FCC PART 15, SUBPART C
IC RSS-210, ISSUE 8, DECEMBER 2010
TEST AND MEASUREMENT REPORT

For

Actiontec Electronics, Inc.

760 North Mary Avenue,

Sunnyvale, CA 94085, USA

FCC ID: LNQT2200H
IC: 2496A-T2200H

Report Type:	**Product Type:**
Original Report	802.11 b/g/n Wireless Router

Prepared By: Chaoran Chu

Report Number: R1307232-247

Report Date: 2013-11-07

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1307232-247	Original Report	2013-11-07

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 model: *T2200H, FCC ID: LNQT2200H, IC: 2496A-T2200H*, which will henceforth be referred to as the "EUT" (Equipment under Test) in this report. The EUT is an xDSL Wireless Gateway operates in 2.4 GHz ISM band.

1.2 Mechanical Description of EUT

The EUT measures approximately 25.5 cm (L) x 18 cm (W) x 4 cm (H) and weighs approximately 458 g.

The test data gathered are from production sample provided by the manufacturer. Serial number: SB213340000136.

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 and IC RSS-210 rules for Output Power, Antenna Requirements, AC Line Conducted Emissions, 6 dB Bandwidth, power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emissions, Conducted 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.

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 $\pm$2.0 dB for Conducted Emissions tests and $\pm$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 Luminares 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.

2.2 EUT Exercise Software

The test software provided by *Actiontec Electronics, Inc.*, and was verified by Chaoran Chu to comply with the standard requirements being tested against.

2.3 Special Equipment

There were no special accessories which were required, included, or intended for use with the 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	7T390 A02
Lenovo	Laptop	G560	CB08585694

2.6 EUT Internal Configuration Details

Manufacturers	Descriptions	Models	Serial Number
Actiontec Electronics, Inc.	Main Board	T2200H	SB213340000136

2.7 Interface Ports and Cabling

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

2.8 Power Supply List and Details

Manufacturer	Description	Model	Serial Number
Actiontec Electronics, Inc.	AC/DC Power Adaptor	STD-12018U1	K2442965

3 Summary of Test Results

Results reported relate only to the product tested.

FCC & IC Rules	Description of Test	Results
FCC §15.247(i), §2.1091 IC RSS-102	RF Exposure	Compliant
FCC §15.203 IC RSS-Gen §7.1.2	Antenna Requirement	Compliant
FCC §15.207(a) IC RSS-Gen §7.2.4	AC Line Conducted Emissions	Compliant
FCC §15.247 (d) IC RSS-210 §A8.5	Spurious Emissions at Antenna Port	Compliant
FCC §15.205 IC RSS-210 §2.2	Restricted Bands	Compliant
FCC §15.209, §15.247 (d) IC RSS-210 §A8.5	Radiated Spurious Emissions	Compliant
FCC §15.247(a)(2) IC RSS-210 §A8.2	6 dB Emission Bandwidth	Compliant
FCC §15.247(b)(3) IC RSS-210 §A8.4	Maximum Peak Output Power	Compliant
FCC §15.247(d) IC RSS-210 §A8.5	100 kHz Bandwidth of Frequency Band Edge	Compliant
FCC §15.247(e) IC RSS-210 §A8.2(b)	Power Spectral Density	Compliant
IC RSS-210 §2.3 & RSS-Gen §6.1	Receiver Spurious Emission	Compliant

4 FCC §15.247 (i), §2.1091 & IC RSS-102 – 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

Maximum peak output power at antenna input terminal (dBm):	24.39
Maximum peak output power at antenna input terminal (mW):	274.7894
Prediction distance (cm):	20
Prediction frequency (MHz):	2437
Maximum Antenna Gain, typical (dBi):	5
Maximum Antenna Gain (numeric):	3.16
Power density of prediction frequency at 20 cm (mW/cm^2):	0.172874
MPE limit for uncontrolled exposure at prediction frequency (mW/m^2):	1.728742

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.172874 mW/cm^2, limit is 1.0 mW/cm^2.

5 FCC §15.203 & IC RSS-Gen §7.1.2 – 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.

According to IC RSS-Gen §7.1.2: Transmitter Antenna

A transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 mW or less. For devices of output powers greater than 10 mW, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

5.2 Antenna List

P/NO	Antenna Gain (dBi)
C787-510006-A	5.0

5.3 Result

The antenna of the EUT has maximum gain of 5 dBi and consists of a reversed SMA connector, which in accordance to sections FCC §15.203 and IC RSS-Gen §7.1.2, is considered sufficient to comply with the provisions of these sections. Please refer to the EUT photos.

6 FCC §15.207 & IC RSS-Gen §7.2.4 – AC Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 and IC RSS-Gen §7.2.4 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 μH/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 and IC RSS-Gen §7.2.4 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.

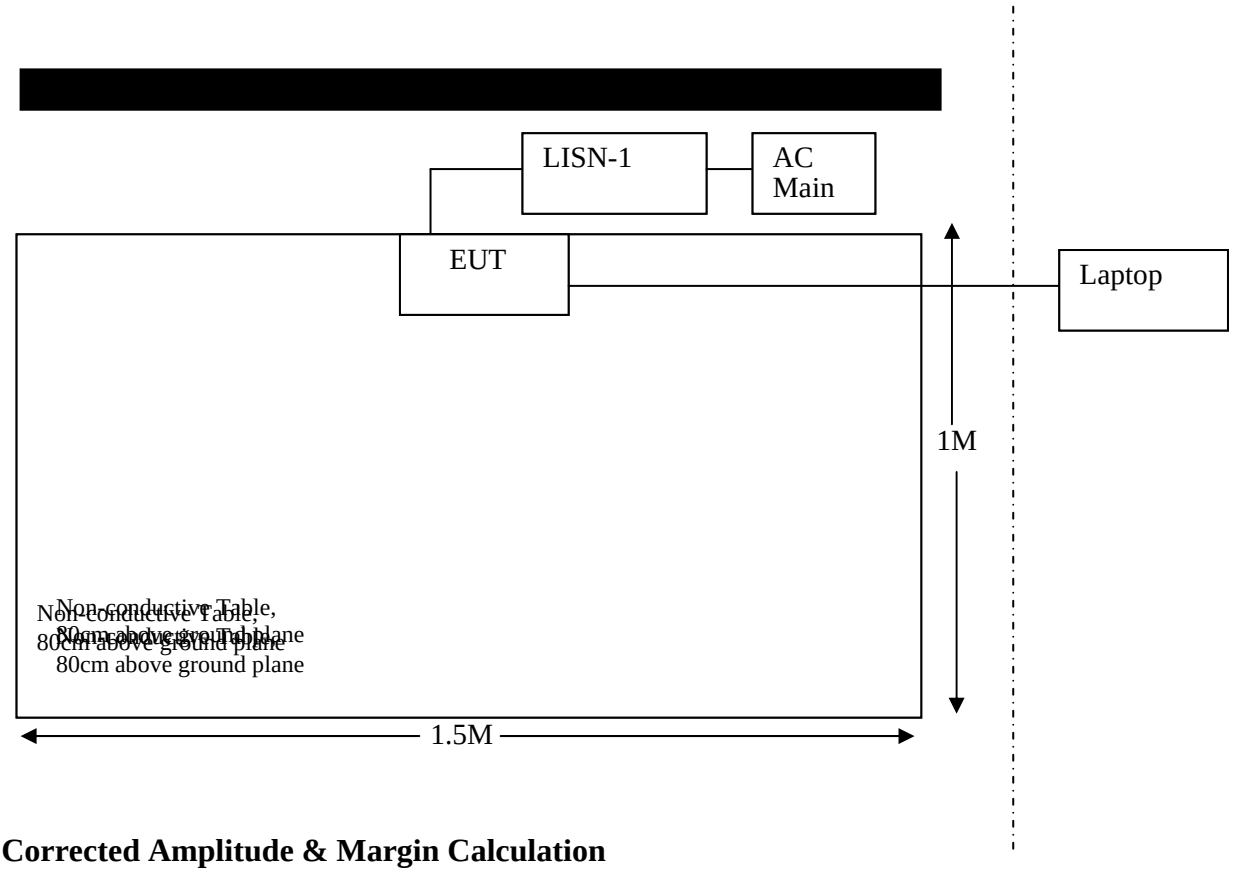
6.3 Test Procedure

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 Test Setup Block Diagram



6.5 Corrected Amplitude & Margin Calculation

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

CA = Ai + CL + Atten

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 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:

Margin = Corrected Amplitude - Limit

6.6 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.*

6.7 Test Environmental Conditions

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

The testing was performed by Chaoran Chu on 2013-10-08 at 5m chamber 3.

6.8 Summary of Test Results

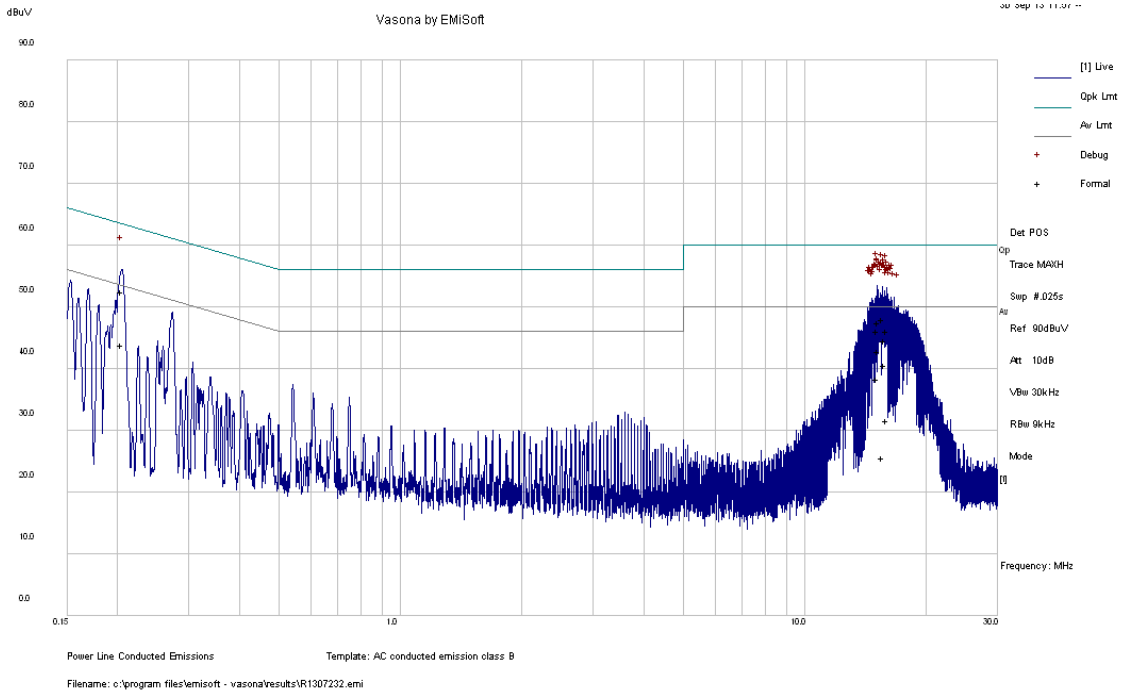
According to the recorded data in following table, the EUT complied with the FCC/IC standard's conducted emissions limits, with the margin reading of:

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)**
-6.78	15.50171	Neutral	0.15-30

6.9 Conducted Emissions Test Plots and Data

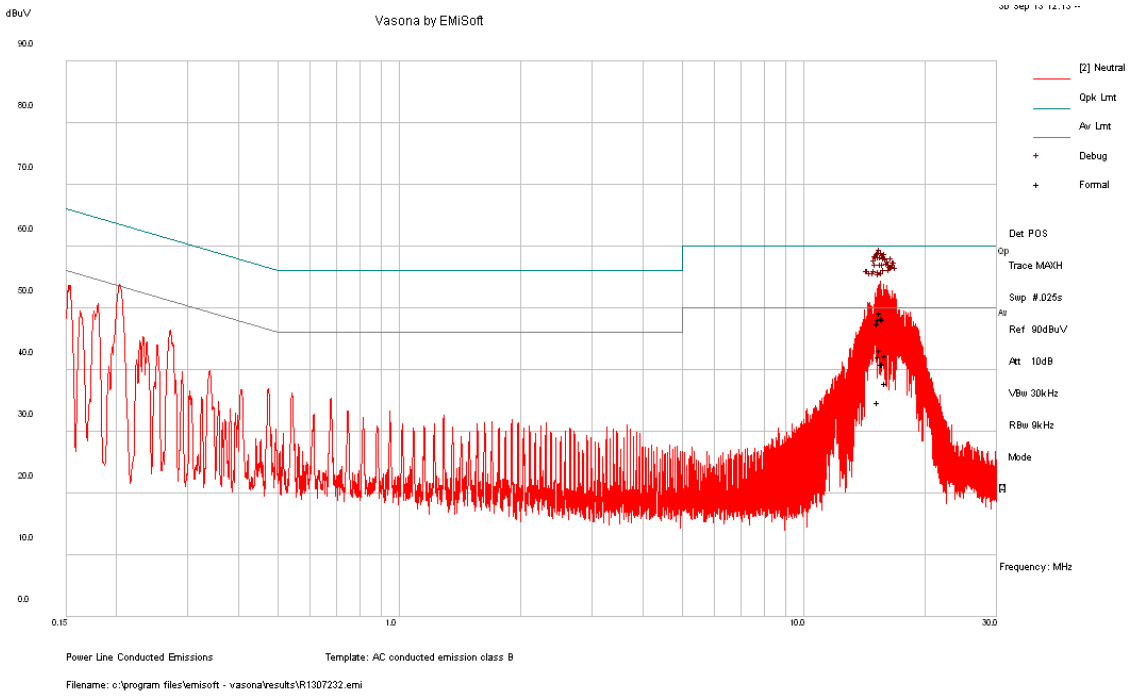
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
15.14988	35.4	Line	60	-13.85	QP
15.54418	37.22	Line	60	-12.00	QP
15.92554	35.26	Line	60	-13.92	QP
15.23182	36.74	Line	60	-12.50	QP
0.205119	41.78	Line	63.4	-10.85	QP
15.76235	33.85	Line	60	-15.35	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
15.14988	27.58	Line	50	-11.67	Ave.
15.54418	14.92	Line	50	-24.30	Ave.
15.92554	20.76	Line	50	-18.43	Ave.
15.23182	32.15	Line	50	-7.09	Ave.
0.205119	33.05	Line	53.4	-9.58	Ave.
15.76235	29.76	Line	50	-9.44	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
15.50171	38.38	Neutral	60	-10.85	QP
15.6977	37.6	Neutral	60	-11.60	QP
15.36502	37.4	Neutral	60	-11.83	QP
16.00276	31.56	Neutral	60	-17.62	QP
15.30843	36.68	Neutral	60	-12.56	QP
15.76294	37.4	Neutral	60	-11.80	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
15.50171	32.45	Neutral	50	-6.78	Ave.
15.6977	30.25	Neutral	50	-8.96	Ave.
15.36502	31.44	Neutral	50	-7.80	Ave.
16.00276	27.07	Neutral	50	-12.11	Ave.
15.30843	24.07	Neutral	50	-15.17	Ave.
15.76294	30.1	Neutral	50	-9.10	Ave.

7 FCC §2.1051, §15.247(d) & IC RSS-210 §A8.5 – Spurious Emissions at Antenna Terminals

7.1 Applicable Standard

For FCC §15.247(d) and IC RSS-210 §A8.5 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

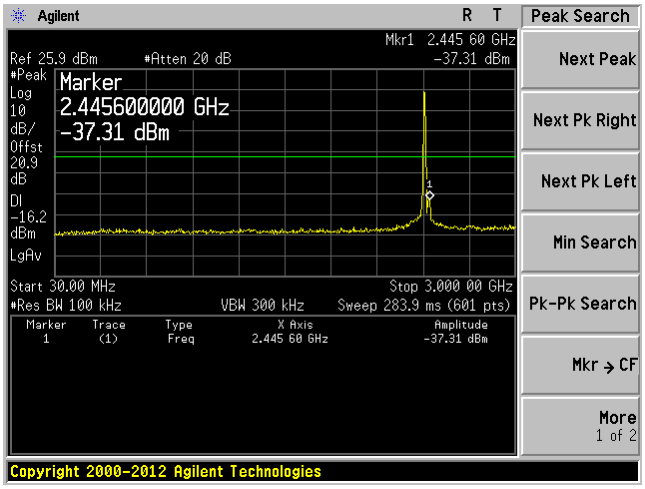
The testing was performed by Chaoran Chu on 2013-10-04 at the RF test site.

7.5 Test Results

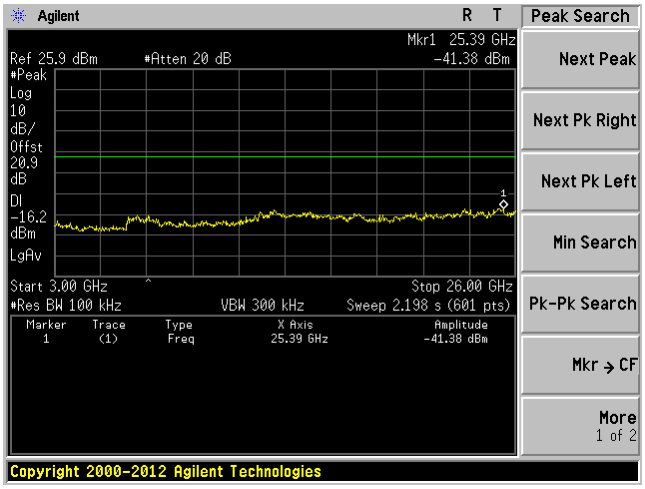
Please refer to following plots of spurious emissions.

802.11b, Low Channel, 2412 MHz

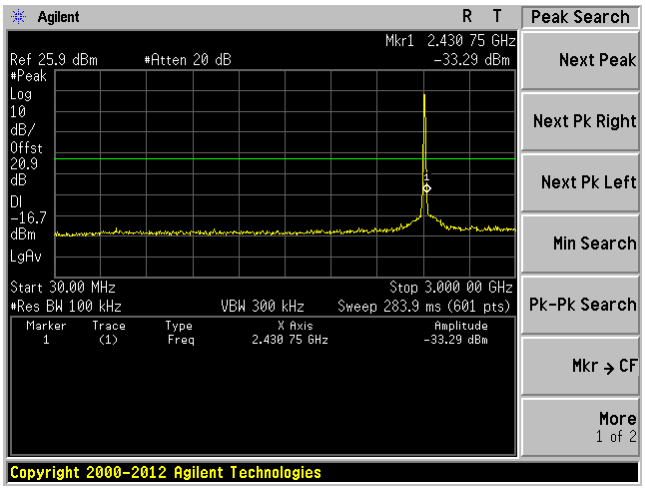
C0, 30 MHz to 3 GHz



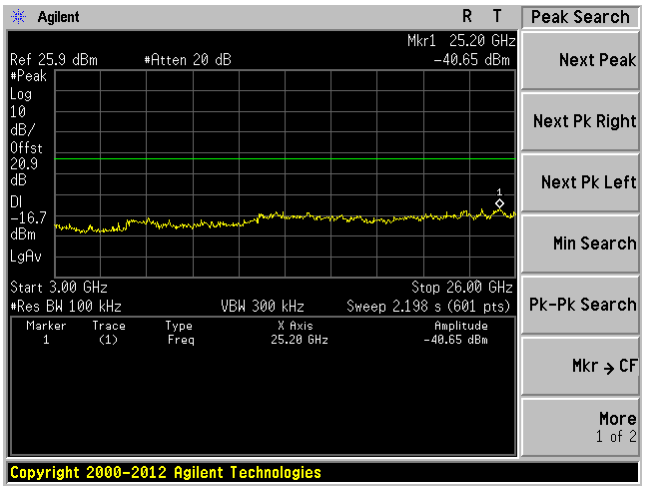
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz

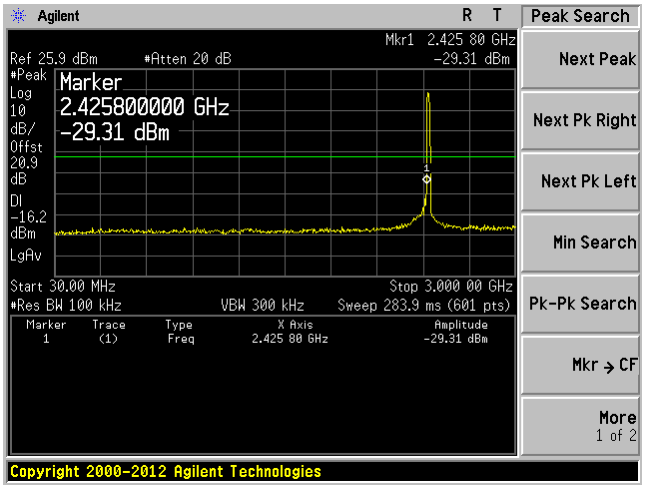


C1, 3 GHz to 26 GHz

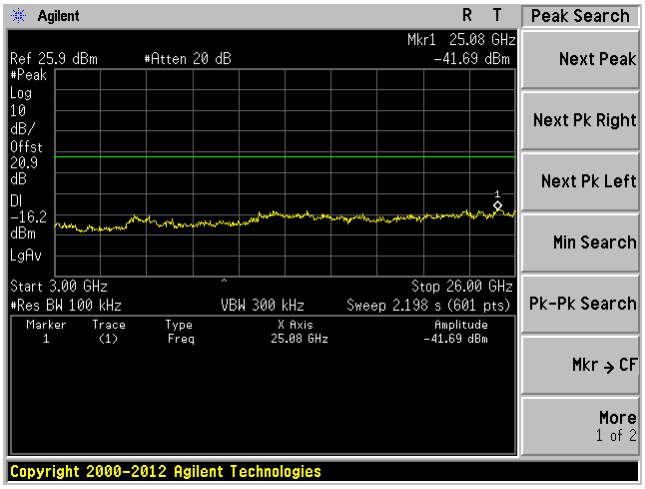


802.11b, Middle Channel, 2437 MHz

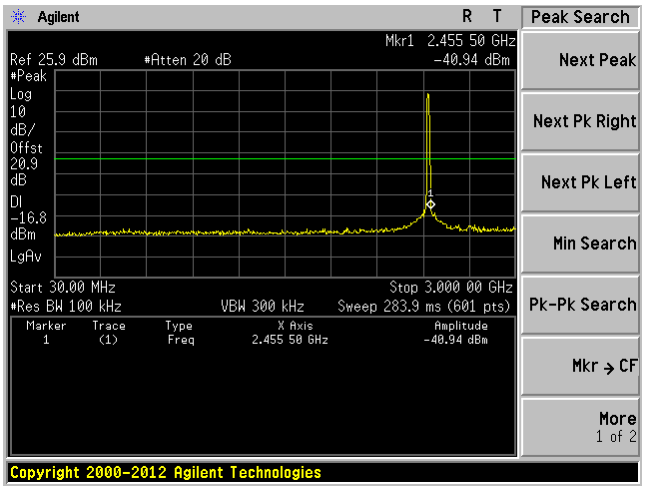
C0, 30 MHz to 3 GHz



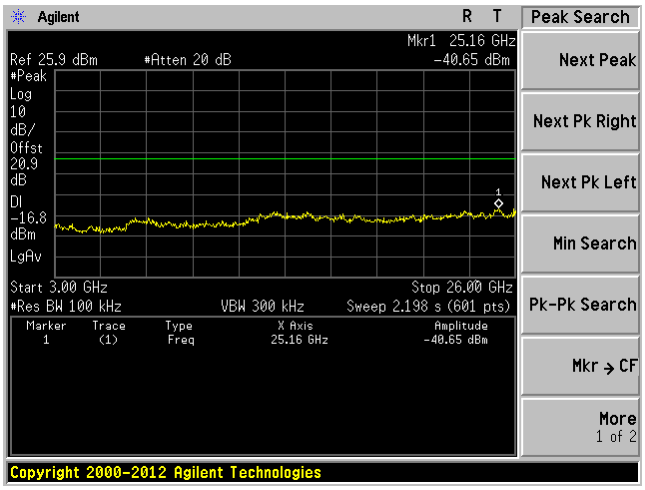
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz

