

TEST REPORT

Report Number: 100810573MPK-001

Project Number: G100810573

September 28, 2012

**Testing performed on the
SKY WiFi Smartpen
Model Numbers: 2GB, 4GB and 8GB
FCC ID: CKD-00053
IC: 10240A-00053**

**to
FCC Part 15 Subpart C (15.247)
RSS-210 Issue 8
FCC Part 15, Subpart B
Industry Canada ICES-003**

for

Livescribe, Inc.

Test Performed by:
Intertek
1365 Adams Court
Menlo Park, CA 94025 USA

Test Authorized by:
Livescribe, Inc.
7677 Oakport St. 12th Floor
Oakland, CA 94621, USA

Prepared by: _____


Krishna K Vemuri

Date: September 28, 2012

Reviewed by: _____


Ollie Moyrong

Date: September 28, 2012

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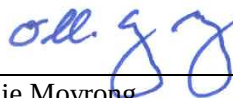
Report No. 100810573MPK-001

Equipment Under Test:	SKY WiFi Smartpen
Trade Name:	Livescribe, Inc.
Model Numbers:	2GB, 4GB and 8GB
Serial Numbers	MPK1206011617-003, MPK1206011617-002, MPK1206011617-001
Applicant:	Livescribe, Inc.
Contact:	Thomas L Davenport
Address:	7677 Oakport St. 12th Floor Oakland, CA 94621
Country	USA
Tel. Number:	(510) 553-4925
Email:	tdavenport@livescribe.com
Applicable Regulation:	FCC Part 15 Subpart C (15.247) RSS-210 Issue 8 FCC Part 15, Subpart B Industry Canada ICES-003
Date of Test:	June 22 to August 17, 2012

We attest to the accuracy of this report:



Krishna K Vemuri
EMC Senior Staff Engineer



Ollie Moyrong
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1.0 Summary of Tests

Test	Reference FCC	Reference RSS	Result
RF Output Power	15.247(b)(3)	A8.4(4)	Complies
6 dB Bandwidth	15.247(a)(2)	A8.2(a)	Complies
Power Density	15.247(e)	A8.2(b)	Complies
Out of Band Antenna Conducted Emission	15.247(d)	A8.5	Complies
Transmitter Radiated Emissions	15.247(d), 15.209, 15.205	A8.5, 2.2	Complies
AC Conducted Emission	15.207	RSS-Gen	Complies
Radiated Emission from Digital Part and Receiver	15.109	ICES-003	Complies
Antenna Requirement	15.203	RSS-Gen	Complies. The EUT uses PCB antenna
RF Exposure	15.247(i)	RSS-102	Complies

EUT receive date: June 22, 2012

EUT receive condition: The pre-production version of the EUT was received in good condition with no apparent damage. As declared by the Applicant, it is identical to the production units.

Test start date: June 22, 2012

Test completion date: August 17, 2012

The test results in this report pertain only to the item tested.

2.0 General Information

2.1 Product Description

The Equipment Under Test (EUT), is a SKY WiFi Smartpen, consisting of one Wi-Fi (IEEE 802.11b/g/n HT20/n HT40) transmitter operating at 2.4GHz. There are 3 versions of SKY WiFi Smartpens, models: 2GB, 4GB and 8GB.

The EUT supports a wide range of data rates in the 2.4GHz band:

IEEE 802.11b: 1, 2, 5.5, 11Mbps

IEEE 802.11g: 6, 9, 12, 18, 24, 36, 54Mbps

IEEE 802.11n: MCS0, MCS1, MCS2, MCS3, MCS4, MCS7

Note: in 802.11n HT20 and 802.11n HT40 modes, the nominal bandwidth is 20 MHz and 40 MHz respectively.

Information about the 2.4GHz radio, installed in the models 2GB, 4GB and 8GB, is presented below:

Applicant	Livescribe, Inc.
Model Numbers	2GB, 4GB and 8GB
FCC Identifier	CKD-00053
IC Identifier	10240A-00053
Use of Product	SKY WiFi Smartpen
Modulation Technique	DSSS (BPSK, QPSK, CCK), OFDM (BPSK, QPSK, 16QAM, 64QAM)
Rated RF Output	53.7mW or 17.3dBm (average)
Frequency Range	2412 – 2462 MHz
Type of modulation	BPSK, QPSK, 16QAM, 64QAM
Number of Channel(s)	11
Antenna(s) & Gain	Internal antenna: PCB antenna, 0.5 - 1 dBi peak gain
Manufacturer Name & Address	Livescribe, Inc. 7677 Oakport St. 12th Floor Oakland, CA 94621, USA

The EUT supports the following configurations:

Channels in 2.4 GHz band					
Number	Frequency, MHz	b/g/n HT20 mode		n HT40 mode	
1	2412	√	X		
2	2417	√			
3	2422	√		√	X
4	2427	√		√	
5	2432	√		√	
6	2437	√	X	√	X
7	2442	√		√	
8	2447	√		√	
9	2452	√		√	X
10	2457	√			
11	2462	√	X		

√ - available

X – to be tested

2.2 Related Submittal(s) Grants

None.

2.3 Test Methodology

Antenna conducted measurements were performed according to the procedure "Measurement of Digital Transmission Systems Operating under Section 15.247".

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4. Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Data Sheet**" of this Application.

All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

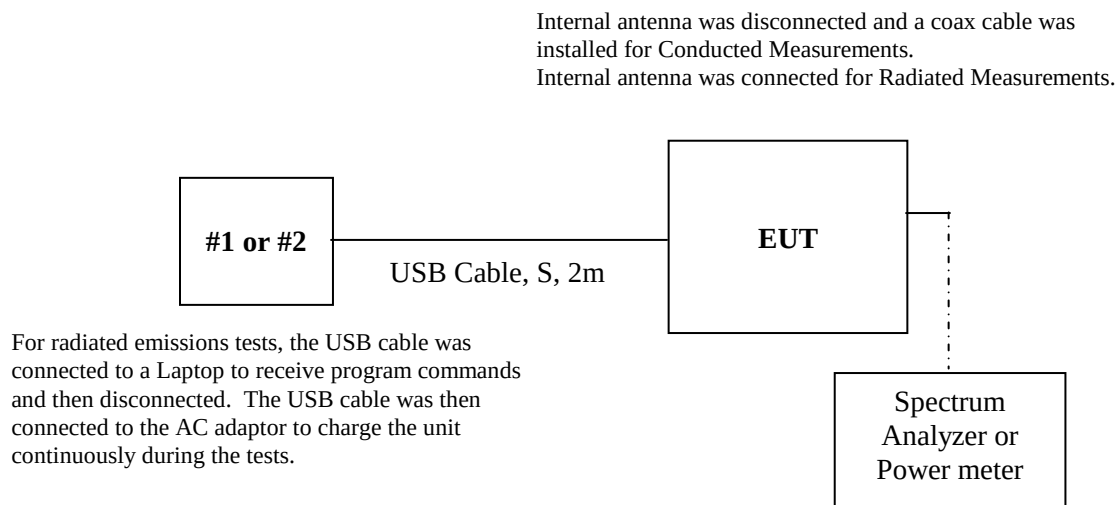
The test site used to collect the radiated data is site 1 (10-m semi-anechoic chamber). This test facility and site measurement data have been fully placed on file with the FCC, IC and A2LA accredited.

3.0 System Test Configuration

3.1 Support Equipment

Item #	Description	Model No.	Serial No.
1	Dell Laptop	PP04X	(01)07898349890528
2	HTC, USBAC adapter	TC U250	Not Labeled

3.2 Block Diagram of Test Setup



S = Shielded U = Unshielded	F = With Ferrite m = Length in Meters
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3.3 Justification

Preliminary testing was performed for all modulation/data rate modes. The following modes, in which the highest power was detected, were selected for final measurements:

CCK 11 Mbps – for 802.11b

OFDM 6 Mbps and 54 Mbps – for 802.11g

OFDM MCS0 and MCS7 – for 802.11n HT20

OFDM MCS0 – for 802.11n HT40

The SKY WiFi Smartpen, models: 2GB, 4GB and 8GB, have identical radio sections, cables and housing. The only difference between the models is a minor change in the non-radio section. The only difference between the three models is memory size. All radio tests were performed on the model: 8GB only; however, the test results are also applicable to the 2GB and 4GB models. Radiated Emissions from Digital Parts and Receiver were performed on all the models.

3.4 Mode of Operation During Test

During transmitter testing, the transmitter was setup to transmit continuously at maximum RF power on low, middle and high channels.

3.5 Modifications Required for Compliance

Intertek installed no modifications during compliance testing in order to bring the product into compliance.

3.6 Additions, Deviations and Exclusions from Standards

No additions, deviations or exclusions from the standard were made.

4.0 Measurement Results

4.1 26-dB Bandwidth, 6-dB Bandwidth and Occupied Bandwidth FCC Rule 15.247(a)(2)

4.1.1 Requirement

The minimum 6-dB bandwidth shall be at least 500 kHz

4.1.2 Procedure

The Procedure described in the FCC Publication 558074 was used.

The antenna port of the EUT was connected to the input of a spectrum analyzer (SA). For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 26 dB or 6 dB lower than PEAK level. The 26-dB or 6-dB bandwidth was determined from where the channel output spectrum intersected the display line.

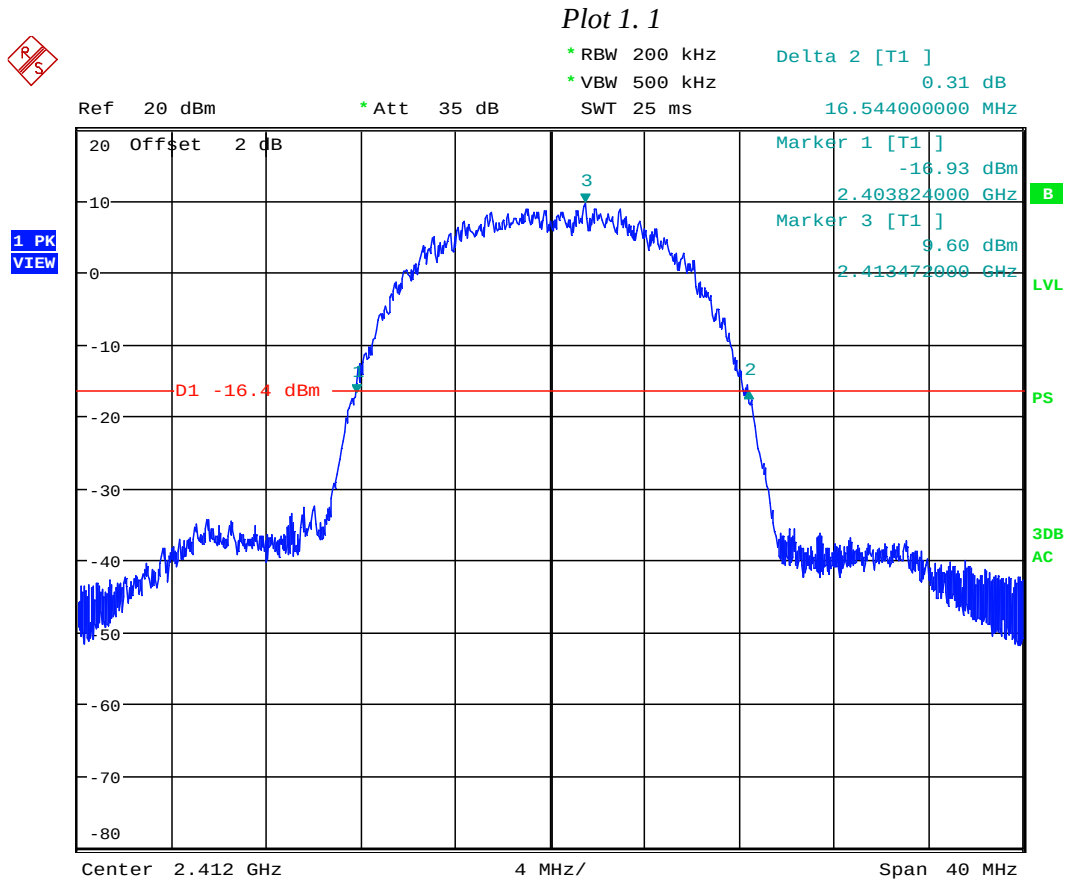
The occupied bandwidth was measured using the built-in spectrum analyzer function for 99% power bandwidth measurement.

4.1.3 Test Result

Channel	Frequency MHz	Standard/ Data rate	26-dB Bandwidth, MHz	Occupied Bandwidth, MHz	6-dB Bandwidth, MHz	Plot #
1	2412	802.11b 11 Mbps	16.5	13.5	10.3	1.1 1.19
		802.11g 6 Mbps	21.4	16.5	16.3	1.4 1.22
		802.11g 54 Mbps	21.1	16.5	16.5	1.7 1.25
		802.11n HT20 MCS0	22.0	17.6	17.2	1.10 1.28
		802.11n HT20 MCS7	21.4	17.6	17.6	1.13 1.31
3	2422	802.11n HT40 MCS0	46.2	36.6	36.1	1.16 1.34
6	2437	802.11b 11 Mbps	16.5	13.5	10.4	1.2 1.20
		802.11g 6 Mbps	21.9	16.5	16.3	1.5 1.23
		802.11g 54 Mbps	21.1	16.5	16.5	1.8 1.26
		802.11n HT20 MCS0	21.9	17.6	17.3	1.11 1.29
		802.11n HT20 MCS7	21.5	17.6	17.6	1.14 1.32
6	2437	802.11n HT40 MCS0	46.7	36.6	36.2	1.17 1.35
11	2462	802.11b 11 Mbps	16.5	13.5	10.4	1.2 1.21
		802.11g 6 Mbps	21.7	16.5	16.3	1.5 1.24
		802.11g 54 Mbps	21.1	16.5	16.5	1.8 1.27
		802.11n HT20 MCS0	22.0	17.6	17.5	1.11 1.30
		802.11n HT20 MCS7	21.5	17.6	17.7	1.14 1.33
9	2452	802.11n HT40 MCS0	46.2	36.6	36.0	1.17 1.36

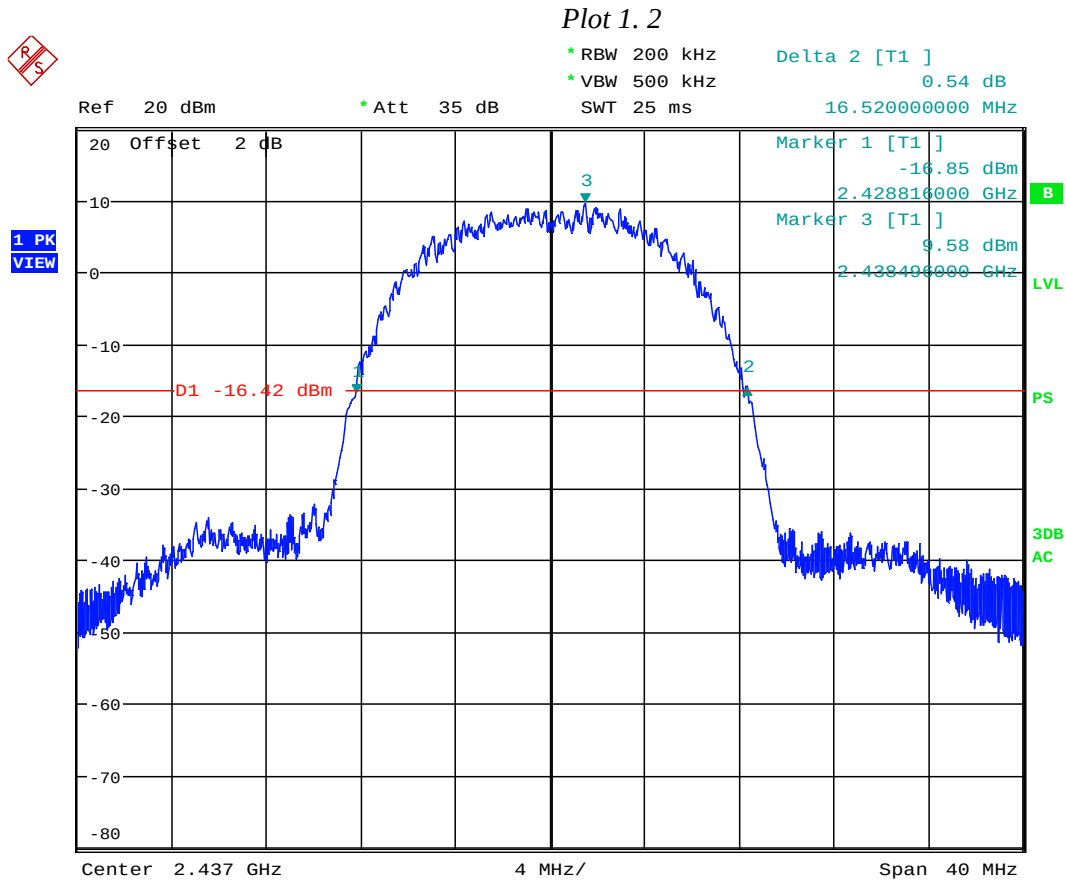
26-dB bandwidth is presented on plots 1.1 – 1.18.

6-dB Bandwidth and Occupied Bandwidth is presented on plots 1.19 – 1.36.



