



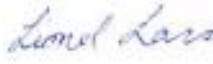
FCC PART 15, SUBPART C TEST AND MEASUREMENT REPORT

For

Actiontec Electronics, Inc.

760 North Mary Avenue,
Sunnyvale, CA 94085, USA

FCC ID: LNQF2250

Report Type: Original Report	Product Type: 802.11 b/g/n xDSL Modem
Prepared By: <u>Lionel Lara</u> 	
Report Number: <u>R1307122-247</u>	
Report Date: <u>2013-09-16</u>	
Reviewed By: <u>Victor Zhang</u>	
EMC/RF Lead	
Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732-9164	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by A2LA*, NIST, or any agency of the Federal Government.

* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “*” (Rev 2)

TABLE OF CONTENTS

1 General Description.....	5
1.1 Product Description for Equipment Under Test (EUT)	5
1.2 Mechanical Description of EUT	5
1.3 Objective.....	5
1.4 Related Submittal(s)/Grant(s)	5
1.5 Test Methodology	5
1.6 Measurement Uncertainty	5
1.7 Test Facility	6
2 System Test Configuration.....	7
2.1 Justification.....	7
2.2 EUT Exercise Software.....	7
2.3 Special Equipment	7
2.4 Equipment Modifications.....	7
2.5 Local Support Equipment	7
2.6 EUT Internal Configuration Details.....	8
2.7 Interface Ports and Cabling.....	8
2.8 Power Supply List and Details.....	8
3 Summary of Test Results	9
4 FCC §15.247 (i) & §2.1091 – RF Exposure.....	10
4.1 Applicable Standard.....	10
4.2 MPE Prediction.....	10
4.3 MPE Results	10
5 FCC §15.203 – Antenna Requirements.....	11
5.1 Applicable Standard.....	11
5.2 Antenna List.....	11
5.3 Result	11
6 FCC §15.207 – AC Line Conducted Emissions	12
6.1 Applicable Standards	12
6.2 Test Setup	12
6.3 Test Procedure	12
6.4 Corrected Amplitude & Margin Calculation.....	13
6.5 Test Equipment List and Details.....	13
6.6 Test Environmental Conditions	13
6.7 Summary of Test Results	13
6.8 Conducted Emissions Test Plots and Data.....	14
7 FCC §2.1051 & §15.247(d) – Spurious Emissions at Antenna Terminals	16
7.1 Applicable Standard.....	16
7.2 Measurement Procedure.....	16
7.3 Test Equipment List and Details.....	16
7.4 Test Environmental Conditions	16
7.5 Test Results.....	16
8 FCC §15.205, §15.209 & §15.247(d) – Spurious Radiated Emissions	29
8.1 Applicable Standard.....	29
8.2 Test Setup	30
8.3 Test Procedure	30
8.4 Corrected Amplitude & Margin Calculation.....	31
8.5 Test Equipment List and Details.....	31
8.6 Test Environmental Conditions	31
8.7 Summary of Test Results	32
8.8 Radiated Emissions Test Data and Plots.....	33

9 FCC§15.247(a)(2) – 6 dB & 99% Emission Bandwidth	45
9.1 Applicable Standard.....	45
9.2 Measurement Procedure.....	45
9.3 Test Equipment List and Details.....	45
9.4 Test Environmental Conditions	45
9.5 Test Results.....	46
10 FCC §15.247(b) – Peak Output Power Measurement	53
10.1 Applicable Standard.....	53
10.2 Measurement Procedure.....	53
10.3 Test Equipment List and Details.....	53
10.4 Test Environmental Conditions	53
10.5 Test Results.....	54
11 FCC §15.247(d) – 100 kHz Bandwidth of Band Edges.....	61
11.1 Applicable Standard.....	61
11.2 Measurement Procedure.....	61
11.3 Test Equipment List and Details.....	61
11.4 Test Environmental Conditions	61
11.5 Test Results.....	61
12 FCC §15.247(e) – Power Spectral Density	66
12.1 Applicable Standard.....	66
12.2 Measurement Procedure.....	66
12.3 Test Equipment List and Details.....	66
12.4 Test Environmental Conditions	66
12.5 Test Results.....	67
13 Exhibit A – FCC Equipment Labeling Requirements.....	74
13.1 FCC ID Label Requirements	74
13.2 FCC ID Label Contents and Location.....	75
14 Exhibit B – Test Setup Photographs	76
14.1 Radiated Emission - Front View.....	76
14.2 Radiated Emission - below 1 GHz Rear View.....	76
14.3 Radiated Emission - above 1 GHz Rear View	77
14.4 Conducted Emission - Front View.....	77
14.5 Conducted Emission - Side View	78
15 Exhibit C – EUT Photographs.....	79
15.1 EUT – Top View.....	79
15.2 EUT – Bottom View	79
15.3 EUT – Left Side View	80
15.4 EUT – Right Side View	80
15.5 EUT – Open View	81
15.6 EUT – Main PCB Component View (w/ shielding)	81
15.7 EUT – Main PCB Component View (w/o shielding)	82
15.8 EUT – Main PCB Solder View (w/shielding).....	82
15.9 EUT – Main PCB Solder View (w/o shielding).....	83
15.10 EUT – AC/DC Adapter	83
15.11 EUT – Antenna View (x2).....	84

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1307122-247	Original Report	2013-09-16

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Actiontec Electronics, Inc.*, and their product FCC ID: LNQF2250, model: *F2250* or the “EUT” as referred on this report is a bonded VDSL2 modem with an 802.11 b/g/n.

1.2 Mechanical Description of EUT

The “EUT” measures approximately 25.5cm (L) x 14.5cm (W) x 4.5cm (H), and weighs approximately 509 g.

The test data gathered are from typical production sample, serial number: SB203320500012 provided by the manufacturer.

1.3 Objective

This report is prepared on behalf of *Actiontec Electronics, Inc.* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15.247 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Conducted Spurious Emissions and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz and FCC KDB 558074 D01 DTS Meas Guidance v03r01: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR16-4-2: 2011, The Treatment of Uncertainty in EMC Measurements, the values ranging from ± 2.0 dB for Conducted Emissions tests and ± 4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

1.7 Test Facility

Bay Area Compliance Laboratories Corp. (BACL) is:

- 1- An independent Commercial Test Laboratory accredited to **ISO 17025:2005** by **A2LA**, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.
- 2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminaires and Computers.
- 3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC (Industry Canada), Korea (Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.
- 4- A Product Certification Body accredited to **ISO Guide 65:1996** by **A2LA** to certify:
 - 1- Unlicensed, Licensed radio frequency devices and Telephone Terminal Equipment for the FCC. Scope A1, A2, A3, A4, B1, B2, B3, B4 & C.
 2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.
 3. Radio Communication Equipment for Singapore.
 4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.
 5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).
 6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (Including GU24s), Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2009, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

<http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b>

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2009 and FCC KDB 558074 D01 DTS Meas Guidance v03r01.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

The EUT had been tested with the following data rate settings (worst case):

Radio Mode	Bandwidth (MHz)	Frequency/Data Rate		
		Low CH (MHz/Mbps)	Mid CH (MHz/Mbps)	High CH (MHz)
802.11b	20	2412/1	2437/1	2462/1
802.11g	20	2412/6	2437/6	2462/6
802.11n-HT20 MIMO	20	2412/MCS0	2437/MCS0	2462/MCS0
802.11n-HT40 MIMO	40	2422/MCS0	2437/MCS0	2452/MCS0

2.2 EUT Exercise Software

The test utility used was Hyper Terminal was provided by the client and was verified by Lionel Lara to comply with the standard requirements being tested against.

2.3 Special Equipment

There were no special accessories were required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model No.	Serial No.
DELL	Laptop	Latitude D600	-
Lenovo	Laptop	0679	-

2.6 EUT Internal Configuration Details

Manufacturers	Descriptions	Models	Serial Number
Actiontec Electronics, Inc.	Main PCB	F2250	SB203320500012

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
Ethernet	> 1	EUT	Laptop

2.8 Power Supply List and Details

Manufacturer	Description	Model	Serial Number
Actiontec Electronics, Inc.	Power Adapter	STD-12018U1	K2442999

3 Summary of Test Results

Results reported relate only to the product tested.

FCC Rules	Description of Test	Results
FCC §15.247(i), §2.1091	RF Exposure	Compliant
FCC §15.203	Antenna Requirement	Compliant
FCC §15.207(a)	AC Line Conducted Emissions	Compliant
FCC §15.247 (d)	Spurious Emissions at Antenna Port	Compliant
FCC §15.205	Restricted Bands	Compliant
FCC §15.209, §15.247(d)	Radiated Spurious Emissions	Compliant
FCC §15.247(a)(2)	6 dB Emission Bandwidth	Compliant
FCC §15.247(b)(3)	Maximum Peak Output Power	Compliant
FCC §15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
FCC §15.247(e)	Power Spectral Density	Compliant

4 FCC §15.247 (i) & §2.1091 – RF Exposure

4.1 Applicable Standard

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* (100)	30
1.34-30	824/f	2.19/f	* (180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Before equipment certification is granted, the procedure of IC RSS-102 must be followed concerning the exposure of humans to RF fields.

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

4.3 MPE Results

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>28.03</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>635.33</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>2437</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>1.8</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>1.51</u>
<u>Power density of prediction frequency at 20 cm (mW/cm²):</u>	<u>0.191</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u>	<u>1.0</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.191 mW/cm², limit is 1.0 mW/cm².

5 FCC §15.203 – Antenna Requirements

5.1 Applicable Standard

According to FCC §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.2 Antenna List

Manufacturers	Models/Name	Antenna Gain (dBi) @ 2.4 GHz
Airgain	N2420S	1.8

5.3 Result

The EUT has maximum gain of 1.8 dBi antenna, which in accordance to sections FCC Part 15.203, is considered sufficient to comply with the provisions of these sections. Please refer to the EUT photos.

6 FCC §15.207 – AC Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 Conducted limits:

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

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

**Decreases with the logarithm of the frequency.*

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2009 measurement procedure. The specification used was FCC §15.207 limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

6.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

6.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

$$CA = Ai + AF + CL + Atten - Ga$$

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corrected Amplitude} - \text{Limit}$$

6.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-03-28	1 year
Solar Electronics	LISN	9252-R-24-BNC	511205	2013-06-25	1 year
TTE	Filter, High Pass	H985-150k-50- 720N	M1149	2013-05-30	1 year

Statement of Traceability: *BACL Corp.* attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

6.6 Test Environmental Conditions

Temperature:	20 °C
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

The testing was performed by Lionel Lara on 2013-09-09 at 5m chamber 3.

6.7 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC standard's conducted emissions limits, with the margin reading of:

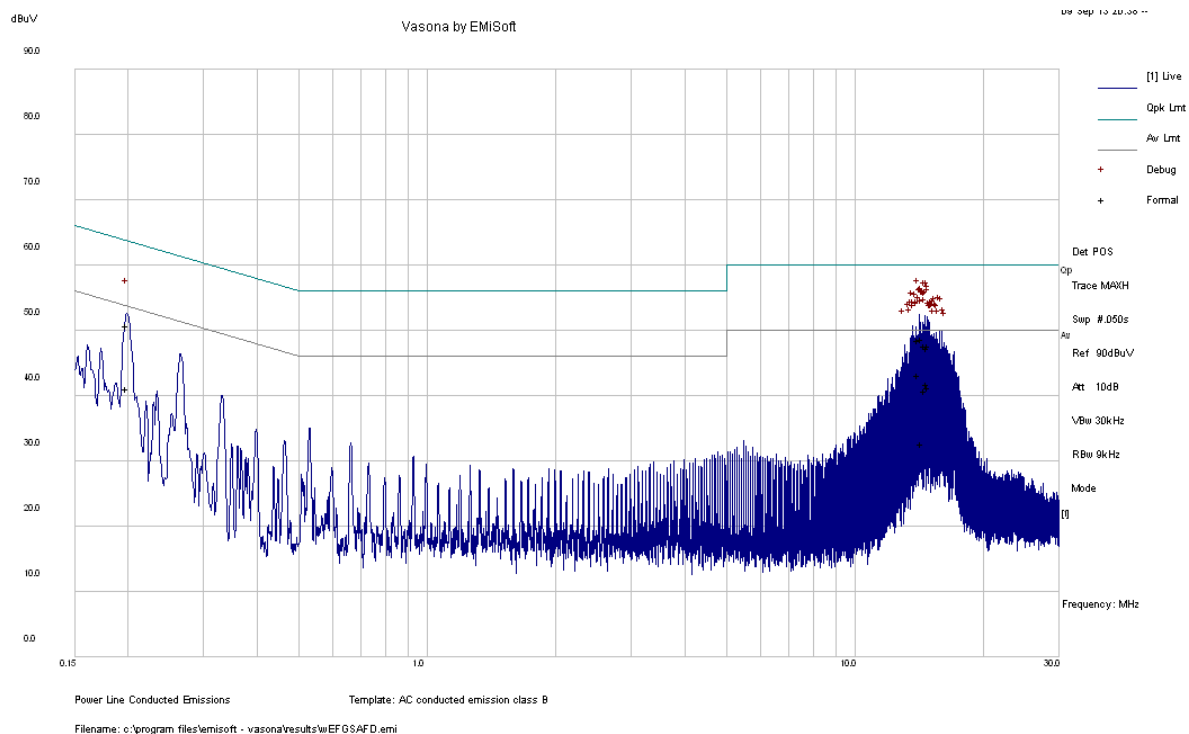
Transmitting Mode: Worst case with 2.4 GHz operating:

Connection: Connected to 120 V/60 Hz, AC			
Margin (dB)	Frequency (MHz)	Conductor Mode (Line/Neutral)	Range (MHz)
-6.34	14.22524	Neutral	0.15 - 30

6.8 Conducted Emissions Test Plots and Data

Transmitting Mode: Worst case with 2.4 GHz operating:

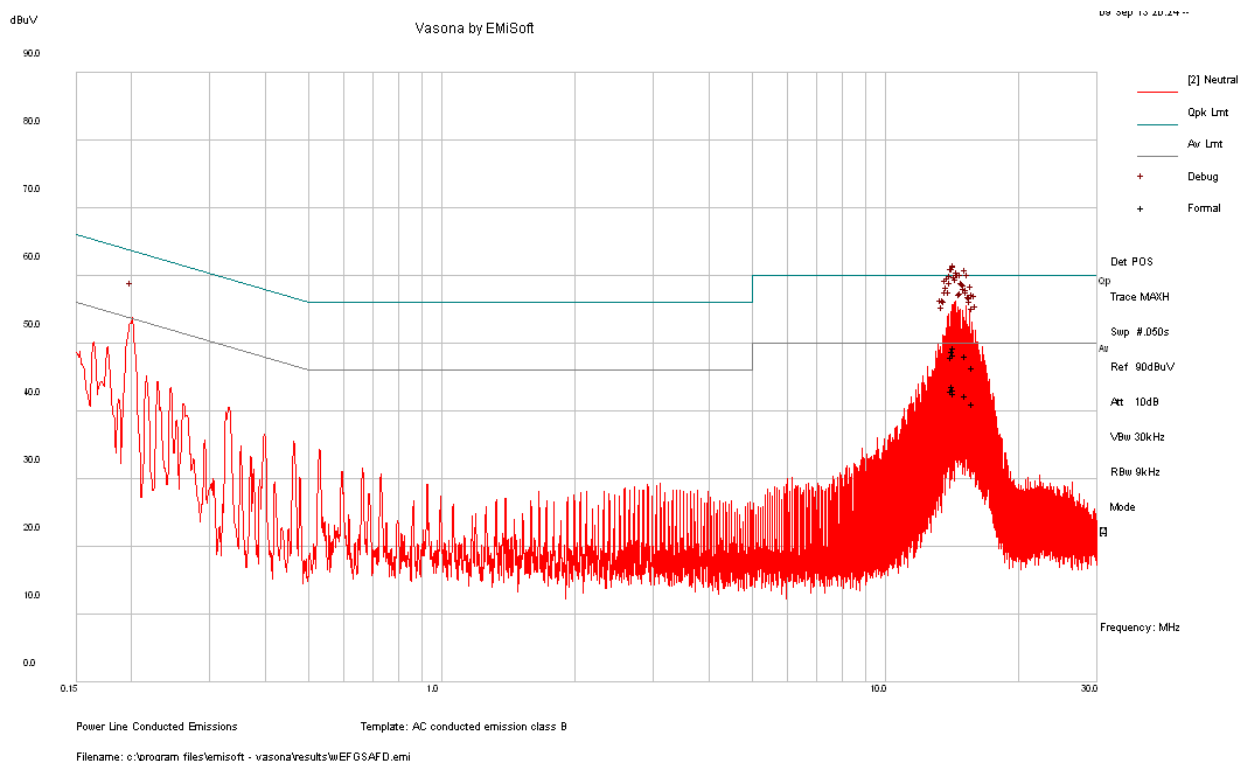
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
14.34817	48.7	Line	60	-11.30	QP
14.09399	48.57	Line	60	-11.43	QP
14.81586	47.74	Line	60	-12.26	QP
14.55173	47.68	Line	60	-12.32	QP
14.75129	47.3	Line	60	-12.70	QP
0.199236	50.76	Line	63.64	-12.88	QP

Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
14.09399	43.14	Line	50	-6.86	Ave.
14.75129	41.8	Line	50	-8.20	Ave.
14.81586	41.28	Line	50	-8.72	Ave.
14.55173	40.73	Line	50	-9.27	Ave.
0.199236	41.21	Line	53.64	-12.44	Ave.
14.34817	32.69	Line	50	-17.31	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
14.28895	49.43	Neutral	60	-10.57	QP
14.22524	48.93	Neutral	60	-11.07	QP
14.35885	48.36	Neutral	60	-11.64	QP
15.21698	48.25	Neutral	60	-11.75	QP
14.16011	48.04	Neutral	60	-11.96	QP
15.81294	46.49	Neutral	60	-13.51	QP

Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
14.22524	43.66	Neutral	50	-6.34	Ave.
14.35885	43.23	Neutral	50	-6.77	Ave.
14.16011	42.96	Neutral	50	-7.04	Ave.
14.28895	42.71	Neutral	50	-7.29	Ave.
15.21698	42.26	Neutral	50	-7.74	Ave.
15.81294	41.09	Neutral	50	-8.91	Ave.

7 FCC §2.1051 & §15.247(d) – Spurious Emissions at Antenna Terminals

7.1 Applicable Standard

For FCC §15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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.

7.2 Measurement Procedure

The measurements are base on FCC KDB 558074 D01 DTS Meas Guidance v03r01: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 11: Emissions in non-restricted frequency bands and section 12: Emissions in restricted frequency bands.

7.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2012-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

7.4 Test Environmental Conditions

Temperature:	20 °C
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

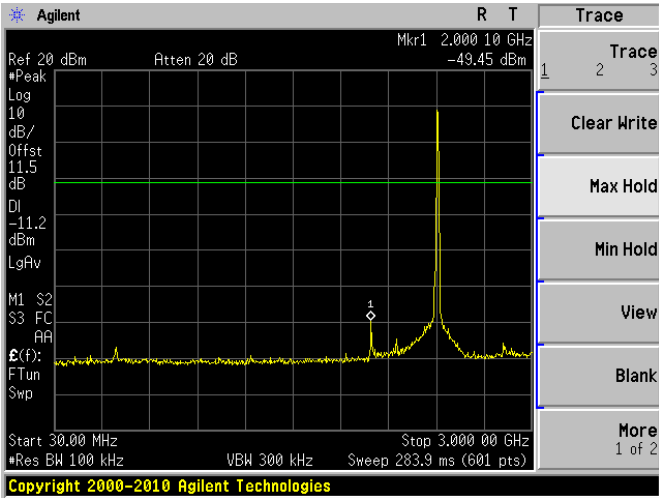
The testing was performed by Lionel Lara on 2013-09-09 at the RF test site.

7.5 Test Results

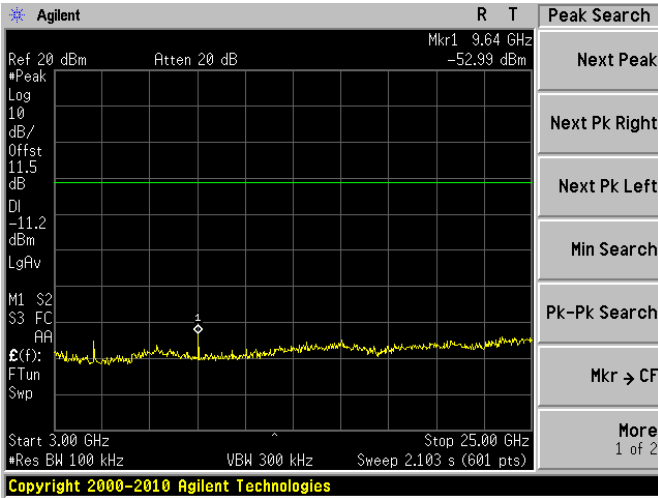
Please refer to following plots of spurious emissions.

802.11b, Low Channel, 2412 MHz

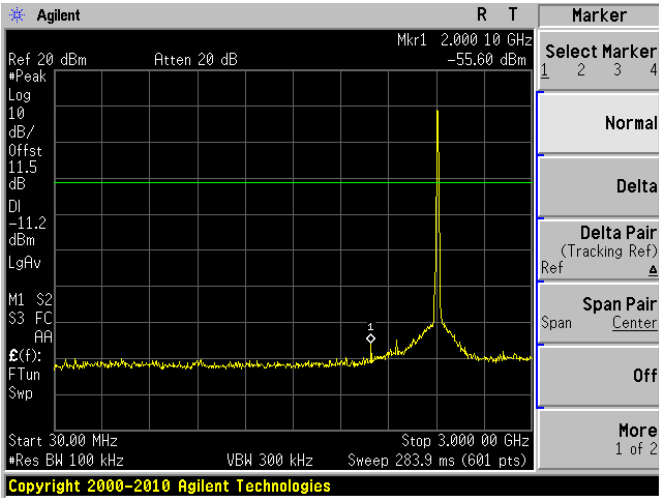
C0, 30MHz to 3GHz



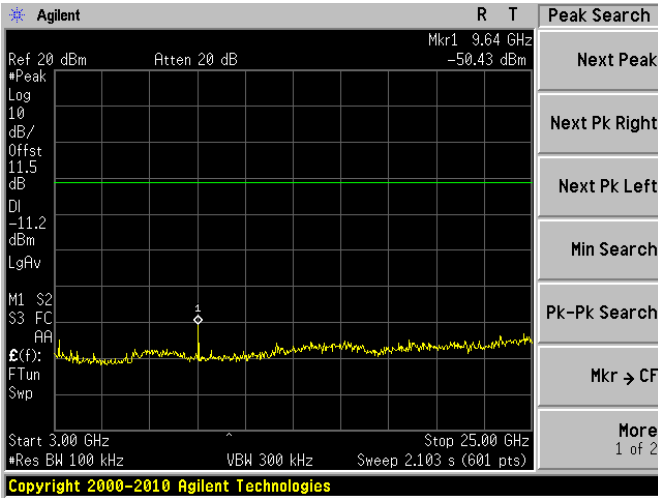
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz

