7.7 CONDUCTED UNDESIRABLE EMISSION

LIMIT

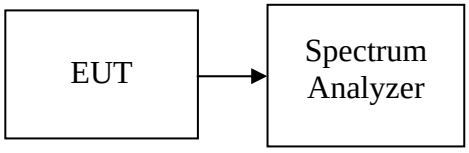
According to 15.407(b),

(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

The provisions of §15.205 apply to intentional radiators operating under this section.

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

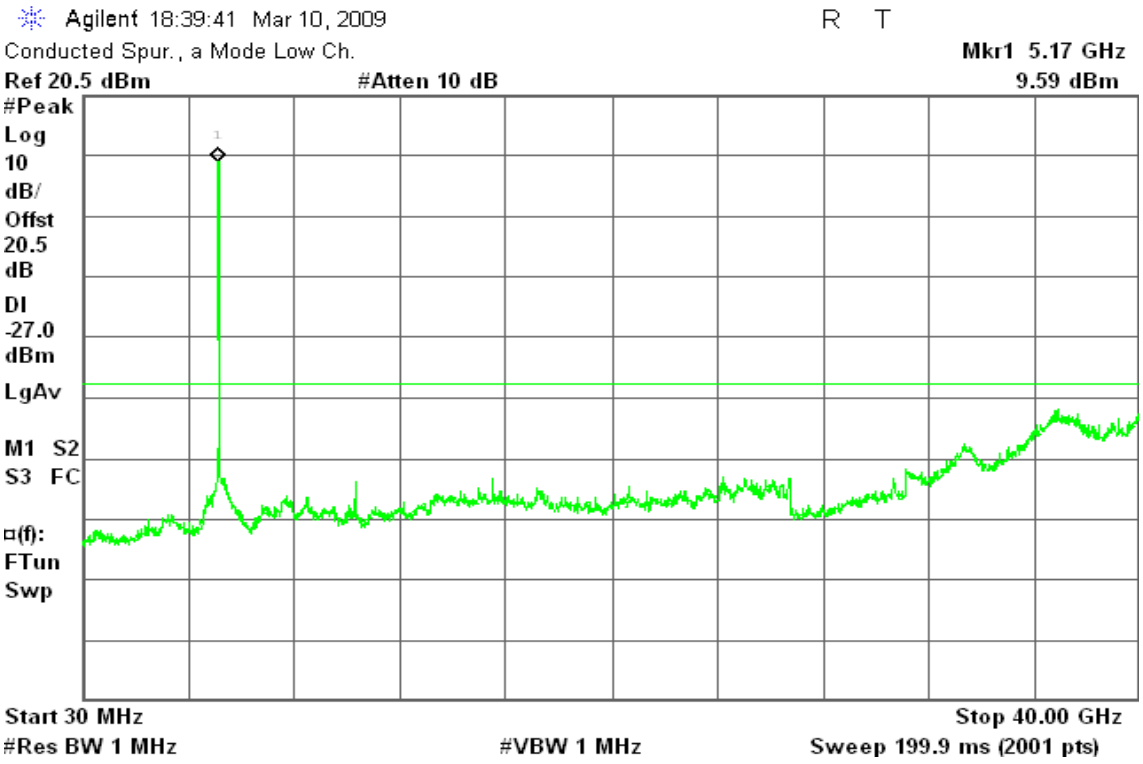
No non-compliance noted

Test Plot

IEEE 802.11a mode / 5180 ~ 5240MHz

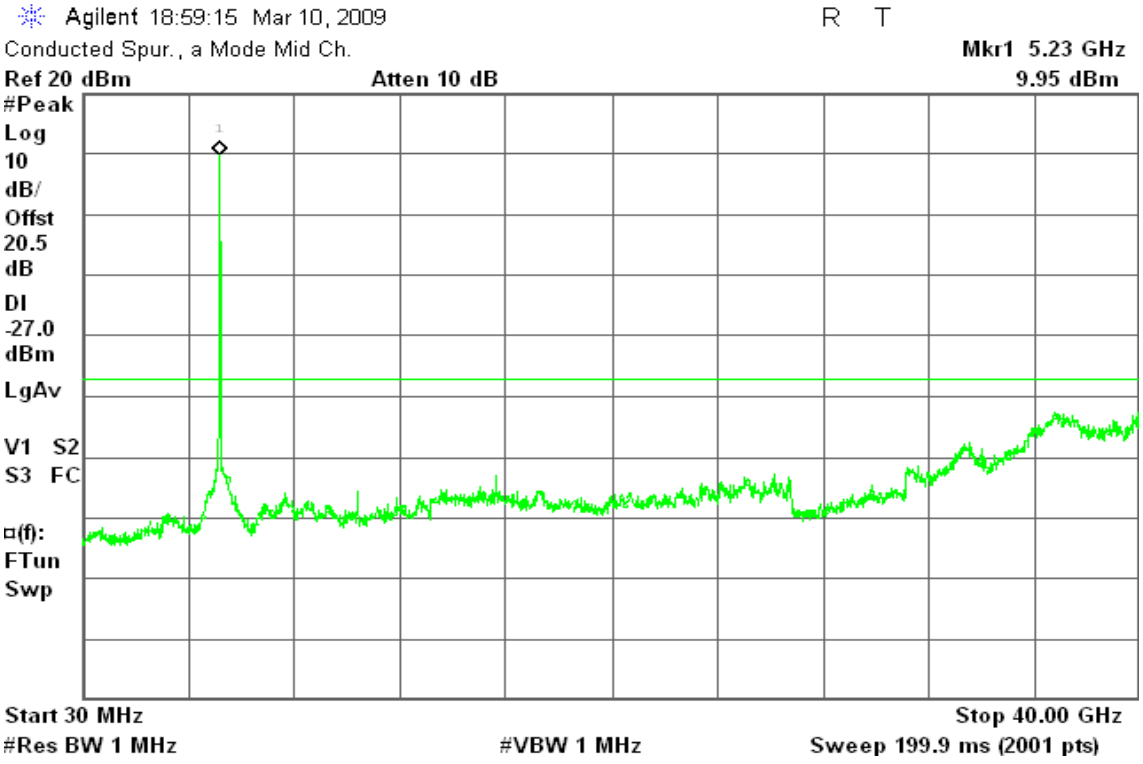
CH Low

30MHz ~ 40GHz



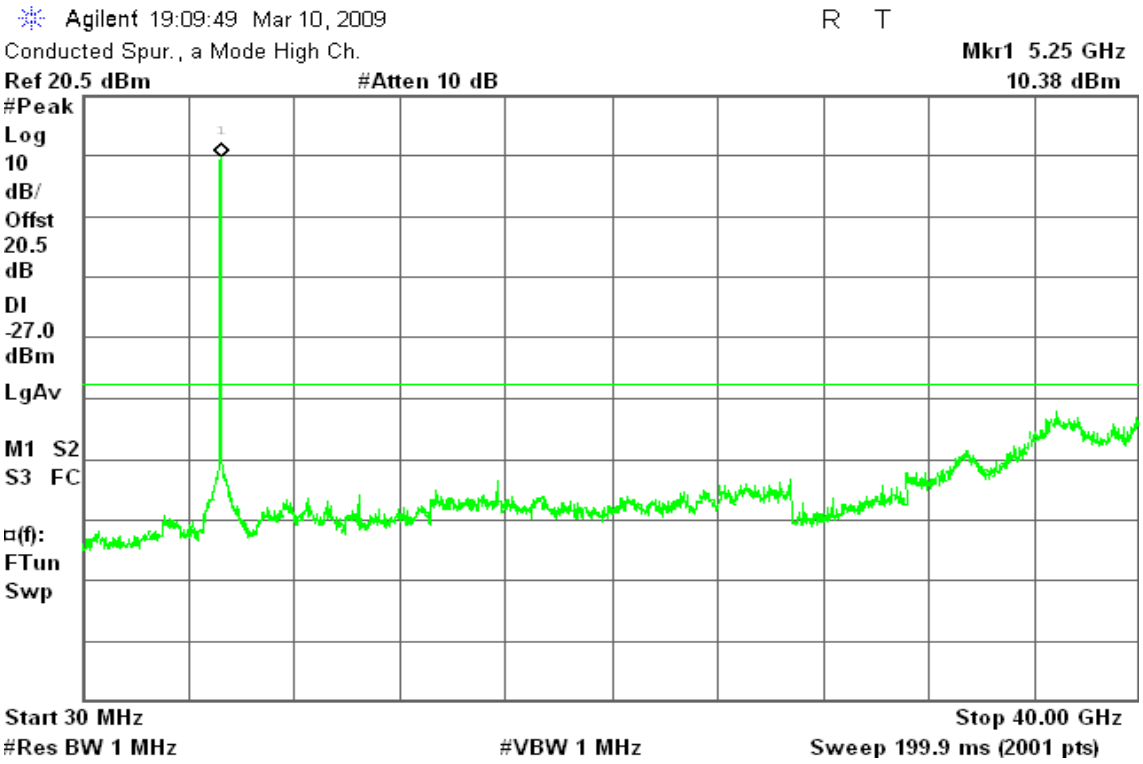
CH Mid

30MHz ~ 40GHz



CH High

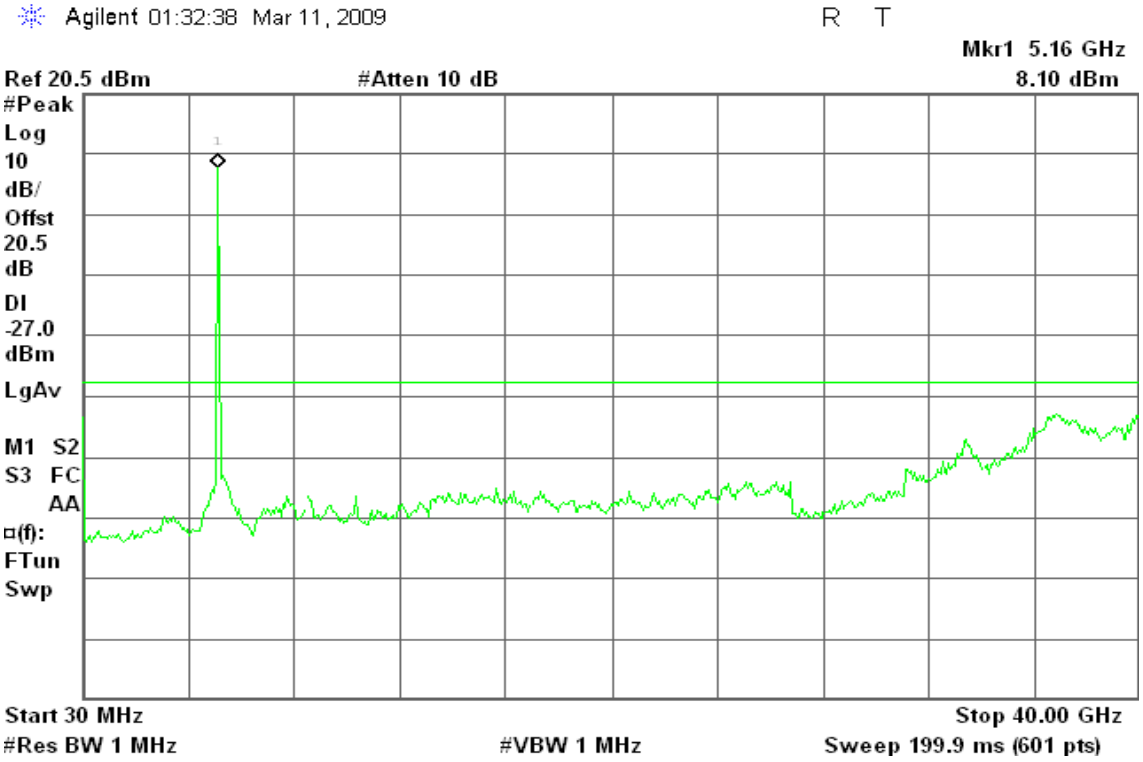
30MHz ~ 40GHz



draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 0

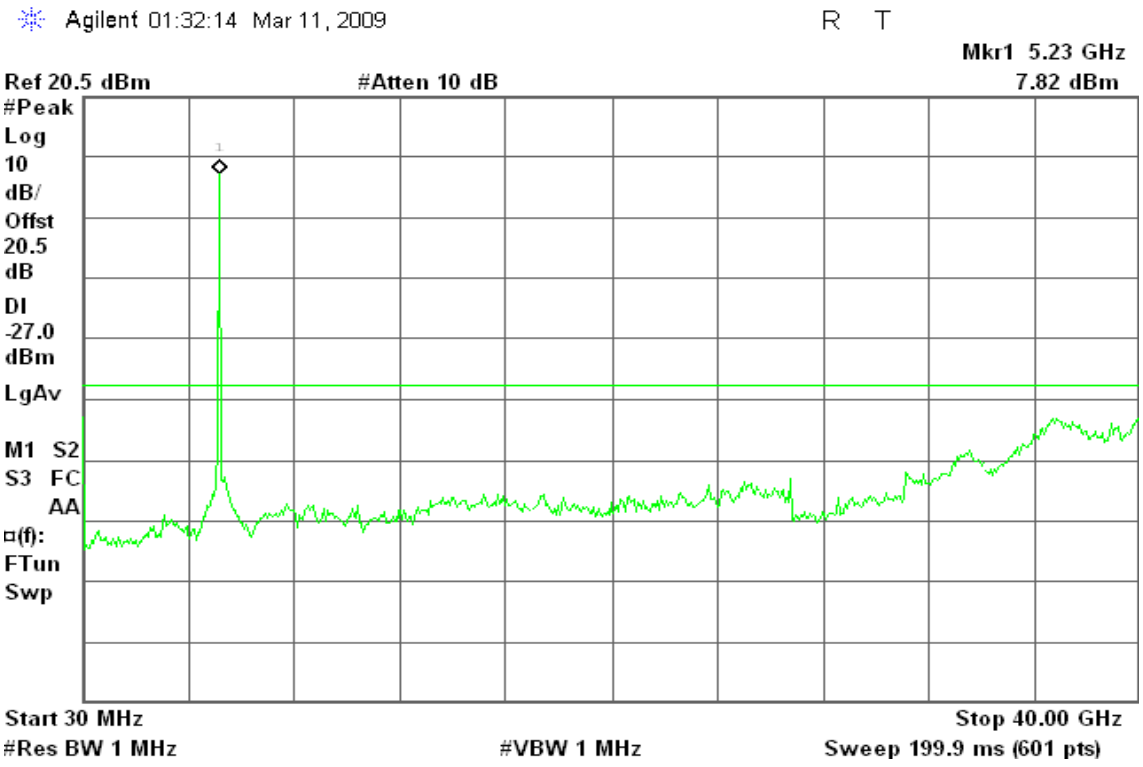
CH Low

30MHz ~ 40GHz



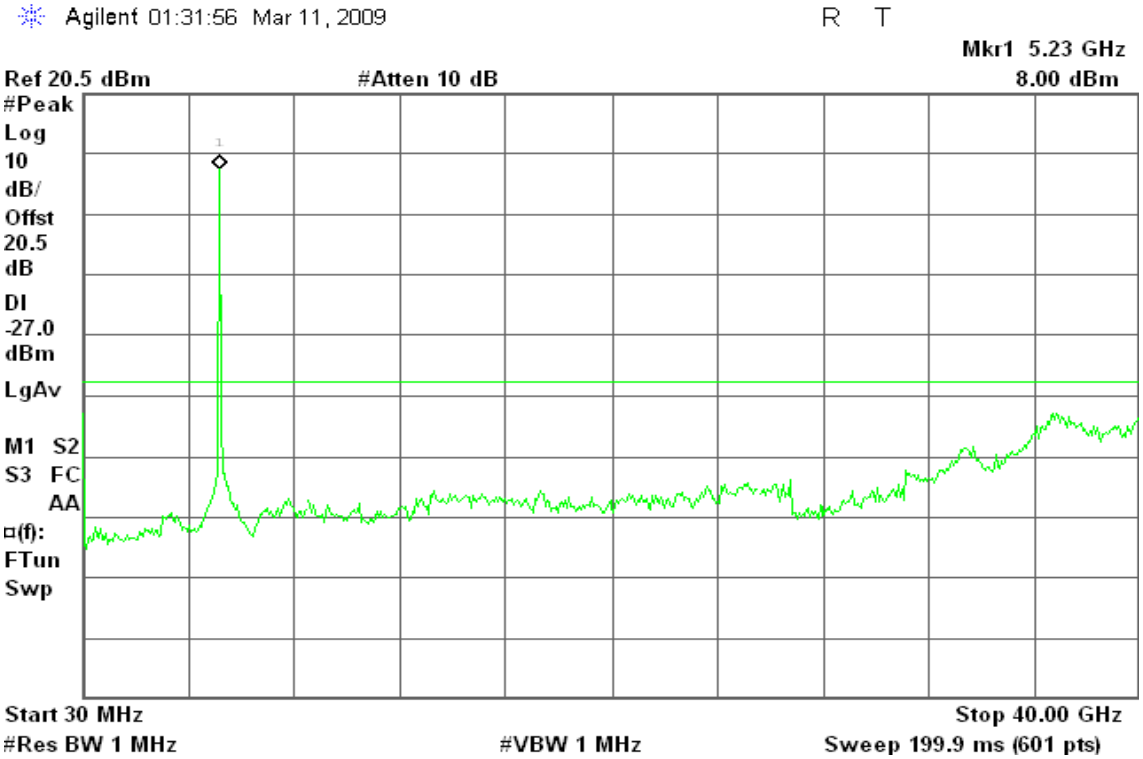
CH Mid

30MHz ~ 40GHz



CH High

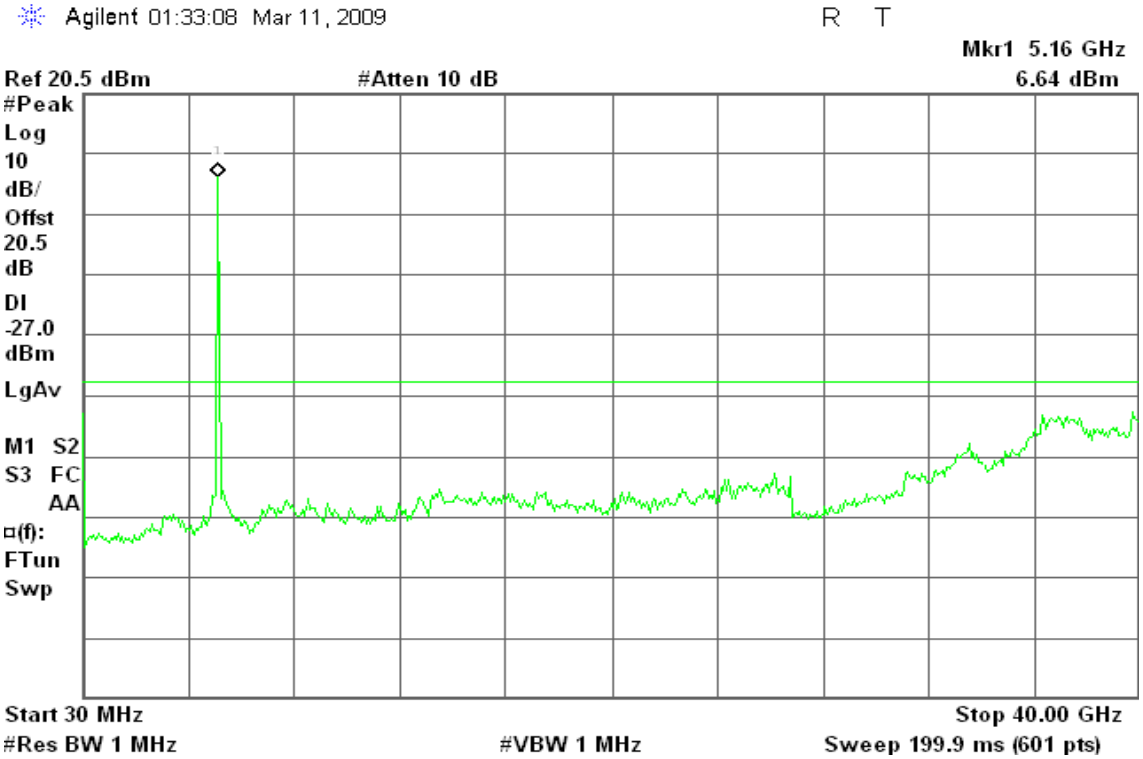
30MHz ~ 40GHz



draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / Chain 1

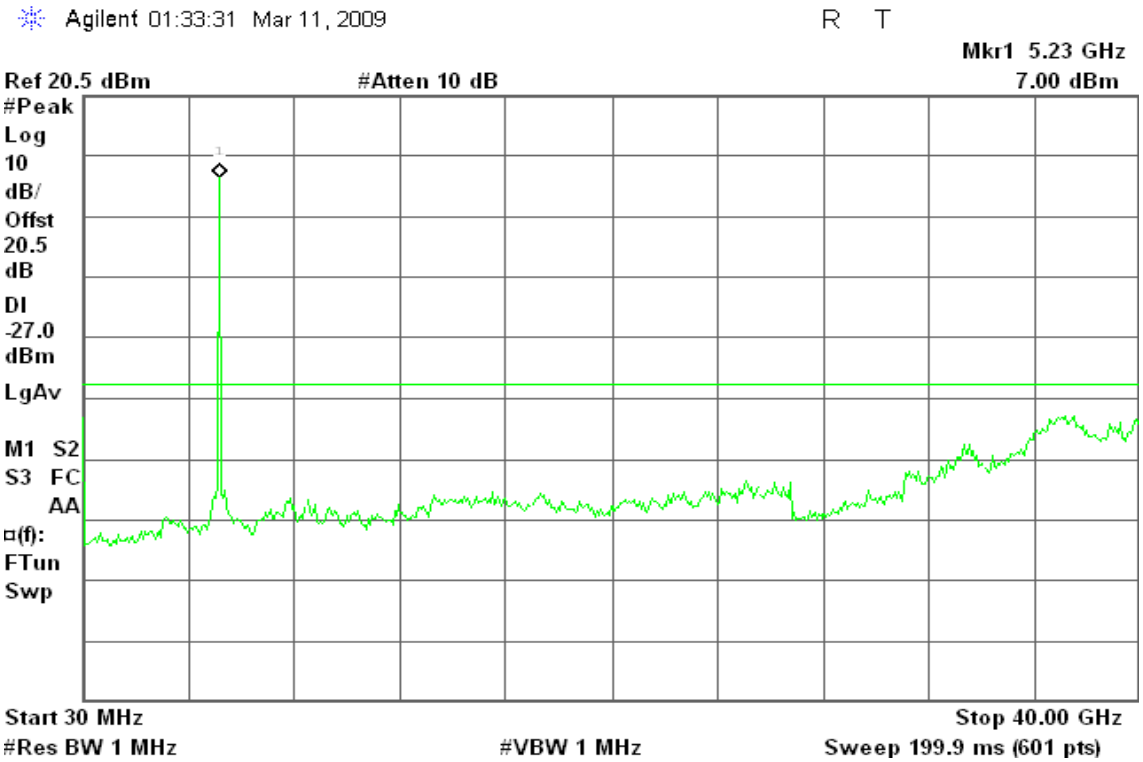
CH Low

30MHz ~ 40GHz



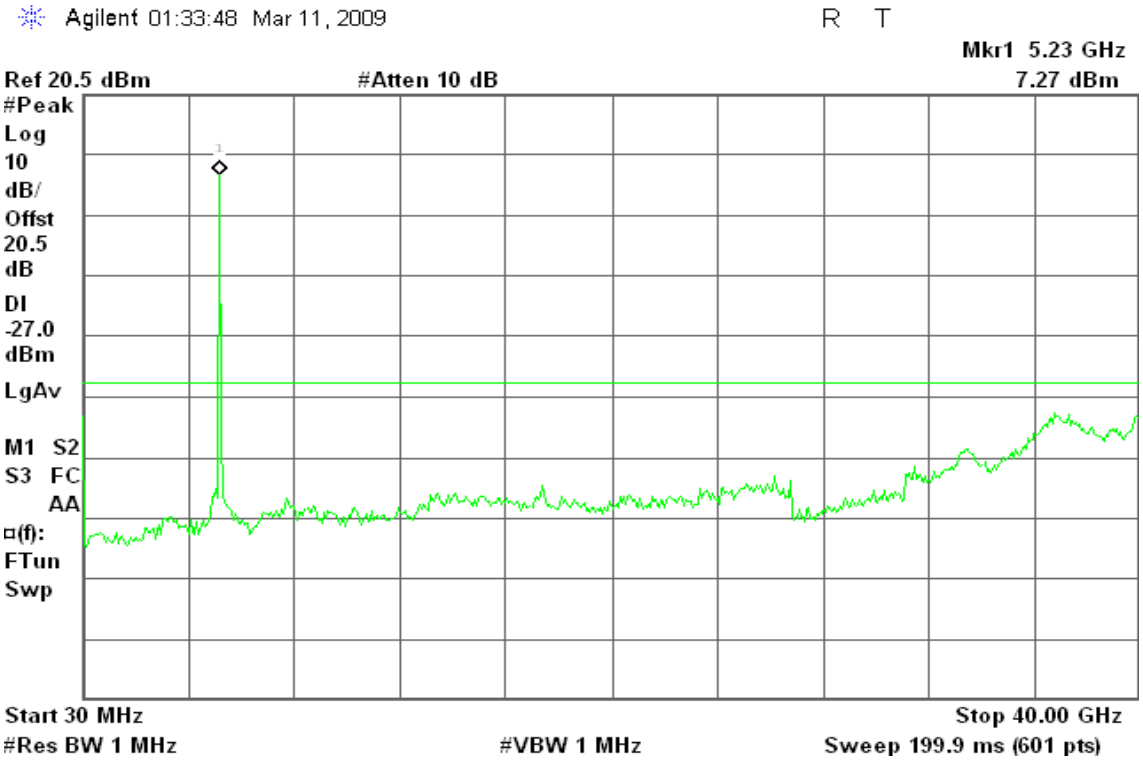
CH Mid

30MHz ~ 40GHz



CH High

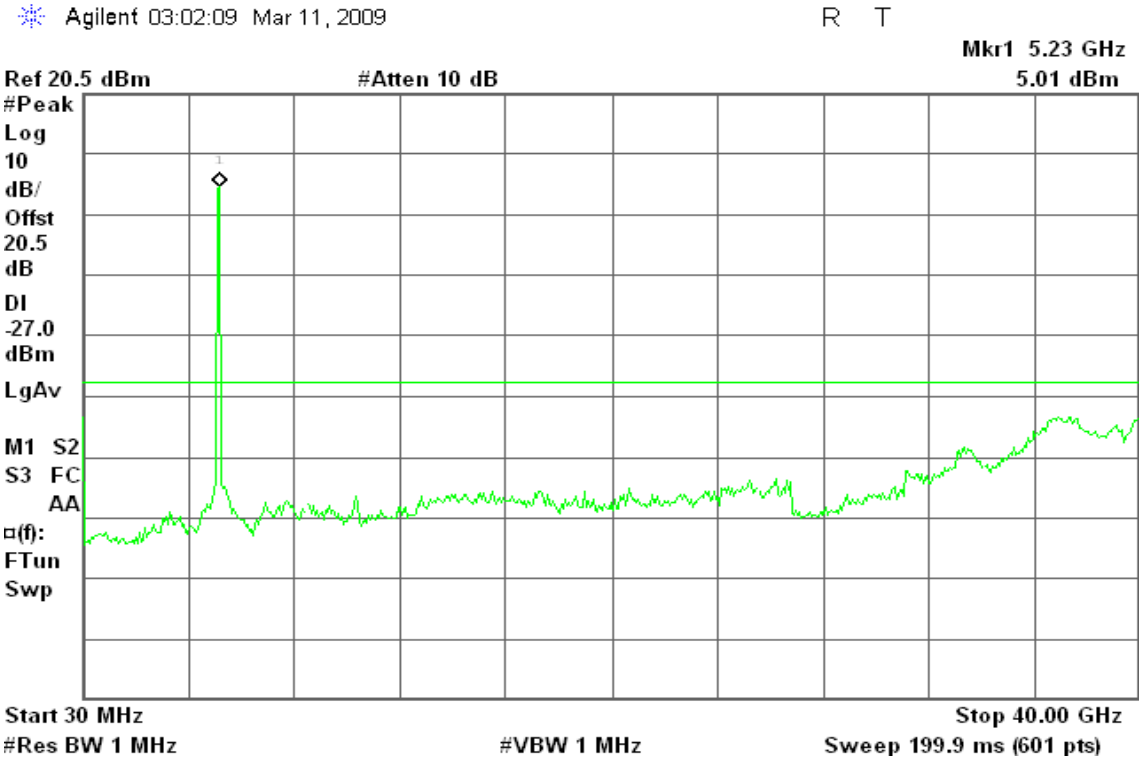
30MHz ~ 40GHz



draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 0

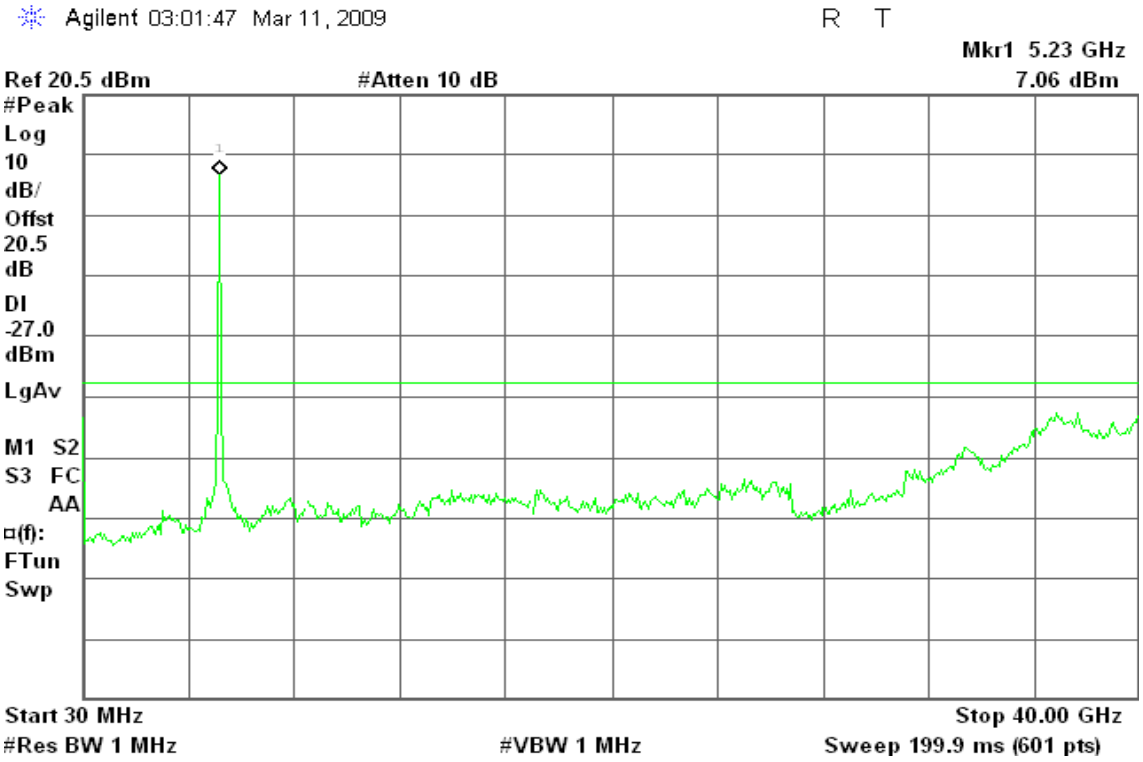
CH Low

30MHz ~ 40GHz



CH High

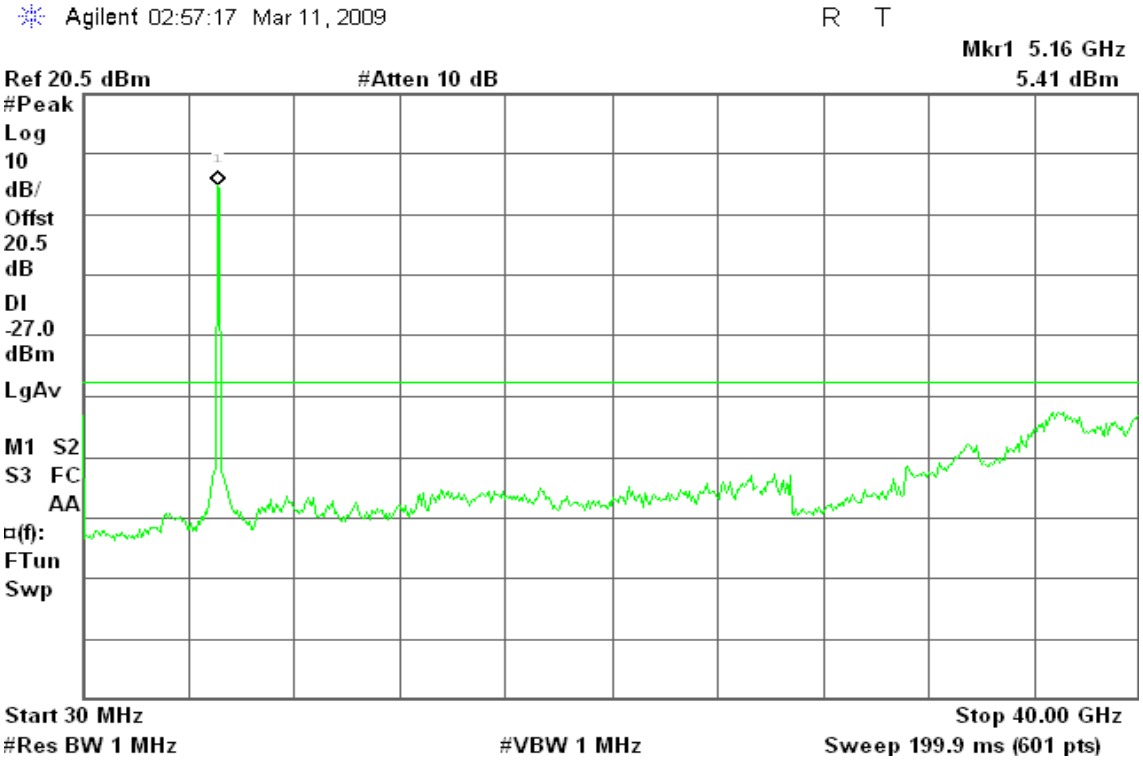
30MHz ~ 40GHz



draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / Chain 1

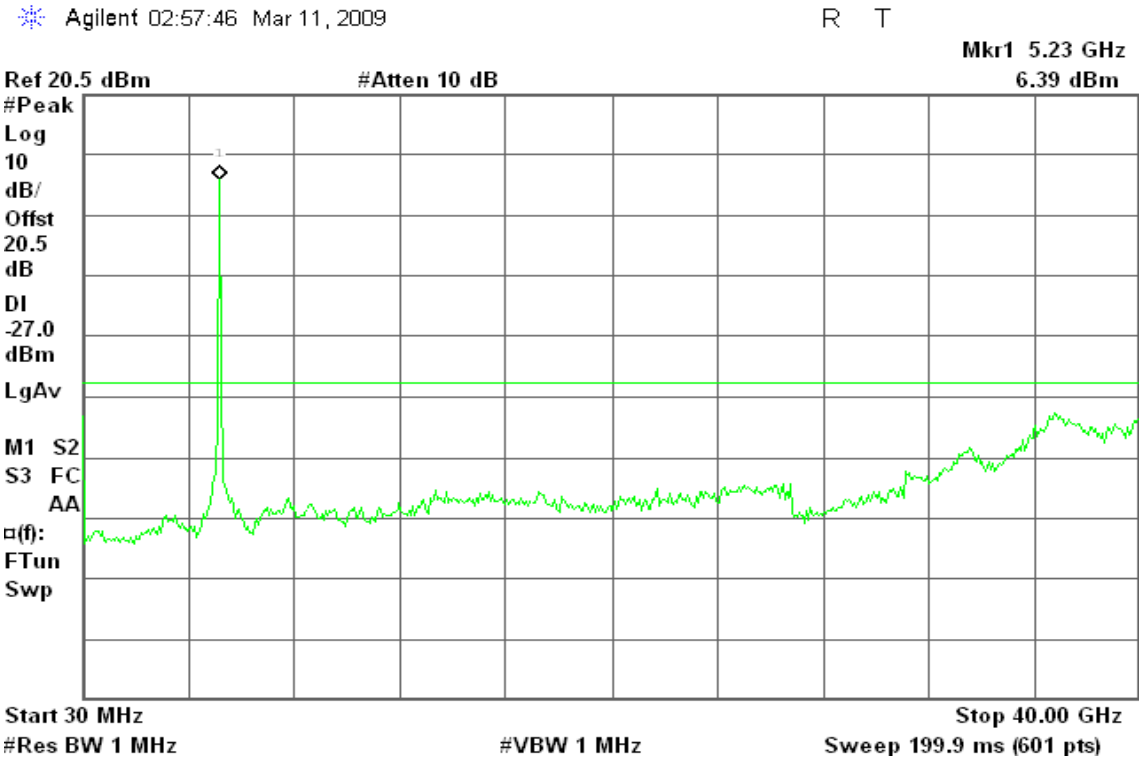
CH Low

