

Test Report No.: 8712318676

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

Model: WS410AD

FCC ID: UGMWS410AD

8.3. Peak power spectral density of digital modulated systems according to § 15.247(d)

8.3.1. Requirements:

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission

8.3.2. Test Procedure:

The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 2.412 - 2.462 GHz frequency range. The EUT RF output was connected to the Spectrum Analyzer and accounted with cable loss in measurement. The maximum level in a 3kHz bandwidth is measured with: RBW=3kHz; VBW>3kHz, sweep time=span/3kHz and video averaging is turned off. The PSD is the highest level found across the emission in any 3kHz band. Additionally, the peak power spectral density from combined (max.) output was calculated and presented in table 16.

8.3.3. Test Results:

All test results met the requirements.

The summaries of the tests are shown below in Tables 14-16.

The tests were performed with the worst case, which is higher power level.

Frequency MHz	Rate Mbps	Modulation mode	Output 1 PSD [dBm]	Output 2 PSD [dBm]	Output 3 PSD [dBm]	Limit [dBm]	Margin [dB] Output 1	Plot number	Margin [dB] Output 2	Plot number	Margin [dB] Output 3	Plot number
2412	1	802.11b	-8.58	-9.53	-8.02	8	16.58	97	17.53	103	16.02	109
	6	802.11g	-9.56	-8.74	-8.91	8	17.56	98	16.74	104	16.91	110
2437	1	802.11b	-9.31	-8.23	-8.52	8	17.31	99	16.23	105	16.52	111
	6	802.11g	-11.15	-8.79	-9.79	8	19.15	100	16.79	106	17.79	112
2462	1	802.11b	-7.12	-9.14	-9.68	8	15.12	101	17.14	107	17.68	113
	6	802.11g	-8.97	-9.65	-9.03	8	16.97	102	17.65	108	17.03	114

Table 14.
PSD (Outputs 1-3) test results.

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Frequency MHz	Rate Mbps	Modulation mode	Output 4 PSD [dBm]	Output 5 PSD [dBm]	Output 6 PSD [dBm]	Limit [dBm]	Margin [dB] Output 4	Plot number	Margin [dB] Output 5	Plot number	Margin [dB] Output 6	Plot number
2412	1	802.11b	-7.41	-11.62	-9.05	8	15.14	115	19.62	121	17.05	127
	6	802.11g	-7.49	-10.72	-9.14	8	15.49	116	18.72	122	17.14	128
2437	1	802.11b	-8.36	-12.94	-9.56	8	16.36	117	20.94	123	17.56	129
	6	802.11g	-9.00	-10.89	-9.79	8	17.00	118	18.89	124	17.79	130
2462	1	802.11b	-7.95	-10.87	-10.78	8	15.95	119	18.87	125	18.78	131
	6	802.11g	-10.37	-10.76	-10.77	8	18.37	120	18.76	126	18.77	132

Table 15.
PSD (Outputs 4-6) test results.

Frequency MHz	Rate Mbps	Modulation mode	Limit [dBm]	Calculated Combined (max) Output * PSD [dBm]	Margin [dB]
2412	1	802.11b	8	-1.0	9.0
	6	802.11g	8	-1.2	9.2
2437	1	802.11b	8	-1.5	9.5
	6	802.11g	8	-2.0	10.0
2462	1	802.11b	8	-1.3	9.3
	6	802.11g	8	-2.1	10.1

Table 16.
PSD (Combined Output) test results.

(*)- Calculated Combined (max) Output, PSD [dBm] is the sum of the measured PSD from all Output terminals, where each result (PSD from separate output terminal) mathematically converted from Logarithm to linear units. The results were present in dBm.

For example, the calculation for 2412 MHz frequency (1 Mbps bit rate, 802.11b modulation) is the following:

1. $(-8.58) \text{ dBm} = 0.14 \text{ mW}$; $(-9.53) \text{ dBm} = 0.11 \text{ mW}$; $(-8.02) \text{ dBm} = 0.16 \text{ mW}$; $(-7.41) \text{ dBm} = 0.18 \text{ mW}$; $(-11.62) \text{ dBm} = 0.07 \text{ mW}$; $(-9.05) \text{ dBm} = 0.12 \text{ mW}$
2. $0.14 + 0.11 + 0.16 + 0.18 + 0.07 + 0.12 = 0.78 \text{ [mW]}$
3. $0.78 \text{ mW} = (-1.1) \text{ dBm}$

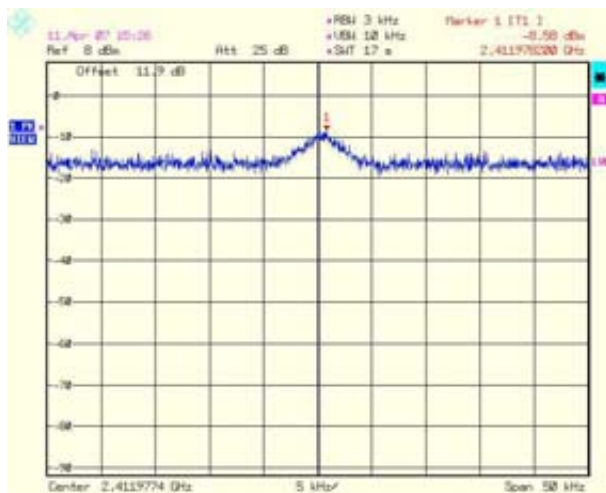
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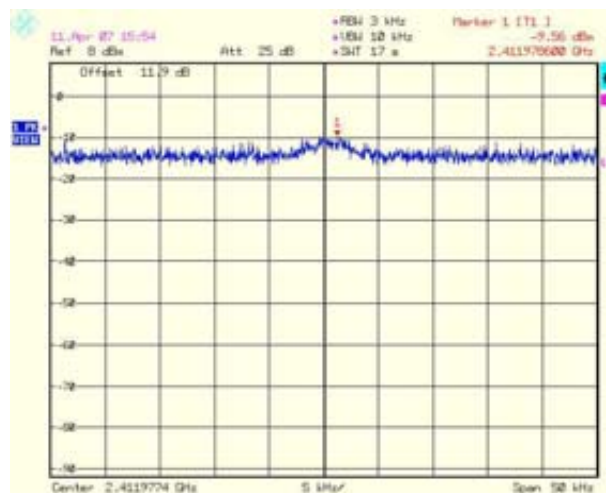
Model: WS410AD

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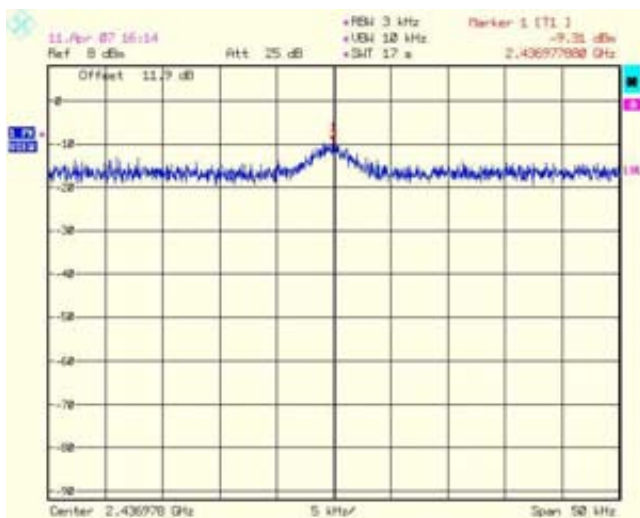
Plot # 97. Transmitter output 1. Peak Power Spectral Density.

Low frequency. 1Mbps rate.



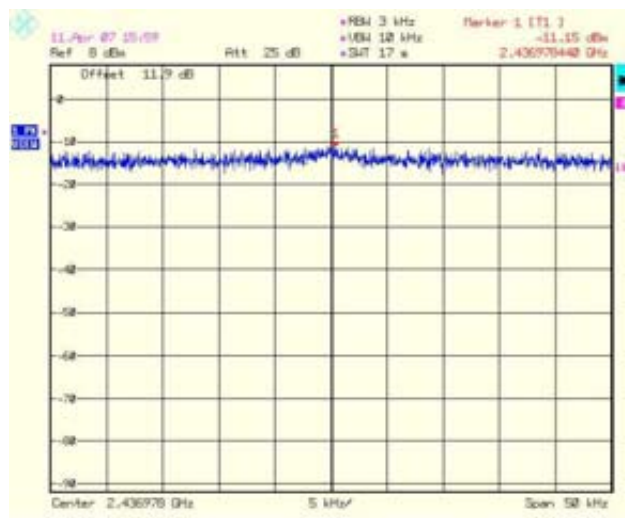
Plot # 98. Transmitter output 1. Peak Power Spectral Density.

Low frequency. 6Mbps rate.



Plot # 99. Transmitter output 1. Peak Power Spectral Density.

Middle frequency. 1Mbps rate.



Plot # 100. Transmitter output 1. Peak Power Spectral Density.

Middle frequency. 6Mbps rate.

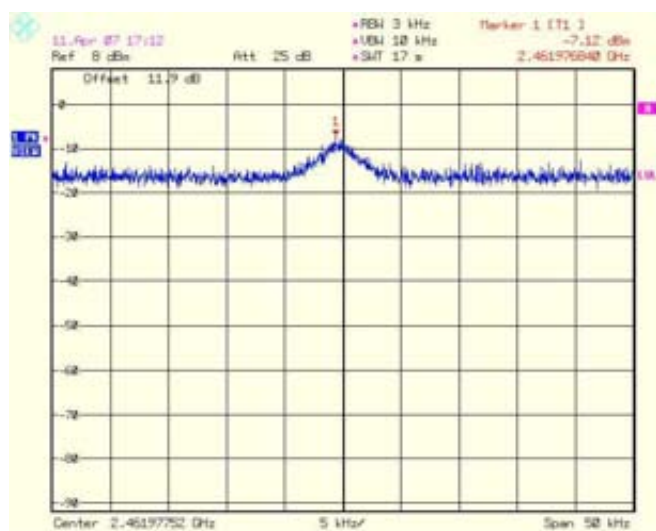
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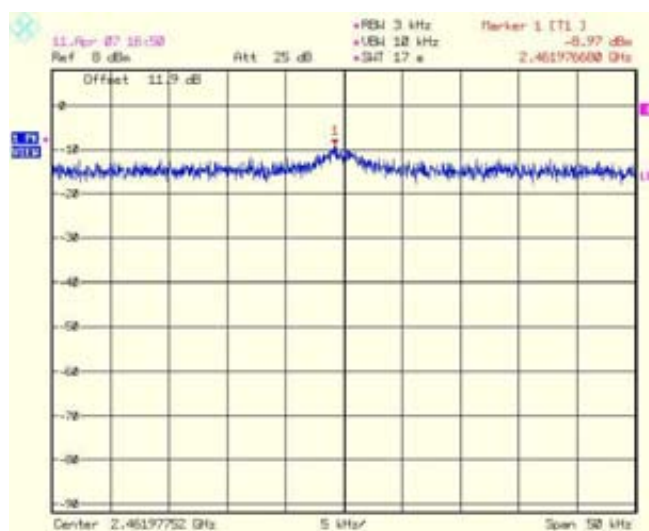
Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

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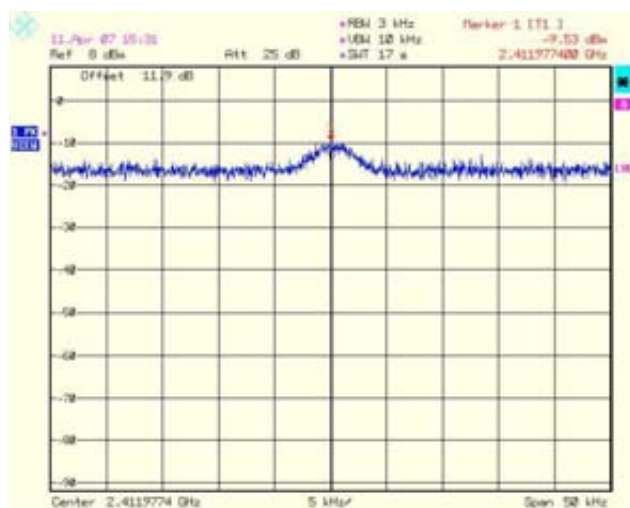
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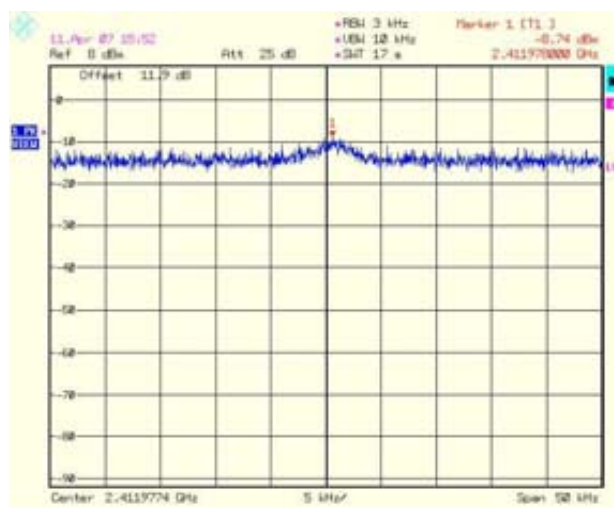
Plot # 101. Transmitter output 1.
Peak Power Spectral Density.
High frequency. 1Mbps rate.



Plot # 102. Transmitter output 1.
Peak Power Spectral Density.
High frequency. 6Mbps rate.



Plot # 103. Transmitter output 2.
Peak Power Spectral Density.
Low frequency. 1Mbps rate.



Plot # 104. Transmitter output 2.
Peak Power Spectral Density.
Low frequency. 6Mbps rate.

