FCC CFR47 PART 15 SUBPART C
CERTIFICATION
TEST REPORT

FOR

WLAN B/G/N MINIPCI ADAPTER

MODEL NUMBER: 65-VE240-P1

FCC ID: J9C-65VE240P1

REPORT NUMBER: 07U10873-1, REVISION E

ISSUE DATE: DECEMBER 4, 2007

Prepared for
QUALCOMM INCORPORATED
900 ARASTRADERO ROAD
PALO ALTO, CA 94304, USA

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	04/17/07	Initial Issue	T. Chan
B	08/03/07	Removed FCC ID	T. Hong
C	11/29/07	Re-added FCC ID	T. Hong
D	12/03/07	Modified EUT description	T. Hong
E	12/04/07	1. Corrected 6dB BW data on page 12 2. Corrected antenna gain on pages 64 and 217 3. Replaced conducted spurious plot on page 160 4. Corrected radiated BE plot on page 223	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: QUALCOMM INCORPORATED
900 ARASTRADERO ROAD
PALO ALTO, CA 94304, USA

EUT DESCRIPTION: WLAN B/G/N MINIPCI ADAPTER

MODEL: 65-VE240-P1

SERIAL NUMBER: 4405

DATE TESTED: MARCH 05-12, 2007

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

THANH NGUYEN
EMC TECHNICIAN
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a WLAN b/g/n miniPCI Adapter.

The radio module is manufactured by Qualcomm Inc.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2400 to 2483.5 MHz Authorized Band			
2412 - 2462	802.11b	29.05	803.53
2412 - 2462	802.11g	25.93	391.74
2412 - 2462	802.11n HT20	25.88	387.26
2422 - 2452	802.11n HT40	26.14	411.15

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes three antennas in MIMO Configuration, each with a maximum gain of 2 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host support equipment during testing was PYTHON24

The test utility software used during testing was PYTHON.EXE rev. wxPTT.PY

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2437 MHz. Thus all emissions tests were made in the 802.11b mode, 2437 MHz, 1 Mb/s.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	DELL	INSPIRON 8600	CAP11290	DoC
AC Adapter	DELL	PA-1650-05D	CN05U092-71615-47M-492B	N/A
DC Power Supply	AGILENT	E3640A	MY40006791	N/A

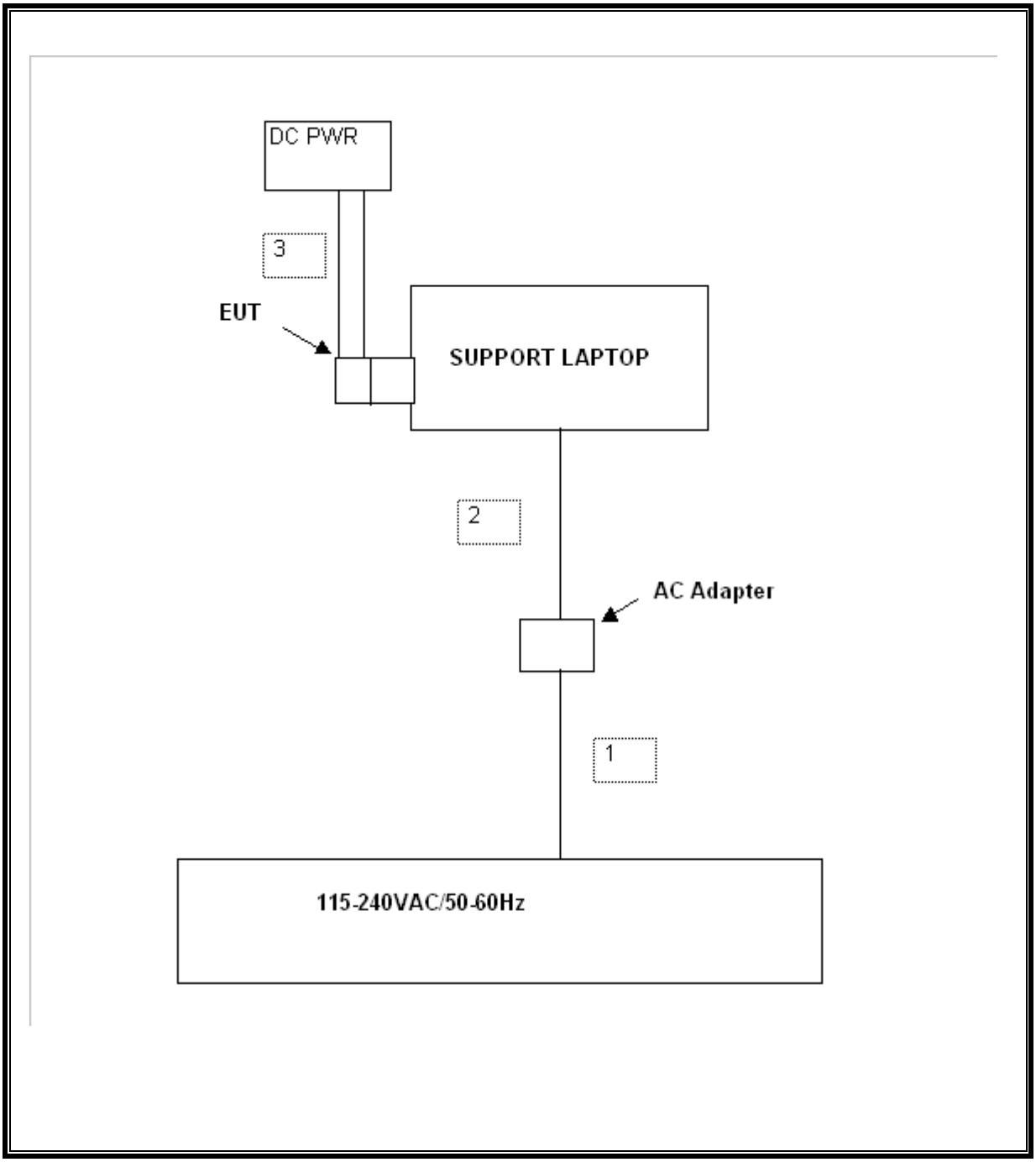
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	1m	No
2	DC	1	DC Plug	Un-shielded	1.5m	Ferrite on laptop's end
3	DC	1	N/A	Twist a pair	1.5m	Solder direct to EUT Card

TEST SETUP

The EUT is installed in a host laptop computer via a cardbus-to-miniPCI adapter / extension board during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A0022704	8/13/2007
Quasi-Peak Adaptor	Agilent / HP	85650A	3145A01654	1/21/2008
SA Display Section 2	Agilent / HP	85662A	2816A16696	4/7/2008
SA RF Section, 1.5 GHz	Agilent / HP	85680B	2814A04227	1/7/2008
Spectrum Analyzer, 1.8 GHz	Agilent / HP	8591A	3009A00791	10/12/2007
Antenna, Horn 1 ~ 18 GHz	ETS	3117	29301	4/22/2007
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00369	8/1/2007
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	MY43360112	5/3/2007
Power Sensor 10MHz - 18GHz	Agilent / HP	8481A	2349A36506	4/11/2007
4.0 GHz Highpass Filter	Micro-Tronics	HPM13351	4	CNR
Power Meter	Agilent / HP	437B	3125U11347	4/18/2007
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	9/15/2007
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	9/15/2007
EMI Test Receiver	R & S	ESHS 20	827129/006	1/27/2008

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 2400 TO 2483.5 MHz BAND

7.1.1. 6 dB BANDWIDTH

LIMIT

§15.247 (a) (2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

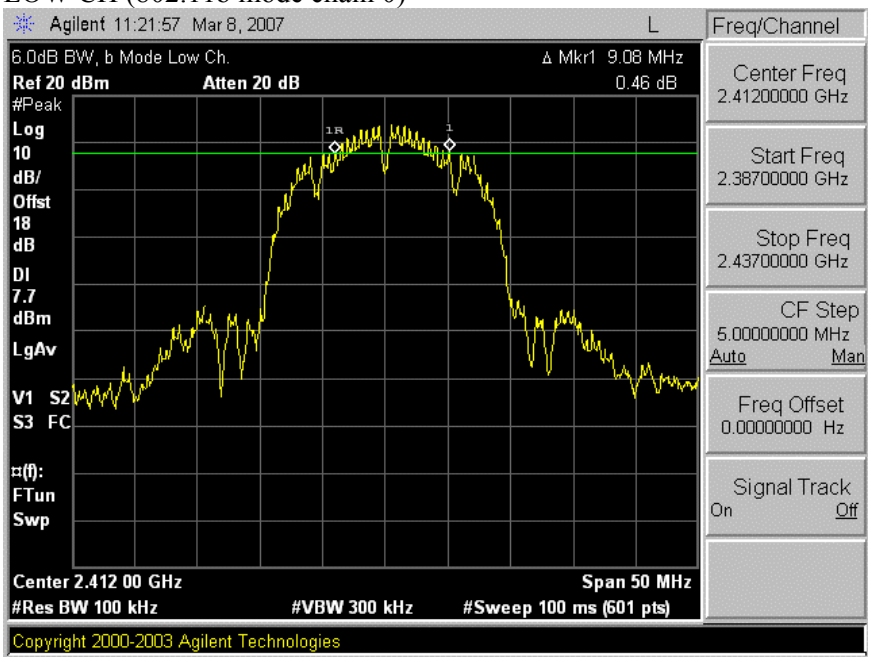
RESULTS

No non-compliance noted:
Chain 0:

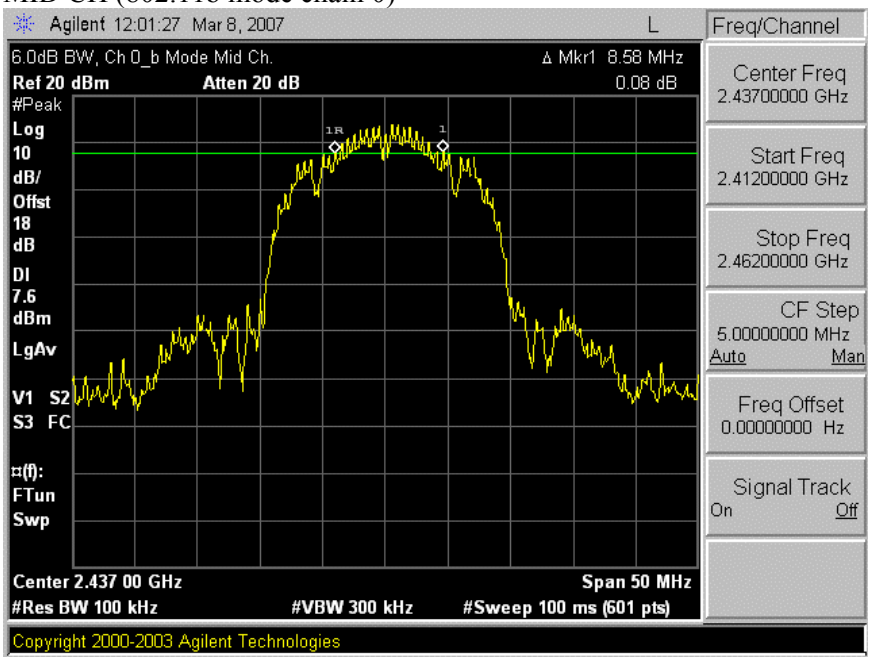
Mode Channel	Frequency (MHz)	6 dB BW Chain 0 (kHz)	6 dB BW Chain 1 (kHz)	Minimum Limit (kHz)	Minimum Margin (kHz)
802.11b Mode					
Low	2412	9080	9000	500	8500
Mid	2437	8580	9000	500	8080
High	2462	9000	9000	500	8500
802.11g Mode					
Low	2412	12670	16170	500	12170
Mid	2437	12750	16330	500	12250
High	2462	12750	16330	500	12250
802.11n HT20 Mode					
Low	2412	12750	16670	500	12250
Mid	2437	12750	17000	500	12250
High	2462	12750	16920	500	12250
802.11n HT40 Mode					
Low	2422	31670	31330	500	30830
Mid	2437	31670	35080	500	31170
High	2452	31580	35080	500	31080

(802.11b MODE CHAIN 0)

LOW CH (802.11b mode chain 0)



MID CH (802.11b mode chain 0)



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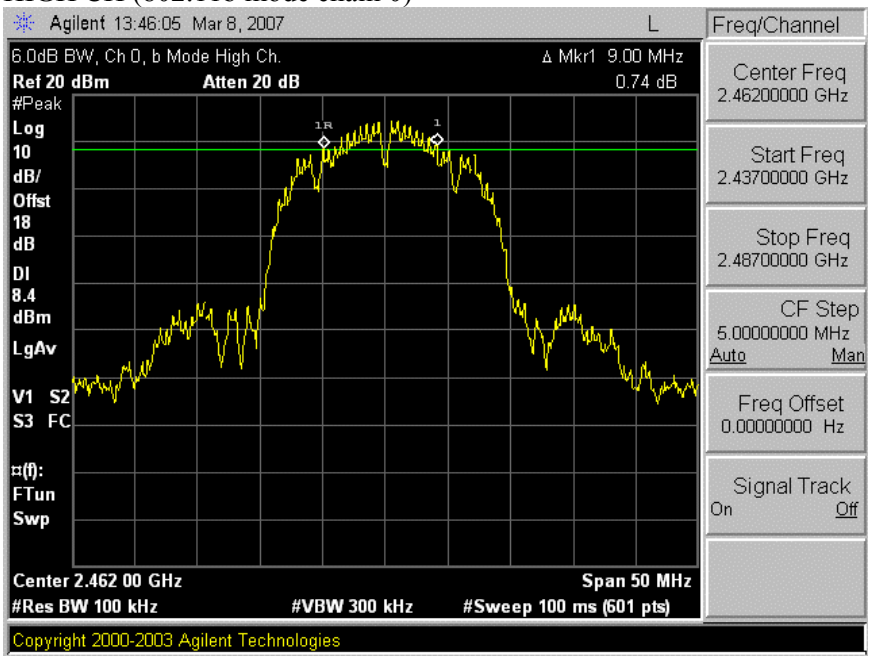
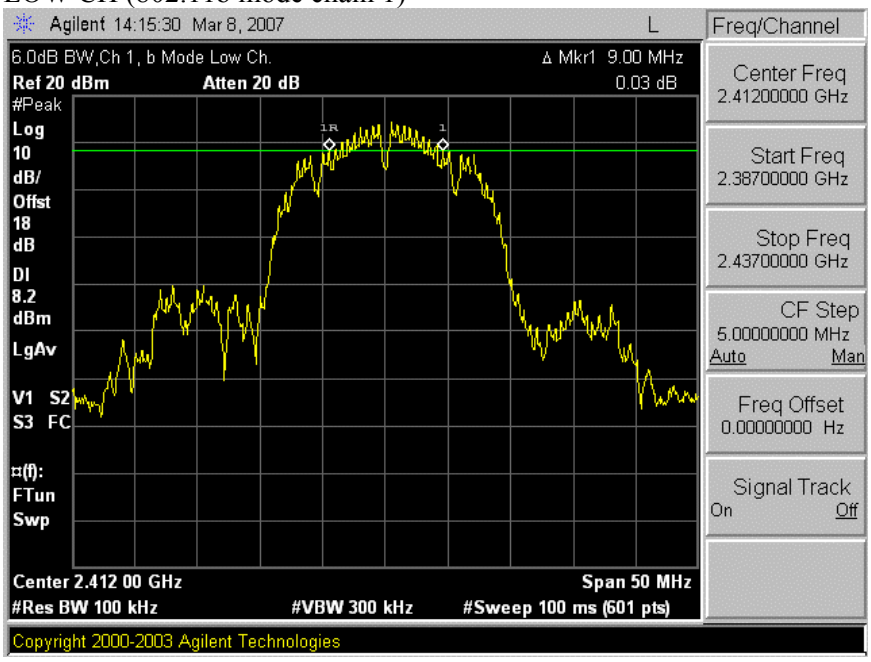
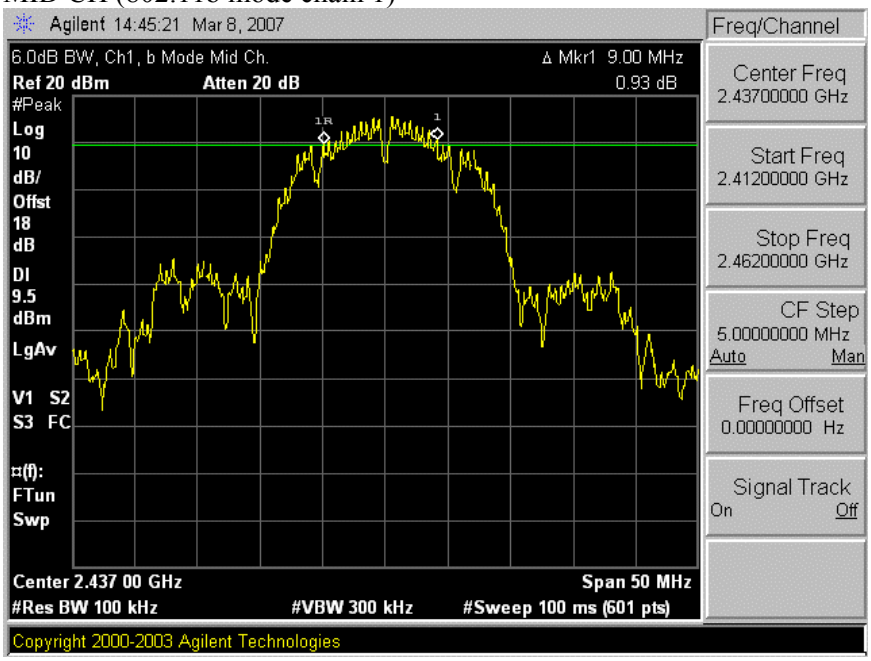


(802.11b MODE CHAIN 1)

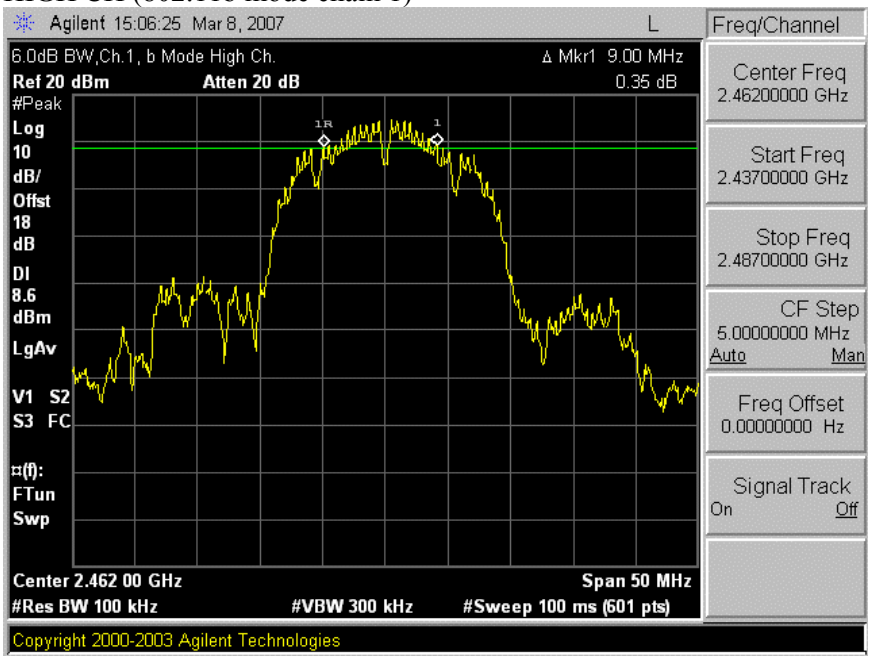
LOW CH (802.11b mode chain 1)



MID CH (802.11b mode chain 1)

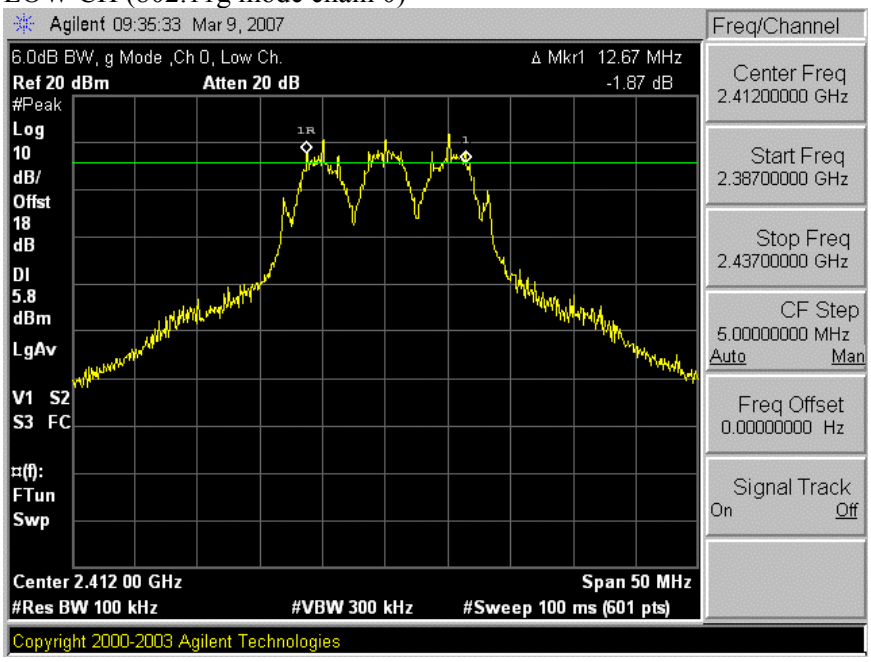


HIGH CH (802.11b mode chain 1)

