RF TEST REPORT

Test item	:	WI-FI Modue
Model No.	:	TWFM-L303D-F
Order No.	:	DEMC1212-02729
Date of receipt	:	2012-12-03
Test duration	:	2012-12-17 ~ 2012-12-28
Date of issue	:	2013-01-10
Use of report	:	FCC Original Grant

Applicant : LG Innotek Co., Ltd.
#978-1, Jangduk-dong,Gwangsan-gu, Gwangju, 506-731, Korea

Test laboratory : Digital EMC Co., Ltd.
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Kyunggi-Do, 449-080, Korea

Test specification	:	FCC Part 15 Subpart C 247 ANSI C63.10-2009, KDB558074
Test environment	:	See appended test report
Test result	:	☒ Pass ☐ Fail

Tested by:	Witnessed by:	Reviewed by:
Engineer JaeJin Lee	N/A	Deputy General Manager WonJung Lee

Test Report Version

Test Report No.	Date	Description
DRTFCC1301-0009	Jan. 10, 2013	Final version for approval

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1. GENERAL INFORMATION

Applicant	:	LG Innotek Co., Ltd.
Address	:	#978-1, Jangduk-dong,Gwangsan-gu, Gwangju, 506-731, Korea
FCC ID	:	YZP-TWFML303D
EUT	:	WI-FI Modue
Model	:	TWFM-L303D-F
Additional Model(s)	:	N/A
Data ofTest	:	2012-12-17 ~ 2012-12-28
Contact person	:	DukSuOh

2. EUT DESCRIPTION

Product	WI-FI Modue
Model Name	TWFM-L303D-F
Power Supply	DC 3.3V
Frequency Range	802.11b/g/n(20MHz): 2412 ~ 2462 MHz 802.11n(40MHz): 2422~2452 MHz
Max. RF Output Power	2.4GHz Band ▪ 802.11b: 14.60dBm ▪ 802.11g: 21.32dBm ▪ 802.11n (HT20): 20.86dBm ▪ 802.11n (HT40): 20.85dBm
Modulation Type	802.11b: DSSS/CCK 802.11g/n(HT20/HT40): OFDM
Antenna Specification	Internal PIFAAntenna (1TX 1RX) ▪ 2.4GHz Band Max. peak gain: 1.68dBi

3. SUMMARY OF TESTS

FCC Part Section(s)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)					
15.247(a)	RSS-210 [A8.2]	6 dB Bandwidth	> 500 kHz	Conducted	**C**
15.247(b)	RSS-210 [A8.4]	Transmitter Output Power	< 1Watt		**C**
15.247(c)	RSS-210 [A8.5]	Out of Band Emissions / Band Edge	20dBc in any 100kHz BW		**C**
15.247(d)	RSS-210 [A8.2]	Transmitter Power Spectral Density	< 8dBm / 3kHz		**C**
-	RSS Gen Issue 3	Occupied Bandwidth (99%)	RSS-Gen(4.6.1)		**NA**
15.205 15.209	RSS-210 [A8.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	<FCC 15.209 limits	Radiated	**C**Note2
15.207	RSS-Gen [7.2.4]	AC Conducted Emissions	< FCC 15.207 limits	AC Line Conducted	**C**
15.203	RSS-Gen [7.1.2]	Antenna Requirements	FCC 15.203	-	**C**

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: This test item was performed in each axis and the worst case data was reported.

4. TEST METHODOLOGY

The measurement procedure described in the American National Standard forTesting Unlicensed Wireless Devices (ANSI C63.10-2009) and KDB558074

4.1 EUT CONFIGURATION

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

4.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose ofthe measurements. According to its specifications, the EUT must comply with the requirements ofthe Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

4.3 GENERAL TEST PROCEDURES

Conducted Emissions

According to therequirements in Section 6.2 of ANSI C63.10, the EUT is placed on the turntable, which is 0.8 m above ground planeand the conducted emissions from theEUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peakand Average detector.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate360 degrees to determine the position of maximum emission level. EUT is set 3 m away from thereceiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, eachemission was to be maximized by changing the polarization of receiving antenna both horizontaland vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axes according to the requirements inSection 6.3 of ANSI C63.10.

4.4 DESCRIPTION OF TEST MODES

The EUT has been tested withall modes ofoperating conditionsto determine the worst case emission characteristics. Atest program is used to control the EUT forstaying in continuous transmitting mode.

5. 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 equipments, which is traceable to recognized national standards.

6. FACILITIES AND ACCREDITATIONS

6.1 FACILITIES

The open area test site(OATS) or semi anechoic chamber and conducted measurement facility used to collect the radiated and conducted test data are located at the 683-3, Yubang-Dong, Yongin-Si, Gyunggi-Do, 449-080, South Korea. The site is constructed in conformance with the requirements.

- Semi anechoic chamber registration Number :678747

6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and peak, 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.”

7. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203& RSS-Gen [7.1.2]:
“An intentional radiator antenna shall be designed to ensure that no antenna other than thatfurnished by the responsible party can be used with the device. The use of a permanently attachedantenna or of an antenna that uses a unique coupling to the intentional radiator shall beconsidered sufficient to comply with the provisions of this section.”

* The antennas of this E.U.T are permanently attached on the board using soldering.
*Therefore this E.U.T Complies with the requirement of §15.203

8. TEST RESULT

8.1 6dB Bandwidth

Test Requirements and limit, §15.247(a)& RSS-210 [A8.2]

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6dB bandwidth is 500 kHz.

▣TEST CONFIGURATION

Refer to the APPENDIX I.

▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of KDB558074.

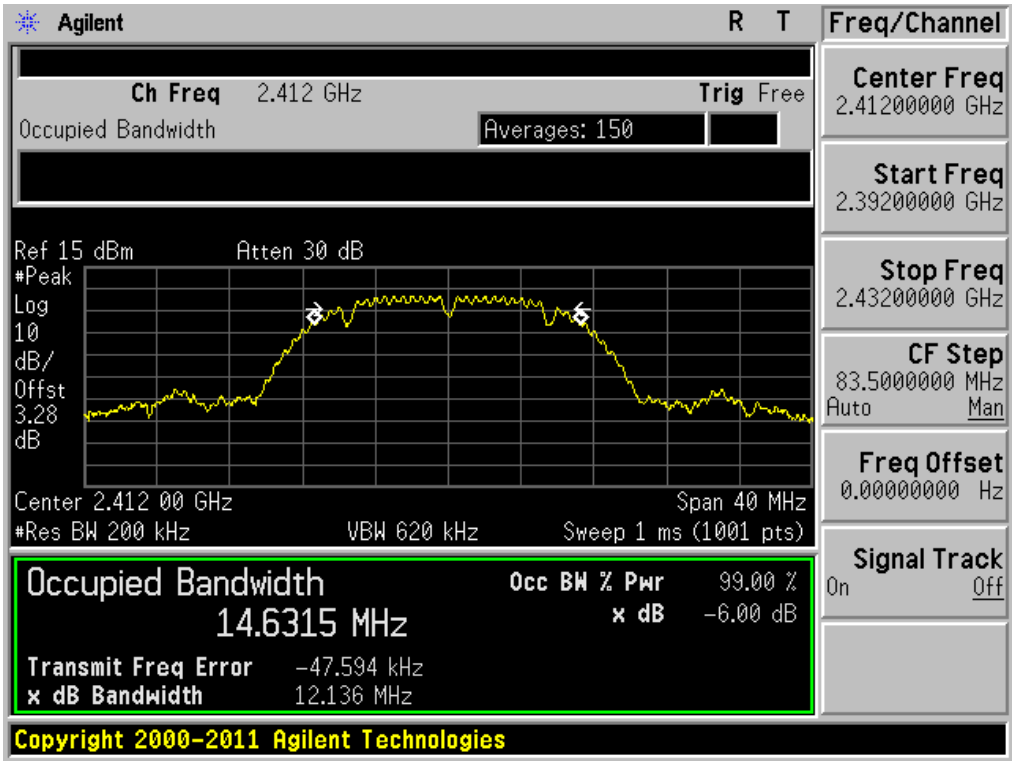
1. Set resolution bandwidth (RBW) = 1-5% of DTS BW.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
   (RBW:200KHz/VBW:620KHz for EBW < 20 MHz , RBW:390KHz/VBW:1.2MHz for 20 MHz < EBW < 40 MHz)
3. Detector = **Peak**.
4. Trace mode = **max hold**.
5. Sweep = **auto couple**.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associatedwith the two outermost amplitude points (upper and lower) that are attenuated by 6 dBrelative to the maximum level measured in the fundamental emission. Compare the resultantbandwidth with the RBW setting of the analyzer.

▣TEST RESULTS: Comply

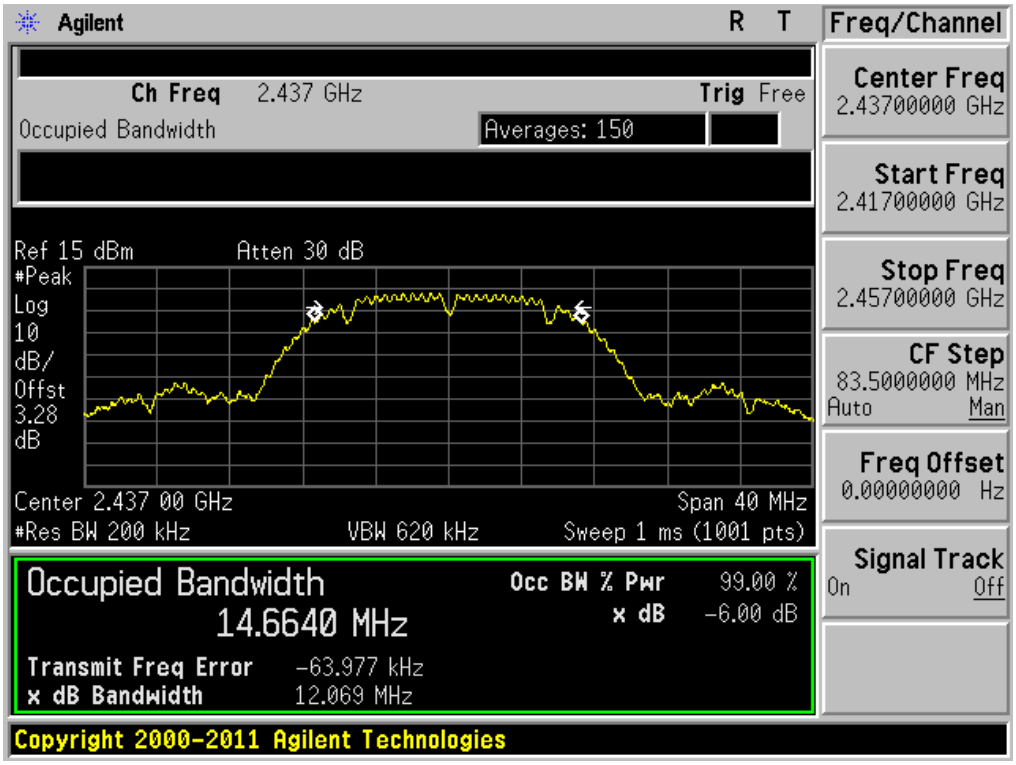
Test Mode	Data Rate	Frequency [MHz]	Test Results[MHz]
802.11b	1Mbps	2412	12.136
		2437	12.069
		2462	12.124
802.11g	6Mbps	2412	16.276
		2437	16.253
		2462	16.339
802.11n (20MHz)	MCS0	2412	17.264
		2437	17.291
		2462	17.335
802.11n (40MHz)	MCS0	2422	35.021
		2437	35.277
		2452	35.120

▣RESULT PLOTS

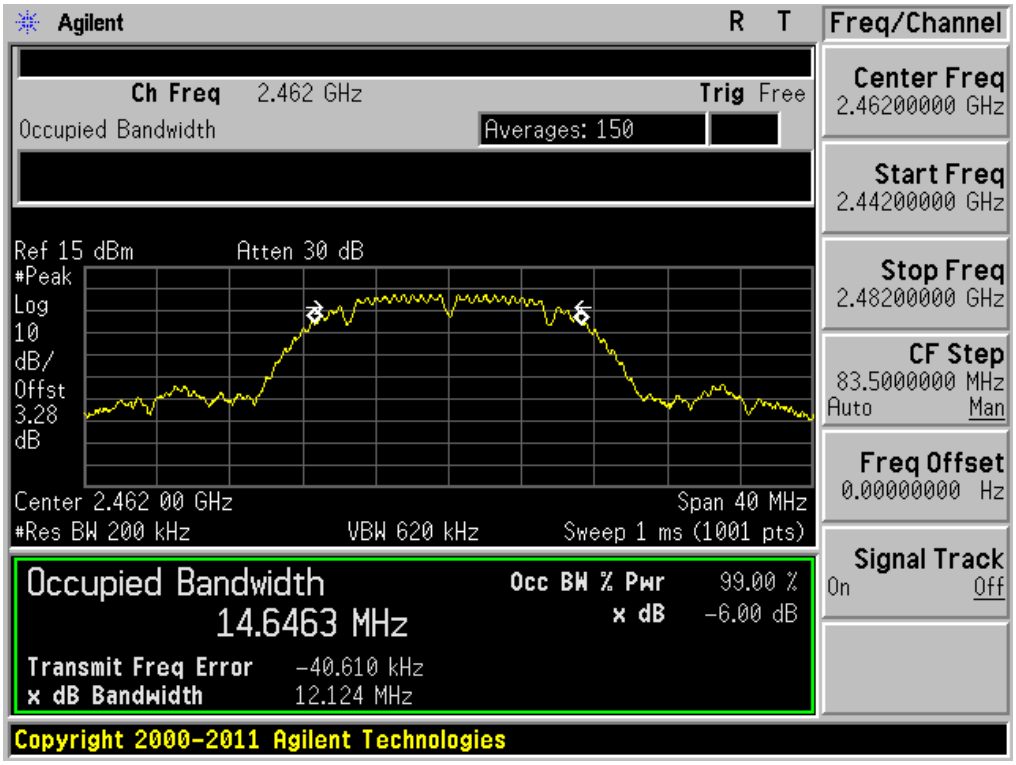
6 dB Bandwidth Test Mode: 802.11b &1Mbps&2412MHz



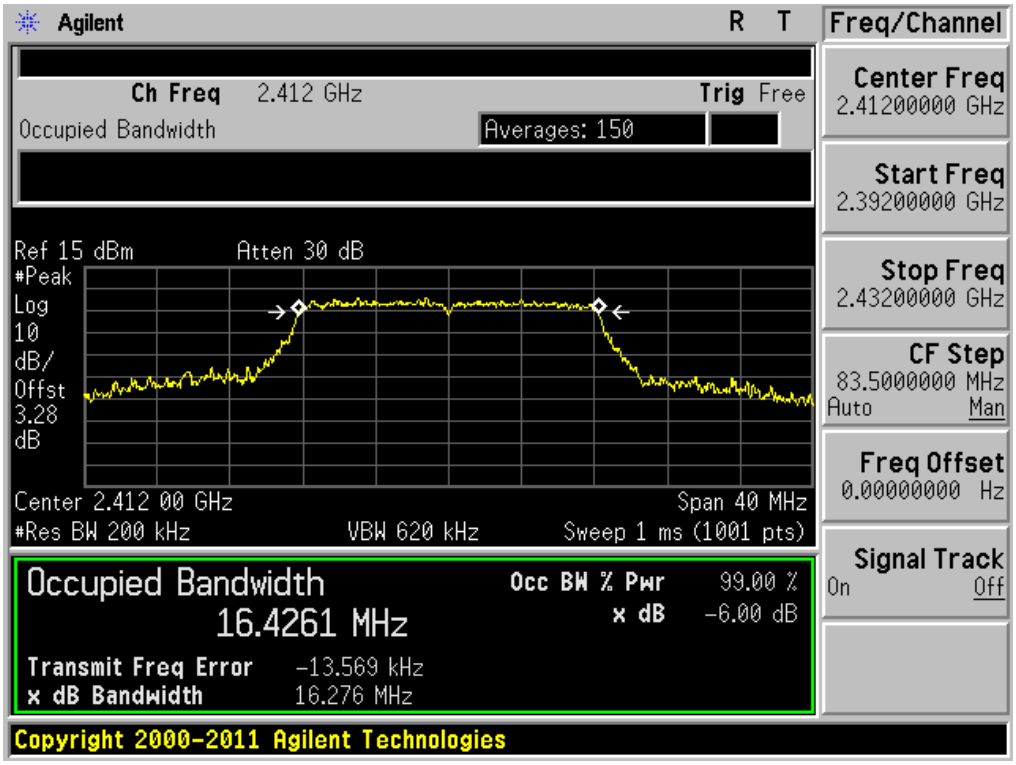
6 dB Bandwidth Test Mode: 802.11b &1Mbps&2437MHz



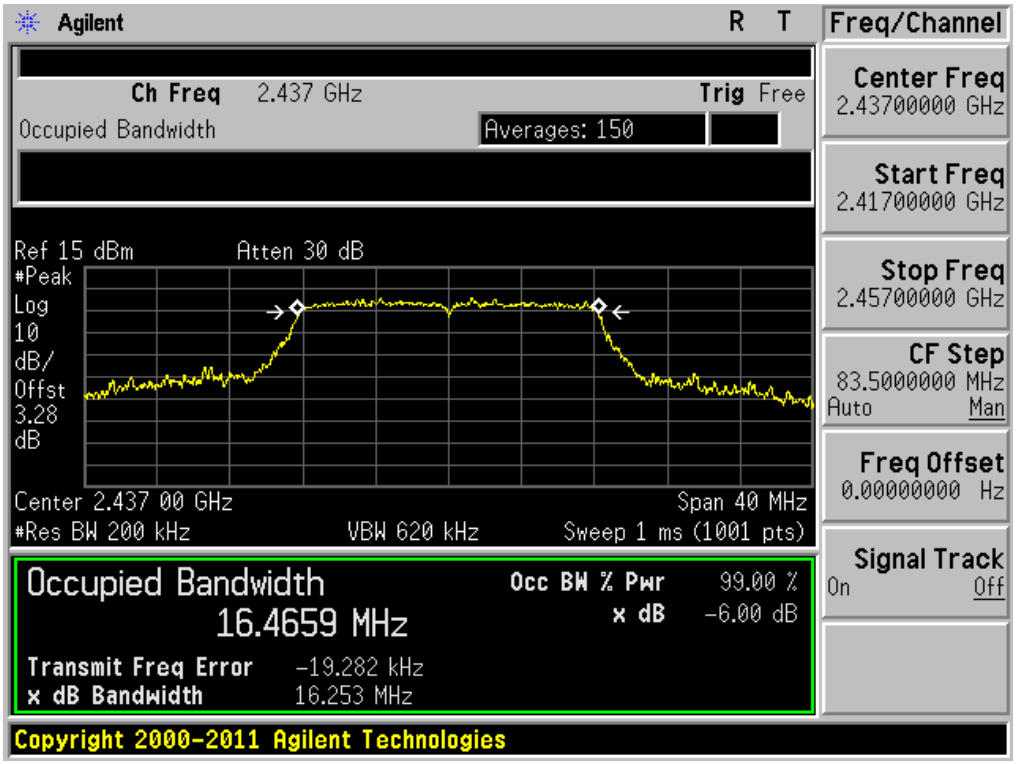
6 dB Bandwidth Test Mode: 802.11b &1Mbps&2462MHz



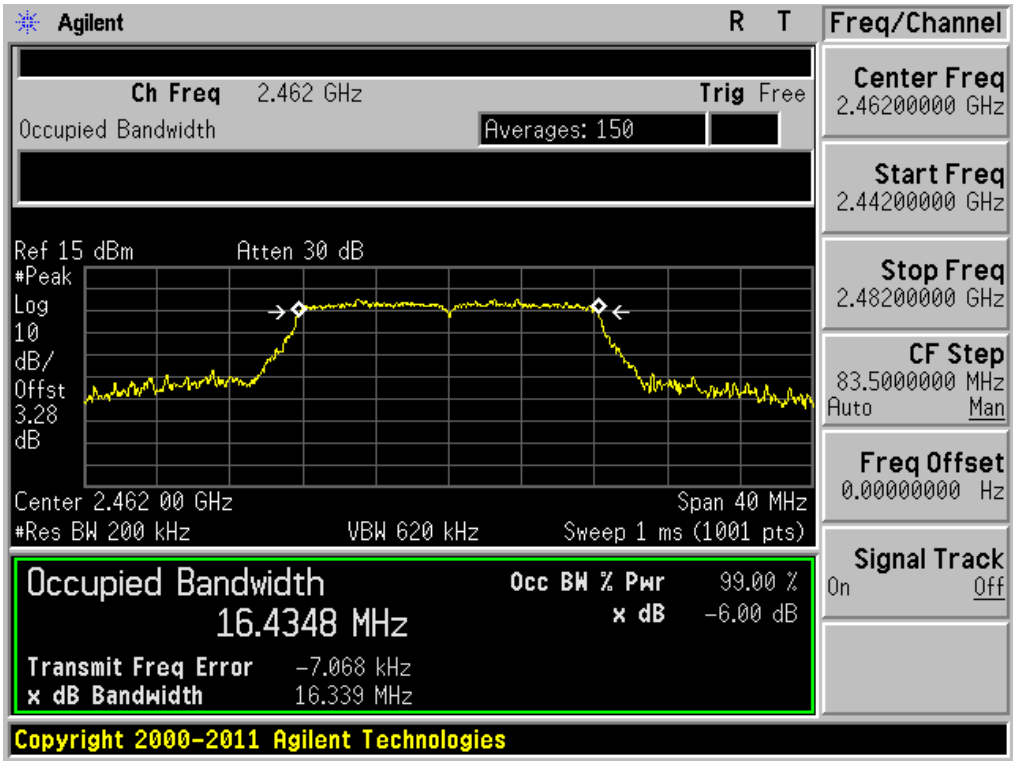
6 dB Bandwidth Test Mode: 802.11g&6Mbps&2412MHz



