FCC Part 15C
Measurement and Test Report
For

Shenzhen Qiyue Optronics Company Limited

Flat3,Tower 3, Excellence Meilin Center Plaza, Zhongkang Road 128, Shangmeilin, Futian District, Shenzhen, China

FCC ID: XOMIRTUOXOXX60XX

FCC Rule(s):	FCC Part 15C
Product Description:	60” SMART 4K UHD TV
Tested Model:	D60A114-U-A-I RNSMU6036 XXXXXXXXXXXXXXXX60XXXXXXXXXX (Where "X"can be any alphanumeric of a-z, A-Z or 0-9 or blank &"-".)
Report No.:	WTG19G01003938W-1
Sample Receipt Date:	January 18, 2019
Tested Date:	January 19 ~ February 26, 2019
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Tested By:	Jason Su/ Engineer
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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information	
Applicant:	**Shenzhen Qiyue Optronics Company Limited**
Address of applicant:	Flat3,Tower 3, Excellence Meilin Center Plaza, Zhongkang Road 128, Shangmeilin, Futian District, Shenzhen, China
Manufacturer:	**SHENZHEN QIYUE OPTRONICS COMPANY LIMITED BRANCH**
Address of manufacturer:	SEIYU INDUSTRIAL PARK, DA SAN VILLAGE, DA SHUI KENG, GUANLAN TOWN, LONGHUA NEW DISTRICT, SHENZHEN, P.R.C

General Description of EUT	
Product Name:	60” SMART 4K UHD TV
Trade Name:	RCA SMARTVIRTUOSO
Model No.:	D60A114-U-A-I RNSMU6036 XXXXXXXXXXXXXXXX60XXXXXXXXXX (Where "X"can be any alphanumeric of a-z, A-Z or 0-9 or blank &"-".)
Rated Voltage:	Input: AC 100-120V, 60Hz, 98W Output: USB DC 5V, 500mA
Power Adapter Model:	/
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT	
Frequency Range:	IEEE 802.11b/ g / nHT20: 2412MHz~2462MHz IEEE802.11nHT40: 2422MHz~2452MHz
Modulation:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
Quantity of Channels:	11 for 802.11b/g/n(HT20); 7 for 802.11n(HT40)
Type of Antenna:	Wi-Fi Antenna

Antenna Gain:	Antenna 1: 3 dBi Antenna 2: 3 dBi
	Note: 11b,g,n uses Antenna 1 / Antenna 2 11n uses MIMO

1.2 Test Standards

The following report is prepared on behalf of the **Shenzhen Qiyue Optronics Company Limited** in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commission rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commission rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices.

1.4 Test Facility

FCC – Registration No.: 125990
Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A
The 3m Semi-anechoic chamber of Shenzhen SEM. Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest
possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11b	2412MHz, 2437MHz, 2462MHz
TM2	802.11g	2412MHz, 2437MHz, 2462MHz
TM3	802.11n-HT20	2412MHz, 2437MHz, 2462MHz
TM4	802.11n-HT40	2422MHz, 2437MHz, 2452MHz
Note: All test modes (different data rate and different modulation) are performed, but only the worst case is recorded in this report.		

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Core
AC Net Cord	1.5	Unshielded	With Core

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Power Spectral Density	Conducted	±1.8dB
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	±2.88dB
Transmitter Spurious Emissions	Radiated	±5.1dB

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2018-06-11	2019-06-10
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2018-06-11	2019-06-10
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2018-06-11	2019-06-10
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2018-06-11	2019-06-10
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2018-06-11	2019-06-10
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2018-06-07	2019-06-06
SEMT-1042	Horn Antenna	ETS	3117	00086197	2018-06-07	2019-06-06
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2018-06-07	2019-06-06
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2018-06-07	2019-06-06
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2018-06-11	2019-06-10
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2018-06-11	2019-06-10
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2018-06-11	2019-06-10

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 2.1093	RF Exposure	Compliant
§15.203;§15.247(b)(4)(i)	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.207(a)	Conducted Emission	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.247(a)(2)	6 dB Bandwidth	Compliant
§15.247(b)(3)	RF Output Power	Compliant
§15.209(a)	Radiated Emission	Compliant
§15.247(d)	Band Edge (Out of Band Emissions)	Compliant

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to§1.1307 and §2.1091, the mobile transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF Exposure, please see the MPE Report.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 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.

4.2 Evaluation Information

The antennas used for this product are Internal antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 3.0 dBi.

5. Power Spectral Density

5.1 Standard Applicable

According to 15.247(a)(1)(iii), 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.

5.2 Test Procedure

According to the KDB 558074 D01 V05, such specifications require that the same method as used to determine the conducted output power shall also be used to determine the power spectral density. The test method of power spectral density as below:

a) Set instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. .
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

5.3 Environmental Conditions

Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

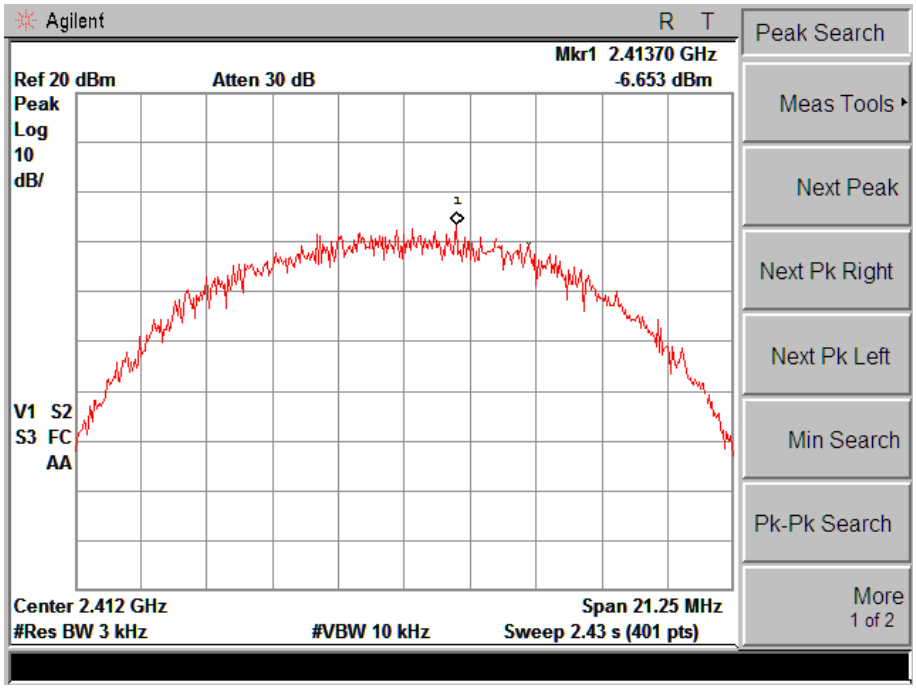
5.4 Summary of Test Results/Plots

Test Mode	Test Channel MHz	Power Spectral Density dBm/3kHz			Limit dBm/3kHz
		Antenna 1	Antenna 2	total	
802.11b	2412	-6.653	-6.401	/	8
	2437	-6.536	-6.721	/	8
	2462	-6.746	-6.53	/	8
802.11g	2412	-12.3	-12.41	/	8
	2437	-13.2	-12.82	/	8
	2462	-12.17	-12.51	/	8
802.11n HT20	2412	-12.77	-11.71	-9.20	8
	2437	-12.84	-12.84	-9.83	8
	2462	-13.08	-12.06	-9.53	8
802.11n HT40	2422	-16.73	-16.72	-13.71	8
	2437	-16.58	-16.65	-13.60	8
	2452	-17.22	-18.42	-14.77	8

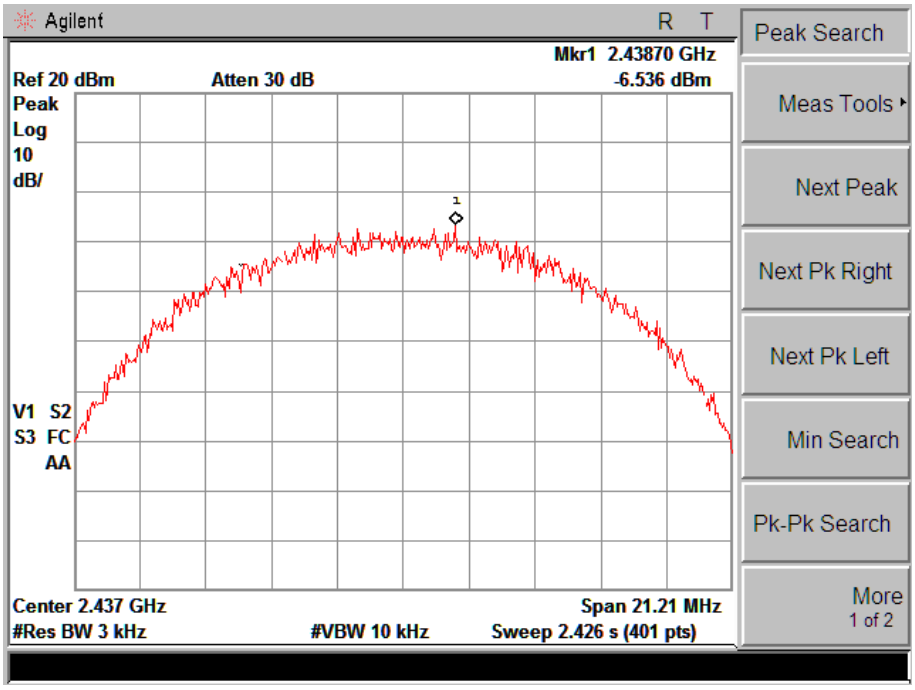
Please refer to the following test plots:

Antenna 1

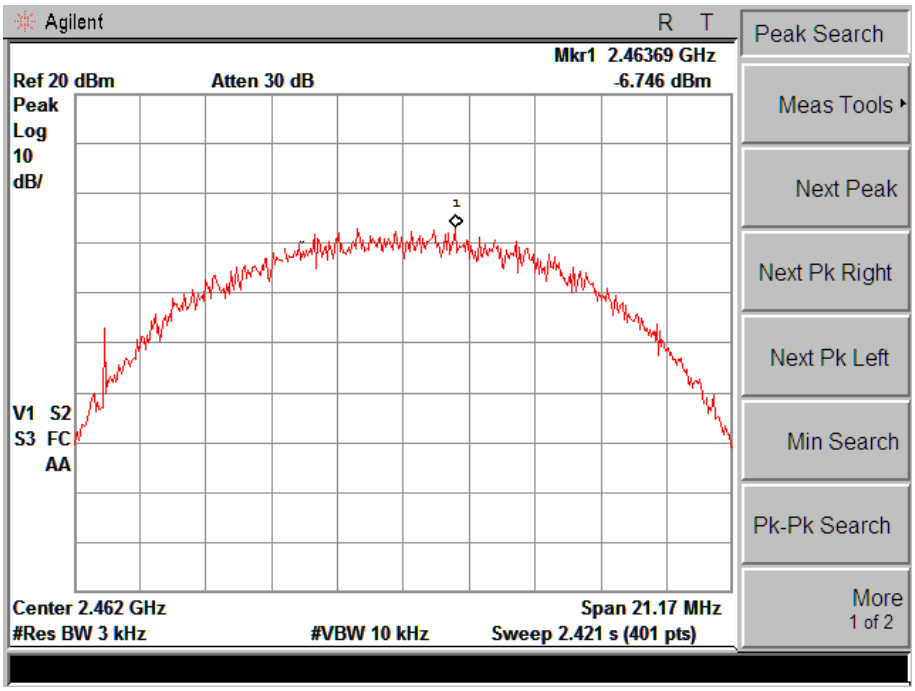
802.11b-Low Channel



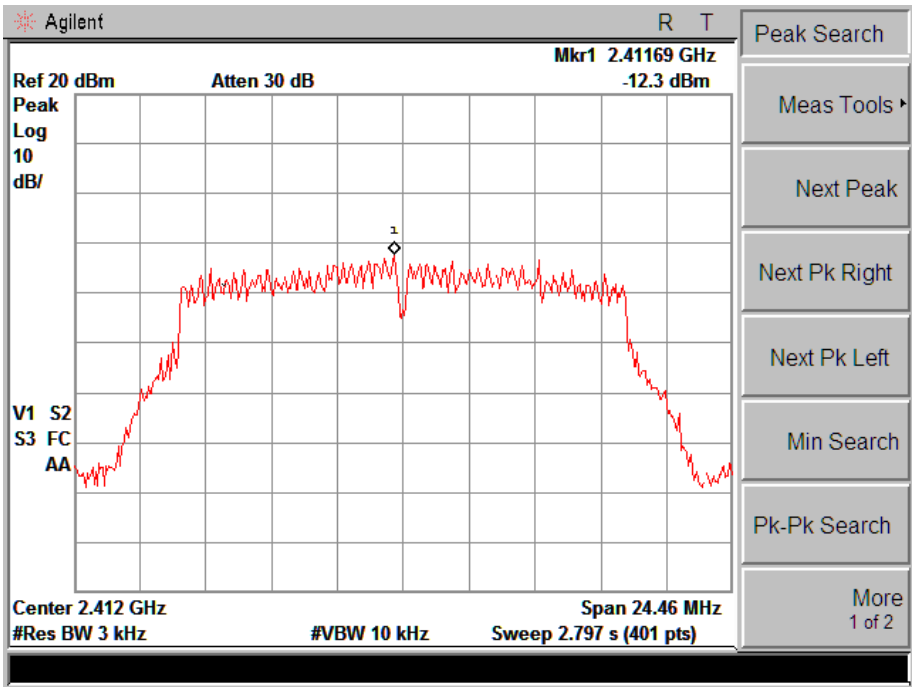
802.11b-Middle Channel



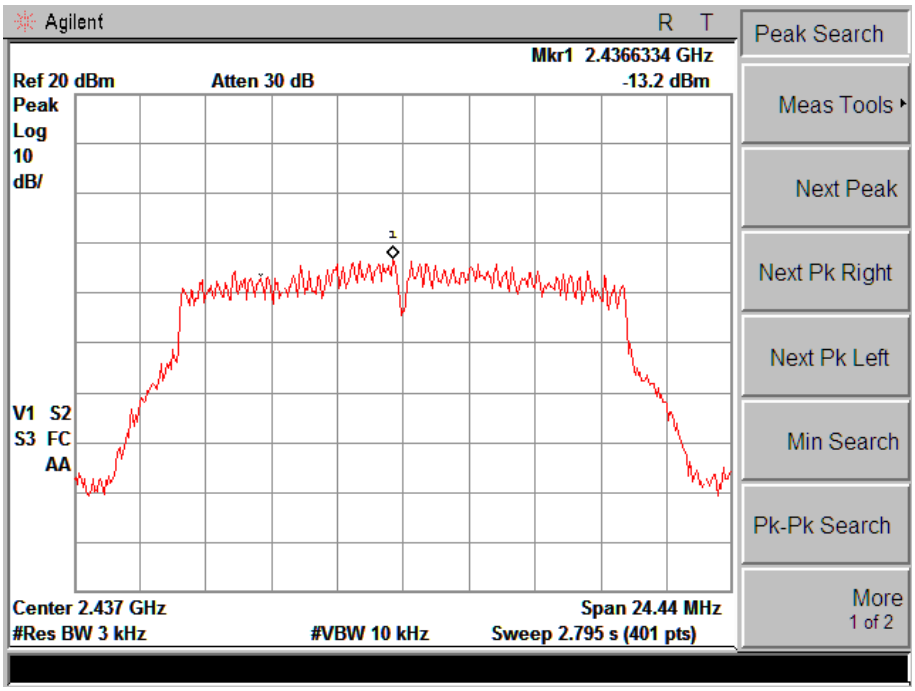
802.11b-High Channel



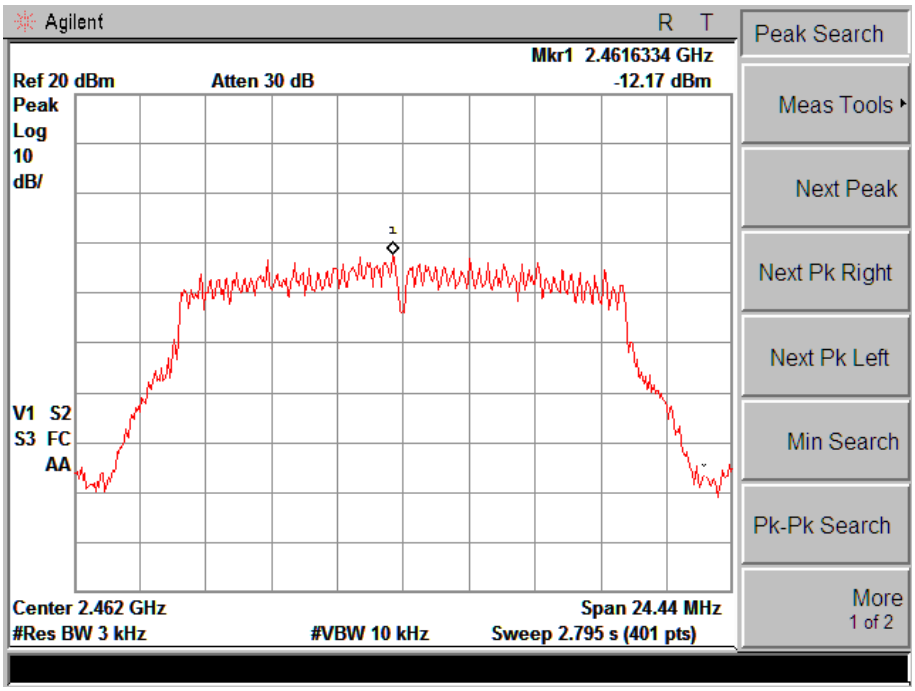
802.11g-Low Channel



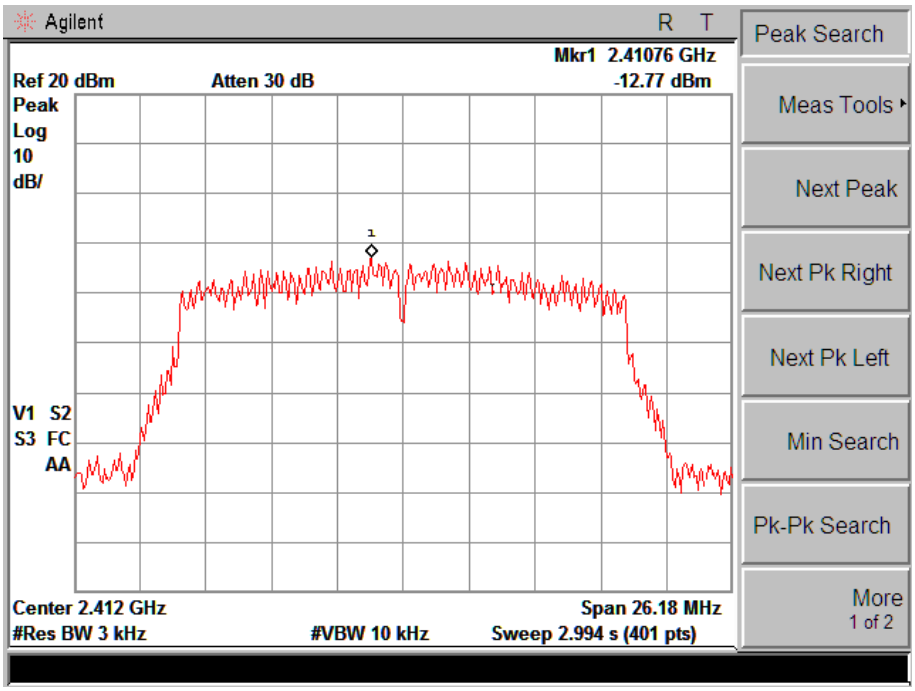
802.11g-Middle Channel



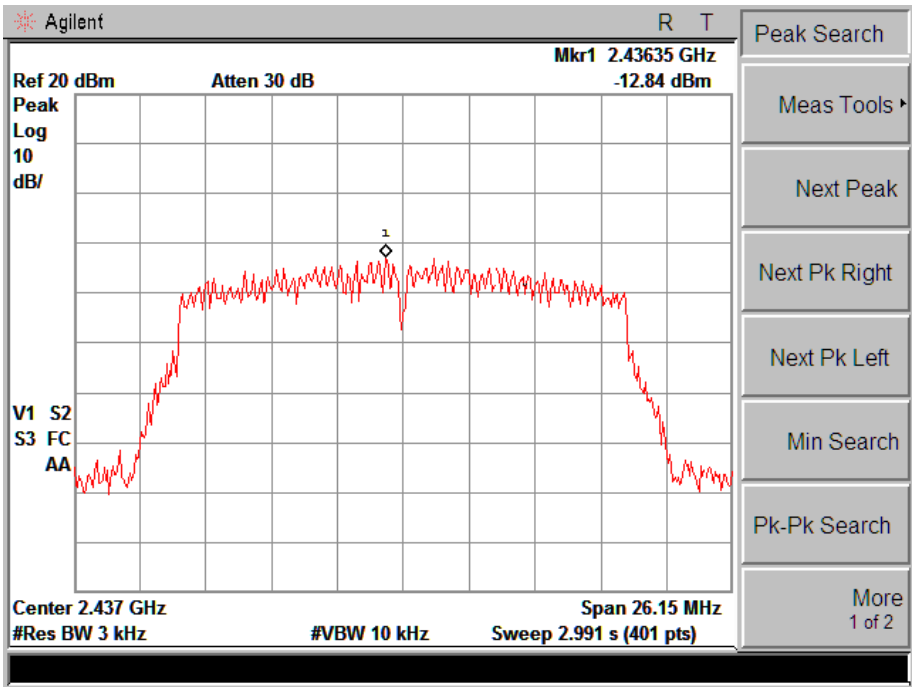
802.11g-High Channel



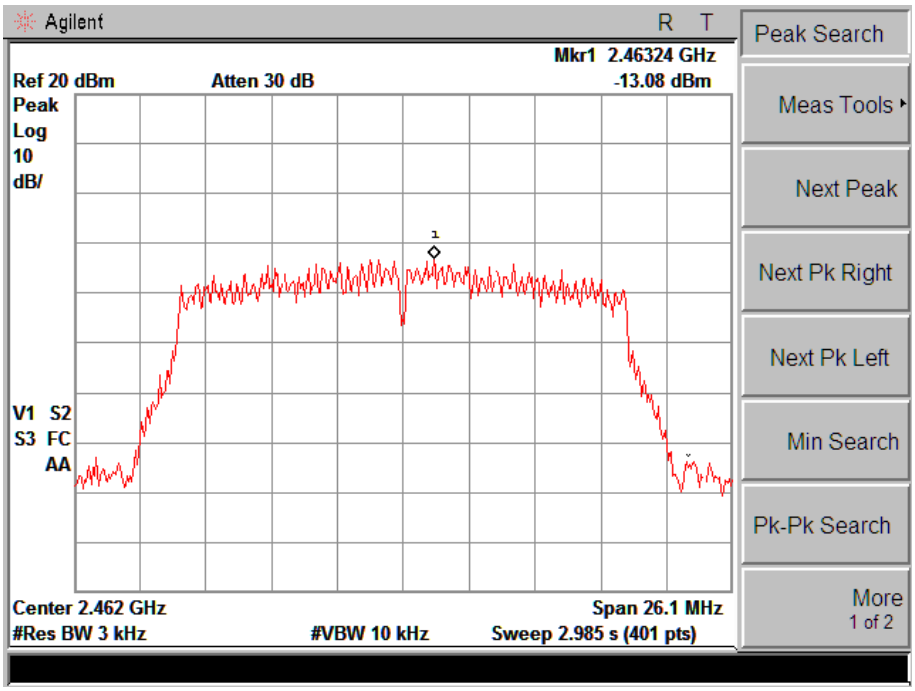
802.11n-HT20-Low Channel



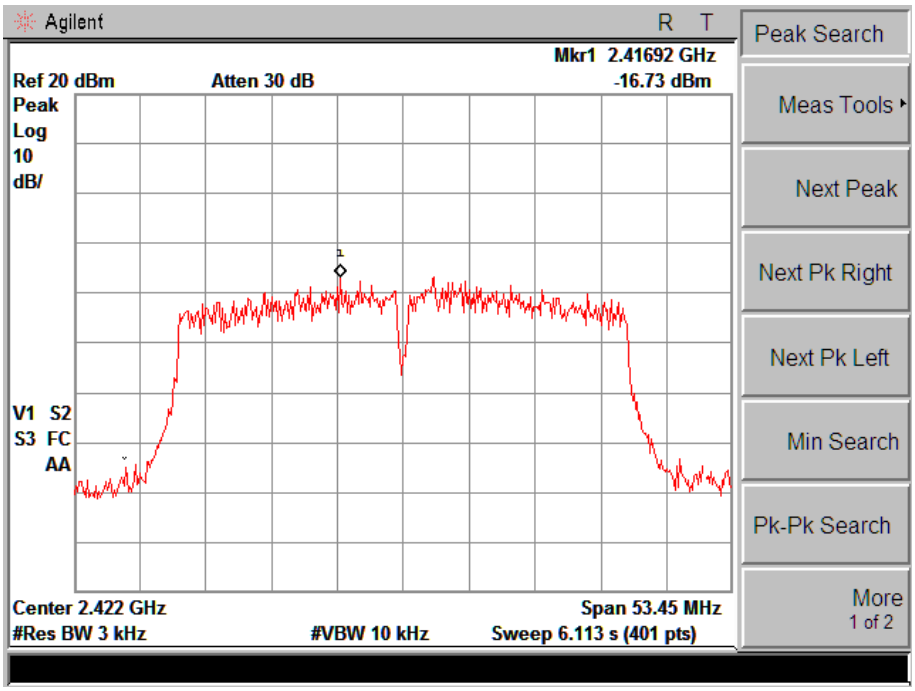
802.11n-HT20-Middle Channel



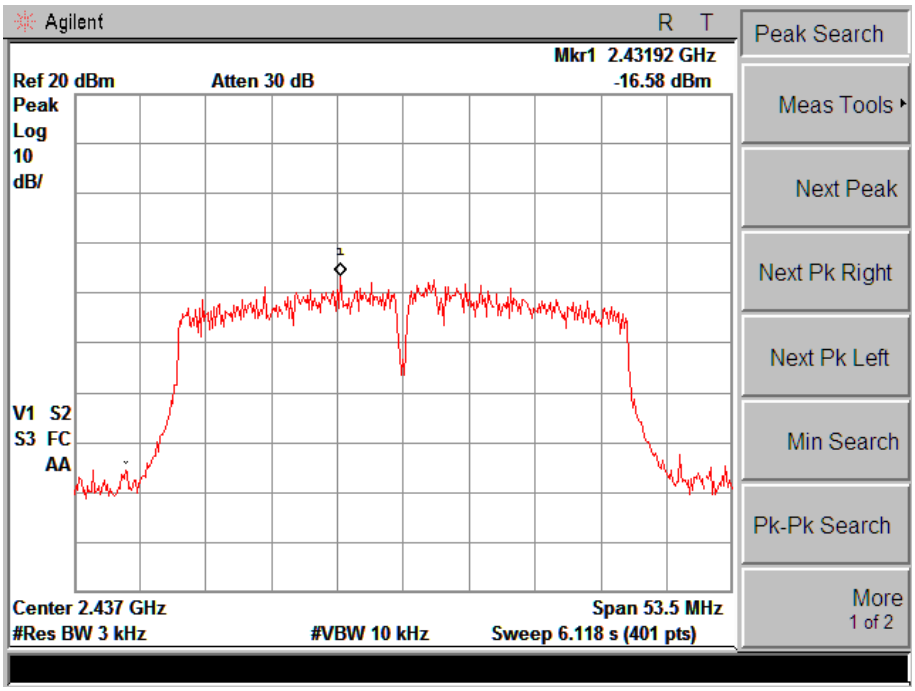
802.11n-HT20-High Channel



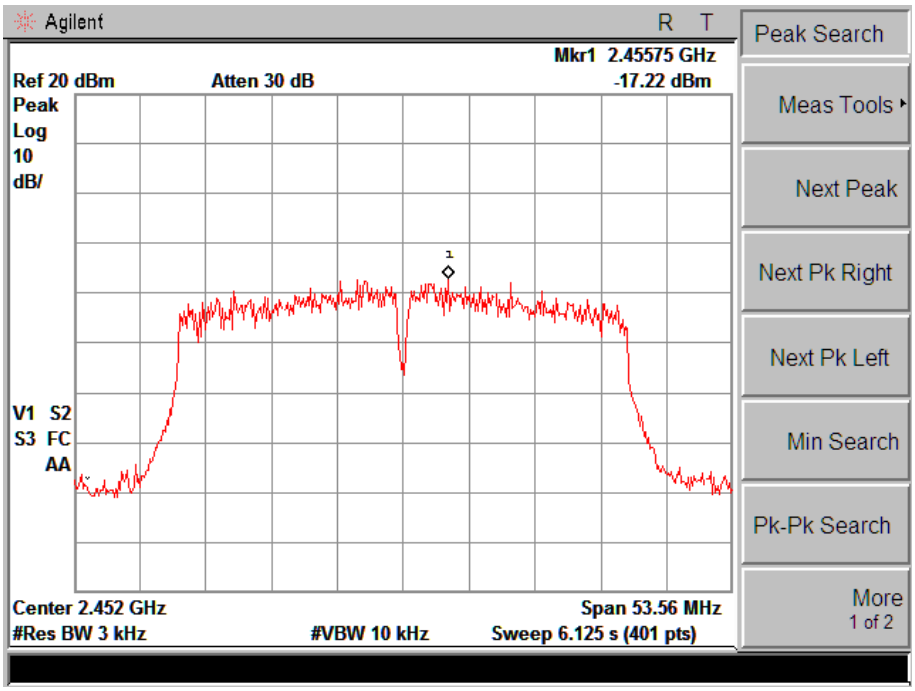
802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel