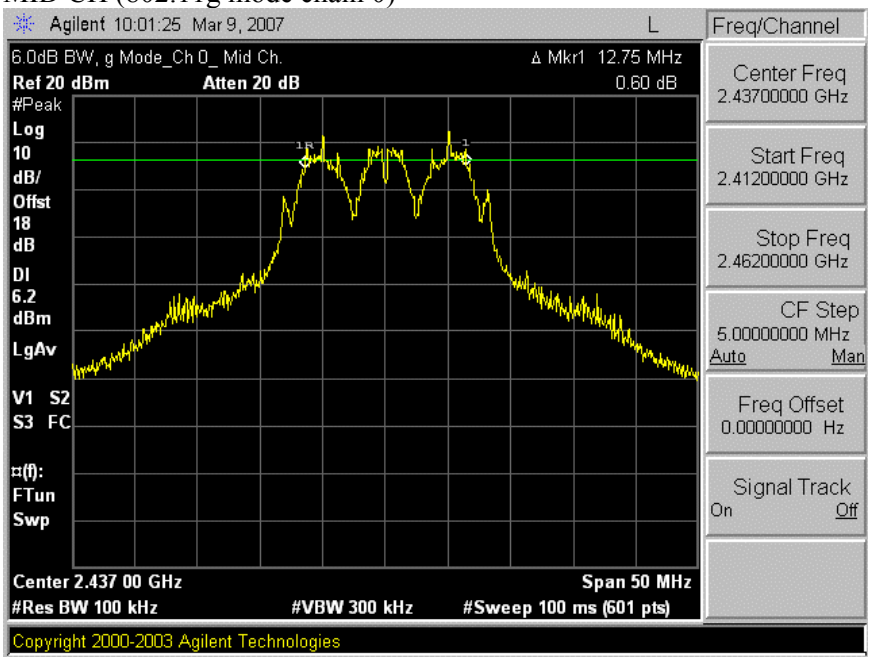


(802.11g MODE CHAIN 0)

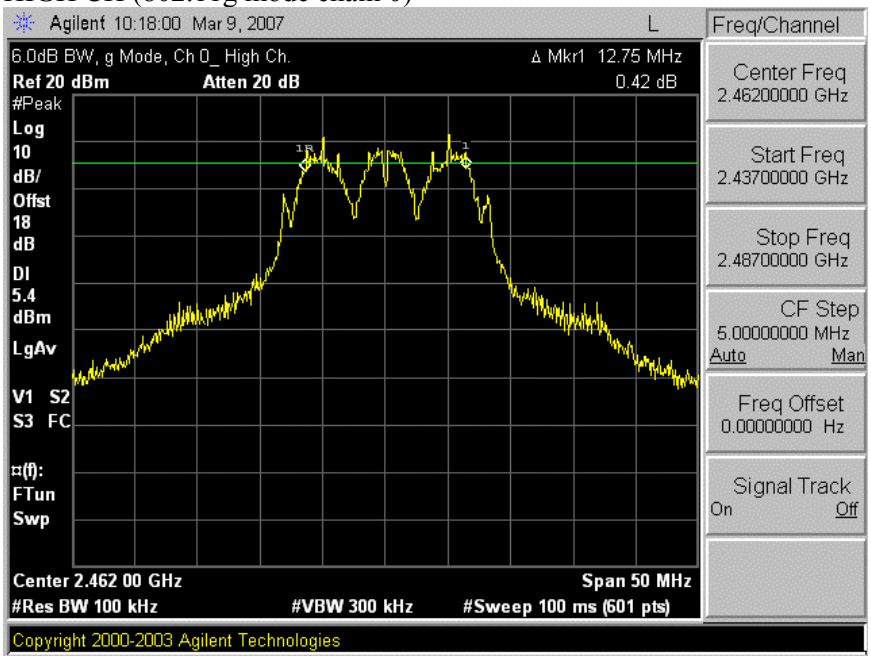
LOW CH (802.11g mode chain 0)



MID CH (802.11g mode chain 0)

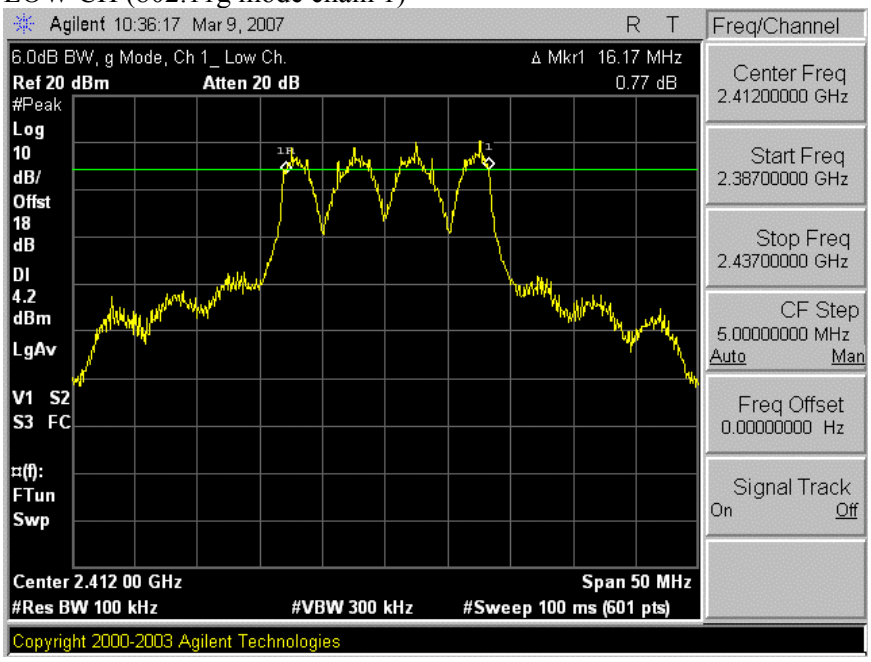


HIGH CH (802.11g mode chain 0)



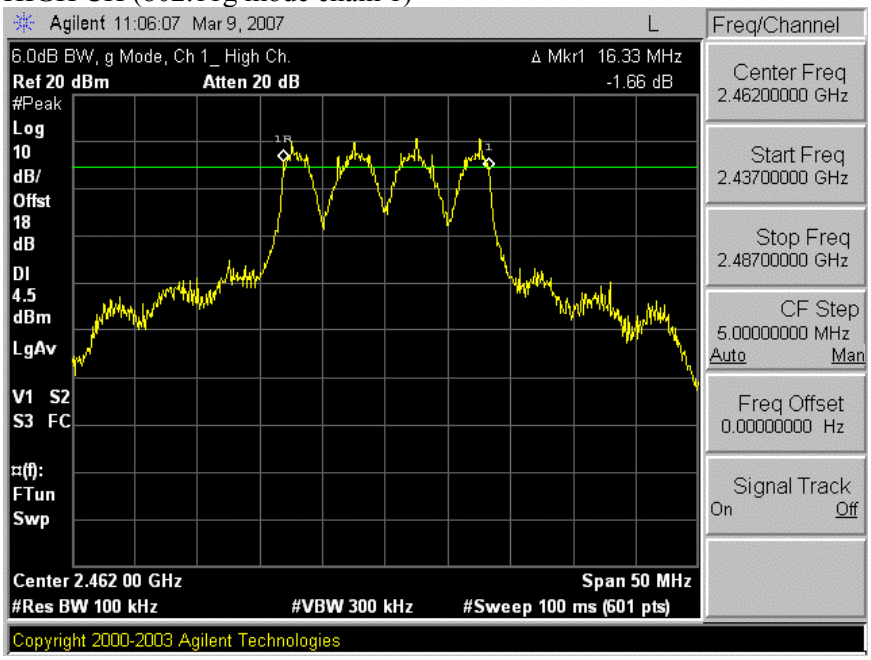
(802.11g MODE CHAIN 1)

LOW CH (802.11g mode chain 1)



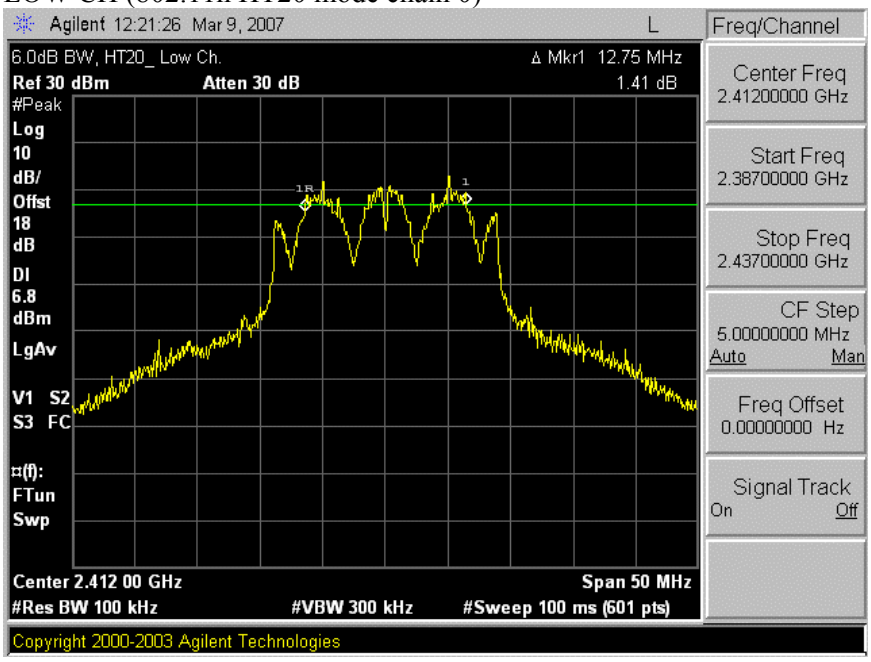
MID CH (802.11g mode chain 1)

HIGH CH (802.11g mode chain 1)

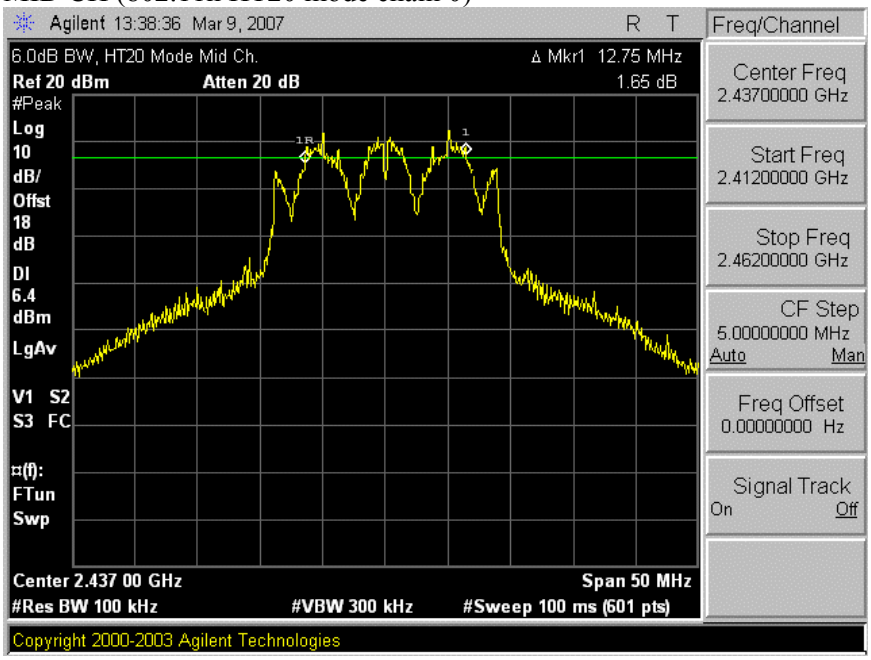


(802.11n HT20 MODE CHAIN 0)

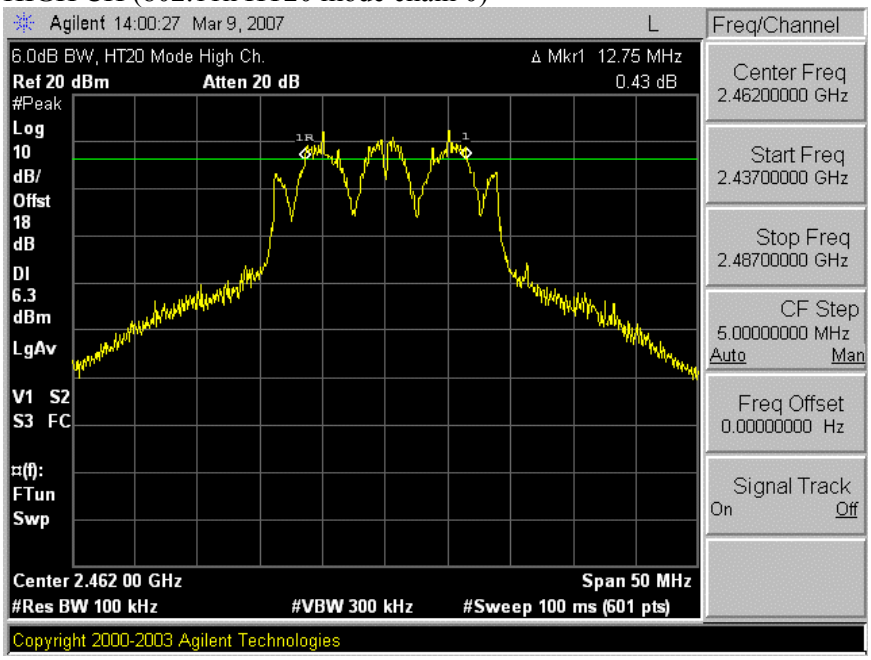
LOW CH (802.11n HT20 mode chain 0)



MID CH (802.11n HT20 mode chain 0)

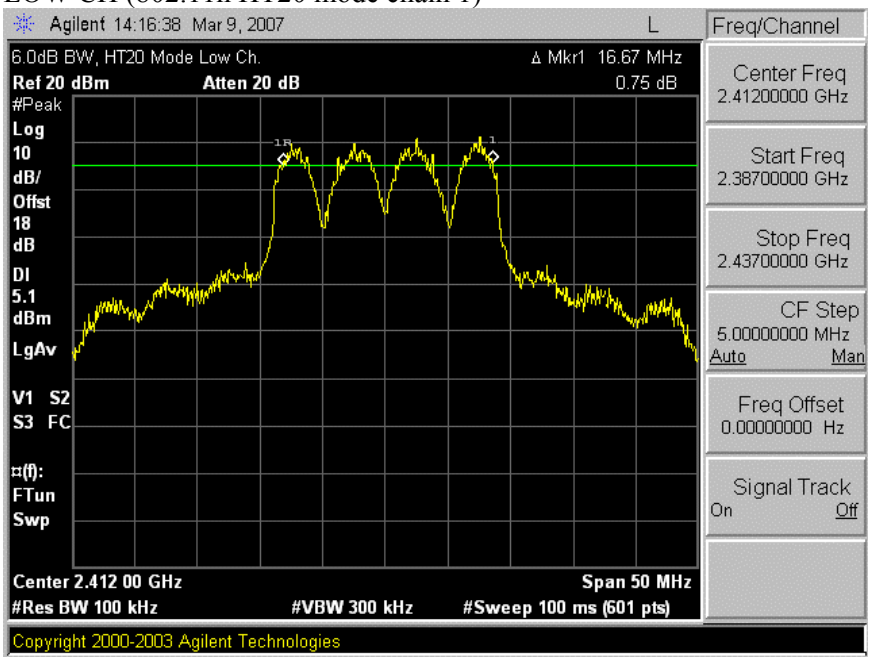


HIGH CH (802.11n HT20 mode chain 0)

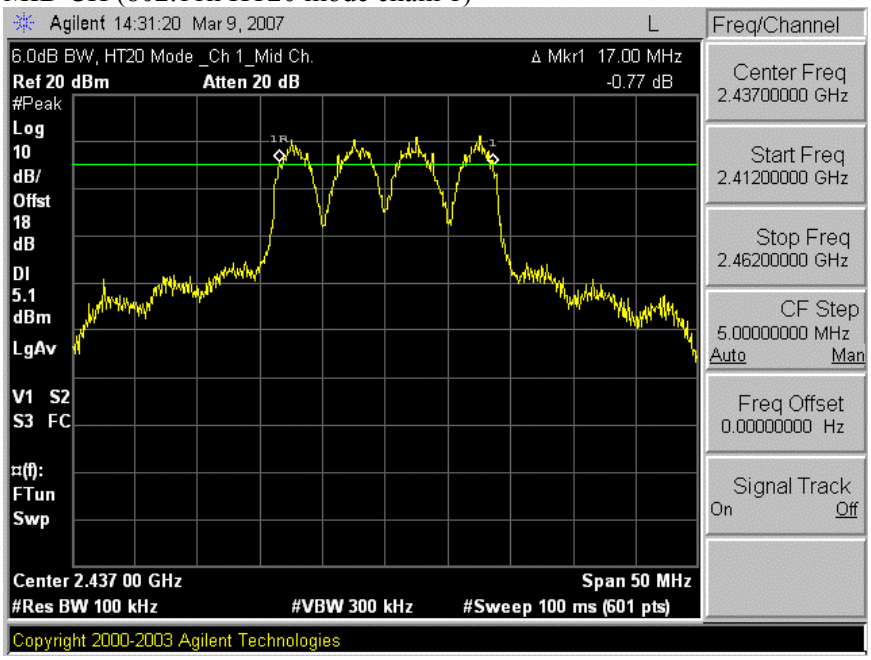


(802.11 HT20 MODE CHAIN 1)

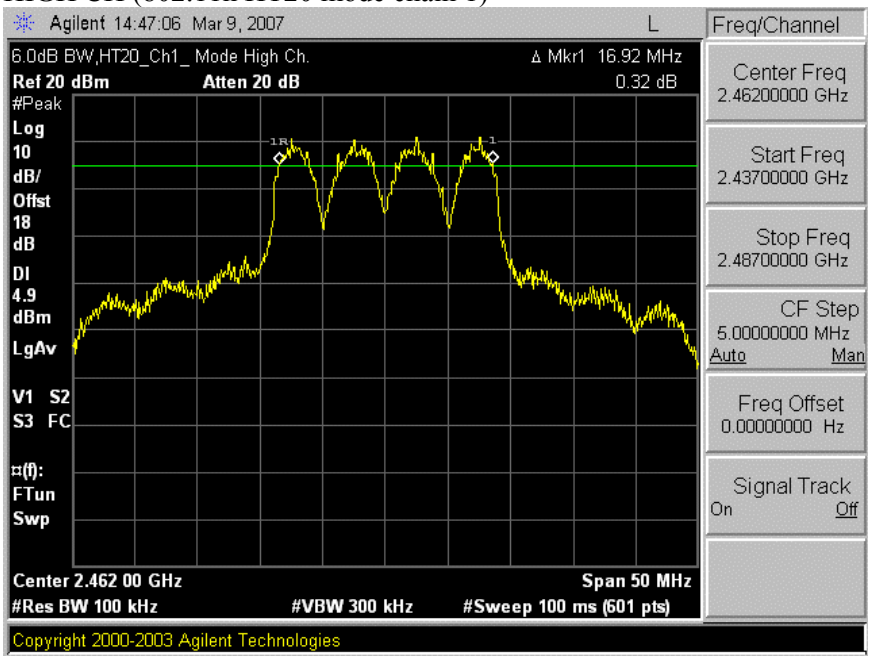
LOW CH (802.11n HT20 mode chain 1)



MID CH (802.11n HT20 mode chain 1)