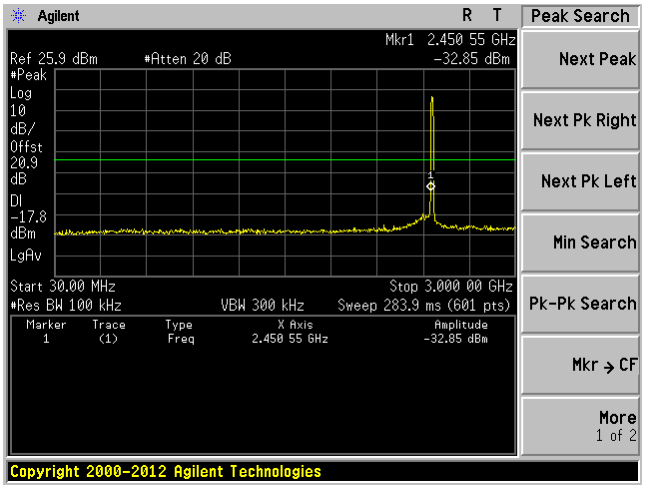


C1, 3 GHz to 26 GHz

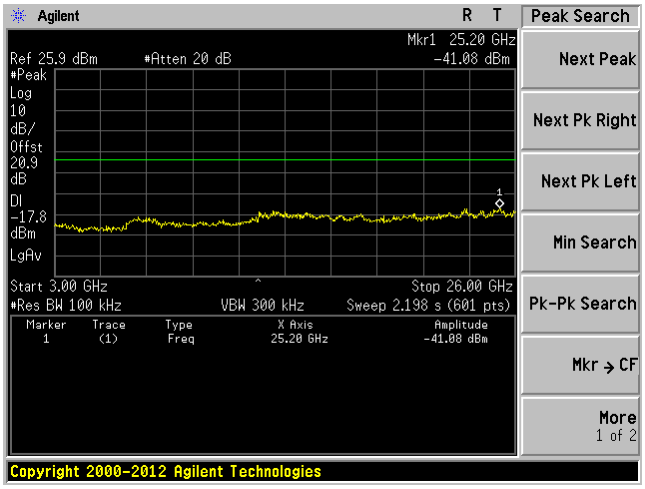


802.11b, High Channel, 2462 MHz

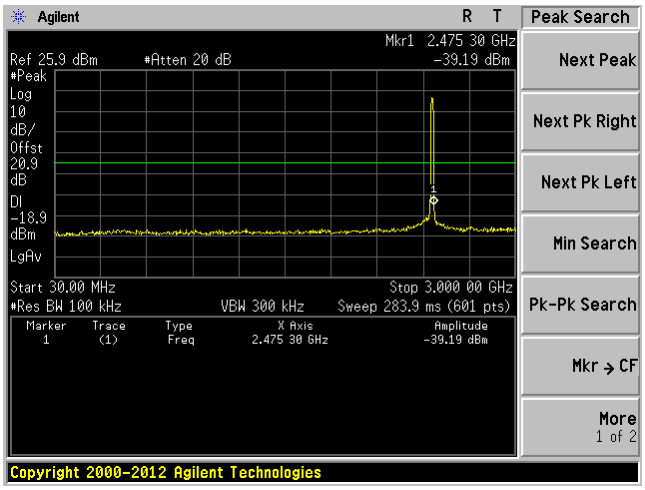
C0, 30 MHz to 3 GHz



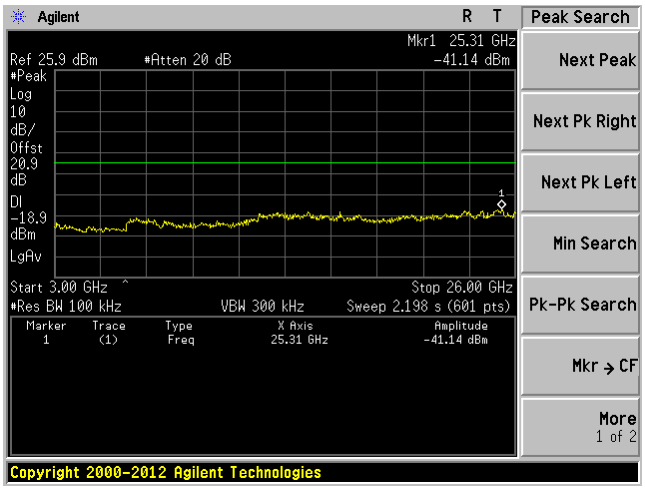
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz

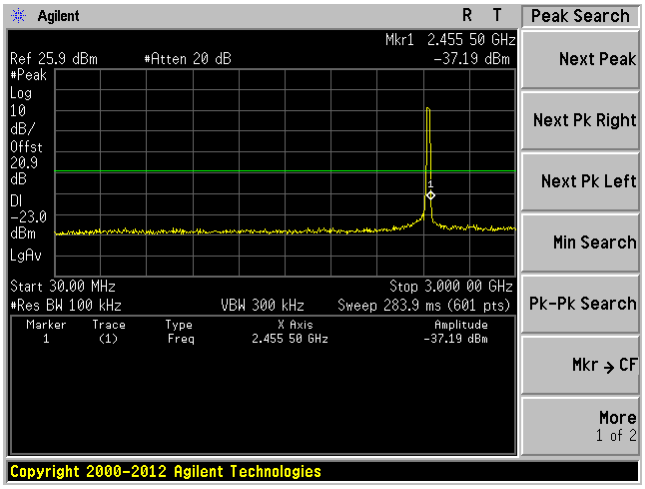


C1, 3 GHz to 26 GHz

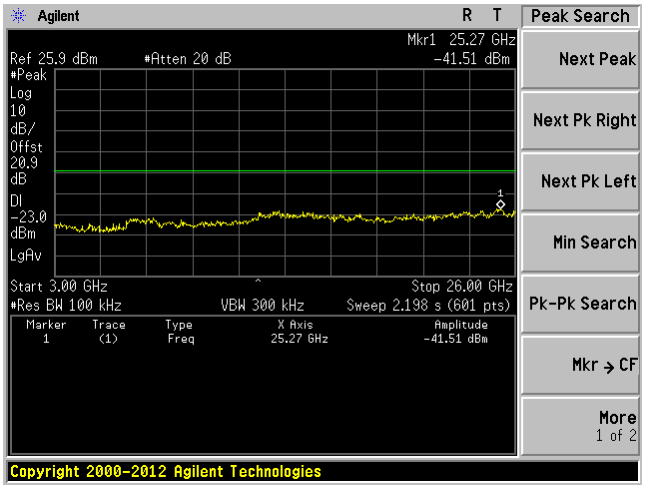


802.11g, Low Channel, 2412 MHz

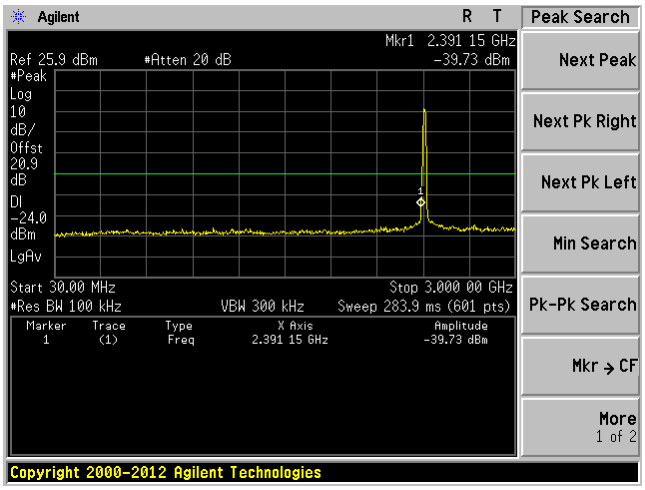
C0, 30 MHz to 3 GHz



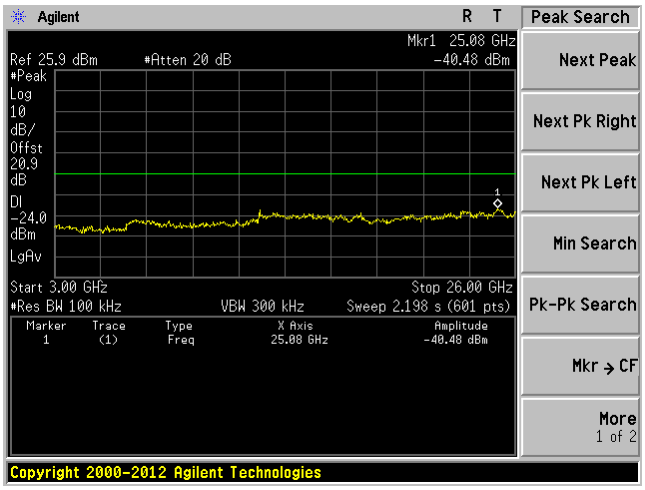
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz

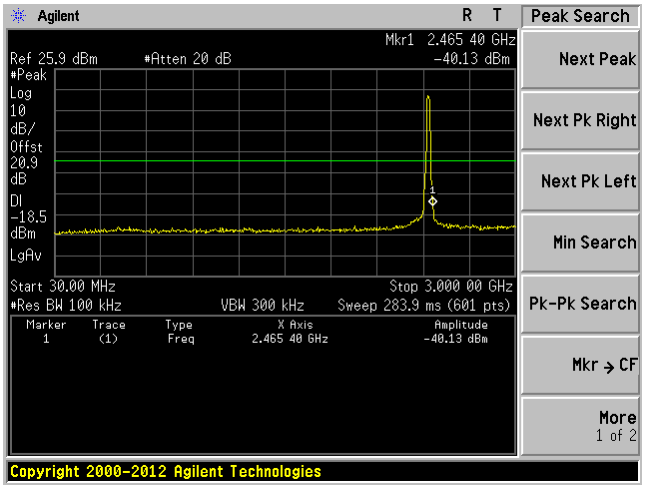


C1, 3 GHz to 26 GHz

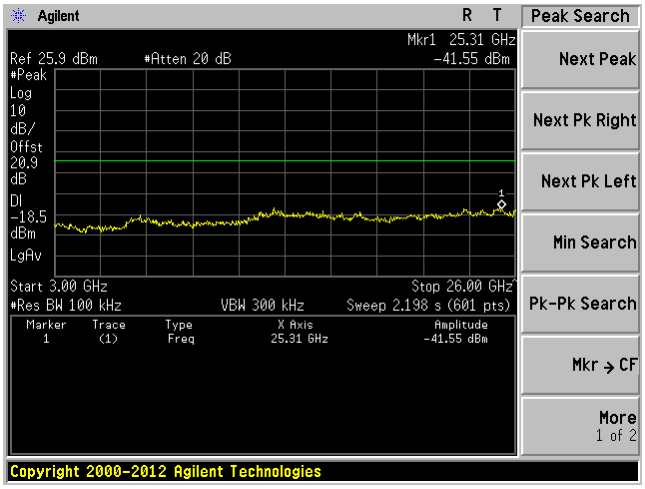


802.11g, Middle Channel, 2437 MHz

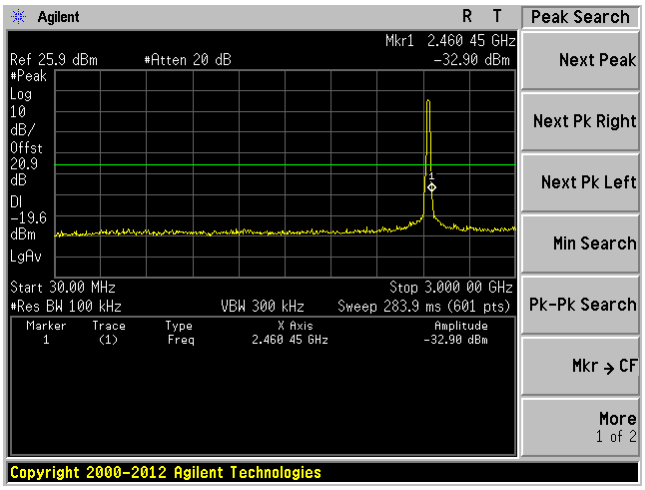
C0, 30 MHz to 3 GHz



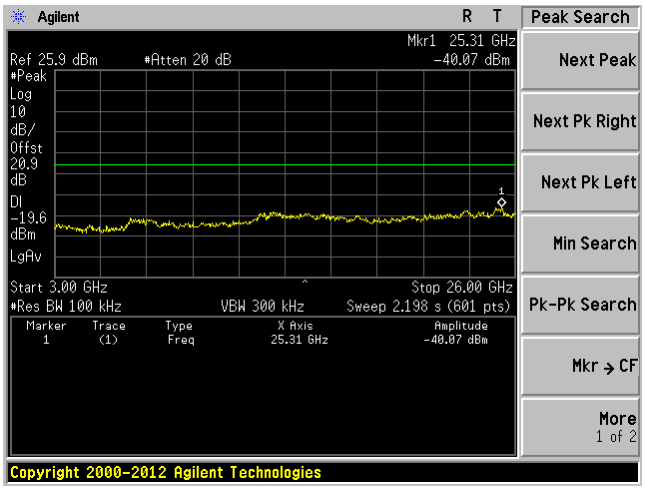
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz

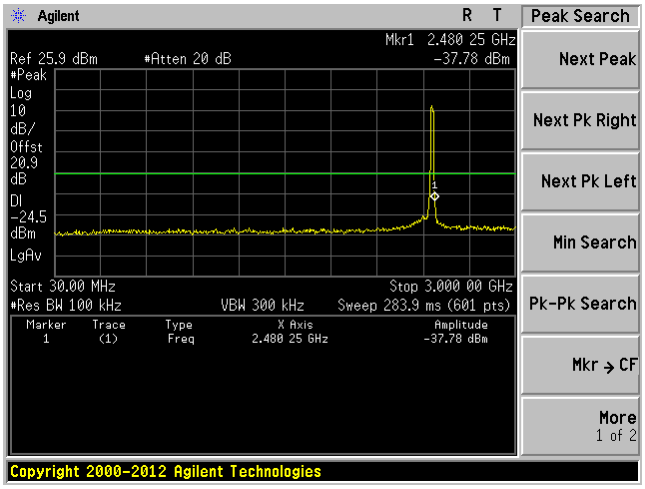


C1, 3 GHz to 26 GHz

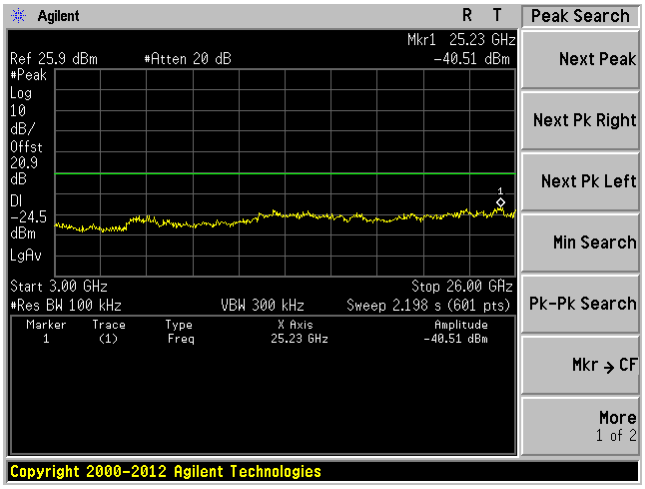


802.11g, High Channel, 2462 MHz

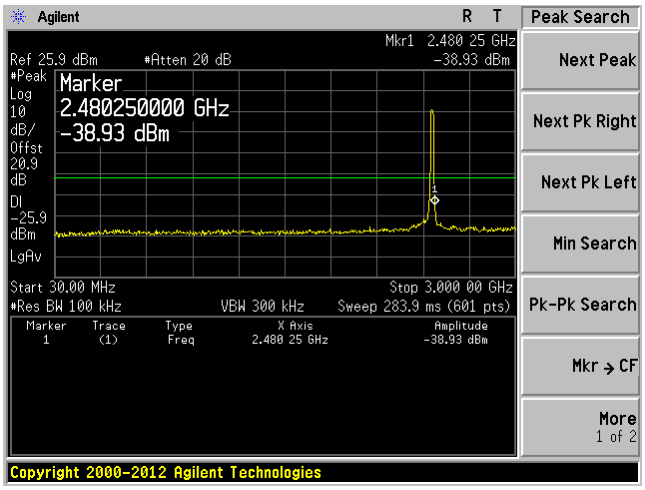
C0, 30 MHz to 3 GHz



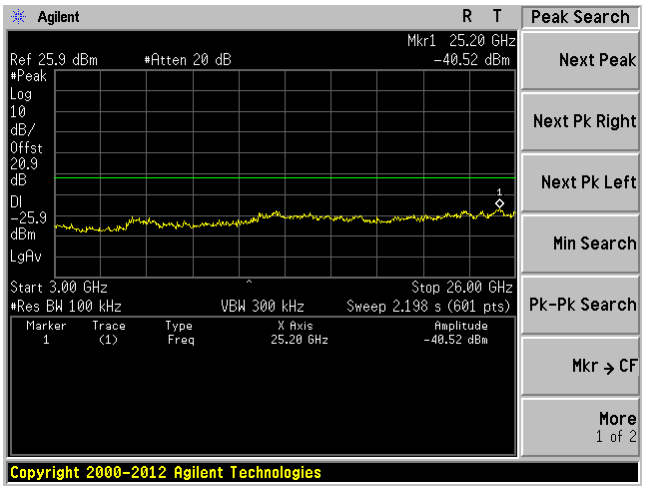
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz

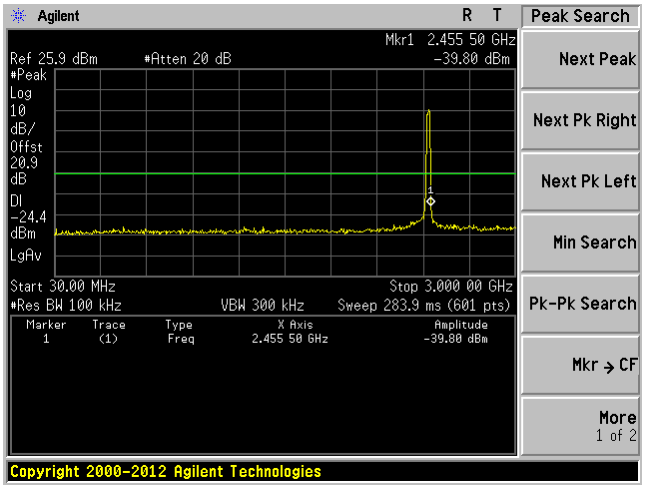


C1, 3 GHz to 26 GHz

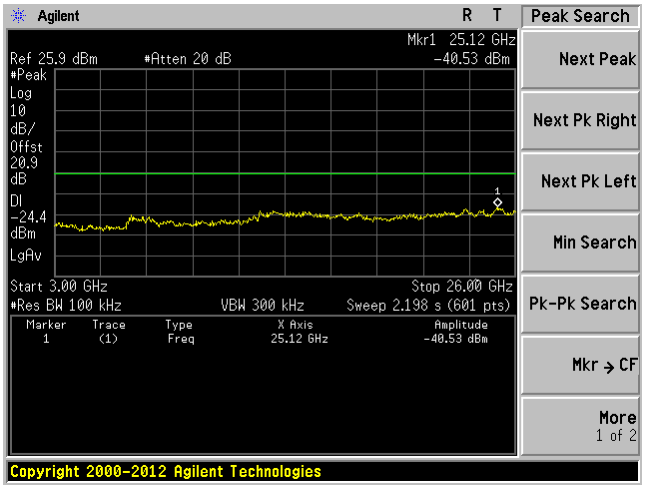


802.11n-HT20, Low Channel, 2412 MHz

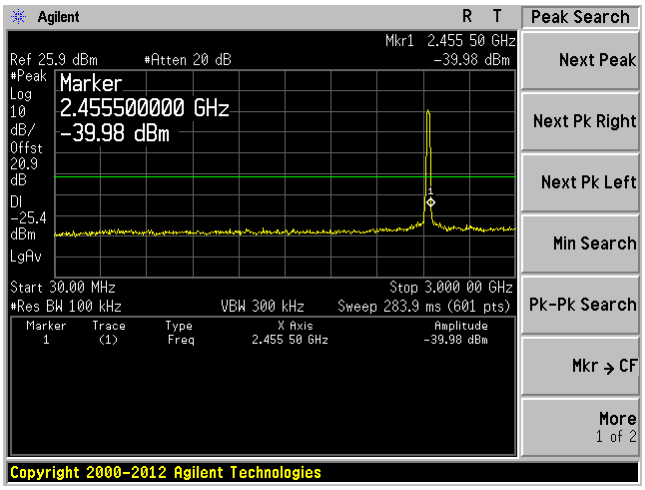
C0, 30 MHz to 3 GHz



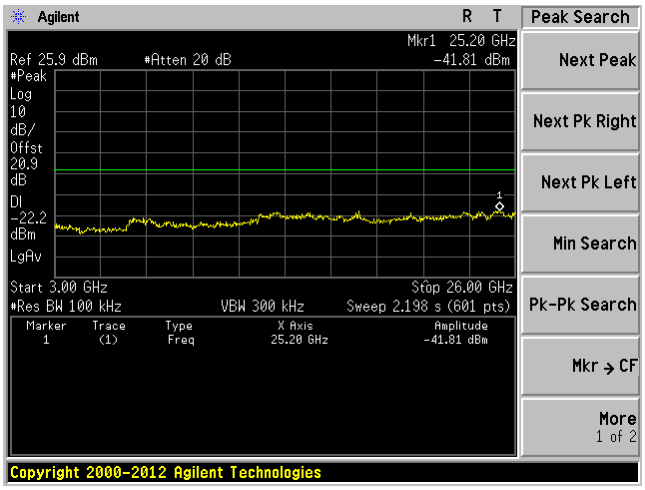
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz

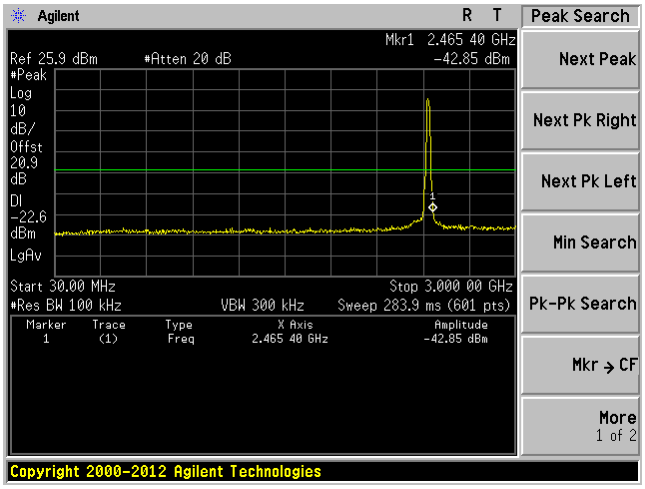


C1, 3 GHz to 26 GHz

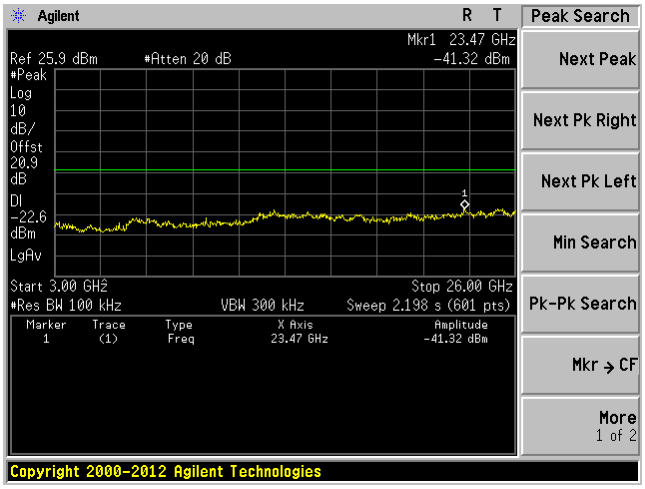


802.11n-HT20, Middle Channel, 2437 MHz

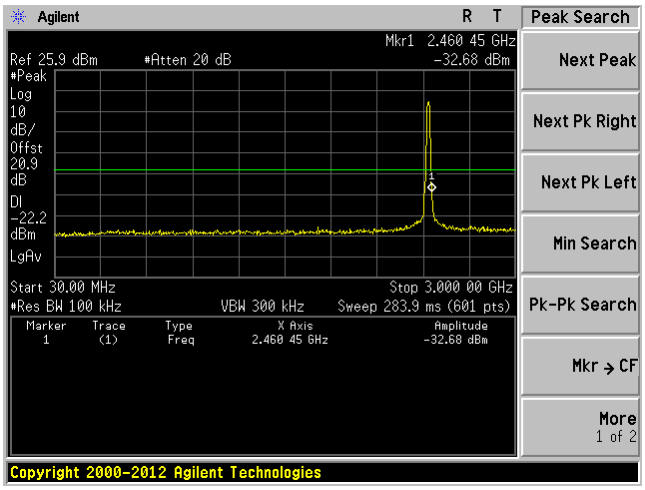
C0, 30 MHz to 3 GHz



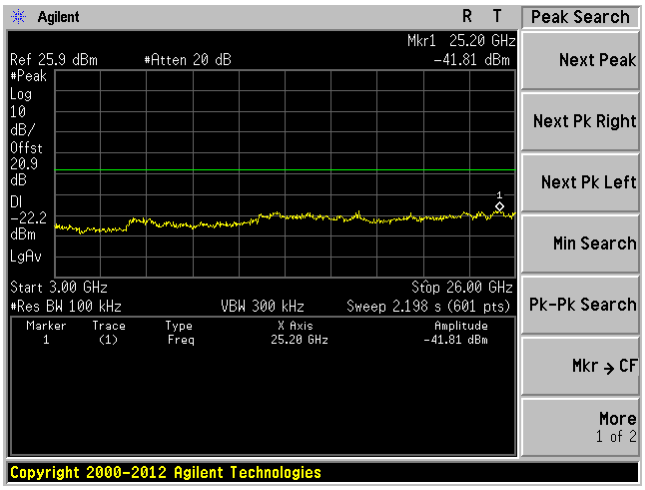
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz

