FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

802.11n ADSL2+ Bonded 4-port Gateway

Model: **P-663HN-51,402004**

Trade Name: ZyXEL

Issued to

ZyXEL Communications Corporation

NO.6 Innovation Rd,II Science Based Industrial Park,Hsin-chu,Taiwan

Prepared by

COMPLIANCE CERTIFICATION SERVICES (KUNSHAN) INC.
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ACCREDITED
TESTING CERT #2541.01

ilac-MRA

TAF
Testing Laboratory
0363

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TEST RESULT CERTIFICATION

Applicant: ZyXEL Communications Corporation
NO.6 Innovation Rd,II Science Based Industrial Park,Hsin-chu,Taiwan

Equipment Under Test: 802.11n ADSL2+ Bonded 4-port Gateway

Trade Name: ZyXEL

Model: P-663HN-51,402004

Date of Test: August 13，2009 ~ August 27,2009

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:

Miro Chueh
EMC Manager
Compliance Certification Service Inc.

Reviewed by:

Lin Zhang
EMC Section Manager
Compliance Certification Service Inc.

EUT DESCRIPTION

Product	802.11n ADSL2+ Bonded 4-port Gateway
Trade Name	ZyXEL
Model Number	P-663HN-51,402004
Model Difference	All the above models are identical except the model designation for different market.
Frequency Range	2412 ~ 2462 MHz
EUT Power Rating	Powered from an AC/DC power adapter Model name: ADS18B 120150 Manufacturer: OEM Input: AC 100-240V, 50-60Hz, 0.5A Output: DC 12V, 1.5A
Transmit Power	IEEE 802.11b mode: 20.83dBm IEEE 802.11g mode: 21.54dBm draft 802.11n Standard-20 MHz Channel mode: 18.82 dBm draft 802.11n Wide-40 MHz Channel mode: 16.93 dBm (the EUT transmitting and receiving with two antennas simultaneously working at n mode)
Modulation Technique	IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mpbs) IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mpbs) draft 802.11n Standard-20 MHz Channel mode: OFDM (150,144, 130, 117, 104, 78, 52, 39, 26 and13 Mpbs) draft 802.11n Wide-40 MHz Channel mode: OFDM (300, 270, 243, 216, 162, 108, 81, 54 and 27Mpbs)
Number of Channels	IEEE 802.11b/g mode: 11 Channels draft 802.11n Standard-20 MHz Channel mode: 11 Channels draft 802.11n Wide-40 MHz Channel mode: 7 Channels
Antenna Specification	an external antenna gain 2.88 dBi and an internal RF PCB Antenna(S/N:C034-510687-A).gain 3.00 dBi /Total gain 5.95 dBi an external antenna(AN2400-24A07GX) gain 2.88 dBi and another internal RF PCB Antenna(S/N:0905-0012)gain 1.42dBi /Total gain 5.22 dBi

Remark:

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *This submittal(s) (test report) is intended for FCC ID: I88P663HN51 filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*

TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 2003and FCC CFR 47 15.207, 15.209 and 15.247.

EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 2003 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4 2003.

FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	([2])
13.36 - 13.41	322 - 335.4		

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

DESCRIPTION OF TEST MODES

The EUT transmitting and receiving with one antenna working at b/g mode.

The EUT transmitting and receiving with two antennas simultaneously working at n mode, so 2x2 configuration was used for all testing in this report.

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

The worst-case data rates:

IEEE802.11b mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 11Mbps data rate were chosen for full testing.

IEEE802.11g mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate were chosen for full testing.

draft 802.11gn Standard-20 MHz Channel mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with MCS15 data rate were chosen for full testing.

draft 802.11gn Wide-40 MHz Channel mode: Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with MCS15 data rate were chosen for full testing.

The following test mode was scanned during the preliminary test:

Mode 1: Set the EUT stand-up on the table top with an external antenna and RF PCB Antenna(S/N:0905-0012).
Mode 2: Set the EUT lie-down on the table top with an external antenna and RF PCB Antenna(S/N:0905-0012).
Mode 3: Set the EUT stand-up on the table top with an external antenna and RF PCB Antenna(S/N:C034-510687-A)
Mode 4: Set the EUT lie-down on the table top with an external antenna and RF PCB Antenna(S/N:C034-510687-A)

After the preliminary scan, the following test mode was found to produce the highest emission level.

Mode 3:Set the EUT stand-up on the table top with an external antenna and RF PCB Antenna(S/N:C034-510687-A)

Then, the EUT configuration and cable configuration of the above highest emission mode was recorded for all final test items.

INSTRUMENT CALIBRATION

MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

Equipment Used for Emissions Measurement

Remark: *Each piece of equipment is scheduled for calibration once a year.*

Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/12/2009
Peak and Avg Power Sensor	Agilent	E9327A	US40441788	09/11/2009
EPM-P Series Power Meter	Agilent	E4416A	QB41292714	09/11/2009

3M Semi Anechoic Chamber				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/12/2009
Pre-Amplfier	Miteq	NSP4000-NF	870731	01/21/2010
Horn Antenna	Austriah	BBHA9120D	D267	05/09/2010
SHF-EHF Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170171	04/12/2010
Turn Table	CT	CT123	4162	N.C.R
Antenna Tower	CT	CTERG23	3253	N.C.R
Controller	CT	CT1OO	95635	N.C.R
Coax Switch	Anitsu	MP 598	M 80094	N/A
Site NSA	CCS Lab.	N/A	N/A	12/11/2009
ESPI3 EMI RECEIVER	R&S	ESPI3	101026	05/06/2010
Pre-Amplfier	MINI	ZFL-1000VH2	d041703	02/28/2010
Bilog Antenna	Sunol Sciences	JB1	A110204-2	11/22/2009

Remark: *The measurement uncertainty is less than +/- 4.83dB (vertical 30MHz ~ 200MHz),+/- 4.70dB(vertical 200MHz ~1000MHz),* +/- 4.72dB*(Horizontal 30MHz ~ 1GHz) +/- 3.92dB (1000MHz ~5000MHz) +/- 3.94dB(5000MHz ~18000MHz) which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV. Expanded Uncertainty (95% CONFIDENCE INTERVAL): K=2*

Power Line Conducted Emission Test Site A				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	SCHAFFNER	SCR3501	343	04/22/2010
V (V-LISN)	Schwarzbeck	NNLK 8129	8129-143	04/11/2010
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	SN:05012	04/11/2010
TRANSIENT LIMITER	SCHAFFNER	CFL9206	1710	04/06/2010

Remark: *The measurement uncertainty is less than +/- 3.43dB dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*

Expanded Uncertainty (95% CONFIDENCE INTERVAL): K=2

FACILITIES AND ACCREDITATIONS

FACILITIES

All measurement facilities used to collect the measurement data are located at
CCS China Kunshan Lab at 10#Weiye Rd, Innovation Park Eco. & Tec. Development Zone

Kunshan city JiangSu, (215300), CHINA.

The sites are constructed in conformance with the requirements of ANSI C63.4 2003 and CISPR Publication 22.

EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

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

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 2541.01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324E-1 for 3/10m Chamber.

TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	47 CFR FCC Part 15/18 (using ANSI C63.4 :2003)；VCCI V3; CNS 13438; CNS 13439; CNS 13803; CISPR 11; EN 55011; CISPR 13; EN 55013; CISPR 22:2005; CISPR 22:1997 +A1 :2000+A2 :2002；EN 55022:2006; EN55022 :1998 +A1 :2001+A2 :2003；EN 61000-6-3 (excluding discontinuous interference); EN 61000-6-4; AS/NZS CISPR 22；CAN/CSA-CEI/IEC CISPR 22；EN 61000-3-2；EN 61000-3-3；EN550024； EN 61000-4-2；EN 61000-4-3；EN61000-4-4；EN 61000-4-5； EN 61000-4-6；IEC 61000-4-8；EN 61000-4-11；IEC61000-3-2；IEC61000-3-3；IEC 61000-4-2；IEC 61000-4-3；IEC 61000-4-4； IEC 61000-4-5；IEC 61000-4-6；IEC 61000-4-8；IEC 61000-4-11；EN 300 220-3; EN 300 328; EN 300 330-2; EN 300 440-1; EN 300-440-2; EN 300 893; EN 301 489-01; EN 301 489-3; EN 301 489-07; EN 301 489-17；47 CFR FCC Part 15, 22, 24	ACCREDITED TESTING CERT #2541.01
USA	FCC	3/10 meter Sites to perform FCC Part 15/18 measurements	93105, 90471
Japan	VCCI	3/10 meter Sites and conducted test sites to perform radiated/conducted measurements	VCCI R-1600 C-1707 T-1499

** No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*

SETUP OF EQUIPMENT UNDER TEST

SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID
1.	Notebook pc	IBM	X31	32P4413	DOC
2.	Notebook pc	DELL	4150	CN-04P20	DOC

Remark:

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

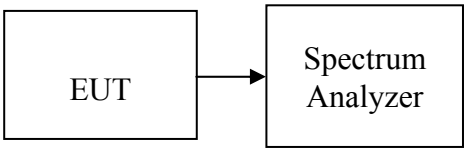
FCC PART 15.247 REQUIREMENTS

6DB BANDWIDTH

LIMIT

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

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100kHz, VBW = RBW, Sweep = auto.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

TEST RESULTS

No non-compliance noted

Test Data

IEEE 802.11b mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	11.310	>500	PASS
Mid	2437	10.563		PASS
High	2462	11.131		PASS

IEEE 802.11g mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.466	>500	PASS
Mid	2437	16.430		PASS
High	2462	16.449		PASS

TRANSMIT CHAIN 0

draft 802.11gn Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	15.336	>500	PASS
Mid	2437	16.044		PASS
High	2462	17.171		PASS

draft 802.11gn Wide-40 MHz Channel mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	35.116	>500	PASS
Mid	2437	35.041		PASS
High	2452	35.963		PASS

TRANSMIT CHAIN 1

draft 802.11gn Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.696	>500	PASS
Mid	2437	17.699		PASS
High	2462	17.677		PASS

draft 802.11gn Wide-40 MHz Channel mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	35.573	>500	PASS
Mid	2437	36.142		PASS
High	2452	36.374		PASS

TRANSMIT CHAIN 0+ CHAIN 1

draft 802.11gn Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.628	>500	PASS
Mid	2437	17.639		PASS
High	2462	17.592		PASS

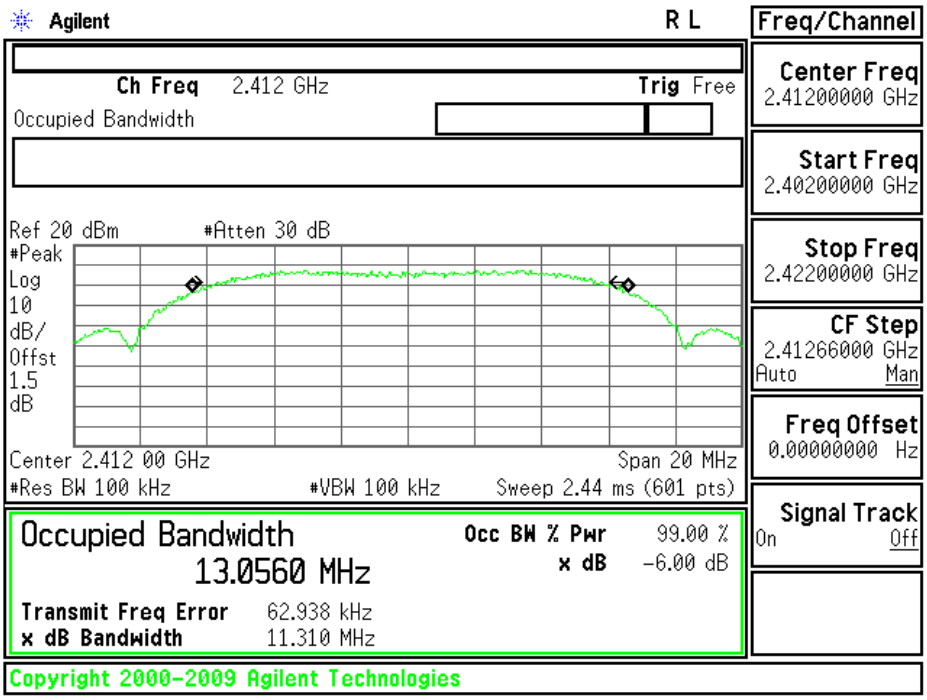
draft 802.11gn Wide-40 MHz Channel mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	35.458	>500	PASS
Mid	2437	35.346		PASS
High	2452	35.442		PASS

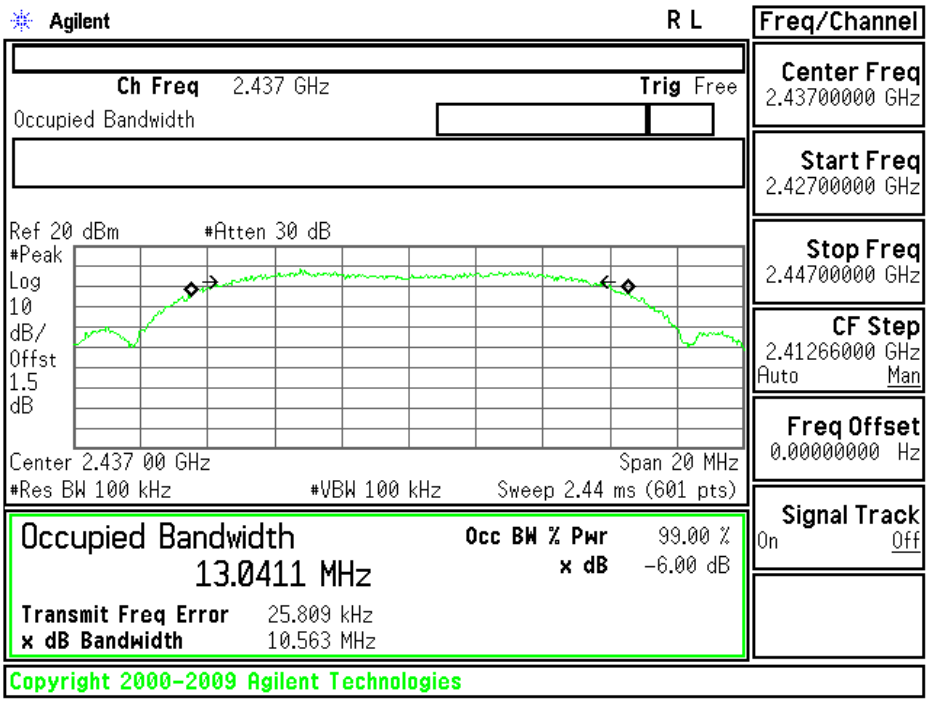
Test Plot

IEEE 802.11b MODE

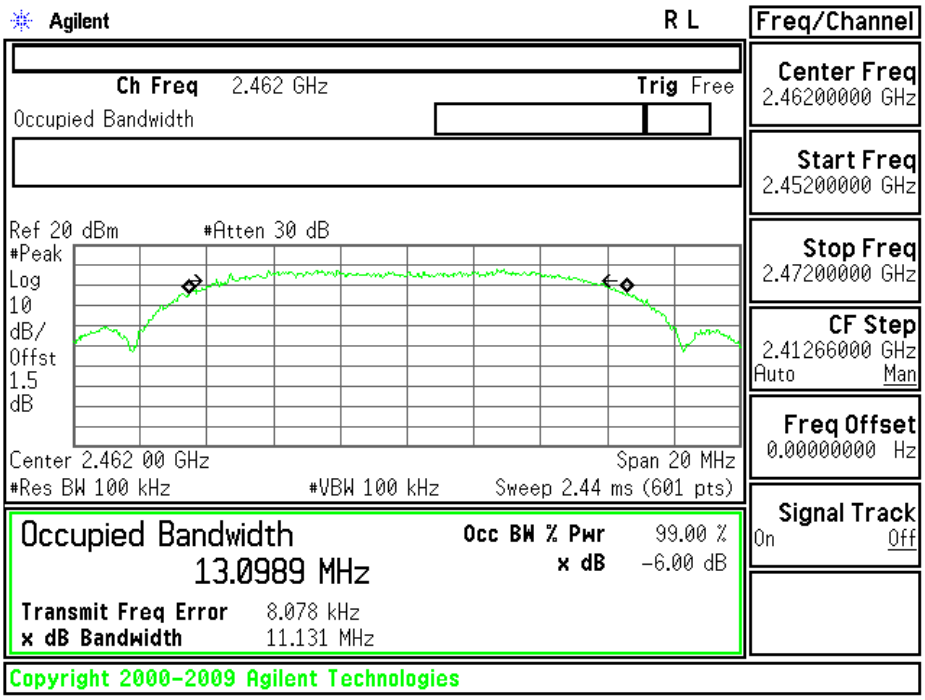
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

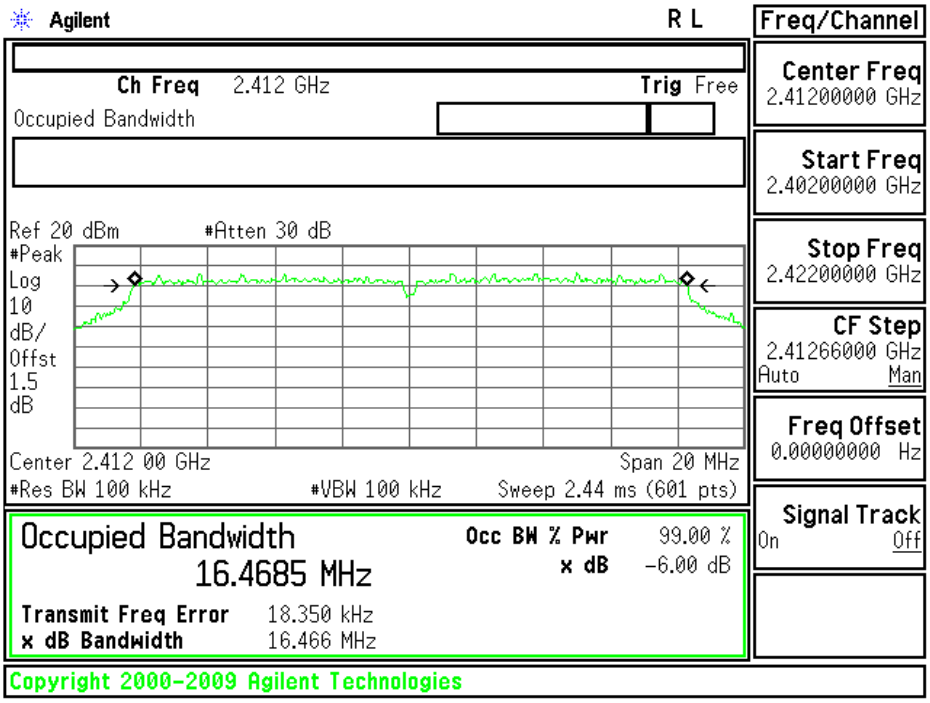


6dB Bandwidth (CH High)

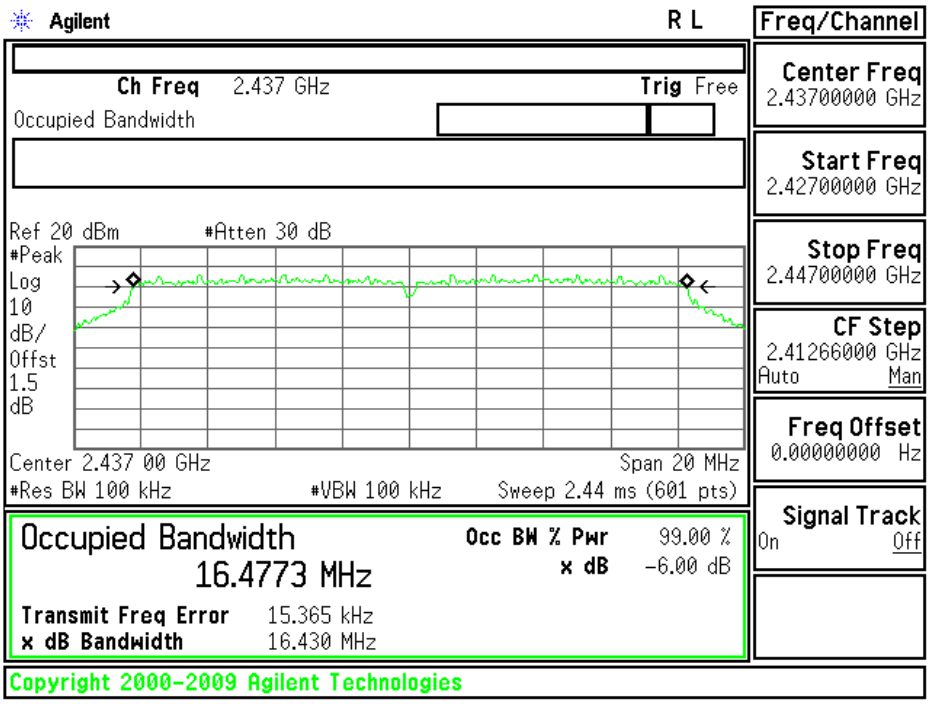


IEEE 802.11g MODE

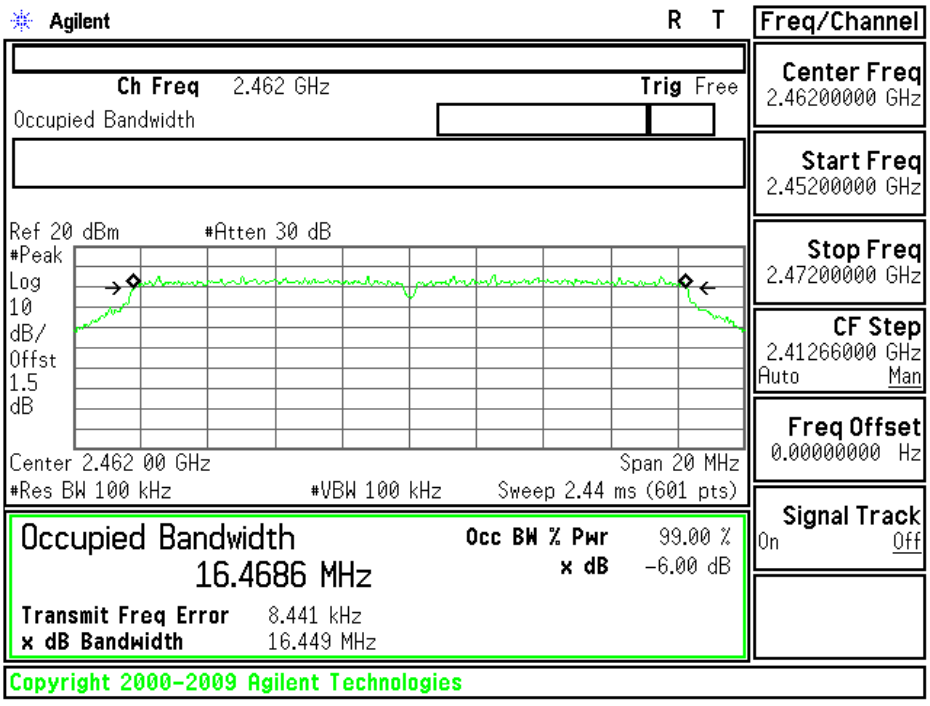
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

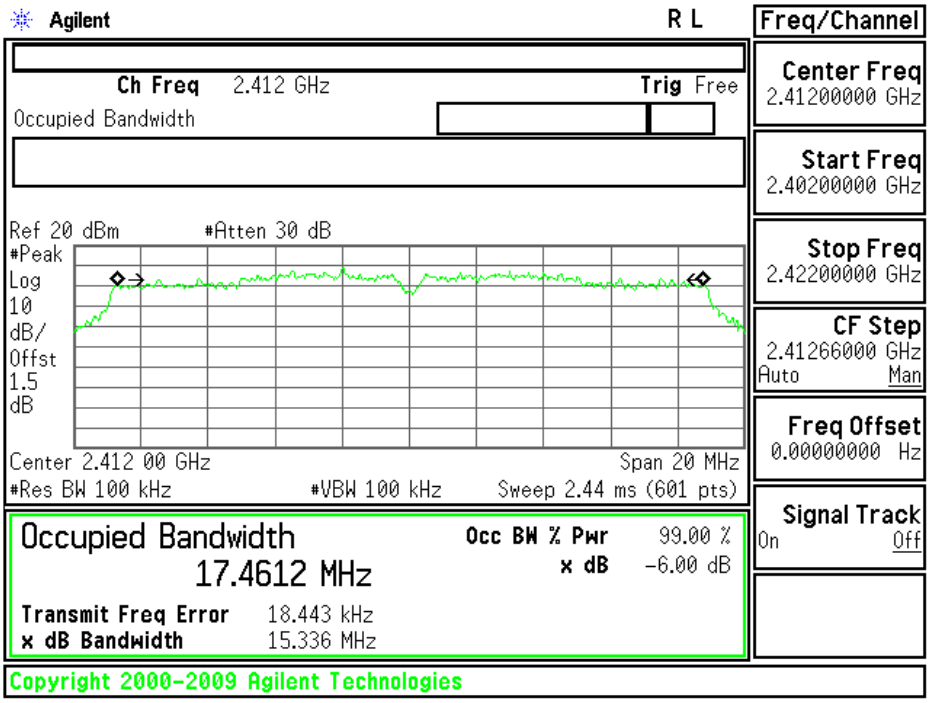


6dB Bandwidth (CH High)

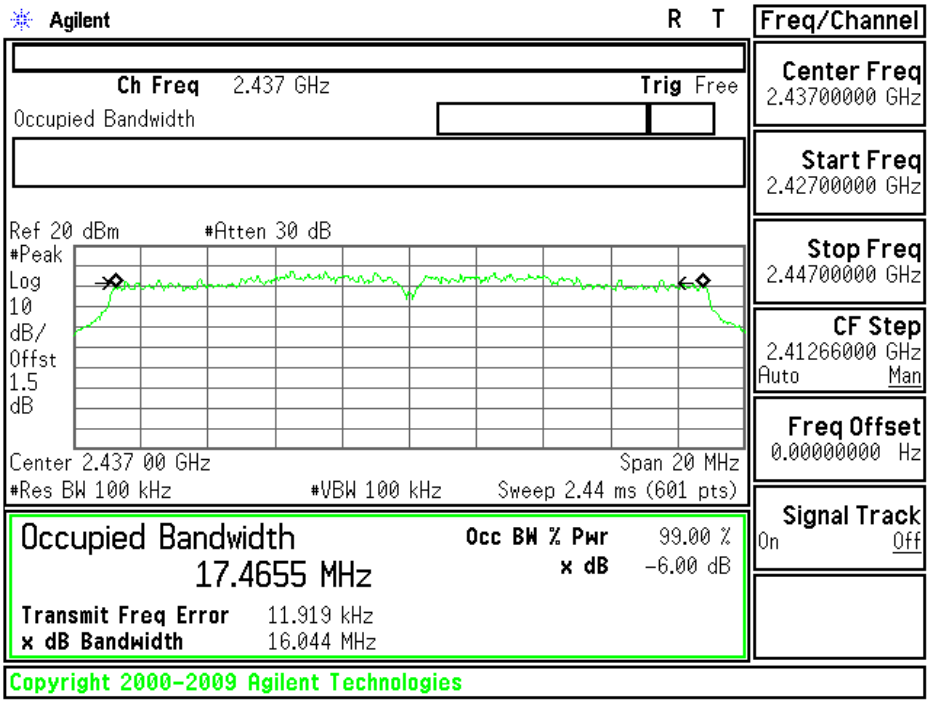


draft 802.11gn Standard-20 MHz Channel mode / Chain 0

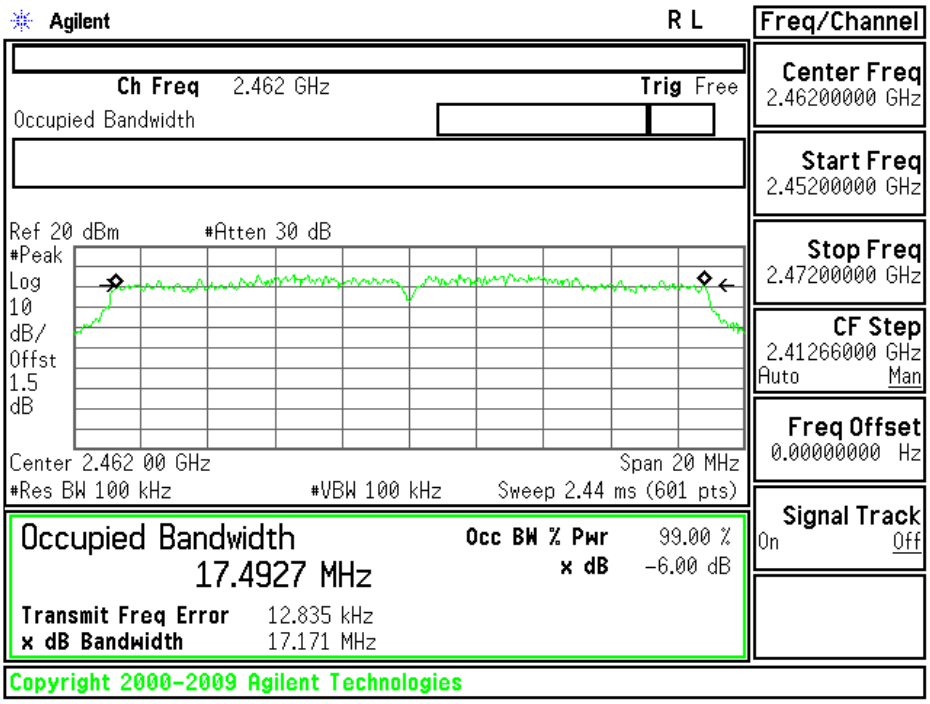
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

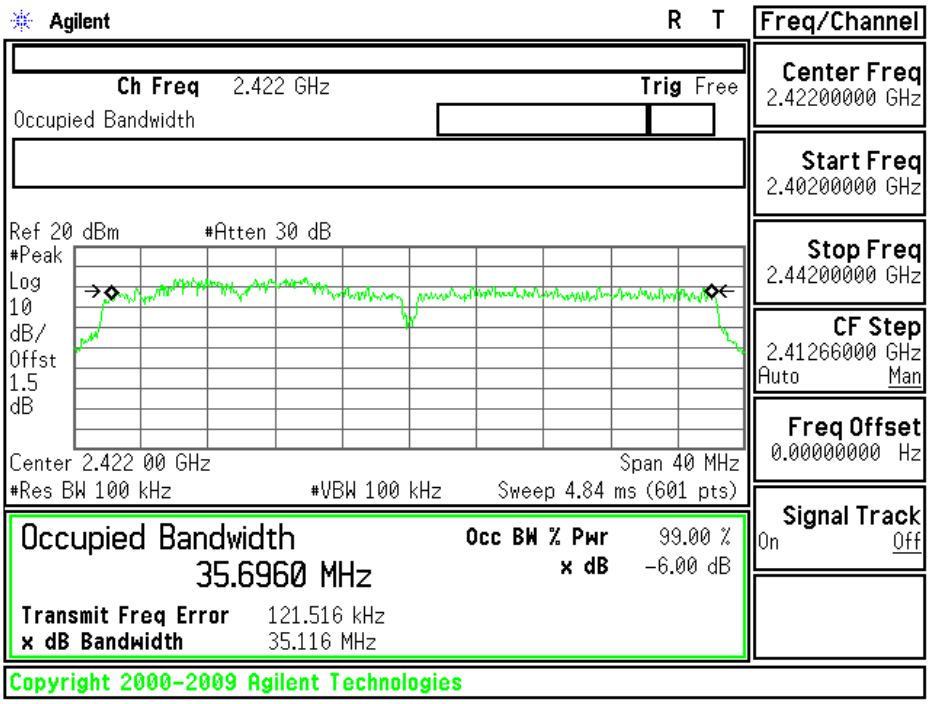


6dB Bandwidth (CH High)

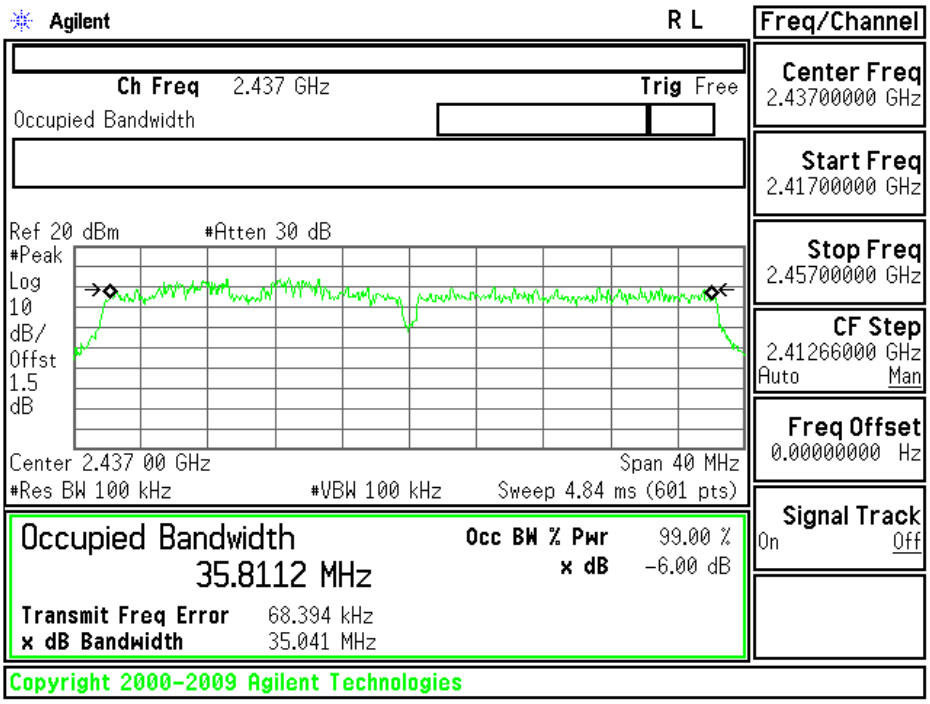


draft 802.11gn Standard-40 MHz Channel mode / Chain 0

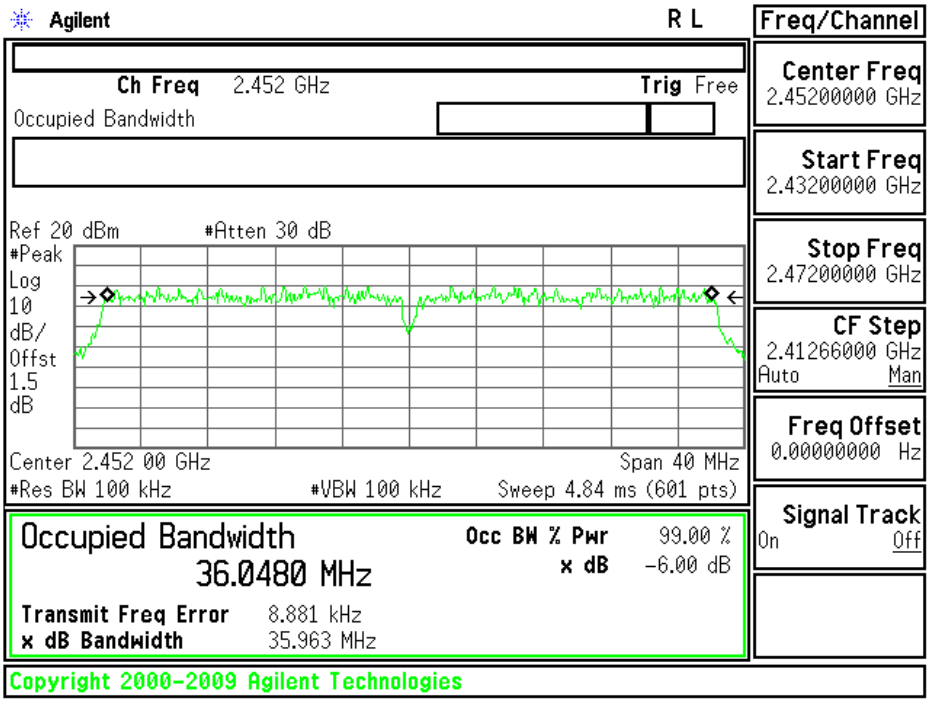
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

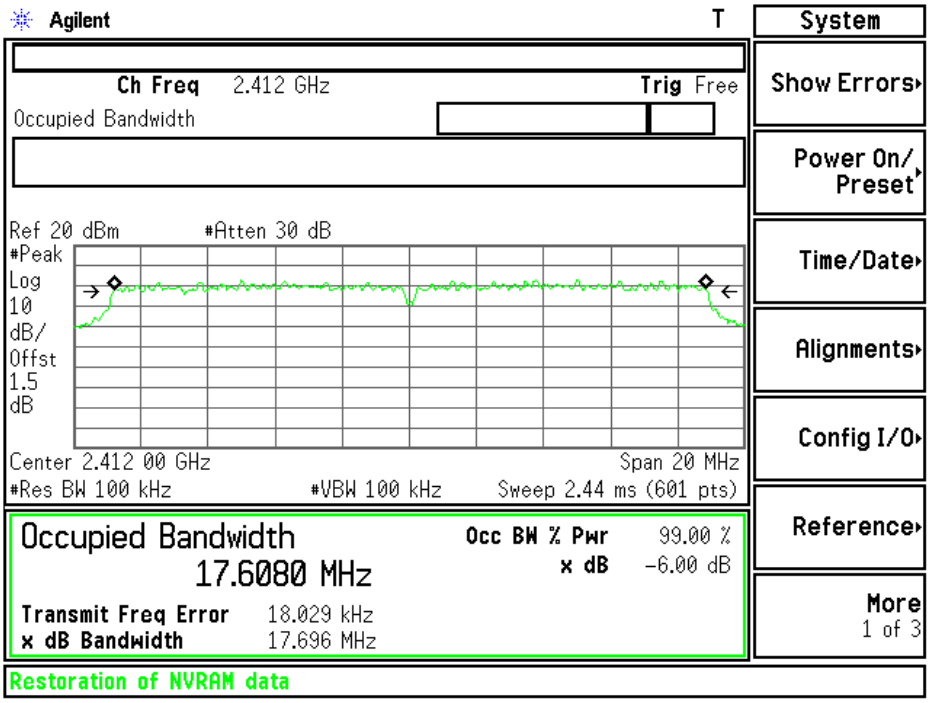


6dB Bandwidth (CH High)

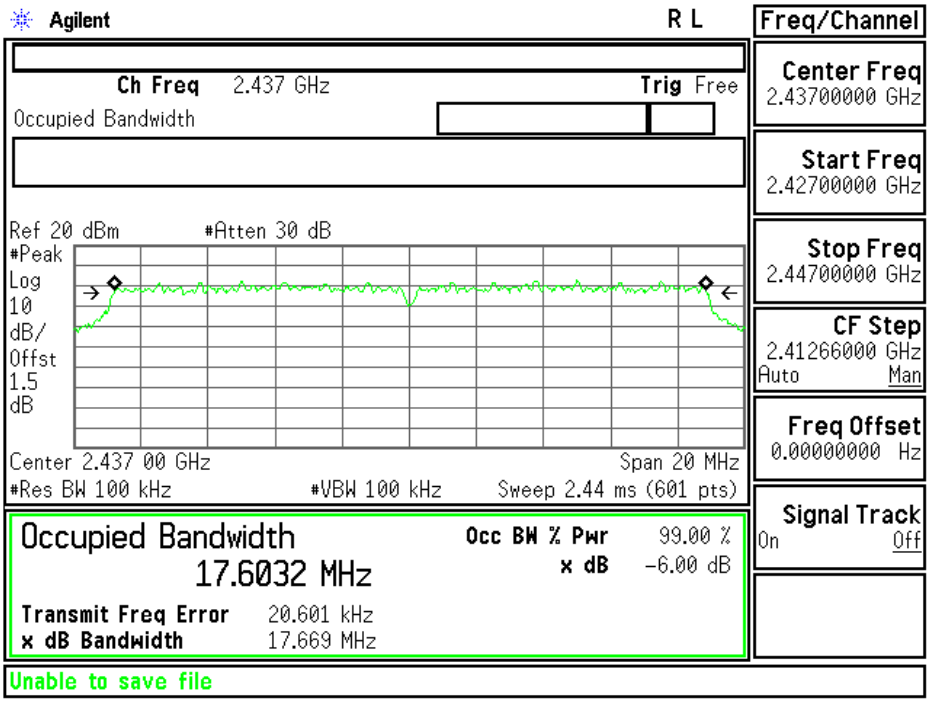


draft 802.11gn Wide-20 MHz Channel mode / Chain 1

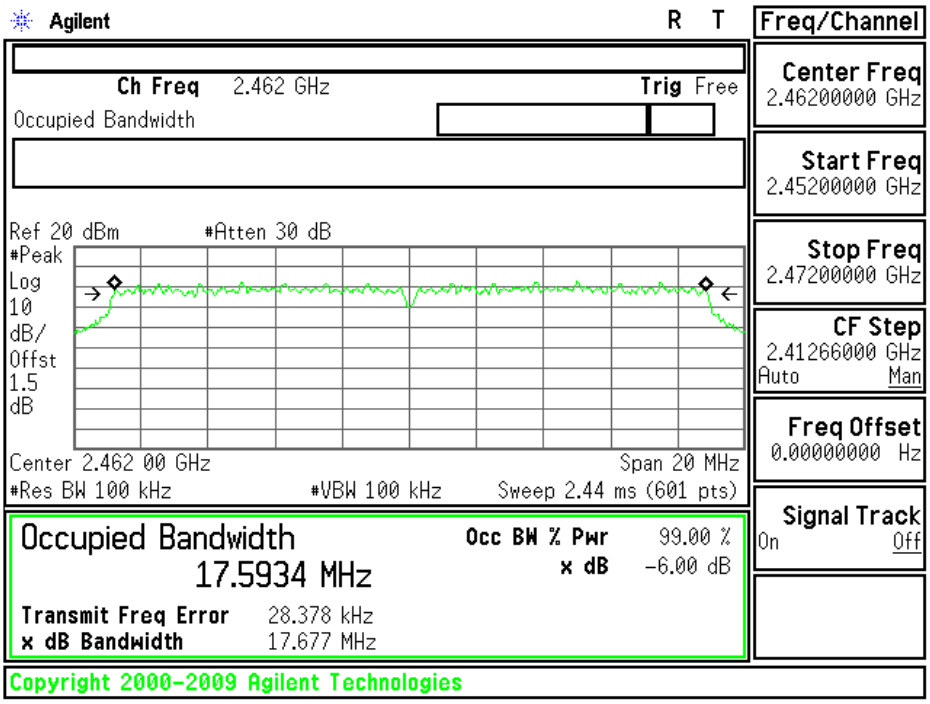
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