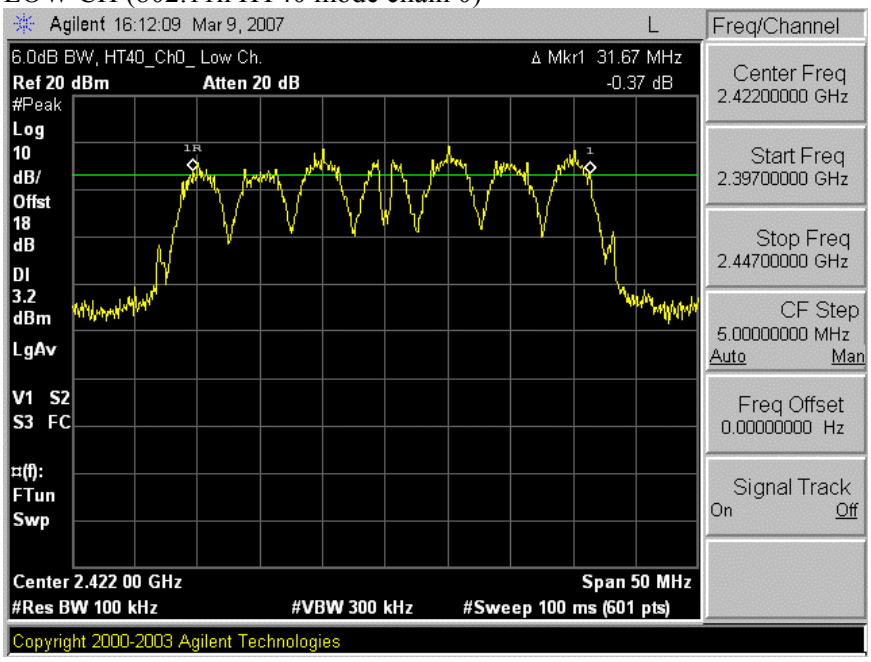


HIGH CH (802.11n HT20 mode chain 1)

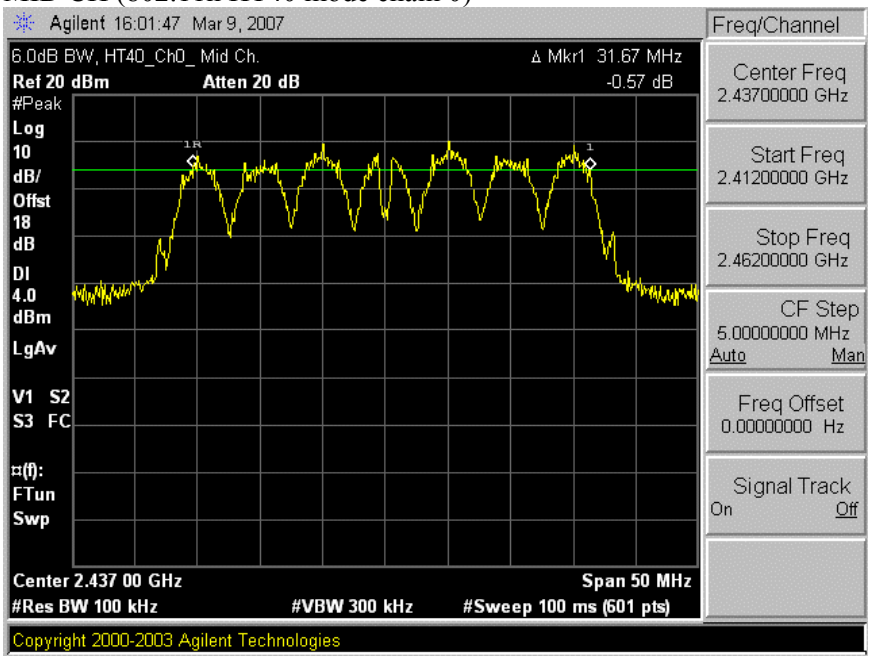


(802.11 HT40 MODE CHAIN 0)

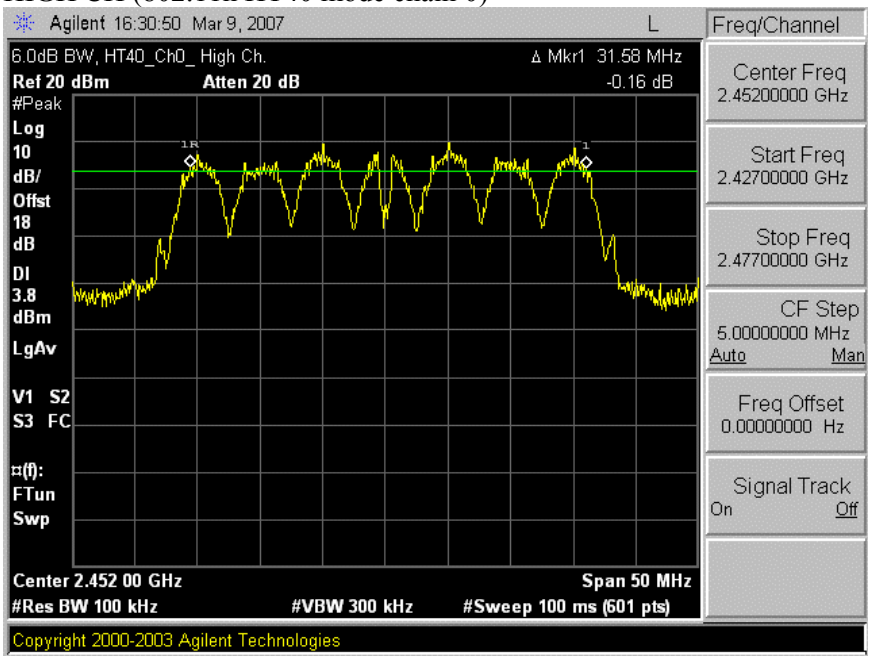
LOW CH (802.11n HT40 mode chain 0)



MID CH (802.11n HT40 mode chain 0)

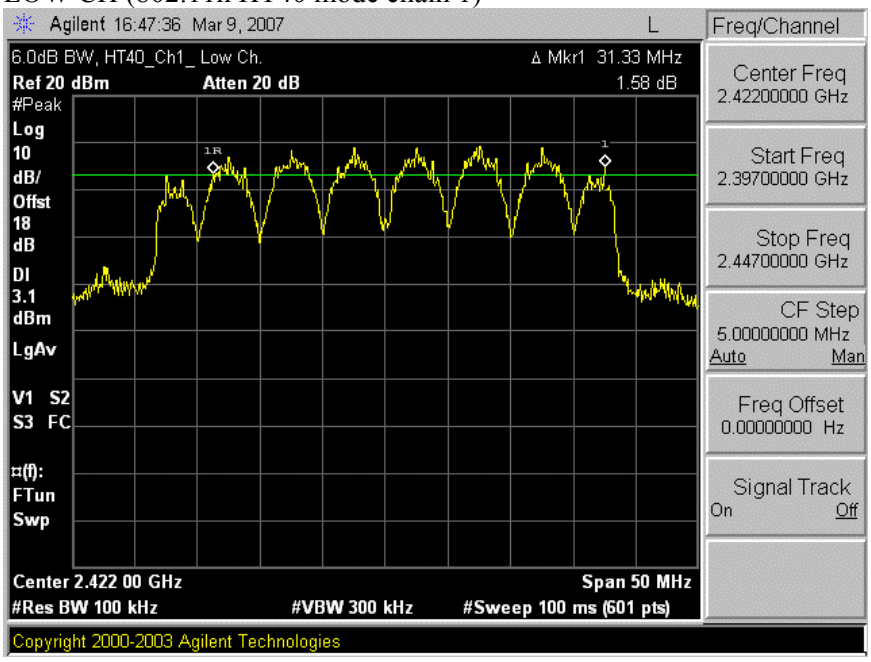


HIGH CH (802.11n HT40 mode chain 0)

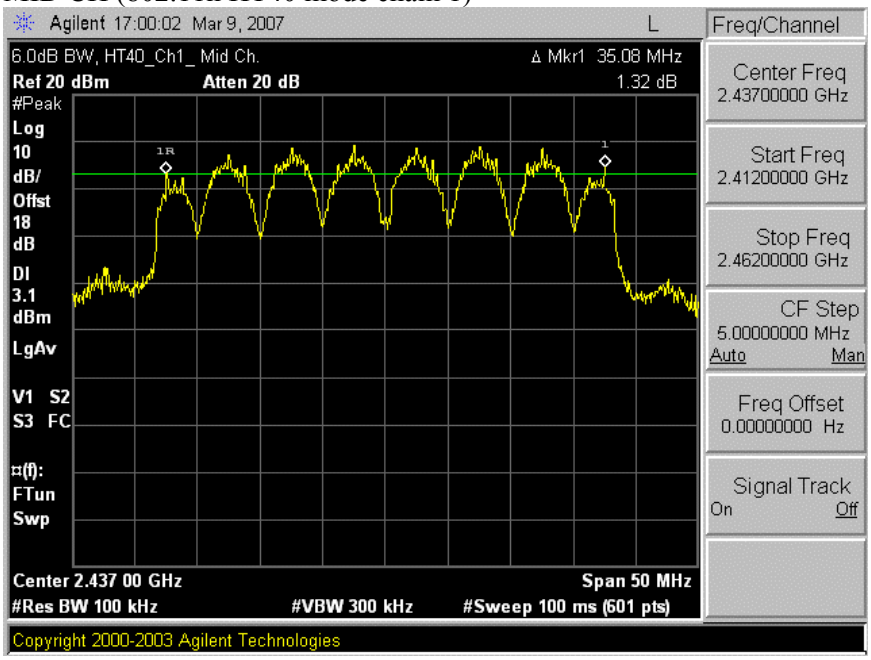


(802.11 HT40 MODE CHAIN 1)

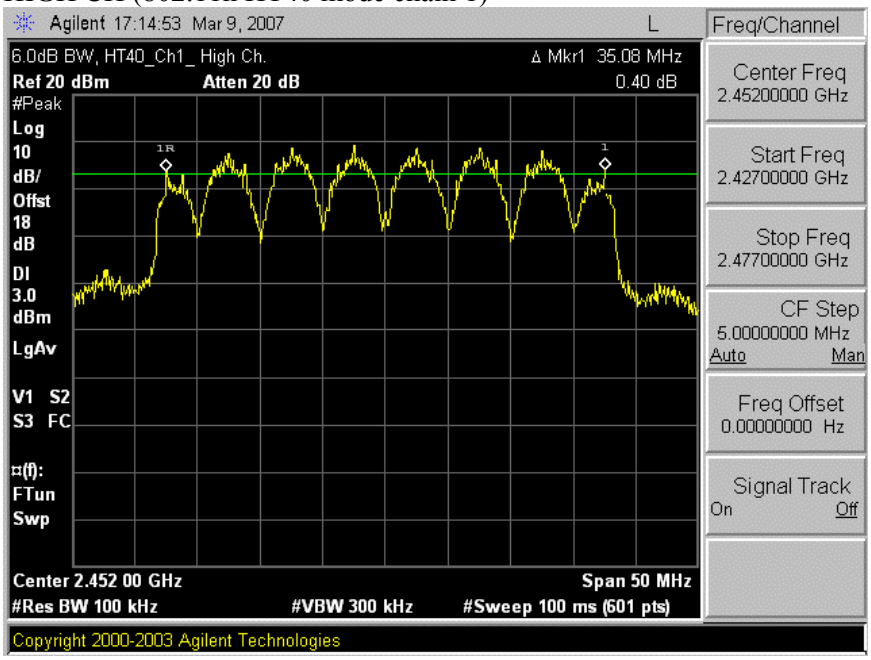
LOW CH (802.11n HT40 mode chain 1)



MID CH (802.11n HT40 mode chain 1)



HIGH CH (802.11n HT40 mode chain 1)



7.1.2. 99% BANDWIDTH AND 26 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth and 26 dB bandwidth functions are utilized.

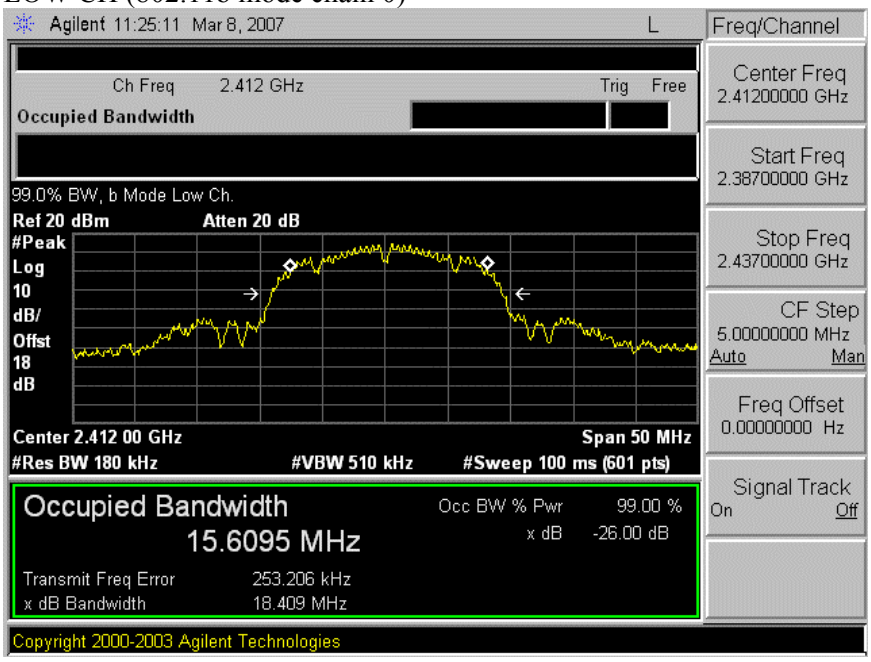
RESULTS

No non-compliance noted:

Mode Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
802.11b Mode					
Low	2412	15.61	15.63	18.41	18.67
Mid	2437	15.61	15.88	18.41	18.73
High	2462	15.64	15.71	18.39	18.46
802.11g Mode					
Low	2412	15.98	16.67	17.87	19.17
Mid	2437	16.08	16.73	19.07	19.48
High	2462	16.02	16.70	19.12	19.58
802.11n HT20 Mode					
Low	2412	17.51	17.58	18.97	19.64
Mid	2437	17.54	17.62	19.01	22.40
High	2462	17.55	17.58	19.61	22.48
802.11n HT40 Mode					
Low	2422	32.92	35.51	37.15	42.36
Mid	2437	32.96	35.48	40.67	45.71
High	2452	32.98	35.41	37.04	41.06

(802.11b MODE CHAIN 0)

LOW CH (802.11b mode chain 0)



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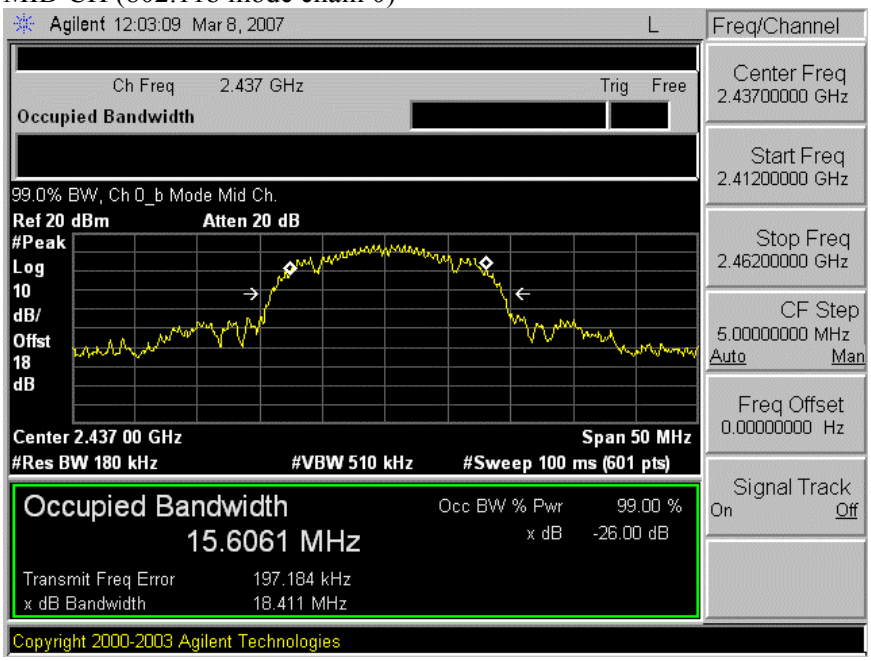
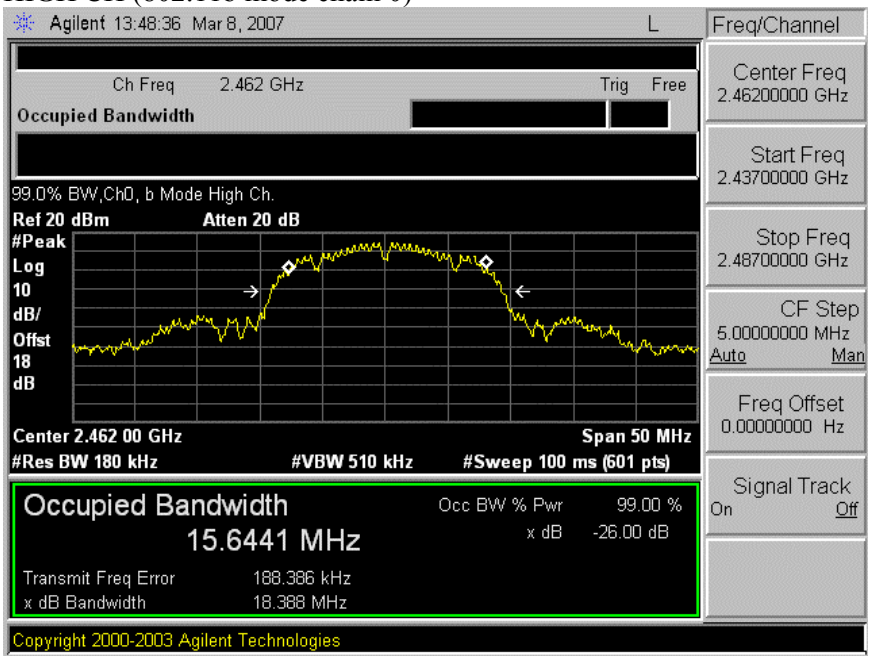
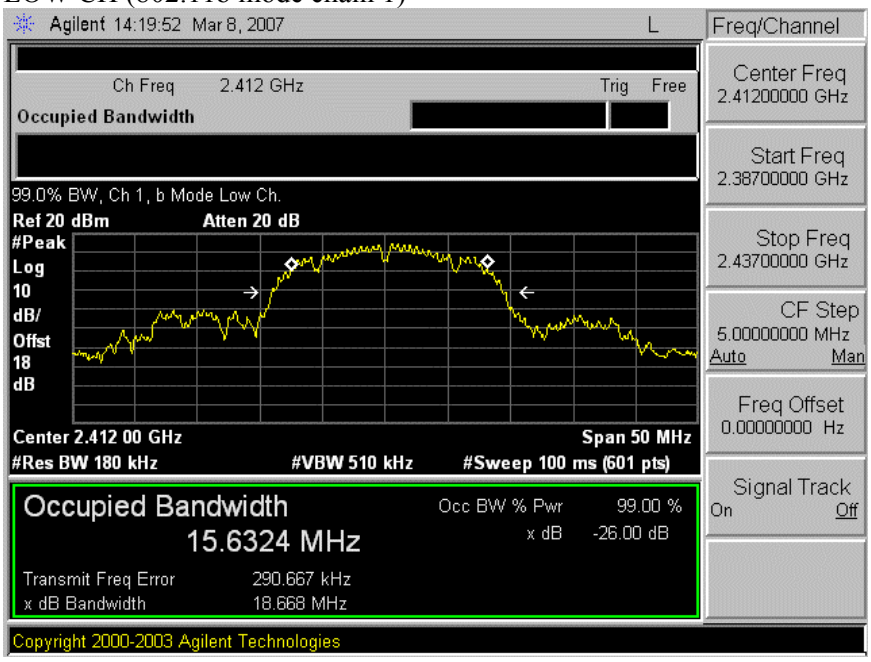


HIGH CH (802.11b mode chain 0)

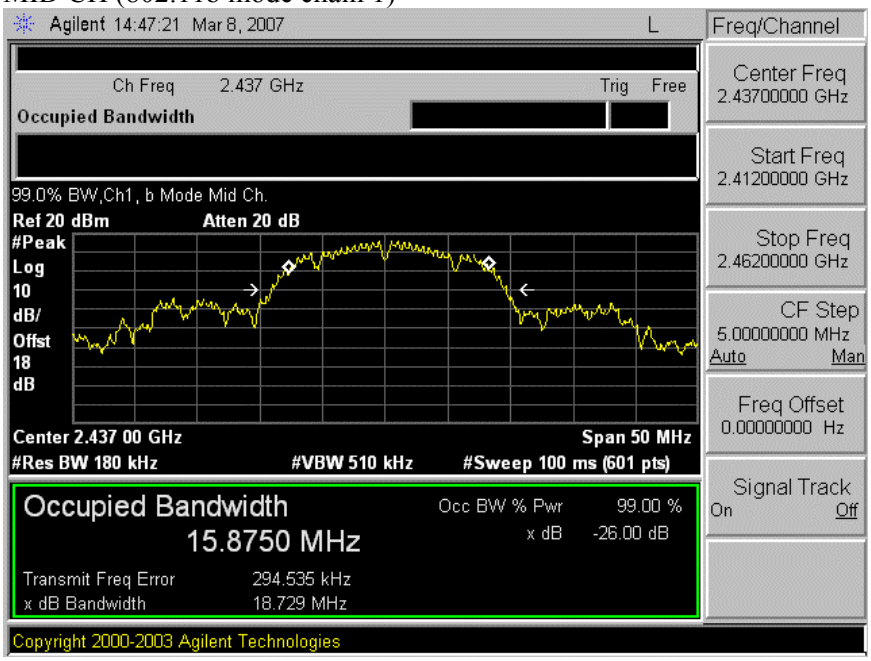


(802.11b MODE CHAIN 1)