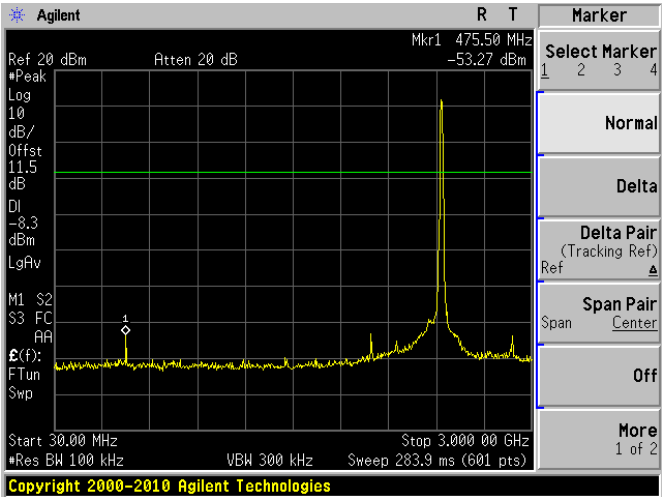


C1, 3GHz to 25GHz

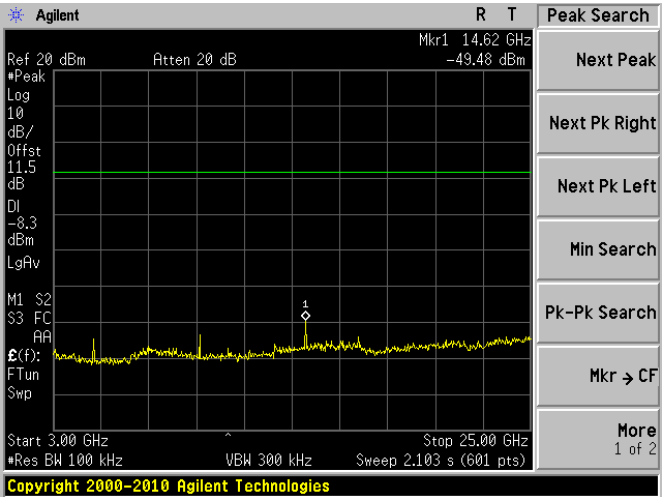


802.11b, Middle Channel, 2437 MHz

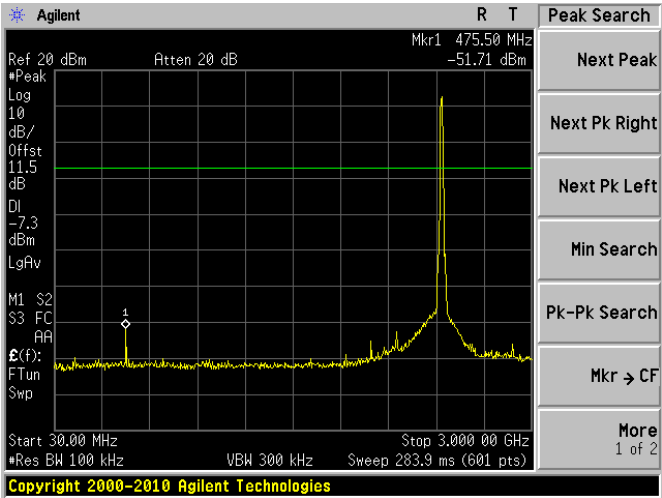
C0, 30MHz to 3GHz



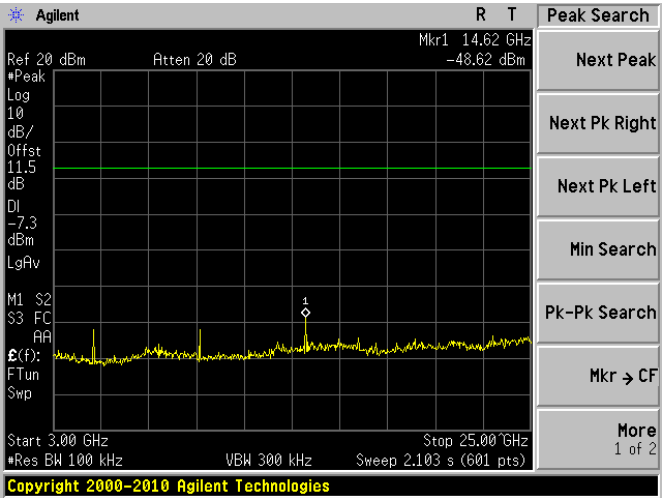
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz

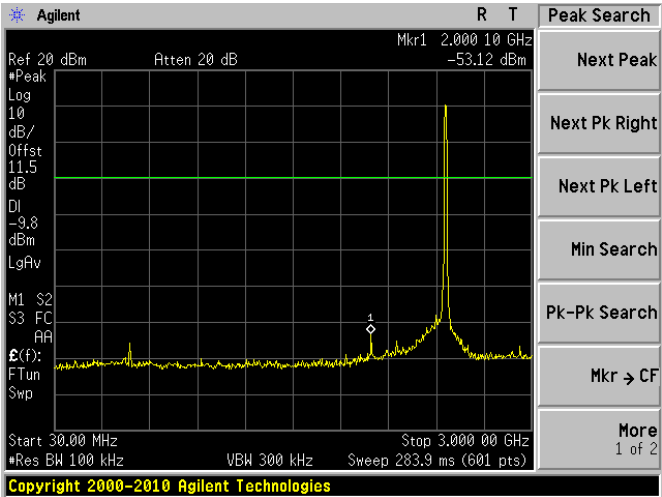


C1, 3GHz to 25GHz

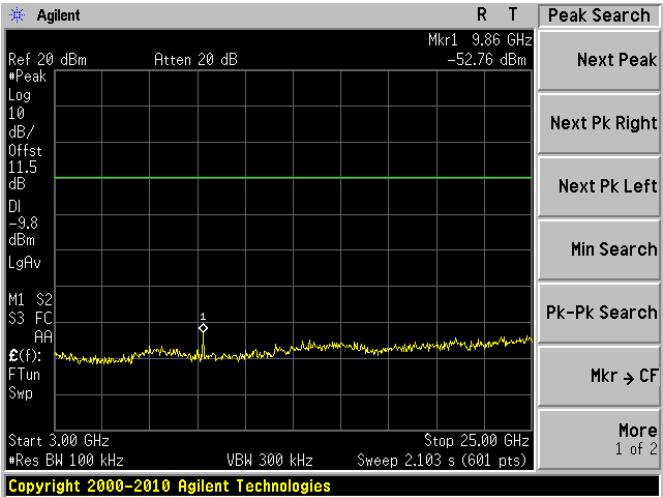


802.11b, High Channel, 2462 MHz

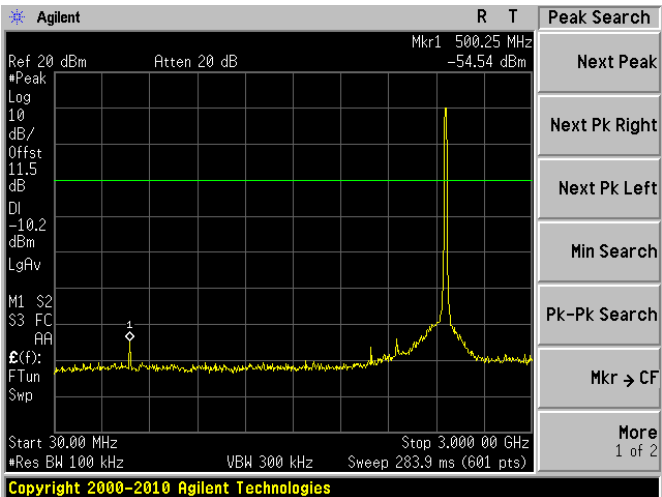
C0, 30MHz to 3GHz



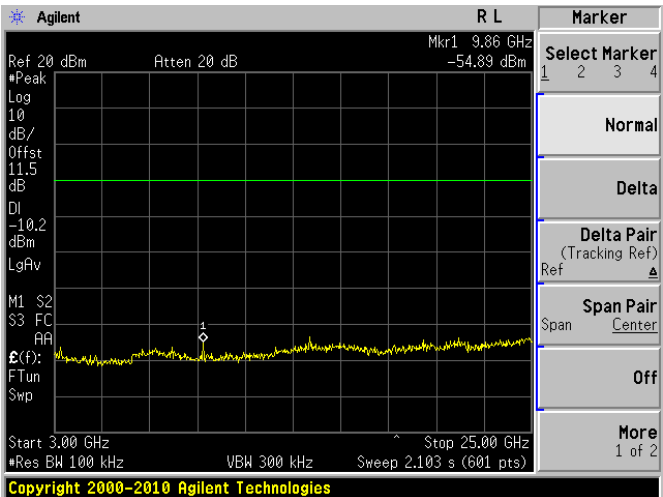
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz

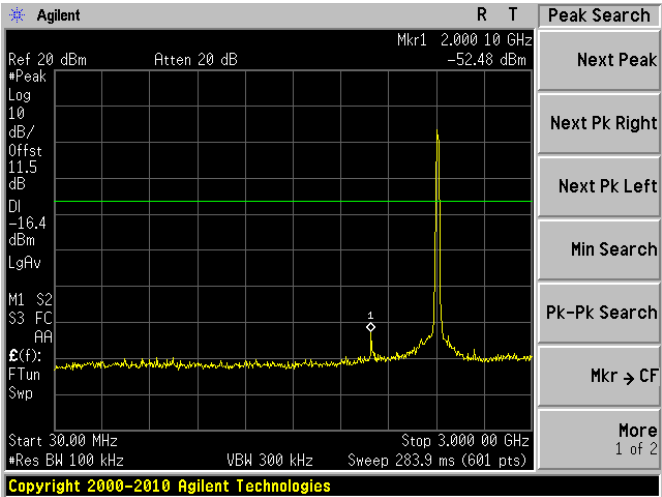


C1, 3GHz to 25GHz

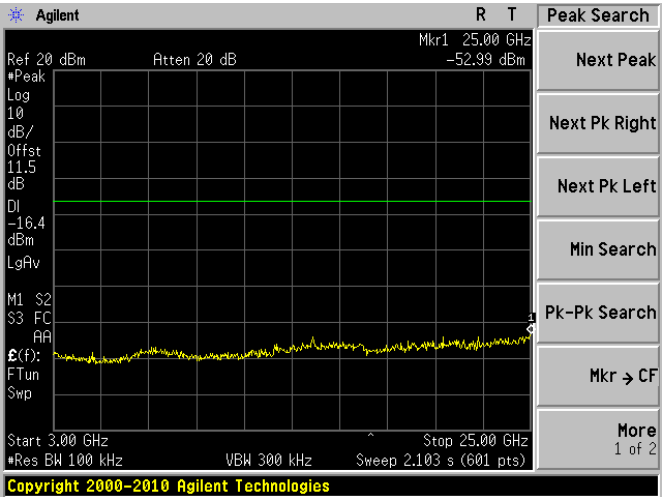


802.11g, Low Channel, 2412 MHz

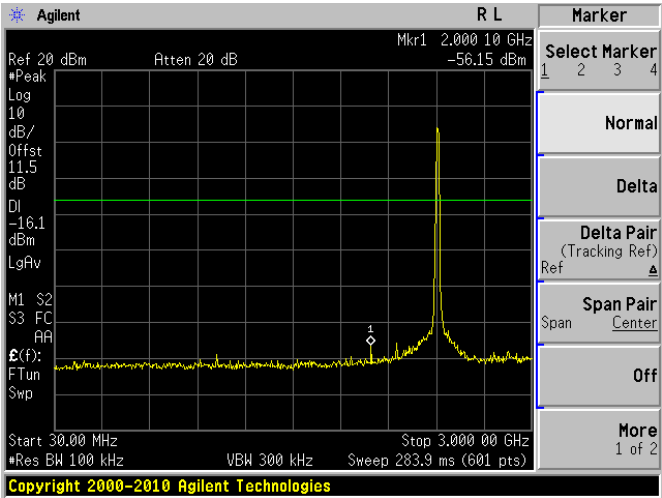
C0, 30MHz to 3GHz



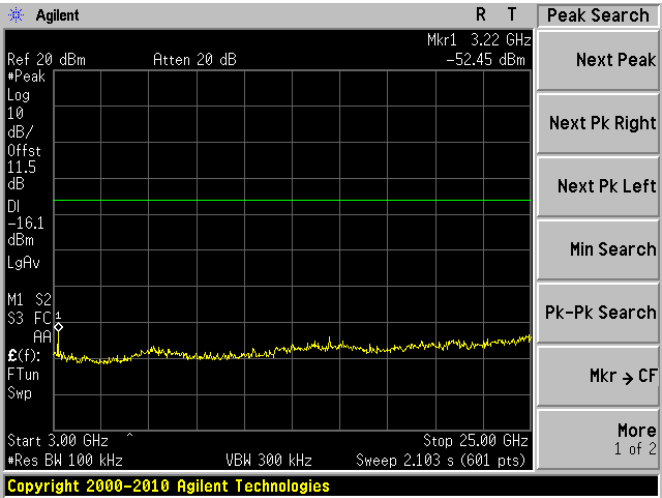
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz

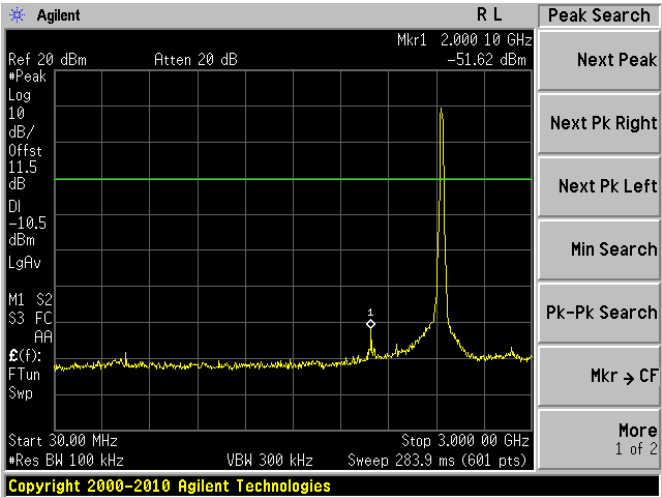


C1, 3GHz to 25GHz

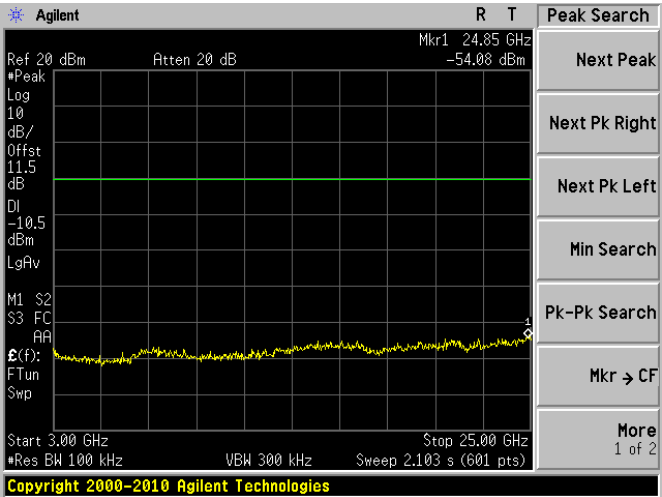


802.11g, Middle Channel, 2437 MHz

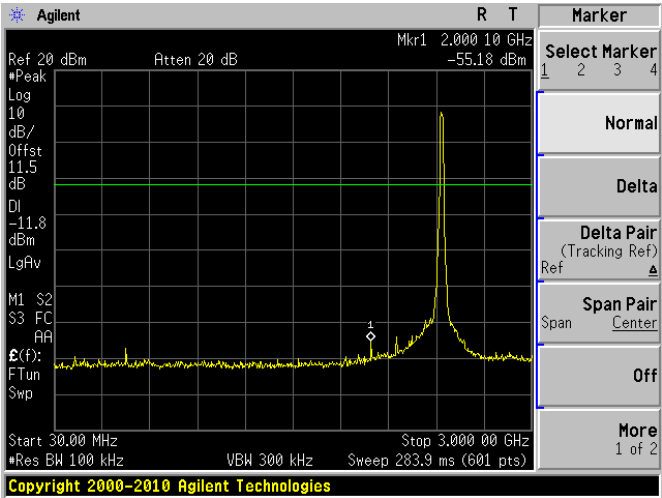
C0, 30MHz to 3GHz



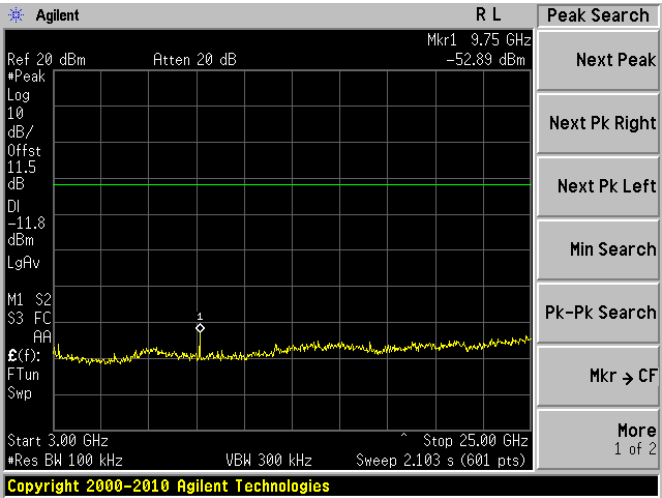
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz

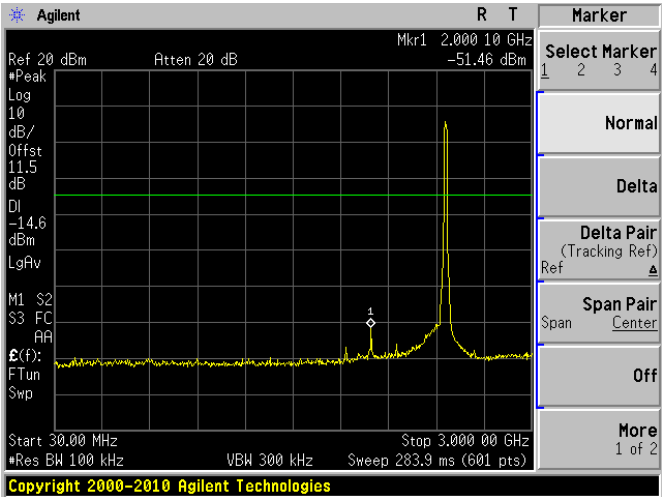


C1, 3GHz to 25GHz

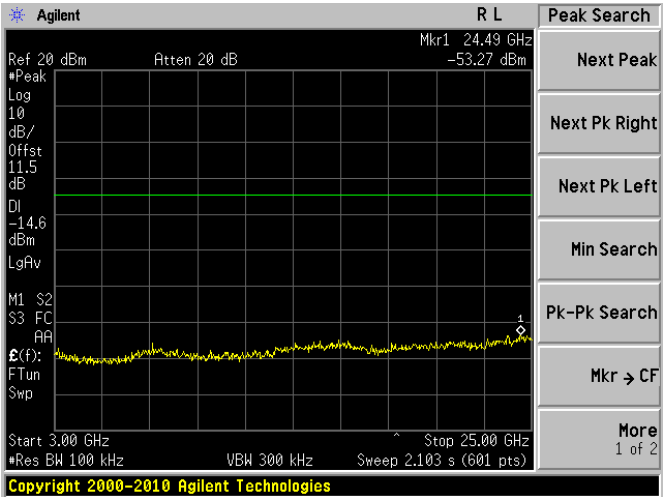


802.11g, High Channel, 2462 MHz

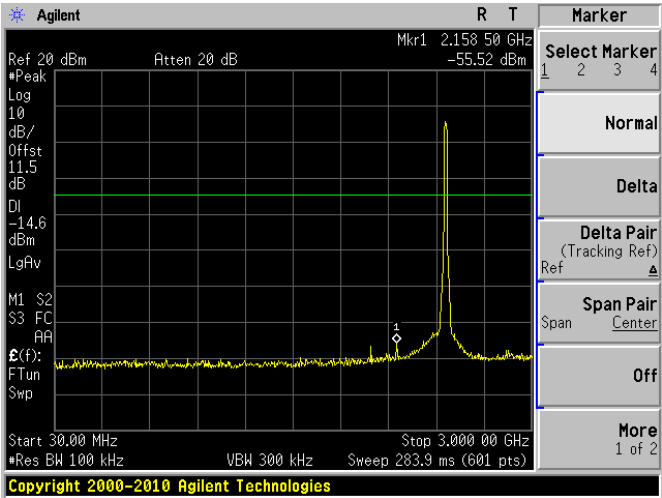
C0, 30MHz to 3GHz



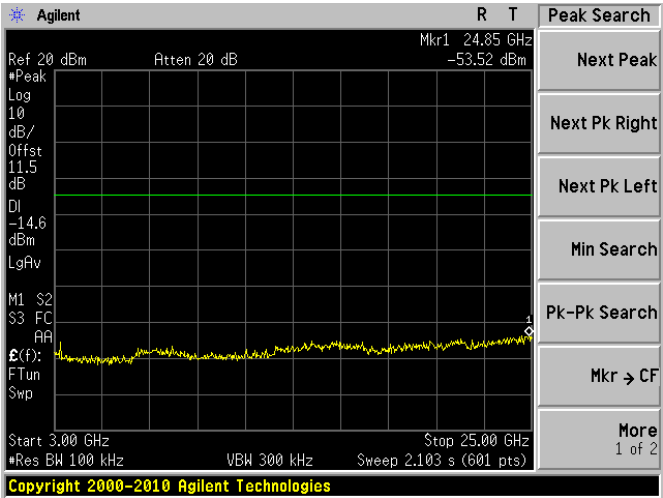
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz

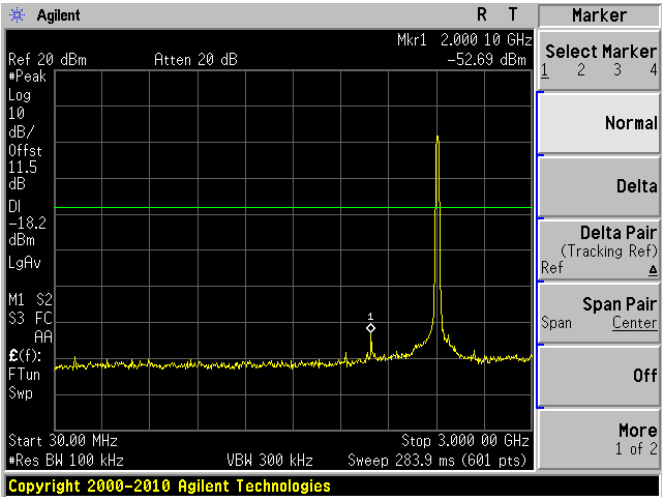


C1, 3GHz to 25GHz

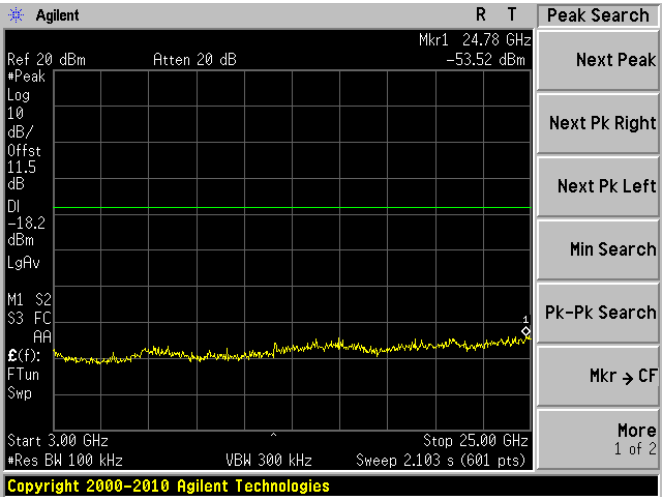


802.11n-HT20, Low Channel, 2412 MHz

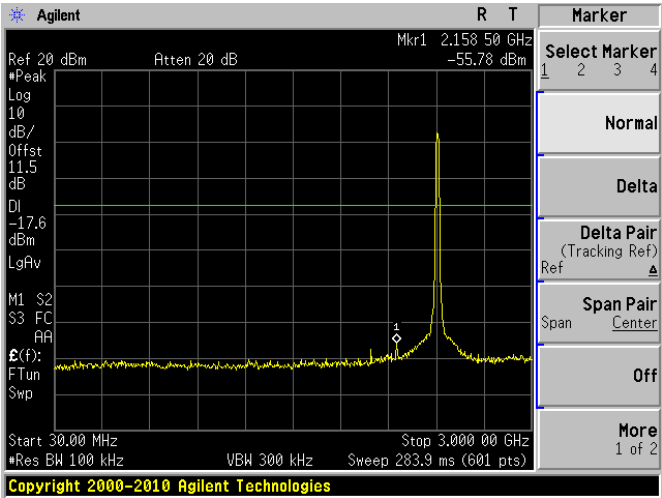
C0, 30MHz to 3GHz



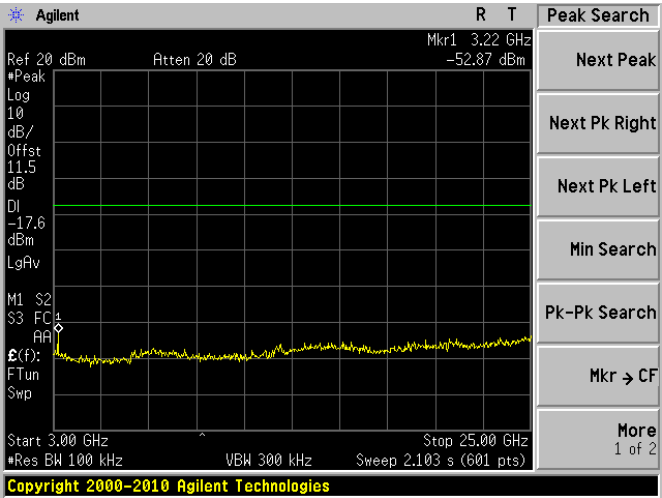
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz

