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# WLAN TEST REPORT

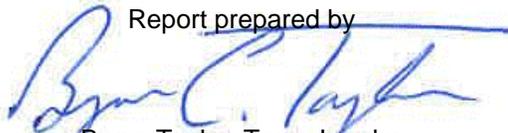
**Report Number:** 100240318LEX-001  
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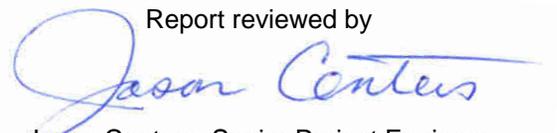
**Report Issue Date:** 1/7/2011

**Product Name:** "Zeus" Mobile Phone Type AAJ-6880004-BV  
**FCCID:** PY7A6880004  
**ICID:** 4170B-A6880004  
**Standards:** FCC Part 15C, FCC Part 15B, RSS-GEN Issue 3,  
and RSS-210 Issue 8

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

Client:  
Sony Ericsson Mobile Communications AB  
Nya Vattentornet  
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**TABLE OF CONTENTS**

**1 Introduction and Conclusion..... 3**

**2 Test Summary ..... 3**

**3 Description of Equipment Under Test ..... 4**

**4 Peak Conducted Power ..... 6**

**5 Occupied Bandwidth ..... 8**

**6 Conducted Spurious Emissions..... 15**

**7 Power Spectral Density..... 24**

**8 Radiated Spurious Emissions (Transmitter)..... 30**

**9 Radiated Spurious Emissions (Receiver)..... 41**

**10 AC Powerline Conducted Emissions ..... 43**

**11 Antenna Requirement per FCC Part 15.203..... 47**

**12 Measurement Uncertainty..... 48**

**13 Revision History ..... 49**

## 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 A8.2(B)	Pass
30	Radiated Spurious Emissions (Transmitter)	§ 15.247(d), § 15.209, and § 15.205	RSS-210 (2.2)	Pass
41	Radiated Spurious Emissions (Receiver)	§ 15.109	RSS-Gen (6.1)	Pass
43	AC Powerline Conducted Emissions	§ 15.107, § 15.207	RSS-Gen (7.2.4)	Pass
47	Antenna Requirement per FCC Part 15.203	§ 15.203	RSS-Gen (7.1.2)	Pass

**3 Description of Equipment Under Test**

<b>Equipment Under Test</b>	
<b>Manufacturer</b>	Sony Ericsson Mobile Communications AB
<b>Model Number</b>	AAJ-6880004-BV
<b>Serial Number</b>	CBA1CEQB8
<b>FCC Identifier</b>	PY7A6880004
<b>IC Identifier</b>	4170B-A6880004
<b>Receive Date</b>	11/27/2010
<b>Test Start Date</b>	11/27/2010
<b>Test End Date</b>	12/3/2010
<b>Device Received Condition</b>	Good
<b>Test Sample Type</b>	Prototype
<b>Frequency Band</b>	2412MHz – 2462MHz
<b>Mode(s) of Operation</b>	802.11b/g/n
<b>Modulation Type</b>	BPSK, QPSK, CCK, OFDM
<b>Duty Cycle</b>	100%
<b>Transmission Control</b>	Test Commands
<b>Maximum Output Power</b>	25.11dBm
<b>Test Channels</b>	1, 6, 11
<b>Antenna Type (15.203)</b>	Internal PCB
<b>Operating Voltage</b>	3.6VDC

<b>Description of Equipment Under Test</b>
The “Zeus” Mobile Phone Type AAJ-6880004-BV was a handset which supports CDMA Cell and PCS bands and also has Bluetooth and WIFI radios.

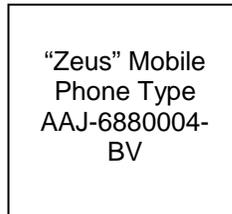
**Operating modes of the EUT:**

No.	Descriptions of EUT Exercising
1	Transmitting on channels 1, 6, or 11.
2	Receive / idle mode
3	All testing was performed with a freshly charged battery.

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

#### 3.2 EUT Block Diagram:

The test sample was tested in stand alone mode and was not connected to any support equipment during the evaluation.



#### 3.3 Cables:

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
USB Charging Cable	3ft	Yes	None	Mini-USB Port on Test Sample	AC Power Adapter

#### 3.4 Support Equipment:

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Laptop Computer	HP	Nc6000	CNU4120T70

\* The laptop computer was used to configure the test sample prior to execution of the test. It was disconnected before the test was conducted.

## 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	3099	Rohde & Schwarz	FSP7	8/27/2010	8/27/2011

**4.4 Results:**

Mode	Channel Number	Frequency (MHz)	Data Rate	Peak Conducted Power (dBm)	Peak Conducted Power Limit (dBm)	Margin (dB)	Result
802.11b	1	2412	1	23.85	30	-6.15	Pass
			2	24.25	30	-5.75	Pass
			5.5	24.98	30	-5.02	Pass
			11	24.87	30	-5.13	Pass
802.11b	6	2437	1	23.78	30	-6.22	Pass
			2	24.65	30	-5.35	Pass
			5.5	25.11	30	-4.89	Pass
			11	25.02	30	-4.98	Pass
802.11b	11	2462	1	23.44	30	-6.56	Pass
			2	23.96	30	-6.04	Pass
			5.5	24.71	30	-5.29	Pass
			11	24.65	30	-5.35	Pass
802.11g	1	2412	6	22.74	30	-7.26	Pass
			9	22.85	30	-7.15	Pass
			12	22.85	30	-7.15	Pass
			18	22.79	30	-7.21	Pass
			24	23.32	30	-6.68	Pass
			36	23.31	30	-6.69	Pass
			48	22.54	30	-7.46	Pass
			54	22.58	30	-7.42	Pass
802.11g	6	2437	6	22.85	30	-7.15	Pass
			9	22.92	30	-7.08	Pass
			12	23.02	30	-6.98	Pass
			18	23.01	30	-6.99	Pass
			24	23.59	30	-6.41	Pass
			36	23.45	30	-6.55	Pass
			48	22.73	30	-7.27	Pass
			54	22.8	30	-7.2	Pass
802.11g	11	2462	6	22.39	30	-7.61	Pass
			9	22.42	30	-7.58	Pass
			12	22.54	30	-7.46	Pass
			18	22.47	30	-7.53	Pass
			24	23.05	30	-6.95	Pass
			36	22.92	30	-7.08	Pass
			48	21.99	30	-8.01	Pass
			54	22	30	-8	Pass
802.11n	1	2412	MCS0	21.13	30	-8.87	Pass
			MCS1	21.27	30	-8.73	Pass
			MCS2	21.22	30	-8.78	Pass
			MCS3	21.65	30	-8.35	Pass
			MCS4	21.73	30	-8.27	Pass
			MCS5	21.88	30	-8.12	Pass
			MCS6	21.9	30	-8.1	Pass
			MCS7	21.88	30	-8.12	Pass
802.11n	6	2437	MCS0	21.25	30	-8.75	Pass
			MCS1	21.37	30	-8.63	Pass
			MCS2	21.37	30	-8.63	Pass
			MCS3	21.96	30	-8.04	Pass
			MCS4	21.75	30	-8.25	Pass
			MCS5	21.91	30	-8.09	Pass
			MCS6	21.95	30	-8.05	Pass
			MCS7	21.94	30	-8.06	Pass
802.11n	11	2462	MCS0	20.64	30	-9.36	Pass
			MCS1	20.81	30	-9.19	Pass
			MCS2	20.86	30	-9.14	Pass
			MCS3	21.43	30	-8.57	Pass
			MCS4	21.43	30	-8.57	Pass
			MCS5	21.24	30	-8.76	Pass
			MCS6	21.27	30	-8.73	Pass
			MCS7	21.32	30	-8.68	Pass

## 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

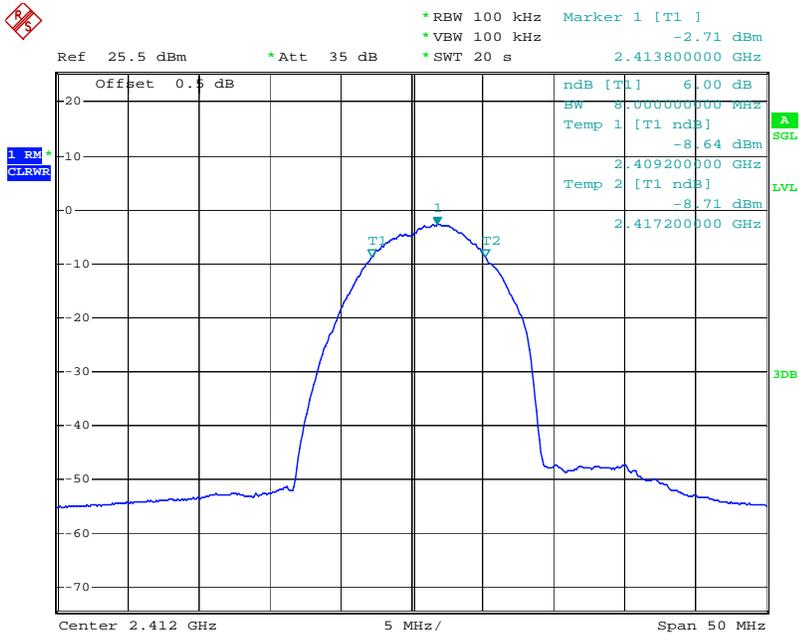
ANSI C63.10: 2009 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)

### 5.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3099	Rohde & Schwarz	FSP7	8/27/2010	8/27/2011

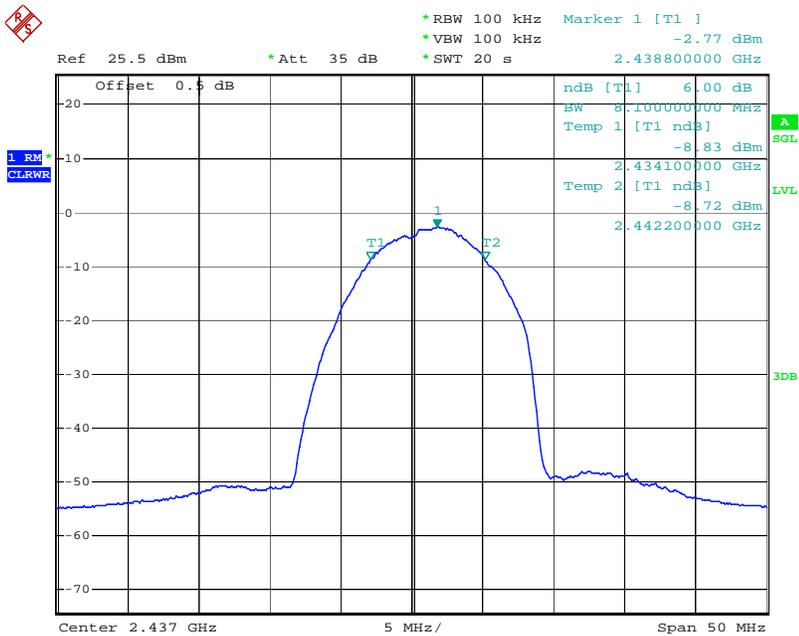
### 5.4 Results:

Mode	Channel Number	Frequency (MHz)	6dB Bandwidth	99% Power Bandwidth	Result
802.11b	1	2412	8.0MHz	---	Pass
802.11b	6	2437	8.1MHz	11.8MHz	Pass
802.11b	11	2462	8.1MHz	---	Pass
802.11g	1	2412	16.4MHz	---	Pass
802.11g	6	2437	16.4MHz	16.36MHz	Pass
802.11g	11	2462	16.4MHz	---	Pass
802.11n	1	2412	17.6MHz	---	Pass
802.11n	6	2437	17.6MHz	23.16MHz	Pass
802.11n	11	2462	17.6MHz	---	Pass



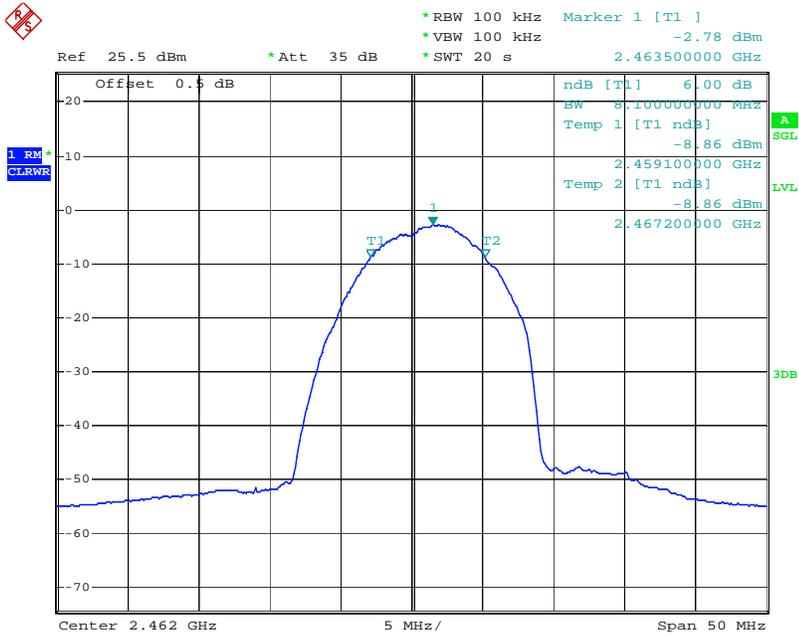
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6dB Bandwidth Plot (Channel 1) – 802.11b mode



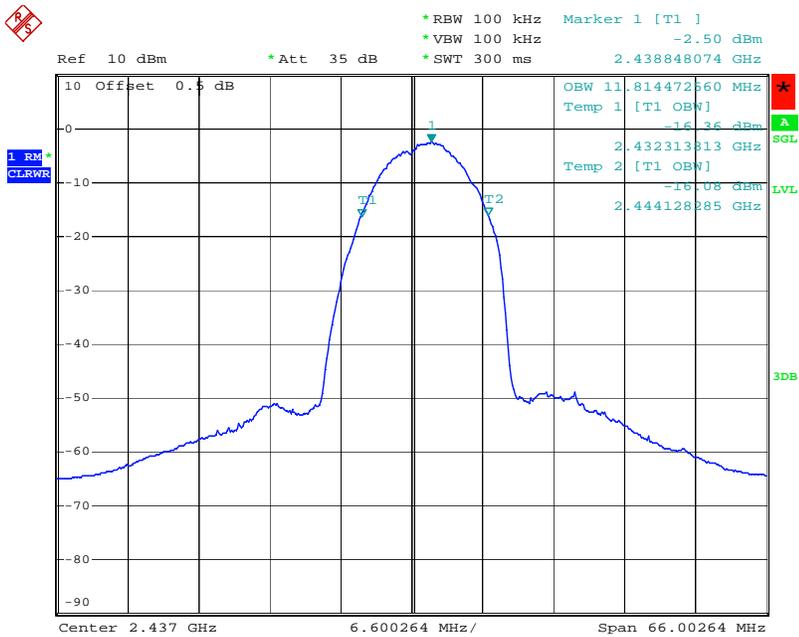
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6dB Bandwidth Plot (Channel 6) – 802.11b mode



