FCC PART 15, SUBPART C
IC RSS-210, ISSUE 8, DECEMBER 2010

TEST AND MEASUREMENT REPORT

For

Ruckus Wireless, Inc.

350 West Java Drive, Sunnyvale, CA 94089, USA

FCC ID: S9GTDBAC22N
IC: 5912A-TDBAC22N
Model: TDBAC22N

Report Type:	**Product Type:**
Original Report	802.11a/b/g/n/ac Module

Prepared By	Rui Zhou
Report Number	R1407152-247 Rev C
Report Date	2014-09-02
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1407152-247	Original Report	2014-08-08
1	R1407152-247 Rev A	Revised Report with updated Model number	2014-08-21
2	R1407152-247 Rev B	Updated MPE	2014-08-28
3	R1407152-257 Rev C	Updated IC	2014-09-02

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Ruckus Wireless, Inc*., and their product model: *TDBAC22N*, FCC ID: S9GTDBAC22N, IC: 5912A-TDBAC22N or the "EUT" as referred to in this report. The EUT is an 802.11 a/b/g/n/ac module.

1.2 Mechanical Description of EUT

The EUT measures approximately 15 cm (L) x 13 cm (W) x 2.0 cm (H) and weighs 114.5 g.
Note: The EUT was tested without enclosure.

The test data gathered are from typical production sample, serial number: 171406000022 assigned by Client.

1.3 Objective

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

The objective is to determine compliance with FCC Part 15.247 rules and IC RSS-210 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, and 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 v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.6 Measurement Uncertainty

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

The following calculation follows the procedures as set forth in clause 7.2.3, ETSI TR 100 028-1 V1.4.1 (2001-12), the expression of Uncertainty in Radiated RF Testing is in accordance to ISO/IEC 17025 and TR 100 028-1 V1.4.1 (2001-12).

The expanded Measurement Uncertainty value having a confidence factor of 95%, is within a range of 5.48 dB. This means that the value of conducted RF carrier power test will be within +/- 2.74 dB of the measuring radiated emissions power versus the expected value.
The expected value is defined as the power at the antenna of the Transmitter under Test.

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 v03r02.

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 utility used was *T300 ART* was provided by Ruckus Wireless Inc., and was verified by *Rui Zhou* to comply with the standard requirements being tested against.

2.3 Special Equipment

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

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Ruckus	DC Adaptor/POE	NPE-5818	740-64157-001
Ruckus	AC Adaptor	PA10244HUB	740-64125-010
Dell	Laptop	Latitude E5420	CHZCMQ1

2.6 EUT Internal Configuration Details

Manufacturer	Description	Model	Serial Number
Ruckus	Main Board (SANTORINI)	ASM 120-11257-003 rev. 4	RUK02806
Ruckus	Interface	-	-

2.7 Interface Ports and Cables

Cable Description	Length (m)	From	To
Ethernet Cable	1m	DC Adaptor/POE	EUT
Ethernet Cable	1m	Laptop	DC Adaptor/POE

2.8 Power Supply List and Details

Manufacturer	Description	Model	Part Number
Ruckus	Power Supply cord	PA1024-4HU	-
Ruckus	POE Power Adapter	NPE-5818	740-64157-001

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

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 field

According to IC RSS-102 Issue 2 section 4.1, RF limits used for general public will be applied to the EUT.

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Time Averaging (min)
0.003 - 1	280	2.19	-	6
1 - 10	280 / f	2.19 / f	-	6
10 - 30	28	2.19 / f	-	6
30 – 300	28	0.073	2*	6
300 – 1 500	$1.585\ f^{0.5}$	$0.0042\ f^{0.5}$	f / 150	6
1 500 – 15 000	61.4	0.163	10	6
15 000 – 150 000	61.4	0.163	10	$616000 / f^{1.2}$
150 000- 300 000	$0.158\ f^{0.5}$	$4.21 \times 10^{-4}\ f^{0.5}$	$6.67 \times 10^{-5}\ f$	$616000 / f^{1.2}$

Note: *f* is frequency in MHz
* = Power density limit is applicable at frequencies greater than 100 MHz

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

2400-2483.5 MHz

Maximum peak output power at antenna input terminal (dBm):	24.58
Maximum peak output power at antenna input terminal (mW):	287.08
Prediction distance (cm):	20
Prediction frequency (MHz):	2437
Maximum Antenna Gain, typical (dBi):	6
Maximum Antenna Gain (numeric):	3.9811
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.2275
Power density of prediction frequency at 20.0 cm (W/m^2):	2.275
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0
MPE limit for uncontrolled exposure at prediction frequency (W/m^2):	10

5725-5850 MHz

Maximum peak output power at antenna input terminal (dBm):	24.9
Maximum peak output power at antenna input terminal (mW):	309.03
Prediction distance (cm):	20
Prediction frequency (MHz):	5785
Maximum Antenna Gain, typical (dBi):	8
Maximum Antenna Gain (numeric):	6.31
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.3813
Power density of prediction frequency at 20.0 cm (W/m^2):	3.813
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0
MPE limit for uncontrolled exposure at prediction frequency (W/m^2):	10

According to KDB 447498 D01 General RF Exposure Guidance v05r02, EUT has 5 GHz and 2.4 GHz transmitting simultaneously. So the sum of MPE ratio for four antennas is 0.6088 which is smaller than 1.0. So the colocation exposure exclusion applies.

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.

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.
Note: The power setting was controlled by manufacture with different antenna configuration. The power setting of the different antenna will be set with the corresponded value and no more than the level reported.

5.2 Antenna Description

The antenna uses a unique coupling to the EUT, which complies with the antenna requirement. And the antenna gain is 6 dBi. Please refer to the internal photos.

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

6.1 Applicable Standards

As per FCC §15.207 Conducted limits:

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 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.

As per IC RSS-Gen §7.2.4 Conducted limits:

Except when the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply, either directly or indirectly (such as with abattery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table below. The more stringent limit applies at the frequency range boundaries. The conducted emissions shall be measured with a 50 ohm/50 microhenry line impedance stabilization network (LISN).

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

**Decreases with the logarithm of the frequency.*

6.2 Test Setup

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

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

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

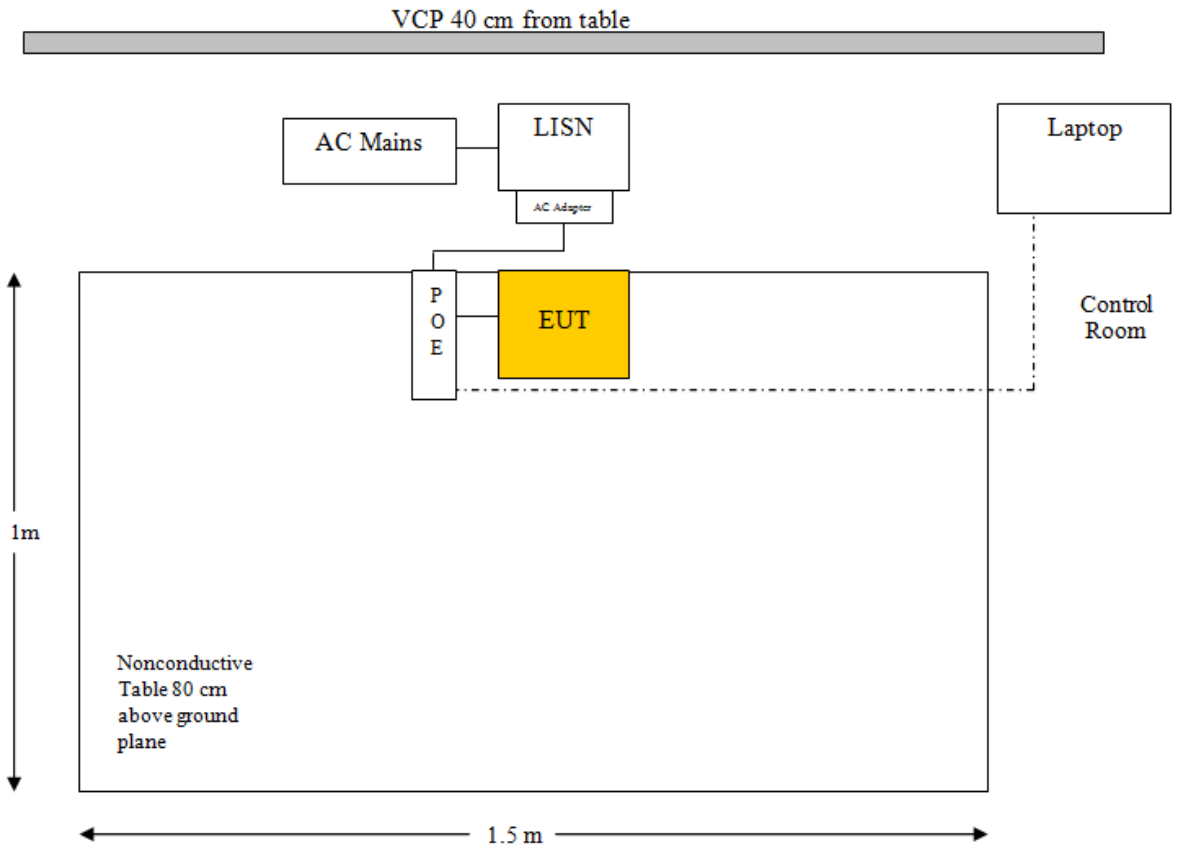
6.3 Test Procedure

Maximizing procedure was performed on the 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

POE:



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	2014-03-28	1 year
Solar Electronics	LISN	9252-50-R-24-N	511213	2014-07-14	1 year
TTE	Filter, High Pass	H962-150K-50-21378	K7133	2013-07-30	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:	22º C
Relative Humidity:	52 %
ATM Pressure:	101.89 kPa

The testing was performed by Rui Zhou on 2014-07-18 in 5 m chamber 3.

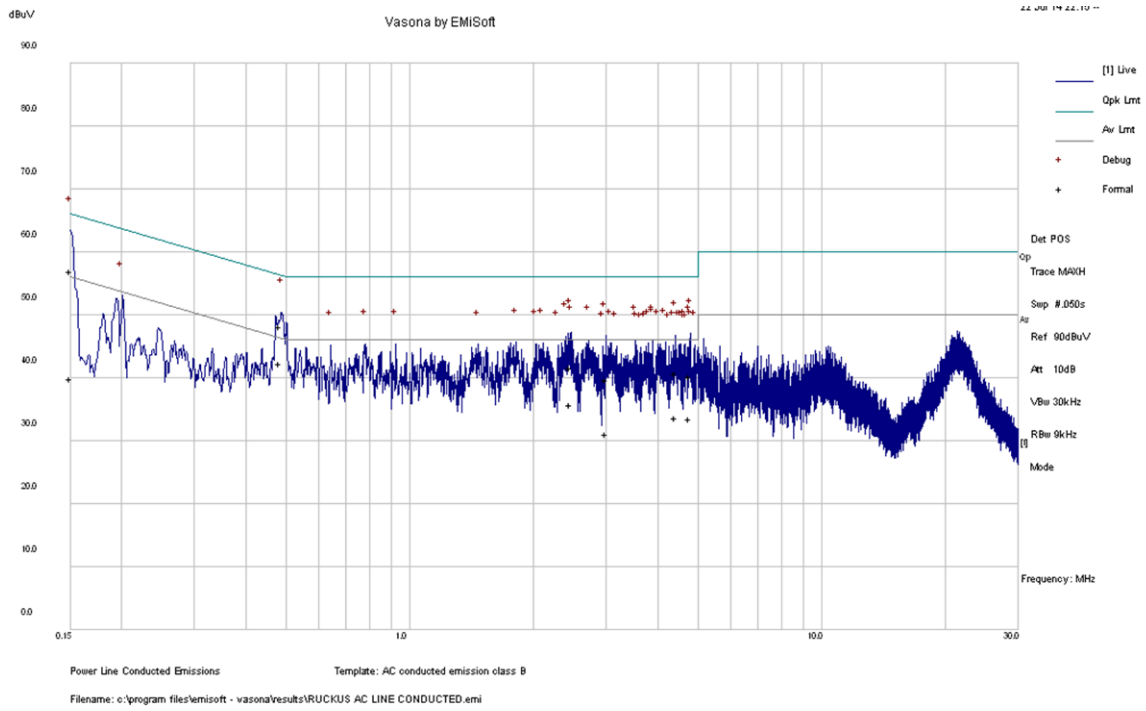
6.8 Summary of Test Results

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

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-3.72	0.48363	Neutral	0.15-30

6.9 Conducted Emissions Test Plots and Data

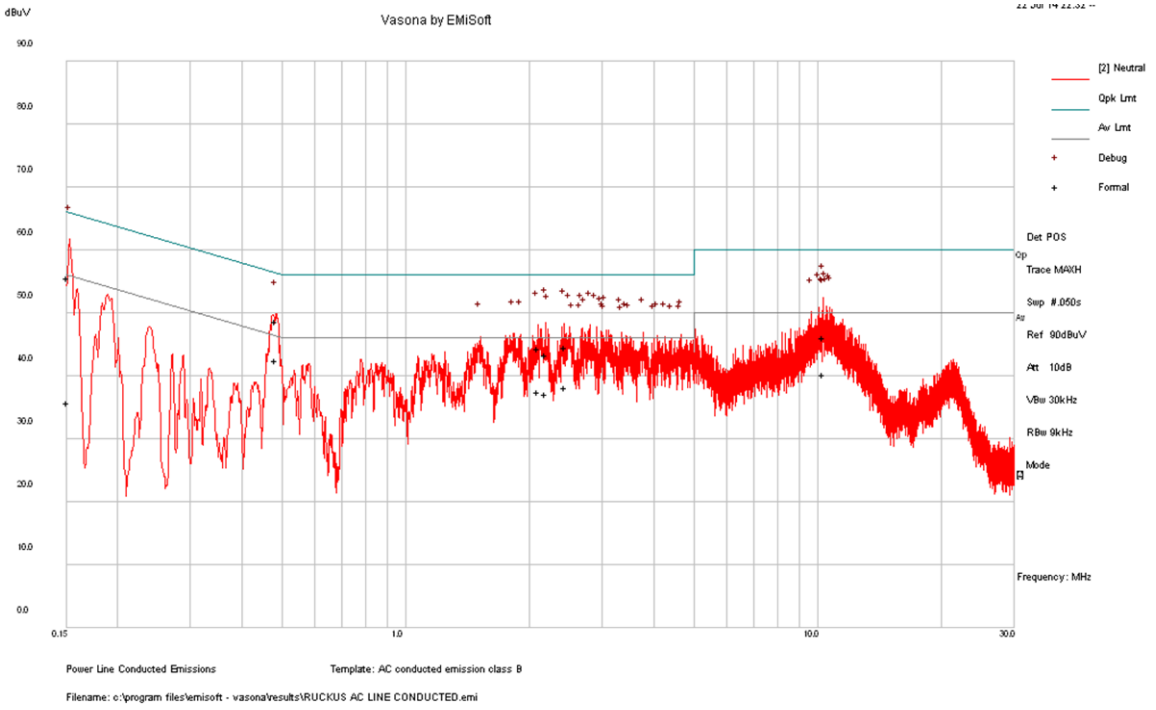
120 V, 60 Hz – Line, POE



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.483582	48.26	Line	56.28	-8.01	QP
0.150335	57.03	Line	65.98	-8.95	QP
2.458293	41.7	Line	56	-14.3	QP
4.416674	40.73	Line	56	-15.27	QP
4.793255	40.32	Line	56	-15.68	QP
2.998408	39.8	Line	56	-16.2	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.483582	42.33	Line	46.28	-3.95	Ave.
2.458293	35.82	Line	46	-10.18	Ave.
4.416674	33.77	Line	46	-12.23	Ave.
4.793255	33.6	Line	46	-12.4	Ave.
2.998408	31.09	Line	46	-14.91	Ave.
0.150335	39.96	Line	55.98	-16.03	Ave.

120 V, 60 Hz – Neutral, POE



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.483633	48.73	Neutral	56.28	-7.55	QP
0.151179	55.53	Neutral	65.93	-10.40	QP
2.436416	44.52	Neutral	56	-11.48	QP
2.095496	44.44	Neutral	56	-11.56	QP
2.19145	43.43	Neutral	56	-12.57	QP
10.31199	46.18	Neutral	60	-13.82	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.483633	42.56	Neutral	46.28	-3.72	Ave.
2.436416	38.16	Neutral	46	-7.84	Ave.
2.095496	37.44	Neutral	46	-8.56	Ave.
2.19145	37.15	Neutral	46	-8.85	Ave.
10.31199	40.23	Neutral	50	-9.77	Ave.
0.151179	35.73	Neutral	55.93	-20.21	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 30 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 based on FCC KDB 558074 D01 DTS Meas Guidance v03r02: 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	Spectrum Analyzer	E4446A	US44300386	2013-09-29	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:	22-24° C
Relative Humidity:	42-45 %
ATM Pressure:	101-102 kPa

The testing was performed by Rui Zhou from 2014-07-18 and 2014-07-22 at RF site.

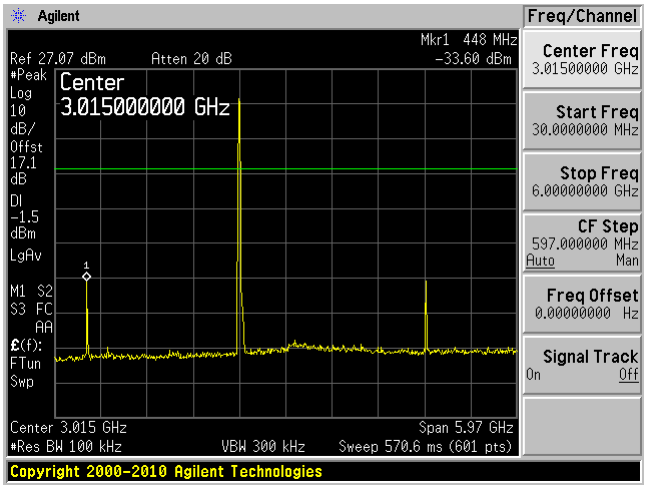
7.5 Test Results

Please refer to following plots of spurious emissions.

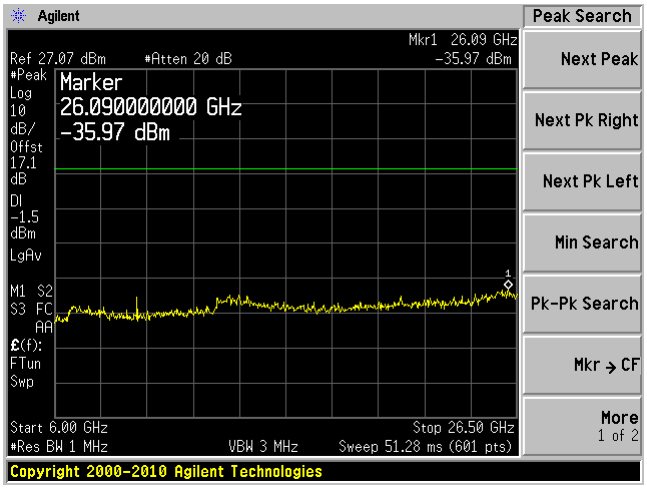
2400-2483.5 MHz

802.11b, Low Channel, 2412 MHz

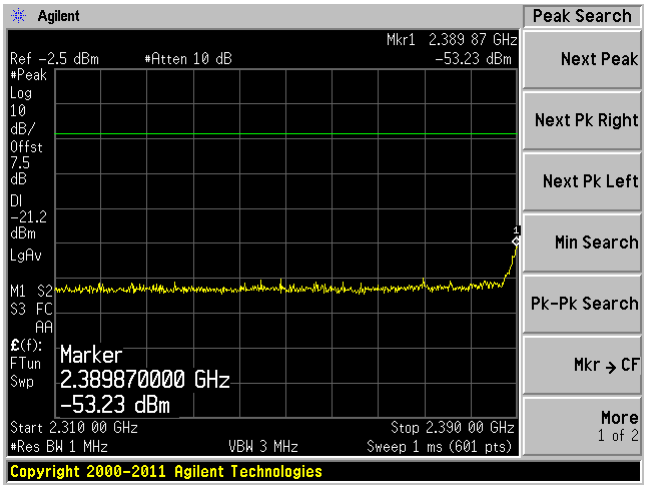
Chain J0, Plot: 30 MHz – 6 GHz



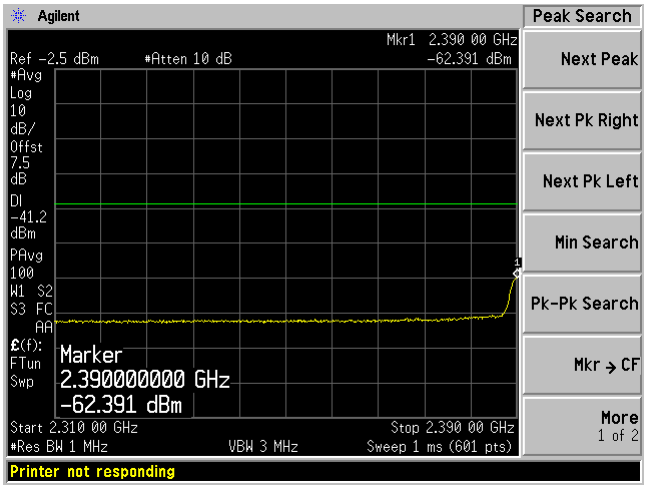
Chain J0, Plot: 6 GHz – 26 GHz



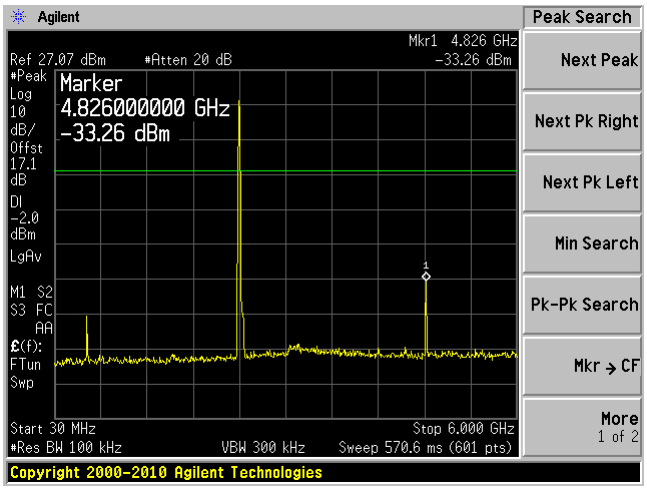
Chain J0, Plot: 2310 MHz – 2390 MHz Peak



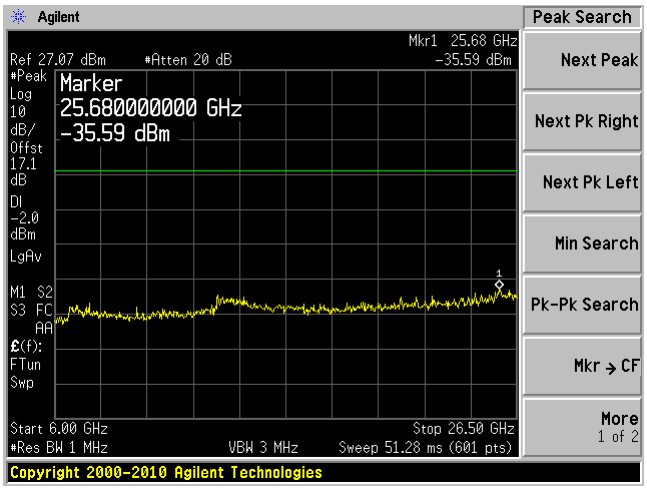
Chain J0, Plot: 2310 MHz – 2390 MHz Ave



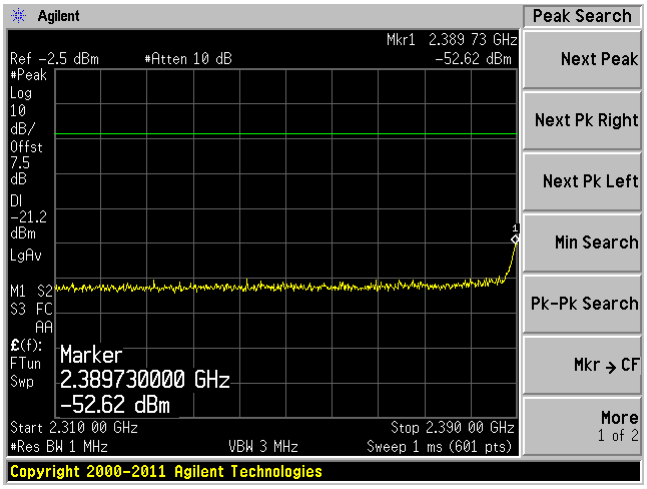
Chain J1, Plot: 30 MHz – 6 GHz



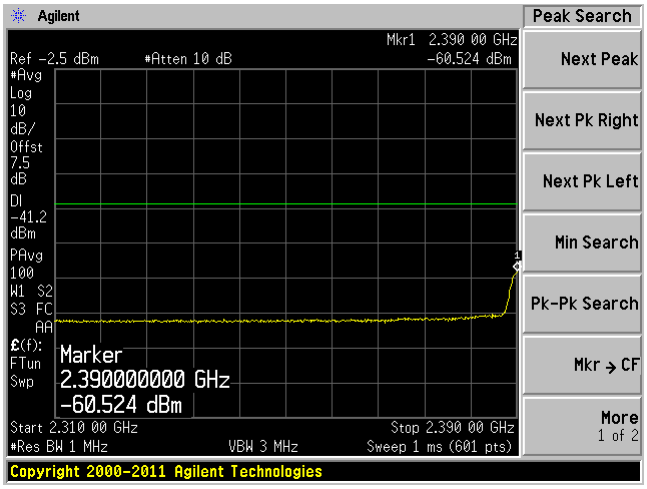
Chain J1, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 2310 MHz – 2390 MHz Peak

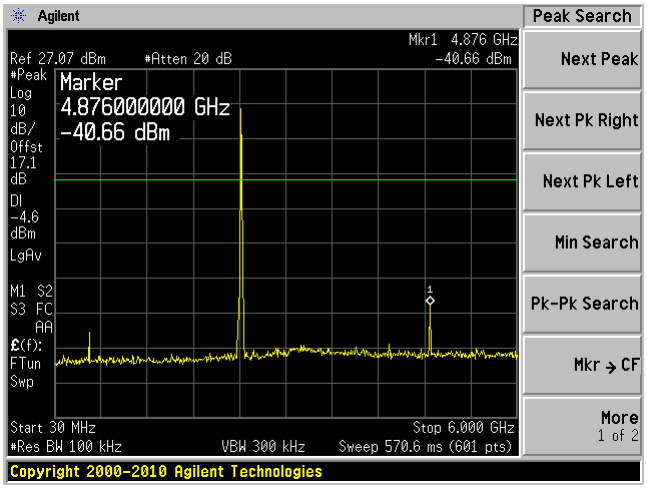


Chain J1, Plot: 2310 MHz – 2390 MHz Ave

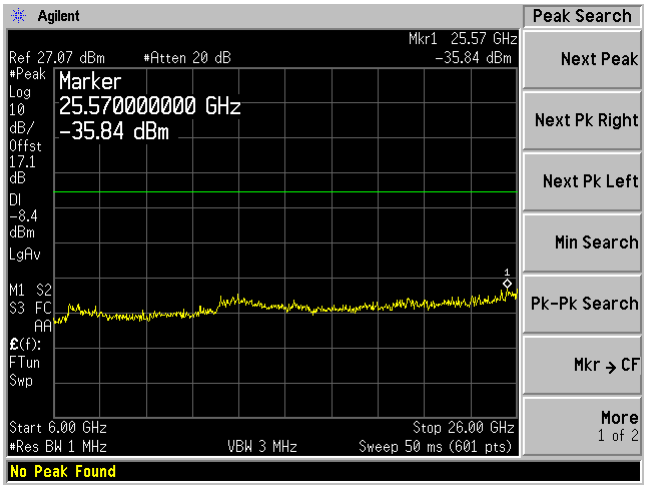


802.11b, Middle Channel, 2437 MHz

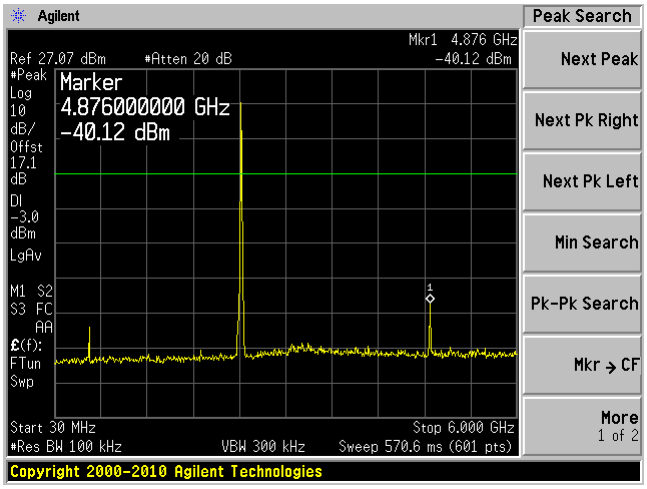
Chain J0, Plot: 30 MHz – 6 GHz



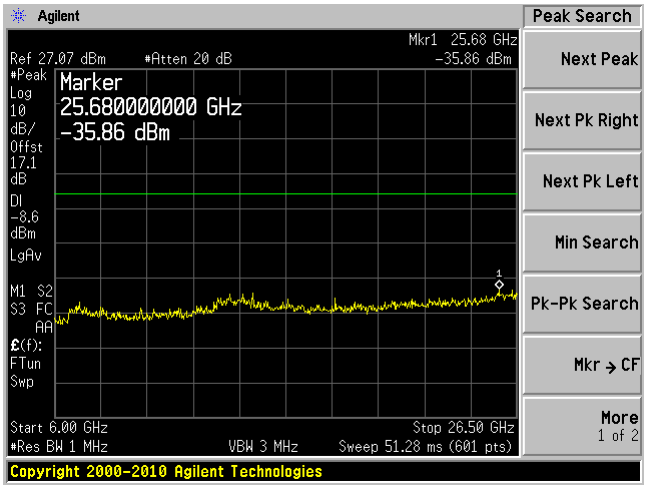
Chain J0, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 30 MHz – 6 GHz

