



## FCC 47 CFR PART 15 SUBPART C

### TEST REPORT

For

**450Mbps Dual Band Wireless N 4-Port Media Bridge**

**Model: TEW-680MB**

**Trade Name: TRENDnet**

*Issued to*

**TRENDnet, Inc.  
20675 Manhattan Place, Torrance, CA 90501**

*Issued by*



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Issued Date: August 3, 2011**



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**Revision History**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	July 27, 2011	Initial Issue	ALL	Sandy Lin
01	August 3, 2011	Revised Conducted Spurious Emission	P.110-148	Sandy Lin
01	August 3, 2011	Revised 6DB Bandwidth	P.44	Sandy Lin



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## 1. TEST RESULT CERTIFICATION

**Applicant:** TRENDnet, Inc.  
20675 Manhattan Place, Torrance, CA 90501

**Equipment Under Test:** 450Mbps Dual Band Wireless N 4-Port Media Bridge

**Trade Name:** TRENDnet

**Model Number:** TEW-680MB

**Date of Test:** July 9 ~ August 2, 2011

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted
Deviation from Applicable Standard	
N/A	

### 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 C63.4: 2003 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:*

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Rex Lai  
Section Manager  
Compliance Certification Services Inc.

*Reviewed by:*

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Gina Lo  
Section Manager  
Compliance Certification Services Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	450Mbps Dual Band Wireless N 4-Port Media Bridge
<b>Trade Name</b>	TRENDnet
<b>Model Number</b>	TEW-680MB
<b>Model Discrepancy</b>	N/A
<b>Received Date</b>	July 5, 2011
<b>Power Supply</b>	Power Adapter Bestec / EA0121WAA I/P: 100-240V, 50-60Hz, 0.5A O/P: 12V, 1A, 12W
<b>Frequency Range</b>	2412 ~ 2462 MHz 5.725~5.850 GHz
<b>Transmit Power</b>	IEEE 802.11b mode: 20.67dBm IEEE 802.11g mode: 26.59 dBm IEEE 802.11n HT 20 MHz mode: 28.86 dBm IEEE 802.11n HT 40 MHz mode: 28.70 dBm IEEE 802.11a mode: 18.52 dBm IEEE 802.11n HT 20 MHz Channel mode: 21.57 dBm IEEE 802.11n HT 40 MHz mode: 20.90 dBm
<b>Modulation Technique</b>	IEEE 802.11b mode: DSSS IEEE 802.11g mode: OFDM IEEE 802.11n HT 20 MHz mode: OFDM IEEE 802.11n HT 40 MHz mode: OFDM IEEE 802.11a: OFDM IEEE 802.11n HT 20 MHz Channel mode: OFDM IEEE 802.11n HT 40 MHz mode: OFDM
<b>Number of Channels</b>	IEEE 802.11b/g mode: 11 Channels IEEE 802.11n HT 20 MHz mode: 11 Channels IEEE 802.11n HT 40 MHz mode: 7 Channels IEEE 802.11a mode: 5 Channels IEEE 802.11n HT 20 MHz Channel mode: 5 Channels IEEE 802.11n HT 40 MHz mode: 2 Channels
<b>Antenna Specification</b>	2412 ~ 2462 MHz: PCB Antenna / Gain: 2 dBi 5.725~5.850 GHz: PCB Antenna / Gain: 1 dBi MIMO Mode: Total ANT= $10 * \text{LOG}(((10^{(\text{ANT0}/20)} + 10^{(\text{ANT1}/20)})^2) + 10^{(\text{ANT2}/20)})^2 / 3)$ 2412 ~ 2462 MHz: 6.77 dBi (Numeric gain: 4.75) 5.725~5.850 GHz: 5.77 dBi (Numeric gain: 3.78)

**Remark:**

1. The sample selected for test was production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: XU8TEW680MB filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



### **3. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 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 C63.4 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**

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 C63.4.



### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

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

<b>MHz</b>	<b>MHz</b>	<b>MHz</b>	<b>GHz</b>
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 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 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

(b) 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**

The EUT (model: TEW-680MB) had been tested under operating condition.

The EUT is a 3x3 configuration spatial MIMO (3Tx & 3Rx) without beam forming function that operate in triple TX chains and triple RX chains. The 3x3 configuration is implemented with three outside TX & RX chains (Chain 0, Chain 1 and Chain 2).

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

#### **IEEE 802.11b mode:**

Channel Low (2412MHz), Channel Mid (2442MHz) and Channel High (2462MHz) with chain 0 at 1Mbps data rate were chosen for full testing.

#### **IEEE 802.11g mode:**

Channel Low (2412MHz), Channel Mid (2442MHz) and Channel High (2462MHz) with chain 0 at 6Mbps data rate were chosen for full testing.

#### **IEEE 802.11n HT 20 MHz mode:**

Channel Low (2412MHz), Channel Mid (2442MHz) and Channel High (2462MHz) with 3 chain transmitting simultaneously at MCS 16 data rate were chosen for full testing.

#### **IEEE 802.11n HT 40 MHz mode:**

Channel Low (2422MHz), Channel Mid (2442MHz) and Channel High (2452MHz) with 3 chain transmitting simultaneously at MCS 16 data rate were chosen for full testing.

#### **IEEE 802.11a mode:**

Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with chain 0 at 6Mbps data rate were chosen for full testing.

#### **IEEE 802.11n HT 20 MHz mode:**

Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 3 chain transmitting simultaneously at MCS 16 data rate were chosen for full testing.

#### **IEEE 802.11n HT 40 MHz mode:**

Channel Low (5755MHz) and Channel High (5795MHz) with 3 chain transmitting simultaneously at MCS 16 data rate were chosen for full testing.



## 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.

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

*Remark: Each piece of equipment is scheduled for calibration once a year and Loop Antenna is scheduled for calibration once three years.*

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	03/02/2012
Power Meter	Anritsu	ML2495A	1012009	03/27/2012
Power Sensor	Anritsu	MA2411B	0917072	03/08/2012

Wugu 966 Chamber A				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	11/03/2011
EMI Test Receiver	R&S	ESCI	100064	02/03/2012
Pre-Amplifier	Mini-Circuits	ZFL-1000LN	SF350700823	01/12/2012
Pre-Amplifier	MITEQ	AFS44-00102650-42-10P-44	1415367	11/19/2011
Bilog Antenna	Sunol Sciences	JB3	A030105	10/06/2011
Horn Antenna	EMCO	3117	00055165	01/12/2012
Turn Table	CCS	CC-T-1F	N/A	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R
Site NSA	CCS	N/A	N/A	12/26/2011
Test S/W	EZ-EMC (CCS-3A1RE)			

Conducted Emission room # A				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESHS10	843743/015	05/01/2012
LISN	SCHWARZBECK	NSLK 8127	8127-541	12/18/2011
LISN	SCHAFFNER	NNB 41	03/10013	N.C.R.
Test S/W	CCS-3A1-CE			



### 4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 1.6202
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0606
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9979
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5790
3M Semi Anechoic Chamber / 8G~18G	+/- 2.5928
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7212
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9520

*Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.*



## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

- No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.  
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029
- No.11, Wu-Gong 6th Rd., Wugu Industrial Park, New Taipei City 248, Taiwan (R.O.C.)  
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045
- No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, TAIWAN, R.O.C.  
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 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.

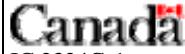
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

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 TABLE OF ACCREDITATIONS AND LISTINGS**

<b>Country</b>	<b>Agency</b>	<b>Scope of Accreditation</b>	<b>Logo</b>
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	 FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	 Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

*\* 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 II for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Wireless Pre-N Router (MIMO) (Remote)	BELKIN	F5D8230-4	N/A	SA3-AGN0901AP0100	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
2.	Notebook PC (Remote)	HP	dv6-1332TX	CNF9491GLJ	PD9112BNHU	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

**Remark:**

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



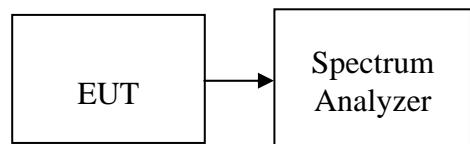
## 7. FCC PART 15.247 REQUIREMENTS

### 7.1 6DB BANDWIDTH

#### LIMIT

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

#### Test Configuration



## 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  
for 2.4G: RBW = 100 kHz, VBW = 300 kHz, Span = 50 MHz, Sweep = 500ms.  
for 5G: RBW = 100 kHz, VBW = RBW, Span = 50 MHz, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

## TEST RESULTS

*No non-compliance noted*



**Test Data**

**Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	12.4167	>500	PASS
Mid	2442	12.3334		PASS
High	2462	12.4167		PASS

**Test mode: IEEE 802.11g mode**

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.6666	>500	PASS
Mid	2442	16.5833		PASS
High	2462	16.5833		PASS

**Test mode: IEEE 802.11n HT 20 MHz mode / Chain 0**

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.6666	>500	PASS
Mid	2442	17.75		PASS
High	2462	17.75		PASS

**Test mode: IEEE 802.11n HT 20 MHz mode / Chain 1**

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.6666	>500	PASS
Mid	2442	17.75		PASS
High	2462	17.75		PASS

**Test mode: IEEE 802.11n HT 20 MHz mode / Chain 2**

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.6666	>500	PASS
Mid	2442	17.75		PASS
High	2462	17.75		PASS

**Test mode: IEEE 802.11n HT 40 MHz mode / Chain 0**

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.0833	>500	PASS
Mid	2442	36.4167		PASS
High	2452	36		PASS

**Test mode: IEEE 802.11n HT 40 MHz mode / Chain 1**

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	35.6667	>500	PASS
Mid	2442	36		PASS
High	2452	36.25		PASS

**Test mode: IEEE 802.11n HT 40 MHz mode / Chain 2**

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.4167	>500	PASS
Mid	2442	36.0833		PASS
High	2452	36.1667		PASS

**Test mode: IEEE 802.11a mode**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	5745	16.50	>500	PASS
Mid	5785	16.58		PASS
High	5825	16.58		PASS

**Test mode: IEEE 802.11n HT 20 MHz Channel mode / Chain 0**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	5745	17.33	>500	PASS
Mid	5785	17.58		PASS
High	5825	17.67		PASS

**Test mode: IEEE 802.11n HT 20 MHz Channel mode / Chain 1**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	5745	16.42	>500	PASS
Mid	5785	17.42		PASS
High	5825	17.33		PASS

**Test mode: IEEE 802.11n HT 20 MHz Channel mode / Chain 2**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	5745	17.00	>500	PASS
Mid	5785	17.33		PASS
High	5825	17.42		PASS

**Test mode: IEEE 802.11n HT 40 MHz mode / Chain 0**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	5755	35.75	>500	PASS
High	5795	35.42		PASS

**Test mode: IEEE 802.11n HT 40 MHz mode / Chain 1**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	5755	35.00	>500	PASS
High	5795	34.75		PASS

**Test mode: IEEE 802.11n HT 40 MHz mode / Chain 2**

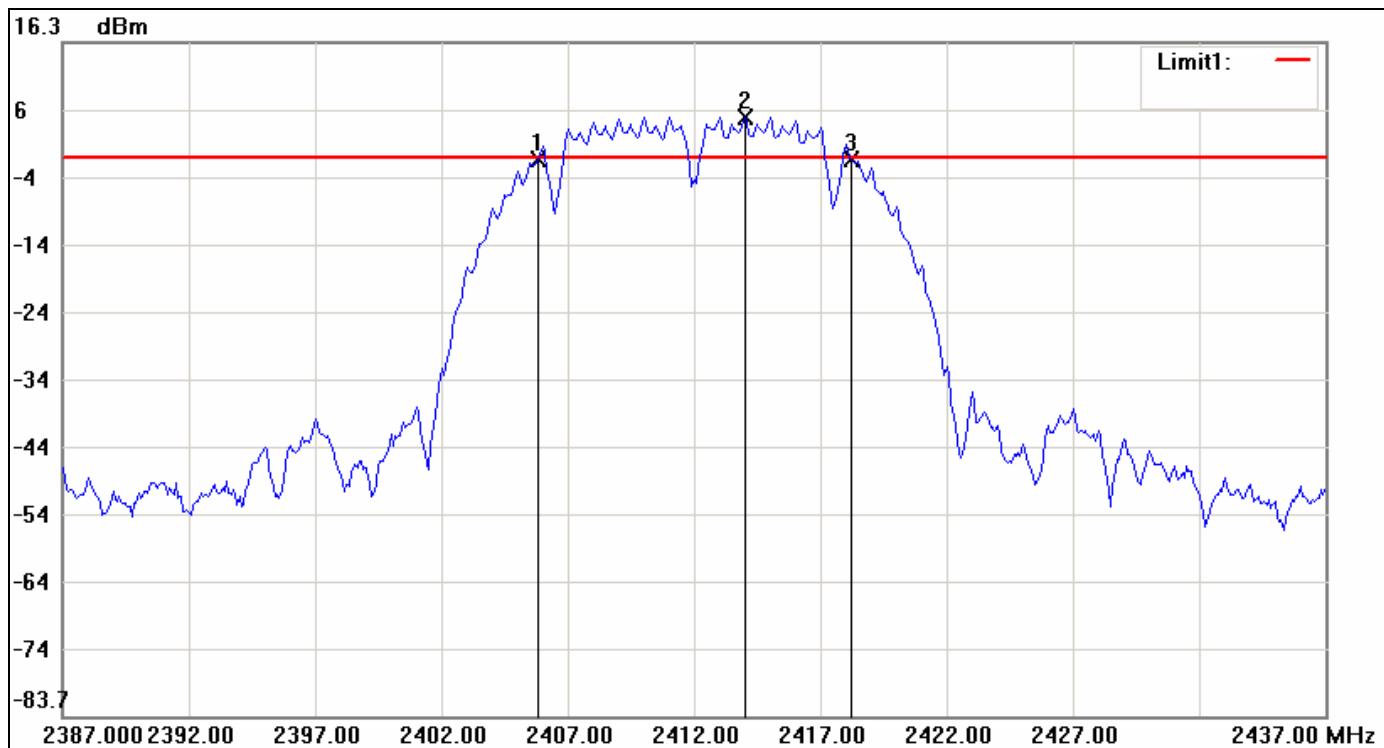
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	5755	35.67	>500	PASS
High	5795	35.75		PASS



### Test Plot

#### IEEE 802.11b mode

#### **6dB Bandwidth (CH Low)**

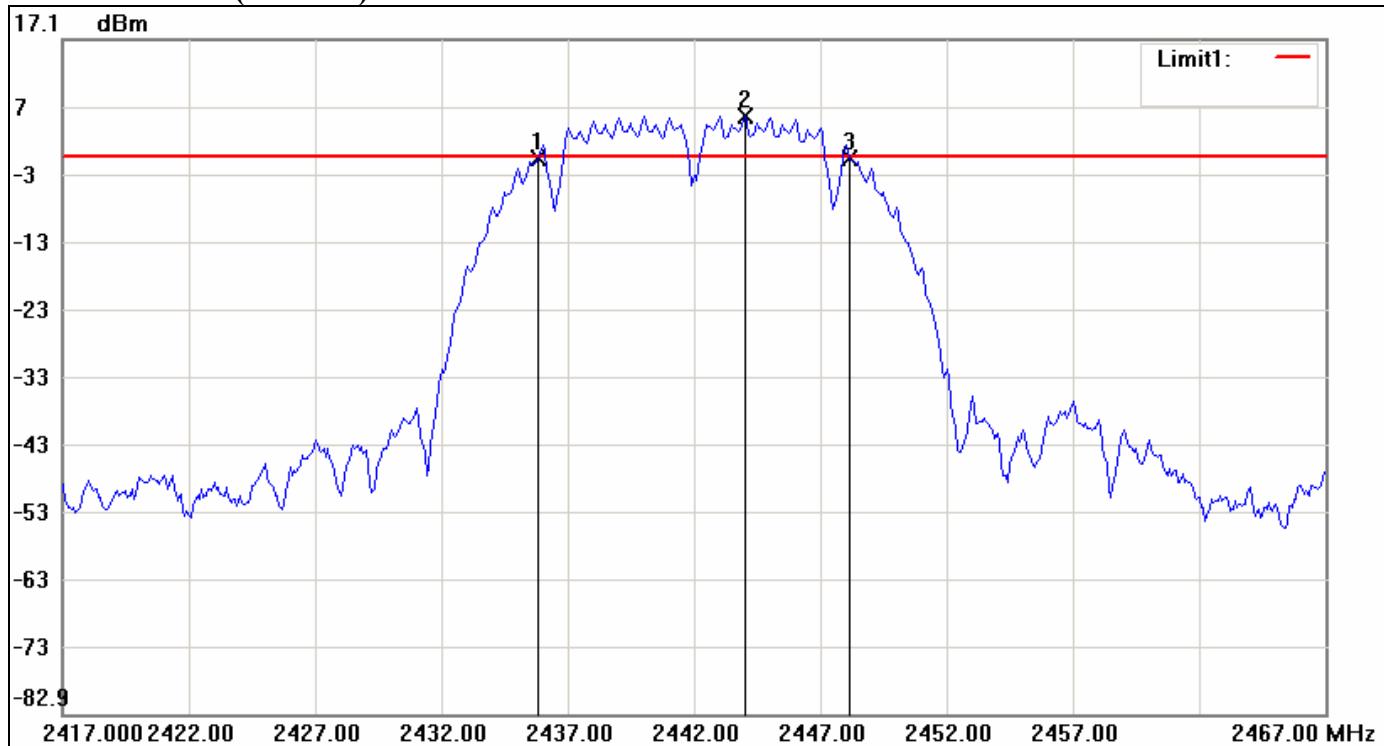


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2405.8333	-1.08	-0.86	-0.22
2	2414.0000	5.14	-0.86	6.00
3	2418.2500	-1.09	-0.86	-0.23

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	12.4167	-0.01



### 6dB Bandwidth (CH Mid)

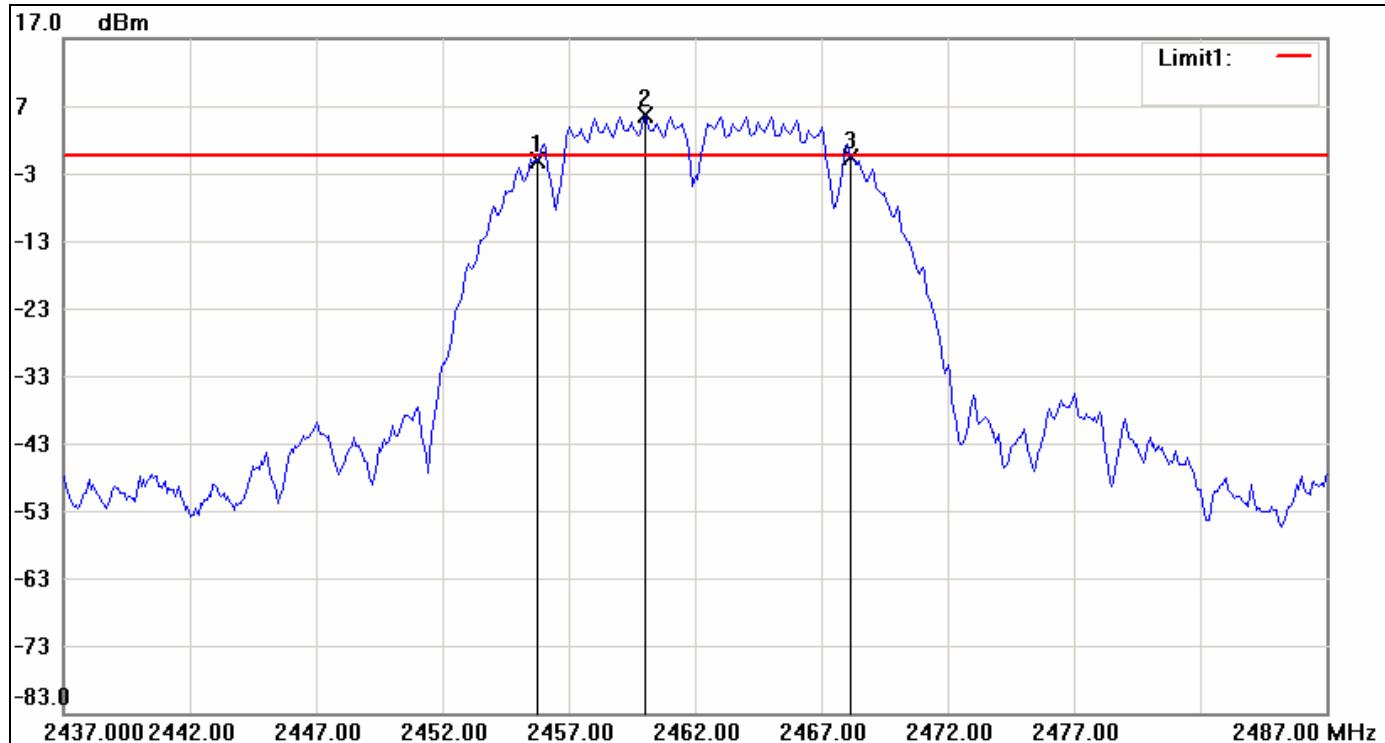


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2435.8333	-0.47	-0.39	-0.08
2	2444.0000	5.61	-0.39	6.00
3	2448.1667	-0.45	-0.39	-0.06

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	12.3334	0.02



### 6dB Bandwidth (CH High)



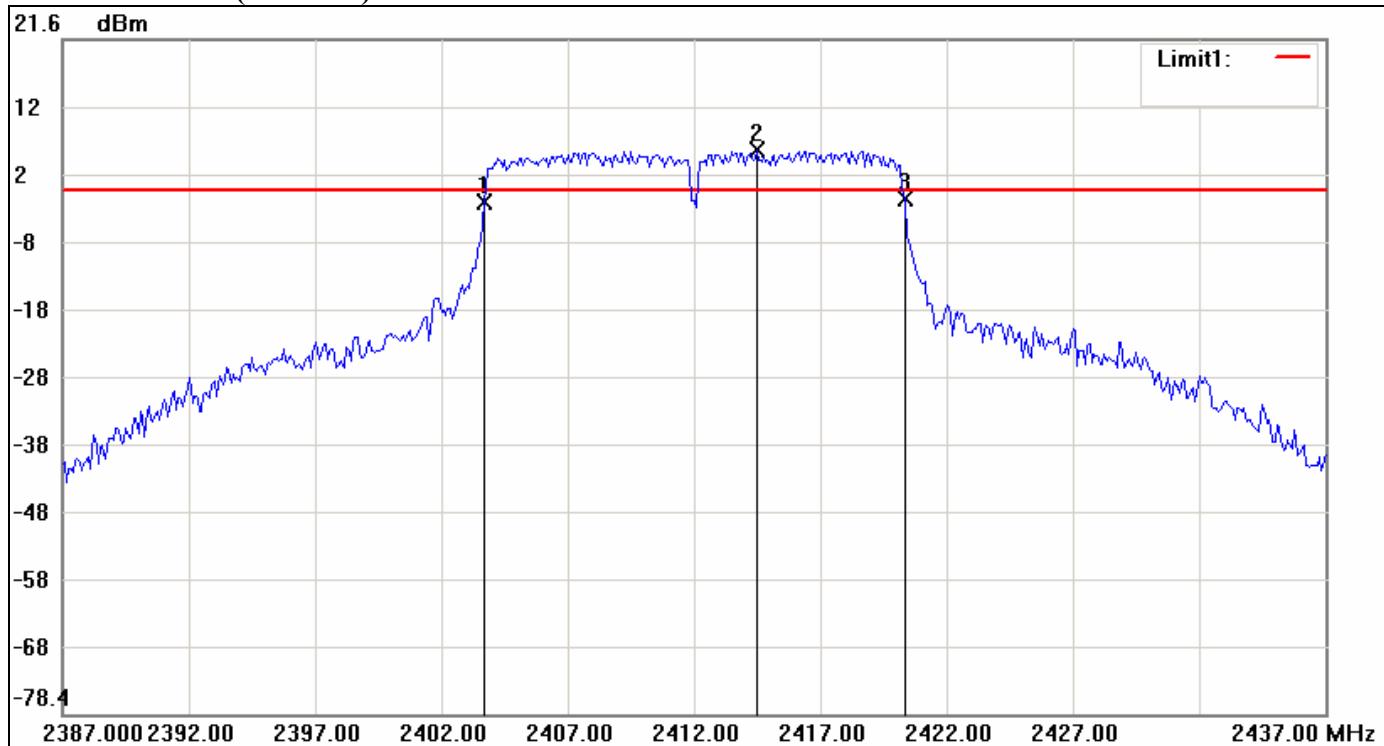
No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2455.7500	-1.04	-0.44	-0.60
2	2460.0000	5.56	-0.44	6.00
3	2468.1667	-0.64	-0.44	-0.20

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	12.4167	0.4



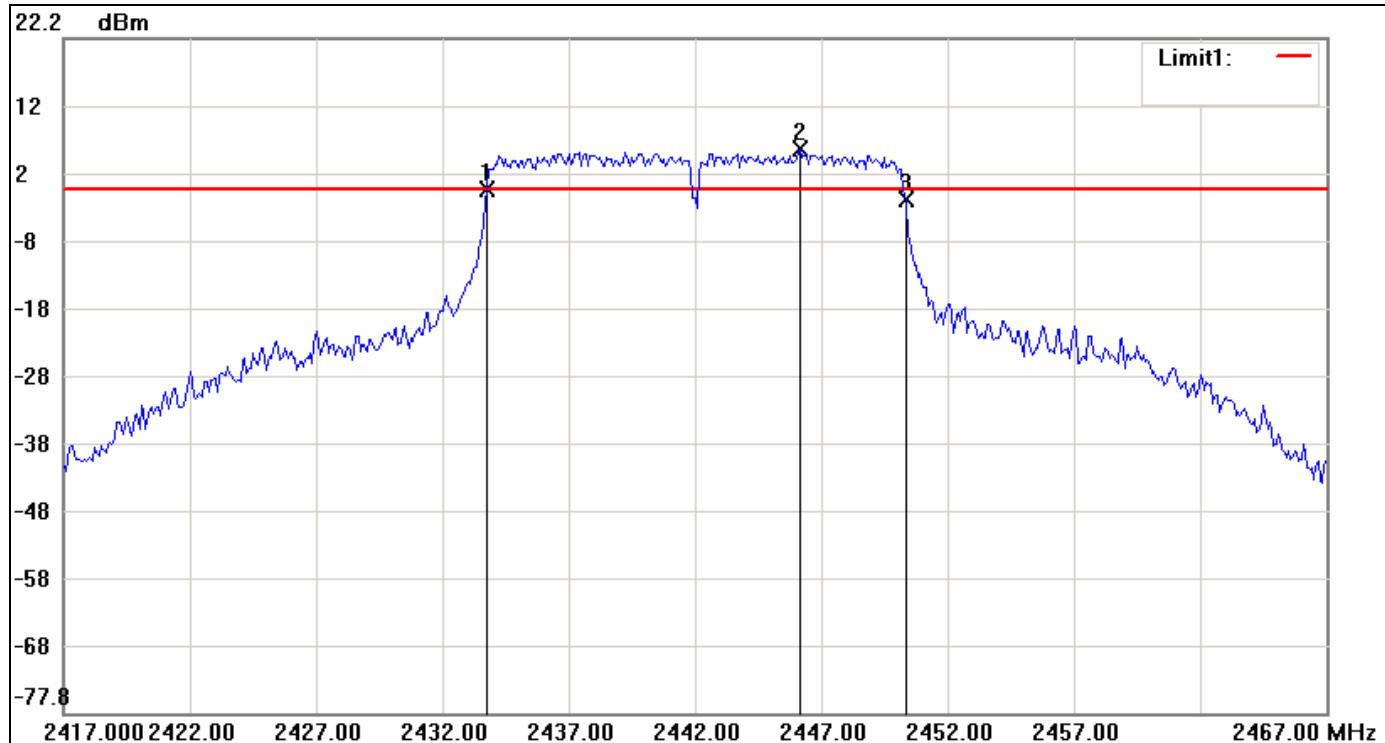
**IEEE 802.11g mode**

**6dB Bandwidth (CH Low)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2403.6667	-2.46	-0.88	-1.58
2	2414.5000	5.12	-0.88	6.00
3	2420.3333	-2.04	-0.88	-1.16

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	16.6666	0.42

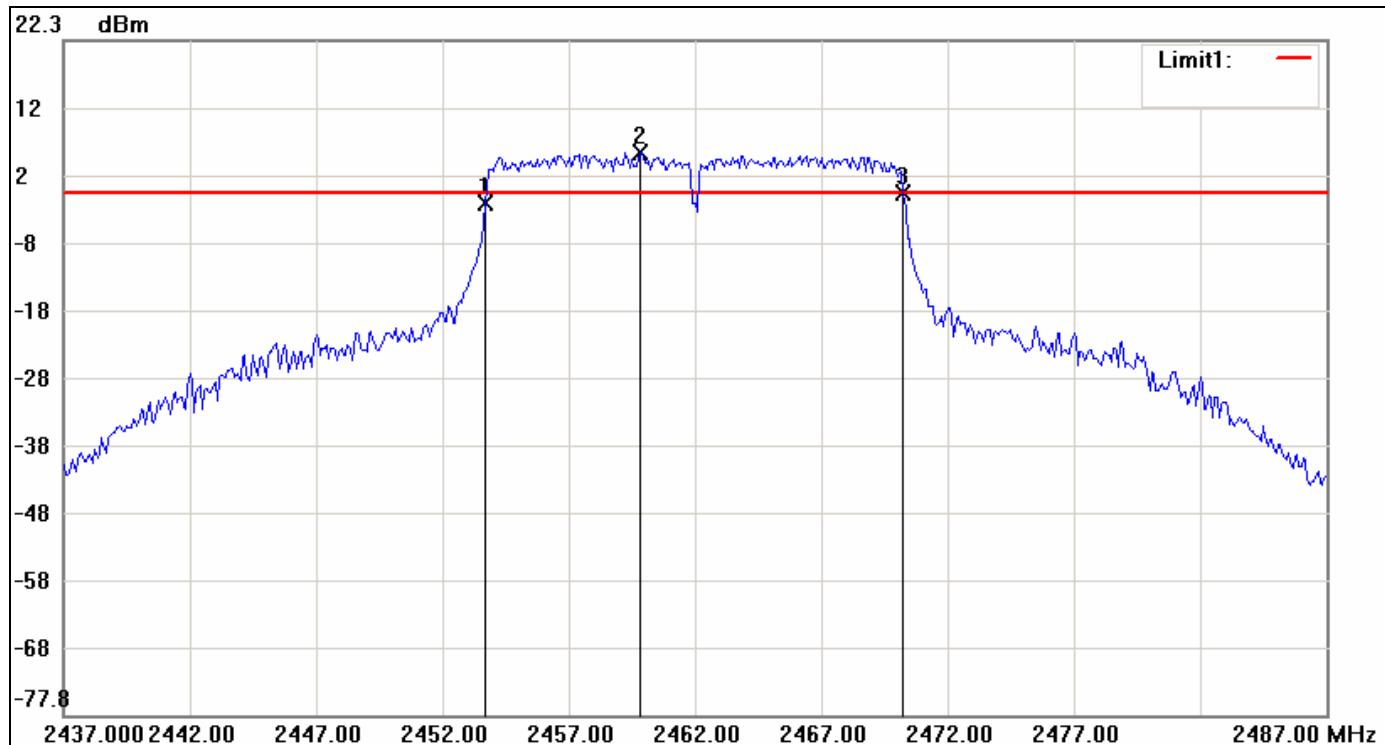
**6dB Bandwidth (CH Mid)**

No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2433.7500	-0.22	-0.16	-0.06
2	2446.1667	5.84	-0.16	6.00
3	2450.3333	-1.57	-0.16	-1.41

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	16.5833	-1.35



### 6dB Bandwidth (CH High)



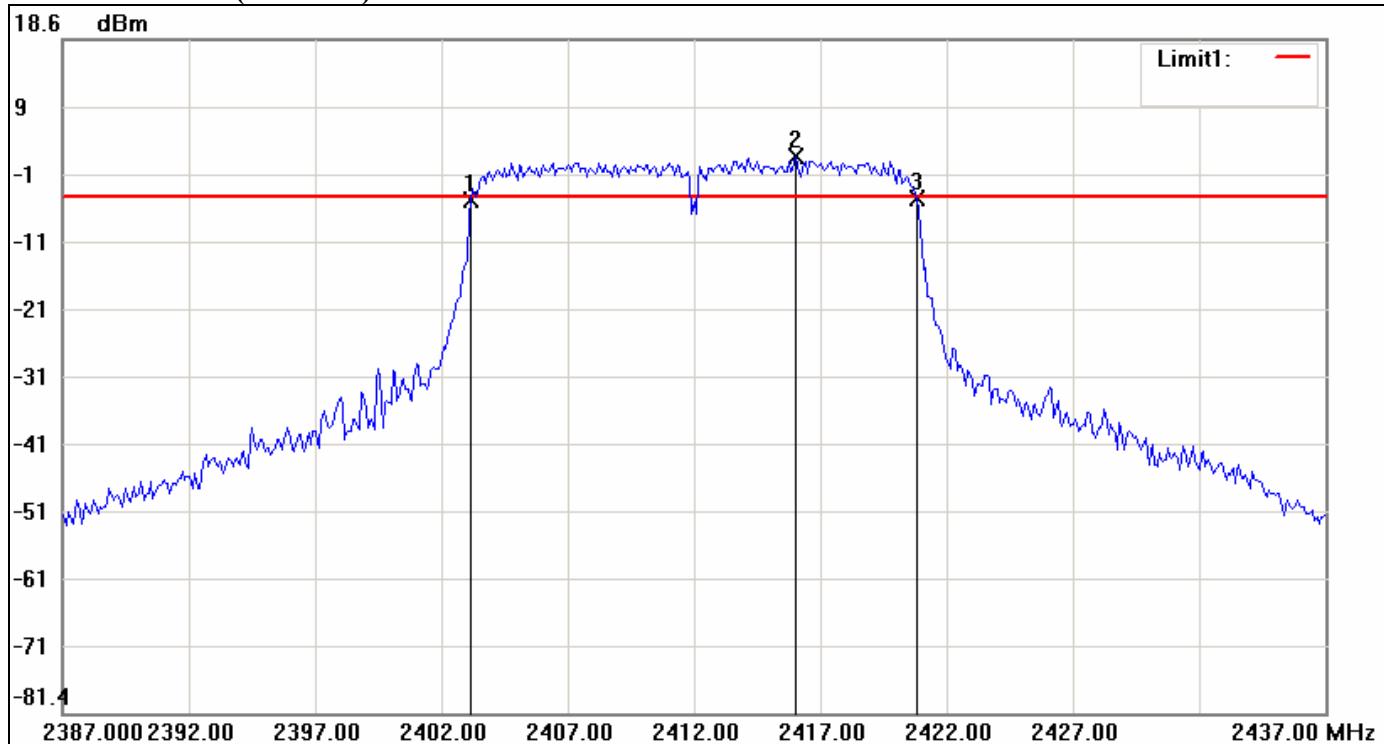
No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2453.6667	-1.76	-0.32	-1.44
2	2459.8333	5.68	-0.32	6.00
3	2470.2500	-0.35	-0.32	-0.03

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	16.5833	1.41



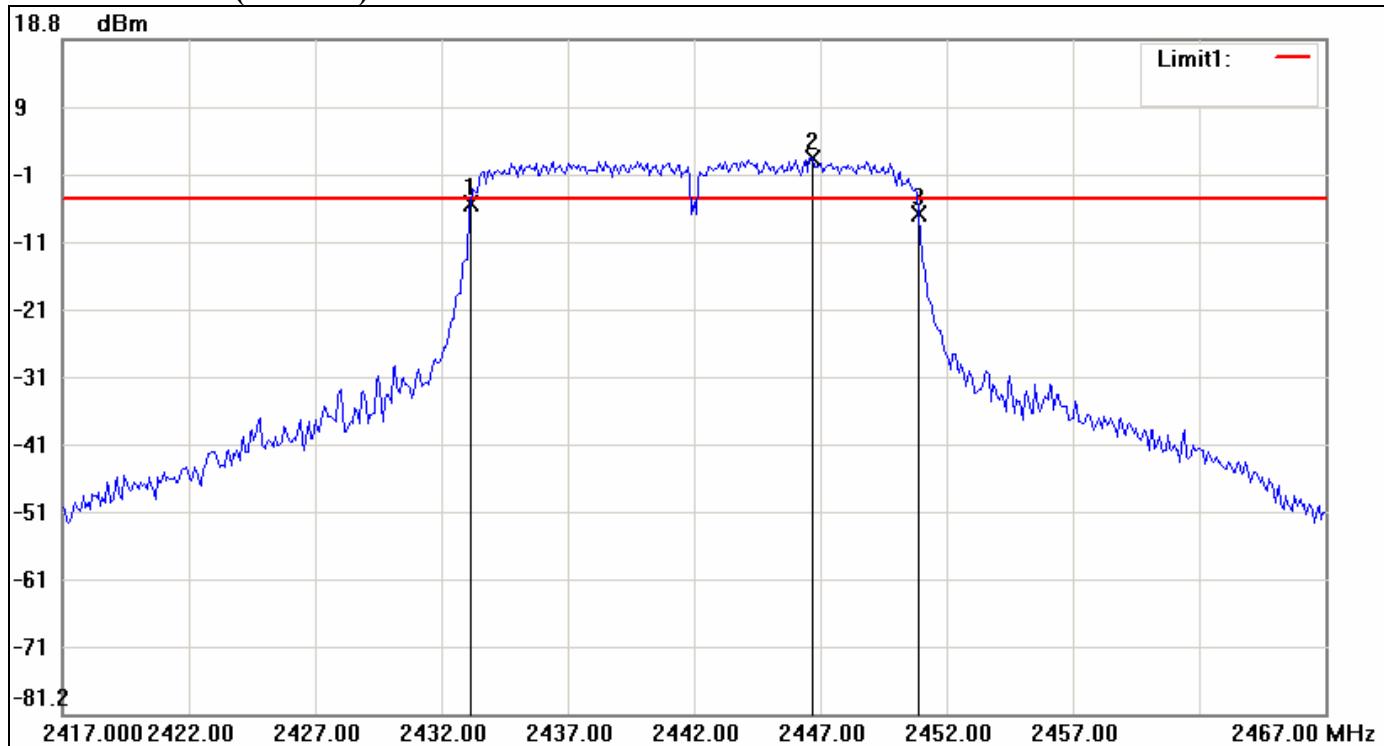
**IEEE 802.11n HT 20 MHz mode / Chain 0**

**6dB Bandwidth (CH Low)**



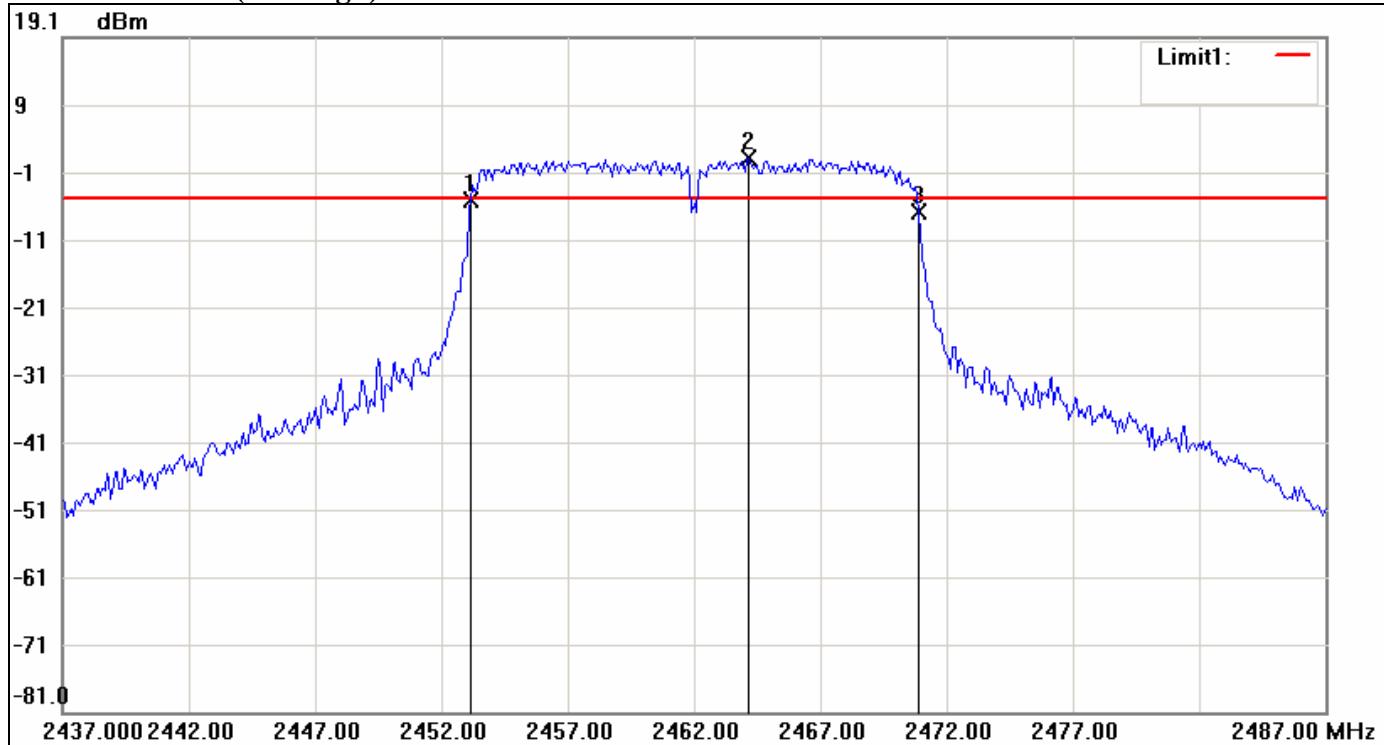
No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2403.1667	-5.29	-4.80	-0.49
2	2416.0000	1.20	-4.80	6.00
3	2420.8333	-4.96	-4.80	-0.16

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	17.6666	0.33

**6dB Bandwidth (CH Mid)**

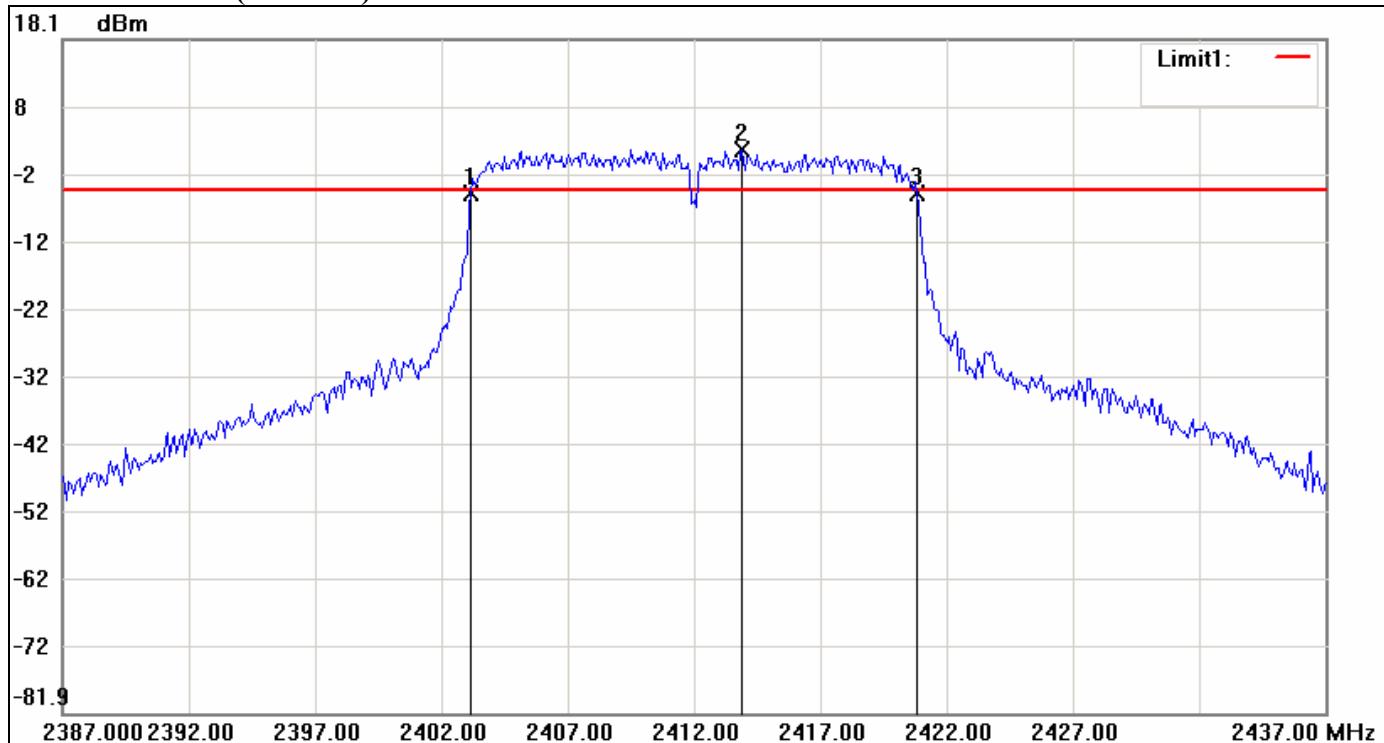
No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2433.1667	-5.51	-4.77	-0.74
2	2446.6667	1.23	-4.77	6.00
3	2450.9167	-7.00	-4.77	-2.23

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.75	-1.49

**6dB Bandwidth (CH High)**

No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2453.1667	-5.16	-4.92	-0.24
2	2464.1667	1.08	-4.92	6.00
3	2470.9167	-6.77	-4.92	-1.85

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.75	-1.61

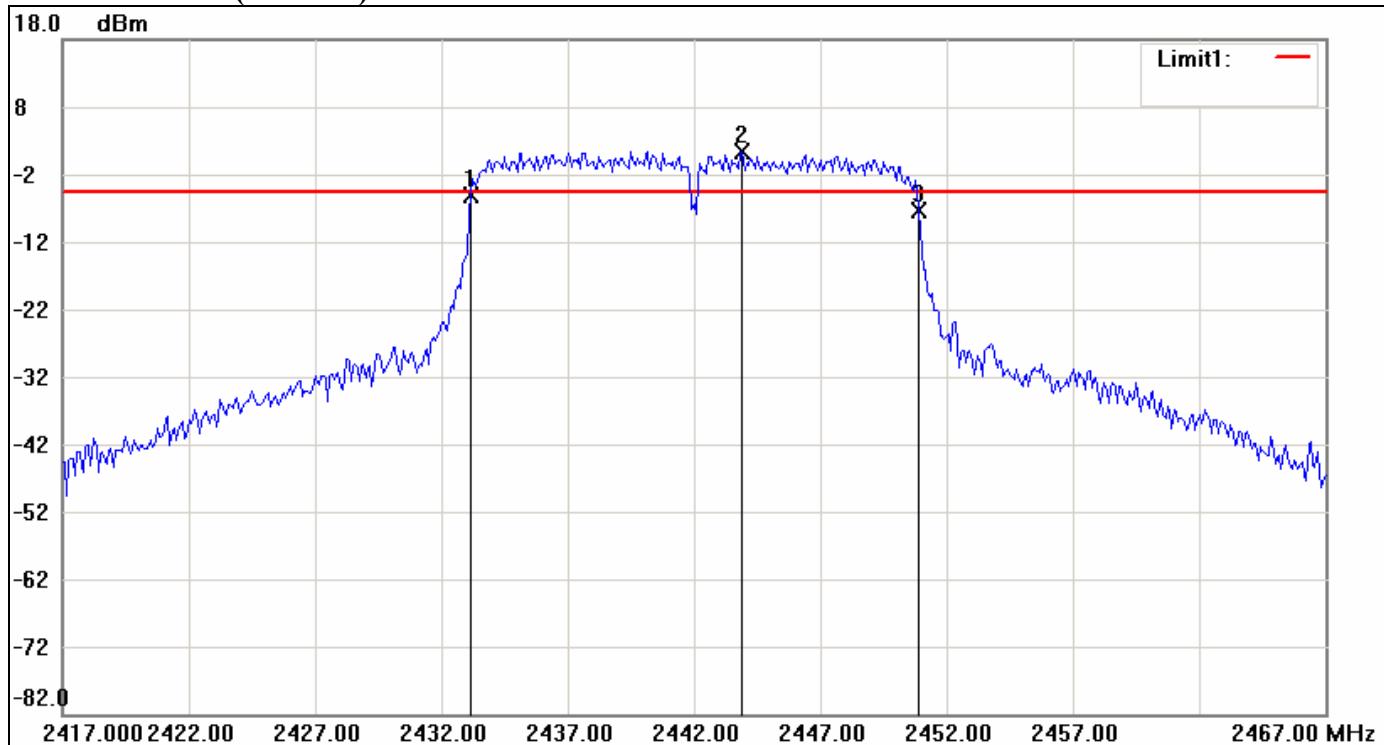
**IEEE 802.11n HT 20 MHz mode / Chain 1****6dB Bandwidth (CH Low)**

No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2403.1667	-4.67	-4.14	-0.53
2	2413.9167	1.86	-4.14	6.00
3	2420.8333	-4.74	-4.14	-0.60

No.	△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.6666



**6dB Bandwidth (CH Mid)**

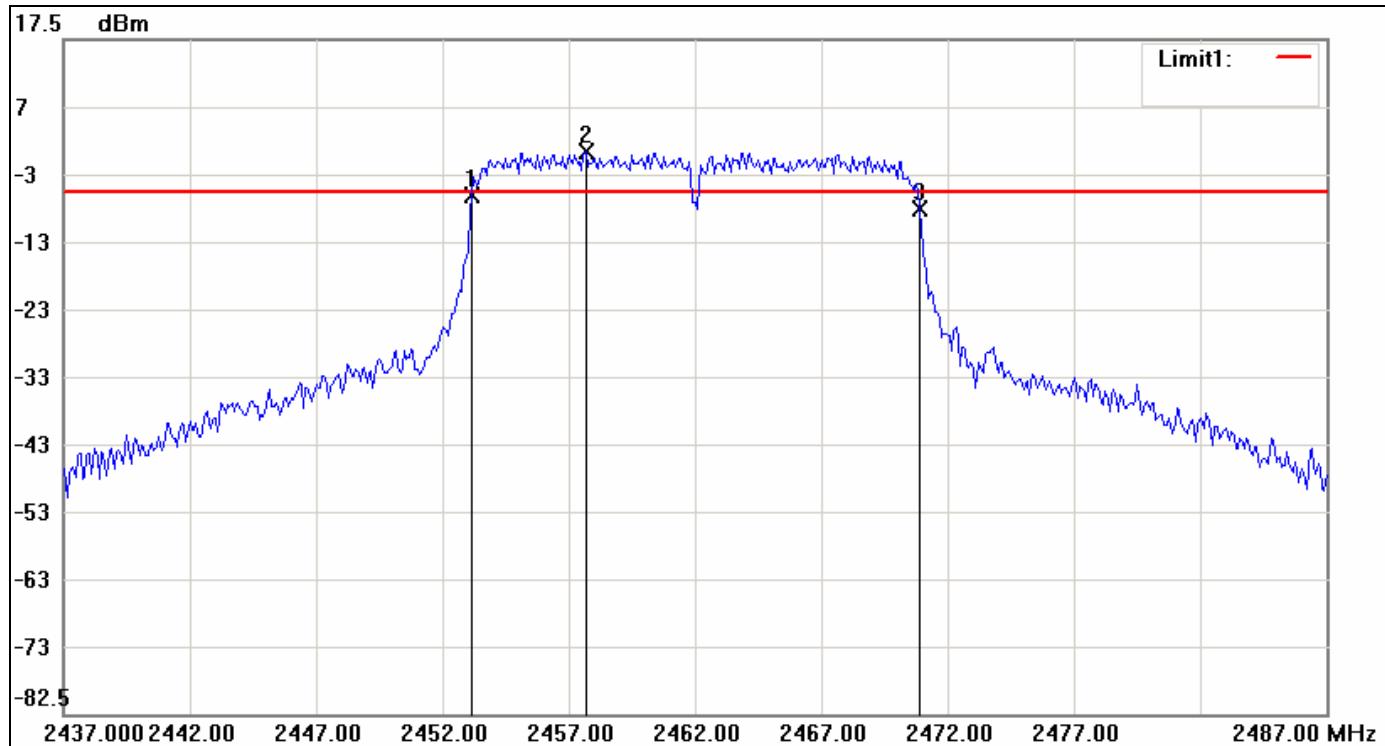


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2433.1667	-5.24	-4.65	-0.59
2	2443.9167	1.35	-4.65	6.00
3	2450.9167	-7.31	-4.65	-2.66

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	17.75	-2.07

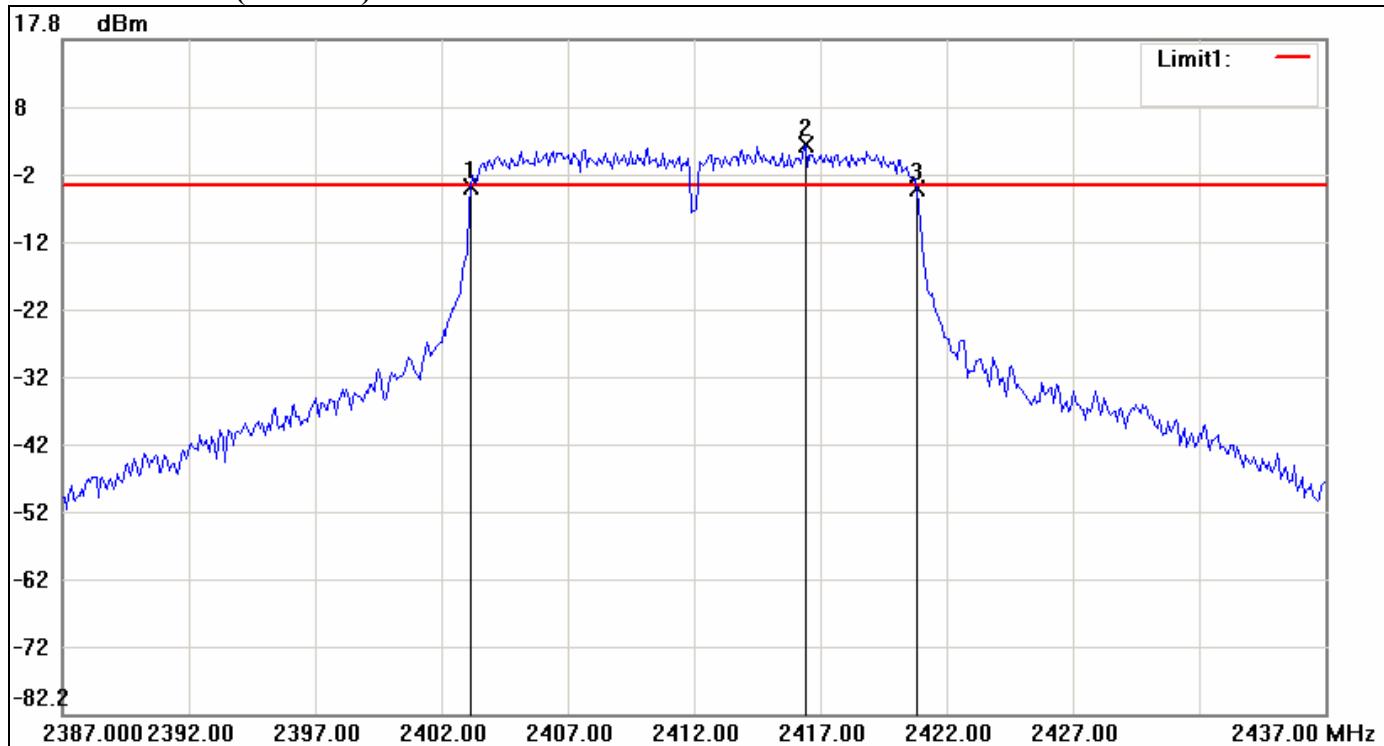


### 6dB Bandwidth (CH High)



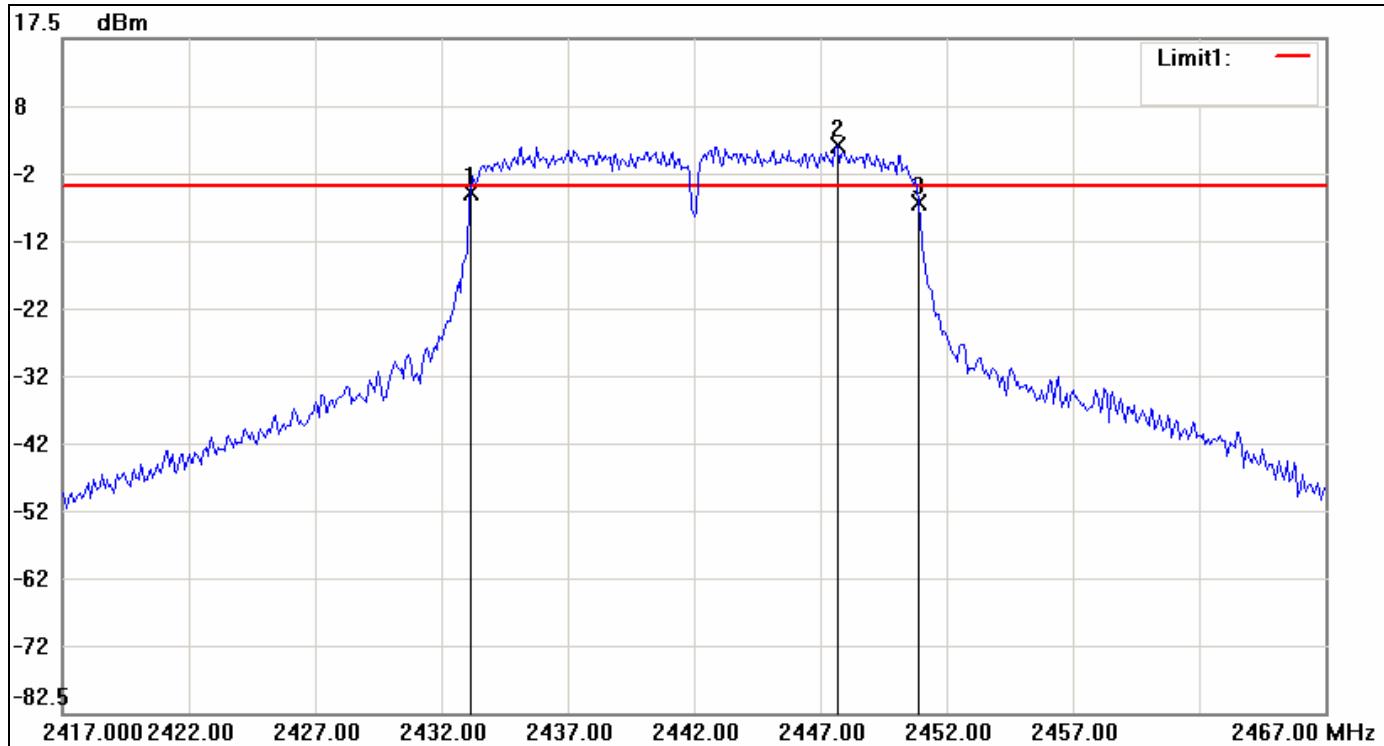
No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2453.1667	-5.71	-5.22	-0.49
2	2457.6667	0.78	-5.22	6.00
3	2470.9167	-7.67	-5.22	-2.45