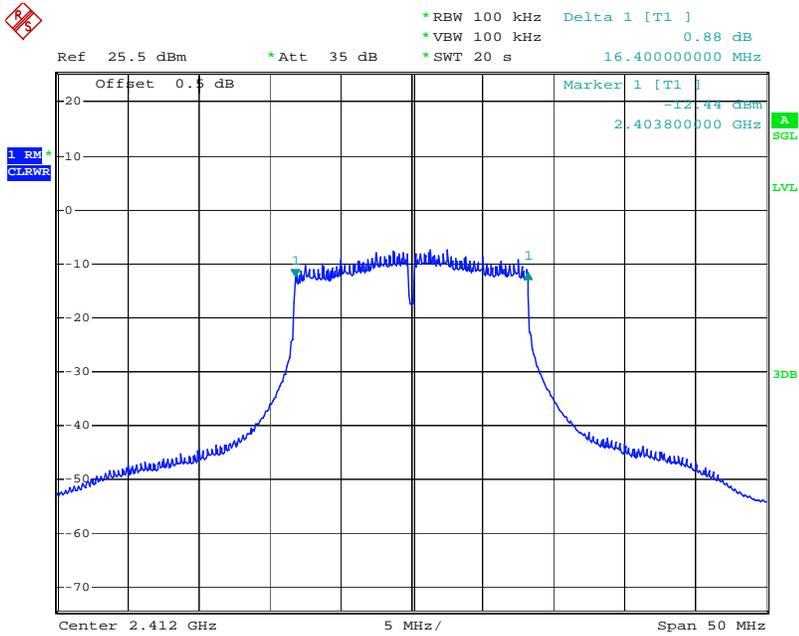
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6dB Bandwidth Plot (Channel 11) – 802.11b mode



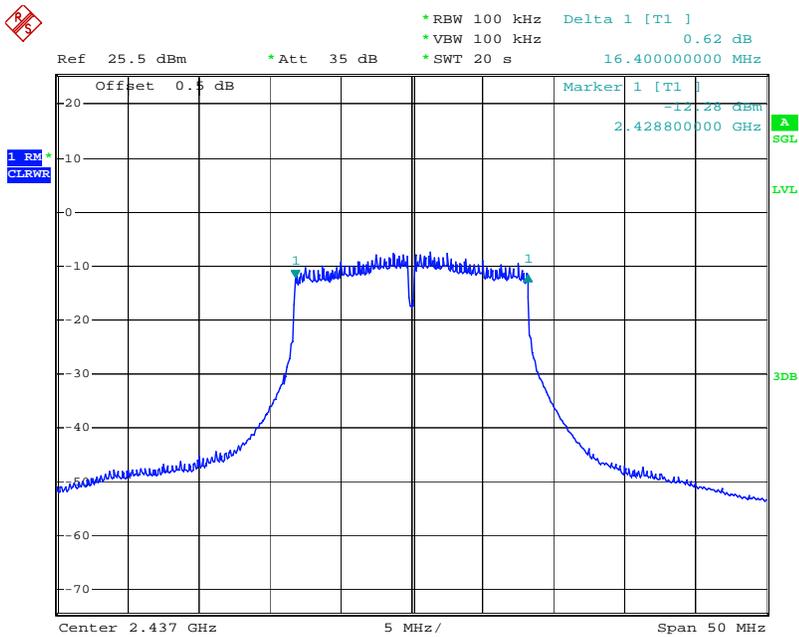
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99% Power Bandwidth Plot (Channel 6) – 802.11b mode



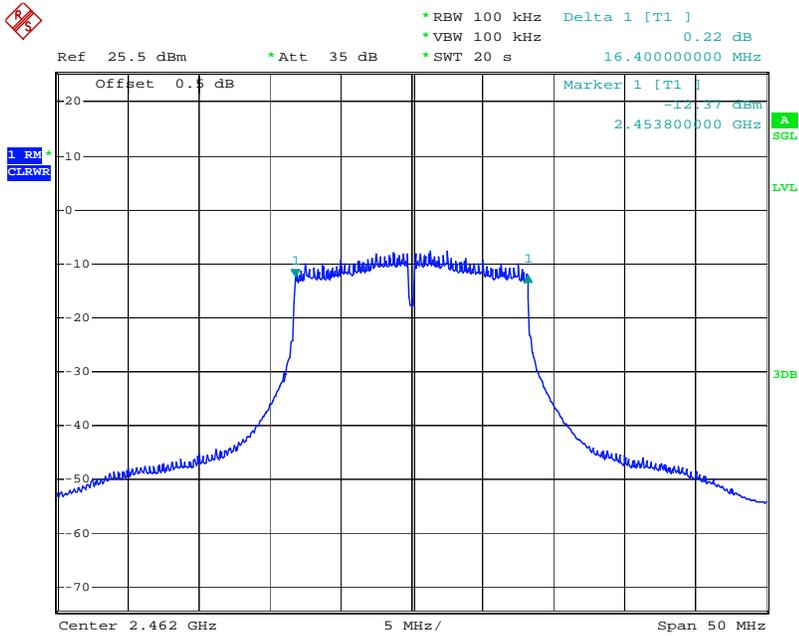
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6dB Bandwidth Plot (Channel 1) – 802.11g mode



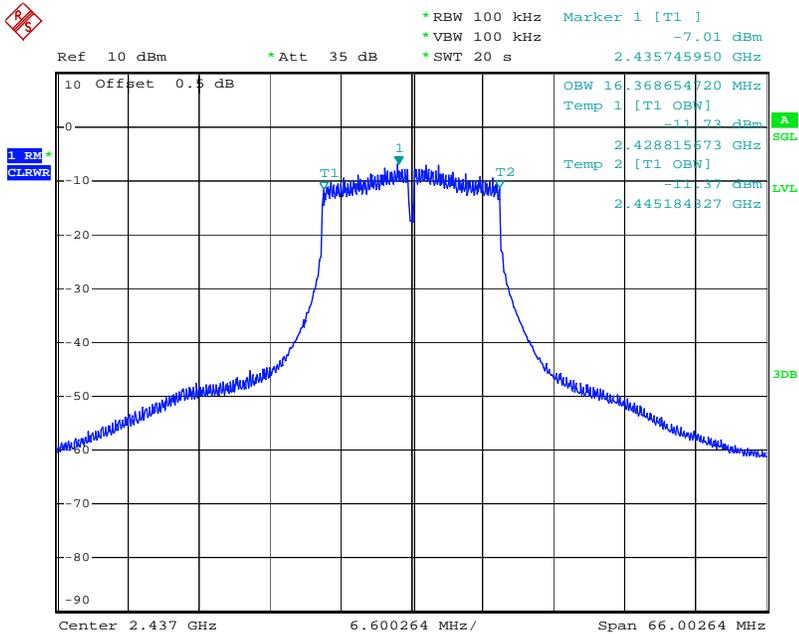
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6dB Bandwidth Plot (Channel 6) – 802.11g mode



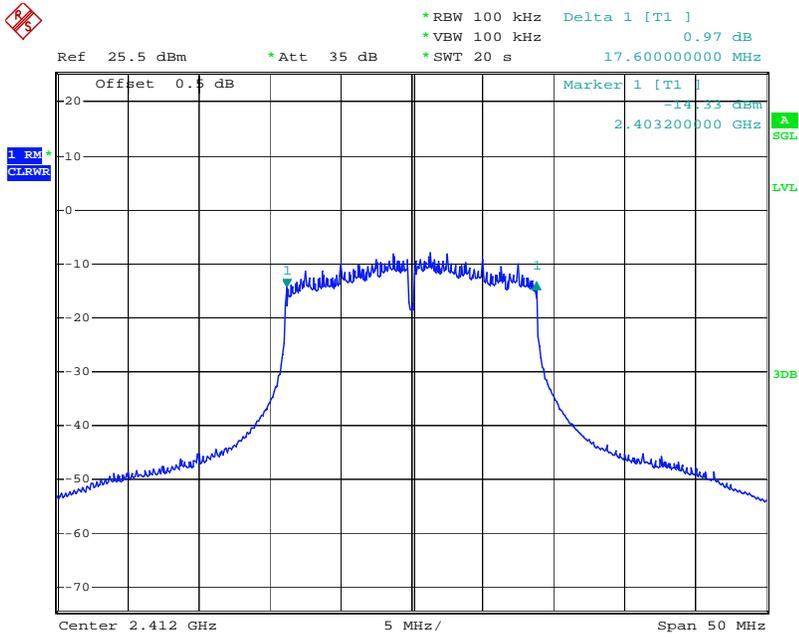
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6dB Bandwidth Plot (Channel 11) – 802.11g mode



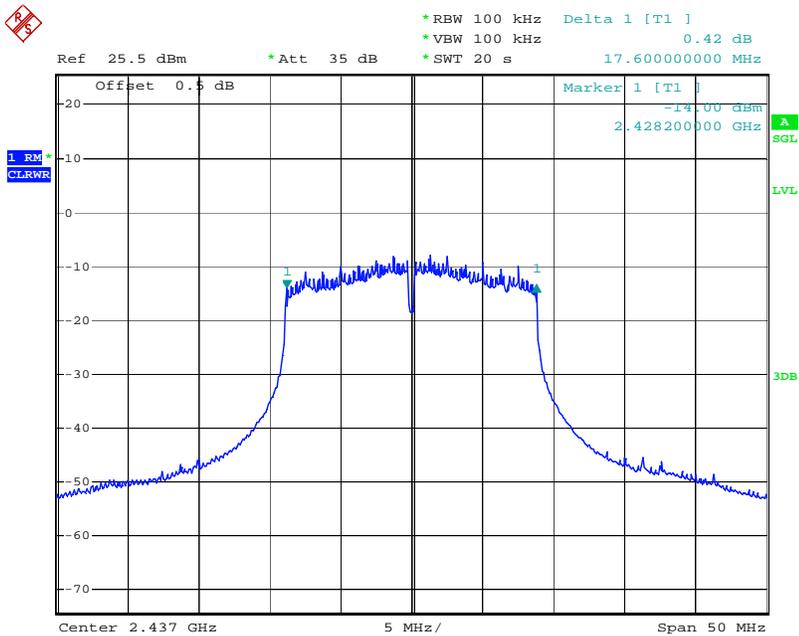
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99% Power Bandwidth Plot (Channel 6) – 802.11g mode



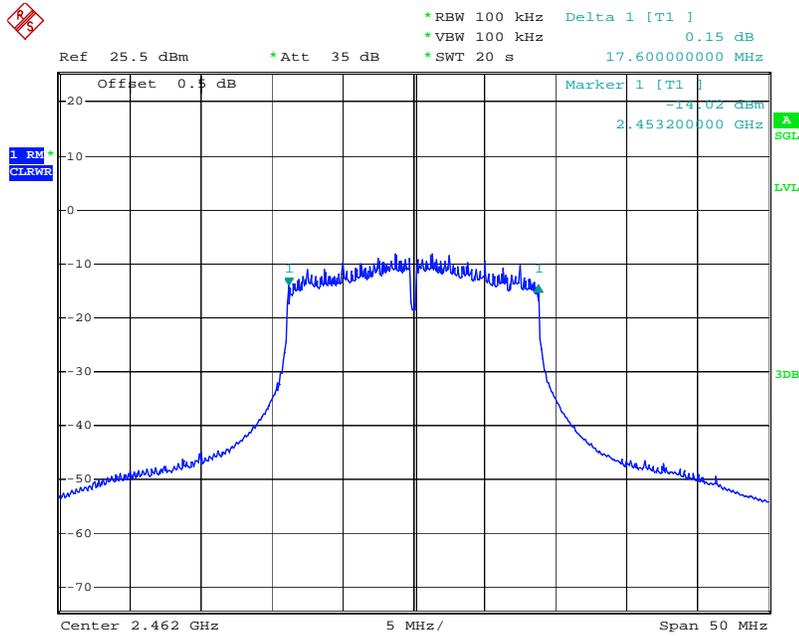
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**6dB Bandwidth Plot (Channel 1) – 802.11n mode**



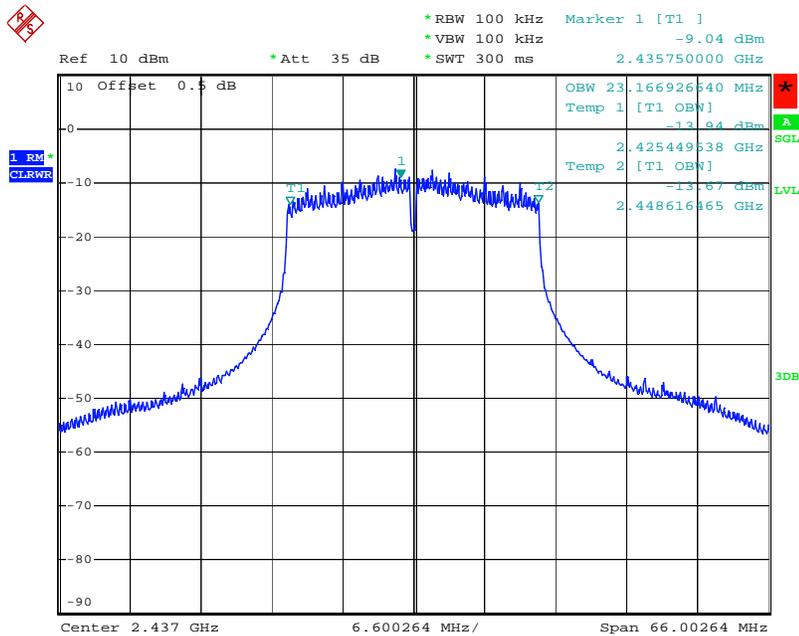
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**6dB Bandwidth Plot (Channel 6) – 802.11n mode**



Date: 27.NOV.2010 14:00:29

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



Date: 27.NOV.2010 14:04:12

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

## 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)

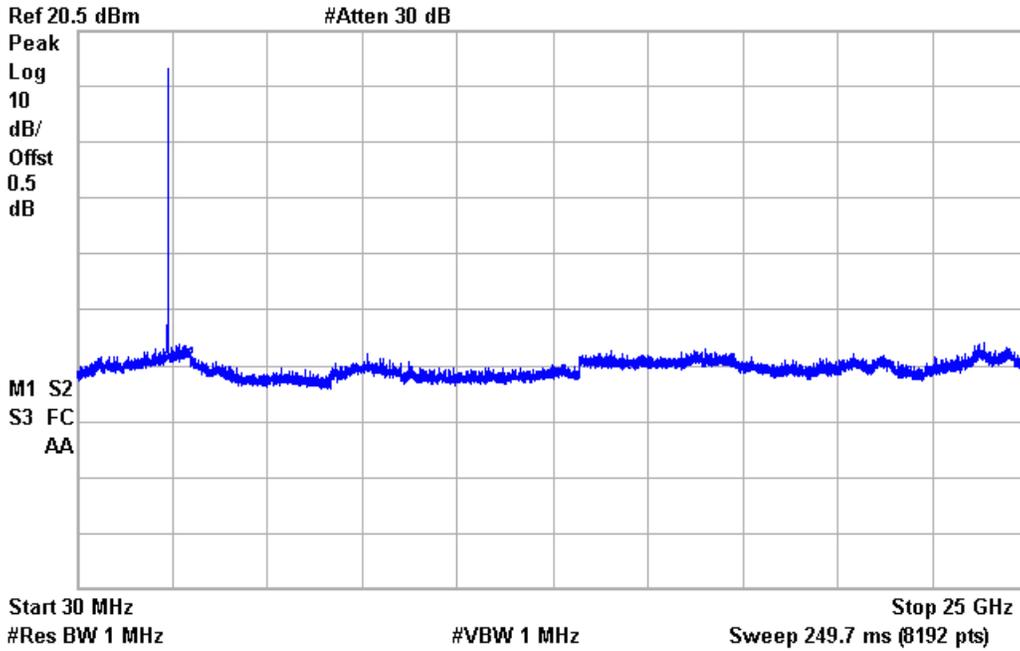
### 6.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMC Analyzer	2142	HP	E7405	9/1/2010	9/1/2011
Spectrum Analyzer	3099	Rohde & Schwarz	FSP7	8/27/2010	8/27/2011

### 6.4 Results:

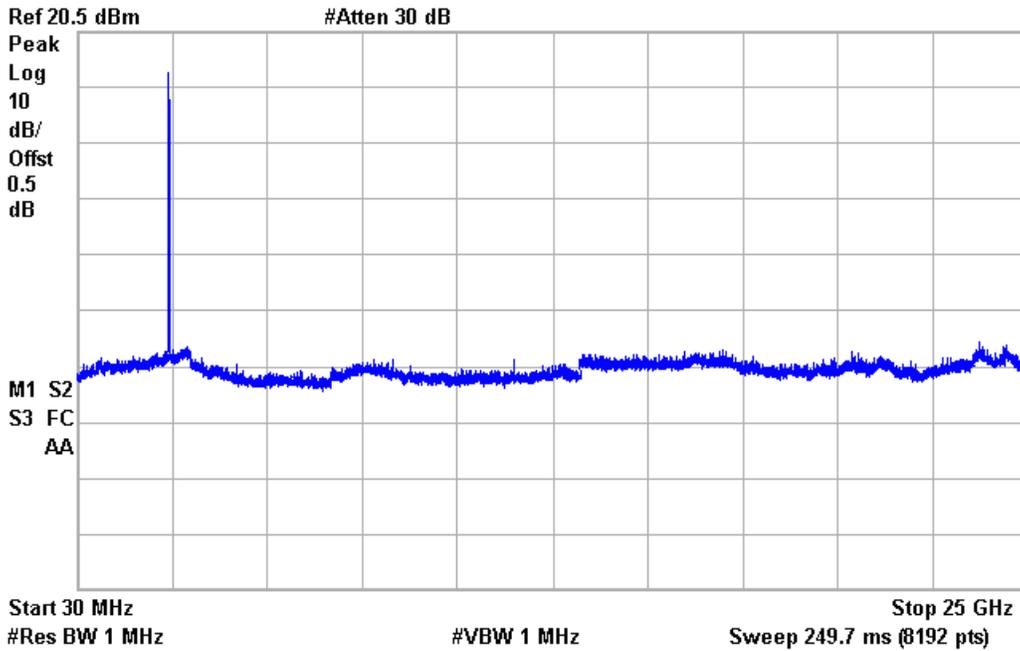
The following plots show that there are no conducted spurious emissions exceeding the 20dB down criteria.