30MHz ~ 40GHz



CH High

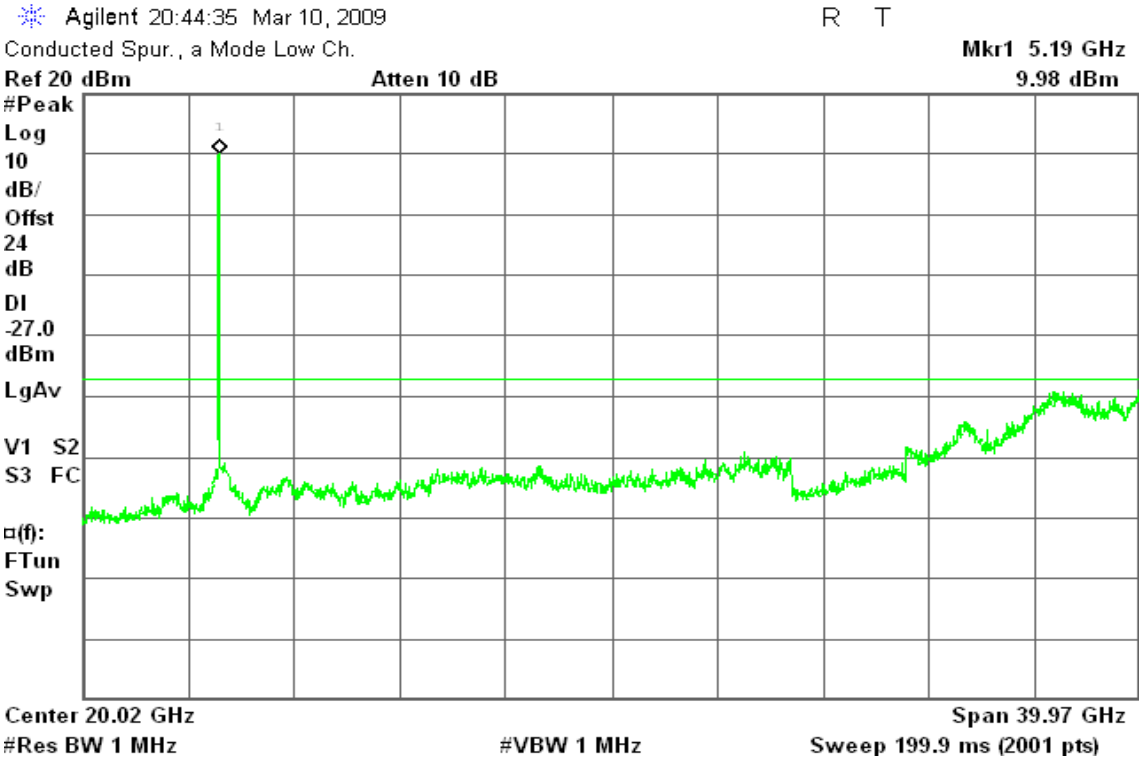
30MHz ~ 40GHz



draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz / with combiner

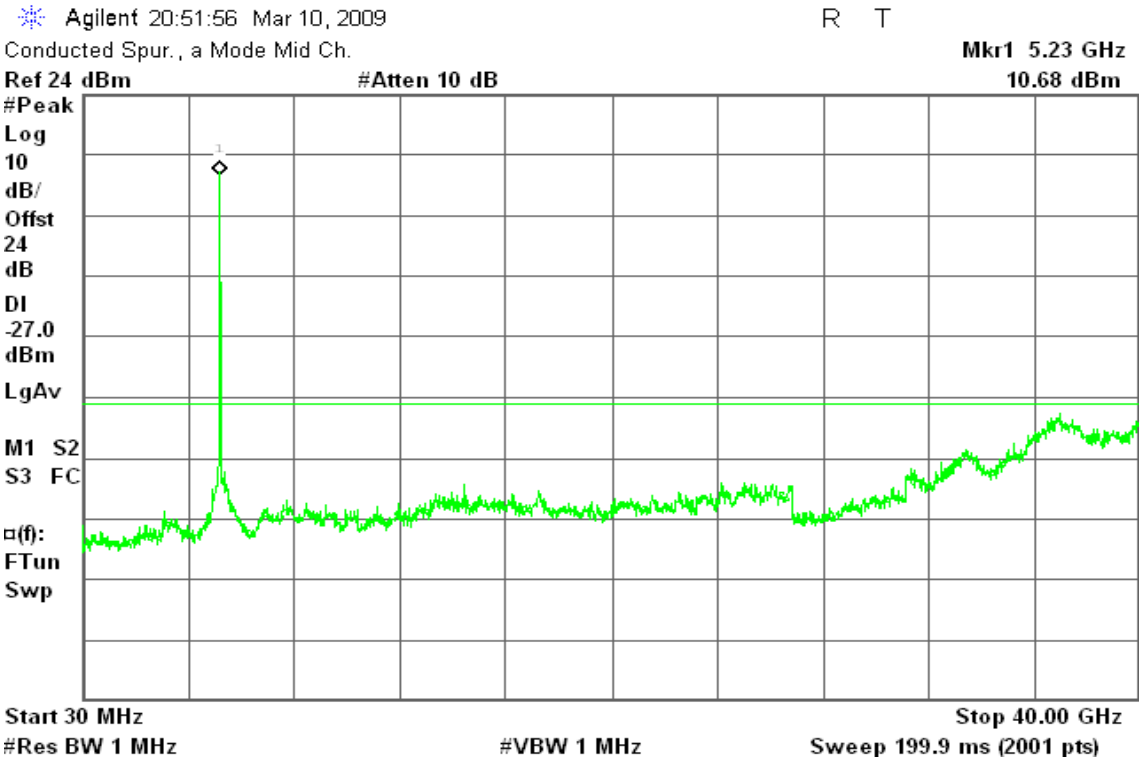
CH Low

30MHz ~ 40GHz



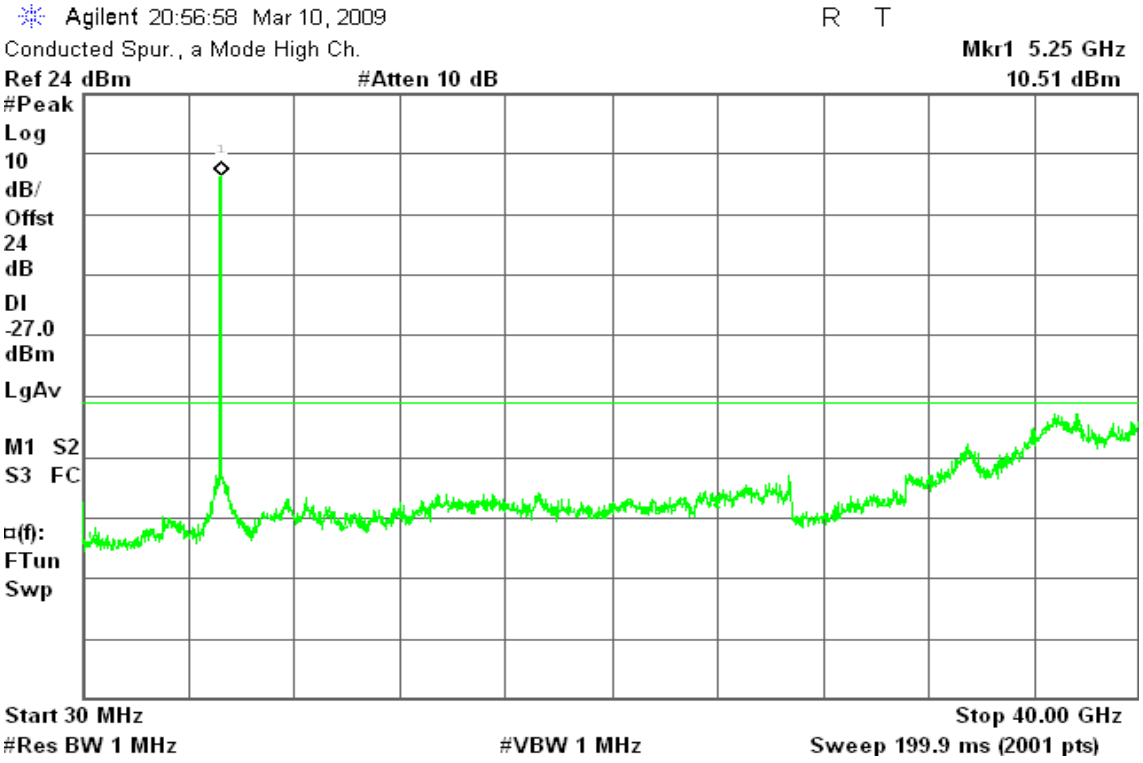
CH Mid

30MHz ~ 40GHz



CH High

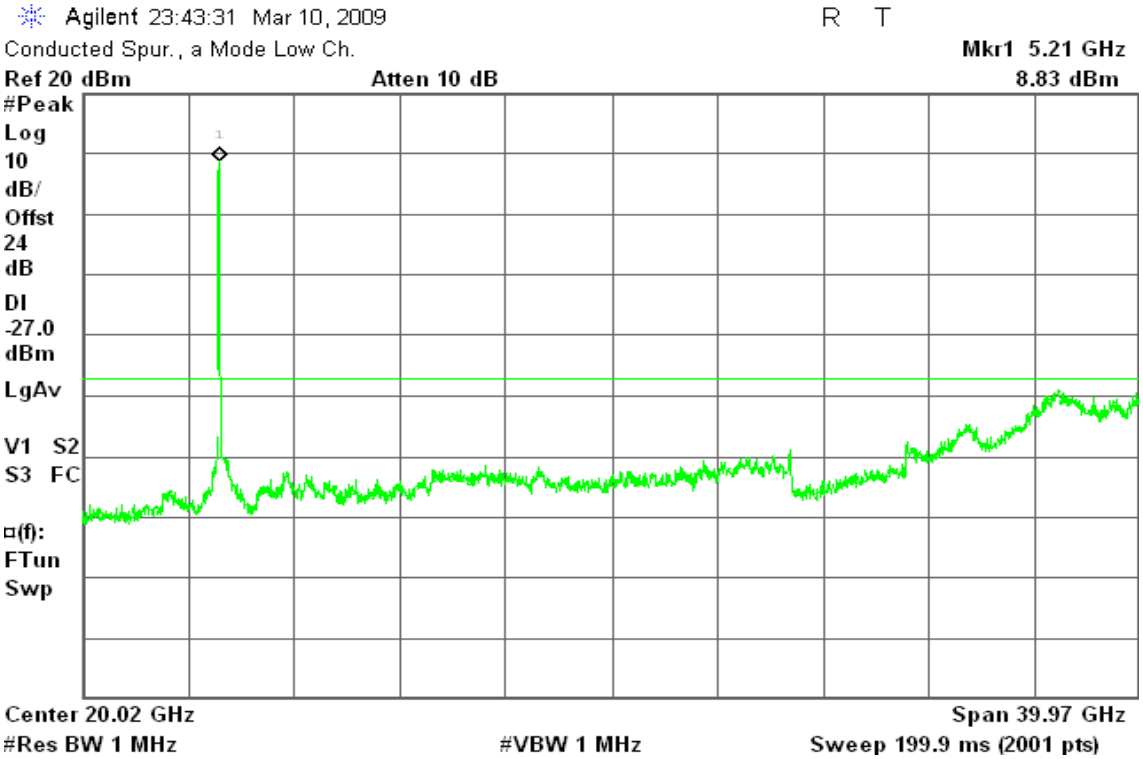
30MHz ~ 40GHz



draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz / with combiner

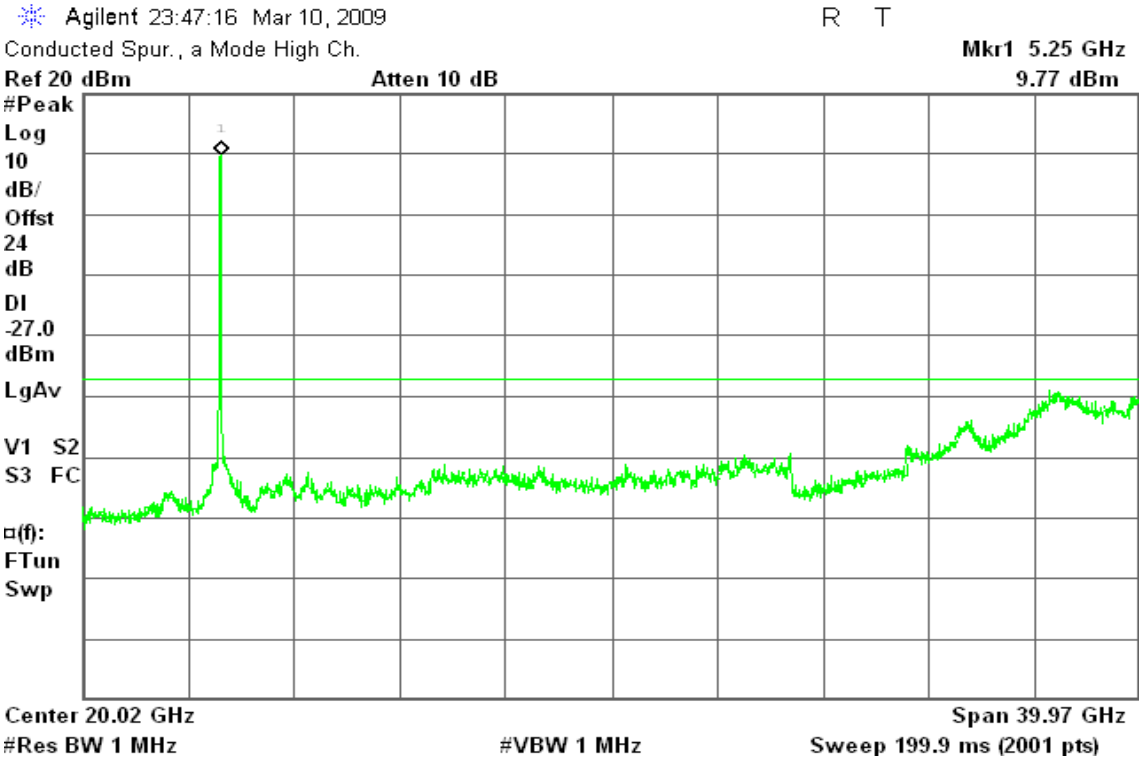
CH Low

30MHz ~ 40GHz



CH High

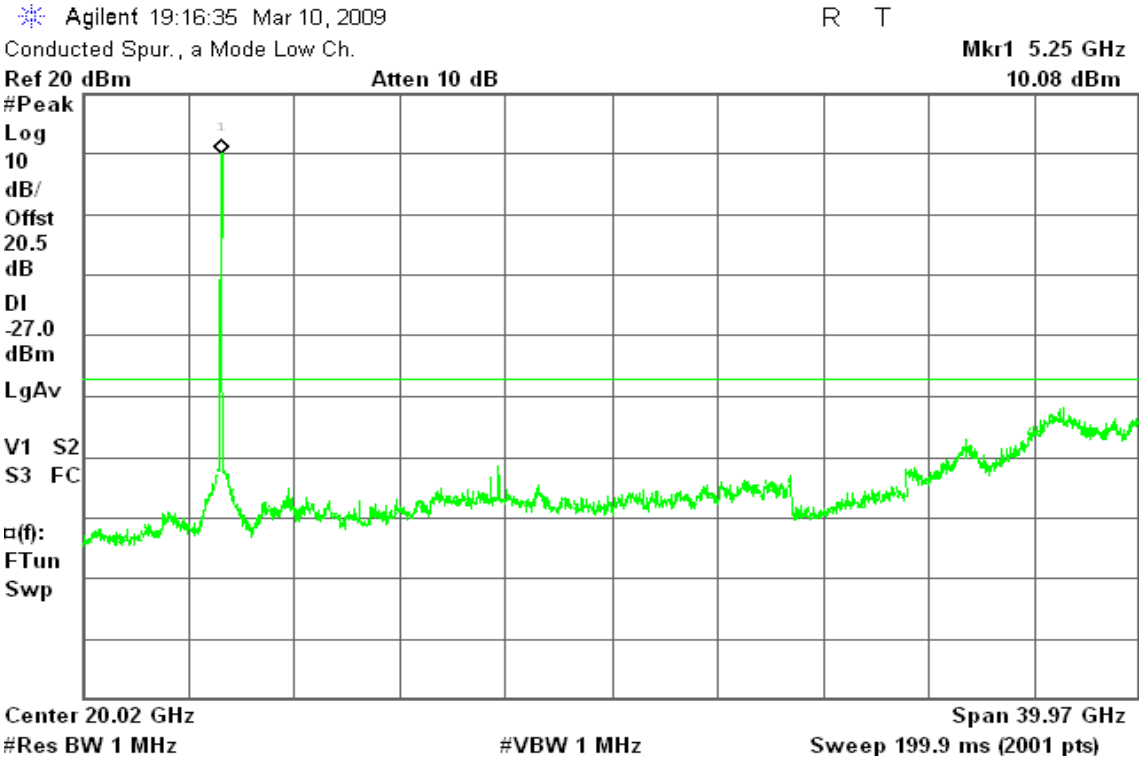
30MHz ~ 40GHz



IEEE 802.11a mode / 5260 ~ 5320MHz

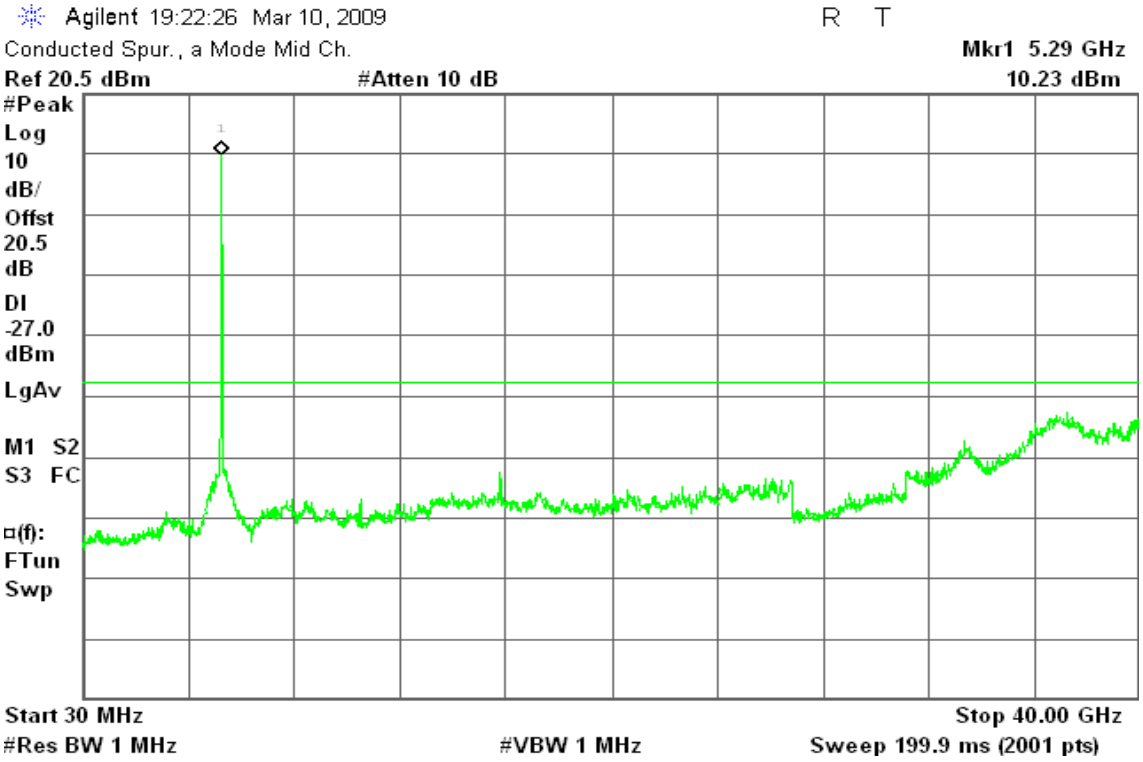
CH Low

30MHz ~ 40GHz



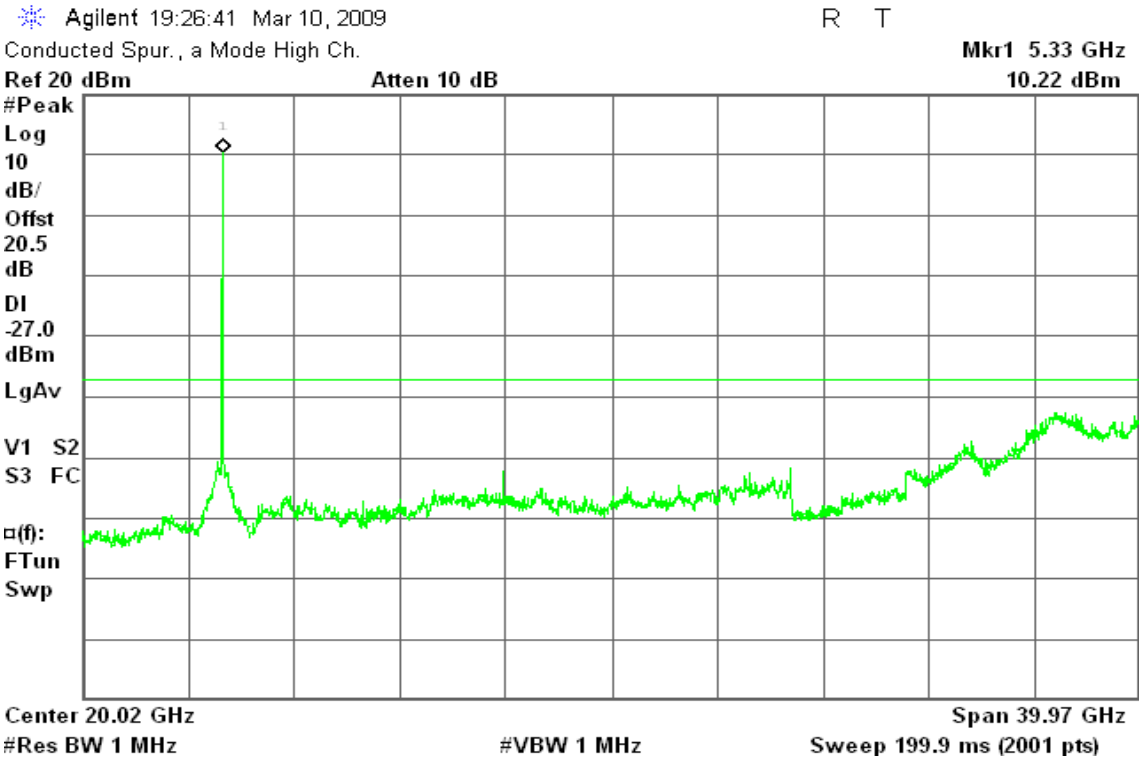
CH Mid

30MHz ~ 40GHz



CH High

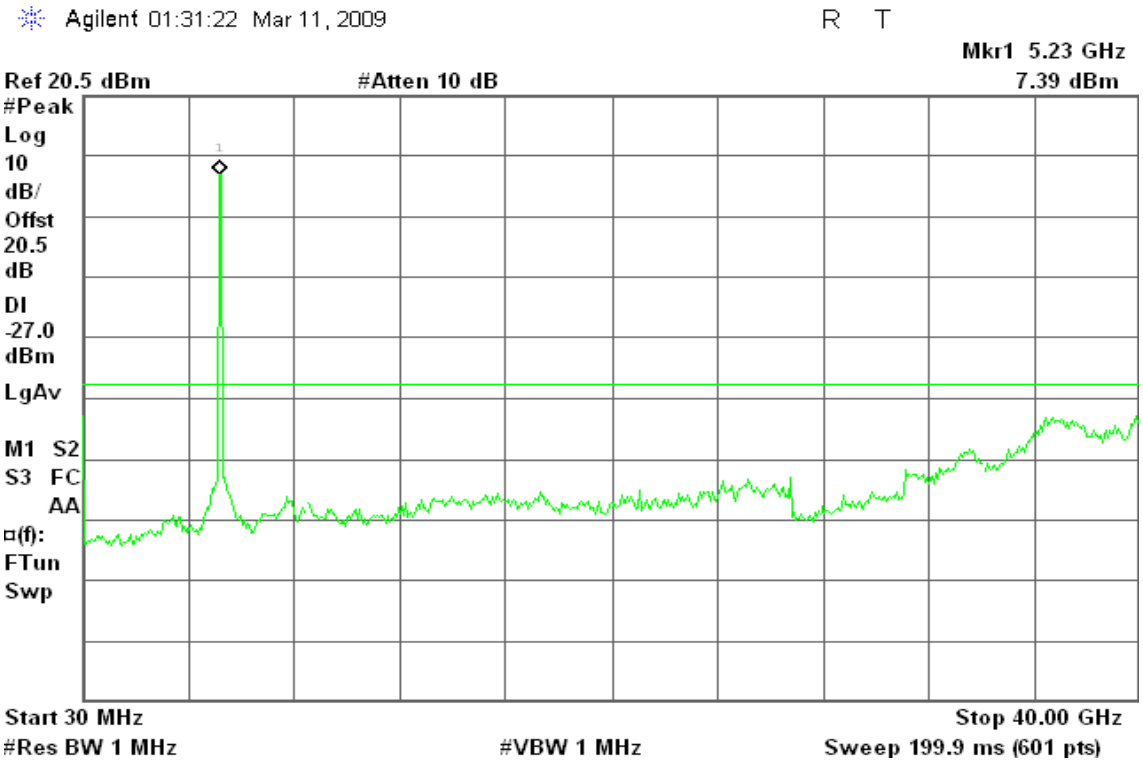
30MHz ~ 40GHz



draft 802.11n Standard-20 MHz Channel mode / 5260 ~ 5320MHz / Chain 0

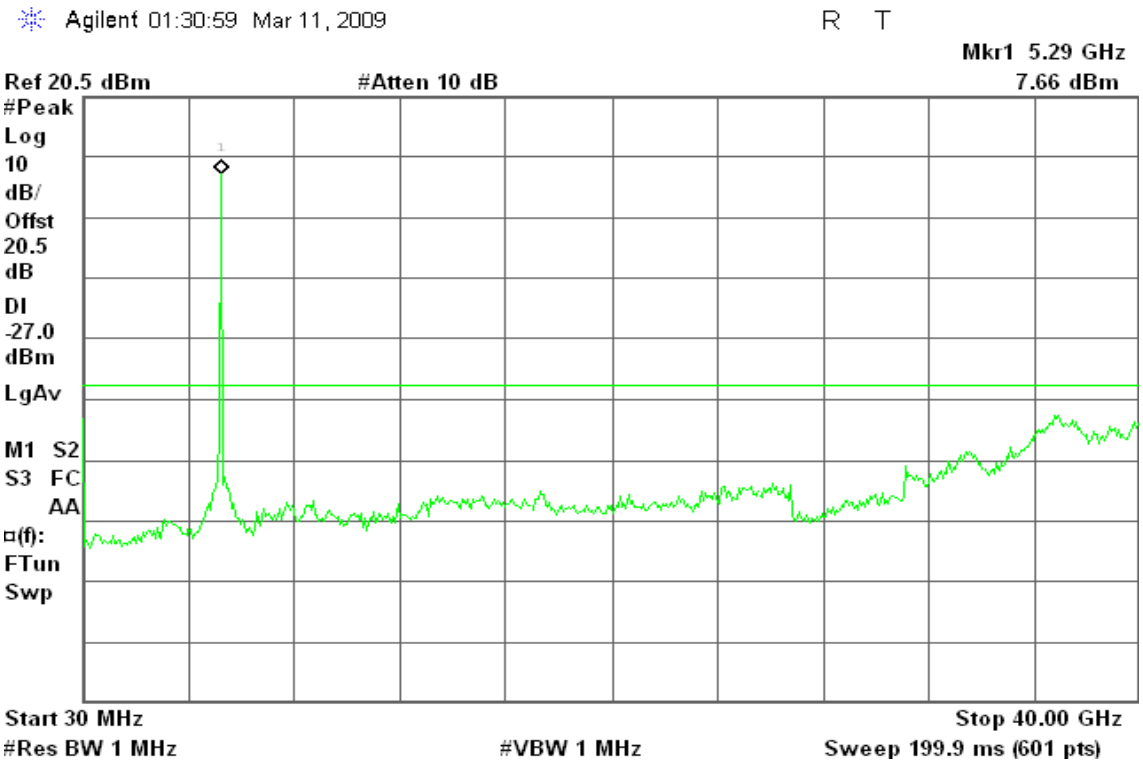
CH Low

30MHz ~ 40GHz



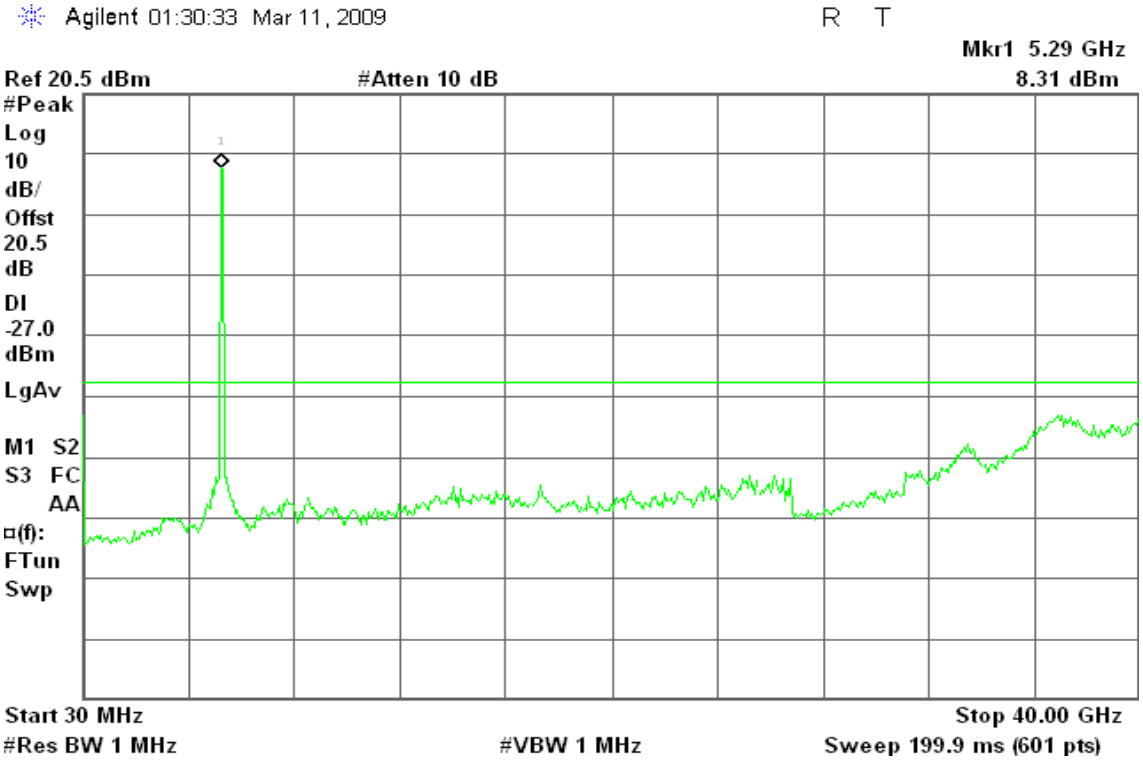
CH Mid

30MHz ~ 40GHz



CH High

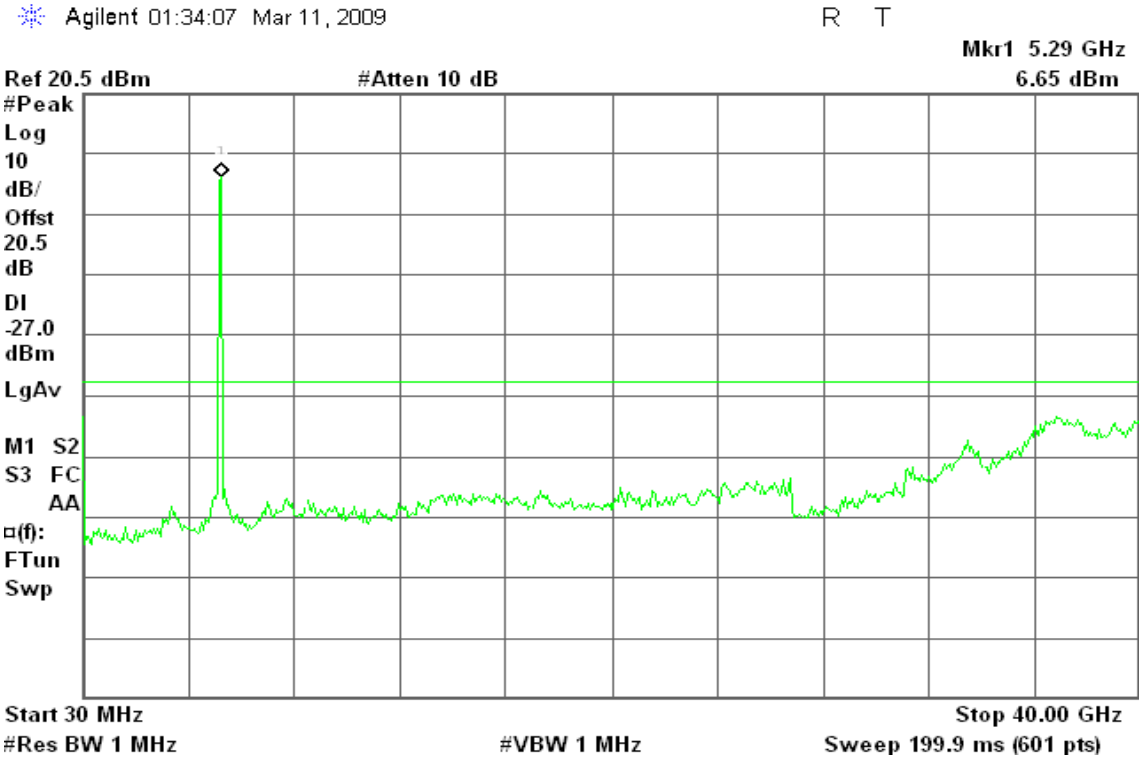
30MHz ~ 40GHz



draft 802.11n Standard-20 MHz Channel mode / 5260 ~ 5320MHz / Chain 1

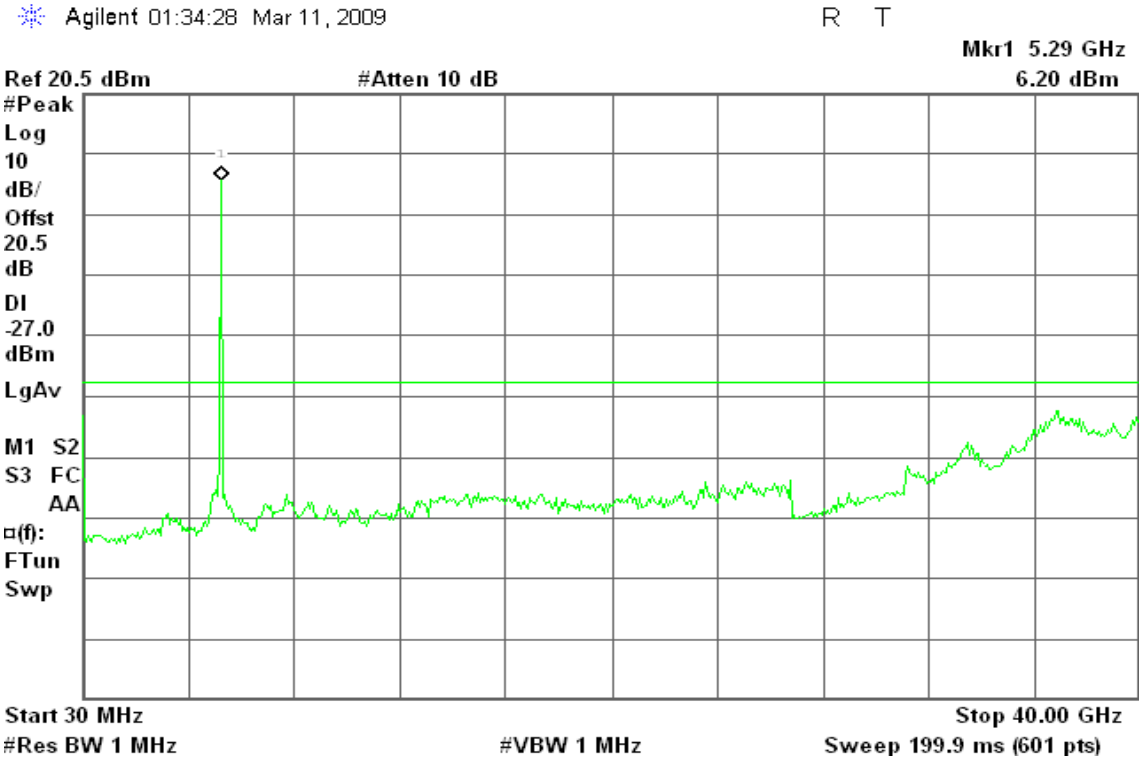
CH Low

30MHz ~ 40GHz



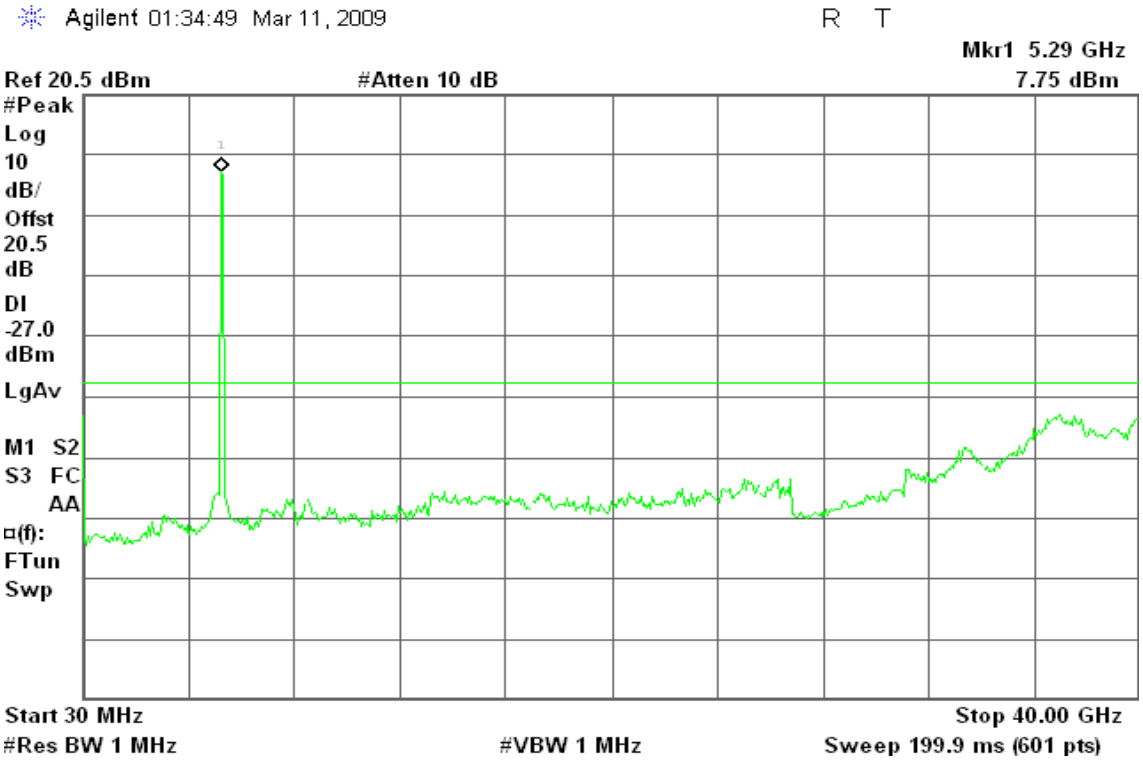
CH Mid

30MHz ~ 40GHz



CH High

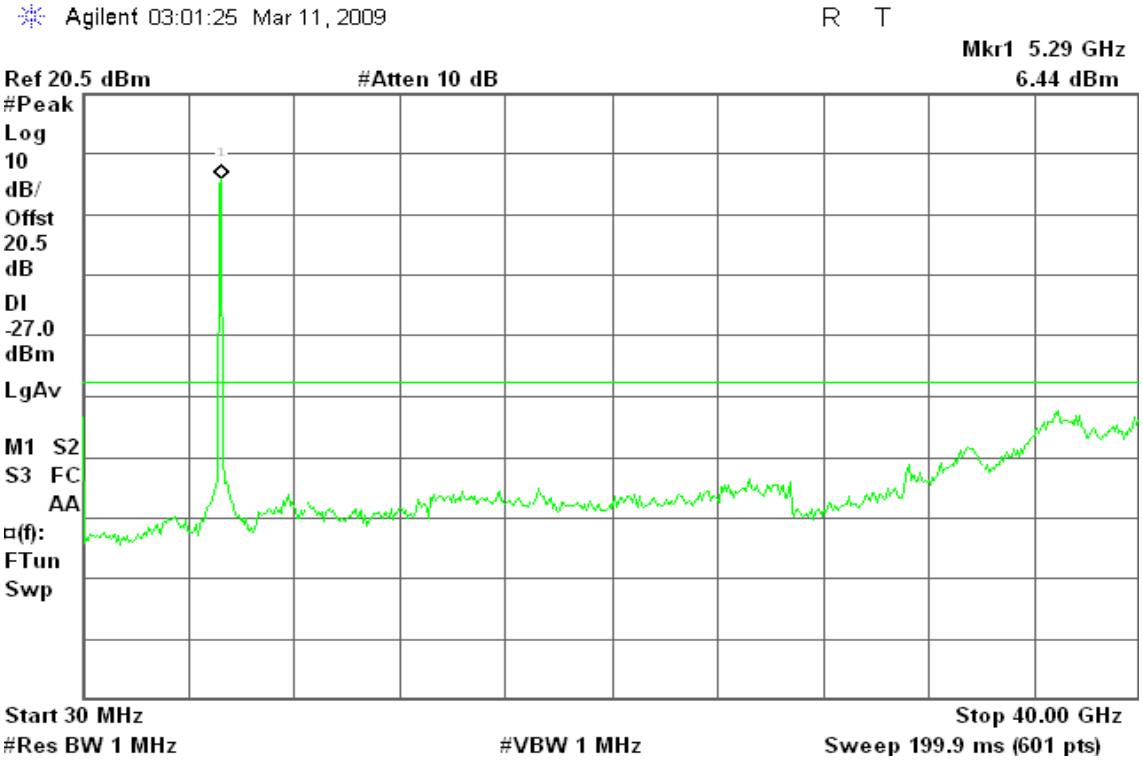
30MHz ~ 40GHz



draft 802.11n Wide-40 MHz Channel mode / 5270 ~ 5310MHz / Chain 0

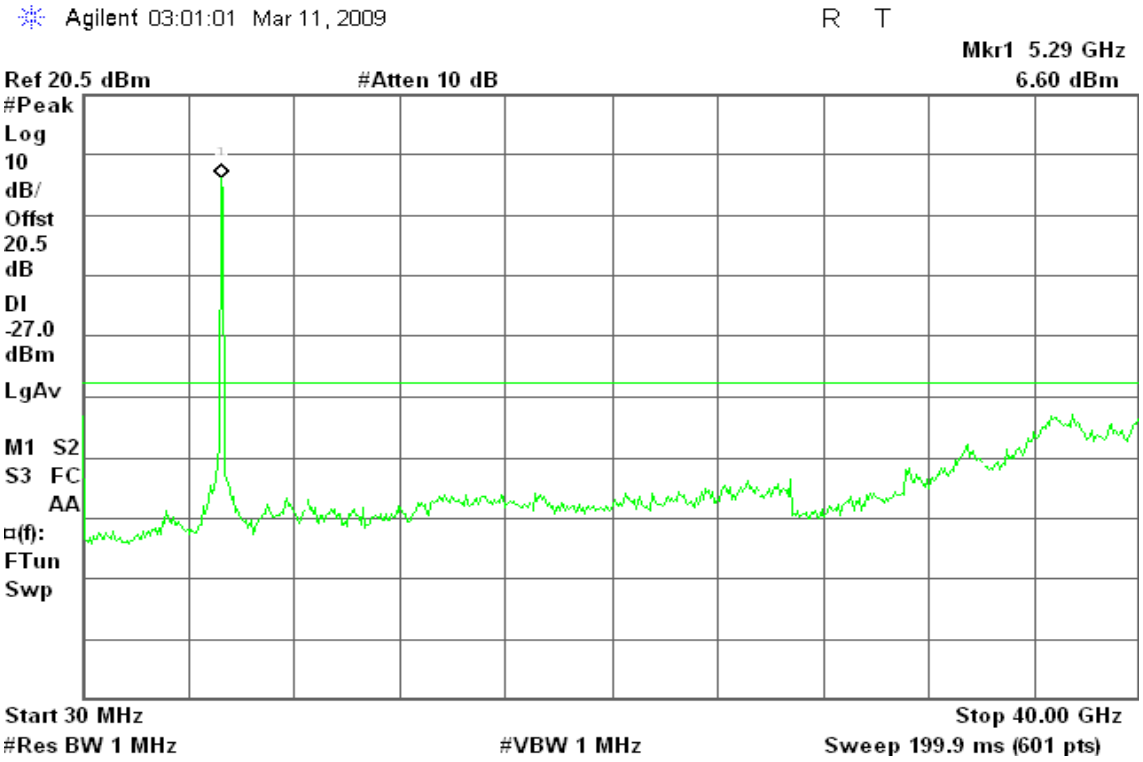
CH Low