LOW CH (802.11b mode chain 1)



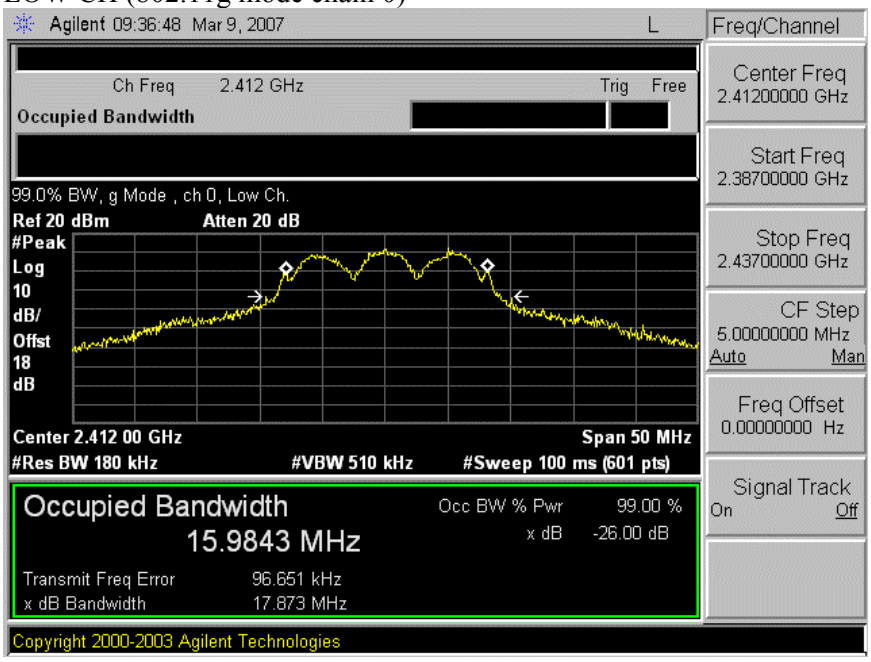
MID CH (802.11b mode chain 1)



HIGH CH (802.11b mode chain 1)

(802.11g MODE CHAIN 0)

LOW CH (802.11g mode chain 0)



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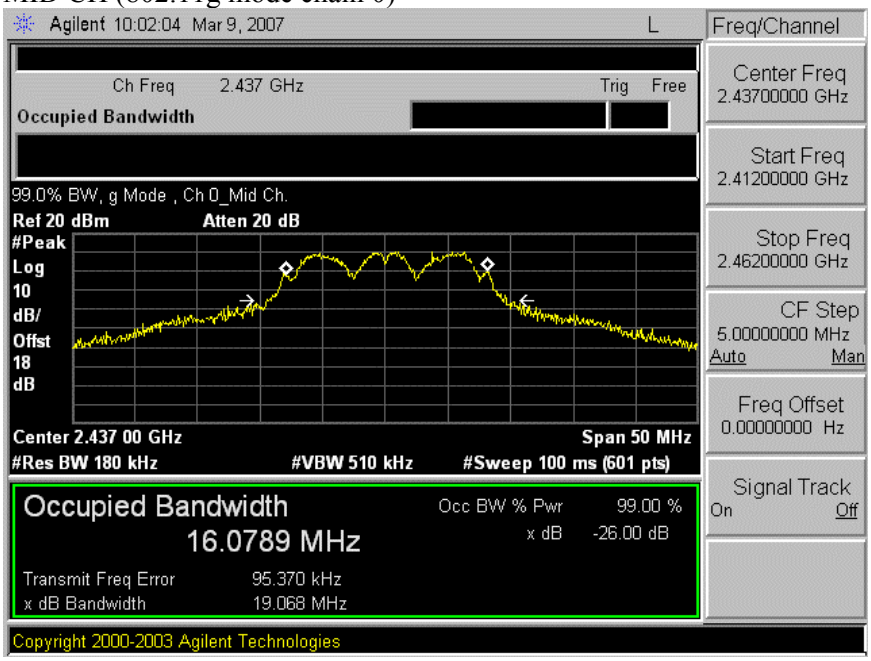
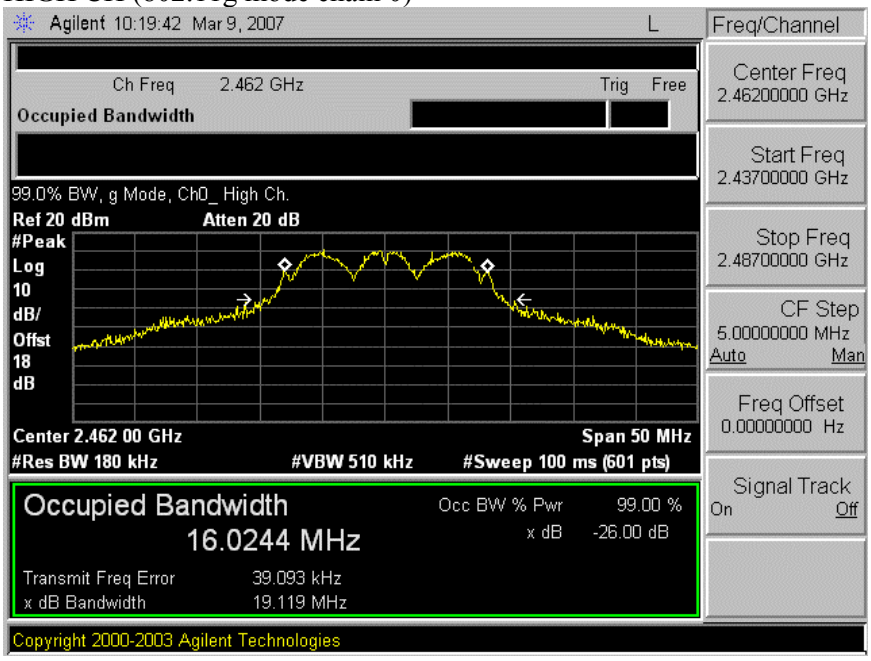
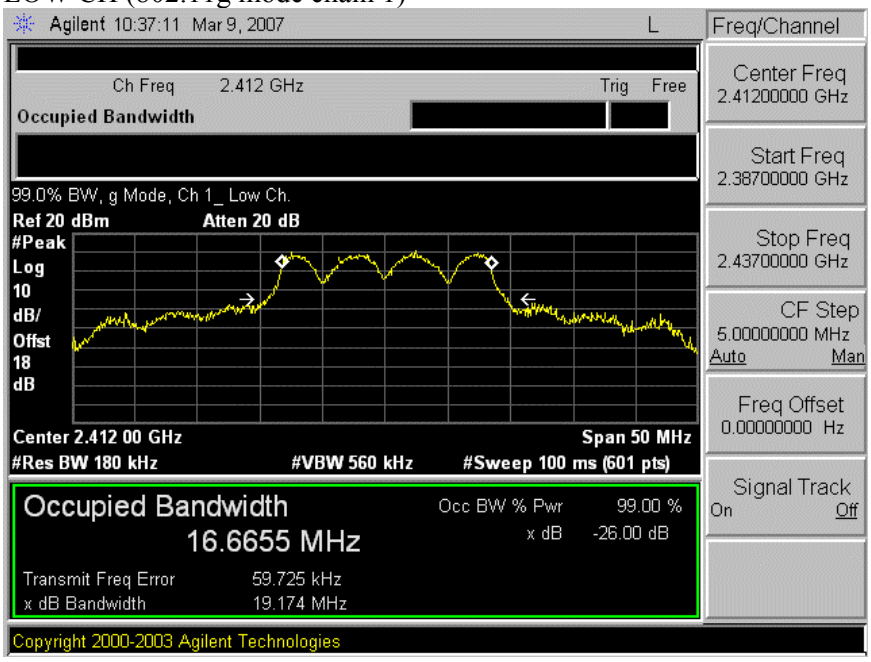


HIGH CH (802.11g mode chain 0)

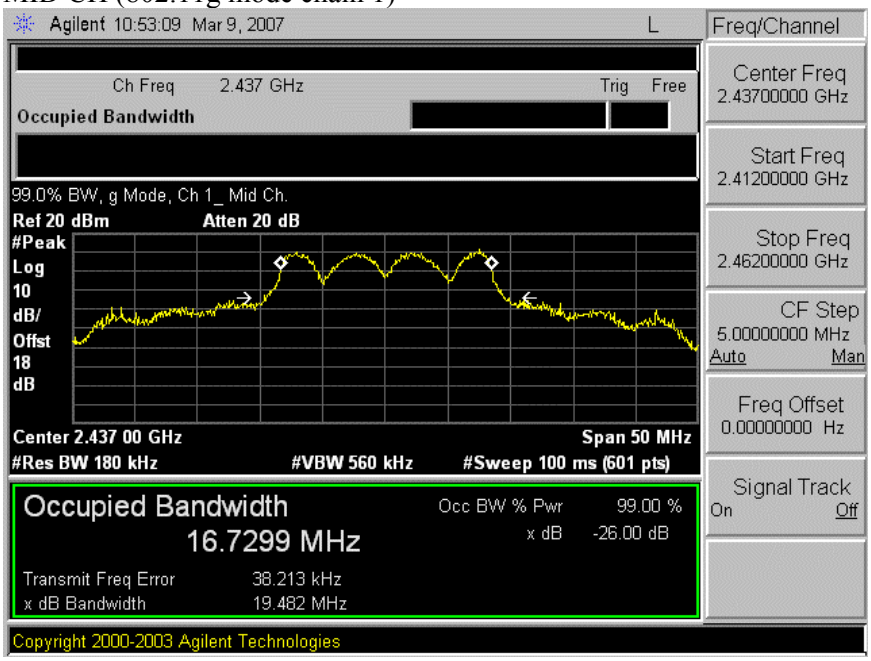


(802.11g MODE CHAIN 1)

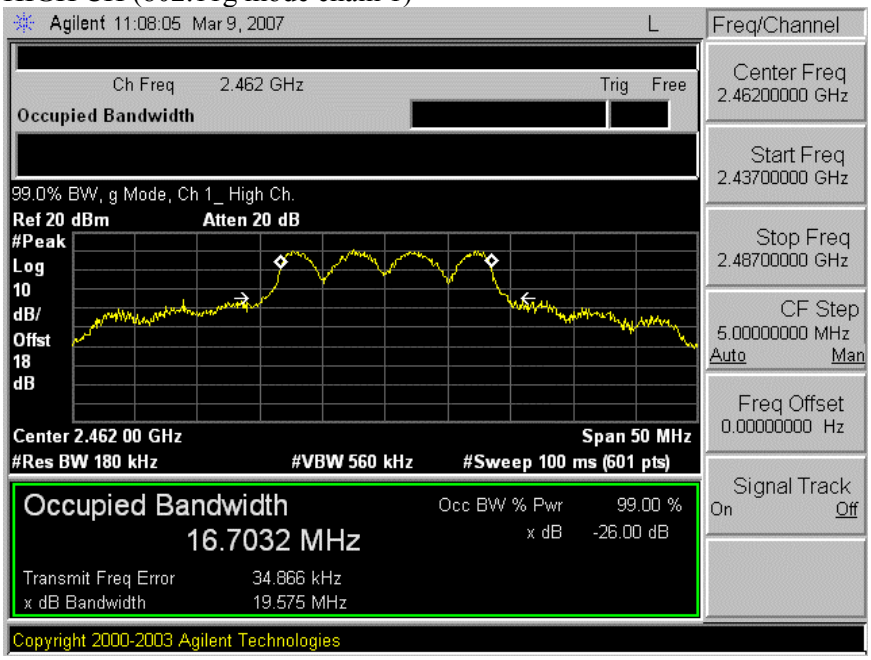
LOW CH (802.11g mode chain 1)



MID CH (802.11g mode chain 1)

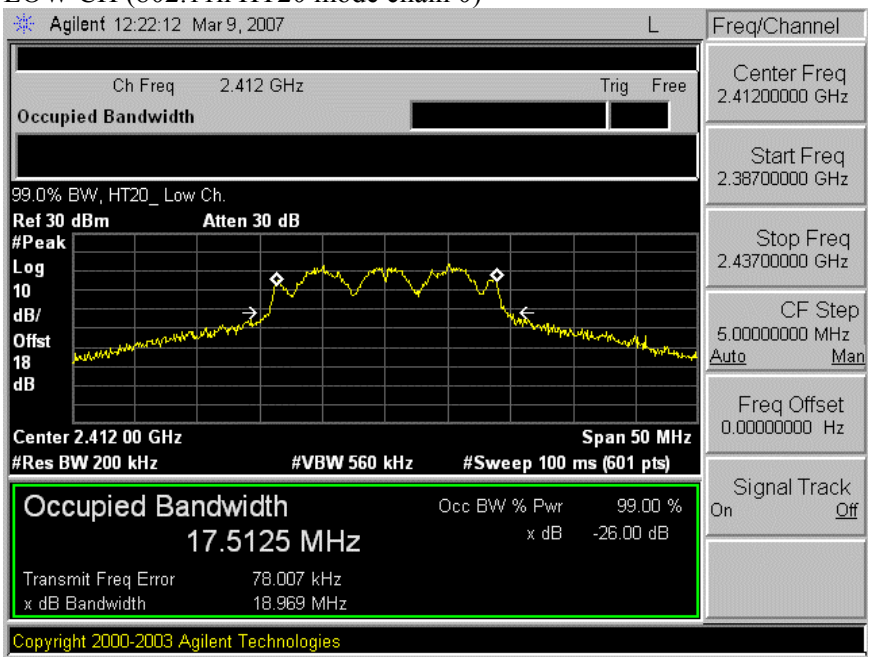


HIGH CH (802.11g mode chain 1)

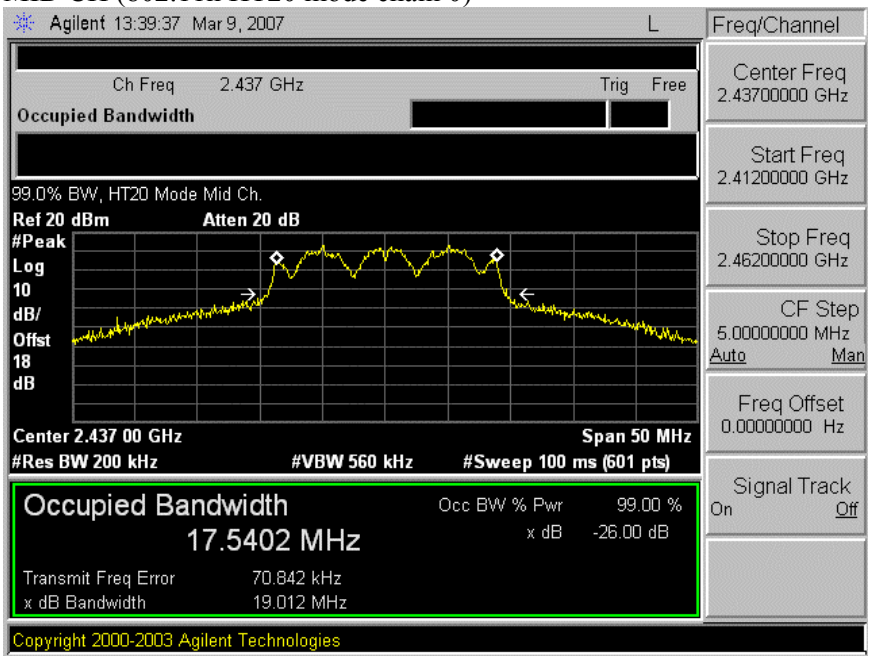


(802.11n HT20 MODE CHAIN 0)

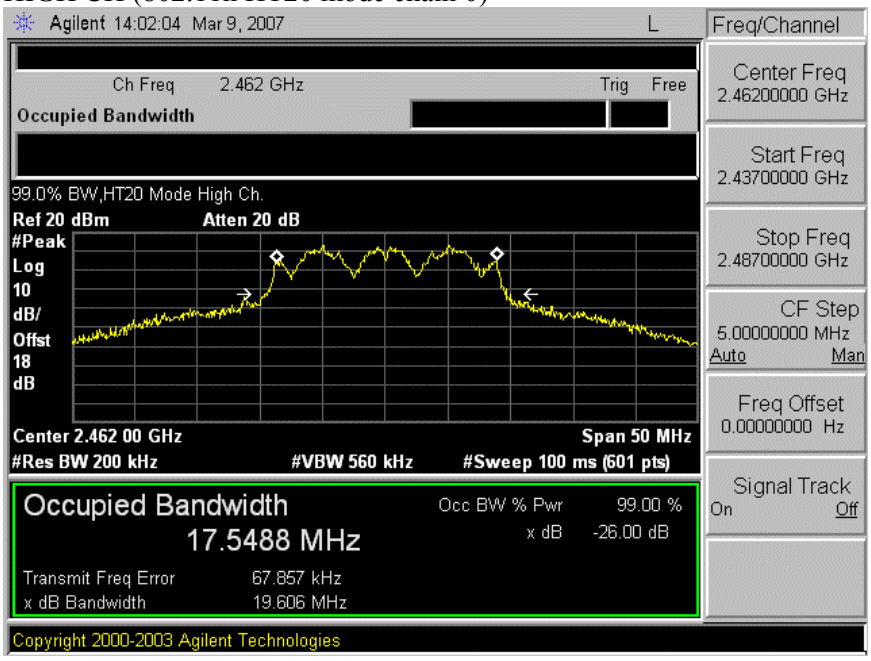
LOW CH (802.11n HT20 mode chain 0)



MID CH (802.11n HT20 mode chain 0)

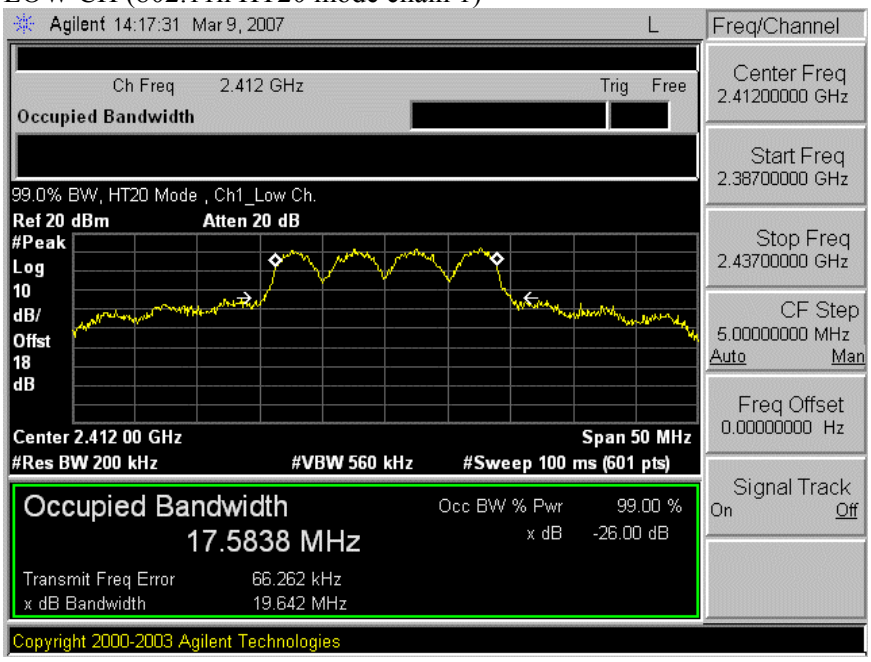


HIGH CH (802.11n HT20 mode chain 0)

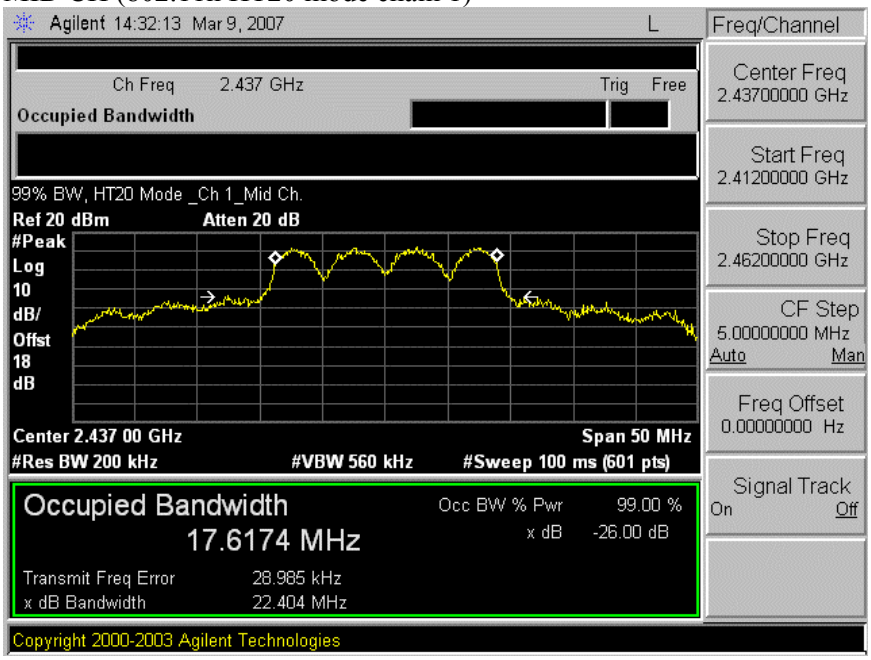


(802.11 HT20 MODE CHAIN 1)