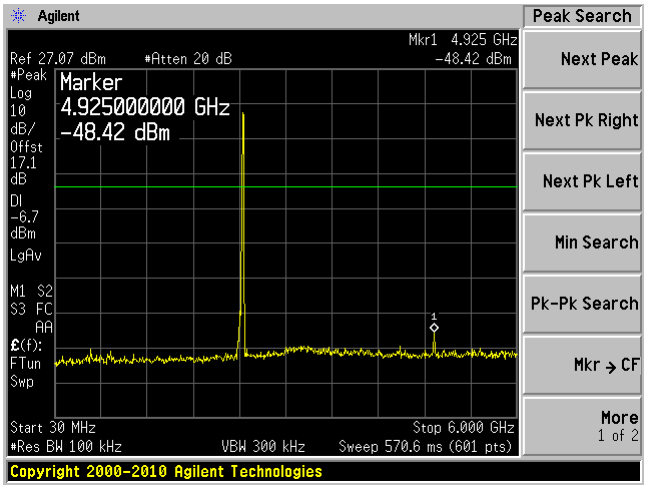


Chain J1, Plot: 6 GHz – 26 GHz

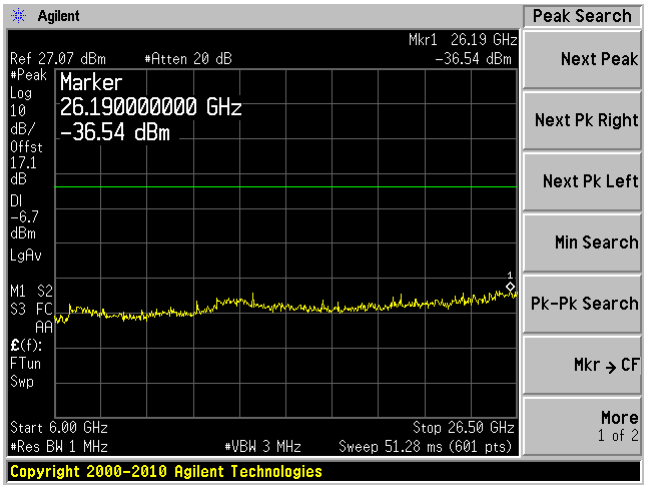


802.11b, High Channel, 2462 MHz

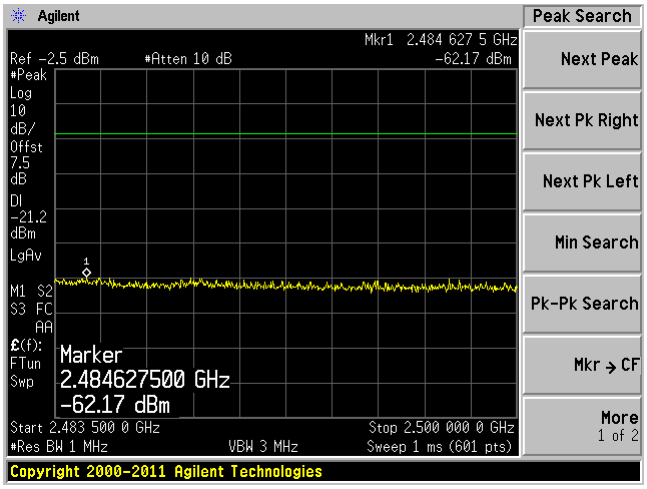
Chain J0, Plot: 30 MHz – 6 GHz



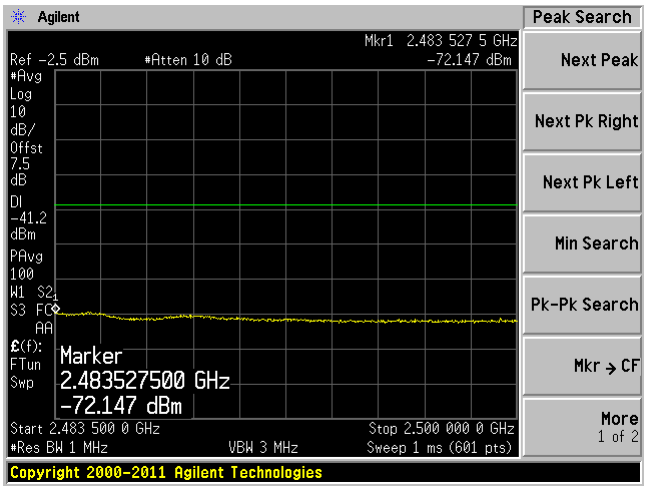
Chain J0, Plot: 6 GHz – 26 GHz



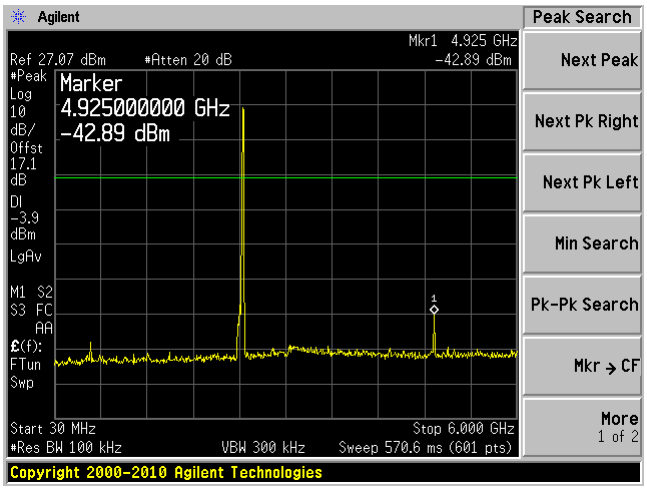
Chain J0, Plot: 2483.5 MHz – 2500 MHz Peak



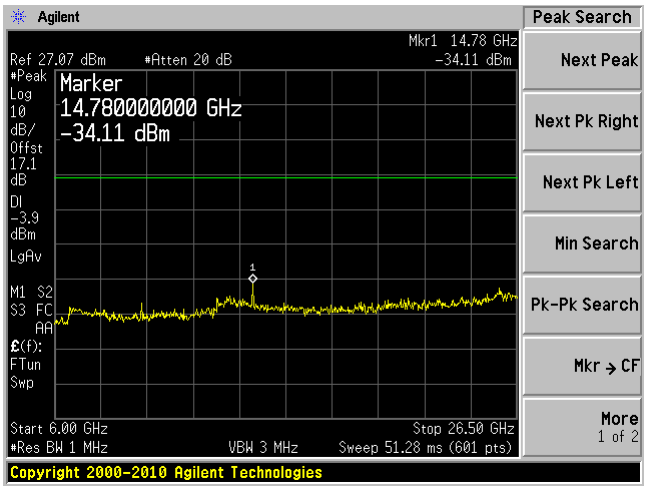
Chain J0, Plot: 2483.5 MHz – 2500 MHz Ave



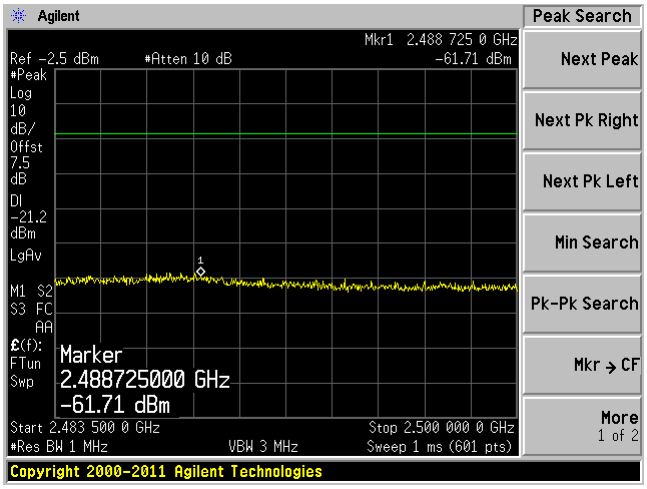
Chain J1, Plot: 30 MHz – 6 GHz



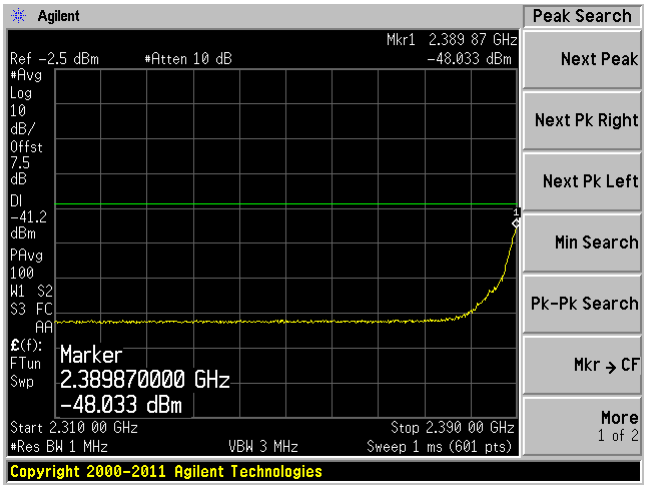
Chain J1, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 2483.5 MHz – 2500 MHz Peak

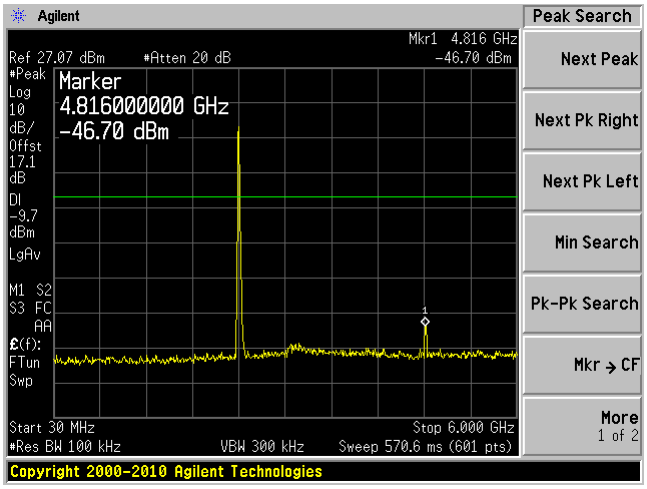


Chain J1, Plot: 2483.5 MHz – 2500 MHz Ave

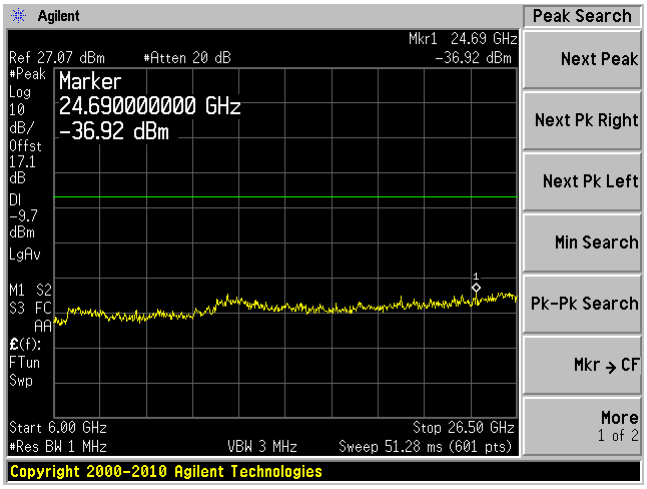


802.11g, Low Channel 2412 MHz

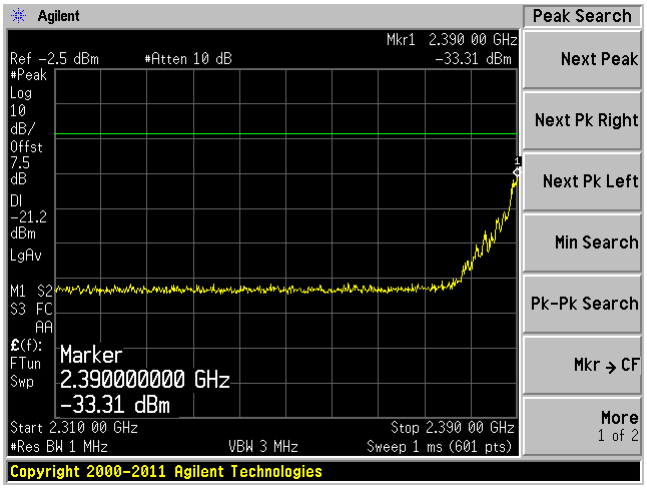
Chain J0, Plot: 30 MHz – 6 GHz



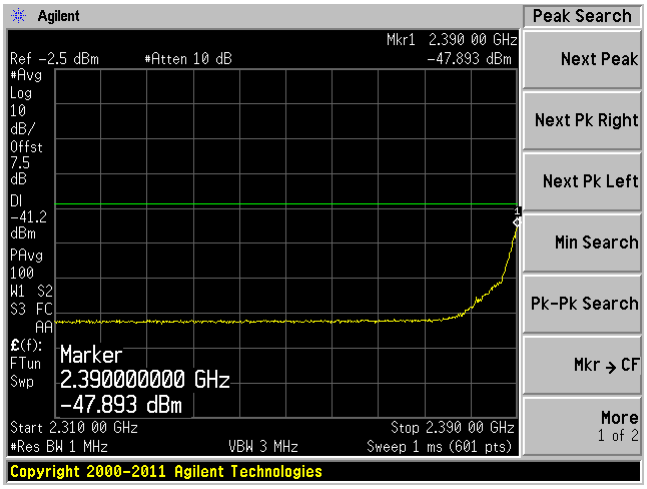
Chain J0, Plot: 6 GHz – 26 GHz



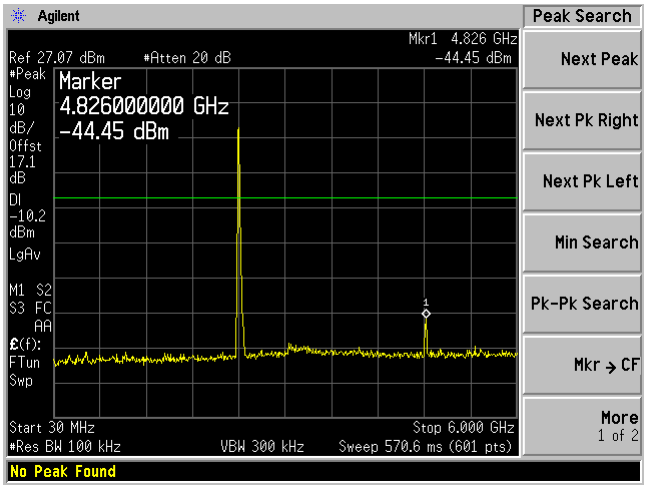
Chain J0, Plot: 2310 MHz – 2390 MHz Peak



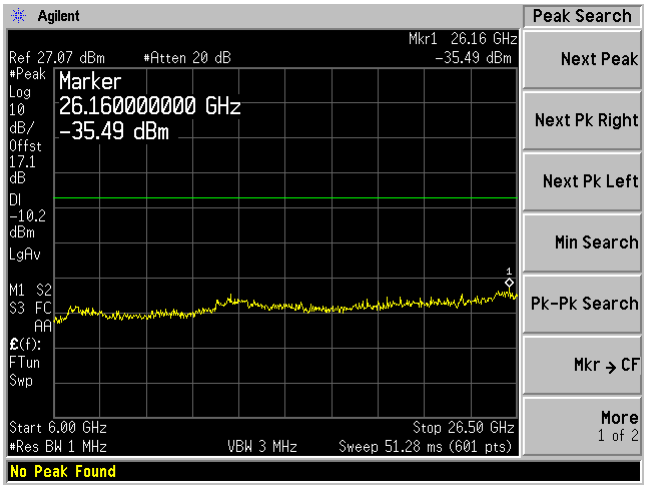
Chain J0, Plot: 2310 MHz – 2390 MHz Ave



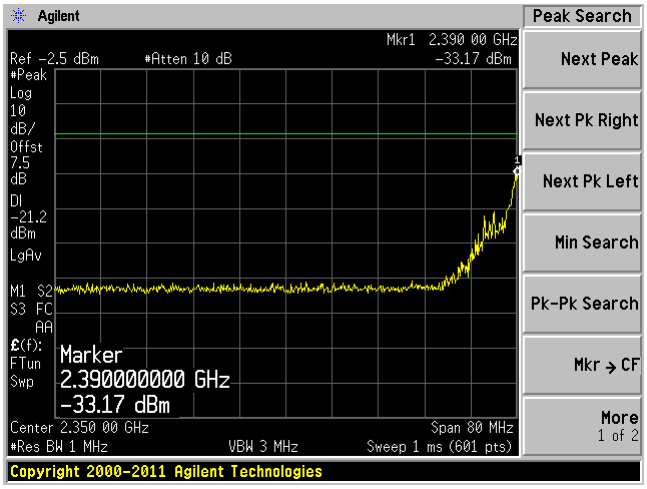
Chain J1, Plot: 30 MHz – 6 GHz



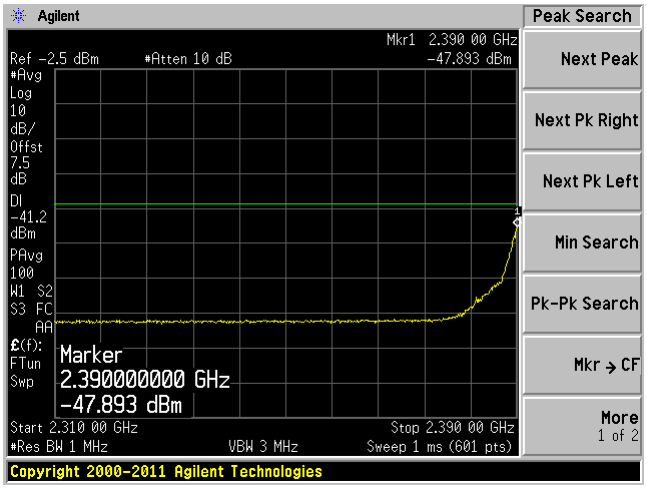
Chain J1, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 2310 MHz – 2390 MHz Peak

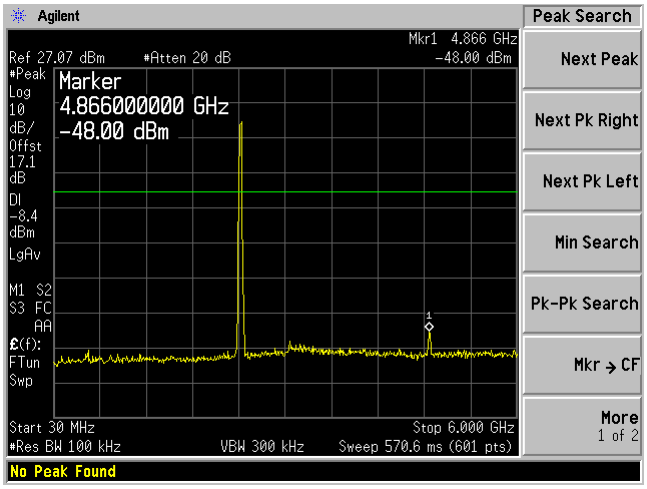


Chain J1, Plot: 2310 MHz – 2390 MHz Ave

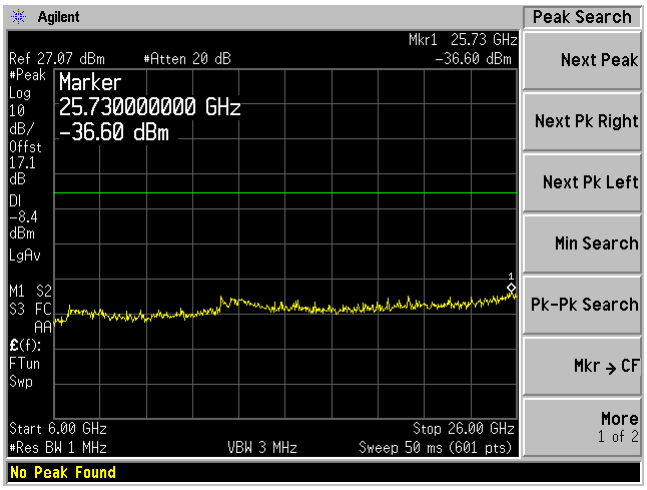


802.11g, Middle Channel 2437 MHz

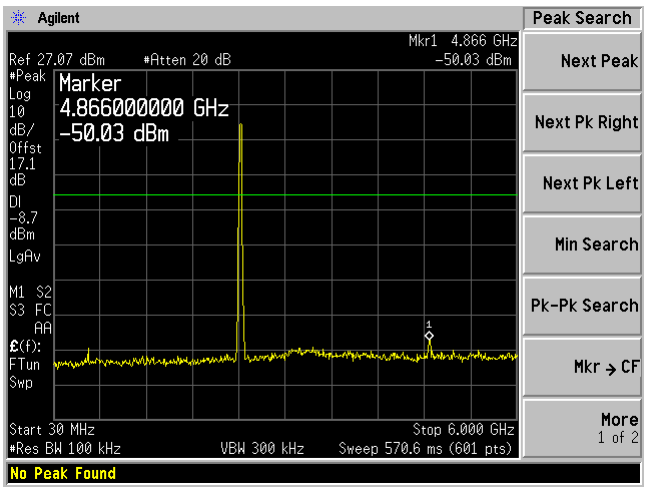
Chain J0, Plot: 30 MHz –6 GHz



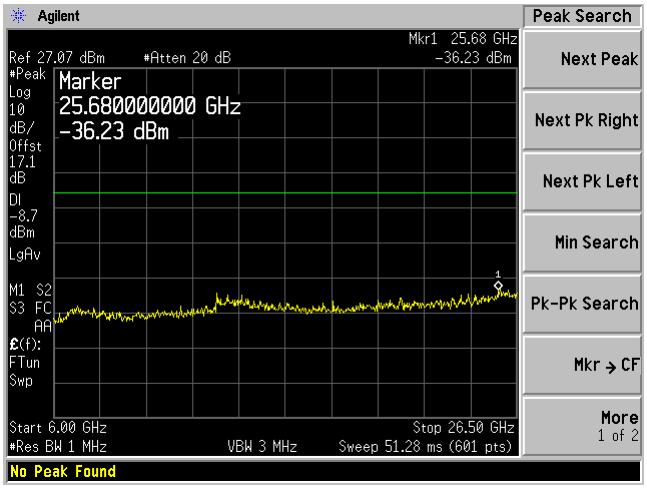
Chain J0, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 30 MHz – 6 GHz

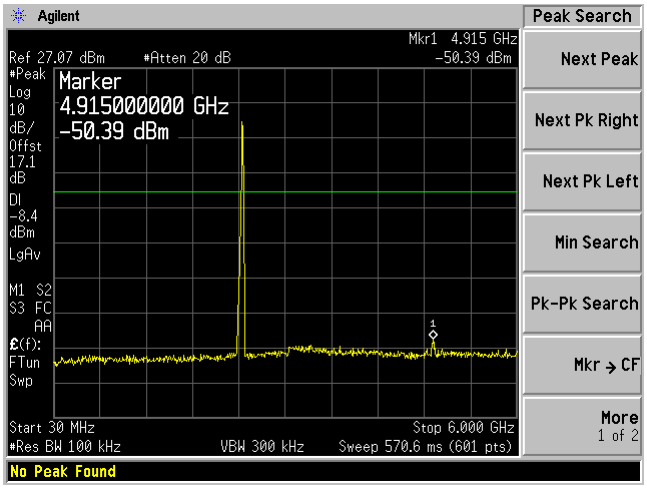


Chain J1, Plot: 6 GHz – 26 GHz

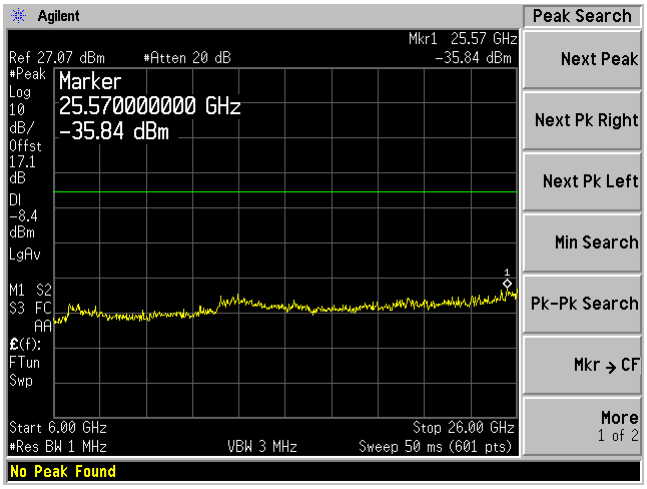


802.11g, High Channel 2462 MHz

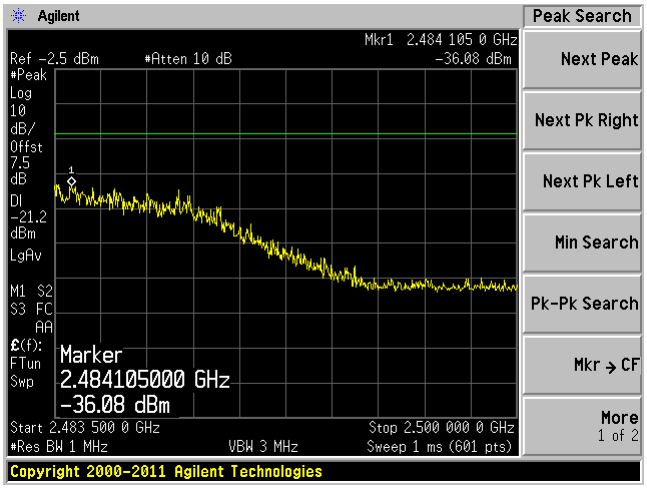
Chain J0, Plot: 30 MHz – 6 GHz



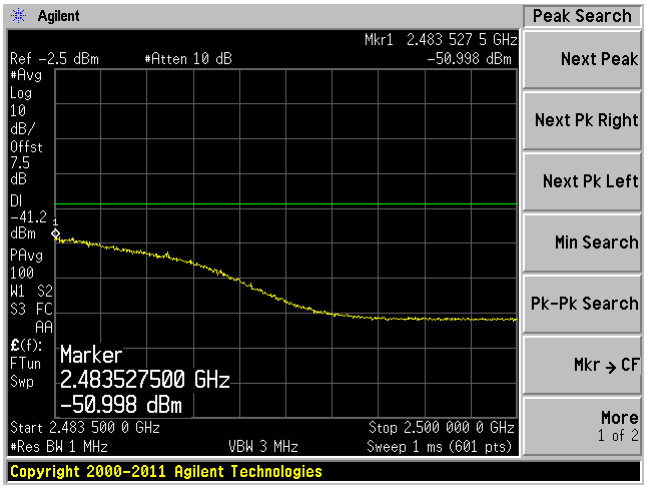
Chain J0, Plot: 6 GHz – 26 GHz



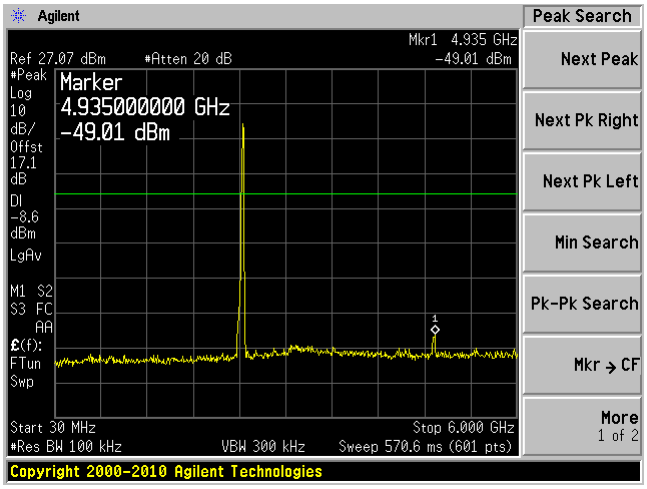
Chain J0, Plot: 2483.5 MHz – 2500 MHz Peak