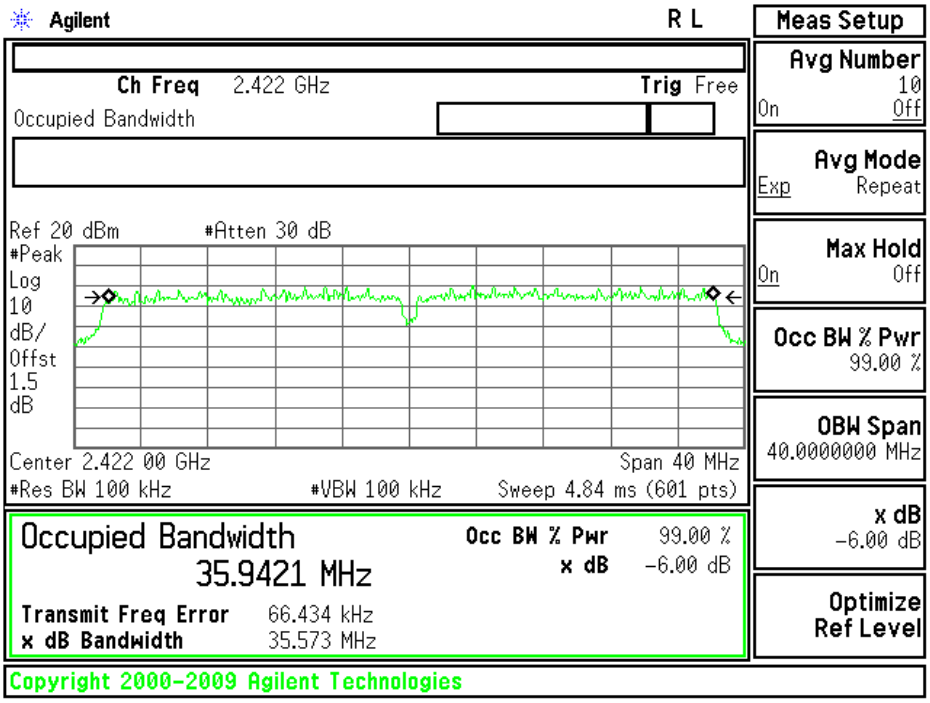


6dB Bandwidth (CH High)

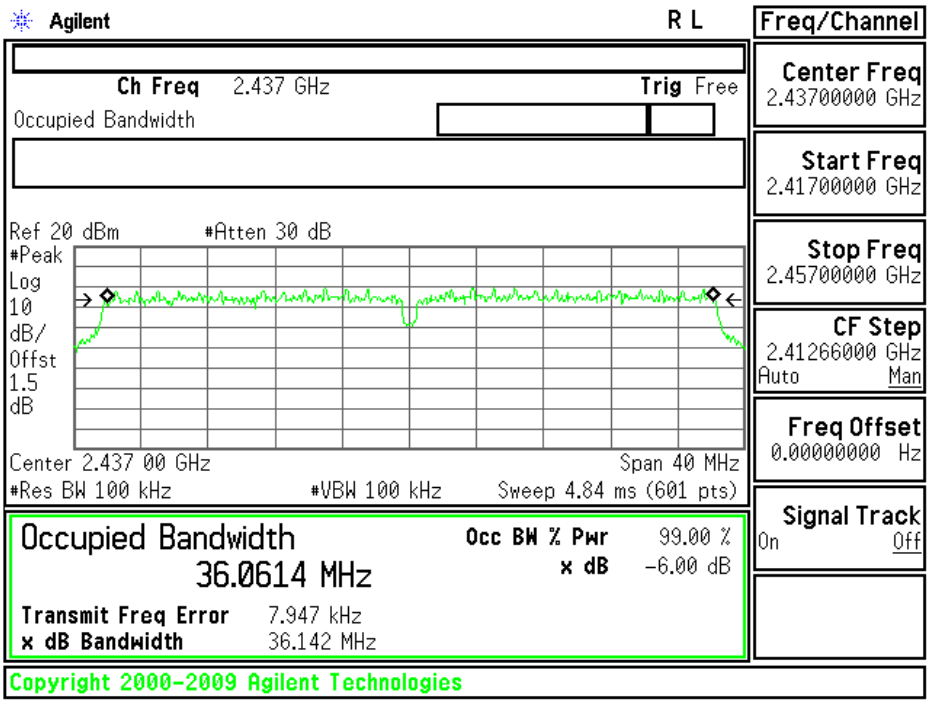


draft 802.11gn Wide-40 MHz Channel mode / Chain 1

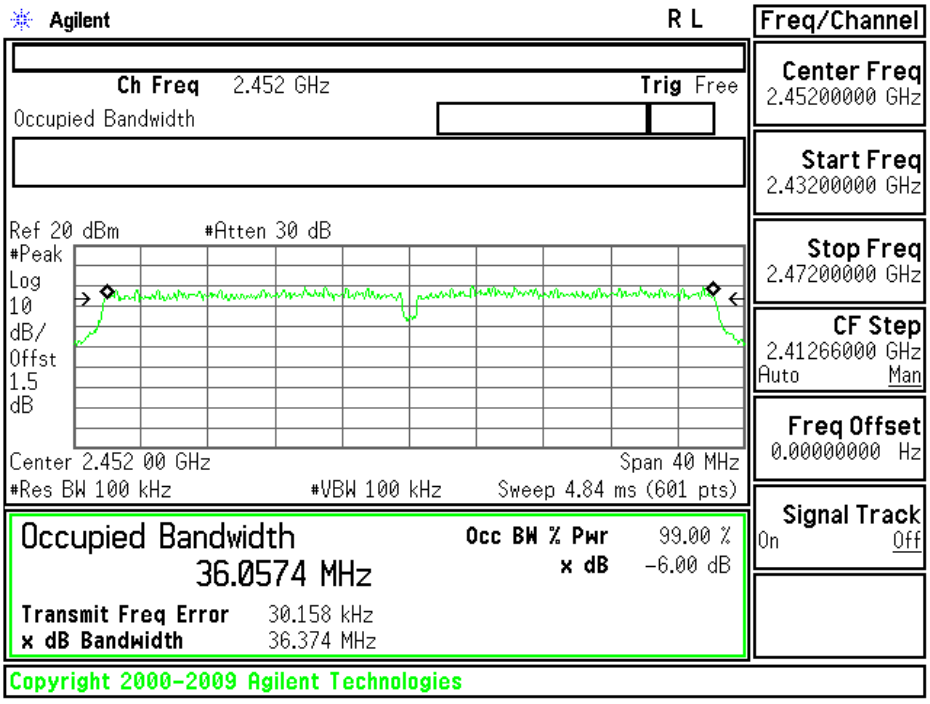
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

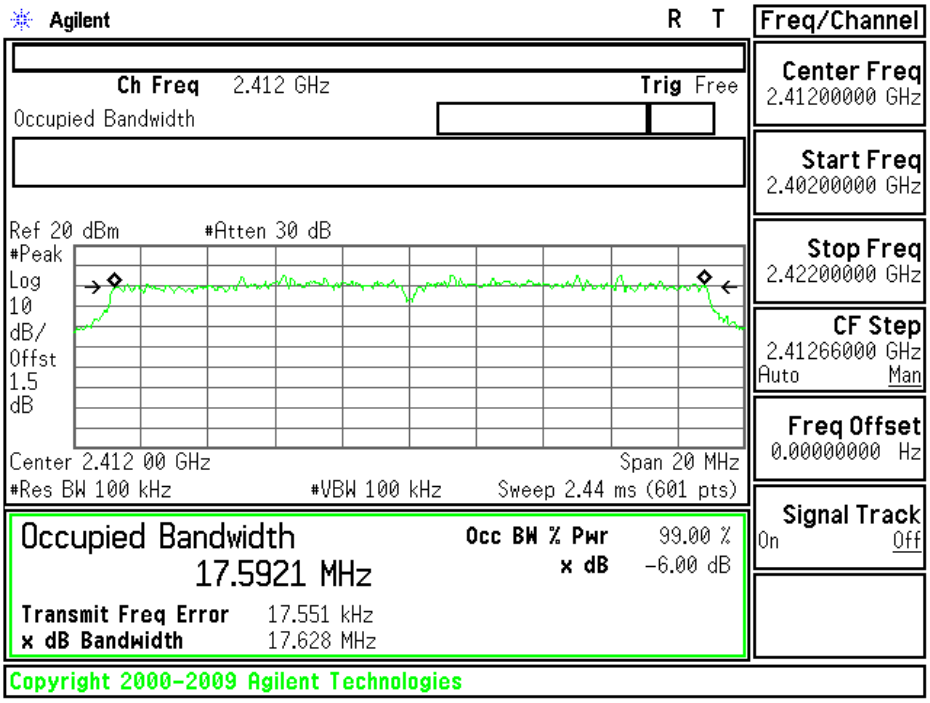


6dB Bandwidth (CH High)

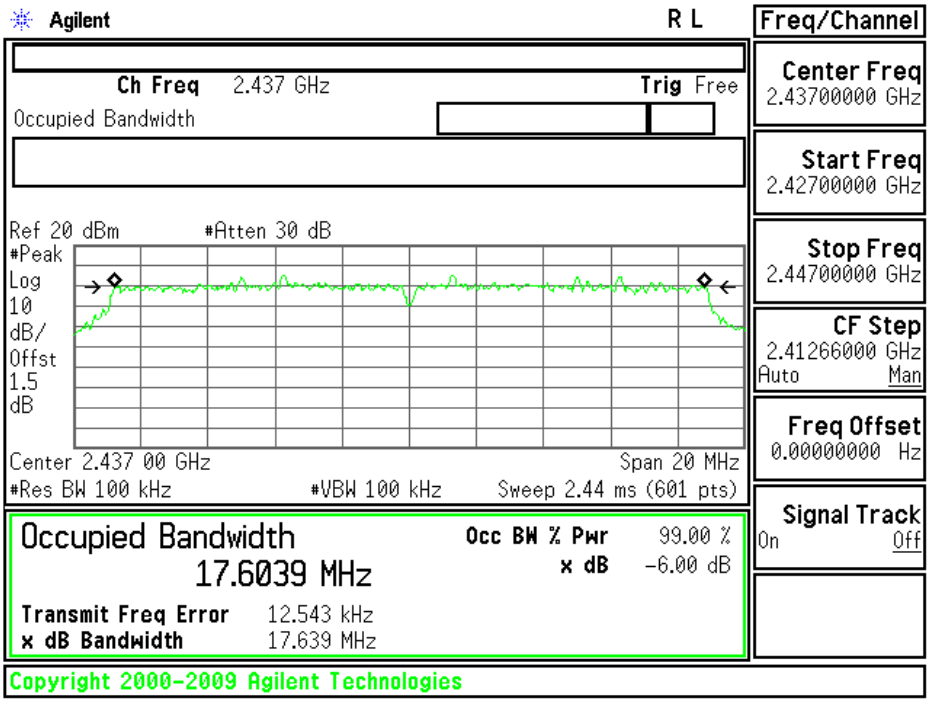


draft 802.11gn Standard-20 MHz Channel mode / Chain 0+ Chain 1

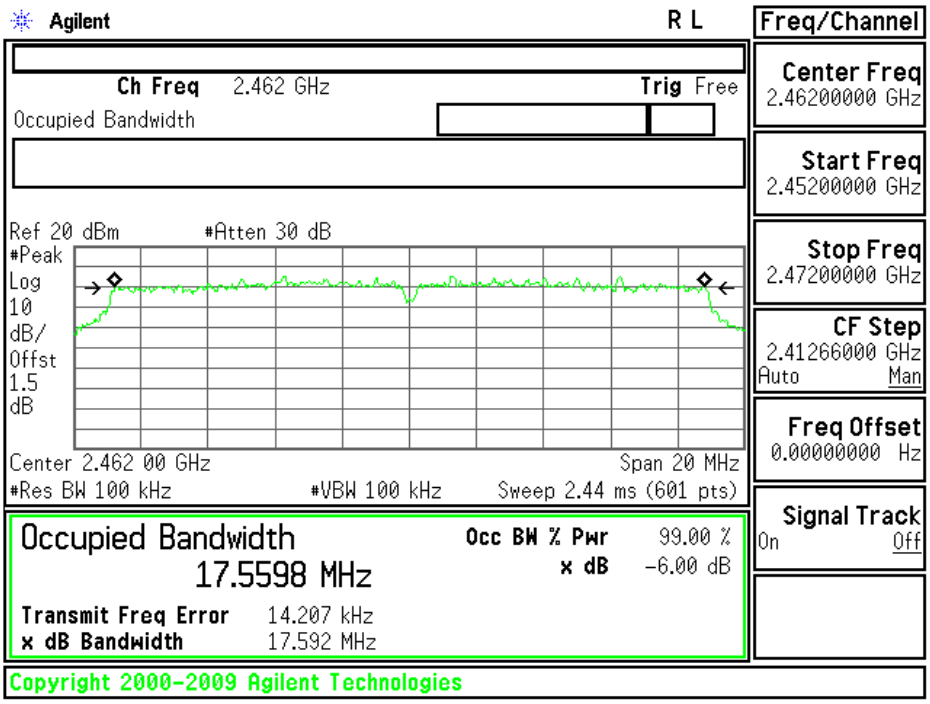
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

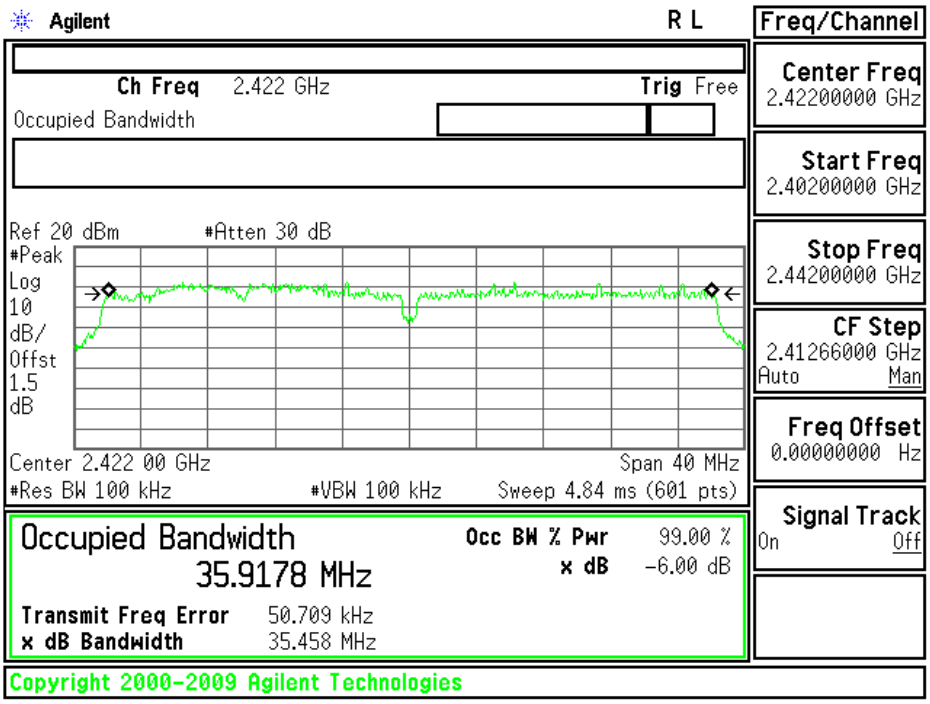


6dB Bandwidth (CH High)

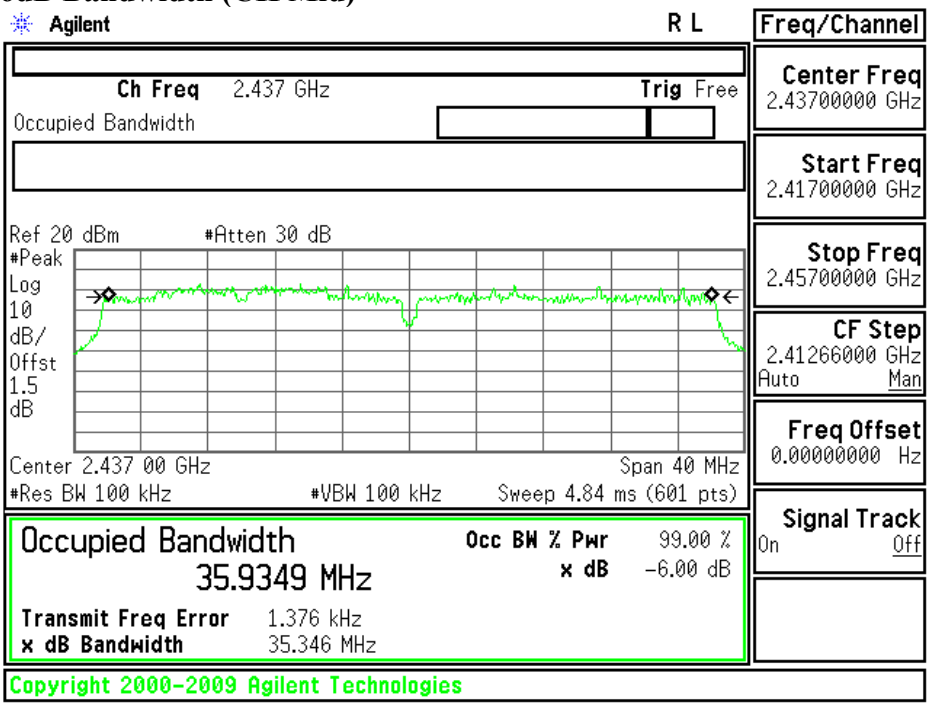


draft 802.11gn Wide-40 MHz Channel mode / Chain 0+ Chain 1

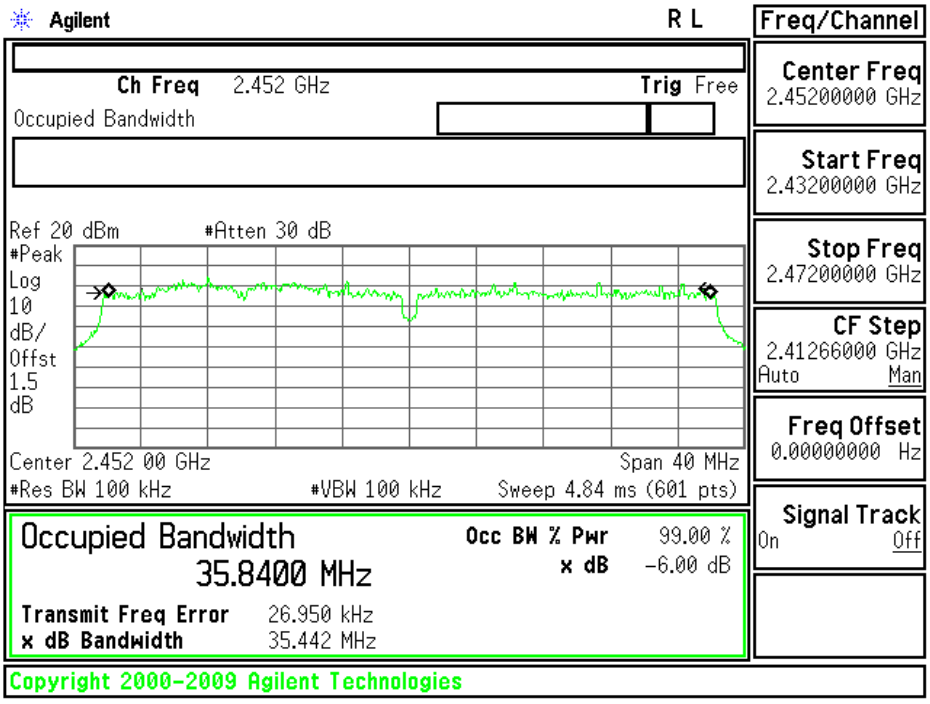
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



6dB Bandwidth (CH High)



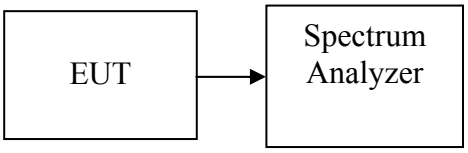
PEAK POWER

LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Configuration



TEST PROCEDURE

1 Set span to encompass the entire emission bandwidth (EBW) of the signal.
2 Set RBW = 1 MHz.
3 Set VBW ≥ 3 MHz.
4 Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode.
5 Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to ôhichfree runöhich.
6 Trace average 100 traces in power averaging mode.
7 Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer's b and power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	20.83	0.1211	1.00	PASS
Mid	2437	20.26	0.1062		PASS
High	2462	20.78	0.1197		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	21.51	0.1416	1.00	PASS
Mid	2437	21.54	0.1426		PASS
High	2462	21.40	0.1380		PASS

Test mode: draft 802.11gn Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	16.59	14.15	18.55	0.0716	1.00	PASS
Mid	2437	16.28	14.03	18.31	0.0678		PASS
High	2462	16.75	14.62	18.82	0.0762		PASS

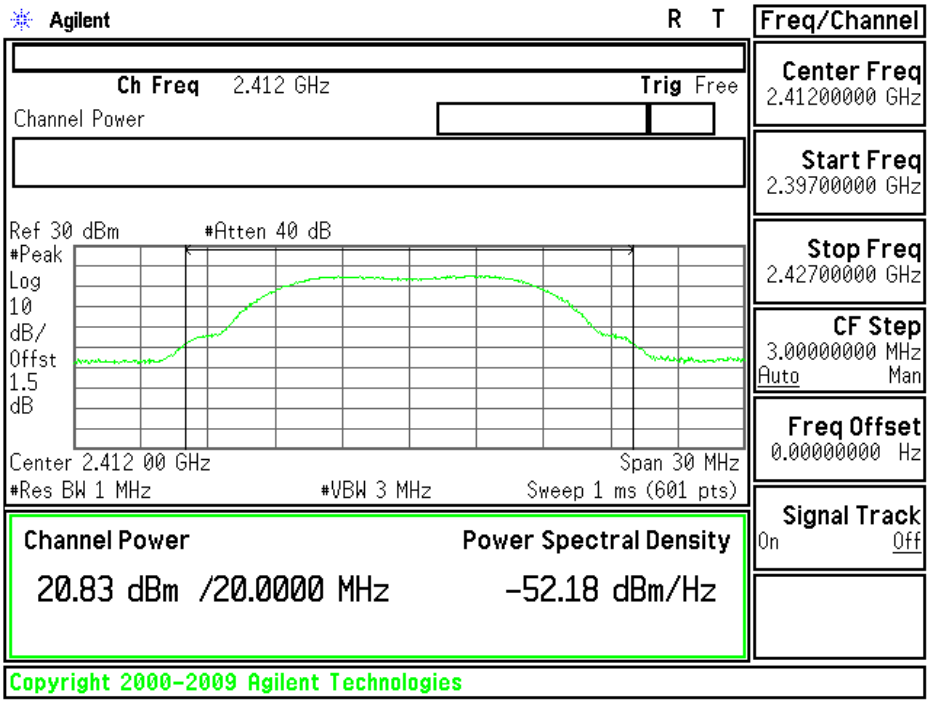
Test mode: draft 802.11gn Wide-40 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	14.55	13.18	16.93	0.0493	1.00	PASS
Mid	2437	14.16	13.19	16.71	0.0469		PASS
High	2452	14.40	13.07	16.80	0.0479		PASS

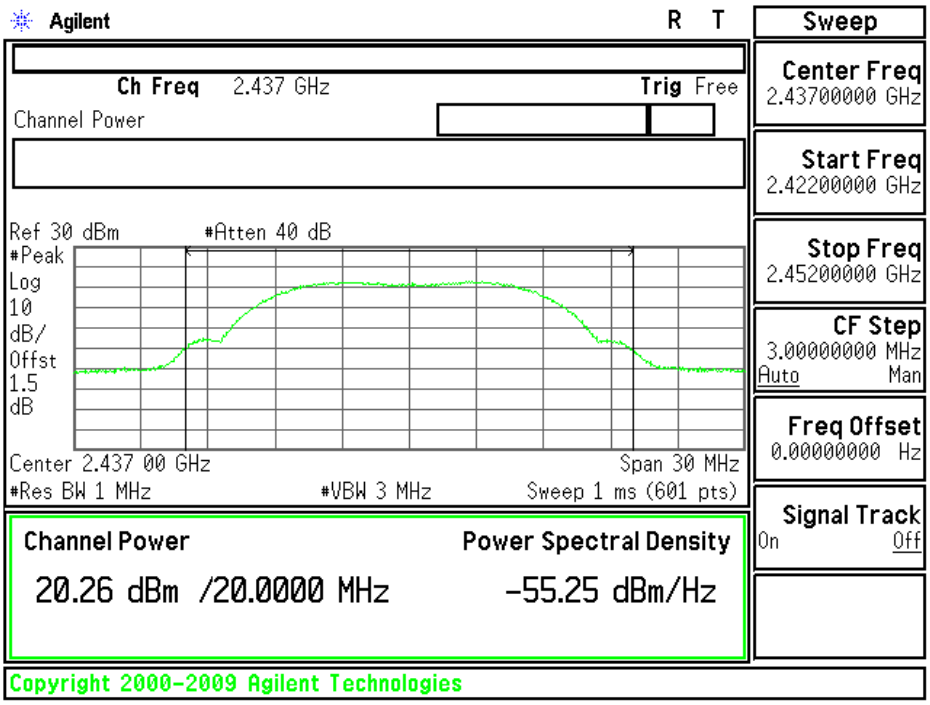
Test Plot

IEEE 802.11b mode

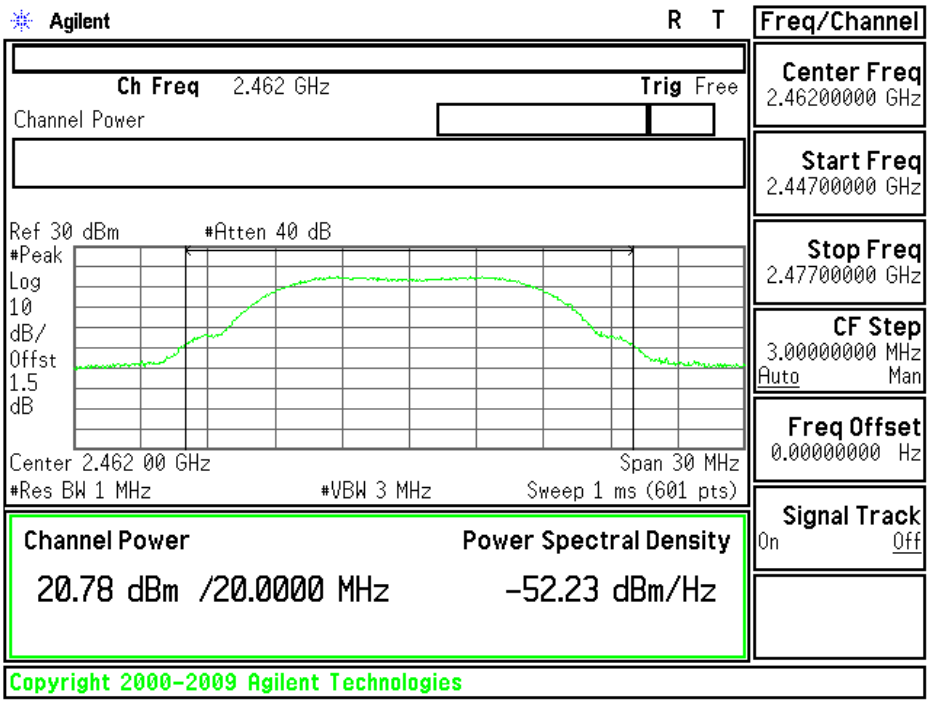
Peak Power (CH Low)



Peak Power (CH Mid)

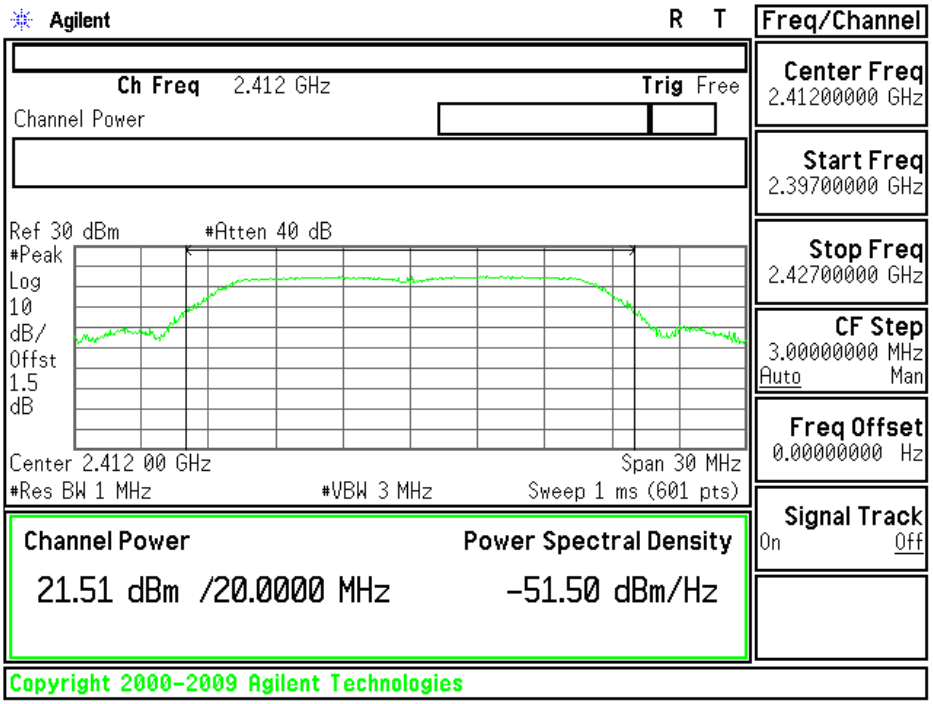


Peak Power (CH High)

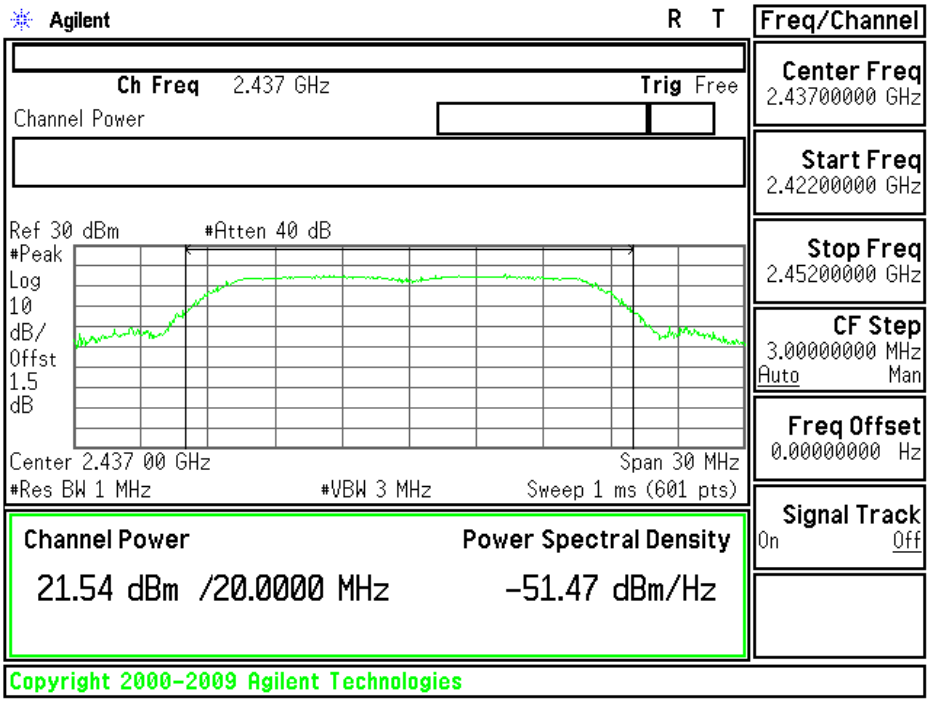


IEEE 802.11g mode

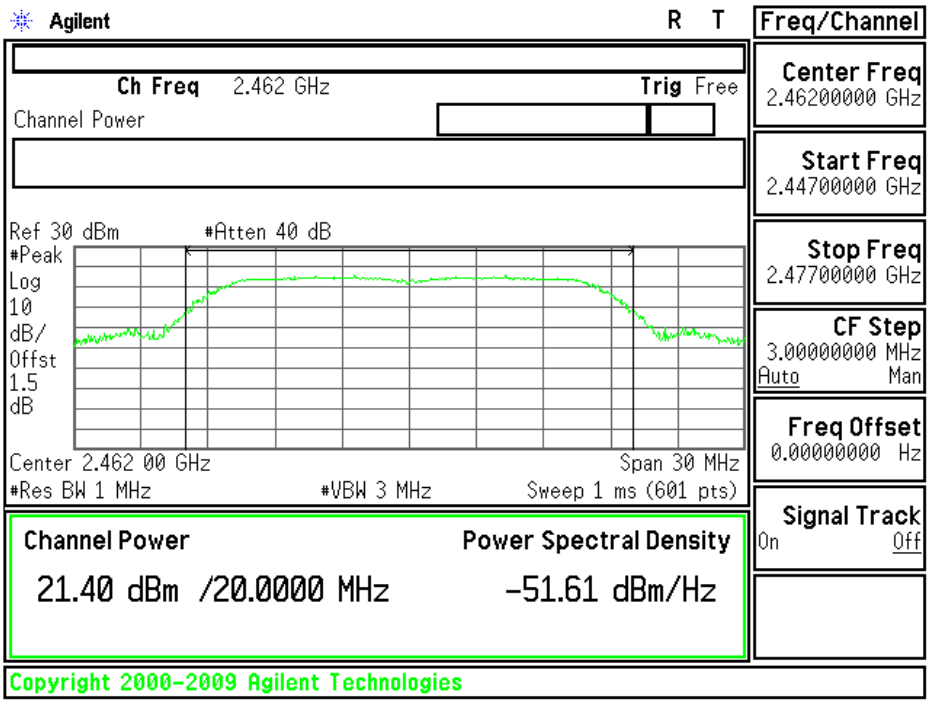
Peak Power (CH Low)



Peak Power (CH Mid)

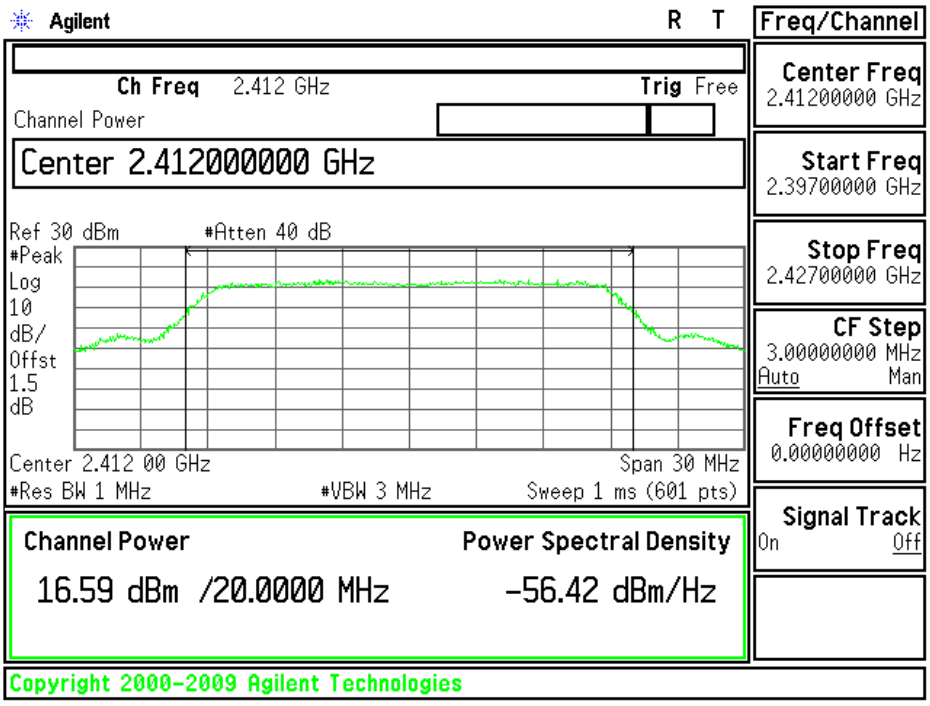


Peak Power (CH High)

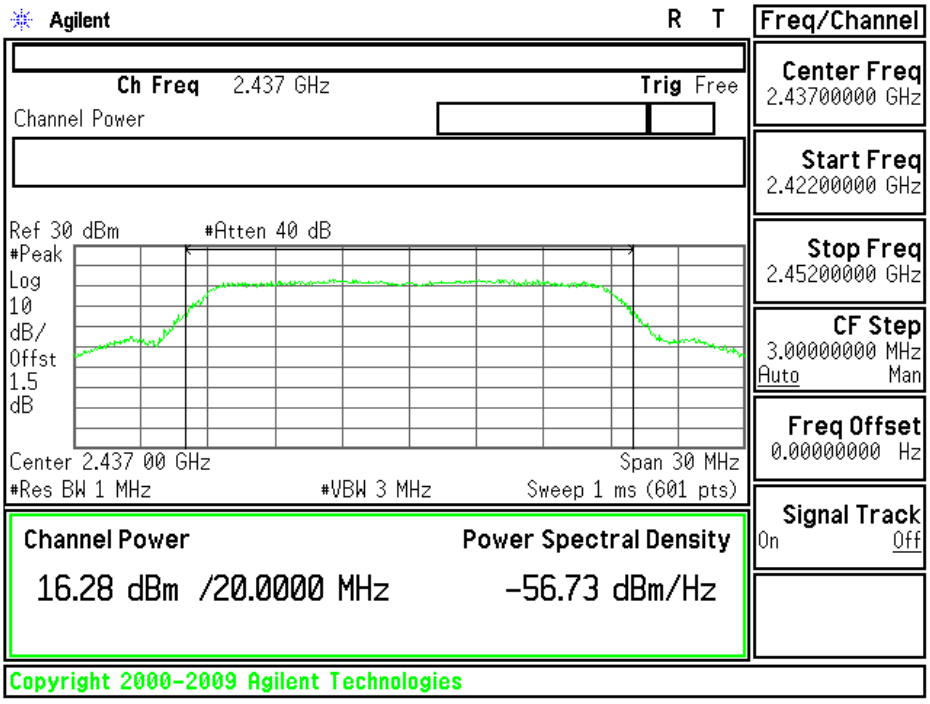


draft 802.11gn Standard-20 MHz Channel mode / Chain 0

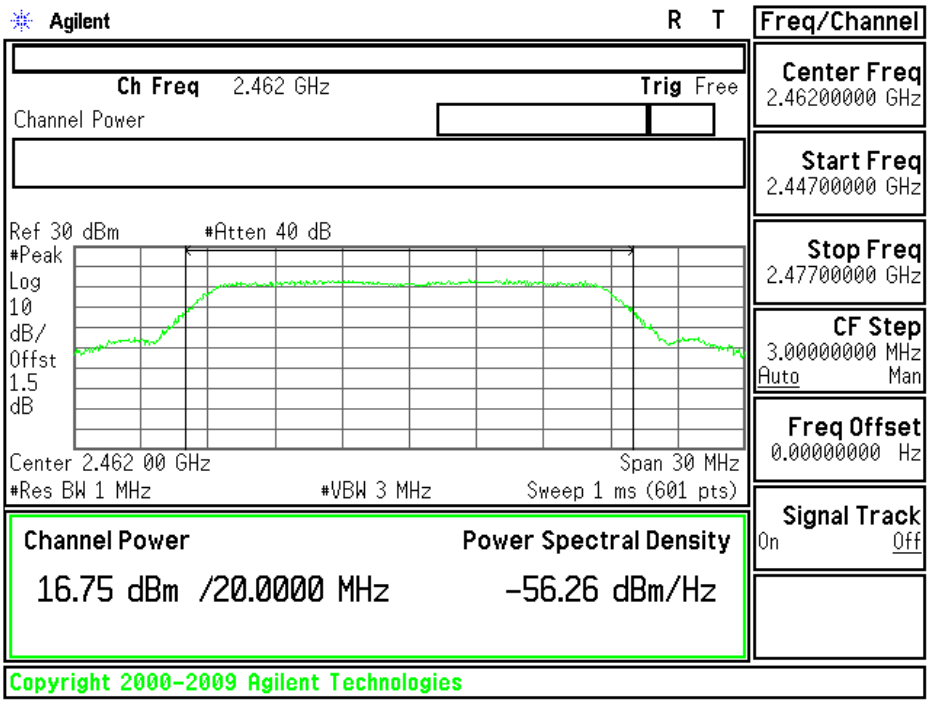
Peak Power (CH Low)