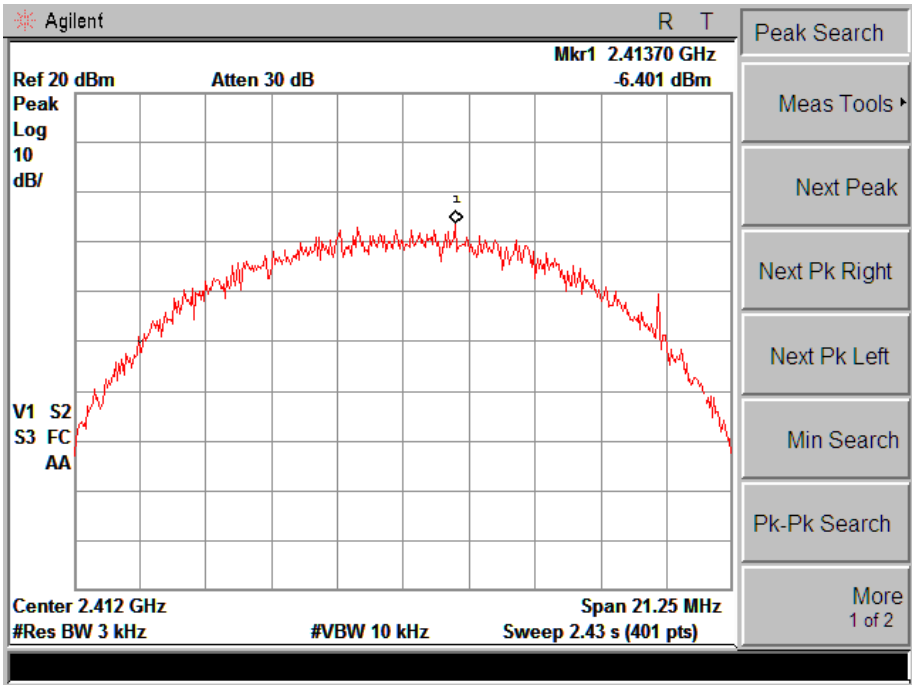


802.11n-HT40-High Channel

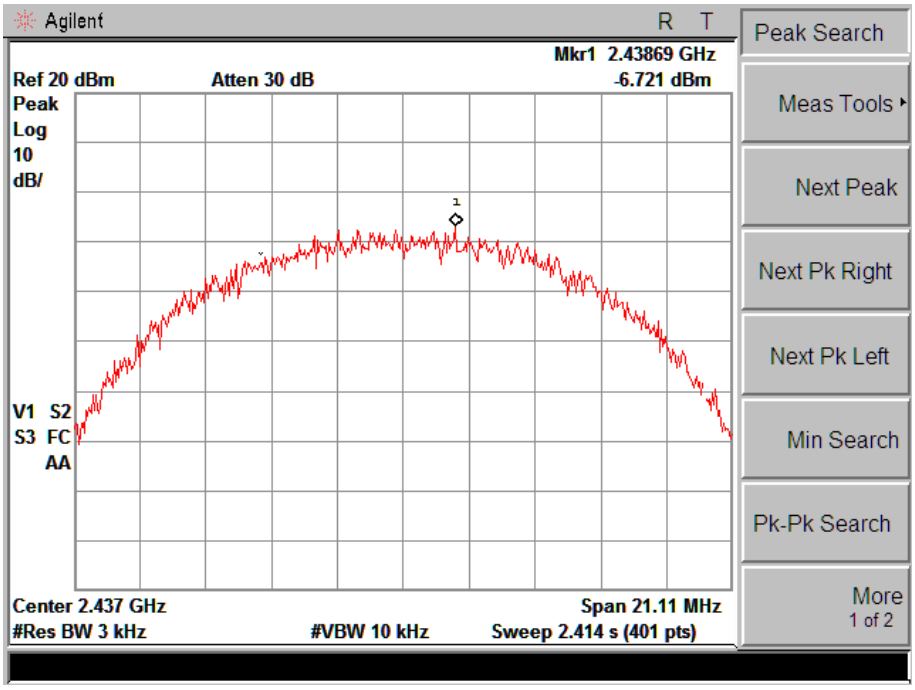


Antenna 2

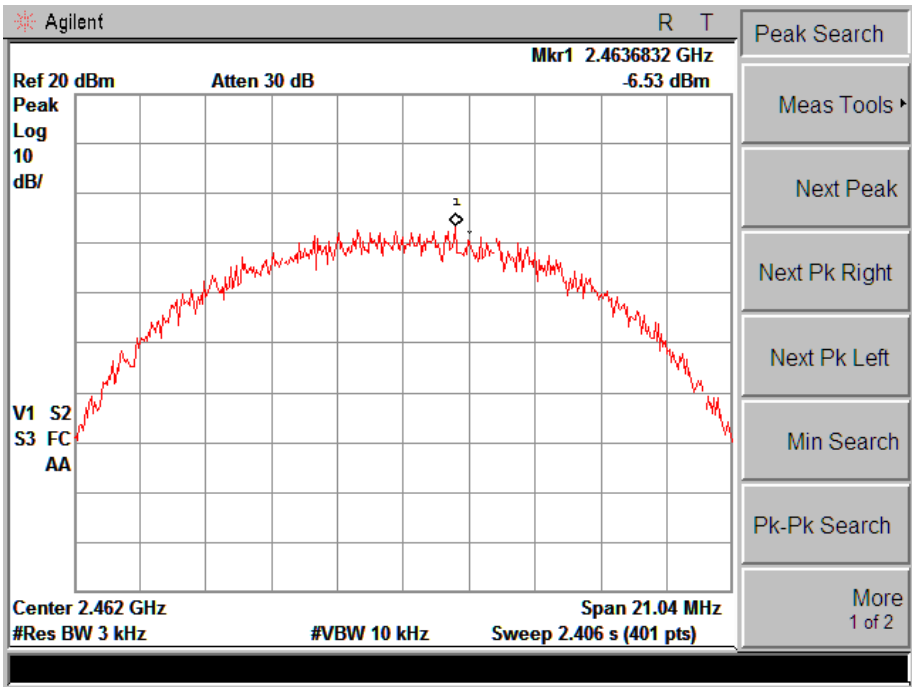
802.11b-Low Channel



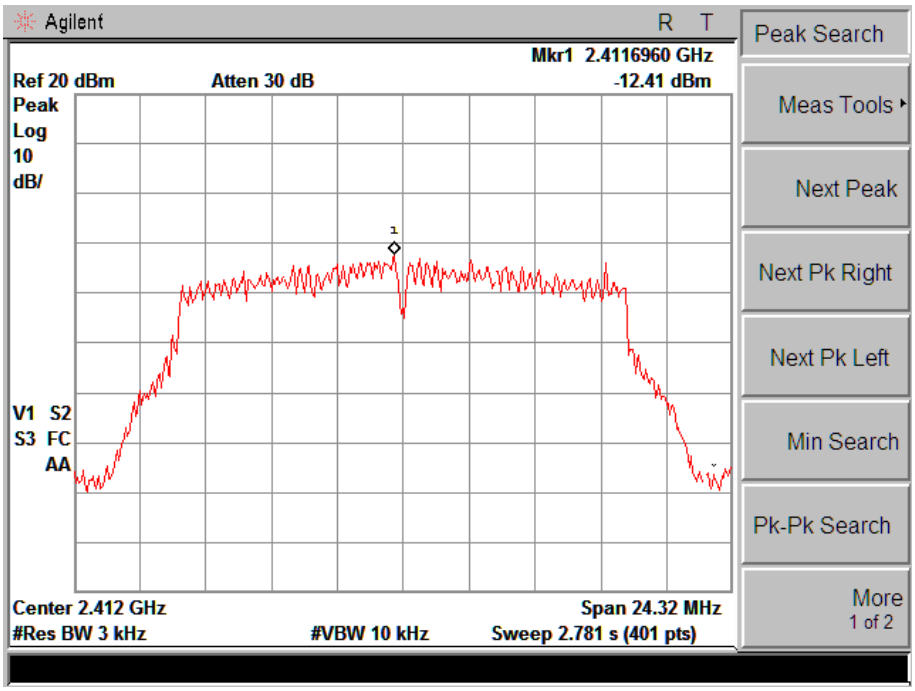
802.11b-Middle Channel



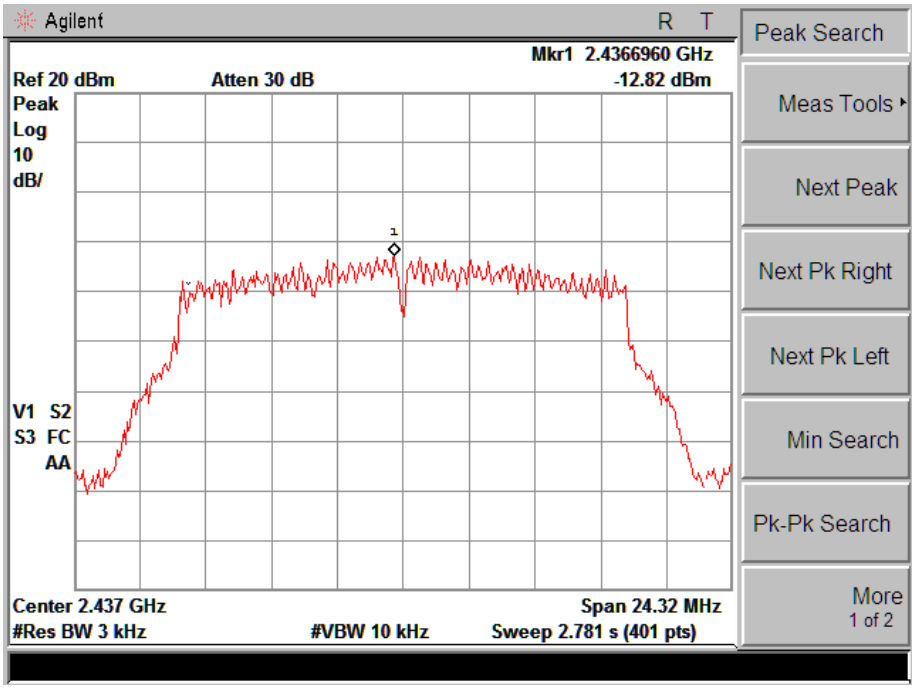
802.11b-High Channel



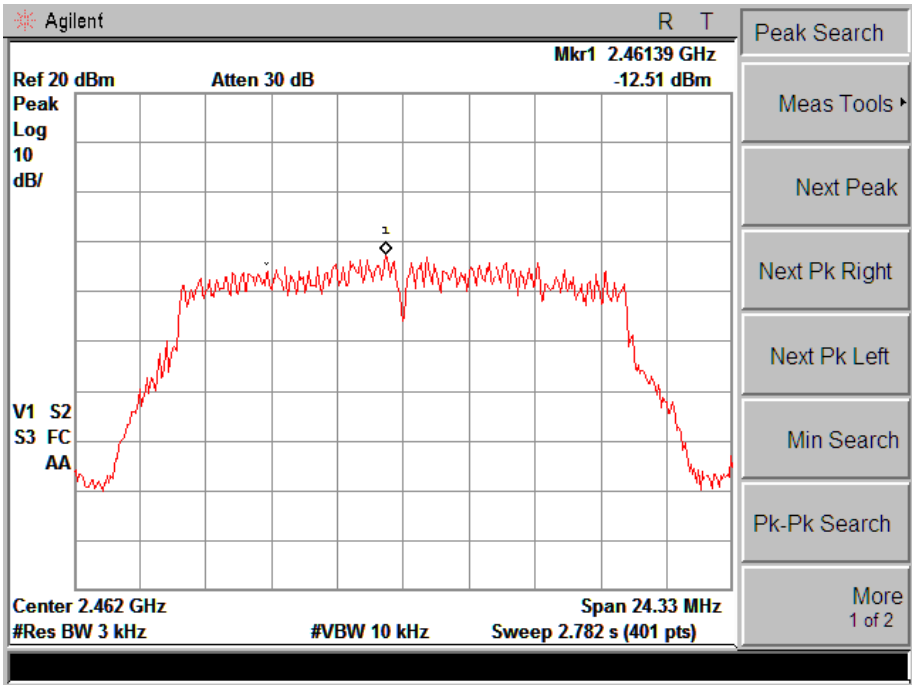
802.11g-Low Channel



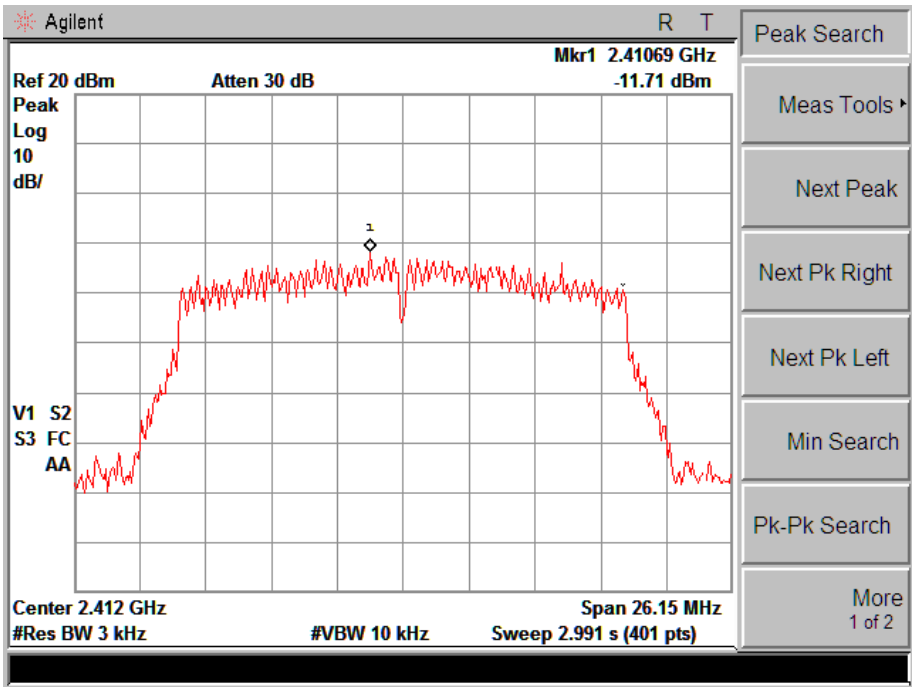
802.11g-Middle Channel



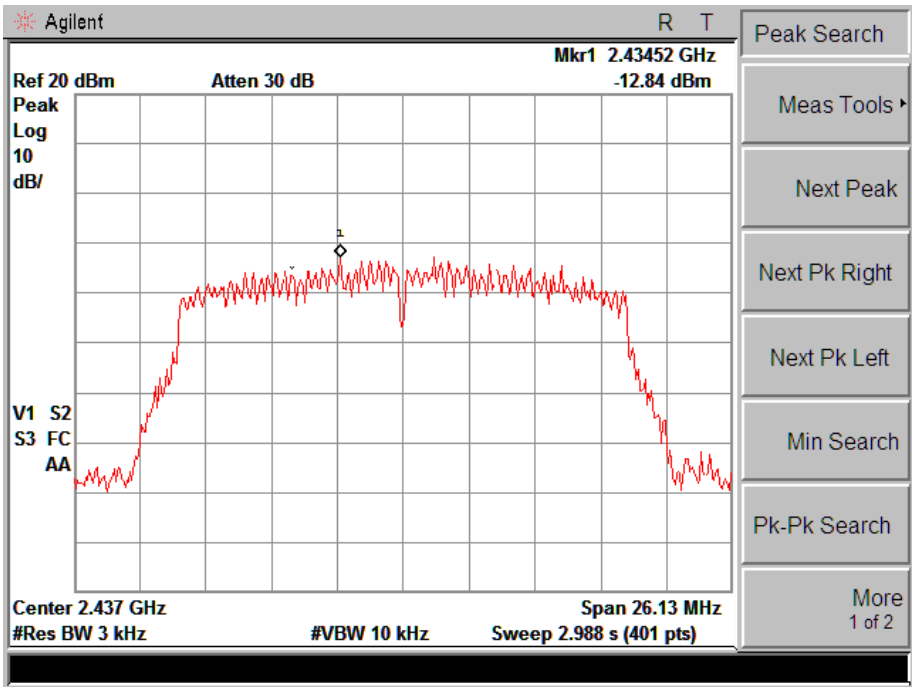
802.11g-High Channel



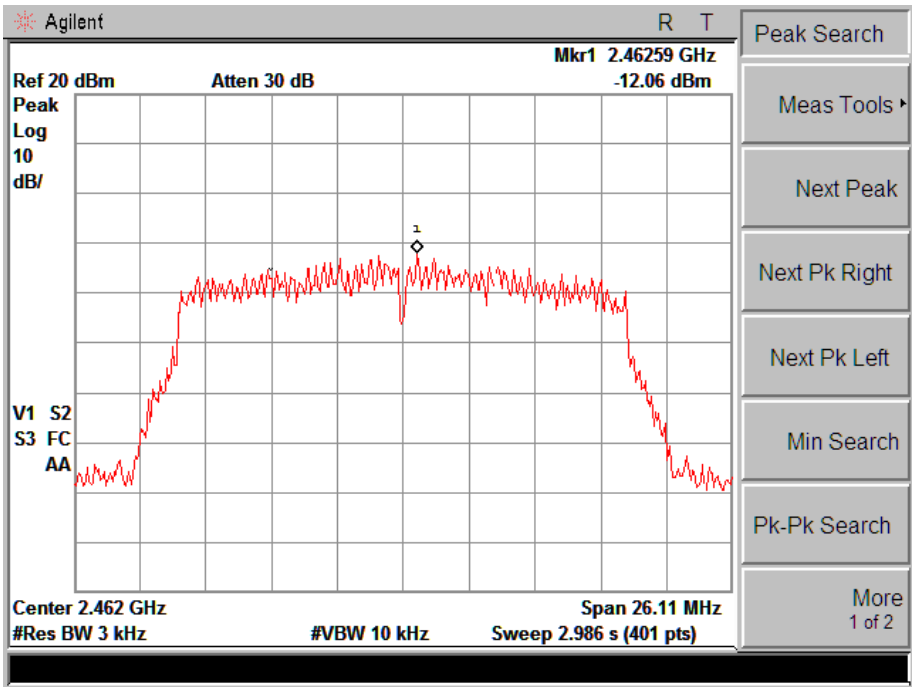
802.11n-HT20-Low Channel



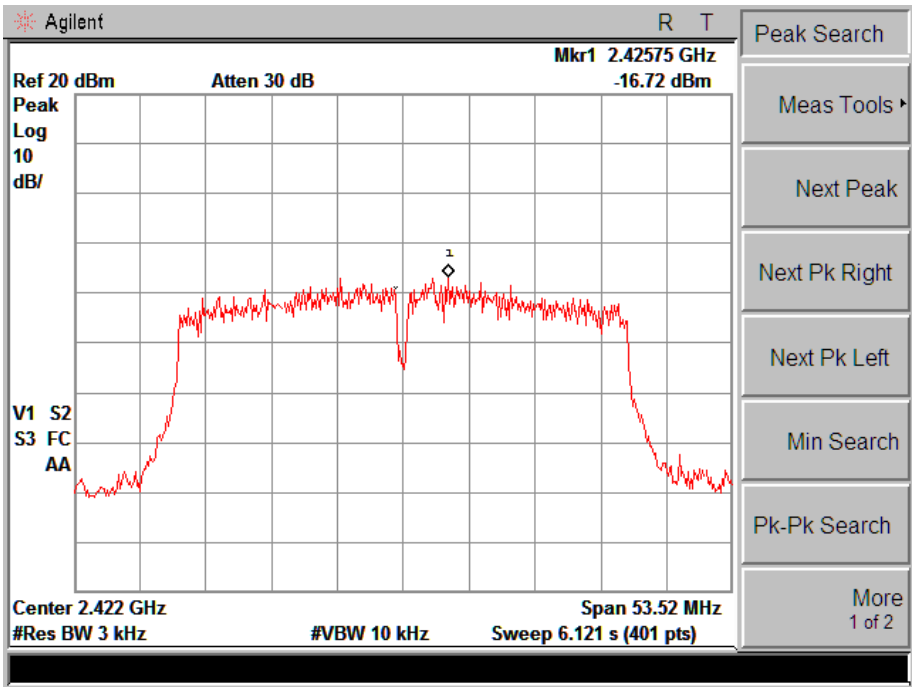
802.11n-HT20-Middle Channel



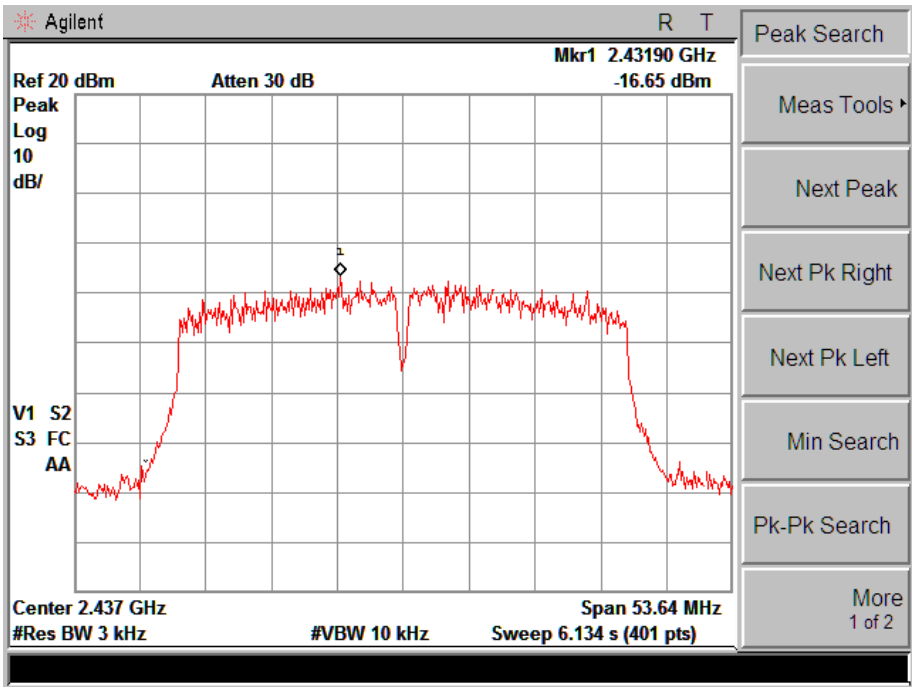
802.11n-HT20-High Channel



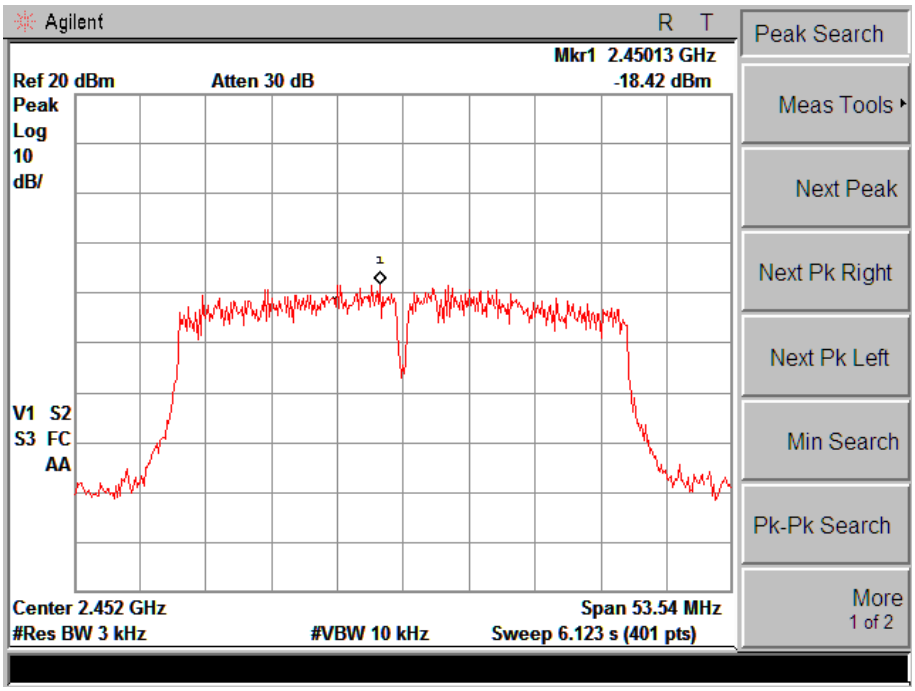
802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel



802.11n-HT40-High Channel



6. 6dB Bandwidth

6.1 Standard Applicable

According to 15.247(a) (2). Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz. The minimum 6 dB bandwidth shall be at least 500 kHz.

6.2 Test Procedure

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3 Environmental Conditions

Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.4 Summary of Test Results/Plots

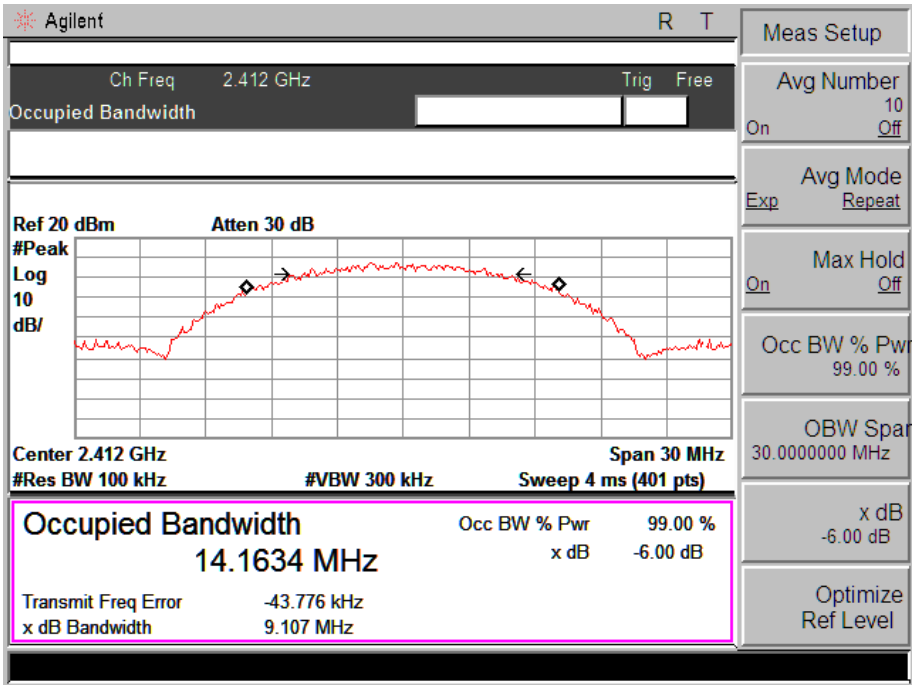
Test Mode	Test Channel MHz	6 dB Bandwidth MHz		99% Bandwidth MHz		Limit kHz
		Antenna1	Antenna2	Antenna1	Antenna2	
802.11b	2412	9.107	8.622	14.1634	14.1700	≥500
	2437	8.264	9.073	14.1423	14.0739	≥500
	2462	9.098	9.070	14.1135	14.0238	≥500
802.11g	2412	15.162	15.126	16.3034	16.2297	≥500
	2437	15.198	15.135	16.2925	16.2140	≥500
	2462	15.141	15.140	16.2901	16.2213	≥500
802.11n-HT20	2412	15.150	15.159	17.4523	17.4338	≥500
	2437	15.124	15.706	17.4353	17.4195	≥500
	2462	14.965	15.270	17.4010	17.4059	≥500

802.11n-HT40	2422	35.224	32.779	35.6301	35.6778	≥500
	2437	35.231	35.229	35.6655	35.7590	≥500
	2452	35.191	35.229	35.7080	35.6957	≥500

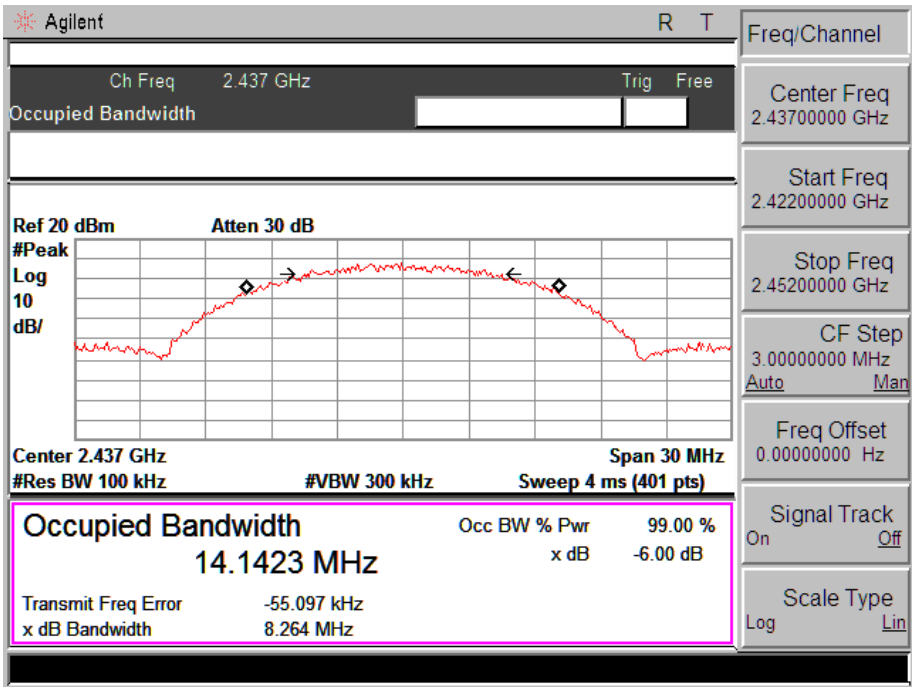
Please refer to the following test plots:

Antenna 1

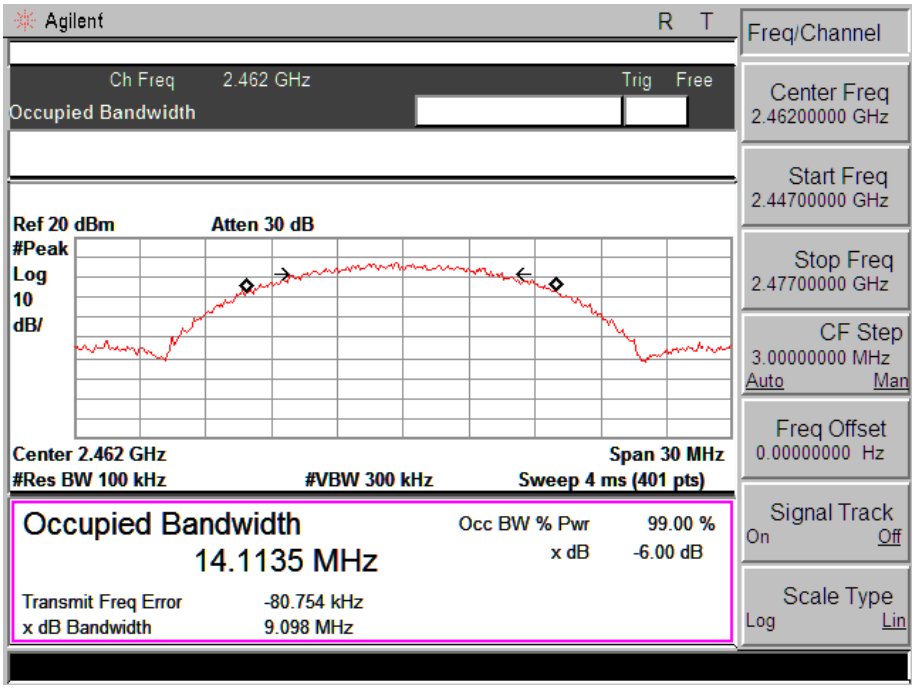
802.11b-Low Channel



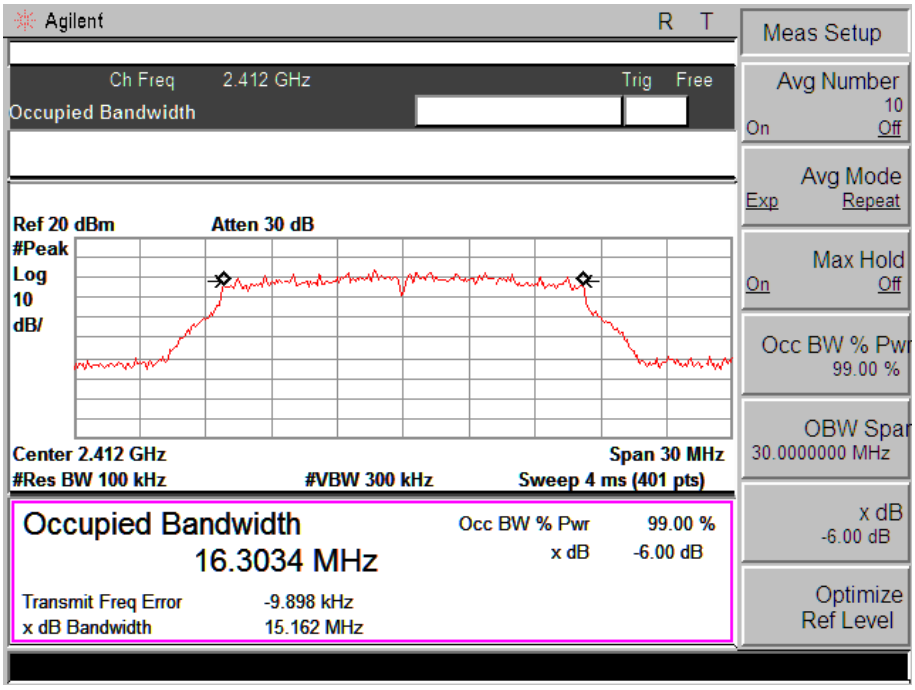
802.11b-Middle Channel



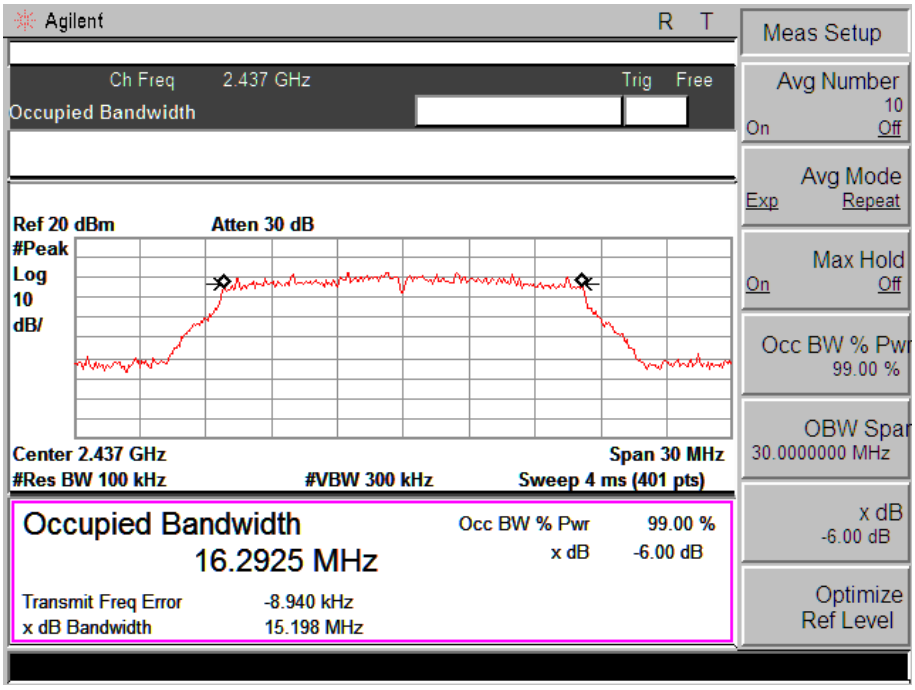
802.11b-High Channel



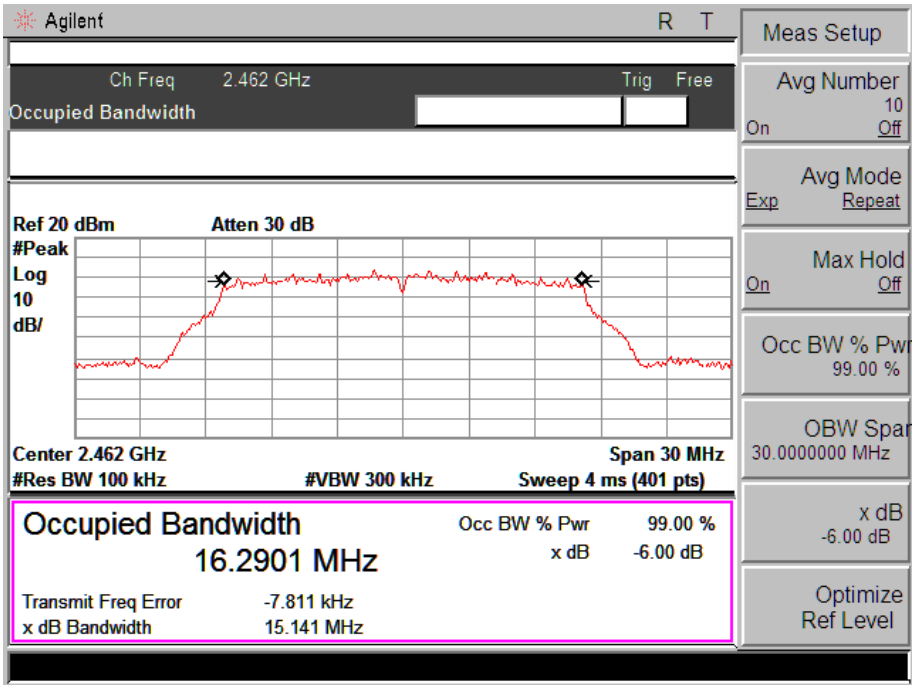
802.11 g-Low Channel



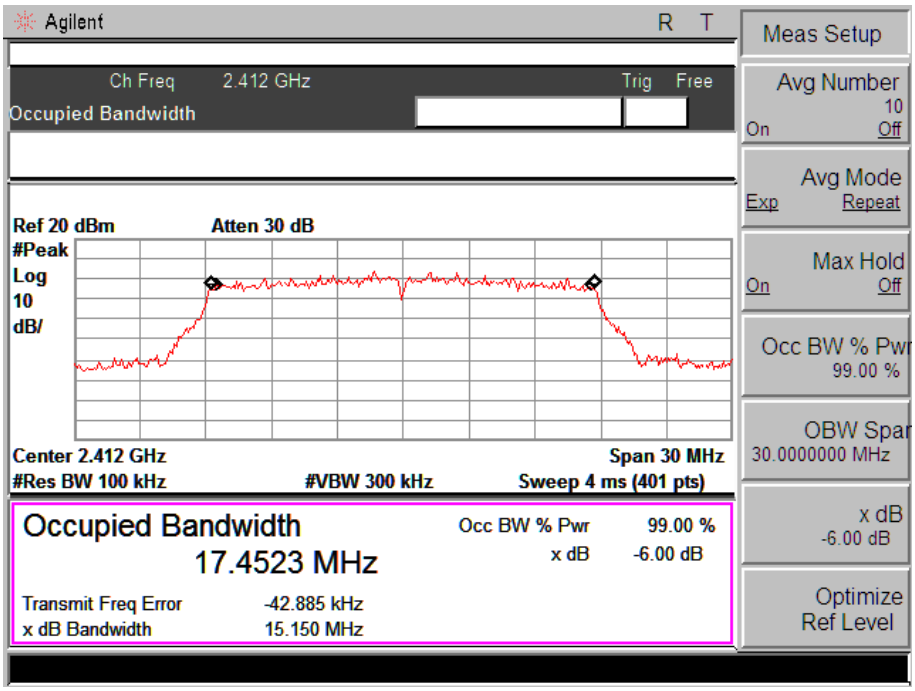
802.11g-Middle Channel



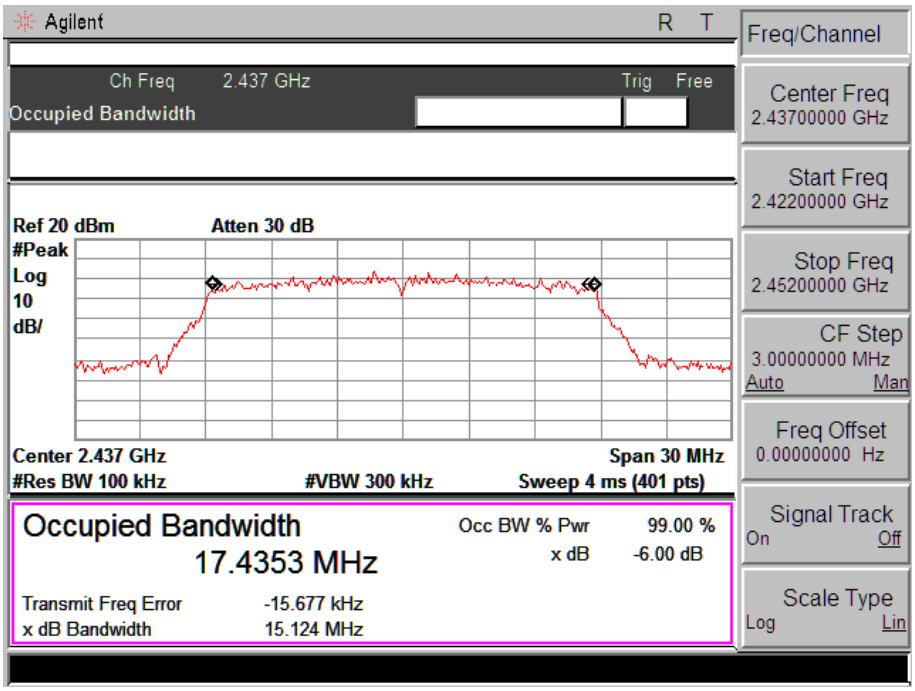
802.11g-High Channel



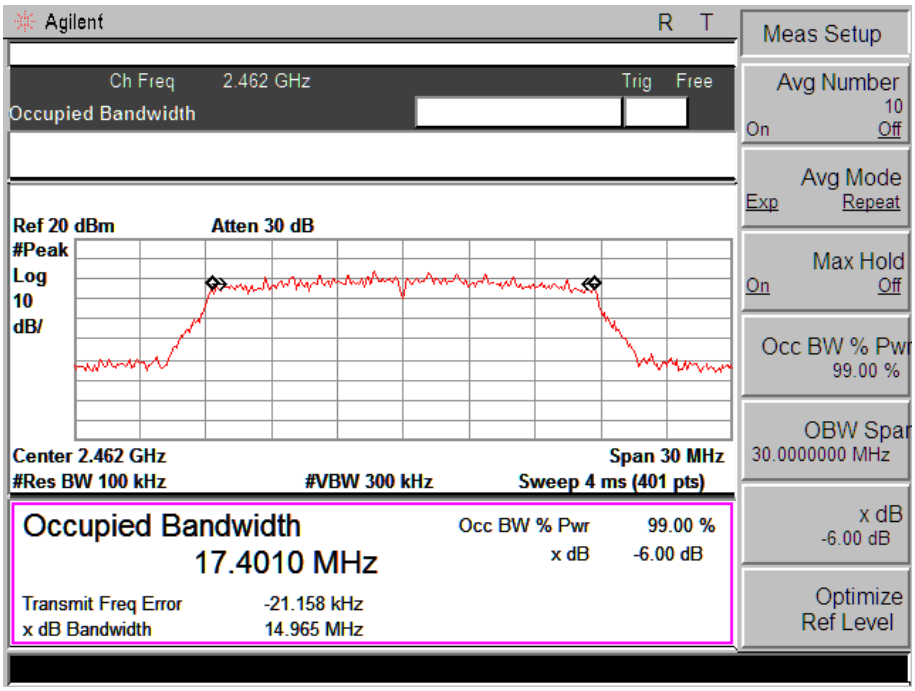
802.11n-HT20-Low Channel



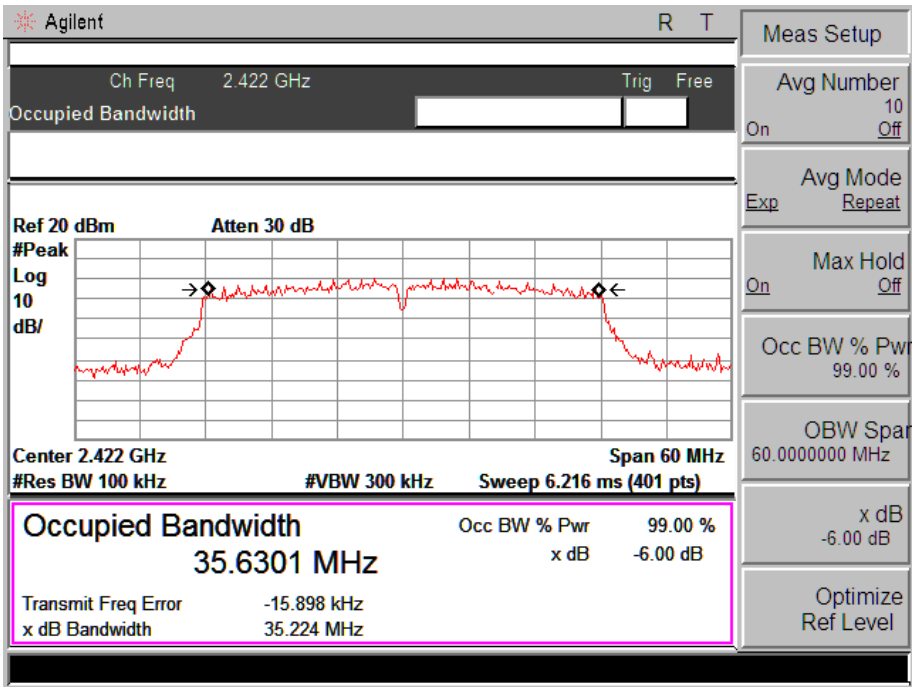
802.11n-HT20-Middle Channel



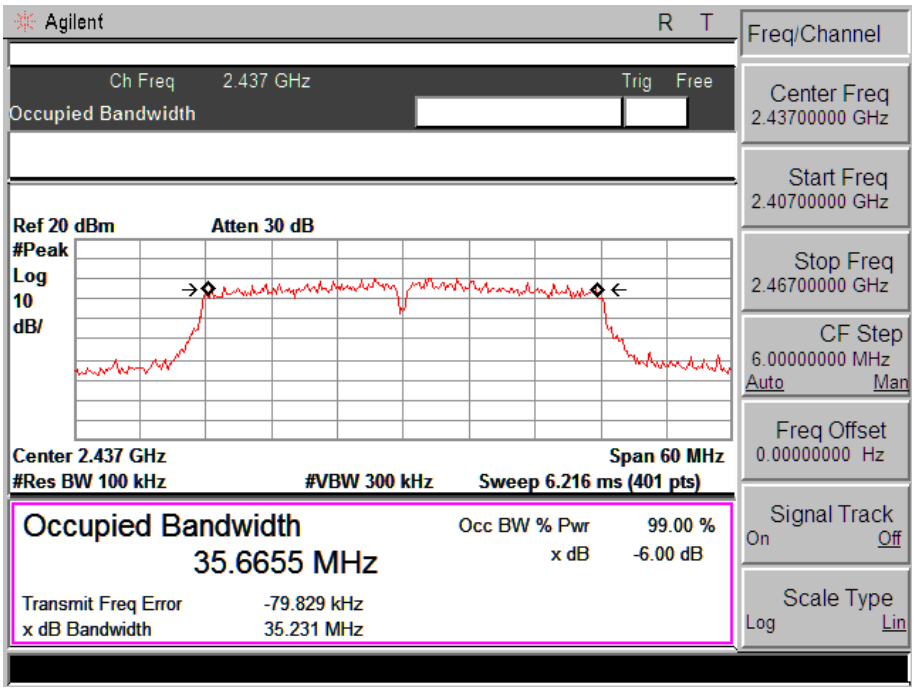
802.11n-HT20-High Channel



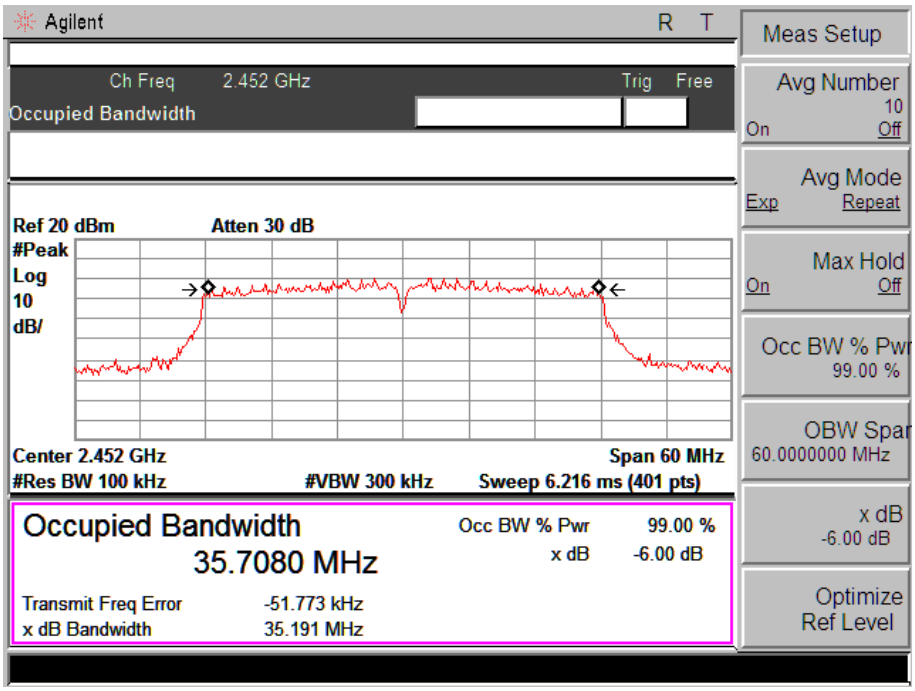
802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel

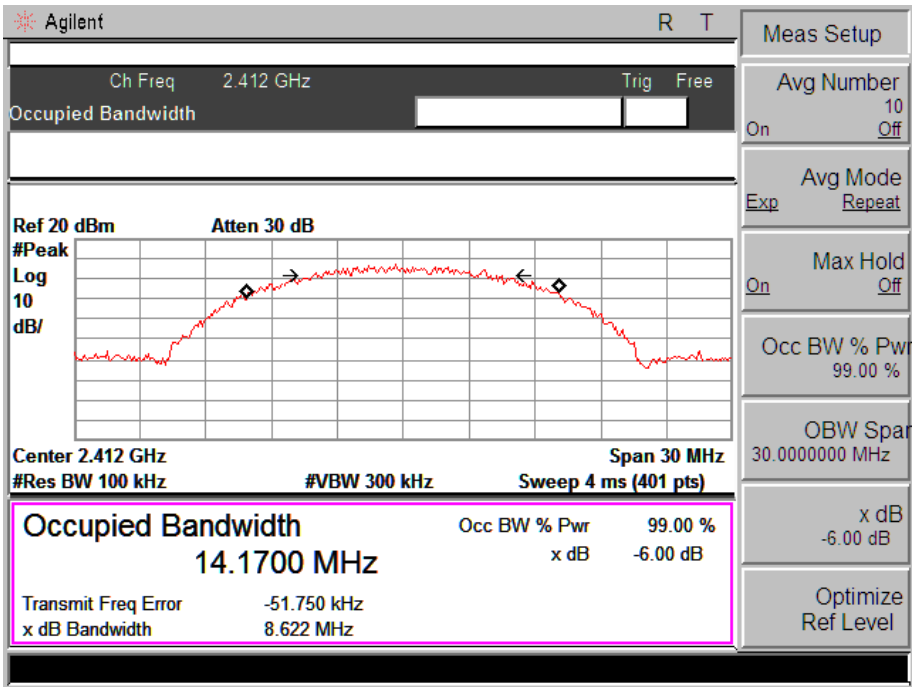


802.11n-HT40-High Channel

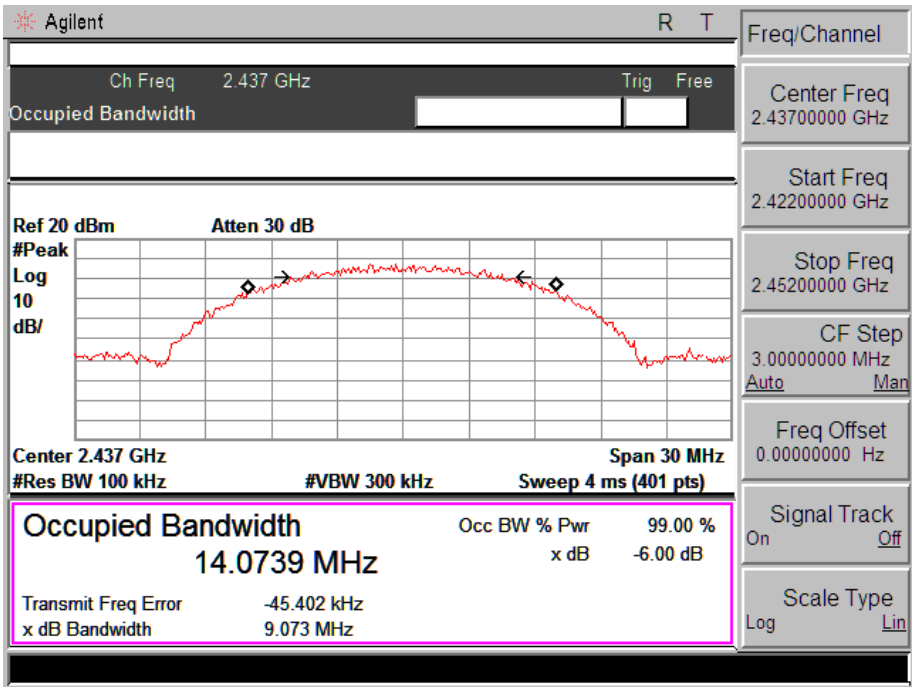


Antenna 2

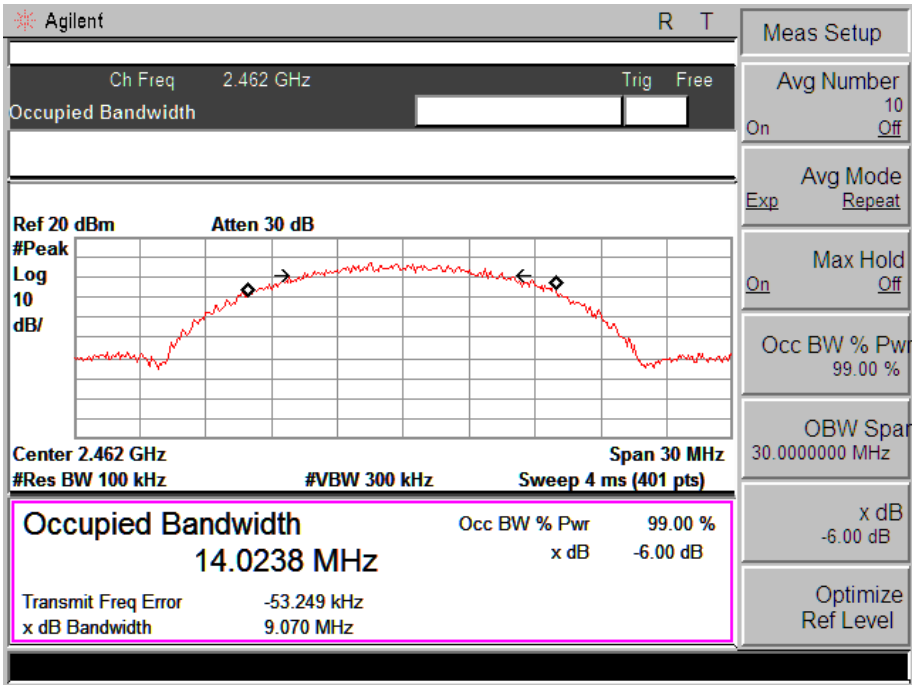
802.11b-Low Channel



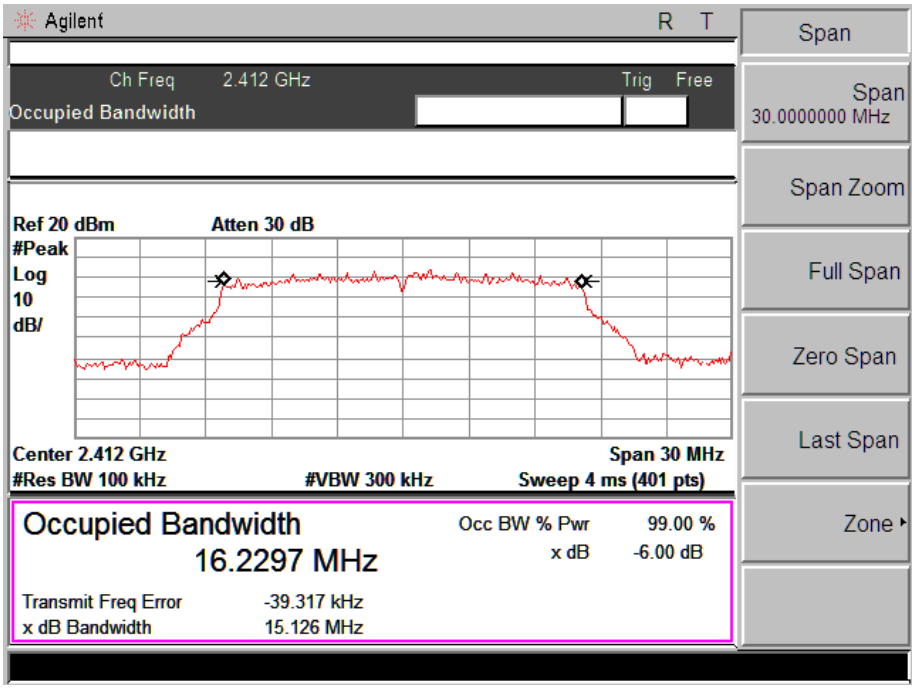
802.11b-Middle Channel



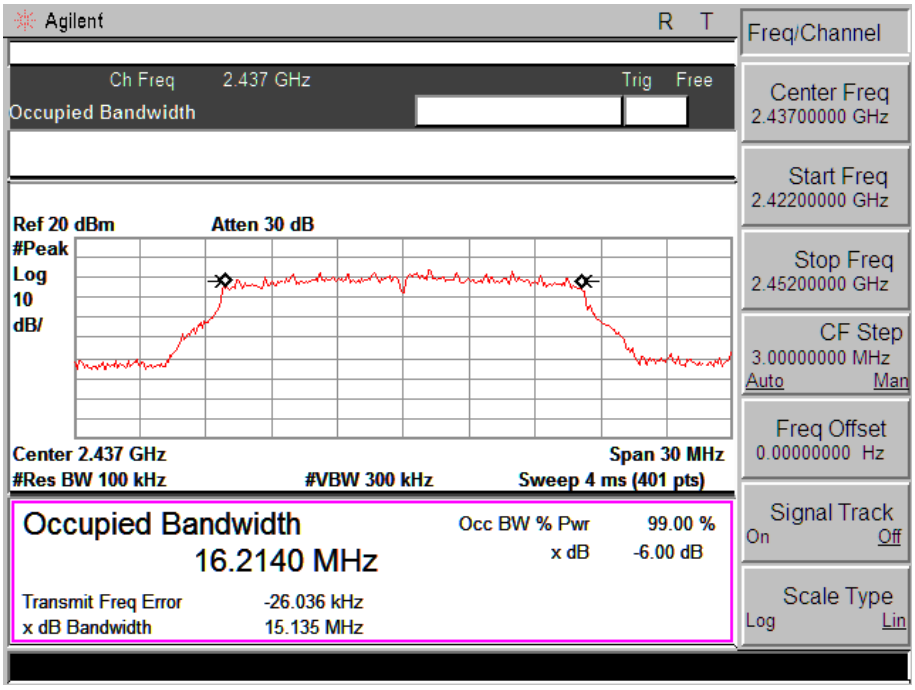
802.11b-High Channel



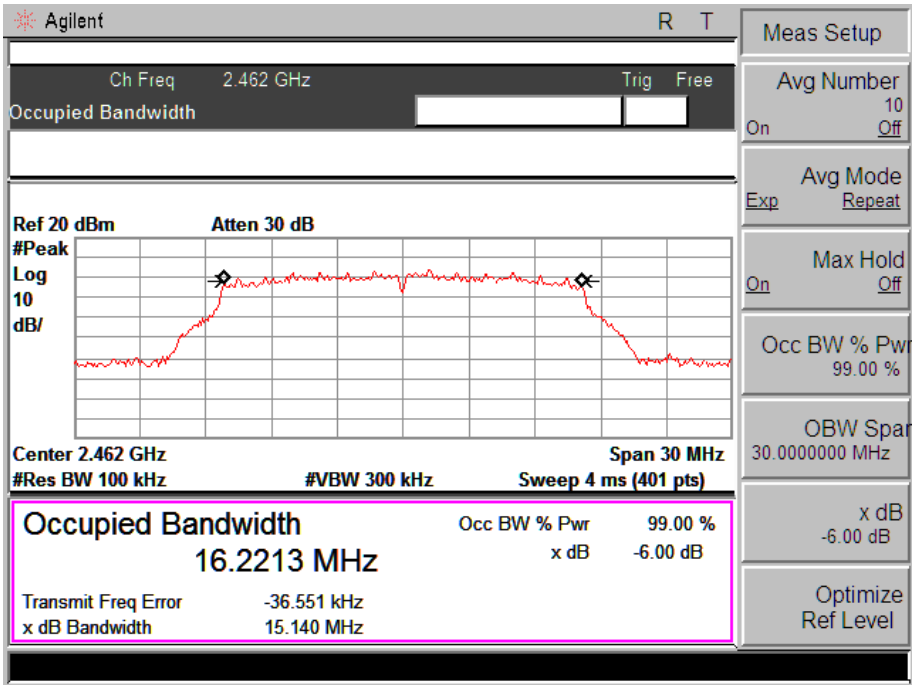
802.11 g-Low Channel



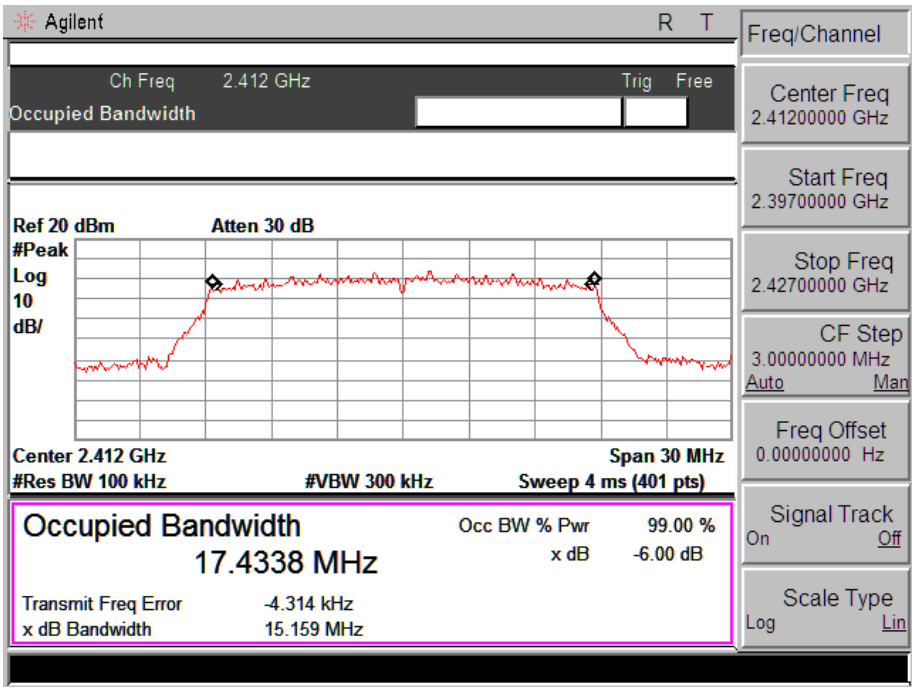
802.11g-Middle Channel



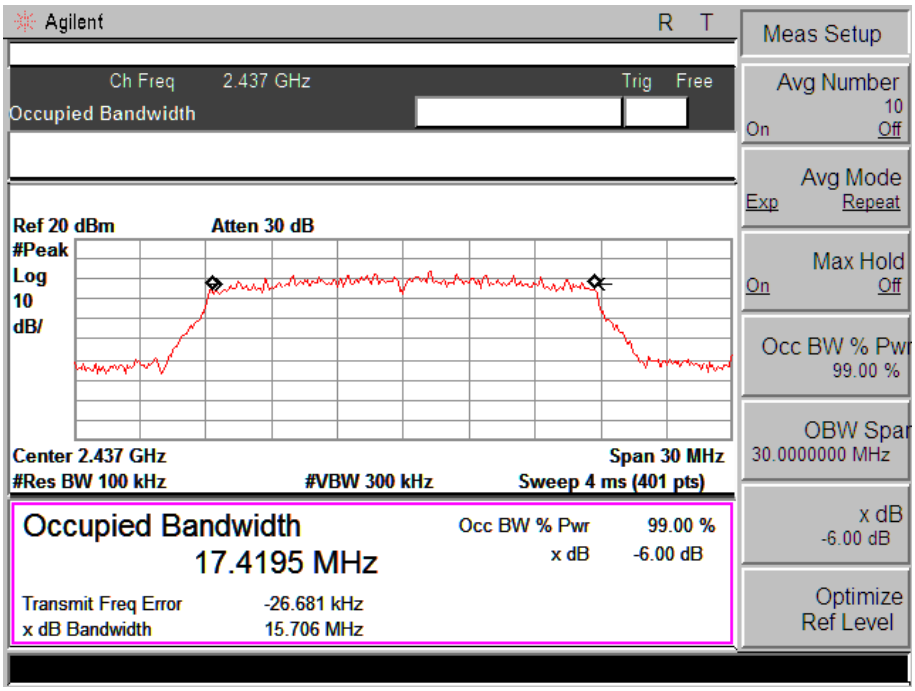
802.11g-High Channel



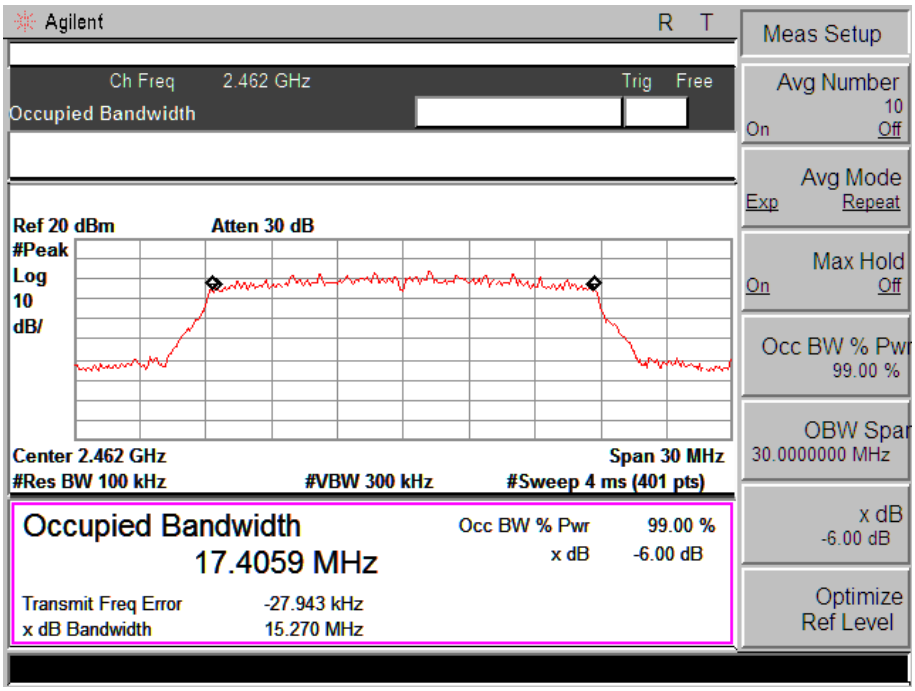
802.11n-HT20-Low Channel



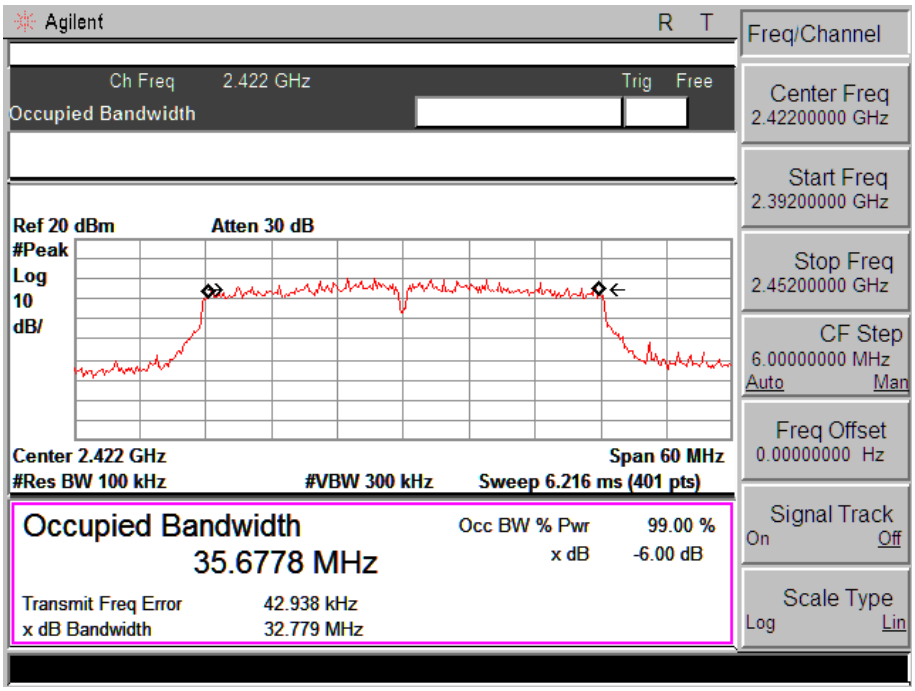
802.11n-HT20-Middle Channel



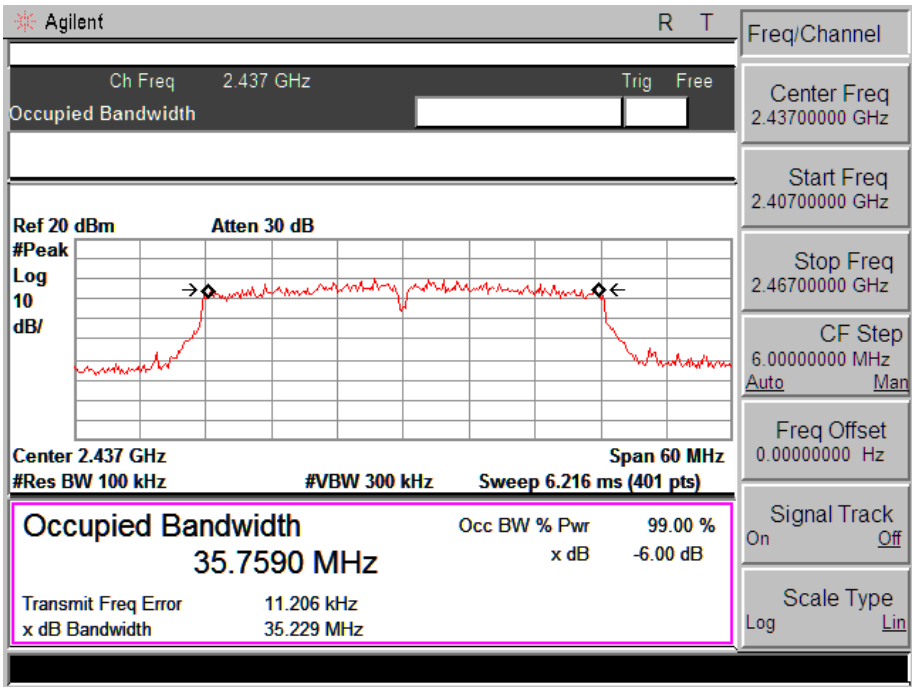
802.11n-HT20-High Channel



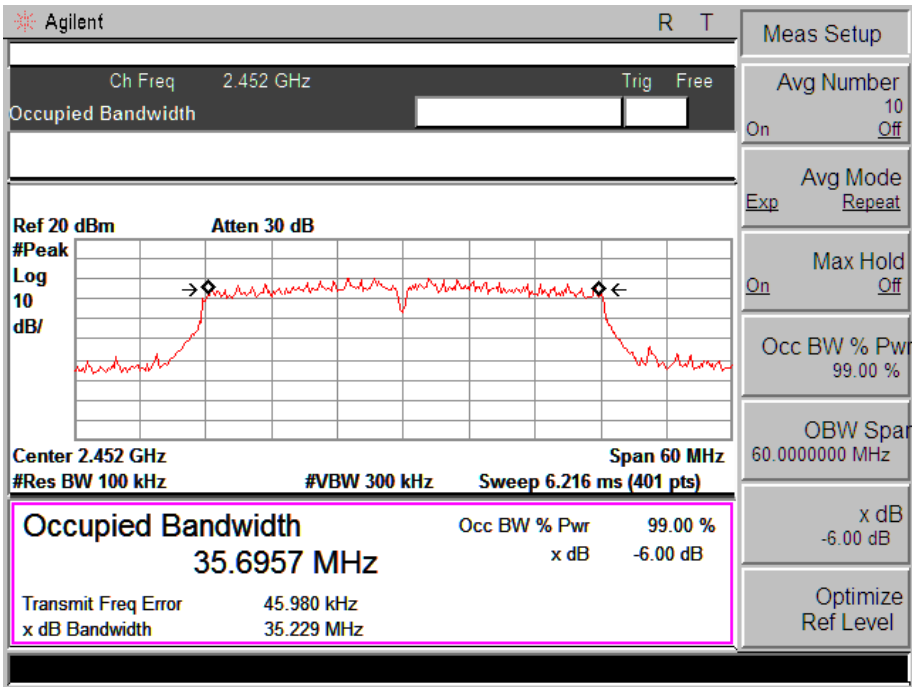
802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel



802.11n-HT40-High Channel



7. RF Output Power

7.1 Standard Applicable

According to 15.247(b)(3). For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz bands: 1 Watt.

7.2 Test Procedure

According to KDB-558074 D01 V05, (channel integration method) When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth

a) Set span to at least 1.5 times the OBW.
b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
c) Set VBW ≥ 3 x RBW.
d) Number of points in sweep ≥ 2 × span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
e) Sweep time = auto.
f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
g) If transmit duty cycle < 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.
h) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

7.3 Environmental Conditions

Temperature:	26° C
Relative Humidity:	57%
ATM Pressure:	1011 mbar

7.4 Summary of Test Results/Plots

Test Mode	Frequency MHz	Power dBm		Output Power mW		Limit mW
		Antenna 1	Antenna 2	Antenna 1	Antenna 2	
802.11b	2412	15.77	15.07	37.8	32.1	1000
	2437	15.53	14.82	35.7	30.3	1000
	2462	15.59	15.02	36.2	31.8	1000
802.11g	2412	10.29	10.22	10.7	10.5	1000
	2437	10.02	9.81	10.0	9.6	1000
	2462	10.52	10.81	11.3	12.1	1000

Test Mode	Frequency MHz	Power dBm			Output Power mW	Limit mW
		Antenna 1	Antenna 2	total	total	
802.11n HT20	2412	9.66	9.35	12.52	17.9	1000
	2437	10.12	10.31	13.23	21.0	1000
	2462	9.55	9.82	12.70	18.6	1000
802.11n HT40	2422	8.09	7.08	10.62	11.5	1000
	2437	7.72	7.73	10.74	11.9	1000
	2452	7.41	7.05	10.24	10.6	1000

8. Field Strength of Spurious Emissions

8.1 Measurement Uncertainty

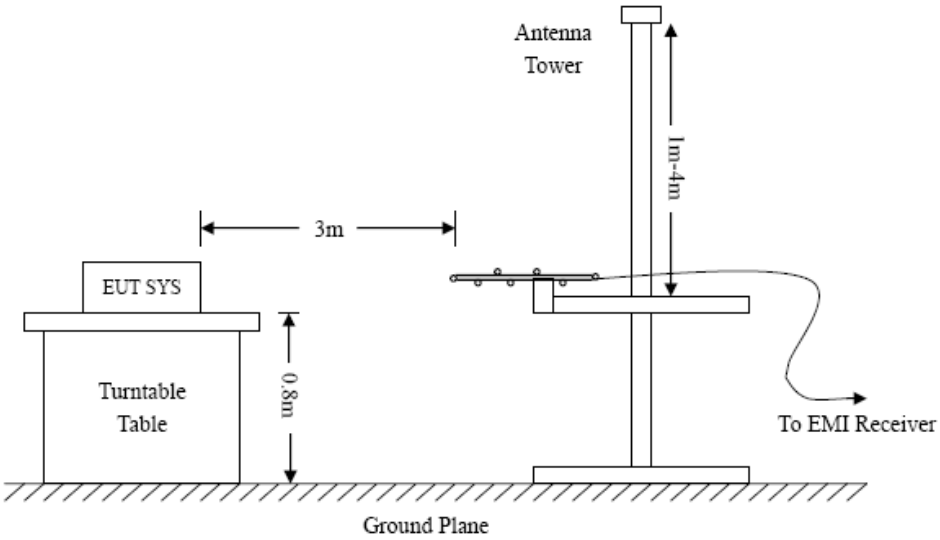
Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±5.10 dB.

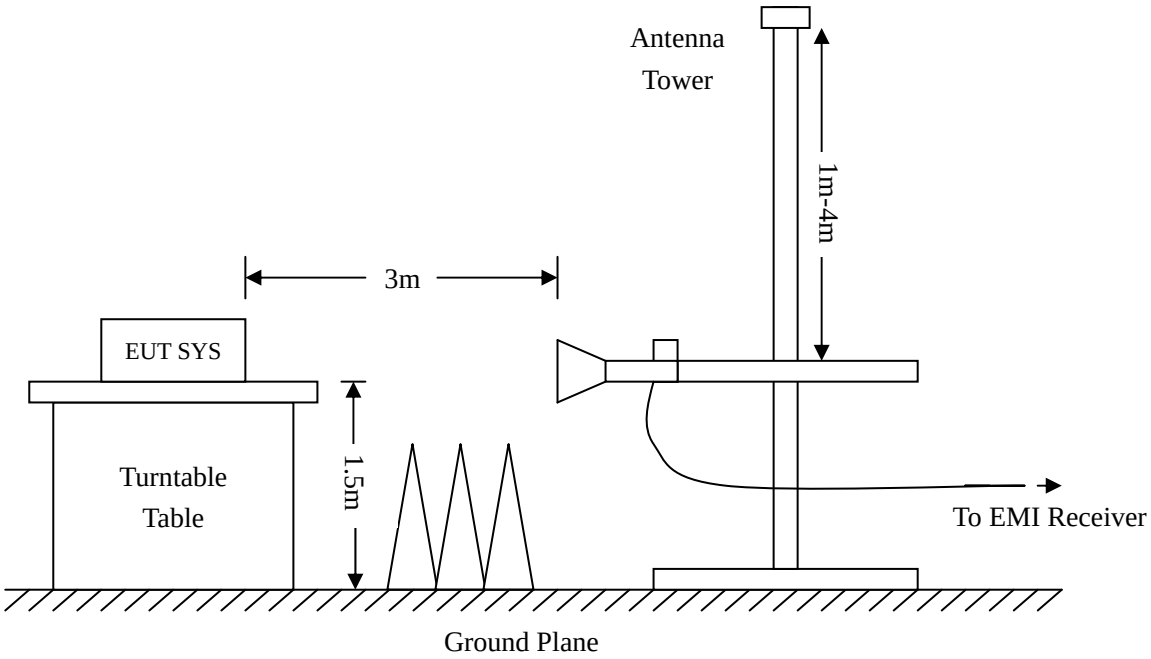
8.2 Standard Applicable

According to §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).
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

8.3 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.





Frequency: 9kHz-30MHz	Frequency: 30MHz-1GHz	Frequency: Above 1GHz
RBW=10 KHz,	RBW=120 KHz,	RBW=1MHz,
VBW =30 KHz	VBW=300 KHz	VBW=3MHz (Peak), 10Hz
(AV)		
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak, QP	Detector function = peak, AV

8.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15 Limit

8.5 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

8.6 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst cases:

Note: The worst mode IEEE 802.11b (channel low, middle, high)) data was reported.

