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TEST REPORT

Report Number: 101159678LEX-001
Project Number: G101159678

Report Issue Date: 6/3/2014

Product Name: WF10040 WiFi, Bluetooth Module
FCCID: URZ-WF10040
ICID: 68270-WF10040

Standards: CFR Title 47 Part 15 C, RSS 210-Issue 8

Radio Under Test: WiFi

Tested by:
Intertek Testing Services NA, Inc.
731 Enterprise Drive
Lexington, KY 40510

Client:
HandEra, Inc.
2859 104th St
Des Moines, IA 50322

Report prepared by
Toby Carrier, Technician

Report reviewed by
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TABLE OF CONTENTS

1 Introduction and Conclusion

The tests indicated in section 2 were performed on the product constructed as described in section 3. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test method, a list of the actual test equipment used, documentation photos, results and raw data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complied with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1 and ANSI C63.4. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters. The test site is listed with the FCC under registration number 485103. The test site is listed with Industry Canada under site number IC 2042M-1.

2 Test Summary

Page	Test full name	FCC Reference	IC Reference	Result
6	Peak Conducted Power	§ 15.247(b)(3)(4)	RSS-210 (A8.4)	Pass
8	Occupied Bandwidth	§ 15.247(a)(2)	RSS-210 (A8.2), RSS-GEN (4.6.1)	Pass
15	Conducted Spurious Emissions	§ 15.247(d)	RSS-210 (A8.5)	Pass
24	Power Spectral Density	§ 15.247(e)	RSS-210 (A8.2b)	Pass
30	Radiated Spurious Emissions (Transmitter)	§ 15.247(d), § 15.209, and § 15.205	RSS-210 (2.2) (A8.5)	Pass
38	Radiated Spurious Emissions (Receiver)	§ 15.109	RSS-Gen (6.1)	Pass
42	AC Powerline Conducted Emissions	§ 15.107, § 15.207	RSS-Gen (7.2.4)	Pass
45	Antenna Requirement per FCC Part 15.203	§ 15.203	RSS-Gen (7.1.2)	Pass

3 Description of Equipment Under Test

Equipment Under Test	
Manufacturer	HandEra, Inc.
Model Number	WF10040
Serial Number	Test Sample 1
FCC Identifier	URZ-WF10040
IC Identifier	68270-WF10040
Receive Date	5/8/2013
Test Start Date	5/8/2013
Test End Date	5/23/2013
Device Received Condition	Good
Test Sample Type	Production
Frequency Band	2412MHz – 2462MHz
Mode(s) of Operation	802.11b/g/n
Modulation Type	BPSK, QPSK, CCK, OFDM
Duty Cycle	100%
Transmission Control	Test Commands
Test Channels	1, 6, 11
Antenna Type (15.203)	Internal
Antenna Gain	2.1dBi
Power Supply	DC

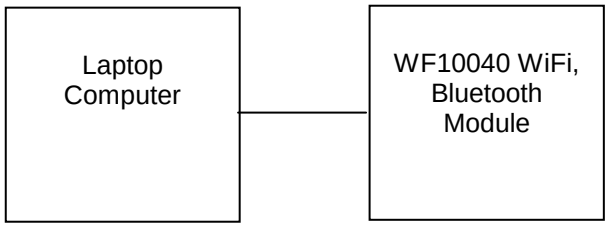
Description of Equipment Under Test
The equipment under test was a Bluetooth / WiFi Module

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Transmitting 802.11 b, g, or n (HT-20) on low mid or high channels
2	Receive / idle mode

3.1 System setup including cable interconnection details, support equipment and simplified block diagram

3.2 EUT Block Diagram:



3.3 Cables:

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
DC Power Cable	4 ft	None	Yes	AC/DC Power Adapter	DC Input to Test Jig
Serial Cable	6 ft	Yes	None	Laptop Computer	Serial Port on Test Jig

3.4 Support Equipment:

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Laptop	HP	EliteBook 8470p	Unknown
Test Jig	Test Jig	Not Labeled	Not Labeled

4 Peak Conducted Power

4.1 Test Limits

§ 15.247(b)(3): For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

§ 15.247(b)(4): The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2 Test Procedure

ANSI C63.10: 2009 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247). The peak output power was measured using the channel power function of the spectrum analyzer.

4.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3720	Rohde&Schwarz	FSEK30	11/26/2012	11/26/2013

4.4 Results:

Mode	Frequency (MHz)	Channel Number	Conducted Power (dBm)			
			Data Rate (Mbps)			
			1	2	5.5	11
	2412	1	19.54	19.76	20.85	22.45
	2437	6	19.51	19.83	20.93	22.51
802.11b	2462	11	19.54	19.66	20.93	22.52

Peak

Mode	Frequency (MHz)	Channel Number	Conducted Power (dBm)			
			Data Rate (Mbps)			
			1	2	5.5	11
	2412	1	16.54	16.69	17.62	17.8
	2437	6	16.46	16.71	17.74	17.71
802.11b	2462	11	16.47	16.62	17.56	17.65

Average

Mode	Frequency (MHz)	Channel Number	Conducted Power (dBm)							
			Data Rate (Mbps)							
			6	9	12	18	24	36	48	54
	2412	1	24.48	24.42	24.64	24.33	23.71	23.91	22.68	22.56
	2437	6	24.51	24.47	24.71	24.68	23.93	24.07	22.5	22.61
802.11g	2462	11	24.43	24.5	24.66	24.47	23.9	24.02	22.54	22.43

Peak

Mode	Frequency (MHz)	Channel Number	Conducted Power (dBm)							
			Data Rate (Mbps)							
			6	9	12	18	24	36	48	54
	2412	1	17.22	17.12	17.38	17.32	16.74	16.71	15.29	15.32
	2437	6	17.36	17.29	17.53	17.56	16.94	16.91	15.3	15.39
802.11g	2462	11	17.25	17.3	17.52	17.54	16.83	16.84	15.42	15.21

Average

Mode	Frequency (MHz)	Channel Number	Conducted Power (dBm)							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	2412	1	24.8	24.56	24.72	24.19	24	22.56	22.66	21.51
802.11n	2437	6	24.98	25.04	24.64	24.07	24.04	22.5	22.3	21.46
(20MHz)	2462	11	25	24.66	24.75	24.05	24.1	22.49	22.47	21.43

Peak

Mode	Frequency (MHz)	Channel Number	Conducted Power (dBm)							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	2412	1	17.58	17.3	17.28	16.83	16.69	15.04	15.36	14.32
802.11n	2437	6	17.36	17.34	17.34	16.72	16.76	15.09	15.18	14.2
(20MHz)	2462	11	17.3	17.36	17.35	16.87	16.83	15.16	15.06	14.27

Average

5 Occupied Bandwidth

5.1 Test Limits

§ 15.247(a)(2): For digital modulation systems, the minimum 6dB bandwidth shall be at least 500kHz.

5.2 Test Procedure

ANSI C63.10: 2009 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)

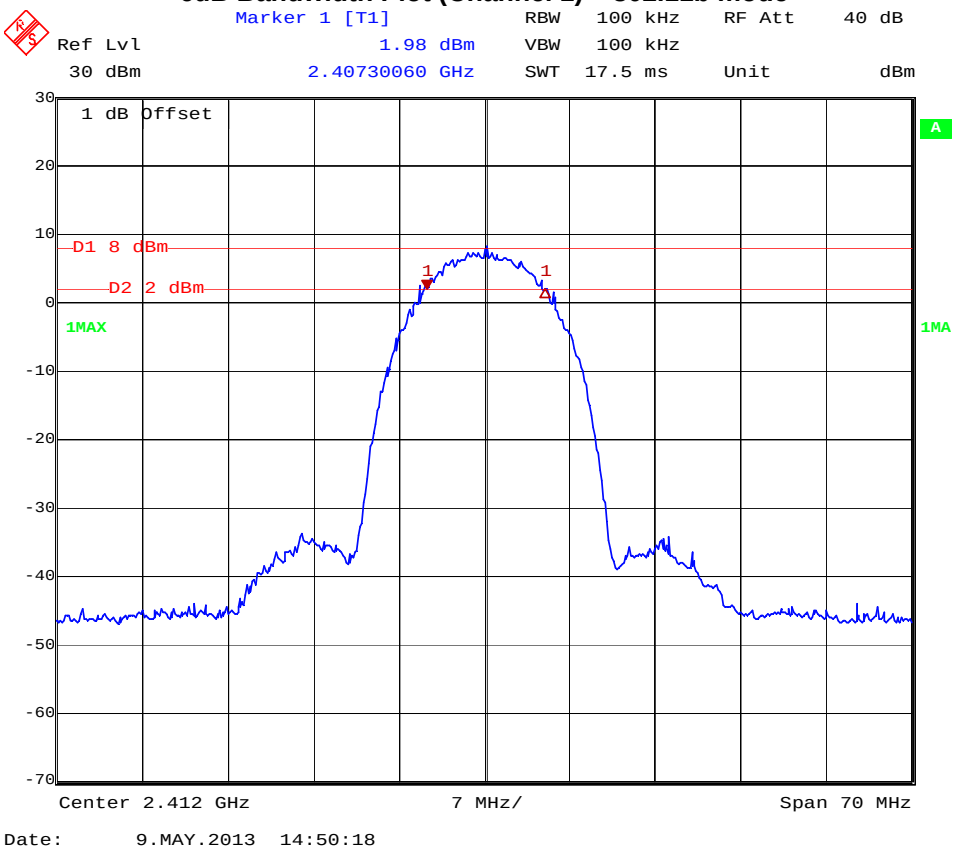
5.3 Test Equipment Used:

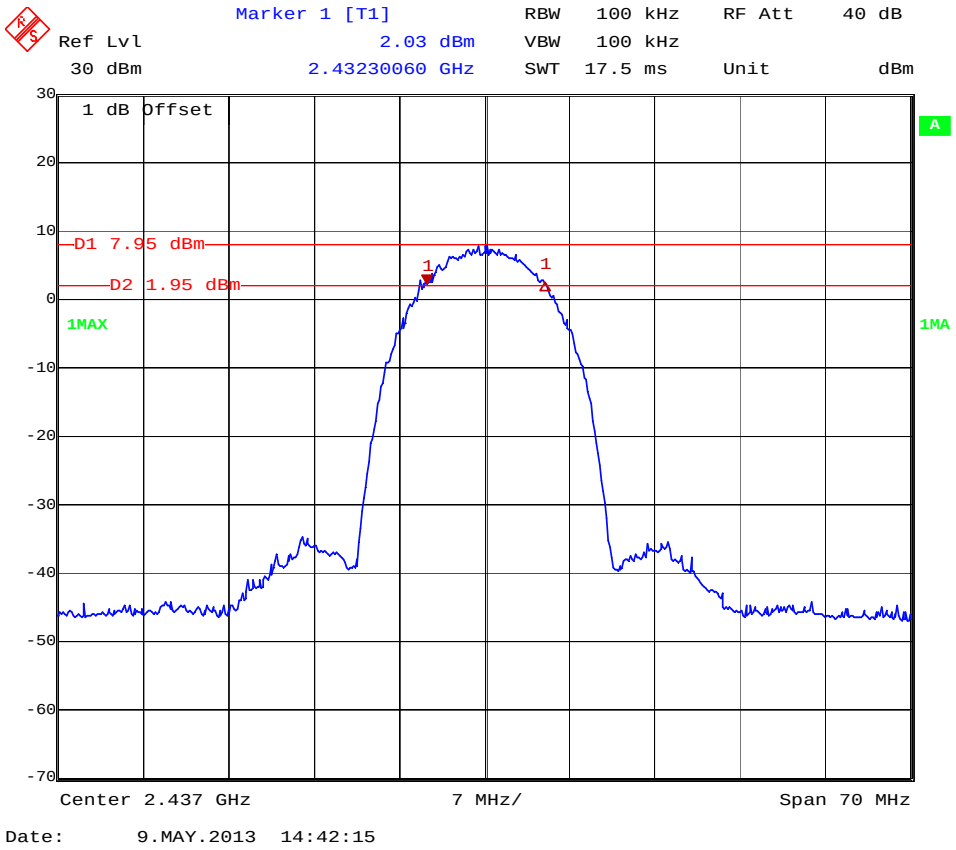
Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3720	Rohde&Schwarz	FSEK30	11/26/2012	11/26/2013

5.4 Results:

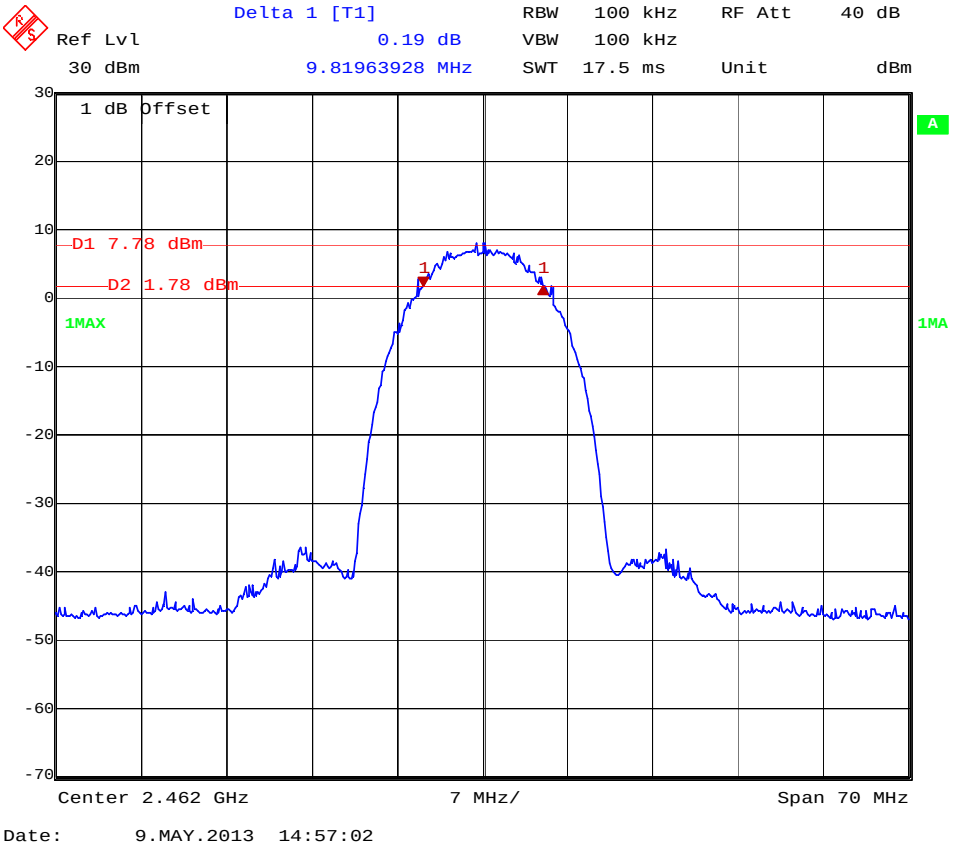
Mode	Channel Number	Frequency (MHz)	6dB Bandwidth	99% Power Bandwidth	Result
802.11b	1	2412	9.67MHz	---	Pass
802.11b	6	2437	9.67MHz	14.44MHz	Pass
802.11b	11	2462	9.81MHz	---	Pass
802.11g	1	2412	15.71MHz	---	Pass
802.11g	6	2437	16.13MHz	16.41MHz	Pass
802.11g	11	2462	15.99MHz	---	Pass
802.11n (20MHz)	1	2412	16.83MHz	---	Pass
802.11n (20MHz)	6	2437	16.97MHz	17.11MHz	Pass
802.11n (20MHz)	11	2462	16.97MHz	---	Pass