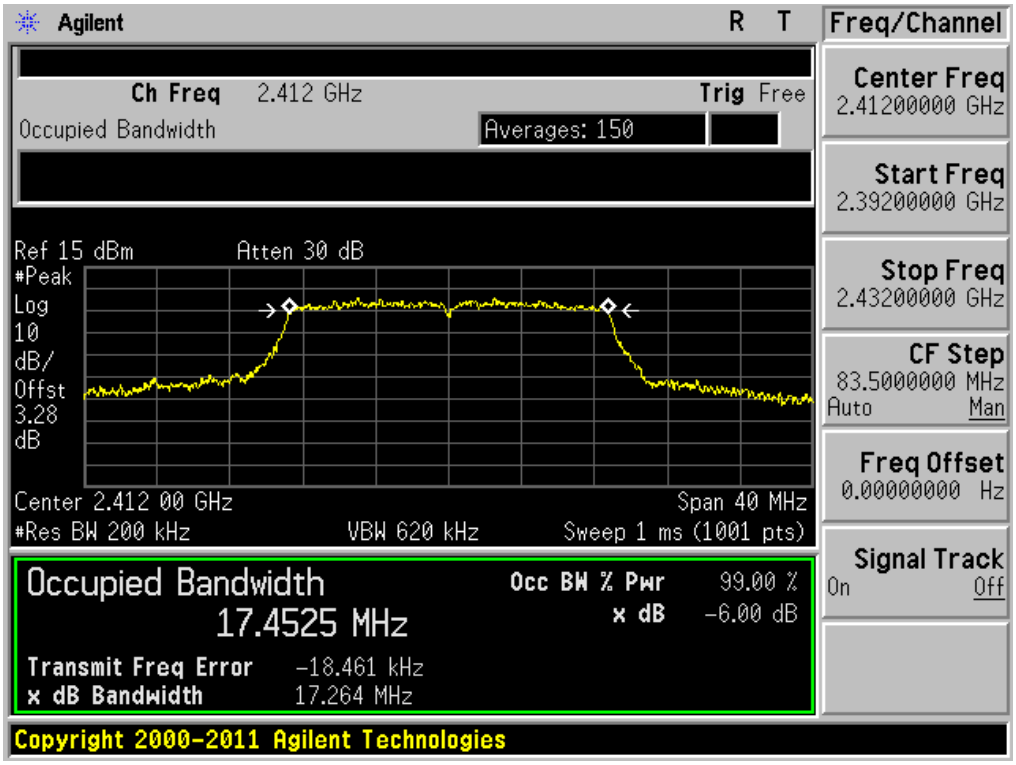
6 dB Bandwidth Test Mode: 802.11g&6Mbps&2437MHz



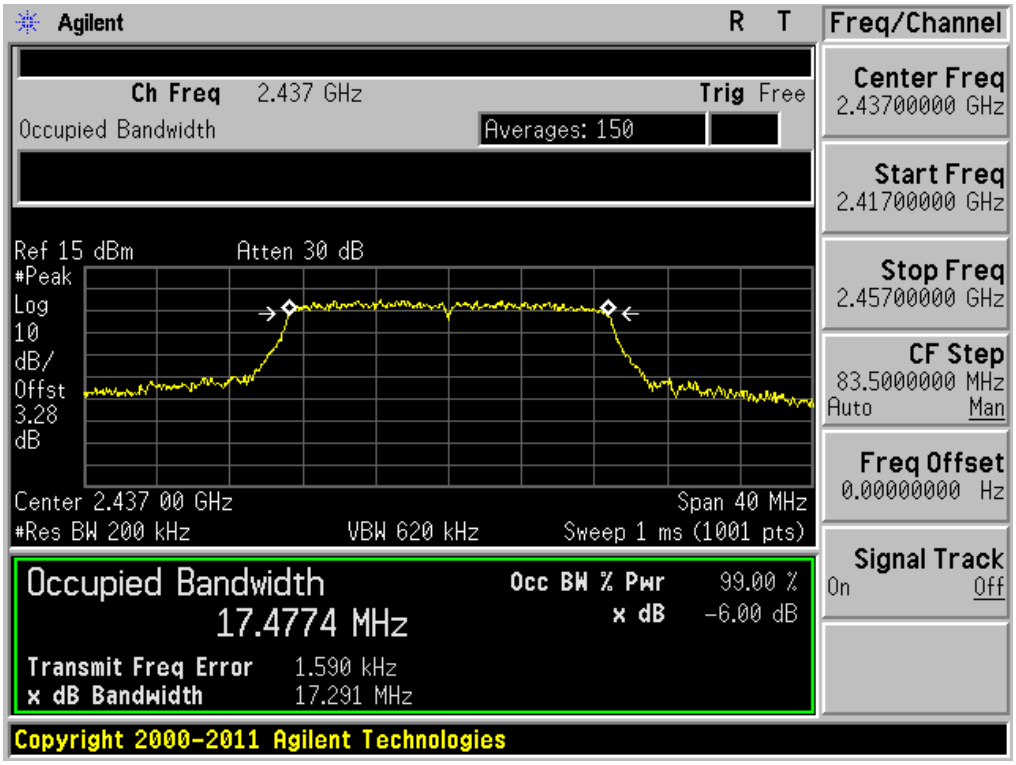
6 dB Bandwidth Test Mode: 802.11g&6Mbps&2462MHz



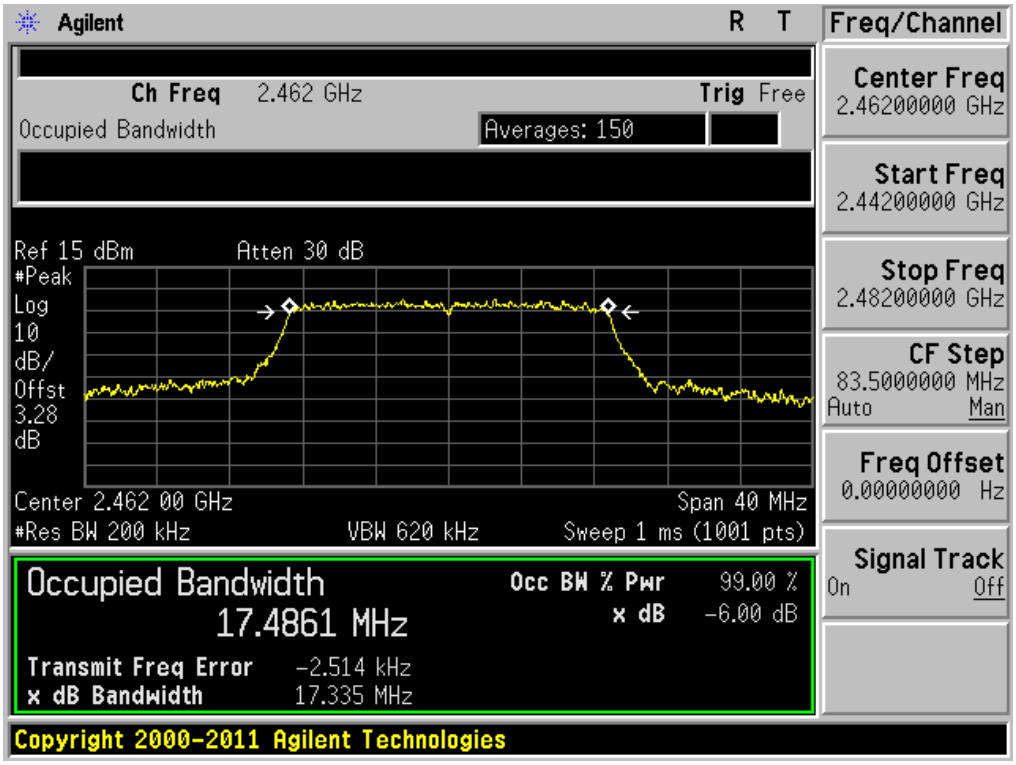
6 dB Bandwidth Test Mode: 802.11n(HT20)&MCS0&2412MHz



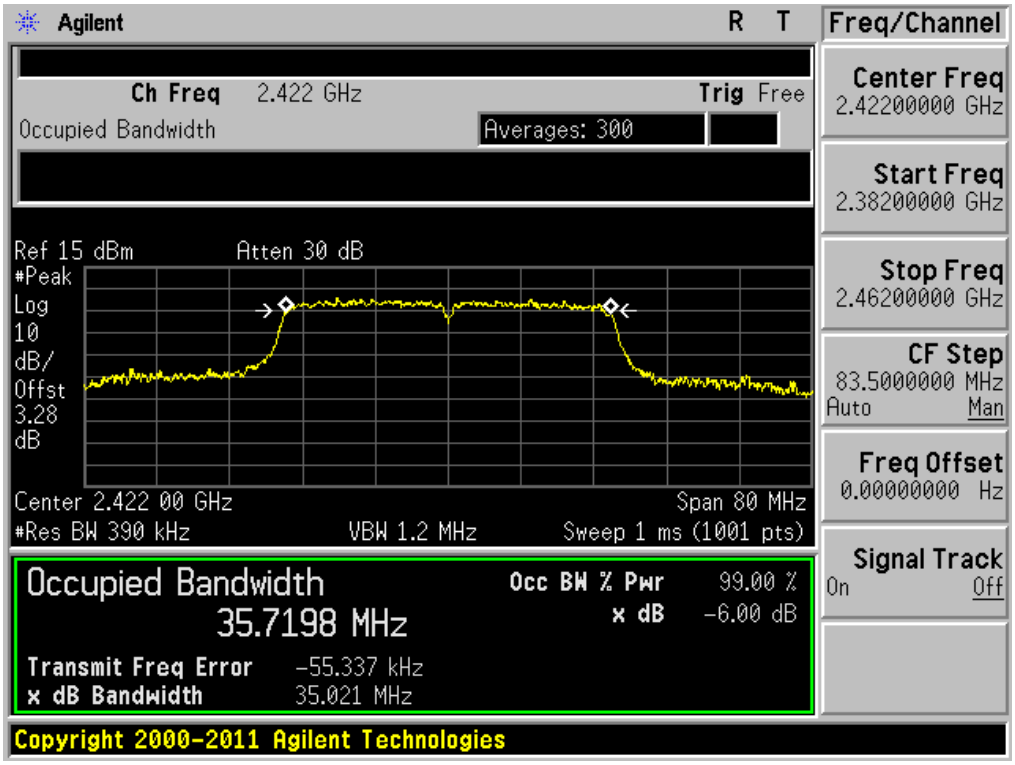
6 dB Bandwidth Test Mode: 802.11n(HT20)&MCS0&2437MHz



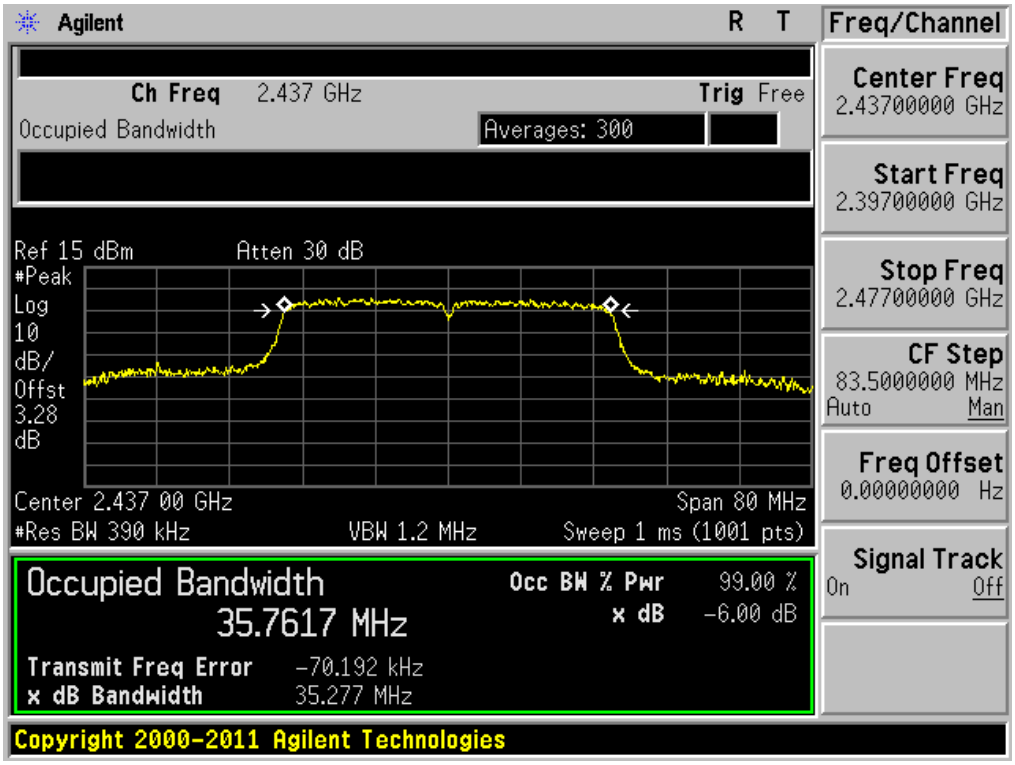
6 dB Bandwidth Test Mode: 802.11n(HT20)&MCS0&2462MHz



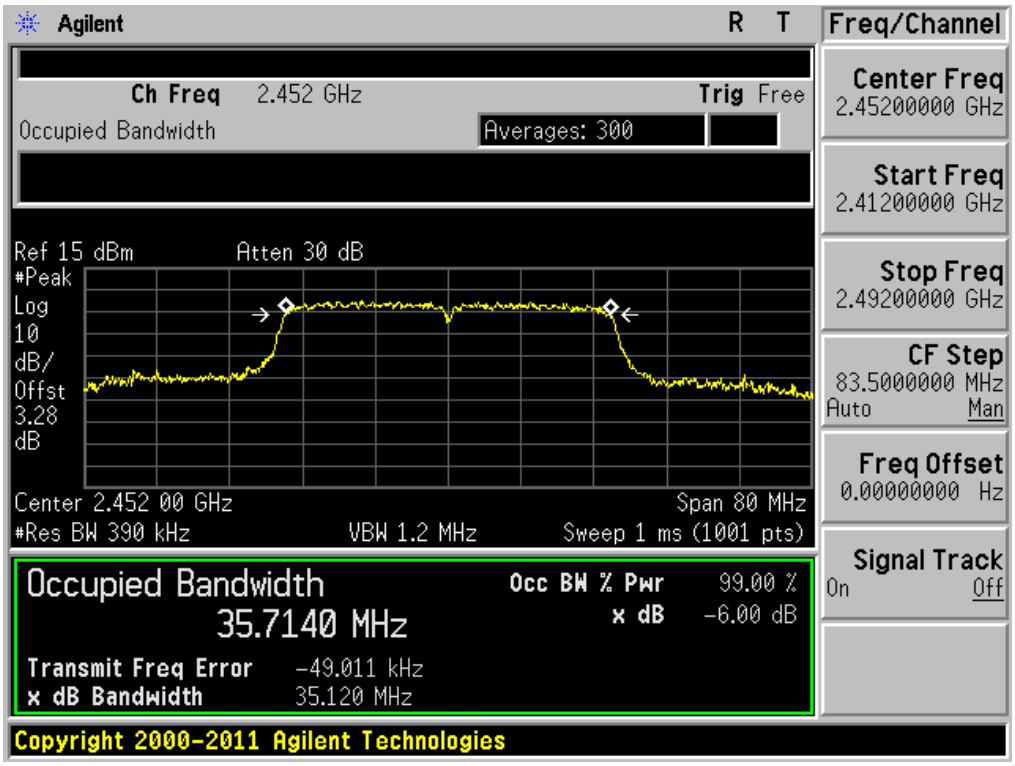
6 dB Bandwidth Test Mode: 802.11n(HT40)& MCS0&2422MHz



6 dB Bandwidth Test Mode: 802.11n(HT40)& MCS0&2437MHz



6 dB Bandwidth Test Mode: 802.11n(HT40)& MCS0&2452MHz

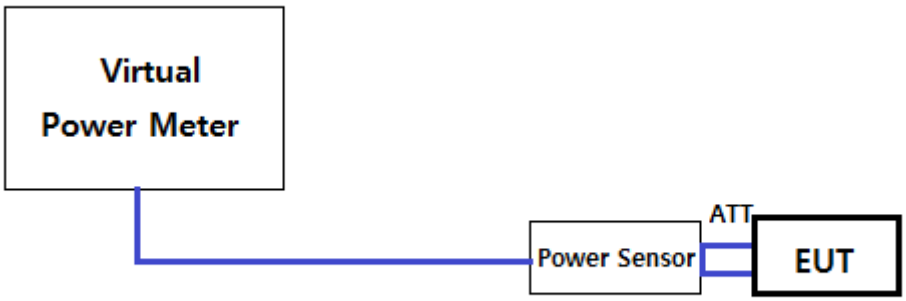


8.2 Maximum Peak Conducted Output Power

Test Requirements and limit, §15.247(b)& RSS-210 [A8.4]

The maximum permissible conducted output power is **1 Watt**.

▣TEST CONFIGURATION



▣TEST PROCEDURE:

A transmitter antenna terminal of EUT is connected to the input of a power sensor using an appropriate attenuator and the total path loss between EUT and a Power Sensor was corrected on the final measurement data using a power meter's internal function.

Measurements are made with a broadband power meter capable of making peak and average measurements while the EUT is operating in transmission mode at the appropriatefrequencies.

▣TEST RESULTS:Comply

- **Measurement Data: Comply**

- **Test Results**

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [Mbps]							
				1	2	5.5	11	N/A	N/A	N/A	N/A
802.11b	1	2412	PK	**14.60**	14.42	14.60	14.58	-	-	-	-
			AV	11.84	11.66	11.46	11.21	-	-	-	-
	6	2437	PK	14.40	14.31	14.32	14.40	-	-	-	-
			AV	11.63	11.55	11.37	11.14	-	-	-	-
	11	2462	PK	14.15	14.12	14.09	14.11	-	-	-	-
			AV	11.23	11.20	11.04	10.88	-	-	-	-

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [Mbps]							
				6	9	12	18	24	36	48	54
802.11g	1	2412	PK	20.72	20.31	20.45	20.44	20.65	20.59	20.69	20.71
			AV	9.28	9.26	9.19	8.99	8.79	8.40	8.18	8.00
	6	2437	PK	**21.32**	20.70	20.90	20.68	21.23	20.93	20.87	21.27
			AV	9.90	9.63	9.31	9.16	9.04	8.49	8.44	8.41
	11	2462	PK	21.05	20.45	20.86	20.85	20.97	20.92	20.86	20.96
			AV	9.62	9.24	9.15	8.94	8.87	8.47	8.23	8.15

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [MCS]							
				0	1	2	3	4	5	6	7
802.11n (HT20)	1	2412	PK	**20.86**	20.53	20.40	19.77	19.58	19.93	20.31	20.33
			AV	9.76	9.38	9.12	8.98	8.73	8.55	8.40	8.25
	6	2437	PK	20.72	20.15	20.41	19.99	20.16	20.59	20.66	20.69
			AV	9.46	9.23	8.96	8.87	8.57	8.36	8.19	7.98
	11	2462	PK	20.65	20.16	20.28	19.91	20.49	20.34	20.38	20.63
			AV	9.36	8.95	8.85	8.63	8.44	8.21	8.13	7.82

Mode	Channel	Frequency [MHz]	Detector	Test Result [dBm]							
				DATA RATE [MCS]							
				0	1	2	3	4	5	6	7
802.11n (HT40)	1	2412	PK	20.79	20.36	20.10	20.54	20.59	20.65	20.65	20.77
			AV	9.04	8.49	8.06	7.73	7.25	6.76	6.75	6.57
	6	2437	PK	**20.85**	20.15	20.07	20.66	20.54	20.52	20.58	20.65
			AV	9.32	8.60	8.34	7.92	7.69	7.35	7.14	6.98
	11	2462	PK	20.72	20.40	20.47	20.49	20.62	20.55	20.53	20.69
			AV	9.05	8.43	8.06	7.79	7.38	6.95	6.91	6.77

8.3 Maximum Power Spectral Density

Test requirements and limit, §15.247(e)& RSS-210[A8.2]

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard –specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz band segmentwithin the fundamental EBW during any time interval of continuous transmission.

▣TEST CONFIGURATION

Refer to the APPENDIX I.