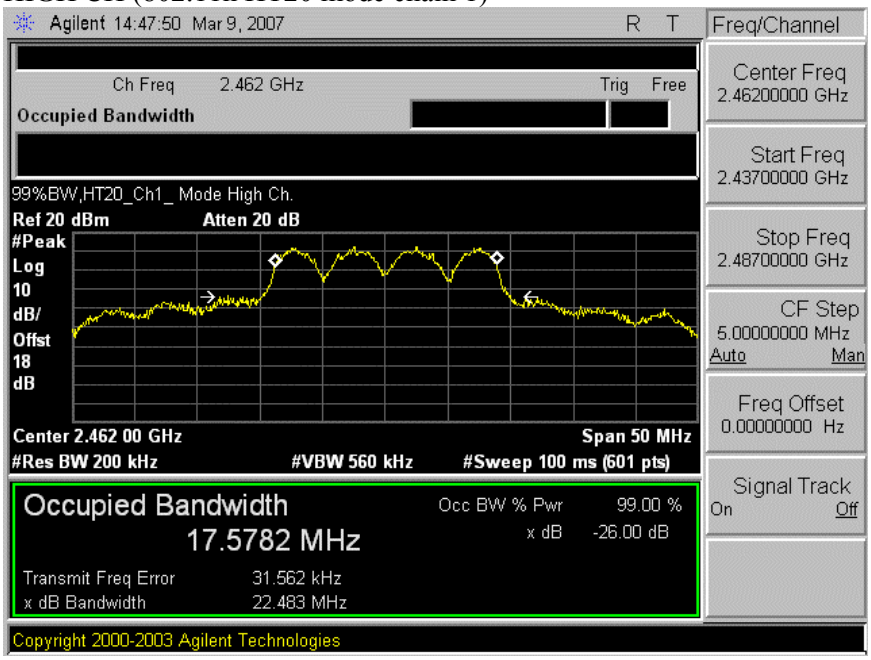
LOW CH (802.11n HT20 mode chain 1)



MID CH (802.11n HT20 mode chain 1)

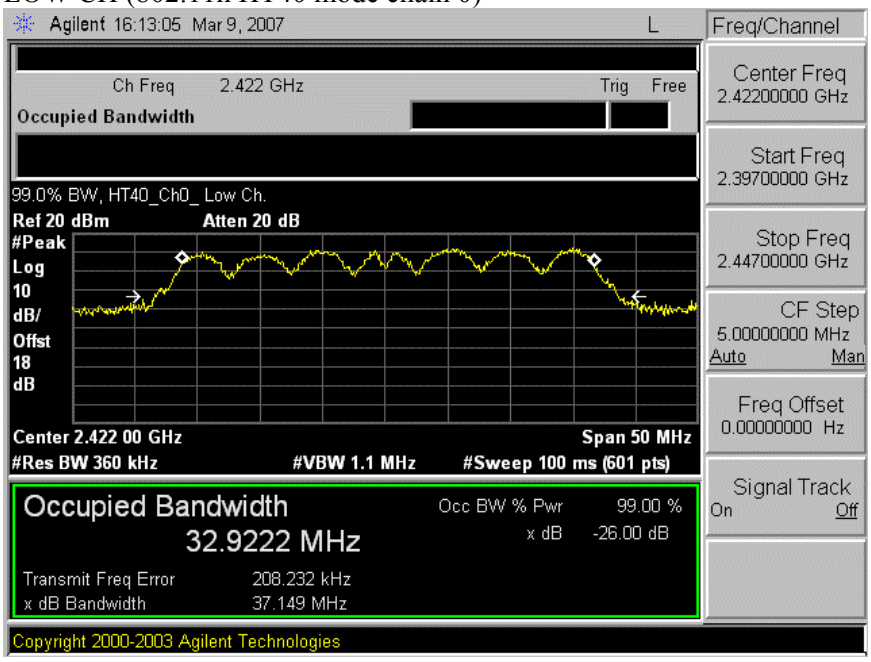


HIGH CH (802.11n HT20 mode chain 1)

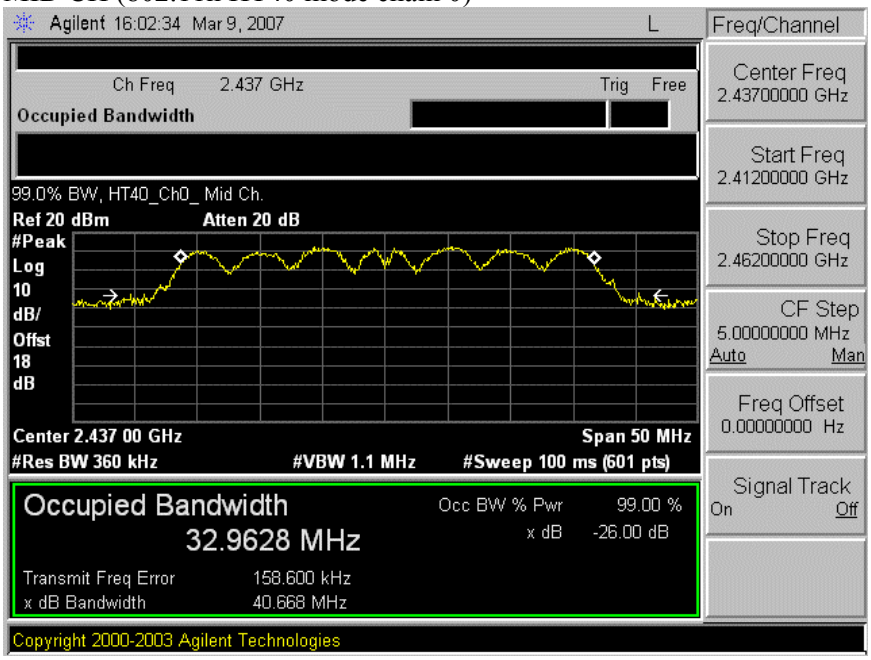


(802.11 HT40 MODE CHAIN 0)

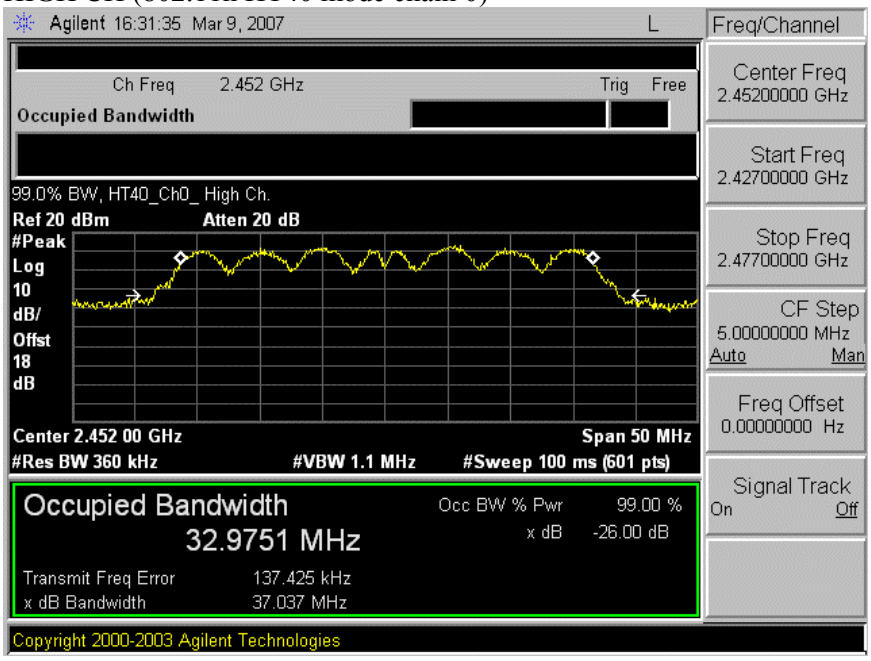
LOW CH (802.11n HT40 mode chain 0)



MID CH (802.11n HT40 mode chain 0)

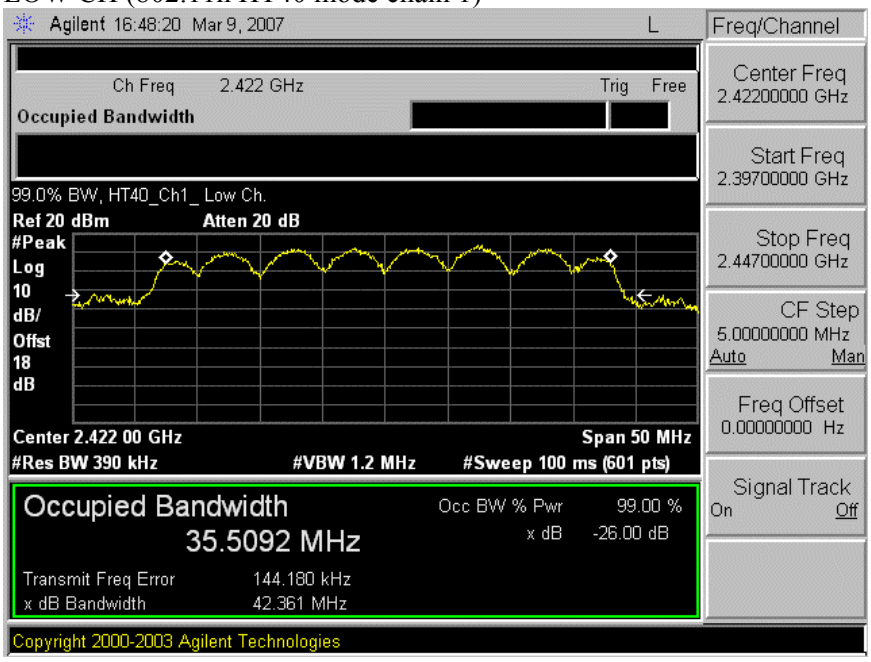


HIGH CH (802.11n HT40 mode chain 0)

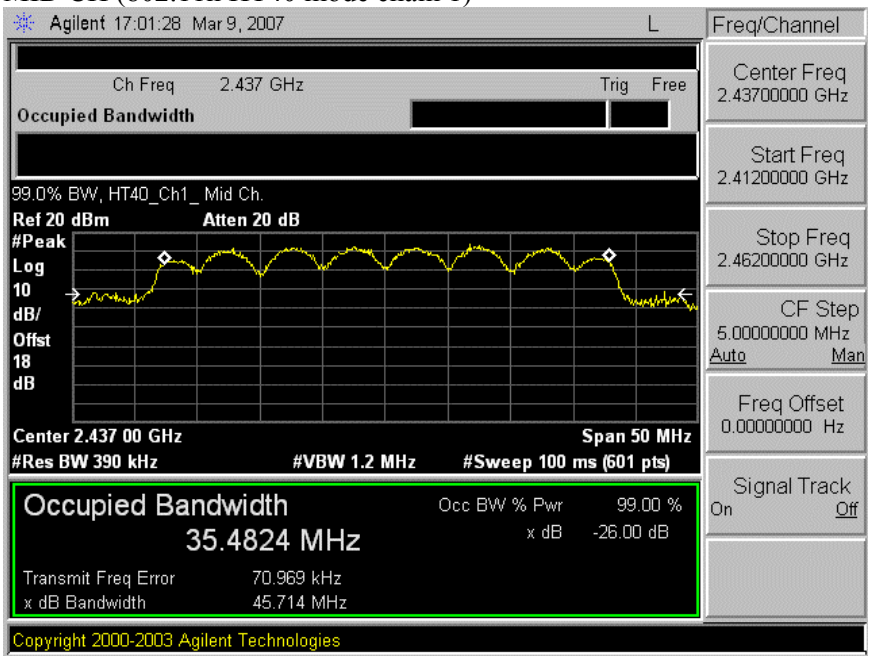


(802.11 HT40 MODE CHAIN 1)

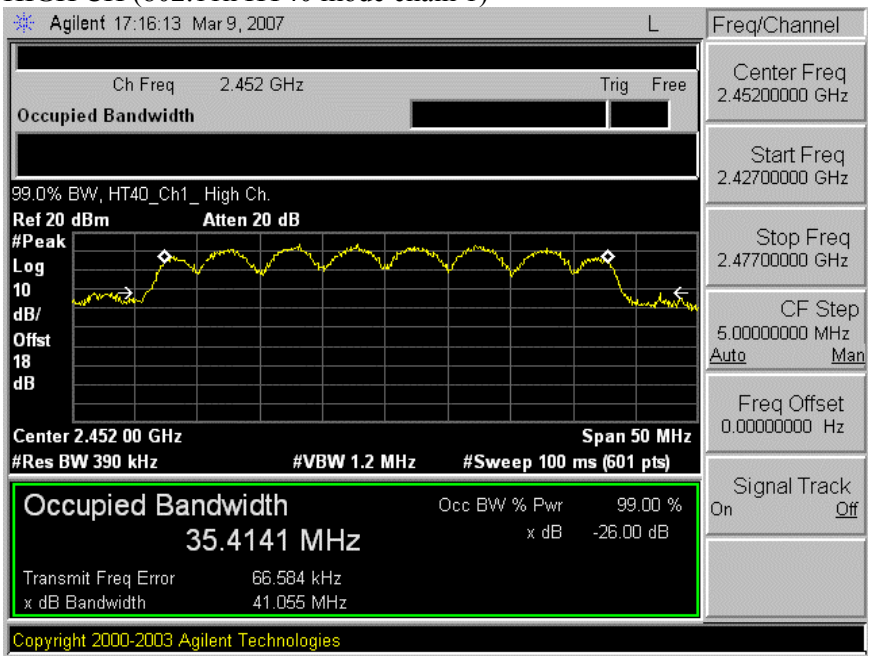
LOW CH (802.11n HT40 mode chain 1)



MID CH (802.11n HT40 mode chain 1)



HIGH CH (802.11n HT40 mode chain 1)



7.1.3. MAXIMUM OUTPUT POWER

LIMIT

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

§15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

§15.247 (b) (4) (i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The test is performed in accordance with Option 2 procedures in FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005. The transmitter operates continuously therefore Method # 1 is used.

Each chain is measured separately and the total power is calculated using:

Total Power = 10 log (10^ (Chain 0 Power / 10) + 10^ (Chain 2 Power / 10))

RESULTS

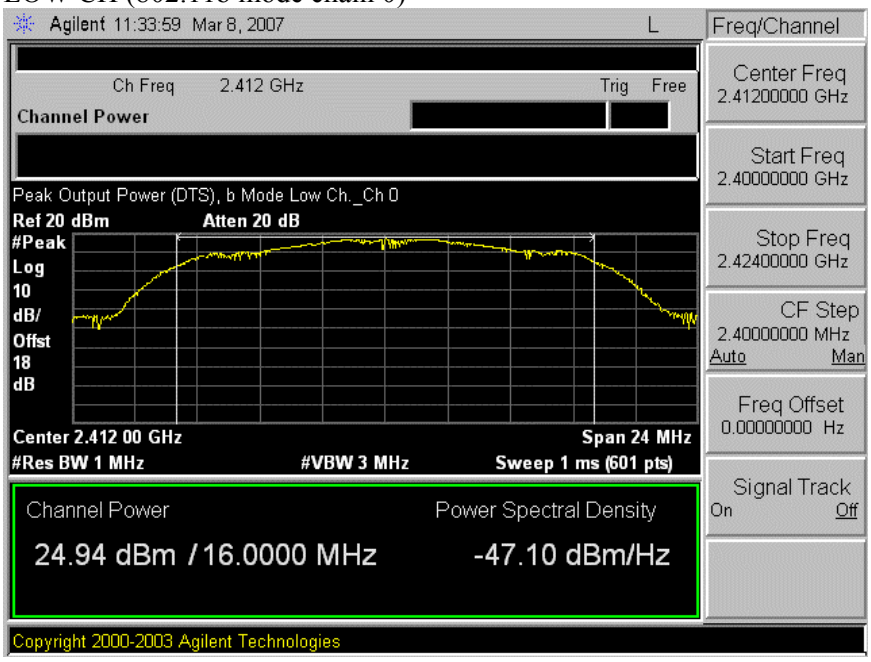
No non-compliance noted:

Fixed Limit (dBm)	30
Antenna Gain (dBi)	2
10 Log (# Tx Chains)	3.01
Effective Legacy Gain	5.01

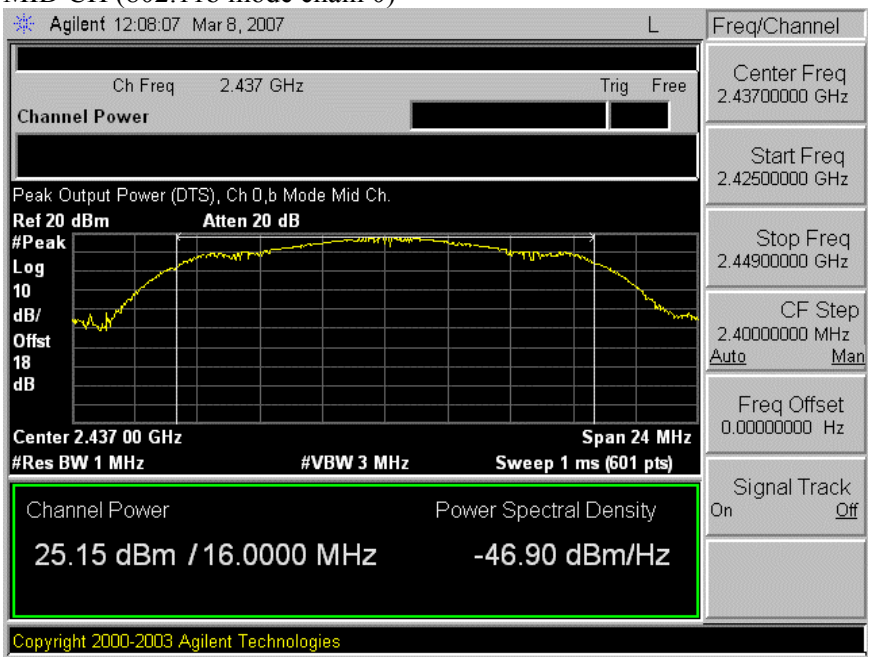
Mode Channel	Frequency (MHz)	Max Power Chain 0 (dBm)	Max Power Chain 1 (dBm)	Max Power Total (dBm)	Limit (dBm)	Margin (dB)
802.11b Mode						
Low	2412	24.94	25.48	28.23	30.00	-1.77
Middle	2437	25.15	26.77	29.05	30.00	-0.95
High	2462	25.41	25.93	28.69	30.00	-1.31
802.11g Mode						
Low	2412	23.18	22.11	25.69	30.00	-4.31
Mid	2437	22.87	22.97	25.93	30.00	-4.07
High	2462	22.83	23.11	25.98	30.00	-4.02
802.11n HT20 Mode						
Low	2412	22.92	22.28	25.62	30.00	-4.38
Middle	2437	22.50	23.16	25.85	30.00	-4.15
High	2462	22.78	22.95	25.88	30.00	-4.12
802.11n HT40 Mode						
Low	2422	21.99	22.75	25.40	30.00	-4.60
Mid	2437	23.10	22.97	26.05	30.00	-3.95
High	2452	23.01	23.25	26.14	30.00	-3.86

(802.11b MODE CHAIN 0)

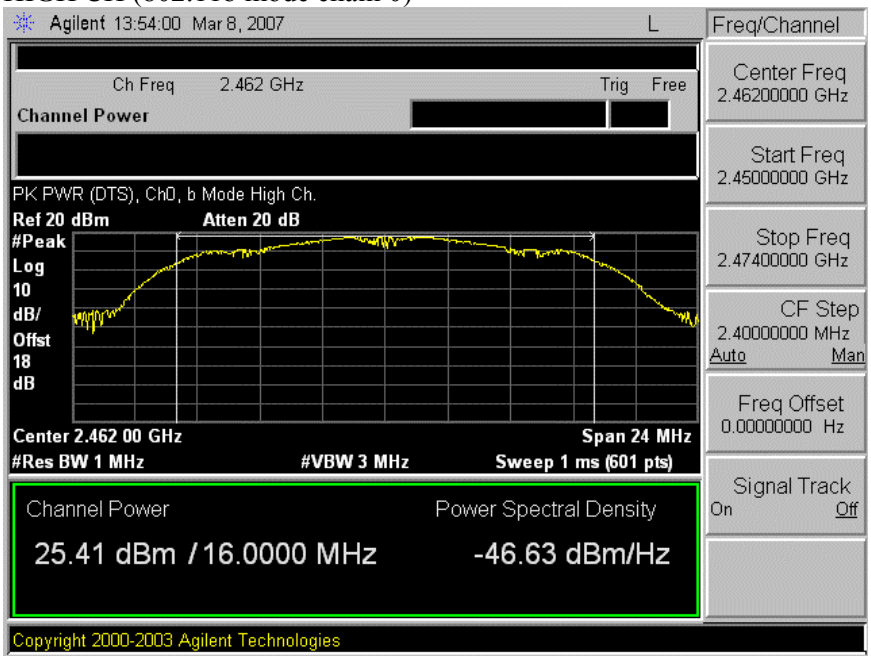
LOW CH (802.11b mode chain 0)