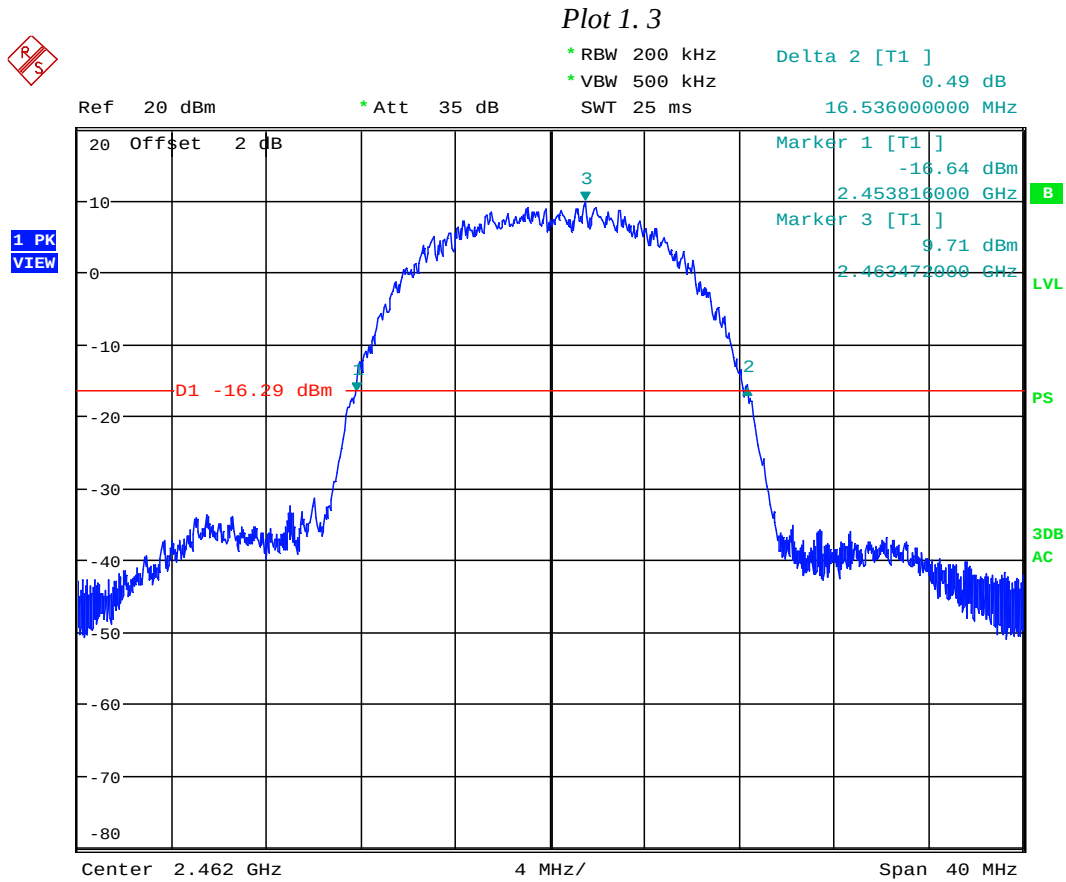
26-dB bandwidth, 802.11b, 11Mbps

Date: 9.JUL.2012 13:43:26



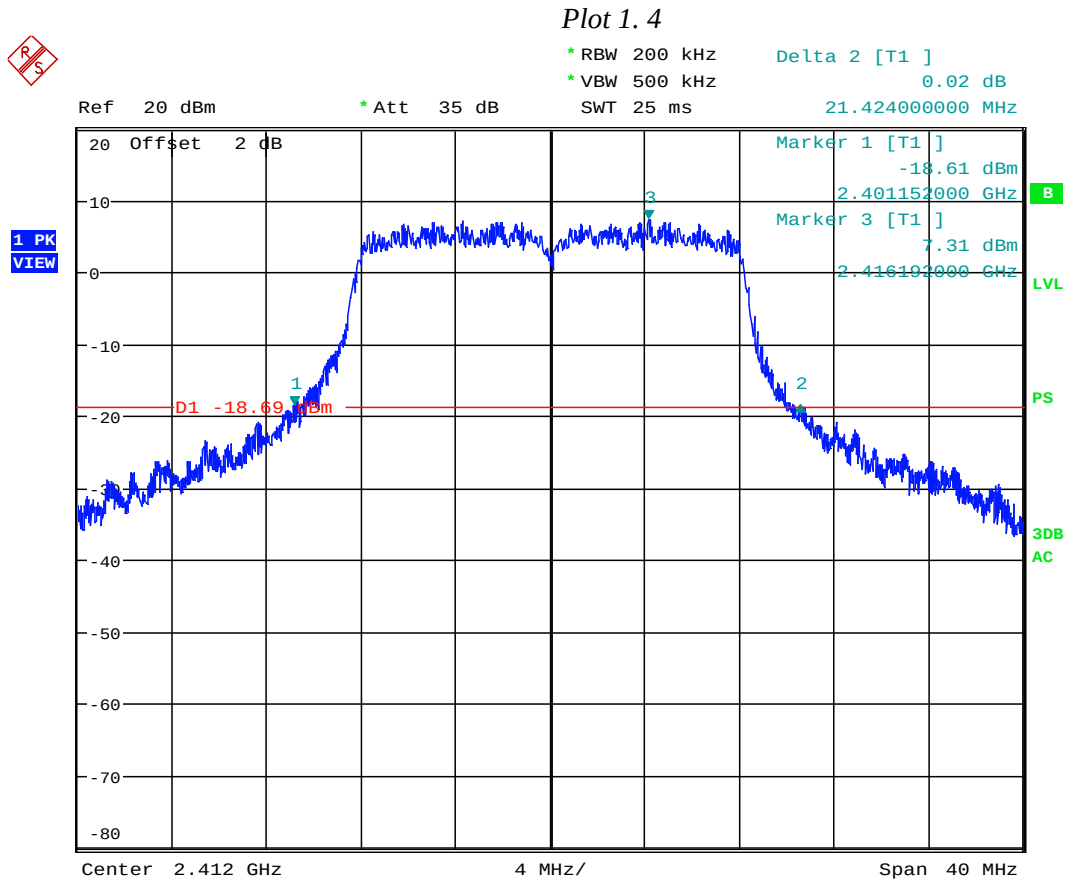
26-dB bandwidth, 802.11b, 11Mbps

Date: 9.JUL.2012 13:45:31



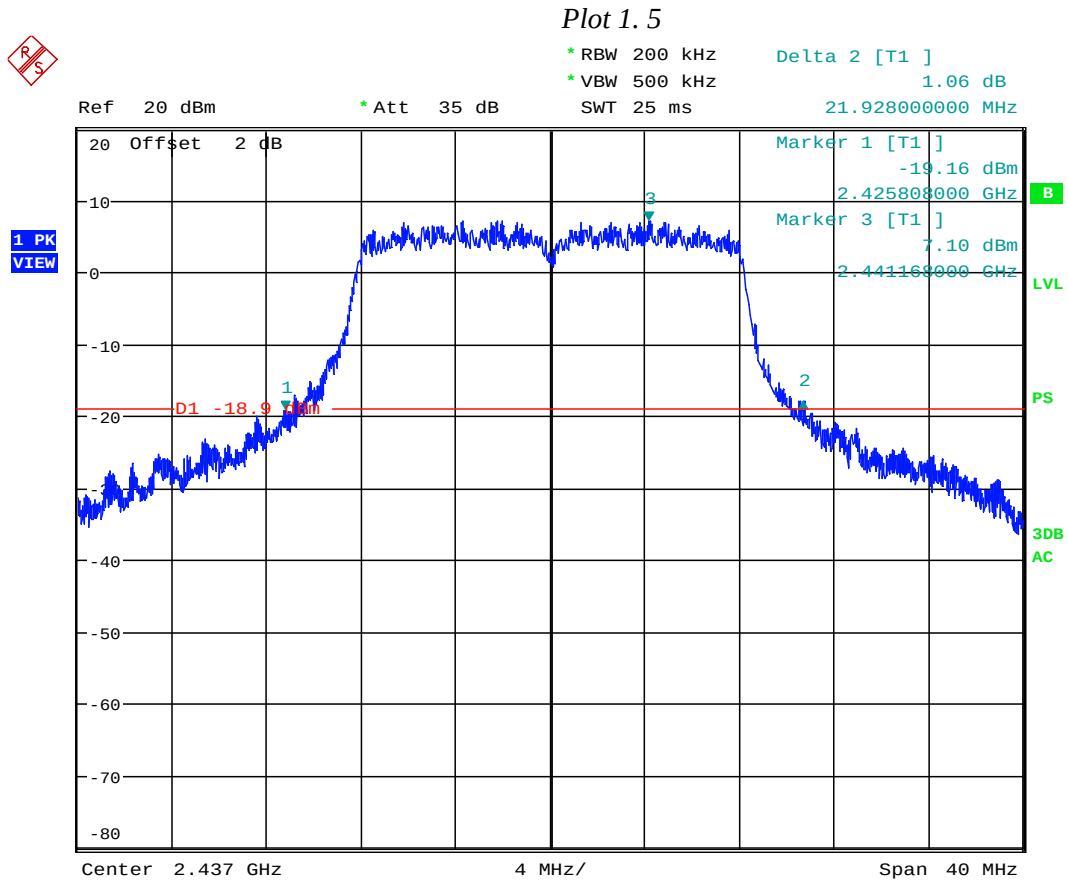
26-dB bandwidth, 802.11b, 11Mbps

Date: 9.JUL.2012 13:48:36



26-dB bandwidth, 802.11g, 6Mbps

Date: 9.JUL.2012 13:52:26

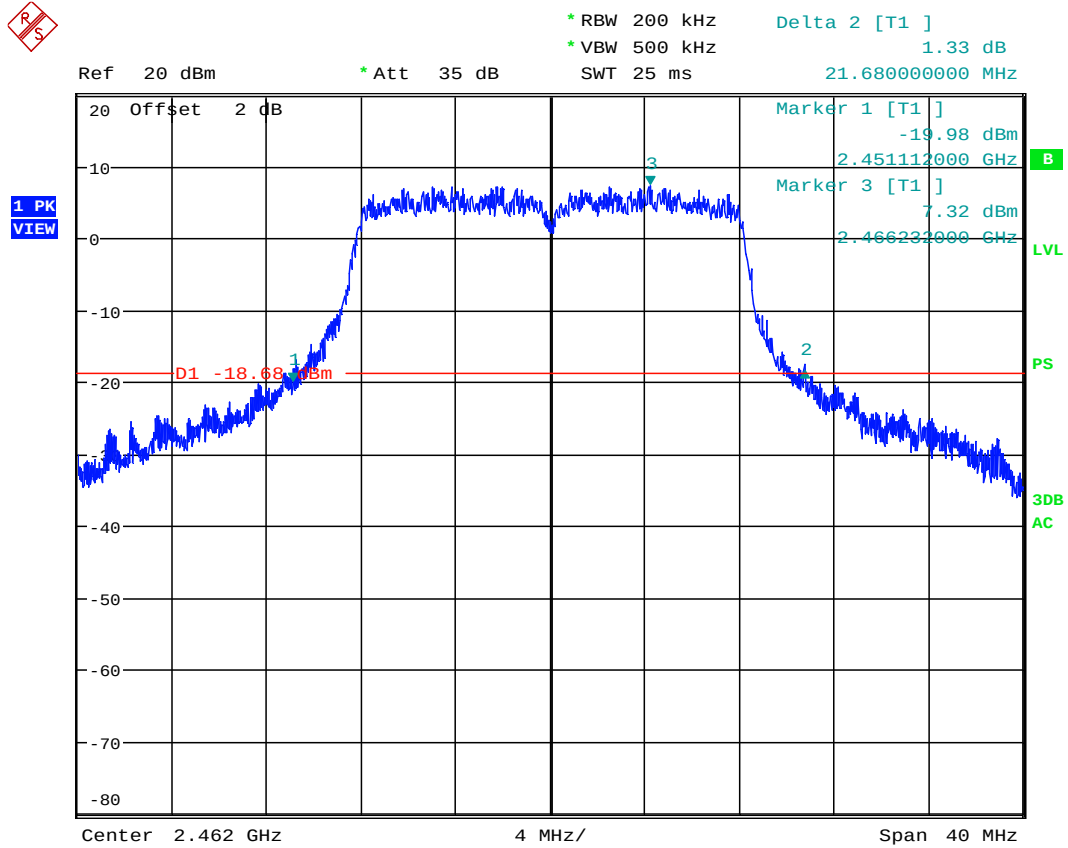


26-dB bandwidth, 802.11g, 6Mbps

Date: 9.JUL.2012 13:54:33

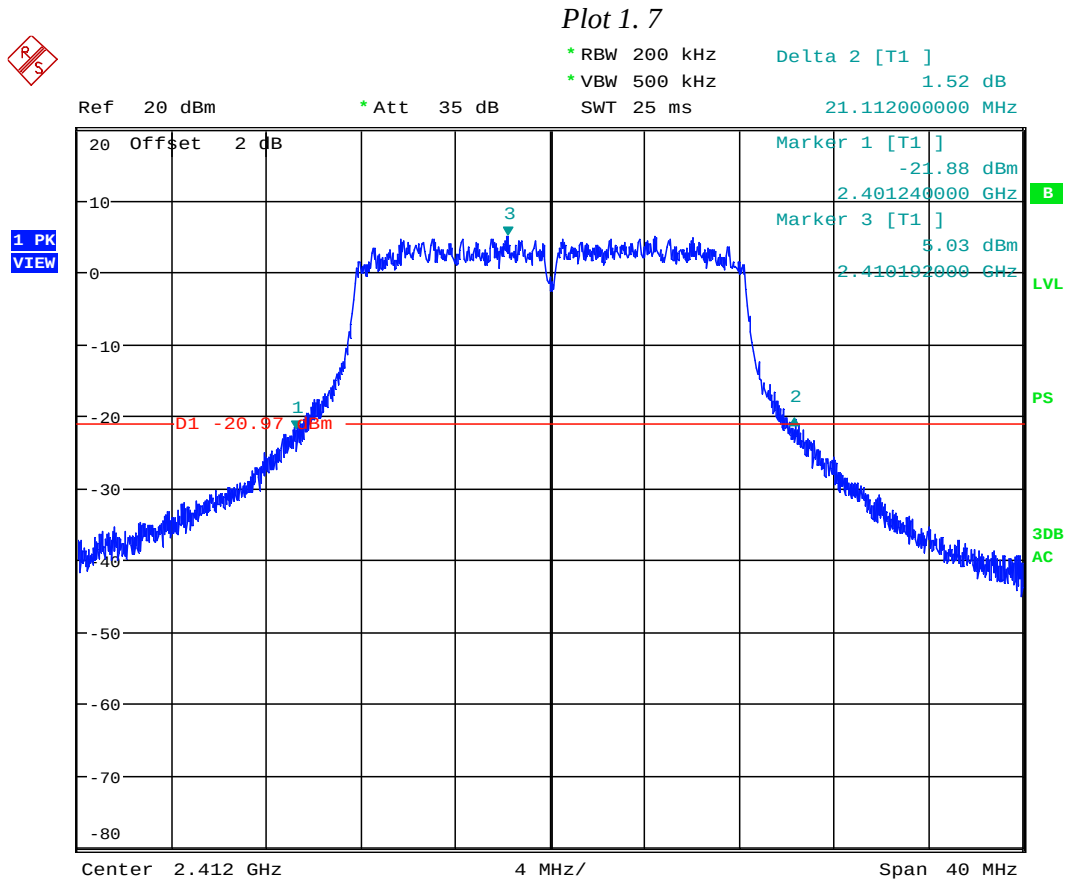


Plot 1.6



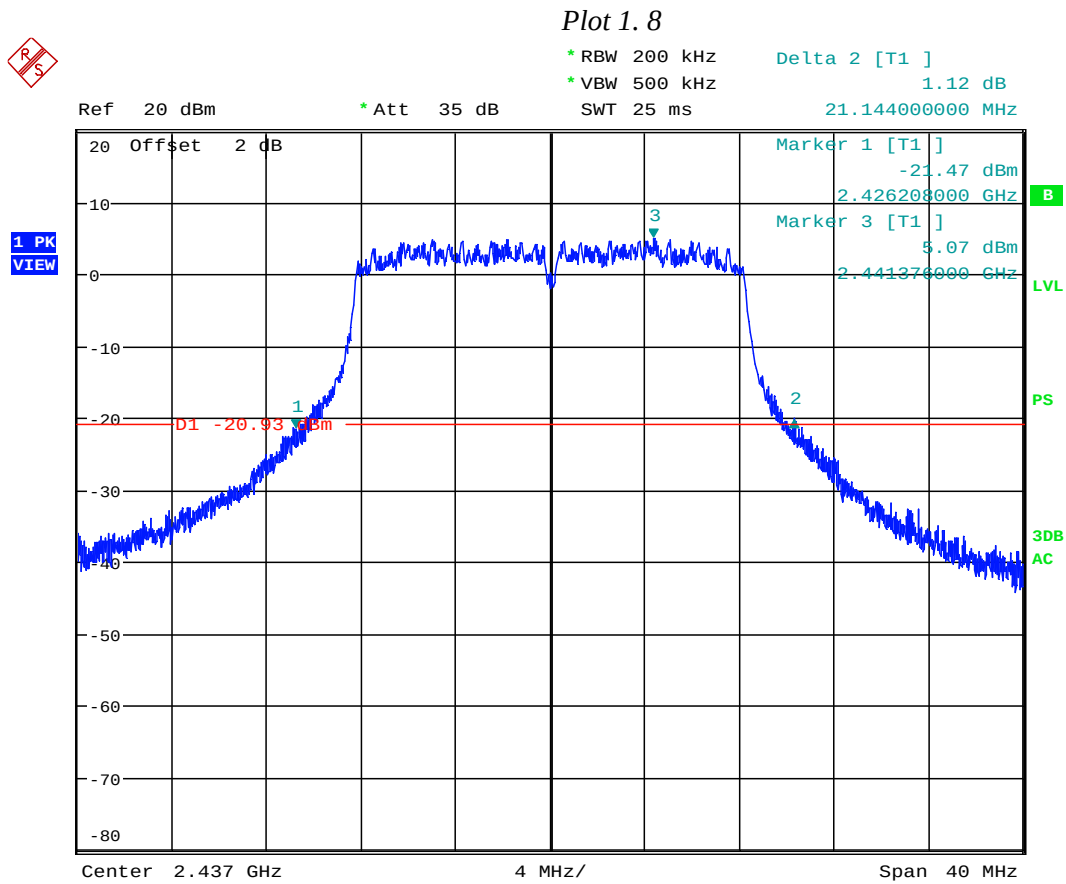
26-dB bandwidth, 802.11g, 6Mbps

Date: 9.JUL.2012 13:56:27



26-dB bandwidth, 802.11g, 54Mbps

Date: 9.JUL.2012 14:00:23

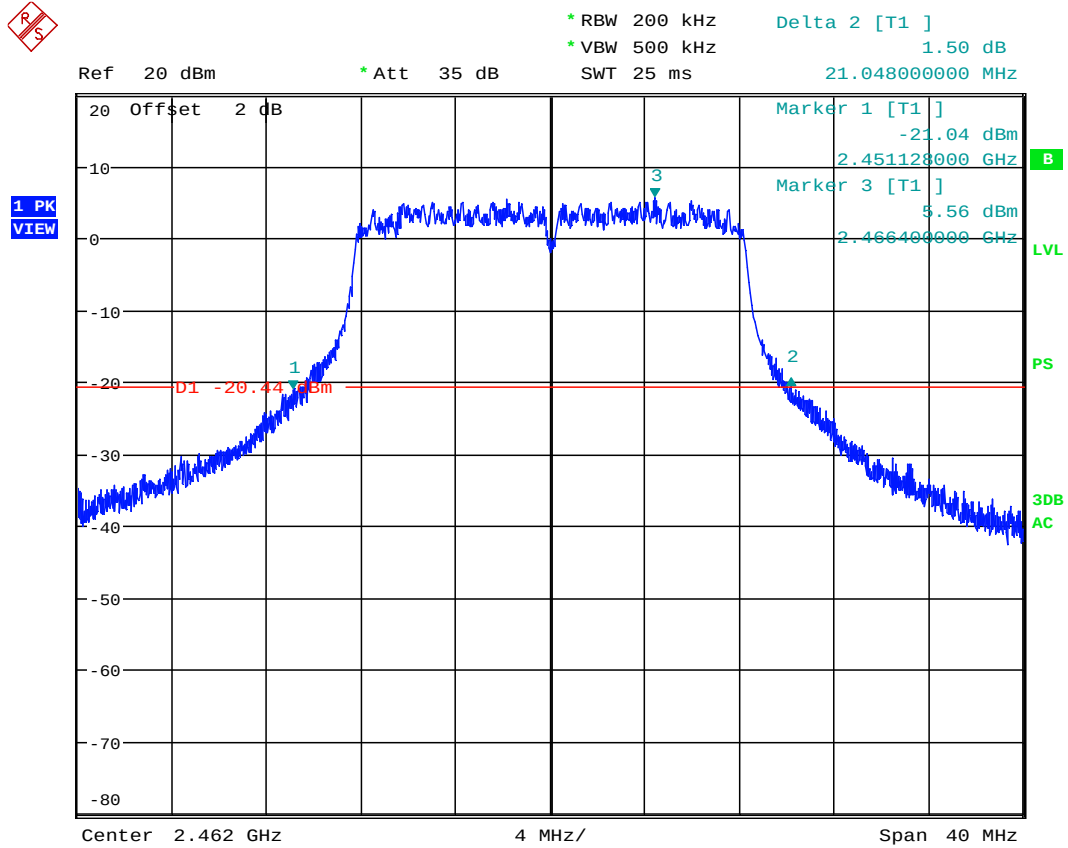


26-dB bandwidth, 802.11g, 54Mbps

Date: 9.JUL.2012 14:07:42



Plot 1.9

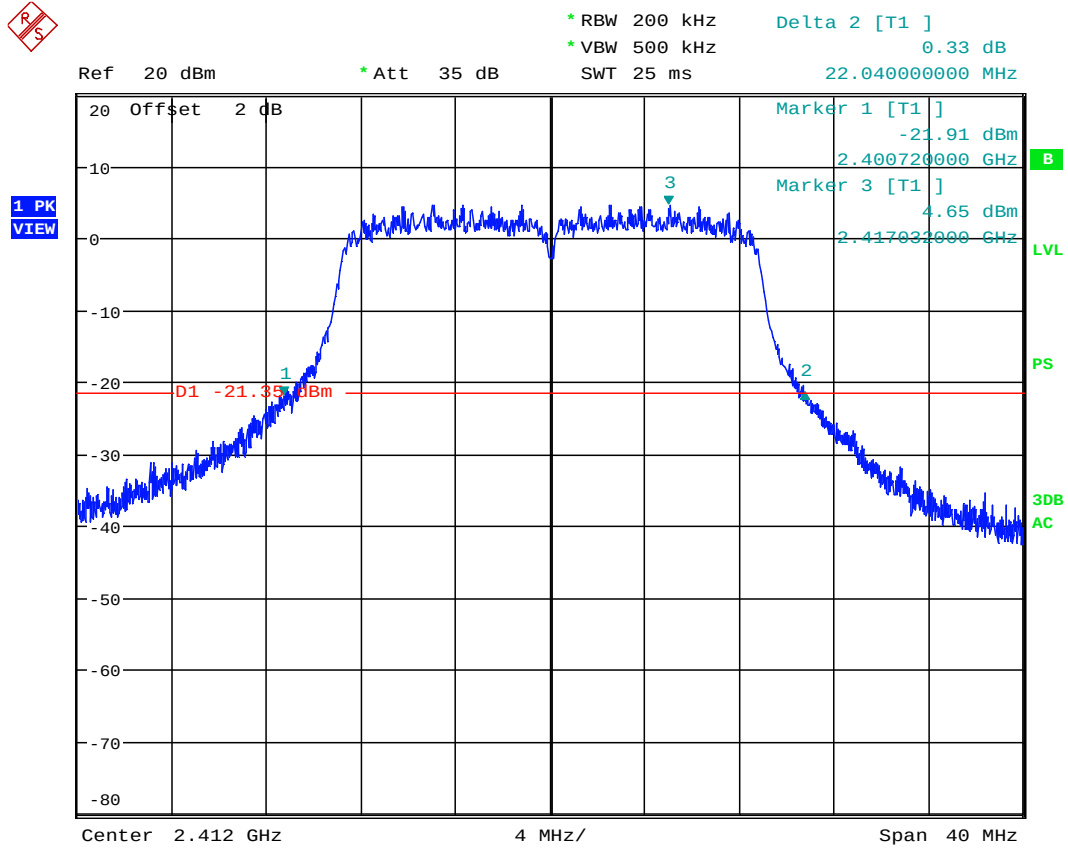


26-dB bandwidth, 802.11g, 54Mbps

Date: 9.JUL.2012 14:12:52



Plot 1. 10

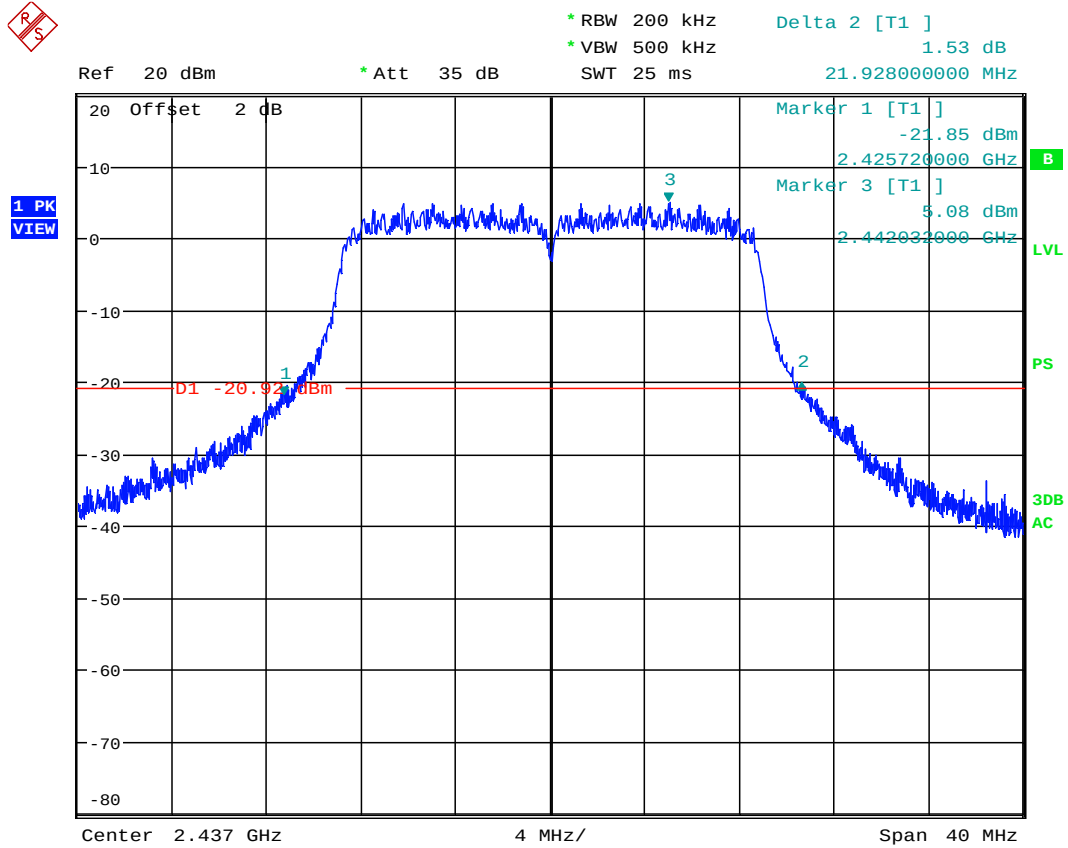


26-dB bandwidth, 802.11n, HT20, MCS0

Date: 9.JUL.2012 15:01:09



Plot 1.11

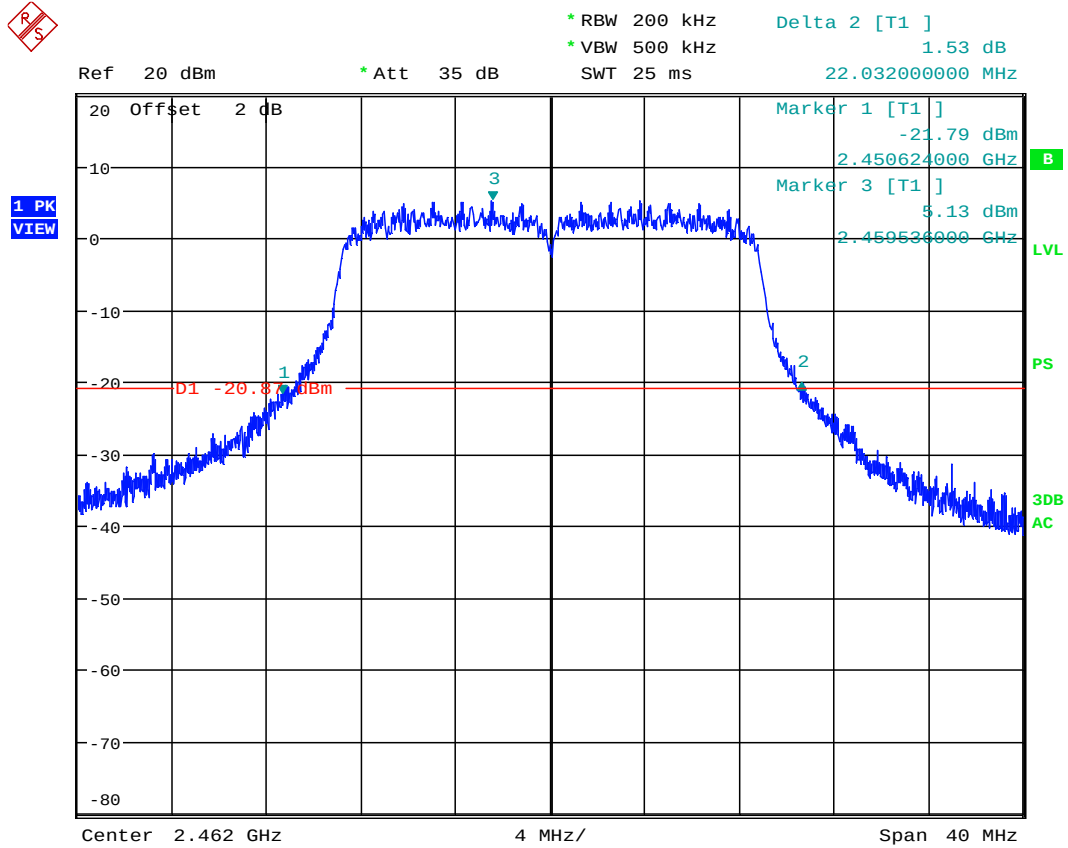


26-dB bandwidth, 802.11n, HT20, MCS0

Date: 9.JUL.2012 15:04:16



Plot 1.12

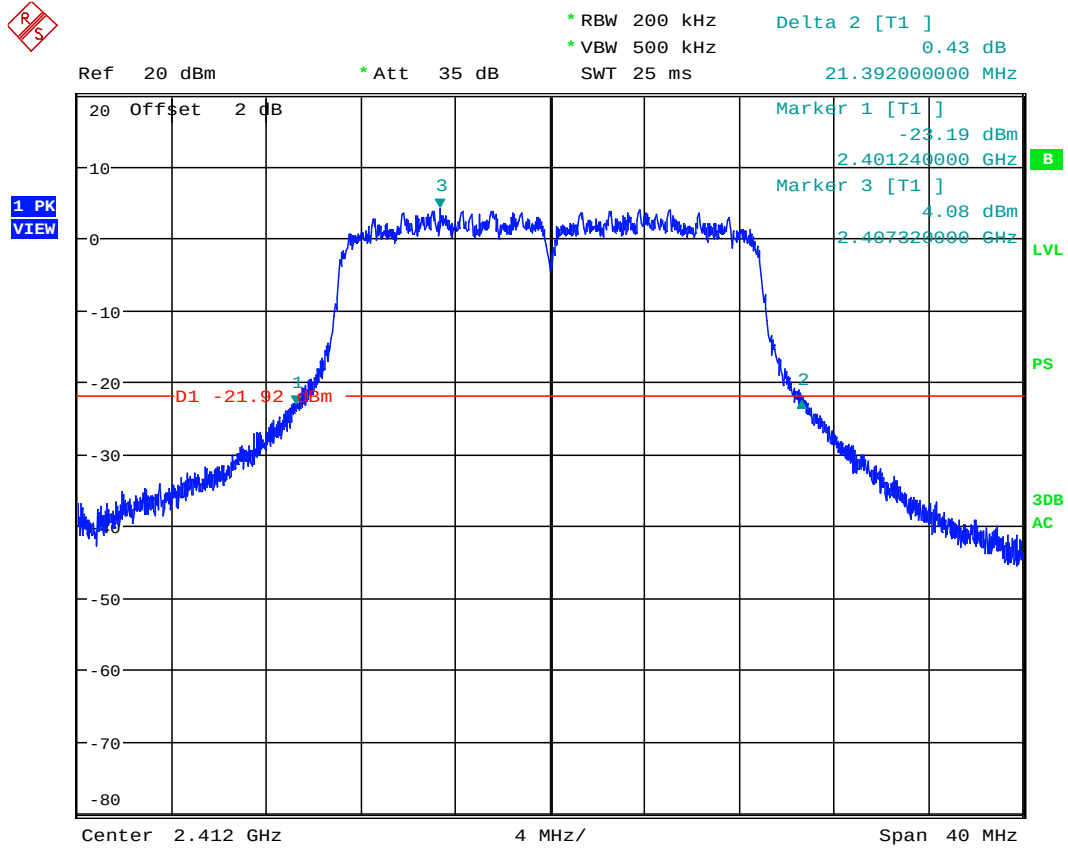


26-dB bandwidth, 802.11n, HT20, MCS0

Date: 9.JUL.2012 15:06:18



Plot 1.13

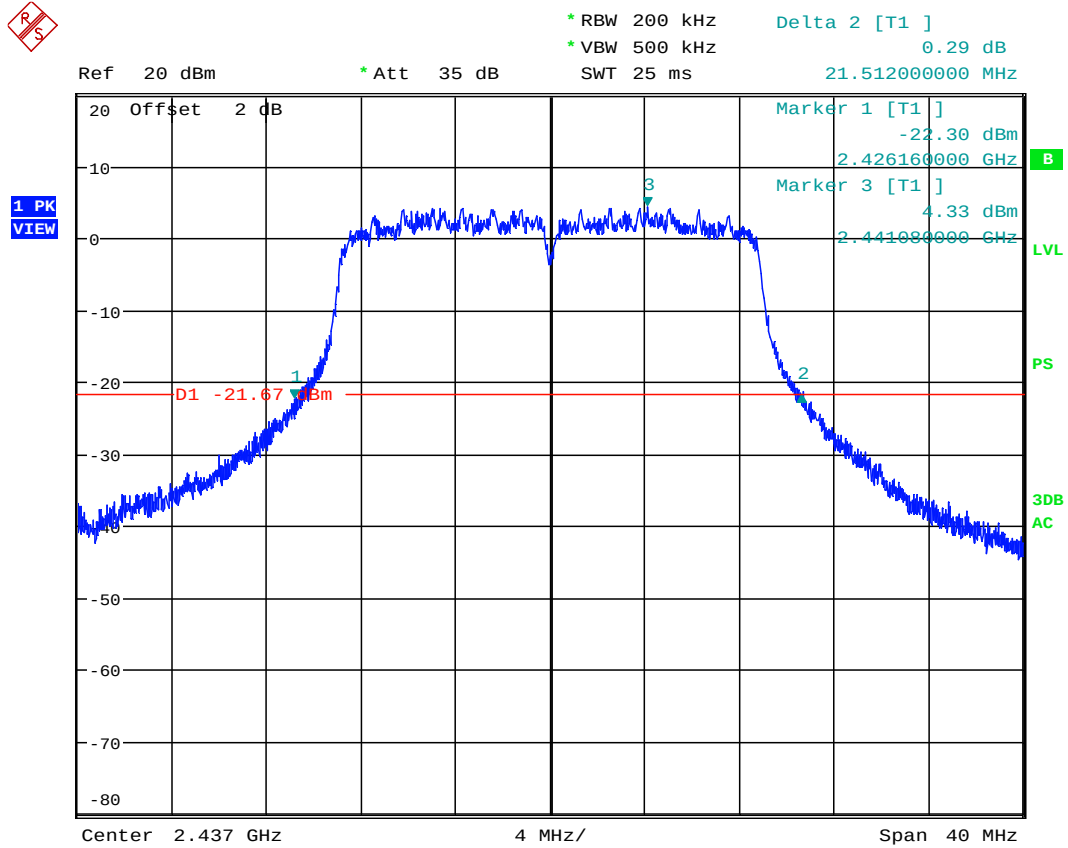


26-dB bandwidth, 802.11n, HT20, MCS7

Date: 9.JUL.2012 15:09:31



Plot 1.14

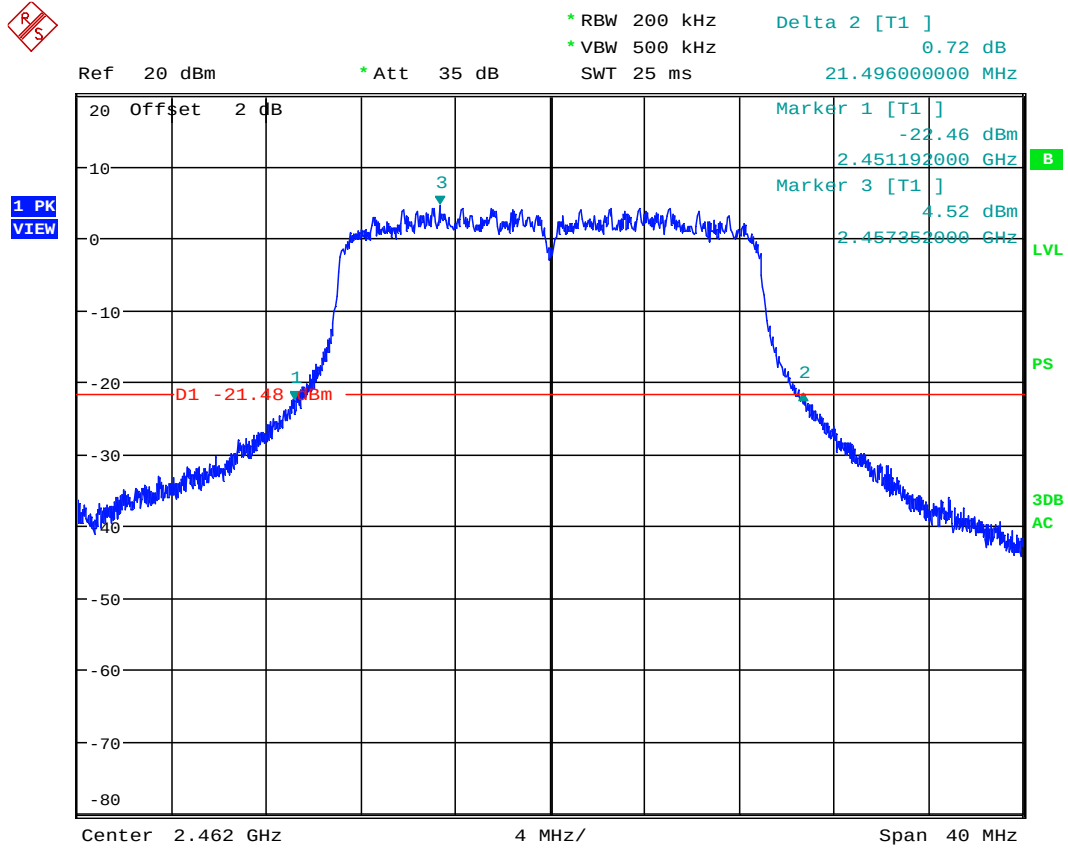


26-dB bandwidth, 802.11n, HT20, MCS7

Date: 9.JUL.2012 15:11:37



Plot 1.15

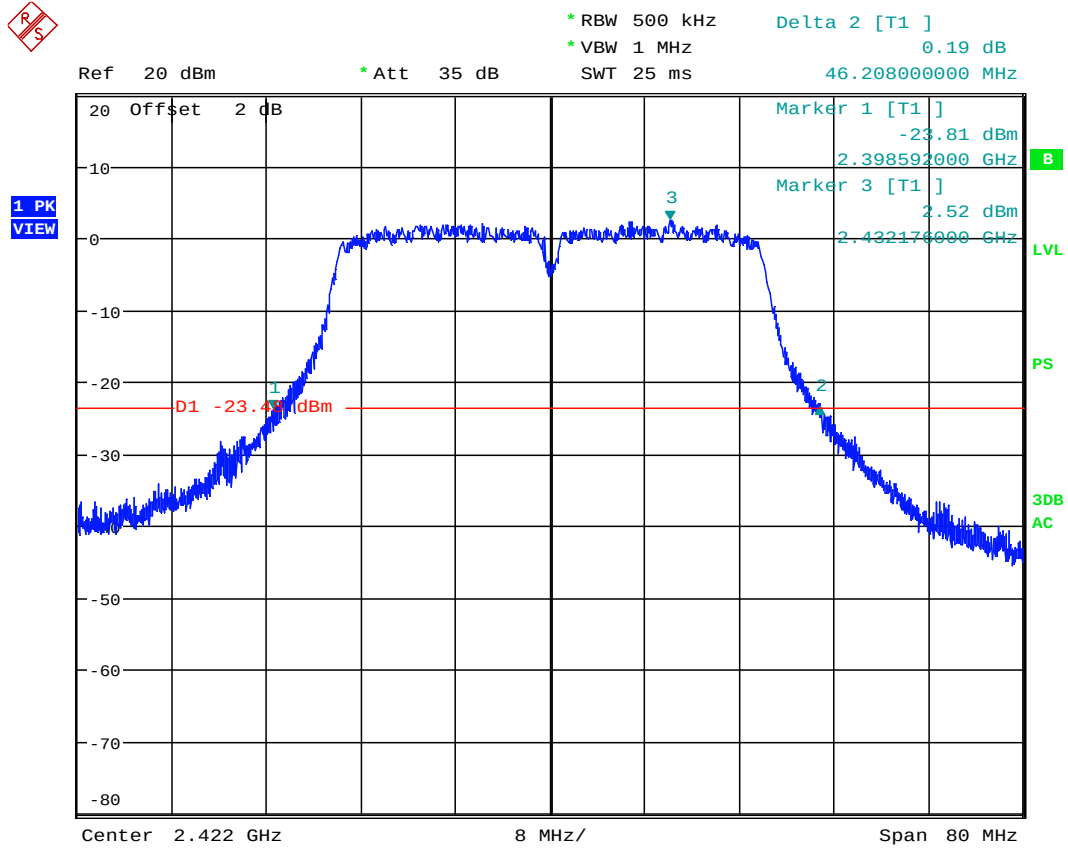


26-dB bandwidth, 802.11n, HT20, MCS7

Date: 9.JUL.2012 15:13:41



Plot 1.16

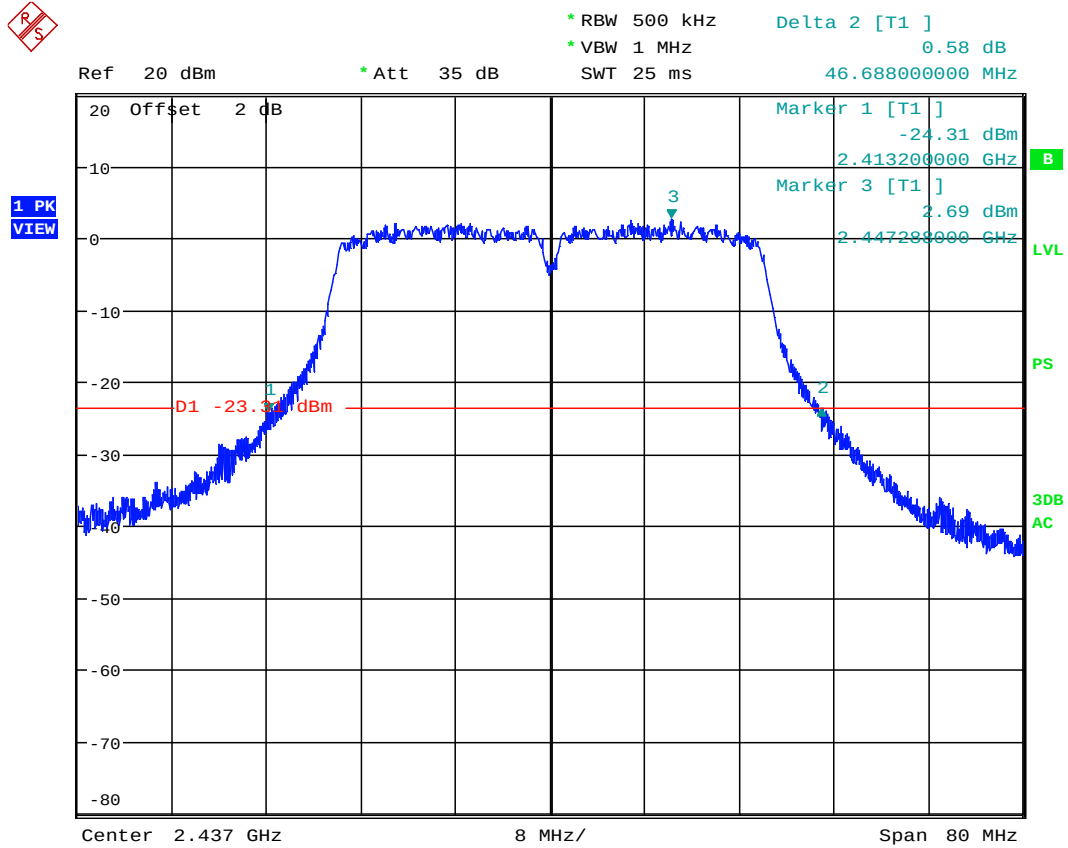


26-dB bandwidth, 802.11n, HT40, MCS0

Date: 9.JUL.2012 15:17:04



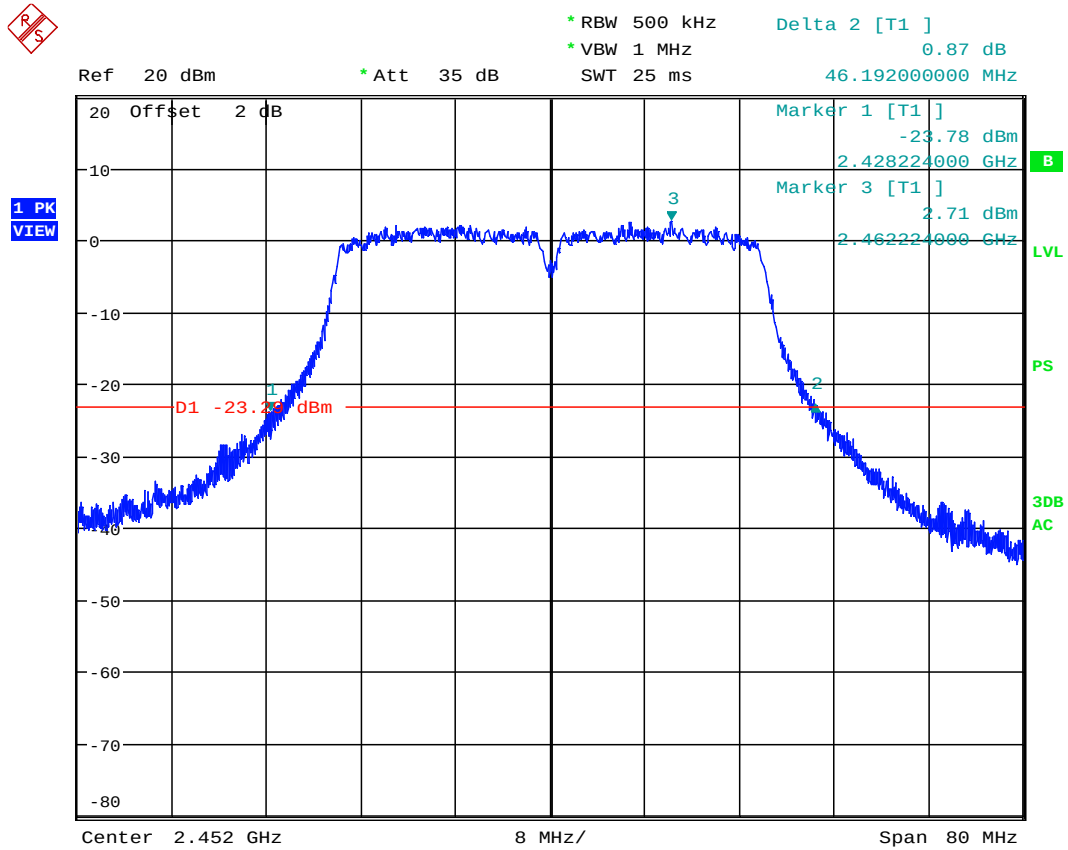
Plot 1.17



26-dB bandwidth, 802.11n, HT40, MCS0

Date: 9.JUL.2012 15:19:32

Plot 1.18

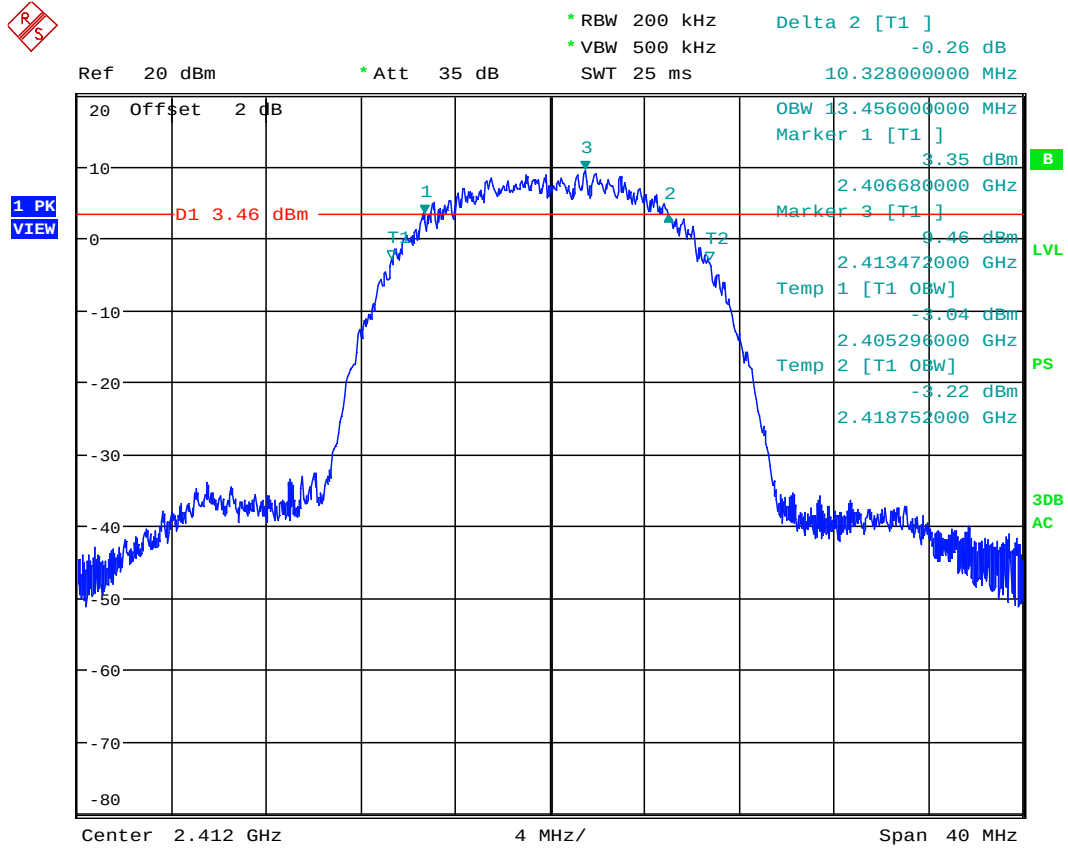


26-dB bandwidth, 802.11n, HT40, MCS0

Date: 9.JUL.2012 15:21:24

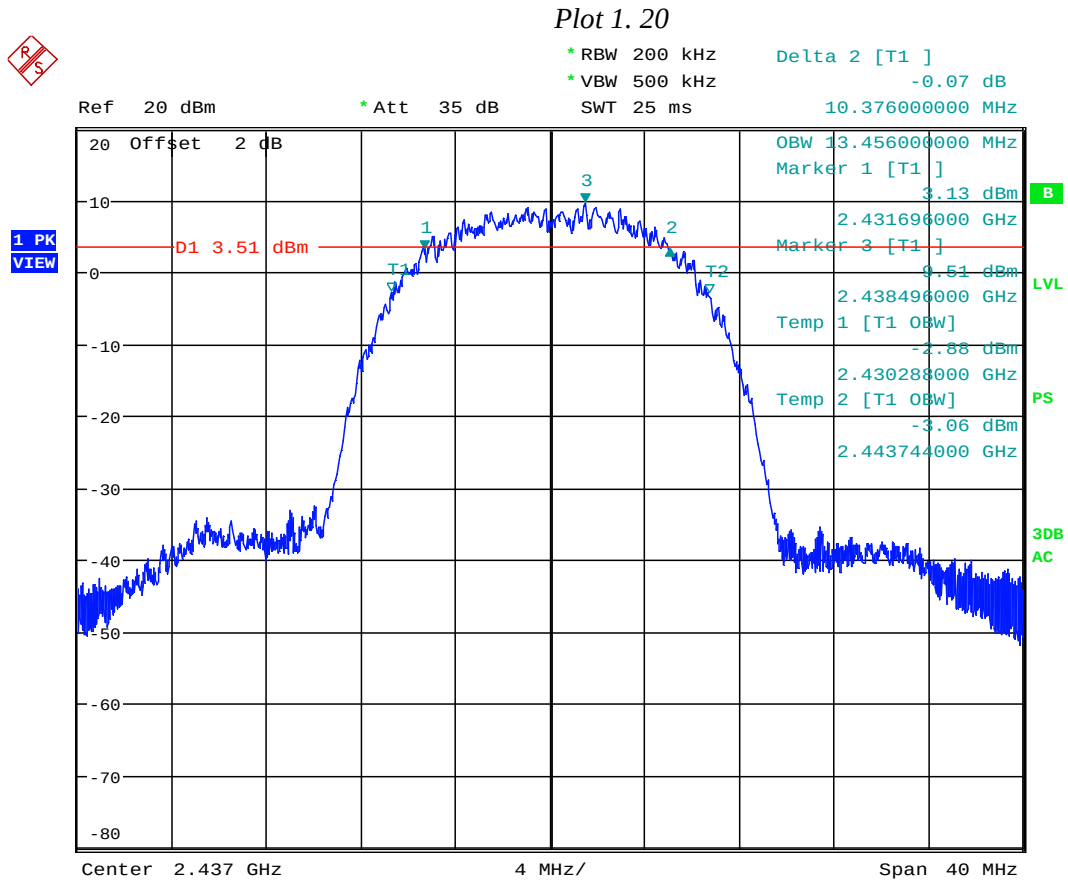


Plot 1. 19



6-dB bandwidth and OBW, 802.11b, 11Mbps

Date: 9.JUL.2012 15:31:12

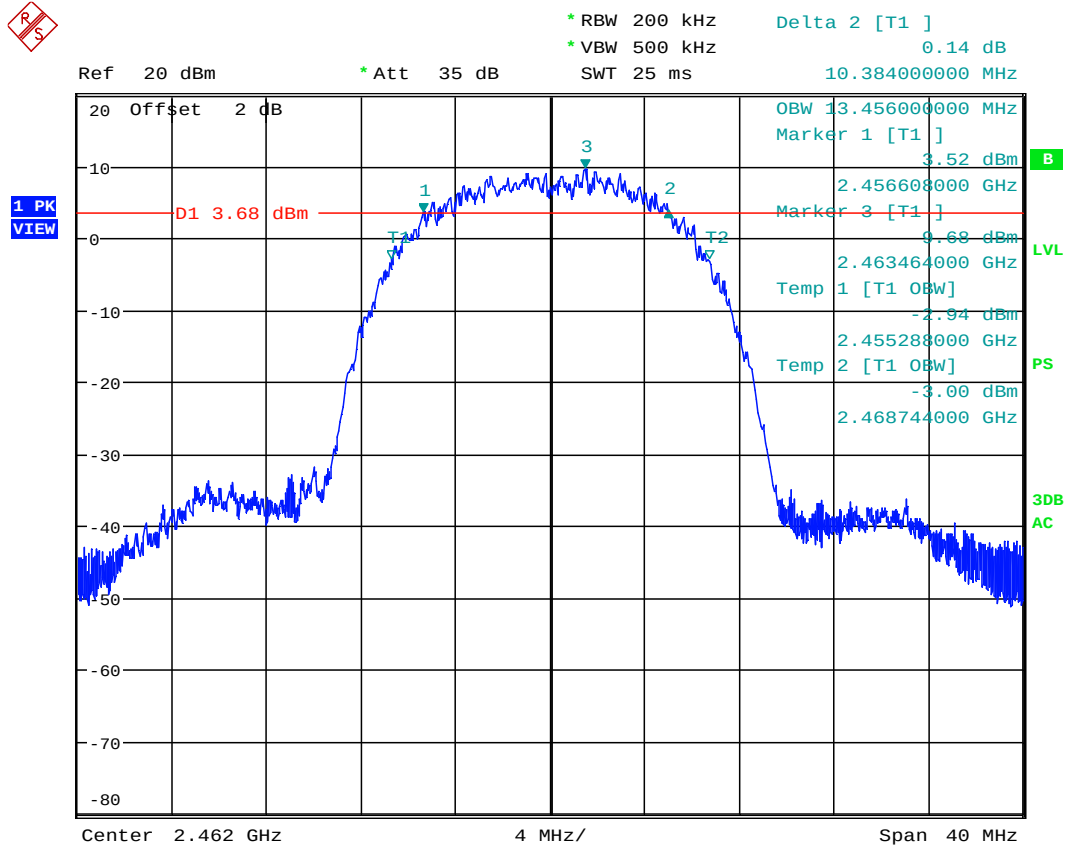


6-dB bandwidth and OBW, 802.11b, 11Mbps

Date: 9.JUL.2012 15:34:11



Plot 1. 21

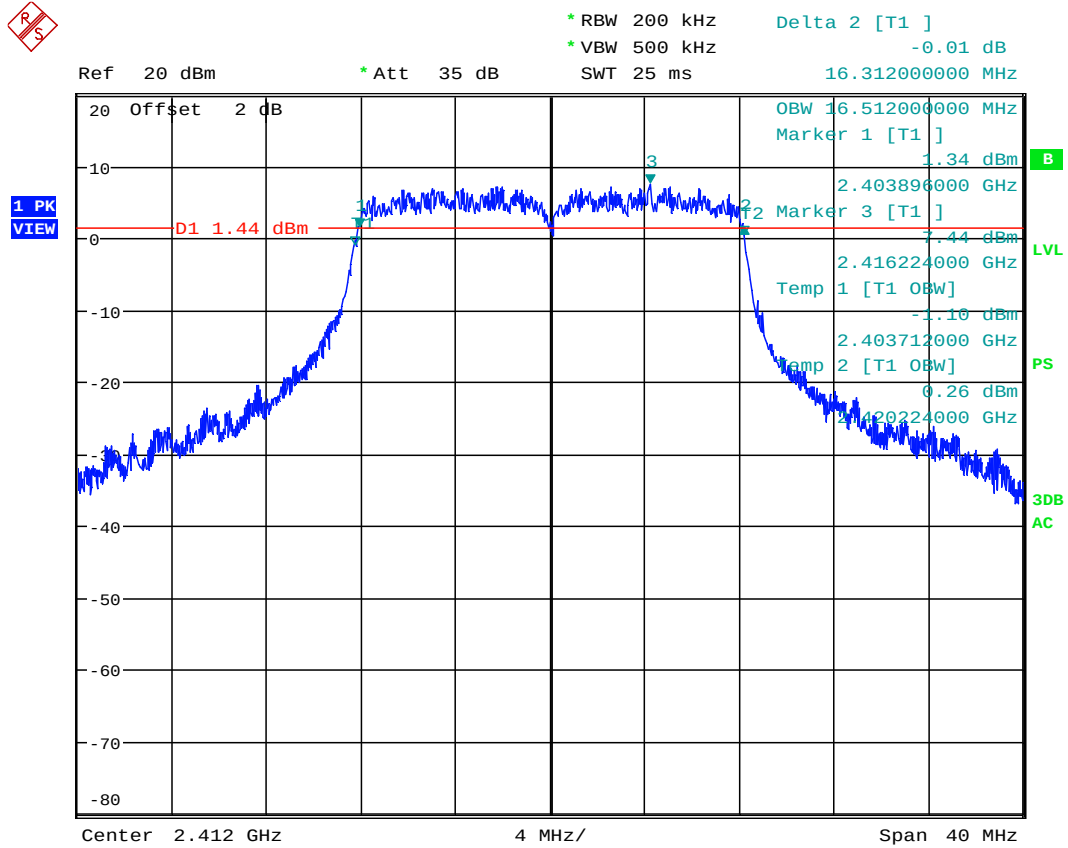


6-dB bandwidth and OBW, 802.11b, 11Mbps

Date: 9.JUL.2012 15:36:29



Plot 1. 22

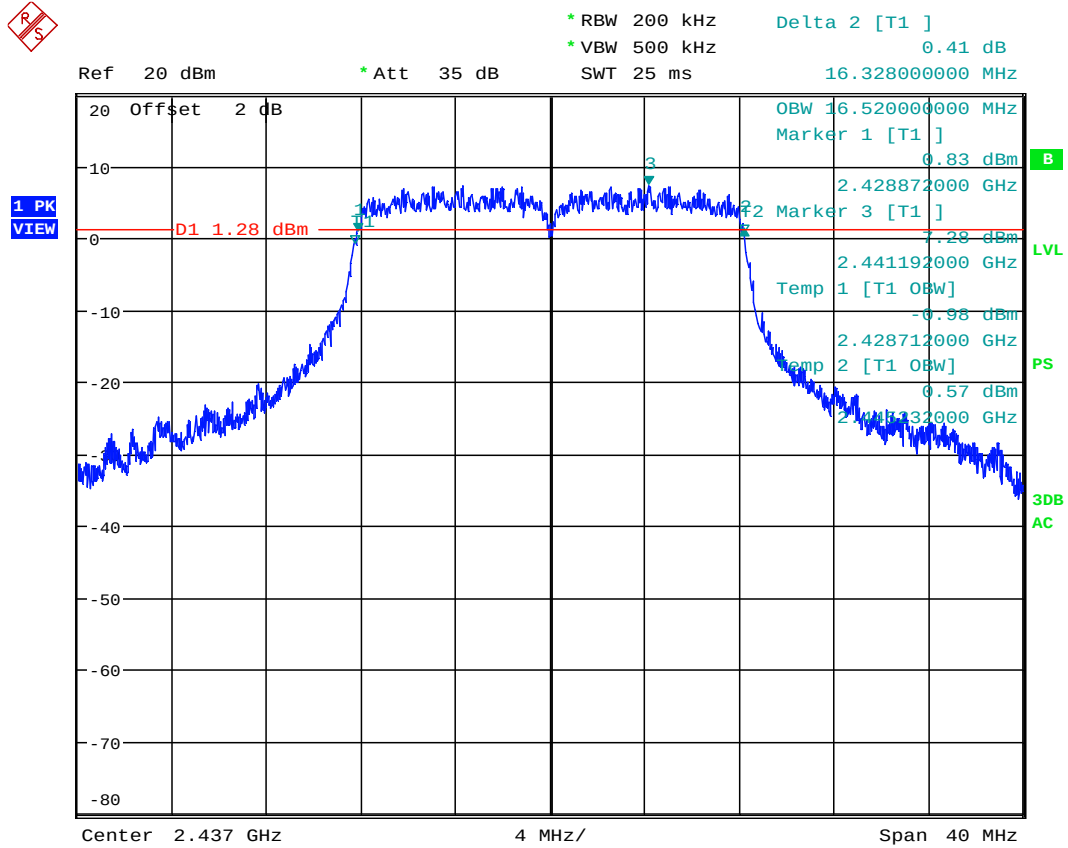


6-dB bandwidth and OBW, 802.11g, 6Mbps

Date: 9.JUL.2012 15:43:03



Plot 1. 23

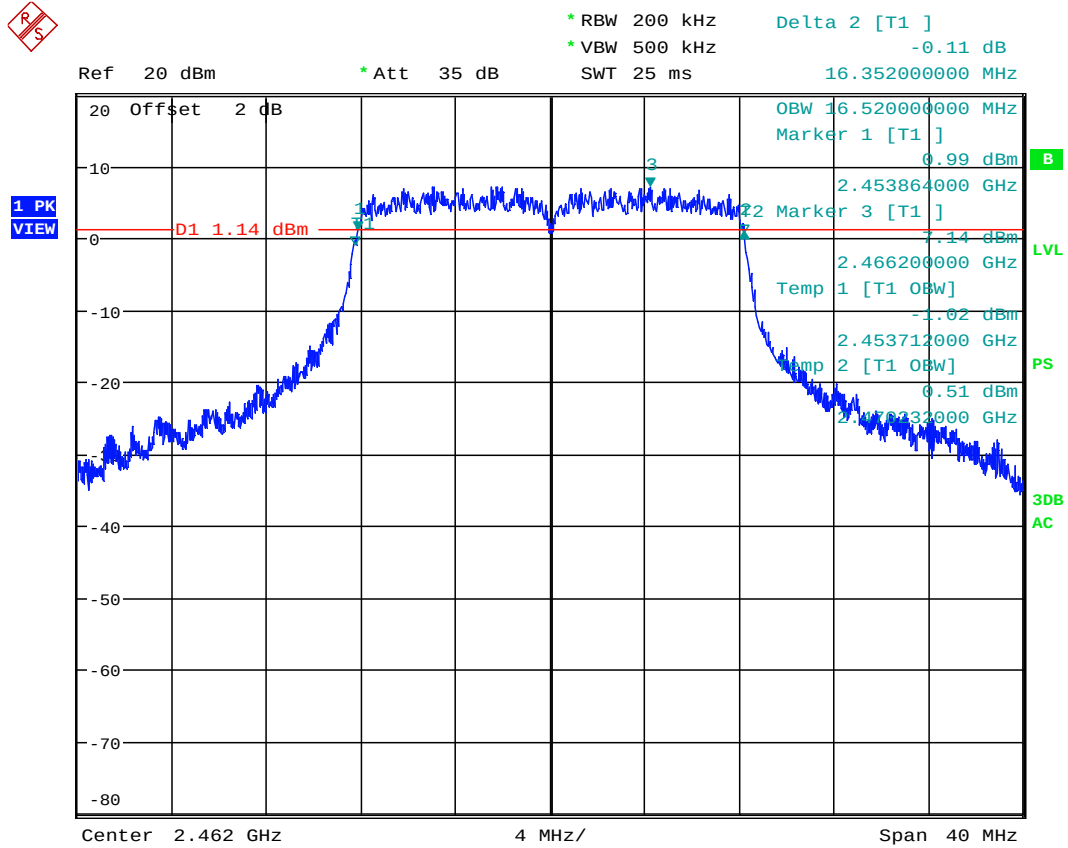


6-dB bandwidth and OBW, 802.11g, 6Mbps

Date: 9.JUL.2012 15:45:30



Plot 1. 24

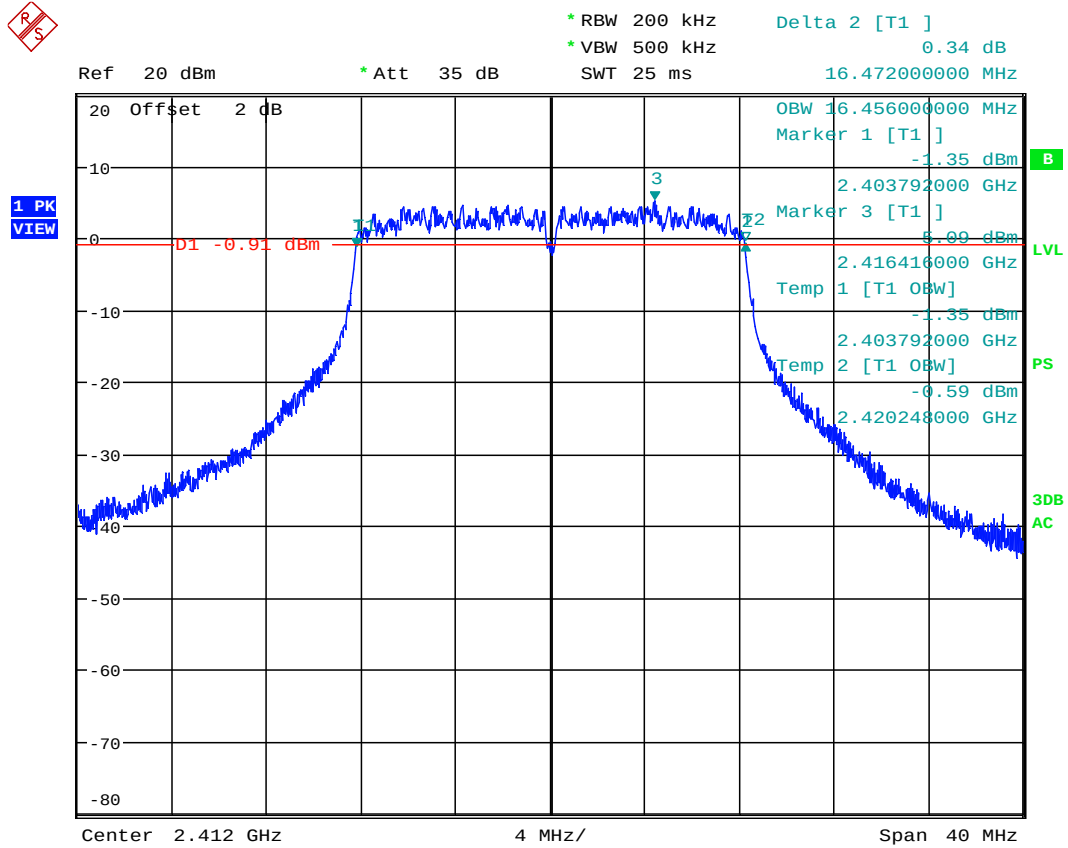


6-dB bandwidth and OBW, 802.11g, 6Mbps

Date: 9.JUL.2012 15:47:34



Plot 1. 25

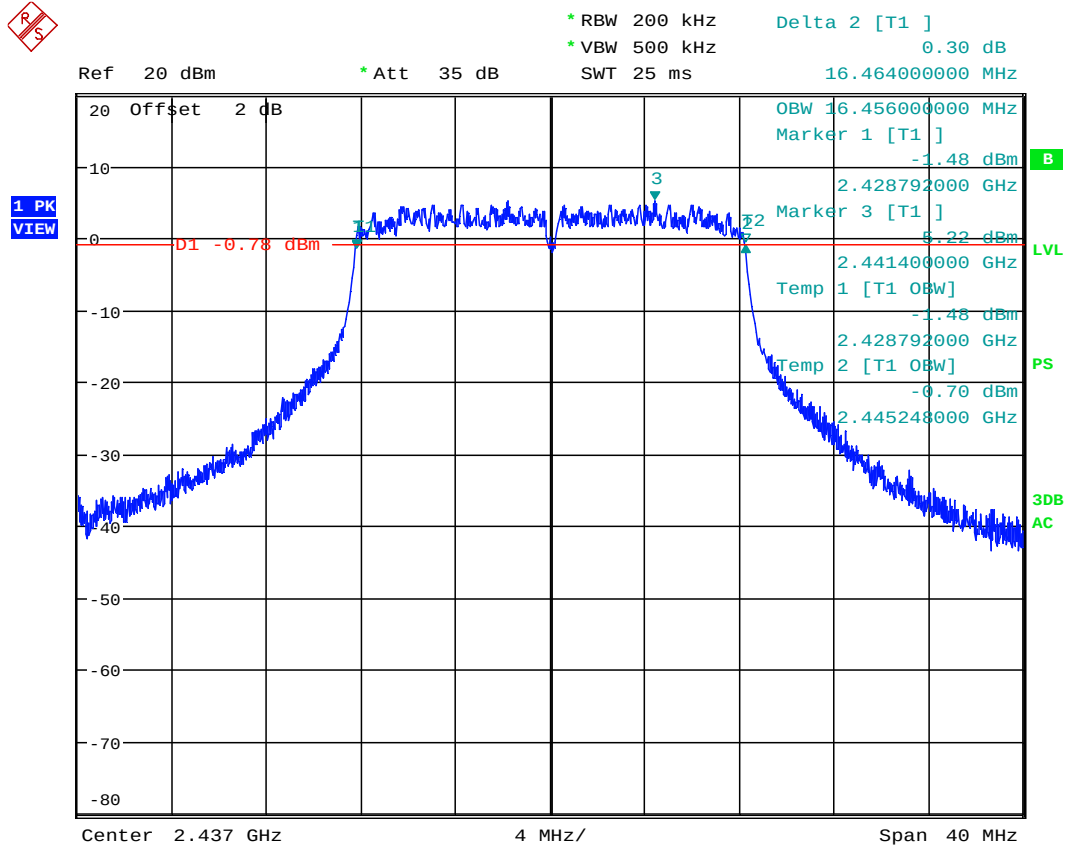


6-dB bandwidth and OBW, 802.11g, 54Mbps

Date: 9.JUL.2012 15:51:15



Plot 1. 26

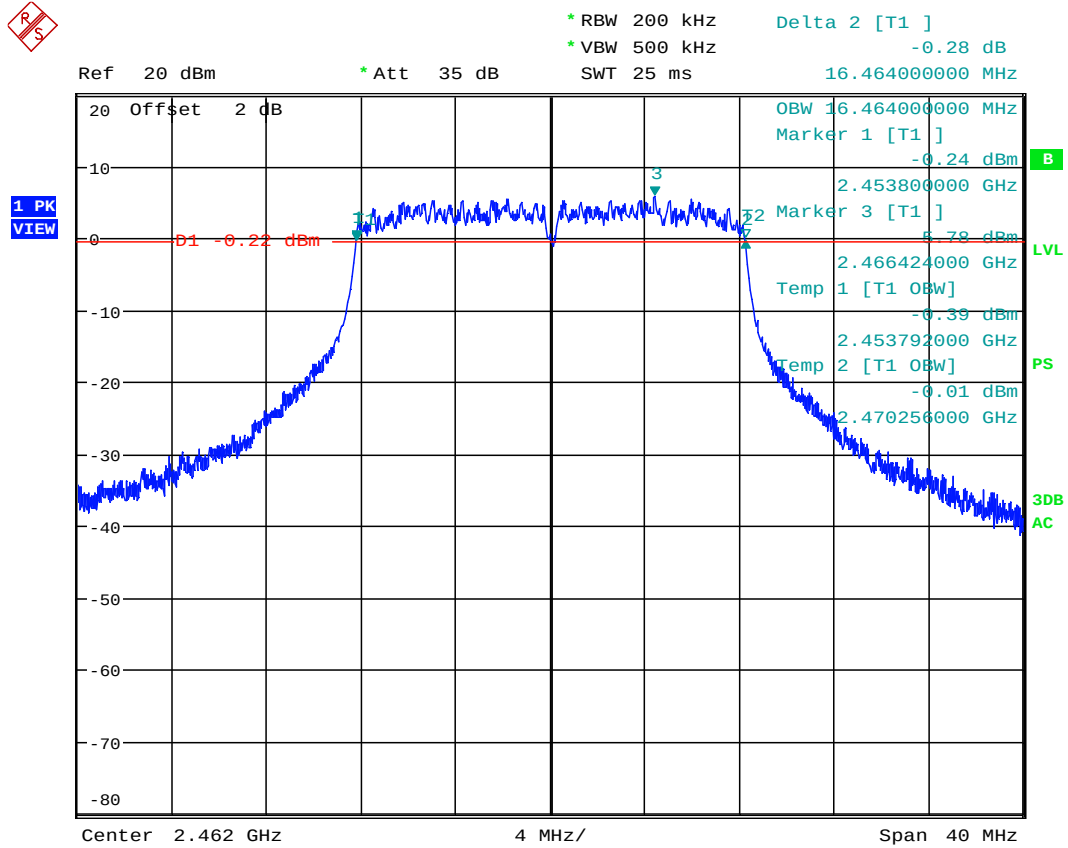


6-dB bandwidth and OBW, 802.11g, 54Mbps

Date: 9.JUL.2012 15:53:20



Plot 1. 27

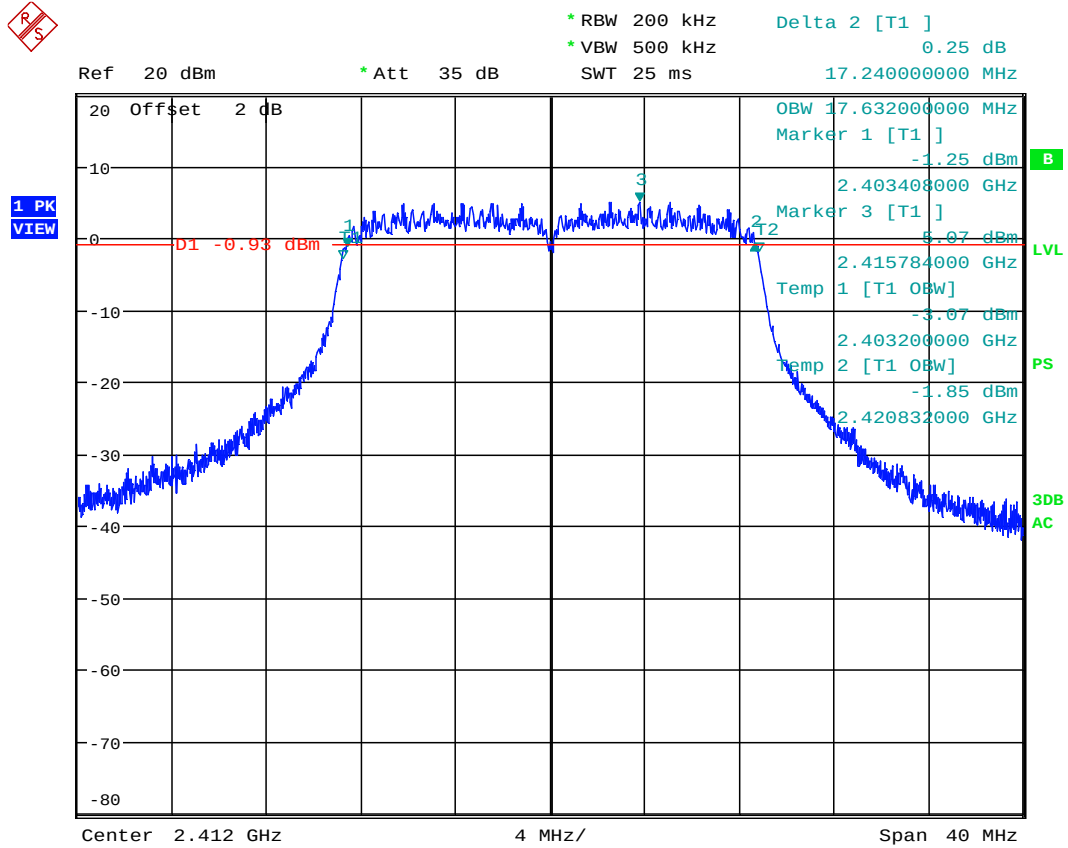


6-dB bandwidth and OBW, 802.11g, 54Mbps

Date: 9.JUL.2012 15:55:28



Plot 1. 28