▣TEST PROCEDURE:

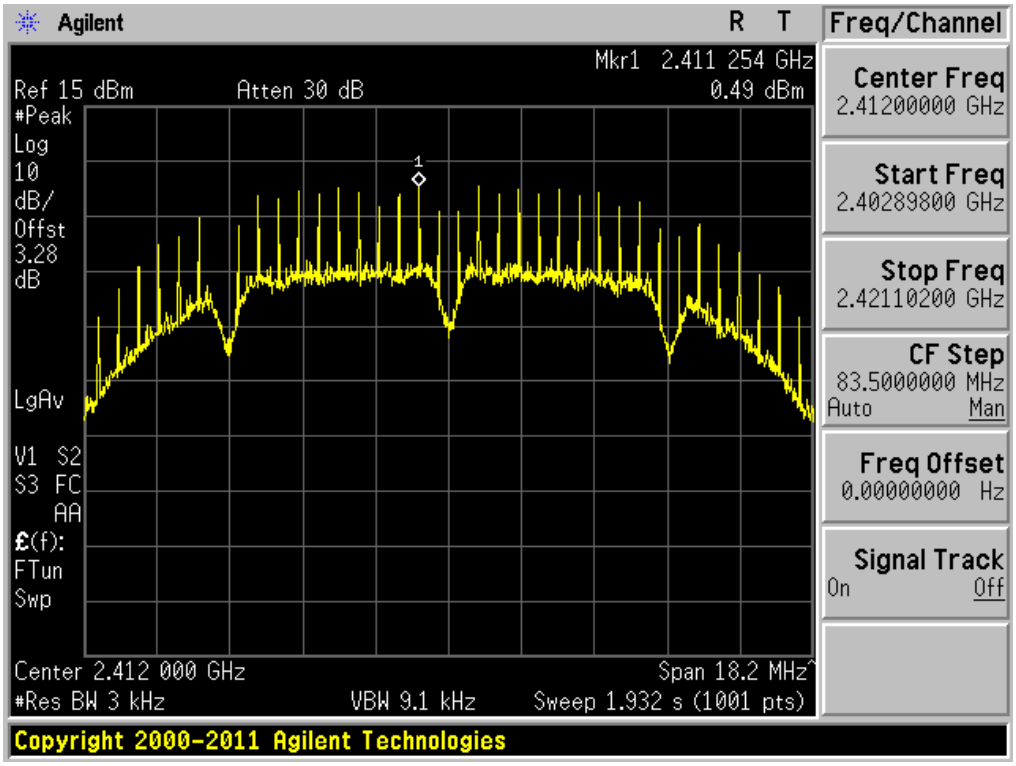
The Measurement Procedure **Option 1of KDB558074** is used.
1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to **1.5 times** the DTS channel bandwidth.
3. Set the RBW ≥ **3 kHz.**
4. Set the VBW ≥ **3 x RBW.**
5. Detector = **peak.**
6. Sweep time = **auto couple.**
7. Trace mode = **max hold.**
8. Allow trace to fully stabilize.
9. Use the **peak marker function** to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

▣TEST RESULTS: Comply

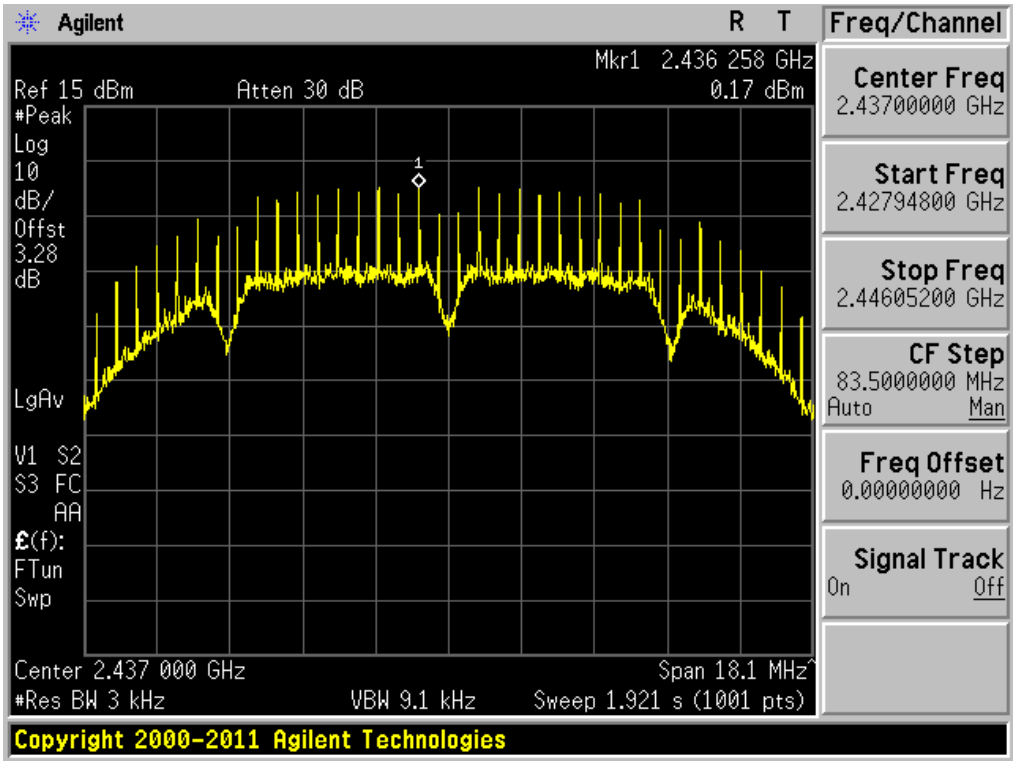
Test Mode	Data Rate	Frequency [MHz]	RBW	PKPSD [dBm]
802.11b	1Mbps	2412	3 kHz	0.49
		2437	3 kHz	0.17
		2462	3 kHz	-0.01
802.11g	6Mbps	2412	3 kHz	-15.98
		2437	3 kHz	-14.84
		2462	3 kHz	-14.82
802.11n HT20	MCS0	2412	3 kHz	-14.83
		2437	3 kHz	-14.65
		2462	3 kHz	-15.92
802.11n HT40	MCS0	2422	3 kHz	-17.88
		2437	3 kHz	-18.04
		2452	3 kHz	-17.73

▣RESULT PLOTS

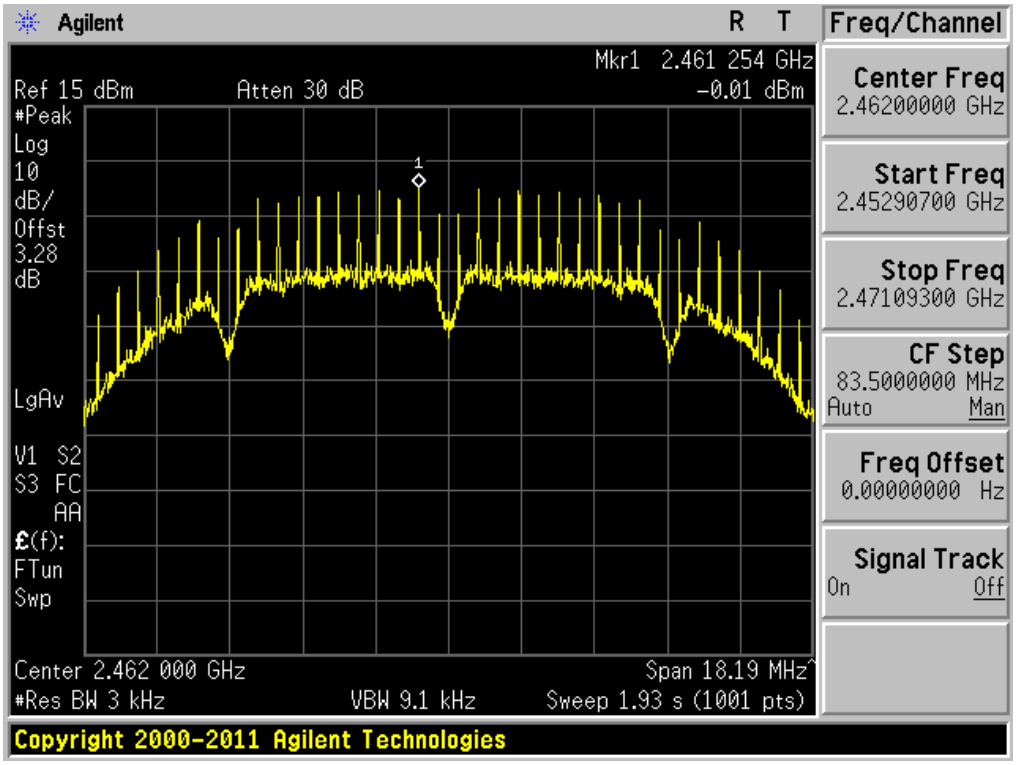
Maximum PKPSD Test Mode: 802.11b&1Mbps &2412MHz



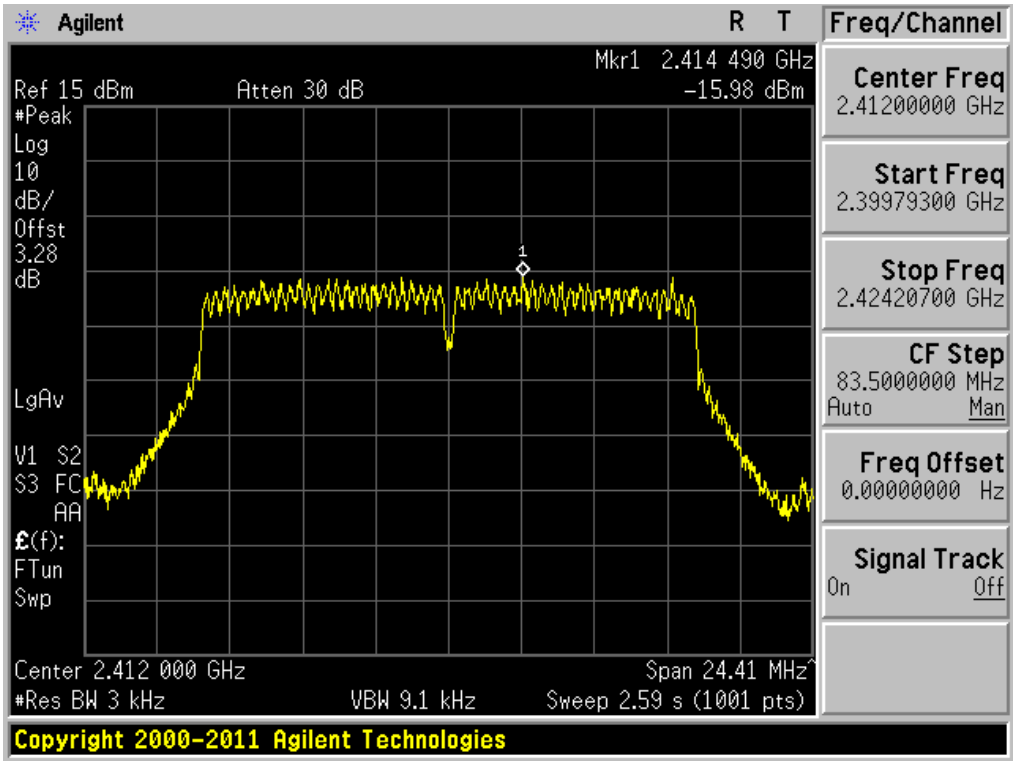
Maximum PKPSD Test Mode: 802.11b&1Mbps &2437MHz



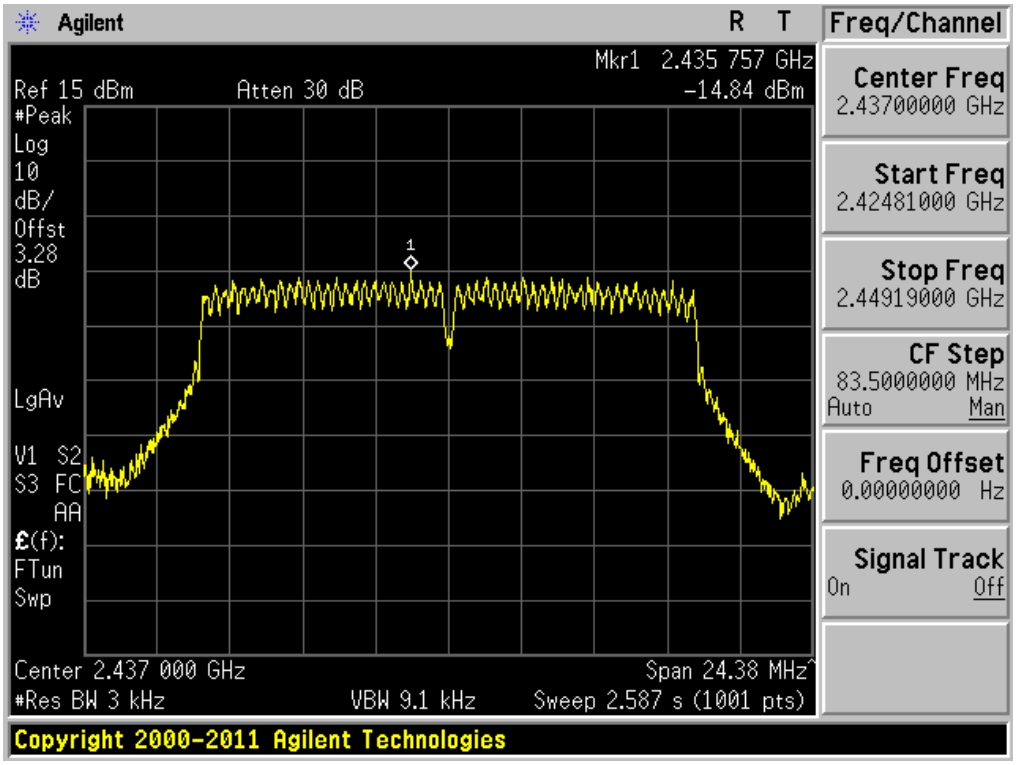
Maximum PKPSD Test Mode: 802.11b&1Mbps &2462MHz



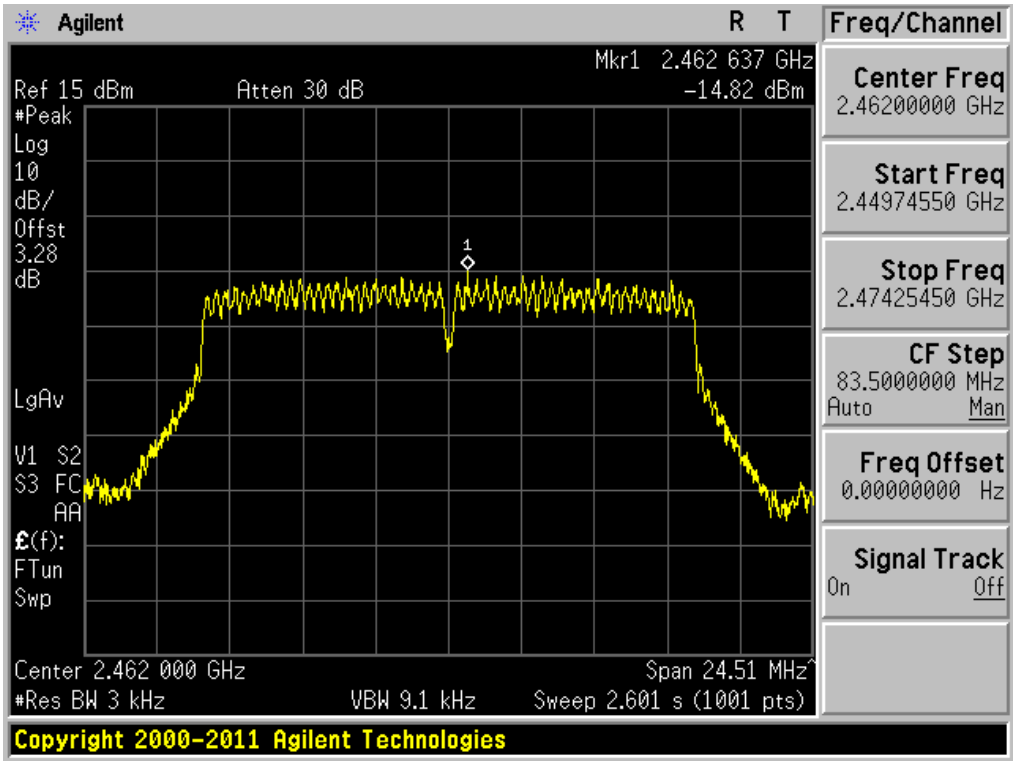
Maximum PKPSD Test Mode: 802.11g&6Mbps &2412MHz



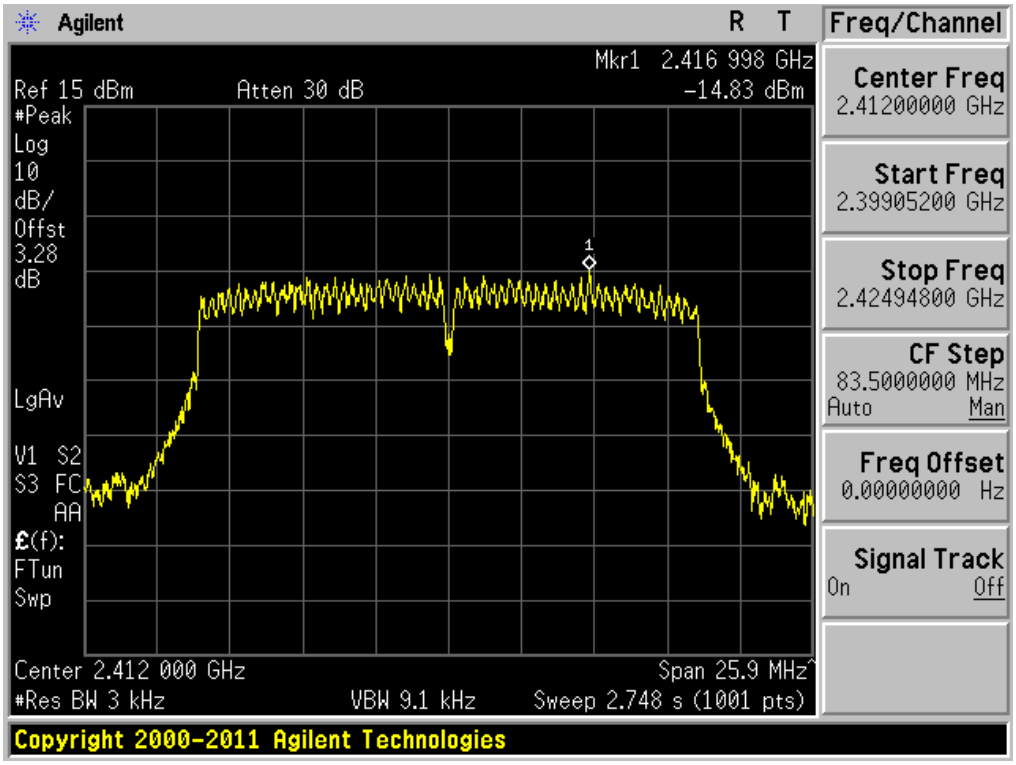
Maximum PKPSD Test Mode: 802.11g &6Mbps &2437MHz



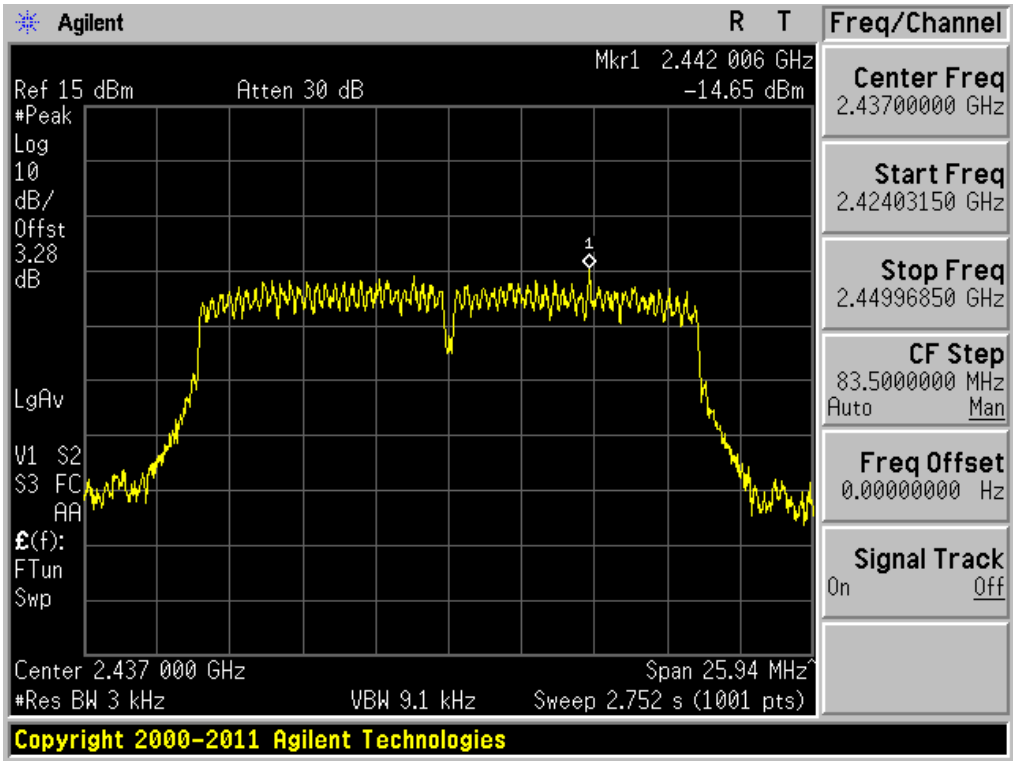
Maximum PKPSD Test Mode: 802.11g&6Mbps&2462MHz



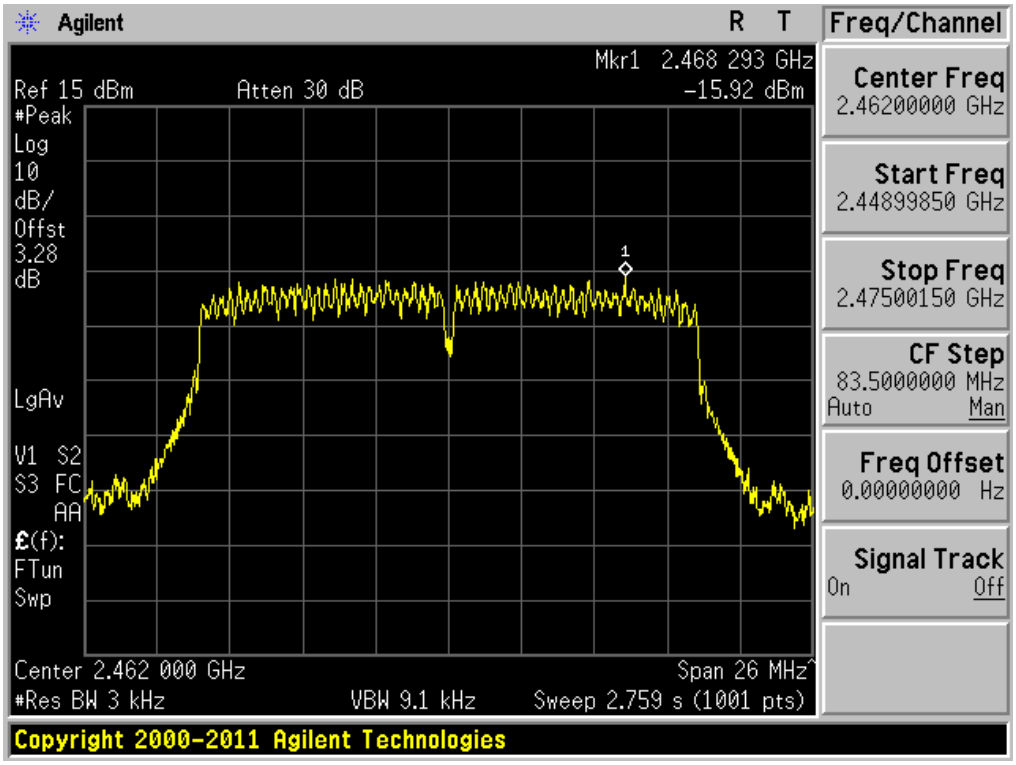
Maximum PKPSD Test Mode: 802.11n(HT20)&MCS0&2412MHz