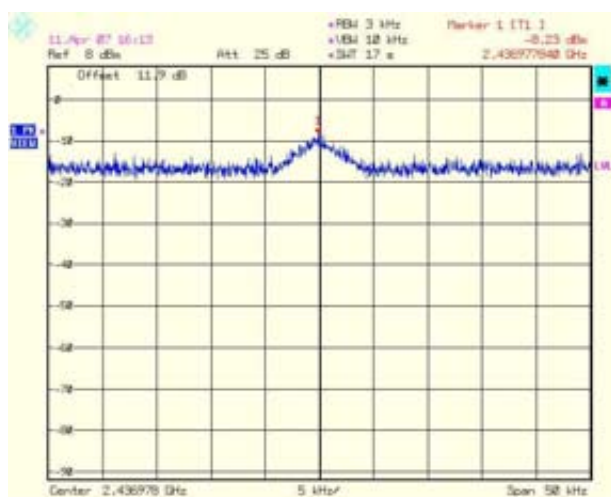
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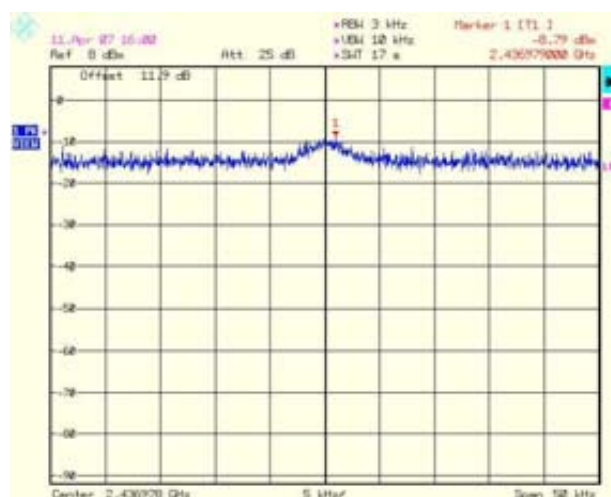
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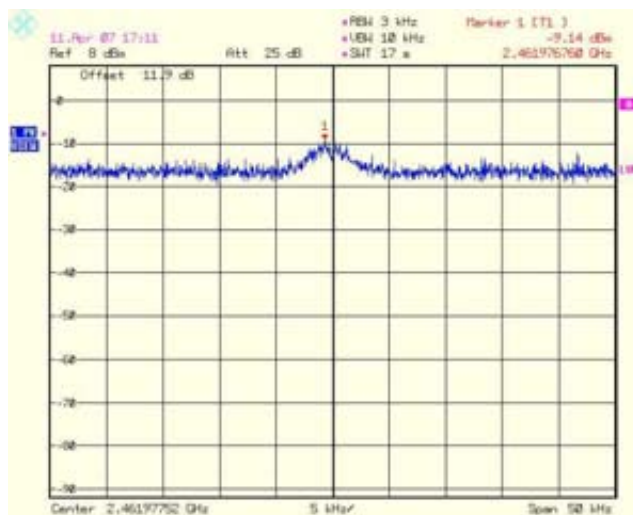
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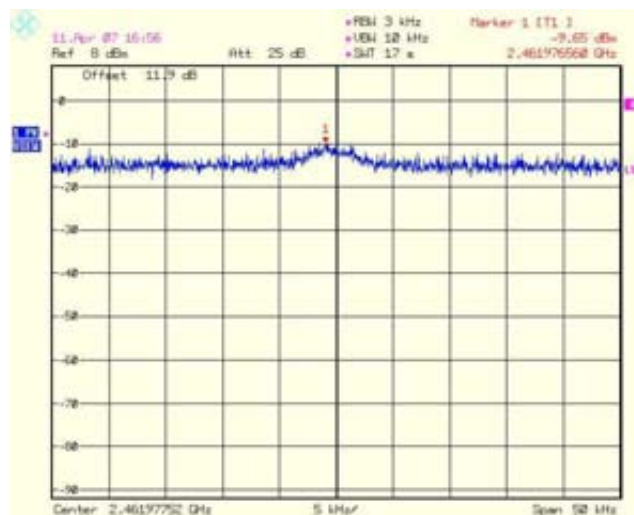
Plot # 105. Transmitter output 2.
Peak Power Spectral Density.
Middle frequency. 1Mbps rate.



Plot # 106. Transmitter output 2.
Peak Power Spectral Density.
Middle frequency. 6Mbps rate.



Plot # 107. Transmitter output 2.
Peak Power Spectral Density.
High frequency. 1Mbps rate.



Plot # 108. Transmitter output 2.
Peak Power Spectral Density.
High frequency. 6Mbps rate.

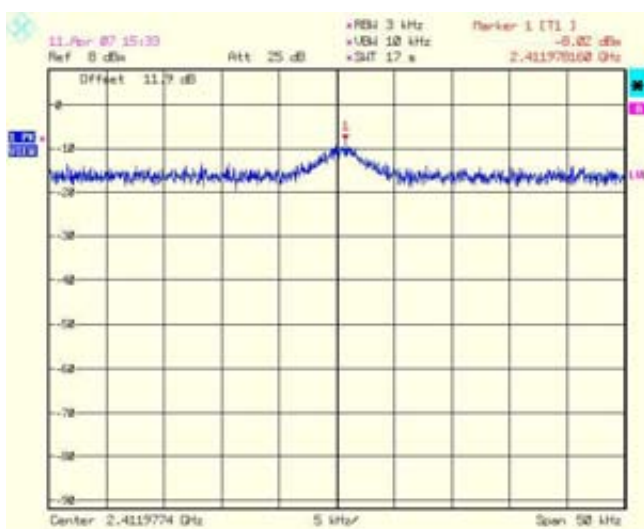
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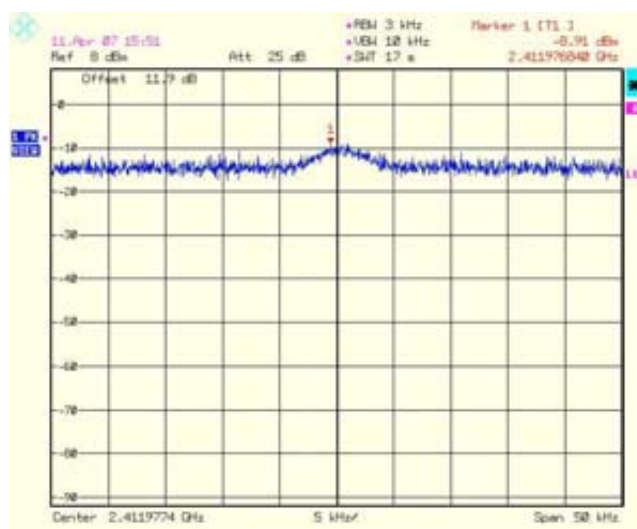
Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

Model: WS410AD

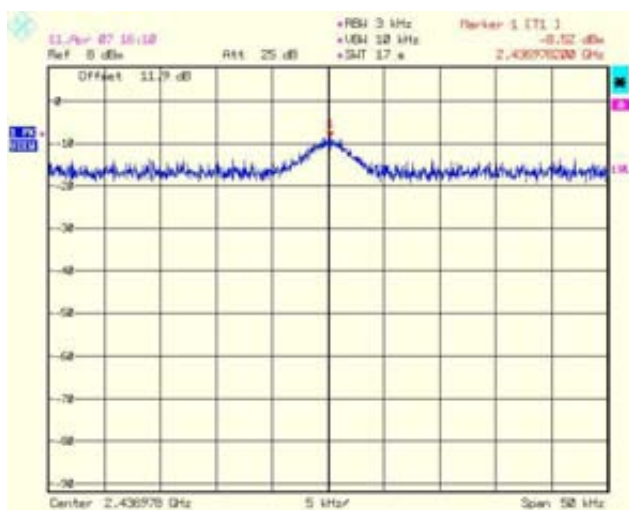
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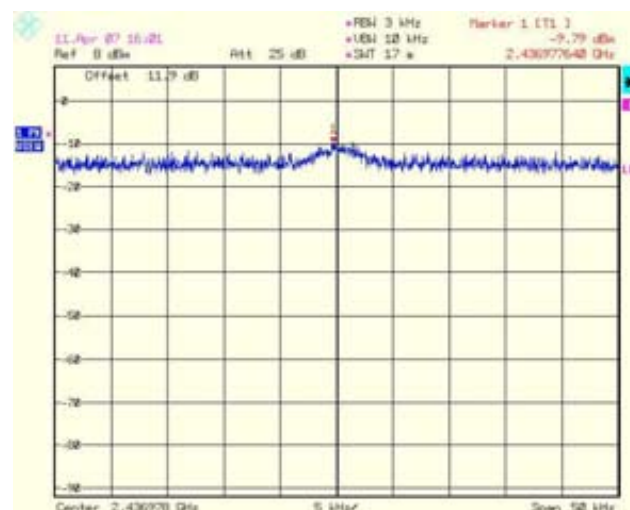
Plot # 109. Transmitter output 3.
Peak Power Spectral Density.
Low frequency. 1Mbps rate.



Plot # 110. Transmitter output 3.
Peak Power Spectral Density.
Low frequency. 6Mbps rate.



Plot # 111. Transmitter output 3.
Peak Power Spectral Density.
Middle frequency. 1Mbps rate.



Plot # 112. Transmitter output 3.
Peak Power Spectral Density.
Middle frequency. 6Mbps rate.

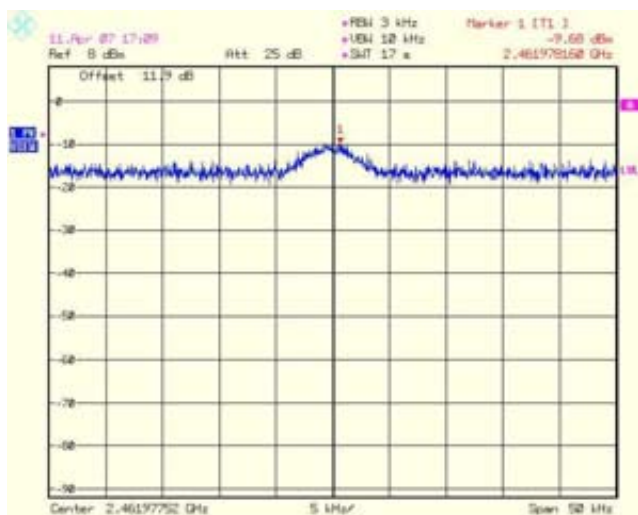
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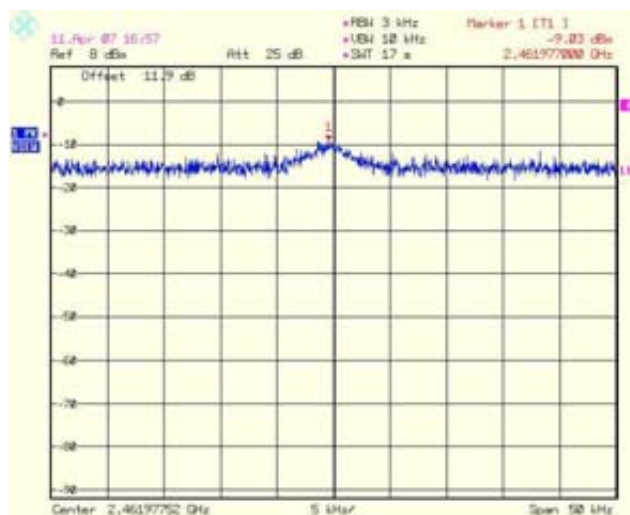
Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

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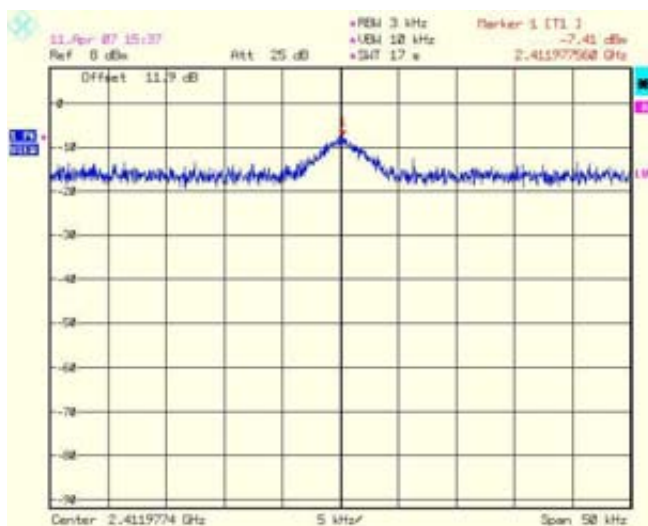
FCC ID: UGMWS410AD



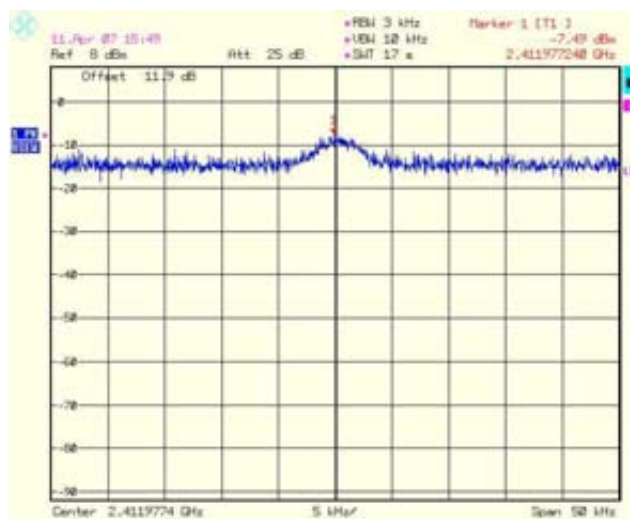
Plot # 113. Transmitter output 3.
Peak Power Spectral Density.
High frequency. 1Mbps rate.



Plot # 114. Transmitter output 3.
Peak Power Spectral Density.
High frequency. 6Mbps rate.



Plot # 115. Transmitter output 4.
Peak Power Spectral Density.
Low frequency. 1Mbps rate.



Plot # 116. Transmitter output 4.
Peak Power Spectral Density.
Low frequency. 6Mbps rate.