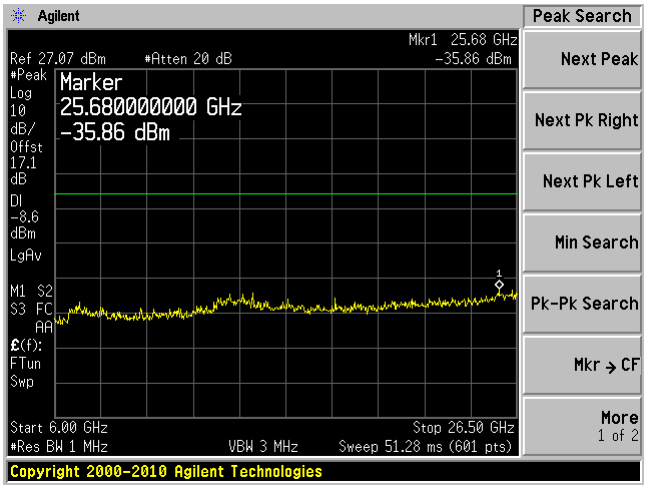
Chain J0, Plot: 2483.5 MHz – 2500 MHz Ave



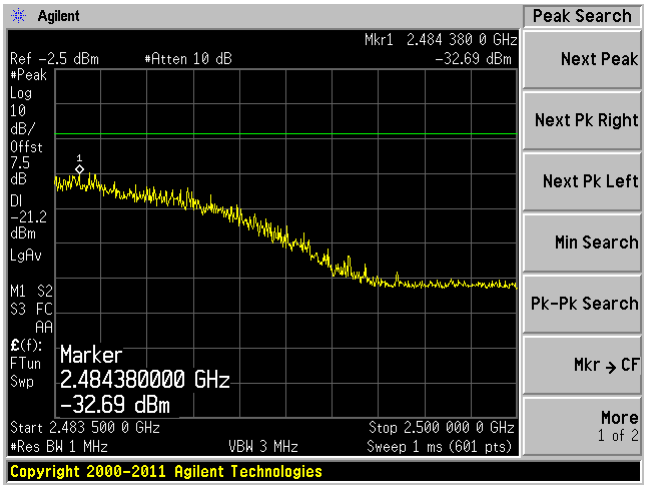
Chain J1, Plot: 30 MHz – 6 GHz



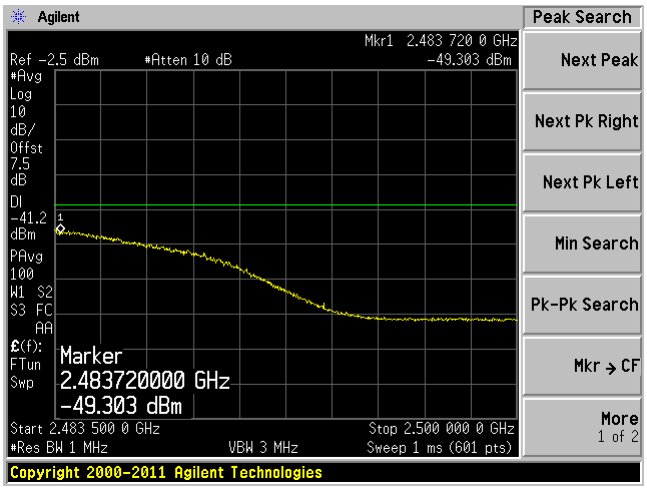
Chain J1, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 2483.5 MHz – 2500 MHz Peak

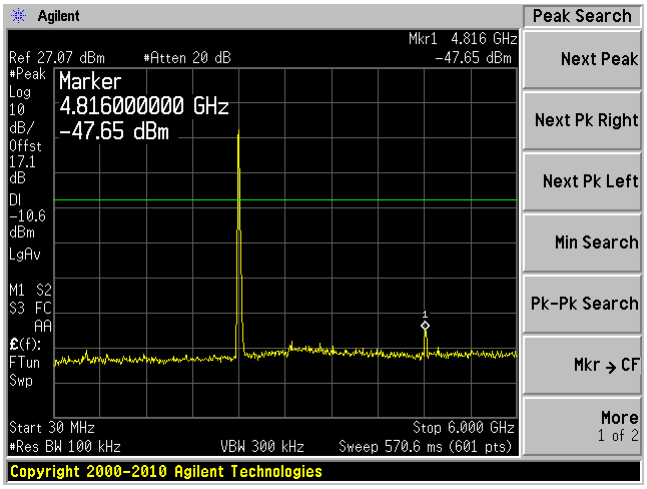


Chain J1, Plot: 2483.5 MHz – 2500 MHz Ave

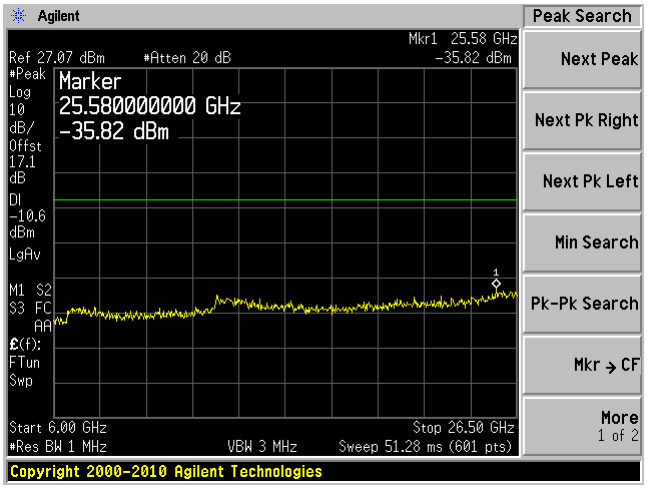


802.11n-HT20, Low Channel 2412 MHz

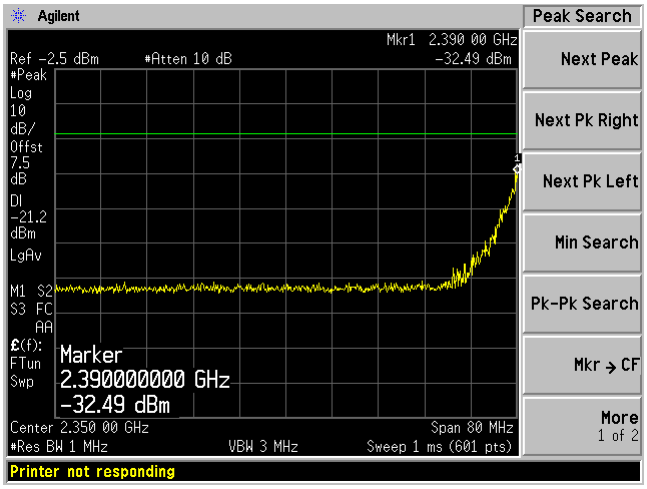
Chain J0, Plot: 30 MHz – 6 GHz



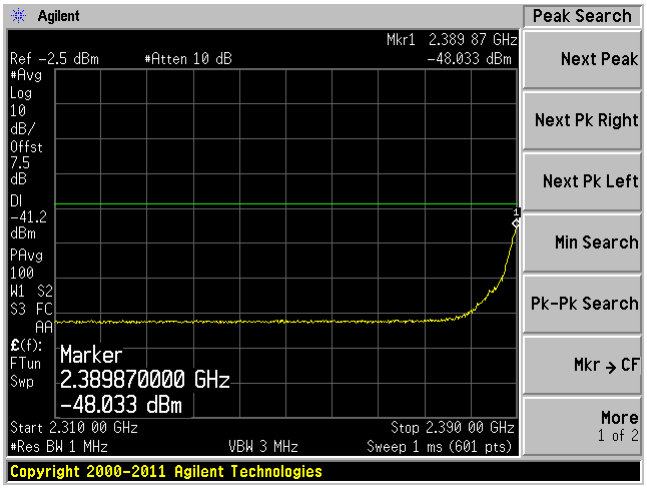
Chain J0, Plot: 6 GHz – 26 GHz



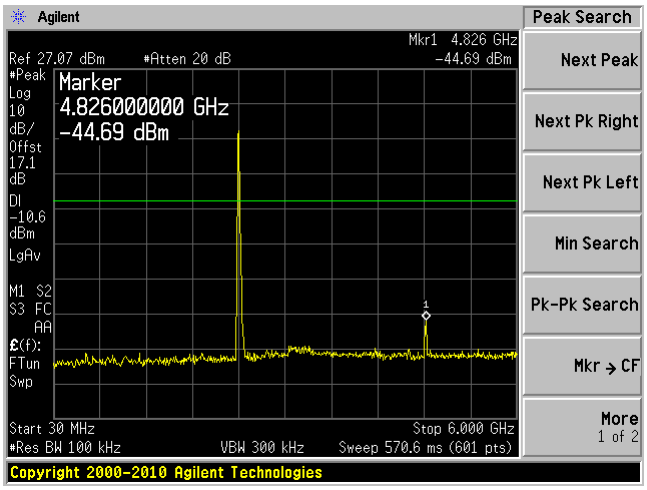
Chain J0, Plot: 2310 MHz – 2390 MHz Peak



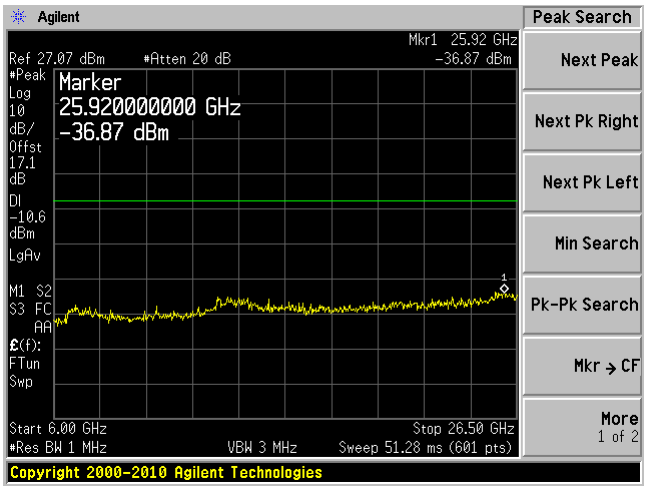
Chain J0, Plot: 2310 MHz – 2390 MHz Ave



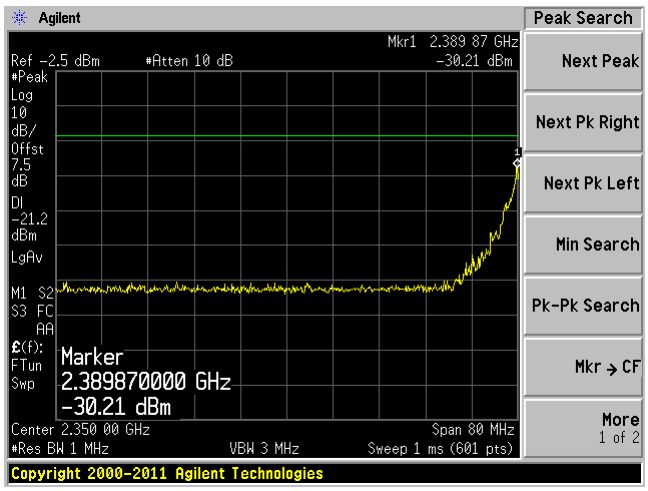
Chain J1, Plot: 30 MHz – 6 GHz



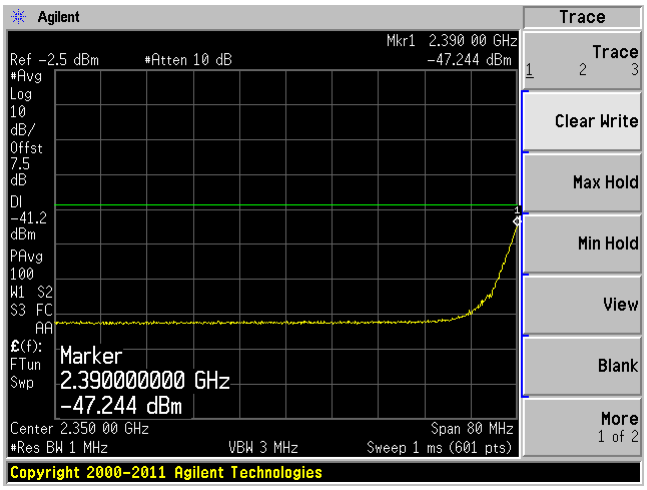
Chain J1, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 2310 MHz – 2390 MHz Peak

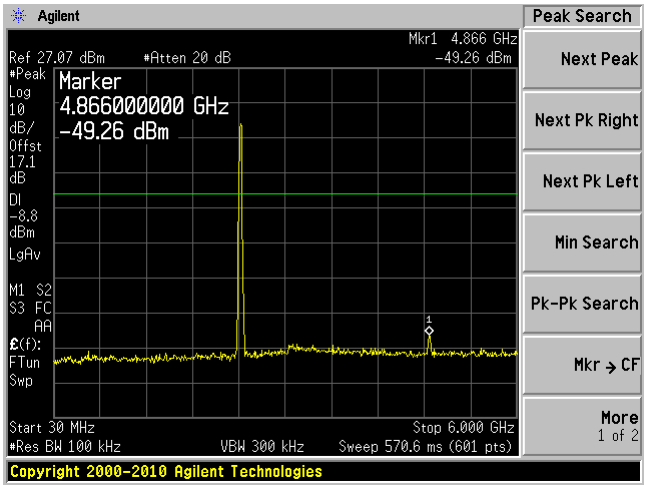


Chain J1, Plot: 2310 MHz – 2390 MHz Ave

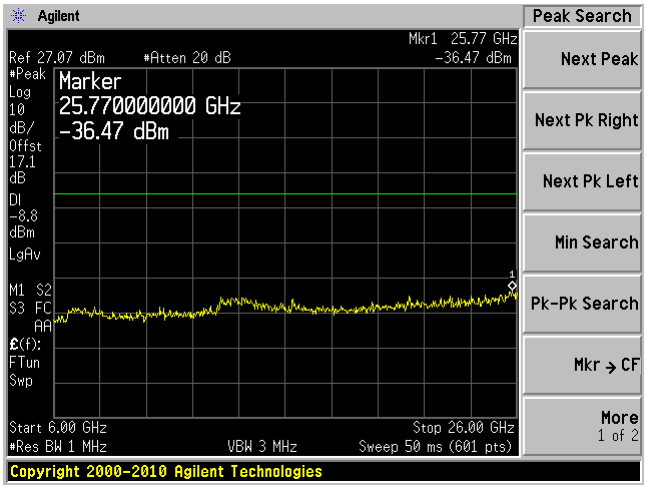


802.11n-HT20, Middle Channel 2437 MHz

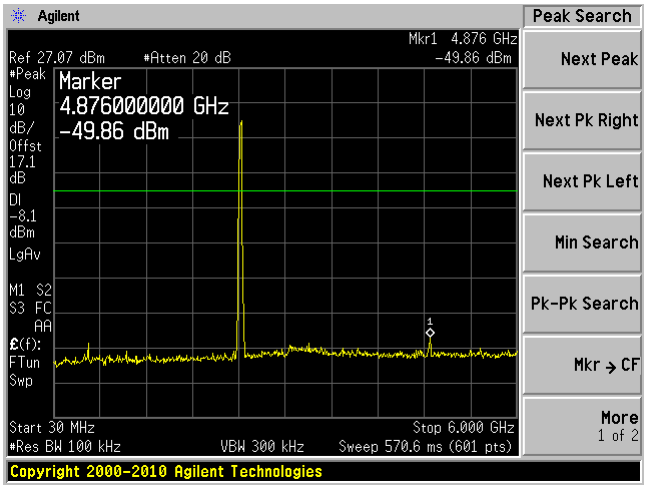
Chain J0, Plot: 30 MHz – 6 GHz



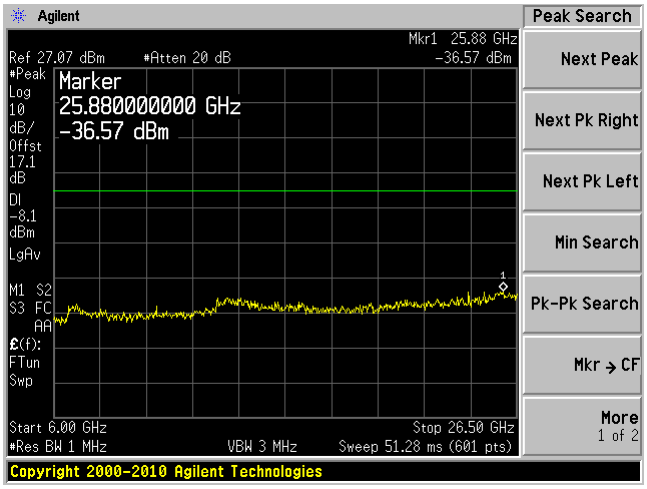
Chain J0, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 30 MHz –6 GHz

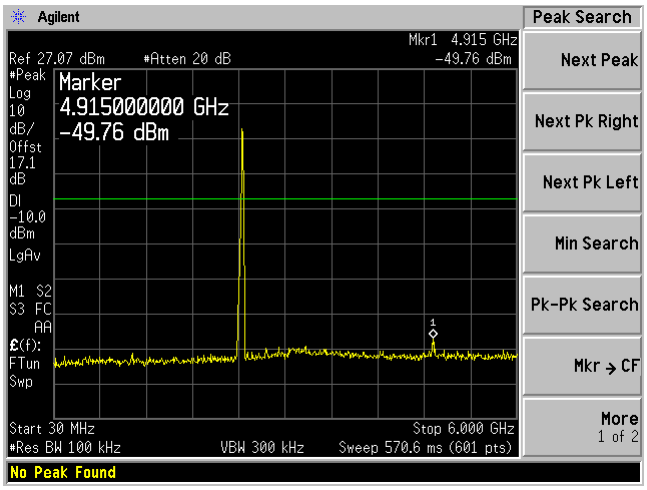


Chain J1, Plot: 6 GHz – 26 GHz

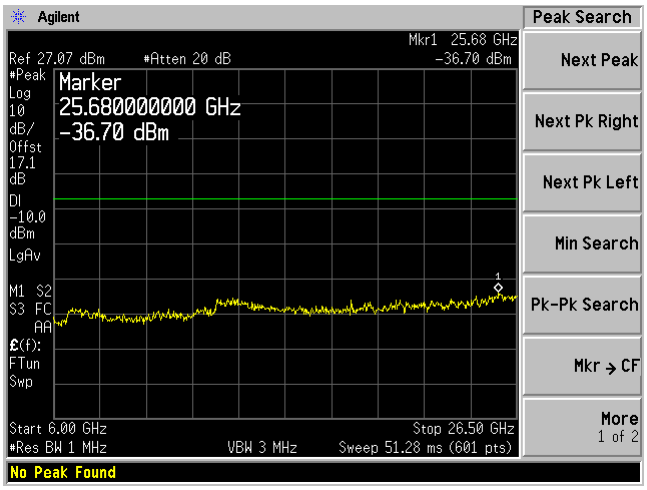


802.11n-HT20, High Channel 2462 MHz

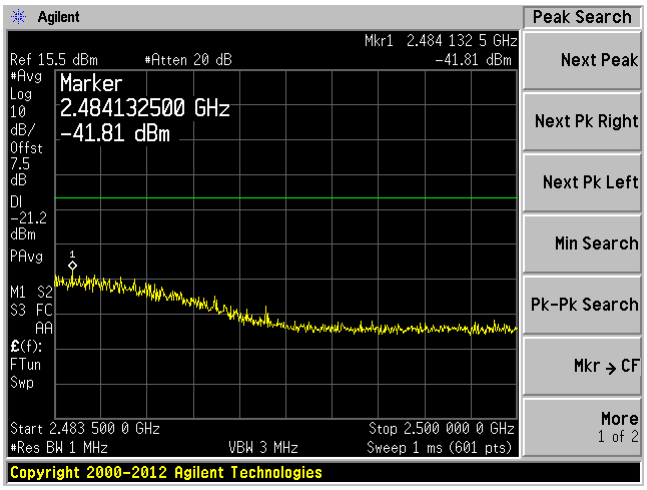
Chain J0, Plot: 30 MHz –6 GHz



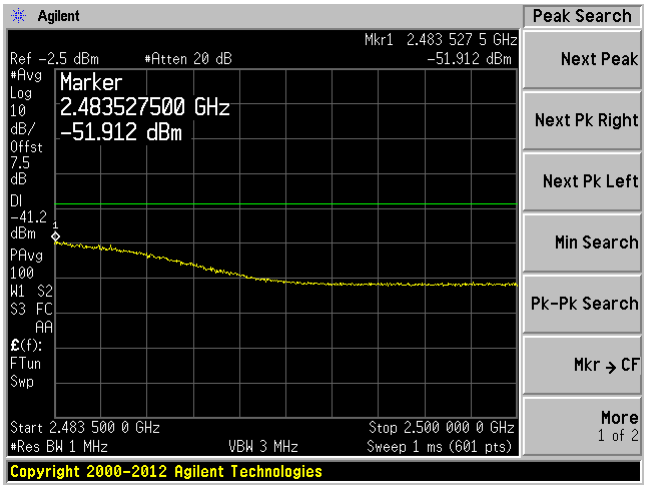
Chain J0, Plot: 6 GHz – 26 GHz



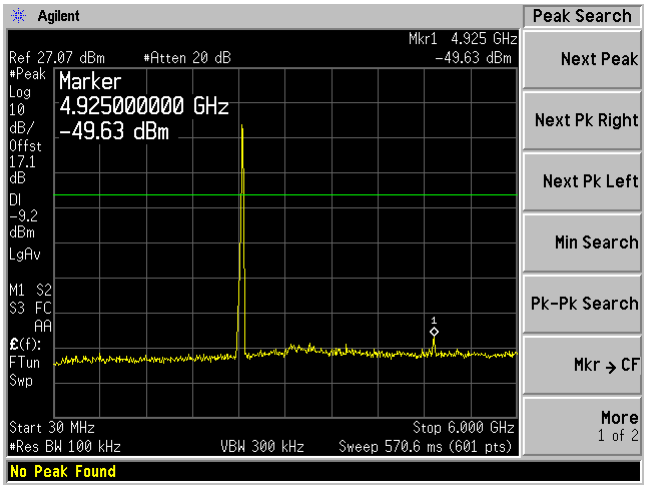
Chain J0, Plot: 2483.5 MHz – 2500 MHz Peak



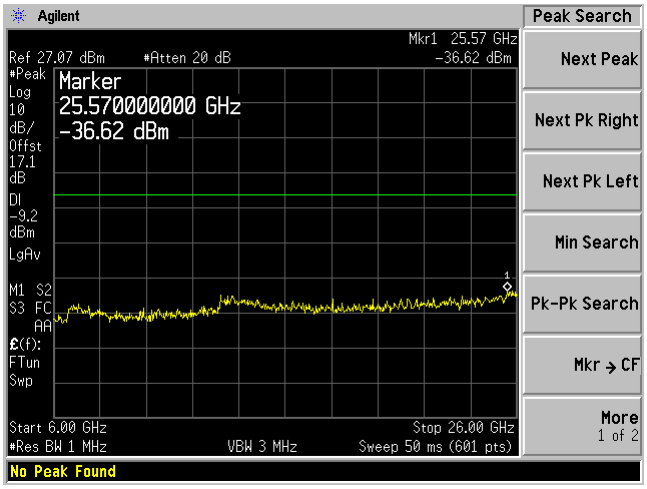
Chain J0, Plot: 2483.5 MHz – 2500 MHz Ave



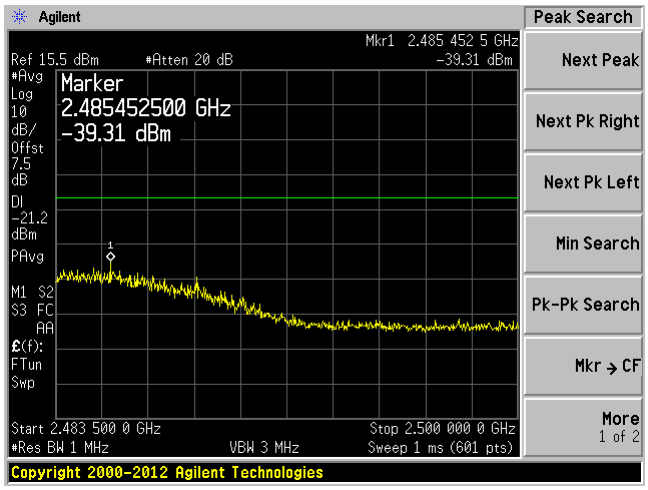
Chain J1, Plot: 30 MHz – 6 GHz



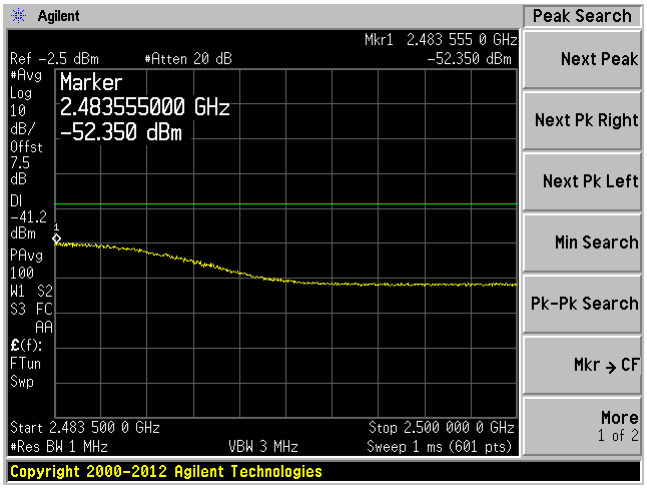
Chain J1, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 2483.5 MHz – 2500 MHz Peak