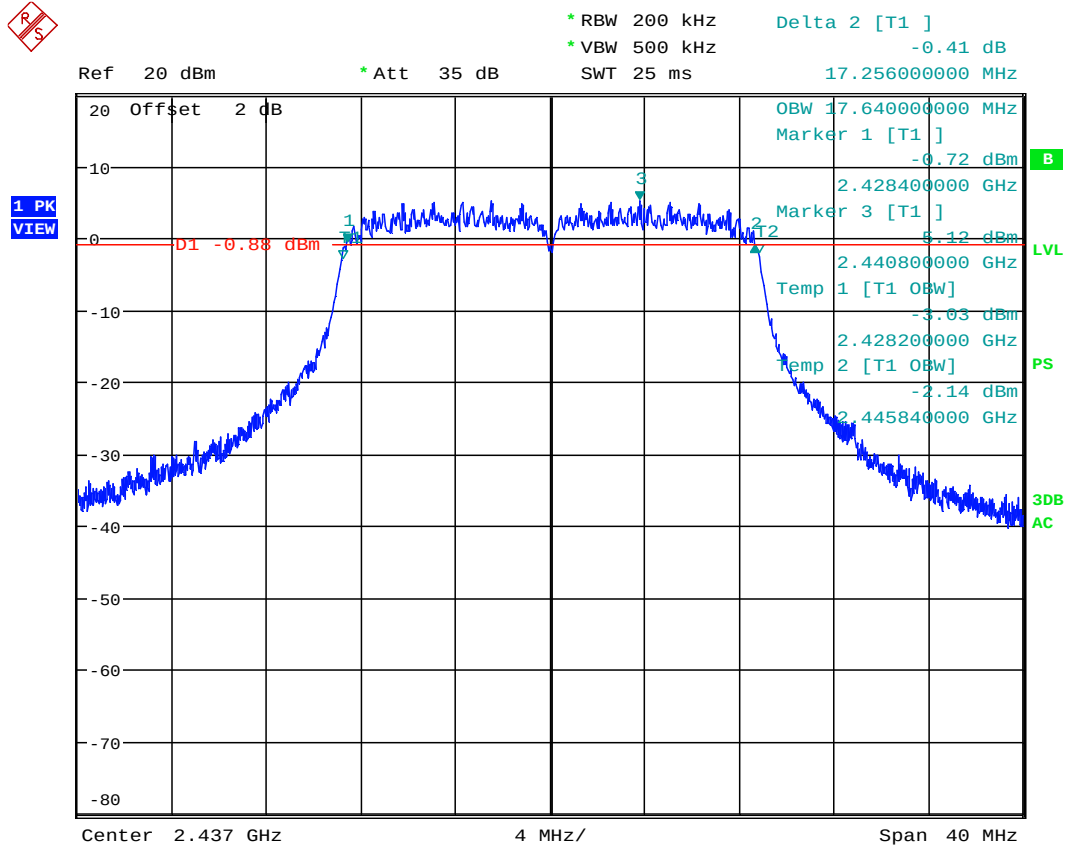


6-dB bandwidth and OBW, 802.11n, HT20, MCS0

Date: 9.JUL.2012 15:59:34



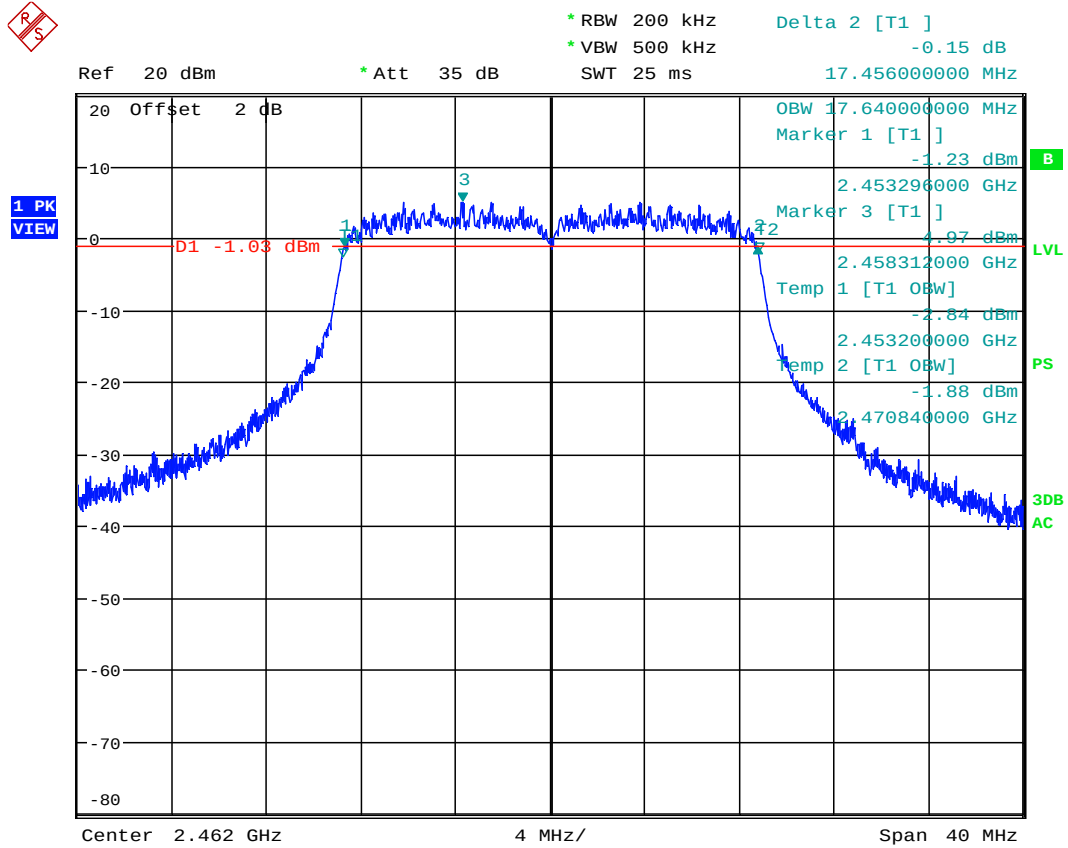
Plot 1. 29



6-dB bandwidth and OBW, 802.11n, HT20, MCS0

Date: 9.JUL.2012 16:02:09

Plot 1. 30

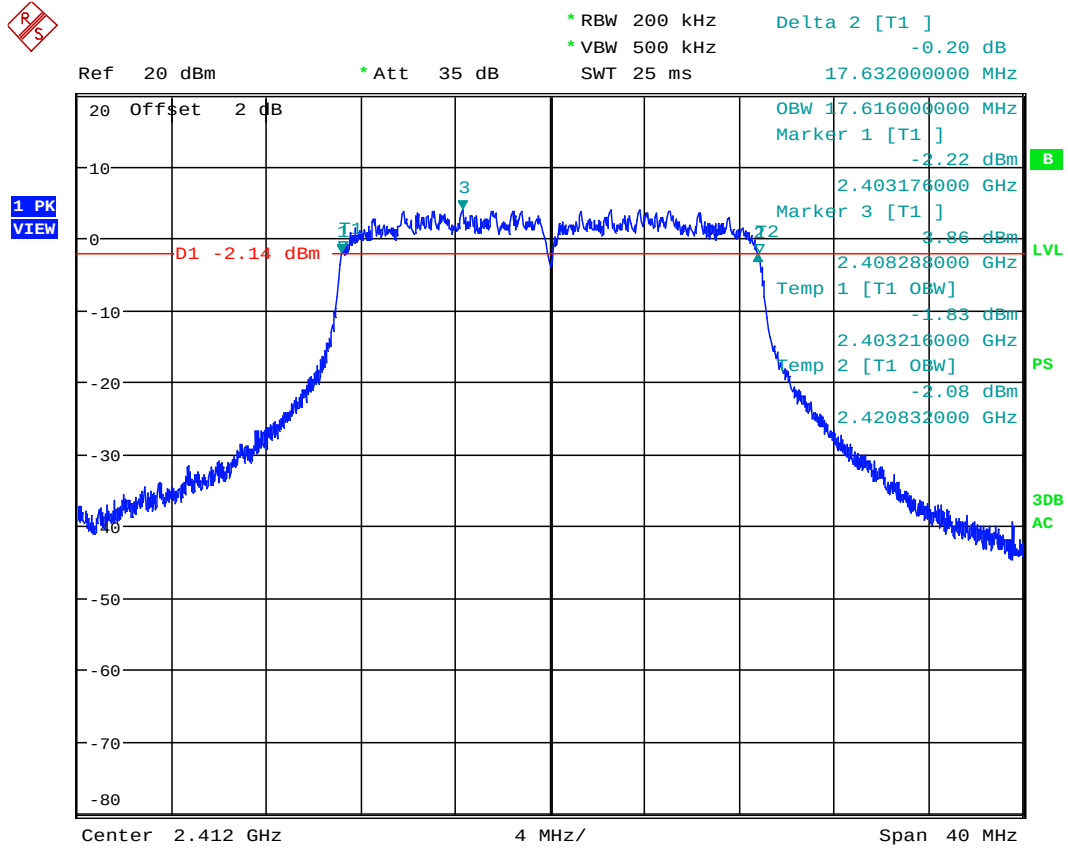


6-dB bandwidth and OBW, 802.11n, HT20, MCS0

Date: 9.JUL.2012 16:04:18



Plot 1. 31

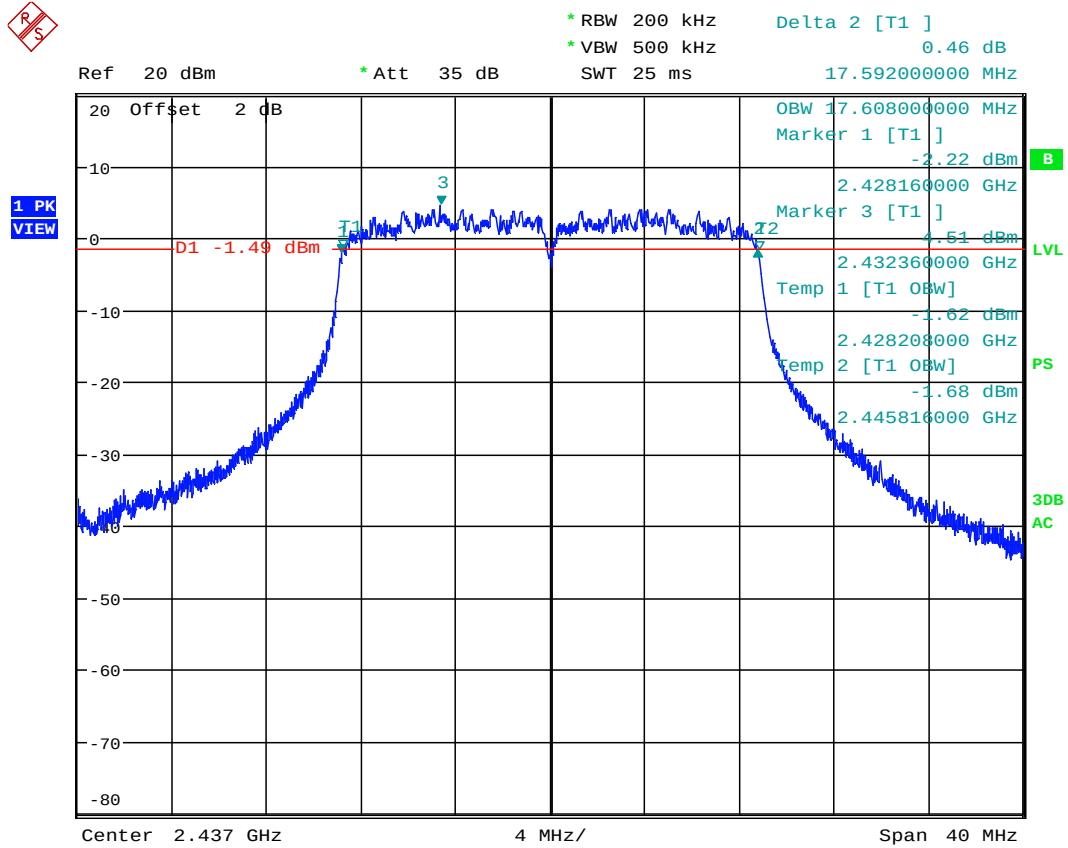


6-dB bandwidth and OBW, 802.11n, HT20, MCS7

Date: 9.JUL.2012 16:06:53



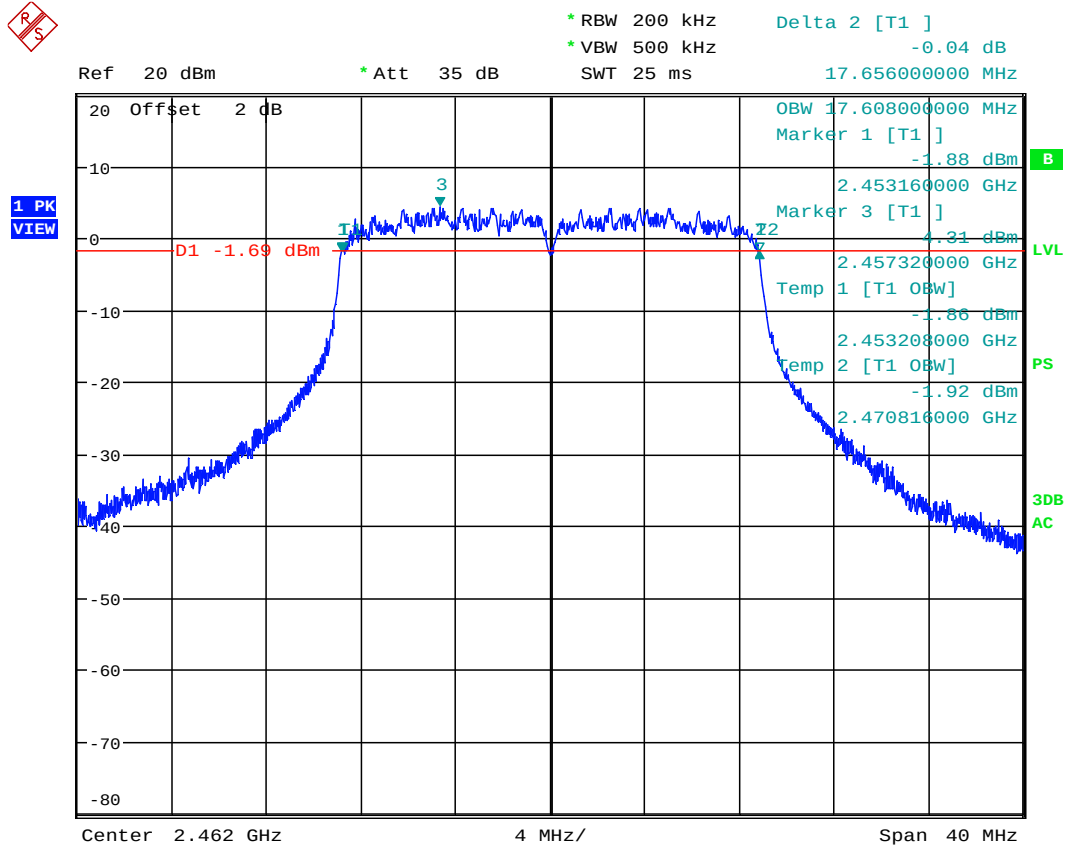
Plot 1. 32



6-dB bandwidth and OBW, 802.11n, HT20, MCS7

Date: 9.JUL.2012 16:09:41

Plot 1.33

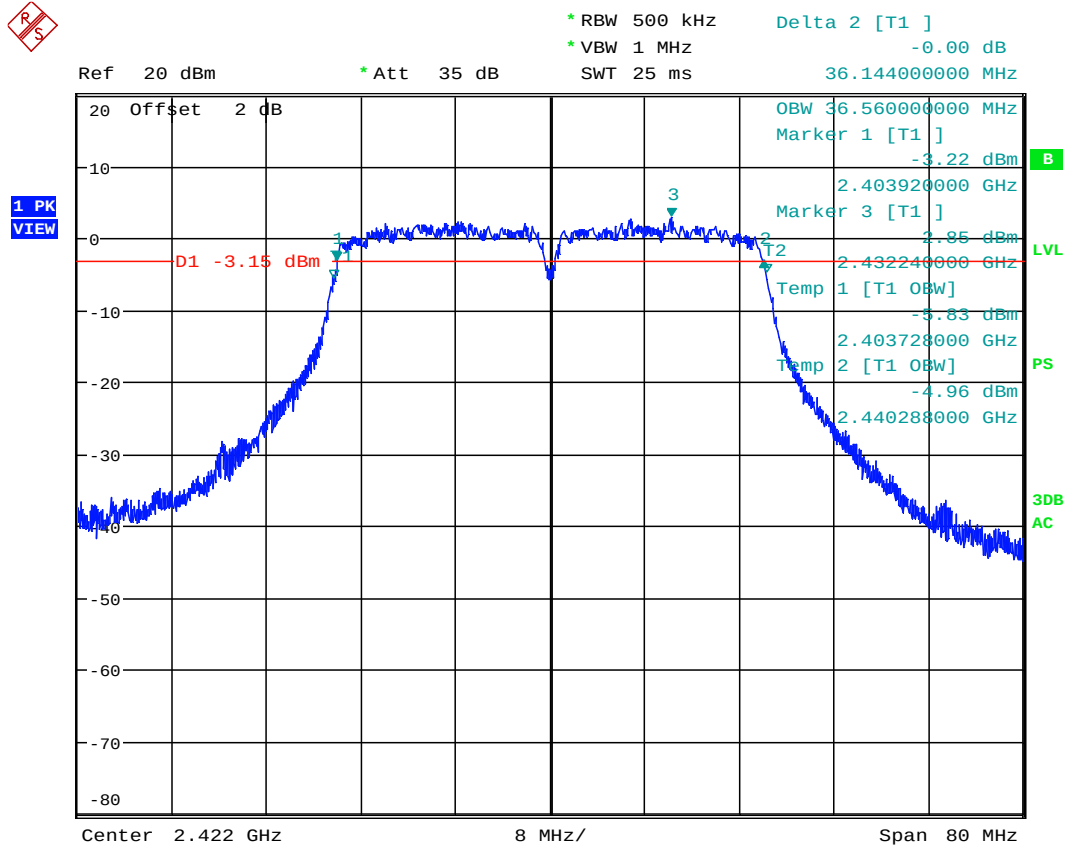


6-dB bandwidth and OBW, 802.11n, HT20, MCS7

Date: 9.JUL.2012 16:13:16



Plot 1. 34

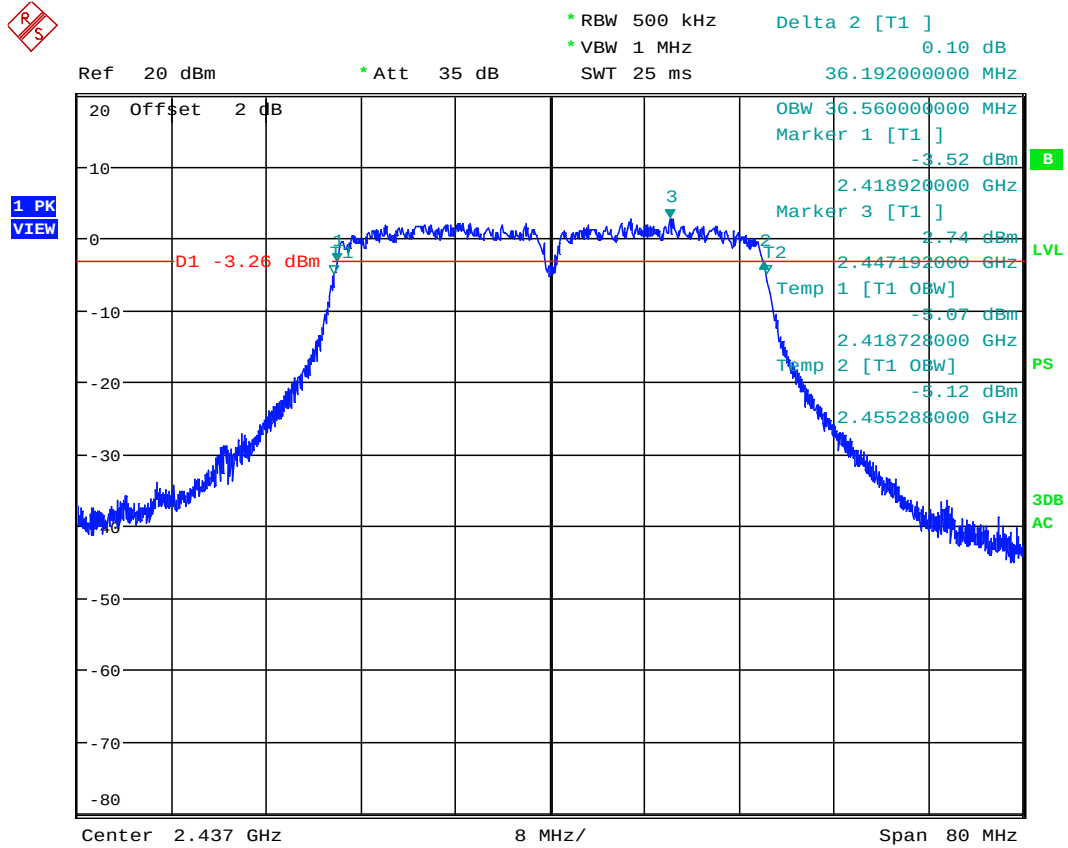


6-dB bandwidth and OBW, 802.11n, HT40, MCS0

Date: 9.JUL.2012 16:18:19



Plot 1. 35

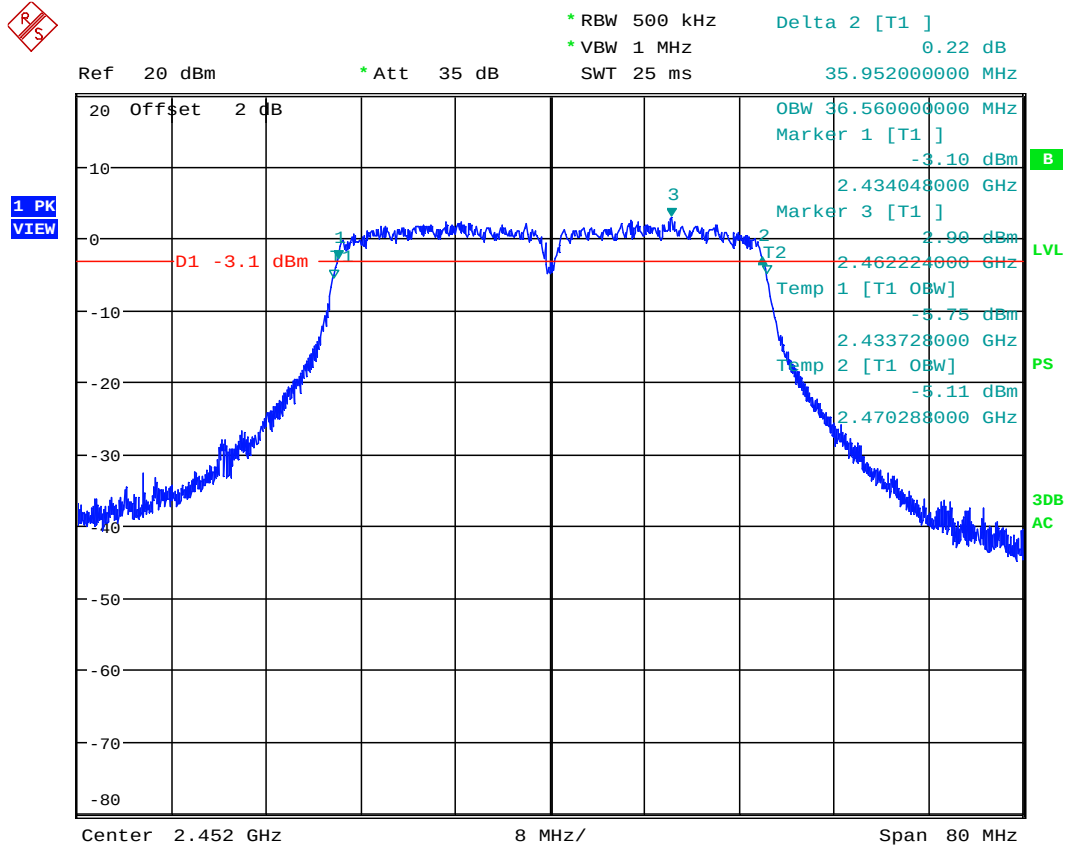


6-dB bandwidth and OBW, 802.11n, HT40, MCS0

Date: 9.JUL.2012 16:20:59



Plot 1.36



6-dB bandwidth and OBW, 802.11n, HT40, MCS0

Date: 9.JUL.2012 16:23:55

4.2 Maximum Conducted Output Power at Antenna Terminals FCC Rule 15.247(b)(3)

4.2.1 Requirement

For antennas with gains of 6 dBi or less, maximum allowed transmitter output is 1 watt (+30 dBm).
For antennas with gains greater than 6 dBi, transmitter output level must be decreased appropriately, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2.2 Procedure

The antenna port of the EUT was connected to the input of a spectrum analyzer/power meter to measure the Maximum Conducted Transmitter Output Power.

The procedure described in FCC Publication 558074, was used. Specifically, section 7.2.2.2, Option 2 (spectral trace averaging), with RMS detector using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges.

4.3.3 Test Result

Refer to the following plots for the test result:

Frequency (MHz)	Channel	Standard	Data rate Mbps	Conducted Power (average) dBm	Conducted Power (average) mW	Plot
2412	1	802.11b	11	17.0	50.1	2.1
		802.11g	6	17.0	50.1	2.4
		802.11g	54	14.9	30.9	2.7
		802.11n HT20	MCS0	15.0	31.6	2.10
		802.11n HT20	MCS7	14.0	25.1	2.13
2422	3	802.11n HT40	MCS0	11.5	14.1	2.16
2437	6	802.11b	11	16.7	46.8	2.2
		802.11g	6	16.9	49.0	2.5
		802.11g	54	14.8	30.2	2.8
		802.11n HT20	MCS0	15.3	33.9	2.11
		802.11n HT20	MCS7	13.7	23.4	2.14
2437	6	802.11n HT40	MCS0	12.0	15.9	2.17
2462	11	802.11b	11	17.0	50.1	2.3
		802.11g	6	17.3	53.7	2.6
		802.11g	54	15.2	33.1	2.9
		802.11n HT20	MCS0	15.2	33.1	2.12
		802.11n HT20	MCS7	14.1	25.7	2.15
2452	9	802.11n HT40	MCS0	11.5	14.1	2.18

Notes:

For all channels in 802.11b mode, software power settings = 17

For all channels in 802.11g mode (6-36Mbps), software power settings = 17

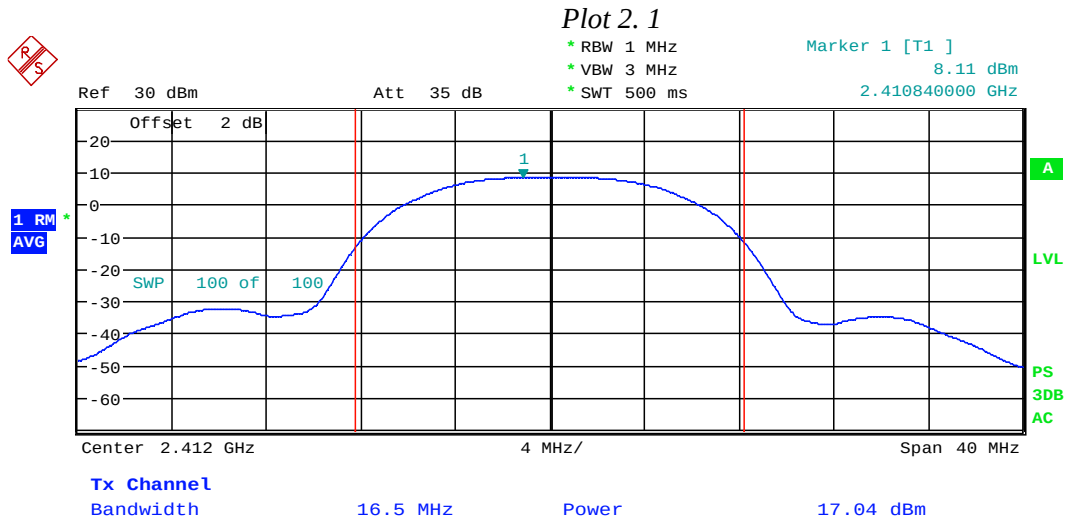
For all channels in 802.11g mode (54Mbps), software power settings = 15

For all channels in 802.11n HT20 mode (MCS0-MCS4), software power settings = 15

For all channels in 802.11n HT20 mode (MCS7), software power settings = 14

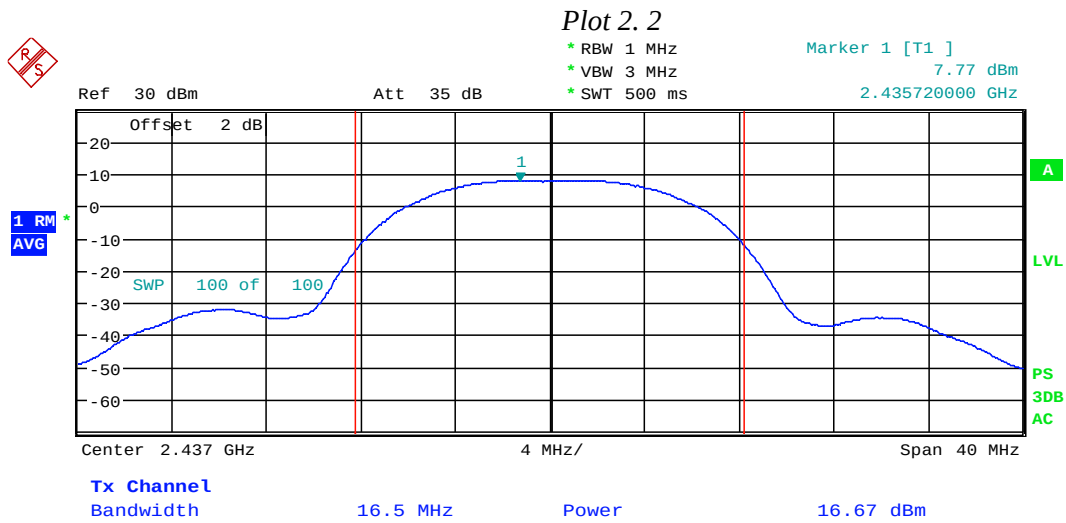
For all channels in 802.11n HT40 mode (MCS0-MCS4/MCS7), software power settings = 12

.