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.75	-1.96

**IEEE 802.11n HT 20 MHz mode / Chain 2****6dB Bandwidth (CH Low)**

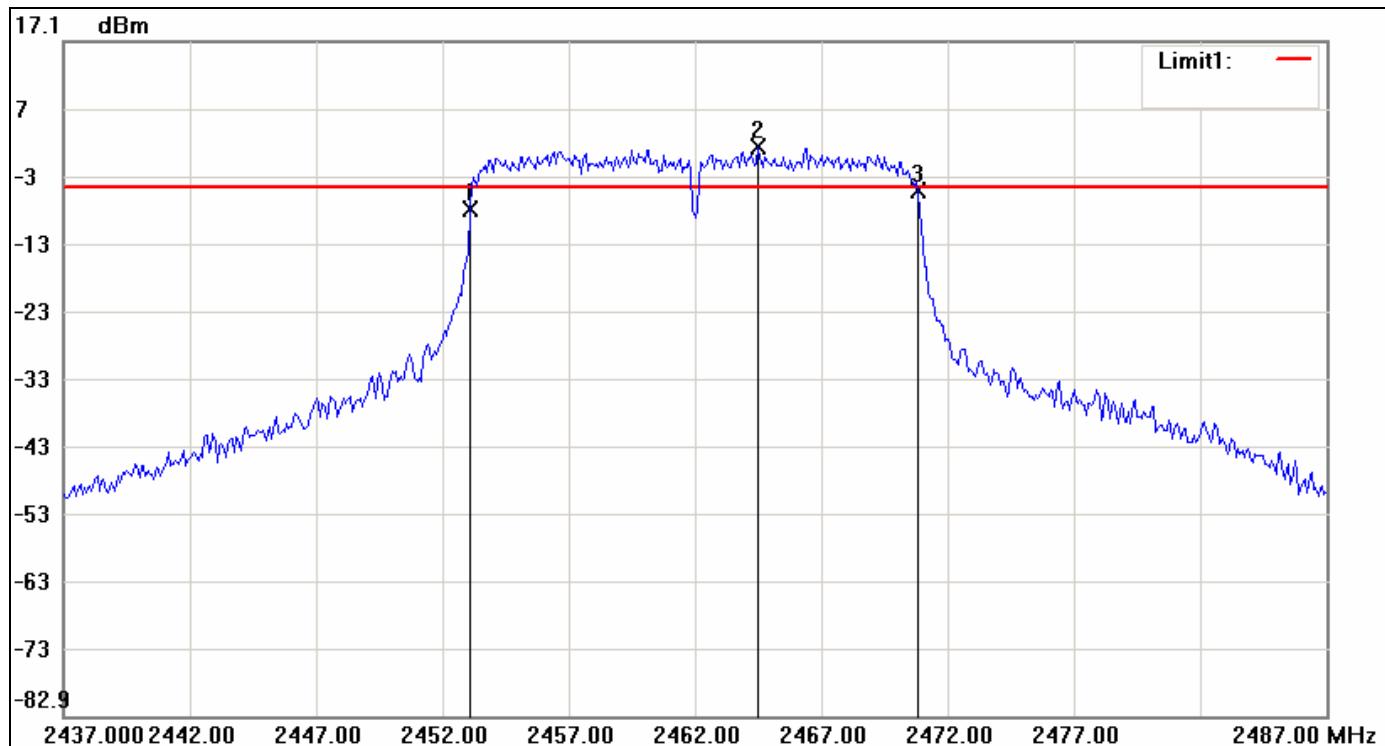
No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2403.1667	-4.02	-3.92	-0.10
2	2416.4167	2.08	-3.92	6.00
3	2420.8333	-4.37	-3.92	-0.45

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.6666	-0.35

**6dB Bandwidth (CH Mid)**

No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2433.1667	-5.33	-4.44	-0.89
2	2447.6667	1.56	-4.44	6.00
3	2450.9167	-6.80	-4.44	-2.36

No.	△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.75

**6dB Bandwidth (CH High)**

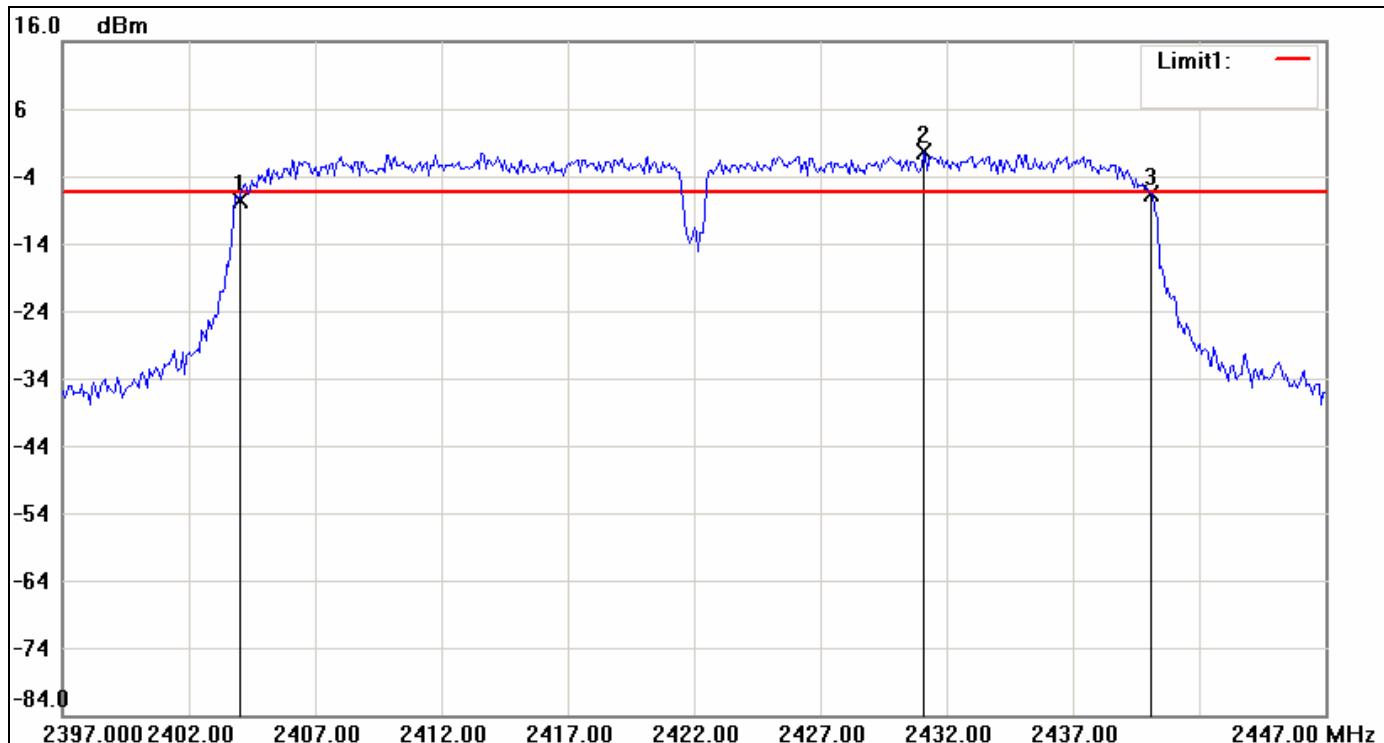
No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2453.0833	-7.79	-4.53	-3.26
2	2464.5000	1.47	-4.53	6.00
3	2470.8333	-4.97	-4.53	-0.44

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.75	2.82



**IEEE 802.11n HT 40 MHz mode / Chain 0**

**6dB Bandwidth (CH Low)**

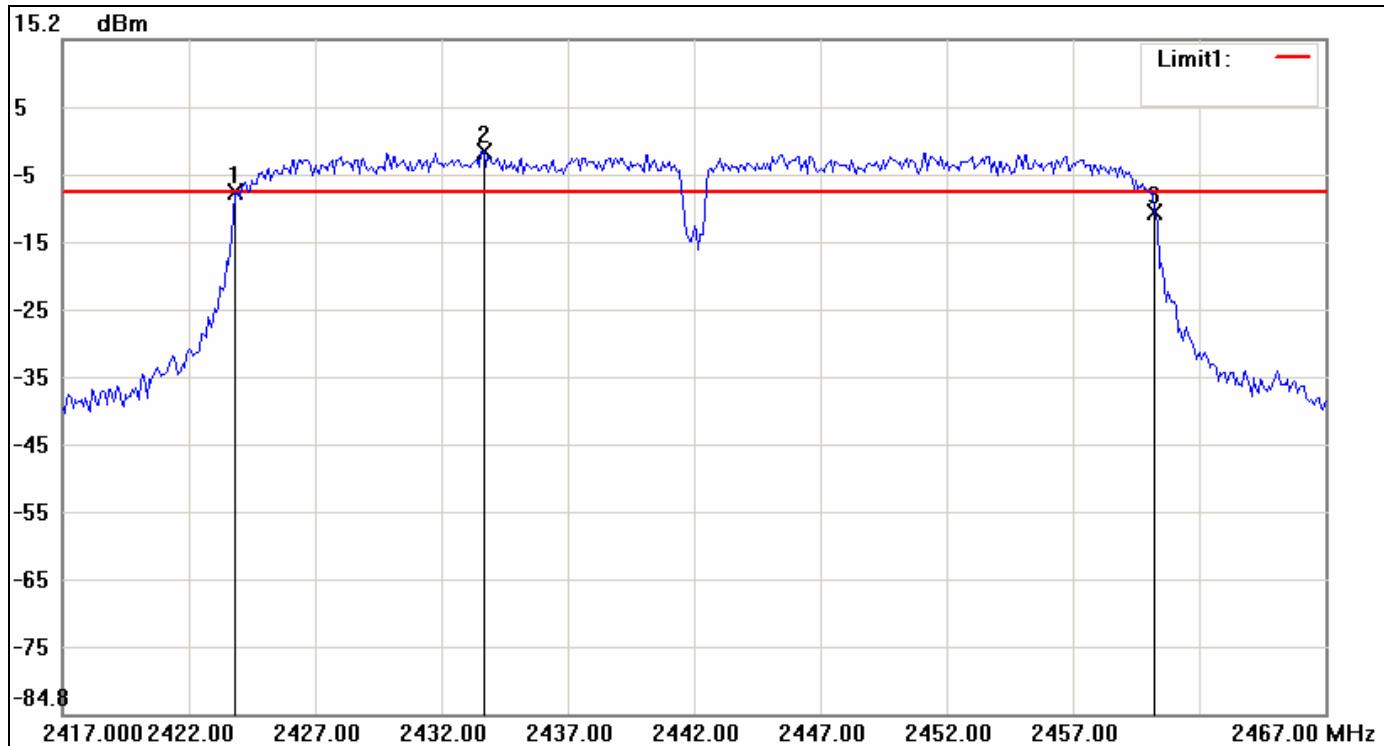


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2404.0000	-7.48	-6.38	-1.10
2	2431.0833	-0.38	-6.38	6.00
3	2440.0833	-6.71	-6.38	-0.33

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	36.0833	0.77



### 6dB Bandwidth (CH Mid)

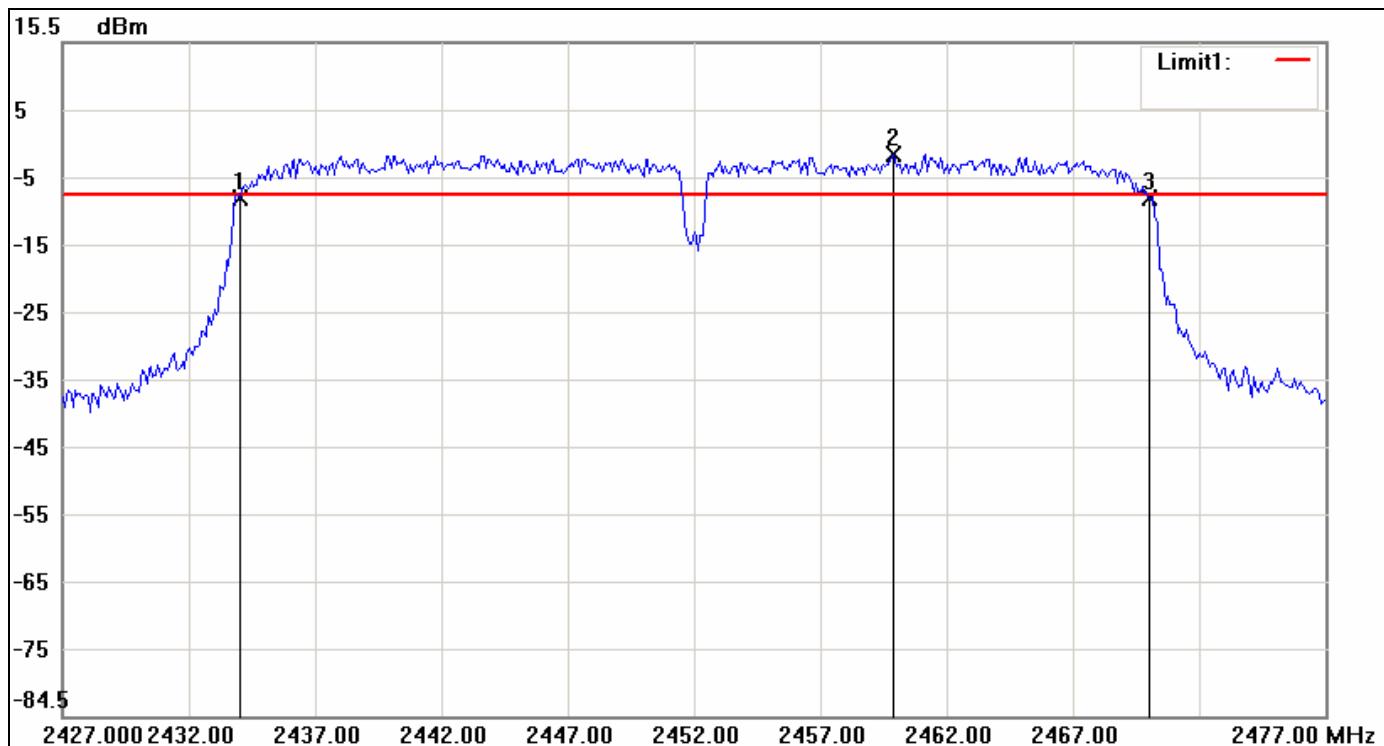


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2423.8333	-7.41	-7.40	-0.01
2	2433.6667	-1.40	-7.40	6.00
3	2460.2500	-10.35	-7.40	-2.95

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	36.4167	-2.94

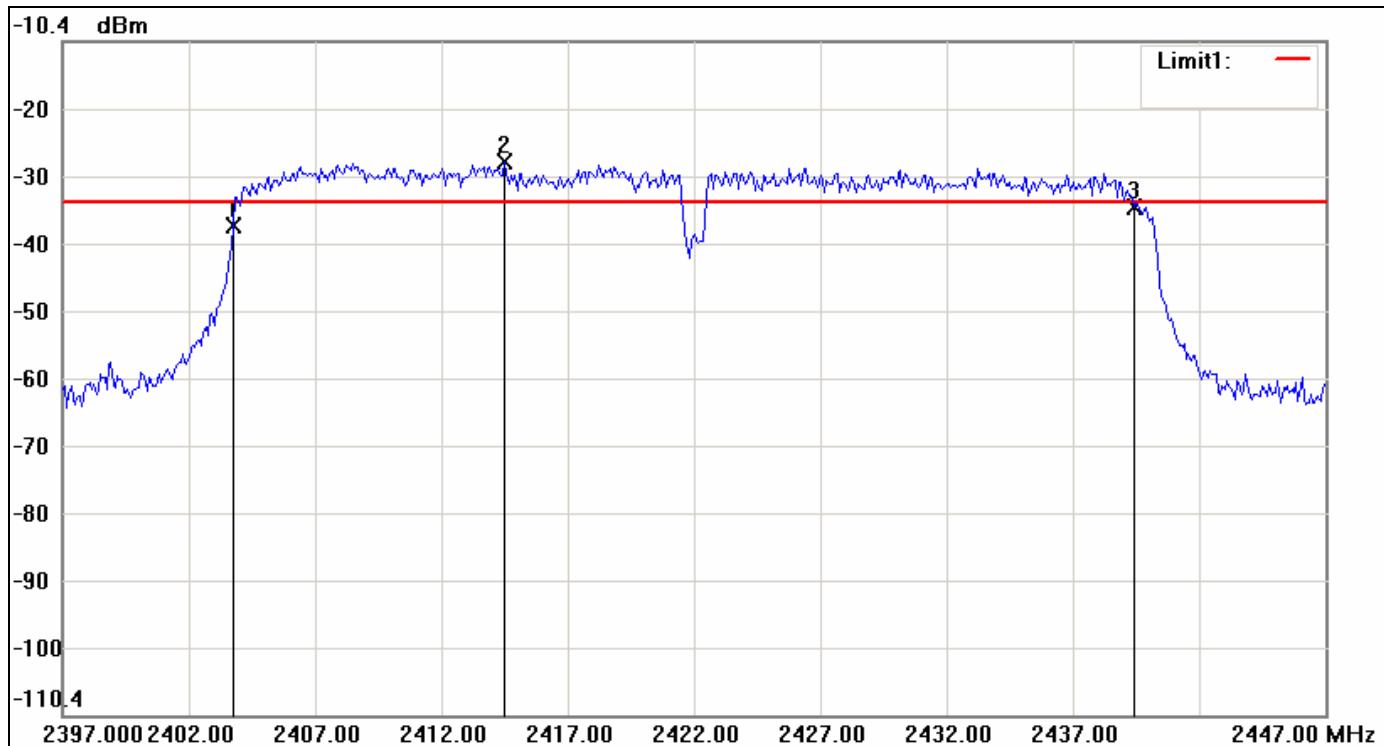


### 6dB Bandwidth (CH High)



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2434.0000	-7.64	-7.10	-0.54
2	2459.9167	-1.10	-7.10	6.00
3	2470.0000	-7.72	-7.10	-0.62

No.	△Frequency(MHz)	△Level(dB)
1	mk3-mk1	36

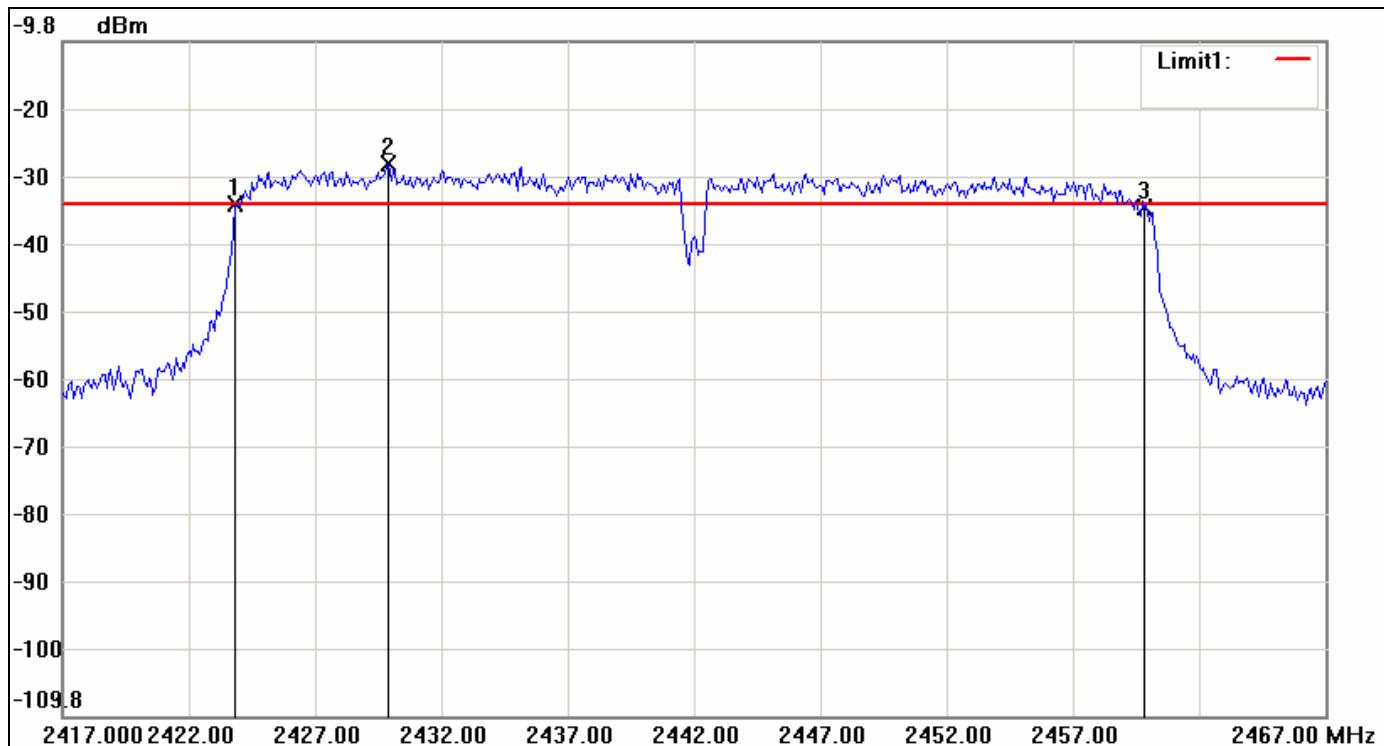
**IEEE 802.11n HT 40 MHz mode / Chain 1****6dB Bandwidth (CH Low)**

No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2403.7500	-37.65	-34.27	-3.38
2	2414.5000	-28.27	-34.27	6.00
3	2439.4167	-34.97	-34.27	-0.70

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	35.6667	2.68



### 6dB Bandwidth (CH Mid)

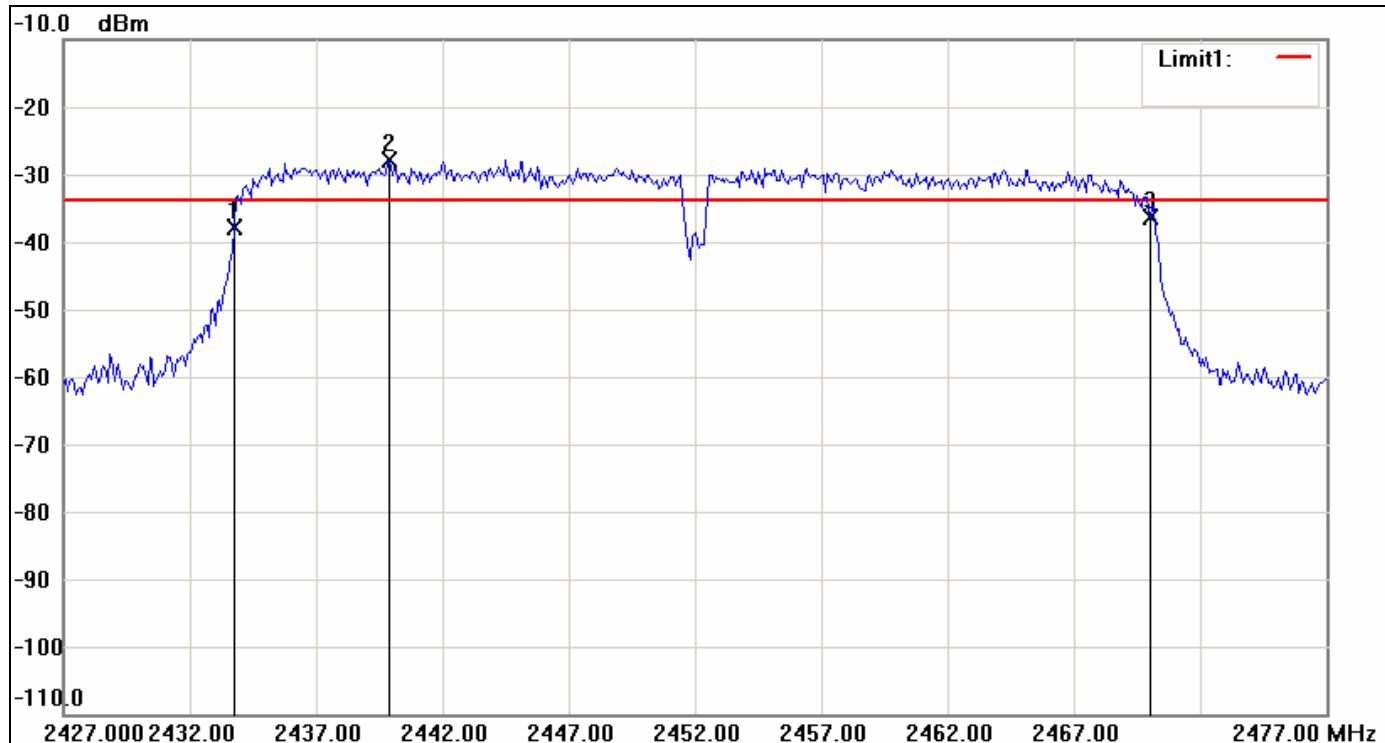


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2423.8333	-33.98	-33.90	-0.08
2	2429.9167	-27.90	-33.90	6.00
3	2459.8333	-34.40	-33.90	-0.50

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	36	-0.42



### 6dB Bandwidth (CH High)



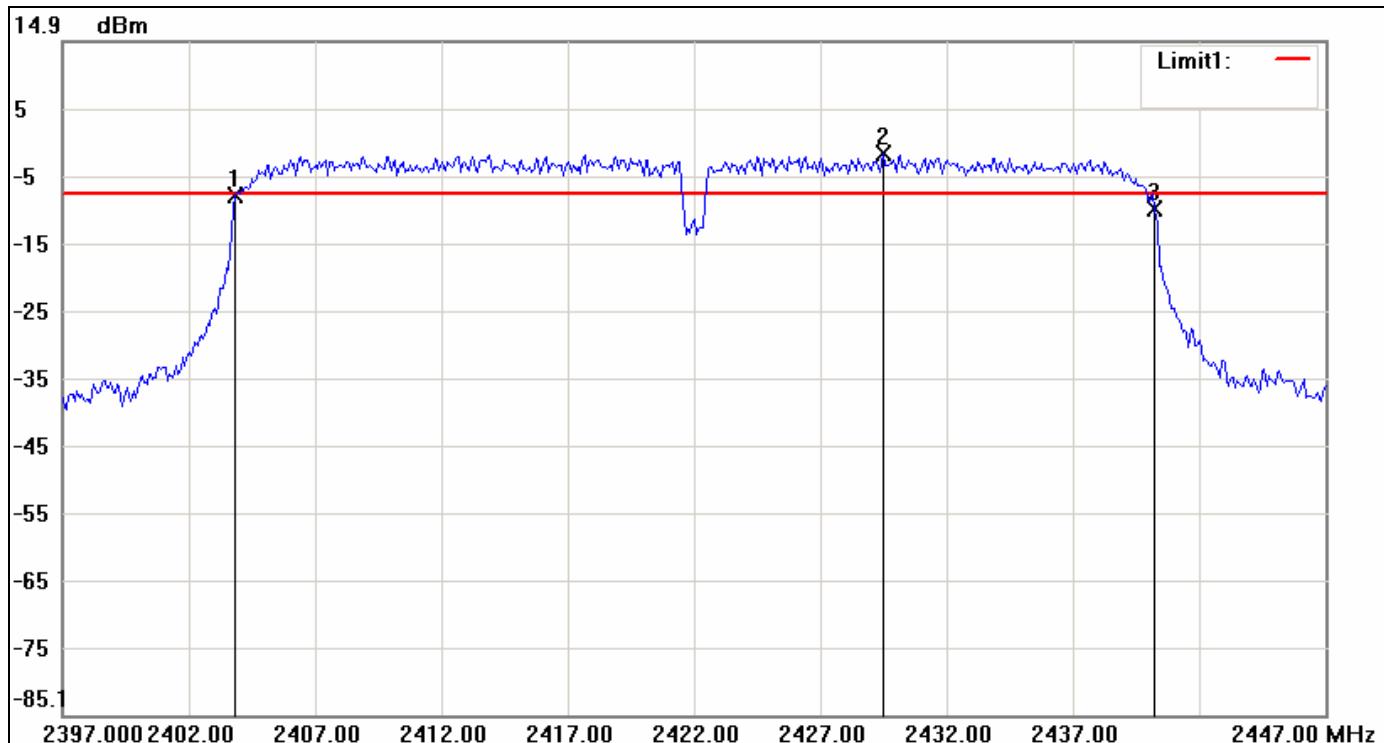
No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2433.7500	-37.84	-33.77	-4.07
2	2439.9167	-27.77	-33.77	6.00
3	2470.0000	-36.41	-33.77	-2.64

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	36.25	1.43



**IEEE 802.11n HT 40 MHz mode / Chain 2**

**6dB Bandwidth (CH Low)**

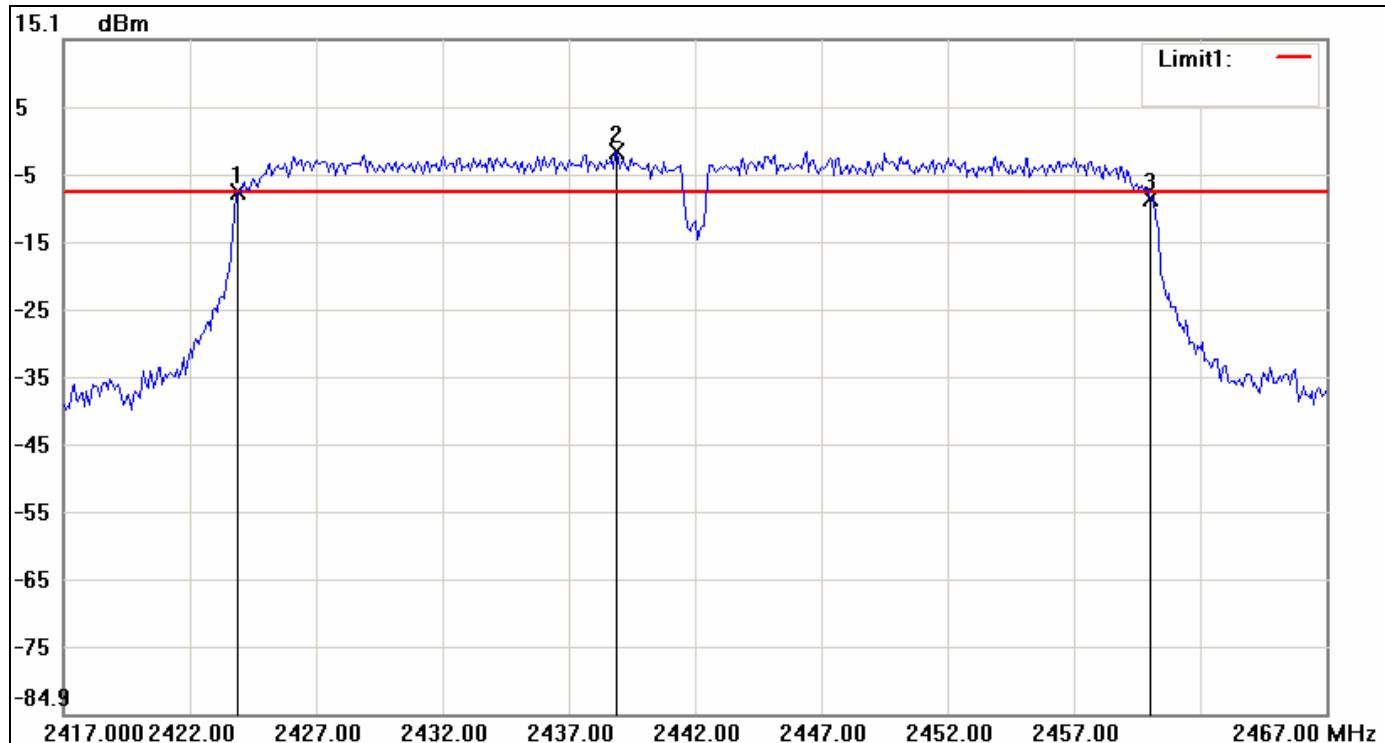


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2403.8333	-7.87	-7.84	-0.03
2	2429.5000	-1.84	-7.84	6.00
3	2440.2500	-9.91	-7.84	-2.07

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	36.4167	-2.04



### 6dB Bandwidth (CH Mid)

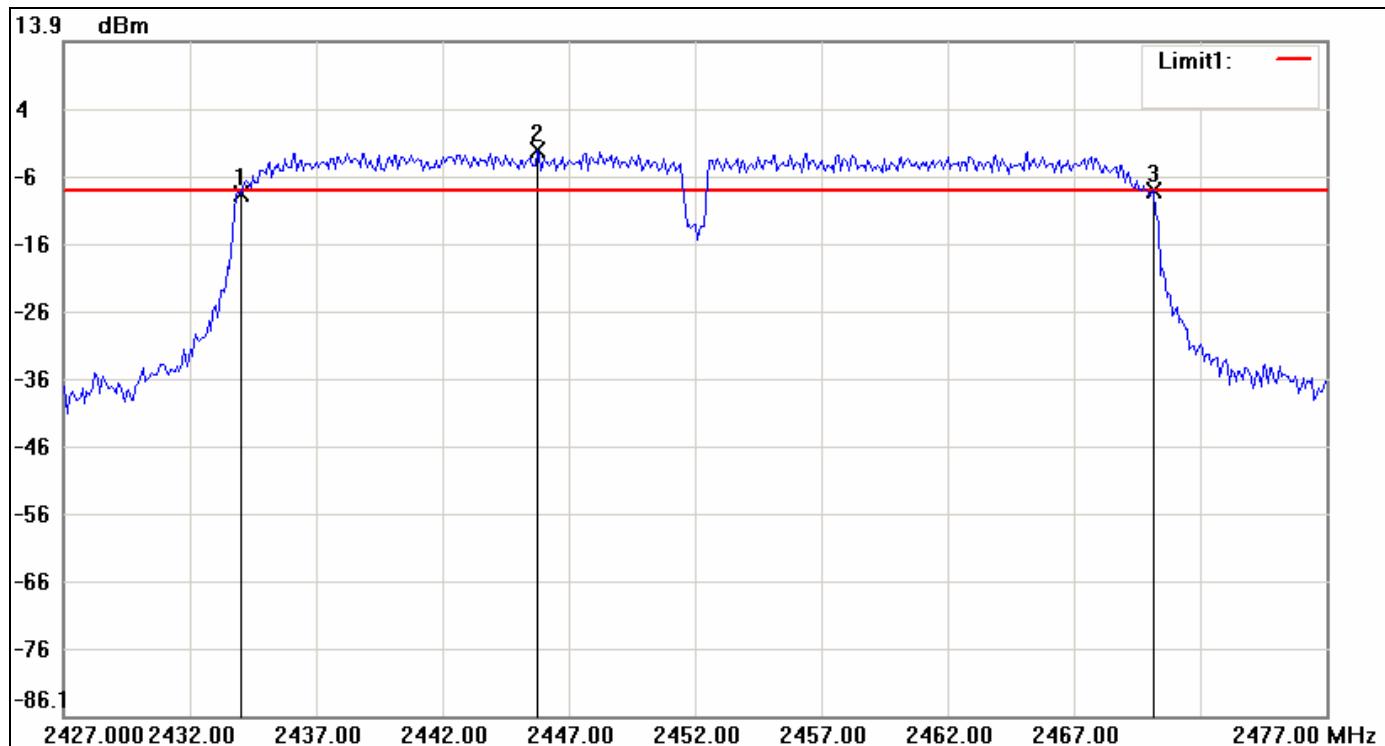


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2423.9167	-7.66	-7.60	-0.06
2	2438.9167	-1.60	-7.60	6.00
3	2460.0000	-8.46	-7.60	-0.86

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	36.0833	-0.8

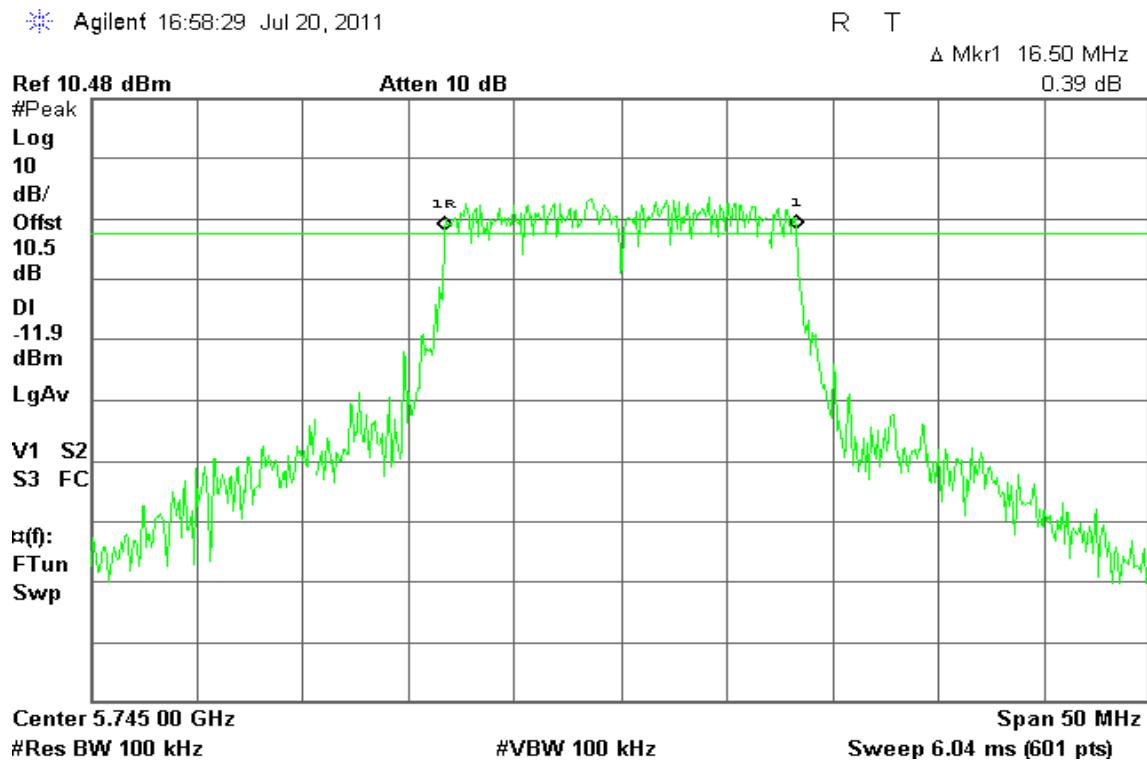
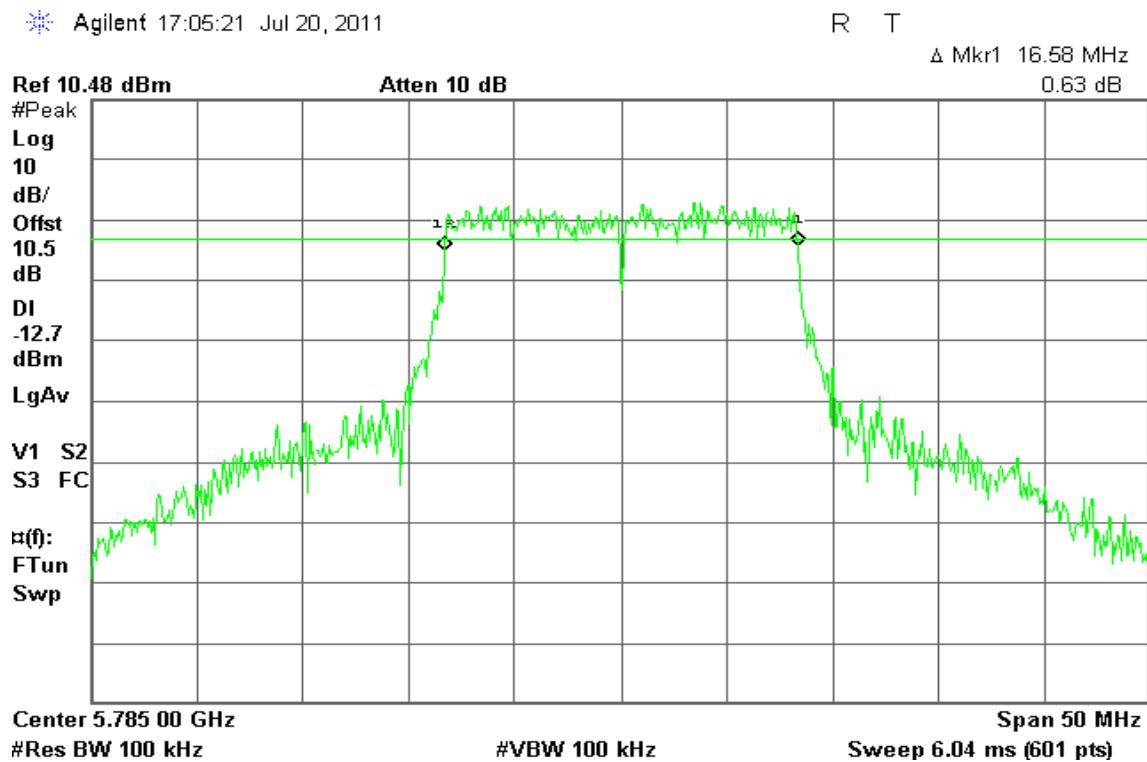


### 6dB Bandwidth (CH High)



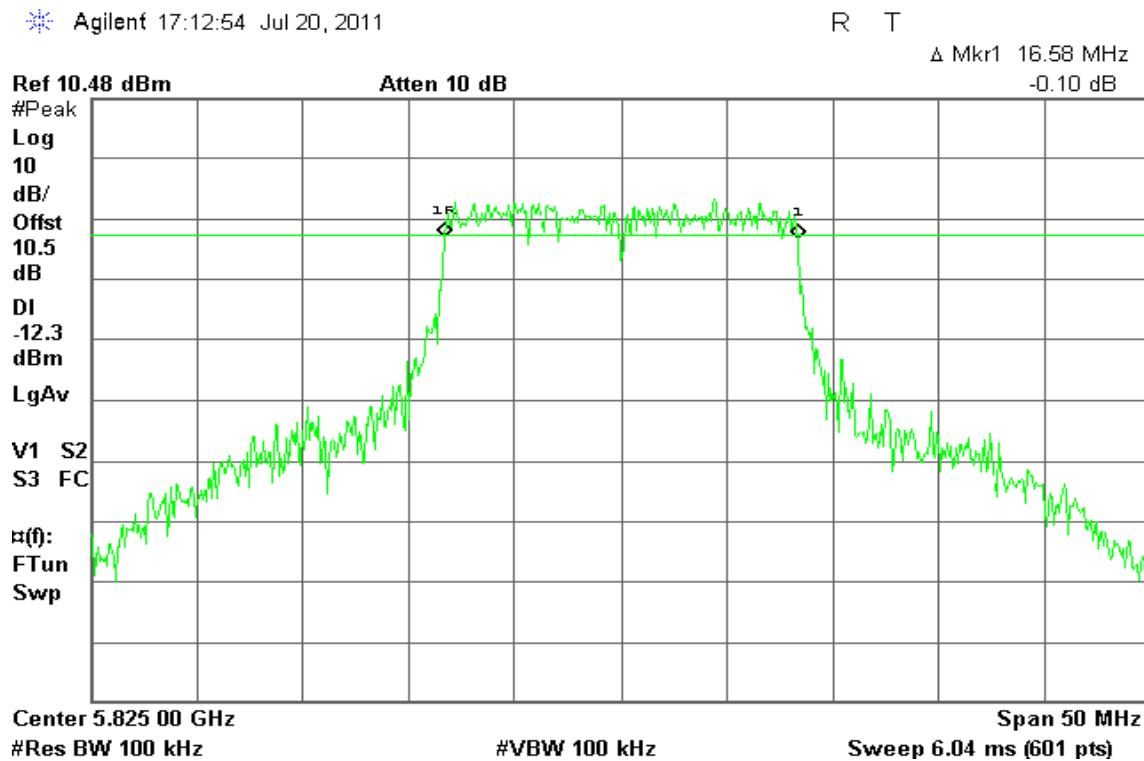
No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2434.0000	-8.56	-8.14	-0.42
2	2445.7500	-2.14	-8.14	6.00
3	2470.1667	-8.18	-8.14	-0.04

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	36.1667	0.38

**IEEE 802.11a mode  
6dB Bandwidth (CH Low)****6dB Bandwidth (CH Mid)**

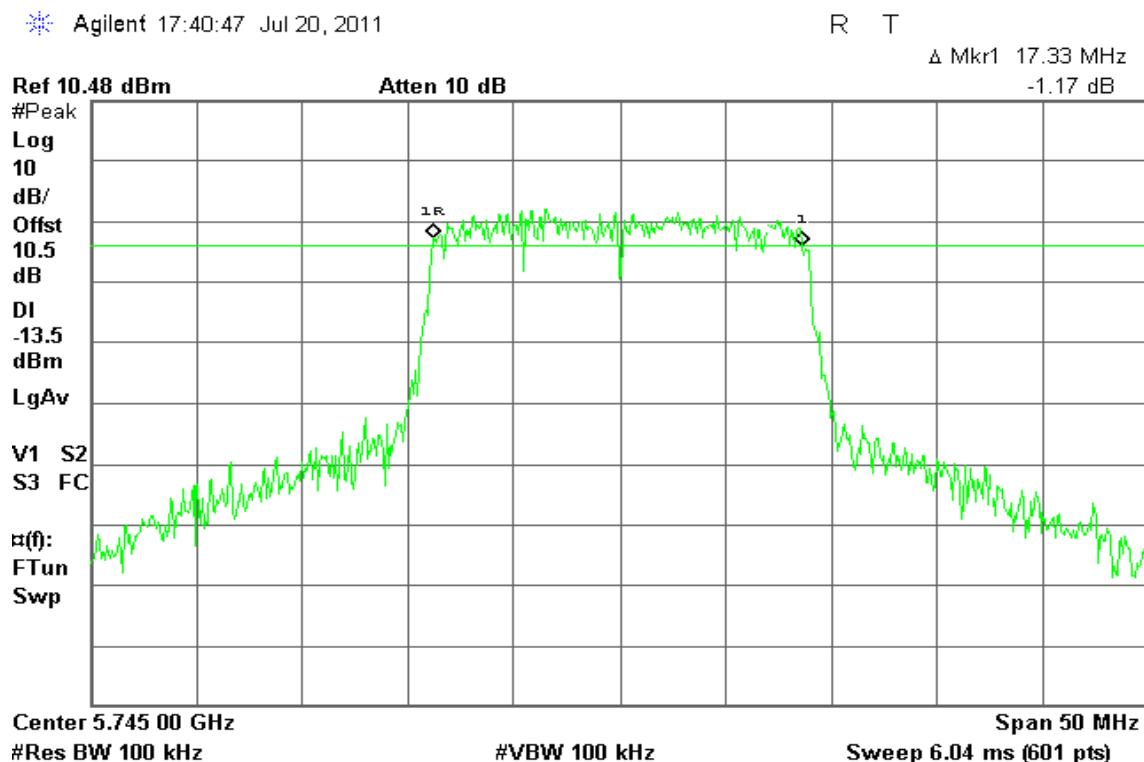


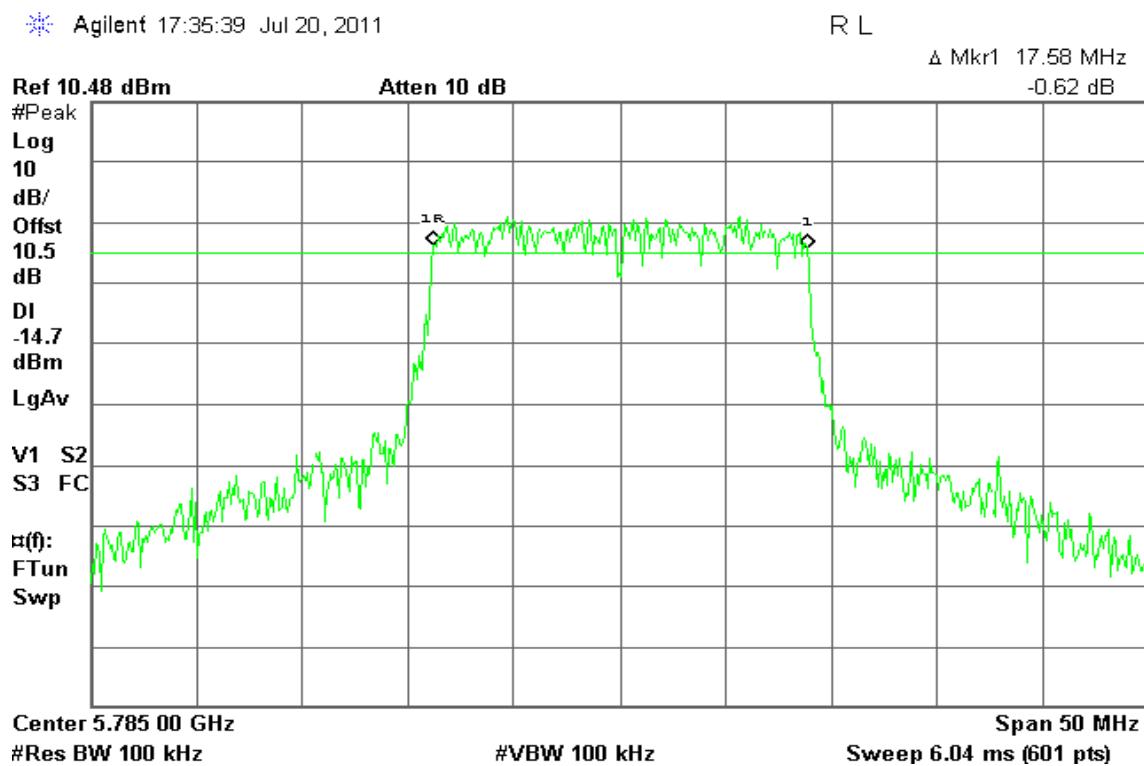
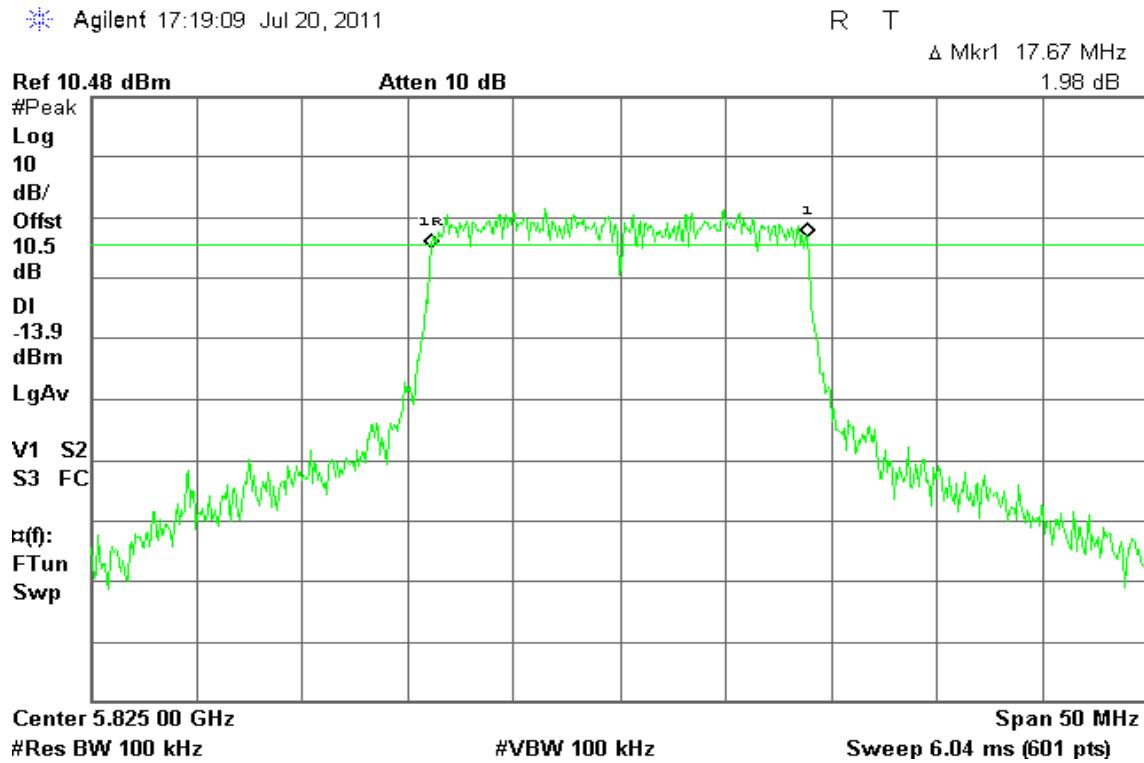
### 6dB Bandwidth (CH High)

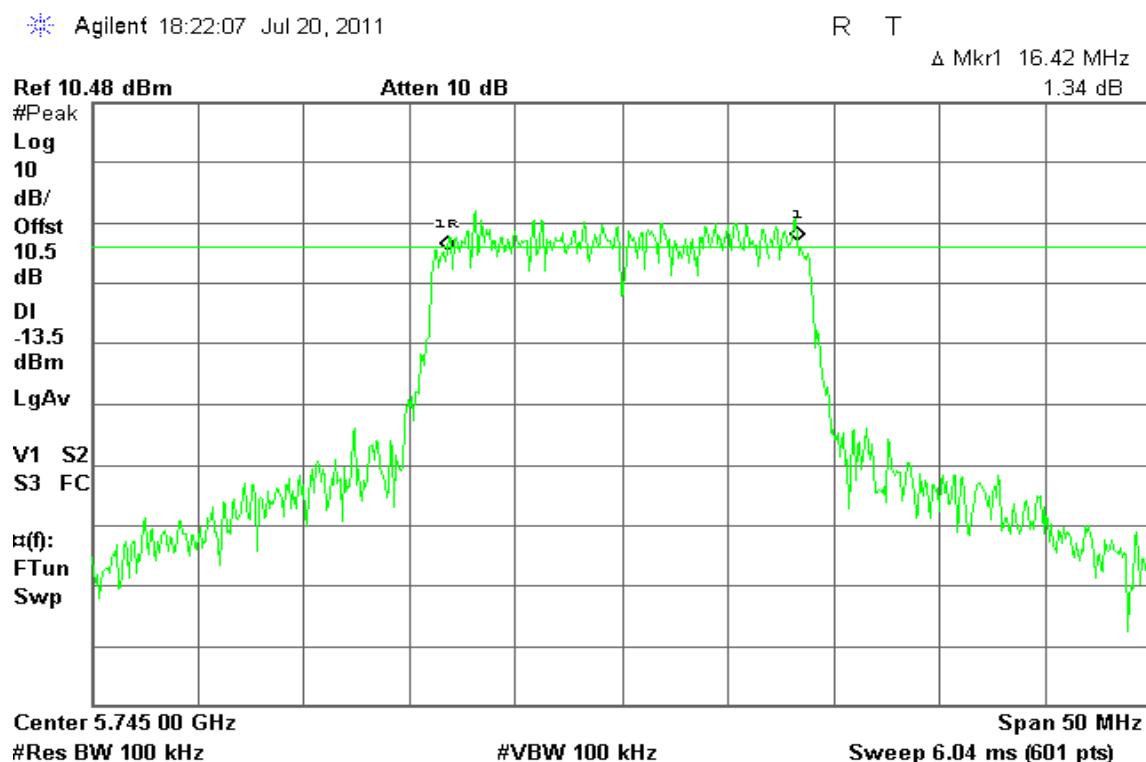
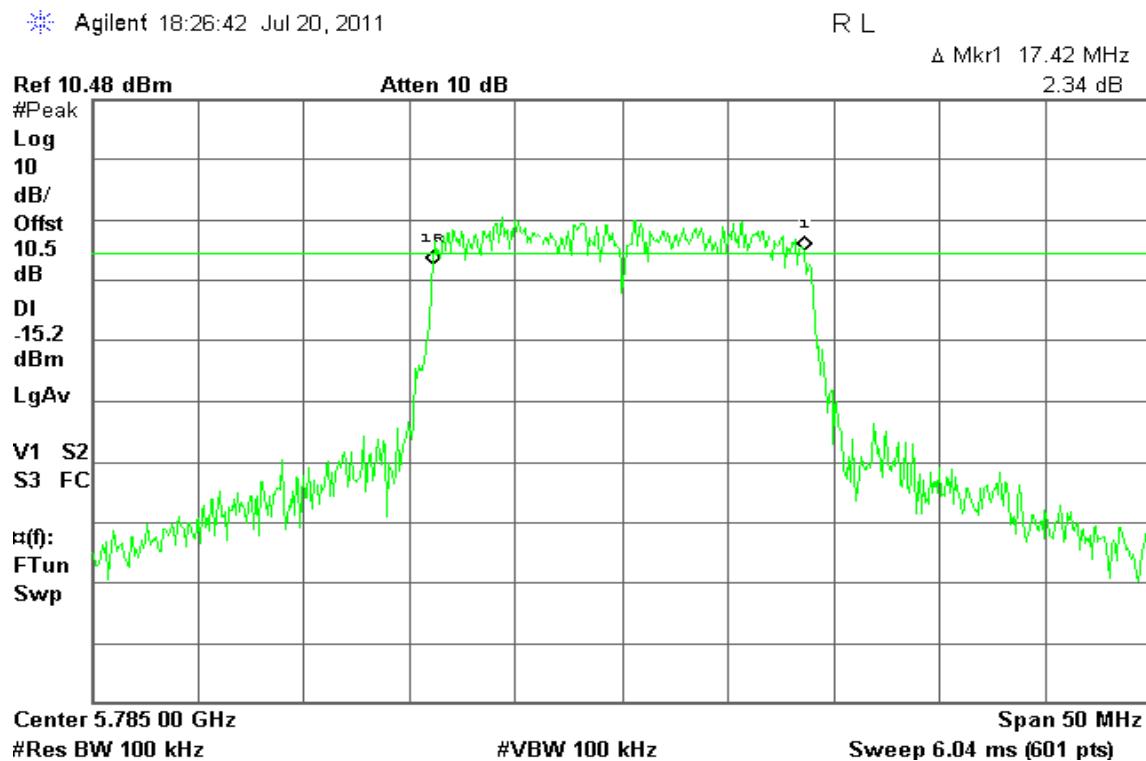


