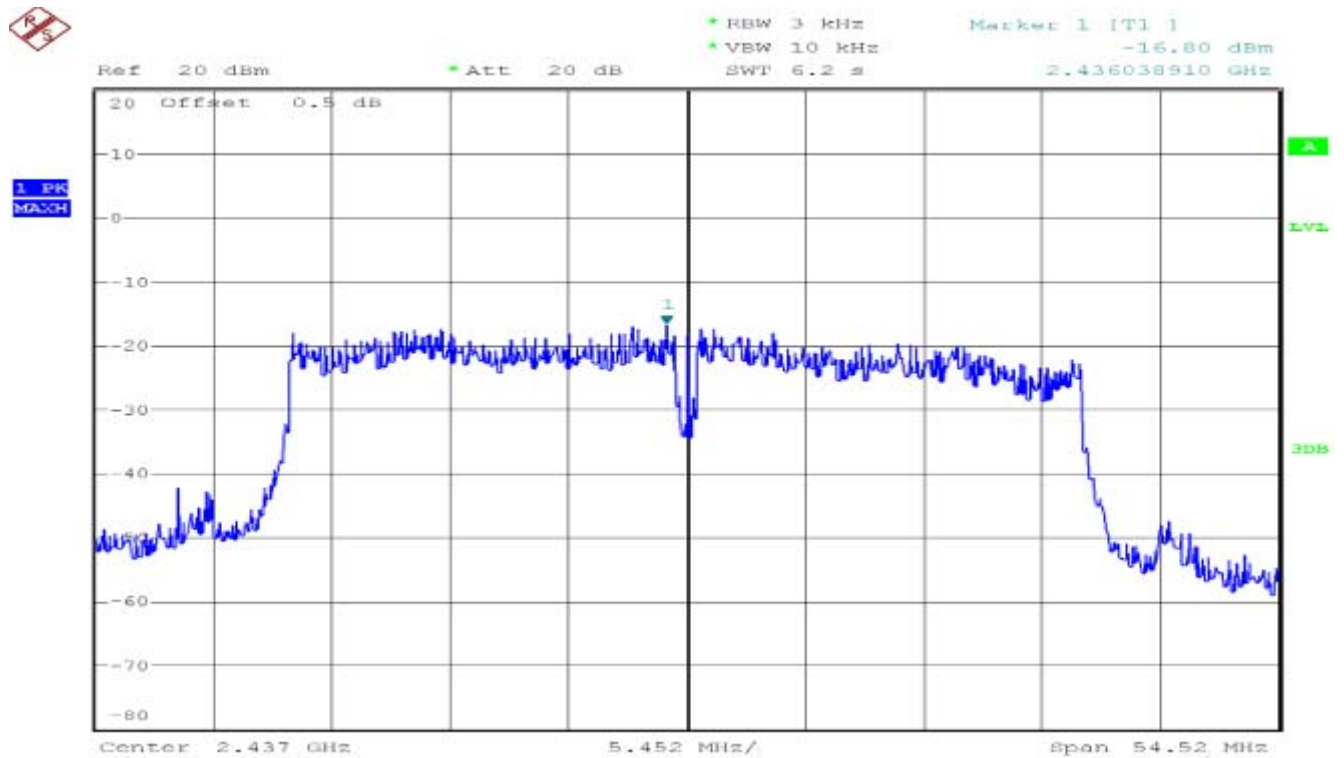


IEEE 802.11n HT40 mode/Chain 1

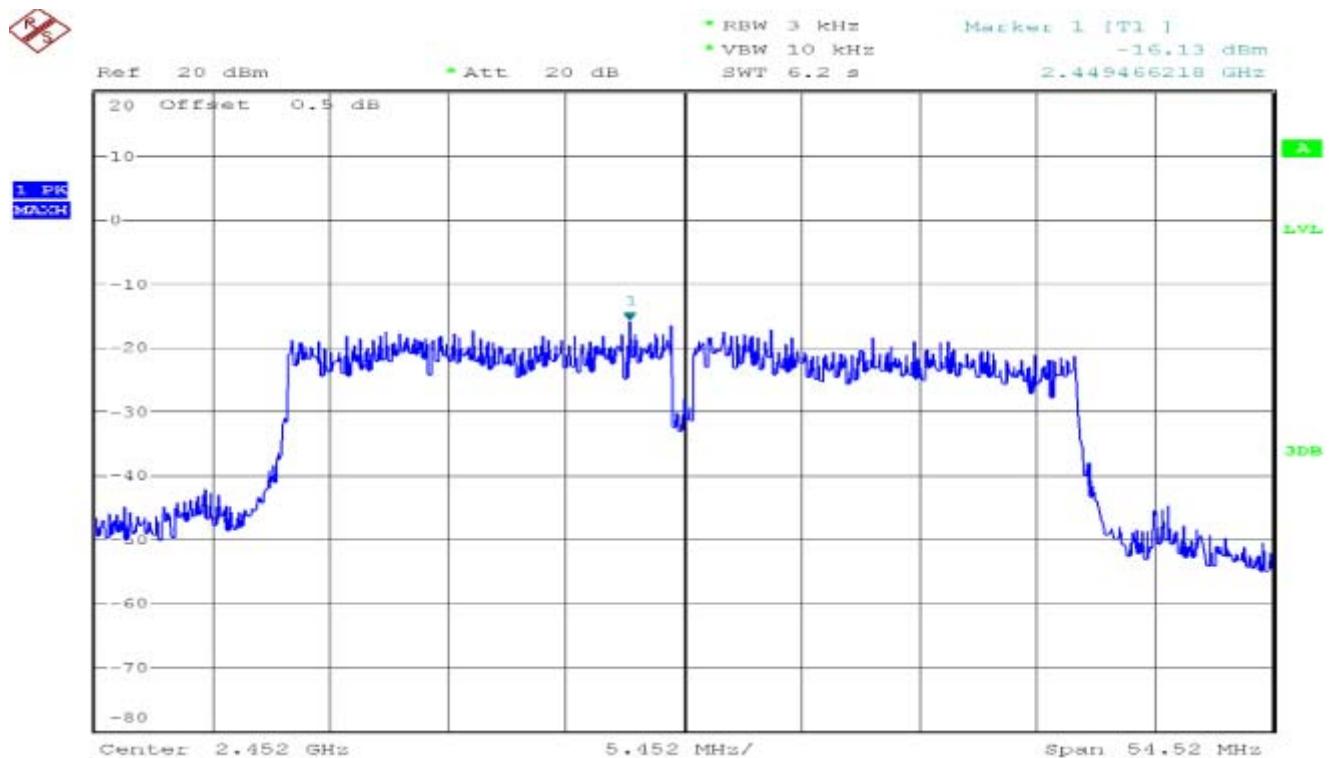
PPSD (CH Low)



PPSD (CH Mid)



PPSD (CH High)



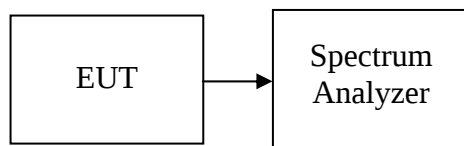
7.5. SPURIOUS EMISSIONS

Conducted Measurement

LIMIT

According to §15.247(d), 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. 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) (see Section 15.205(c)).

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

Measurements are made over the 30MHz to 40GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

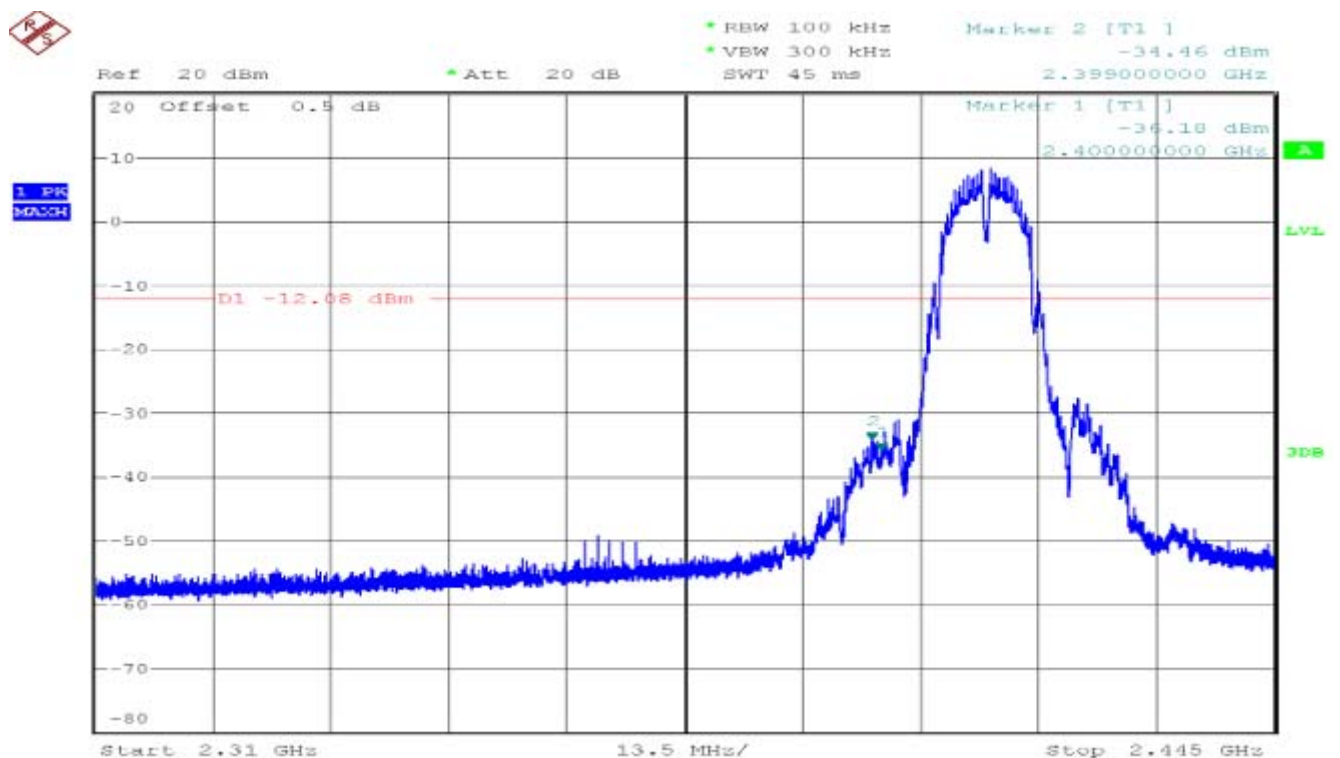
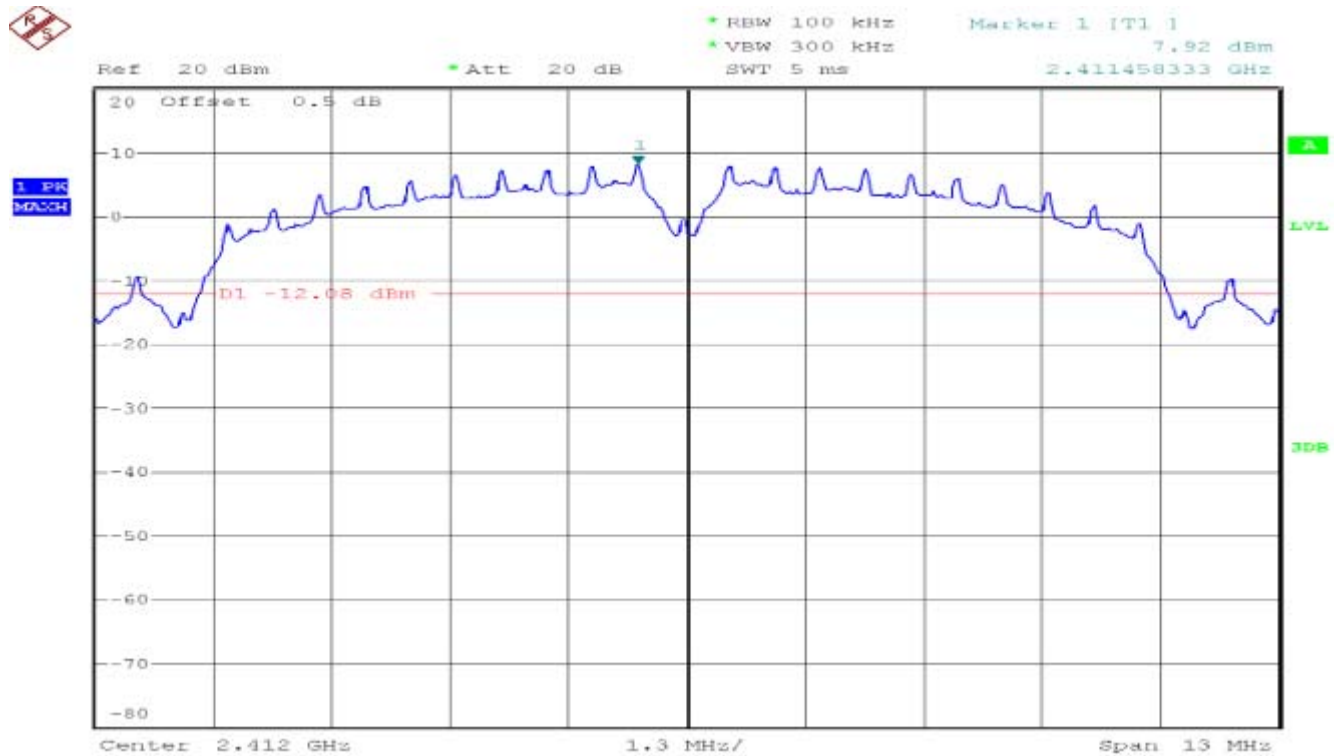
No non-compliance noted

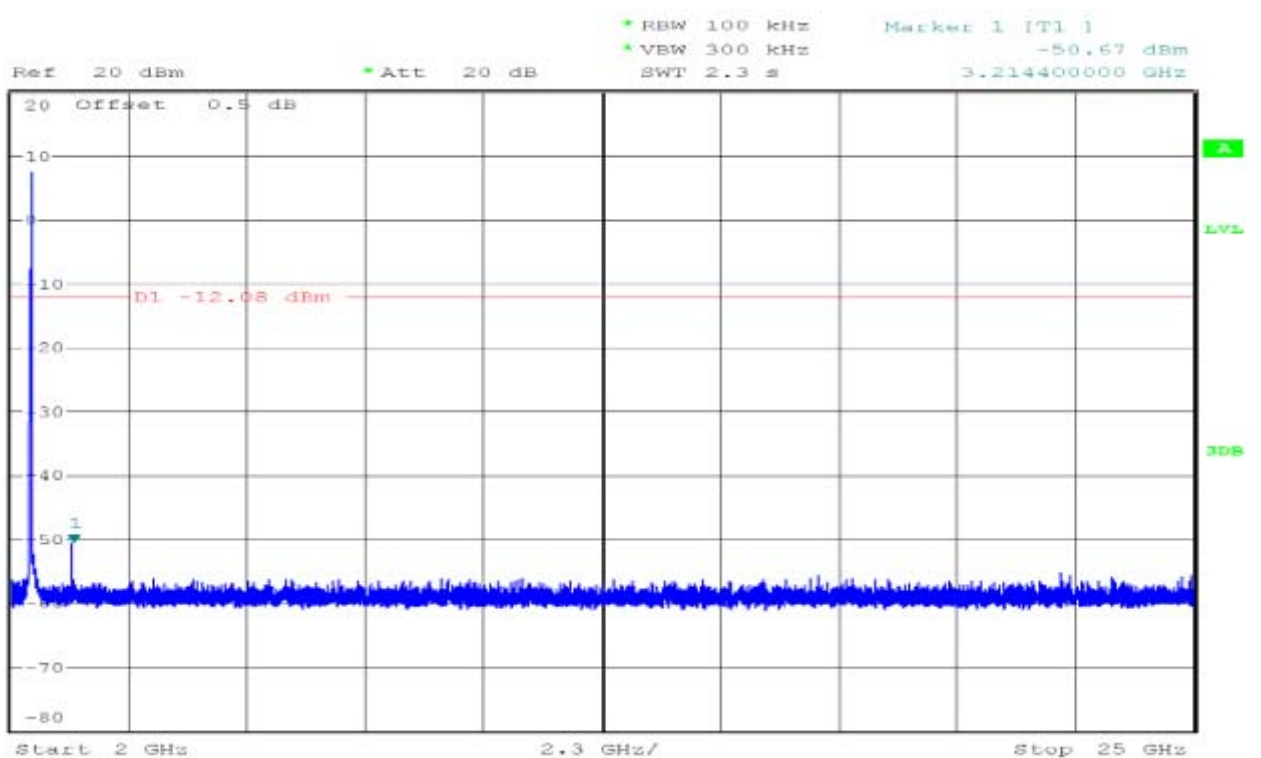
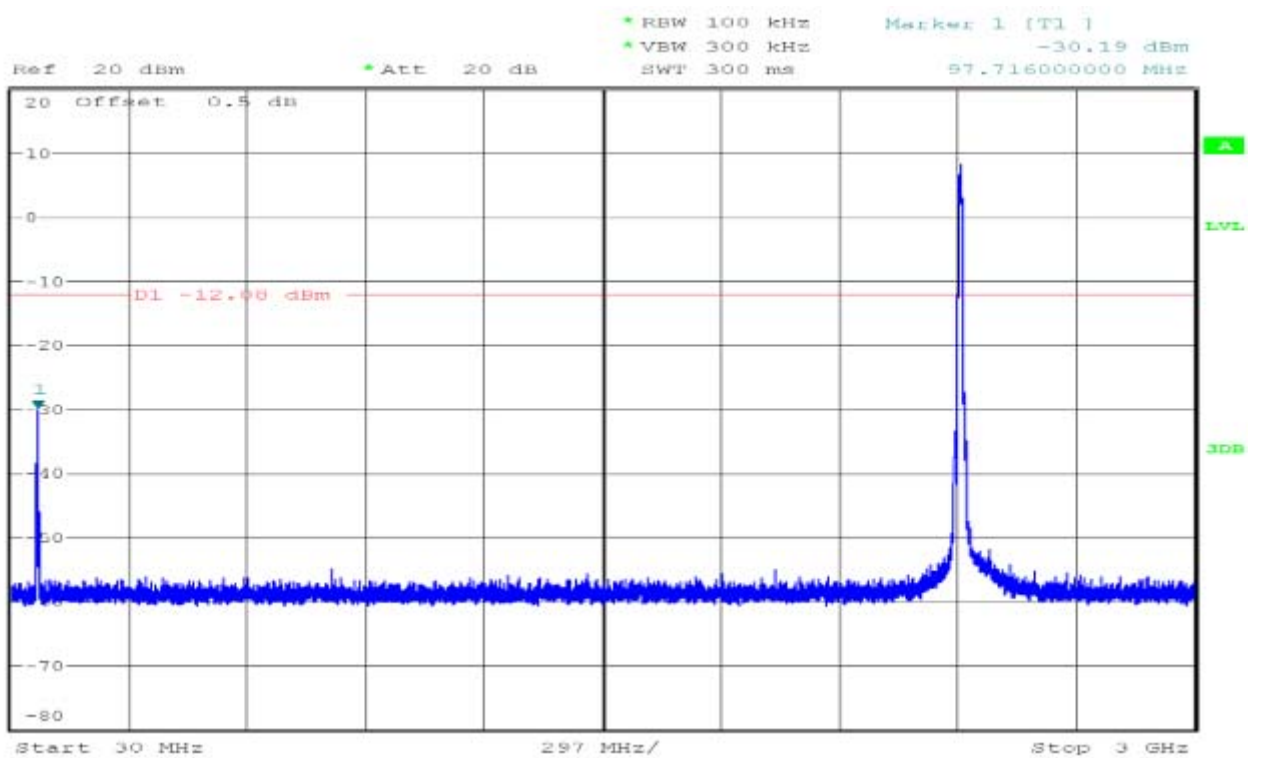
Test Plot

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

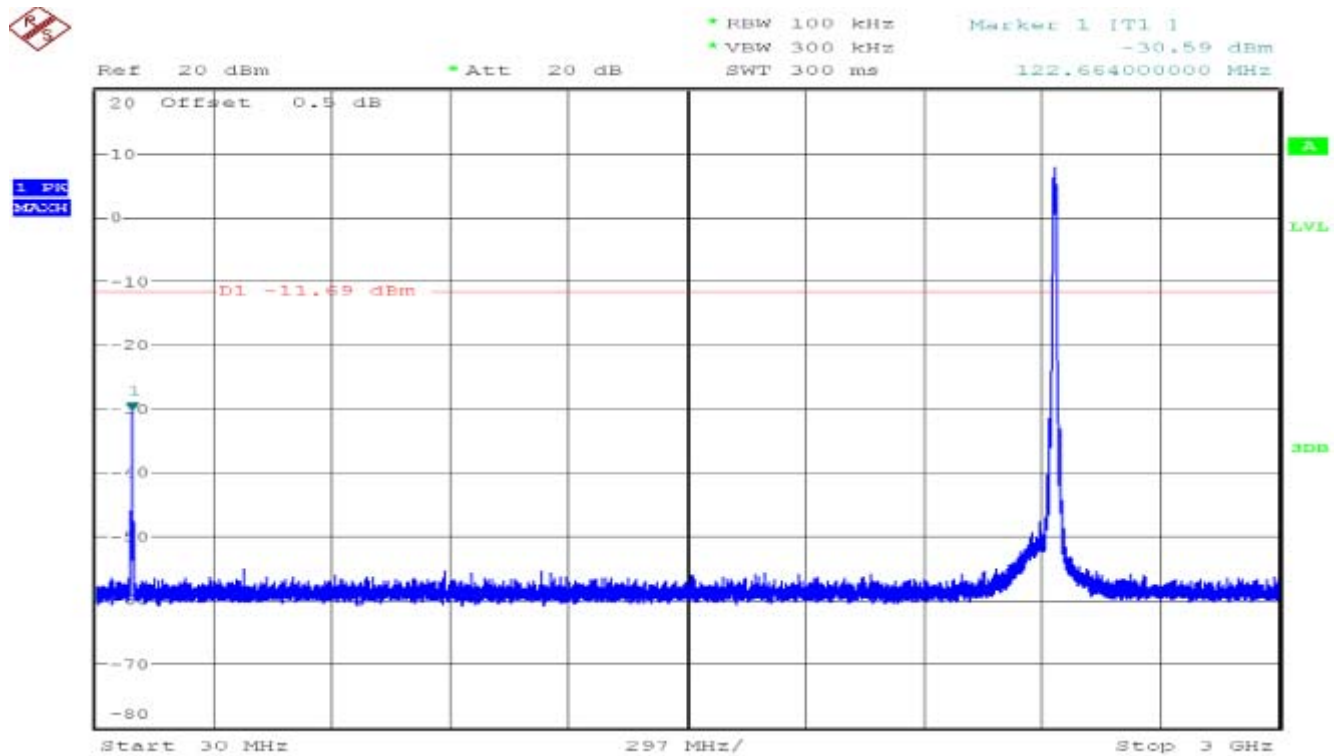
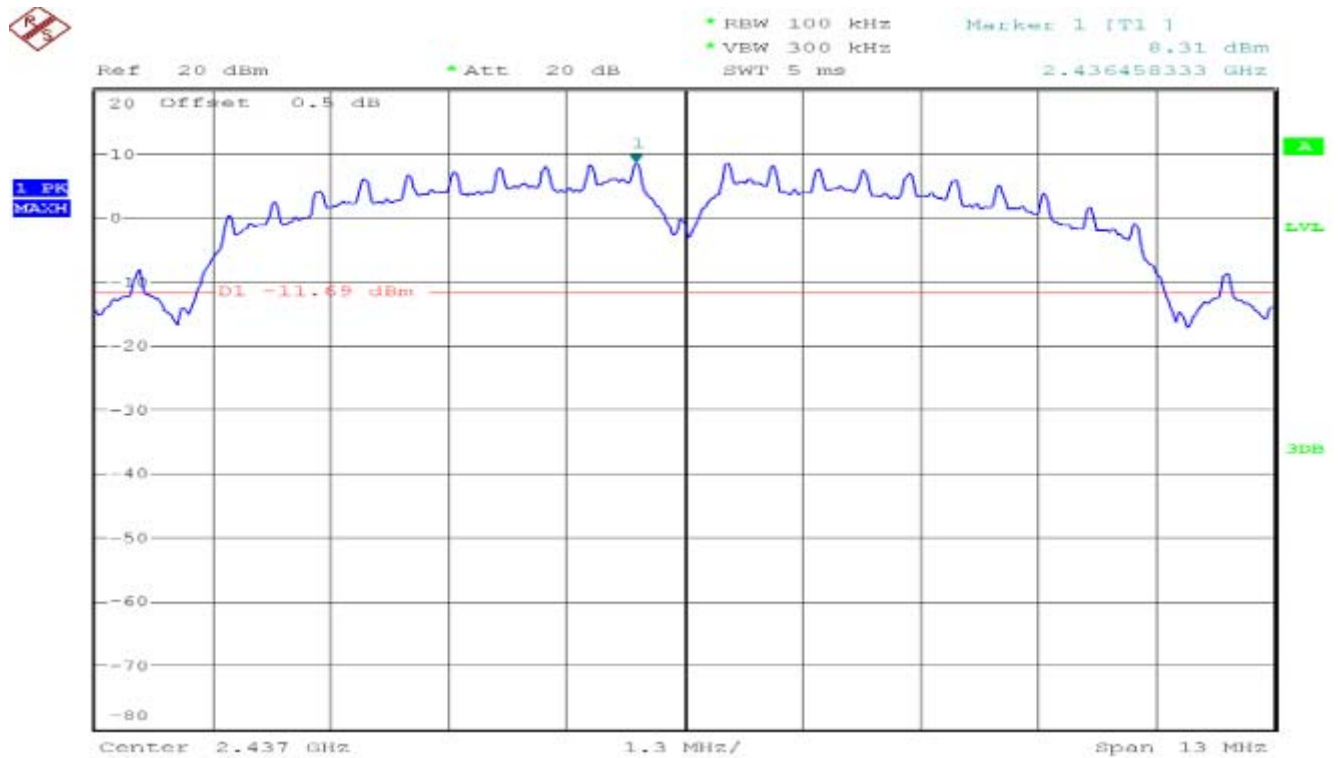
IEEE 802.11b mode/Chain 0

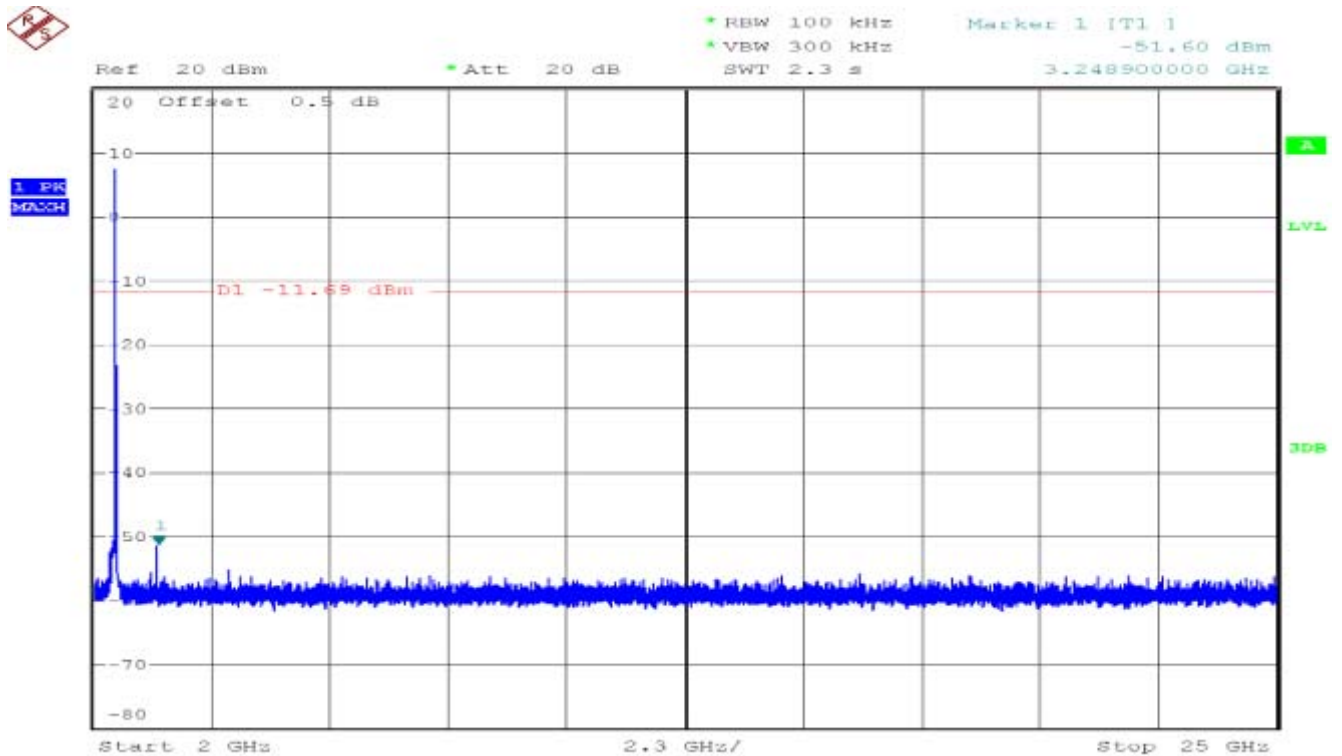
CH Low



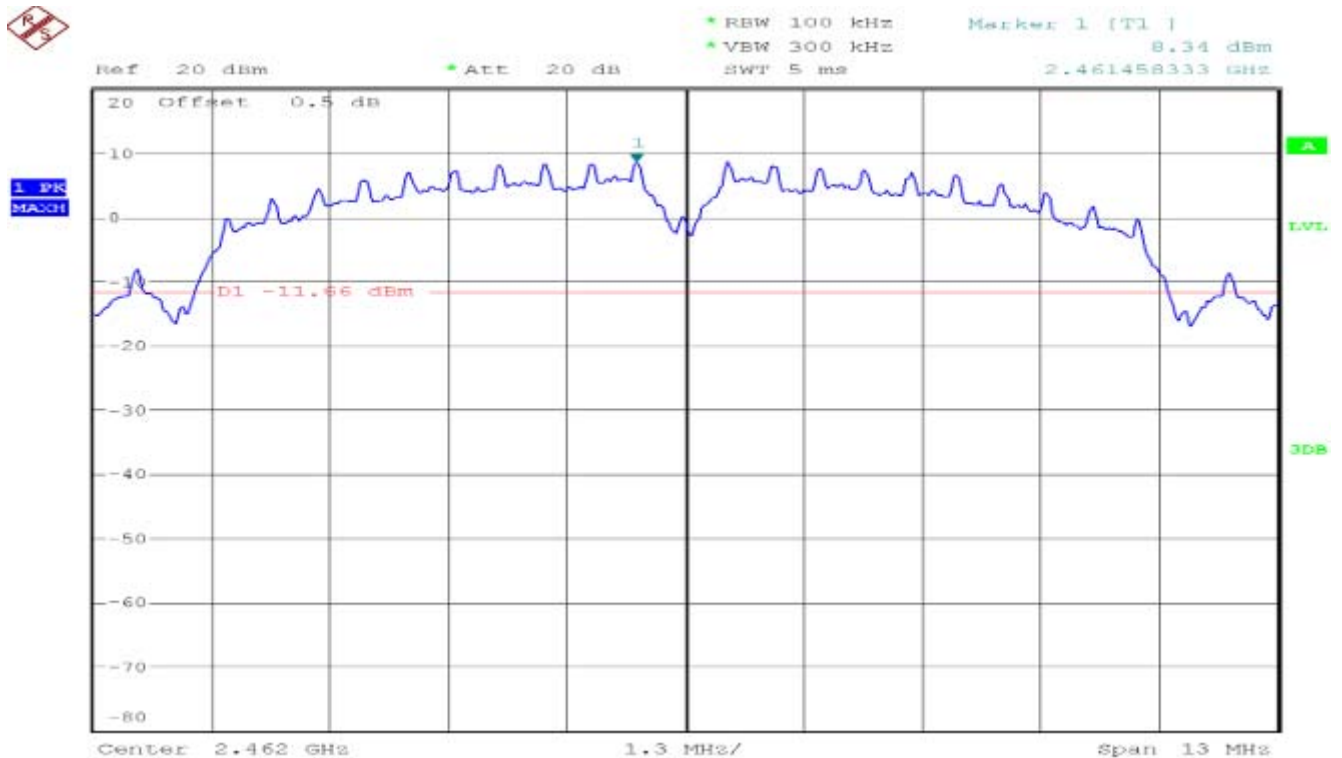


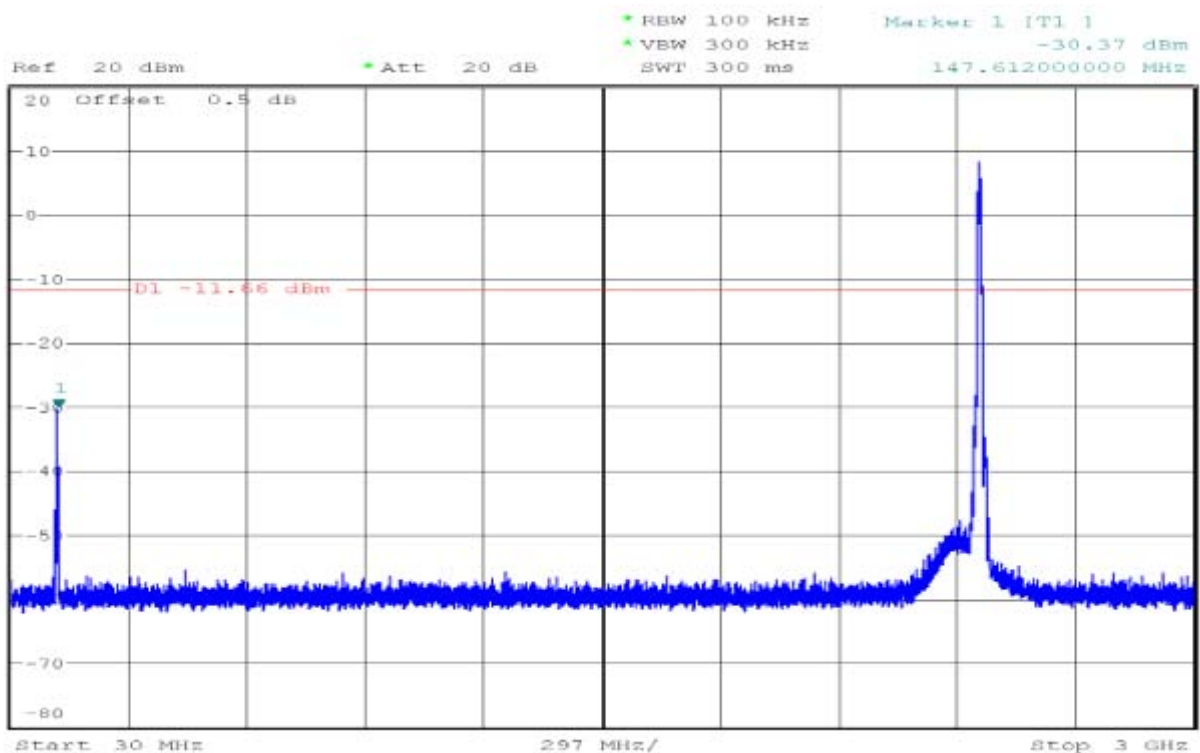
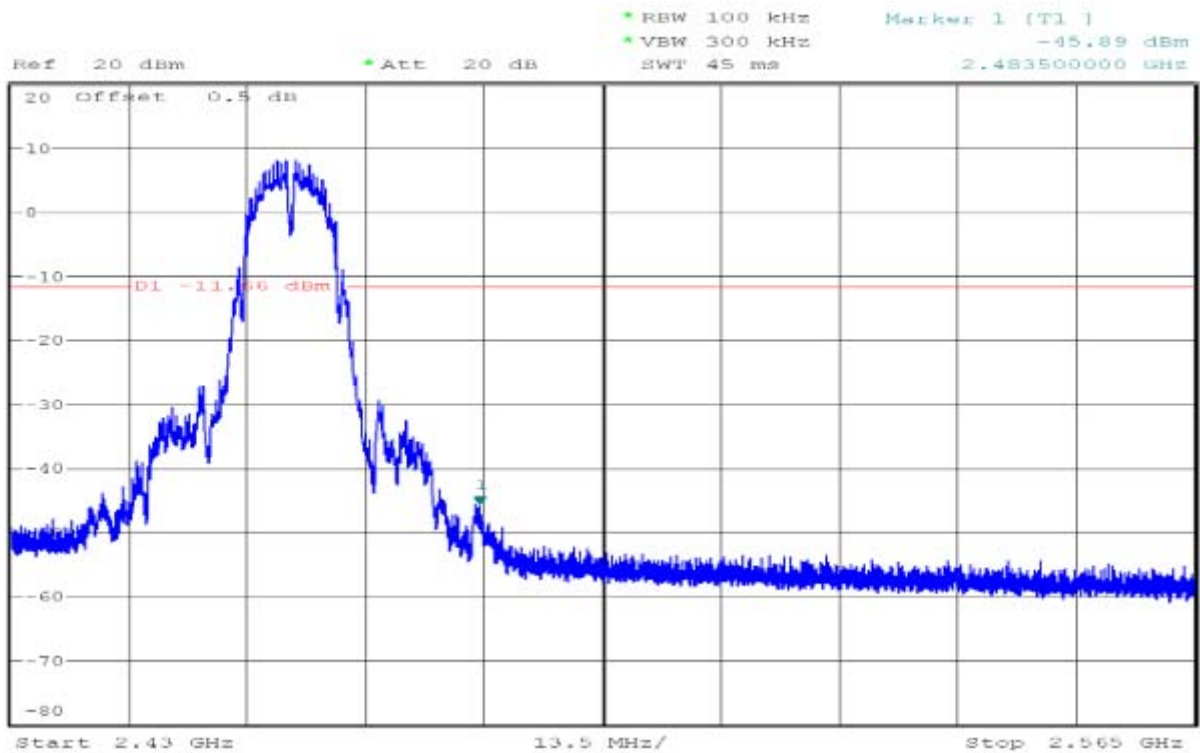
CH Mid