Peak Power (CH Mid)

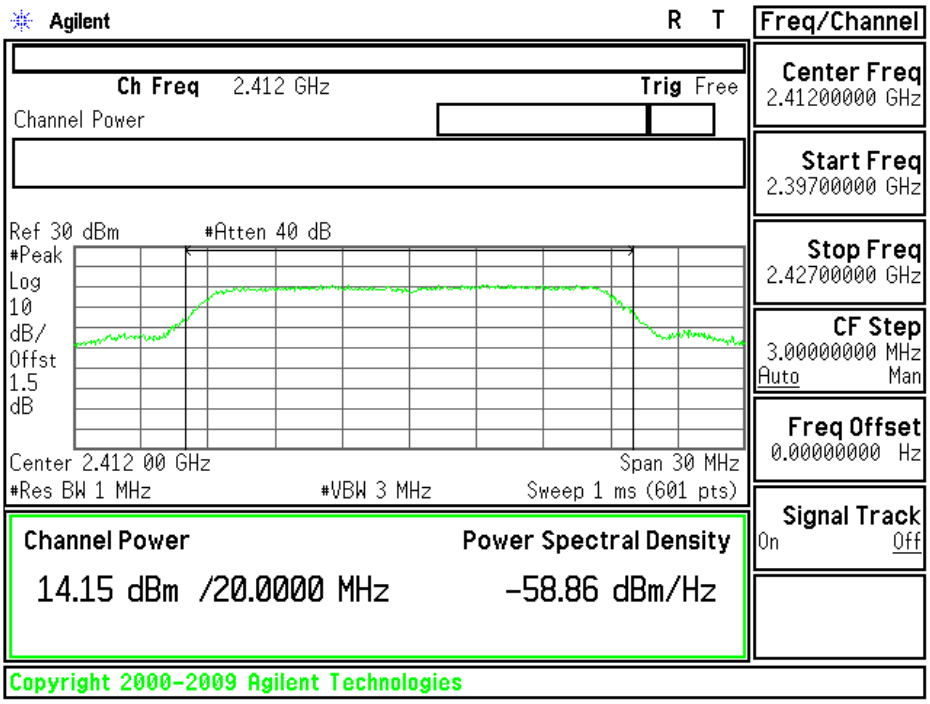


Peak Power (CH High)

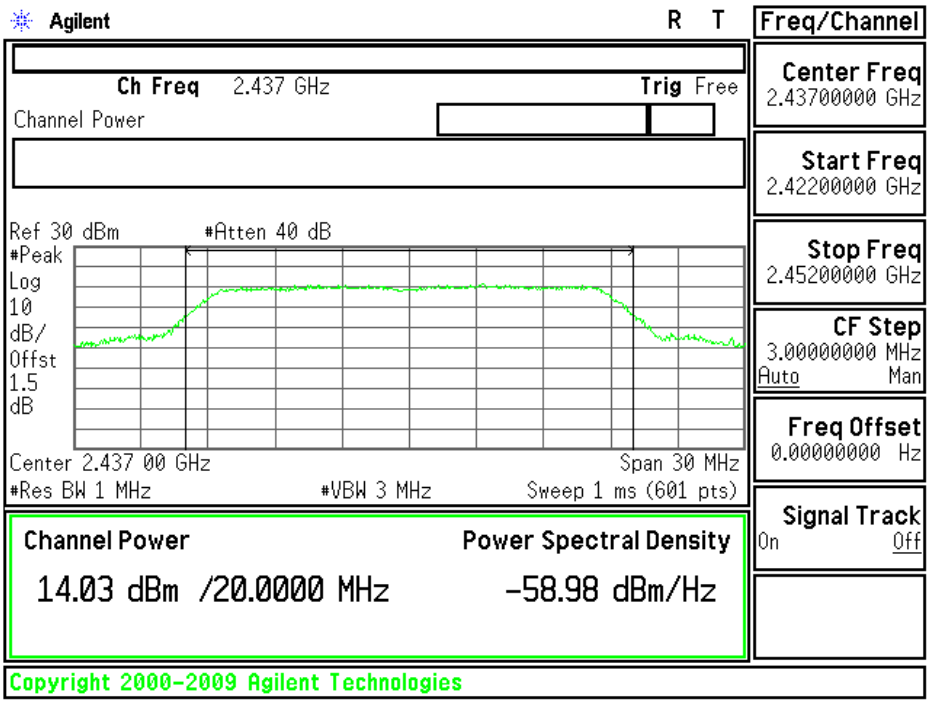


draft 802.11gn Standard-20 MHz Channel mode / Chain 1

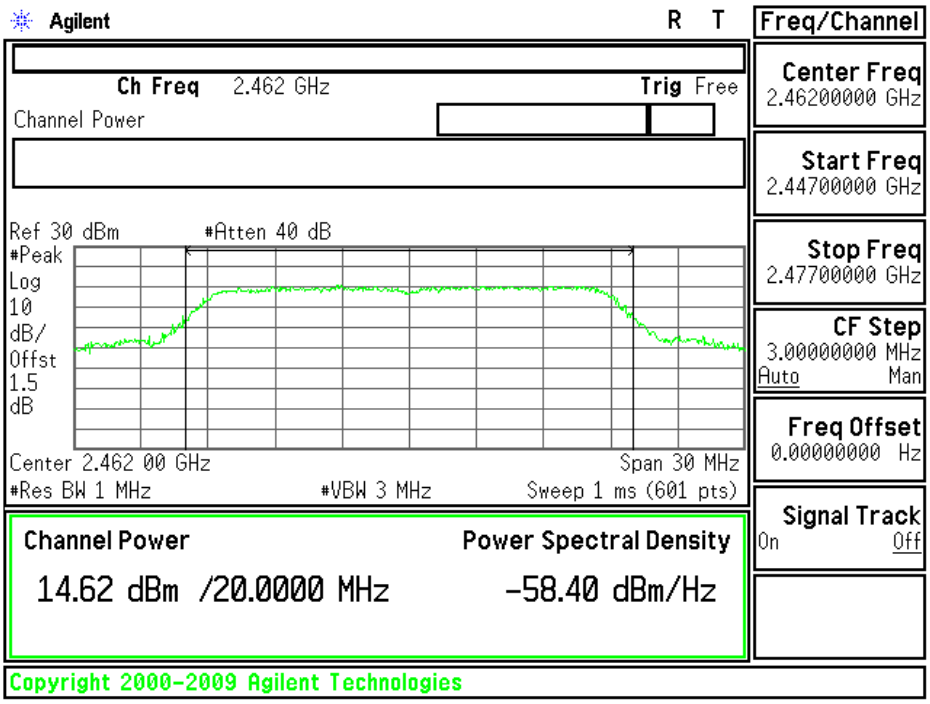
Peak Power (CH Low)



Peak Power (CH Mid)

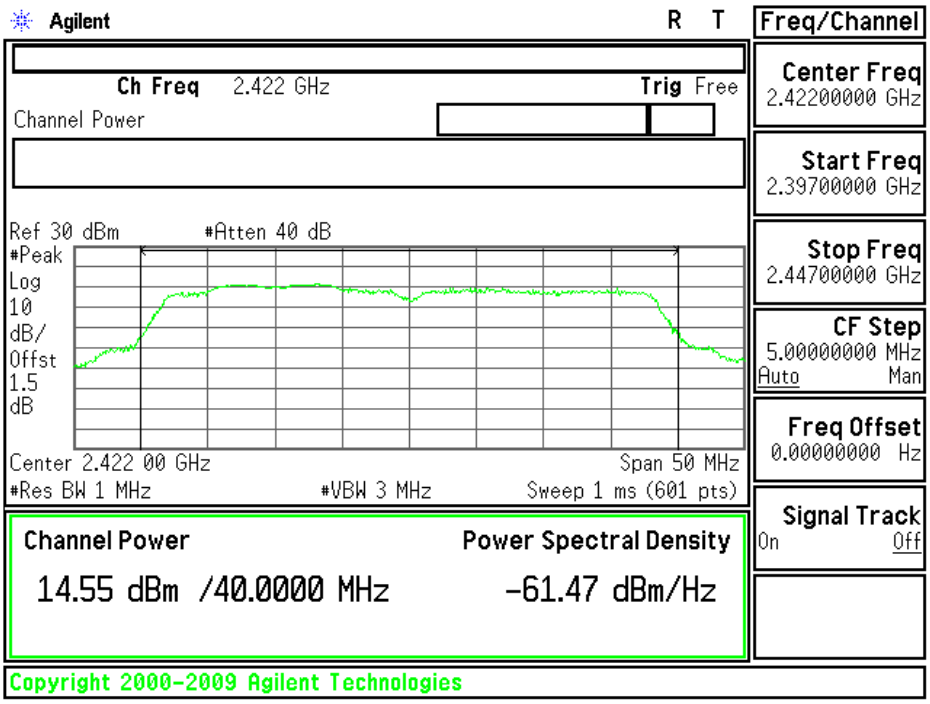


Peak Power (CH High)

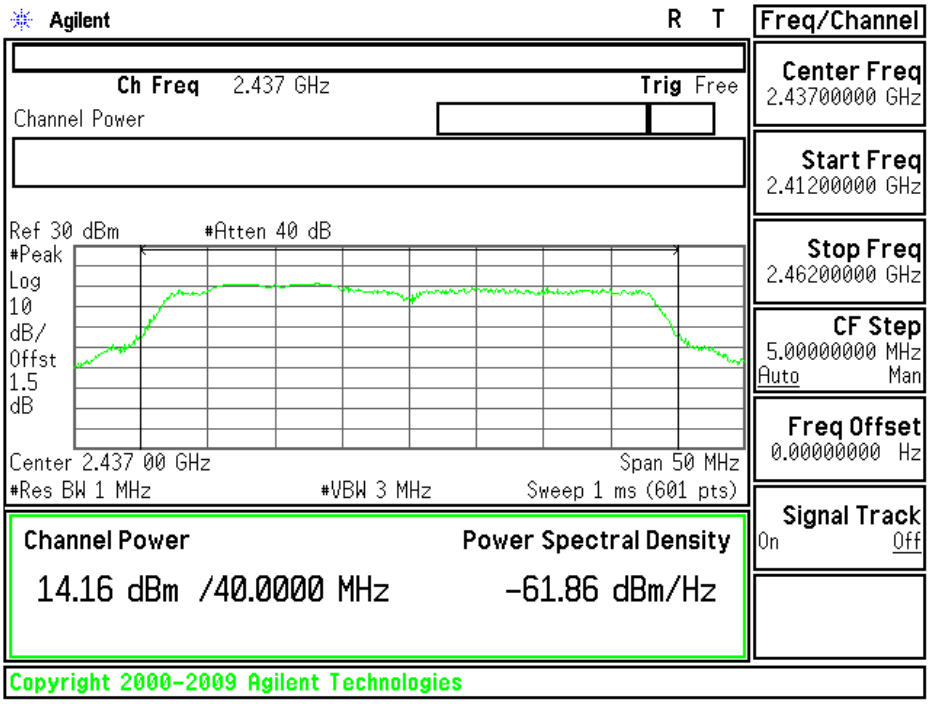


draft 802.11gn Wide-40 MHz Channel mode / Chain 0

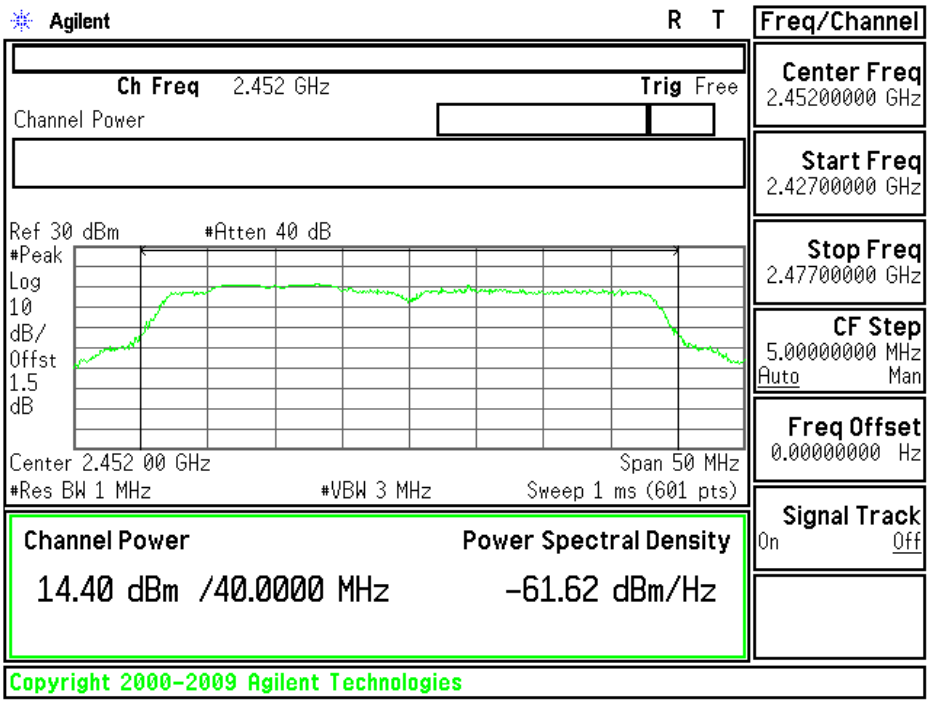
Peak Power (CH Low)



Peak Power (CH Mid)

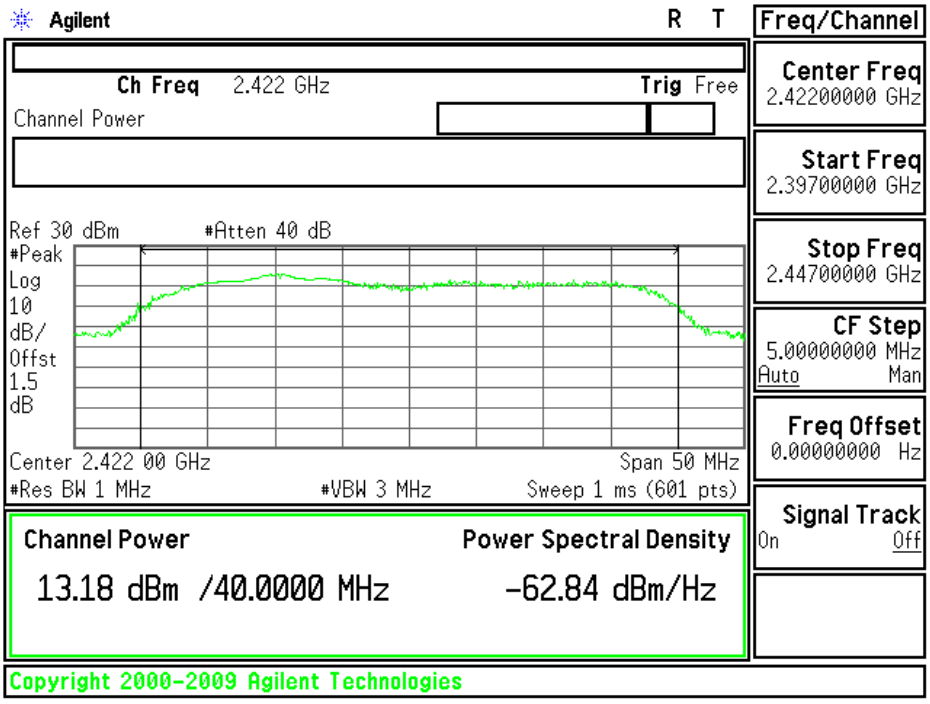


Peak Power (CH High)

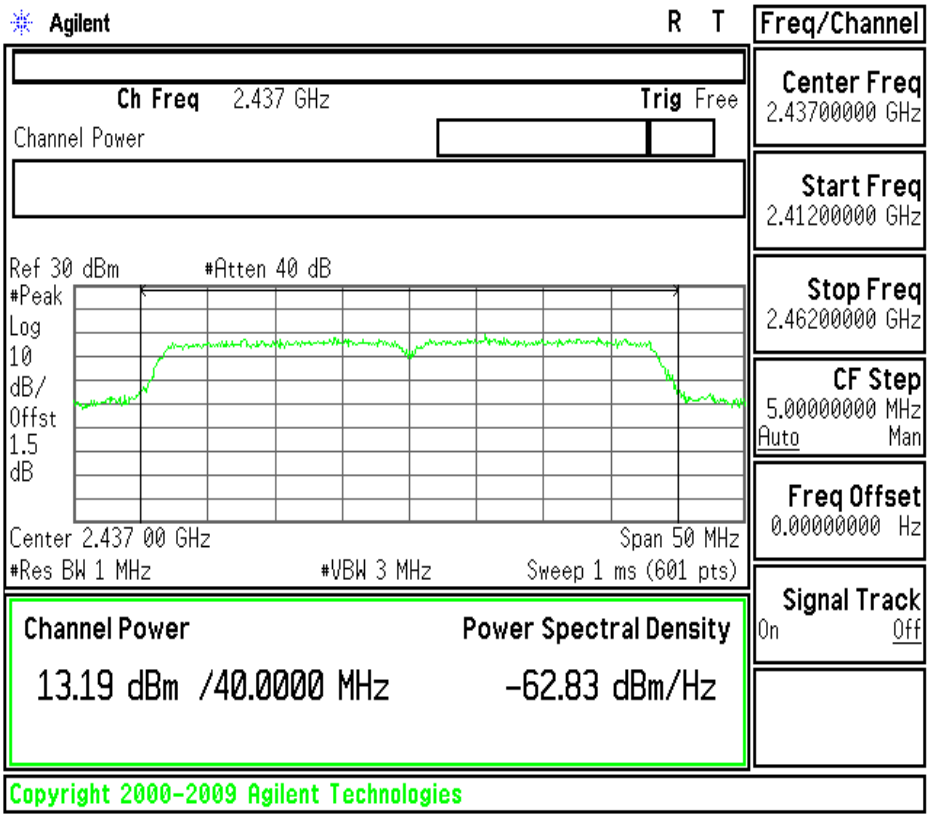


draft 802.11gn Wide-40 MHz Channel mode / Chain 1

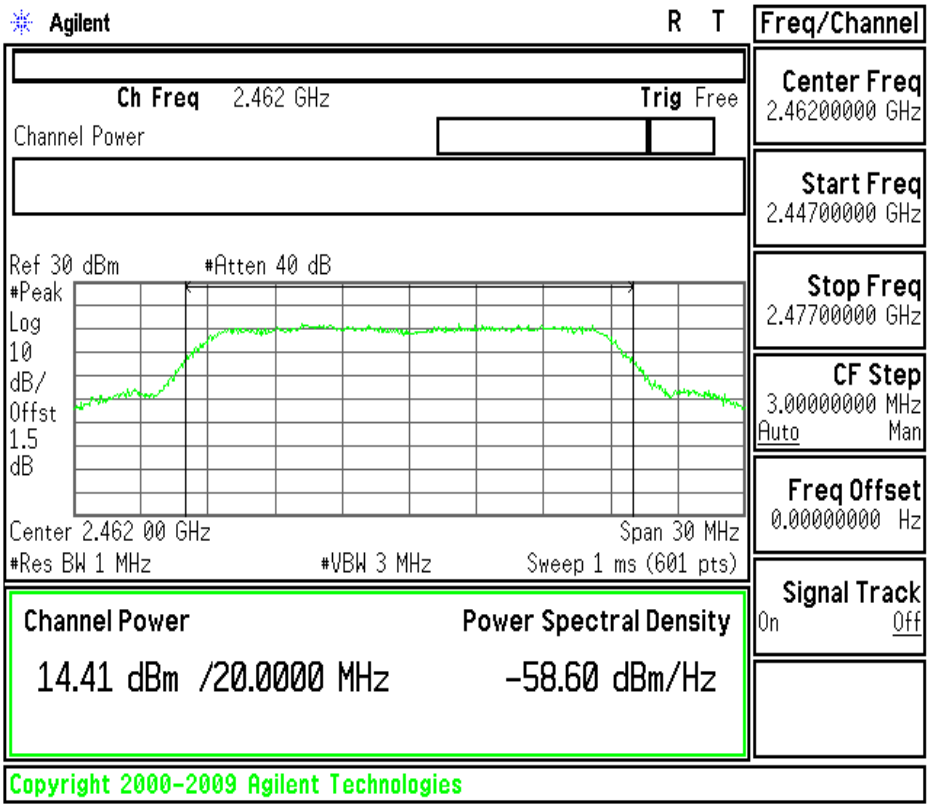
Peak Power (CH Low)



Peak Power (CH Mid)



Peak Power (CH High)

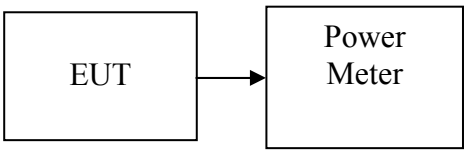


AVERAGE POWER

LIMIT

None; for reporting purposes only.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the Power meter.

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)
Low	2412	17.97
Mid	2437	17.79
High	2462	17.81

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)
Low	2412	18.06
Mid	2437	18.13
High	2462	18.03

Test mode: draft 802.11gn Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Output Power (dBm)
Low	2412	12.97	10.12	14.79
Mid	2437	12.80	10.38	14.77
High	2462	12.26	10.77	14.59

Test mode: draft 802.11gn Wide-40 MHz Channel mode

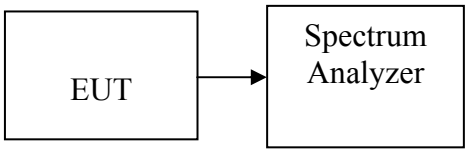
Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Output Power (dBm)
Low	2422	10.79	9.52	13.21
Mid	2437	10.35	9.19	12.82
High	2452	10.60	9.10	12.92

PEAK POWER SPECTRAL DENSITY

LIMIT

1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
   Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3 kHz, VBW = 10 kHz, Span = 300 kHz, Sweep = 100 s
3. Record the max reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-5.49	8.00	PASS
Mid	2437	-6.45	8.00	PASS
High	2462	-5.27	8.00	PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-7.82	8.00	PASS
Mid	2437	-7.65	8.00	PASS
High	2462	-7.20	8.00	PASS

Test mode: draft 802.11gn Standard-20 MHz Channel mode

Channel	Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Result
Low	2412	-7.34	-13.77	-6.45	8.00	PASS
Mid	2437	-7.78	-11.14	-6.13	8.00	PASS
High	2462	-7.06	-11.91	-5.83	8.00	PASS

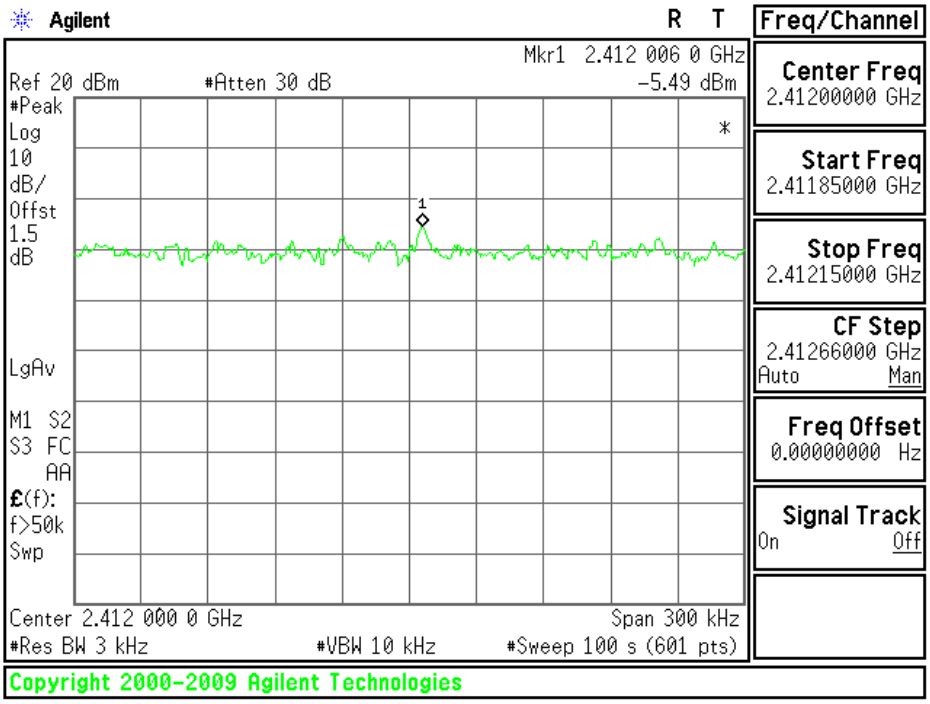
Test mode: draft 802.11gn Wide-40 MHz Channel mode

Channel	Frequency (MHz)	PPSD Chain 0 (dBm)	PPSD Chain 1 (dBm)	PPSD Total (dBm)	Limit (dBm)	Result
Low	2422	-6.85	-12.51	-5.81	8.00	PASS
Mid	2437	-7.66	-11.60	-6.19	8.00	PASS
High	2452	-7.29	-13.31	-6.32	8.00	PASS

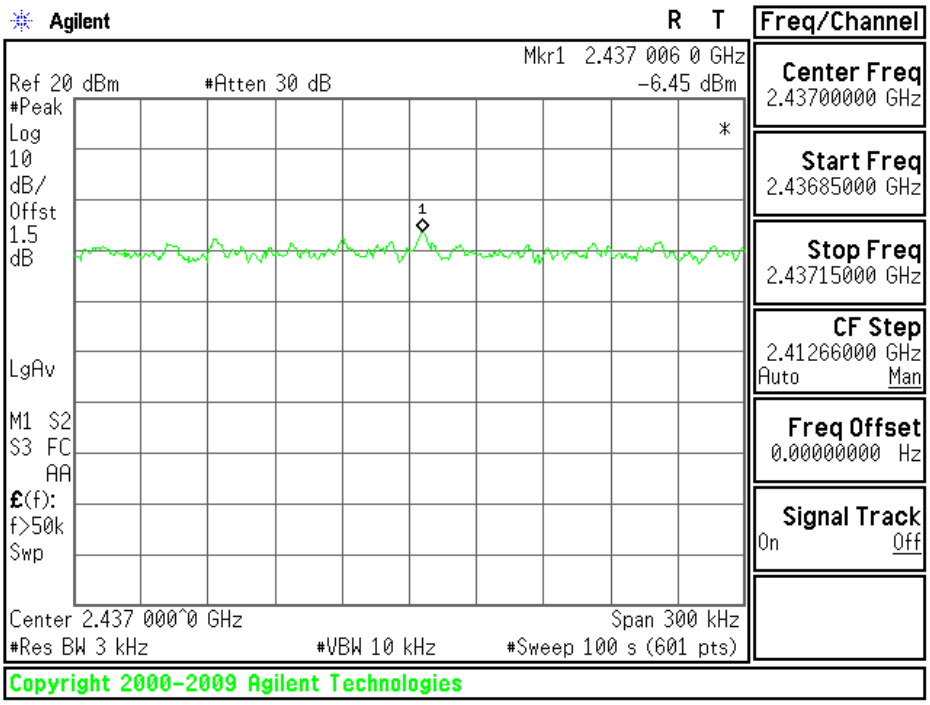
Test Plot

IEEE 802.11b mode

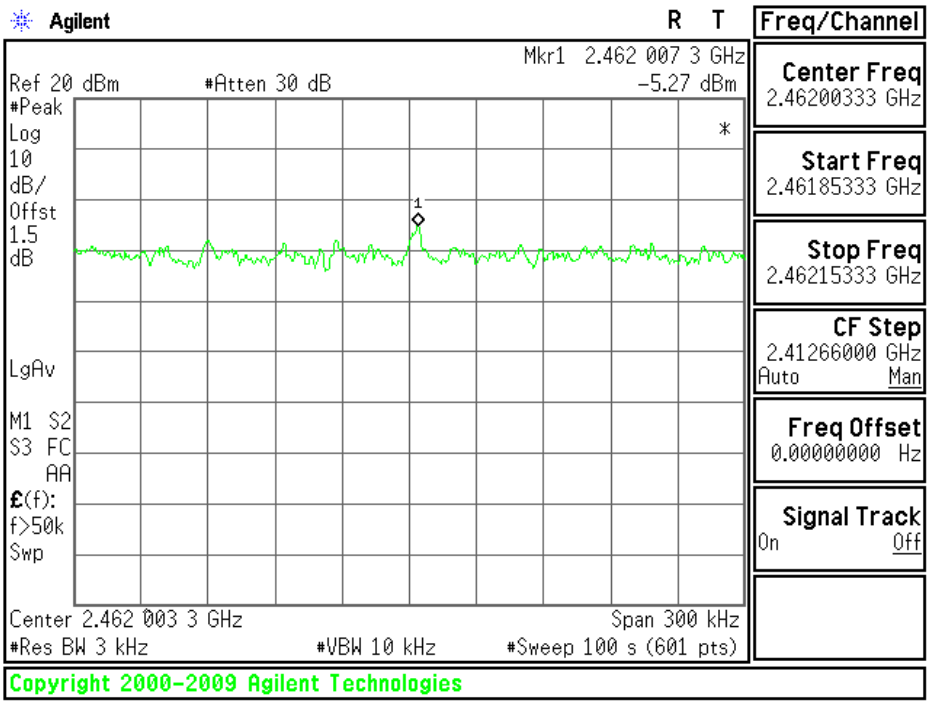
PPSD (CH Low)



PPSD (CH Mid)

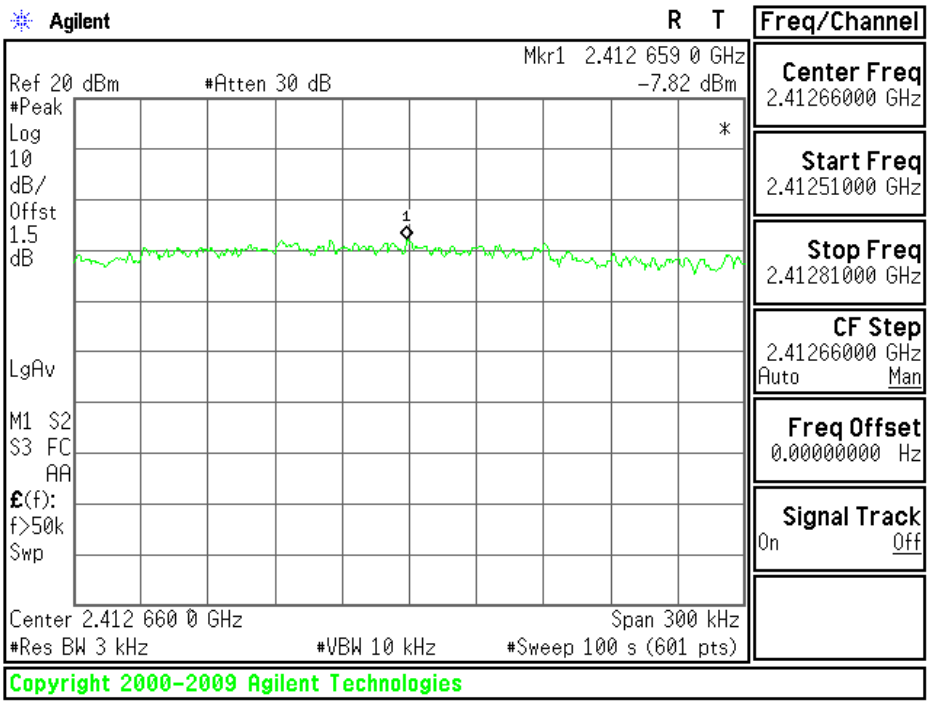


PPSD (CH High)

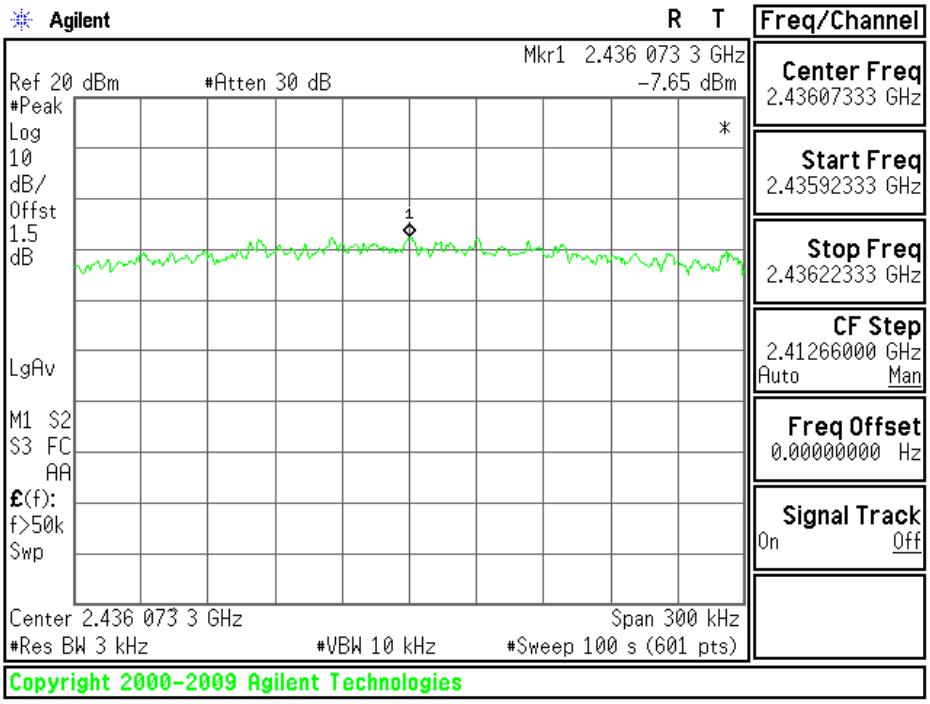


IEEE 802.11g mode

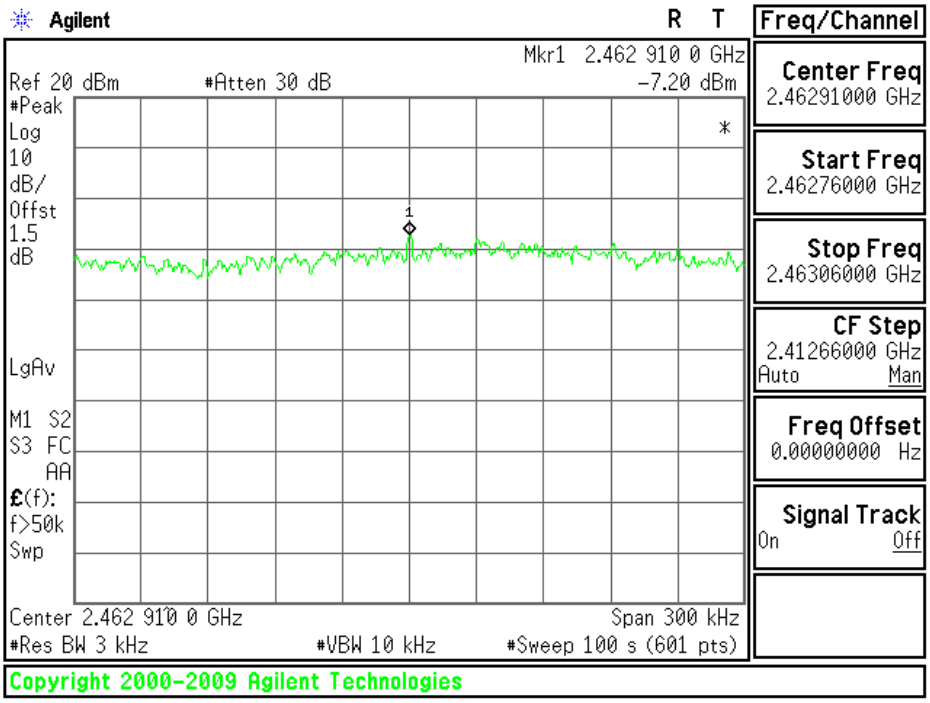
PPSD (CH Low)



PPSD (CH Mid)

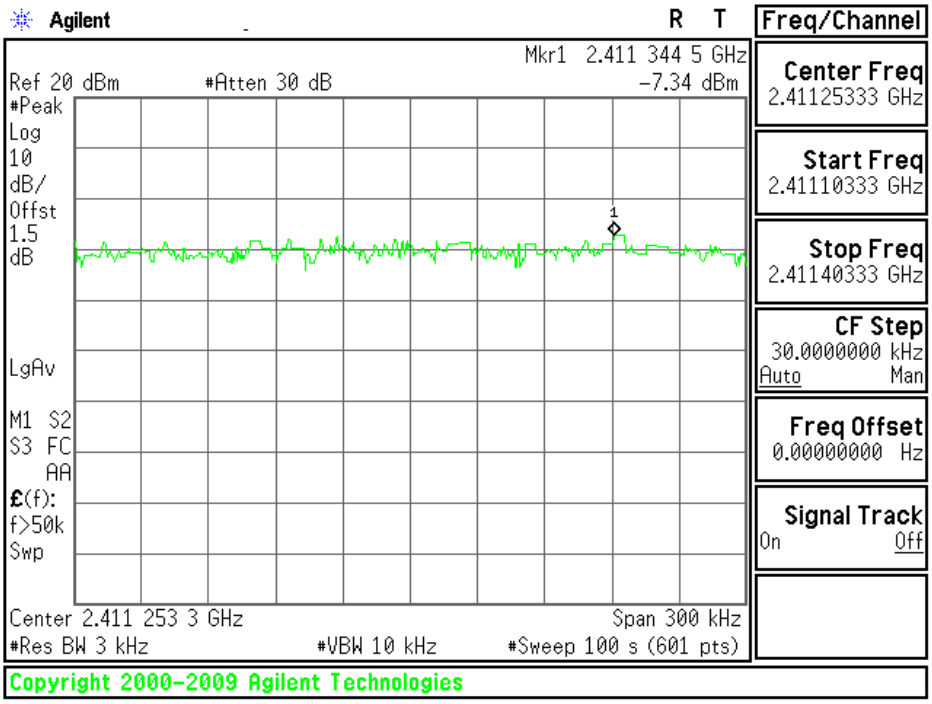


PPSD (CH High)

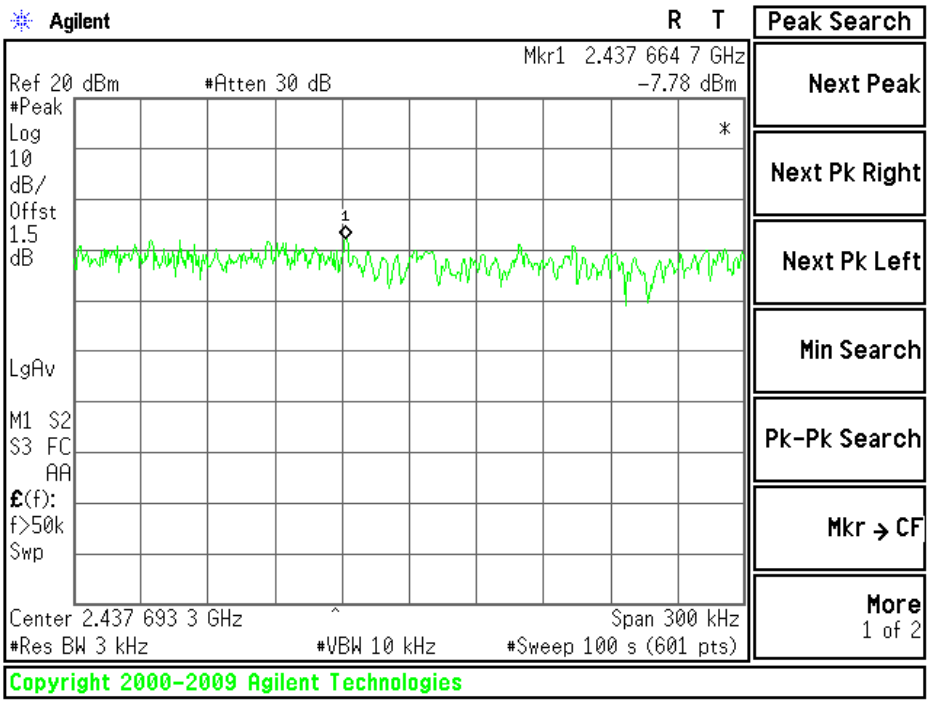


draft 802.11gn Standard-20 MHz Channel mode / Chain 0

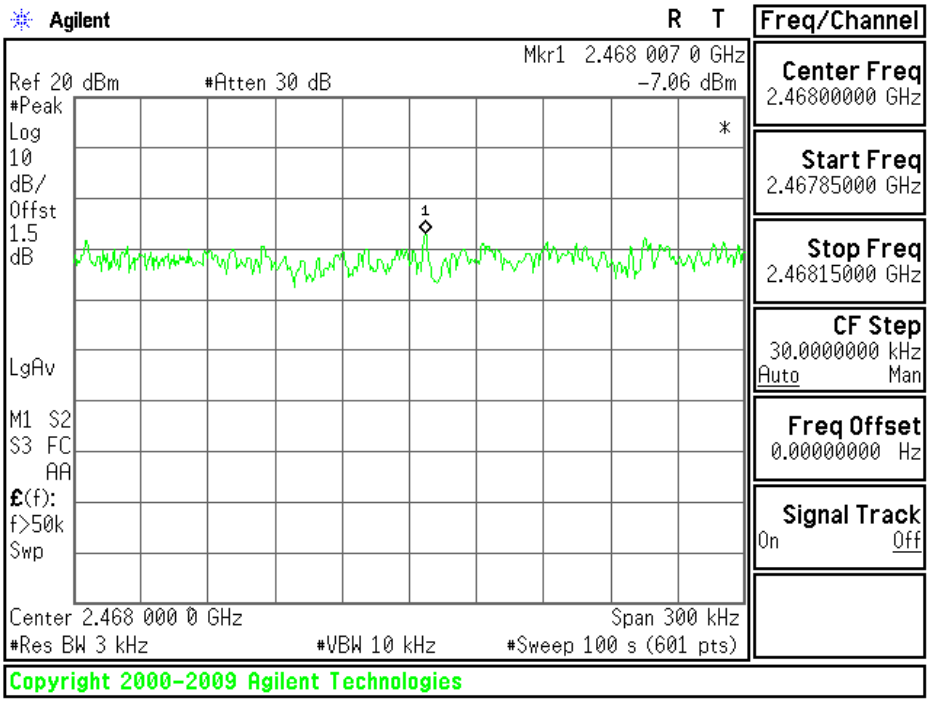
PPSD (CH Low)



