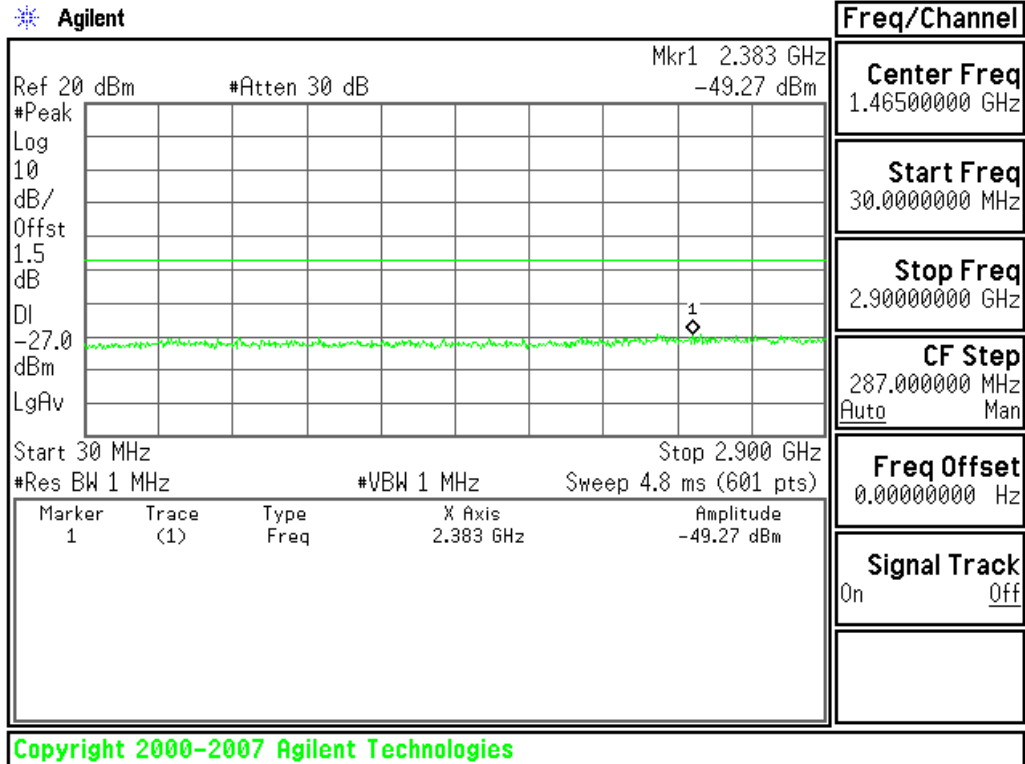


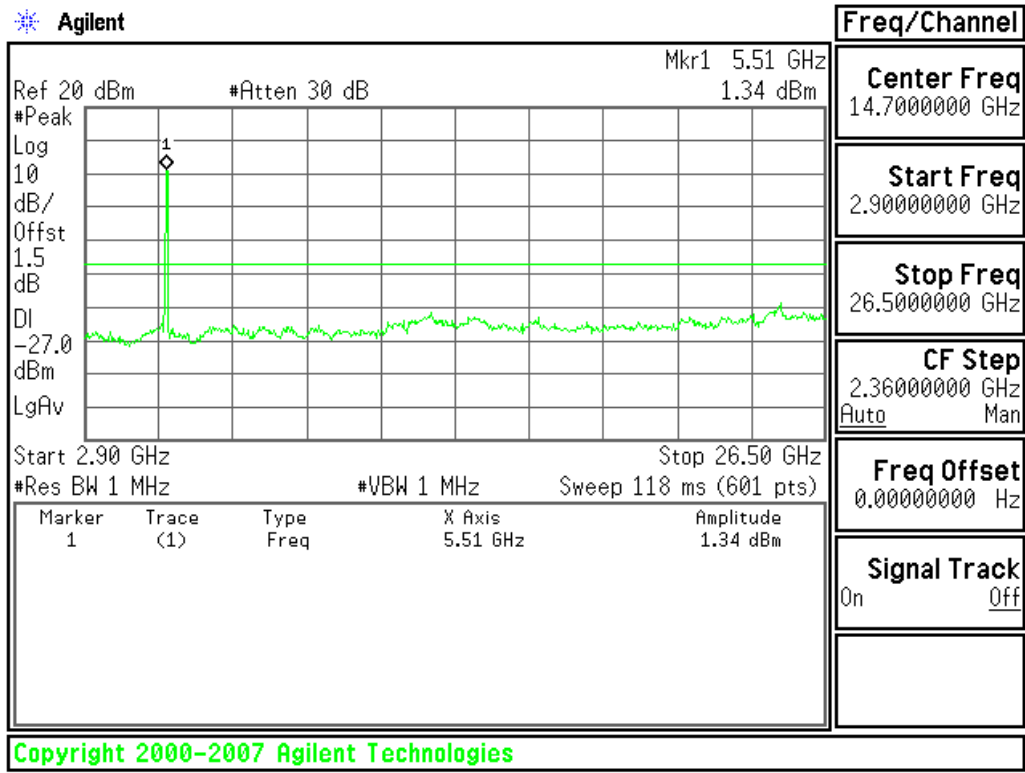


5470~5725MHz

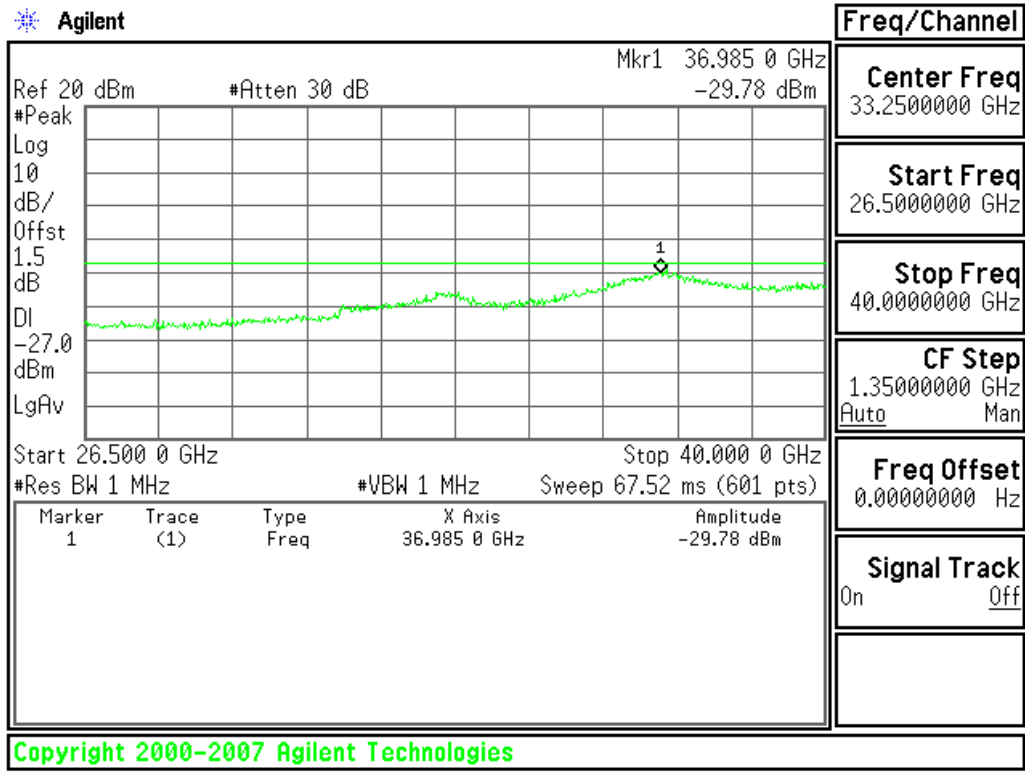
CH Low



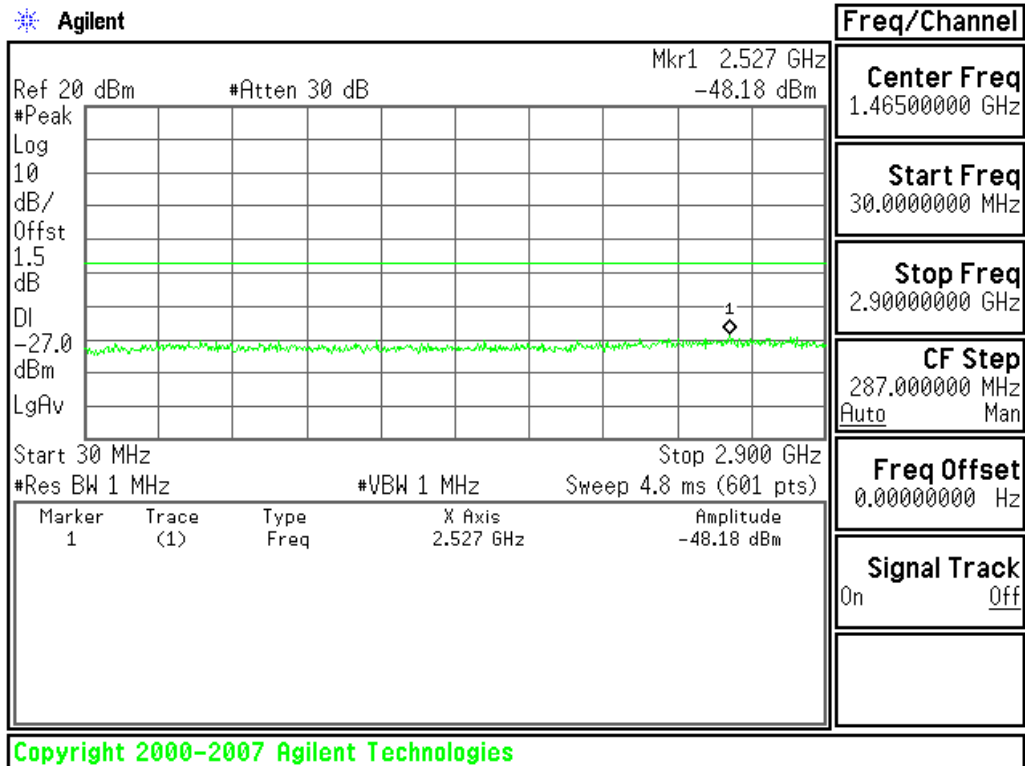
Freq/Channel	
Center Freq	1.46500000 GHz
Start Freq	30.0000000 MHz
Stop Freq	2.90000000 GHz
CF Step	287.000000 MHz Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