30MHz ~ 40GHz



CH High

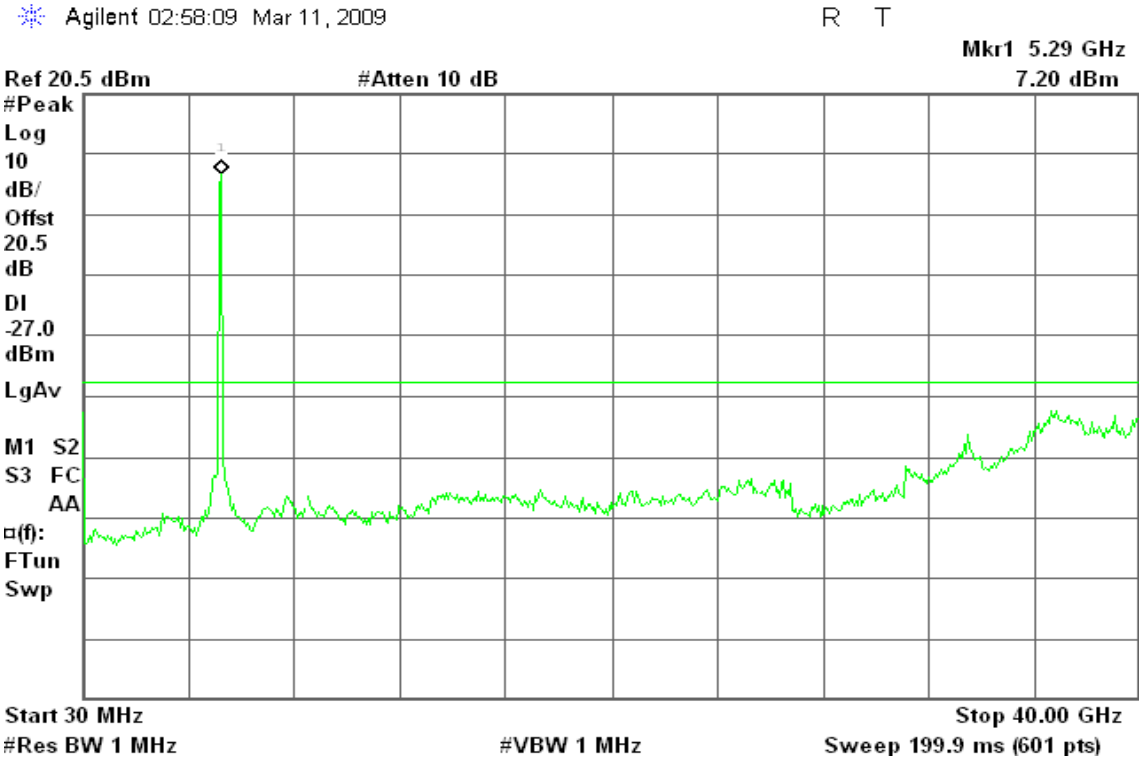
30MHz ~ 40GHz



draft 802.11n Wide-40 MHz Channel mode / 5270 ~ 5310MHz / Chain 1

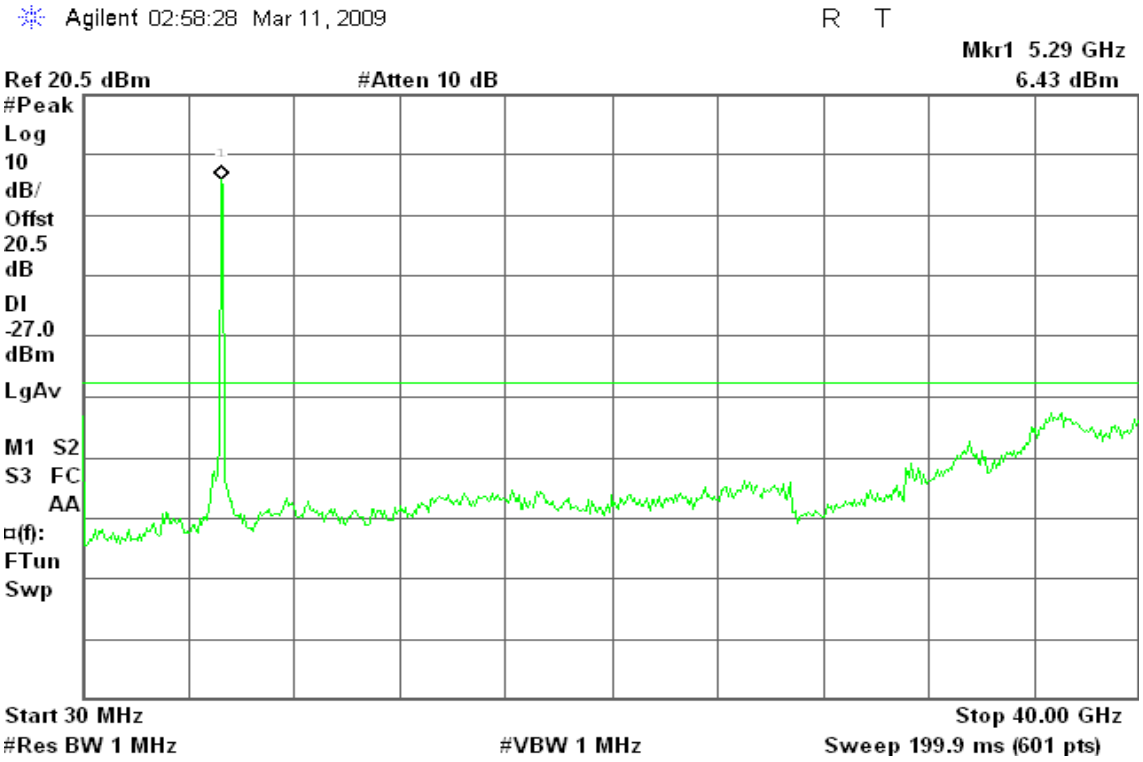
CH Low

30MHz ~ 40GHz



CH High

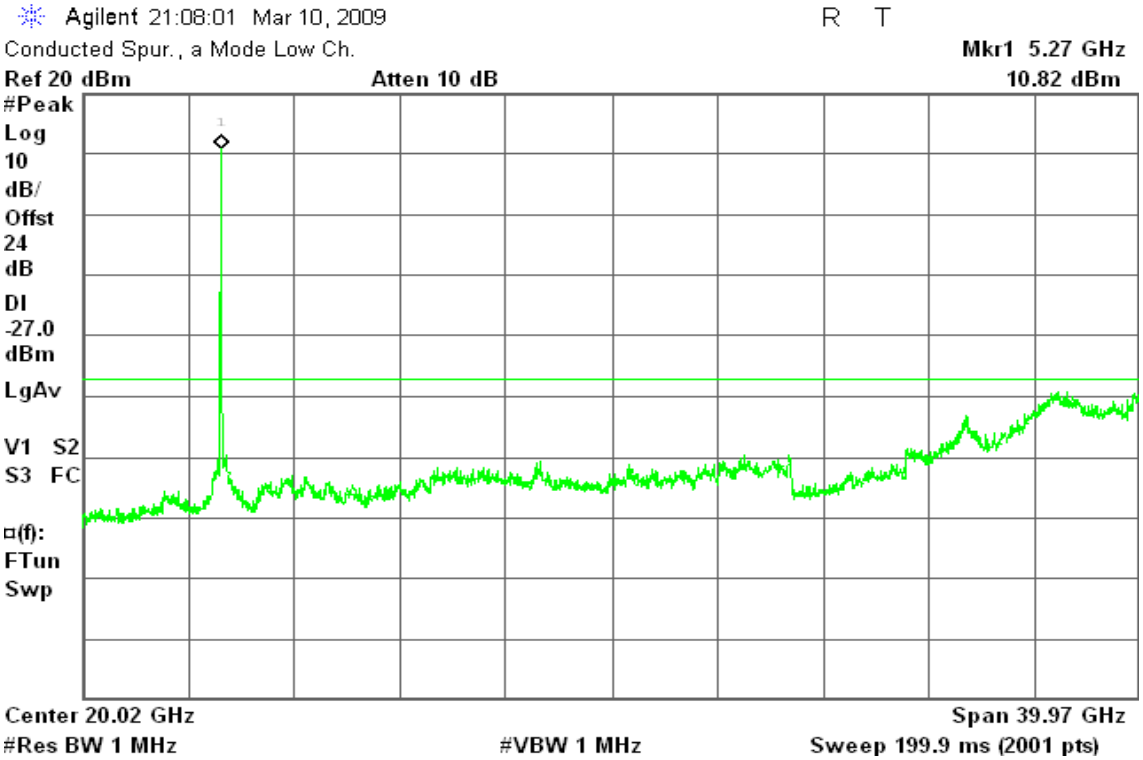
30MHz ~ 40GHz



draft 802.11n Standard-20 MHz Channel mode / 5260 ~ 5320MHz / with combiner

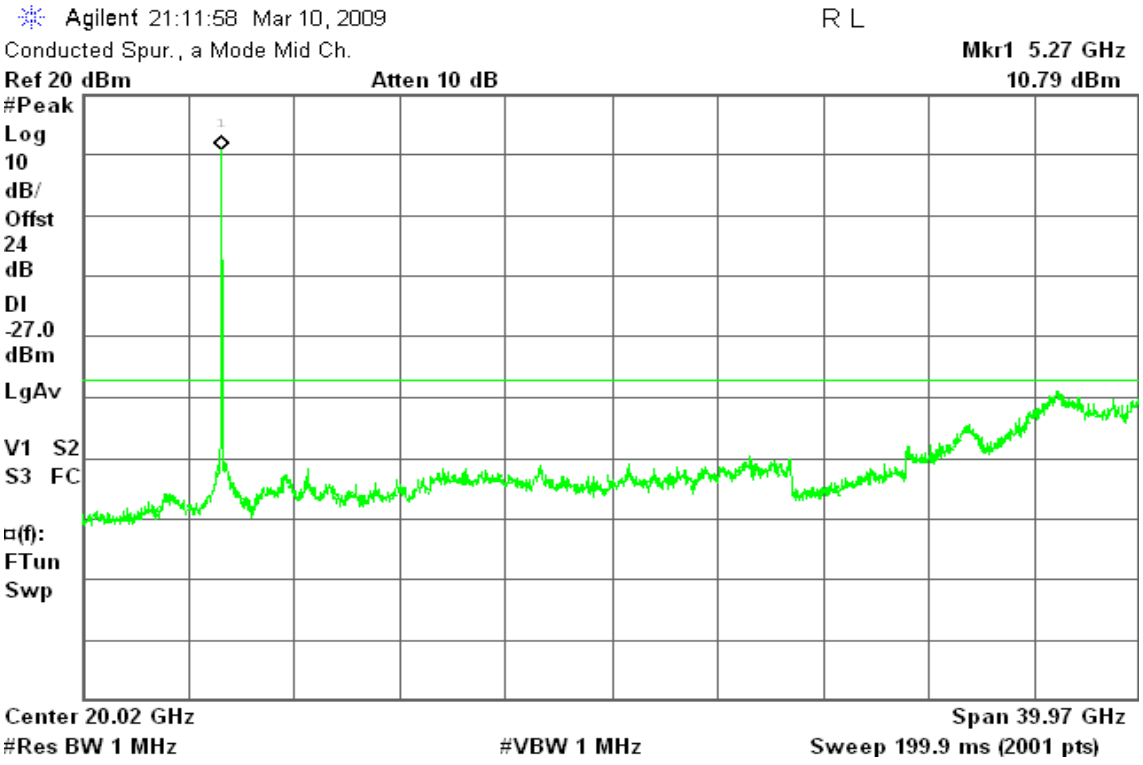
CH Low

30MHz ~ 40GHz



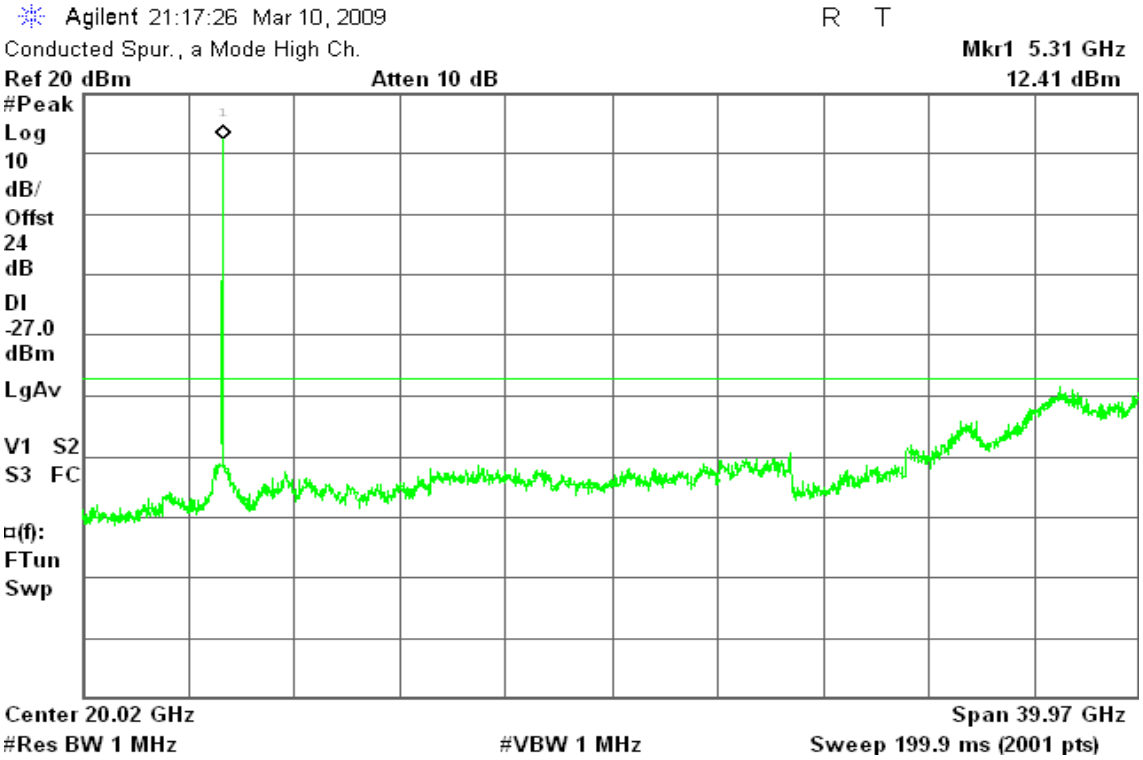
CH Mid

30MHz ~ 40GHz



CH High

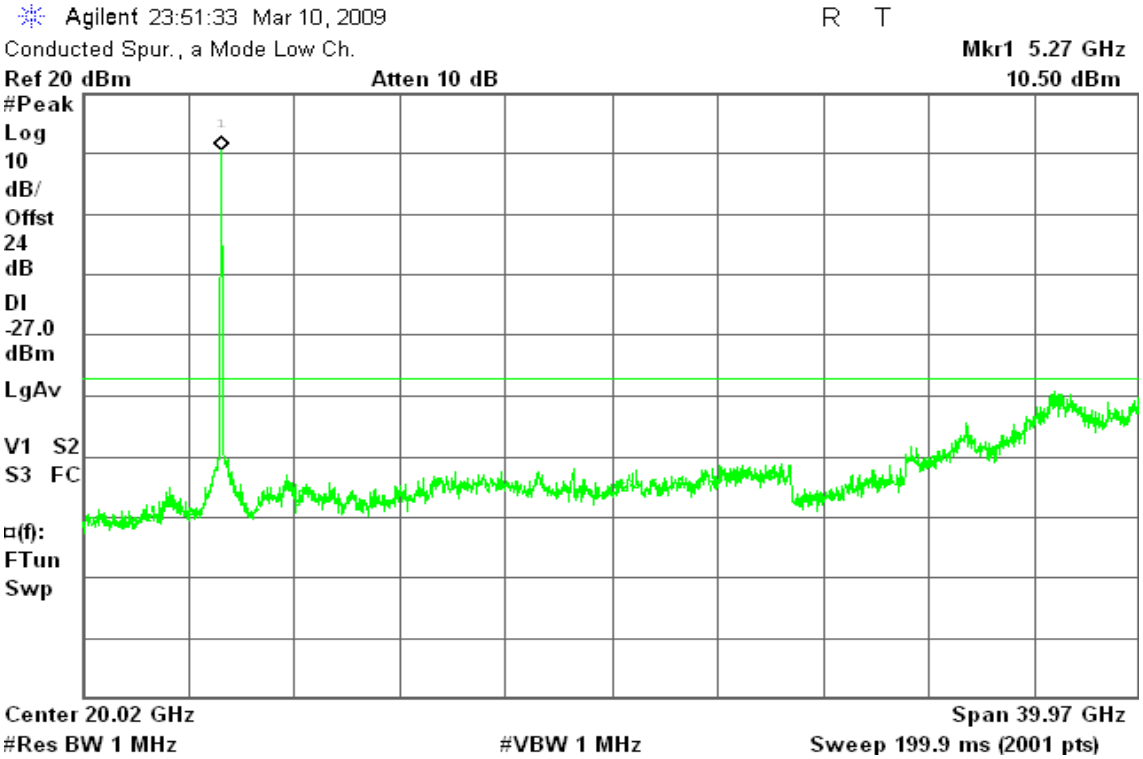
30MHz ~ 40GHz



draft 802.11n Wide-40 MHz Channel mode / 5270 ~ 5310MHz / with combiner

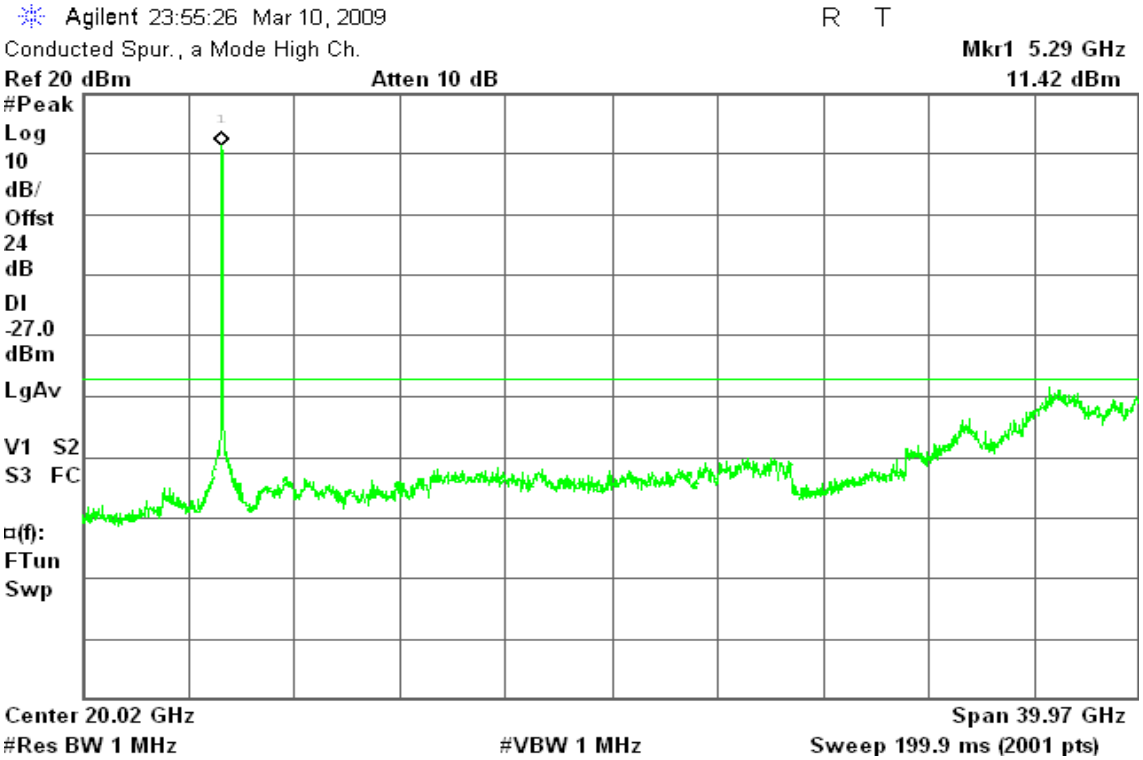
CH Low

30MHz ~ 40GHz



CH High

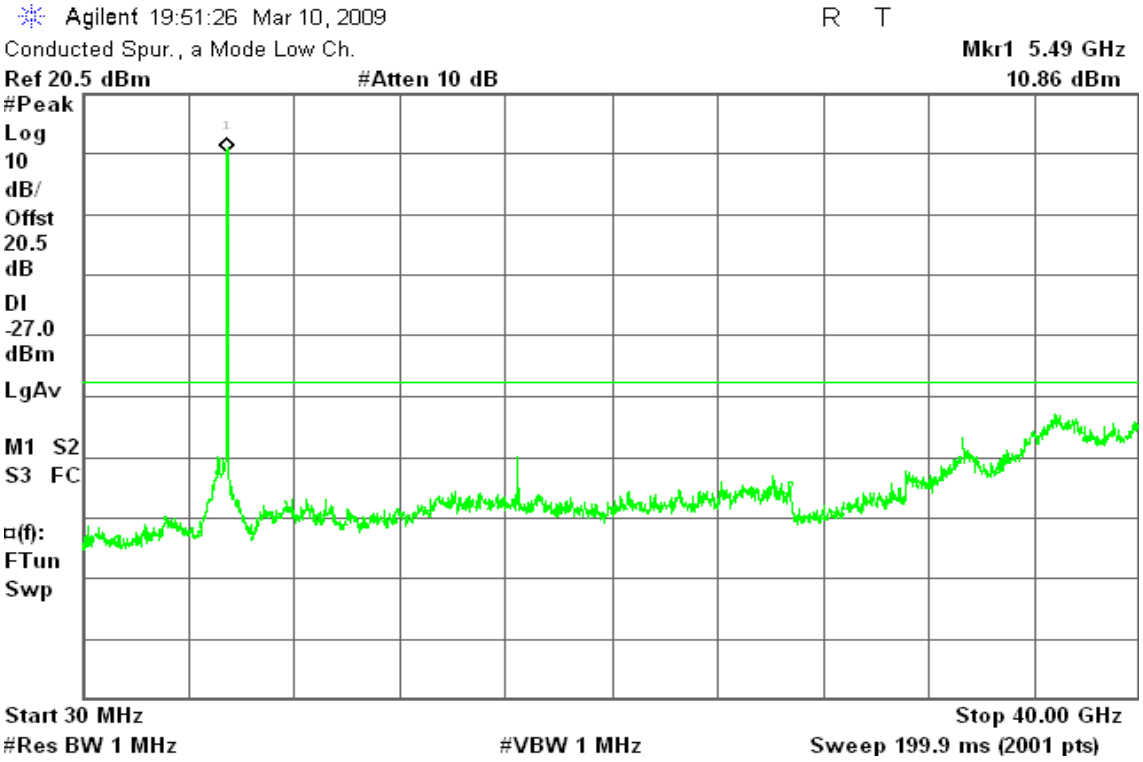
30MHz ~ 40GHz



Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz

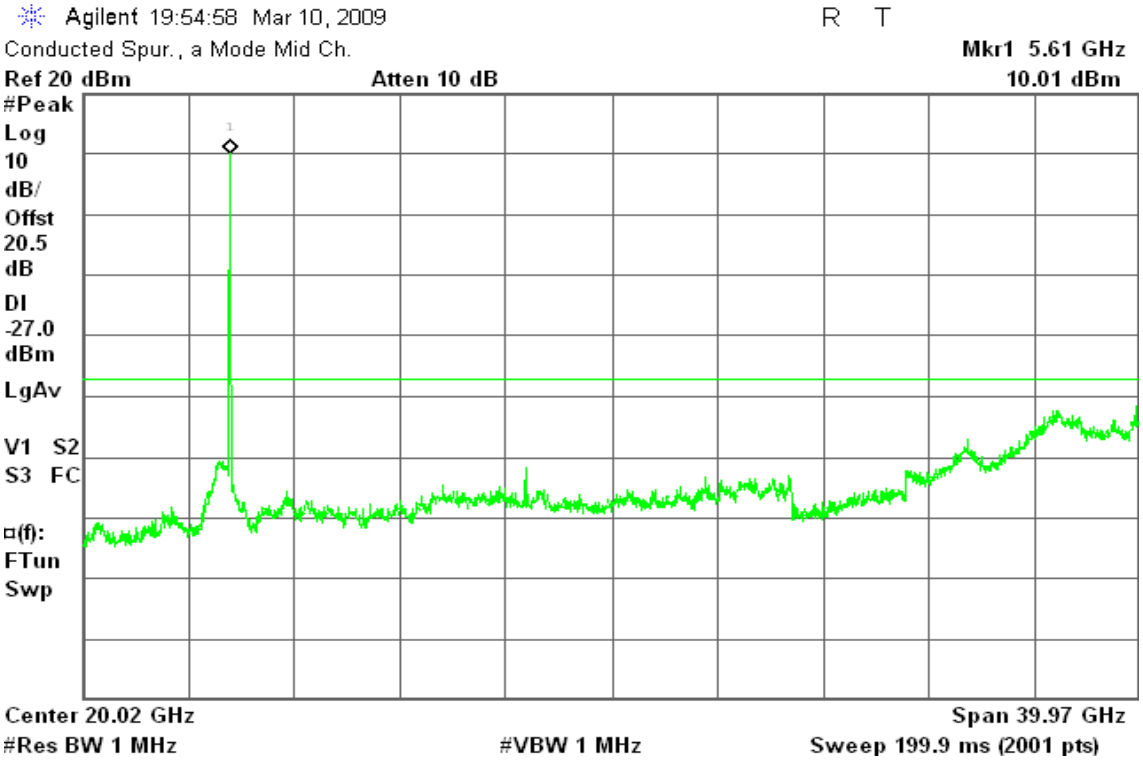
CH Low

30MHz ~ 40GHz



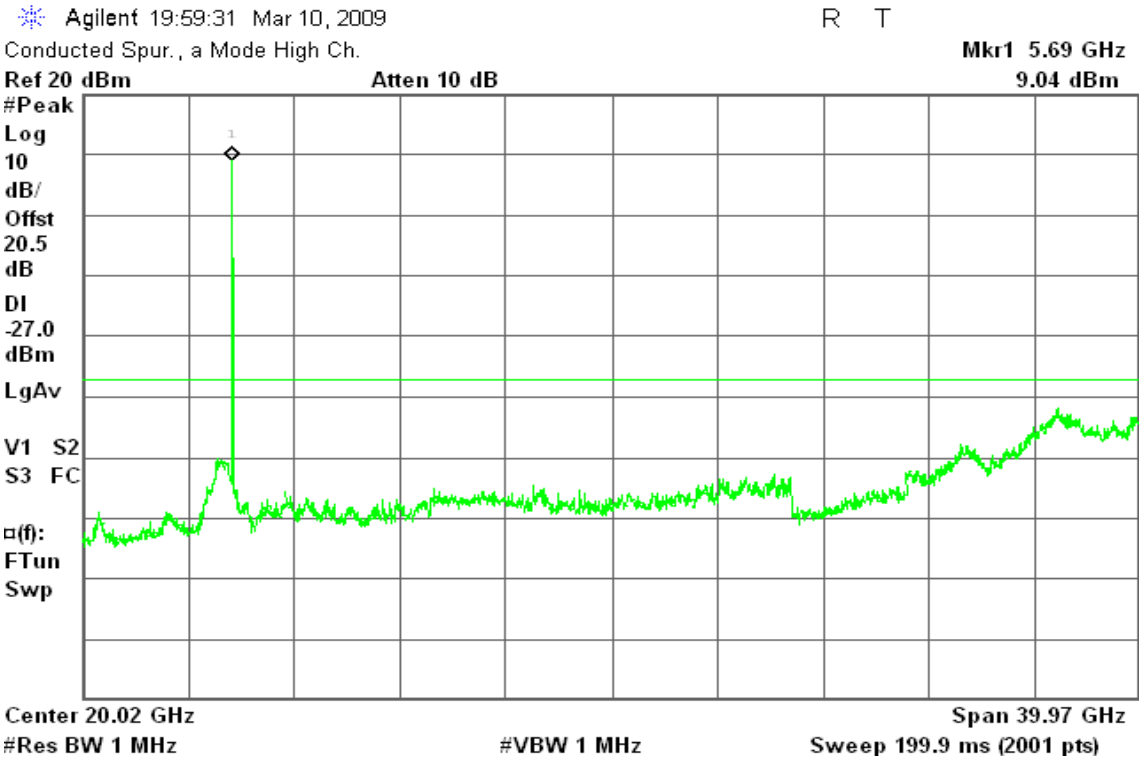
CH Mid

30MHz ~ 40GHz



CH High

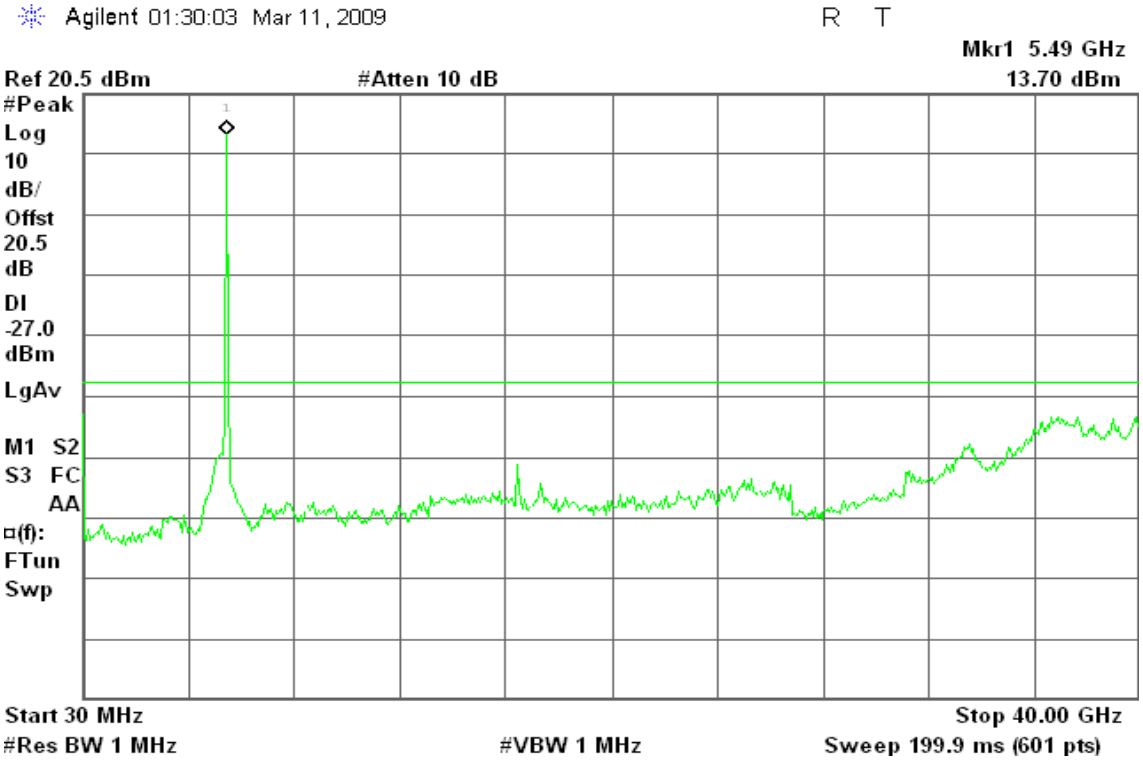
30MHz ~ 40GHz



draft 802.11n Standard-20 MHz Channel mode / 5500 ~ 5700MHz / Chain 0

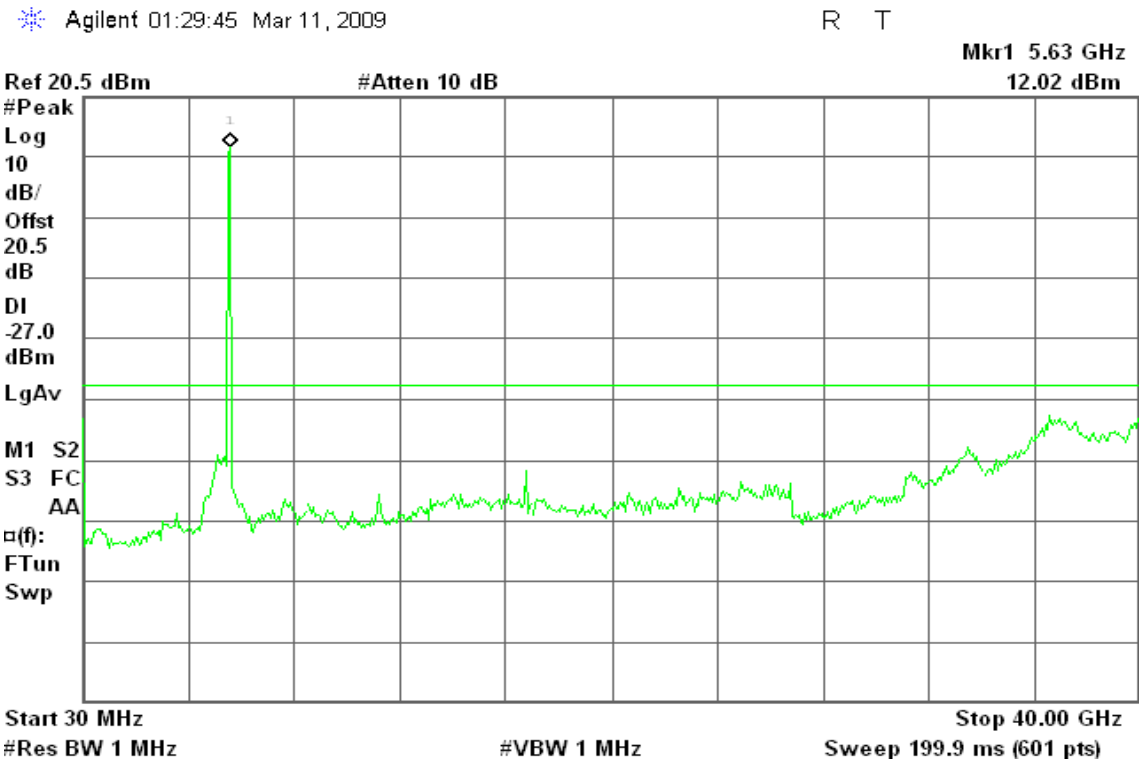
CH Low

30MHz ~ 40GHz



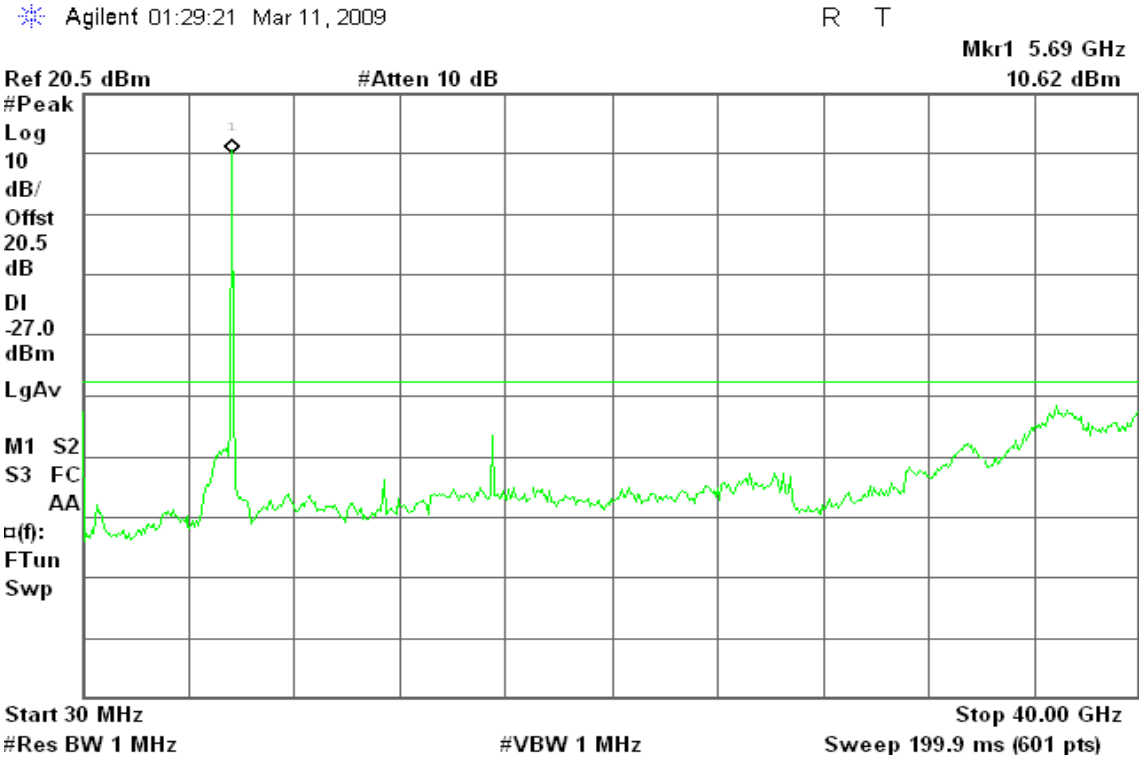
CH Mid

30MHz ~ 40GHz



CH High

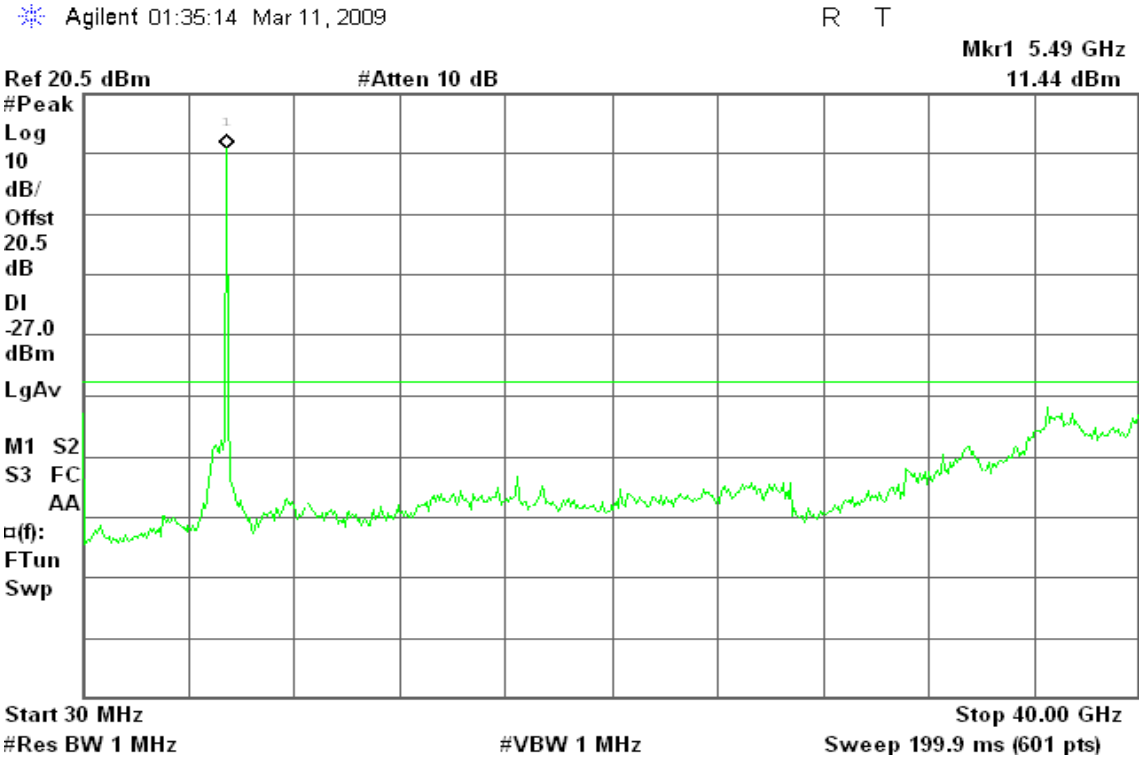
30MHz ~ 40GHz



draft 802.11n Standard-20 MHz Channel mode / 5500 ~ 5700MHz / Chain 1

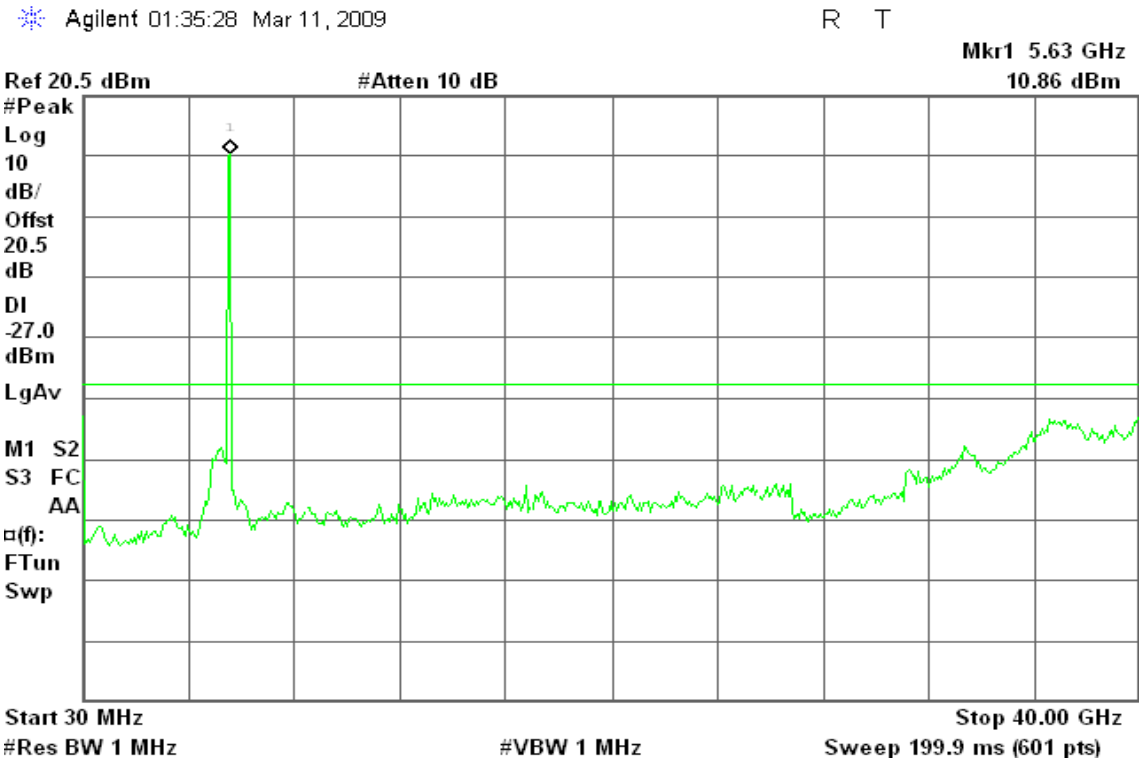
CH Low

30MHz ~ 40GHz



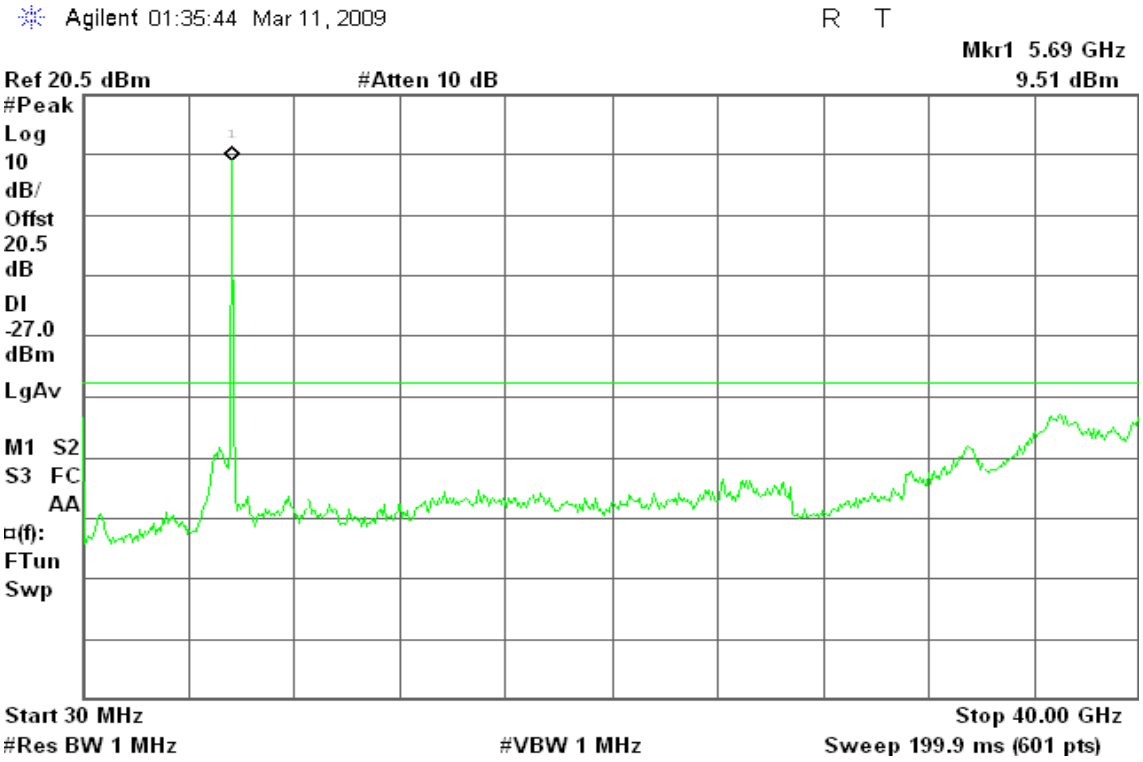