PPSD (CH Mid)

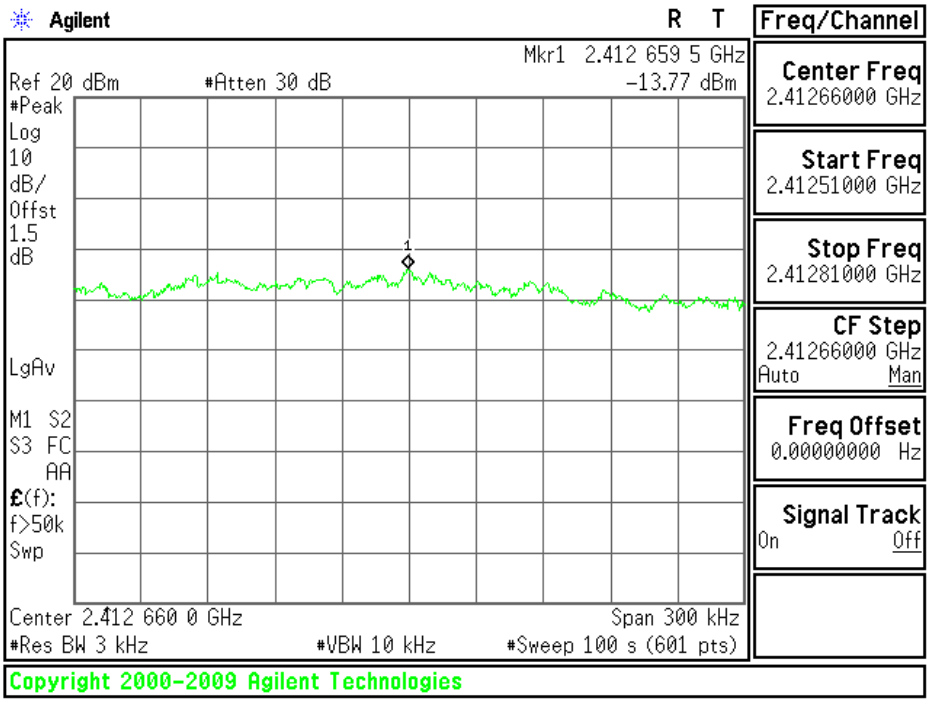


PPSD (CH High)

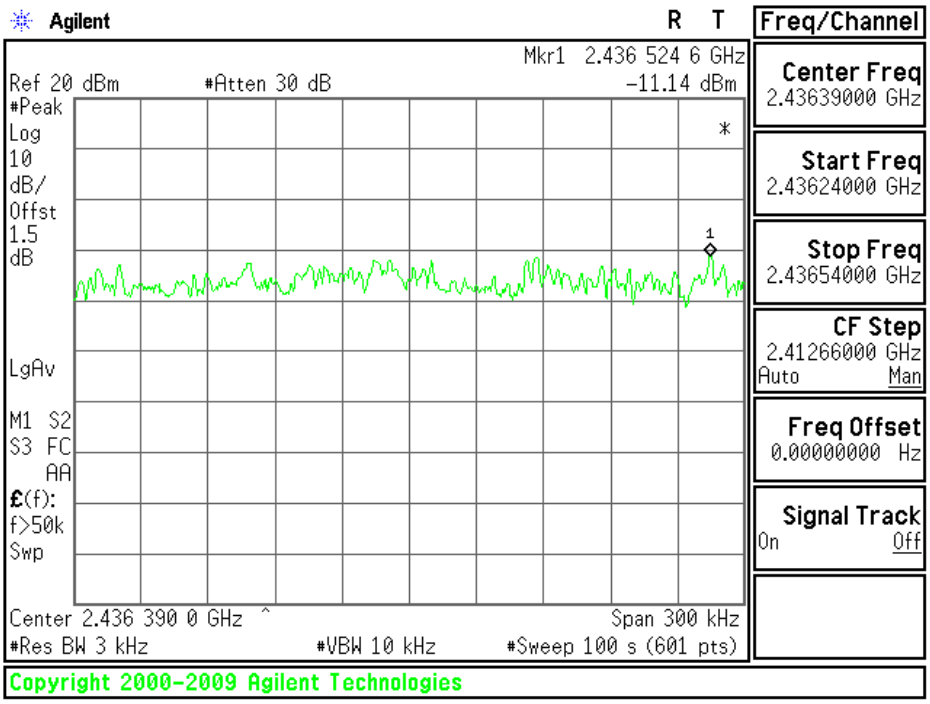


draft 802.11gn Standard-20 MHz Channel mode / Chain 1

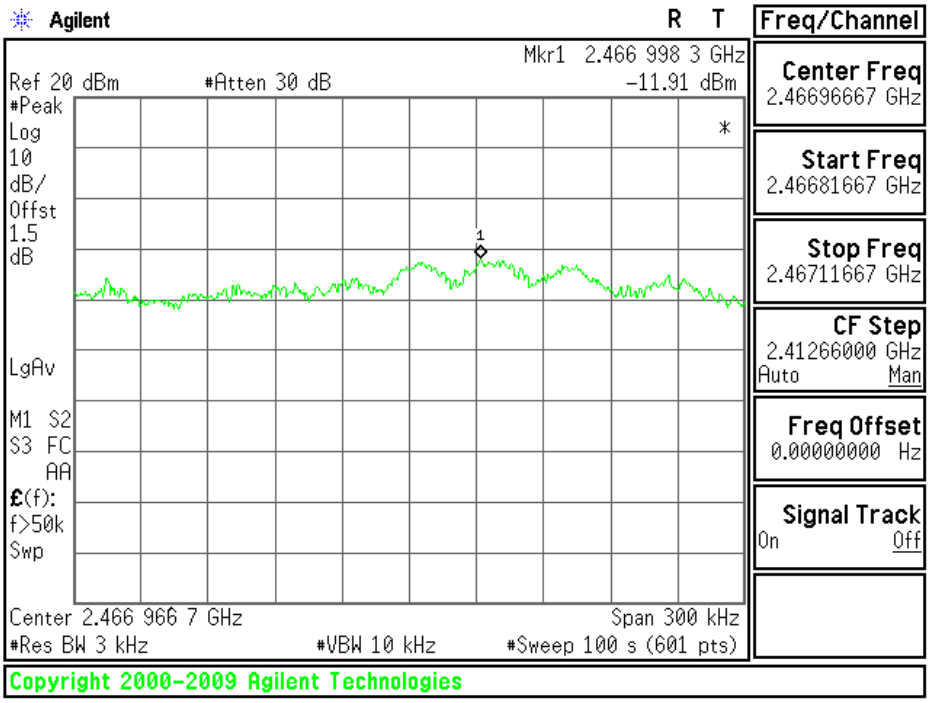
PPSD (CH Low)



PPSD (CH Mid)

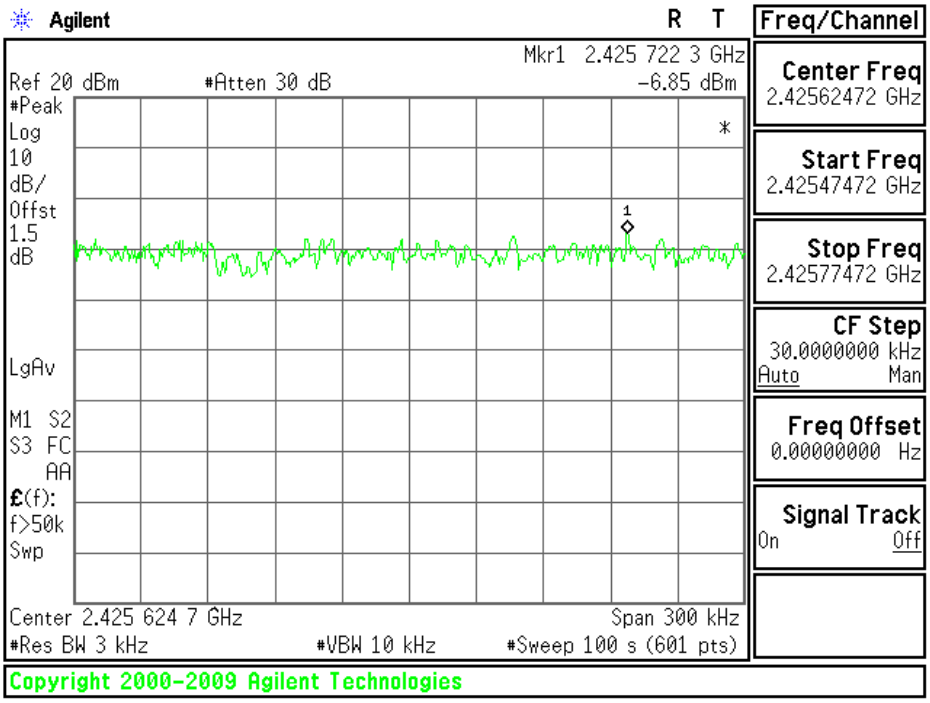


PPSD (CH High)

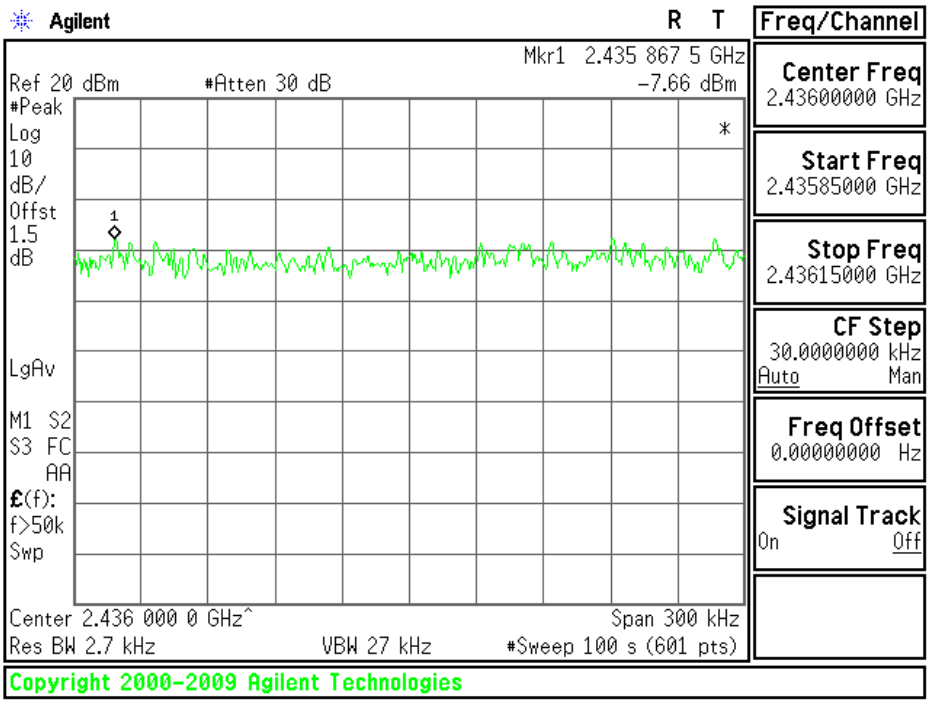


draft 802.11gn Wide-40 MHz Channel mode / Chain 0

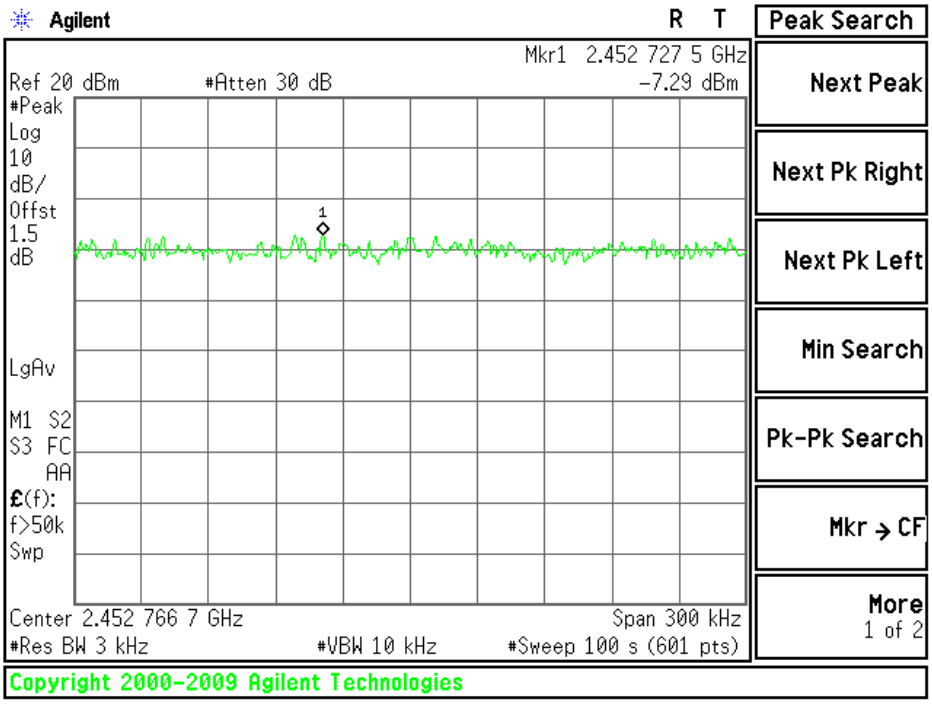
PPSD (CH Low)



PPSD (CH Mid)

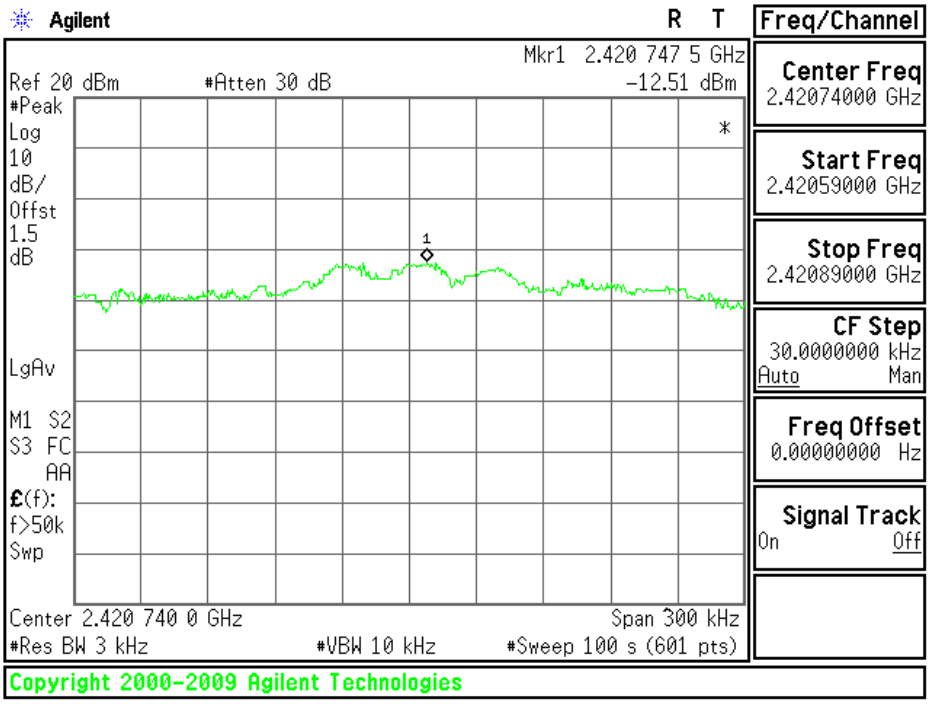


PPSD (CH High)

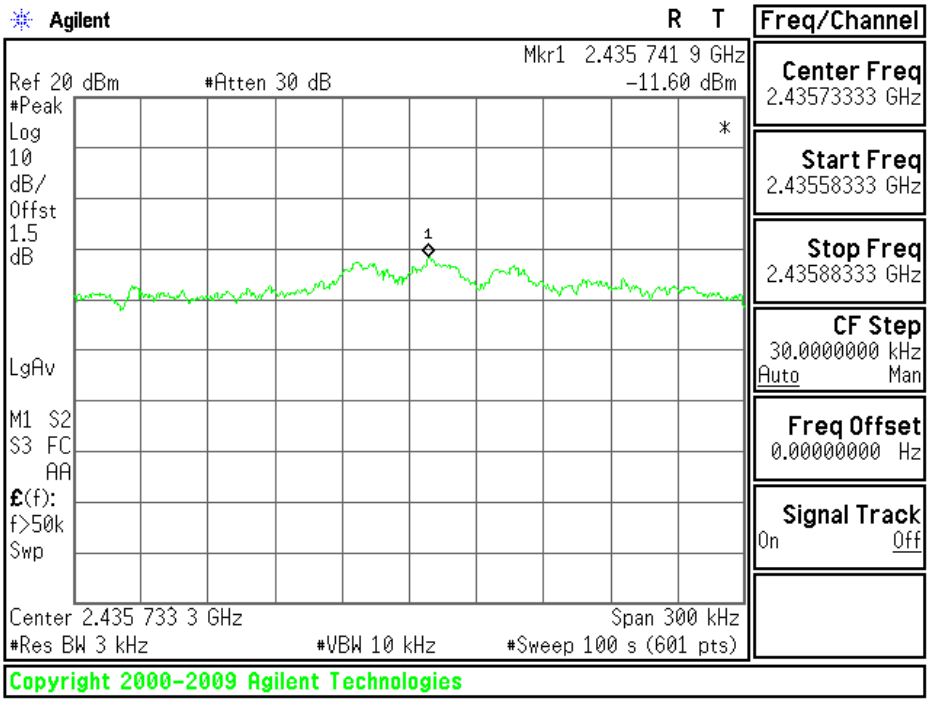


draft 802.11gn Wide-40 MHz Channel mode / Chain 1

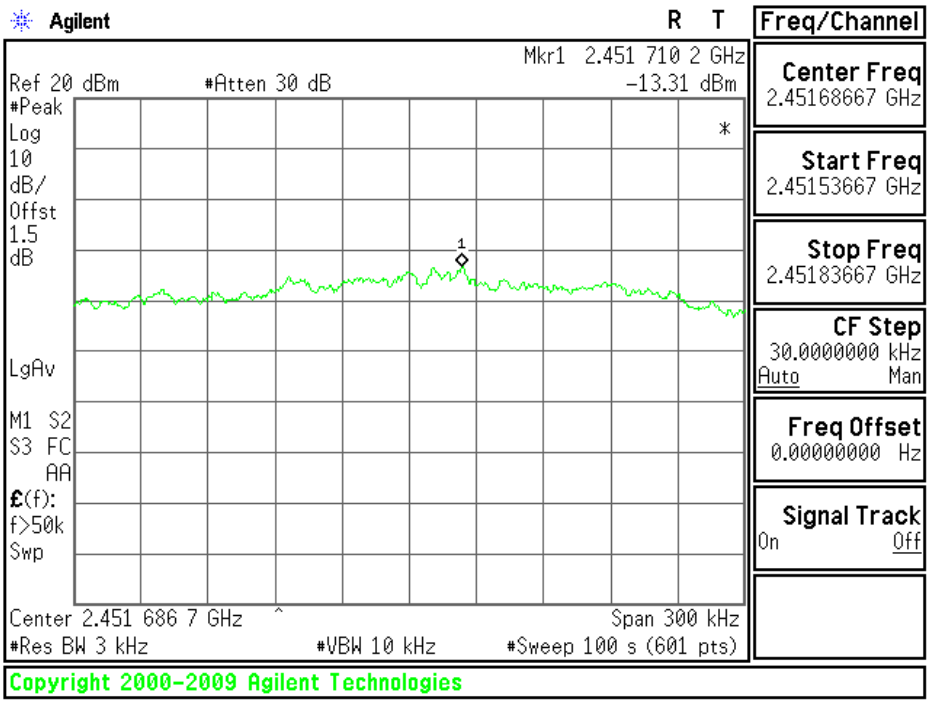
PPSD (CH Low)



PPSD (CH Mid)



PPSD (CH High)



SPURIOUS EMISSIONS

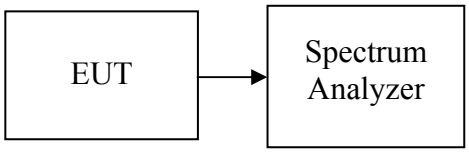
Conducted Measurement

LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Conducted power was measured based on the use of RMS averaging over a time interval,therefore the required attenuntion is 30 dB.