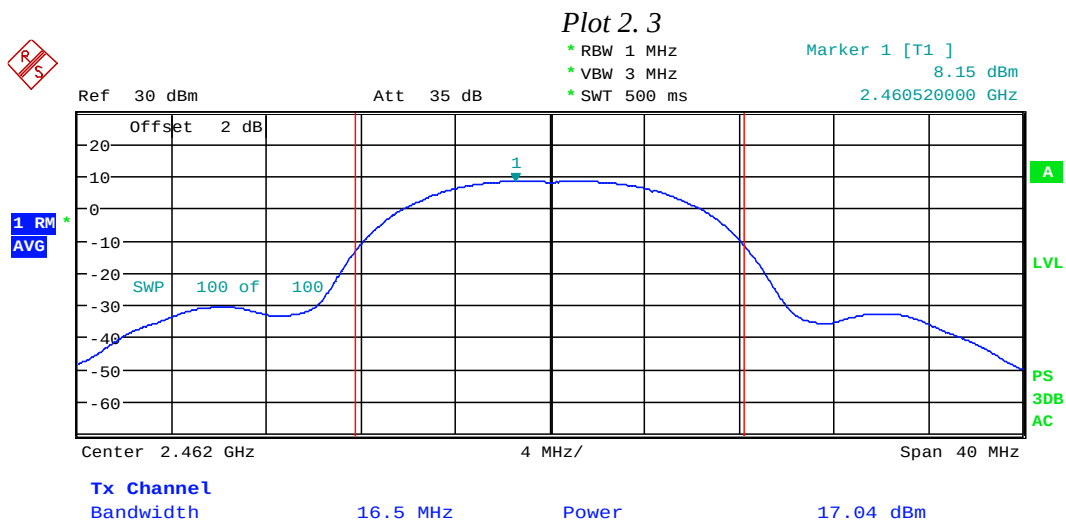
Channel Power, 802.11b, 11Mbps

Date: 20.JUL.2012 14:08:10



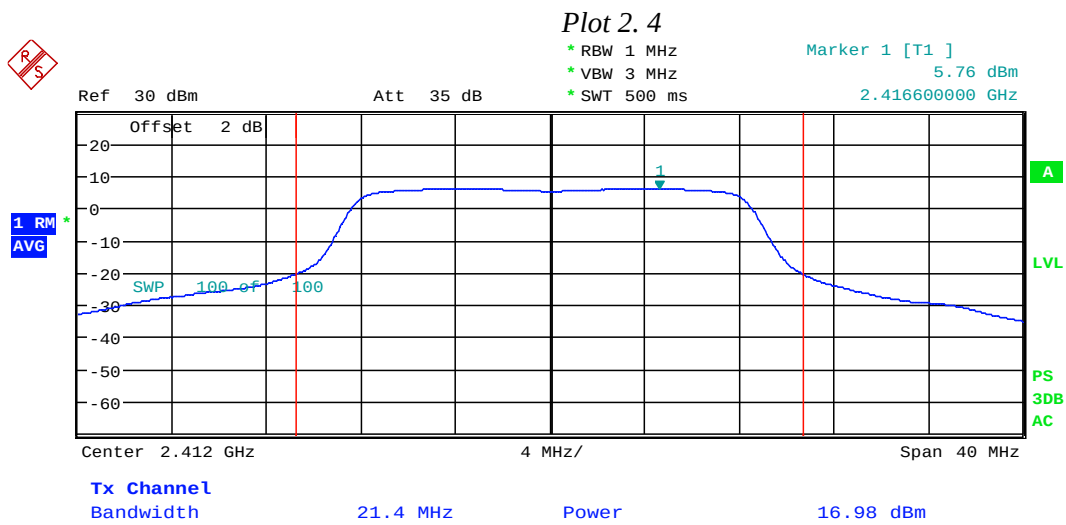
Channel Power, 802.11b, 11Mbps

Date: 20.JUL.2012 14:11:22



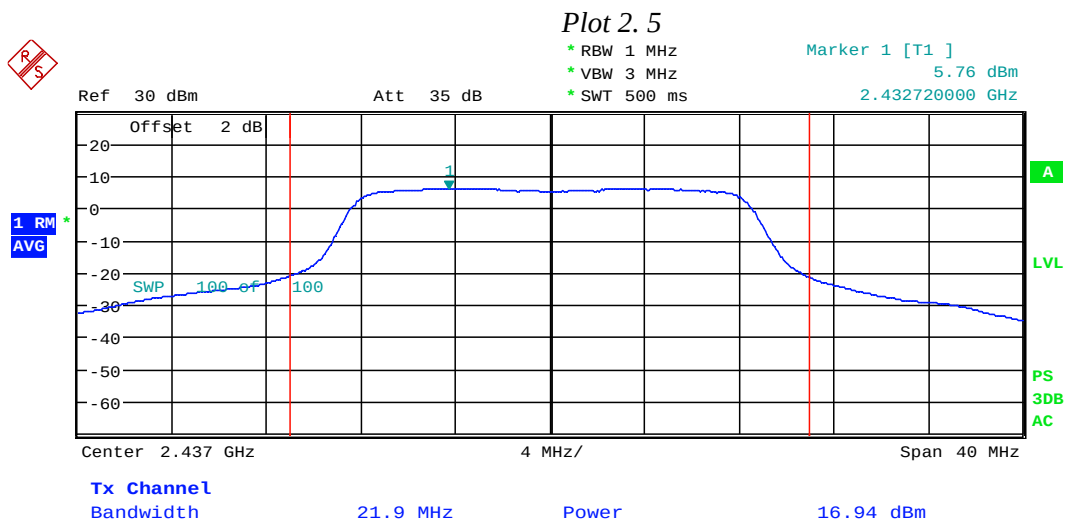
Channel Power, 802.11b, 11Mbps

Date: 20.JUL.2012 14:13:35



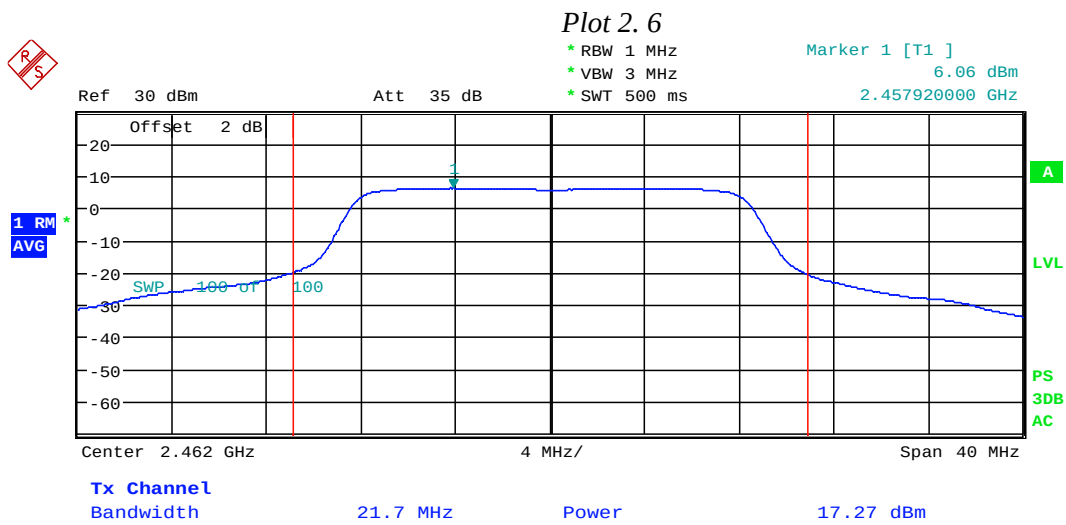
Channel Power, 802.11g, 6Mbps

Date: 20.JUL.2012 14:15:46



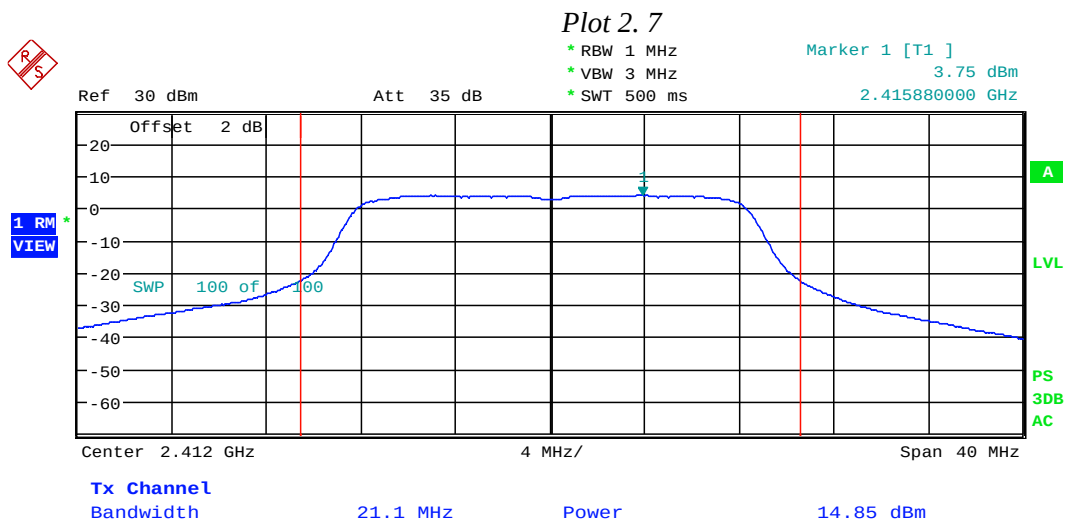
Channel Power, 802.11g, 6Mbps

Date: 20.JUL.2012 14:18:12



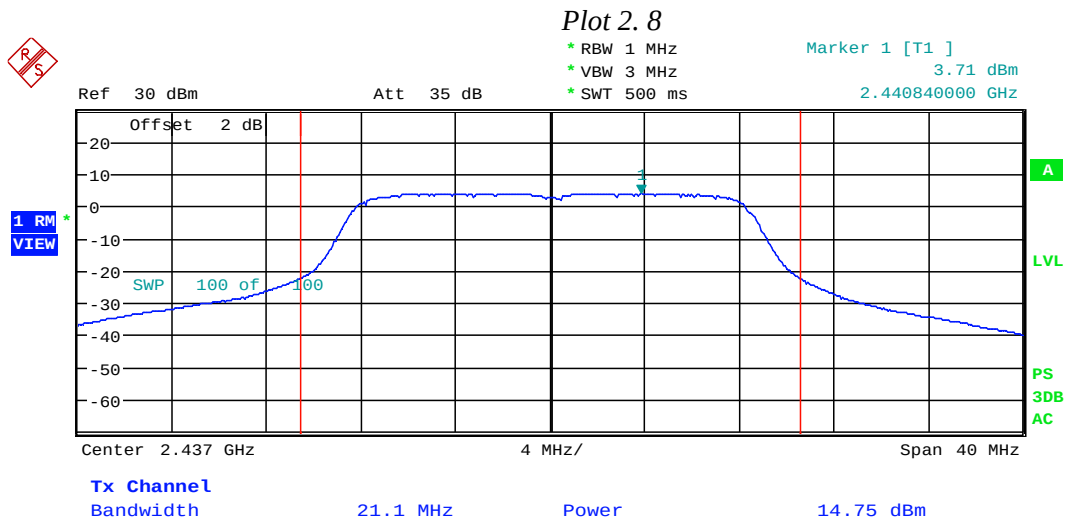
Channel Power, 802.11g, 6Mbps

Date: 20.JUL.2012 14:21:22



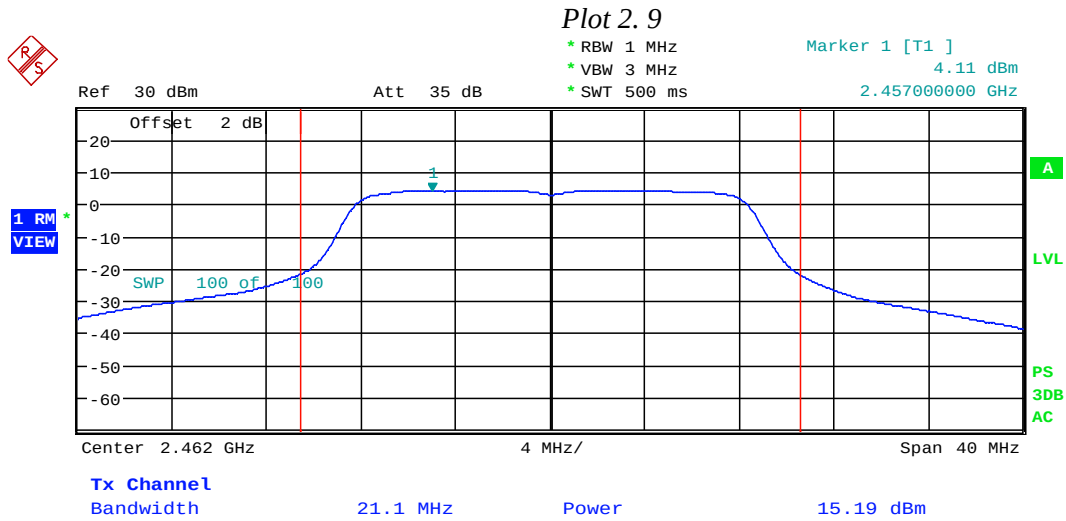
Channel Power, 802.11g, 54Mbps

Date: 20.JUL.2012 14:24:23



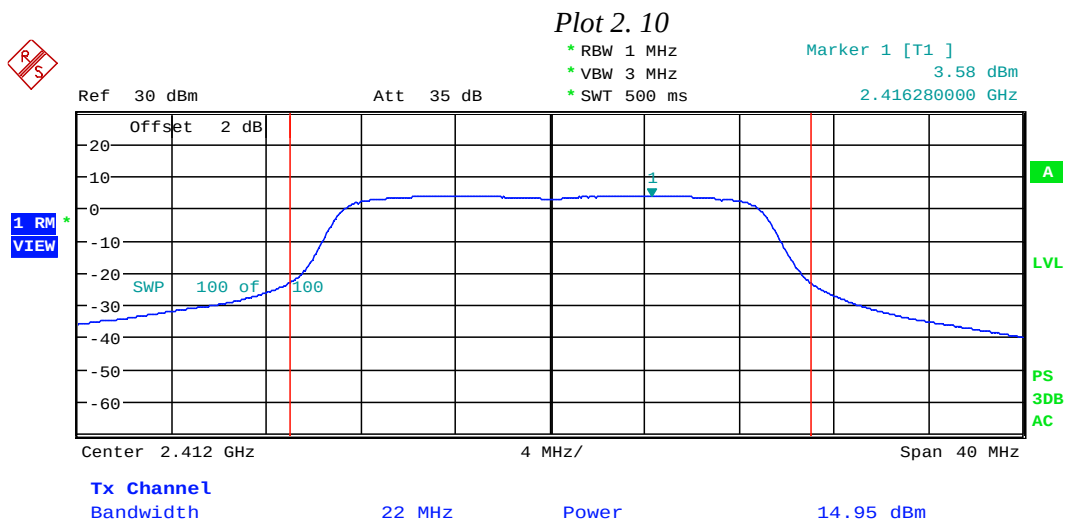
Channel Power, 802.11g, 54Mbps

Date: 20.JUL.2012 14:27:11



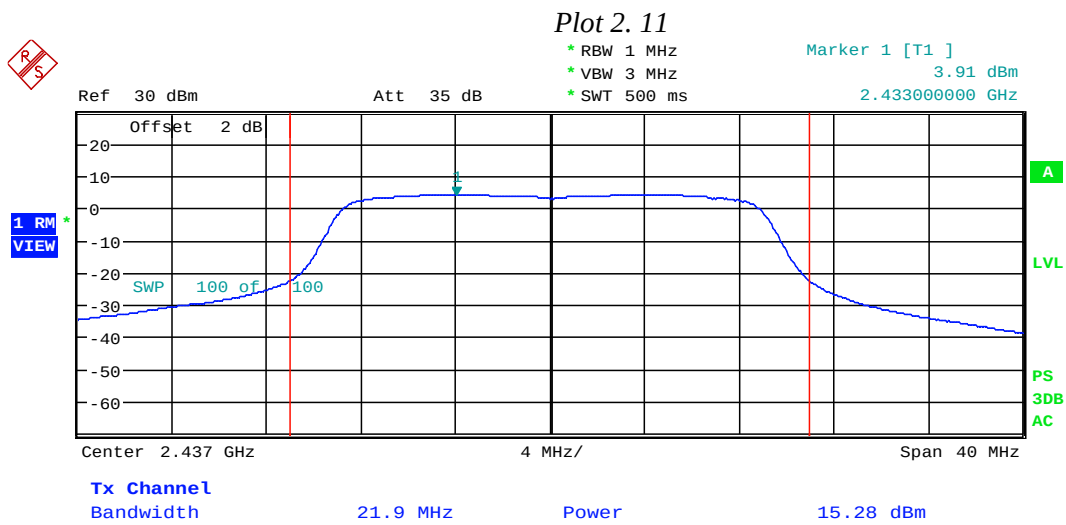
Channel Power, 802.11g, 54Mbps

Date: 20.JUL.2012 14:28:40



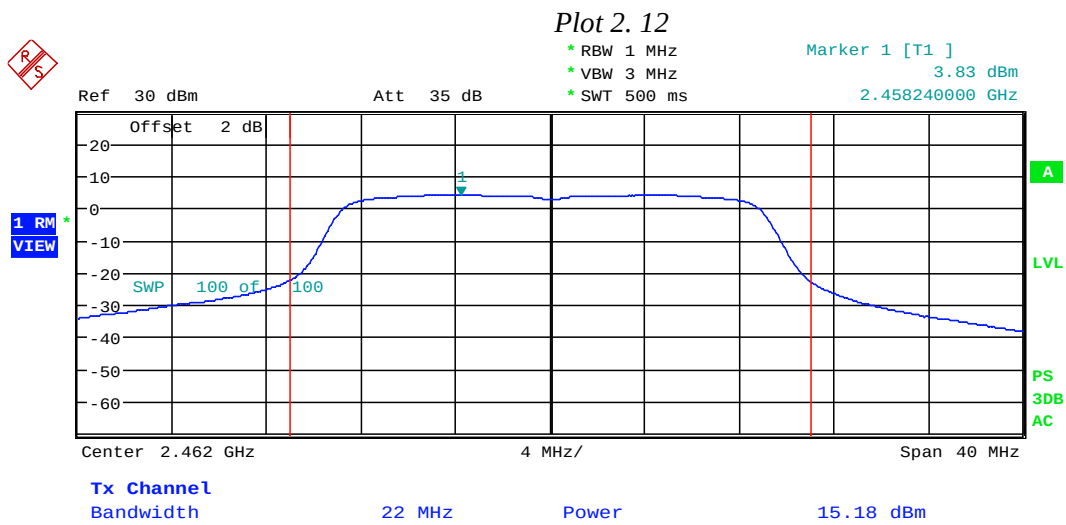
Channel Power, 802.11n, HT20, MCS0

Date: 20.JUL.2012 14:30:58



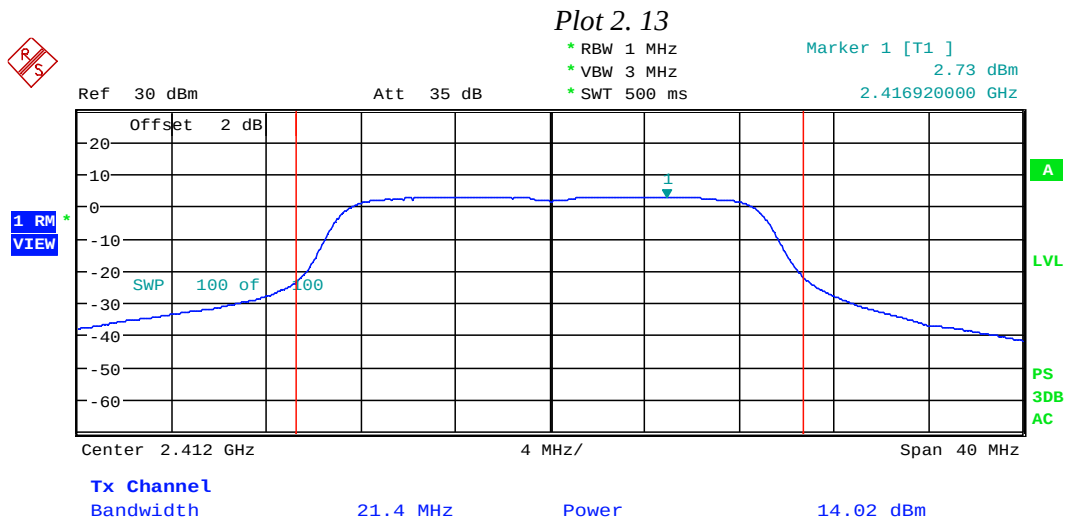
Channel Power, 802.11n, HT20, MCS0

Date: 20.JUL.2012 14:32:37



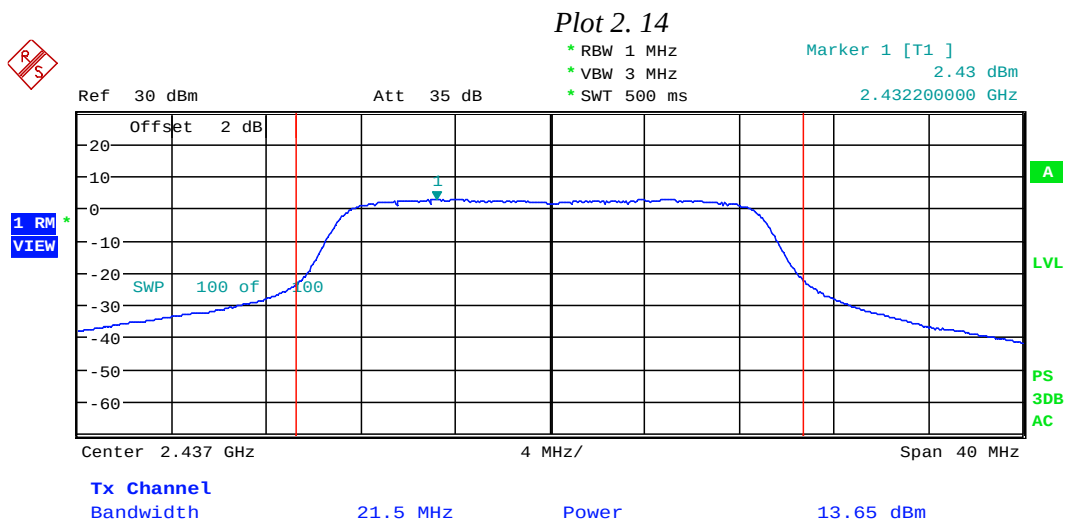
Channel Power, 802.11n, HT20, MCS0

Date: 20.JUL.2012 14:34:14



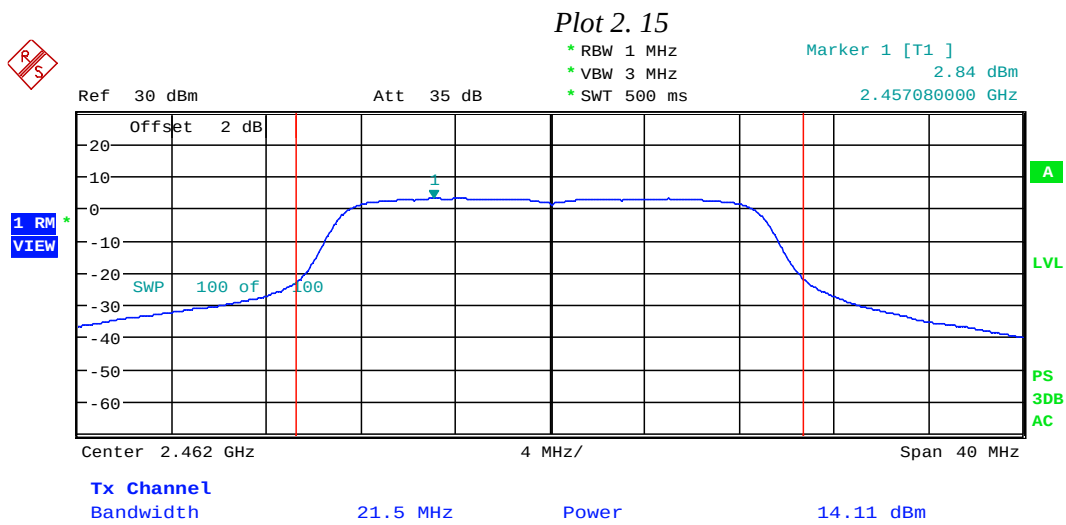
Channel Power, 802.11n, HT20, MCS7

Date: 20.JUL.2012 14:36:25



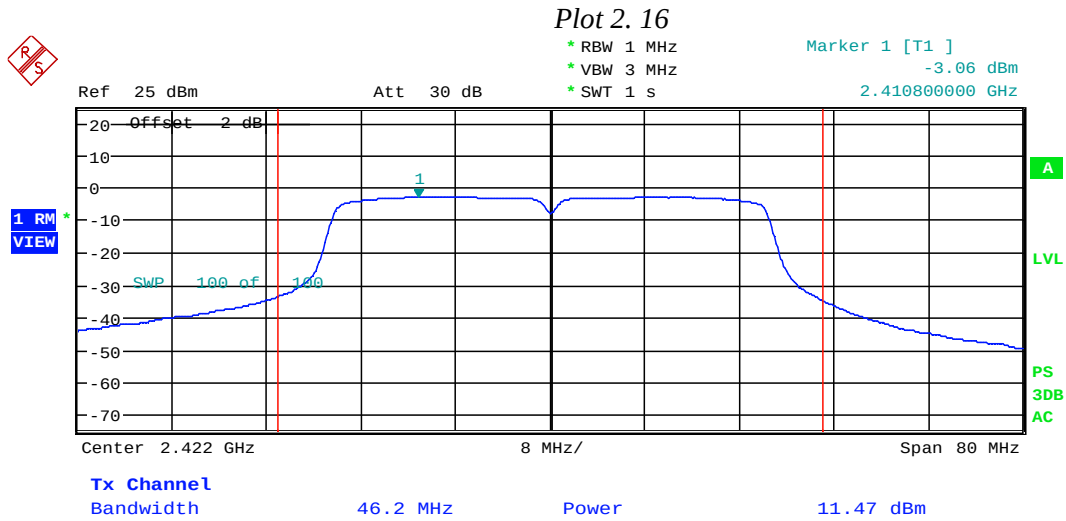
Channel Power, 802.11n, HT20, MCS7

Date: 20.JUL.2012 14:38:25



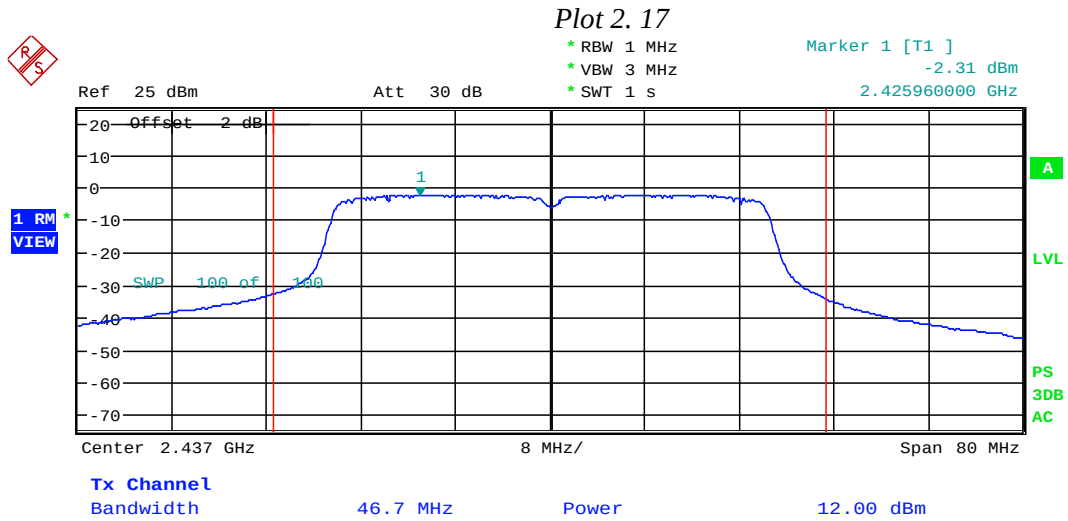
Channel Power, 802.11n, HT20, MCS7

Date: 20.JUL.2012 14:40:00



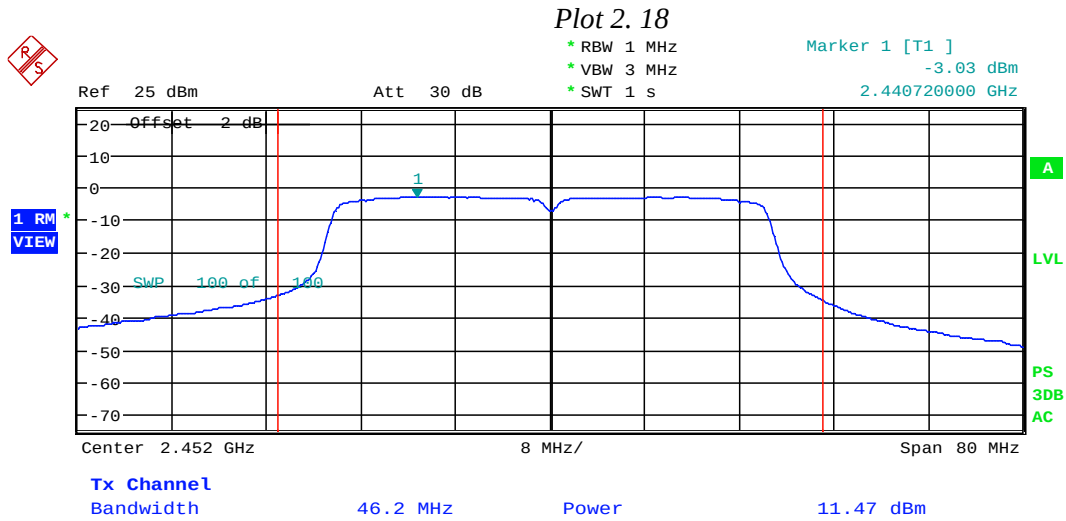
Channel Power, 802.11n, HT40, MCS0

Date: 20.JUL.2012 14:45:49



Channel Power, 802.11n, HT40, MCS0

Date: 20.JUL.2012 14:49:57



Channel Power, 802.11n, HT40, MCS0

Date: 20.JUL.2012 14:53:02

4.3 Power Spectral Density FCC 15.247 (e)

4.3.1 Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna should not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2 Procedure

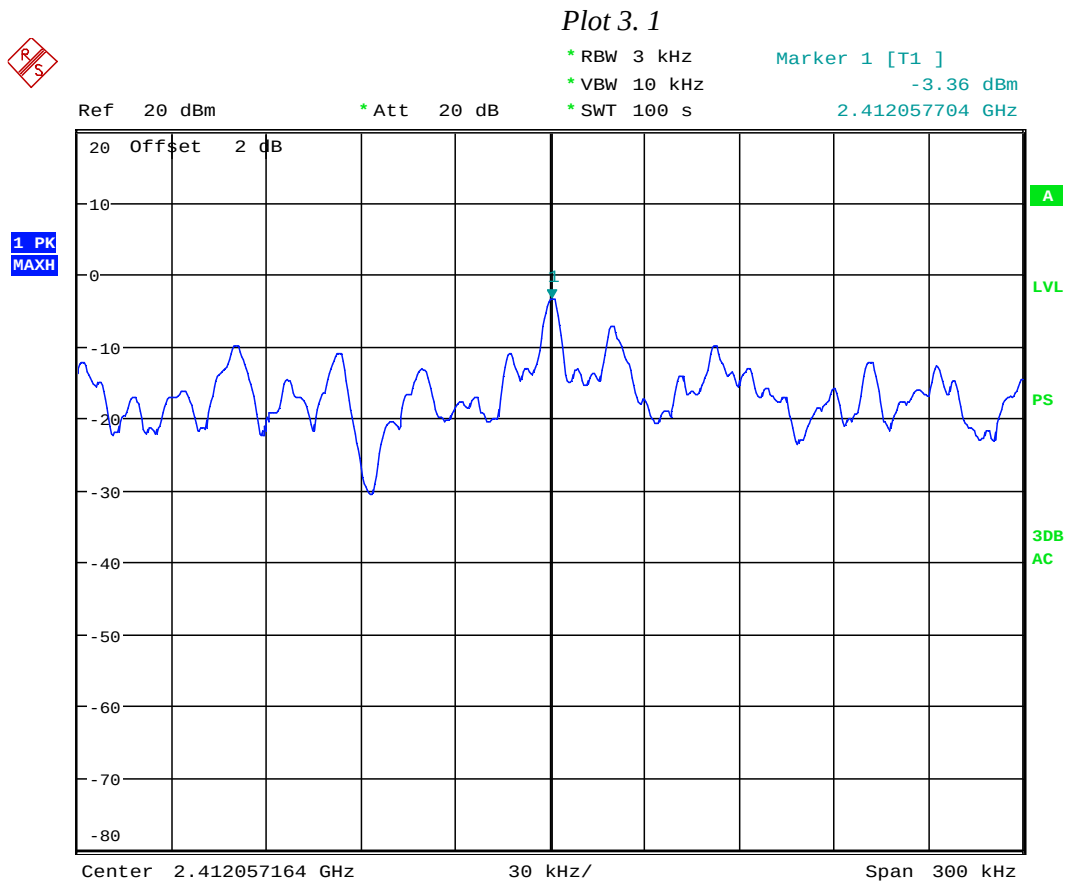
The antenna port of the EUT was connected to the input of a spectrum analyzer to measure the Transmitter Power Density (PSD).

The procedure described in FCC Publication 558074 was used. Specifically, section 7.3.3, Alternative 1 (Peak PSD alternative), with peak detector, spectrum analyzer resolution bandwidth of 3 kHz, span of 300 kHz and sweep time of 100 s.

4.3.3 Test Result

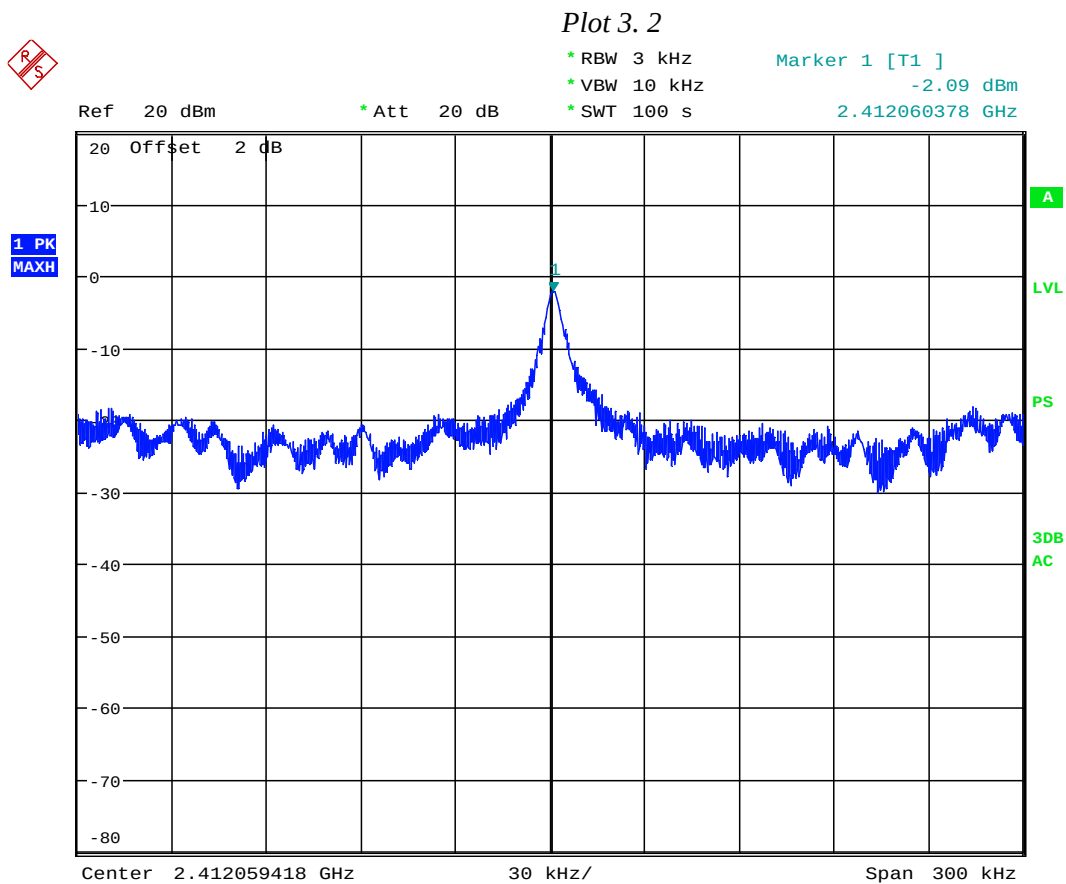
Refer to the following plots for the test result:

Frequency (MHz)	Channel	Standard	Data rate Mbps	PSD (Peak) dBm	Margin to -8dBm Limit dB	Plot
2412	1	802.11b	11	-3.4	-11.4	3.1
		802.11g	6	-2.1	-10.1	3.2
		802.11g	54	-6.5	-14.5	3.3
		802.11n HT20	MCS0	-5.8	-13.8	3.4
		802.11n HT20	MCS7	-8.0	-16.0	3.5
2422	3	802.11n HT40	MCS0	-10.7	-18.7	3.6
2437	6	802.11b	11	-4.2	-12.2	3.7
		802.11g	6	-2.7	-10.7	3.8
		802.11g	54	-6.1	-14.1	3.9
		802.11n HT20	MCS0	-6.3	-14.3	3.10
		802.11n HT20	MCS7	-7.5	-15.5	3.11
2437	6	802.11n HT40	MCS0	-10.2	-18.2	3.12
2462	11	802.11b	11	-4.2	-12.2	3.13
		802.11g	6	-0.8	-8.8	3.14
		802.11g	54	-6.8	-14.8	3.15
		802.11n HT20	MCS0	-5.3	-13.3	3.16
		802.11n HT20	MCS7	-7.6	-15.6	3.17
2452	9	802.11n HT40	MCS0	-12.2	-20.2	3.18



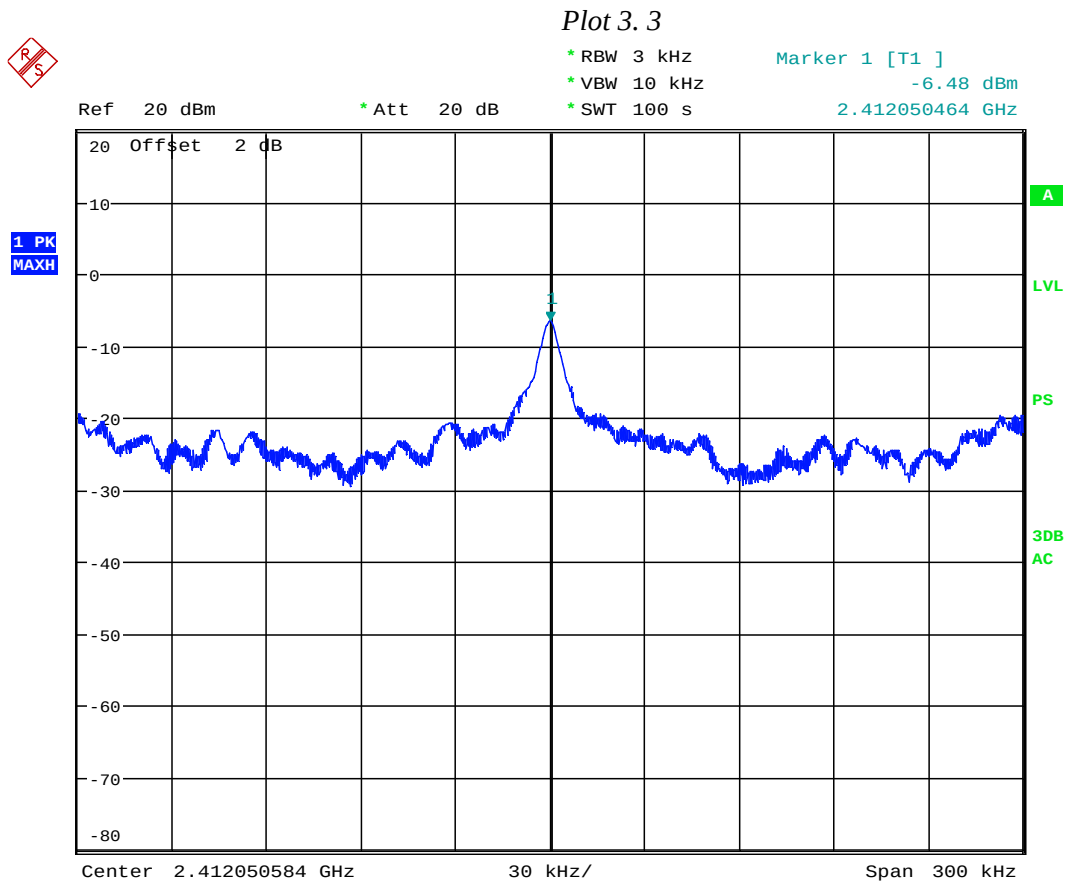
Power spectral density, 802.11b, 11Mbps

Date: 17.JUL.2012 13:22:59



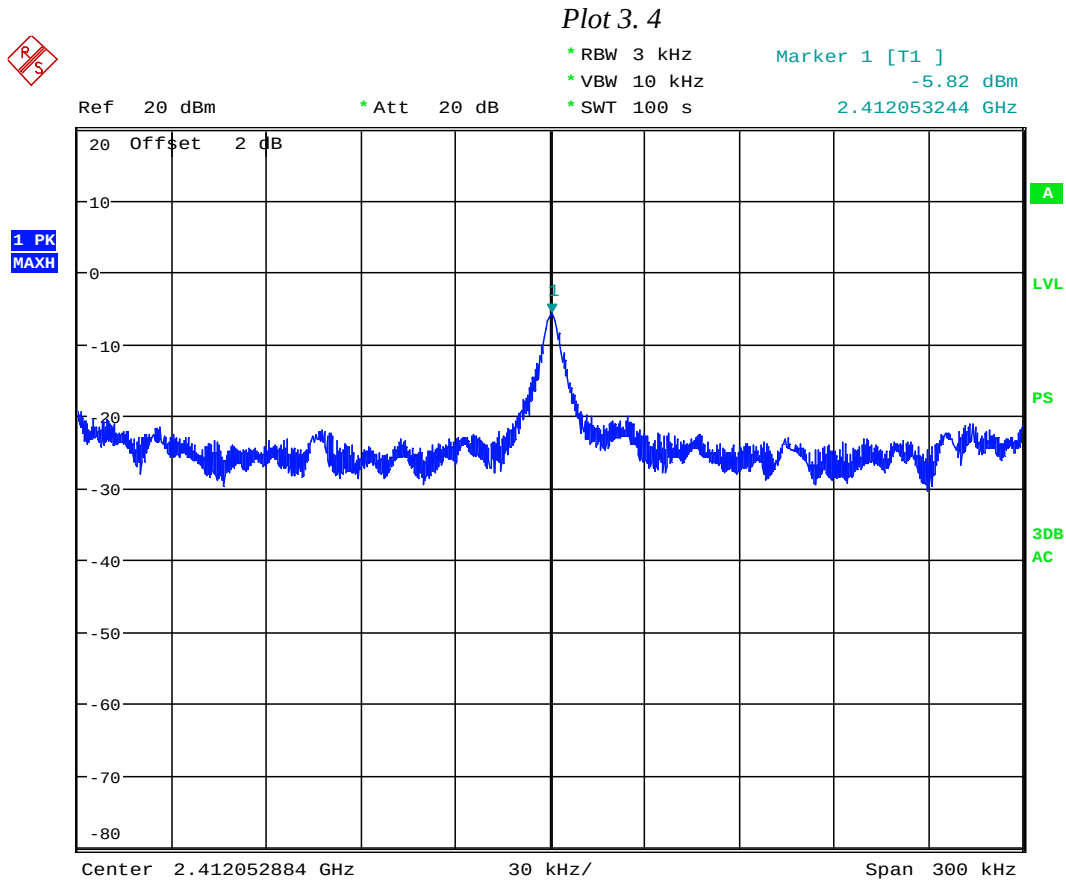
Power spectral density, 802.11g, 6Mbps

Date: 17.JUL.2012 12:20:58



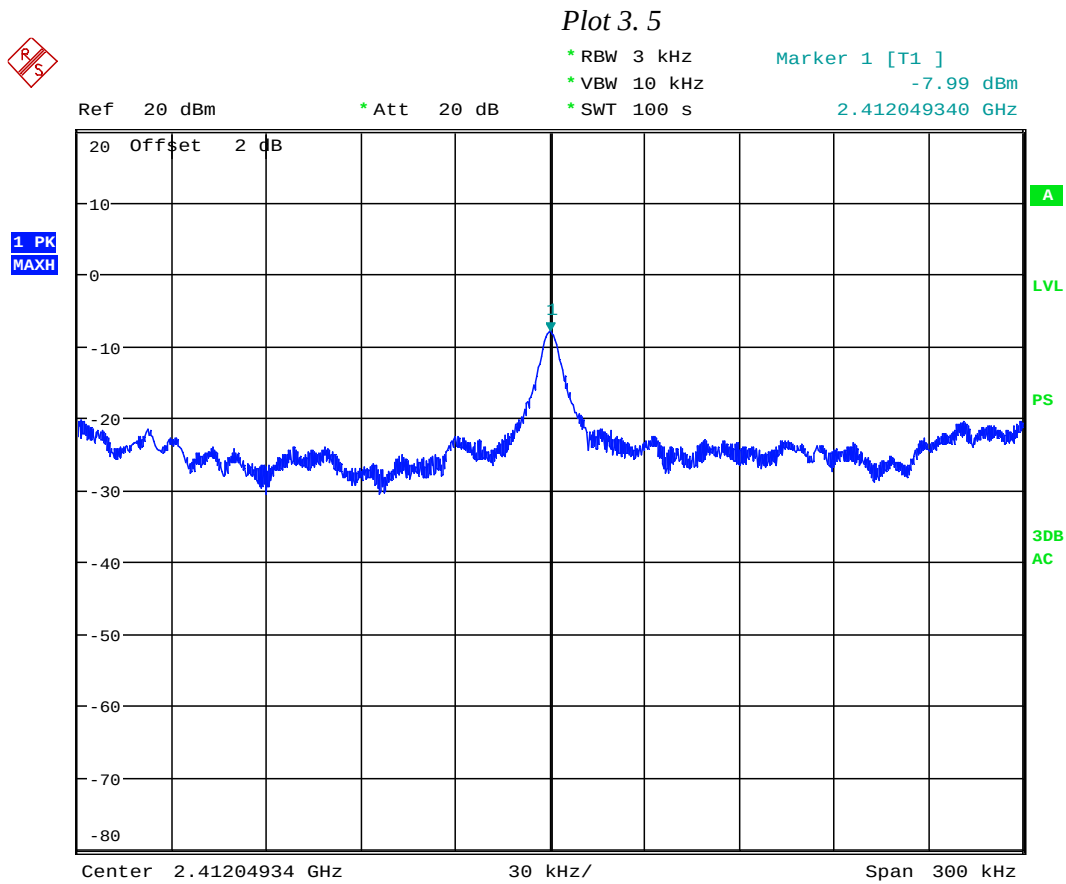
Power spectral density, 802.11g, 54Mbps

Date: 17.JUL.2012 13:32:05



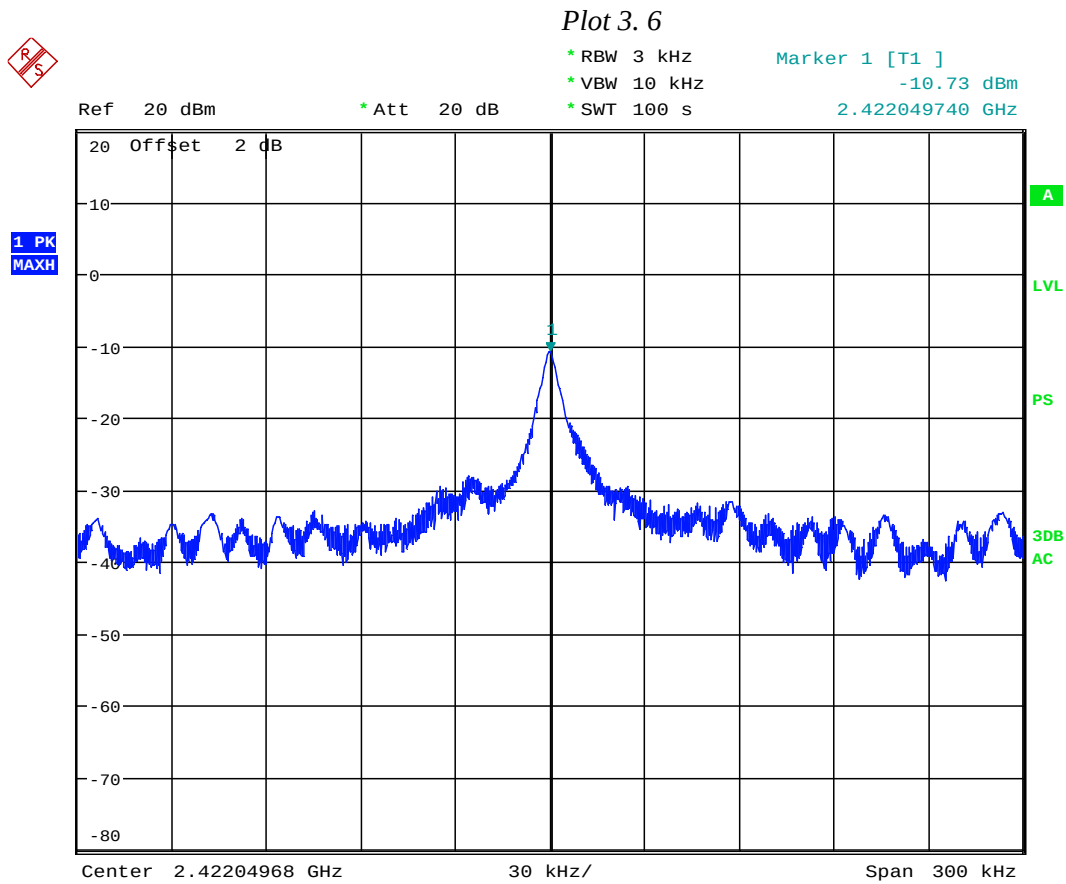
Power spectral density, 802.11n, HT20, MCS0