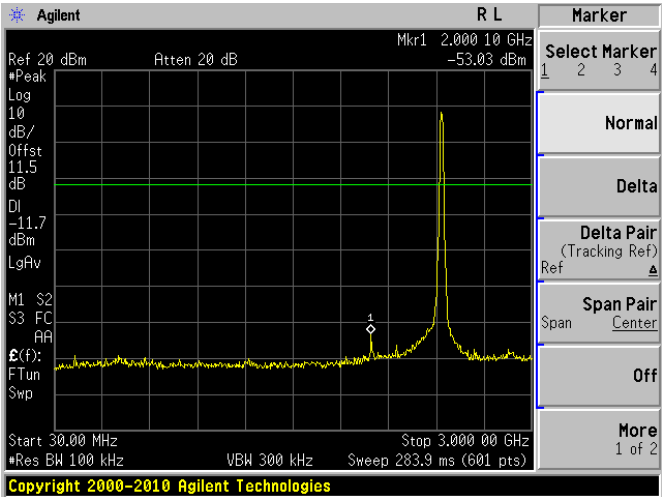


C1, 3GHz to 25GHz

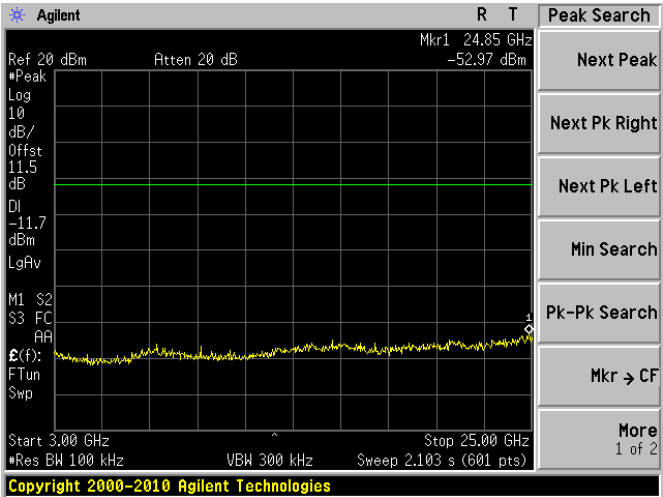


802.11n HT20, Middle Channel, 2437 MHz

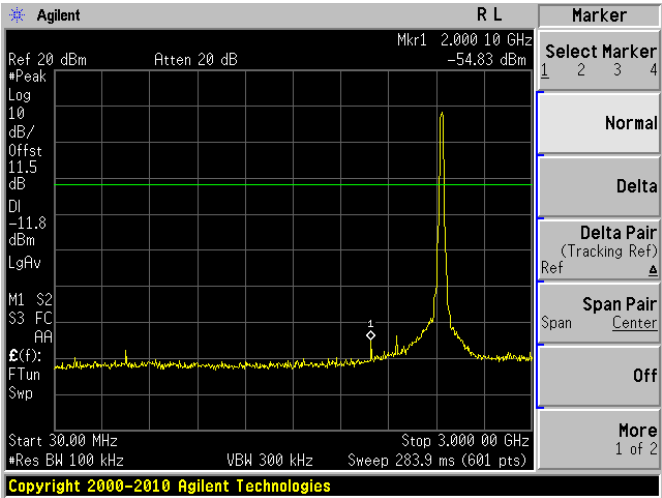
C0, 30MHz to 3GHz



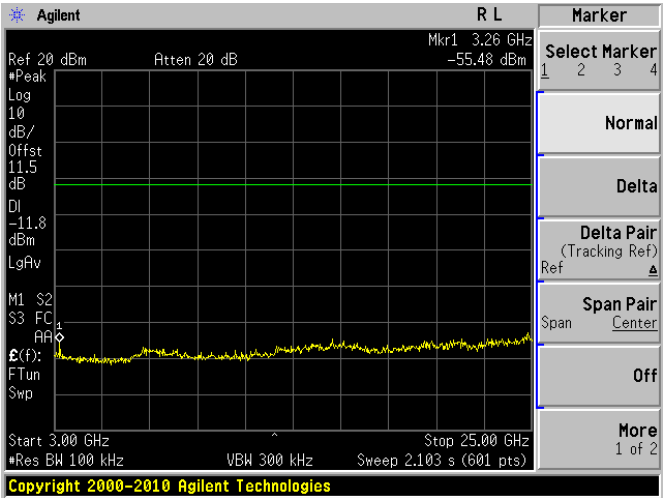
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz

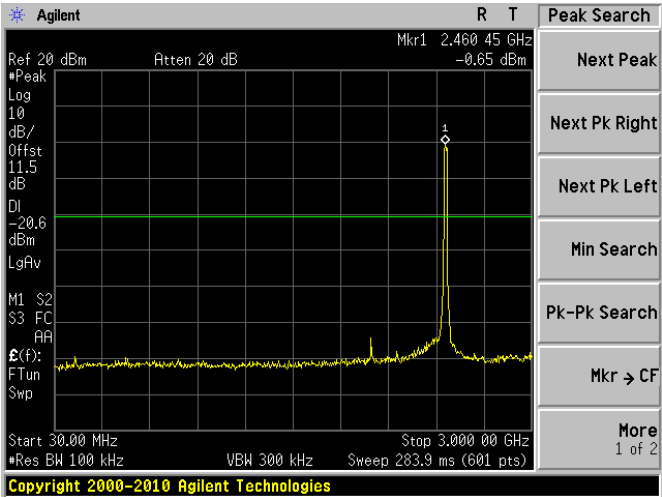


C1, 3GHz to 25GHz

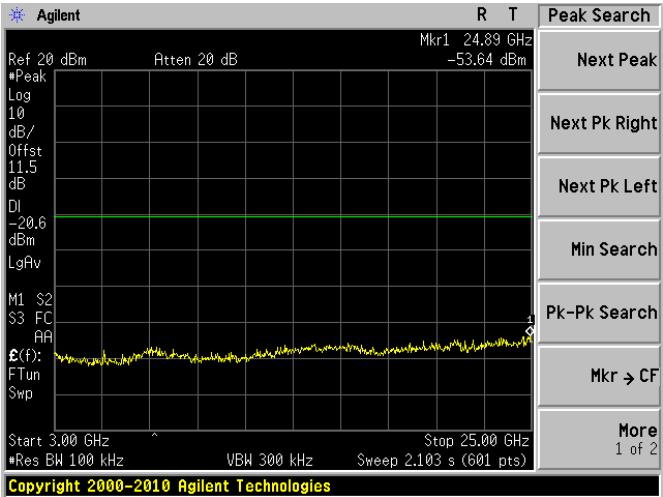


802.11n-HT20, High Channel, 2462 MHz

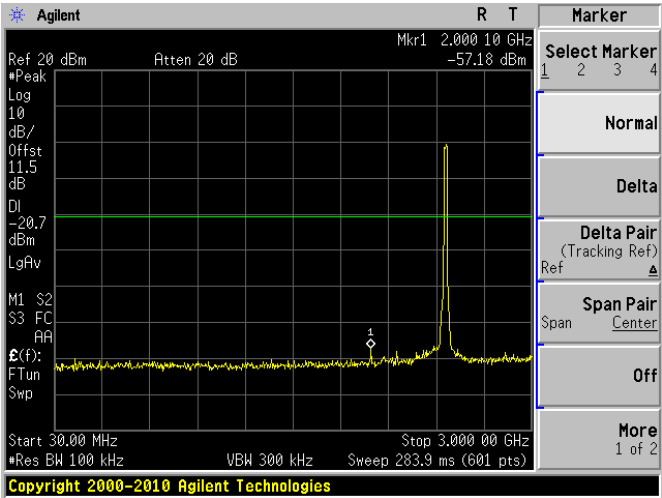
C0, 30MHz to 3GHz



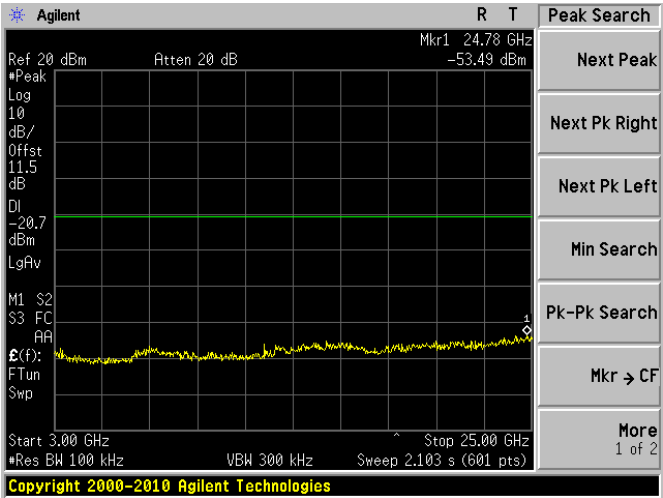
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz

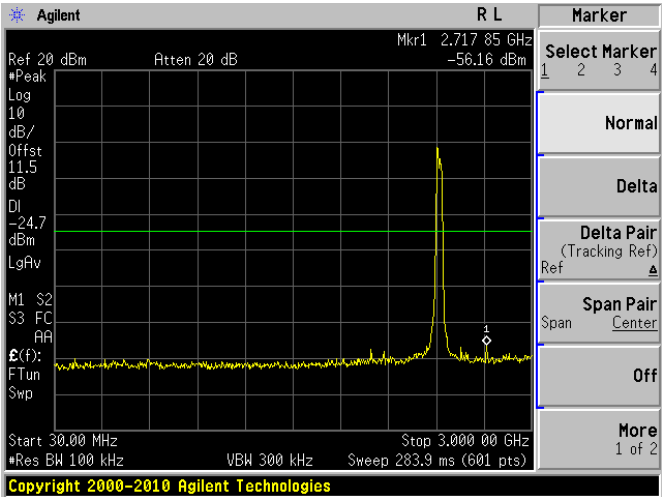


C1, 3GHz to 25GHz

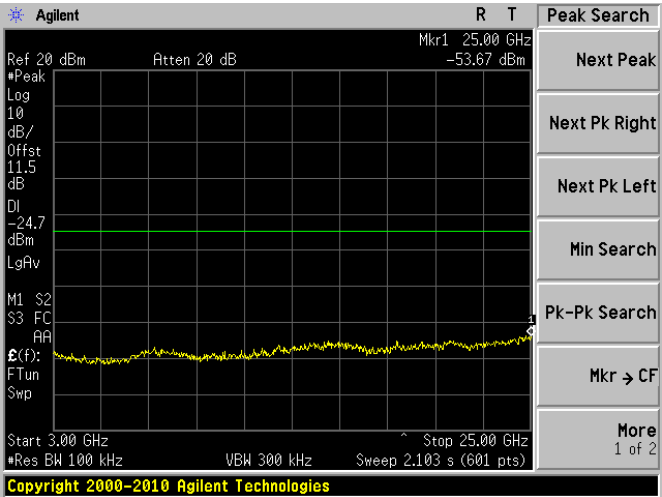


802.11n-HT40, Low Channel, 2422 MHz

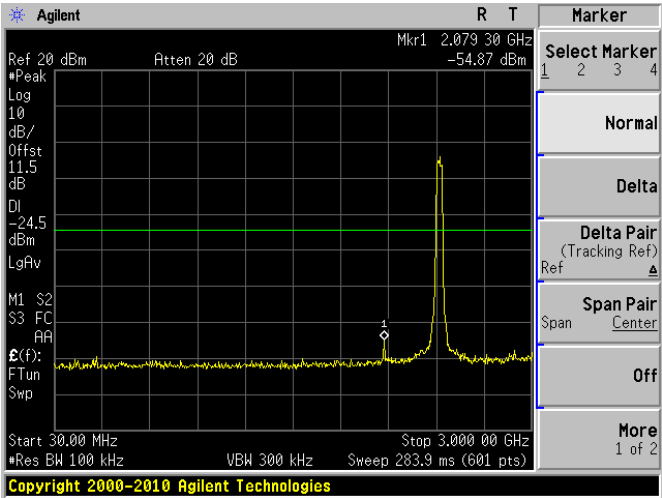
C0, 30MHz to 3GHz



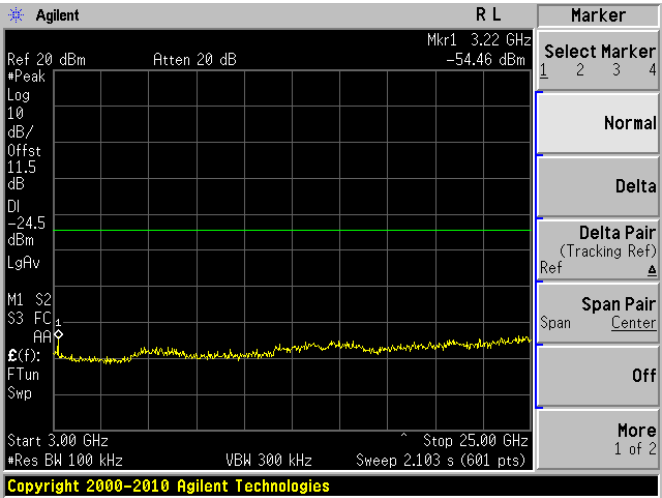
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz

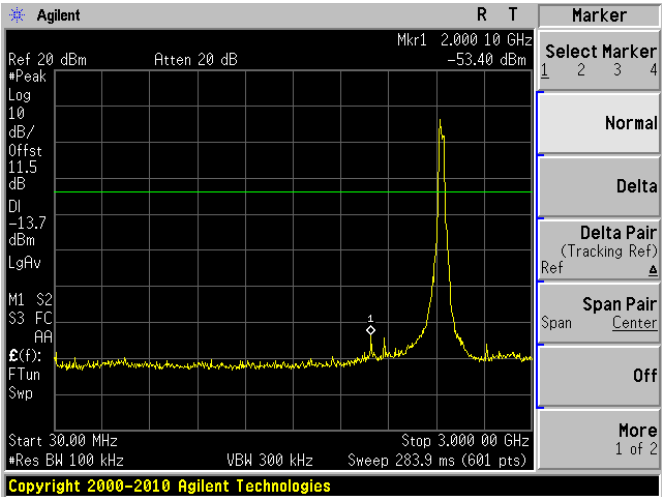


C1, 3GHz to 25GHz

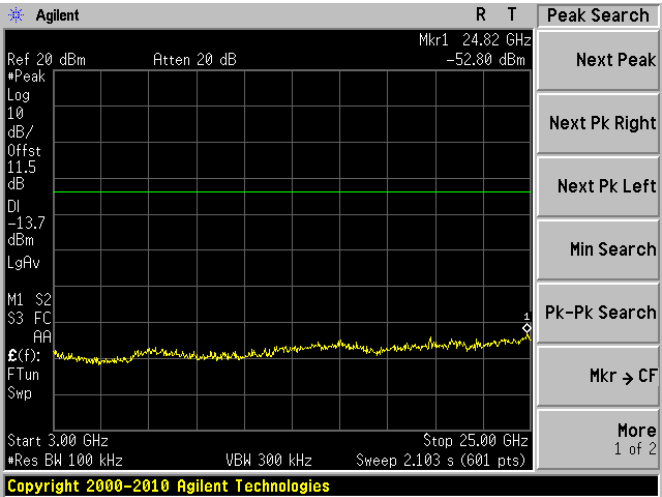


802.11n-HT40, Middle Channel, 2437 MHz

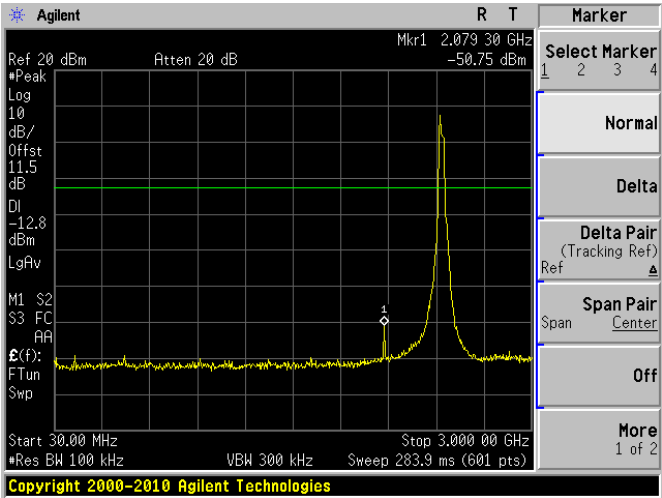
C0, 30MHz to 3GHz



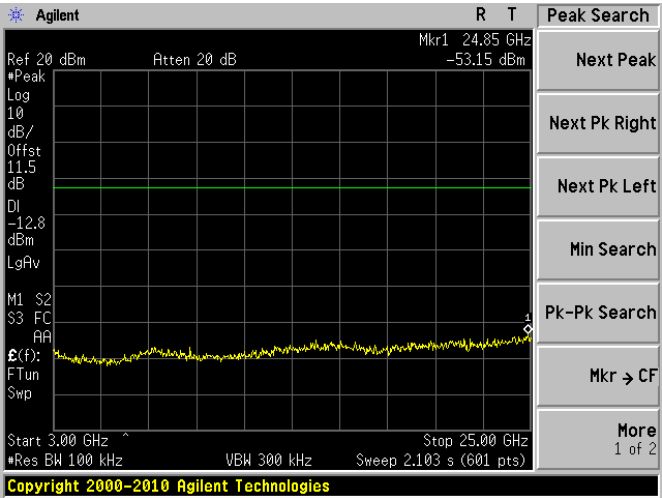
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz

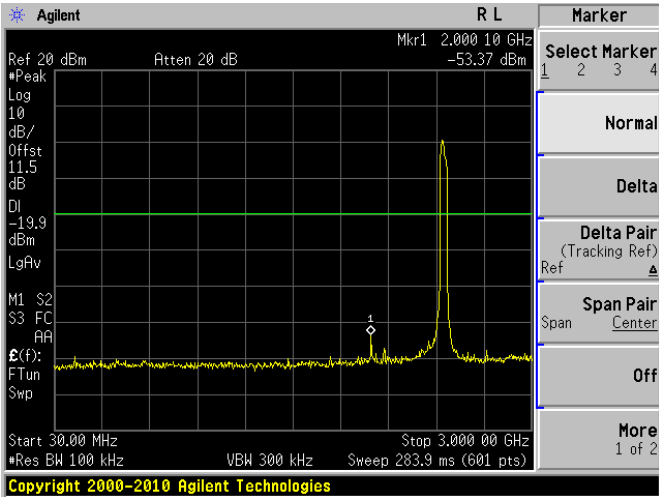


C1, 3GHz to 25GHz

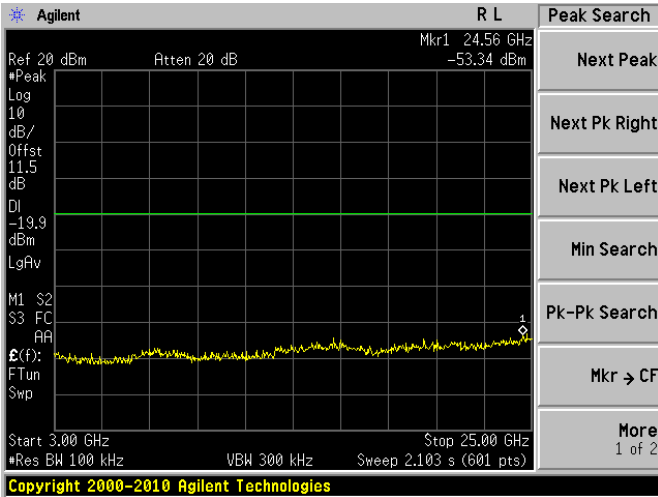


802.11n-HT40, High Channel, 2452 MHz

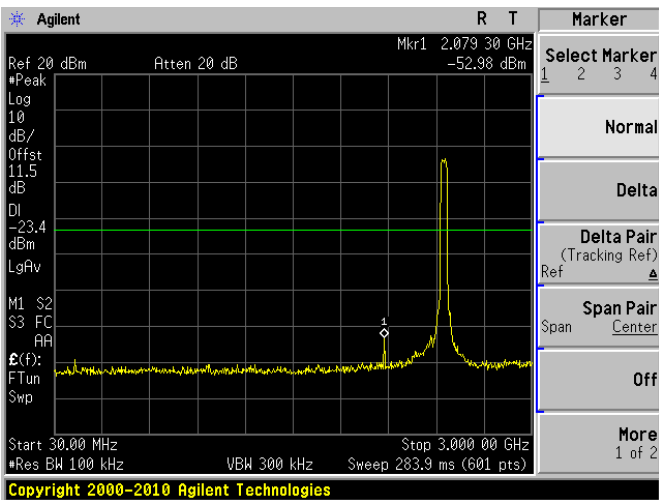
C0, 30MHz to 3GHz



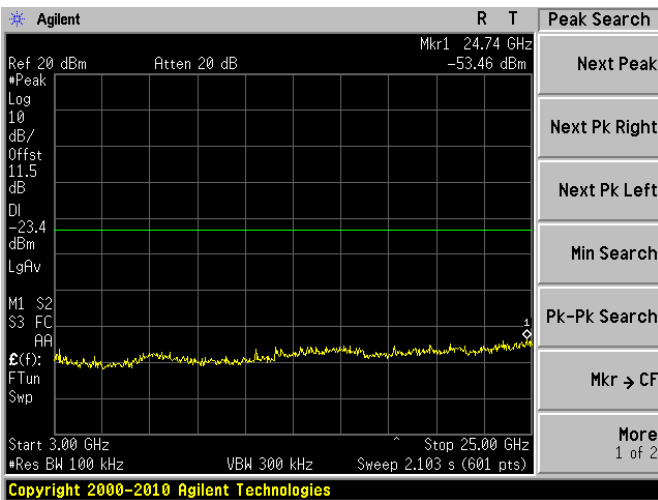
C0, 3GHz to 25GHz



C1, 30MHz to 3GHz



C1, 3GHz to 25GHz



8 FCC §15.205, §15.209 & §15.247(d) – Spurious Radiated Emissions

8.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §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 (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** 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.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5.35 – 5.46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 – 167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3.3458 – 3.358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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 §15.205(c)).

8.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2009. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 3 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

8.3 Test Procedure

The measurements are base on FCC KDB 558074 D01 DTS Meas Guidance v03r01: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 11: Emissions in non-restricted frequency bands and section 12: Emissions in restricted frequency bands. As well as ANSI C63.4: 2009 as described below:

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

Above 1000 MHz:

- (1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
- (2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

8.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

$$CA = Ai + AF + CL + Atten - Ga$$

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corrected Amplitude} - \text{Limit}$$

8.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2012-10-16	1 year
EMCO	Antenna, Horn	3115	9511-4627	2012-10-17	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2013-05-09	1 year
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100337	2013-03-28	1 year
Sunol Sciences	Antenna, Biconi-Log	JB3	A020106-2	2013-08-12	1 year
HP	Pre-amplifier	8447D	2944A06639	2013-06-09	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

8.6 Test Environmental Conditions

Temperature:	20-23 °C
Relative Humidity:	51-59 %
ATM Pressure:	101.1-101.8 kPa

The testing was performed by Lionel Lara on 2013-08-28 to 2013-09-09 at 5m chamber 3.

8.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15C standard's radiated emissions limits, and had the worst margin of:

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Mode, Channel
-5.28	241.9852	Horizontal	802.11n-HT20, Middle

1-25 GHz:

Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Mode, Channel
-0.12	2390	Horizontal	802.11n-HT20, Low

Please refer to the following table and plots for specific test result details.