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

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

TEST RESULTS

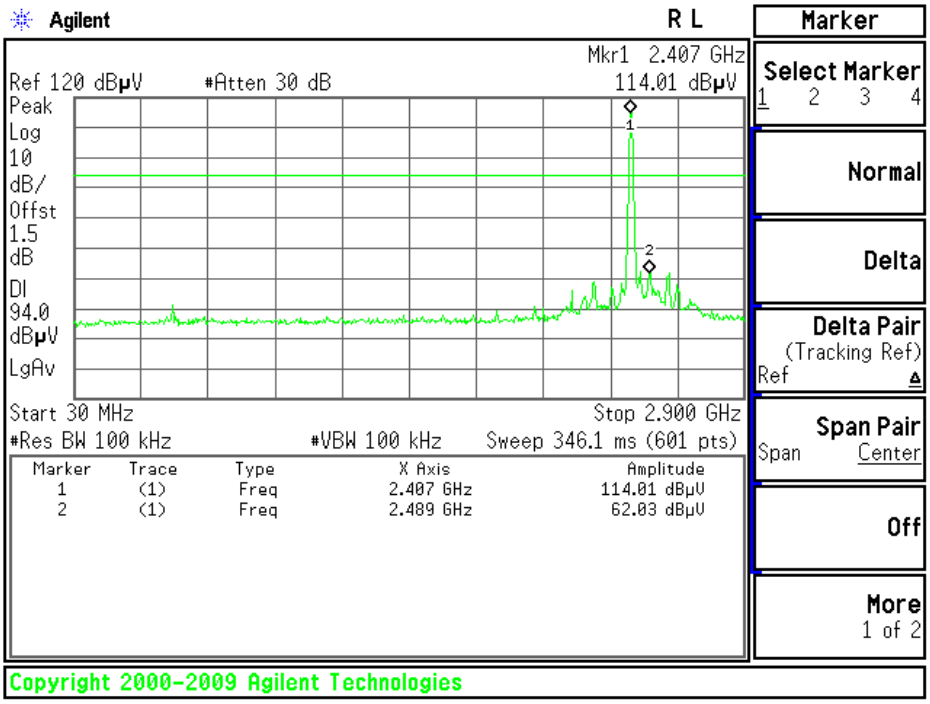
No non-compliance noted

Test Plot

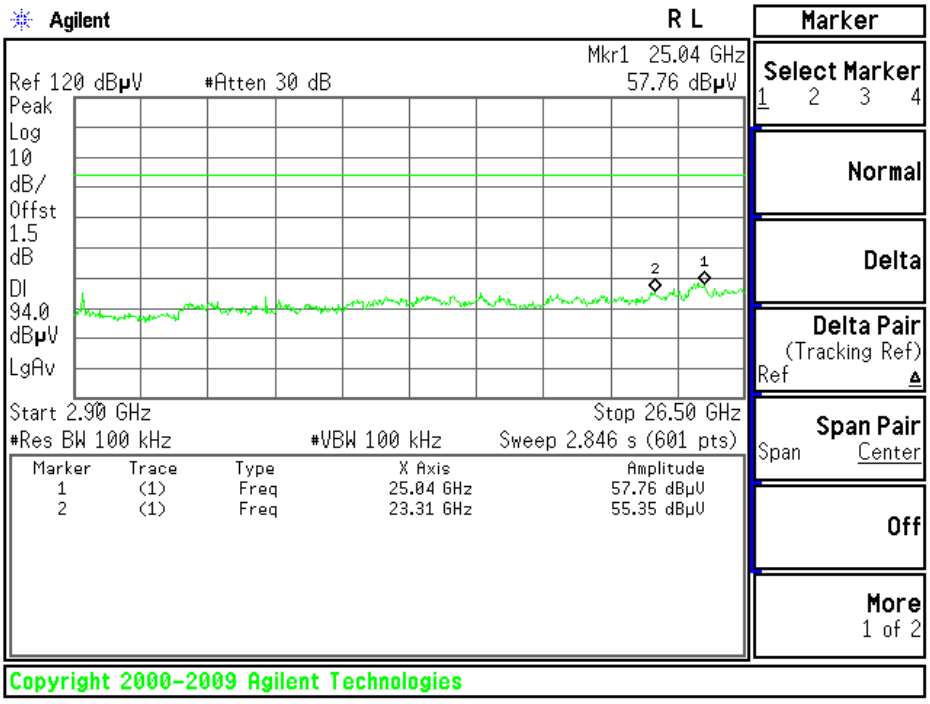
IEEE 802.11b mode

CH Low

30MHz ~ 2.9GHz

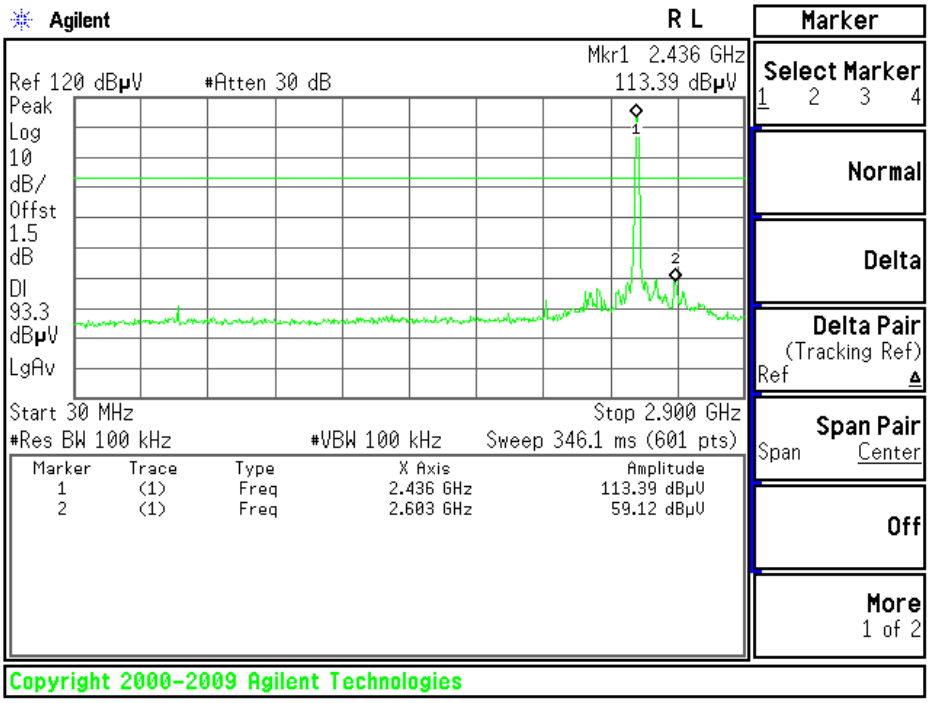


2.9GHz ~ 26.5GHz

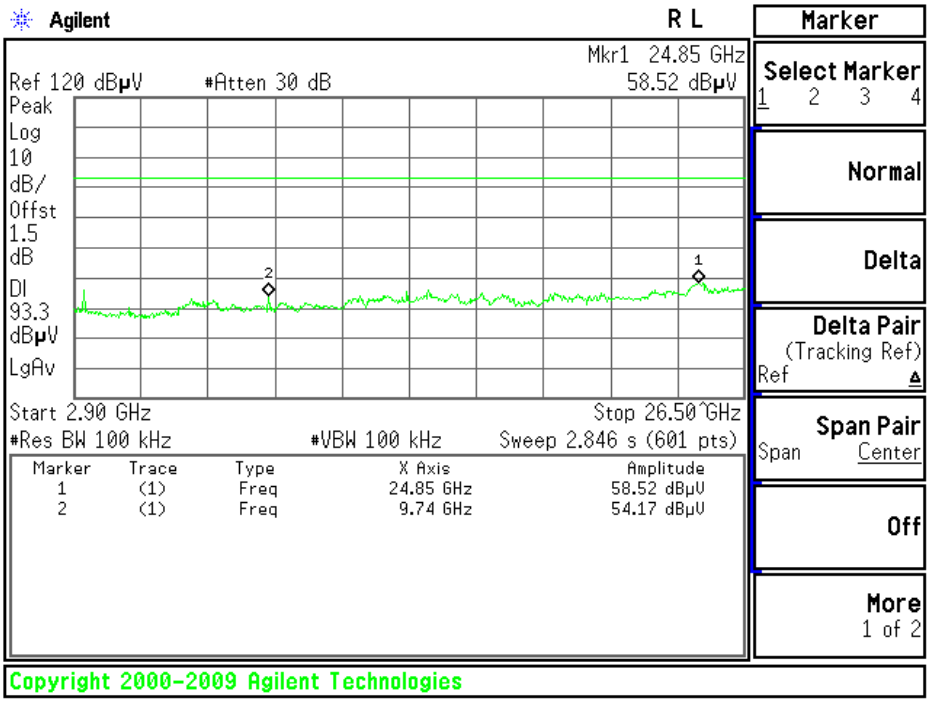


CH Mid

30MHz ~ 2.9GHz

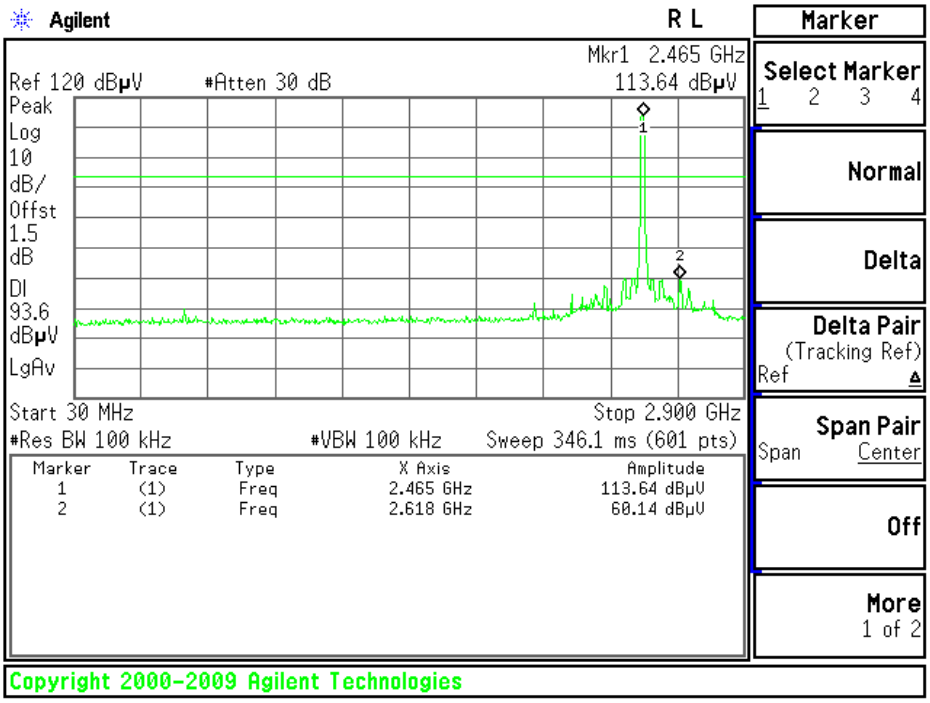


2.9GHz ~ 26.5GHz

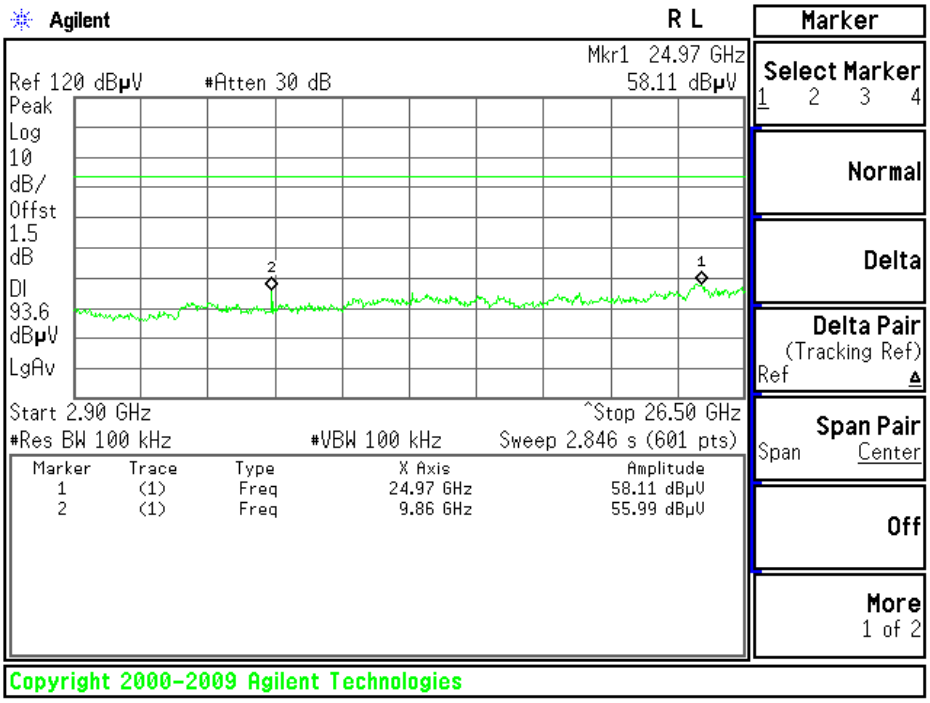


CH High

30MHz ~ 2.9GHz



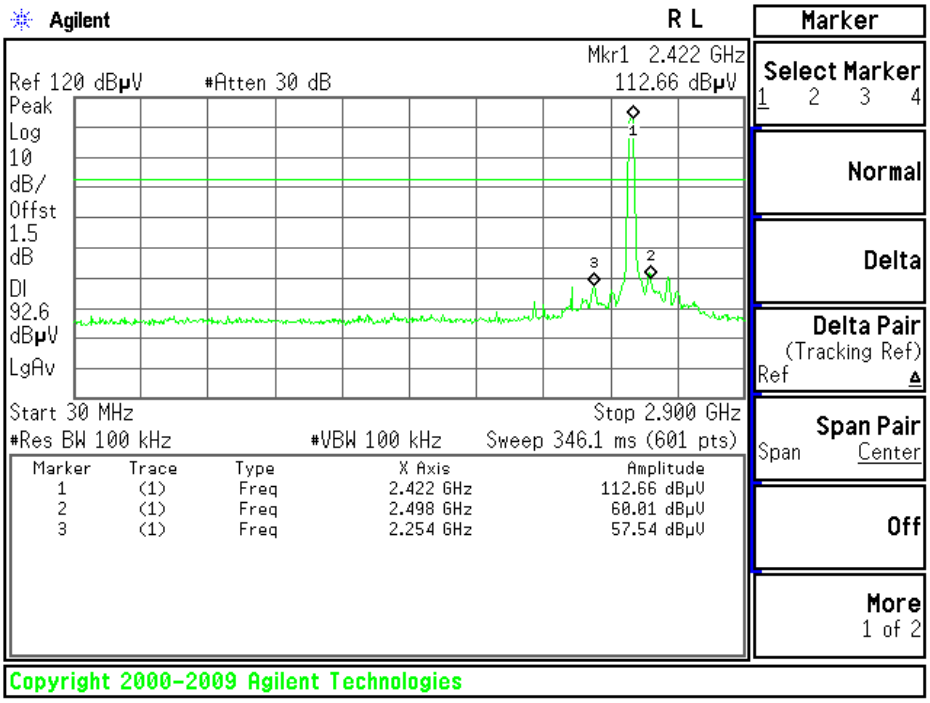
2.9GHz ~ 26.5GHz



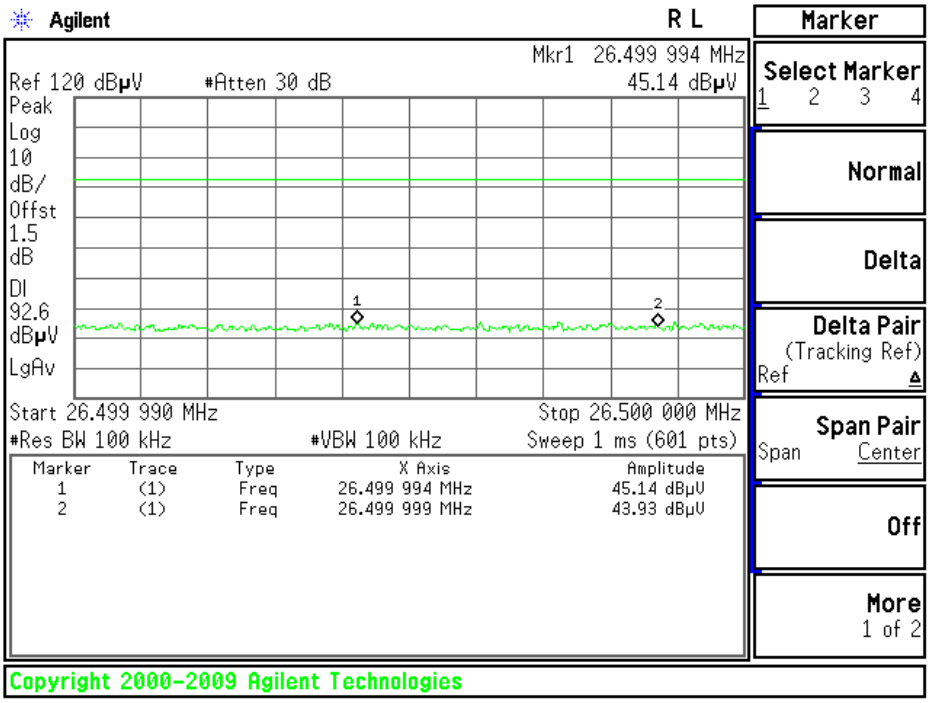
IEEE 802.11g mode

CH Low

30MHz ~ 2.9GHz

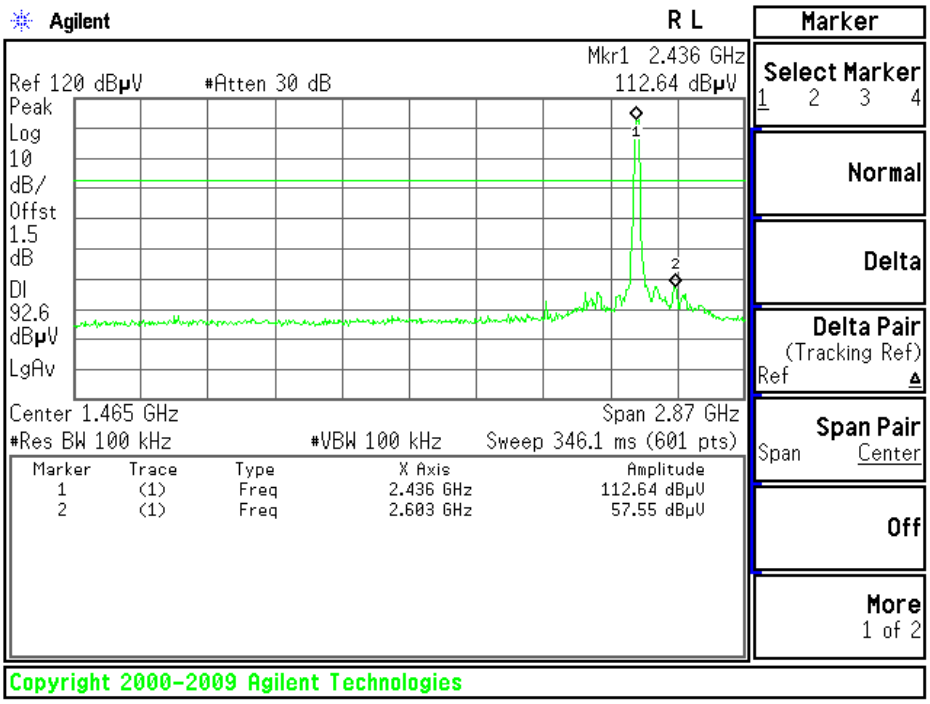


2.9GHz ~ 26.5GHz

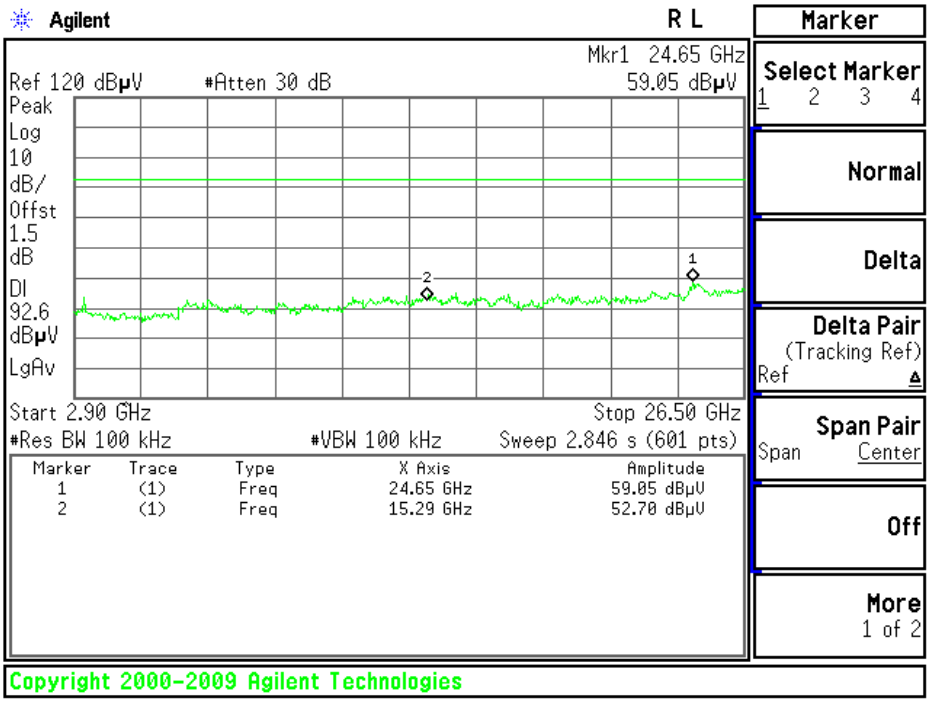


CH Mid

30MHz ~ 2.9GHz

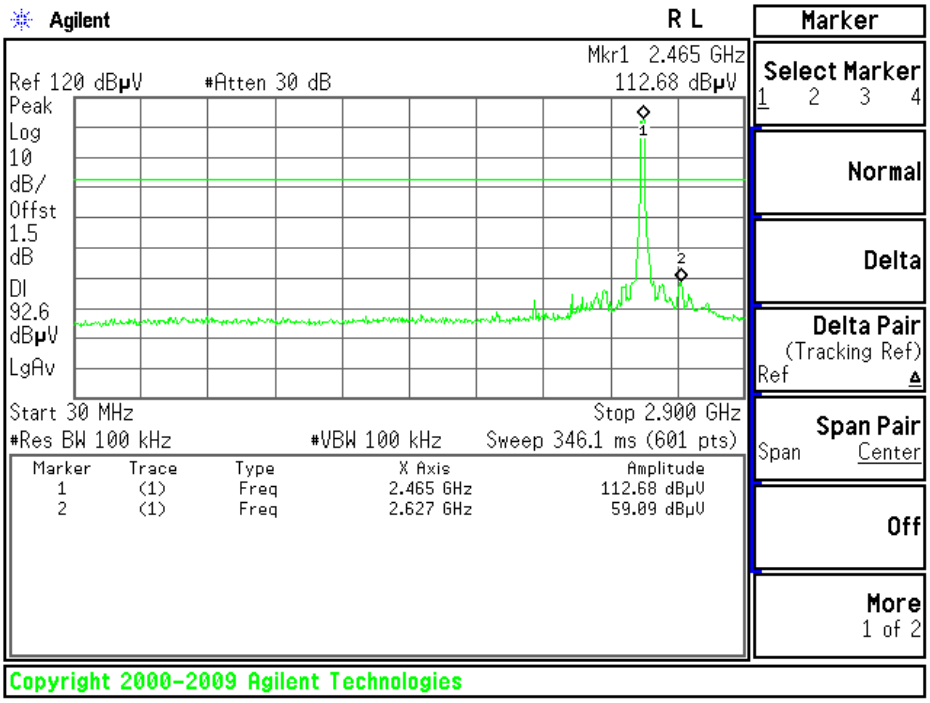


2.9GHz ~ 26.5GHz

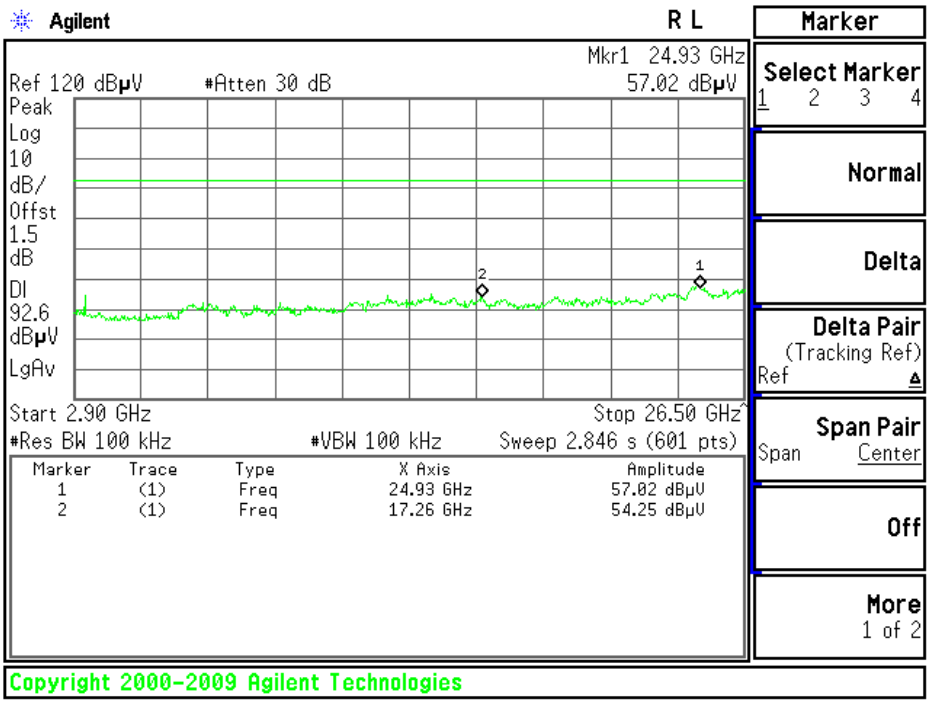


CH High

30MHz ~ 2.9GHz



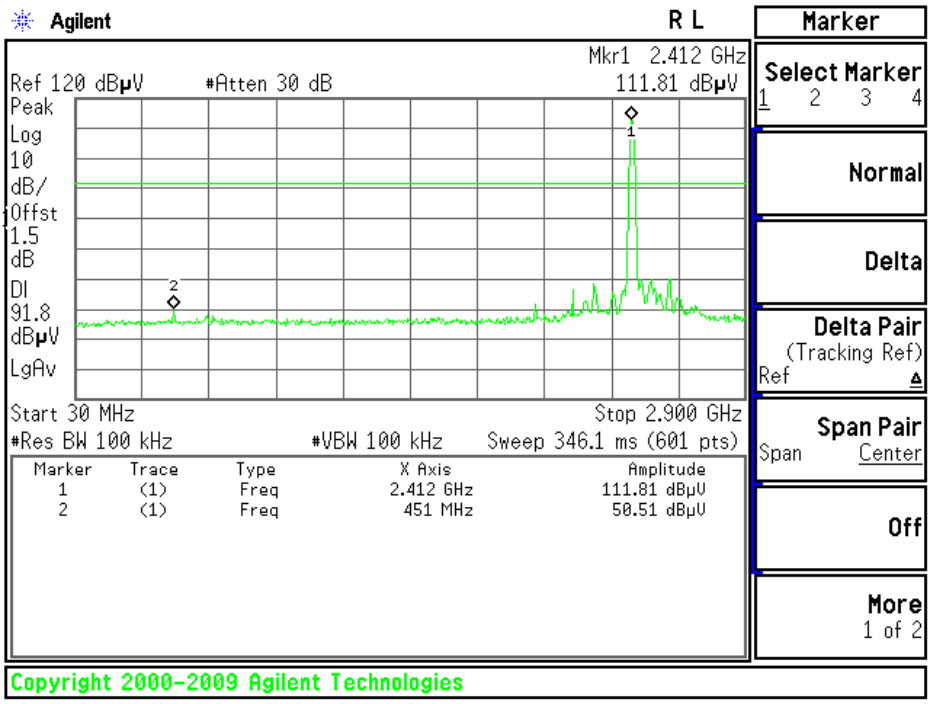
2.9GHz ~ 26.5GHz



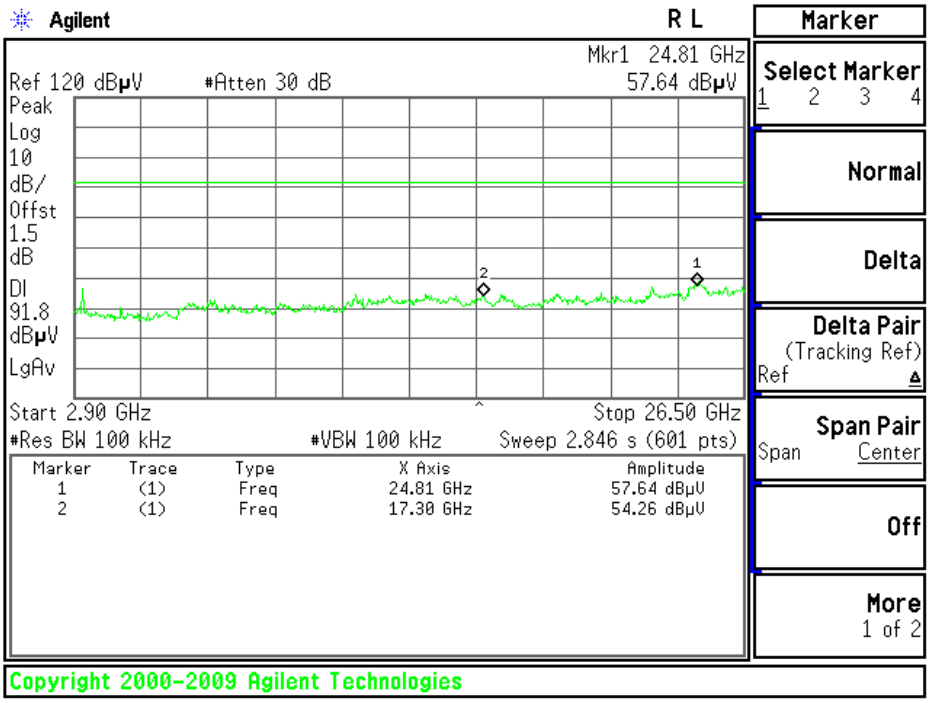
draft 802.11gn Standard-20 MHz Channel mode / Chain 0

CH Low

30MHz ~ 2.9GHz

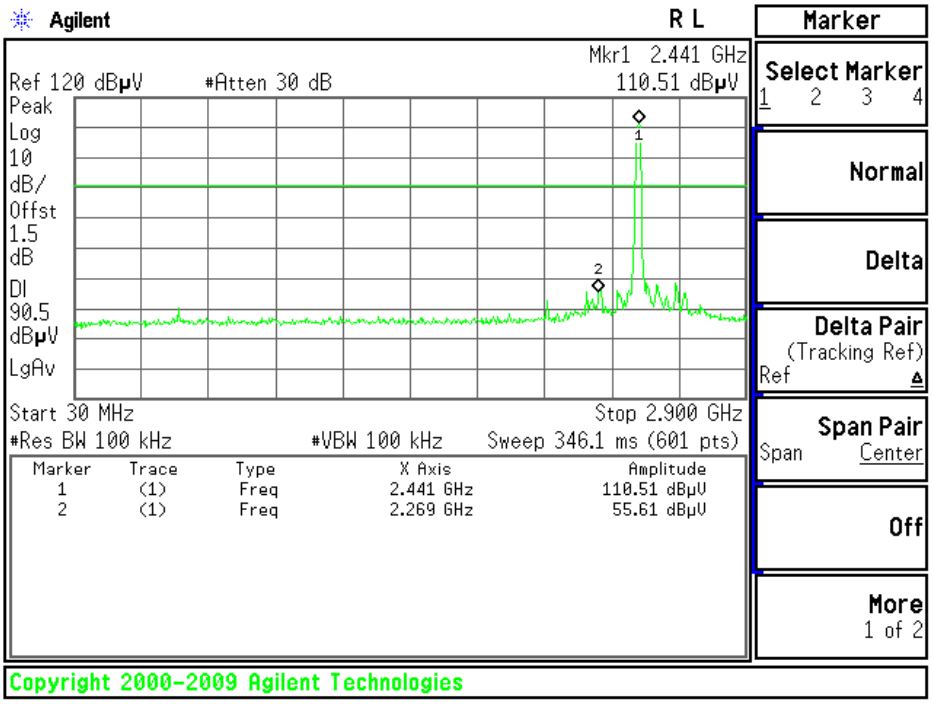


2.9GHz ~ 26.5GHz

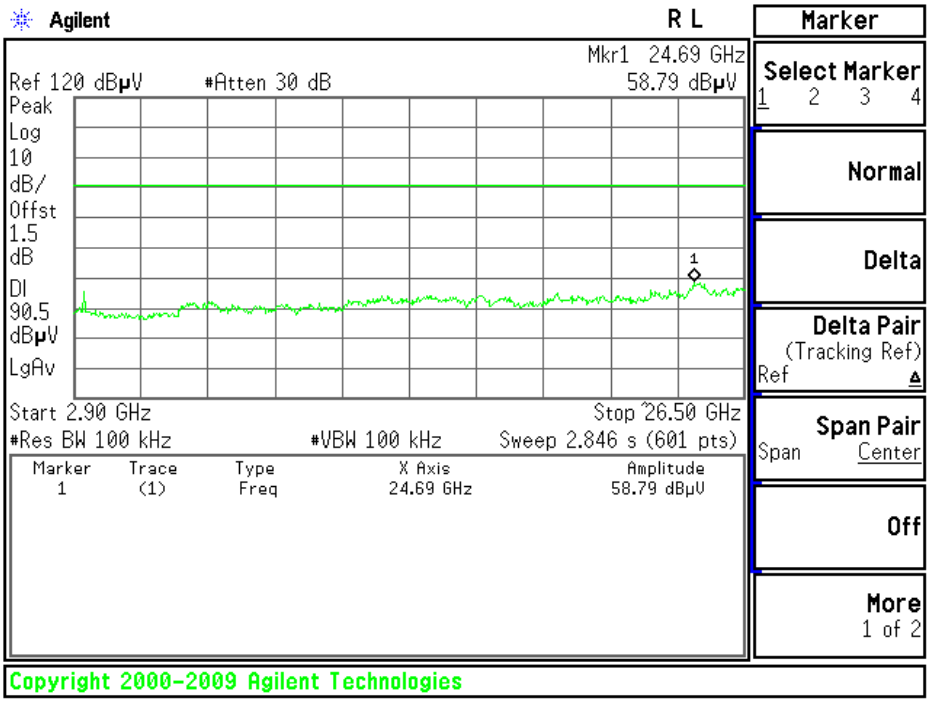


CH Mid

30MHz ~2.9GHz

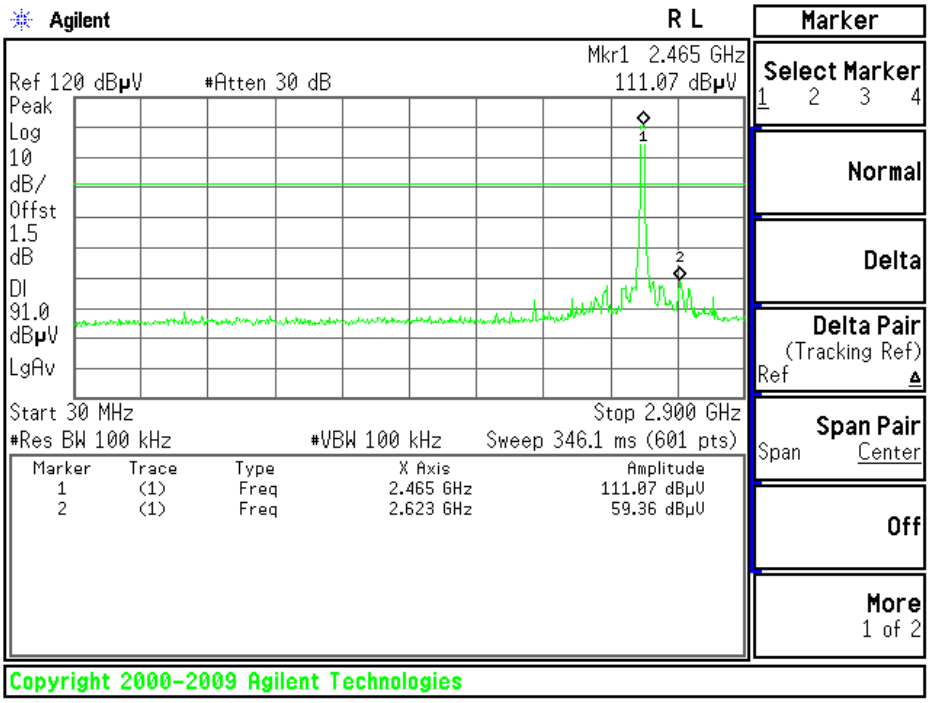


2.9GHz ~ 26.5GHz

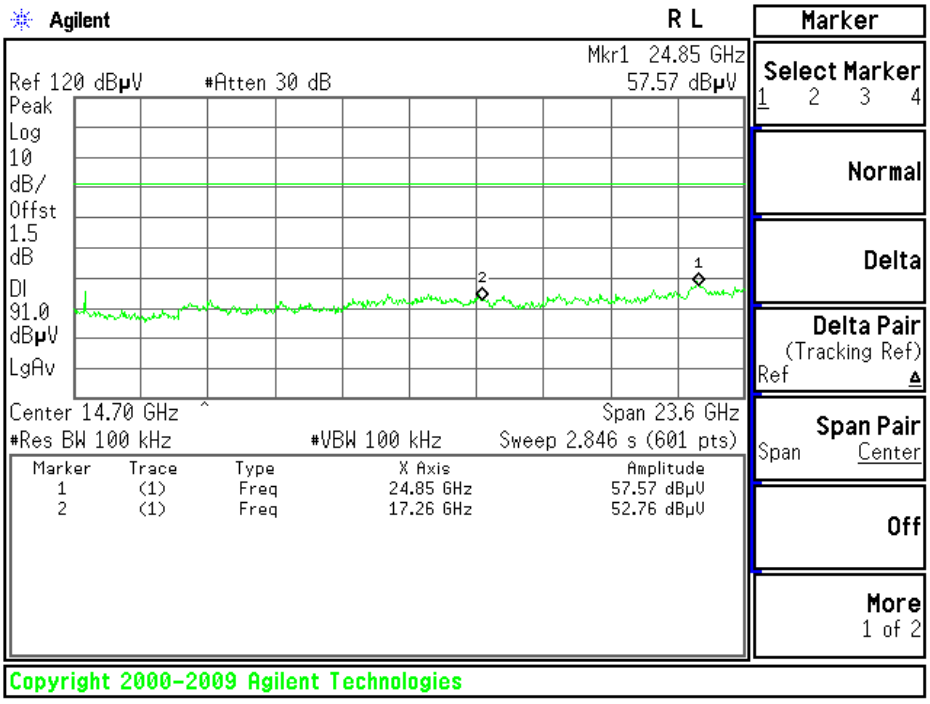


CH High

30MHz ~2.9GHz



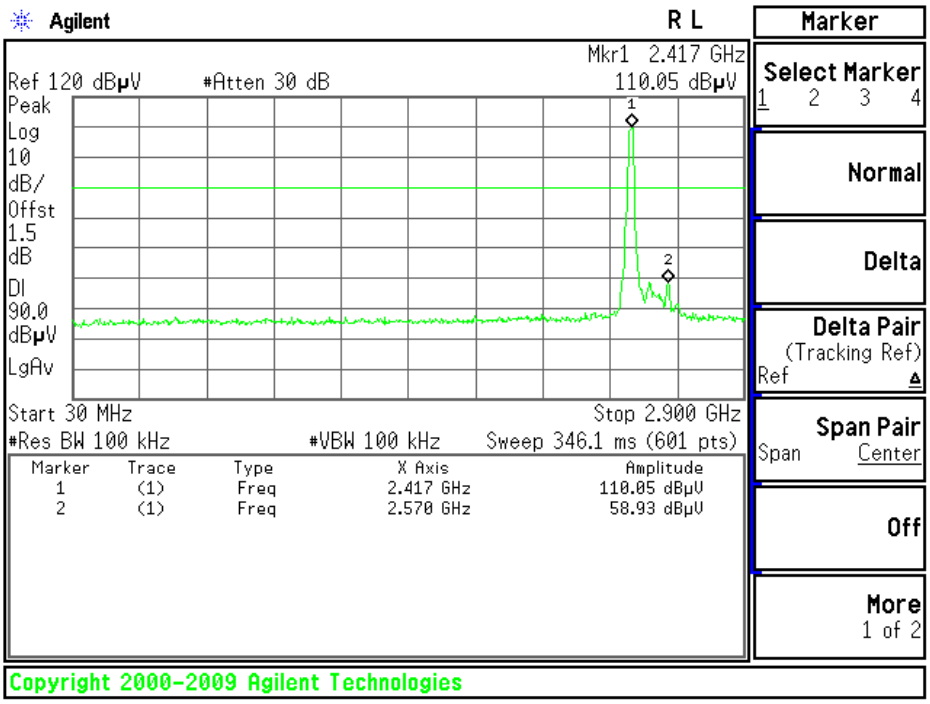
2.9GHz ~ 26.5GHz



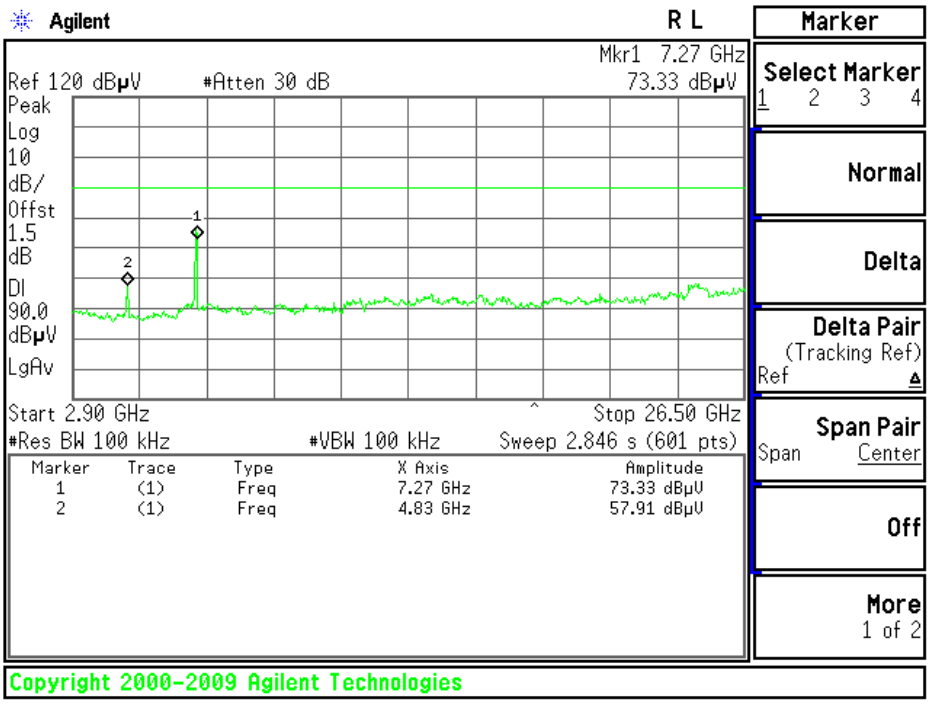
draft 802.11gn Standard-20 MHz Channel mode / Chain 1

CH Low

30MHz ~2.9GHz

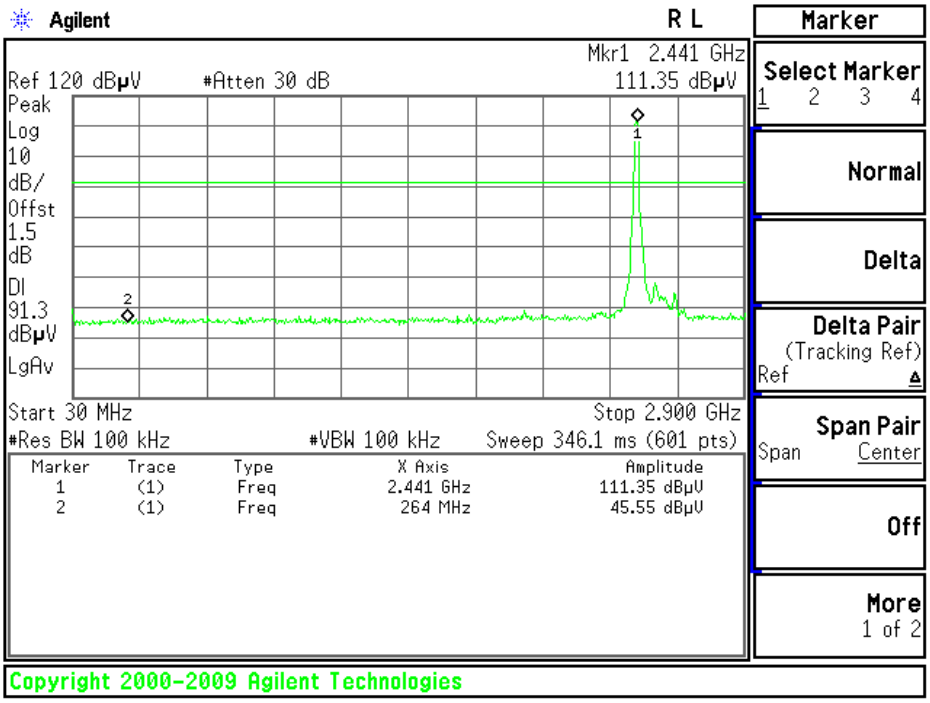


2.9GHz ~ 26.5GHz

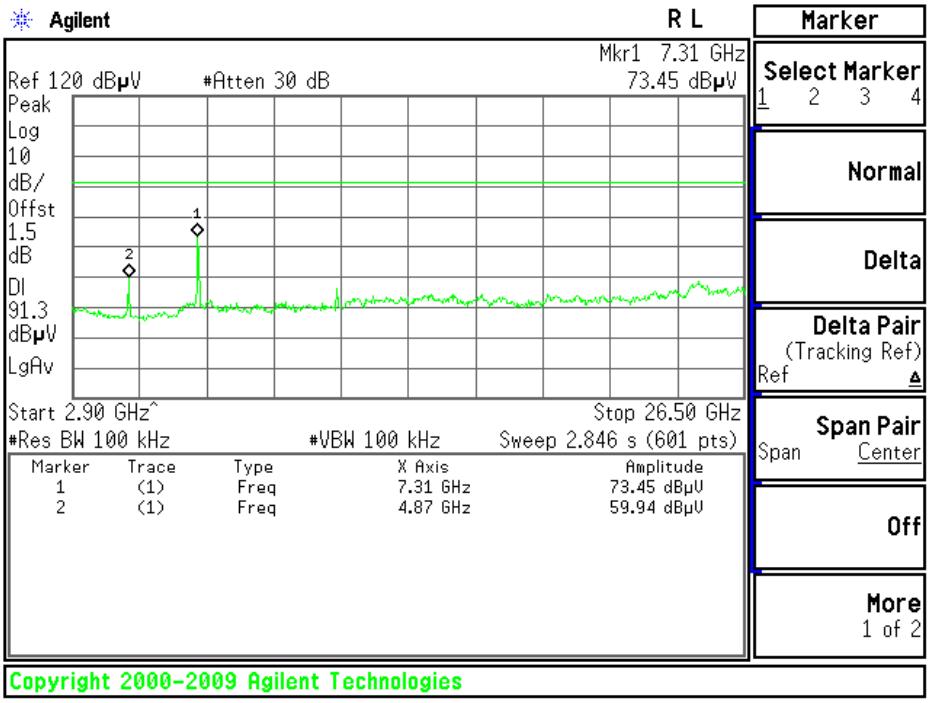


CH Mid

30MHz ~2.9GHz

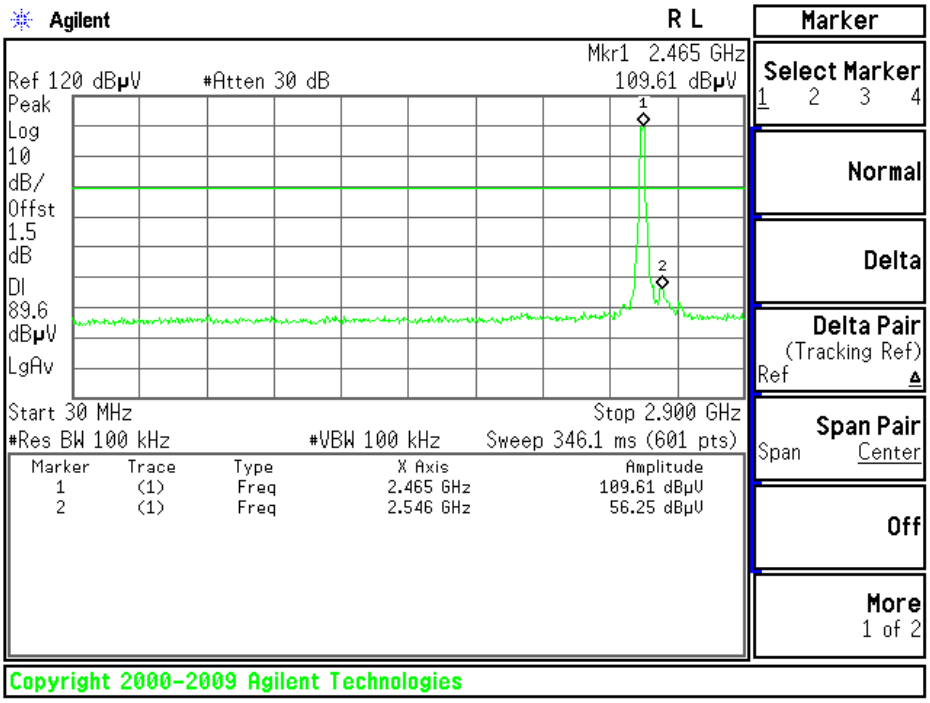


2.9GHz ~ 26.5GHz

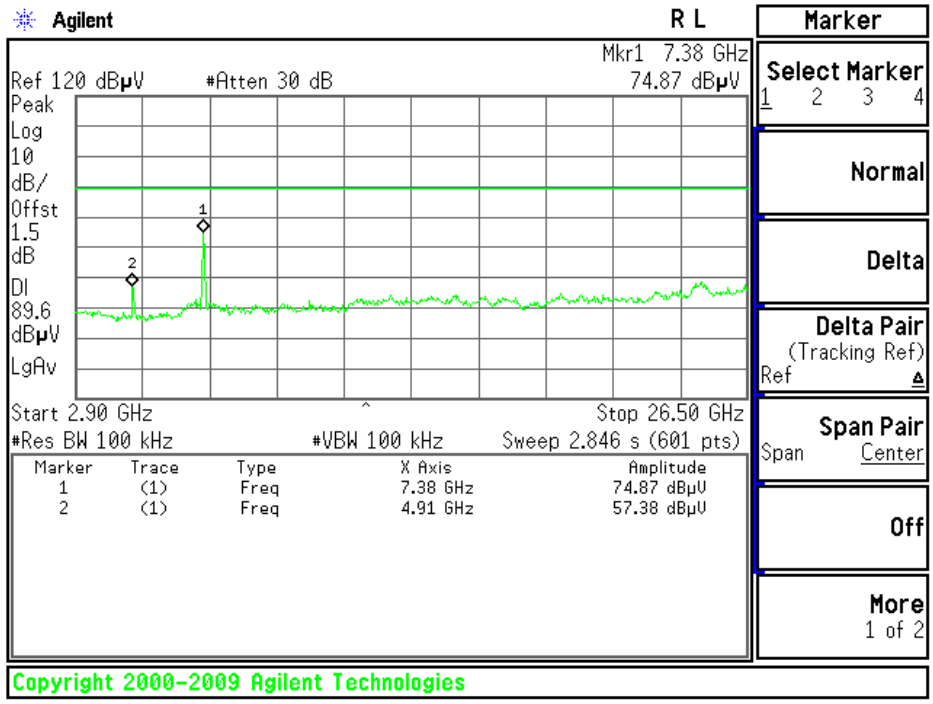


CH High

30MHz ~2.9GHz



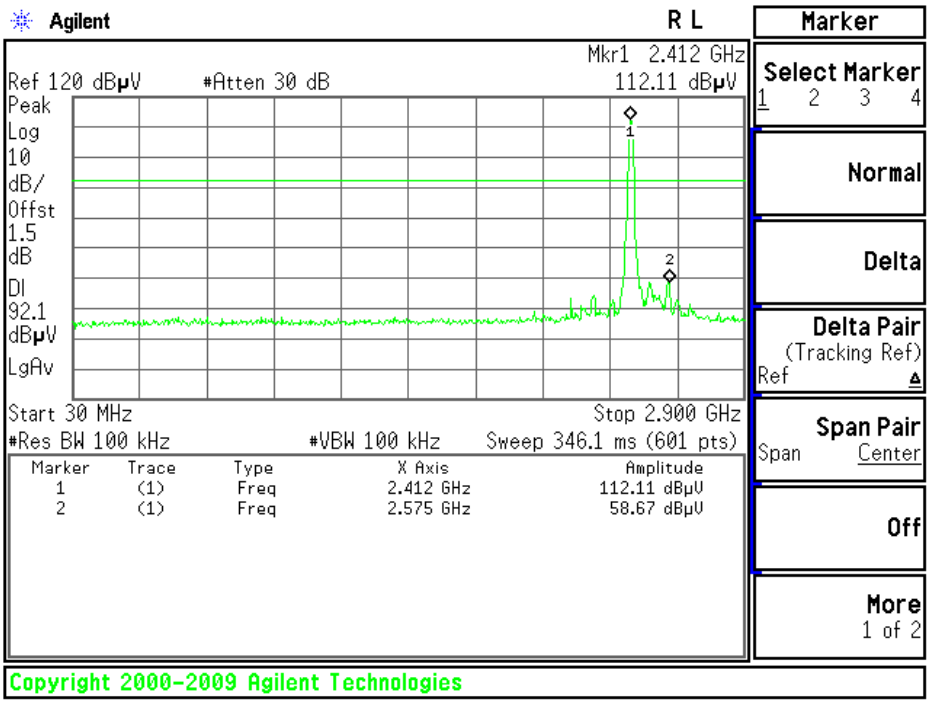
2.9GHz ~ 26.5GHz



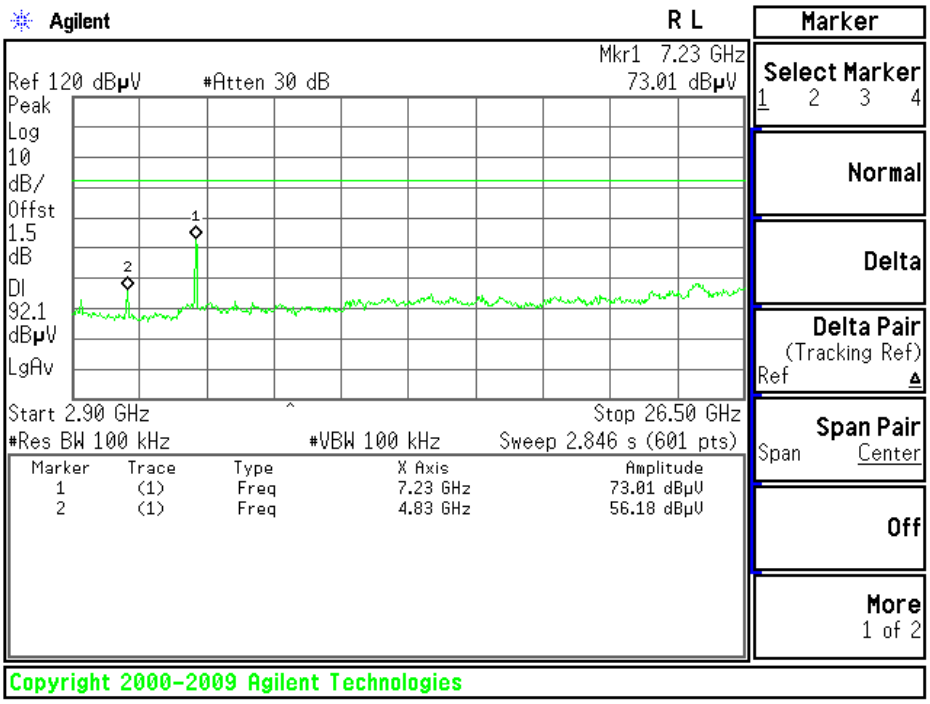
draft 802.11gn Standard-20 MHz Channel mode / Chain 0+ Chain 1