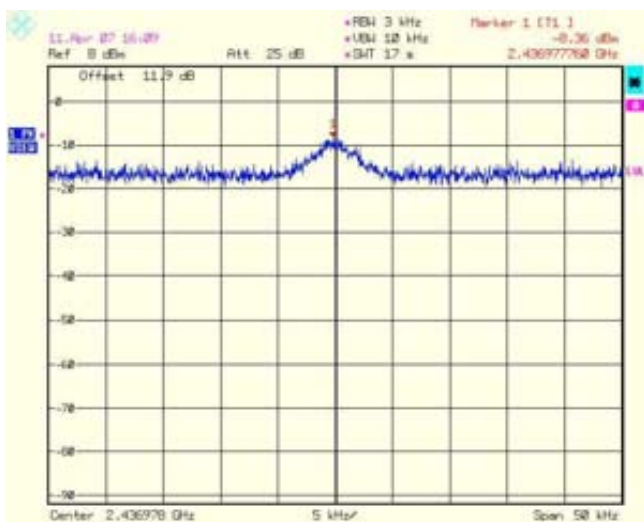
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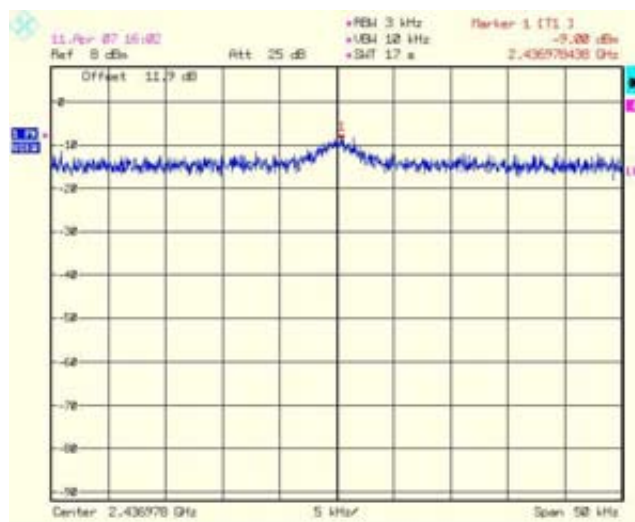
Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

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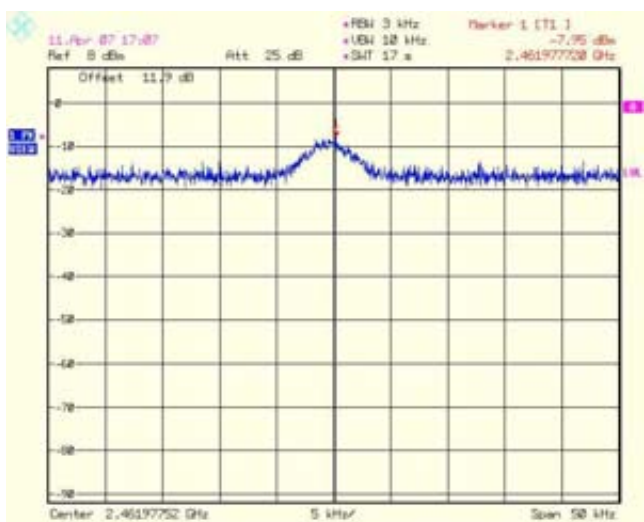
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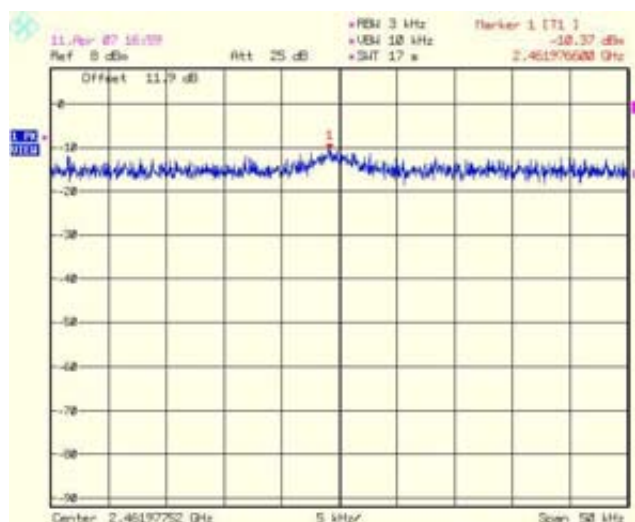
Plot # 117. Transmitter output 4.
Peak Power Spectral Density.
Middle frequency. 1Mbps rate.



Plot # 118. Transmitter output 4.
Peak Power Spectral Density.
Middle frequency. 6Mbps rate.



Plot # 119. Transmitter output 4.
Peak Power Spectral Density.
High frequency. 1Mbps rate.



Plot # 120. Transmitter output 4.
Peak Power Spectral Density.
High frequency. 6Mbps rate.

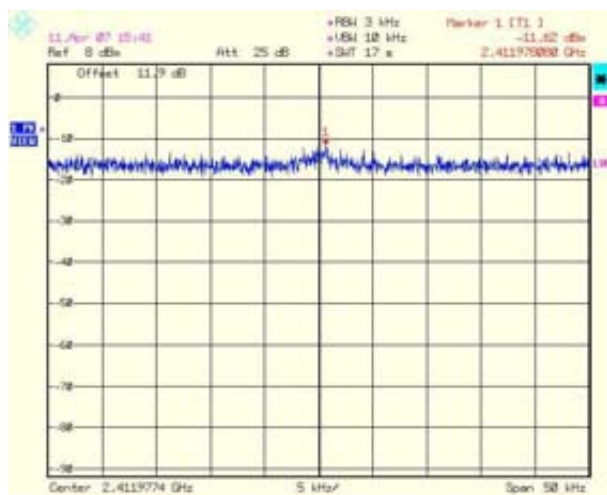
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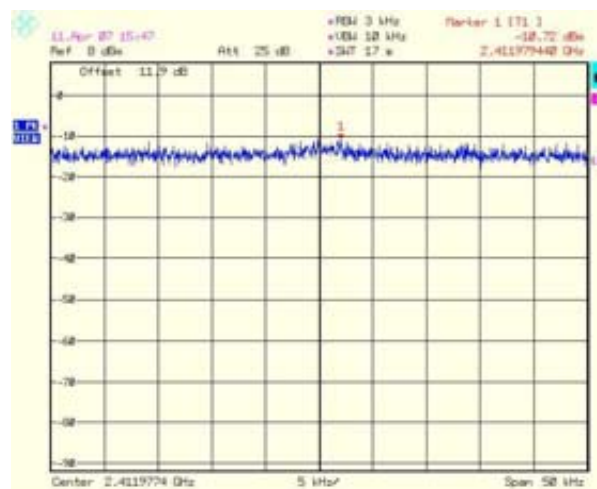
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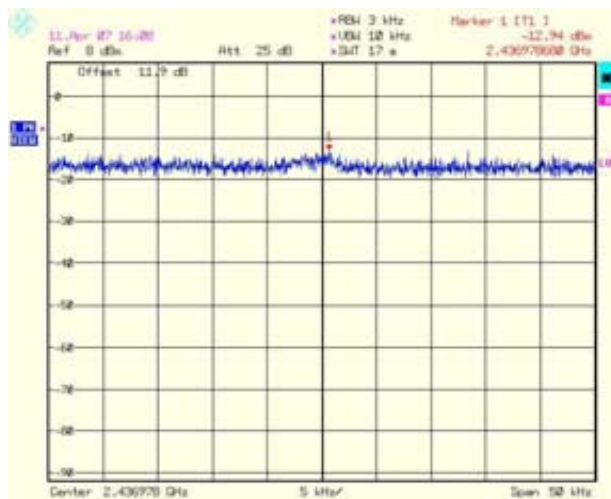
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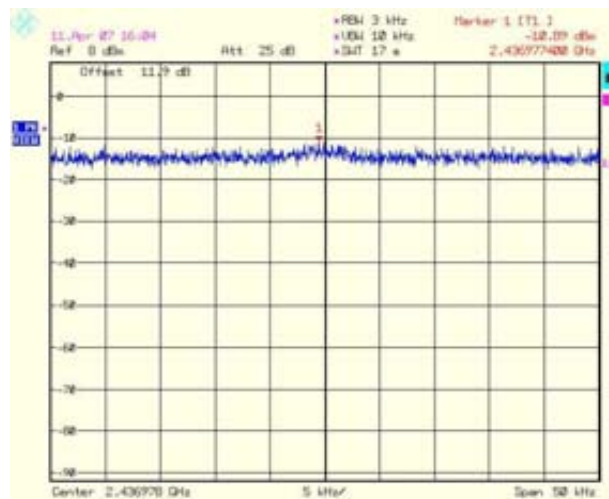
**Plot # 121. Transmitter output 5.
Peak Power Spectral Density.
Low frequency. 1Mbps rate.**



**Plot # 122. Transmitter output 5.
Peak Power Spectral Density.
Low frequency. 6Mbps rate.**



**Plot # 123. Transmitter output 5.
Peak Power Spectral Density.
Middle frequency. 1Mbps rate.**



**Plot # 124. Transmitter output 5.
Peak Power Spectral Density.
Middle frequency. 6Mbps rate.**

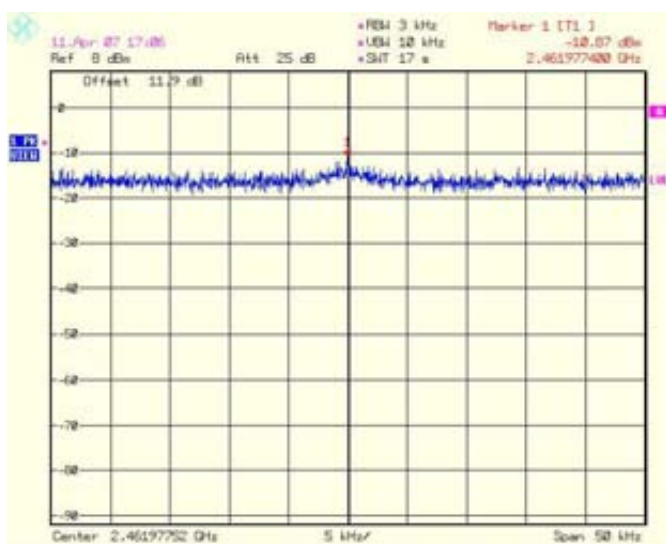
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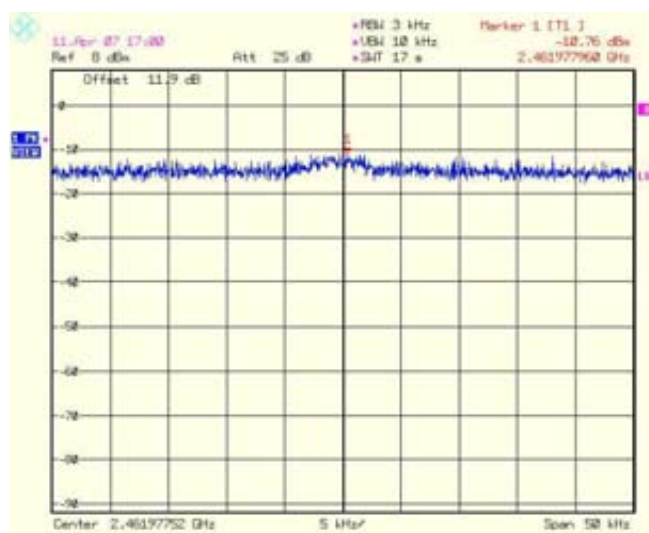
Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

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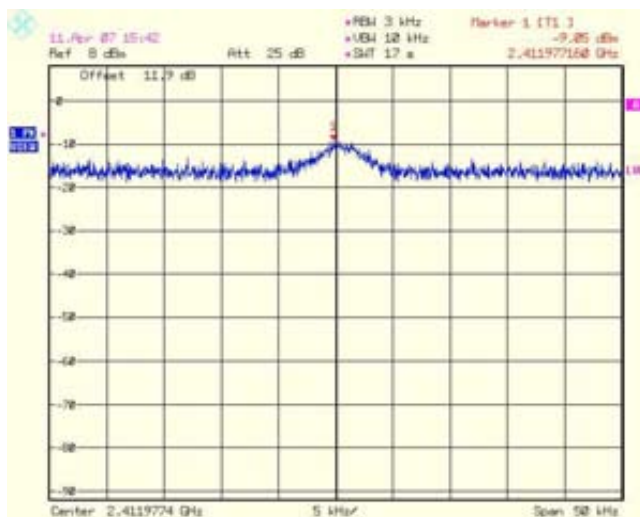
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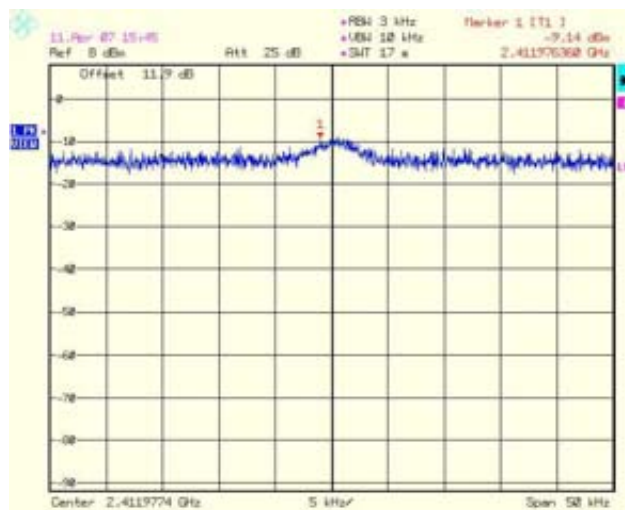
Plot # 125. Transmitter output 5.
Peak Power Spectral Density.
High frequency. 1Mbps rate.



Plot # 126. Transmitter output 5.
Peak Power Spectral Density.
High frequency. 6Mbps rate.



Plot # 127. Transmitter output 6.
Peak Power Spectral Density.
Low frequency. 1Mbps rate.



Plot # 128. Transmitter output 6.
Peak Power Spectral Density.
Low frequency. 6Mbps rate.