8.8 Radiated Emissions Test Data and Plots

1) 30 MHz–1 GHz, Measured at 3 meters, Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)
802.11b mode, Low Channel						
875.1055	29.37	125	H	281	46	-16.63
499.9745	38.48	147	H	220	46	-7.52
241.9933	40.45	99	H	138	46	-5.55
802.11b mode, Middle Channel						
875.012	38.87	126	H	280	46	-7.13
500.0019	39.98	148	H	221	46	-6.02
241.9843	40.69	100	H	139	46	-5.31
802.11b mode, High Channel						
875.015	38.91	126	H	280	46	-7.09
500.0018	39.88	148	H	221	46	-6.12
241.9855	40.55	100	H	139	46	-5.45

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)
802.11g mode, Low Channel						
875.006	38.94	126	H	280	46	-7.06
499.974	38.61	148	H	221	46	-7.39
241.9932	40.36	100	H	139	46	-5.64
802.11g mode, Middle Channel						
875.011	38.92	126	H	280	46	-7.08
500.0017	39.95	148	H	221	46	-6.05
241.9844	40.71	100	H	139	46	-5.29
802.11g mode, High Channel						
875.0186	39	126	H	280	46	-7
500.0019	39.79	148	H	221	46	-6.21
241.9855	40.51	100	H	139	46	-5.49

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)
802.11n-HT20 mode, Low Channel						
875.0082	38.94	126	H	280	46	-7.06
499.9755	38.38	148	H	221	46	-7.62
241.9939	40.46	100	H	139	46	-5.54
802.11n-HT20 mode, Middle Channel						
875.0066	38.88	126	H	280	46	-7.12
500.0022	40.04	148	H	221	46	-5.96
241.9852	40.72	100	H	139	46	-5.28
802.11n-HT20 mode, High Channel						
875.0195	38.99	126	H	280	46	-7.01
500.0026	39.94	148	H	221	46	-6.06
241.9841	40.6	100	H	139	46	-5.4

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)
802.11n-HT40 mode, Low Channel						
875.0082	38.9	126	H	280	46	-7.1
499.9744	38.4	148	H	221	46	-7.6
241.9919	40.48	100	H	139	46	-5.52
802.11n-HT40 mode, Middle Channel						
875.0067	38.95	126	H	280	46	-7.05
500.0034	39.91	148	H	221	46	-6.09
241.9827	40.7	100	H	139	46	-5.3
802.11n-HT40 mode, High Channel						
875.022	38.94	126	H	280	46	-7.06
500.0018	39.95	148	H	221	46	-6.05
241.9851	40.54	100	H	139	46	-5.46

2) 1–25 GHz, Measured at 3 meters

802.11b mode

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	77.13	200	100	V	28.96	2.94	0	109.03	-	-	Peak/ Fund
2412	82.57	260	100	H	28.96	2.94	0	114.47	-	-	Peak/ Fund
2412	71.95	200	100	V	28.96	2.94	0	103.85	-	-	Ave/ Fund
2412	77.5	260	100	H	28.96	2.94	0	109.4	-	-	Ave/ Fund
4824	38.08	350	100	V	33.08	4.06	27.7	47.52	74	-26.48	Peak
4824	35.9	45	116	H	33.08	4.06	27.7	45.34	74	-28.66	Peak
4824	32.47	350	100	V	33.08	4.06	27.7	41.91	54	-12.09	Ave
4824	27.6	45	116	H	33.08	4.06	27.7	37.04	54	-16.96	Ave
7236	39.32	333	163	V	35.93	4.93	27.58	52.6	74	-21.4	Peak
7236	34.34	0	158	H	35.93	4.93	27.58	47.62	74	-26.38	Peak
7236	32.14	333	163	V	35.93	4.93	27.58	45.42	54	-8.58	Ave
7236	21.84	0	158	H	35.93	4.93	27.58	35.12	54	-18.88	Ave
9648	50	328	135	V	37.95	5.82	27.02	66.75	89.03	-22.28	Peak
9648	42.98	196	124	H	37.95	5.82	27.02	59.73	94.47	-34.74	Peak
9648	47.13	328	135	V	37.95	5.82	27.02	63.88	83.85	-19.97	Ave
9648	38.93	196	124	H	37.95	5.82	27.02	55.68	89.4	-33.72	Ave
Middle Channel 2437 MHz, measured at 3 meters											
2437	80.96	276	100	V	28.96	2.94	0	112.86	-	-	Peak/ Fund
2437	82.44	205	130	H	28.96	2.94	0	114.34	-	-	Peak/ Fund
2437	75.93	276	100	V	28.96	2.94	0	107.83	-	-	Ave/ Fund
2437	78	205	130	H	28.96	2.94	0	109.9	-	-	Ave/ Fund
4874	40.92	356	100	V	33.33	4.1	27.76	50.59	74	-23.41	Peak
4874	39.69	264	100	H	33.33	4.1	27.76	49.36	74	-24.64	Peak
4874	34.71	356	100	V	33.33	4.1	27.76	44.38	54	-9.62	Ave
4874	32.28	264	100	H	33.33	4.1	27.76	41.95	54	-12.05	Ave
7311	45.19	334	160	V	36.36	4.88	27.51	58.92	74	-15.08	Peak
7311	36.96	126	100	H	36.36	4.88	27.51	50.69	74	-23.31	Peak
7311	39.82	334	160	V	36.36	4.88	27.51	53.55	54	-0.45	Ave
7311	27.34	126	100	H	36.36	4.88	27.51	41.07	54	-12.93	Ave
9748	55.61	320	108	V	38.06	5.74	26.98	72.43	92.86	-20.43	Peak
9748	49.4	205	100	H	38.06	5.74	26.98	66.22	94.34	-28.12	Peak
9748	53.48	320	108	V	38.06	5.74	26.98	70.3	87.83	-17.53	Ave
9748	46.68	205	100	H	38.06	5.74	26.98	63.5	89.9	-26.4	Ave

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	79.38	222	100	V	29.16	3.01	0	111.55	-	-	Peak/ Fund
2462	81.7	256	100	H	29.16	3.01	0	113.87	-	-	Peak/ Fund
2462	74.39	222	100	V	29.16	3.01	0	106.56	-	-	Ave/ Fund
2462	76.81	256	100	H	29.16	3.01	0	108.98	-	-	Ave/ Fund
4924	39.15	216	100	V	33.33	4.1	27.75	48.83	74	-25.17	Peak
4924	36.43	47	100	H	33.33	4.1	27.75	46.11	74	-27.89	Peak
4924	33.55	216	100	V	33.33	4.1	27.75	43.23	54	-10.77	Ave
4924	28.98	47	100	H	33.33	4.1	27.75	38.66	54	-15.34	Ave
7386	39.65	336	161	V	36.51	4.89	27.51	53.54	74	-20.46	Peak
7386	34.4	109	100	H	36.51	4.89	27.51	48.29	74	-25.71	Peak
7386	32.56	336	161	V	36.51	4.89	27.51	46.45	54	-7.55	Ave
7386	22.12	109	100	H	36.51	4.89	27.51	36.01	54	-17.99	Ave
9848	55.59	325	112	V	38.29	5.77	26.98	72.67	91.55	-18.88	Peak
9848	46.38	21	100	H	38.29	5.77	26.98	63.46	93.87	-30.41	Peak
9848	52.81	325	112	V	38.29	5.77	26.98	69.89	86.56	-16.67	Ave
9848	43.56	21	100	H	38.29	5.77	26.98	60.64	88.98	-28.34	Ave

802.11g mode

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	74.19	204	100	V	28.96	2.94	0	106.09	-	-	Peak/ Fund
2412	79.65	261	100	H	28.96	2.94	0	111.55	-	-	Peak/ Fund
2412	61.56	204	100	V	28.96	2.94	0	93.46	-	-	Ave/ Fund
2412	66.4	261	100	H	28.96	2.94	0	98.3	-	-	Ave/ Fund
4824 ¹	33.75	0	100	V	33.08	4.06	27.7	43.19	74	-30.81	Peak
4824 ¹	33.75	0	100	H	33.08	4.06	27.7	43.19	74	-30.81	Peak
4824 ¹	21.77	0	100	V	33.08	4.06	27.7	31.21	54	-22.79	Ave
4824 ¹	21.77	0	100	H	33.08	4.06	27.7	31.21	54	-22.79	Ave
7236 ¹	33.11	0	100	V	35.93	4.93	27.58	46.39	74	-27.61	Peak
7236 ¹	33.11	0	100	H	35.93	4.93	27.58	46.39	74	-27.61	Peak
7236 ¹	18.55	0	100	V	35.93	4.93	27.58	31.83	54	-22.17	Ave
7236 ¹	18.55	0	100	H	35.93	4.93	27.58	31.83	54	-22.17	Ave
9648	39.49	320	100	V	37.95	5.82	27.02	56.24	86.09	-29.85	Peak
9648 ¹	33.49	0	100	H	37.95	5.82	27.02	50.24	91.55	-41.31	Peak
9648	21.73	320	100	V	37.95	5.82	27.02	38.48	73.46	-34.98	Ave
9648 ¹	16.86	0	100	H	37.95	5.82	27.02	33.61	78.3	-44.69	Ave
Middle Channel 2437 MHz, measured at 3 meters											
2437	84.68	349	194	V	28.96	2.94	0	116.58	-	-	Peak/ Fund
2437	82.88	71	111	H	28.96	2.94	0	114.78	-	-	Peak/ Fund
2437	71.39	349	194	V	28.96	2.94	0	103.29	-	-	Ave/ Fund
2437	69.99	71	111	H	28.96	2.94	0	101.89	-	-	Ave/ Fund
4874	46.62	33	100	V	33.33	4.1	27.76	56.29	74	-17.71	Peak
4874	41.69	282	102	H	33.33	4.1	27.76	51.36	74	-22.64	Peak
4874	32.1	33	100	V	33.33	4.1	27.76	41.77	54	-12.23	Ave
4874	27.17	282	102	H	33.33	4.1	27.76	36.84	54	-17.16	Ave
7311	44.7	67	190	V	36.36	4.88	27.51	58.43	74	-15.57	Peak
7311	36.68	238	117	H	36.36	4.88	27.51	50.41	74	-23.59	Peak
7311	29.97	67	190	V	36.36	4.88	27.51	43.7	54	-10.3	Ave
7311	22.5	238	117	H	36.36	4.88	27.51	36.23	54	-17.77	Ave
9748	55.81	36	100	V	38.06	5.74	26.98	72.63	96.58	-23.95	Peak
9748	49.97	193	121	H	38.06	5.74	26.98	66.79	94.78	-27.99	Peak
9748	37.54	36	100	V	38.06	5.74	26.98	54.36	83.29	-28.93	Ave
9748	33.3	193	121	H	38.06	5.74	26.98	50.12	81.89	-31.77	Ave

Note 1: Noise floor level. All other emissions at noise floor level.

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	78.41	223	100	V	29.16	3.01	0	110.58	-	-	Peak/ Fund
2462	81.32	256	100	H	29.16	3.01	0	113.49	-	-	Peak/ Fund
2462	65.27	223	100	V	29.16	3.01	0	97.44	-	-	Ave/ Fund
2462	67.89	256	100	H	29.16	3.01	0	100.06	-	-	Ave/ Fund
4924 ¹	33.72	0	100	V	33.33	4.1	27.75	43.4	74	-30.6	Peak
4924 ¹	33.72	0	100	H	33.33	4.1	27.75	43.4	74	-30.6	Peak
4924 ¹	20.83	0	100	V	33.33	4.1	27.75	30.51	54	-23.49	Ave
4924 ¹	20.83	0	100	H	33.33	4.1	27.75	30.51	54	-23.49	Ave
7386 ¹	33.21	0	100	V	36.51	4.89	27.51	47.1	74	-26.9	Peak
7386 ¹	33.21	0	100	H	36.51	4.89	27.51	47.1	74	-26.9	Peak
7386 ¹	19.28	0	100	V	36.51	4.89	27.51	33.17	54	-20.83	Ave
7386 ¹	19.28	0	100	H	36.51	4.89	27.51	33.17	54	-20.83	Ave
9848	49.47	316	100	V	38.29	5.77	26.98	66.55	90.58	-24.03	Peak
9848	38.97	44	100	H	38.29	5.77	26.98	56.05	93.49	-37.44	Peak
9848	32.28	316	100	V	38.29	5.77	26.98	49.36	77.44	-28.08	Ave
9848	23.83	44	100	H	38.29	5.77	26.98	40.91	80.06	-39.15	Ave

Note 1: Noise floor level. All other emissions at noise floor level.

802.11n-HT20 mode

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	74.37	218	100	V	28.96	2.94	0	106.27	-	-	Peak/ Fund
2412	81.64	257	100	H	28.96	2.94	0	113.54	-	-	Peak/ Fund
2412	61.41	218	100	V	28.96	2.94	0	93.31	-	-	Ave/ Fund
2412	68.76	257	100	H	28.96	2.94	0	100.66	-	-	Ave/ Fund
4824 ¹	33.21	0	100	V	33.08	4.06	27.7	42.65	74	-31.35	Peak
4824 ¹	33.21	0	100	H	33.08	4.06	27.7	42.65	74	-31.35	Peak
4824 ¹	21.65	0	100	V	33.08	4.06	27.7	31.09	54	-22.91	Ave
4824 ¹	21.65	0	100	H	33.08	4.06	27.7	31.09	54	-22.91	Ave
7236 ¹	33.15	0	100	V	35.93	4.93	27.58	46.43	74	-27.57	Peak
7236 ¹	33.15	0	100	H	35.93	4.93	27.58	46.43	74	-27.57	Peak
7236 ¹	18.6	0	100	V	35.93	4.93	27.58	31.88	54	-22.12	Ave
7236 ¹	18.6	0	100	H	35.93	4.93	27.58	31.88	54	-22.12	Ave
9648 ¹	33.81	0	100	V	37.95	5.82	27.02	50.56	86.27	-35.71	Peak
9648 ¹	33.81	0	100	H	37.95	5.82	27.02	50.56	93.54	-42.98	Peak
9648 ¹	16.85	0	100	V	37.95	5.82	27.02	33.6	73.31	-39.71	Ave
9648 ¹	16.85	0	100	H	37.95	5.82	27.02	33.6	80.66	-47.06	Ave
Middle Channel 2437 MHz, measured at 3 meters											
2437	83.14	72	100	V	28.96	2.94	0	115.04	-	-	Peak/ Fund
2437	83.91	0	190	H	28.96	2.94	0	115.81	-	-	Peak/ Fund
2437	70.74	72	100	V	28.96	2.94	0	102.64	-	-	Ave/ Fund
2437	70.63	0	190	H	28.96	2.94	0	102.53	-	-	Ave/ Fund
4874	45.21	35	100	V	33.33	4.1	27.76	54.88	74	-19.12	Peak
4874	41.17	288	103	H	33.33	4.1	27.76	50.84	74	-23.16	Peak
4874	31.24	35	100	V	33.33	4.1	27.76	40.91	54	-13.09	Ave
4874	26.58	288	103	H	33.33	4.1	27.76	36.25	54	-17.75	Ave
7311	42.59	67	192	V	36.36	4.88	27.51	56.32	74	-17.68	Peak
7311	36.61	238	116	H	36.36	4.88	27.51	50.34	74	-23.66	Peak
7311	27.8	67	192	V	36.36	4.88	27.51	41.53	54	-12.47	Ave
7311	22.5	238	116	H	36.36	4.88	27.51	36.23	54	-17.77	Ave
9748	52.66	39	100	V	38.06	5.74	26.98	69.48	95.04	-25.56	Peak
9748	47.28	195	120	H	38.06	5.74	26.98	64.1	95.81	-31.71	Peak
9748	34.89	39	100	V	38.06	5.74	26.98	51.71	82.64	-30.93	Ave
9748	31.87	195	120	H	38.06	5.74	26.98	48.69	82.53	-33.84	Ave

Note 1: Noise floor level. All other emissions at noise floor level.

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	76.15	84	100	V	29.16	3.01	0	108.32	-	-	Peak/ Fund
2462	79.39	256	100	H	29.16	3.01	0	111.56	-	-	Peak/ Fund
2462	63.14	84	100	V	29.16	3.01	0	95.31	-	-	Ave/ Fund
2462	66.84	256	100	H	29.16	3.01	0	99.01	-	-	Ave/ Fund
4924 ¹	33.71	0	100	V	33.33	4.1	27.75	43.39	74	-30.61	Peak
4924 ¹	33.71	0	100	H	33.33	4.1	27.75	43.39	74	-30.61	Peak
4924 ¹	21.59	0	100	V	33.33	4.1	27.75	31.27	54	-22.73	Ave
4924 ¹	21.59	0	100	H	33.33	4.1	27.75	31.27	54	-22.73	Ave
7386 ¹	33.22	0	100	V	36.51	4.89	27.51	47.11	74	-26.89	Peak
7386 ¹	33.22	0	100	H	36.51	4.89	27.51	47.11	74	-26.89	Peak
7386 ¹	18.64	0	100	V	36.51	4.89	27.51	32.53	54	-21.47	Ave
7386 ¹	18.64	0	100	H	36.51	4.89	27.51	32.53	54	-21.47	Ave
9848 ¹	33.51	0	100	V	38.29	5.77	26.98	50.59	88.32	-37.73	Peak
9848 ¹	33.51	0	100	H	38.29	5.77	26.98	50.59	91.56	-40.97	Peak
9848 ¹	16.87	0	100	V	38.29	5.77	26.98	33.95	75.31	-41.36	Ave
9848 ¹	16.87	0	100	H	38.29	5.77	26.98	33.95	79.01	-45.06	Ave

Note 1: Noise floor level. All other emissions at noise floor level.

802.11n-HT40 mode

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 2422 MHz, measured at 3 meters											
2422	69.81	218	100	V	28.96	2.94	0	101.71	-	-	Peak/ Fund
2422	76.53	259	100	H	28.96	2.94	0	108.43	-	-	Peak/ Fund
2422	56.83	218	100	V	28.96	2.94	0	88.73	-	-	Ave/ Fund
2422	63.54	259	100	H	28.96	2.94	0	95.44	-	-	Ave/ Fund
4824 ¹	33.84	0	100	V	33.08	4.06	27.7	43.28	74	-30.72	Peak
4824 ¹	33.84	0	100	H	33.08	4.06	27.7	43.28	74	-30.72	Peak
4824 ¹	21.72	0	100	V	33.08	4.06	27.7	31.16	54	-22.84	Ave
4824 ¹	21.72	0	100	H	33.08	4.06	27.7	31.16	54	-22.84	Ave
7236 ¹	32.97	0	100	V	35.93	4.93	27.58	46.25	74	-27.75	Peak
7236 ¹	32.97	0	100	H	35.93	4.93	27.58	46.25	74	-27.75	Peak
7236 ¹	18.46	0	100	V	35.93	4.93	27.58	31.74	54	-22.26	Ave
7236 ¹	18.46	0	100	H	35.93	4.93	27.58	31.74	54	-22.26	Ave
9648 ¹	33.39	0	100	V	37.95	5.82	27.02	50.14	81.71	-31.57	Peak
9648 ¹	33.39	0	100	H	37.95	5.82	27.02	50.14	88.43	-38.29	Peak
9648 ¹	16.89	0	100	V	37.95	5.82	27.02	33.64	68.73	-35.09	Ave
9648 ¹	16.89	0	100	H	37.95	5.82	27.02	33.64	75.44	-41.8	Ave
Middle Channel 2437 MHz, measured at 3 meters											
2437	80.47	71	100	V	28.96	2.94	0	112.37	-	-	Peak/ Fund
2437	81.64	0	192	H	28.96	2.94	0	113.54	-	-	Peak/ Fund
2437	68.38	71	100	V	28.96	2.94	0	100.28	-	-	Ave/ Fund
2437	68.65	0	192	H	28.96	2.94	0	100.55	-	-	Ave/ Fund
4874	40.25	33	100	V	33.33	4.1	27.76	49.92	74	-24.08	Peak
4874	35.87	283	103	H	33.33	4.1	27.76	45.54	74	-28.46	Peak
4874	27.54	33	100	V	33.33	4.1	27.76	37.21	54	-16.79	Ave
4874	22.76	283	103	H	33.33	4.1	27.76	32.43	54	-21.57	Ave
7311	39.44	29	191	V	36.36	4.88	27.51	53.17	74	-20.83	Peak
7311	33.24	241	115	H	36.36	4.88	27.51	46.97	74	-27.03	Peak
7311	24.18	69	191	V	36.36	4.88	27.51	37.91	54	-16.09	Ave
7311	18.95	241	115	H	36.36	4.88	27.51	32.68	54	-21.32	Ave
9748	49.72	34	100	V	38.06	5.74	26.98	66.54	92.37	-25.83	Peak
9748	45.61	194	120	H	38.06	5.74	26.98	62.43	93.54	-31.11	Peak
9748	32.76	34	100	V	38.06	5.74	26.98	49.58	80.28	-30.7	Ave
9748	27.83	194	120	H	38.06	5.74	26.98	44.65	80.55	-35.9	Ave

Note 1: Noise floor level. All other emissions at noise floor level.

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2452 MHz, measured at 3 meters											
2452	72.86	199	100	V	29.16	3.01	0	105.03	-	-	Peak/ Fund
2452	78.59	255	100	H	29.16	3.01	0	110.76	-	-	Peak/ Fund
2452	60.06	199	100	V	29.16	3.01	0	92.23	-	-	Ave/ Fund
2452	65.32	255	100	H	29.16	3.01	0	97.49	-	-	Ave/ Fund
4924 ¹	33.81	0	100	V	33.33	4.1	27.75	43.49	74	-30.51	Peak
4924 ¹	33.81	0	100	H	33.33	4.1	27.75	43.49	74	-30.51	Peak
4924 ¹	21.6	0	100	V	33.33	4.1	27.75	31.28	54	-22.72	Ave
4924 ¹	21.6	0	100	H	33.33	4.1	27.75	31.28	54	-22.72	Ave
7386 ¹	33.54	0	100	V	36.51	4.89	27.51	47.43	74	-26.57	Peak
7386 ¹	33.54	0	100	H	36.51	4.89	27.51	47.43	74	-26.57	Peak
7386 ¹	18.59	0	100	V	36.51	4.89	27.51	32.48	54	-21.52	Ave
7386 ¹	18.59	0	100	H	36.51	4.89	27.51	32.48	54	-21.52	Ave
9848 ¹	33.52	0	100	V	38.29	5.77	26.98	50.6	85.03	-34.43	Peak
9848 ¹	33.52	0	100	H	38.29	5.77	26.98	50.6	90.76	-40.16	Peak
9848 ¹	16.88	0	100	V	38.29	5.77	26.98	33.96	72.23	-38.27	Ave
9848 ¹	16.88	0	100	H	38.29	5.77	26.98	33.96	77.49	-43.53	Ave

Note 1: Noise floor level. All other emissions at noise floor level.

3) Restricted Band Edge, Measured at 3 meters**802.11b**

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2390	29.53	200	100	V	28.96	2.94	0	61.43	74	-12.57	Peak
2390	34.14	260	100	H	28.96	2.94	0	66.04	74	-7.96	Peak
2390	16.9	200	100	V	28.96	2.94	0	48.8	54	-5.2	Ave
2390	21.65	260	100	H	28.96	2.94	0	53.55	54	-0.45	Ave
High Channel 2462 MHz, measured at 3 meters											
2483.5	32.06	222	100	V	29.16	3.01	0	64.23	74	-9.77	Peak
2487	38.43	256	100	H	29.16	3.01	0	70.6	74	-3.4	Peak
2483.5	18.4	222	100	V	29.16	3.01	0	50.57	54	-3.43	Ave
2487	19.64	256	100	H	29.16	3.01	0	51.81	54	-2.19	Ave

802.11g

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2390	33.96	204	100	V	28.96	2.94	0	65.86	74	-8.14	Peak
2390	41.18	44	147	H	28.96	2.94	0	73.08	74	-0.92	Peak
2390	14.71	204	100	V	28.96	2.94	0	46.61	54	-7.39	Ave
2390	17.64	44	147	H	28.96	2.94	0	49.54	54	-4.46	Ave
High Channel 2462 MHz, measured at 3 meters											
2483.5	38.93	223	100	V	29.16	3.01	0	71.1	74	-2.9	Peak
2483.5	41.62	46	148	H	29.16	3.01	0	73.79	74	-0.21	Peak
2483.5	16.29	223	100	V	29.16	3.01	0	48.46	54	-5.54	Ave
2483.5	17.04	46	148	H	29.16	3.01	0	49.21	54	-4.79	Ave

802.11n-HT20

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2390	33.28	218	100	V	28.96	2.94	0	65.18	74	-8.82	Peak
2390	41.98	351	196	H	28.96	2.94	0	73.88	74	-0.12	Peak
2390	15.18	218	100	V	28.96	2.94	0	47.08	54	-6.92	Ave
2390	19.99	351	196	H	28.96	2.94	0	51.89	54	-2.11	Ave
High Channel 2462 MHz, measured at 3 meters											
2483.5	38.65	84	100	V	29.16	3.01	0	70.82	74	-3.18	Peak
2483.5	41.18	352	196	H	29.16	3.01	0	73.35	74	-0.65	Peak
2483.5	14.36	84	100	V	29.16	3.01	0	46.53	54	-7.47	Ave
2483.5	15.45	352	196	H	29.16	3.01	0	47.62	54	-6.38	Ave

802.11n-HT40

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 2422 MHz, measured at 3 meters											
2390	30.91	218	100	V	28.96	2.94	0	62.81	74	-11.19	Peak
2390	40.28	340	196	H	28.96	2.94	0	72.18	74	-1.82	Peak
2390	15.36	218	100	V	28.96	2.94	0	47.26	54	-6.74	Ave
2390	21.27	340	196	H	28.96	2.94	0	53.17	54	-0.83	Ave
High Channel 2452 MHz, measured at 3 meters											
2483.5	37.99	199	100	V	29.16	3.01	0	70.16	74	-3.84	Peak
2483.5	41.14	338	193	H	29.16	3.01	0	73.31	74	-0.69	Peak
2483.5	16.17	199	100	V	29.16	3.01	0	48.34	54	-5.66	Ave
2483.5	17.44	338	193	H	29.16	3.01	0	49.61	54	-4.39	Ave

9 FCC§15.247(a)(2) – 6 dB & 99% Emission Bandwidth

9.1 Applicable Standard

According to FCC §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 6 dB bandwidth shall be at least 500 kHz.