MID CH (802.11b mode chain 0)

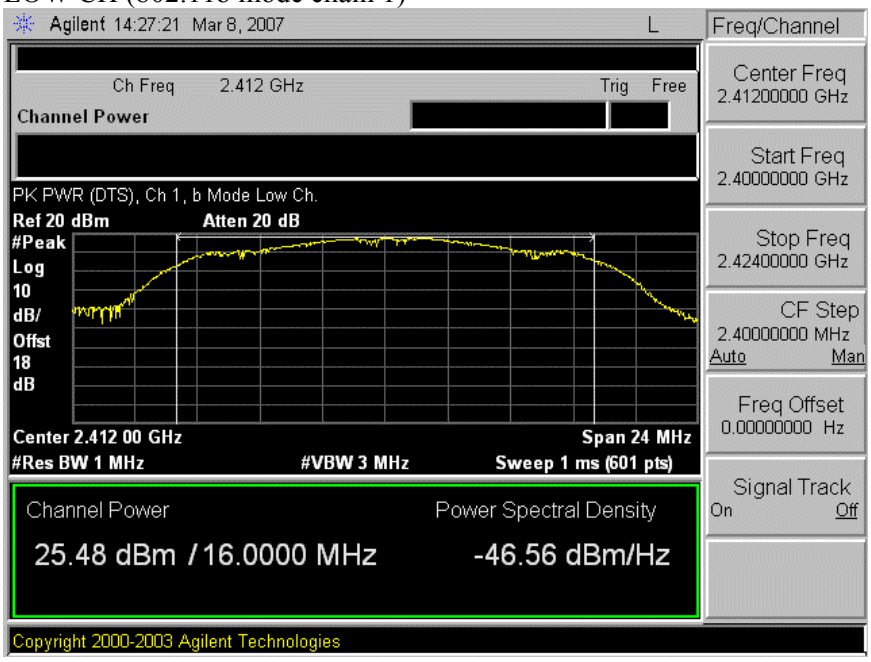


HIGH CH (802.11b mode chain 0)

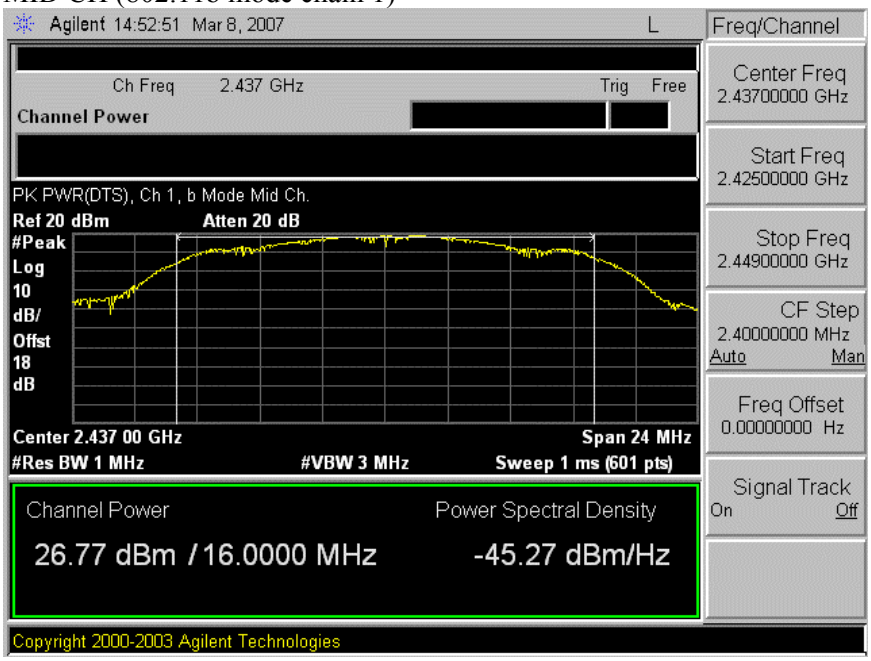


(802.11b MODE CHAIN 1)

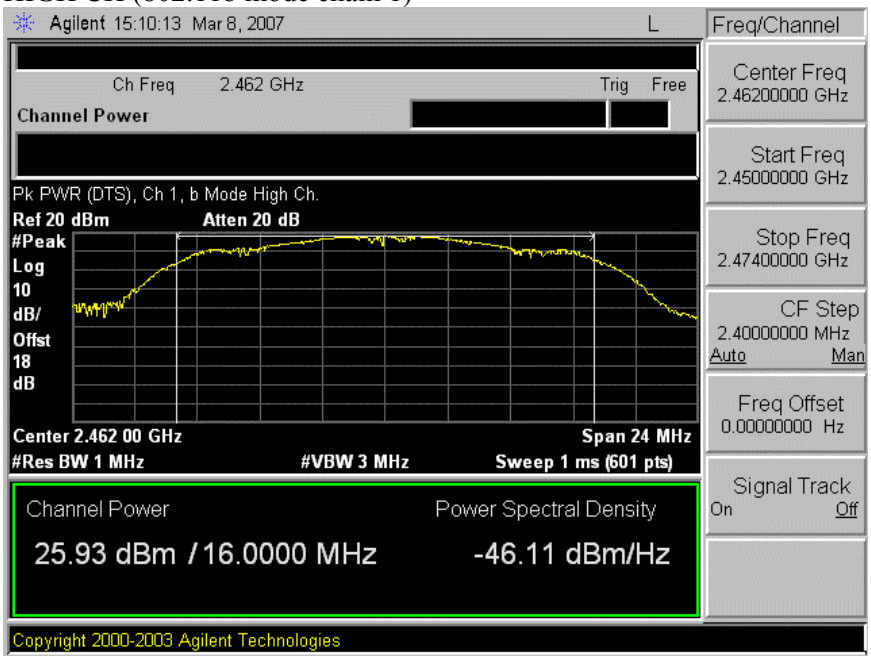
LOW CH (802.11b mode chain 1)



MID CH (802.11b mode chain 1)

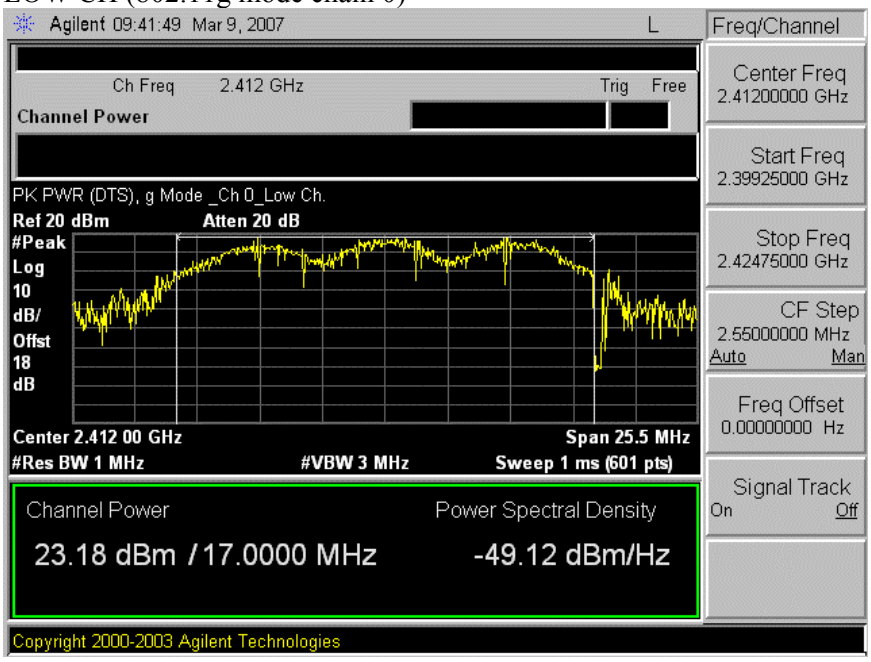


HIGH CH (802.11b mode chain 1)



(802.11g MODE CHAIN 0)

LOW CH (802.11g mode chain 0)



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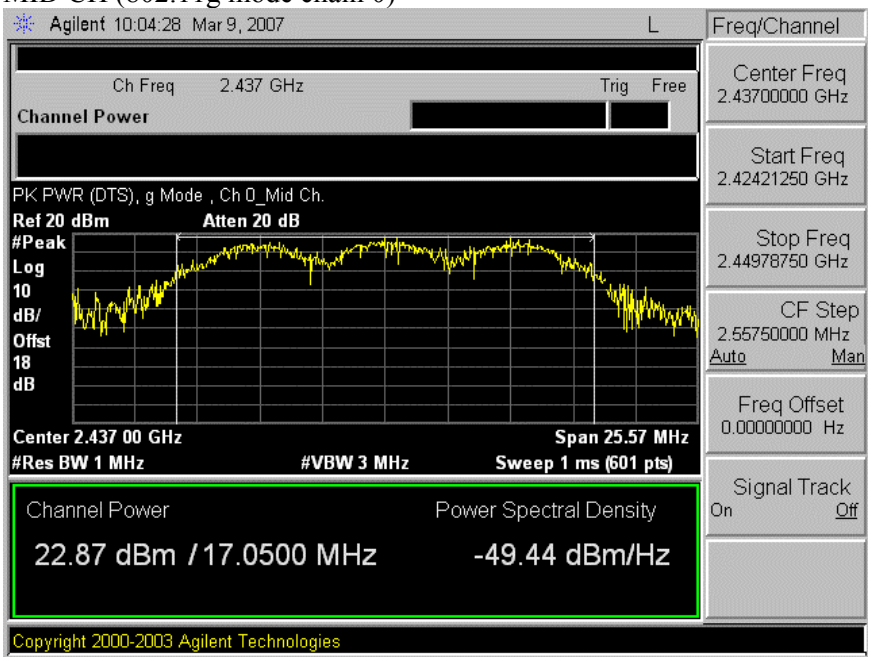

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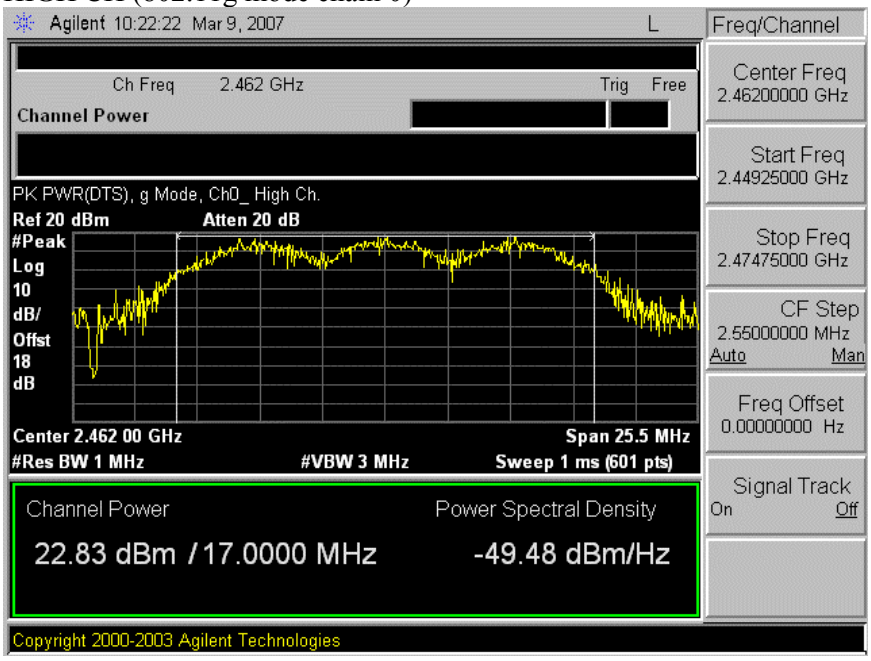
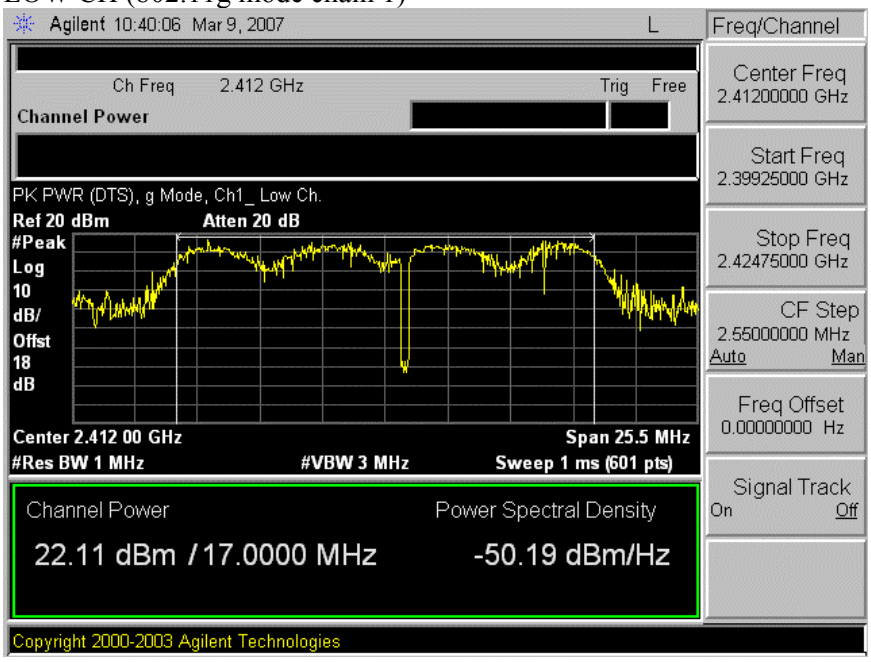
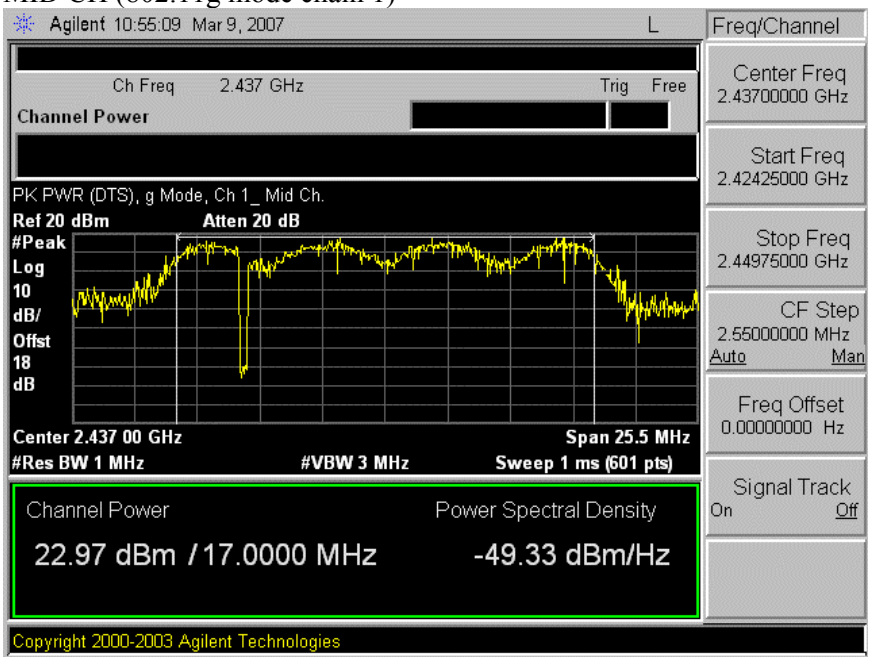


(802.11g MODE CHAIN 1)

LOW CH (802.11g mode chain 1)



MID CH (802.11g mode chain 1)



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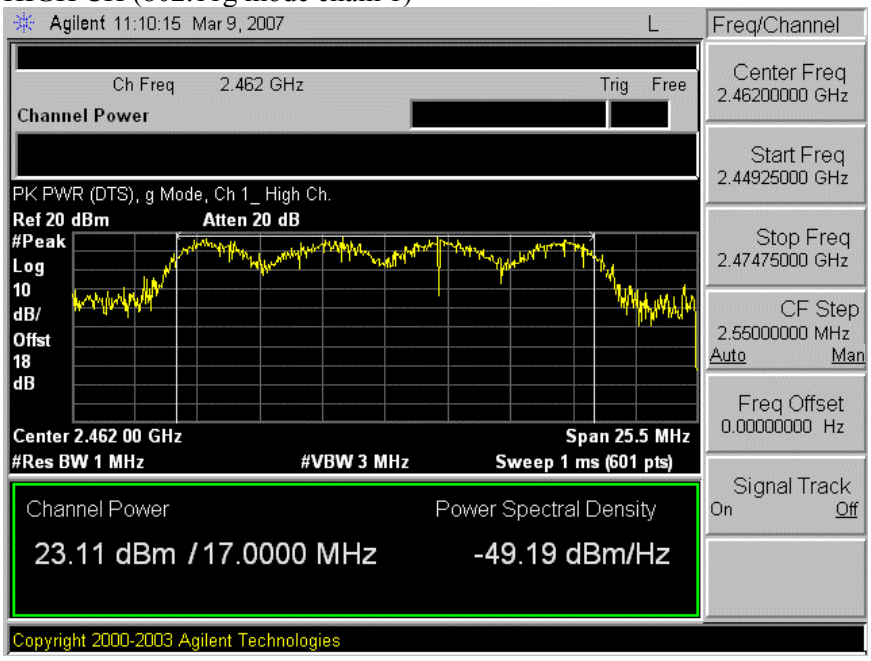
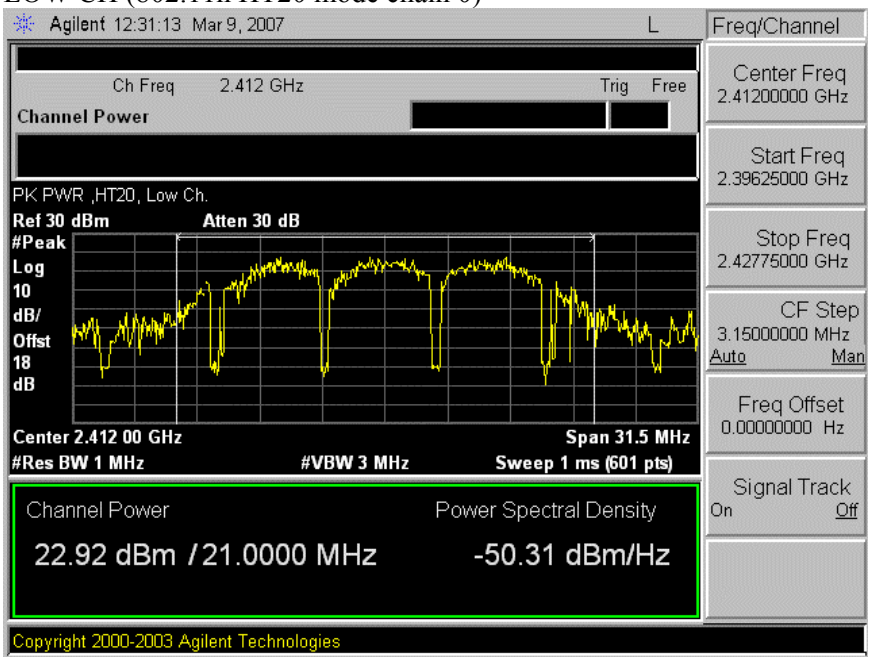
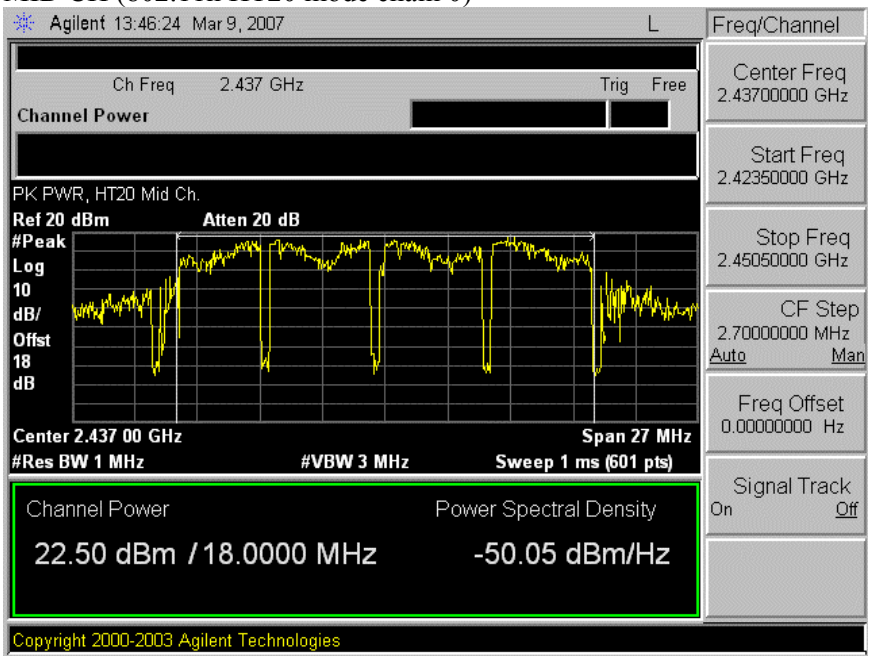