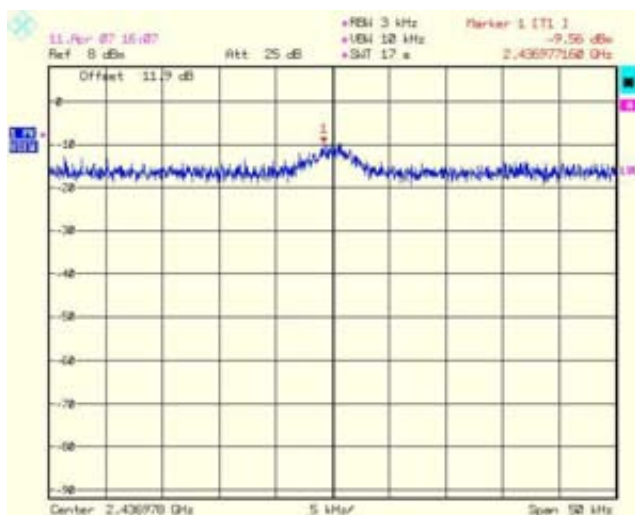
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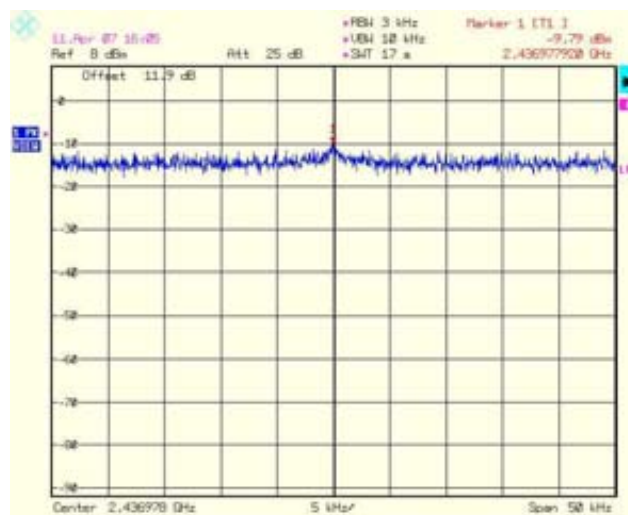
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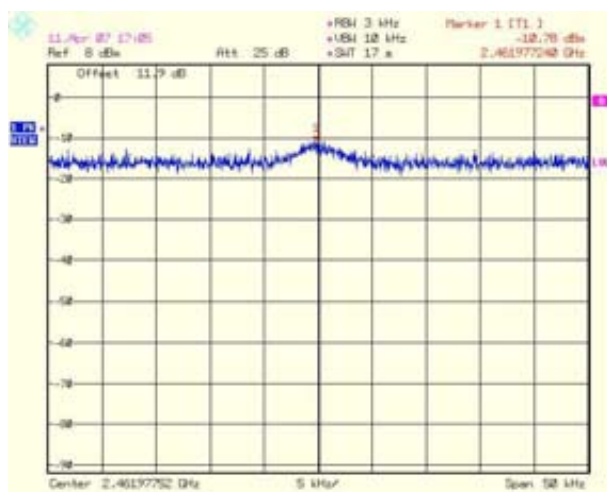
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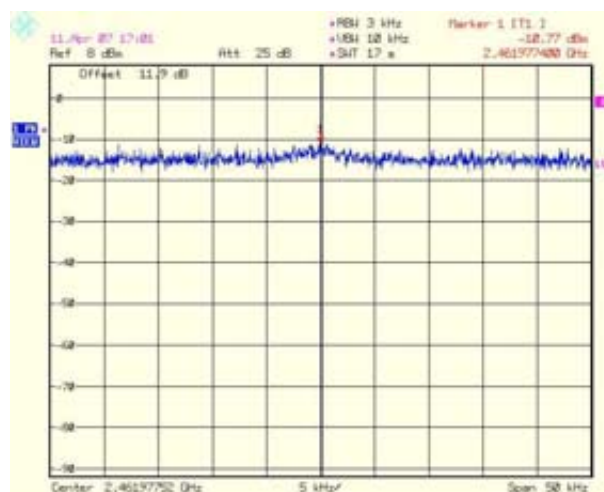
Plot # 129. Transmitter output 6.
Peak Power Spectral Density.
Middle frequency. 1Mbps rate.



Plot # 130. Transmitter output 6.
Peak Power Spectral Density.
Middle frequency. 6Mbps rate.



Plot # 131. Transmitter output 6.
Peak Power Spectral Density.
High frequency. 1Mbps rate.



Plot # 132. Transmitter output 6.
Peak Power Spectral Density.
High frequency. 6Mbps rate.

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8.4. Conducted spurious emission

8.4.1. Requirements:

Clause 15.247(c). 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 Sec. 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a) (see Sec. 15.205(c)). Due to the conducted power was measured based on the use of RMS averaging over a time interval, the attenuation required here shall be 30 dB instead of 20 dB.

8.4.2. Test Procedure:

The transmitter output is connected to a spectrum analyzer.

The RBW is set to 100 kHz.

The VBW is set to 300 kHz.

The spectrum from 30MHz to 26GHz is investigated with the transmitter set to the low, middle and high frequencies.

8.4.3. Test Results:

All test results met the requirements.

The tests were performed with the worst case, which is higher power level.

All harmonics/spurs are at least 30dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

The results are shown in plots 133-204.

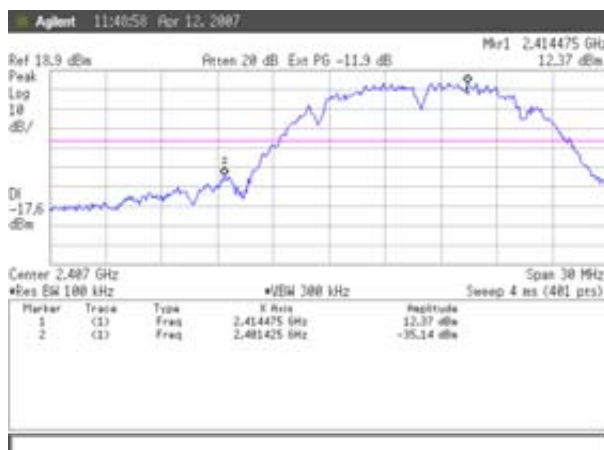
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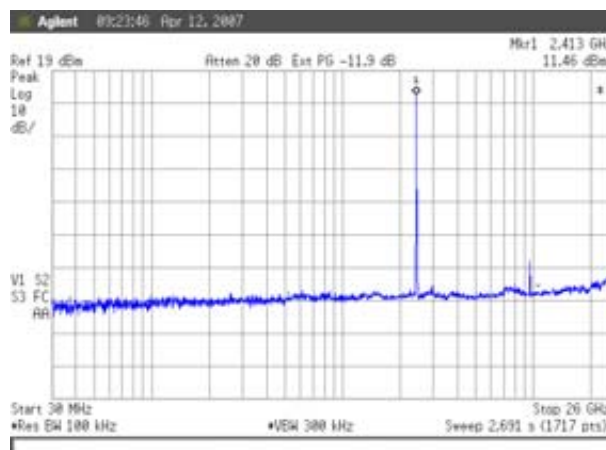
Model: WS410AD

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Plot # 133.

Output 1. Low frequency bandedge.
802.11b mode.



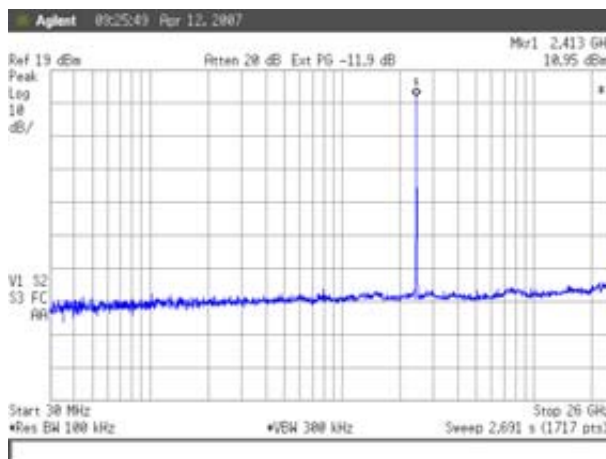
Plot # 134.

Output 1. Low frequency spurious.
802.11b mode.



Plot # 135.

Output 2. Low frequency bandedge.
802.11b mode.



Plot # 136.

Output 2. Low frequency spurious.
802.11b mode.

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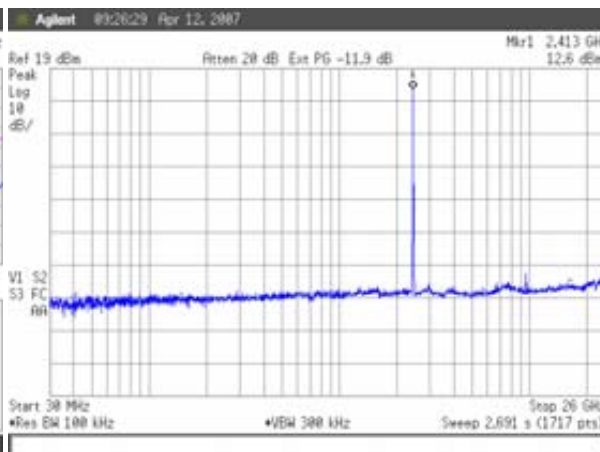
Model: WS410AD

FCC ID: UGMWS410AD



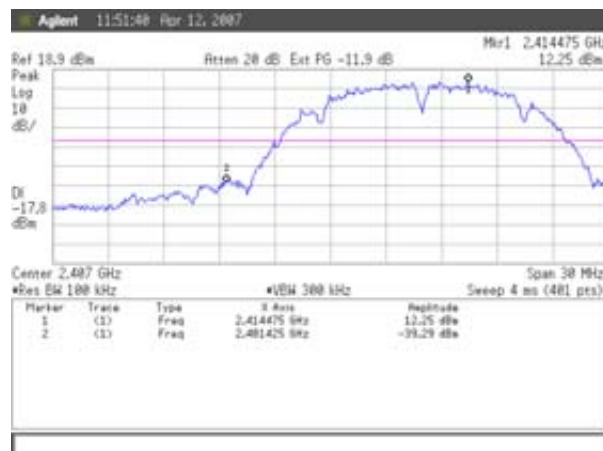
Plot # 137.

Output 3. Low frequency bandedge.
802.11b mode.



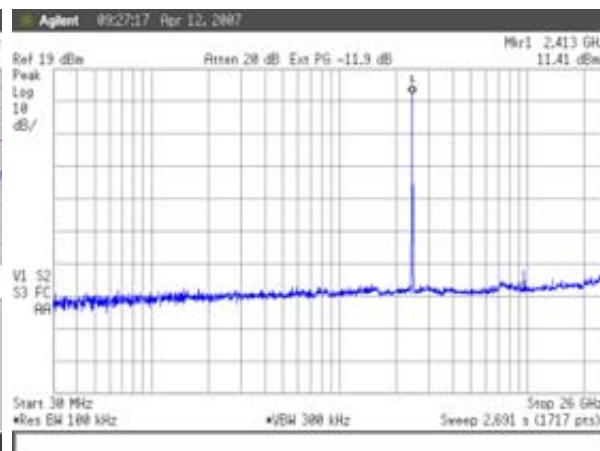
Plot # 138.

Output 3. Low frequency spurious.
802.11b mode.



Plot # 139.

Output 4. Low frequency bandedge.
802.11b mode.



Plot # 140.

Output 4. Low frequency spurious.
802.11b mode.

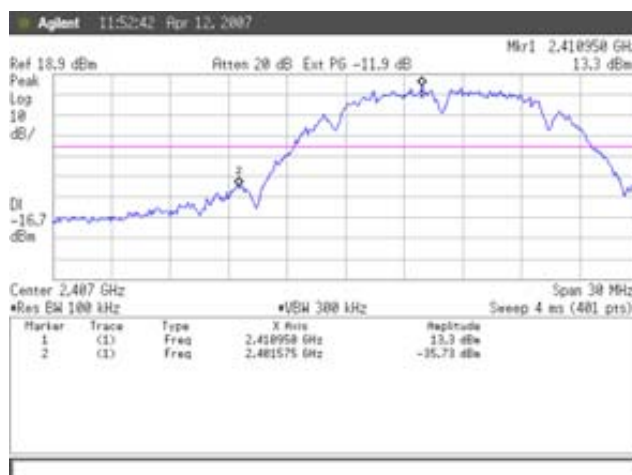
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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

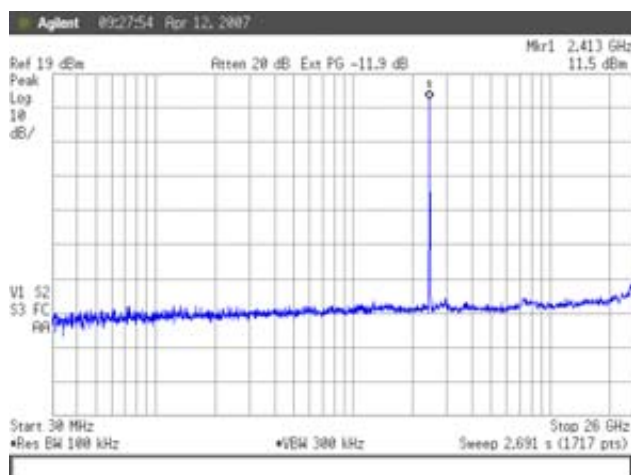
Model: WS410AD

FCC ID: UGMWS410AD



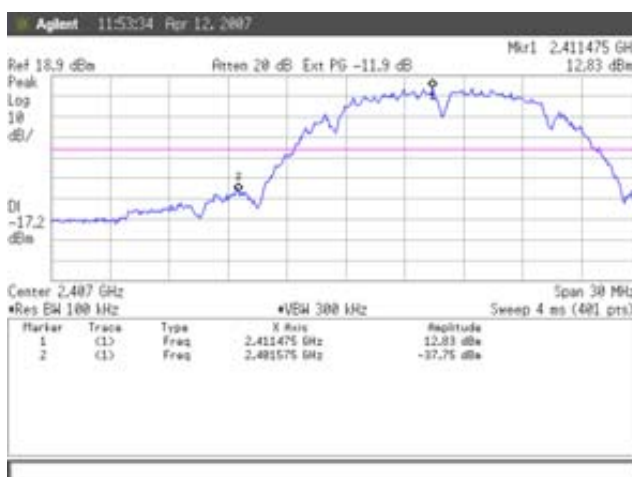
Plot # 141.

Output 5. Low frequency bandedge.
802.11b mode.



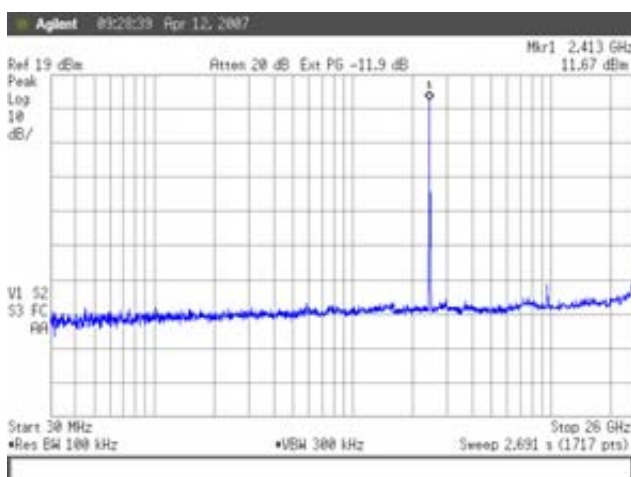
Plot # 142.

Output 5. Low frequency spurious.
802.11b mode.



Plot # 143.

Output 6. Low frequency bandedge.
802.11b mode.



Plot # 144.

Output 6. Low frequency spurious.
802.11b mode.

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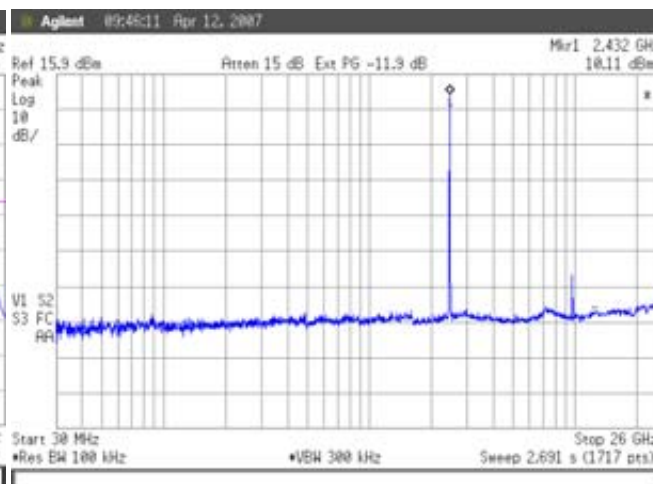
Model: WS410AD

FCC ID: UGMWS410AD



Plot # 145.