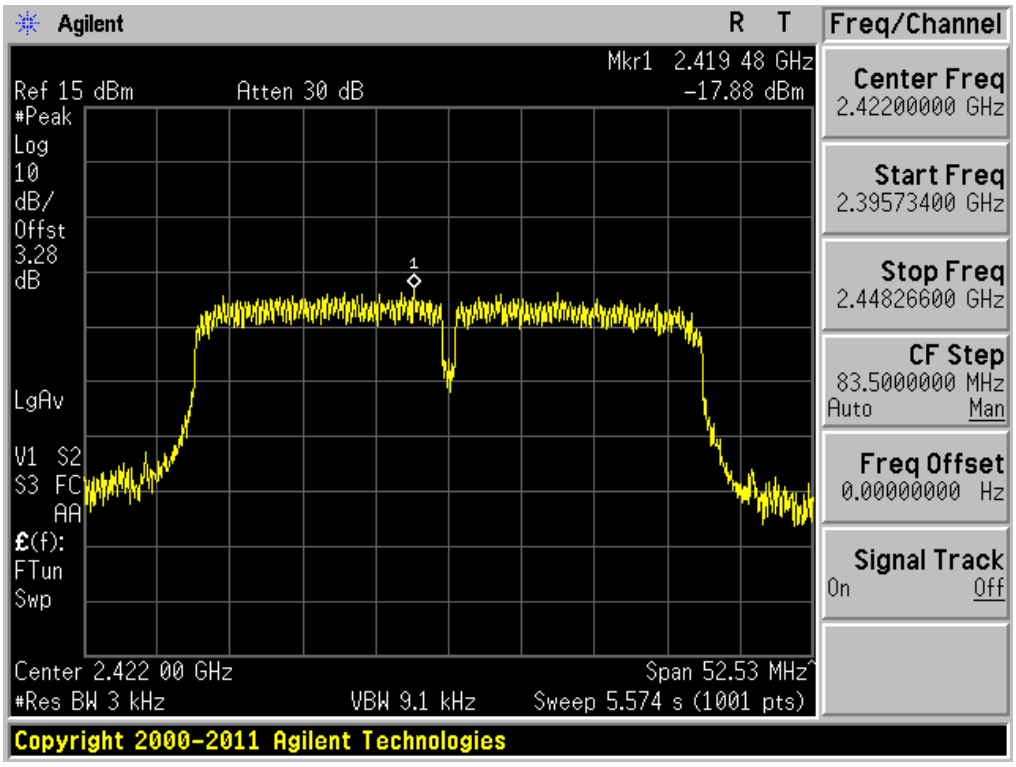
Maximum PKPSD Test Mode: 802.11n(HT20)&MCS0&2437MHz



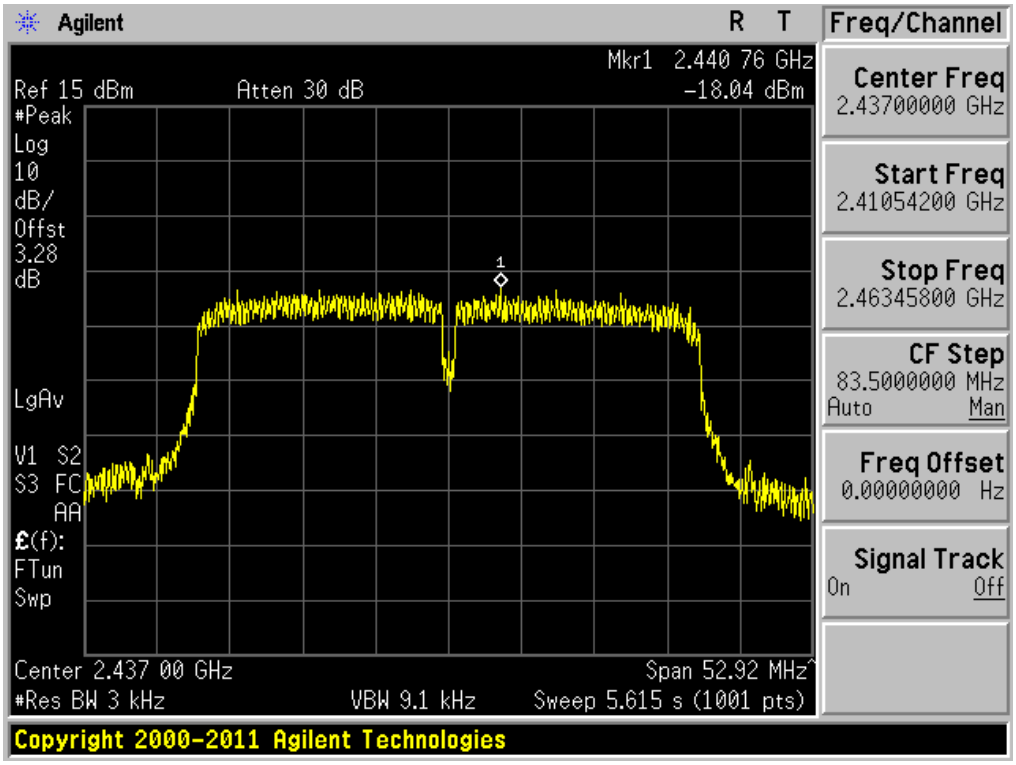
Maximum PKPSD Test Mode: 802.11n(HT20)&MCS0&2462MHz



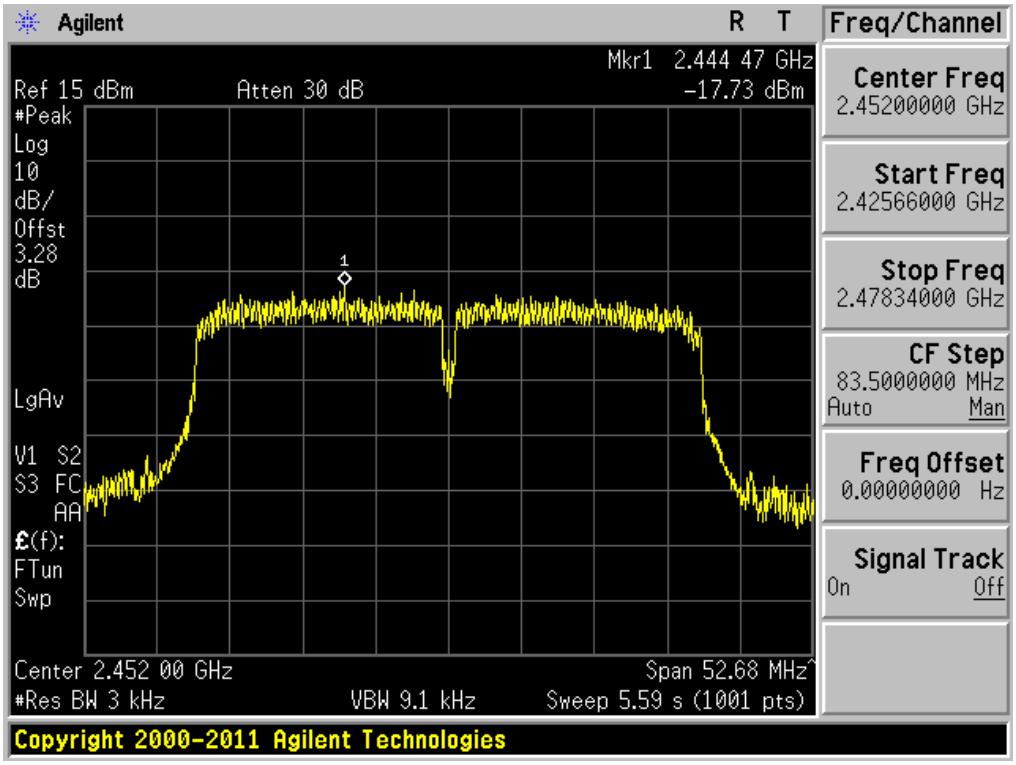
Maximum PKPSD Test Mode: 802.11n(HT40)& MCS0 &2422MHz



Maximum PKPSD Test Mode: 802.11n(HT40)& MCS0 &2437MHz



Maximum PKPSD Test Mode: 802.11n(HT40)& MCS0 &2452MHz



8.4 Out of Band Emissions at the Band Edge/ Conducted Spurious Emissions

Test requirements and limit, §15.247(d)

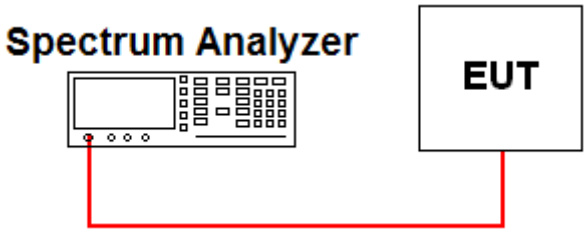
§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, thepower shall be attenuated according to the following conditions:

If **the peak output power procedure**is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated **by at least 20 dB** relative to the maximum measured in-band peak PSD level.

If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured inband average PSD level.

In either case, attenuation to levels below the general emission limits specified in **§15.209(a)** is not required.

▣TEST CONFIGURATION



▣TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer.

- Measurement Procedure 1 – Reference Level

Establish the reference level by using the peak PSD procedure of KDB558074to measure the PSD level in any 100 kHz bandwidth (i.e., set RBW = 100 kHz and VBW ≥ 300 kHz) within the DTS channel bandwidth (the channel found to contain the maximum PSD level can be used to establish the reference level).

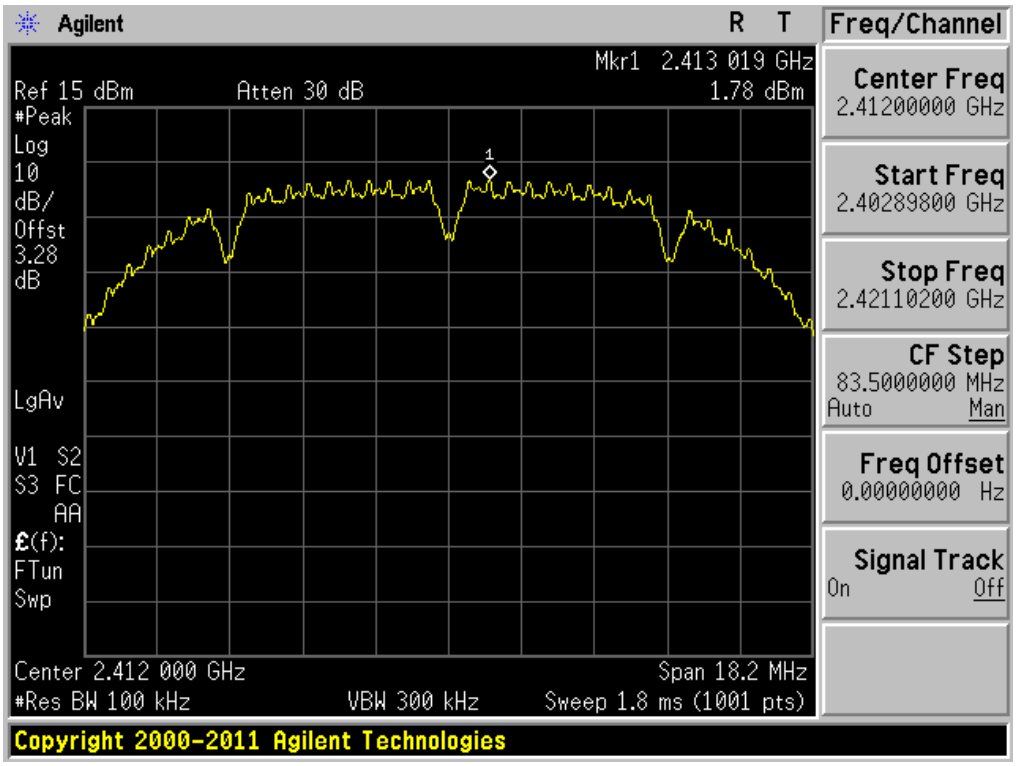
- Measurement Procedure 2 - Unwanted Emissions

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.

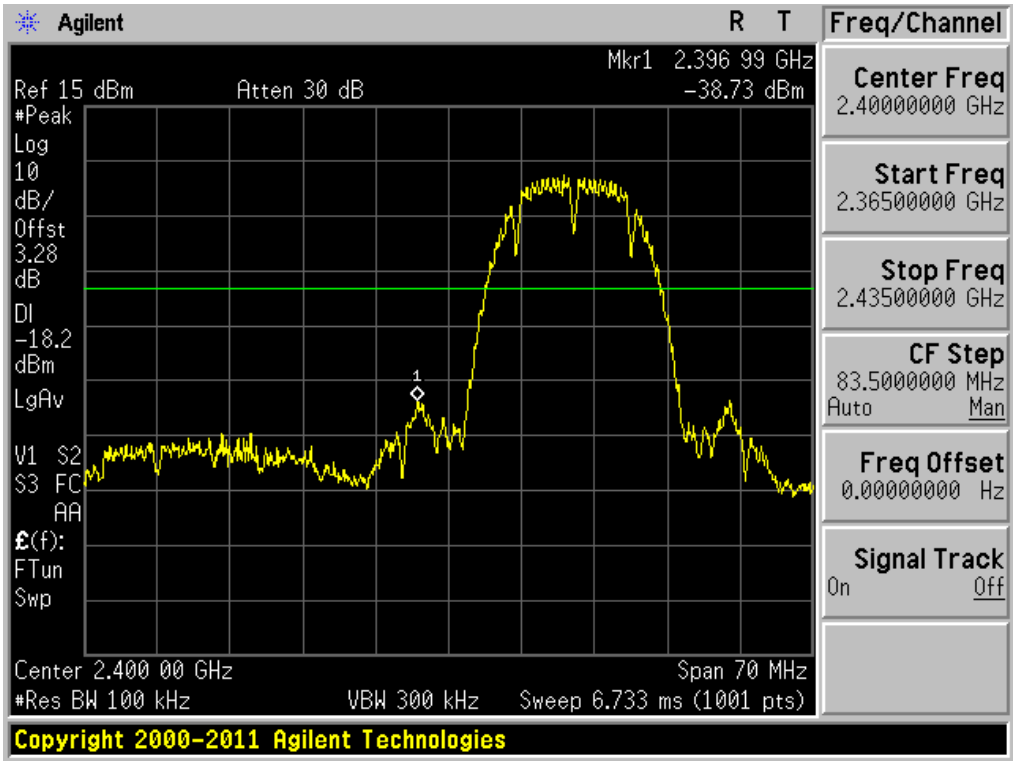
▣RESULT PLOTS

802.11b&1Mbps & 2412MHz

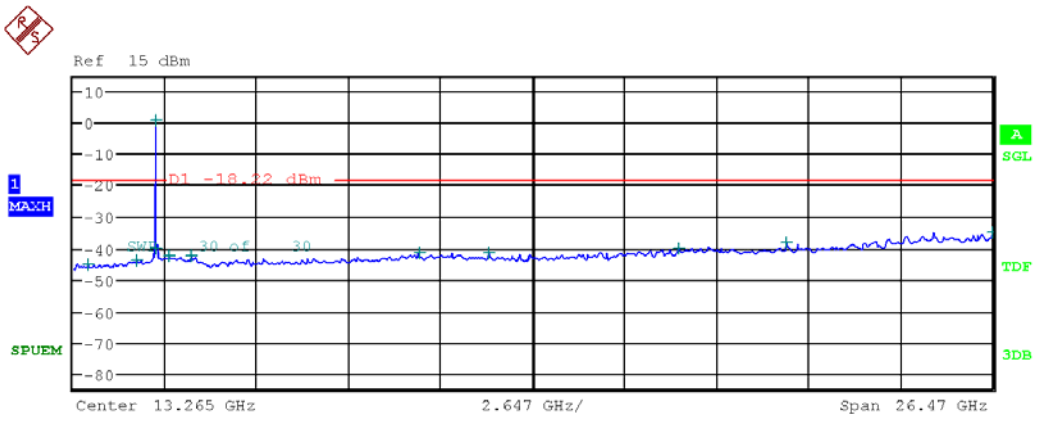
Reference



Low Band-edge



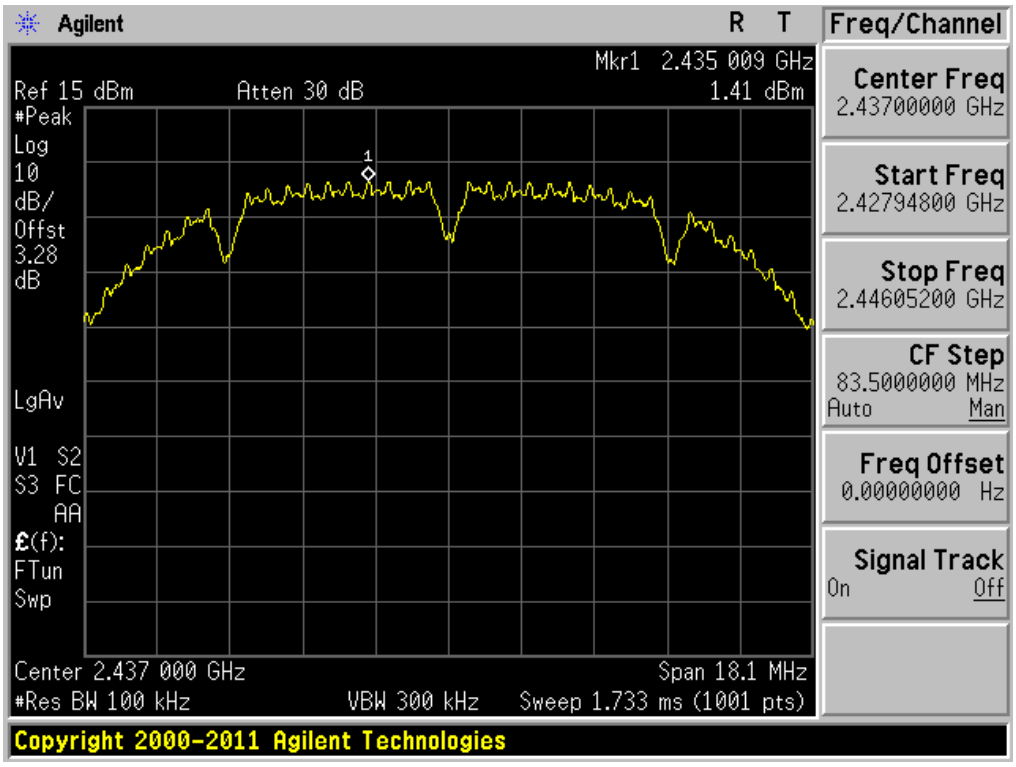
Conducted Spurious Emissions



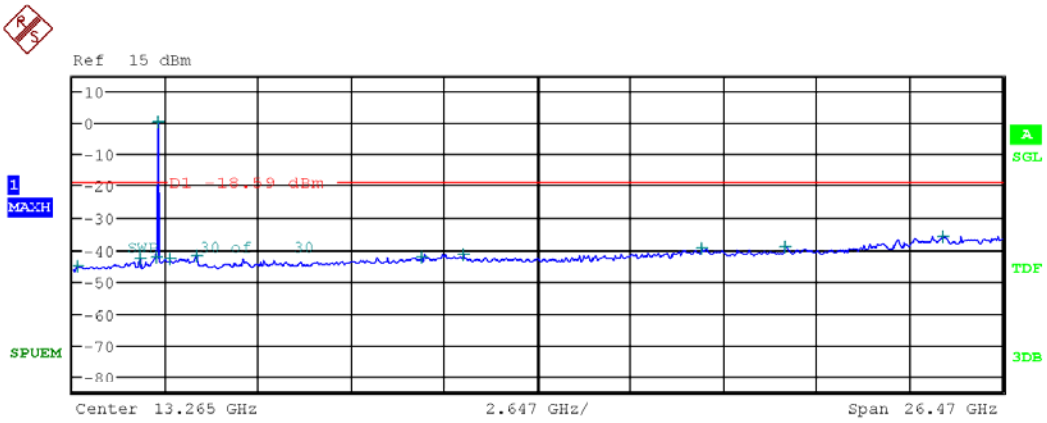
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	468.634000 M	-45.15
1.000 G	2.000 G	100.00 k	1.839600 G	-44.12
2.000 G	2.400 G	100.00 k	2.397022 G	-40.11
2.400 G	2.483 G	100.00 k	2.410003 G	0.56
2.483 G	3.000 G	100.00 k	2.770846 G	-42.52
3.000 G	6.000 G	100.00 k	3.439500 G	-42.44
6.000 G	10.000 G	100.00 k	9.981500 G	-41.75
10.000 G	14.000 G	100.00 k	11.981500 G	-41.66
14.000 G	18.000 G	100.00 k	17.461000 G	-40.21
18.000 G	22.000 G	100.00 k	20.540500 G	-38.50
22.000 G	26.500 G	100.00 k	26.496063 G	-34.77