9.2 Measurement Procedure

The measurements are base on FCC KDB 558074 D01 DTS Meas Guidance v03r01: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 8: DTS bandwidth

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2012-10-16	1 year

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

9.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	52 %
ATM Pressure:	101.5 kPa

The testing was performed by Lionel Lara on 2013-09-06 at the RF test site.

9.5 Test Results

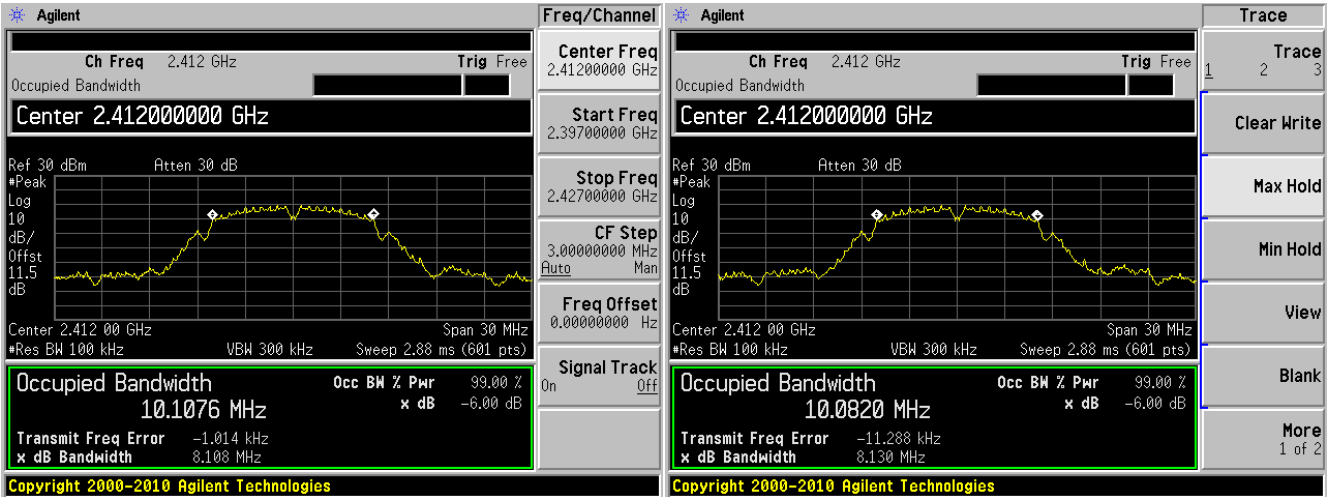
Antenna Port	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Results
802.11b mode						
C0	Low	2412	10.1076	8.108	> 500	Compliant
	Middle	2437	11.0051	8.141	> 500	Compliant
	High	2462	10.2052	8.122	> 500	Compliant
C1	Low	2412	10.0820	8.130	> 500	Compliant
	Middle	2437	10.9808	9.146	> 500	Compliant
	High	2462	10.1592	8.082	> 500	Compliant
802.11g mode						
C0	Low	2412	16.4368	16.095	> 500	Compliant
	Middle	2437	16.5526	16.372	> 500	Compliant
	High	2462	16.4621	16.375	> 500	Compliant
C1	Low	2412	16.4637	16.324	> 500	Compliant
	Middle	2437	16.5393	16.344	> 500	Compliant
	High	2462	16.4529	16.090	> 500	Compliant
802.11n-HT20 mode						
C0	Low	2412	17.6046	17.376	> 500	Compliant
	Middle	2437	17.6552	17.271	> 500	Compliant
	High	2462	17.5969	17.631	> 500	Compliant
C1	Low	2412	17.5791	17.585	> 500	Compliant
	Middle	2437	17.6119	16.974	> 500	Compliant
	High	2462	17.6173	17.664	> 500	Compliant
802.11n-HT40 mode						
C0	Low	2422	36.0112	35.349	> 500	Compliant
	Middle	2437	36.0619	36.434	> 500	Compliant
	High	2452	35.9853	36.010	> 500	Compliant
C1	Low	2422	35.8970	35.335	> 500	Compliant
	Middle	2437	36.1283	36.381	> 500	Compliant
	High	2452	35.9959	36.433	> 500	Compliant

Please refer to the following plots for detailed test results.

802.11b, Low Channel, 2412 MHz

C0

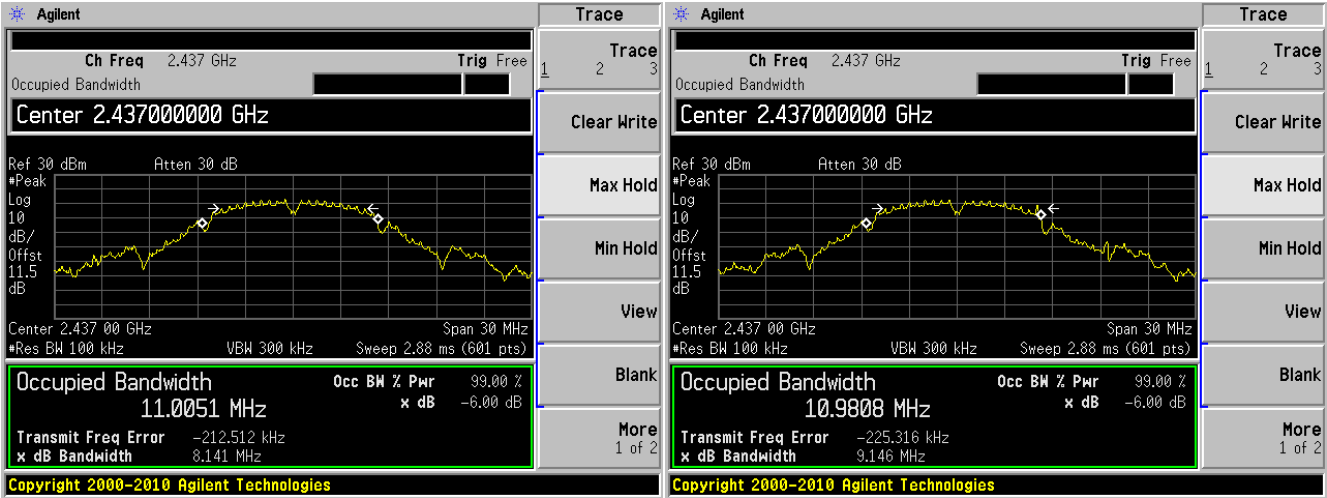
C1



802.11b, Middle Channel, 2437 MHz

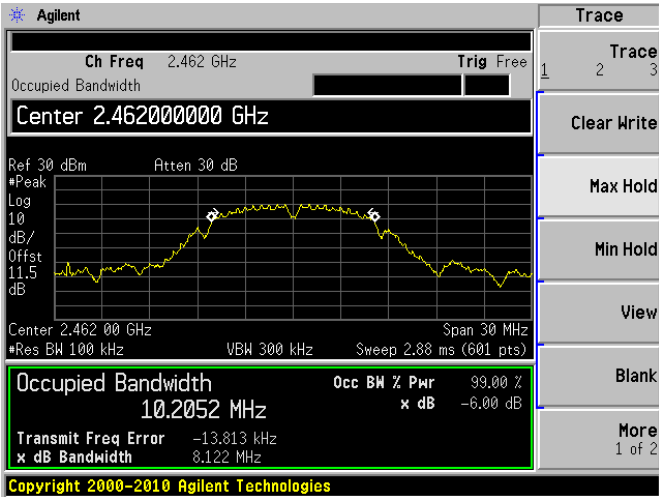
C0

C1

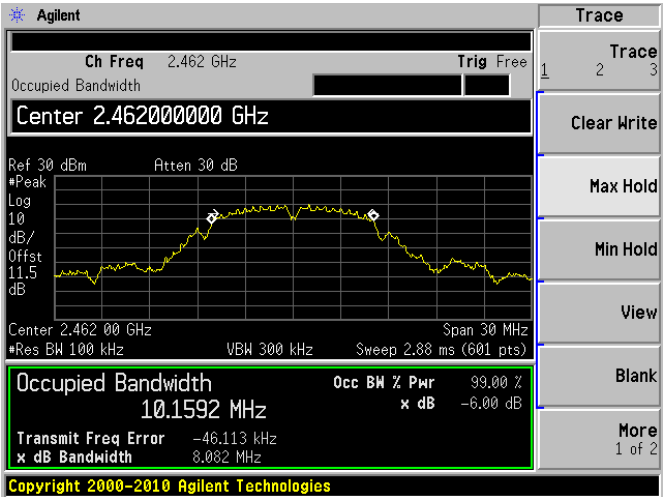


802.11b, High Channel, 2462 MHz

C0

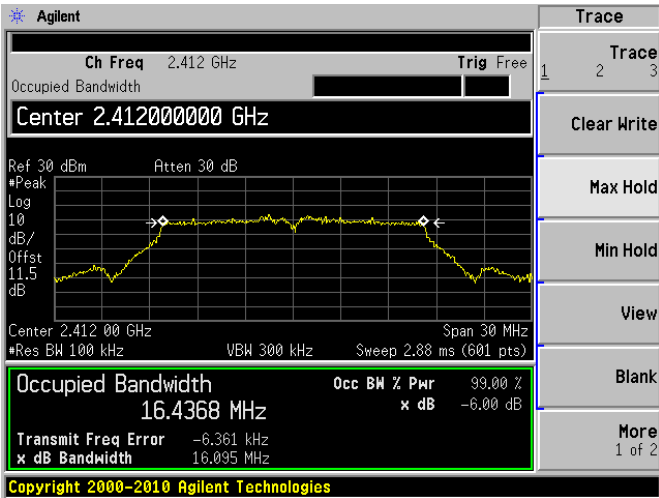


C1

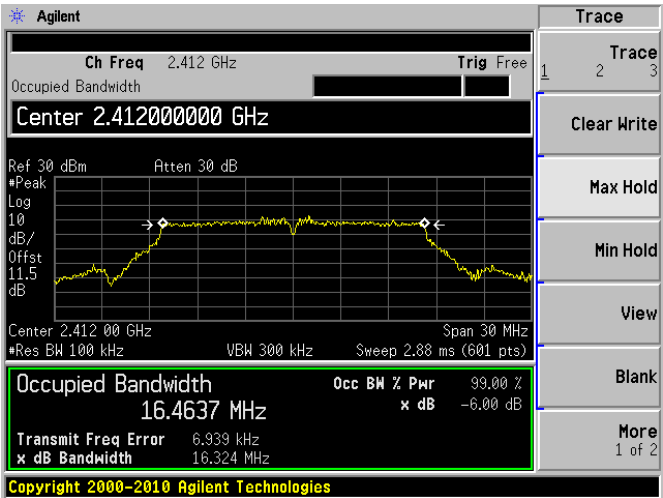


802.11g, Low Channel, 2412 MHz

C0

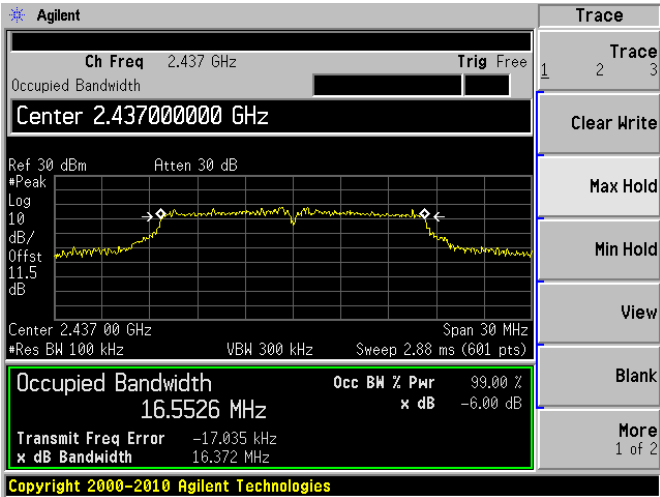


C1

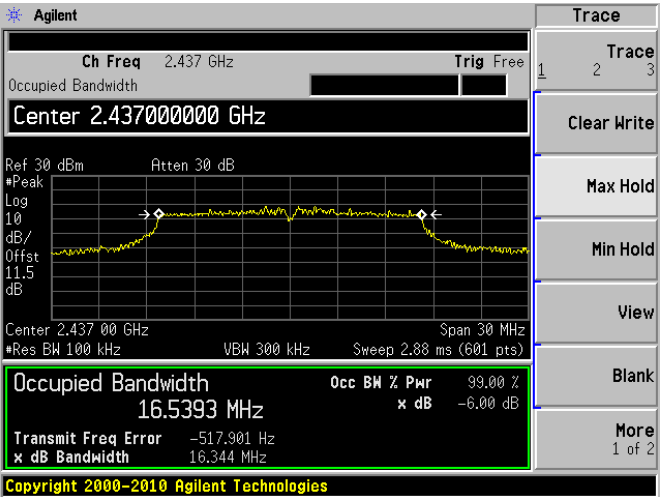


802.11g, Middle Channel, 2437 MHz

C0

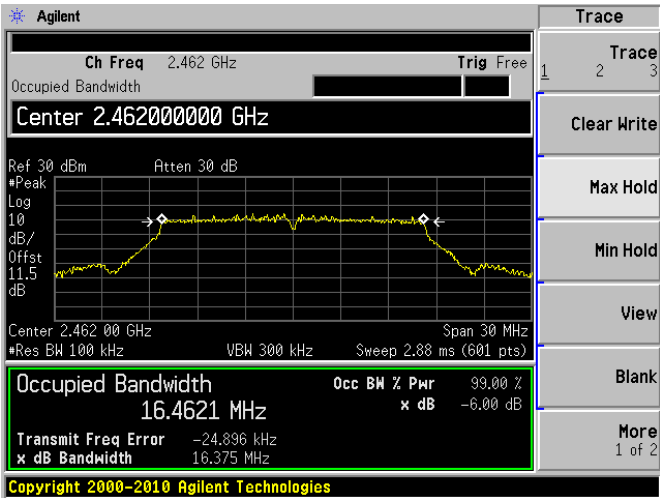


C1

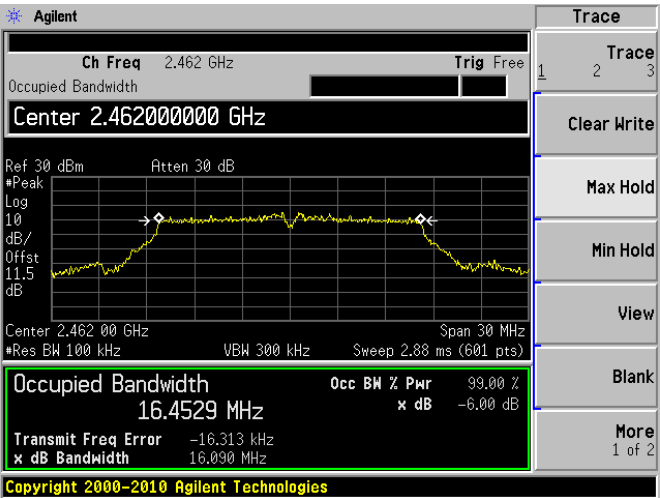


802.11g, High Channel, 2462 MHz

C0

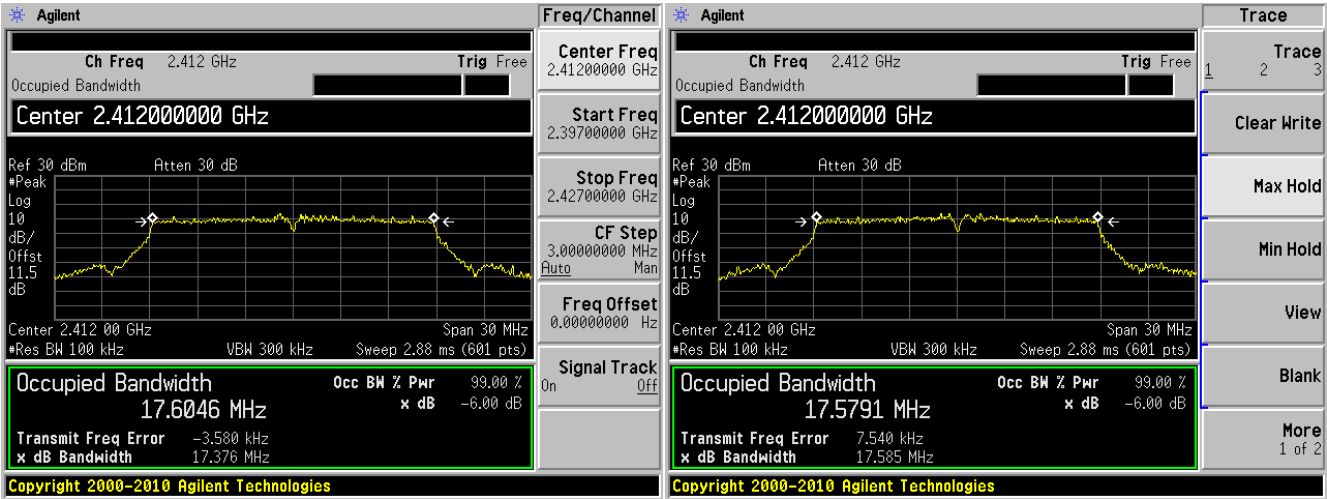


C1



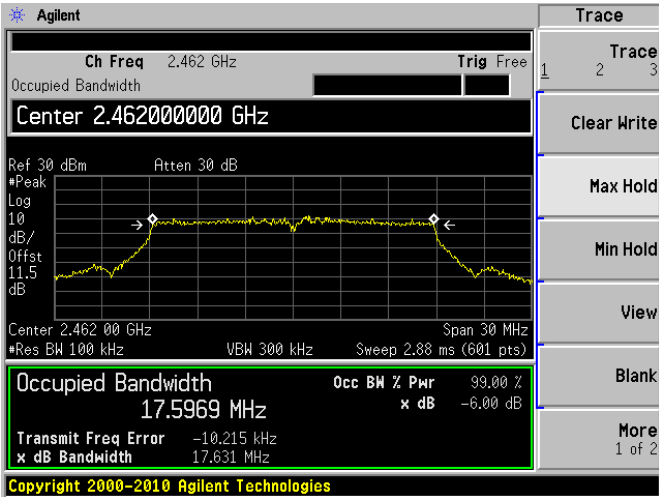
802.11n-HT20, Low Channel, 2412 MHz

C0C1

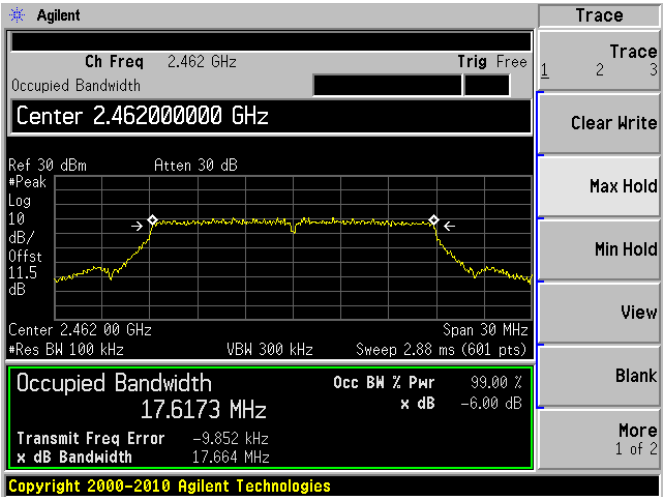


802.11n-HT20, High Channel, 2462 MHz

C0

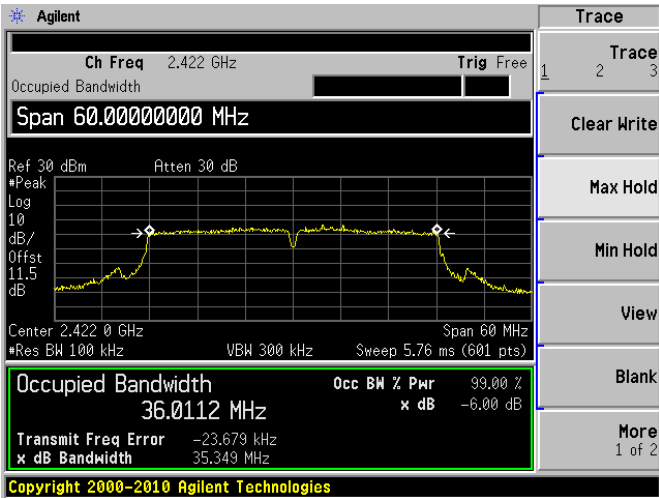


C1

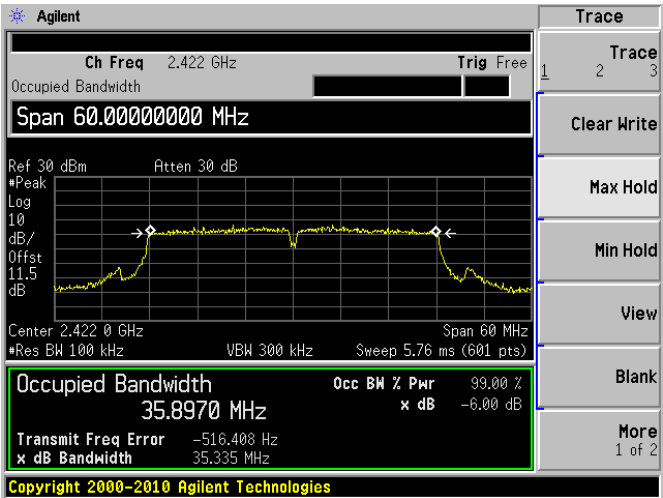


802.11n-HT40, Low Channel, 2422 MHz

C0



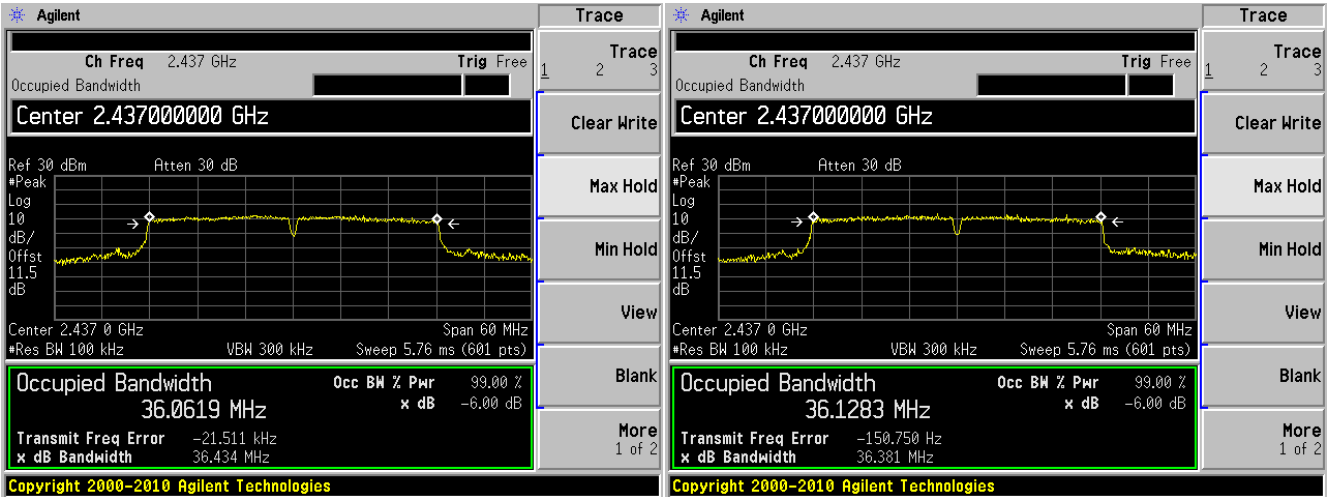
C1



802.11n-HT40, Middle Channel, 2437 MHz

C0

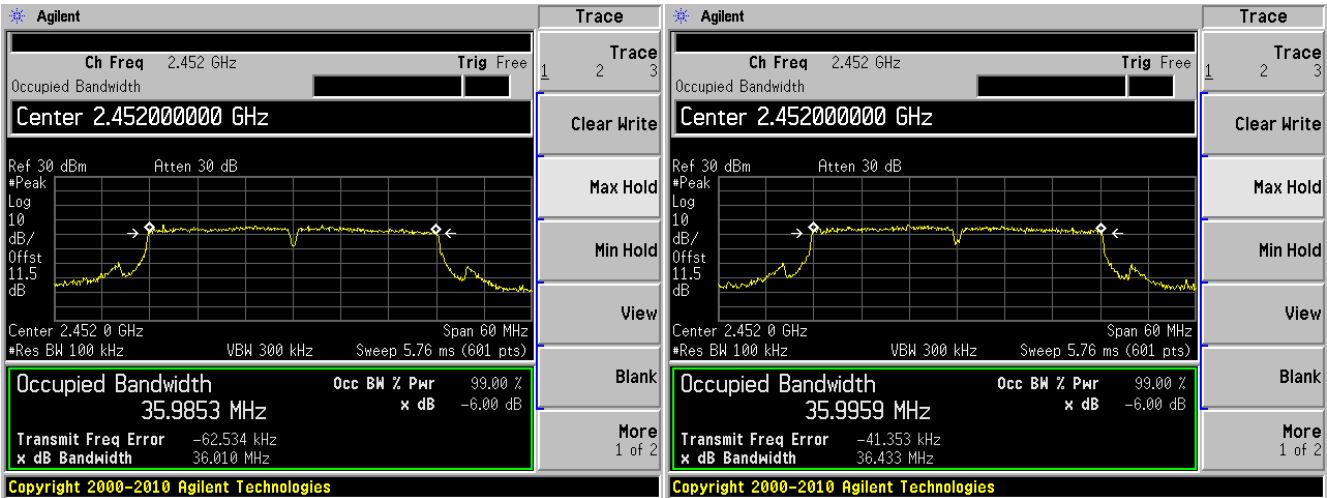
C1



802.11n-HT40, High Channel, 2452 MHz

C0

C1



10 FCC §15.247(b) – Peak Output Power Measurement

10.1 Applicable Standard

According to FCC §15.247(b): The maximum peak conducted output power of the intentional radiator, for systems using digital modulation in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands, shall not exceed 1 Watt.