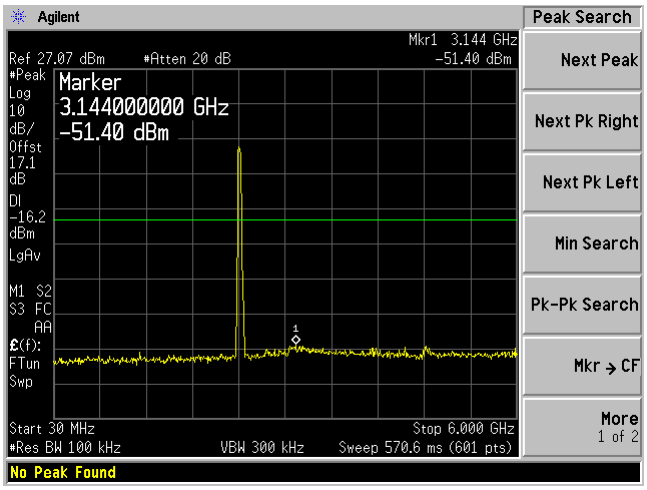


Chain J1, Plot: 2483.5 MHz – 2500 MHz Ave

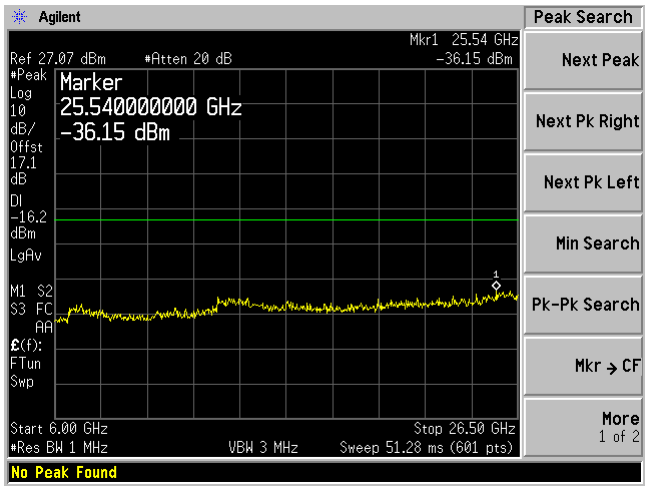


802.11n HT40, Low Channel 2422 MHz

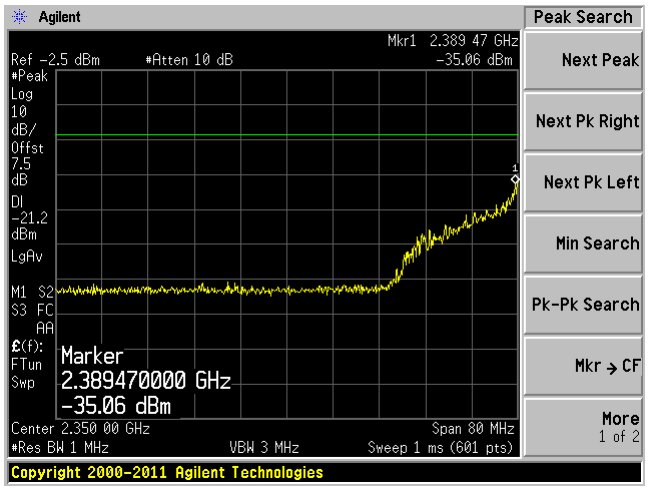
Chain J0, Plot: 30 MHz – 6 GHz



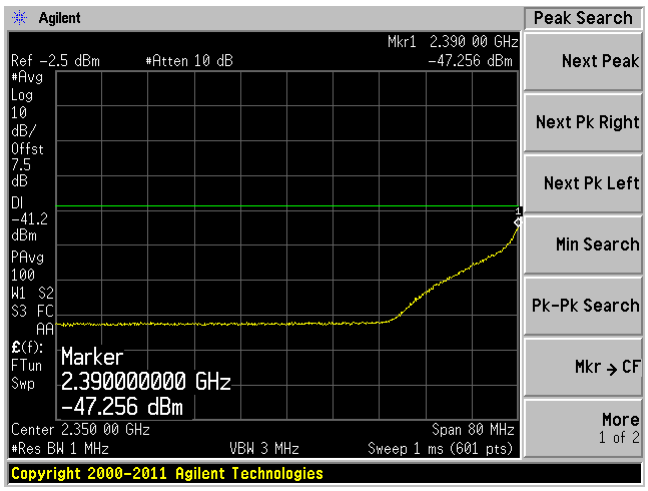
Chain J0, Plot: 6 GHz – 26 GHz



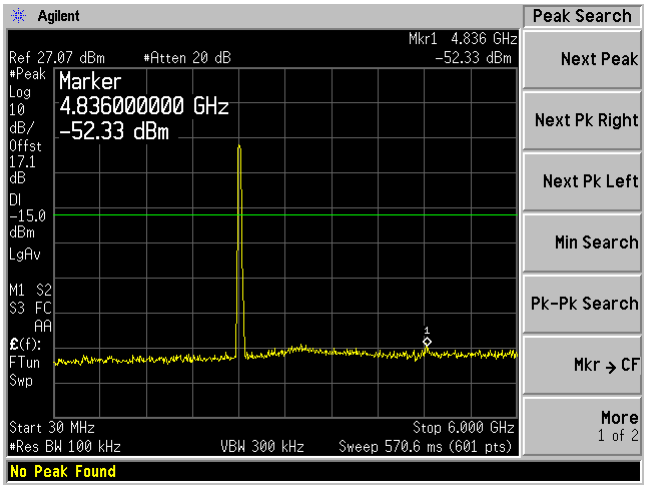
Chain J0, Plot: 2310 MHz – 2390 MHz Peak



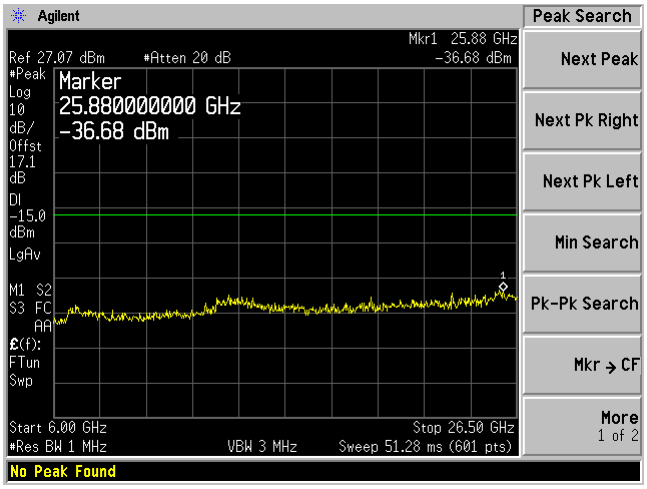
Chain J0, Plot: 2310 MHz – 2390 MHz Ave



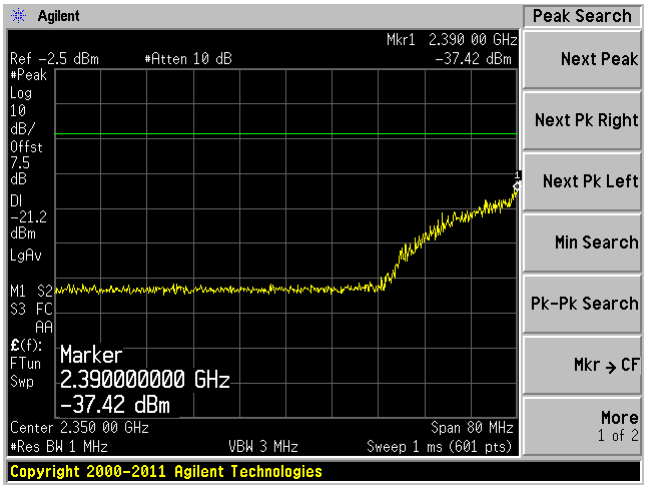
Chain J1, Plot: 30 MHz – 6 GHz



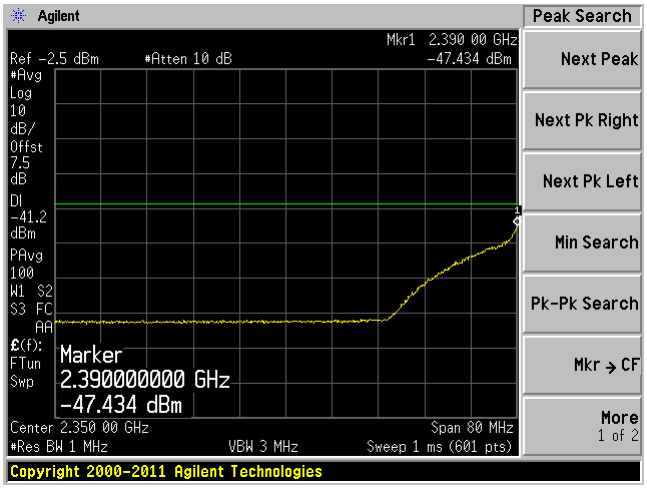
Chain J1, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 2310 MHz – 2390 MHz Peak

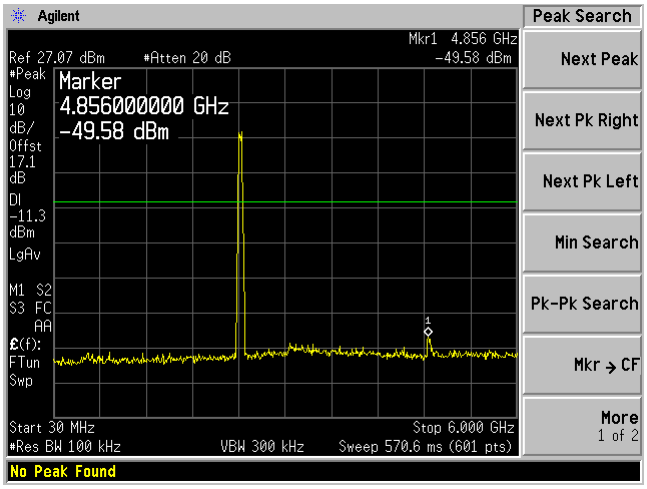


Chain J1, Plot: 2310 MHz – 2390 MHz Ave

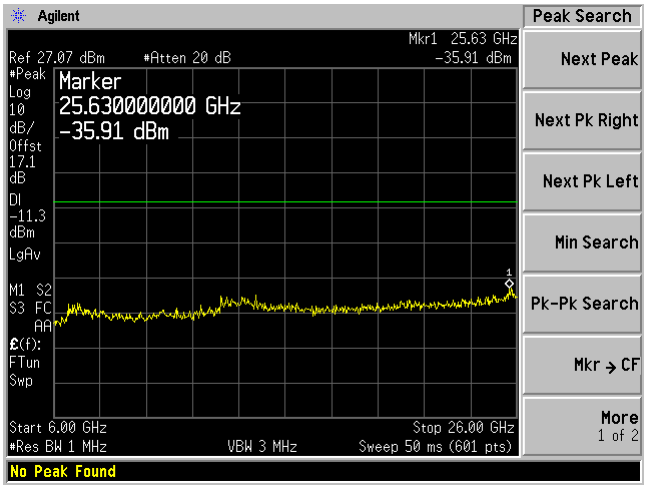


802.11n-HT40, Middle Channel 2437 MHz

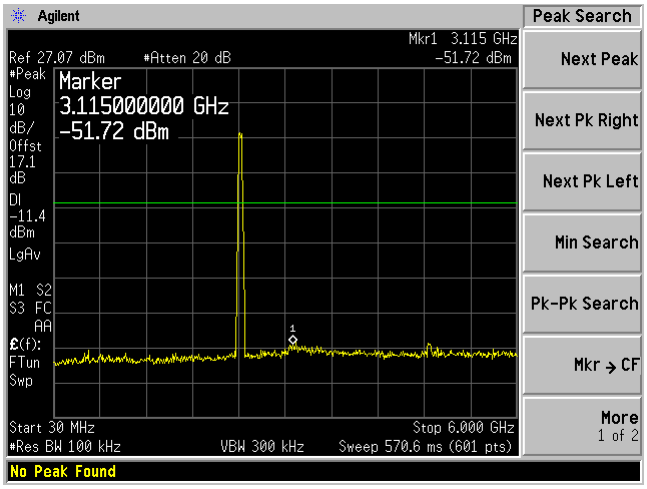
Chain J0, Plot: 30 MHz – 6 GHz



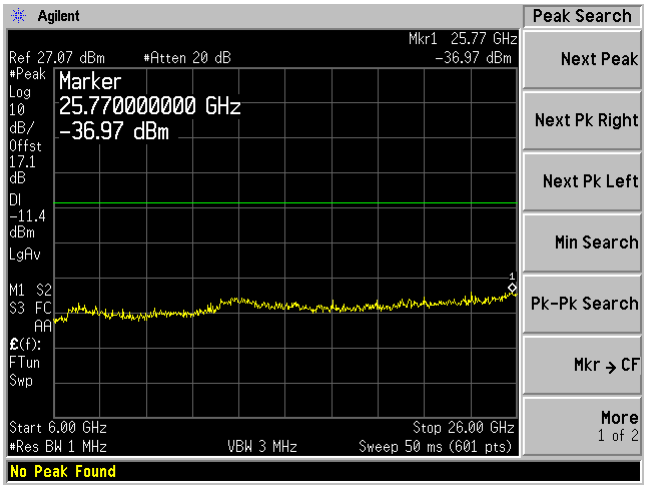
Chain J0, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 30 MHz – 6 GHz

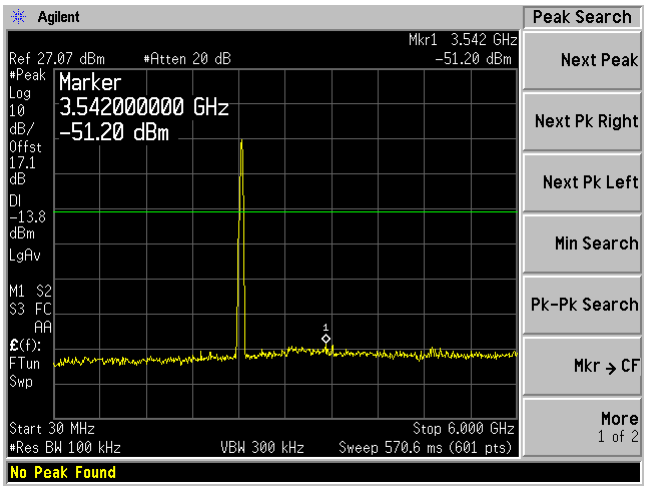


Chain J1, Plot: 6 GHz – 26 GHz

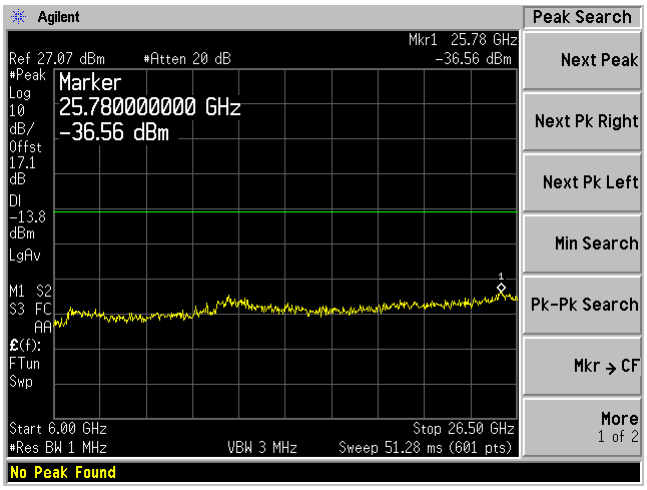


802.11n-HT40, High Channel 2452 MHz

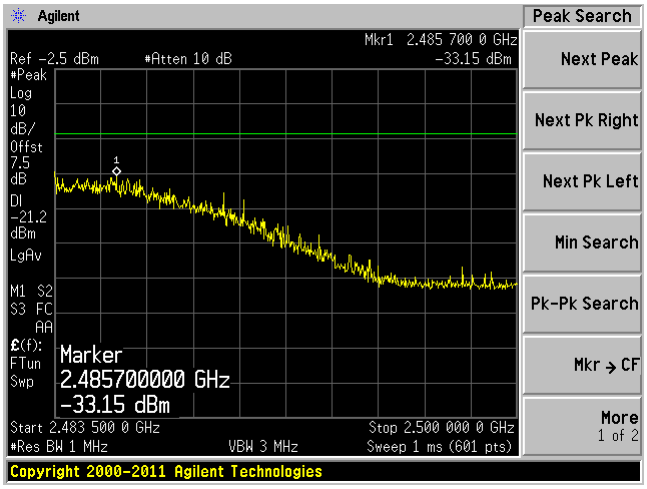
Chain J0, Plot: 30 MHz – 6 GHz



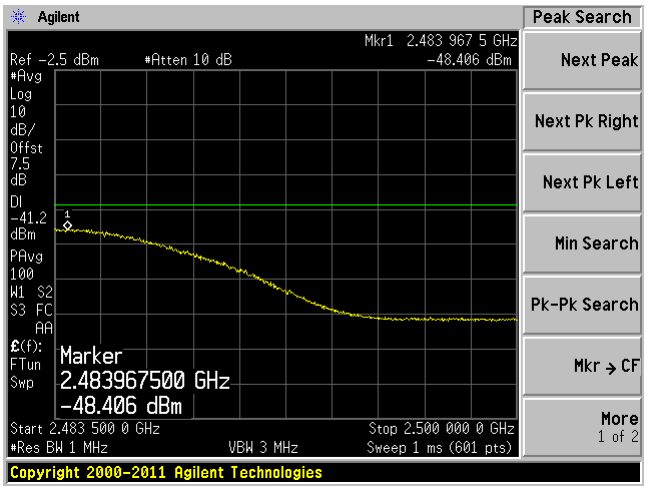
Chain J0, Plot: 6 GHz – 26 GHz



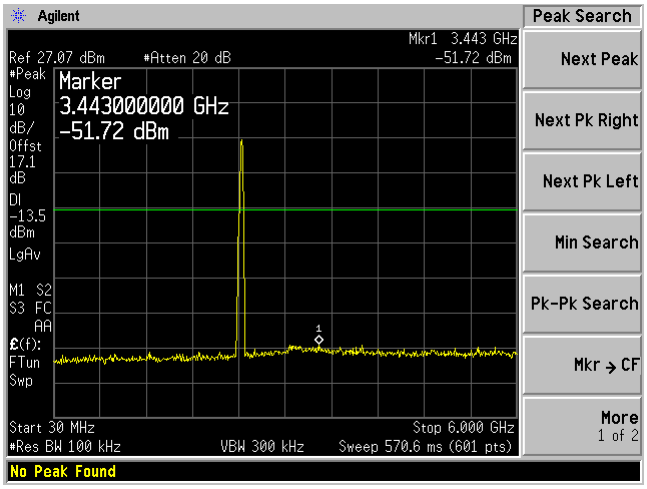
Chain J0, Plot: 2483.5 MHz – 2500 MHz Peak



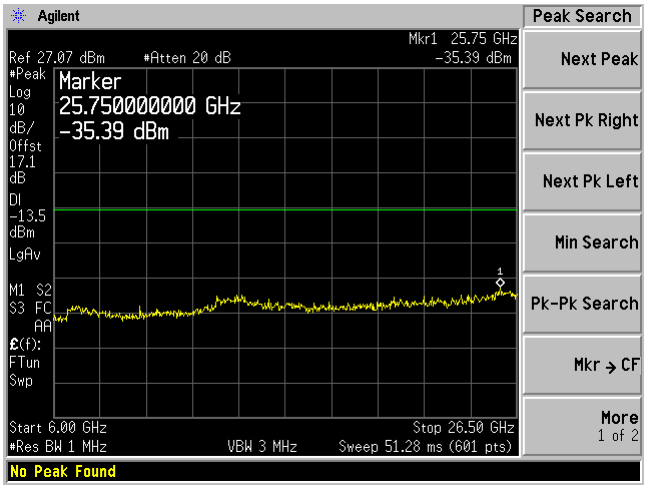
Chain J0, Plot: 2483.5 MHz – 2500 MHz Ave



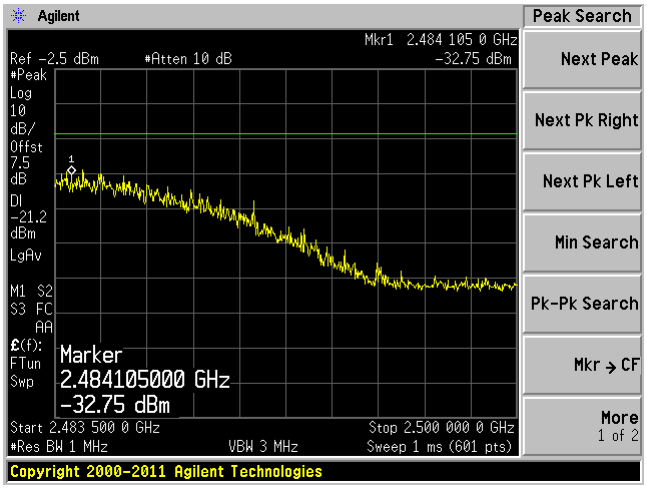
Chain J1, Plot: 30 MHz – 6 GHz



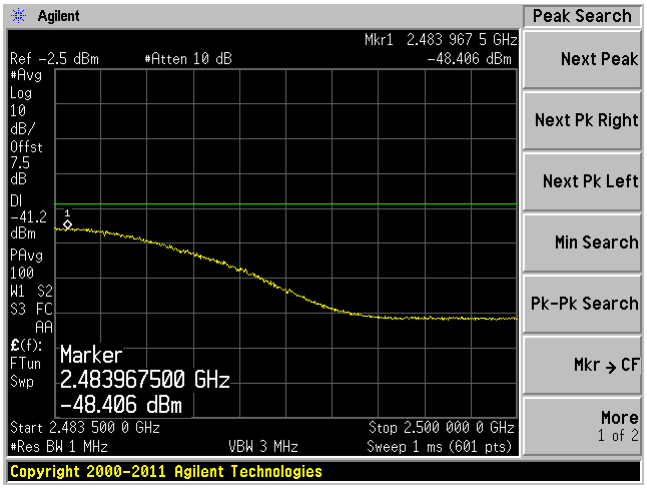
Chain J1, Plot: 6 GHz – 26 GHz



Chain J1, Plot: 2483.5 MHz – 2500 MHz Peak



Chain J1, Plot: 2483.5 MHz – 2500 MHz Ave



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).

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

8.3 Test Procedure

The measurements are base on FCC KDB 558074 D01 DTS Meas Guidance v03r02: 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
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2013-07-18	1 year
Agilent	Spectrum Analyzer	E4446A	MY48250238	2013-08-29	1 year
EMCO	Horn Antenna	3315	9511-4627	2013-10-17	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-09-28	1 year

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

8.6 Test Environmental Conditions

Temperature:	22º C
Relative Humidity:	52 %
ATM Pressure:	101.9 kPa

The testing was performed by Rui Zhou on 2014-07-17 in 5 m chamber 3.

8.7 Summary of Test Results

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

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-1.54	199.987	Vertical	802.11 b mode Low Channel

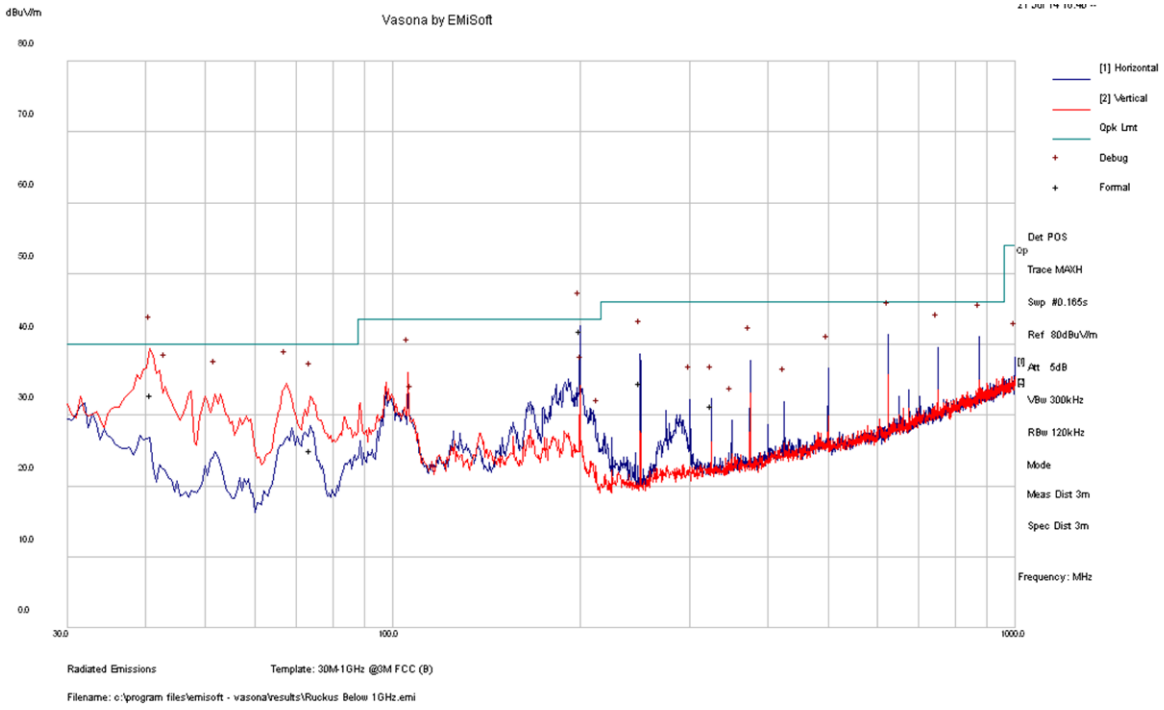
1–26 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-6.533	4874	Vertical	802.11 b mode Middle Channel

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

8.8 Radiated Emissions Test Results

1) 30 MHz – 1 GHz, Measured at 3 meters, EUT antenna port was terminated



2.4 GHz Band, Quasi-Peak Measurements @ 3m, worst case

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
199.987	41.96	100	V	305	43.5	-1.54
40.85	32.92	127	V	162	40	-7.08
249.955	34.54	100	V	0	46	-11.46
324.991	31.36	100	V	246	46	-14.64
73.74575	25.02	187	V	34	40	-14.98

2) 1–26 GHz, Measured at 3 meters, EUT antenna port was terminated

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											
4824	50.44	91	145	V	33.097	3.78	34.29	53.027	74	-20.973	Peak
4824	48.63	44	100	H	33.097	3.78	34.29	51.217	74	-22.783	Peak
4824	43.65	91	145	V	33.097	3.78	34.29	46.237	54	-7.763	Ave
4824	40.79	44	100	H	33.097	3.78	34.29	43.377	54	-10.623	Ave
7236	42.22	0	100	V	35.928	4.63	34.39	48.388	104.81	-56.42	Peak
7236	44.3	0	100	H	35.928	4.63	34.39	50.468	104.81	-54.34	Peak
7236	28.91	0	100	V	35.928	4.63	34.39	35.078	94.81	-59.73	Ave
7236	30.133	0	100	H	35.928	4.63	34.39	36.301	94.81	-58.51	Ave
9648	65.1	35	132	V	37.954	5.26	34.9	73.414	104.81	-31.40	Peak
9648	59.3	111	131	H	37.954	5.26	34.9	67.614	104.81	-37.20	Peak
9648	62.69	35	132	V	37.954	5.26	34.9	71.004	94.81	-23.81	Ave
9648	56.9	111	131	H	37.954	5.26	34.9	65.214	94.81	-29.60	Ave
Middle Channel 2437 MHz, measured at 3 meters											
4874	49.38	330	100	V	33.327	3.78	34.29	52.197	74	-21.803	Peak
4874	47.8	327	124	H	33.327	3.78	34.29	50.617	74	-23.383	Peak
4874	44.65	330	100	V	33.327	3.78	34.29	47.467	54	-6.533	Ave
4874	36.6	327	124	H	33.327	3.78	34.29	39.417	54	-14.583	Ave
7311	46.14	0	100	V	36.369	4.63	34.42	52.719	74	-21.281	Peak
7311	46.08	0	100	H	36.369	4.63	34.42	52.659	74	-21.341	Peak
7311	32.56	0	100	V	36.369	4.63	34.42	39.139	54	-14.861	Ave
7311	32.58	0	100	H	36.369	4.63	34.42	39.159	54	-14.841	Ave
9748	62.4	2	100	V	38.087	5.26	34.85	70.897	104.18	-33.28	Peak
9748	58.75	109	126	H	38.087	5.26	34.85	67.247	104.18	-36.93	Peak
9748	58.08	2	100	V	38.087	5.26	34.85	66.577	94.18	-27.60	Ave
9748	55.87	109	126	H	38.087	5.26	34.85	64.367	94.18	-29.81	Ave
High Channel 2462 MHz, measured at 3 meters											
4924	47.33	358	100	V	33.327	3.79	34.42	50.027	74	-23.973	Peak
4924	45.62	0	100	H	33.327	3.79	34.42	48.317	74	-25.683	Peak
4924	38.09	358	100	V	33.327	3.79	34.42	40.787	54	-13.213	Ave
4924	32.84	0	100	H	33.327	3.79	34.42	35.537	54	-18.463	Ave
7386	45.76	0	100	V	36.565	4.75	34.44	52.635	74	-21.365	Peak
7386	46.19	0	100	H	36.565	4.75	34.44	53.065	74	-20.935	Peak
7386	32.2	0	100	V	36.565	4.75	34.44	39.075	54	-14.925	Ave
7386	32.19	0	100	H	36.565	4.75	34.44	39.065	54	-14.935	Ave
9848	58.42	34	126	V	38.287	5.35	34.84	67.217	103.04	-35.823	Peak
9848	53.5	111	100	H	38.287	5.35	34.84	62.297	103.04	-40.743	Peak
9848	56.1	34	126	V	38.287	5.35	34.84	64.897	93.04	-28.143	Ave
9848	49.69	111	100	H	38.287	5.35	34.84	58.487	93.04	-34.553	Ave