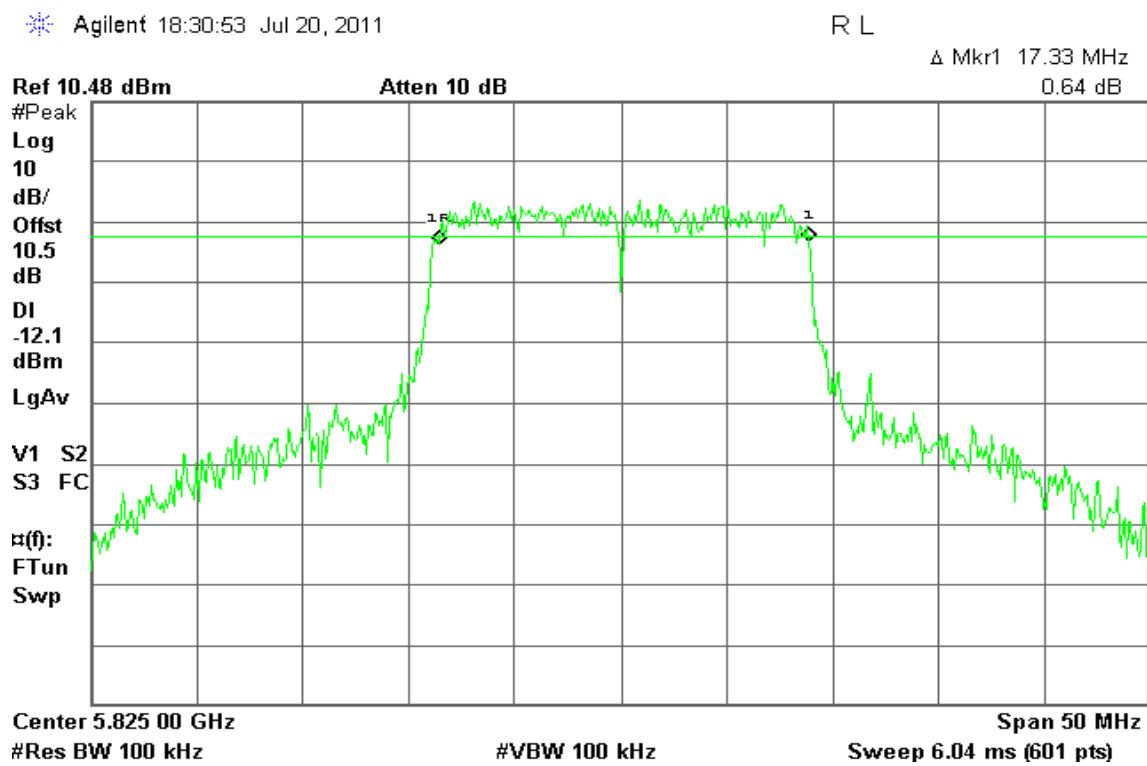
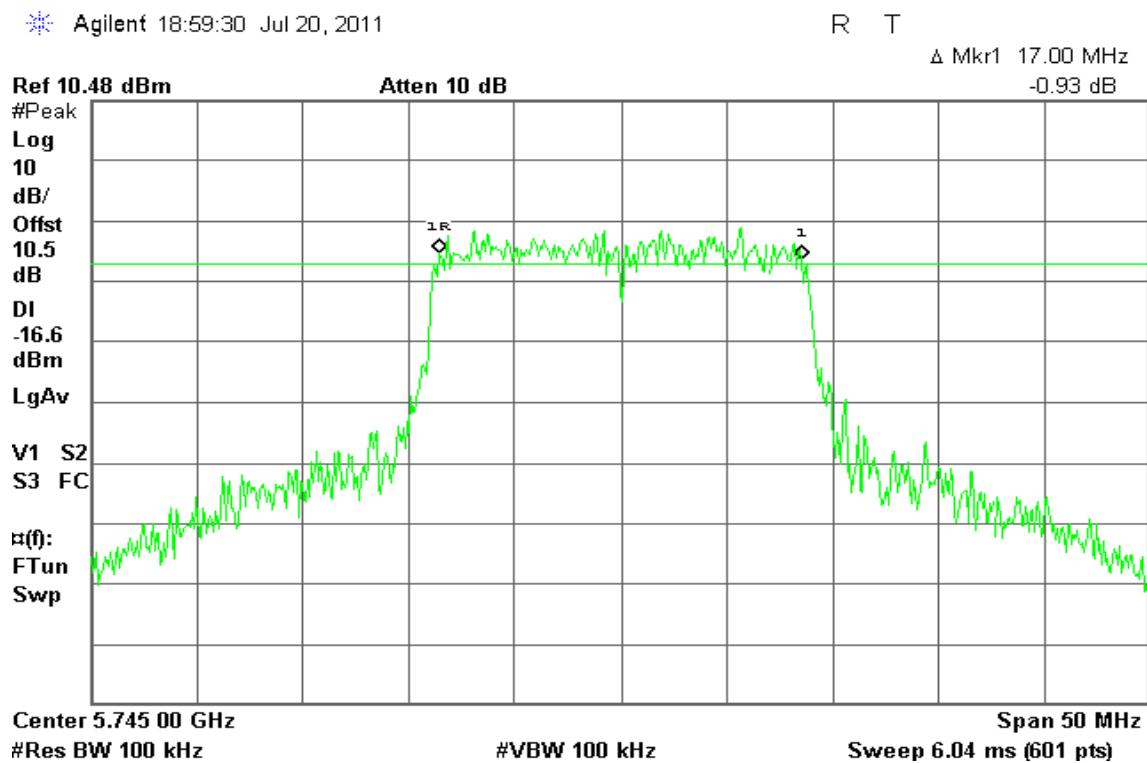
### IEEE 802.11n HT 20 MHz Channel mode / Chain 0

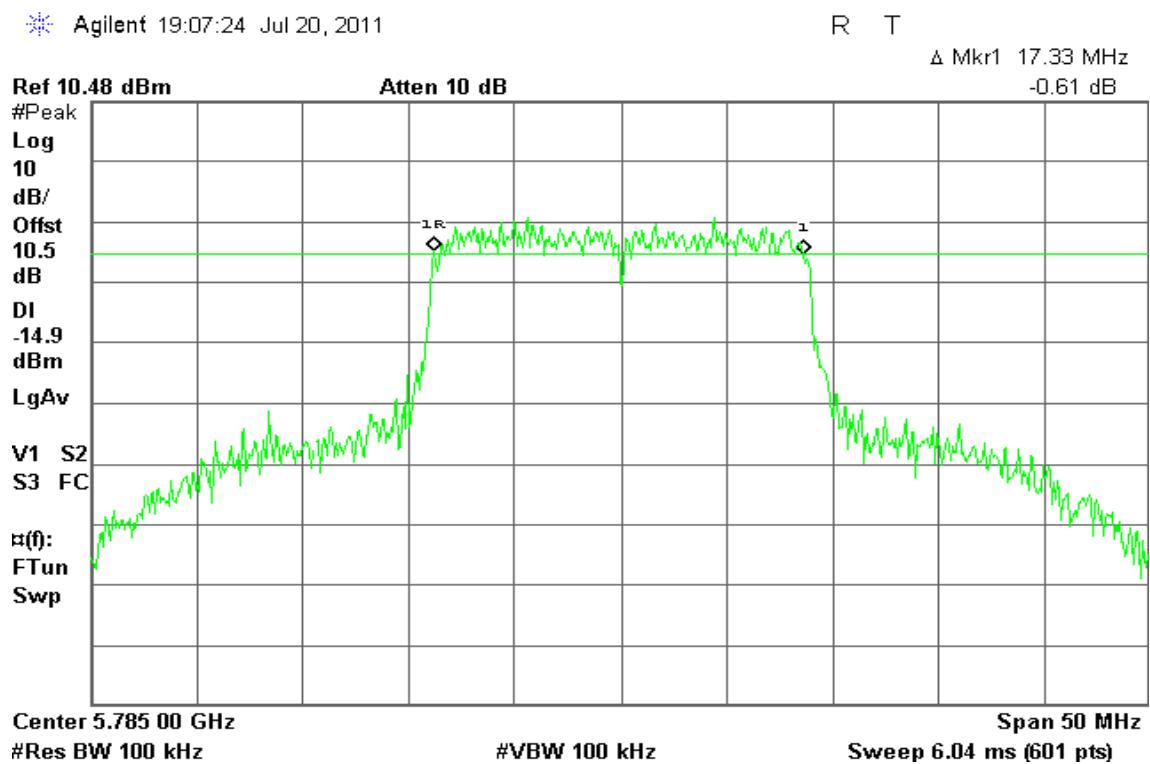
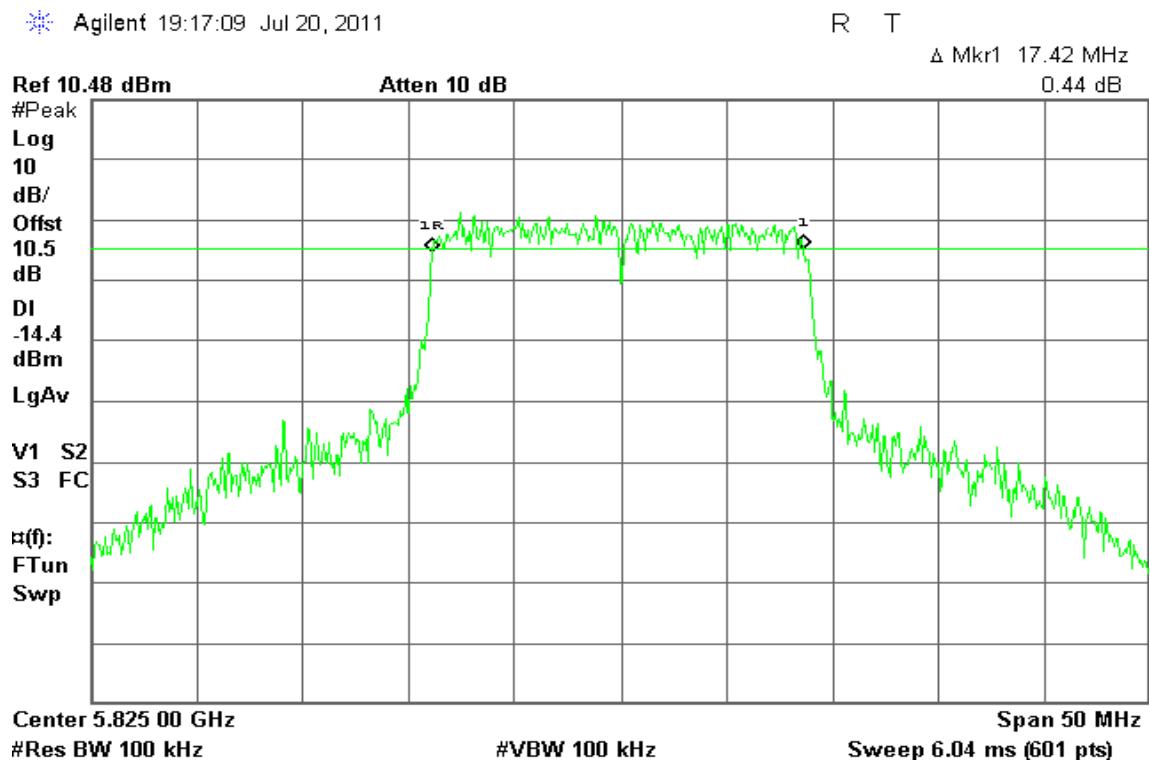
#### 6dB Bandwidth (CH Low)

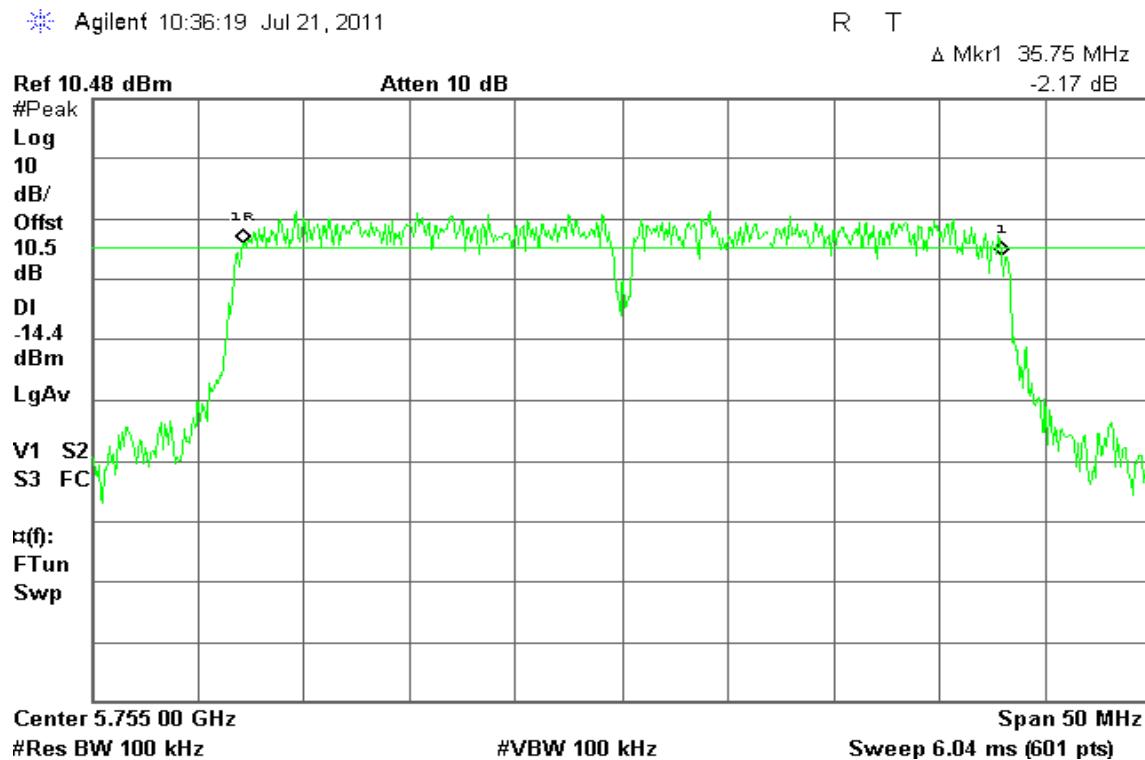
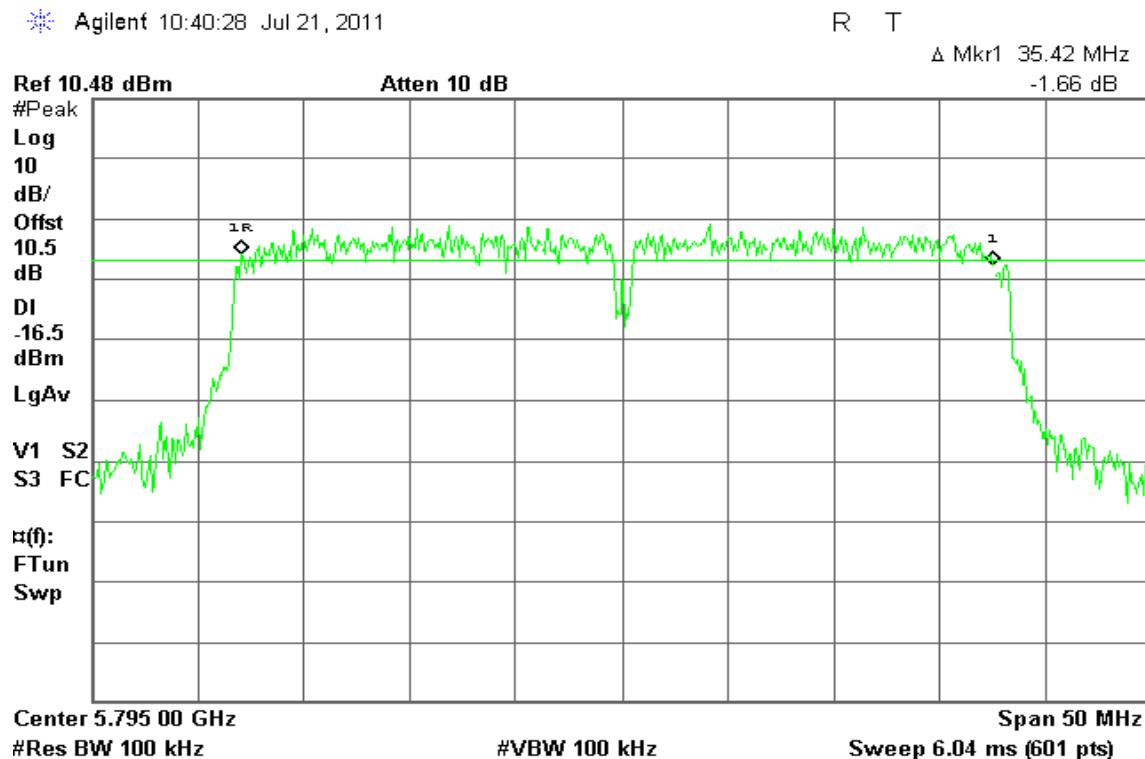


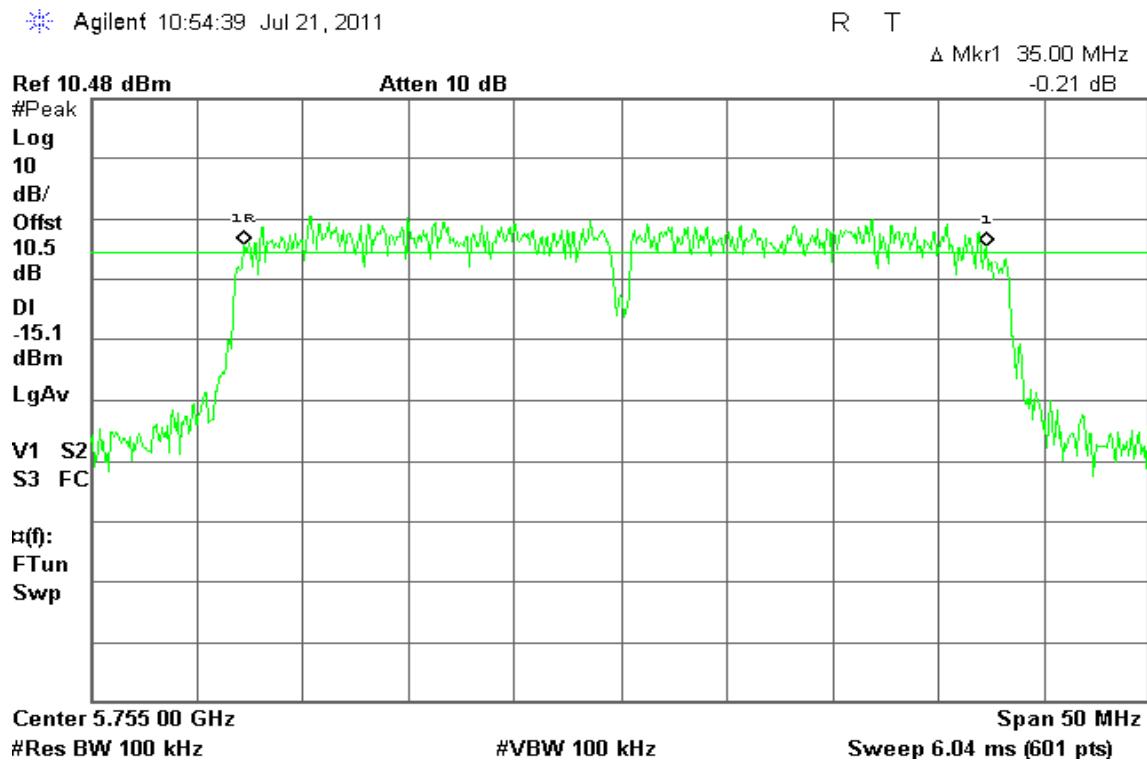
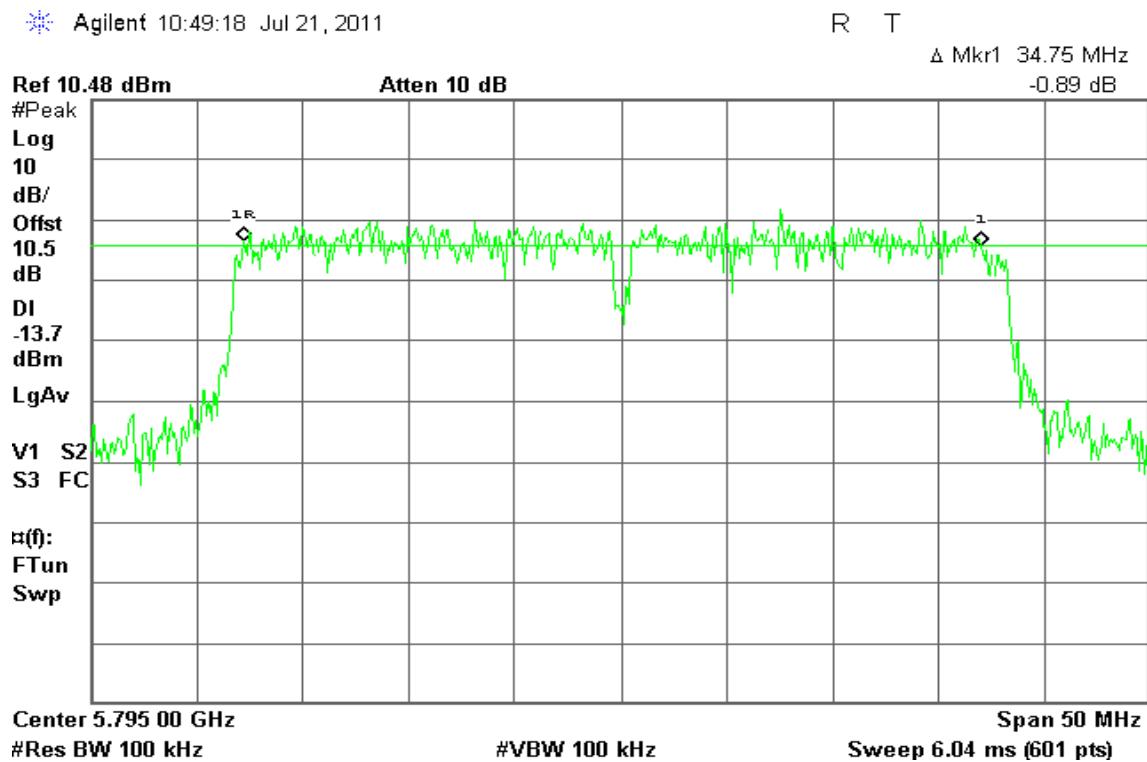
**6dB Bandwidth (CH Mid)****6dB Bandwidth (CH High)**

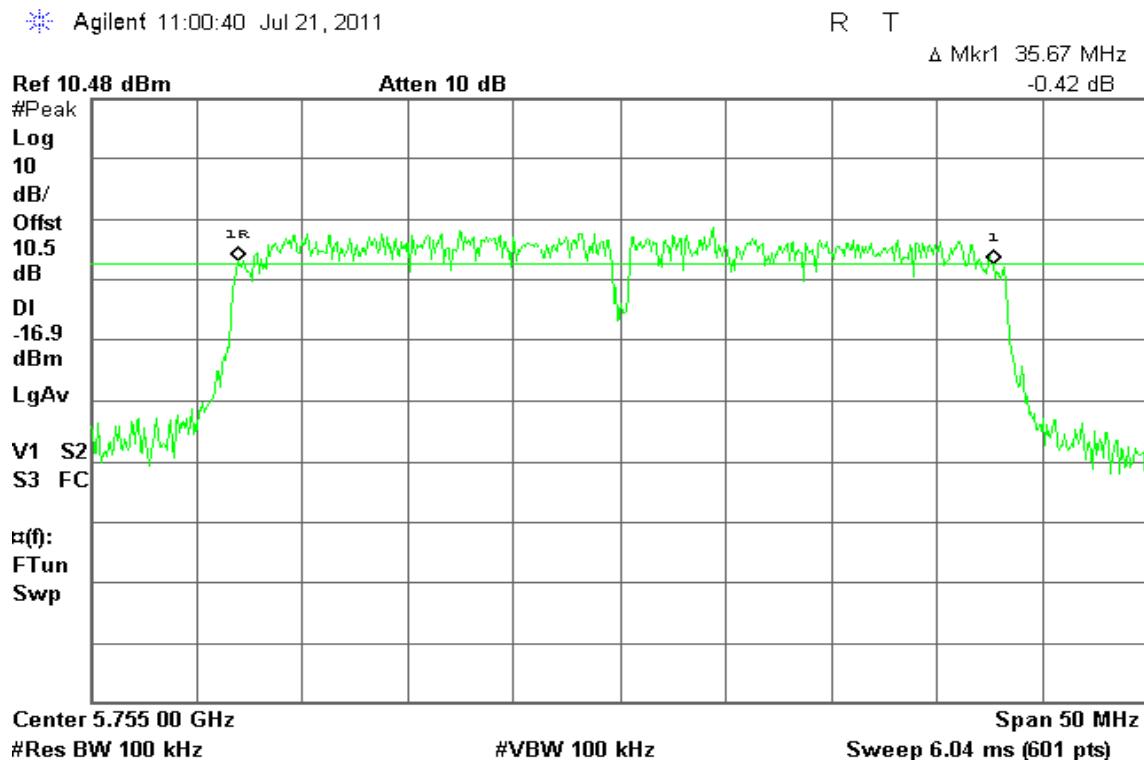
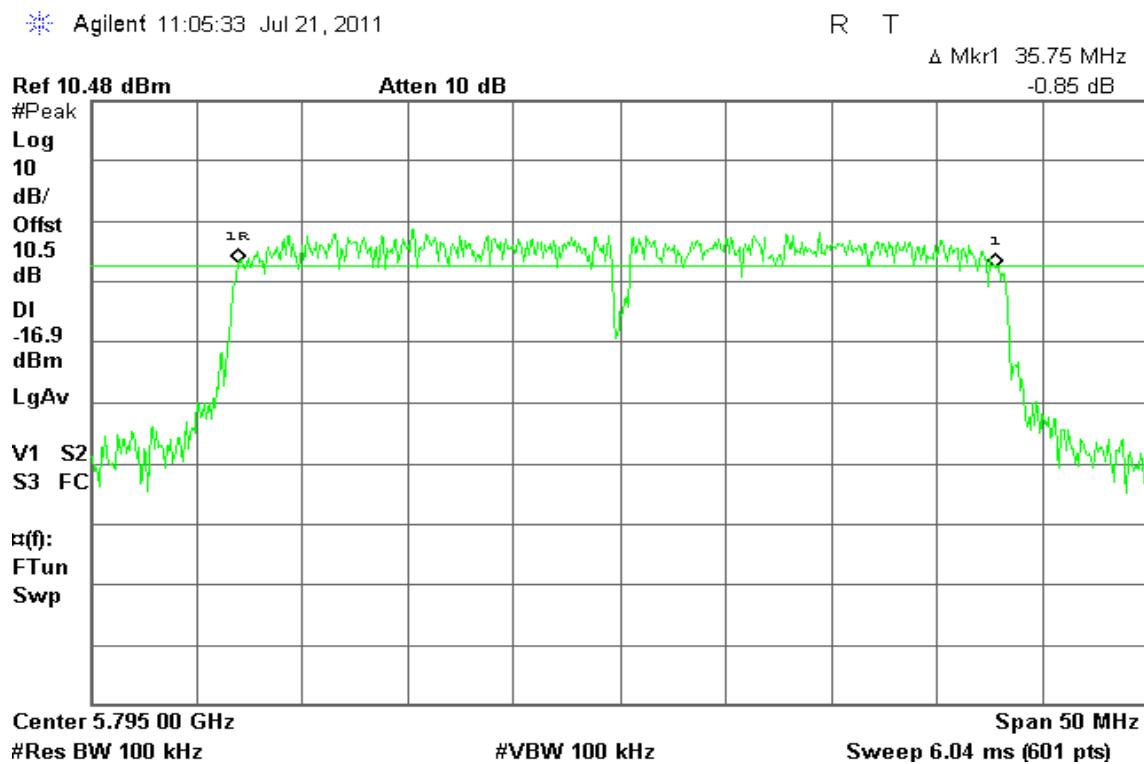
**IEEE 802.11n HT 20 MHz Channel mode / Chain 1****6dB Bandwidth (CH Low)****6dB Bandwidth (CH Mid)**

**6dB Bandwidth (CH High)****IEEE 802.11n HT 20 MHz Channel mode / Chain 2****6dB Bandwidth (CH Low)**

**6dB Bandwidth (CH Mid)****6dB Bandwidth (CH High)**

**IEEE 802.11n HT 40 MHz mode / Chain 0****6dB Bandwidth (CH Low)****6dB Bandwidth (CH High)**

**IEEE 802.11n HT 40 MHz mode / Chain 1****6dB Bandwidth (CH Low)****6dB Bandwidth (CH High)**

**IEEE 802.11n HT 40 MHz mode / Chain 2****6dB Bandwidth (CH Low)****6dB Bandwidth (CH High)**



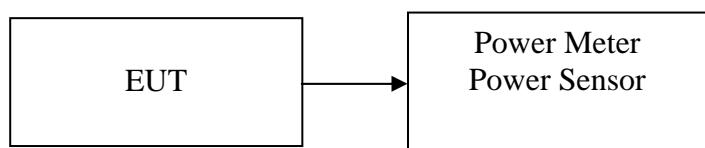
## 7.2 PEAK POWER

### 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, 2400-2483.5 MHz, and 5725-5850 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

The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.

### TEST RESULTS

*No non-compliance noted*



## Test Data

### Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	19.54	0.08995	1	PASS
Mid	2442	20.59	0.11455		PASS
High	2462	20.67	0.11668		PASS

### Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	26.13	0.41020	1	PASS
Mid	2442	26.59	0.45604		PASS
High	2462	26.49	0.44566		PASS

### Test mode: IEEE 802.11n HT 20 MHz mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	23.71	23.66	24.35	28.69	0.7395	0.9988	PASS
Mid	2442	24.43	23.76	24.05	28.86	0.7691		PASS
High	2462	24.57	23.57	23.98	28.83	0.7640		PASS

### Test mode: IEEE 802.11n HT 40 MHz mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	24.09	23.66	24.01	28.70	0.7405	0.9988	PASS
Mid	2442	24.19	23.34	23.78	28.56	0.7170		PASS
High	2452	24.31	22.69	23.45	28.31	0.6769		PASS

#### **Remark:**

1. Total PPSD (dBm) =  $10 \cdot \log(10^{(Chain\ 0\ PPSD\ /10)} + 10^{(Chain\ 1\ PPSD\ /10)} + 10^{(Chain\ 2\ PPSD\ /10)})$
2. The maximum antenna gain is 6.77 dBi; therefore the reduction due to antenna gain is 0.77 dBi, so the limit is 0.9988W.

**Test mode: IEEE 802.11a mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	5745	18.52	0.07112	1.00	PASS
Mid	5785	18.25	0.06683		PASS
High	5825	18.27	0.06714		PASS

**Test mode: IEEE 802.11n HT 20 MHz Channel mode**

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	5745	17.04	15.22	13.61	20.29	0.1068	1.00	PASS
Mid	5785	16.04	15.11	14.95	20.17	0.1039		PASS
High	5825	15.81	18.01	16.25	21.57	0.1435		PASS

**Test mode: IEEE 802.11n HT 40 MHz mode**

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	5755	16.44	17.16	14.31	20.90	0.1230	1.00	PASS
High	5795	14.86	16.89	15.81	20.70	0.1176		PASS

**Remark:**

1. Total Output Power (w) = Chain 0 (10^(Output Power /10)/1000) + Chain 1 (10^(Output Power /10)/1000) + Chain 2 (10^(Output Power /10)/1000)

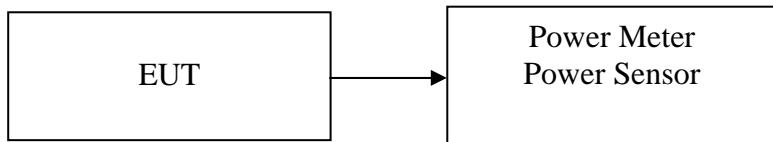


## 7.3 AVERAGE POWER

### LIMIT

None; for reporting purposes only.

### Test Configuration



### TEST PROCEDURE

The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.

### TEST RESULTS

*No non-compliance noted*

**Test Data****Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	16.67	0.04645
Mid	2442	17.61	0.05768
High	2462	17.72	0.05916

**Test mode: IEEE 802.11g mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	19.54	0.08995
Mid	2442	20.06	0.10139
High	2462	20.25	0.10593

**Test mode: IEEE 802.11n HT 20 MHz mode**

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)
Low	2412	15.27	15.48	15.83	20.30	0.1073
Mid	2442	16.12	15.71	15.46	20.54	0.1133
High	2462	16.39	15.41	15.46	20.55	0.1135

**Test mode: IEEE 802.11n HT 40 MHz mode**

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)
Low	2422	15.67	15.61	15.62	20.40	0.1098
Mid	2442	15.98	15.57	15.18	20.36	0.1086
High	2452	16.17	14.67	14.56	19.97	0.0993

**Remark:** Total Output Power (w) = Chain 0 ( $10^{(Output\ Power\ /10)/1000}$ ) + Chain 1 ( $10^{(Output\ Power\ /10)/1000}$ ) + Chain 2 ( $10^{(Output\ Power\ /10)/1000}$ )

**Test mode: IEEE 802.11a mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	5745	9.77	0.00948
Mid	5785	10.06	0.01014
High	5825	10.16	0.01038

**Test mode: IEEE 802.11n HT 20 MHz Channel mode**

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)
Low	5745	8.32	7.09	5.28	11.84	0.0153
Mid	5785	7.26	6.63	7.01	11.75	0.0149
High	5825	7.11	9.84	8.02	13.25	0.0211

**Test mode: IEEE 802.11n HT 40 MHz mode**

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)
Low	5755	7.99	8.65	6.37	12.54	0.0180
High	5795	6.63	9.19	7.55	12.69	0.0186

**Remark:**

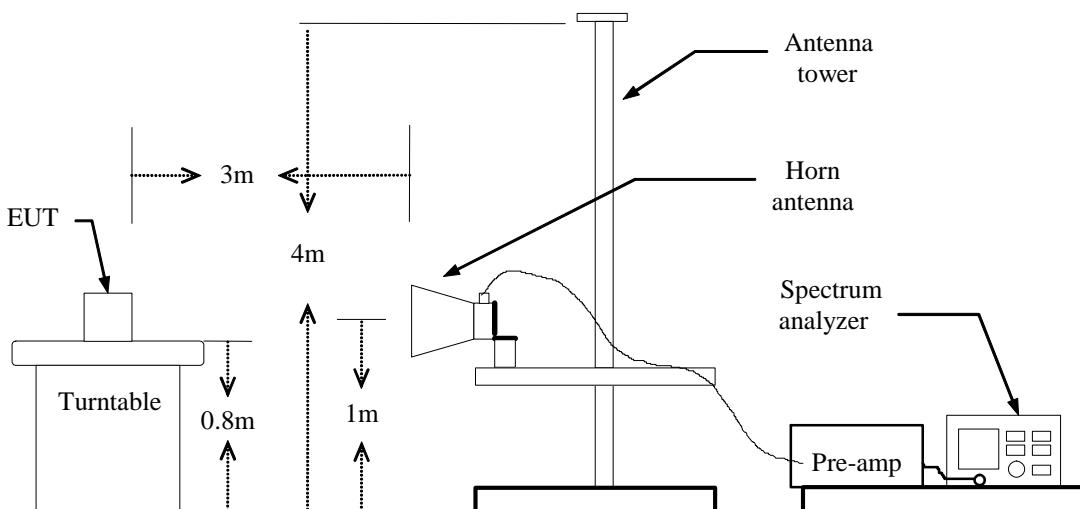
1. Total Output Power (w) = Chain 0 ( $10^{(Output\ Power/10)/1000}$ ) + Chain 1 ( $10^{(Output\ Power/10)/1000}$ ) + Chain 2 ( $10^{(Output\ Power/10)/1000}$ )

## 7.4 BAND EDGES 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

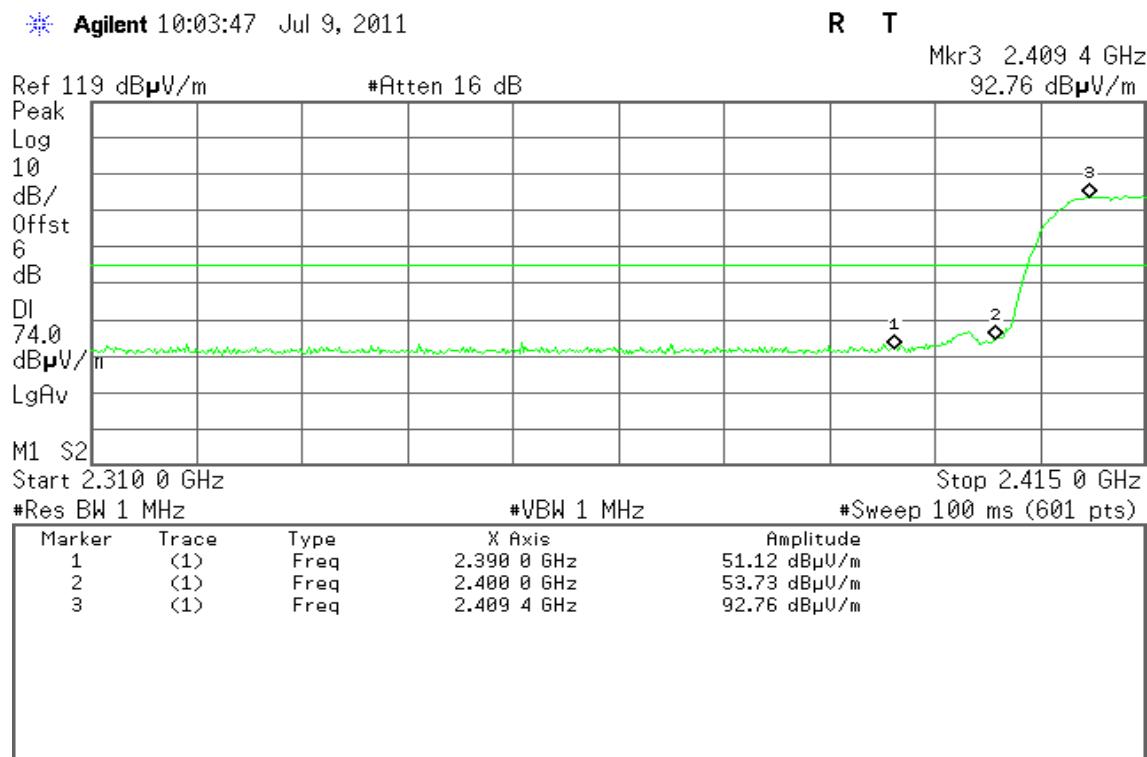
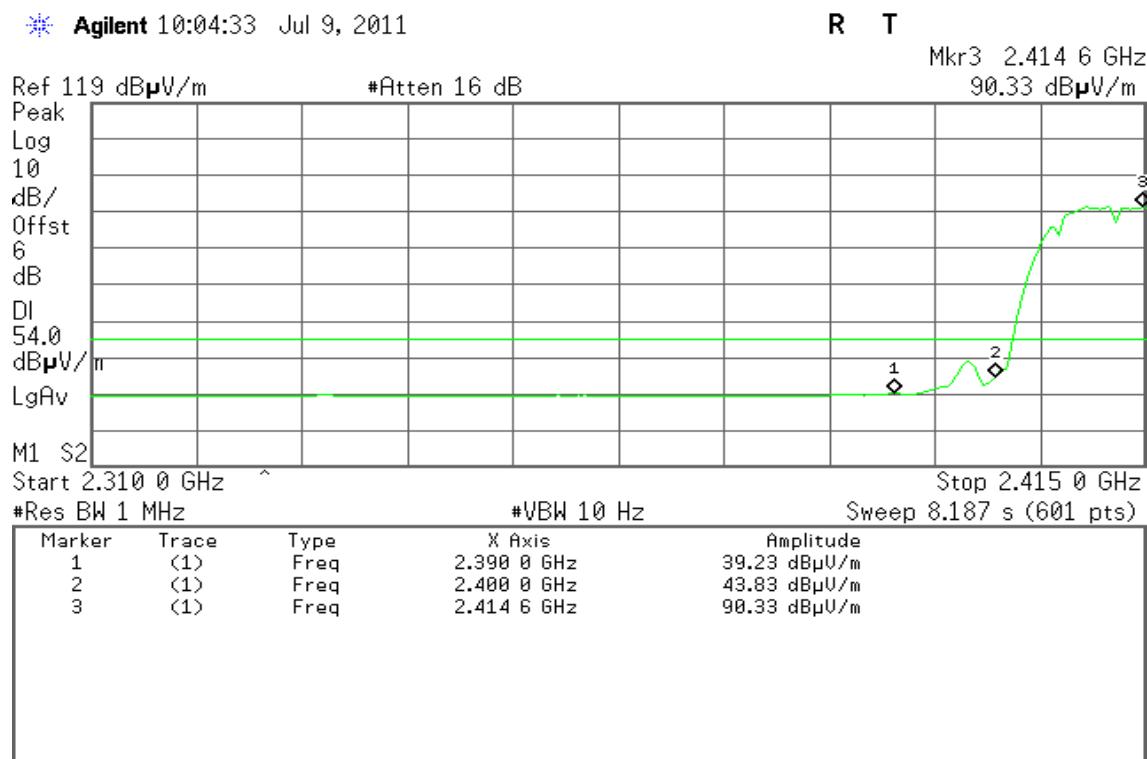


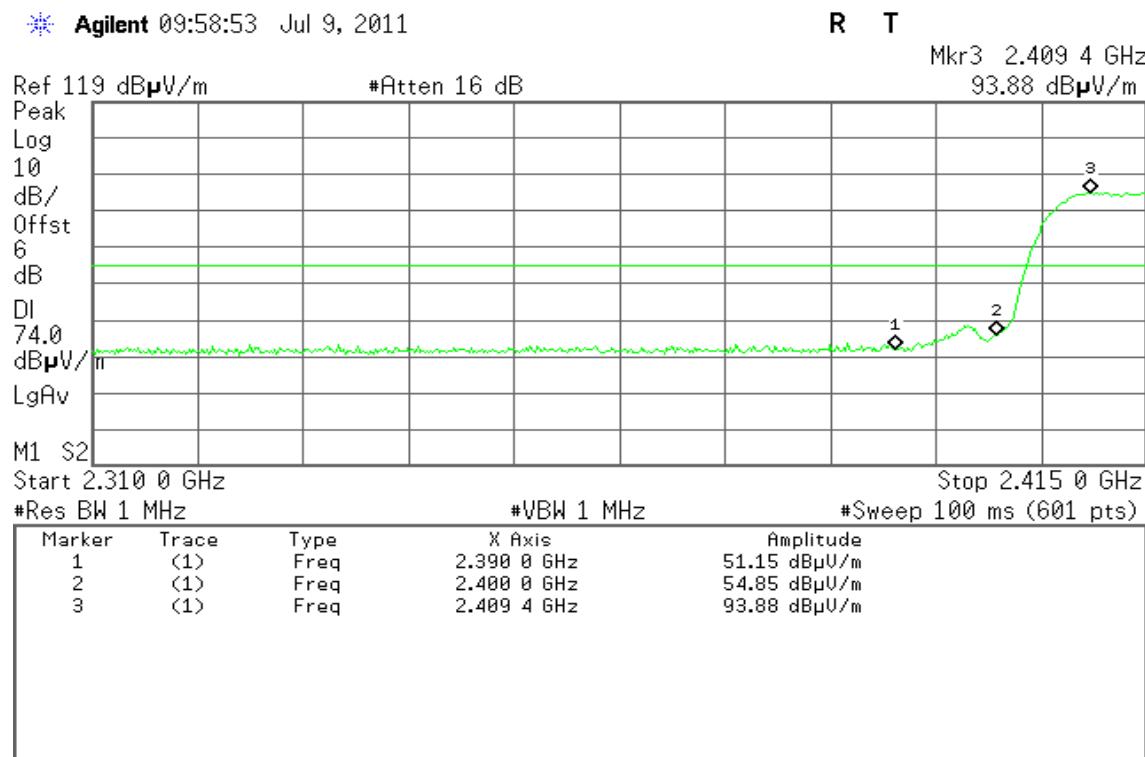
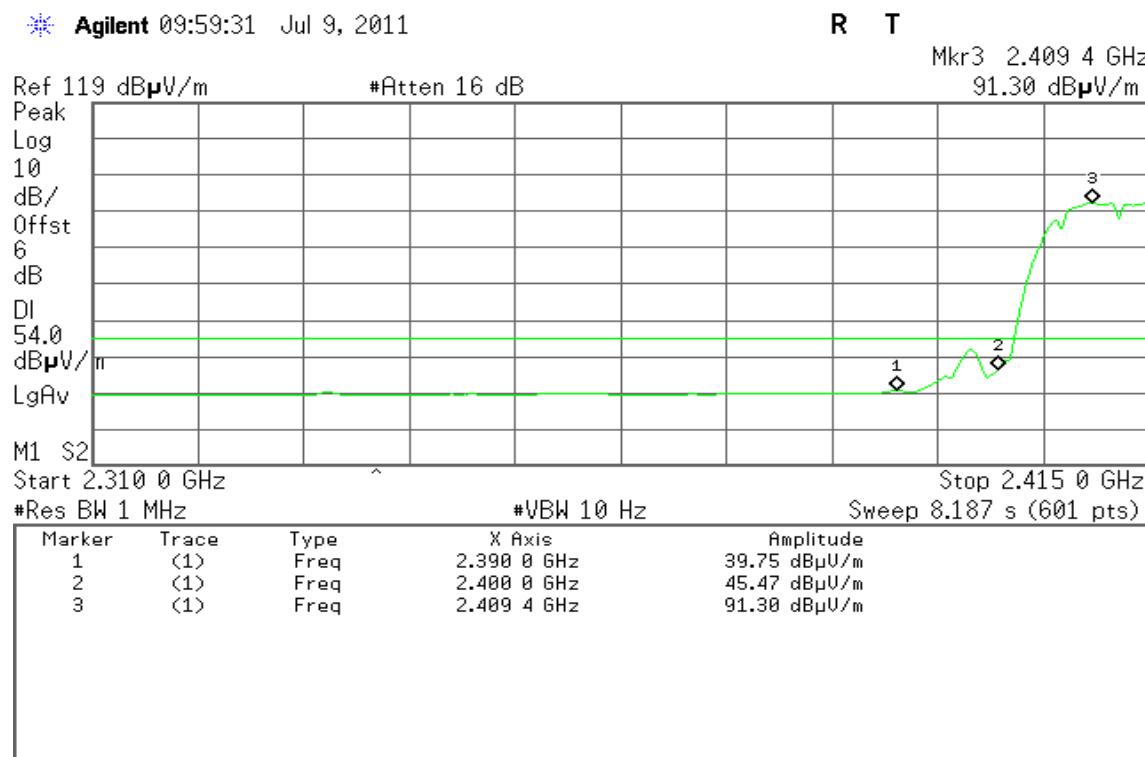
### TEST PROCEDURE

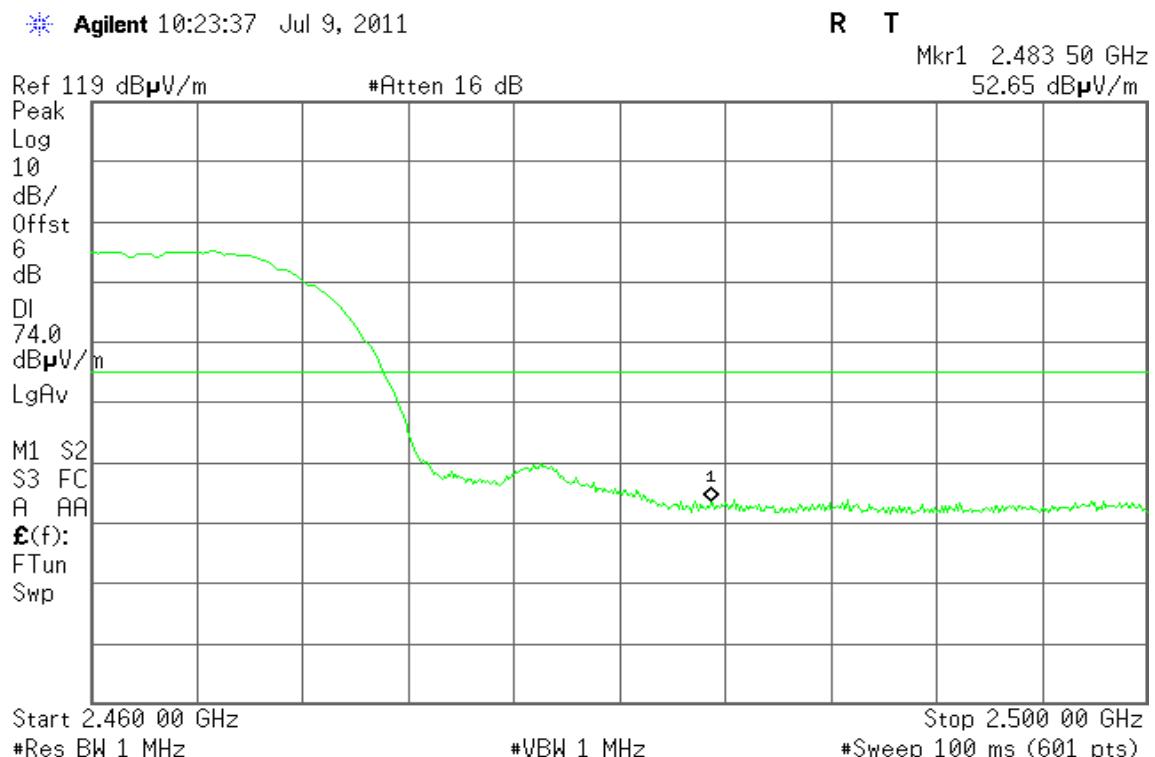
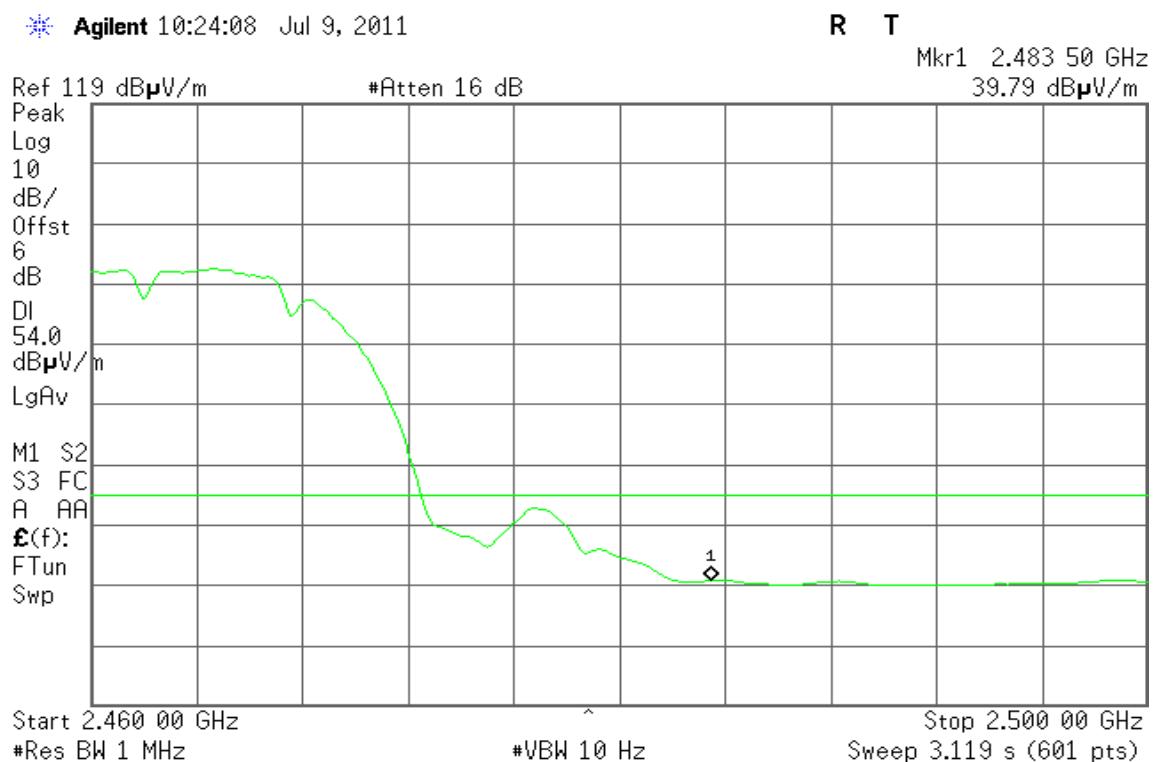
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

### TEST RESULTS

Refer to attach spectrum analyzer data chart.