802.11b&1Mbps & 2437MHz

Reference



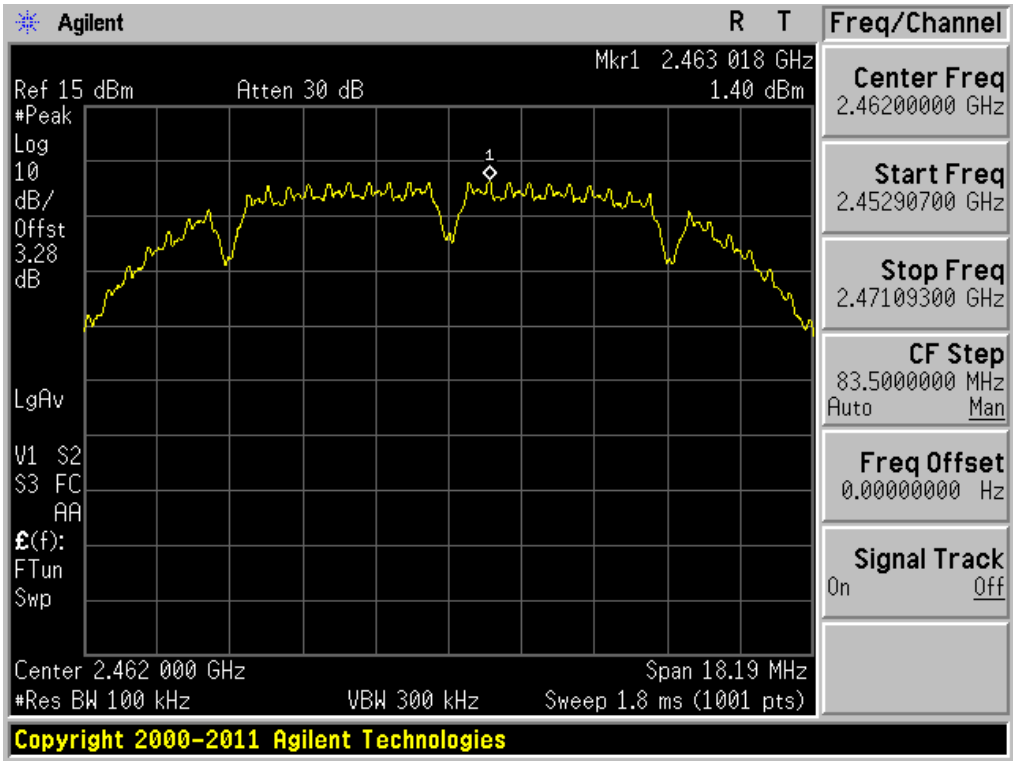
Conducted Spurious Emissions



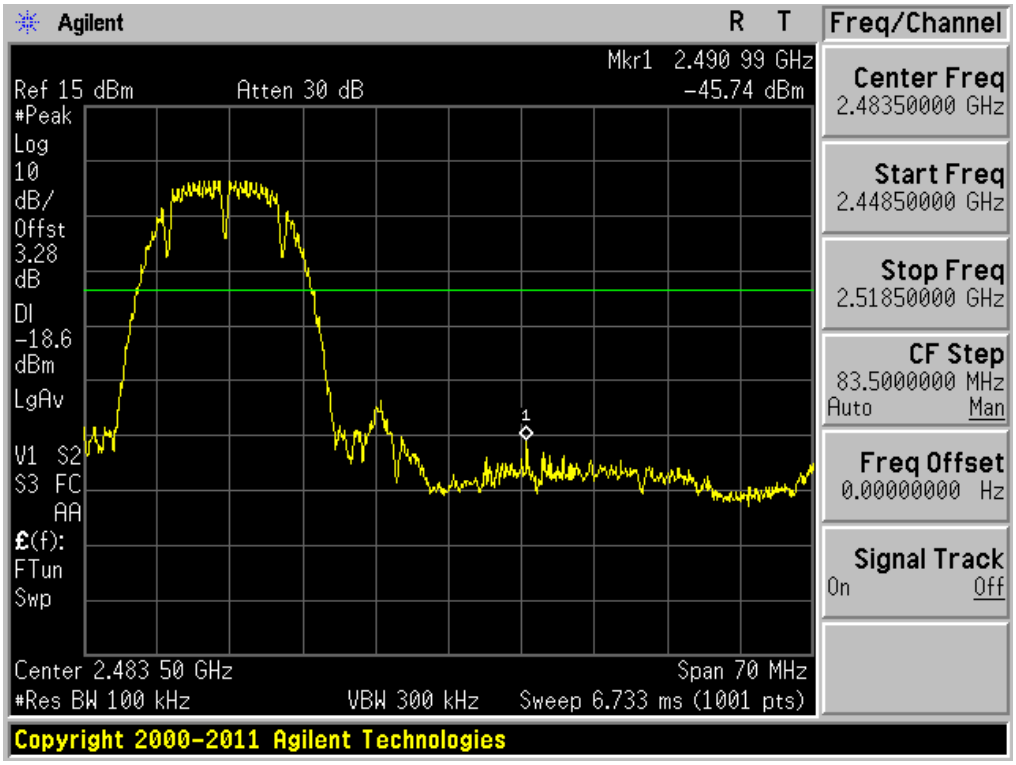
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	164.830000 M	-45.28
1.000 G	2.000 G	100.00 k	1.947400 G	-43.20
2.000 G	2.400 G	100.00 k	2.395511 G	-42.33
2.400 G	2.483 G	100.00 k	2.435003 G	0.44
2.483 G	3.000 G	100.00 k	2.779971 G	-43.15
3.000 G	6.000 G	100.00 k	3.547500 G	-42.22
6.000 G	10.000 G	100.00 k	9.949000 G	-42.52
10.000 G	14.000 G	100.00 k	11.141000 G	-41.44
14.000 G	18.000 G	100.00 k	17.928000 G	-39.66
18.000 G	22.000 G	100.00 k	20.327500 G	-39.26
22.000 G	26.500 G	100.00 k	24.799000 G	-35.85

802.11b& 1Mbps & 2462MHz

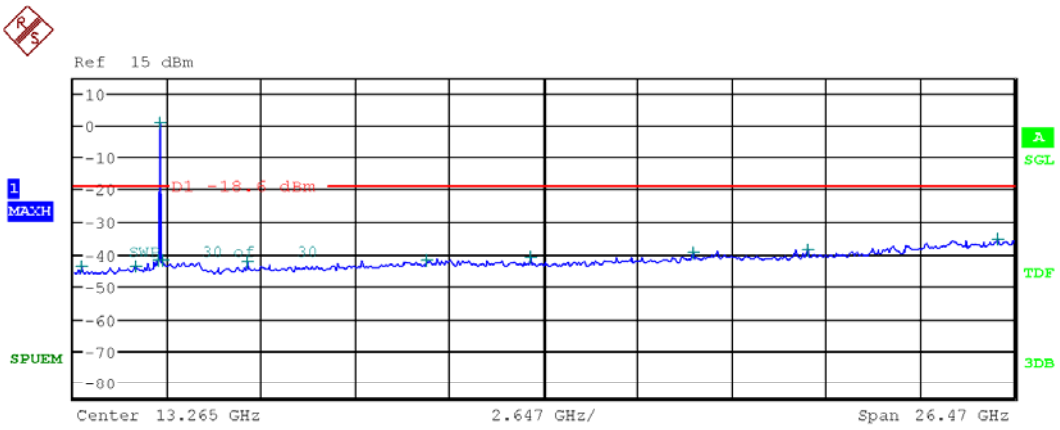
Reference



High Band-edge



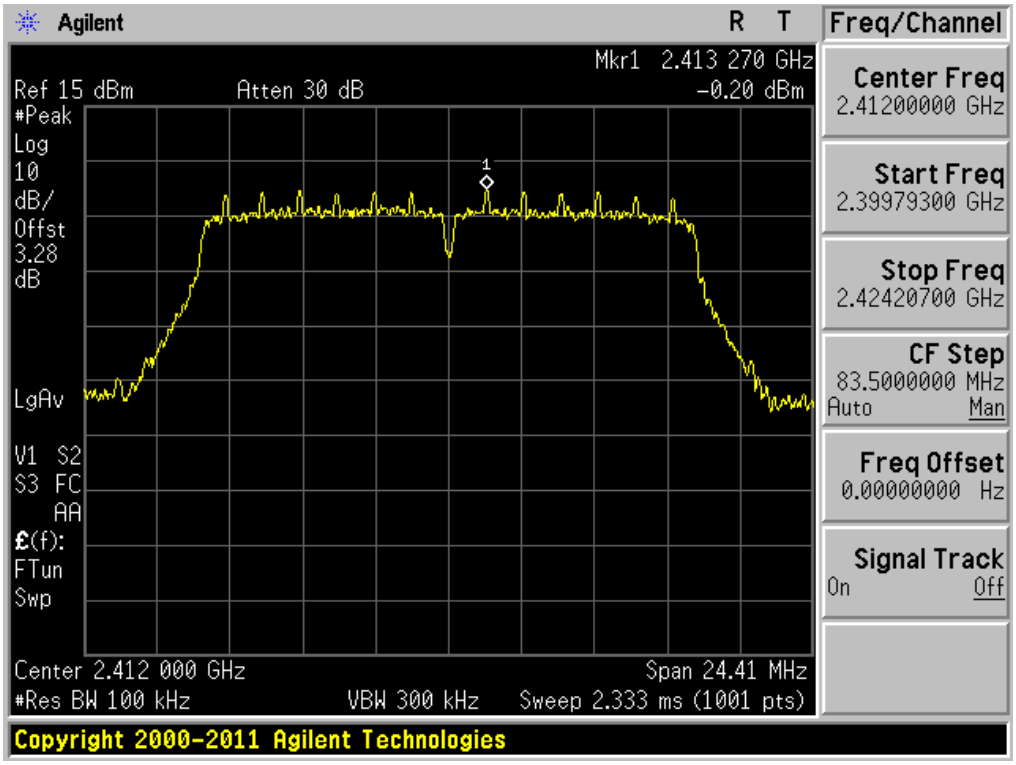
Conducted Spurious Emissions



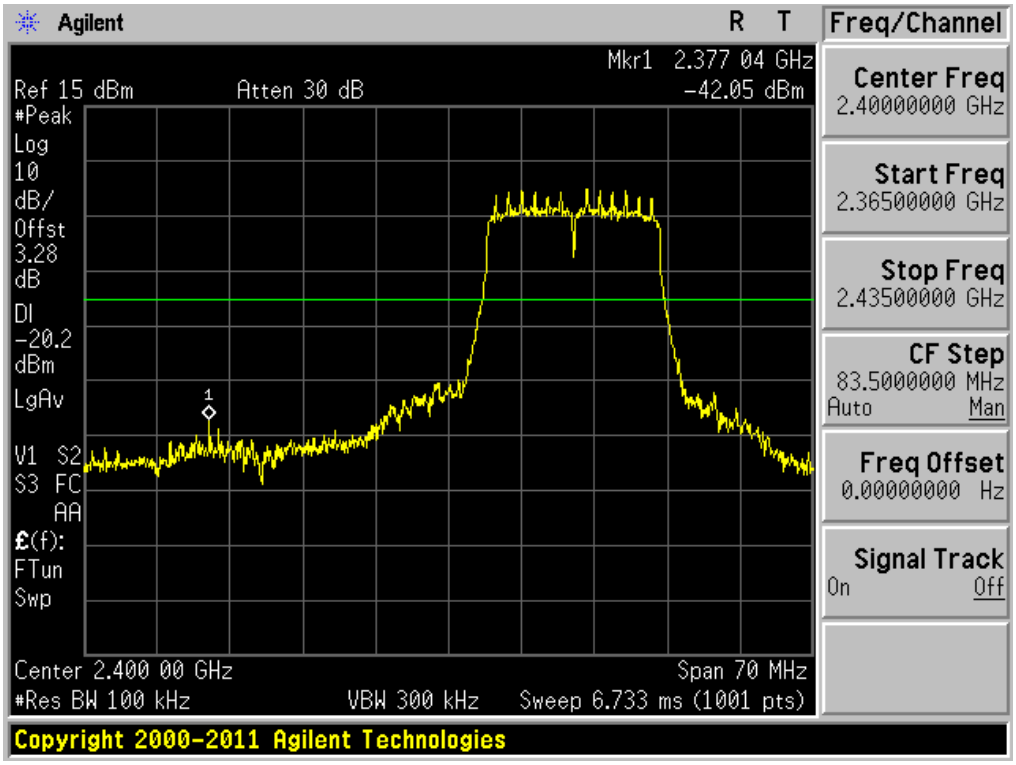
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	239.908000 M	-44.15
1.000 G	2.000 G	100.00 k	1.787000 G	-43.81
2.000 G	2.400 G	100.00 k	2.384756 G	-42.23
2.400 G	2.483 G	100.00 k	2.463527 G	0.47
2.483 G	3.000 G	100.00 k	2.543816 G	-42.05
3.000 G	6.000 G	100.00 k	4.924125 G	-42.57
6.000 G	10.000 G	100.00 k	9.975000 G	-41.81
10.000 G	14.000 G	100.00 k	12.888500 G	-41.27
14.000 G	18.000 G	100.00 k	17.461500 G	-39.65
18.000 G	22.000 G	100.00 k	20.668000 G	-38.85
22.000 G	26.500 G	100.00 k	26.018500 G	-35.44

802.11g & 6Mbps& 2412MHz

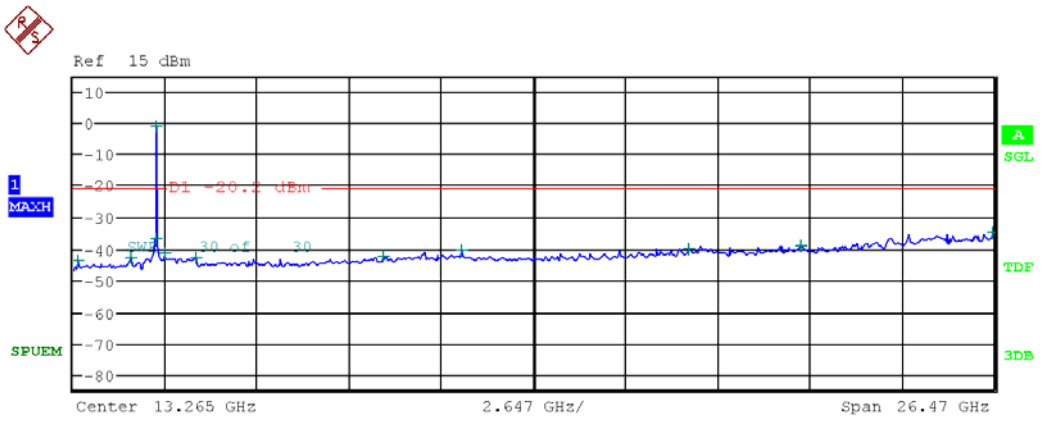
Reference



Low Band-edge



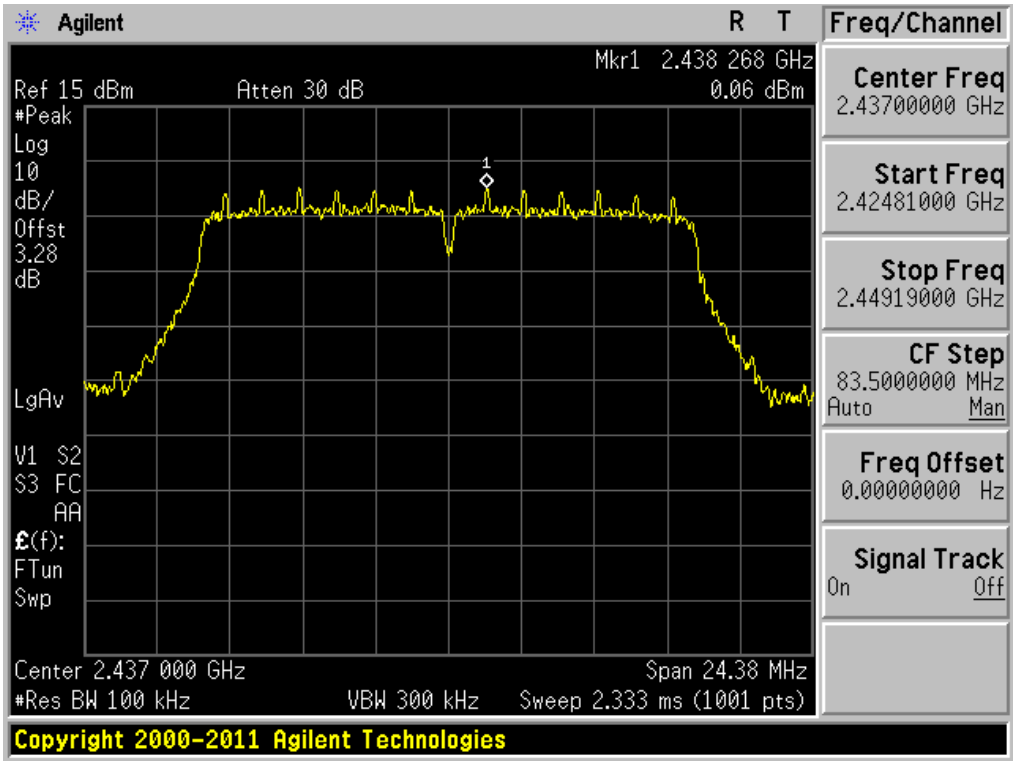
Conducted Spurious Emissions



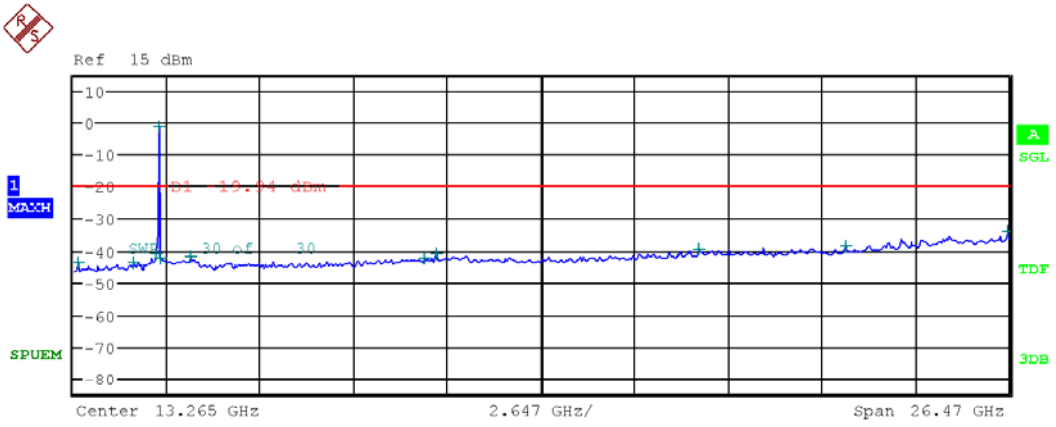
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	159.980000 M	-43.76
1.000 G	2.000 G	100.00 k	1.673600 G	-42.93
2.000 G	2.400 G	100.00 k	2.397644 G	-36.84
2.400 G	2.483 G	100.00 k	2.413243 G	-1.15
2.483 G	3.000 G	100.00 k	2.639770 G	-41.70
3.000 G	6.000 G	100.00 k	3.562125 G	-43.03
6.000 G	10.000 G	100.00 k	8.917000 G	-42.31
10.000 G	14.000 G	100.00 k	11.197500 G	-40.66
14.000 G	18.000 G	100.00 k	17.713500 G	-39.99
18.000 G	22.000 G	100.00 k	20.946500 G	-39.27
22.000 G	26.500 G	100.00 k	26.453875 G	-34.83

802.11g &6Mbps & 2437MHz

Reference



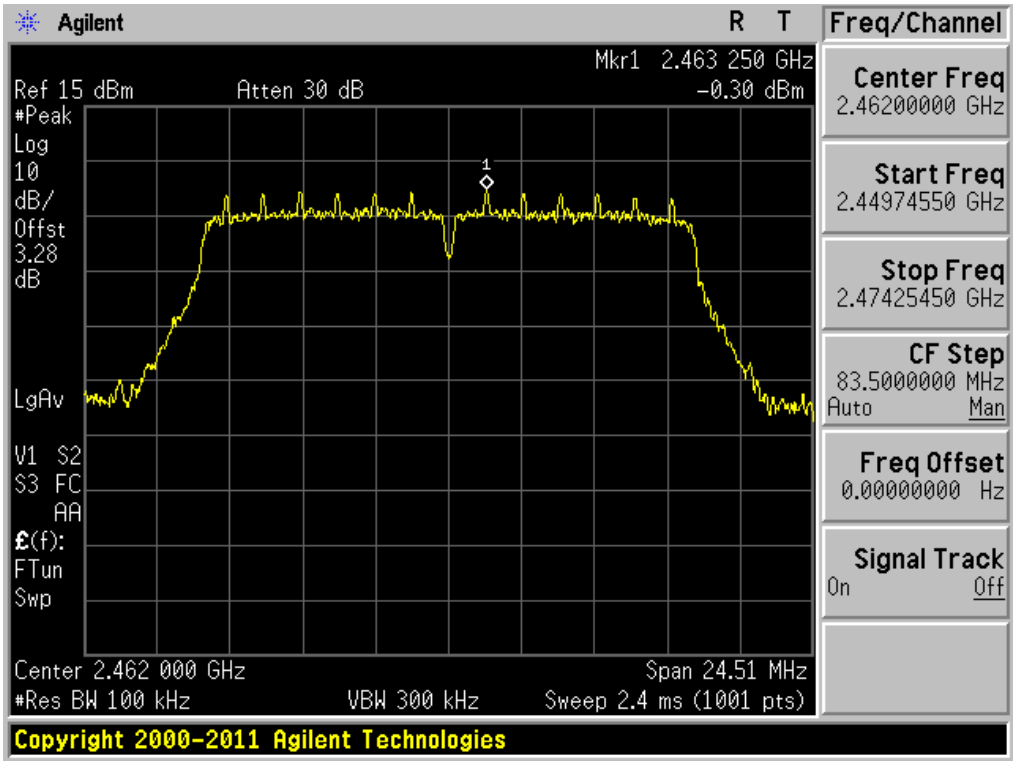
Conducted Spurious Emissions



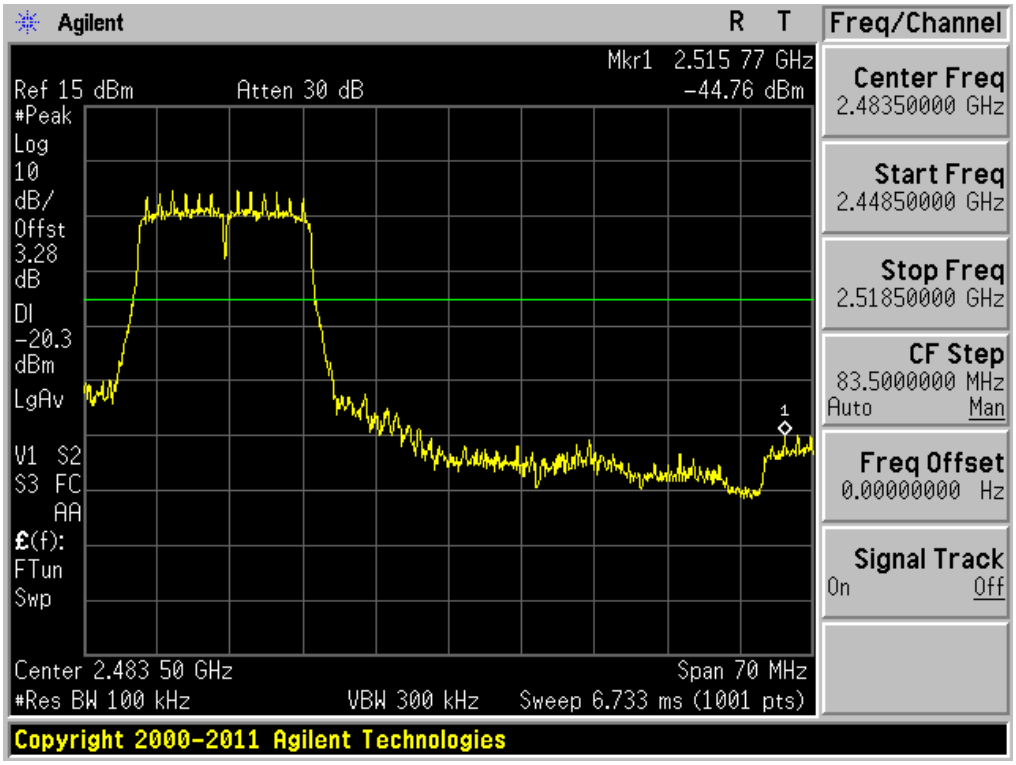
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	159.980000 M	-44.08
1.000 G	2.000 G	100.00 k	1.725800 G	-43.79
2.000 G	2.400 G	100.00 k	2.350756 G	-41.19
2.400 G	2.483 G	100.00 k	2.438276 G	-1.39
2.483 G	3.000 G	100.00 k	2.494002 G	-42.34
3.000 G	6.000 G	100.00 k	3.345750 G	-42.27
6.000 G	10.000 G	100.00 k	9.968000 G	-42.70
10.000 G	14.000 G	100.00 k	10.298500 G	-41.28
14.000 G	18.000 G	100.00 k	17.729000 G	-39.68
18.000 G	22.000 G	100.00 k	21.860000 G	-38.75
22.000 G	26.500 G	100.00 k	26.453312 G	-34.29