Agilent 12:07:31 Nov 27, 2010 T



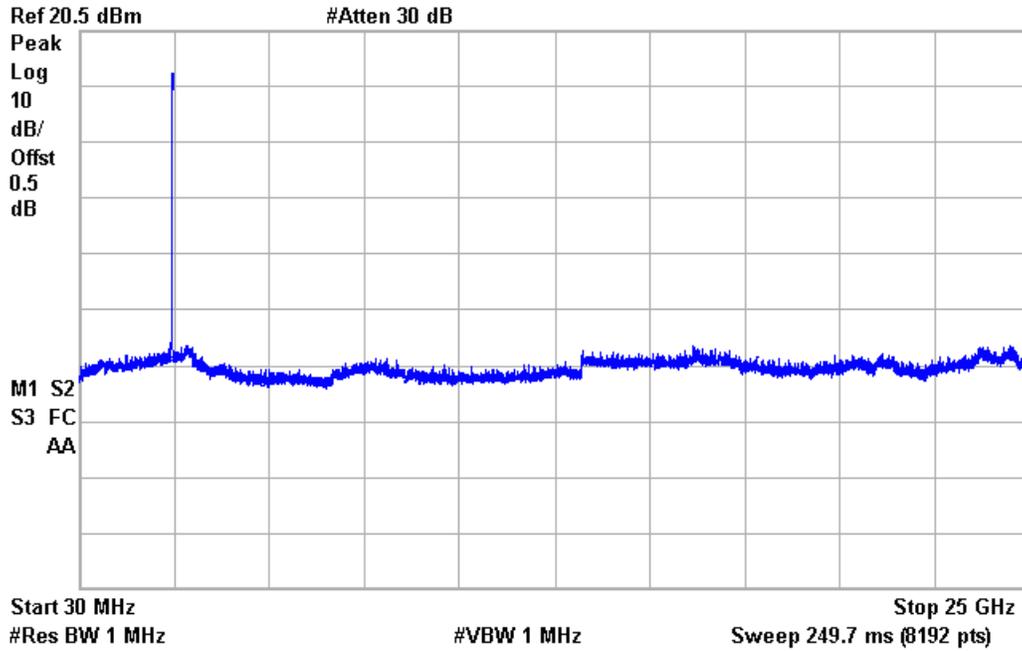
Conducted Spurious Emissions - 802.11b Mode Low Channel

Agilent 12:05:51 Nov 27, 2010 T



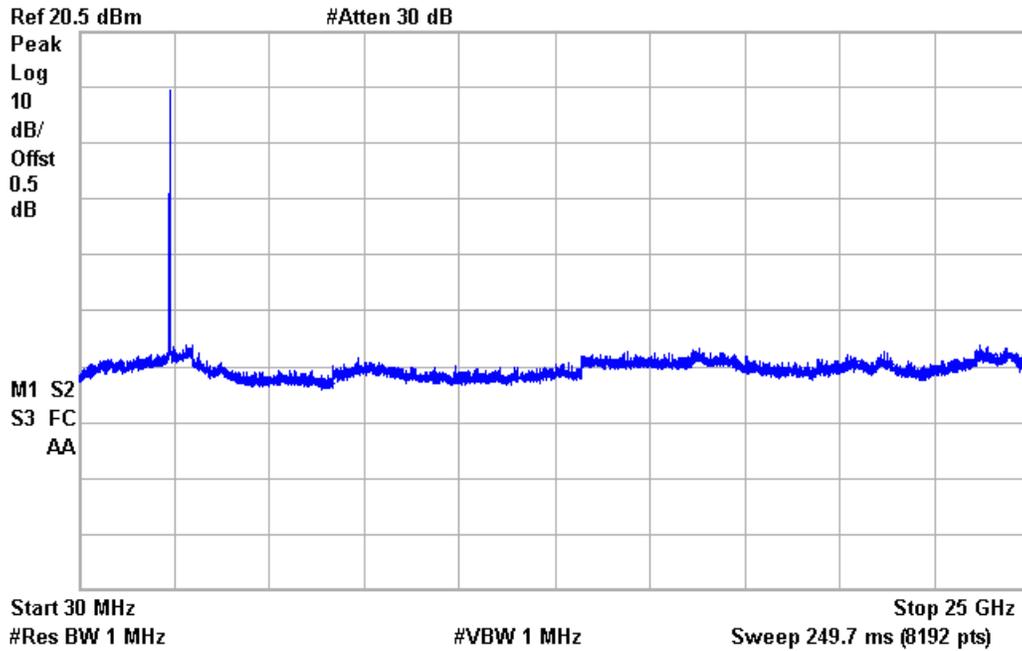
Conducted Spurious Emissions - 802.11b Mode Mid Channel

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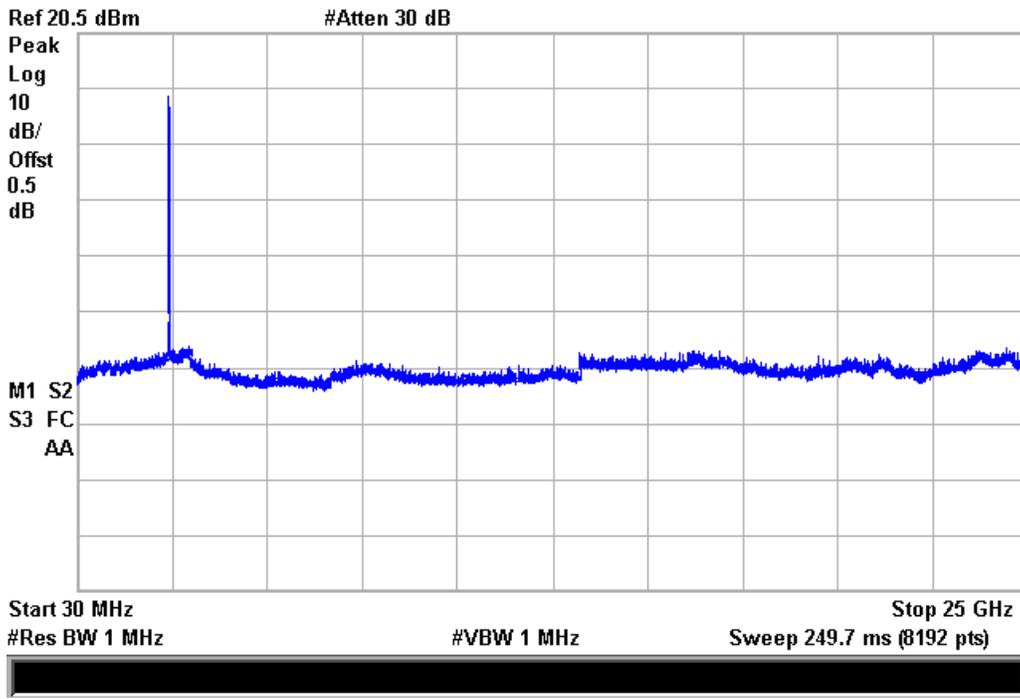
Conducted Spurious Emissions - 802.11b Mode High Channel

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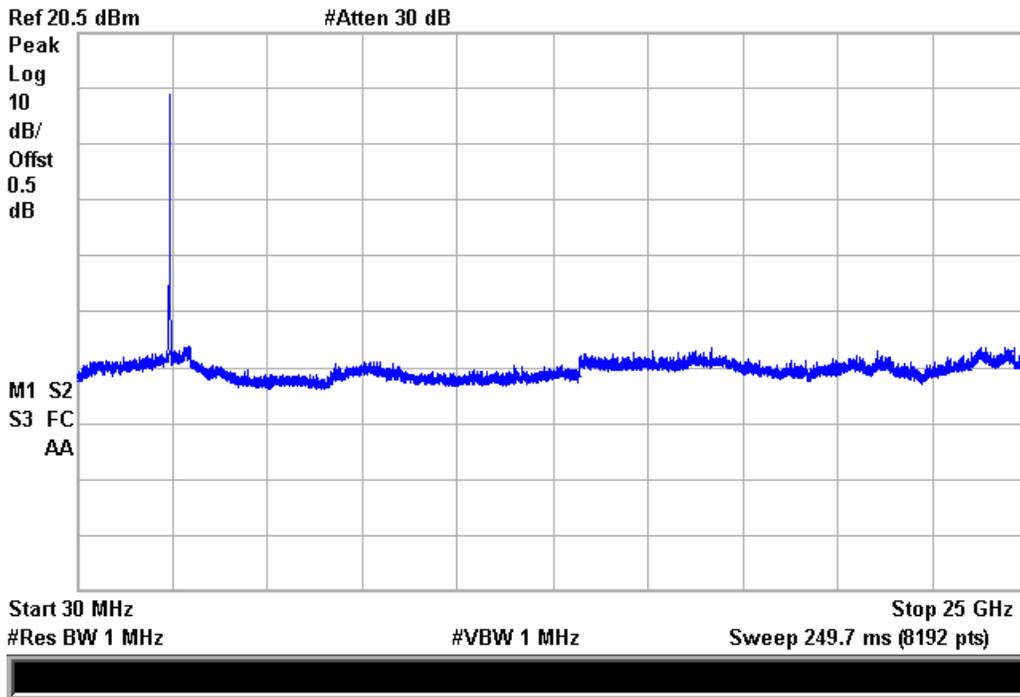


Conducted Spurious Emissions - 802.11g Mode Low Channel

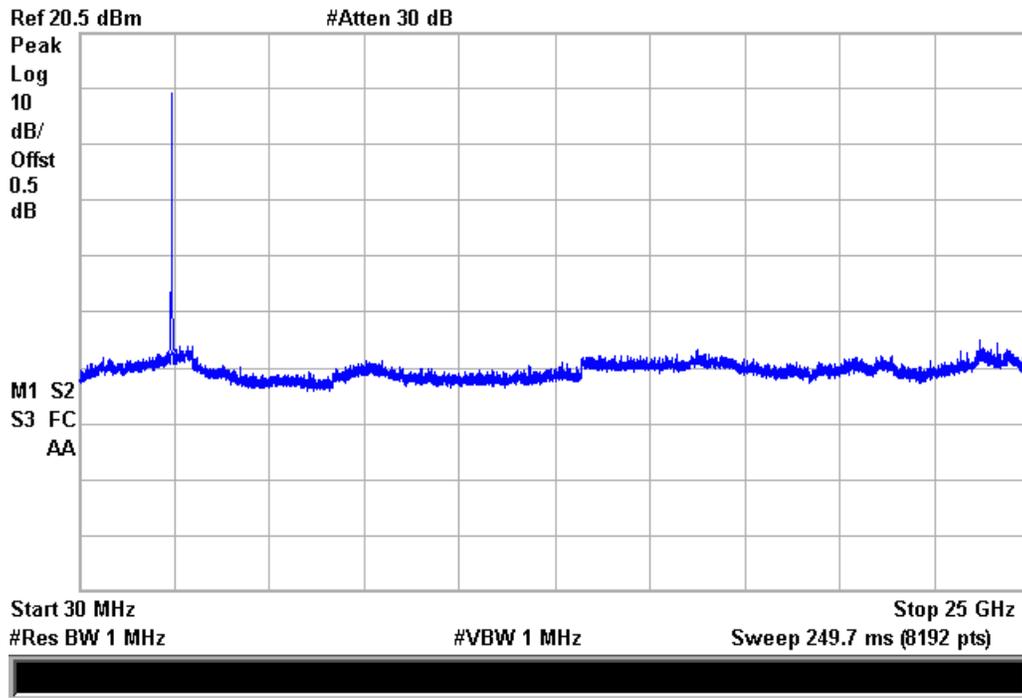
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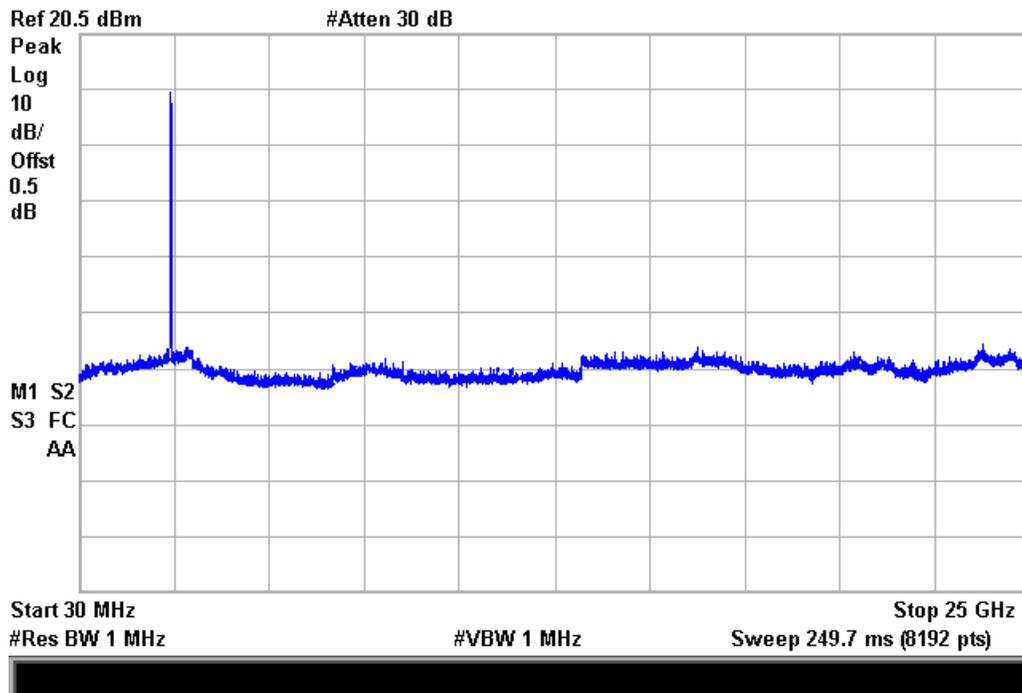