6dB Bandwidth Plot (Channel 1) – 802.11b mode

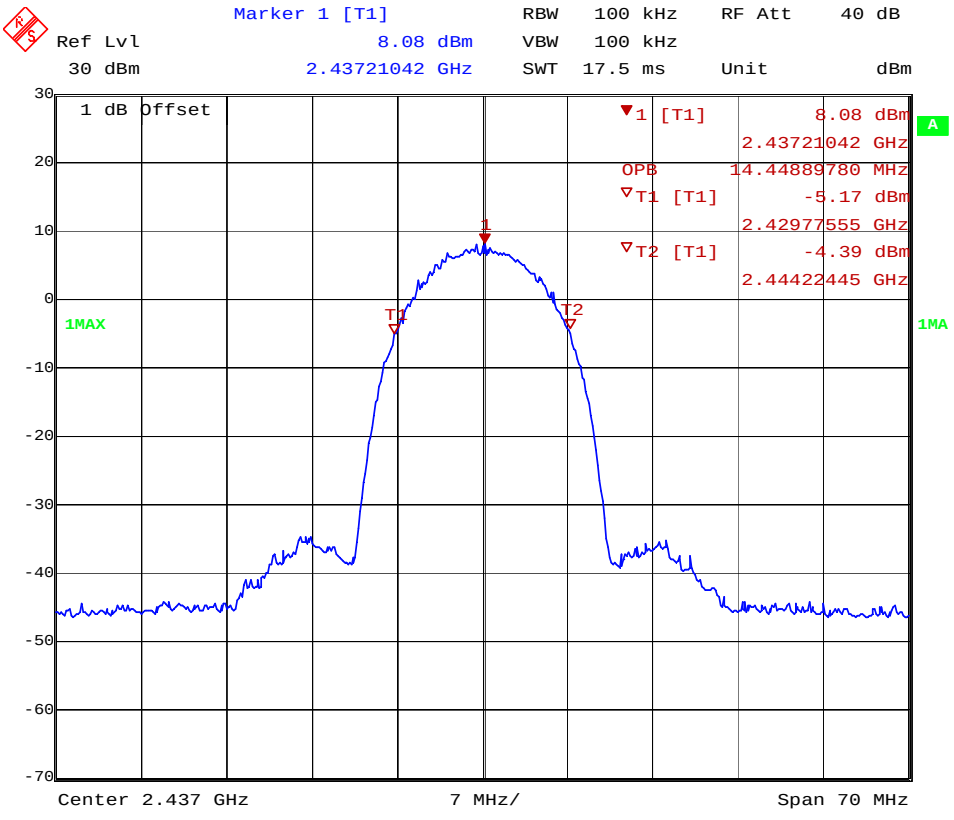




6dB Bandwidth Plot (Channel 6) – 802.11b mode

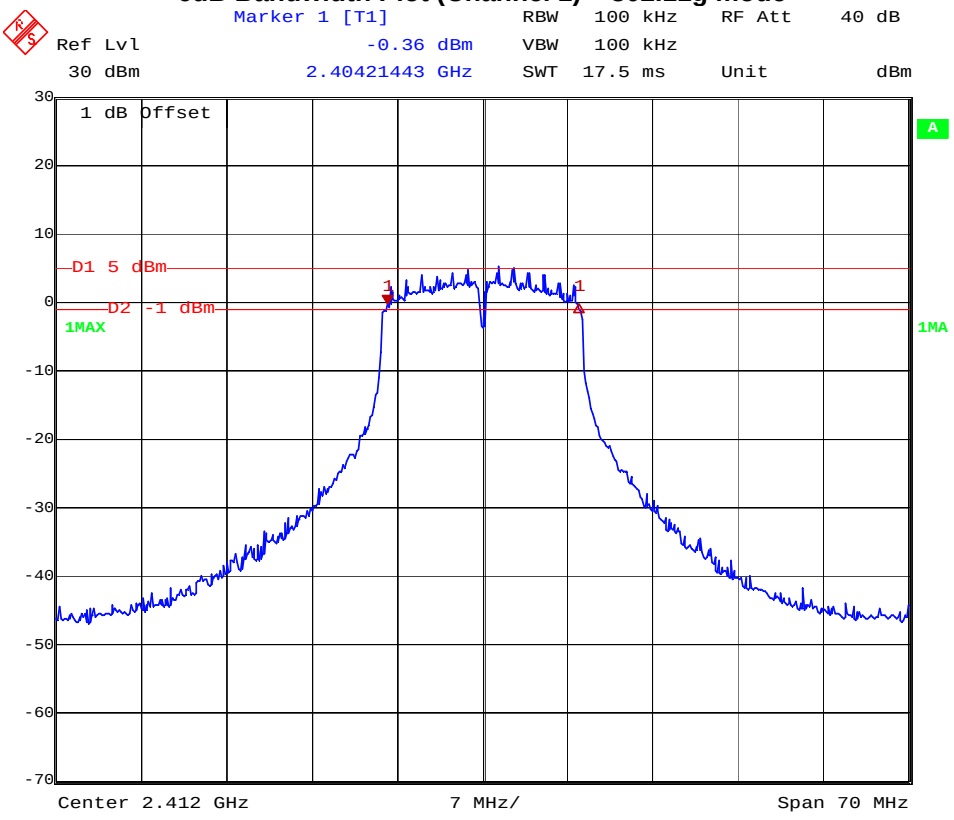


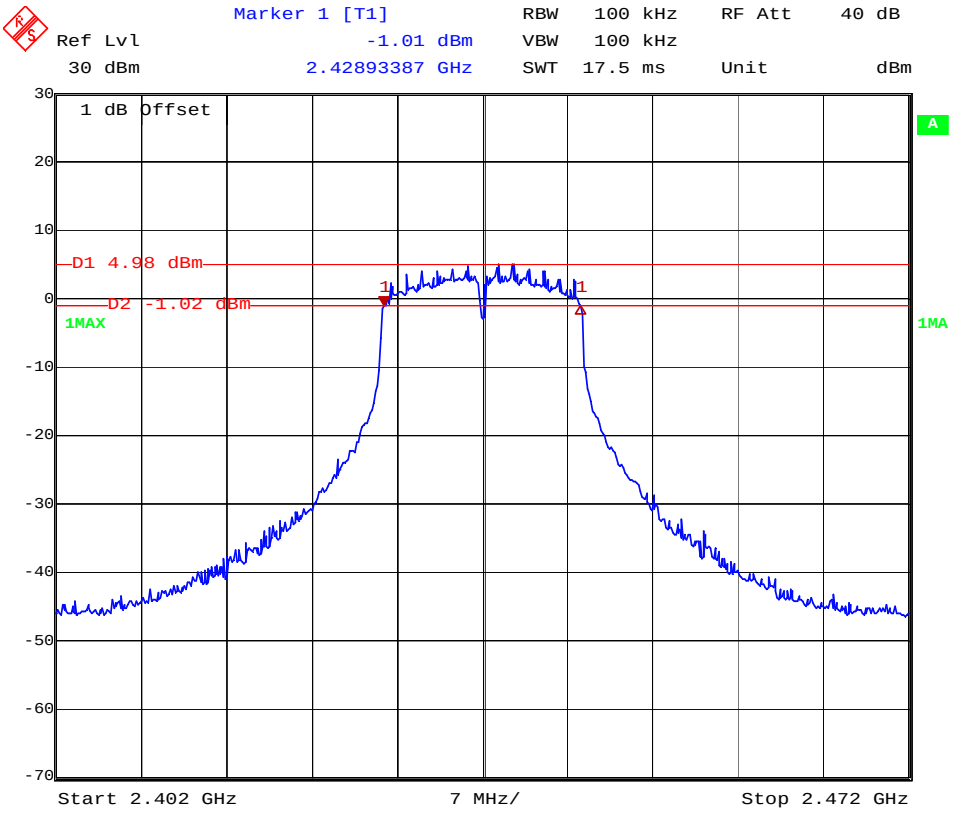
6dB Bandwidth Plot (Channel 11) – 802.11b mode



99% Power Bandwidth Plot (Channel 6) – 802.11b mode

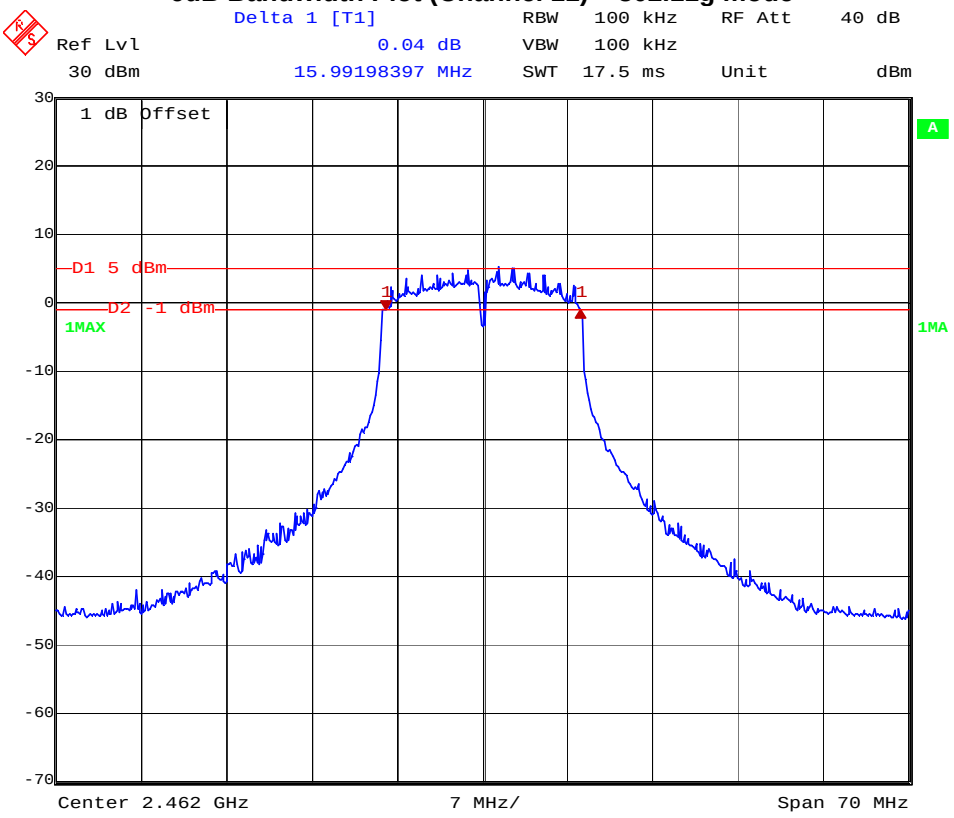
6dB Bandwidth Plot (Channel 1) – 802.11g mode

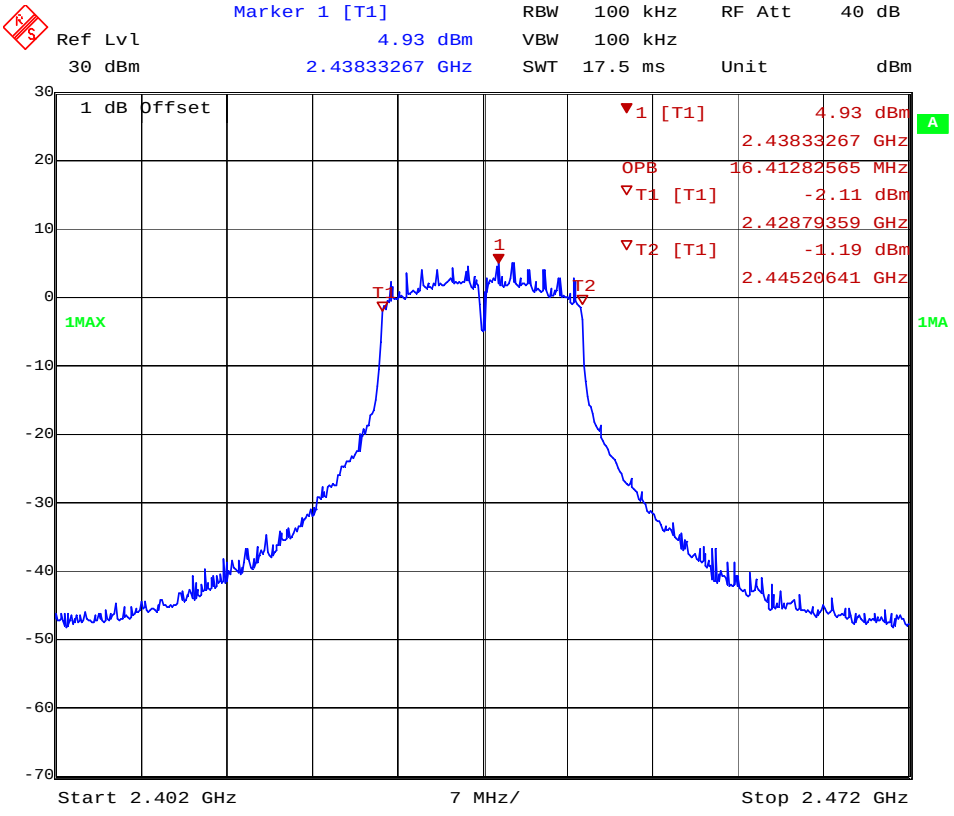




6dB Bandwidth Plot (Channel 6) – 802.11g mode

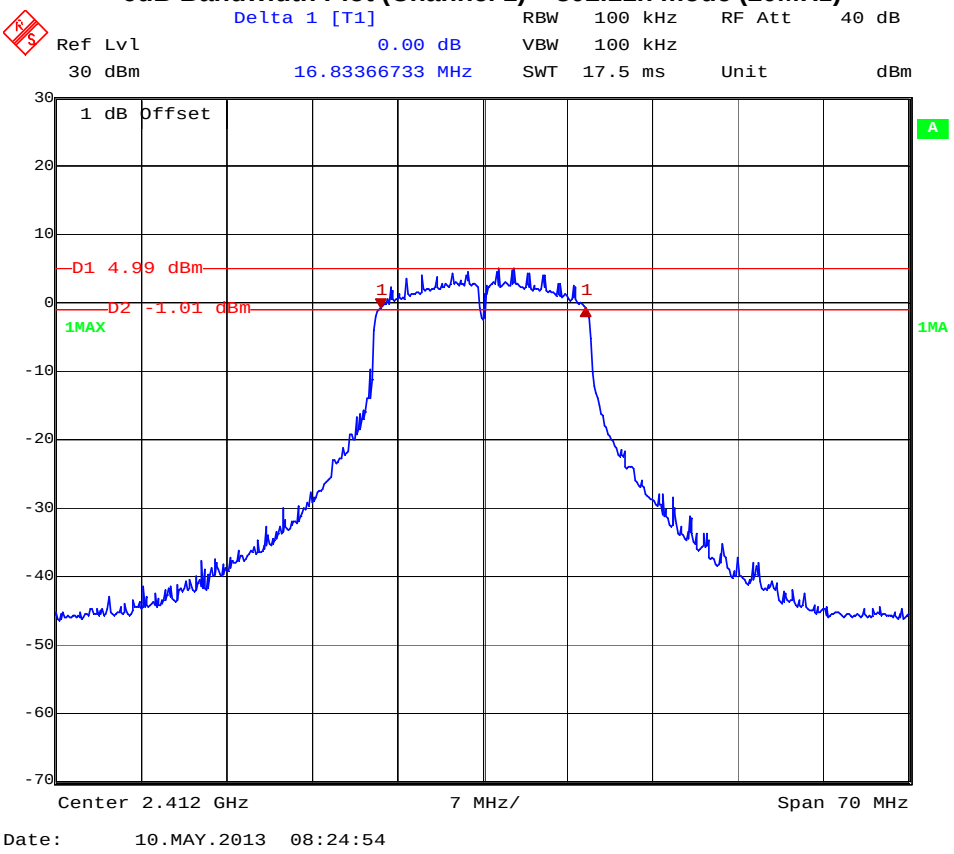
6dB Bandwidth Plot (Channel 11) – 802.11g mode

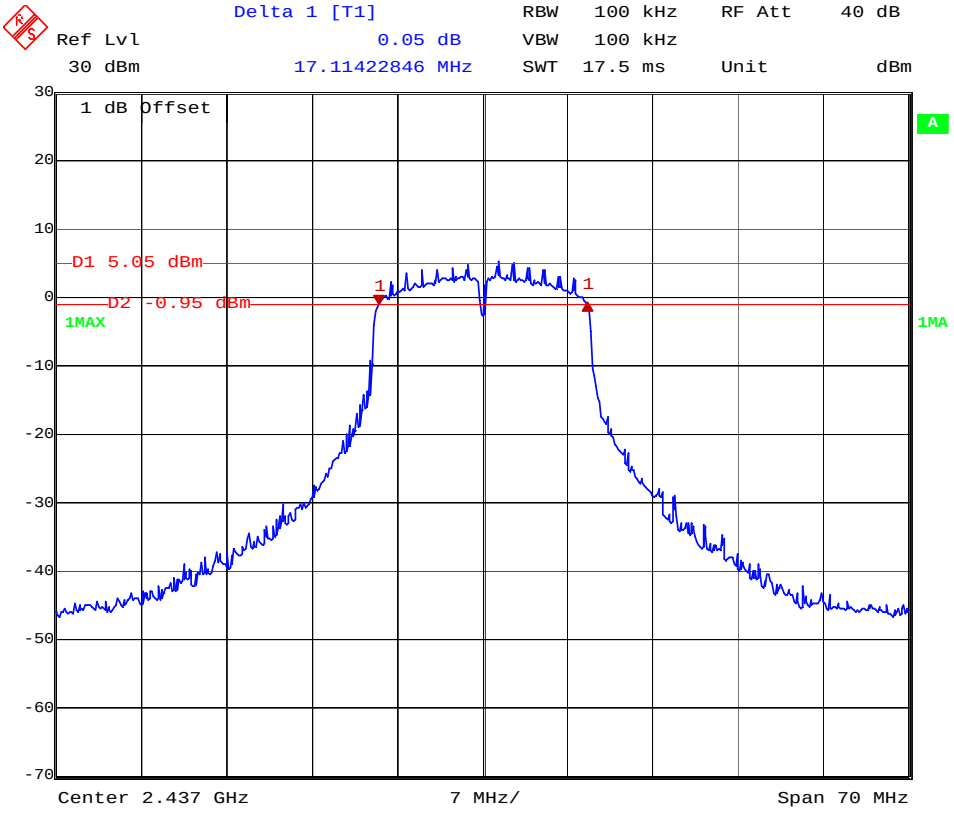




99% Power Bandwidth Plot (Channel 6) – 802.11g mode

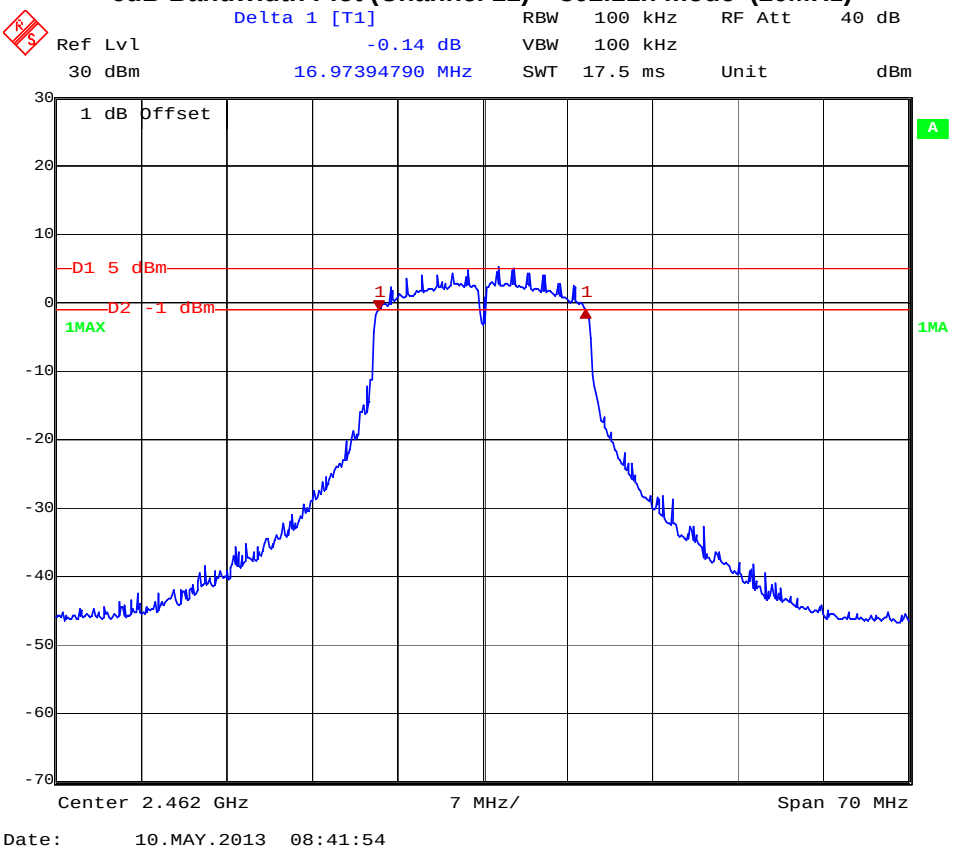
6dB Bandwidth Plot (Channel 1) – 802.11n mode (20MHz)

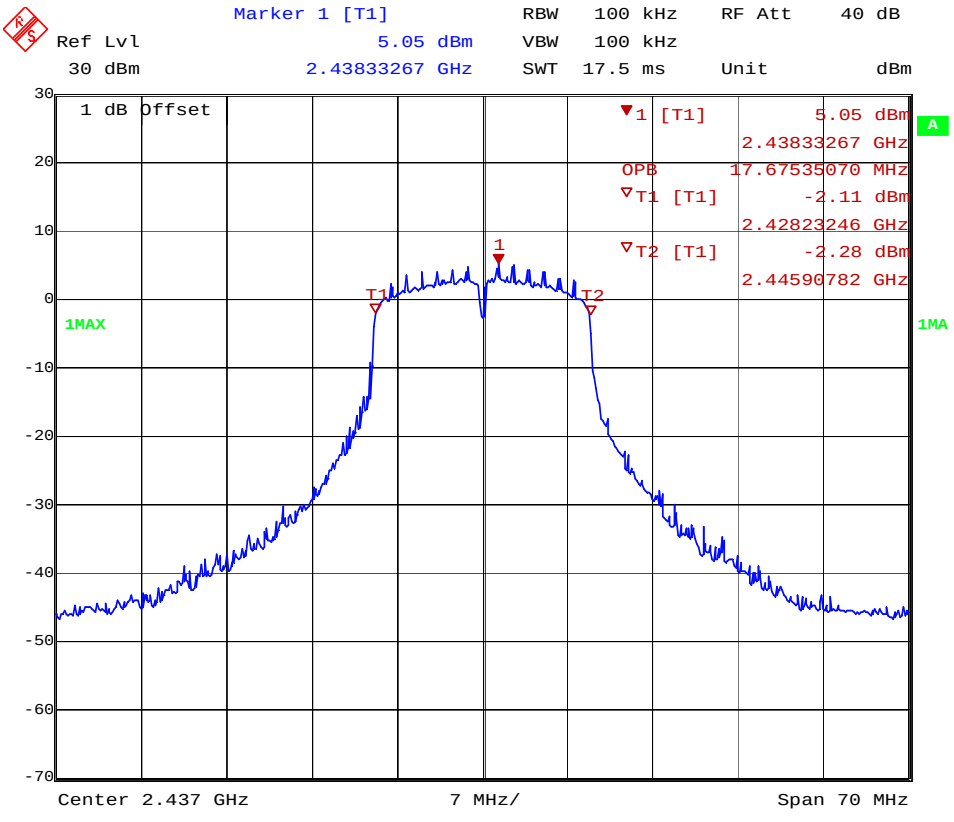




6dB Bandwidth Plot (Channel 6) – 802.11n mode (20MHz)

6dB Bandwidth Plot (Channel 11) – 802.11n mode (20MHz)





99% Power Bandwidth Plot (Channel 6) – 802.11n mode (20MHz)

6 Conducted Spurious Emissions

6.1 Test Limits

§ 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.