**Band Edges (IEEE 802.11b mode / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

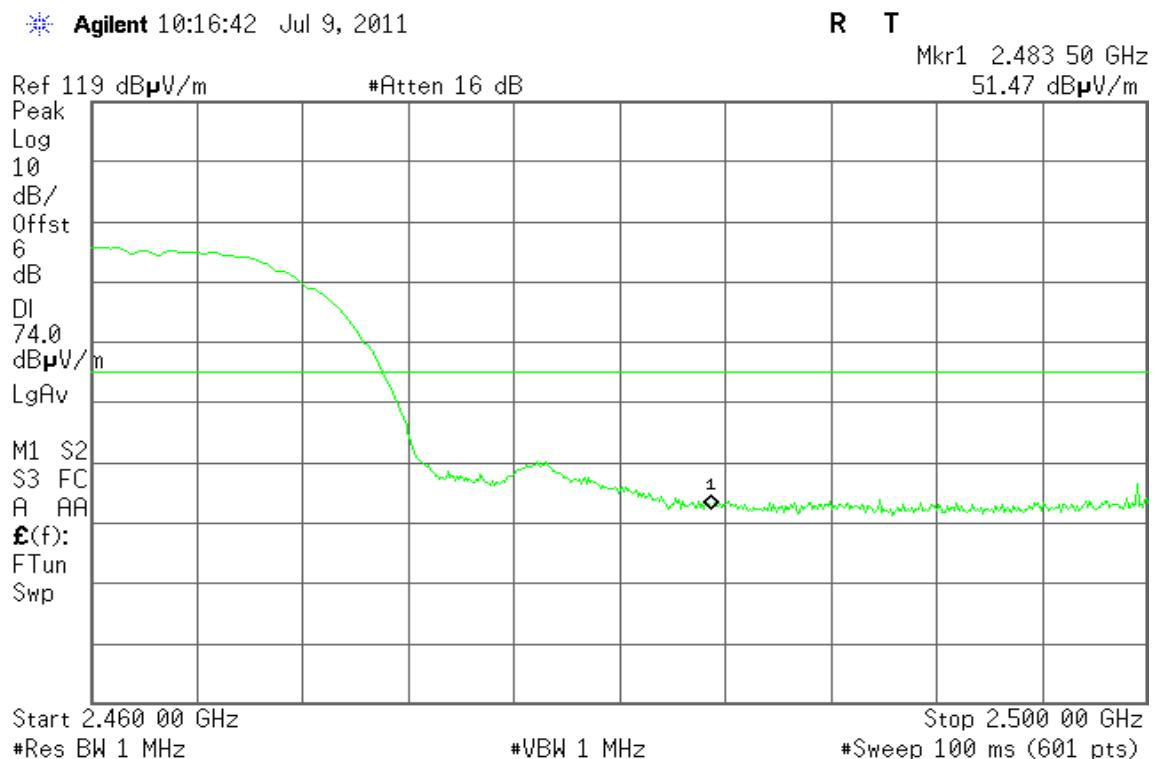
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

**Band Edges (IEEE 802.11b mode / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**



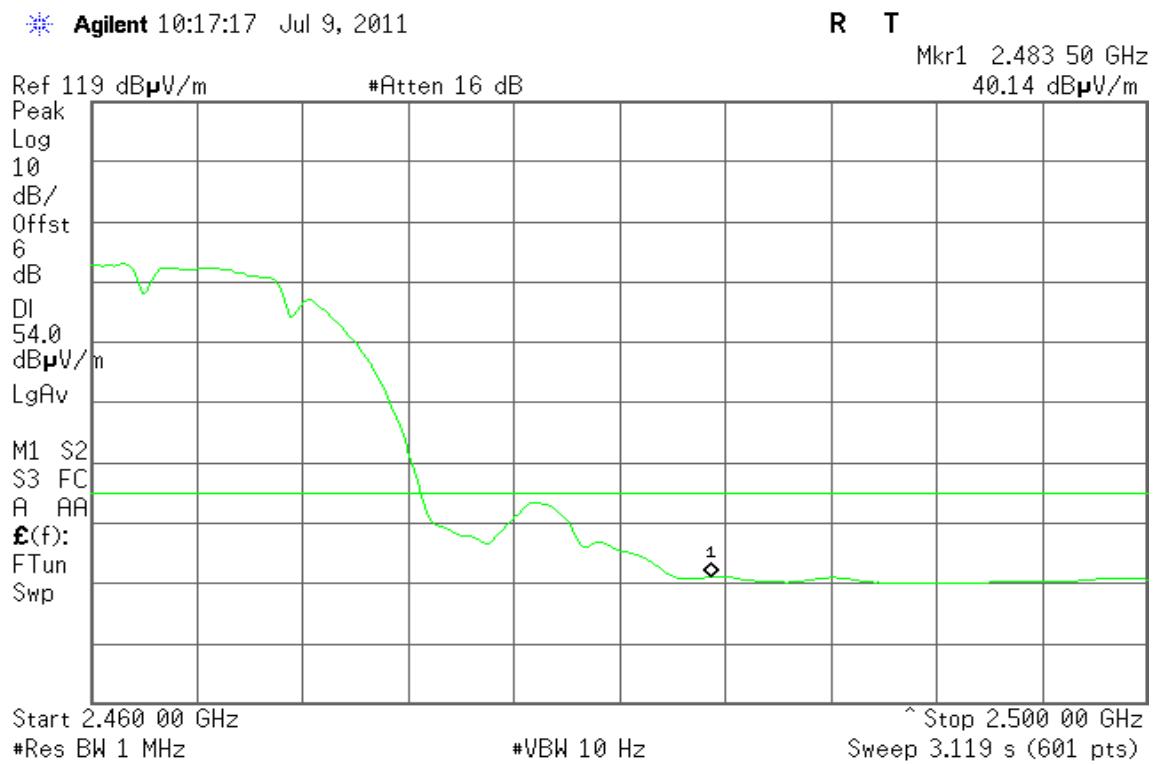
**Detector mode: Peak**

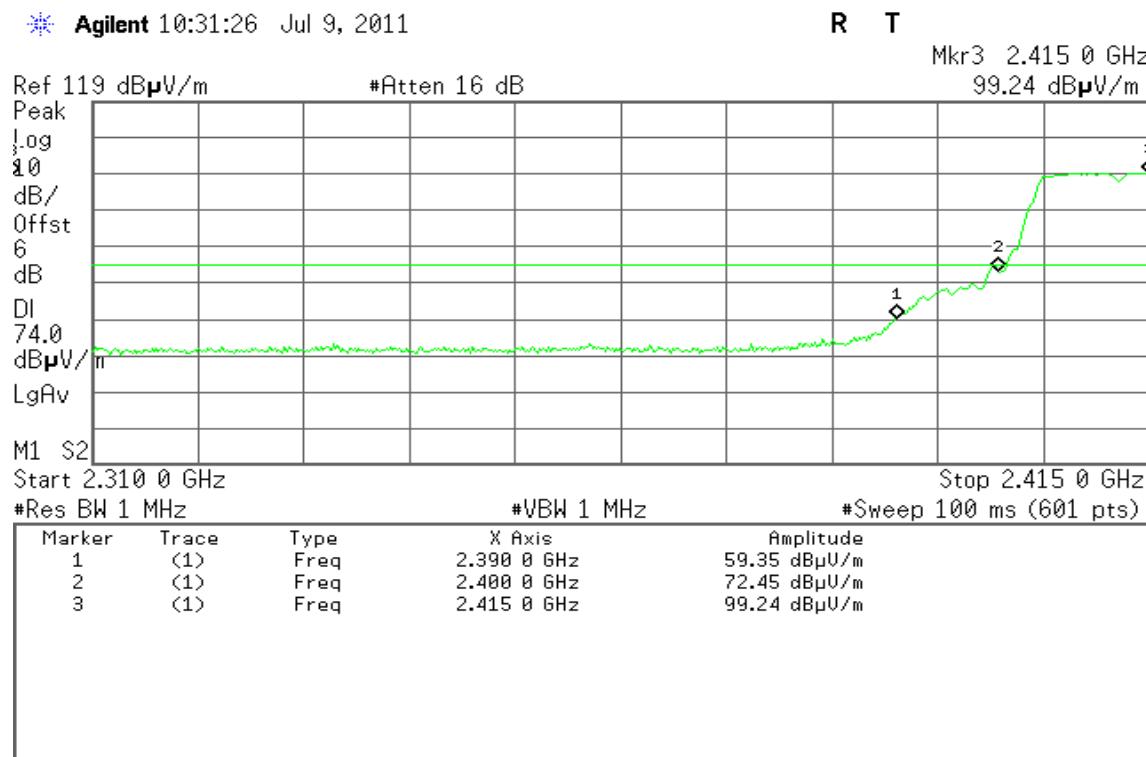
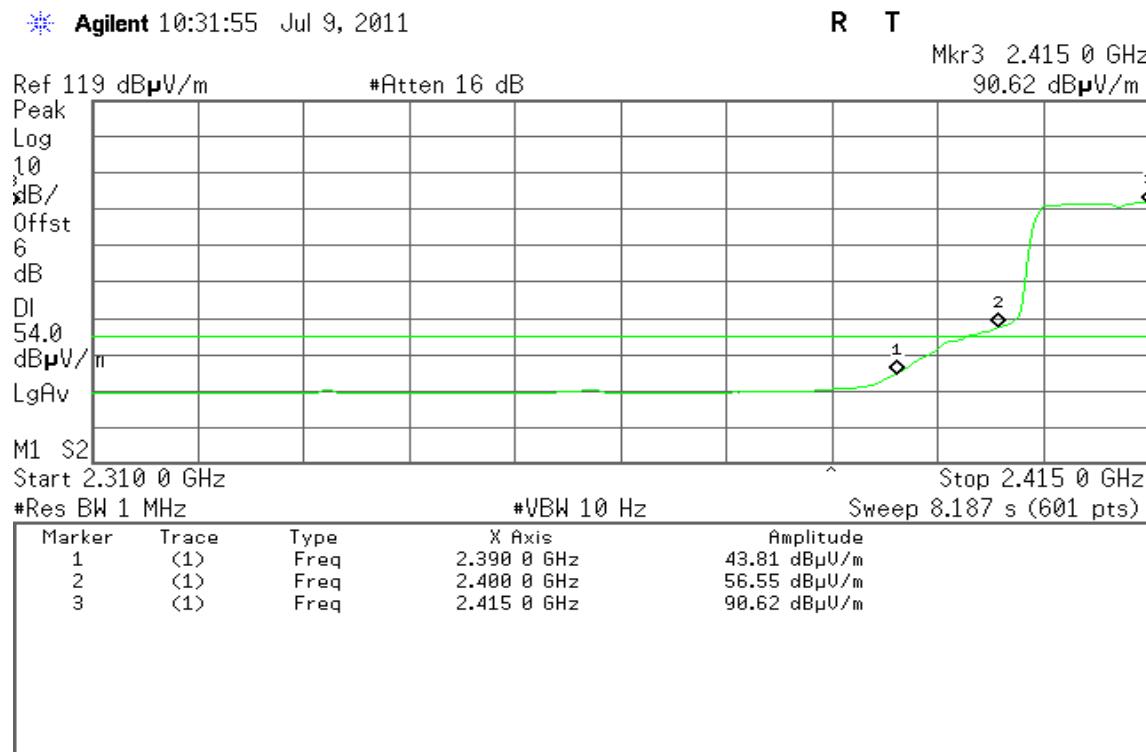
**Polarity: Horizontal**

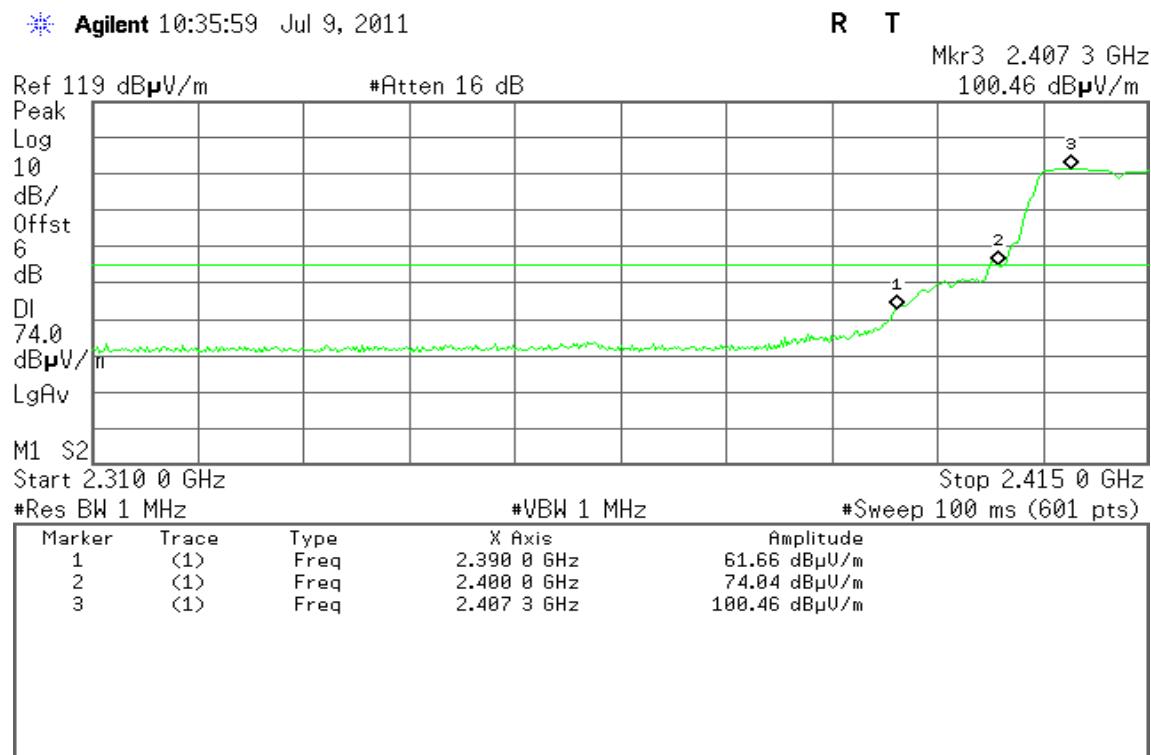
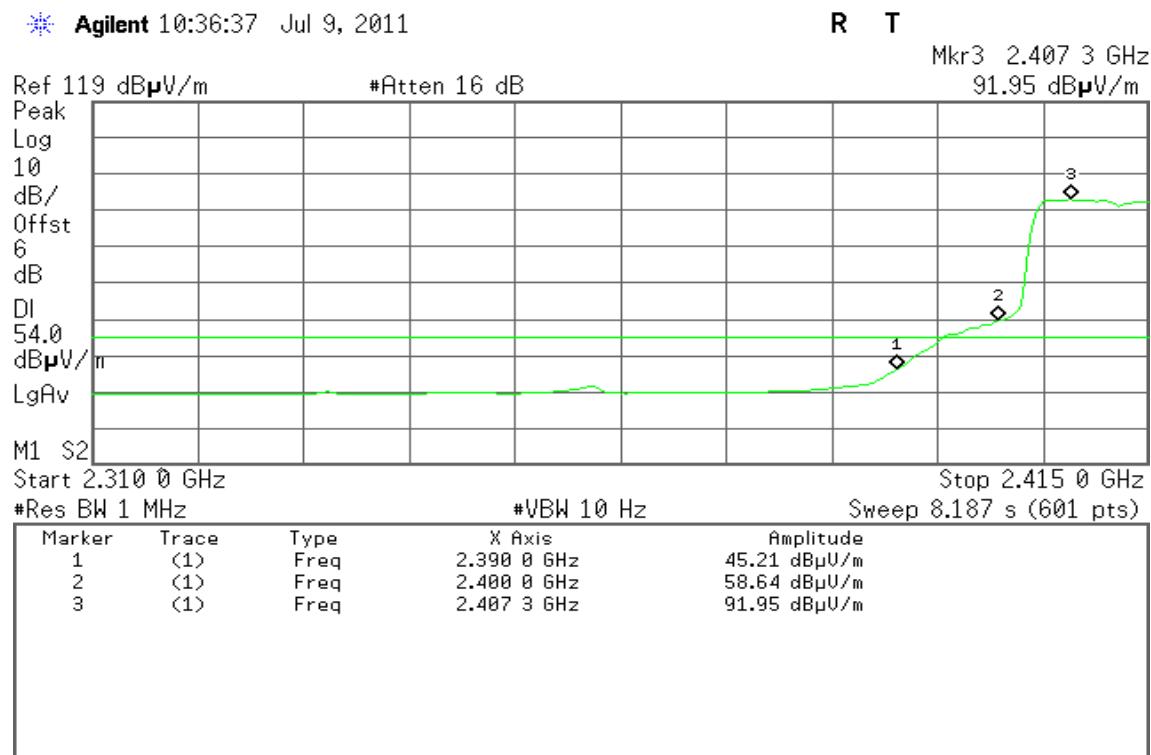


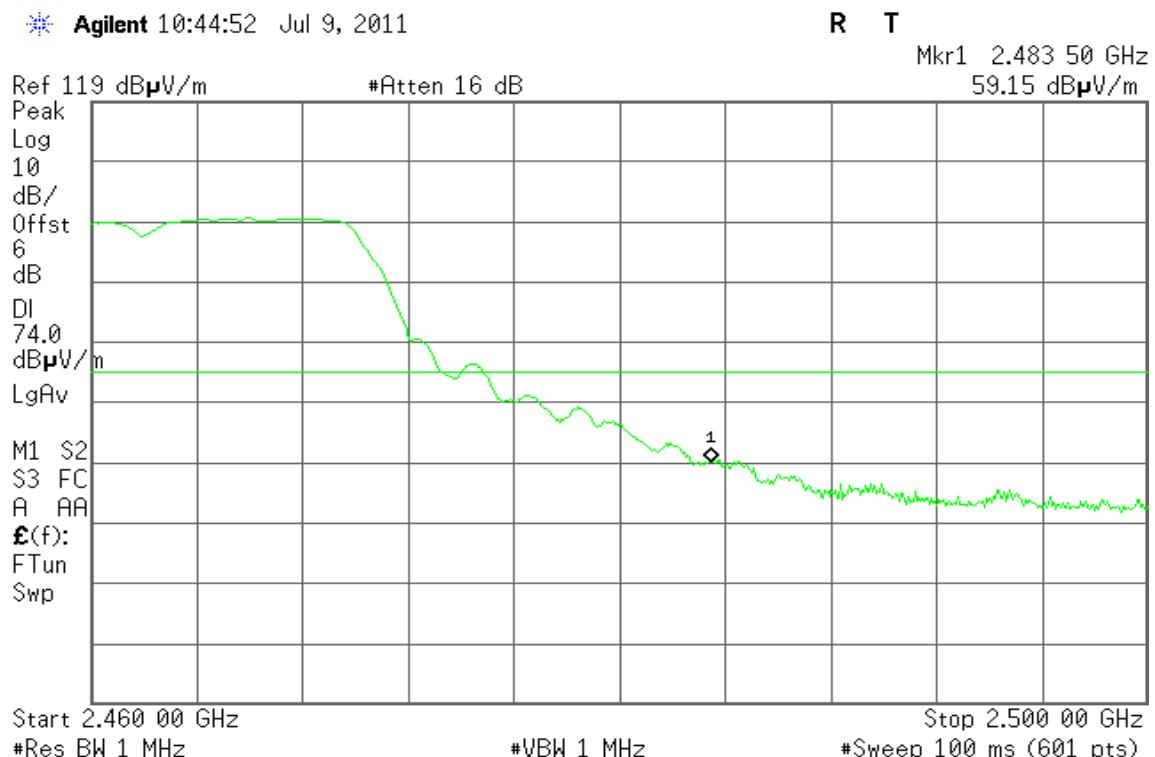
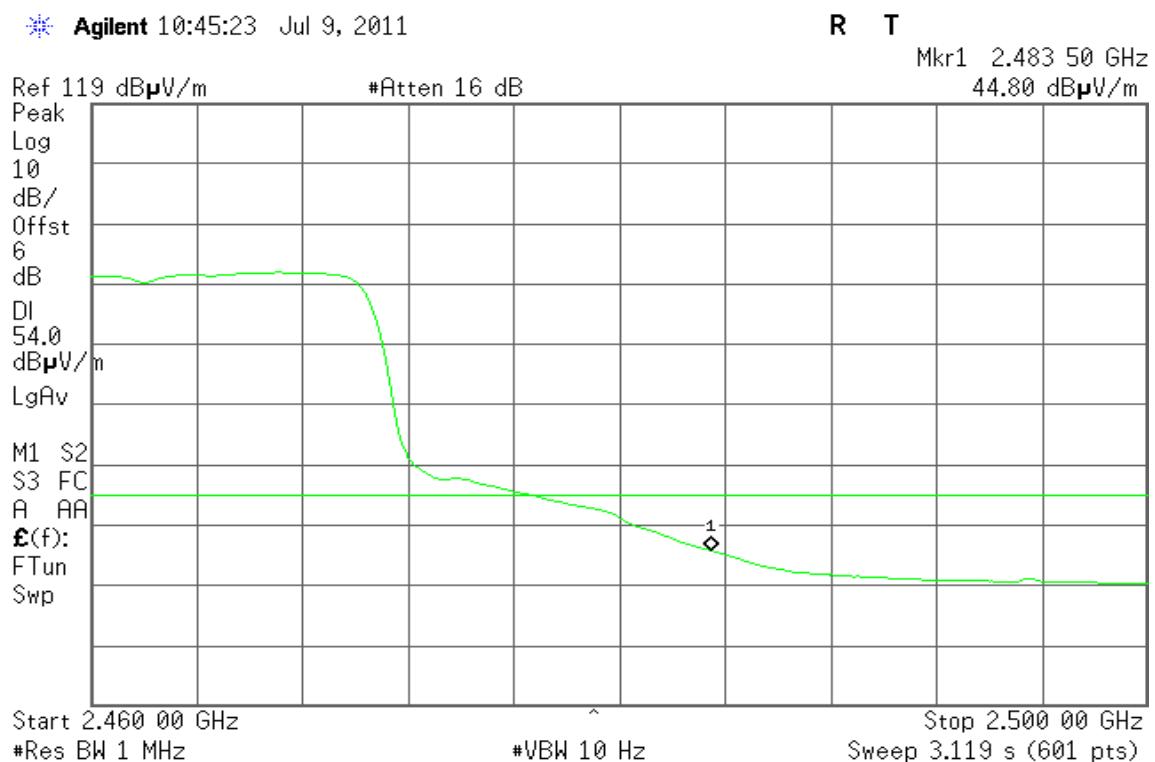
**Detector mode: Average**

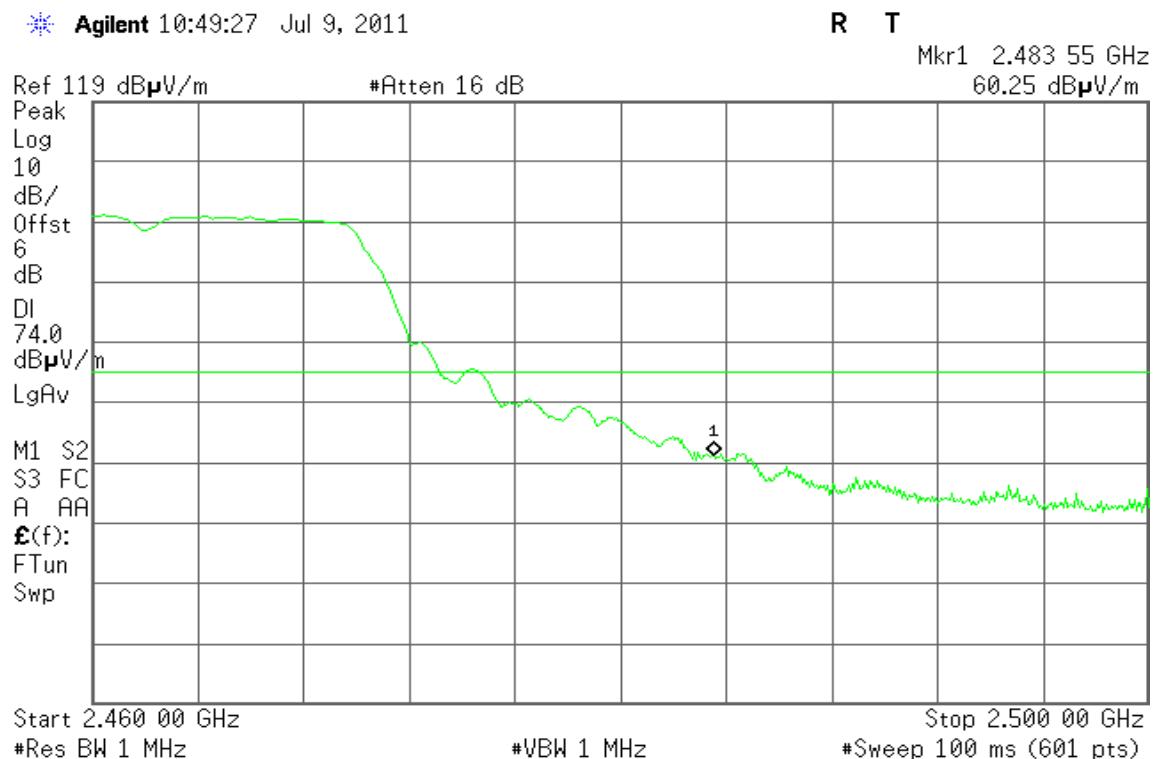
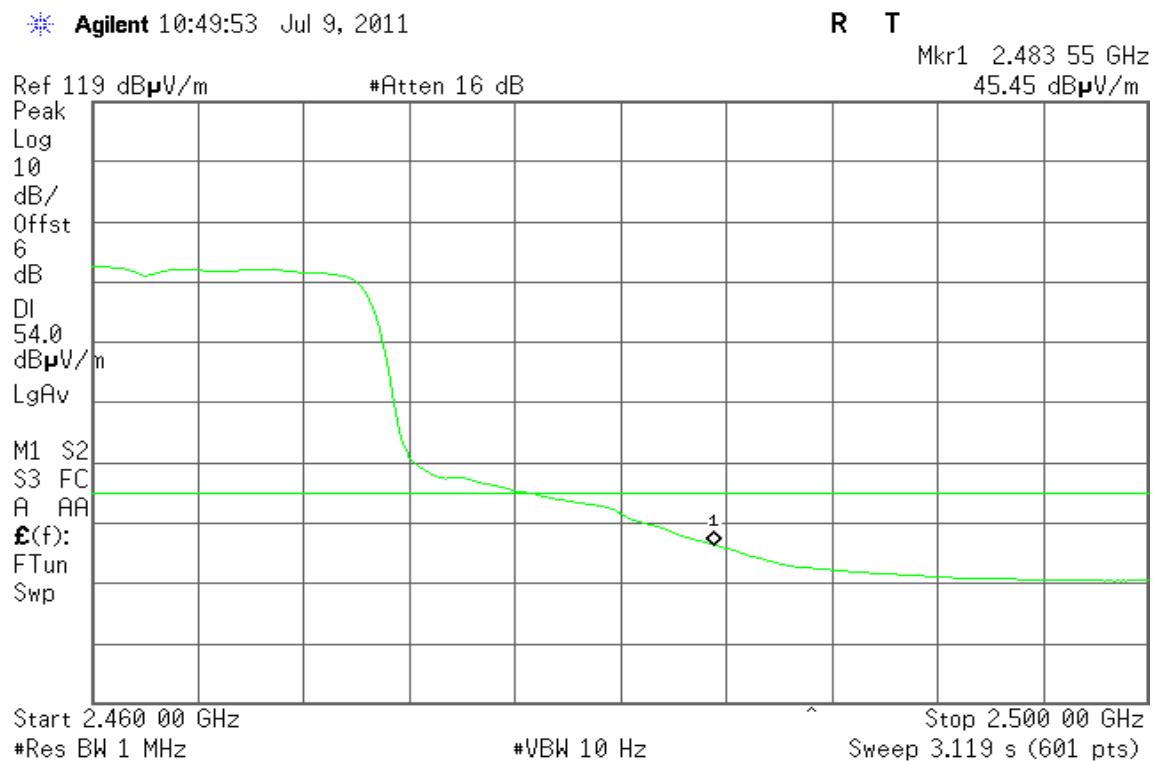
**Polarity: Horizontal**

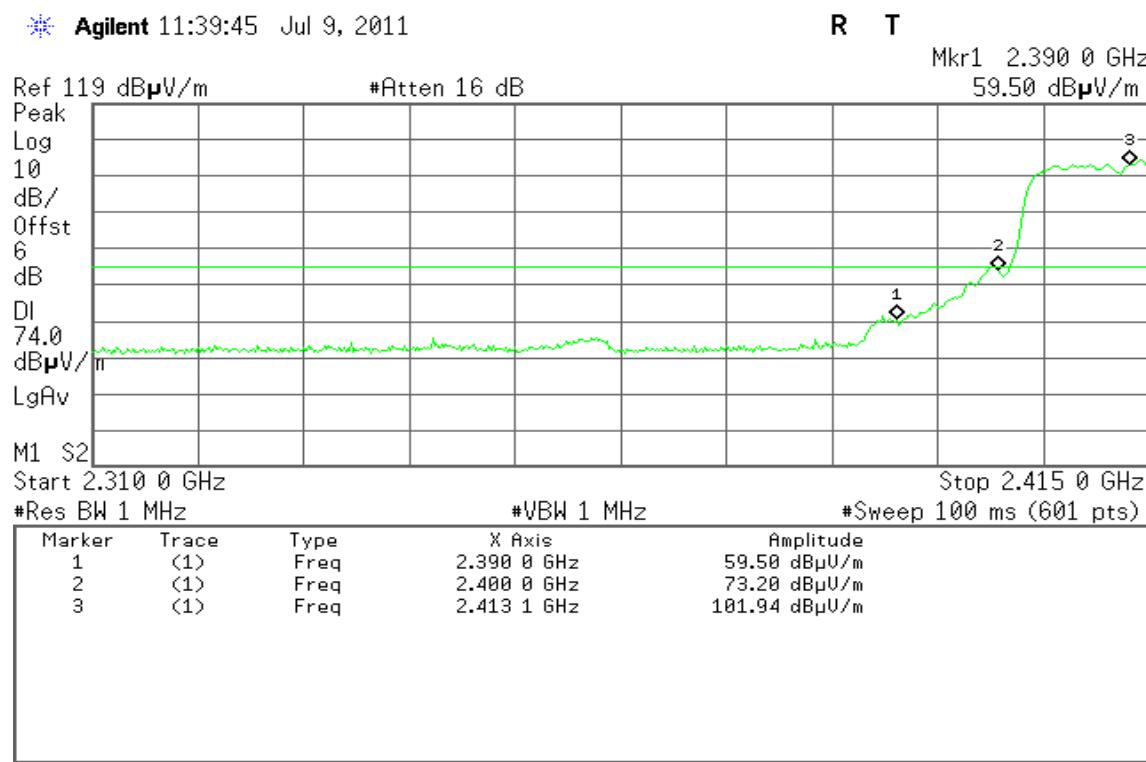
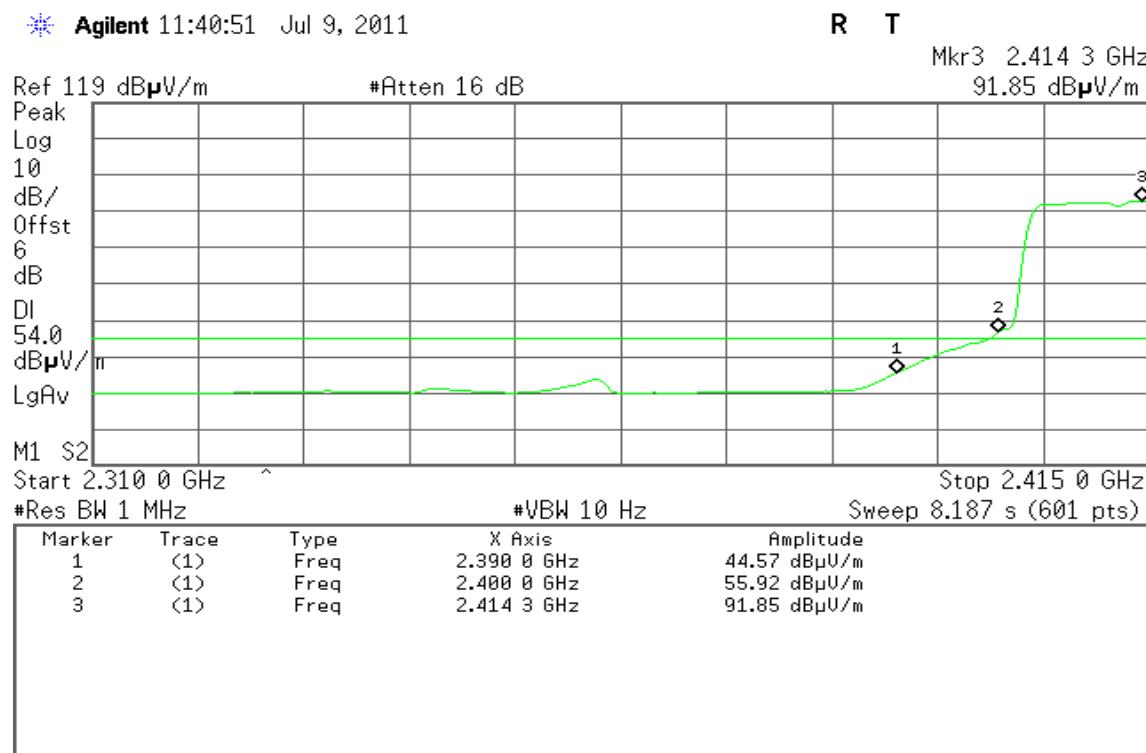


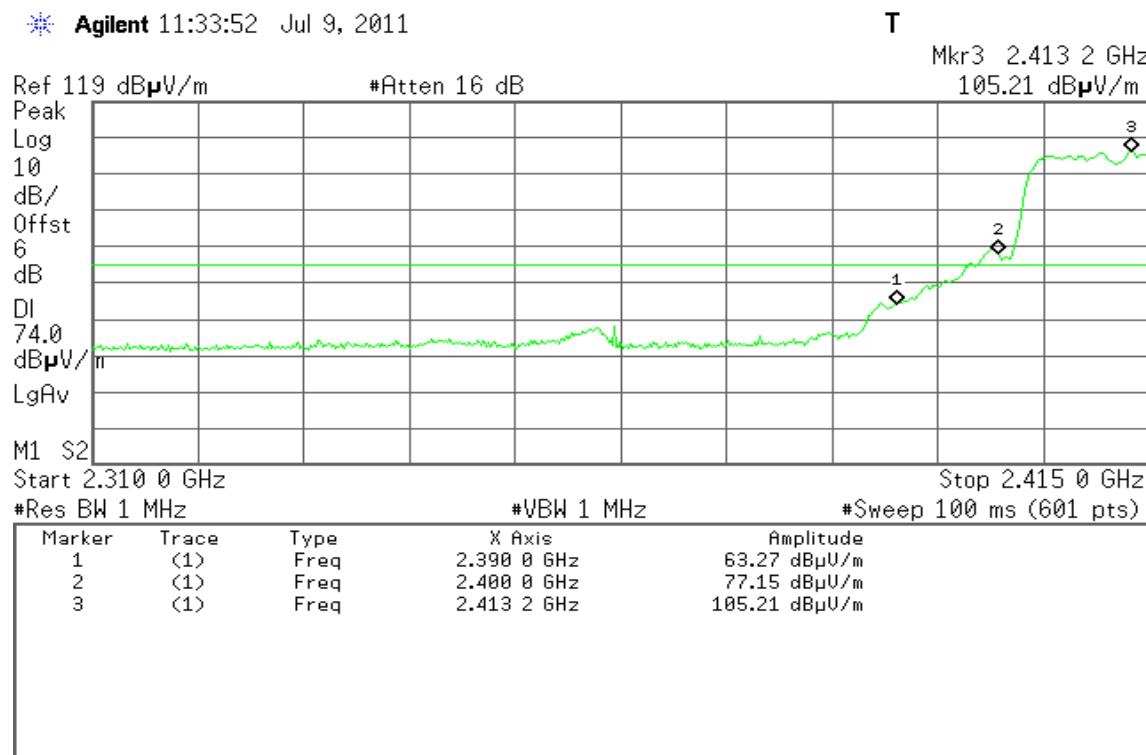
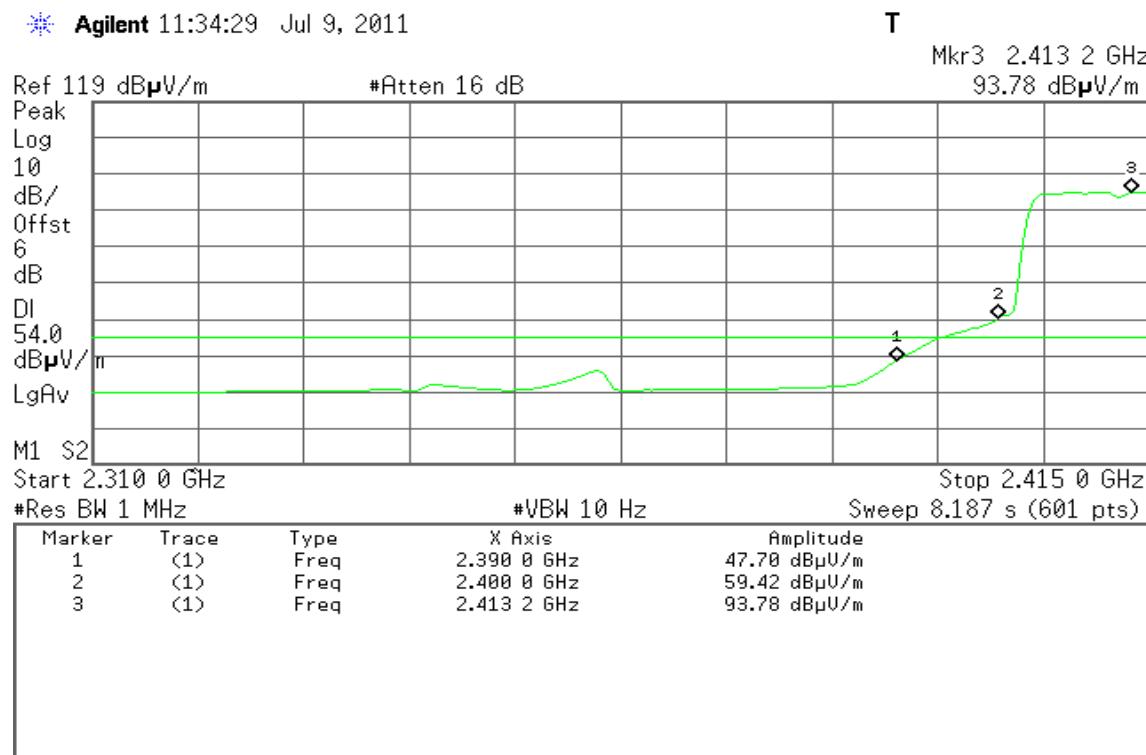
**Band Edges (IEEE 802.11g mode / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

**Band Edges (IEEE 802.11g mode / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

**Band Edges (IEEE 802.11n HT 20 MHz mode / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

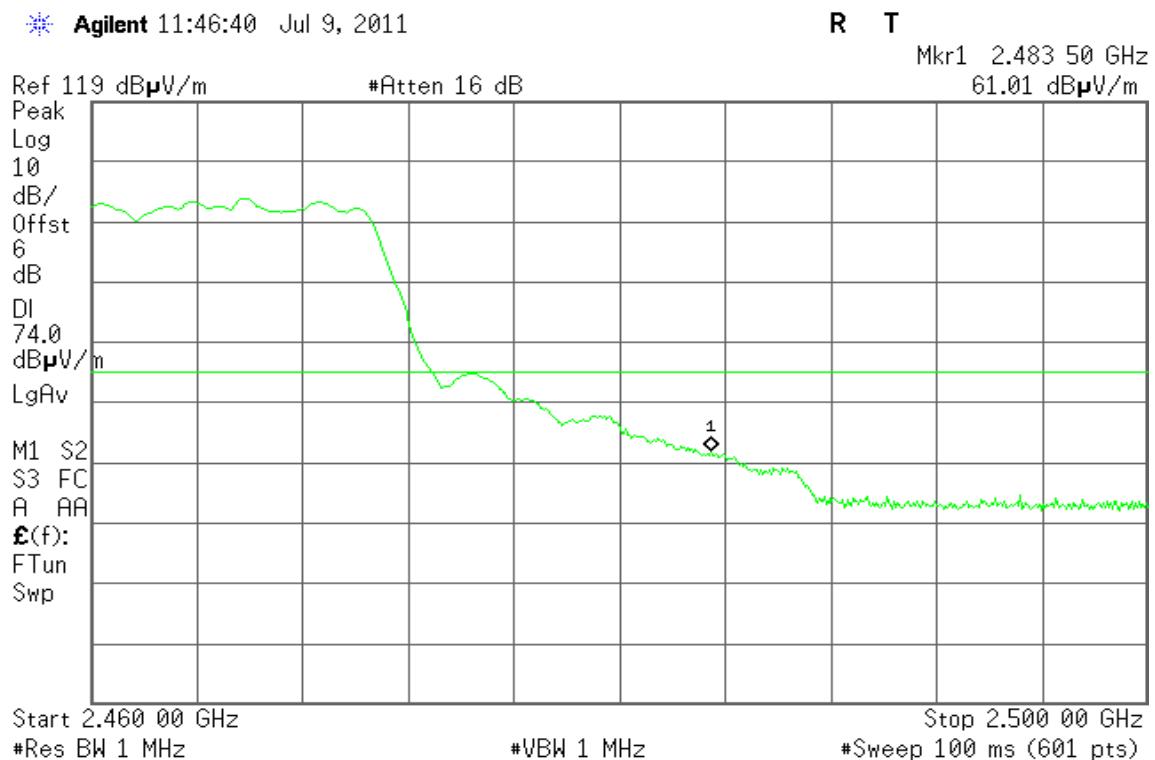
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**



## Band Edges (IEEE 802.11n HT 20 MHz mode / CH High)

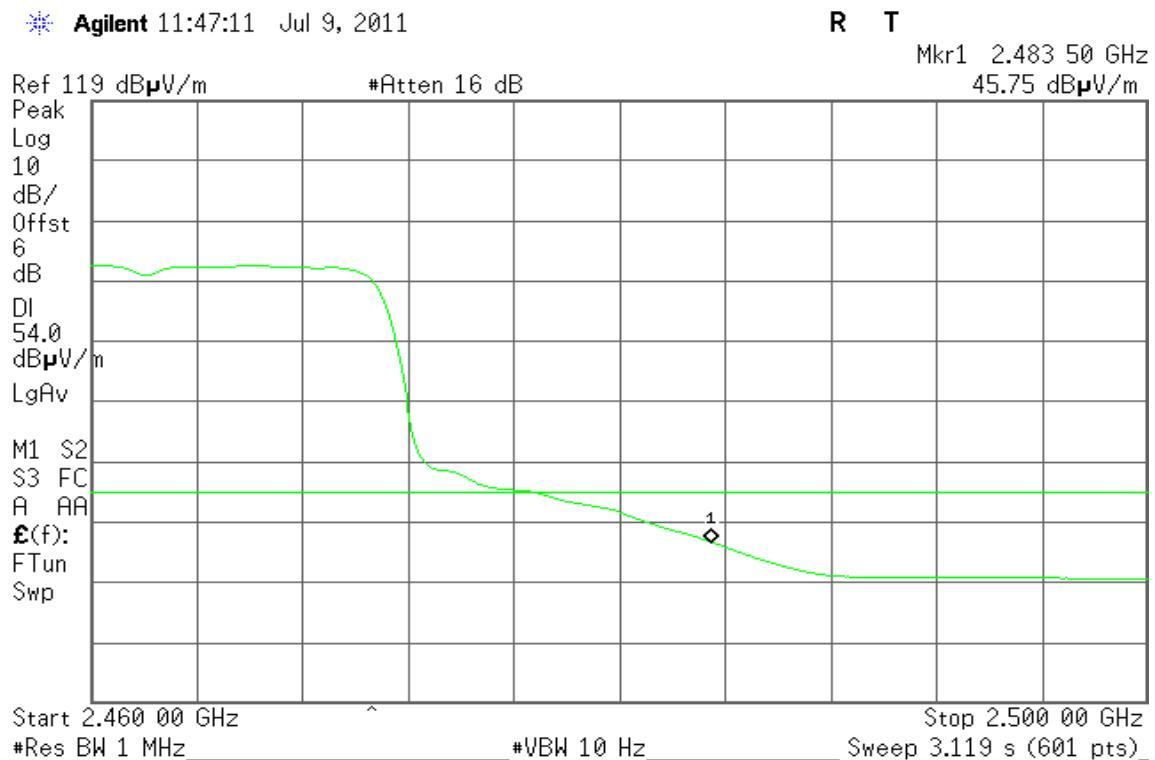
Detector mode: Peak

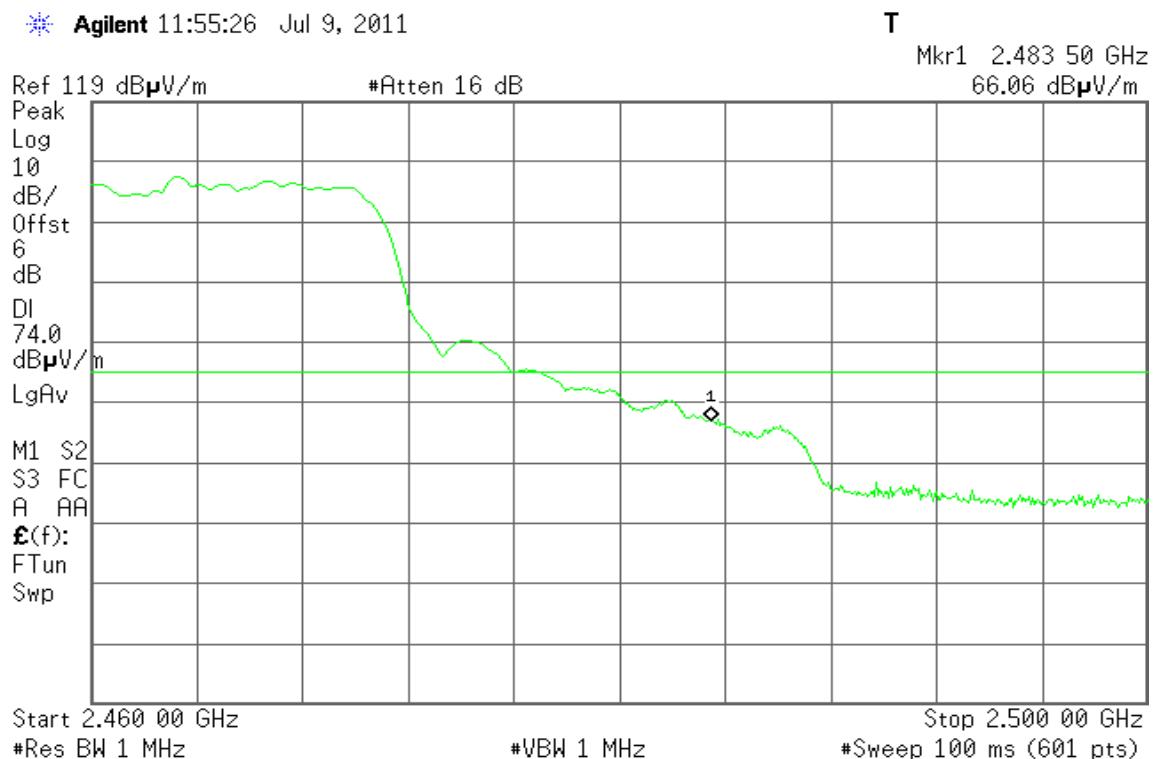
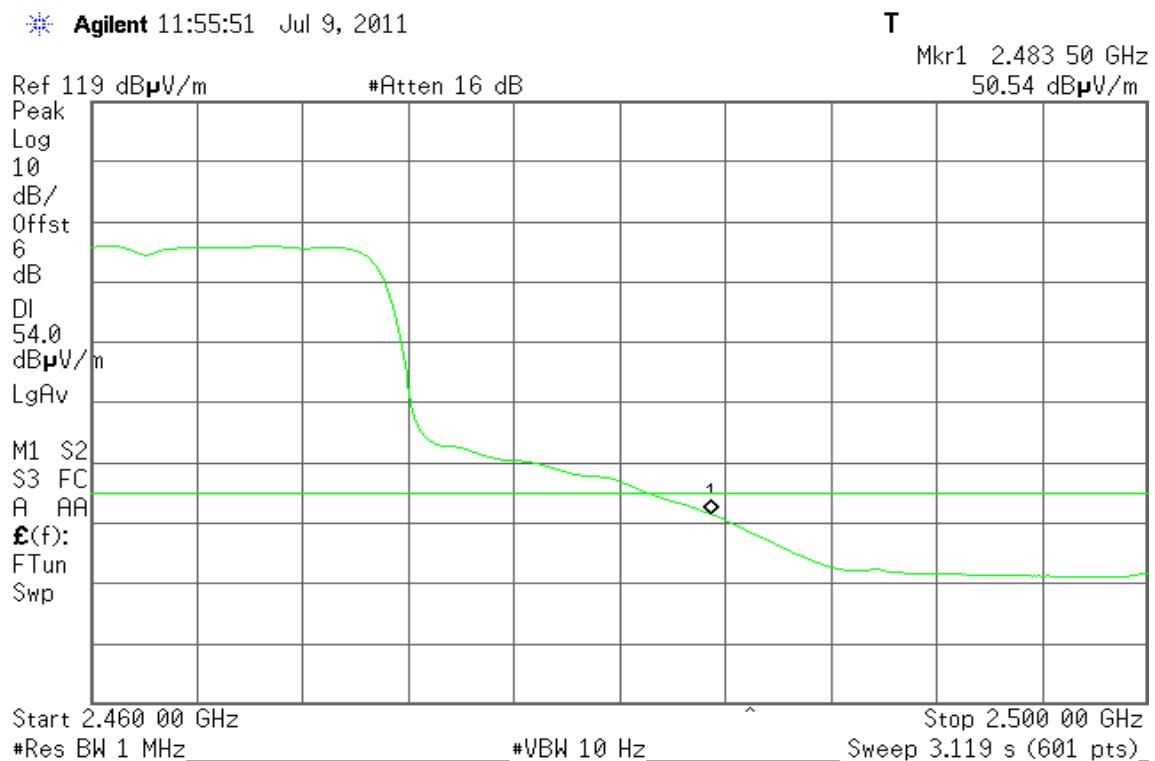
Polarity: Vertical

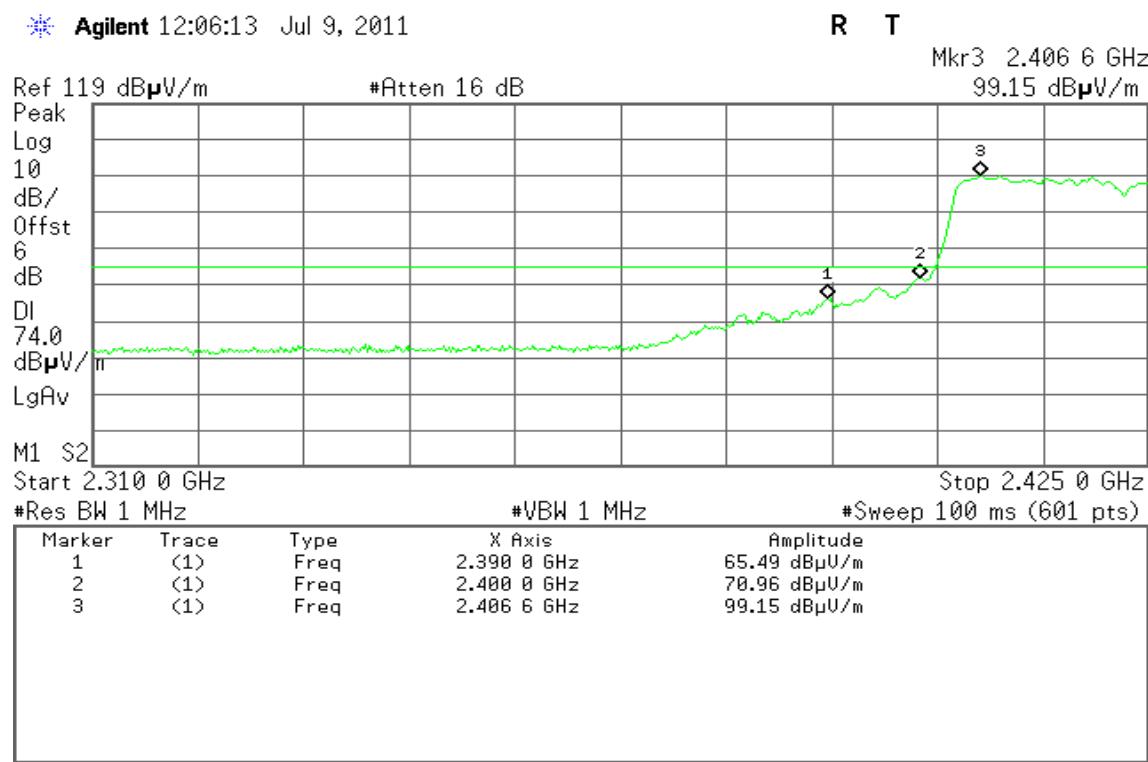
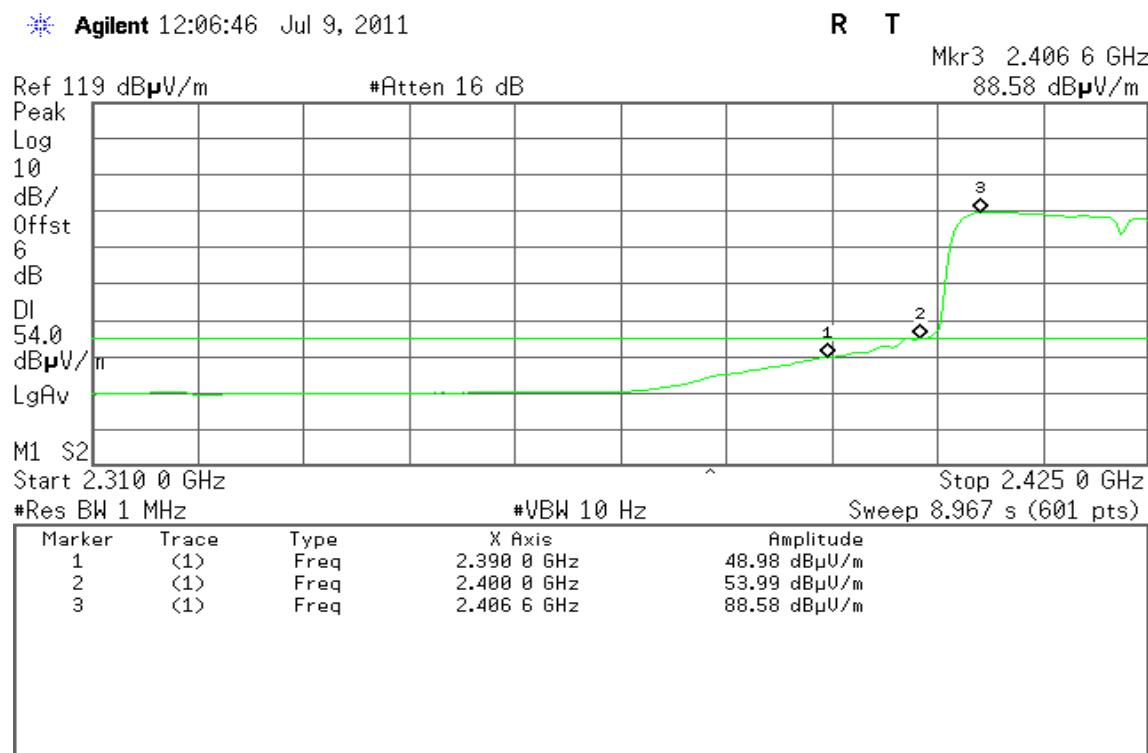


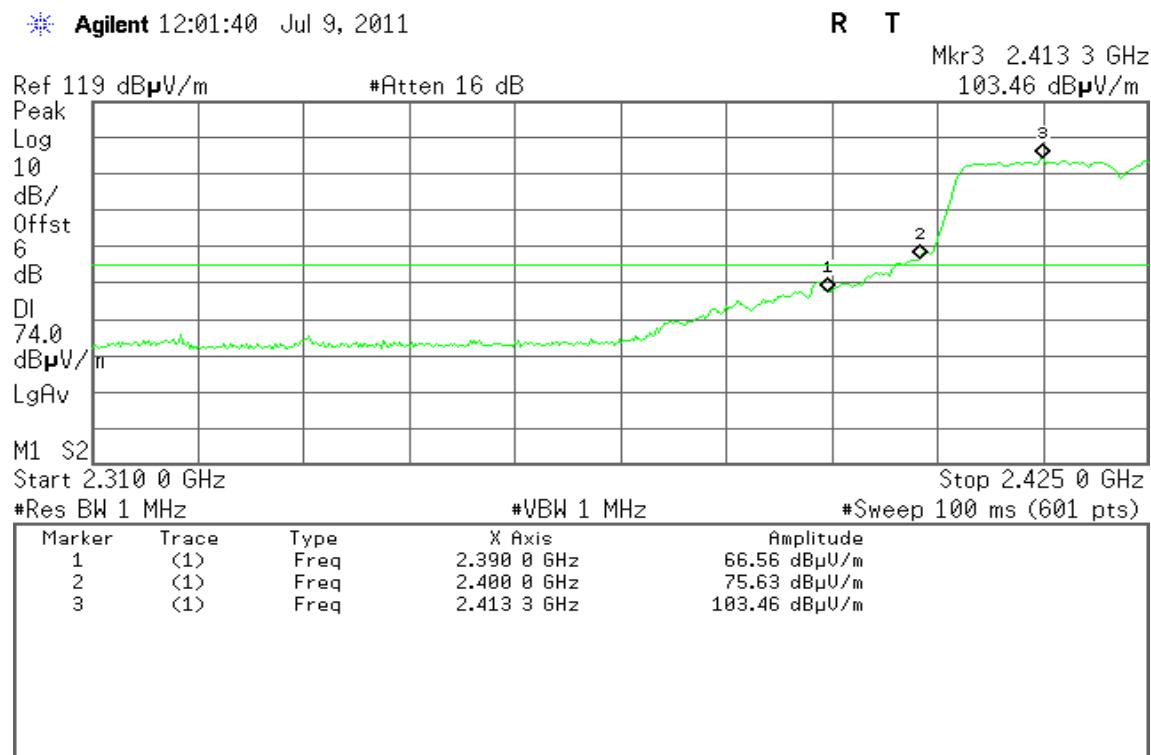
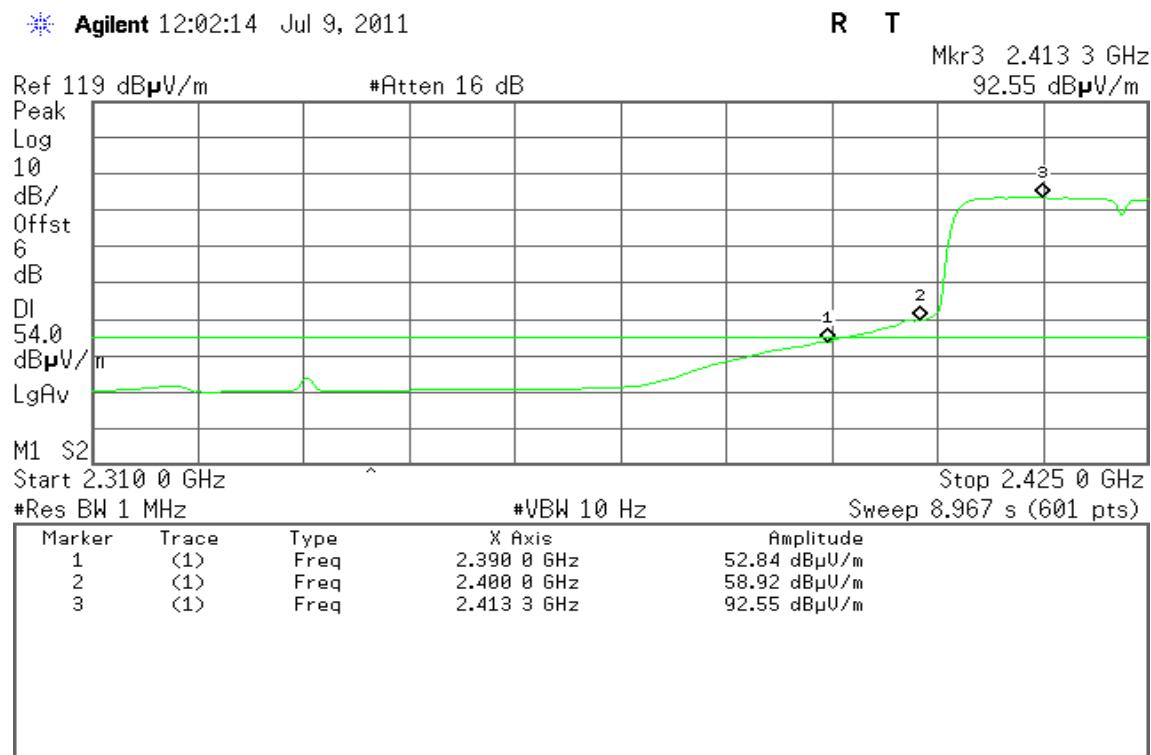
Detector mode: Average

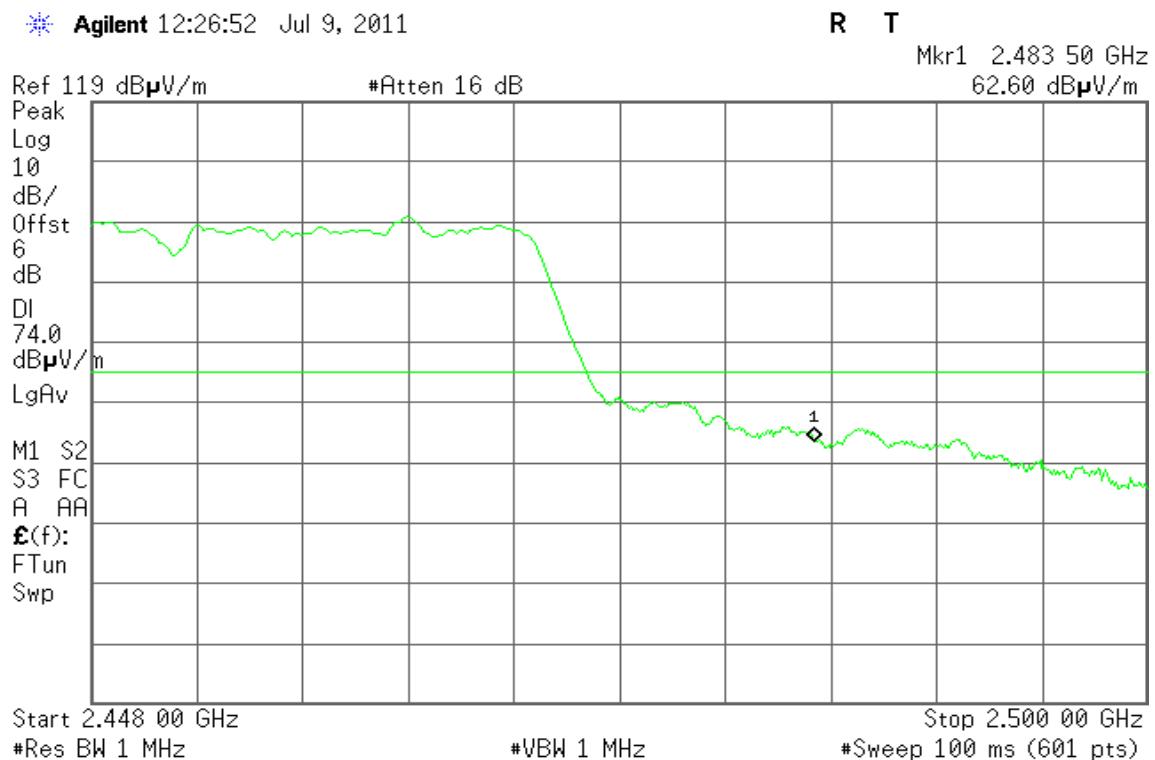
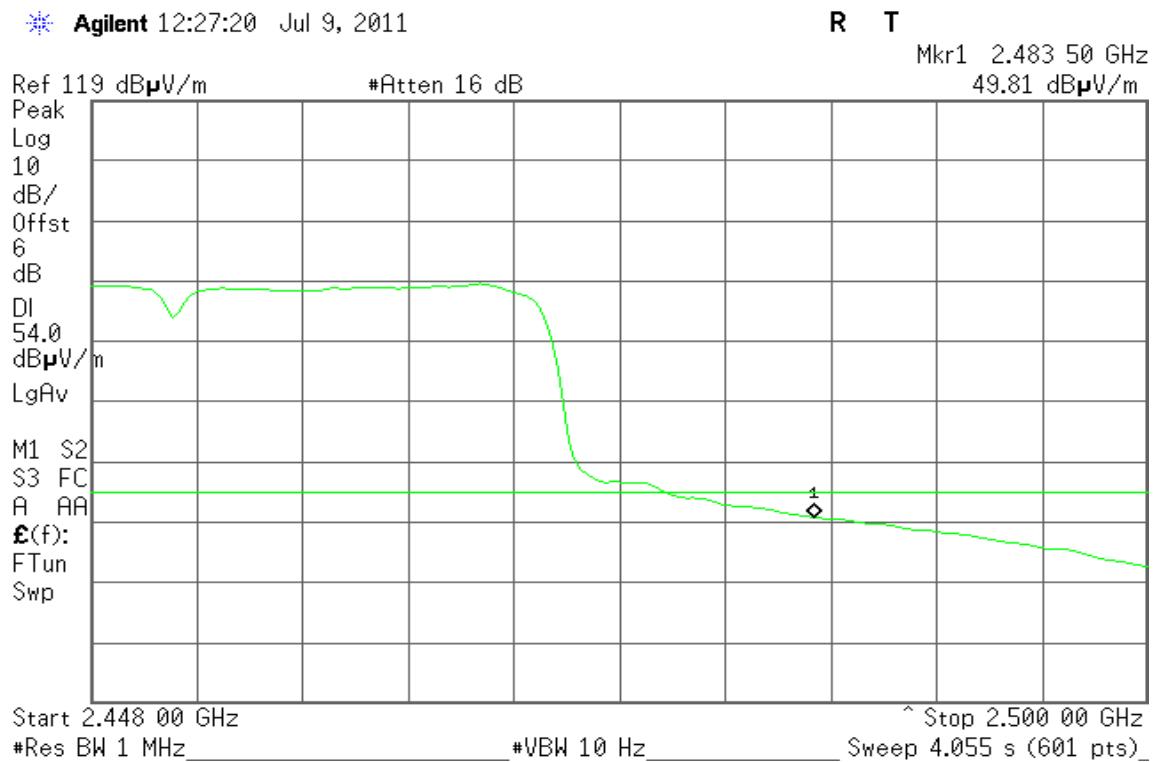
Polarity: Vertical