802.11g&6Mbps & 2462MHz

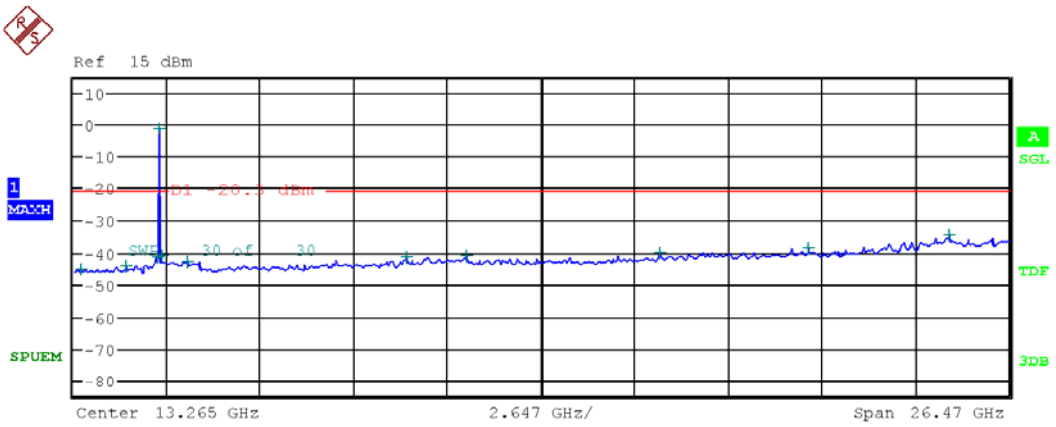
Reference



High Band-edge



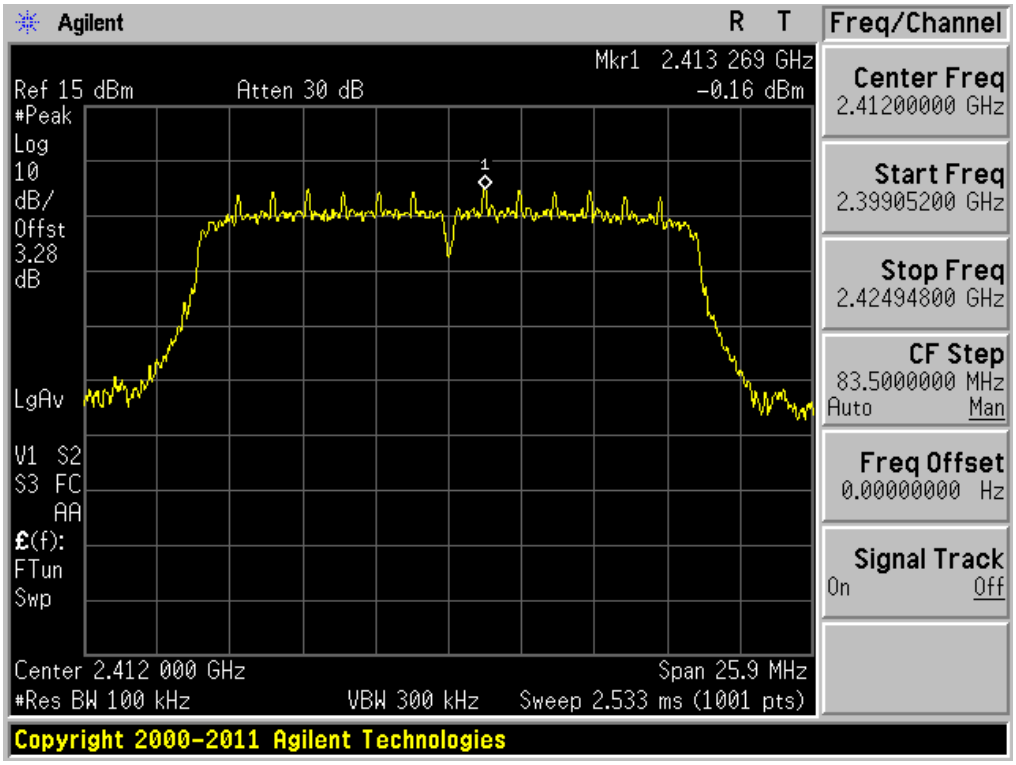
Conducted Spurious Emissions



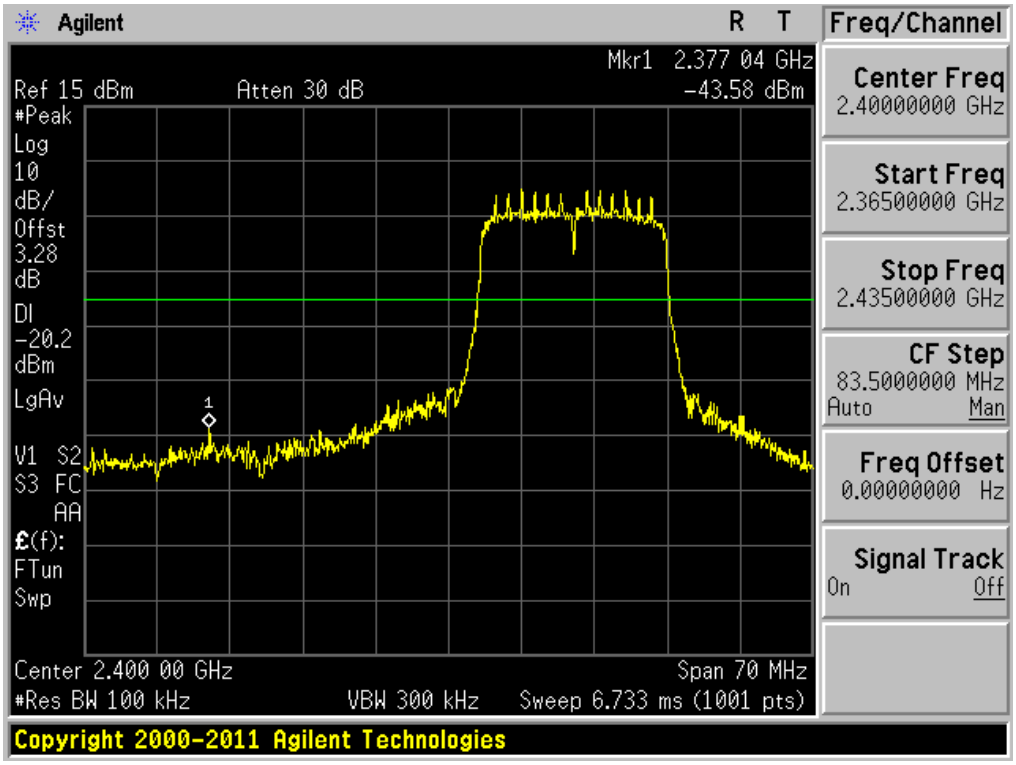
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	239.132000 M	-45.19
1.000 G	2.000 G	100.00 k	1.520000 G	-44.22
2.000 G	2.400 G	100.00 k	2.387244 G	-41.55
2.400 G	2.483 G	100.00 k	2.456980 G	-1.26
2.483 G	3.000 G	100.00 k	2.536986 G	-41.07
3.000 G	6.000 G	100.00 k	3.266250 G	-42.91
6.000 G	10.000 G	100.00 k	9.466000 G	-41.67
10.000 G	14.000 G	100.00 k	11.148500 G	-41.23
14.000 G	18.000 G	100.00 k	16.601500 G	-39.97
18.000 G	22.000 G	100.00 k	20.803000 G	-38.89
22.000 G	26.500 G	100.00 k	24.817000 G	-34.74

802.11n(HT20)&MCS0& 2412MHz

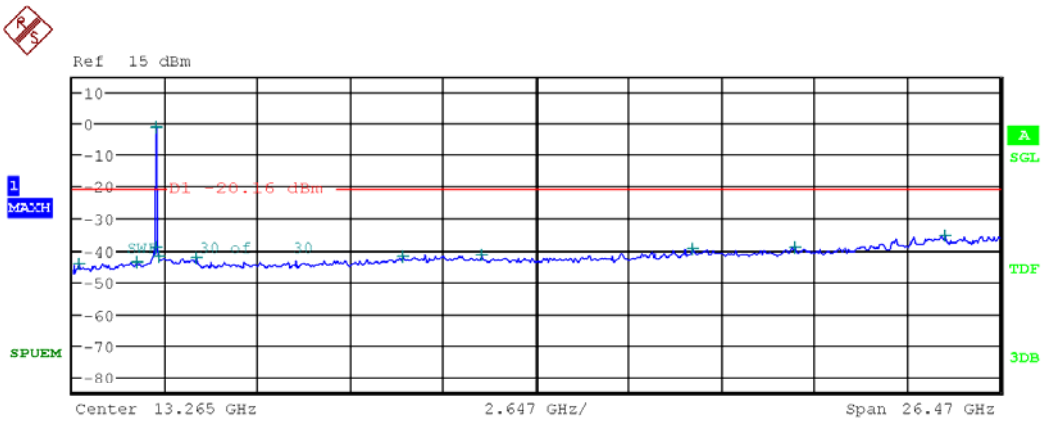
Reference



Low Band-edge



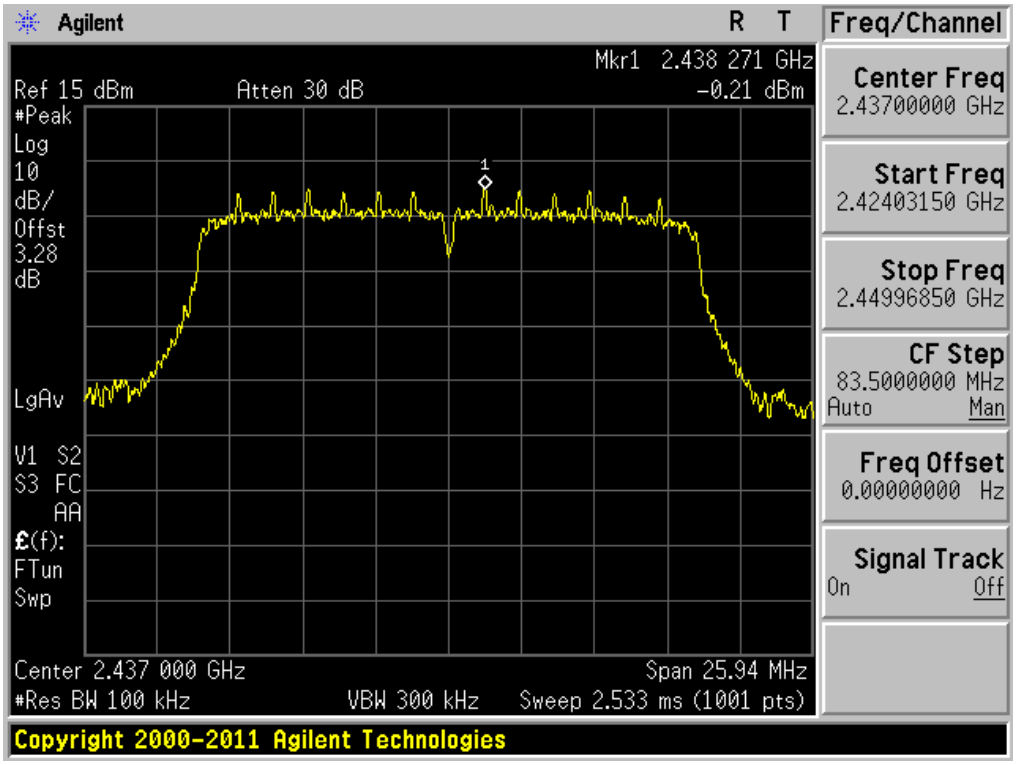
Conducted Spurious Emissions



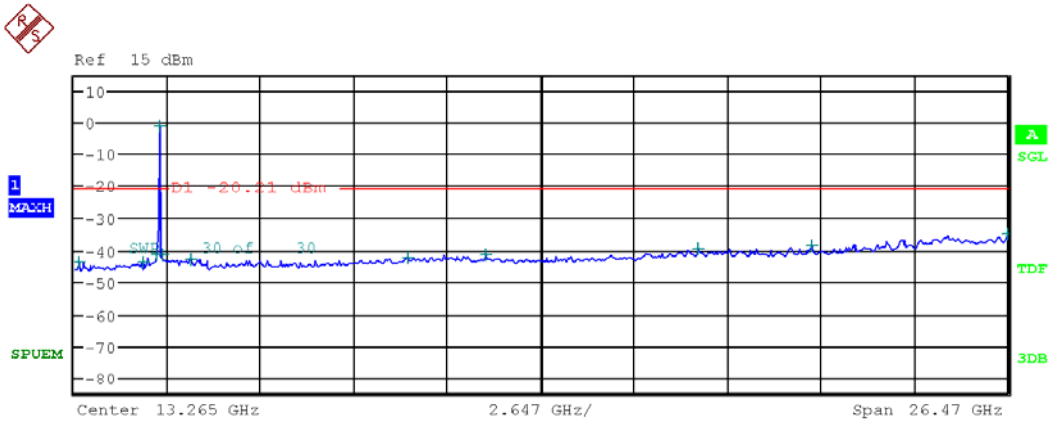
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	210.226000 M	-44.46
1.000 G	2.000 G	100.00 k	1.872000 G	-43.71
2.000 G	2.400 G	100.00 k	2.399778 G	-39.21
2.400 G	2.483 G	100.00 k	2.417001 G	-1.06
2.483 G	3.000 G	100.00 k	2.495379 G	-42.18
3.000 G	6.000 G	100.00 k	3.549000 G	-42.67
6.000 G	10.000 G	100.00 k	9.439500 G	-41.86
10.000 G	14.000 G	100.00 k	11.692000 G	-41.80
14.000 G	18.000 G	100.00 k	17.720000 G	-39.59
18.000 G	22.000 G	100.00 k	20.654500 G	-39.26
22.000 G	26.500 G	100.00 k	24.912063 G	-35.66

802.11n(HT20)&MCS0& 2437MHz

Reference



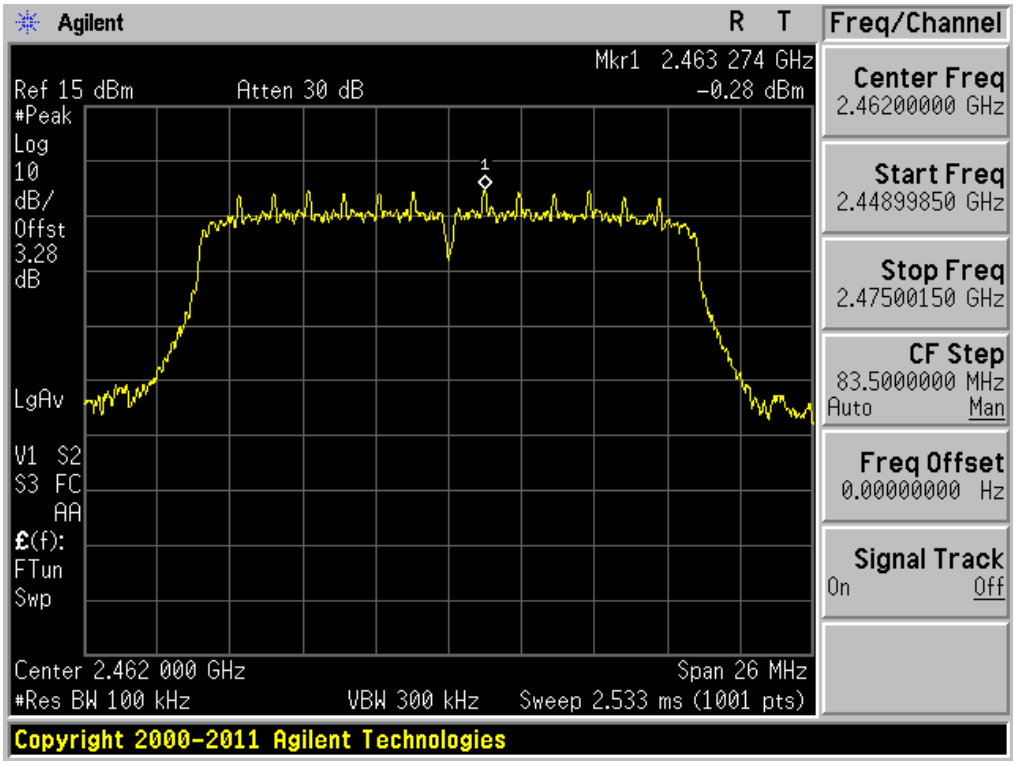
Conducted Spurious Emissions



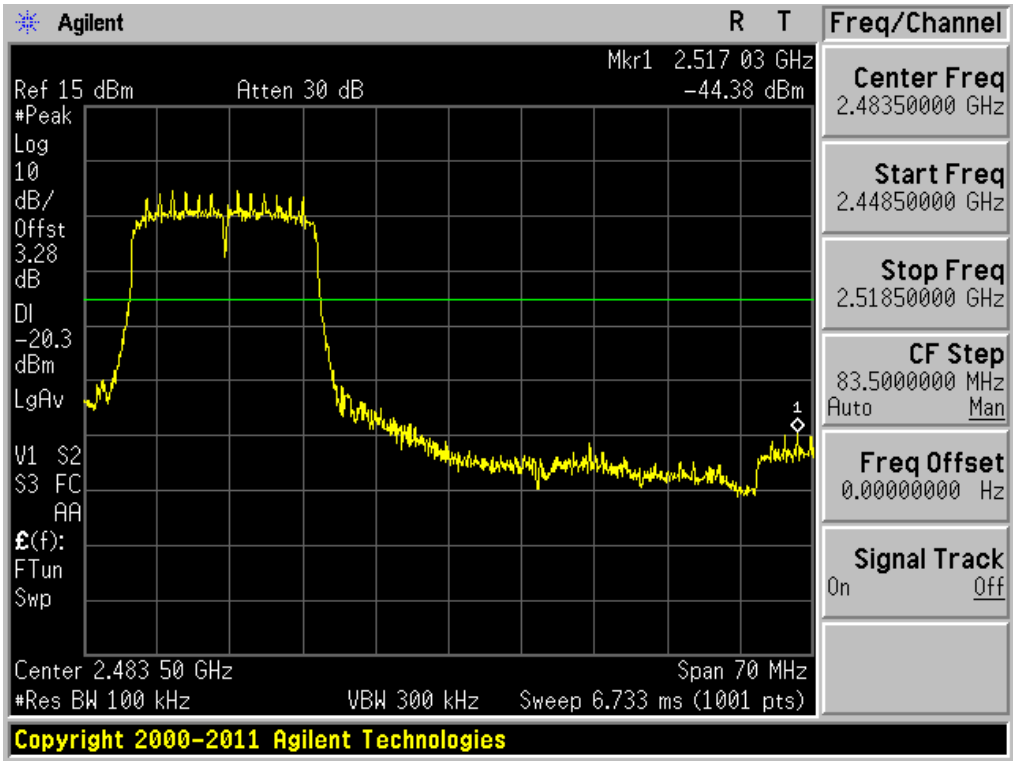
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	159.980000 M	-43.73
1.000 G	2.000 G	100.00 k	1.994800 G	-43.87
2.000 G	2.400 G	100.00 k	2.378267 G	-41.58
2.400 G	2.483 G	100.00 k	2.442001 G	-1.28
2.483 G	3.000 G	100.00 k	2.514720 G	-41.40
3.000 G	6.000 G	100.00 k	3.336000 G	-43.09
6.000 G	10.000 G	100.00 k	9.485500 G	-42.37
10.000 G	14.000 G	100.00 k	11.713500 G	-41.56
14.000 G	18.000 G	100.00 k	17.707000 G	-39.87
18.000 G	22.000 G	100.00 k	20.930000 G	-38.64
22.000 G	26.500 G	100.00 k	26.497187 G	-35.00