6.2 Test Procedure

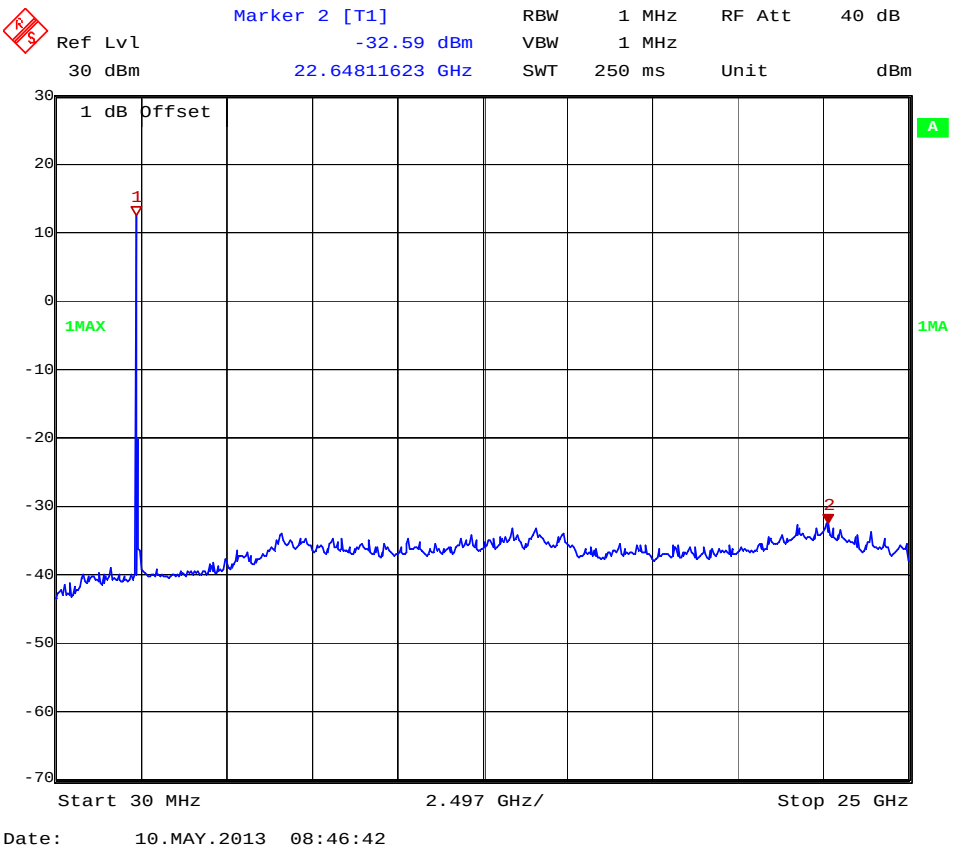
ANSI C63.10: 2009 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)

6.3 Test Equipment Used:

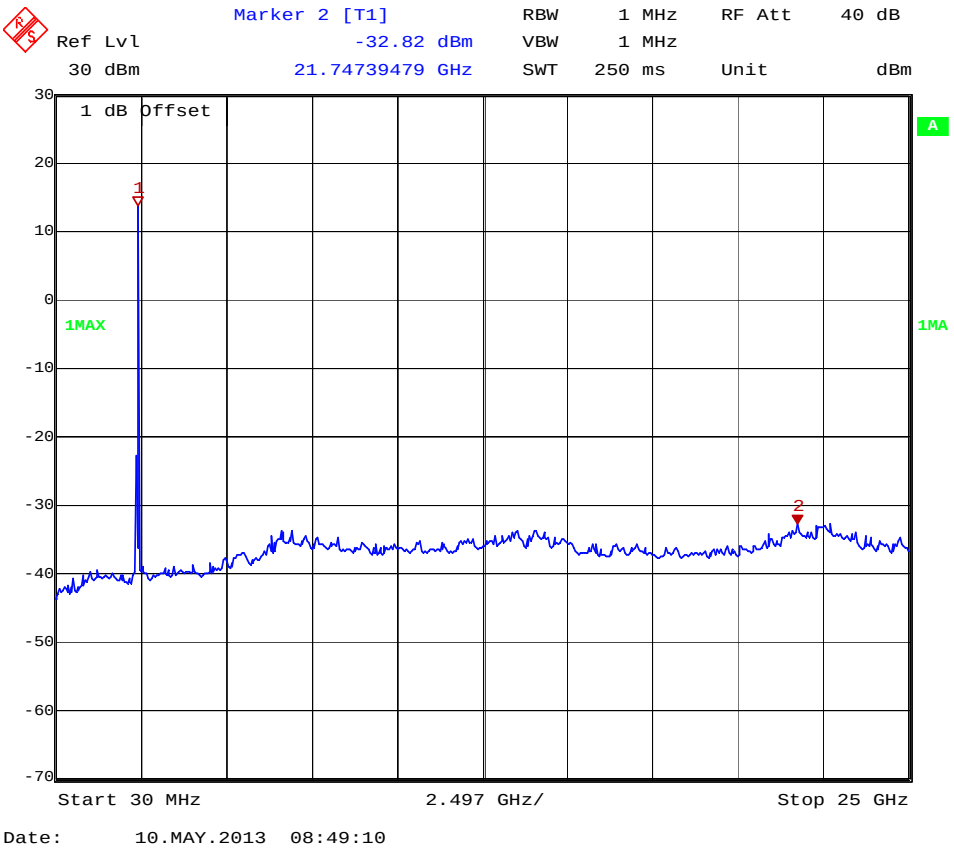
Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3720	Rohde&Schwarz	FSEK30	11/26/2012	11/26/2013

6.4 Results:

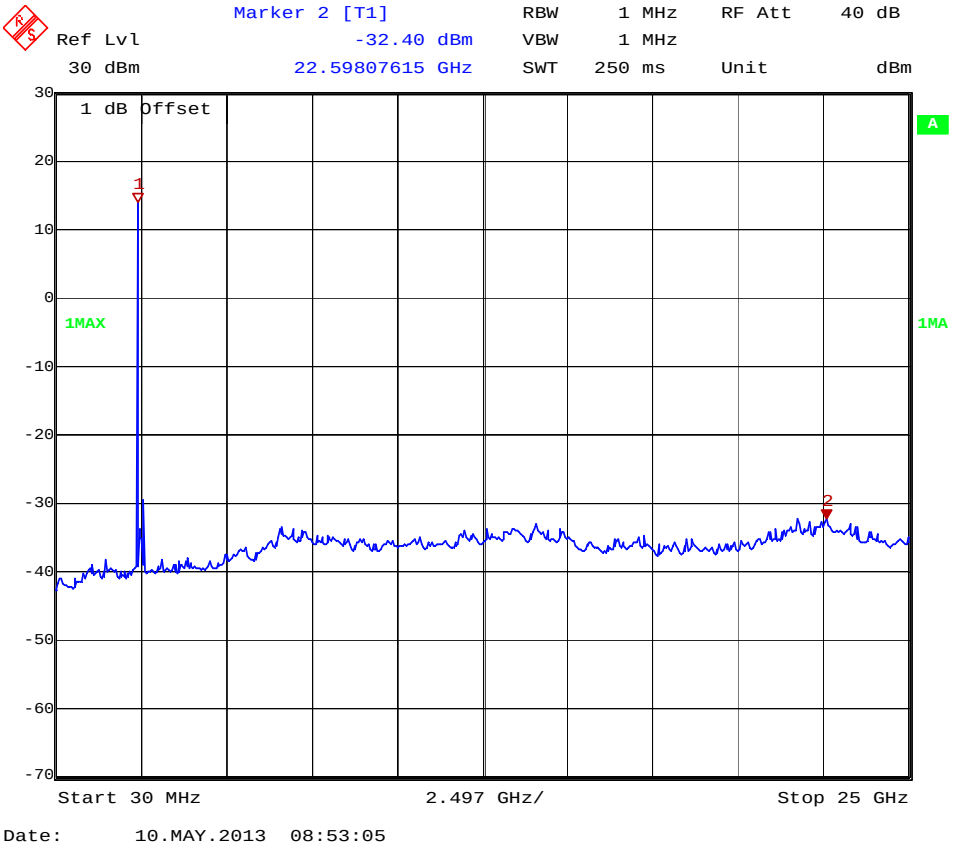
The following plots show that there are no conducted spurious emissions exceeding the 20dB down criteria.



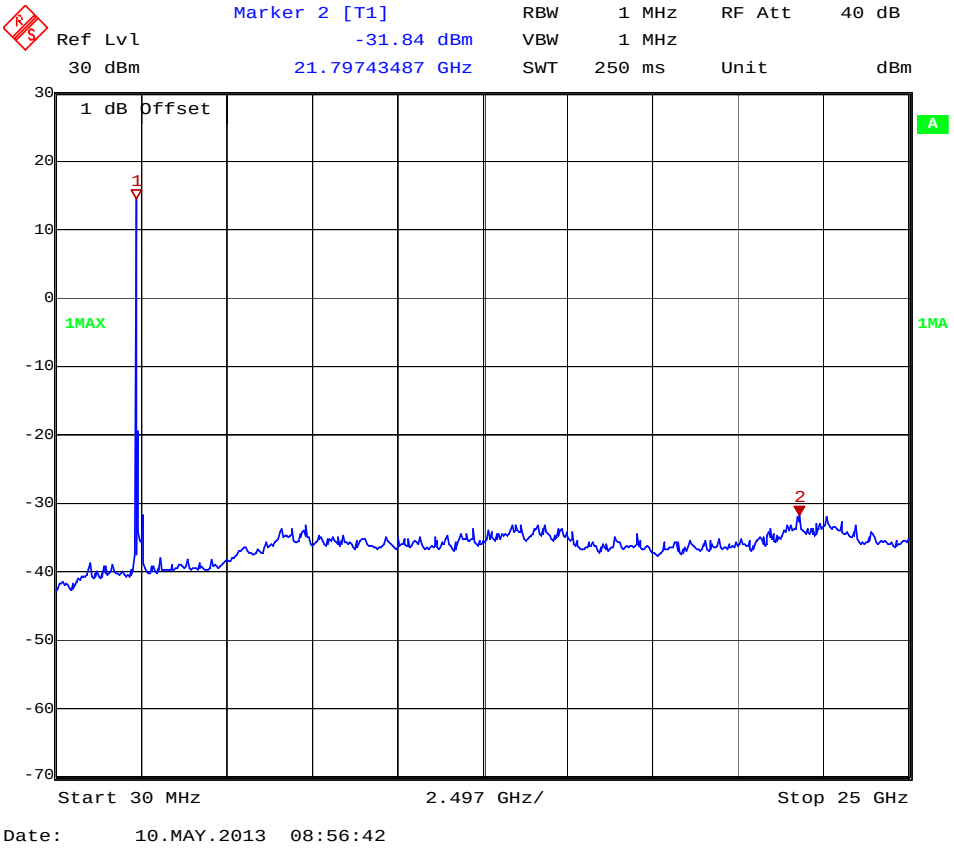
Conducted Spurious Emissions - 802.11b Mode Low Channel



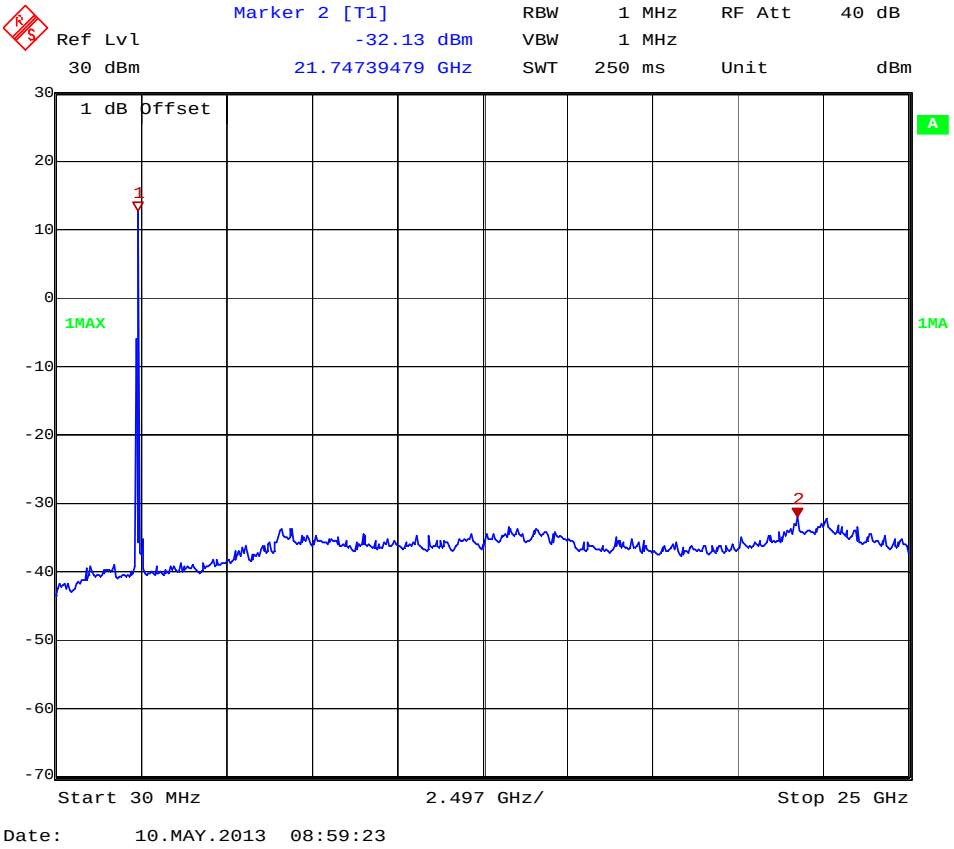
Conducted Spurious Emissions - 802.11b Mode Mid Channel



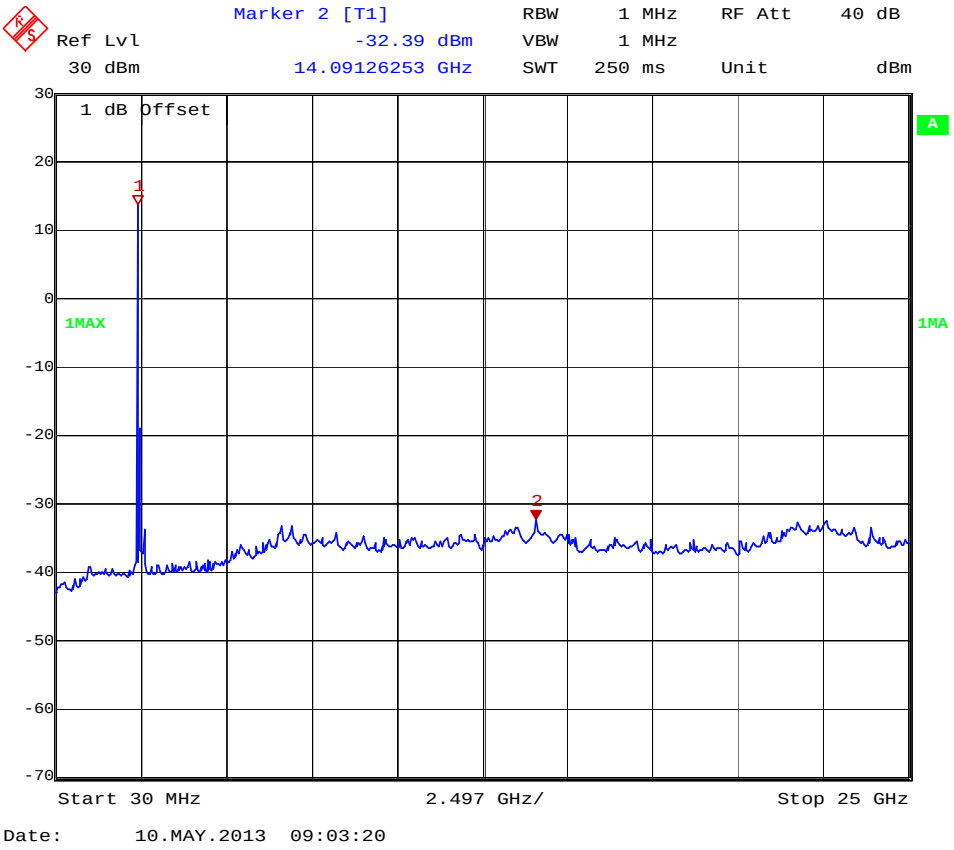
Conducted Spurious Emissions - 802.11b Mode High Channel



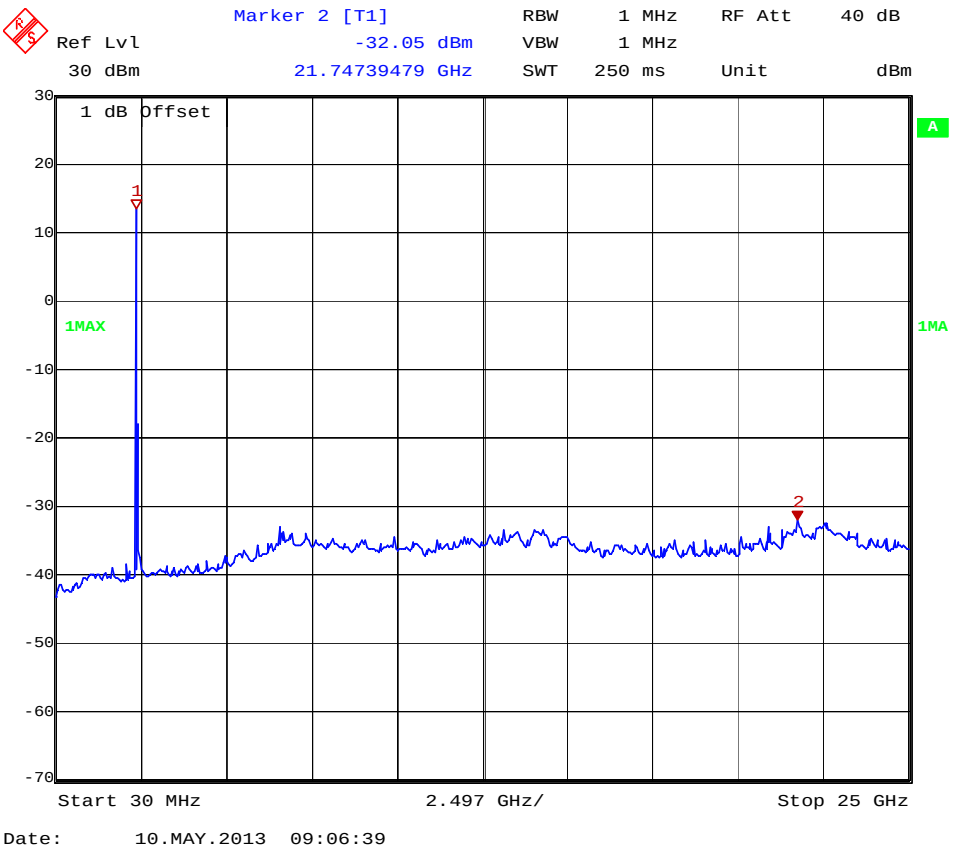
Conducted Spurious Emissions - 802.11g Mode Low Channel