Output 1. Middle frequency bandedge.
802.11b mode.



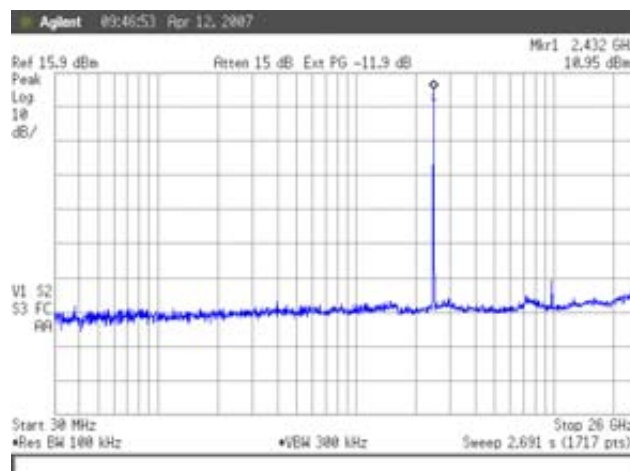
Plot # 146.

Output 1. Middle frequency spurious.
802.11b mode.



Plot # 147.

Output 2. Middle frequency bandedge.
802.11b mode.



Plot # 148.

Output 2. Middle frequency spurious.
802.11b mode.

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

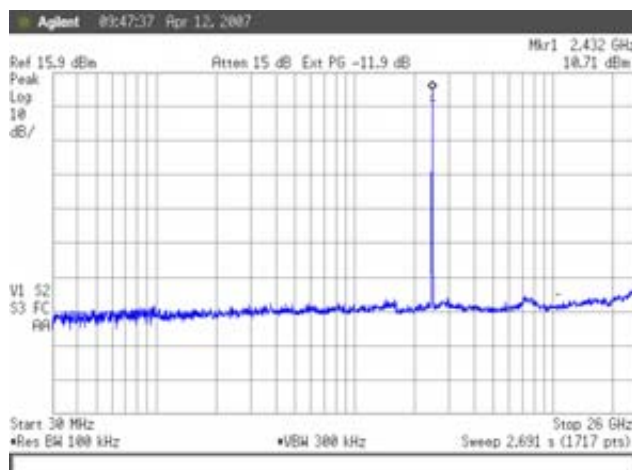
Model: WS410AD

FCC ID: UGMWS410AD



Plot # 149.

Output 3. Middle frequency bandedge.
802.11b mode.



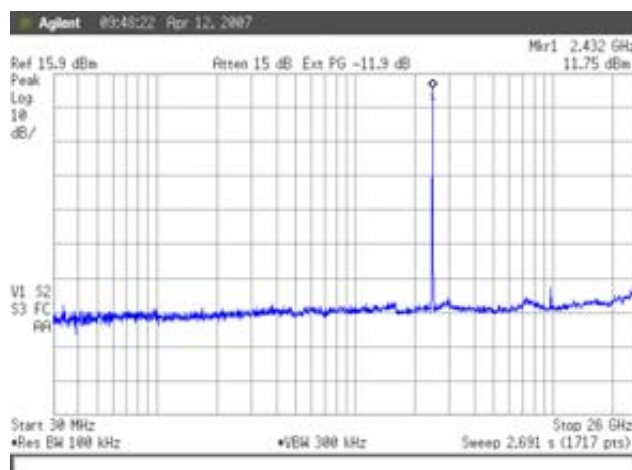
Plot # 150.

Output 3. Middle frequency spurious.
802.11b mode.



Plot # 151.

Output 4. Middle frequency bandedge.
802.11b mode.



Plot # 152.

Output 4. Middle frequency spurious.
802.11b mode.

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

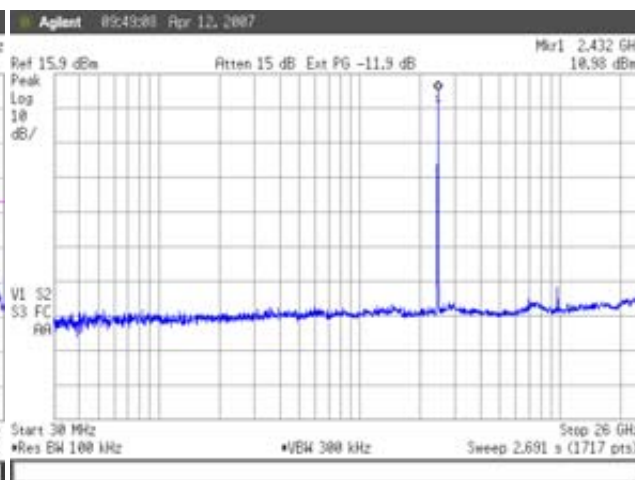
Model: WS410AD

FCC ID: UGMWS410AD



Plot # 153.

Output 5. Middle frequency bandedge.
802.11b mode.



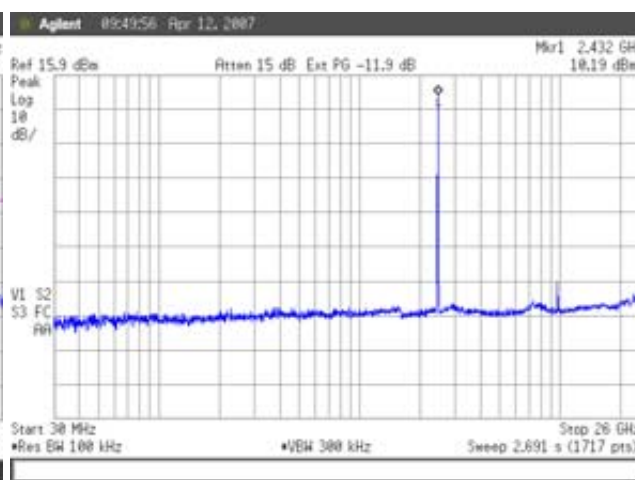
Plot # 154.

Output 5. Middle frequency spurious.
802.11b mode.



Plot # 155.

Output 6. Middle frequency bandedge.
802.11b mode.



Plot # 156.

Output 6. Middle frequency spurious.
802.11b mode.

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

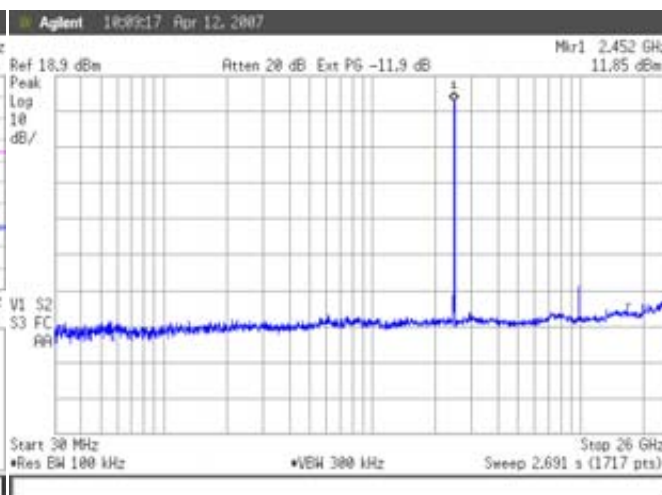
Model: WS410AD

FCC ID: UGMWS410AD



Plot # 157.

Output 1. High frequency bandedge.
802.11b mode.



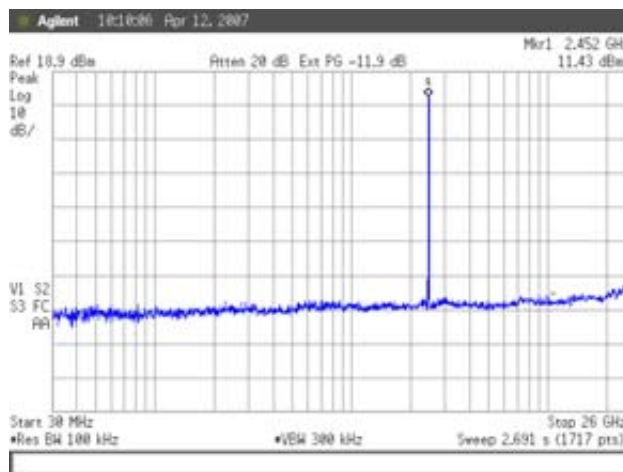
Plot # 158.

Output 1. High frequency spurious.
802.11b mode.



Plot # 159.

Output 2. High frequency bandedge.
802.11b mode.



Plot # 160.

Output 2. High frequency spurious.
802.11b mode.

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

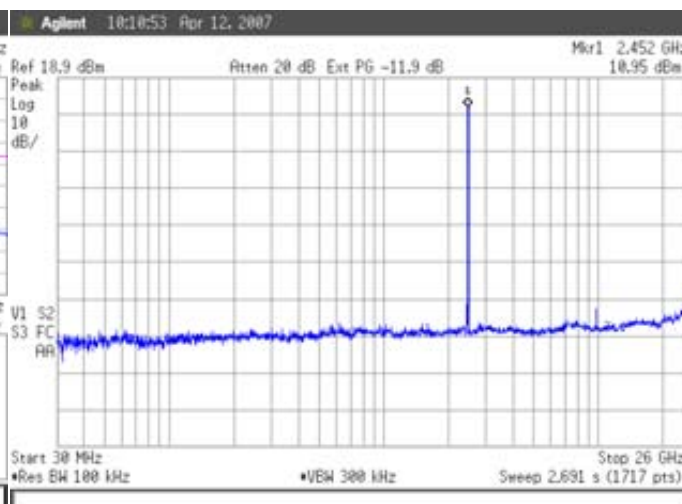
Model: WS410AD

FCC ID: UGMWS410AD



Plot # 161.

Output 3. High frequency bandedge.
802.11b mode.



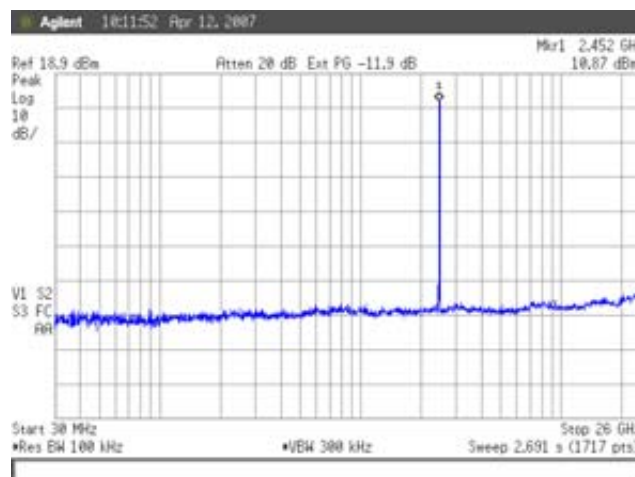
Plot # 162.

Output 3. High frequency spurious.
802.11b mode.



Plot # 163.

Output 4. High frequency bandedge.
802.11b mode.



Plot # 164.

Output 4. High frequency spurious.
802.11b mode.

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

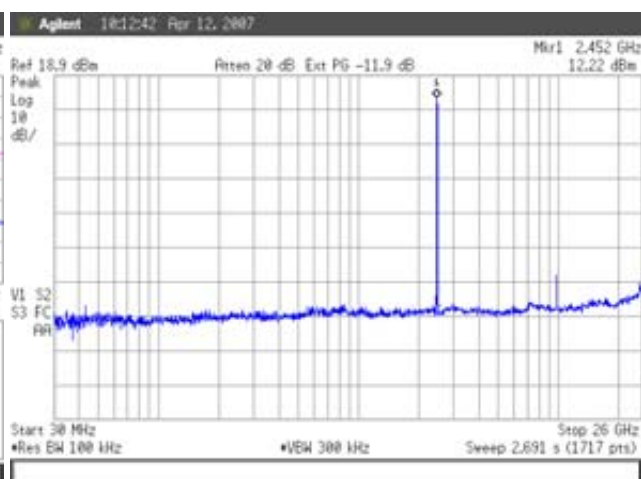
Model: WS410AD

FCC ID: UGMWS410AD



Plot # 165.

Output 5. High frequency bandedge.
802.11b mode.



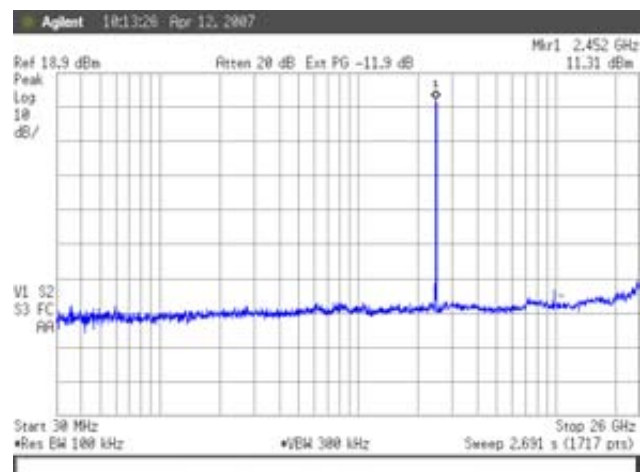
Plot # 166.

Output 5. High frequency spurious.
802.11b mode.



Plot # 167.

Output 6. High frequency bandedge.
802.11b mode.



Plot # 168.

Output 6. High frequency spurious.
802.11b mode.