**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

**Band Edges (IEEE 802.11n HT 40 MHz mode / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

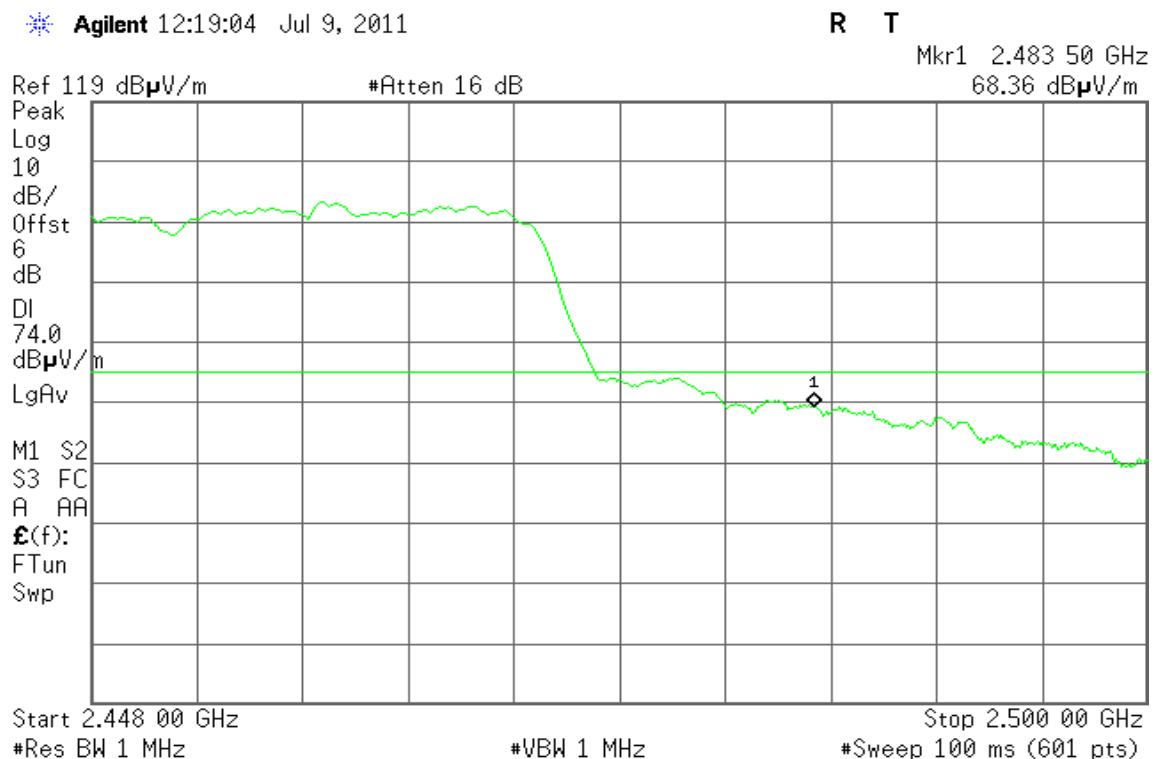
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

**Band Edges (IEEE 802.11n HT 40 MHz mode / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**



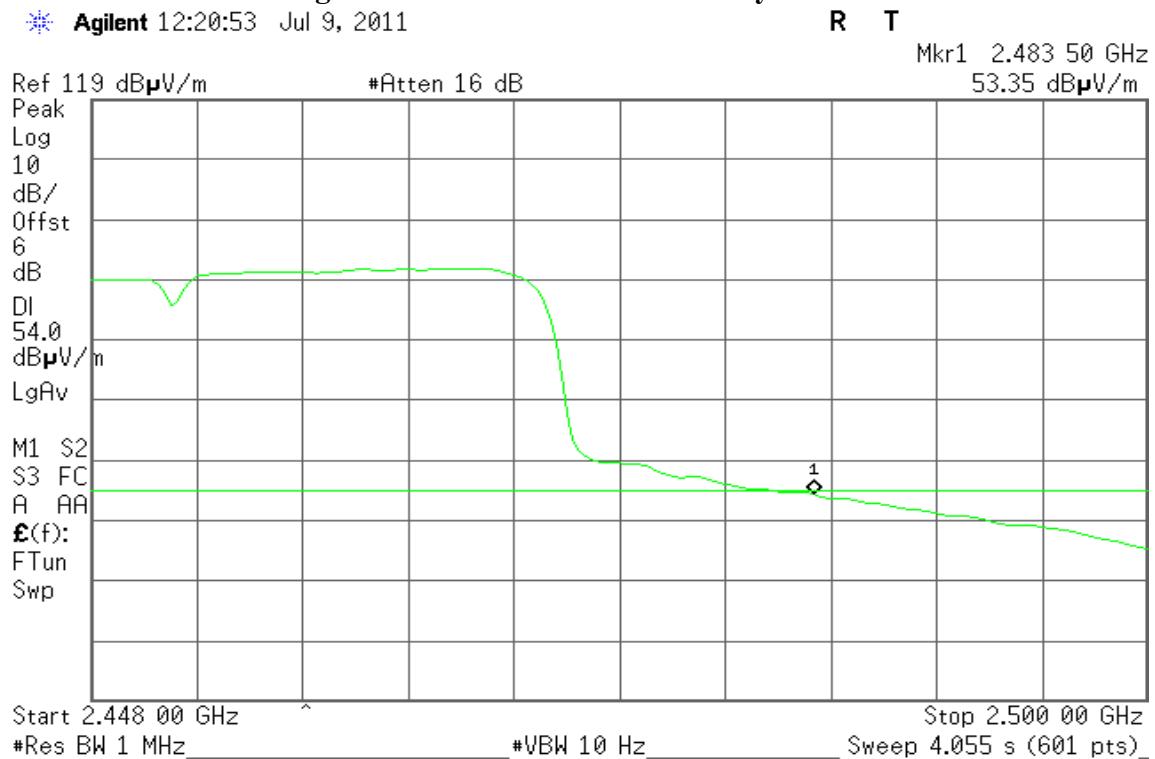
**Detector mode: Peak**

**Polarity: Horizontal**



**Detector mode: Average**

**Polarity: Horizontal**



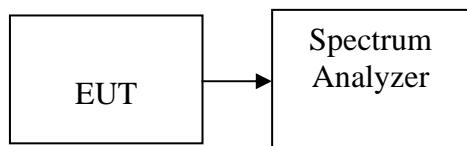


## 7.5 PEAK POWER SPECTRAL DENSITY

### 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 = 300 kHz, Sweep time = 100 s
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)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-13.42	8.00	PASS
Mid	2442	-12.76		PASS
High	2462	-12.77		PASS

**Test mode: IEEE 802.11g mode**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-9.95	8.00	PASS
Mid	2442	-9.68		PASS
High	2462	-9.62		PASS

**Test mode: IEEE 802.11n HT 20 MHz mode**

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-14.61	-14.71	-14.30	-9.77	7.23	PASS
Mid	2442	-14.13	-14.41	-14.18	-9.47		PASS
High	2462	-13.67	-15.03	-14.89	-9.71		PASS

**Test mode: IEEE 802.11n HT 40 MHz mode**

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	2422	-14.60	-17.89	-16.66	-11.40	7.23	PASS
Mid	2442	-16.28	-18.40	-17.15	-12.42		PASS
High	2452	-16.16	-17.74	-18.17	-14.04		PASS

***Remark:***

1. Total PPSD (dBm) =  $10 * LOG(10^{(Chain 0 PPSD / 10)} + 10^{(Chain 1 PPSD / 10)} + 10^{(Chain 2 PPSD / 10)})$
2. The maximum antenna gain is 6.77 dBi; therefore the reduction due to antenna gain is 0.77 dBi, so the limit is 7.23 dBm.

**Test mode: IEEE 802.11a mode**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	5745	-20.37	8.00	PASS
Mid	5785	-20.49		PASS
High	5825	-20.14		PASS

**Test mode: IEEE 802.11n HT 20 MHz Channel mode**

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	5745	-20.03	-23.23	-23.50	-17.18	8.00	PASS
Mid	5785	-20.77	-24.01	-22.73	-17.53		PASS
High	5825	-21.60	-21.31	-22.03	-16.87		PASS

**Test mode: IEEE 802.11n HT 40 MHz mode**

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	5755	-21.38	-23.50	-24.37	-18.12	8.00	PASS
High	5795	-24.53	-21.93	-23.64	-18.46		PASS

**Remark:**

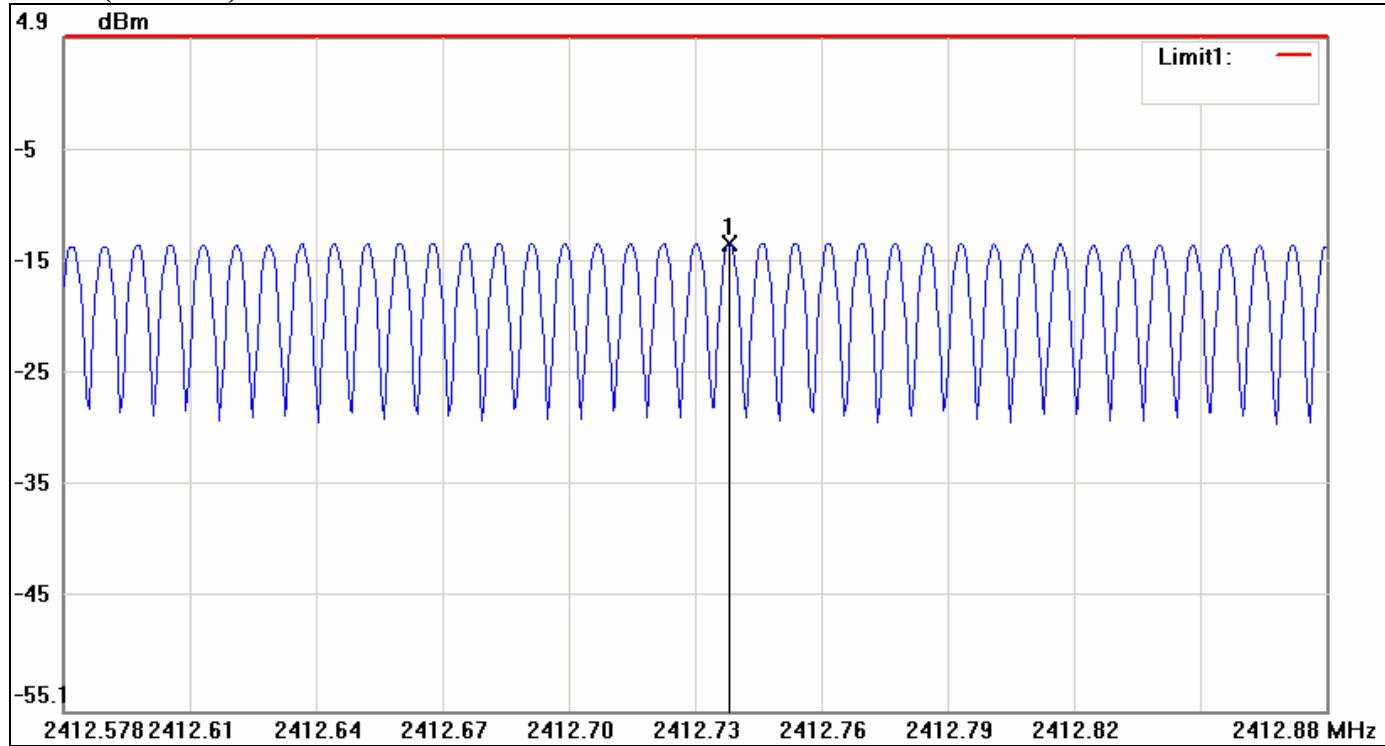
1. Total PPSD (dBm) =  $10 * \log(10^{(Chain\ 0\ PPSD\ /10)} + 10^{(Chain\ 1\ PPSD\ /10)} + 10^{(Chain\ 2\ PPSD\ /10)})$



## Test Plot

### IEEE 802.11b mode

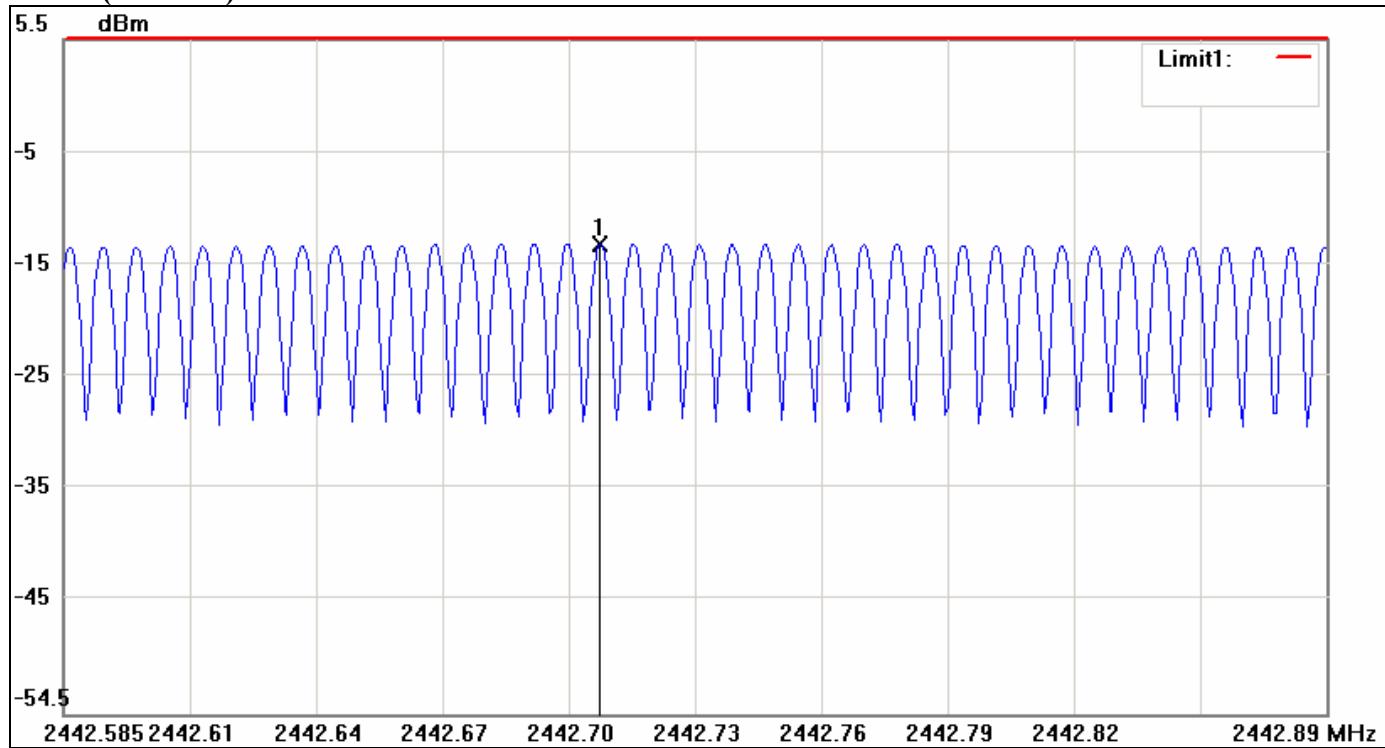
#### PPSD (CH Low)



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2412.7360	-13.42	8.00	-21.42



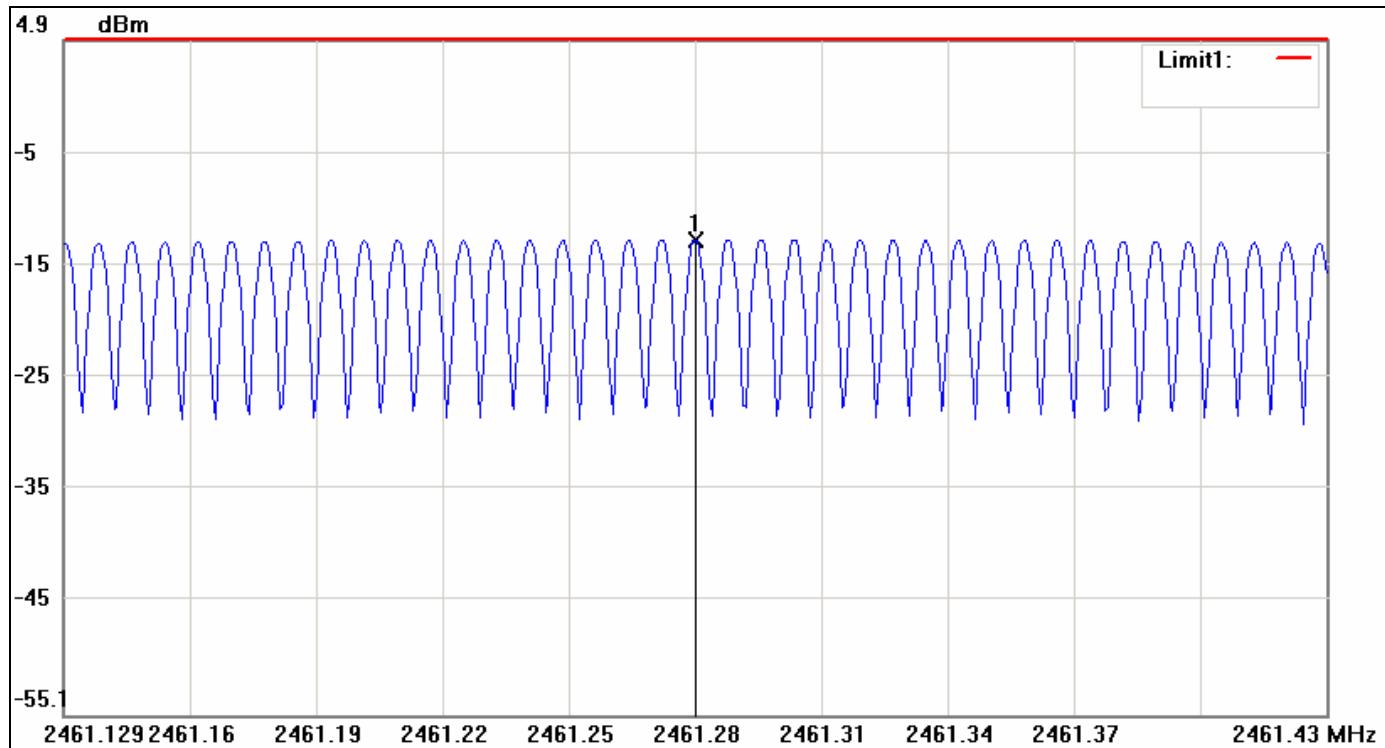
**PPSD (CH Mid)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2442.7122	-12.76	8.00	-20.76



**PPSD (CH High)**

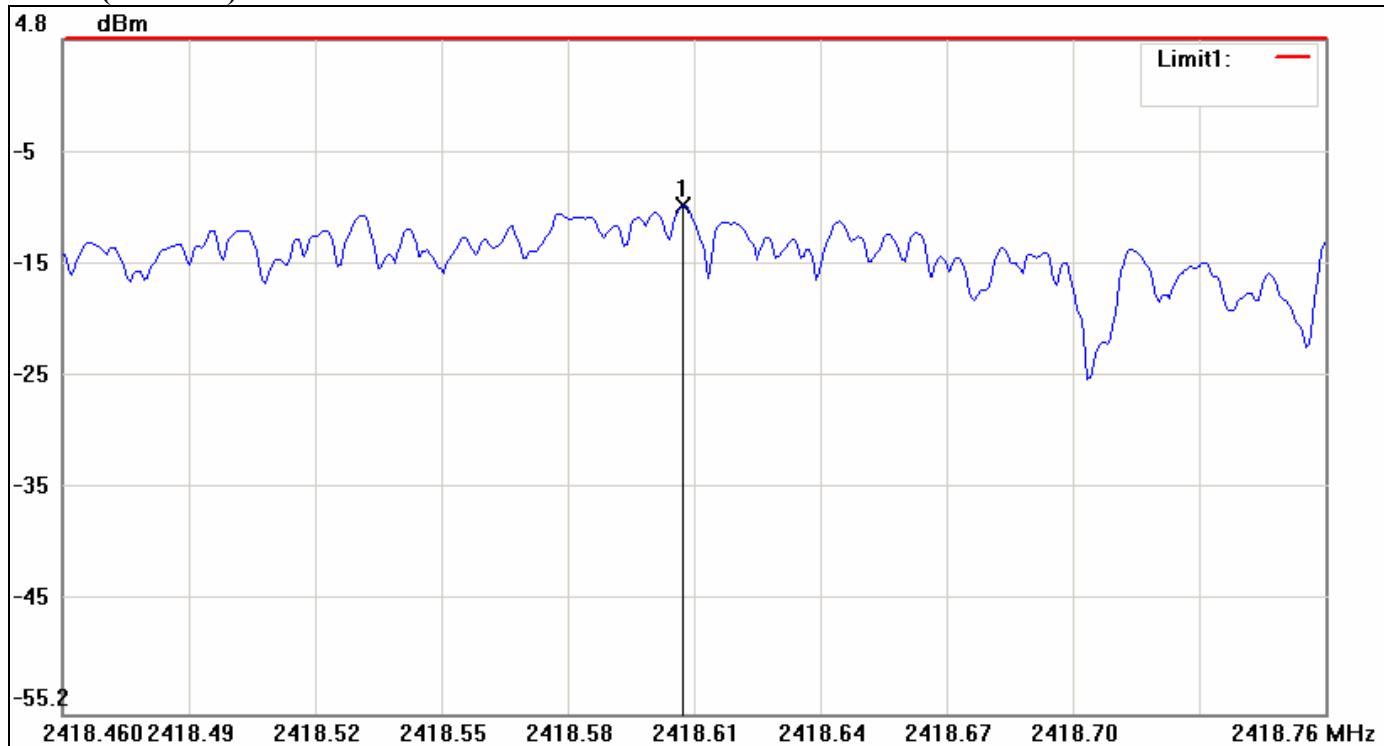


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2461.2790	-12.77	8.00	-20.77



**IEEE 802.11g mode**

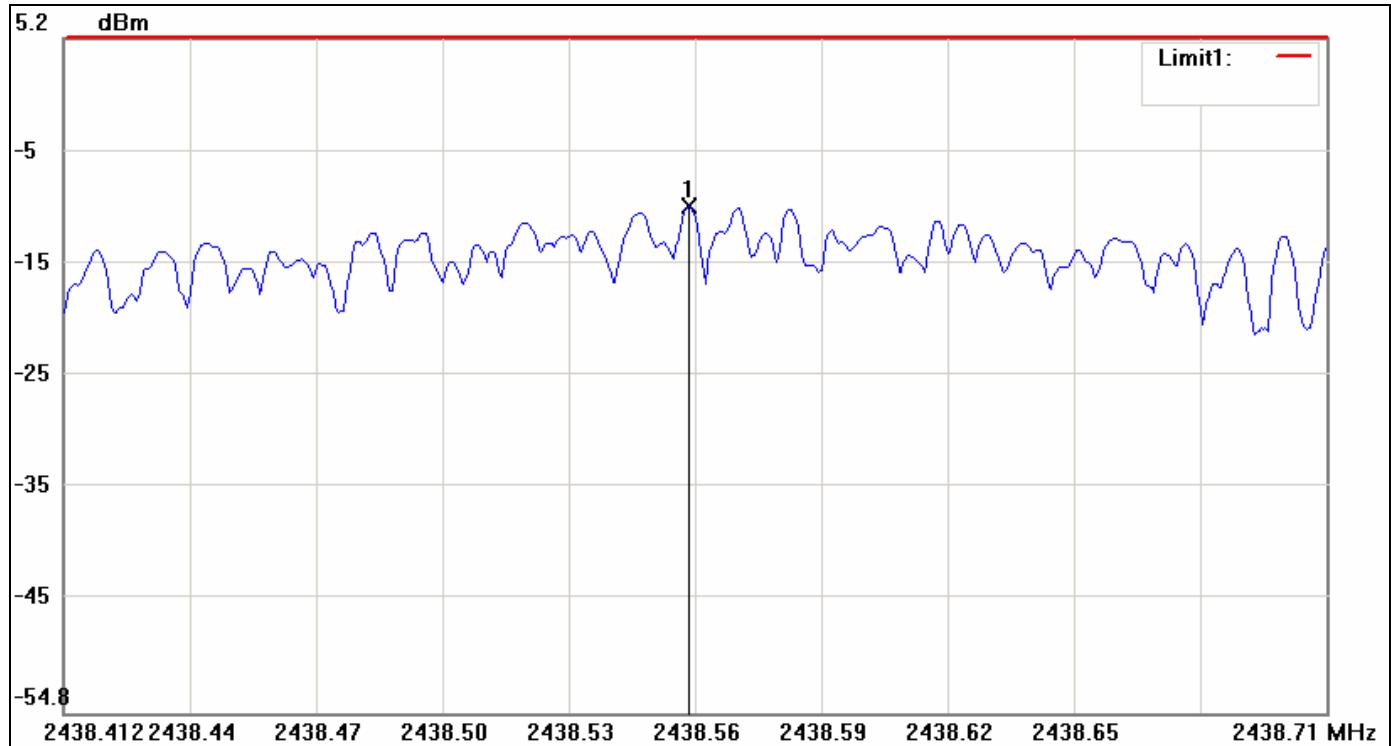
**PPSD (CH Low)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2418.6072	-9.95	8.00	-17.95



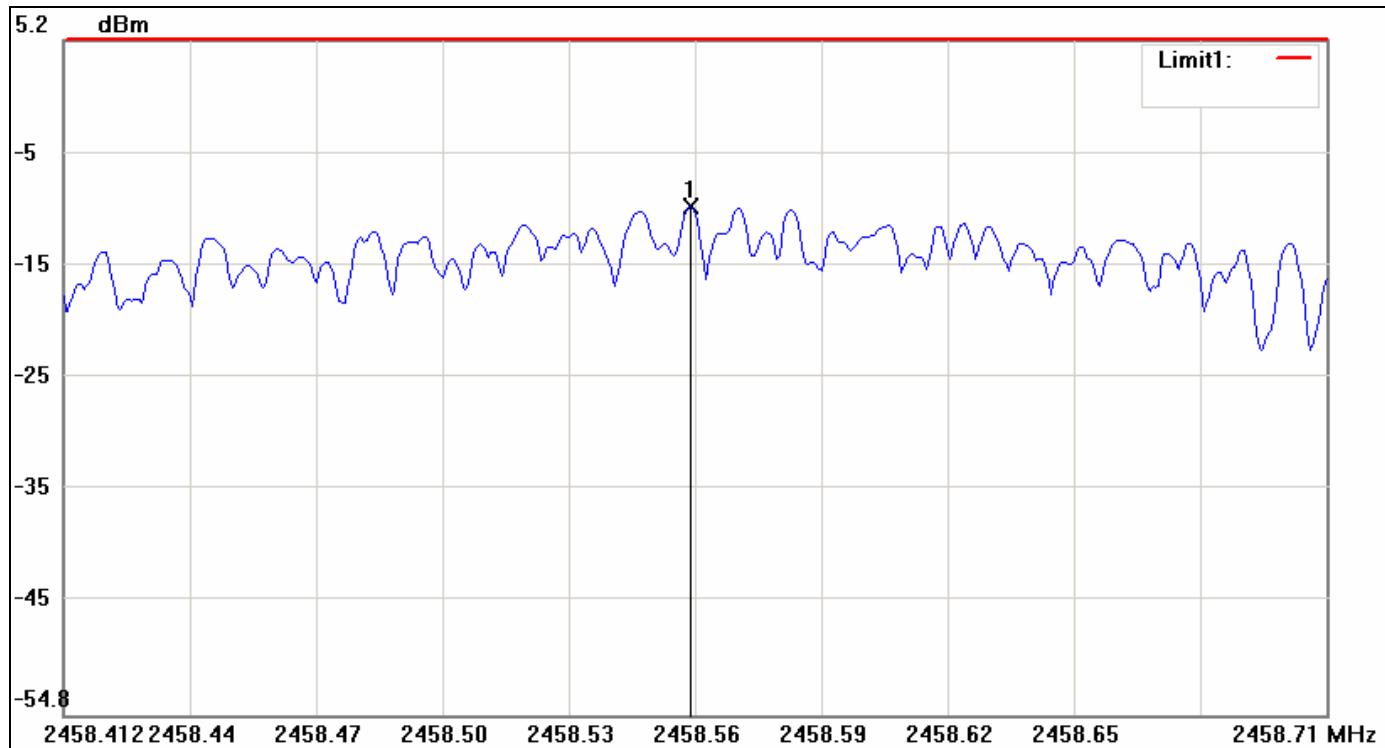
**PPSD (CH Mid)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2438.5601	-9.68	8.00	-17.68



**PPSD (CH High)**

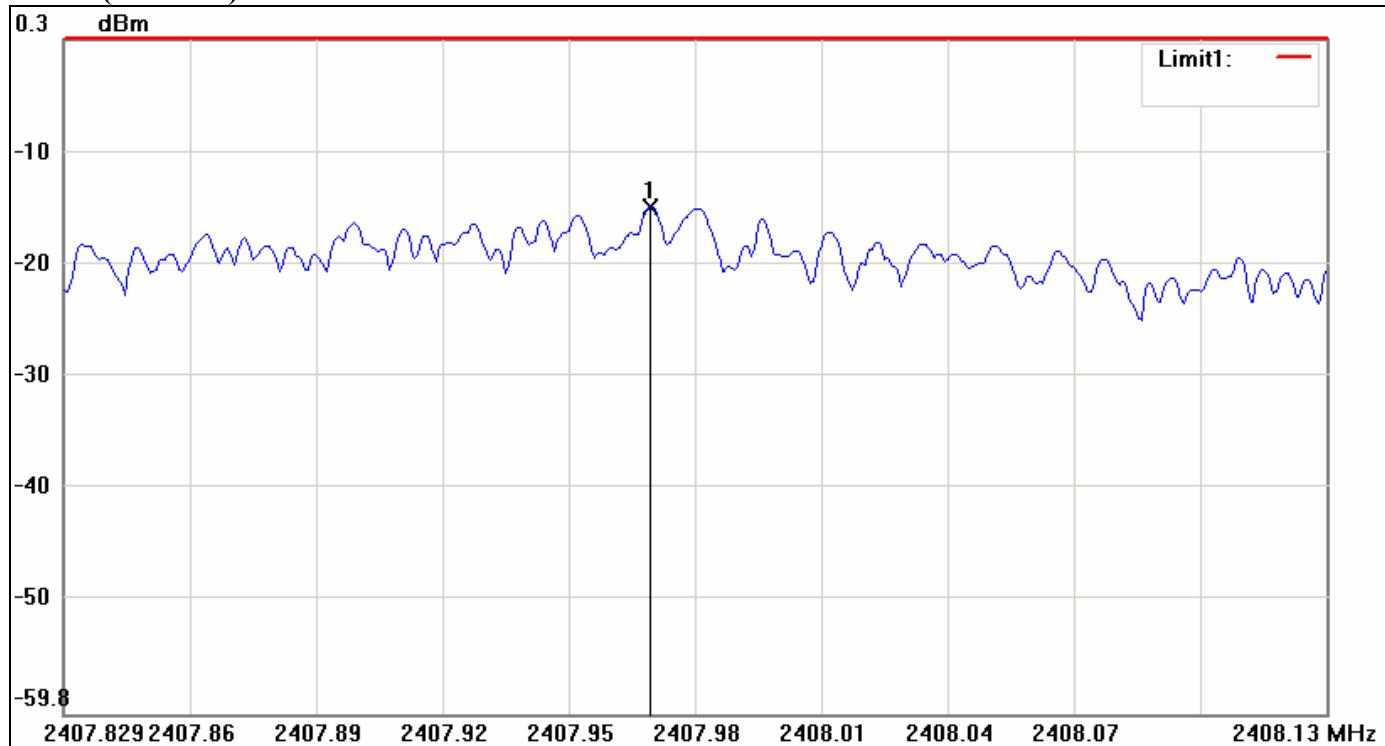


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2458.5605	-9.62	8.00	-17.62



**IEEE 802.11n HT 20 MHz mode / Chain 0**

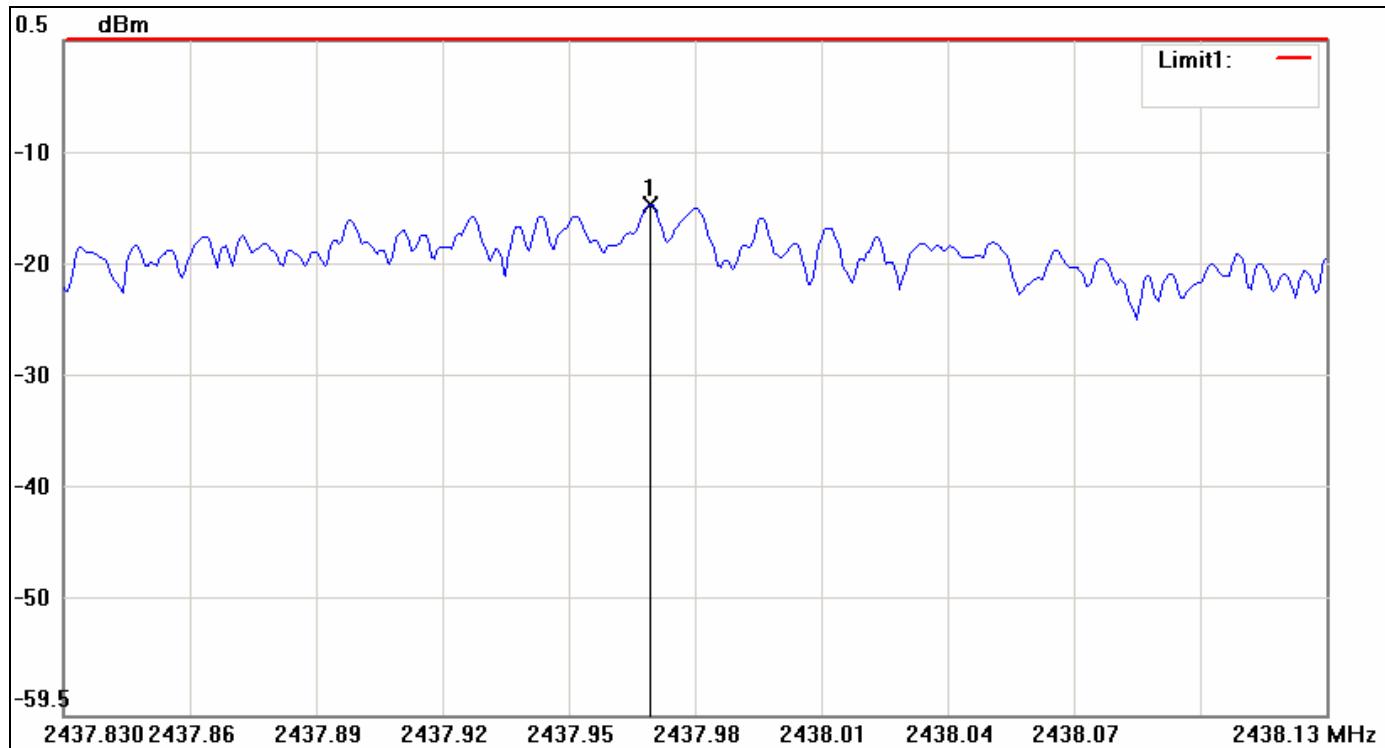
**PPSD (CH Low)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2407.9687	-14.61	8.00	-22.61



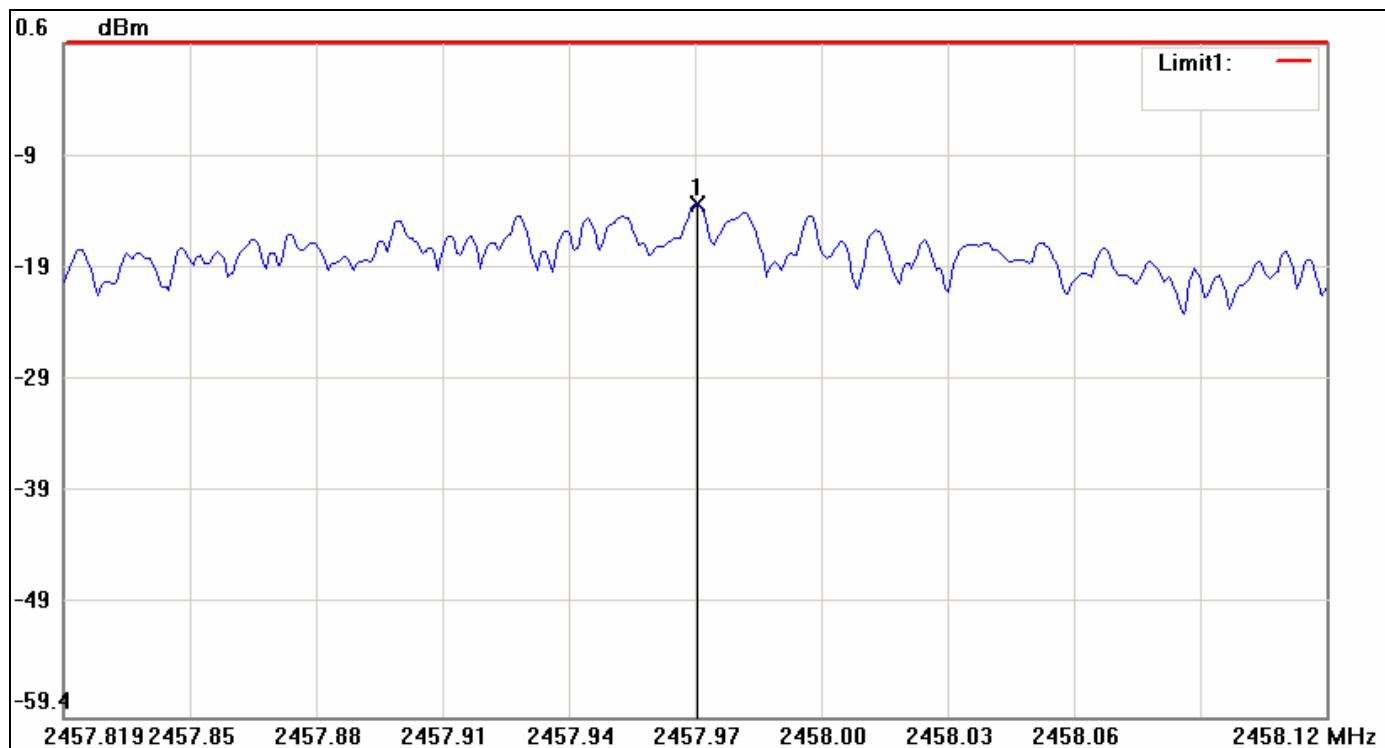
**PPSD (CH Mid)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2437.9693	-14.13	8.00	-22.13



**PPSD (CH High)**

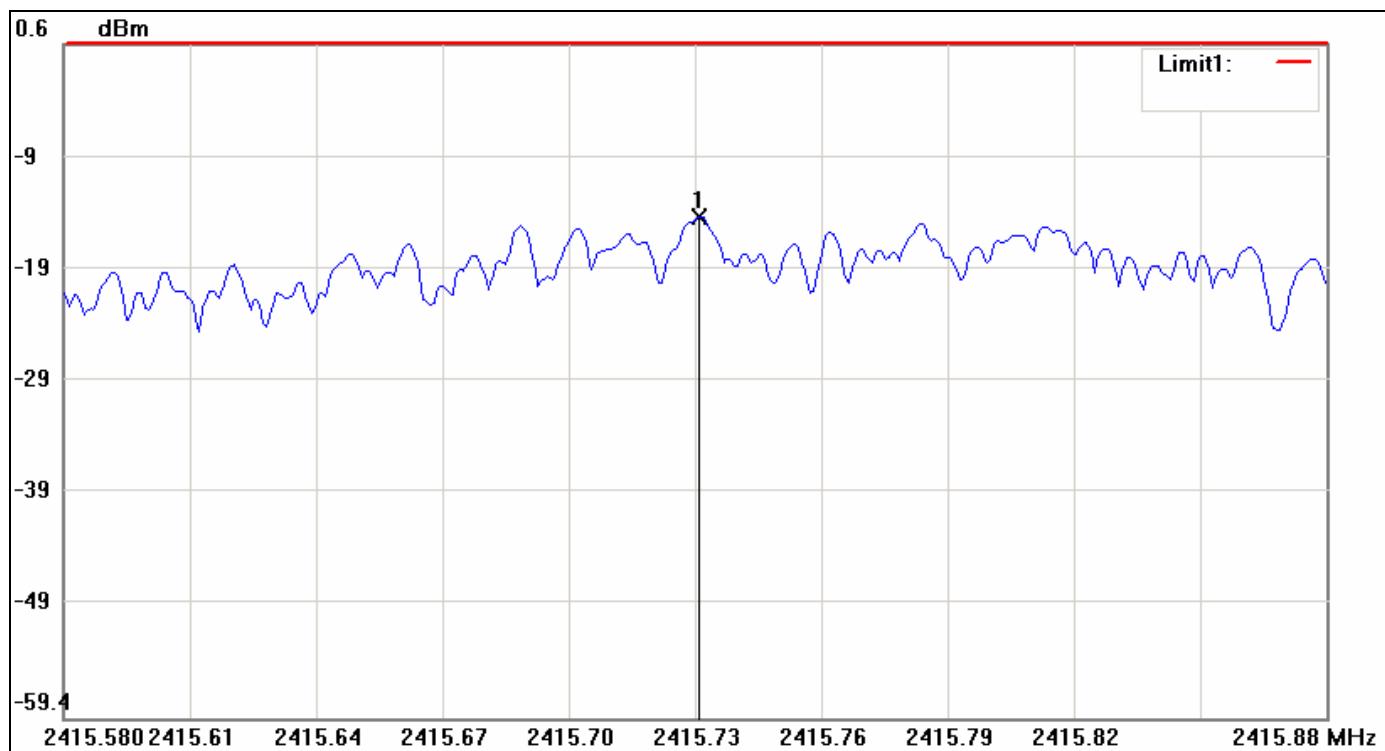


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2457.9691	-13.67	8.00	-21.67



**IEEE 802.11n HT 20 MHz mode / Chain 1**

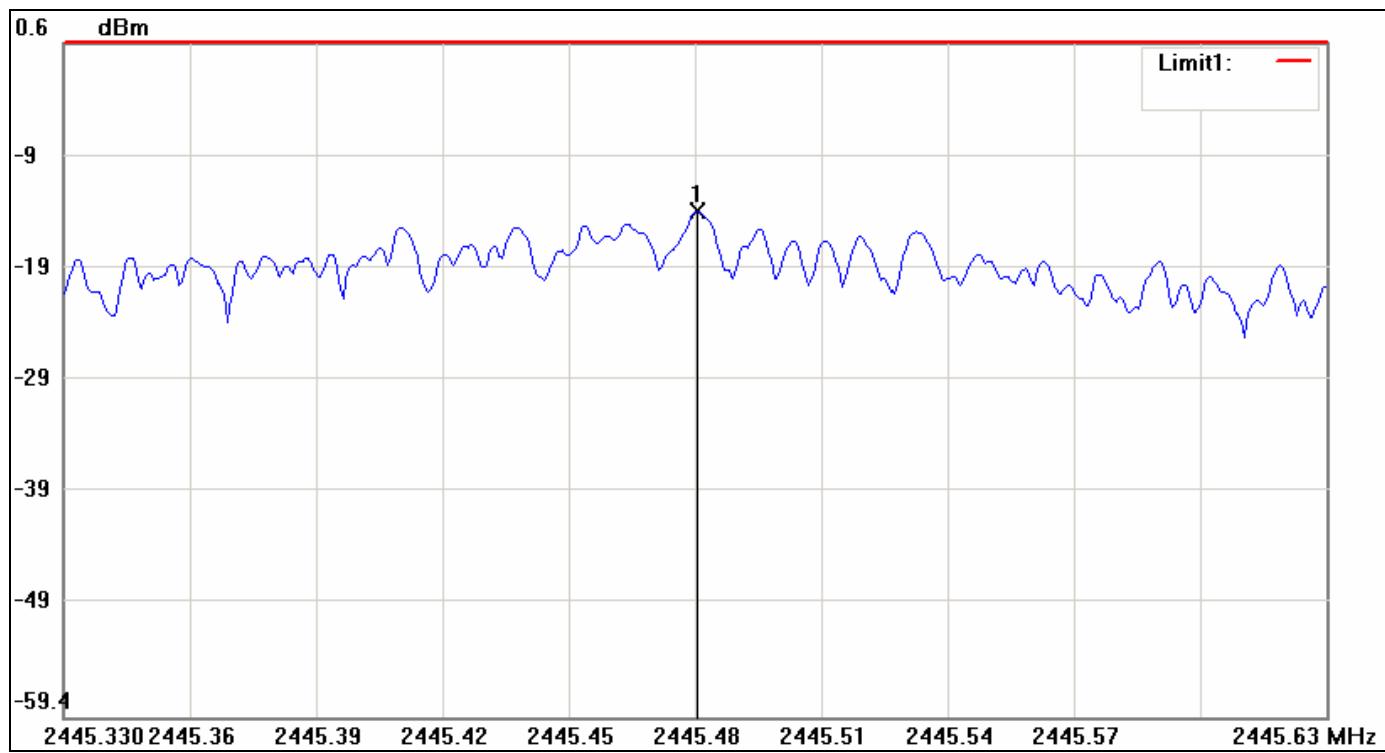
PPSD (CH Low)



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2415.7306	-14.71	8.00	-22.71



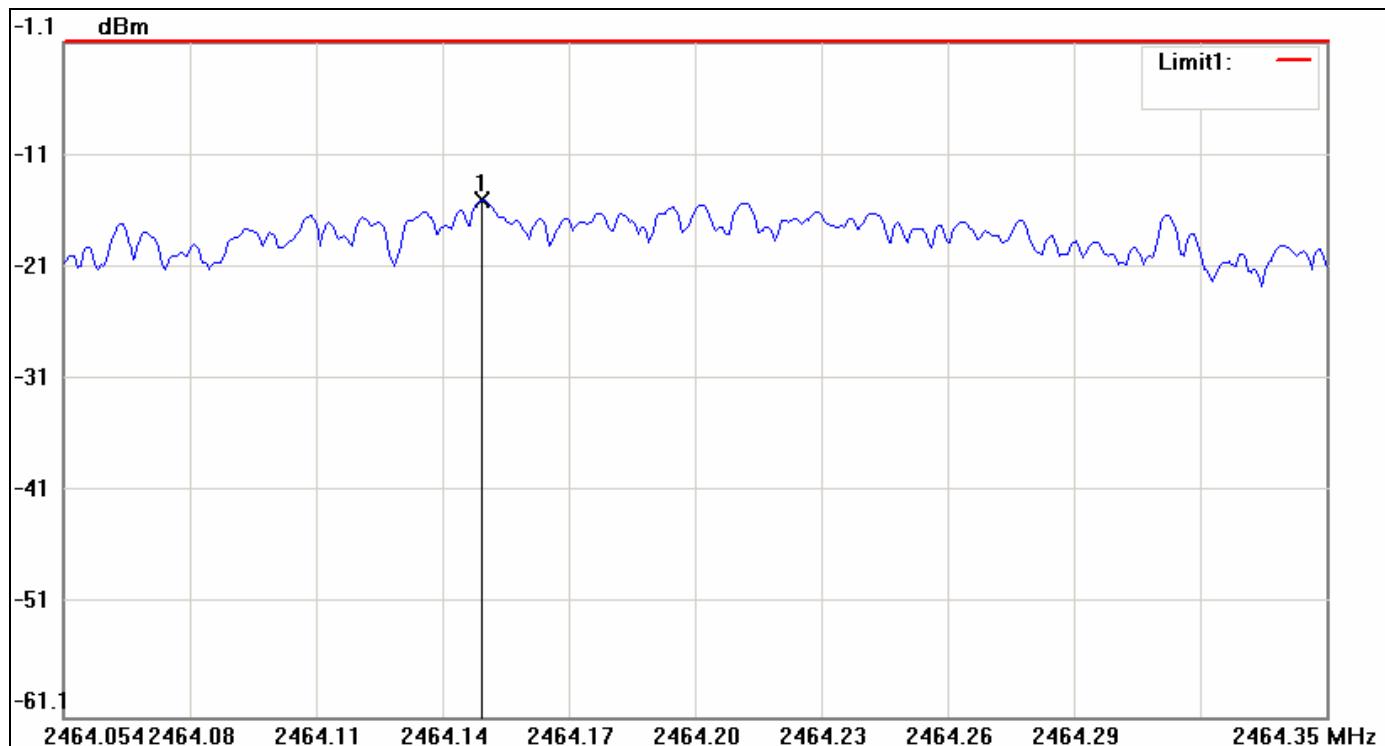
**PPSD (CH Mid)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2445.4806	-14.41	8.00	-22.41



**PPSD (CH High)**

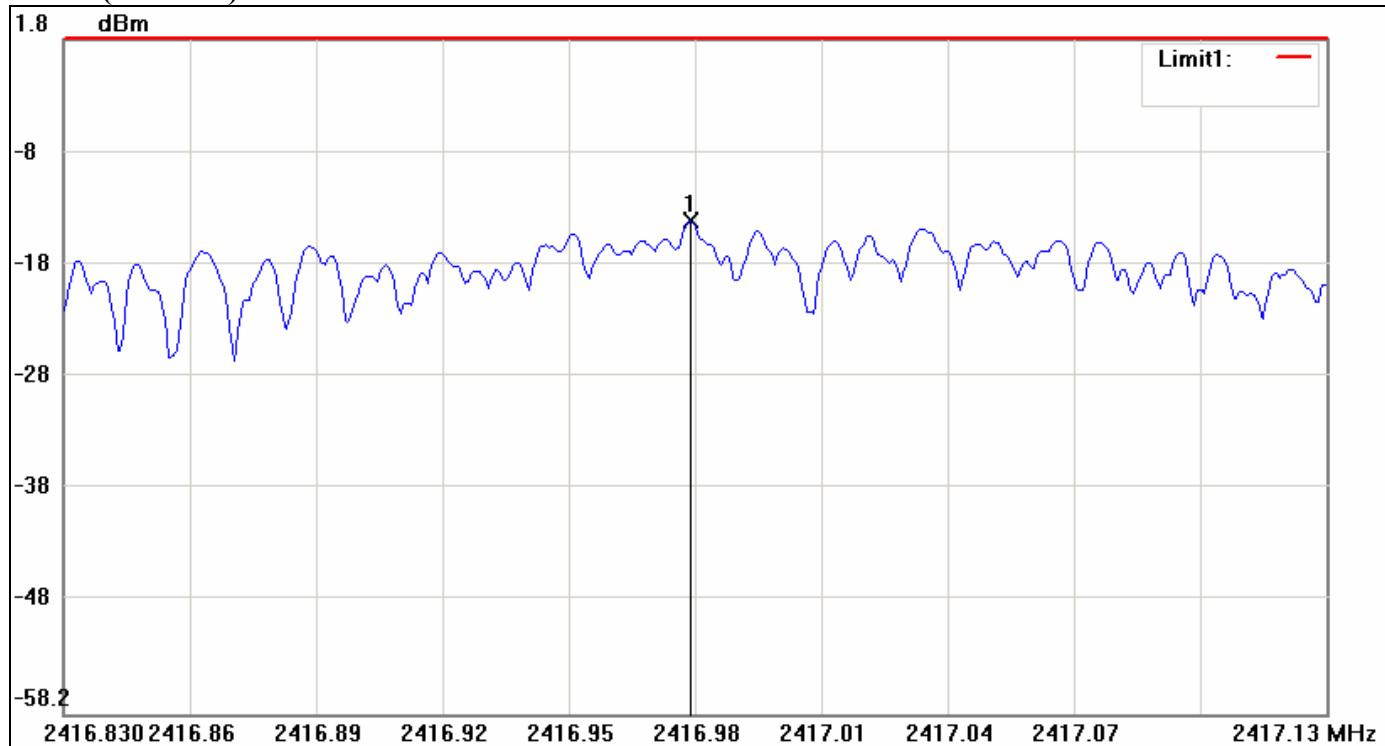


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2464.1535	-15.03	8.00	-23.03



**IEEE 802.11n HT 20 MHz mode / Chain 2**

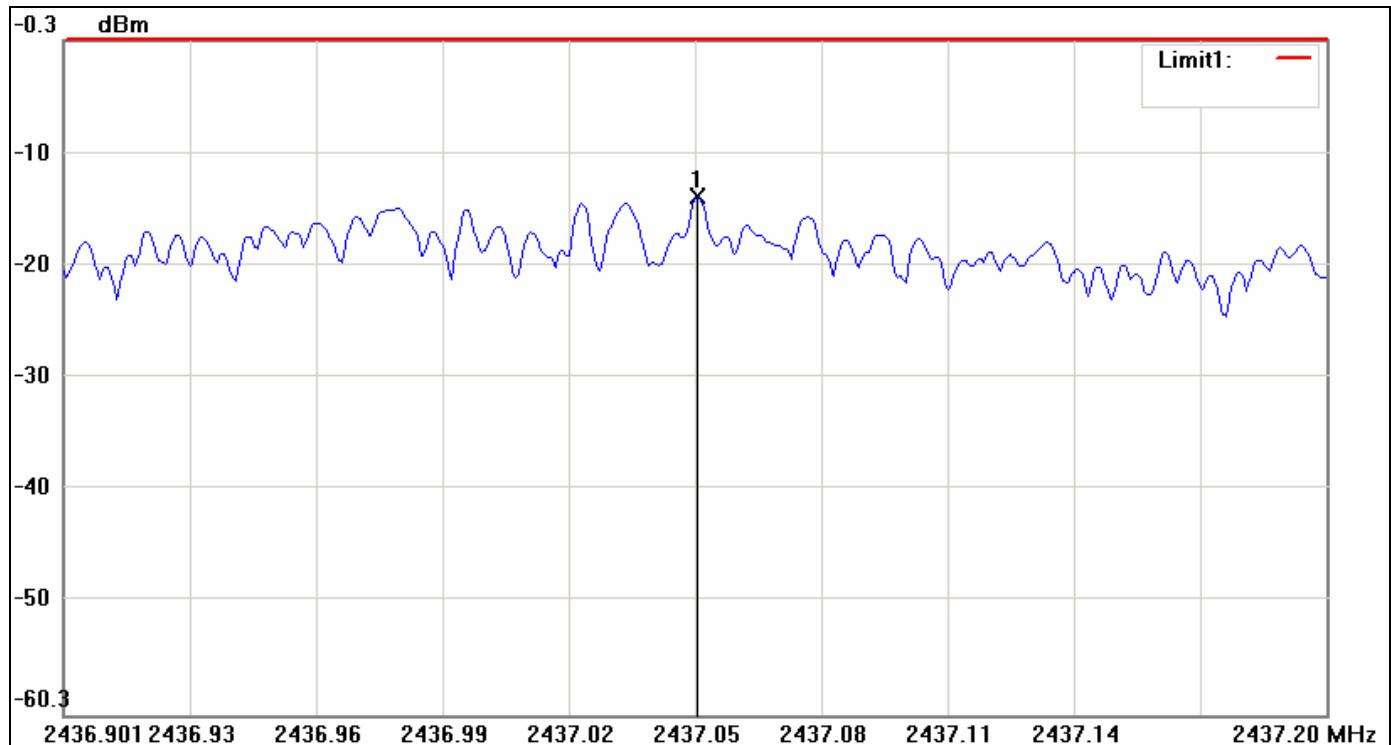
**PPSD (CH Low)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2416.9790	-14.30	8.00	-22.30



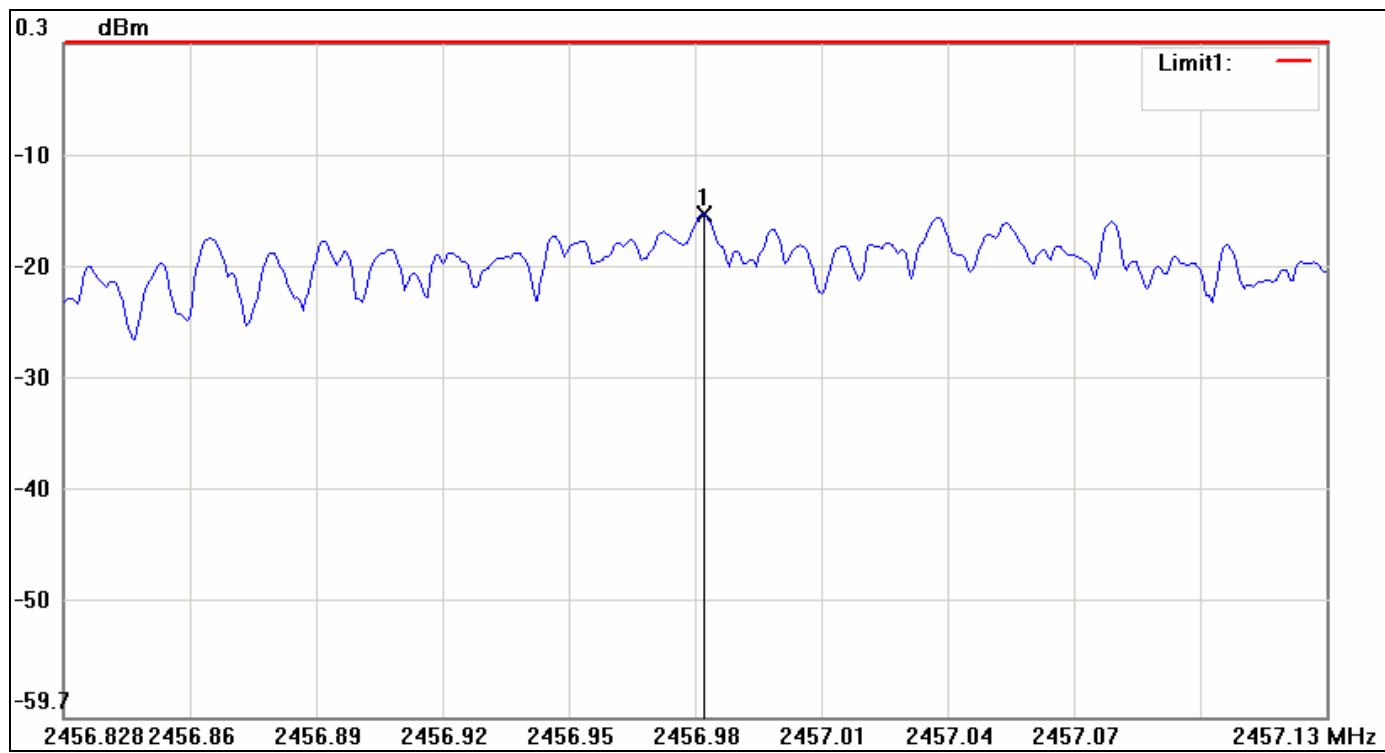
**PPSD (CH Mid)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2437.0512	-14.18	8.00	-22.18