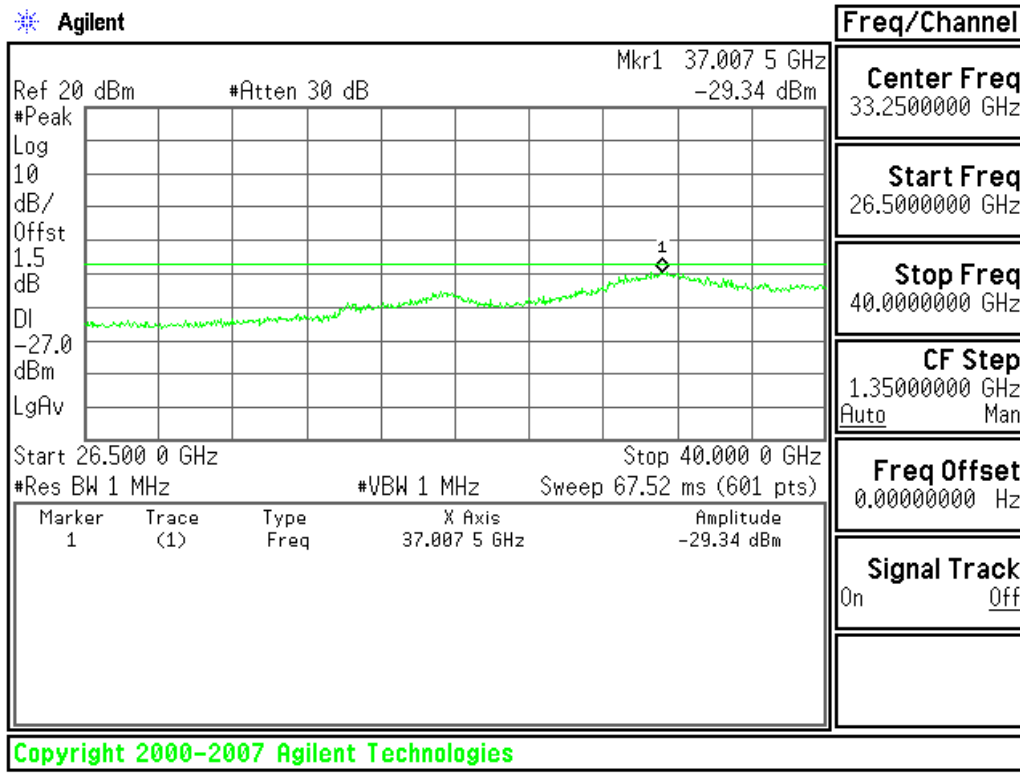
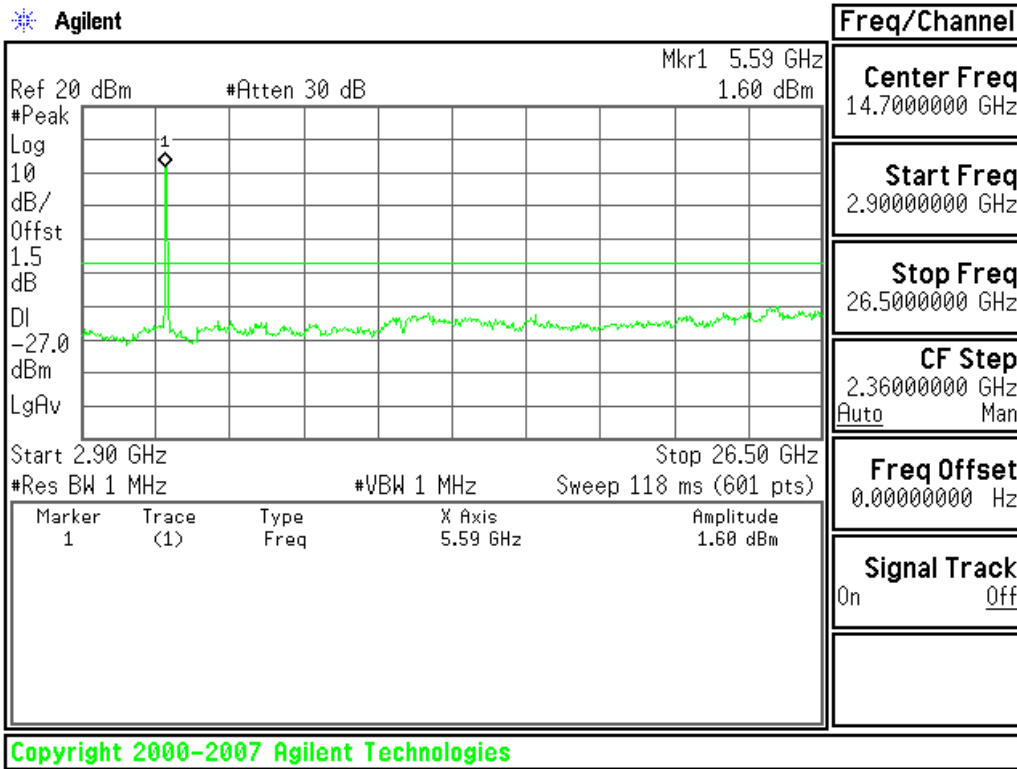


Freq/Channel	
Center Freq	14.7000000 GHz
Start Freq	2.90000000 GHz
Stop Freq	26.5000000 GHz
CF Step	2.36000000 GHz Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off



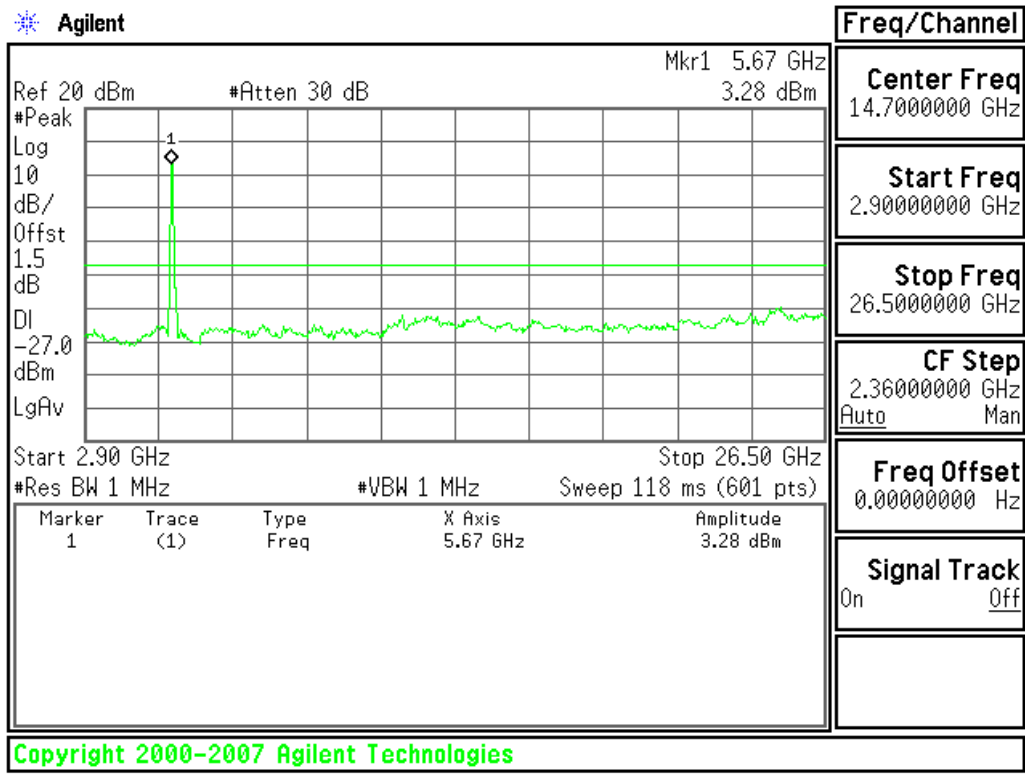
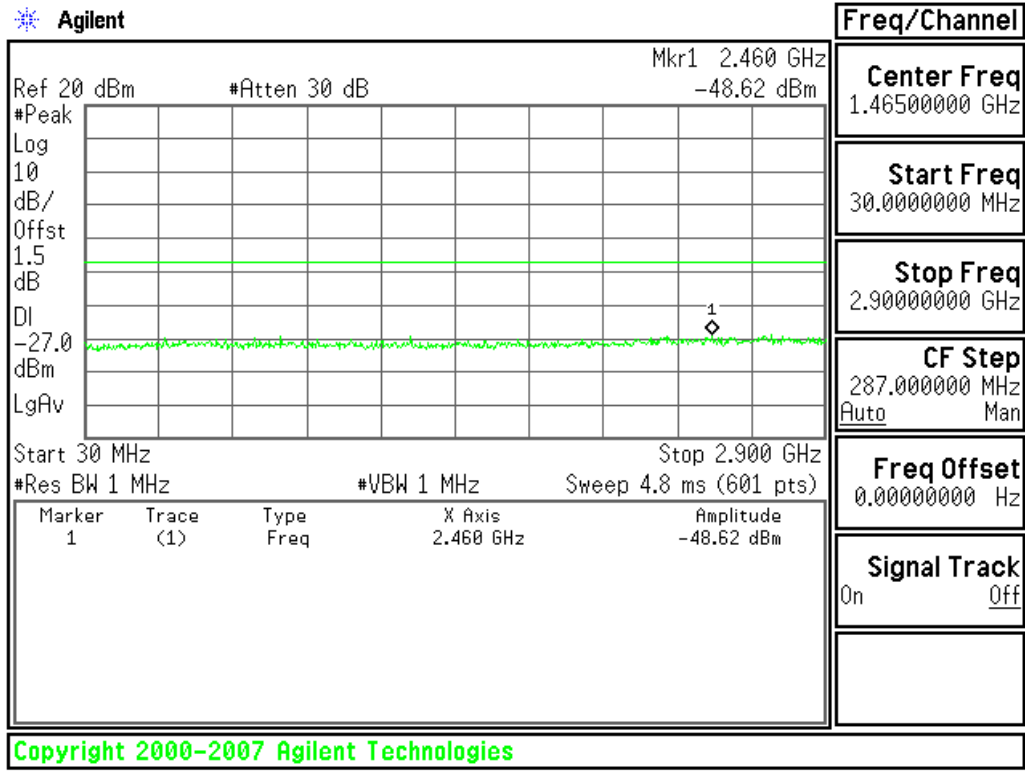
CH Mid