CH Mid

30MHz ~ 40GHz



CH High

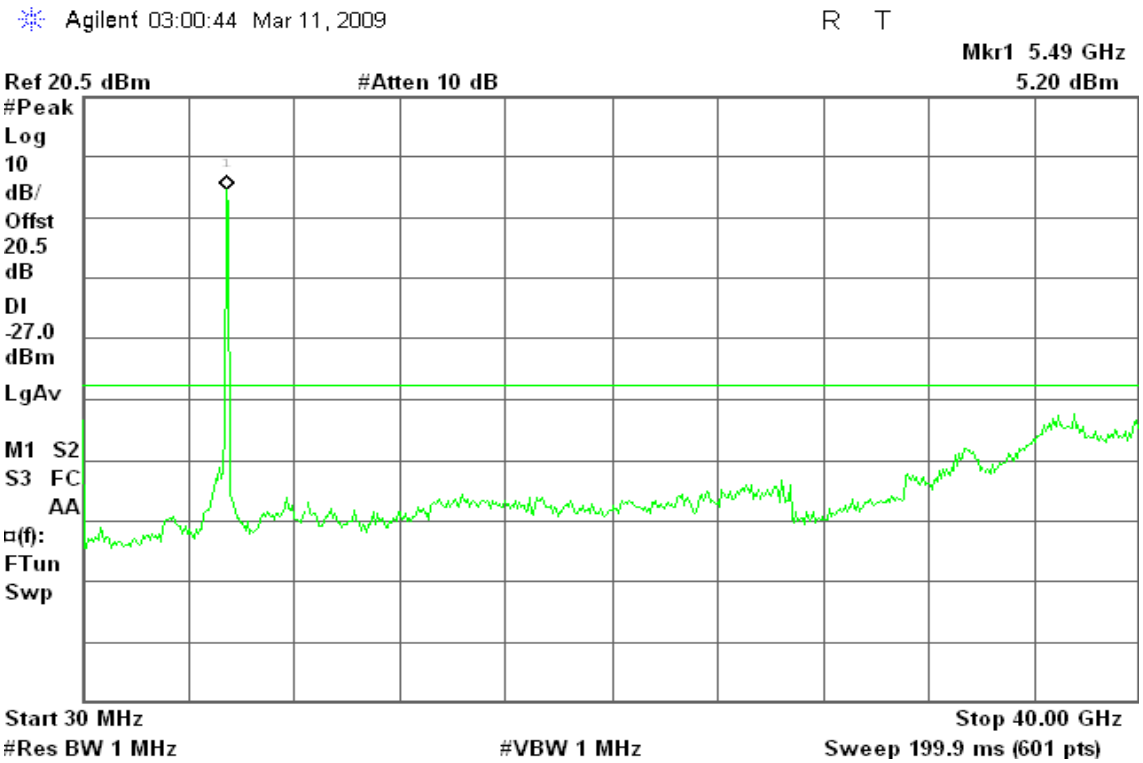
30MHz ~ 40GHz



draft 802.11n Wide-40 MHz Channel mode / 5510 ~ 5670MHz / Chain 0

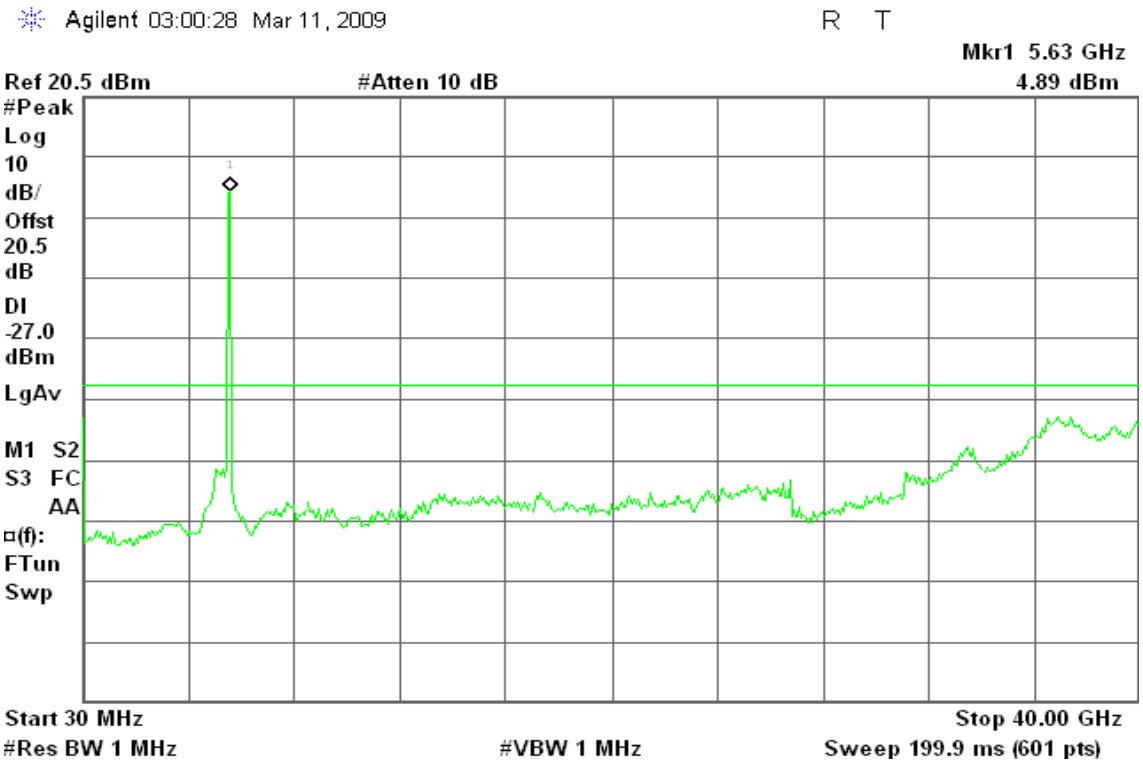
CH Low

30MHz ~ 40GHz



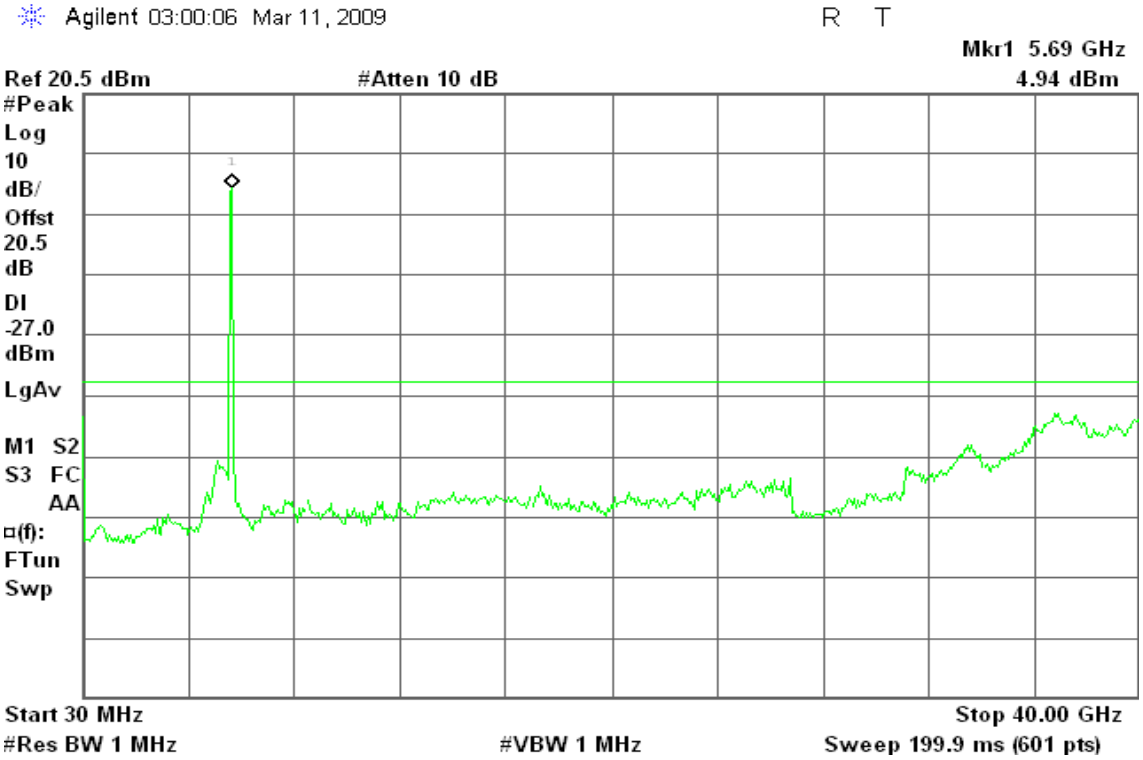
CH Mid

30MHz ~ 40GHz



CH High

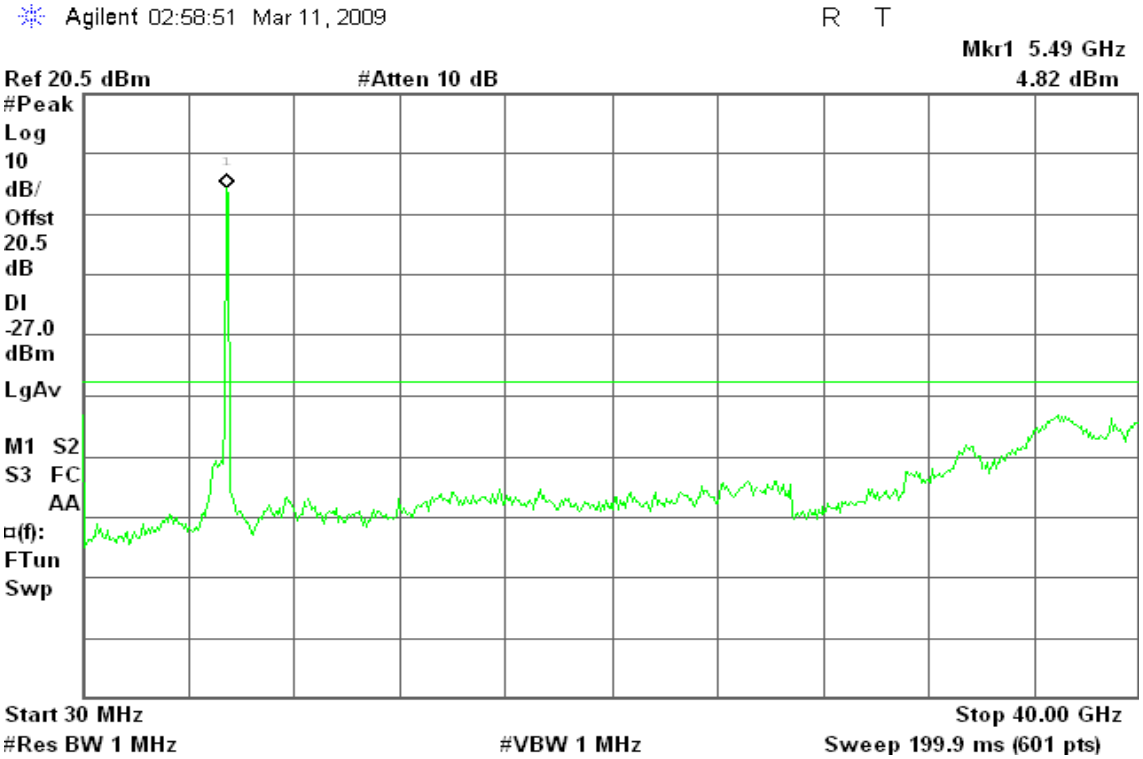
30MHz ~ 40GHz



draft 802.11n Wide-40 MHz Channel mode / 5510 ~ 5670MHz / Chain 1

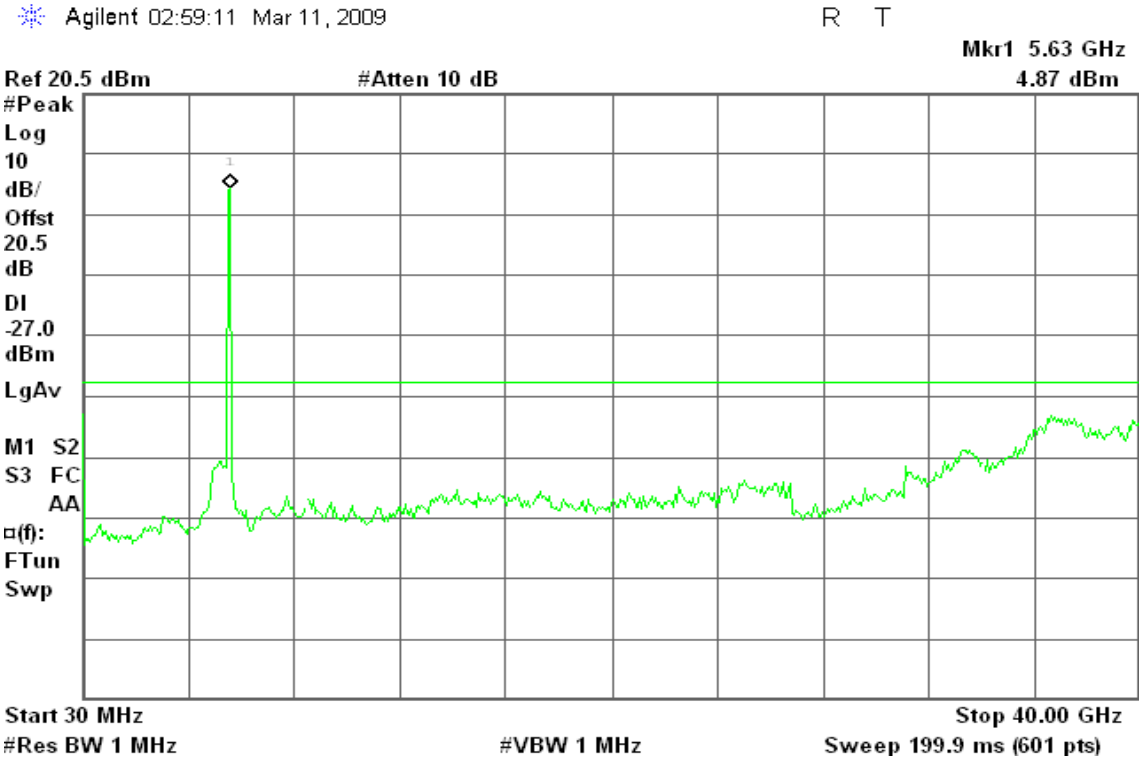
CH Low

30MHz ~ 40GHz



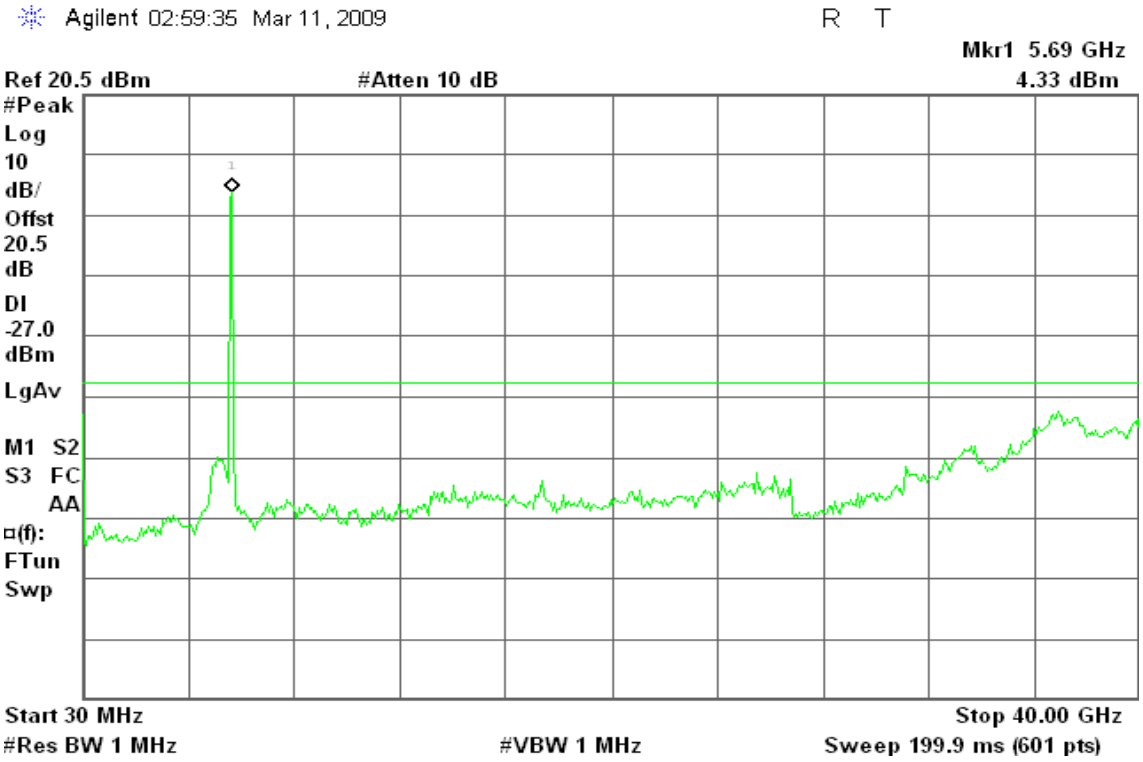
CH Mid

30MHz ~ 40GHz



CH High

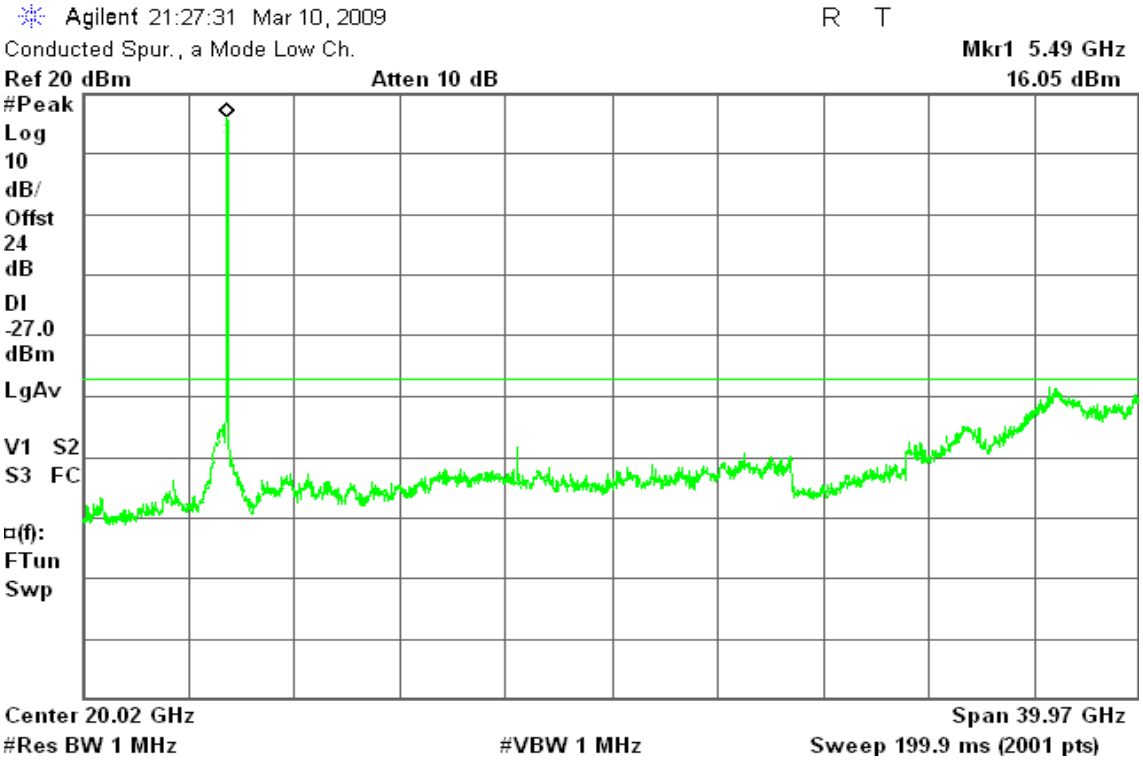
30MHz ~ 40GHz



draft 802.11n Standard-20 MHz Channel mode / 5500 ~ 5700MHz / with combiner

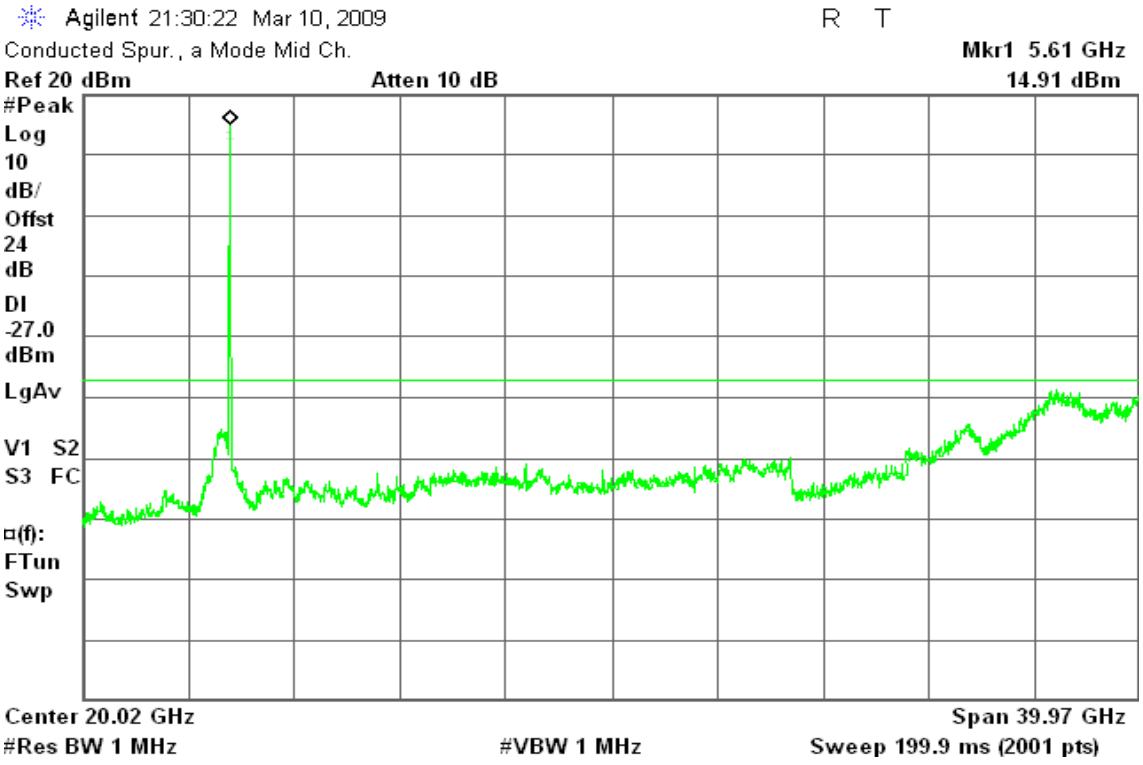
CH Low

30MHz ~ 40GHz



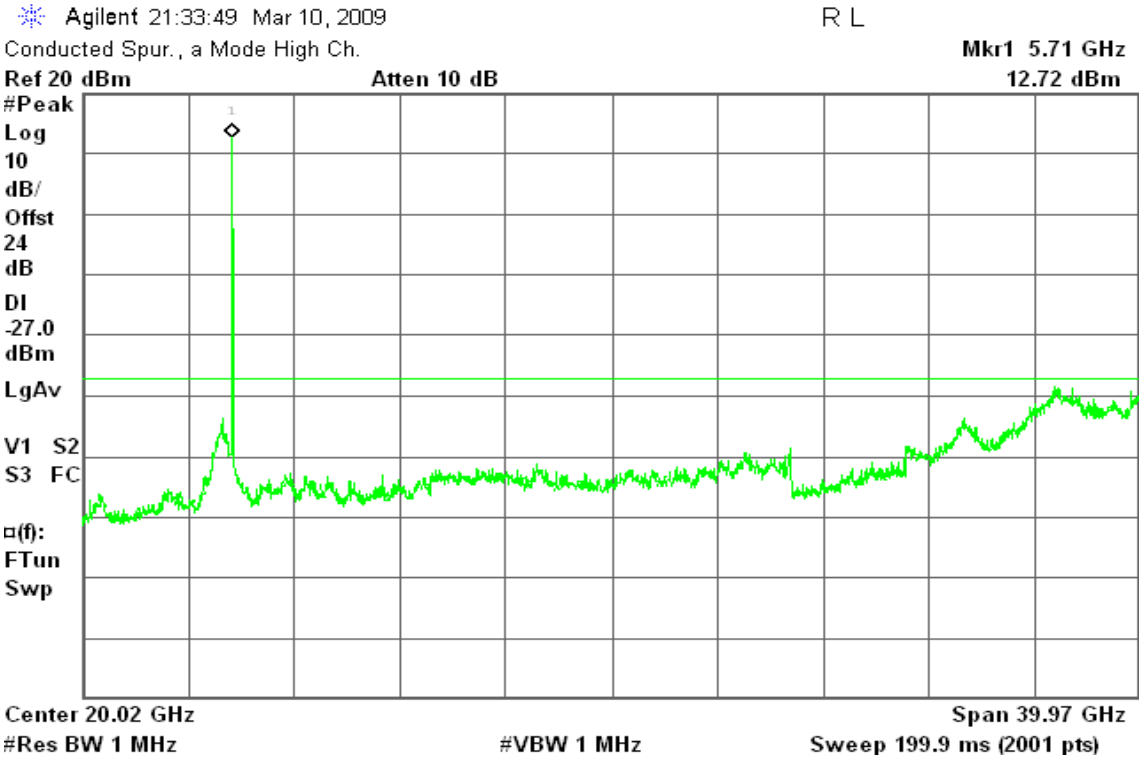
CH Mid

30MHz ~ 40GHz



CH High

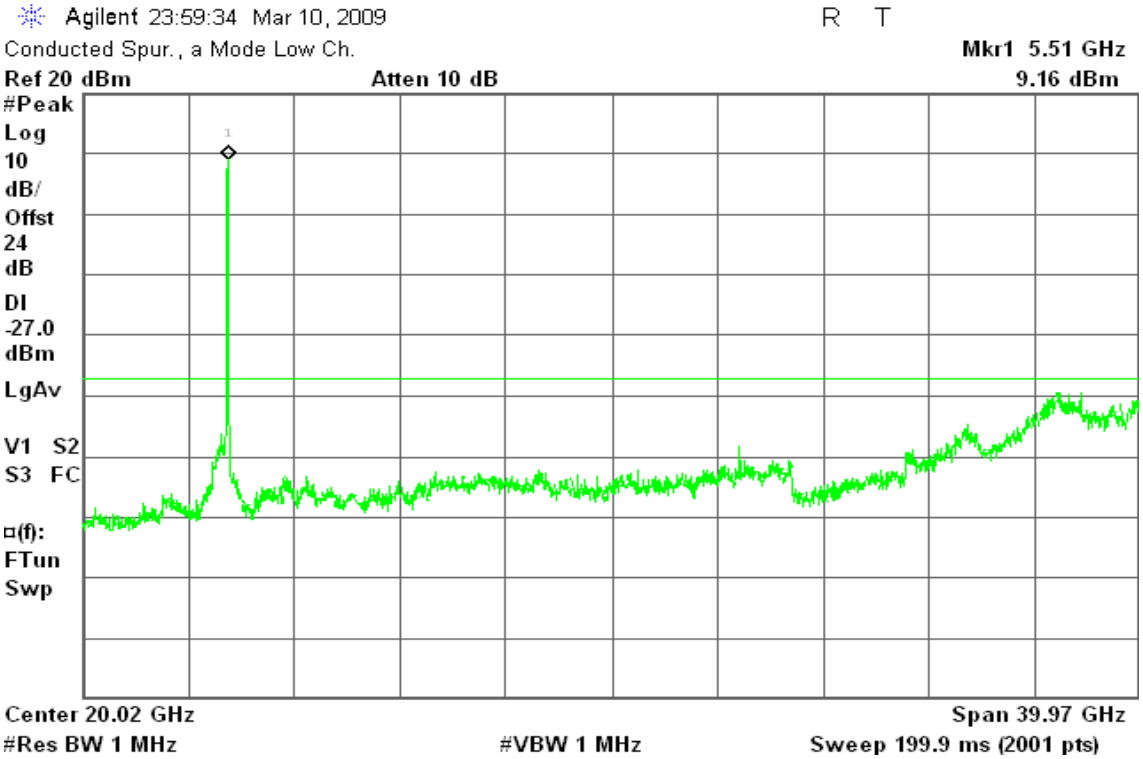
30MHz ~ 40GHz



draft 802.11n Wide-40 MHz Channel mode / 5510 ~ 5670MHz / with combiner

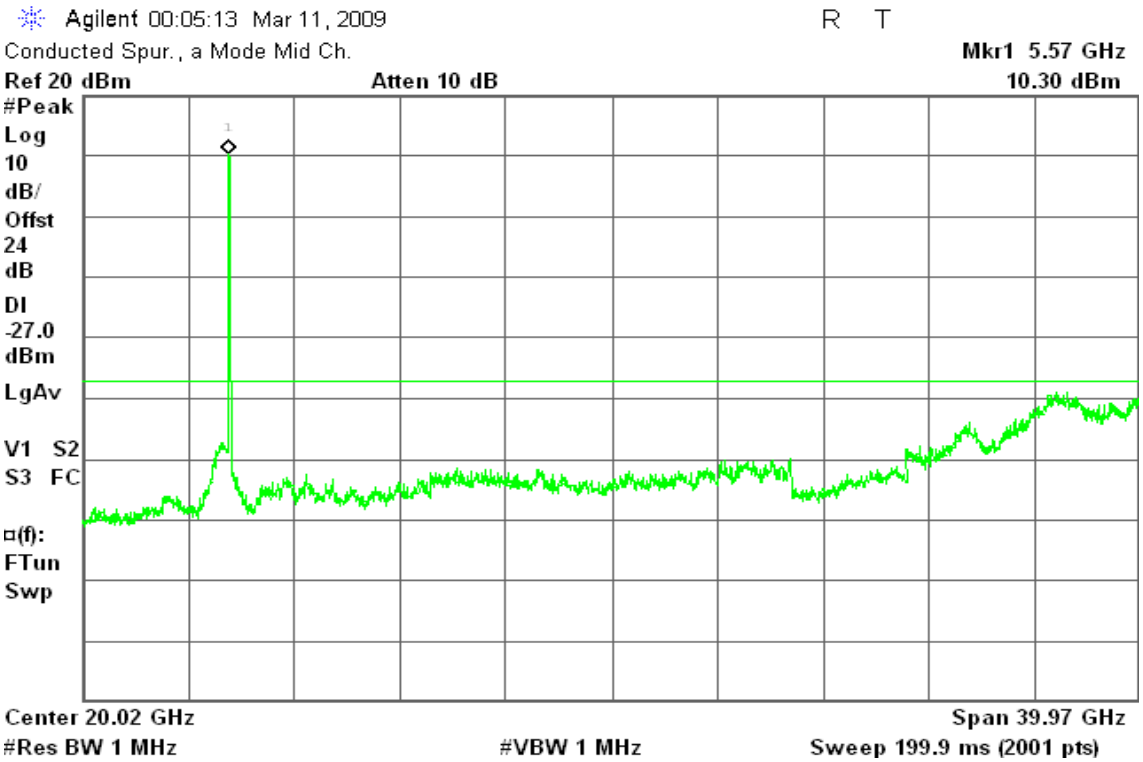
CH Low

30MHz ~ 40GHz



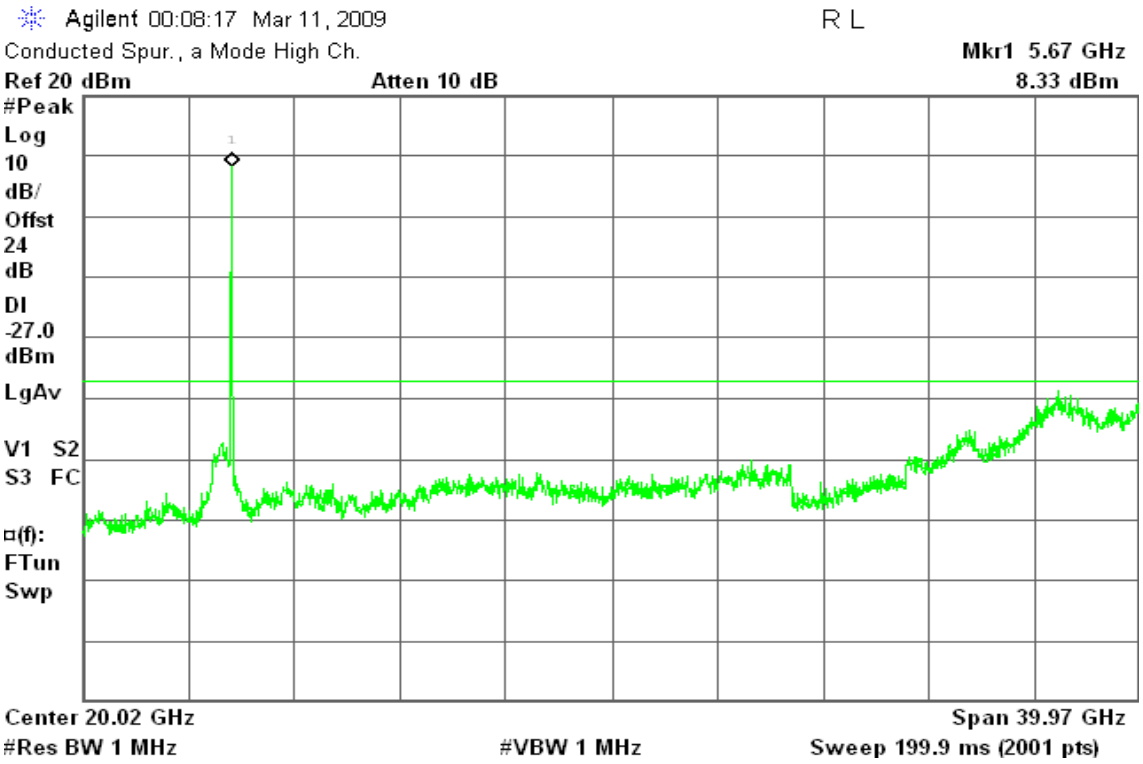
CH Mid

30MHz ~ 40GHz



CH High

30MHz ~ 40GHz



7.8 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

** Decreases with the logarithm of the frequency.*

TEST CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

Operation Mode:	Normal Link	**Test Date:**	January 21, 2009
Temperature:	20°C	**Tested by:**	Alex Tsai
Humidity:	58% RH		