802.11n(HT20)&MCS0& 2462MHz

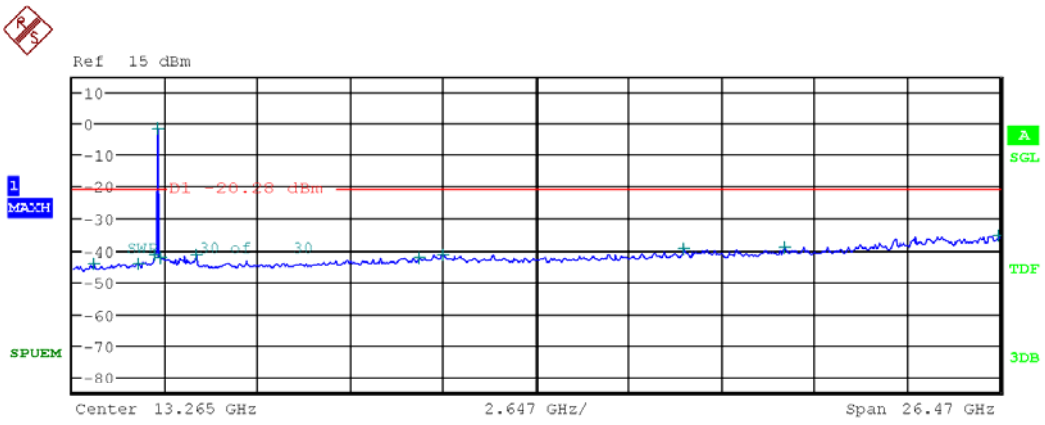
Reference



High Band-edge



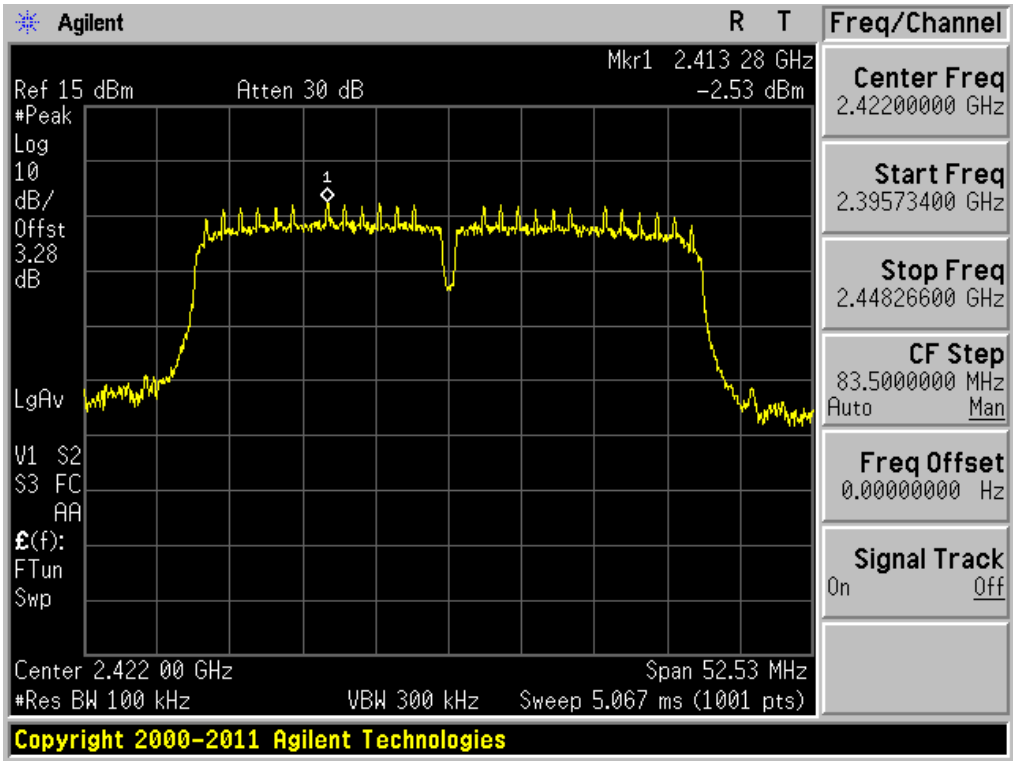
Conducted Spurious Emissions



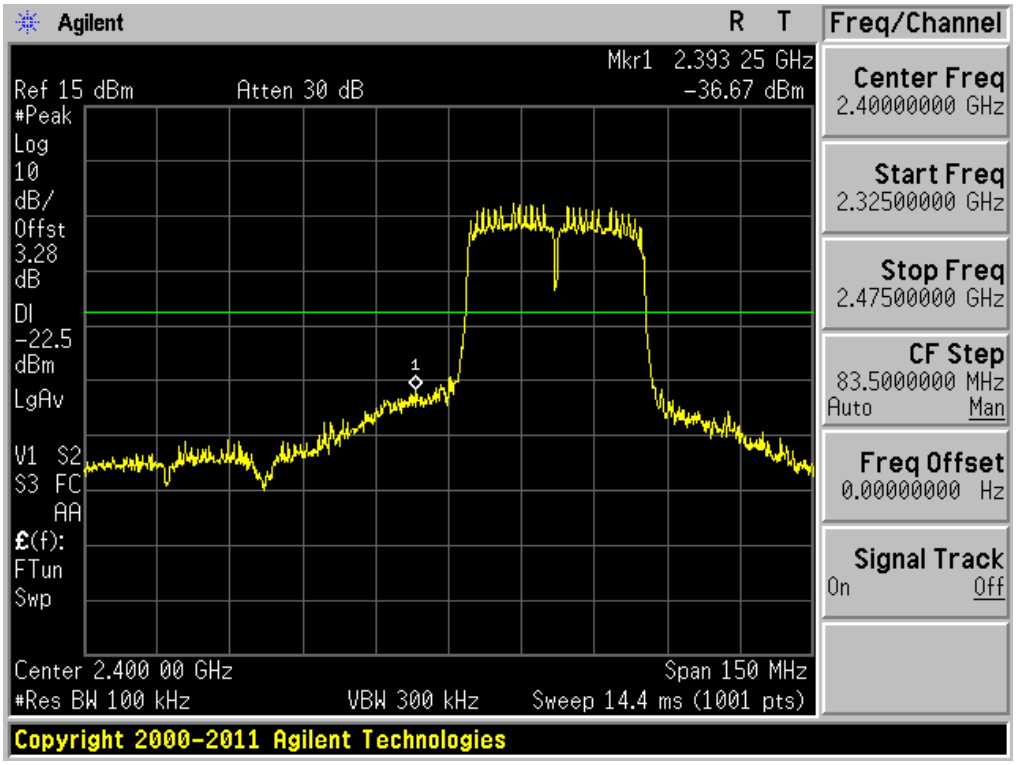
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	613.552000 M	-44.41
1.000 G	2.000 G	100.00 k	1.910400 G	-44.29
2.000 G	2.400 G	100.00 k	2.375733 G	-41.38
2.400 G	2.483 G	100.00 k	2.460771 G	-1.57
2.483 G	3.000 G	100.00 k	2.536240 G	-42.32
3.000 G	6.000 G	100.00 k	3.567750 G	-41.37
6.000 G	10.000 G	100.00 k	9.933500 G	-42.45
10.000 G	14.000 G	100.00 k	10.582500 G	-41.63
14.000 G	18.000 G	100.00 k	17.451500 G	-39.61
18.000 G	22.000 G	100.00 k	20.366000 G	-39.32
22.000 G	26.500 G	100.00 k	26.465125 G	-35.37

802.11n(HT40)&MCS0 & 2422MHz

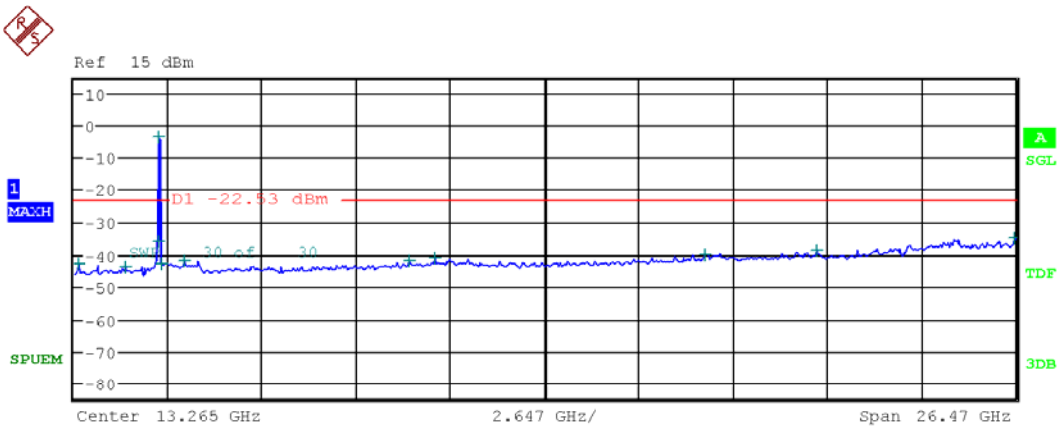
Reference



Low Band-edge



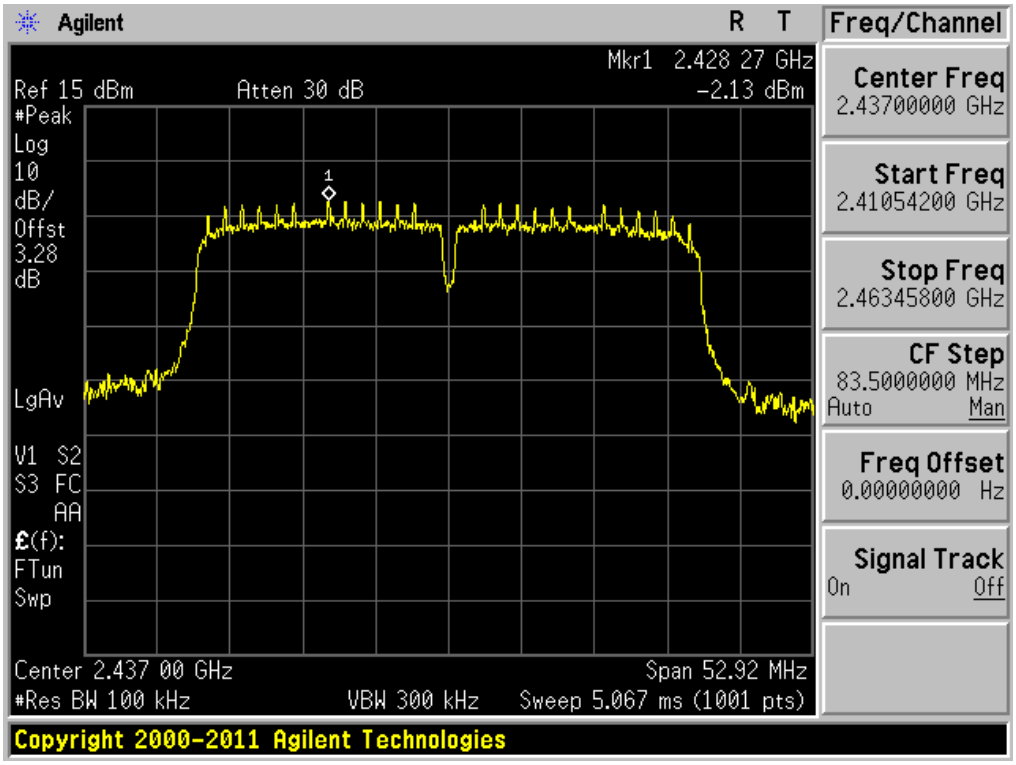
Conducted Spurious Emissions



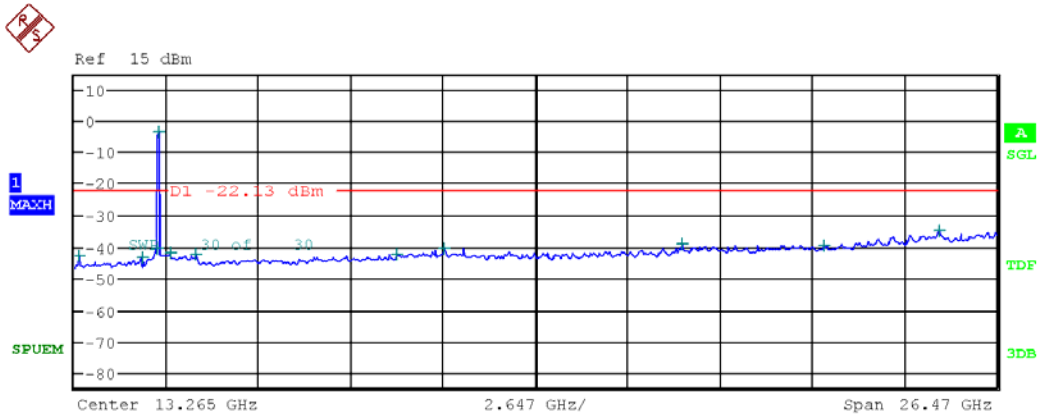
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	159.980000 M	-42.85
1.000 G	2.000 G	100.00 k	1.468200 G	-43.90
2.000 G	2.400 G	100.00 k	2.395778 G	-36.11
2.400 G	2.483 G	100.00 k	2.417001 G	-3.59
2.483 G	3.000 G	100.00 k	2.488435 G	-42.82
3.000 G	6.000 G	100.00 k	3.117750 G	-42.03
6.000 G	10.000 G	100.00 k	9.464000 G	-41.96
10.000 G	14.000 G	100.00 k	10.154000 G	-41.30
14.000 G	18.000 G	100.00 k	17.761000 G	-40.00
18.000 G	22.000 G	100.00 k	20.898000 G	-38.86
22.000 G	26.500 G	100.00 k	26.460625 G	-35.14

802.11n(HT40)& MCS0 & 2437MHz

Reference



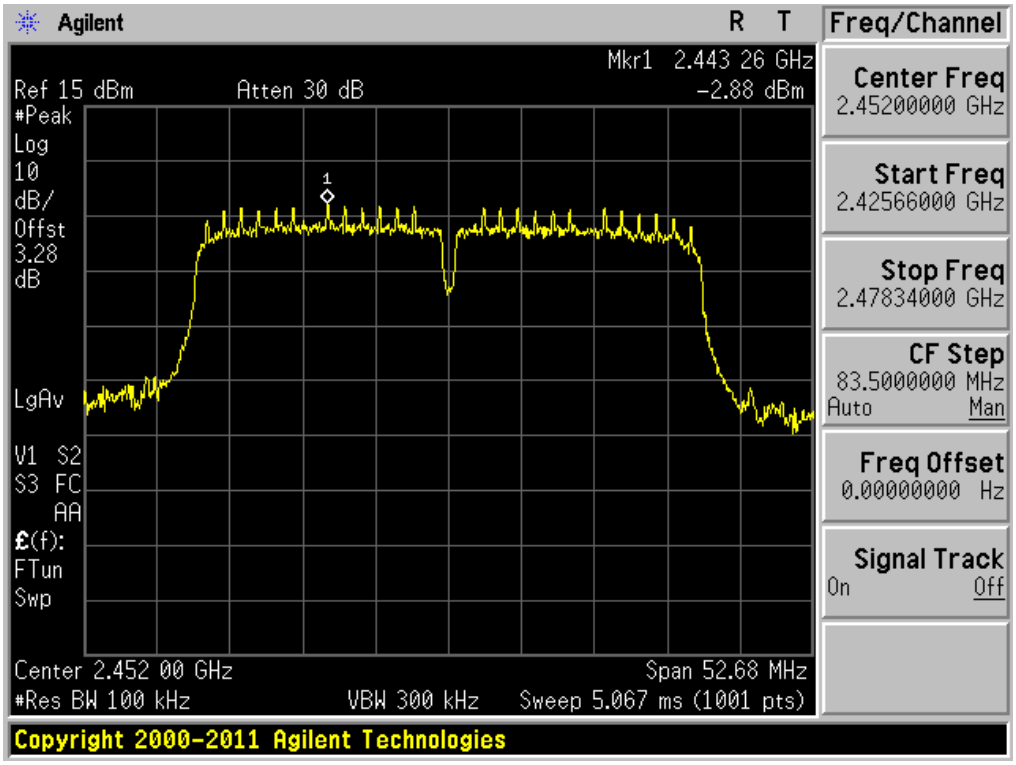
Conducted Spurious Emissions



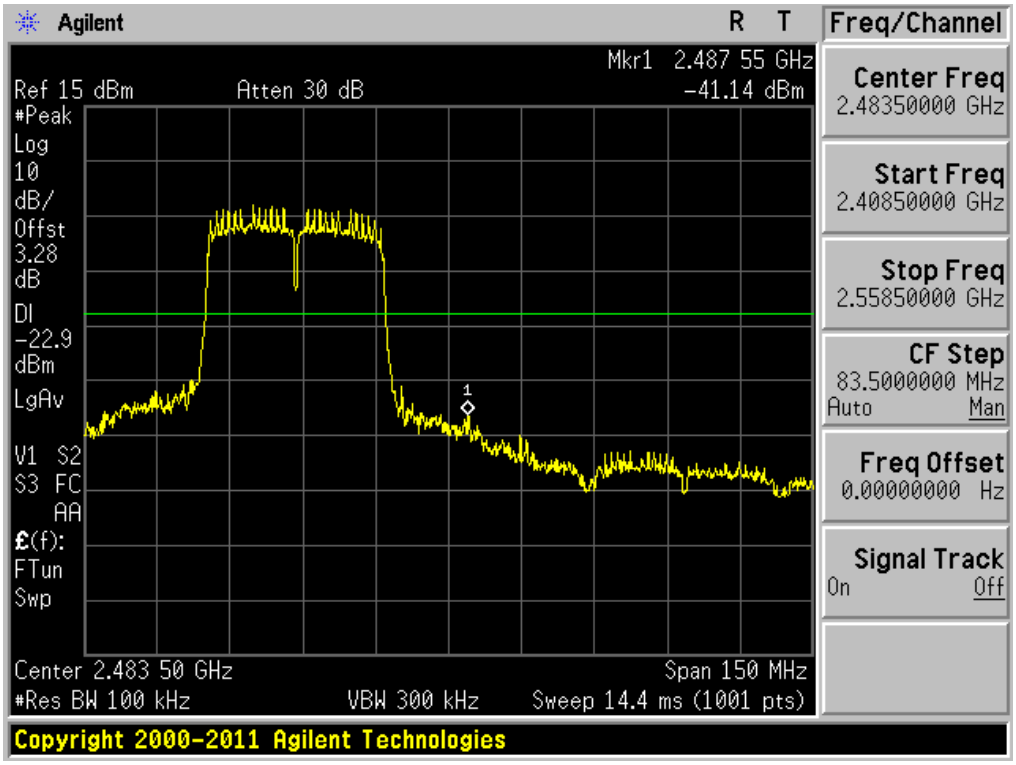
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	159.980000 M	-42.98
1.000 G	2.000 G	100.00 k	1.975400 G	-43.58
2.000 G	2.400 G	100.00 k	2.397289 G	-40.84
2.400 G	2.483 G	100.00 k	2.428256 G	-3.43
2.483 G	3.000 G	100.00 k	2.797016 G	-42.09
3.000 G	6.000 G	100.00 k	3.504000 G	-42.60
6.000 G	10.000 G	100.00 k	9.266000 G	-42.36
10.000 G	14.000 G	100.00 k	10.646500 G	-40.60
14.000 G	18.000 G	100.00 k	17.454000 G	-39.19
18.000 G	22.000 G	100.00 k	21.544500 G	-39.60
22.000 G	26.500 G	100.00 k	24.836125 G	-35.07

802.11n(HT40)& MCS0 & 2452MHz

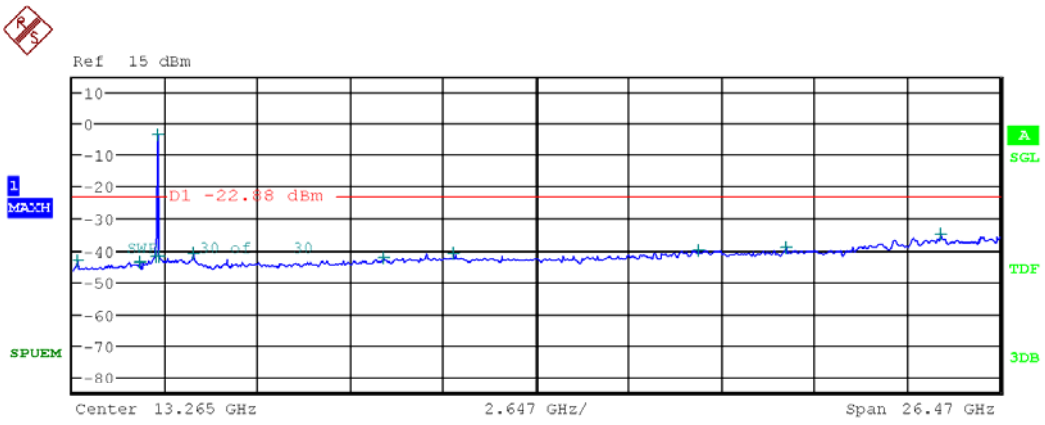
Reference



High Band-edge



Conducted Spurious Emissions



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]
30.000 M	1.000 G	100.00 k	159.980000 M	-43.49
1.000 G	2.000 G	100.00 k	1.945000 G	-43.91
2.000 G	2.400 G	100.00 k	2.385644 G	-42.17
2.400 G	2.483 G	100.00 k	2.446994 G	-3.62
2.483 G	3.000 G	100.00 k	2.484476 G	-41.94
3.000 G	6.000 G	100.00 k	3.486000 G	-41.13
6.000 G	10.000 G	100.00 k	8.912500 G	-42.44
10.000 G	14.000 G	100.00 k	10.888500 G	-40.95
14.000 G	18.000 G	100.00 k	17.886000 G	-40.27
18.000 G	22.000 G	100.00 k	20.383000 G	-39.32
22.000 G	26.500 G	100.00 k	24.817563 G	-34.99

8.5 Radiated Spurious Emissions

Test Requirements and limit,§15.247(d), §15.205, §15.209& RSS-210[A8.5], RSS-Gen [7.2.2]

In any 100kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) and (b), then the 15.209(a) limit in the table below has to be followed

▪ **FCC Part 15.209(a) and (b)**

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

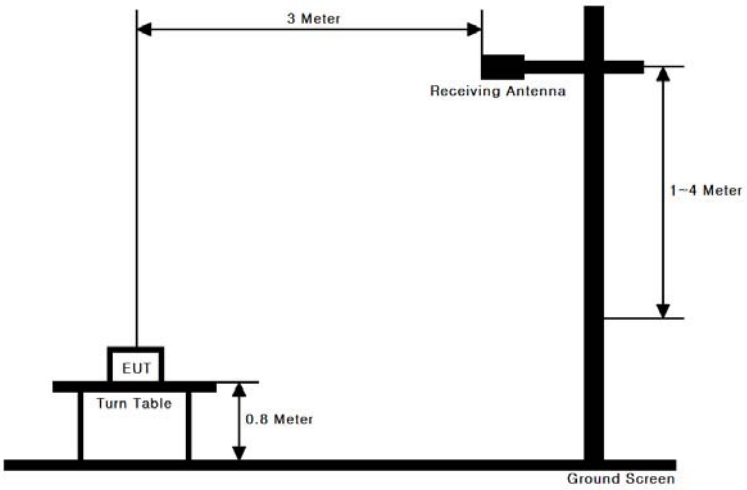
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

▪ **FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	3600 ~ 4400	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	4.5 ~ 5.15	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	5.35 ~ 5.46	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	156.52475 ~	1660 ~ 1710	7.25 ~ 7.75	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57675 ~	156.52525	1718.8 ~ 1722.2	8.025 ~ 8.5	23.6 ~ 24.0
4.20725 ~ 4.20775	12.57725	156.7 ~ 156.9	2200 ~ 2300	9.0 ~ 9.2	31.2 ~ 31.8
6.215 ~ 6.218	13.36 ~ 13.41	162.0125 ~ 167.17	2310 ~ 2390	9.3 ~ 9.5	36.43 ~ 36.5
6.26775 ~ 6.26825	16.42 ~ 16.423	167.72 ~ 173.2	2483.5 ~ 2500	10.6 ~ 12.7	Above 38.6
6.31175 ~ 6.31225	16.69475 ~	240 ~ 285	2655 ~ 2900	13.25 ~ 13.4	
8.291 ~ 8.294	16.69525	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	16.80425 ~	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	16.80475	608 ~ 614	3345.8 ~ 3358		
	25.5 ~ 25.67	960 ~ 1240			
	37.5 ~ 38.25				
	73 ~ 74.6				
	74.8 ~ 75.2				

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

Test Configuration



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m 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. Repeat above procedures until the measurements for all frequencies are complete.