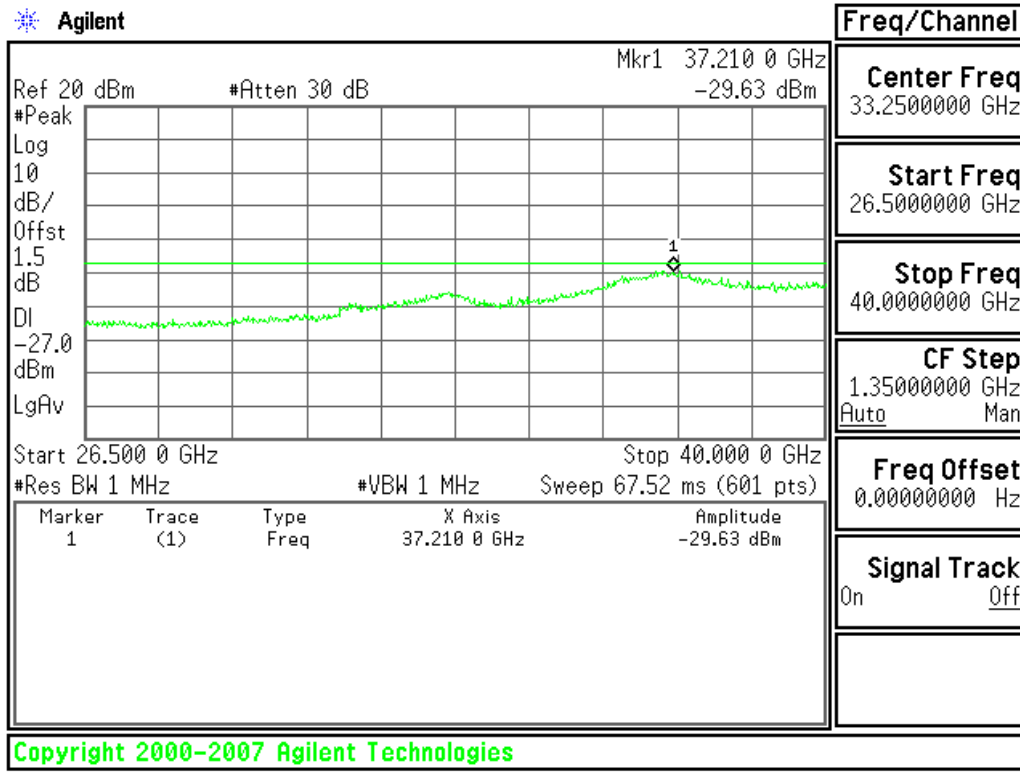






CH High

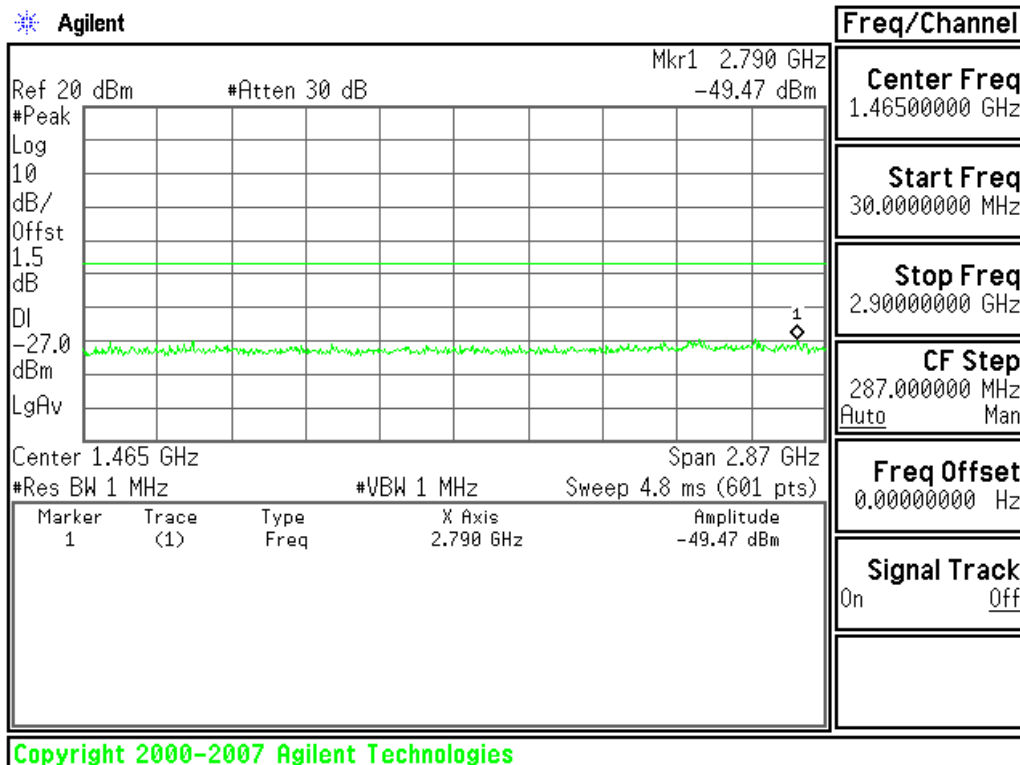


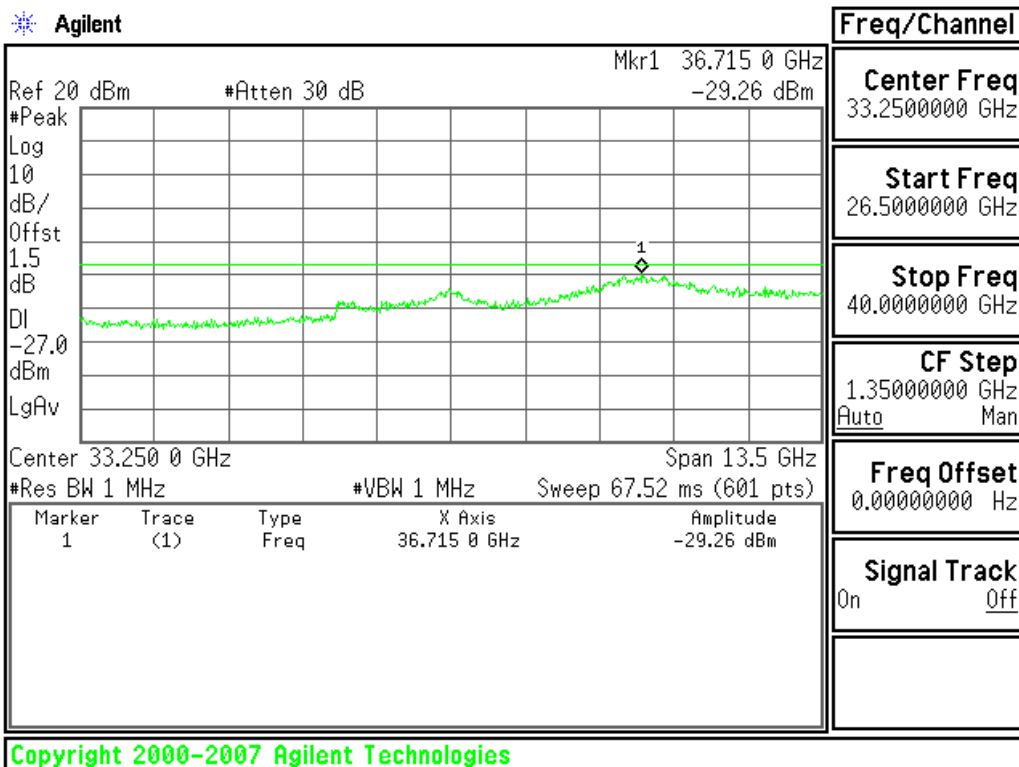
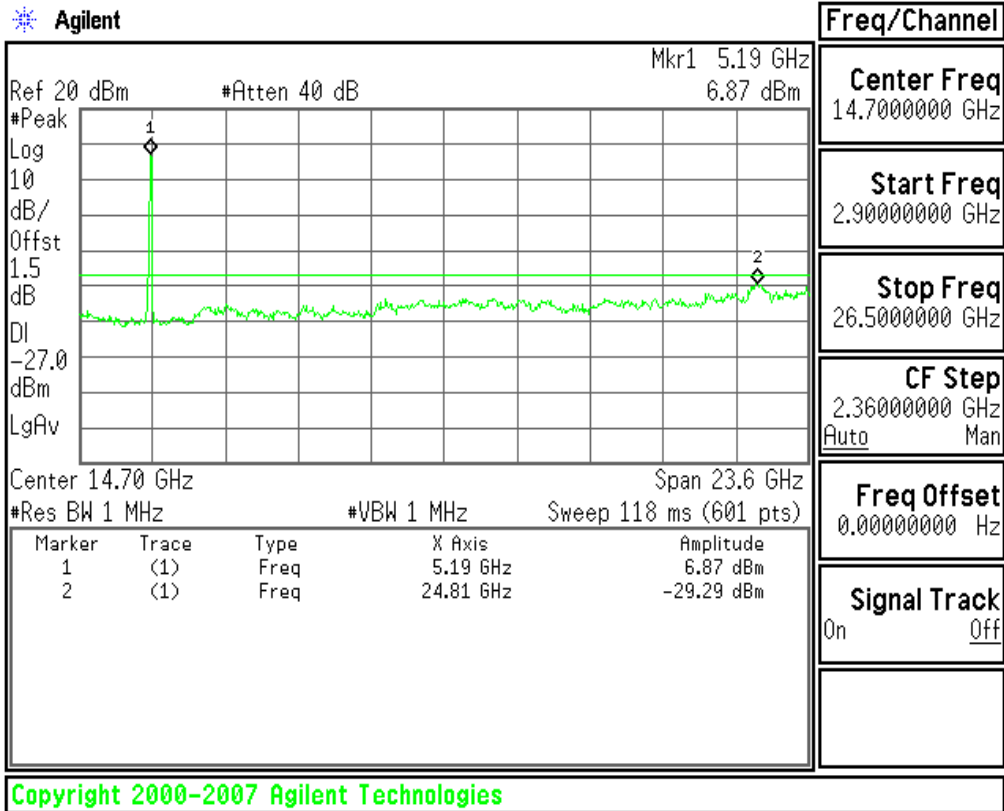