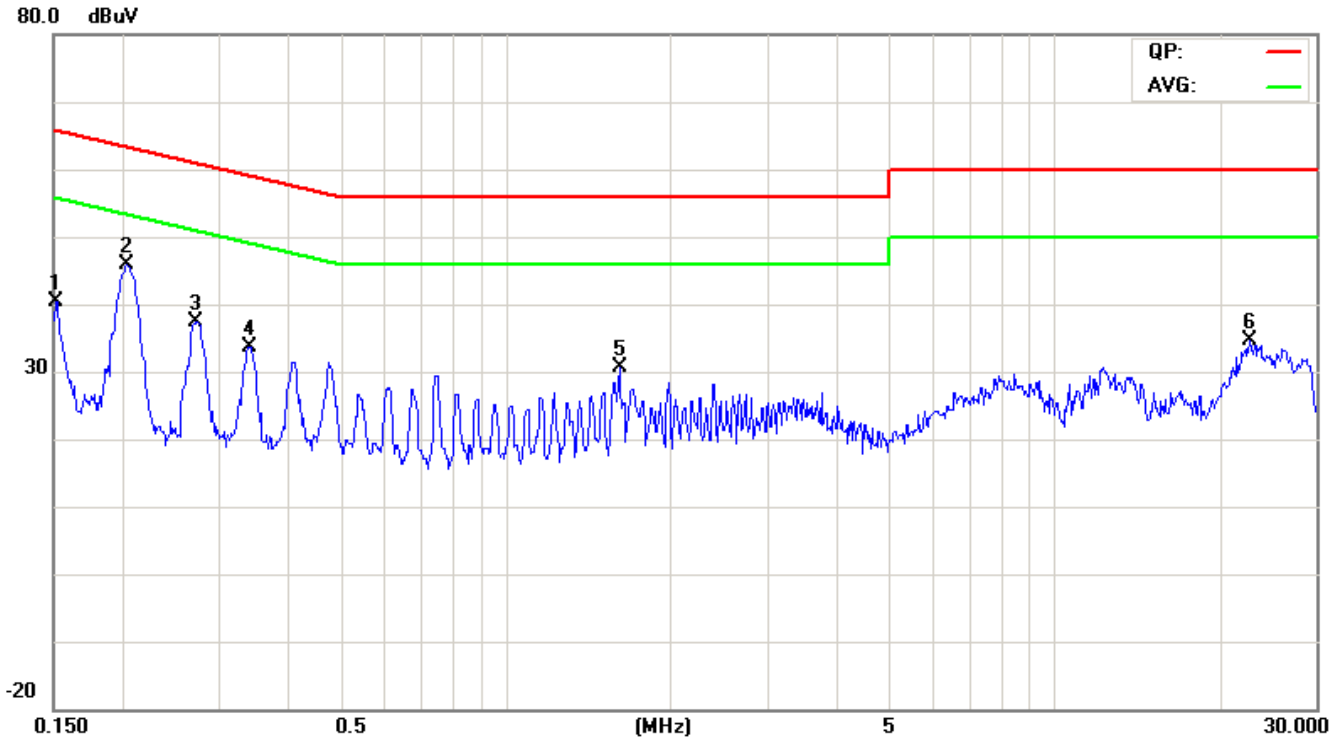
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.151	15.41	10.69	9.65	25.06	20.34	66.05	56.05	-40.99	-35.71	L1
0.2036	34.86	25.59	9.60	44.46	35.19	63.46	53.46	-19.00	-18.27	L1
0.2719	25.94	17.61	9.60	35.54	27.21	61.06	51.06	-25.52	-23.85	L1
0.3413	21.98	16.77	9.60	31.58	26.37	59.17	49.17	-27.59	-22.80	L1
1.6236	5.32	0.14	9.66	14.98	9.80	56.00	46.00	-41.02	-36.20	L1
22.5614	21.61	15.97	10.45	32.06	26.42	60.00	50.00	-27.94	-23.58	L1
0.151	0.01	-3.47	9.65	9.66	6.18	66.00	56.01	-56.34	-49.83	L2
0.2048	35.23	25.61	9.60	44.83	35.21	63.41	53.41	-18.58	-18.20	L2
0.2727	25.97	17.96	9.60	35.57	27.56	61.03	51.04	-25.46	-23.48	L2
0.4087	21.05	12.88	9.59	30.64	22.47	57.67	47.67	-27.03	-25.20	L2
21.6734	16.97	10.10	10.50	27.47	20.60	60.00	50.00	-32.53	-29.40	L2
26.5182	19.39	14.02	10.73	30.12	24.75	60.00	50.00	-29.88	-25.25	L2

Remark:

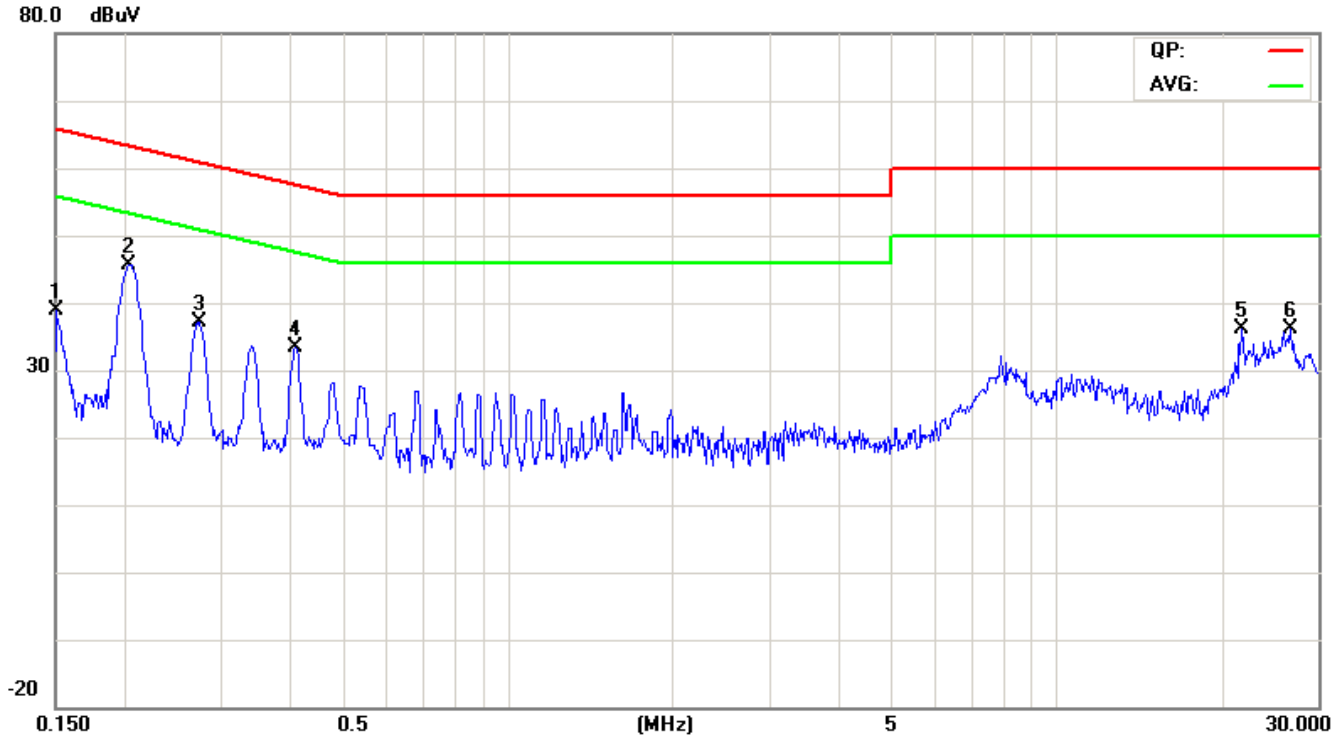
1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
3. *The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;*
4. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*

Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)

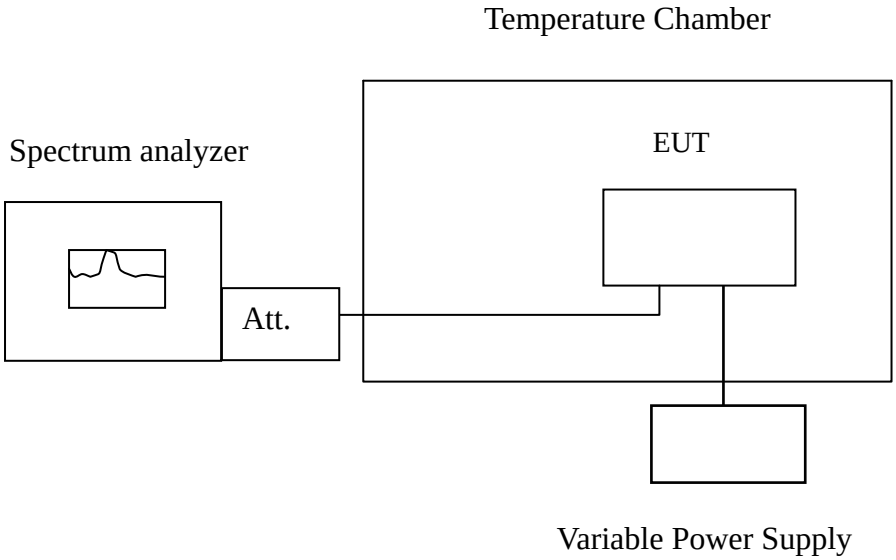


7.9 FREQUENCY STABILITY

LIMIT

According to §15.407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST PROCEDURE

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to –20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

TEST RESULTS

No non-compliance noted.