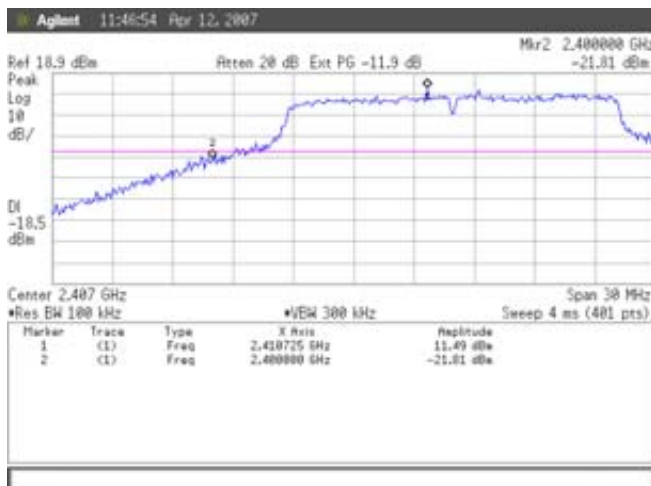
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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

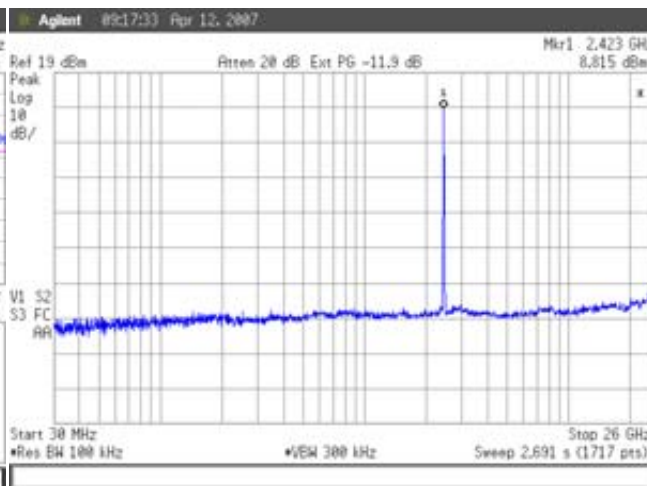
Model: WS410AD

FCC ID: UGMWS410AD



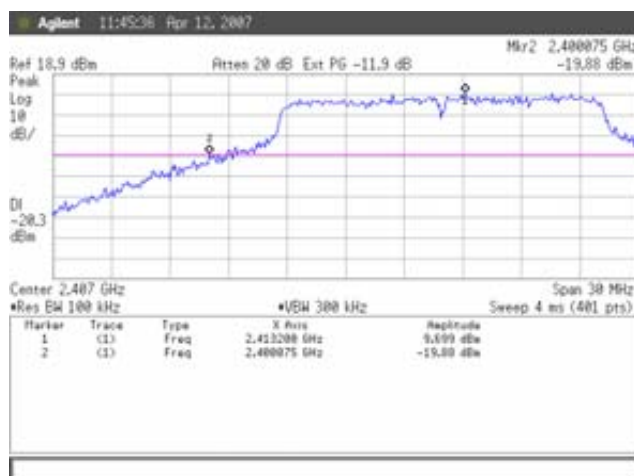
Plot # 169.

Output 1. Low frequency bandedge.
802.11g mode.



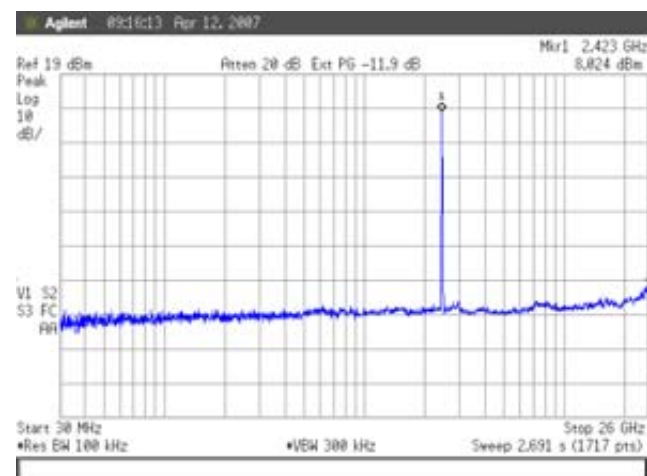
Plot # 170.

Output 1. Low frequency spurious.
802.11g mode.



Plot # 171.

Output 2. Low frequency bandedge.
802.11g mode.



Plot # 172.

Output 2. Low frequency spurious.
802.11g mode.

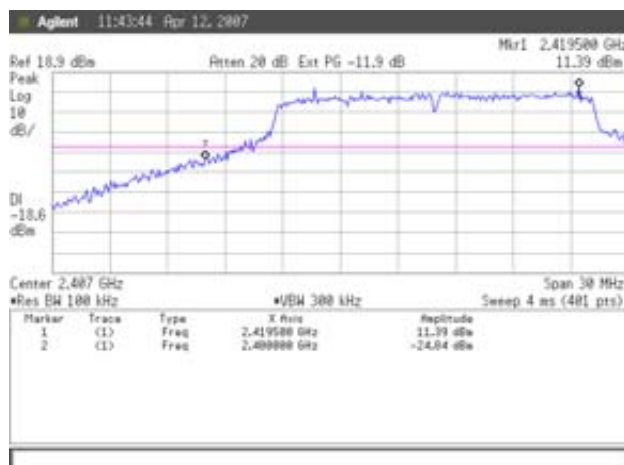
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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

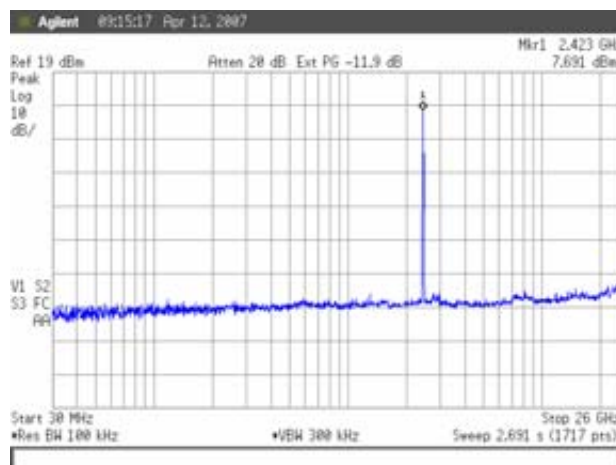
Model: WS410AD

FCC ID: UGMWS410AD



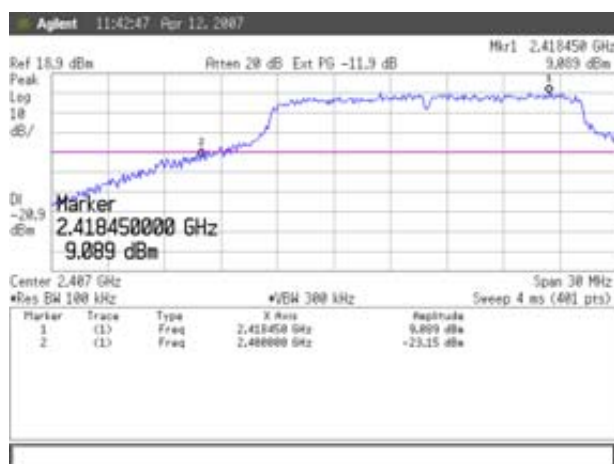
Plot # 173.

Output 3. Low frequency bandedge.
802.11g mode.



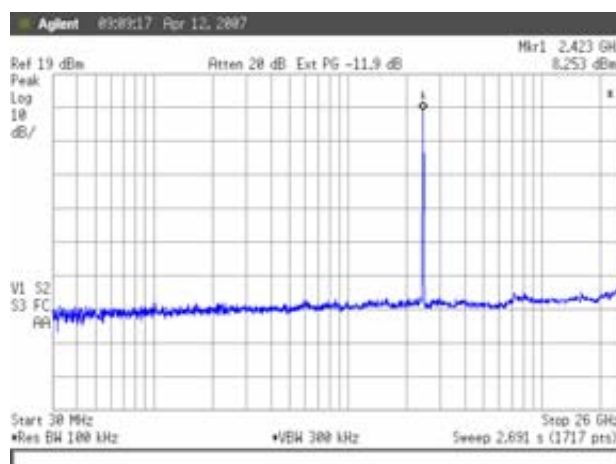
Plot # 174.

Output 3. Low frequency spurious.
802.11g mode.



Plot # 175.

Output 4. Low frequency bandedge.
802.11g mode.



Plot # 176.

Output 4. Low frequency spurious.
802.11g mode.

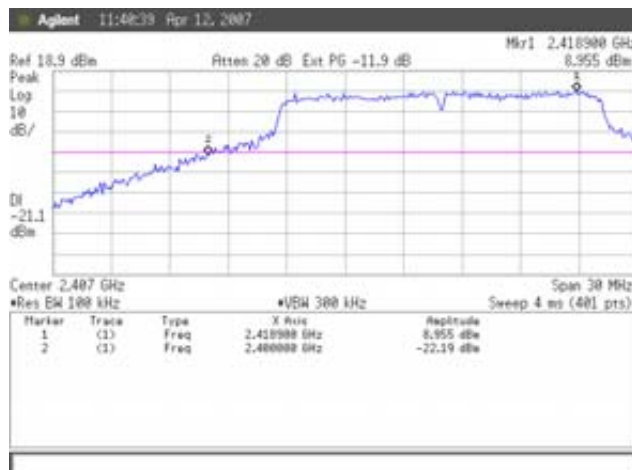
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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

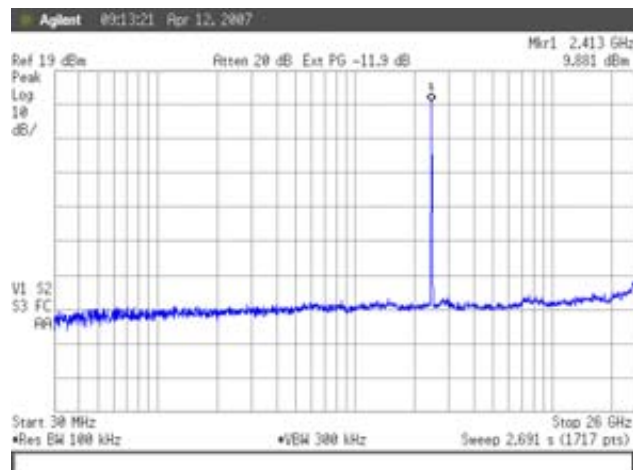
Model: WS410AD

FCC ID: UGMWS410AD



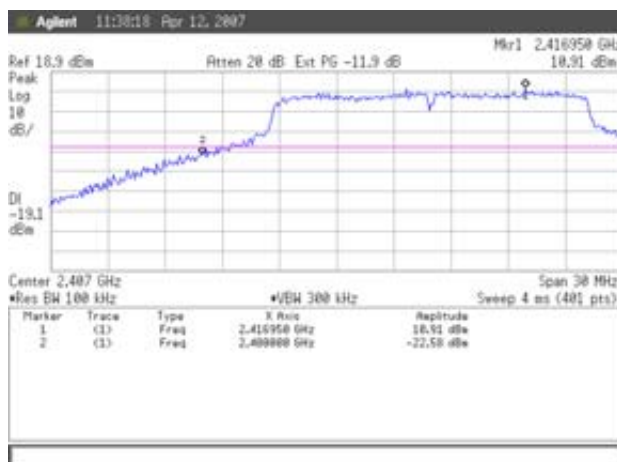
Plot # 177.

Output 5. Low frequency bandedge.
802.11g mode.



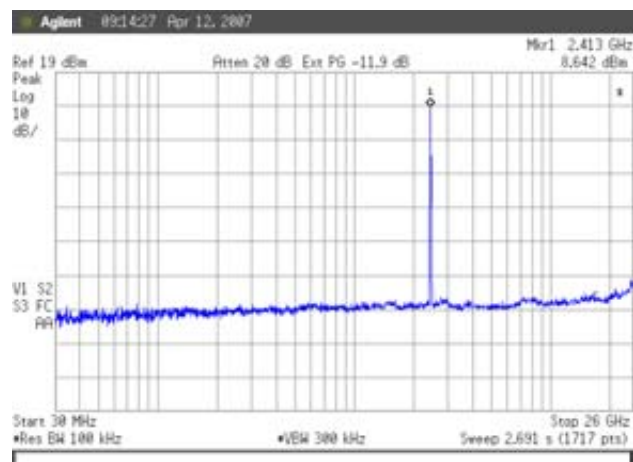
Plot # 178.

Output 5. Low frequency spurious.
802.11g mode.



Plot # 179.

Output 6. Low frequency bandedge.
802.11b mode.



Plot # 180.

Output 6. Low frequency spurious.
802.11b mode.

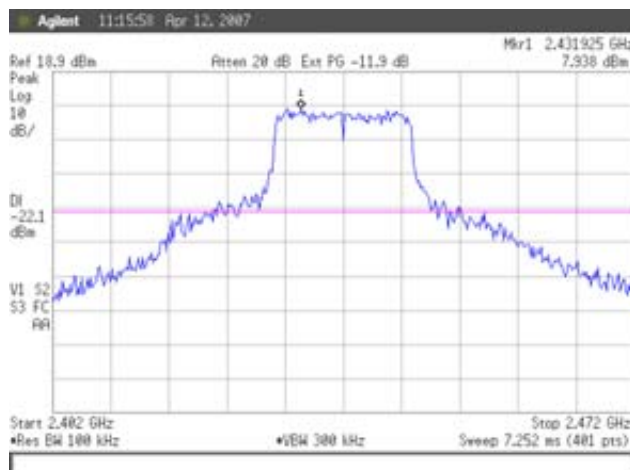
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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

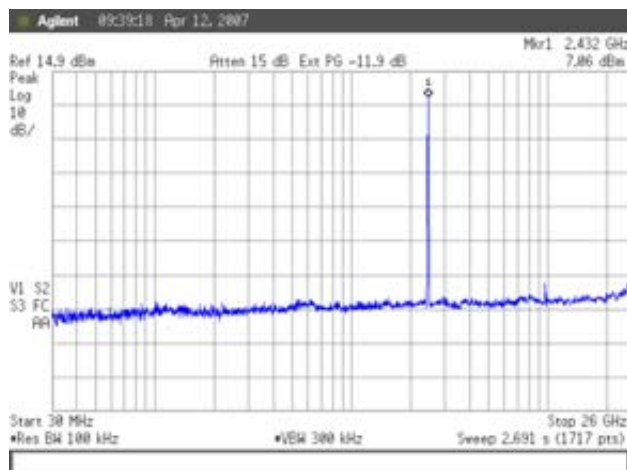
Model: WS410AD

FCC ID: UGMWS410AD



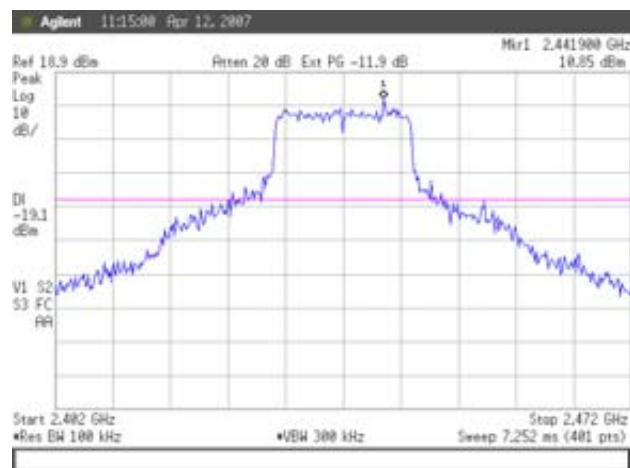
Plot # 181.

Output 1. Middle frequency bandedge.
802.11g mode.