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1:

5150~5250MHz

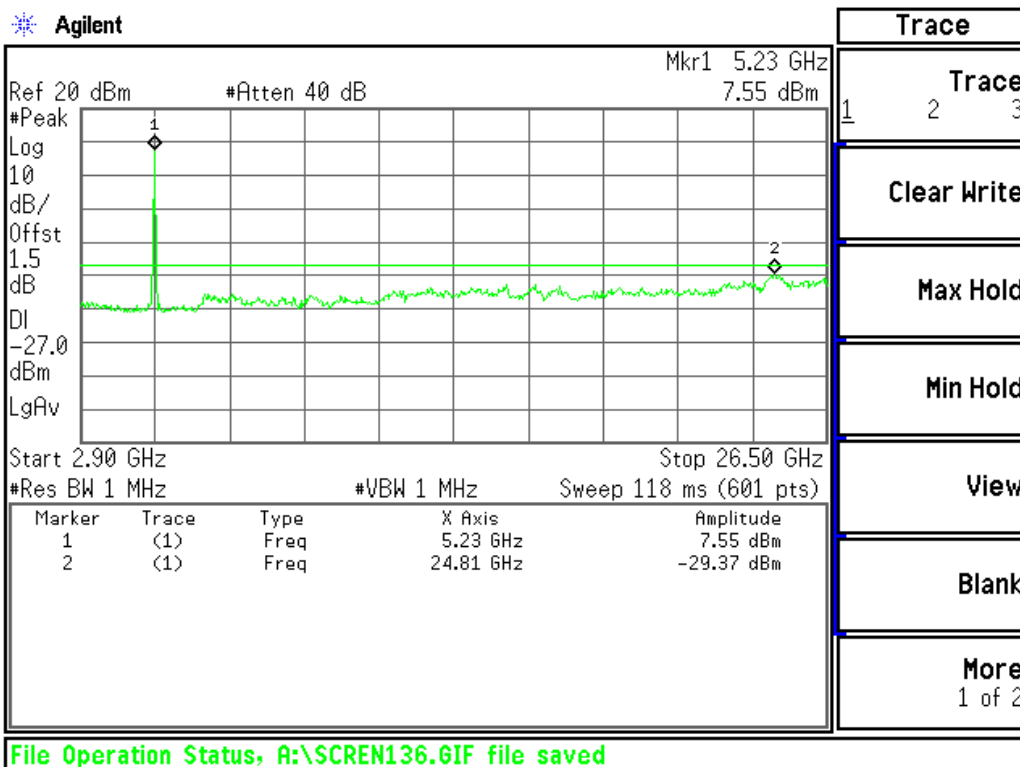
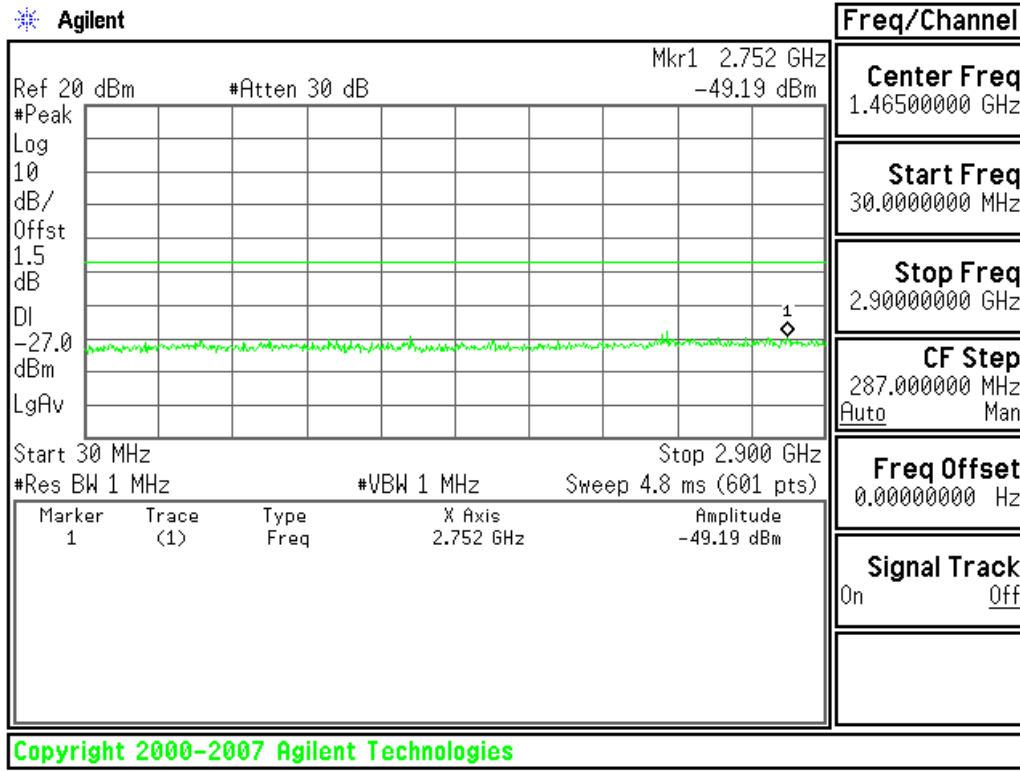
CH Low