**PPSD (CH High)**

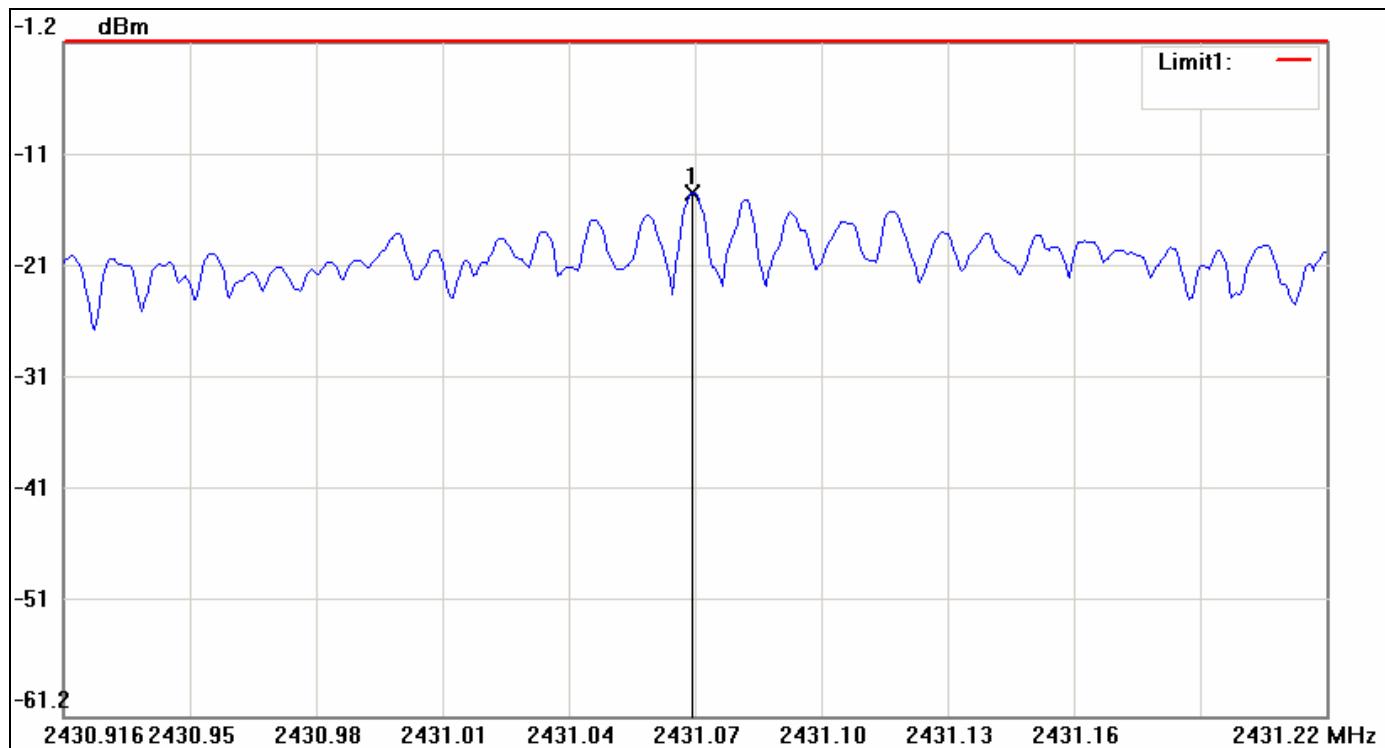


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2456.9800	-14.89	8.00	-22.89



**IEEE 802.11n HT 40 MHz mode / Chain 0**

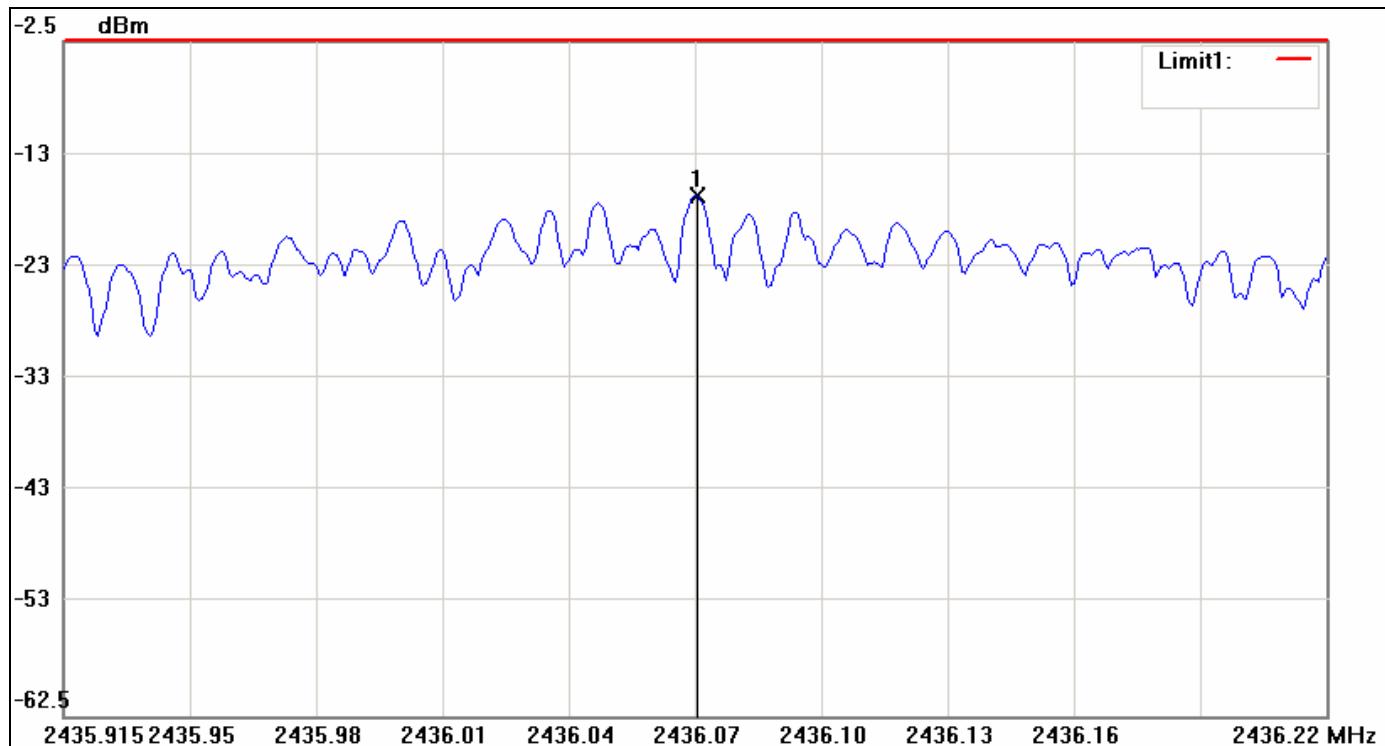
PPSD (CH Low)



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2431.0657	-14.60	8.00	-22.60



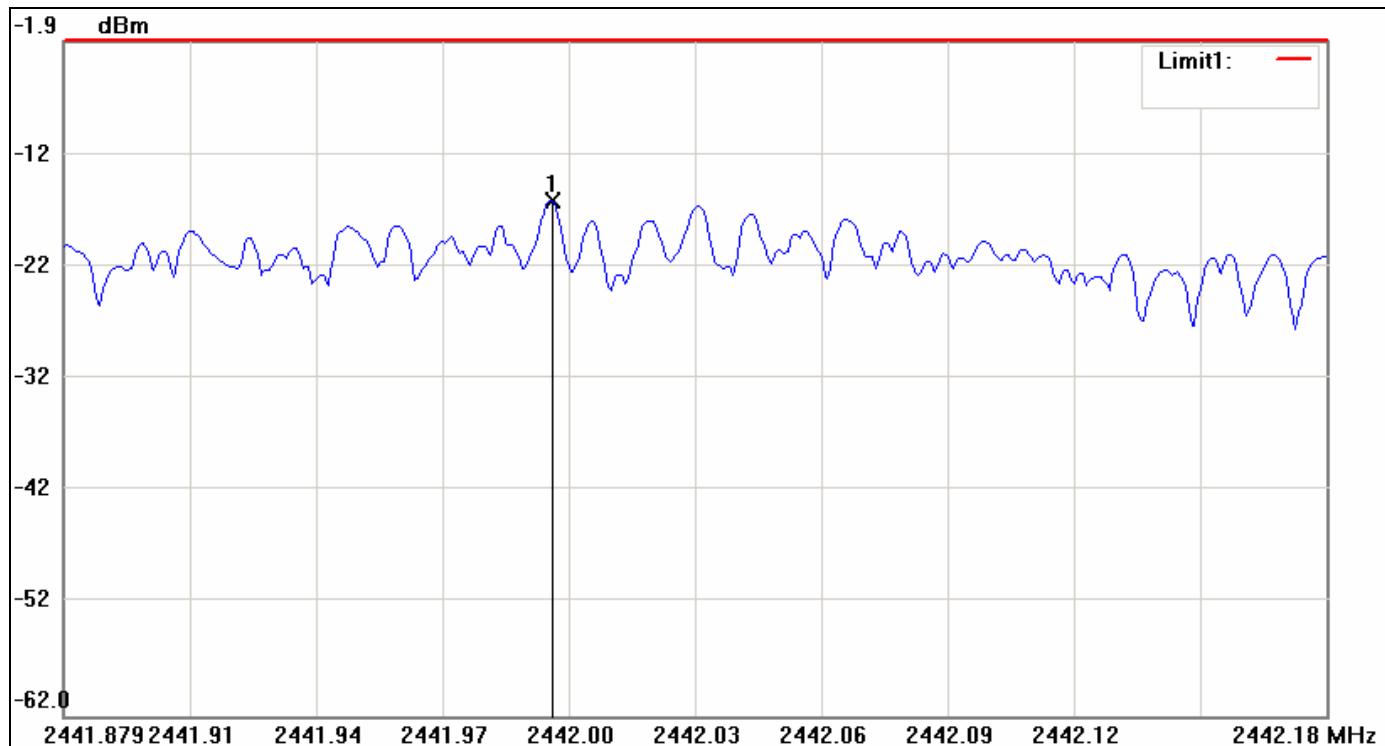
PPSD (CH Mid)



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2436.0656	-16.28	8.00	-24.28



**PPSD (CH High)**

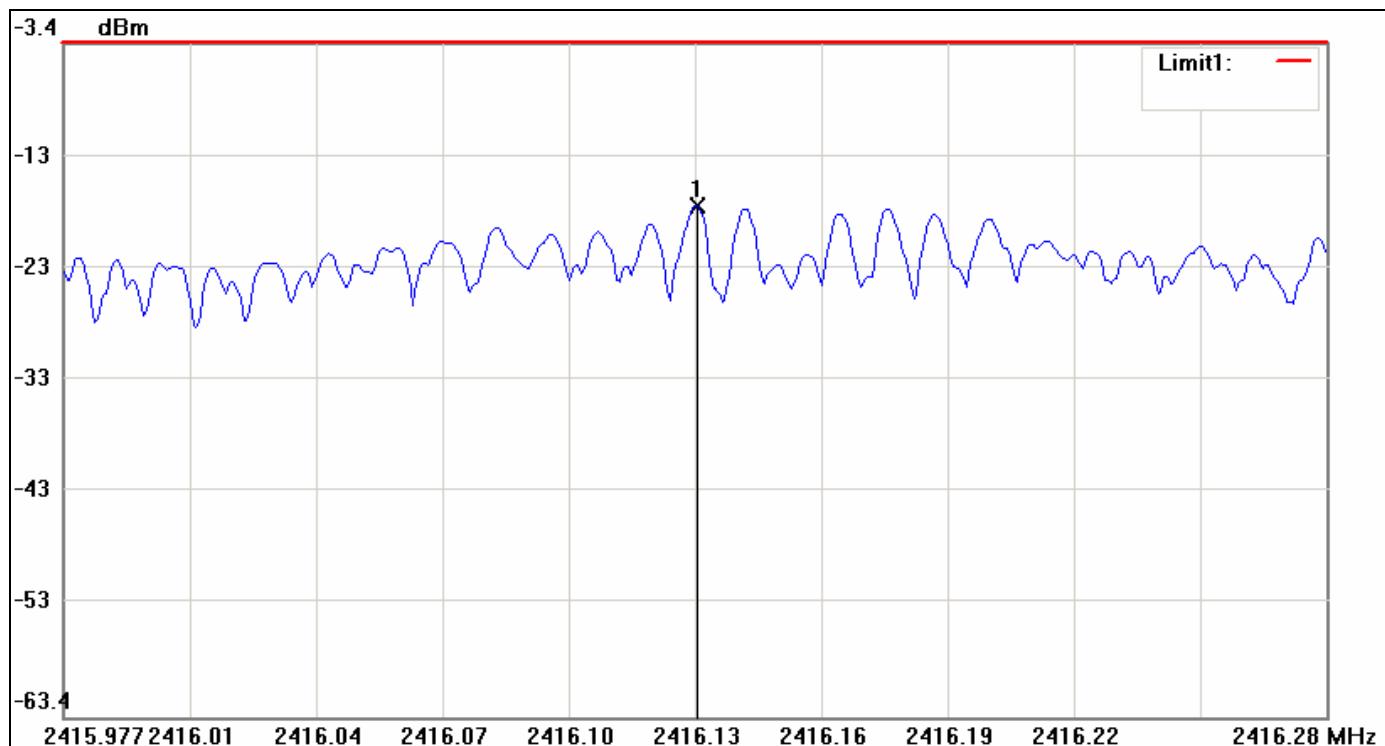


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2441.9953	-16.16	8.00	-24.16



**IEEE 802.11n HT 40 MHz mode / Chain 1**

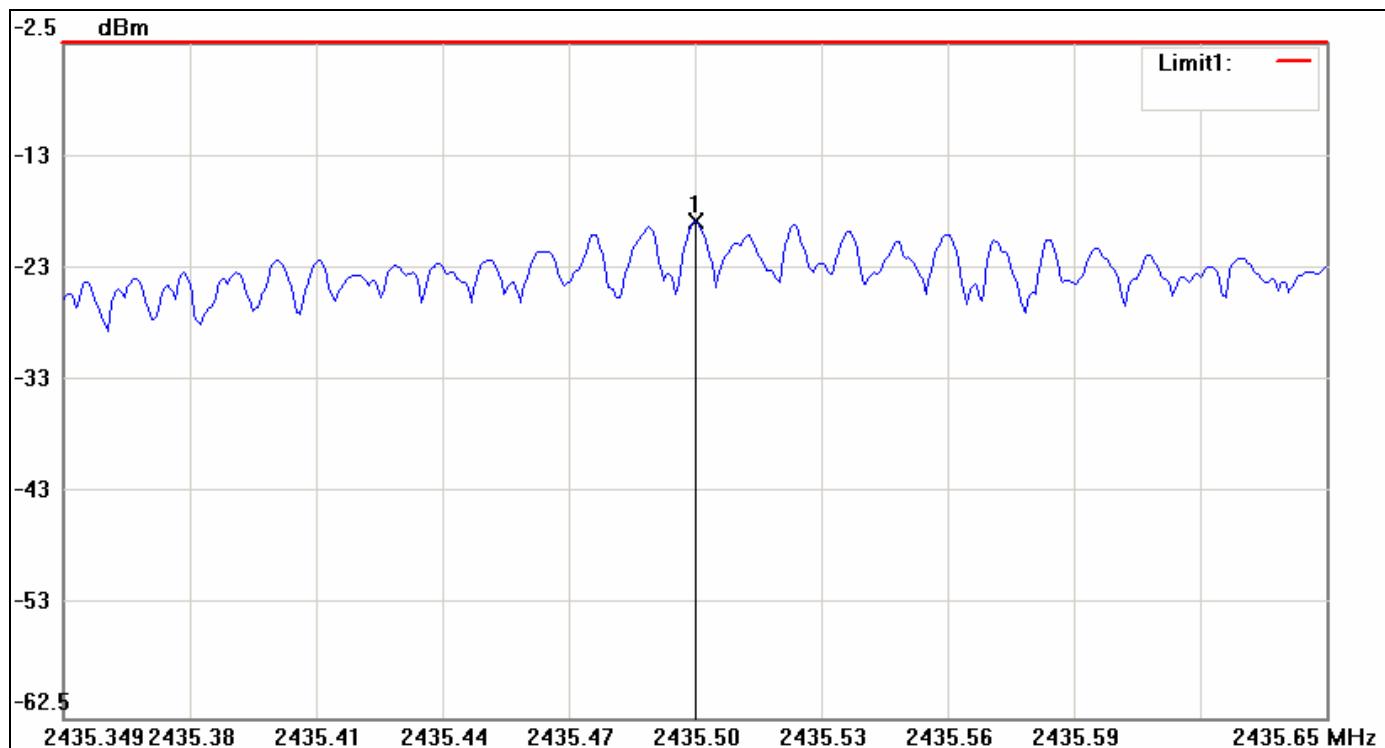
PPSD (CH Low)



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2416.1275	-17.89	8.00	-25.89



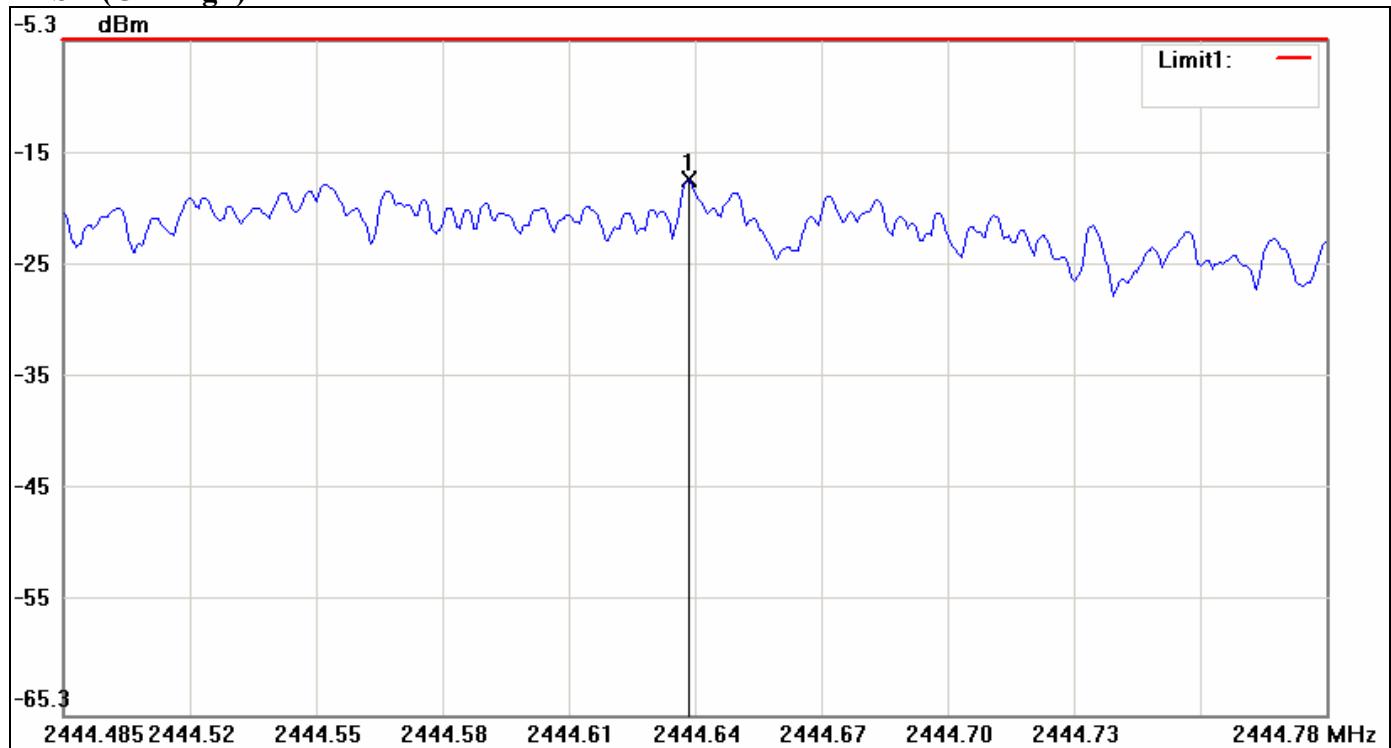
**PPSD (CH Mid)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2435.4987	-18.40	8.00	-26.40



**PPSD (CH High)**

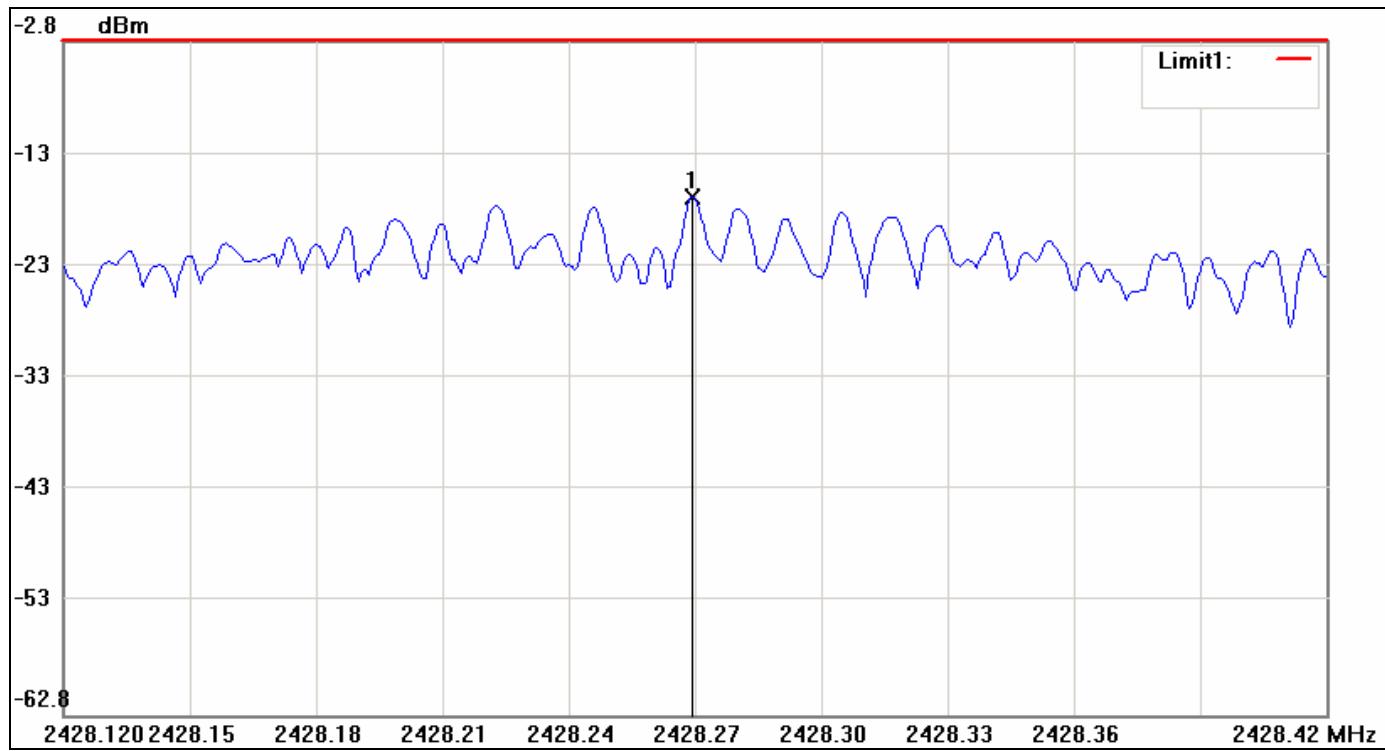


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2444.6335	-17.74	8.00	-25.74



**IEEE 802.11n HT 40 MHz mode / Chain 2**

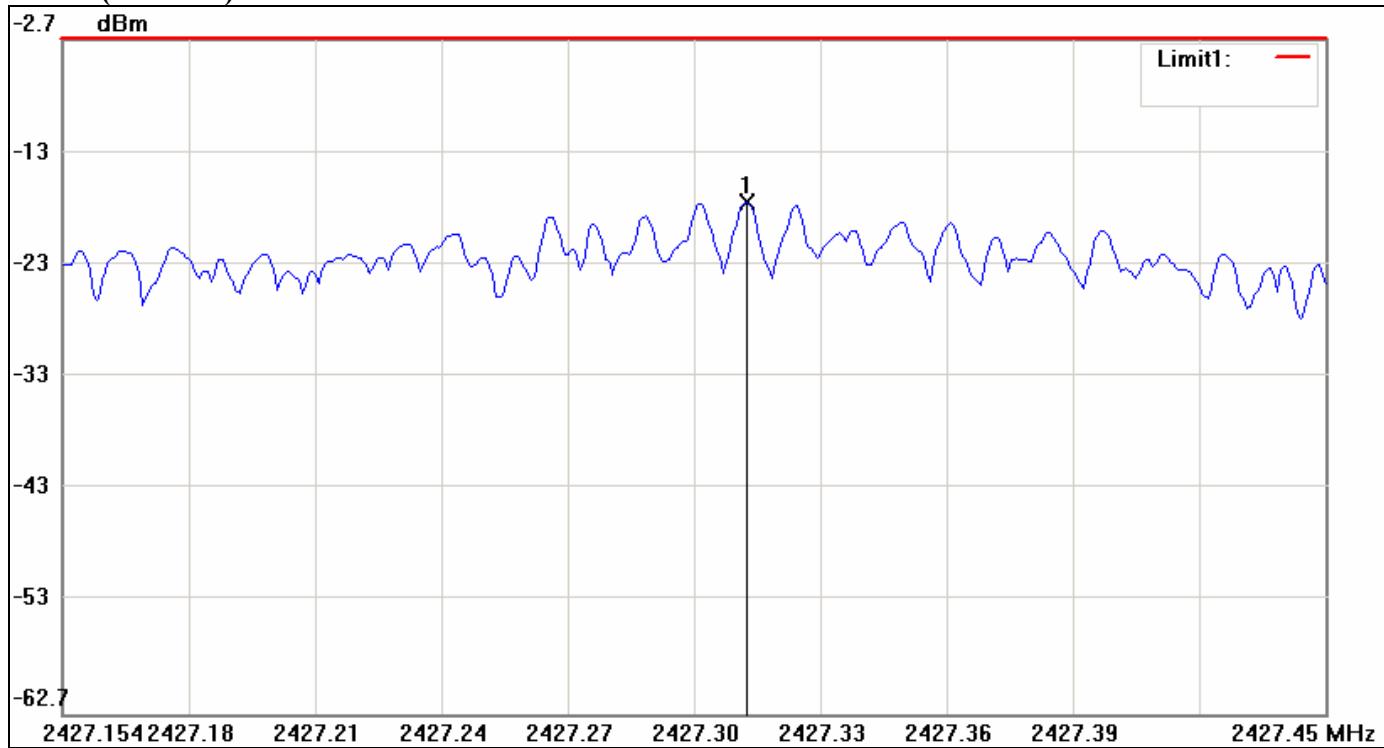
**PPSD (CH Low)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2428.2692	-16.66	8.00	-24.66



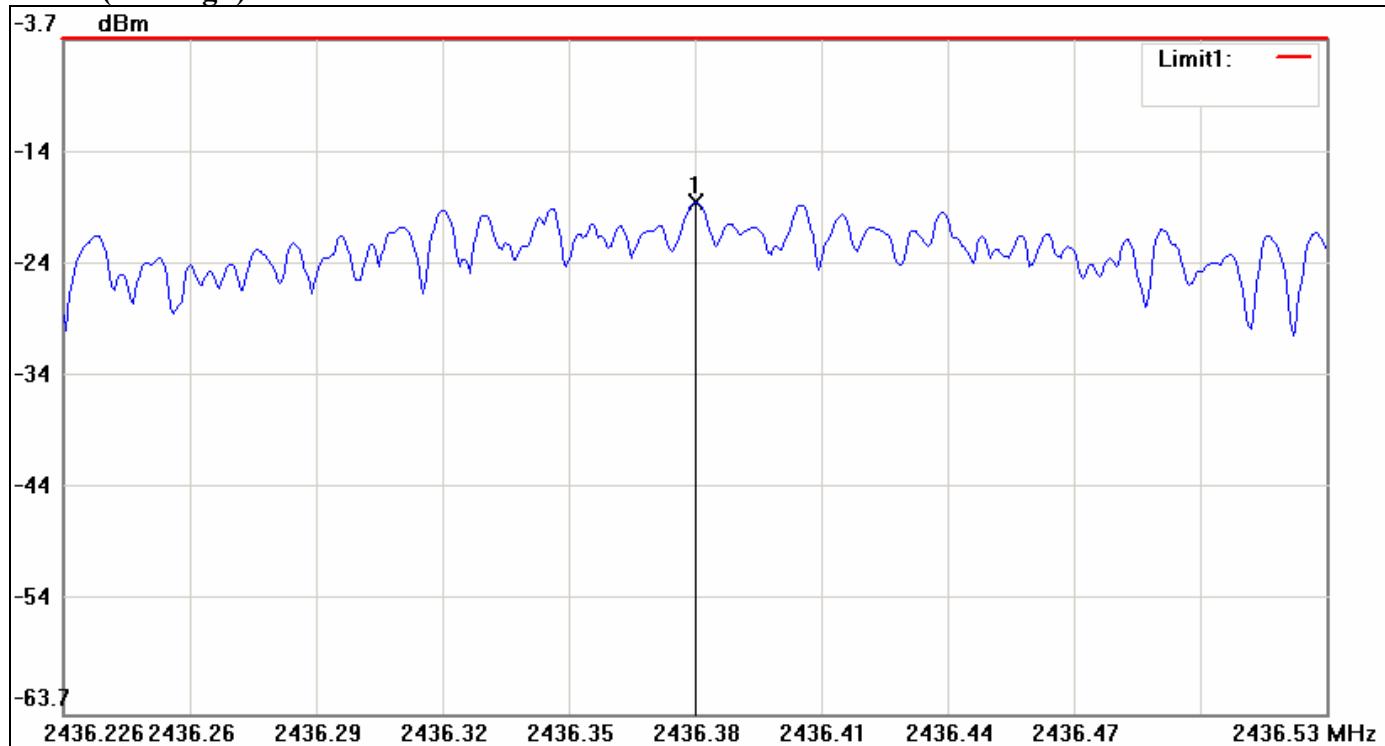
**PPSD (CH Mid)**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2427.3162	-17.15	8.00	-25.15



**PPSD (CH High)**

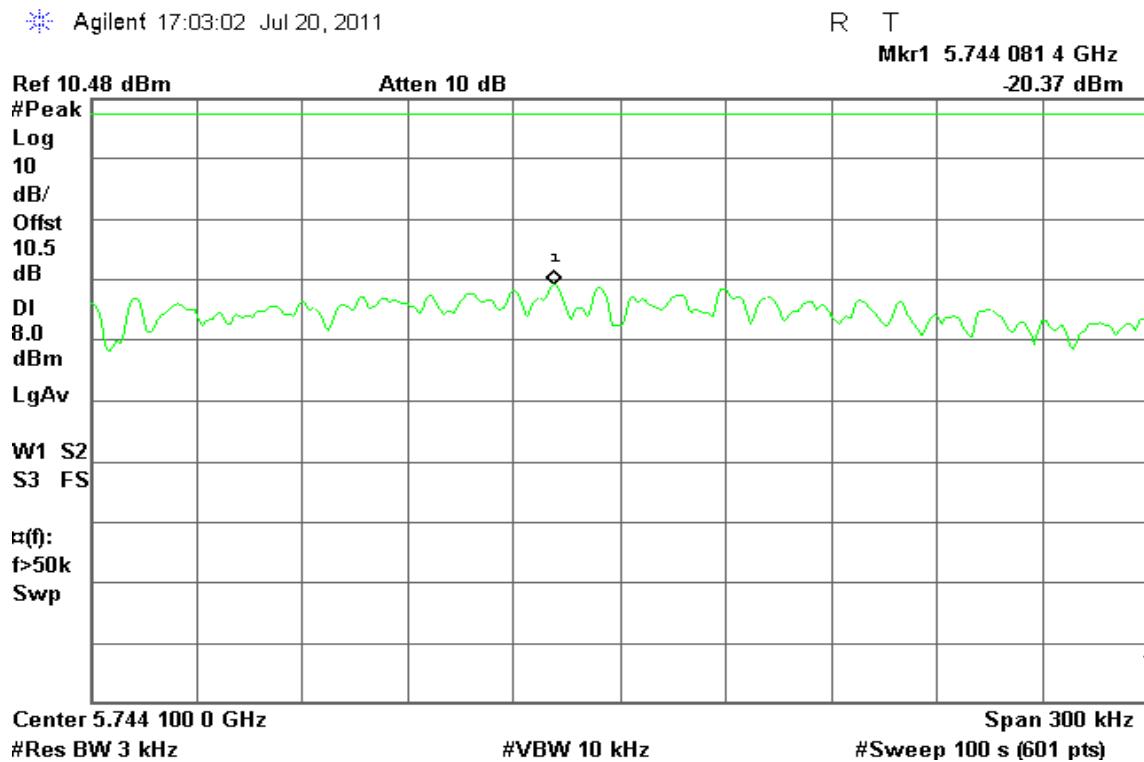


No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	2436.3758	-18.17	8.00	-26.17

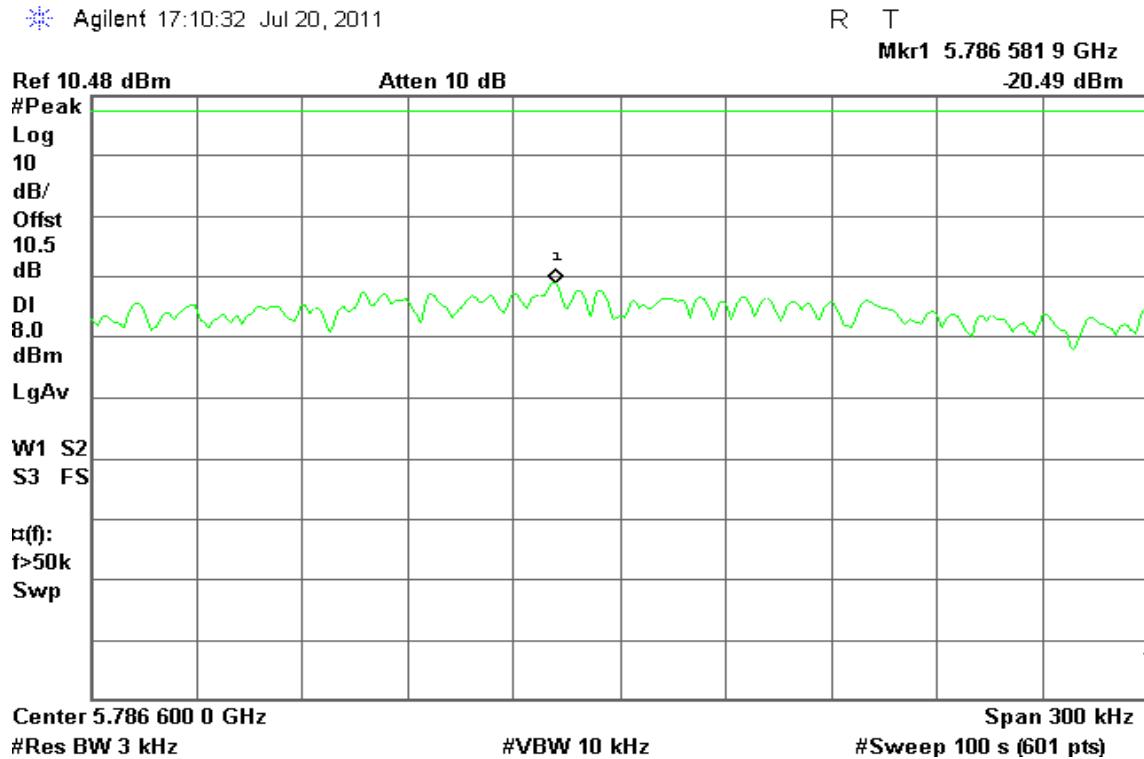


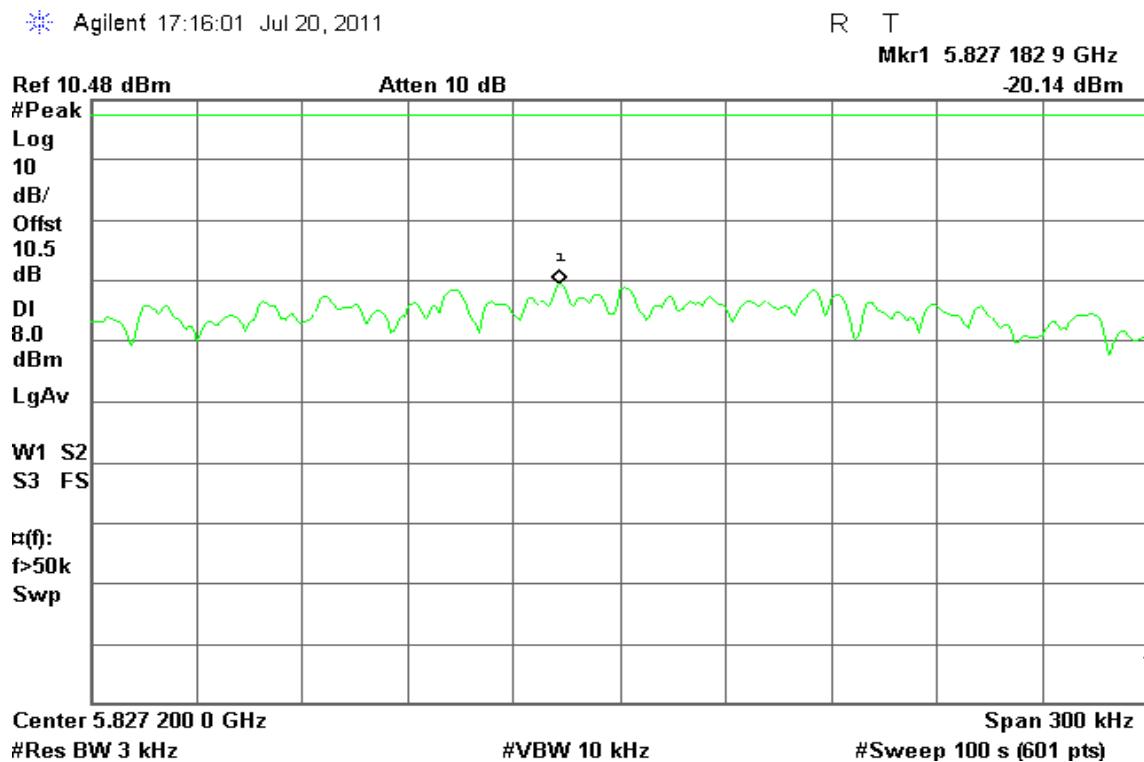
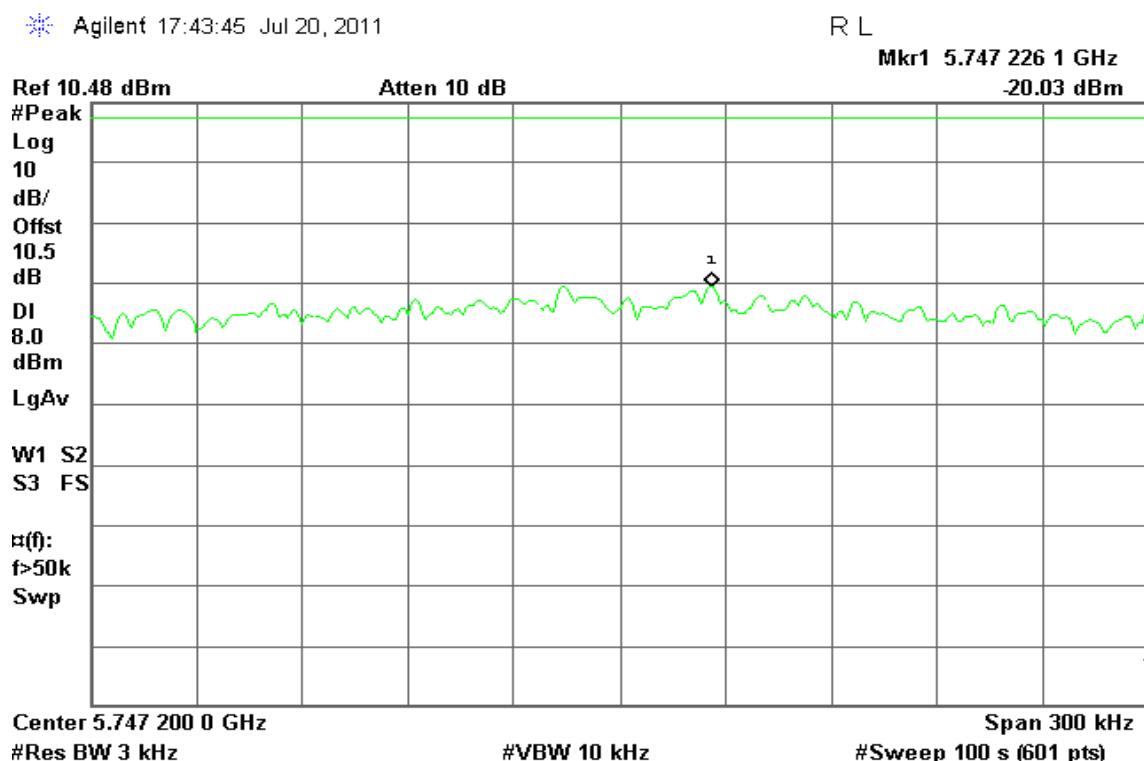
## IEEE 802.11a mode

## PPSD (CH Low)



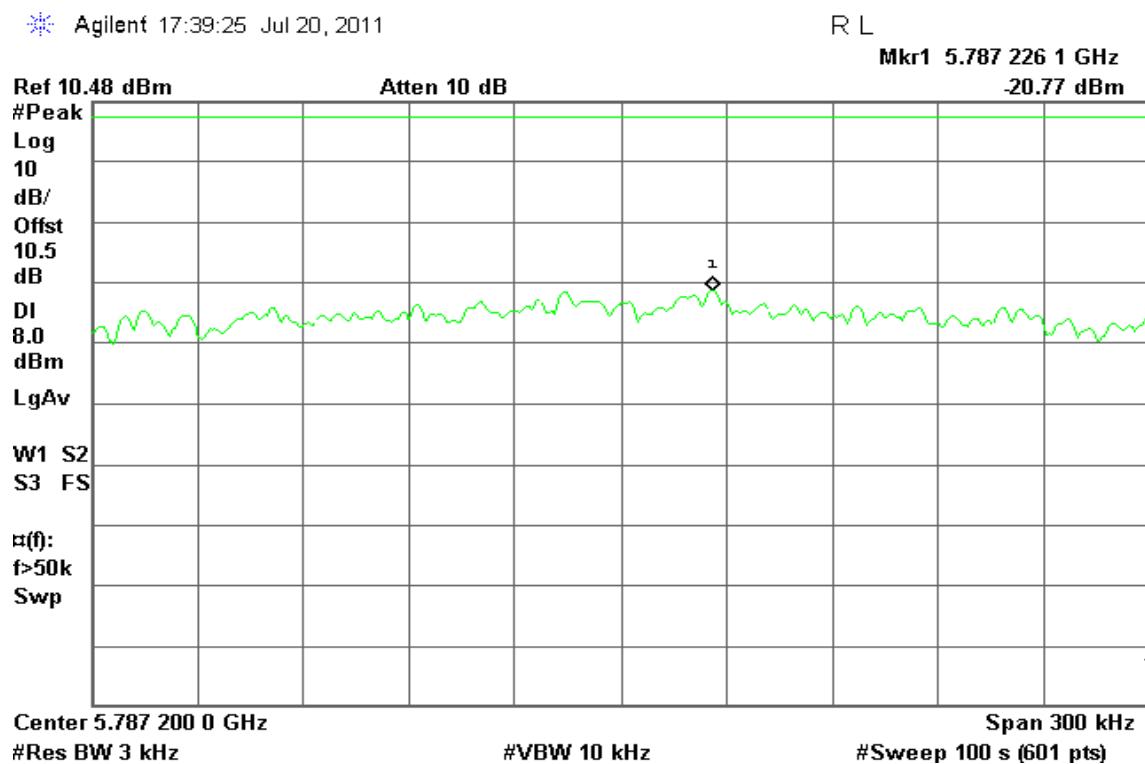
## PPSD (CH Mid)



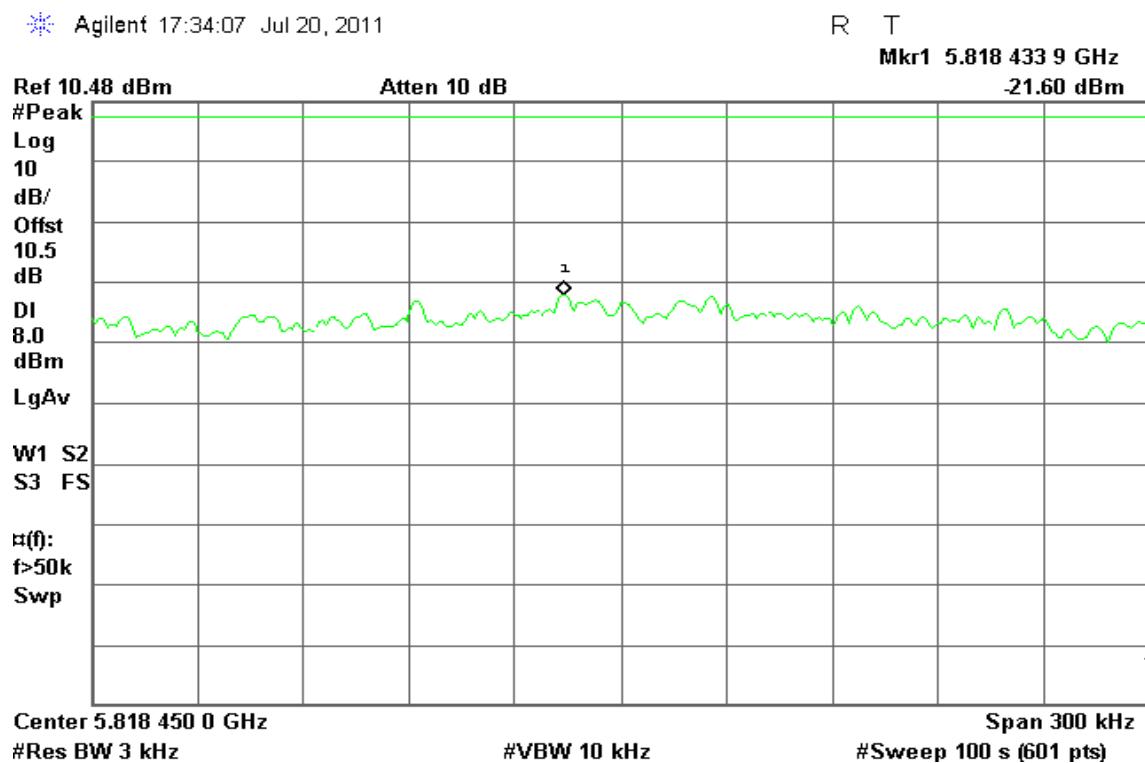
**PPSD (CH High)****IEEE 802.11n HT 20 MHz Channel mode / Chain 0****PPSD (CH Low)**



## PPSD (CH Mid)



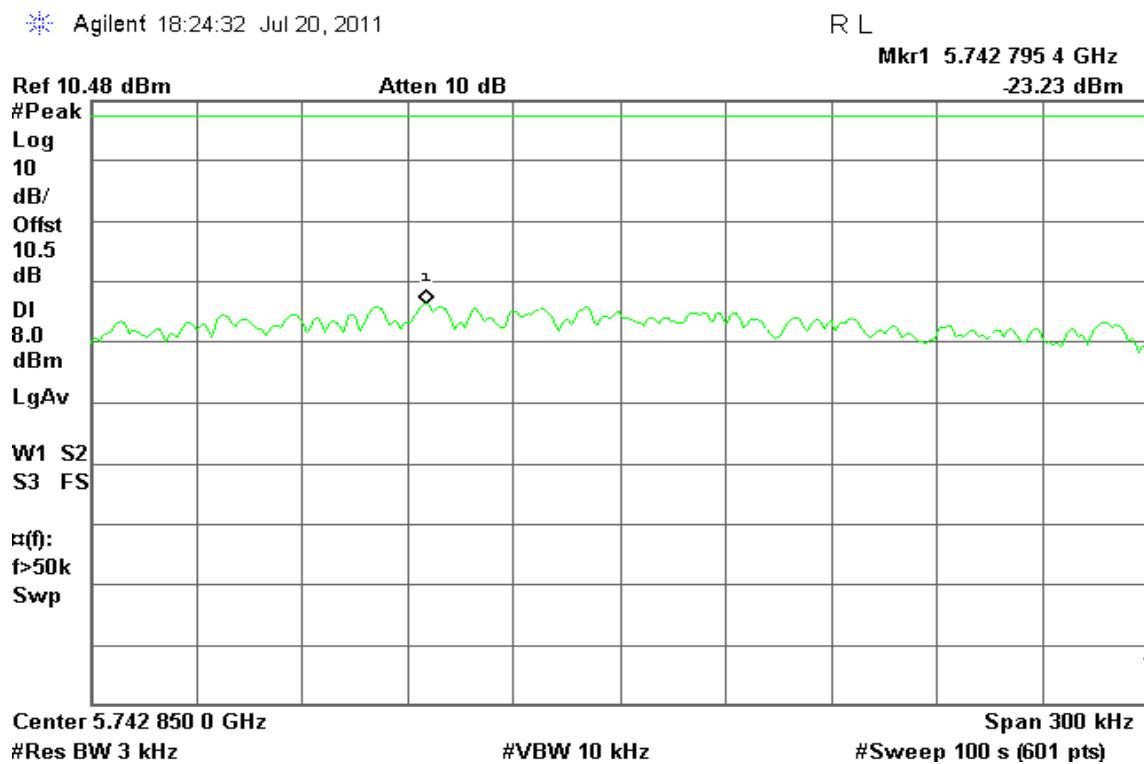
## PPSD (CH High)



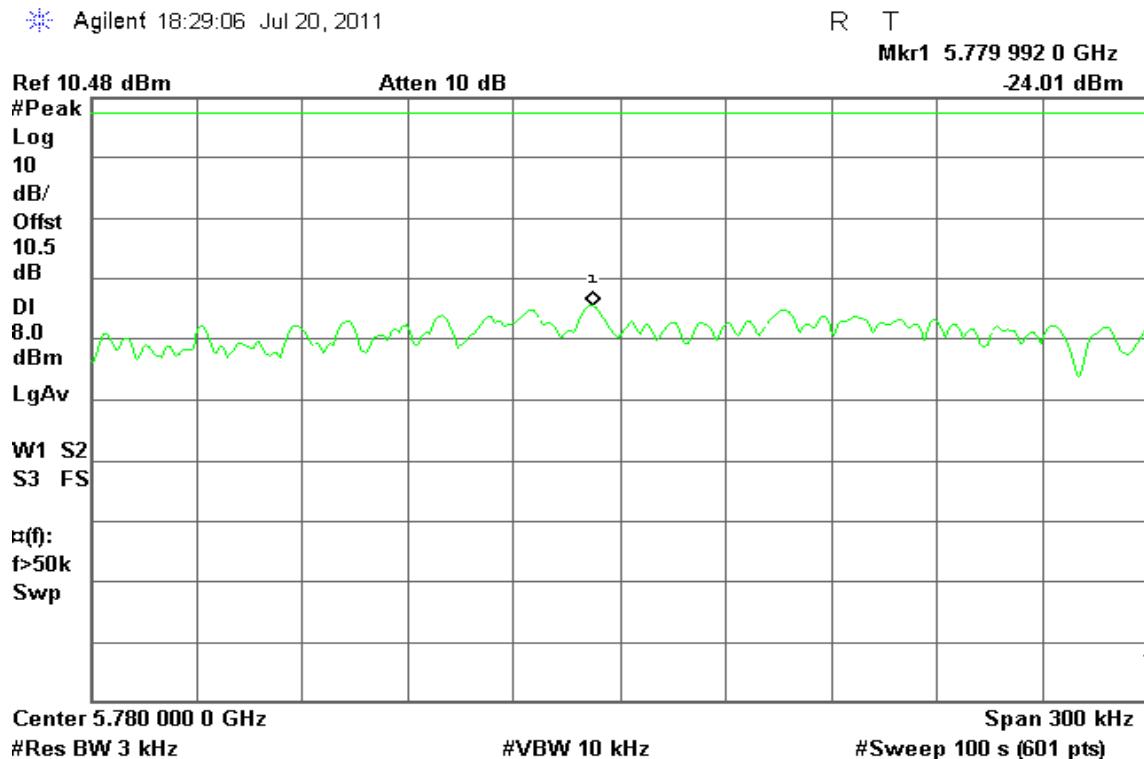


**IEEE 802.11n HT 20 MHz Channel mode / Chain 1**

**PPSD (CH Low)**

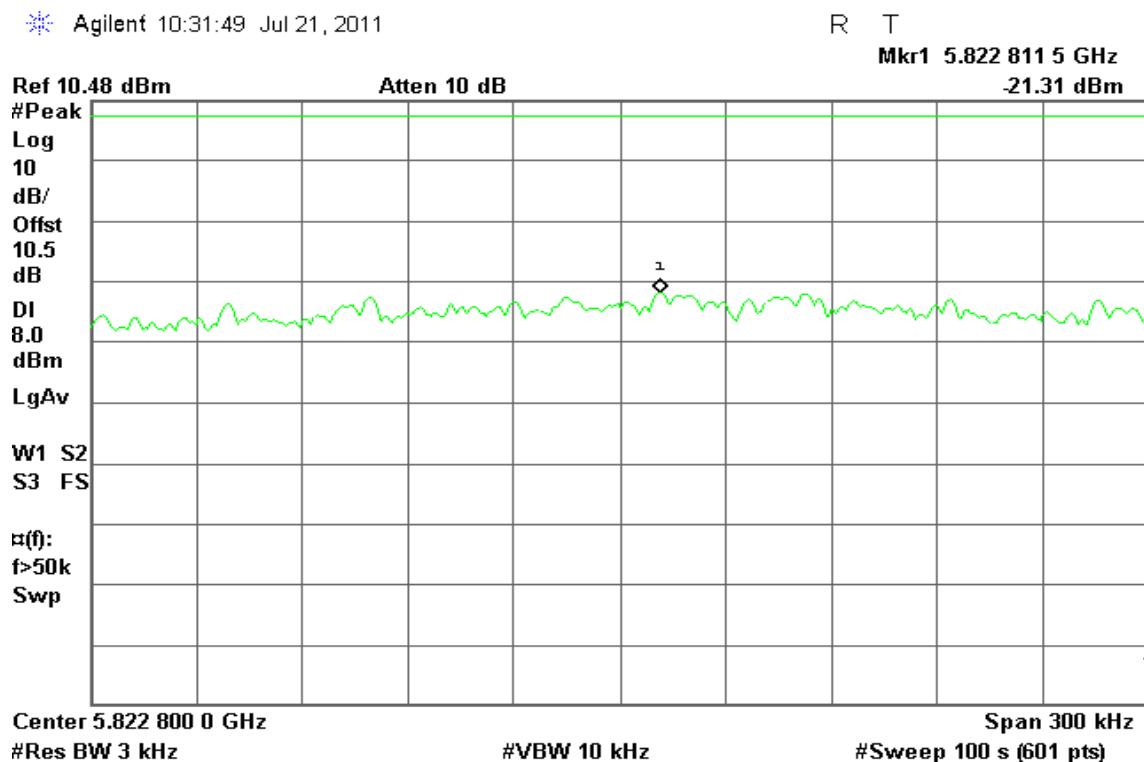


**PPSD (CH Mid)**



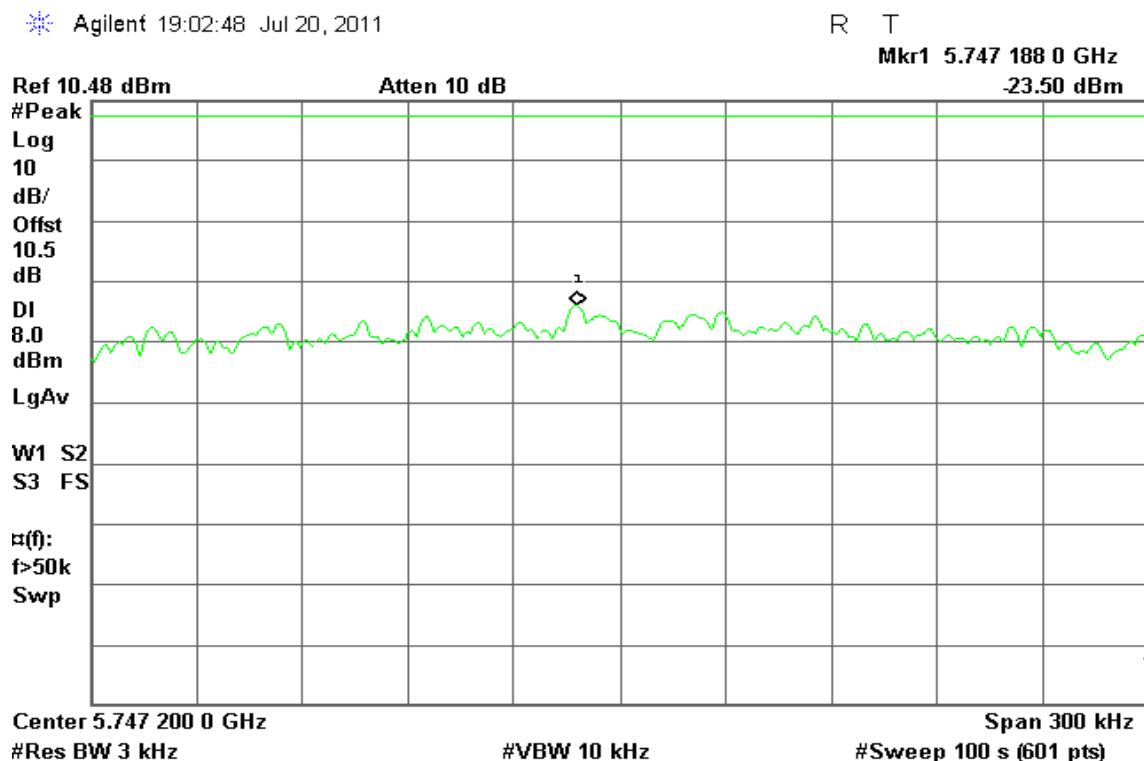


### PPSD (CH High)



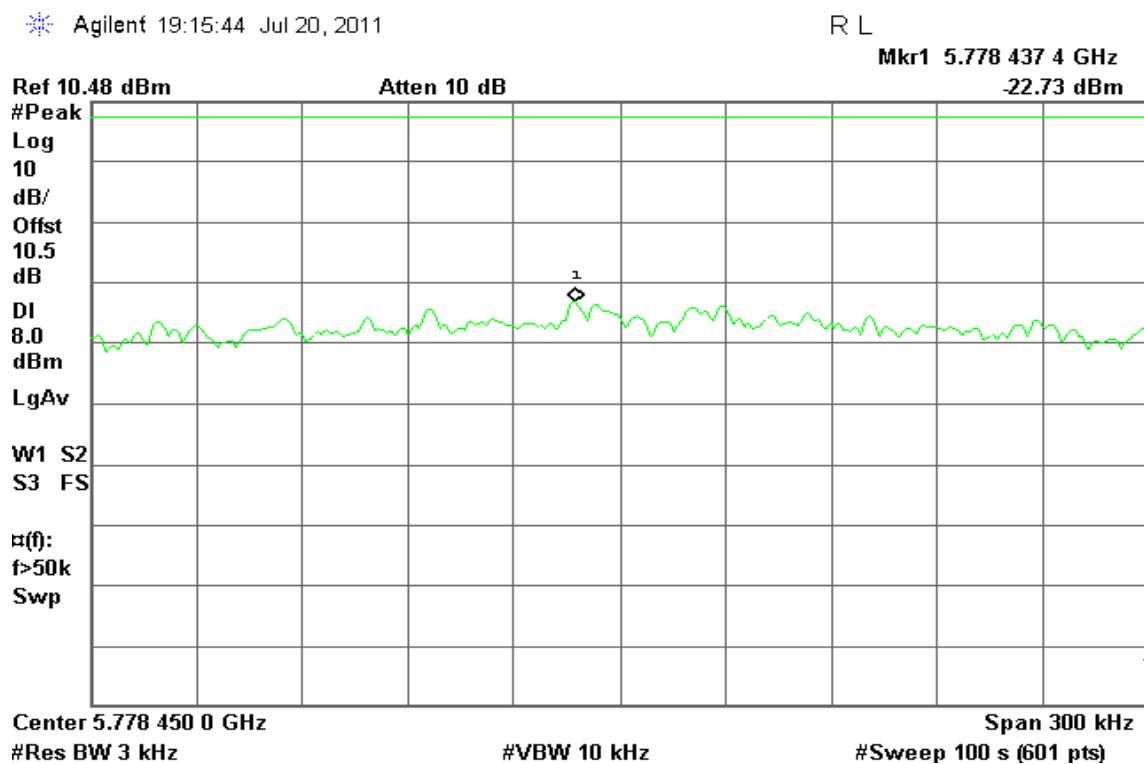
### IEEE 802.11n HT 20 MHz Channel mode / Chain 2