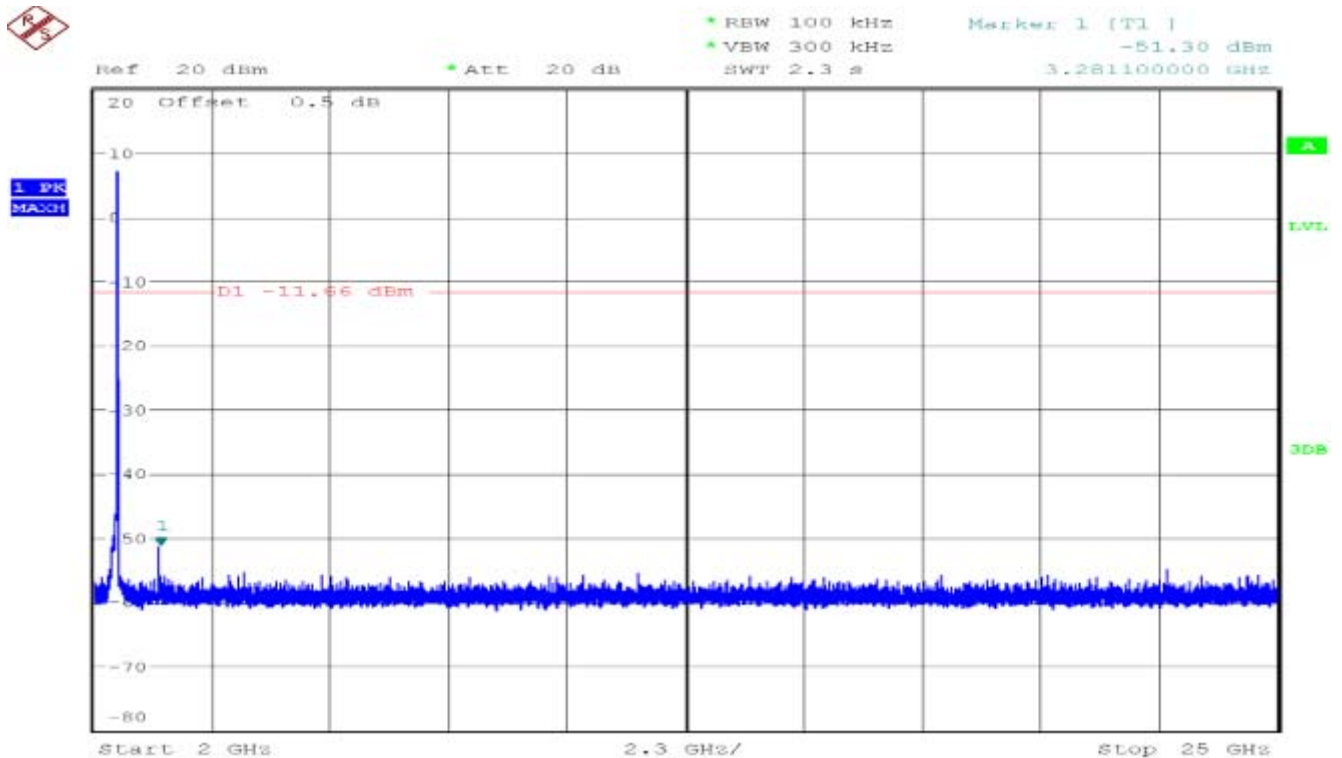




CH High

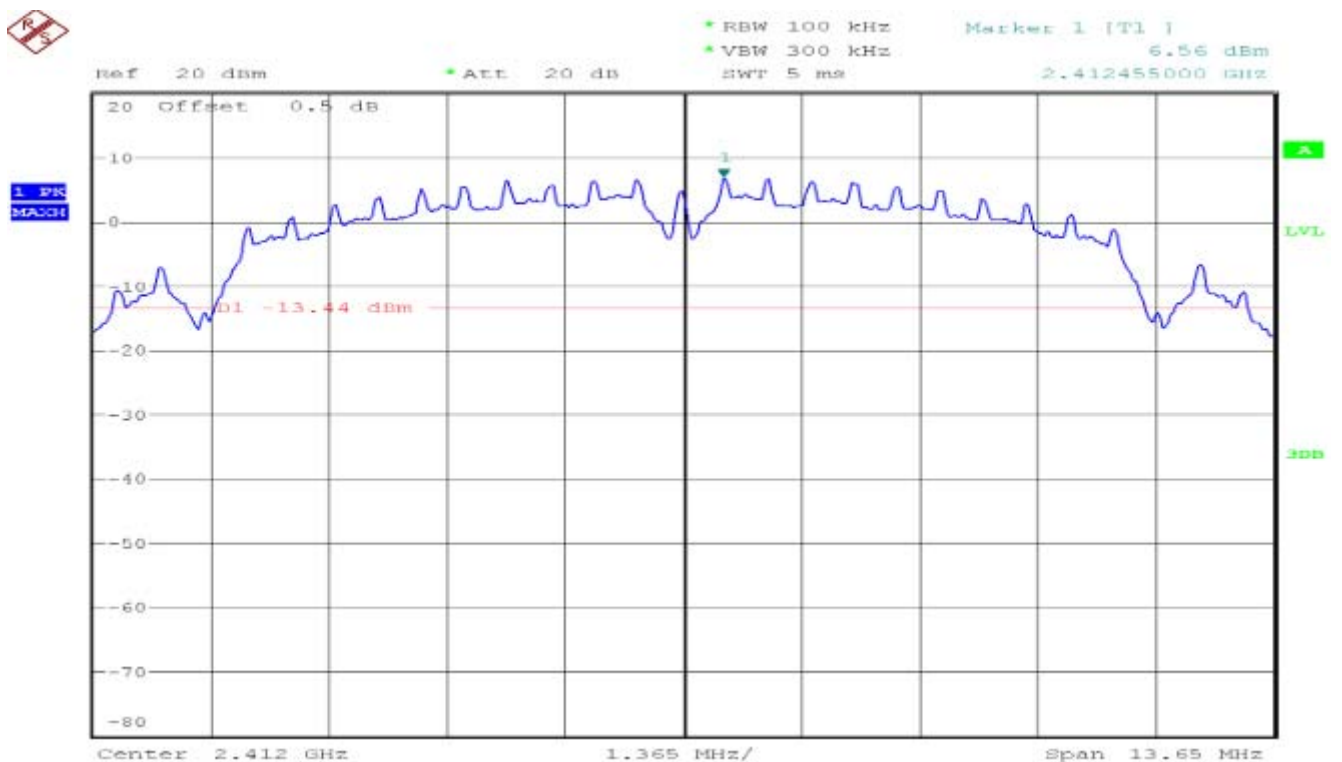


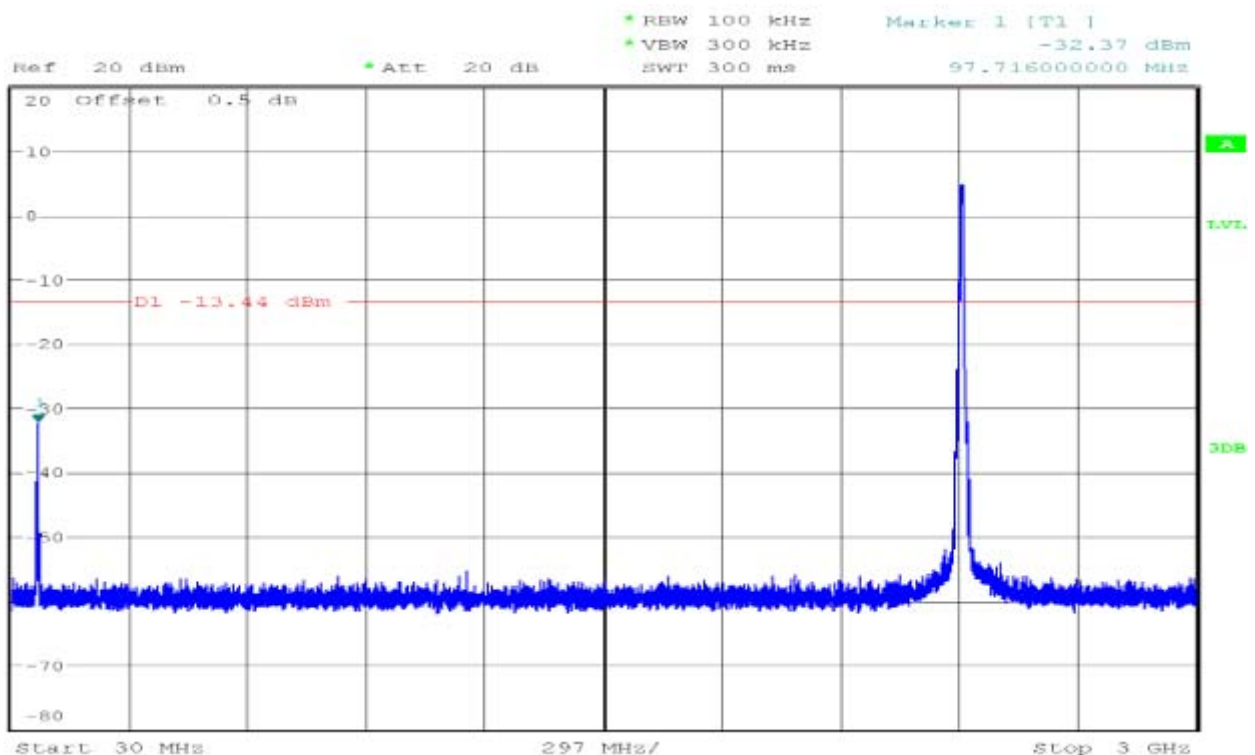
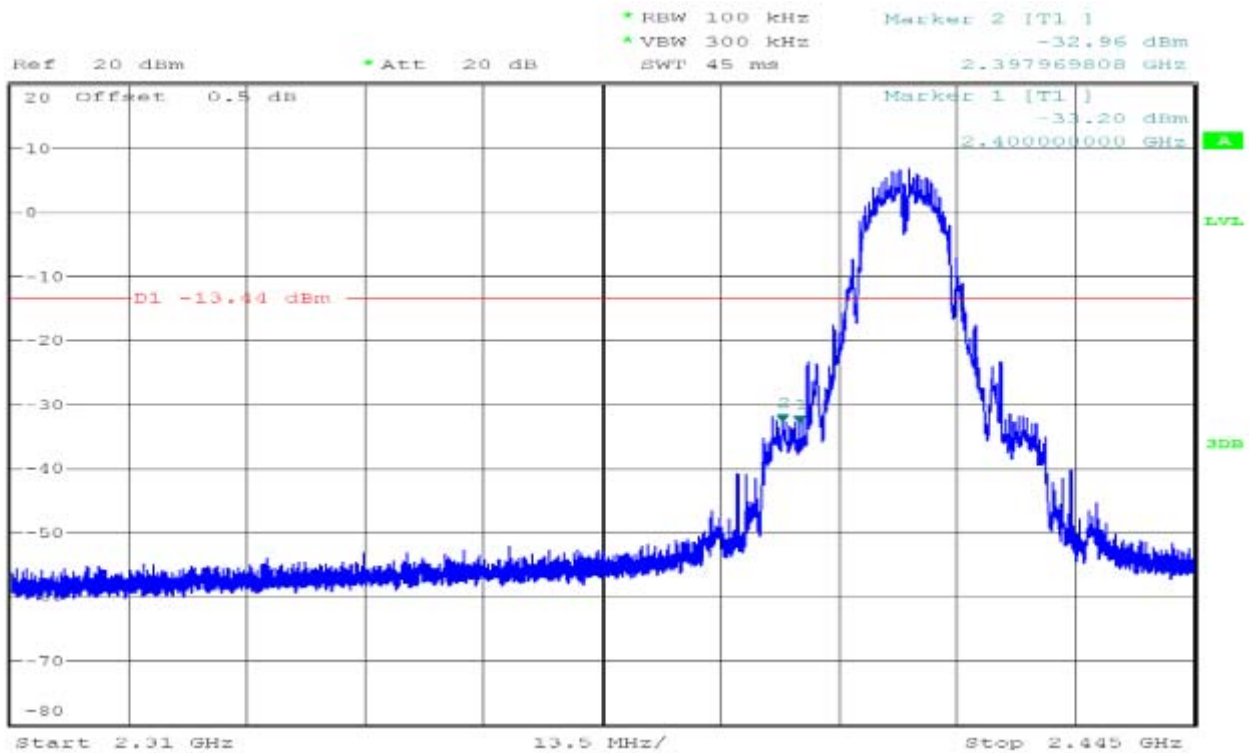


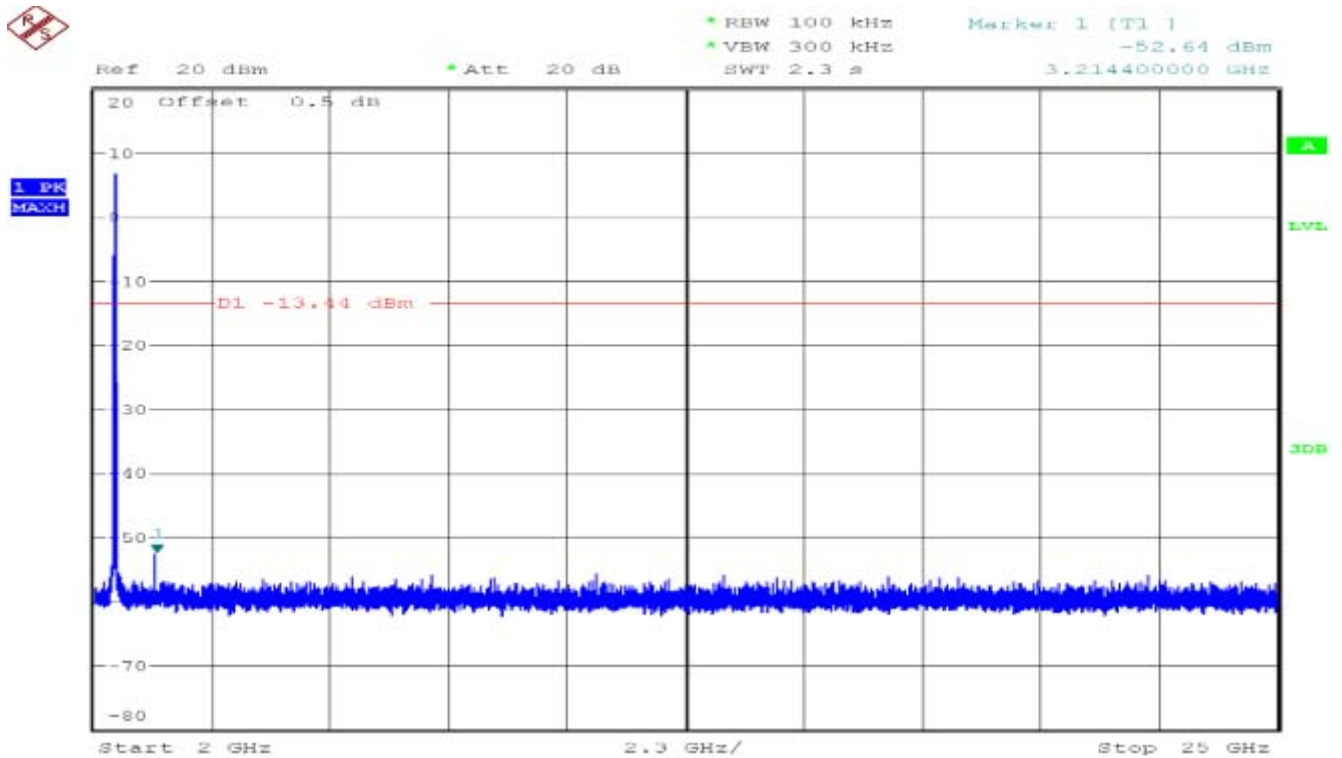


IEEE 802.11b mode/Chain 1

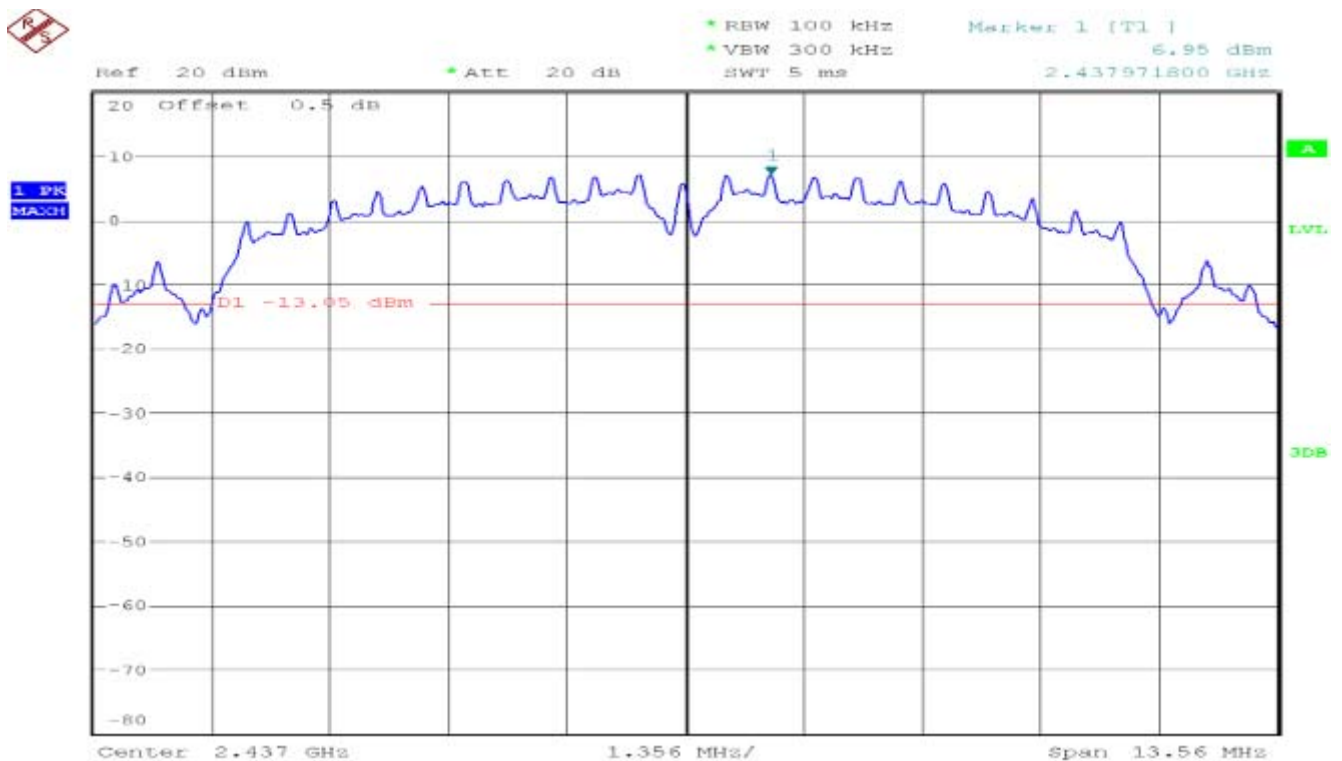
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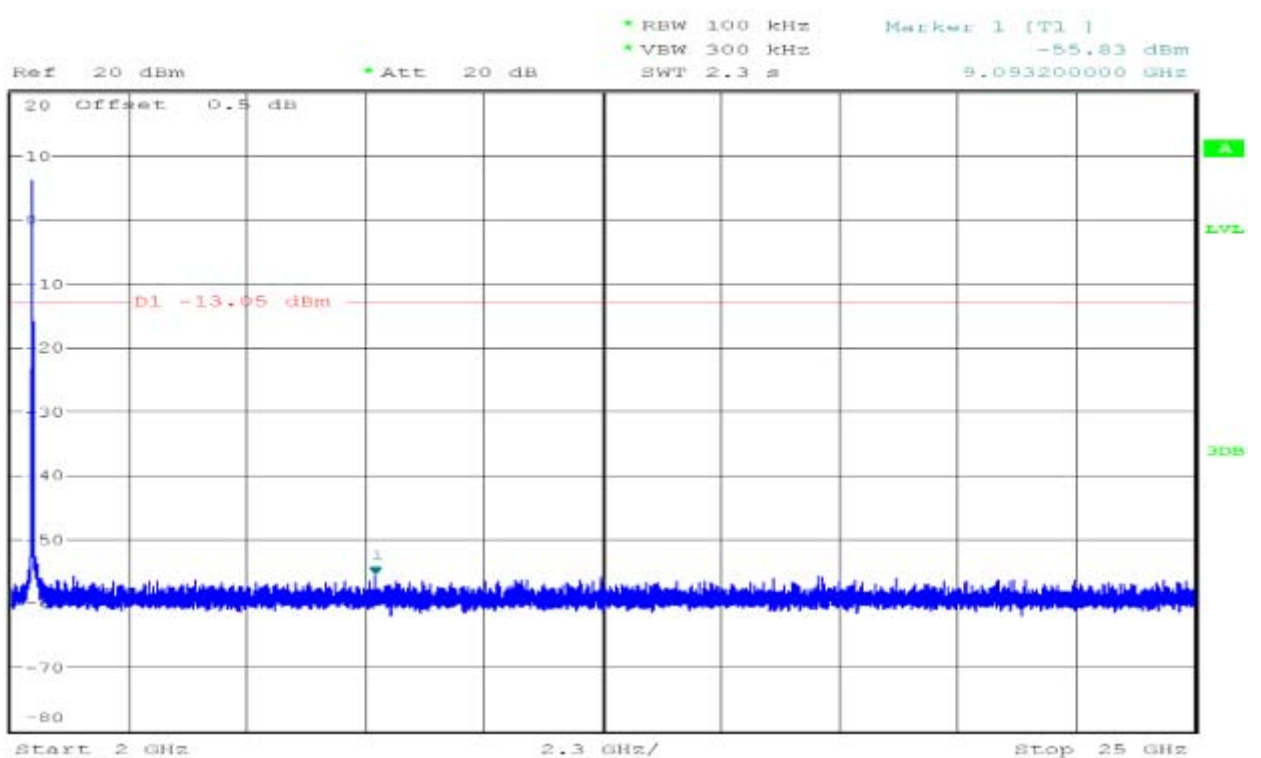
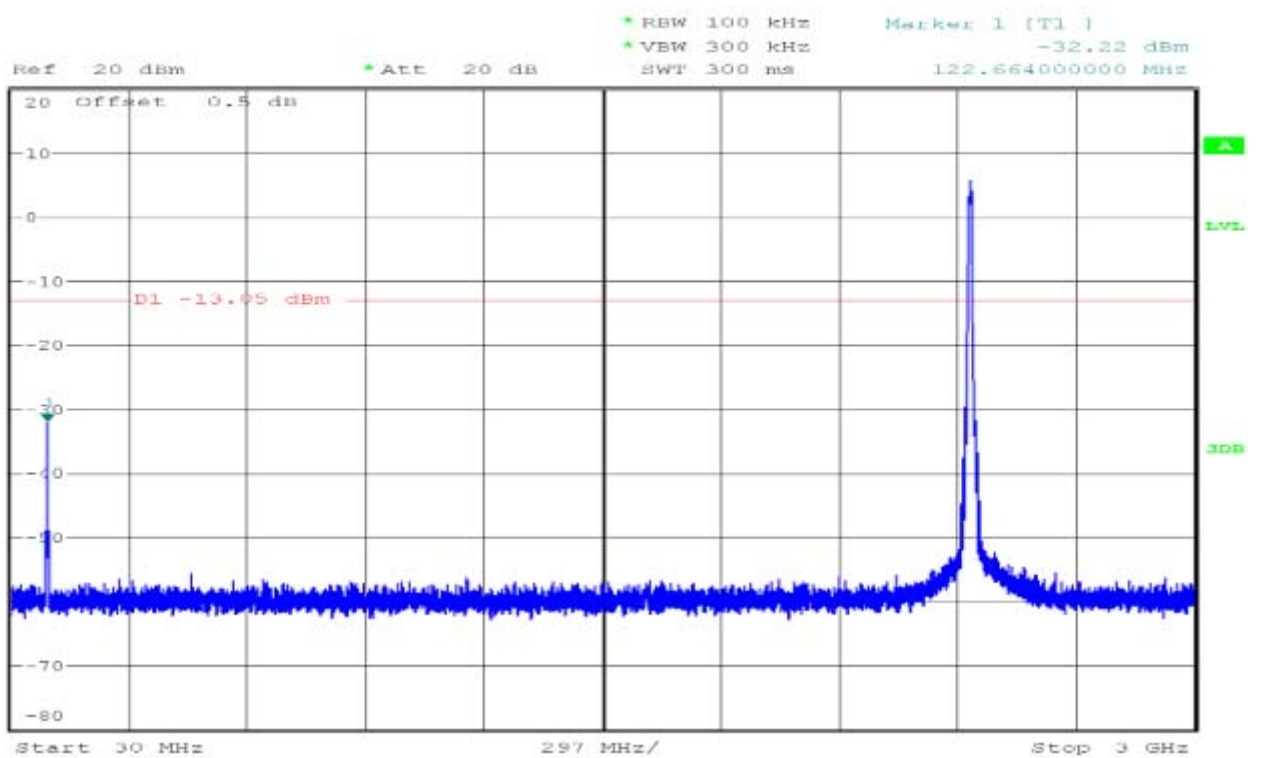




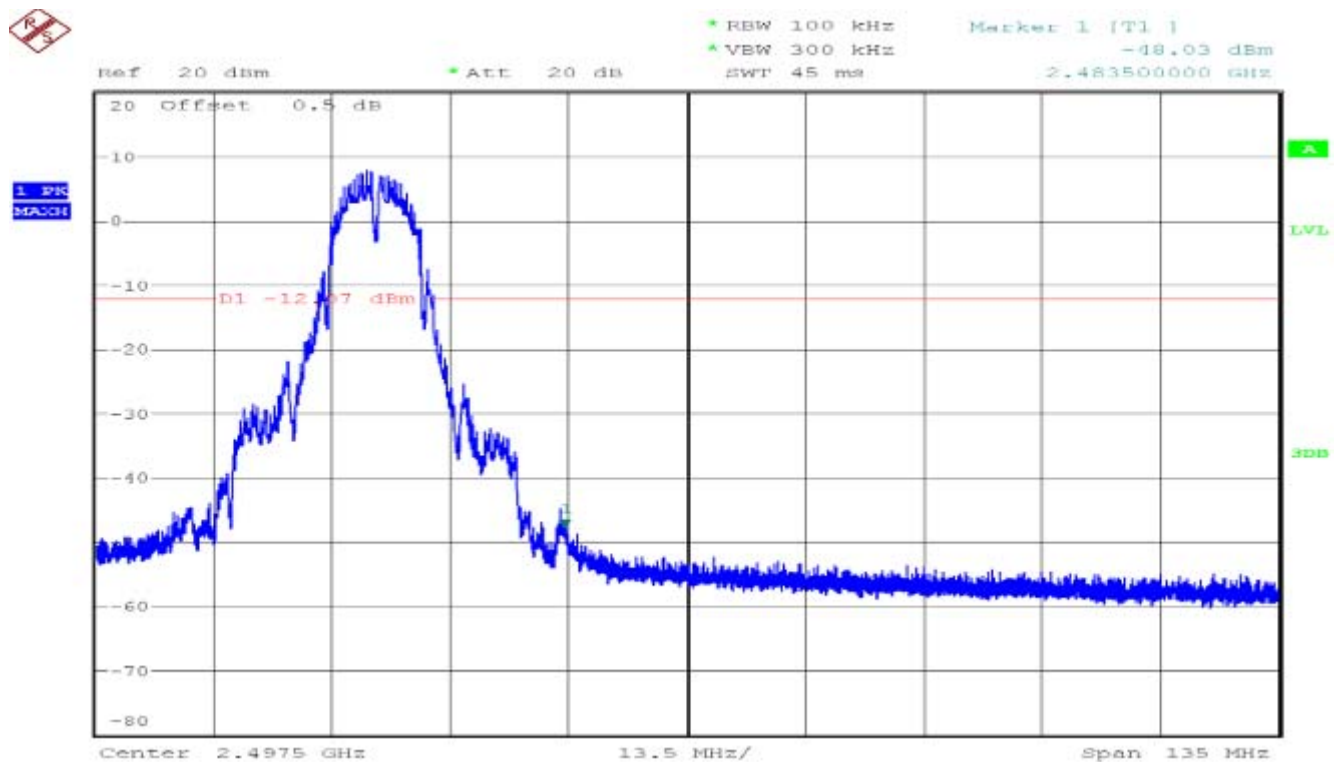
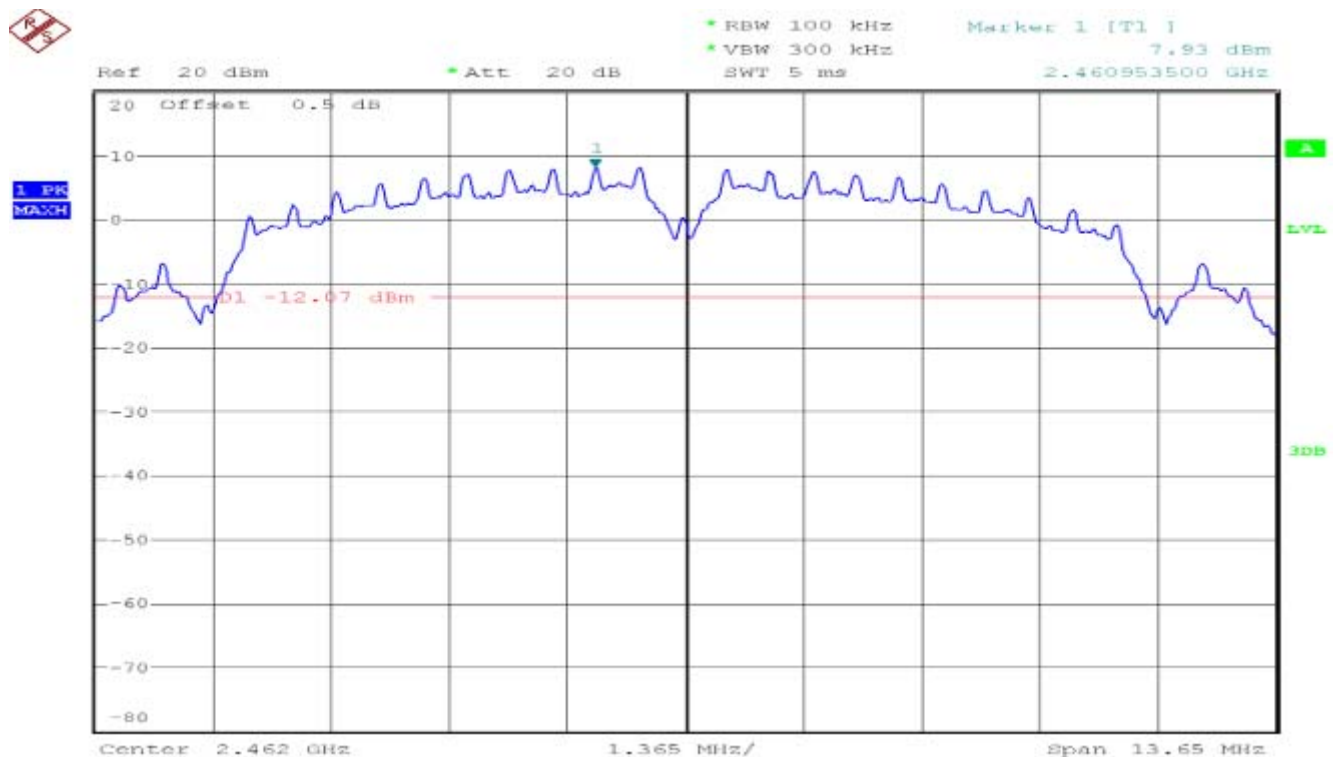


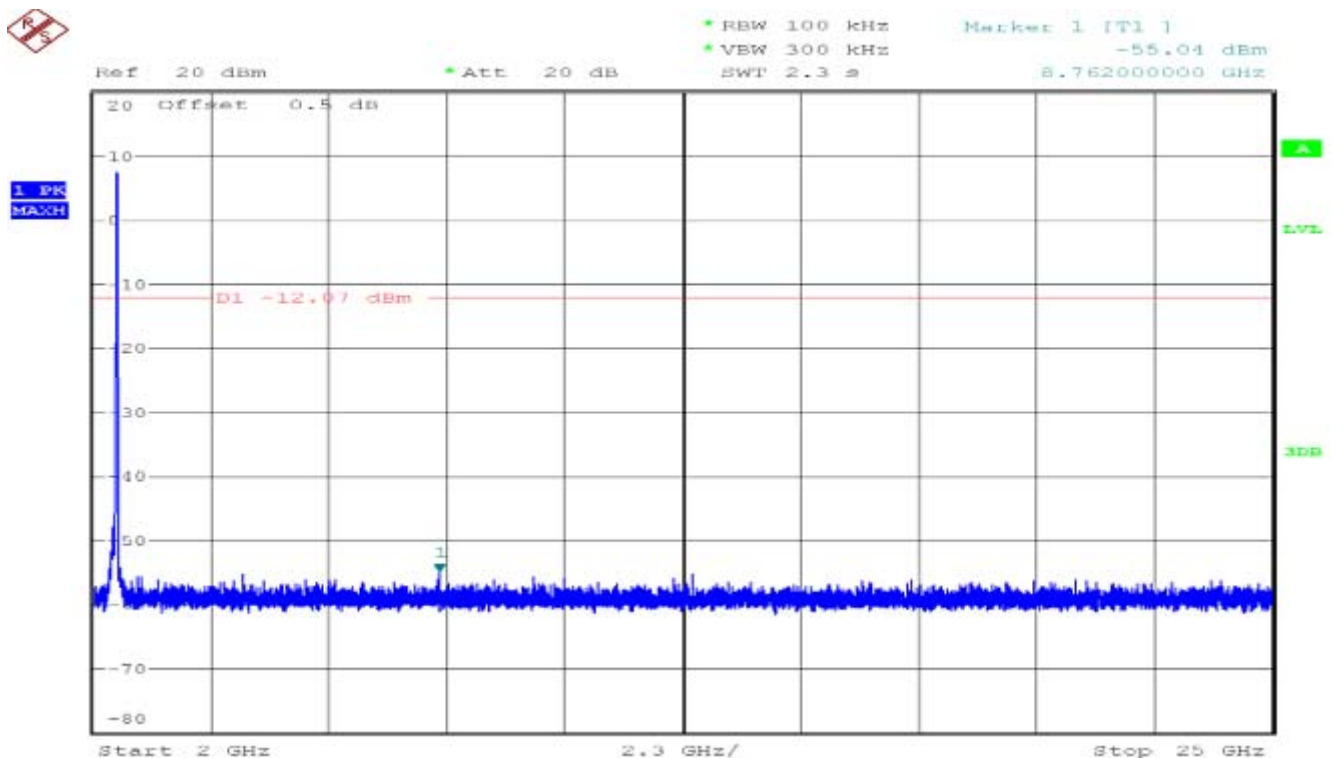
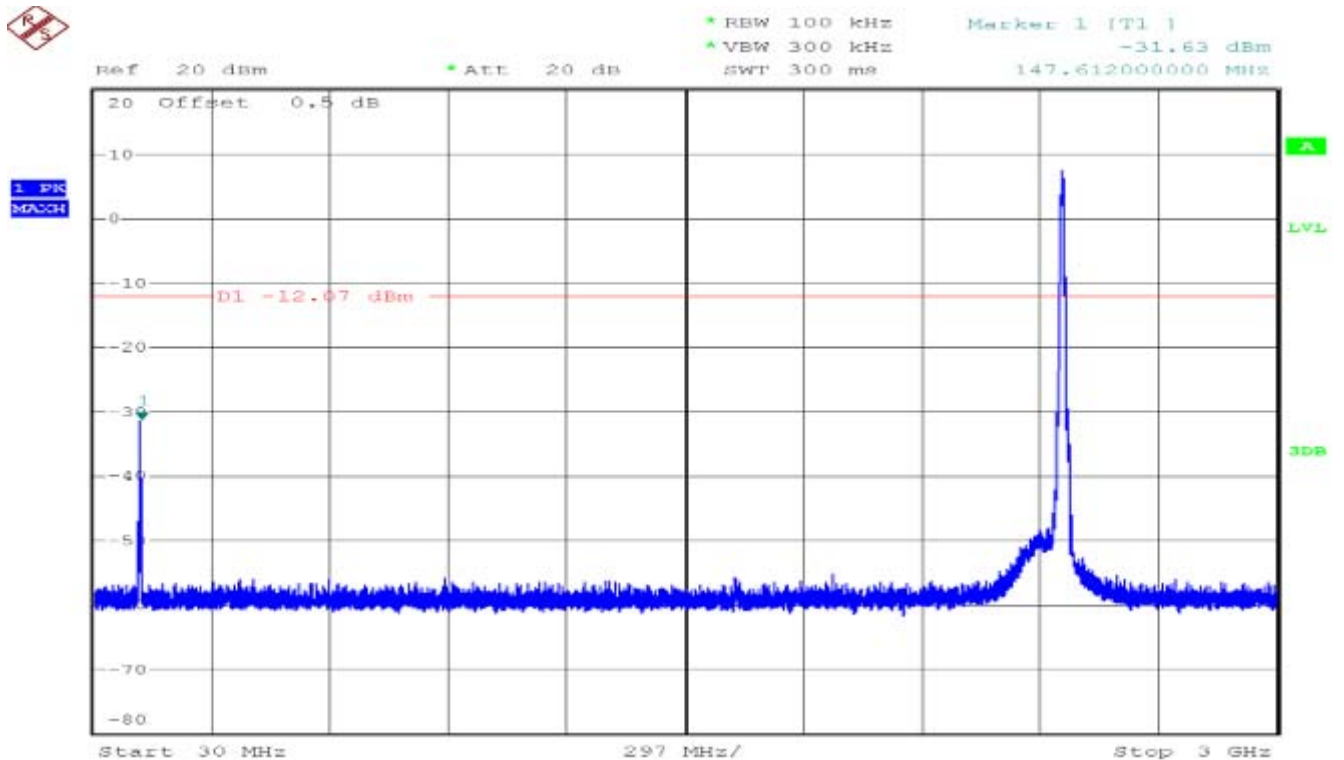
CH Mid





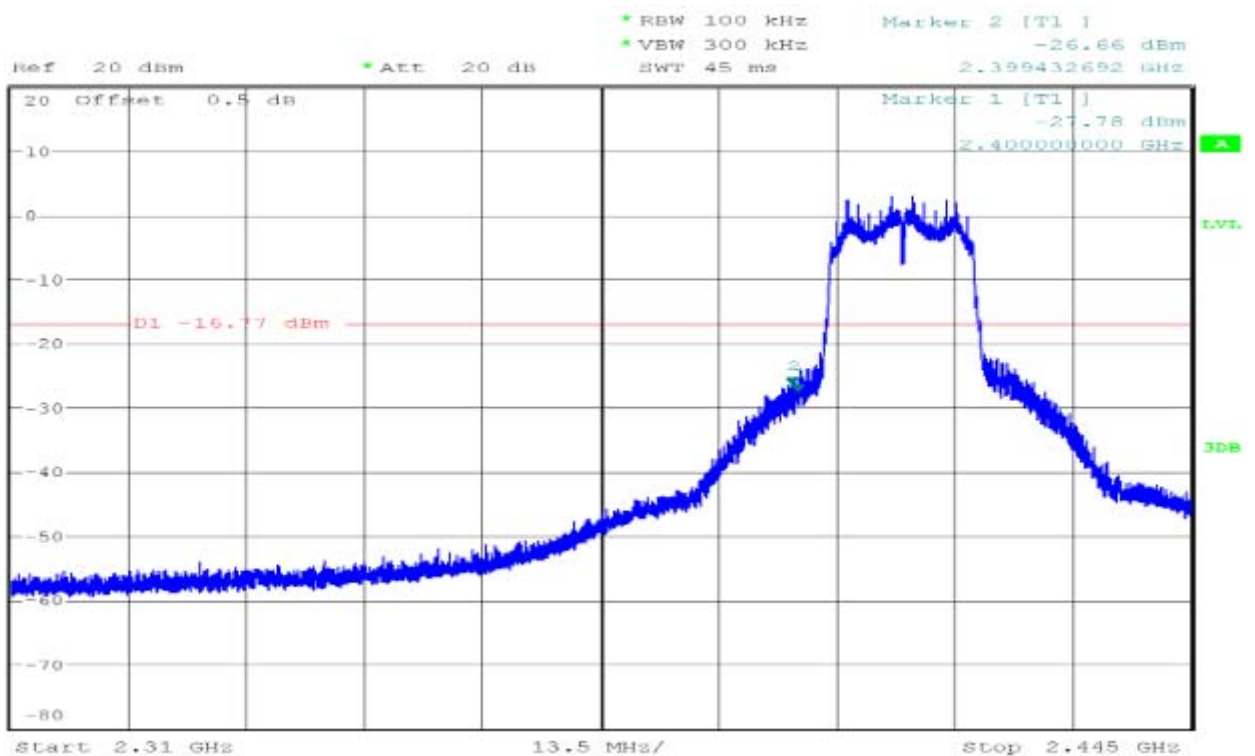
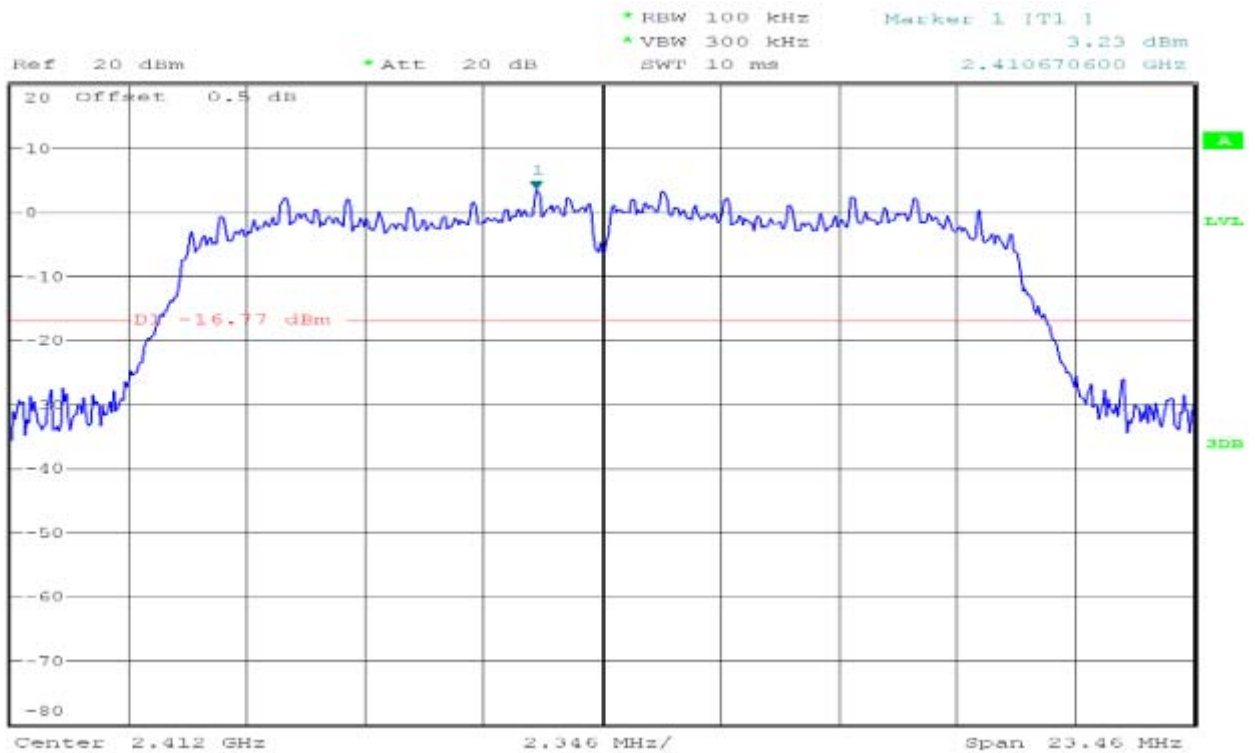
CH High

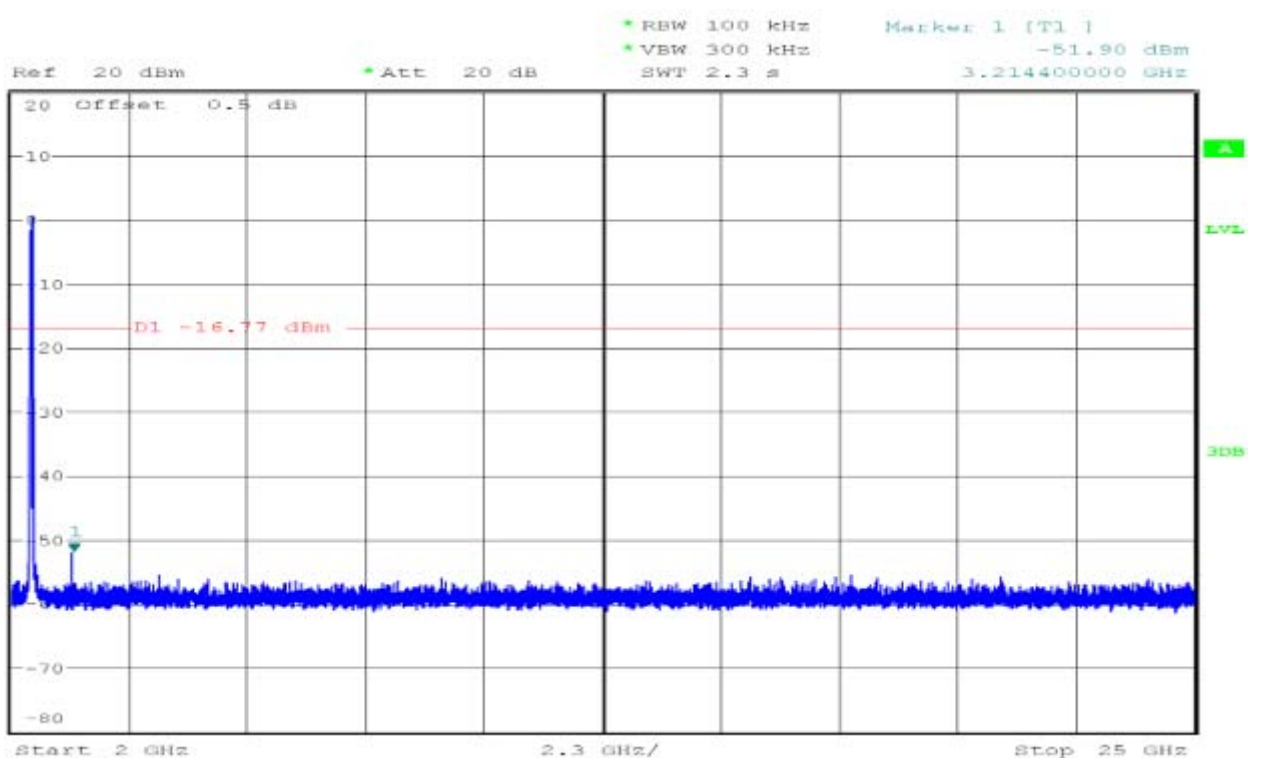
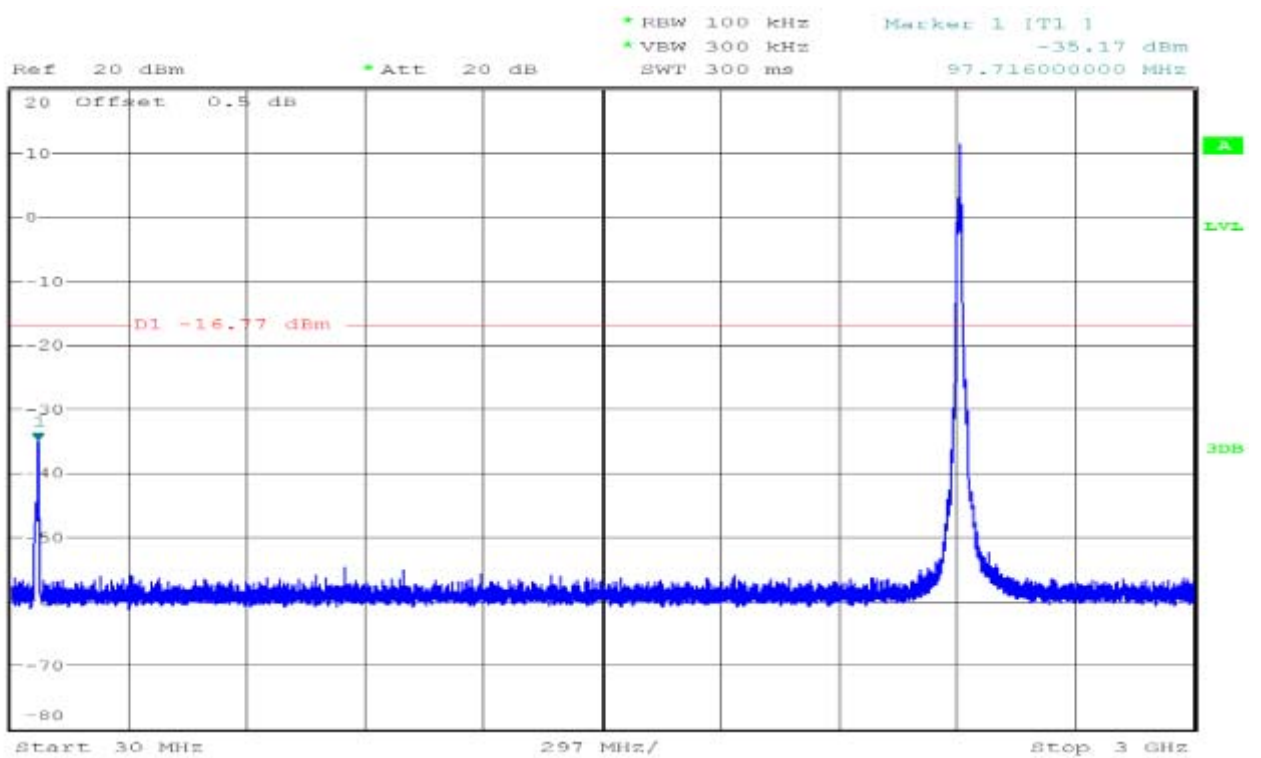