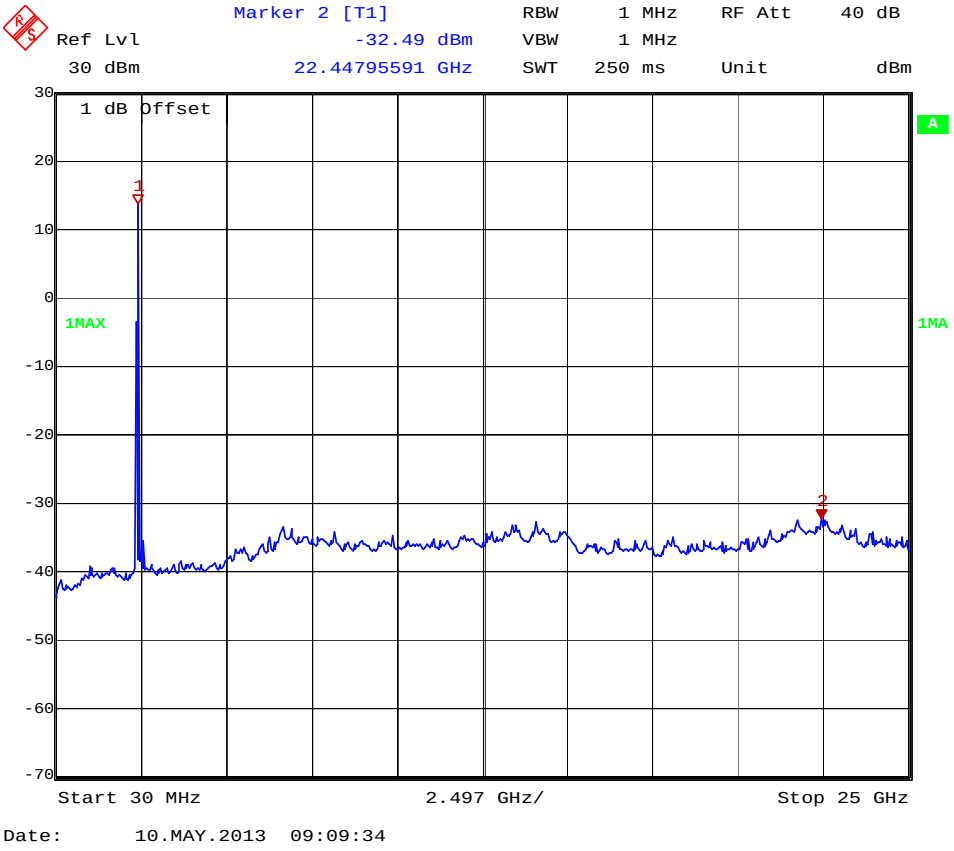
Conducted Spurious Emissions - 802.11g Mode Mid Channel



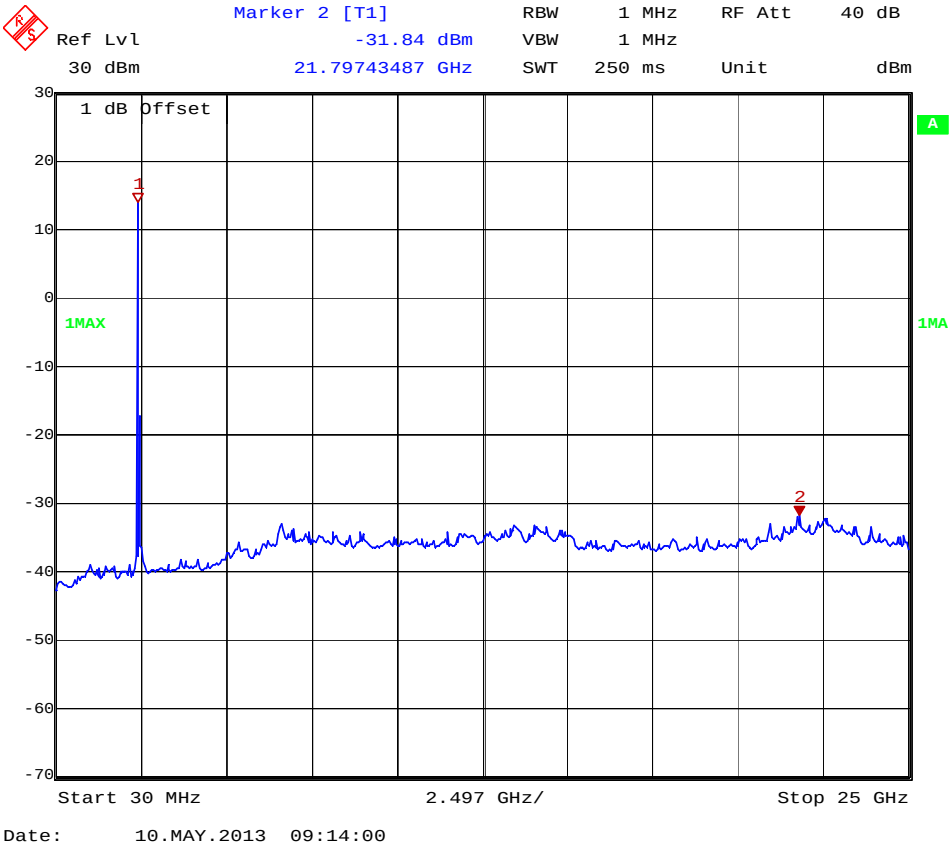
Conducted Spurious Emissions - 802.11g Mode High Channel



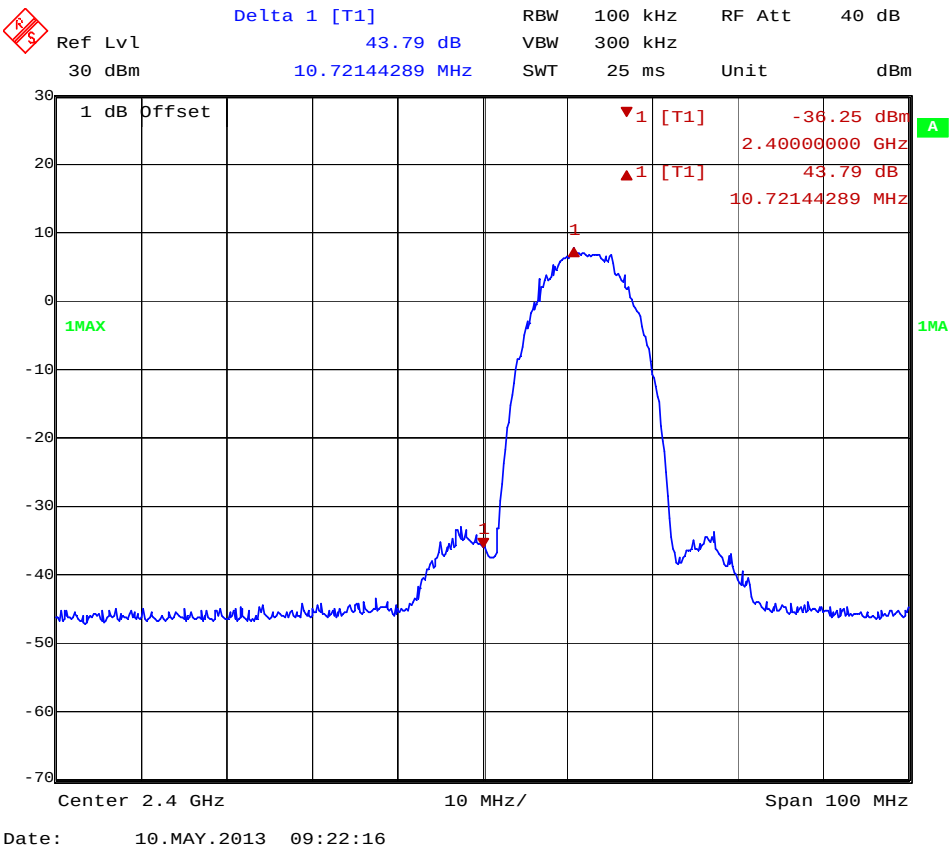
Conducted Spurious Emissions - 802.11n Mode (20MHz) Low Channel



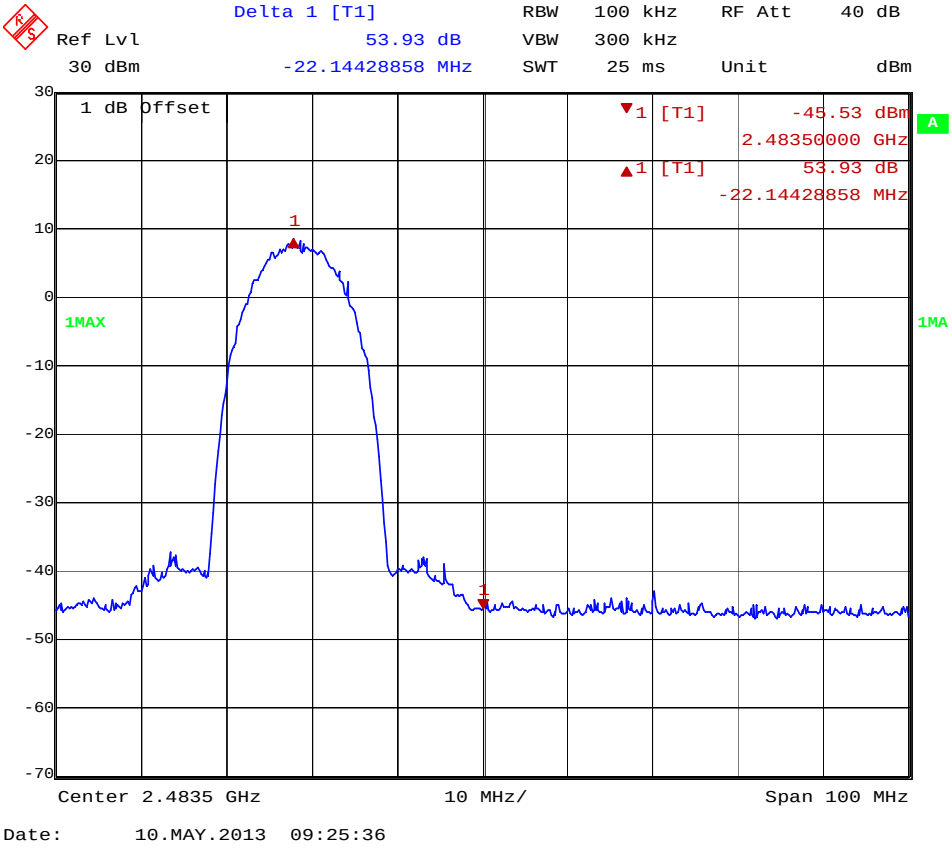
Conducted Spurious Emissions - 802.11n Mode (20MHz) Mid Channel



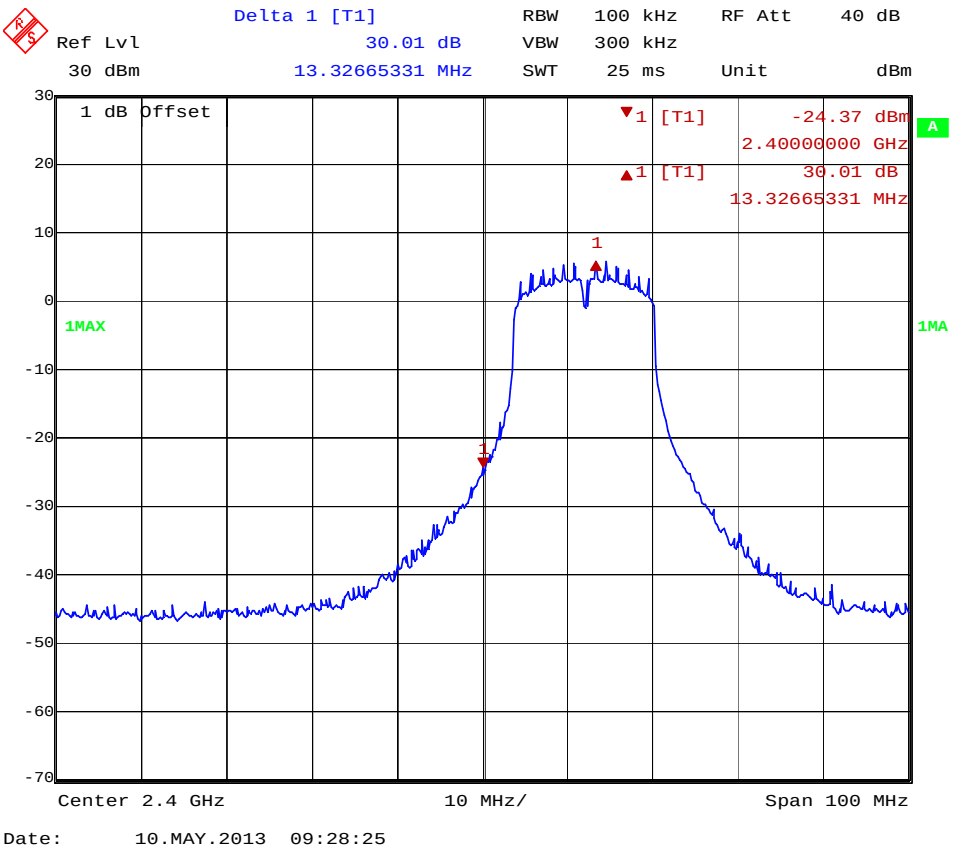
Conducted Spurious Emissions - 802.11n (20MHz) Mode High Channel



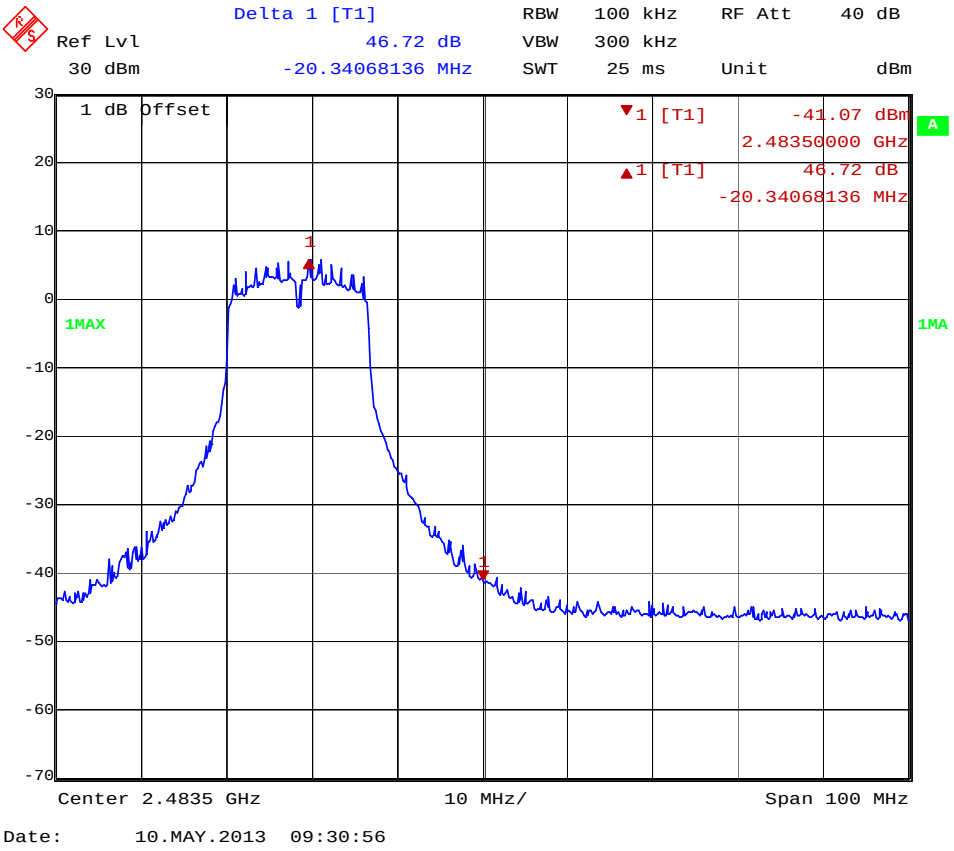
Emissions Close to Band Edge - 802.11b Mode Low Channel



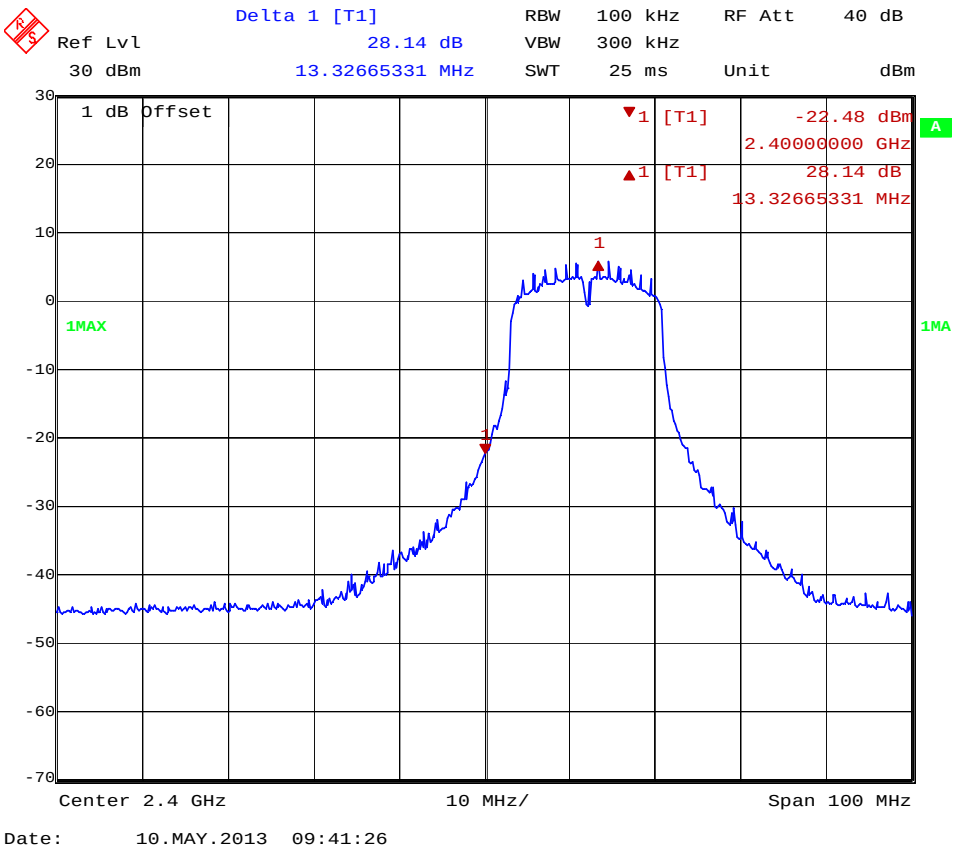
Emissions Close to Band Edge - 802.11b Mode High Channel