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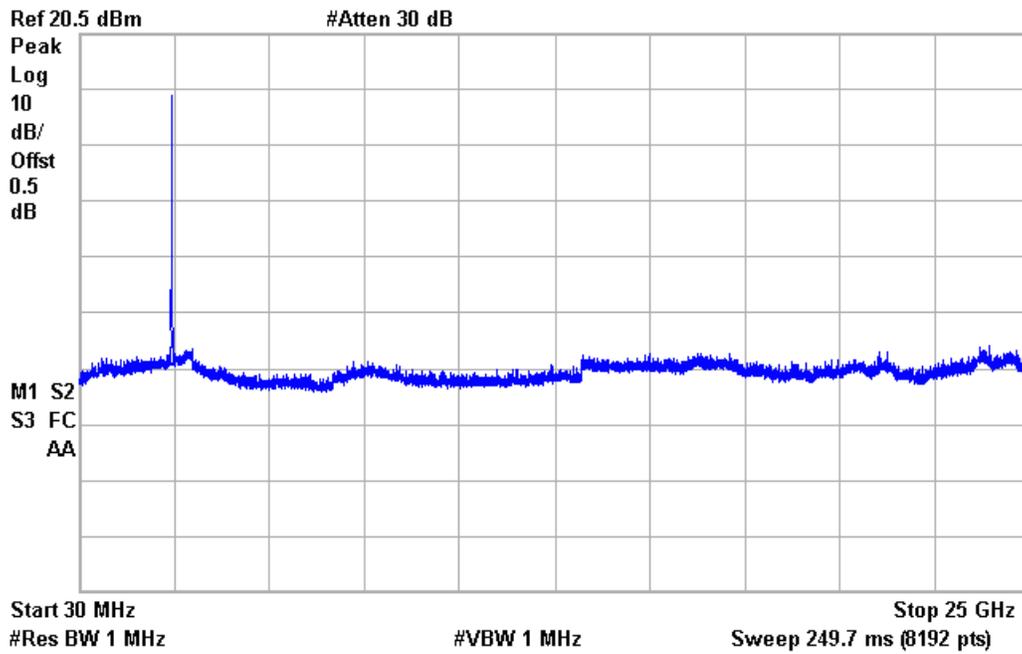
Conducted Spurious Emissions - 802.11n Mode Low Channel

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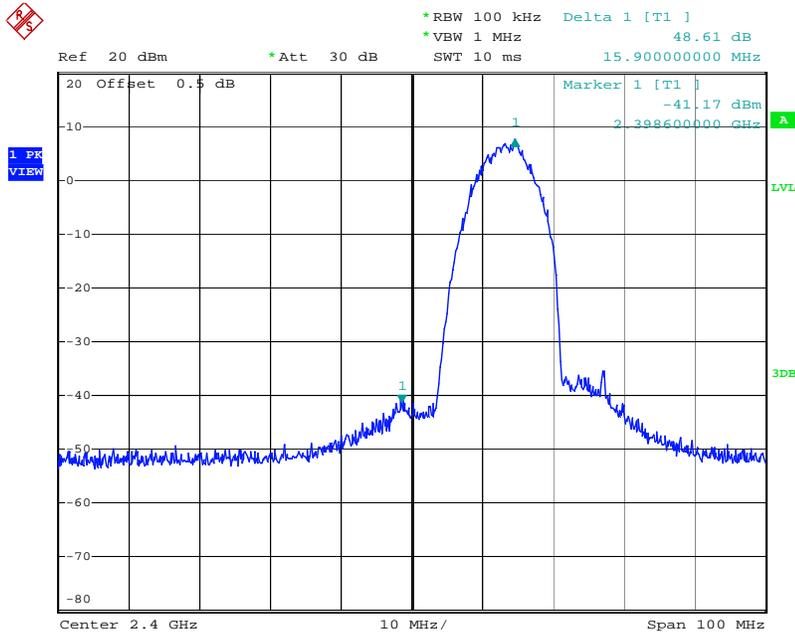


Conducted Spurious Emissions - 802.11n Mode Mid Channel

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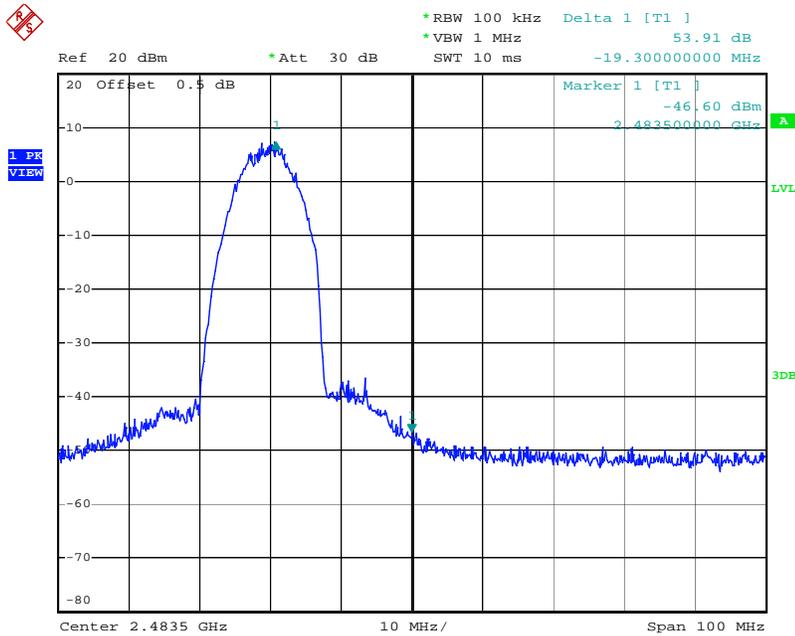


Conducted Spurious Emissions - 802.11n Mode High Channel



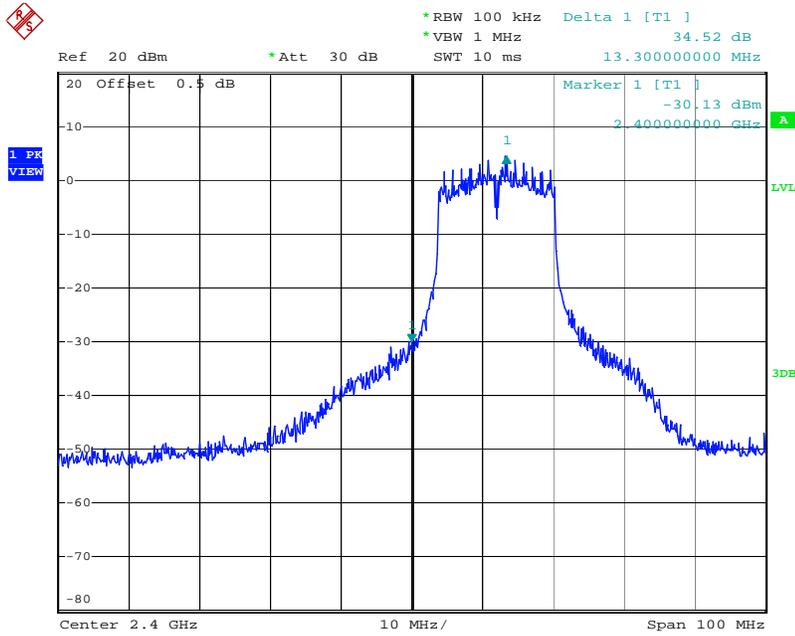
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**Emissions Close to Band Edge - 802.11b Mode Low Channel**



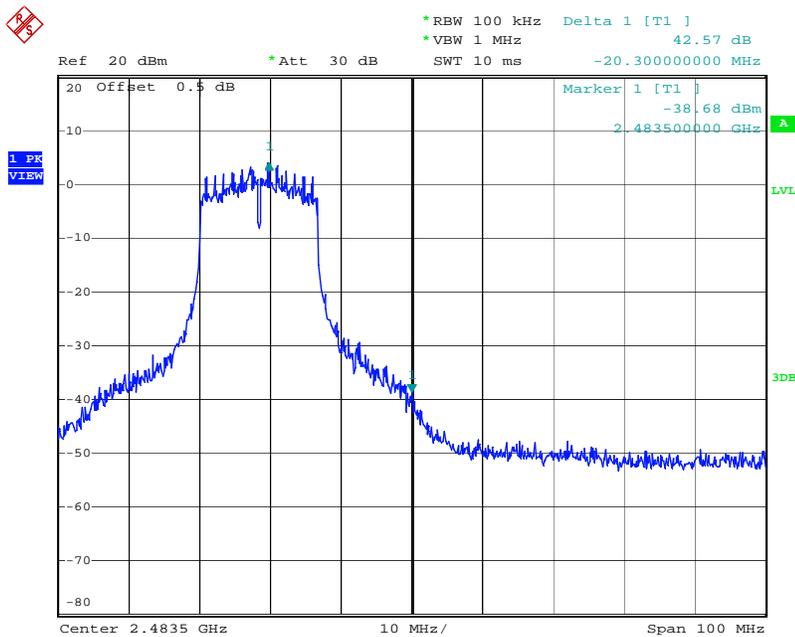
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**Emissions Close to Band Edge - 802.11b Mode High Channel**



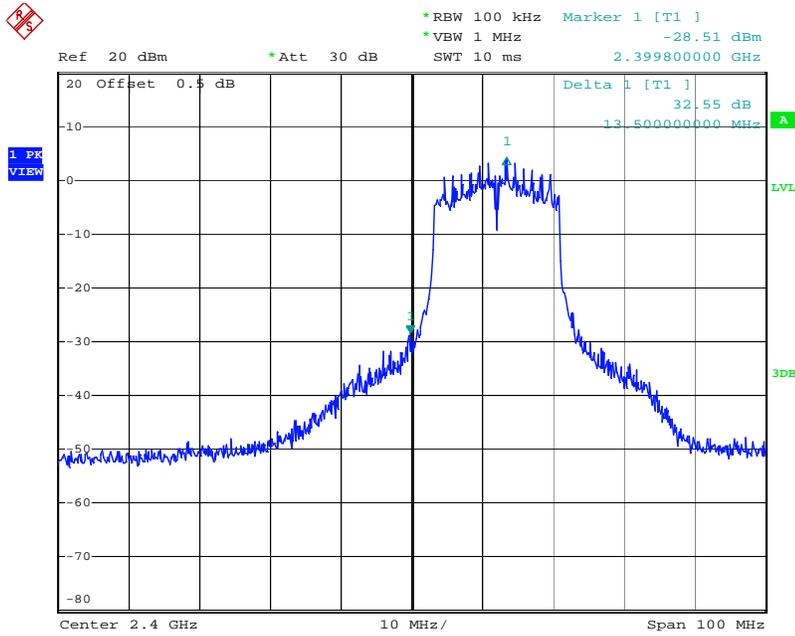
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### Emissions Close to Band Edge - 802.11g Mode Low Channel



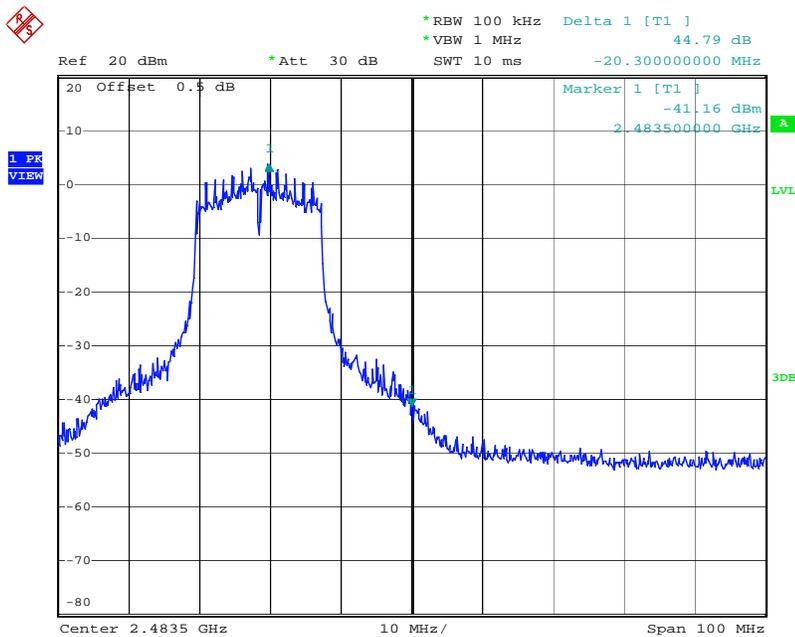
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### Emissions Close to Band Edge - 802.11g Mode High Channel



Date: 29.NOV.2010 10:51:05

### Emissions Close to Band Edge - 802.11g Mode Low Channel



Date: 29.NOV.2010 10:52:08

### Emissions Close to Band Edge - 802.11n Mode 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)

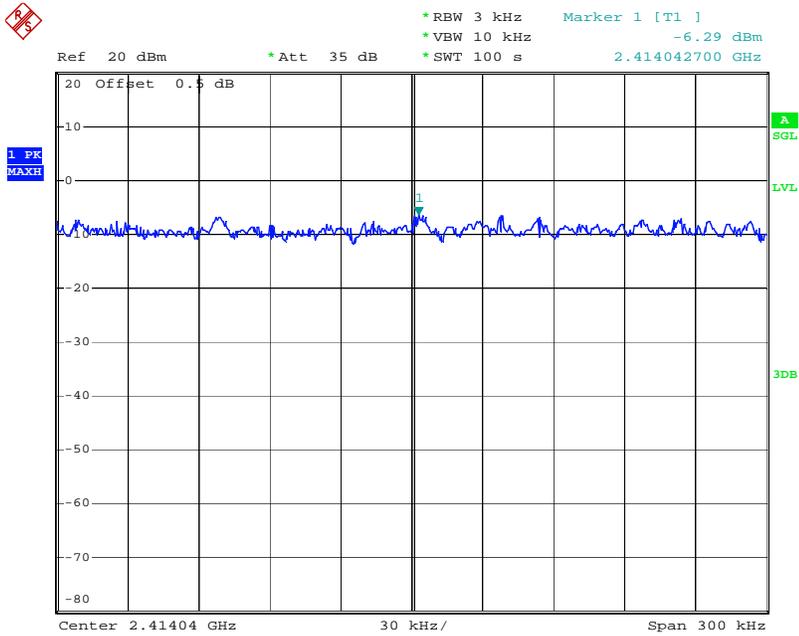
### 7.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3099	Rohde & Schwarz	FSP7	8/27/2010	8/27/2011

### 7.4 Results:

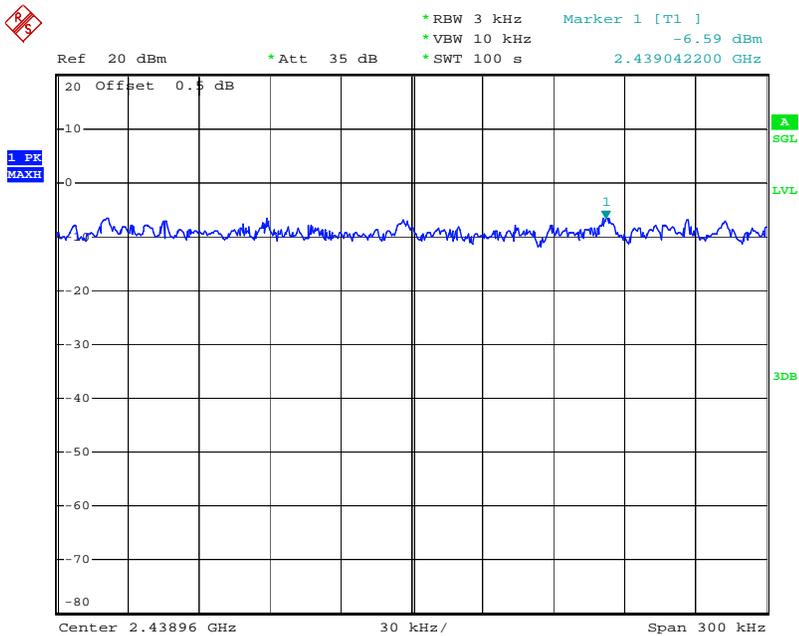
\*PSD Option 1 Method

Mode	Channel Number	Frequency (MHz)	PSD in 3kHz BW (dBm)	Limit (dBm)	Margin (dBm)	Result
802.11b	1	2412	-6.29	8.0	-14.29	Pass
802.11b	6	2437	-6.59	8.0	-14.59	Pass
802.11b	11	2462	-6.63	8.0	-14.63	Pass
802.11g	1	2412	-11.24	8.0	-19.24	Pass
802.11g	6	2437	-10.96	8.0	-18.96	Pass
802.11g	11	2462	-11.09	8.0	-19.09	Pass
802.11n	1	2412	-11.76	8.0	-19.76	Pass
802.11n	6	2437	-11.68	8.0	-19.68	Pass
802.11n	11	2462	-12.09	8.0	-20.09	Pass