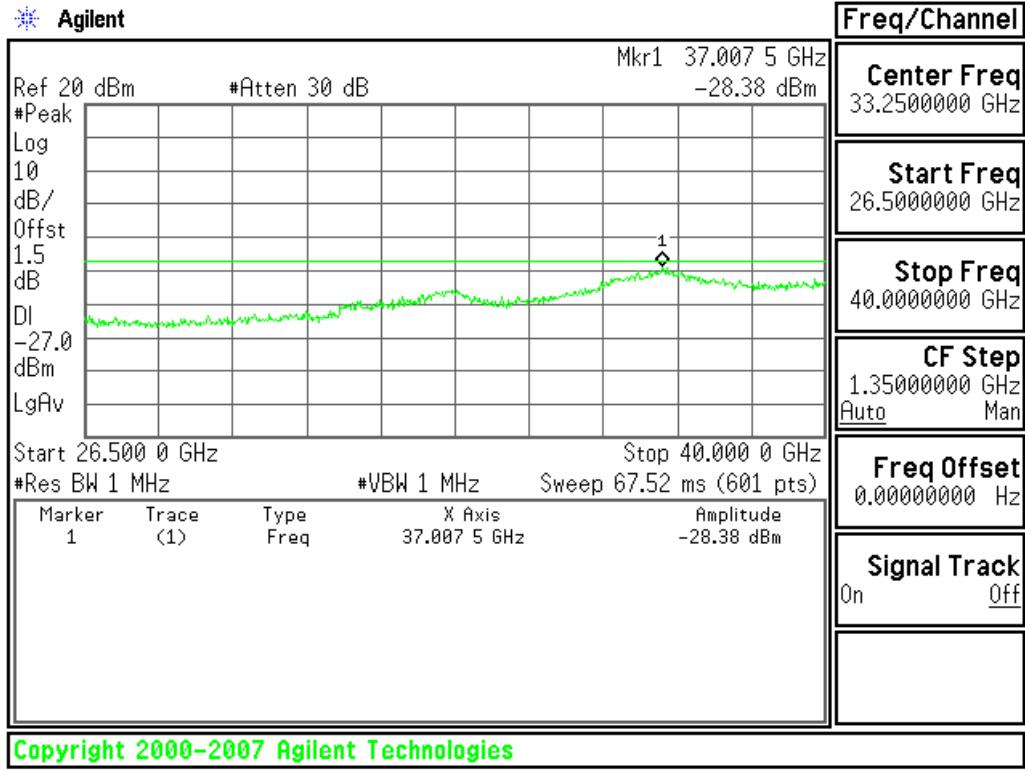






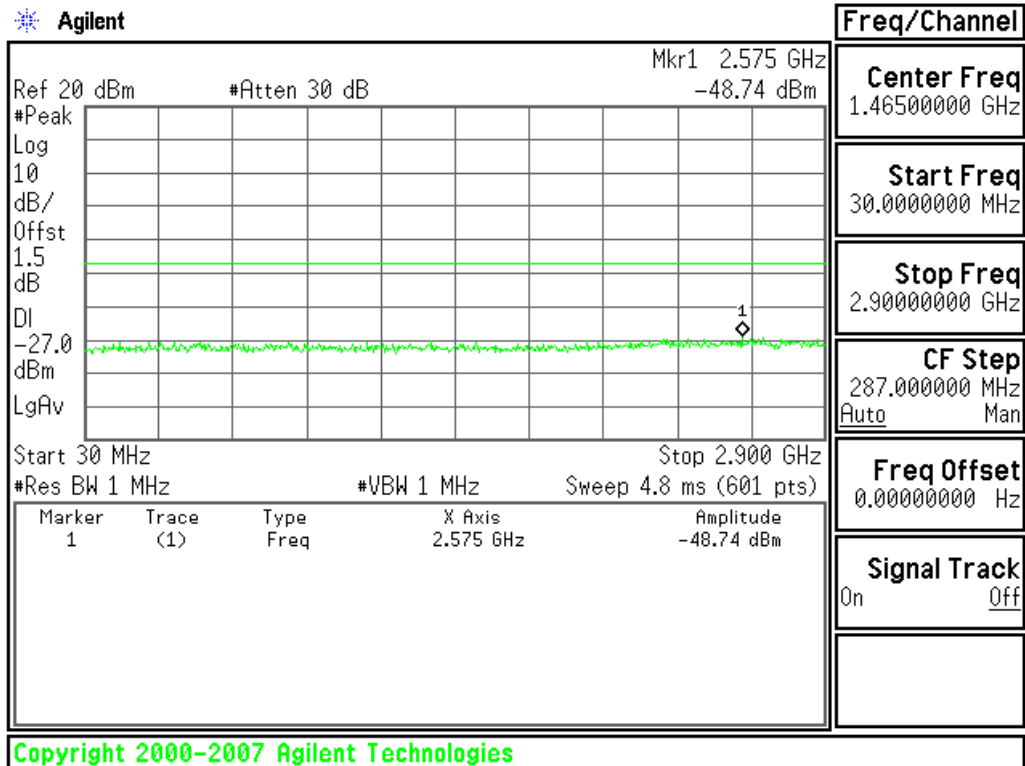
CH High

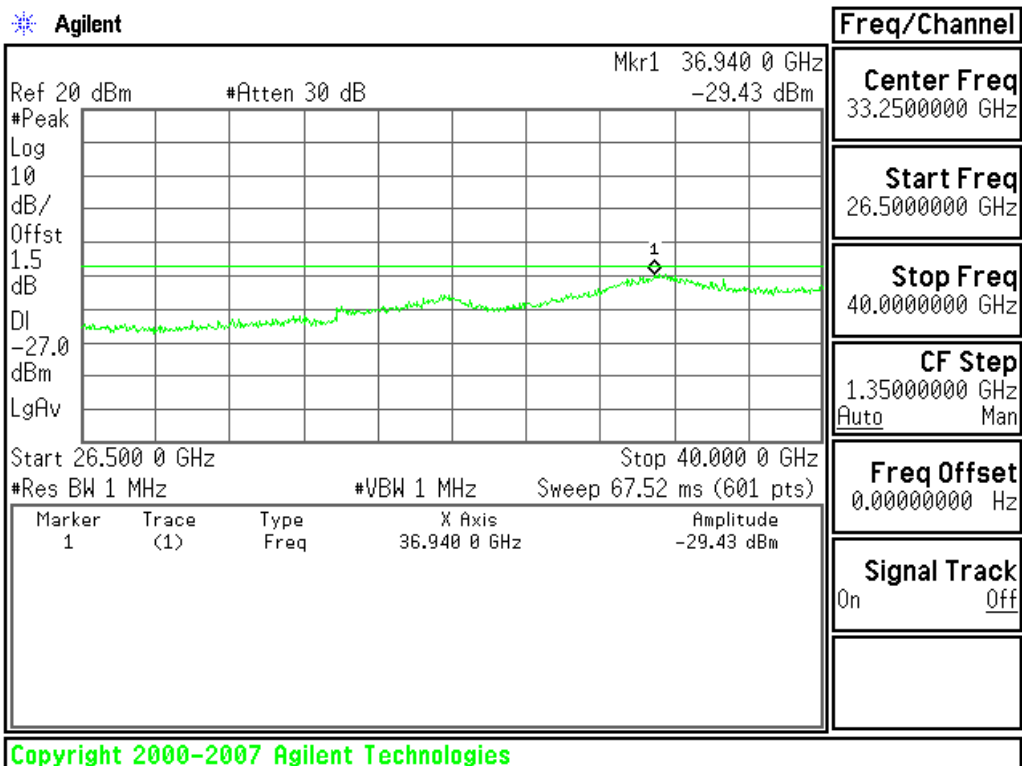
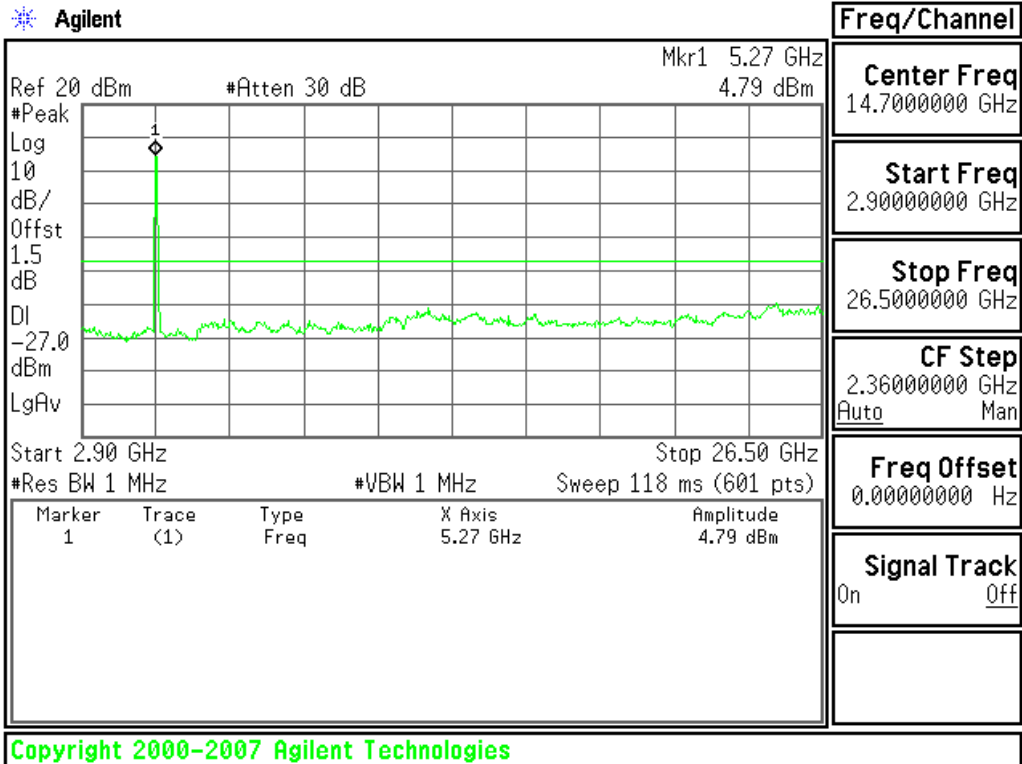