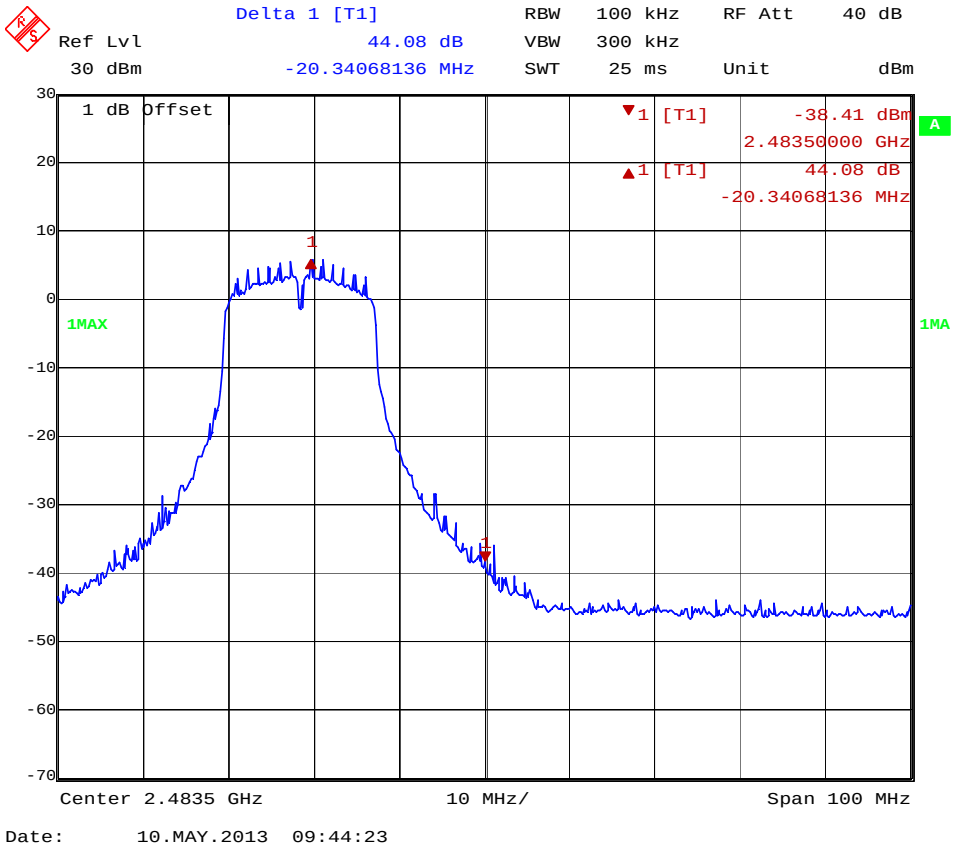
Emissions Close to Band Edge - 802.11g Mode Low Channel



Emissions Close to Band Edge - 802.11g Mode High Channel



Emissions Close to Band Edge - 802.11n Mode (20MHz) Low Channel



Emissions Close to Band Edge - 802.11n Mode (20MHz) High Channel

7 Power Spectral Density

7.1 Test Limits

§ 15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

7.2 Test Procedure

ANSI C63.10: 2009 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)

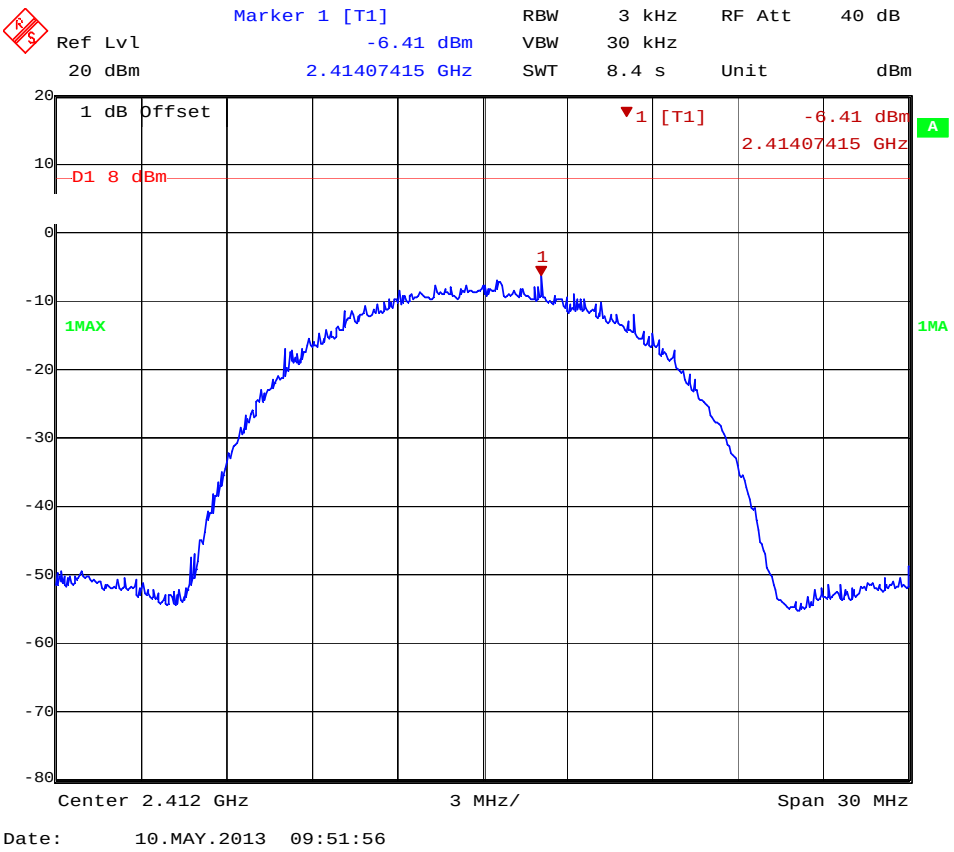
7.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3720	Rohde&Schwarz	FSEK30	11/26/2012	11/26/2013

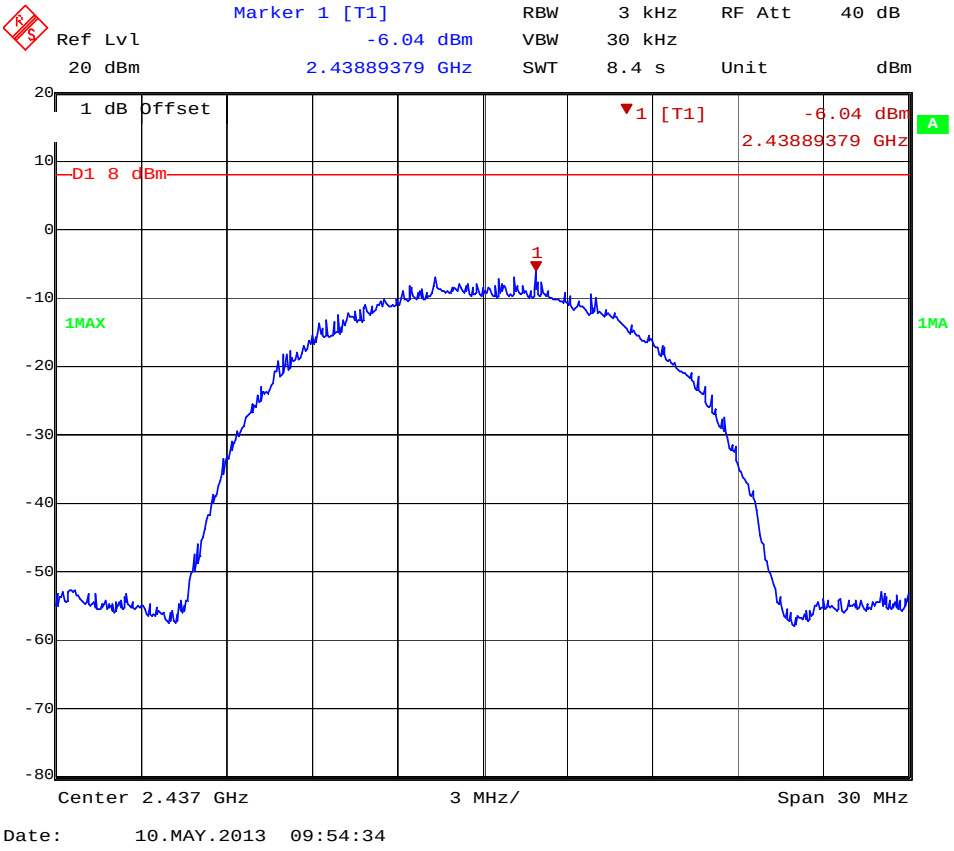
7.4 Results:

*PSD Option 1 Method

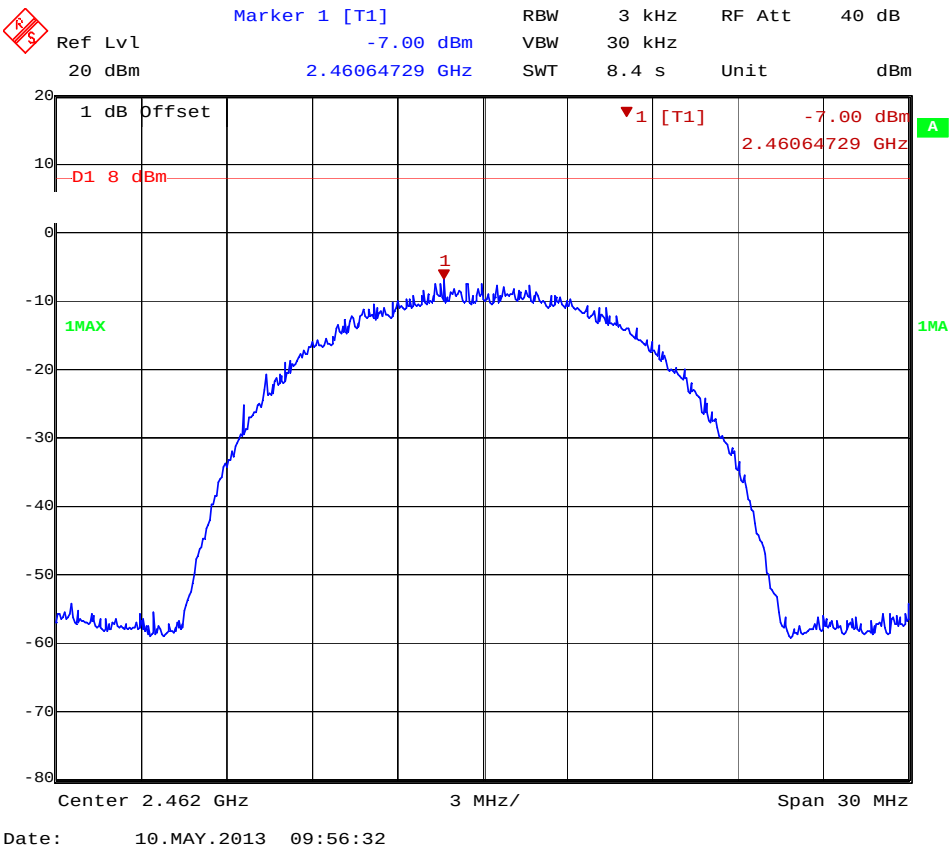
Mode	Channel Number	Frequency (MHz)	PSD in 3kHz BW (dBm)	Limit (dBm)	Result
802.11b	1	2412	-6.41dbm	8.0	Pass
802.11b	6	2437	-6.04dbm	8.0	Pass
802.11b	11	2462	-7.00dbm	8.0	Pass
802.11g	1	2412	-8.18dbm	8.0	Pass
802.11g	6	2437	-7.61dbm	8.0	Pass
802.11g	11	2462	-8.08dbm	8.0	Pass
802.11n (20MHz)	1	2412	-8.60dbm	8.0	Pass
802.11n (20MHz)	6	2437	-9.15dbm	8.0	Pass
802.11n (20MHz)	11	2462	-7.52dbm	8.0	Pass



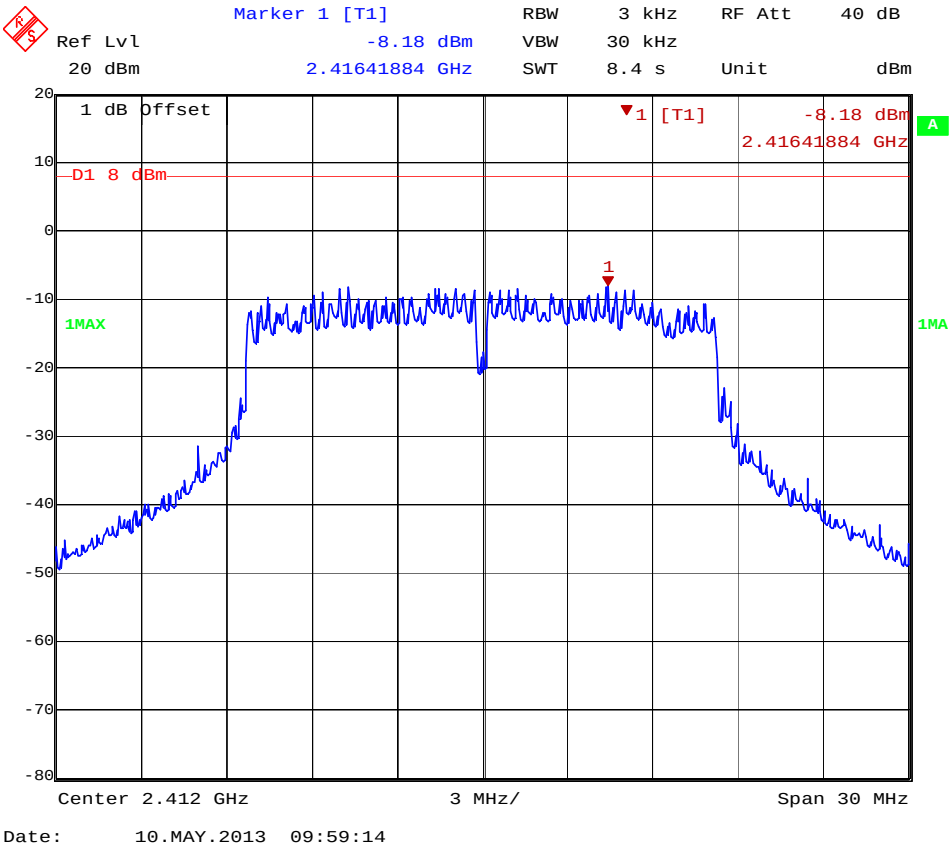
Power Spectral Density – Channel 1 802.11b mode



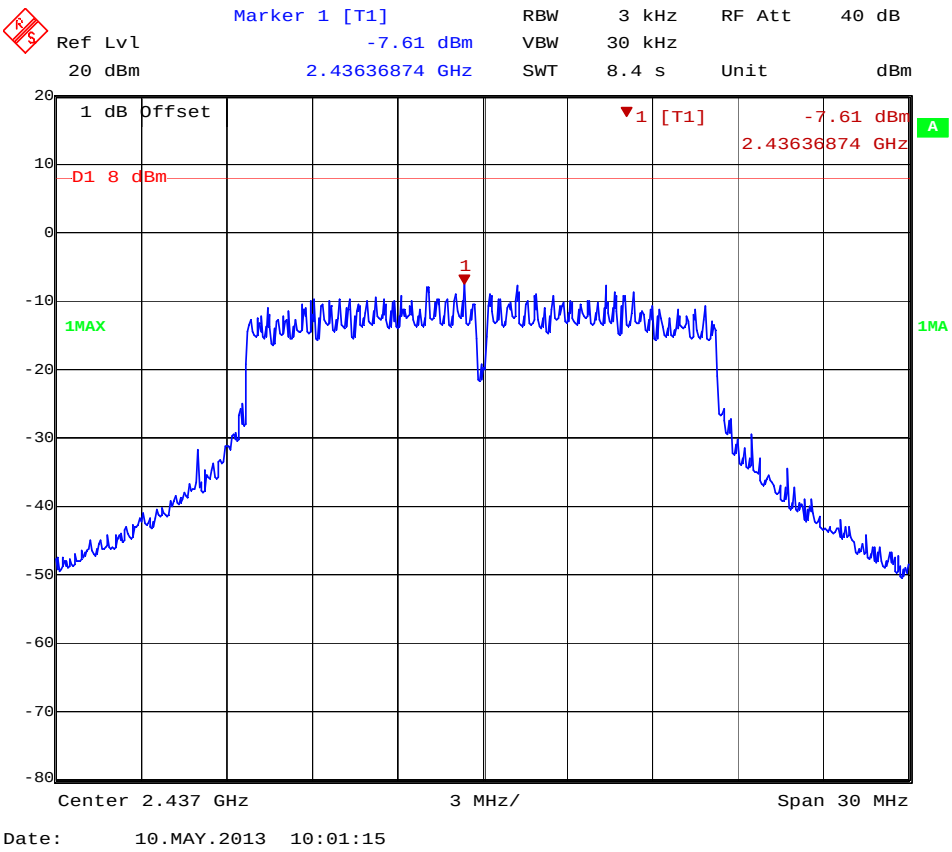
Power Spectral Density – Channel 6 802.11b mode



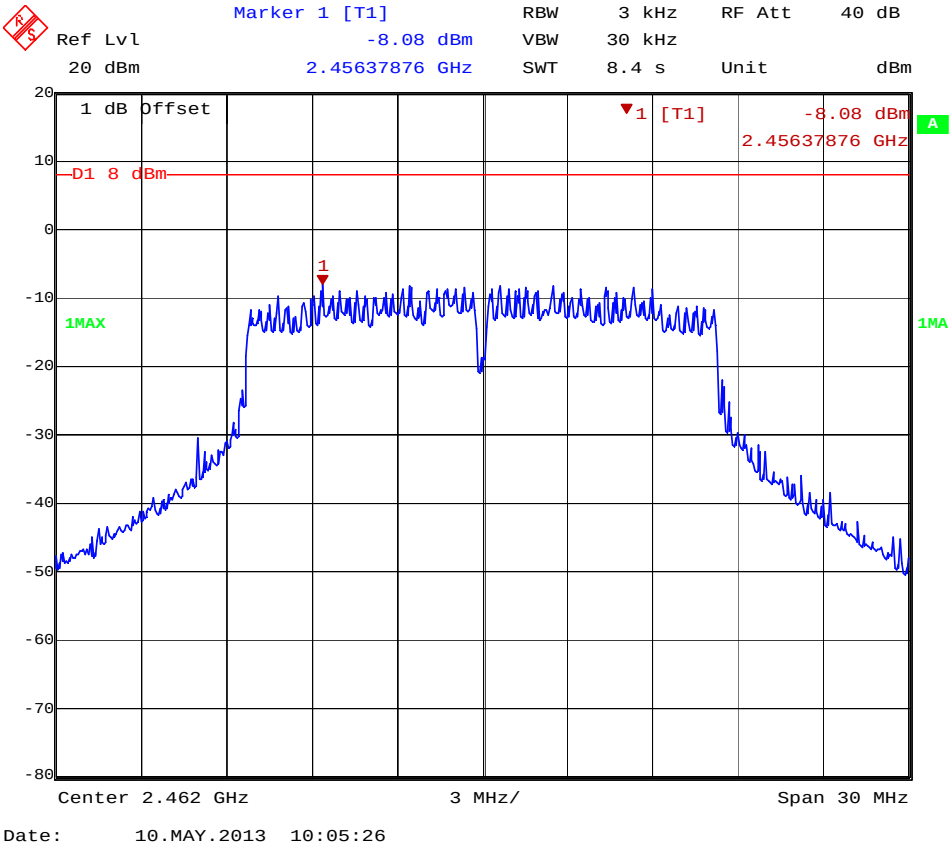
Power Spectral Density – Channel 11 802.11b mode