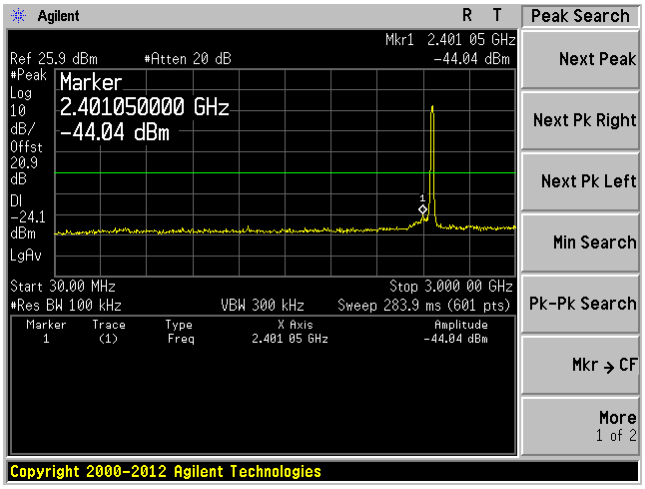


C1, 3 GHz to 26 GHz

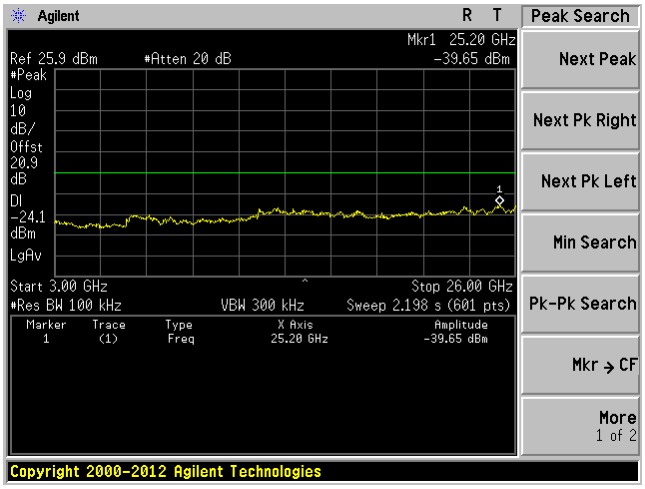


802.11n-HT20, High Channel, 2462 MHz

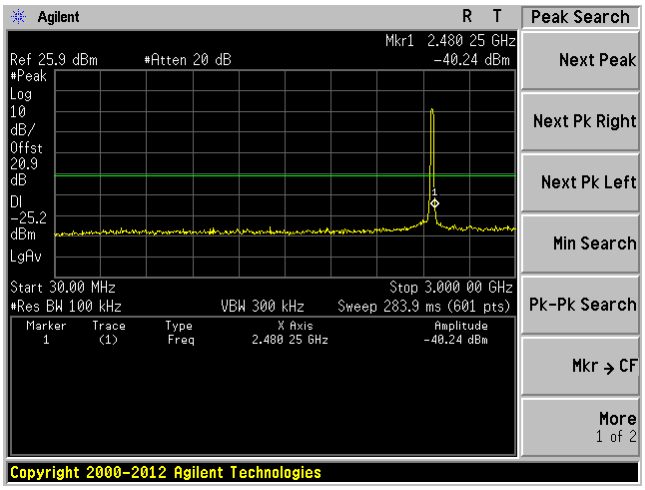
C0, 30 MHz to 3 GHz



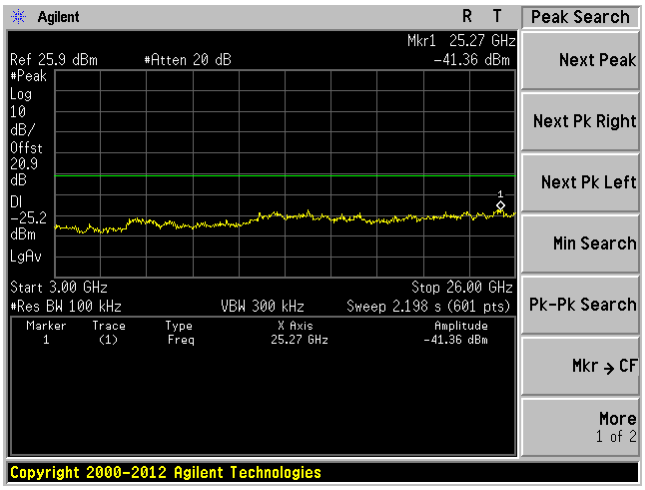
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz

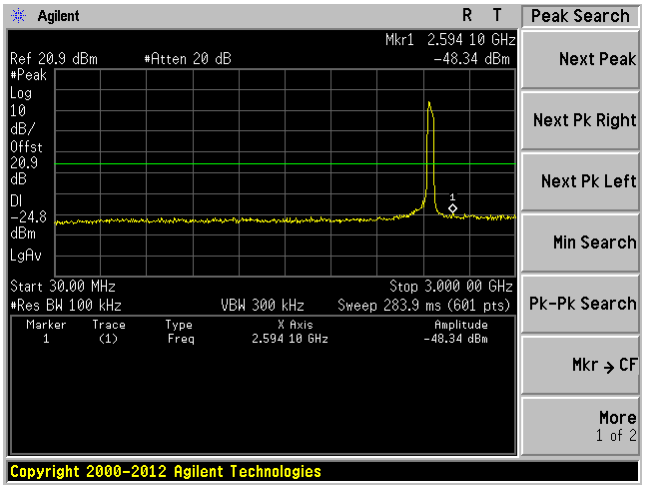


C1, 3 GHz to 26 GHz

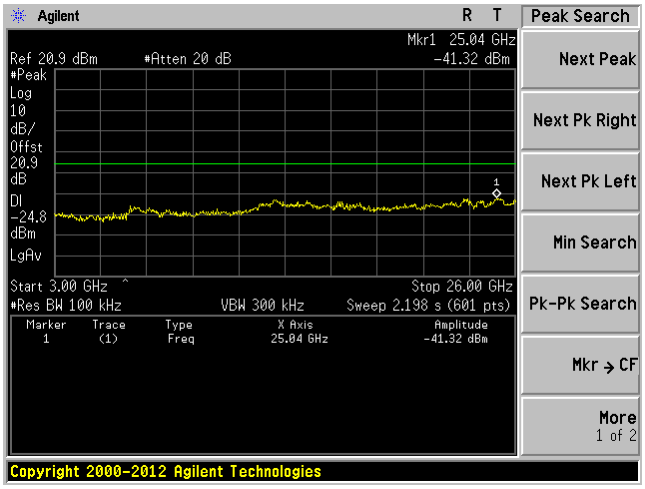


802.11n-HT40, Low Channel, 2422 MHz

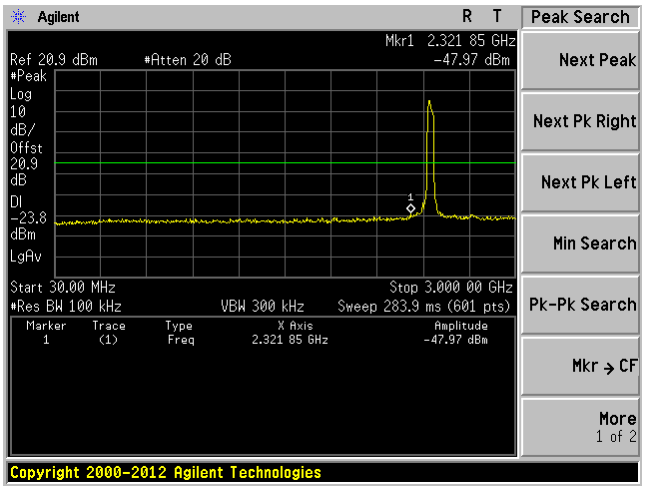
C0, 30 MHz to 3 GHz



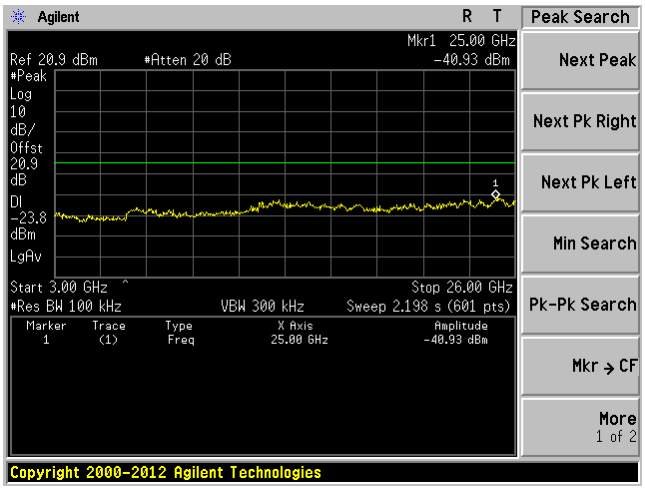
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz

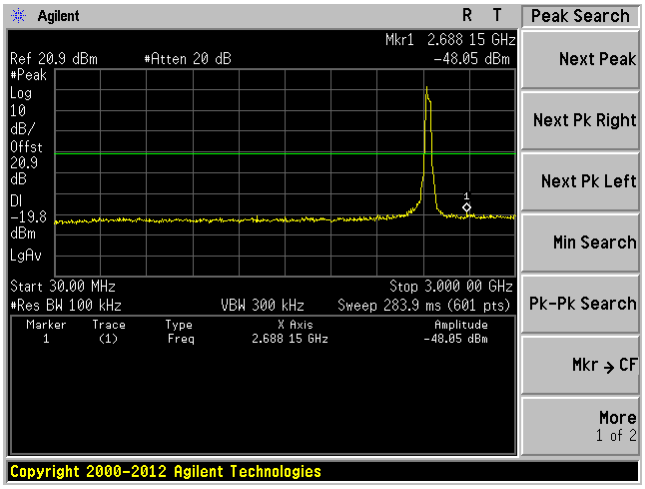


C1, 3 GHz to 26 GHz

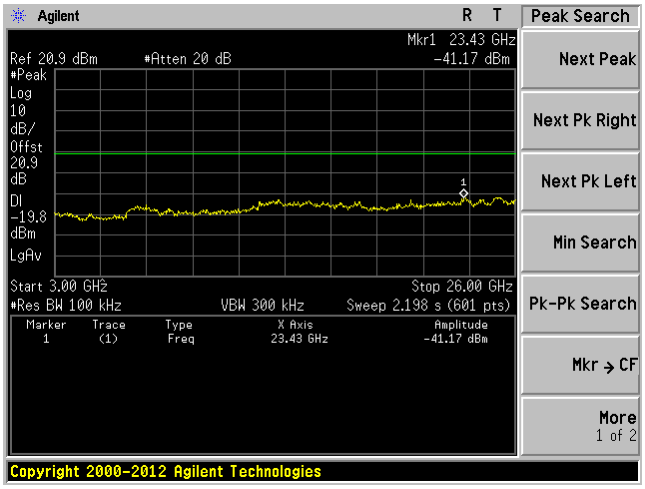


802.11n-HT40, Middle Channel, 2437 MHz

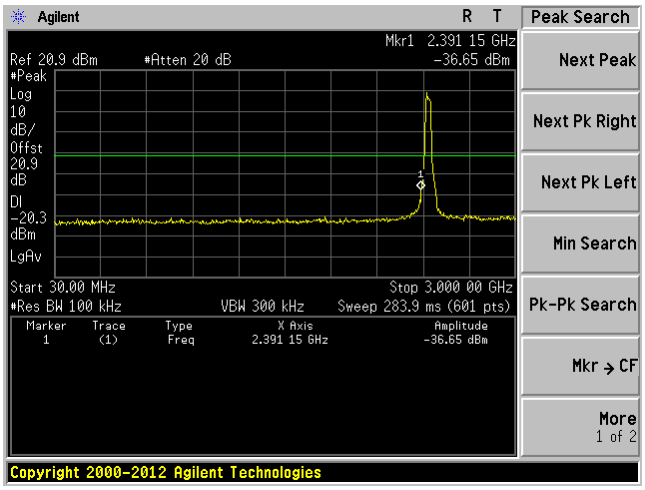
C0, 30 MHz to 3 GHz



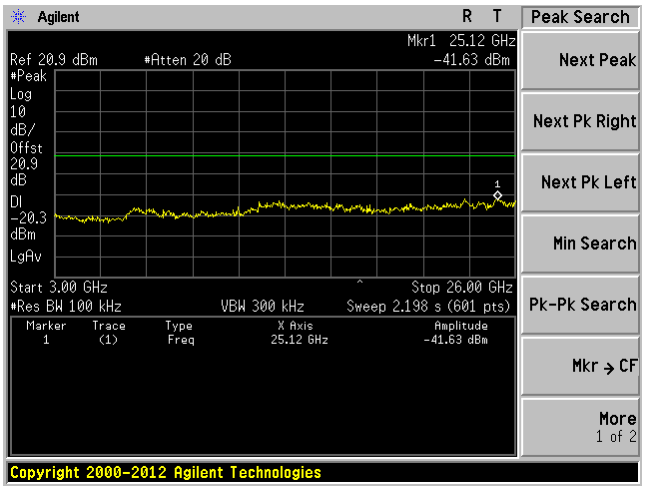
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz

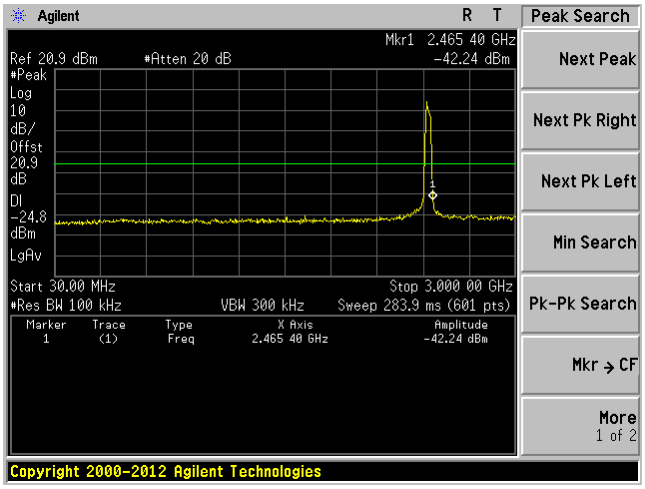


C1, 3 GHz to 26 GHz

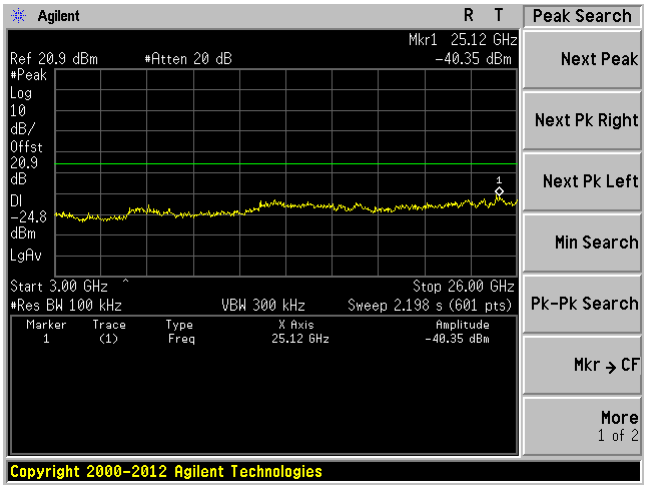


802.11n-HT40, High Channel, 2452 MHz

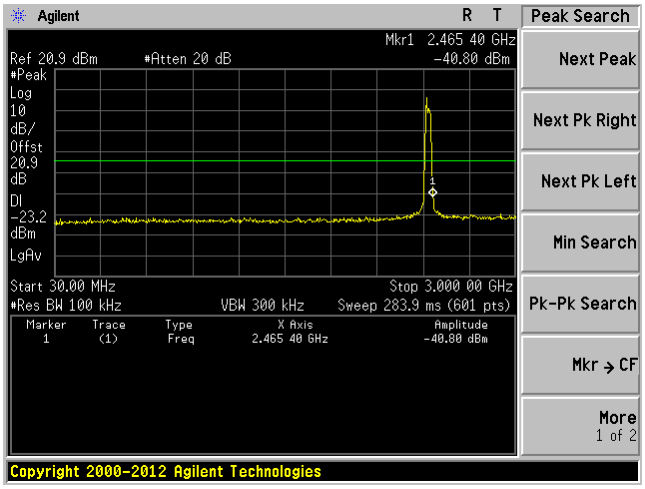
C0, 30 MHz to 3 GHz



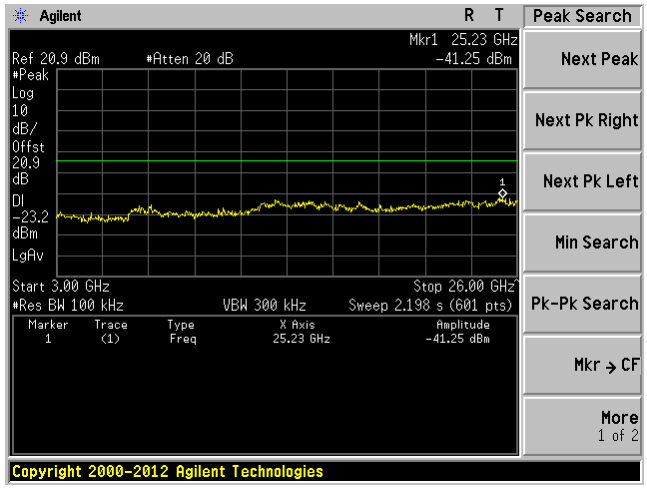
C0, 3 GHz to 26 GHz



C1, 30 MHz to 3 GHz



C1, 3 GHz to 26 GHz



8 FCC §15.205, §15.209 & §15.247(d) & IC RSS-210 §A8.5 – 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) and RSS-210: 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).

As per IC RSS-210 A8.5 Out-of-band Emissions, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

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 and IC RSS-210 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 based 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:

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

Margin = Corrected Amplitude - 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 Chaoran Chu on 2013-10-07 to 2013-10-23 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 and IC RSS-210 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**
-1.19	550.0028	Horizontal	802.11g, Middle

1–25 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-0.024	2390	Horizontal	802.11b, 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

802.11b mode, Middle Channel

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
550.0005	38.89	99	H	360	46	-7.11
249.9968	42.8	158	H	28	46	-3.2
124.9938	39.64	99	V	360	43.5	-3.86

802.11g mode, Middle Channel

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
550.0028	44.81	99	H	195	46	-1.19
125.0063	39.13	106	V	360	43.5	-4.37
250.0025	41.35	241	H	93	46	-4.65

802.11n-HT20 mode, Middle Channel

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
499.9963	35.74	105	H	40	46	-10.26
250.0148	41.96	143	H	242	46	-4.04
124.998	38.73	115	V	335	43.5	-4.77

802.11n-HT40 mode, Middle Channel

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
549.9953	44.1	99	H	119	46	-1.9
125.019	37.9	116	V	335	43.5	-5.6
240.0085	30.37	163	H	360	46	-15.63

Note: Only digital emissions present from 30 MHz to 1 GHz, therefore only the middle channel was tested.

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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	83.69	350	100	V	28.956	3.12	0	115.766	-	-	Peak/ Fund
2412	83.82	133	127	H	28.956	3.12	0	115.896	-	-	Peak/ Fund
2412	78.51	350	100	V	28.956	3.12	0	110.586	-	-	Ave/ Fund
2412	78.73	133	127	H	28.956	3.12	0	110.806	-	-	Ave/ Fund
4824	40.61	221	100	V	33.097	4.56	27.7	50.567	74	-23.433	Peak
4824	39.08	317	100	H	33.097	4.56	27.7	49.037	74	-24.963	Peak
4824	33.88	221	100	V	33.097	4.56	27.7	43.837	54	-10.163	Ave
4824	28.13	317	100	H	33.097	4.56	27.7	38.087	54	-15.913	Ave
7236	39.66	309	100	V	35.928	5.49	27.58	53.498	95.766	-42.268	Peak
7236	40.14	210	112	H	35.928	5.49	27.58	53.978	95.896	-41.918	Peak
7236	27.75	309	100	V	35.928	5.49	27.58	41.588	90.586	-48.998	Ave
7236	27.77	210	112	H	35.928	5.49	27.58	41.608	90.806	-49.198	Ave
9648[1]	38.67	0	100	V	37.954	6.54	27.06	56.104	95.766	-39.662	Peak
9648[1]	38.49	0	100	H	37.954	6.54	27.06	55.924	95.896	-39.972	Peak
9648[1]	25.94	0	100	V	37.954	6.54	27.06	43.374	90.586	-47.212	Ave
9648[1]	25.92	0	100	H	37.954	6.54	27.06	43.354	90.806	-47.452	Ave
Middle Channel 2437 MHz, measured at 3 meters											
2437	84.41	352	100	V	28.956	3.12	0	116.486	-	-	Peak/ Fund
2437	86.3	136	128	H	28.956	3.12	0	118.376	-	-	Peak/ Fund
2437	79.44	352	100	V	28.956	3.12	0	111.516	-	-	Ave/ Fund
2437	80.74	136	128	H	28.956	3.12	0	112.816	-	-	Ave/ Fund
4874	44.47	76	100	V	33.327	4.54	27.76	54.577	74	-19.423	Peak
4874	40.99	63	100	H	33.327	4.54	27.76	51.097	74	-22.903	Peak
4874	40.3	76	100	V	33.327	4.54	27.76	50.407	54	-3.593	Ave
4874	34.59	63	100	H	33.327	4.54	27.76	44.697	54	-9.303	Ave
7311	41.92	52	100	V	36.369	5.57	27.51	56.349	74	-17.651	Peak
7311	40.81	0	100	H	36.369	5.57	27.51	55.239	74	-18.761	Peak
7311	32.7	52	100	V	36.369	5.57	27.51	47.129	54	-6.871	Ave
7311	28.54	0	100	H	36.369	5.57	27.51	42.969	54	-11.031	Ave
9748[1]	38.08	0	100	V	38.087	6.62	26.98	55.807	96.486	-40.679	Peak
9748[1]	38.71	0	100	H	38.087	6.62	26.98	56.437	98.376	-41.939	Peak
9748[1]	25.99	0	100	V	38.087	6.62	26.98	43.717	91.516	-47.799	Ave
9748[1]	26.02	0	100	H	38.087	6.62	26.98	43.747	92.816	-49.069	Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	82.79	337	100	V	29.155	3.25	0	115.195	-	-	Peak/ Fund
2462	84.53	135	152	H	29.155	3.25	0	116.935	-	-	Peak/ Fund
2462	77.61	337	100	V	29.155	3.25	0	110.015	-	-	Ave/ Fund
2462	79.75	135	152	H	29.155	3.25	0	112.155	-	-	Ave/ Fund
4924	39.15	216	100	V	33.327	4.52	27.75	49.247	74	-24.753	Peak
4924	36.43	47	100	H	33.327	4.52	27.75	46.527	74	-27.473	Peak
4924	33.55	216	100	V	33.327	4.52	27.75	43.647	54	-10.353	Ave
4924	28.98	47	100	H	33.327	4.52	27.75	39.077	54	-14.923	Ave
7386[1]	40.35	0	100	V	36.565	5.62	27.51	55.025	74	-18.975	Peak
7386[1]	39.63	0	100	H	36.565	5.62	27.51	54.305	74	-19.695	Peak
7386[1]	27.64	0	100	V	36.565	5.62	27.51	42.315	54	-11.685	Ave
7386[1]	27.73	0	100	H	36.565	5.62	27.51	42.405	54	-11.595	Ave
9848[1]	38.77	0	100	V	38.287	6.55	26.98	56.627	95.195	-38.568	Peak
9848[1]	38.55	0	100	H	38.287	6.55	26.98	56.407	96.935	-40.528	Peak
9848[1]	26.16	0	100	V	38.287	6.55	26.98	44.017	90.015	-45.998	Ave
9848[1]	26.11	0	100	H	38.287	6.55	26.98	43.967	92.155	-48.188	Ave