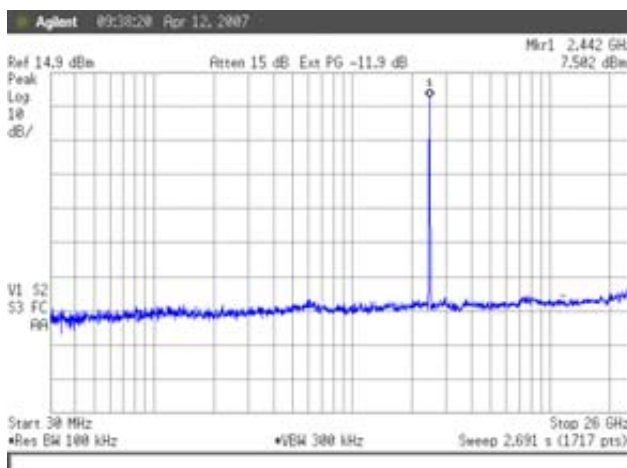
Plot # 182.

Output 1. Middle frequency spurious.
802.11g mode.



Plot # 183.

Output 2. Middle frequency bandedge.
802.11g mode.



Plot # 184.

Output 2. Middle frequency spurious.
802.11g mode.

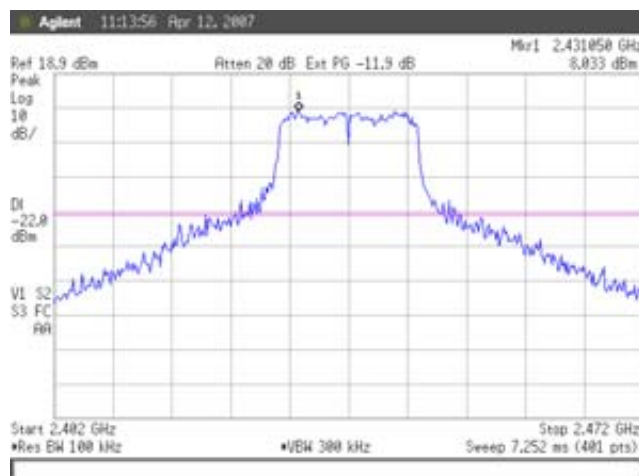
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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

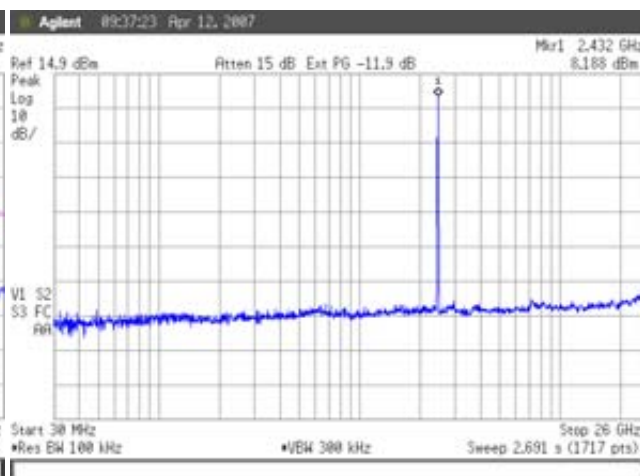
Model: WS410AD

FCC ID: UGMWS410AD



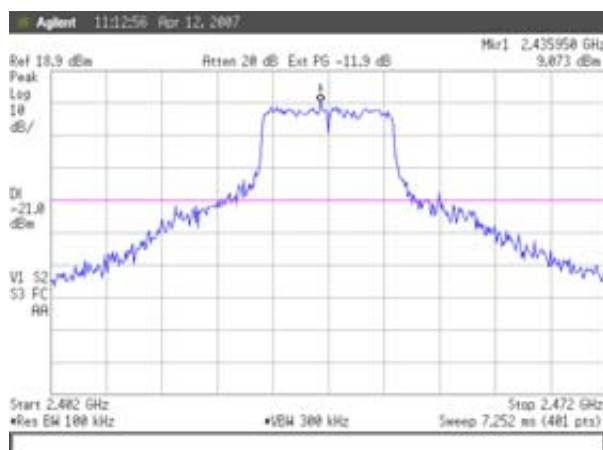
Plot # 185.

Output 3. Middle frequency bandedge.
802.11g mode.



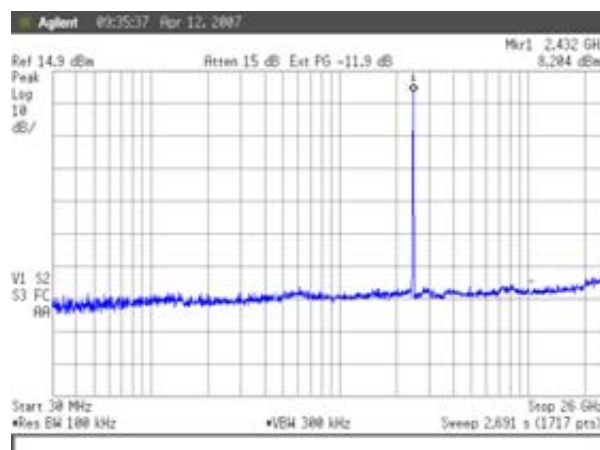
Plot # 186.

Output 3. Middle frequency spurious.
802.11g mode.



Plot # 187.

Output 4. Middle frequency bandedge.
802.11g mode.



Plot # 188.

Output 4. Middle frequency spurious.
802.11g mode.

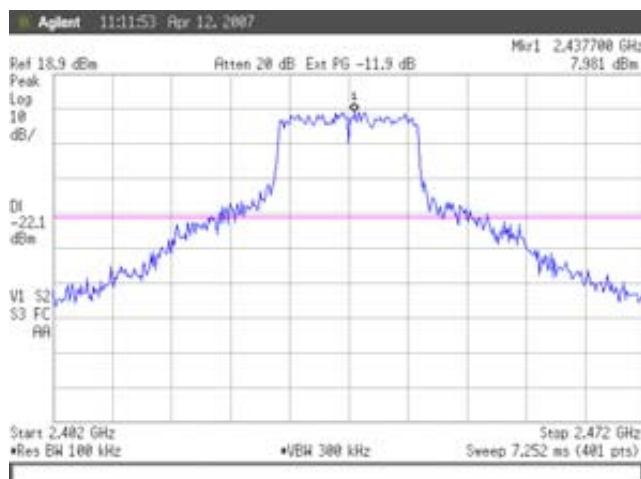
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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

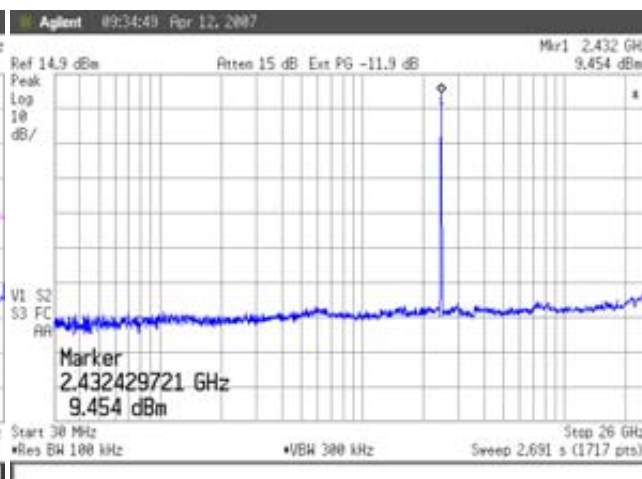
Model: WS410AD

FCC ID: UGMWS410AD



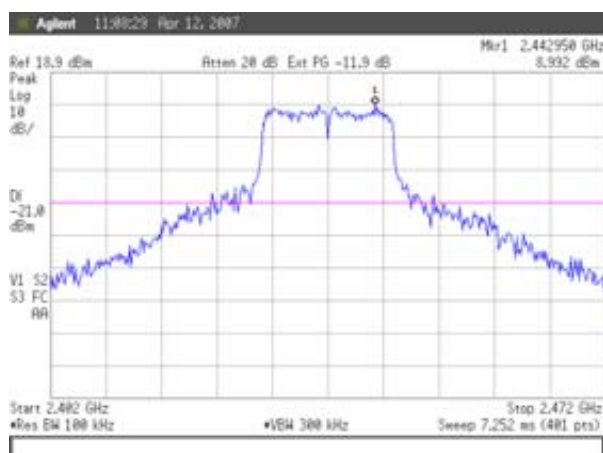
Plot # 189.

Output 5. Middle frequency bandedge.
802.11g mode.



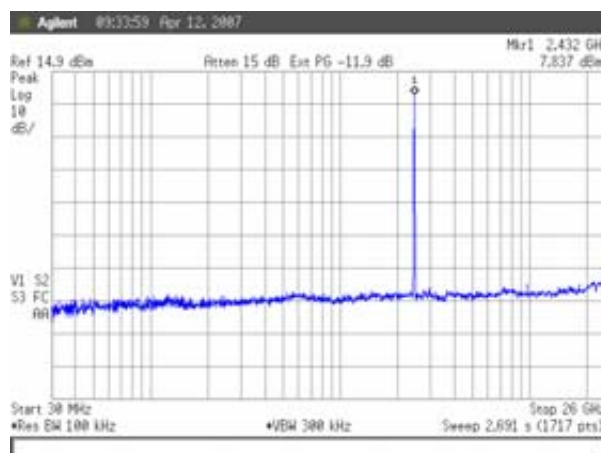
Plot # 190.

Output 5. Middle frequency spurious.
802.11g mode.



Plot # 191.

Output 6. Middle frequency bandedge.
802.11g mode.



Plot # 192.

Output 6. Middle frequency spurious.
802.11g mode.

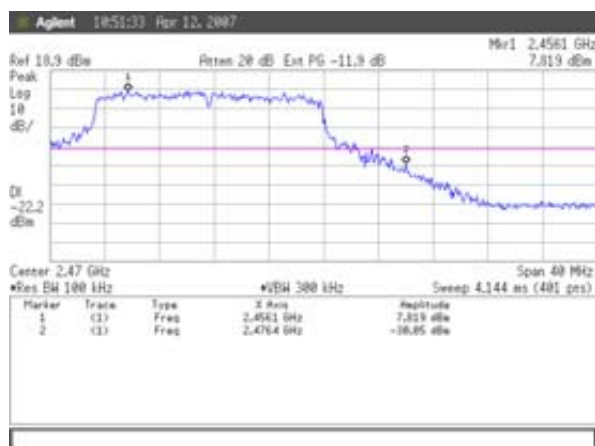
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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

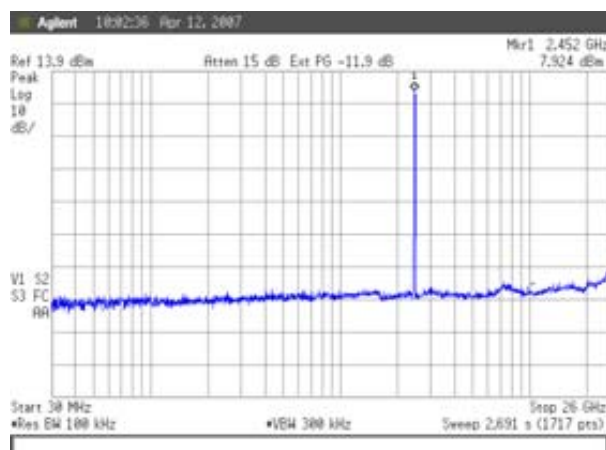
Model: WS410AD

FCC ID: UGMWS410AD



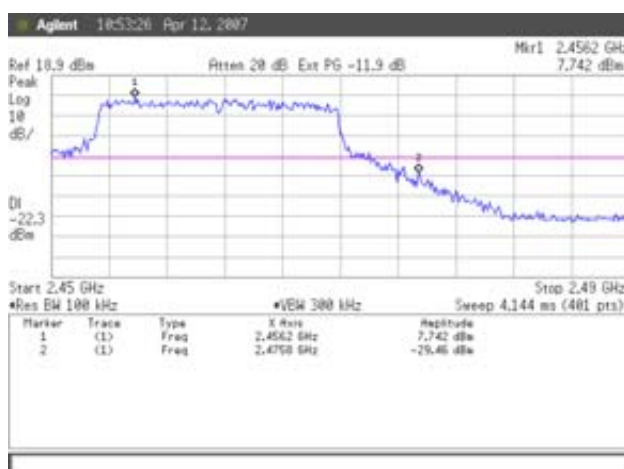
Plot # 193.

Output 1. High frequency bandedge.
802.11g mode.



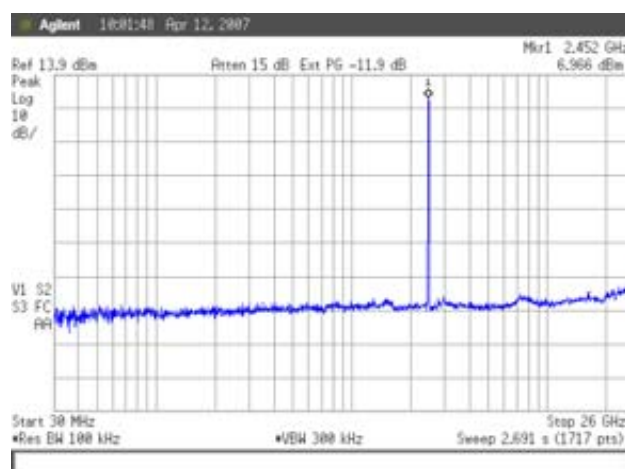
Plot # 194.

Output 1. High frequency spurious.
802.11g mode.



Plot # 195.

Output 2. High frequency bandedge.
802.11g mode.



Plot # 196.

Output 2. High frequency spurious.
802.11g mode.