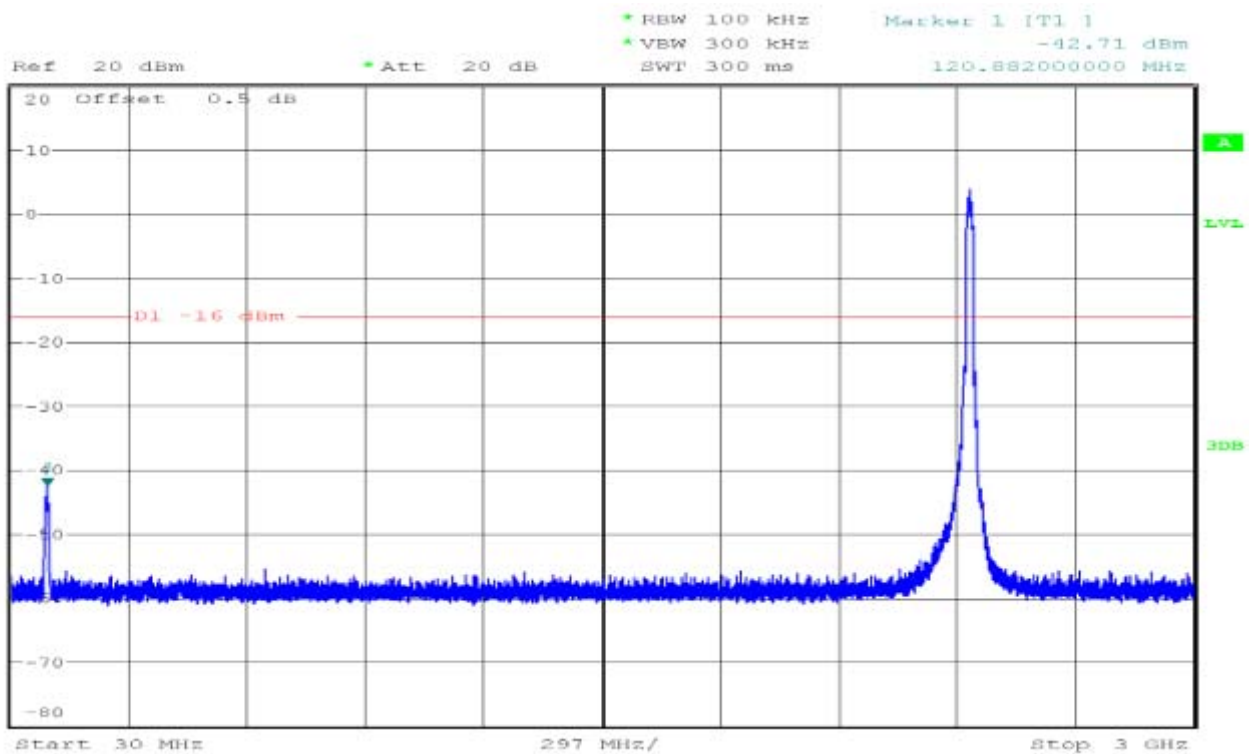
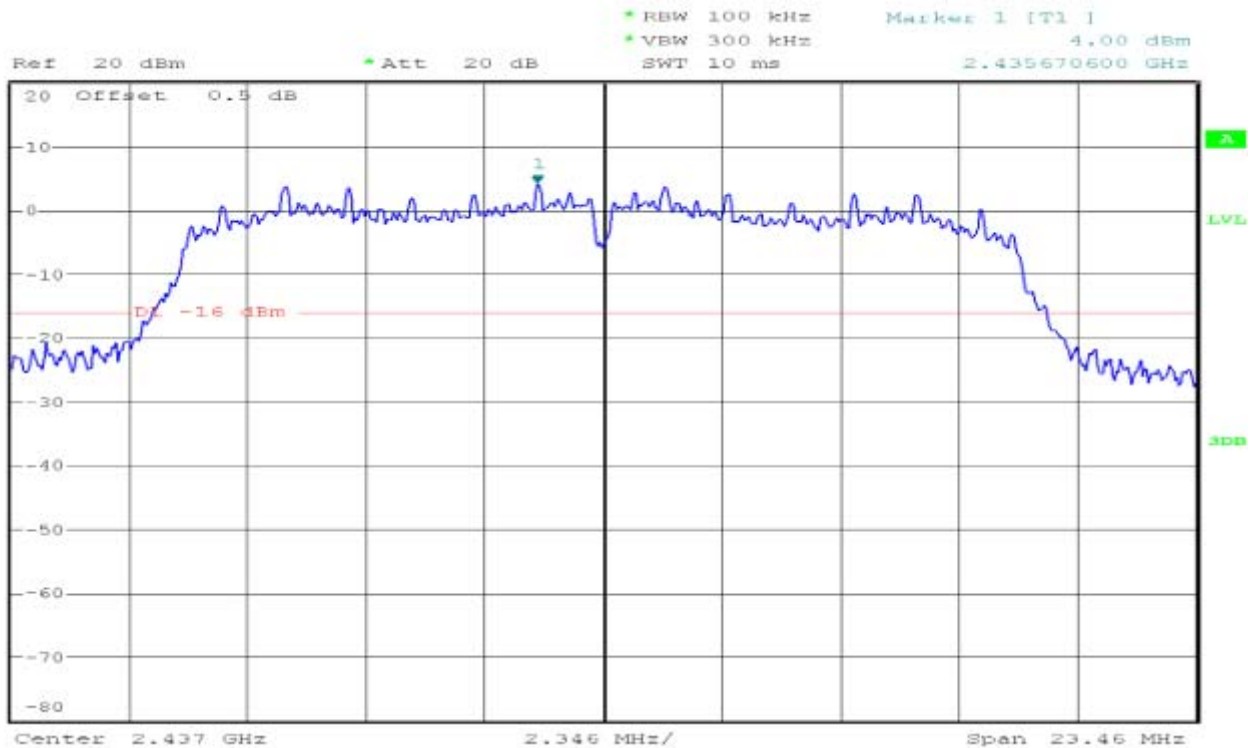
IEEE 802.11g mode/Chain 0

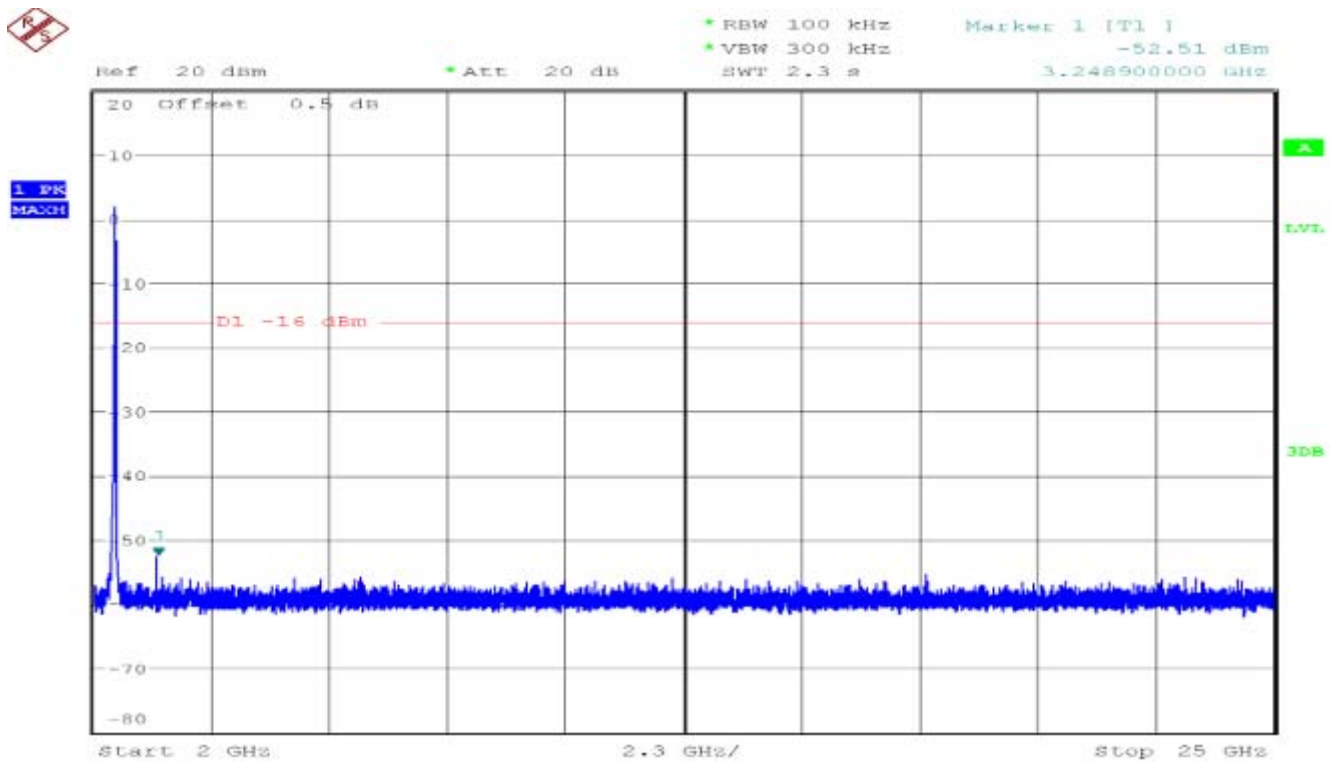
CH Low



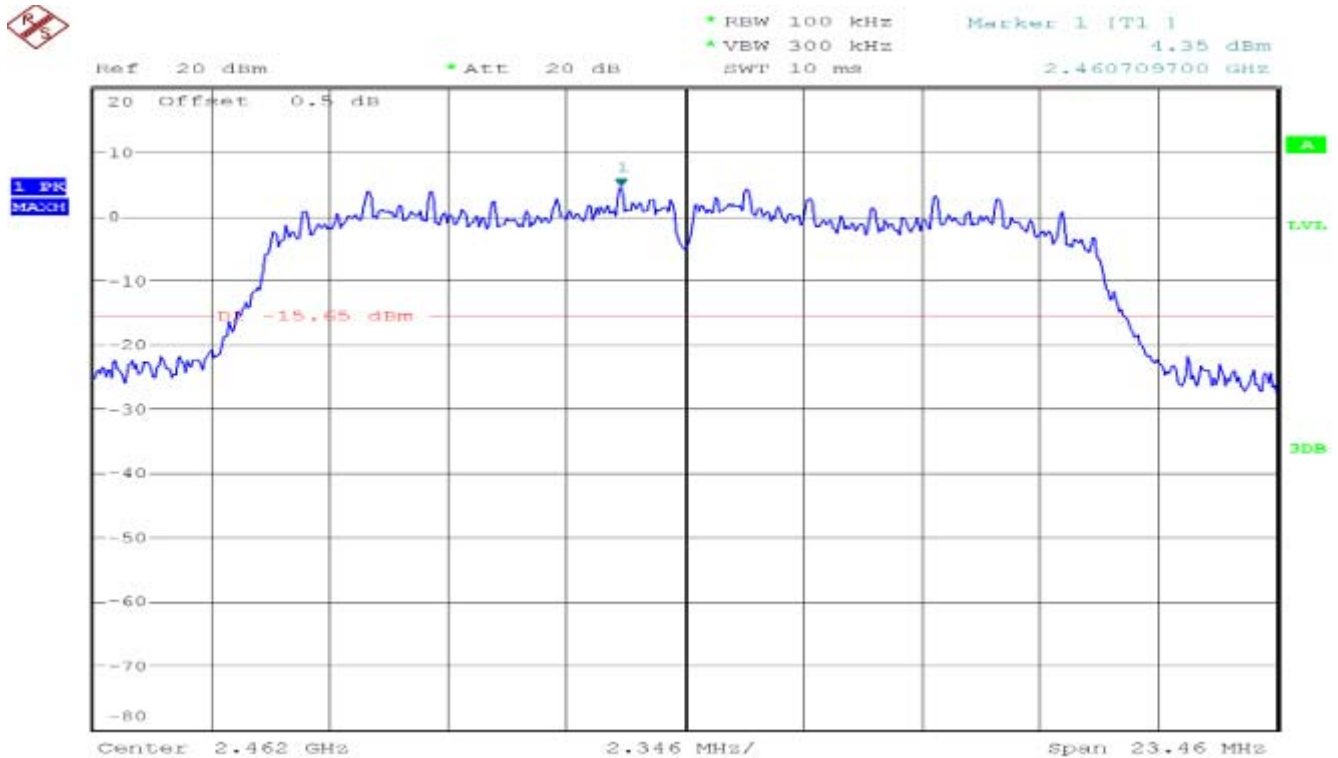


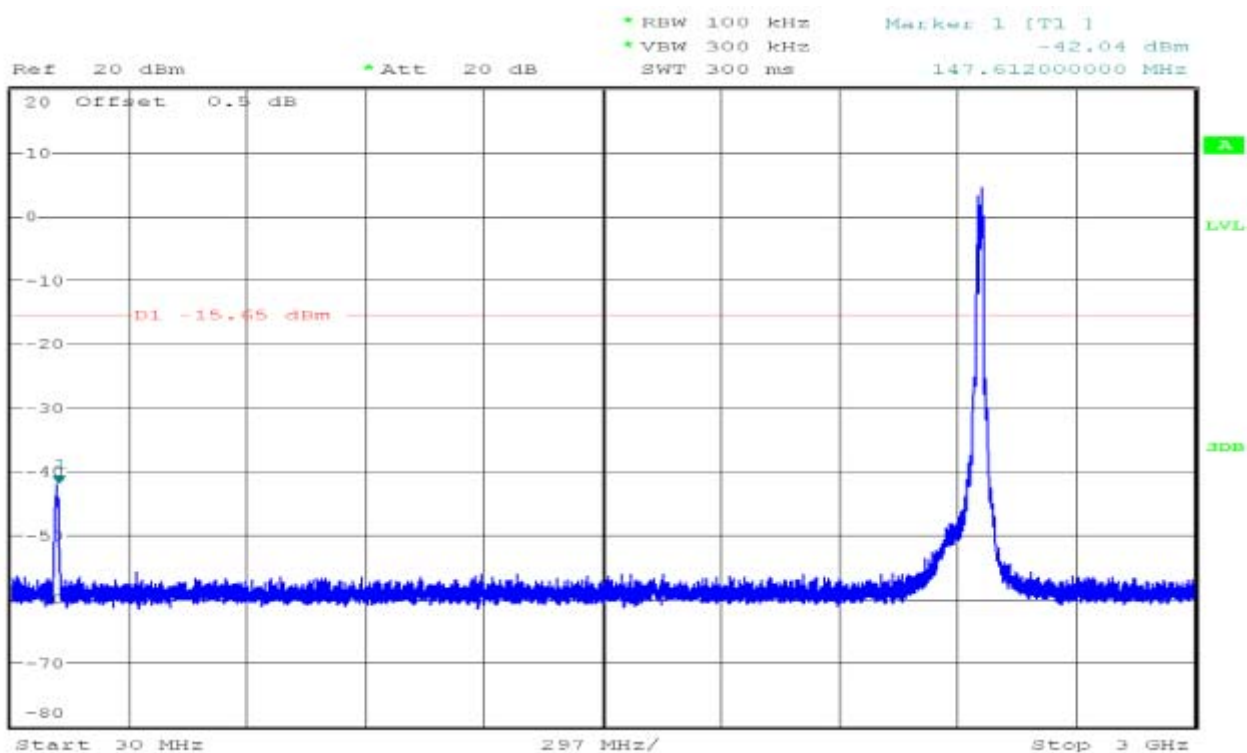
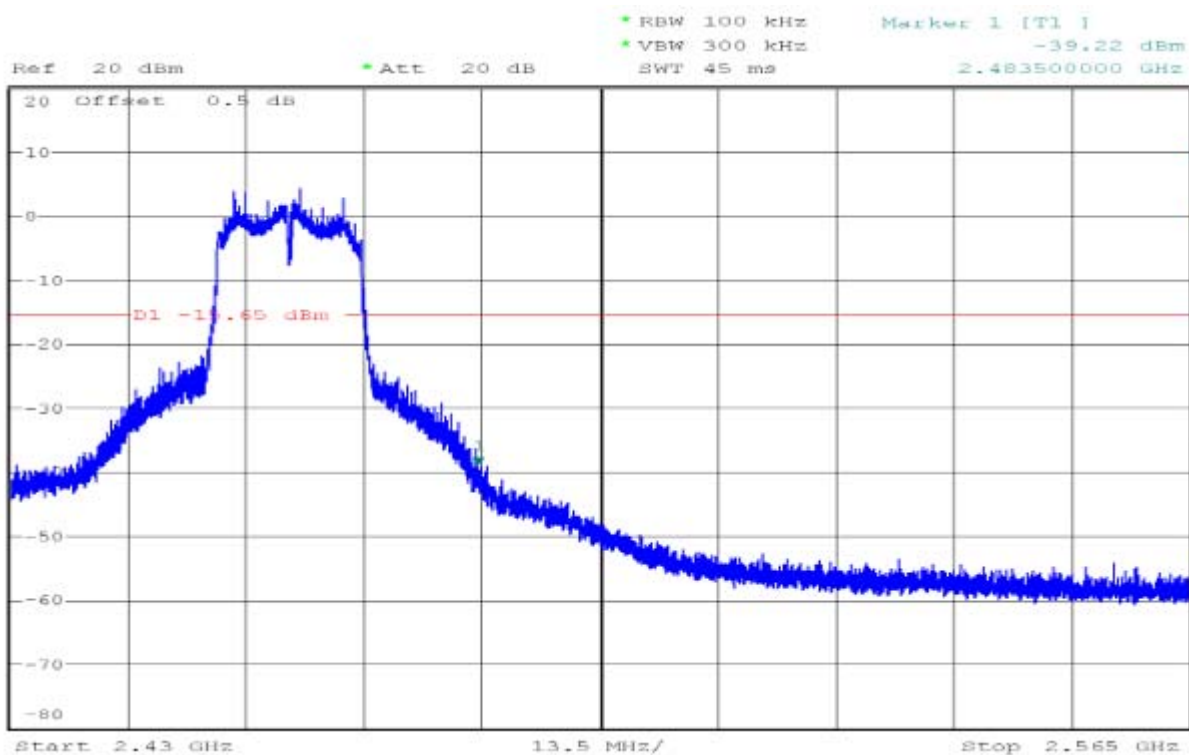
CH Mid

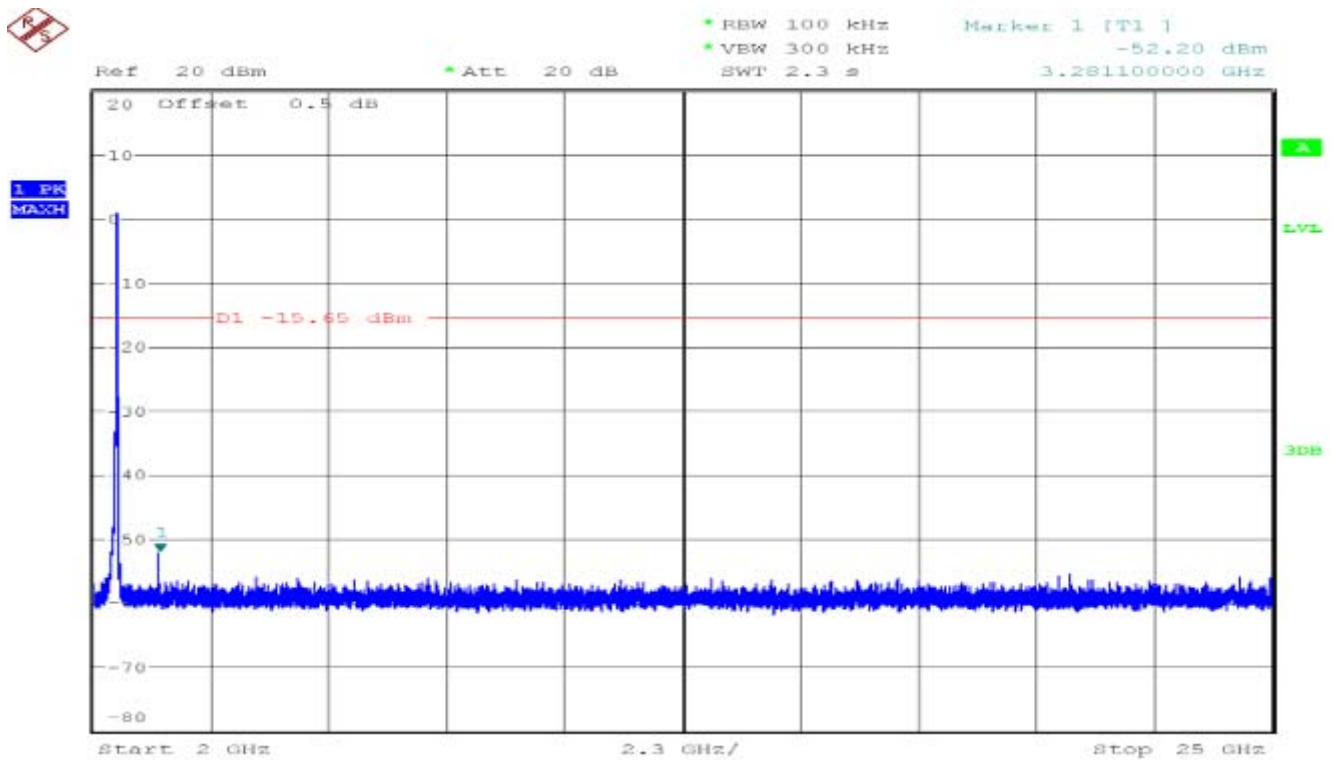




CH High

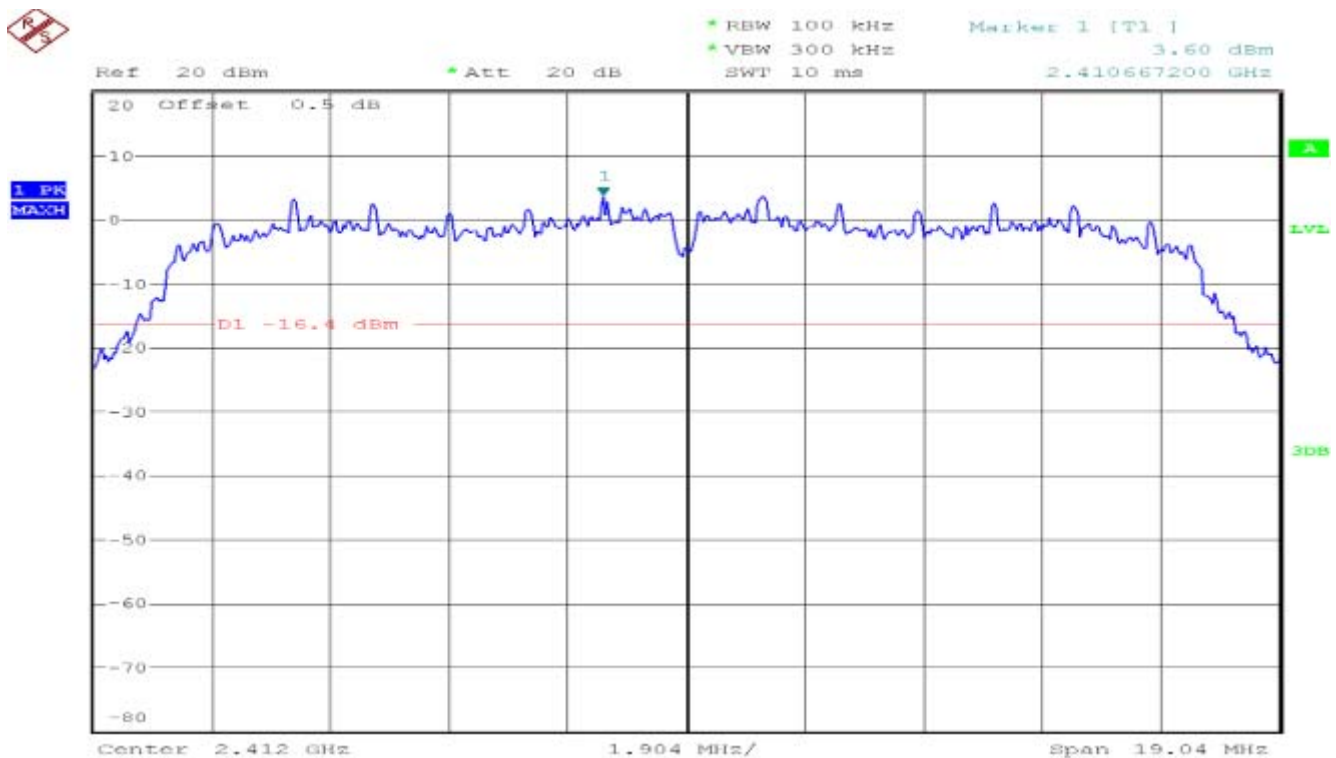


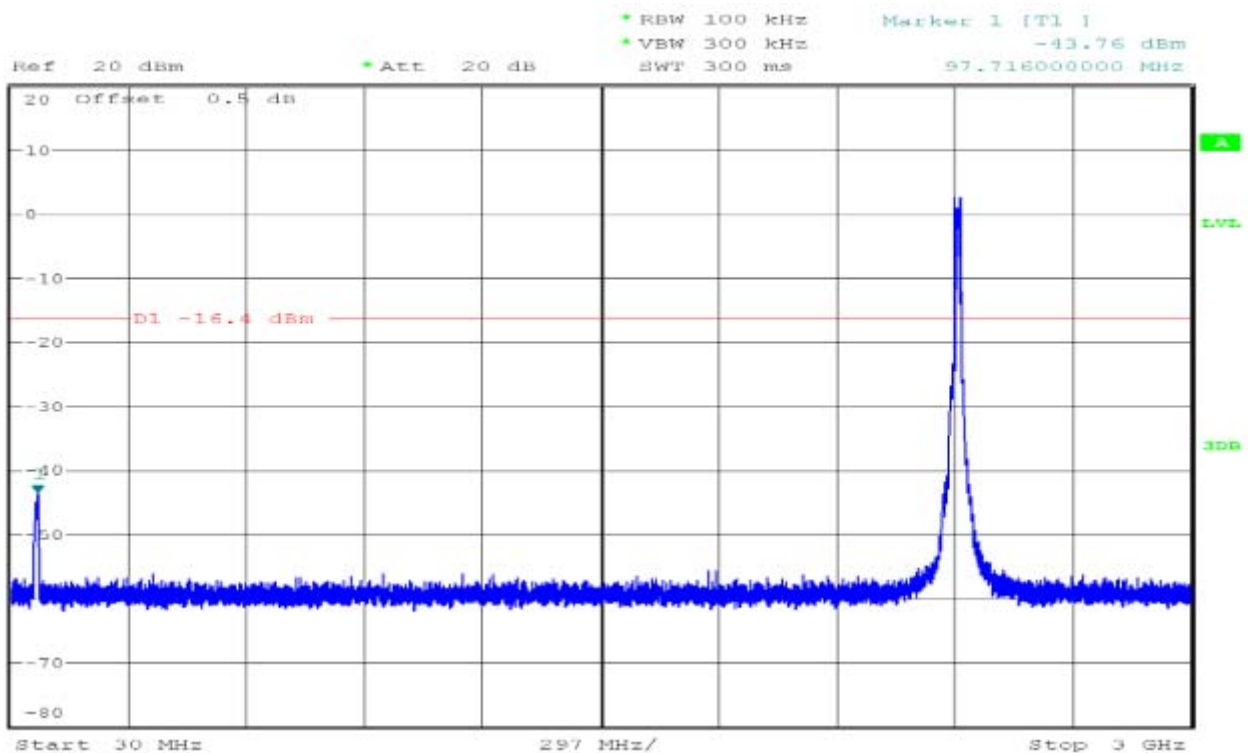
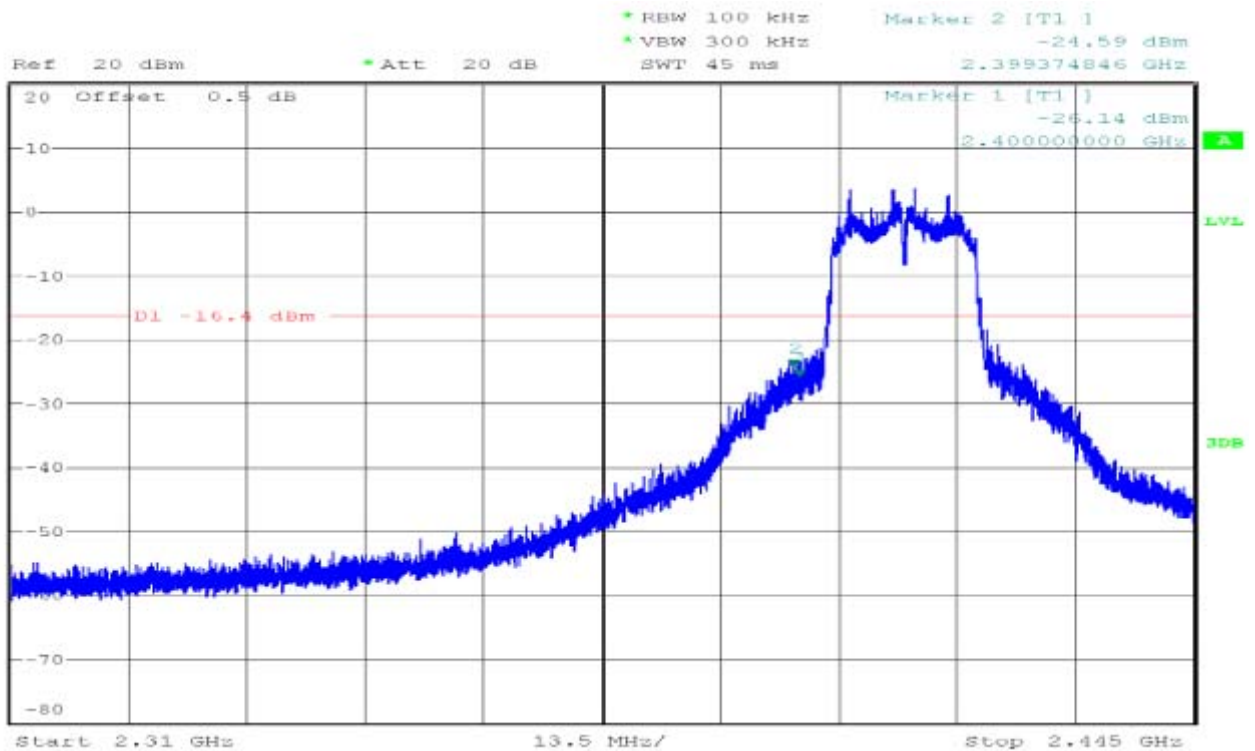


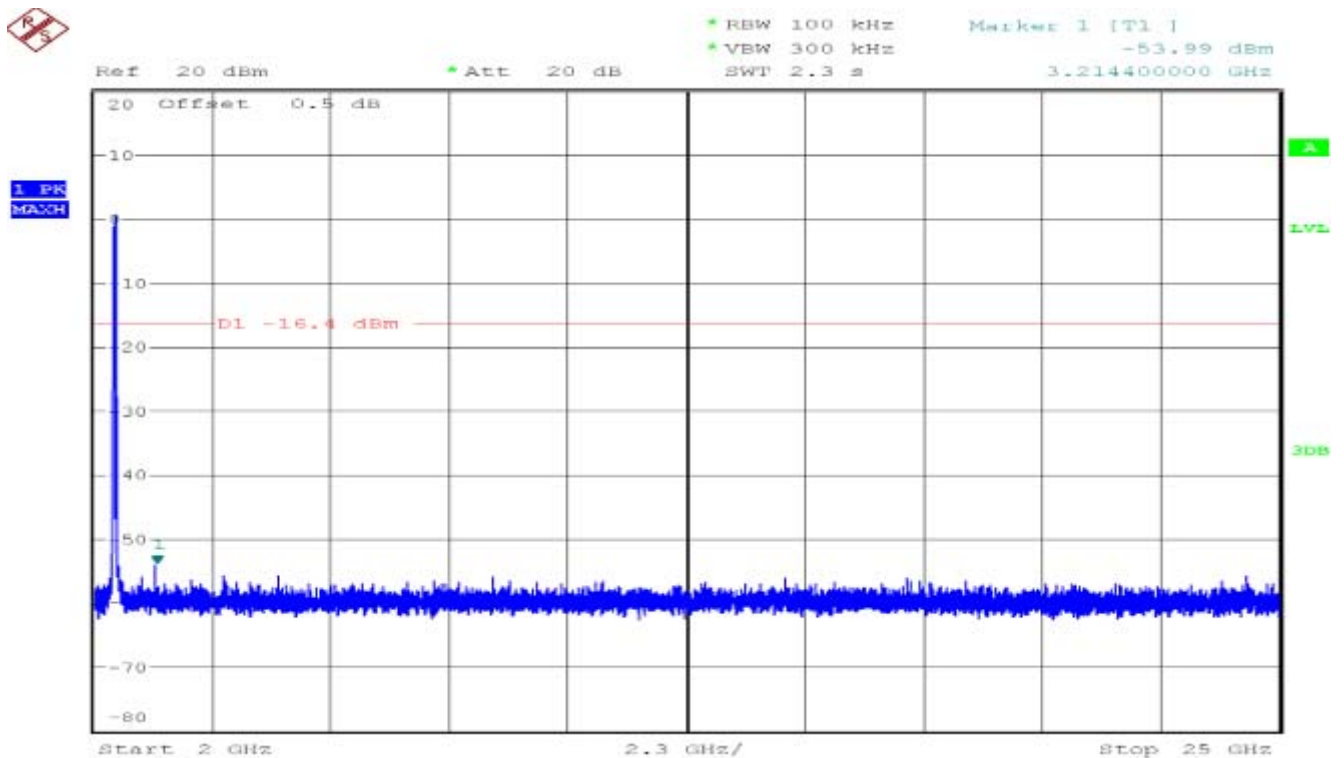


IEEE 802.11g mode/Chain 1

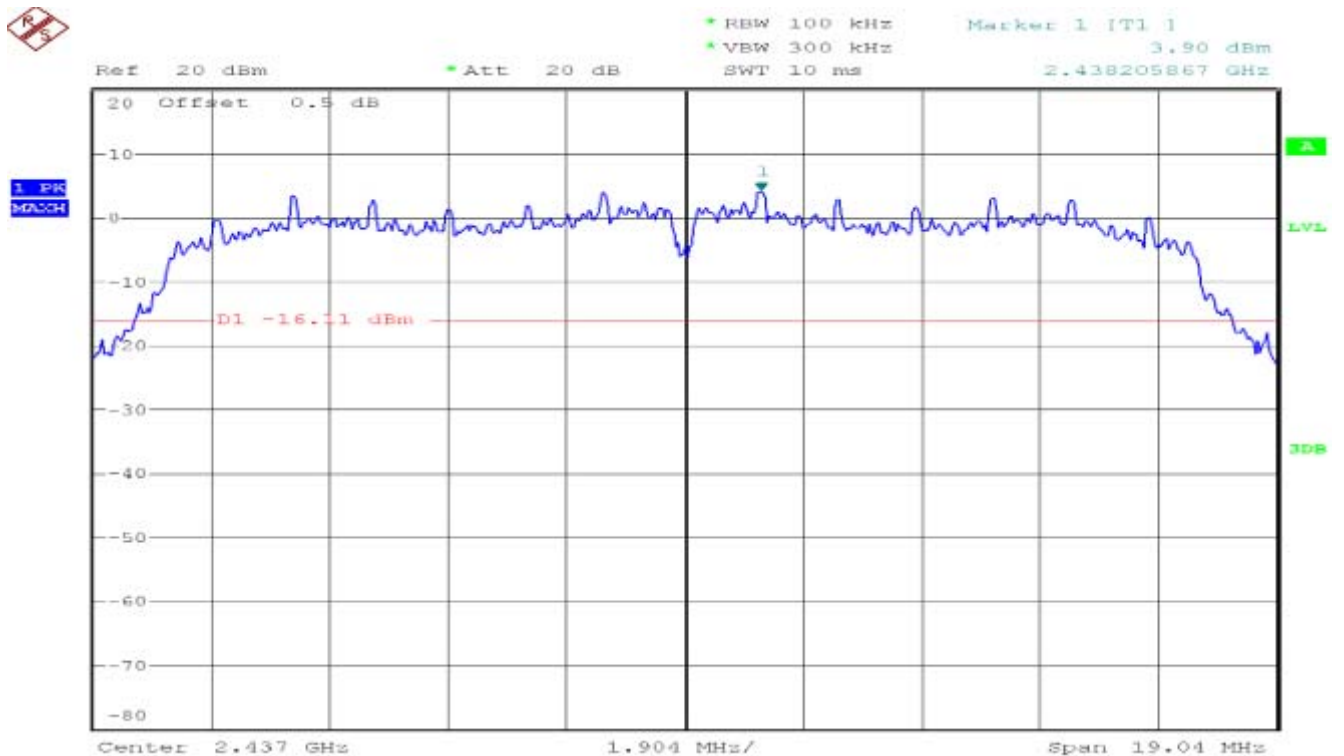
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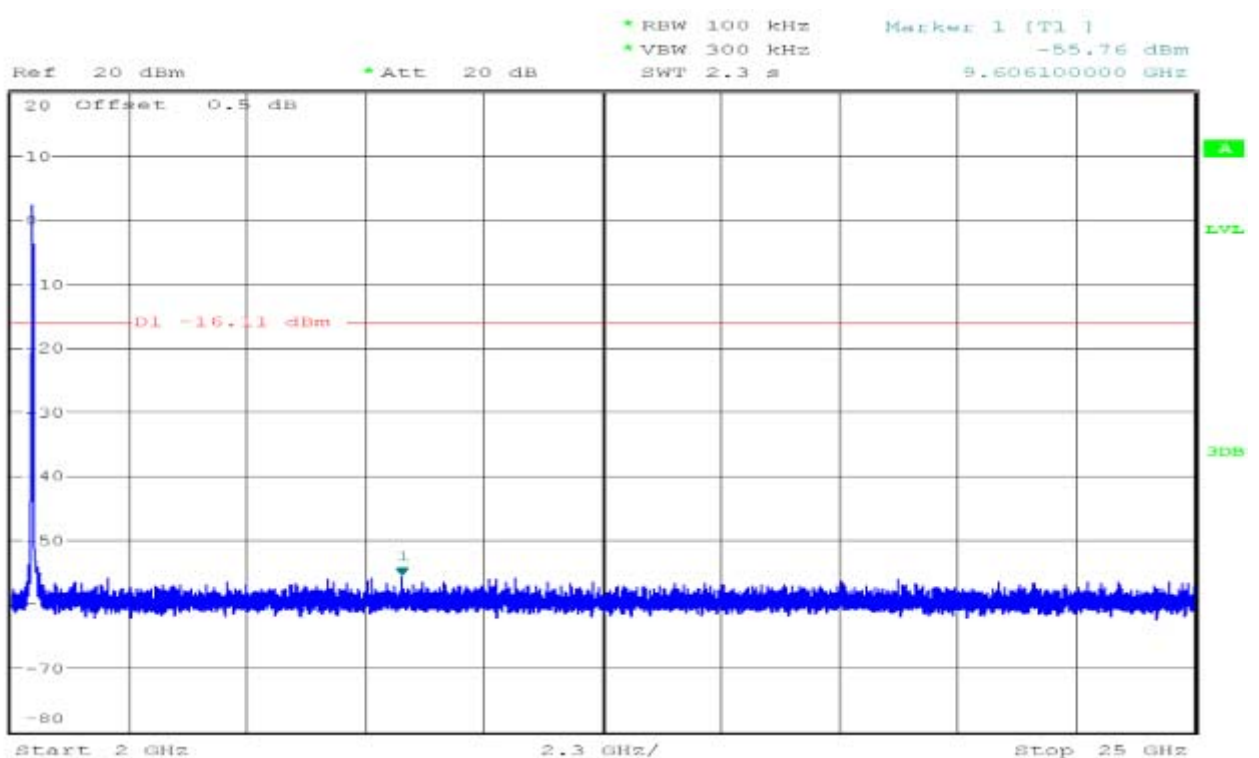
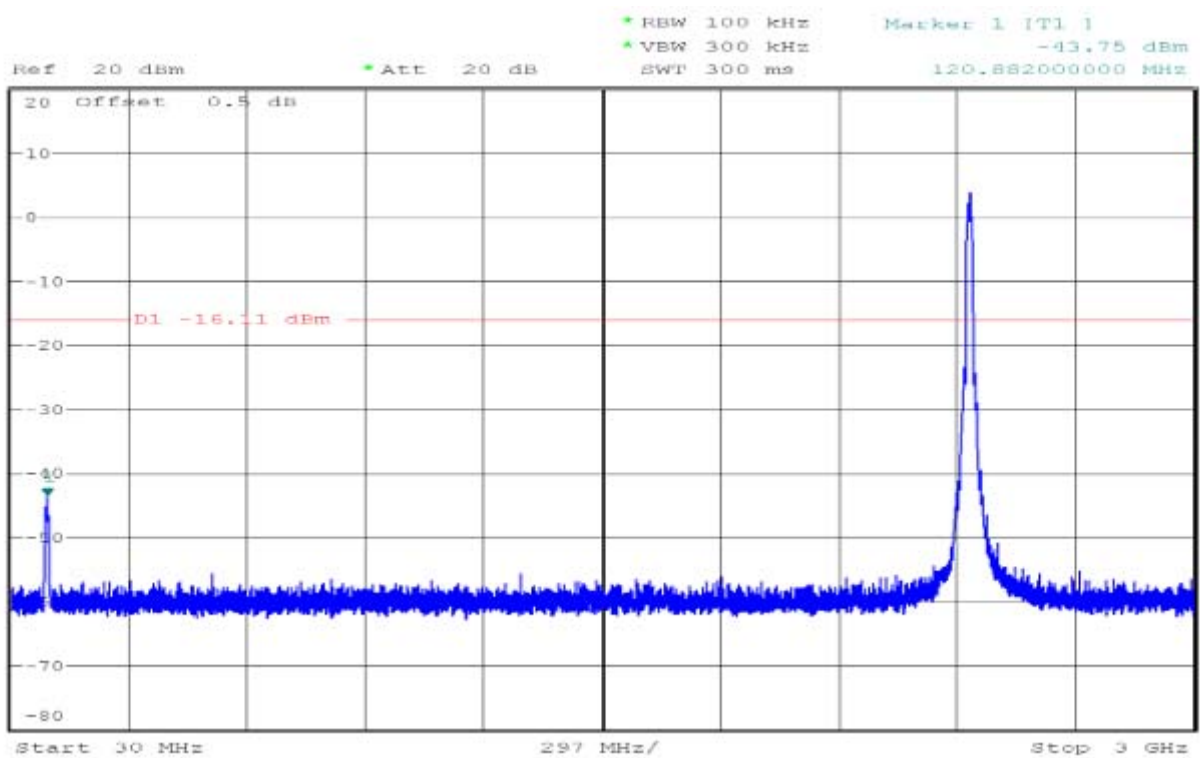