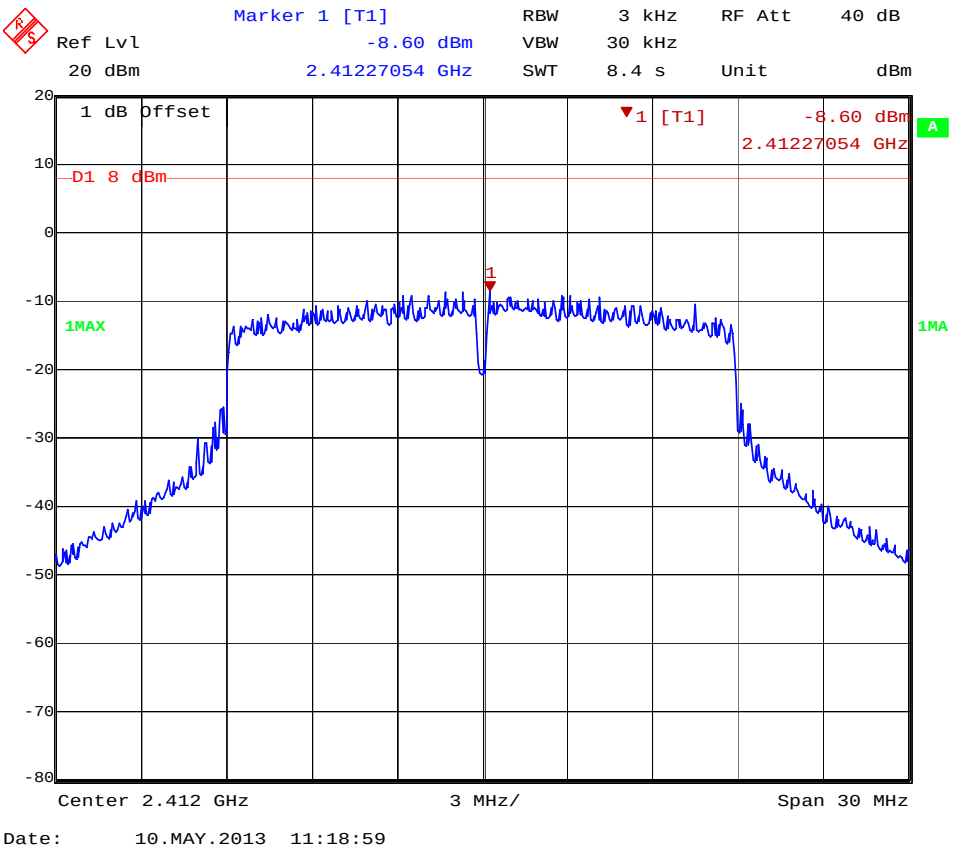
Power Spectral Density – Channel 1 802.11g mode



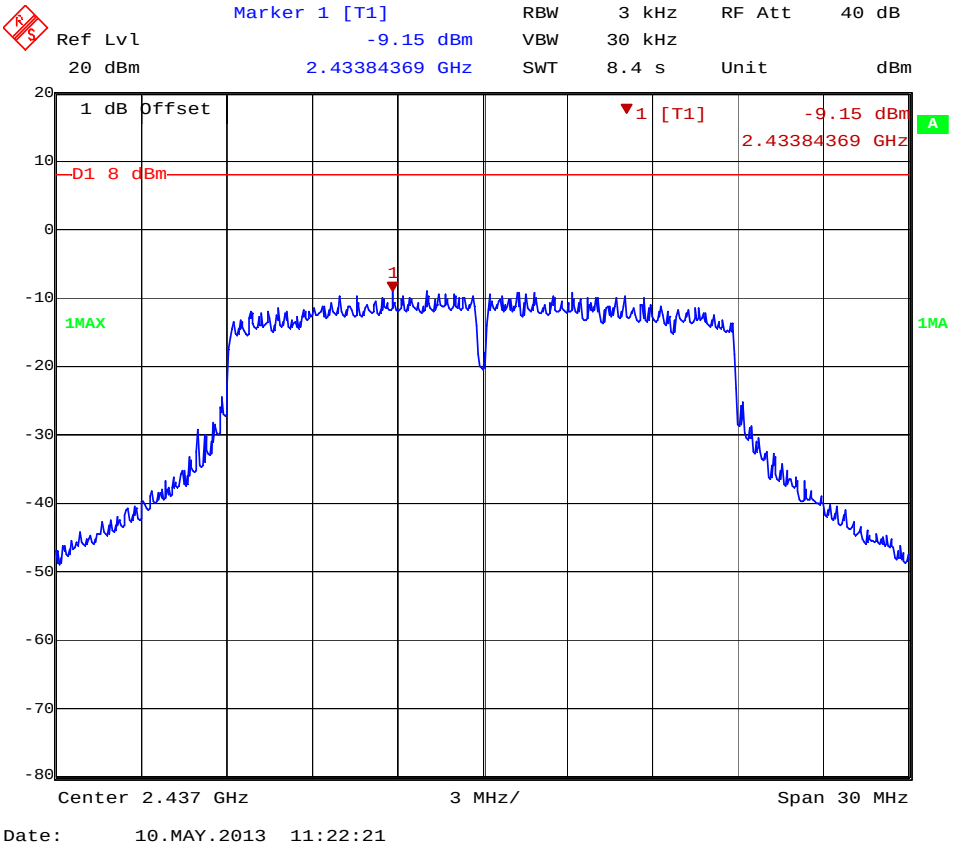
Power Spectral Density – Channel 6 802.11g mode



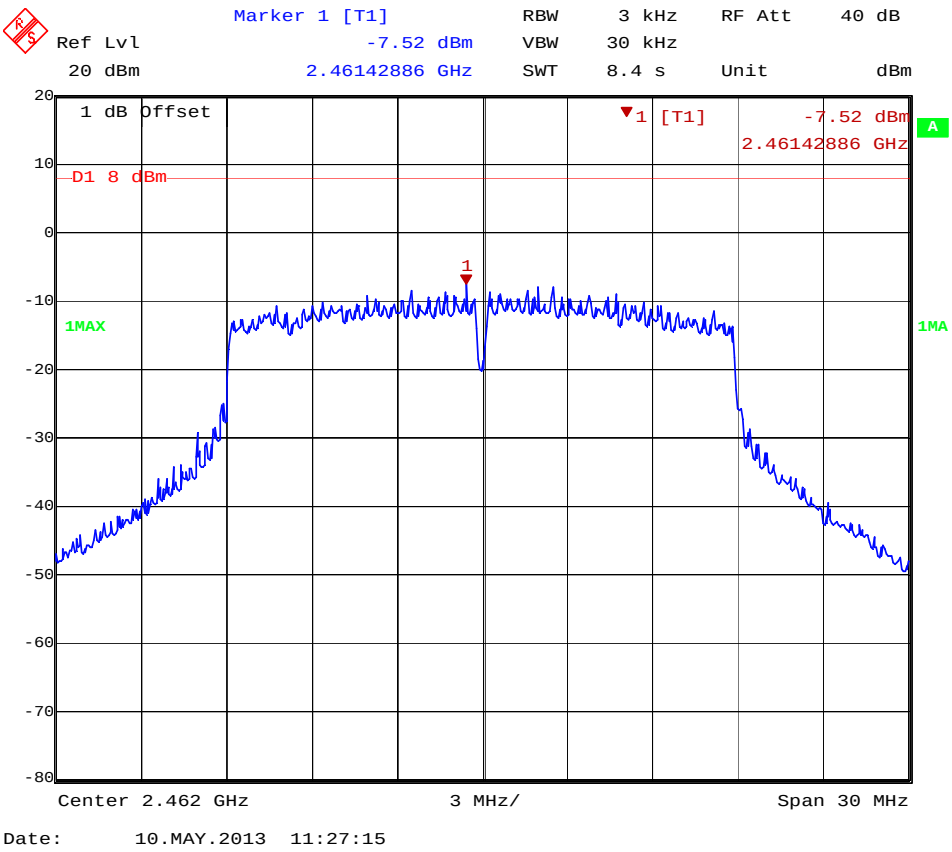
Power Spectral Density – Channel 11 802.11g mode



Power Spectral Density – Channel 1 802.11n mode (20MHz)



Power Spectral Density – Channel 6 802.11n mode (20MHz)



Power Spectral Density – Channel 11 802.11n mode (20MHz)

8 Radiated Spurious Emissions (Transmitter)

8.1 Test Limits

§ 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Part 15.205(a): Restricted Bands of Operations

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

[1] Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.
[2] Above 38.6

Part 15.209(a): Field Strength Limits for Restricted Bands of Operation

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2,400 / F (kHz)	300
0.490 - 1.705	24,000 / F (kHz)	30
1.705 - 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

8.2 Test Procedure

ANSI C63.10: 2009 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)

8.3 Example of Field Strength Calculation Method:

The measured field strength was calculated by summing the readings taken from the spectrum analyzer with the appropriate correction factors associated with the antenna losses and cable losses. The calculation formula and sample calculations are listed below:

Formula:
FS = RA + AF + CF

FS = Field Strength in dBµV/m
RA = Receiver Amplitude in dBµV
AF = Antenna Factor in dB
CF = Cable Attenuation Factor in dB (Including preamplifier and filter attenuation)

Example Calculation:

RA = 19.48 dBµV
AF = 18.52 dB
CF = 0.78 dB

FS = 19.48 + 18.52 + 0.78 = 38.78 dBµV/m
Level in µV/m = Common Antilogarithm [(38.78 dBµV/m)/20] = 86.89 µV/m

8.4 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	10887490.26	Rohde & Schwarz	ESI26	9/15/2012	9/14/2013
Spectrum Analyzer	3720	Rohde & Schwarz	FSEK30	11/26/2012	11/26/2013
Preamplifier	987410	Miteq	AFS44-00102000-30-10P-44	9/4/2012	9/4/2013
Preamplifier	SF456200904	Mini-Circuits	ZX60-3018G-S+	9/4/2012	9/4/2013
Biconnilog Antenna	00051864	ETS	3142C	12/14/2012	12/14/2013
Horn Antenna	6556	ETS	3115	9/13/2012	9/13/2013
System Controller	121701-1	Sunol Sciences	SC99V	Calibration Not Required	Calibration Not Required
High Pass Filter	3986-01 DC0408	Microwave Circuits, Inc.	H3G020G2	Calibrate at Time Of Use	Calibrate at Time Of Use

8.5 Results:

All spurious emissions were attenuated by at least 20dB below the level of the fundamental as required by Part 15.247(d). Additionally, all emissions falling within restricted bands of operation and at the band edges were found to be below the limit specified in Part 15.209(a). The spurious emissions listed in the following tables are the worst case emissions. Emissions not reported were at or below the measurement noise floor. The test sample was evaluated on three orthogonal axes since it was a hand held device and could be used in any orientation.

Worst Case Spurious Measurements (802.11b Mode, Low Channel)

Radiated Emissions										
Test Engineer:	Toby Carrier		**Start Date:**	5/15/2013		**End Date:**	5/15/2013			
Temperature:	24℃		**Humidity:**	52.30%		**Pressure:**	986 mbar			
Specification:	FCC		**Test Limit:**	15.205						
Notes:	802.11b, Channel 1									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / VBW / Detector**	**Test Distance**	**Results**
4824	H	40.1	-32.215	32.898	40.783	54	-13.217	1MHZ/1MHz/AVG	3m	**Compliant**
7236	H	30.79	-27.044	36.017	39.763	54	-14.237	1MHZ/1MHz/AVG	3m	**Compliant**
12060	H	28.79	-23.342	39.059	44.507	54	-9.493	1MHZ/1MHz/AVG	3m	**Compliant**
14472	H	32.45	-22.458	41.765	51.757	54	-2.243	1MHZ/1MHz/AVG	3m	**Compliant**
2387	H	52.145	-35.891	28.046	44.3	54	-9.7	1MHZ/1MHz/AVG	3m	**Compliant**
2390	H	48.305	-35.891	28.046	40.46	54	-13.54	1MHZ/1MHz/AVG	3m	**Compliant**
4824	V	35.86	-32.215	32.898	36.543	54	-17.457	1MHZ/1MHz/AVG	3m	**Compliant**
7236	V	30.52	-27.044	36.017	39.493	54	-14.507	1MHZ/1MHz/AVG	3m	**Compliant**
12060	V	26.28	-23.342	39.059	41.997	54	-12.003	1MHZ/1MHz/AVG	3m	**Compliant**
14472	V	32.42	-22.458	41.765	51.727	54	-2.273	1MHZ/1MHz/AVG	3m	**Compliant**
2387	V	48.595	-35.891	28.046	40.75	54	-13.25	1MHZ/1MHz/AVG	3m	**Compliant**
2390	V	49.275	-35.891	28.046	41.43	54	-12.57	1MHZ/1MHz/AVG	3m	**Compliant**
4824	H	41.82	-32.215	32.898	42.503	74	-31.497	1MHz/1MHz/PK	3m	**Compliant**
7236	H	37.35	-27.044	36.017	46.323	74	-27.677	1MHz/1MHz/PK	3m	**Compliant**
12060	H	35.88	-23.342	39.059	51.597	74	-22.403	1MHz/1MHz/PK	3m	**Compliant**
14472	H	35.77	-22.458	41.765	55.077	74	-18.923	1MHz/1MHz/PK	3m	**Compliant**
2387	H	56.705	-35.891	28.046	48.86	74	-25.14	1MHz/1MHz/PK	3m	**Compliant**
2390	H	58.205	-35.891	28.046	50.36	74	-23.64	1MHz/1MHz/PK	3m	**Compliant**
4824	V	40.64	-32.215	32.898	41.323	74	-32.677	1MHz/1MHz/PK	3m	**Compliant**
7236	V	38.47	-27.044	36.017	47.443	74	-26.557	1MHz/1MHz/PK	3m	**Compliant**
12060	V	32.4	-23.342	39.059	48.117	74	-25.883	1MHz/1MHz/PK	3m	**Compliant**
14472	V	36.53	-22.458	41.765	55.837	74	-18.163	1MHz/1MHz/PK	3m	**Compliant**
2387	V	57.645	-35.891	28.046	49.8	74	-24.2	1MHz/1MHz/PK	3m	**Compliant**
2390	V	56.575	-35.891	28.046	48.73	74	-25.27	1MHz/1MHz/PK	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

Worst Case Spurious Measurements (802.11b Mode, Mid Channel)

Radiated Emissions										
Test Engineer:	Toby Carrier		**Start Date:**	5/15/2013		**End Date:**	5/15/2013			
Temperature:	24℃		**Humidity:**	52.30%		**Pressure:**	986 mbar			
Specification:	FCC		**Test Limit:**	15.205						
Notes:	802.11b, Channel 6									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / VBW / Detector**	**Test Distance**	**Results**
4874	H	40.92	-32.215	32.898	41.603	54	-12.397	1MHZ/1MHz/AVG	3m	**Compliant**
7312	H	31.11	-26.741	36.525	40.894	54	-13.106	1MHZ/1MHz/AVG	3m	**Compliant**
12185	H	30.04	-22.777	38.971	46.234	54	-7.766	1MHZ/1MHz/AVG	3m	**Compliant**
4874	V	35.45	-32.215	32.898	36.133	54	-17.867	1MHZ/1MHz/AVG	3m	**Compliant**
7312	V	30.32	-26.741	36.525	40.104	54	-13.896	1MHZ/1MHz/AVG	3m	**Compliant**
12185	V	27.9	-22.777	38.971	44.094	54	-9.906	1MHZ/1MHz/AVG	3m	**Compliant**
4874	H	44.05	-32.215	32.898	44.733	74	-29.267	1MHz/1MHz/PK	3m	**Compliant**
7312	H	36.94	-26.741	36.525	46.724	74	-27.276	1MHz/1MHz/PK	3m	**Compliant**
12185	H	34.64	-22.777	38.971	50.834	74	-23.166	1MHz/1MHz/PK	3m	**Compliant**
4874	V	41.31	-32.215	32.898	41.993	74	-32.007	1MHz/1MHz/PK	3m	**Compliant**
7312	V	37.36	-26.741	36.525	47.144	74	-26.856	1MHz/1MHz/PK	3m	**Compliant**
12185	V	33.11	-22.777	38.971	49.304	74	-24.696	1MHz/1MHz/PK	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

Worst Case Spurious Measurements (802.11b Mode, High Channel)

Radiated Emissions										
Test Engineer:	Toby Carrier		**Start Date:**	5/15/2013		**End Date:**	5/15/2013			
Temperature:	24℃		**Humidity:**	52.30%		**Pressure:**	986 mbar			
Specification:	FCC		**Test Limit:**							
Notes:	802.11b, Channel 11									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / VBW / Detector**	**Test Distance**	**Results**
4924	H	40.57	-32.033	33.048	41.585	54	-12.415	1MHZ/1MHz/AVG	3m	**Compliant**
7386	H	31.08	-26.741	36.525	40.864	54	-13.136	1MHZ/1MHz/AVG	3m	**Compliant**
12310	H	30.57	-22.413	38.839	46.996	54	-7.004	1MHZ/1MHz/AVG	3m	**Compliant**
2483.5	H	48.614	-35.994	28.48	41.1	54	-12.9	1MHZ/1MHz/AVG	3m	**Compliant**
4924	V	36.32	-32.033	33.048	37.335	54	-16.665	1MHZ/1MHz/AVG	3m	**Compliant**
7386	V	29.78	-26.741	36.525	39.564	54	-14.436	1MHZ/1MHz/AVG	3m	**Compliant**
12310	V	25.66	-22.413	38.839	42.086	54	-11.914	1MHZ/1MHz/AVG	3m	**Compliant**
2483.5	V	46.504	-35.994	28.48	38.99	54	-15.01	1MHZ/1MHz/AVG	3m	**Compliant**
4924	H	42.4	-32.033	33.048	43.415	74	-30.585	1MHz/1MHz/PK	3m	**Compliant**
7386	H	39.43	-26.741	36.525	49.214	74	-24.786	1MHz/1MHz/PK	3m	**Compliant**
12310	H	33.38	-22.413	38.839	49.806	74	-24.194	1MHz/1MHz/PK	3m	**Compliant**
2483.5	H	57.324	-35.994	28.48	49.81	74	-24.19	1MHz/1MHz/PK	3m	**Compliant**
4924	V	41.75	-32.033	33.048	42.765	74	-31.235	1MHz/1MHz/PK	3m	**Compliant**
7386	V	37.49	-26.741	36.525	47.274	74	-26.726	1MHz/1MHz/PK	3m	**Compliant**
12310	V	30.41	-22.413	38.839	46.836	74	-27.164	1MHz/1MHz/PK	3m	**Compliant**
2483.5	V	56.744	-35.994	28.48	49.23	74	-24.77	1MHz/1MHz/PK	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