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

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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	80.94	355	100	V	28.956	3.12	0	113.016	-	-	Peak/ Fund
2412	81.45	134	144	H	28.956	3.12	0	113.526	-	-	Peak/ Fund
2412	68.32	355	100	V	28.956	3.12	0	100.396	-	-	Ave/ Fund
2412	69.21	134	144	H	28.956	3.12	0	101.286	-	-	Ave/ Fund
4824	41.05	213	100	V	33.097	4.56	27.7	51.007	74	-22.993	Peak
4824	38.74	0	100	H	33.097	4.56	27.7	48.697	74	-25.303	Peak
4824	34.43	213	100	V	33.097	4.56	27.7	44.387	54	-9.613	Ave
4824	27.21	0	100	H	33.097	4.56	27.7	37.167	54	-16.833	Ave
7236[1]	40.04	0	100	V	35.928	5.49	27.58	53.878	93.016	-39.138	Peak
7236[1]	39.63	0	100	H	35.928	5.49	27.58	53.468	93.526	-40.058	Peak
7236[1]	27.79	0	100	V	35.928	5.49	27.58	41.628	80.396	-38.768	Ave
7236[1]	27.82	0	100	H	35.928	5.49	27.58	41.658	81.286	-39.628	Ave
9648[1]	38.14	0	100	V	37.954	6.54	27.06	55.574	93.016	-37.442	Peak
9648[1]	37.66	0	100	H	37.954	6.54	27.06	55.094	93.526	-38.432	Peak
9648[1]	25.97	0	100	V	37.954	6.54	27.06	43.404	80.396	-36.992	Ave
9648[1]	25.95	0	100	H	37.954	6.54	27.06	43.384	81.286	-37.902	Ave
Middle Channel 2437 MHz, measured at 3 meters											
2437	85.47	353	100	V	28.956	3.12	0	117.546	-	-	Peak/ Fund
2437	86.69	139	144	H	28.956	3.12	0	118.766	-	-	Peak/ Fund
2437	72.88	353	100	V	28.956	3.12	0	104.956	-	-	Ave/ Fund
2437	74.44	139	144	H	28.956	3.12	0	106.516	-	-	Ave/ Fund
4874	43.31	75	100	V	33.327	4.54	27.76	53.417	74	-20.583	Peak
4874	39.12	0	100	H	33.327	4.54	27.76	49.227	74	-24.773	Peak
4874	31.94	75	100	V	33.327	4.54	27.76	42.047	54	-11.953	Ave
4874	26.11	0	100	H	33.327	4.54	27.76	36.217	54	-17.783	Ave
7311[1]	40.98	0	100	V	36.369	5.57	27.51	55.409	74	-18.591	Peak
7311[1]	40.07	0	100	H	36.369	5.57	27.51	54.499	74	-19.501	Peak
7311[1]	28.06	0	100	V	36.369	5.57	27.51	42.489	54	-11.511	Ave
7311[1]	27.98	0	100	H	36.369	5.57	27.51	42.409	54	-11.591	Ave
9748[1]	38.33	0	100	V	38.087	6.62	26.98	56.057	97.546	-41.489	Peak
9748[1]	38.49	0	100	H	38.087	6.62	26.98	56.217	98.766	-42.549	Peak
9748[1]	25.98	0	100	V	38.087	6.62	26.98	43.707	84.956	-41.249	Ave
9748[1]	25.94	0	100	H	38.087	6.62	26.98	43.667	86.516	-42.849	Ave

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	81.85	341	100	V	29.155	3.25	0	114.255	-	-	Peak/ Fund
2462	84.68	134	150	H	29.155	3.25	0	117.085	-	-	Peak/ Fund
2462	69.35	341	100	V	29.155	3.25	0	101.755	-	-	Ave/ Fund
2462	71.43	134	150	H	29.155	3.25	0	103.835	-	-	Ave/ Fund
4924[1]	38.22	0	100	V	33.327	4.52	27.75	48.317	74	-25.683	Peak
4924[1]	38.8	0	100	H	33.327	4.52	27.75	48.897	74	-25.103	Peak
4924[1]	25.78	0	100	V	33.327	4.52	27.75	35.877	54	-18.123	Ave
4924[1]	25.77	0	100	H	33.327	4.52	27.75	35.867	54	-18.133	Ave
7386[1]	39.45	0	100	V	36.565	5.62	27.51	54.125	74	-19.875	Peak
7386[1]	39.25	0	100	H	36.565	5.62	27.51	53.925	74	-20.075	Peak
7386[1]	27.74	0	100	V	36.565	5.62	27.51	42.415	54	-11.585	Ave
7386[1]	27.75	0	100	H	36.565	5.62	27.51	42.425	54	-11.575	Ave
9848[1]	38.65	0	100	V	38.287	6.55	26.98	56.507	94.255	-37.748	Peak
9848[1]	38.03	0	100	H	38.287	6.55	26.98	55.887	97.085	-41.198	Peak
9848[1]	26.06	0	100	V	38.287	6.55	26.98	43.917	81.755	-37.838	Ave
9848[1]	26.11	0	100	H	38.287	6.55	26.98	43.967	83.835	-39.868	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	82.61	349	100	V	28.956	3.12	0	114.686	-	-	Peak/ Fund
2412	81.97	139	144	H	28.956	3.12	0	114.046	-	-	Peak/ Fund
2412	70.09	349	100	V	28.956	3.12	0	102.166	-	-	Ave/ Fund
2412	70.07	139	144	H	28.956	3.12	0	102.146	-	-	Ave/ Fund
4824[1]	38.81	0	100	V	33.097	4.56	27.7	48.767	74	-25.233	Peak
4824[1]	38.86	0	100	H	33.097	4.56	27.7	48.817	74	-25.183	Peak
4824[1]	25.78	0	100	V	33.097	4.56	27.7	35.737	54	-18.263	Ave
4824[1]	25.73	0	100	H	33.097	4.56	27.7	35.687	54	-18.313	Ave
7236[1]	39.61	0	100	V	35.928	5.49	27.58	53.448	94.686	-41.238	Peak
7236[1]	40.43	0	100	H	35.928	5.49	27.58	54.268	94.046	-39.778	Peak
7236[1]	27.51	0	100	V	35.928	5.49	27.58	41.348	82.166	-40.818	Ave
7236[1]	27.47	0	100	H	35.928	5.49	27.58	41.308	82.146	-40.838	Ave
9648[1]	37.9	0	100	V	37.954	6.54	27.06	55.334	94.686	-39.352	Peak
9648[1]	37.85	0	100	H	37.954	6.54	27.06	55.284	94.046	-38.762	Peak
9648[1]	25.67	0	100	V	37.954	6.54	27.06	43.104	82.166	-39.062	Ave
9648[1]	25.71	0	100	H	37.954	6.54	27.06	43.144	82.146	-39.002	Ave
Middle Channel 2437 MHz, measured at 3 meters											
2437	87.78	344	100	V	28.956	3.12	0	119.856	-	-	Peak/ Fund
2437	87.8	139	166	H	28.956	3.12	0	119.876	-	-	Peak/ Fund
2437	74.39	344	100	V	28.956	3.12	0	106.466	-	-	Ave/ Fund
2437	75.65	139	166	H	28.956	3.12	0	107.726	-	-	Ave/ Fund
4874	45.21	35	100	V	33.327	4.54	27.76	55.317	74	-18.683	Peak
4874	41.17	288	103	H	33.327	4.54	27.76	51.277	74	-22.723	Peak
4874	31.24	35	100	V	33.327	4.54	27.76	41.347	54	-12.653	Ave
4874	26.58	288	103	H	33.327	4.54	27.76	36.687	54	-17.313	Ave
7311[1]	42.43	0	100	V	36.369	5.57	27.51	56.859	74	-17.141	Peak
7311[1]	39.82	0	100	H	36.369	5.57	27.51	54.249	74	-19.751	Peak
7311[1]	29.77	0	100	V	36.369	5.57	27.51	44.199	54	-9.801	Ave
7311[1]	27.95	0	100	H	36.369	5.57	27.51	42.379	54	-11.621	Ave
9748[1]	37.63	0	100	V	38.087	6.62	26.98	55.357	99.856	-44.499	Peak
9748[1]	37.69	0	100	H	38.087	6.62	26.98	55.417	99.876	-44.459	Peak
9748[1]	25.74	0	100	V	38.087	6.62	26.98	43.467	86.466	-42.999	Ave
9748[1]	25.73	0	100	H	38.087	6.62	26.98	43.457	87.726	-44.269	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	82.05	346	100	V	29.155	3.25	0	114.455	-	-	Peak/ Fund
2462	81.72	137	143	H	29.155	3.25	0	114.125	-	-	Peak/ Fund
2462	69.56	346	100	V	29.155	3.25	0	101.965	-	-	Ave/ Fund
2462	69.25	137	143	H	29.155	3.25	0	101.655	-	-	Ave/ Fund
4924[1]	38.68	0	100	V	33.327	4.52	27.75	48.777	74	-25.223	Peak
4924[1]	38.44	0	100	H	33.327	4.52	27.75	48.537	74	-25.463	Peak
4924[1]	25.53	0	100	V	33.327	4.52	27.75	35.627	54	-18.373	Ave
4924[1]	25.52	0	100	H	33.327	4.52	27.75	35.617	54	-18.383	Ave
7386[1]	39.21	0	100	V	36.565	5.62	27.51	53.885	74	-20.115	Peak
7386[1]	39.4	0	100	H	36.565	5.62	27.51	54.075	74	-19.925	Peak
7386[1]	27.47	0	100	V	36.565	5.62	27.51	42.145	54	-11.855	Ave
7386[1]	27.48	0	100	H	36.565	5.62	27.51	42.155	54	-11.845	Ave
9848[1]	37.86	0	100	V	38.287	6.55	26.98	55.717	94.455	-38.738	Peak
9848[1]	38.66	0	100	H	38.287	6.55	26.98	56.517	94.125	-37.608	Peak
9848[1]	25.84	0	100	V	38.287	6.55	26.98	43.697	81.965	-38.268	Ave
9848[1]	25.87	0	100	H	38.287	6.55	26.98	43.727	81.655	-37.928	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2422 MHz, measured at 3 meters											
2422	76.7	350	100	V	28.956	3.12	0	108.776	-	-	Peak/ Fund
2422	77.28	140	140	H	28.956	3.12	0	109.356	-	-	Peak/ Fund
2422	64.37	350	100	V	28.956	3.12	0	96.446	-	-	Ave/ Fund
2422	65.35	140	140	H	28.956	3.12	0	97.426	-	-	Ave/ Fund
4844[1]	38.33	0	100	V	33.097	4.56	27.7	48.287	74	-25.713	Peak
4844[1]	37.16	0	100	H	33.097	4.56	27.7	47.117	74	-26.883	Peak
4844[1]	25.65	0	100	V	33.097	4.56	27.7	35.607	54	-18.393	Ave
4844[1]	25.68	0	100	H	33.097	4.56	27.7	35.637	54	-18.363	Ave
7266[1]	40.16	0	100	V	35.928	5.49	27.56	54.018	88.776	-34.758	Peak
7266[1]	39.43	0	100	H	35.928	5.49	27.56	53.288	89.356	-36.068	Peak
7266[1]	27.6	0	100	V	35.928	5.49	27.56	41.458	76.446	-34.988	Ave
7266[1]	27.61	0	100	H	35.928	5.49	27.56	41.468	77.426	-35.958	Ave
9688[1]	37.95	0	100	V	37.954	6.54	26.98	55.464	88.776	-33.312	Peak
9688[1]	37.71	0	100	H	37.954	6.54	26.98	55.224	89.356	-34.132	Peak
9688[1]	25.67	0	100	V	37.954	6.54	26.98	43.184	76.446	-33.262	Ave
9688[1]	25.68	0	100	H	37.954	6.54	26.98	43.194	77.426	-34.232	Ave
Middle Channel 2437 MHz, measured at 3 meters											
2437	83.87	349	100	V	28.956	3.12	0	115.946	-	-	Peak/ Fund
2437	85.31	142	133	H	28.956	3.12	0	117.386	-	-	Peak/ Fund
2437	71	349	100	V	28.956	3.12	0	103.076	-	-	Ave/ Fund
2437	73.1	142	133	H	28.956	3.12	0	105.176	-	-	Ave/ Fund
4874	40.25	33	100	V	33.327	4.54	27.76	50.357	74	-23.643	Peak
4874	35.87	283	103	H	33.327	4.54	27.76	45.977	74	-28.023	Peak
4874	27.54	33	100	V	33.327	4.54	27.76	37.647	54	-16.353	Ave
4874	22.76	283	103	H	33.327	4.54	27.76	32.867	54	-21.133	Ave
7311[1]	40.68	0	100	V	36.369	5.57	27.51	55.109	74	-18.891	Peak
7311[1]	40.07	0	100	H	36.369	5.57	27.51	54.499	74	-19.501	Peak
7311[1]	28.08	0	100	V	36.369	5.57	27.51	42.509	54	-11.491	Ave
7311[1]	27.89	0	100	H	36.369	5.57	27.51	42.319	54	-11.681	Ave
9748[1]	37.8	0	100	V	38.087	6.62	26.98	55.527	95.946	-40.419	Peak
9748[1]	37.68	0	100	H	38.087	6.62	26.98	55.407	97.386	-41.979	Peak
9748[1]	25.7	0	100	V	38.087	6.62	26.98	43.427	83.076	-39.649	Ave
9748[1]	25.73	0	100	H	38.087	6.62	26.98	43.457	85.176	-41.719	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2452 MHz, measured at 3 meters											
2452	79.37	347	100	V	29.155	3.25	0	111.775	-	-	Peak/ Fund
2452	78.27	140	144	H	29.155	3.25	0	110.675	-	-	Peak/ Fund
2452	66.52	347	100	V	29.155	3.25	0	98.925	-	-	Ave/ Fund
2452	66.47	140	144	H	29.155	3.25	0	98.875	-	-	Ave/ Fund
4904[1]	32.78	0	100	V	33.327	4.52	27.67	42.957	74	-31.043	Peak
4904[1]	32.04	0	100	H	33.327	4.52	27.67	42.217	74	-31.783	Peak
4904[1]	20.08	0	100	V	33.327	4.52	27.67	30.257	54	-23.743	Ave
4904[1]	19.94	0	100	H	33.327	4.52	27.67	30.117	54	-23.883	Ave
7356[1]	32.44	0	100	V	36.565	5.62	27.57	47.055	74	-26.945	Peak
7356[1]	32.14	0	100	H	36.565	5.62	27.57	46.755	74	-27.245	Peak
7356[1]	20.22	0	100	V	36.565	5.62	27.57	34.835	54	-19.165	Ave
7356[1]	20.08	0	100	H	36.565	5.62	27.57	34.695	54	-19.305	Ave
9808[1]	30.85	0	100	V	38.287	6.55	27.02	48.667	91.775	-43.108	Peak
9808[1]	31.02	0	100	H	38.287	6.55	27.02	48.837	90.675	-41.838	Peak
9808[1]	18.64	0	100	V	38.287	6.55	27.02	36.457	78.925	-42.468	Ave
9808[1]	18.6	0	100	H	38.287	6.55	27.02	36.417	78.875	-42.458	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2390	35.86	41	100	V	28.956	3.12	0	67.936	74	-6.064	Peak
2390	41.9	156	100	H	28.956	3.12	0	73.976	74	-0.024	Peak
2390	19	41	100	V	28.956	3.12	0	51.076	54	-2.924	Ave
2390	21.9	156	100	H	28.956	3.12	0	53.976	54	-0.024	Ave
High Channel 2462 MHz, measured at 3 meters											
2483.5	36.36	120	100	V	29.155	3.25	0	68.765	74	-5.235	Peak
2483.5	39.07	152	153	H	29.155	3.25	0	71.475	74	-2.525	Peak
2483.5	18.39	120	100	V	29.155	3.25	0	50.795	54	-3.205	Ave
2483.5	20.31	152	153	H	29.155	3.25	0	52.715	54	-1.285	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2390	40.31	360	100	V	28.956	3.12	0	72.386	74	-1.614	Peak
2390	40	132	100	H	28.956	3.12	0	72.076	74	-1.924	Peak
2390	18.96	360	100	V	28.956	3.12	0	51.036	54	-2.964	Ave
2390	18.41	132	100	H	28.956	3.12	0	50.486	54	-3.514	Ave
High Channel 2462 MHz, measured at 3 meters											
2483.5	40.9	120	100	V	29.155	3.25	0	73.305	74	-0.695	Peak
2483.5	41.5	151	152	H	29.155	3.25	0	73.905	74	-0.095	Peak
2483.5	17.13	120	100	V	29.155	3.25	0	49.535	54	-4.465	Ave
2483.5	18.45	151	152	H	29.155	3.25	0	50.855	54	-3.145	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2390	38.35	360	100	V	28.956	3.12	0	70.426	74	-3.574	Peak
2390	40.26	148	135	H	28.956	3.12	0	72.336	74	-1.664	Peak
2390	19.87	360	100	V	28.956	3.12	0	51.946	54	-2.054	Ave
2390	20.76	148	135	H	28.956	3.12	0	52.836	54	-1.164	Ave
High Channel 2462 MHz, measured at 3 meters											
2483.5	39.71	116	100	V	29.155	3.25	0	72.115	74	-1.885	Peak
2483.5	38.03	214	115	H	29.155	3.25	0	70.435	74	-3.565	Peak
2483.5	18.1	116	100	V	29.155	3.25	0	50.505	54	-3.495	Ave
2483.5	18.09	214	115	H	29.155	3.25	0	50.495	54	-3.505	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2422 MHz, measured at 3 meters											
2390	36.6	360	100	V	28.956	3.12	0	68.676	74	-5.324	Peak
2390	36.36	148	135	H	28.956	3.12	0	68.436	74	-5.564	Peak
2390	21.32	360	100	V	28.956	3.12	0	53.396	54	-0.604	Ave
2390	20.07	148	135	H	28.956	3.12	0	52.146	54	-1.854	Ave
High Channel 2452 MHz, measured at 3 meters											
2483.5	36.12	351	129	V	29.155	3.25	0	68.525	74	-5.475	Peak
2483.5	39.02	148	153	H	29.155	3.25	0	71.425	74	-2.575	Peak
2483.5	17.17	351	129	V	29.155	3.25	0	49.575	54	-4.425	Ave
2483.5	20.22	148	153	H	29.155	3.25	0	52.625	54	-1.375	Ave

9 FCC§15.247(a)(2) & IC RSS-210 §A8.2 – 6 dB & 99% Emission Bandwidth

9.1 Applicable Standard

According to FCC §15.247(a)(2) and IC RSS-210 A8.2 (a), 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 Chaoran Chu on 2013-10-04 at the RF test site.

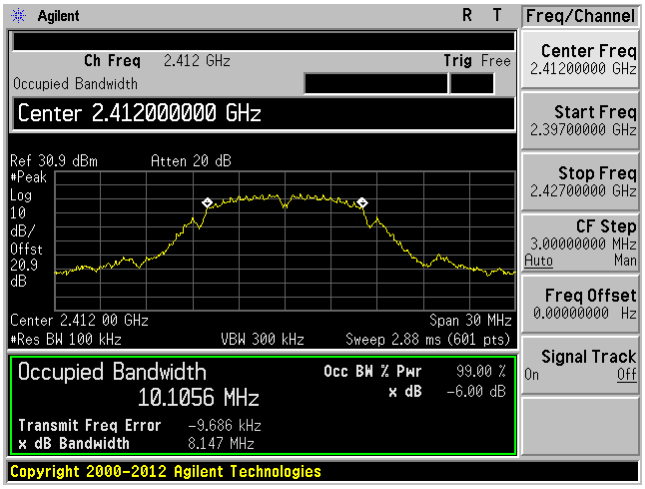
9.5 Test Results

Antenna Port	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Results
802.11b mode						
C0	Low	2412	10.1056	8.147	> 500	Compliant
	Middle	2437	10.0928	8.097	> 500	Compliant
	High	2462	10.0590	8.086	> 500	Compliant
C1	Low	2412	10.7166	8.099	> 500	Compliant
	Middle	2437	10.0554	8.106	> 500	Compliant
	High	2462	10.0959	8.080	> 500	Compliant
802.11g mode						
C0	Low	2412	16.4372	16.368	> 500	Compliant
	Middle	2437	16.4965	16.381	> 500	Compliant
	High	2462	16.3931	15.504	> 500	Compliant
C1	Low	2412	16.5058	16.499	> 500	Compliant
	Middle	2437	16.4884	16.343	> 500	Compliant
	High	2462	16.4037	15.711	> 500	Compliant
802.11n-HT20 mode						
C0	Low	2412	17.6200	17.563	> 500	Compliant
	Middle	2437	17.6043	17.563	> 500	Compliant
	High	2462	17.5761	16.002	> 500	Compliant
C1	Low	2412	17.5701	17.608	> 500	Compliant
	Middle	2437	17.6374	17.629	> 500	Compliant
	High	2462	17.5908	17.582	> 500	Compliant
802.11n-HT40 mode						
C0	Low	2422	35.6941	33.861	> 500	Compliant
	Middle	2437	35.6458	25.843	> 500	Compliant
	High	2452	35.6908	26.253	> 500	Compliant
C1	Low	2422	35.7042	28.862	> 500	Compliant
	Middle	2437	35.6458	18.560	> 500	Compliant
	High	2452	35.5808	19.020	> 500	Compliant

Please refer to the following plots for detailed test results.