CH Low

30MHz ~2.9GHz

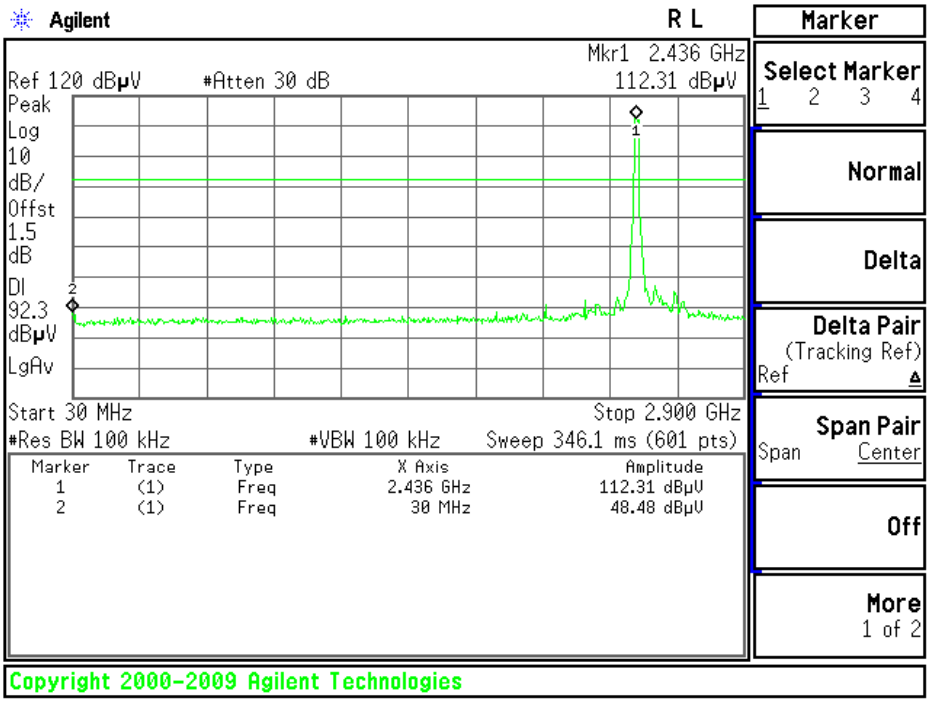


2.9GHz ~ 26.5GHz

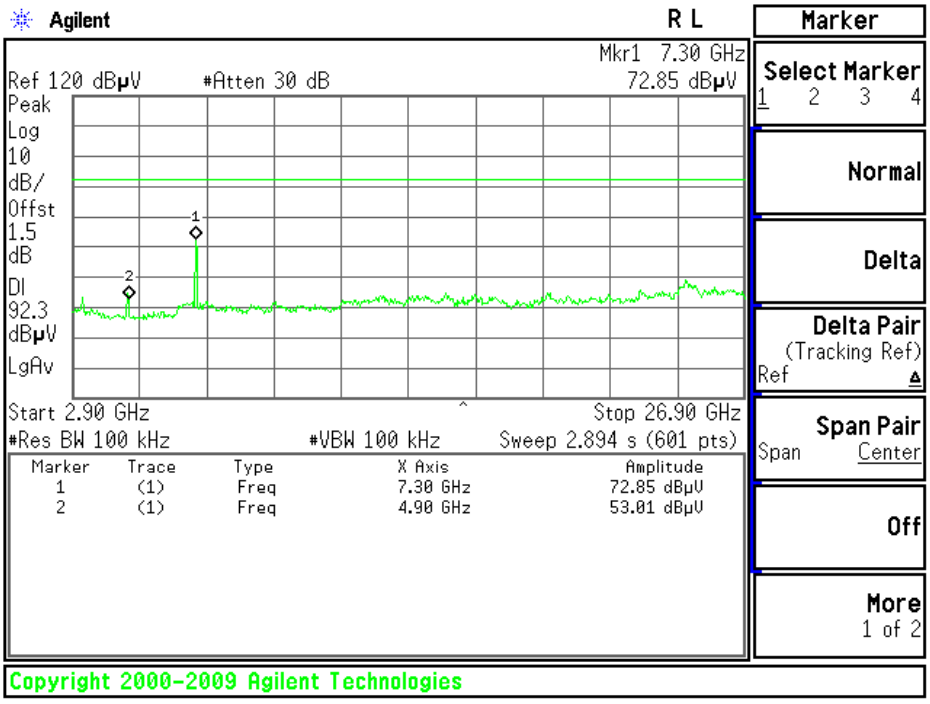


CH Mid

30MHz ~ 2.9GHz

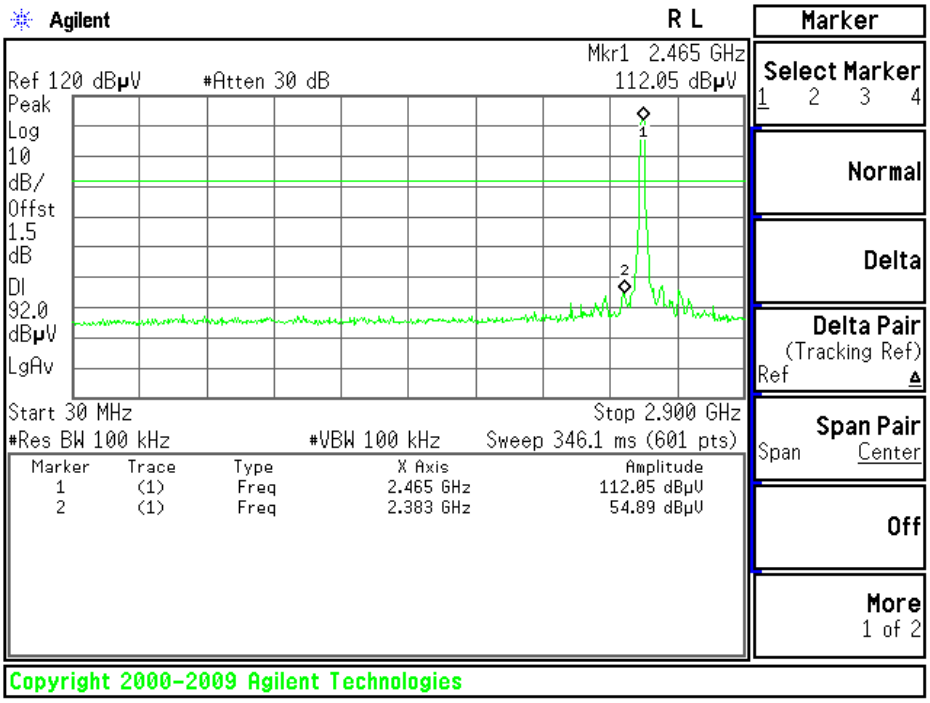


2.9GHz ~ 26.5GHz

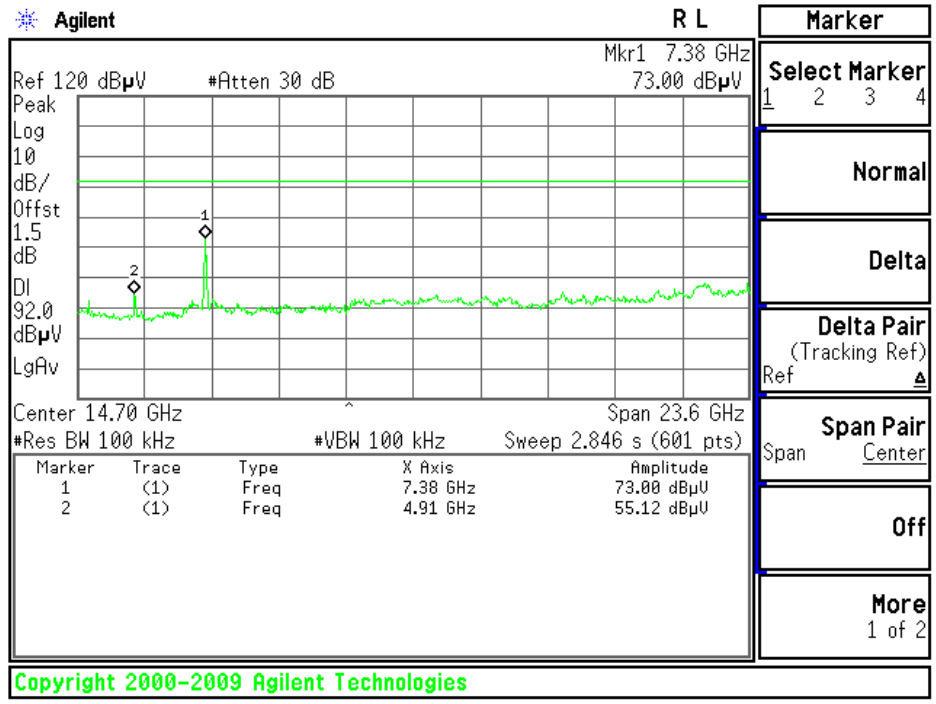


CH High

30MHz ~ 2.9GHz



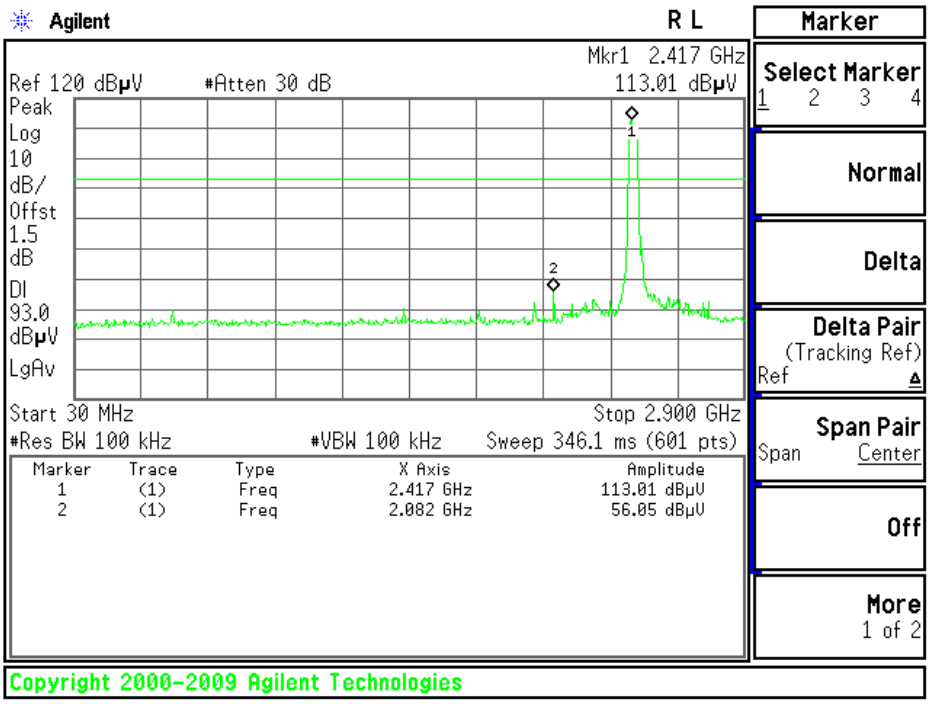
2.9GHz ~ 26.5GHz



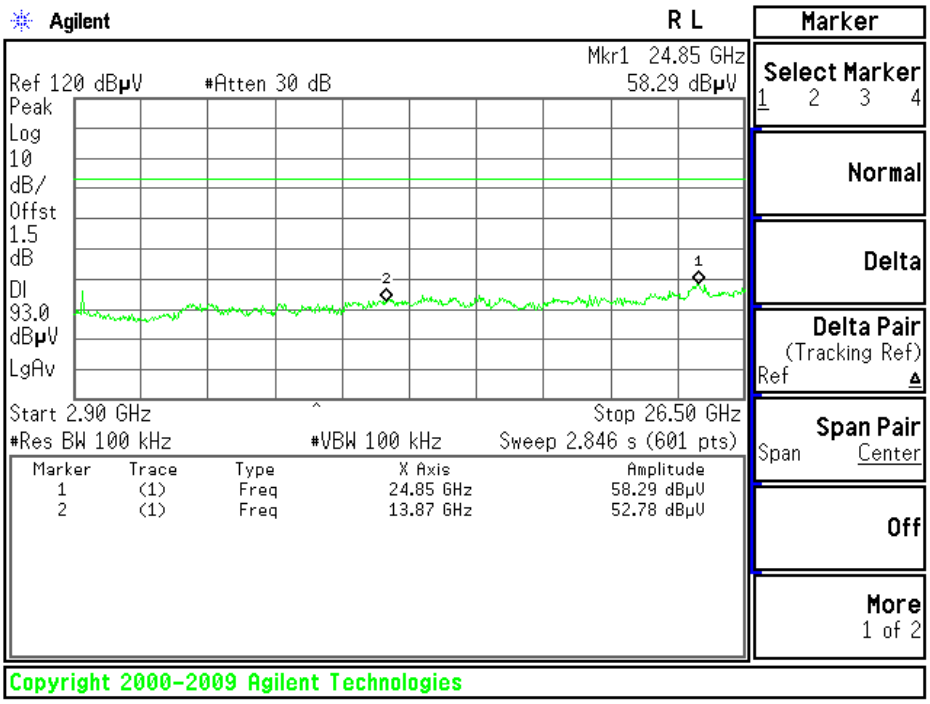
draft 802.11gn Wide-40 MHz Channel mode / Chain 0

CH Low

30MHz ~2.9GHz

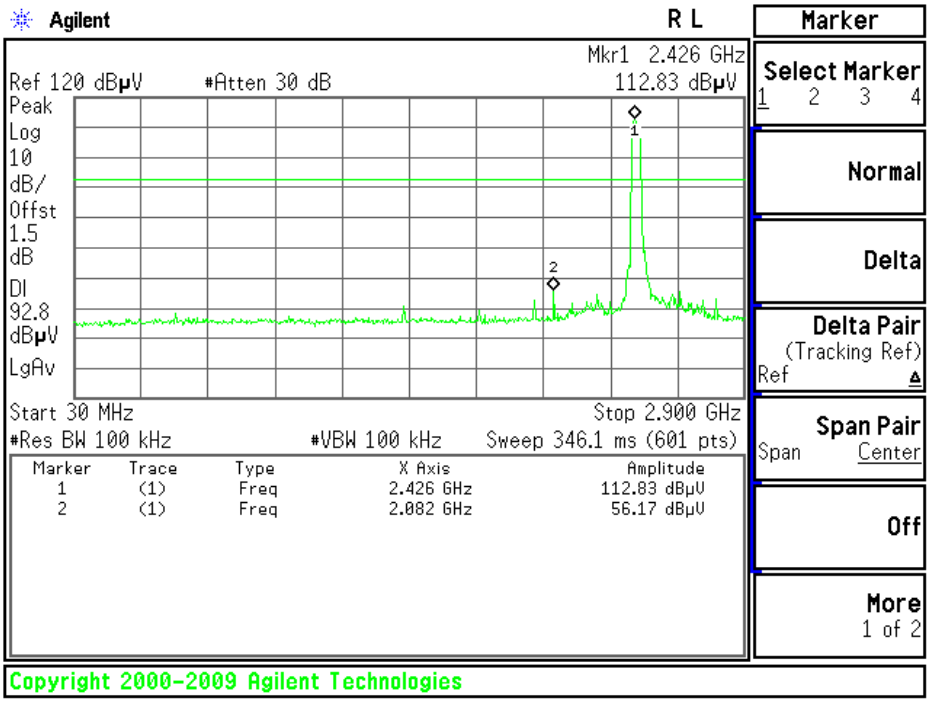


2.9GHz ~ 26.5GHz

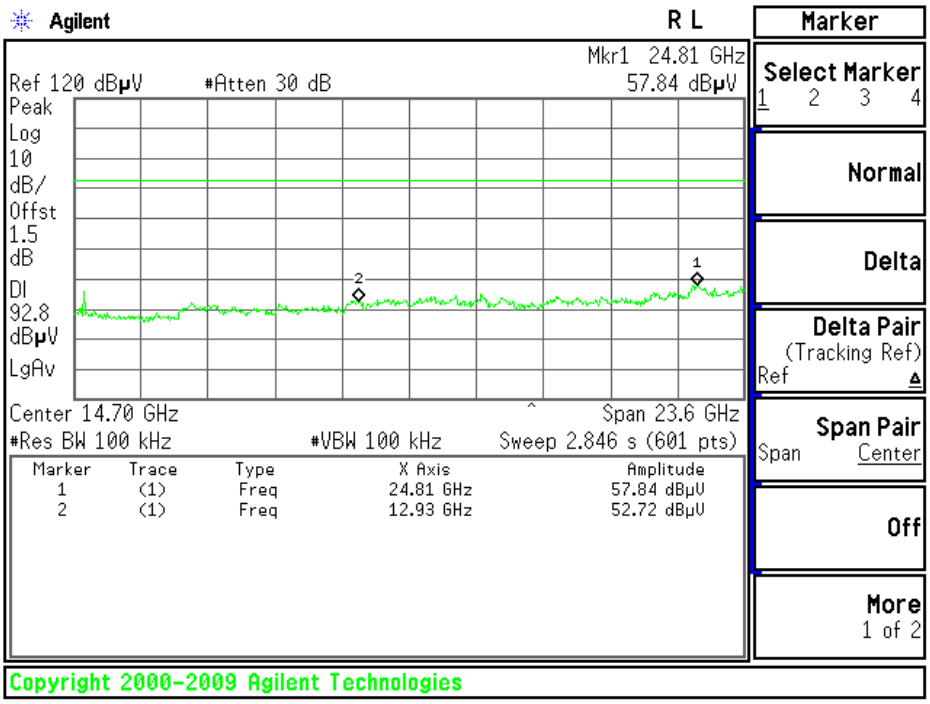


CH Mid

30MHz ~ 2.9GHz

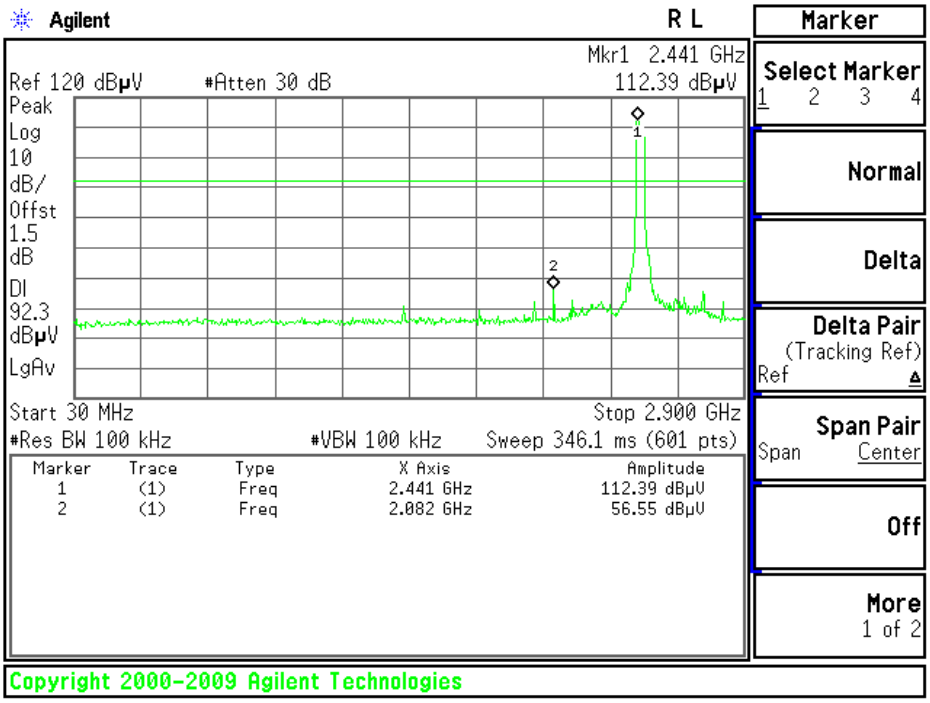


2.9GHz ~ 26.5GHz

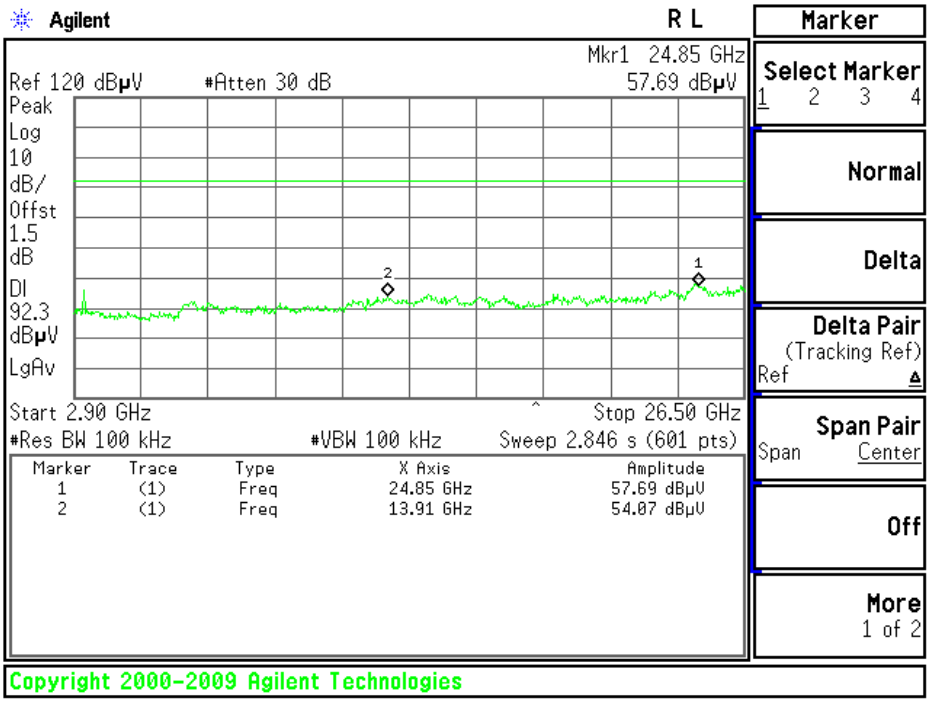


CH High

30MHz ~2.9GHz



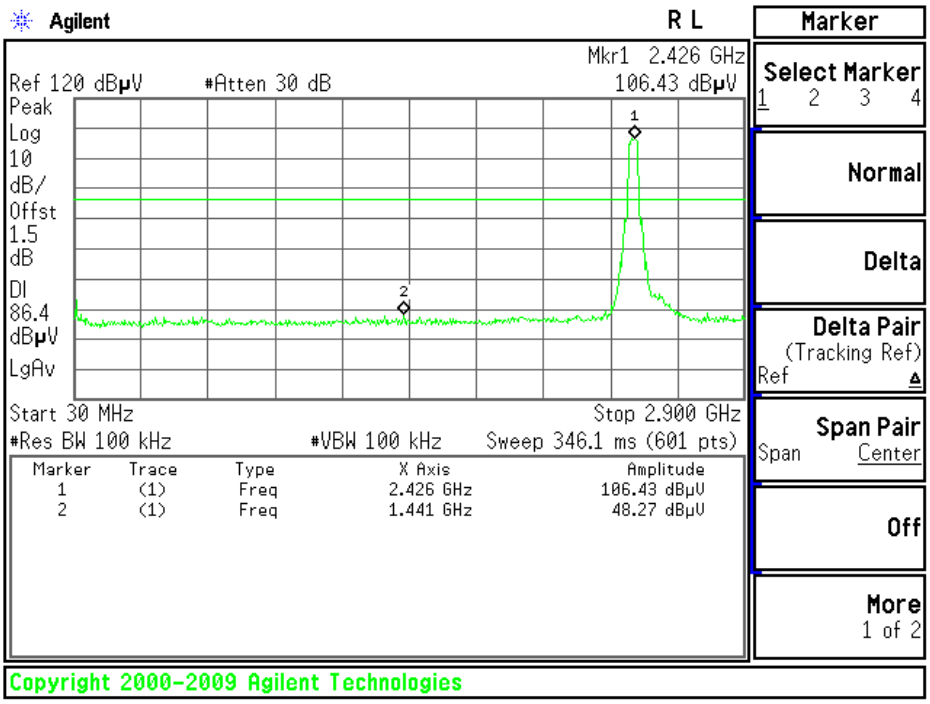
2.9GHz ~ 26.5GHz



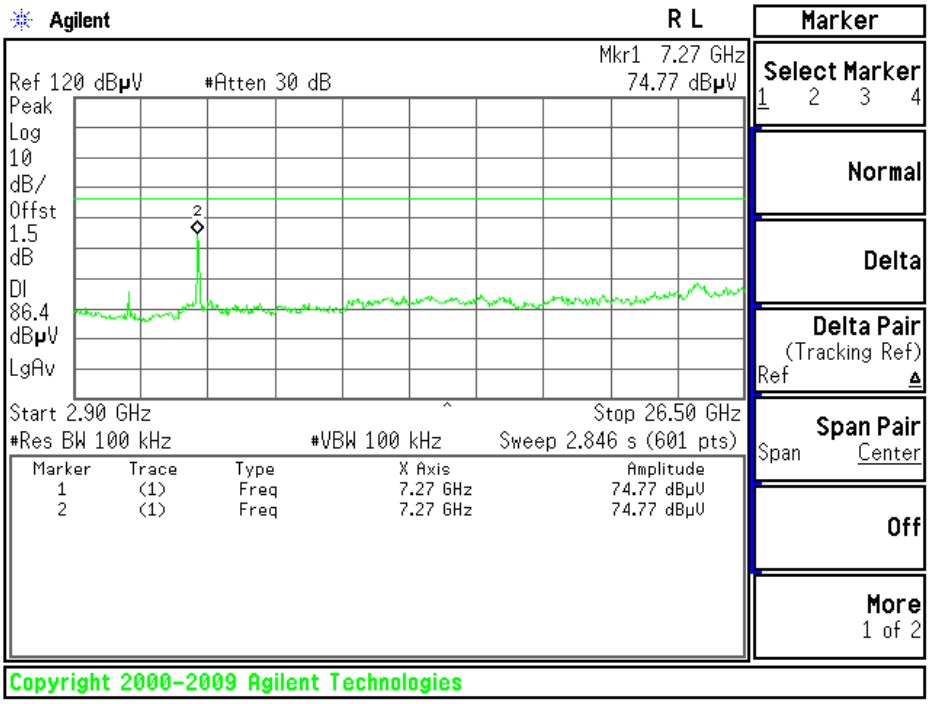
draft 802.11gn Wide-40 MHz Channel mode / Chain 1

CH Low

30MHz ~ 2.9GHz

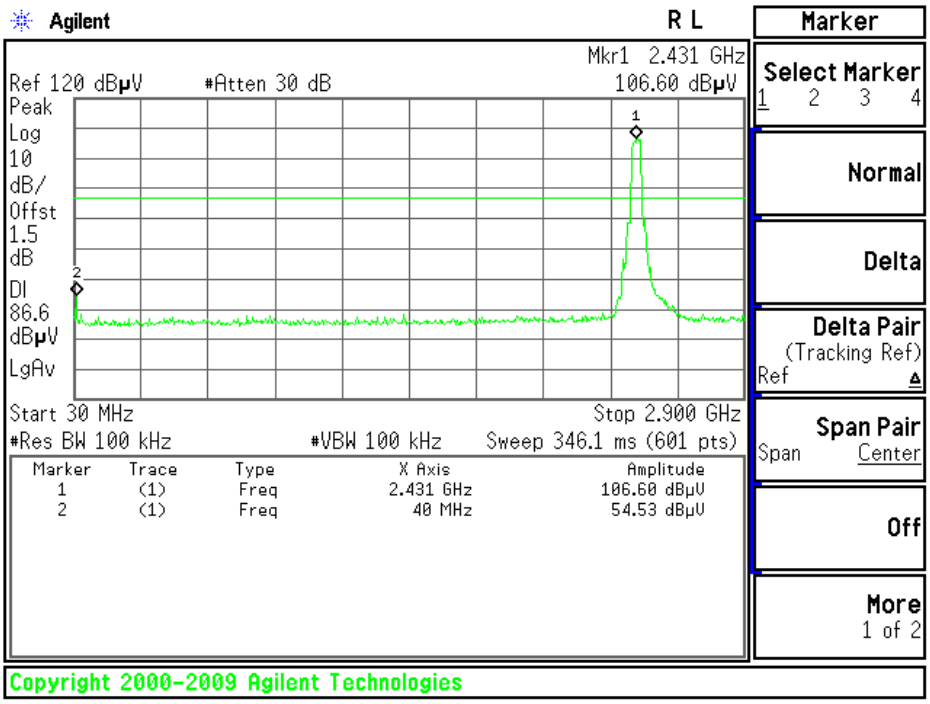


2.9GHz ~ 26.5GHz

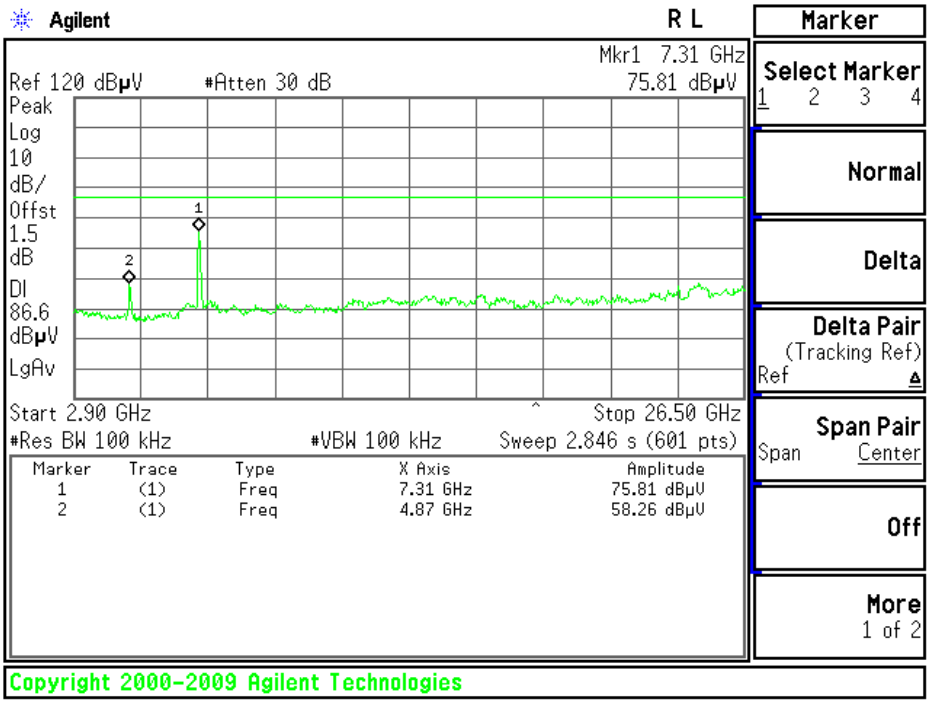


CH Mid

30MHz ~ 2.9GHz

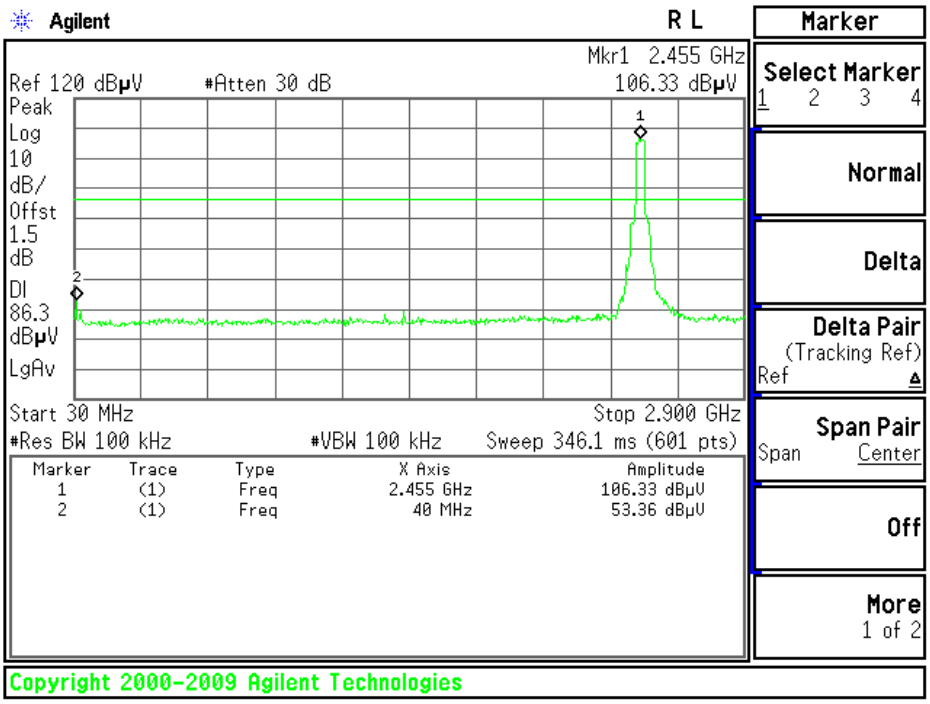


2.9GHz ~ 26.5GHz

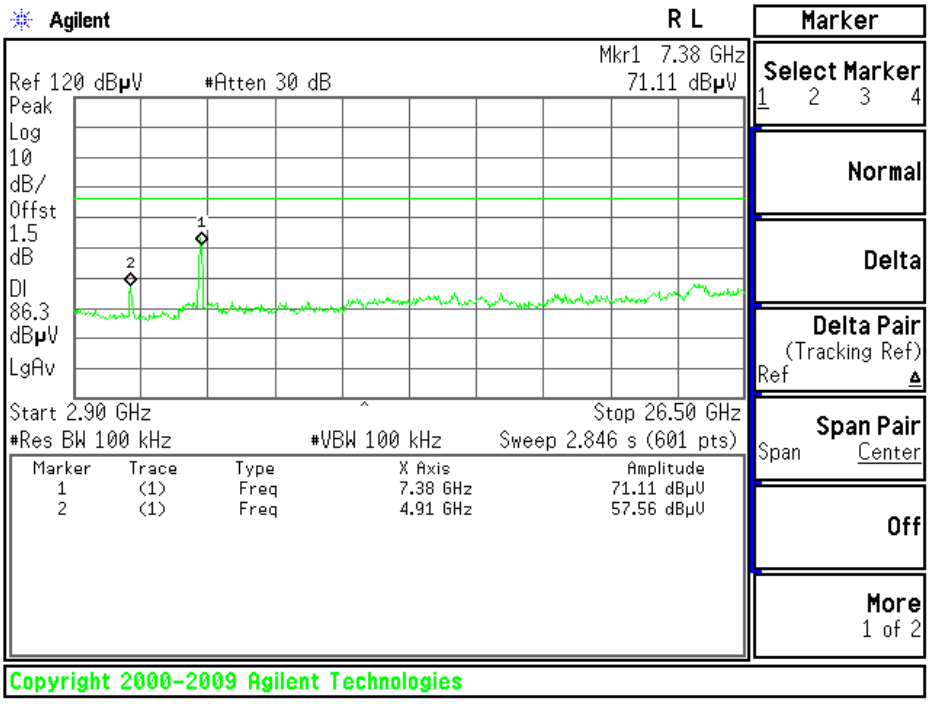


CH High

30MHz ~ 2.9GHz



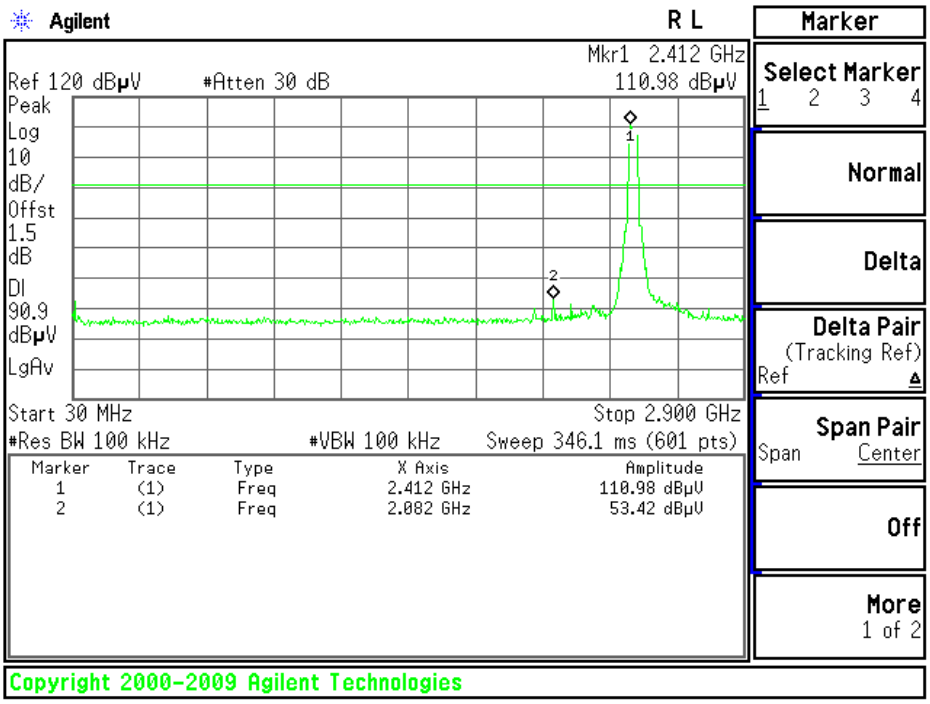
2.9GHz ~ 26.5GHz



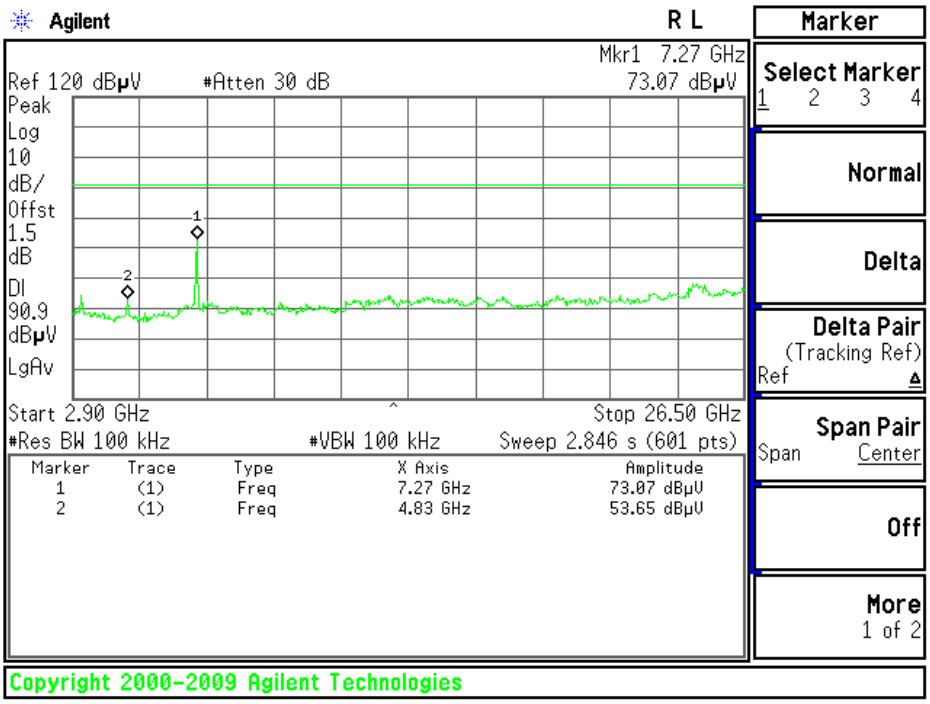
draft 802.11gn Wide-40 MHz Channel mode / Chain 0+ Chain 1