802.11g mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
4824	46.75	0	100	V	33.097	3.78	34.29	49.337	74	-24.663	Peak
4824	46.59	0	100	H	33.097	3.78	34.29	49.177	74	-24.823	Peak
4824	32.91	0	100	V	33.097	3.78	34.29	35.497	54	-18.503	Ave
4824	33.88	0	100	H	33.097	3.78	34.29	36.467	54	-17.533	Ave
7236	46.44	0	100	V	35.928	4.63	34.39	52.608	102.91	-50.302	Peak
7236	46.51	0	100	H	35.928	4.63	34.39	52.678	102.91	-50.232	Peak
7236	32.76	0	100	V	35.928	4.63	34.39	38.928	92.91	-53.982	Ave
7236	32.7	0	100	H	35.928	4.63	34.39	38.868	92.91	-54.042	Ave
9648	62.08	33	140	V	37.954	5.26	34.9	70.394	102.91	-32.516	Peak
9648	51.91	140	140	H	37.954	5.26	34.9	60.224	102.91	-42.686	Peak
9648	48.25	33	140	V	37.954	5.26	34.9	56.564	92.91	-36.346	Ave
9648	38.84	140	140	H	37.954	5.26	34.9	47.154	92.91	-45.756	Ave
Middle Channel 2437 MHz, measured at 3 meters											
4874	46.02	0	100	V	33.327	3.78	34.29	48.837	74	-25.163	Peak
4874	45.29	0	100	H	33.327	3.78	34.29	48.107	74	-25.893	Peak
4874	32.6	0	100	V	33.327	3.78	34.29	35.417	54	-18.583	Ave
4874	32.23	0	100	H	33.327	3.78	34.29	35.047	54	-18.953	Ave
7311	45.12	0	100	V	36.369	4.63	34.42	51.699	74	-22.301	Peak
7311	45.02	0	100	H	36.369	4.63	34.42	51.599	74	-22.401	Peak
7311	32.4	0	100	V	36.369	4.63	34.42	38.979	54	-15.021	Ave
7311	32.4	0	100	H	36.369	4.63	34.42	38.979	54	-15.021	Ave
9748	61.1	0	100	V	38.087	5.26	34.85	69.597	105.12	-35.523	Peak
9748	56.87	105	144	H	38.087	5.26	34.85	65.367	105.12	-39.753	Peak
9748	46.88	0	100	V	38.087	5.26	34.85	55.377	95.12	-39.743	Ave
9748	43.36	105	144	H	38.087	5.26	34.85	51.857	95.12	-43.263	Ave
High Channel 2462 MHz, measured at 3 meters											
4924	45.92	0	100	V	33.327	3.79	34.42	48.617	74	-25.383	Peak
4924	45.64	0	100	H	33.327	3.79	34.42	48.337	74	-25.663	Peak
4924	33.02	0	100	V	33.327	3.79	34.42	35.717	54	-18.283	Ave
4924	32.78	0	100	H	33.327	3.79	34.42	35.477	54	-18.523	Ave
7386	46.13	0	100	V	36.565	4.75	34.44	53.005	74	-20.995	Peak
7386	32.03	0	100	H	36.565	4.75	34.44	38.905	74	-35.095	Peak
7386	45.28	0	100	H	36.565	4.75	34.44	52.155	74	-21.845	Peak
7386	32.03	0	100	V	36.565	4.75	34.44	38.905	54	-15.095	Ave
9848	53.97	0	100	V	38.287	5.35	34.84	62.767	104.03	-41.263	Peak
9848	49.71	0	100	H	38.287	5.35	34.84	58.507	104.03	-45.523	Peak
9848	39.57	0	100	V	38.287	5.35	34.84	48.367	94.03	-45.663	Ave
9848	33.22	0	100	H	38.287	5.35	34.84	42.017	94.03	-52.013	Ave

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											
4824	47.71	0	100	V	33.097	3.78	34.29	50.297	74	-23.703	Peak
4824	46.93	0	100	H	33.097	3.78	34.29	49.517	74	-24.483	Peak
4824	32.52	0	100	V	33.097	3.78	34.29	35.107	54	-18.893	Ave
4824	33.25	0	100	H	33.097	3.78	34.29	35.837	54	-18.163	Ave
7236	45.64	0	100	V	35.928	4.63	34.39	51.808	102.02	-50.212	Peak
7236	46.92	0	100	H	35.928	4.63	34.39	53.088	102.02	-48.932	Peak
7236	32.62	0	100	V	35.928	4.63	34.39	38.788	92.02	-53.232	Ave
7236	32.91	0	100	H	35.928	4.63	34.39	39.078	92.02	-52.942	Ave
9648	57.01	0	100	V	37.954	5.26	34.9	65.324	102.02	-36.696	Peak
9648	53.88	102	125	H	37.954	5.26	34.9	62.194	102.02	-39.826	Peak
9648	39.83	0	100	V	37.954	5.26	34.9	48.144	92.02	-43.876	Ave
9648	37.11	102	125	H	37.954	5.26	34.9	45.424	92.02	-46.596	Ave
Middle Channel 2437 MHz, measured at 3 meters											
4874	47.75	0	100	V	33.327	3.78	34.29	50.567	74	-23.433	Peak
4874	46.68	0	100	H	33.327	3.78	34.29	49.497	74	-24.503	Peak
4874	32.39	0	100	V	33.327	3.78	34.29	35.207	54	-18.793	Ave
4874	32.41	0	100	H	33.327	3.78	34.29	35.227	54	-18.773	Ave
7311	46.84	0	100	V	36.369	4.63	34.42	53.419	74	-20.581	Peak
7311	46.43	0	100	H	36.369	4.63	34.42	53.009	74	-20.991	Peak
7311	32.13	0	100	V	36.369	4.63	34.42	38.709	54	-15.291	Ave
7311	32.01	0	100	H	36.369	4.63	34.42	38.589	54	-15.411	Ave
9748	61.63	32	131	V	38.087	5.26	34.85	70.127	105.51	-35.383	Peak
9748	53.33	0	100	H	38.087	5.26	34.85	61.827	105.51	-43.683	Peak
9748	44.02	32	131	V	38.087	5.26	34.85	52.517	95.51	-42.993	Ave
9748	37.44	0	100	H	38.087	5.26	34.85	45.937	95.51	-49.573	Ave
High Channel 2462 MHz, measured at 3 meters											
4924	46.29	0	100	V	33.327	3.79	34.42	48.987	74	-25.013	Peak
4924	45.78	0	100	H	33.327	3.79	34.42	48.477	74	-25.523	Peak
4924	34.45	0	100	V	33.327	3.79	34.42	37.147	54	-16.853	Ave
4924	33.91	0	100	H	33.327	3.79	34.42	36.607	54	-17.393	Ave
7386	45.87	0	100	V	36.565	4.75	34.44	52.745	74	-21.255	Peak
7386	45.69	0	100	H	36.565	4.75	34.44	52.565	74	-21.435	Peak
7386	34.07	0	100	V	36.565	4.75	34.44	40.945	54	-13.055	Ave
7386	33.81	0	100	H	36.565	4.75	34.44	40.685	54	-13.315	Ave
9848	58.3	355	105	V	38.287	5.35	34.84	67.097	103.55	-36.453	Peak
9848	54.61	2	100	H	38.287	5.35	34.84	63.407	103.55	-40.143	Peak
9848	42.65	355	105	V	38.287	5.35	34.84	51.447	93.55	-42.103	Ave
9848	39.25	2	100	H	38.287	5.35	34.84	48.047	93.55	-45.503	Ave

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											
4844	45.9	0	100	V	33.097	3.78	34.33	48.447	74	-25.553	Peak
4844	44.9	0	100	H	33.097	3.78	34.33	47.447	74	-26.553	Peak
4844	33.01	0	100	V	33.097	3.78	34.33	35.557	54	-18.443	Ave
4844	32.65	0	100	H	33.097	3.78	34.33	35.197	54	-18.803	Ave
7266	44.51	0	100	V	35.928	4.63	34.39	50.678	74	-23.322	Peak
7266	45.13	0	100	H	35.928	4.63	34.39	51.298	74	-22.702	Peak
7266	32.91	0	100	V	35.928	4.63	34.39	39.078	54	-14.922	Ave
7266	32.68	0	100	H	35.928	4.63	34.39	38.848	54	-15.152	Ave
9688	52.24	2	100	V	37.954	5.26	34.87	60.584	100.84	-40.256	Peak
9688	46.36	0	100	H	37.954	5.26	34.87	54.704	100.84	-46.136	Peak
9688	36.6	2	100	V	37.954	5.26	34.87	44.944	90.84	-45.896	Ave
9688	33.13	0	100	H	37.954	5.26	34.87	41.474	90.84	-49.366	Ave
Middle Channel 2437 MHz, measured at 3 meters											
4874	45.5	0	100	V	33.327	3.78	34.33	48.277	74	-25.723	Peak
4874	44.26	0	100	H	33.327	3.78	34.33	47.037	74	-26.963	Peak
4874	32.5	0	100	V	33.327	3.78	34.33	35.277	54	-18.723	Ave
4874	31.9	0	100	H	33.327	3.78	34.33	34.677	54	-19.323	Ave
7311	45.83	0	100	V	36.369	4.63	34.42	52.409	74	-21.591	Peak
7311	45.13	0	100	H	36.369	4.63	34.42	51.709	74	-22.291	Peak
7311	32.45	0	100	V	36.369	4.63	34.42	39.029	54	-14.971	Ave
7311	32.11	0	100	H	36.369	4.63	34.42	38.689	54	-15.311	Ave
9748	55.1	37	100	V	38.087	5.26	34.85	63.597	104.93	-41.333	Peak
9748	45.14	0	100	H	38.087	5.26	34.85	53.637	104.93	-51.293	Peak
9748	42.52	37	100	V	38.087	5.26	34.85	51.017	94.93	-43.913	Ave
9748	32.37	0	100	H	38.087	5.26	34.85	40.867	94.93	-54.063	Ave
Middle Channel 2452 MHz, measured at 3 meters											
4904	45.12	0	100	V	33.327	3.79	34.42	47.817	74	-26.183	Peak
4904	44.28	0	100	H	33.327	3.79	34.42	46.977	74	-27.023	Peak
4904	33.11	0	100	V	33.327	3.79	34.42	35.807	54	-18.193	Ave
4904	32.73	0	100	H	33.327	3.79	34.42	35.427	54	-18.573	Ave
7356	44.99	0	100	V	36.565	4.75	34.43	51.875	74	-22.125	Peak
7356	44.67	0	100	H	36.565	4.75	34.43	51.555	74	-22.445	Peak
7356	33.07	0	100	V	36.565	4.75	34.43	39.955	54	-14.045	Ave
7356	31.98	0	100	H	36.565	4.75	34.43	38.865	54	-15.135	Ave
9808	45.71	0	100	V	38.287	5.35	34.85	54.497	102.55	-48.053	Peak
9808	45.32	0	100	H	38.287	5.35	34.85	54.107	102.55	-48.443	Peak
9808	33.87	0	100	V	38.287	5.35	34.85	42.657	92.55	-49.893	Ave
9808	32.91	0	100	H	38.287	5.35	34.85	41.697	92.55	-50.853	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 v03r02: 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	Spectrum Analyzer	E4446A	US44300386	2013-09-29	1 year

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

9.4 Test Environmental Conditions

Temperature:	22-24° C
Relative Humidity:	42-45 %
ATM Pressure:	101-102 kPa

The testing was performed by Rui Zhou from 2014-07-18 and 2014-07-22 at RF site.

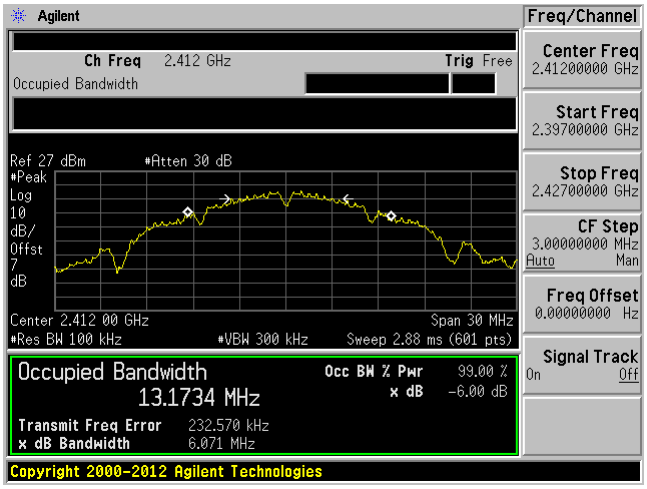
9.5 Test Results and Plots

Channel	Frequency (MHz)	99% Emission Bandwidth (MHz) J0	99% Emission Bandwidth (MHz) J1	6dB Emission Bandwidth (MHz) J0	6dB Emission Bandwidth (MHz) J1	Limit (MHz)	Results
802.11b mode							
Low	2412	13.1734	13.1466	6.071	6.559	> 0.5	Compliant
Middle	2437	13.2754	13.1148	6.128	6.126	> 0.5	Compliant
High	2462	14.596	13.8934	6.587	5.660	> 0.5	Compliant
802.11g mode							
Low	2412	16.7934	16.947	16.549	16.587	> 0.5	Compliant
Middle	2437	19.9109	19.554	16.608	16.634	> 0.5	Compliant
High	2462	21.0303	19.8464	16.498	16.508	> 0.5	Compliant
802.11n-HT20 mode							
Low	2412	17.8123	17.861	17.78	17.755	> 0.5	Compliant
Middle	2437	19.7365	19.1245	17.846	17.846	> 0.5	Compliant
High	2462	20.698	19.8416	17.776	17.74	> 0.5	Compliant
802.11n-HT40 mode							
Low	2422	36.1216	36.1464	36.522	36.526	> 0.5	Compliant
Middle	2437	36.3189	36.3531	36.402	36.572	> 0.5	Compliant
High	2452	36.1197	36.1587	36.099	36.4	> 0.5	Compliant

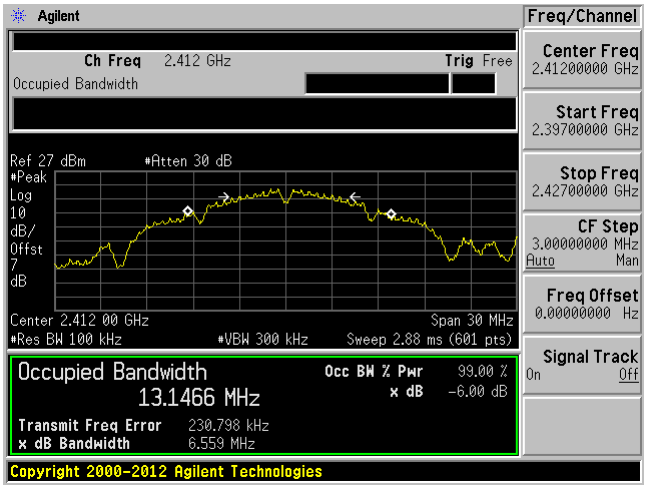
Please refer to the following plots for detailed test results