Plot of Radiated Emissions Test Data (30MHz to 1GHz)

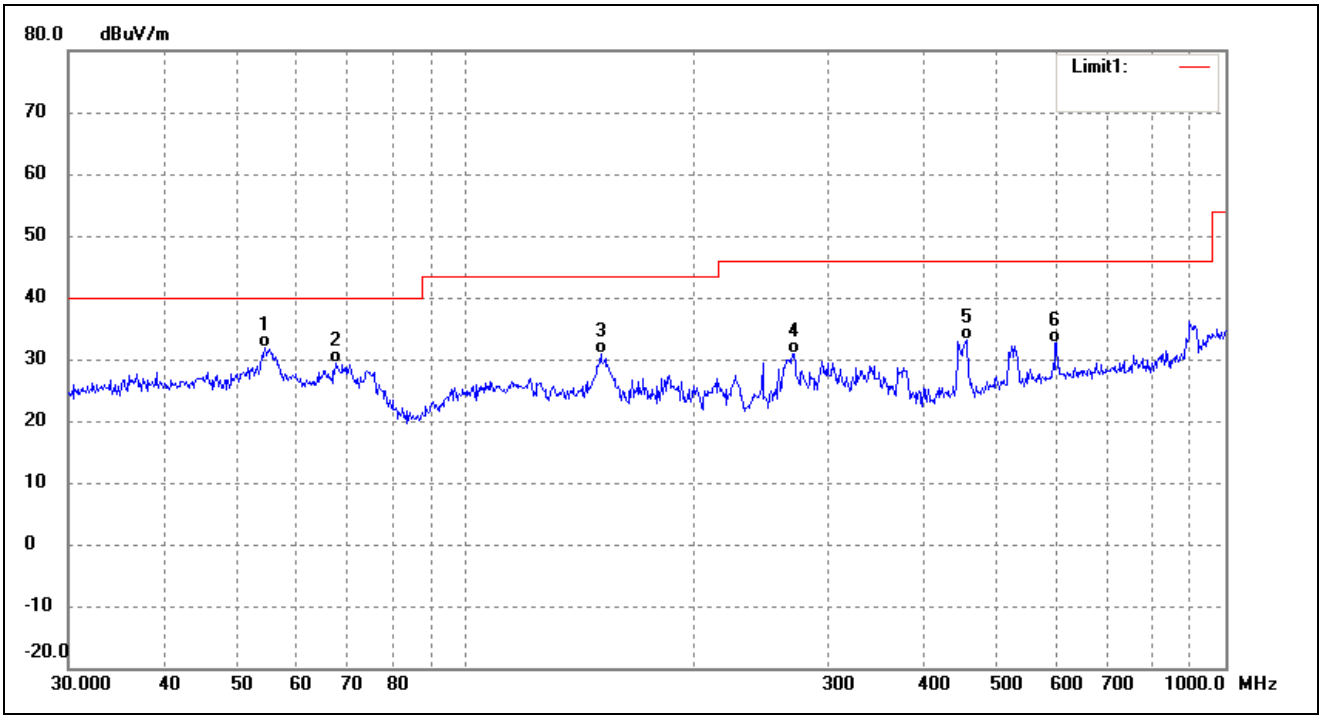
EUT: *60" SMART 4K UHD TV*
D60A114-U-A-I RNSMU6036

Tested Model: *XXXXXXXXXXXXXXXX60XXXXXXXXXXX (Where "X"can be any alphanumeric of a-z, A-Z or 0-9 or blank &"-".)*

Operating Condition: *802.11b Transmitting Low Channel-2412MHz*

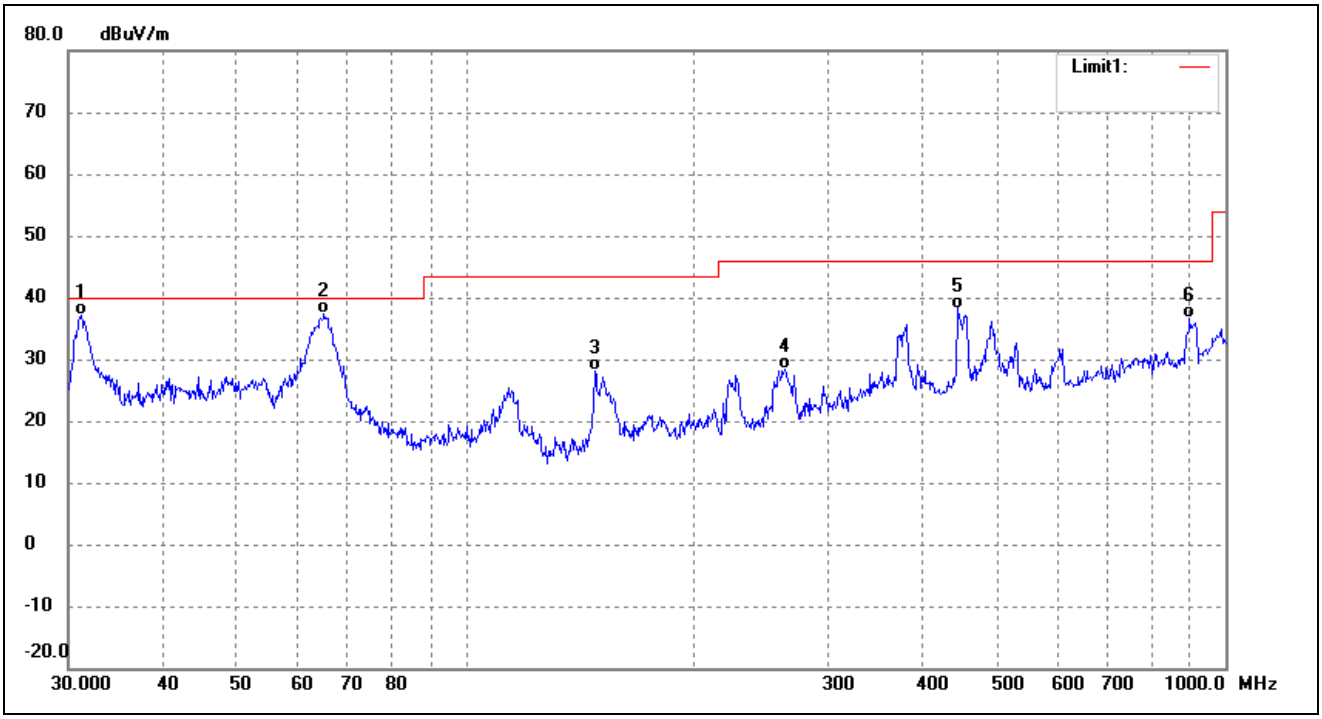
Comment: *120V/60Hz*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	54.4516	41.06	-9.09	31.97	40.00	-8.03	QP
2	67.4382	42.63	-13.32	29.31	40.00	-10.69	QP
3	150.5378	48.26	-17.43	30.83	43.50	-12.67	QP
4	270.3748	41.37	-10.45	30.92	46.00	-15.08	QP
5	455.9058	40.04	-6.80	33.24	46.00	-12.76	QP
6	597.2234	36.71	-3.99	32.72	46.00	-13.28	QP

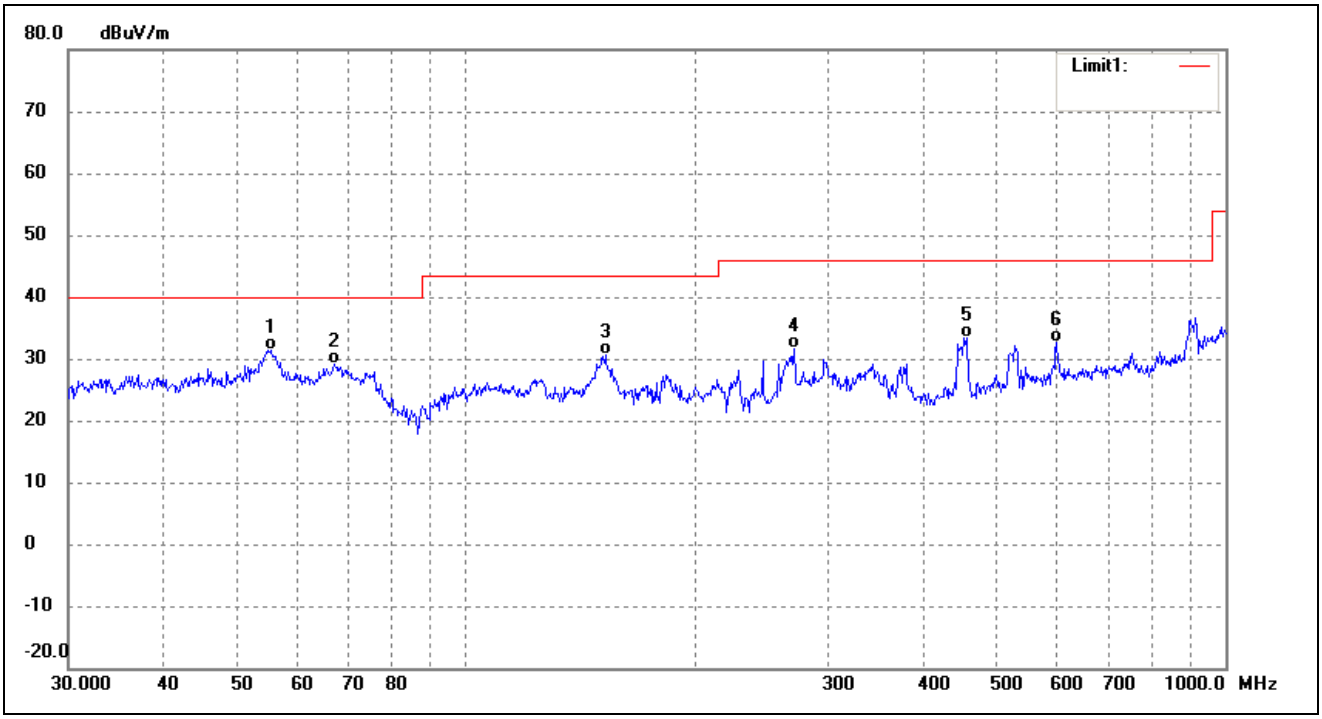
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	31.1798	46.73	-9.57	37.16	40.00	-2.84	QP
2	65.1145	49.62	-12.21	37.41	40.00	-2.59	QP
3	147.9214	45.70	-17.59	28.11	43.50	-15.39	QP
4	262.8955	39.11	-10.70	28.41	46.00	-17.59	QP
5	443.2943	45.20	-6.95	38.25	46.00	-7.75	QP
6	896.9965	35.38	1.27	36.65	46.00	-9.35	QP

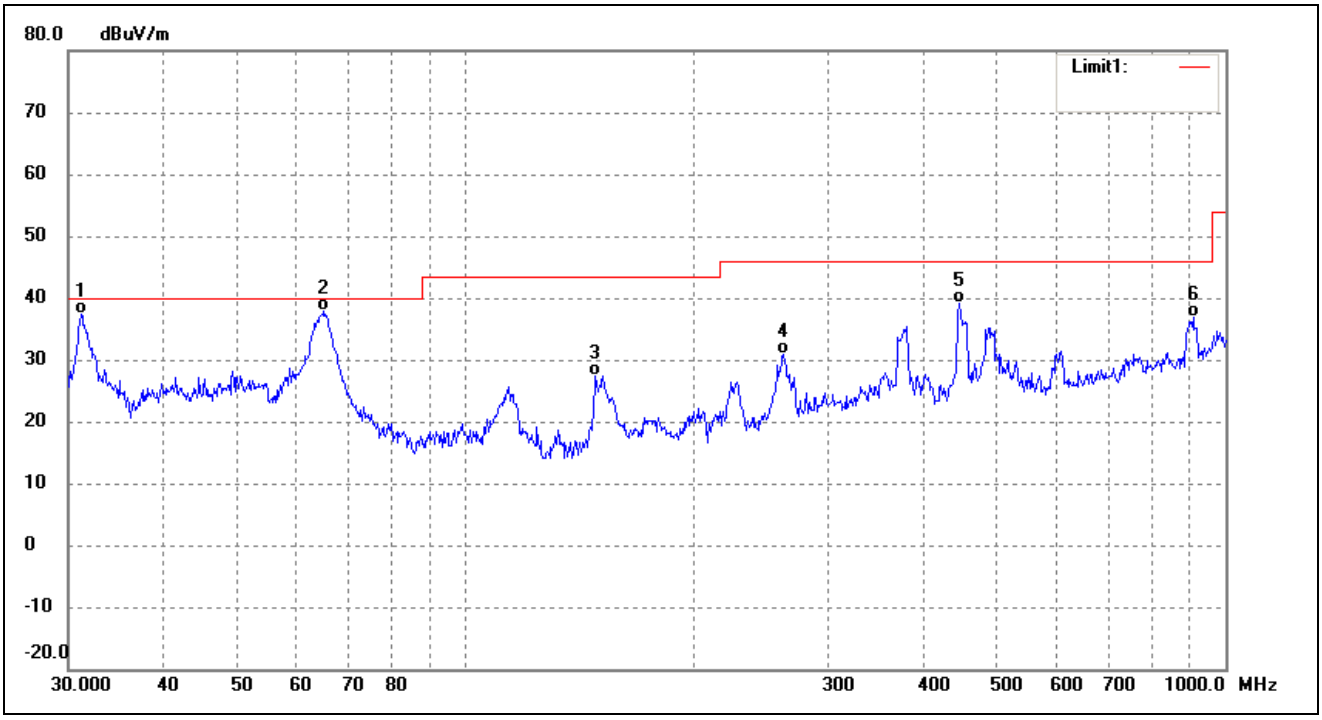
Operating Condition: *802.11b Transmitting Middle Channel-2437MHz*
Comment: *120V/60Hz*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	55.4147	40.68	-9.40	31.28	40.00	-8.72	QP
2	67.2022	42.39	-13.20	29.19	40.00	-10.81	QP
3	152.6641	48.03	-17.29	30.74	43.50	-12.76	QP
4	270.3748	42.18	-10.45	31.73	46.00	-14.27	QP
5	455.9058	40.13	-6.80	33.33	46.00	-12.67	QP
6	599.3213	36.63	-3.98	32.65	46.00	-13.35	QP

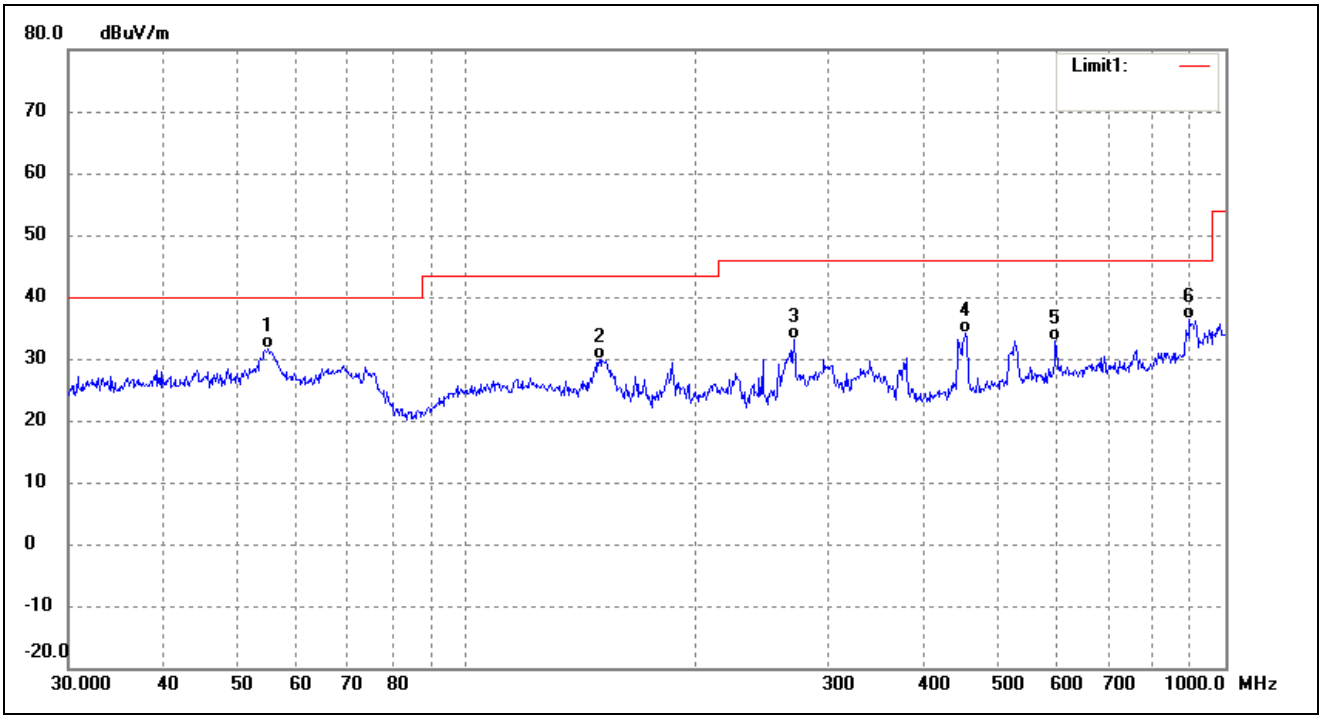
Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	31.1798	47.00	-9.57	37.43	40.00	-2.57	QP
2	65.1145	50.02	-12.21	37.81	40.00	-2.19	QP
3	147.9214	45.04	-17.59	27.45	43.50	-16.05	QP
4	261.9753	41.51	-10.75	30.76	46.00	-15.24	QP
5	446.4141	46.15	-6.97	39.18	46.00	-6.82	QP
6	906.4824	35.23	1.55	36.78	46.00	-9.22	QP

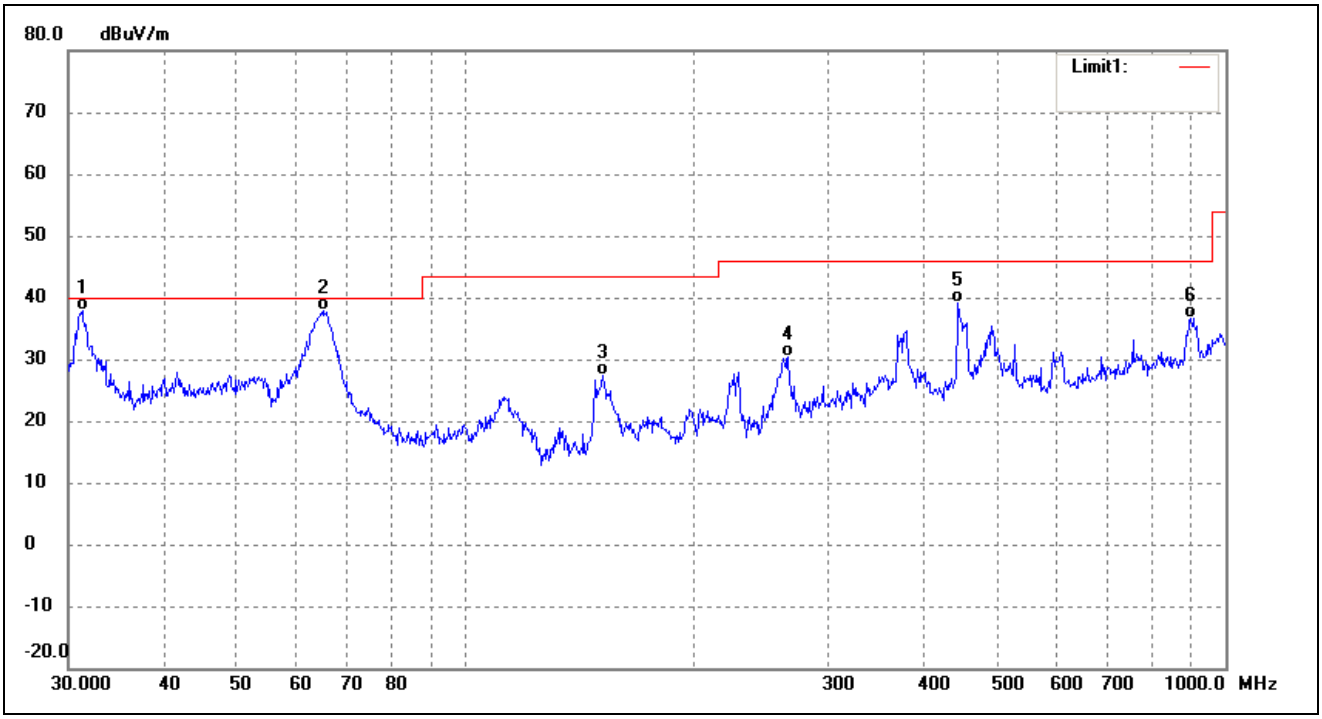
Operating Condition: *802.11b Transmitting High Channel-2462MHz*
Comment: *120V/60Hz*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	55.0274	40.97	-9.27	31.70	40.00	-8.30	QP
2	150.0108	47.34	-17.45	29.89	43.50	-13.61	QP
3	270.3748	43.57	-10.45	33.12	46.00	-12.88	QP
4	454.3100	40.95	-6.85	34.10	46.00	-11.90	QP
5	597.2234	36.79	-3.99	32.80	46.00	-13.20	QP
6	896.9965	35.12	1.27	36.39	46.00	-9.61	QP

Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	31.2893	47.43	-9.59	37.84	40.00	-2.16	QP
2	65.1145	50.02	-12.21	37.81	40.00	-2.19	QP
3	151.5972	44.74	-17.36	27.38	43.50	-16.12	QP
4	265.6757	40.91	-10.58	30.33	46.00	-15.67	QP
5	444.8514	46.01	-6.96	39.05	46.00	-6.95	QP
6	900.1474	35.30	1.39	36.69	46.00	-9.31	QP

Test Mode: 802.11b

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2412MHz							
4824	61.18	-3.86	57.32	74	-16.68	H	Peak
4824	43.63	-3.86	39.77	54	-14.23	H	AV
7236	55.59	1.10	56.69	74	-17.31	H	Peak
7236	38.43	1.10	39.53	54	-14.47	H	AV
4824	59.37	-3.86	55.51	74	-18.49	V	Peak
4824	43.75	-3.86	39.89	54	-14.11	V	AV
7236	55.24	1.10	56.34	74	-17.66	V	Peak
7236	40.74	1.10	41.84	54	-12.16	V	AV
Middle Channel-2437MHz							
4874	62.30	-3.74	58.56	74	-15.44	H	Peak
4874	41.29	-3.74	37.55	54	-16.45	H	AV
7311	55.57	1.47	57.04	74	-16.96	H	Peak
7311	40.73	1.47	42.20	54	-11.80	H	AV
4874	61.55	-3.74	57.81	74	-16.19	V	Peak
4874	41.98	-3.74	38.24	54	-15.76	V	AV
7311	55.90	1.47	57.37	74	-16.63	V	Peak
7311	41.12	1.47	42.59	54	-11.41	V	AV
High Channel-2462MHz							
4924	59.03	-3.63	55.40	74	-18.60	H	Peak
4924	40.55	-3.63	36.92	54	-17.08	H	AV
7386	56.62	1.62	58.24	74	-15.76	H	Peak
7386	40.42	1.62	42.04	54	-11.96	H	AV
4924	58.41	-3.63	54.78	74	-19.22	V	Peak
4924	41.03	-3.63	37.40	54	-16.60	V	AV
7386	53.83	1.62	55.45	74	-18.55	V	Peak
7386	40.39	1.62	42.01	54	-11.99	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The measurements greater than 20dB below the limit from 9kHz to 30MHz.

9. Out of Band Emissions

9.1 Standard Applicable

According to §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).

9.2 Test Procedure

According to the KDB 558074D01 V05, the band-edge radiated test method as follows:

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2420MHz for low bandedge, 2460MHz to 2500MHz for the high bandedge)
RBW = 1MHz, VBW = 1MHz for peak value measured
RBW = 1MHz, VBW = 10Hz for average value measured
Sweep = auto; Detector function = peak/average; Trace = max hold
All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product
outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the
marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply
with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement
KDB publication number: 913591 may be used for the radiated bandedge measurements.

According to the KDB 558074 D01 V05, the conducted spurious emissions test method as follows:
1. Set start frequency to DTS channel edge frequency.
2. Set stop frequency so as to encompass the spectrum to be examined.
3. Set RBW = 100 kHz.
4. Set VBW ≥ 300 kHz.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).

9. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding
restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1. Report
the three highest emissions relative to the limit.

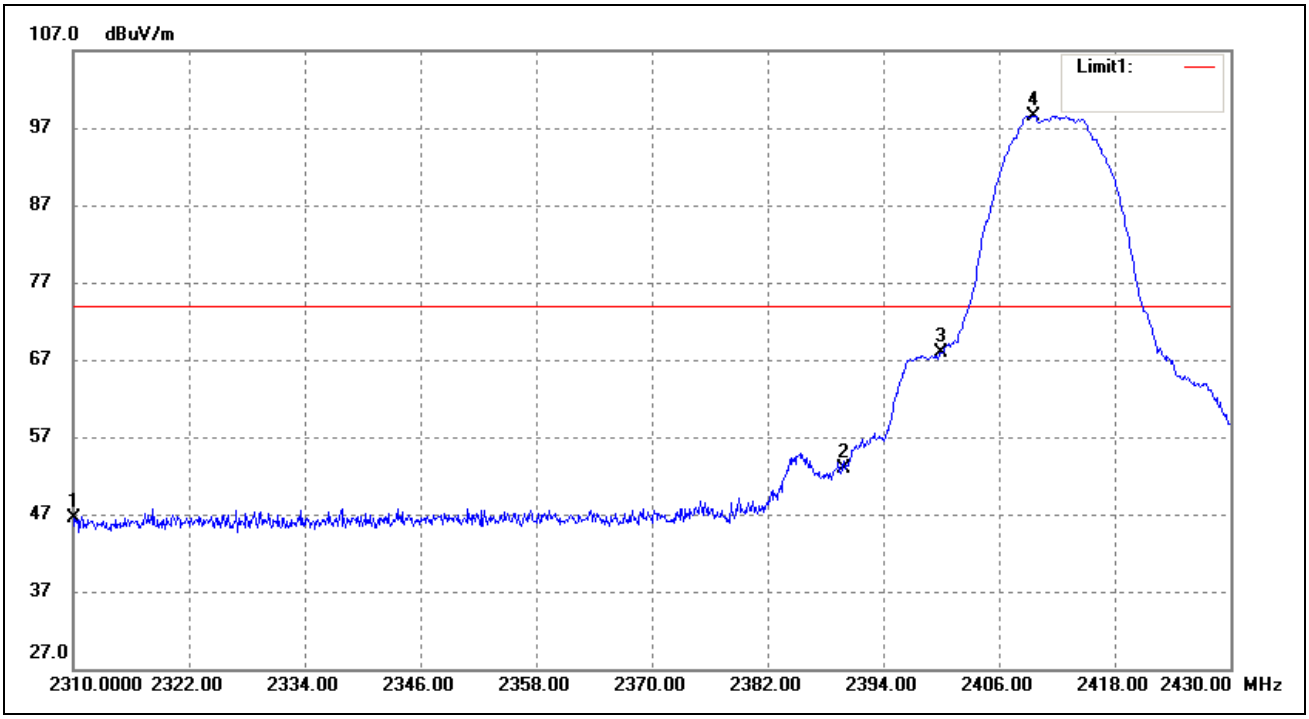
9.3 Environmental Conditions

Temperature:	23°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

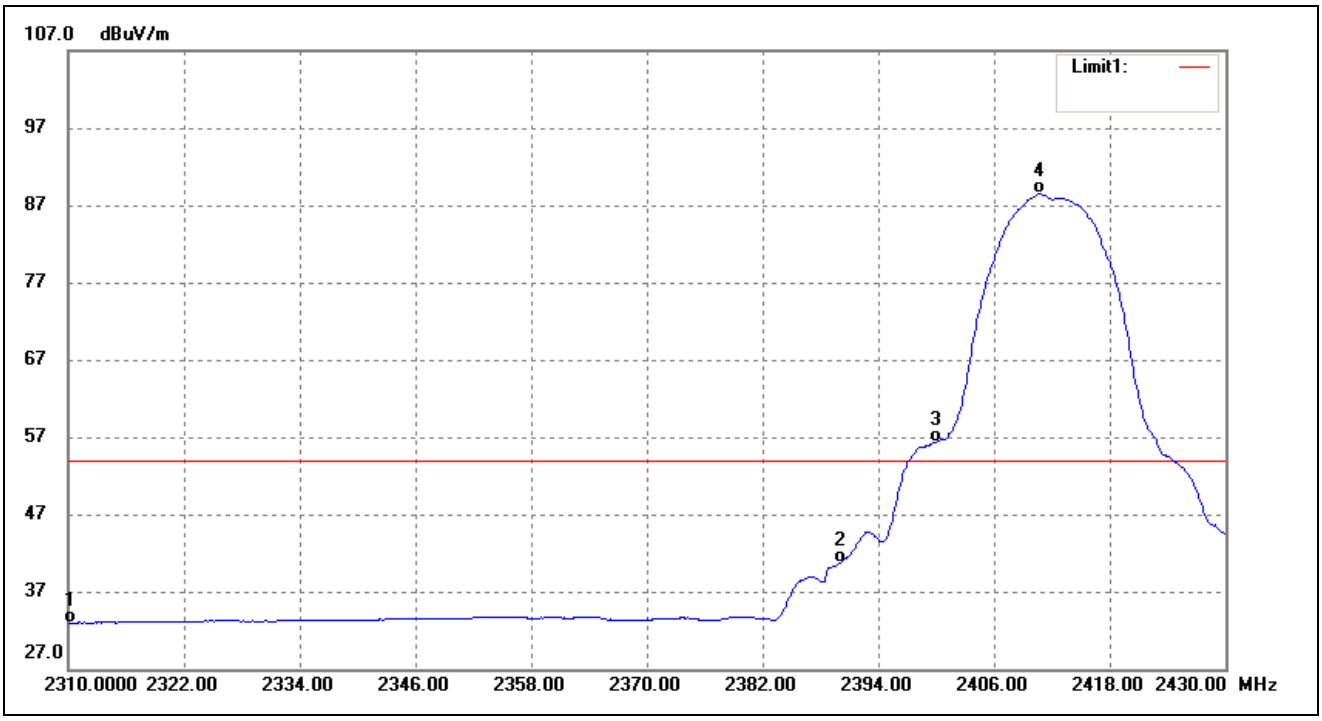
9.4 Summary of Test Results/Plots

802.11b-Lowest Band edge

Vertical (Worst case)



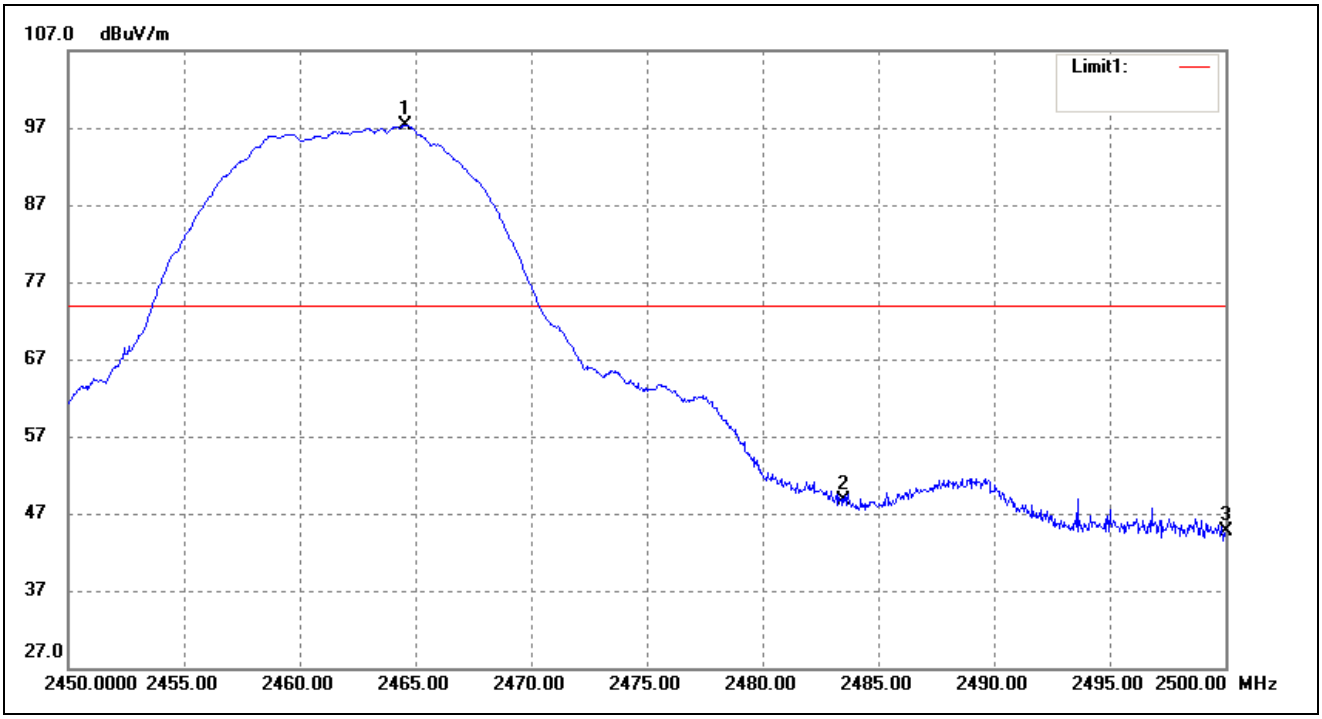
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	54.22	-7.78	46.44	74.00	-27.56	peak
2	2390.000	60.31	-7.32	52.99	74.00	-21.01	peak
3	2400.000	75.09	-7.26	67.83	74.00	-6.17	peak
4	2409.600	105.78	-7.19	98.59	74.00	24.59	peak



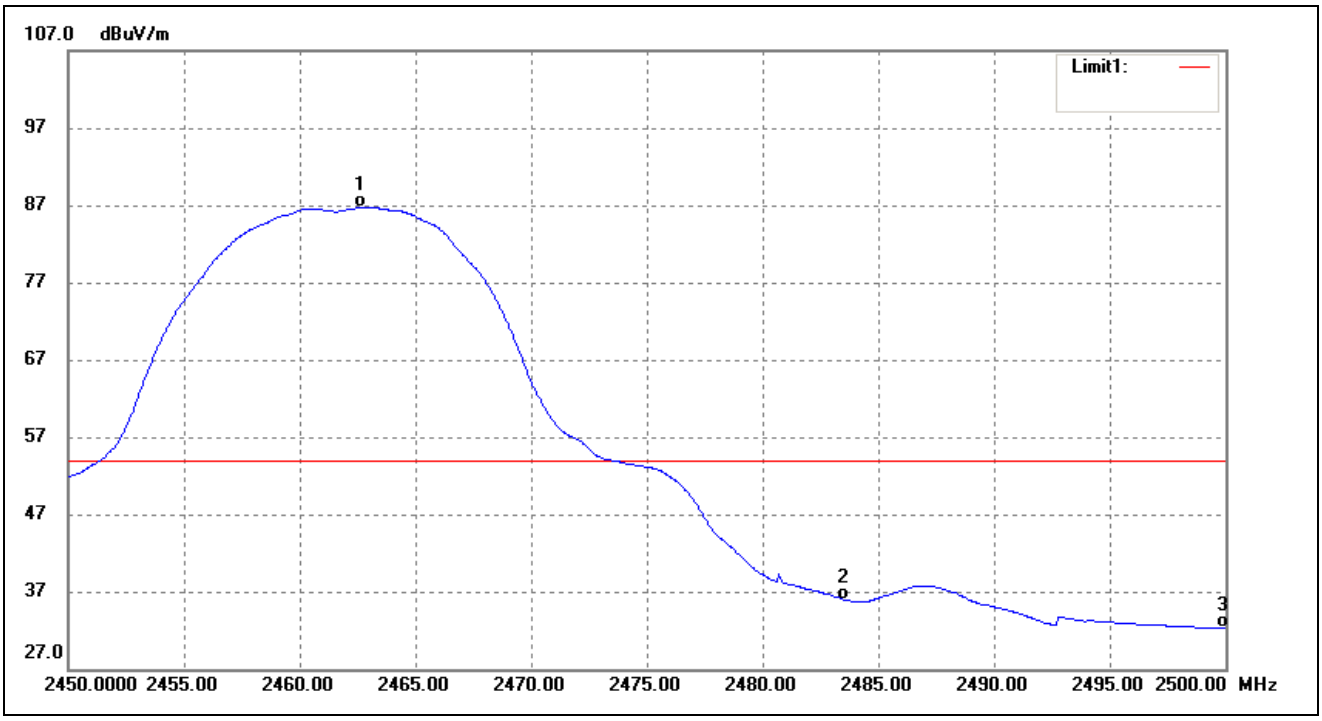
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	40.76	-7.78	32.98	54.00	-21.02	AVG
2	2390.000	48.09	-7.32	40.77	54.00	-13.23	AVG
3	2400.000	63.62	-7.26	56.36	Delta=32.11dB		AVG
4	2410.680	95.66	-7.19	88.47			AVG

802.11b-Highest Band edge

Vertical (Worst case)