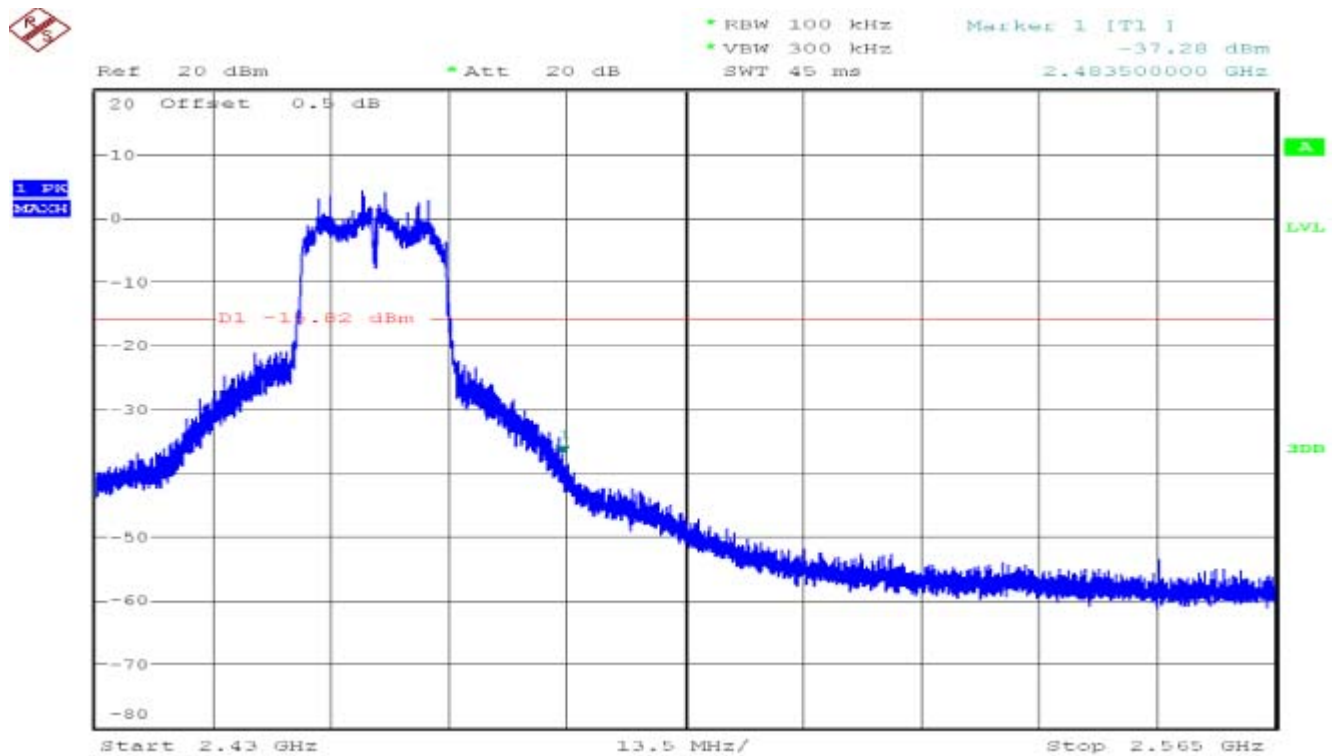
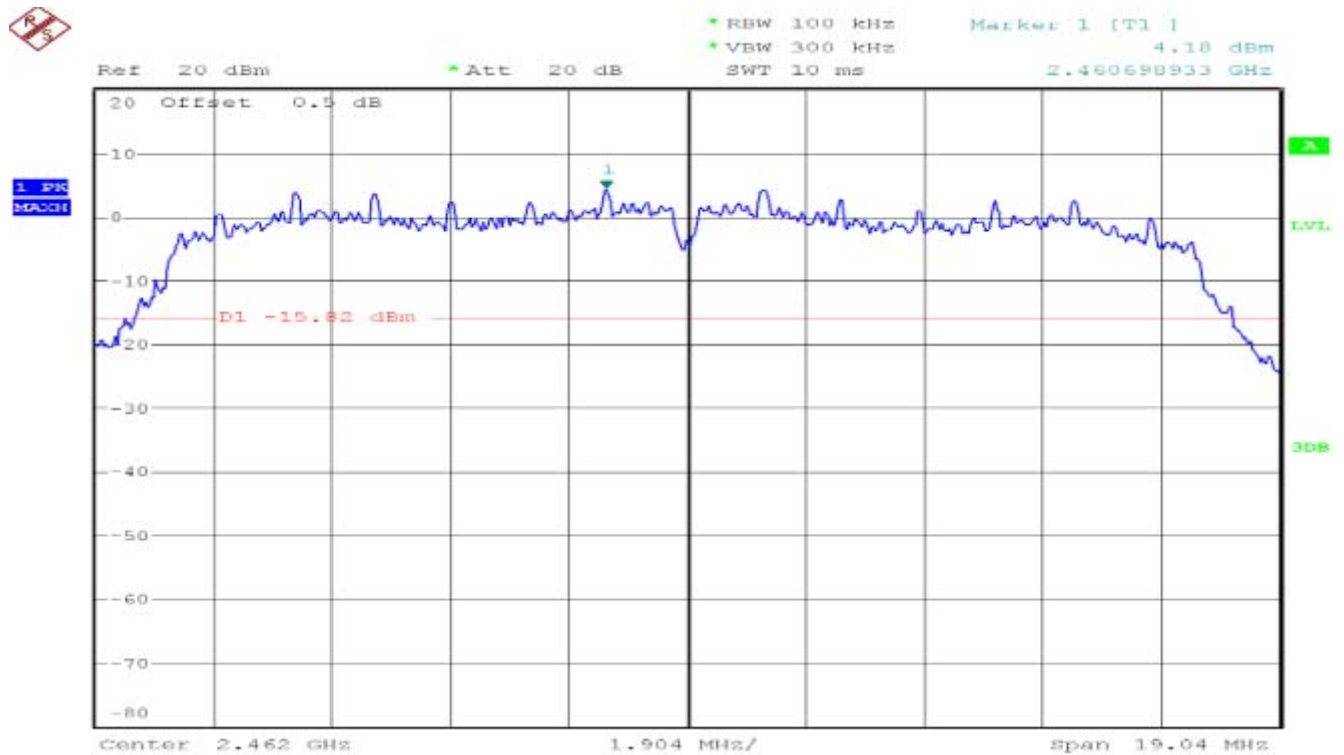


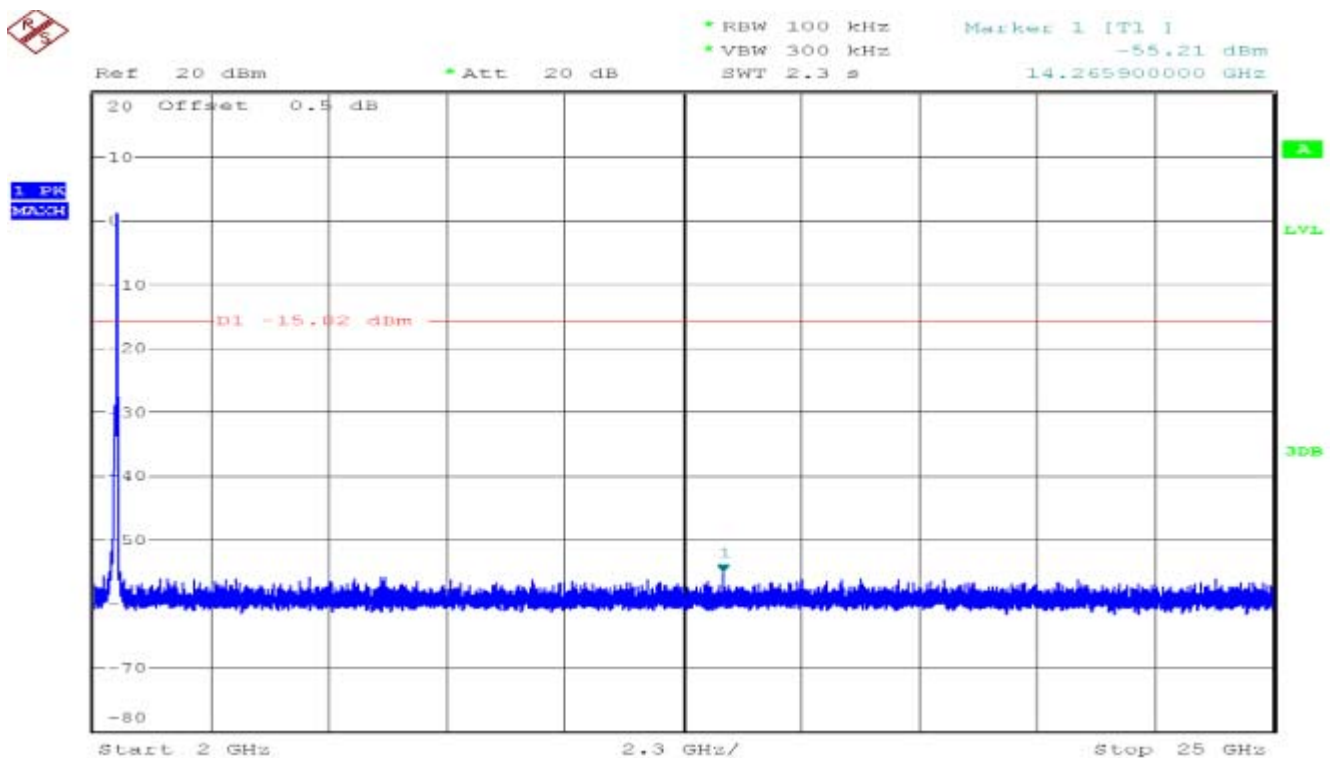
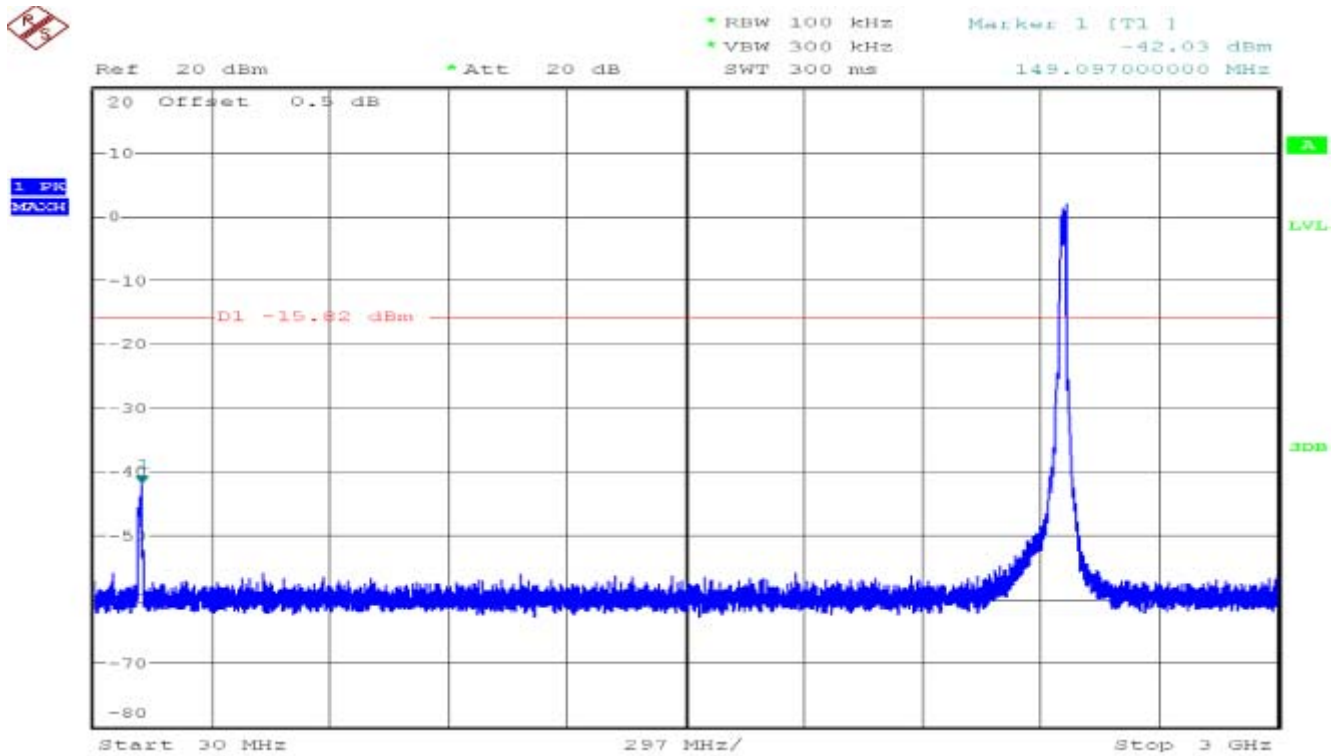
CH Mid





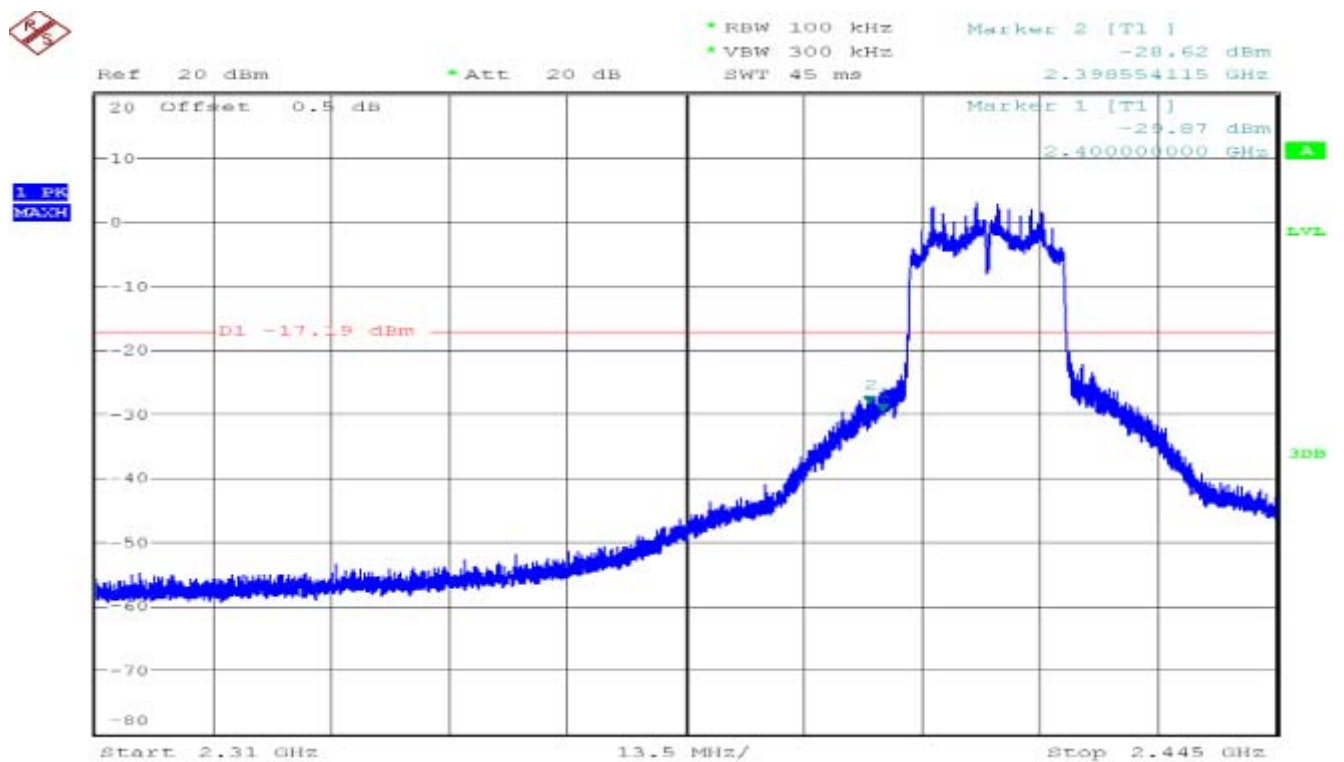
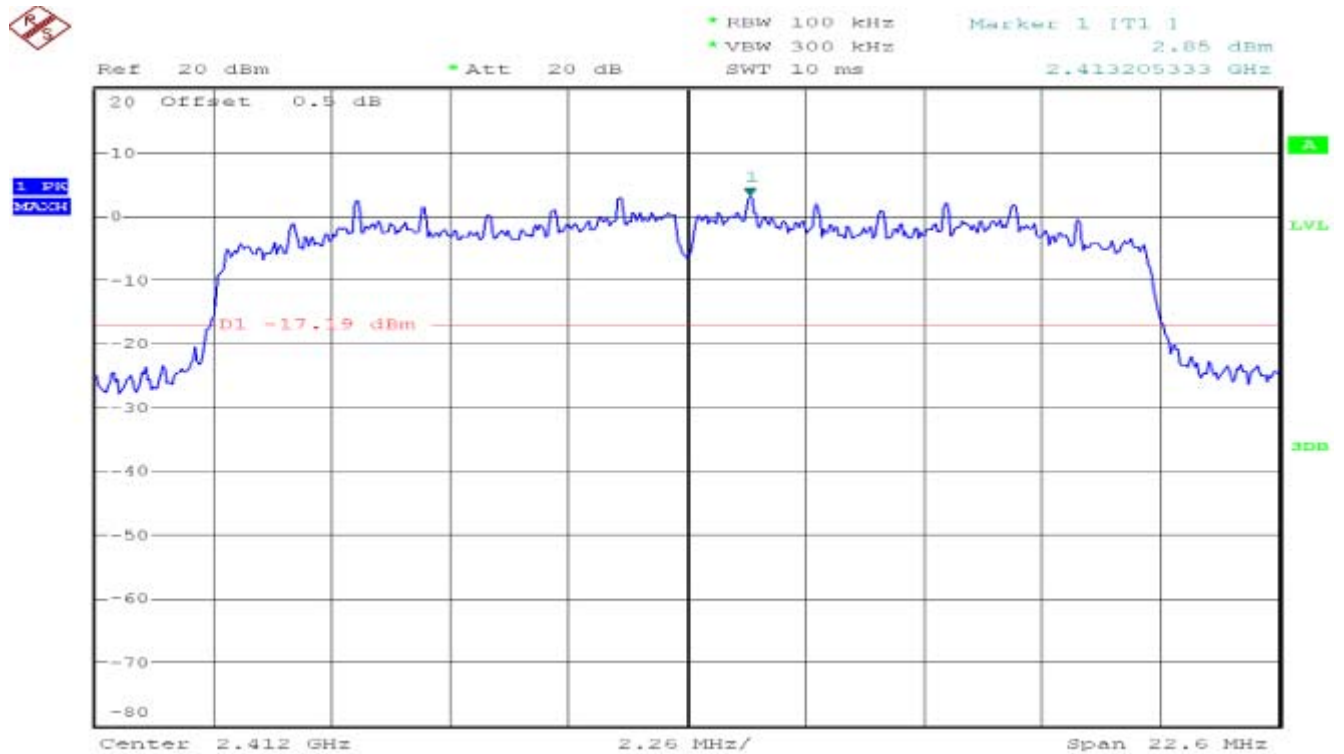
CH High

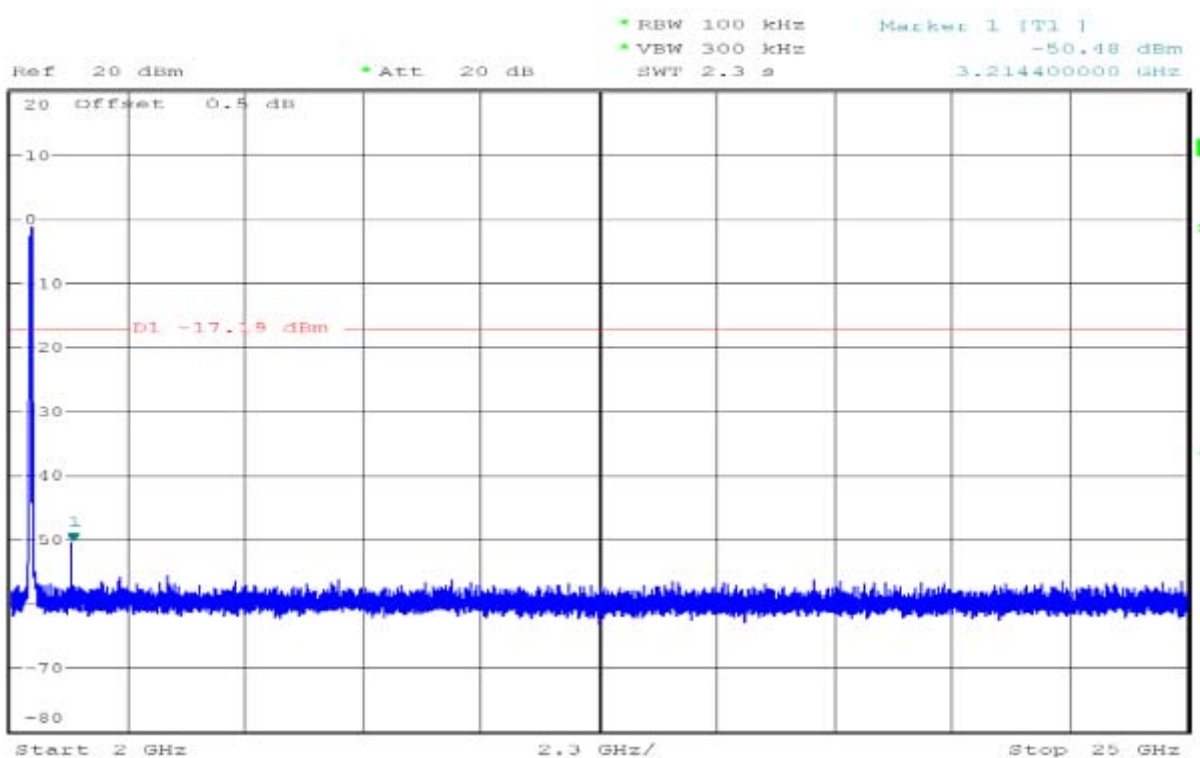
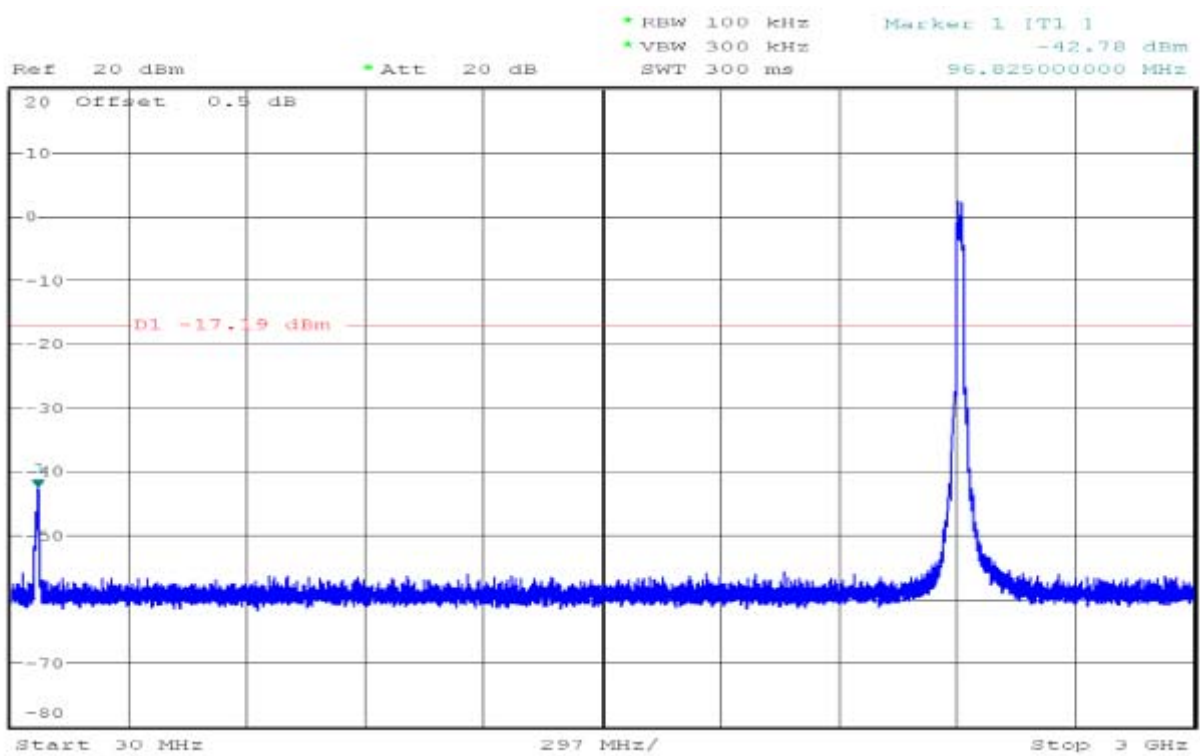




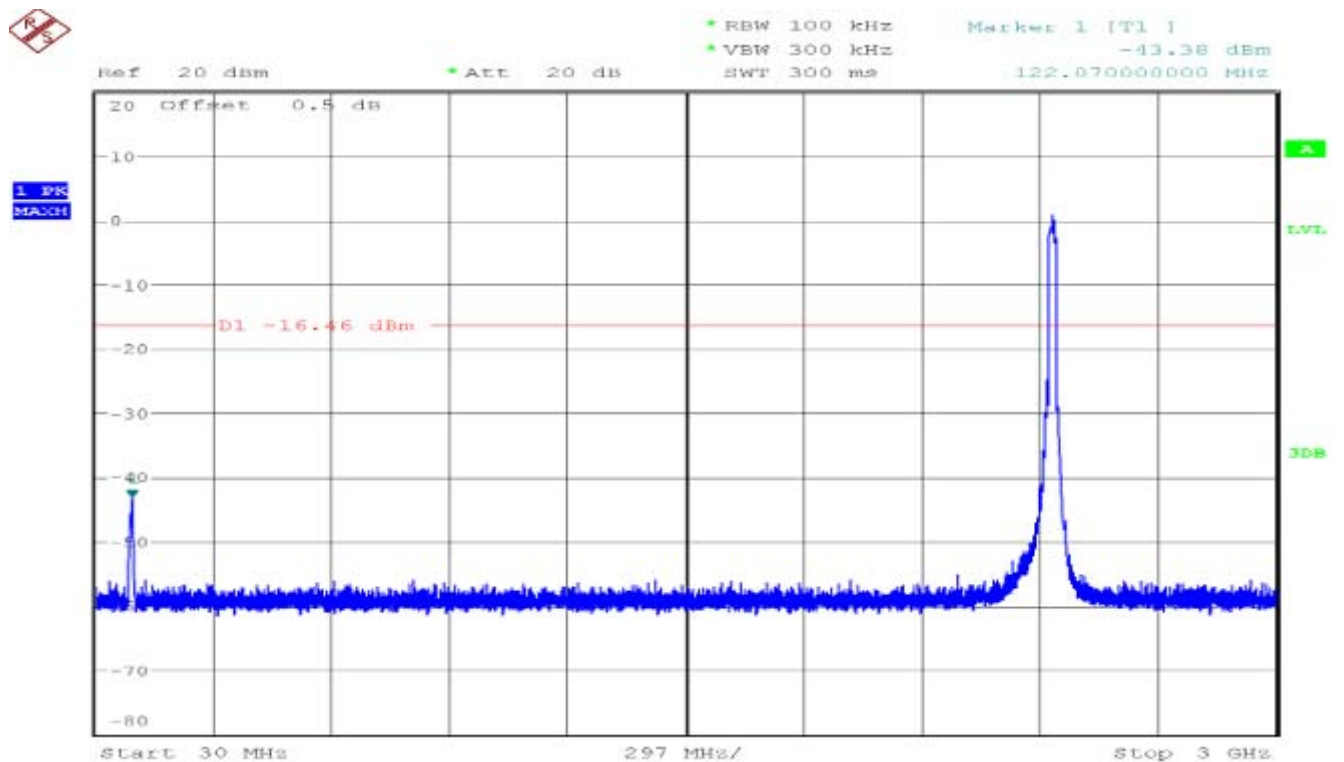
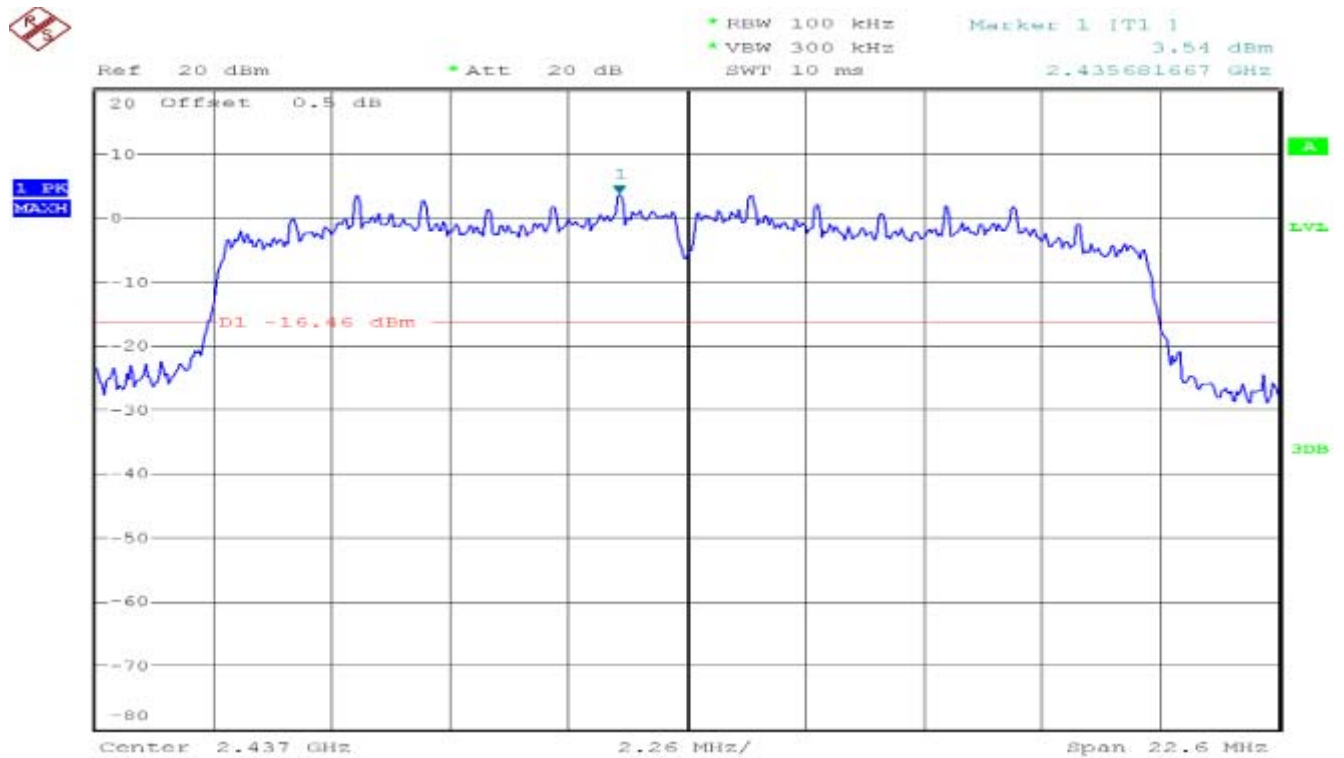
IEEE 802.11n HT20 mode/Chain 0

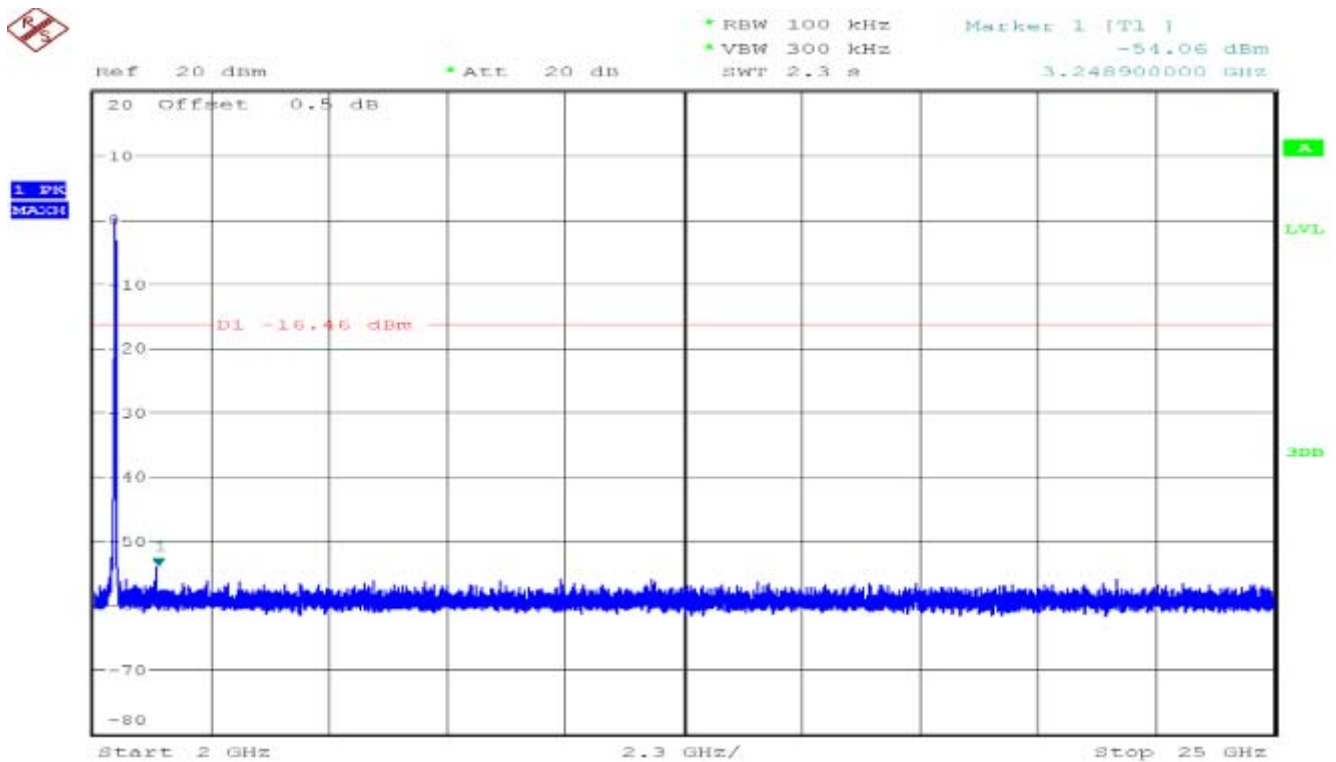
CH Low



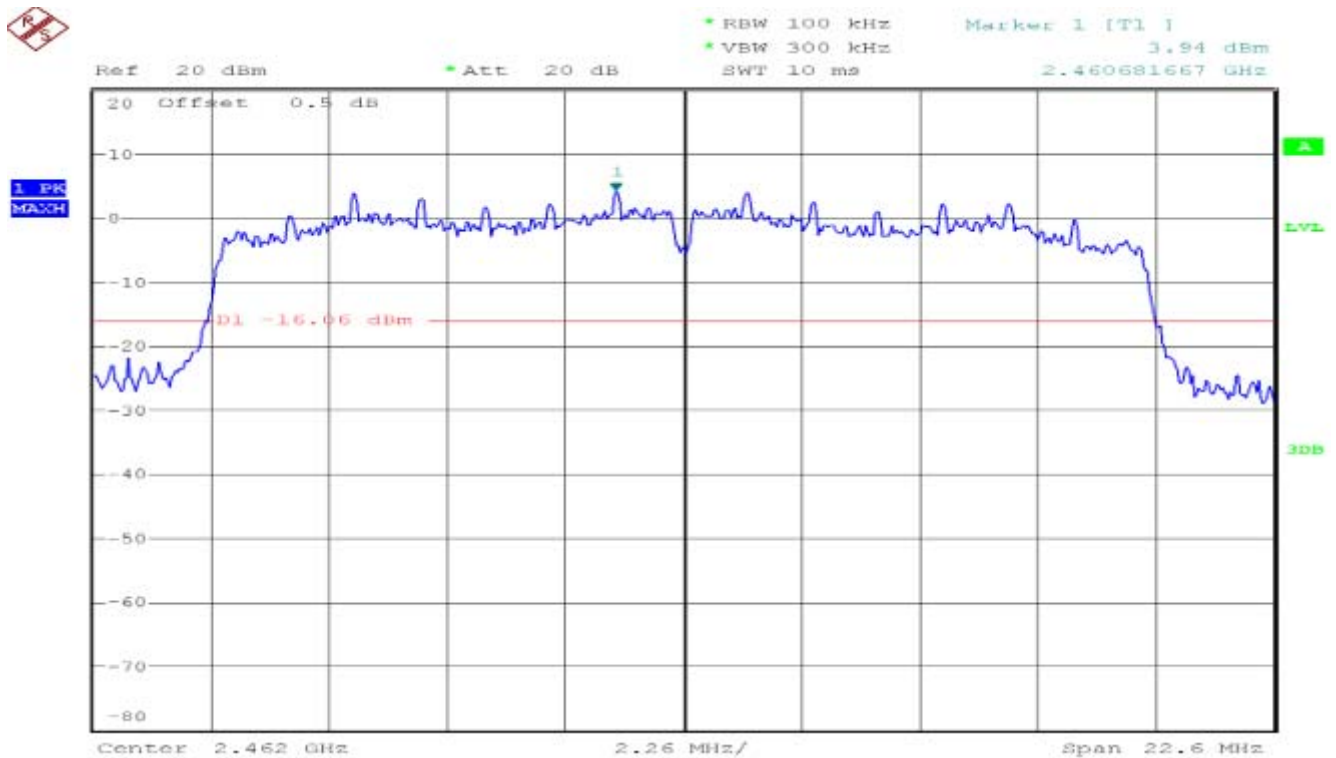


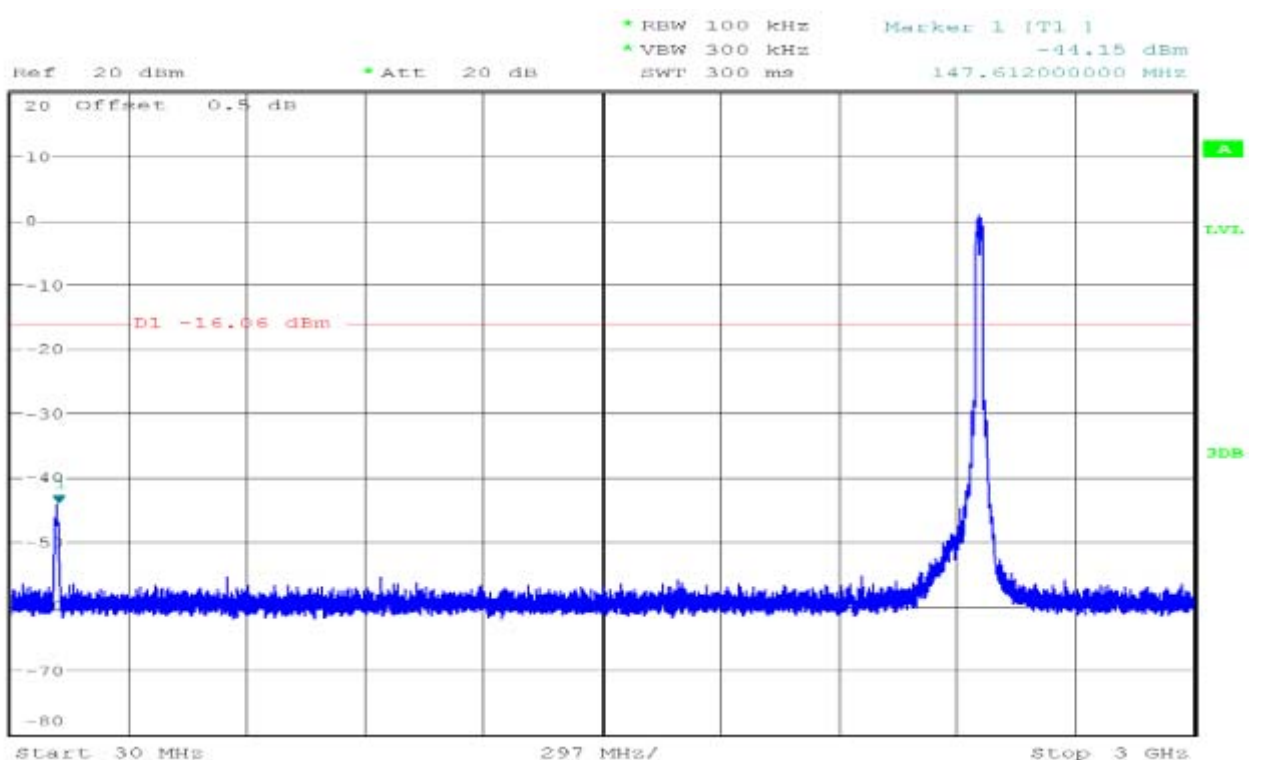
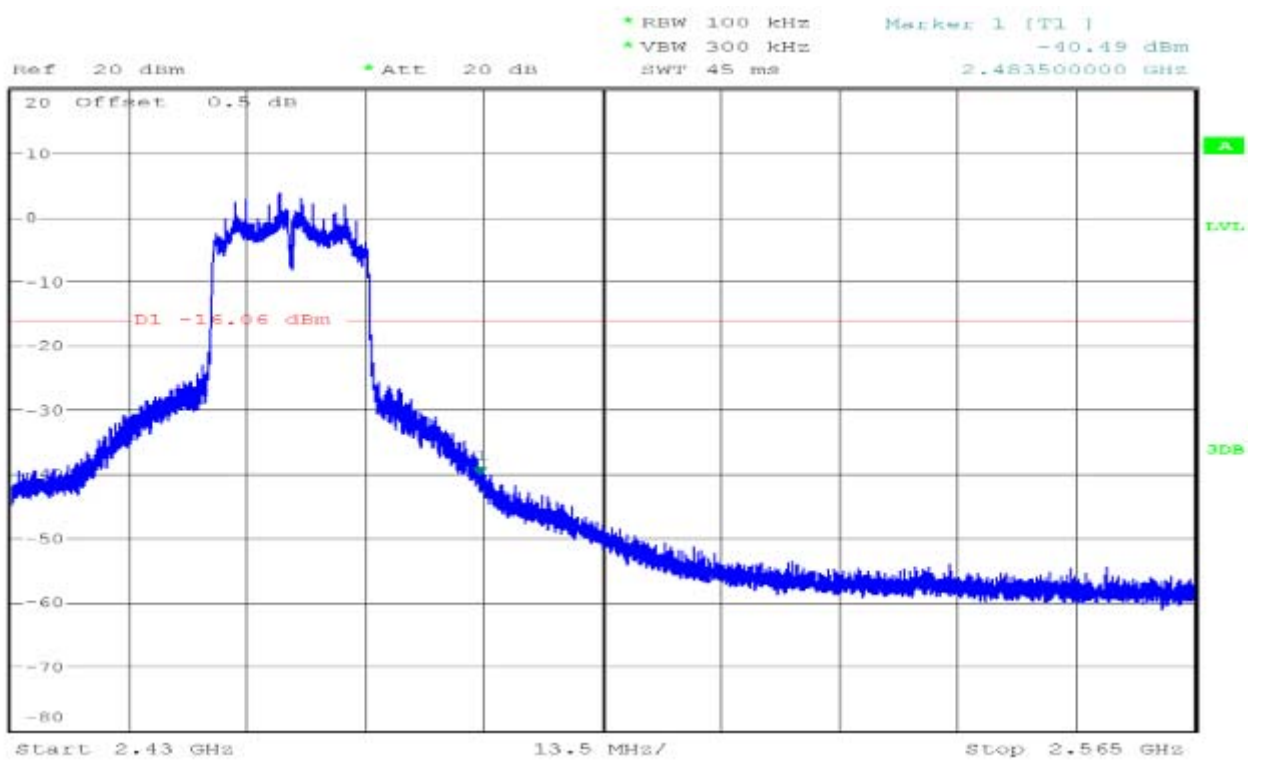
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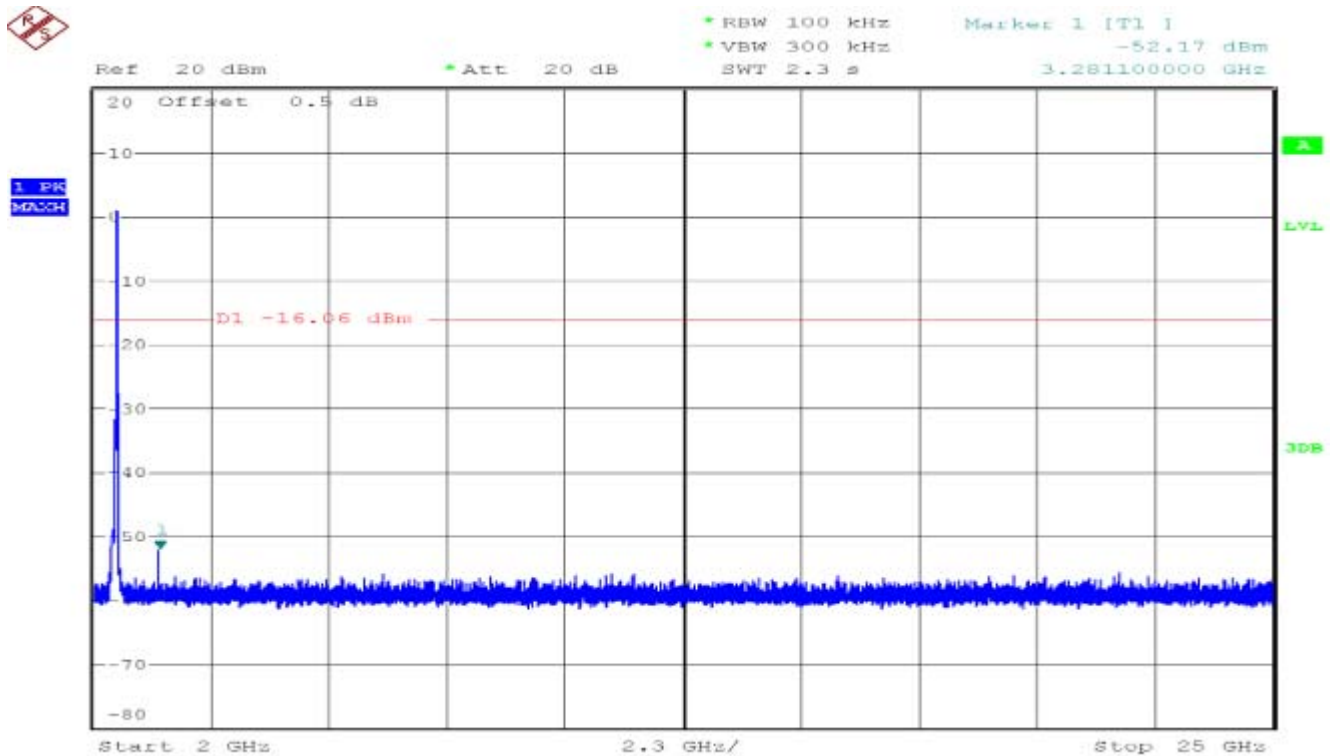