802.11 b mode

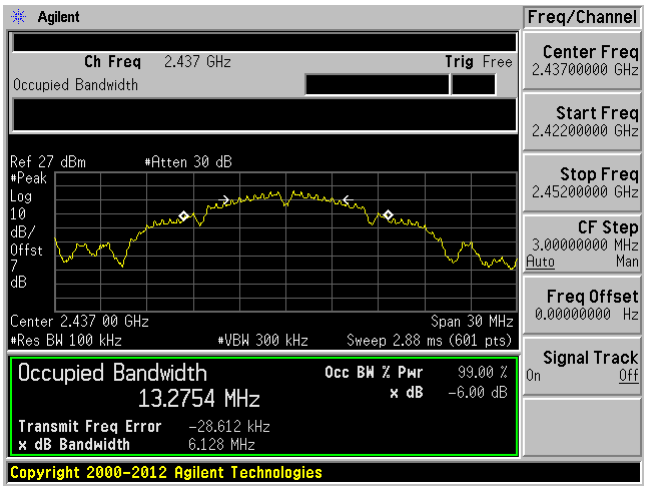
Low channel: 2412 MHz Chain J0



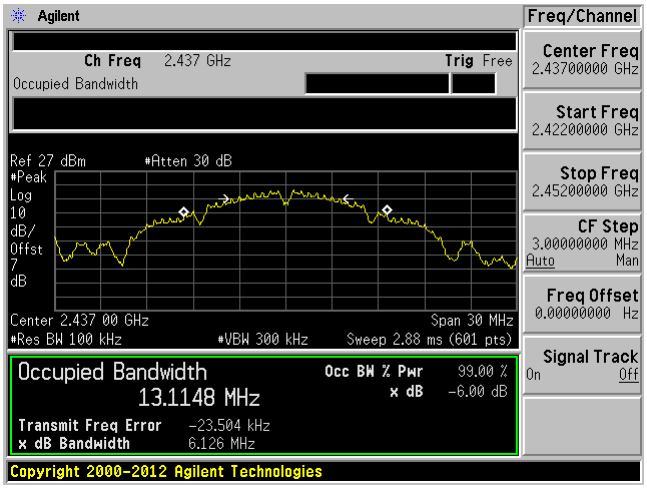
Low channel: 2412 MHz Chain J1



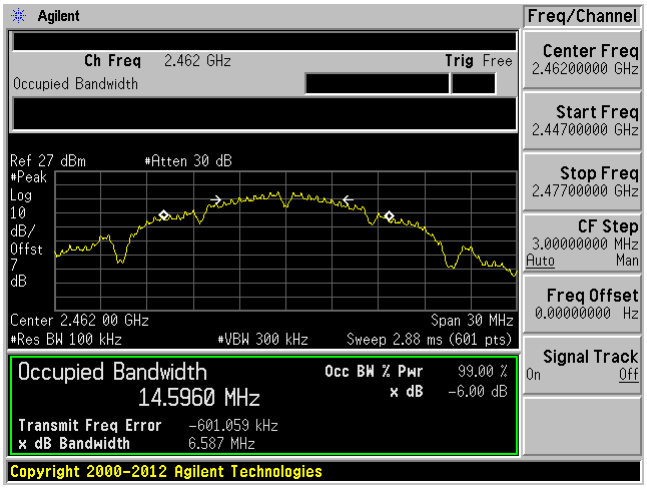
Middle channel: 2437 MHz Chain J0



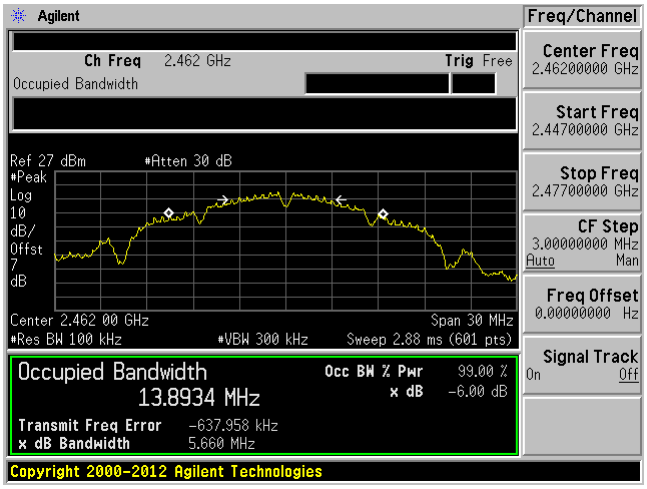
Middle channel: 2437 MHz Chain J1



High channel: 2462 MHz Chain J0

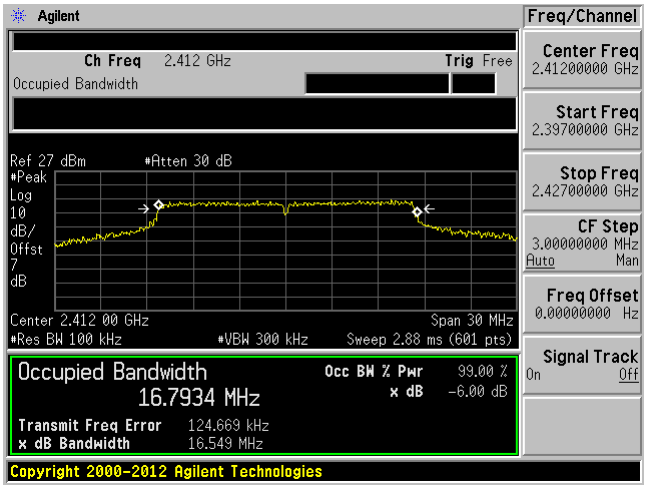


High channel: 2462 MHz Chain J1

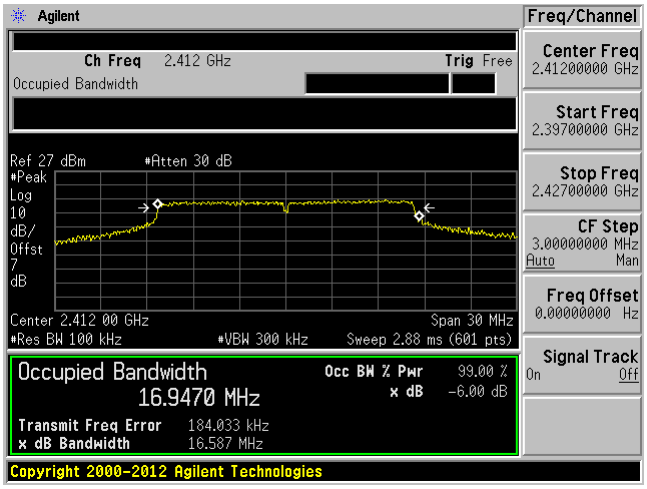


802.11 g mode

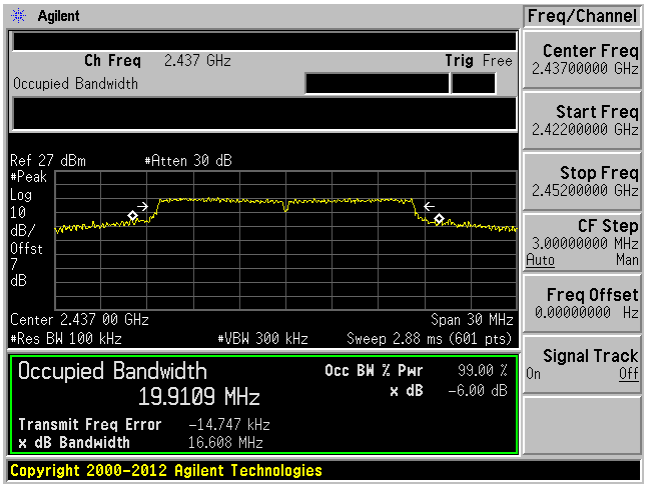
Low channel: 2412 MHz Chain J0



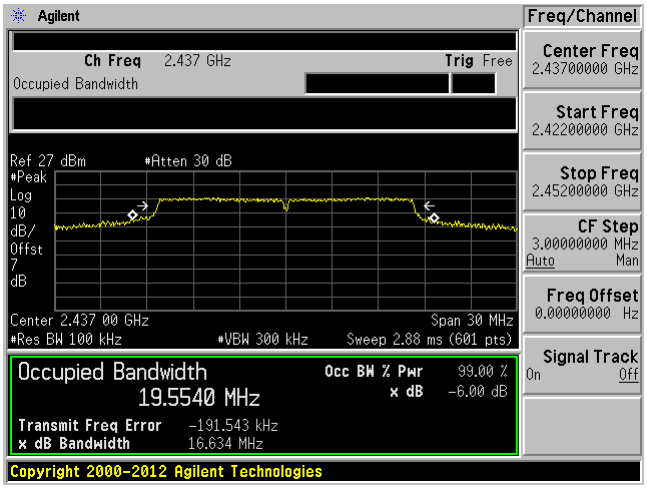
Low channel: 2412 MHz Chain J1



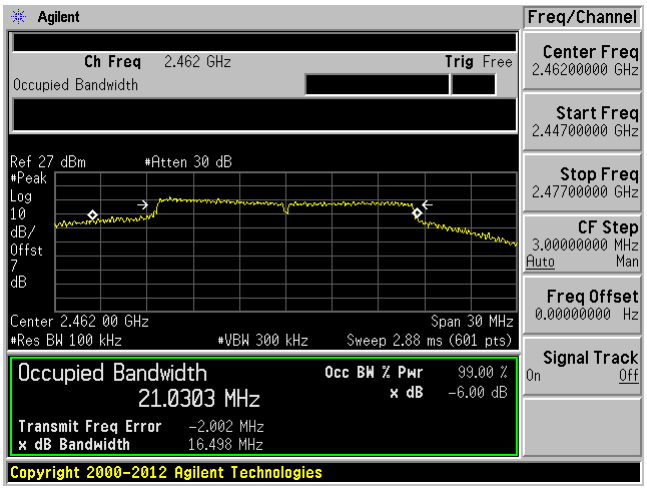
Middle channel: 2437 MHz Chain J0



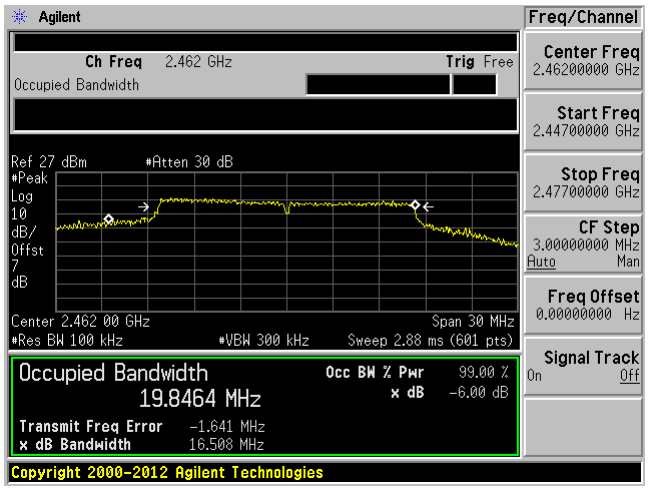
Middle channel: 2437 MHz Chain J1



High channel: 2462 MHz Chain J0

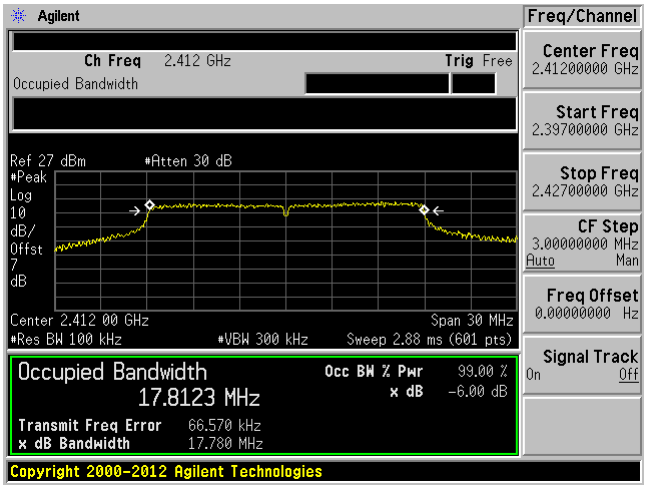


High channel: 2462 MHz Chain J1

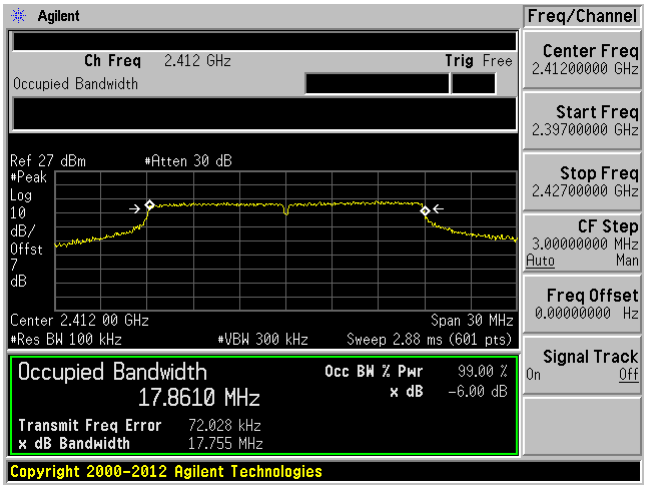


802.11n-HT20 mode

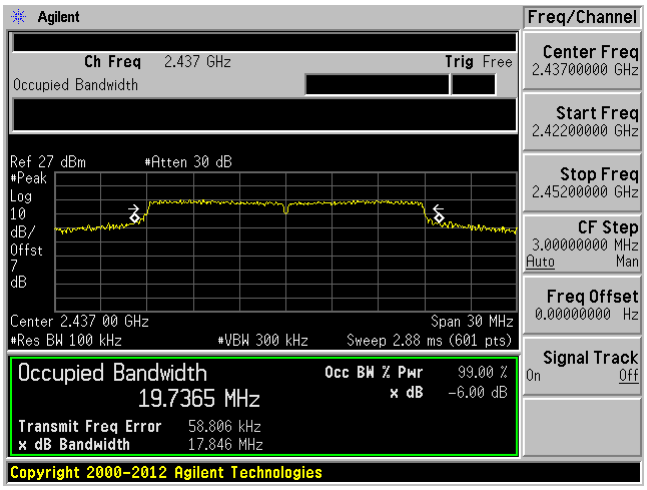
Low channel: 2412 MHz Chain J0



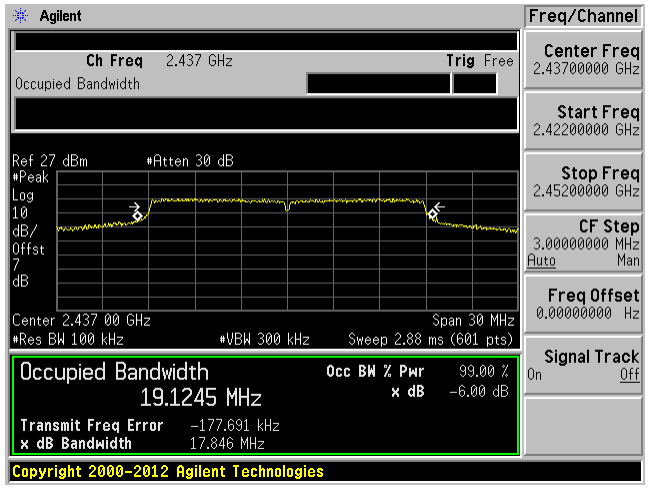
Low channel: 2412 MHz Chain J1



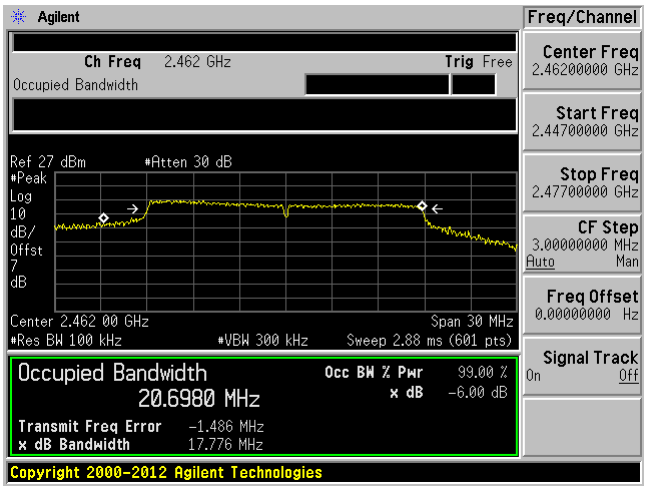
Middle channel: 2437 MHz Chain J0



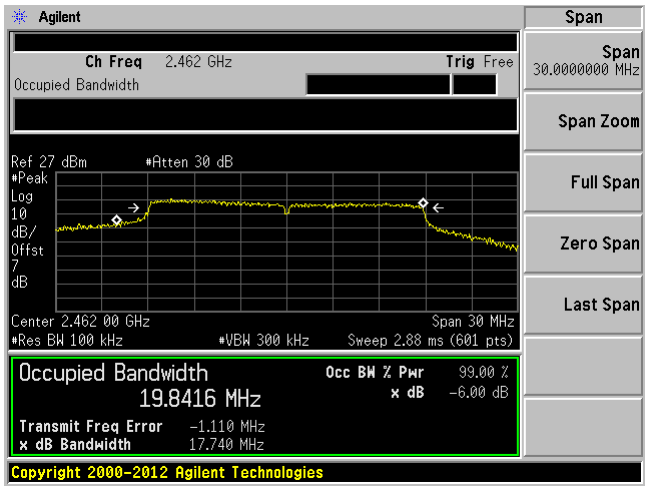
Middle channel: 2437 MHz Chain J1



High channel: 2462 MHz Chain J0

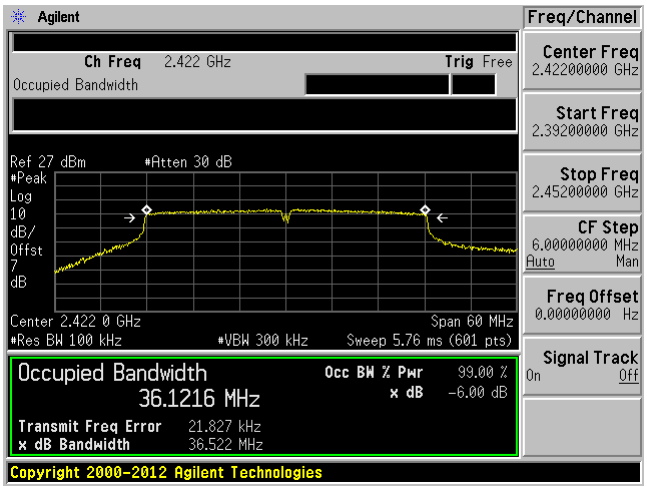


High channel: 2462 MHz Chain J1

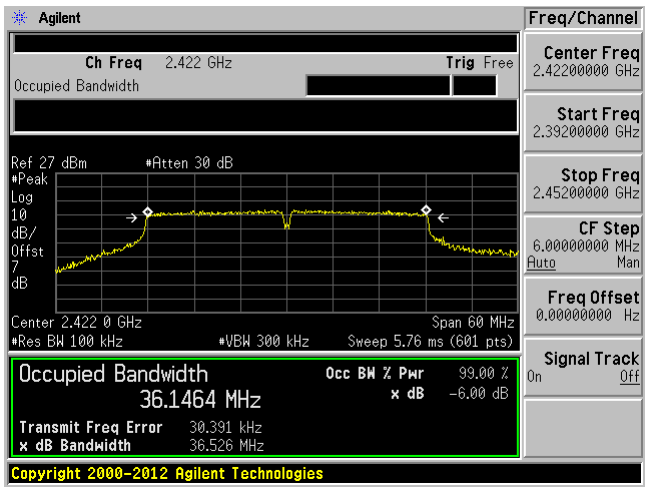


802.11n-HT40 mode

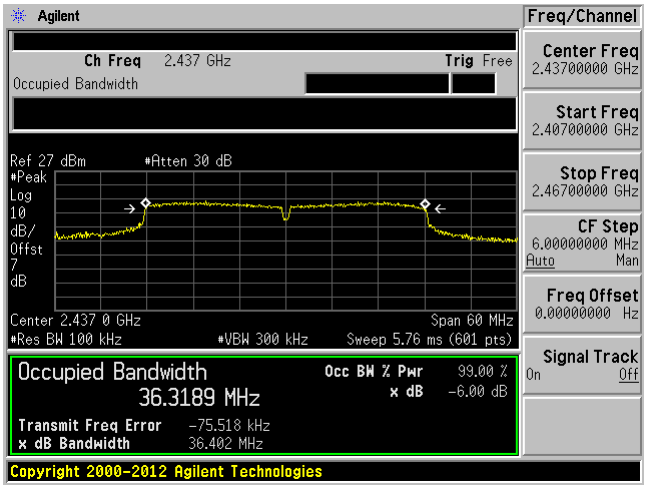
Low channel: 2422 MHz Chain J0



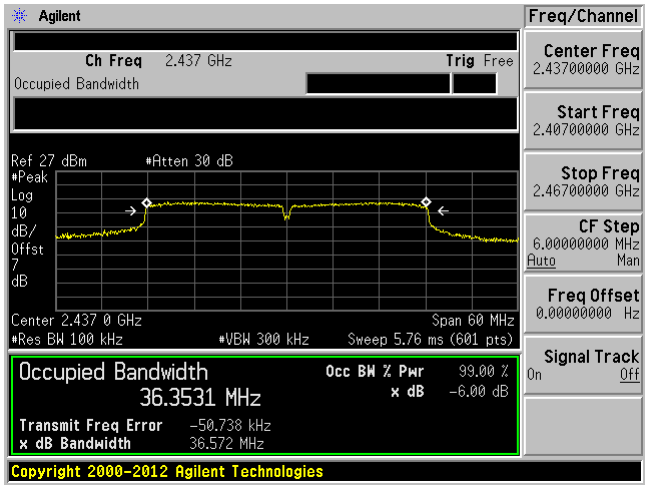
Low channel: 2422 MHz Chain J1



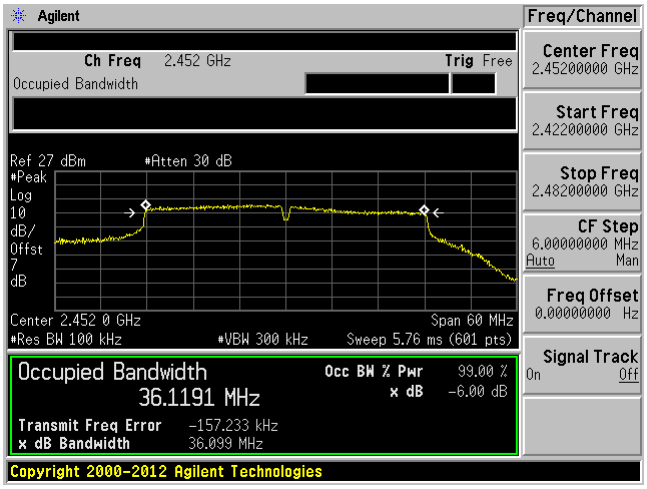
Middle channel: 2437 MHz Chain J0



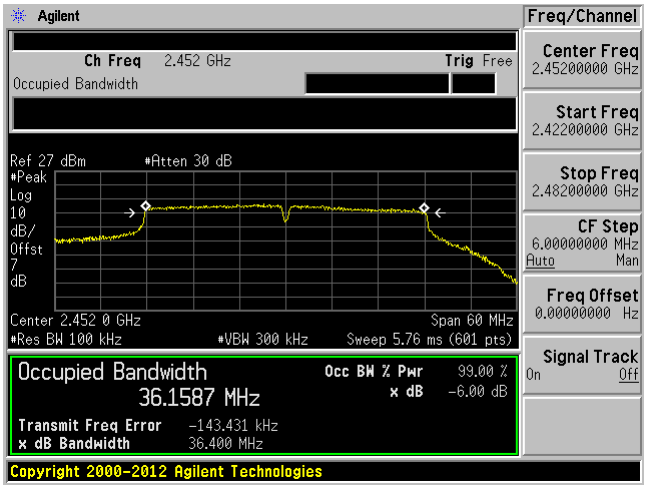
Middle channel: 2437 MHz Chain J1



High channel: 2452 MHz Chain J0



High channel: 2452 MHz Chain J1



10 FCC §15.247(b) & IC RSS-210 §A8.4 (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 v03r02: 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	Spectrum Analyzer	E4446A	US44300386	2013-09-29	1 year

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

10.4 Test Environmental Conditions

Temperature:	22-24° C
Relative Humidity:	42-45 %
ATM Pressure:	101-102 kPa

The testing was performed by Rui Zhou from 2014-07-18 and 2014-07-22 at RF site.

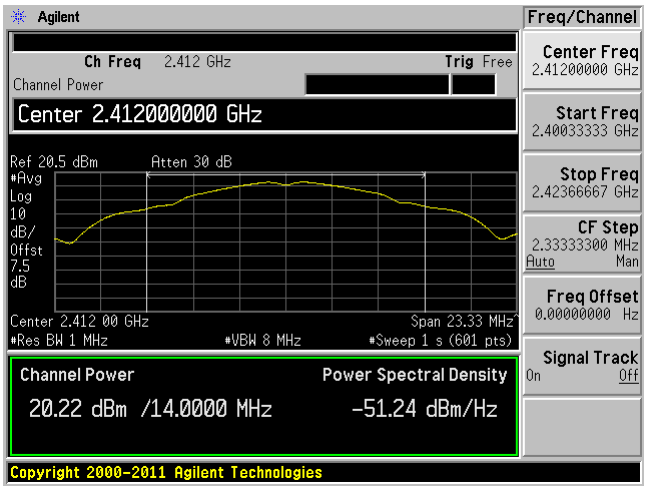
10.5 Test Results

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Total Output Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
		Chain J0	Chain J1				
802.11b mode							
Low	2412	20.22	20.95	23.61	30	-6.39	Target
Middle	2437	20.36	19.55	22.98	30	-7.02	Target
High	2462	19.07	19.11	22.1	30	-7.90	Target
802.11g mode							
Low	2412	18.43	18.96	21.71	30	-8.29	19
Middle	2437	20.47	21.31	23.92	30	-6.08	Target
High	2462	19.43	20.11	22.79	30	-7.21	Target
802.11n-HT20 mode							
Low	2412	17.44	18.16	20.83	30	-9.17	18
Middle	2437	20.52	20.06	23.31	30	-6.69	Target
High	2462	19.5	18.99	22.26	30	-7.74	Target
802.11n-HT40 mode							
Low	2422	17.02	16.2	19.64	30	-10.36	16.5
Middle	2437	21.41	21.72	24.58	30	-5.42	Target
High	2452	18.68	17.97	21.35	30	-8.65	20

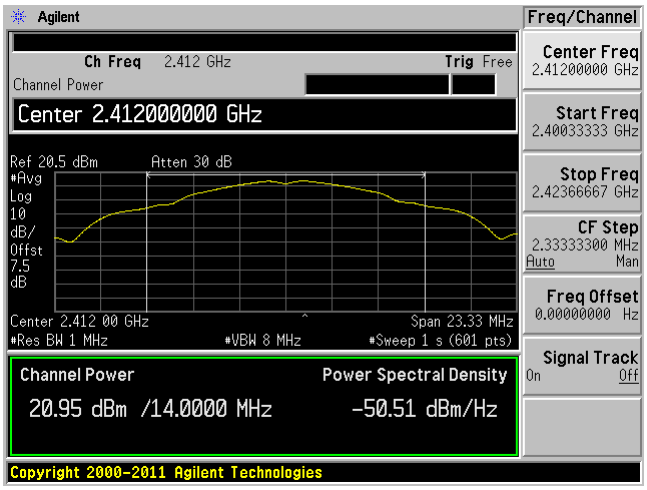
Please refer to the following plots:

802.11 b mode

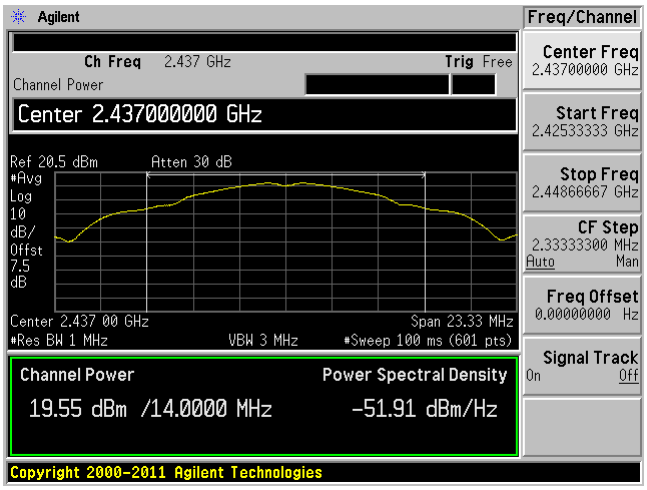
Low channel: 2412 MHz Chain J0



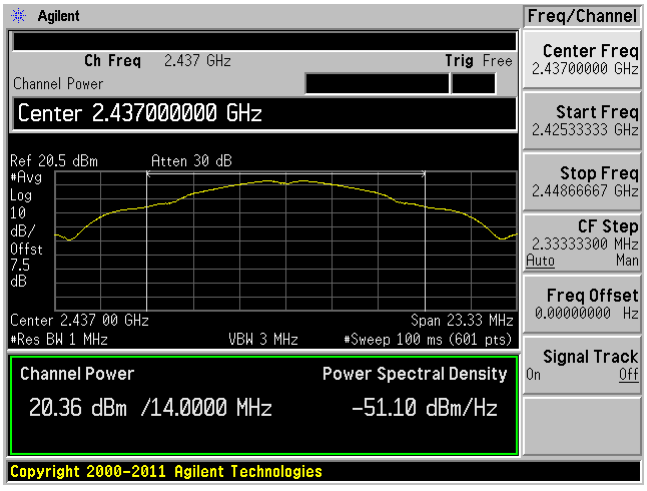
Low channel: 2412 MHz Chain J1



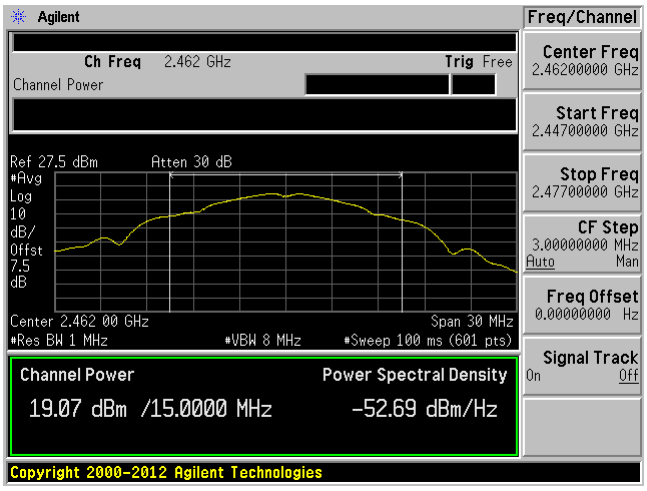
Middle channel: 2437 MHz Chain J0



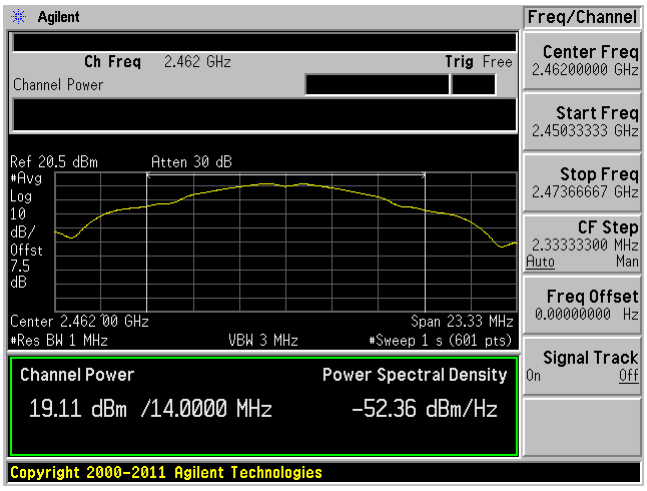
Middle channel: 2437 MHz Chain J1



High channel: 2462 MHz Chain J0

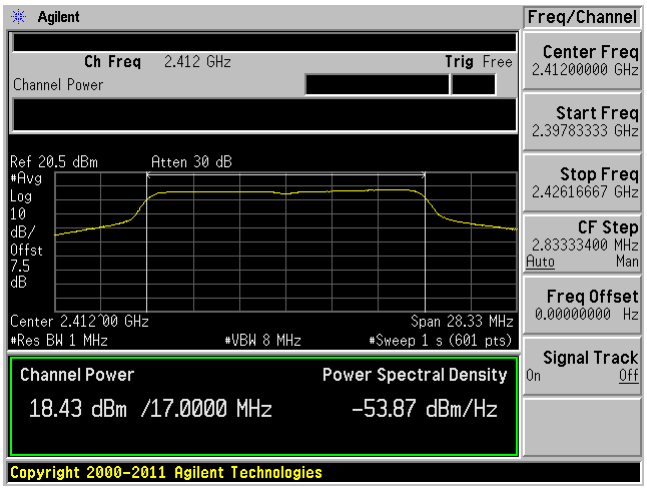


High channel: 2462 MHz Chain J1

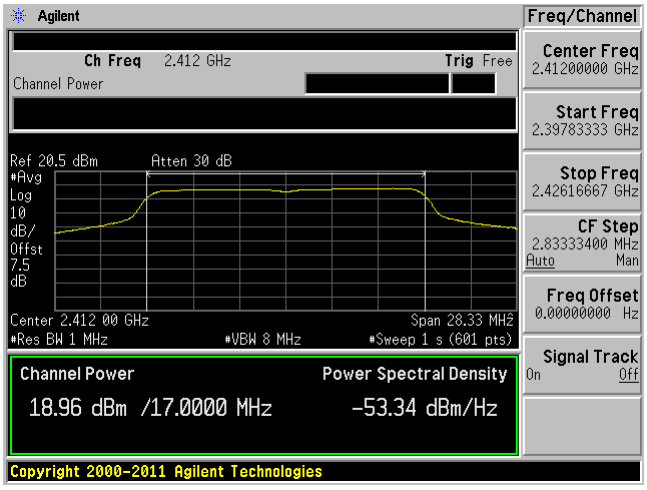


802.11 g mode

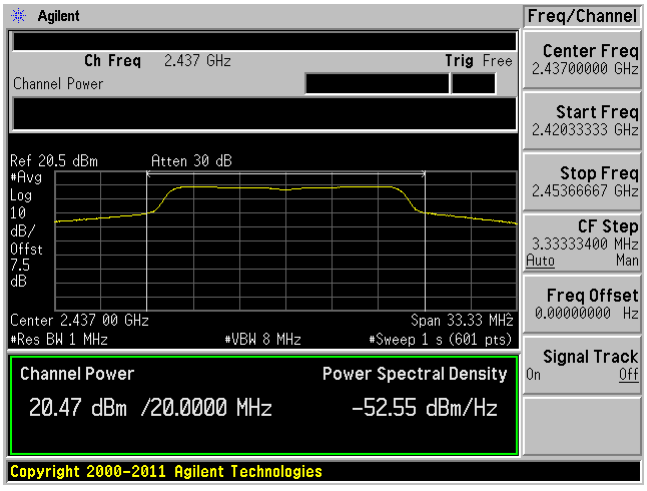
Low channel: 2412 MHz Chain J0



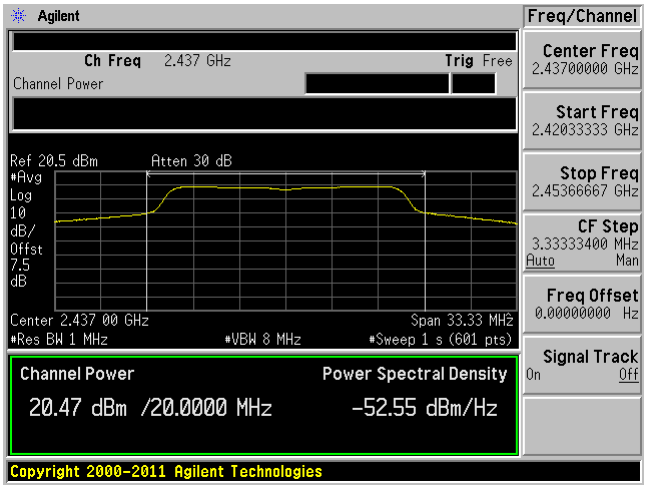
Low channel: 2412 MHz Chain J1



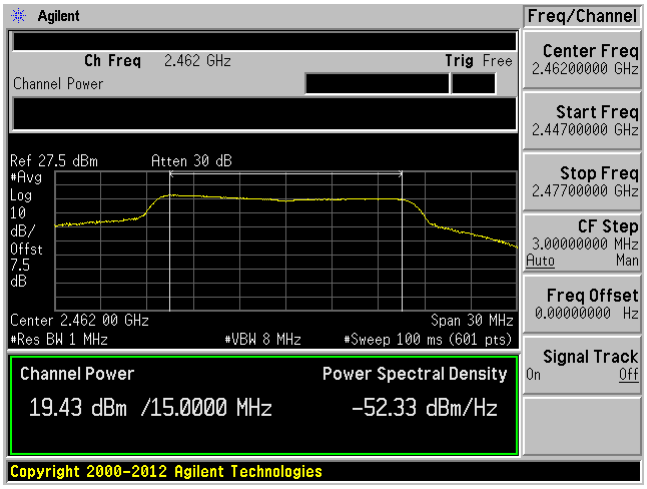
Middle channel: 2437 MHz Chain J0



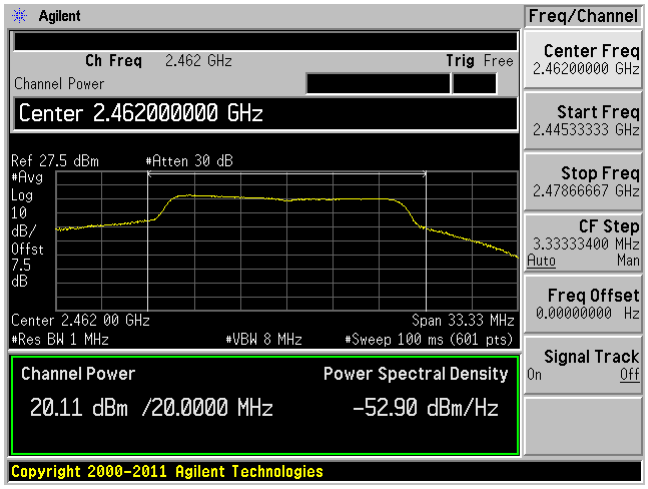
Middle channel: 2437 MHz Chain J1



High channel: 2462 MHz Chain J0

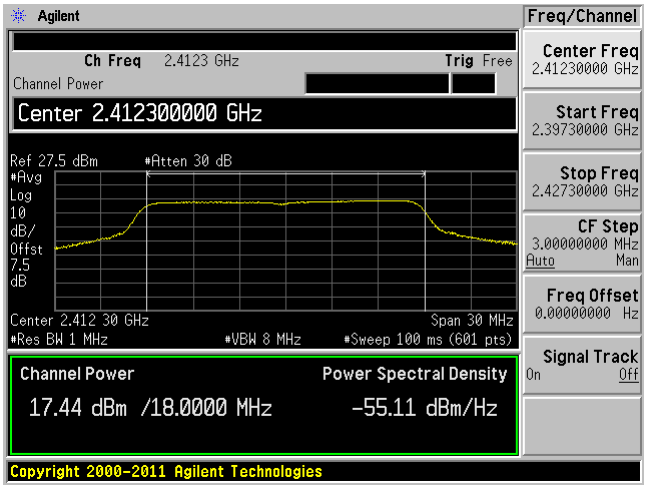


High channel: 2462 MHz Chain J1

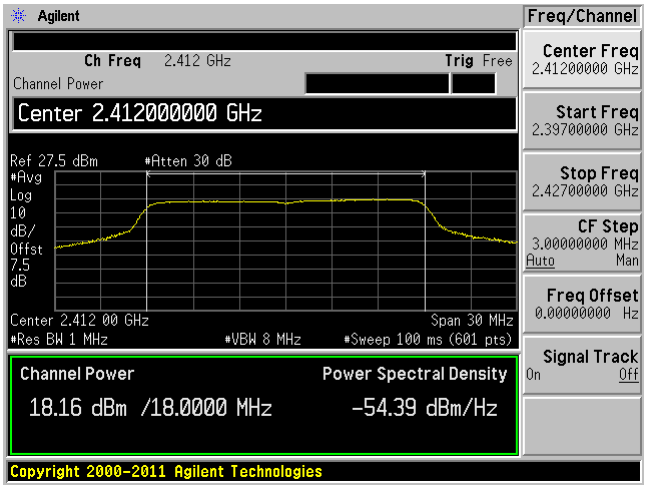


802.11n-HT20 mode

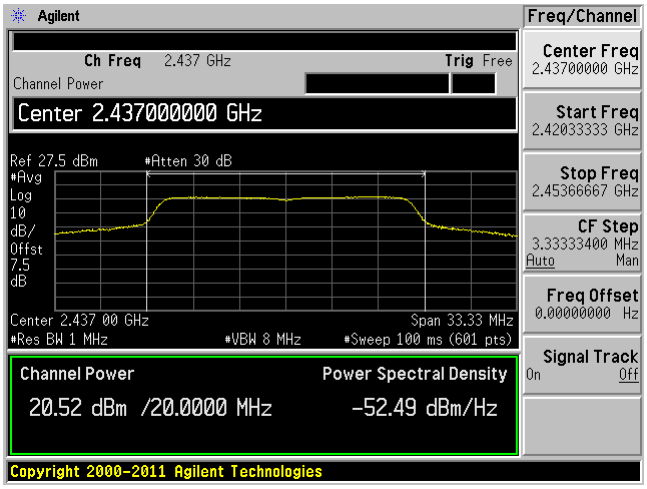
Low channel: 2412 MHz Chain J0



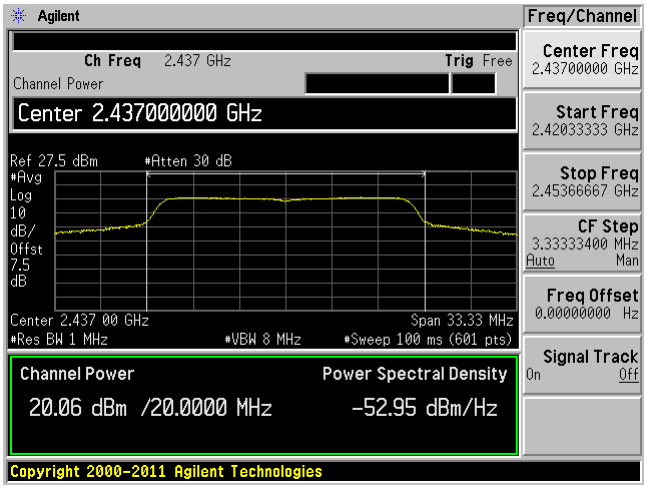
Low channel: 2412 MHz Chain J1



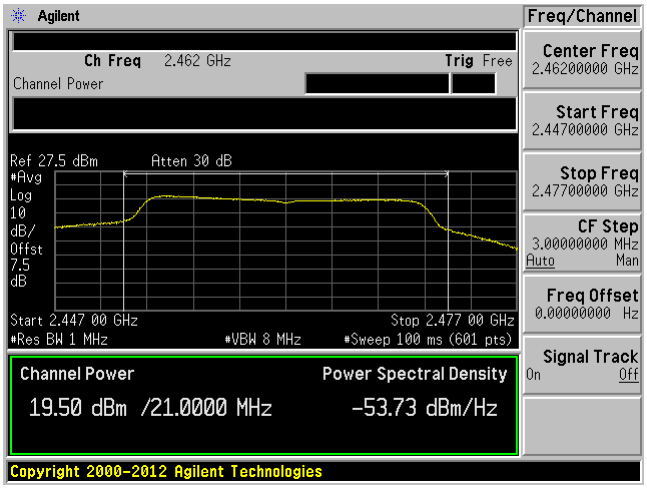
Middle channel: 2437 MHz Chain J0



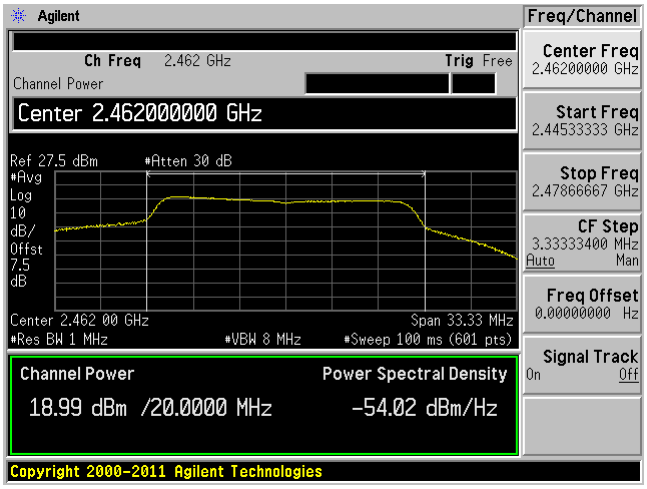
Middle channel: 2437 MHz Chain J1



High channel: 2462 MHz Chain J0

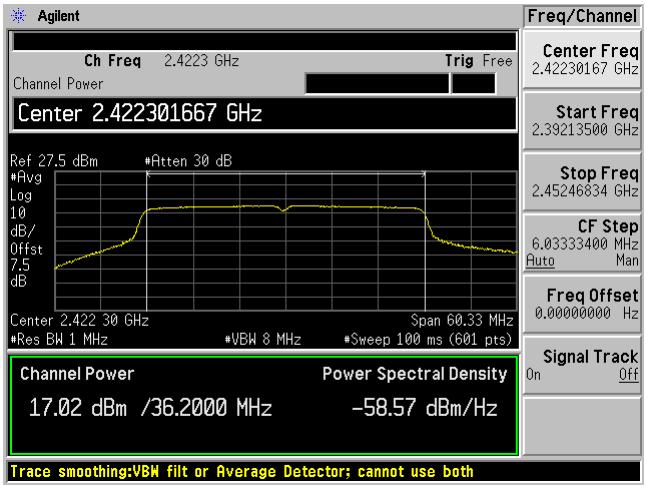


High channel: 2462 MHz Chain J1

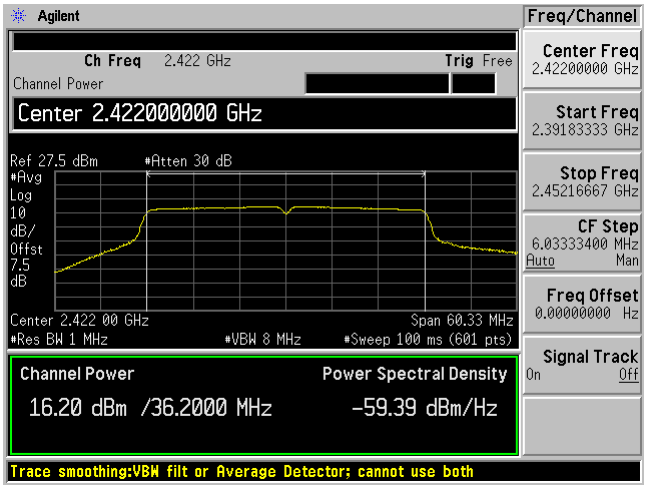


802.11n-HT40 mode

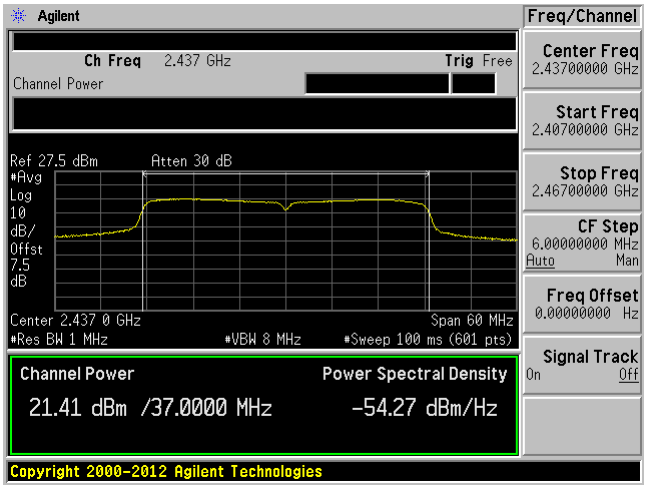
Low channel: 2422 MHz Chain J0



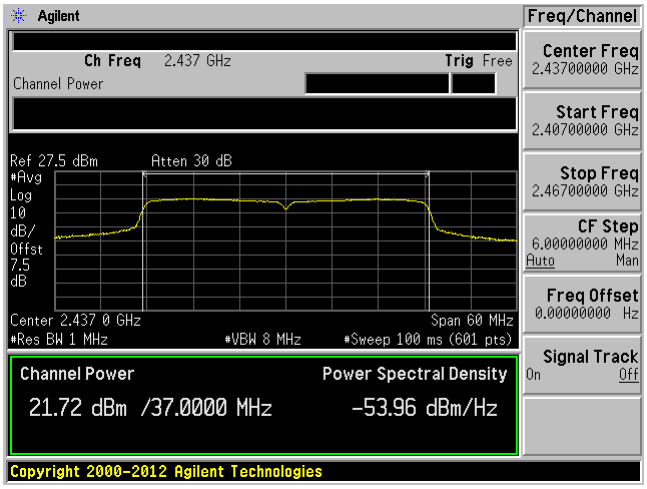
Low channel: 2422 MHz Chain J1



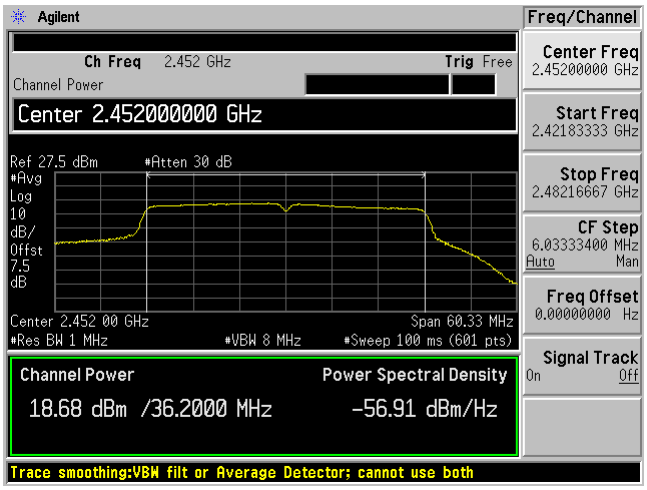
Middle channel: 2437 MHz Chain J0



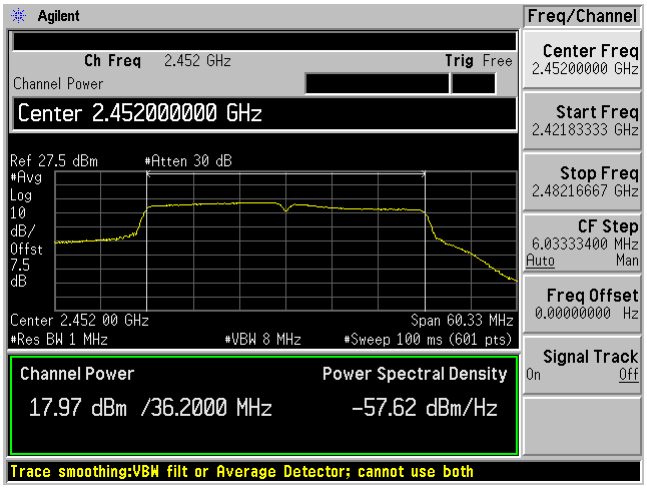
Middle channel: 2437 MHz Chain J1



High channel: 2452 MHz Chain J0



High channel: 2452 MHz Chain J1



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	Spectrum Analyzer	E4446A	US44300386	2013-09-29	1 year

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

11.4 Test Environmental Conditions

Temperature:	22-24° C
Relative Humidity:	42-45 %
ATM Pressure:	101-102 kPa

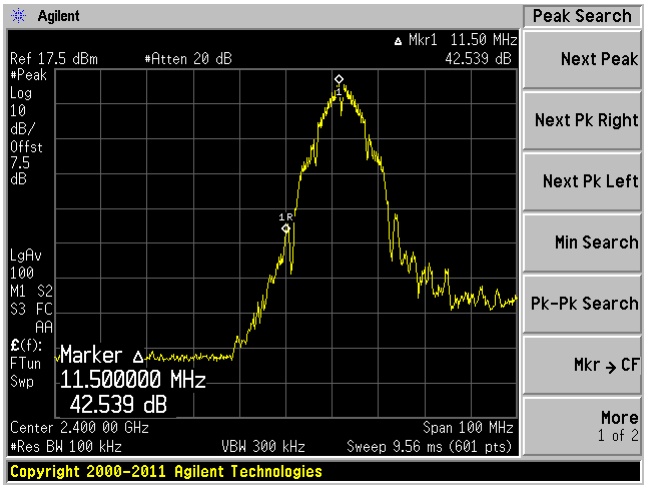
The testing was performed by Rui Zhou from 2014-07-18 and 2014-07-22 at RF site.

11.5 Test Results

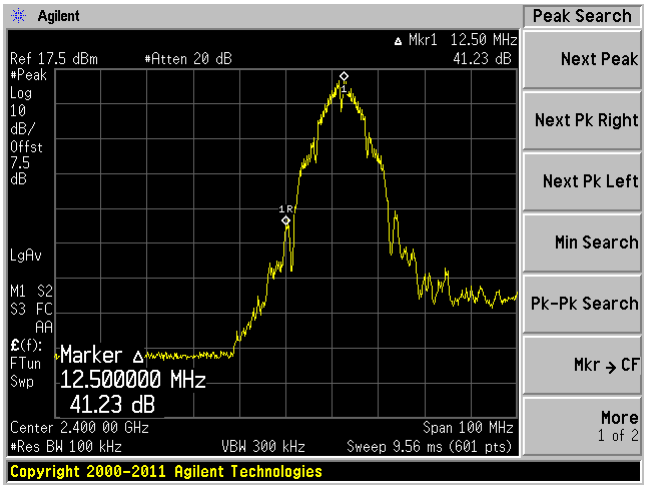
Please refer to following pages for plots of band edge.

802.11b mode

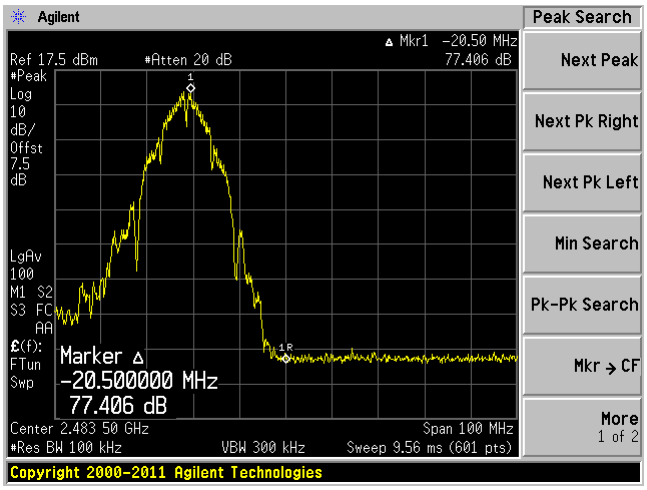
802.11b, Chain J0 Low Band Edge



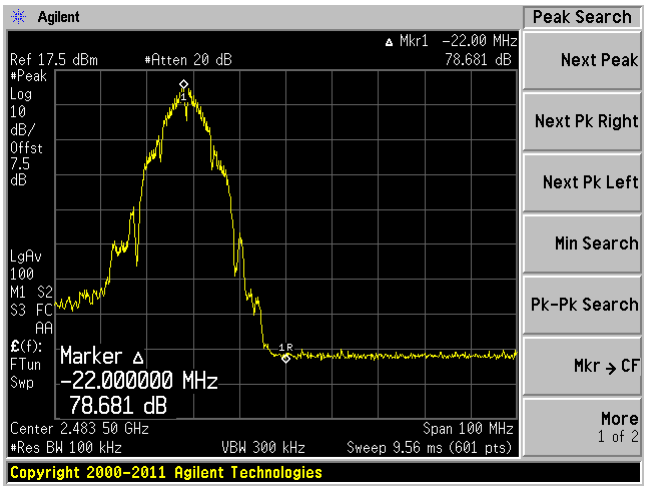
802.11b, Chain J1 Low Band Edge



802.11b, Chain J0 High Band Edge

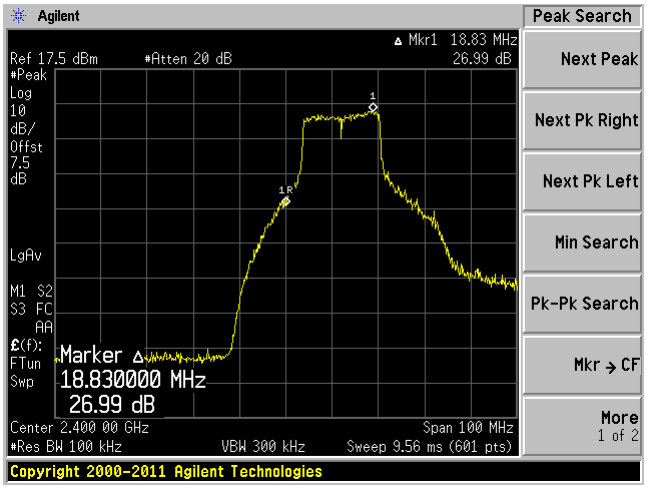


802.11b, Chain J1 High Band Edge

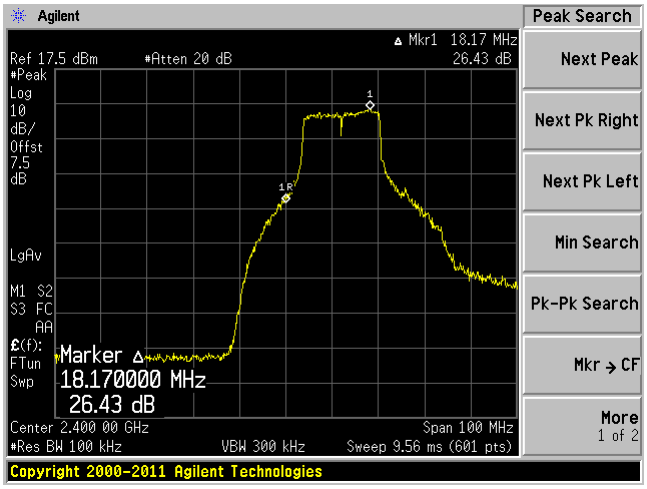


802.11g mode

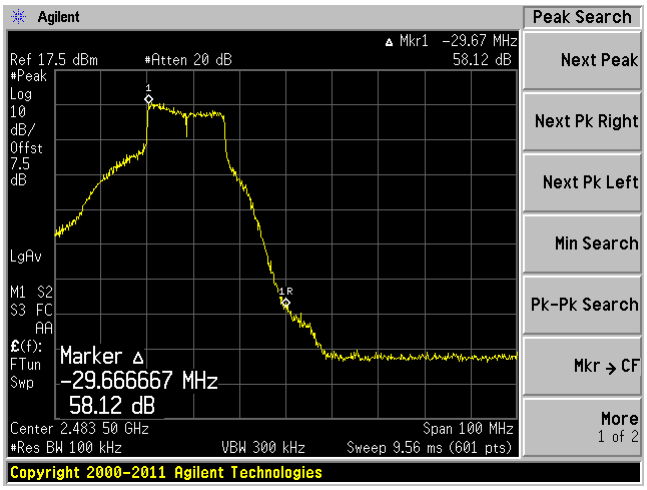
802.11g, Chain J0 Low Band Edge



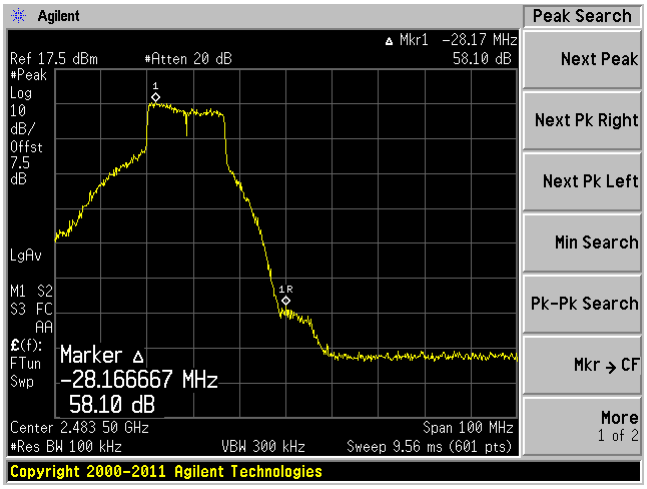
802.11g, Chain J1 Low Band Edge



802.11g, Chain J0 High Band Edge

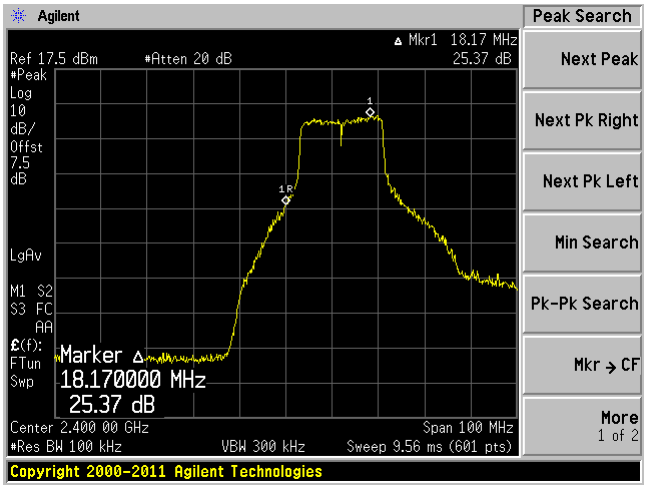


802.11g, Chain J1 High Band Edge

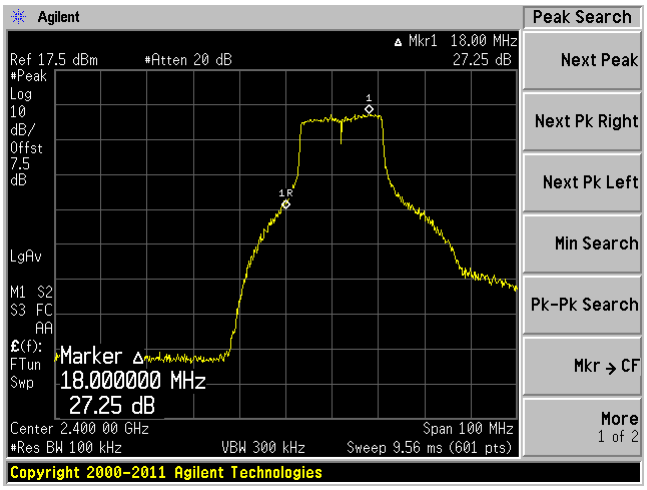


802.11n-HT20 mode

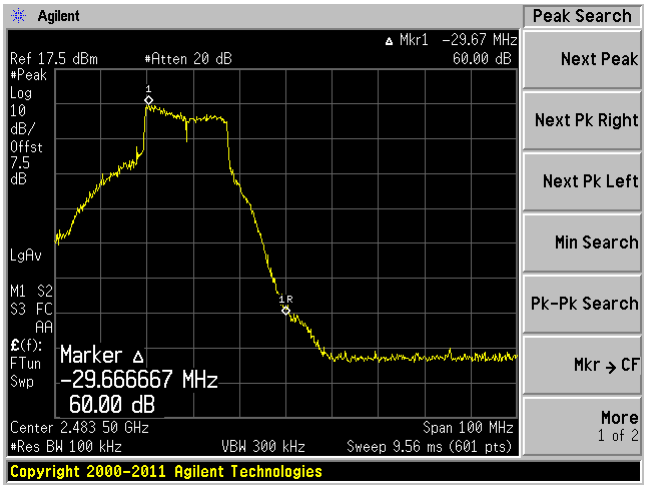
802.11n-HT20, Chain J0 Low Band Edge



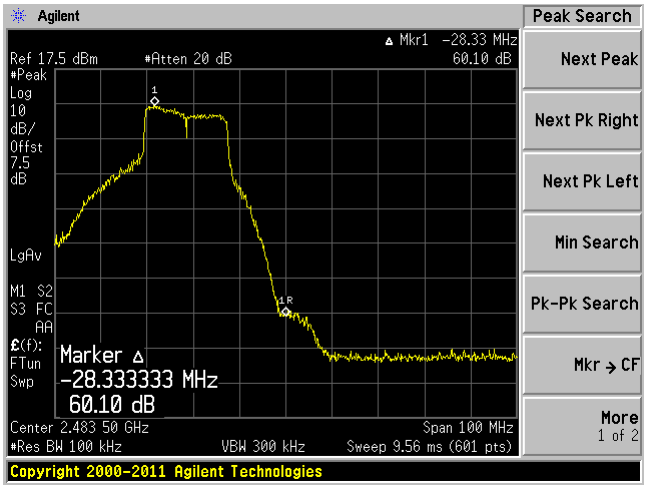
802.11n-HT20, Chain J1 Low Band Edge



802.11n-HT20, Chain J0 High Band Edge

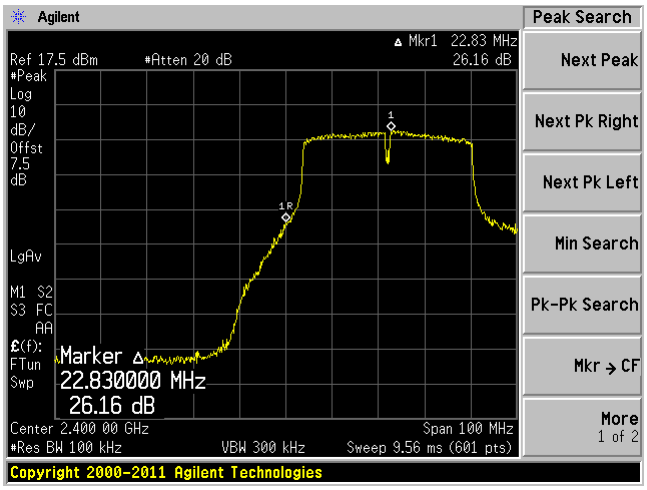


802.11n-HT20, Chain J1 High Band Edge

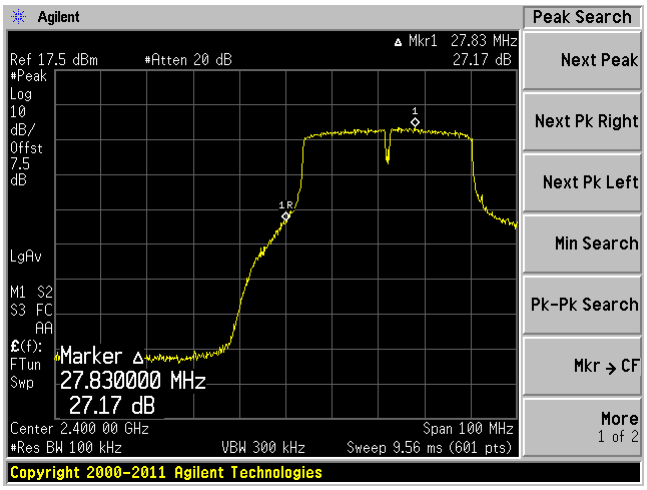


802.11n-HT40 mode

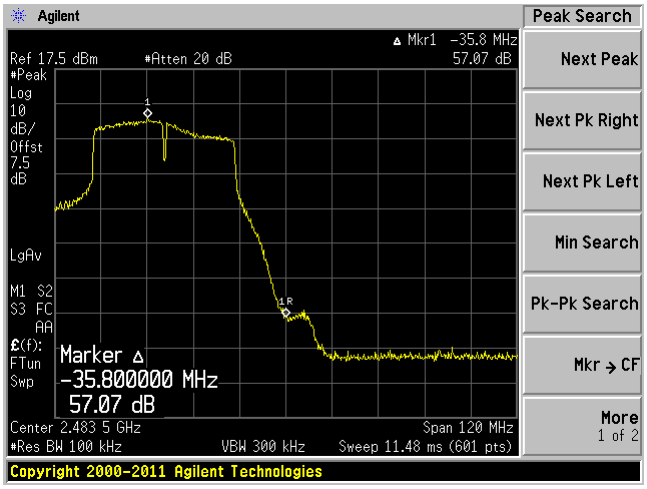
802.11n-HT40, Chain J0 Low Band Edge



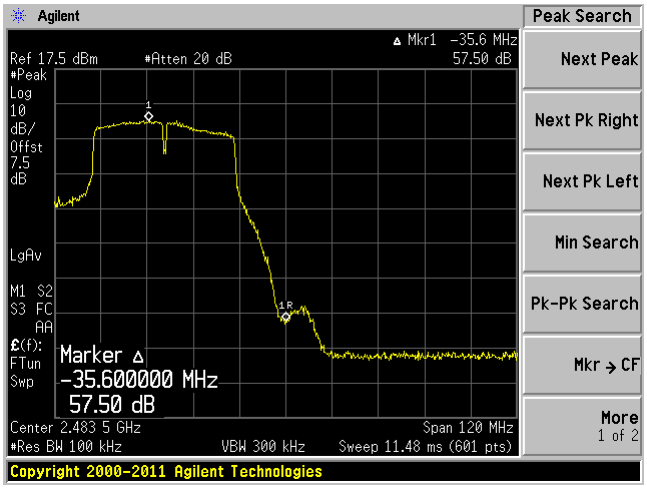
802.11n-HT40, Chain J1 Low Band Edge



802.11n-HT40, Chain J0 High Band Edge



802.11n-HT40, Chain J1 High Band Edge



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	Spectrum Analyzer	E4446A	US44300386	2013-09-29	1 year

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

12.4 Test Environmental Conditions

Temperature:	22-24° C
Relative Humidity:	42-45 %
ATM Pressure:	101-102 kPa

The testing was performed by Rui Zhou from 2014-07-18 and 2014-07-22 at RF site.