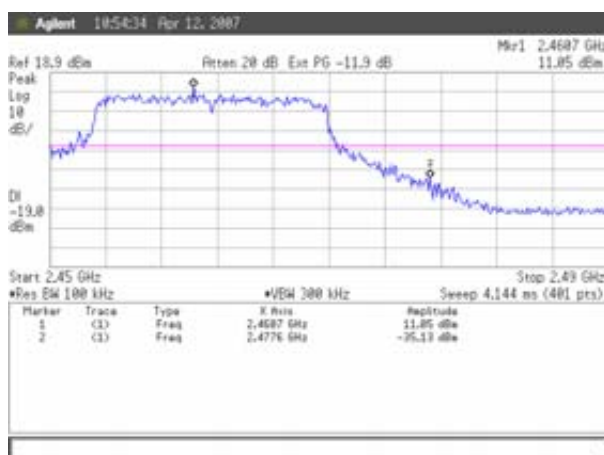
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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

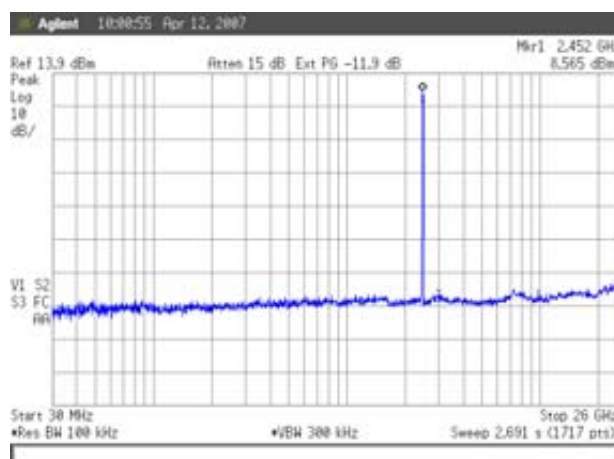
Model: WS410AD

FCC ID: UGMWS410AD



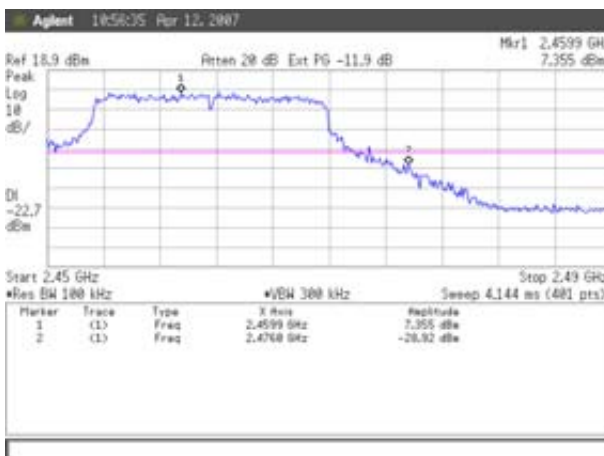
Plot # 197.

Output 3. High frequency bandedge.
802.11g mode.



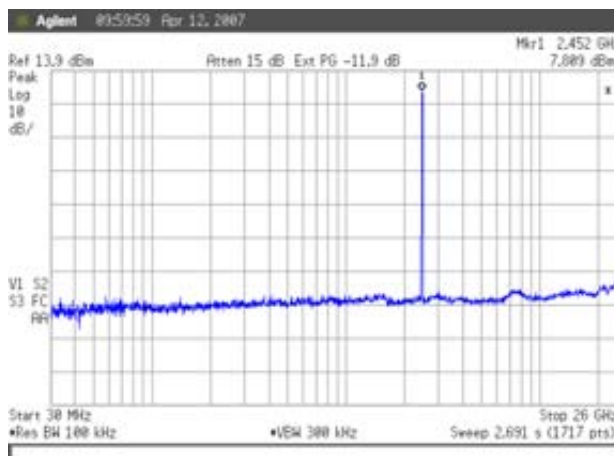
Plot # 198.

Output 3. High frequency spurious.
802.11g mode.



Plot # 199.

Output 4. High frequency bandedge.
802.11g mode.



Plot # 200.

Output 4. High frequency spurious.
802.11g mode.

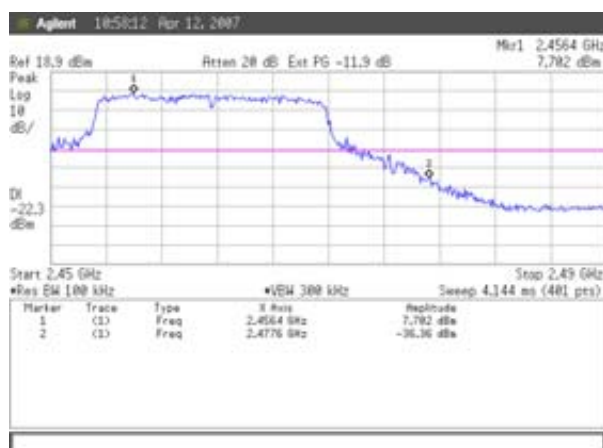
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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

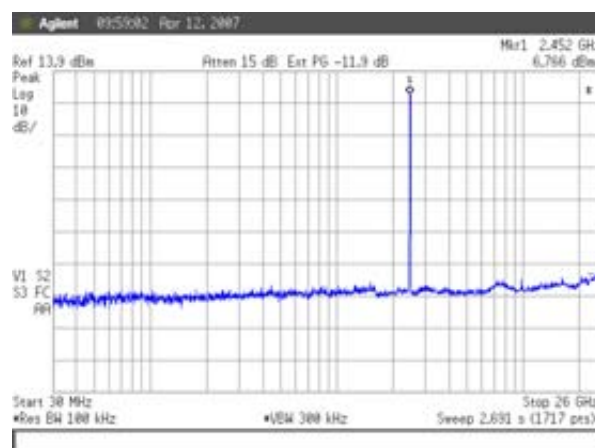
Model: WS410AD

FCC ID: UGMWS410AD



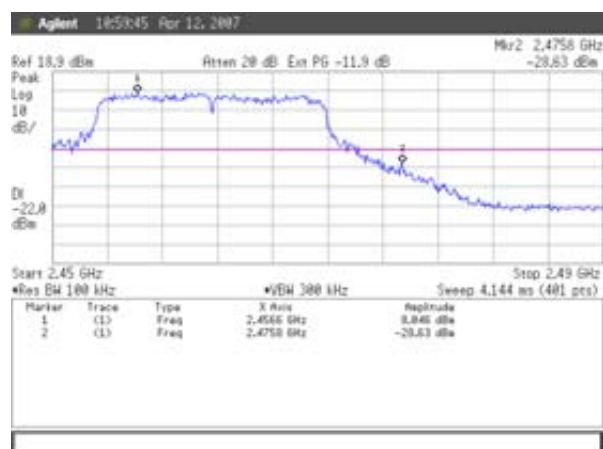
Plot # 201.

Output 5. High frequency bandedge.
802.11g mode.



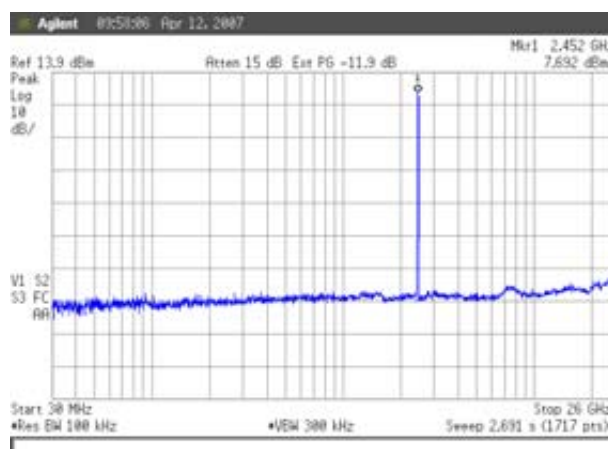
Plot # 202.

Output 5. High frequency spurious.
802.11g mode.



Plot # 203.

Output 6. High frequency bandedge.
802.11g mode.



Plot # 204.

Output 6. High frequency spurious.
802.11g mode.

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

Model: WS410AD

FCC ID: UGMWS410AD

9. Appendix 1: Test equipment used

All measurements equipment is on SII calibration schedule with a recalibration interval not exceeding one year.

Instrument	Manufacturer	Model	Serial No.	Due calibration date
Spectrum analyzer 10 KHz-26.5 GHz	HP	E7405a	SII 4944	02/07
Signal Analyzer	Rohde&Schwarz	FSQ 8	100647	10/06
EMI Analyzer	HP	E7405A	SII 4944	10/06
Antenna Double Ridge 1-18 GHz	EMCO	3115	SII 4873	04/07
Antenna SHF-EHF Horn 15-40 GHz	Schwarzbeck	BBHA 9170	SII 5854	03/07
Biconilog Antenna 30 – 2000 MHz	Schaffner- Chase	CBL-6112B	S/N 2531	12/06
Antenna Mast	R&S	HCM	-	N/A
Metallic turntable	R&S	HCT12	100001	N/A
Positioning controller	R&S	HCC	-	N/A
LISN 9 kHz – 30 MHz	FCC	LISN- 50/250-32-4- 16	SII 5023	03/07
Transient limiter 0.009-200 MHz	HP	11947A	31074A3105	03/07

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

Model: WS410AD

FCC ID: UGMWS410AD

10. Appendix 2 Antenna Factor and Cable Loss

Cable Loss (10m cable + Mast)

Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)
1	30	0.53	21	1000	3.68
2	50	0.75	22	1100	3.82
3	100	1.08	23	1200	4.07
4	150	1.39	24	1300	4.24
5	200	1.61	25	1400	4.43
6	250	1.752	26	1500	4.6
7	300	2.00	27	1600	4.7
8	350	2.15	28	1700	4.85
9	400	2.26	29	1800	4.98
10	450	2.383	30	1900	5.19
11	500	2.52	31	2000	5.34
12	550	2.606	32	2100	5.51
13	600	2.75	33	2200	5.69
14	650	2.856	34	2300	5.89
15	700	3.06	35	2400	6.07
16	750	3.201	36	2500	6.22
17	800	3.27	37	2600	6.28
18	850	3.38	38	2700	6.41
19	900	3.46	39	2800	6.53
20	950	3.55	40	2900	6.84

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

Model: WS410AD

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Antenna Factor

For Biconilog Antenna, Model Number: CBL-6112B, S/N: 2531
10 m Calibration

Frequency (MHz)	Antenna Factor (dB/m)	Frequency (MHz)	Antenna Factor (dB/m)	Frequency (MHz)	Antenna Factor (dB/m)	Frequency (MHz)	Antenna Factor (dB/m)
Vertical Polarization				Horizontal Polarization			
30.00	17.89	650.00	18.95	30.00	18.99	650.00	19.24
40.00	12.75	675.00	19.14	40.00	13.45	675.00	19.14
50.00	8.58	700.00	19.30	50.00	8.43	700.00	18.98
60.00	6.05	725.00	19.72	60.00	6.39	725.00	19.58
70.00	6.25	750.00	20.11	70.00	6.38	750.00	20.07
80.00	7.66	775.00	20.25	80.00	7.32	775.00	20.16
90.00	9.22	800.00	20.24	90.00	9.25	800.00	20.02
100.00	10.85	825.00	20.55	100.00	10.95	825.00	20.53
110.00	11.65	850.00	20.60	110.00	11.71	850.00	20.36
120.00	11.81	875.00	20.70	120.00	12.01	875.00	20.74
130.00	11.73	900.00	20.79	130.00	11.87	900.00	20.60
140.00	11.01	925.00	21.27	140.00	11.21	925.00	20.89
150.00	10.38	950.00	21.34	150.00	10.50	950.00	20.96
160.00	10.08	975.00	21.52	160.00	9.98	975.00	21.36
170.00	9.67	1,000.00	21.56	170.00	9.61	1,000.00	21.38
180.00	9.51	1,050.00	22.04	180.00	9.37	1,050.00	21.99
190.00	9.76	1,100.00	22.39	190.00	9.08	1,100.00	22.01
200.00	10.05	1,150.00	22.92	200.00	9.33	1,150.00	22.39
225.00	10.52	1,200.00	22.95	225.00	9.62	1,200.00	23.10
250.00	12.56	1,250.00	23.26	250.00	12.34	1,250.00	23.49
275.00	13.22	1,300.00	23.76	275.00	12.79	1,300.00	23.88
300.00	13.44	1,350.00	24.04	300.00	13.44	1,350.00	24.23
325.00	13.86	1,400.00	24.37	325.00	13.76	1,400.00	24.41
350.00	14.63	1,450.00	24.57	350.00	14.49	1,450.00	24.92
375.00	15.04	1,500.00	24.81	375.00	14.91	1,500.00	25.29
400.00	16.03	1,550.00	24.71	400.00	15.92	1,550.00	25.31
425.00	16.78	1,600.00	25.16	425.00	16.74	1,600.00	25.61
450.00	16.69	1,650.00	24.98	450.00	16.79	1,650.00	25.95
475.00	17.32	1,700.00	25.29	475.00	17.28	1,700.00	26.11
500.00	17.48	1,750.00	25.87	500.00	17.35	1,750.00	26.90
525.00	17.51	1,800.00	26.42	525.00	17.39	1,800.00	27.34
550.00	18.59	1,850.00	26.83	550.00	19.19	1,850.00	28.12
575.00	18.54	1,900.00	27.24	575.00	18.80	1,900.00	29.84
600.00	18.89	1,950.00	27.64	600.00	18.80	1,950.00	29.20
625.00	19.10	2,000.00	27.73	625.00	19.30	2,000.00	27.93

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

Model: WS410AD

FCC ID: UGMWS410AD

Antenna Factor

For Double Ridge Guide Antenna Model Number: 3115, S/N: 5802
3 m Calibration (Vertical and Horizontal polarizations)

Point	Frequency (MHz)	Antenna Factor (dB/m)
1	1000	23.9
2	2000	28.3
3	3000	31.0
4	4000	33.1
5	4500	32.5
6	5000	32.4
7	6000	53.7
8	6500	35.6
9	7000	36.4
10	7500	36.9
11	8000	37.0
12	8500	38.0
13	9000	38.6
14	9500	38.4
15	10000	38.4
16	10500	38.4
17	11000	38.9
18	11500	39.6
19	12000	39.4
20	12500	39.2
21	13000	40.3
22	13500	41.0
23	14000	41.2
24	14500	41.3
25	15000	40.0
26	15500	38.0
27	16000	38.1
28	16500	40.3
29	17000	42.2
30	17500	44.6
31	18000	46.2

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

Model: WS410AD

FCC ID: UGMWS410AD

For SHF-EHF Horn Antenna Model Number: BBHA 9170, S/N: 5854
1m Calibration (Vertical and Horizontal polarizations)

Point	Frequency (GHz)	Antenna Factor (dB/m)
1	15	38.5
2	16	37.7
3	17	38.1
4	18	37.9
5	19	38.0
6	20	38.0
7	21	37.9
8	22	38.2
9	23	39.6
10	24	39.6
11	25	39.3
12	26	39.5
13	28	39.6
14	30	40.1
15	32	41.2
16	34	41.5
17	35	41.9
18	36	42.2
19	38	43.8
20	40	43.2

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11. Appendix 3: Test configuration illustration



Photo # 1.

WS410AD

**Radiated emission test on open site
Front side / overall view**

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WS410AD
Radiated emission test on open site
Rear view

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

Model: WS410AD

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Photo # 3.

Radiated emission test on Radio Unit – spurious & restricted bands.



Photo # 4.

Radiated emission test on Radio Unit – spurious & restricted bands.

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Title: Test on 2.4 GHz Band Outdoor WiFi (802.11b/g) access point

Model: WS410AD

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Photo # 5.
Spurious emission test



Photo # 6.
Power Spectral Density test