IEEE 802.11a mode / 5180 ~ 5240 MHz:

CH Low

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5180.019007	5150~5250	Pass
40	120	5179.984448	5150~5250	Pass
30	120	5179.996700	5150~5250	Pass
20	120	5180.011605	5150~5250	Pass
10	120	5180.018181	5150~5250	Pass
0	120	5179.984985	5150~5250	Pass
-10	120	5180.018112	5150~5250	Pass
-20	120	5180.020665	5150~5250	Pass

Operating Frequency: 5180 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5179.989114	5150~5250	Pass
	120	5180.004767	5150~5250	Pass
	138	5179.984792	5150~5250	Pass

CH High

Operating Frequency: 5240 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5240.007443	5150~5250	Pass
40	120	5239.986447	5150~5250	Pass
30	120	5239.988081	5150~5250	Pass
20	120	5239.972987	5150~5250	Pass
10	120	5239.996031	5150~5250	Pass
0	120	5240.014309	5150~5250	Pass
-10	120	5240.008238	5150~5250	Pass
-20	120	5239.999374	5150~5250	Pass

Operating Frequency: 5240 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5239.982208	5150~5250	Pass
	120	5240.014544	5150~5250	Pass
	138	5240.017307	5150~5250	Pass

draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240 MHz:

CH Low

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5180.001264	5150~5250	Pass
40	120	5179.992734	5150~5250	Pass
30	120	5179.976220	5150~5250	Pass
20	120	5180.019668	5150~5250	Pass
10	120	5180.000187	5150~5250	Pass
0	120	5179.986879	5150~5250	Pass
-10	120	5179.997586	5150~5250	Pass
-20	120	5179.993536	5150~5250	Pass

Operating Frequency: 5180 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5179.971623	5150~5250	Pass
	120	5180.014185	5150~5250	Pass
	138	5180.012982	5150~5250	Pass

CH High

Operating Frequency: 5240 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5239.984517	5150~5250	Pass
40	120	5240.004205	5150~5250	Pass
30	120	5240.018703	5150~5250	Pass
20	120	5240.01499	5150~5250	Pass
10	120	5240.014077	5150~5250	Pass
0	120	5240.016779	5150~5250	Pass
-10	120	5239.98889	5150~5250	Pass
-20	120	5240.015278	5150~5250	Pass

Operating Frequency: 5240 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5239.988882	5150~5250	Pass
	120	5239.988216	5150~5250	Pass
	138	5239.973616	5150~5250	Pass

draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230 MHz:

CH Low

Operating Frequency: 5190 MHz				
Environment Temperature (^{o}C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
50	120	5189.986827	5150~5250	Pass
40	120	5189.995626	5150~5250	Pass
30	120	5190.01822	5150~5250	Pass
20	120	5190.010512	5150~5250	Pass
10	120	5189.996066	5150~5250	Pass
0	120	5190.003479	5150~5250	Pass
-10	120	5189.977551	5150~5250	Pass
-20	120	5189.983803	5150~5250	Pass

Operating Frequency: 5190 MHz,				
Environment Temperature (^{o}C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	102	5190.005008	5150~5250	Pass
	120	5189.996665	5150~5250	Pass
	138	5189.976008	5150~5250	Pass

CH High

Operating Frequency: 5230 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5229.994681	5150~5250	Pass
40	120	5230.005062	5150~5250	Pass
30	120	5229.974178	5150~5250	Pass
20	120	5230.017154	5150~5250	Pass
10	120	5229.993448	5150~5250	Pass
0	120	5230.002105	5150~5250	Pass
-10	120	5230.004087	5150~5250	Pass
-20	120	5229.979961	5150~5250	Pass

Operating Frequency: 5230 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5230.020538	5150~5250	Pass
	120	5229.981907	5150~5250	Pass
	138	5189.990847	5150~5250	Pass

IEEE 802.11a mode / 5260 ~ 5320 MHz:

CH Low

Operating Frequency: 5260 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5259.984719	5250~5350	Pass
40	120	5260.001409	5250~5350	Pass
30	120	5259.997602	5250~5350	Pass
20	120	5259.99205	5250~5350	Pass
10	120	5259.980019	5250~5350	Pass
0	120	5259.991241	5250~5350	Pass
-10	120	5260.002559	5250~5350	Pass
-20	120	5259.975405	5250~5350	Pass

Operating Frequency: 5260 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5259.972295	5250~5350	Pass
	120	5259.982943	5250~5350	Pass
	138	5259.983658	5250~5350	Pass

CH High

Operating Frequency: 5320 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5319.99986	5250~5350	Pass
40	120	5319.978681	5250~5350	Pass
30	120	5320.020902	5250~5350	Pass
20	120	5319.977896	5250~5350	Pass
10	120	5320.006078	5250~5350	Pass
0	120	5320.002271	5250~5350	Pass
-10	120	5319.994862	5250~5350	Pass
-20	120	5320.014729	5250~5350	Pass

Operating Frequency: 5320 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5319.97146	5250~5350	Pass
	120	5320.012563	5250~5350	Pass
	138	5319.996464	5250~5350	Pass

draft 802.11n Standard-20 MHz Channel mode / 5260 ~ 5320 MHz:

CH Low

Operating Frequency: 5260 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5259.981641	5250~5350	Pass
40	120	5259.971192	5250~5350	Pass
30	120	5260.0094	5250~5350	Pass
20	120	5259.993284	5250~5350	Pass
10	120	5259.973056	5250~5350	Pass
0	120	5260.006536	5250~5350	Pass
-10	120	5259.995736	5250~5350	Pass
-20	120	5259.977981	5250~5350	Pass

Operating Frequency: 5260 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5259.980512	5250~5350	Pass
	120	5259.996091	5250~5350	Pass
	138	5259.994214	5250~5350	Pass

CH High

Operating Frequency: 5320 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5319.97553	5250~5350	Pass
40	120	5319.998573	5250~5350	Pass
30	120	5319.990428	5250~5350	Pass
20	120	5319.971719	5250~5350	Pass
10	120	5319.982463	5250~5350	Pass
0	120	5319.984842	5250~5350	Pass
-10	120	5319.98845	5250~5350	Pass
-20	120	5319.975462	5250~5350	Pass

Operating Frequency: 5320 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5320.0101	5250~5350	Pass
	120	5320.012202	5250~5350	Pass
	138	5320.019043	5250~5350	Pass

draft 802.11n Wide-40 MHz Channel mode / 5270 ~ 5310 MHz:

CH Low

Operating Frequency: 5270 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5270.014249	5250~5350	Pass
40	120	5270.016439	5250~5350	Pass
30	120	5270.012131	5250~5350	Pass
20	120	5269.983365	5250~5350	Pass
10	120	5270.016825	5250~5350	Pass
0	120	5269.975735	5250~5350	Pass
-10	120	5270.002533	5250~5350	Pass
-20	120	5270.018552	5250~5350	Pass

Operating Frequency: 5270 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5269.98435	5250~5350	Pass
	120	5269.997547	5250~5350	Pass
	138	5270.015547	5250~5350	Pass

CH High

Operating Frequency: 5310 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5310.009225	5250~5350	Pass
40	120	5309.972307	5250~5350	Pass
30	120	5309.994153	5250~5350	Pass
20	120	5309.984603	5250~5350	Pass
10	120	5309.983522	5250~5350	Pass
0	120	5309.981027	5250~5350	Pass
-10	120	5310.010257	5250~5350	Pass
-20	120	5309.991102	5250~5350	Pass

Operating Frequency: 5310 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5310.010893	5250~5350	Pass
	120	5310.013067	5250~5350	Pass
	138	5309.999407	5250~5350	Pass

IEEE 802.11a mode / 5500 ~ 5700 MHz:

CH Low

Operating Frequency: 5500 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5500.019548	5470~5725	Pass
40	120	5499.995567	5470~5725	Pass
30	120	5499.998279	5470~5725	Pass
20	120	5500.009907	5470~5725	Pass
10	120	5499.971999	5470~5725	Pass
0	120	5499.977853	5470~5725	Pass
-10	120	5499.994595	5470~5725	Pass
-20	120	5499.988207	5470~5725	Pass

Operating Frequency: 5500 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5500.012832	5470~5725	Pass
	120	5499.987022	5470~5725	Pass
	138	5499.973736	5470~5725	Pass

CH High

Operating Frequency: 5700 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5699.990258	5470~5725	Pass
40	120	5699.988174	5470~5725	Pass
30	120	5700.017724	5470~5725	Pass
20	120	5699.986683	5470~5725	Pass
10	120	5700.017812	5470~5725	Pass
0	120	5699.977609	5470~5725	Pass
-10	120	5699.996777	5470~5725	Pass
-20	120	5699.998668	5470~5725	Pass

Operating Frequency: 5700 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5699.973716	5470~5725	Pass
	120	5700.011581	5470~5725	Pass
	138	5699.970882	5470~5725	Pass

draft 802.11n Standard-20 MHz Channel mode / 5500 ~ 5700 MHz:

CH Low

Operating Frequency: 5500 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5500.016331	5470~5725	Pass
40	120	5500.0158	5470~5725	Pass
30	120	5500.012072	5470~5725	Pass
20	120	5500.015647	5470~5725	Pass
10	120	5499.984781	5470~5725	Pass
0	120	5500.001252	5470~5725	Pass
-10	120	5499.988418	5470~5725	Pass
-20	120	5500.02091	5470~5725	Pass

Operating Frequency: 5500 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5499.973082	5470~5725	Pass
	120	5499.978982	5470~5725	Pass
	138	5500.01252	5470~5725	Pass

CH High

Operating Frequency: 5700 MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
50	120	5700.011625	5470~5725	Pass
40	120	5700.015435	5470~5725	Pass
30	120	5699.995428	5470~5725	Pass
20	120	5700.009806	5470~5725	Pass
10	120	5699.99697	5470~5725	Pass
0	120	5700.009142	5470~5725	Pass
-10	120	5700.000692	5470~5725	Pass
-20	120	5699.994762	5470~5725	Pass

Operating Frequency: 5700 MHz,				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	102	5700.012458	5470~5725	Pass
	120	5699.979223	5470~5725	Pass
	138	5699.986567	5470~5725	Pass

draft 802.11n Wide-40 MHz Channel mode / 5510 ~ 5670 MHz:

CH Low

Operating Frequency: 5510 MHz				
Environment Temperature (^{o}C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
50	120	5509.997376	5470~5725	Pass
40	120	5510.007934	5470~5725	Pass
30	120	5509.975466	5470~5725	Pass
20	120	5510.018269	5470~5725	Pass
10	120	5509.983566	5470~5725	Pass
0	120	5509.999392	5470~5725	Pass
-10	120	5509.975691	5470~5725	Pass
-20	120	5509.976233	5470~5725	Pass

Operating Frequency: 5510 MHz				
Environment Temperature (oC)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	102	5509.99295	5470~5725	Pass
	120	5510.002238	5470~5725	Pass
	138	5509.985448	5470~5725	Pass

CH High

Operating Frequency: 5670 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	120	5669.978606	5470~5725	Pass
40	120	5670.000167	5470~5725	Pass
30	120	5669.994765	5470~5725	Pass
20	120	5669.983128	5470~5725	Pass
10	120	5669.986177	5470~5725	Pass
0	120	5669.991794	5470~5725	Pass
-10	120	5669.974692	5470~5725	Pass
-20	120	5670.015875	5470~5725	Pass

Operating Frequency: 5670 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	102	5669.998752	5470~5725	Pass
	120	5670.013823	5470~5725	Pass
	138	5669.976483	5470~5725	Pass

7.10 DYNAMIC FREQUENCY SELECTION

LIMIT

According to §15.407 (h) and FCC 06-96 appendix "compliance measurement procedures for unlicensed-national information infrastructure devices operating in the 5250-5350 MHz and 5470-5725 MHz bands incorporating dynamic frequency selection".

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client(with radar detection)
Non-Occupancy Period	Yes	Yes	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client(with radar detection)
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 3: Interference Threshold values, Master or Client incorporating In-Service

Maximum Transmit Power	Value (see note)
>=200 Milliwatt	-64 dBm
< 200 Milliwatt	-62 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period
U-NII Detection Bandwidth	Minimum 80% of the UNII 99% transmission power bandwidth. See Note 3.

The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:

- For the Short pulse radar Test Signals this instant is the end of the Burst.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated.
- For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Table 6 – Long Pulse Radar Test Signal

Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (µsec)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

Table 7 – Frequency Hopping Radar Test Signal

Radar Waveform	Pulse Width (µsec)	PRI (µsec)	Burst Length (ms)	Pulses Per Hop	Hopping Rate (kHz)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	300	9	0.33	70%	30

DESCRIPTION OF EUT

Overview Of EUT With Respect To §15.407 (H) Requirements

The EUT operates over the 5250-5350 MHz range as a Client Device that does not have radar detection capability.

The antenna assembly utilized with the EUT has a gain of 4.09 dBi.

The highest power level is 20.56 dBm EIRP in the 5500 ~ 5700MHz band.

The EUT uses one transmitter connected to two 50-ohm coaxial antenna ports via a diversity switch. Two antenna port is connected to the test system since the EUT has two antenna.

The Slave device associated with the EUT during these tests does not have radar detection capability.

WLAN traffic is generated by streaming the video file TestFile.mp2 "6 ½ Magic Hours" from the Master to the Slave in full motion video mode using the media player with the V2.61 Codec package.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes the 802.11a architecture, with a nominal channel bandwidth of 20 MHz.

The Master Device is a Cisco Aironet 802.11a/b/g Access Point, FCC ID: LDK102056.

The rated output power of the Master unit is < 23dBm (EIRP). Therefore the required interference threshold level is -62 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is –62 + 5 = -57dBm.

The calibrated conducted DFS Detection Threshold level is set to -62 dBm. The tested level is lower than the required level hence it provides margin to the limit.

Manufacturer's Statement Regarding Uniform Channel Spreading

The end product implements an automatic channel selection feature at startup such that operation commences on channels distributed across the entire set of allowed 5GHz channels. This feature will ensure uniform spreading is achieved while avoiding non-allowed channels due to prior radar events.

TEST AND MEASUREMENT SYSTEM

System Overview

The measurement system is based on a conducted test method.

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

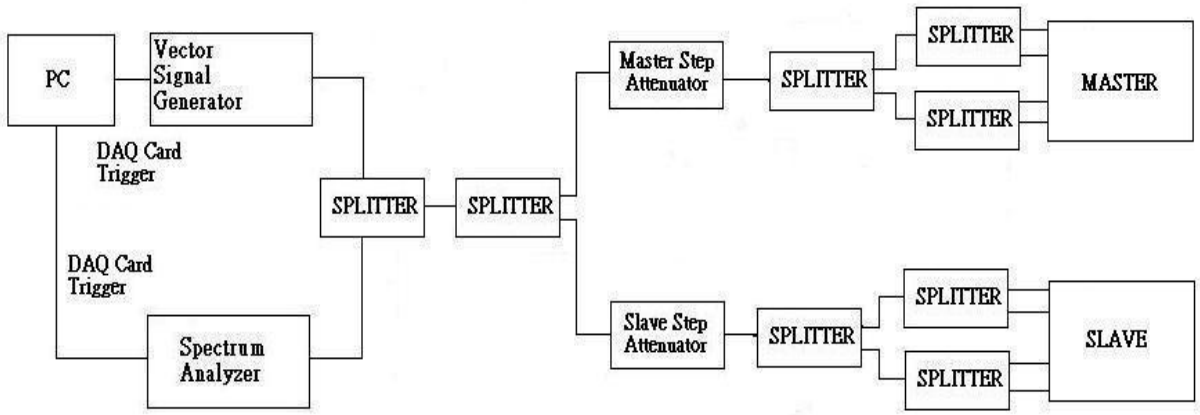
The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from FL to FH for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer set to display 8001 bins on the horizontal axis. The time-domain resolution is 2 msec / bin with a 16 second sweep time, meeting the 10 second short pulse reporting criteria. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold. The time-domain resolution is 3 msec / bin with a 24 second sweep time, meeting the 22 second long pulse reporting criteria and allowing a minimum of 10 seconds after the end of the long pulse waveform.

Should multiple RF ports be utilized for the Master and/or Slave devices (for example, for diversity or MIMO implementations), 50 ohm termination would be removed from the splitter so that connection can be established between splitter and the Master and/or Slave devices.

Conducted Method System Block Diagram



System Calibration

Connect the spectrum analyzer to the test system in place of the master device. Set the signal generator to CW mode. Adjust the amplitude of the signal generator to yield a measured level of –62 dBm on the spectrum analyzer.

Without changing any of the instrument settings, reconnect the spectrum analyzer to the Common port of the Spectrum Analyzer Combiner/Divider and connect a 50 ohm load to the Master Device port of the test system.

Measure the amplitude and calculate the difference from –62 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference. Confirm that the signal is displayed at –62 dBm. Readjust the RBW and VBW to 3 MHz, set the span to 10 MHz, and confirm that the signal is still displayed at –62 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –62 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

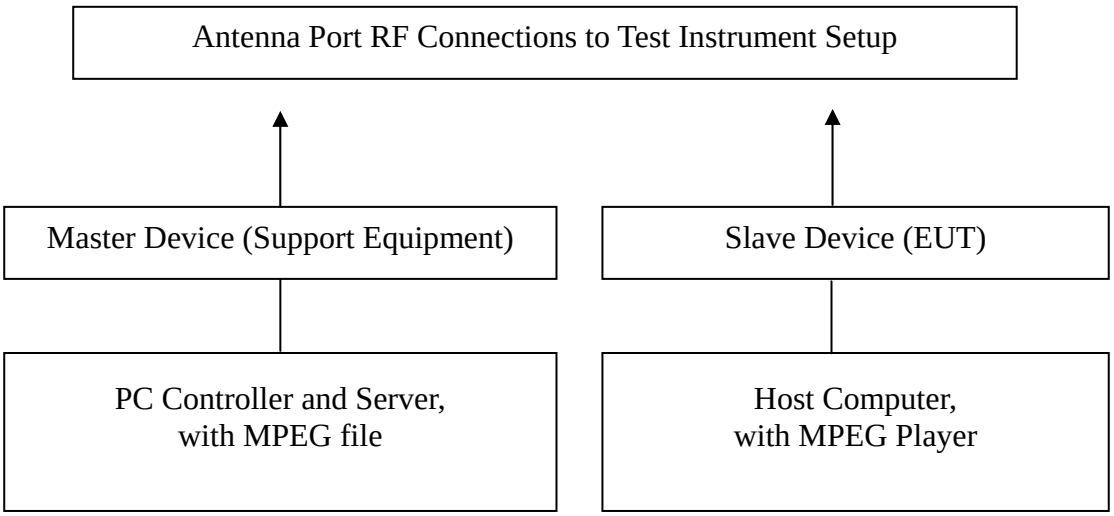
Set the signal generator to produce a radar waveform, trigger a burst manually and measure the level on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection threshold. Separate signal generator amplitude settings are determined as required for each radar type.

Adjustment Of Displayed Traffic Level

Establish a link between the Master and Slave, adjusting the Link Step Attenuator as needed to provide a suitable received level at the Master and Slave devices. Stream the video test file to generate WLAN traffic. Confirm that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold. Confirm that the displayed traffic is from the Master Device. For Master Device testing confirm that the displayed traffic does not include Slave Device traffic. For Slave Device testing confirm that the displayed traffic does not include Master Device traffic.

If a different setting of the Master Step Attenuator is required to meet the above conditions, perform a new System Calibration for the new Master Step Attenuator setting.