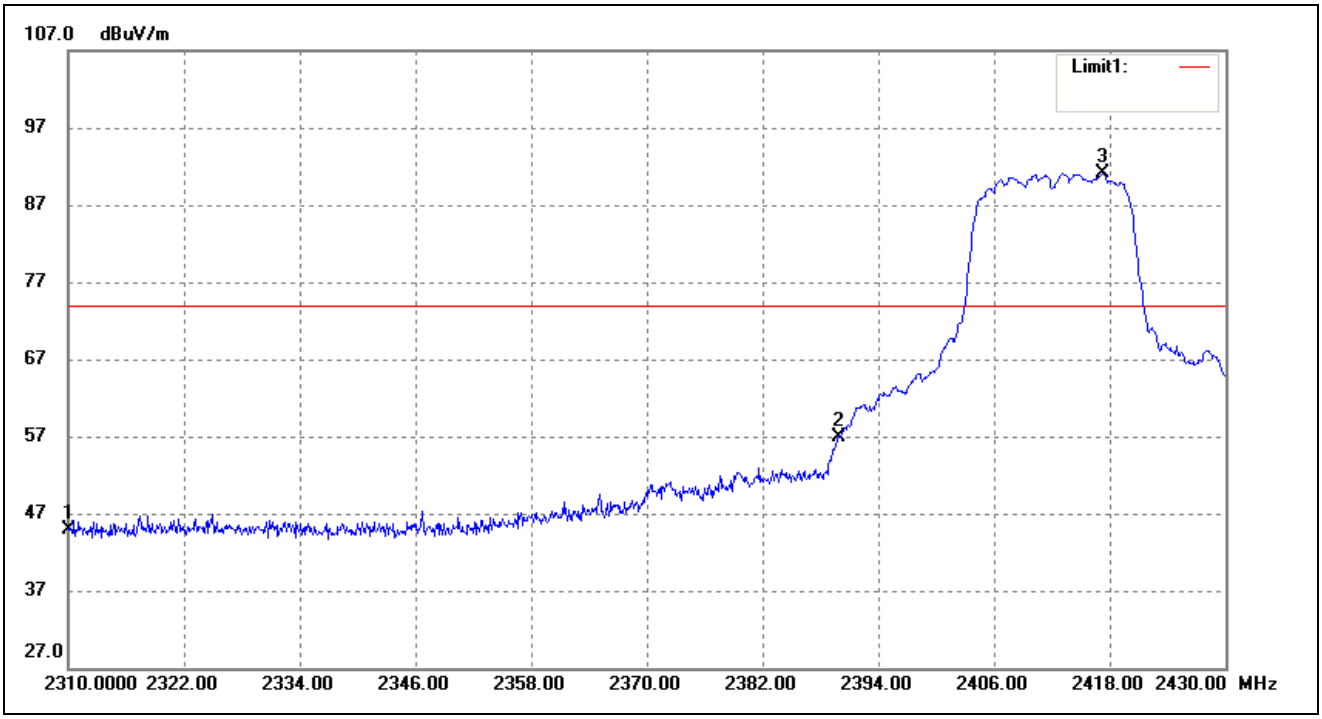
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2464.550	104.22	-6.89	97.33	74.00	23.33	peak
2	2483.500	55.54	-6.77	48.77	74.00	-25.23	peak
3	2500.000	51.41	-6.67	44.74	74.00	-29.26	peak



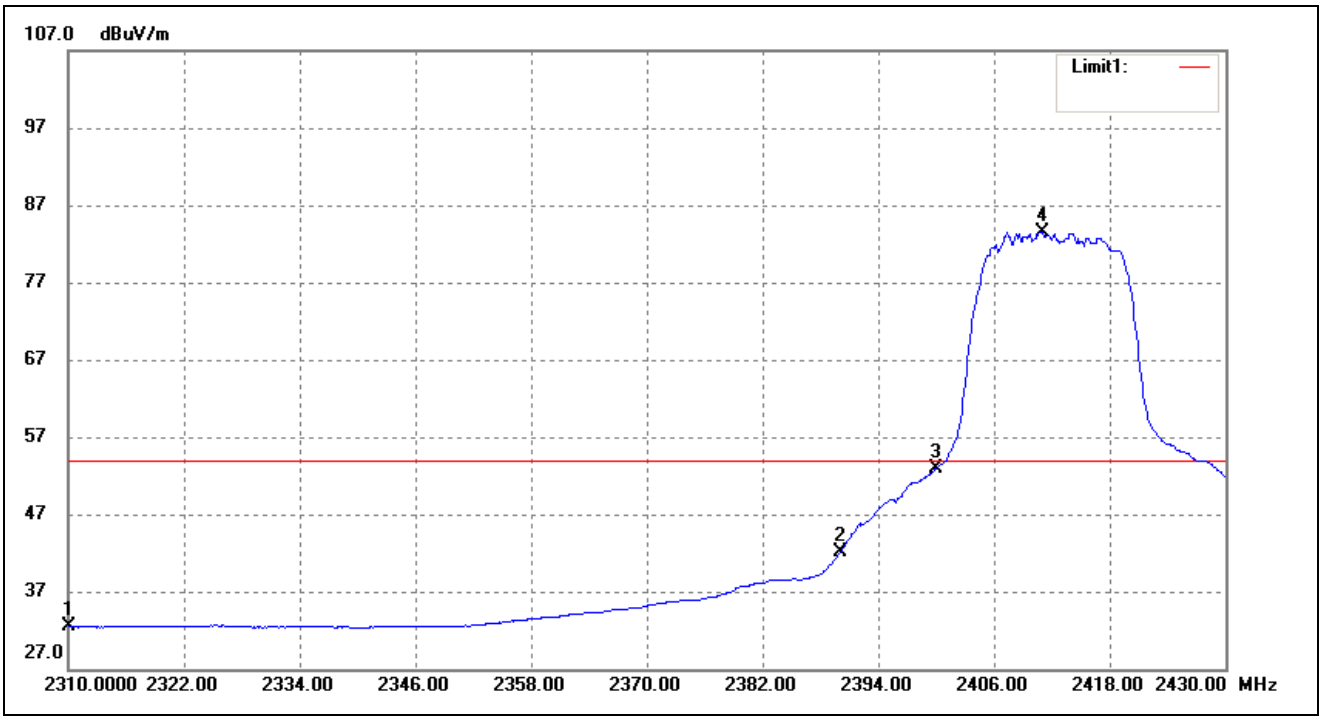
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2462.650	93.53	-6.89	86.64	54.00	32.64	AVG
2	2483.500	42.75	-6.77	35.98	54.00	-18.02	AVG
3	2500.000	38.90	-6.67	32.23	54.00	-21.77	AVG

802.11g-Lowest Band edge

Vertical (Worst case)



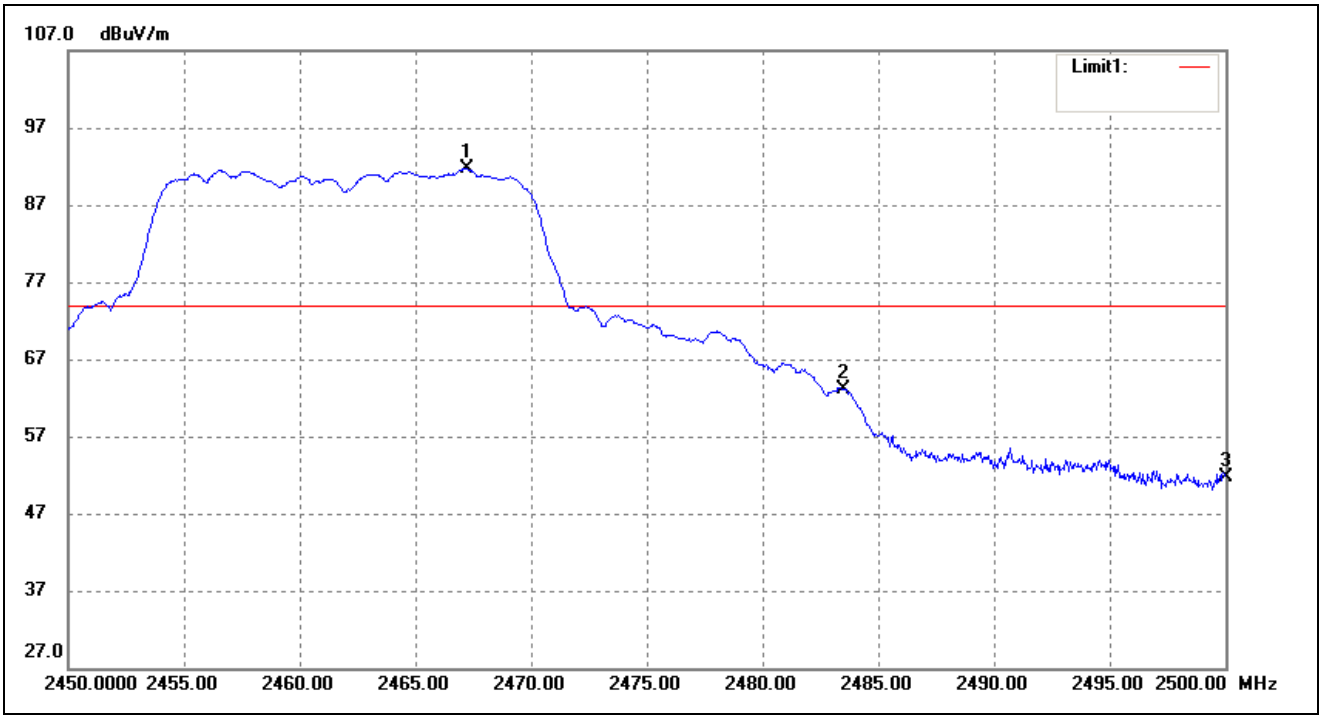
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	52.77	-7.78	44.99	74.00	-29.01	peak
2	2390.000	64.15	-7.32	56.83	74.00	-17.17	peak
3	2417.280	98.16	-7.15	91.01	74.00	17.01	peak



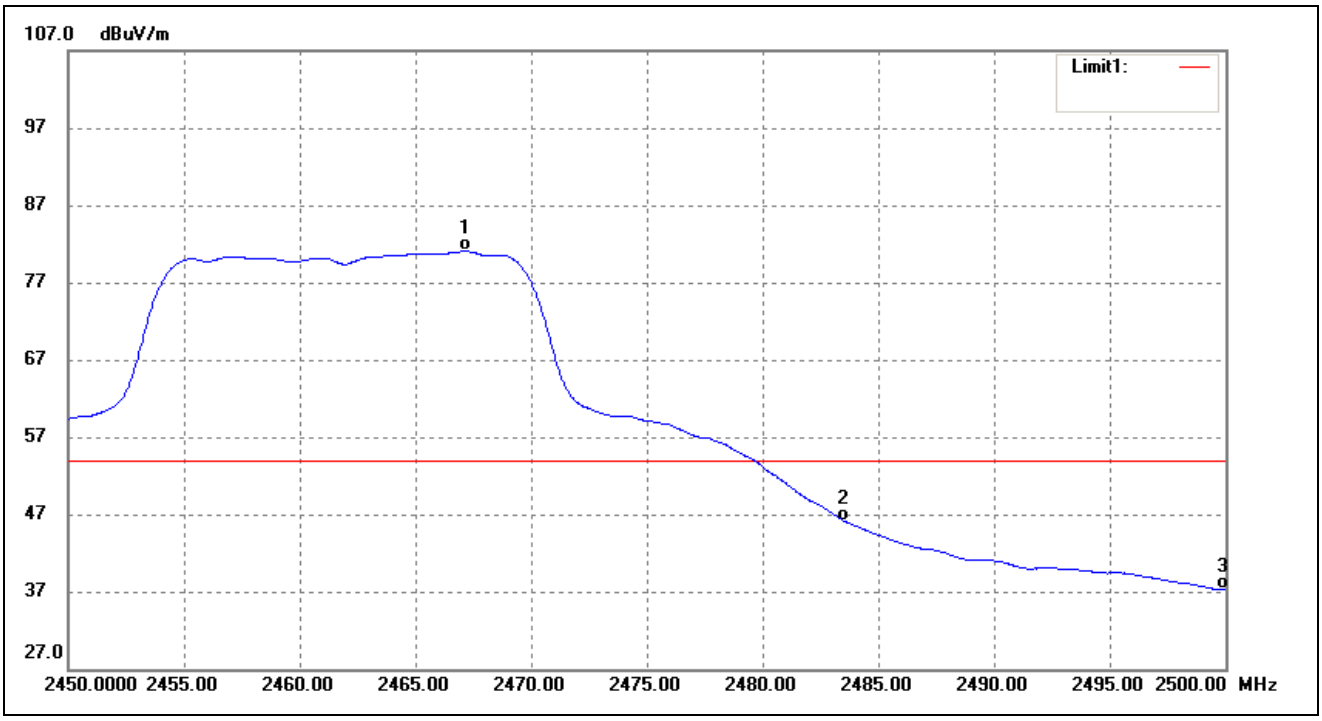
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	40.23	-7.78	32.45	54.00	-21.55	peak
2	2390.000	49.42	-7.32	42.10	54.00	-11.90	peak
3	2400.000	60.23	-7.26	52.97	Delta=30.53dB		peak
4	2411.040	90.69	-7.19	83.50			peak

802.11g-Highest Band edge

Vertical (Worst case)



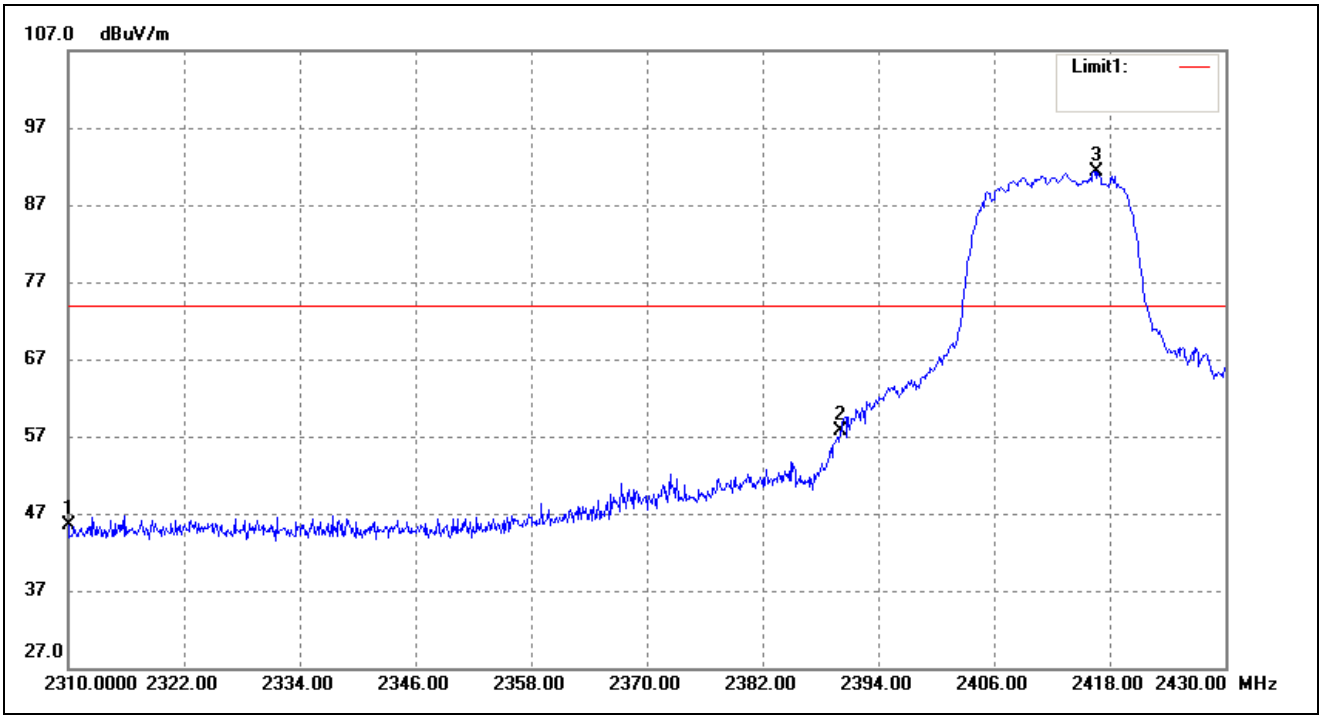
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2467.250	98.54	-6.86	91.68	74.00	17.68	peak
2	2483.500	69.94	-6.77	63.17	74.00	-10.83	peak
3	2500.000	58.34	-6.67	51.67	74.00	-22.33	peak



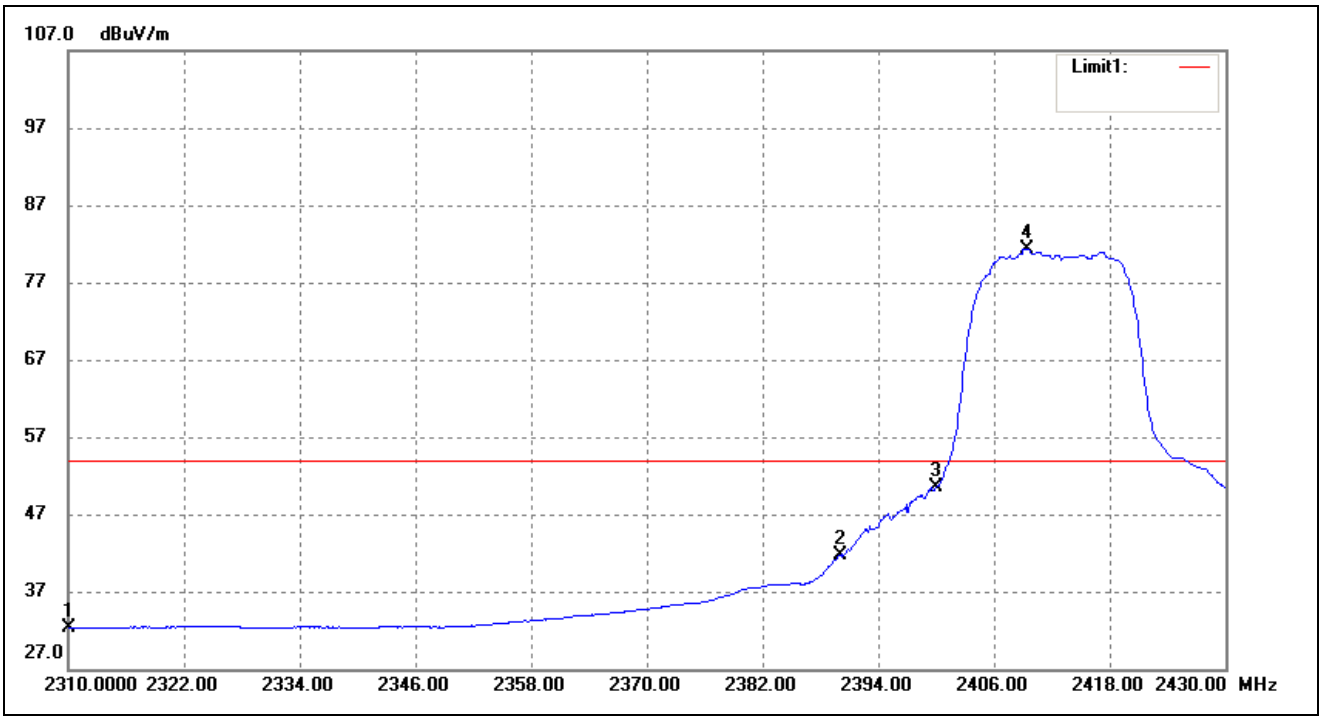
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2467.150	87.91	-6.86	81.05	54.00	27.05	AVG
2	2483.500	52.93	-6.77	46.16	54.00	-7.84	AVG
3	2500.000	43.87	-6.67	37.20	54.00	-16.80	AVG

802.11n-HT20-Lowest Band edge

Vertical (Worst case)



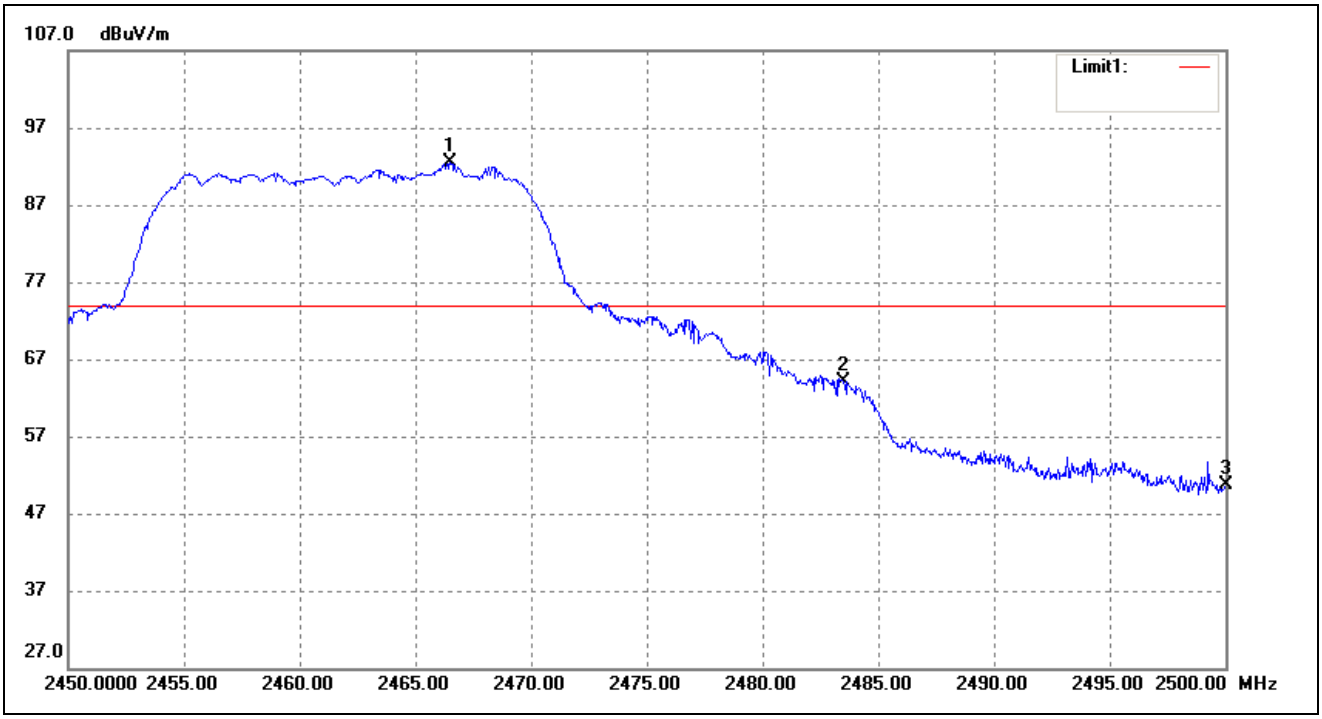
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	53.37	-7.78	45.59	74.00	-28.41	peak
2	2390.000	64.97	-7.32	57.65	74.00	-16.35	peak
3	2416.680	98.48	-7.15	91.33	74.00	17.33	peak



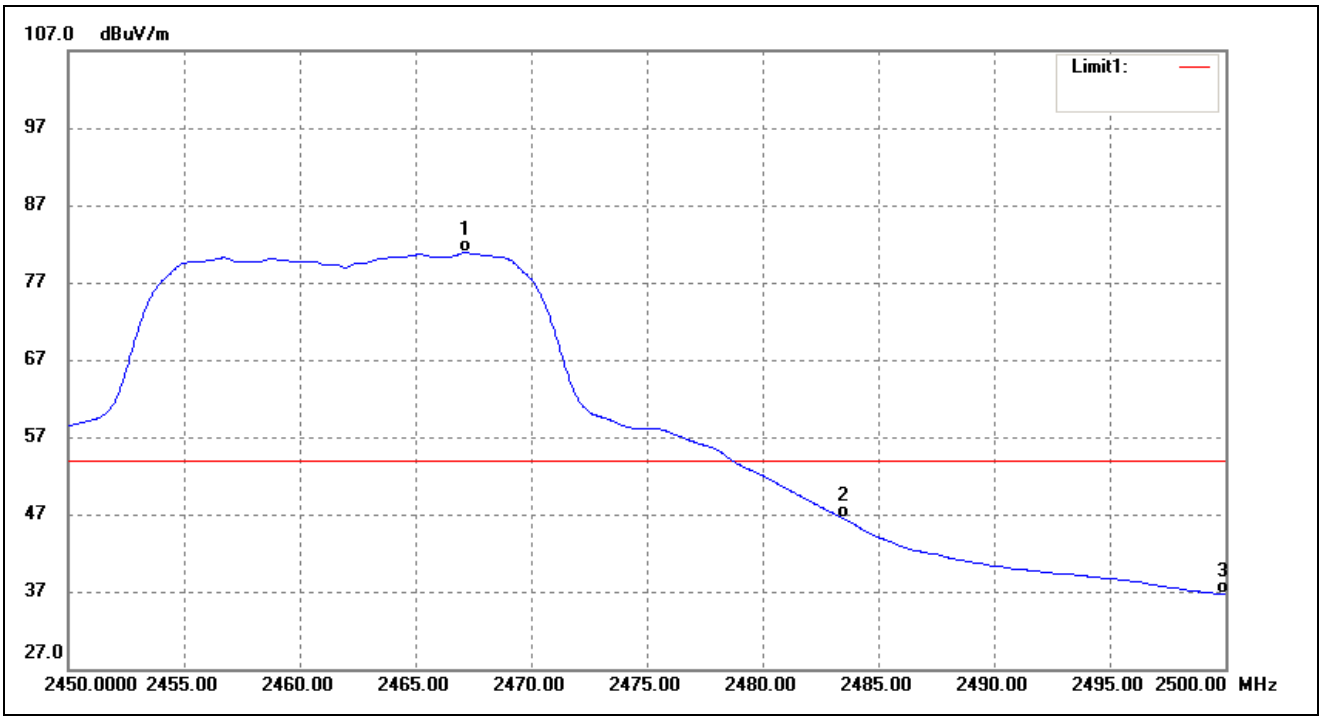
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	2310.000	40.11	-7.78	32.33	54.00	-21.67			peak
2	2390.000	49.11	-7.32	41.79	54.00	-12.21			peak
3	2400.000	57.72	-7.26	50.46	Delta=30.80dB				peak
4	2409.360	88.47	-7.21	81.26					peak

802.11n-HT20-Highest Band edge

Vertical (Worst case)



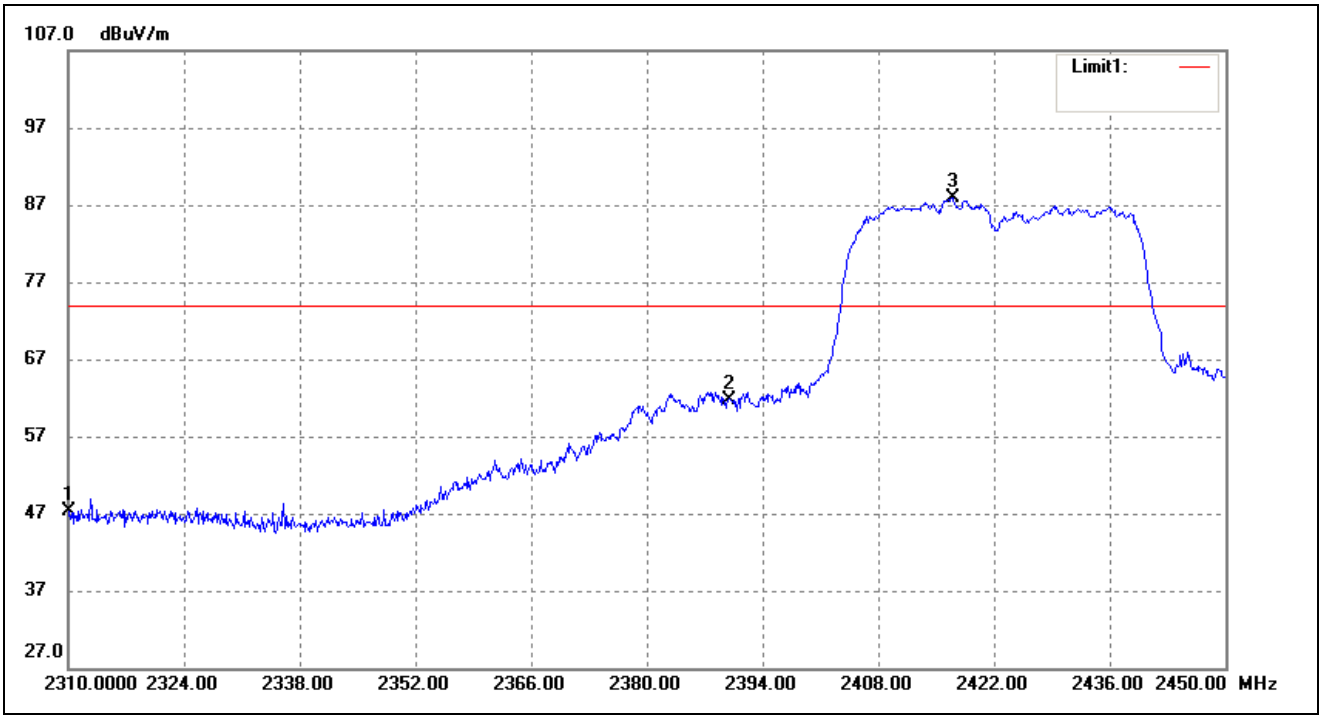
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2466.500	99.30	-6.86	92.44	74.00	18.44	peak
2	2483.500	70.83	-6.77	64.06	74.00	-9.94	peak
3	2500.000	57.34	-6.67	50.67	74.00	-23.33	peak



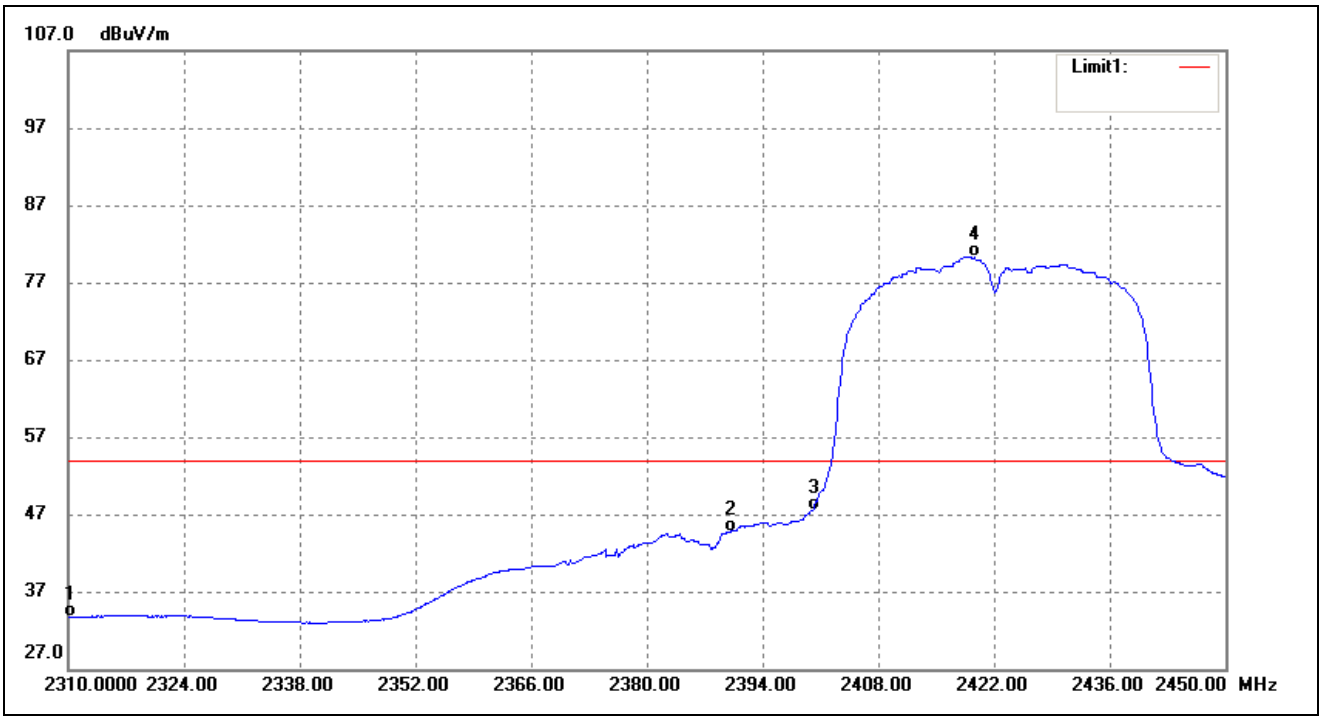
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2467.150	87.71	-6.86	80.85	54.00	26.85	AVG
2	2483.500	53.21	-6.77	46.44	54.00	-7.56	AVG
3	2500.000	43.29	-6.67	36.62	54.00	-17.38	AVG

802.11n-HT40-Lowest Band edge

Vertical (Worst case)



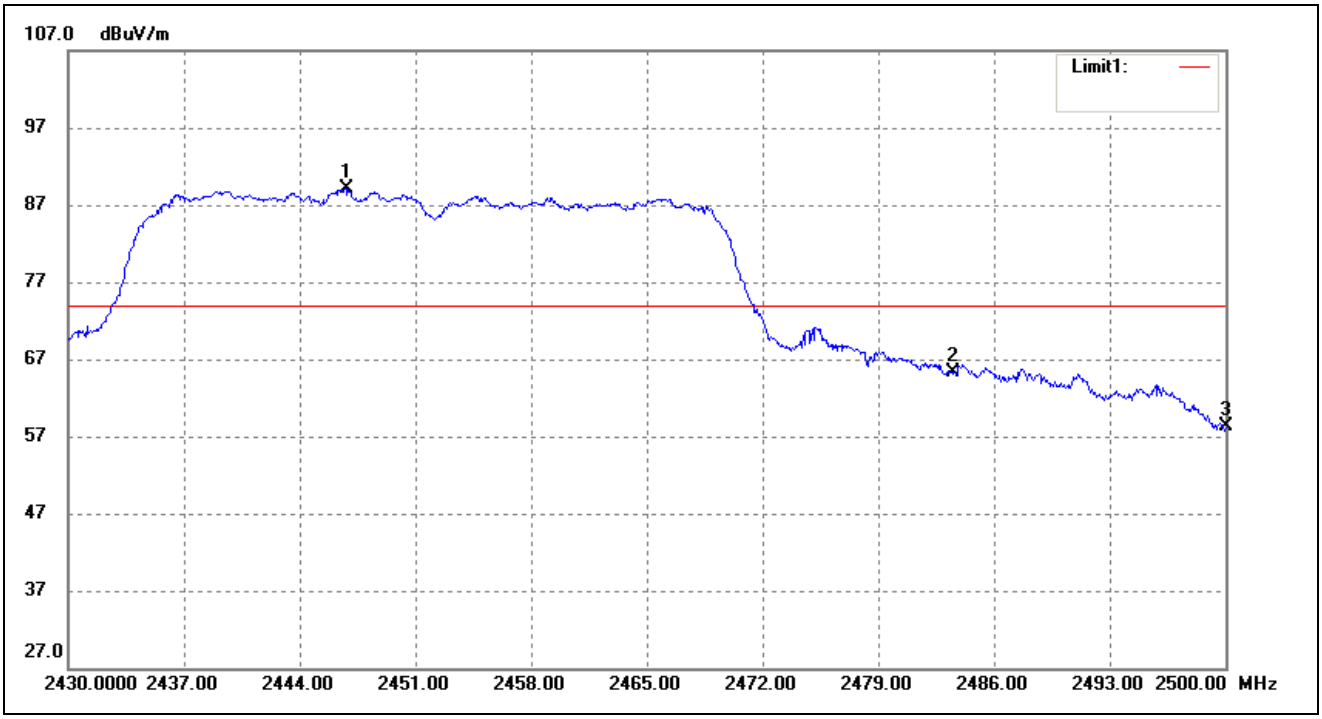
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	55.14	-7.78	47.36	74.00	-26.64	peak
2	2390.000	68.94	-7.32	61.62	74.00	-12.38	peak
3	2416.960	95.08	-7.15	87.93	74.00	13.93	peak



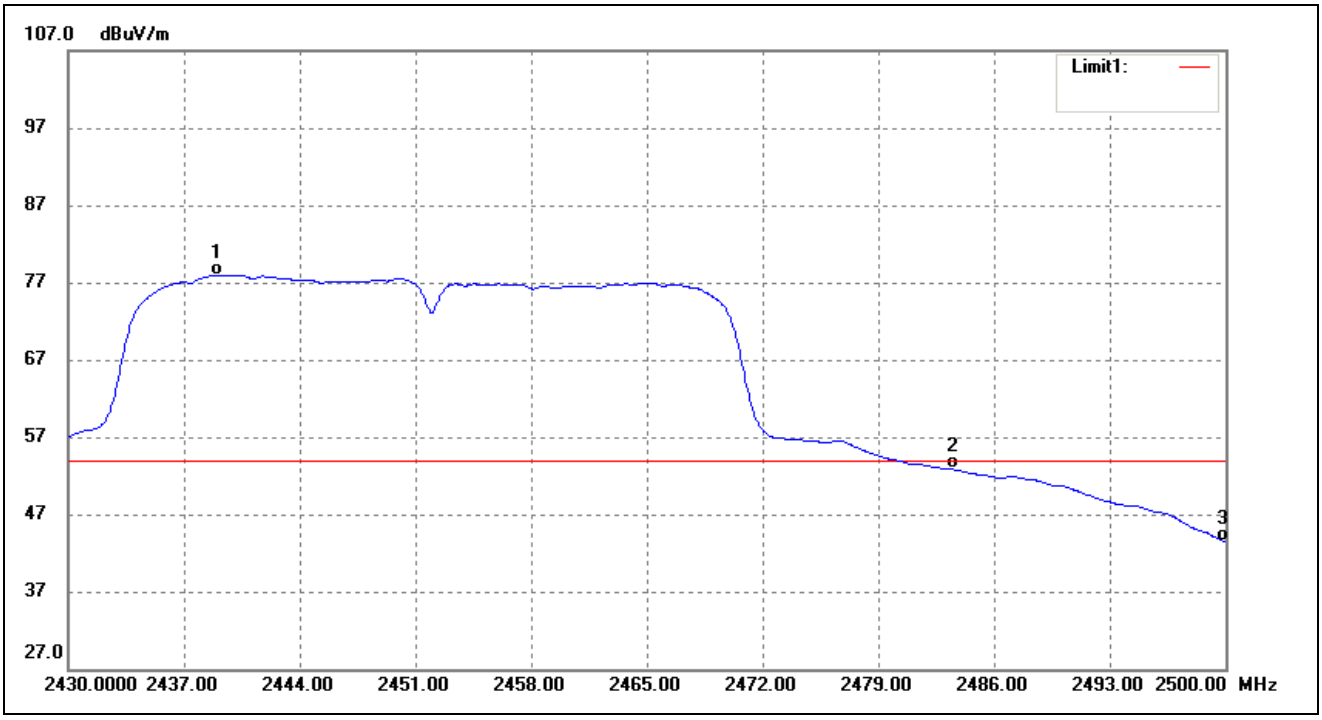
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	41.50	-7.78	33.72	54.00	-20.28	AVG
2	2390.000	52.09	-7.32	44.77	54.00	-9.23	AVG
3	2400.000	54.84	-7.26	47.58	Delta=32.70dB		AVG
4	2419.620	87.42	-7.14	80.28			AVG