CH High

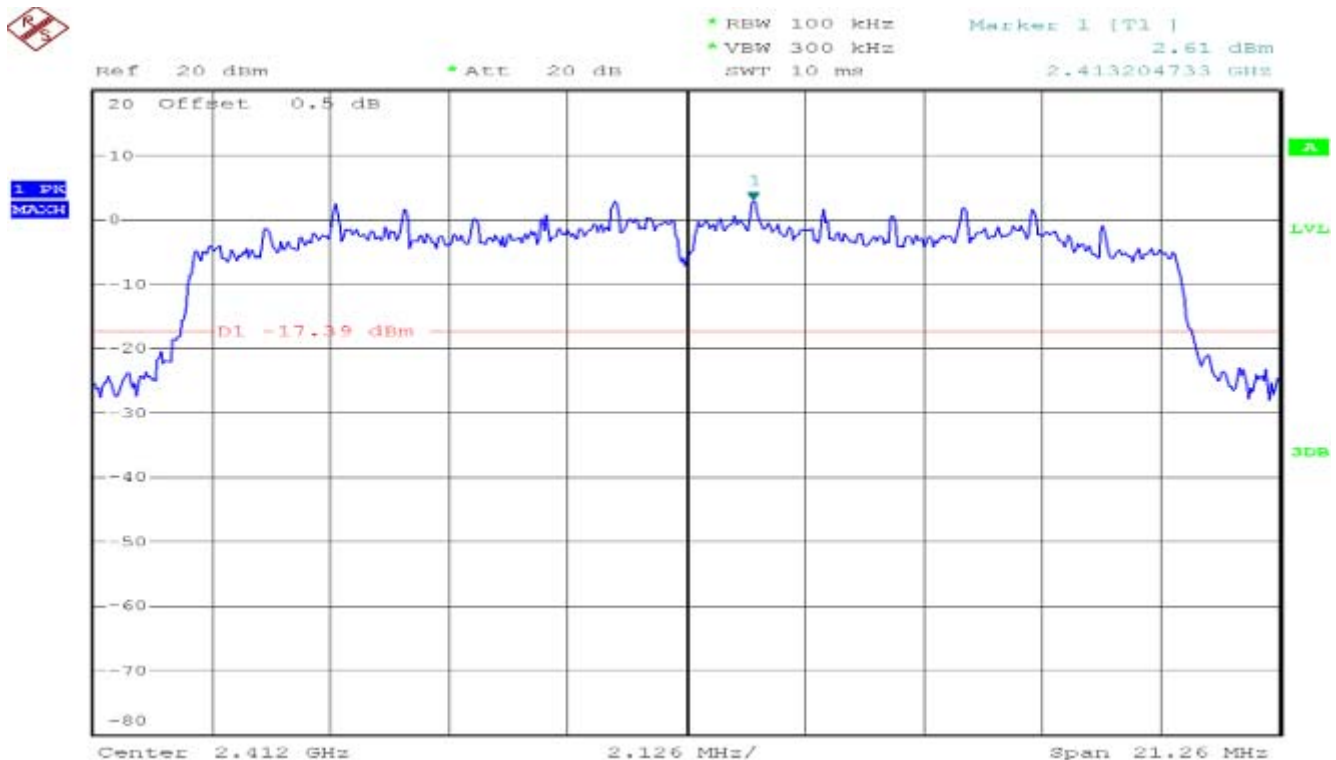


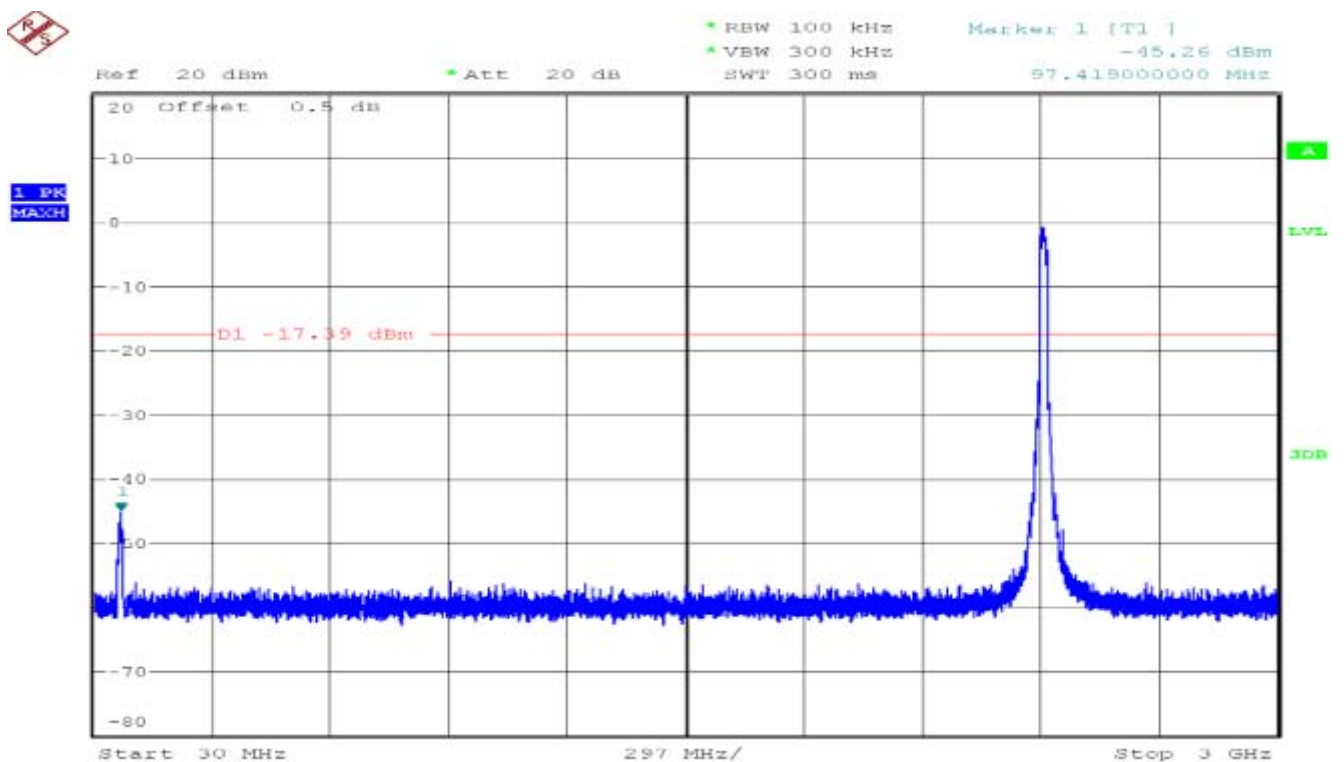
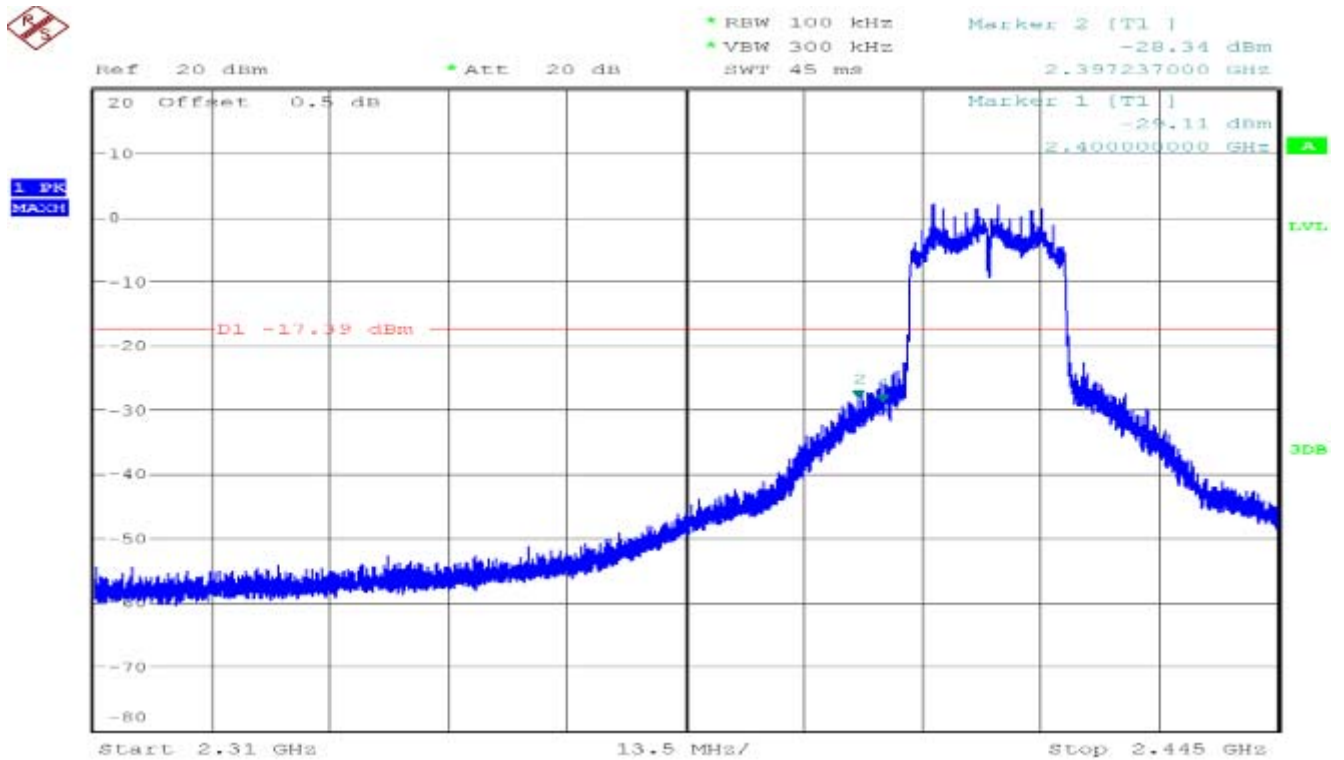


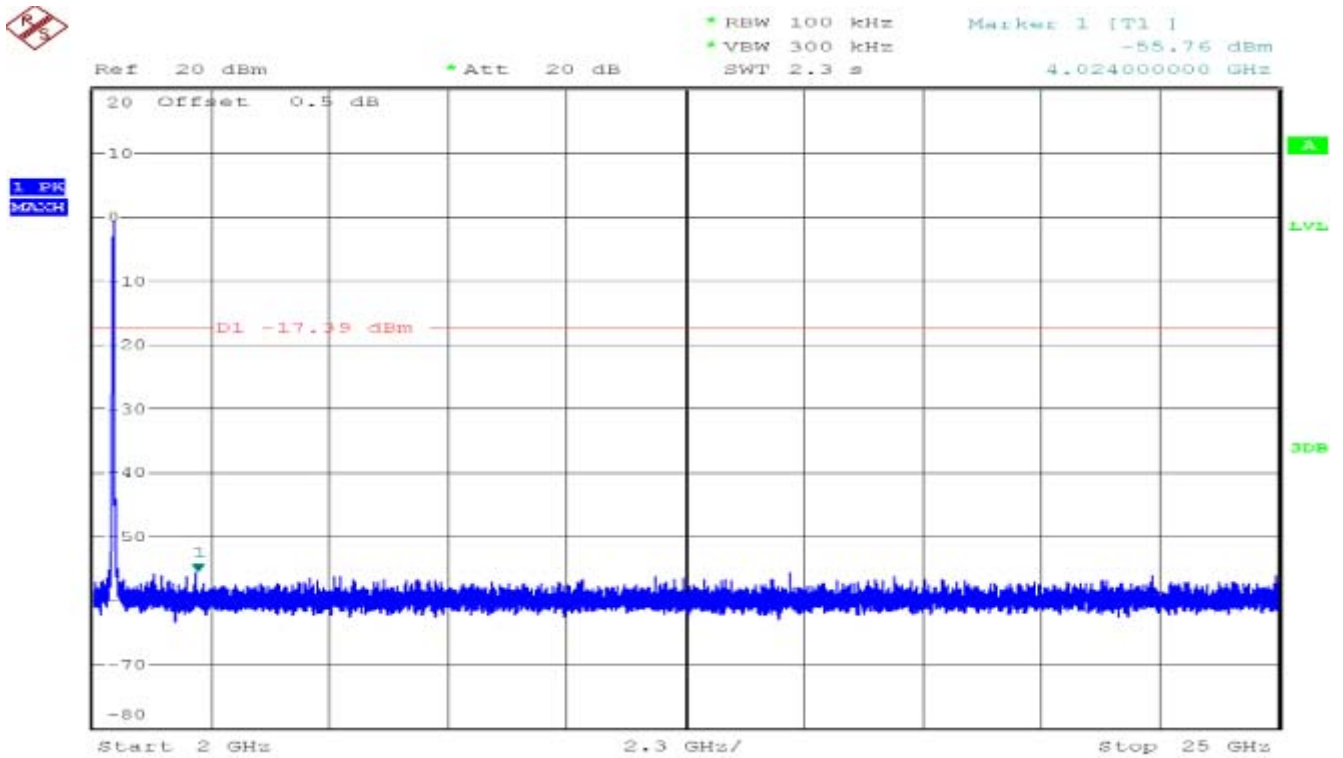


IEEE 802.11n HT20 mode/Chain 1

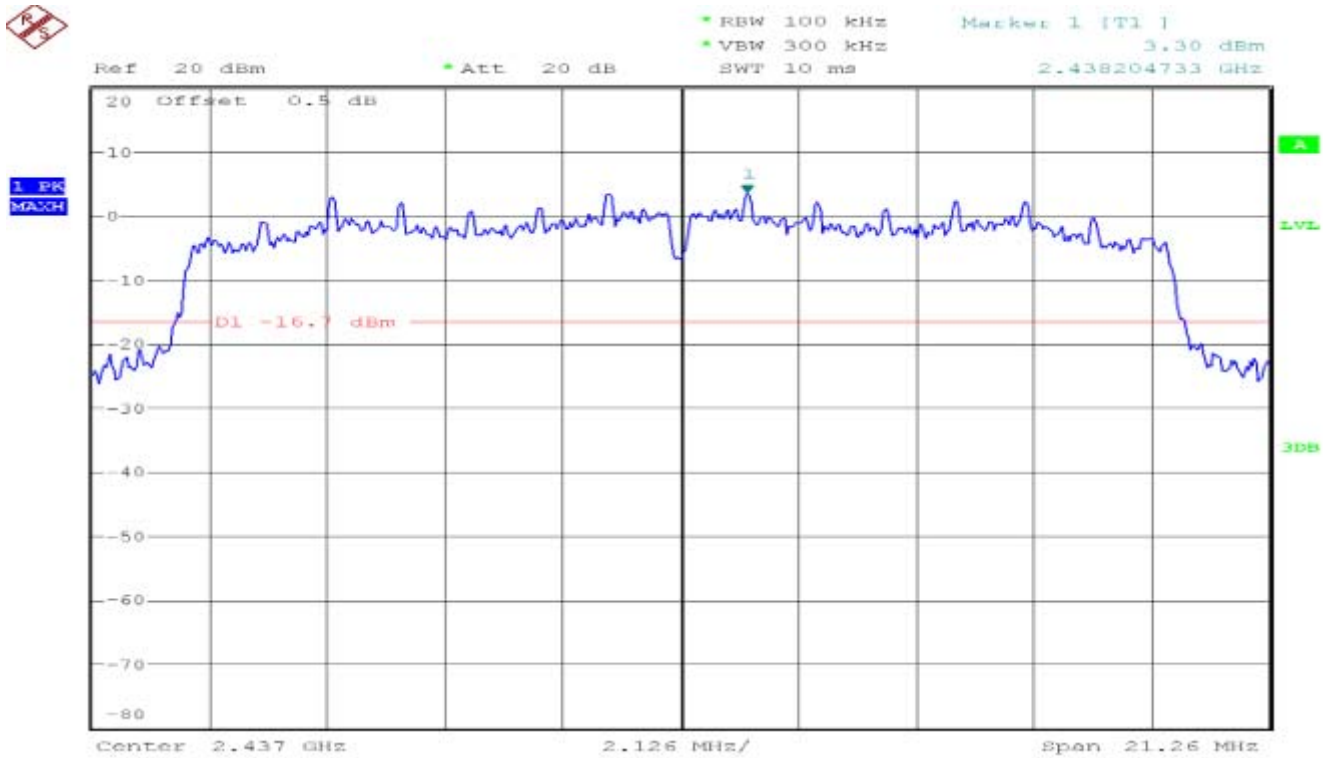
CH Low

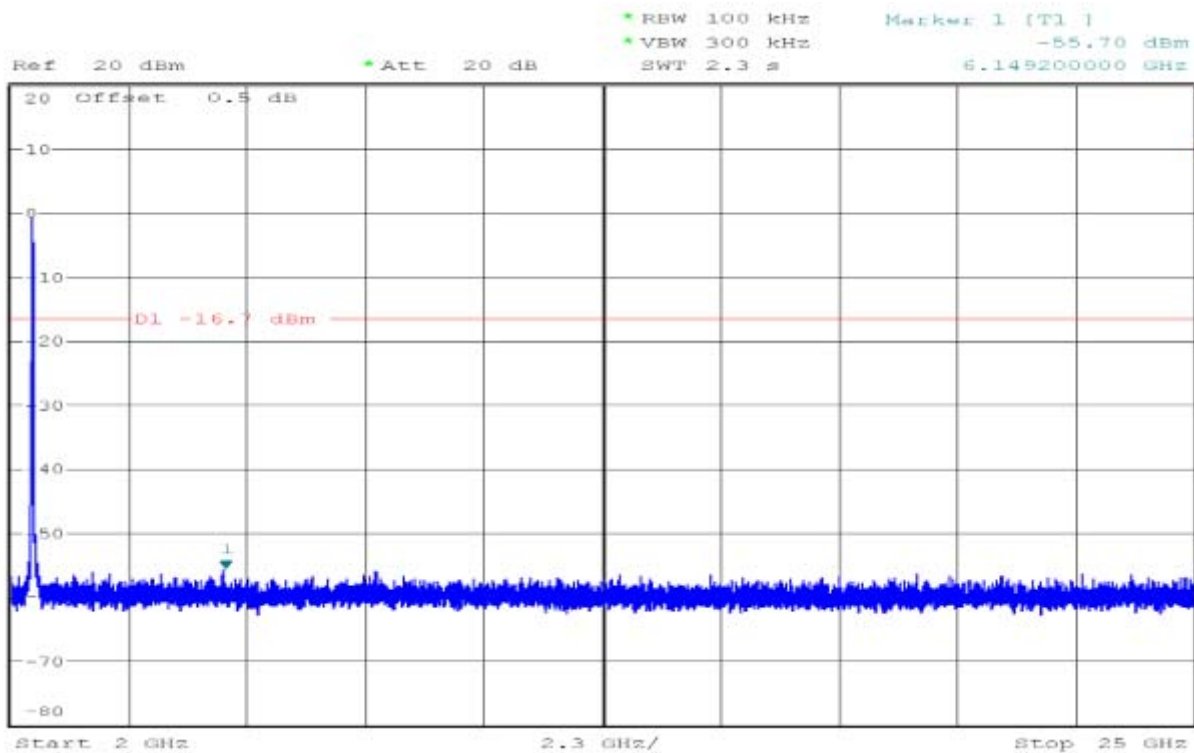
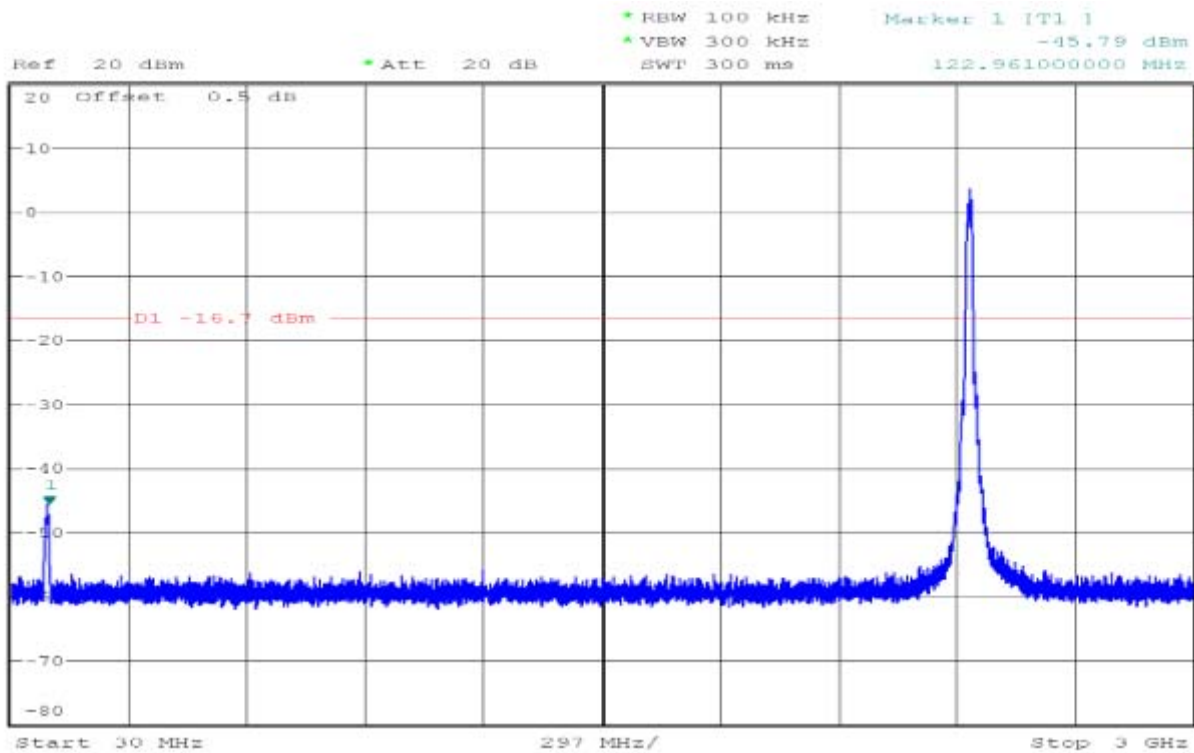




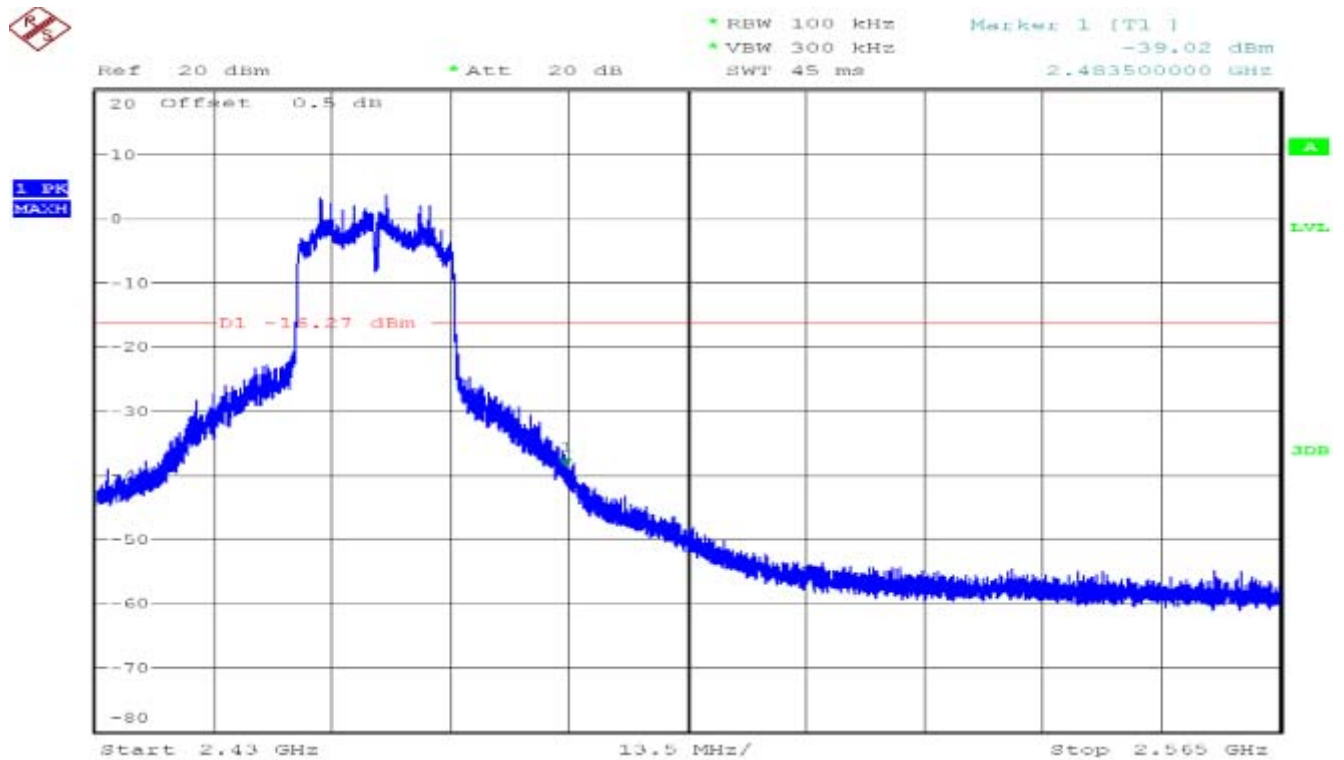
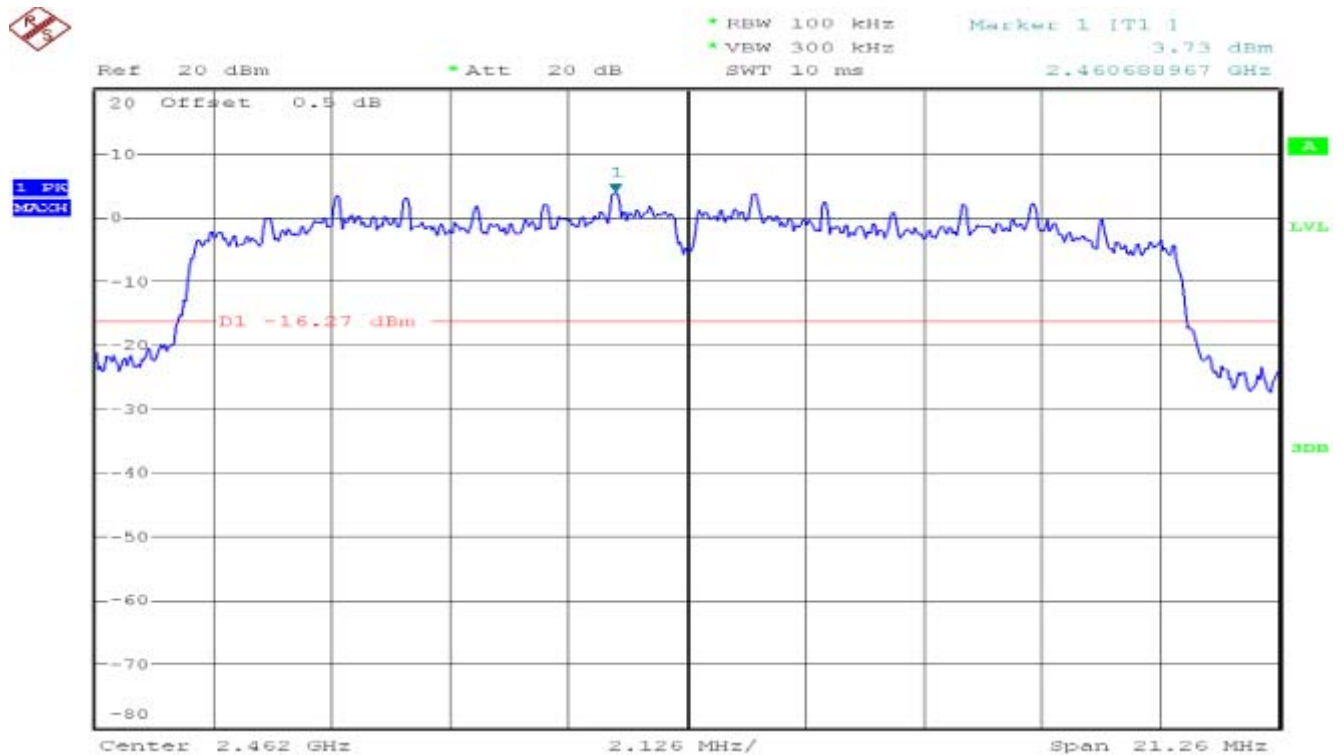


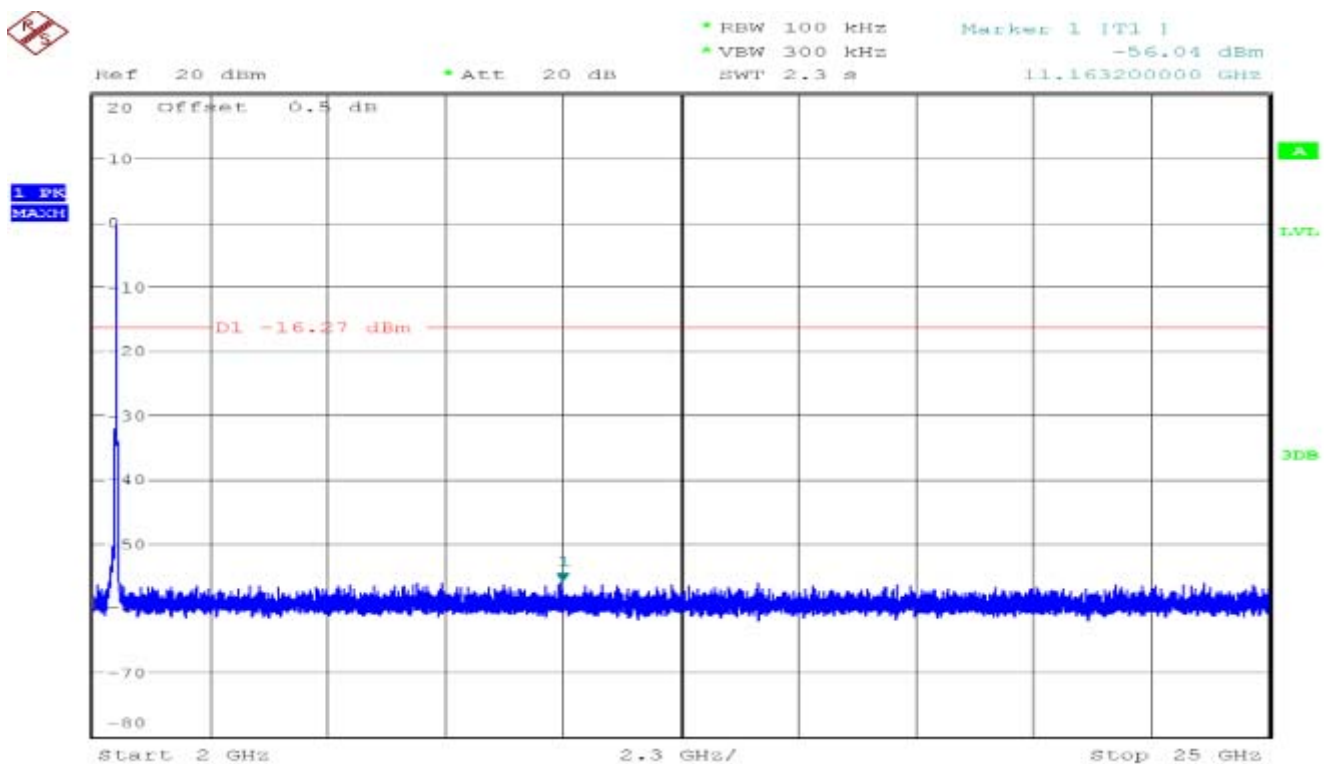
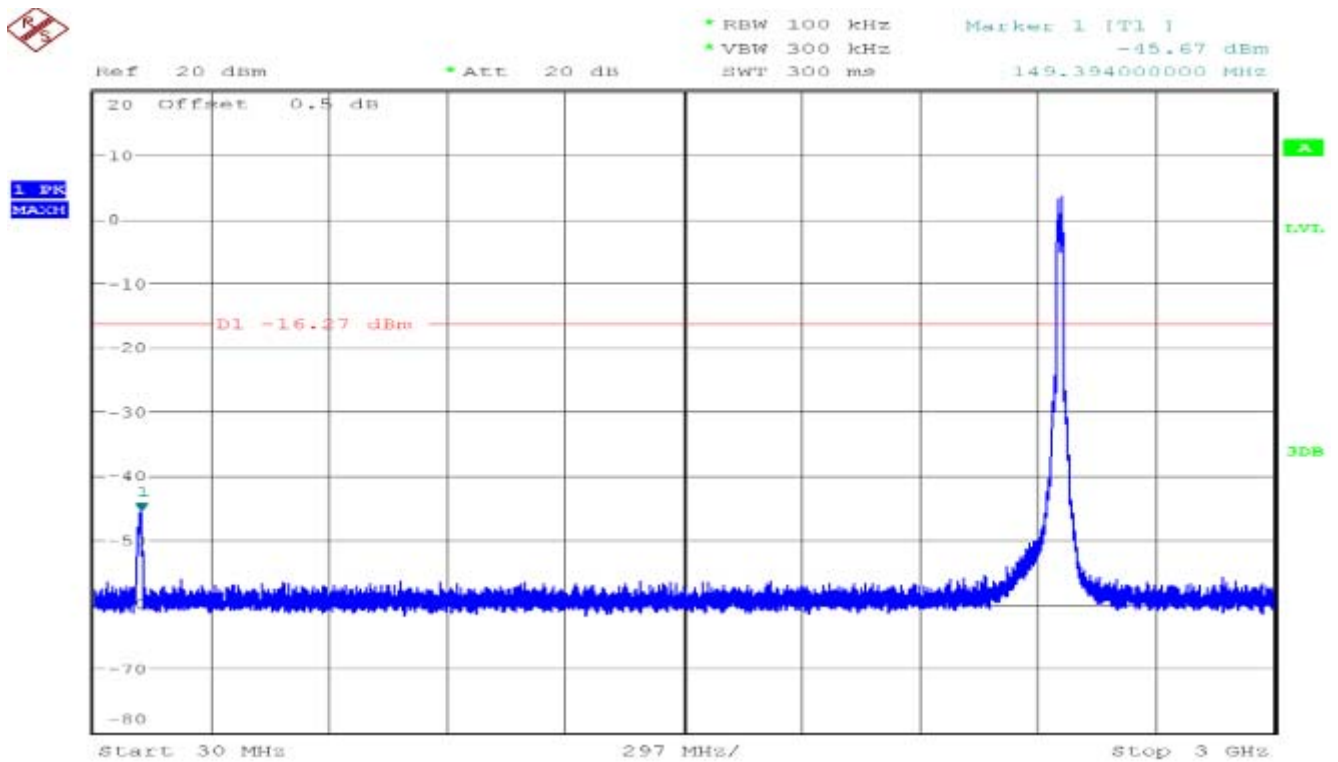
CH Mid





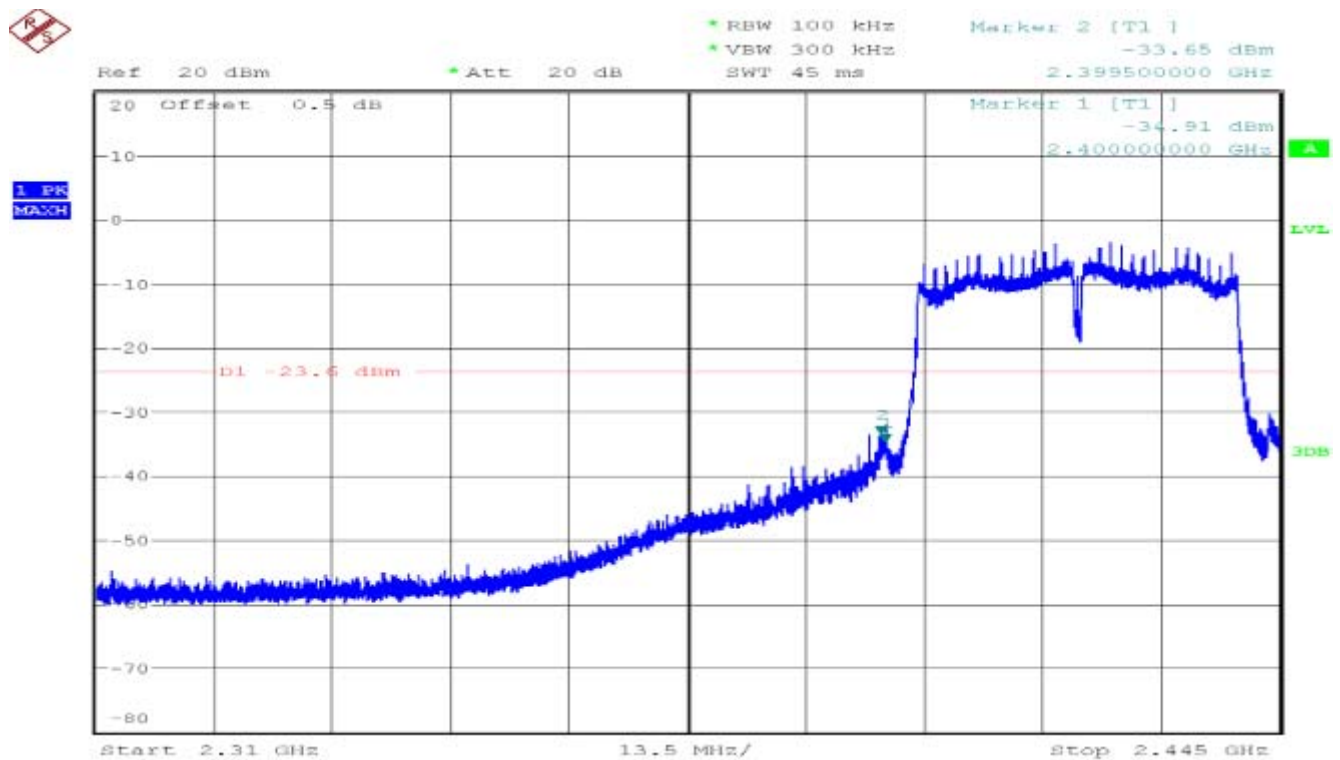
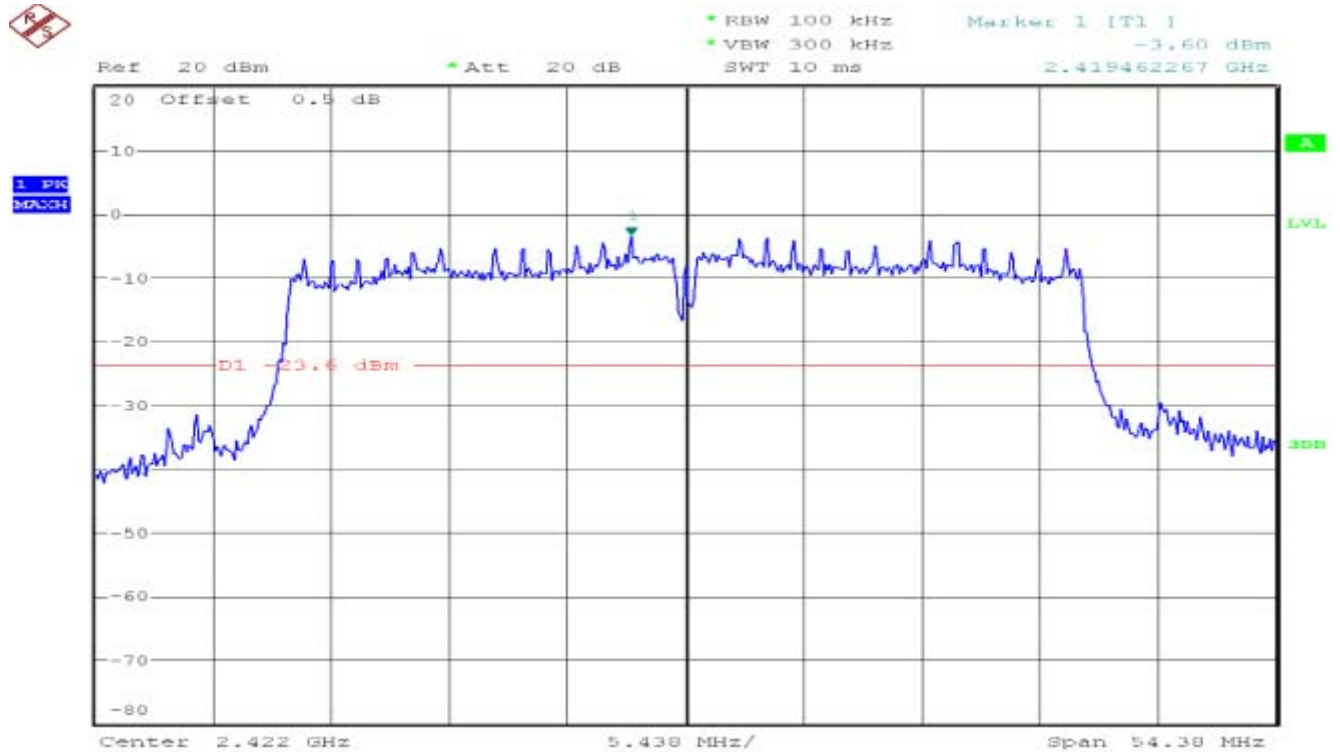
CH High