802.11b, Low Channel, 2412 MHz

C0



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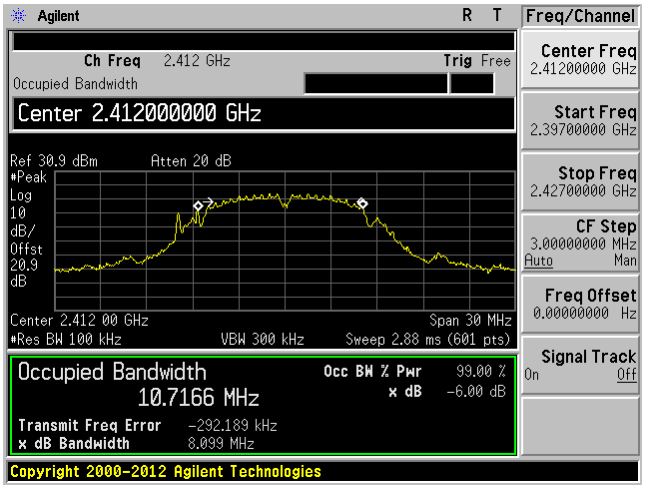
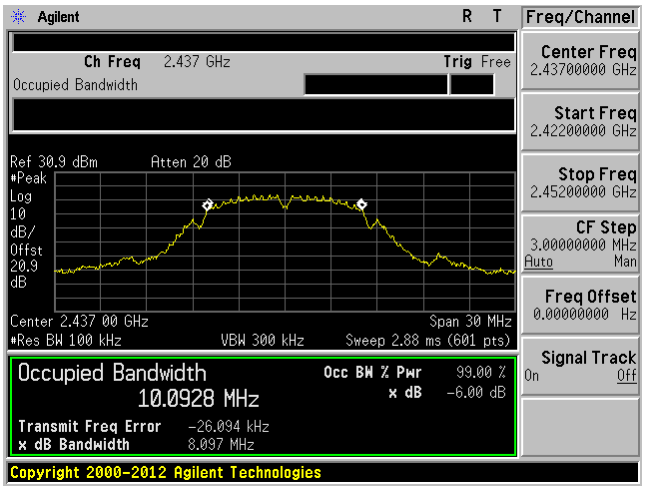


802.11b, Middle Channel, 2437 MHz

C0



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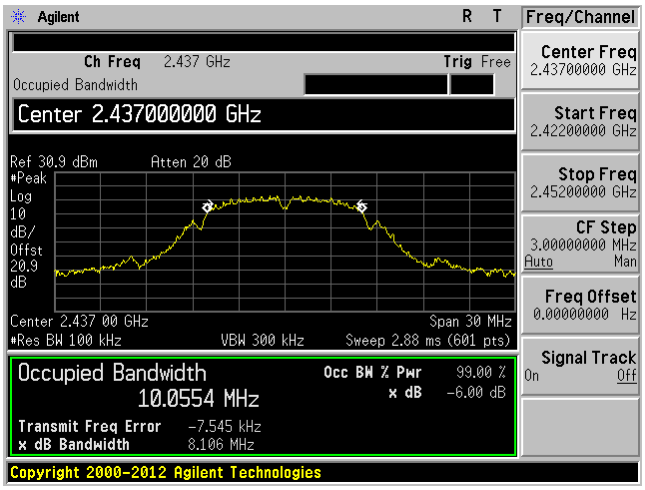
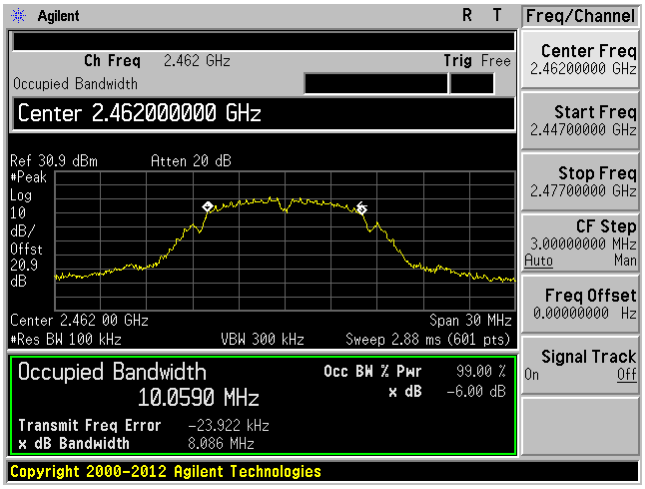


802.11b, High Channel, 2462 MHz

C0



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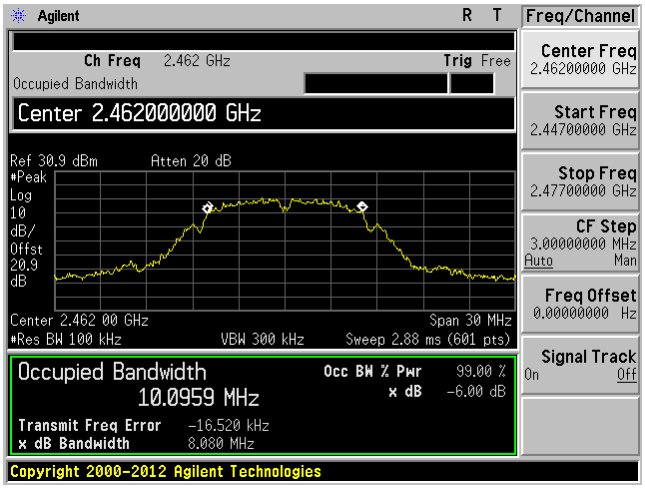
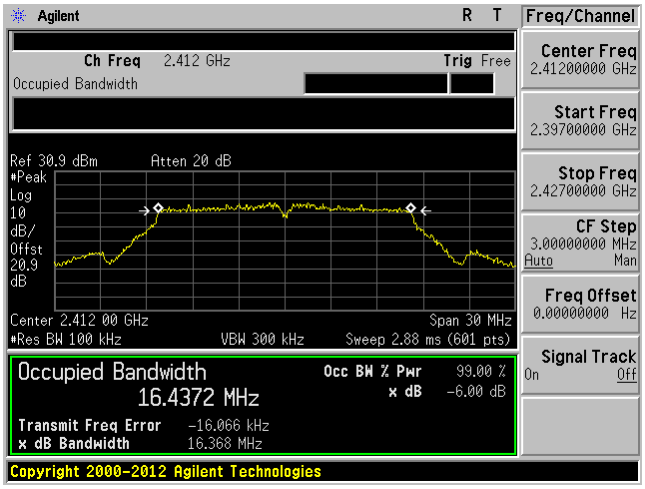


802.11g, Low Channel, 2412 MHz

C0



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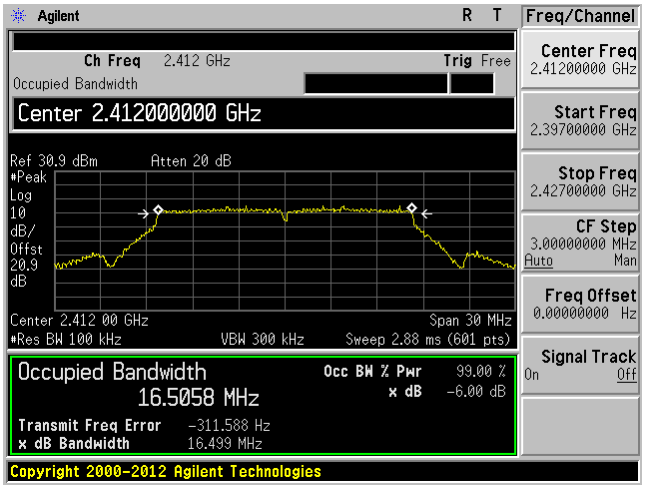
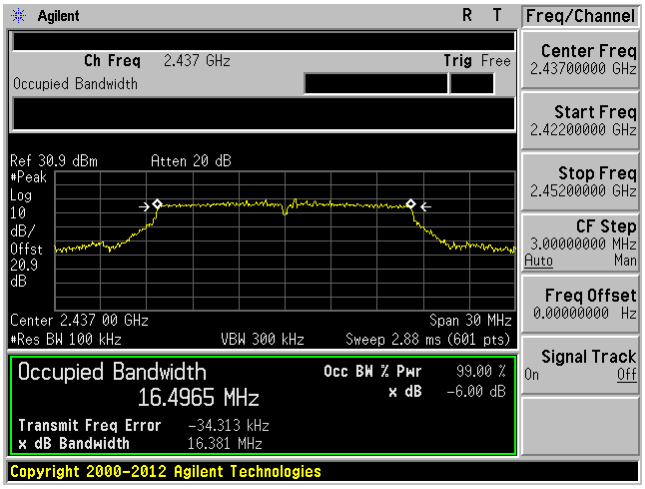


802.11g, Middle Channel, 2437 MHz

C0



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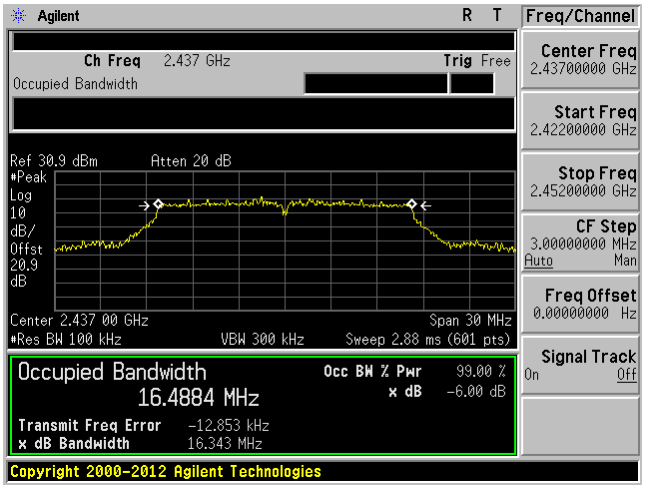
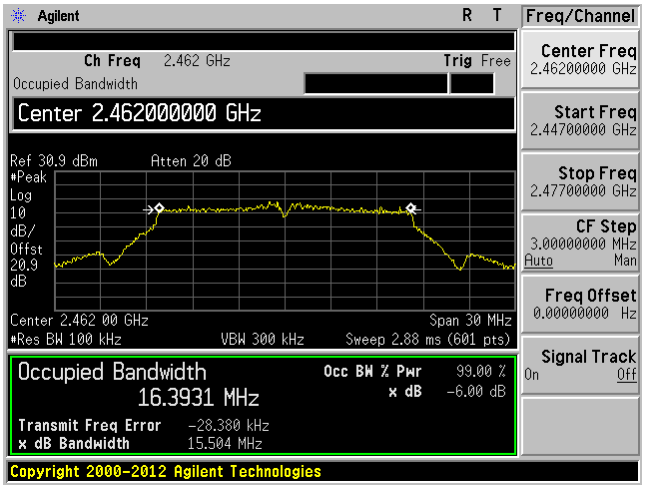


802.11g, High Channel, 2462 MHz

C0



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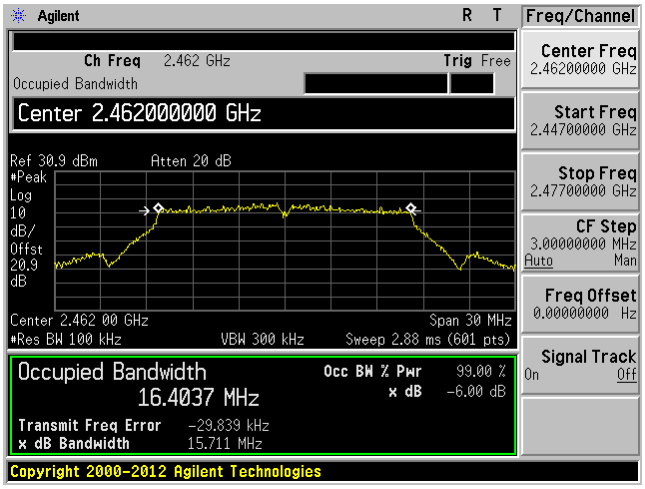
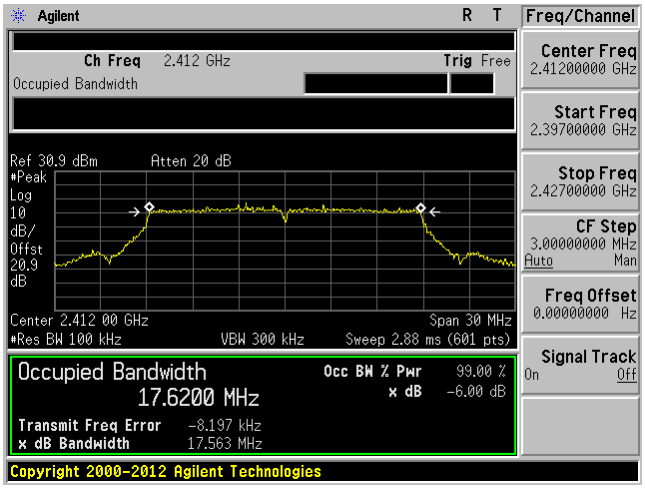


802.11n-HT20, Low Channel, 2412 MHz

C0



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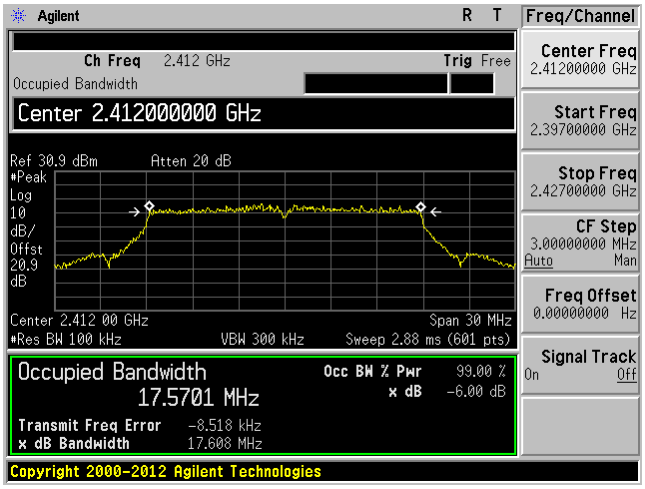
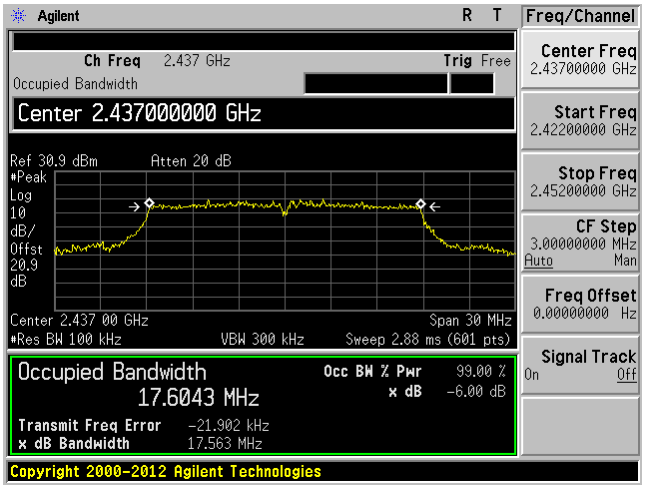


802.11n-HT20, Middle Channel, 2437 MHz

C0



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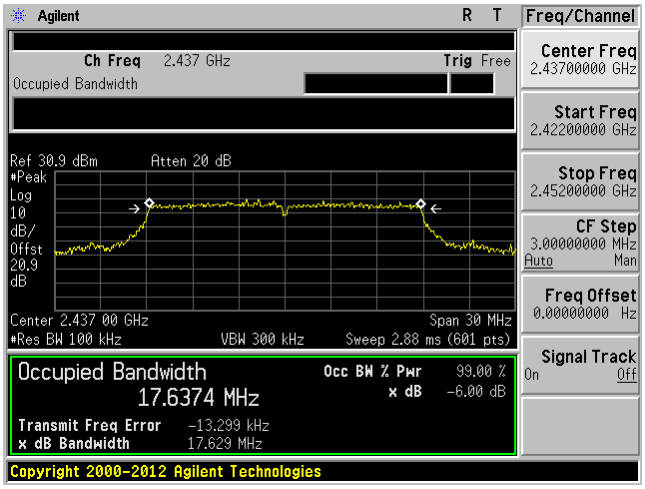
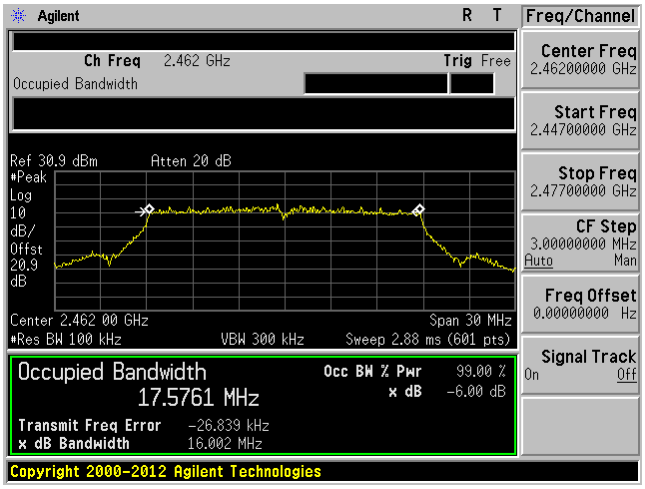
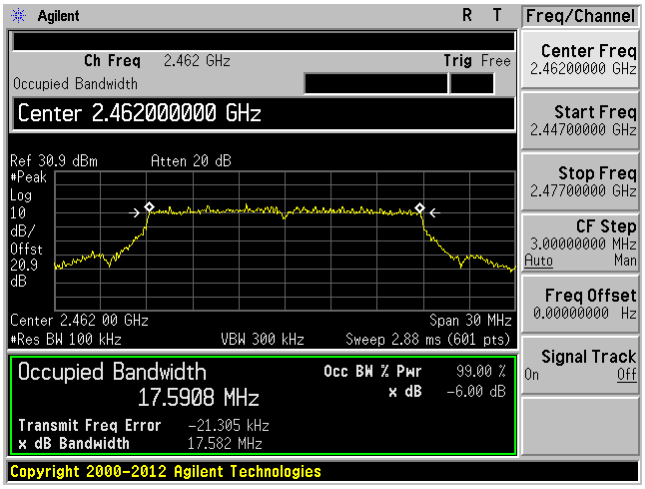


802.11n-HT20, High Channel, 2462 MHz

C0

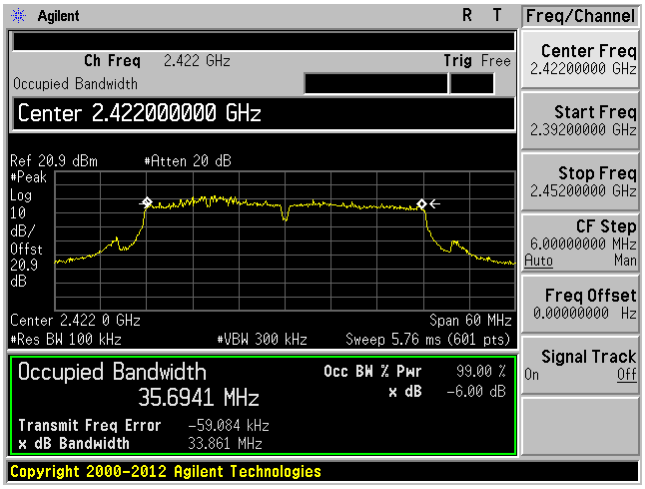


C1



802.11n-HT40, Low Channel, 2422 MHz

C0



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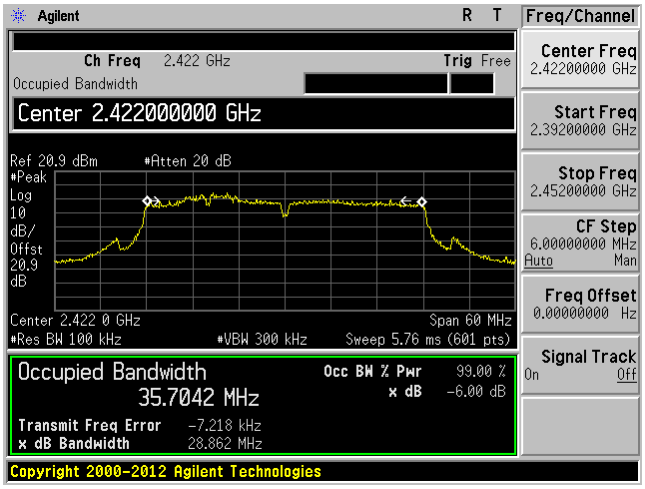
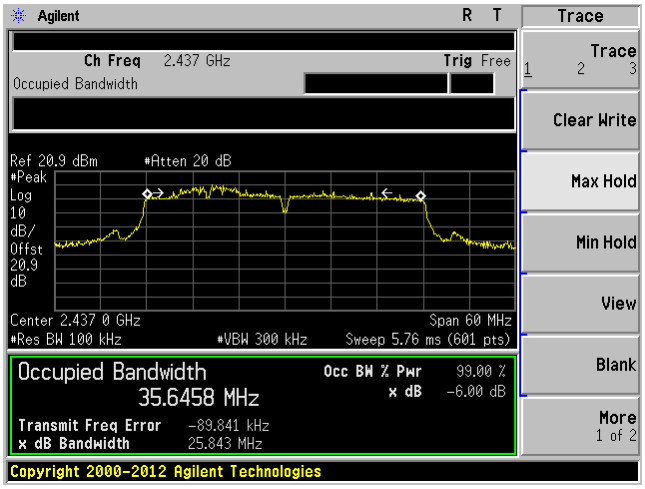


802.11n-HT40, Middle Channel, 2437 MHz

C0



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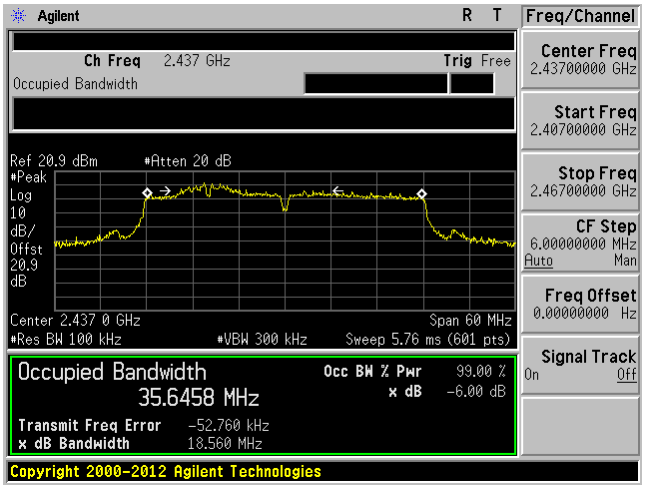
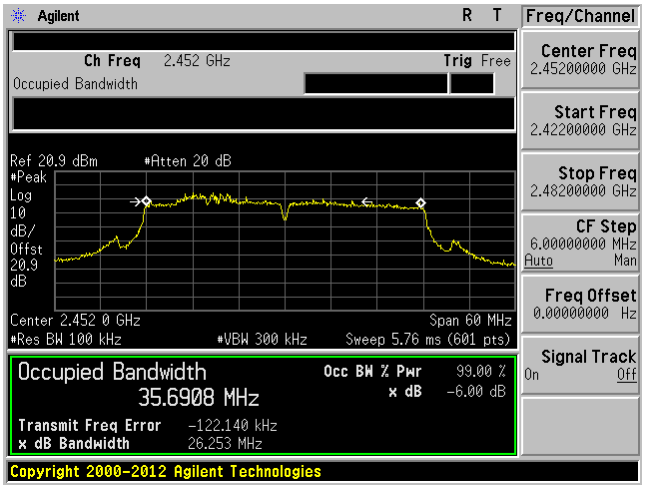
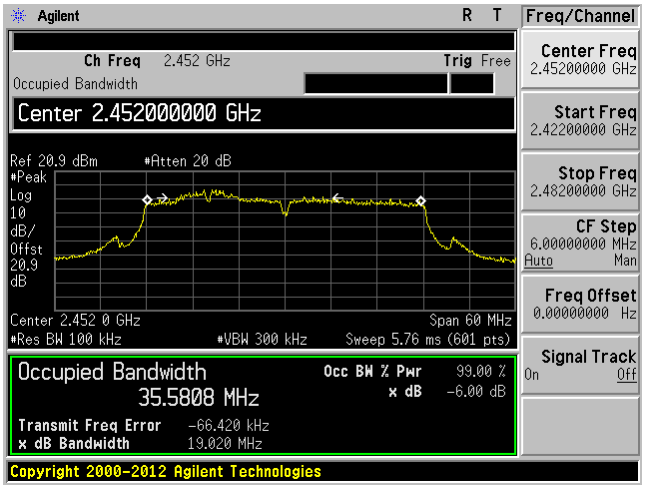


802.11n-HT40, High Channel, 2452 MHz

C0



C1



10 FCC §15.247(b) & IC RSS-210 §A8.4 – Peak Output Power Measurement

10.1 Applicable Standard

According to FCC §15.247(b) and IC RSS-210 §A8.4 (4) for systems using digital modulation in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands: 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 Chaoran Chu on 2013-10-03 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)	Max Output Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	2412	23.15	23.26	23.26	30	-6.74	91
Middle	2437	23.06	23.01	23.06	30	-6.94	90
High	2462	20.60	20.65	20.65	30	-9.35	80

802.11g mode

Channel	Frequency (MHz)	Conducted Output Power C0 (dBm)	Conducted Output Power C1 (dBm)	Max Output Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	2412	19.17	19.04	19.17	30	-10.83	73
Middle	2437	22.00	22.02	22.02	30	-7.98	90
High	2462	18.19	18.15	18.19	30	-11.81	70

802.11n-HT20 mode

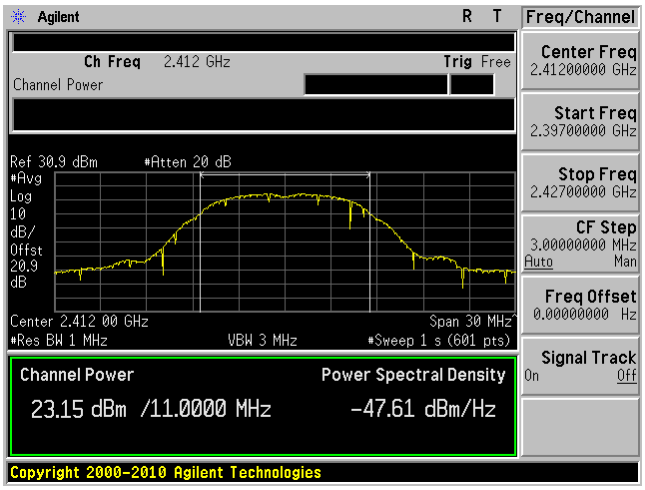
Channel	Frequency (MHz)	Conducted Output Power C0 (dBm)	Conducted Output Power C1 (dBm)	Total Output Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	2412	17.71	17.86	20.78	30	-9.22	70
Middle	2437	21.42	21.34	24.39	30	-5.61	88
High	2462	17.05	17.12	20.10	30	-9.9	66