Date: 17.JUL.2012 13:37:35



Power spectral density, 802.11n, HT20, MCS7

Date: 17.JUL.2012 13:50:48

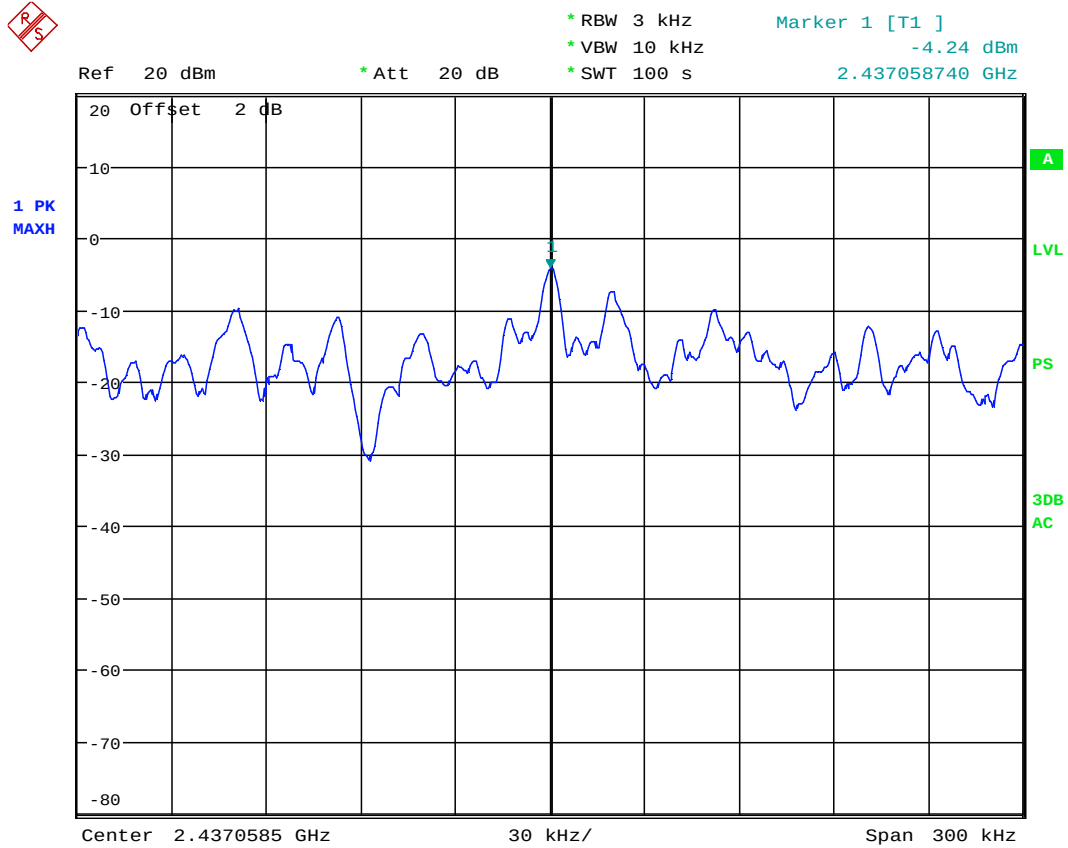


Power spectral density, 802.11n, HT40, MCS0

Date: 17.JUL.2012 13:47:47

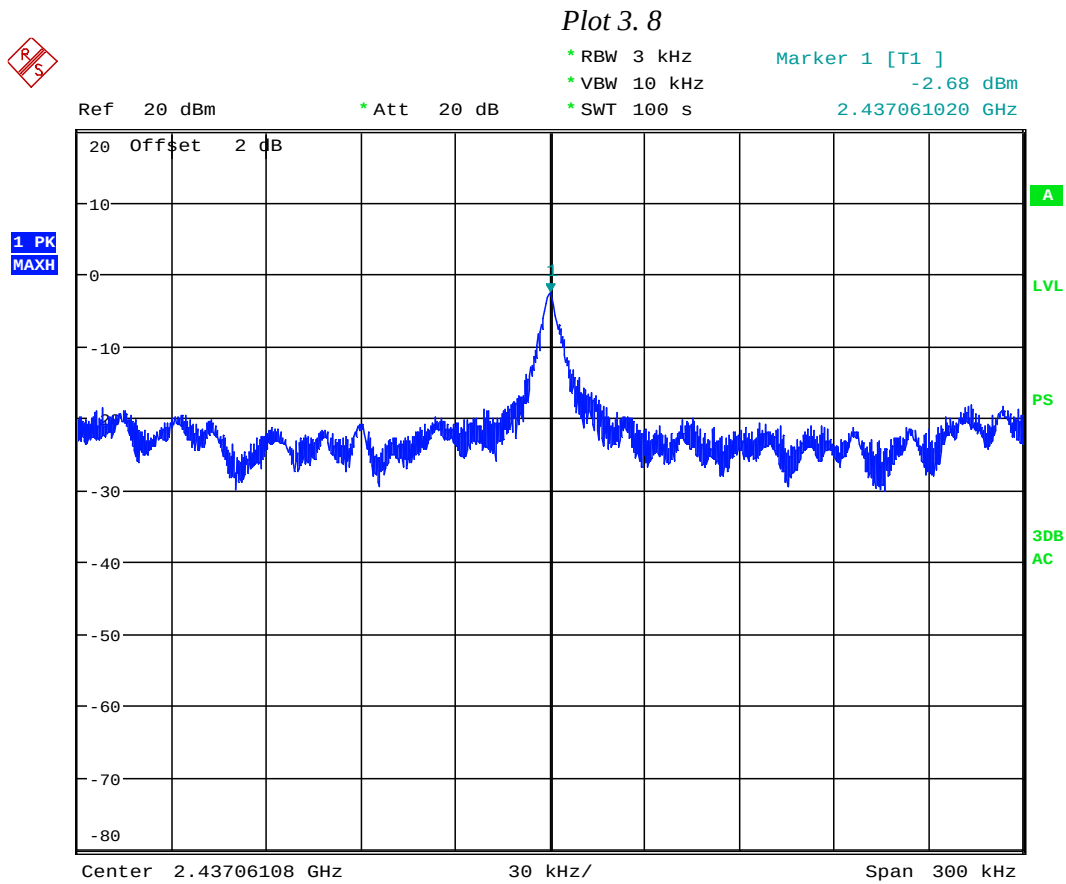


Plot 3.7



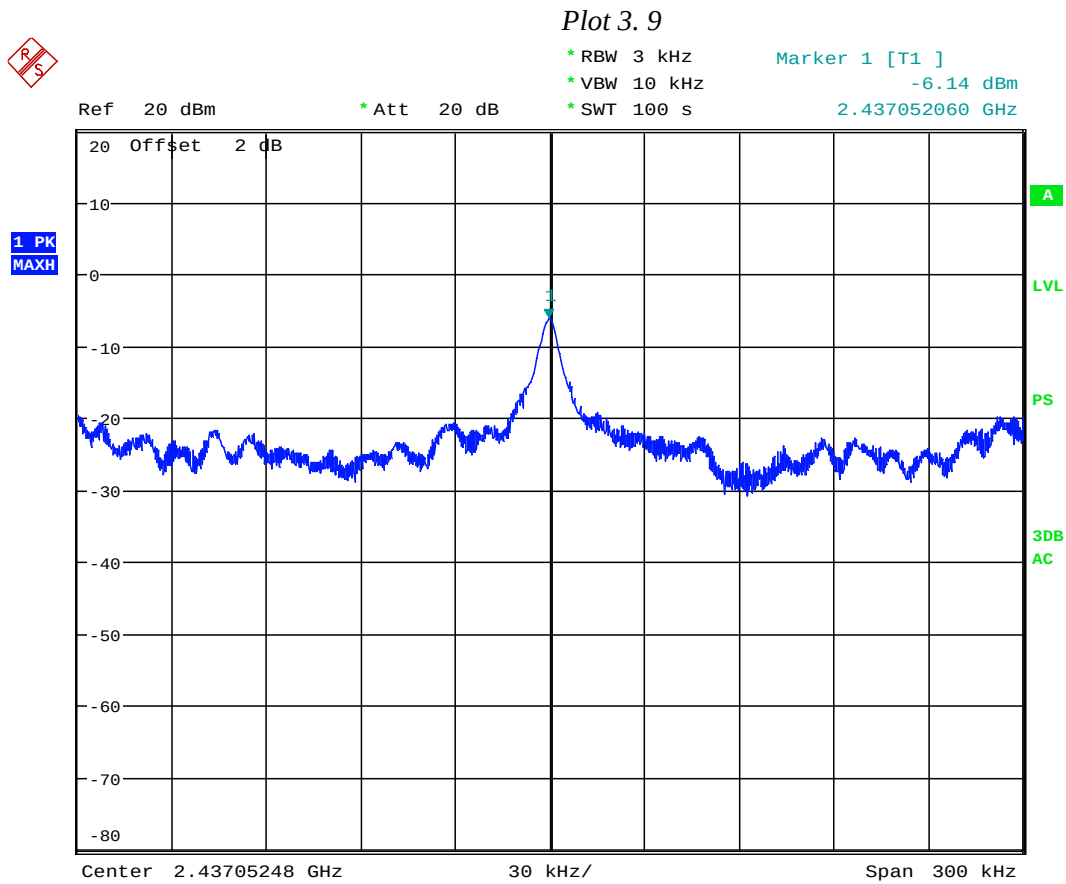
Power spectral density, 802.11b, 11Mbps

Date: 17.JUL.2012 14:02:44



Power spectral density, 802.11g, 6Mbps

Date: 17.JUL.2012 14:08:13

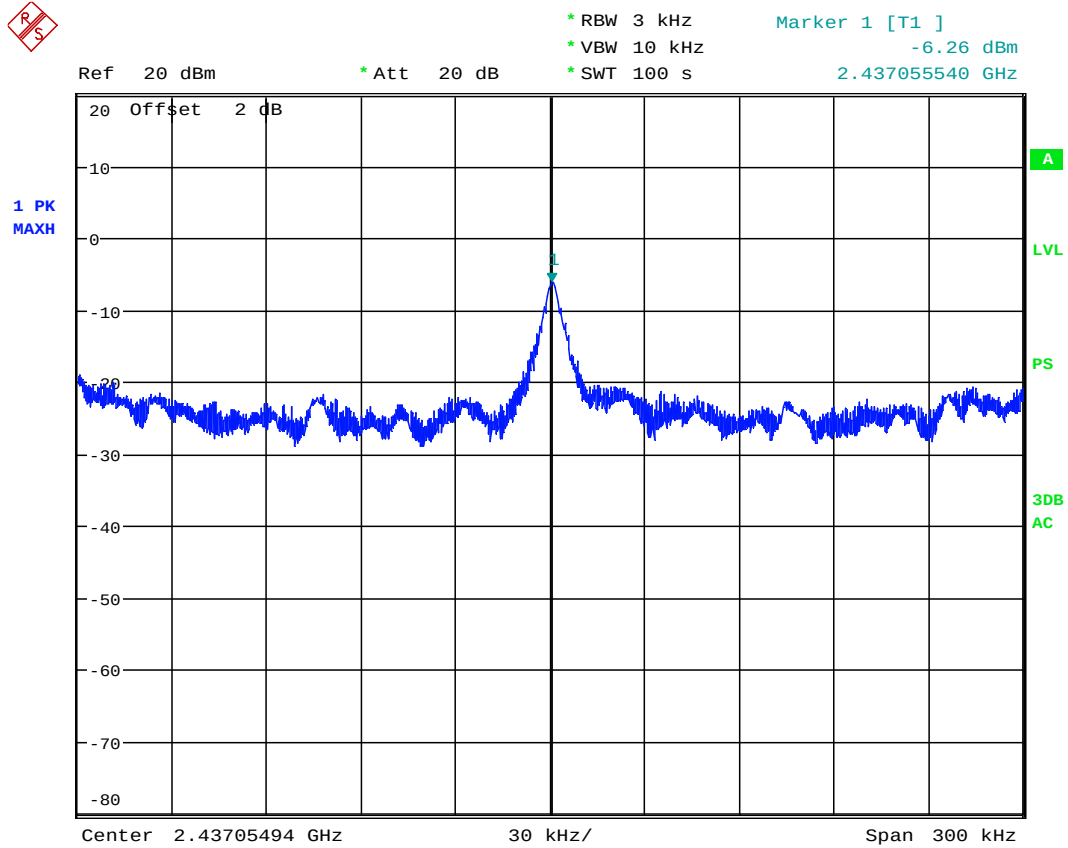


Power spectral density, 802.11g, 54Mbps

Date: 17.JUL.2012 14:14:43



Plot 3.10

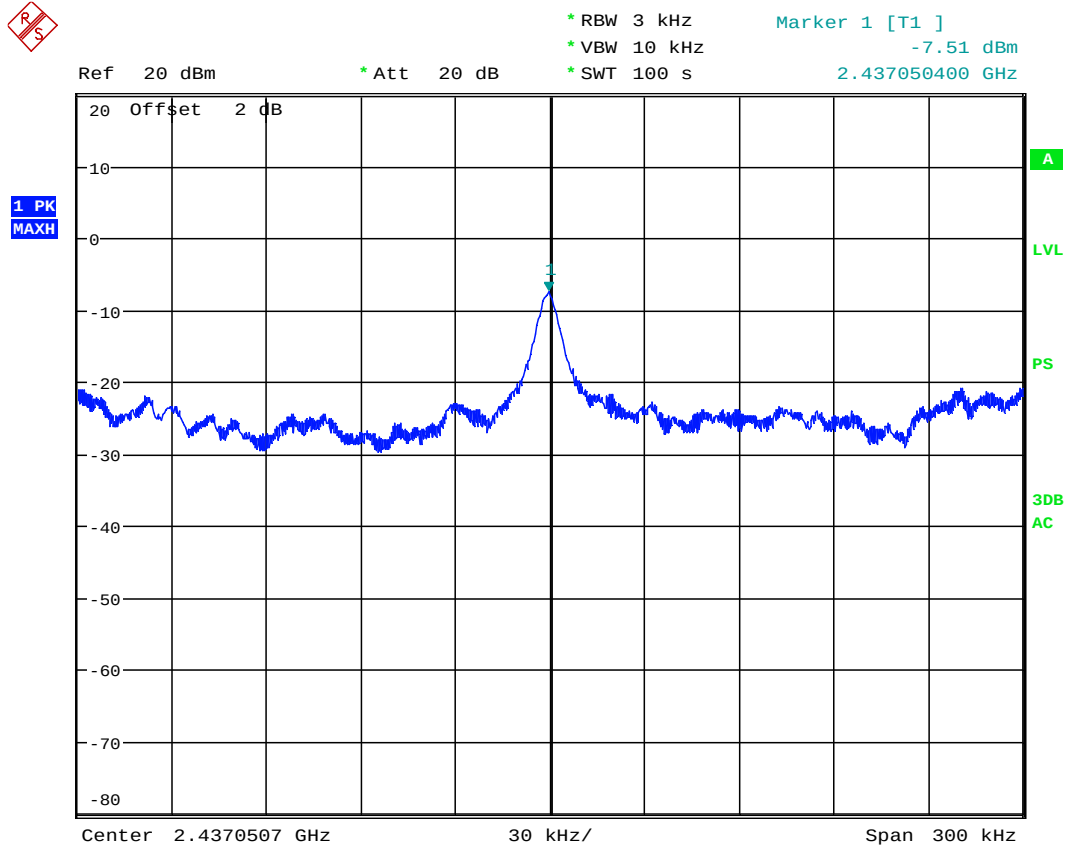


Power spectral density, 802.11n, HT20, MCS0

Date: 17.JUL.2012 14:20:49

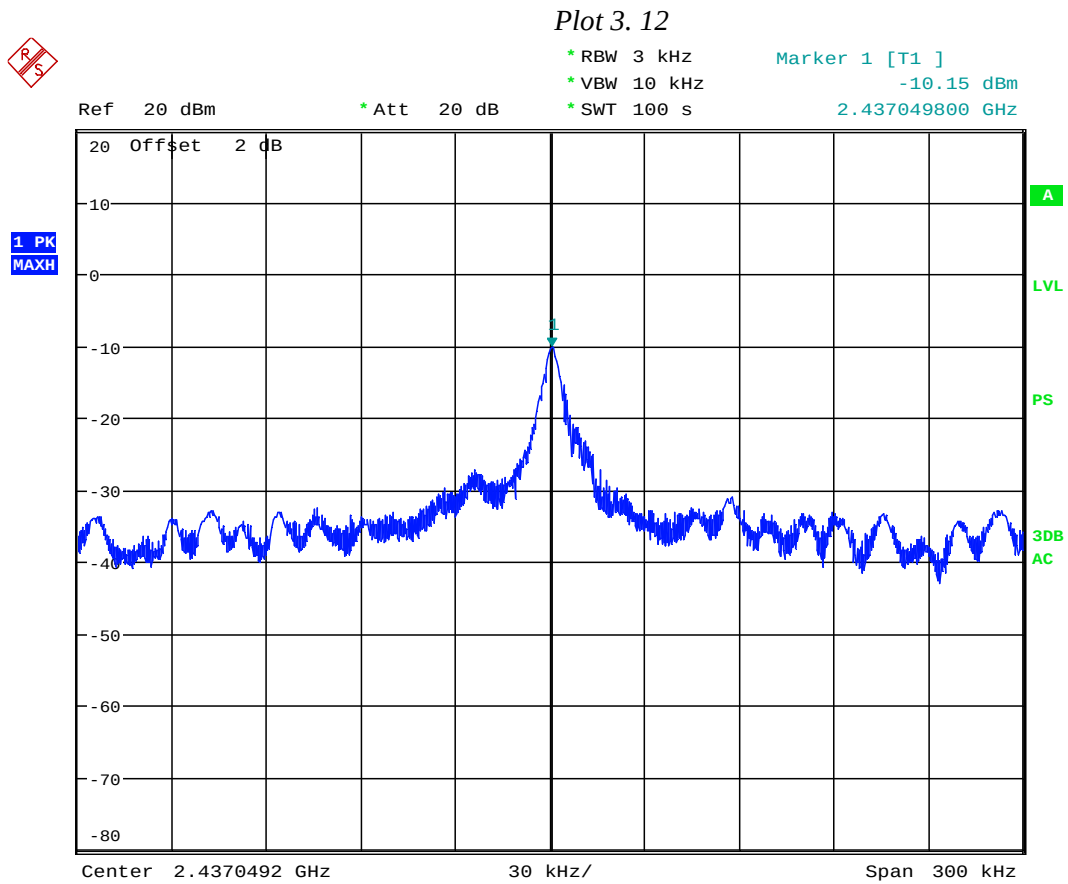


Plot 3.11



Power spectral density, 802.11n, HT20, MCS7

Date: 17.JUL.2012 14:26:38

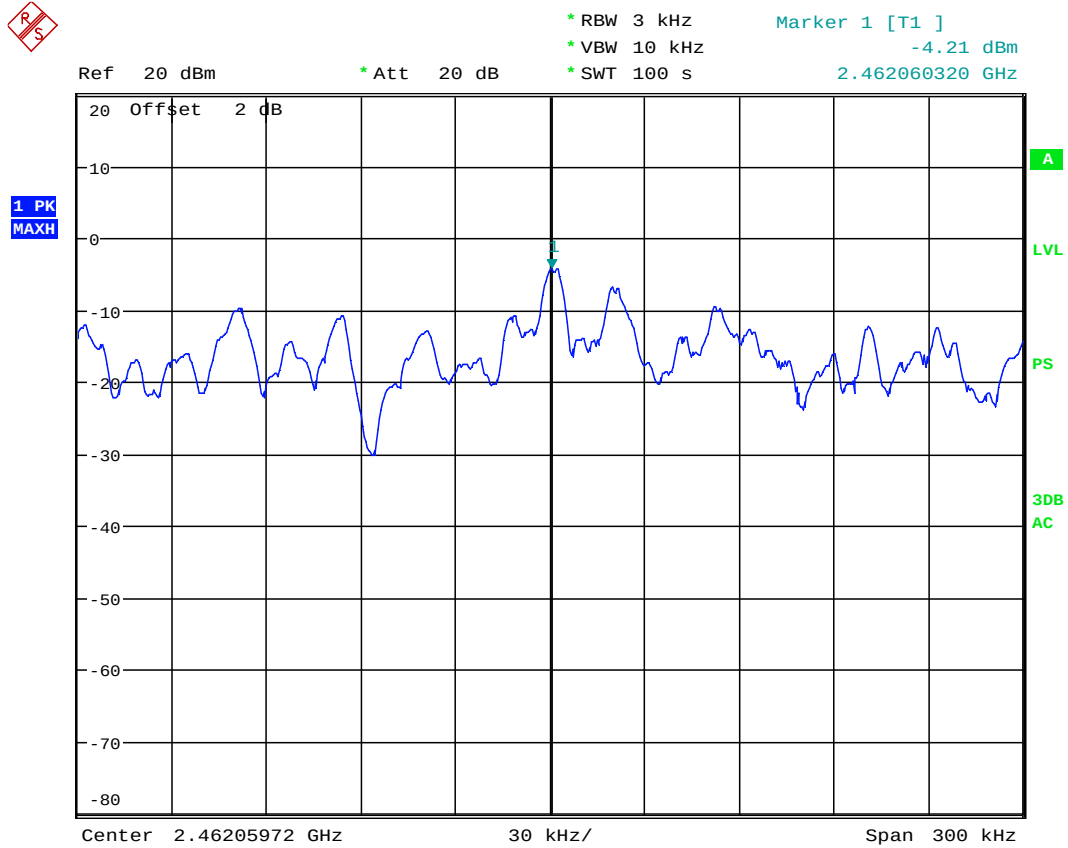


Power spectral density, 802.11n, HT40, MCS0

Date: 17.JUL.2012 14:35:07

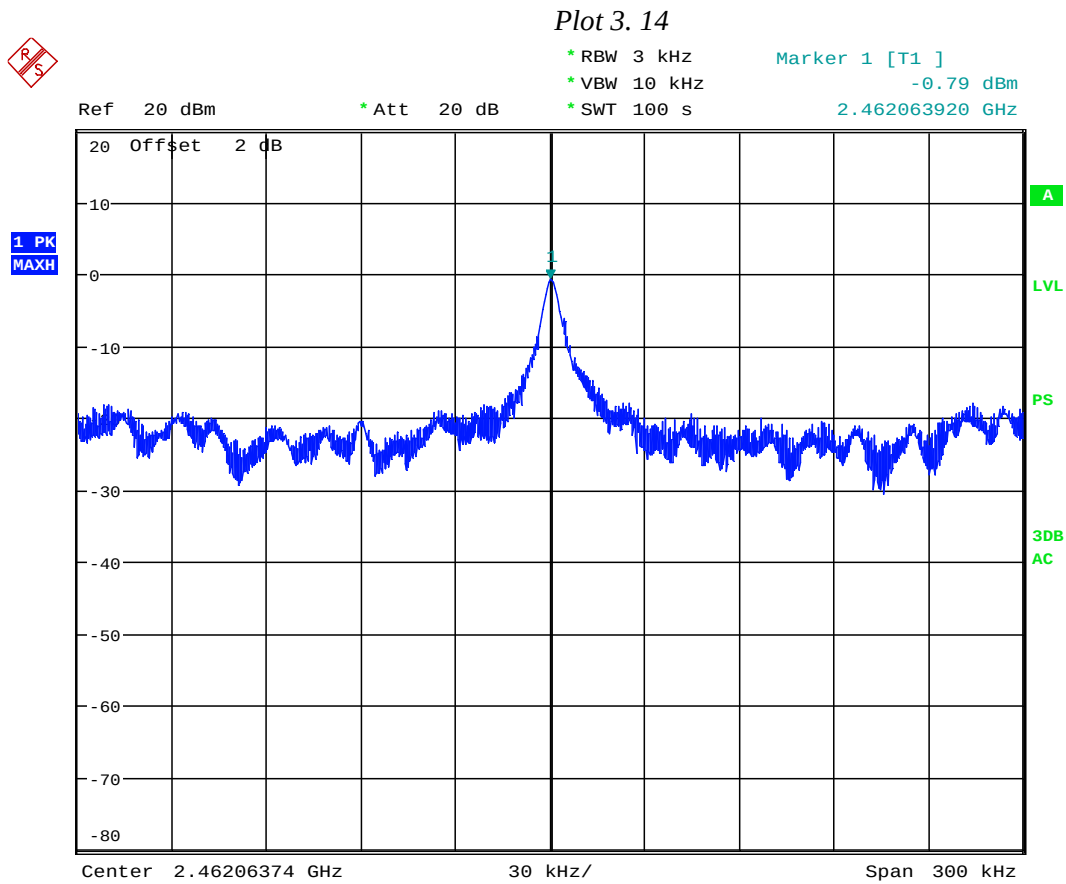


Plot 3.13



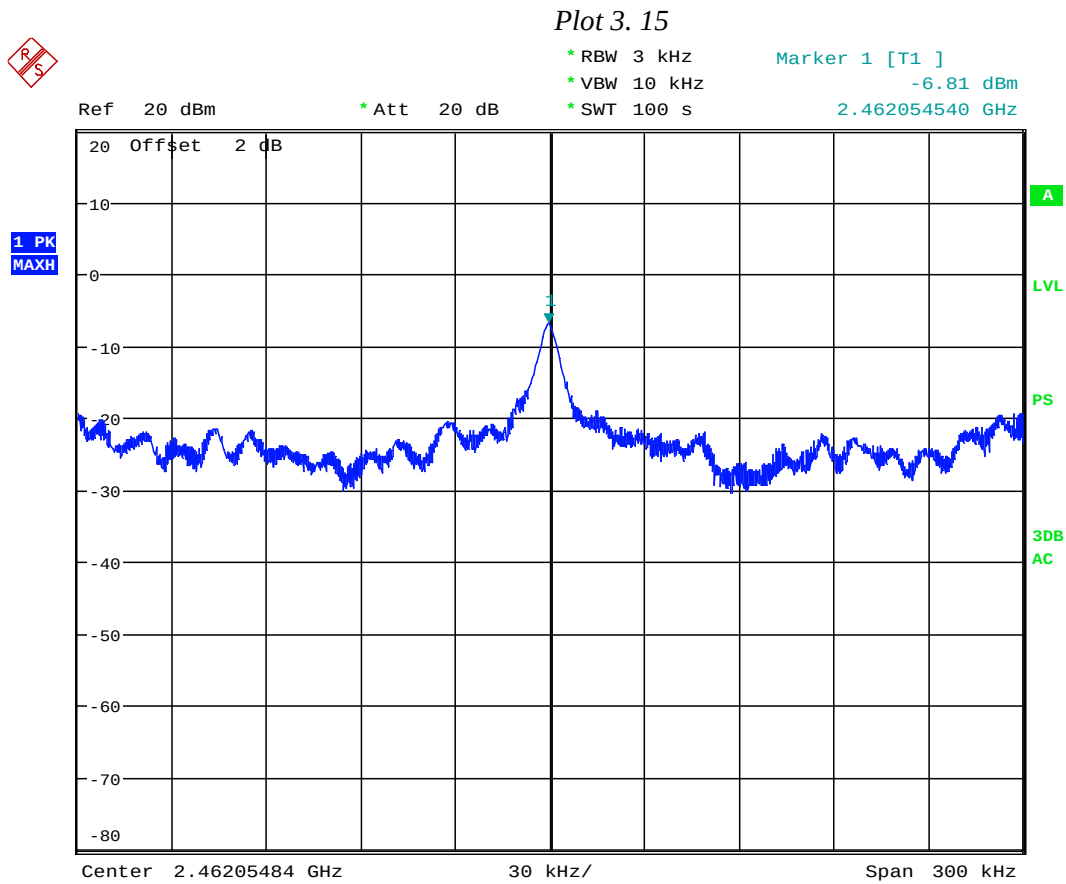
Power spectral density, 802.11b, 11Mbps

Date: 17.JUL.2012 14:43:27



Power spectral density, 802.11g, 6Mbps

Date: 17.JUL.2012 14:48:12

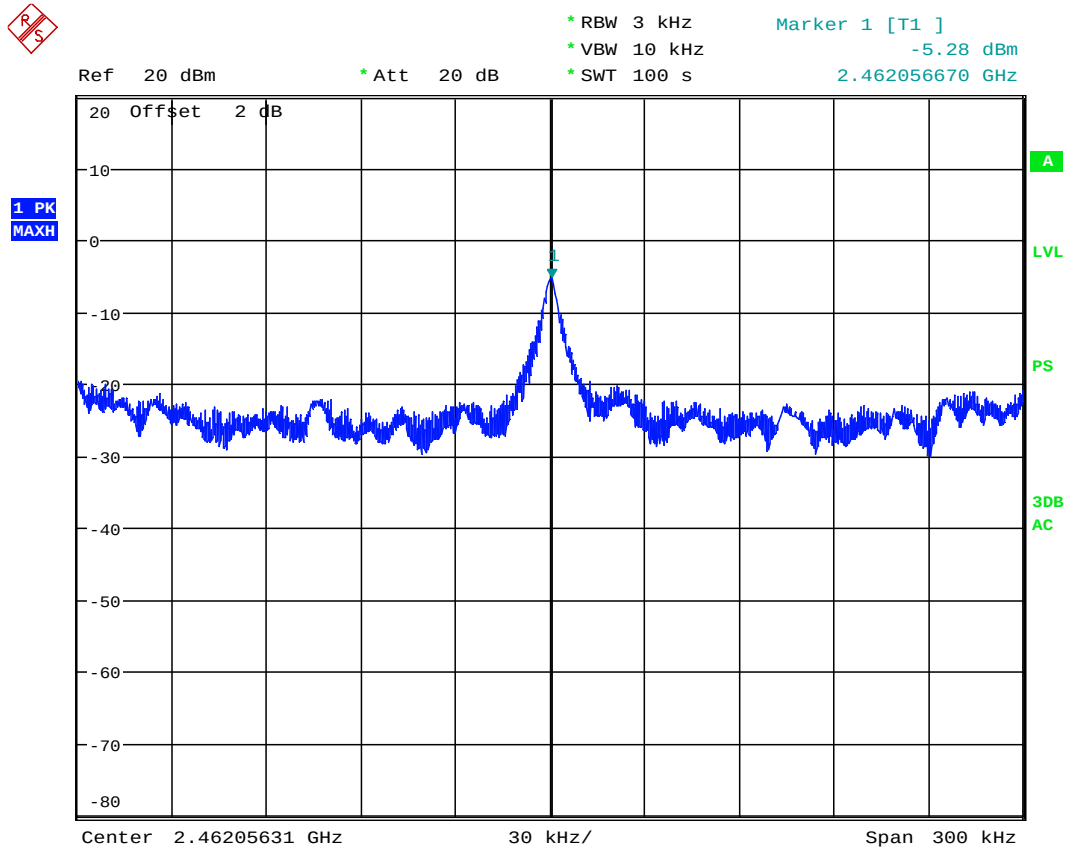


Power spectral density, 802.11g, 54Mbps

Date: 17.JUL.2012 14:56:01

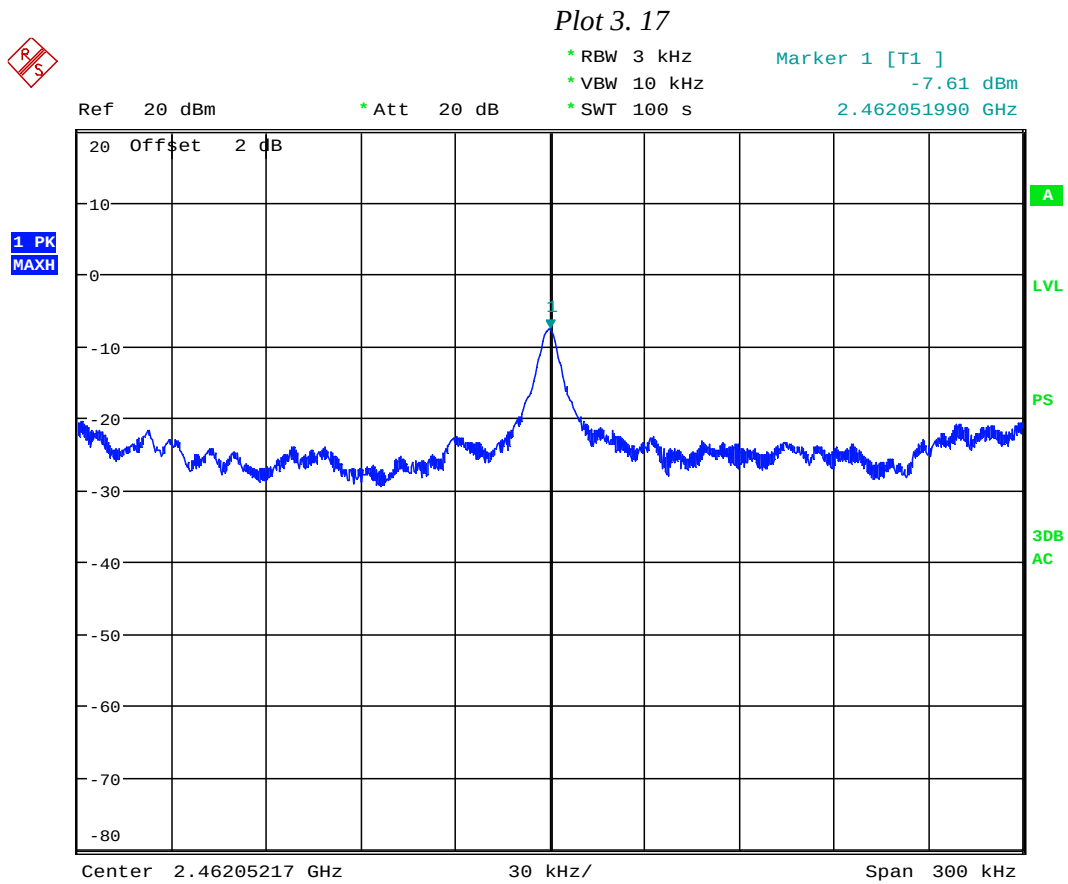


Plot 3.16



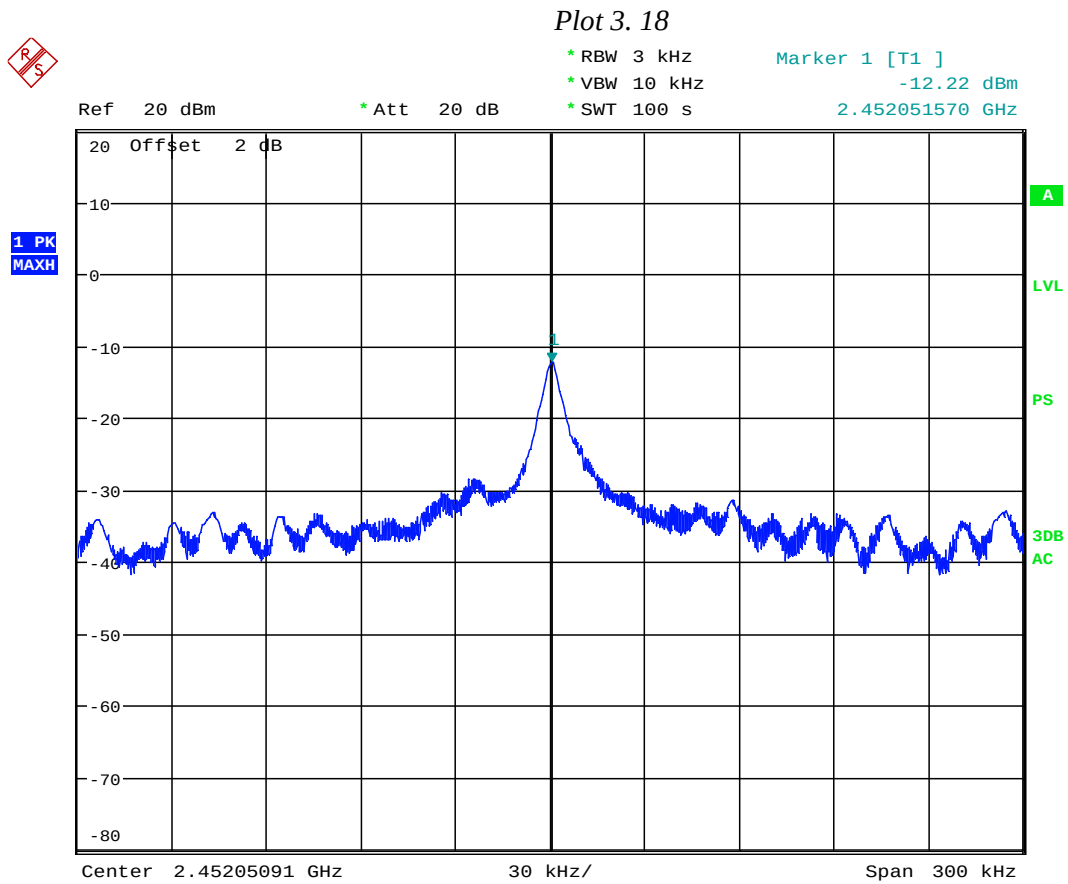
Power spectral density, 802.11n, HT20, MCS0

Date: 17.JUL.2012 15:03:35



Power spectral density, 802.11n, HT20, MCS7

Date: 17.JUL.2012 15:10:35



Power spectral density, 802.11n, HT40, MCS0

Date: 17.JUL.2012 15:26:31

4.4 Out-of-Band Conducted Emissions FCC 15.247(d)

4.4.1 Requirement

In any 100 kHz bandwidths outside the EUT pass-band, the RF power shall be at least 20dB (peak) or 30 dB (average) below that of the maximum in-band 100 kHz emissions.

4.4.2 Procedure

A spectrum analyzer was connected to the antenna port of the transmitter. Analyzer Resolution Bandwidth was set to 100 kHz. For each channel investigated, the in-band and out-of-band emission measurements were performed. The out-of-band emissions were measured from 30 MHz to 25 GHz.

4.4.3 Test Result

Refer to the following plots and out-of-band conducted spurious emissions at the Band-Edge, Table 4.1 for the test results:

Frequency (MHz)	Channel	Standard	Data rate Mbps	Description	Plot
2412	1	802.11b	11	Scan 30 MHz – 25 GHz	4.1
		802.11g	6	Scan 30 MHz – 25 GHz	4.2
		802.11g	54	Scan 30 MHz – 25 GHz	4.3
		802.11n HT20	MCS0	Scan 30 MHz – 25 GHz	4.4
		802.11n HT20	MCS7	Scan 30 MHz – 25 GHz	4.5
2422	3	802.11n HT40	MCS0	Scan 30 MHz – 25 GHz	4.6
2437	6	802.11b	11	Scan 30 MHz – 25 GHz	4.7
		802.11g	6	Scan 30 MHz – 25 GHz	4.8
		802.11g	54	Scan 30 MHz – 25 GHz	4.9
		802.11n HT20	MCS0	Scan 30 MHz – 25 GHz	4.10
		802.11n HT20	MCS7	Scan 30 MHz – 25 GHz	4.11
2437	6	802.11n HT40	MCS0	Scan 30 MHz – 25 GHz	4.12
2462	11	802.11b	11	Scan 30 MHz – 25 GHz	4.13
		802.11g	6	Scan 30 MHz – 25 GHz	4.14
		802.11g	54	Scan 30 MHz – 25 GHz	4.15
		802.11n HT20	MCS0	Scan 30 MHz – 25 GHz	4.16
		802.11n HT20	MCS7	Scan 30 MHz – 25 GHz	4.17
2452	9	802.11n HT40	MCS0	Scan 30 MHz – 25 GHz	4.18

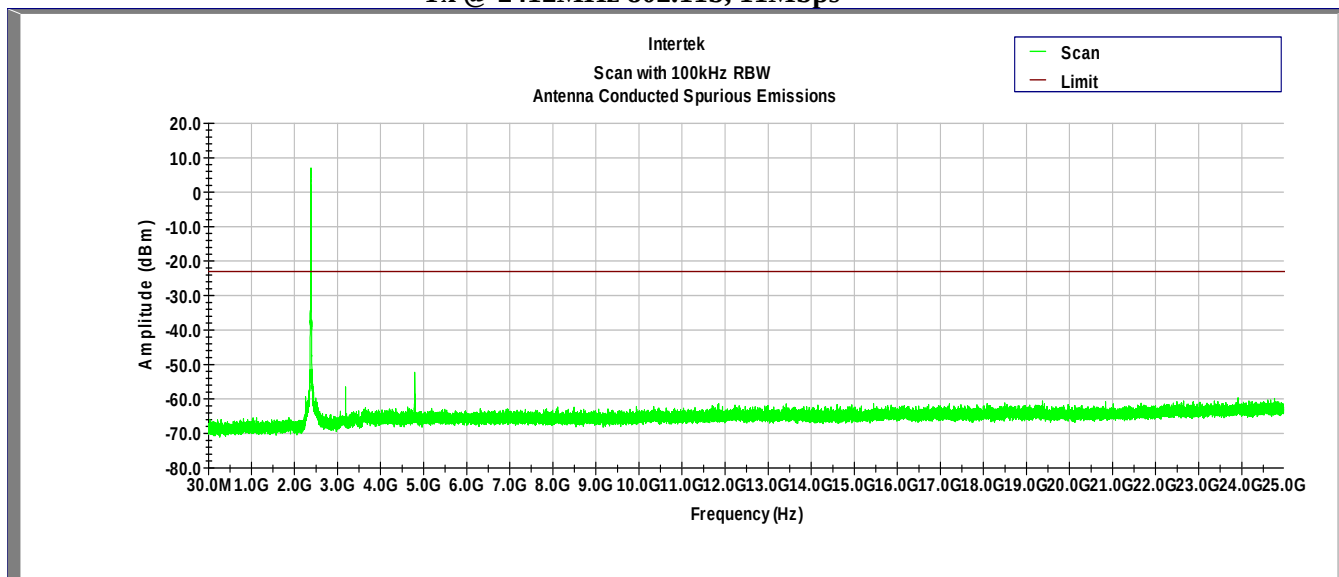
Results	Complies
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Out-of-Band Conducted Spurious Emissions at the Band-Edge:
Spurious emissions in the restricted bands 2310–2390 GHz and 2483.5–2500 GHz

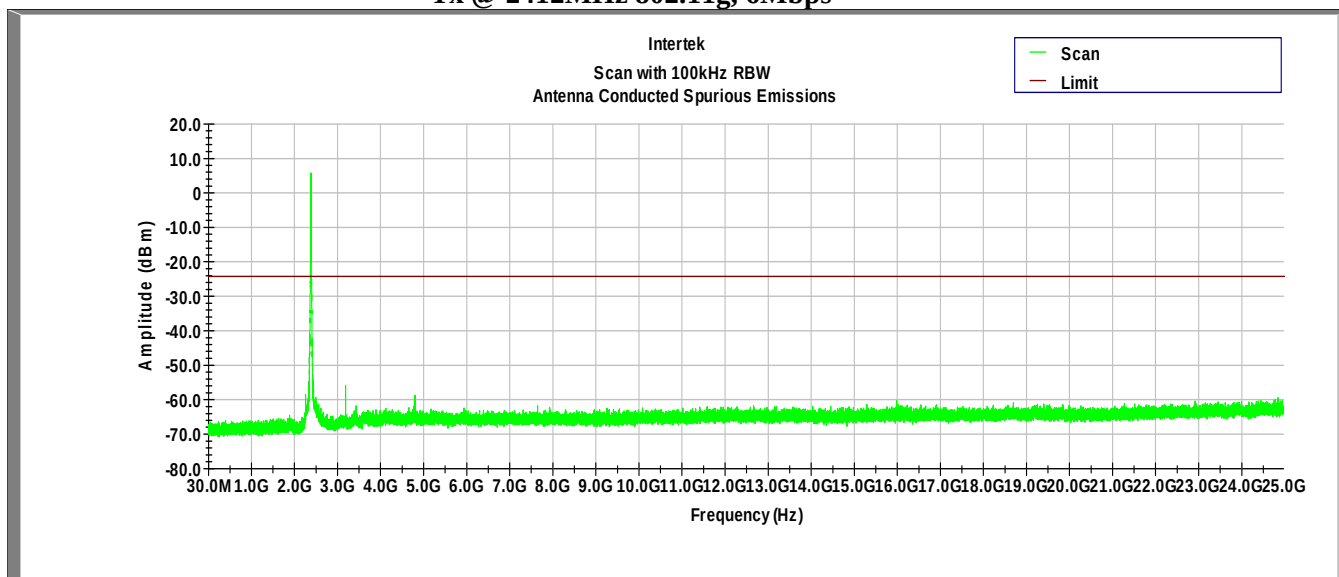
Table 4.1

Frequency (MHz)	Ch	Standard	Data rate Mbps	Peak Out-band conducted spurious in restricted bands (dBm)	Peak In-band 100 kHz emissions (dBm)	Out-band emissions margin to In-band emissions (dB)
2412	1	802.11b	11	-48.5	7.9	-56.4
		802.11g	6	-35.3	6.7	-42.0
		802.11g	54	-40.6	4.7	-45.3
		802.11n HT20	MCS0	-38.7	4.4	-43.1
		802.11n HT20	MCS7	-39.7	4.1	-43.8
2422	3	802.11n HT40	MCS0	-37.2	-1.6	-35.6
2462	11	802.11b	11	-50.1	8.1	-58.2
		802.11g	6	-35.1	6.9	-42.0
		802.11g	54	-40.1	5.5	-45.6
		802.11n HT20	MCS0	-38.7	5.3	-44.0
		802.11n HT20	MCS7	-41.2	4.5	-45.7
2452	9	802.11n HT40	MCS0	-41.1	-2.2	-38.9