802.11n-HT40-Highest Band edge

Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2446.800	96.00	-6.98	89.02	74.00	15.02	peak
2	2483.500	72.14	-6.77	65.37	74.00	-8.63	peak
3	2500.000	64.96	-6.67	58.29	74.00	-15.71	peak



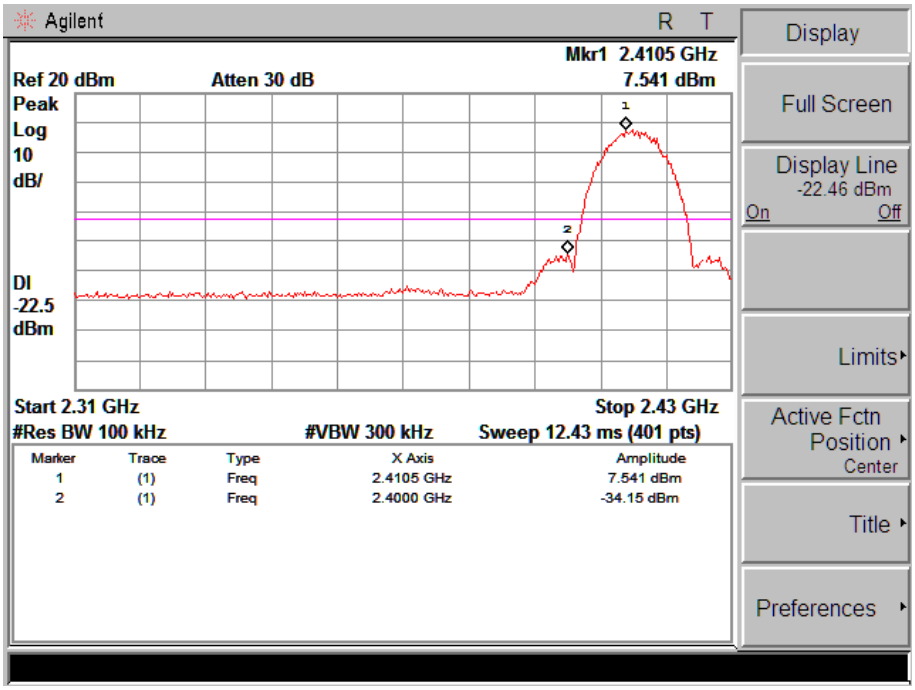
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2439.030	85.01	-7.03	77.98	54.00	23.98	AVG
2	2483.500	59.60	-6.77	52.83	54.00	-1.17	AVG
3	2500.000	50.17	-6.67	43.50	54.00	-10.50	AVG

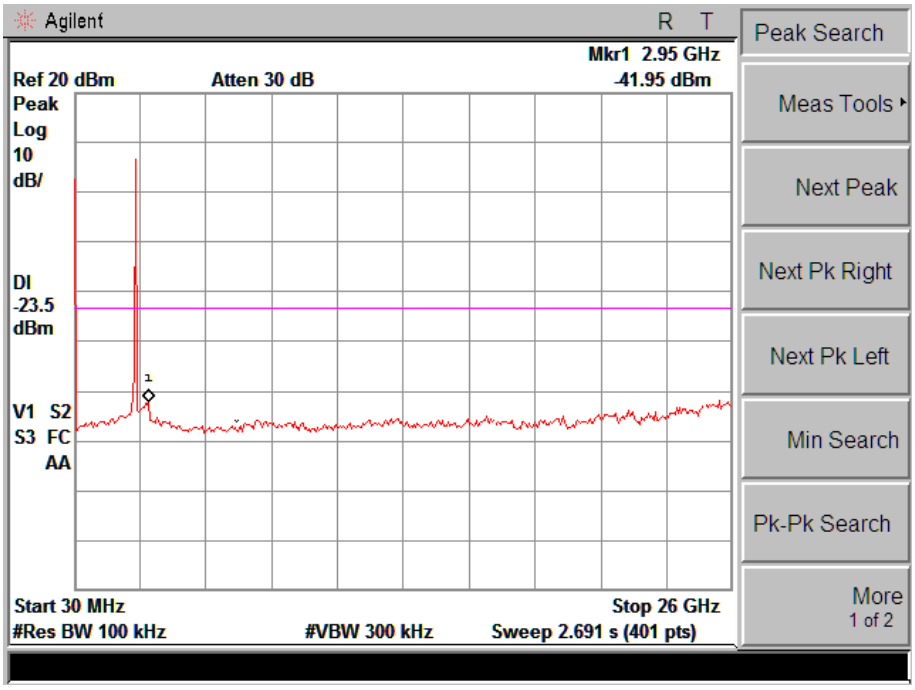
Out-of-Band and Spurious Emission (Conducted)

Antenna 1

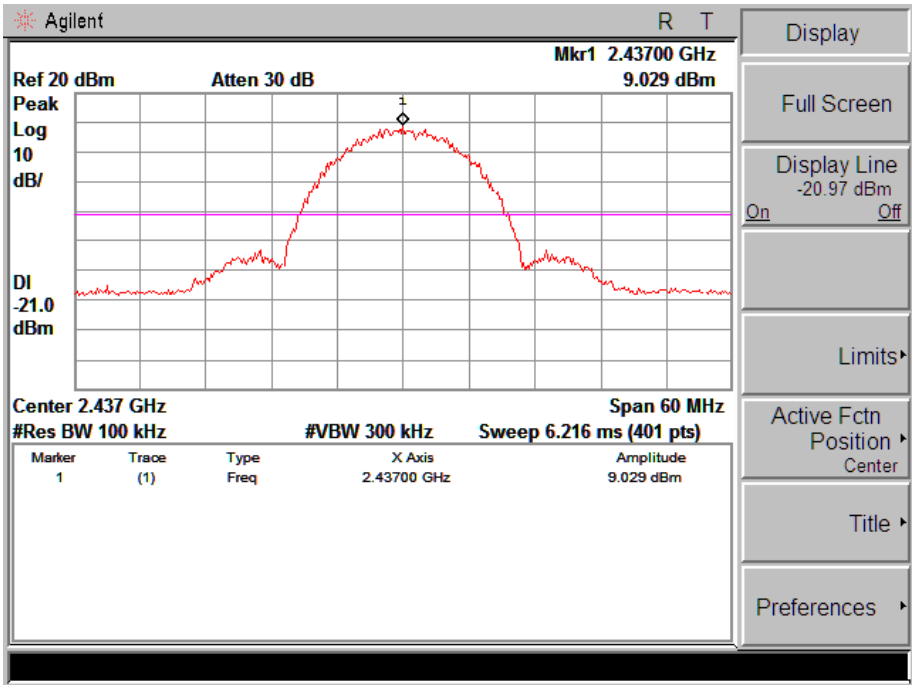
802.11b

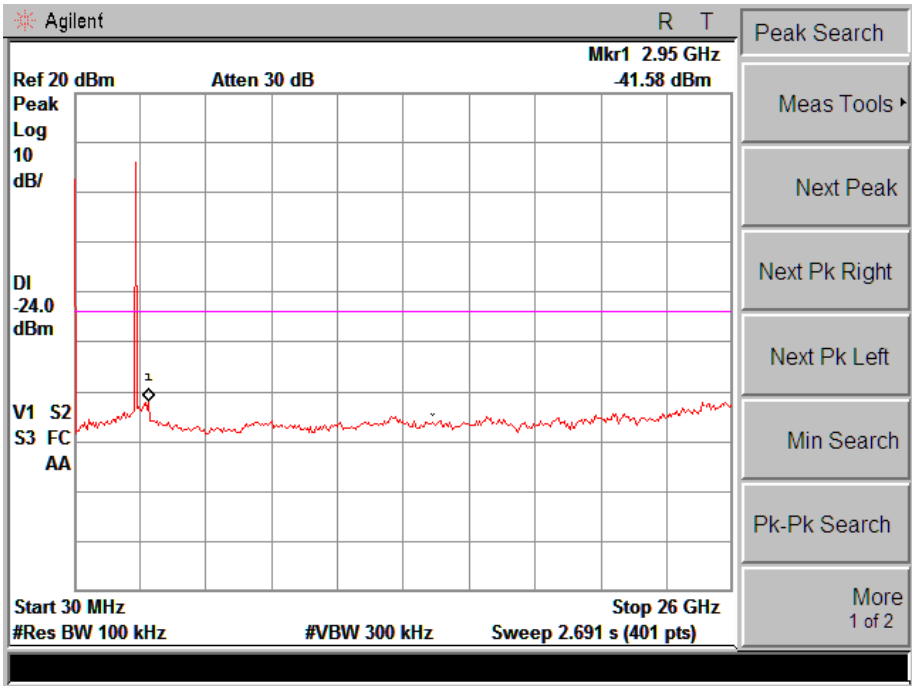
Low Channel



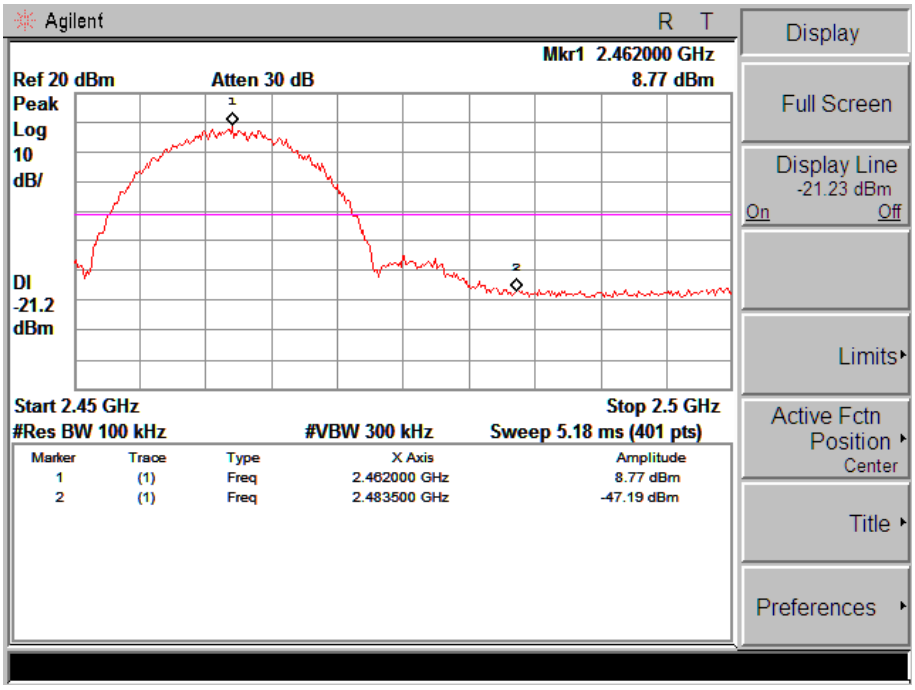


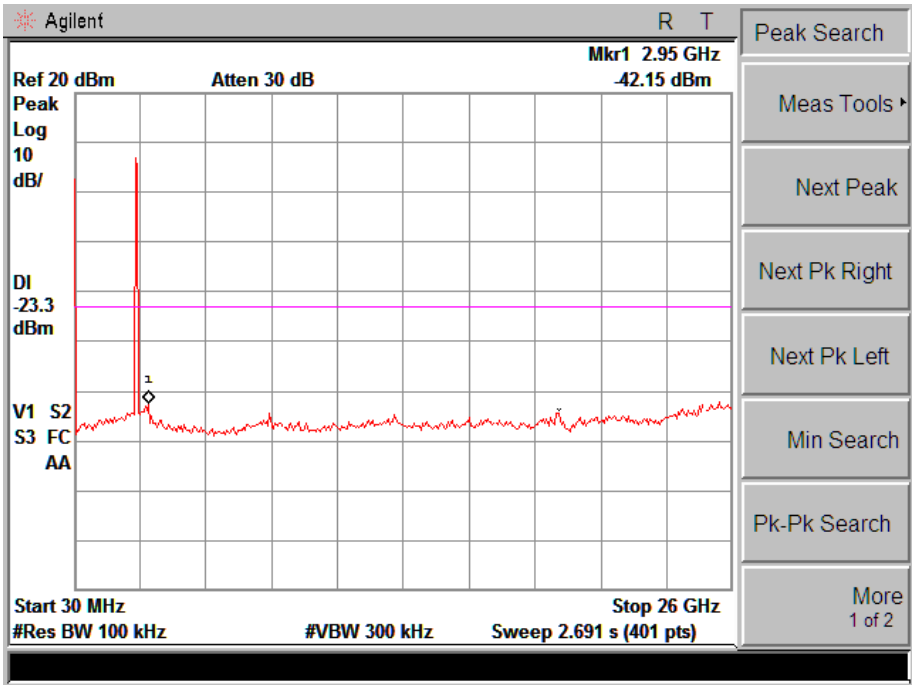
Middle Channel


Agilent
R T
Mkr1 2.43700 GHz
Ref 20 dBm
Atten 30 dB
9.029 dBm
Peak
Log
10
dB/
Dl
-21.0
dBm
Center 2.437 GHz
Span 60 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 6.216 ms (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.43700 GHz 9.029 dBm
Display
Full Screen
Display Line
-20.97 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences


Agilent
R T
Mkr1 2.95 GHz
Ref 20 dBm
Atten 30 dB
-41.58 dBm
Peak
Log
10
dB/
Dl
-24.0
dBm
V1 S2
S3 FC
AA
Start 30 MHz
Stop 26 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.691 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

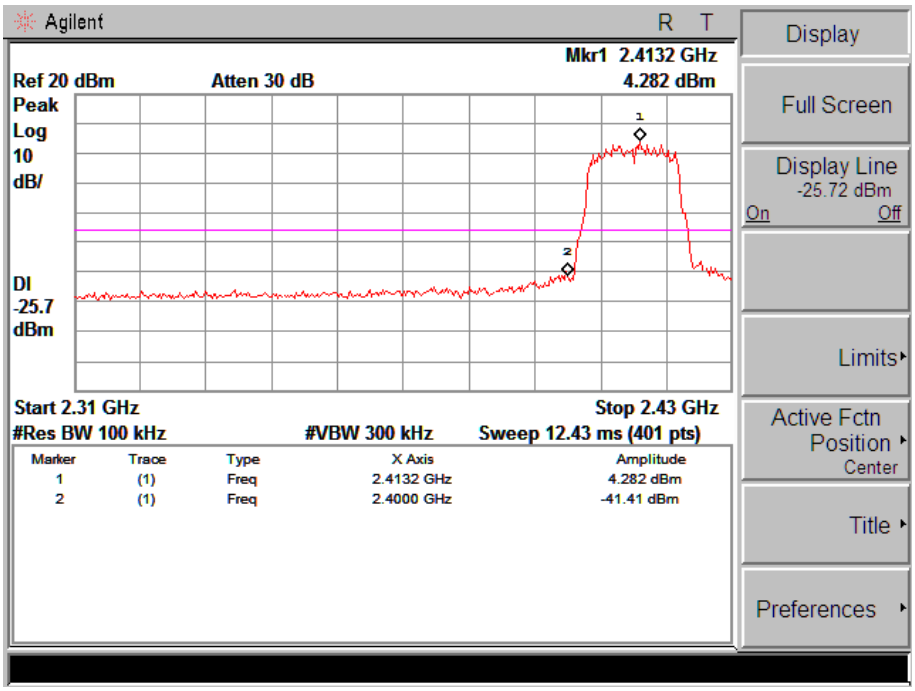
High Channel

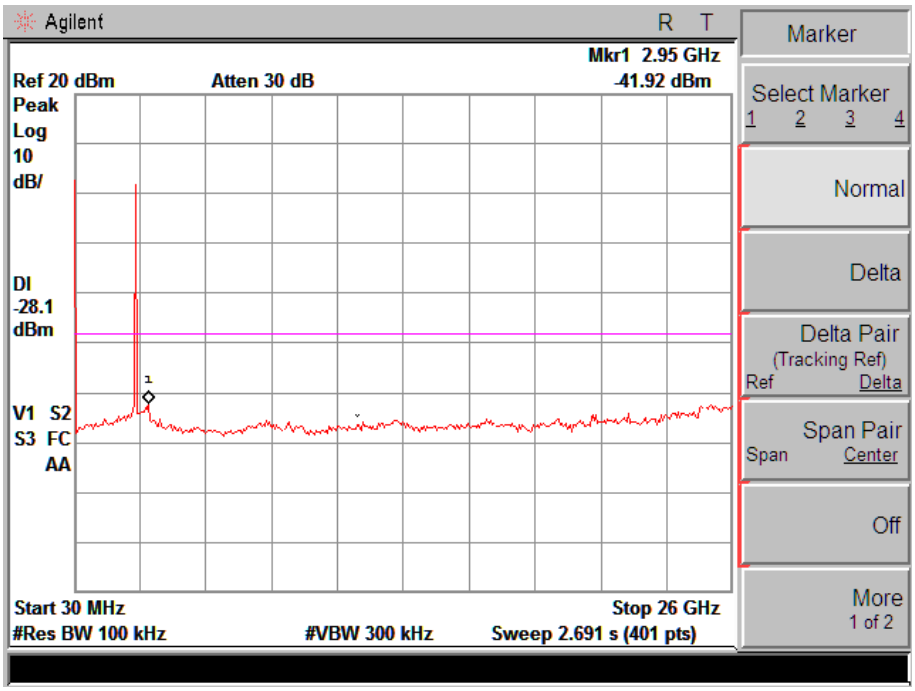




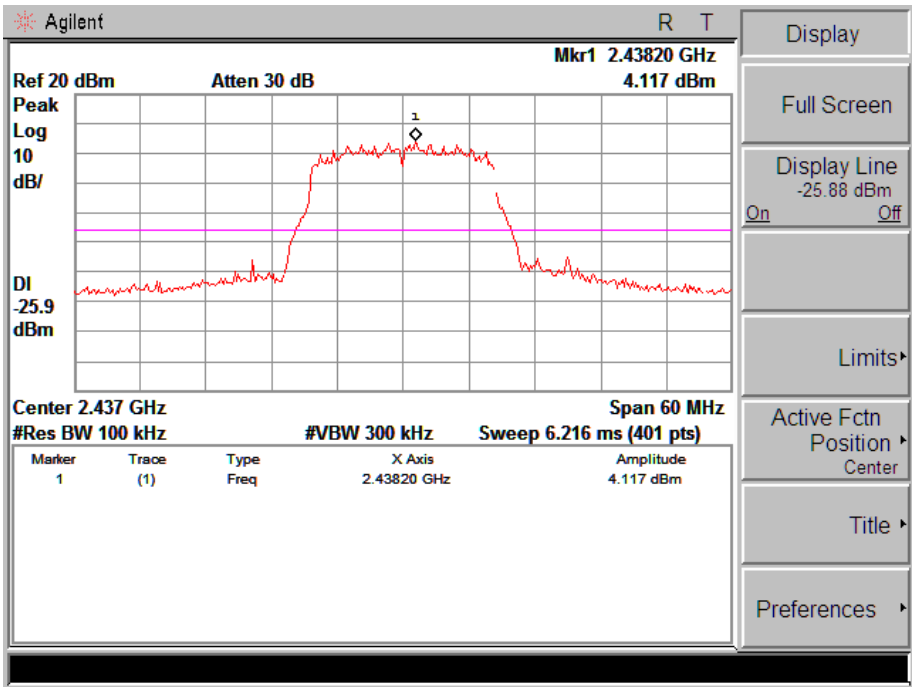
802.11g

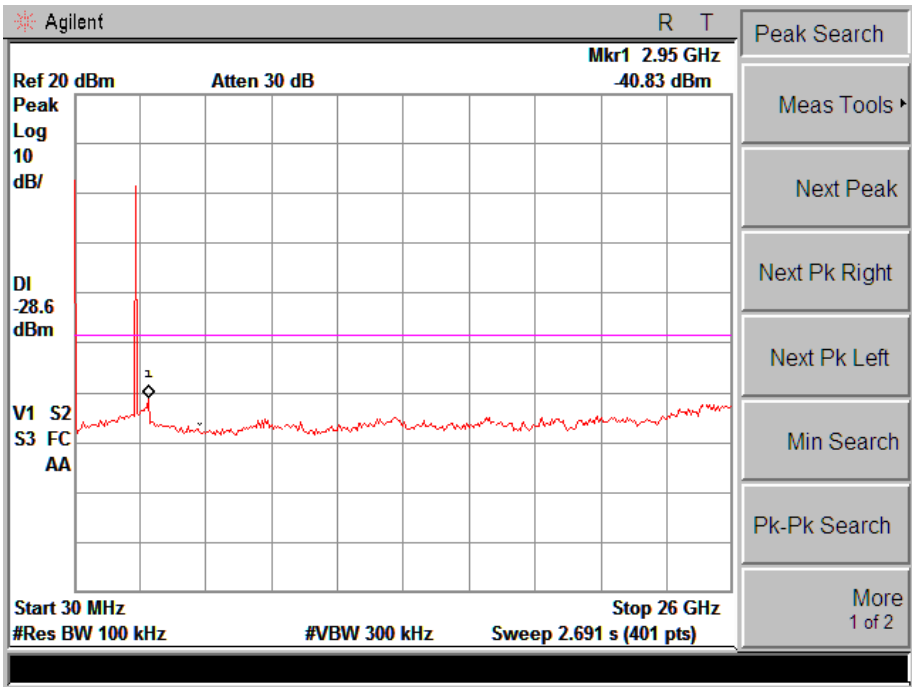
Low Channel


Agilent
R T
Mkr1 2.4132 GHz
Ref 20 dBm
Atten 30 dB
4.282 dBm
Peak
Log
10
dB/
Dl
-25.7
dBm
Start 2.31 GHz
Stop 2.43 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 12.43 ms (401 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.4132 GHz 4.282 dBm
2 (1) Freq 2.4000 GHz -41.41 dBm
Display
Full Screen
Display Line
-25.72 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences

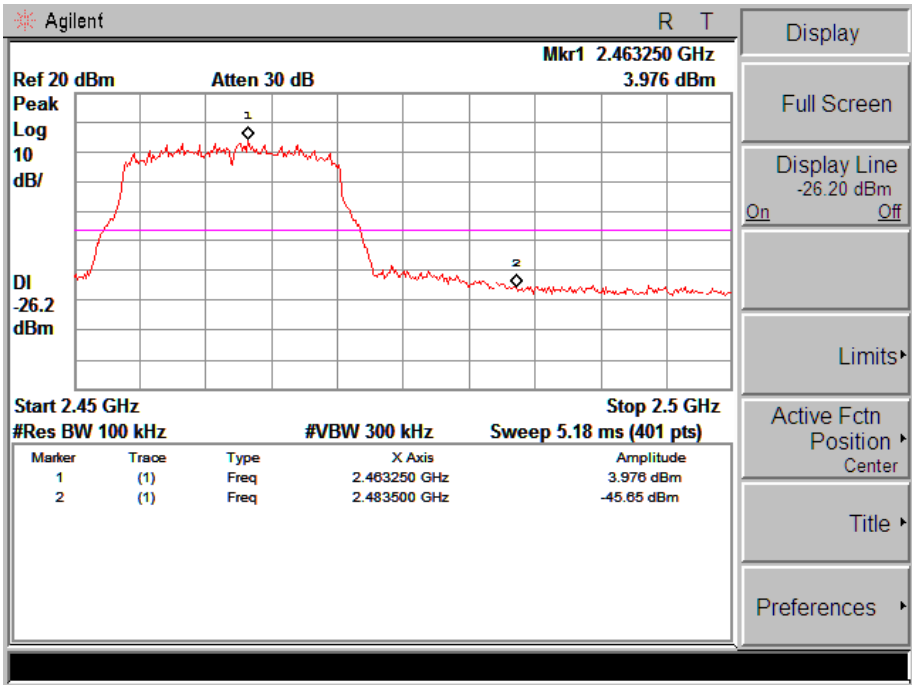

Agilent
R T
Mkr1 2.95 GHz
Ref 20 dBm
Atten 30 dB
-41.92 dBm
Peak
Log
10
dB/
Dl
-28.1
dBm
V1 S2
S3 FC
AA
Start 30 MHz
Stop 26 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.691 s (401 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2

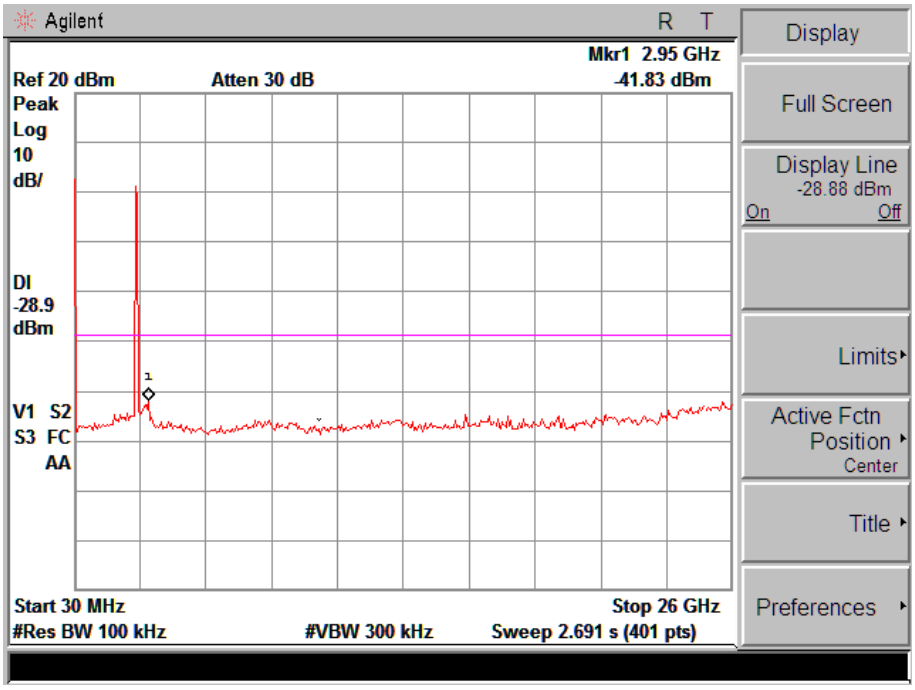
Middle Channel



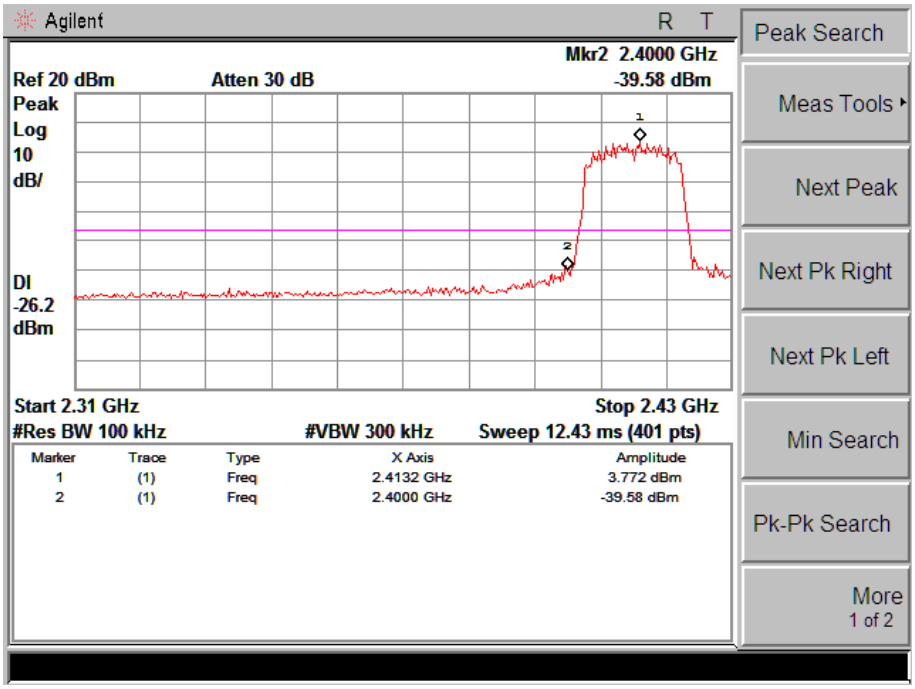


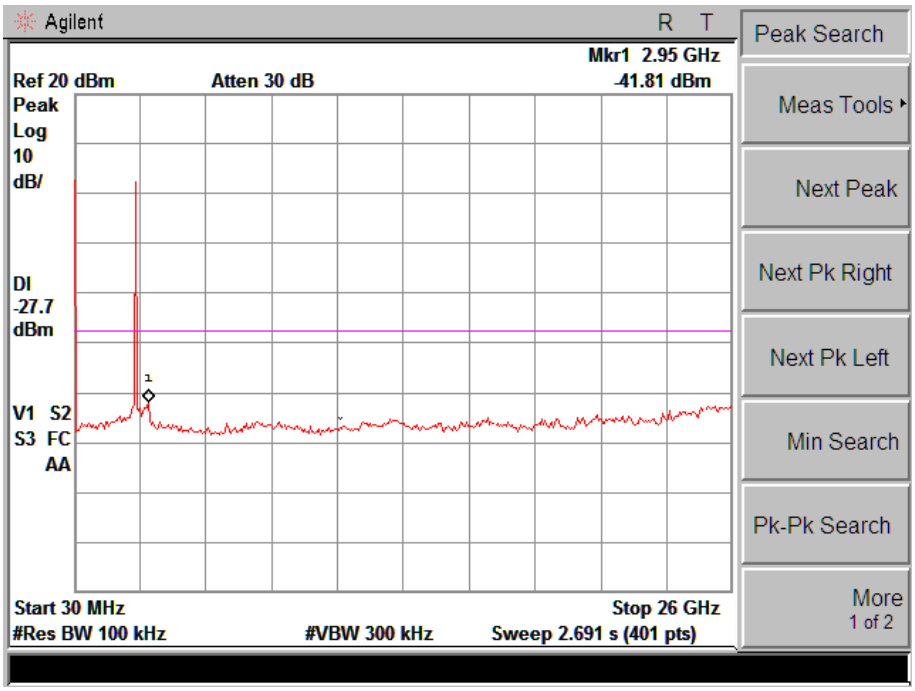
High Channel



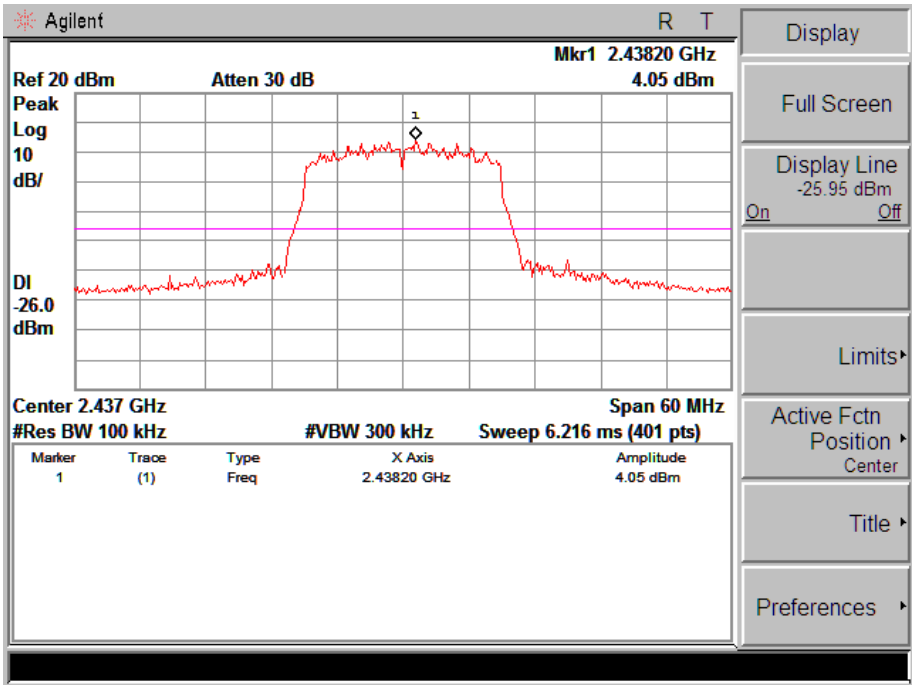


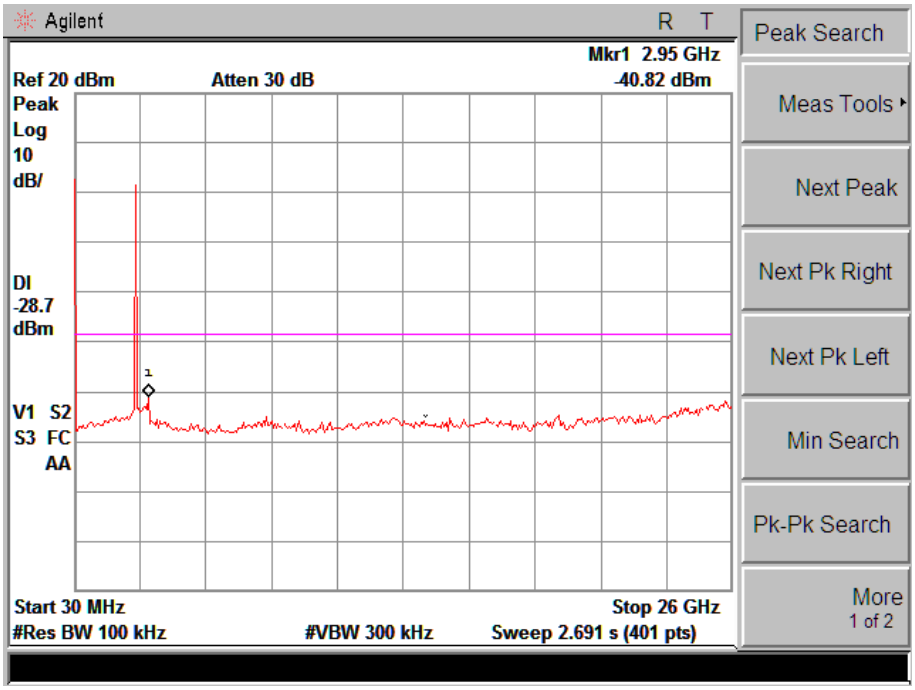
11n-HT20
Low Channel



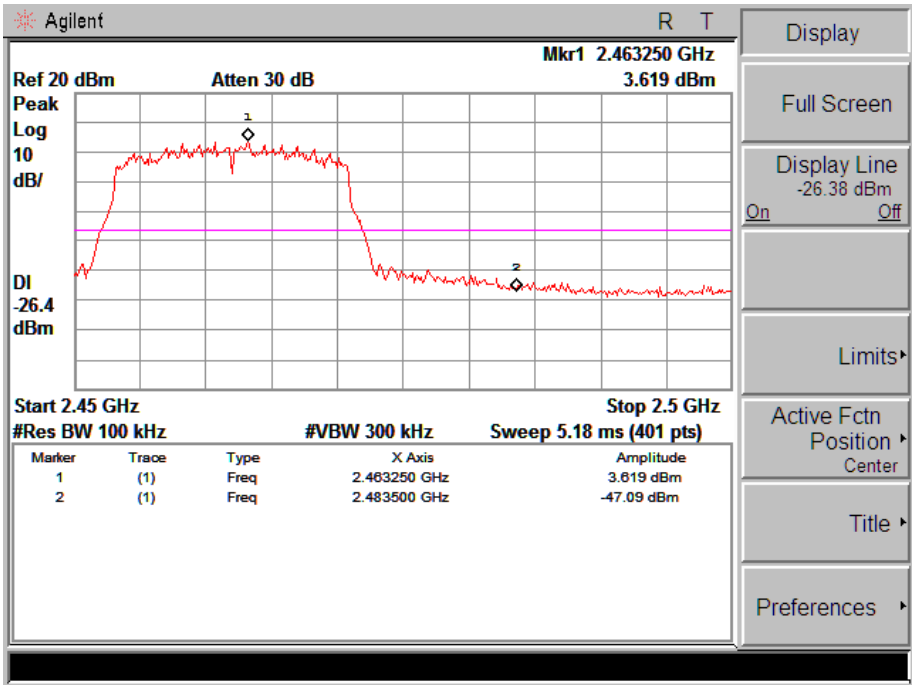


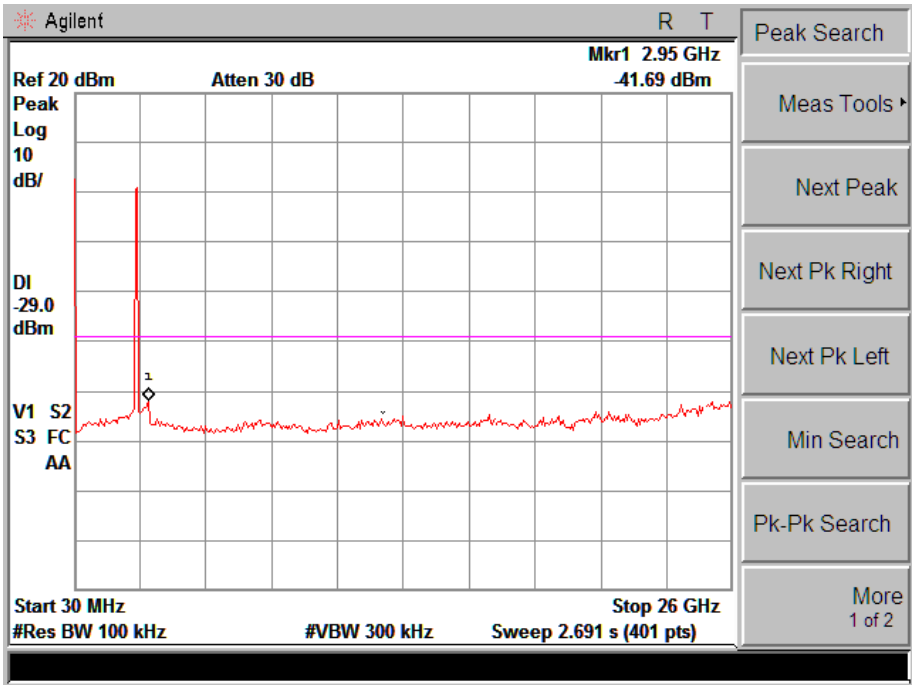
Middle Channel


Agilent
R T
Display
Mkr1 2.43820 GHz
Ref 20 dBm
Atten 30 dB
4.05 dBm
Peak
Log
10
dB/
Full Screen
Display Line
-25.95 dBm
On
Off
DI
-26.0
dBm
Limits
Center 2.437 GHz
Span 60 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 6.216 ms (401 pts)
Active Fctn
Position
Center
Marker
Trace
Type
X Axis
Amplitude
1
(1)
Freq
2.43820 GHz
4.05 dBm
Title
Preferences