CH Low

30MHz ~ 2.9GHz

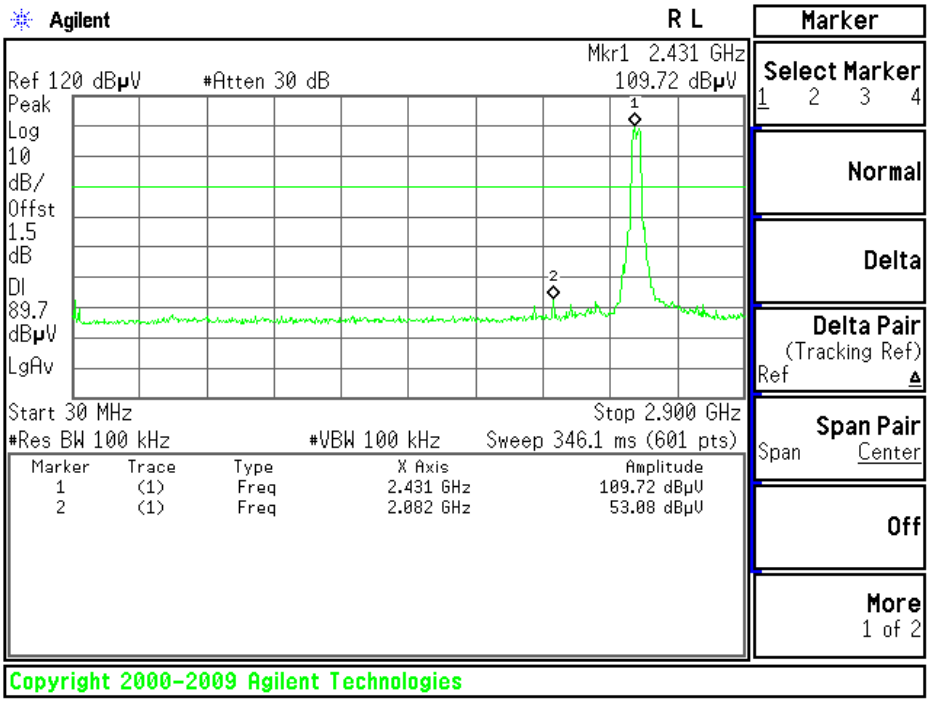


2.9GHz ~ 26.5GHz

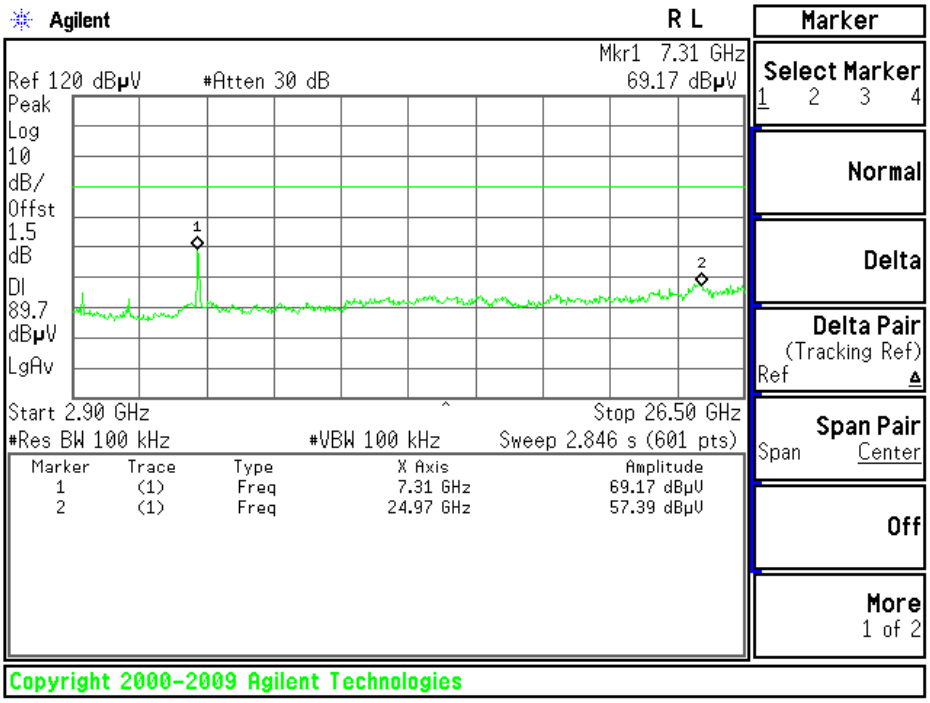


CH Mid

30MHz ~ 2.9GHz

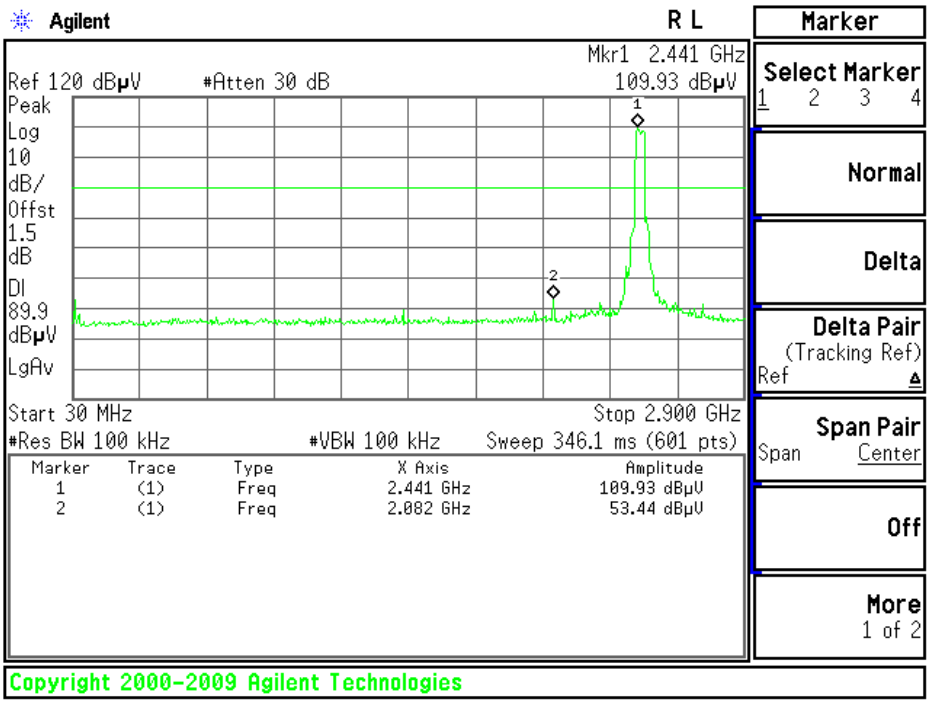


2.9GHz ~ 26.5GHz

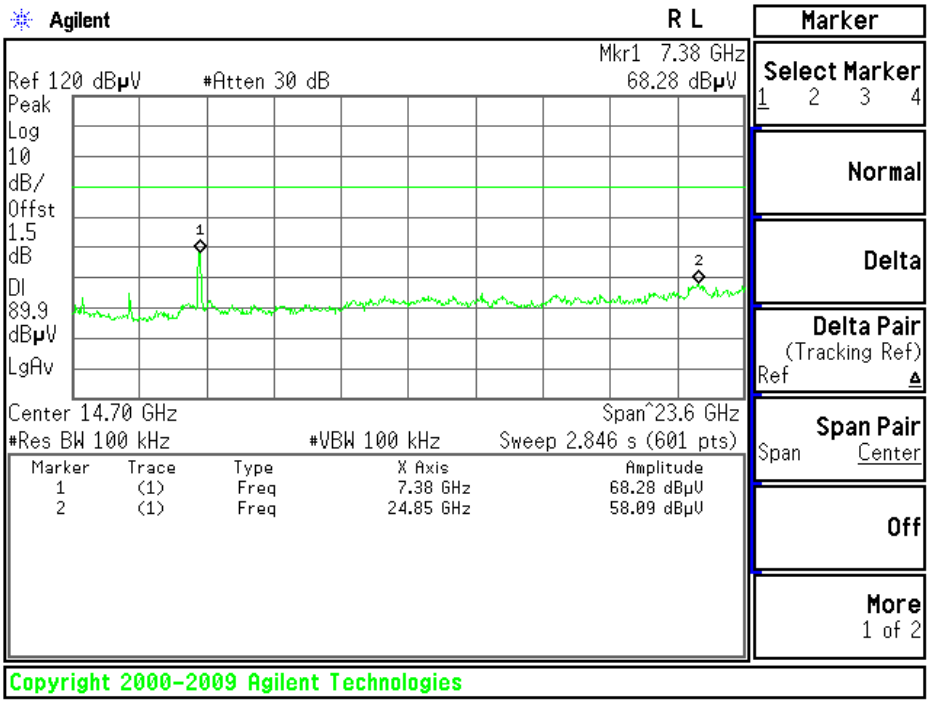


CH High

30MHz ~ 2.9GHz



2.9GHz ~ 26.5GHz



RADIATED EMISSIONS

LIMIT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

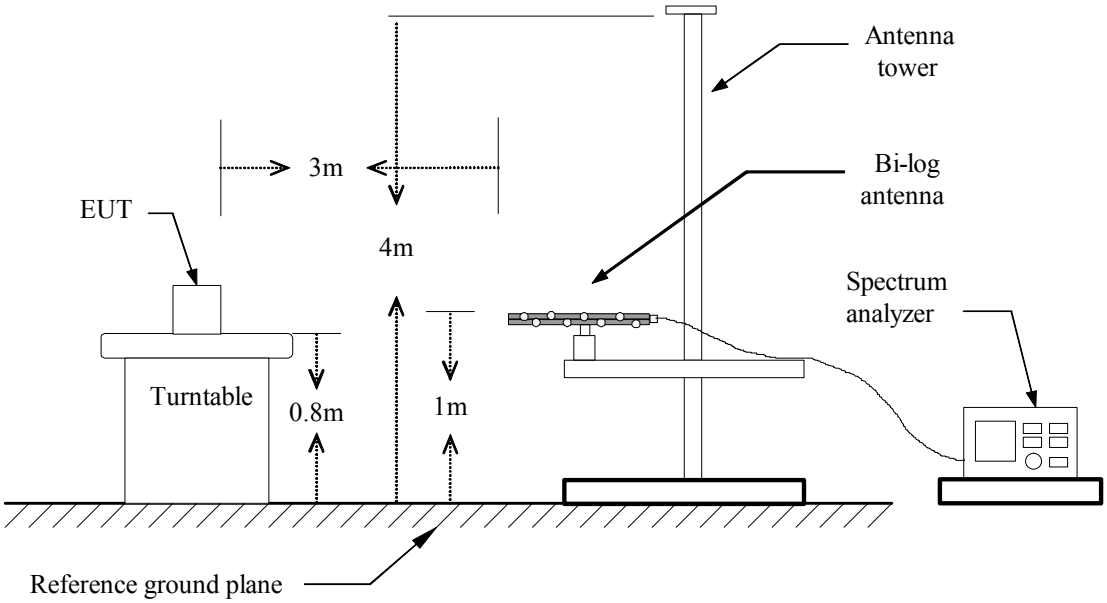
Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

2. In the emission table above, the tighter limit applies at the band edges.

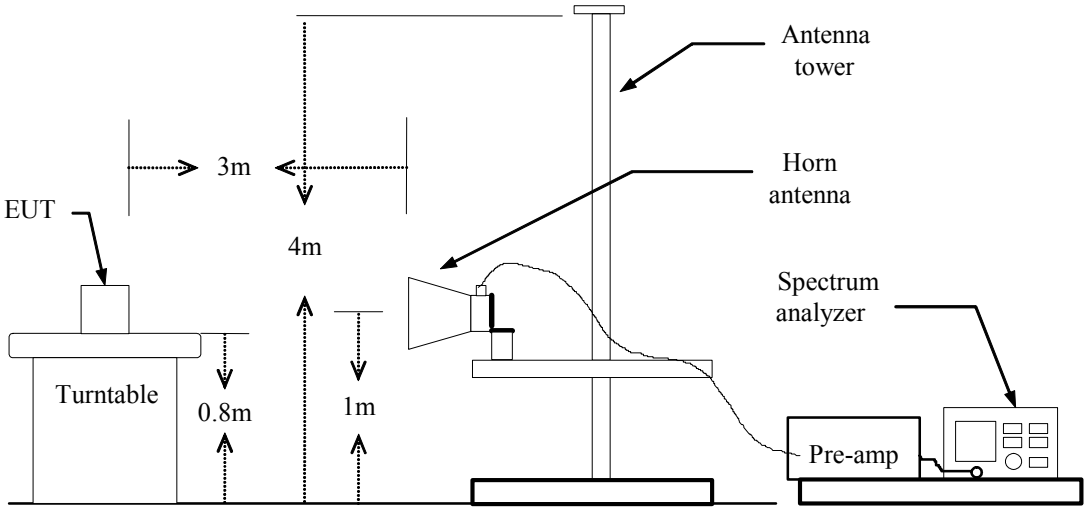
Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Test Configuration

Below 1 GHz



Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

   Below 1GHz:

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

   Above 1GHz:

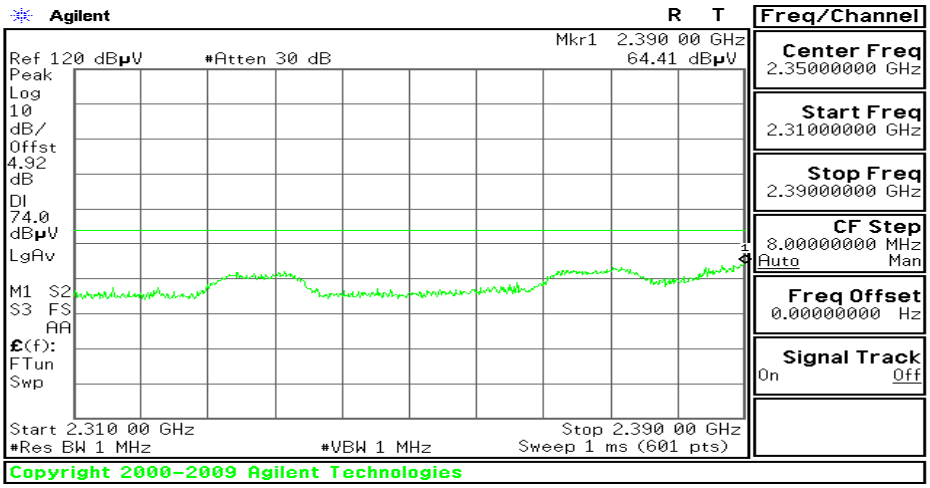
   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

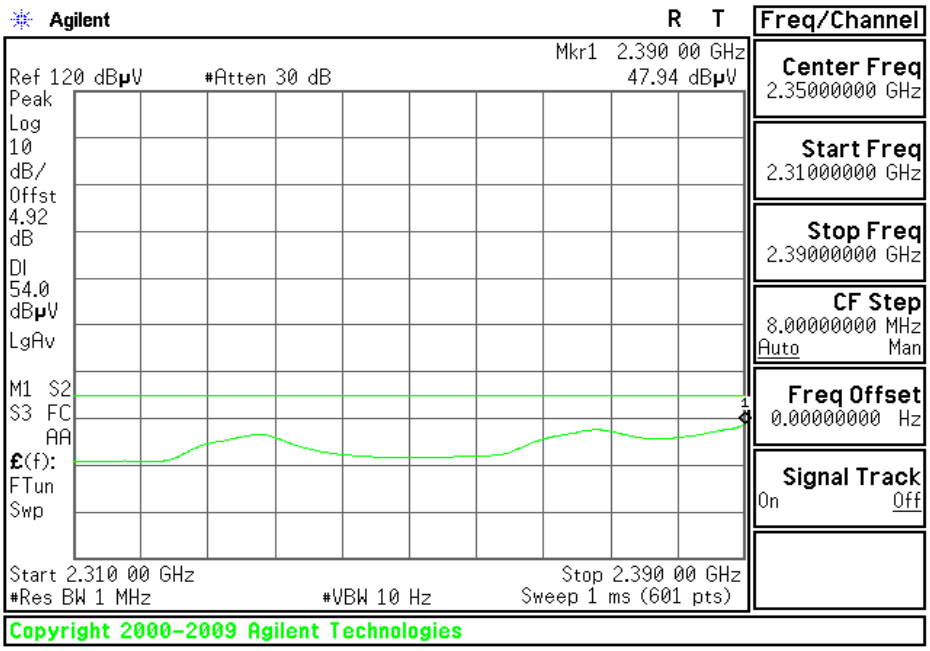
TEST RESULTS

RESTRICTED BANDEDGE (b Mode, Low Channel, Horizontal)

PEAK

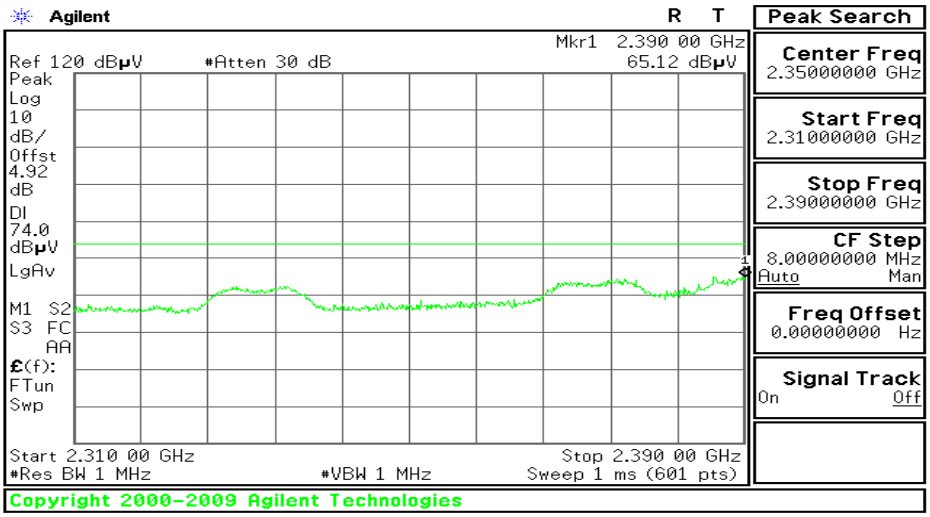


AVG

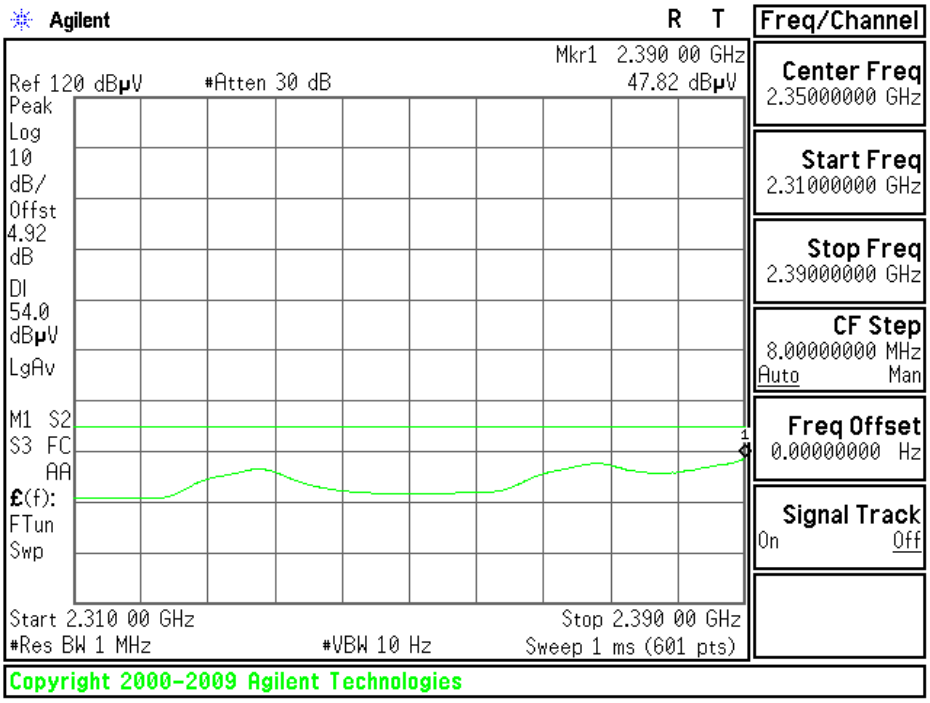


RESTRICTED BANDEDGE (b Mode, Low Channel, Vertical)

PEAK

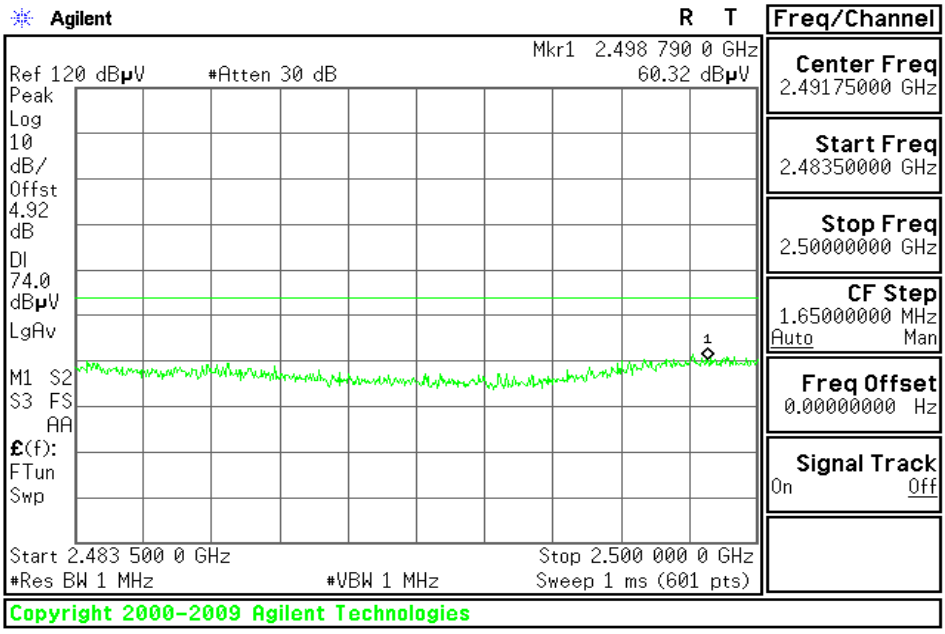


AVG

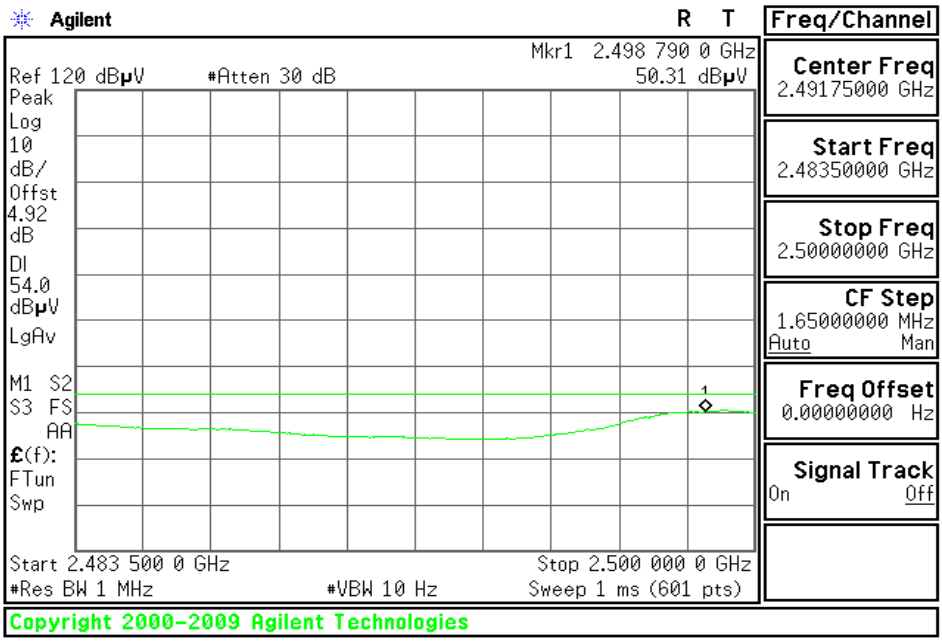


RESTRICTED BANDEDGE (b Mode, High Channel, Horizontal)

PEAK

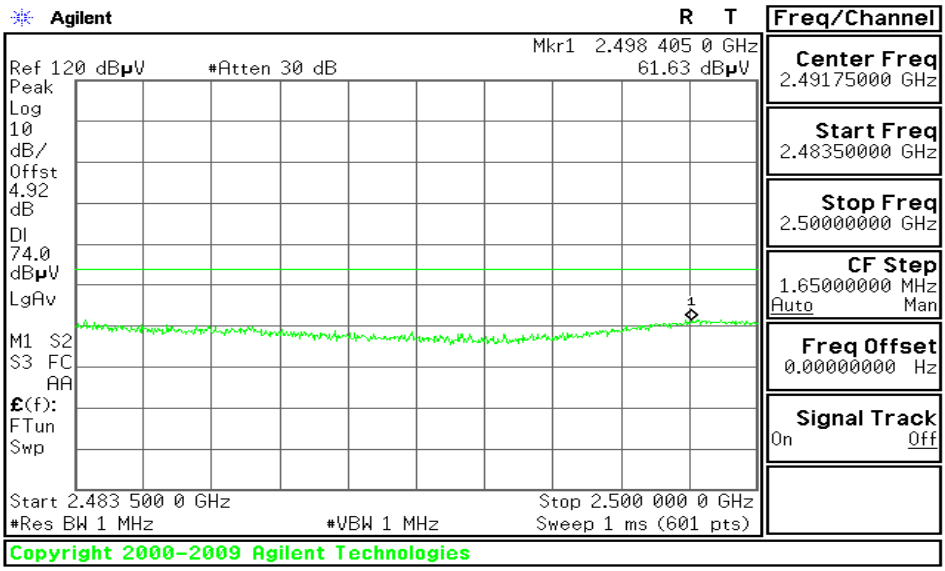


AVG

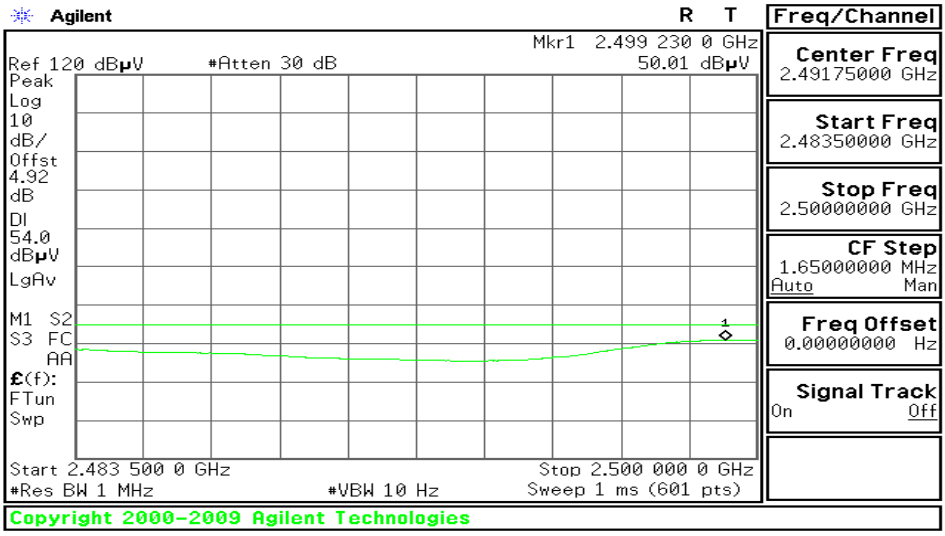


RESTRICTED BANDEDGE (b Mode, High Channel, Vertical)

PEAK

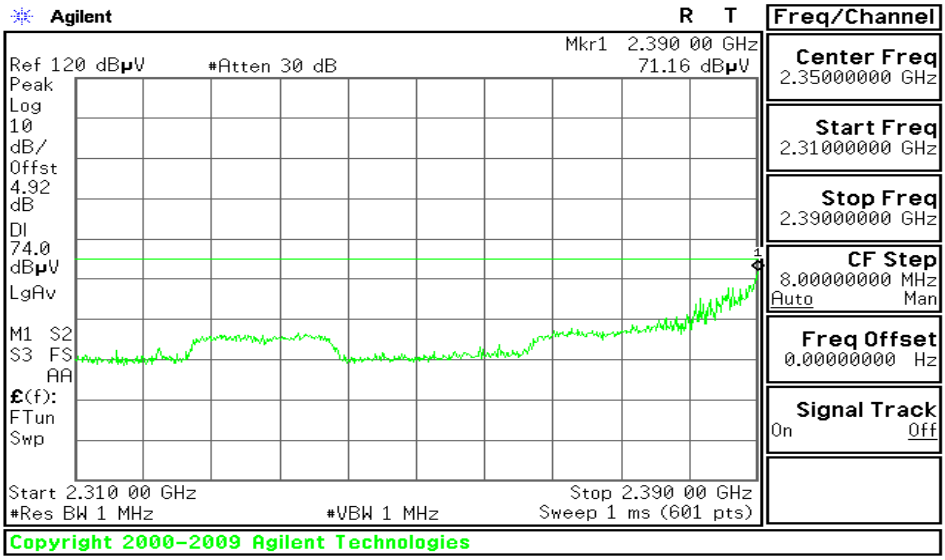


AVG

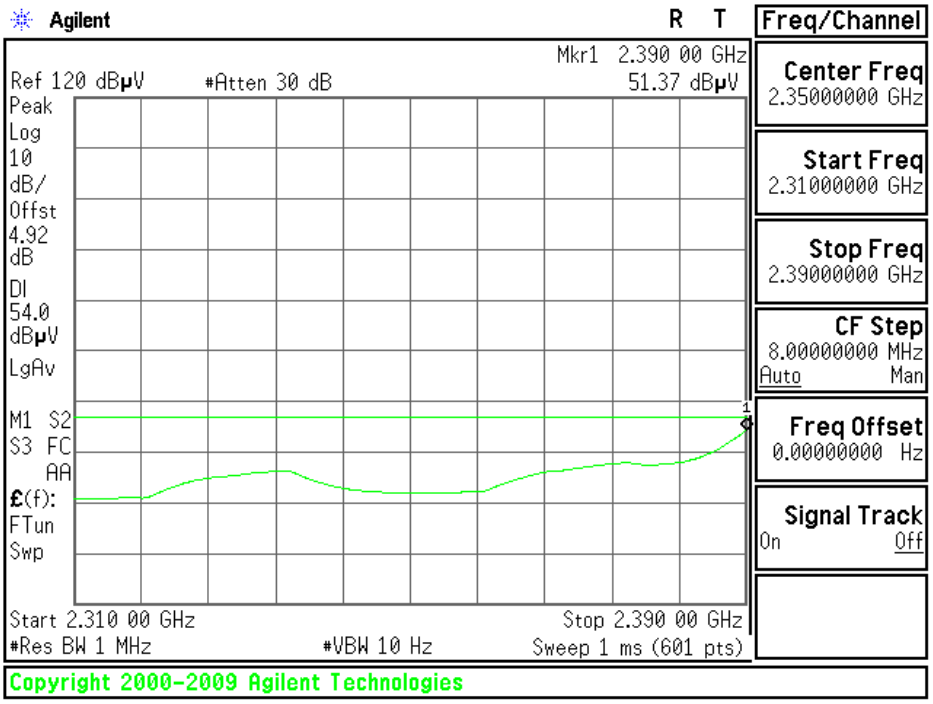


RESTRICTED BANDEDGE (g Mode, Low Channel, Horizontal)

PEAK

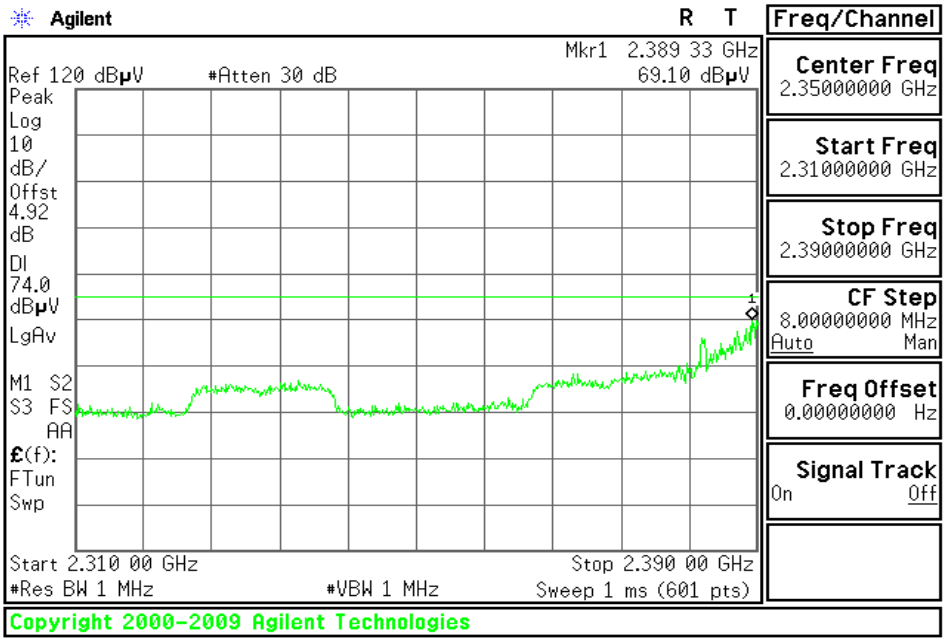


AVG

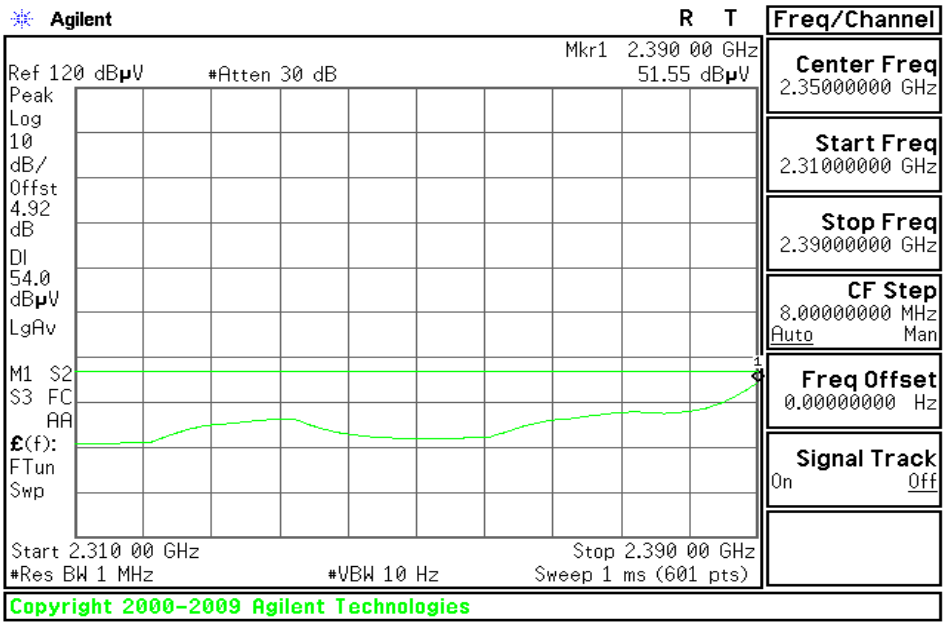


RESTRICTED BANDEDGE (g Mode, Low Channel, Vertical)

PEAK

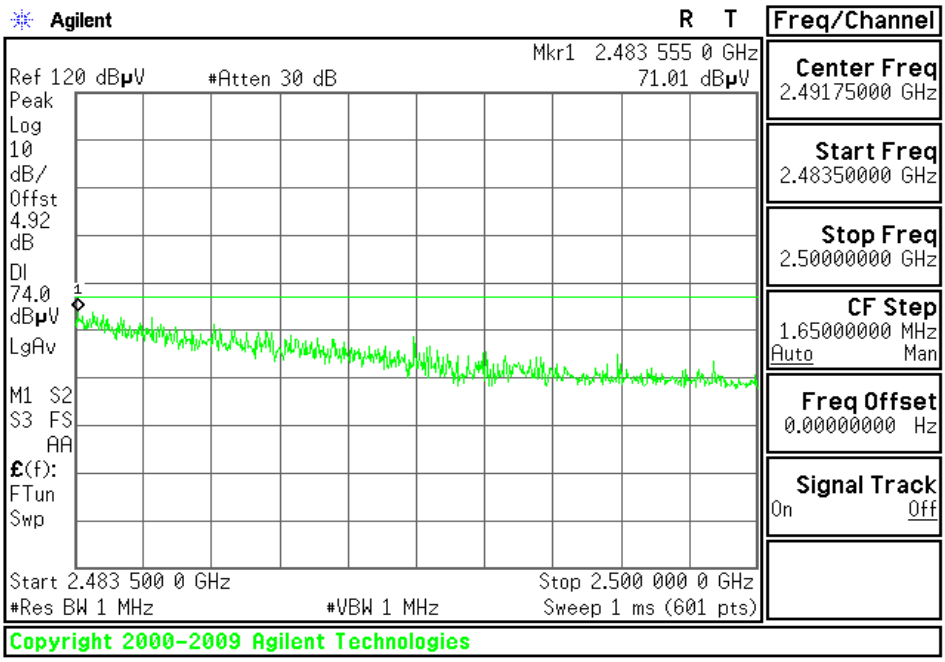


AVG

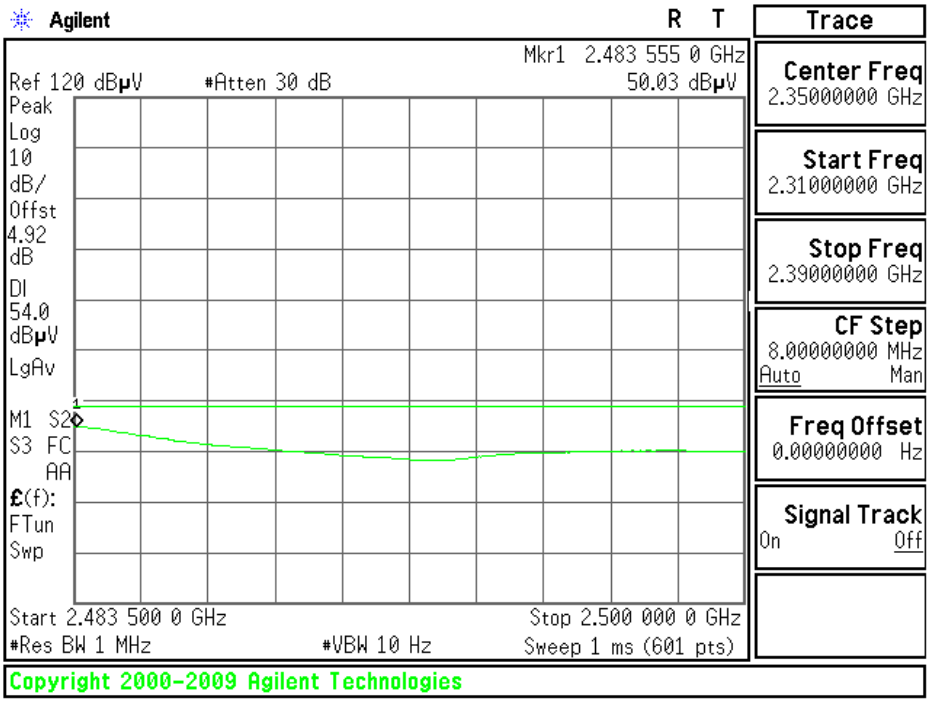


RESTRICTED BANDEDGE (g Mode, High Channel, Horizontal)

PEAK

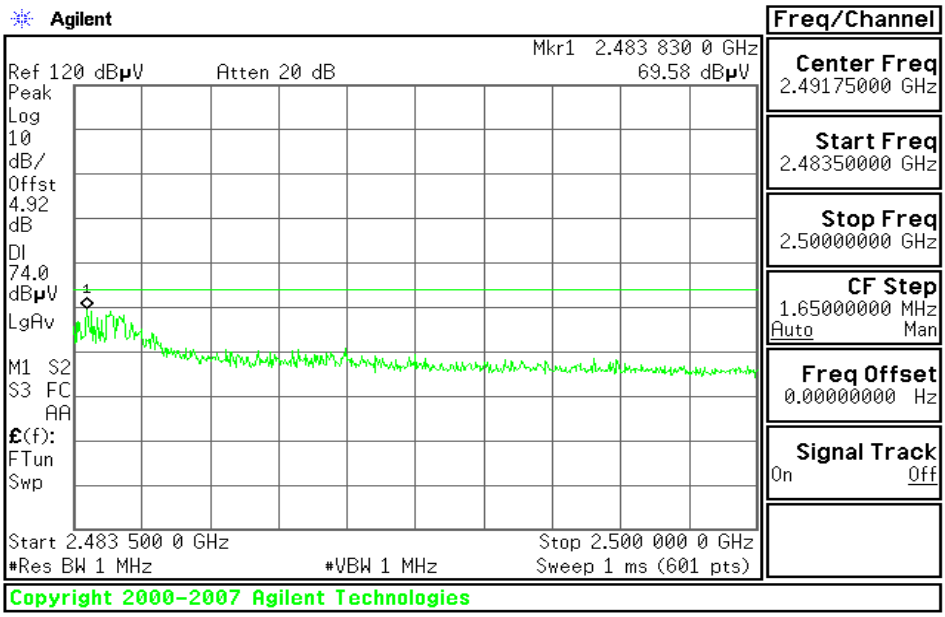


AVG

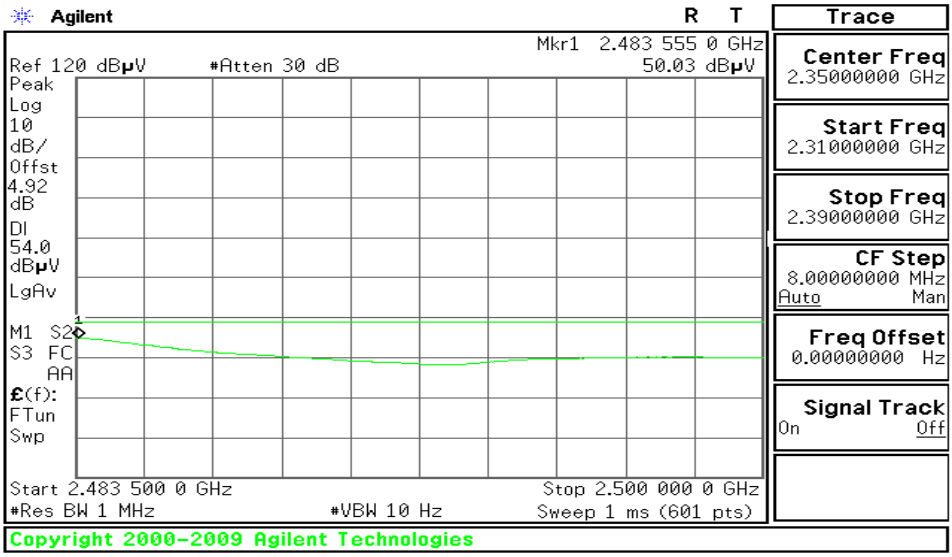


RESTRICTED BANDEDGE (g Mode, High Channel, Vertical)

PEAK

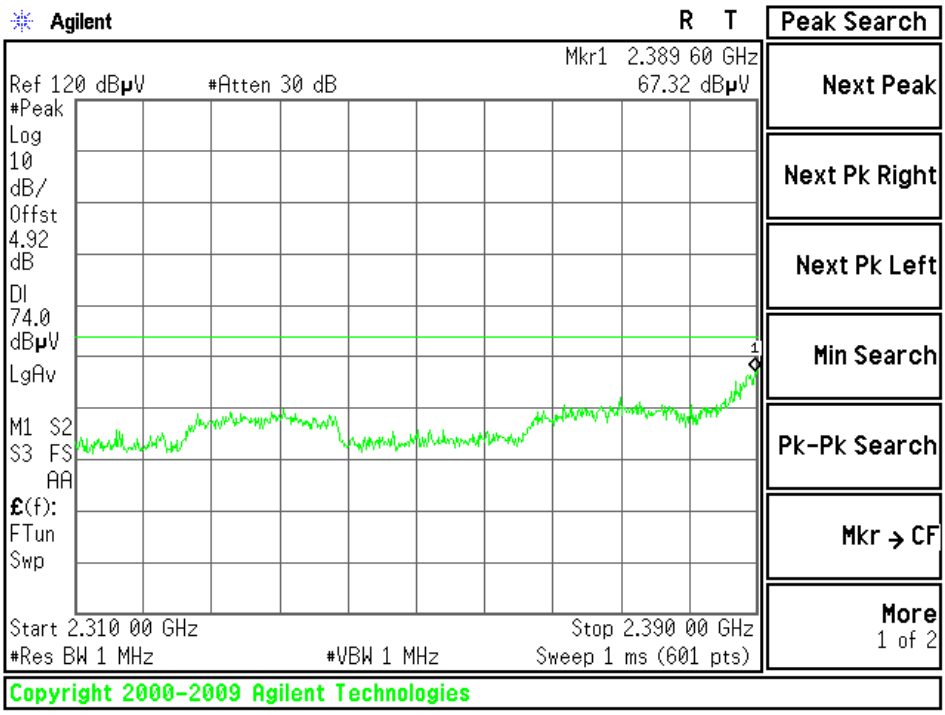


AVG

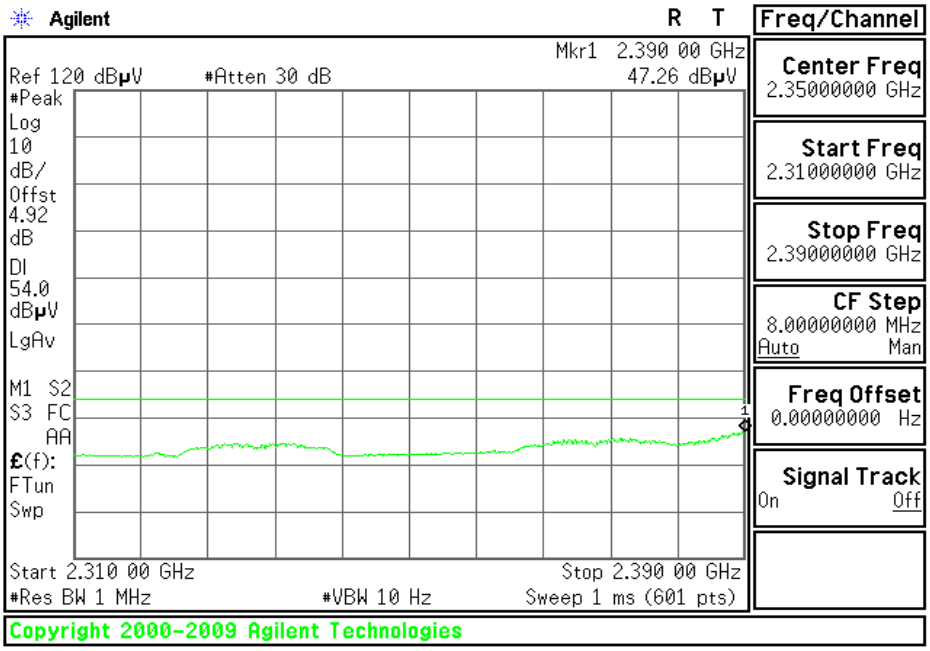


RESTRICTED BANDEDGE (draft 802.11gn Standard-20 MHz Channel mode, Low Channel, Horizontal)