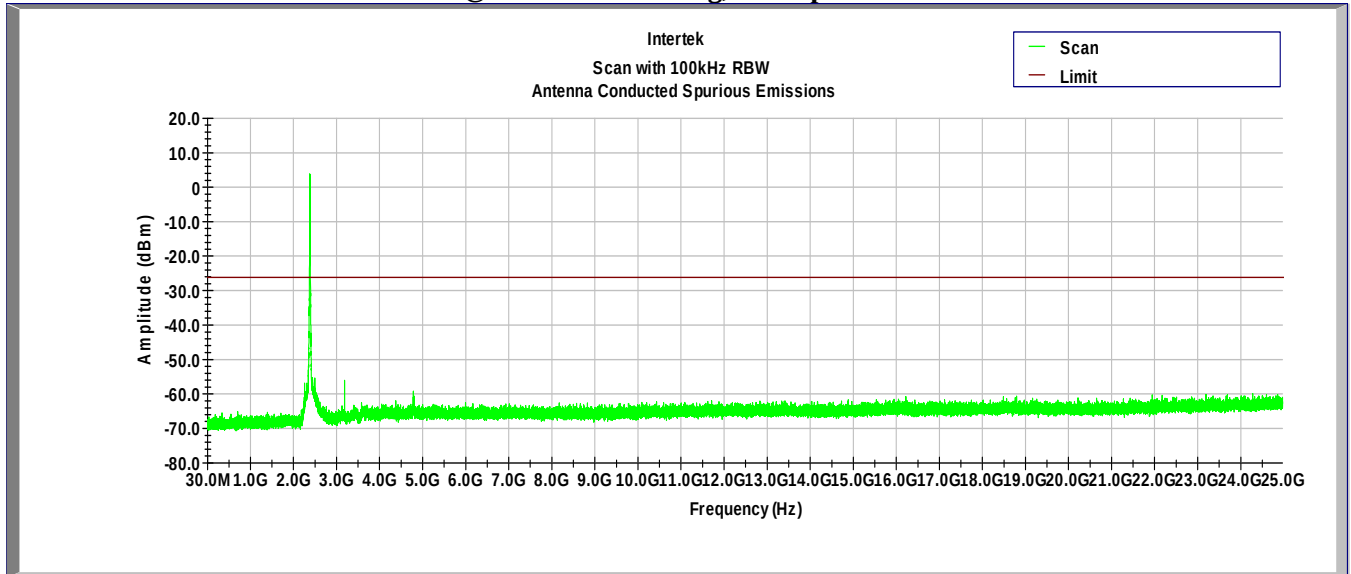
Plot 4.1
Tx @ 2412MHz 802.11b, 11Mbps



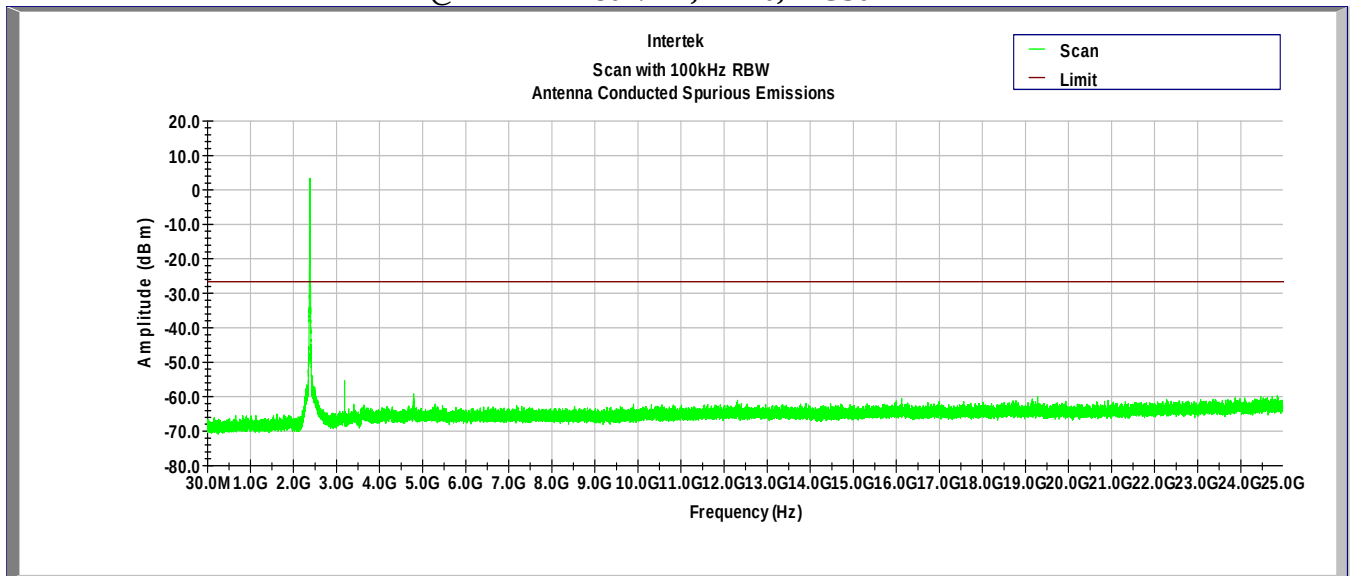
Plot 4.2
Tx @ 2412MHz 802.11g, 6Mbps



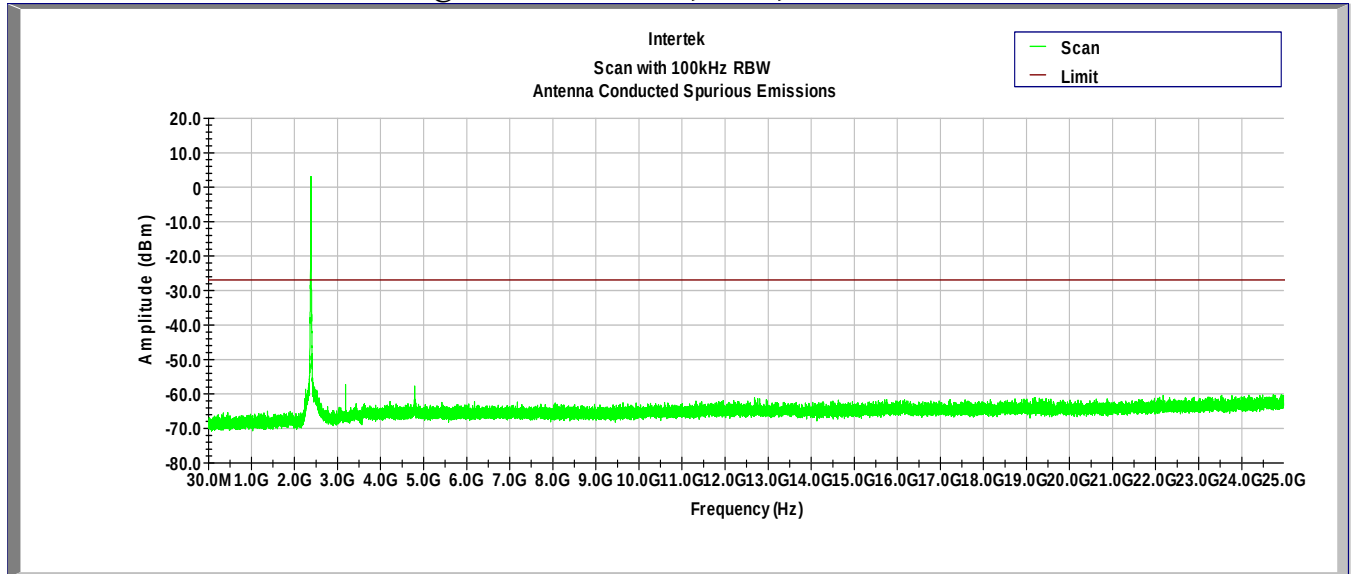
Plot 4.3
Tx @ 2412MHz 802.11g, 54Mbps



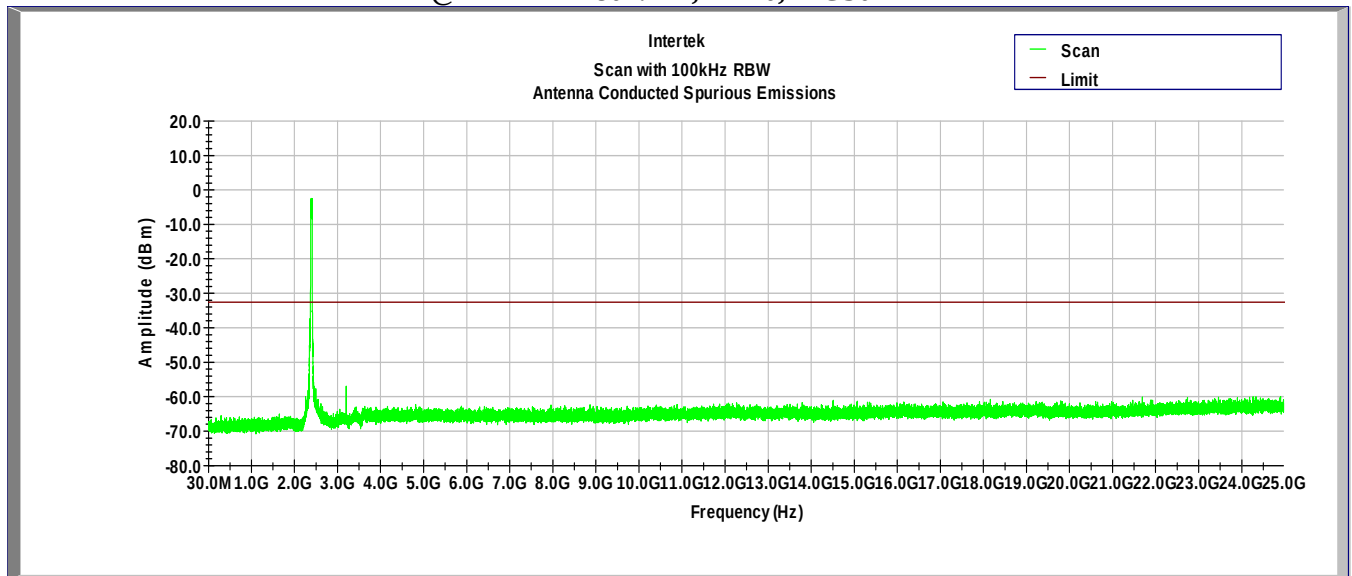
Plot 4.4
Tx @ 2412MHz 802.11n, HT20, MCS0



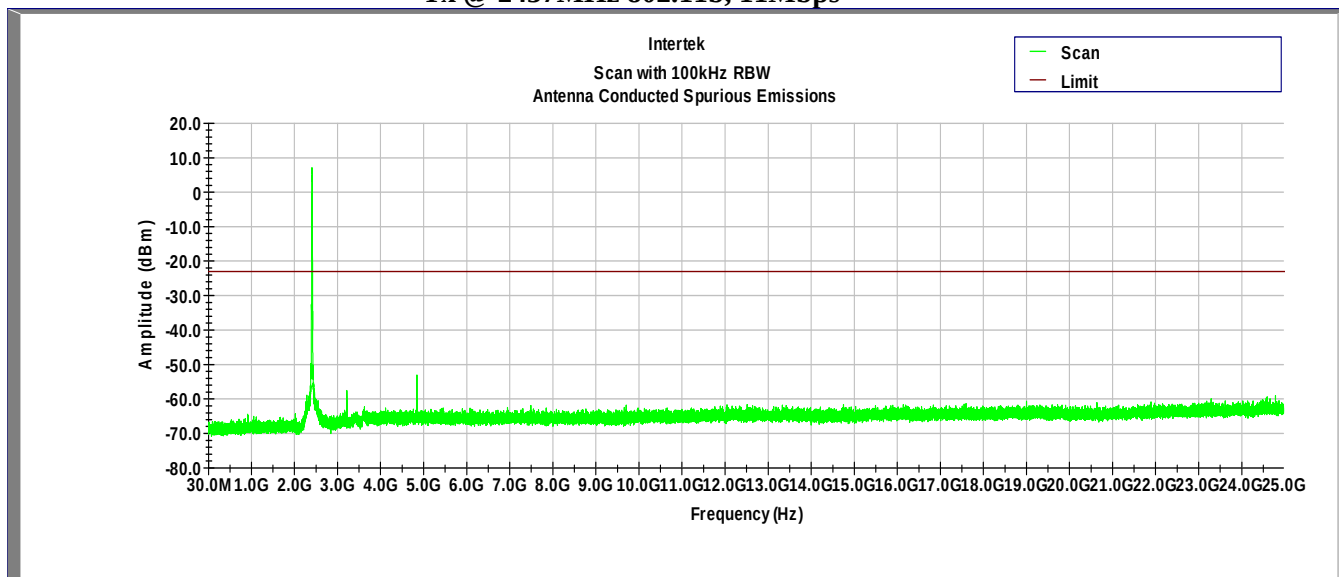
Plot 4.5
Tx @ 2412MHz 802.11n, HT20, MCS7



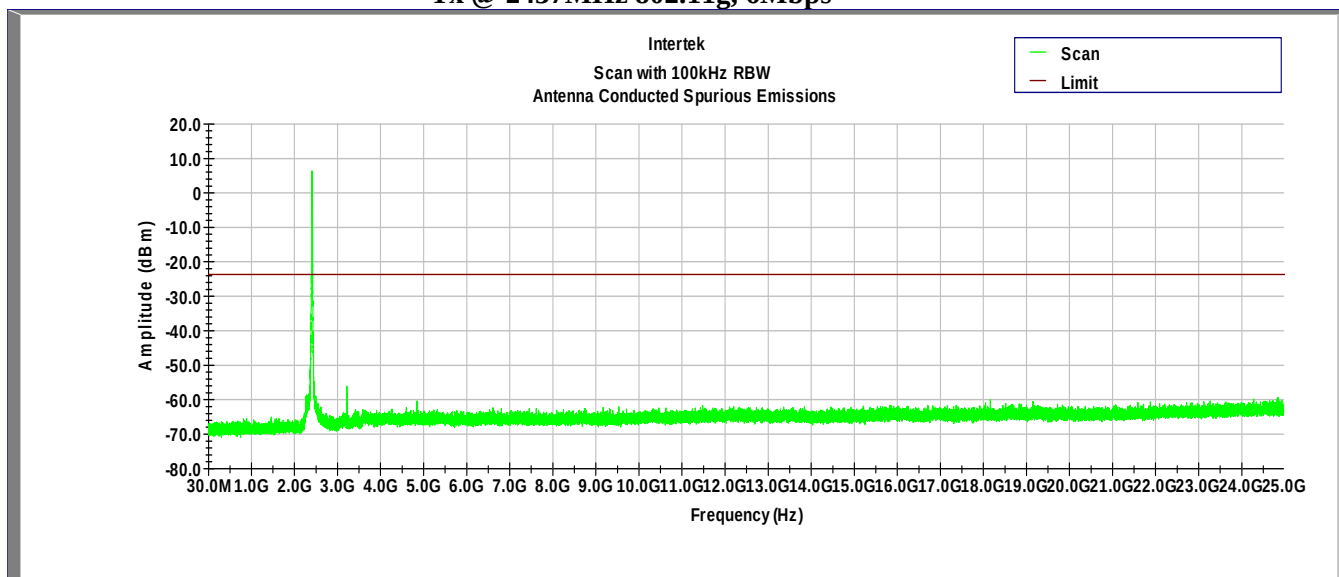
Plot 4.6
Tx @ 2422MHz 802.11n, HT40, MCS0



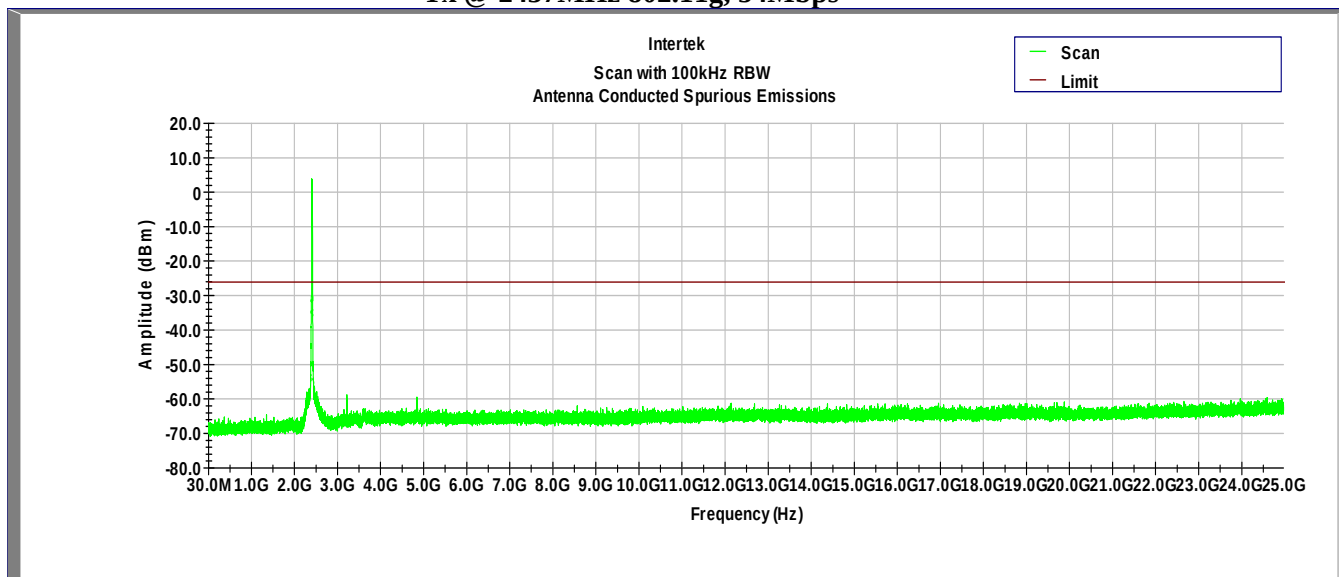
Plot 4.7
Tx @ 2437MHz 802.11b, 11Mbps



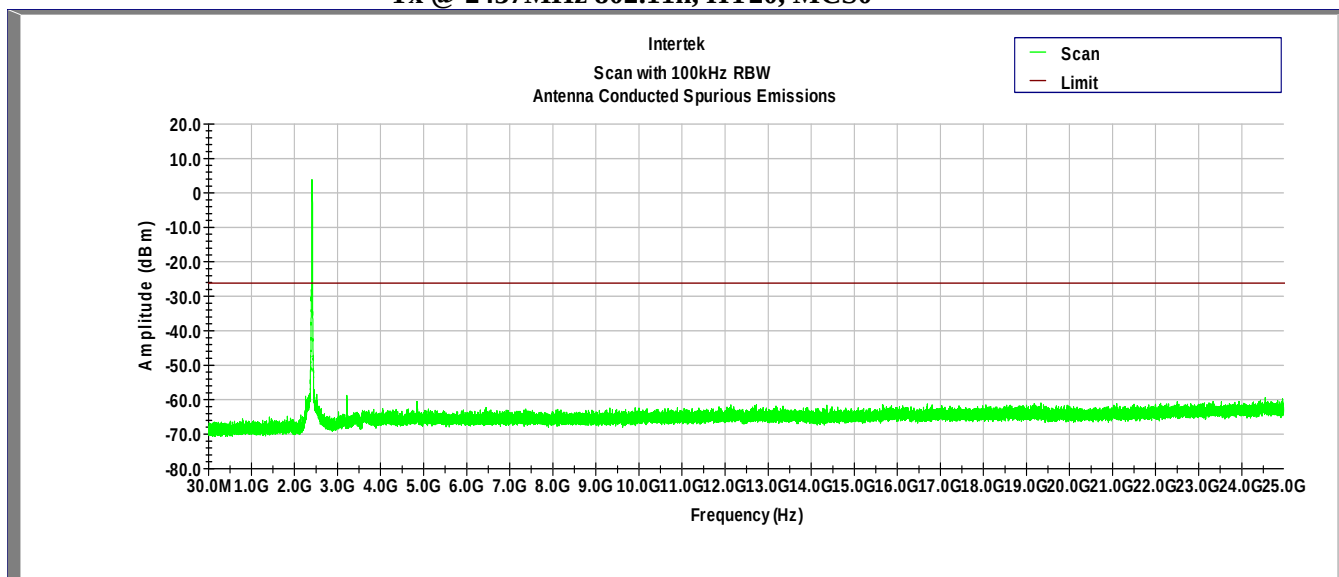
Plot 4.8
Tx @ 2437MHz 802.11g, 6Mbps



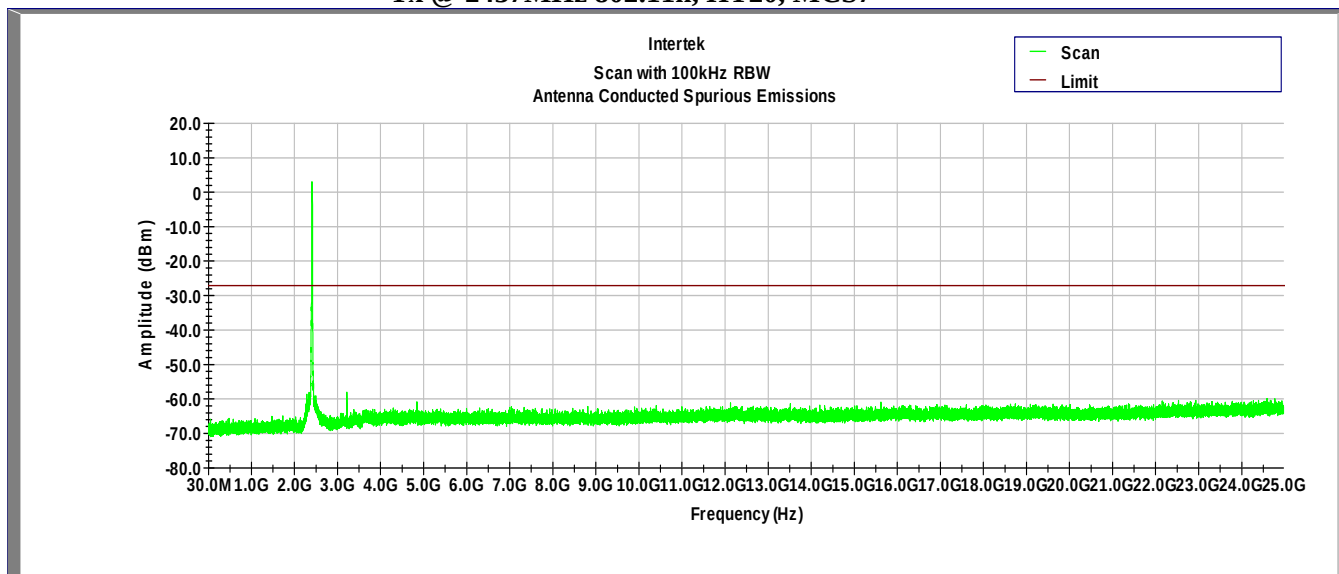
Plot 4.9
Tx @ 2437MHz 802.11g, 54Mbps



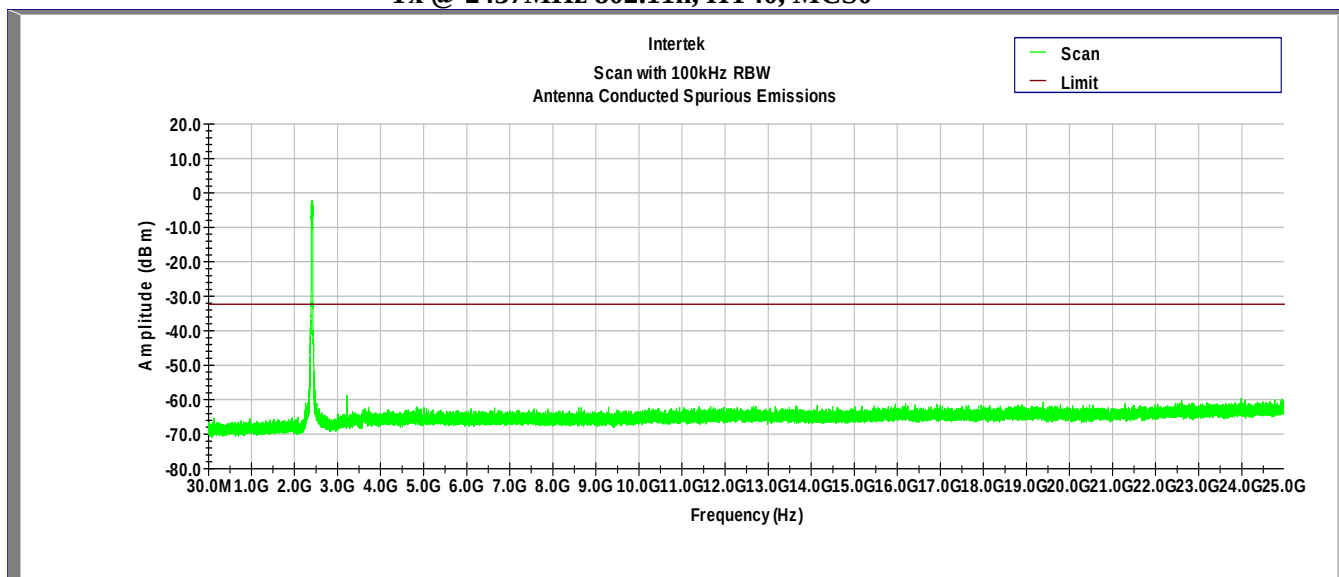
Plot 4.10
Tx @ 2437MHz 802.11n, HT20, MCS0



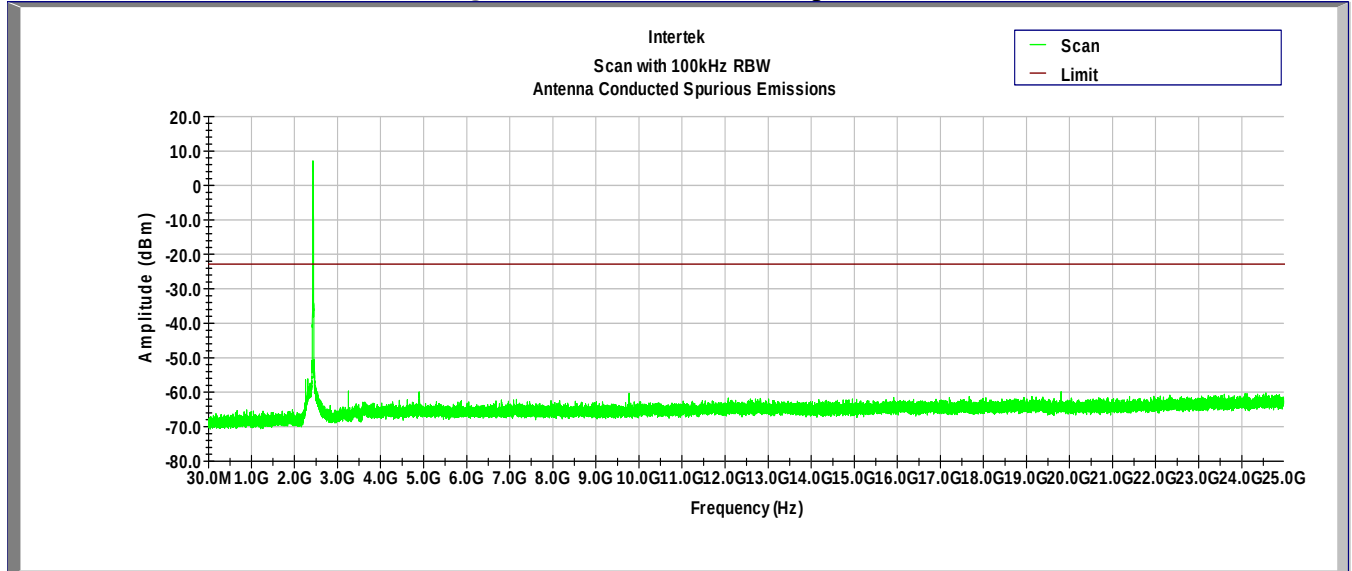
Plot 4.11
Tx @ 2437MHz 802.11n, HT20, MCS7



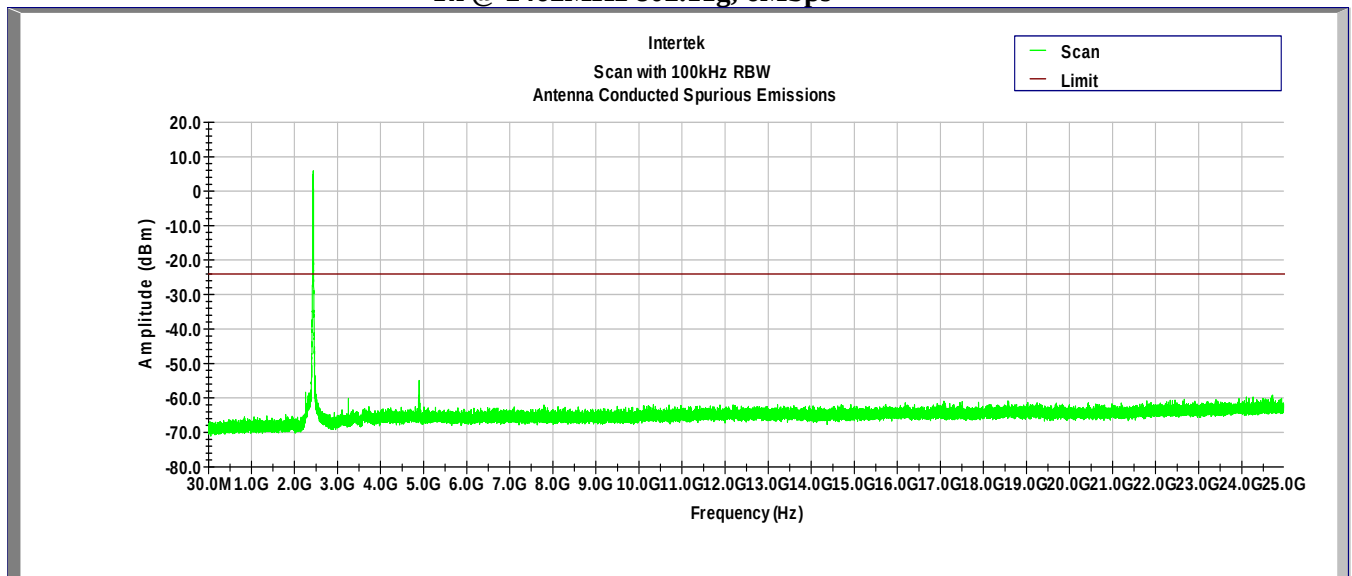
Plot 4.12
Tx @ 2437MHz 802.11n, HT40, MCS0



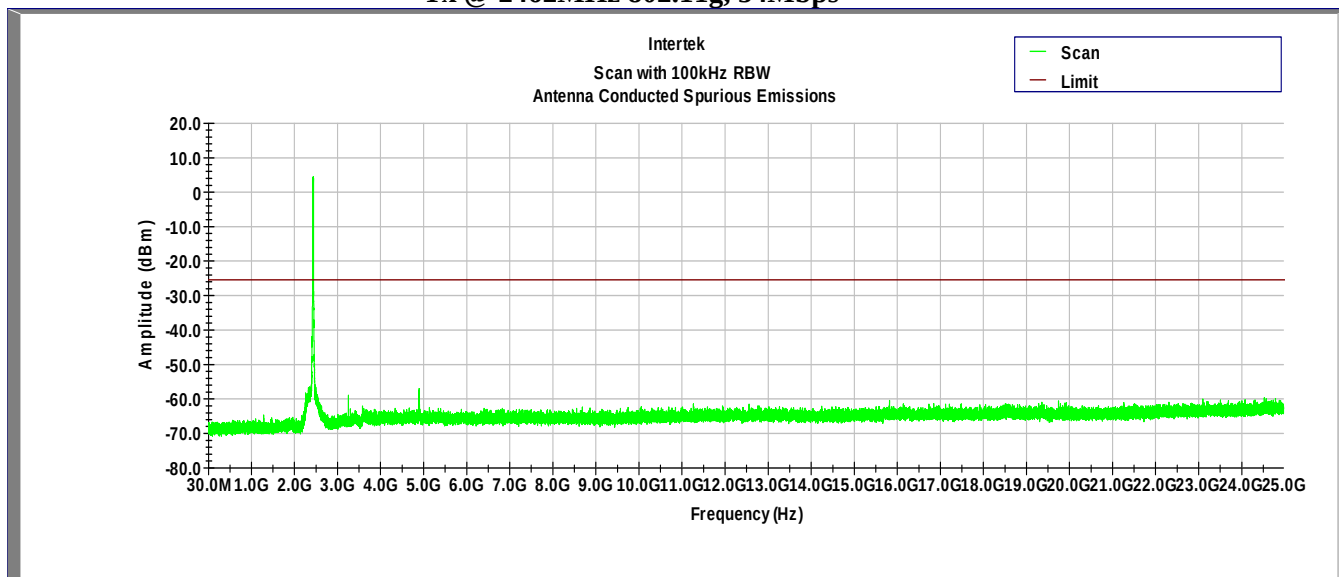
Plot 4.13
Tx @ 2462MHz 802.11b, 11Mbps



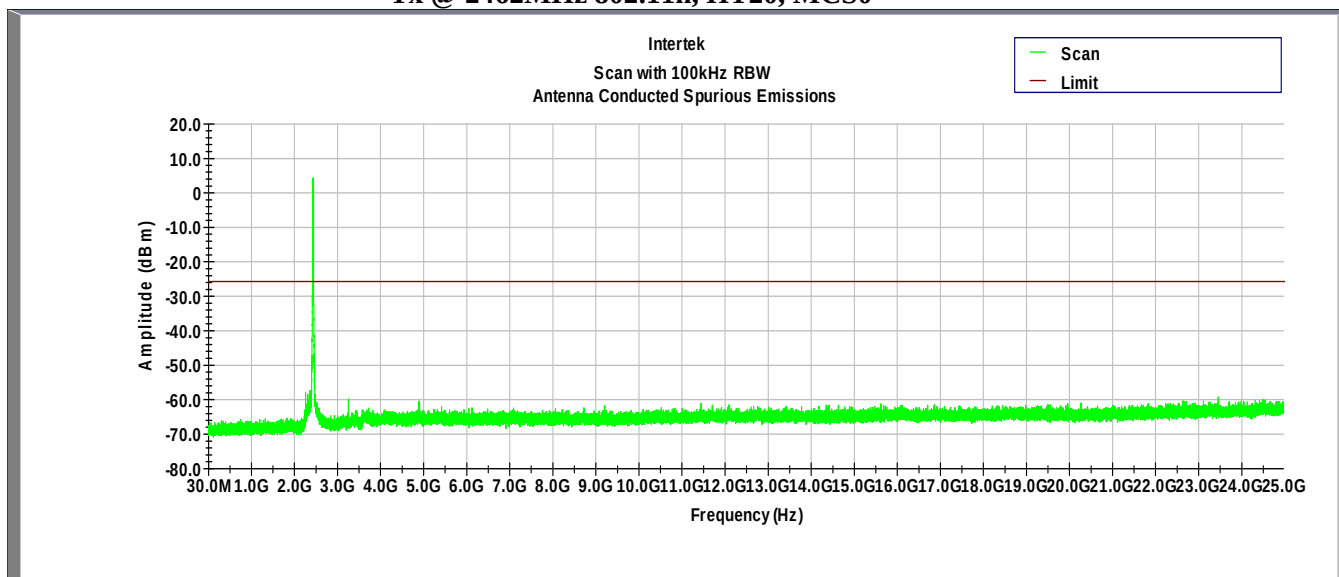
Plot 4.14
Tx @ 2462MHz 802.11g, 6Mbps



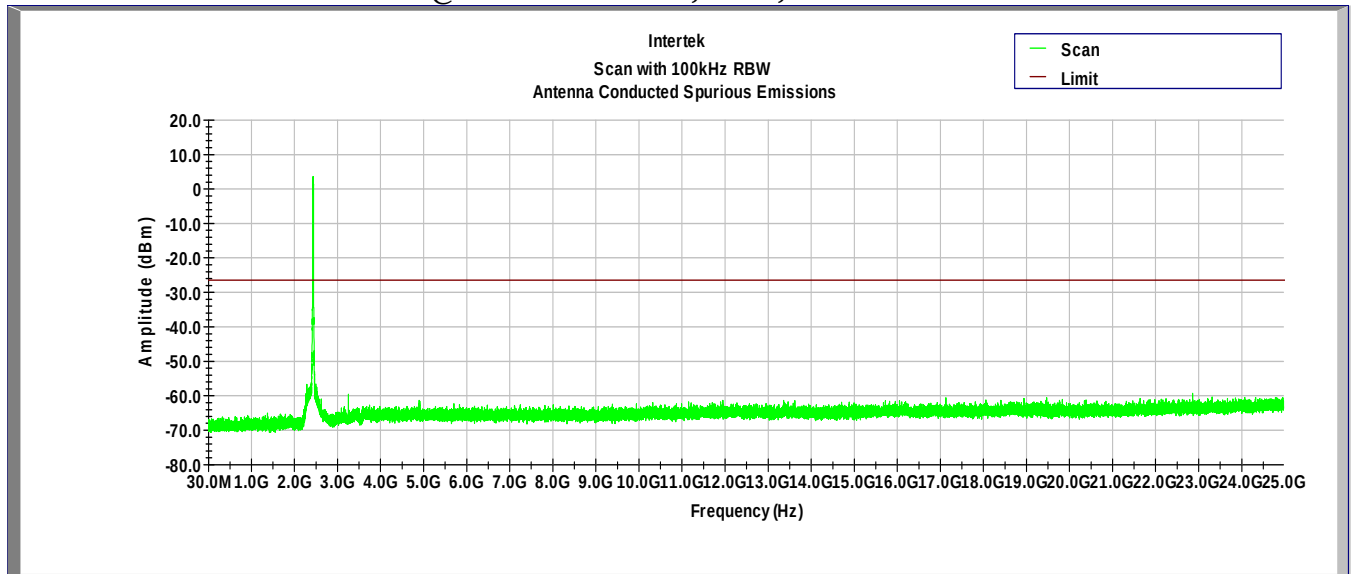
Plot 4.15
Tx @ 2462MHz 802.11g, 54Mbps



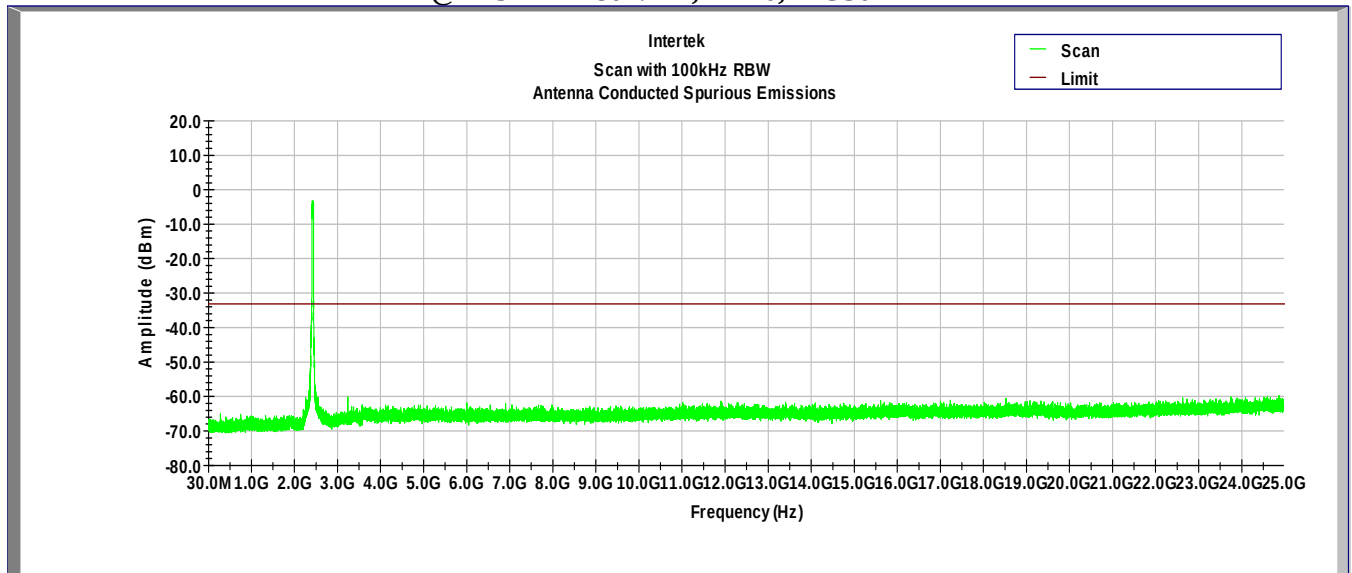
Plot 4.16
Tx @ 2462MHz 802.11n, HT20, MCS0



Plot 4.17
Tx @ 2462MHz 802.11n, HT20, MCS7



Plot 4.18
Tx @ 2452MHz 802.11n, HT40, MCS0



4.5 Transmitter Radiated Emissions FCC Rule 15.247(d), 15.209, 15.205

4.5.1 Requirement

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)).

For out of band radiated emissions (except for frequencies in restricted bands), in any 100 kHz bandwidths outside the EUT pass-band, the RF power shall be at least 20dB (peak) or 30 dB (average) below that of the maximum in-band 100 kHz emissions.

4.5.2 Procedure

Radiated emission measurements were performed from 30 MHz to 40,000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz for frequencies above 1000 MHz.

The EUT is placed on a plastic turntable that is 80 cm in height. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). During testing, all cables were manipulated to produce worst-case emissions. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at three meters for frequencies above 1 GHz and at 10 meters for frequencies below 1 GHz.

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels).

4.5.3 Field Strength Calculation

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$FS = RA + AF + CF - AG$; if measurement is performed at a distance other than specified in the rule, a Distance Correction Factor (DCF) shall be added.

Where FS = Field Strength in $dB(\mu V/m)$

RA = Receiver Amplitude (including preamplifier) in $dB(\mu V)$; AF = Antenna Factor in $dB(1/m)$

CF = Cable Attenuation Factor in dB ; AG = Amplifier Gain in dB

Assume a receiver reading of $52.0\text{ dB}(\mu V)$ is obtained. The antennas factor of $7.4\text{ dB}(1/m)$ and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of $32\text{ dB}(\mu V/m)$. This value in $dB(\mu V/m)$ was converted to its corresponding level in $\mu V/m$.

$RA = 52.0\text{ dB}(\mu V)$

$AF = 7.4\text{ dB}(1/m)$

$CF = 1.6\text{ dB}$

$AG = 29.0\text{ dB}$

$FS = 52.0 + 7.4 + 1.6 - 29.0 = 32\text{ dB}(\mu V/m)$.

Level in $\mu V/m$ = Common Antilogarithm $[(32\text{ dB}\mu V/m)/20] = 39.8\text{ }\mu V/m$.

4.5.3 Test Results

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

The EUT passed the test by 0.7 dB .

Table 5.1
Transmitter Radiated Emissions below 1GHz
Tx @ 2412MHz 802.11b, 11Mbps

Intertek Testing Services
Radiated Emissions 30 MHz- 1000 MHz
FCC Part 15 Class B

Operator: KK
11-Jul-12

Model Number: 8GB
Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	30.4	40.0	-9.6	36.5	0.7	32.1	10.5	14.8
5.99E+07	28.8	40.0	-11.2	43.7	0.9	32.1	10.5	5.8
9.71E+07	29.6	43.5	-13.9	40.1	1.1	32.1	10.5	9.9
1.29E+08	31.0	43.5	-12.5	39.6	1.3	32.0	10.5	11.6
1.46E+08	30.9	43.5	-12.6	39.8	1.4	32.0	10.5	11.2
1.68E+08	37.9	43.5	-5.6	47.9	1.5	32.0	10.5	10.0
2.25E+08	32.4	46.0	-13.6	42.7	1.7	32.0	10.5	9.5
2.42E+08	27.4	46.0	-18.6	35.7	1.8	32.0	10.5	11.4
2.89E+08	34.1	46.0	-11.9	40.5	2.0	32.0	10.5	13.1
4.33E+08	31.1	46.0	-14.9	33.3	2.4	32.0	10.5	16.9
4.80E+08	32.2	46.0	-13.8	33.6	2.6	32.1	10.5	17.6
5.06E+08	32.3	46.0	-13.7	33.2	2.7	32.1	10.5	18.1
5.30E+08	32.4	46.0	-13.6	32.9	2.7	32.2	10.5	18.5
5.54E+08	32.6	46.0	-13.4	32.0	2.8	32.2	10.5	19.5
5.76E+08	35.3	46.0	-10.7	34.7	2.8	32.2	10.5	19.5
6.73E+08	33.3	46.0	-12.7	32.3	3.1	32.3	10.5	19.8
7.20E+08	34.8	46.0	-11.2	32.0	3.2	32.3	10.5	21.4
9.60E+08	35.5	54.0	-18.5	28.6	3.7	31.2	10.5	23.9

Test Mode: Tx @ 2412MHz
Temp: 24C
Humidity: 45%

Notes: Measurements made at 10 meters distance.

Table 5.2
Transmitter Radiated Emissions below 1GHz
Tx @ 2412MHz 802.11g, 6Mbps or 54Mbps

Intertek Testing Services
 Radiated Emissions 30 MHz- 1000 MHz
 FCC Part 15 Class B

Operator: KK
 11-Jul-12

Model Number: 8GB
 Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	30.6	40.0	-9.4	36.7	0.7	32.1	10.5	14.8
5.99E+07	27.4	40.0	-12.6	42.3	0.9	32.1	10.5	5.8
9.71E+07	32.0	43.5	-11.5	42.6	1.1	32.1	10.5	9.9
1.21E+08	32.6	43.5	-10.9	41.4	1.3	32.0	10.5	11.5
1.46E+08	31.6	43.5	-11.9	40.5	1.4	32.0	10.5	11.2
1.68E+08	37.7	43.5	-5.8	47.7	1.5	32.0	10.5	10.0
2.18E+08	25.7	46.0	-20.3	36.5	1.7	32.0	10.5	9.0
2.90E+08	29.2	46.0	-16.8	35.7	2.0	32.0	10.5	13.1
3.60E+08	29.9	46.0	-16.1	34.5	2.2	32.0	10.5	14.6
5.05E+08	31.1	46.0	-14.9	31.9	2.7	32.1	10.5	18.1
7.20E+08	35.9	46.0	-10.1	33.2	3.2	32.3	10.5	21.4
9.72E+08	34.8	54.0	-19.2	27.2	3.7	31.1	10.5	24.4

Test Mode: Tx @ 2412MHz
 Temp: 24C
 Humidity: 45%

Notes: Measurements made at 10 meters distance.