802.11n-HT40 mode

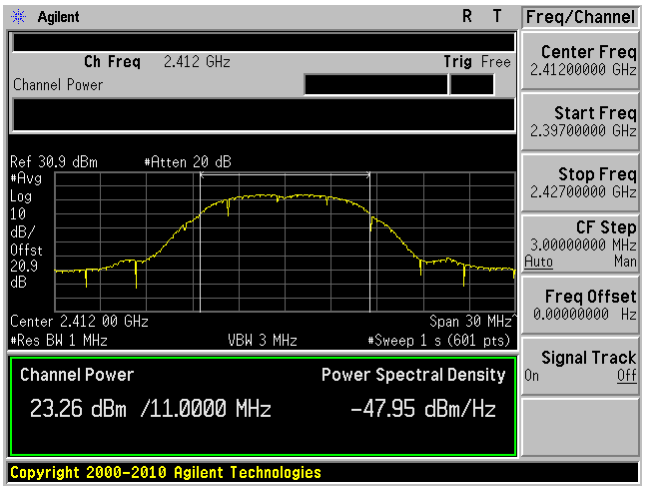
Channel	Frequency (MHz)	Conducted Output Power C0 (dBm)	Conducted Output Power C1 (dBm)	Total Output Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	2422	15.38	16.13	18.78	30	-11.22	60
Middle	2437	20.51	20.77	23.65	30	-6.35	84
High	2452	15.33	16.10	18.74	30	-11.26	60

802.11b mode

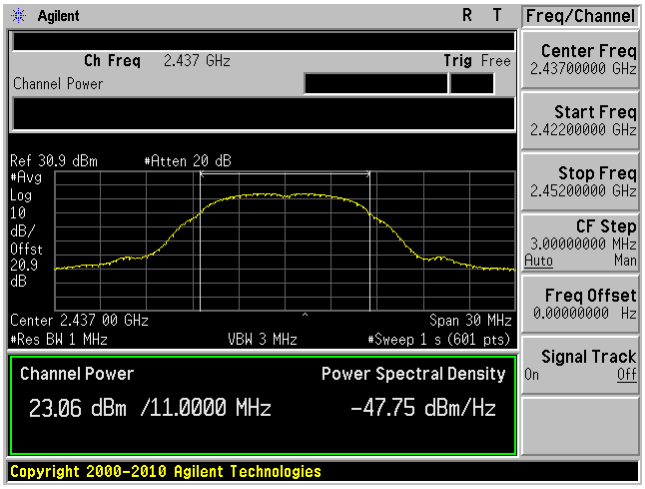
Low channel: 2412 MHz Chain 0



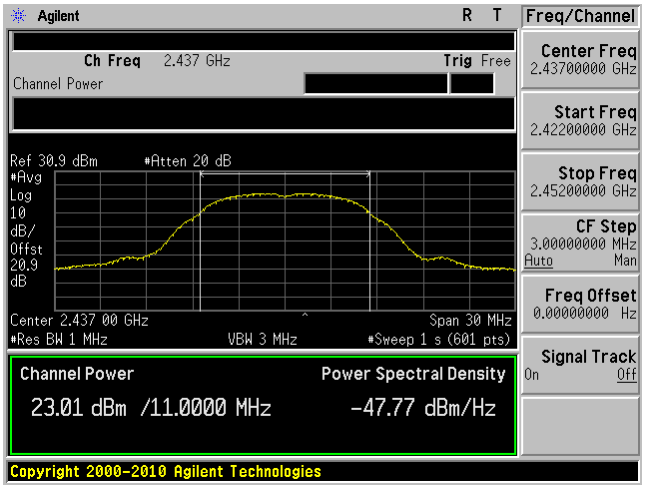
Low channel: 2412 MHz Chain 1



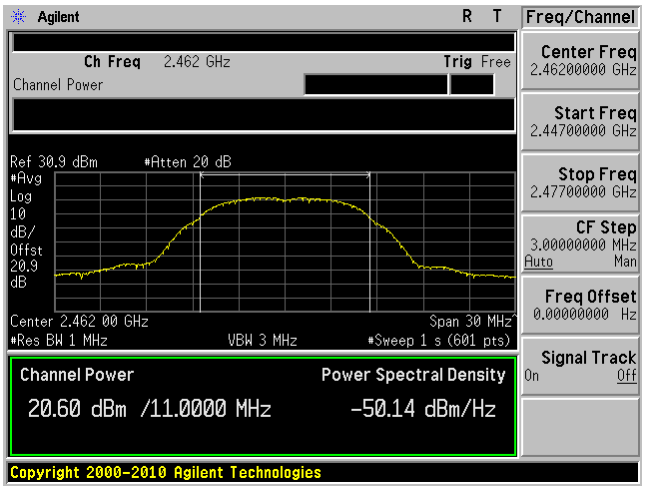
Middle channel: 2437 MHz Chain 0



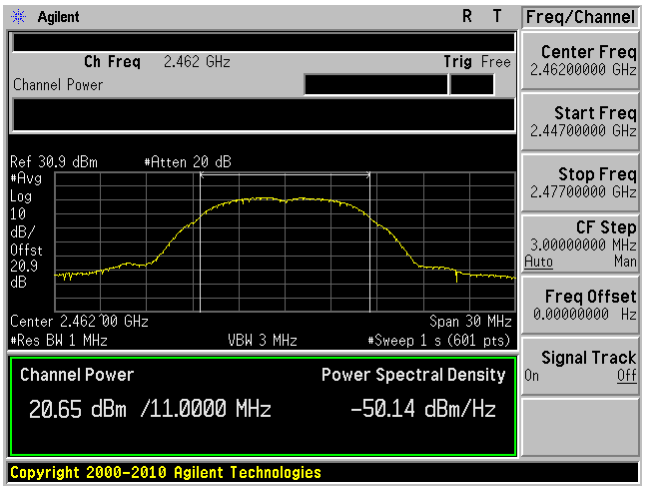
Middle channel: 2437 MHz Chain 1



High channel: 2462 MHz Chain 0

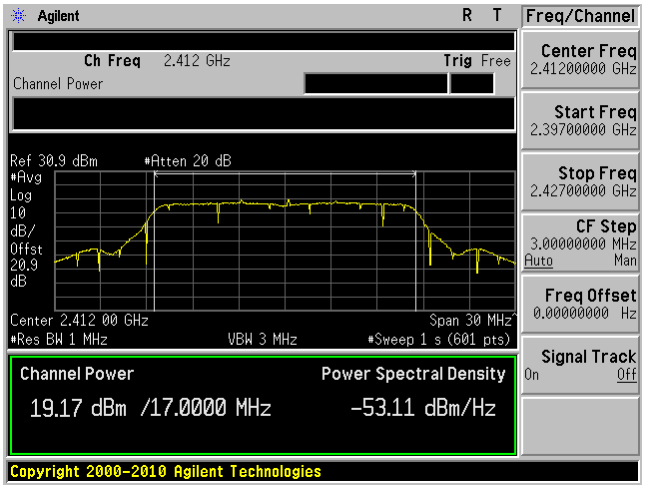


High channel: 2462 MHz Chain 1

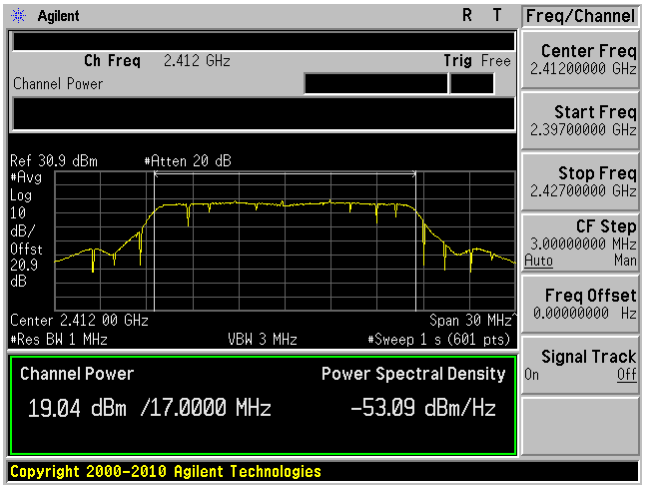


802.11g mode

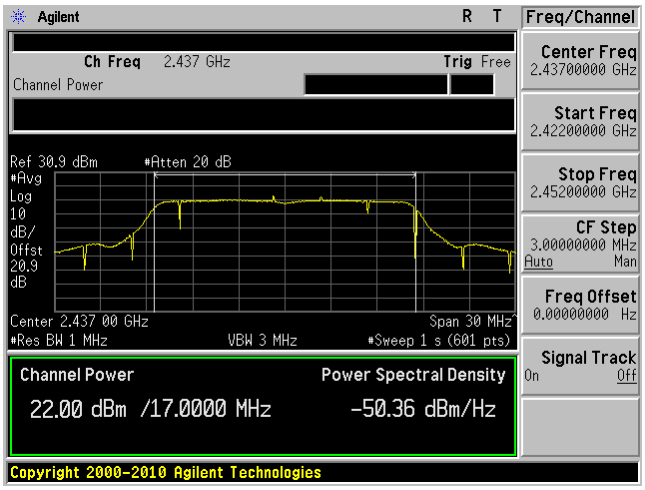
Low channel: 2412 MHz Chain 0



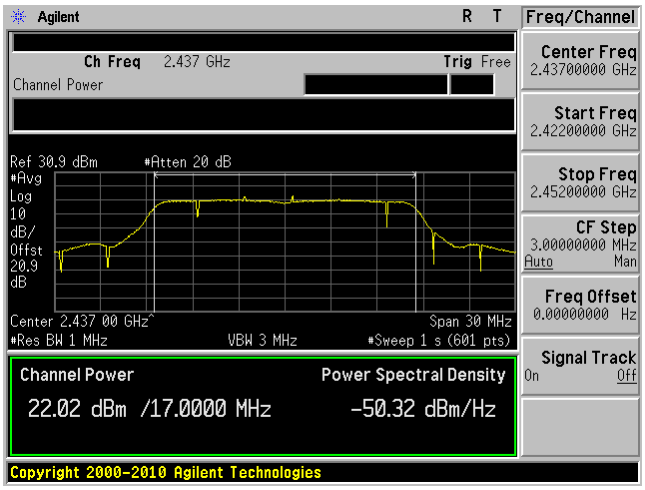
Low channel: 2412 MHz Chain 1



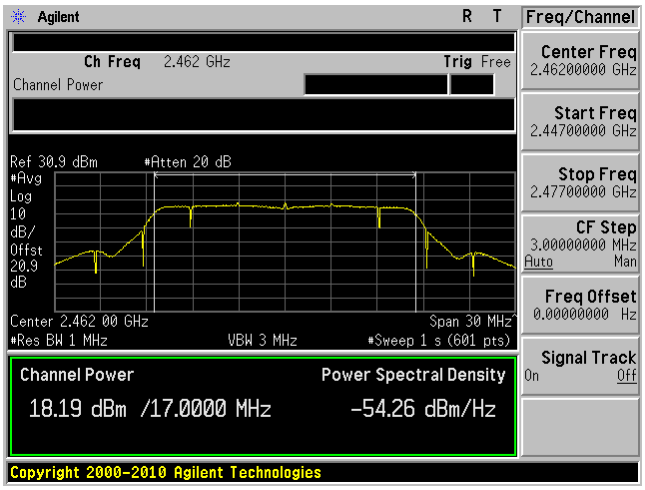
Middle channel: 2437 MHz Chain 0



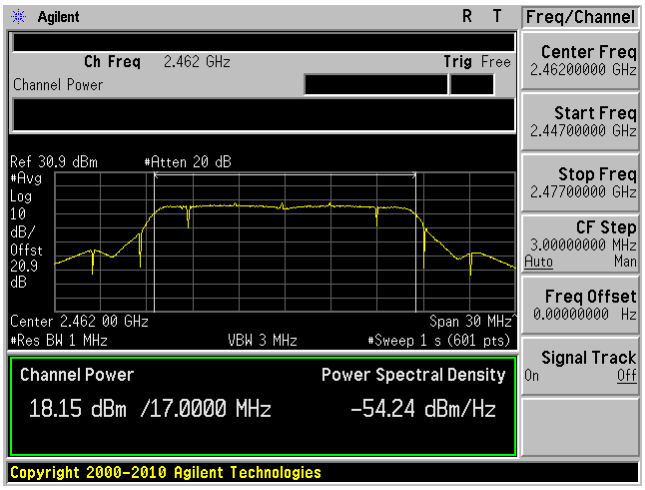
Middle channel: 2437 MHz Chain 1



High channel: 2462 MHz Chain 0

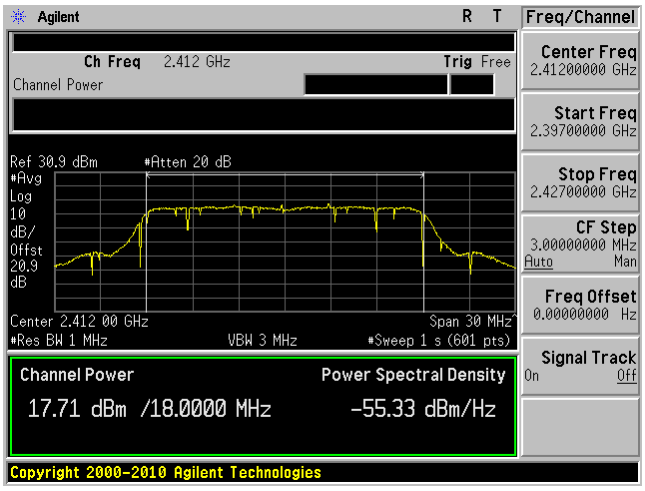


High channel: 2462 MHz Chain 1

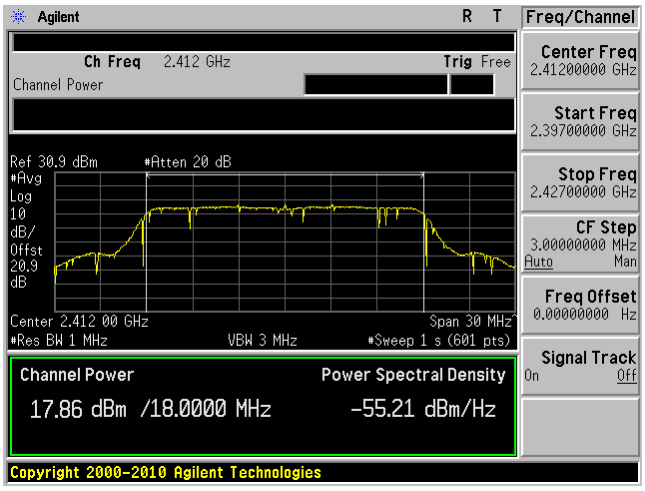


802.11n-HT20 mode

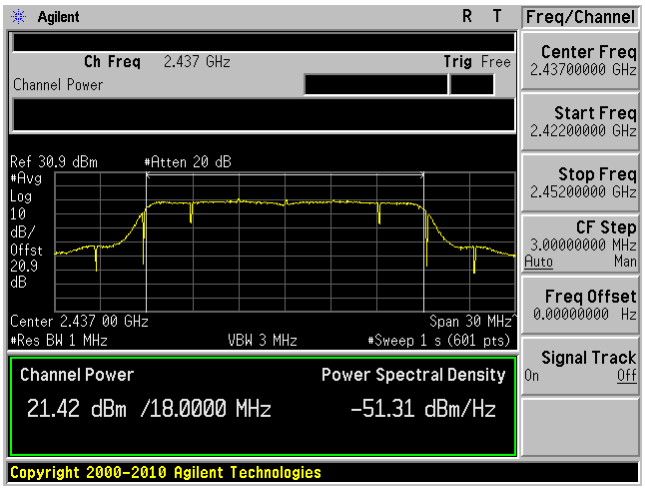
Low channel: 2412 MHz Chain 0



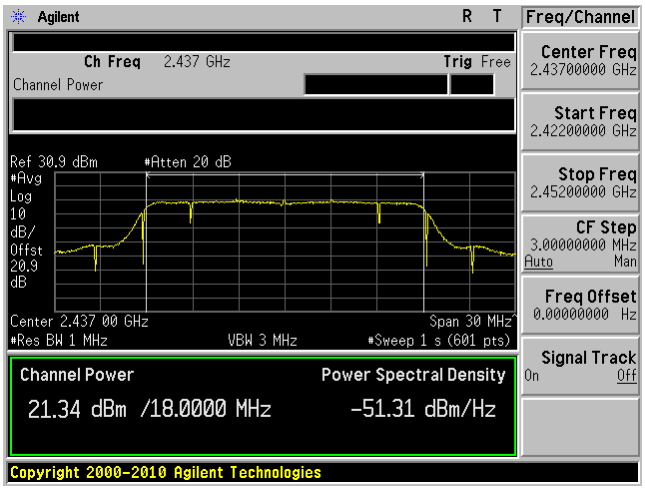
Low channel: 2412 MHz Chain 1



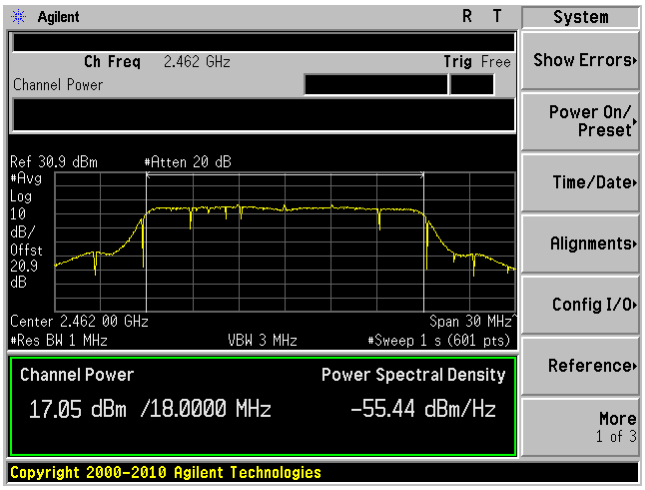
Middle channel: 2437 MHz Chain 0



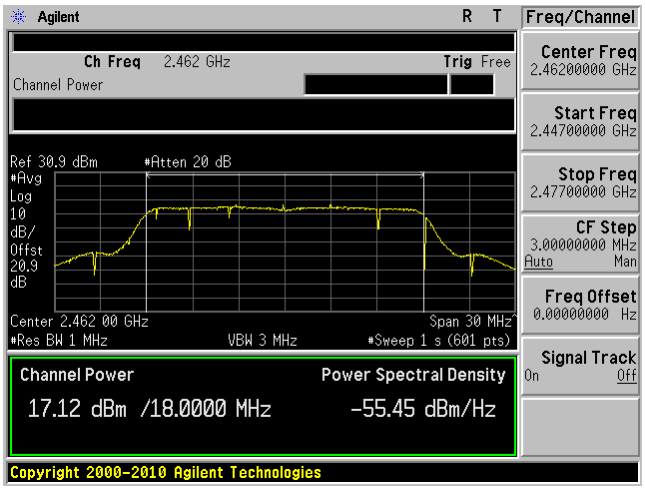
Middle channel: 2437 MHz Chain 1



High channel: 2462 MHz Chain 0

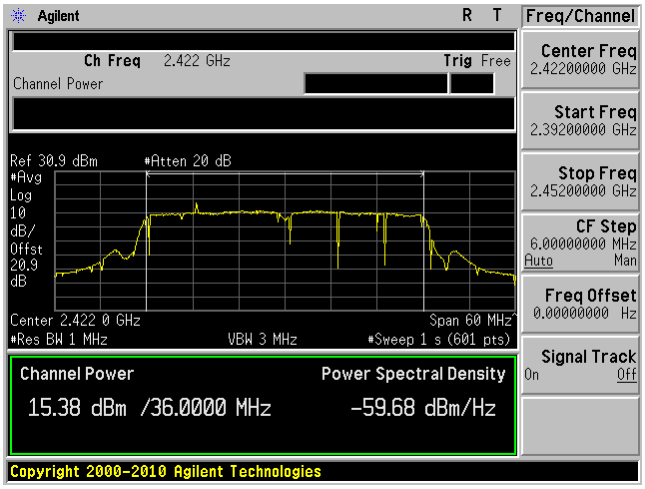


High channel: 2462 MHz Chain 1

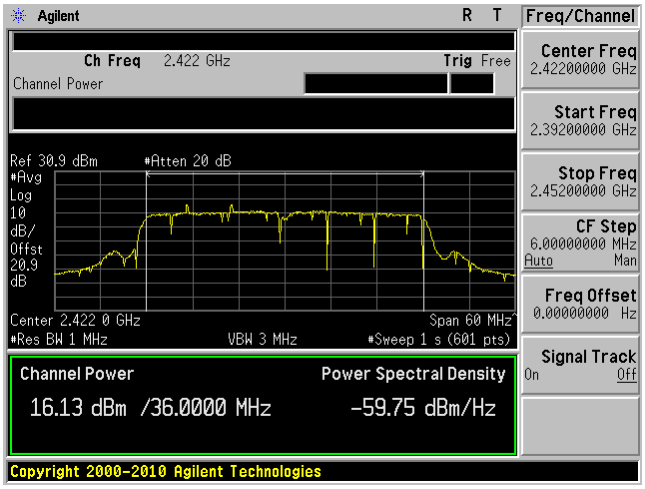


802.11n-HT40 mode

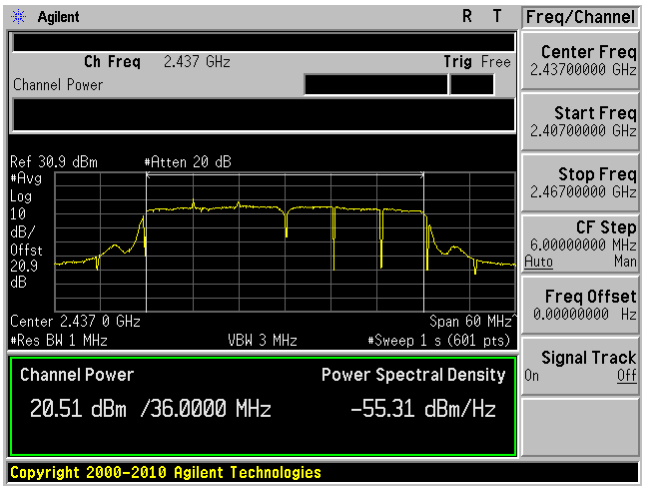
Low channel: 2422 MHz Chain 0



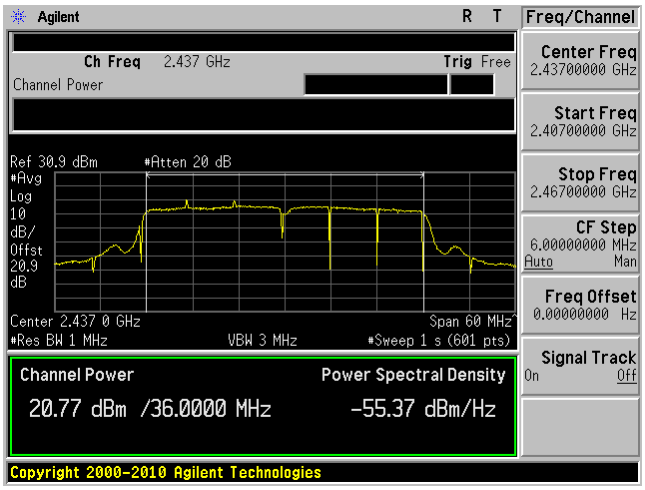
Low channel: 2422 MHz Chain 1



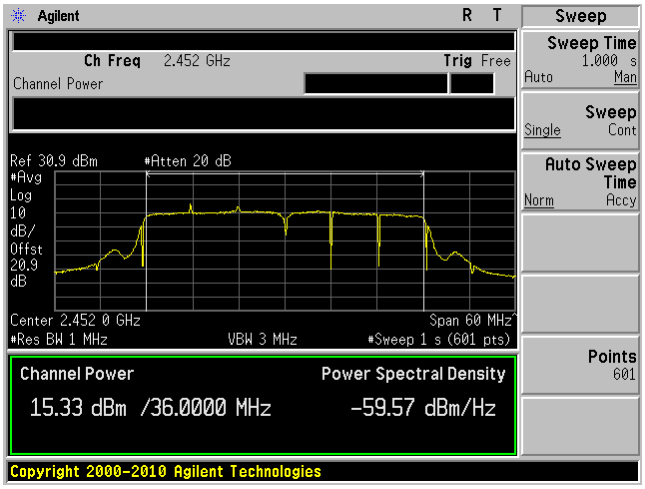
Middle channel: 2437 MHz Chain 0



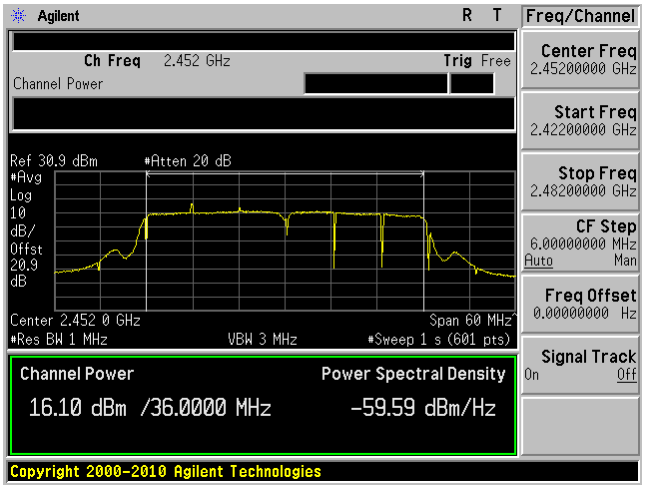
Middle channel: 2437 MHz Chain 1



High channel: 2452 MHz Chain 0



High channel: 2452 MHz Chain 1



11 FCC §15.247(d) & IC RSS-210 §A8.5 – 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).

According to IC Rss-210 §A8.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

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

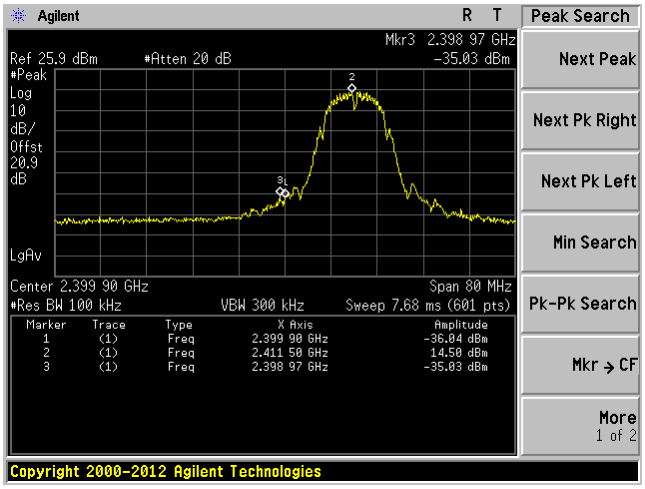
The testing was performed by Chaoran Chu on 2013-10-04 at RF the test site.