Worst Case Spurious Measurements (802.11g Mode, Low Channel)

Radiated Emissions										
Test Engineer:	Toby Carrier		**Start Date:**	5/16/2013		**End Date:**	5/16/2013			
Temperature:	24℃		**Humidity:**	52.30%		**Pressure:**	986 mbar			
Specification:	FCC		**Test Limit:**	15.205						
Notes:	802.11g, Channel 1									

A	B	C	D	E	F	G	H	I	J	K
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / VBW / Detector**	**Test Distance**	**Results**
4824	H	34.22	-32.215	32.898	34.903	54	-19.097	1MHZ/1MHz/AVG	3m	**Compliant**
7236	H	32.33	-27.044	36.017	41.303	54	-12.697	1MHZ/1MHz/AVG	3m	**Compliant**
12060	H	29.15	-23.342	39.059	44.867	54	-9.133	1MHZ/1MHz/AVG	3m	**Compliant**
14472	H	28.95	-22.458	41.765	48.257	54	-5.743	1MHZ/1MHz/AVG	3m	**Compliant**
2390	H	53.845	-35.891	28.046	46	54	-8	1MHZ/1MHz/AVG	3m	**Compliant**
4824	V	31.4	-32.215	32.898	32.083	54	-21.917	1MHZ/1MHz/AVG	3m	**Compliant**
7236	V	30.71	-27.044	36.017	39.683	54	-14.317	1MHZ/1MHz/AVG	3m	**Compliant**
12060	V	27.44	-23.342	39.059	43.157	54	-10.843	1MHZ/1MHz/AVG	3m	**Compliant**
14472	V	28.89	-22.458	41.765	48.197	54	-5.803	1MHZ/1MHz/AVG	3m	**Compliant**
2390	V	51.185	-35.891	28.046	43.34	54	-10.66	1MHZ/1MHz/AVG	3m	**Compliant**
4824	H	41.17	-32.215	32.898	41.853	74	-32.147	1MHz/1MHz/PK	3m	**Compliant**
7236	H	37.47	-27.044	36.017	46.443	74	-27.557	1MHz/1MHz/PK	3m	**Compliant**
12060	H	35.13	-23.342	39.059	50.847	74	-23.153	1MHz/1MHz/PK	3m	**Compliant**
14472	H	34.64	-22.458	41.765	53.947	74	-20.053	1MHz/1MHz/PK	3m	**Compliant**
2390	H	55.895	-35.891	28.046	48.05	75	-26.95	1MHz/1MHz/PK	3m	**Compliant**
4824	V	38.29	-32.215	32.898	38.973	74	-35.027	1MHz/1MHz/PK	3m	**Compliant**
7236	V	37.75	-27.044	36.017	46.723	74	-27.277	1MHz/1MHz/PK	3m	**Compliant**
12060	V	34.62	-23.342	39.059	50.337	74	-23.663	1MHz/1MHz/PK	3m	**Compliant**
14472	V	35.69	-22.458	41.765	54.997	74	-19.003	1MHz/1MHz/PK	3m	**Compliant**
2390	V	59.015	-35.891	28.046	51.17	74	-22.83	1MHz/1MHz/PK	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

Worst Case Spurious Measurements (802.11g Mode, Mid Channel)

Radiated Emissions										
Test Engineer:	Toby Carrier		**Start Date:**	5/16/2013		**End Date:**	5/16/2013			
Temperature:	24℃		**Humidity:**	52.30%		**Pressure:**	986 mbar			
Specification:	FCC		**Test Limit:**	15.205						
Notes:	802.11g, Channel 6									

A	B	C	D	E	F	G	H	I	J	K
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / VBW / Detector**	**Test Distance**	**Results**
4874	H	33.99	-32.215	32.898	34.673	54	-19.327	1MHZ/1MHz/AVG	3m	**Compliant**
7312	H	30.18	-26.741	36.525	39.964	54	-14.036	1MHZ/1MHz/AVG	3m	**Compliant**
12185	H	27.52	-22.777	38.971	43.714	54	-10.286	1MHZ/1MHz/AVG	3m	**Compliant**
4874	V	32.39	-32.215	32.898	33.073	54	-20.927	1MHZ/1MHz/AVG	3m	**Compliant**
7312	V	28.6	-26.741	36.525	38.384	54	-15.616	1MHZ/1MHz/AVG	3m	**Compliant**
12185	V	26.58	-22.777	38.971	42.774	54	-11.226	1MHZ/1MHz/AVG	3m	**Compliant**
4874	H	40.71	-32.215	32.898	41.393	74	-32.607	1MHz/1MHz/PK	3m	**Compliant**
7312	H	36.84	-26.741	36.525	46.624	74	-27.376	1MHz/1MHz/PK	3m	**Compliant**
12185	H	33.61	-22.777	38.971	49.804	74	-24.196	1MHz/1MHz/PK	3m	**Compliant**
4874	V	39.58	-32.215	32.898	40.263	74	-33.737	1MHz/1MHz/PK	3m	**Compliant**
7312	V	35.95	-26.741	36.525	45.734	74	-28.266	1MHz/1MHz/PK	3m	**Compliant**
12185	V	31.01	-22.777	38.971	47.204	74	-26.796	1MHz/1MHz/PK	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

Worst Case Spurious Measurements (802.11g Mode, High Channel)

Radiated Emissions										
Test Engineer:	Toby Carrier		**Start Date:**	5/16/2013		**End Date:**	5/16/2013			
Temperature:	24℃		**Humidity:**	52.30%		**Pressure:**	986 mbar			
Specification:	FCC		**Test Limit:**							
Notes:	802.11g, Channel 11									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / VBW / Detector**	**Test Distance**	**Results**
4924	H	34.29	-32.033	33.048	35.305	54	-18.695	1MHZ/1MHz/AVG	3m	**Compliant**
7386	H	30.24	-26.741	36.525	40.024	54	-13.976	1MHZ/1MHz/AVG	3m	**Compliant**
12310	H	27.18	-22.413	38.839	43.606	54	-10.394	1MHZ/1MHz/AVG	3m	**Compliant**
2483.5	H	47.964	-35.994	28.48	40.45	54	-13.55	1MHZ/1MHz/AVG	3m	**Compliant**
4924	V	32.73	-32.033	33.048	33.745	54	-20.255	1MHZ/1MHz/AVG	3m	**Compliant**
7386	V	29.18	-26.741	36.525	38.964	54	-15.036	1MHZ/1MHz/AVG	3m	**Compliant**
12310	V	26.71	-22.413	38.839	43.136	54	-10.864	1MHZ/1MHz/AVG	3m	**Compliant**
2483.5	V	44.194	-35.994	28.48	36.68	54	-17.32	1MHZ/1MHz/AVG	3m	**Compliant**
4924	H	38.4	-32.033	33.048	39.415	74	-34.585	1MHz/1MHz/PK	3m	**Compliant**
7386	H	36.29	-26.741	36.525	46.074	74	-27.926	1MHz/1MHz/PK	3m	**Compliant**
12310	H	33.85	-22.413	38.839	50.276	74	-23.724	1MHz/1MHz/PK	3m	**Compliant**
2483.5	H	58.514	-35.994	28.48	51	74	-23	1MHz/1MHz/PK	3m	**Compliant**
4924	V	39.37	-32.033	33.048	40.385	74	-33.615	1MHz/1MHz/PK	3m	**Compliant**
7386	V	36.5	-26.741	36.525	46.284	74	-27.716	1MHz/1MHz/PK	3m	**Compliant**
12310	V	33.6	-22.413	38.839	50.026	74	-23.974	1MHz/1MHz/PK	3m	**Compliant**
2483.5	V	57.154	-35.994	28.48	49.64	74	-24.36	1MHz/1MHz/PK	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

Worst Case Spurious Measurements (802.11n (20MHz) Mode, Low Channel)

Radiated Emissions										
Test Engineer:	Toby Carrier		**Start Date:**	5/16/2013		**End Date:**	5/16/2013			
Temperature:	24℃		**Humidity:**	52.30%		**Pressure:**	986 mbar			
Specification:	FCC		**Test Limit:**	15.205						
Notes:	802.11n, Channel 1									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / VBW / Detector**	**Test Distance**	**Results**
4824	H	33.74	-32.215	32.898	34.423	54	-19.577	1MHZ/1MHz/AVG	3m	**Compliant**
7236	H	30.21	-27.044	36.017	39.183	54	-14.817	1MHZ/1MHz/AVG	3m	**Compliant**
12060	H	26.32	-23.342	39.059	42.037	54	-11.963	1MHZ/1MHz/AVG	3m	**Compliant**
14472	H	26.75	-22.458	41.765	46.057	54	-7.943	1MHZ/1MHz/AVG	3m	**Compliant**
2390	H	53.065	-35.891	28.046	45.22	54	-8.78	1MHZ/1MHz/AVG	3m	**Compliant**
4824	V	31.37	-32.215	32.898	32.053	54	-21.947	1MHZ/1MHz/AVG	3m	**Compliant**
7236	V	29.41	-27.044	36.017	38.383	54	-15.617	1MHZ/1MHz/AVG	3m	**Compliant**
12060	V	25.58	-23.342	39.059	41.297	54	-12.703	1MHZ/1MHz/AVG	3m	**Compliant**
14472	V	27.24	-22.458	41.765	46.547	54	-7.453	1MHZ/1MHz/AVG	3m	**Compliant**
2390	V	51.445	-35.891	28.046	43.6	54	-10.4	1MHZ/1MHz/AVG	3m	**Compliant**
4824	H	39.2	-32.215	32.898	39.883	74	-34.117	1MHz/1MHz/PK	3m	**Compliant**
7236	H	36.39	-27.044	36.017	45.363	74	-28.637	1MHz/1MHz/PK	3m	**Compliant**
12060	H	33.41	-23.342	39.059	49.127	74	-24.873	1MHz/1MHz/PK	3m	**Compliant**
14472	H	32.07	-22.458	41.765	51.377	74	-22.623	1MHz/1MHz/PK	3m	**Compliant**
2390	H	62.505	-35.891	28.046	54.66	75	-20.34	1MHz/1MHz/PK	3m	**Compliant**
4824	V	38.47	-32.215	32.898	39.153	74	-34.847	1MHz/1MHz/PK	3m	**Compliant**
7236	V	37.17	-27.044	36.017	46.143	74	-27.857	1MHz/1MHz/PK	3m	**Compliant**
12060	V	33.08	-23.342	39.059	48.797	74	-25.203	1MHz/1MHz/PK	3m	**Compliant**
14472	V	34.07	-22.458	41.765	53.377	74	-20.623	1MHz/1MHz/PK	3m	**Compliant**
2390	V	60.205	-35.891	28.046	52.36	74	-21.64	1MHz/1MHz/PK	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

Worst Case Spurious Measurements (802.11n (20MHz) Mode, Mid Channel)

Radiated Emissions										
Test Engineer:	Toby Carrier		**Start Date:**	5/16/2013		**End Date:**	5/16/2013			
Temperature:	24℃		**Humidity:**	52.30%		**Pressure:**	986 mbar			
Specification:	FCC		**Test Limit:**	15.205						
Notes:	802.11n, Channel 6									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / VBW / Detector**	**Test Distance**	**Results**
4874	H	33.31	-32.215	32.898	33.993	54	-20.007	1MHZ/1MHz/AVG	3m	**Compliant**
7312	H	29.73	-26.741	36.525	39.514	54	-14.486	1MHZ/1MHz/AVG	3m	**Compliant**
12185	H	28.53	-22.777	38.971	44.724	54	-9.276	1MHZ/1MHz/AVG	3m	**Compliant**
4874	V	31.8	-32.215	32.898	32.483	54	-21.517	1MHZ/1MHz/AVG	3m	**Compliant**
7312	V	28.5	-26.741	36.525	38.284	54	-15.716	1MHZ/1MHz/AVG	3m	**Compliant**
12185	V	28.13	-22.777	38.971	44.324	54	-9.676	1MHZ/1MHz/AVG	3m	**Compliant**
4874	H	38.93	-32.215	32.898	39.613	74	-34.387	1MHz/1MHz/PK	3m	**Compliant**
7312	H	36.37	-26.741	36.525	46.154	74	-27.846	1MHz/1MHz/PK	3m	**Compliant**
12185	H	34.27	-22.777	38.971	50.464	74	-23.536	1MHz/1MHz/PK	3m	**Compliant**
4874	V	40.54	-32.215	32.898	41.223	74	-32.777	1MHz/1MHz/PK	3m	**Compliant**
7312	V	36.71	-26.741	36.525	46.494	74	-27.506	1MHz/1MHz/PK	3m	**Compliant**
12185	V	36.73	-22.777	38.971	52.924	74	-21.076	1MHz/1MHz/PK	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

Worst Case Spurious Measurements (802.11n (20MHz) Mode, High Channel)

Radiated Emissions										
Test Engineer:	Toby Carrier		**Start Date:**	5/16/2013		**End Date:**	5/16/2013			
Temperature:	24℃		**Humidity:**	52.30%		**Pressure:**	986 mbar			
Specification:	FCC		**Test Limit:**							
Notes:	802.11n, Channel 11									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / VBW / Detector**	**Test Distance**	**Results**
4924	H	33.96	-32.033	33.048	34.975	54	-19.025	1MHZ/1MHz/AVG	3m	**Compliant**
7386	H	30.28	-26.741	36.525	40.064	54	-13.936	1MHZ/1MHz/AVG	3m	**Compliant**
12310	H	27.78	-22.413	38.839	44.206	54	-9.794	1MHZ/1MHz/AVG	3m	**Compliant**
2483.5	H	47.544	-35.994	28.48	40.03	54	-13.97	1MHZ/1MHz/AVG	3m	**Compliant**
4924	V	32.67	-32.033	33.048	33.685	54	-20.315	1MHZ/1MHz/AVG	3m	**Compliant**
7386	V	29.7	-26.741	36.525	39.484	54	-14.516	1MHZ/1MHz/AVG	3m	**Compliant**
12310	V	25.34	-22.413	38.839	41.766	54	-12.234	1MHZ/1MHz/AVG	3m	**Compliant**
2483.5	V	47.504	-35.994	28.48	39.99	54	-14.01	1MHZ/1MHz/AVG	3m	**Compliant**
4924	H	40.7	-32.033	33.048	41.715	74	-32.285	1MHz/1MHz/PK	3m	**Compliant**
7386	H	37.34	-26.741	36.525	47.124	74	-26.876	1MHz/1MHz/PK	3m	**Compliant**
12310	H	35.78	-22.413	38.839	52.206	74	-21.794	1MHz/1MHz/PK	3m	**Compliant**
2483.5	H	57.564	-35.994	28.48	50.05	74	-23.95	1MHz/1MHz/PK	3m	**Compliant**
4924	V	38.5	-32.033	33.048	39.515	74	-34.485	1MHz/1MHz/PK	3m	**Compliant**
7386	V	36.41	-26.741	36.525	46.194	74	-27.806	1MHz/1MHz/PK	3m	**Compliant**
12310	V	32.51	-22.413	38.839	48.936	74	-25.064	1MHz/1MHz/PK	3m	**Compliant**
2483.5	V	56.744	-35.994	28.48	49.23	74	-24.77	1MHz/1MHz/PK	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

Worst Case Spurious Measurements Above 18GHz

Radiated Emissions										
Test Engineer:	Bryan Taylor		**Start Date:**	5/23/2013		**End Date:**	5/23/2013			
Temperature:	24℃		**Humidity:**	52.30%		**Pressure:**	986 mbar			
Specification:	FCC		**Test Limit:**	Class B						
Notes:	802.11 b mode, Measurements Above 18GHz									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Frequency (GHz)	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / VBW / Detector**	**Test Distance**	**Results**
802.11b Low Channel										
19.296	V	41.98	-19.98	44.3	66.3	83.5	-17.2	1MHz/1MHz/PK	1m	**Compliant**
19.296	V	38.53	-19.98	44.3	62.85	63.5	-0.65	1MHZ/1MHz/AVG	1m	**Compliant**
19.296	H	36.33	-19.98	44.3	60.65	83.5	-22.85	1MHz/1MHz/PK	1m	**Compliant**
19.296	H	29.03	-19.98	44.3	53.35	63.5	-10.15	1MHZ/1MHz/AVG	1m	**Compliant**
802.11b Mid Channel										
19.496	V	42.42	-19.98	44.3	66.74	83.5	-16.76	1MHz/1MHz/PK	1m	**Compliant**
19.496	V	38.9	-19.98	44.3	63.22	63.5	-0.28	1MHZ/1MHz/AVG	1m	**Compliant**
19.496	H	36.84	-19.98	44.3	61.16	83.5	-22.34	1MHz/1MHz/PK	1m	**Compliant**
19.496	H	30.31	-19.98	44.3	54.63	63.5	-8.87	1MHZ/1MHz/AVG	1m	**Compliant**
802.11b High Channel										
19.696	V	42.55	-19.98	44.3	66.87	83.5	-16.63	1MHz/1MHz/PK	1m	**Compliant**
19.696	V	38.84	-19.98	44.3	63.16	63.5	-0.34	1MHZ/1MHz/AVG	1m	**Compliant**
19.696	H	37.34	-19.98	44.3	61.66	83.5	-21.84	1MHz/1MHz/PK	1m	**Compliant**
19.696	H	30.31	-19.98	44.3	54.63	63.5	-8.87	1MHZ/1MHz/AVG	1m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

9 Radiated Spurious Emissions (Receiver)

9.1 Test Limits

§ 15.109: Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field strength (microvolts/meter)	Field strength (dBuV/m)
30–88	100	40
88–216	150	43.5
216–960	200	46
Above 960	500	54

These limits are identical to those in RSS-GEN

9.2 Test Procedure

ANSI C63.4: 2009

9.3 Example of Field Strength Calculation Method:

The measured field strength was calculated by summing the readings taken from the spectrum analyzer with the appropriate correction factors associated with the antenna losses and cable losses. The calculation formula and sample calculations are listed below:

Formula:
FS = RA + AF + CF

FS = Field Strength in dBμV/m
RA = Receiver Amplitude in dBμV
AF = Antenna Factor in dB
CF = Cable Attenuation Factor in dB (Including preamplifier and filter attenuation)

Example Calculation:

RA = 19.48 dBμV
AF = 18.52 dB
CF = 0.78 dB

FS = 19.48 + 18.52 + 0.78 = 38.78 dBμV/m
Level in μV/m = Common Antilogarithm [(38.78 dBμV/m)/20] = 86.89 μV/m

9.4 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	10887490.26	Rohde & Schwarz	ESI26	9/15/2012	9/14/2013
Preamplifier	SF456200904	Mini-Circuits	ZX60-3018G-S+	9/4/2012	9/4/2013
Biconnilog Antenna	00051864	ETS	3142C	12/14/2012	12/14/2013
Horn Antenna	6556	ETS	3115	9/13/2012	9/13/2013
System Controller	121701-1	Sunol Sciences	SC99V	Time of Use	Time of Use

9.5 Results:

All spurious emissions with the test sample in receive mode were below the limits specified in Part 15.109 for a class B digital device and RSS-GEN Section 6.1.