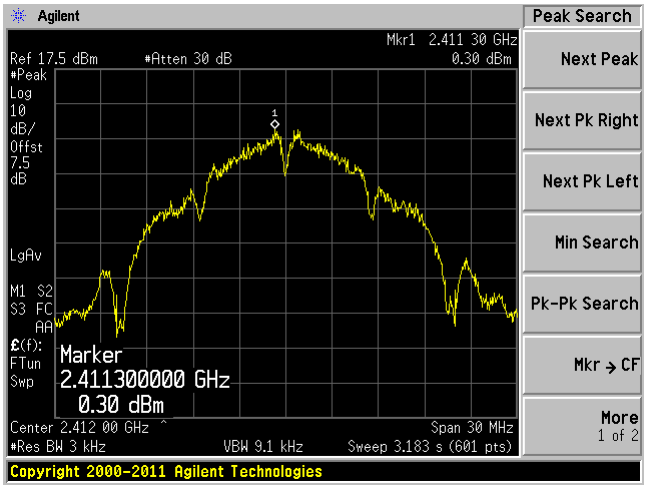
12.5 Test Results

Channel	Frequency (MHz)	PSD (dBm)		Total PSD (dBm)	Limit (dBm)	Margin (dB)
		Chain J0	Chain J1			
802.11b mode						
Low	2412	0.3	0.24	3.28	8	-4.72
Middle	2437	-1.5	-0.92	1.81	8	-6.19
High	2462	-0.4	-3.24	1.42	8	-6.58
802.11g mode						
Low	2412	-6.03	-6.56	-3.28	8	-11.28
Middle	2437	-3.8	-5.59	-1.59	8	-9.59
High	2462	-4.43	-3.23	-0.78	8	-8.78
802.11n-HT20 mode						
Low	2412	-7.24	-6.41	-3.79	8	-11.79
Middle	2437	-4.64	-4.77	-1.69	8	-9.69
High	2462	-5.24	-5.02	-2.12	8	-10.12
802.11n-HT40 mode						
Low	2422	-12.34	-3.8	-3.23	8	-11.23
Middle	2437	-7.53	-7.31	-4.41	8	-12.41
High	2452	-8.85	-8.88	-5.85	8	-13.85

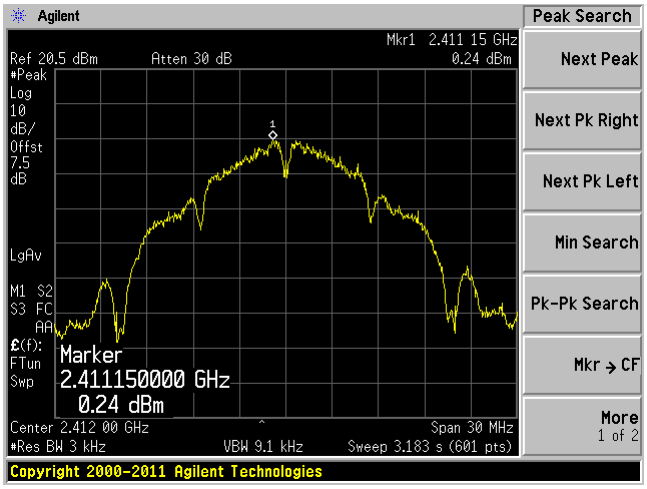
Please refer to the following plots for detailed test results:

802.11b mode

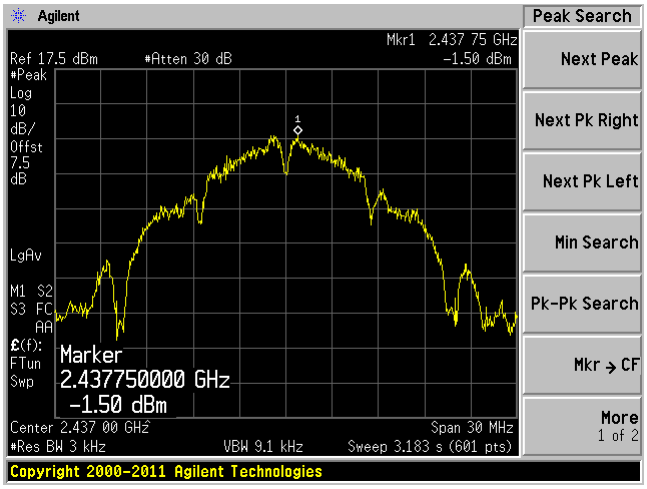
Low channel J0: 2412 MHz



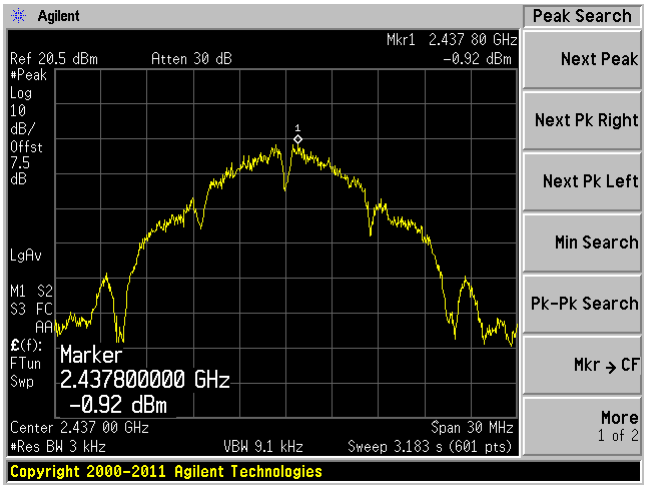
Low channel J1: 2412 MHz



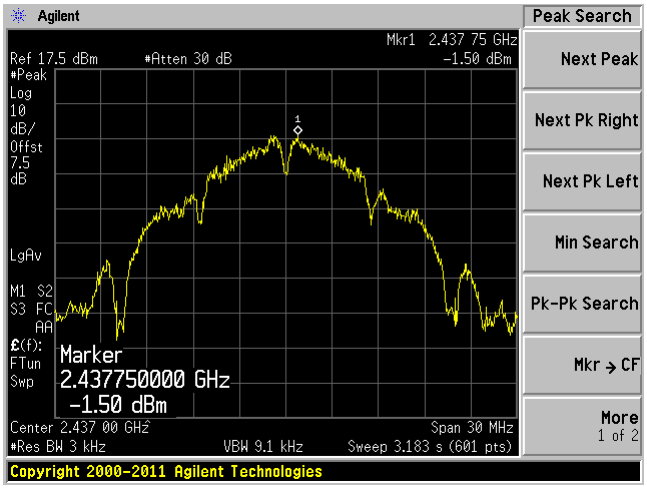
Middle channel J0: 2437 MHz



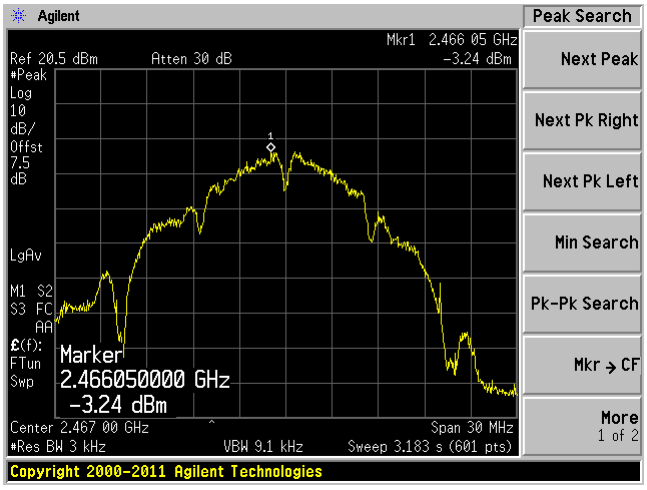
Middle channel J1: 2437 MHz



High channel J0: 2462 MHz

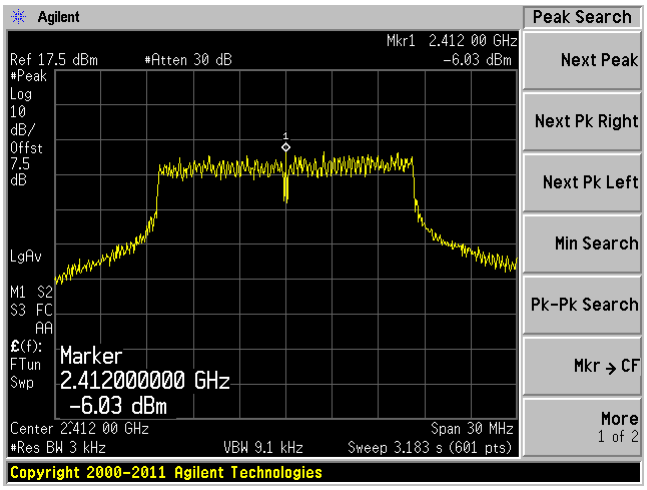


High channel J1: 2462 MHz

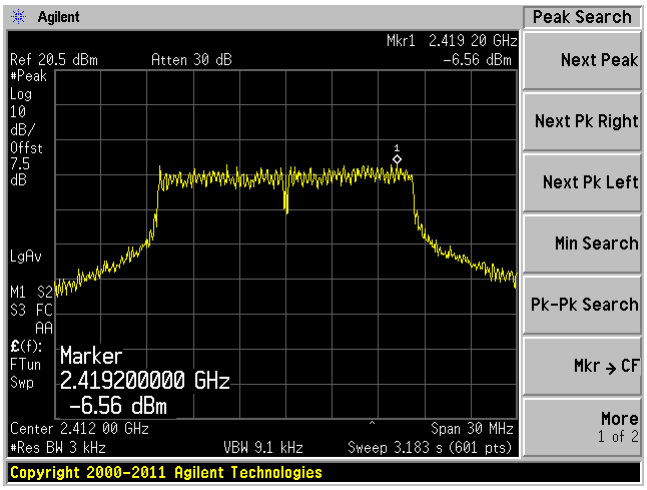


802.11g mode

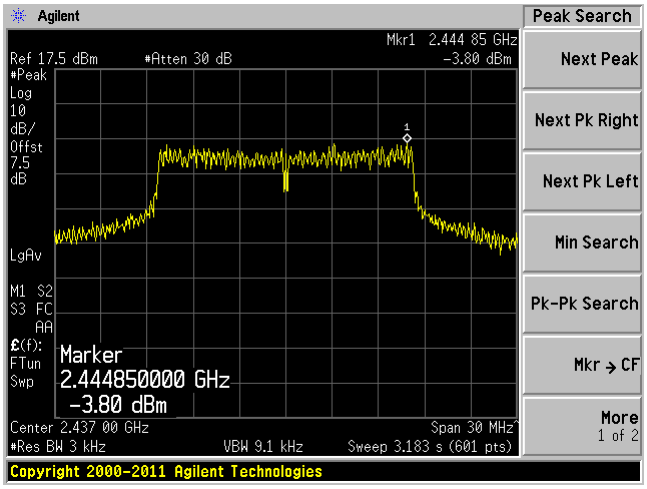
Low channel J0: 2412 MHz



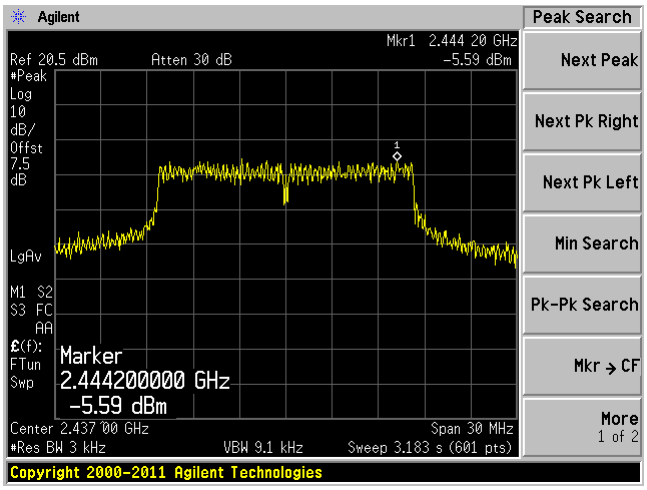
Low channel J1: 2412 MHz



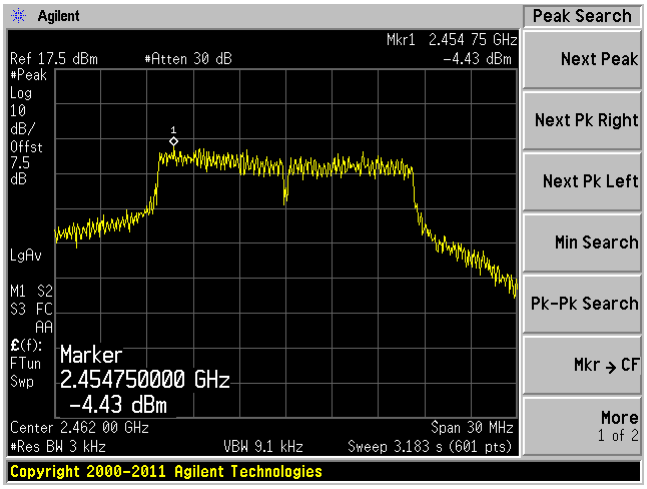
Middle channel J0: 2437 MHz



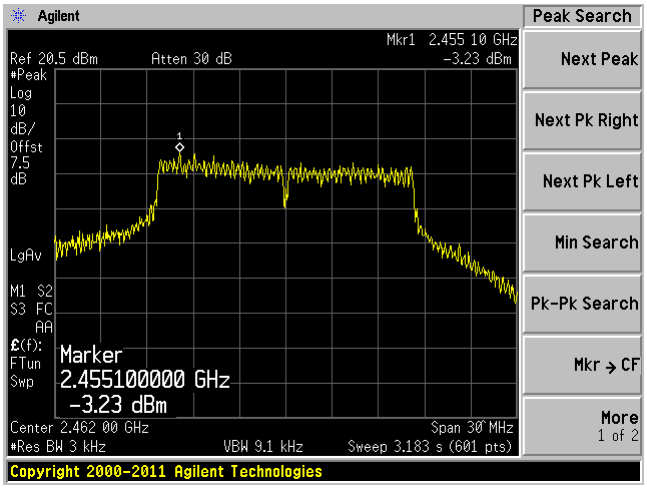
Middle channel J1: 2437 MHz



High channel J0: 2462 MHz

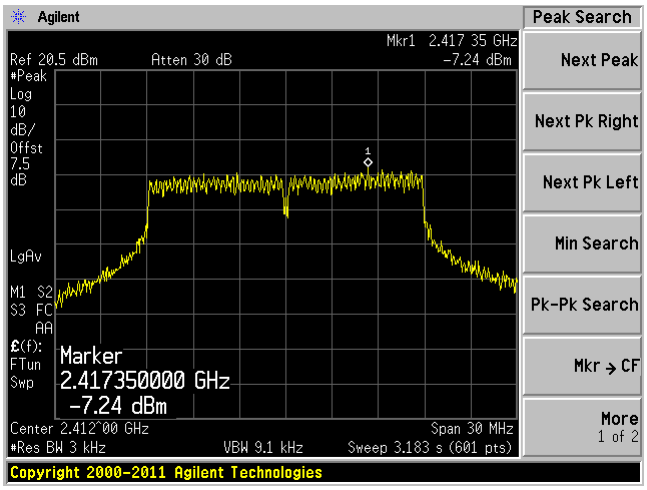


High channel J1: 2462 MHz

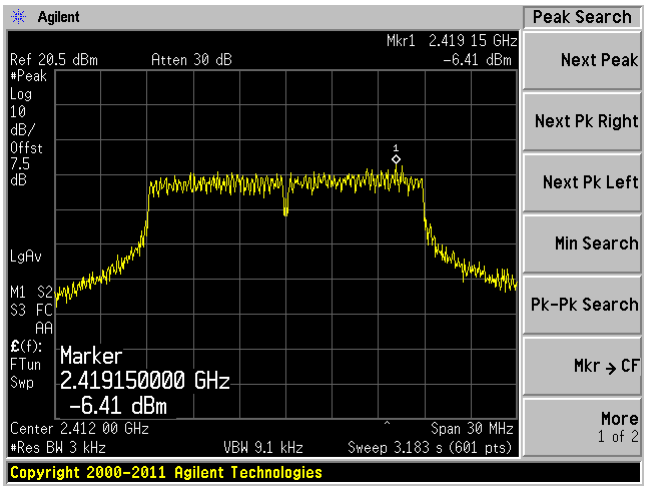


802.11n-HT20 mode

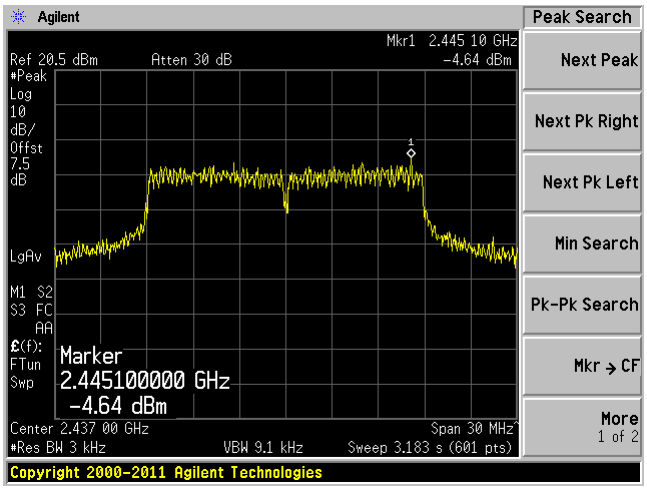
Low channel J0: 2412 MHz



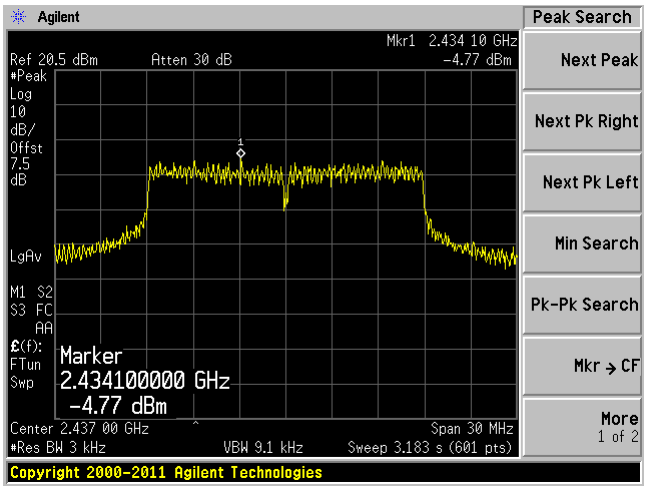
Low channel J1: 2412 MHz



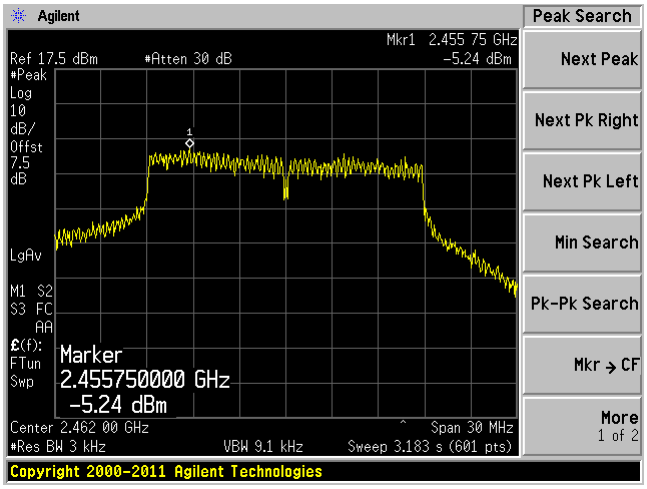
Middle channel J0: 2437 MHz



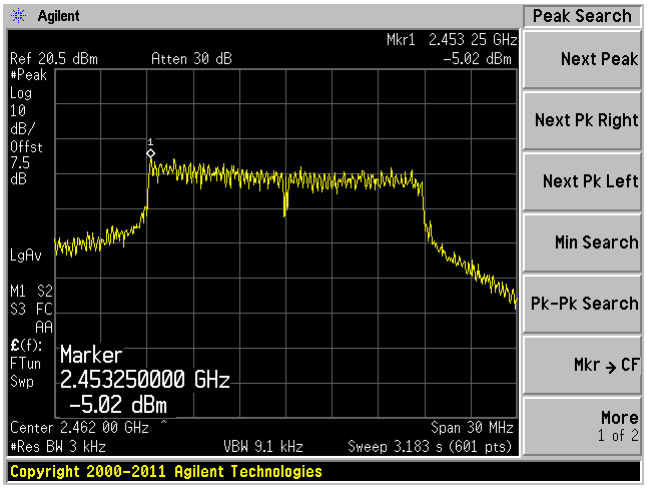
Middle channel J1: 2437 MHz



High channel J0: 2462 MHz

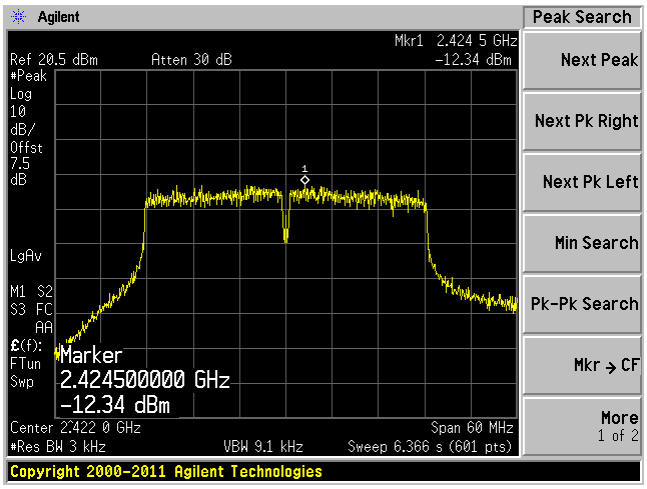


High channel J1: 2462 MHz

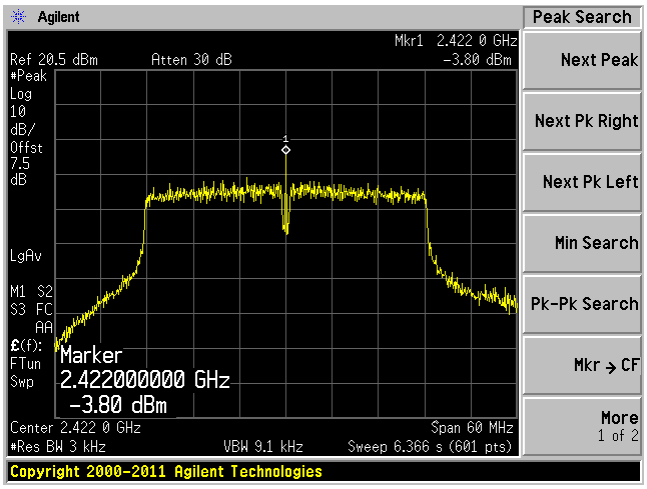


802.11n-HT40 mode

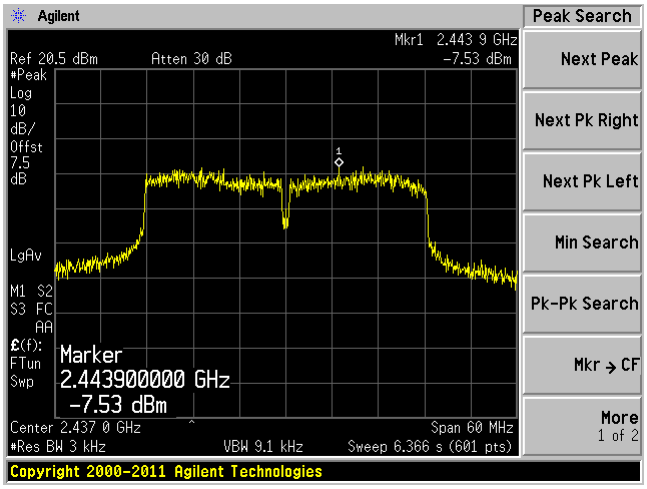
Low channel J0: 2422 MHz



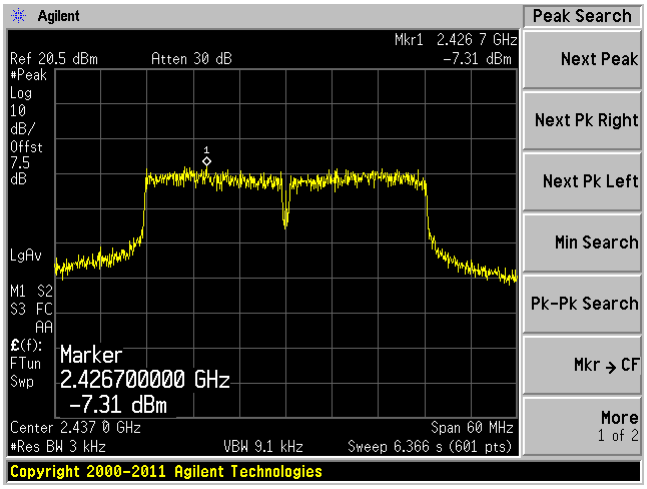
Low channel J1: 2422 MHz



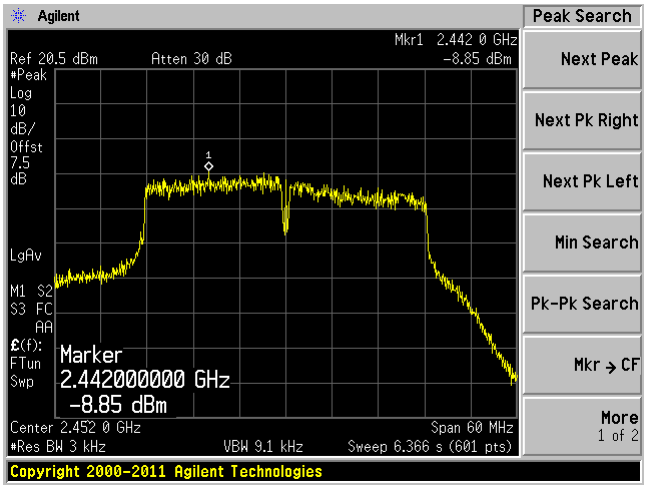
Middle channel J0: 2437 MHz



Middle channel J1: 2437 MHz



High channel J0: 2452 MHz



High channel J1: 2452 MHz