(802.11n HT20 MODE CHAIN 0)

LOW CH (802.11n HT20 mode chain 0)



MID CH (802.11n HT20 mode chain 0)



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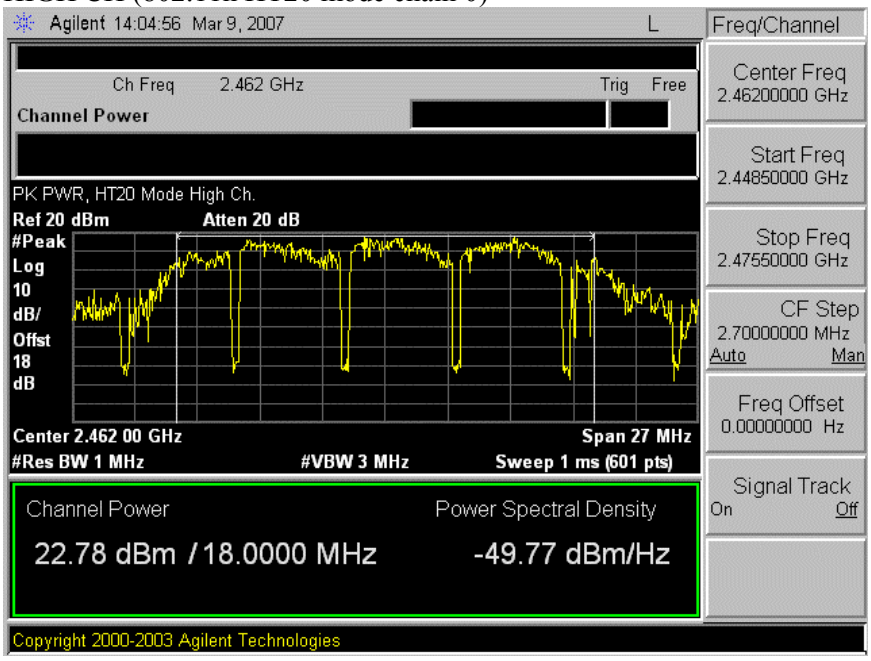
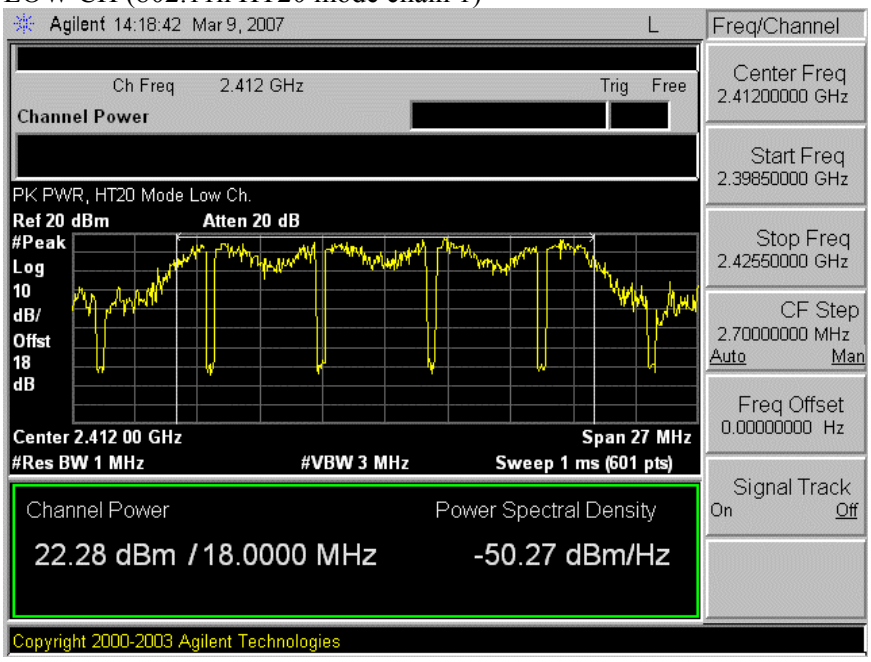
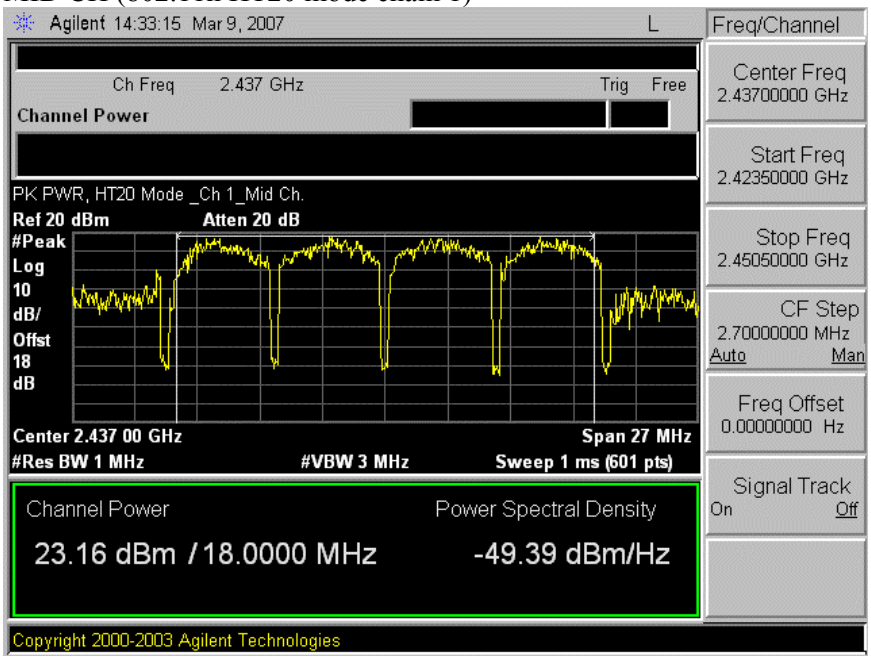


(802.11 HT20 MODE CHAIN 1)

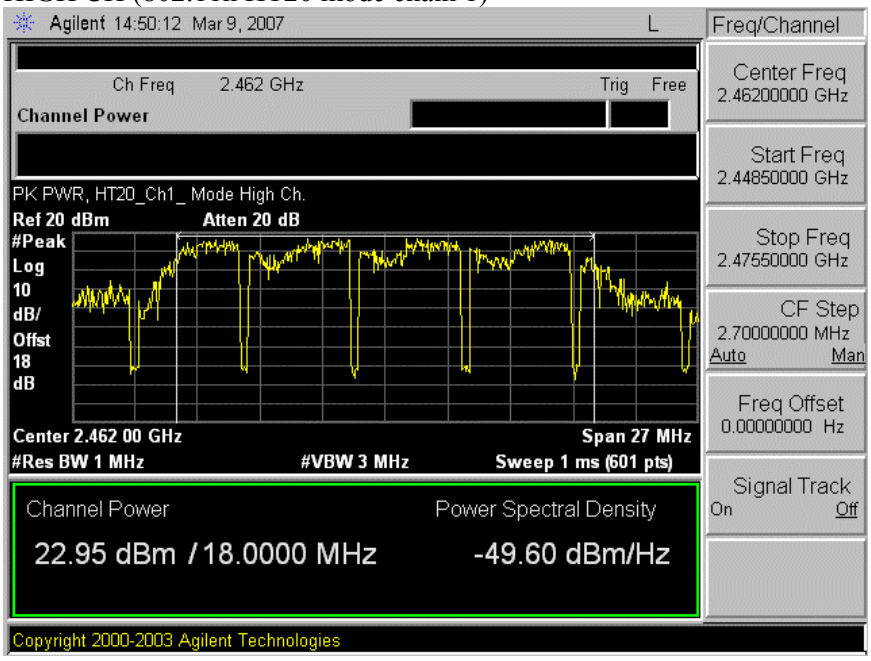
LOW CH (802.11n HT20 mode chain 1)



MID CH (802.11n HT20 mode chain 1)

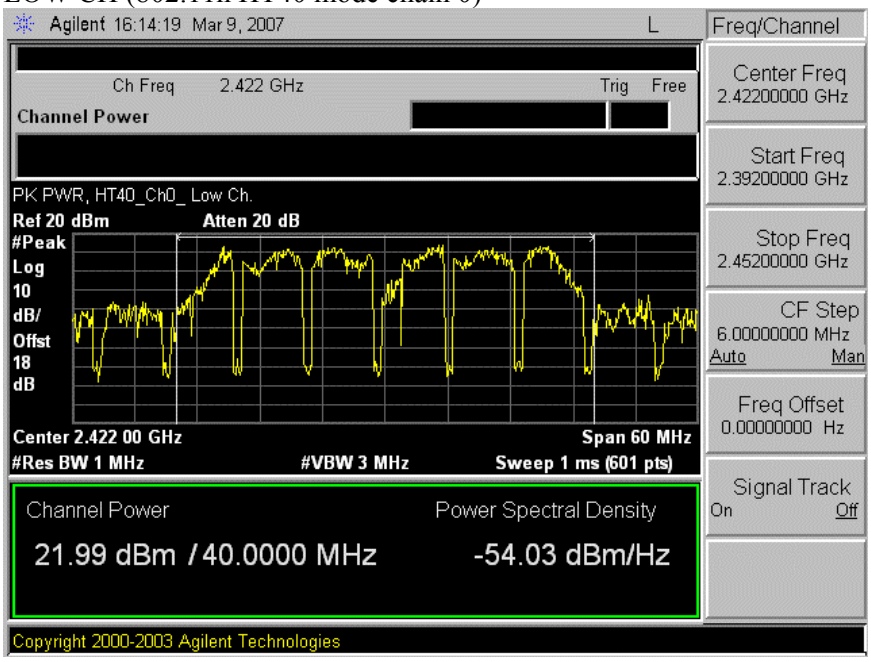


HIGH CH (802.11n HT20 mode chain 1)



(802.11 HT40 MODE CHAIN 0)

LOW CH (802.11n HT40 mode chain 0)



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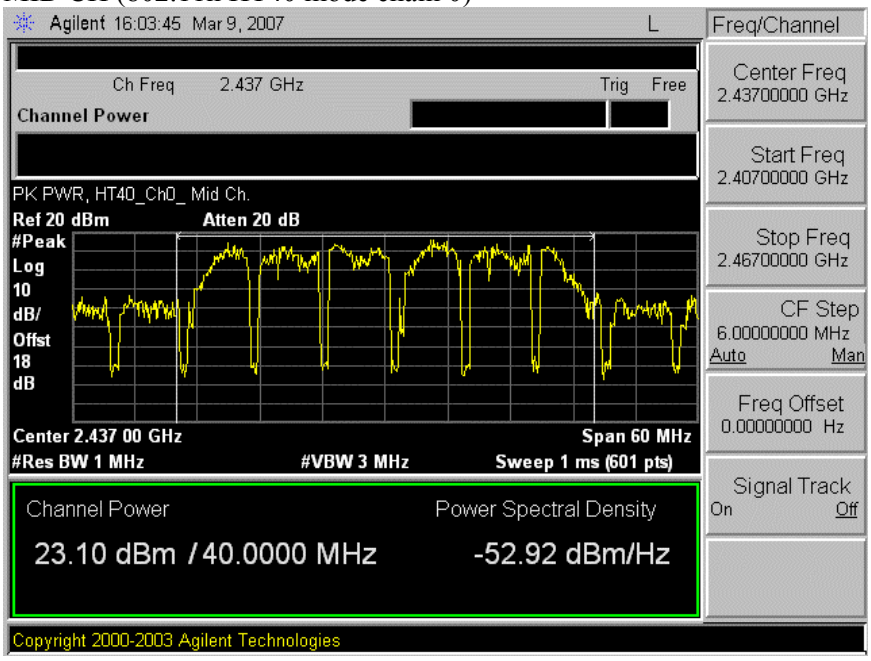

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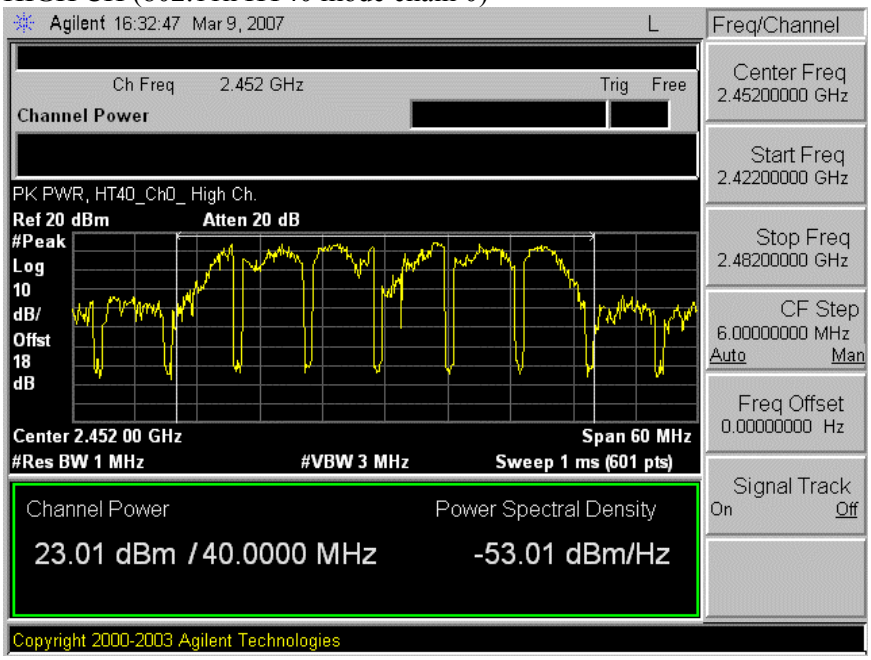
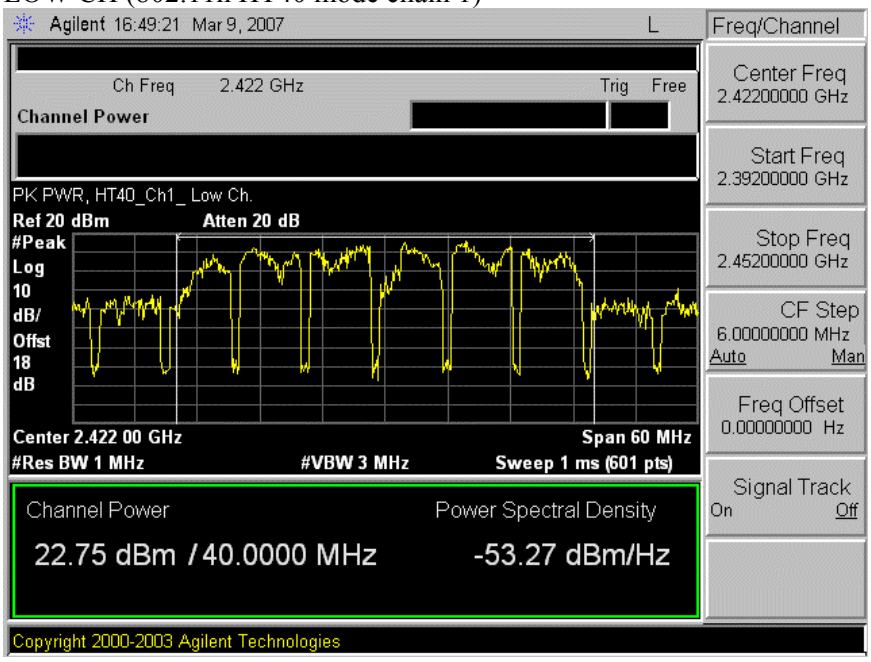
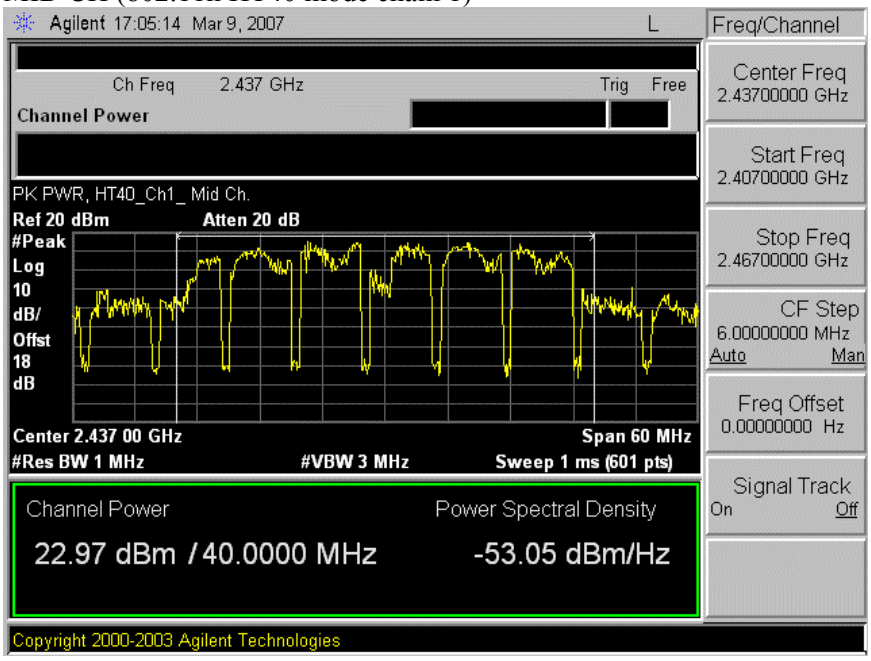


(802.11 HT40 MODE CHAIN 1)

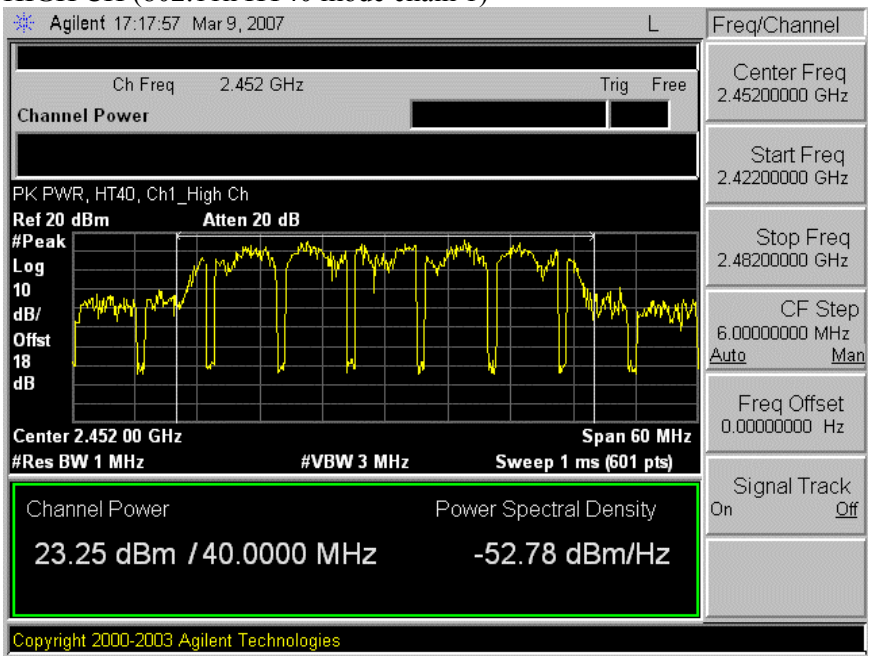
LOW CH (802.11n HT40 mode chain 1)



MID CH (802.11n HT40 mode chain 1)