### PPSD (CH Low)

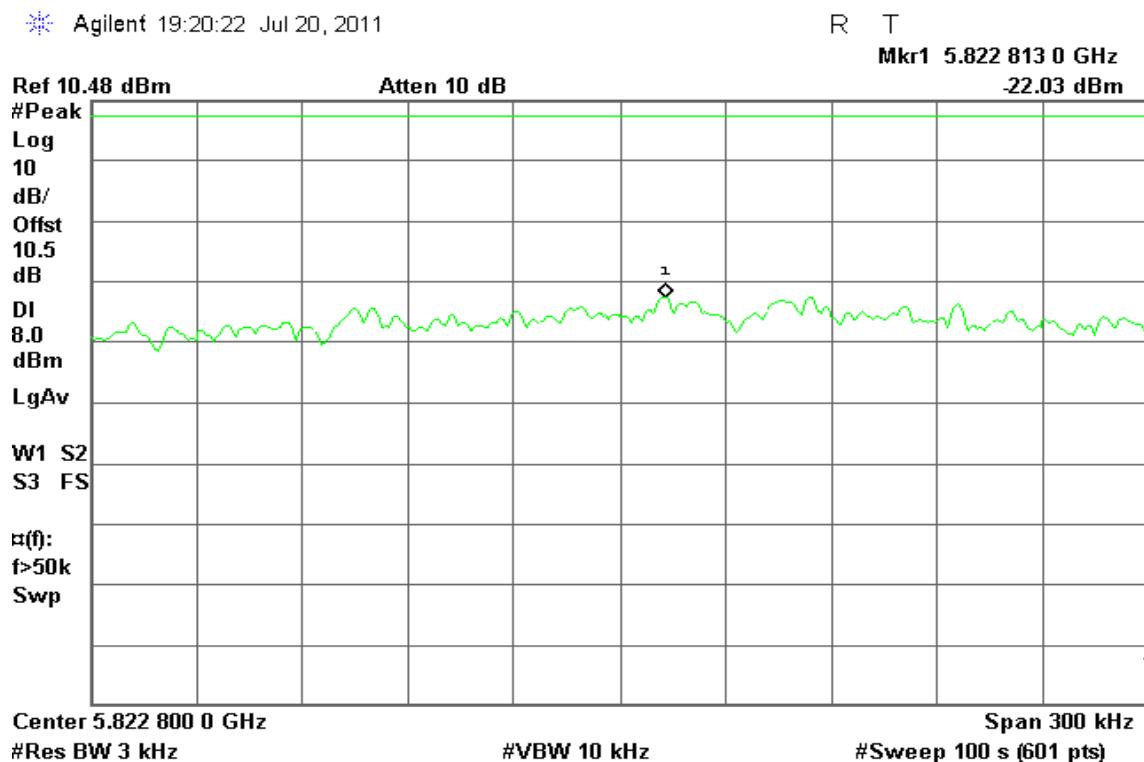




## PPSD (CH Mid)



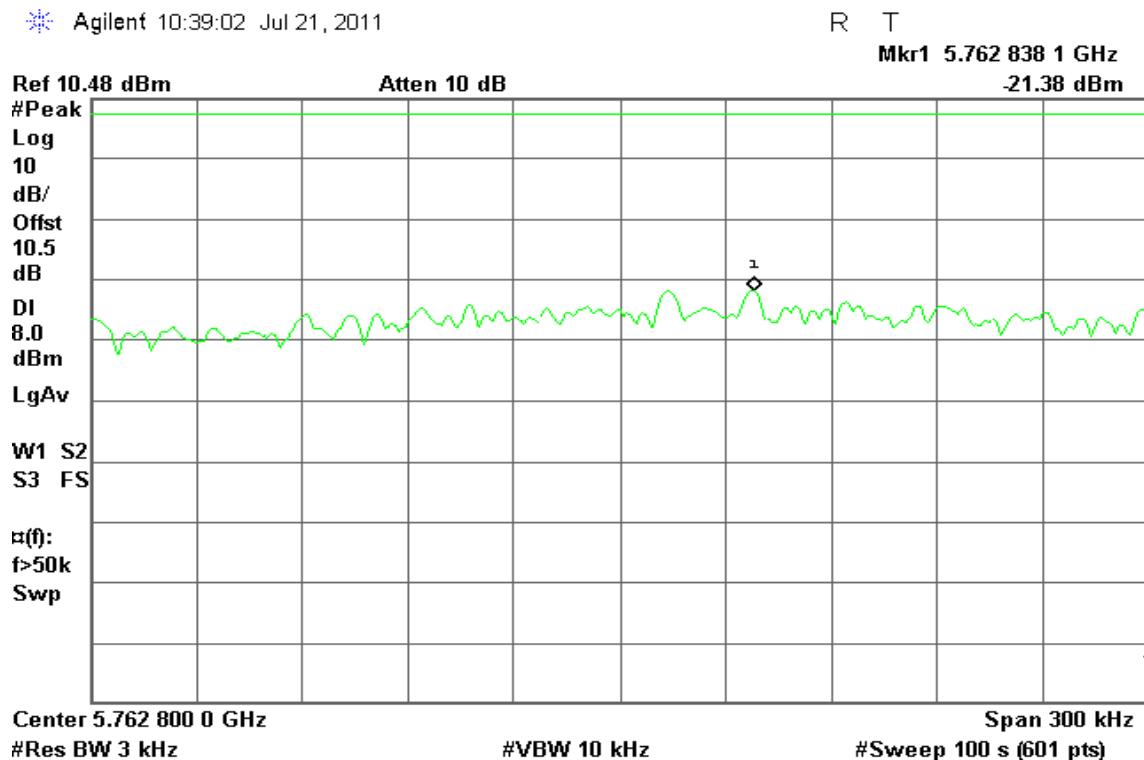
## PPSD (CH High)



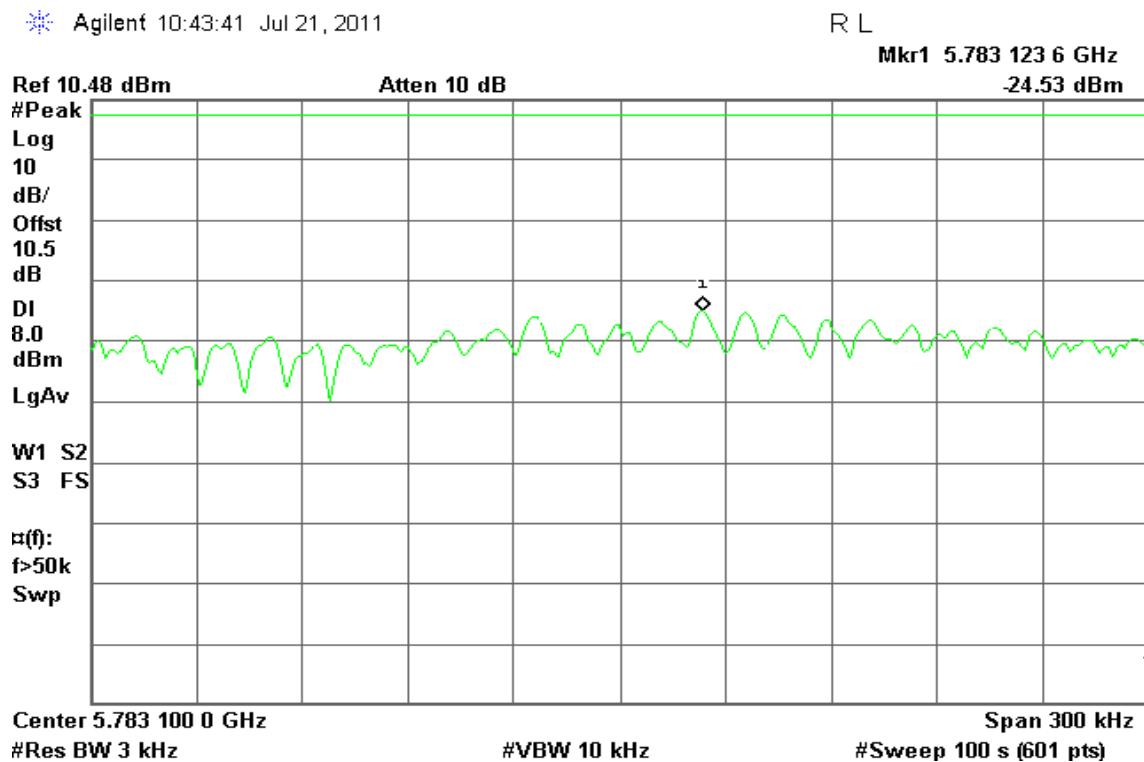


**IEEE 802.11n HT 40 MHz mode / Chain 0**

**PPSD (CH Low)**



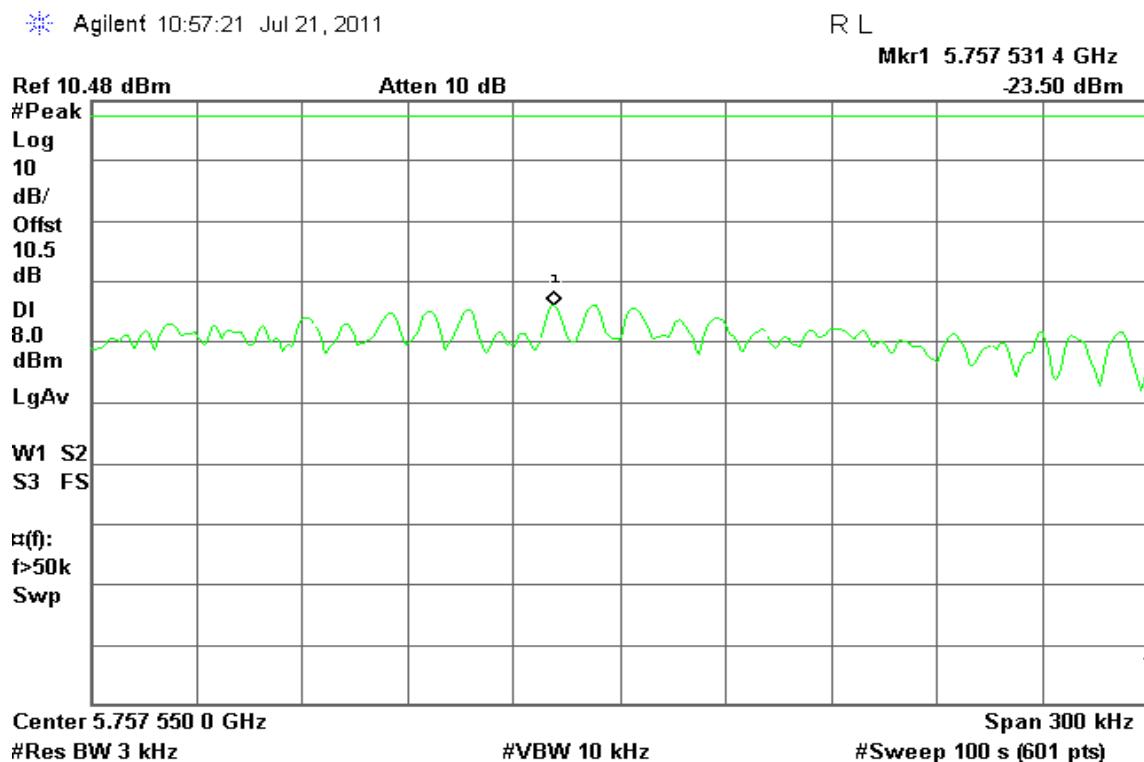
**PPSD (CH High)**



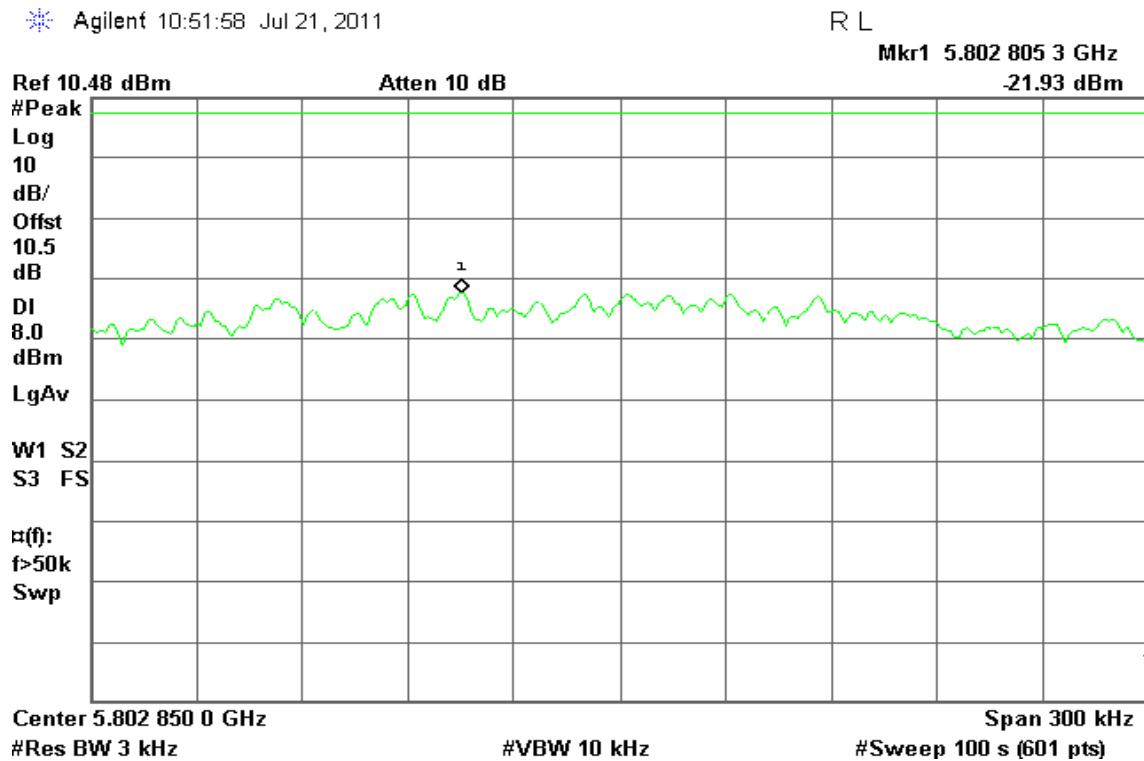


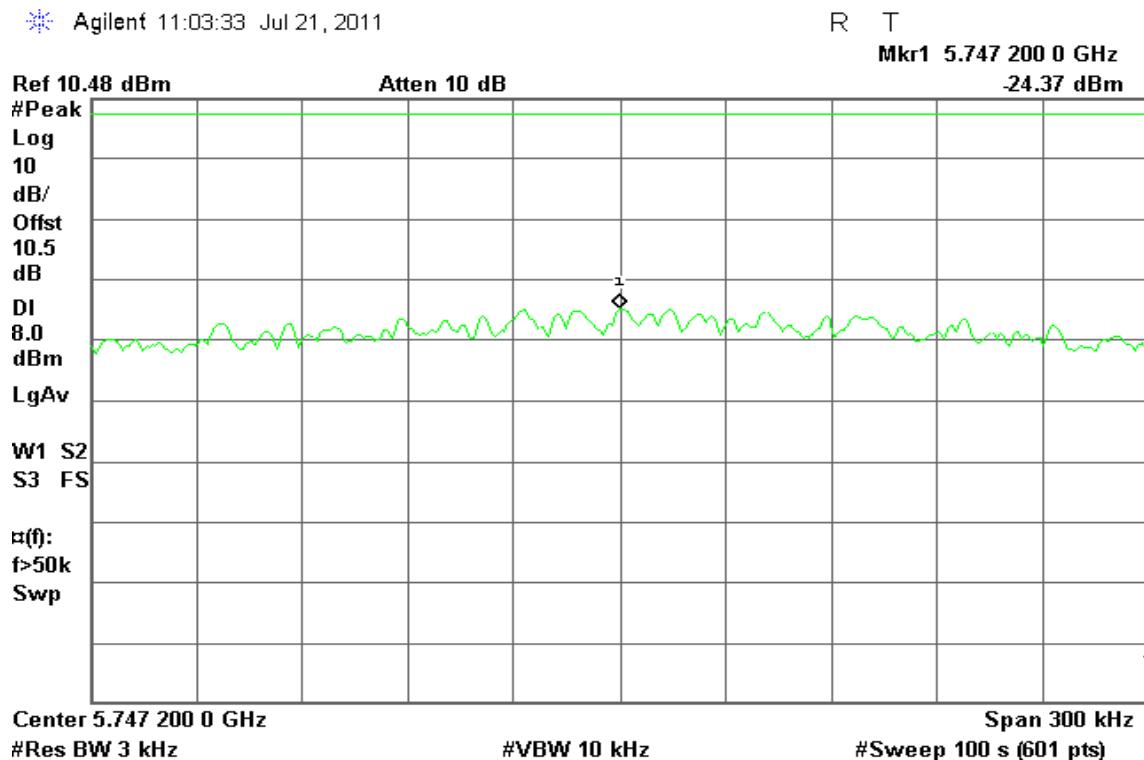
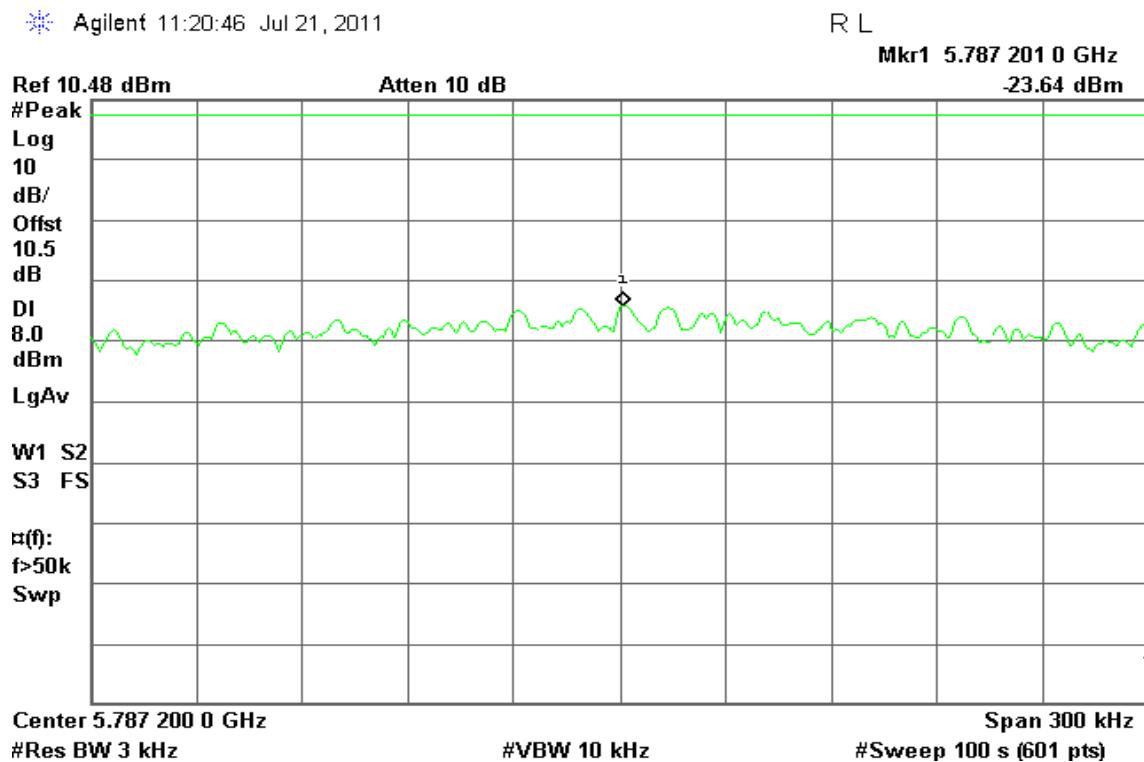
**IEEE 802.11n HT 40 MHz mode / Chain 1**

**PPSD (CH Low)**



**PPSD (CH High)**



**IEEE 802.11n HT 40 MHz mode / Chain 2****PPSD (CH Low)****PPSD (CH High)**



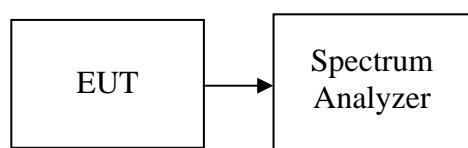
## 7.6 SPURIOUS EMISSIONS

### 7.6.1 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 100 kHz.

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

## TEST RESULTS

*No non-compliance noted*



**Test Plot**

**IEEE 802.11b mode**

**CH Low**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-41.55	-14.84	-26.71
2	2402.1500	5.16	-14.84	---
3	4815.9167	-40.62	-14.84	-25.78



CH Mid



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-40.99	-13.58	-27.41
2	2443.7667	6.42	-13.58	---
3	4899.1500	-39.22	-13.58	-25.64



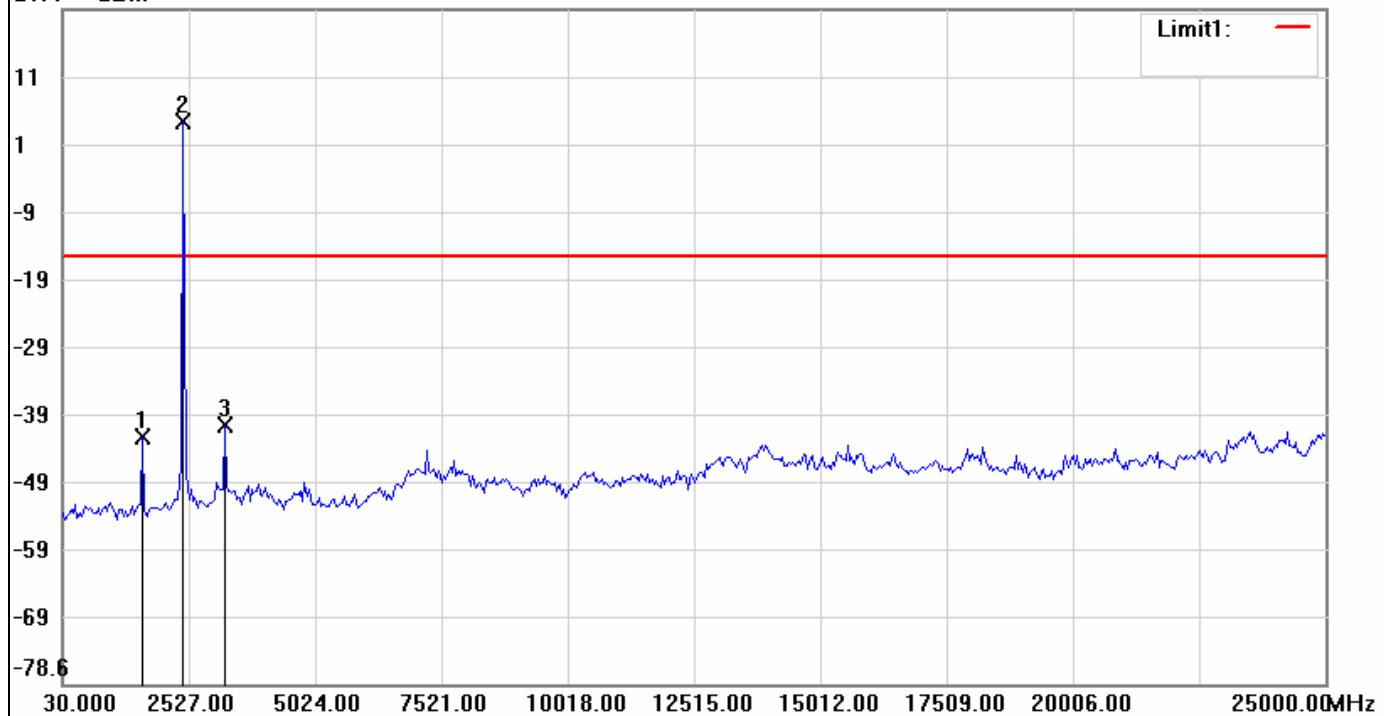
**CH High**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1653.0500	-40.80	-13.53	-27.27
2	2443.7667	6.47	-13.53	---
3	4940.7667	-37.63	-13.53	-24.10

**IEEE 802.11g mode****CH Low**

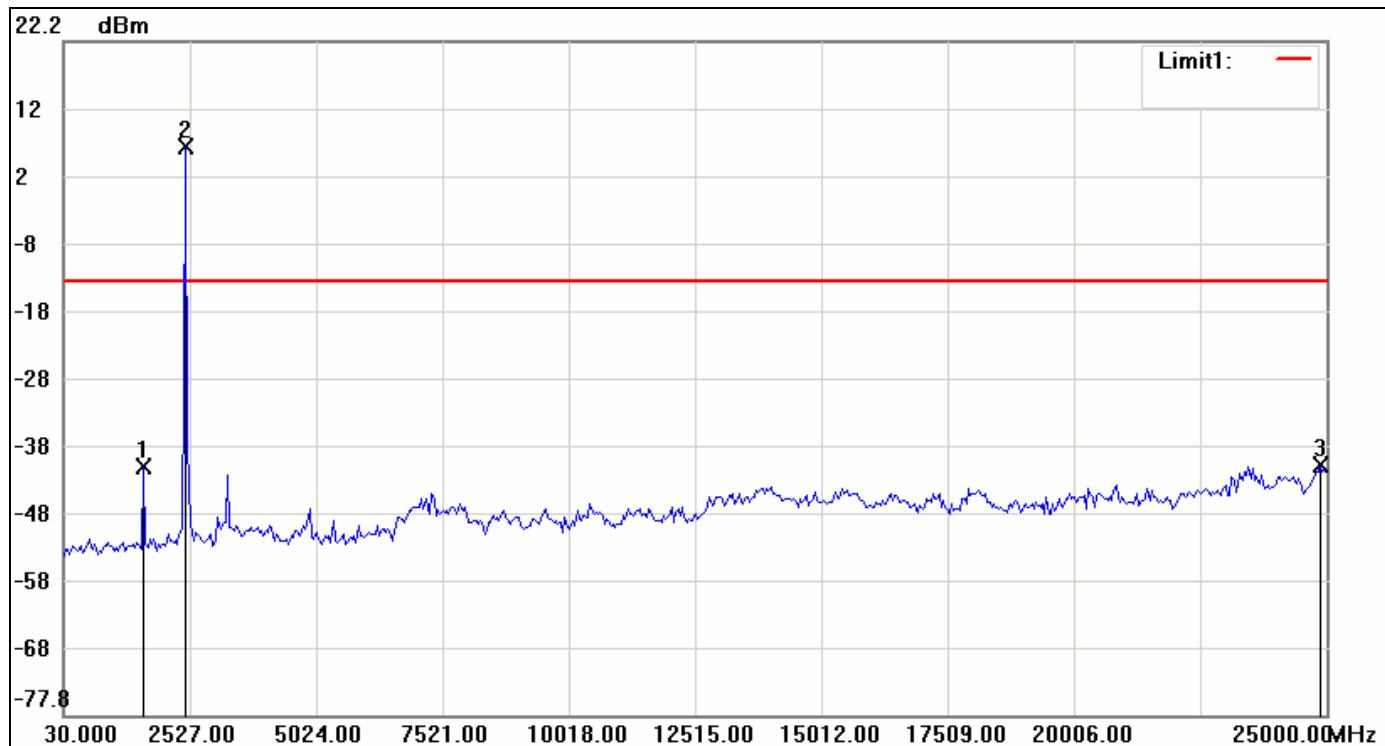
21.4 dBm



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-42.01	-15.15	-26.86
2	2402.1500	4.85	-15.15	---
3	3234.4833	-40.18	-15.15	-25.03



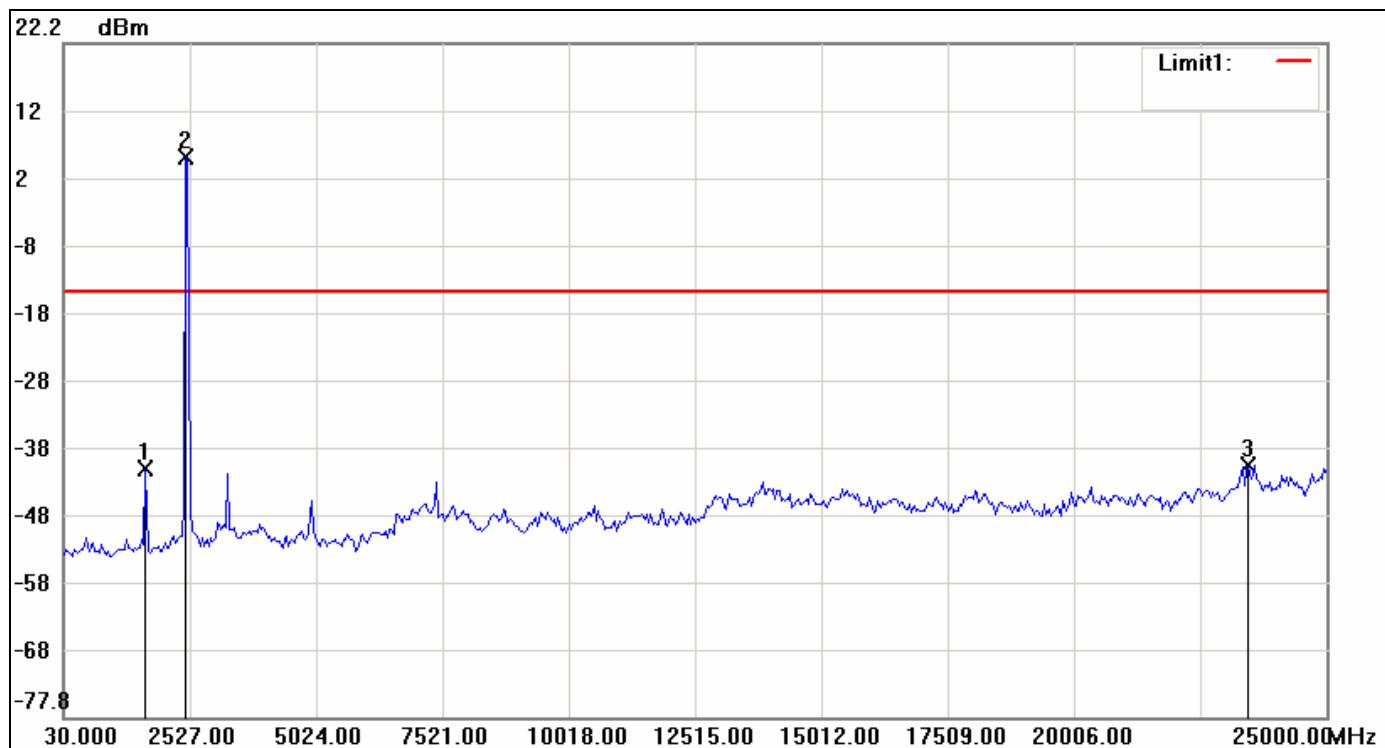
**CH Mid**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-40.84	-13.52	-27.32
2	2443.7667	6.48	-13.52	---
3	24875.1500	-40.63	-13.52	-27.11



**CH High**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1653.0500	-40.81	-14.58	-26.23
2	2443.7667	5.42	-14.58	---
3	23460.1833	-40.33	-14.58	-25.75



**IEEE 802.11n HT 20 MHz mode / Chain 0**

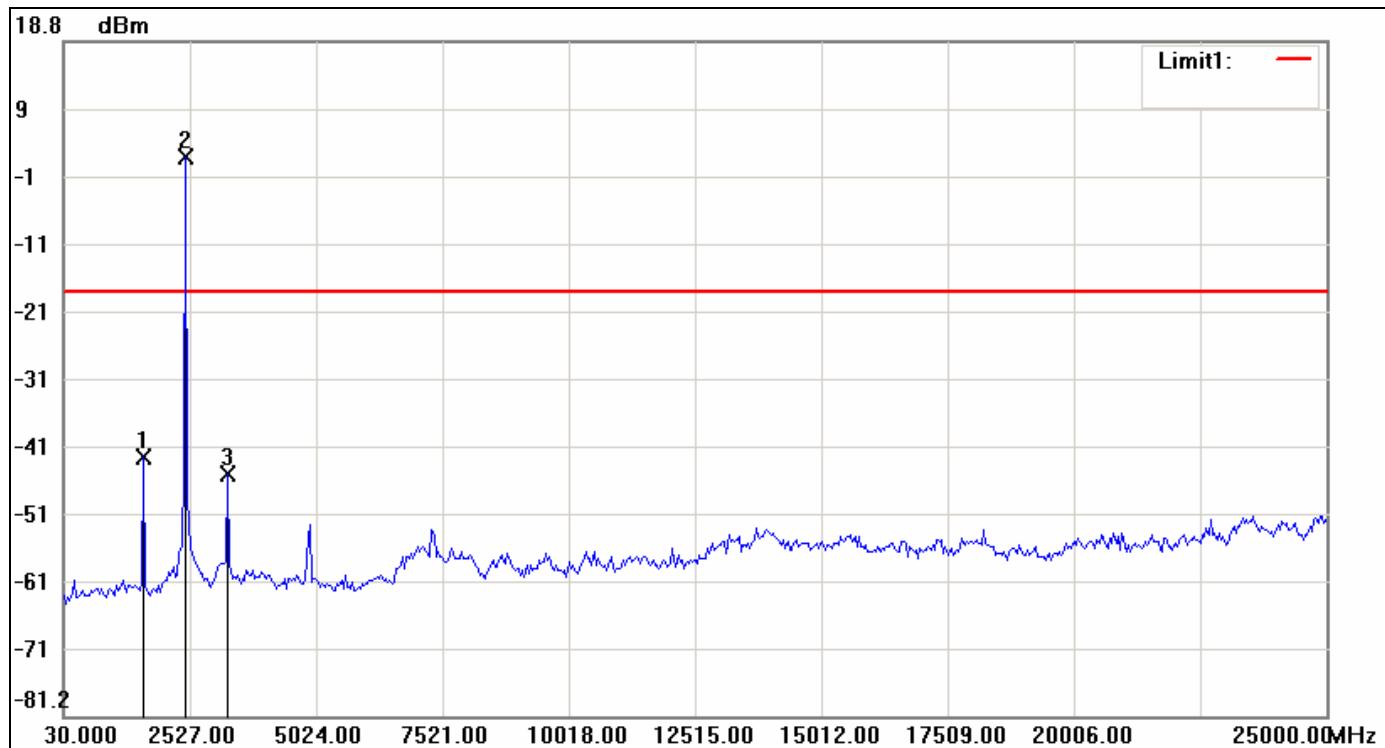
**CH Low**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-41.26	-18.92	-22.34
2	2402.1500	1.08	-18.92	---
3	3234.4833	-43.41	-18.92	-24.49



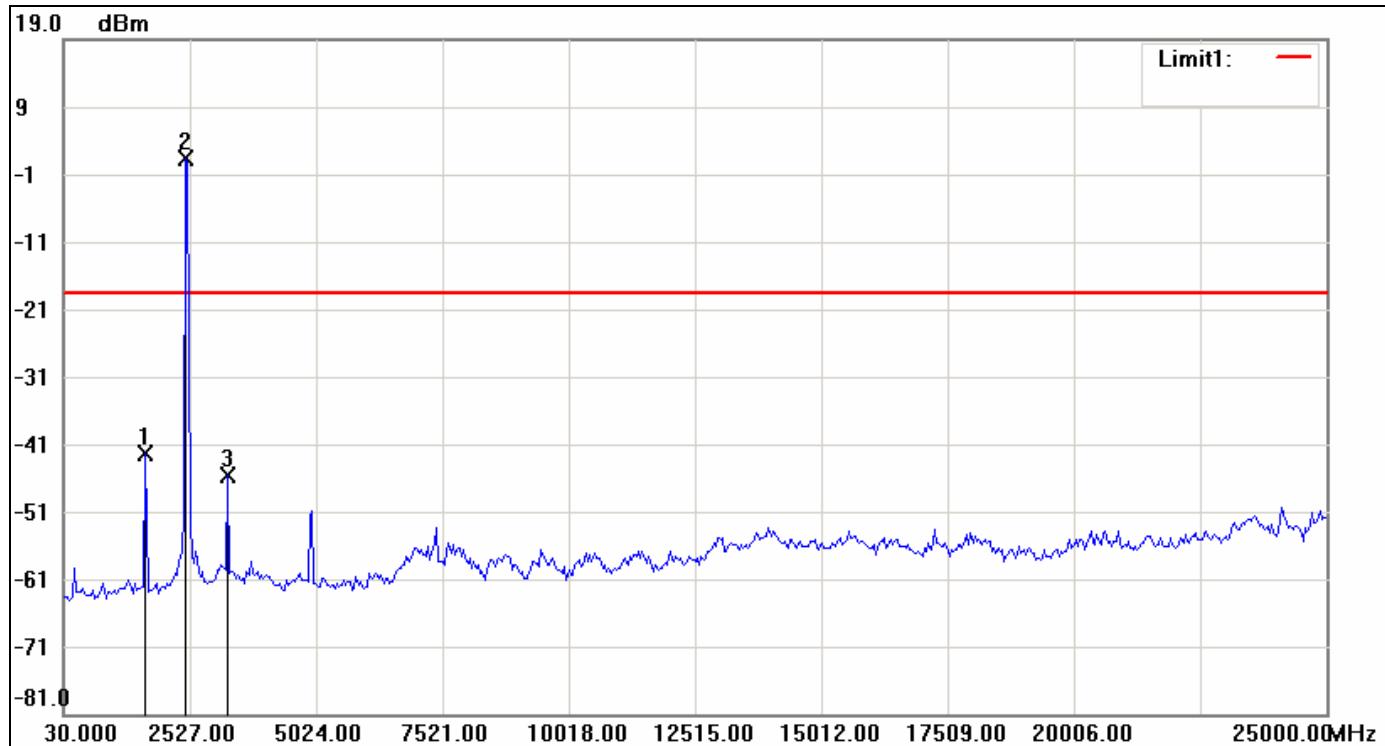
CH Mid



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-42.81	-18.42	-24.39
2	2443.7667	1.58	-18.42	---
3	3276.1000	-45.37	-18.42	-26.95



**CH High**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1653.0500	-42.50	-18.71	-23.79
2	2443.7667	1.29	-18.71	---
3	3276.1000	-45.70	-18.71	-26.99



**IEEE 802.11n HT 20 MHz mode / Chain 1**

**CH Low**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-34.73	-17.92	-16.81
2	2402.1500	2.08	-17.92	---
3	3234.4833	-35.45	-17.92	-17.53



CH Mid



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-37.23	-18.50	-18.73
2	2443.7667	1.50	-18.50	---
3	3276.1000	-37.43	-18.50	-18.93



**CH High**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1653.0500	-39.80	-18.95	-20.85
2	2443.7667	1.05	-18.95	---
3	3276.1000	-38.94	-18.95	-19.99



**IEEE 802.11n HT 20 MHz mode / Chain 2**

**CH Low**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-50.19	-18.33	-31.86
2	2402.1500	1.67	-18.33	---
3	3234.4833	-38.21	-18.33	-19.88



## CH Mid



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-54.12	-18.70	-35.42
2	2443.7667	1.30	-18.70	---
3	3276.1000	-39.87	-18.70	-21.17



**CH High**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1653.0500	-49.57	-19.13	-30.44
2	2443.7667	0.87	-19.13	---
3	3276.1000	-40.94	-19.13	-21.81



**IEEE 802.11n HT 20 MHz mode**

Low Channel						
Frequency (MHz)	Chain0 (dBm)	Chain1 (dBm)	Chain2 (dBm)	Total (dBm)	Limit (dBm)	Margin (dBm)
1611.4330	-41.26	-34.73	-50.19	-29.96	-17.92	-12.04
3234.4800	-43.41	-35.45	-38.21	-30.68	-17.92	-12.76
Fundamental limit	-18.92	-17.92	-18.33	---	---	---

Mid Channel						
Frequency (MHz)	Chain0 (dBm)	Chain1 (dBm)	Chain2 (dBm)	Total (dBm)	Limit (dBm)	Margin (dBm)
1611.4330	-42.81	-37.23	-54.12	-32.46	-18.42	-14.04
3276.1000	-45.37	-37.43	-39.87	-32.66	-18.42	-14.24
Fundamental limit	-18.42	-18.50	-18.70	---	---	---

High Channel						
Frequency (MHz)	Chain0 (dBm)	Chain1 (dBm)	Chain2 (dBm)	Total (dBm)	Limit (dBm)	Margin (dBm)
1653.0500	-42.50	-39.80	-49.57	-35.03	-18.71	-16.32
3276.1000	-45.70	-38.94	-40.94	-34.17	-18.71	-52.88
Fundamental limit	-18.71	-18.95	-19.13	---	---	---

**Remark:**

1. Total (dBm) = Measure + 10 log(3) dB,  
Measure=Choose the max chain value



**IEEE 802.11n HT 40 MHz mode / Chain 0**

**CH Low**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-40.37	-20.06	-20.31
2	2443.7667	-0.06	-20.06	---
3	3234.4833	-43.91	-20.06	-23.85



CH Mid



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-40.98	-21.61	-19.37
2	2443.7667	-1.61	-21.61	---
3	3276.1000	-45.07	-21.61	-23.46



**CH High**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1653.0500	-40.89	-21.30	-19.59
2	2443.7667	-1.30	-21.30	---
3	3276.1000	-45.77	-21.30	-24.47



**IEEE 802.11n HT 40 MHz mode / Chain 1**

**CH Low**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	30.000	-58.13	-22.92	-35.21
2	2402.1500	-2.92	-22.92	---
3	24750.3000	-51.46	-22.92	-28.54



CH Mid



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	30.0000	-56.61	-22.49	-34.12
2	2443.7667	-2.49	-22.49	---
3	25000.0000	-51.09	-22.49	-28.60



**CH High**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	30.0000	-60.39	-24.29	-36.10
2	2443.7667	-4.29	-24.29	---
3	24958.3833	-51.10	-24.29	-26.81



**IEEE 802.11n HT 40 MHz mode / Chain 2**

**CH Low**



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-50.16	-22.29	-27.87
2	2443.7667	-2.29	-22.29	---
3	3234.4833	-38.81	-22.29	-16.52



CH Mid



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1611.4333	-50.29	-22.05	-28.24
2	2443.7667	-2.05	-22.05	---
3	3276.1000	-39.70	-22.05	-17.65



## CH High



No.	Frequency(MHz)	Level(dBm)	Limit(dBm)	Margin(dBm)
1	1653.0500	-54.08	-22.26	-31.82
2	2443.7667	-2.26	-22.26	---
3	3276.1000	-40.44	-22.26	-18.18

**IEEE 802.11n HT 40 MHz mode**

Low Channel						
Frequency (MHz)	Chain0 (dBm)	Chain1 (dBm)	Chain2 (dBm)	Total (dBm)	Limit (dBm)	Margin (dBm)
1611.4330	-40.37	---	-50.16	-35.60	-20.06	-15.54
3234.4800	-43.91	---	-38.81	-34.04	-20.06	-13.98
30.0000	---	-58.13	---	-53.36	-20.06	-33.30
24750.0000	---	-51.46	---	-46.69	-20.06	-26.63
Fundamental limit	-20.06	-22.92	-22.29	---	---	---

Mid Channel						
Frequency (MHz)	Chain0 (dBm)	Chain1 (dBm)	Chain2 (dBm)	Total (dBm)	Limit (dBm)	Margin (dBm)
1611.4330	-40.98	---	-50.29	-36.21	-21.61	-14.60
3276.1000	-45.07	---	-39.7	-34.93	-21.61	-13.32
30.0000	---	-56.61	---	-51.84	-21.61	-30.23
25000.0000	---	-51.09	---	-46.32	-21.61	-24.71
Fundamental limit	-21.61	-22.49	-22.05	---	---	---

High Channel						
Frequency (MHz)	Chain0 (dBm)	Chain1 (dBm)	Chain2 (dBm)	Total (dBm)	Limit (dBm)	Margin (dBm)
1653.0500	-40.89	---	-54.08	-36.12	-21.30	-14.82
3276.1000	-45.77	---	-40.44	-35.67	-21.30	-14.37
30.0000	---	-60.39	---	-55.62	-21.30	-34.32
24958.0000	---	-51.1	---	-46.33	-21.30	-25.03
Fundamental limit	-21.30	-24.29	-22.26	---	---	---

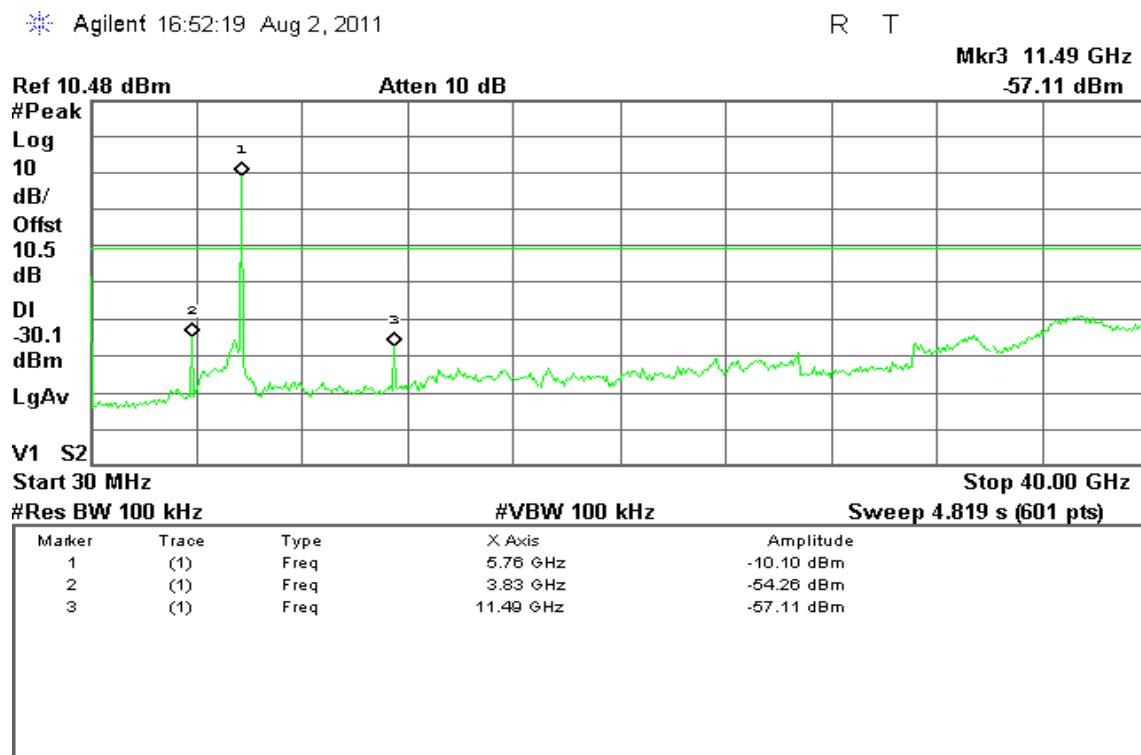
**Remark:**

1.  $\text{Total (dBm)} = \text{Measure} + 10 \log(3) \text{ dB}$ ,  
Measure=Choose the max chain value

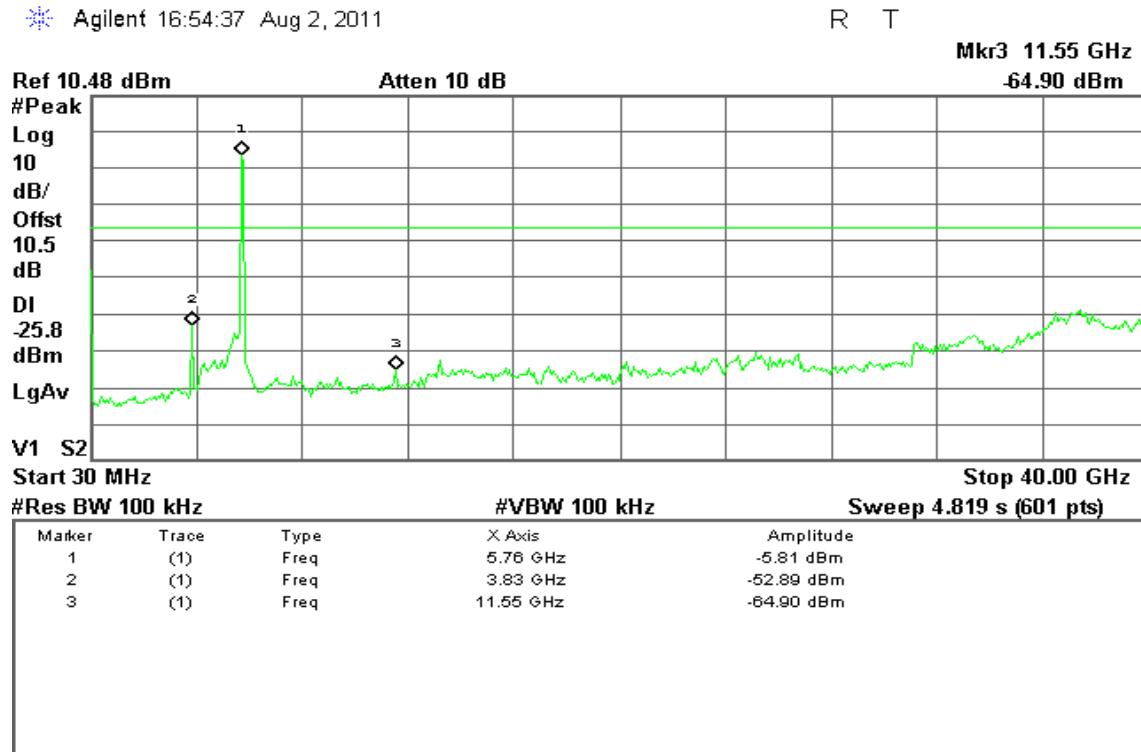


## IEEE 802.11a mode

## CH Low



## CH Mid

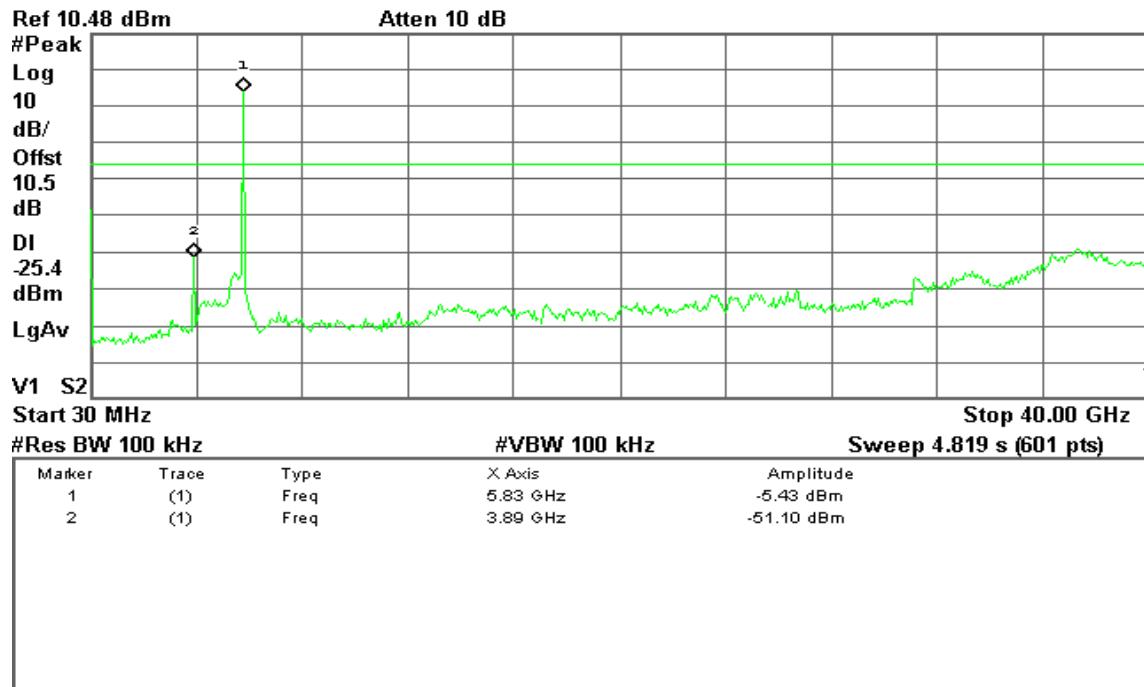




**CH High**

Agilent 16:55:42 Aug 2, 2011

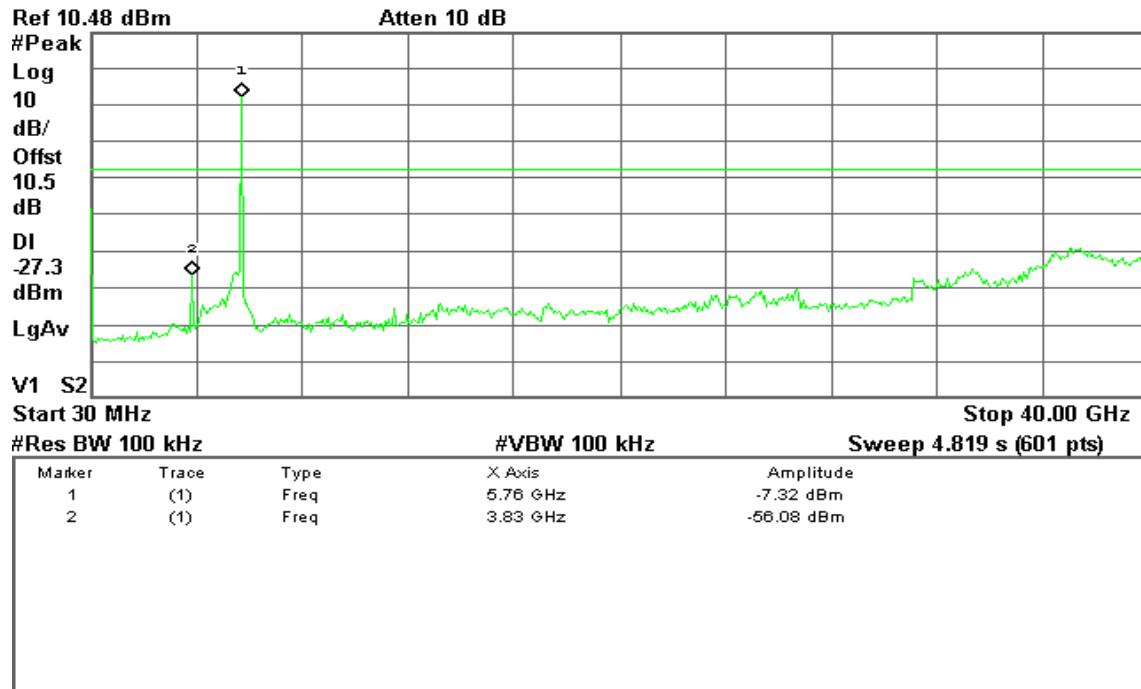
R T



**IEEE 802.11n HT 20 MHz Channel mode / Chain 0****CH Low**

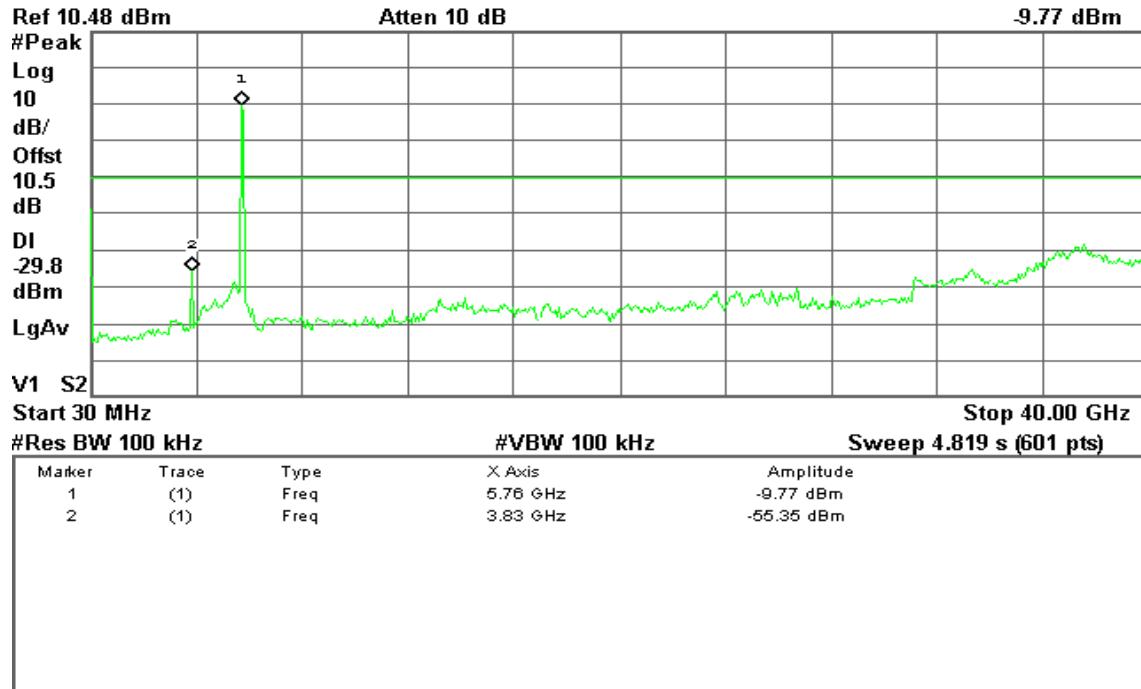
Agilent 16:59:04 Aug 2, 2011

R T

**CH Mid**

Agilent 17:04:21 Aug 2, 2011

R T

Mkr1 5.76 GHz  
-9.77 dBm

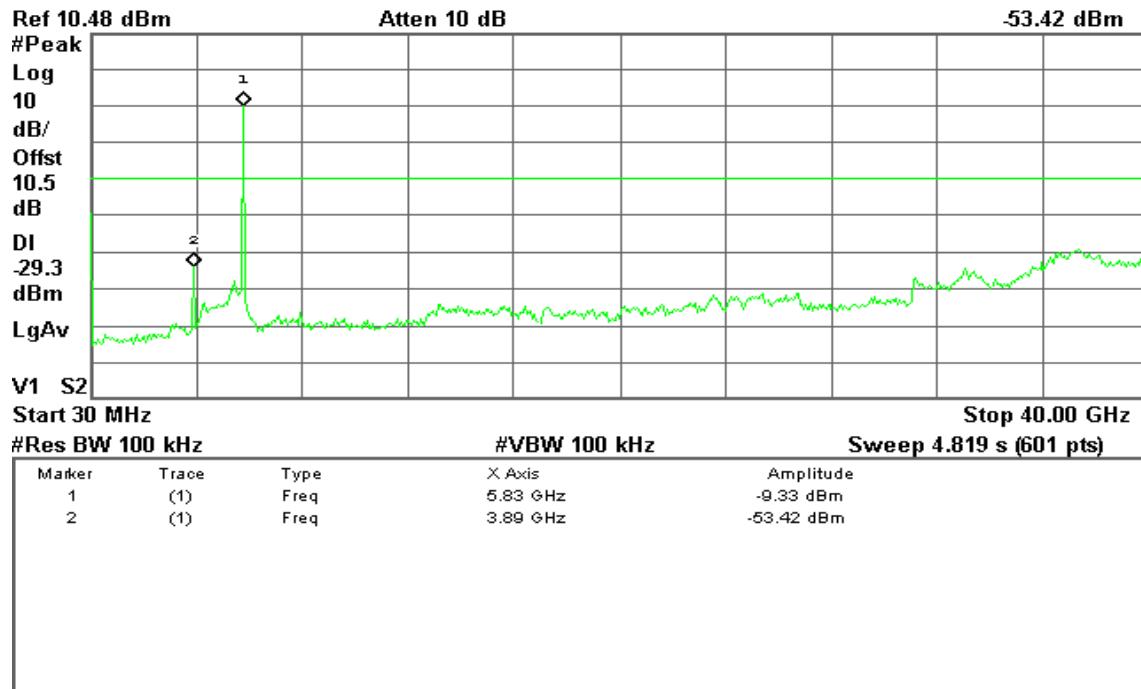
**CH High**

Agilent 17:05:26 Aug 2, 2011

R T

Mkr2 3.89 GHz

-53.42 dBm

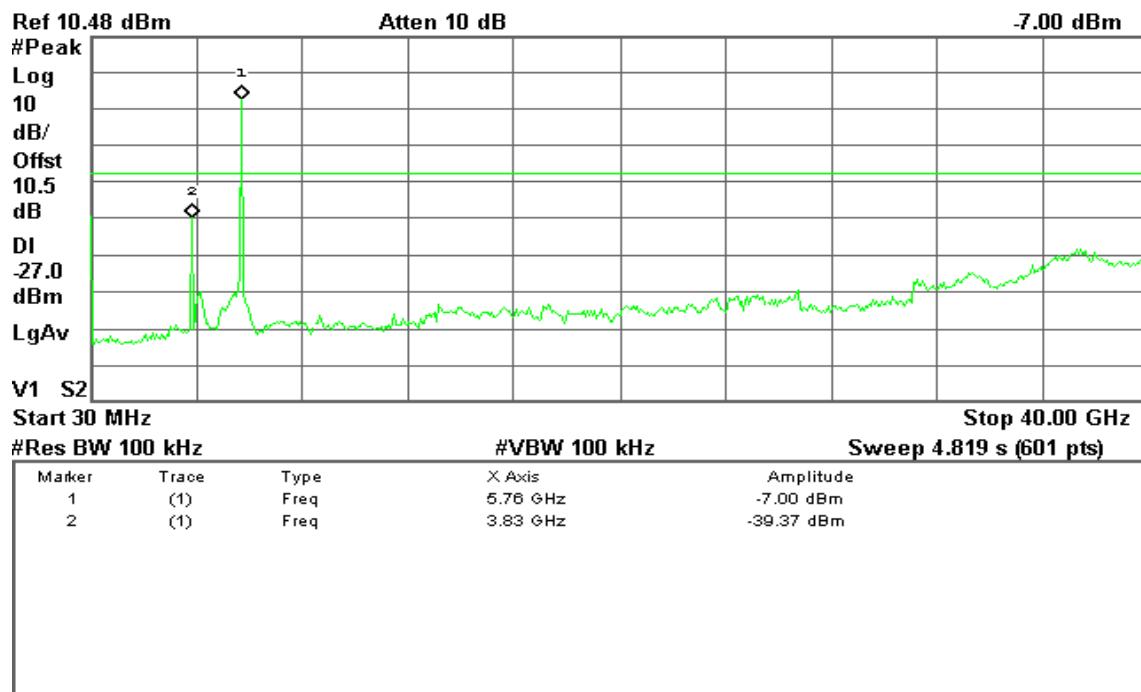
**IEEE 802.11n HT 20 MHz Channel mode / Chain 1****CH Low**