Note : Measurement Instrument Setting for Radiated Emission Measurements.

1. **Frequency Range Below 1 GHz**
   RBW = 100 or 120 KHz, VBW = 3 x RBW , Detector = Peak or Quasi Peak

2. **Frequency Range > 1 GHz**
   Peak Measurement
   RBW = 1 MHz , VBW = 3 MHz, Detector = Peak
   Average Measurement
   VBW = 10 Hz, When duty cycle is no less than 98 percent.
   VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T_{on}(us)	1/T_{on}(KHz)	Determined VBW Setting
802.11b	97.75	8.680	0.12	**1KHz**
802.11g	87.80	1.440	0.70	**1KHz**
2.4GHz 802.11n(HT20)	86.77	1.345	0.75	**1KHz**
2.4GHz 802.11n(HT40)	76.78	0.668	1.50	**1.5KHz**
-	-	-	-	-
-	-	-	-	-

Note: For average measurement with duty cycle < 98%, the reduced VBW measurement methodof 4.2.3.2.3 in ANSI C63.10 is used.

30MHz ~ 25GHz Data(*802.11b &1Mbps*)

▪ Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
359.94	H	X	QP	47.81	-6.10	41.71	46.00	4.29
900.00	H	X	QP	38.46	4.30	42.76	46.00	3.24
2381.75	V	X	PK	61.08	-2.33	58.75	74.00	15.25
2375.84	V	X	AV	50.79	-2.33	48.46	54.00	5.54
2488.51	V	X	PK	57.22	-2.24	54.98	74.00	19.02
2488.89	V	X	AV	48.56	-2.24	46.32	54.00	7.68
3216.04	H	Z	PK	50.70	1.12	51.82	74.00	22.18
3216.55	H	Z	AV	46.60	1.12	47.72	54.00	6.28
4824.10	V	Y	PK	47.48	6.21	53.69	74.00	20.31
4824.15	V	Y	AV	40.16	6.21	46.37	54.00	7.63

▪ Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
360.01	H	X	QP	48.19	-6.10	42.09	46.00	3.91
900.00	H	X	QP	38.79	4.30	43.09	46.00	2.91
2358.32	V	X	PK	60.03	-2.33	57.70	74.00	16.30
2359.84	V	X	AV	53.22	-2.33	50.89	54.00	3.11
2489.27	V	X	PK	54.60	-2.24	52.36	74.00	21.64
2490.13	V	X	AV	41.42	-2.24	39.18	54.00	14.82
3249.46	H	Z	PK	49.52	1.28	50.80	74.00	23.20
3249.43	H	Z	AV	43.56	1.28	44.84	54.00	9.16
4874.10	V	Y	PK	47.03	6.60	53.63	74.00	20.37
4874.10	V	Y	AV	39.99	6.60	46.59	54.00	7.41

▪ Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
359.99	H	X	QP	47.94	-6.10	41.84	46.00	4.16
900.00	H	X	QP	37.92	4.30	42.22	46.00	3.78
2380.72	V	X	PK	61.20	-2.33	58.87	74.00	15.13
2381.20	V	X	AV	54.22	-2.33	51.89	54.00	2.11
2498.26	V	X	PK	55.12	-2.24	52.88	74.00	21.12
2498.51	V	X	AV	46.20	-2.24	43.96	54.00	10.04
3282.81	H	Z	PK	48.90	1.44	50.34	74.00	23.66
3282.79	H	Z	AV	42.26	1.44	43.70	54.00	10.30
4924.14	V	Y	PK	46.74	6.63	53.37	74.00	20.63
4924.22	V	Y	AV	38.60	6.63	45.23	54.00	8.77

Note.

1.No other spurious and harmonic emissions were foundgreater than listed emissions on above table.
2.Above listed point data is the worst case data.
3.Sample Calculation.
Margin = Limit – Result / Result = Reading + T.F / T.F = AF + CL – AG
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

30MHz ~ 25GHz Data(*802.11g &6Mbps*)

▪ Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
359.97	H	X	QP	48.86	-6.10	42.76	46.00	3.24
900.00	H	X	QP	38.77	4.30	43.07	46.00	2.93
2386.40	V	X	PK	61.94	-2.33	59.61	74.00	14.39
2388.16	V	X	AV	49.97	-2.33	47.64	54.00	6.36
2489.35	V	X	PK	58.08	-2.24	55.84	74.00	18.16
2483.59	V	X	AV	46.61	-2.24	44.37	54.00	9.63
3216.01	H	Z	PK	51.38	1.12	52.50	74.00	21.50
3216.15	H	Z	AV	46.81	1.12	47.93	54.00	6.07
4824.39	V	Y	PK	47.34	6.21	53.55	74.00	20.45
4824.25	V	Y	AV	37.70	6.21	43.91	54.00	10.09

▪ Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
359.95	H	X	QP	48.20	-6.10	42.10	46.00	3.90
900.00	H	X	QP	39.02	4.30	43.32	46.00	2.68
2358.80	V	X	PK	61.49	-2.33	59.16	74.00	14.84
2358.72	V	X	AV	51.07	-2.33	48.74	54.00	5.26
2497.65	V	X	PK	55.87	-2.24	53.63	74.00	20.37
2499.40	V	X	AV	44.80	-2.24	42.56	54.00	11.44
3249.20	H	Z	PK	49.50	1.28	50.78	74.00	23.22
3249.43	H	Z	AV	44.05	1.28	45.33	54.00	8.67
4874.29	V	Y	PK	45.58	6.60	52.18	74.00	21.82
4874.20	V	Y	AV	35.89	6.60	42.49	54.00	11.51

▪ Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
359.96	H	X	QP	48.51	-6.10	42.41	46.00	3.59
900.00	H	X	QP	38.61	4.30	42.91	46.00	3.09
2380.32	V	X	PK	62.60	-2.33	60.27	74.00	13.73
2380.24	V	X	AV	52.73	-2.33	50.40	54.00	3.60
2483.53	V	X	PK	62.19	-2.24	59.95	74.00	14.05
2486.23	V	X	AV	46.58	-2.24	44.34	54.00	9.66
3282.89	H	Z	PK	48.55	1.44	49.99	74.00	24.01
3282.75	H	Z	AV	42.02	1.44	43.46	54.00	10.54
4924.23	V	Y	PK	45.77	6.63	52.40	74.00	21.60
4924.02	V	Y	AV	35.52	6.63	42.15	54.00	11.85

Note.

1.No other spurious and harmonic emissions were foundgreater than listed emissions on above table..
2.Above listed point data is the worst case data.
3.Sample Calculation.
Margin = Limit – Result / Result = Reading + T.F / T.F = AF + CL – AG
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

30MHz ~ 25GHz Data(*802.11n HT20 &MCS0*)

▪ Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
359.91	H	X	QP	48.78	-6.10	42.68	46.00	3.32
900.00	H	X	QP	39.46	4.30	43.76	46.00	2.24
2385.04	V	X	PK	61.22	-2.33	58.89	74.00	15.11
2388.24	V	X	AV	49.23	-2.33	46.90	54.00	7.10
2487.67	V	X	PK	57.63	-2.24	55.39	74.00	18.61
2489.07	V	X	AV	46.66	-2.24	44.42	54.00	9.58
3216.11	H	Z	PK	51.04	1.12	52.16	74.00	21.84
3216.08	H	Z	AV	46.87	1.12	47.99	54.00	6.01
4823.53	V	Y	PK	47.06	6.21	53.27	74.00	20.73
4824.17	V	Y	AV	37.97	6.21	44.18	54.00	9.82

▪ Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
359.94	H	X	QP	48.10	-6.10	42.00	46.00	4.00
900.00	H	X	QP	38.12	4.30	42.42	46.00	3.58
2360.88	V	X	PK	61.04	-2.33	58.71	74.00	15.29
2359.62	V	X	AV	50.41	-2.33	48.08	54.00	5.92
2499.90	V	X	PK	57.65	-2.24	55.41	74.00	18.59
2499.85	V	X	AV	45.88	-2.24	43.64	54.00	10.36
3249.42	H	Z	PK	49.14	1.28	50.42	74.00	23.58
3249.41	H	Z	AV	43.77	1.28	45.05	54.00	8.95
4874.42	V	Y	PK	46.20	6.60	52.80	74.00	21.20
4874.05	V	Y	AV	35.97	6.60	42.57	54.00	11.43

▪ Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
360.00	H	X	QP	47.93	-6.10	41.83	46.00	4.17
900.00	H	X	QP	38.57	4.30	42.87	46.00	3.13
2383.60	V	X	PK	63.47	-2.33	61.14	74.00	12.86
2381.04	V	X	AV	53.59	-2.33	51.26	54.00	2.74
2483.50	V	X	PK	63.94	-2.24	61.70	74.00	12.30
2485.61	V	X	AV	46.60	-2.24	44.36	54.00	9.64
3282.79	H	Z	PK	49.19	1.44	50.63	74.00	23.37
3282.67	H	Z	AV	42.41	1.44	43.85	54.00	10.15
4923.31	V	Y	PK	46.21	6.63	52.84	74.00	21.16
4924.01	V	Y	AV	35.33	6.63	41.96	54.00	12.04

Note.

1.No other spurious and harmonic emissions were foundgreater than listed emissions on above table..
2.Above listed point data is the worst case data.
3.Sample Calculation.
Margin = Limit – Result / Result = Reading + T.F / T.F = AF + CL – AG
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

30MHz ~ 25GHz Data(*802.11n HT40 & MCS0*)

▪ Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
359.99	H	X	QP	49.09	-6.10	42.99	46.00	3.01
900.00	H	X	QP	39.51	4.30	43.81	46.00	2.19
2385.92	V	X	PK	61.97	-2.33	59.64	74.00	14.36
2385.68	V	X	AV	49.11	-2.33	46.78	54.00	7.22
2497.77	V	X	PK	57.25	-2.24	55.01	74.00	18.99
2499.50	V	X	AV	45.90	-2.24	43.66	54.00	10.34
3229.36	H	Z	PK	50.29	1.12	51.41	74.00	22.59
3229.48	H	Z	AV	45.15	1.12	46.27	54.00	7.73
4844.02	V	Y	PK	46.40	6.21	52.61	74.00	21.39
4844.03	V	Y	AV	37.33	6.21	43.54	54.00	10.46

▪ Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
359.92	H	X	QP	47.91	-6.10	41.81	46.00	4.19
900.00	H	X	QP	39.50	4.30	43.80	46.00	2.20
2387.48	V	X	PK	62.22	-2.33	59.89	74.00	14.11
2382.30	V	X	AV	51.88	-2.33	49.55	54.00	4.45
2483.64	V	X	PK	59.39	-2.24	57.15	74.00	16.85
2486.14	V	X	AV	48.30	-2.24	46.06	54.00	7.94
3249.44	H	Z	PK	49.89	1.28	51.17	74.00	22.83
3249.38	H	Z	AV	43.67	1.28	44.95	54.00	9.05
4873.91	V	Y	PK	48.80	6.60	55.40	74.00	18.60
4874.11	V	Y	AV	35.45	6.60	42.05	54.00	11.95

▪ Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
359.97	H	X	QP	48.62	-6.10	42.52	46.00	3.48
900.00	H	X	QP	39.35	4.30	43.65	46.00	2.35
2382.56	V	X	PK	62.58	-2.33	60.25	74.00	13.75
2382.24	V	X	AV	52.21	-2.33	49.88	54.00	4.12
2484.04	V	X	PK	63.20	-2.24	60.96	74.00	13.04
2487.90	V	X	AV	49.78	-2.24	47.54	54.00	6.46
3269.50	H	Z	PK	48.84	1.44	50.28	74.00	23.72
3269.46	H	Z	AV	42.53	1.44	43.97	54.00	10.03
4903.94	V	Y	PK	45.69	6.63	52.32	74.00	21.68
4904.27	V	Y	AV	35.53	6.63	42.16	54.00	11.84

Note.

1.No other spurious and harmonic emissions were foundgreater than listed emissions on above table..
2.Above listed point data is the worst case data.
3.Sample Calculation.
Margin = Limit – Result / Result = Reading + T.F / T.F = AF + CL – AG
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

8.6 Power-line Conducted Emissions

Test Requirements and limit, §15.207& RSS-Gen [7.2.2]

For an intentional radiator which 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 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

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

* Decreases with the logarithm of the frequency

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs for the actual connections between EUT and supportequipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference groundplane.
2. The EUT is connected via LISN to the test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

▣RESULT PLOTS

AC Line Conducted Emissions (Graph)

Test Mode: 802.11b(2.4GHz Band)

Digital EMC

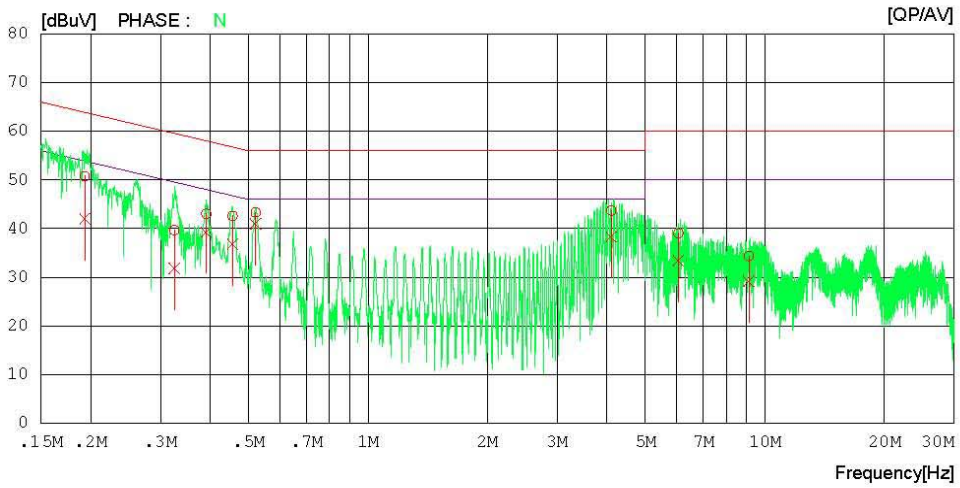
Results of Conducted Emission

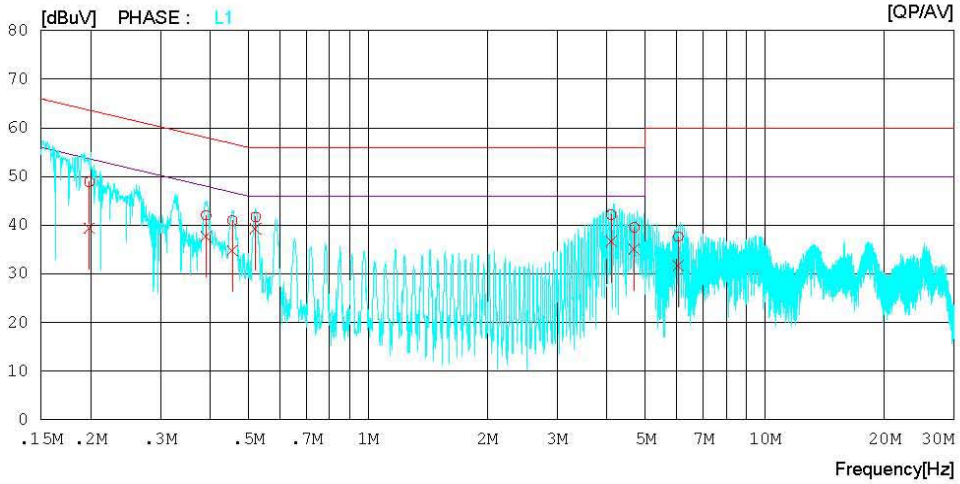
Digital EMC
Date : 2012-12-26

Model No.	:	TWFM-L303D-F	Referrence No.	:	
Type	:		Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	21 'C 39 % R.H.
Test Condition	:	WLAN	Operator	:	J.J.LEE

Memo : 802.11b

LIMIT : CISPR22_B QP
CISPR22_B AV





AC Line Conducted Emissions (List)

Test Mode: 802.11b(2.4GHz Band)

Results of Conducted Emission

Digital EMC
Date : 2012-12-26

Model No.	:	TWFM-L303D-F	Referrence No.	:	
Type	:		Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	21 'C 39 % R.H.
Test Condition	:	WLAN	Operator	:	J.J.LEE

Memo : 802.11b

LIMIT : CISPR22_B QP
CISPR22_B AV

NO	FREQ	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.19350	50.5	41.8	0.2	50.7	42.0	63.9	53.9	13.2	11.9	N
2	0.32519	39.5	31.6	0.2	39.7	31.8	59.6	49.6	19.9	17.8	N
3	0.39111	42.8	39.0	0.2	43.0	39.2	58.0	48.0	15.0	8.8	N
4	0.45581	42.4	36.5	0.2	42.6	36.7	56.8	46.8	14.2	10.1	N
5	0.52116	43.1	40.8	0.2	43.3	41.0	56.0	46.0	12.7	5.0	N
6	4.10350	43.4	38.0	0.3	43.7	38.3	56.0	46.0	12.3	7.7	N
7	6.05650	38.5	32.9	0.5	39.0	33.4	60.0	50.0	21.0	16.6	N
8	9.11750	33.6	28.4	0.7	34.3	29.1	60.0	50.0	25.7	20.9	N
9	0.19850	48.7	39.2	0.2	48.9	39.4	63.7	53.7	14.8	14.3	L1
10	0.39108	41.8	37.5	0.2	42.0	37.7	58.0	48.0	16.0	10.3	L1
11	0.45550	40.8	34.6	0.2	41.0	34.8	56.8	46.8	15.8	12.0	L1
12	0.52111	41.5	39.1	0.2	41.7	39.3	56.0	46.0	14.3	6.7	L1
13	4.10200	41.9	36.4	0.3	42.2	36.7	56.0	46.0	13.8	9.3	L1
14	4.68850	39.2	34.7	0.4	39.6	35.1	56.0	46.0	16.4	10.9	L1
15	6.05650	37.2	31.2	0.5	37.7	31.7	60.0	50.0	22.3	18.3	L1

8.7Occupied Bandwidth

Test Requirements, RSS-Gen [4.6.1]

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

▣TEST CONFIGURATION

Refer to the APPENDIX I.

▣ TEST PROCEDURE

The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%.
The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted.
Where practical,a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

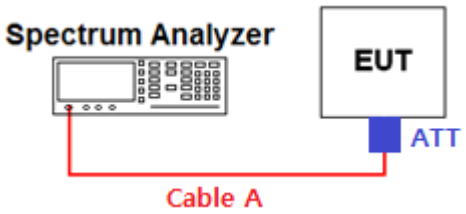
▣TEST RESULTS: N/A

9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	E4440A	12/09/18	13/09/18	MY45304199
Spectrum Analyzer	Agilent	E4440A	12/10/22	13/10/22	US45303051
Spectrum Analyzer	Rohde Schwarz	FSQ26	12/01/09	13/01/09	200445
Power Sensor	Rohde Schwarz	NRP-Z81	12/06/28	13/06/28	1137.9009.02-101001-EA
Virtual Power Meter(S/W)	Rohde Schwarz	R&S Power Viewer Plus	-	-	V 4.1.0
Digital Multimeter	H.P	34401A	12/03/05	13/03/05	3146A13475
Signal Generator	Rohde Schwarz	SMR20	12/03/05	13/03/05	101251
Vector Signal Generator	Rohde Schwarz	SMJ100A	12/01/09	13/01/09	100148
Thermo hygrometer	BODYCOM	BJ5478	12/01/13	13/01/13	090205-2
DC Power Supply	HP	6622A	12/03/05	13/03/05	3448A03760
High-pass filter	Wainwright	WHNX3.0	12/09/17	13/09/17	9
BILOG ANTENNA	SCHAFFNER	CBL6112B	12/11/06	14/11/06	2737
HORN ANT	ETS	3115	12/02/20	14/02/20	6419
HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	154
Attenuator (3dB)	WEINSCHEL	56-3	12/09/17	13/09/17	Y2342
Amplifier (22dB)	H.P	8447E	12/01/09	13/01/09	2945A02865
Amplifier (30dB)	Agilent	8449B	12/03/05	13/03/05	3008A00370
EMI TEST RECEIVER	R&S	ESU	12/01/09	13/01/09	100014
EMI TEST RECEIVER	R&S	ESCI	12/03/06	13/03/06	100364
CVCF	KIKUSUI	PCR1000L	12/09/15	13/09/15	14110610
LISN	R&S	ESH2-Z5	12/09/18	13/09/18	828739/006
RFI/Field intensity Meter	KYORITSU	KNM-2402	12/07/02	13/07/02	4N-170-3

APPENDIX I
Conducted Test set up Diagram &Path lossInformation

▪Conducted Measurement(30MHz ~ 26.5GHz)



Path loss value information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	2.97	10	3.79
1	3.03	15	4.27
2.412 ~ 2.462	3.28	20	4.48
5	3.46	26.5	4.80

Note. 1: The path loss from EUT to Spectrum analyzer was measured and used for test.
Path loss (=S/A's offset value) = Cable A + ATT(Attenuator, Applied only when it was used externally)
Note. 2: For conducted spurious emissions, the path loss values were saved as the transducer factor on the spurious measurement function of the spectrum analyzer and the transducer factor of tested frequency is calculated and corrected automatically by the spectrum analyzer's measurement function.