5250~5350MHz

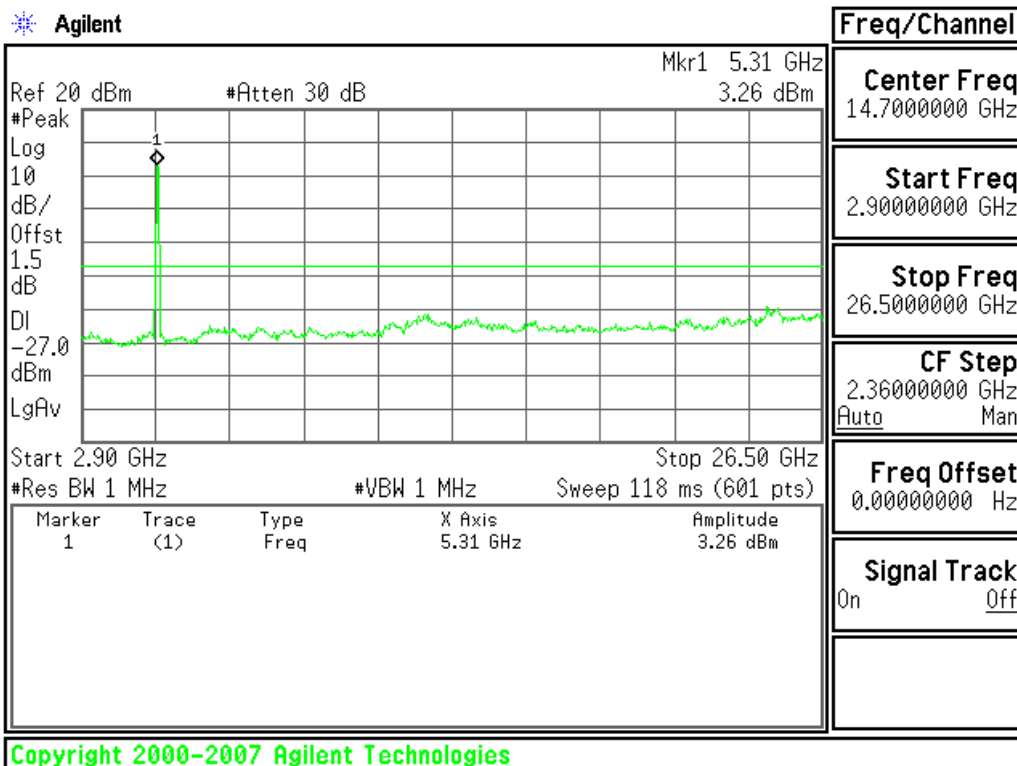
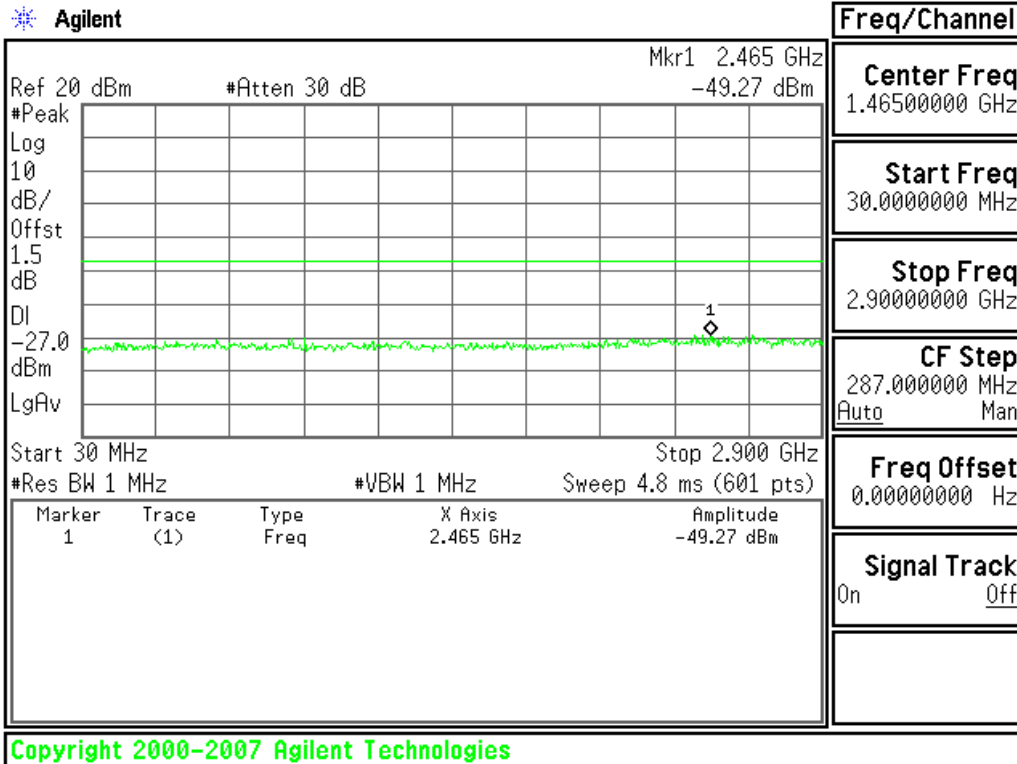
CH Low