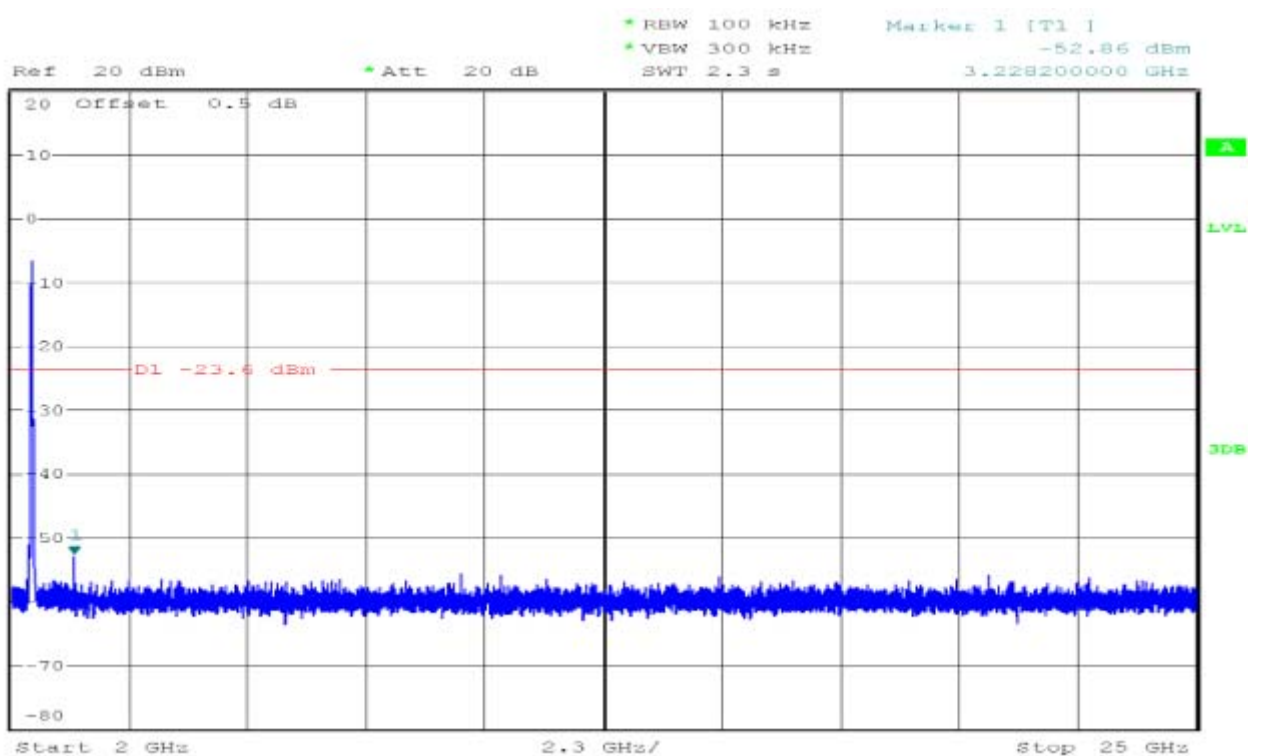
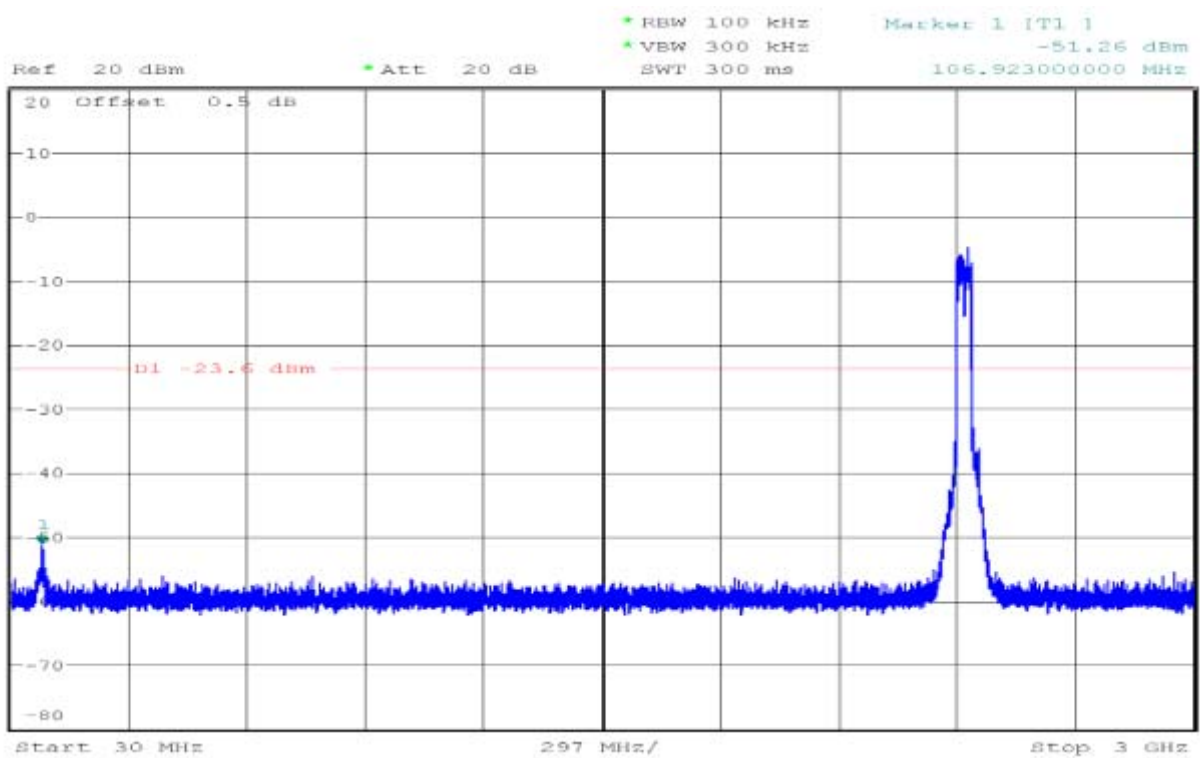




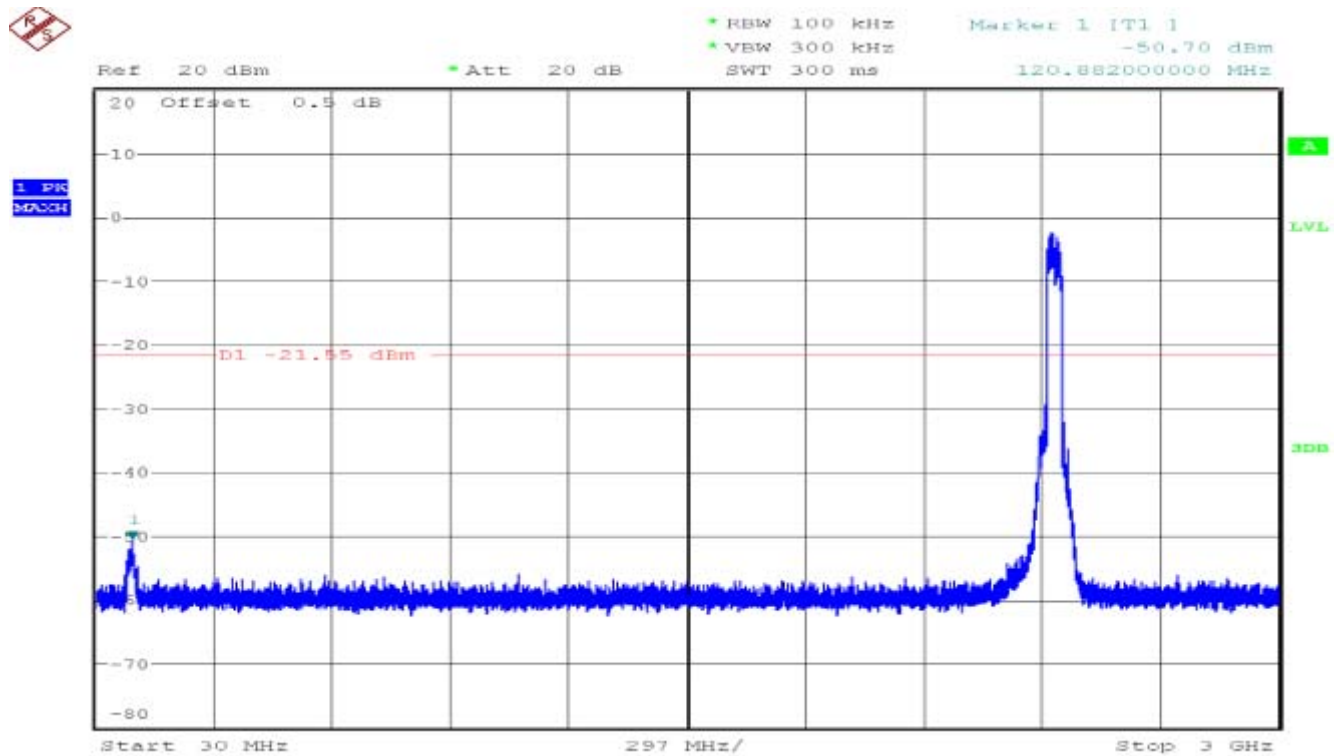
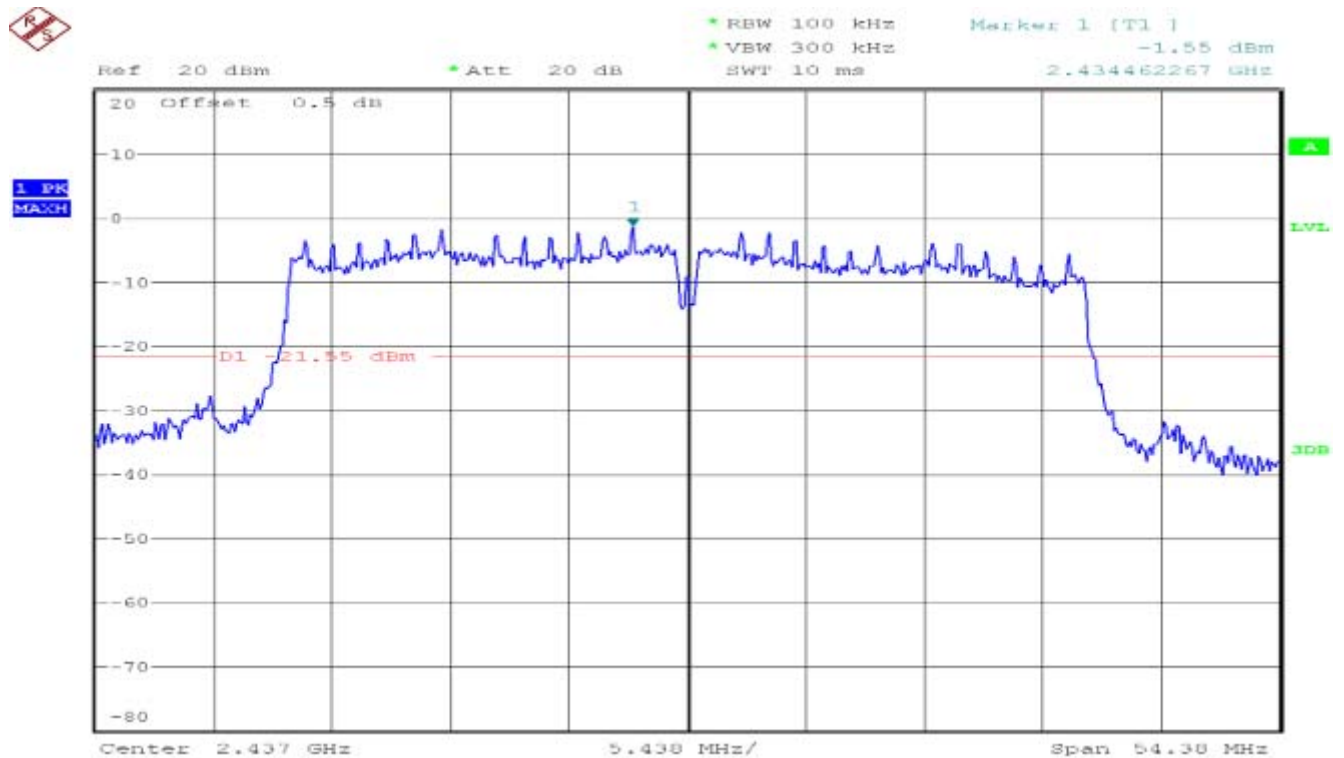
IEEE 802.11n HT40 mode/Chain 0

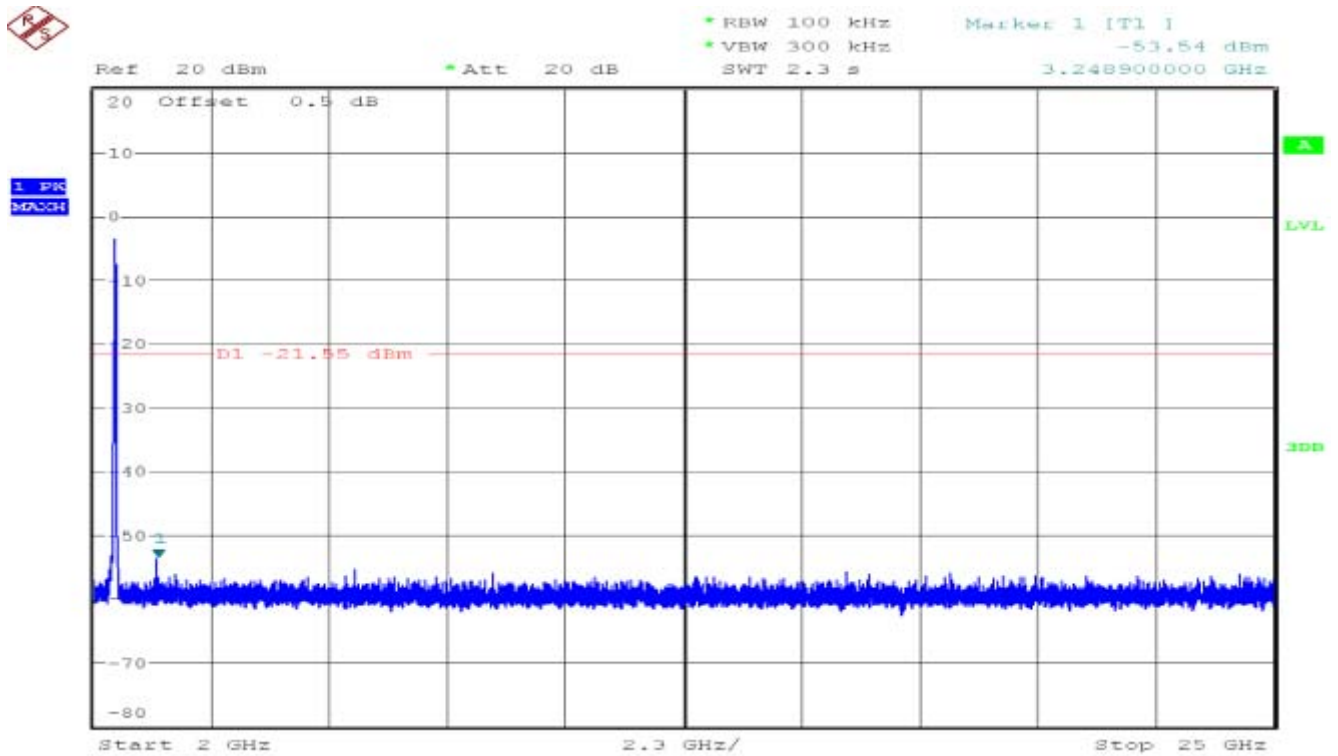
CH Low



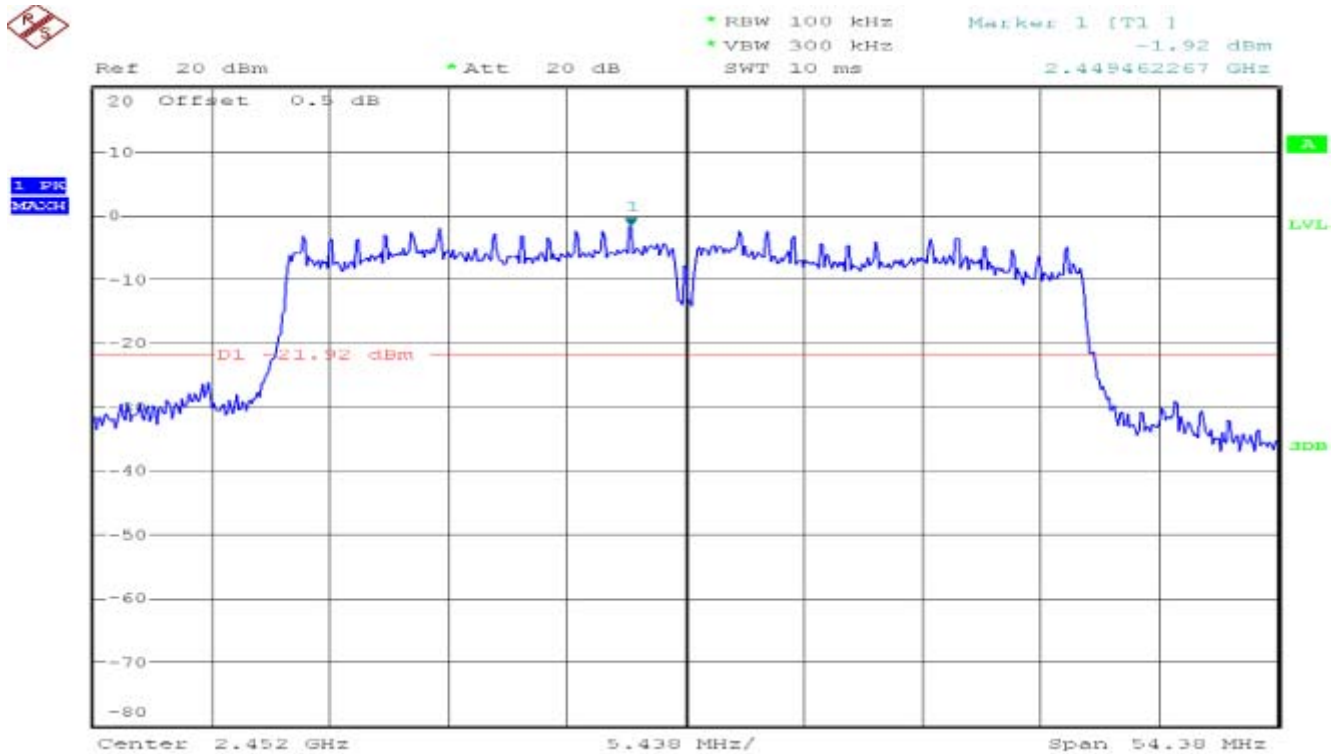


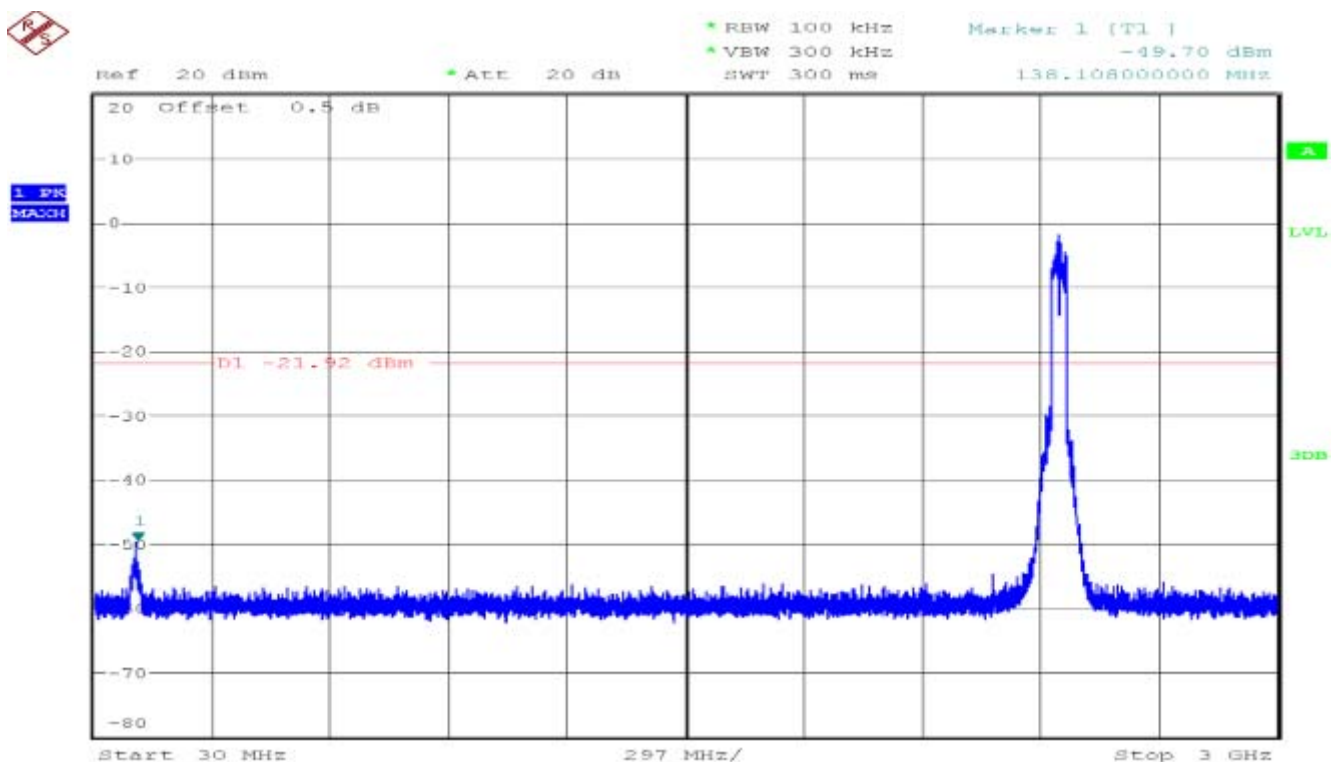
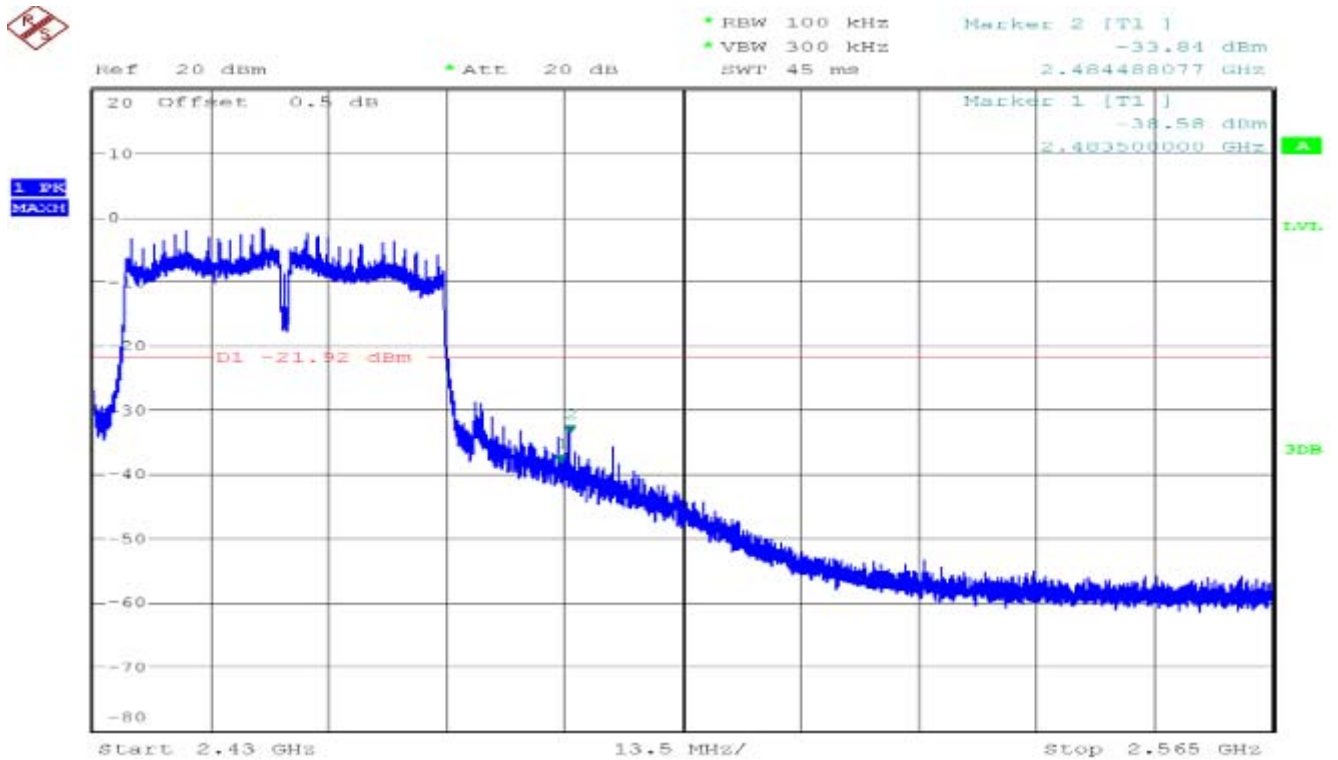
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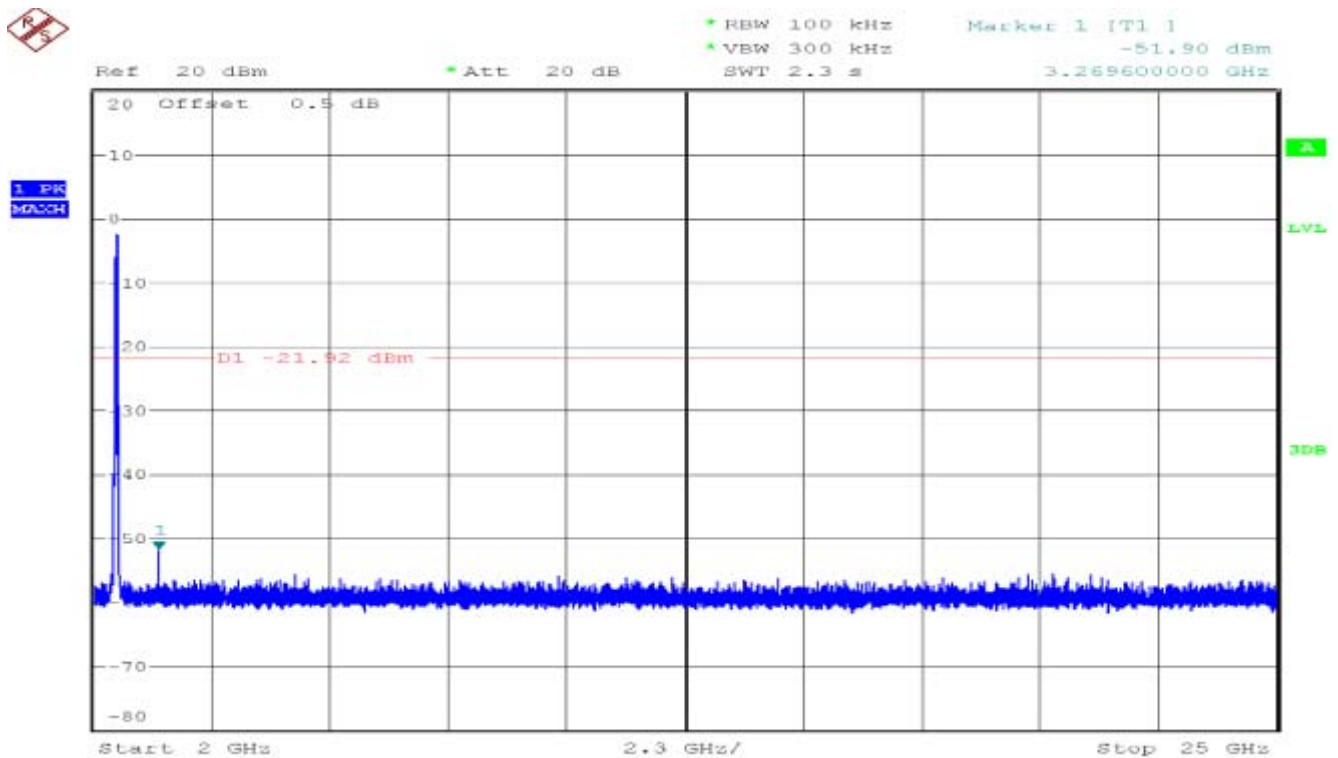




CH High

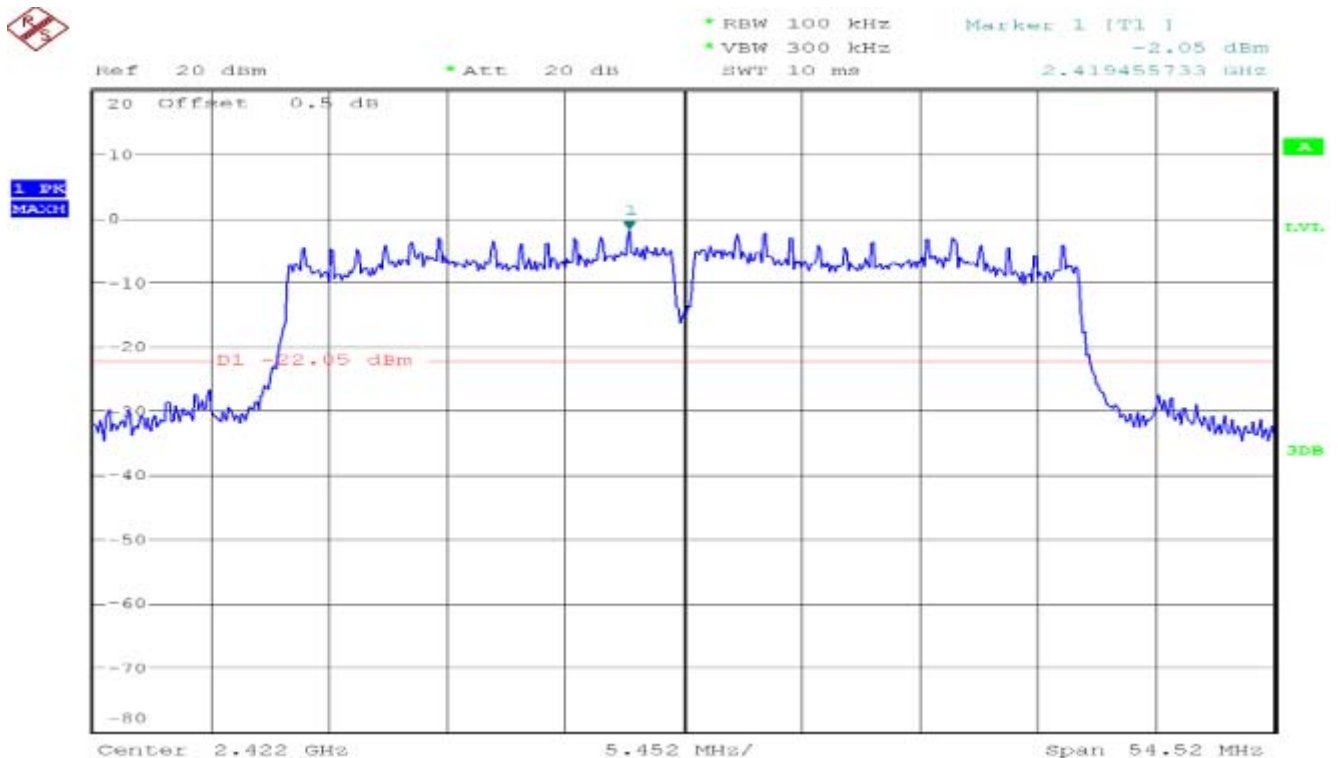


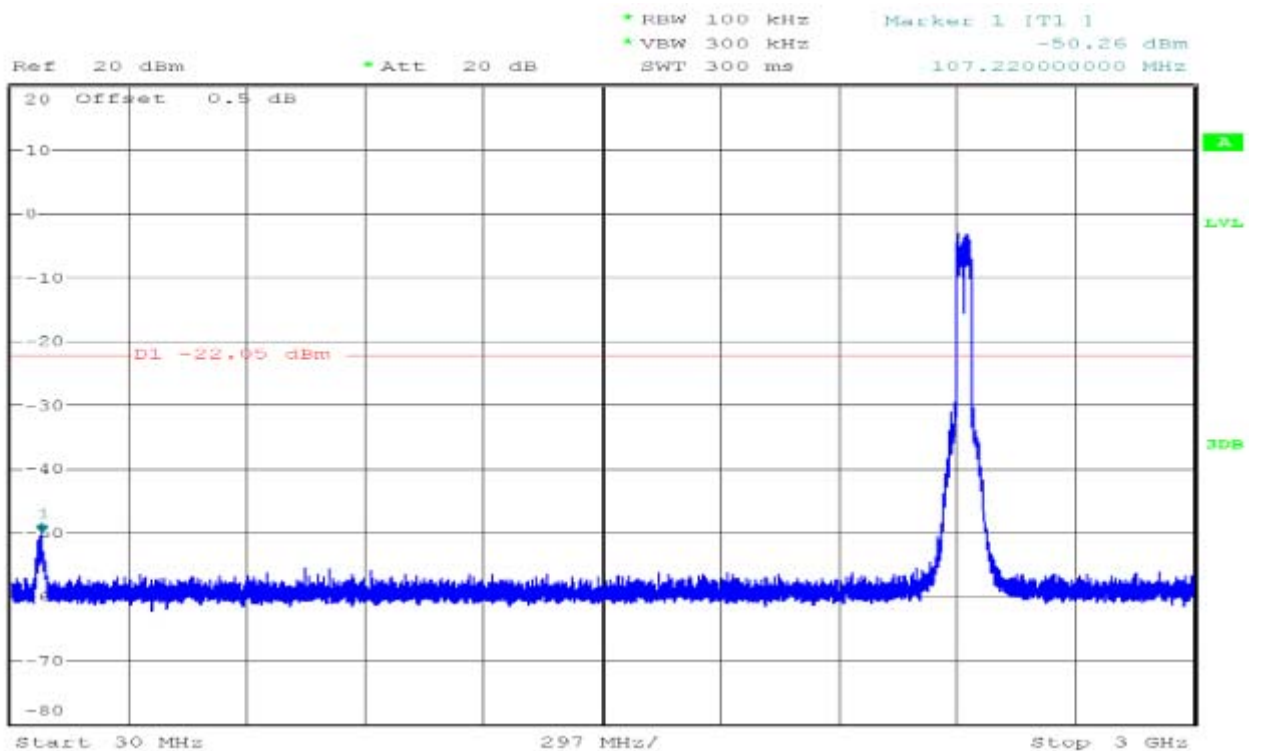
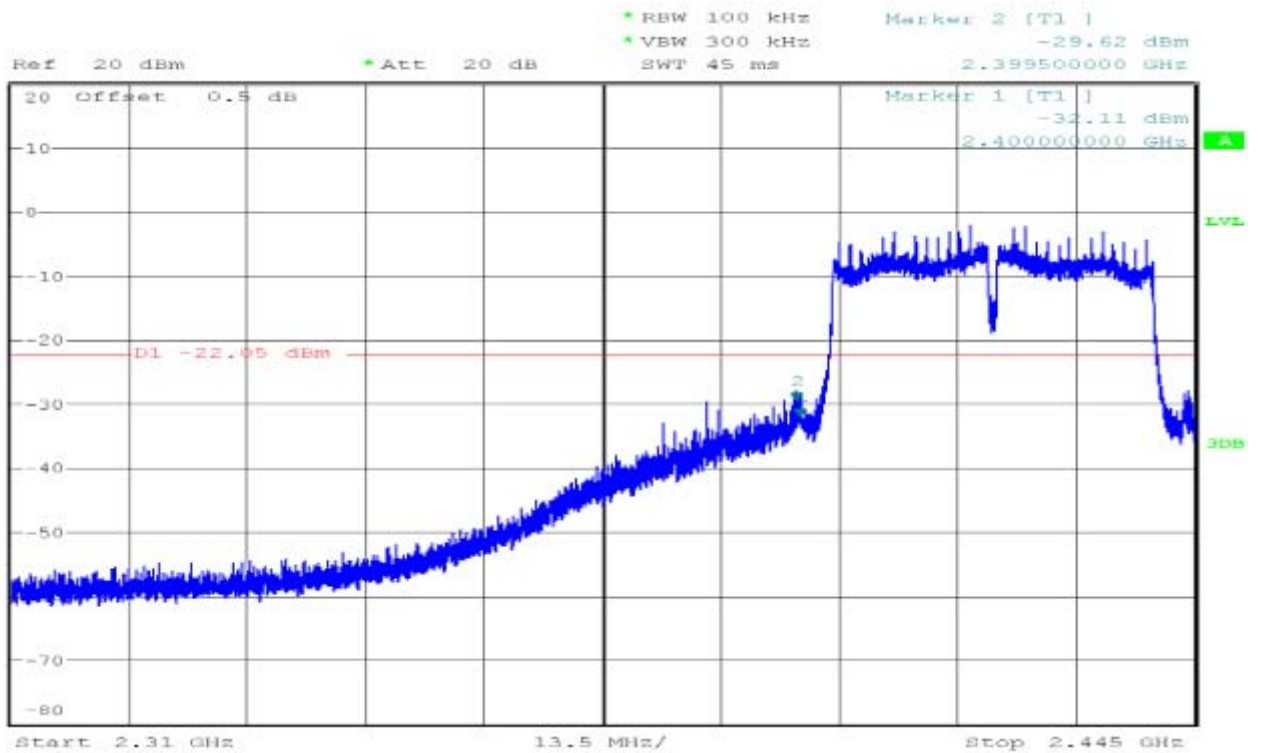


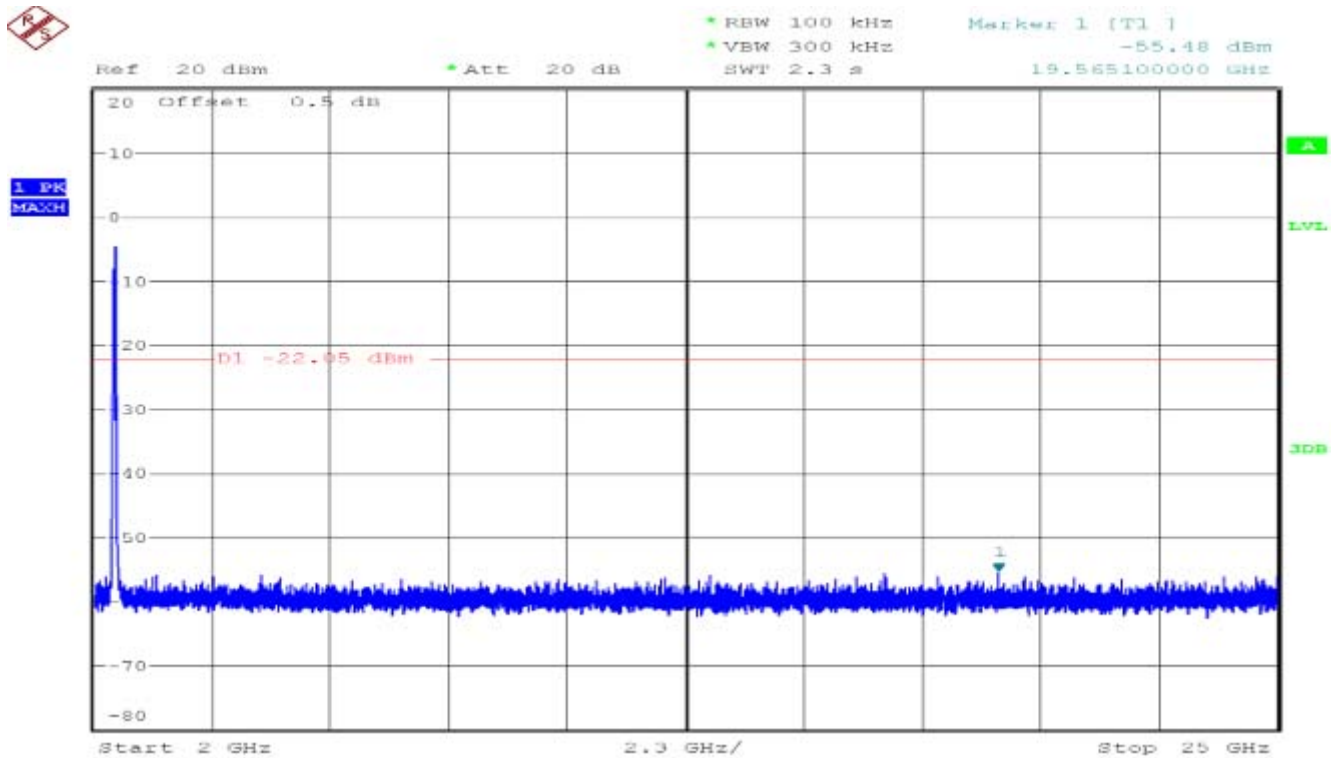


IEEE 802.11n HT40 mode/Chain 1

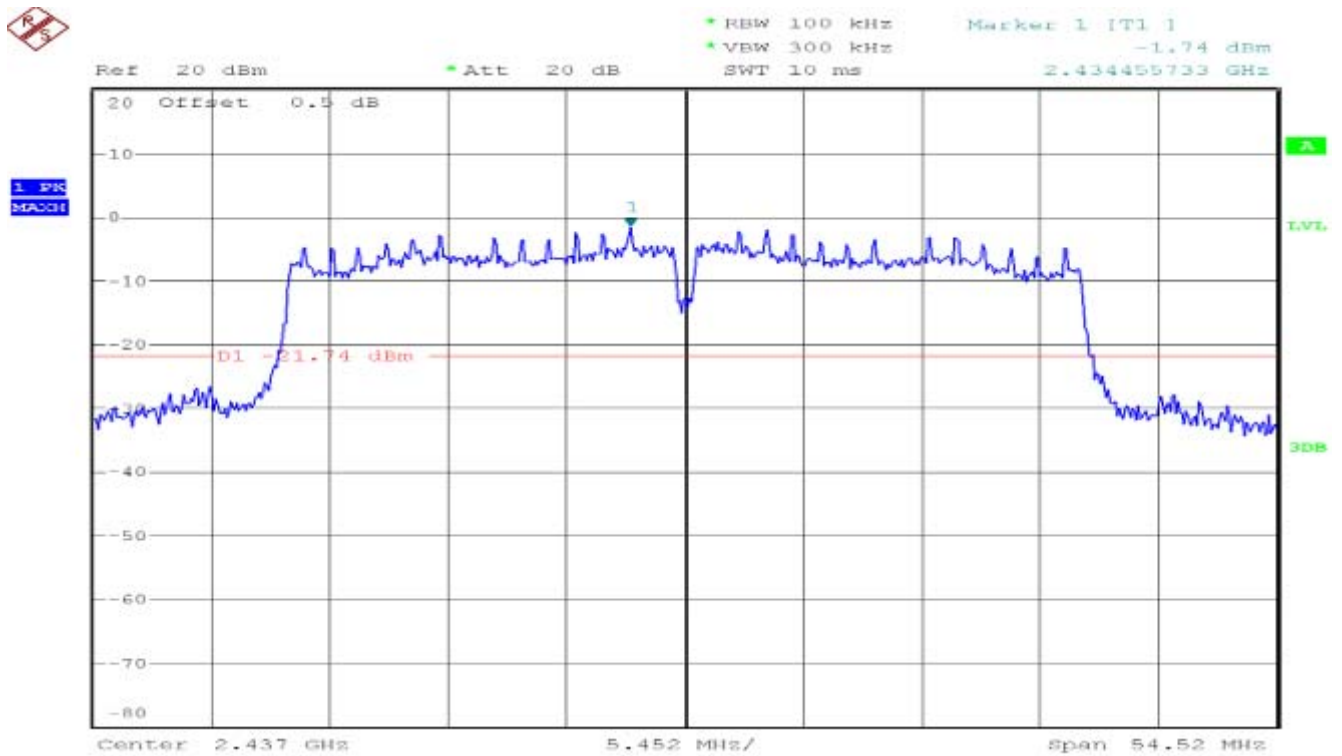
CH Low

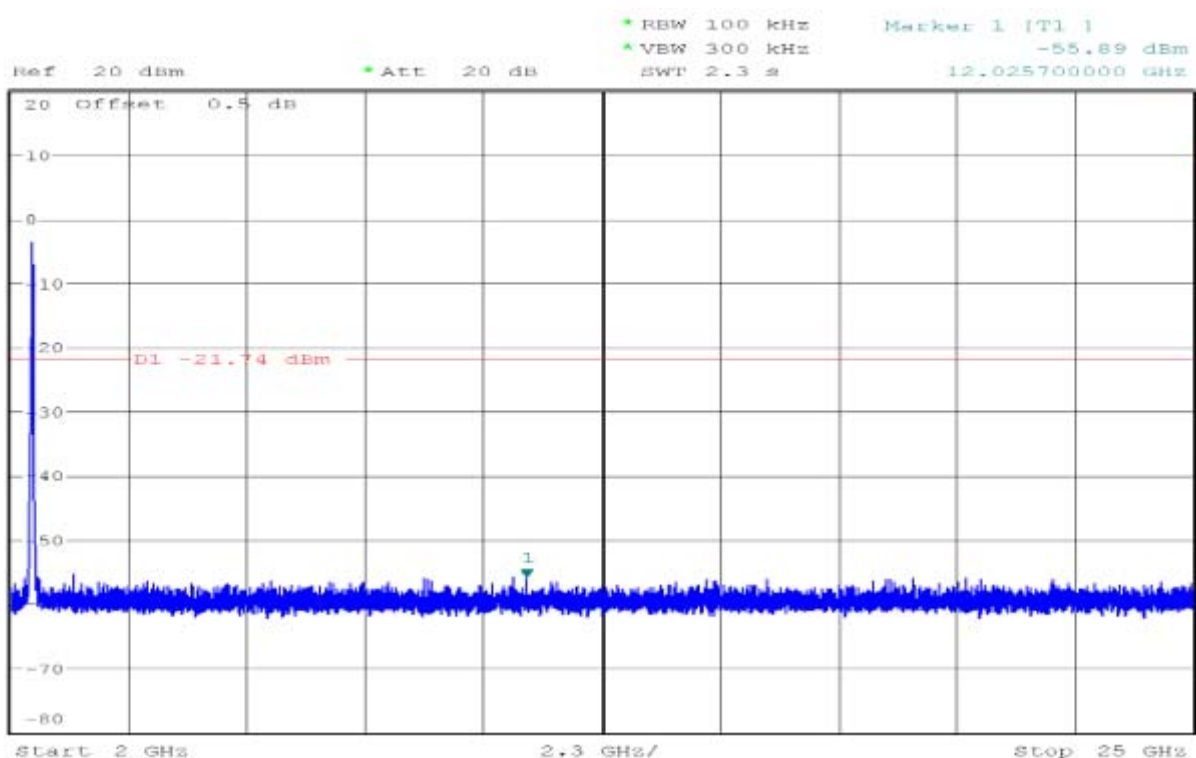
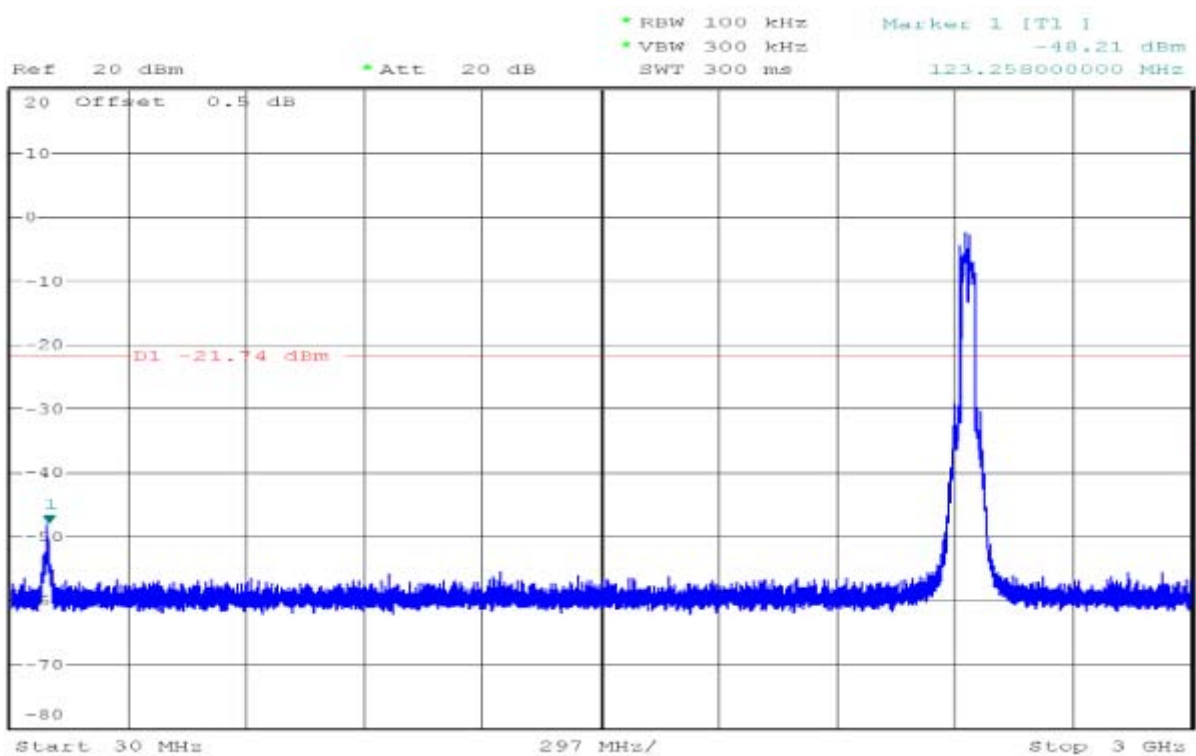