10.2 Measurement Procedure

The measurements are base on FCC KDB 558074 D01 DTS Meas Guidance v03r01: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 9: Fundamental emission output power

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2012-10-16	1 year

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

10.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	55 %
ATM Pressure:	101.3 kPa

The testing was performed by Lionel Lara on 2013-09-05 at the RF test site.

10.5 Test Results

802.11b mode

Channel	Frequency (MHz)	Conducted Output Power C0 (dBm)	Conducted Output Power C1 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	22.24	22.12	25.19	30	-4.81
Middle	2437	24.5	25.48	28.03	30	-1.97
High	2462	22.63	23.41	26.05	30	-3.95

802.11g mode

Channel	Frequency (MHz)	Conducted Output Power C0 (dBm)	Conducted Output Power C1 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	18.4	18.13	21.28	30	-8.72
Middle	2437	23.04	23.64	26.36	30	-3.64
High	2462	19.68	19.25	22.48	30	-7.52

802.11n-HT20 mode

Channel	Frequency (MHz)	Conducted Output Power C0 (dBm)	Conducted Output Power C1 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	18.31	18.76	21.55	30	-8.45
Middle	2437	23.45	23.14	26.31	30	-3.69
High	2462	17.62	17.81	20.73	30	-9.27

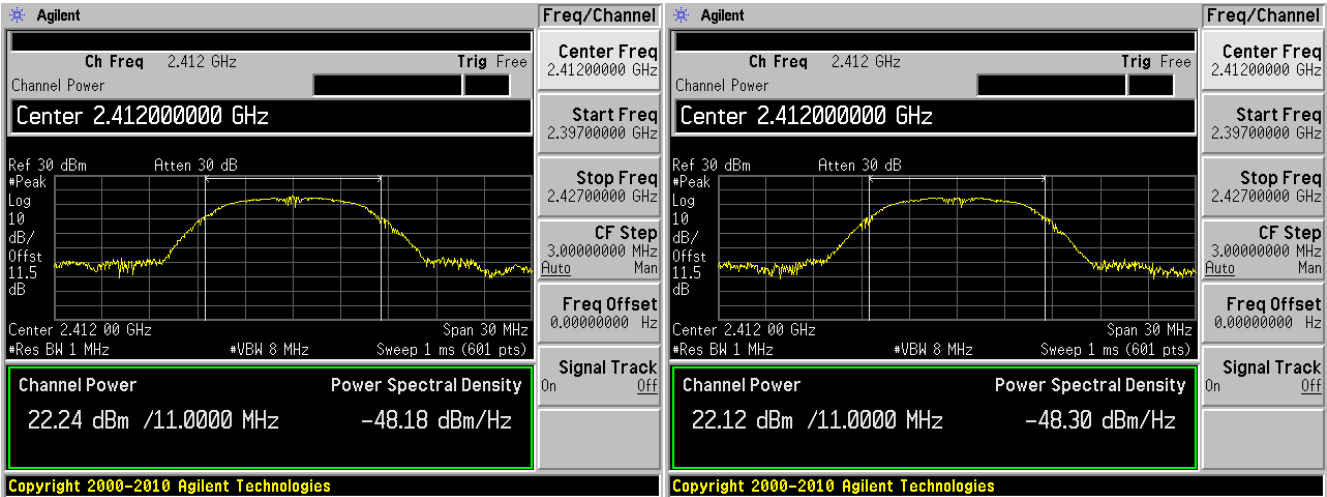
802.11n-HT40 mode

Channel	Frequency (MHz)	Conducted Output Power C0 (dBm)	Conducted Output Power C1 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	16.8	17.38	20.11	30	-9.89
Middle	2437	23.24	23.91	26.6	30	-3.4
High	2452	16.71	17.08	19.91	30	-10.1