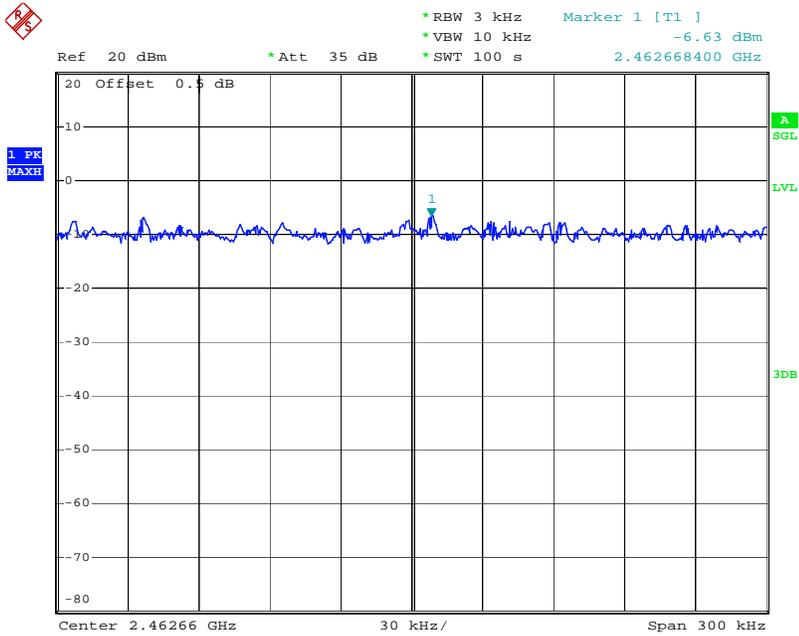
Date: 29.NOV.2010 09:05:56

**Power Spectral Density – Channel 1 802.11b mode**



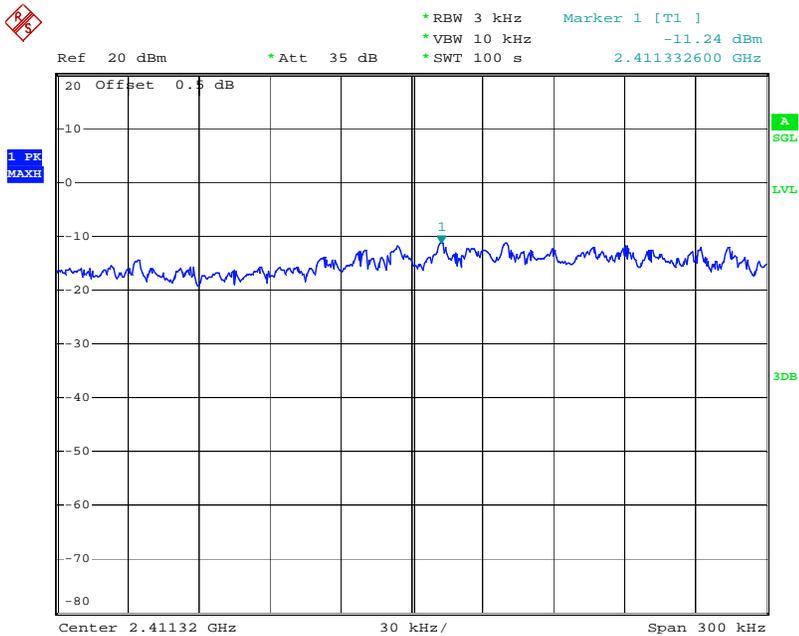
Date: 29.NOV.2010 09:11:55

**Power Spectral Density – Channel 6 802.11b mode**



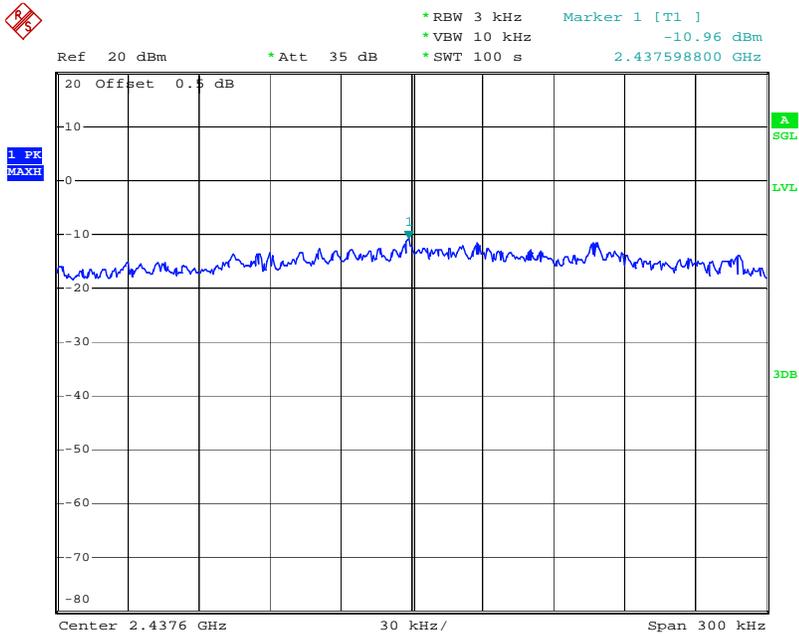
Date: 29.NOV.2010 09:16:05

**Power Spectral Density – Channel 11 802.11b mode**



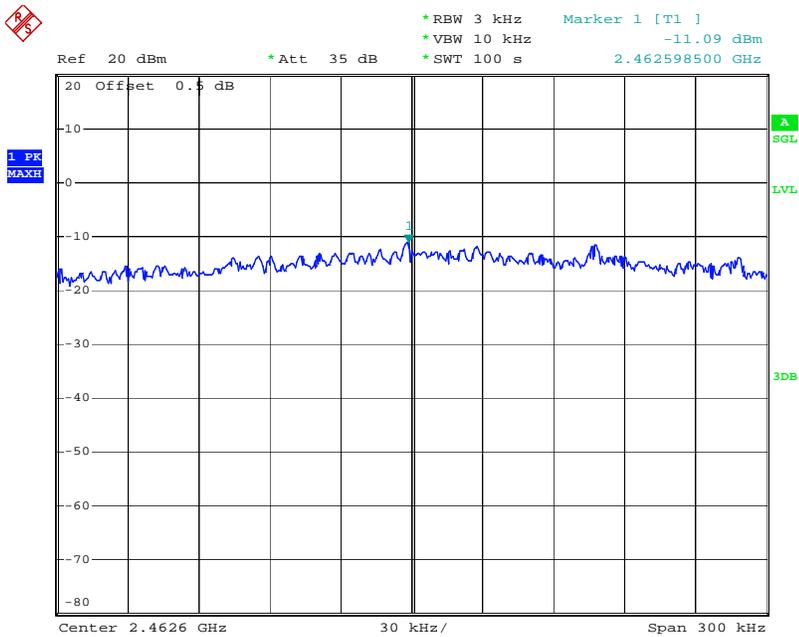
Date: 29.NOV.2010 09:39:37

**Power Spectral Density – Channel 1 802.11g mode**



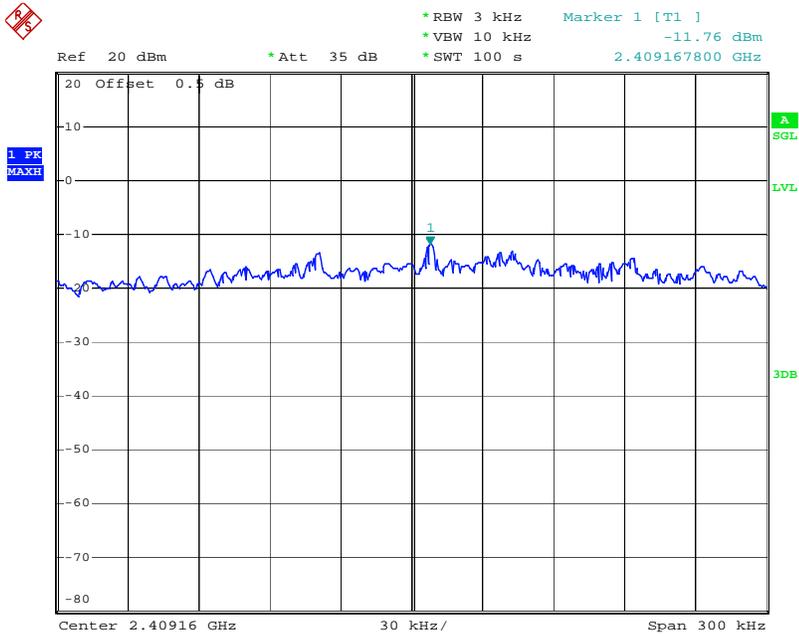
Date: 29.NOV.2010 09:34:22

**Power Spectral Density – Channel 6 802.11g mode**



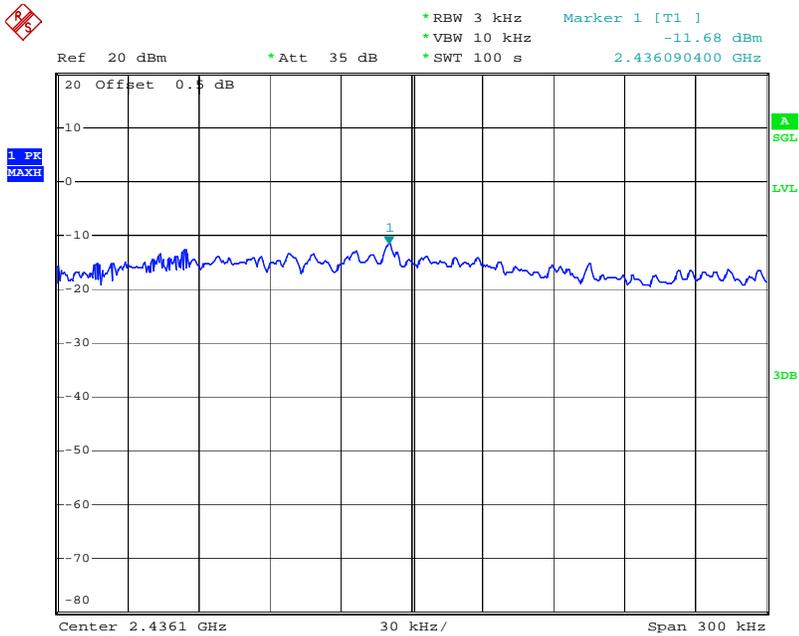
Date: 29.NOV.2010 09:20:18

**Power Spectral Density – Channel 11 802.11g mode**



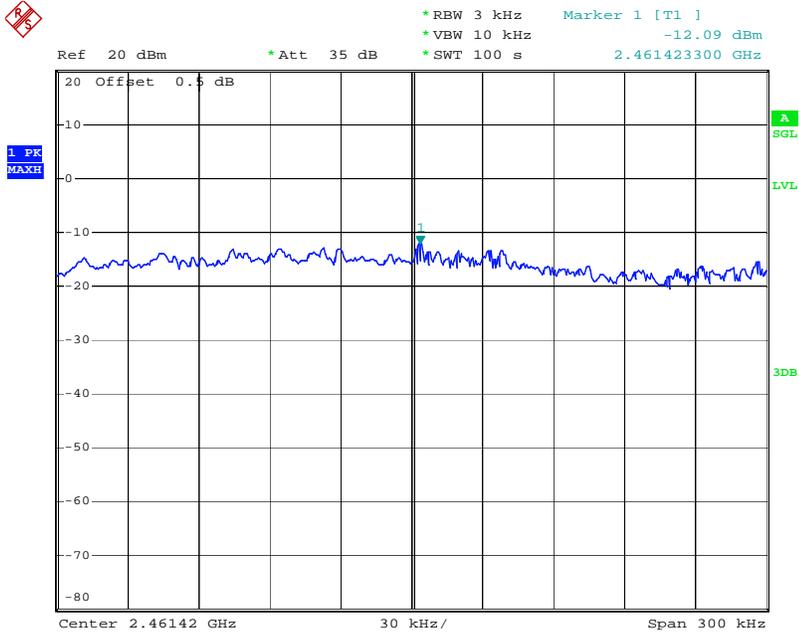
Date: 29.NOV.2010 09:46:33

**Power Spectral Density – Channel 1 802.11n mode**



Date: 29.NOV.2010 09:50:35

**Power Spectral Density – Channel 6 802.11n mode**



Date: 29.NOV.2010 09:54:23

**Power Spectral Density – Channel 11 802.11n mode**

## 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
10.495–0.505	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	( <sup>2</sup> )
13.36–13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.

<sup>2</sup> 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 dB $\mu$ V/m

RA = Receiver Amplitude in dB $\mu$ V

AF = Antenna Factor in dB

CF = Cable Attenuation Factor in dB (Including preamplifier and filter attenuation)

Example Calculation:

$$RA = 19.48 \text{ dB}\mu\text{V}$$

$$AF = 18.52 \text{ dB}$$

$$CF = 0.78 \text{ dB}$$

$$FS = 19.48 + 18.52 + 0.78 = 38.78 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(38.78 \text{ dB}\mu\text{V/m})/20] = 86.89 \mu\text{V/m}$$

### 8.4 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	10887490.26	Rohde & Schwarz	ESI26	6/29/2010	6/29/2011
Preamplifier	987410	Miteq	AFS44-00102000-30-10P-44	6/17/2010	6/17/2011
Preamplifier	SF456200904	Mini-Circuits	ZX60-3018G-S+	2/12/2010	2/12/2011
Biconnilog Antenna	00051864	ETS	3142C	12/21/2009	12/21/2010
Horn Antenna	6556	ETS	3115	8/9/2010	8/9/2011
System Controller	121701-1	Sunol Sciences	SC99V	Time of Use	Time of Use
High Pass Filter	3986-01 DC0408	Microwave Circuits, Inc.	H3G020G2	2/10/2010	2/10/2011

**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.

**Worst Case Spurious Measurements (802.11b Mode)**

TX Channel	Spurious Frequency	Polarity	Corr. Peak Reading. (dBuV/m)	Corr. Avg Reading. (dBuV/m)	Peak Limit (dBuV/m)	Avg. Limit (dBuV/m)	Results	Comments
1	4.824 GHz	V	46.589	39.699	74	54	Compliant	Restricted Band
1	7.236 GHz	V	42.713	33.043	74	54	Compliant	Restricted Band
1	12.06 GHz	V	46.473	37.363	74	54	Compliant	Restricted Band
1	14.472 GHz	V	48.799	39.889	74	54	Compliant	Restricted Band
1	4.8239 GHz	H	52.316	47.986	74	54	Compliant	Restricted Band
1	7.236 GHz	H	41.422	32.812	74	54	Compliant	Restricted Band
1	12.06 GHz	H	48.743	37.313	74	54	Compliant	Restricted Band
1	14.472 GHz	H	48.929	39.869	74	54	Compliant	Restricted Band
6	4.874 GHz	V	47.679	38.309	74	54	Compliant	Restricted Band
6	7.311 GHz	V	45.622	35.102	74	54	Compliant	Restricted Band
6	12.185 GHz	V	47.672	38.192	74	54	Compliant	Restricted Band
6	14.622 GHz	V	50.191	41.011	74	54	Compliant	Restricted Band
6	4.8739 GHz	H	52.237	47.997	74	54	Compliant	Restricted Band
6	7.311 GHz	H	44.623	34.963	74	54	Compliant	Restricted Band
6	12.185 GHz	H	46.942	38.122	74	54	Compliant	Restricted Band
6	14.622 GHz	H	50.711	41.051	74	54	Compliant	Restricted Band
11	4.9239 GHz	V	45.88	37.32	74	54	Compliant	Restricted Band
11	7.386 GHz	V	43.358	35.008	74	54	Compliant	Restricted Band
11	12.31 GHz	V	47.913	38.463	74	54	Compliant	Restricted Band
11	14.772 GHz	V	50.608	40.288	74	54	Compliant	Restricted Band
11	4.924 GHz	H	48.16	41.04	74	54	Compliant	Restricted Band
11	7.386 GHz	H	42.208	33.948	74	54	Compliant	Restricted Band
11	12.31 GHz	H	46.923	37.713	74	54	Compliant	Restricted Band
11	14.772 GHz	H	49.958	39.748	74	54	Compliant	Restricted Band

\*Emissions were investigated with the test sample positioned in 3 orthogonal axis and the worst case reported.