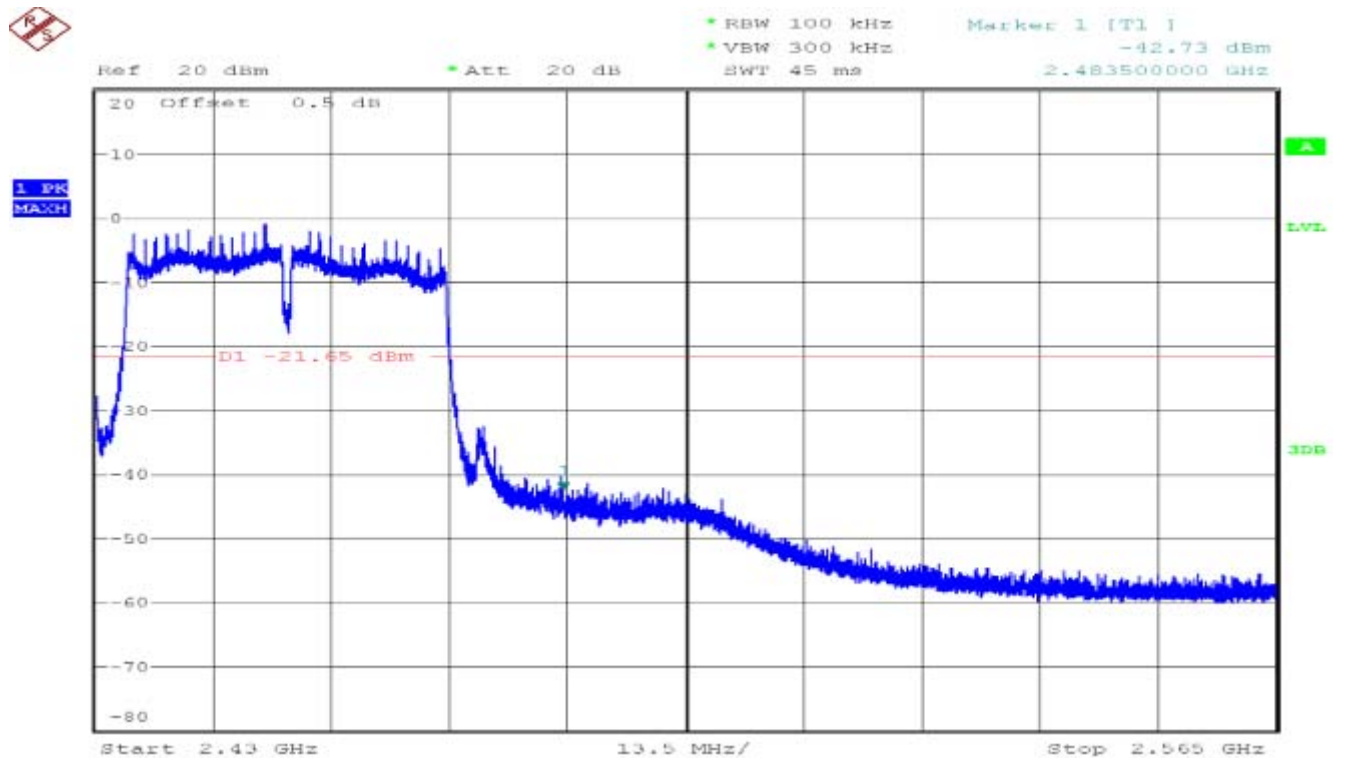
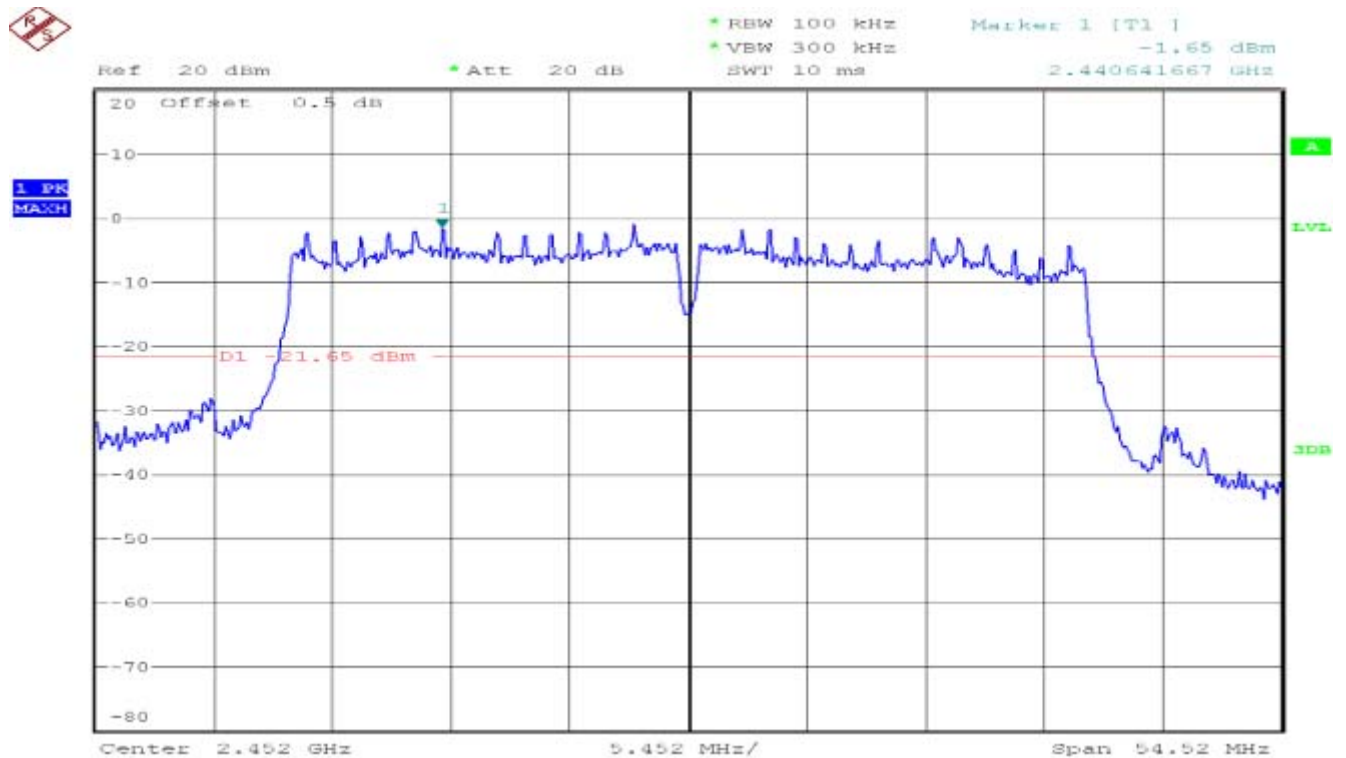


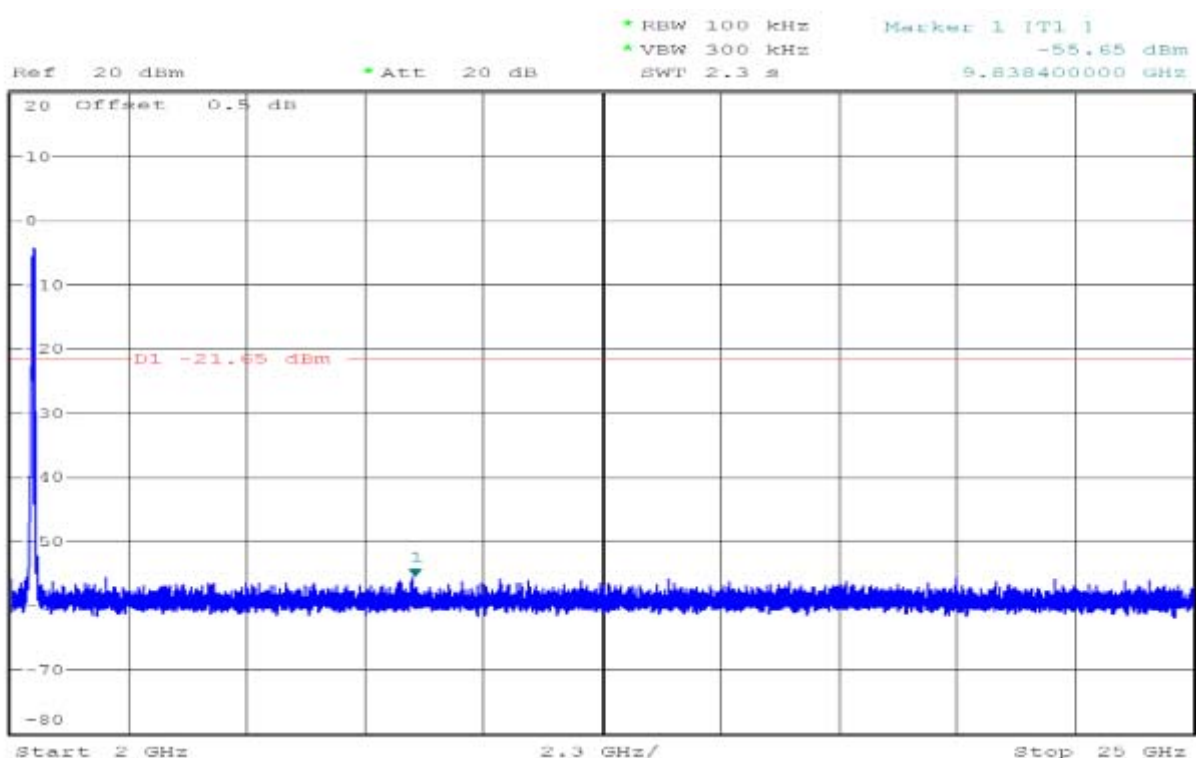
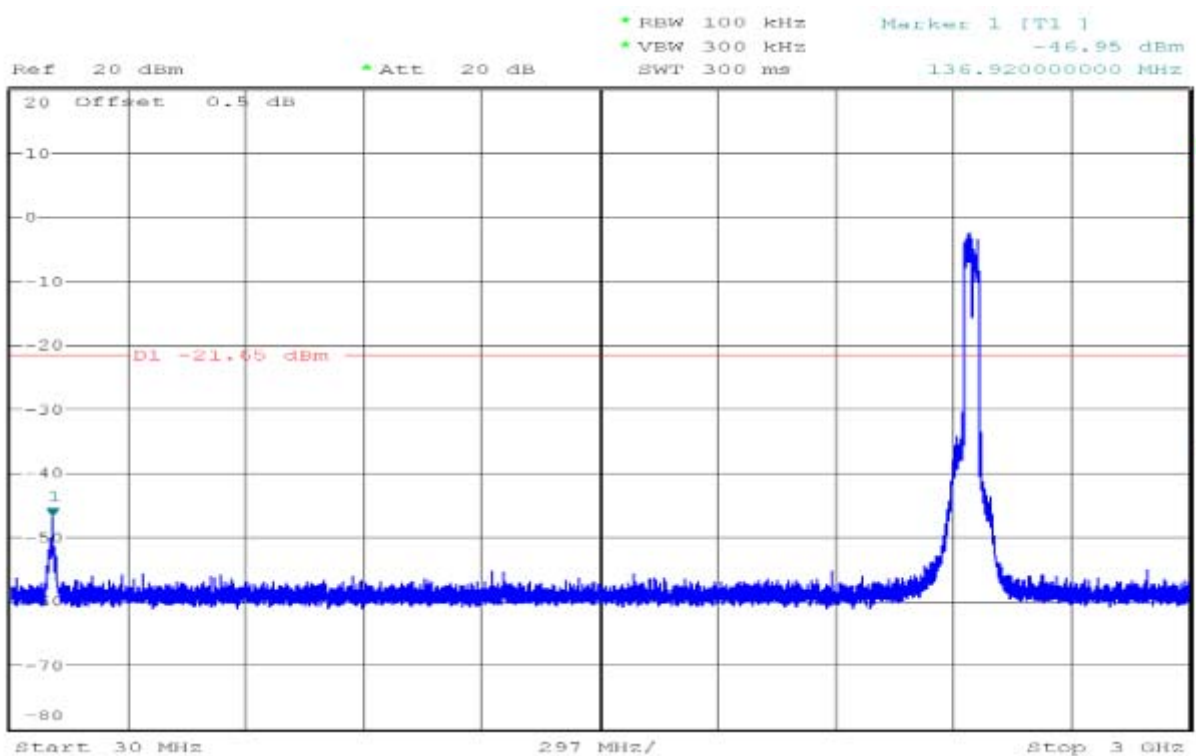
CH Mid





CH High





7.6. RADIATED EMISSIONS

LIMIT

Radiated emissions from 9 kHz to 25 GHz were measured according to the methods defines in ANSI C63.10-2013. The EUT was placed above the ground plane, 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

FREQUENCIES(MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE(meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

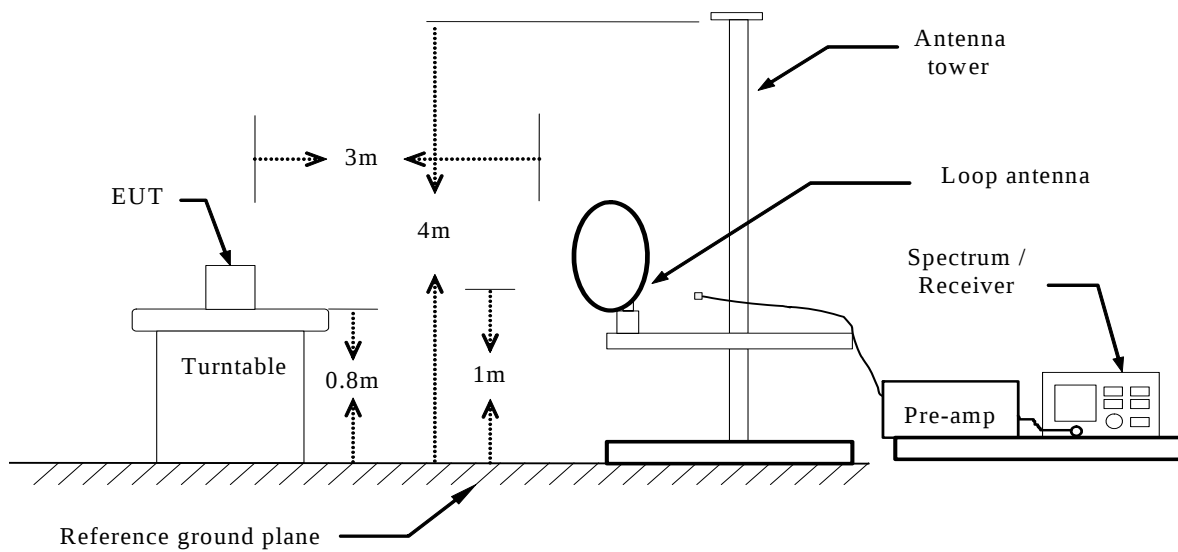
Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2.In the emission table above, the tighter limit applies at the band edges.

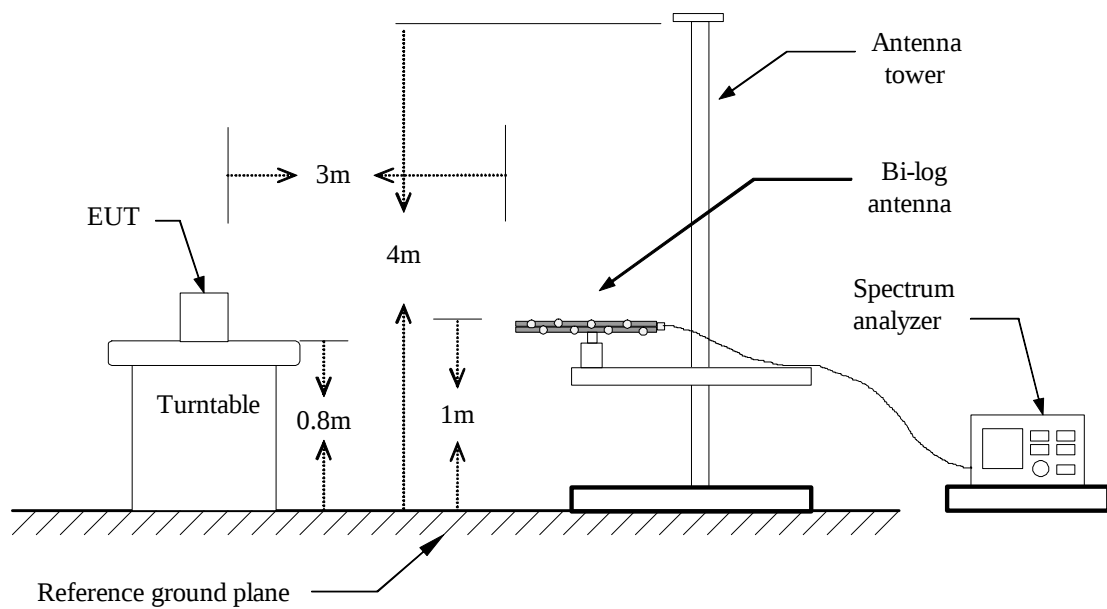
Frequency (MHz)	Field Strength (μ V/m at 3-meter)	Field Strength (dB μ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Test Configuration

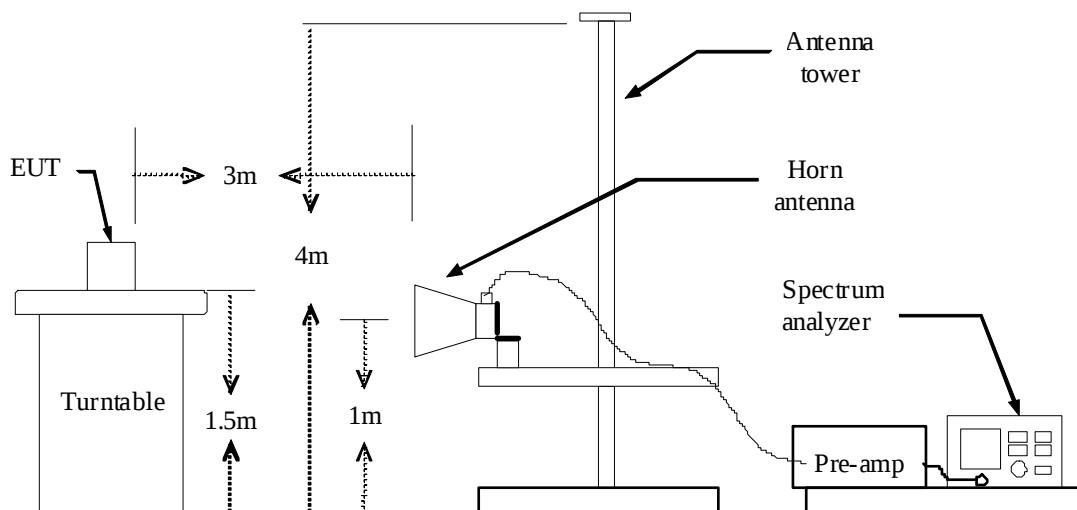
Below 30MHz



Below 1 GHz



Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable above ground plane, which is 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz.
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 emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

PEAK: RBW=VBW=1MHz / Sweep=AUTO

AVERAGE: RBW=1MHz / Sweep=AUTO

VBW=10Hz, when duty cycle is no less than 98 percent.

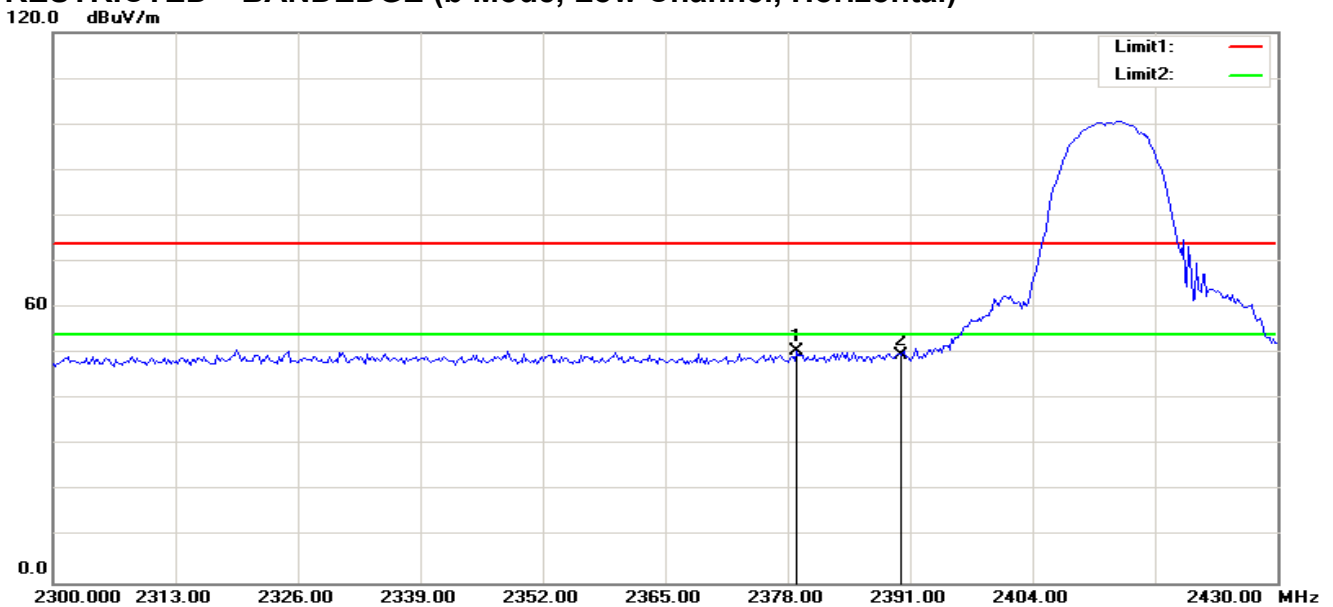
VBW $\geq 1/T$, when duty cycle is less than 98 percent, where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
IEEE 802.11 b	99	--	--	10Hz
IEEE 802.11 g	98	--	--	10Hz
IEEE 802.11n HT20	94	1.4	0.7	1KHz
IEEE 802.11n HT40	94	1.4	0.7	1KHz

7. Repeat above procedures until the measurements for all frequencies are complete.

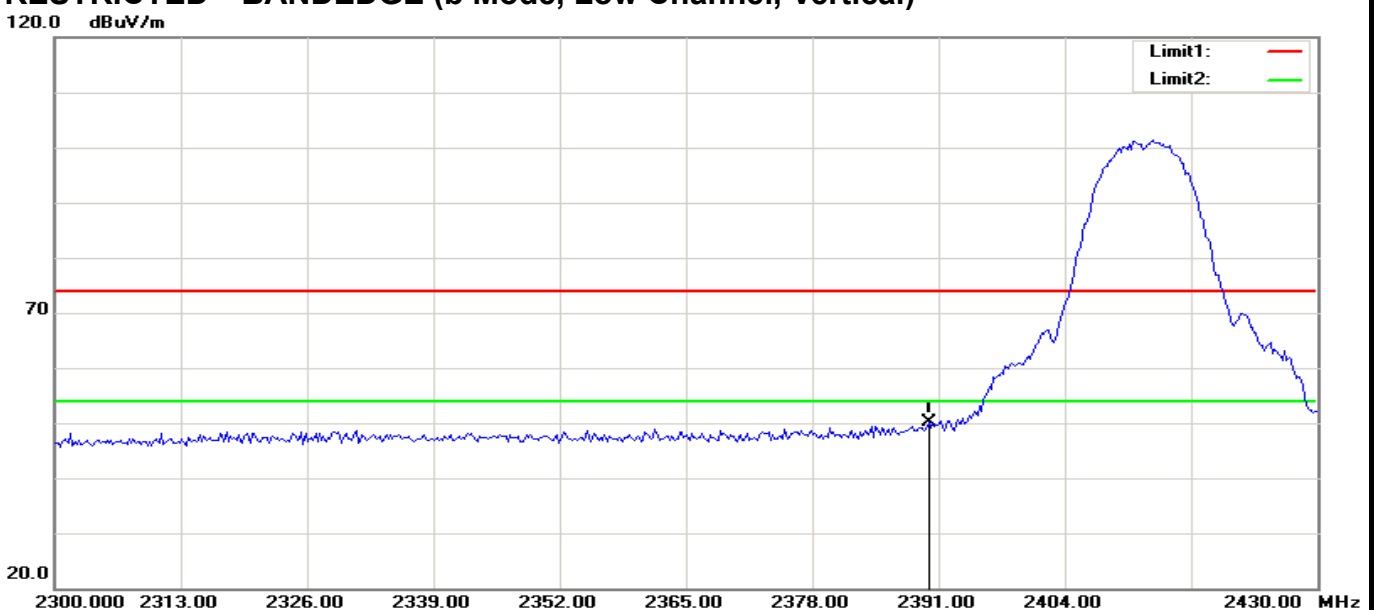
TEST RESULTS

RESTRICTED BANDEDGE (b Mode, Low Channel, Horizontal)

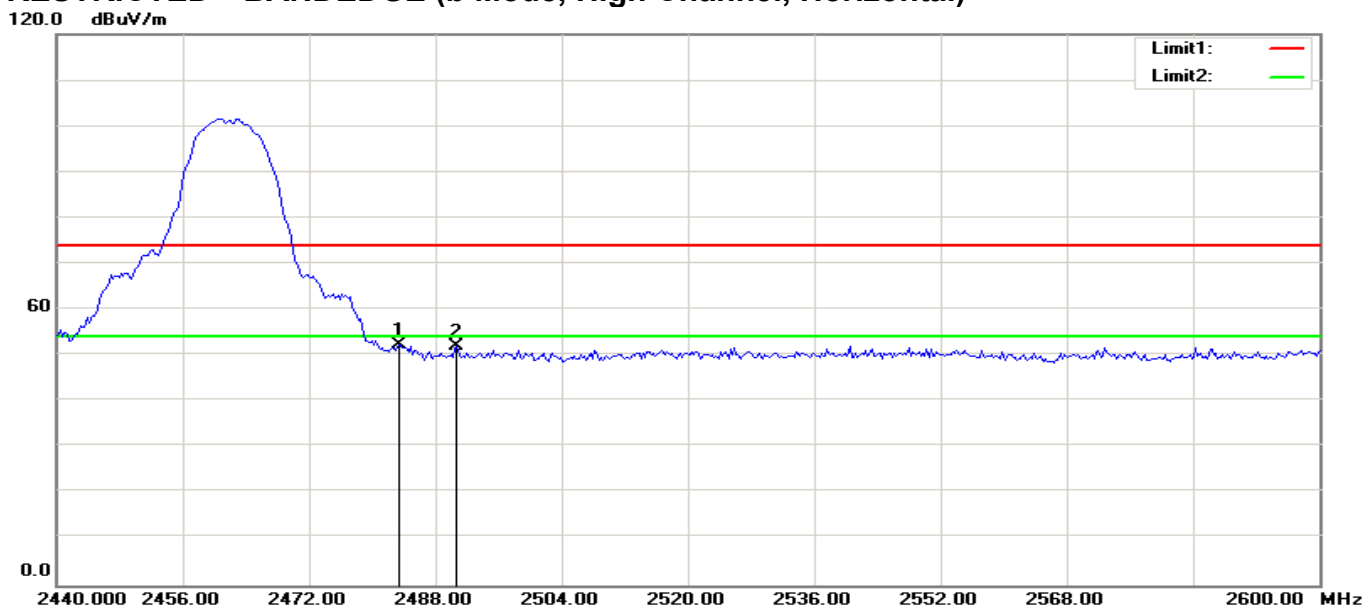


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2378.958	57.91	-7.41	50.50	74.00	-23.50	200	314	peak
2	2390.000	57.11	-7.31	49.80	74.00	-24.20	200	115	peak

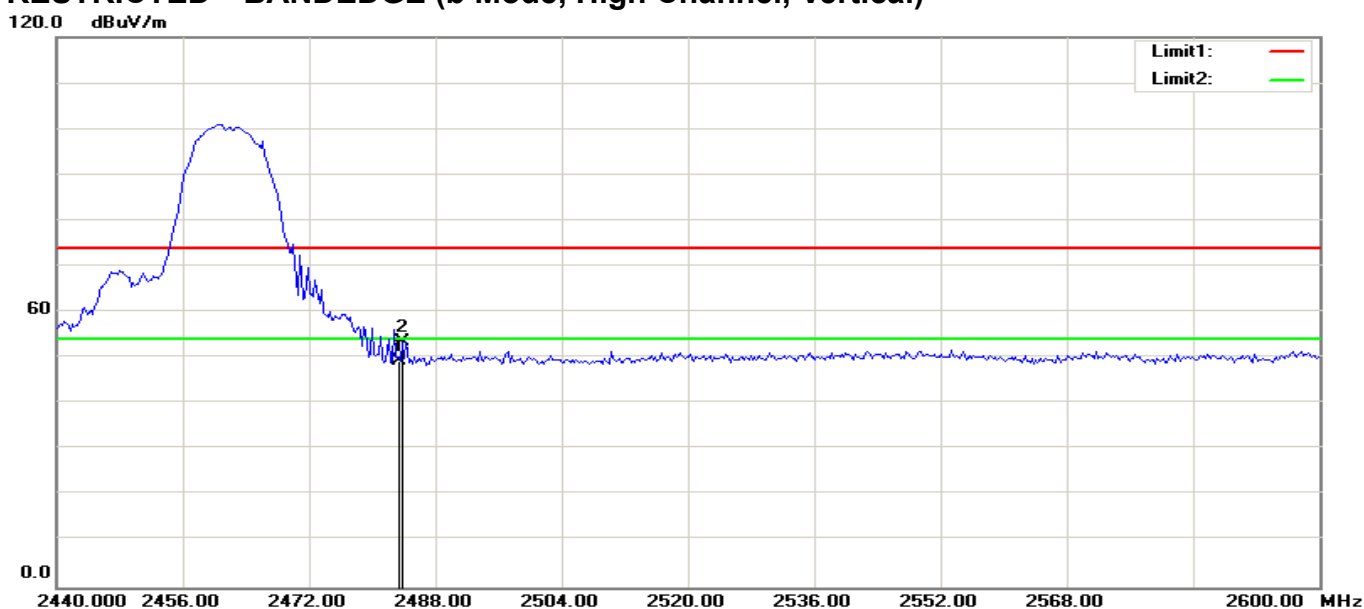
RESTRICTED BANDEDGE (b Mode, Low Channel, Vertical)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2390.000	57.37	-7.31	50.06	74.00	-23.94	100	206	peak

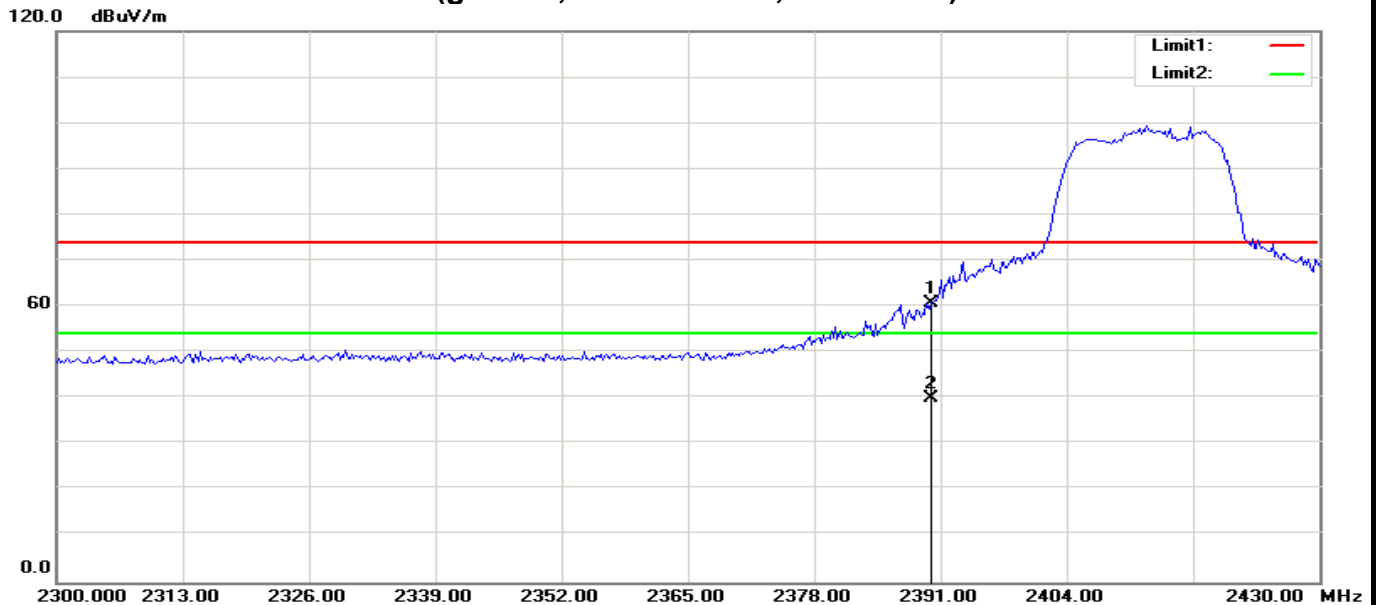
RESTRICTED BANDEDGE (b Mode, High Channel, Horizontal)

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	58.89	-6.44	52.45	74.00	-21.55	100	293	peak
2	2490.769	58.38	-6.38	52.00	74.00	-22.00	100	327	peak

RESTRICTED BANDEDGE (b Mode, High Channel, Vertical)

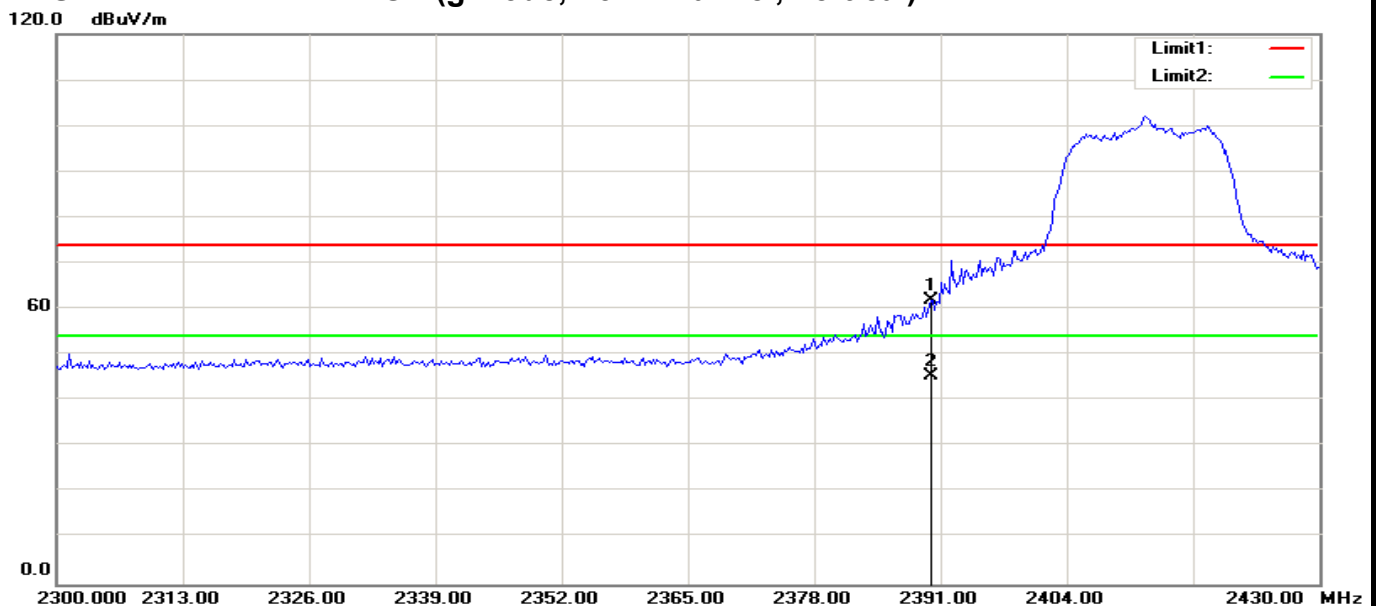
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	55.74	-6.44	49.30	74.00	-24.70	100	299	peak
2	2483.846	60.00	-6.44	53.56	74.00	-20.44	100	272	peak

RESTRICTED BANDEDGE (g Mode, Low Channel, Horizontal)



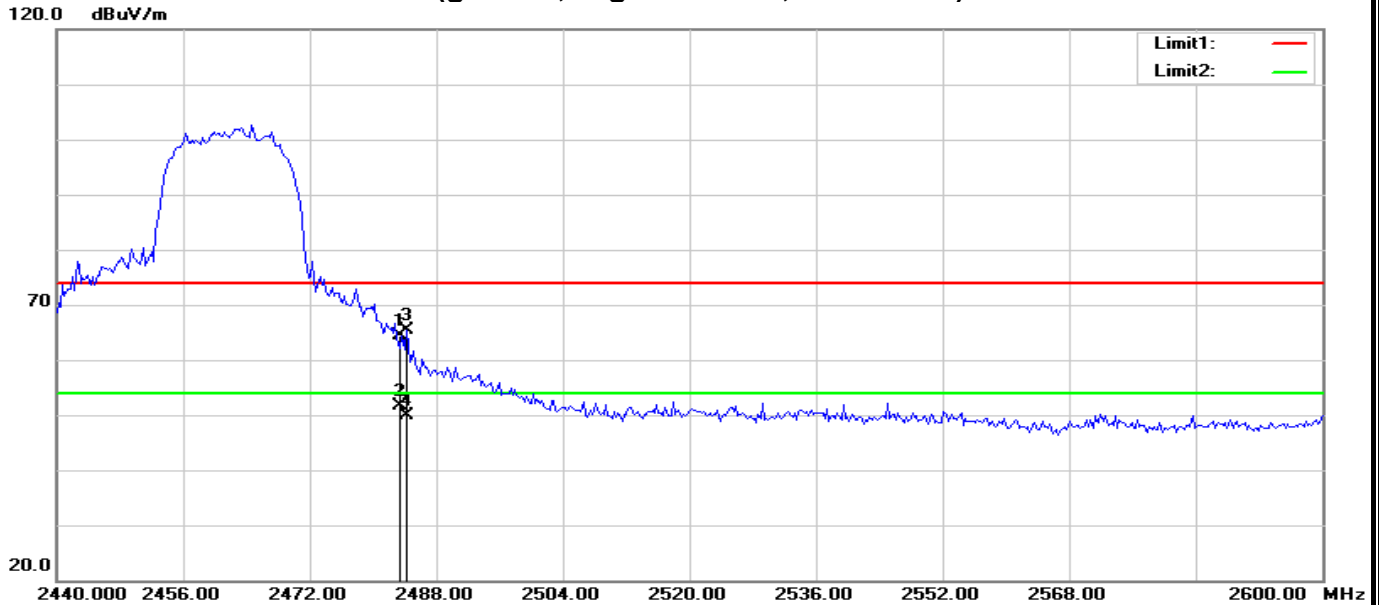
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2390.000	68.19	-7.31	60.88	74.00	-13.12	200	100	peak
2	2390.000	47.33	-7.31	40.02	54.00	-13.98	200	230	AVG