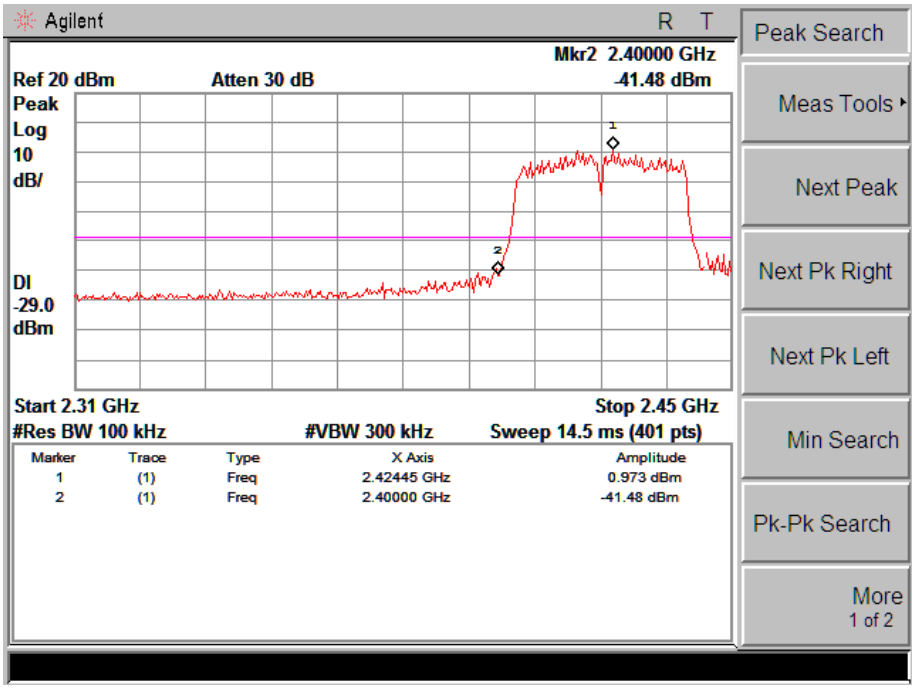

Agilent
R T
Peak Search
Mkr1 2.95 GHz
Ref 20 dBm
Atten 30 dB
-40.82 dBm
Peak
Log
10
dB/
Meas Tools
Next Peak
Next Pk Right
DI
-28.7
dBm
Next Pk Left
V1 S2
S3 FC
AA
Min Search
Pk-Pk Search
Start 30 MHz
Stop 26 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.691 s (401 pts)
More
1 of 2