802.11b, Low Channel, 2412 MHz

C0

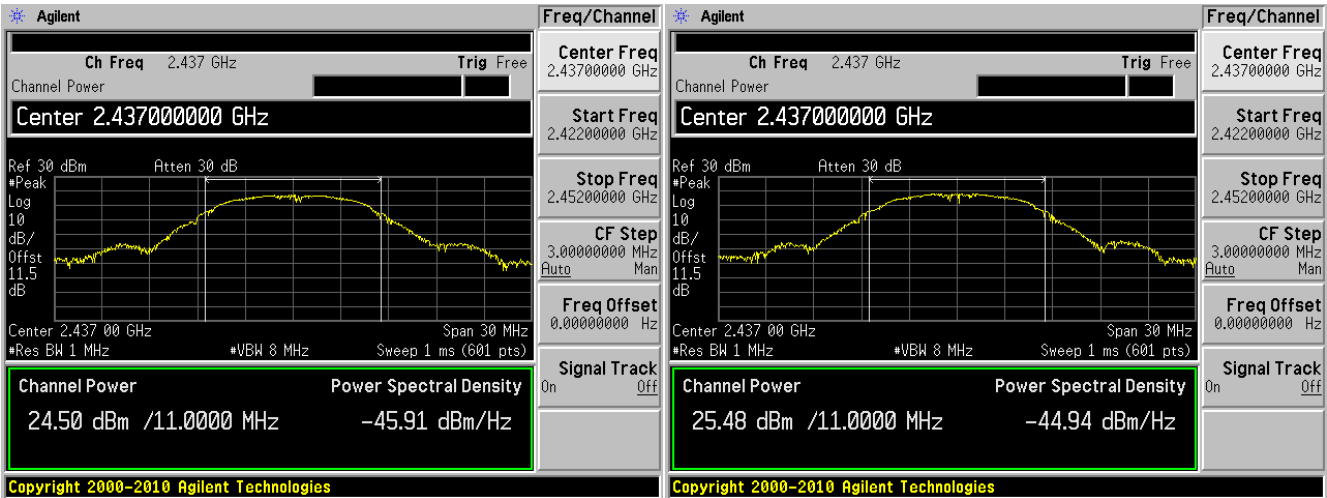
C1



802.11b, Middle Channel, 2437 MHz

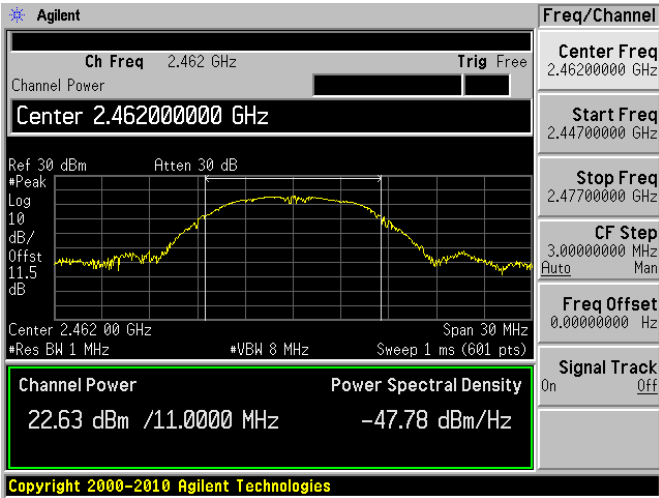
C0

C1

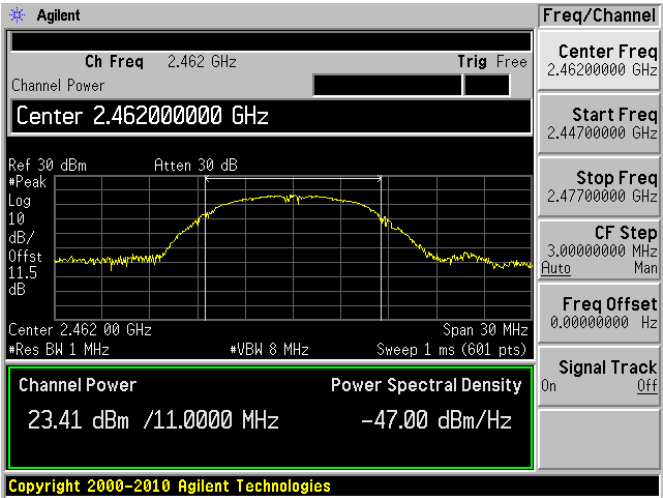


802.11b, High Channel, 2462 MHz

C0

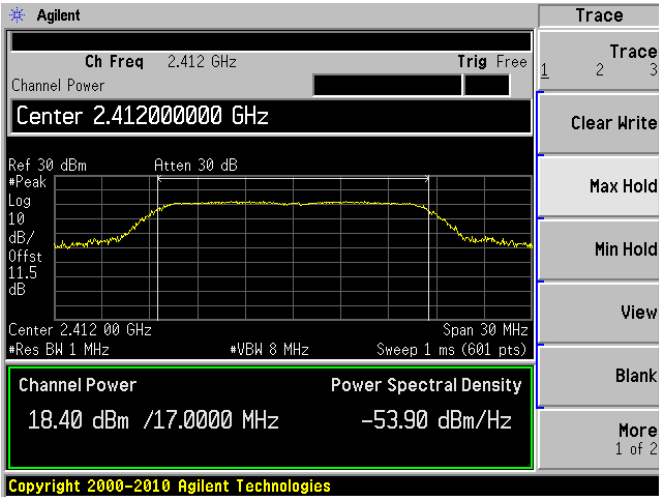


C1

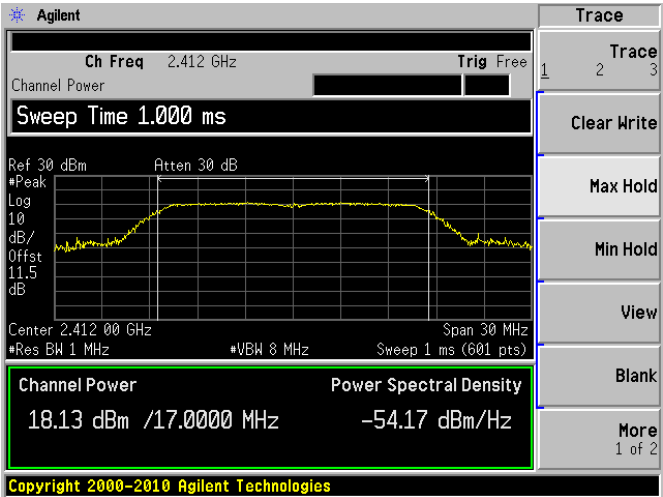


802.11g, Low Channel, 2412 MHz

C0

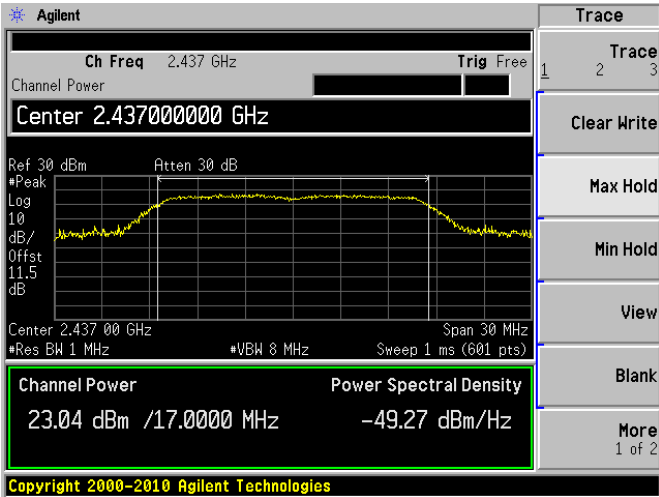


C1

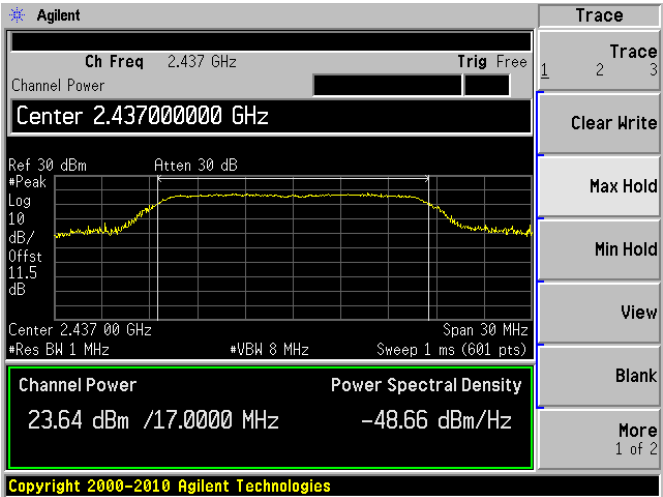


802.11g, Middle Channel, 2437 MHz

C0

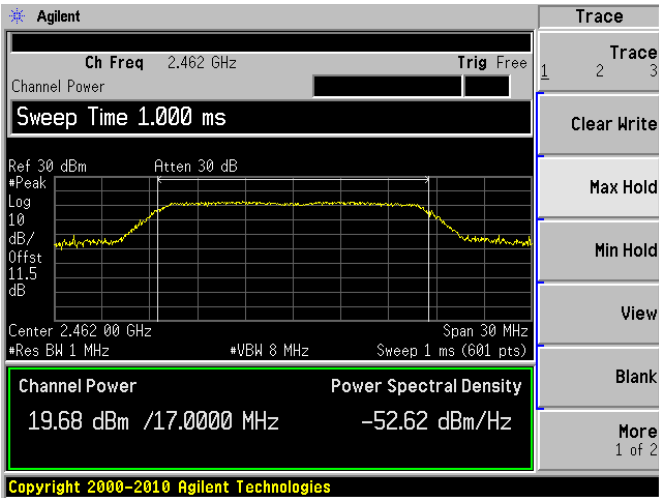


C1

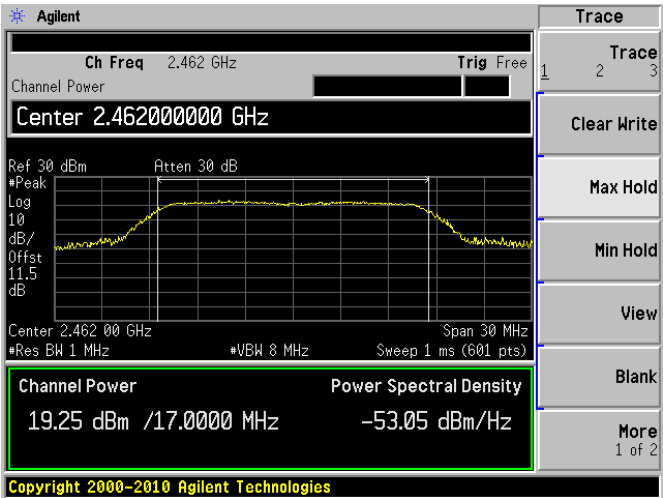


802.11g, High Channel, 2462 MHz

C0



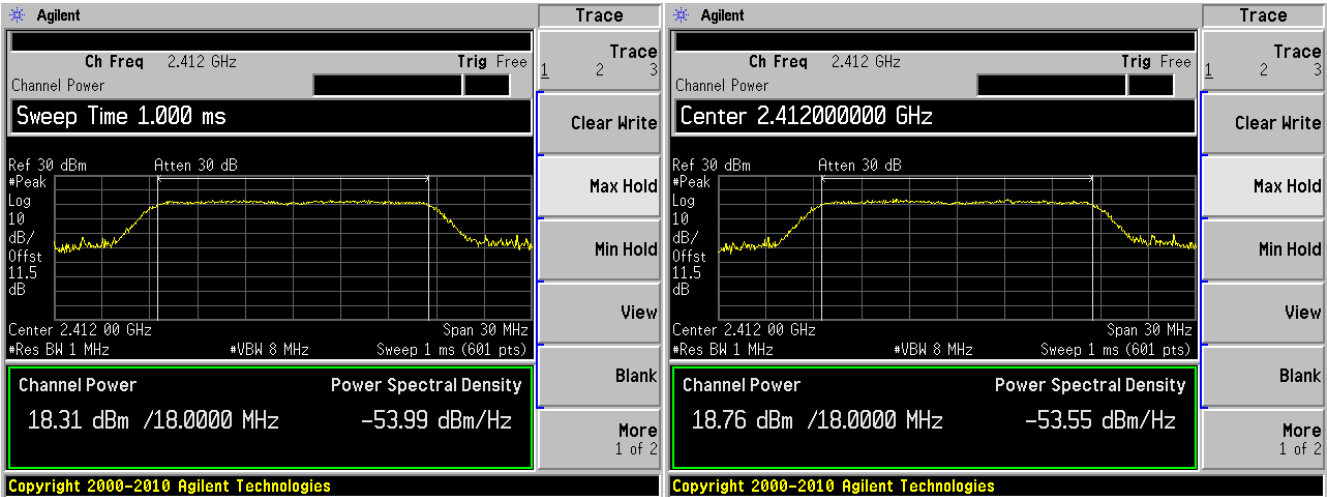
C1



802.11n-HT20, Low Channel, 2412 MHz

C0

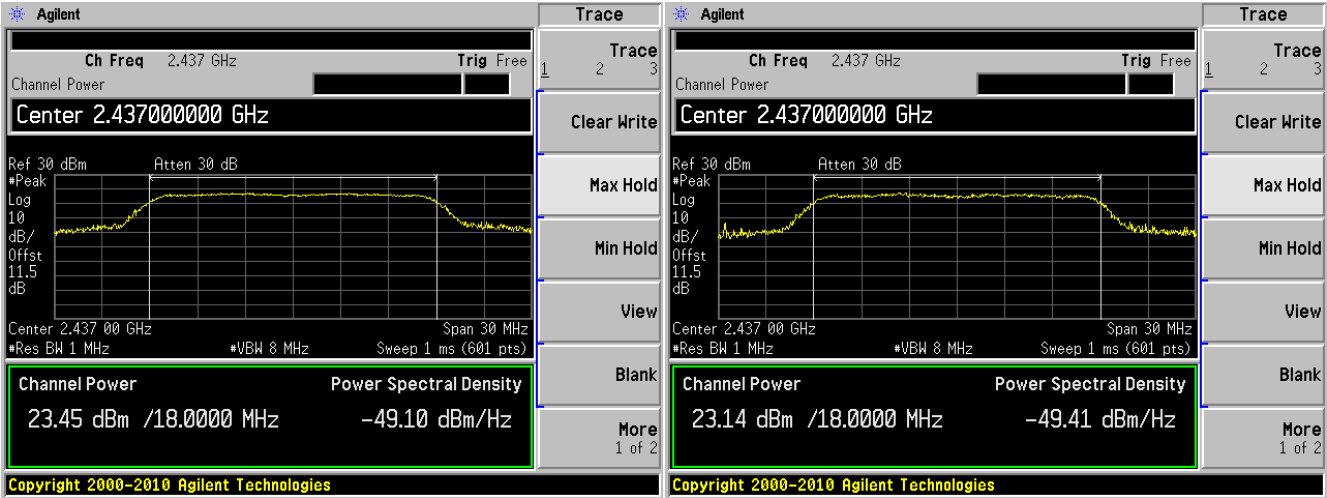
C1



802.11n-HT20, Middle Channel, 2437 MHz

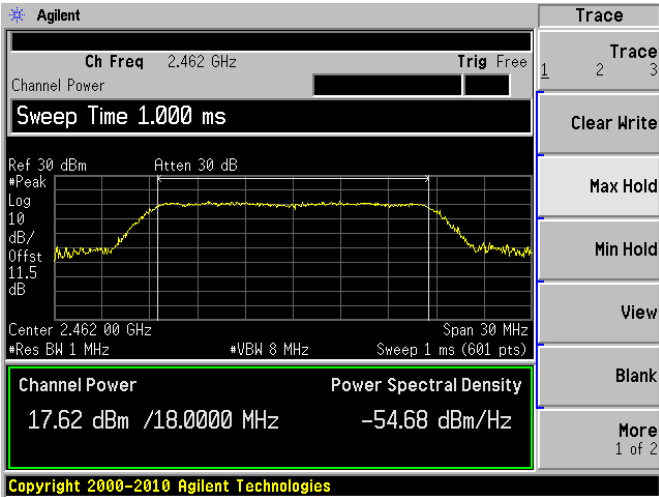
C0

C1

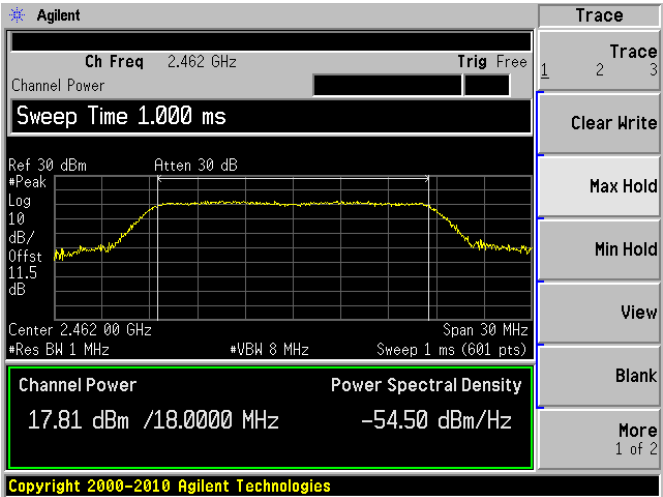


802.11n-HT20, High Channel, 2462 MHz

C0

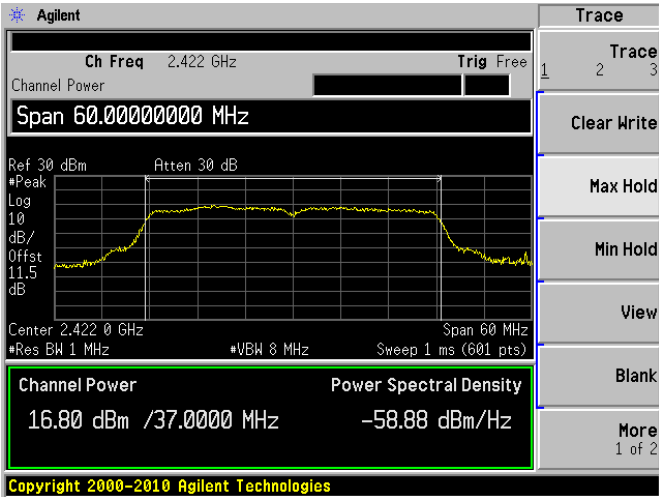


C1

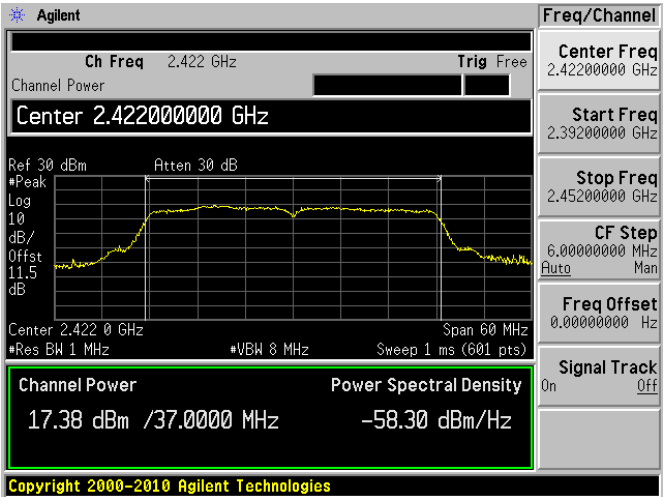


802.11n-HT40, Low Channel, 2422 MHz

C0

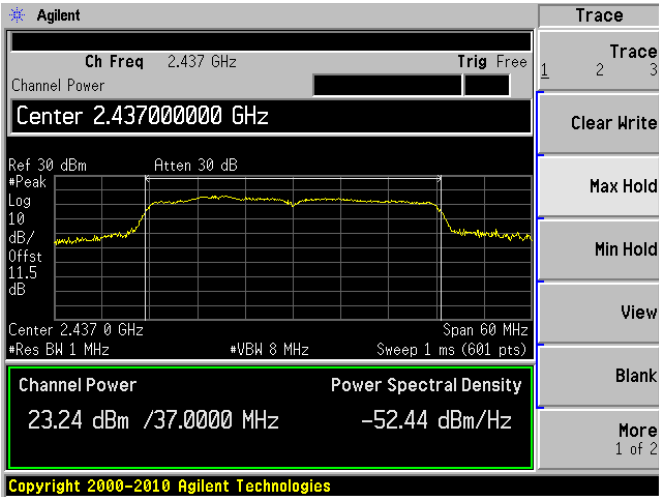


C1

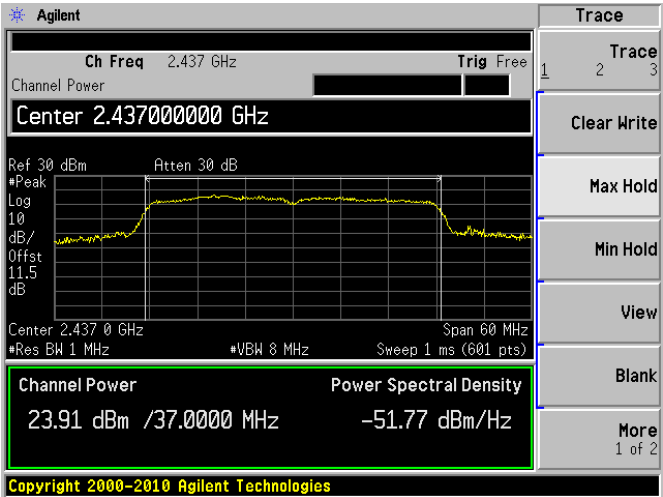


802.11n-HT40, Middle Channel, 2437 MHz

C0

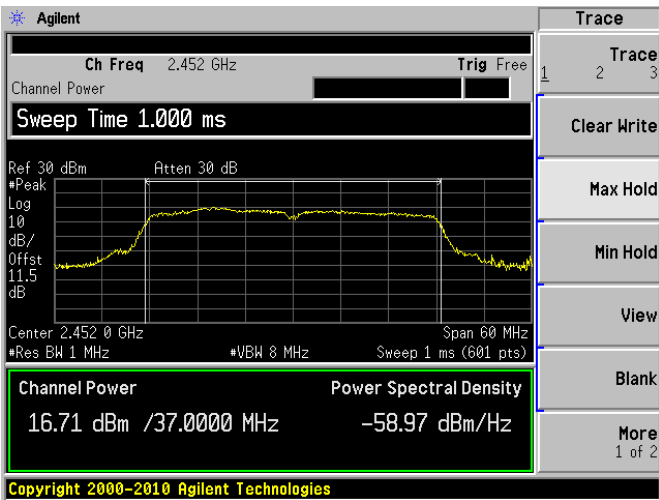


C1

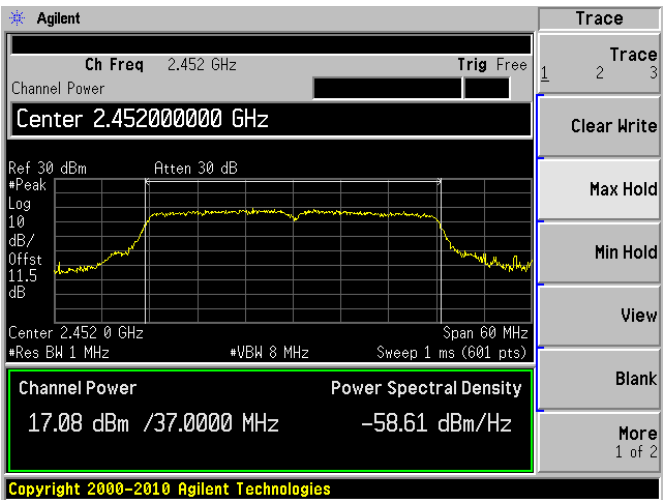


802.11n-HT40, High Channel, 2452 MHz

C0



C1



11 FCC §15.247(d) – 100 kHz Bandwidth of Band Edges

11.1 Applicable Standard

According to FCC §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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c).

11.2 Measurement Procedure

The measurements are base on FCC KDB 558074 D01 DTS Meas Guidance v03r01: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 13: Band-edge measurements

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2012-10-16	1 year

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

11.4 Test Environmental Conditions

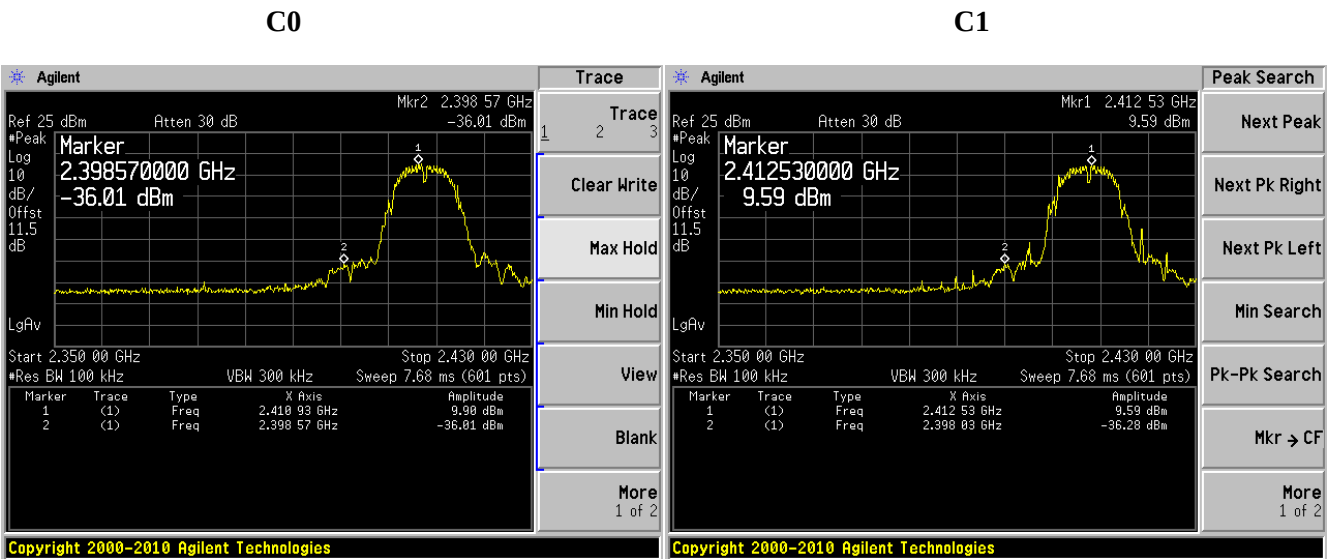
Temperature:	21 °C
Relative Humidity:	52 %
ATM Pressure:	101.5 kPa

The testing was performed by Lionel Lara on 2013-09-06 at RF the test site.

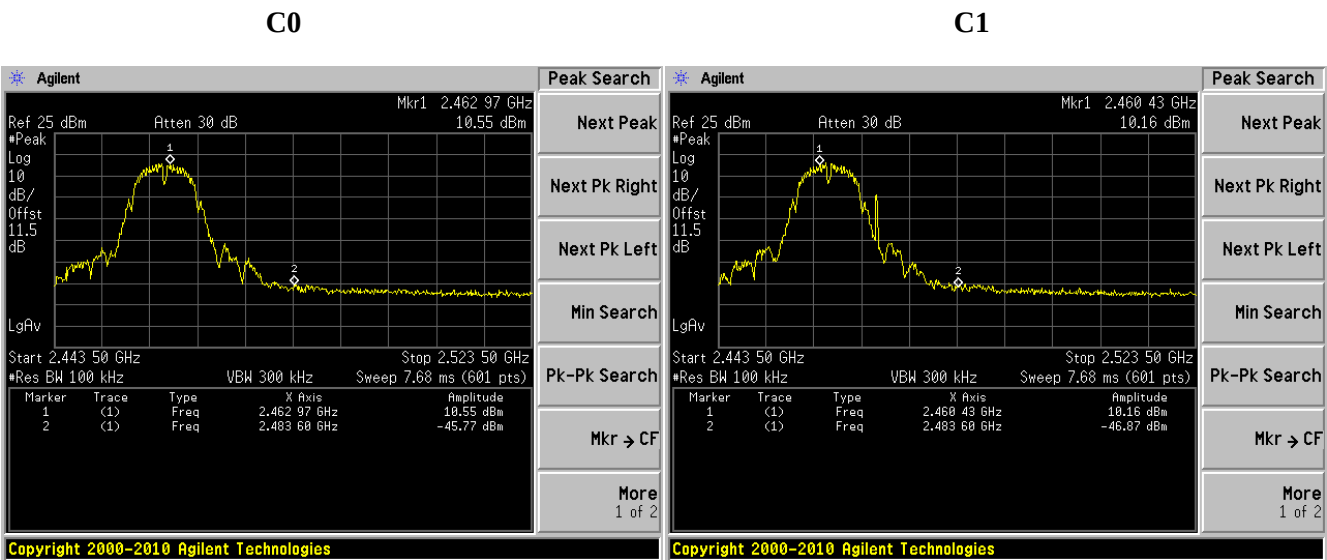
11.5 Test Results

Please refer to following pages for plots of band edge.

802.11b, Low Channel, 2412 MHz

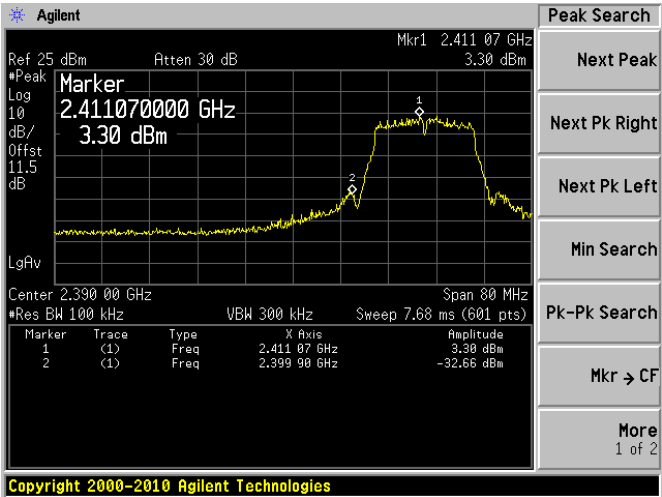


802.11b, High Channel, 2462 MHz

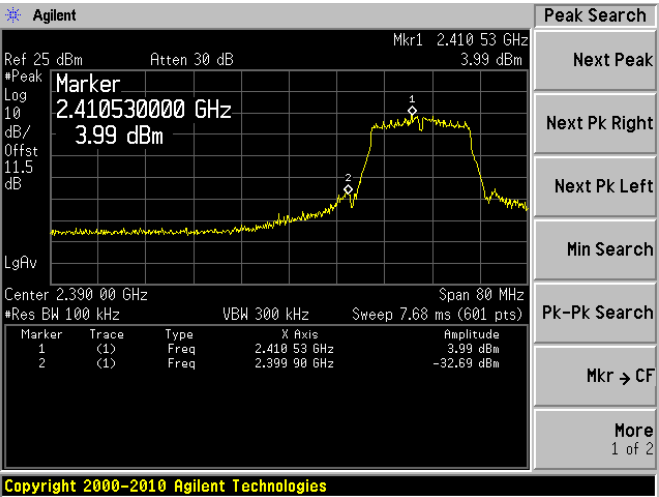


802.11g, Low Channel, 2412 MHz

C0

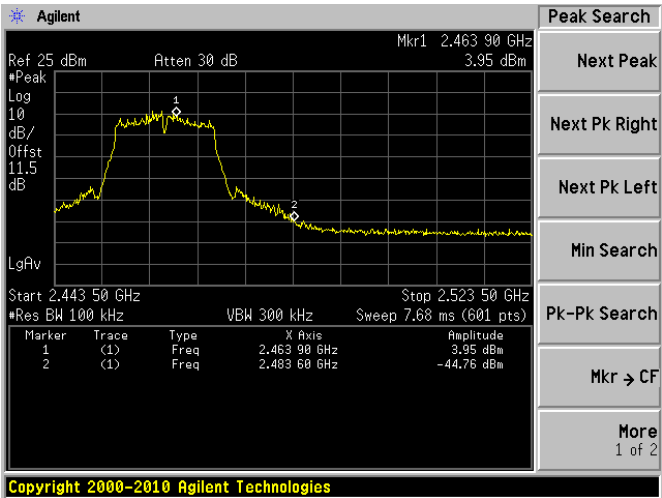


C1

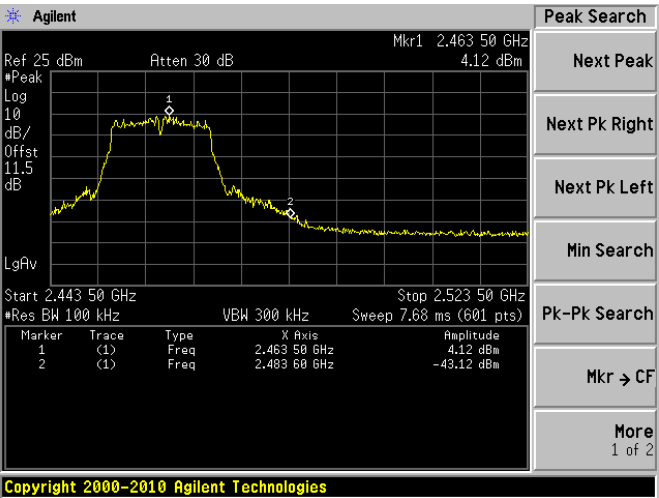


802.11g, High Channel, 2462 MHz

C0

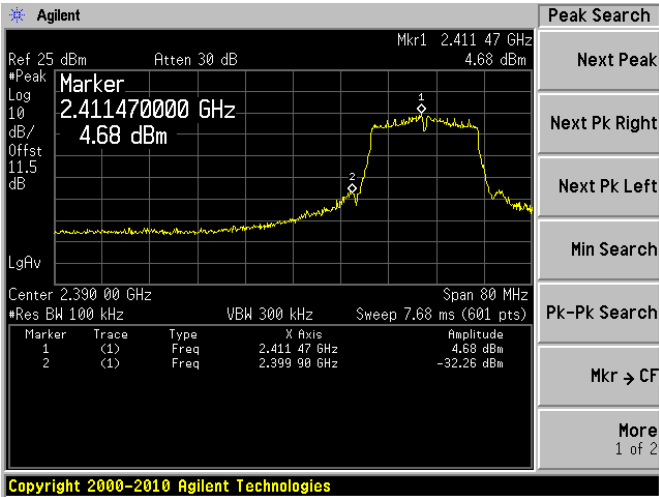


C1

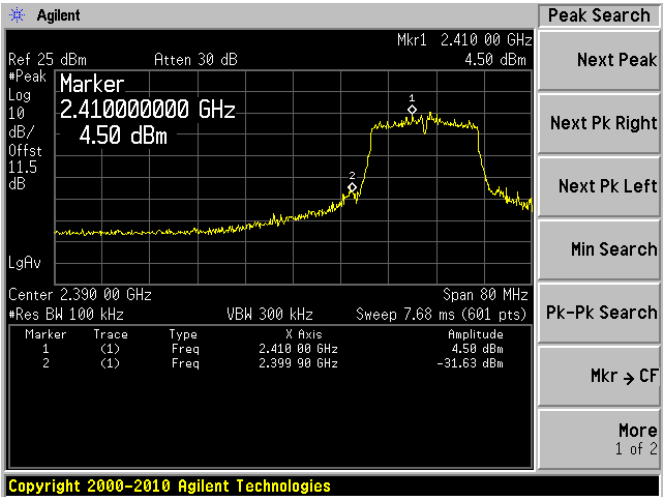


802.11n-HT20, Low Channel, 2412 MHz

C0

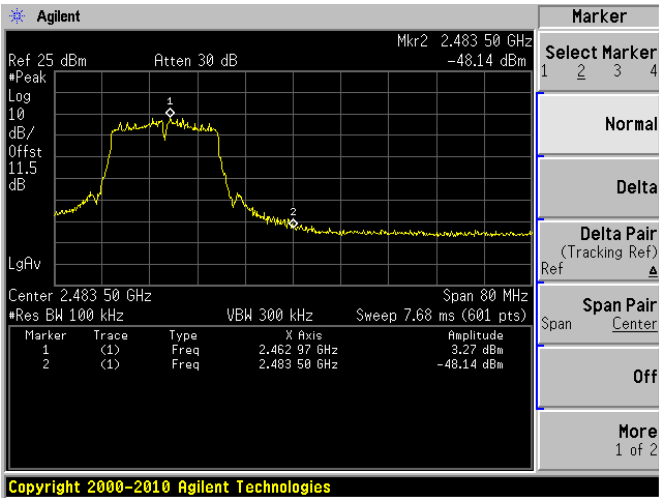


C1

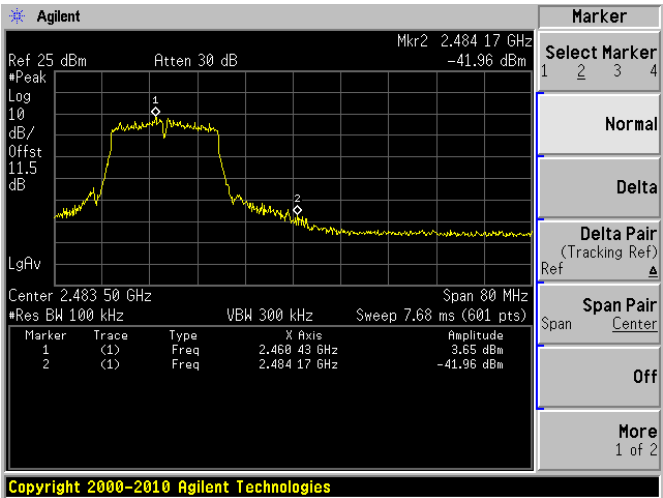


802.11n-HT20, High Channel, 2462 MHz

C0

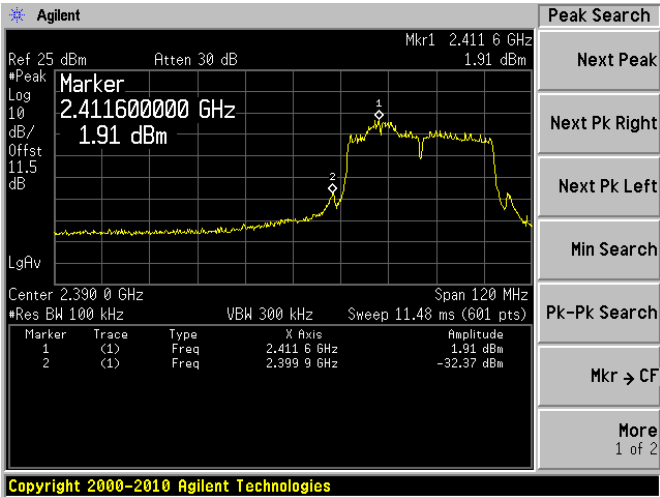


C1

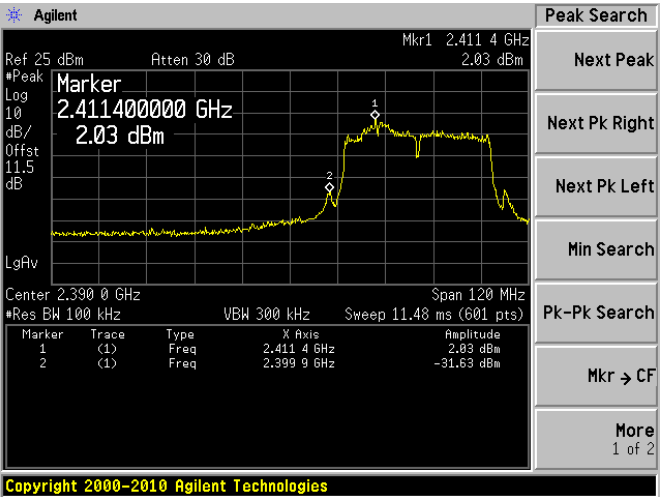


802.11n-HT40, Low Channel, 2422 MHz

C0

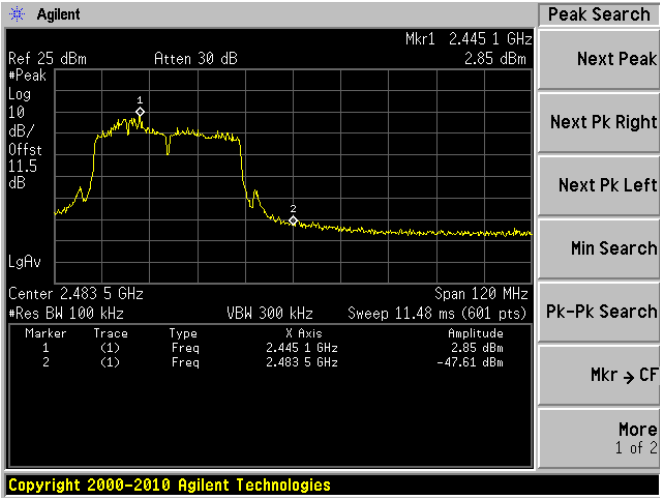


C1

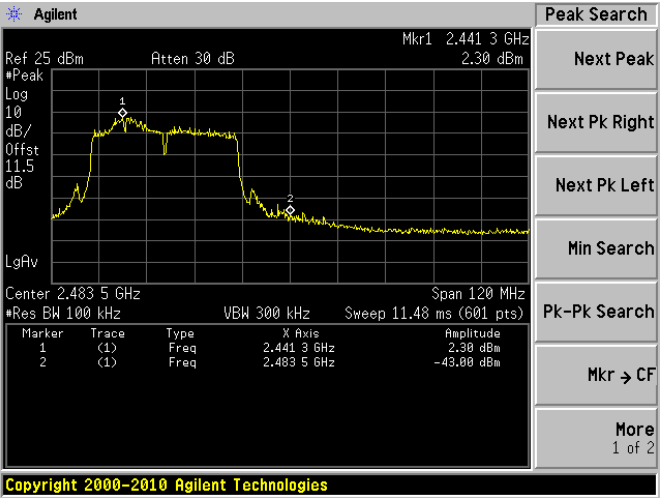


802.11n-HT40, High Channel, 2452 MHz

C0



C1



12 FCC §15.247(e) – Power Spectral Density

12.1 Applicable Standard

According to FCC §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.

12.2 Measurement Procedure

The measurements are base on FCC KDB 558074 D01 DTS Meas Guidance v03r01: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10: Maximum power spectral density level in the fundamental emission

12.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2012-10-16	1 year

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

12.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	52 %
ATM Pressure:	101.5 kPa

The testing was performed by Lionel Lara on 2013-09-06 at RF the test site.