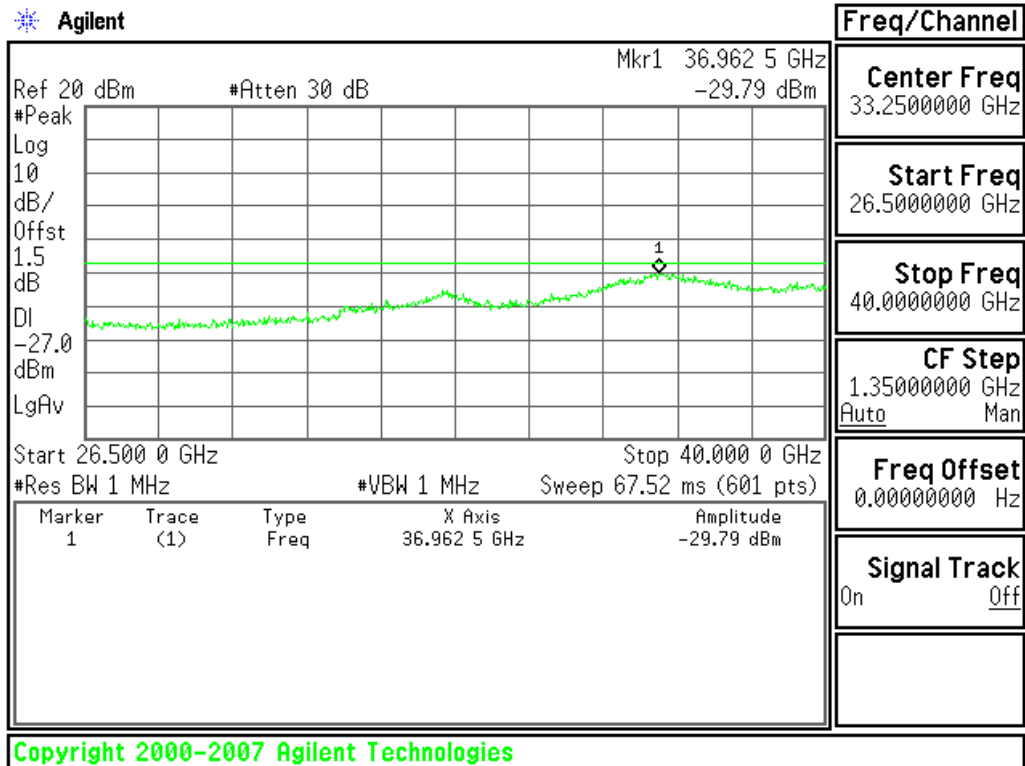






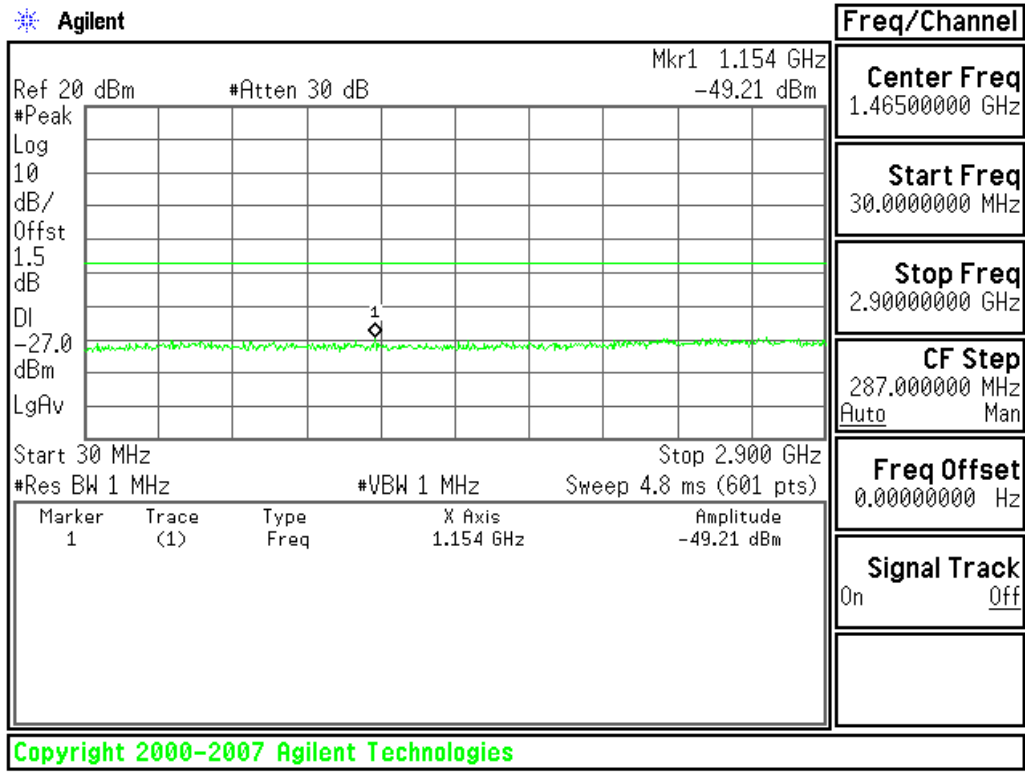
CH High

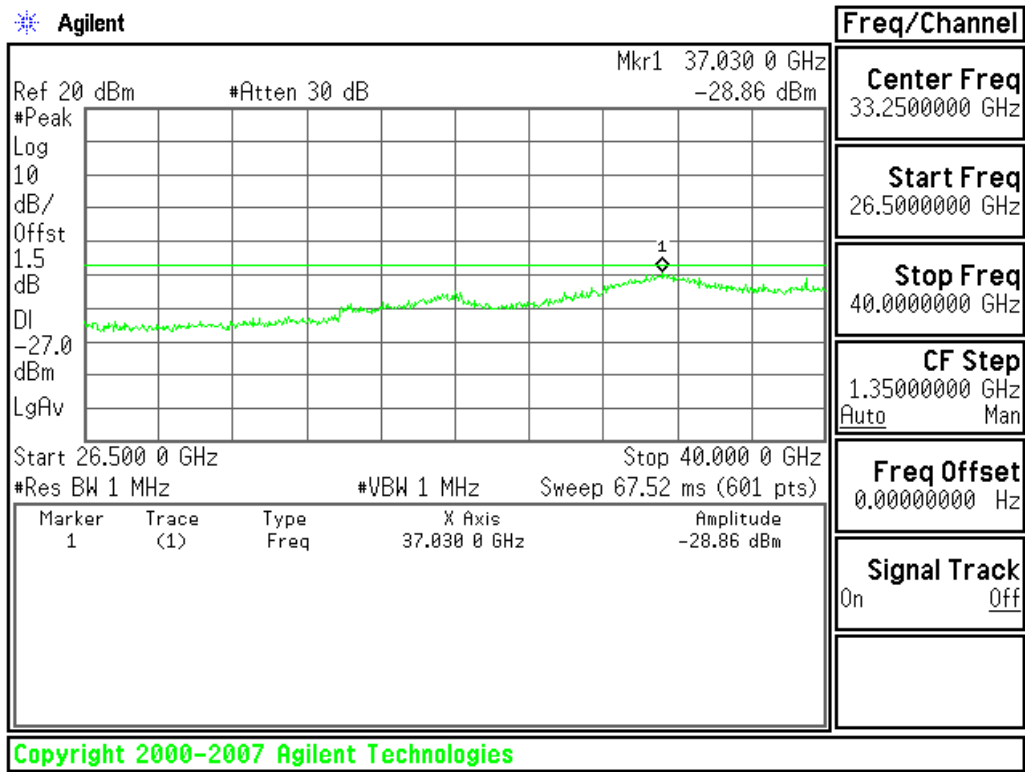
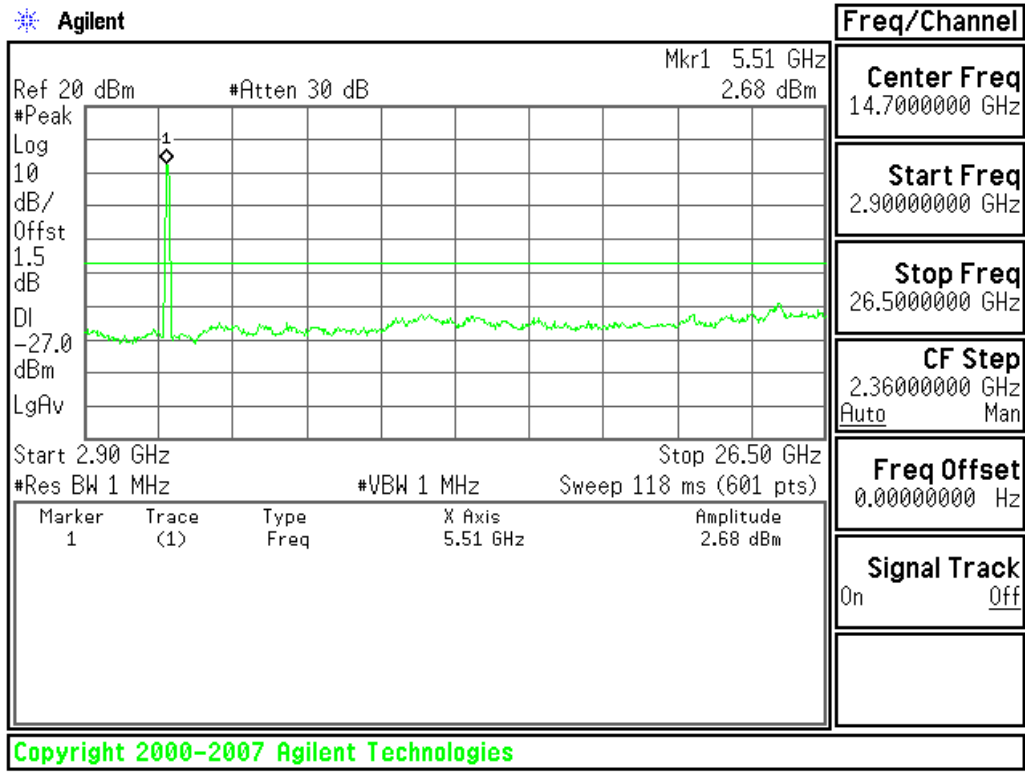




5470~5725MHz

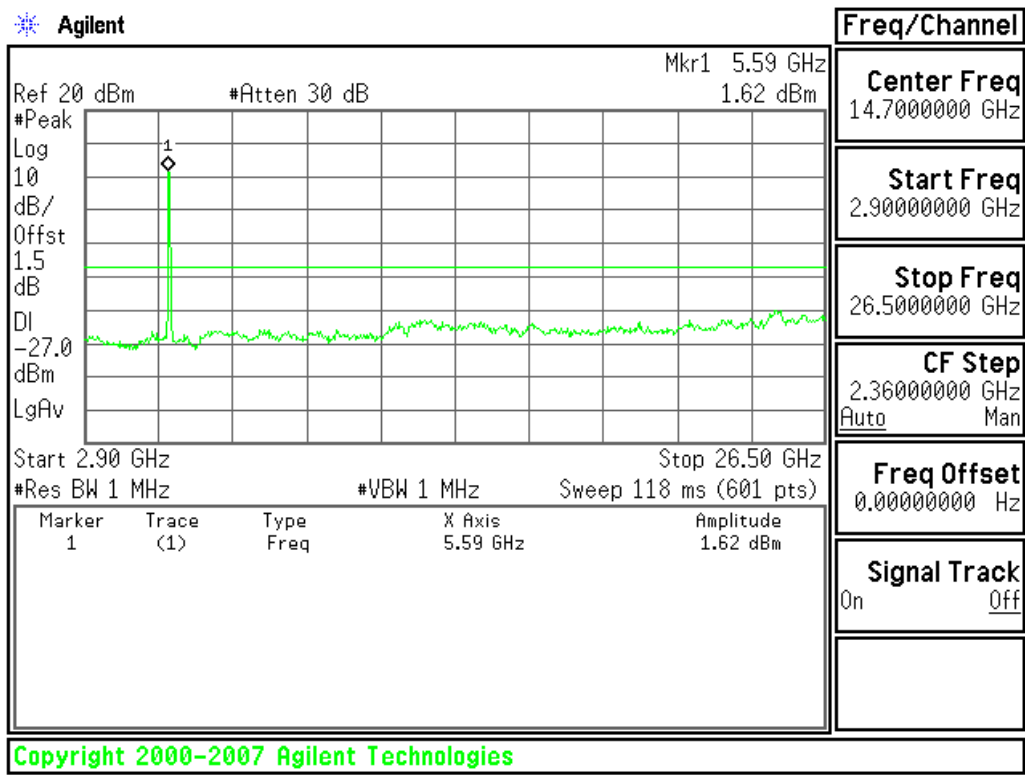
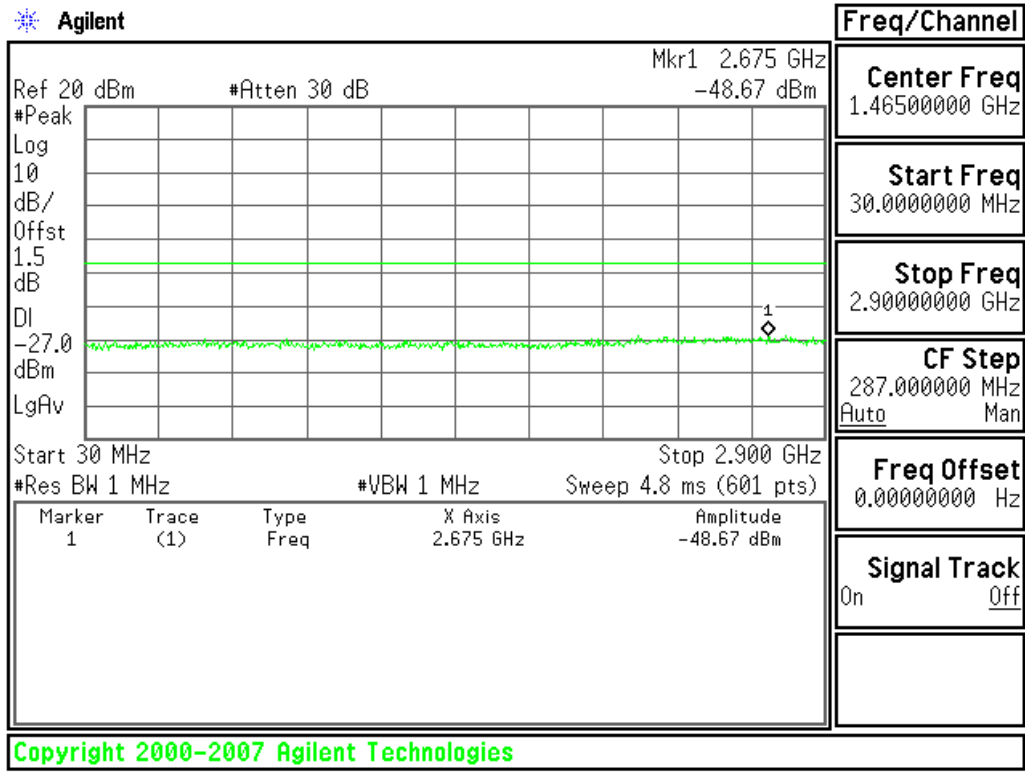
CH Low