9.6 Test Data: Bilog

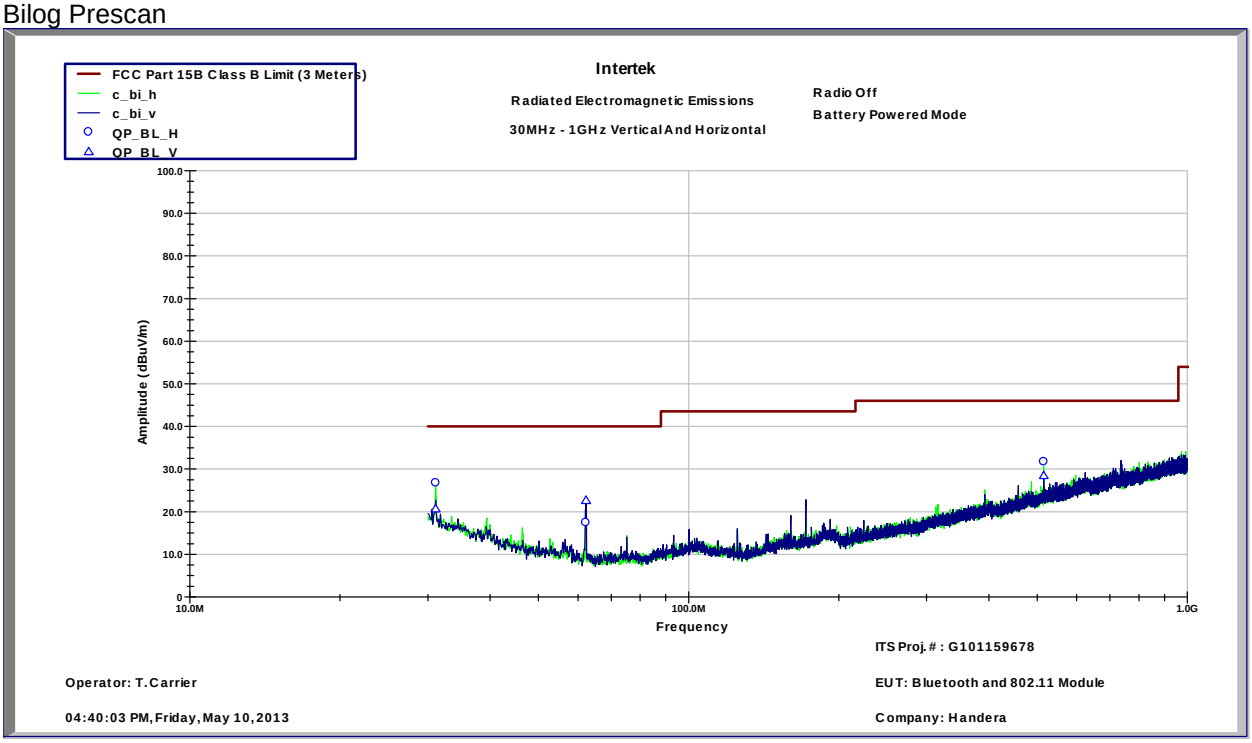
Radiated Emissions										
Test Engineer:	Toby Carrier	**Start Date:**	5/10/2013		**End Date:**	5/10/2013				
Temperature:	23.05°	**Humidity:**	30.70%		**Pressure:**	988.9 mbar				
Specification:	FCC Part 15B	**Test Limit:**	Class B							
Notes:	Radio Off									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / Detector**	**Test Distance**	**Results**
31.129 MHz	H	8.7	0.71	17.35	26.75	40	-13.25	120kHz/QP	3m	**Compliant**
62.257 MHz	H	9.1	1.02	7.27	17.4	40	-22.6	120kHz/QP	3m	**Compliant**
515.43 MHz	H	9.98	3.11	18.62	31.7	46.02	-14.32	120kHz/QP	3m	**Compliant**
31.114 MHz	V	2.63	0.71	17.35	20.69	40	-19.31	120kHz/QP	3m	**Compliant**
62.267 MHz	V	14.36	1.02	7.27	22.66	40	-17.34	120kHz/QP	3m	**Compliant**
515.48 MHz	V	6.75	3.11	18.62	28.48	46.02	-17.54	120kHz/QP	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

9.7 Test Data: Horn

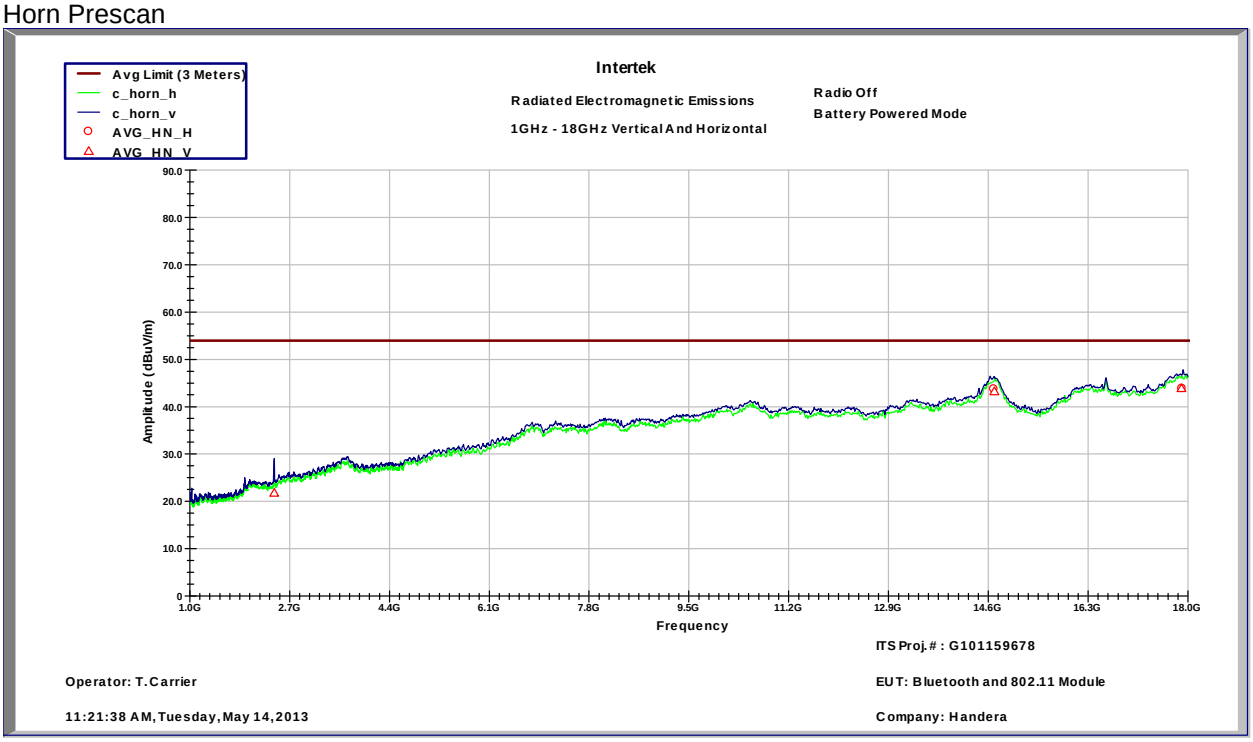
Radiated Emissions										
Test Engineer:	Toby Carrier	**Start Date:**	5/14/2013		**End Date:**	5/14/2013				
Temperature:	23.05°	**Humidity:**	30.70%		**Pressure:**	988.9 mbar				
Specification:	FCC Part 15B	**Test Limit:**	Class B							
Notes:	Radio Off									
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Frequency	**Polarity (H/V)**	**Raw Reading (dBuV)**	**Cab. (dB)**	**Ant. (dB)**	**Corr. Reading. (dBuV/m)**	**Limit (dBuV/m)**	**Delta (dB)**	**RBW / Detector**	**Test Distance**	**Results**
14.694 GHz	H	19.11	-22.24	46.81	43.67	53.98	-10.31	1MHz/AVG	3m	**Compliant**
17.902 GHz	H	15.48	-16.81	45.14	43.81	53.98	-10.17	1MHz/AVG	3m	**Compliant**
2.4358 GHz	V	29.09	-35.91	28.55	21.73	53.98	-32.25	1MHz/AVG	3m	**Compliant**
14.705 GHz	V	18.64	-22.24	46.77	43.17	53.98	-10.81	1MHz/AVG	3m	**Compliant**
17.89 GHz	V	15.54	-16.83	45.13	43.84	53.98	-10.14	1MHz/AVG	3m	**Compliant**
Calculations:					F = C + D + E		H = F - G			

Deviations, Additions, or Exclusions: None

Bilog Prescan



Horn Prescan



10 AC Powerline Conducted Emissions

10.1 Test Limits

§ 15.107(e): Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	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.

10.2 Test Procedure

ANSI C63.4: 2009

10.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	10887490.26	Rohde & Schwarz	ESI26	9/15/2012	9/14/2013
LISN	3333	Teseq	NNB52	3/11/2013	3/11/2014

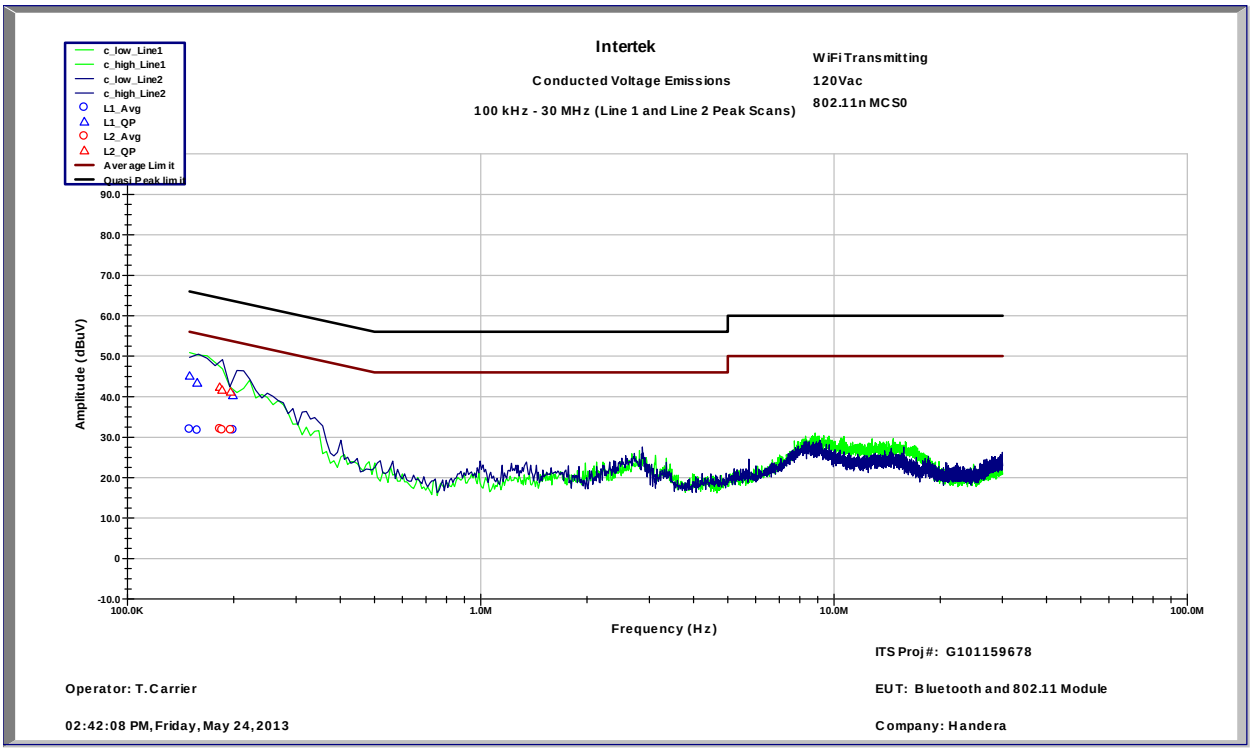
10.4 Results:

The sample tested was found to Comply.

10.5 Data (802.11 Transmitting):

Conducted Voltage Emissions on Power Lines								
Test Engineer:	Toby Carrier	**Start Date:**	5/24/2013	**End Date:**	5/24/2013			
Temperature:	25.5℃	**Humidity:**	31.20%	**Pressure:**	984.5 mbar			
Specification:	FCC Part 15B	**Test Limit:**	Class B	**RBW:**	9kHz			
Notes:	Radio Transmitting (WiFi - 802.11n MCS0)							

Line	Frequency (MHz)	Quasi-Peak (dBuV)	Quasi-Peak Limit (dBuV)	Quasi-Peak Delta (dB)	Average (dBuV)	Average Limit (dBuV)	Average Delta (dB)	Results
L1	150.0 KHz	45.09	66	-20.91	31.98	56	-24.02	**Compliant**
L1	157.6 KHz	43.38	65.59	-22.21	31.66	55.59	-23.93	**Compliant**
L1	198.9 KHz	40.3	63.66	-23.36	31.82	53.66	-21.84	**Compliant**
L2	182.5 KHz	42.32	64.37	-22.05	32.07	54.37	-22.3	**Compliant**
L2	185.3 KHz	41.62	64.24	-22.63	31.74	54.24	-22.51	**Compliant**
L2	195.9 KHz	41.12	63.78	-22.66	31.77	53.78	-22.01	**Compliant**

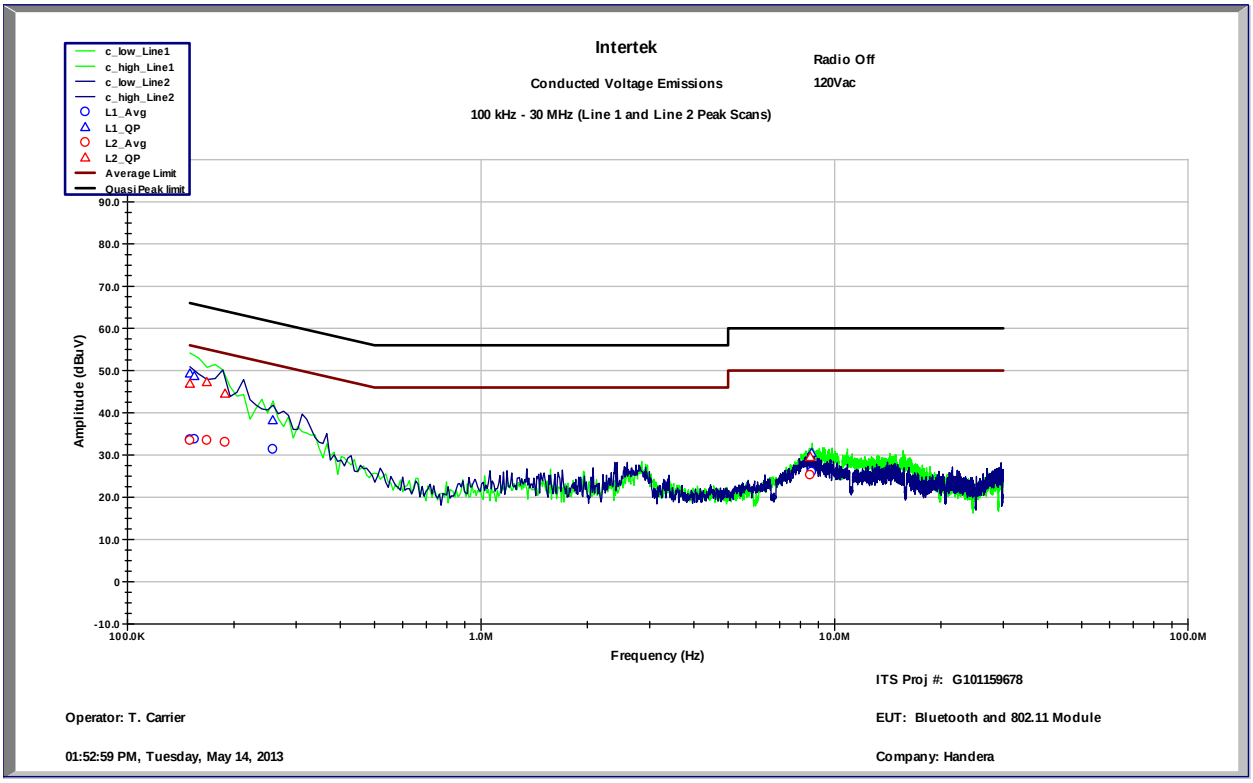


Deviations, Additions, or Exclusions: None

10.6 Data (Idle Mode):

Conducted Voltage Emissions on Power Lines								
Test Engineer:	Toby Carrier	**Start Date:**	5/14/2013	**End Date:**	5/14/2013			
Temperature:	25.5℃	**Humidity:**	31.20%	**Pressure:**	984.5 mbar			
Specification:	FCC Part 15B	**Test Limit:**	Class B	**RBW:**	9kHz			
Notes:	Radio Off							

Line	Frequency (MHz)	Quasi-Peak (dBuV)	Quasi-Peak Limit (dBuV)	Quasi-Peak Delta (dB)	Average (dBuV)	Average Limit (dBuV)	Average Delta (dB)	Results
L1	150.0 KHz	49.3	66	-16.7	33.63	56	-22.37	**Compliant**
L1	154.6 KHz	48.67	65.75	-17.08	33.8	55.75	-21.95	**Compliant**
L1	257.5 KHz	38.23	61.51	-23.28	31.39	51.51	-20.12	**Compliant**
L1	8.6133 MHz	30.49	60	-29.51	26	50	-24	**Compliant**
L2	150.0 KHz	46.86	66	-19.14	33.46	56	-22.54	**Compliant**
L2	167.6 KHz	47.26	65.08	-17.82	33.49	55.08	-21.59	**Compliant**
L2	188.7 KHz	44.51	64.09	-19.59	33.07	54.09	-21.03	**Compliant**
L2	8.5301 MHz	29.52	60	-30.48	25.31	50	-24.69	**Compliant**



Deviations, Additions, or Exclusions: None

11 Antenna Requirement per FCC Part 15.203

11.1 Test Limits

§ 15.203: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

11.2 Results:

The sample tested met the antenna requirement. The antenna used was permanently attached and integral to the PCB.

12 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements.

The measurement uncertainty figures were calculated and correspond to a coverage factor of k = 2, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Measurement uncertainty Table

Parameter	Uncertainty	Notes
Radiated emissions, 30 to 1000 MHz	±3.9dB	
Radiated emissions, 1 to 18 GHz	±4.2dB	
Radiated emissions, 18 to 40 GHz	±4.3dB	
Power Port Conducted emissions, 150kHz to 30 MHz	±2.8dB	

13 Revision History

Revision Level	Date	Report Number	Notes
0	6/3/2014	101159678LEX-001	Original Issue