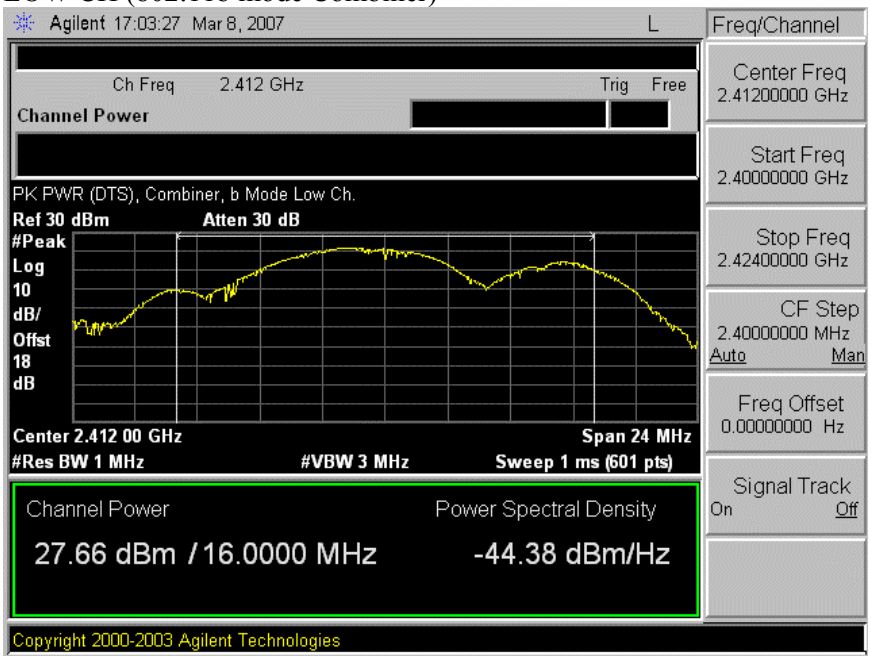
HIGH CH (802.11n HT40 mode chain 1)



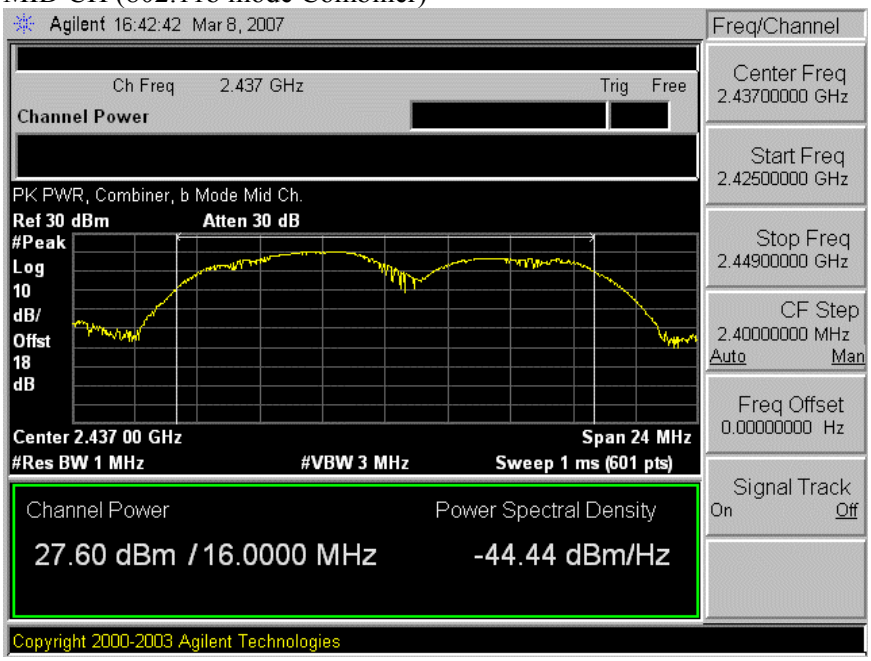
COMBINER

(802.11b MODE COMBINER)

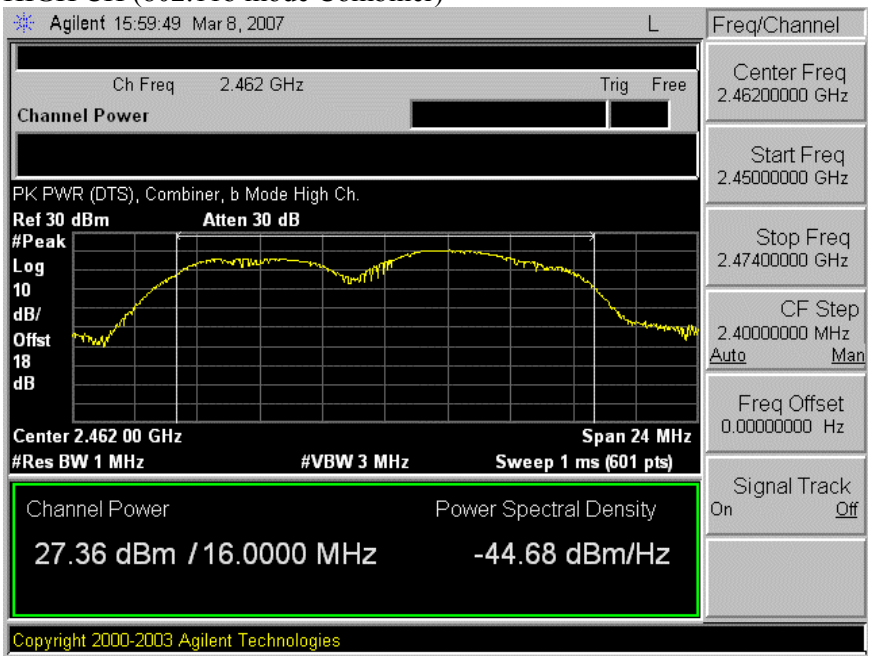
LOW CH (802.11b mode Combiner)



MID CH (802.11b mode Combiner)

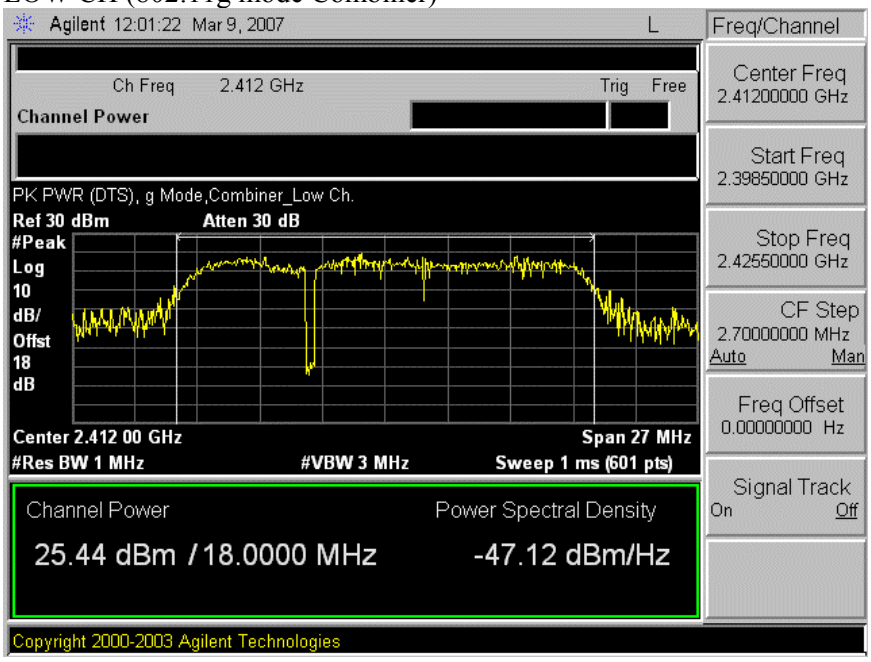


HIGH CH (802.11b mode Combiner)

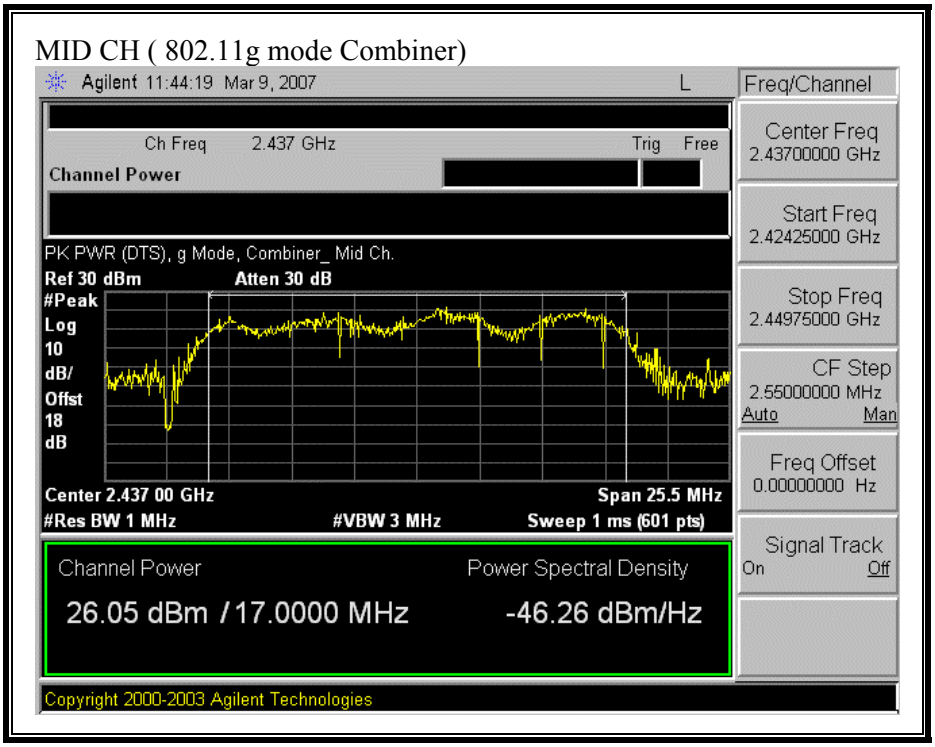


(802.11g MODE COMBINER)

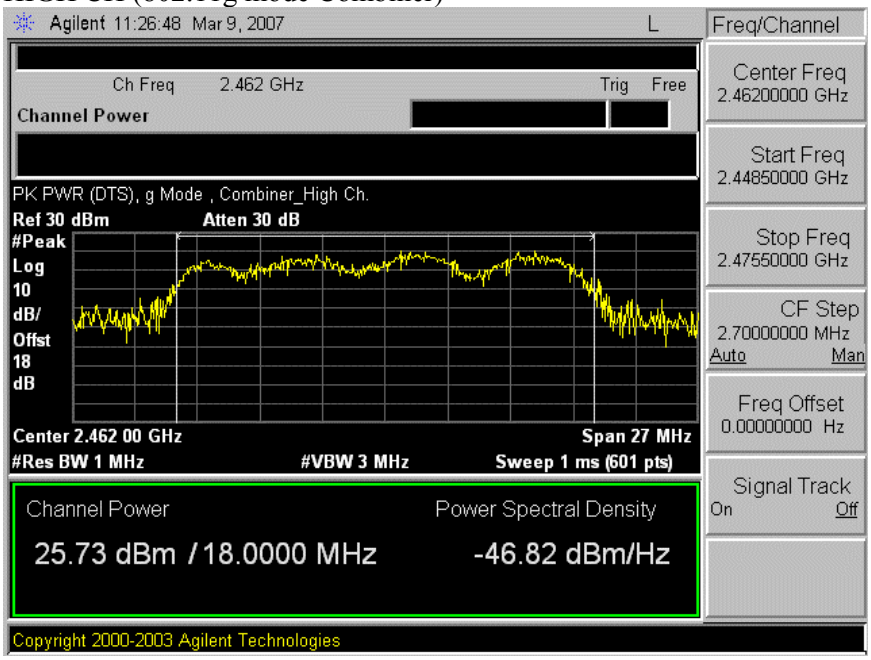
LOW CH (802.11g mode Combiner)



MID CH (802.11g mode Combiner)

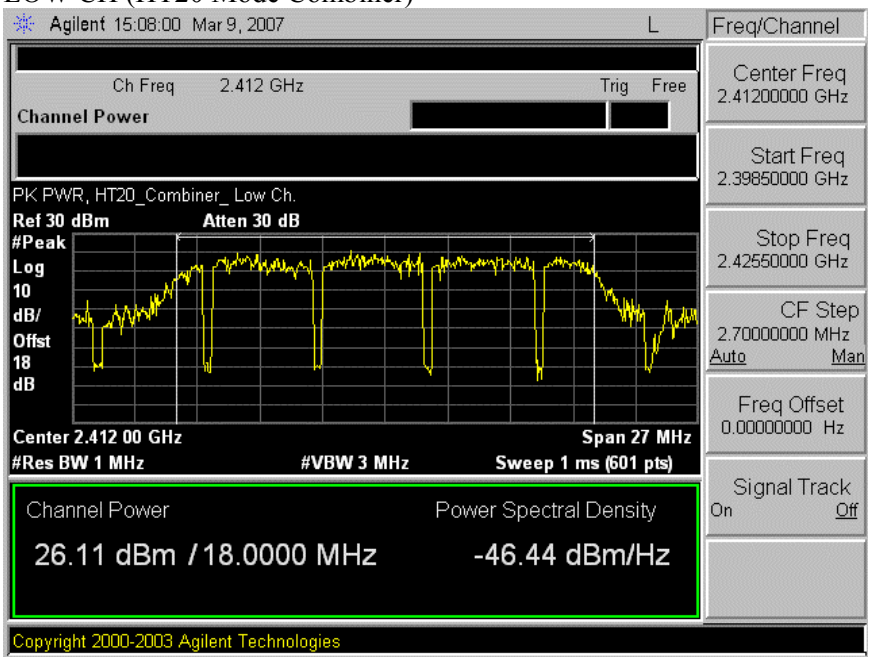


HIGH CH (802.11g mode Combiner)

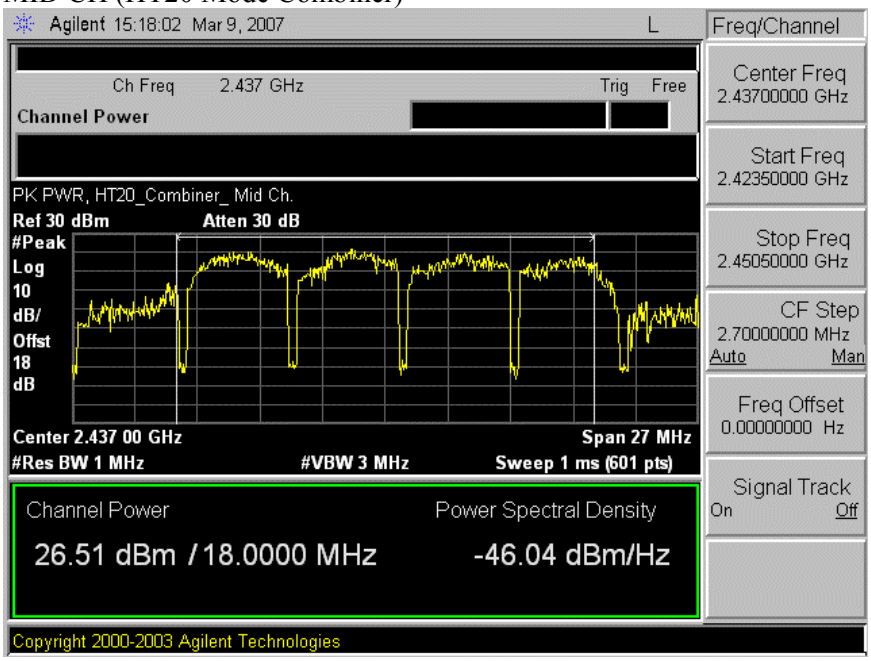


(HT20 MODE COMBINER)

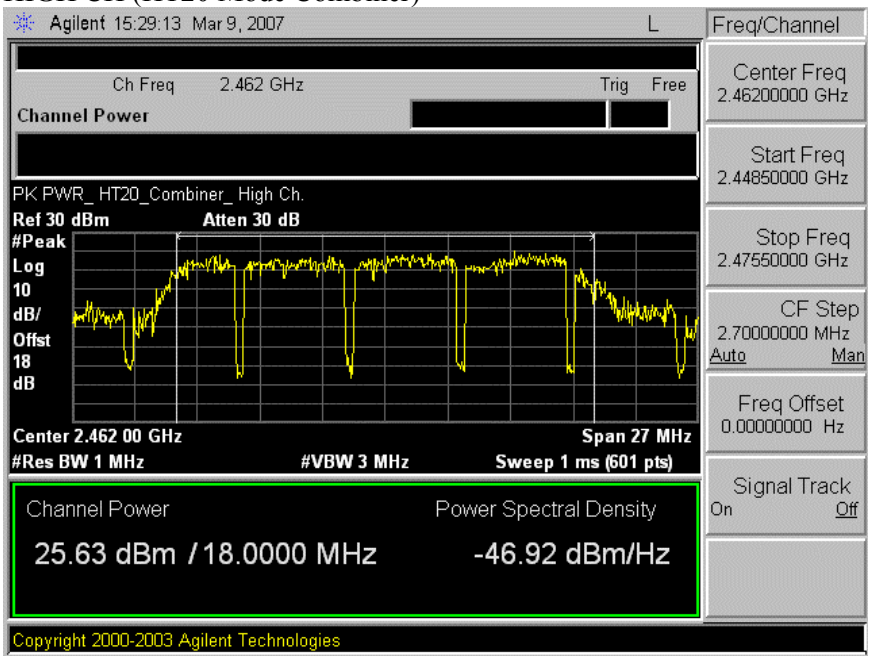
LOW CH (HT20 Mode Combiner)



MID CH (HT20 Mode Combiner)

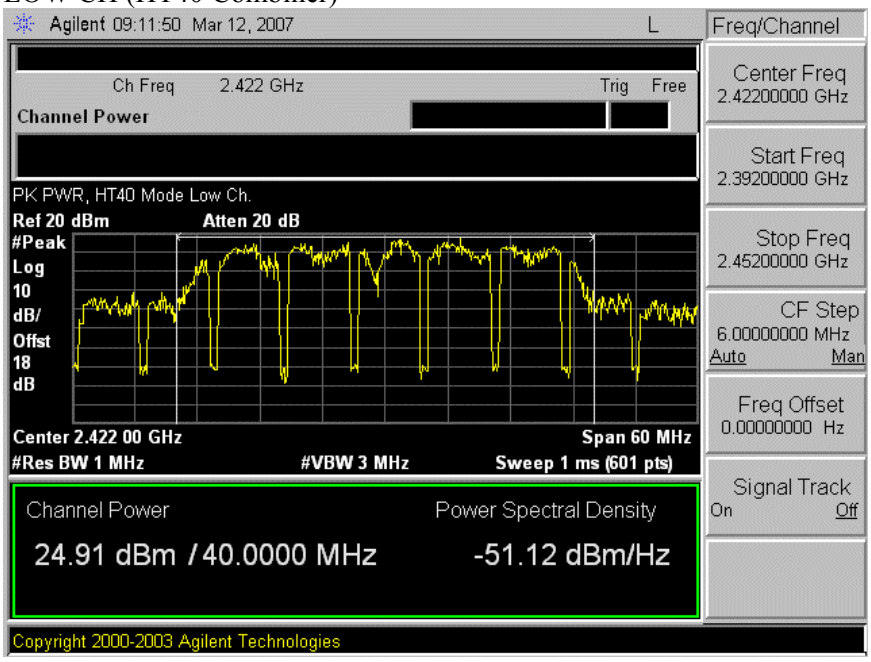


HIGH CH (HT20 Mode Combiner)

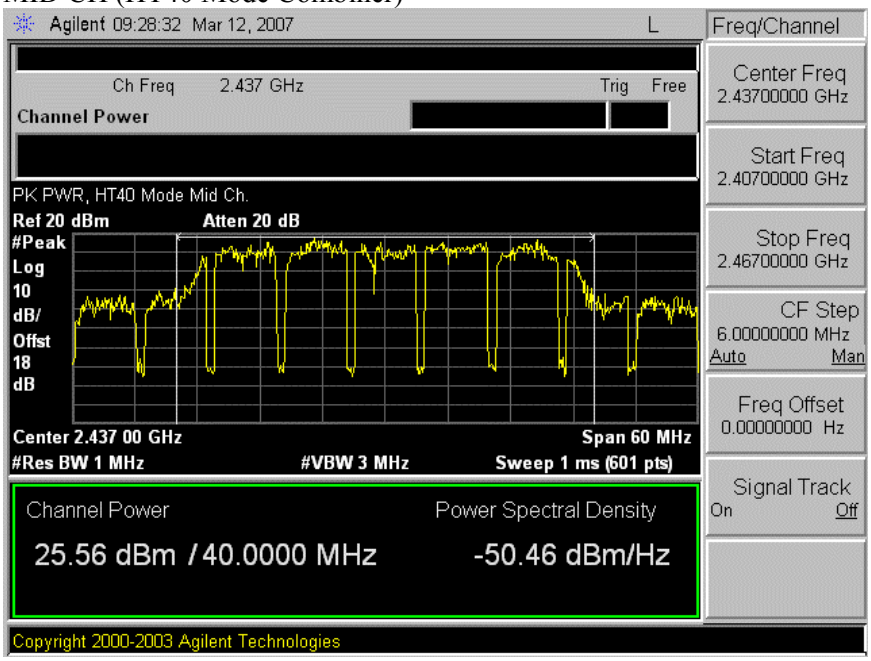


(HT40 MODE COMBINER)

LOW CH (HT40 Combiner)



MID CH (HT40 Mode Combiner)



HIGH CH (HT40 Mode Combiner)