Test Setup



TEST RESULTS

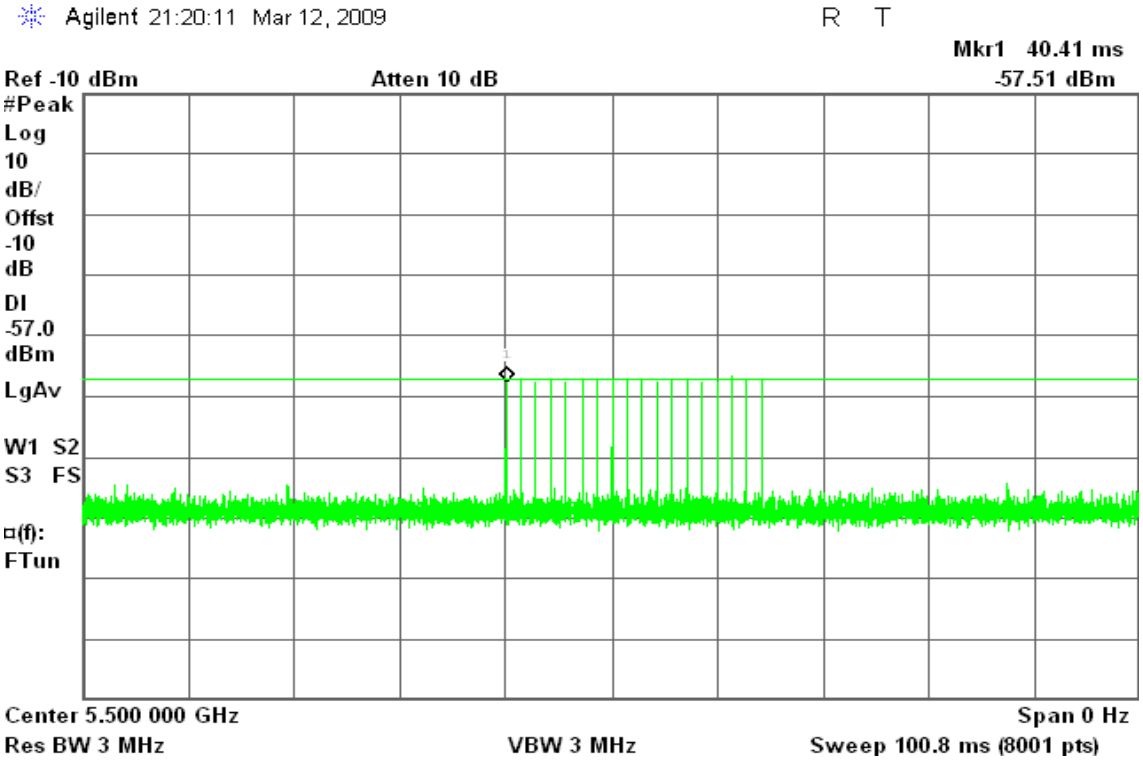
No non-compliance noted

Test Plot

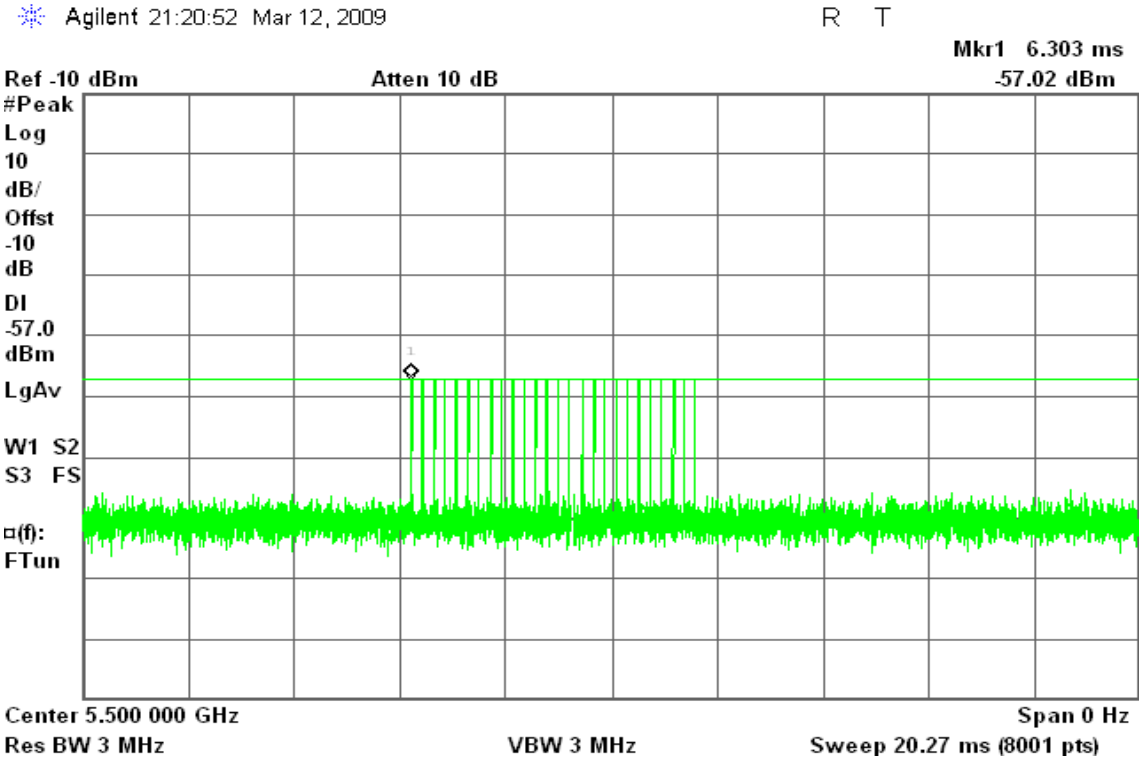
PLOTS OF RADAR WAVEFORMS

draft 802.11n Standard-20 MHz mode

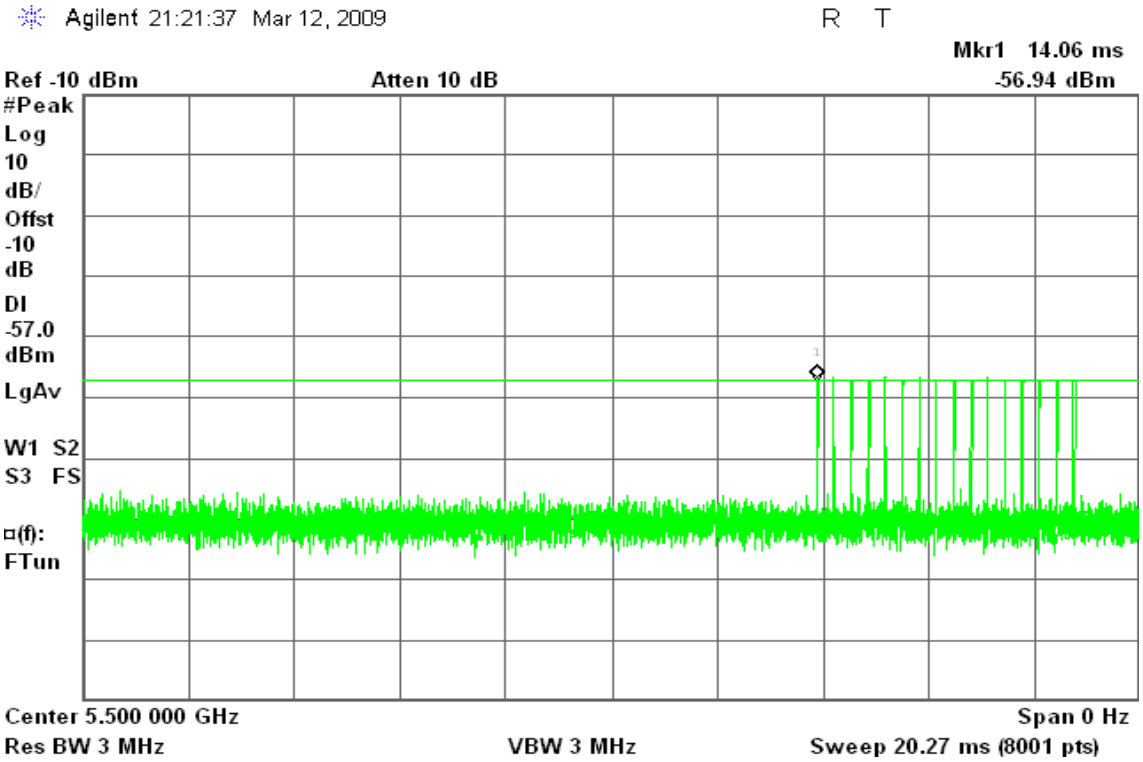
Sample of Short Pulse Radar Type 1



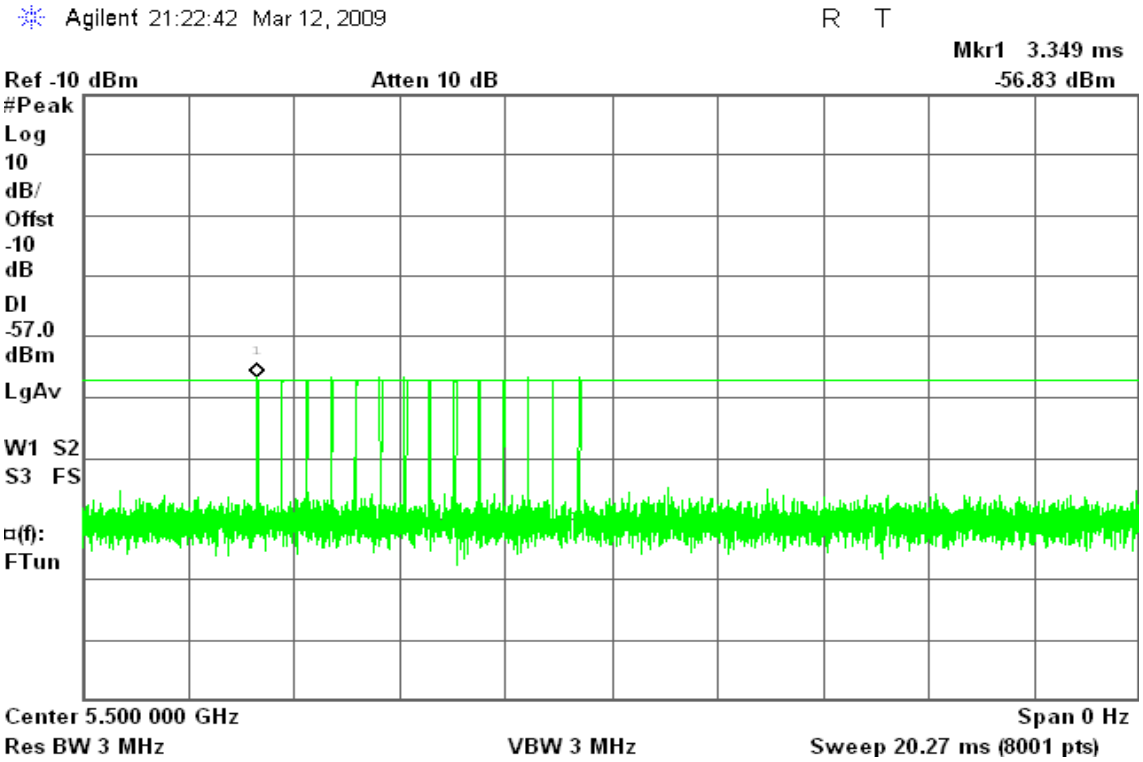
Sample of Short Pulse Radar Type 2



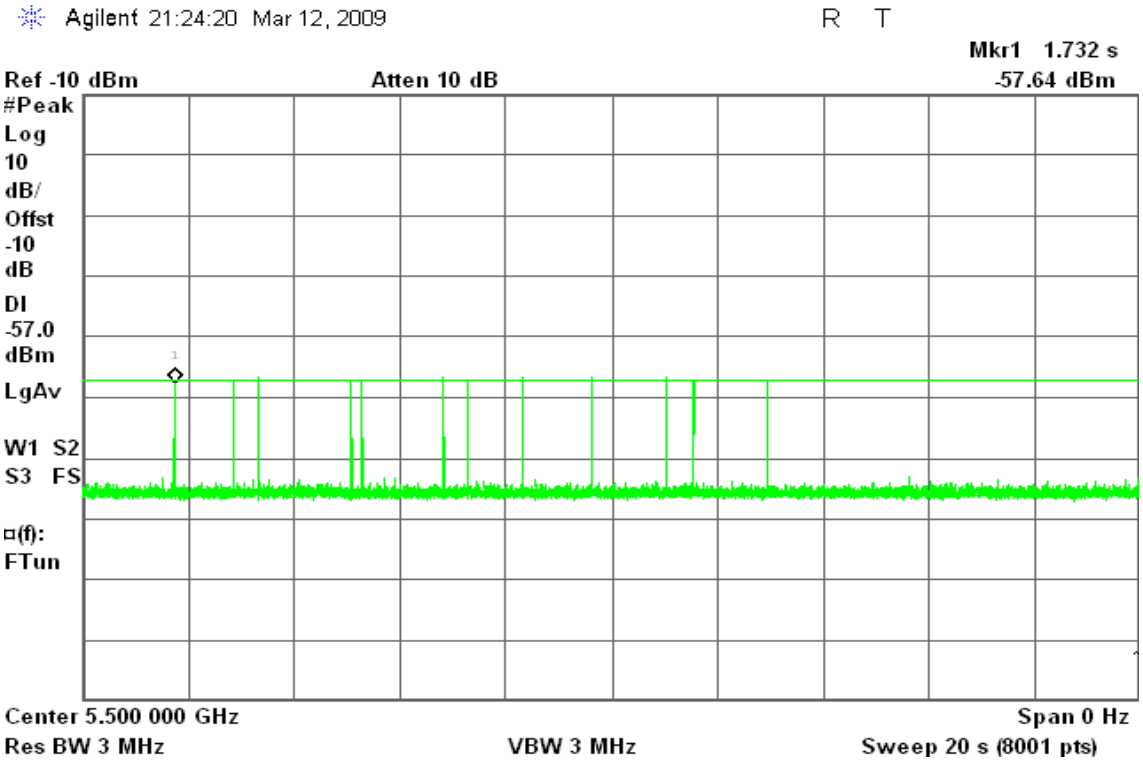
Sample of Short Pulse Radar Type 3



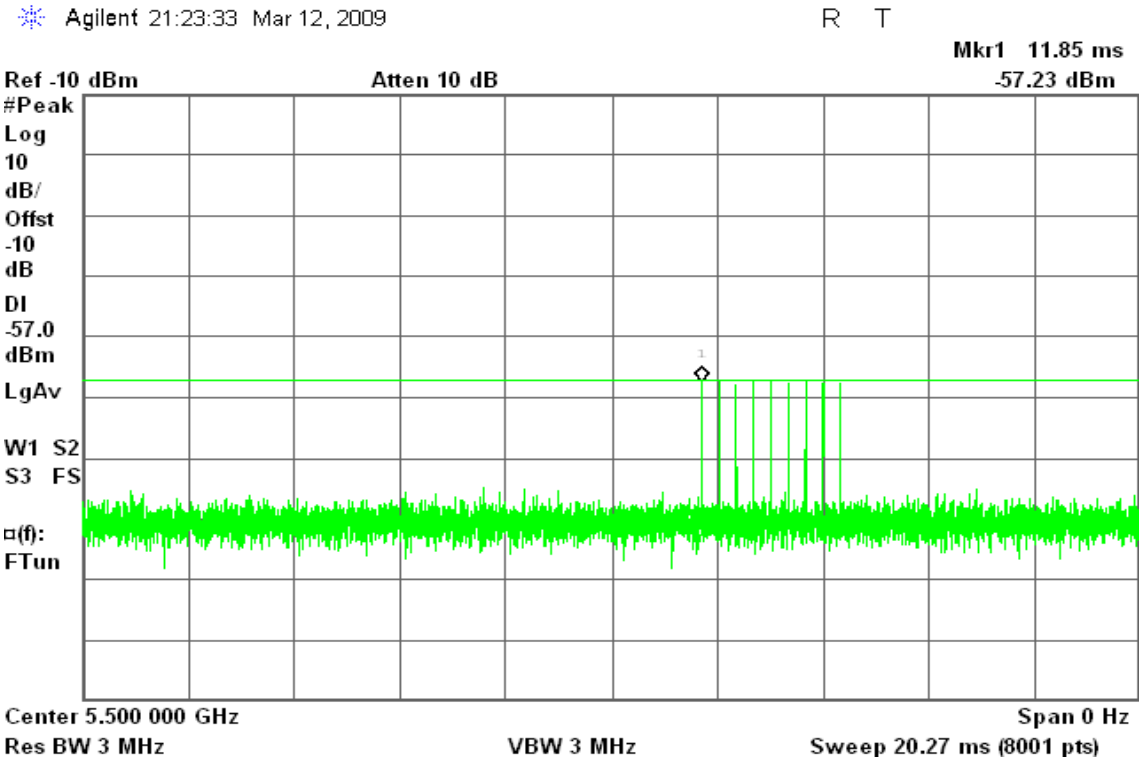
Sample of Short Pulse Radar Type 4



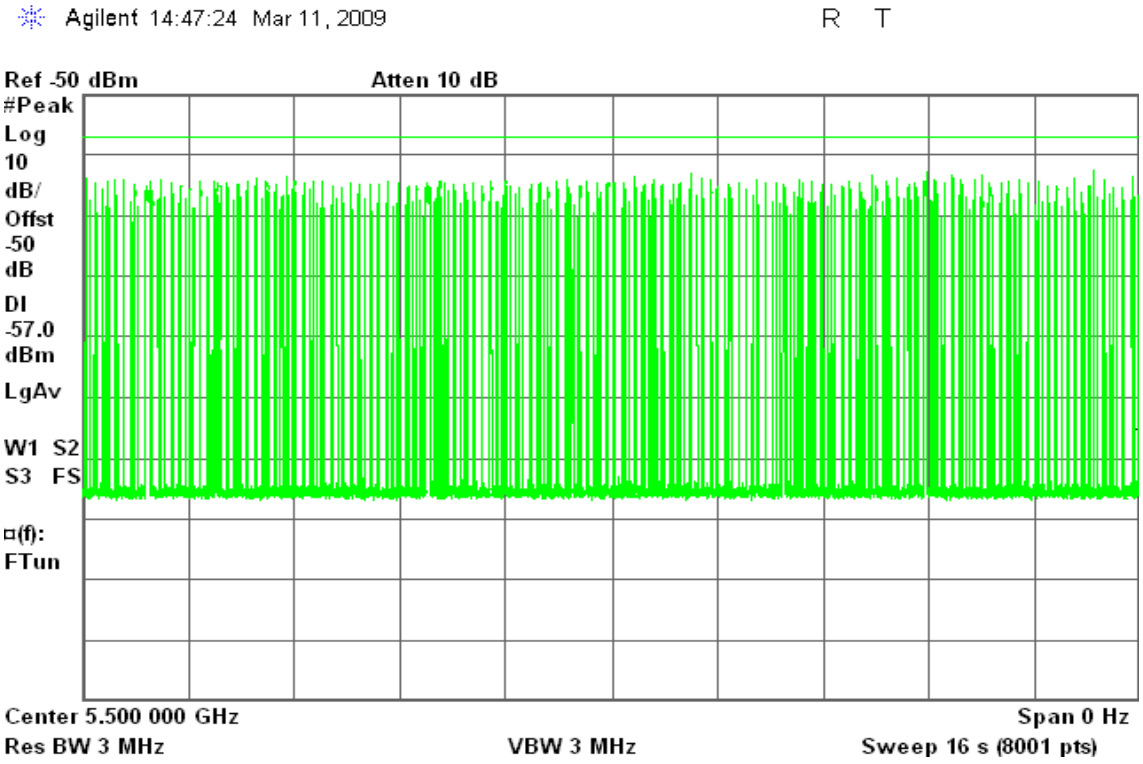
Sample of Long Pulse Radar Type 5



Sample of Frequency Hopping Radar Type 6

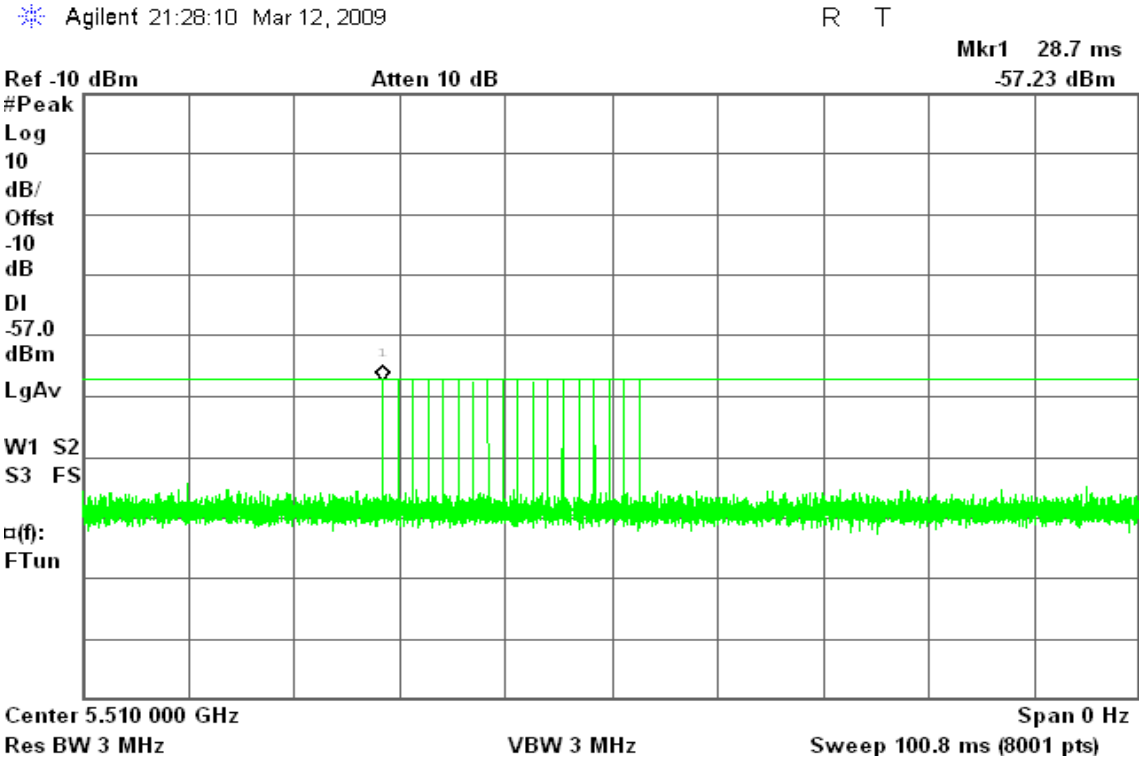


Plot of WLAN Traffic from Slave

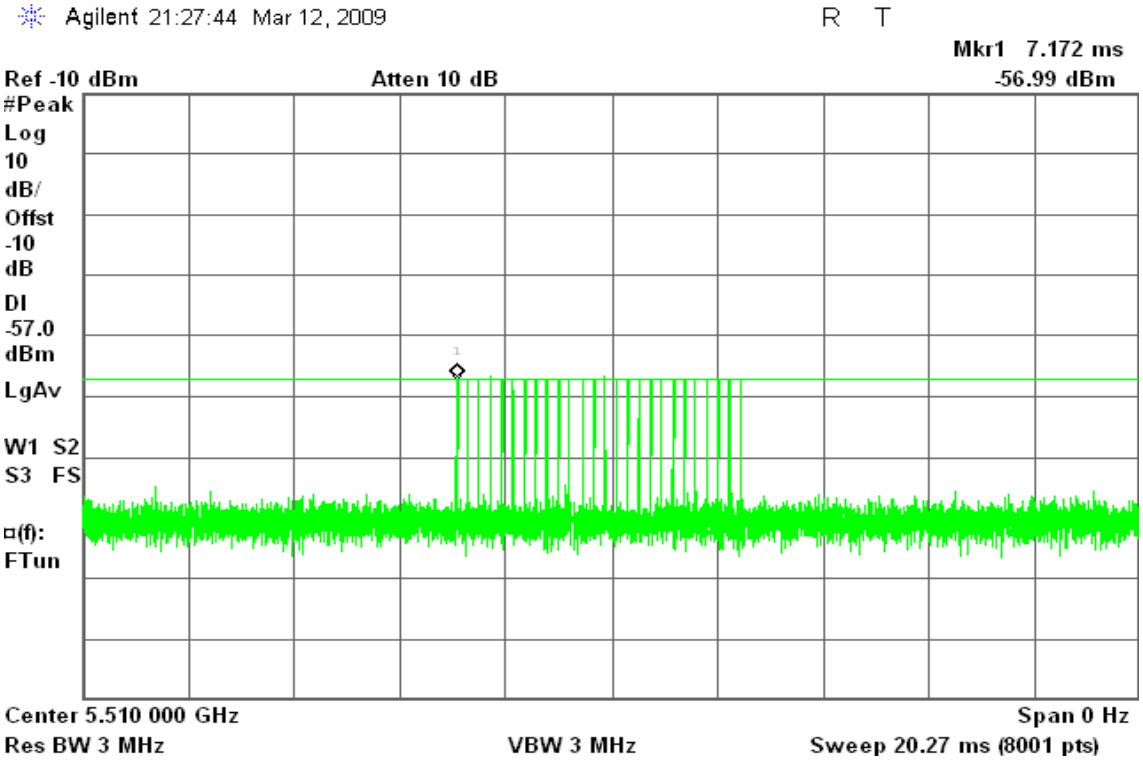


draft 802.11n Wide-40 MHz mode

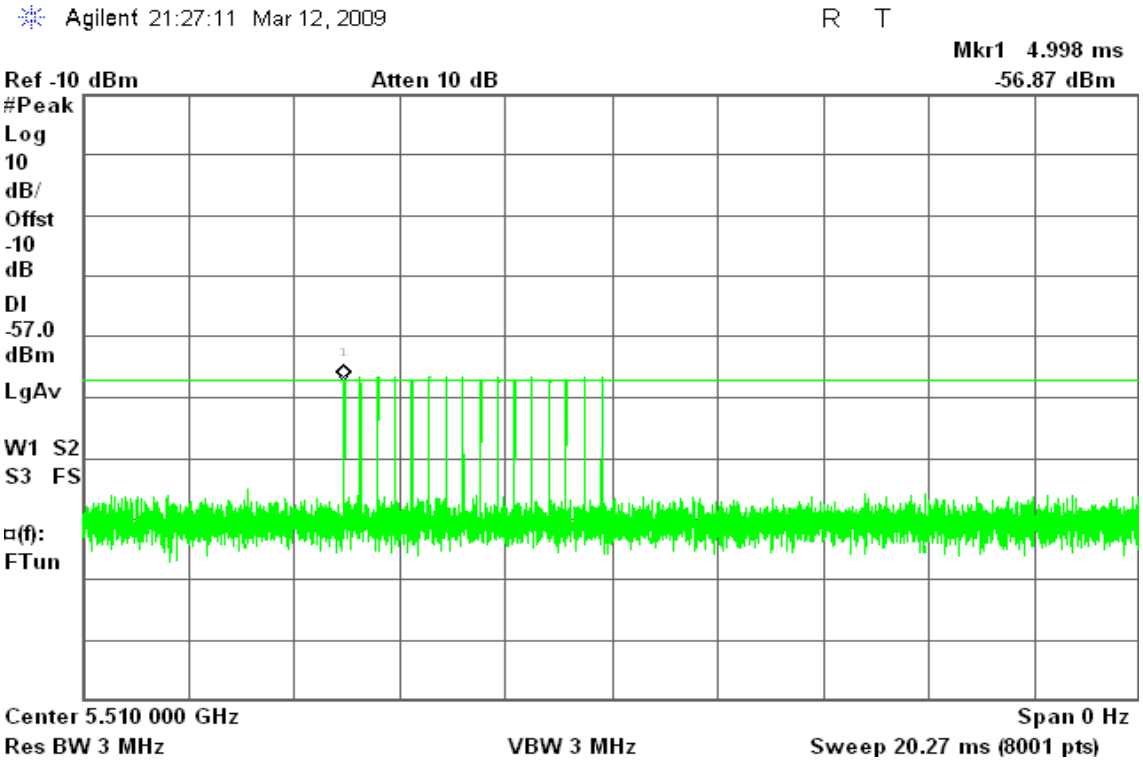
Sample of Short Pulse Radar Type 1



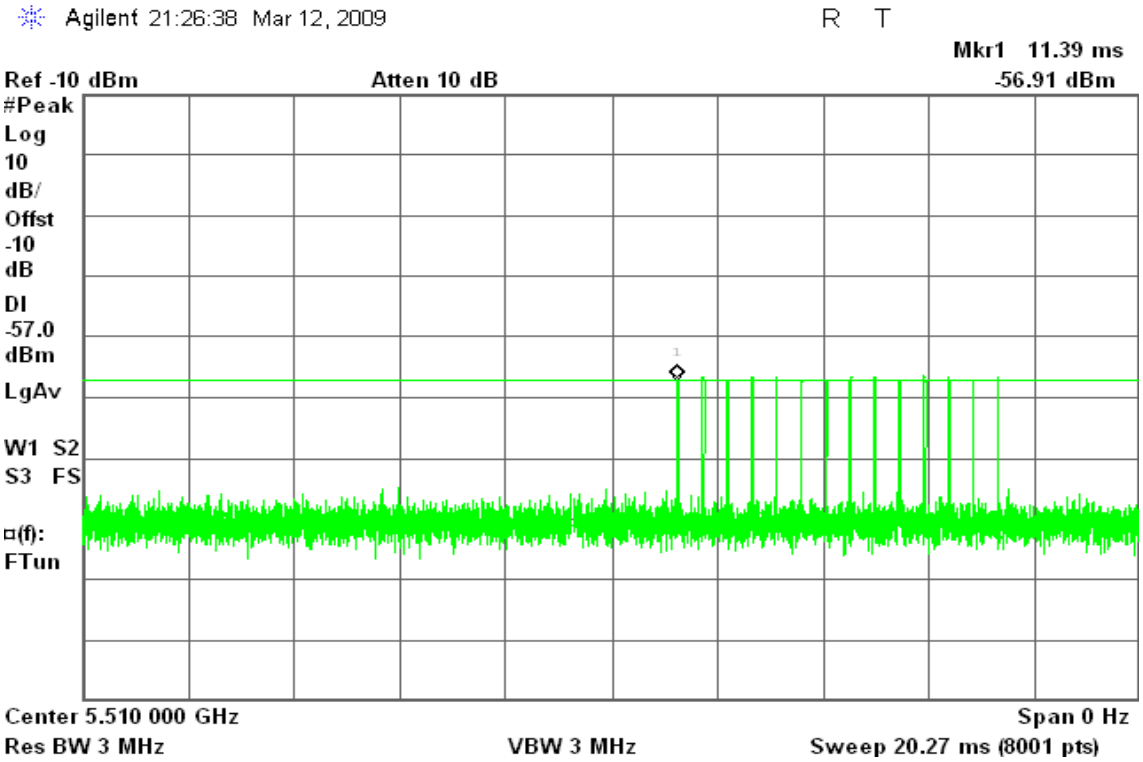
Sample of Short Pulse Radar Type 2



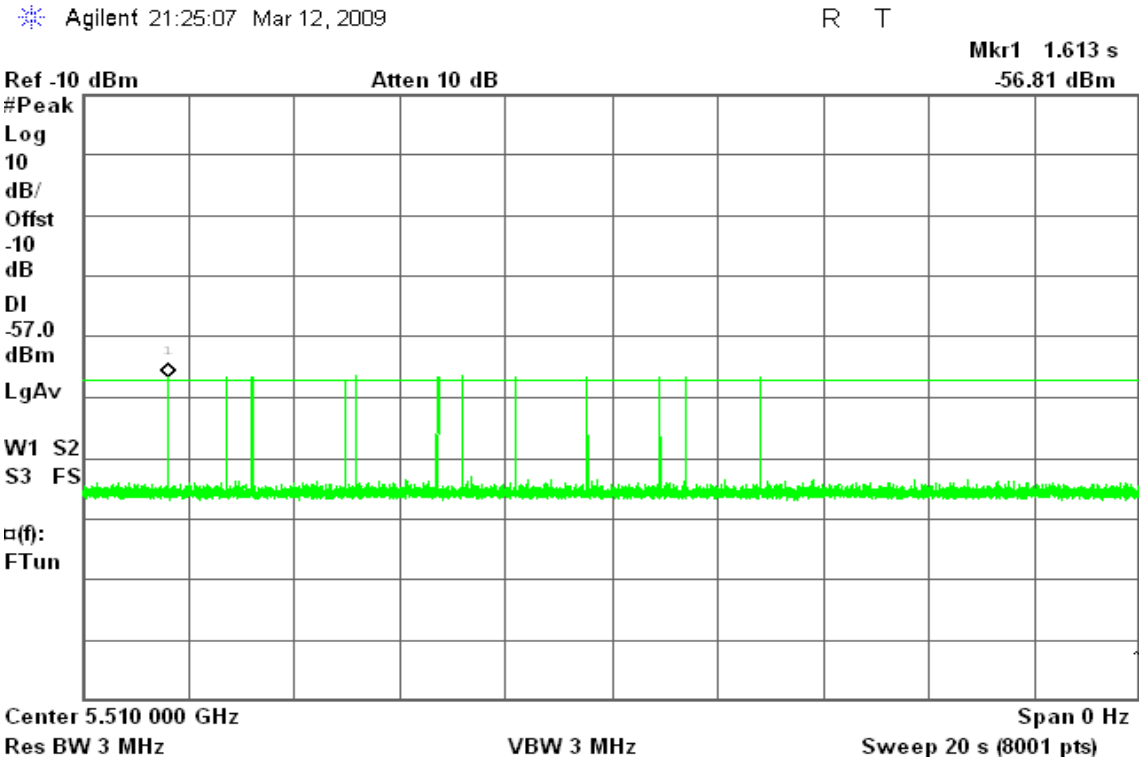
Sample of Short Pulse Radar Type 3



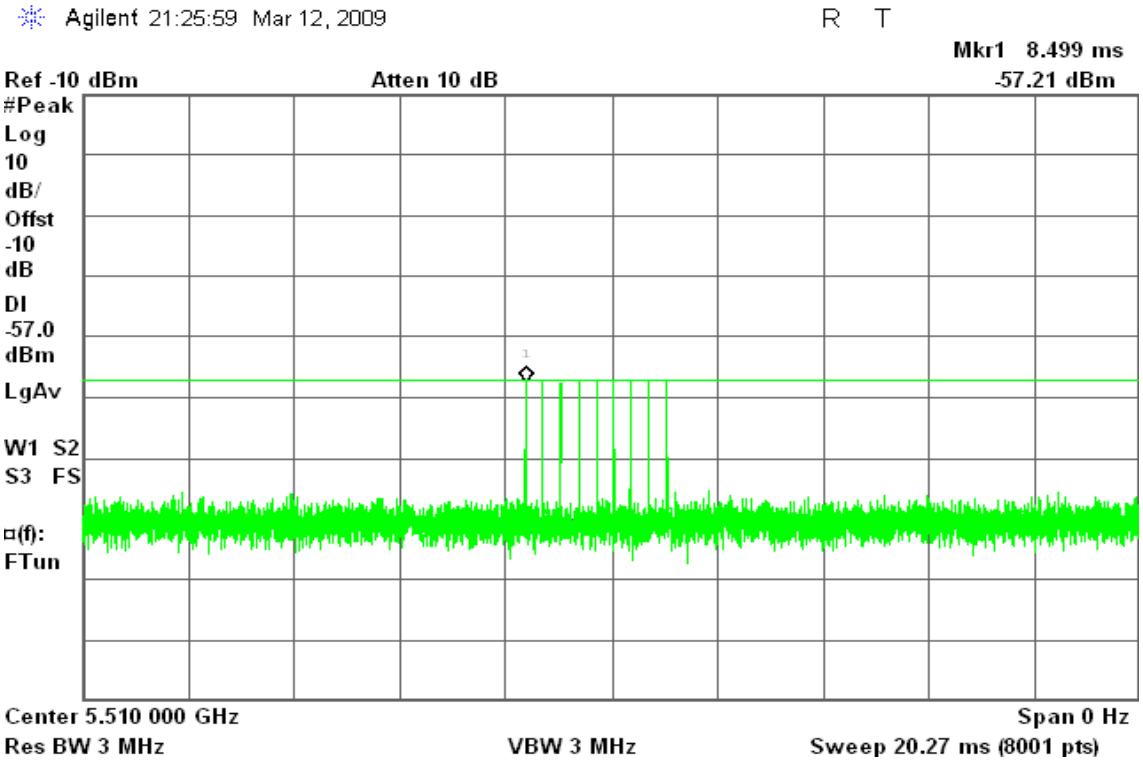
Sample of Short Pulse Radar Type 4



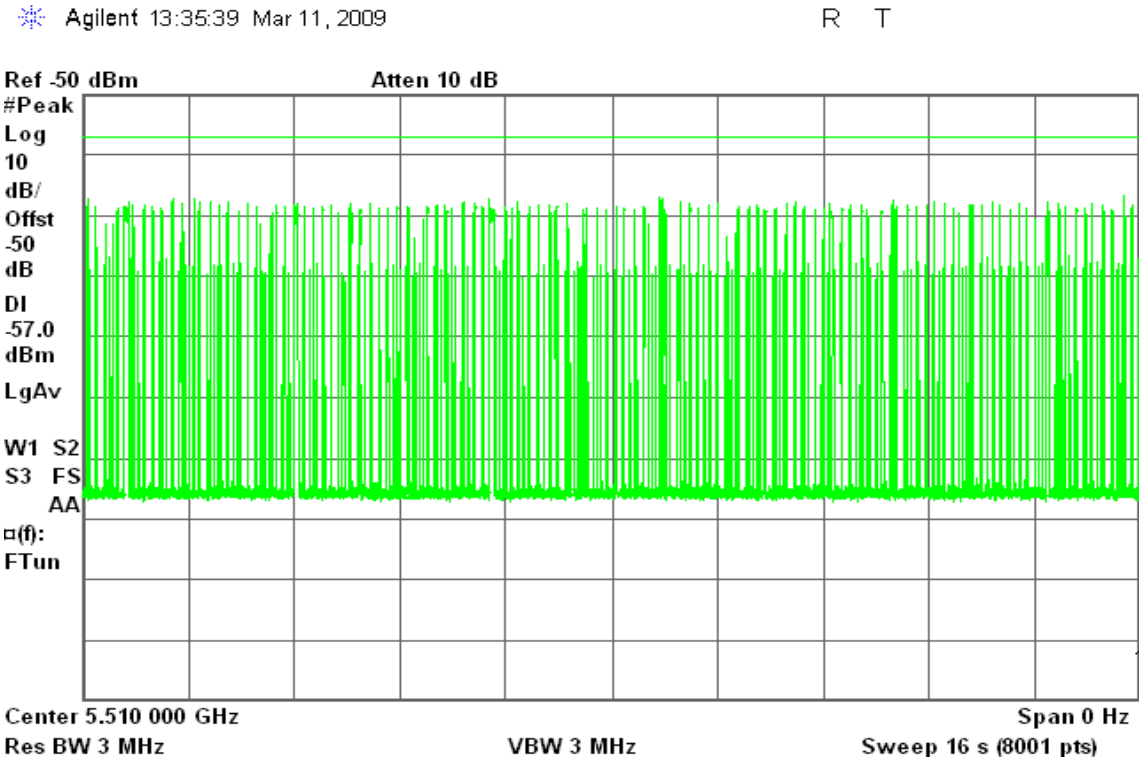
Sample of Long Pulse Radar Type 5



Sample of Frequency Hopping Radar Type 6



Plot of WLAN Traffic from Slave



TEST CHANNEL AND METHOD

All tests were performed at a channel center frequency of 5500 MHz utilizing a conducted test method.

CHANNEL MOVE TIME AND CHANNEL CLOSING TRANSMISSION TIME

GENERAL REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =

(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the aggregate time is calculated

Begins at (Reference Marker + 200 msec) and

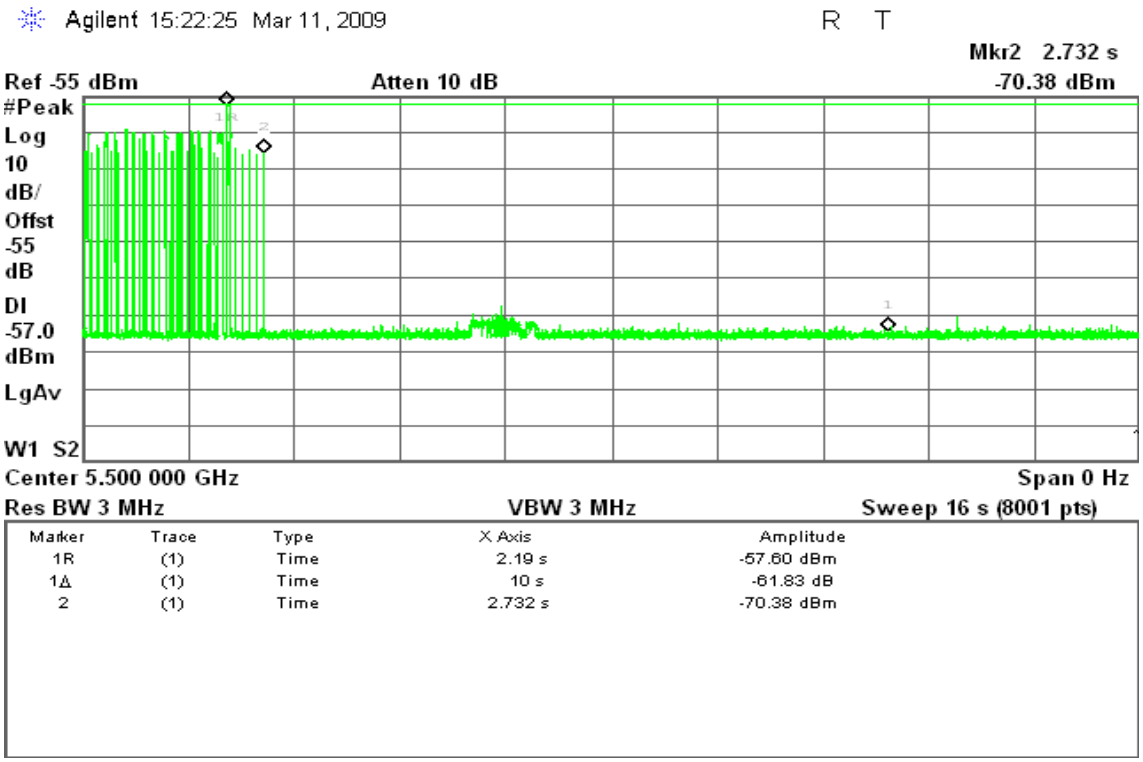
Ends no earlier than (Reference Marker + 10 sec).

draft 802.11n Standard-20 MHz Channel mode

Type 1 Channel Move Time Results

No non-compliance noted.

Channel Move Time (s)	Limit (s)
2.732	10

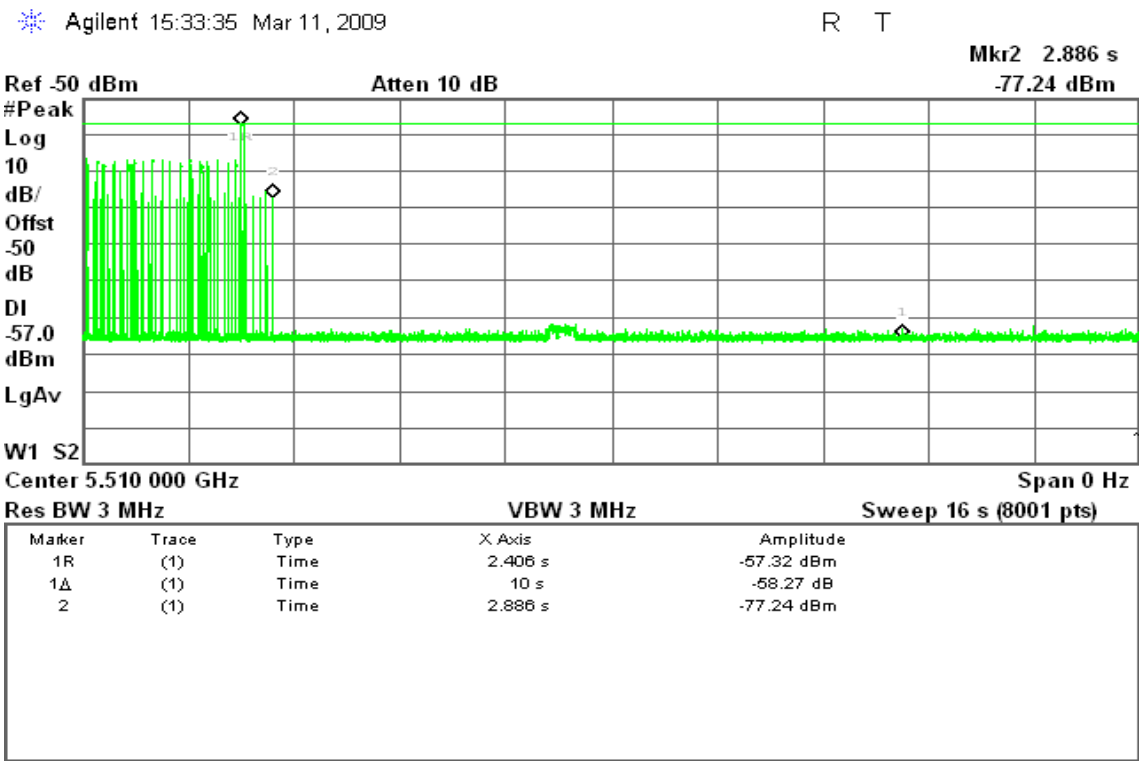


draft 802.11n Wide-40 MHz Channel mode

Type 1 Channel Move Time Results

No non-compliance noted.

Channel Move Time (s)	Limit (s)
2.886	10

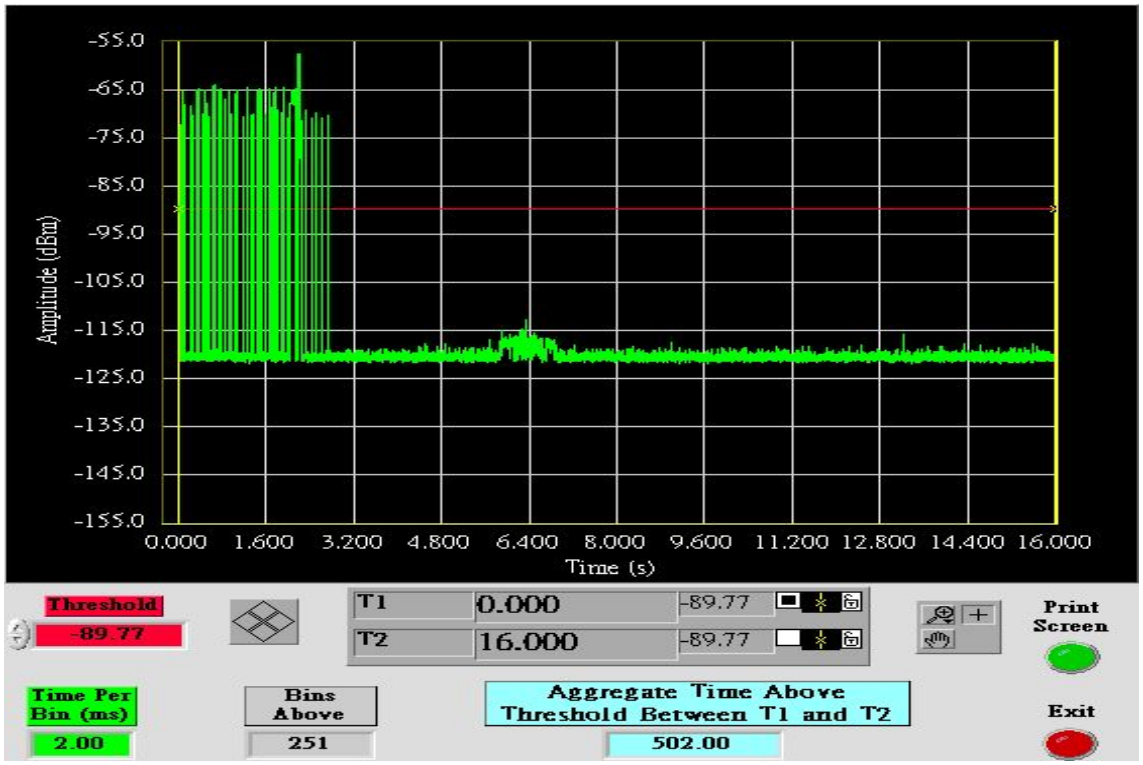


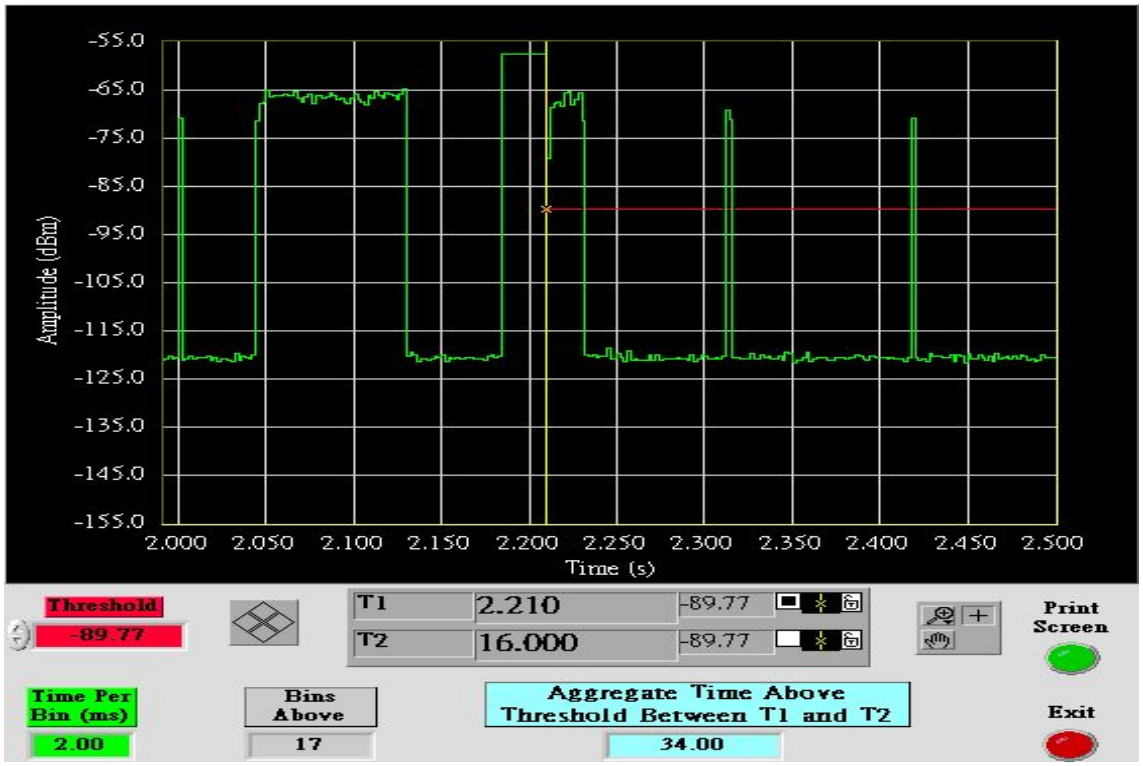
draft 802.11n Standard-20 MHz Channel mode

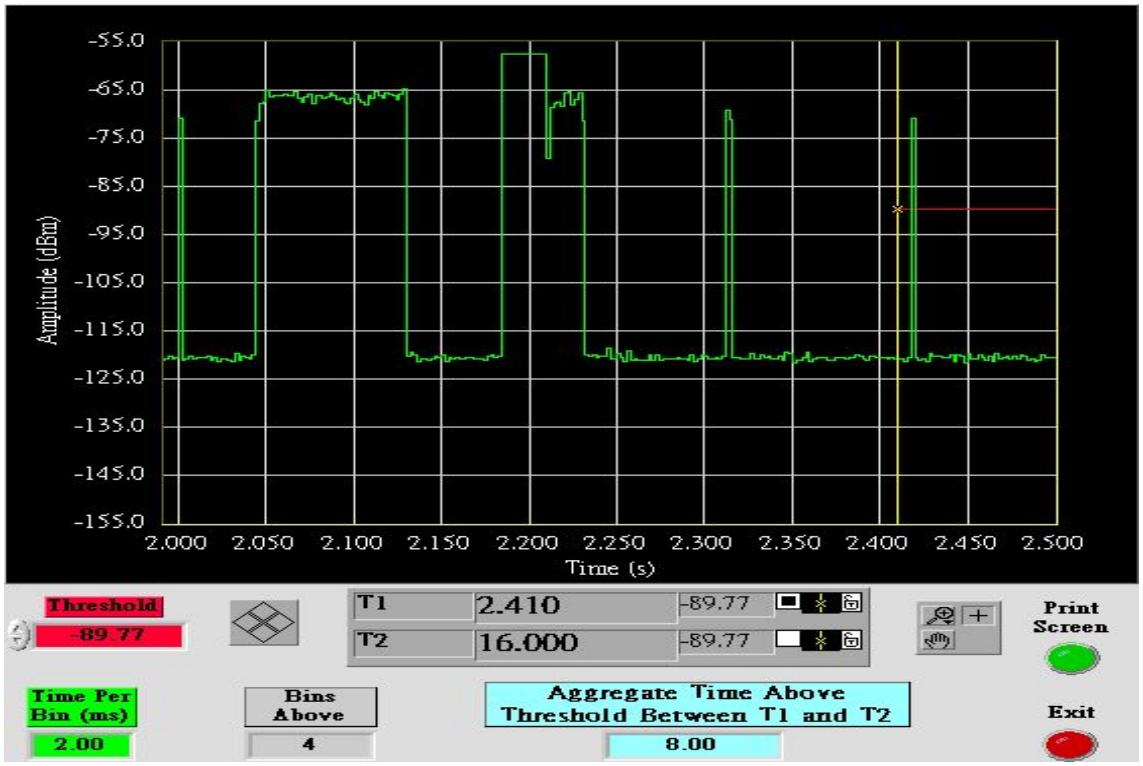
Type 1 Channel Closing Transmission Time Results

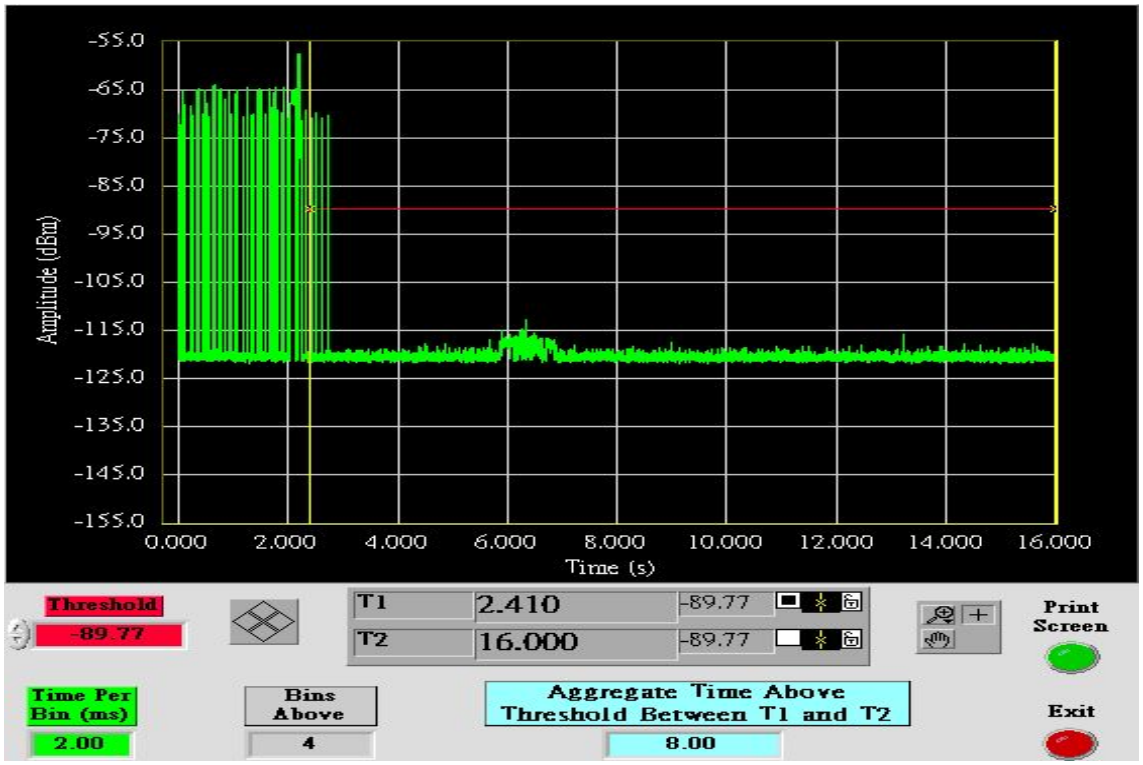
No non-compliance noted.