## Worst Case Spurious Measurements (802.11g Mode)

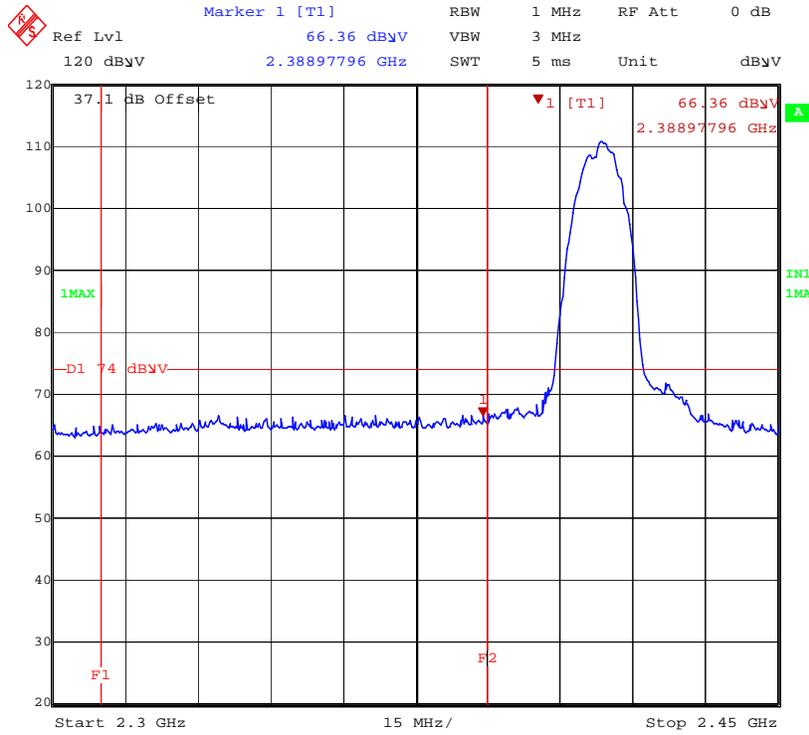
TX Channel	Spurious Frequency	Polarity	Corr. Peak Reading. (dBuV/m)	Corr. Avg Reading. (dBuV/m)	Peak Limit (dBuV/m)	Avg. Limit (dBuV/m)	Results	Comments
1	4.8241 GHz	V	44.759	30.892	74	54	Compliant	Restricted Band
1	7.236 GHz	V	46.38	35.24	74	54	Compliant	Restricted Band
1	12.06 GHz	V	49.383	38.773	74	54	Compliant	Restricted Band
1	14.472 GHz	V	49.679	41.249	74	54	Compliant	Restricted Band
1	4.824 GHz	H	51.188	37.328	74	54	Compliant	Restricted Band
1	7.236 GHz	H	45.173	34.513	74	54	Compliant	Restricted Band
1	12.06 GHz	H	48.243	38.763	74	54	Compliant	Restricted Band
1	14.472 GHz	H	50.159	41.149	74	54	Compliant	Restricted Band
6	4.874 GHz	V	44.67	31.54	74	54	Compliant	Restricted Band
6	7.311 GHz	V	43.563	34.713	74	54	Compliant	Restricted Band
6	12.185 GHz	V	47.932	37.902	74	54	Compliant	Restricted Band
6	14.622 GHz	V	50.061	40.761	74	54	Compliant	Restricted Band
6	4.874 GHz	H	48.921	34.411	74	54	Compliant	Restricted Band
6	7.311 GHz	H	43.313	34.063	74	54	Compliant	Restricted Band
6	12.185 GHz	H	47.062	37.462	74	54	Compliant	Restricted Band
6	14.622 GHz	H	49.451	40.411	74	54	Compliant	Restricted Band
11	4.924 GHz	H	45.16	31.52	74	54	Compliant	Restricted Band
11	7.386 GHz	H	45.797	34.987	74	54	Compliant	Restricted Band
11	12.31 GHz	H	48.563	38.443	74	54	Compliant	Restricted Band
11	14.772 GHz	H	50.608	40.468	74	54	Compliant	Restricted Band
11	4.924 GHz	V	44.04	30.41	74	54	Compliant	Restricted Band
11	7.386 GHz	V	45.368	35.088	74	54	Compliant	Restricted Band
11	12.31 GHz	V	48.813	38.563	74	54	Compliant	Restricted Band
11	14.772 GHz	V	50.858	40.578	74	54	Compliant	Restricted Band

\*Emissions were investigated with the test sample positioned in 3 orthogonal axis and the worst case reported.

## Worst Case Spurious Measurements (802.11n Mode)

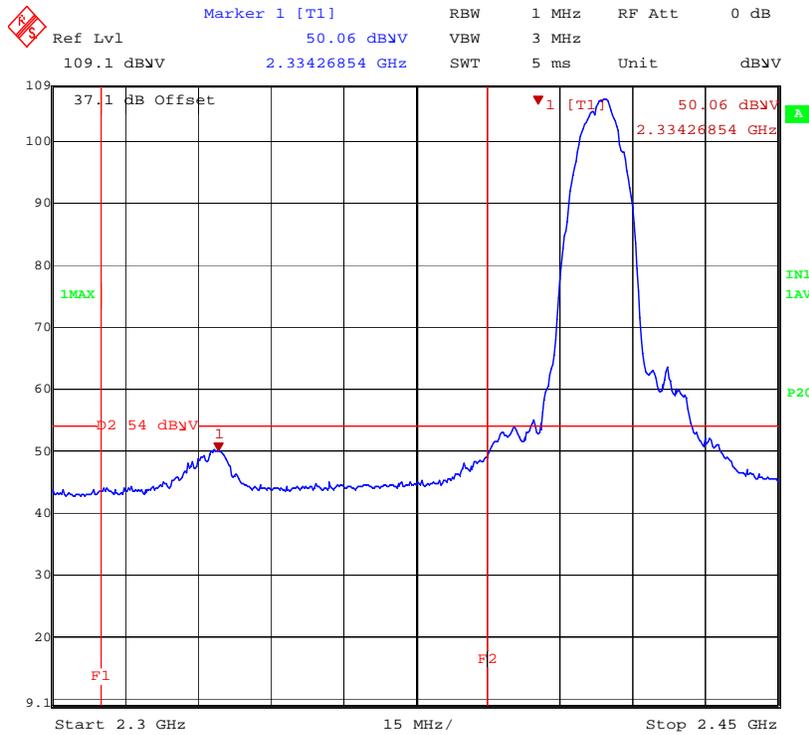
TX Channel	Spurious Frequency	Polarity	Corr. Peak Reading. (dBuV/m)	Corr. Avg Reading. (dBuV/m)	Peak Limit (dBuV/m)	Avg. Limit (dBuV/m)	Results	Comments
1	4.824 GHz	H	49.629	33.889	74	54	Compliant	Restricted Band
1	12.06 GHz	H	46.353	37.713	74	54	Compliant	Restricted Band
1	14.472 GHz	H	50.039	40.289	74	54	Compliant	Restricted Band
1	4.824 GHz	V	44.629	30.819	74	54	Compliant	Restricted Band
1	12.06 GHz	V	51.443	37.963	74	54	Compliant	Restricted Band
1	14.472 GHz	V	51.199	40.399	74	54	Compliant	Restricted Band
6	4.8739 GHz	H	49.451	33.838	74	54	Compliant	Restricted Band
6	7.311 GHz	H	44.903	34.913	74	54	Compliant	Restricted Band
6	12.185 GHz	H	48.583	38.053	74	54	Compliant	Restricted Band
6	14.622 GHz	H	50.32	40.97	74	54	Compliant	Restricted Band
6	4.874 GHz	V	45.291	31.281	74	54	Compliant	Restricted Band
6	7.3109 GHz	V	45.054	35.034	74	54	Compliant	Restricted Band
6	12.185 GHz	V	49.722	38.072	74	54	Compliant	Restricted Band
6	14.622 GHz	V	50.06	40.98	74	54	Compliant	Restricted Band
11	4.924 GHz	V	43.42	30.09	74	54	Compliant	Restricted Band
11	7.386 GHz	V	44.398	35.128	74	54	Compliant	Restricted Band
11	12.31 GHz	V	47.783	38.683	74	54	Compliant	Restricted Band
11	14.772 GHz	V	50.978	40.578	74	54	Compliant	Restricted Band
11	4.924 GHz	H	44.19	29.56	74	54	Compliant	Restricted Band
11	7.386 GHz	H	43.109	34.569	74	54	Compliant	Restricted Band
11	12.31 GHz	H	51.763	38.323	74	54	Compliant	Restricted Band
11	14.772 GHz	H	49.568	40.198	74	54	Compliant	Restricted Band

\*Emissions were investigated with the test sample positioned in 3 orthogonal axis and the worst case reported.



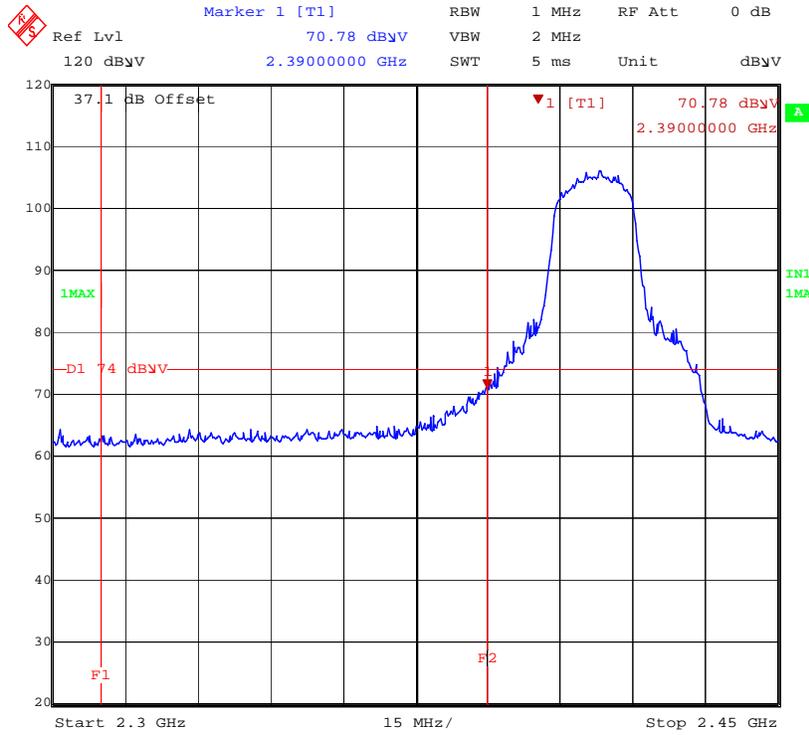
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Low Channel Band Edge Emissions (Peak Detection) – 802.11b Mode



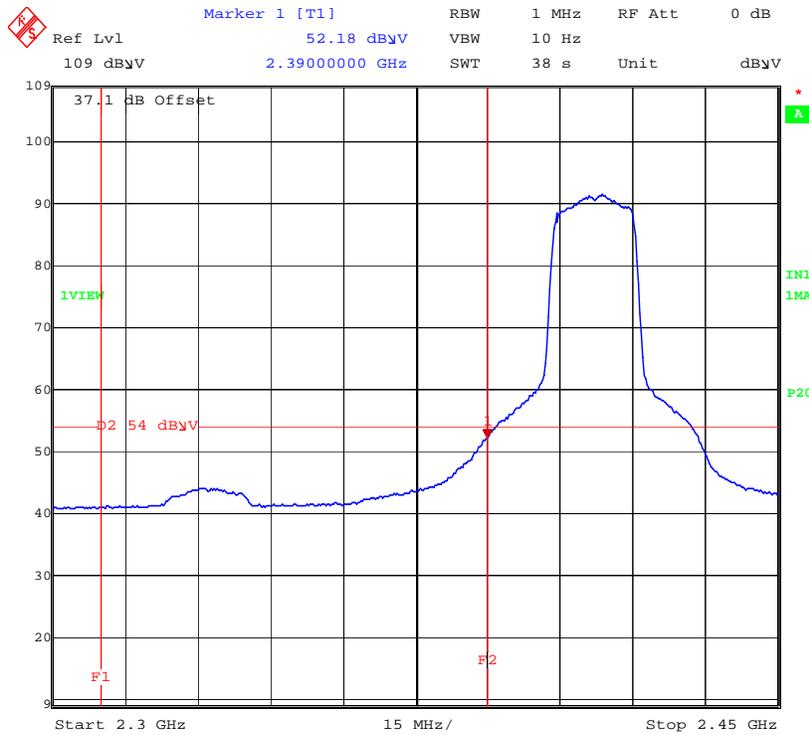
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Low Channel Band Edge Emissions (Average Detection) – 802.11b Mode