Table 5.3
Transmitter Radiated Emissions below 1GHz
Tx @ 2412MHz 802.11n, HT20, MCS0 or MCS7

Intertek Testing Services
 Radiated Emissions 30 MHz- 1000 MHz
 FCC Part 15 Class B

Operator: KK
 11-Jul-12

Model Number: 8GB
 Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	30.4	40.0	-9.6	36.5	0.7	32.1	10.5	14.8
5.99E+07	27.9	40.0	-12.1	42.8	0.9	32.1	10.5	5.8
9.71E+07	31.2	43.5	-12.3	41.7	1.1	32.1	10.5	9.9
1.21E+08	31.2	43.5	-12.3	40.0	1.3	32.0	10.5	11.5
1.46E+08	31.5	43.5	-12.0	40.4	1.4	32.0	10.5	11.2
1.68E+08	37.6	43.5	-5.9	47.6	1.5	32.0	10.5	10.0
2.18E+08	25.9	46.0	-20.1	36.8	1.7	32.0	10.5	9.0
2.41E+08	27.0	46.0	-19.0	35.3	1.8	32.0	10.5	11.3
2.89E+08	31.5	46.0	-14.5	37.9	2.0	32.0	10.5	13.1
3.85E+08	33.3	46.0	-12.7	37.2	2.3	32.0	10.5	15.3
5.30E+08	32.1	46.0	-13.9	32.6	2.7	32.2	10.5	18.5
5.76E+08	30.9	46.0	-15.1	30.2	2.8	32.2	10.5	19.5
7.20E+08	34.3	46.0	-11.7	31.5	3.2	32.3	10.5	21.4
9.97E+08	34.6	54.0	-19.4	27.0	3.8	30.9	10.5	24.2

Test Mode: Tx @ 2412MHz
 Temp: 24C
 Humidity: 45%

Notes: Measurements made at 10 meters distance.

Table 5.4
Transmitter Radiated Emissions below 1GHz
Tx @ 2422MHz 802.11n, HT40, MCS0

Intertek Testing Services
 Radiated Emissions 30 MHz- 1000 MHz
 FCC Part 15 Class B

Operator: KK
 11-Jul-12

Model Number: 8GB
 Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	34.3	40.0	-5.7	40.4	0.7	32.1	10.5	14.8
5.91E+07	28.2	40.0	-11.8	43.1	0.9	32.1	10.5	5.8
9.71E+07	33.6	43.5	-9.9	44.1	1.1	32.1	10.5	9.9
1.21E+08	33.0	43.5	-10.5	41.9	1.3	32.0	10.5	11.4
1.46E+08	30.9	43.5	-12.6	39.8	1.4	32.0	10.5	11.2
1.68E+08	37.9	43.5	-5.6	47.9	1.5	32.0	10.5	10.0
1.94E+08	32.4	43.5	-11.1	43.4	1.6	32.0	10.5	8.9
2.18E+08	25.4	46.0	-20.6	36.2	1.7	32.0	10.5	9.0
2.41E+08	28.7	46.0	-17.3	37.1	1.8	32.0	10.5	11.3
3.38E+08	29.7	46.0	-16.3	35.1	2.2	32.0	10.5	13.9
3.85E+08	31.1	46.0	-14.9	35.1	2.3	32.0	10.5	15.3
9.98E+08	35.4	54.0	-18.6	27.8	3.8	30.9	10.5	24.2

Test Mode: Tx @ 2412MHz
 Temp: 24C
 Humidity: 45%

Notes: Measurements made at 10 meters distance.

Table 5.5
Transmitter Radiated Emissions below 1GHz
Tx @ 2437MHz 802.11b, 11Mbps

Intertek Testing Services
Radiated Emissions 30 MHz- 1000 MHz
FCC Part 15 Class B

Operator: KK
11-Jul-12

Model Number: 8GB
Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	33.9	40.0	-6.1	40.0	0.7	32.1	10.5	14.8
5.91E+07	26.8	40.0	-13.2	41.7	0.9	32.1	10.5	5.8
9.71E+07	33.7	43.5	-9.8	44.3	1.1	32.1	10.5	9.9
1.21E+08	30.9	43.5	-12.6	39.8	1.3	32.0	10.5	11.5
1.46E+08	31.1	43.5	-12.4	40.0	1.4	32.0	10.5	11.2
1.68E+08	38.0	43.5	-5.5	48.0	1.5	32.0	10.5	10.0
1.94E+08	32.9	43.5	-10.6	43.9	1.6	32.0	10.5	8.9
2.18E+08	25.8	46.0	-20.2	36.7	1.7	32.0	10.5	9.0
2.42E+08	26.5	46.0	-19.5	34.7	1.8	32.0	10.5	11.4
2.90E+08	29.0	46.0	-17.0	35.4	2.0	32.0	10.5	13.1
3.61E+08	30.2	46.0	-15.8	34.9	2.2	32.0	10.5	14.6
3.85E+08	34.4	46.0	-11.6	38.3	2.3	32.0	10.5	15.3
4.08E+08	30.3	46.0	-15.7	33.3	2.4	32.0	10.5	16.2
9.84E+08	35.3	54.0	-18.7	27.7	3.7	31.0	10.5	24.4

Test Mode: Tx @ 2437MHz
Temp: 24C
Humidity: 45%

Notes: Measurements made at 10 meters distance.

Table 5.6
Transmitter Radiated Emissions below 1GHz
Tx @ 2437MHz 802.11g, 6Mbps or 54Mbps

Intertek Testing Services
 Radiated Emissions 30 MHz- 1000 MHz
 FCC Part 15 Class B

Operator: KK
 11-Jul-12

Model Number: 8GB
 Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	33.7	40.0	-6.3	39.8	0.7	32.1	10.5	14.8
5.99E+07	27.3	40.0	-12.7	42.2	0.9	32.1	10.5	5.8
9.71E+07	32.3	43.5	-11.2	42.8	1.1	32.1	10.5	9.9
1.21E+08	31.7	43.5	-11.8	40.5	1.3	32.0	10.5	11.5
1.46E+08	30.8	43.5	-12.7	39.7	1.4	32.0	10.5	11.2
1.68E+08	37.0	43.5	-6.5	47.0	1.5	32.0	10.5	10.0
1.94E+08	31.2	43.5	-12.3	42.2	1.6	32.0	10.5	8.9
2.18E+08	25.5	46.0	-20.5	36.3	1.7	32.0	10.5	9.0
2.42E+08	26.0	46.0	-20.0	34.3	1.8	32.0	10.5	11.4
2.90E+08	29.8	46.0	-16.2	36.2	2.0	32.0	10.5	13.1
3.85E+08	29.9	46.0	-16.1	33.8	2.3	32.0	10.5	15.3
7.20E+08	34.1	46.0	-11.9	31.4	3.2	32.3	10.5	21.4
9.75E+08	36.2	54.0	-17.8	28.6	3.7	31.1	10.5	24.5
3.77E+07	33.7	40.0	-6.3	39.9	0.7	32.1	10.5	14.7

Test Mode: Tx @ 2437MHz
 Temp: 24C
 Humidity: 45%

Notes: Measurements made at 10 meters distance

Table 5.7
Transmitter Radiated Emissions below 1GHz
Tx @ 2437MHz 802.11n, HT20, MCS0 or MCS7

Intertek Testing Services
Radiated Emissions 30 MHz- 1000 MHz
FCC Part 15 Class B

Operator: KK
11-Jul-12

Model Number: 8GB
Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	34.4	40.0	-5.6	40.5	0.7	32.1	10.5	14.8
9.71E+07	35.1	43.5	-8.4	45.7	1.1	32.1	10.5	9.9
1.31E+08	30.7	43.5	-12.8	39.3	1.3	32.0	10.5	11.7
1.46E+08	32.0	43.5	-11.5	40.9	1.4	32.0	10.5	11.2
1.68E+08	35.1	43.5	-8.4	45.1	1.5	32.0	10.5	10.0
1.94E+08	31.9	43.5	-11.6	42.9	1.6	32.0	10.5	8.9
2.18E+08	26.4	46.0	-19.6	37.2	1.7	32.0	10.5	9.0
2.42E+08	27.5	46.0	-18.5	35.8	1.8	32.0	10.5	11.4
2.89E+08	36.9	46.0	-9.1	43.3	2.0	32.0	10.5	13.1
3.61E+08	29.7	46.0	-16.3	34.4	2.2	32.0	10.5	14.6
3.85E+08	30.5	46.0	-15.5	34.4	2.3	32.0	10.5	15.3
5.05E+08	33.5	46.0	-12.5	34.3	2.7	32.1	10.5	18.1
6.73E+08	36.3	46.0	-9.7	35.3	3.1	32.3	10.5	19.8
7.20E+08	35.2	46.0	-10.8	32.5	3.2	32.3	10.5	21.4
9.73E+08	34.8	54.0	-19.2	27.3	3.7	31.1	10.5	24.5

Test Mode: Tx @ 2437MHz
Temp: 24C
Humidity: 45%

Notes: Measurements made at 10 meters distance

Table 5.8
Transmitter Radiated Emissions below 1GHz
Tx @ 2437MHz 802.11n, HT40, MCS0

Intertek Testing Services
Radiated Emissions 30 MHz- 1000 MHz
FCC Part 15 Class B

Operator: KK
11-Jul-12

Model Number: 8GB
Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	34.6	40.0	-5.4	40.7	0.7	32.1	10.5	14.8
5.83E+07	27.5	40.0	-12.5	42.3	0.9	32.1	10.5	5.9
9.71E+07	34.1	43.5	-9.4	44.7	1.1	32.1	10.5	9.9
1.21E+08	28.5	43.5	-15.0	37.3	1.3	32.0	10.5	11.5
1.31E+08	28.0	43.5	-15.5	36.6	1.3	32.0	10.5	11.7
1.45E+08	32.0	43.5	-11.5	40.9	1.4	32.0	10.5	11.3
1.68E+08	35.7	43.5	-7.8	45.7	1.5	32.0	10.5	10.0
1.94E+08	31.3	43.5	-12.2	42.3	1.6	32.0	10.5	8.9
2.18E+08	25.6	46.0	-20.4	36.5	1.7	32.0	10.5	9.0
2.42E+08	28.4	46.0	-17.6	36.7	1.8	32.0	10.5	11.4
3.12E+08	30.1	46.0	-15.9	36.5	2.1	32.0	10.5	13.1
3.61E+08	29.4	46.0	-16.6	34.0	2.2	32.0	10.5	14.6
3.85E+08	33.6	46.0	-12.4	37.5	2.3	32.0	10.5	15.3
5.30E+08	32.0	46.0	-14.0	32.5	2.7	32.2	10.5	18.5
6.73E+08	33.1	46.0	-12.9	32.1	3.1	32.3	10.5	19.8
7.69E+08	34.6	46.0	-11.4	31.9	3.3	32.2	10.5	21.2
7.87E+08	37.3	46.0	-8.7	34.6	3.3	32.2	10.5	21.1
9.99E+08	35.1	54.0	-18.9	27.6	3.8	30.9	10.5	24.1

Test Mode: Tx @ 2437MHz
Temp: 24C
Humidity: 45%

Notes: Measurements made at 10 meters distance

Table 5.9
Transmitter Radiated Emissions below 1GHz
Tx @ 2462MHz 802.11b, 11Mbps

Intertek Testing Services
Radiated Emissions 30 MHz- 1000 MHz
FCC Part 15 Class B

Operator: KK
11-Jul-12

Model Number: 8GB
Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	34.7	40.0	-5.3	40.8	0.7	32.1	10.5	14.8
5.91E+07	28.1	40.0	-11.9	43.0	0.9	32.1	10.5	5.8
9.71E+07	30.7	43.5	-12.8	41.3	1.1	32.1	10.5	9.9
1.21E+08	31.7	43.5	-11.8	40.5	1.3	32.0	10.5	11.5
1.46E+08	31.1	43.5	-12.4	40.0	1.4	32.0	10.5	11.2
1.68E+08	37.5	43.5	-5.9	47.6	1.5	32.0	10.5	10.0
2.18E+08	25.8	46.0	-20.2	36.6	1.7	32.0	10.5	9.0
2.41E+08	26.5	46.0	-19.5	34.9	1.8	32.0	10.5	11.3
3.38E+08	30.2	46.0	-15.8	35.6	2.2	32.0	10.5	13.9
3.46E+08	30.3	46.0	-15.7	35.1	2.2	32.0	10.5	14.4
3.85E+08	30.4	46.0	-15.6	34.3	2.3	32.0	10.5	15.3
4.07E+08	32.3	46.0	-13.7	35.2	2.4	32.0	10.5	16.3
5.30E+08	32.5	46.0	-13.5	33.0	2.7	32.2	10.5	18.5
7.20E+08	34.6	46.0	-11.4	31.8	3.2	32.3	10.5	21.4
9.73E+08	34.7	54.0	-19.3	27.1	3.7	31.1	10.5	24.5

Test Mode: Tx @ 2462MHz
Temp: 24C
Humidity: 45%

Notes: Measurements made at 10 meters distance.

Table 5.10
Transmitter Radiated Emissions below 1GHz
Tx @ 2462MHz 802.11g, 6Mbps or 54Mbps

Intertek Testing Services
Radiated Emissions 30 MHz- 1000 MHz
FCC Part 15 Class B

Operator: KK
11-Jul-12

Model Number: 8GB
Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	34.6	40.0	-5.4	40.7	0.7	32.1	10.5	14.8
5.99E+07	26.7	40.0	-13.3	41.6	0.9	32.1	10.5	5.8
9.71E+07	33.3	43.5	-10.2	43.8	1.1	32.1	10.5	9.9
1.21E+08	31.0	43.5	-12.5	39.9	1.3	32.0	10.5	11.4
1.46E+08	31.3	43.5	-12.2	40.2	1.4	32.0	10.5	11.2
1.68E+08	36.6	43.5	-6.9	46.6	1.5	32.0	10.5	10.0
1.94E+08	32.1	43.5	-11.4	43.2	1.6	32.0	10.5	8.9
2.18E+08	25.6	46.0	-20.4	36.5	1.7	32.0	10.5	9.0
2.90E+08	32.5	46.0	-13.5	38.9	2.0	32.0	10.5	13.1
3.61E+08	31.0	46.0	-15.0	35.7	2.2	32.0	10.5	14.6
3.85E+08	32.5	46.0	-13.5	36.4	2.3	32.0	10.5	15.3
6.73E+08	35.1	46.0	-10.9	34.1	3.1	32.3	10.5	19.8
7.20E+08	36.4	46.0	-9.6	33.7	3.2	32.3	10.5	21.4
9.85E+08	35.1	54.0	-18.9	27.4	3.7	31.0	10.5	24.4

Test Mode: Tx @ 2462MHz
Temp: 24C
Humidity: 45%

Notes: Measurements made at 10 meters distance.

Table 5.11
Transmitter Radiated Emissions below 1GHz
Tx @ 2462MHz 802.11n, HT20, MCS0 or MCS7

Intertek Testing Services
Radiated Emissions 30 MHz- 1000 MHz
FCC Part 15 Class B

Operator: KK
11-Jul-12

Model Number: 8GB
Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	34.5	40.0	-5.5	40.6	0.7	32.1	10.5	14.8
5.83E+07	25.3	40.0	-14.7	40.2	0.9	32.1	10.5	5.9
9.71E+07	32.2	43.5	-11.3	42.7	1.1	32.1	10.5	9.9
1.21E+08	32.4	43.5	-11.1	41.3	1.3	32.0	10.5	11.5
1.46E+08	32.1	43.5	-11.4	41.0	1.4	32.0	10.5	11.2
1.68E+08	37.0	43.5	-6.5	47.0	1.5	32.0	10.5	10.0
1.91E+08	30.5	43.5	-13.0	41.5	1.6	32.0	10.5	8.9
2.18E+08	25.3	46.0	-20.7	36.2	1.7	32.0	10.5	9.0
2.42E+08	27.3	46.0	-18.7	35.5	1.8	32.0	10.5	11.4
2.89E+08	28.6	46.0	-17.4	35.0	2.0	32.0	10.5	13.1
3.61E+08	30.6	46.0	-15.4	35.3	2.2	32.0	10.5	14.6
3.85E+08	32.3	46.0	-13.7	36.2	2.3	32.0	10.5	15.3
4.08E+08	30.6	46.0	-15.4	33.5	2.4	32.0	10.5	16.2
5.04E+08	31.5	46.0	-14.5	32.4	2.7	32.1	10.5	18.1
6.25E+08	32.2	46.0	-13.8	30.8	3.0	32.3	10.5	20.3
6.73E+08	34.1	46.0	-11.9	33.1	3.1	32.3	10.5	19.8
9.70E+08	34.3	54.0	-19.7	26.9	3.7	31.1	10.5	24.4

Test Mode: Tx @ 2462MHz
Temp: 24C
Humidity: 45%

Notes: Measurements made at 10 meters distance.

Table 5.12
Transmitter Radiated Emissions below 1GHz
Tx @ 2452MHz 802.11n, HT40, MCS0

Intertek Testing Services
Radiated Emissions 30 MHz- 1000 MHz
FCC Part 15 Class B

Operator: KK
11-Jul-12

Model Number: 8GB
Company: Livescribe, Inc.

Frequency (Hz)	Peak FS dB(uV/m)	Limit@3m dB(uV/m)	Margin dB	RA db(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
3.77E+07	34.0	40.0	-6.0	40.1	0.7	32.1	10.5	14.8
5.83E+07	24.1	40.0	-15.9	39.0	0.9	32.1	10.5	5.9
9.06E+07	28.9	43.5	-14.6	40.3	1.1	32.1	10.5	9.1
1.21E+08	33.7	43.5	-9.8	42.5	1.3	32.0	10.5	11.5
1.46E+08	31.3	43.5	-12.2	40.2	1.4	32.0	10.5	11.2
1.68E+08	38.5	43.5	-5.0	48.5	1.5	32.0	10.5	10.0
2.17E+08	25.6	46.0	-20.4	36.5	1.7	32.0	10.5	8.9
2.42E+08	26.5	46.0	-19.5	34.8	1.8	32.0	10.5	11.4
2.90E+08	33.7	46.0	-12.3	40.1	2.0	32.0	10.5	13.1
3.62E+08	29.6	46.0	-16.4	34.2	2.2	32.0	10.5	14.6
3.85E+08	33.4	46.0	-12.6	37.3	2.3	32.0	10.5	15.3
5.05E+08	31.6	46.0	-14.4	32.4	2.7	32.1	10.5	18.1
6.73E+08	34.5	46.0	-11.5	33.5	3.1	32.3	10.5	19.8
7.20E+08	37.1	46.0	-8.9	34.4	3.2	32.3	10.5	21.4
7.69E+08	34.8	46.0	-11.2	32.1	3.3	32.2	10.5	21.2
9.74E+08	34.5	54.0	-19.5	26.9	3.7	31.1	10.5	24.5

Test Mode: Tx @ 2452MHz
Temp: 24C
Humidity: 45%

Notes: Measurements made at 10 meters distance.

Table 5.13
Out-of-Band Radiated spurious emissions at the Band-edge
2310–2390 MHz

EUT Channel/ Frequency MHz	Detector	Standard/ Data rate	SA reading dB(uV)	Corr. Factor dB	FS at 3m dB(uV/m)	FS Limit dB(uV/m)	Margin dB
1 (2412MHz)	Peak	802.11b, 11 Mbps	30.4	31.0	61.4	74.0	-12.6
	Peak	802.11g, 6 Mbps	38.2	31.0	69.2	74.0	-4.8
	Peak	802.11g, 54 Mbps	37.2	31.0	68.2	74.0	-5.8
	Peak	802.11n, HT20 MCS0	42.3	31.0	73.3	74.0	-0.7
	Peak	802.11n, HT20 MCS7	35.0	31.0	66.0	74.0	-8.0
3 (2422MHz)	Peak	802.11n, HT40 MCS0	35.6	31.0	66.6	74.0	-7.4
	Peak	802.11n, HT40 MCS7	36.9	31.0	67.9	74.0	-6.1
1 (2412MHz)	Average	802.11b, 11 Mbps	15.5	31.0	46.5	54.0	-7.5
	Average	802.11g, 6 Mbps	21.8	31.0	52.8	54.0	-1.2
	Average	802.11g, 54 Mbps	18.4	31.0	49.4	54.0	-4.6
	Average	802.11n, HT20 MCS0	21.3	31.0	52.3	54.0	-1.7
	Average	802.11n, HT20 MCS7	18.9	31.0	49.9	54.0	-4.1
3 (2422MHz)	Average	802.11n, HT40 MCS0	21.5	31.0	52.5	54.0	-1.5
	Average	802.11n, HT40 MCS7	20.9	31.0	51.9	54.0	-2.1

- a) Correction Factor @ 2.39GHz: Cable loss + Antenna factor
b) FS at 3m = SA reading + Correction Factor

Table 5.14
Out-of-Band Radiated spurious emissions at the Band-edge
2483.5–2500 MHz

EUT Channel/ Frequency MHz	Detector	Standard/ Data rate	SA reading dB(uV)	Corr. Factor dB	FS at 3m dB(uV/m)	FS Limit dB(uV/m)	Margin dB
11 (2462MHz)	Peak	802.11b, 11 Mbps	30.4	31.4	61.8	74.0	-12.2
	Peak	802.11g, 6 Mbps	36.9	31.4	68.3	74.0	-5.7
	Peak	802.11g, 54 Mbps	31.8	31.4	63.2	74.0	-10.8
	Peak	802.11n, HT20 MCS0	34.9	31.4	66.3	74.0	-7.7
	Peak	802.11n, HT20 MCS7	31.5	31.4	62.9	74.0	-11.1
9 (2452MHz)	Peak	802.11n, HT40 MCS0	34.0	31.4	65.4	74.0	-8.6
	Peak	802.11n, HT40 MCS7	34.6	31.4	66.0	74.0	-8.0
11 (2462MHz)	Average	802.11b, 11 Mbps	15.2	31.4	46.6	54.0	-7.4
	Average	802.11g, 6 Mbps	20.7	31.4	52.1	54.0	-1.9
	Average	802.11g, 54 Mbps	16.9	31.4	48.3	54.0	-5.7
	Average	802.11n, HT20 MCS0	18.5	31.4	49.9	54.0	-4.1
	Average	802.11n, HT20 MCS7	17.0	31.4	48.4	54.0	-5.6
9 (2452MHz)	Average	802.11n, HT40 MCS0	18.4	31.4	49.8	54.0	-4.2
	Average	802.11n, HT40 MCS7	18.4	31.4	49.8	54.0	-4.2

- a) Correction Factor @ 2483.5MHz: Cable loss + Antenna factor
b) FS at 3m = SA reading + Correction Factor

Table 5.15
Transmitter Radiated Emissions above 1GHz

Temperature: 24.0 C	Company: Livescribe, Inc.
Humidity: 45.0 %	Model: 8GB
Measurement distance: 3 m	Date: 5-Jul-12
Configuration: 802.11b, 11Mbps	

Frequency MHz	Detector	SA reading dB(uV)	Corr. Factor dB	Antenna factor dB(1/m)	FS at 3m dB(uV/m)	FS Limit dB(uV/m)	Margin dB
Ch: 1, 2412 MHz							
4824	Peak	60.4	-28.3	32.8	64.9	74.0	-9.1
7236	Peak	36.0	-25.4	37.2	47.8	74.0	-26.2
12060	Peak	35.0	-24.3	38.5	49.2	74.0	-24.8
14472	Peak	33.0	-21.5	40.3	51.8	74.0	-22.2
4824	Average	46.2	-28.3	32.8	50.7	54.0	-3.3
7236	Average	23.6	-25.4	37.2	35.4	54.0	-18.6
12060	Average	21.5	-24.3	38.5	35.7	54.0	-18.3
14472	Average	20.1	-21.5	40.3	38.9	54.0	-15.1
Ch: 6, 2437 MHz							
4874	Peak	60.0	-28.1	32.8	64.7	74.0	-9.3
7311	Peak	37.1	-25.7	37.4	48.8	74.0	-25.2
12185	Peak	35.0	-25.2	38.4	48.2	74.0	-25.8
14622	Peak	33.2	-22.8	40.1	50.5	74.0	-23.5
4874	Average	45.8	-28.1	32.8	50.5	54.0	-3.5
7311	Average	24.9	-25.7	37.4	36.6	54.0	-17.4
12185	Average	22.0	-25.2	38.4	35.2	54.0	-18.8
14622	Average	20.2	-22.8	40.1	37.5	54.0	-16.5
Ch: 11, 2462 MHz							
4924	Peak	58.3	-27.7	32.9	63.5	74.0	-10.5
7386	Peak	36.8	-26.1	37.4	48.1	74.0	-25.9
12310	Peak	35.0	-25.3	38.4	48.1	74.0	-25.9
14772	Peak	32.0	-22.0	39.6	49.6	74.0	-24.4
4924	Average	42.8	-27.7	32.9	48.0	54.0	-6.0
7386	Average	24.5	-26.1	37.4	35.8	54.0	-18.2
12310	Average	22.1	-25.3	38.4	35.2	54.0	-18.8
14772	Average	19.9	-22.0	39.6	37.5	54.0	-16.5

- RBW = 1 MHz, VBW = 1 MHz - for peak measurements
RBW = 1MHz, VBW = 10 Hz - for average measurements
- Correction Factor: Cable loss + High Pass Filter loss - Pre-amplifier gain
- FS at 3m = SA reading + Correction Factor + Antenna factor
- Measurements made at 3 meters distance. Radiated emission measurements were performed up to 25GHz. No other emissions were detected above the noise floor which is at least 10 dB below the limit.

Table 5.16
Transmitter Radiated Emissions above 1GHz

Temperature: 24.0 C	Company: Livescribe, Inc.
Humidity: 45.0 %	Model: 8GB
Measurement distance: 3 m	Date: 5-Jul-12
Configuration: 802.11g, 6Mbps or 54Mbps	

Frequency MHz	Detector	SA reading dB(uV)	Corr. Factor dB	Antenna factor dB(1/m)	FS at 3m dB(uV/m)	FS Limit dB(uV/m)	Margin dB
Ch: 1, 2412 MHz							
4824	Peak	58.4	-28.3	32.8	62.9	74.0	-11.1
7236	Peak	39.4	-25.4	37.2	51.2	74.0	-22.8
12060	Peak	34.3	-24.3	38.5	48.5	74.0	-25.5
14472	Peak	33.1	-21.5	40.3	51.9	74.0	-22.1
4824	Average	43.5	-28.3	32.8	48.0	54.0	-6.0
7236	Average	24.0	-25.4	37.2	35.8	54.0	-18.2
12060	Average	21.8	-24.3	38.5	36.0	54.0	-18.0
14472	Average	19.8	-21.5	40.3	38.6	54.0	-15.4
Ch: 6, 2437 MHz							
4874	Peak	59.1	-28.1	32.8	63.8	74.0	-10.2
7311	Peak	42.1	-25.7	37.4	53.8	74.0	-20.2
12185	Peak	36.1	-25.2	38.4	49.3	74.0	-24.7
14622	Peak	33.4	-22.8	40.1	50.7	74.0	-23.3
4874	Average	45.5	-28.1	32.8	50.2	54.0	-3.8
7311	Average	25.4	-25.7	37.4	37.1	54.0	-16.9
12185	Average	22.5	-25.2	38.4	35.7	54.0	-18.3
14622	Average	20.4	-22.8	40.1	37.7	54.0	-16.3
Ch: 11, 2462 MHz							
4924	Peak	58.2	-27.7	32.9	63.4	74.0	-10.6
7386	Peak	40.8	-26.1	37.4	52.1	74.0	-21.9
12310	Peak	36.1	-25.3	38.4	49.2	74.0	-24.8
14772	Peak	33.3	-22.0	39.6	50.9	74.0	-23.1
4924	Average	44.6	-27.7	32.9	49.8	54.0	-4.2
7386	Average	25.2	-26.1	37.4	36.5	54.0	-17.5
12310	Average	22.2	-25.3	38.4	35.3	54.0	-18.7
14772	Average	20.0	-22.0	39.6	37.6	54.0	-16.4

- RBW = 1 MHz, VBW = 1 MHz - for peak measurements
RBW = 1MHz, VBW = 10 Hz - for average measurements
- Correction Factor: Cable loss + High Pass Filter loss - Pre-amplifier gain
- FS at 3m = SA reading + Correction Factor + Antenna factor
- Measurements made at 3 meters distance. Radiated emission measurements were performed up to 25GHz. No other emissions were detected above the noise floor which is at least 10 dB below the limit.

Table 5.17
Transmitter Radiated Emissions above 1GHz

Temperature: 24.0 C	Company: Livescribe, Inc.
Humidity: 45.0 %	Model: 8GB
Measurement distance: 3 m	Date: 5-Jul-12
Configuration: 802.11n, HT20, MCS0 or MCS7	

Frequency MHz	Detector	SA reading dB(uV)	Corr. Factor dB	Antenna factor dB(1/m)	FS at 3m dB(uV/m)	FS Limit dB(uV/m)	Margin dB
Ch: 1, 2412 MHz							
4824	Peak	58.0	-28.3	32.8	62.5	74.0	-11.5
7236	Peak	34.8	-25.4	37.2	46.6	74.0	-27.4
12060	Peak	34.7	-24.3	38.5	48.9	74.0	-25.1
14472	Peak	33.0	-21.5	40.3	51.8	74.0	-22.2
4824	Average	42.0	-28.3	32.8	46.5	54.0	-7.5
7236	Average	21.7	-25.4	37.2	33.5	54.0	-20.5
12060	Average	21.8	-24.3	38.5	36.0	54.0	-18.0
14472	Average	20.0	-21.5	40.3	38.8	54.0	-15.2
Ch: 6, 2437 MHz							
4874	Peak	57.9	-28.1	32.8	62.6	74.0	-11.4
7311	Peak	35.0	-25.7	37.4	46.7	74.0	-27.3
12185	Peak	35.1	-25.2	38.4	48.3	74.0	-25.7
14622	Peak	33.4	-22.8	40.1	50.7	74.0	-23.3
4874	Average	41.9	-28.1	32.8	46.6	54.0	-7.4
7311	Average	22.1	-25.7	37.4	33.8	54.0	-20.2
12185	Average	22.1	-25.2	38.4	35.3	54.0	-18.7
14622	Average	20.3	-22.8	40.1	37.6	54.0	-16.4
Ch: 11, 2462 MHz							
4924	Peak	57.0	-27.7	32.9	62.2	74.0	-11.8
7386	Peak	36.1	-26.1	37.4	47.4	74.0	-26.6
12310	Peak	35.0	-25.3	38.4	48.1	74.0	-25.9
14772	Peak	33.0	-22.0	39.6	50.6	74.0	-23.4
4924	Average	41.0	-27.7	32.9	46.2	54.0	-7.8
7386	Average	22.9	-26.1	37.4	34.2	54.0	-19.8
12310	Average	22.2	-25.3	38.4	35.3	54.0	-18.7
14772	Average	19.9	-22.0	39.6	37.5	54.0	-16.5

- RBW = 1 MHz, VBW = 1 MHz - for peak measurements
RBW = 1MHz, VBW = 10 Hz - for average measurements
- Correction Factor: Cable loss + High Pass Filter loss - Pre-amplifier gain
- FS at 3m = SA reading + Correction Factor + Antenna factor
- Measurements made at 3 meters distance. Radiated emission measurements were performed up to 25GHz. No other emissions were detected above the noise floor which is at least 10 dB below the limit.

Table 5.18
Transmitter Radiated Emissions above 1GHz

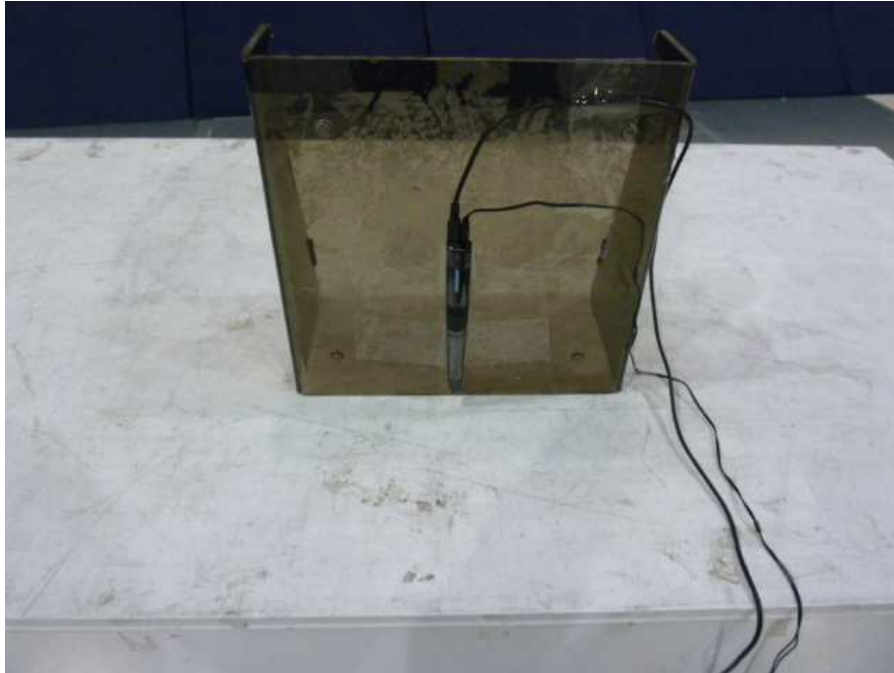
Temperature: 24.0 C	Company: Livescribe, Inc.
Humidity: 45.0 %	Model: 8GB
Measurement distance: 3 m	Date: 5-Jul-12
Configuration: 802.11n, HT40, MCS0 or MCS7	

Frequency MHz	Detector	SA reading dB(uV)	Corr. Factor dB	Antenna factor dB(1/m)	FS at 3m dB(uV/m)	FS Limit dB(uV/m)	Margin dB
Ch: 3, 2422 MHz							
4844	Peak	50.3	-28.1	32.8	55.0	74.0	-19.0
7266	Peak	35.3	-25.5	37.3	47.1	74.0	-26.9
12110	Peak	35.5	-25.3	38.5	48.7	74.0	-25.3
14532	Peak	33.3	-22.4	40.3	51.2	74.0	-22.8
4844	Average	36.5	-28.1	32.8	41.2	54.0	-12.8
7266	Average	21.9	-25.5	37.3	33.7	54.0	-20.3
12110	Average	22.2	-25.3	38.5	35.4	54.0	-18.6
14532	Average	20.6	-22.4	40.3	38.5	54.0	-15.5
Ch: 6, 2437 MHz							
4874	Peak	49.8	-28.1	32.8	54.5	74.0	-19.5
7311	Peak	35.8	-25.7	37.4	47.5	74.0	-26.5
12185	Peak	36.0	-25.2	38.4	49.2	74.0	-24.8
14622	Peak	33.3	-22.8	40.1	50.6	74.0	-23.4
4874	Average	36.3	-28.1	32.8	41.0	54.0	-13.0
7311	Average	22.1	-25.7	37.4	33.8	54.0	-20.2
12185	Average	22.3	-25.2	38.4	35.5	54.0	-18.5
14622	Average	20.3	-22.8	40.1	37.6	54.0	-16.4
Ch: 9, 2452 MHz							
4904	Peak	49.0	-28.1	32.8	53.7	74.0	-20.3
7356	Peak	35.4	-25.7	37.4	47.1	74.0	-26.9
12260	Peak	35.8	-25.0	38.4	49.2	74.0	-24.8
14712	Peak	33.0	-22.9	39.8	49.9	74.0	-24.1
4904	Average	35.9	-28.1	32.8	40.6	54.0	-13.4
7356	Average	22.5	-25.7	37.4	34.2	54.0	-19.8
12260	Average	22.2	-25.0	38.4	35.6	54.0	-18.4
14712	Average	20.6	-22.9	39.8	37.5	54.0	-16.5

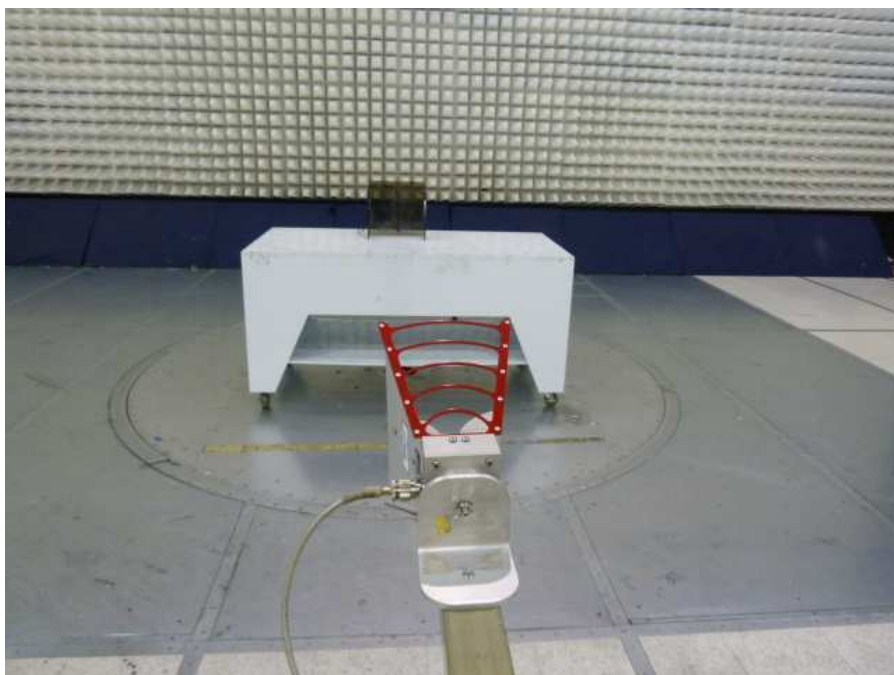
- RBW = 1 MHz, VBW = 1 MHz - for peak measurements
RBW = 1MHz, VBW = 10 Hz - for average measurements
- Correction Factor: Cable loss + High Pass Filter loss - Pre-amplifier gain
- FS at 3m = SA reading + Correction Factor + Antenna factor
- Measurements made at 3 meters distance. Radiated emission measurements were performed up to 25GHz. No other emissions were detected above the noise floor which is at least 10 dB below the limit.

4.5.4 Test Setup Photographs

The following photographs show the testing configurations used.



4.5.4 Test Setup Photographs



4.6 Radiated Emissions from Digital Parts and Receiver FCC Ref: 15.109

4.6.1 Requirement

*Limits for Electromagnetic Radiated Emissions, FCC Section 15.109(b) and ICES 003 **

Frequency (MHz)	Class A at 10m dB(μV/m)	Class B at 3m dB(μV/m)
30-88	39	40.0
88-216	43.5	43.5
216-960	46.4	46.0
Above 960	49.5	54.0

* According to FCC Part 15.109(g) an alternative to the radiated emission limits shown above, digital devices may be shown to comply with the limit of CISPR Pub. 22

4.6.2 Procedure

Measurements are conducted with a quasi-peak detector instrument in the frequency range of 30 MHz to 1000 MHz and with the average detector instrument in the frequency range above 1000 MHz. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole.

Measurements of the radiated field are made with the antenna located at a distance of 10 meters from the EUT. If the field-strength measurements at 10m cannot be made because of high ambient noise level or for other reasons, measurements of Class B equipment may be made at a closer distance, for example 3m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for a larger EUT.

Floor standing EUTs are placed on a horizontal metal ground plane and isolated from the ground plane by 3 to 12 mm of insulating material.

Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4 (2003).

Example Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor to from the measured reading, followed by subtracting the Amplifier Gain (if any) and Distance Correction Factor (if any). The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - PA - DCF$$

Where

FS = Field Strength in dB ($\mu\text{V}/\text{m}$)

RA = Receiver Amplitude (including preamplifier) in dB (μV)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB (1/m)

AG = Amplifier Gain in dB

DCF=Distance Correction Factor in dB

(Formula: $DCF = 20\log_{10}(\text{measurement distance}/\text{specification distance})$)

Assume a receiver reading of 52.0 dB (μV) is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB and DCF of 10.5 dB (DCF in this example: $20\log_{10}(10/3)$) is subtracted, giving field strength of 21.5 dB ($\mu\text{V}/\text{m}$).

$$RA = 52.0 \text{ dB } (\mu\text{V})$$

$$AF = 7.4 \text{ dB } (1/\text{m})$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$DCF=10.5 \text{ dB}$$

$$FS = RF + AF + CF - AG - DCF$$

$$FS = 52.0 + 7.4 + 1.6 - 29.0 - 10.5$$

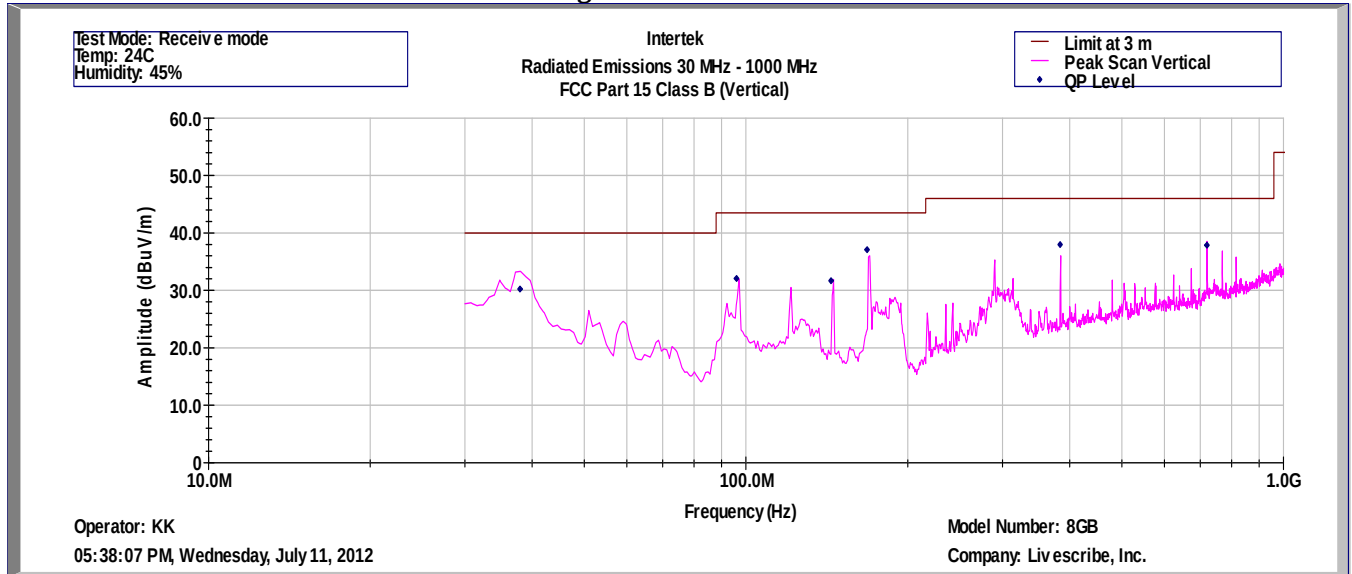
$$FS = 21.5 \text{ dB } (\mu\text{V}/\text{m})$$

4.6.3 Test Results

Radiated emission measurements were performed from 30 MHz to 1000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater below 1000 MHz and 1 MHz - above 1000 MHz.

The EUT passed by 4.2dB for Class B.

Radiated Emissions from Digital Parts and Receiver below 1GHz



Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class B (QP-Vertical)

Operator: KK
11-Jul-12

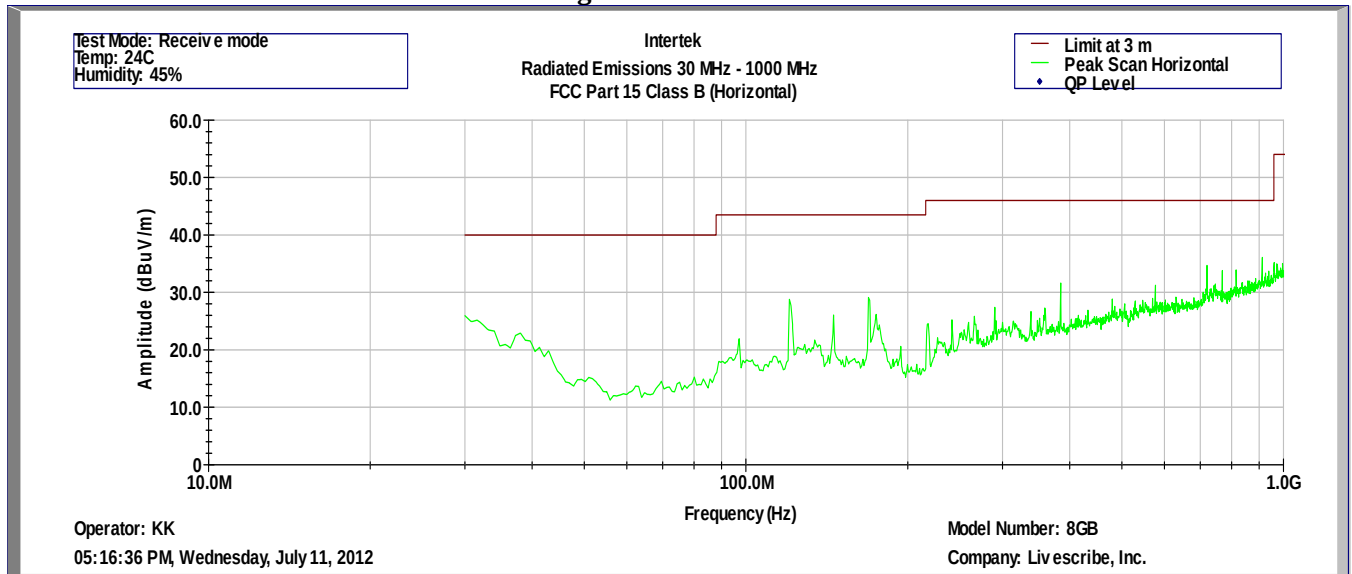
Model Number: 8GB
Company: Livescribe, Inc.