Agilent 17:00:56 Aug 2, 2011

R T

Mkr1 5.76 GHz

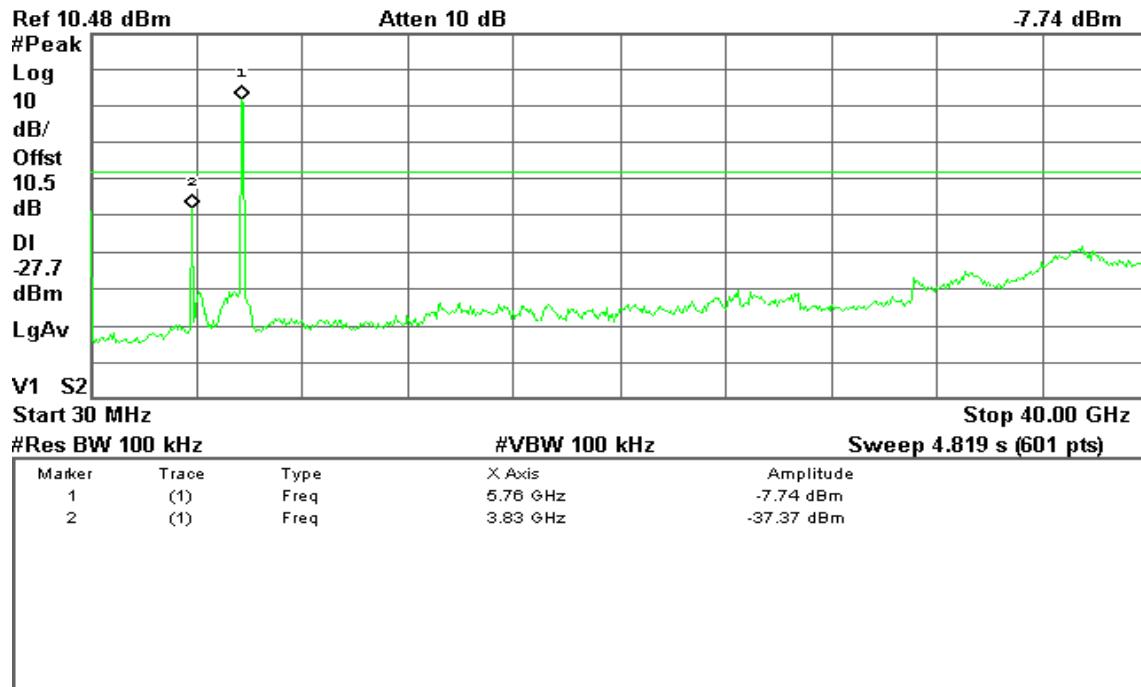
-7.00 dBm



**CH Mid**

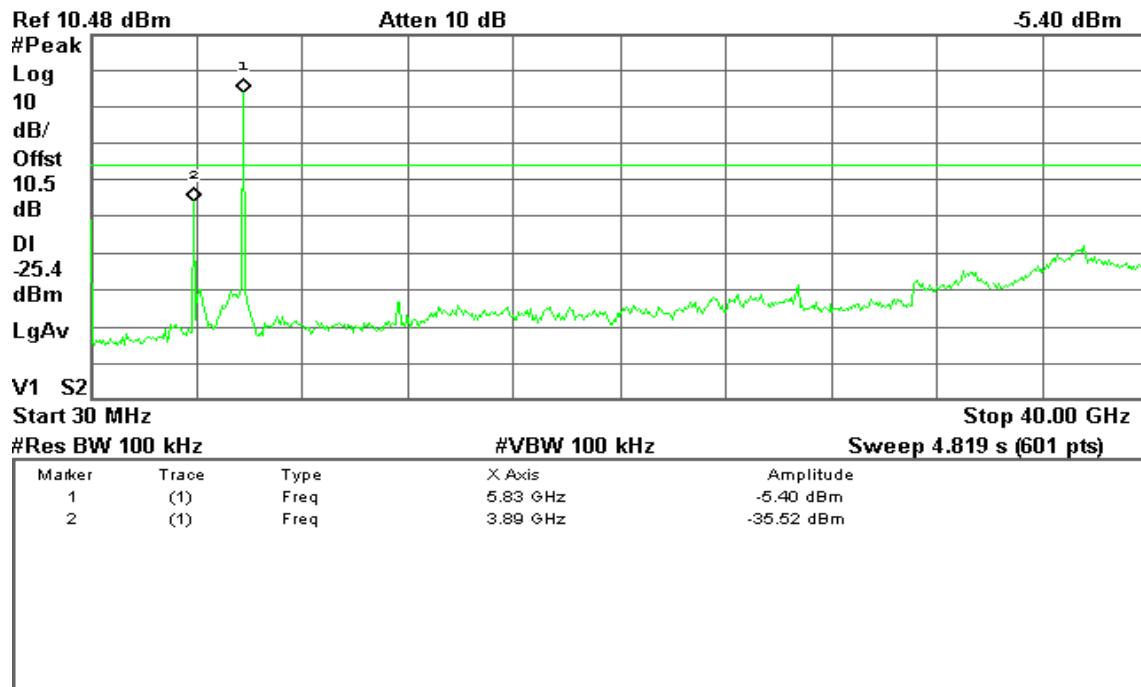
Agilent 17:03:41 Aug 2, 2011

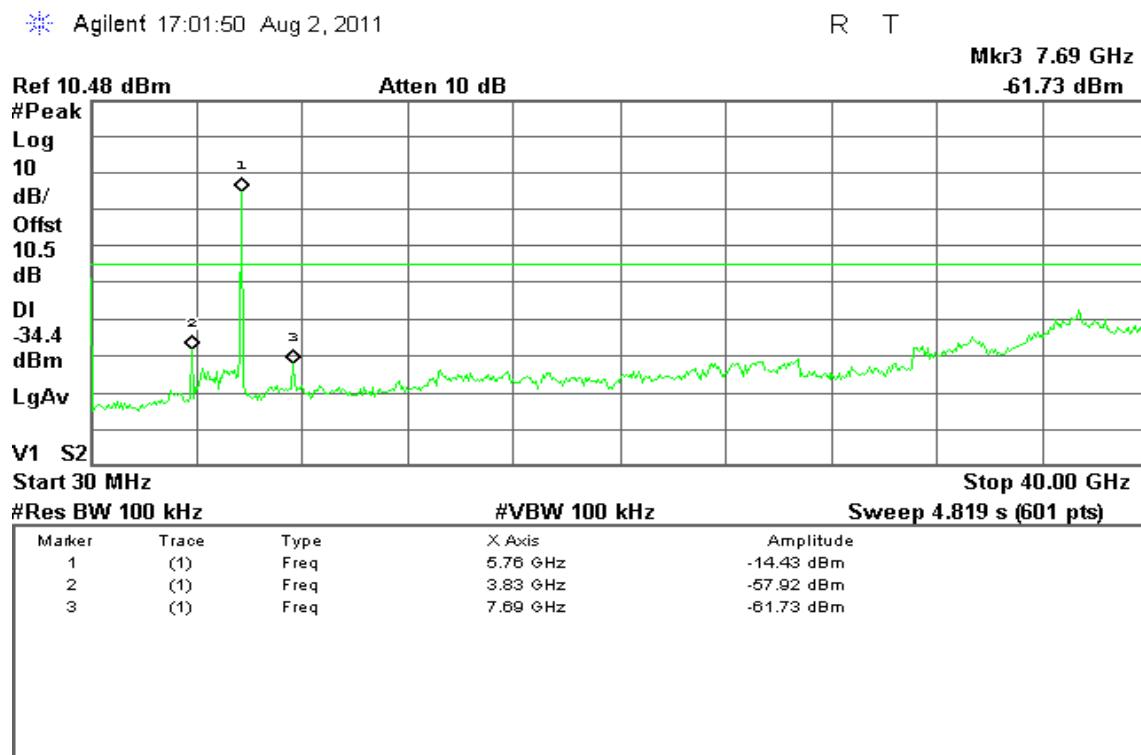
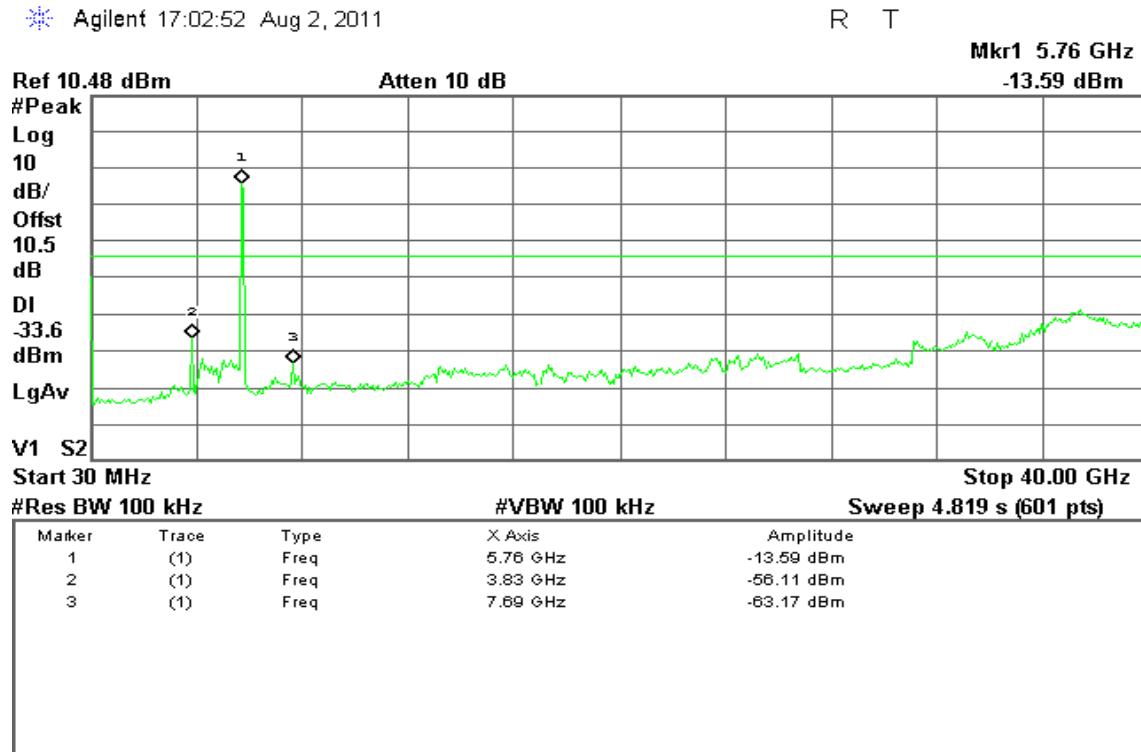
R L

Mkr1 5.76 GHz  
-7.74 dBm**CH High**

Agilent 17:06:09 Aug 2, 2011

R T

Mkr1 5.83 GHz  
-5.40 dBm

**IEEE 802.11n HT 20 MHz Channel mode / Chain 2****CH Low****CH Mid**



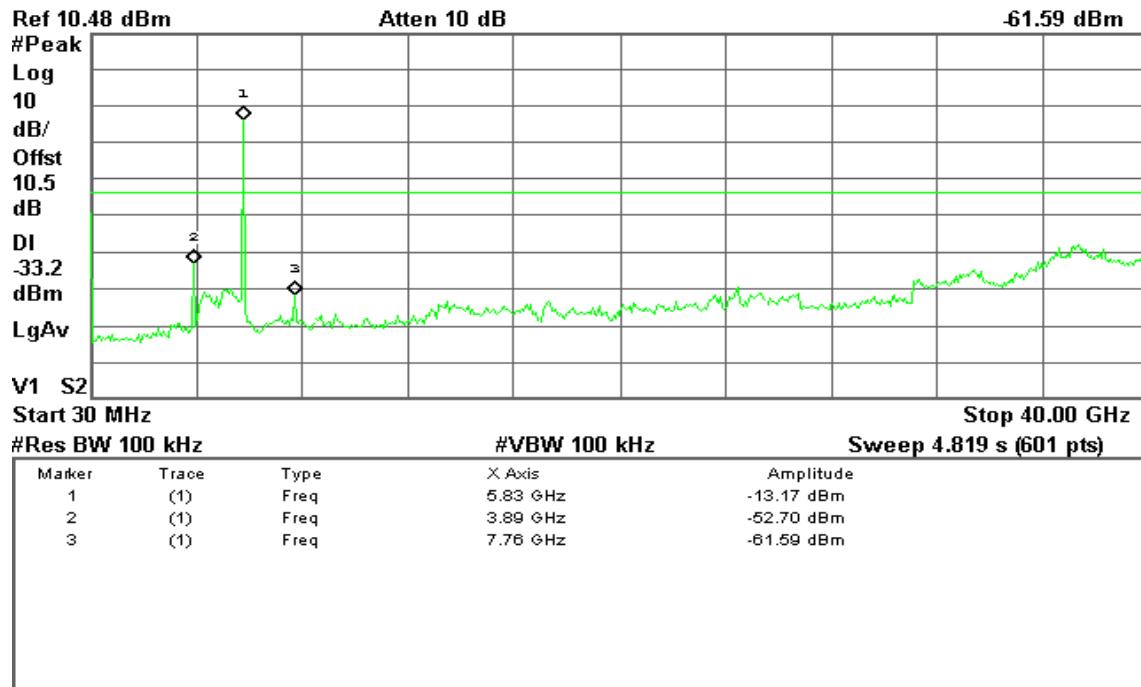
**CH High**

Agilent 17:07:40 Aug 2, 2011

R T

Mkr3 7.76 GHz

-61.59 dBm



**IEEE 802.11n HT 20 MHz Channel mode**

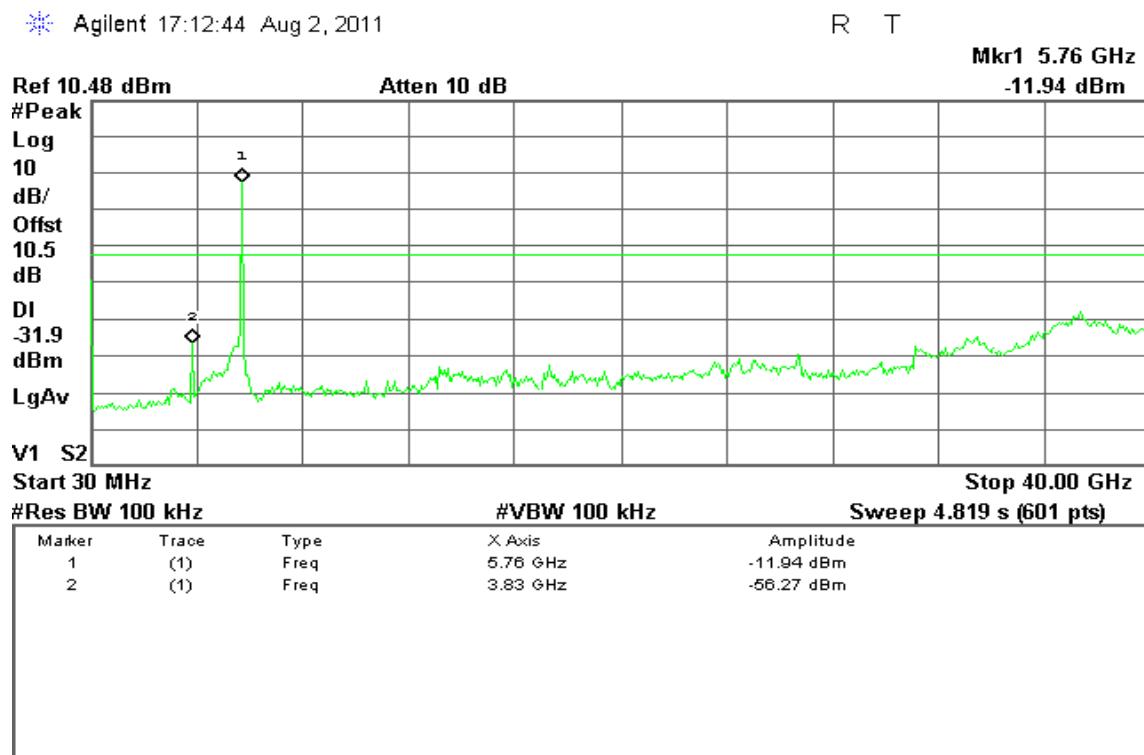
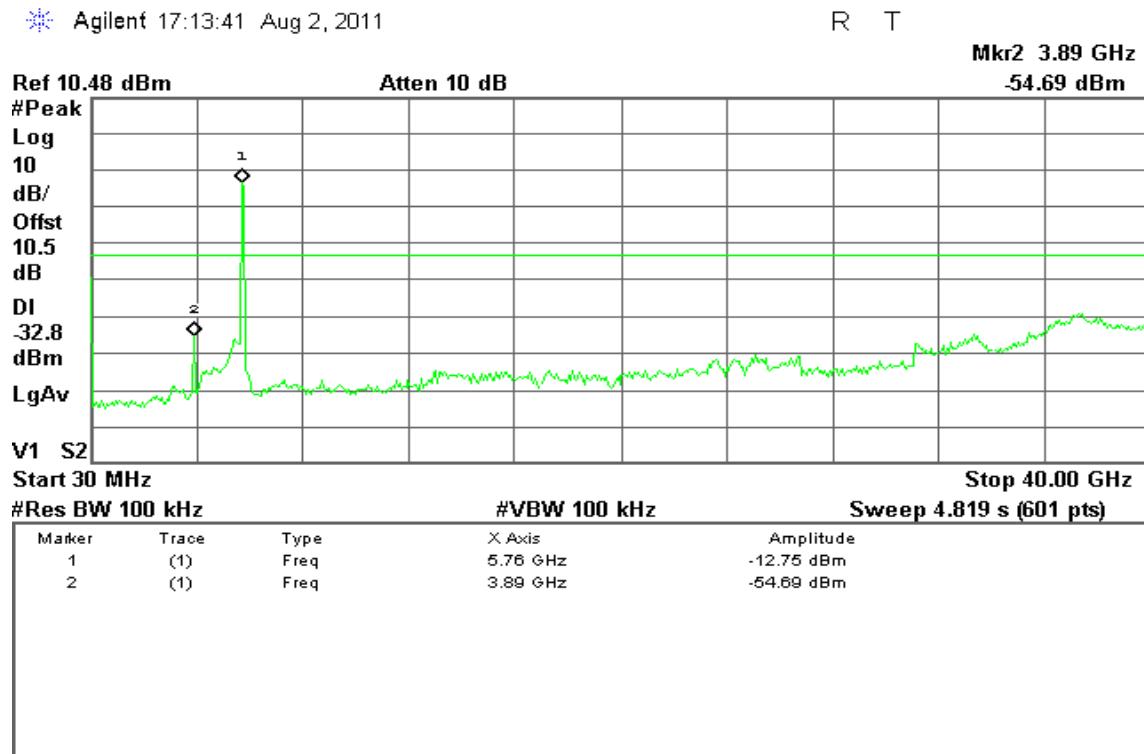
Low Channel						
Frequency (MHz)	Chain0 (dBm)	Chain1 (dBm)	Chain2 (dBm)	Total (dBm)	Limit (dBm)	Margin (dBm)
3830	-56.08	-39.37	-57.92	-34.60	-27.00	-7.60
7690	---	---	-61.73	-56.96	-27.00	-29.96
Fundamental limit	-27.30	-27	-34.40	---	---	---

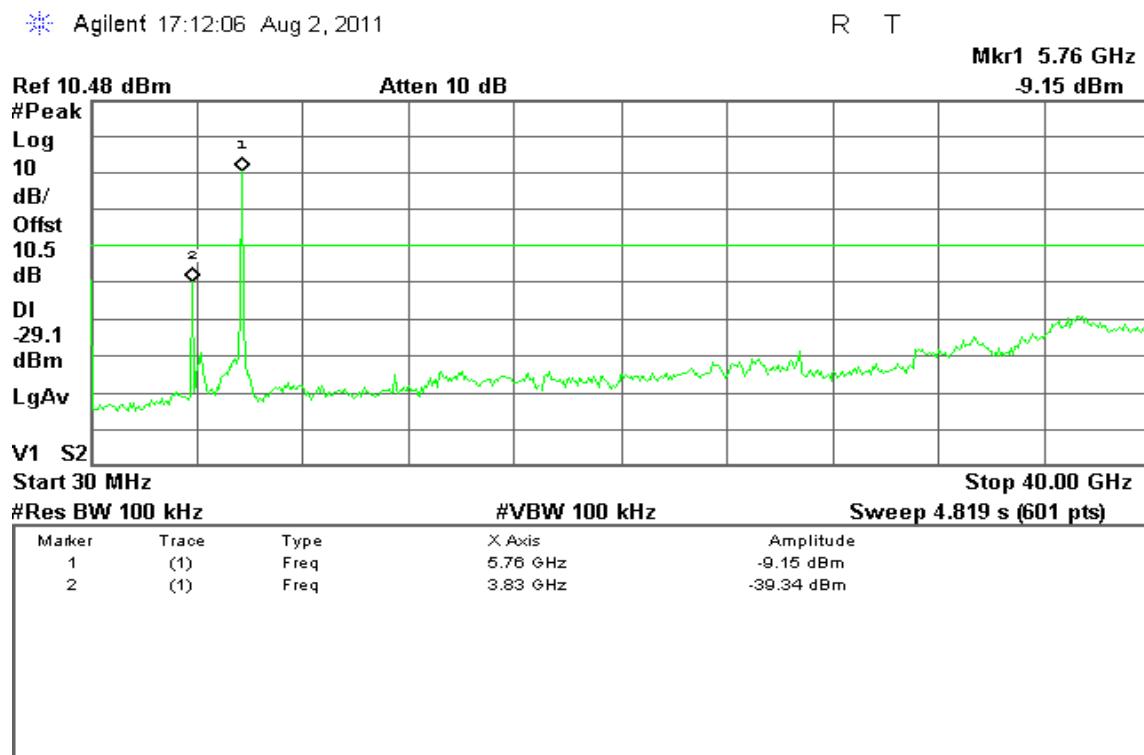
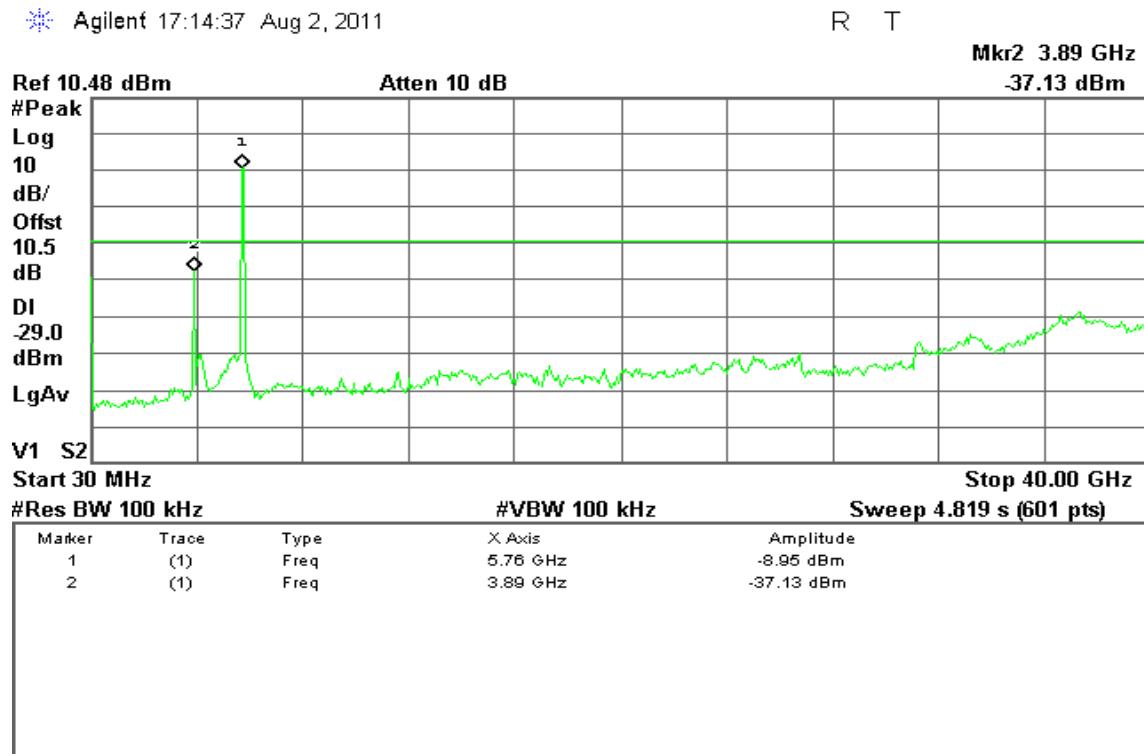
Mid Channel						
Frequency (MHz)	Chain0 (dBm)	Chain1 (dBm)	Chain2 (dBm)	Total (dBm)	Limit (dBm)	Margin (dBm)
3830	-55.35	-37.37	-56.11	-32.60	-27.70	-4.90
7690	---	---	-63.17	-58.40	-27.70	-30.70
Fundamental limit	-29.80	-27.7	-33.60	---	---	---

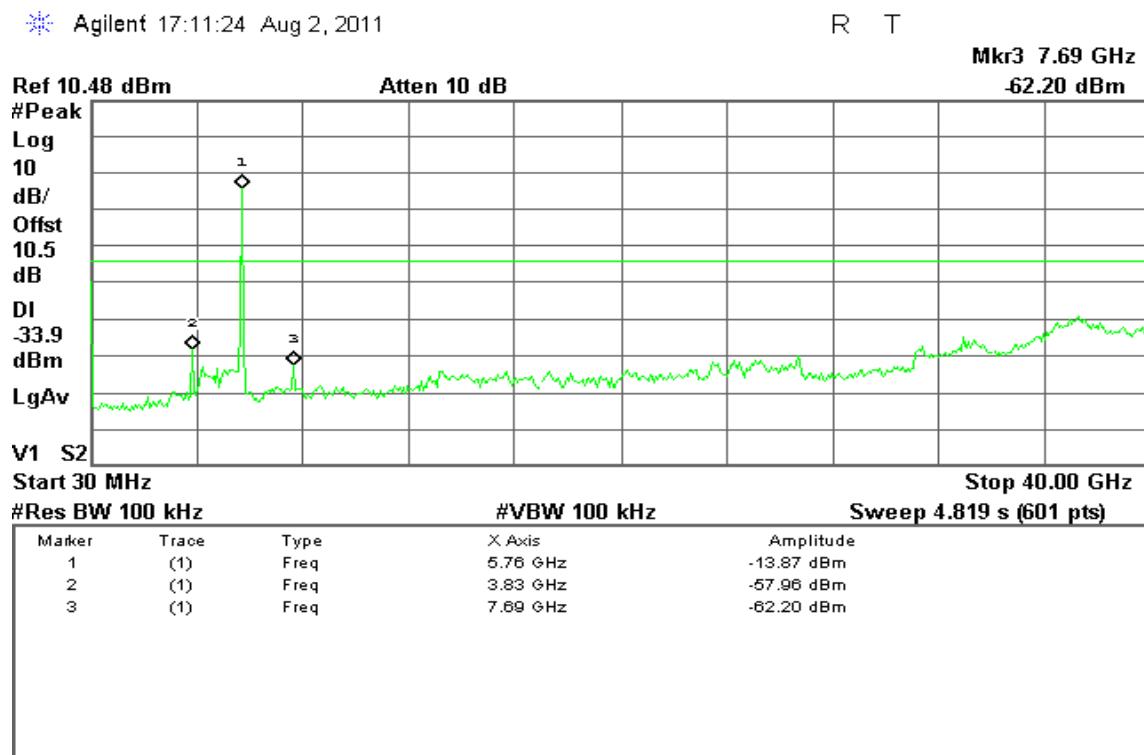
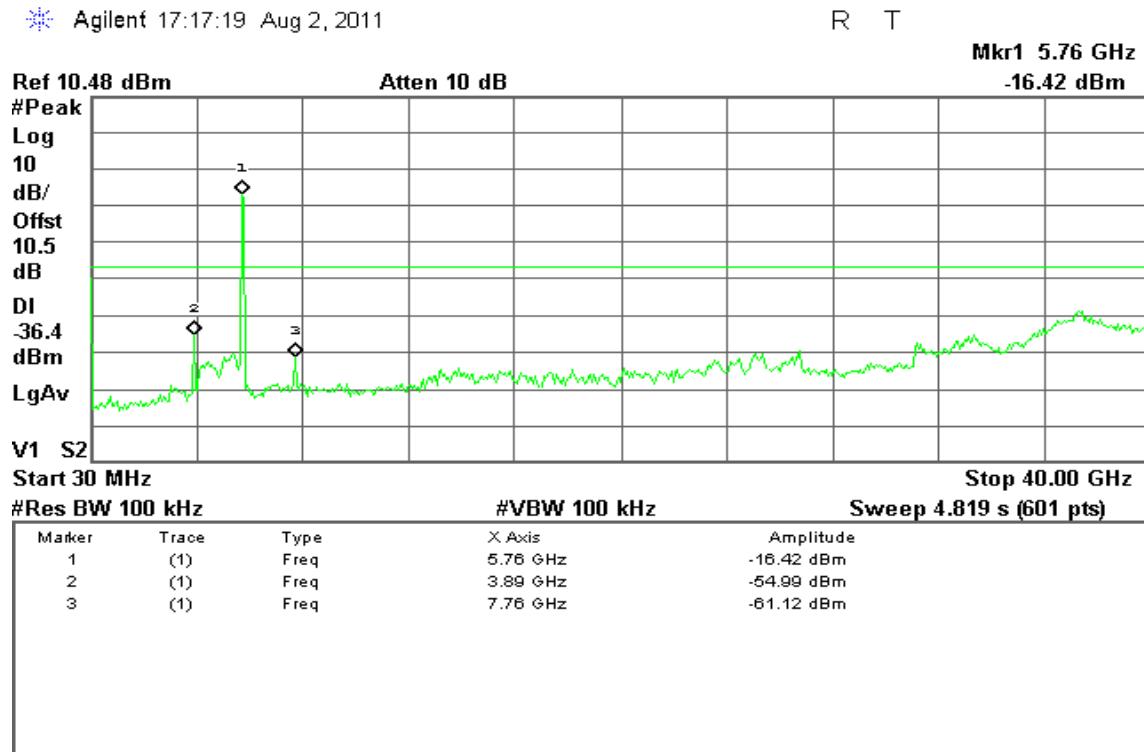
High Channel						
Frequency (MHz)	Chain0 (dBm)	Chain1 (dBm)	Chain2 (dBm)	Total (dBm)	Limit (dBm)	Margin (dBm)
3890	-53.42	-35.52	-52.70	-30.75	-25.40	-5.35
7760	---	---	-61.59	-56.82	-25.40	-31.42
Fundamental limit	-29.30	-25.40	-33.20	---	---	---

***Remark:***

1.  $\text{Total (dBm)} = \text{Measure} + 10 \log(3) \text{ dB}$ ,  
*Measure=Choose the max chain value*

**IEEE 802.11n HT 40 MHz mode / Chain 0****CH Low****CH High**

**IEEE 802.11n HT 40 MHz mode / Chain 1****CH Low****CH High**

**IEEE 802.11n HT 40 MHz mode / Chain 2****CH Low****CH High**

**IEEE 802.11n HT 40 MHz Channel mode**

Low Channel						
Frequency (MHz)	Chain0 (dBm)	Chain1 (dBm)	Chain2 (dBm)	Total (dBm)	Limit (dBm)	Margin (dBm)
3830	-56.27	-39.34	-57.96	-34.57	-29.10	-5.47
7690	---	---	-62.20	-57.43	-29.10	-28.33
Fundamental limit	-31.90	-29.10	-33.90	---	---	---

High Channel						
Frequency (MHz)	Chain0 (dBm)	Chain1 (dBm)	Chain2 (dBm)	Total (dBm)	Limit (dBm)	Margin (dBm)
3890	-54.69	-37.13	-54.99	-32.36	-29.00	-3.36
7760	---	---	-61.12	-56.35	-29.00	-27.35
Fundamental limit	-32.80	-29.00	-36.40	---	---	---

***Remark:***

1.  $Total (dBm) = Measure + 10 \log(3) dB$ ,  
*Measure*=Choose the max chain value



## 7.7 RADIATED EMISSIONS

### LIMIT

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:

Frequency (MHz)	Field Strength ( $\mu$ V/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

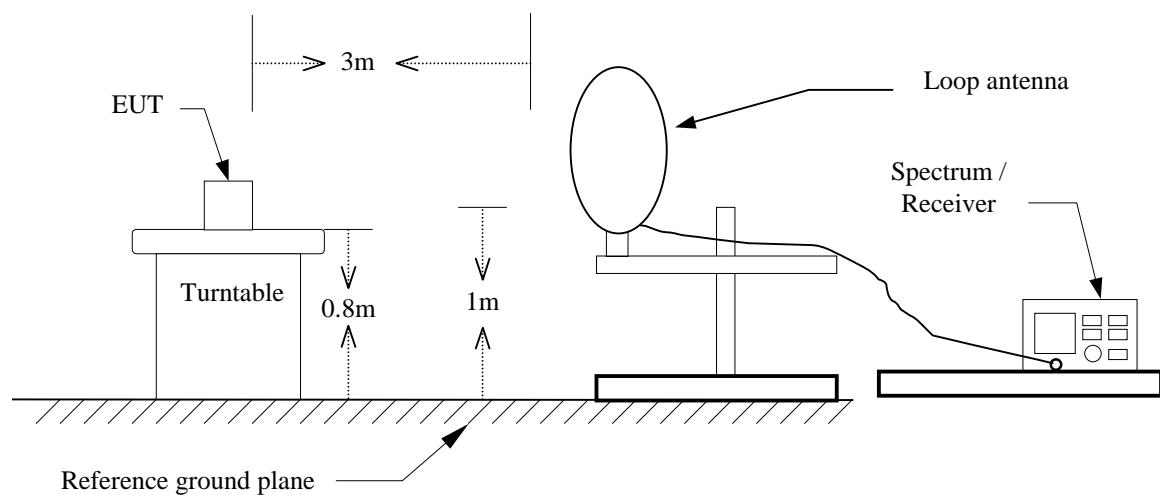
**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections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

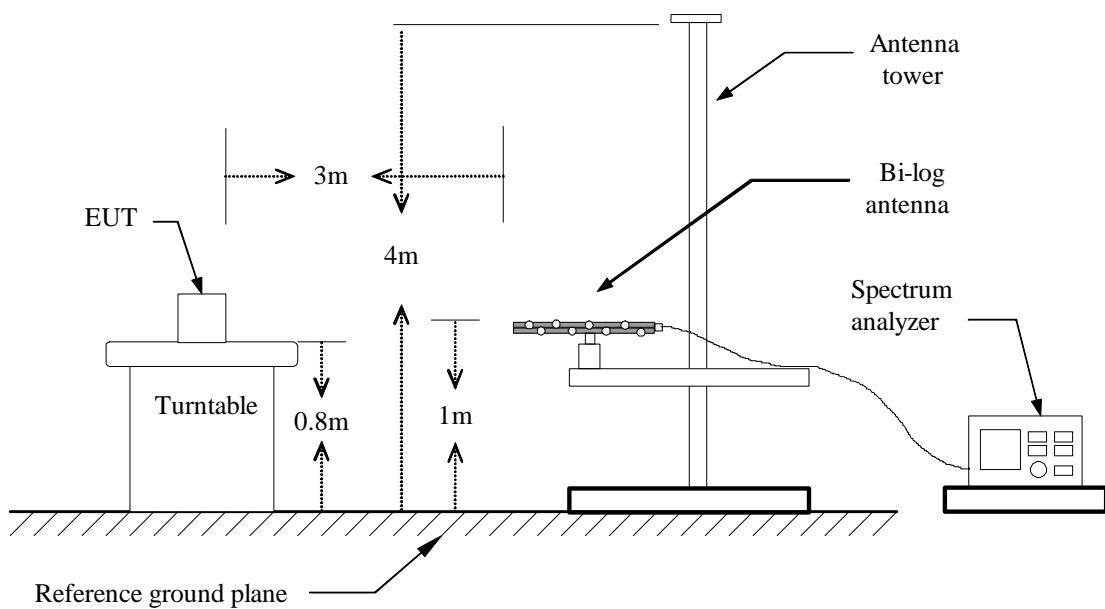
Frequency (MHz)	Field Strength ( $\mu$ V/m at 3-meter)	Field Strength (dB $\mu$ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

### Test Configuration

9kHz ~ 30MHz

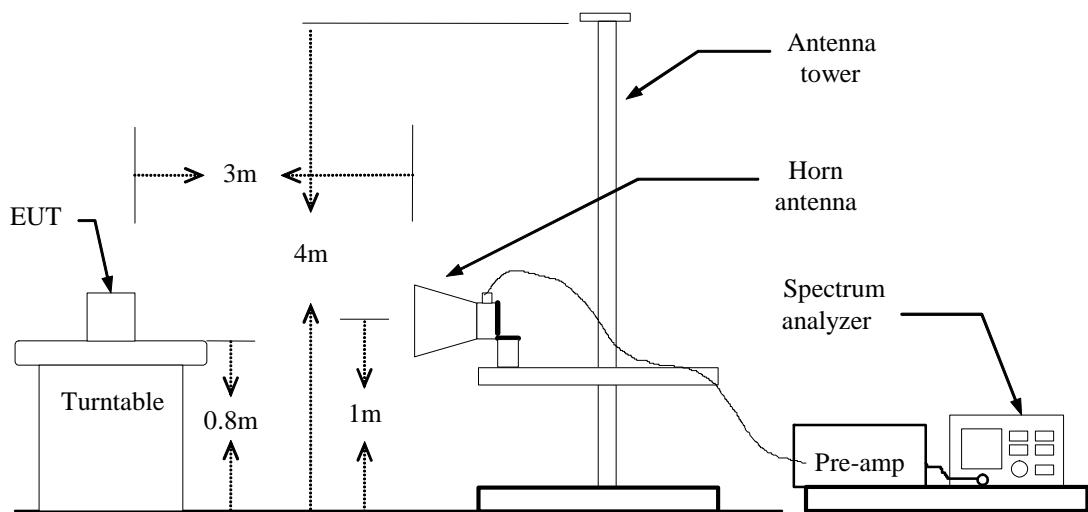


30MHz ~ 1GHz





**Above 1 GHz**





## **TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
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:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

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



**Below 1GHz**

**Operation Mode:** Normal Link

**Test Date:** July 11, 2011

**Temperature:** 25°C

**Tested by:** Sehni Hu

**Humidity:** 50% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
84.97	45.12	-15.31	29.81	40.00	-10.19	QP	V
249.87	42.17	-10.90	31.26	46.00	-14.74	Peak	V
374.35	39.63	-7.58	32.05	46.00	-13.95	Peak	V
500.45	35.38	-5.14	30.24	46.00	-15.76	Peak	V
624.93	37.88	-3.48	34.41	46.00	-11.59	Peak	V
875.52	31.51	-0.73	30.78	46.00	-15.22	Peak	V
160.95	40.93	-10.60	30.33	43.50	-13.17	Peak	H
249.87	46.51	-10.90	35.61	46.00	-10.39	Peak	H
374.35	43.59	-7.58	36.01	46.00	-9.99	Peak	H
624.93	38.30	-3.48	34.82	46.00	-11.18	Peak	H
749.42	34.25	-1.83	32.42	46.00	-13.58	Peak	H
875.52	33.06	-0.73	32.32	46.00	-13.68	Peak	H

**Remark:**

1. *No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)*
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. *Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).*

**Above 1 GHz****Operation Mode:** TX / IEEE 802.11b / CH Low**Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1930.00	57.22	---	-6.18	51.04	---	74.00	54.00	-2.96	Peak	V
N/A										
1533.33	57.66	---	-10.21	47.44	---	74.00	54.00	-6.56	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11b / CH Mid**Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2026.67	56.73	---	-5.40	51.33	---	74.00	54.00	-2.67	Peak	V
N/A										
1793.33	56.27	---	-7.57	48.70	---	74.00	54.00	-5.30	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11b / CH High**Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2036.67	56.90	---	-5.37	51.52	---	74.00	54.00	-2.48	Peak	V
N/A										
1793.33	55.82	---	-7.57	48.25	---	74.00	54.00	-5.75	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH Low**Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1863.33	57.93	---	-6.86	51.08	---	74.00	54.00	-2.92	Peak	V
N/A										
1913.33	56.85	---	-6.35	50.50	---	74.00	54.00	-3.50	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH Mid**Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1746.67	56.95	---	-8.04	48.91	---	74.00	54.00	-5.09	Peak	V
N/A										
2193.33	56.36	---	-4.97	51.39	---	74.00	54.00	-2.61	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH High**Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1646.67	58.24	---	-9.06	49.18	---	74.00	54.00	-4.82	Peak	V
N/A										
1743.33	56.58	---	-8.08	48.51	---	74.00	54.00	-5.49	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH Low    **Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1666.67	56.23	---	-8.86	47.37	---	74.00	54.00	-6.63	Peak	V
3216.67	53.29	49.89	-1.60	51.70	48.29	74.00	54.00	-5.71	AVG	V
N/A										
2360.00	59.28	50.11	-4.44	54.84	45.67	74.00	54.00	-8.33	AVG	H
2463.33	59.72	48.94	-4.02	55.70	44.92	74.00	54.00	-9.08	AVG	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH Mid    **Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2390.00	57.53	48.17	-4.32	53.21	43.85	74.00	54.00	-10.15	AVG	V
3258.33	51.18	47.80	-1.49	49.69	46.31	74.00	54.00	-7.69	AVG	V
N/A										
2390.00	59.16	48.58	-4.32	54.84	44.26	74.00	54.00	-9.74	AVG	H
2493.33	58.74	49.01	-3.90	54.84	45.11	74.00	54.00	-8.89	AVG	H
4891.67	51.35	41.51	2.74	54.09	44.25	74.00	54.00	-9.75	AVG	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH High **Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1906.67	56.86	---	-6.42	50.44	---	74.00	54.00	-3.56	Peak	V
N/A										
2410.00	59.31	50.17	-4.24	55.07	45.93	74.00	54.00	-8.07	AVG	H
2513.33	58.12	46.09	-3.82	54.29	42.27	74.00	54.00	-11.73	AVG	H
4925.00	52.56	41.88	2.81	55.37	44.69	74.00	54.00	-9.31	AVG	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode  
/ CH Low

**Test Date:** July 9, 2011

**Temperature:** 25°C

**Tested by:** Sehni Hu

**Humidity:** 50 % RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1653.33	57.46	---	-8.99	48.47	---	74.00	54.00	-5.53	Peak	V
3233.33	53.30	---	-1.55	51.74	---	74.00	54.00	-2.26	Peak	V
N/A										
1556.67	57.08	---	-9.97	47.11	---	74.00	54.00	-6.89	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode  
/ CH Mid

**Test Date:** July 9, 2011

**Temperature:** 25°C

**Tested by:** Sehni Hu

**Humidity:** 50 % RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1626.67	57.83	---	-9.26	48.57	---	74.00	54.00	-5.43	Peak	V
3258.33	51.57	---	-1.49	50.08	---	74.00	54.00	-3.92	Peak	V
N/A										
2546.67	58.28	45.29	-3.71	54.57	41.58	74.00	54.00	-12.42	AVG	H
4883.33	50.06	38.40	2.73	52.79	41.13	74.00	54.00	-12.87	AVG	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode  
/ CH High

**Test Date:** July 9, 2011

**Temperature:** 25°C

**Tested by:** Sehni Hu

**Humidity:** 50 % RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1810.00	56.67	---	-7.40	49.27	---	74.00	54.00	-4.73	Peak	V
3266.67	51.24	---	-1.47	49.77	---	74.00	54.00	-4.23	Peak	V
N/A										
1450.00	57.47	---	-10.60	46.86	---	74.00	54.00	-7.14	Peak	H
4891.67	49.85	35.21	2.74	52.60	37.95	74.00	54.00	-16.05	AVG	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** Tx / IEEE 802.11a mode/ CH Low**Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2341.67	56.12	---	-4.52	51.60	---	74.00	54.00	-2.40	Peak	V
N/A										
2680.00	54.78	---	-3.26	51.52	---	74.00	54.00	-2.48	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** Tx / IEEE 802.11a mode/ CH Mid**Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2691.67	55.03	---	-3.22	51.81	---	74.00	54.00	-2.19	Peak	V
N/A										
2551.67	55.29	---	-3.69	51.60	---	74.00	54.00	-2.40	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** Tx / IEEE 802.11a mode/ CH High**Test Date:** July 9, 2011**Temperature:** 25°C**Tested by:** Sehni Hu**Humidity:** 50% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2306.67	55.61	---	-4.66	50.95	---	74.00	54.00	-3.05	Peak	V
N/A										
1653.33	58.40	---	-8.99	49.41	---	74.00	54.00	-4.59	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT 20 MHz Channel mode / CH Low

**Test Date:** July 9, 2011

**Temperature:** 25°C

**Tested by:** Sehni Hu

**Humidity:** 50% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2575.00	55.52	---	-3.62	51.90	---	74.00	54.00	-2.10	Peak	V
N/A										
2178.33	55.08	---	-5.01	50.07	---	74.00	54.00	-3.93	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT 20 MHz Channel mode / CH Mid

**Test Date:** July 9, 2011

**Temperature:** 25°C

**Tested by:** Sehni Hu

**Humidity:** 50% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2645.00	55.14	---	-3.38	51.76	---	74.00	54.00	-2.24	Peak	V
N/A										
2120.00	56.72	---	-5.16	51.56	---	74.00	54.00	-2.44	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT 20 MHz Channel mode / CH High      **Test Date:** July 9, 2011  
**Temperature:** 25°C      **Tested by:** Sehni Hu  
**Humidity:** 50% RH      **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2388.33	55.48	---	-4.33	51.15	---	74.00	54.00	-2.85	Peak	V
N/A										
2470.00	55.61	---	-3.99	51.62	---	74.00	54.00	-2.38	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode  
/ CH Low

**Test Date:** July 9, 2011

**Temperature:** 25°C

**Tested by:** Sehni Hu

**Humidity:** 50% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2143.33	55.90	---	-5.10	50.80	---	74.00	54.00	-3.20	Peak	V
N/A										
2050.00	55.27	---	-5.34	49.93	---	74.00	54.00	-4.07	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode  
/ CH High

**Test Date:** July 9, 2011

**Temperature:** 25°C

**Tested by:** Sehni Hu

**Humidity:** 50% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2143.33	55.24	---	-5.10	50.14	---	74.00	54.00	-3.86	Peak	V
N/A										
2143.33	56.74	---	-5.10	51.65	---	74.00	54.00	-2.35	Peak	H
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. 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.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



## 7.8 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  $\mu$ 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 $\mu$ 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 II 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

**Operation Mode:** Normal Link      **Test Date:** July 26, 2011

**Temperature:** 26°C      **Tested by:** David Lee

**Humidity:** 60% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB/m)	QP Result (dBuV/m)	AV Result (dBuV/m)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1680	42.13	29.33	0.17	42.30	29.50	65.06	55.06	-22.76	-25.56	L1
0.2117	35.74	25.24	0.16	35.90	25.40	63.14	53.14	-27.24	-27.74	L1
0.5370	36.04	24.54	0.16	36.20	24.70	56.00	46.00	-19.80	-21.30	L1
0.7084	38.63	28.63	0.17	38.80	28.80	56.00	46.00	-17.20	-17.20	L1
6.2025	23.75	11.25	0.35	24.10	11.60	60.00	50.00	-35.90	-38.40	L1
8.5965	27.47	15.47	0.43	27.90	15.90	60.00	50.00	-32.10	-34.10	L1
0.1680	33.14	17.64	0.26	33.40	17.90	65.06	55.06	-31.66	-37.16	L2
0.2175	42.15	25.95	0.25	42.40	26.20	62.91	52.91	-20.51	-26.71	L2
0.4065	33.35	18.15	0.25	33.60	18.40	57.72	47.72	-24.12	-29.32	L2
0.6990	26.95	12.95	0.25	27.20	13.20	56.00	46.00	-28.80	-32.80	L2
9.4065	24.36	15.86	0.44	24.80	16.30	60.00	50.00	-35.20	-33.70	L2
12.1965	33.71	27.71	0.49	34.20	28.20	60.00	50.00	-25.80	-21.80	L2

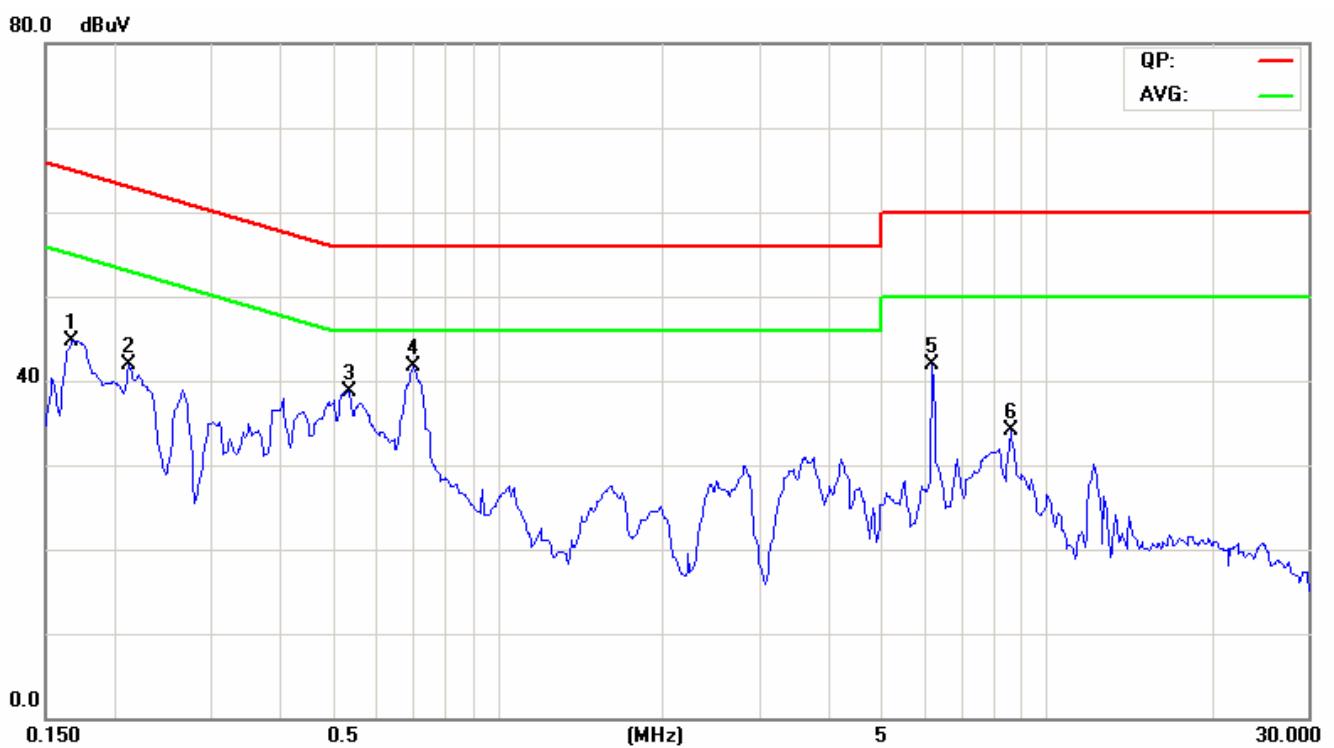
**Remark:**

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10 kHz; the IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9 kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)



### Test Plots

#### *Conducted emissions (Line 1)*



#### *Conducted emissions (Line 2)*