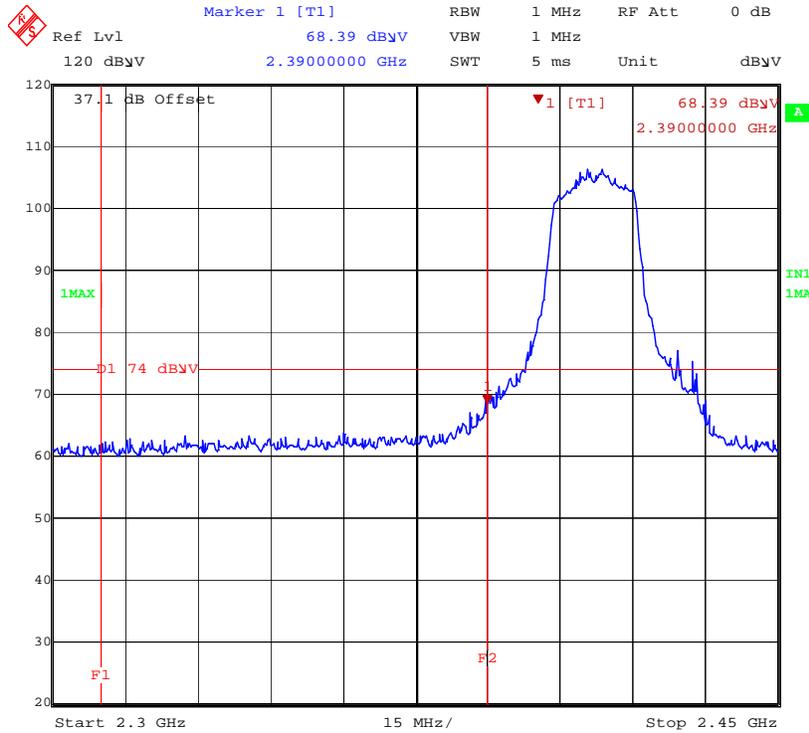
Date: 7.DEC.2010 11:36:25

**Low Channel Band Edge Emissions (Peak Detection) – 802.11g Mode**



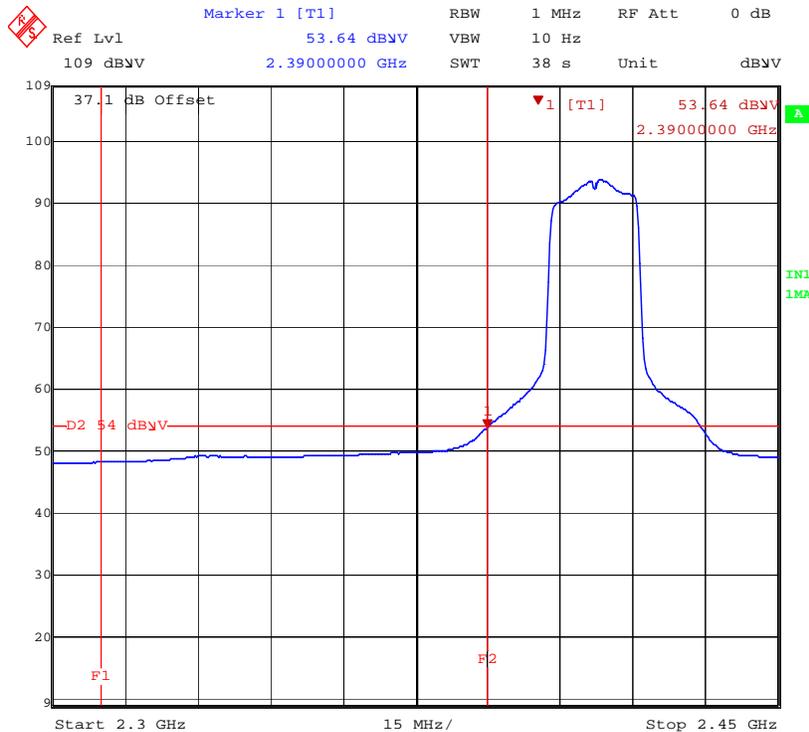
Date: 8.DEC.2010 06:08:46

**Low Channel Band Edge Emissions (Average Detection) – 802.11g Mode**



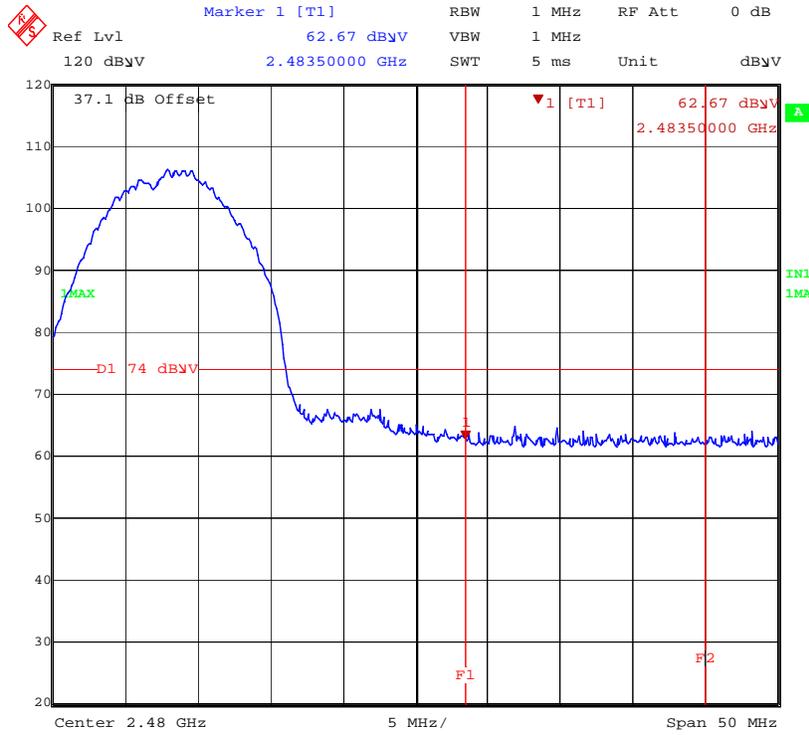
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**Low Channel Band Edge Emissions (Peak Detection) – 802.11n Mode**



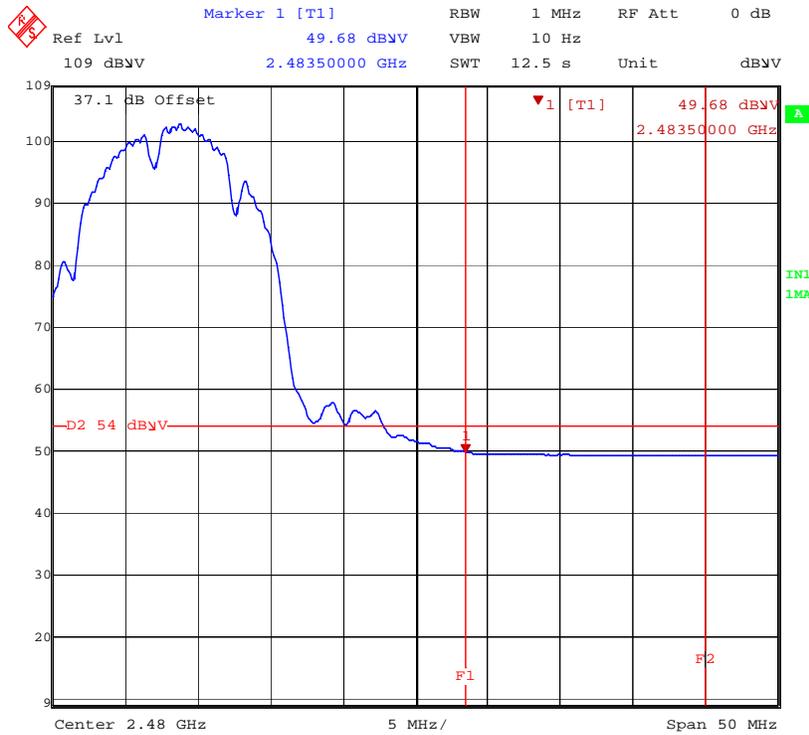
Date: 3.DEC.2010 12:45:25

**Low Channel Band Edge Emissions (Average Detection) – 802.11n Mode**



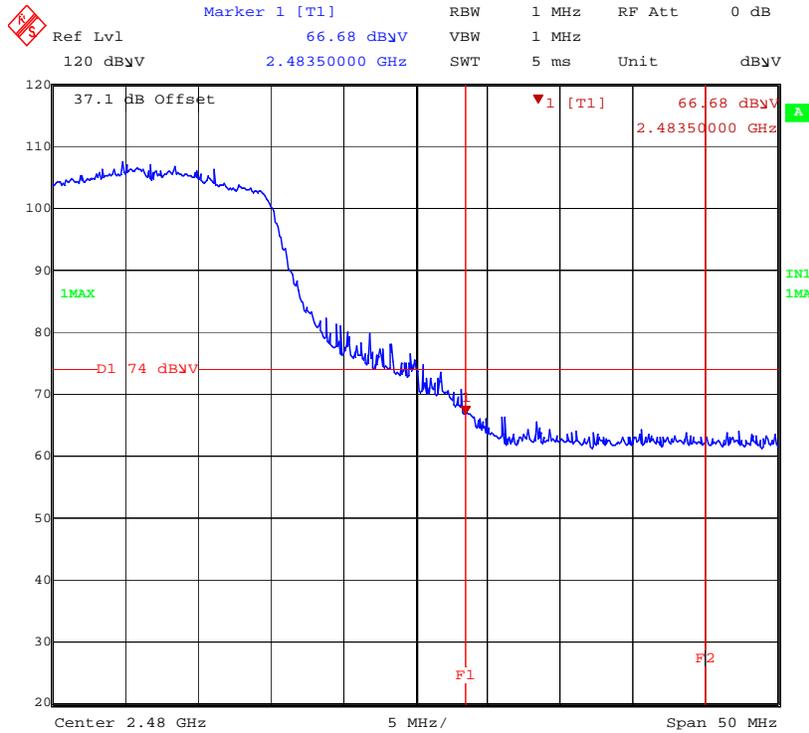
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High Channel Band Edge Emissions (Peak Detection) – 802.11b Mode



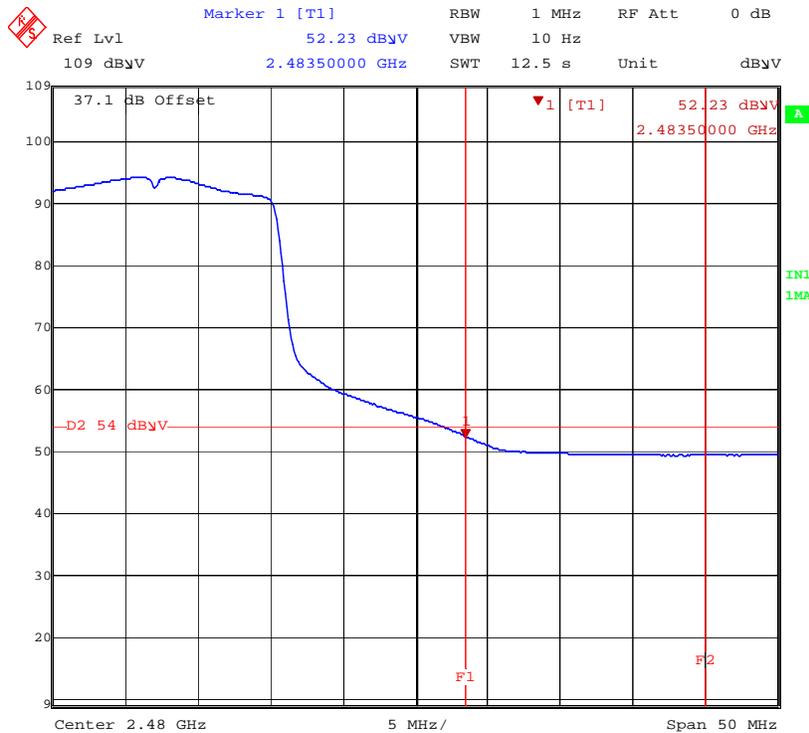
Date: 3.DEC.2010 12:58:35

High Channel Band Edge Emissions (Average Detection) – 802.11b Mode



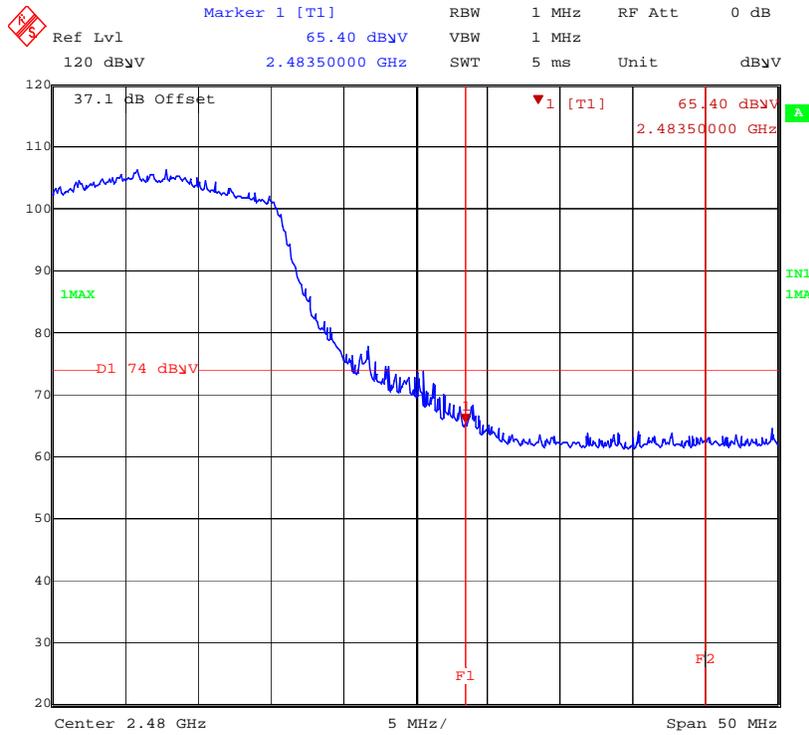
Date: 3.DEC.2010 13:04:51

High Channel Band Edge Emissions (Peak Detection) – 802.11g Mode



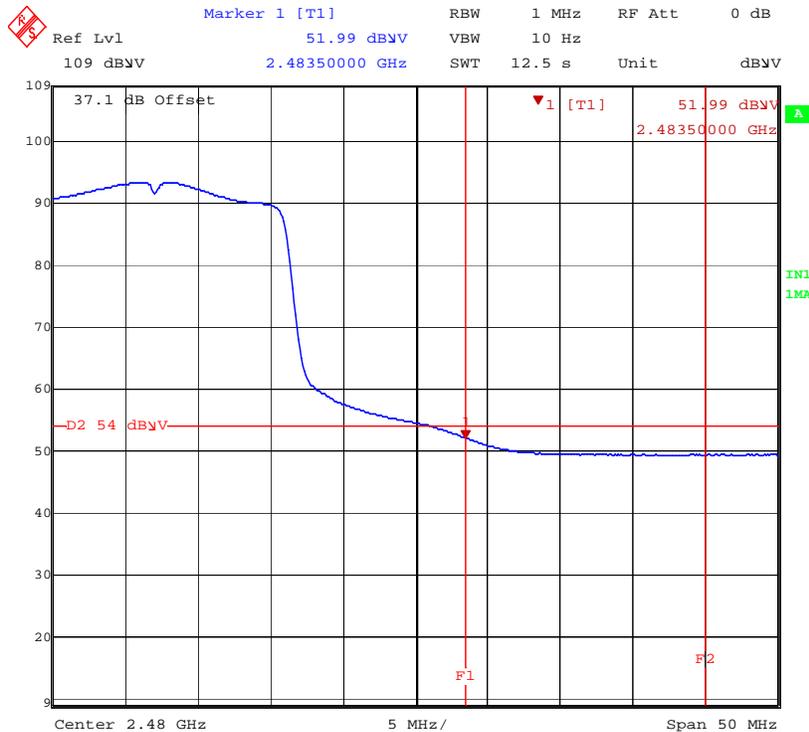
Date: 3.DEC.2010 13:06:08

High Channel Band Edge Emissions (Average Detection) – 802.11g Mode



Date: 3.DEC.2010 13:10:32

High Channel Band Edge Emissions (Peak Detection) – 802.11n Mode



Date: 3.DEC.2010 13:09:36

High Channel Band Edge Emissions (Average Detection) – 802.11n Mode

## 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: 2003

### 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 dB $\mu$ V/m

RA = Receiver Amplitude in dB $\mu$ V

AF = Antenna Factor in dB

CF = Cable Attenuation Factor in dB (Including preamplifier and filter attenuation)

Example Calculation:

$$RA = 19.48 \text{ dB}\mu\text{V}$$

$$AF = 18.52 \text{ dB}$$

$$CF = 0.78 \text{ dB}$$

$$FS = 19.48 + 18.52 + 0.78 = 38.78 \text{ dB}\mu\text{V/m}$$

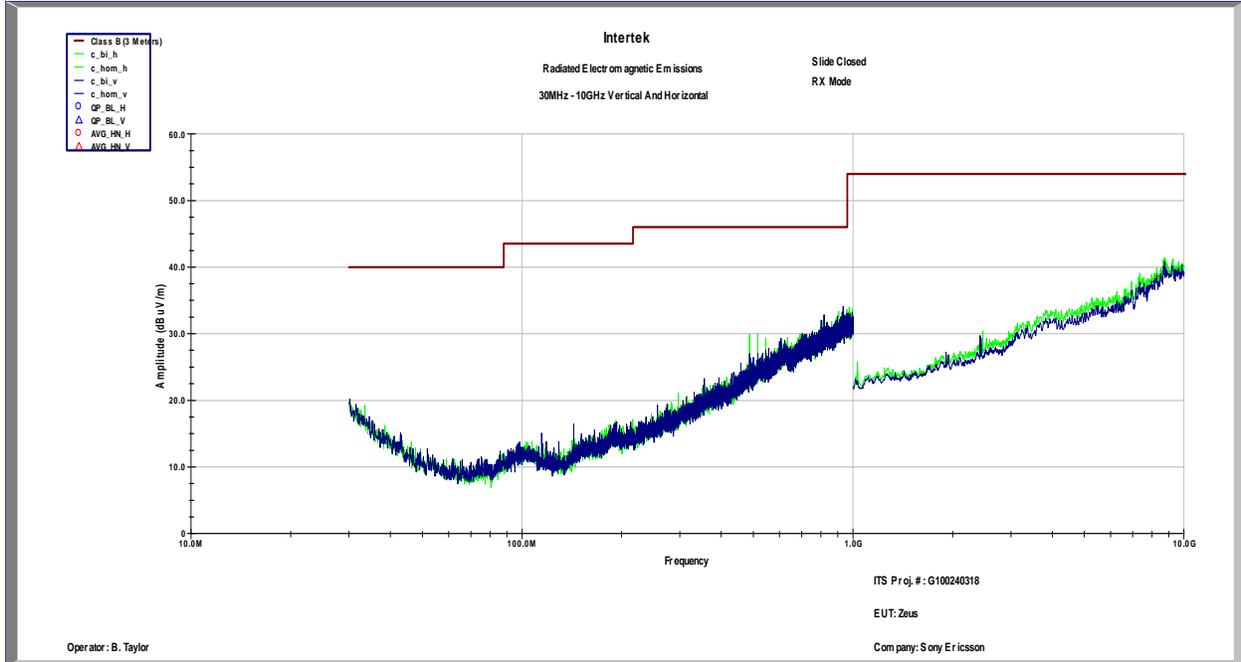
$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(38.78 \text{ dB}\mu\text{V/m})/20] = 86.89 \mu\text{V/m}$$

### 9.4 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	10887490.26	Rohde & Schwarz	ESI26	6/29/2010	6/29/2011
Preamplifier	SF456200904	Mini-Circuits	ZX60-3018G-S+	2/12/2010	2/12/2011
Biconnilog Antenna	00051864	ETS	3142C	12/21/2009	12/21/2010
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. All peak detected emissions were at least 15dB below the limit.