PEAK

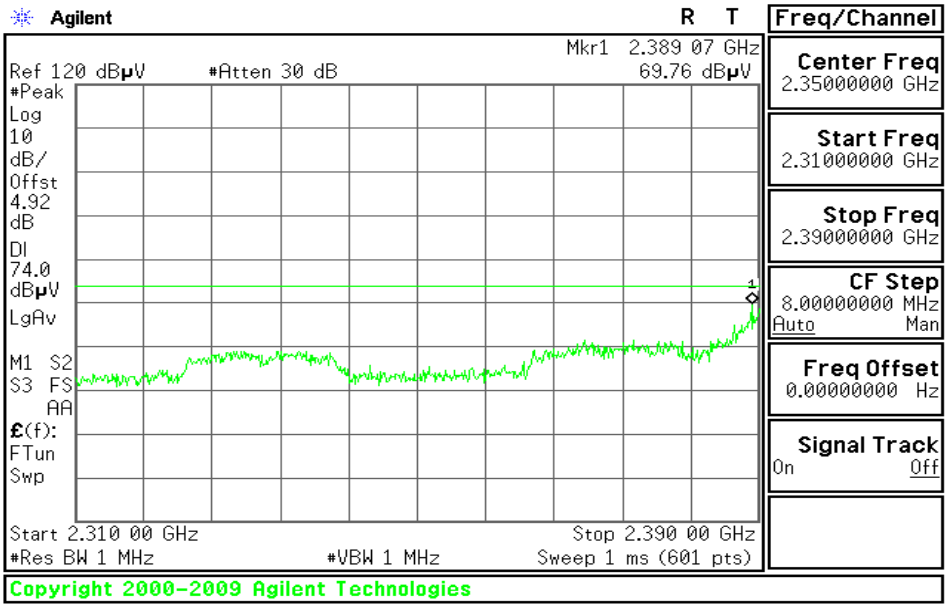


AVG

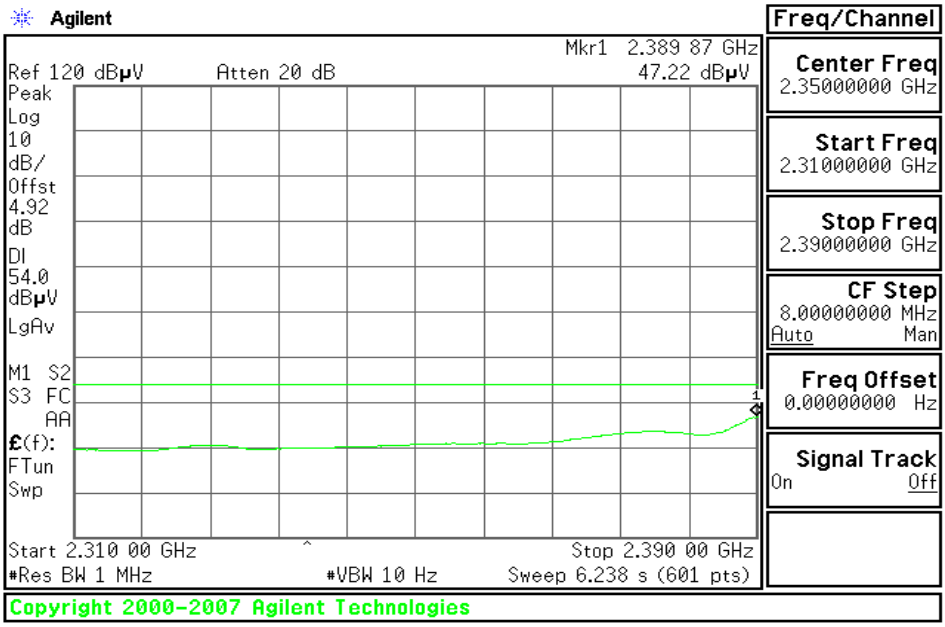


RESTRICTED BANDEDGE (draft 802.11gn Standard-20 MHz Channel mode, Low Channel, Vertical)

PEAK

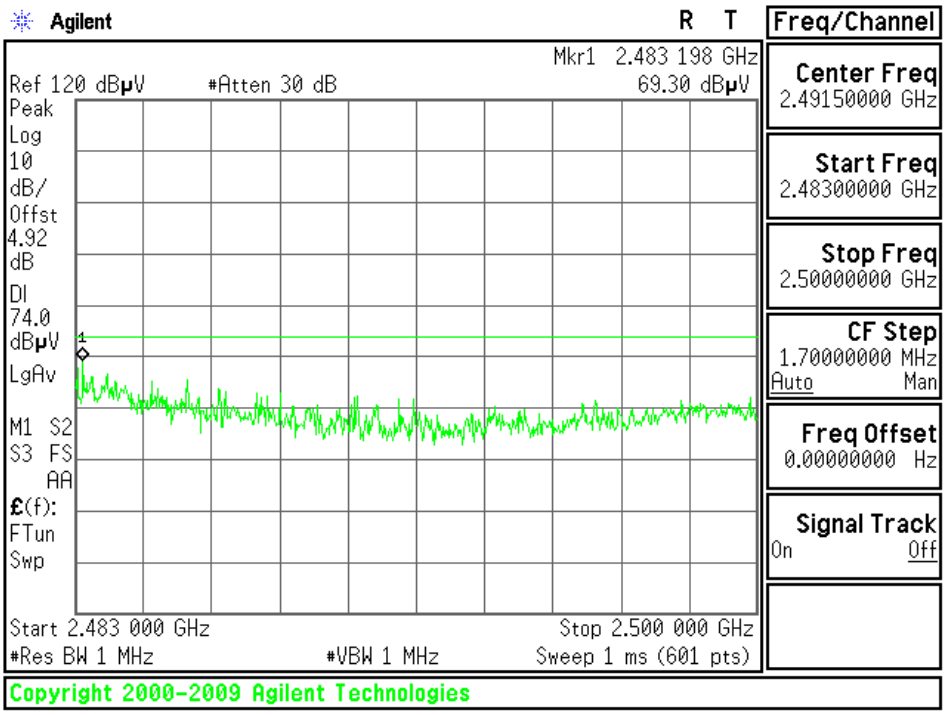


AVG

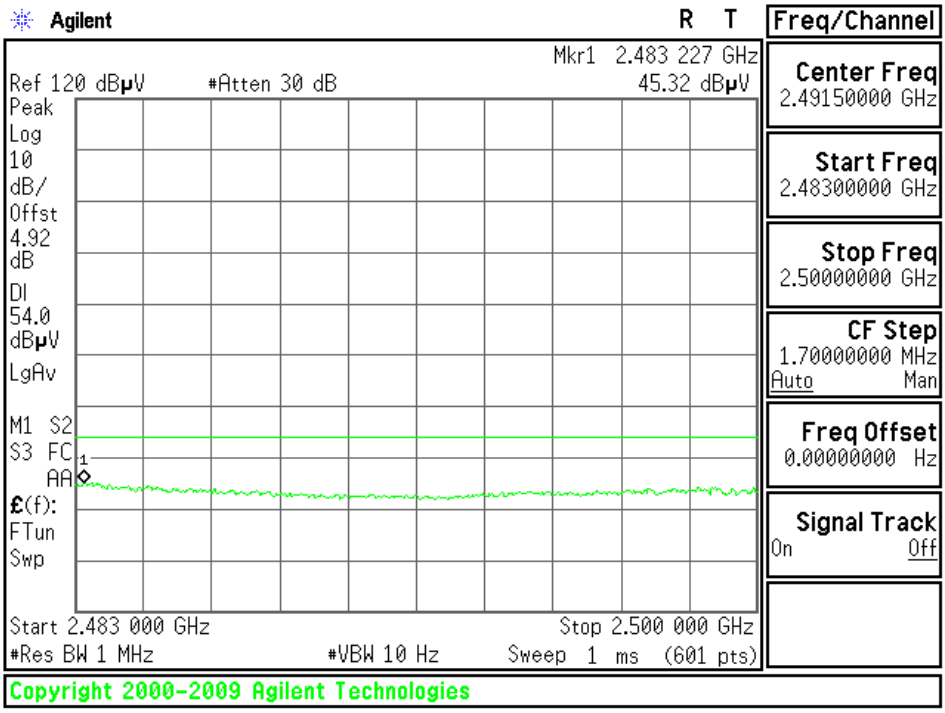


RESTRICTED BANDEDGE (draft 802.11gn Standard-20 MHz Channel mode, High Channel, Horizontal)

PEAK

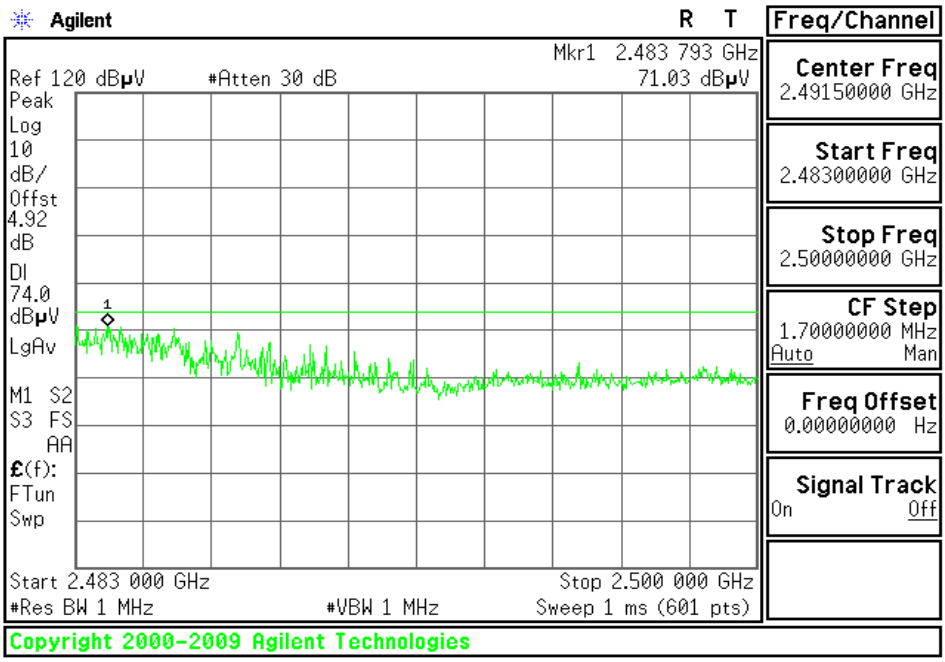


AVG

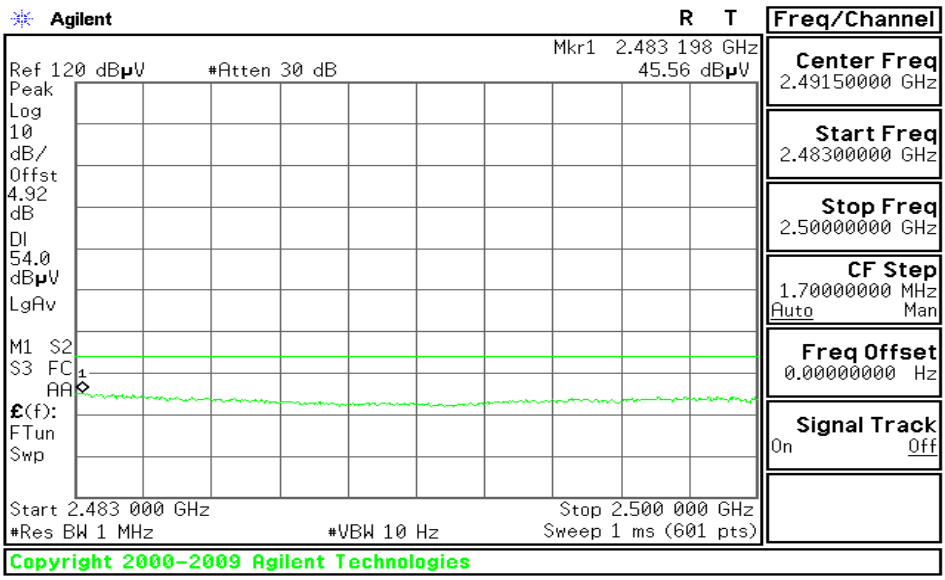


RESTRICTED BANDEDGE (draft 802.11gn Standard-20 MHz Channel mode, High Channel, Vertical)

PEAK

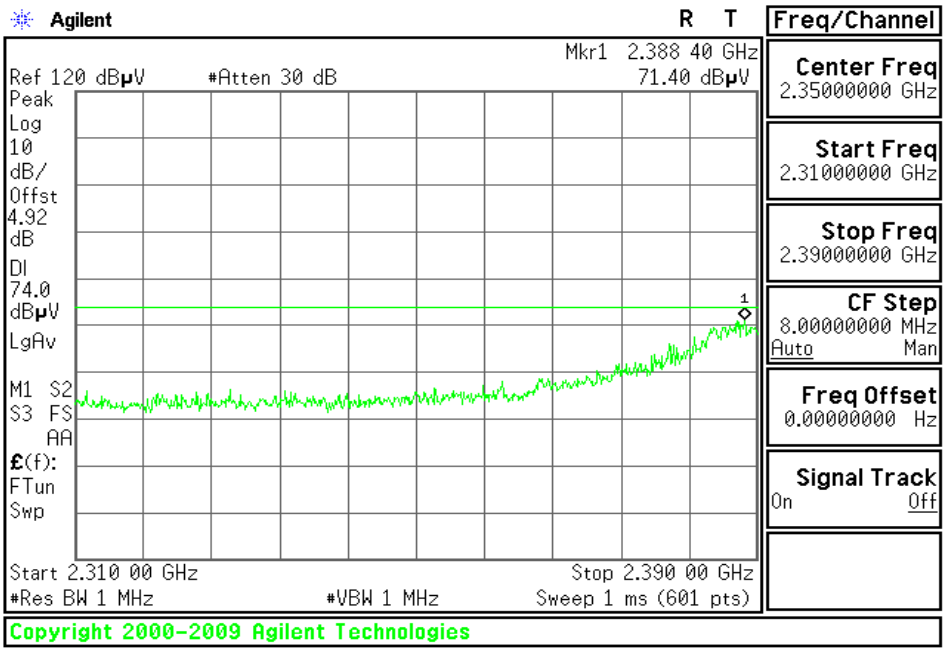


AVG

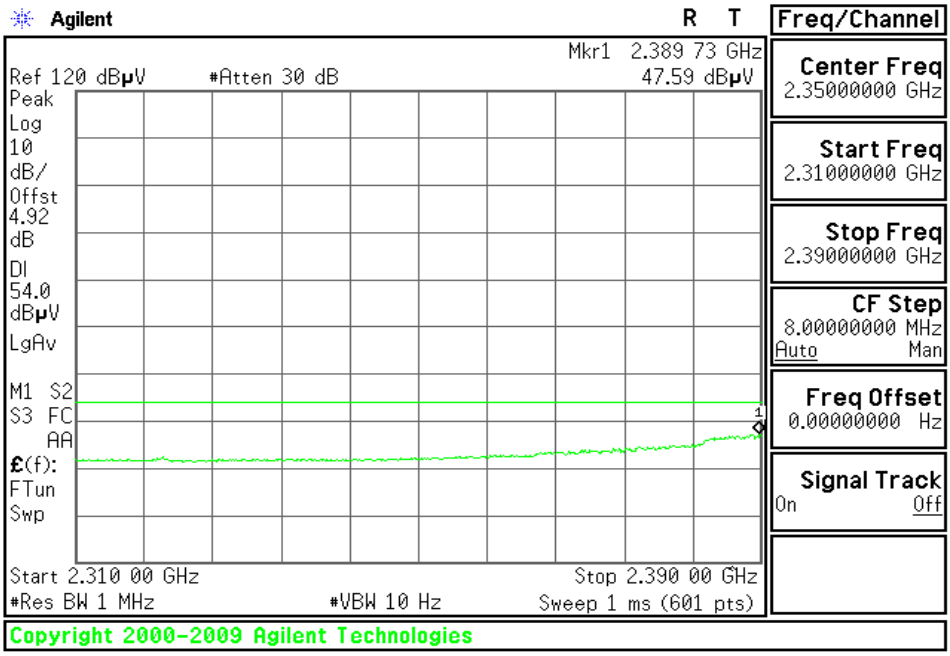


RESTRICTED BANDEDGE (draft 802.11gn Wide -40 MHz Channel mode, Low Channel, Horizontal)

PEAK

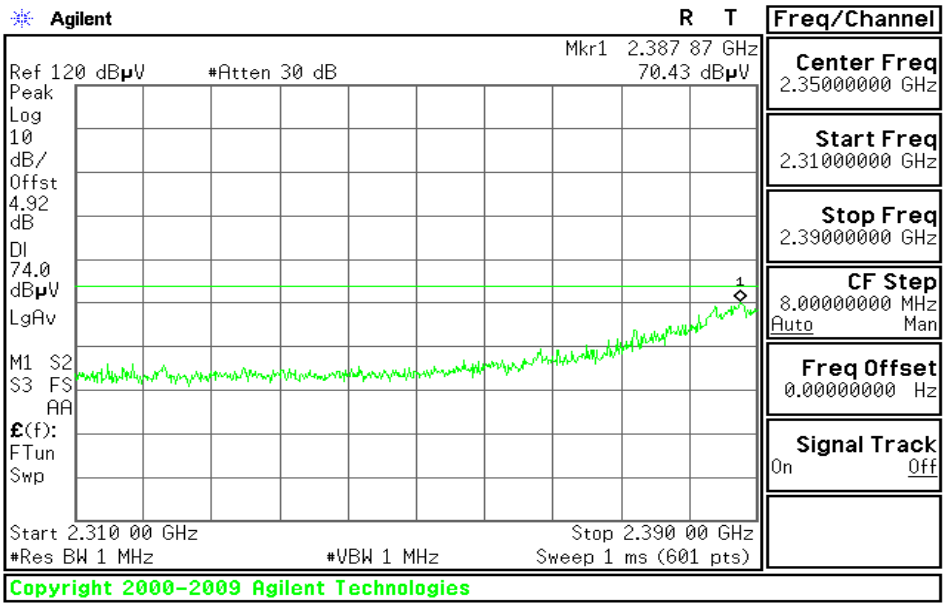


AVG

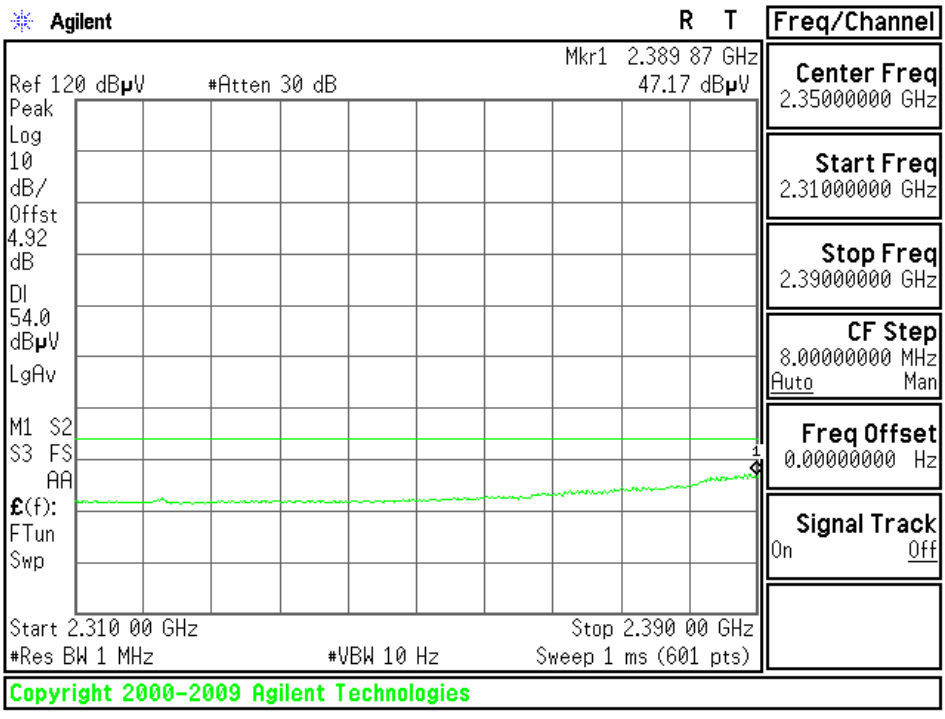


RESTRICTED BANDEDGE (draft 802.11gn Wide -40 MHz Channel mode, Low Channel, Vertical)

PEAK

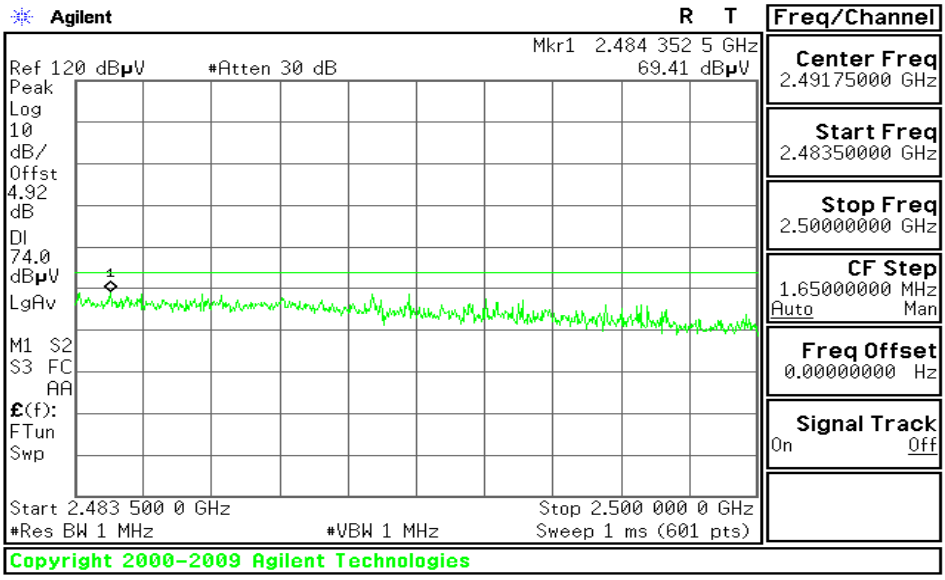


AVG

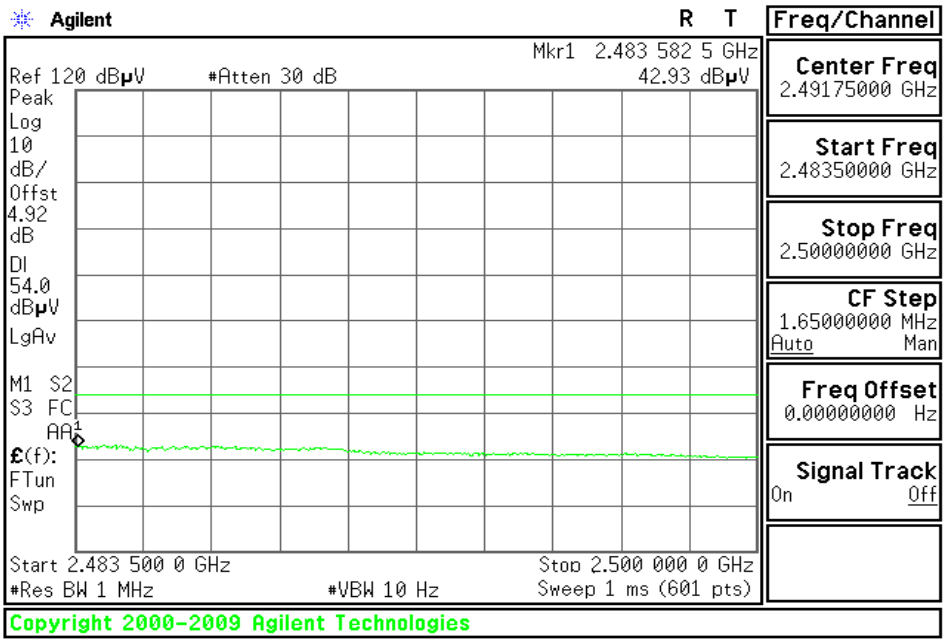


RESTRICTED BANDEDGE (draft 802.11gn Wide -40 MHz Channel mode, High Channel, Horizontal)

PEAK

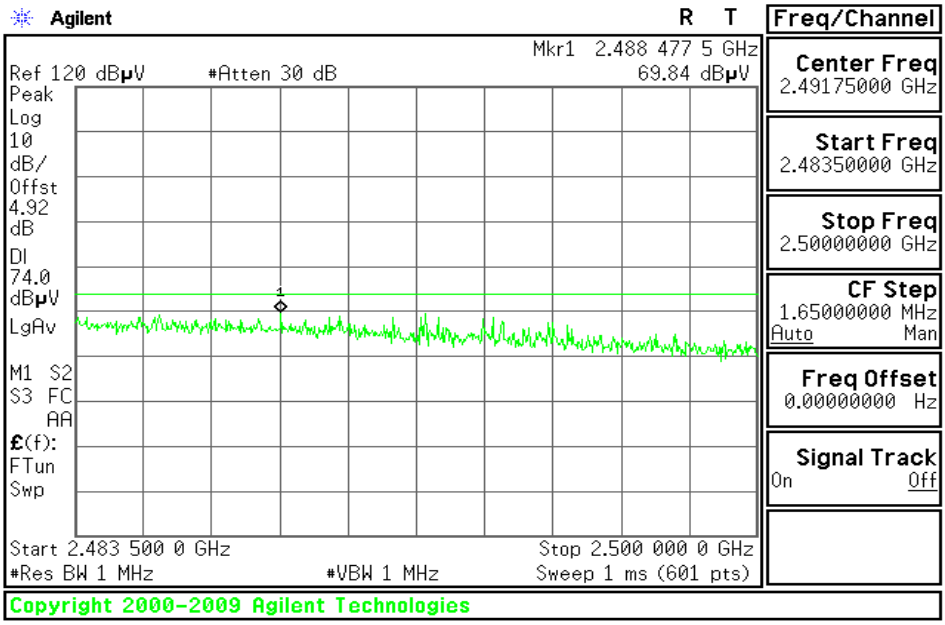


AVG

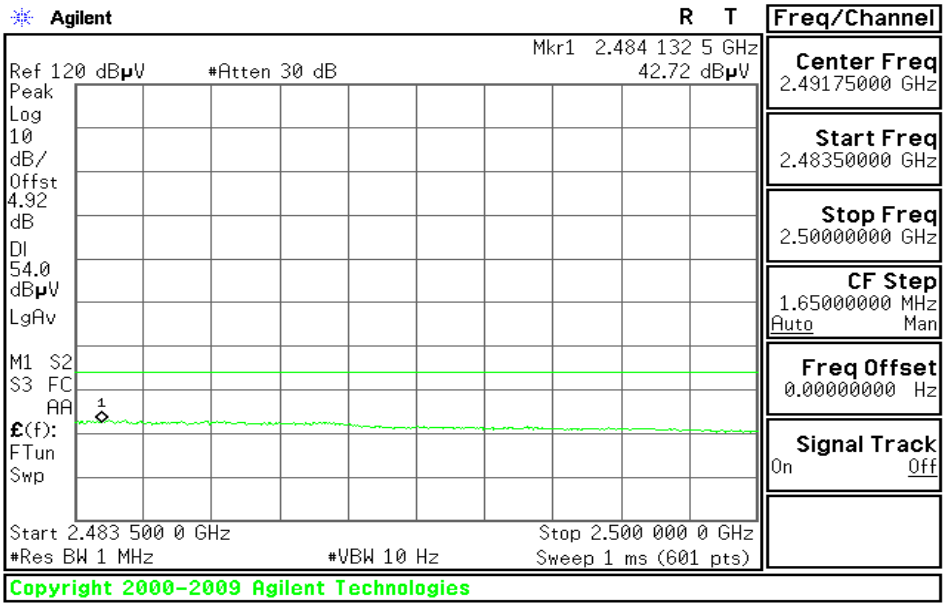


RESTRICTED BANDEDGE (draft 802.11gn Wide -40 MHz Channel mode, High Channel, Vertical)

PEAK



AVG



Below 1GHz

Operation Mode: Normal Link **Test Date:** August 22, 2009

Temperature: 22°C **Tested by:** Jeff

Humidity: 48% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
50.3258	V	52.04	-14.52	37.52	40.00	-2.48	QP
79.6033	V	48.92	-14.54	34.38	40.00	-5.62	QP
155.5741	V	47.69	-9.65	38.04	43.50	-5.46	QP
192.4669	V	49.70	-10.86	38.84	43.50	-4.66	QP
204.3878	V	50.07	-9.45	40.62	43.50	-2.88	QP
388.3658	V	41.23	-5.06	36.17	46.00	-9.83	Peak
111.1623	H	49.40	-10.02	39.38	43.50	-4.12	Peak
153.9078	H	49.97	-9.65	40.32	43.50	-3.18	QP
187.4549	H	49.83	-10.81	39.02	43.50	-4.48	QP
205.7695	H	48.27	-9.45	38.82	43.50	-4.68	QP
300.1420	H	48.46	-7.53	40.93	46.00	-5.07	Peak
907.2545	H	36.82	3.69	40.51	46.00	-5.49	Peak

Remark:

1. *Measuring frequencies from 30 MHz to the 1GHz (No emission found between lowest internal used/generated frequency to 30 MH)z.*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.*
3. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
4. *Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).*

Above 1 GHz

Operation Mode: TX / IEEE 802.11b / CH Low **Test Date:** August 22, 2009

Temperature: 22°C **Tested by:** Jeff

Humidity: 48 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4824.25	V	43.16	30.23	12.41	55.57	42.64	74	54	-11.36	Average
7236.87	V	39.28	32.41	15.48	54.76	47.89	74	54	-6.11	Average
4824.23	H	42.71	29.93	12.41	55.12	42.34	74.00	54.00	-11.66	Average
7233.72	H	38.35	32.48	15.47	53.82	47.95	74.00	54.00	-6.05	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: TX / IEEE 802.11b / CH Mid **Test Date:** August 22, 2009

Temperature: 22°C **Tested by:** Jeff

Humidity: 48 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4865.23	V	40.73	30.64	12.68	53.41	43.32	74.00	54.00	-10.68	Average
7307.45	V	37.74	31.17	15.72	53.46	46.89	74.00	54.00	-7.11	Average
N/A										
4866.18	H	38.15	31.15	12.68	50.83	43.83	74.00	54.00	-10.17	Average
7321.52	H	36.82	29.57	15.76	52.58	45.33	74.00	54.00	-8.67	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: TX / IEEE 802.11b / CH High **Test Date:** August 22, 2009

Temperature: 22°C **Tested by:** Jeff

Humidity: 48 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4921.22	V	37.63	30.65	12.93	50.56	43.58	74.00	54.00	-10.42	Average
7378.30	V	39.64	31.93	15.82	55.46	47.75	74.00	54.00	-6.25	Average
N/A										
4923.36	H	38.28	30.28	12.93	51.21	43.21	74.00	54.00	-10.79	Average
7380.64	H	40.94	32.06	15.82	56.76	47.88	74.00	54.00	-6.12	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: TX / IEEE 802.11g / CH Low **Test Date:** August 22, 2009

Temperature: 24°C **Tested by:** Jeff

Humidity: 48 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4819.45	V	37.14	30.14	12.41	49.55	42.55	74.00	54.00	-11.45	Average
7233.28	V	38.85	33.28	15.48	54.33	48.76	74.00	54.00	-5.24	Average
N/A										
4823.43	H	34.02	29.02	12.41	46.43	41.43	74.00	54.00	-12.57	Average
7238.62	H	36.3	32.46	15.48	51.78	47.94	74.00	54.00	-6.06	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: TX / IEEE 802.11g / CH Mid **Test Date:** August 22, 2009

Temperature: 24°C **Tested by:** Jeff

Humidity: 48 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4876.34	V	33.61	30.61	12.68	46.29	43.29	74.00	54.00	-10.71	Average
7320.65	V	37.35	32.06	15.76	53.11	47.82	74.00	54.00	-6.18	Average
N/A										
4875.33	H	32.99	29.99	12.68	45.67	42.67	74.00	54.00	-11.33	Average
7318.21	H	37.14	31.04	15.74	52.88	46.78	74.00	54.00	-7.22	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: TX / IEEE 802.11g / CH High **Test Date:** August 22, 2009

Temperature: 24°C **Tested by:** Jeff

Humidity: 48 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4930.48	V	38.60	29.60	12.94	51.54	42.54	74.00	54.00	-11.46	Average
7391.72	V	37.38	30.35	15.82	53.20	46.17	74.00	54.00	-7.83	Average
N/A										
4929.54	H	39.38	30.38	12.93	52.31	43.31	74.00	54.00	-10.69	Average
7389.69	H	37.16	29.92	15.82	52.98	45.74	74.00	54.00	-8.26	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode:	TX / draft 802.11gn Standard-20 MHz Channel mode (Chain 0 + Chain 1) / CH Low	**Test Date:**	August 22, 2009
Temperature:	24°C	**Tested by:**	Jeff
Humidity:	48 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4832.34	V	39.48	30.14	12.41	51.89	42.55	74.00	54.00	-11.45	Average
7230.45	V	37.94	32.68	15.48	53.42	48.16	74.00	54.00	-5.84	Average
N/A										
4824.36	H	37.30	31.44	12.41	49.71	43.85	74.00	54.00	-10.15	Average
7219.49	H	36.30	31.17	15.48	51.78	46.65	74.00	54.00	-7.35	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode:	TX / draft 802.11gn Standard-20 MHz Channel mode (Chain 0 + Chain 1) / CH Mid	**Test Date:**	August 22, 2009
Temperature:	24°C	**Tested by:**	Jeff
Humidity:	48 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4876.31	V	34.64	29.84	12.68	47.32	42.52	74.00	54.00	-11.48	Average
7321.27	V	36.89	31.42	15.76	52.65	47.18	74.00	54.00	-6.82	Average
N/A										
4875.64	H	35.00	31.00	11.02	46.02	42.02	74.00	54.00	-11.98	Average
7316.36	H	39.74	30.50	15.72	55.46	40.22	74.00	54.00	-7.78	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode:	TX / draft 802.11gn Standard-20 MHz Channel mode (Chain 0 + Chain 1) / CH High	**Test Date:**	August 22, 2009
Temperature:	24°C	**Tested by:**	Jeff
Humidity:	48 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4930.48	V	37.60	30.59	12.93	46.52	43.52	74.00	54.00	-10.48	Average
7387.56	V	38.30	31.99	15.82	54.12	47.81	74.00	54.00	-6.19	Average
N/A										
4924.62	H	32.74	29.79	12.93	45.67	42.72	74.00	54.00	-11.28	Peak
7384.74	H	39.64	31.09	15.82	55.46	46.91	74.00	54.00	-7.09	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode:	TX / draft 802.11gn Wide-40 MHz Channel mode (Chain 0 + Chain 1) / CH Low	**Test Date:**	August 22, 2009
Temperature:	24°C	**Tested by:**	Jeff
Humidity:	48 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4845.65	V	35.42	29.42	12.41	47.83	41.83	74.00	54.00	-12.17	Average
7385.52	V	39.27	31.80	15.48	54.75	47.28	74.00	54.00	-6.72	Average
N/A										
4850.47	H	34.38	30.02	12.41	46.79	42.43	74.00	54.00	-11.57	Average
7389.68	H	38.55	30.67	15.48	54.03	46.15	74.00	54.00	-7.85	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode:	TX / draft 802.11gn Wide-40 MHz Channel mode (Chain 0 + Chain 1) / CH Mid	**Test Date:**	August 22, 2009
Temperature:	24°C	**Tested by:**	Jeff
Humidity:	48 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4874.54	V	33.74	30.74	12.68	46.42	43.42	74.00	54.00	-10.58	Average
7313.29	V	36.77	31.38	15.71	52.48	47.09	74.00	54.00	-6.91	Average
N/A										
4874.36	H	32.75	30.05	12.68	45.43	42.73	74.00	54.00	-11.27	Average
7314.42	H	36.26	31.11	15.71	51.97	46.82	74.00	54.00	-7.18	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode:	TX / draft 802.11gn Wide-40 MHz Channel mode (Chain 0 + Chain 1) / CH High	**Test Date:**	August 22, 2009
Temperature:	24°C	**Tested by:**	Jeff
Humidity:	48 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
4910.33	V	37.72	30.58	12.93	47.07	43.51	74.00	54.00	-10.49	Average
7360.64	V	37.89	31.25	15.83	53.72	47.08	74.00	54.00	-6.92	Average
N/A										
4911.62	H	33.58	29.75	12.93	46.51	42.68	74.00	54.00	-11.32	Average
7359.37	H	36.35	30.57	15.82	52.17	46.39	74.00	54.00	-7.61	Average
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 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 frequency ranges.

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

** Decreases with the logarithm of the frequency.*

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

Operation Mode:	Normal Link	**Test Date:**	Auguset 13, 2009
Temperature:	23°C	Tested by:	Jeff
Humidity:	50% RH		

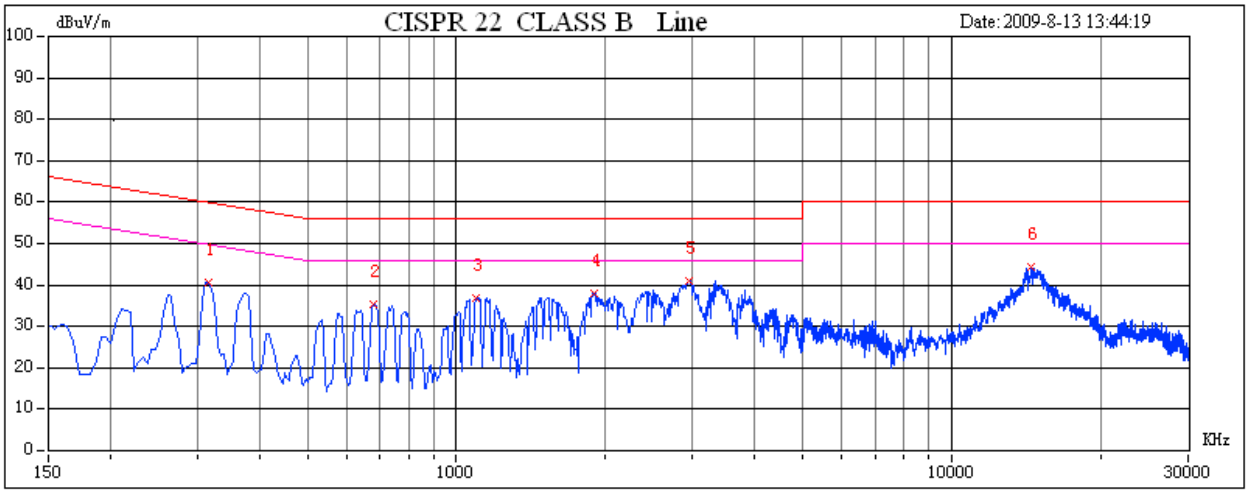
Freq. (MHz)	PEAK. Raw (dBuV)	Q.P. Raw (dBuV)	AVG Raw (dBuV)	Q.P. Limit (dBuV)	AVG Limit (dBuV)	Margin (dB)	Factor (dB)	Remark
0.310	40.50	39.24	36.93	61.41	51.41	-14.48	10.26	Line
0.675	35.48	35.37	33.07	56.00	46.00	-12.93	10.58	Line
1.090	36.80	36.00	31.55	56.00	46.00	-14.45	10.91	Line
1.896	38.08	33.74	19.16	56.00	46.00	-26.84	11.21	Line
2.938	46.16	36.45	22.96	56.00	46.00	-23.04	11.76	Line
14.488	44.36	39.36	29.16	60.00	50.00	-20.84	11.44	Line
0.312	37.33	37.10	35.08	61.36	51.36	-16.28	10.23	Neutral
0.677	35.55	33.35	31.64	56.00	46.00	-14.36	10.69	Neutral
1.143	35.50	33.37	30.11	56.00	46.00	-15.89	11.10	Neutral
2.028	37.87	35.79	30.33	56.00	46.00	-15.67	11.27	Neutral
2.947	38.19	33.80	24.12	56.00	46.00	-21.88	11.75	Neutral
15.041	42.69	37.33	27.90	60.00	50.00	-22.10	11.43	Neutral

Remark:

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

Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)