RESTRICTED BANDEDGE (g Mode, Low Channel, Vertical)



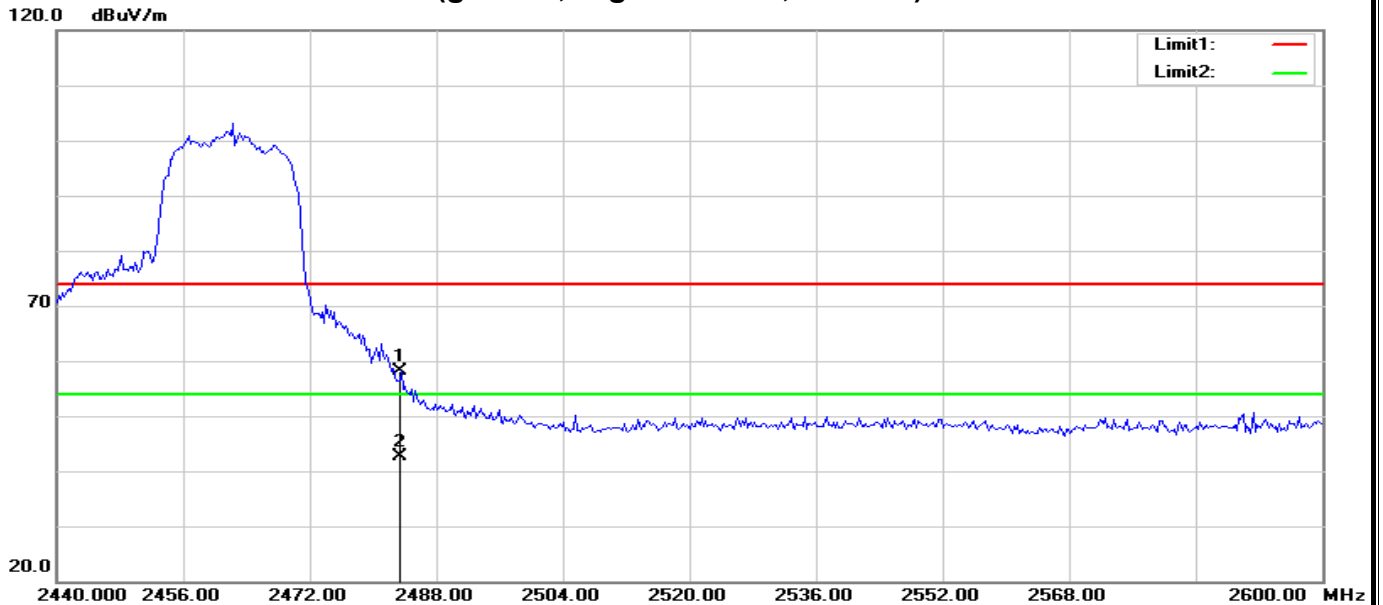
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2390.000	69.26	-7.31	61.95	74.00	-12.05	200	313	peak
2	2390.000	52.82	-7.31	45.51	54.00	-8.49	200	300	AVG

RESTRICTED BANDEDGE (g Mode, High Channel, Horizontal)



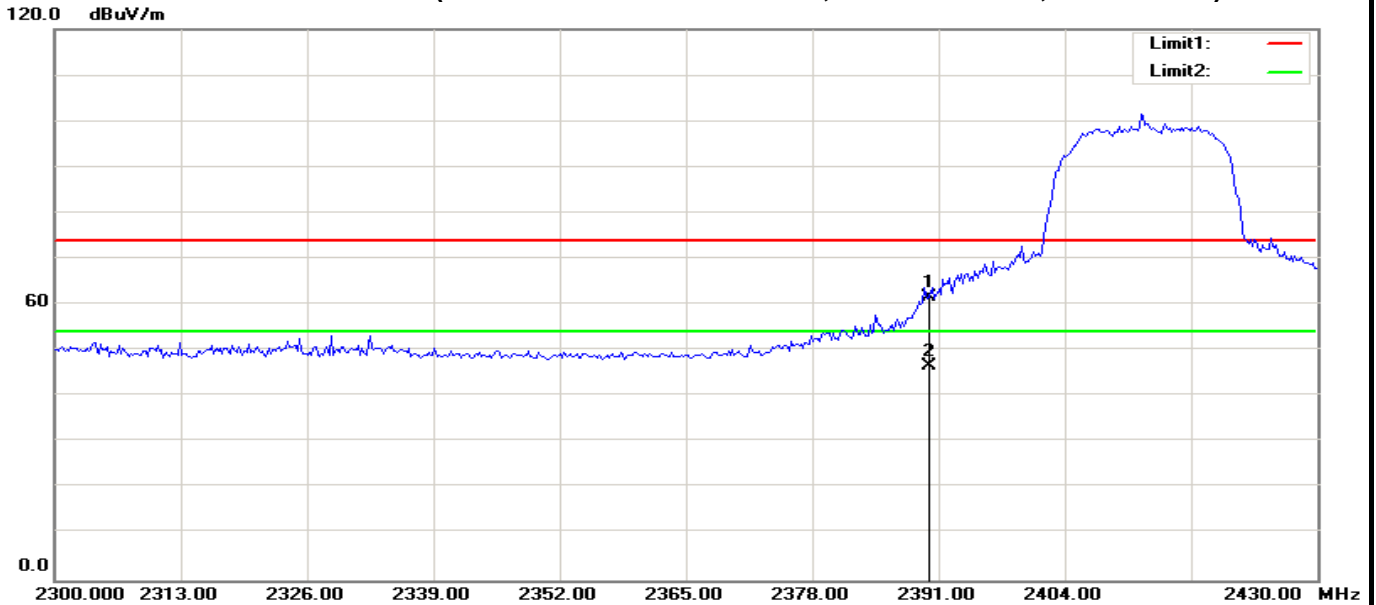
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	70.82	-6.44	64.38	74.00	-9.62	200	317	peak
2	2483.500	57.97	-6.44	51.53	54.00	-2.47	200	302	AVG
3	2484.359	71.72	-6.43	65.29	74.00	-8.71	100	280	peak
4	2484.359	56.37	-6.43	49.94	54.00	-4.06	100	250	AVG

RESTRICTED BANDEDGE (g Mode, High Channel, Vertical)



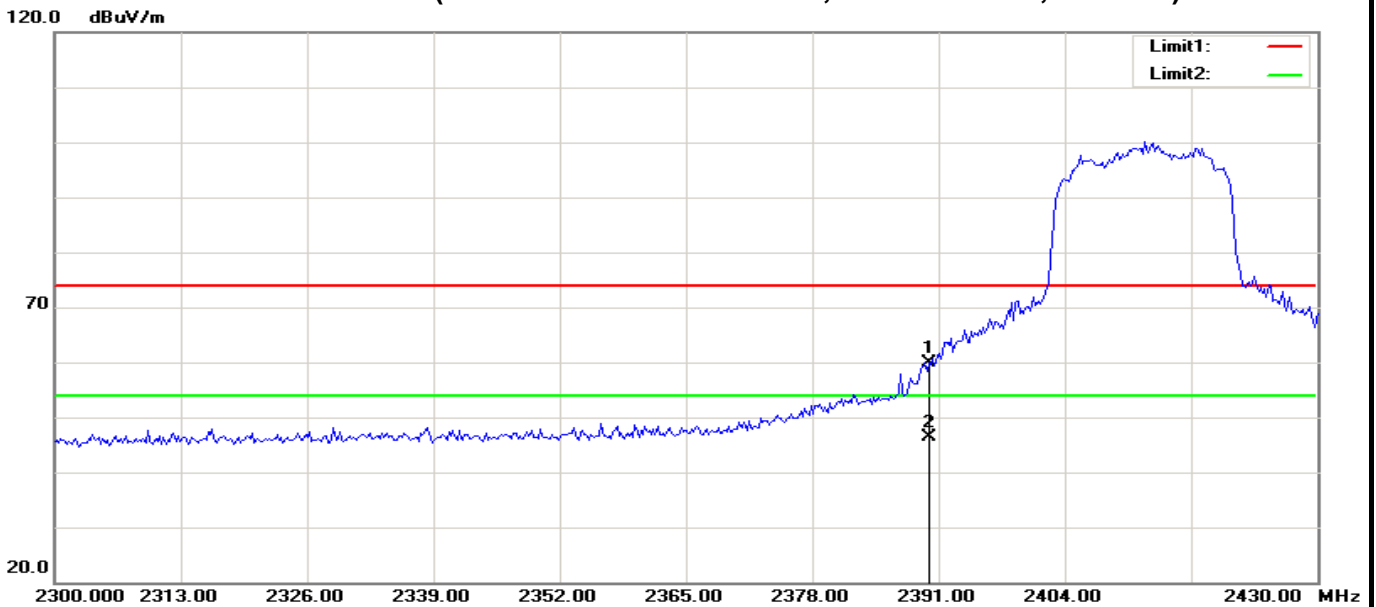
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	64.58	-6.44	58.14	74.00	-15.86	200	126	peak
2	2483.500	48.98	-6.44	42.54	54.00	-11.46	200	341	AVG

RESTRICTED BANDEDGE (IEEE 802.11n HT20 mode, Low Channel, Horizontal)



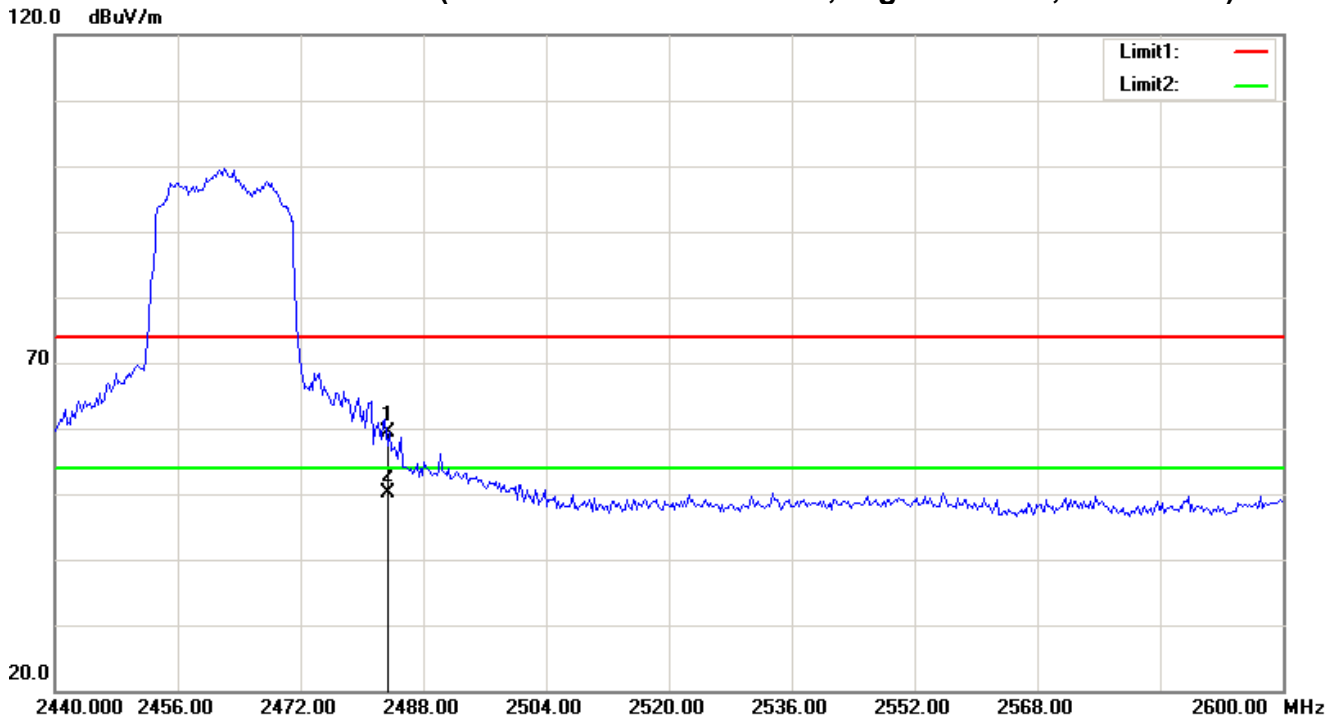
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2390.000	69.11	-7.31	61.80	74.00	-12.20	200	150	peak
2	2390.000	53.85	-7.31	46.54	54.00	-7.46	200	280	AVG

RESTRICTED BANDEDGE (IEEE 802.11n HT20 mode, Low Channel, Vertical)



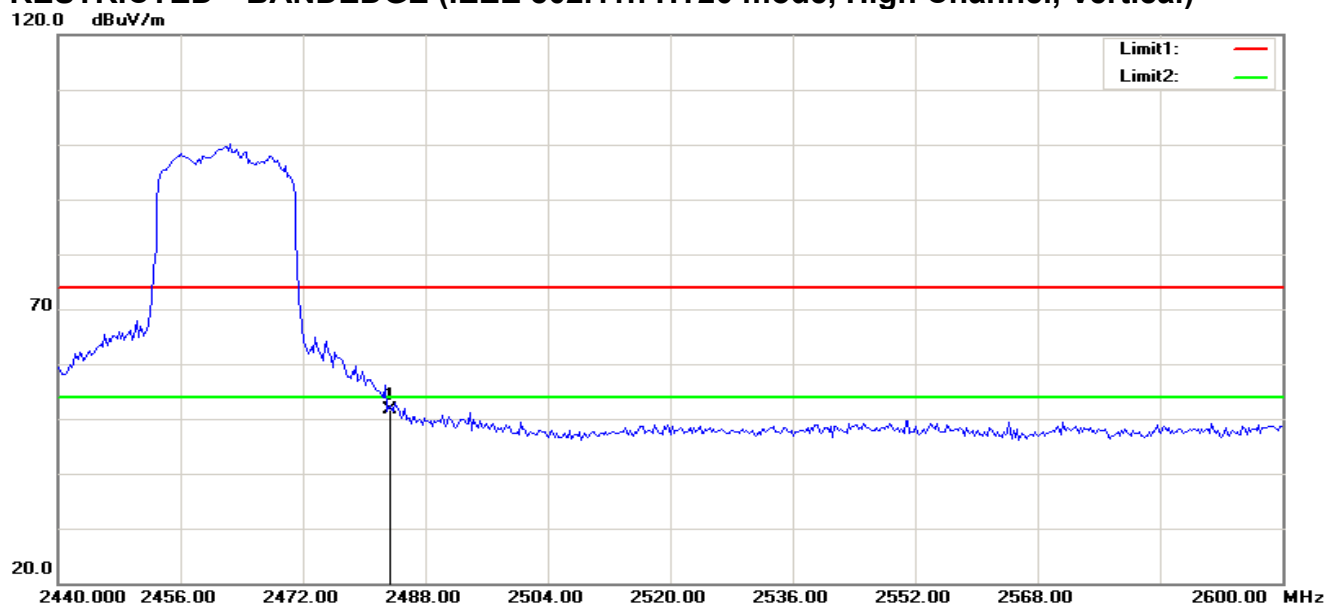
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2390.000	67.12	-7.31	59.81	74.00	-14.19	100	276	peak
2	2390.000	53.73	-7.31	46.42	54.00	-7.58	100	216	AVG

RESTRICTED BANDEDGE (IEEE 802.11n HT20 mode, High Channel, Horizontal)



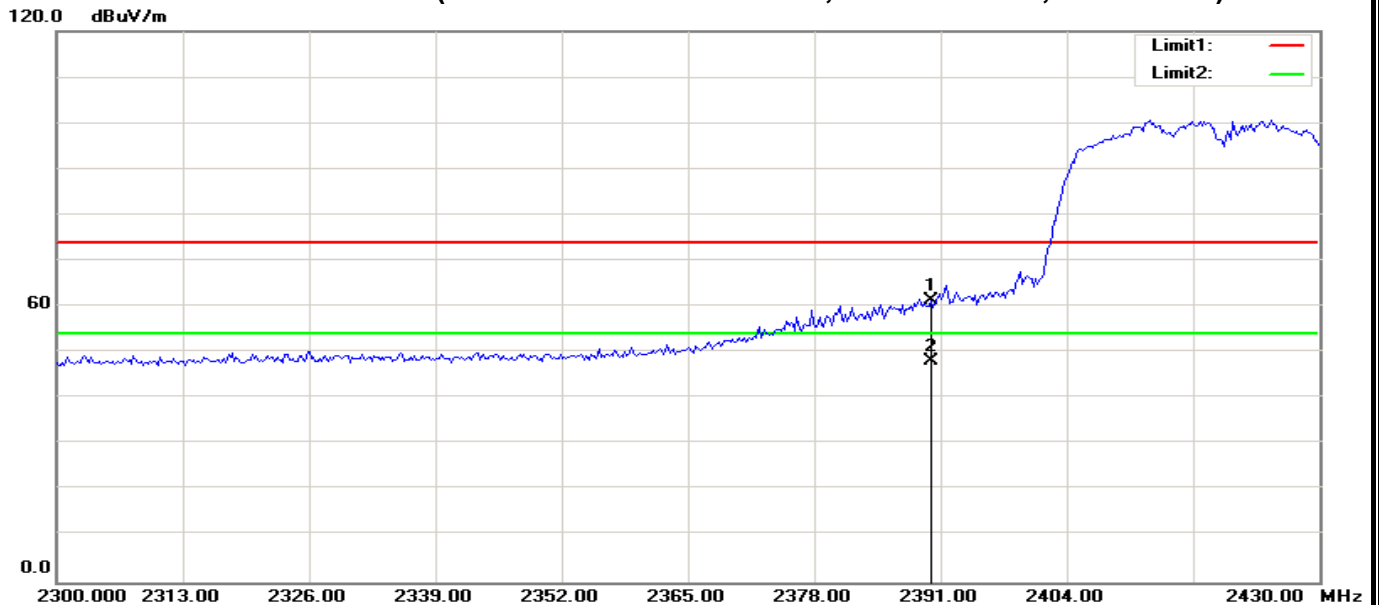
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	65.74	-6.44	59.30	74.00	-14.70	100	145	peak
2	2483.500	56.59	-6.44	50.15	54.00	-3.85	100	346	AVG

RESTRICTED BANDEDGE (IEEE 802.11n HT20 mode, High Channel, Vertical)



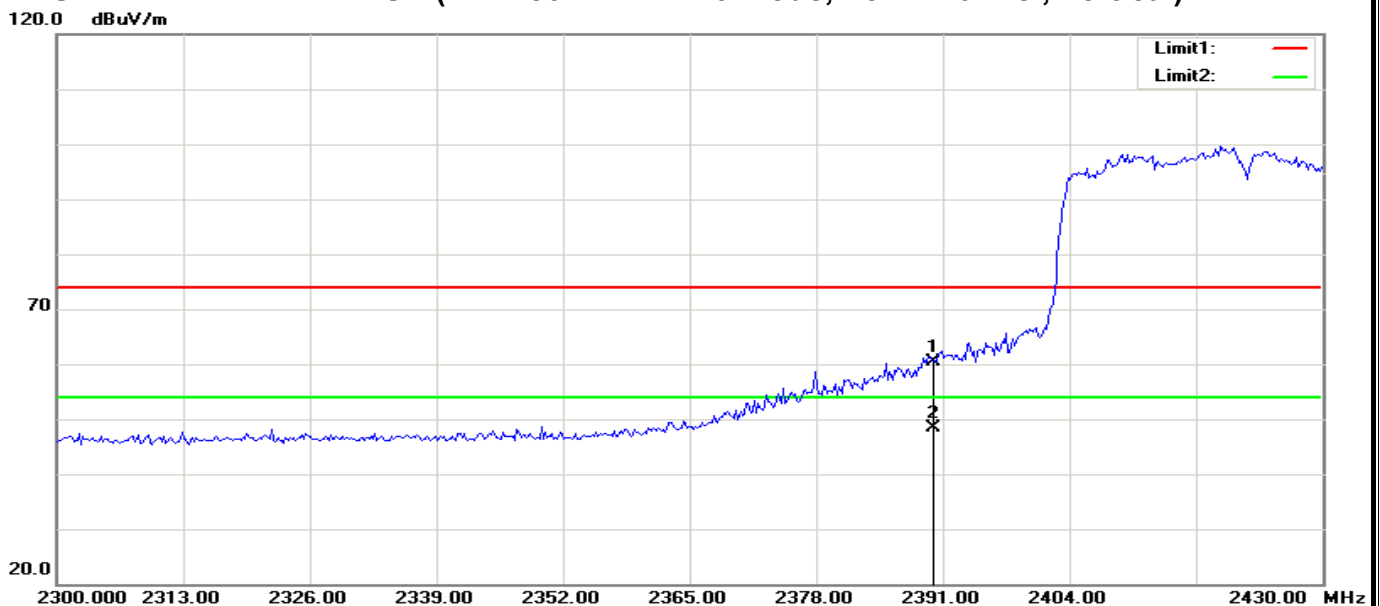
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	58.14	-6.44	51.70	74.00	-22.30	100	126	peak

RESTRICTED BANDEDGE (IEEE 802.11n HT40 mode, Low Channel, Horizontal)



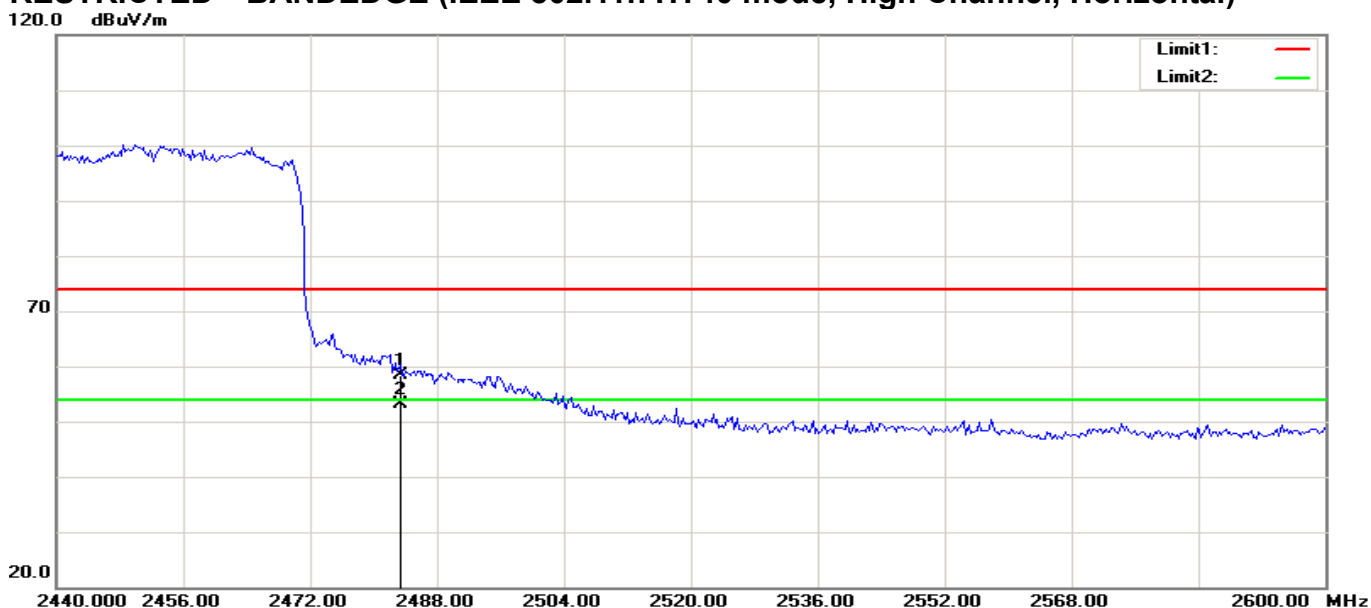
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2390.000	68.70	-7.31	61.39	74.00	-12.61	200	129	peak
2	2390.000	55.52	-7.31	48.21	54.00	-5.79	200	150	AVG

RESTRICTED BANDEDGE (IEEE 802.11n HT40 mode, Low Channel, Vertical)



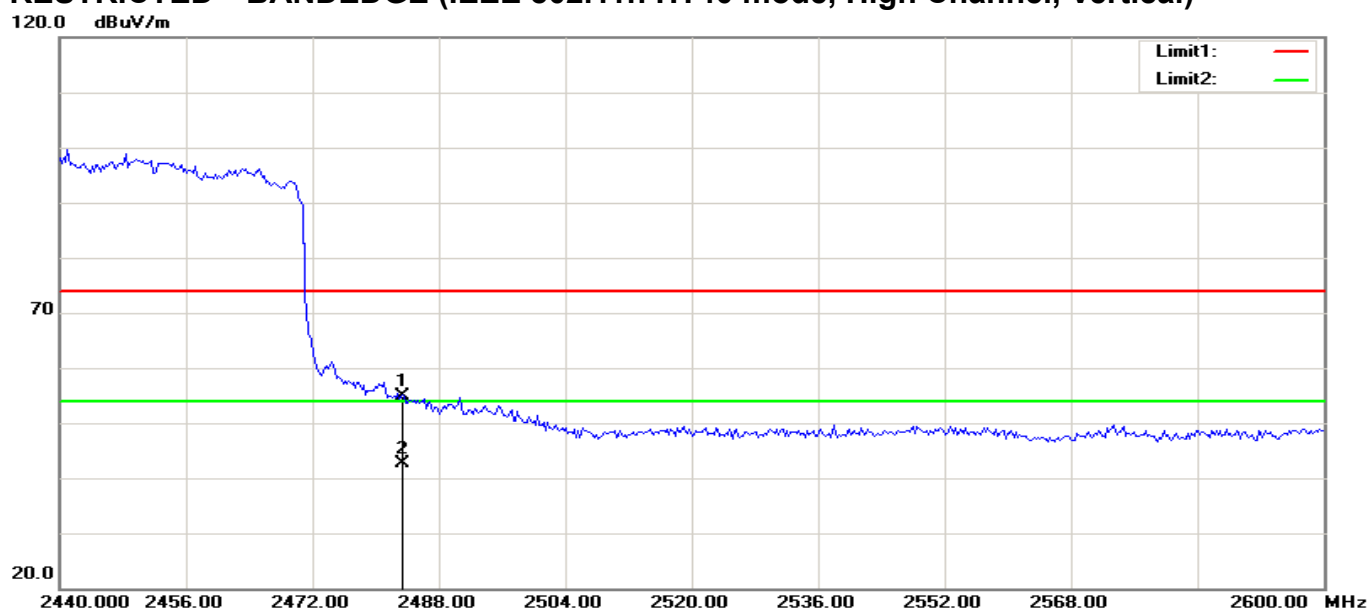
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2390.000	67.68	-7.31	60.37	74.00	-13.63	200	283	peak
2	2390.000	55.77	-7.31	48.46	54.00	-5.54	200	217	AVG

RESTRICTED BANDEDGE (IEEE 802.11n HT40 mode, High Channel, Horizontal)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	64.76	-6.44	58.32	74.00	-15.68	200	132	peak
2	2483.500	59.45	-6.44	53.01	54.00	-0.99	200	366	AVG

RESTRICTED BANDEDGE (IEEE 802.11n HT40 mode, High Channel, Vertical)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	61.31	-6.44	54.87	74.00	-19.13	100	101	peak
2	2483.500	49.01	-6.44	42.57	54.00	-11.43	100	153	AVG

Test Result of Radiated Emission

Below 30MHz

The interference of the frequency value is lower than the limit below 20 db, measured as the background noise values and will not be recorded.

30MHz-1GHz

Operation Mode:	Normal Link	Test Date:	2017-9-21
Temperature:	25°C	Tested by:	Lily.Wang
Humidity:	48% RH	Polarity:	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
143.4900	V	19.12	13.44	32.56	43.50	-10.94	peak
167.7400	V	20.74	12.77	33.51	43.50	-9.99	peak
263.7700	V	20.92	11.99	32.91	46.00	-13.09	peak
385.0200	V	21.73	15.21	36.94	46.00	-9.06	peak
431.5800	V	19.68	16.70	36.38	46.00	-9.62	peak
880.6900	V	12.91	23.41	36.32	46.00	-9.68	peak
97.9000	H	22.58	10.69	33.27	43.50	-10.23	peak
215.2700	H	23.48	11.08	34.56	43.50	-8.94	peak
263.7700	H	24.18	11.99	36.17	46.00	-9.83	peak
385.0200	H	23.88	15.21	39.09	46.00	-6.91	peak
424.7900	H	19.48	16.51	35.99	46.00	-10.01	peak
880.6900	H	12.61	23.41	36.02	46.00	-9.98	peak

Remark:

1. Measuring frequencies from 30 MHz to the 1GHz (No emission found between lowest internal used/generated frequency to 30 MHz).
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
4. $\text{Margin (dB)} = \text{Result (dBuV/m)} - \text{Limit (dBuV/m)}$.

Above 1 GHz

Operation Mode: TX / IEEE 802.11b / CH Low

Test Date: 2017-9-19

Temperature: 24°C

Tested by: Lily.Wang

Humidity: 48 % RH

Polarity: Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4814.103	48.14	-5.26	42.88	74.00	-31.12	100	301	peak
2	7238.782	44.29	6.32	50.61	74.00	-23.39	100	149	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4814.103	49.03	-5.26	43.77	74.00	-30.23	100	24	peak
2	7238.782	44.06	6.32	50.38	74.00	-23.62	100	10	peak
N/A									

Operation Mode: TX / IEEE 802.11b / CH Mid

Test Date: 2017-9-19

Temperature: 24°C

Tested by: Lily.Wang

Humidity: 48 % RH

Polarity: Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4868.590	46.63	-5.22	41.41	74.00	-32.59	100	291	peak
2	7320.513	41.77	6.40	48.17	74.00	-25.83	100	316	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4868.590	49.44	-5.22	44.22	74.00	-29.78	100	23	peak
2	7320.513	43.29	6.40	49.69	74.00	-24.31	100	183	peak
N/A									

Operation Mode: TX / IEEE 802.11b / CH High

Test Date: 2017-9-19

Temperature: 24°C

Tested by:Lily.Wang

Humidity: 48 % RH

Polarity: Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4923.077	53.78	-5.17	48.61	74.00	-25.39	100	292	peak
2	7375.000	45.90	6.45	52.35	74.00	-21.65	100	311	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4923.077	54.14	-5.17	48.97	74.00	-25.03	100	122	peak
2	7375.000	46.52	6.45	52.97	74.00	-21.03	100	182	peak
N/A									

Operation Mode: TX / IEEE 802.11g / CH Low

Test Date: 2017-9-19

Temperature: 24°C

Tested by:Lily.Wang

Humidity: 48 % RH

Polarity: Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4923.077	52.61	-5.17	47.44	74.00	-26.56	100	292	peak
2	7375.000	45.18	6.45	51.63	74.00	-22.37	100	309	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4923.077	54.58	-5.17	49.41	74.00	-24.59	100	30	peak
2	7375.000	45.56	6.45	52.01	74.00	-21.99	100	8	peak
N/A									

Operation Mode: TX / IEEE 802.11g / CH Mid
Temperature: 24°C
Humidity: 48 % RH

Test Date: 2017-9-19
Tested by: Lily.Wang
Polarity: Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4868.590	49.39	-5.22	44.17	74.00	-29.83	100	279	peak
2	7320.513	52.25	6.40	58.65	74.00	-15.35	100	264	peak
3	7320.513	37.34	6.40	43.74	54.00	-10.26	200	281	AVG
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4868.590	52.29	-5.22	47.07	74.00	-26.93	100	63	peak
2	7293.269	53.26	6.37	59.63	74.00	-14.37	100	292	peak
3	7293.269	33.11	6.37	39.48	54.00	-14.52	100	295	AVG
N/A									

Operation Mode: TX / IEEE 802.11g / CH High
Temperature: 24°C
Humidity: 48 % RH

Test Date: 2017-9-19
Tested by: Lily.Wang
Polarity: Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4923.077	51.37	-5.17	46.20	74.00	-27.80	100	279	peak
2	7375.000	49.33	6.45	55.78	74.00	-18.22	100	270	peak
3	7375.000	34.48	6.45	40.93	54.00	-13.07	100	3	AVG
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4923.077	55.21	-5.17	50.04	74.00	-23.96	100	71	peak
2	7375.000	49.72	6.45	56.17	74.00	-17.83	100	291	peak
3	7375.000	38.45	6.45	44.90	54.00	-9.10	200	286	AVG
N/A									

Operation Mode: TX / IEEE 802.11n HT20 mode / CH Low
Temperature: 24°C
Humidity: 48 % RH

Test Date: 2017-9-19
Tested by: Lily.Wang
Polarity: Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4814.103	44.66	-5.26	39.40	74.00	-34.60	100	222	peak
2	7238.782	46.91	6.32	53.23	74.00	-20.77	100	105	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4814.103	52.80	-5.26	47.54	74.00	-26.46	100	275	peak
2	7238.782	49.74	6.32	56.06	74.00	-17.94	100	113	peak
3	7238.782	37.87	6.32	44.19	54.00	-9.81	187	112	AVG
N/A									

Operation Mode: TX / IEEE 802.11n HT20 mode / CH Mid
Temperature: 24°C
Humidity: 48 % RH

Test Date: 2017-9-19
Tested by: Lily.Wang
Polarity: Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4868.590	39.81	-5.22	34.59	74.00	-39.41	100	67	peak
2	7347.756	39.67	6.42	46.09	74.00	-27.91	100	49	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4868.590	43.05	-5.22	37.83	74.00	-36.17	100	142	peak
2	7157.051	41.95	6.25	48.20	74.00	-25.80	100	302	peak
N/A									

Operation Mode: TX / IEEE 802.11n HT20 mode / CH High **Test Date:** 2017-9-19

Temperature: 24°C

Tested by: Lily.Wang

Humidity: 48 % RH

Polarity: Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4923.077	47.91	-5.17	42.74	74.00	-31.26	100	284	peak
2	7375.000	45.65	6.45	52.10	74.00	-21.90	100	4	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4923.077	51.17	-5.17	46.00	74.00	-28.00	100	339	peak
2	7375.000	46.78	6.45	53.23	74.00	-20.77	100	207	peak
N/A									

Operation Mode: TX / IEEE 802.11n HT40 mode / CH Low

Test Date: 2017-9-19

Temperature: 24°C

Tested by: Lily.Wang

Humidity: 48 % RH

Polarity: Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4841.346	43.83	-5.24	38.59	74.00	-35.41	100	280	peak
2	7238.782	42.21	6.32	48.53	74.00	-25.47	100	22	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4841.346	47.57	-5.24	42.33	74.00	-31.67	100	336	peak
2	7266.026	43.78	6.35	50.13	74.00	-23.87	100	116	peak
N/A									

Operation Mode: TX / IEEE 802.11n HT40 mode / CH Mid
Temperature: 24°C
Humidity: 48 % RH

Test Date: 2017-9-19
Tested by: Lily.Wang
Polarity: Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4868.590	45.05	-5.22	39.83	74.00	-34.17	100	285	peak
2	7293.269	42.69	6.37	49.06	74.00	-24.94	100	20	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4868.590	50.27	-5.22	45.05	74.00	-28.95	100	341	peak
2	7293.269	44.14	6.37	50.51	74.00	-23.49	100	175	peak
N/A									

Operation Mode: TX / IEEE 802.11n HT40 mode / CH High **Test Date:** 2017-9-19
Temperature: 24°C **Tested by:** Lily.Wang
Humidity: 48 % RH **Polarity:** Ver. / Hor.

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4895.833	46.54	-5.19	41.35	74.00	-32.65	100	280	peak
2	7347.756	41.43	6.42	47.85	74.00	-26.15	100	4	peak
N/A									

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4895.833	50.57	-5.19	45.38	74.00	-28.62	100	346	peak
2	7347.756	42.17	6.42	48.59	74.00	-25.41	100	170	peak
N/A									

7.7.POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

* Decreases with the logarithm of the frequency.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

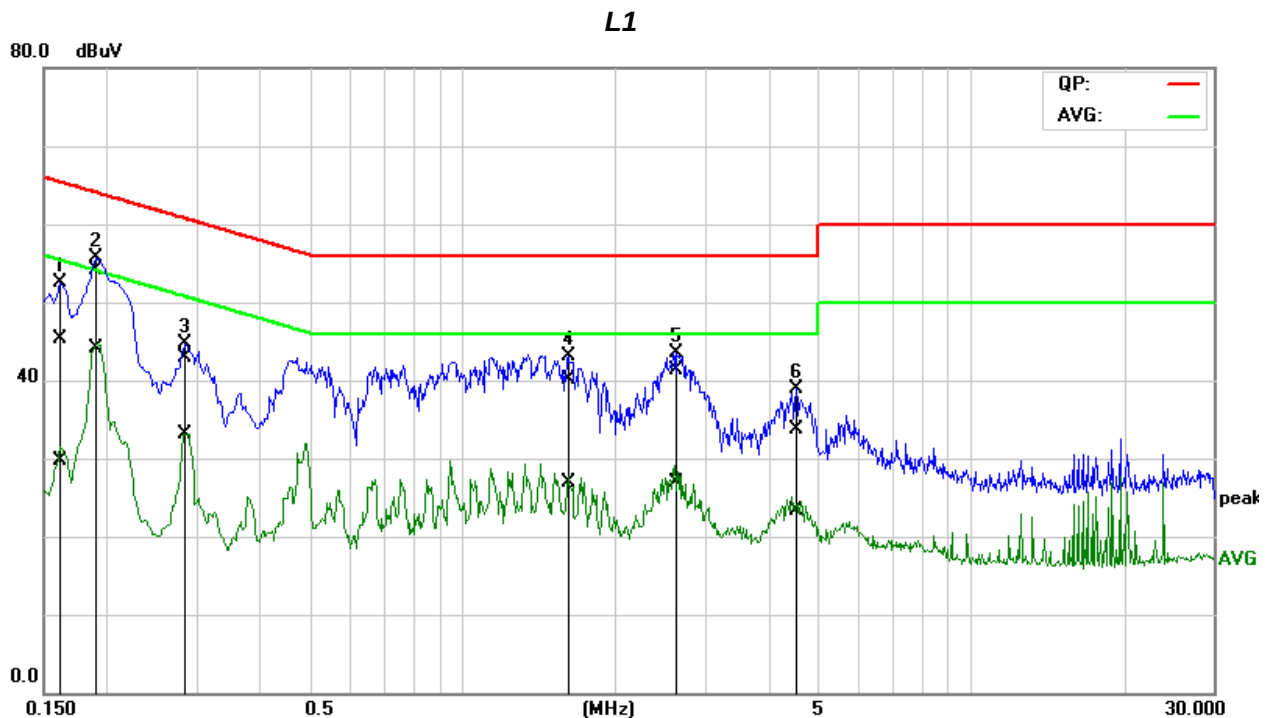
- 1.The EUT was placed on a table, which is 0.8m above ground plane.
- 2.Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3.Repeat above procedures until all frequency measured were complete.

TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

TEST DATA

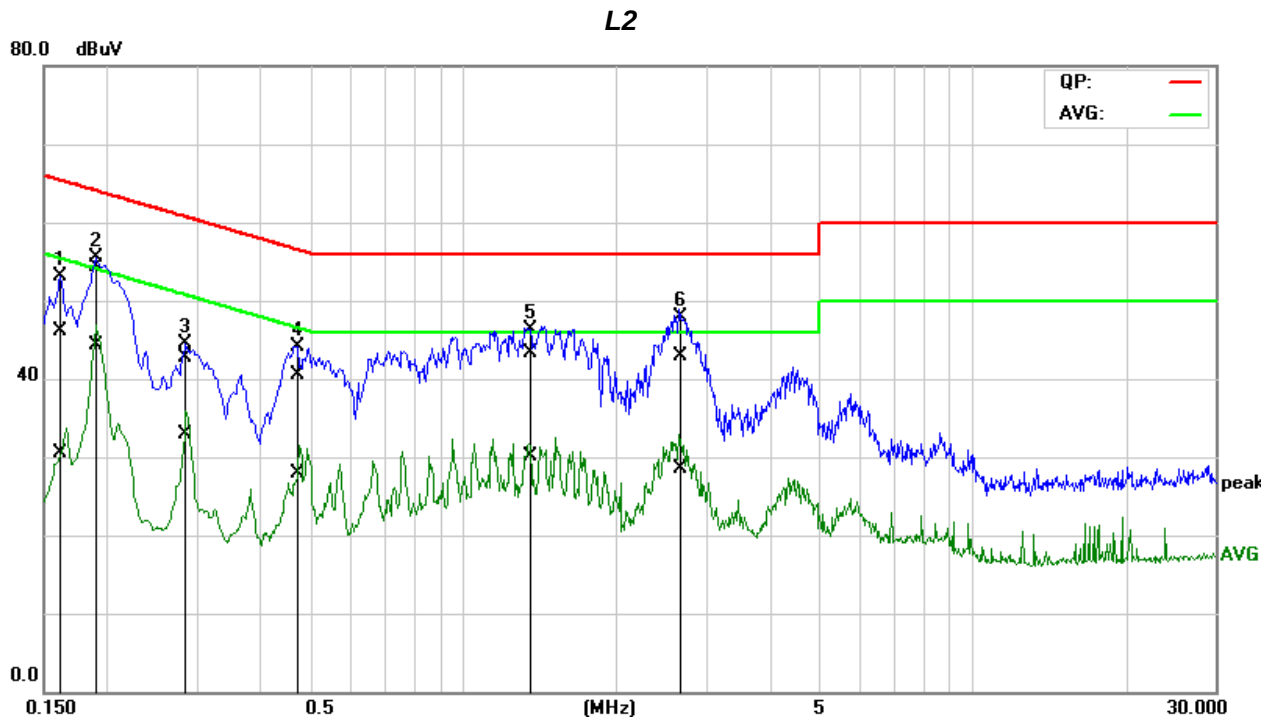
Job No.:	C170913R02	Date:	2017/9/25
Model No.:	AS02-PAR38NAE26	Time:	16:18:04
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/41%
Test item:	Conduction test	Test By:	King.Xu
Line:	L1	Test Voltage:	AC 120V/60Hz
Model:		Description:	



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1608	24.75	9.13	20.57	45.32	29.70	65.42	55.42	-20.10	-25.72	Pass
2*	0.1887	33.50	23.52	20.53	54.03	44.05	64.09	54.09	-10.06	-10.04	Pass
3	0.2844	22.34	12.62	20.50	42.84	33.12	60.69	50.69	-17.85	-17.57	Pass
4	1.6147	19.57	6.46	20.46	40.03	26.92	56.00	46.00	-15.97	-19.08	Pass
5	2.6038	20.84	6.50	20.50	41.34	27.00	56.00	46.00	-14.66	-19.00	Pass
6	4.5368	13.06	2.72	20.59	33.65	23.31	56.00	46.00	-22.35	-22.69	Pass

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Job No.:	C170913R02	Date:	2017/9/25
Model No.:	AS02-PAR38NAE26	Time:	16:18:04
Standard:	FCC Class B	Temp.(C)/Hum.(%)	22(C)/41%
Test item:	Conduction test	Test By:	King.Xu
Line:	L2	Test Voltage:	AC 120V/60Hz
Model:		Description:	



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1628	25.80	10.20	20.37	46.17	30.57	65.32	55.32	-19.15	-24.75	Pass
2*	0.1894	33.83	23.92	20.39	54.22	44.31	64.06	54.06	-9.84	-9.75	Pass
3	0.2839	22.20	12.46	20.45	42.65	32.91	60.70	50.70	-18.05	-17.79	Pass
4	0.4711	20.12	7.53	20.45	40.57	27.98	56.49	46.49	-15.92	-18.51	Pass
5	1.3539	22.77	9.71	20.48	43.25	30.19	56.00	46.00	-12.75	-15.81	Pass
6	2.6888	22.32	8.02	20.58	42.90	28.60	56.00	46.00	-13.10	-17.40	Pass

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Remark:

- 1.The measuring frequencies range between 0.15 MHz and 30 MHz.
- 2.The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.
- 3.“---” denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.
- 4.The IF bandwidth of SPA between 0.15MHz and 30MHz was 10KHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.

END OF REPORT