Peak Scan (Receive Mode)

## 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  $\mu$ H/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 (dB $\mu$ V)	
	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: 2003

### 10.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	10887490.26	Rohde & Schwarz	ESI26	6/29/2010	6/29/2011
LISN	3333	Teseq	NNB52	2/23/2010	2/23/2011

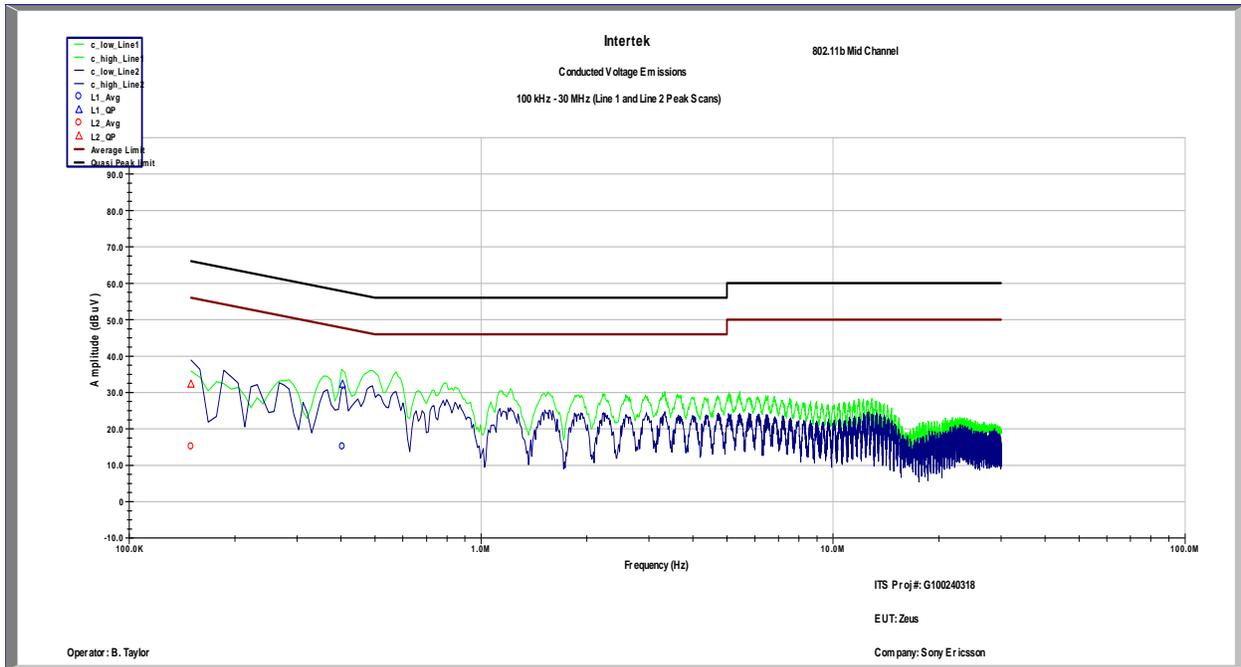
**10.4 Results:**

Conducted Voltage Emissions on Power Lines								
<b>Test Engineer:</b> Bryan Taylor		<b>Start Date:</b> 12/2/2010		<b>End Date:</b> 12/2/2010				
<b>Temperature:</b> 22.3C		<b>Humidity:</b> 35.40%		<b>Pressure:</b> 996.5mBar				
<b>Specification:</b> FCC Part 15		<b>Test Limit:</b> Class B		<b>RBW:</b> 9kHz				
<b>Notes:</b> Tested in 802.11b, g, and n modes								
Line	Frequency (MHz)	Quasi-Peak (dBuV)	Quasi-Peak Limit (dBuV)	Quasi-Peak Delta (dB)	Average (dBuV)	Average Limit (dBuV)	Average Delta (dB)	Results
802.11b - Line 1	403.7 KHz	32.26	57.78	-25.51	15.02	47.78	-32.75	Compliant
802.11b - Line 2	150.0 KHz	32.26	66	-33.74	15.02	56	-40.98	Compliant
802.11g - Line 1	168.0 KHz	33.06	65.06	-32	10.54	55.06	-44.52	Compliant
802.11g - Line 2	240.0 KHz	26.03	62.1	-36.07	4.57	52.1	-47.53	Compliant
802.11n - Line 1	150.0 KHz	37.12	66	-28.88	9.98	56	-46.02	Compliant
802.11n - Line 2	195.0 KHz	37.12	63.82	-26.7	9.98	53.82	-43.84	Compliant

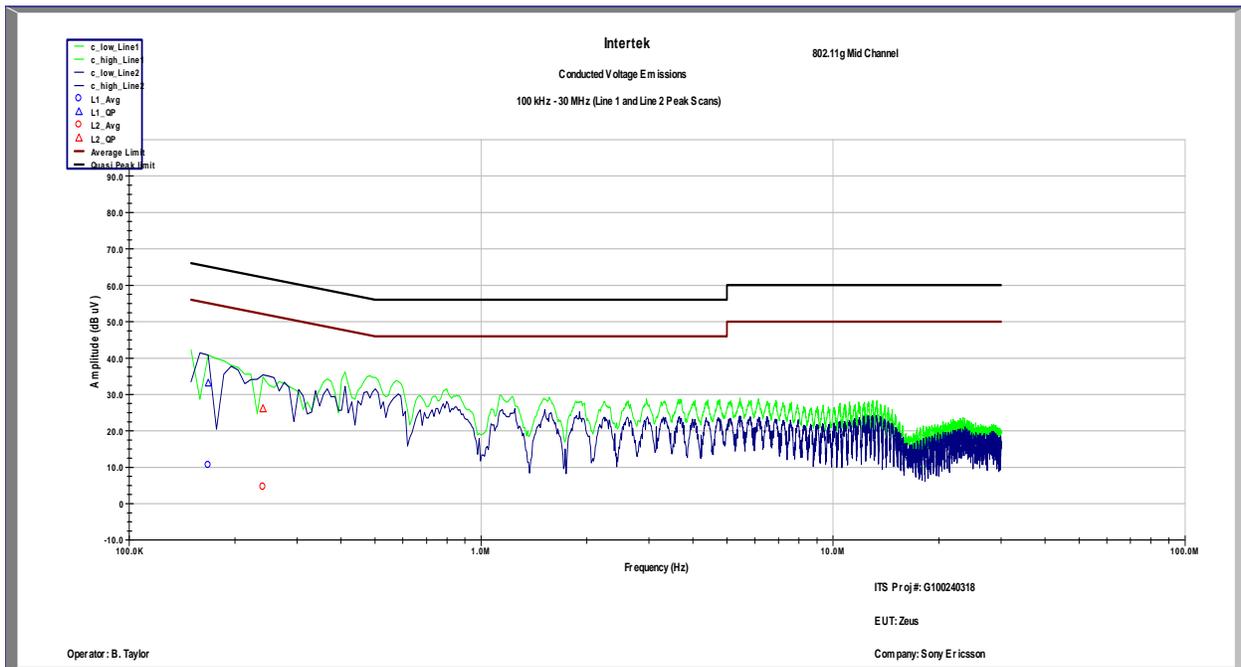
Quasi-Peak and Average Measurements (802.11b,g,n Mode)

Conducted Voltage Emissions on Power Lines								
<b>Test Engineer:</b> Bryan Taylor		<b>Start Date:</b> 11/23/2010		<b>End Date:</b> 11/23/2010				
<b>Temperature:</b> 22.1C		<b>Humidity:</b> 46.40%		<b>Pressure:</b> 989.4mBar				
<b>Specification:</b> FCC Part 15		<b>Test Limit:</b> Class B		<b>RBW:</b> 9kHz				
<b>Notes:</b> Tested in Receive Mode								
Line	Frequency (MHz)	Quasi-Peak (dBuV)	Quasi-Peak Limit (dBuV)	Quasi-Peak Delta (dB)	Average (dBuV)	Average Limit (dBuV)	Average Delta (dB)	Results
Line 1	393.0 KHz	44.21	58	-13.79	35.53	48	-12.47	Compliant
Line 1	591.0 KHz	44.29	56	-11.71	35.36	46	-10.64	Compliant
Line 1	708.0 KHz	43.26	56	-12.74	34.11	46	-11.89	Compliant
Line 1	933.0 KHz	41.92	56	-14.08	32.62	46	-13.38	Compliant
Line 1	1.626 MHz	32.97	56	-23.03	23.77	46	-22.23	Compliant
Line 2	321.0 KHz	35.93	59.68	-23.75	27.37	49.68	-22.31	Compliant
Line 2	429.0 KHz	33.91	57.27	-23.36	25.77	47.27	-21.5	Compliant
Line 2	1.999 MHz	26.78	56	-29.22	18.67	46	-27.33	Compliant

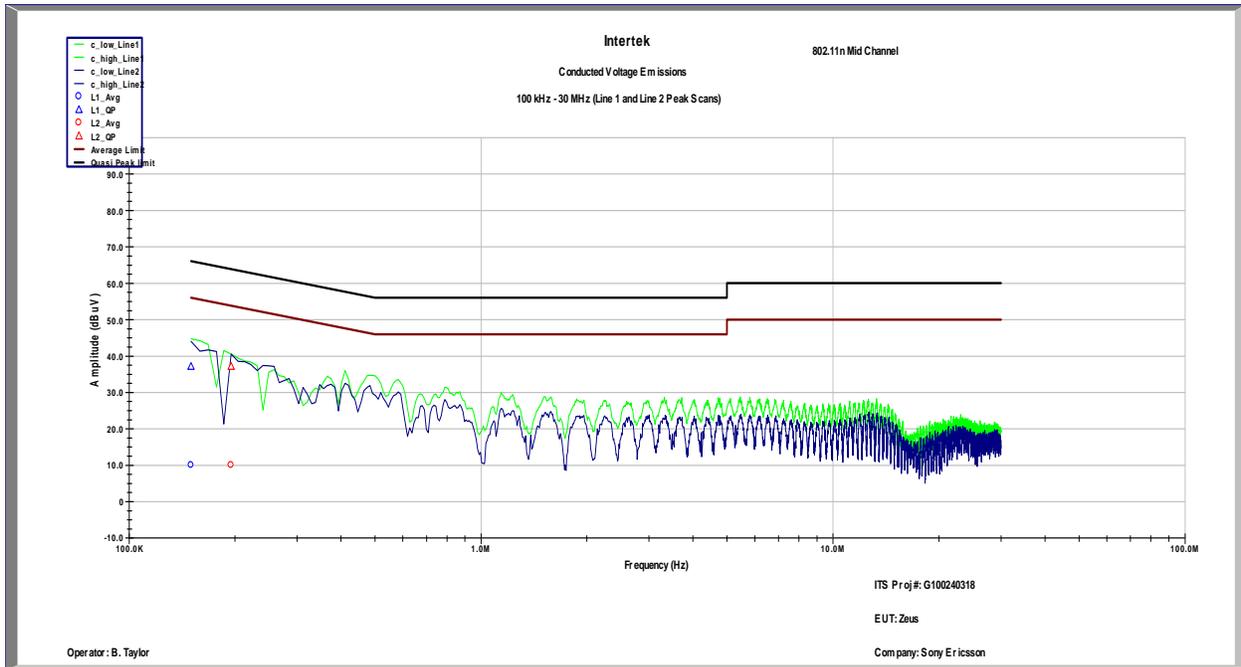
Quasi-Peak and Average Measurements (Receive Mode)



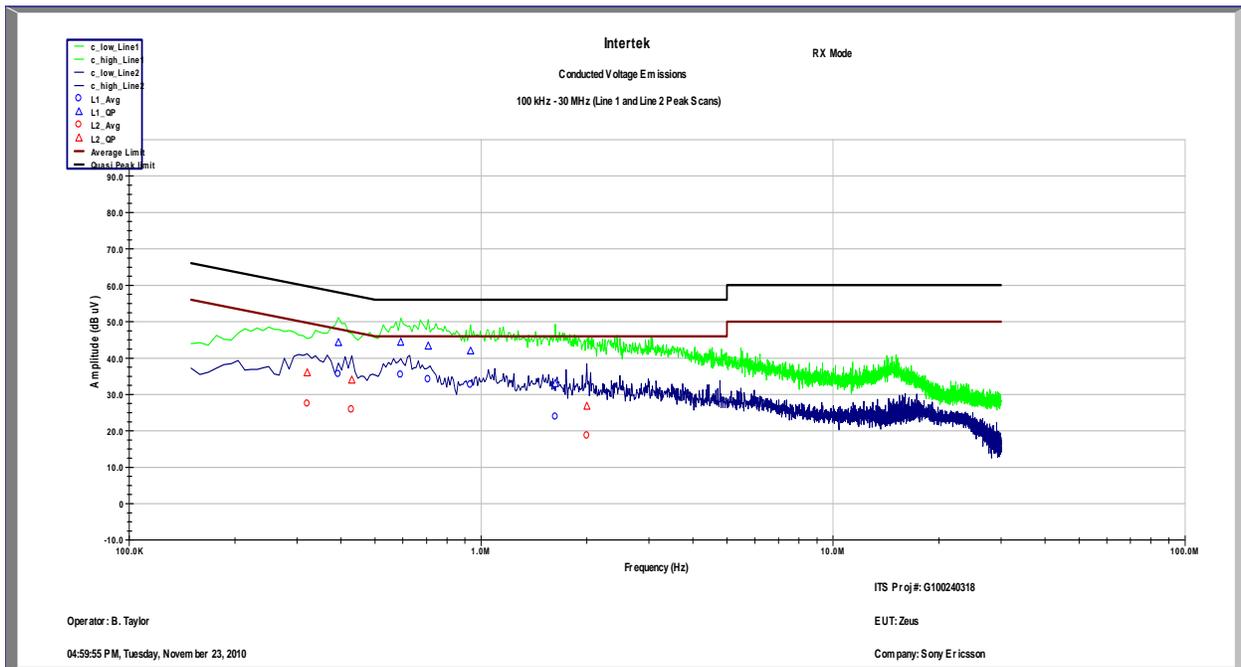
Peak Scan (Line 1 and 2) – 802.11b Mode



Peak Scan (Line 1 and 2) – 802.11g Mode



Peak Scan (Line 1 and 2) – 802.11n Mode



Peak Scan (Line 1 and 2) – Receive Mode

**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	1/7/2011	100240318LEX-001	Original Issue