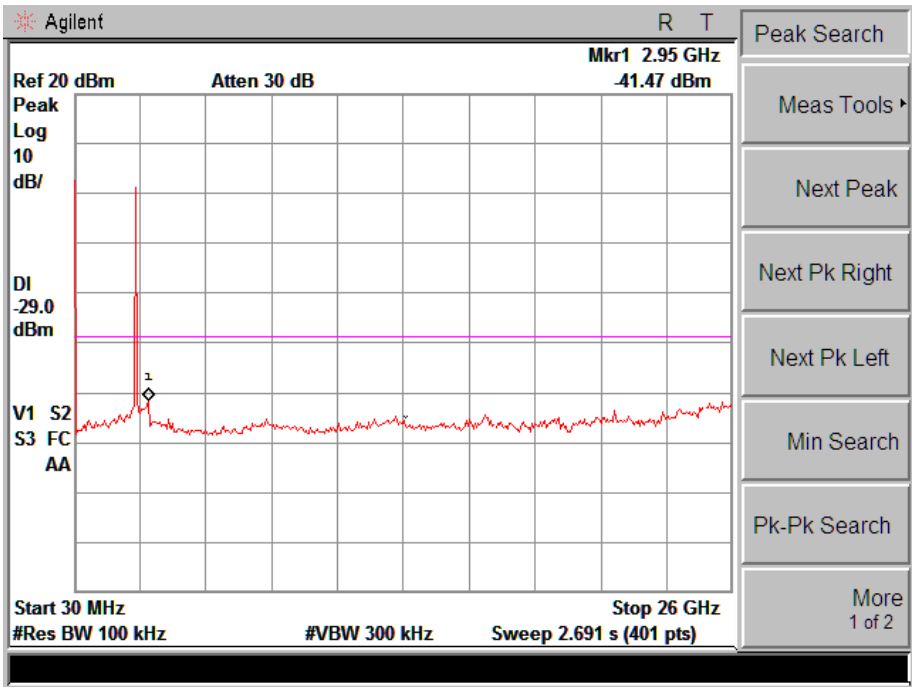
High Channel



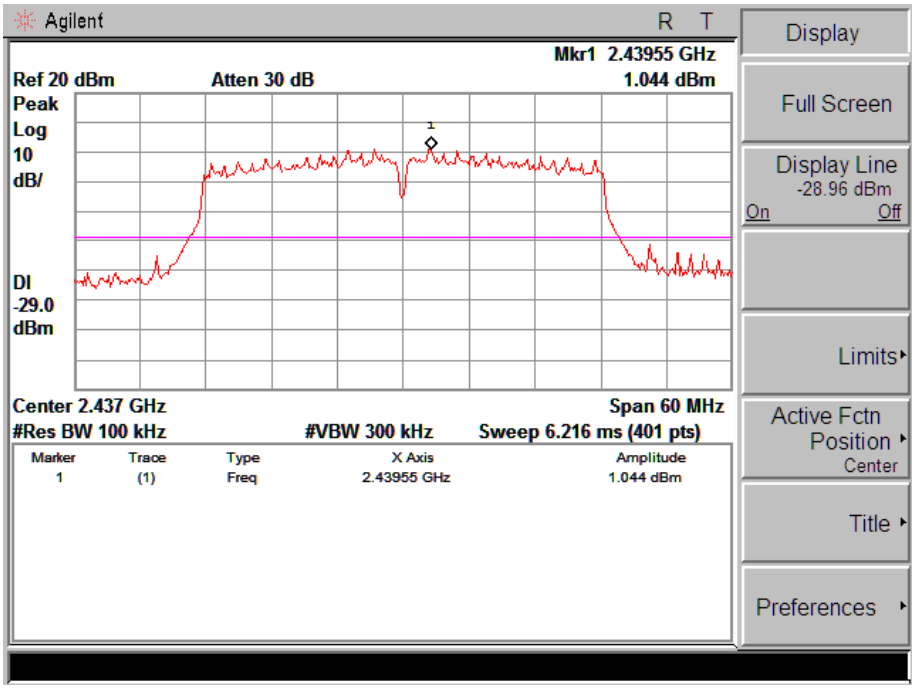


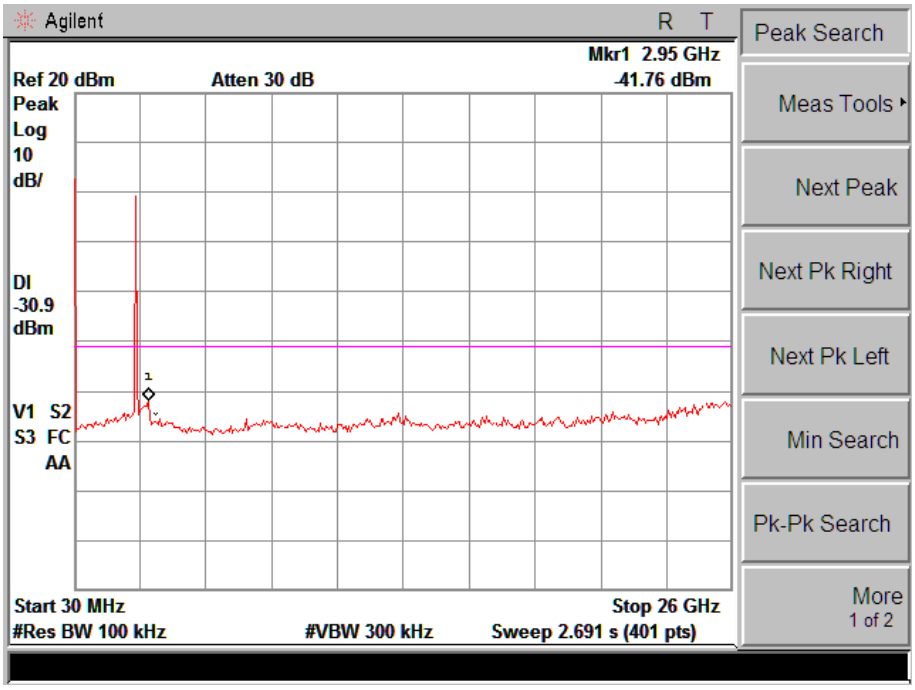
11n-HT40
Low Channel



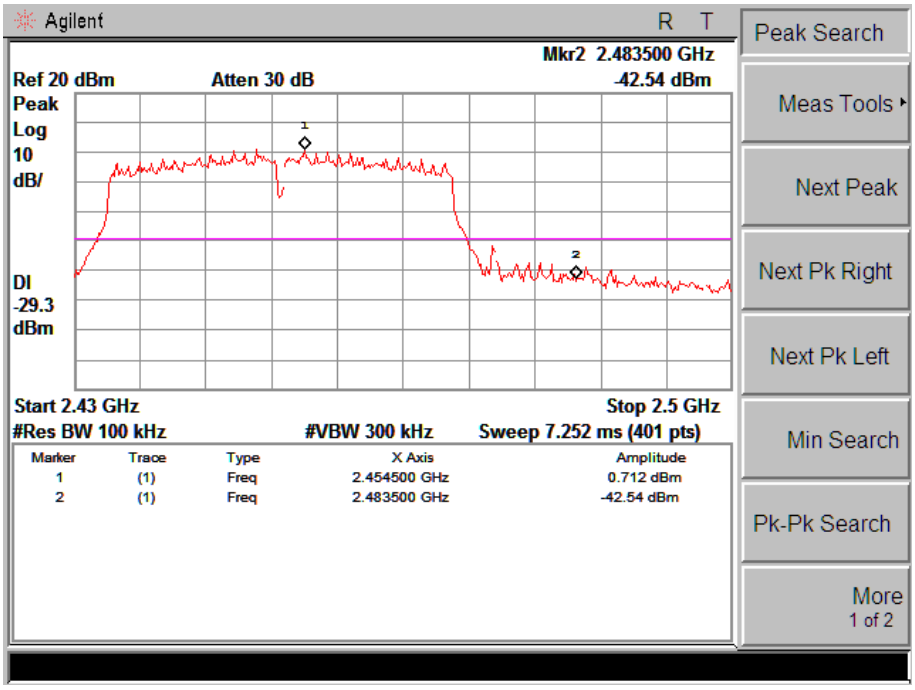


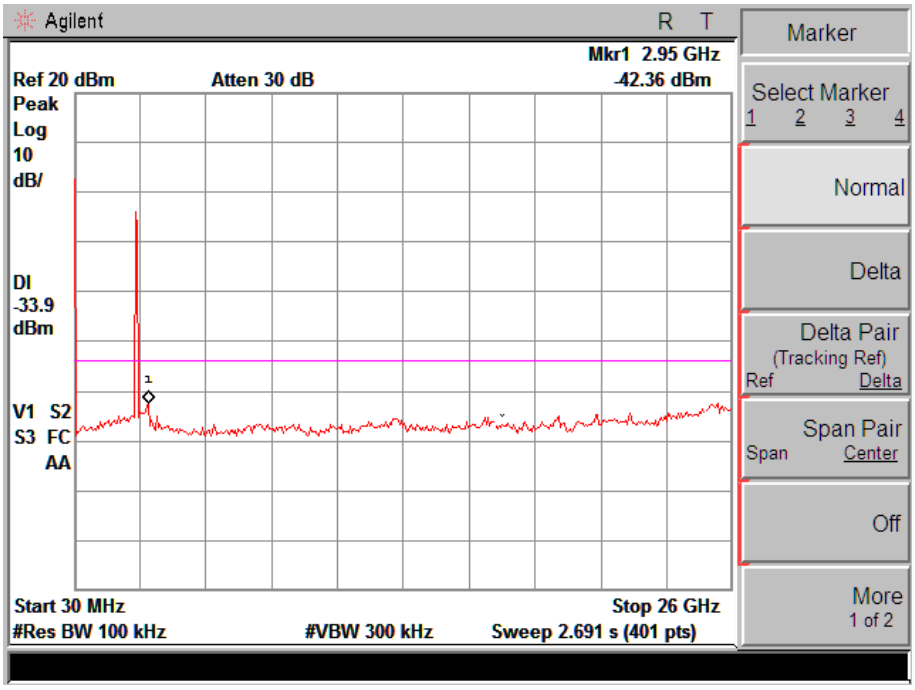
Middle Channel





High Channel

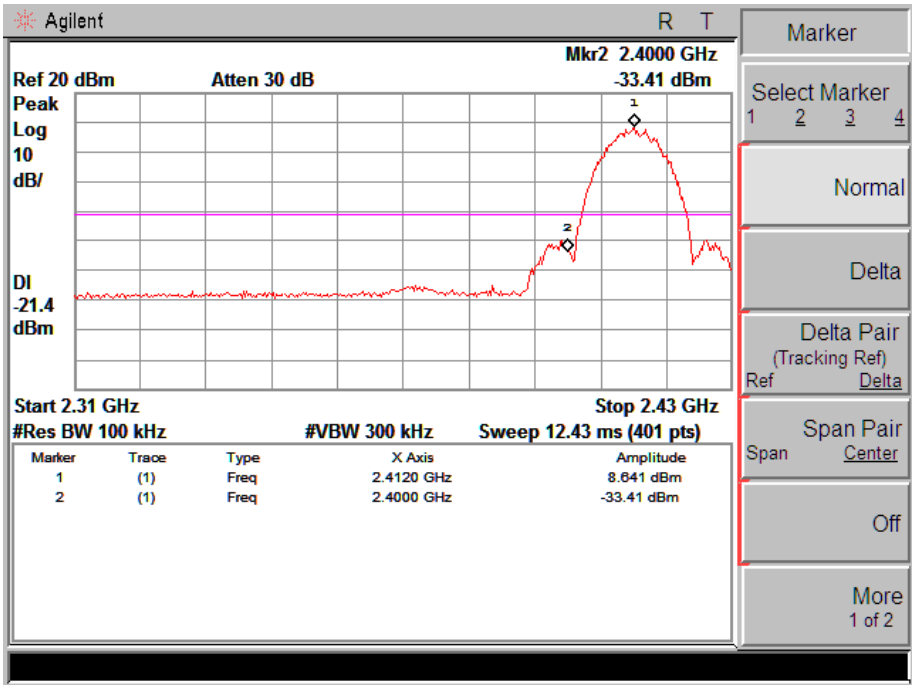


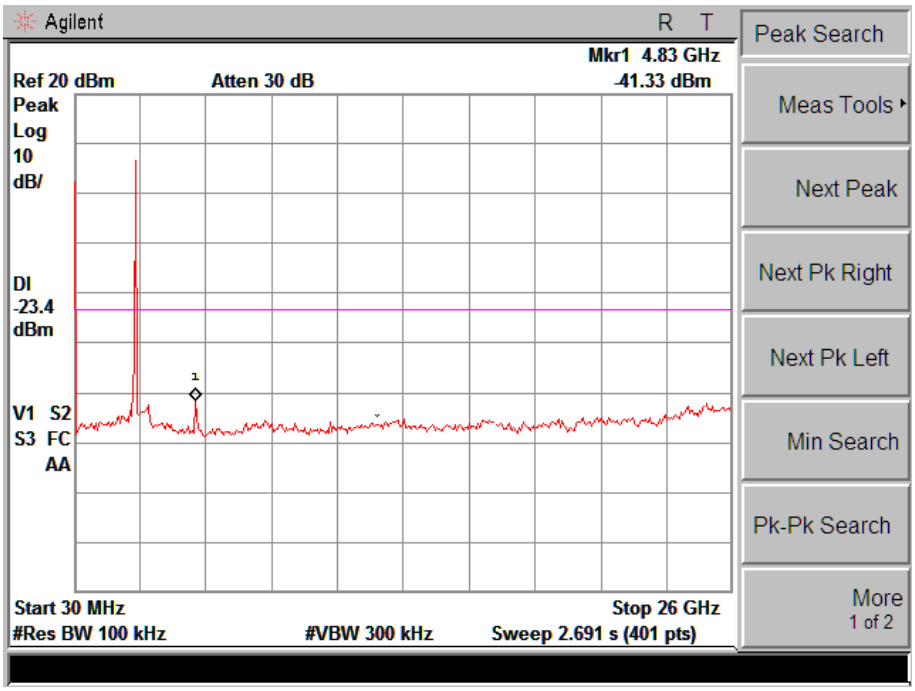


Antenna 2

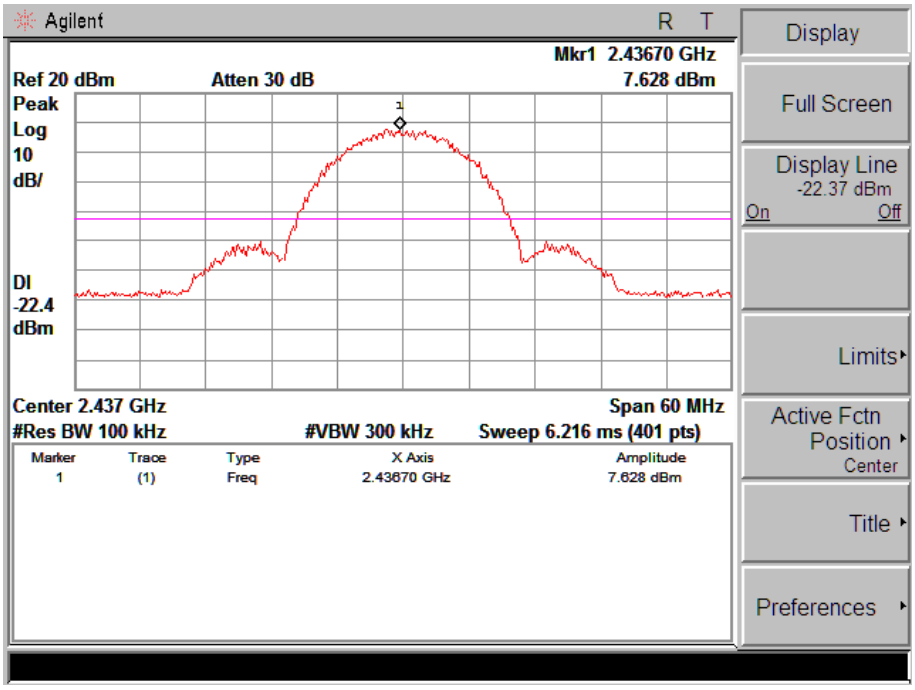
802.11b

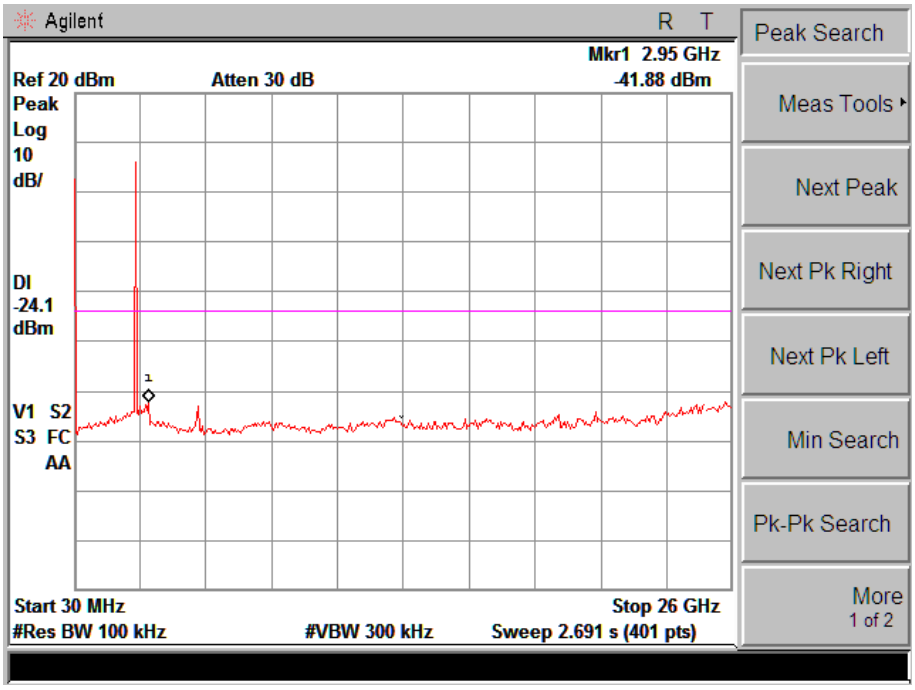
Low Channel



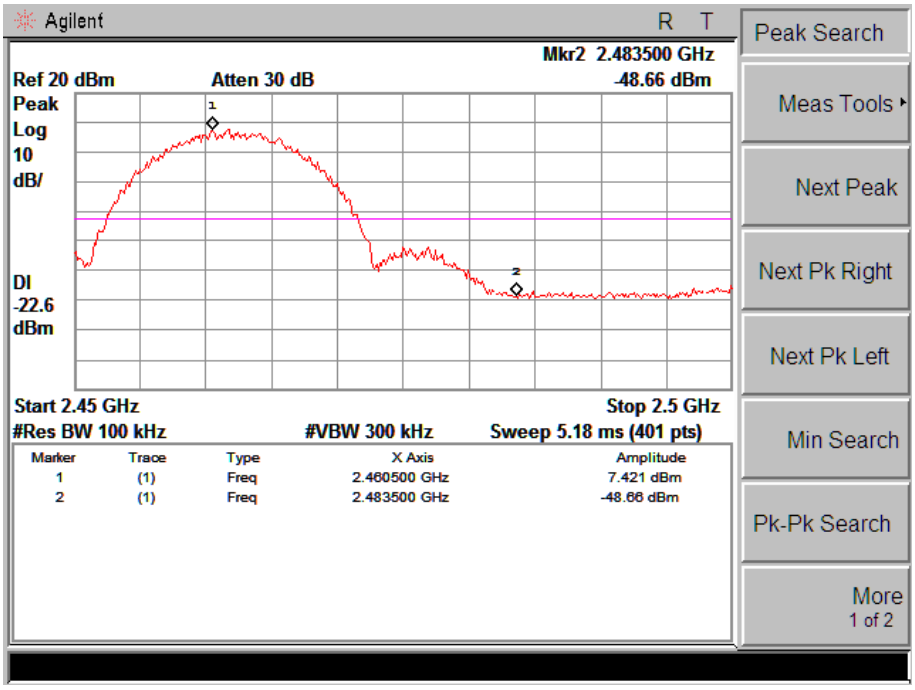


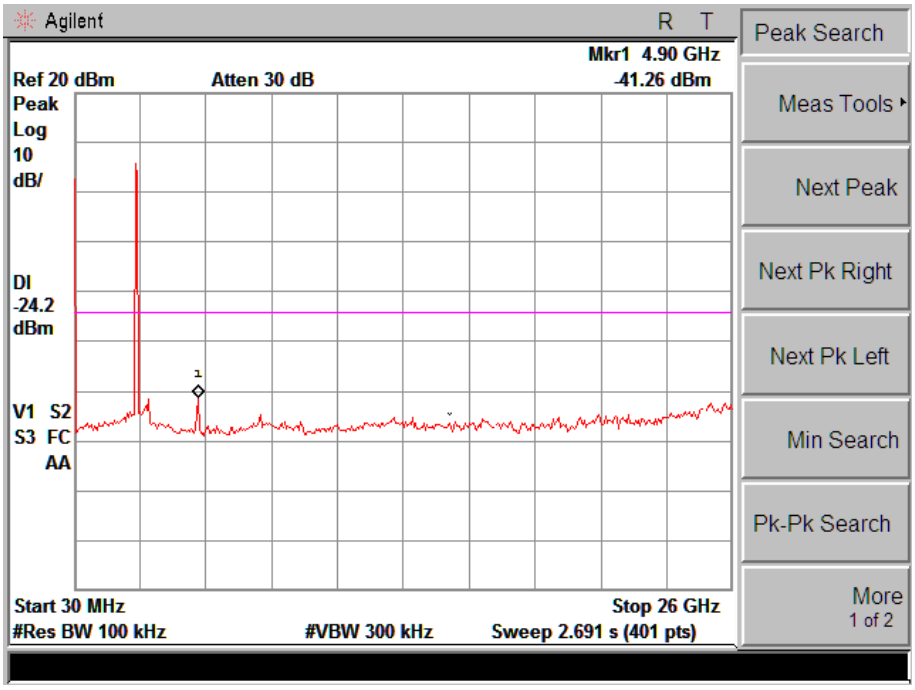
Middle Channel



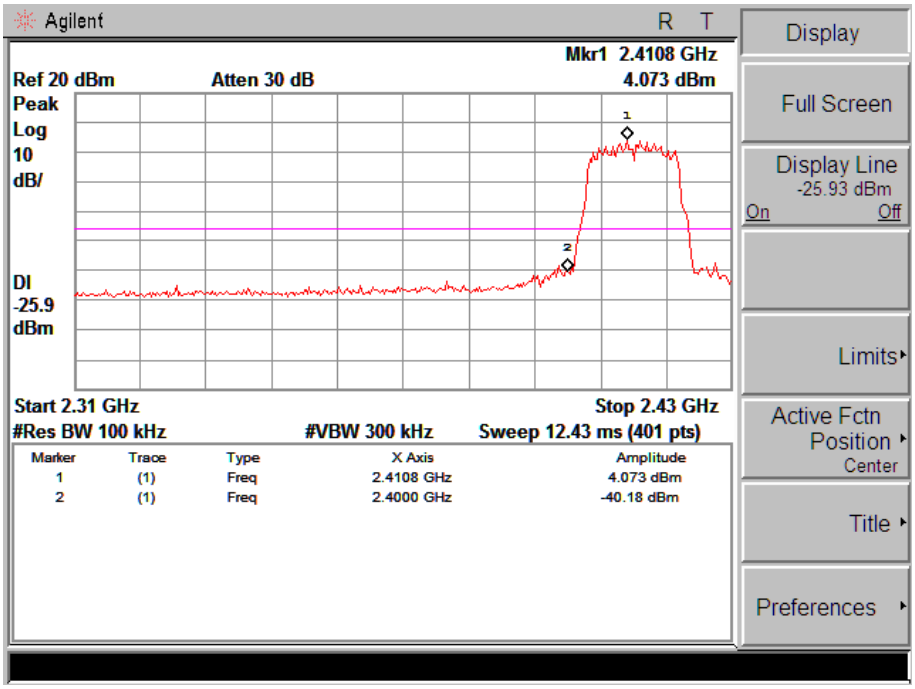


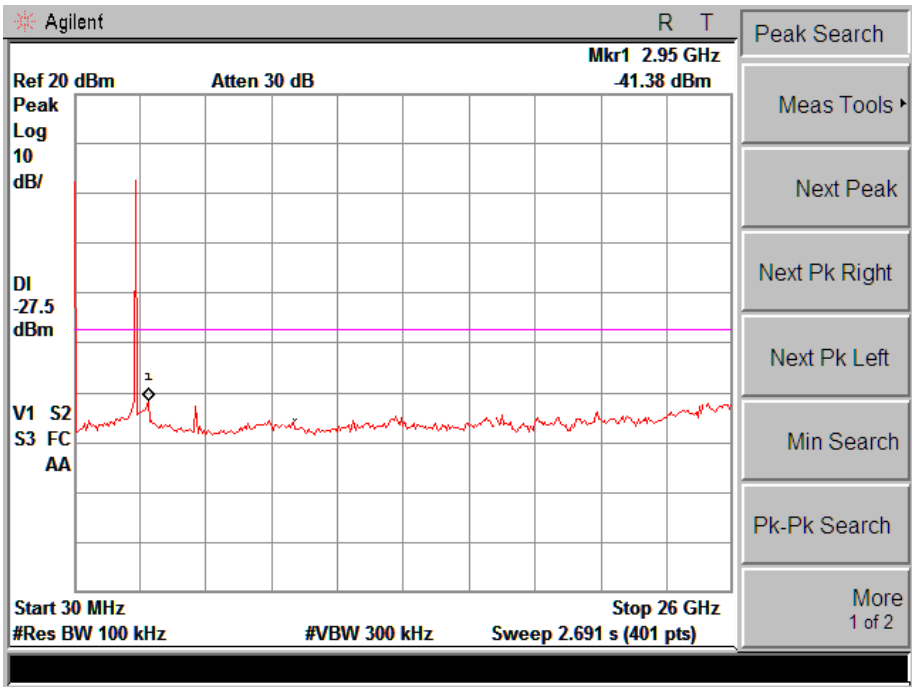
High Channel



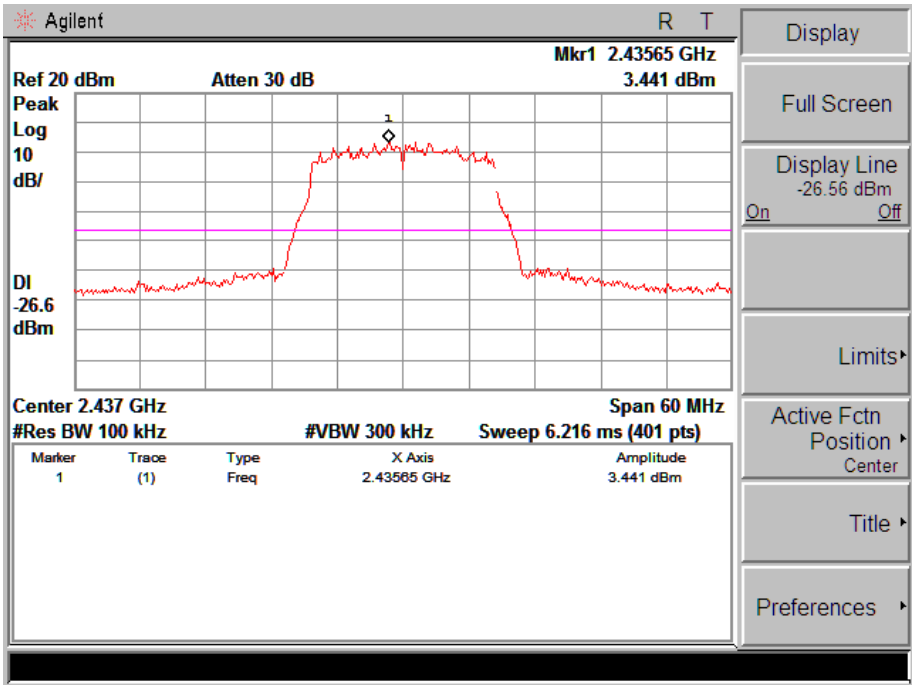


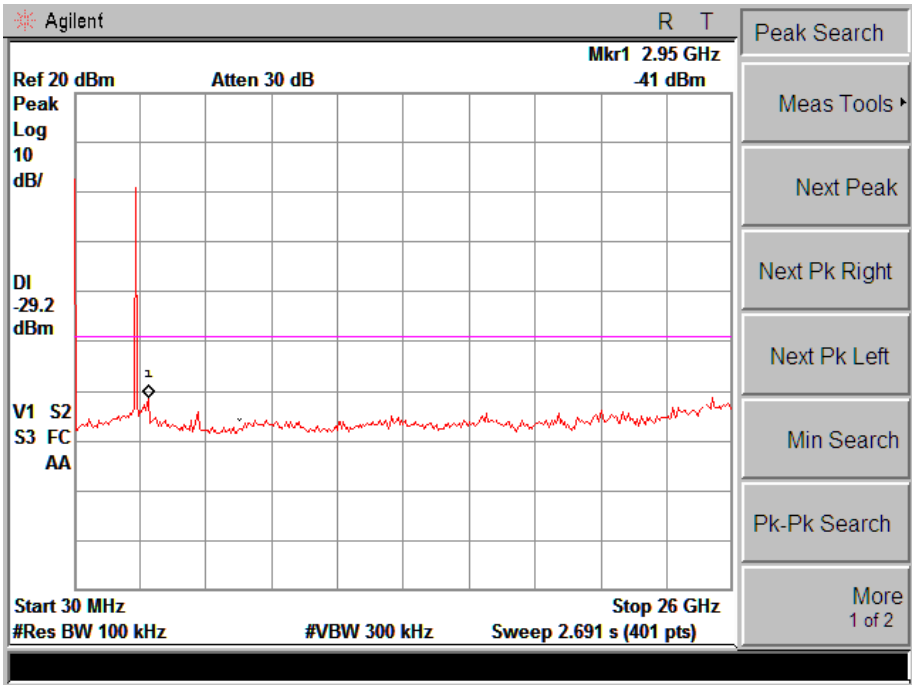
802.11g
Low Channel



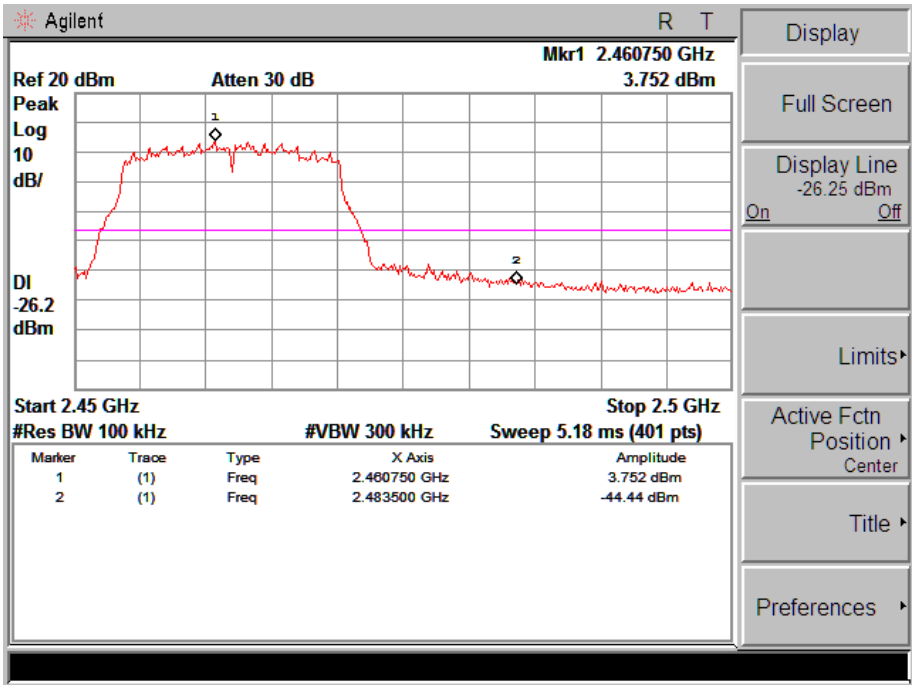


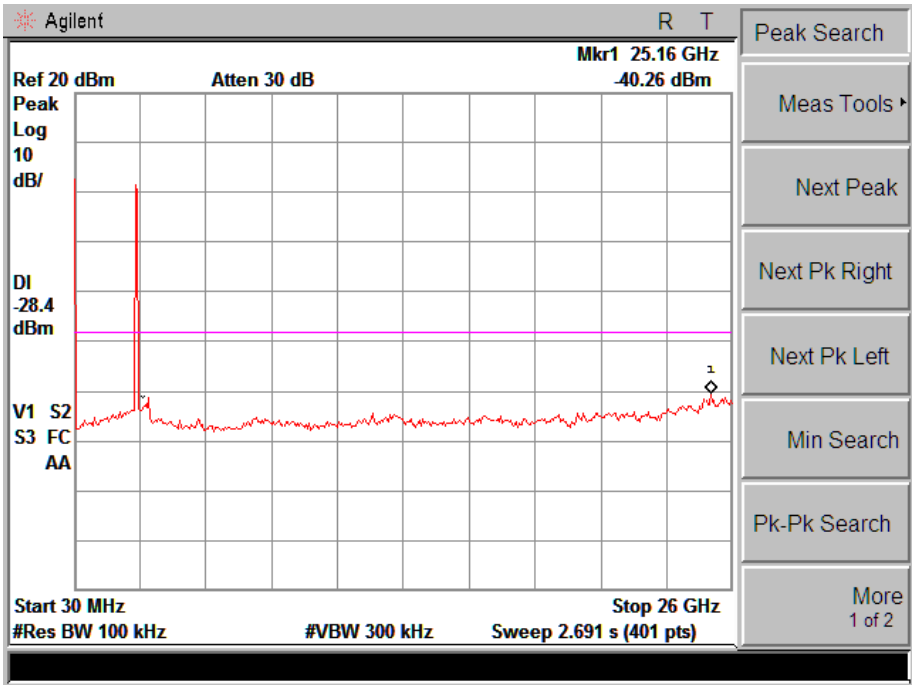
Middle Channel



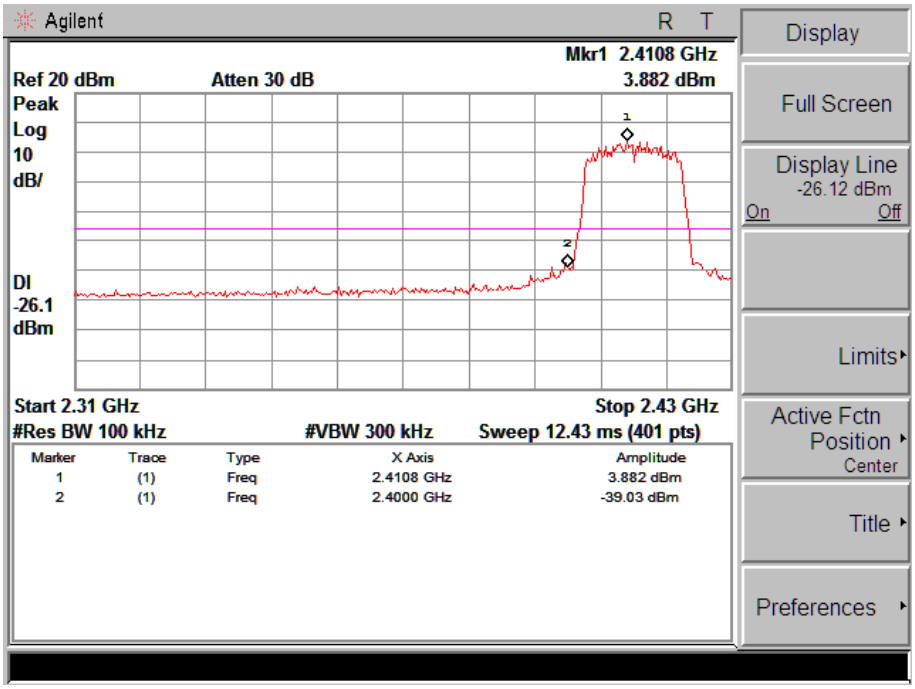


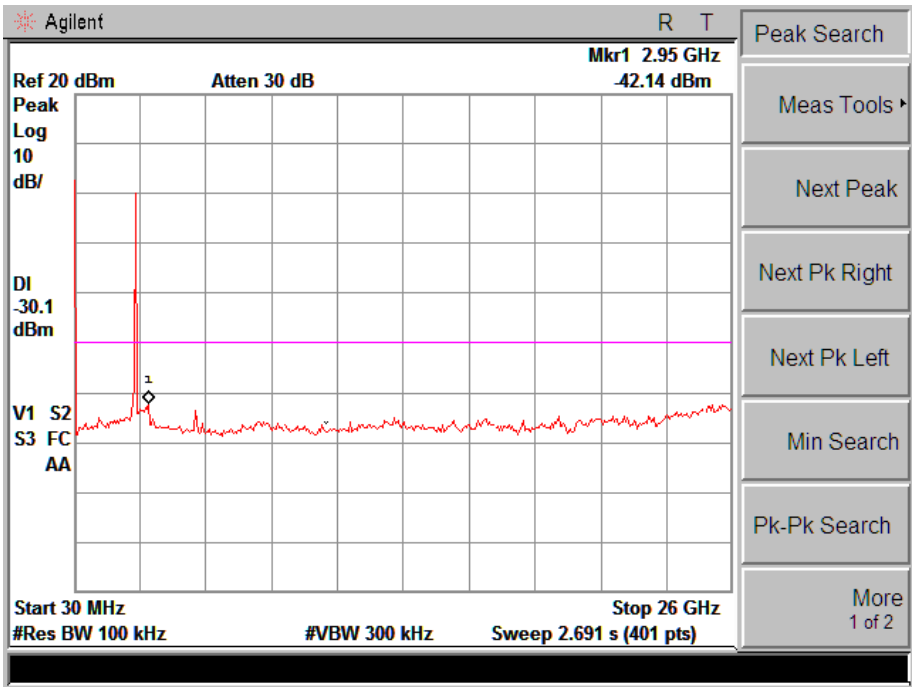
High Channel



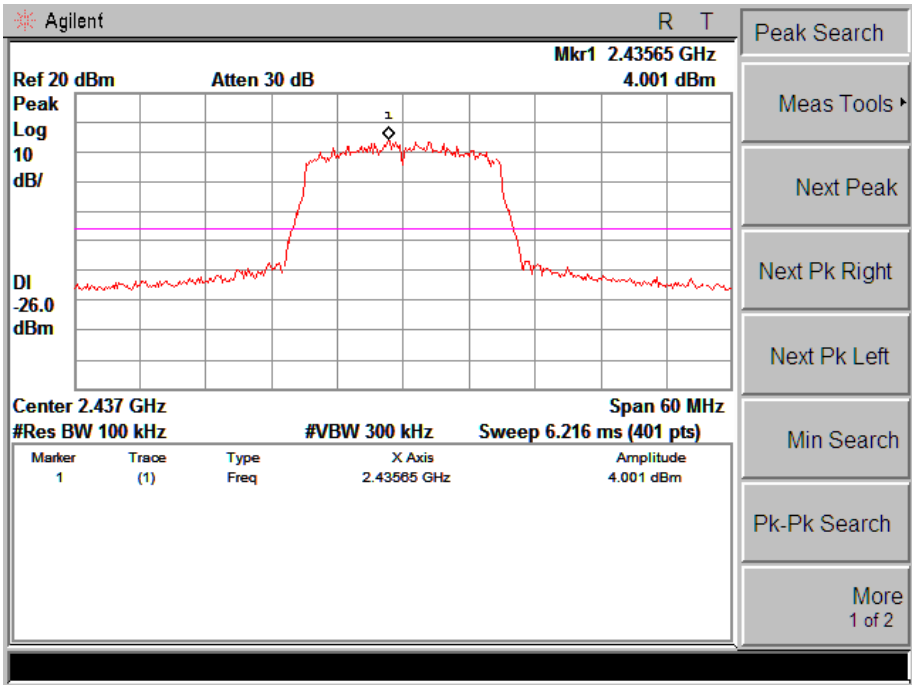


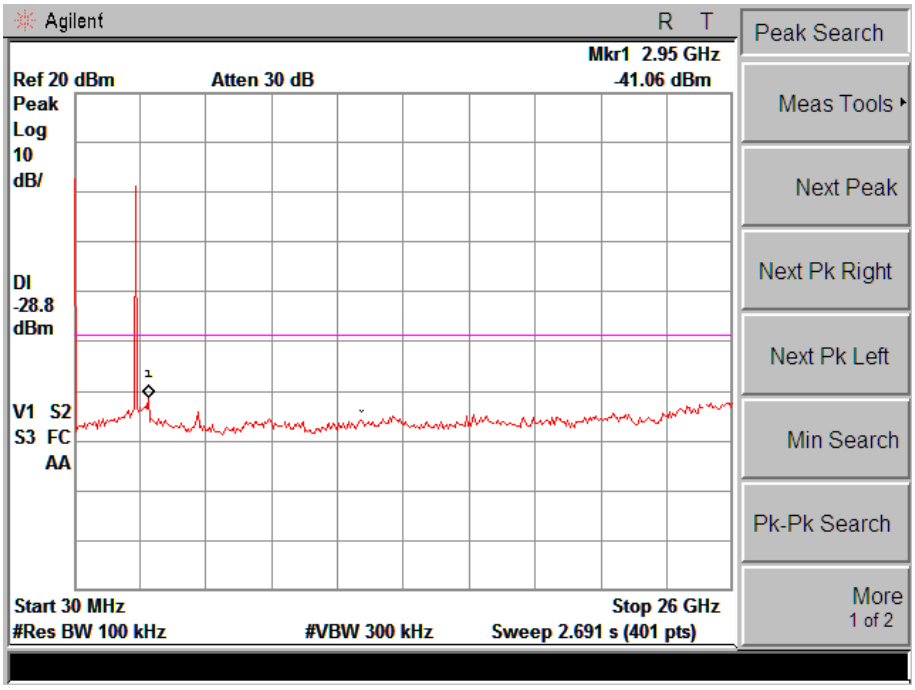
11n-HT20
Low Channel



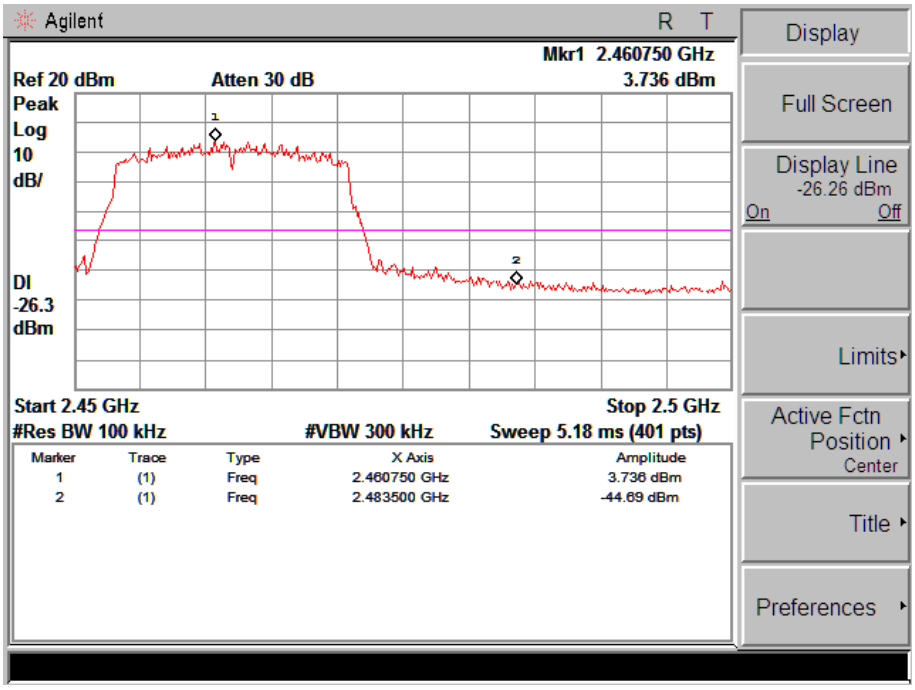


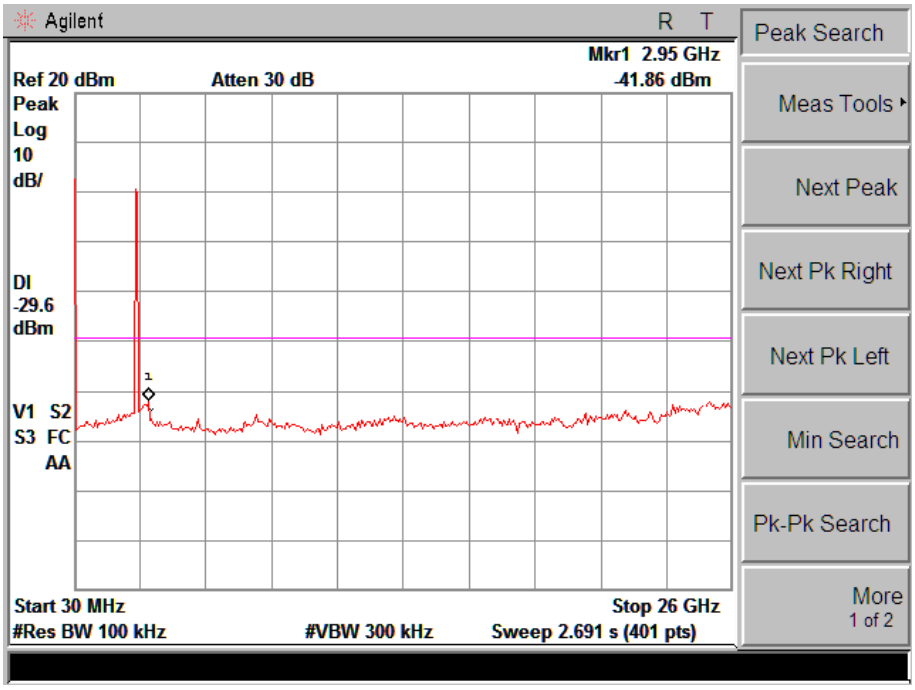
Middle Channel



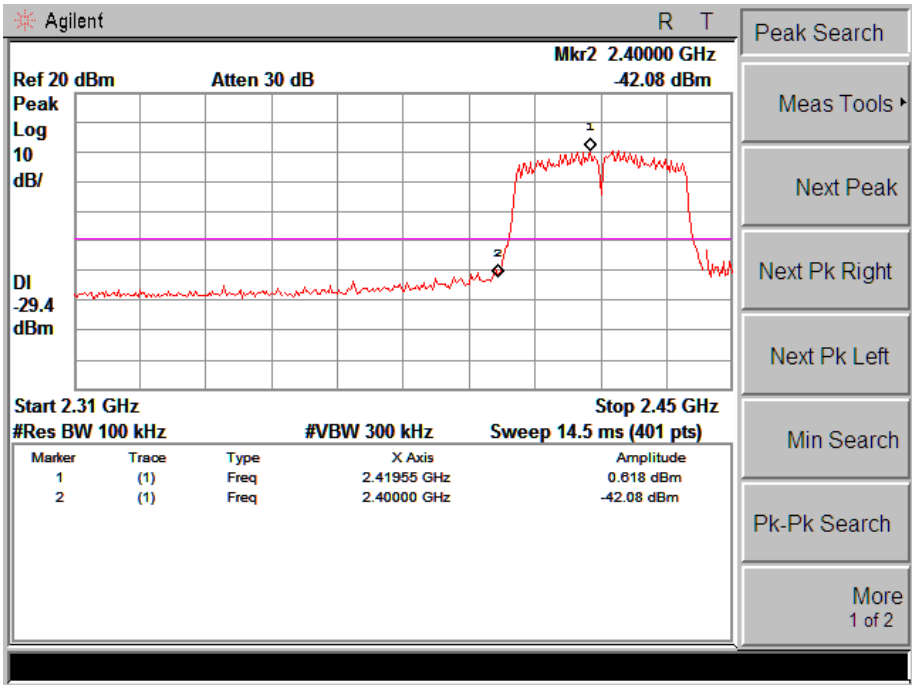


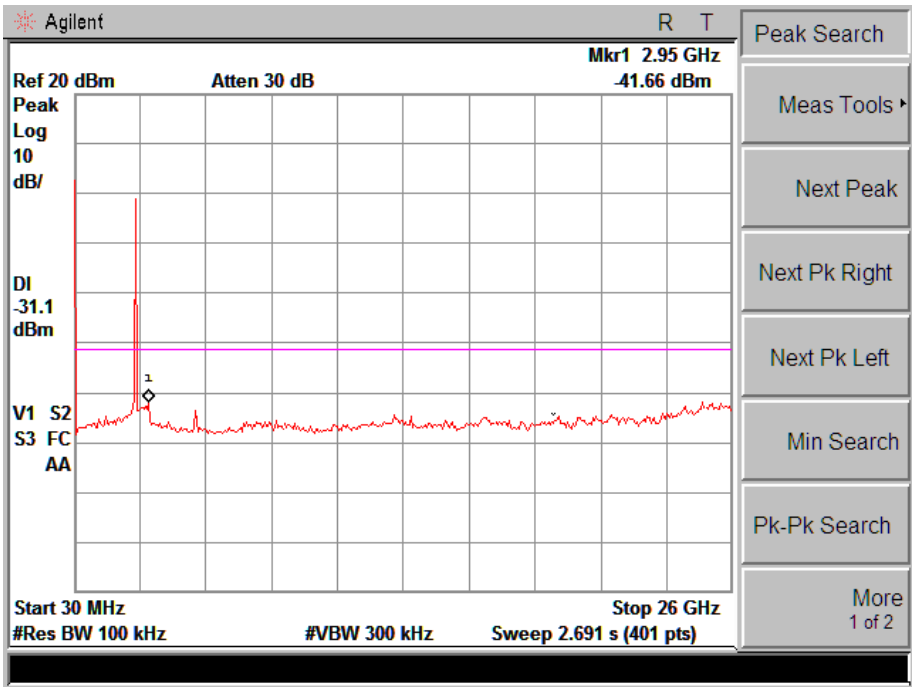
High Channel



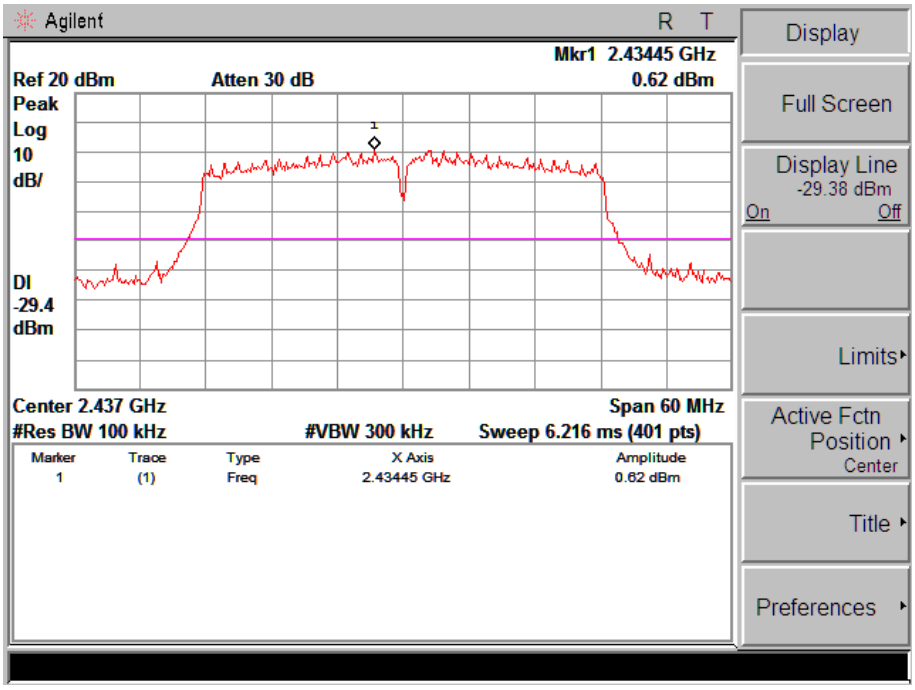


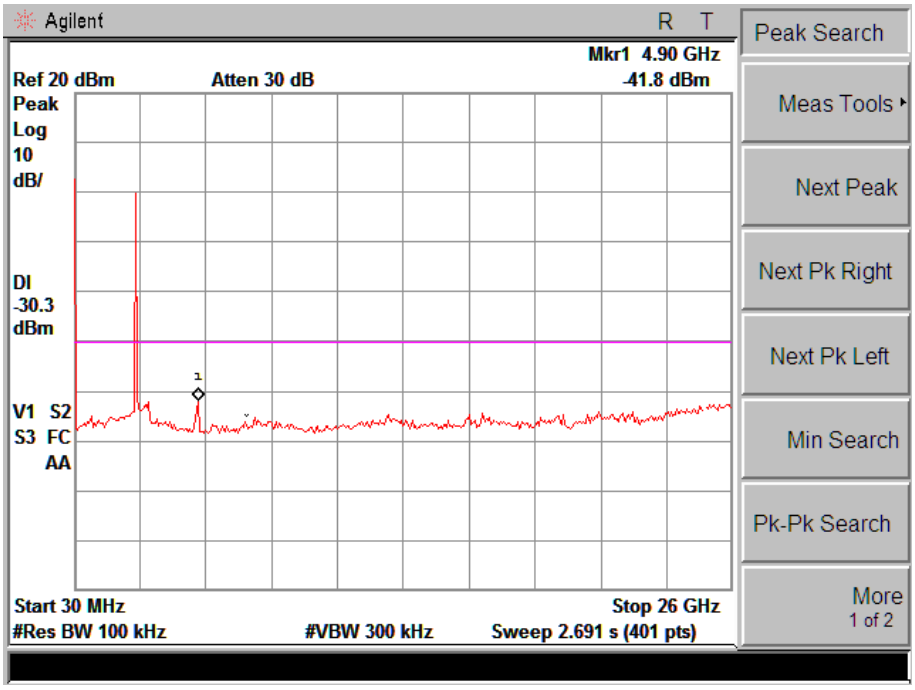
11n-HT40
Low Channel



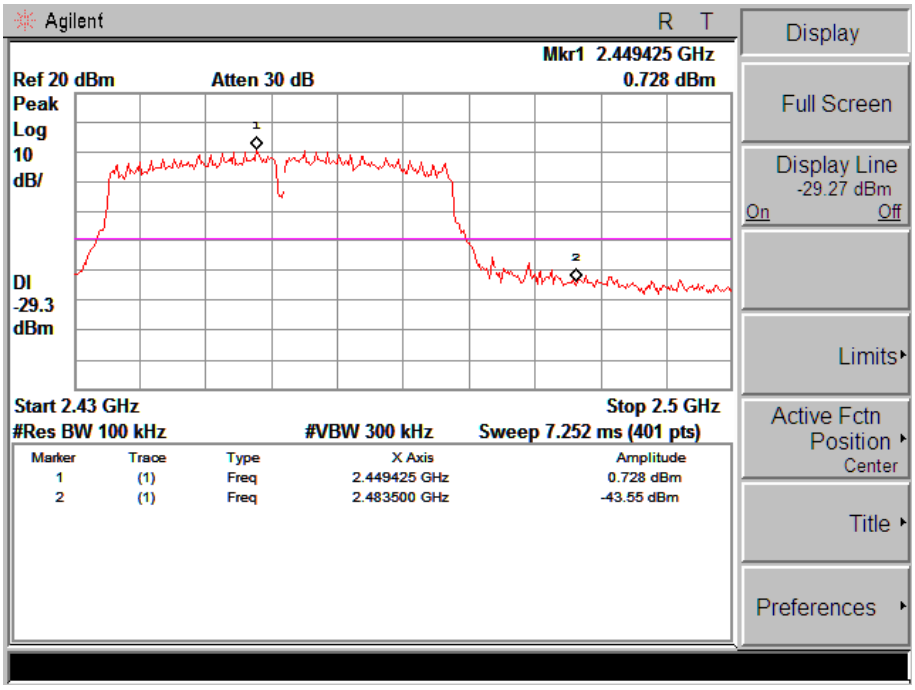


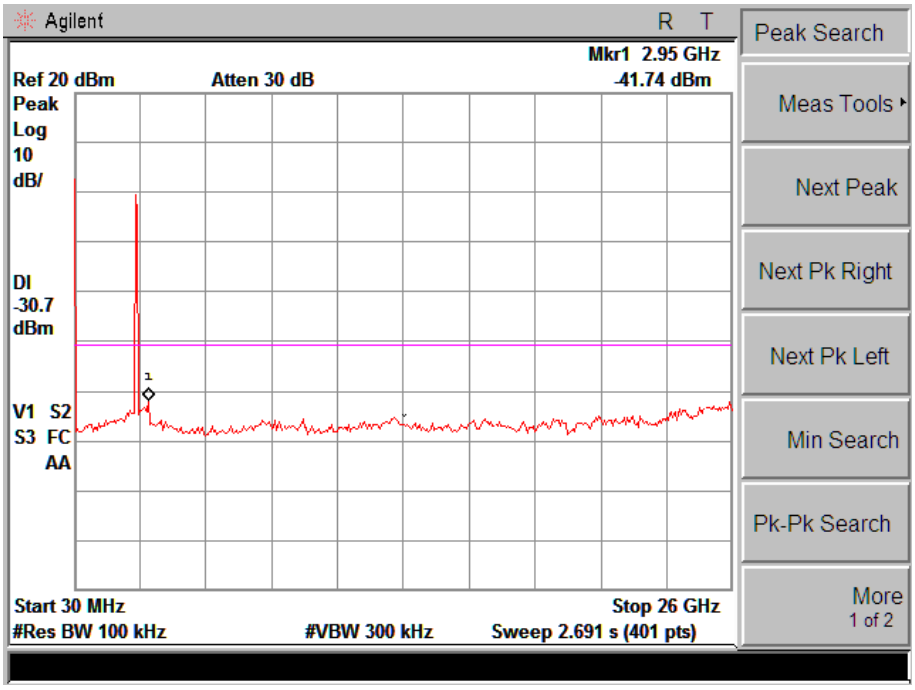
Middle Channel





High Channel





10. Conducted Emissions

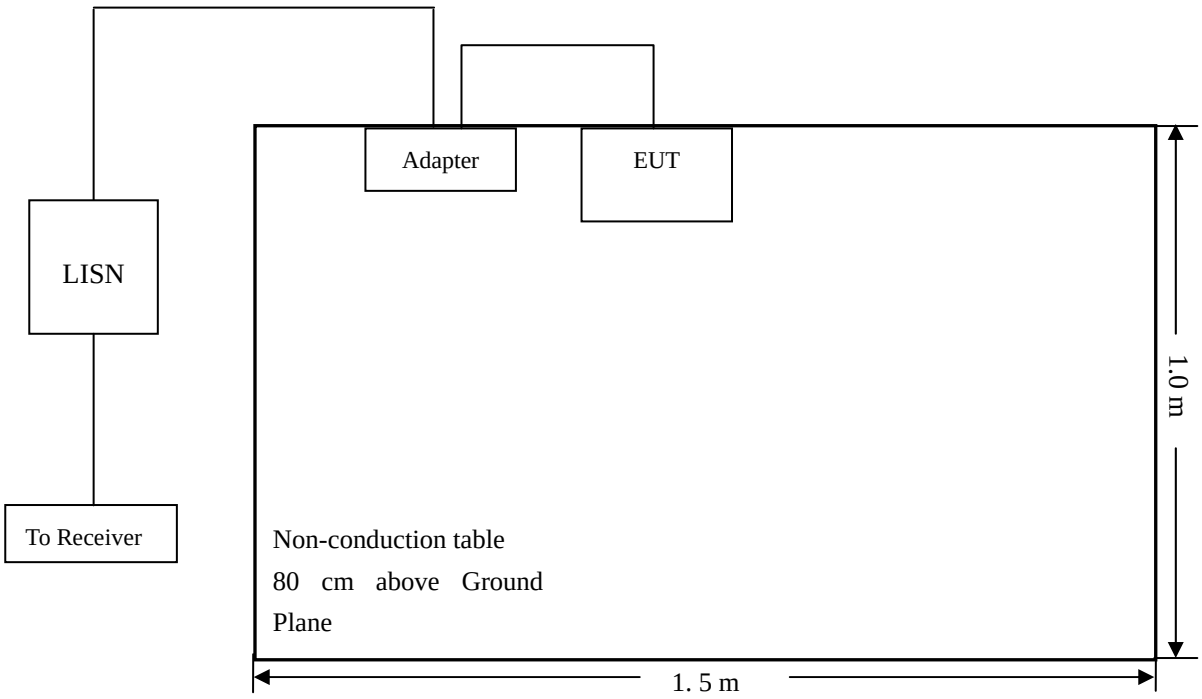
10.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

10.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.

10.3 Basic Test Setup Block Diagram



10.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

10.5 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency .....150 kHz
Stop Frequency .....30 MHz
Sweep Speed .....Auto
IF Bandwidth.....10 kHz
Quasi-Peak Adapter Bandwidth.....9 kHz
Quasi-Peak Adapter Mode.....Normal

10.6 Summary of Test Results/Plots

According to the data in section 10.7, the EUT complied with the FCC Part 15.207 Conducted margin for this device, with the *worst* margin:

10.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

EUT: 60” SMART 4K UHD TV

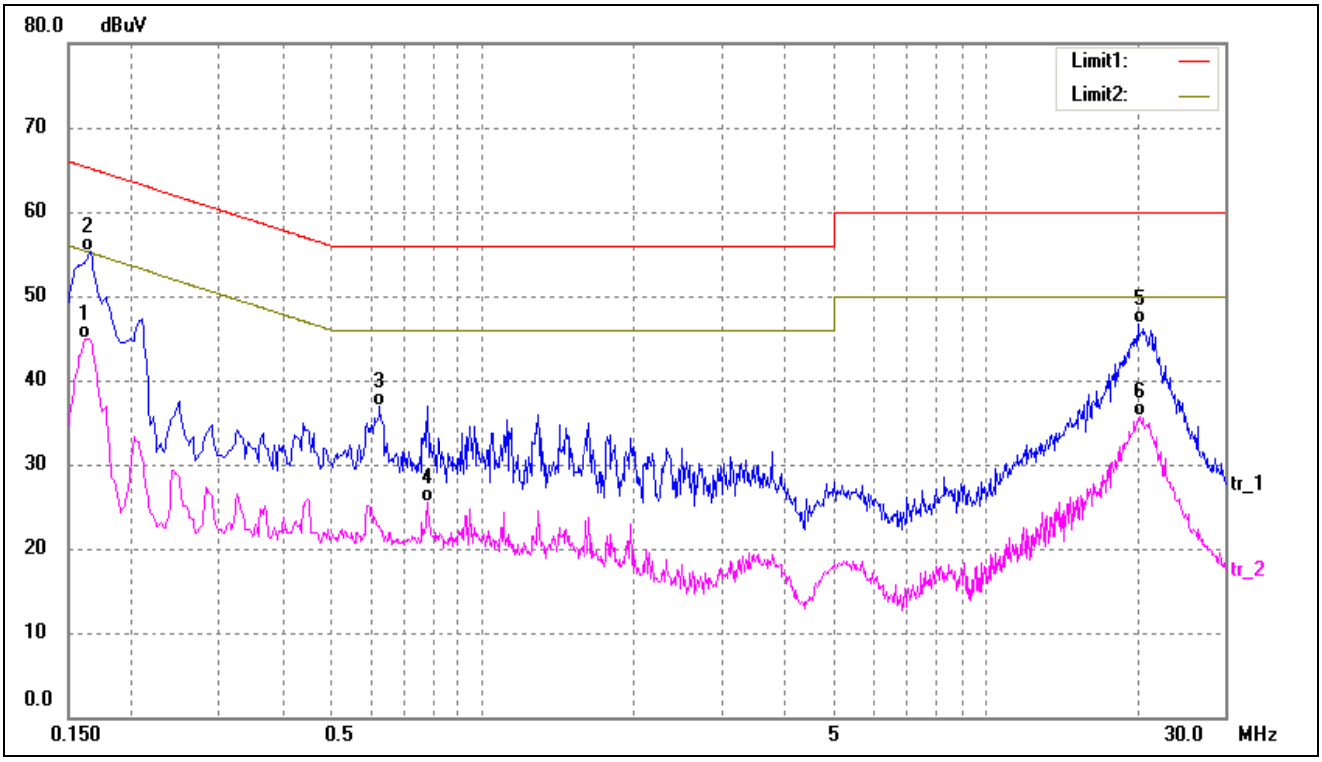
D60A114-U-A-I RNSMU6036

Tested Model: *XXXXXXXXXXXXXXXX60XXXXXXXXXX (Where "X"can be any alphanumeric of a-z, A-Z or 0-9 or blank &"-".)*

Operating Condition: Transmitting

Comment: AC 120V/60Hz

Test Specification: Neutral



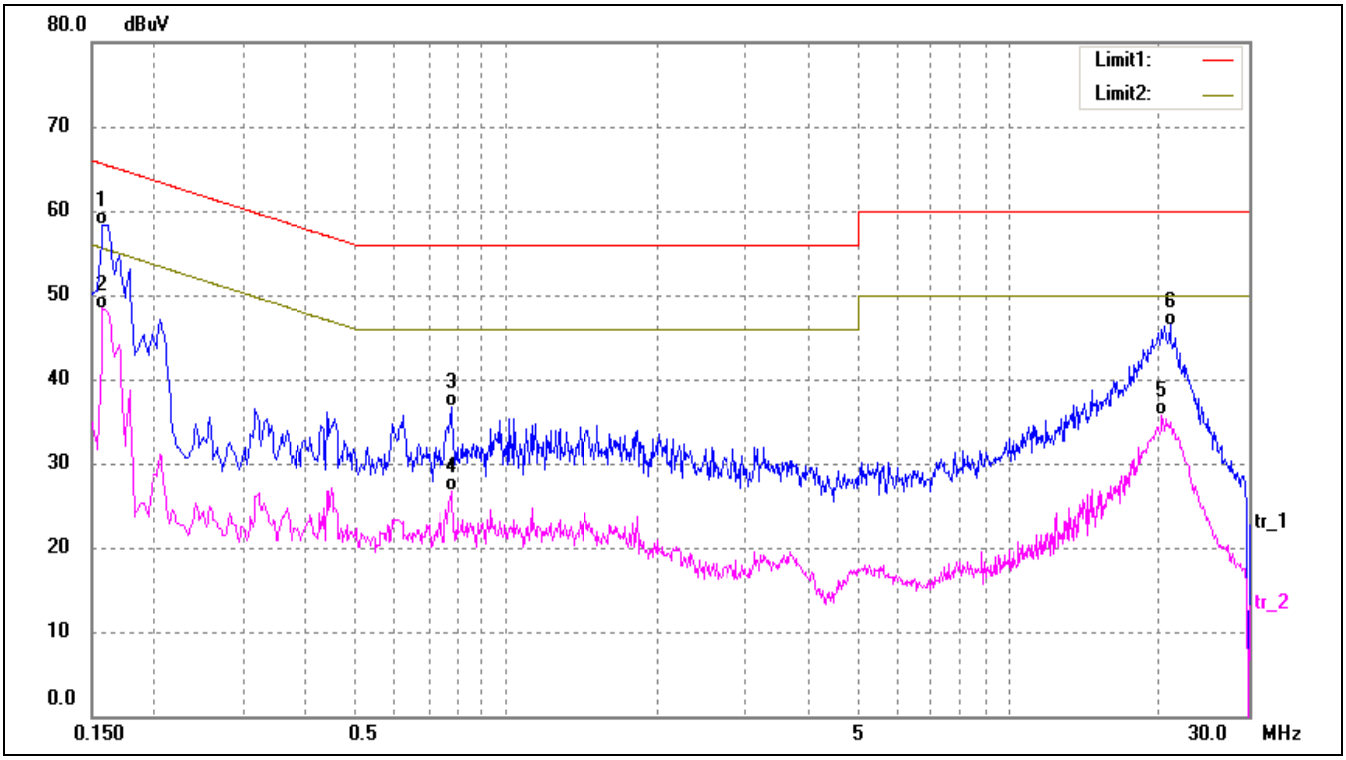
No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.1620	34.85	10.10	44.95	55.36	-10.41	AVG
2*	0.1660	45.21	10.11	55.32	65.16	-9.84	QP
3	0.6260	26.64	10.35	36.99	56.00	-19.01	QP
4	0.7780	15.04	10.42	25.46	46.00	-20.54	AVG
5	20.1220	35.60	11.17	46.77	60.00	-13.23	QP
6	20.3700	24.51	11.17	35.68	50.00	-14.32	AVG

Note:

1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz), Step size: 4 kHz, Scan time: auto.

XXXXXXXXXXXXXXXX60XXXXXXXXXX
(Where "X"can be any alphanumeric of a-z, A-Z or 0-9 or blank &"-".)

Operating Condition: Transmitting
Comment: AC 120V/60Hz
Test Specification: Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.1580	48.12	10.10	58.22	65.57	-7.35	QP
2*	0.1580	38.30	10.10	48.40	55.57	-7.17	AVG
3	0.7820	26.29	10.42	36.71	56.00	-19.29	QP
4	0.7820	16.22	10.42	26.64	46.00	-19.36	AVG
5	20.2340	24.59	11.17	35.76	50.00	-14.24	AVG
6	21.0260	35.22	11.18	46.40	60.00	-13.60	QP

Note:
1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz), Step size: 4 kHz, Scan time: auto.

******* END OF REPORT *******