Frequency	Quasi Pk FS	Limit@3m	Margin	RA	Cable	AG	DCF	AF
Hz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB	dB(1/m)
3.80E+07	30.2	40.0	-9.8	36.4	0.7	32.1	10.5	14.7
9.60E+07	32.0	43.5	-11.5	42.6	1.1	32.1	10.5	9.9
1.44E+08	31.6	43.5	-11.9	40.6	1.4	32.0	10.5	11.2
1.68E+08	37.1	43.5	-6.4	47.1	1.5	32.0	10.5	10.0
3.84E+08	37.9	46.0	-8.1	41.9	2.3	32.0	10.5	15.3
7.20E+08	37.9	46.0	-8.1	35.1	3.2	32.3	10.5	21.4

Test Mode: Receive mode
Temp: 24C
Humidity: 45%

Notes: Measurements made at 10 meters distance.

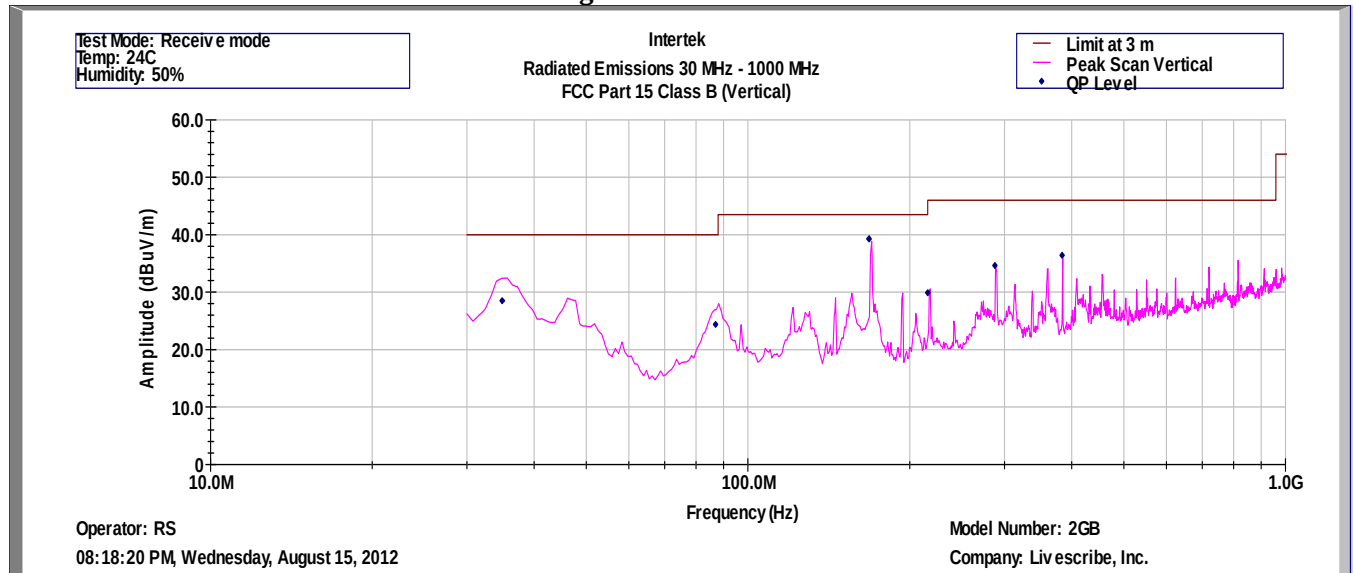
Radiated Emissions from Digital Parts and Receiver below 1GHz



Worst case emissions were observed in Vertical polarization. QP measurements were performed in Vertical polarization only.

Notes: Measurements made at 10 meters distance.

Radiated Emissions from Digital Parts and Receiver below 1GHz



Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class B (QP-Vertical)

Operator: RS
15-Aug-12

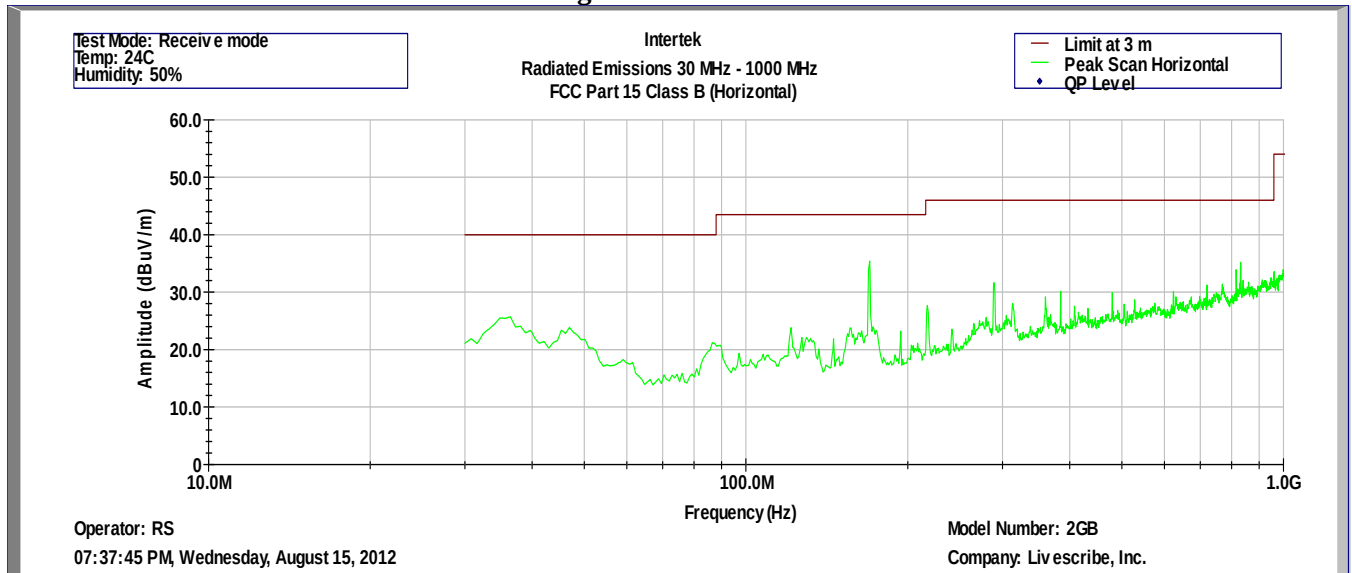
Model Number: 2GB
Company: Livescribe, Inc.

Frequency	Quasi Pk FS	Limit@3m	Margin	RA	Cable	AG	DCF	AF
Hz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB	dB(1/m)
3.489E+07	28.5	40.0	-11.5	32.0	0.7	32.1	10.5	17.4
8.705E+07	24.4	40.0	-15.6	36.7	1.1	32.1	10.5	8.2
1.680E+08	39.3	43.5	-4.2	50.3	1.5	32.0	10.5	9.0
2.160E+08	29.9	46.0	-16.1	38.8	1.7	32.0	10.5	10.9
2.880E+08	34.6	46.0	-11.4	41.5	2.0	32.0	10.5	12.6
3.840E+08	36.4	46.0	-9.6	40.8	2.3	32.0	10.5	14.8

Test Mode: Receive mode
Temp: 24C
Humidity: 50%

Notes: Measurements made at 10 meters distance.

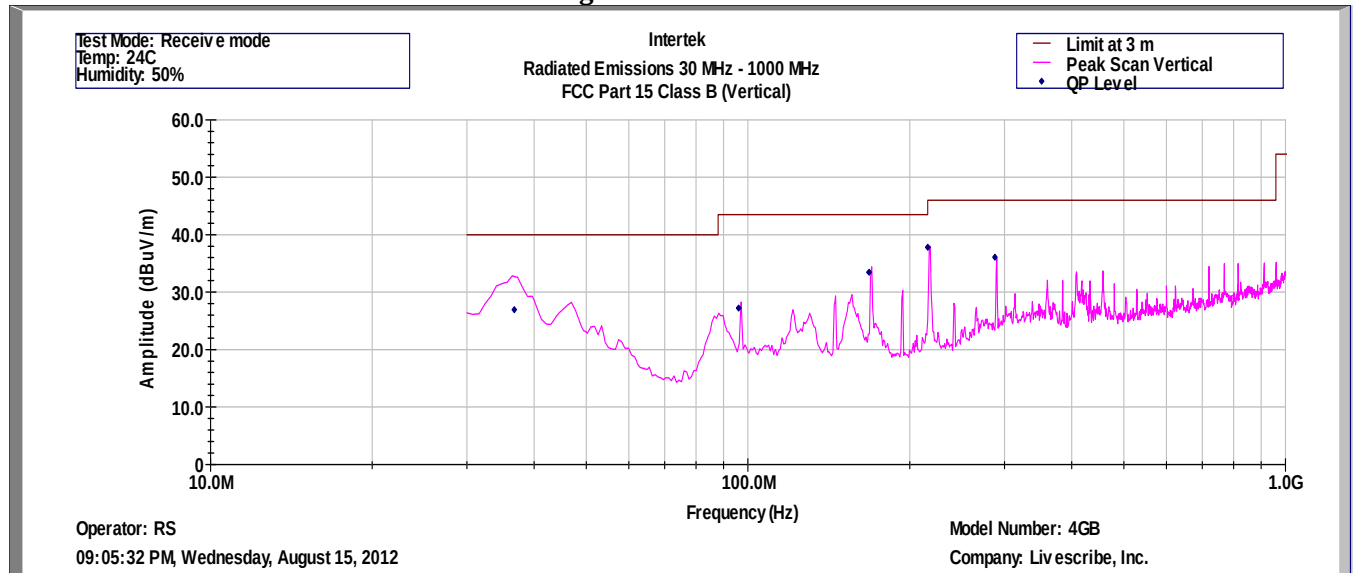
Radiated Emissions from Digital Parts and Receiver below 1GHz



Worst case emissions were observed in Vertical polarization. QP measurements were performed in Vertical polarization only.

Notes: Measurements made at 10 meters distance.

Radiated Emissions from Digital Parts and Receiver below 1GHz



Intertek Testing Services

Radiated Emissions 30 MHz - 1000 MHz

FCC Part 15 Class B (QP-Vertical)

Operator: RS

15-Aug-12

Model Number: 4GB

Company: Livescribe, Inc.

Frequency	Quasi Pk FS	Limit@3m	Margin	RA	Cable	AG	DCF	AF
Hz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB	dB(1/m)
3.676E+07	26.9	40.0	-13.1	30.7	0.7	32.1	10.5	17.1
9.612E+07	27.2	43.5	-16.3	38.4	1.1	32.1	10.5	9.2
1.680E+08	33.5	43.5	-10.0	44.5	1.5	32.0	10.5	9.0
2.160E+08	37.8	46.0	-8.2	46.8	1.7	32.0	10.5	10.9
2.880E+08	36.1	46.0	-9.9	42.9	2.0	32.0	10.5	12.6

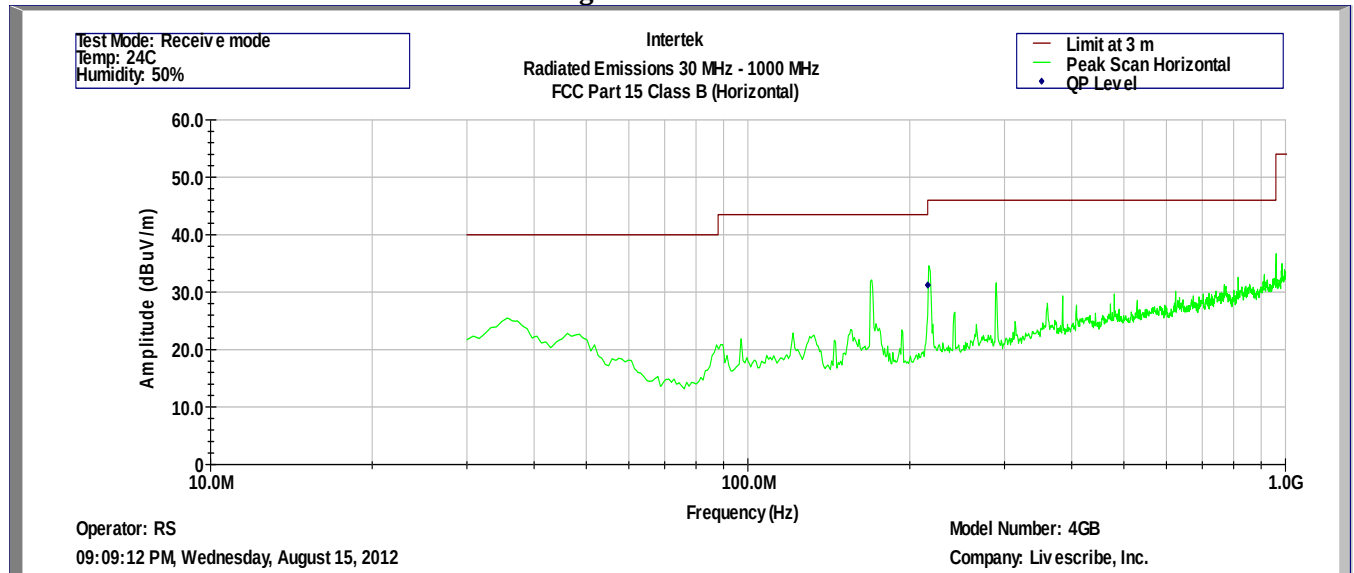
Test Mode: Receive mode

Temp: 24C

Humidity: 50%

Notes: Measurements made at 10 meters distance.

Radiated Emissions from Digital Parts and Receiver below 1GHz



Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class B (QP-Horizontal)

Operator: RS
15-Aug-12

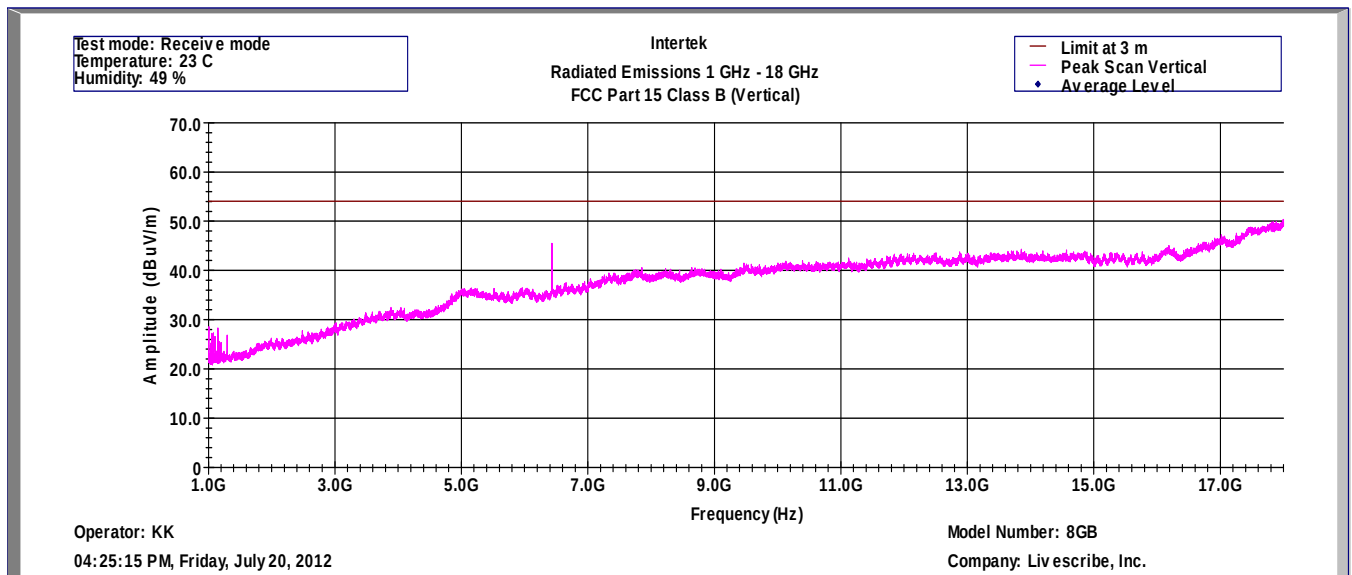
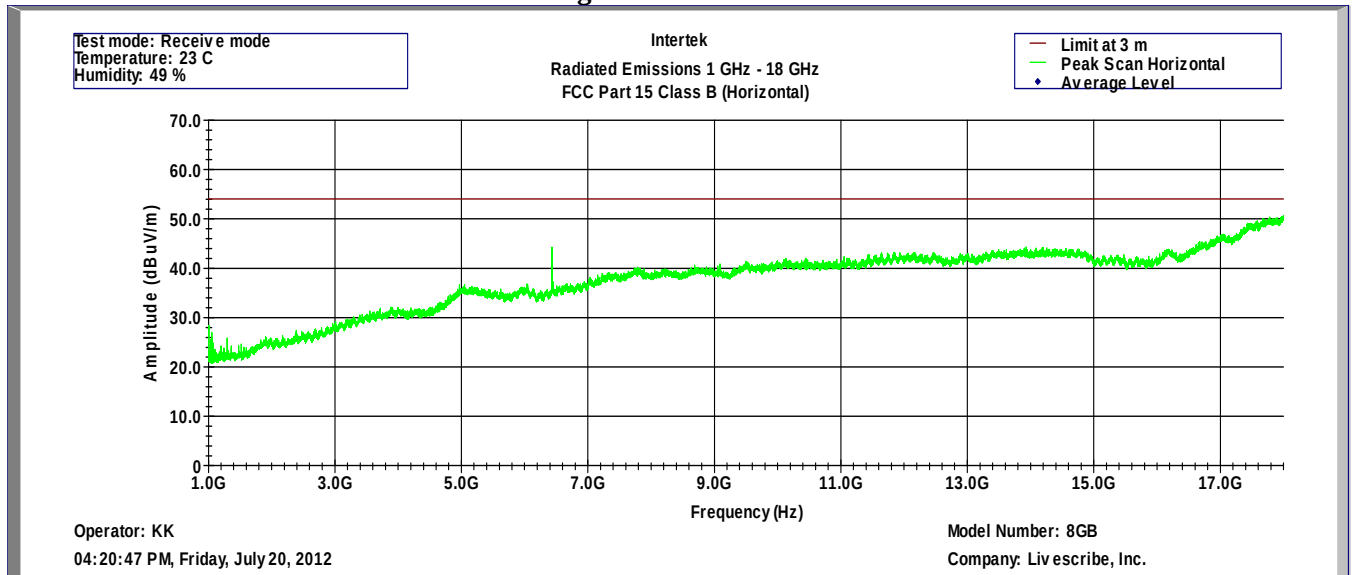
Model Number: 4GB
Company: Livescribe, Inc.

Frequency	Quasi Pk FS	Limit@3m	Margin	RA	Cable	AG	DCF	AF
Hz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB	dB(1/m)
2.160E+08	31.2	46.0	-14.8	40.1	1.7	32.0	10.5	10.9

Test Mode: Receive mode
Temp: 24C
Humidity: 50%

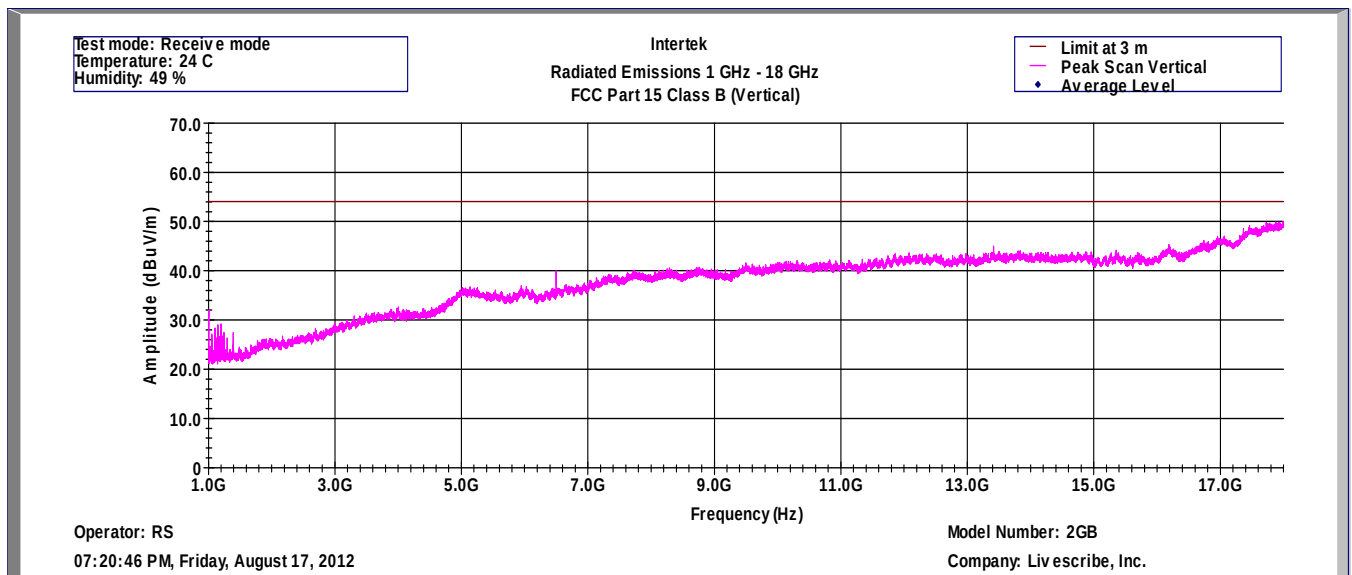
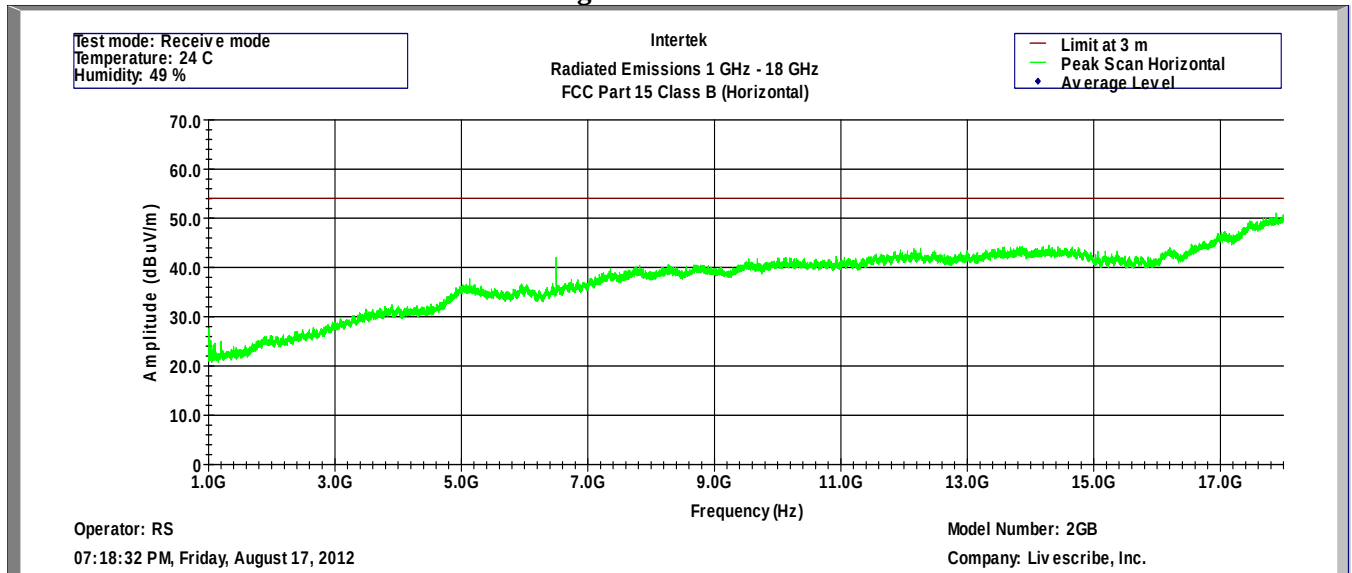
Notes: Measurements made at 10 meters distance.

Radiated Emissions from Digital Parts and Receiver above 1GHz



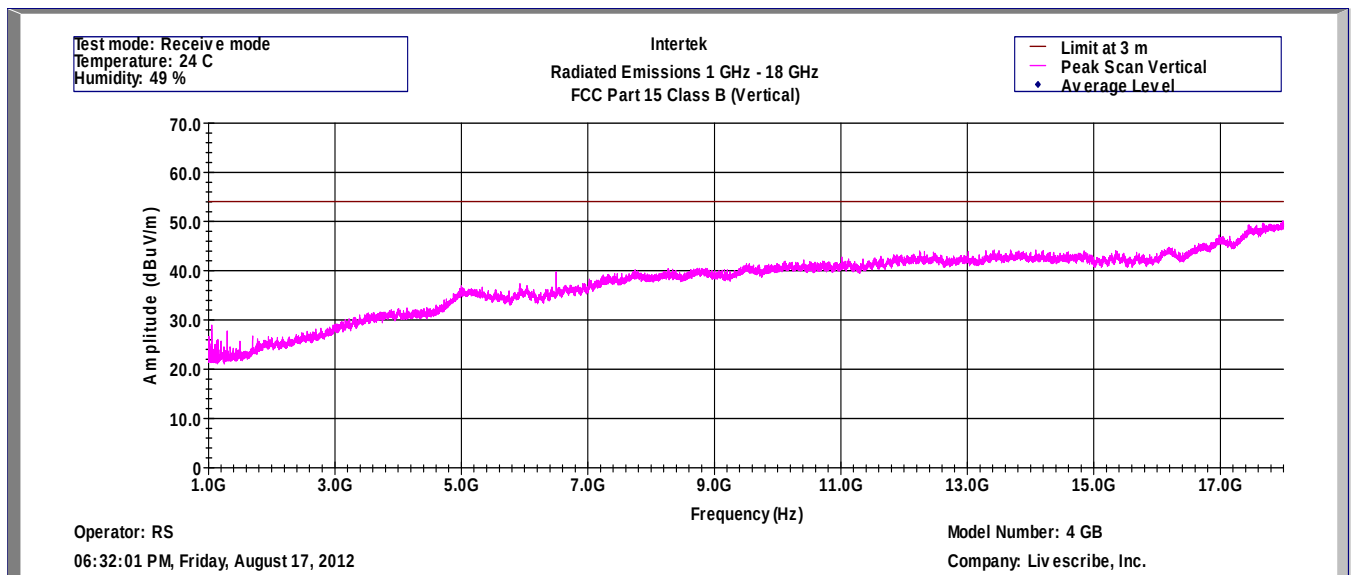
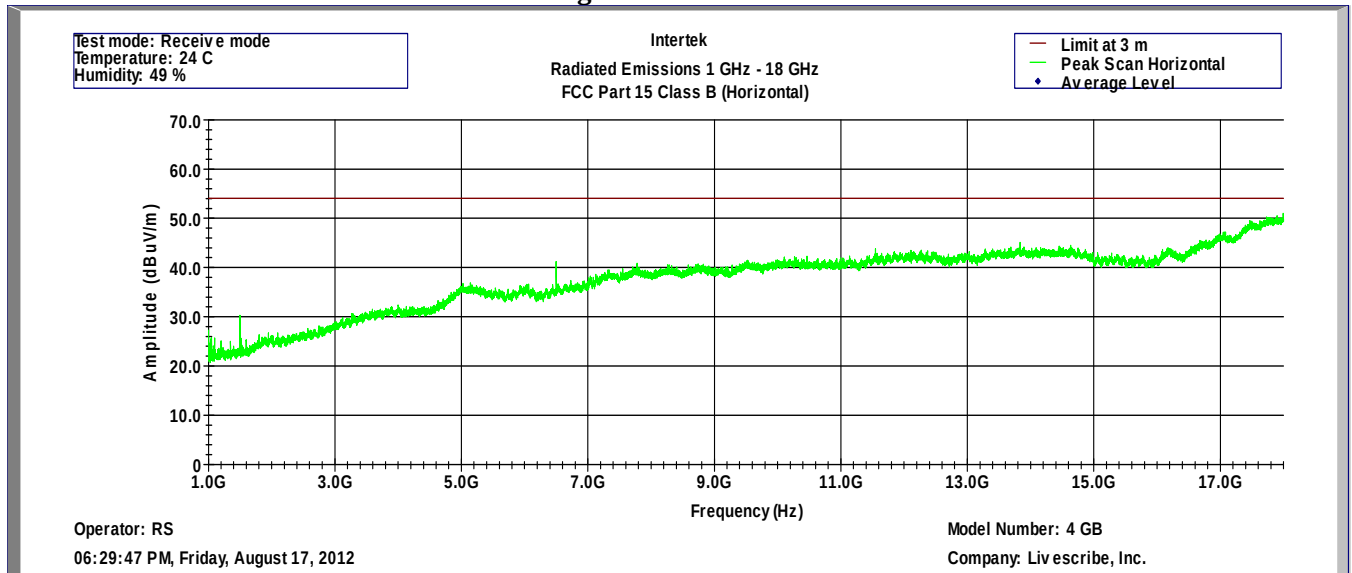
Note: Measurements made at 3 meters distance. Radiated emission measurements were performed up to 25GHz. In the range 18GHz to 25GHz, no other emissions were detected above the noise floor which is at least 6 dB below the limit.

Radiated Emissions from Digital Parts and Receiver above 1GHz



Note: Measurements made at 3 meters distance. Radiated emission measurements were performed up to 25GHz. In the range 18GHz to 25GHz, no other emissions were detected above the noise floor which is at least 6 dB below the limit.

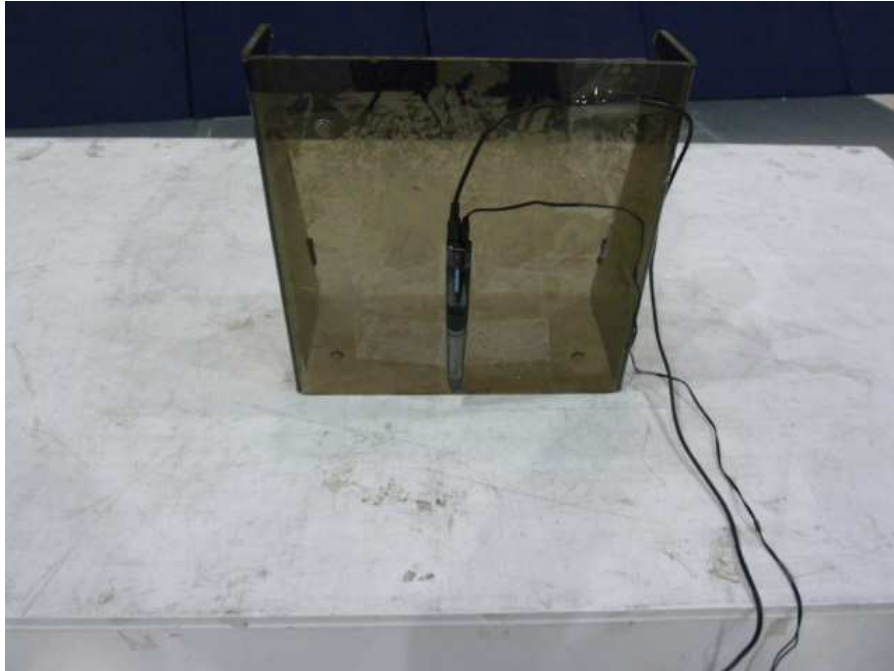
Radiated Emissions from Digital Parts and Receiver above 1GHz



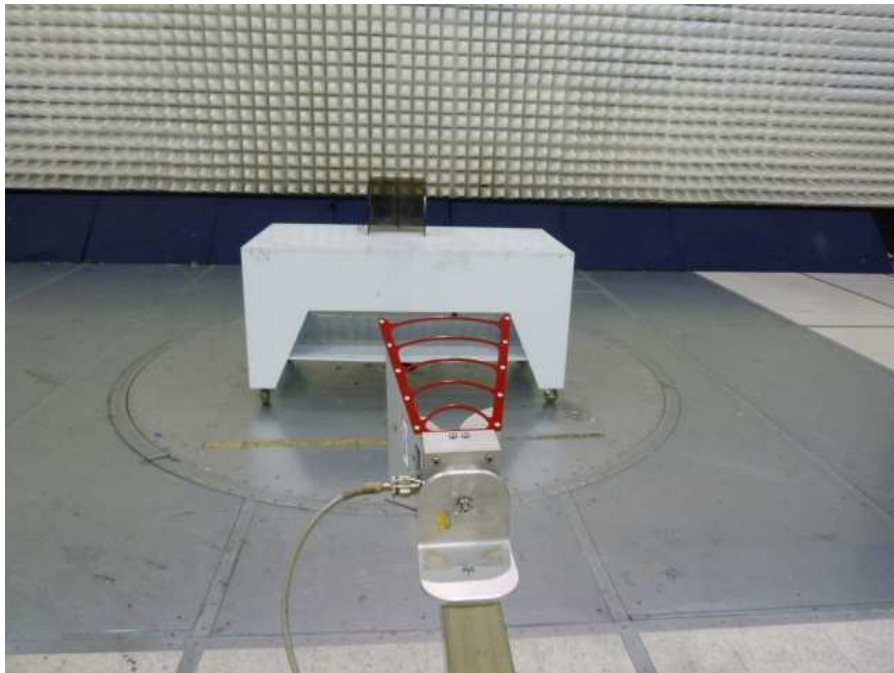
Note: Measurements made at 3 meters distance. Radiated emission measurements were performed up to 25GHz. In the range 18GHz to 25GHz, no other emissions were detected above the noise floor which is at least 6 dB below the limit.

4.6.4 Test setup photographs

The following photographs show the testing configurations used.



4.6.4 Test Setup Photographs



4.7 AC Line Conducted Emission FCC 15.207

4.7.1 Requirement

Frequency Band MHz	Class B Limit dB (μV)	
	Quasi-Peak	Average
0.15-0.50	66 to 56 Decreases linearly with the logarithm of the frequency	56 to 46 Decreases linearly with the logarithm of the frequency
0.50-5.00	56	46
5.00-30.00	60	50

Note: At the transition frequency the lower limit applies.

4.7.2 Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

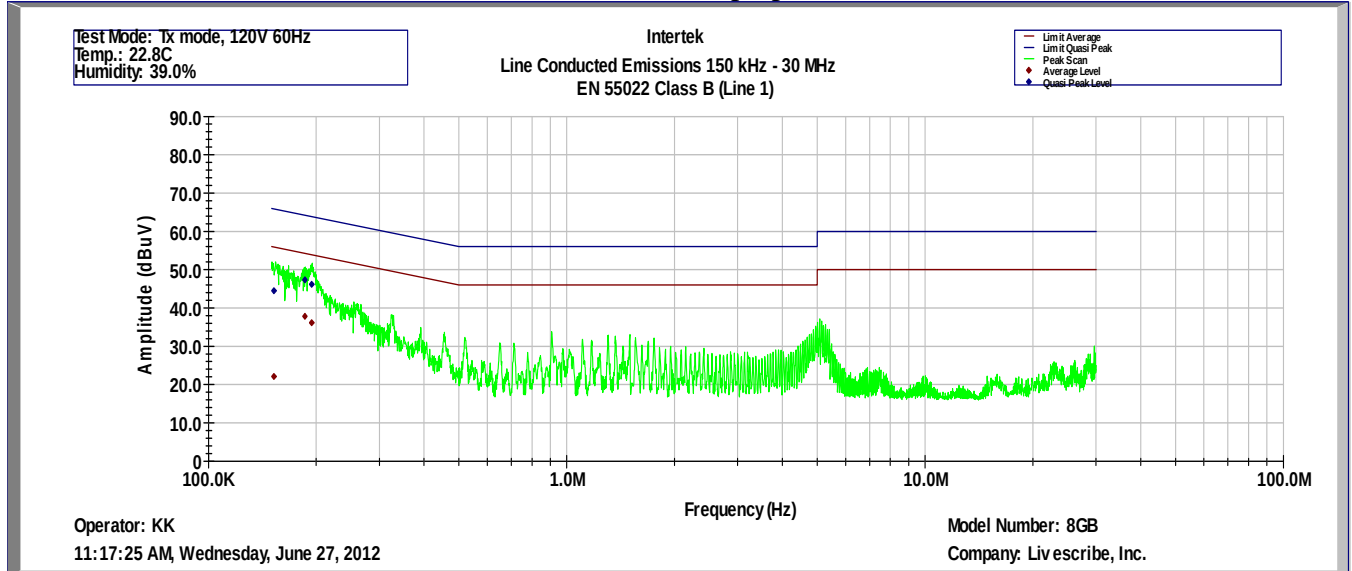
The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4.

4.7.3 Test Result

Conducted Disturbance at Laptop AC Mains



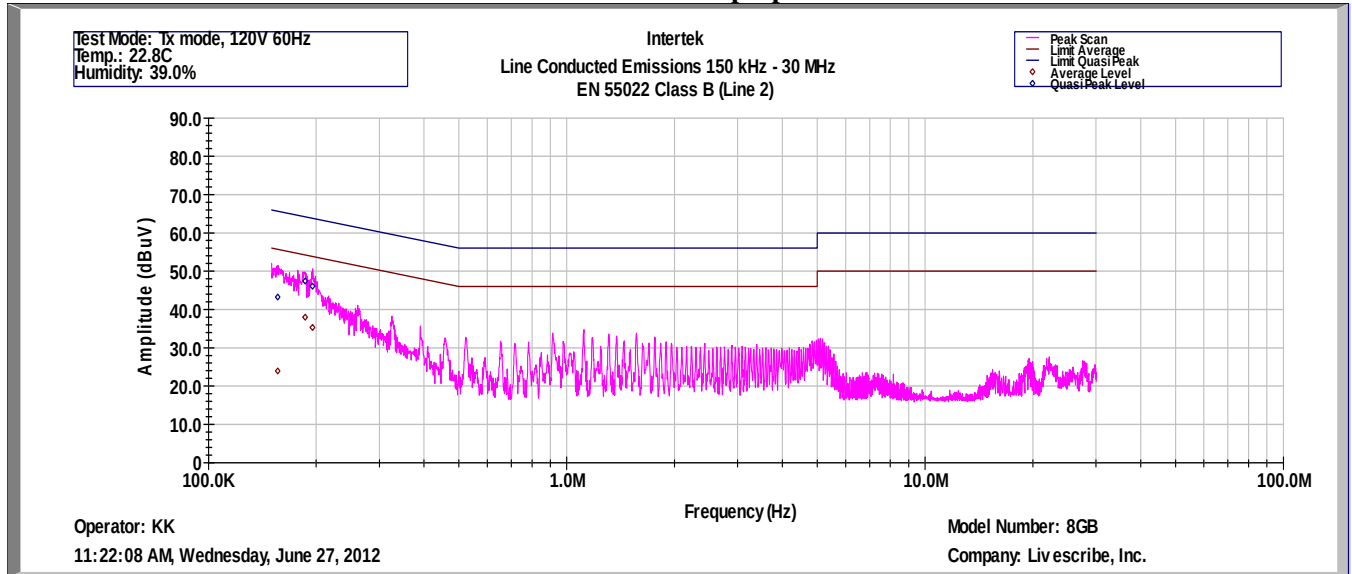
Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
EN 55022 Class B (Line 1)
Operator: KK
27-Jun-12

Model Number: 8GB
Company: Livescribe, Inc.

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
152406	22.1	44.5	55.9	65.9	-33.8	-21.5
185867	37.8	47.3	55.0	65.0	-17.1	-17.7
194259	36.1	46.1	54.7	64.7	-18.6	-18.6

Test Mode: Tx mode, 120V 60Hz
Temp.: 22.8C
Humidity: 39.0%

Conducted Disturbance at Laptop AC Mains



Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
EN 55022 Class B (Line 2)

Operator: KK
27-Jun-12

Model Number: 8GB
Company: Livescribe, Inc.

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
156147	23.9	43.2	55.8	65.8	-31.9	-22.6
186093	37.9	47.5	55.0	65.0	-17.0	-17.5
195289	35.3	46.1	54.7	64.7	-19.4	-18.6

Test Mode: Tx mode, 120V 60Hz
Temp.: 22.8C
Humidity: 39.0%

Results

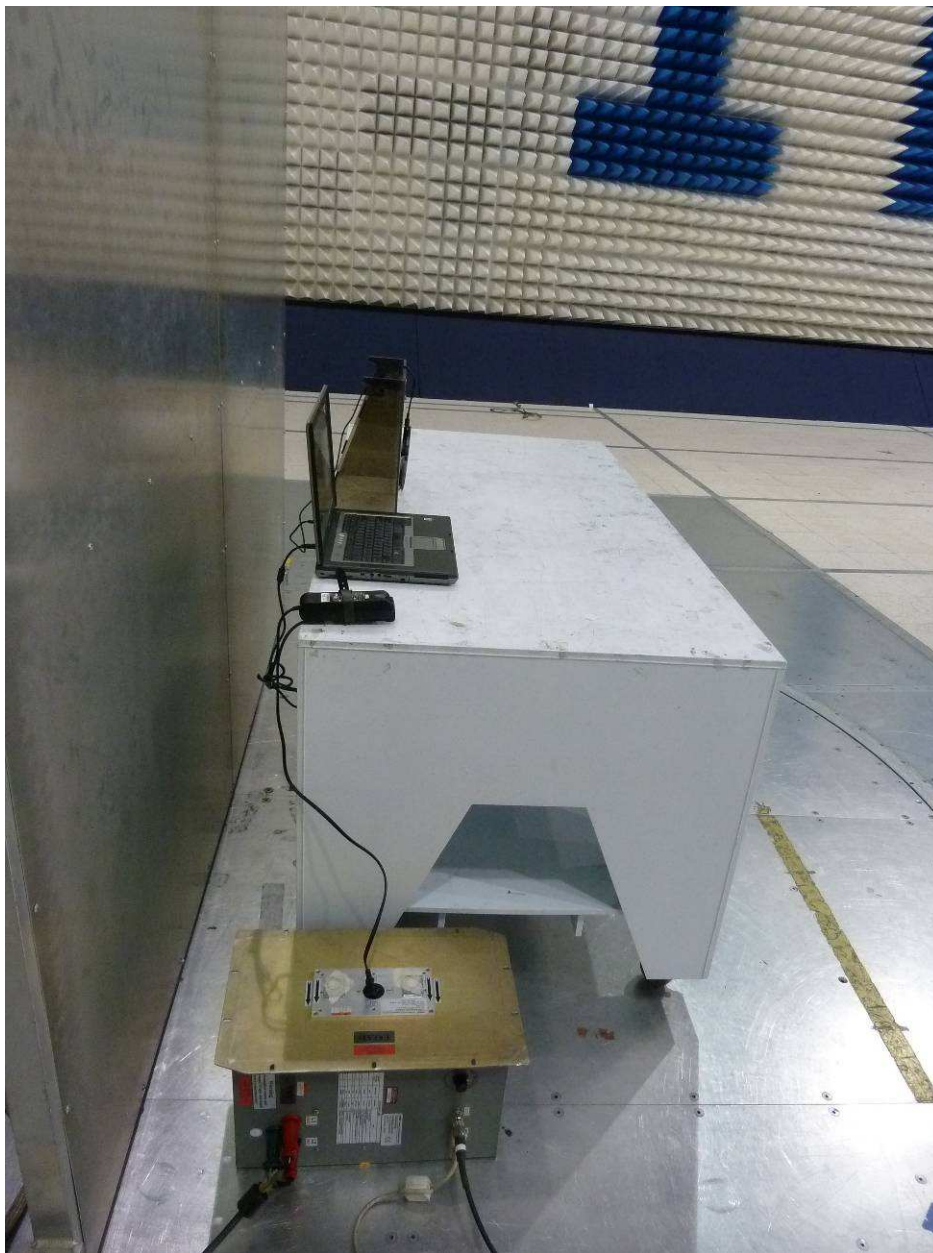
Complies by 10.8dB

4.7.4 Test Configuration Photographs

The following photographs show the testing configurations used.



4.7.4 Test Configuration Photographs (continued)



5.0 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	03/09/13
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	03/09/13
Spectrum Analyzer	Rohde&Schwarz	FSU	200482	12	03/22/13
Spectrum Analyzer	Rohde&Schwarz	FSP-40	100030	12	11/09/12
Spectrum Analyzer	Rohde&Schwarz	ESU	100172	12	10/04/12
BI-Log Antenna	ARA	LPB-2513/A	1154	12	07/12/13
Horn Antenna	EMCO	3115	9107-3712	12	11/16/12
Horn Antenna	EMCO	3115	00126795	12	11/03/12
Pyramidal Horn Antenna	EMCO	3160-09	Not Labeled	#	#
Pyramidal Horn Antenna	EMCO	3160-10	Not Labeled	#	#
Pre-Amplifier	Sonoma	310N	293620	12	11/11/12
Pre-Amplifier	Miteq	AMF-4D-001180-24-10P	799159	12	09/01/12
Pre-Amplifier	Miteq	JSD44-18004000-30-5P	1071636	12	05/11/13
Signal Generator	Hewlett Packard	SMR40	100445	12	09/01/12
LISN	FCC	FCC-LISN-50-50-M-H	2011	12	02/02/13

No Calibration required



6.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / G100810573	KK	September 28, 2012	Original document