11.5 Test Results

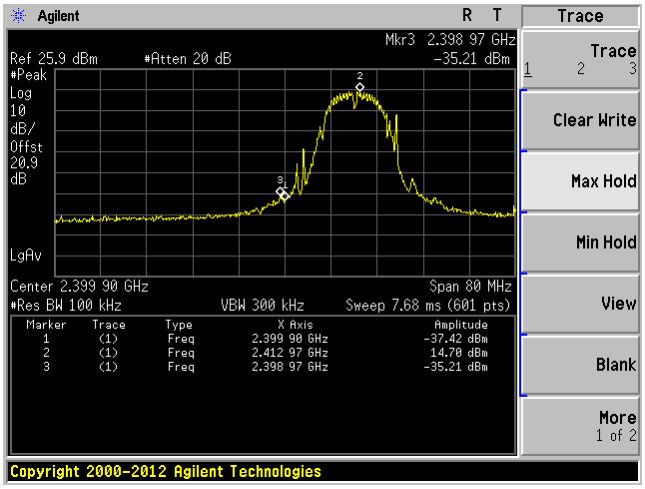
Please refer to following pages for plots of band edge.

802.11b, Low Channel, 2412 MHz

C0

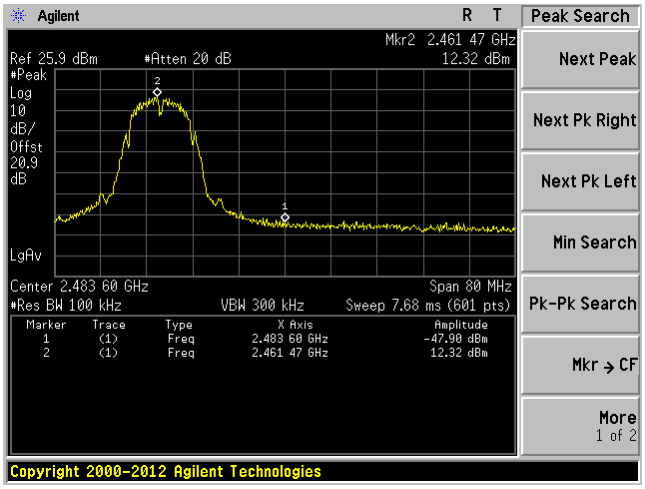


C1

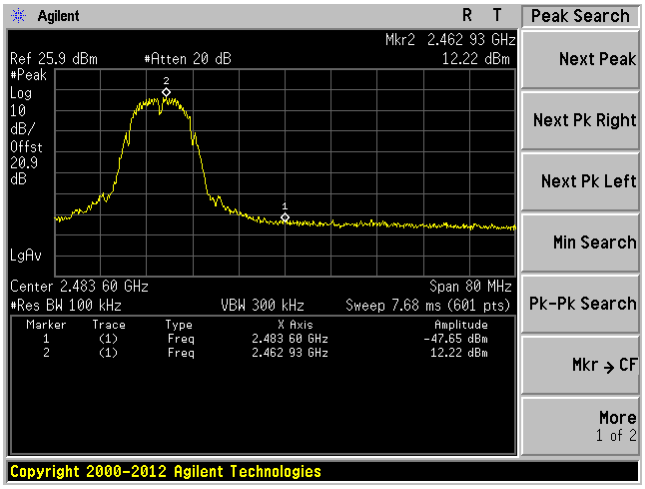


802.11b, High Channel, 2462 MHz

C0

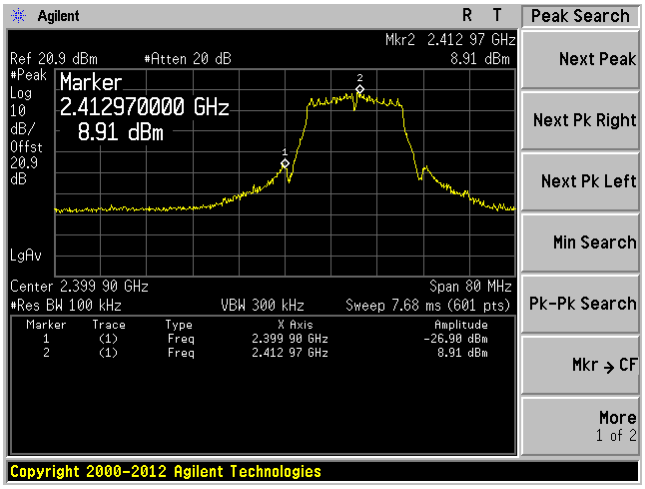


C1

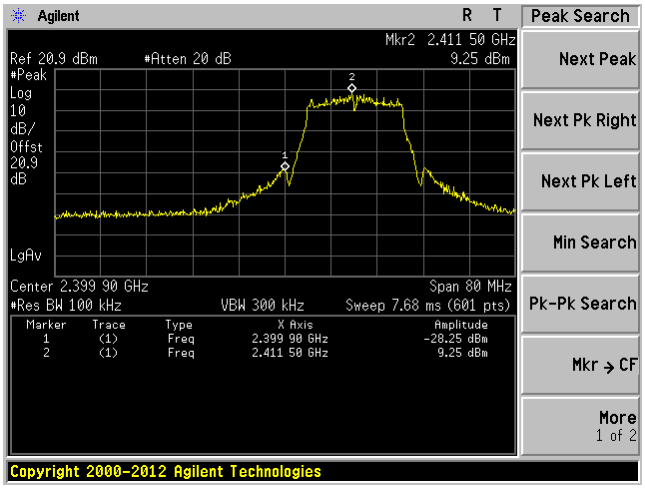


802.11g, Low Channel, 2412 MHz

C0

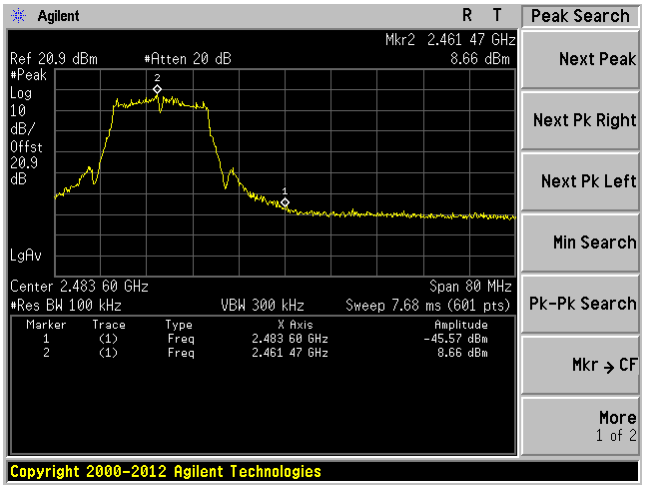


C1

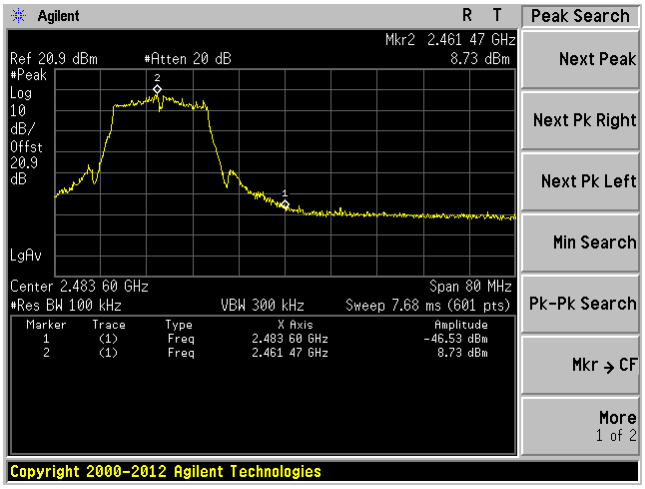


802.11g, High Channel, 2462 MHz

C0

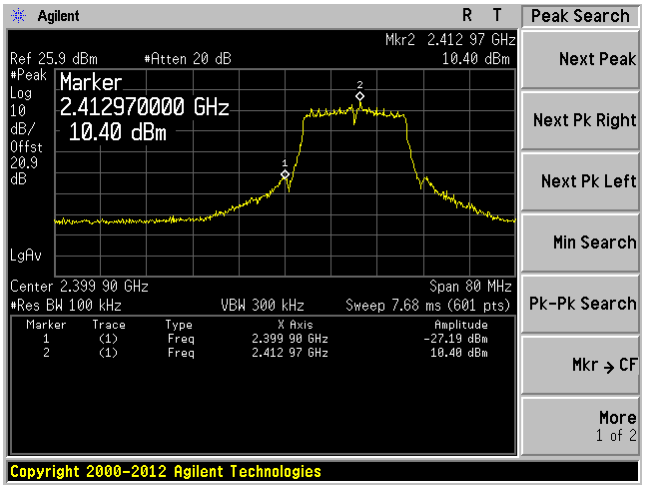


C1

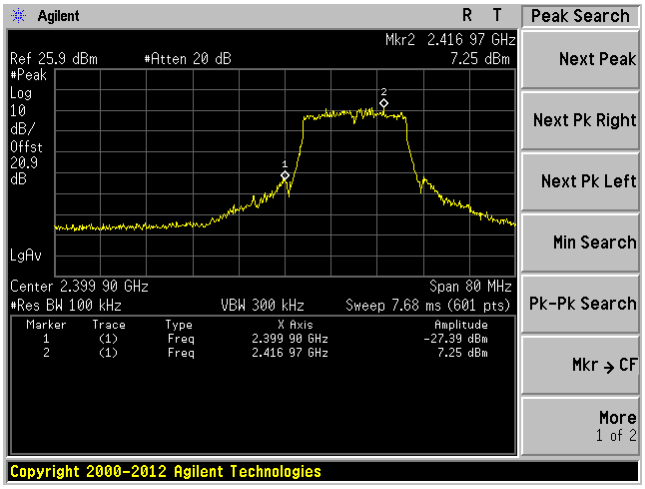


802.11n-HT20, Low Channel, 2412 MHz

C0

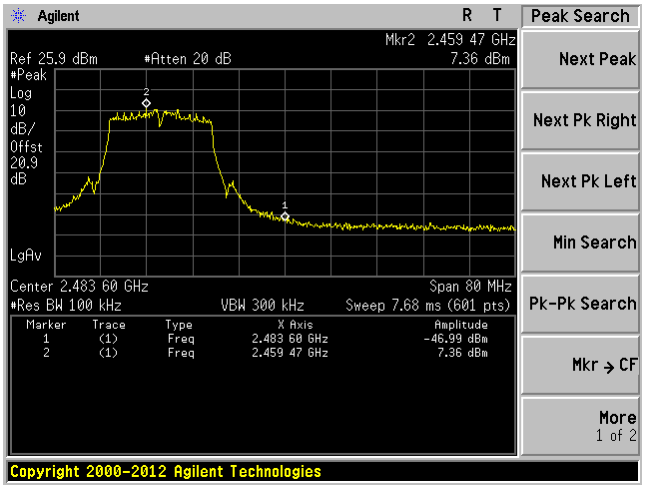


C1

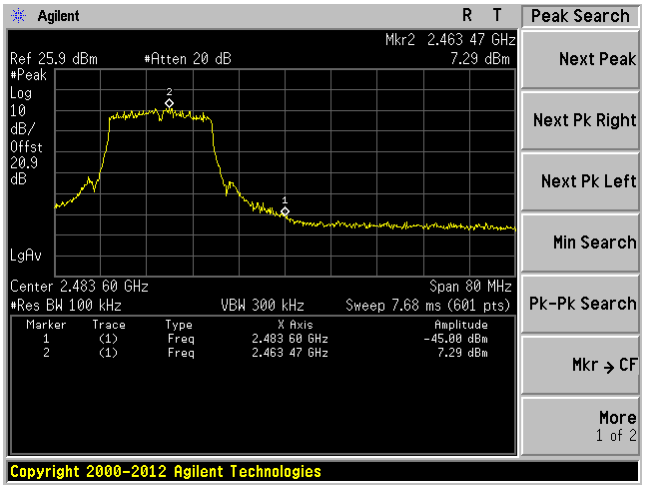


802.11n-HT20, High Channel, 2462 MHz

C0

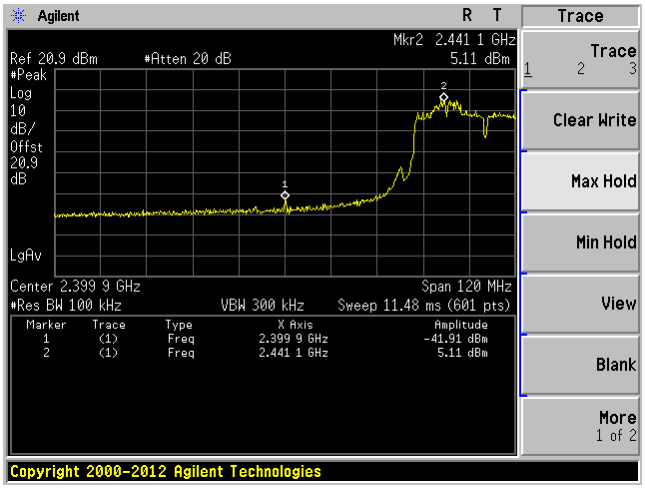


C1

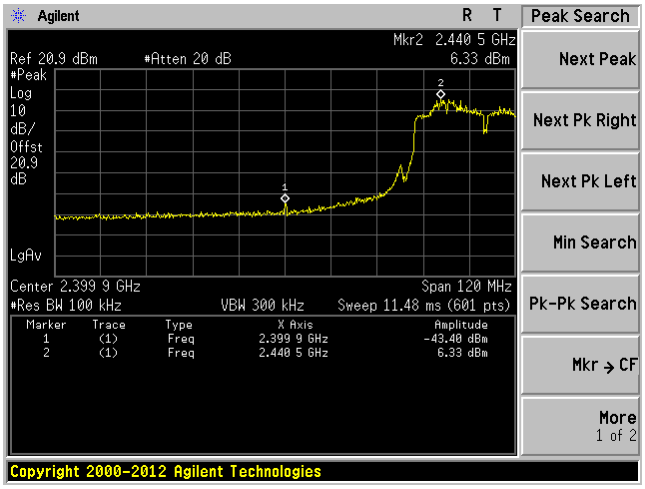


802.11n-HT40, Low Channel, 2422 MHz

C0

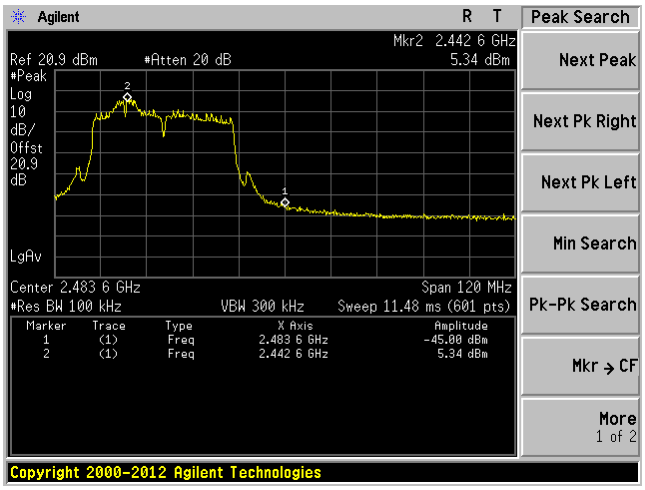


C1

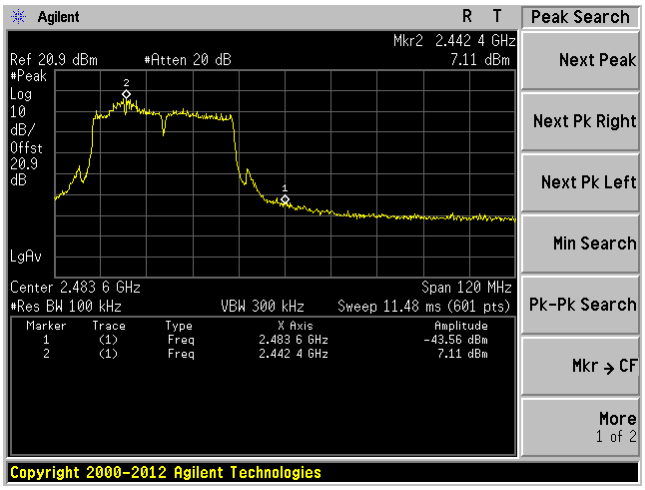


802.11n-HT40, High Channel, 2452 MHz

C0



C1



12 FCC §15.247(e) & IC RSS-210 §A8.2 (b) – Power Spectral Density

12.1 Applicable Standard

According to FCC §15.247(e) and RSS-210 §A8.2 (b) , 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 Chaoran Chu on 2013-10-04 at RF the test site.

12.5 Test Results

802.11b mode

Channel	Frequency (MHz)	PSD C0 (dBm)	PSD C1 (dBm)	Max PSD (dBm)	Limit (dBm/3kHz)	Margin (dB)
Low	2412	-0.46	-0.81	-0.46	8	-8.46
Middle	2437	-0.23	-0.28	-0.23	8	-8.23
High	2462	-2.46	-1.75	-1.75	8	-9.75

802.11 g mode

Channel	Frequency (MHz)	PSD C0 (dBm)	PSD C1 (dBm)	Max PSD (dBm)	Limit (dBm/3kHz)	Margin (dB)
Low	2412	-8.06	-4.94	-4.94	8	-12.94
Middle	2437	-2.51	-3.27	-2.51	8	-10.51
High	2462	-6.95	-8.02	-6.95	8	-14.95

802.11n-HT20 mode

Channel	Frequency (MHz)	PSD C0 (dBm)	PSD C1 (dBm)	Total PSD (dBm)	Limit (dBm/3kHz)	Margin (dB)
Low	2412	-7.83	-7.28	-4.54	8	-12.54
Middle	2437	-3.24	-3.62	-0.42	8	-8.42
High	2462	-8.94	-6.89	-4.78	8	-12.78

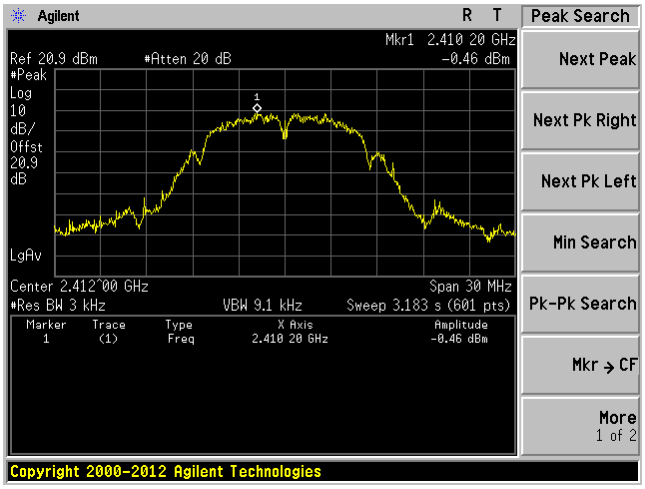
802.11n-HT40 mode

Channel	Frequency (MHz)	PSD C0 (dBm)	PSD C1 (dBm)	Total PSD (dBm)	Limit (dBm/3kHz)	Margin (dB)
Low	2422	-12.40	-9.72	-7.84	8	-15.84
Middle	2437	-6.16	-4.35	-2.15	8	-10.15
High	2452	-10.35	-10.70	-7.51	8	-15.51

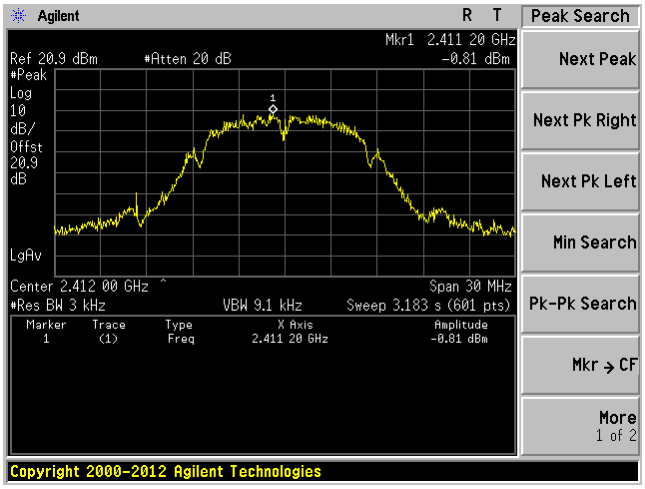
Please refer to the following plots for detailed test results:

802.11b, Low Channel, 2412 MHz

C0

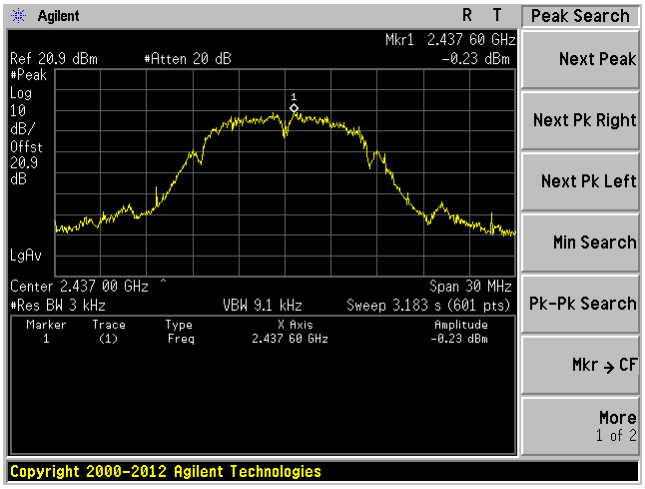


C1

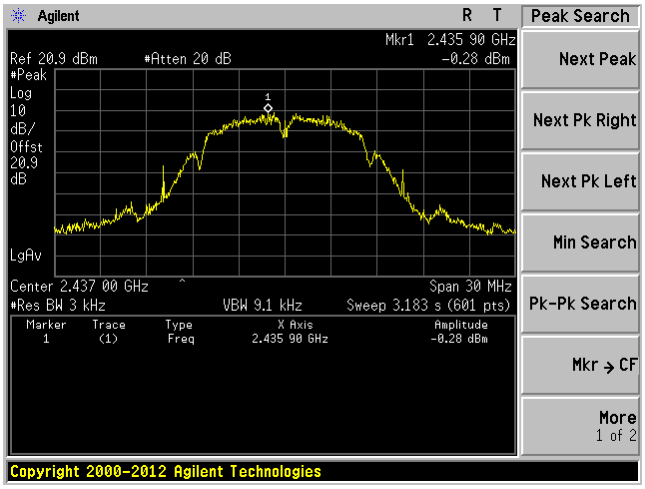


802.11b, Middle Channel, 2437 MHz

C0

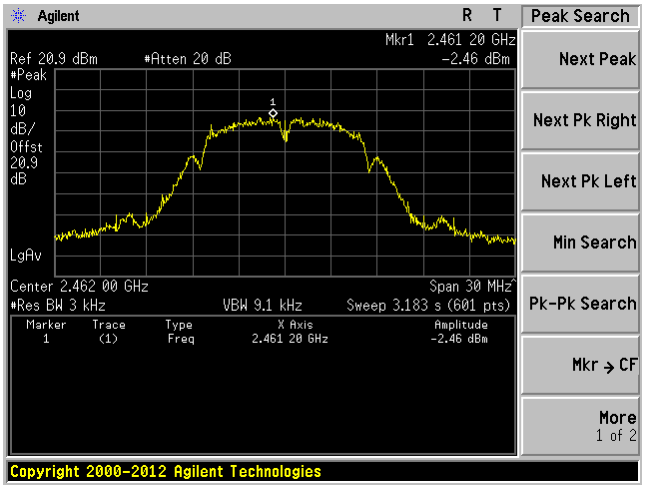


C1

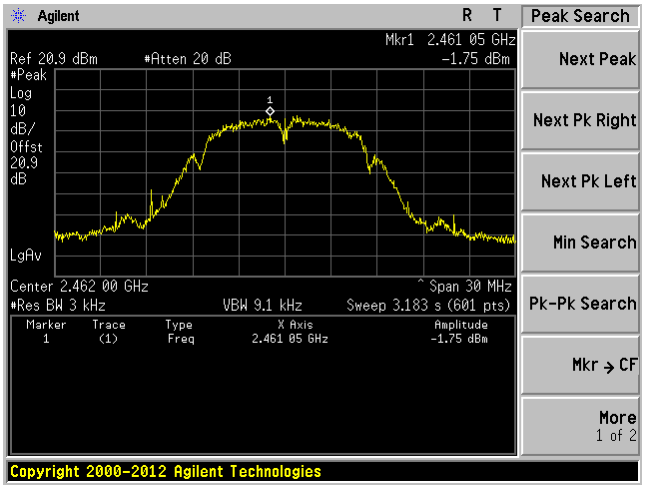


802.11b, High Channel, 2462 MHz

C0

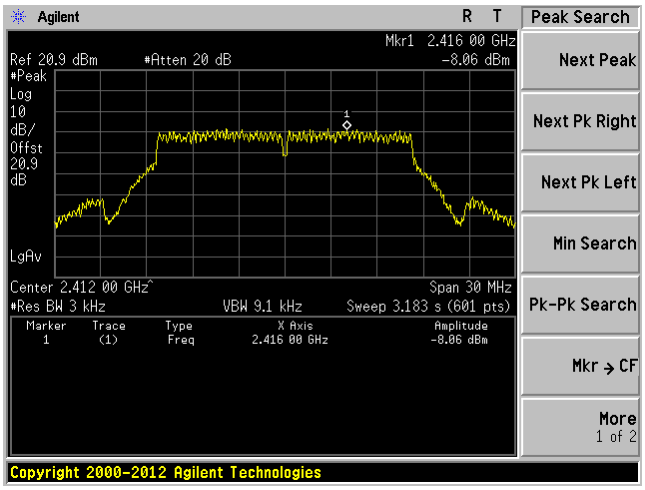


C1



802.11g, Low Channel, 2412 MHz

C0



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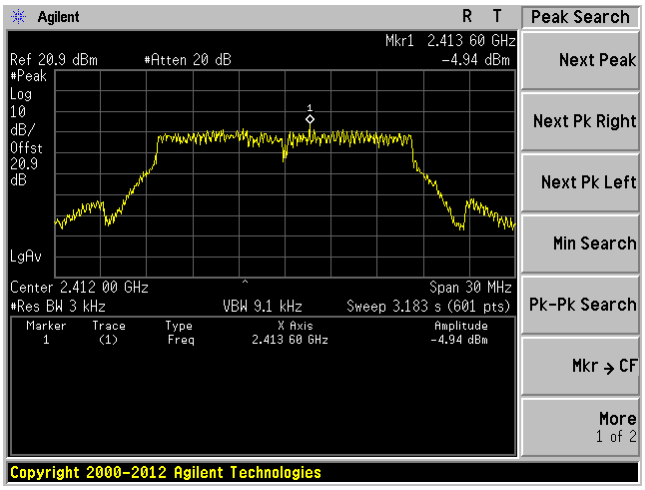
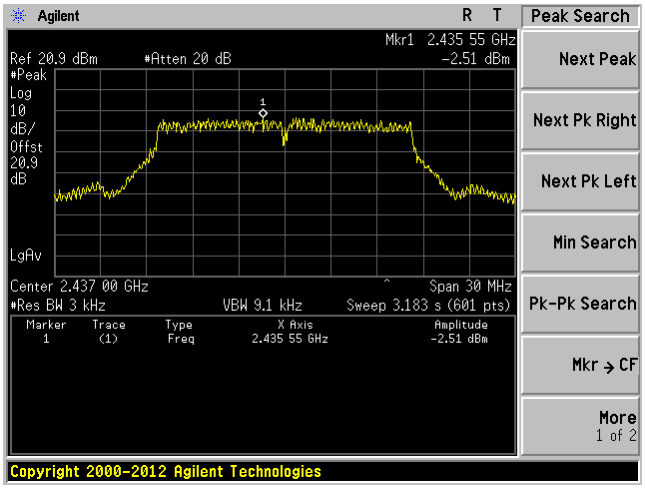


802.11g, Middle Channel, 2437 MHz

C0



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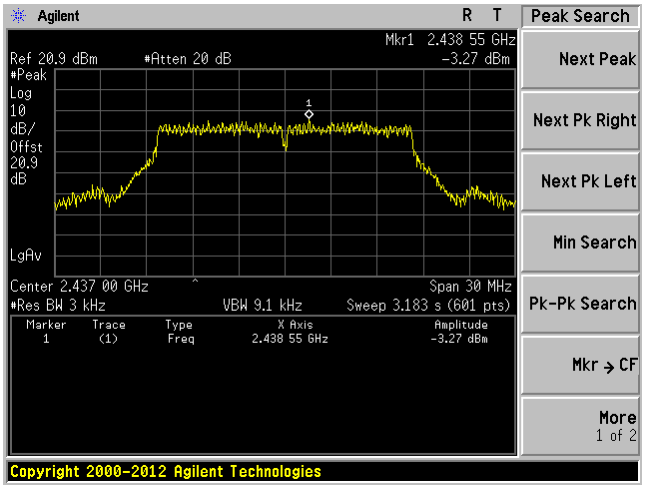
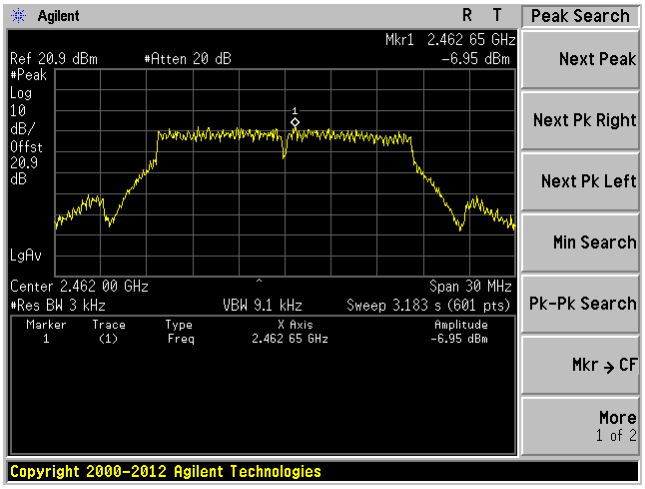


802.11g, High Channel, 2462 MHz

C0



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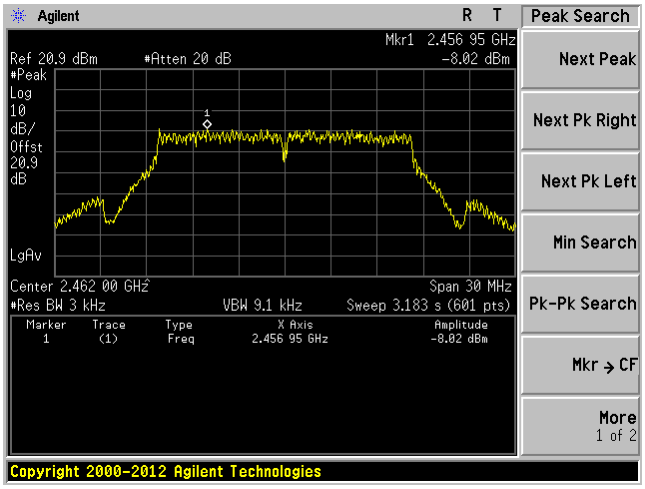
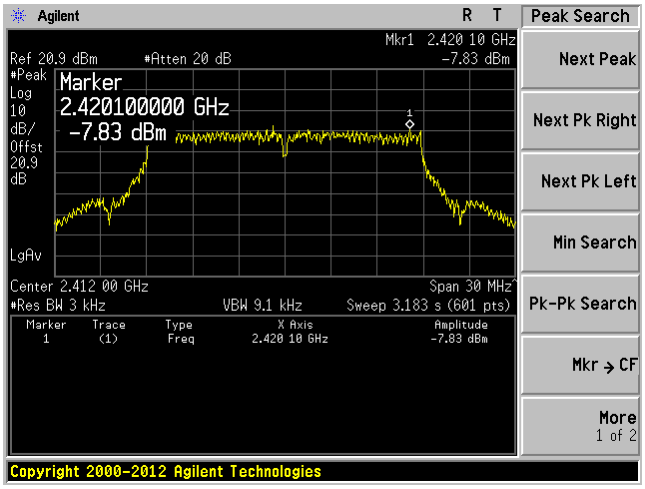


802.11n-HT20, Low Channel, 2412 MHz

C0



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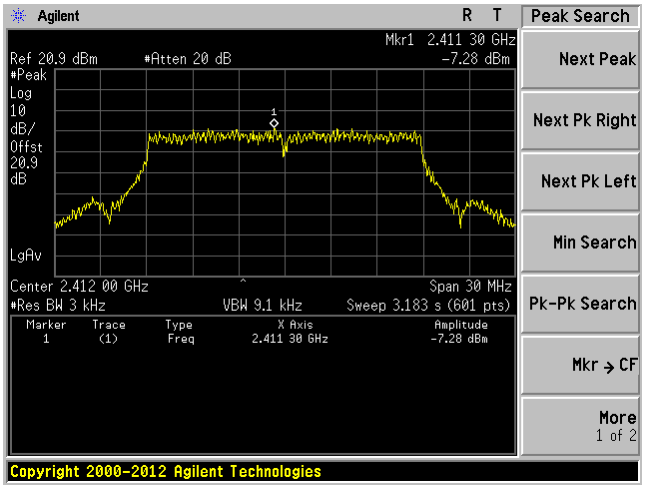

802.11n-HT20, Middle Channel, 2437 MHz

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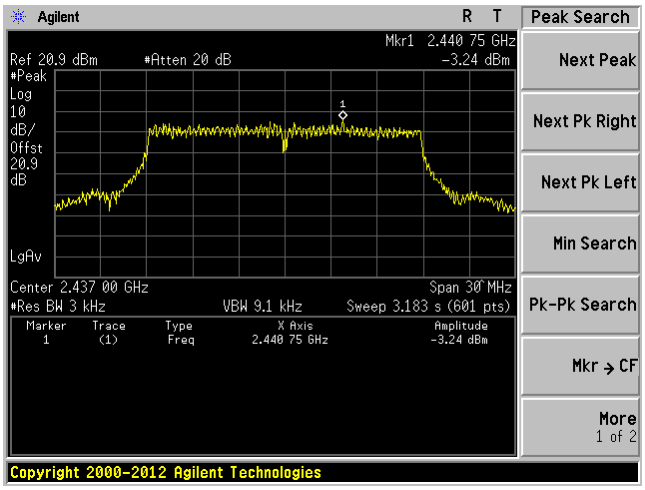

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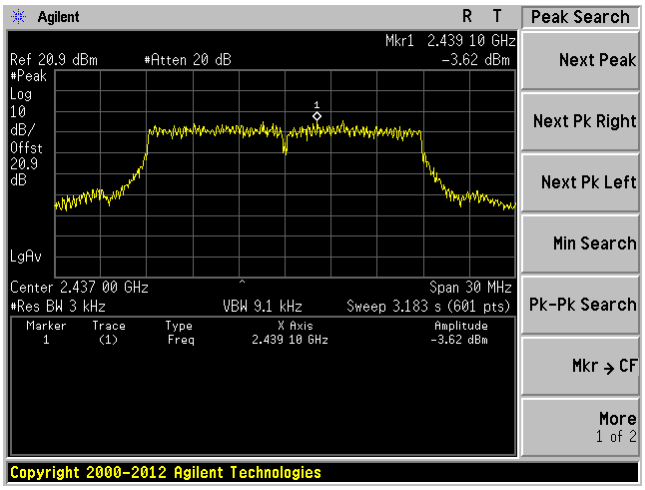

802.11n-HT20, High Channel, 2462 MHz

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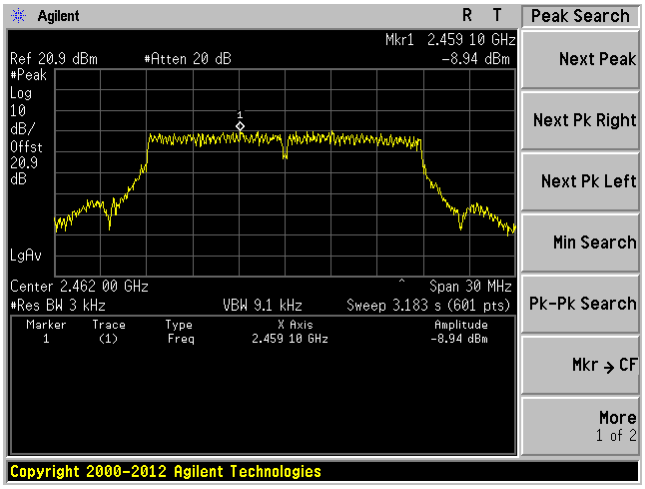

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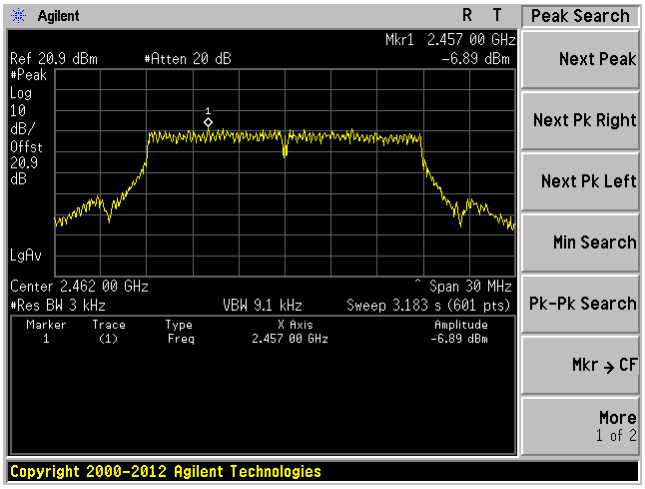
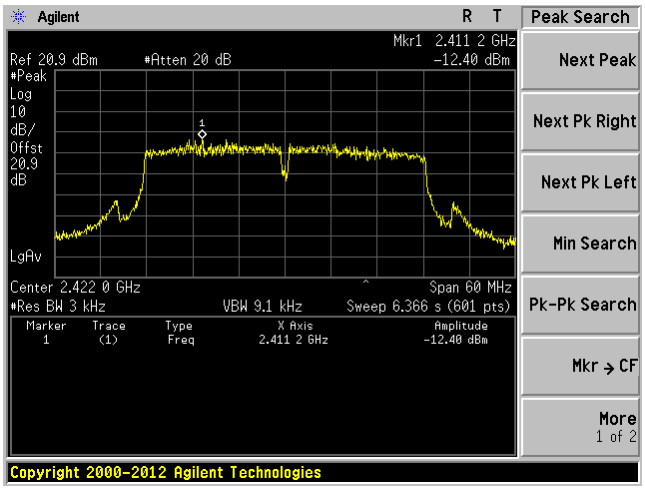


802.11n-HT40, Low Channel, 2422 MHz

C0



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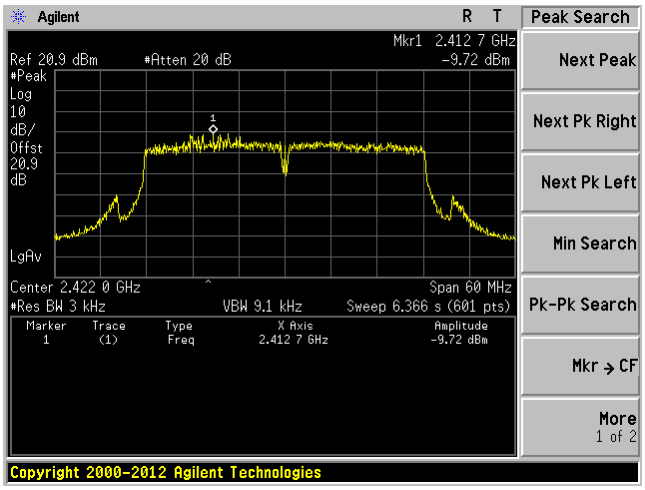
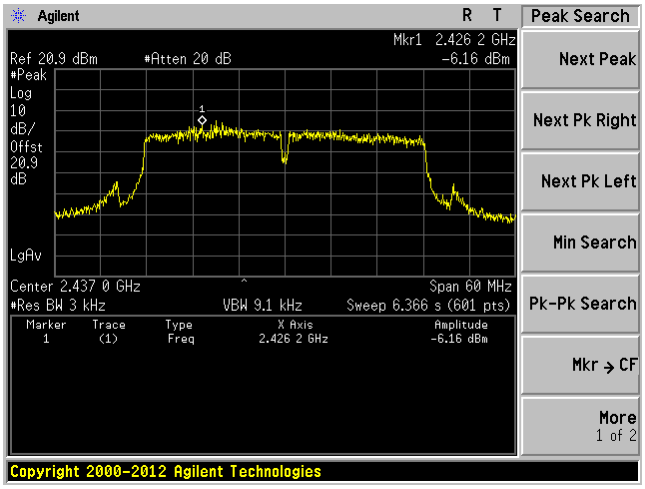


802.11n-HT40, Middle Channel, 2437 MHz

C0



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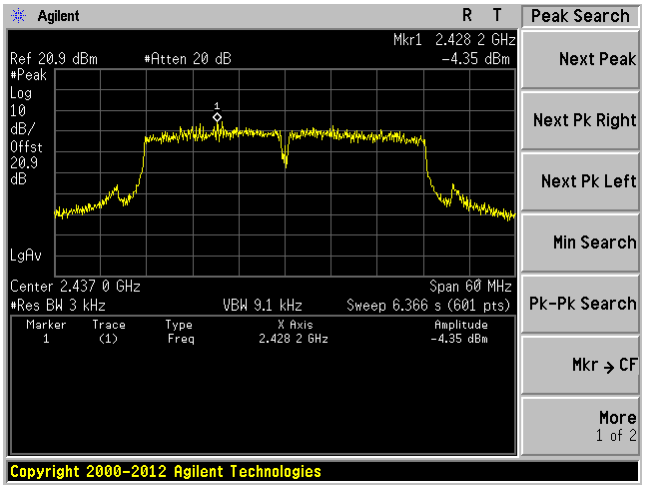
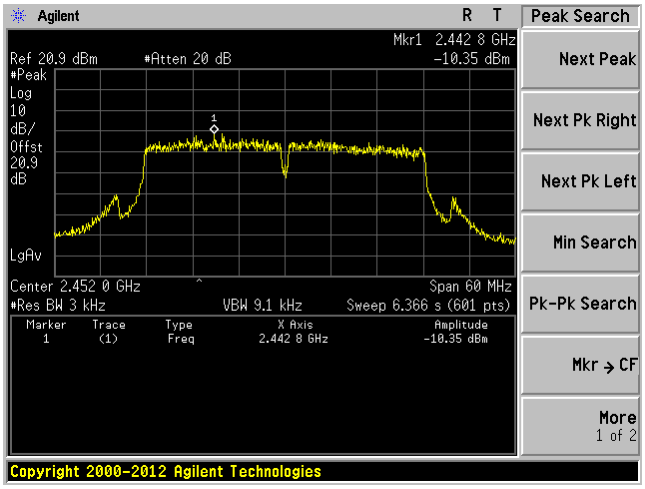
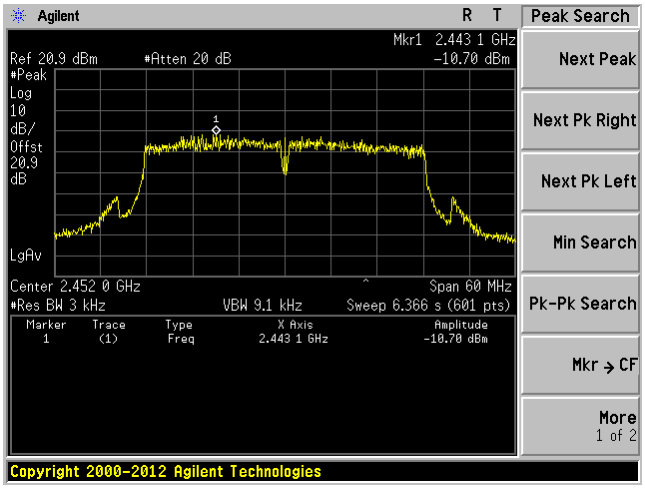


802.11n-HT40, High Channel, 2452 MHz

C0



C1



13 IC RSS-210 §2.3 & RSS-Gen §6.1 – Receiver Spurious Radiated Emissions

13.1 Applicable Standard

According to IC RSS-Gen §6.1, spurious emissions from receivers shall not exceed the radiated limits shown in the table below.

Table 2: General Field Strength Limits for Transmitters and Receivers at Frequencies above 30 MHz

Frequency (MHz)	Field Strength Microvolts/m at 3 meters
30-88	100
88-216	150
216-960	200
Above 960	500

13.2 EUT Setup

The radiated emissions tests were performed in the 3 meter chamber, using the setup in accordance with ANSI C63.4-2009.

13.3 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data were recorded in the peak detection mode. Quasi-peak readings was performed only when an emissions was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**QP**" in the data table.

13.4 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:

Margin = Corrected Amplitude - Limit

13.5 Test Equipment Lists 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.*

13.6 Test Environmental Conditions

Temperature:	18-22 °C
Relative Humidity:	45-48 %
ATM Pressure:	101-102 kPa

The testing was performed by Chaoran Chu from 2013-10-08 at 5 meter 3.

13.7 Summary of Test Results

According to the test data, the EUT complied with the RSS-210/RSS-Gen, with the closest margins from the limit listed below:

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
-0.12	499.9915	Vertical	30-1000

13.8 Test Results and Plots

1) 30-1000 MHz, Measured at 3 meters

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
499.9915	45.88	99	V	37	46	-0.12
800.1800	45.70	100	H	32	46	-0.30
549.9200	45.62	100	V	176	46	-0.38
66.37500	39.39	100	V	3	40	-0.61
58.57350	38.60	111	V	141	40	-1.40
147.4805	40.41	131	V	160	43.5	-3.09

2) Above 1 GHz Measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
2400	45.69	339	100	V	28.956	3.12	27.76	50.006	74	-23.994	Peak
2400	44.38	310	100	H	28.956	3.12	27.76	48.696	74	-25.304	Peak
2400	30.52	339	100	V	28.956	3.12	27.76	34.836	54	-19.164	Ave
2400	26.49	310	100	H	28.956	3.12	27.76	30.806	54	-23.194	Ave