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
8	60	-52






-55.0
-65.0
-75.0
-85.0
-95.0
-105.0
-115.0
-125.0
-135.0
-145.0
-155.0
Amplitude (dBm)
2.000 2.050 2.100 2.150 2.200 2.250 2.300 2.350 2.400 2.450 2.500
Time (s)
Threshold
-89.77
T1 2.410 -89.77
T2 16.000 -89.77
Print Screen
Time Per Bin (ms)
2.00
Bins Above
4
Aggregate Time Above Threshold Between T1 and T2
8.00
Exit

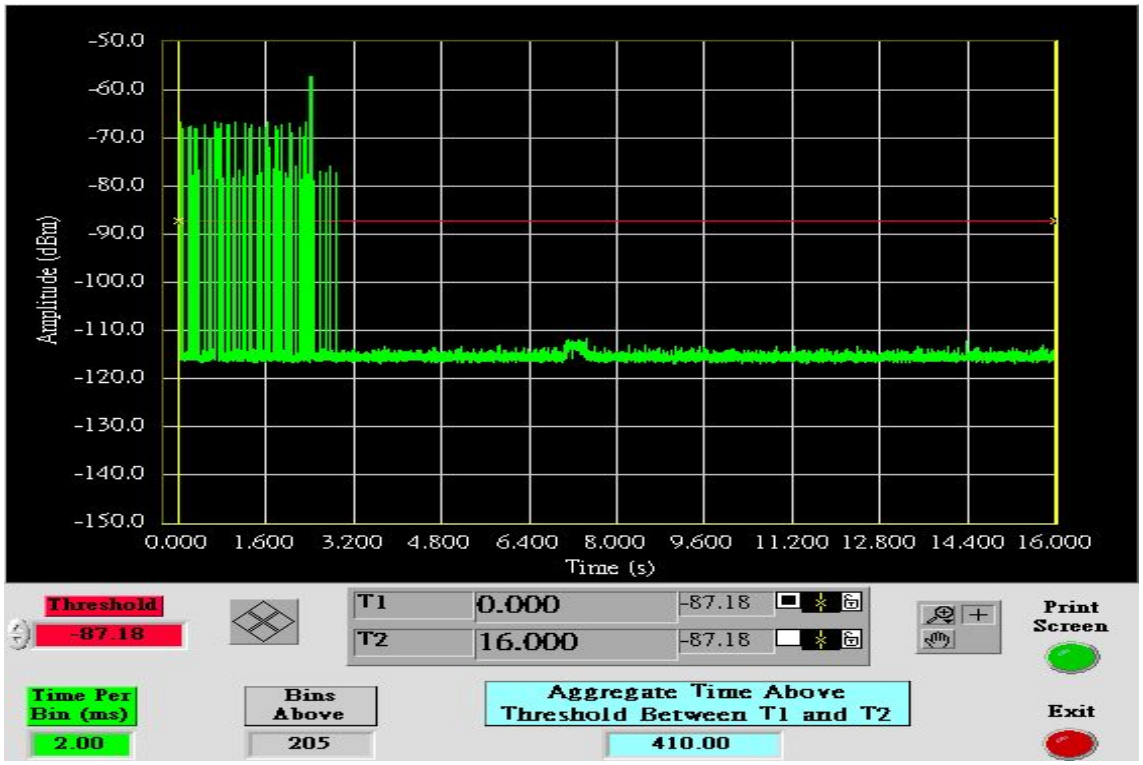

-55.0
-65.0
-75.0
-85.0
-95.0
-105.0
-115.0
-125.0
-135.0
-145.0
-155.0
Amplitude (dBm)
0.000 2.000 4.000 6.000 8.000 10.000 12.000 14.000 16.000
Time (s)
Threshold
-89.77
T1 2.410 -89.77
T2 16.000 -89.77
Print Screen
Time Per Bin (ms)
2.00
Bins Above
4
Aggregate Time Above Threshold Between T1 and T2
8.00
Exit

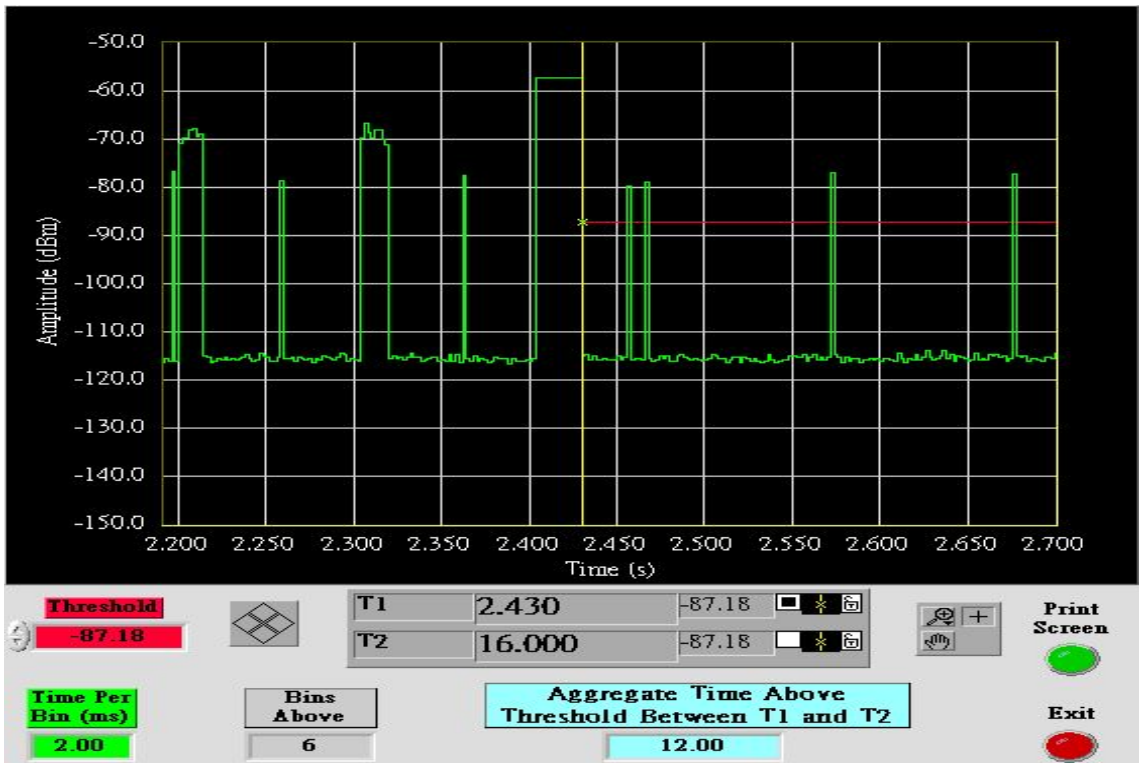
draft 802.11n Wide-40 MHz Channel mode

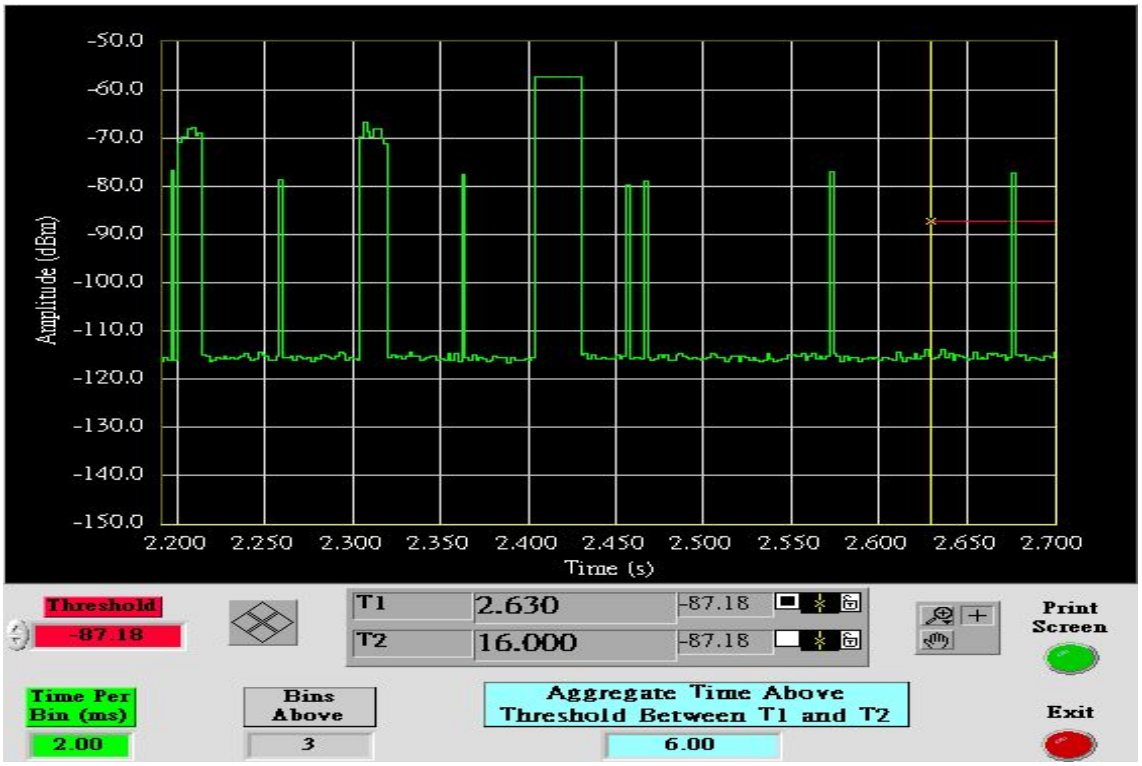
Type 1 Channel Closing Transmission Time Results

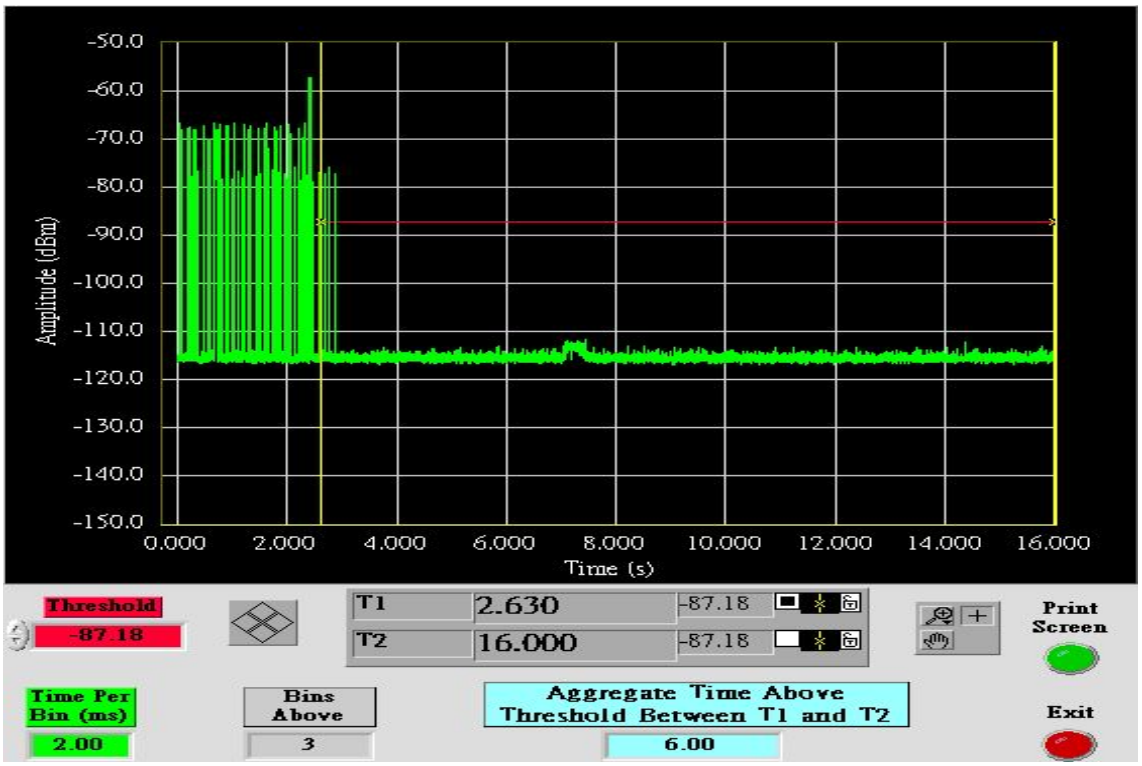
No non-compliance noted.

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
6	60	-54





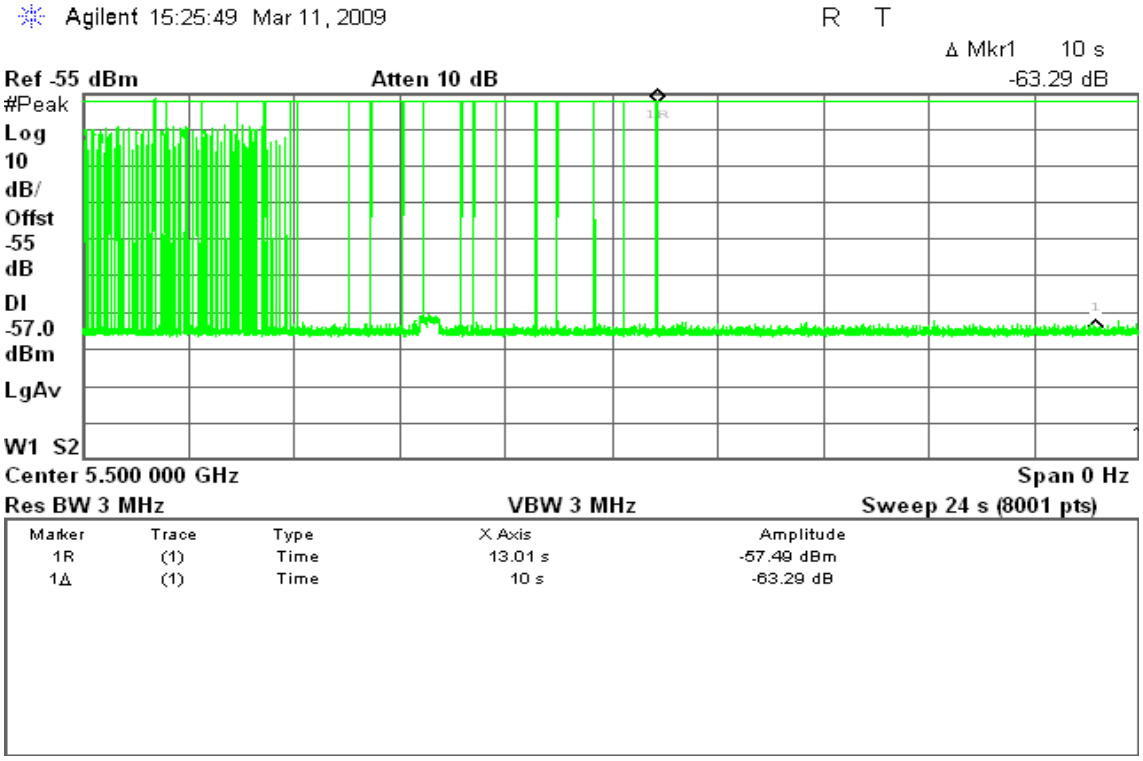

-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
-120.0
-130.0
-140.0
-150.0
Amplitude (dBm)
2.200 2.250 2.300 2.350 2.400 2.450 2.500 2.550 2.600 2.650 2.700
Time (s)
Threshold
-87.18
T1 2.630 -87.18
T2 16.000 -87.18
Print Screen
Time Per Bin (ms)
2.00
Bins Above
3
Aggregate Time Above Threshold Between T1 and T2
6.00
Exit


-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
-120.0
-130.0
-140.0
-150.0
Amplitude (dBm)
0.000 2.000 4.000 6.000 8.000 10.000 12.000 14.000 16.000
Time (s)
Threshold
-87.18
T1 2.630 -87.18
T2 16.000 -87.18
Print Screen
Time Per Bin (ms)
2.00
Bins Above
3
Aggregate Time Above Threshold Between T1 and T2
6.00
Exit

draft 802.11n Standard-20 MHz Channel mode

Type 5 Channel Move Time Results

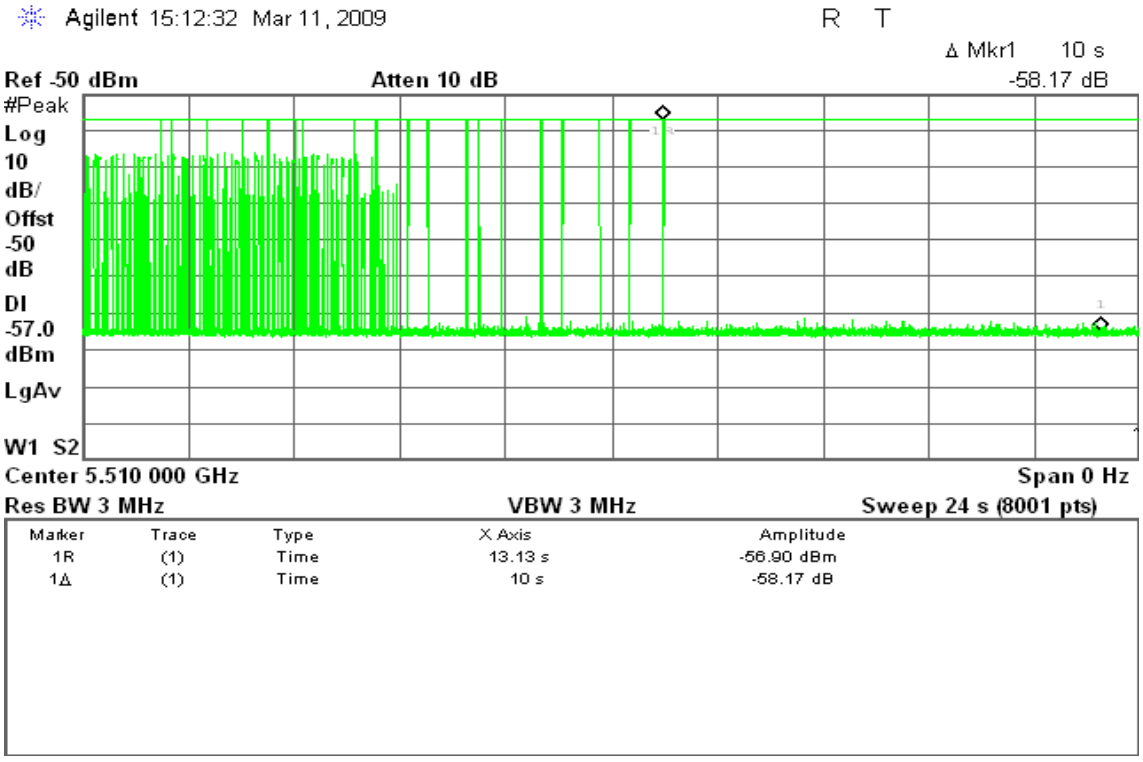
No non-compliance noted: The traffic ceases prior to the end of the radar waveform, therefore it also ceases prior to 10 seconds after the end of the radar waveform.



draft 802.11n Wide-40 MHz Channel mode

Type 5 Channel Move Time Results

No non-compliance noted: The traffic ceases prior to the end of the radar waveform, therefore it also ceases prior to 10 seconds after the end of the radar waveform.



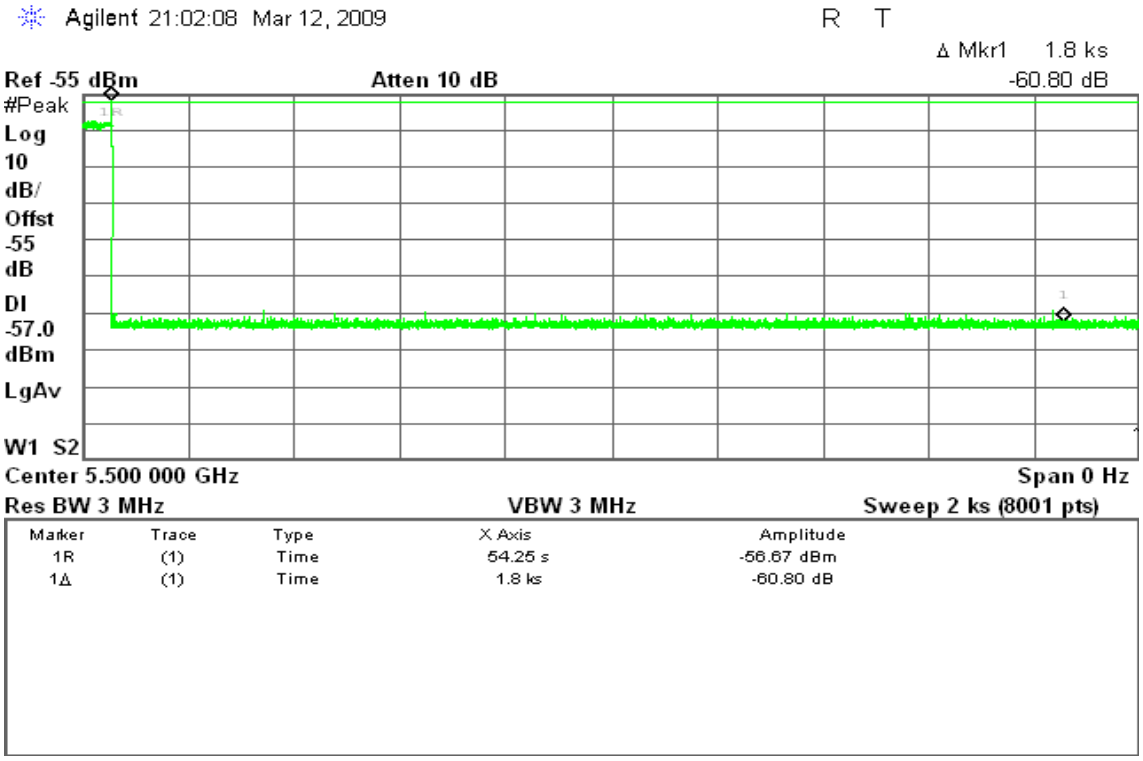
NON-OCCUPANCY PERIOD

draft 802.11n Wide-20 MHz mode

Type 1 Non-Occupancy Period Test Results

No non-compliance noted.

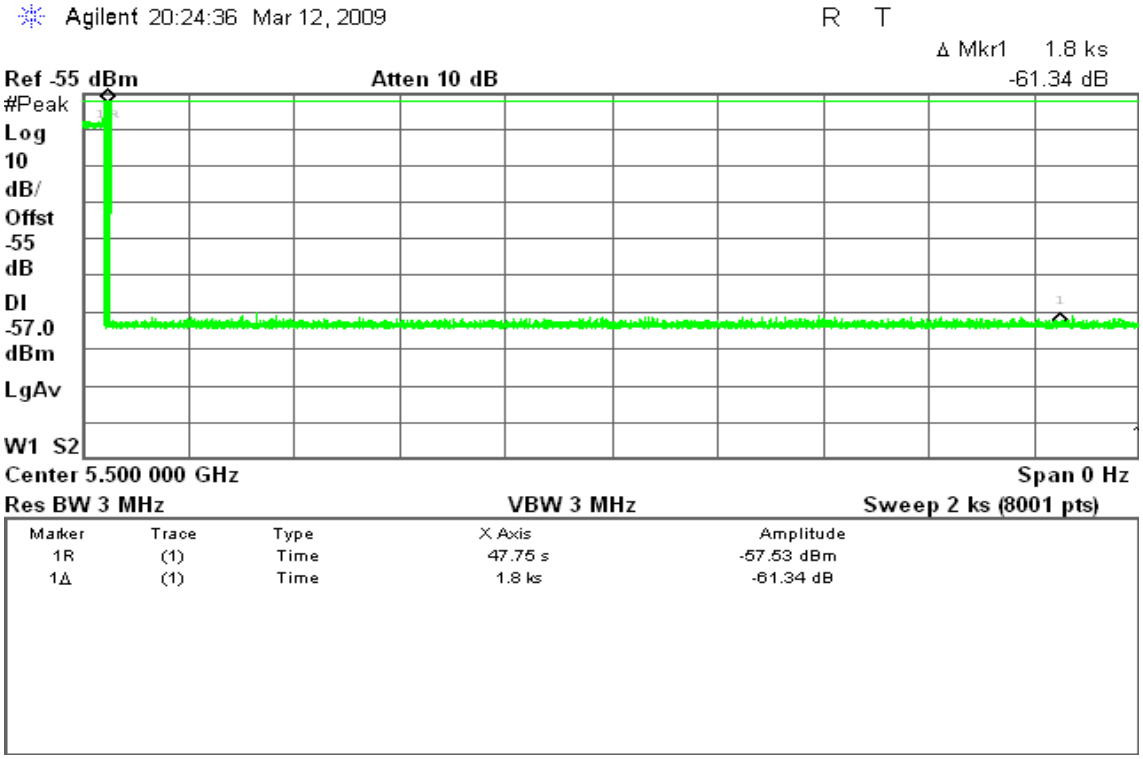
No EUT transmissions were observed on the test channel during the 30 minute observation time.



Type 5 Non-Occupancy Period Test Results

No non-compliance noted.

No EUT transmissions were observed on the test channel during the 30 minute observation time.

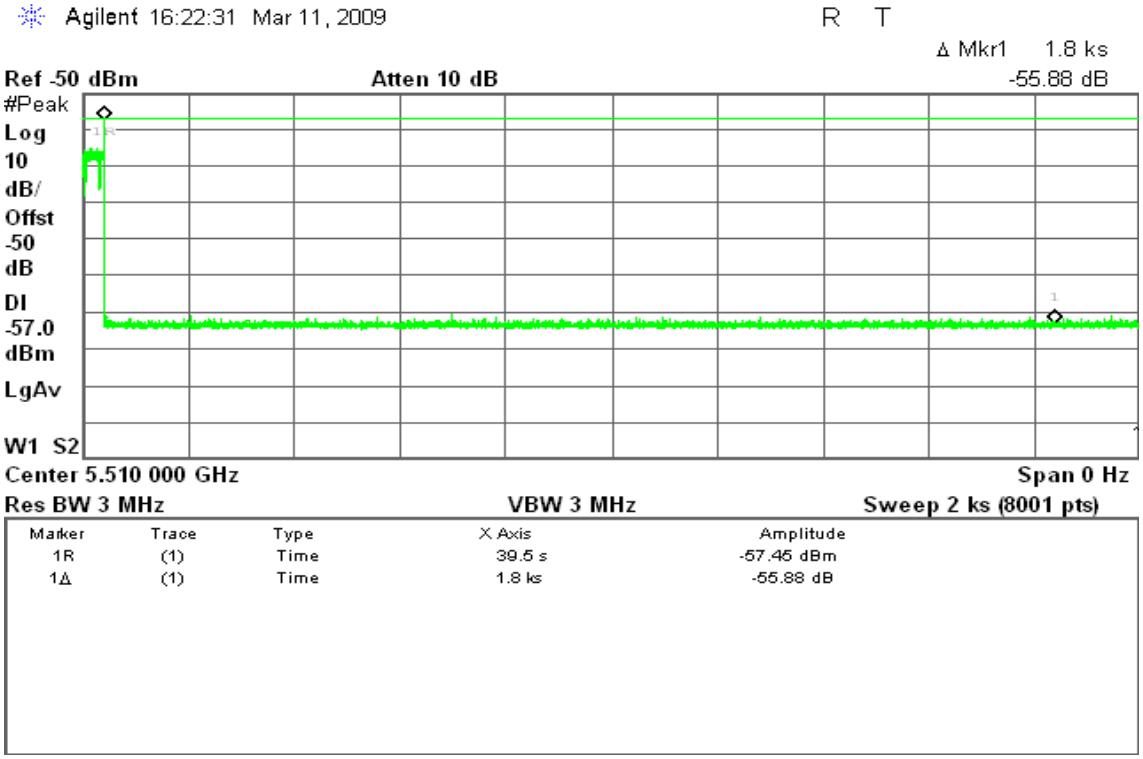


draft 802.11n Wide-40 MHz mode

Type 1 Non-Occupancy Period Test Results

No non-compliance noted.

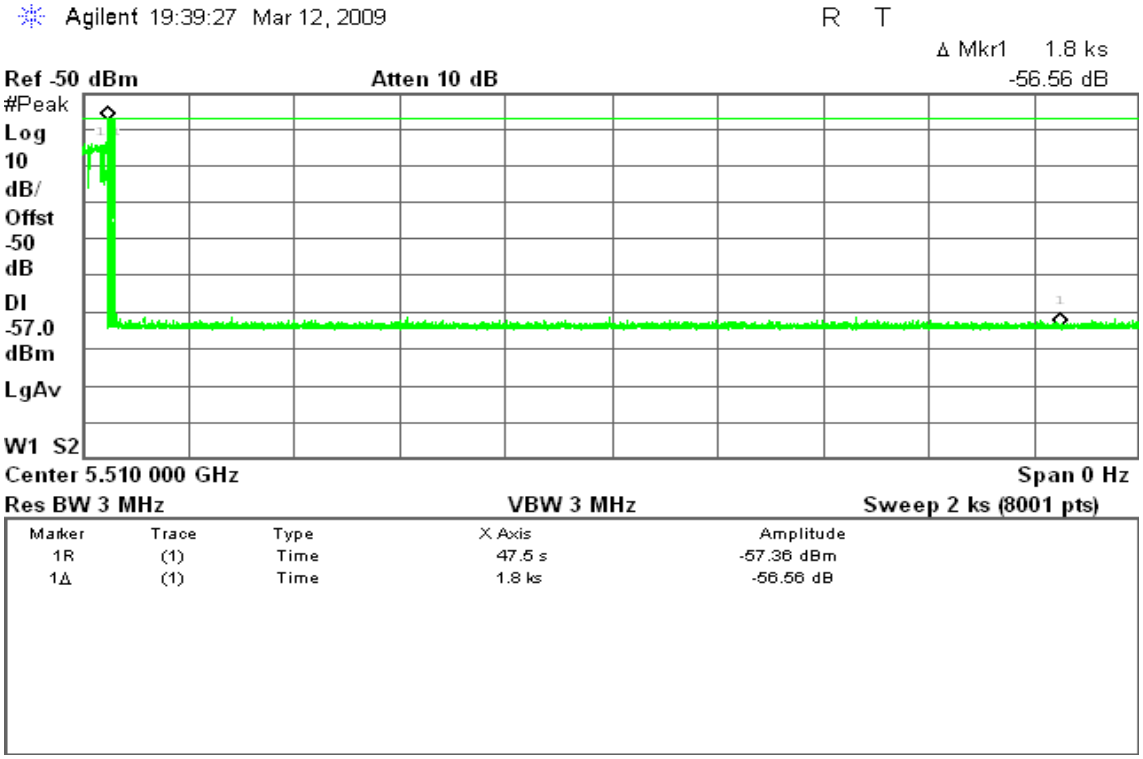
No EUT transmissions were observed on the test channel during the 30 minute observation time.



Type 5 Non-Occupancy Period Test Results

No non-compliance noted.

No EUT transmissions were observed on the test channel during the 30 minute observation time.



APPENDIX I
RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.407(f), U-NII devices are subject to the radio frequency radiation exposure requirements specified in §§ 1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

EUT Specification

EUT	10.4" Fanless Mobile Clinical Assistant
Frequency band (Operating)	☐ WLAN: 2.412GHz ~ 2.462GHz ☒ WLAN: 5.15GHz ~ 5.35GHz ☒ WLAN: 5.5GHz ~ 5.7GHz ☐ WLAN: 5.725GHz ~ 5.850GHz ☐ Bluetooth: 2.402 GHz ~ 2.482 GHz ☐ Others: _____
Device category	☒ Portable (<20cm separation) ☐ Mobile (>20cm separation) ☐ Others: _____
Exposure classification	General Population/Uncontrolled exposure *(S=1mW/cm^2)*
Antenna diversity	☐ Single antenna ☒ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☒ Tx/Rx diversity
Max. output power	IEEE 802.11a mode / 5180 ~ 5240MHz:15.07 dBm(32.14mW) draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5240MHz: 15.34dBm(34.20mW) draft 802.11n Wide-40 MHz Channel mode / 5190 ~ 5230MHz: 15.79 dBm(37.93mW) IEEE 802.11a mode / 5260 ~ 5320MHz: 15.48 dBm(35.32mW) draft 802.11n Standard-20 MHz Channel mode / 5260 ~ 5320MHz: 15.11 dBm(32.43mW) draft 802.11n Wide-40 MHz Channel mode / 5270 ~ 5310MHz: 16.37 dBm(43.35mW) IEEE 802.11a mode / 5500 ~ 5700MHz: 16.57 dBm(45.39mW) draft 802.11n Standard-20 MHz Channel mode / 5500 ~ 5700MHz: 20.56dBm(113.76mW) draft 802.11n Wide-40 MHz Channel mode / 5510 ~ 5670MHz: 16.64 dBm(46.13mW)
Antenna gain (Max)	Gain: IEEE 802.11a: 4.09 dBi (Numeric gain: 2.56) Gain: MIMO:4.09 dBi + 10 log (2) = 7.09 dBi (Numeric gain: 5.12)
Evaluation applied	☐ MPE Evaluation ☒ SAR Evaluation* ☐ N/A

Remark:
1. *The maximum output power is 20.56dBm (113.76mW) at 5500MHz (with 5.12 numeric antenna gain.)*
2. *For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.*

TEST RESULTS

No non-compliance noted.

Remark: *Please refer to the separated SAR report.*