12.5 Test Results

802.11b mode

Channel	Frequency (MHz)	PSD C0 (dBm)	PSD C1 (dBm)	Total PSD (dBm)	Limit (dBm/3kHz)	Margin (dB)
Low	2412	-6.04	-5.83	-2.92	8	-10.9
Middle	2437	-1.23	-1.98	1.421	8	-6.58
High	2462	-3.24	-3.19	-0.2	8	-8.2

802.11 g mode

Channel	Frequency (MHz)	PSD C0 (dBm)	PSD C1 (dBm)	Total PSD (dBm)	Limit (dBm/3kHz)	Margin (dB)
Low	2412	-11.83	-11.76	-8.78	8	-16.8
Middle	2437	-4.14	-5.84	-1.9	8	-9.9
High	2462	-9.49	-8.94	-6.2	8	-14.2

802.11n-HT20 mode

Channel	Frequency (MHz)	PSD C0 (dBm)	PSD C1 (dBm)	Total PSD (dBm)	Limit (dBm/3kHz)	Margin (dB)
Low	2412	-11.06	-10.11	-7.55	8	-15.5
Middle	2437	-6.16	-6.62	-3.37	8	-11.4
High	2462	-11.74	-11.95	-8.83	8	-16.8

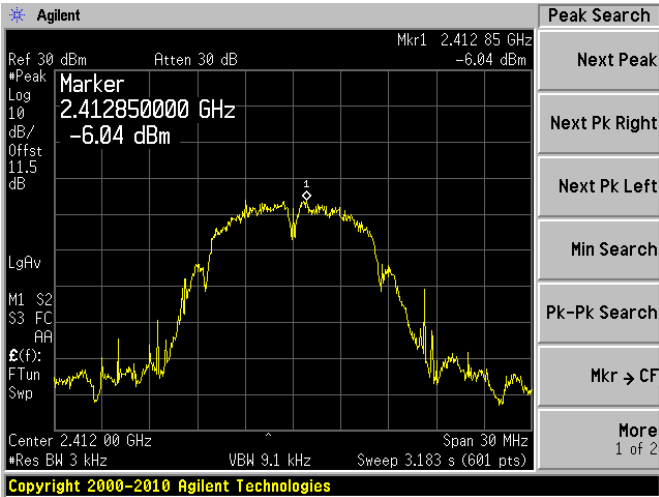
802.11n-HT40 mode

Channel	Frequency (MHz)	PSD C0 (dBm)	PSD C1 (dBm)	Total PSD (dBm)	Limit (dBm/3kHz)	Margin (dB)
Low	2422	-13.64	-14.95	-11.2	8	-19.2
Middle	2437	-5.07	-7.91	-3.25	8	-11.3
High	2452	-11.62	-14.02	-9.65	8	-17.6

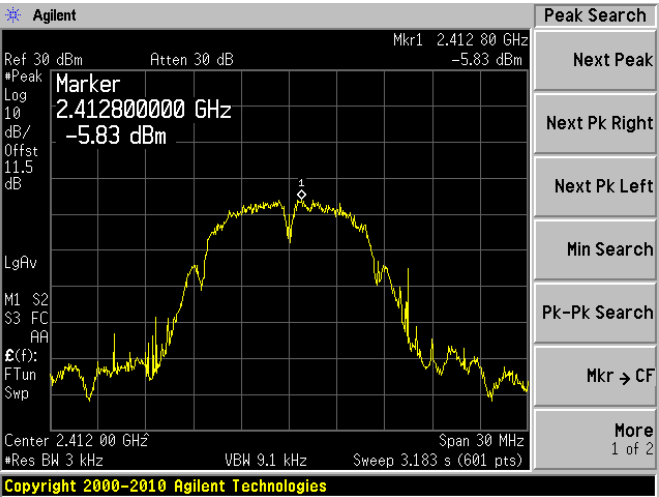
Please refer to the following plots for detailed test results:

802.11b, Low Channel, 2412 MHz

C0

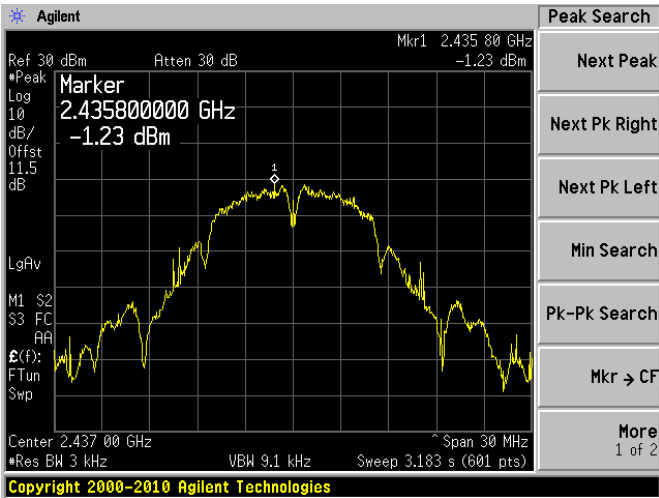


C1

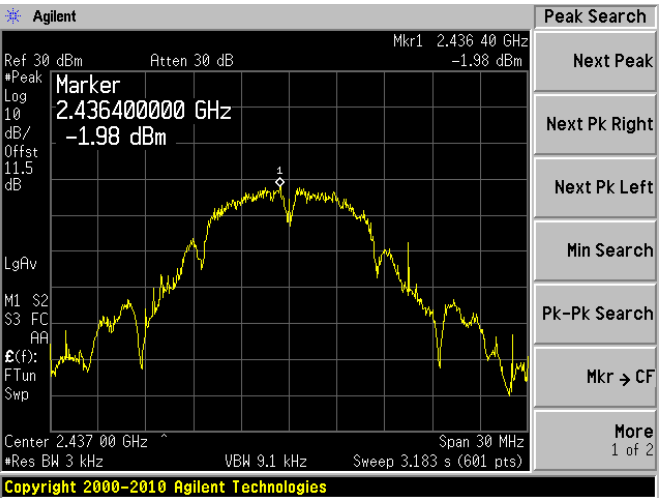


802.11b, Middle Channel, 2437 MHz

C0

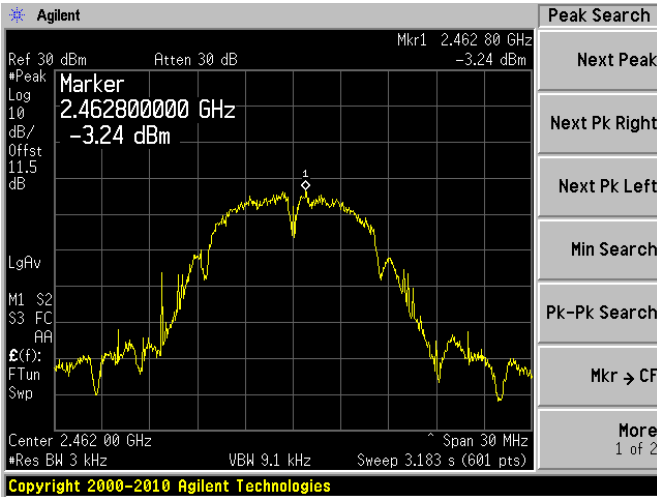


C1

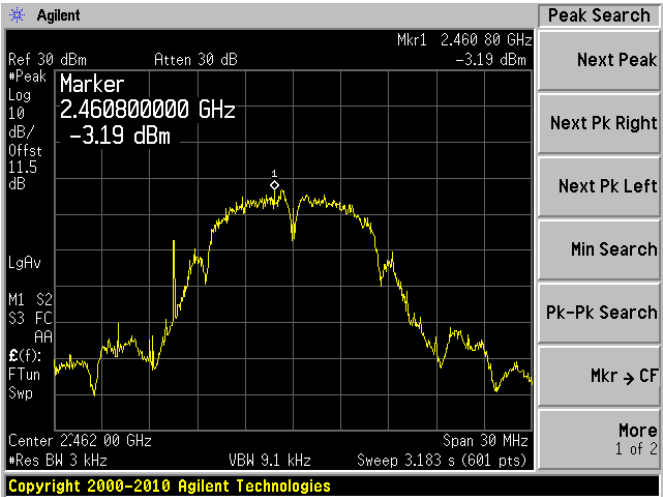


802.11b, High Channel, 2462 MHz

C0

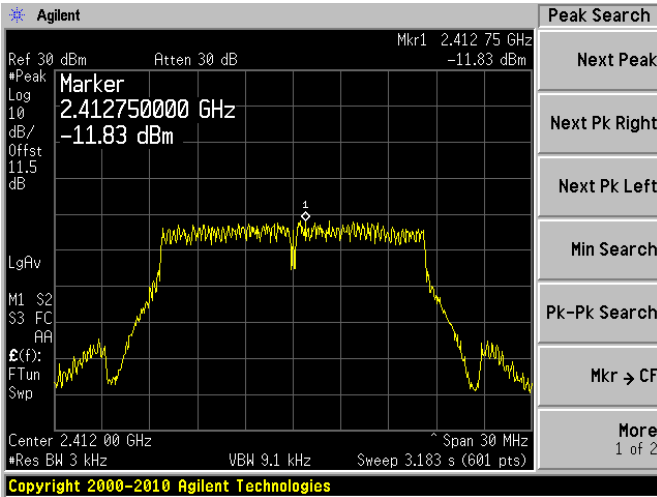


C1

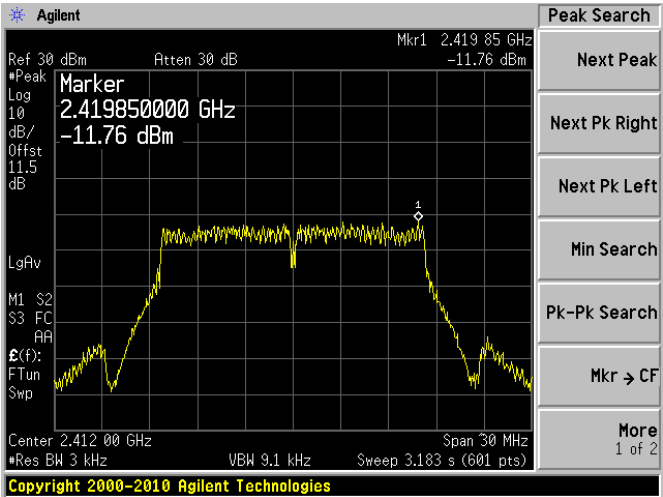


802.11g, Low Channel, 2412 MHz

C0

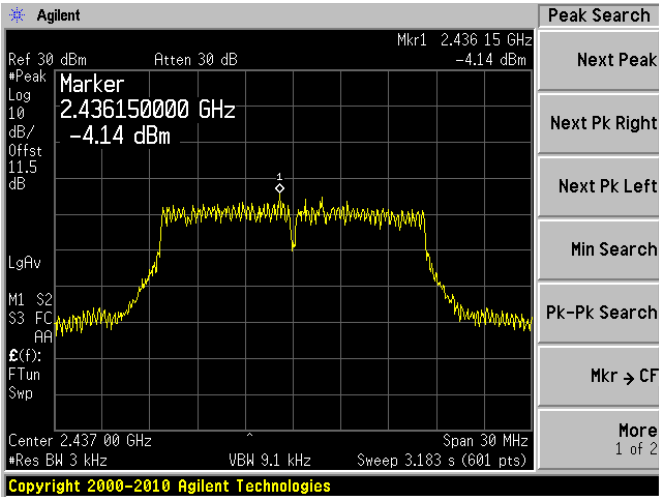


C1

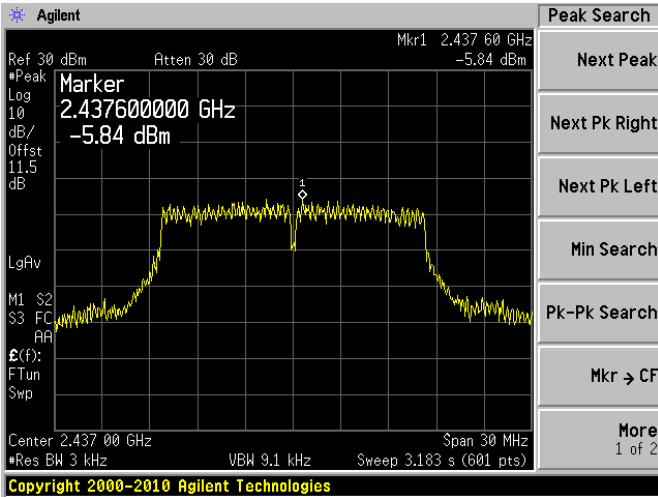


802.11g, Middle Channel, 2437 MHz

C0

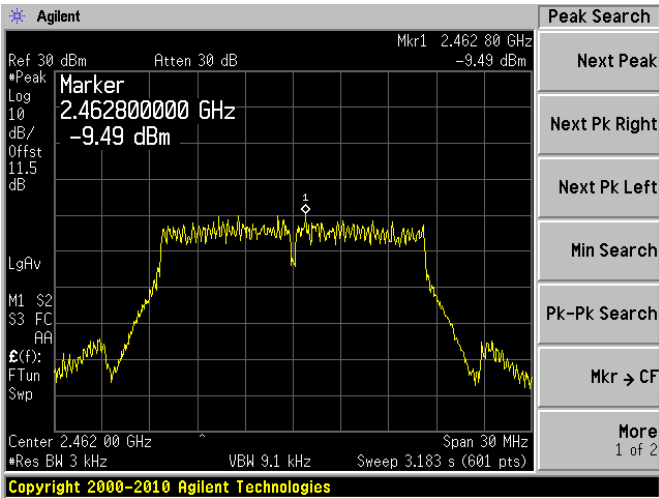


C1

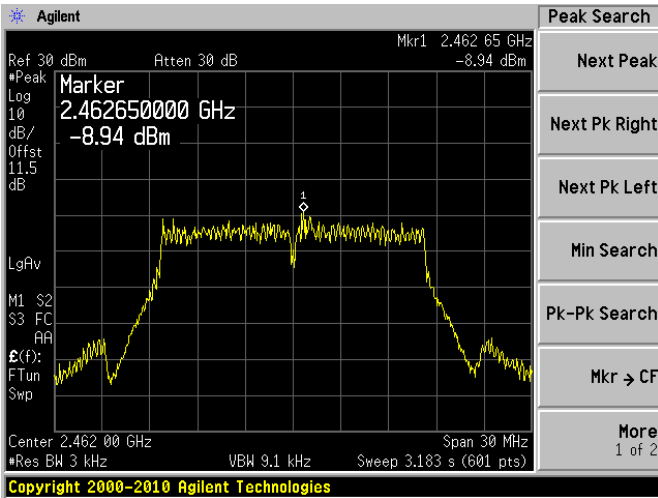


802.11g, High Channel, 2462 MHz

C0

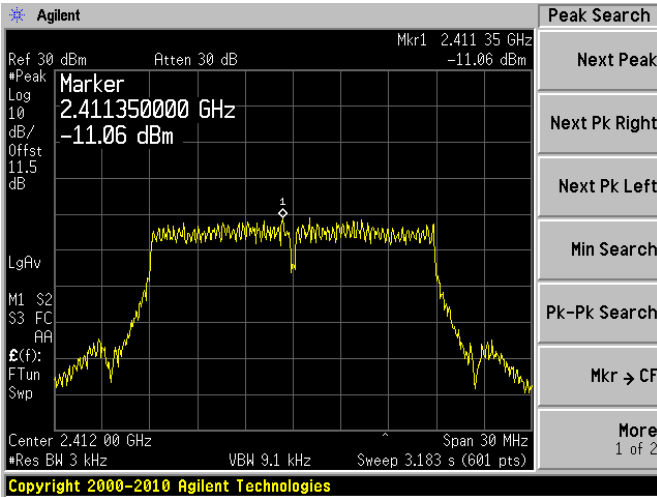


C1

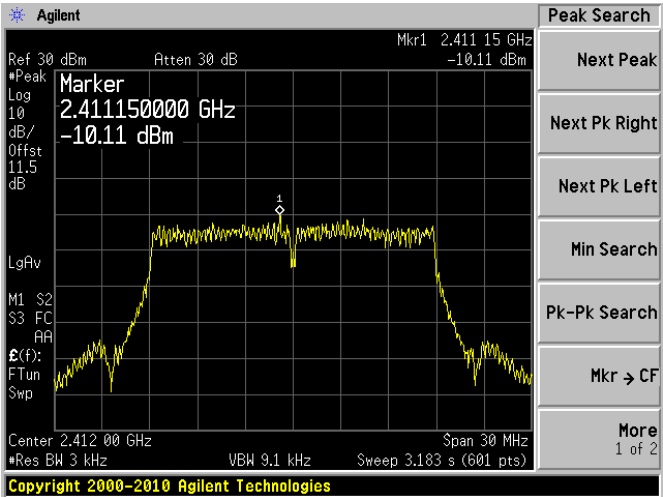


802.11n-HT20, Low Channel, 2412 MHz

C0

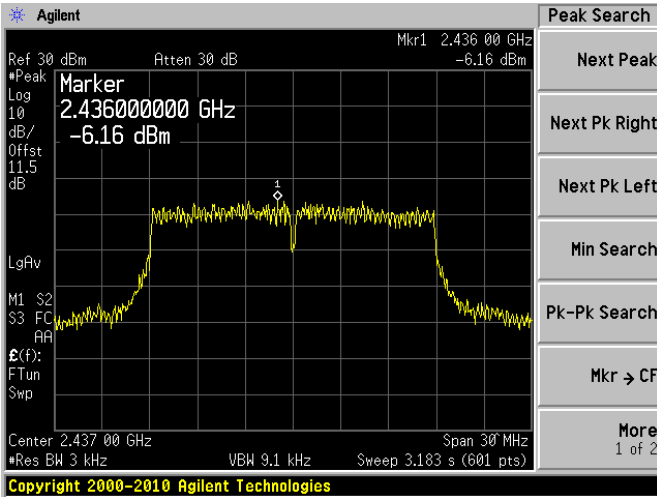


C1

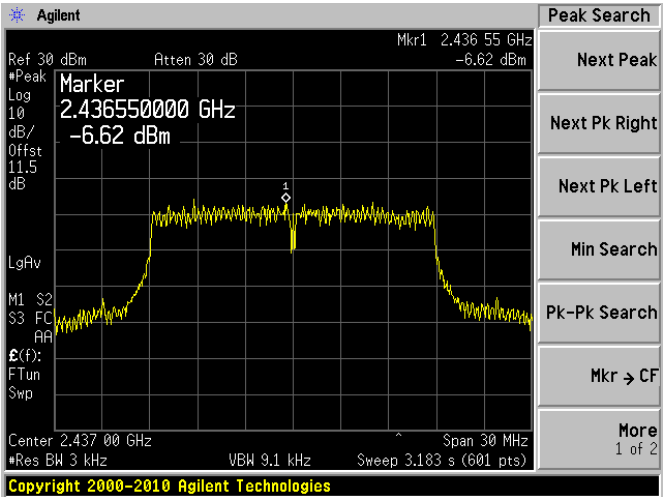


802.11n-HT20, Middle Channel, 2437 MHz

C0

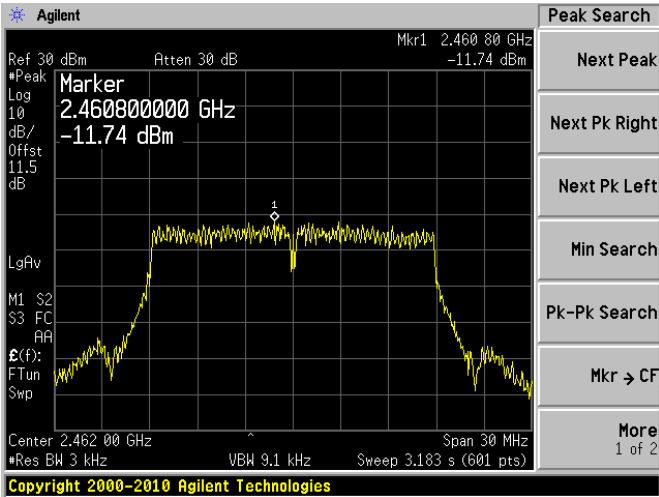


C1

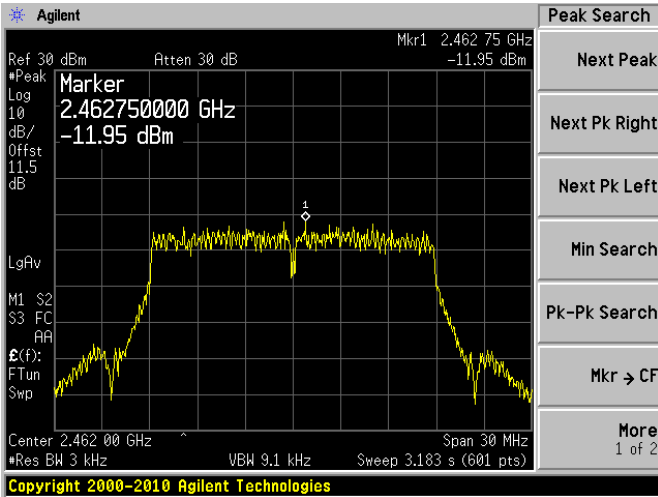


802.11n-HT20, High Channel, 2462 MHz

C0

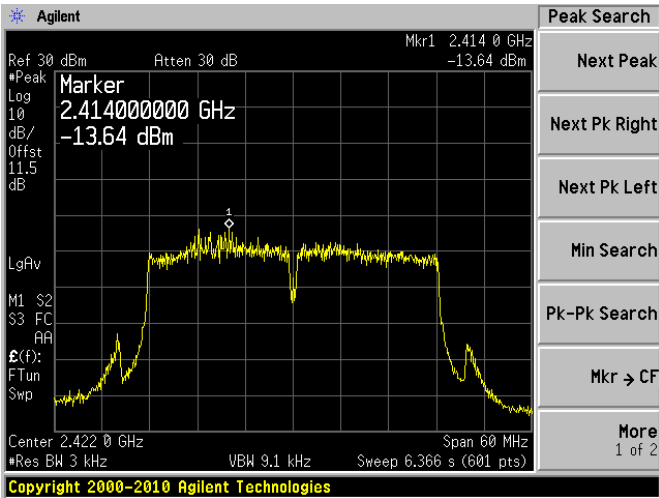


C1

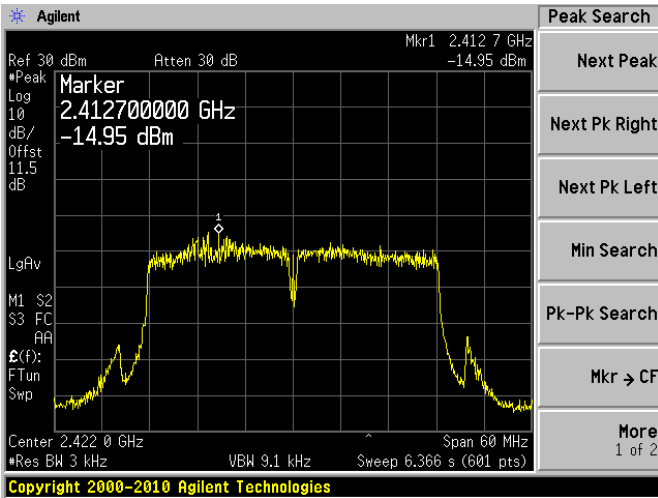


802.11n-HT40, Low Channel, 2422 MHz

C0

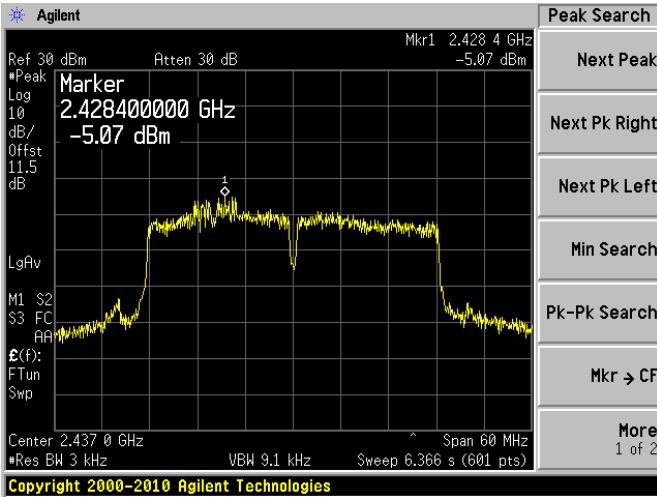


C1

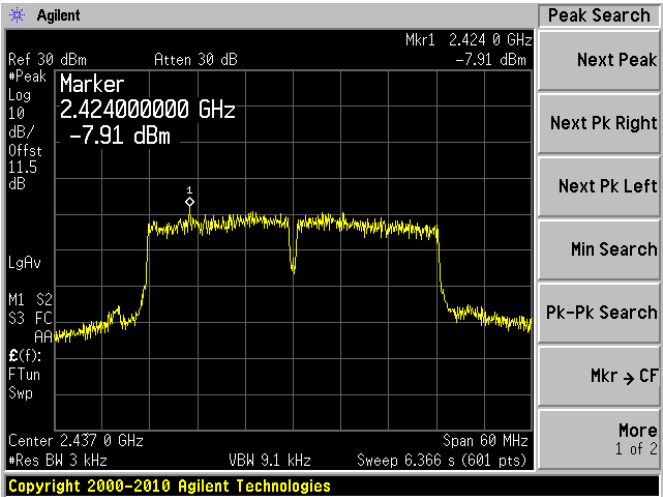


802.11n-HT40, Middle Channel, 2437 MHz

C0

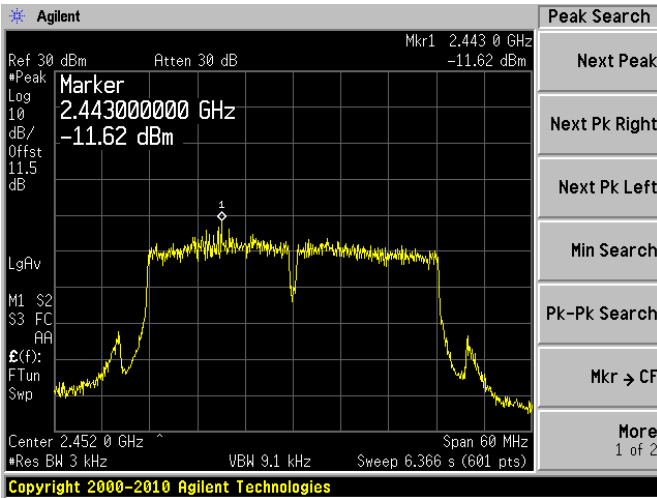


C1



802.11n-HT40, High Channel, 2462 MHz

C0



C1