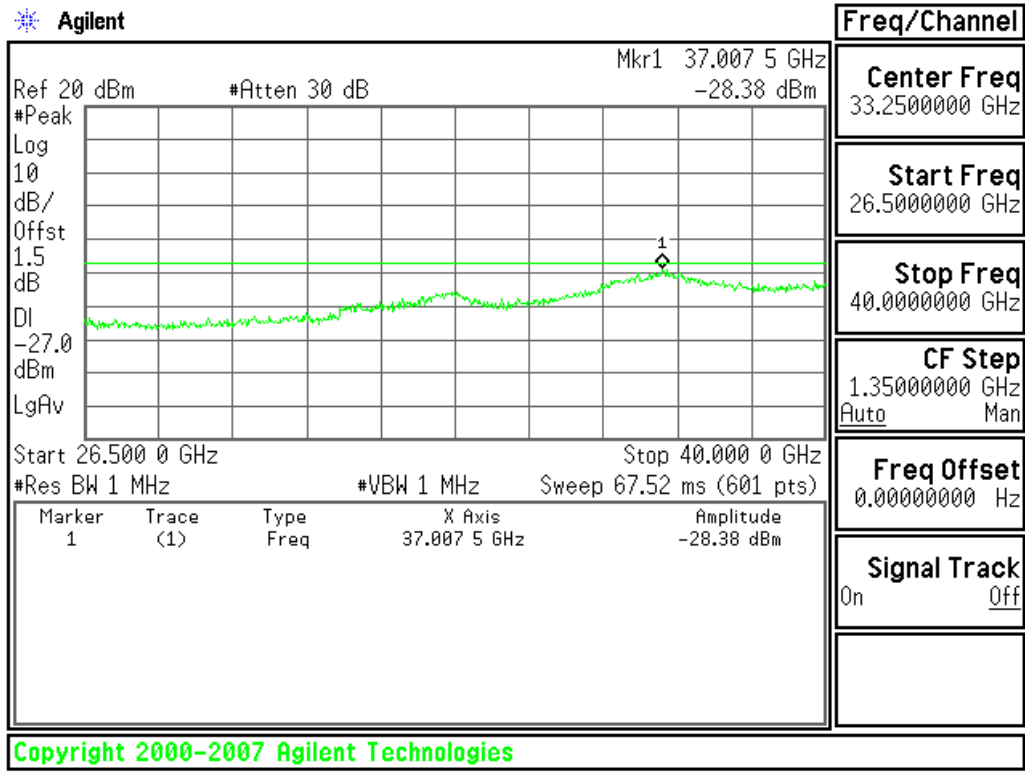




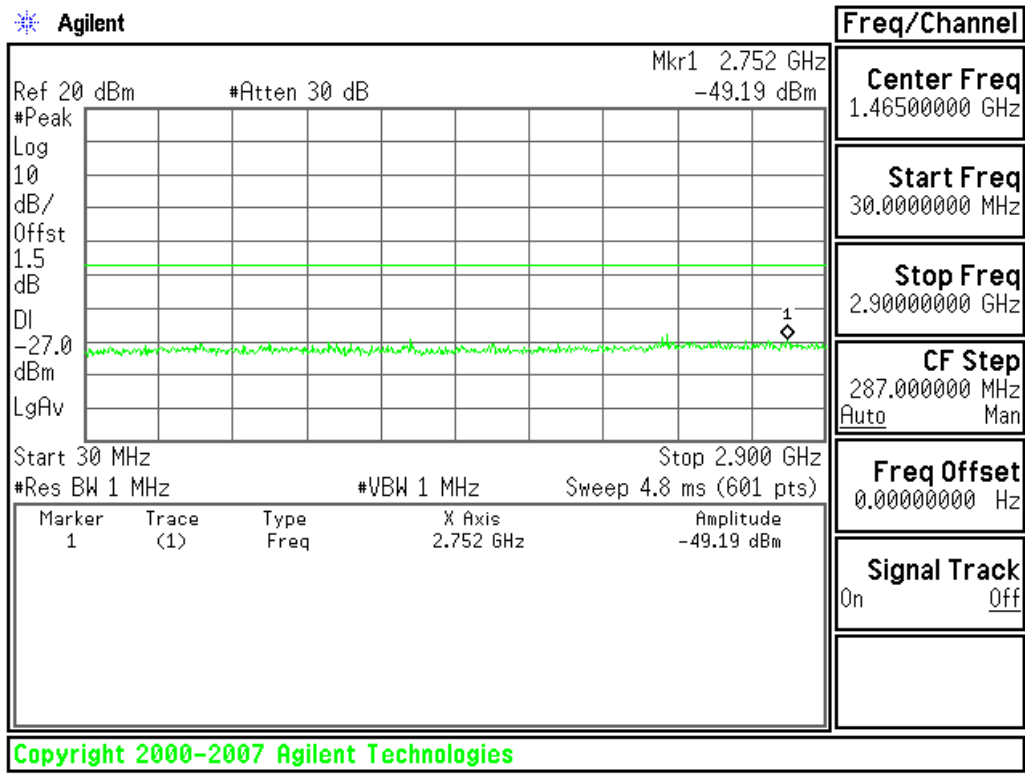


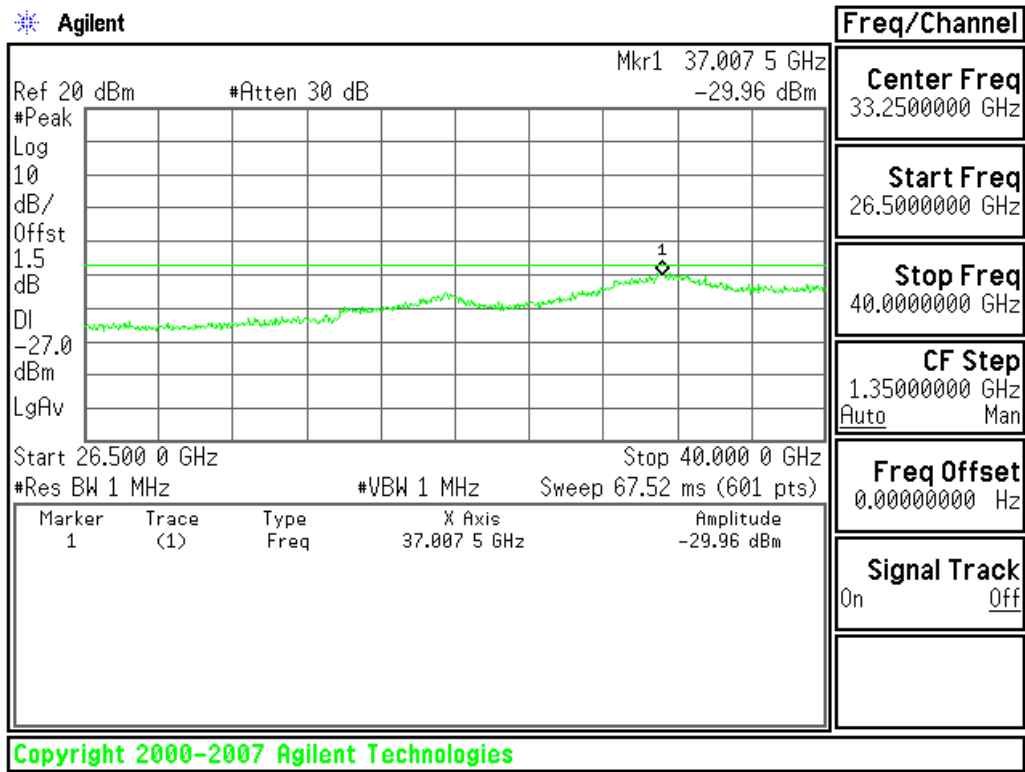
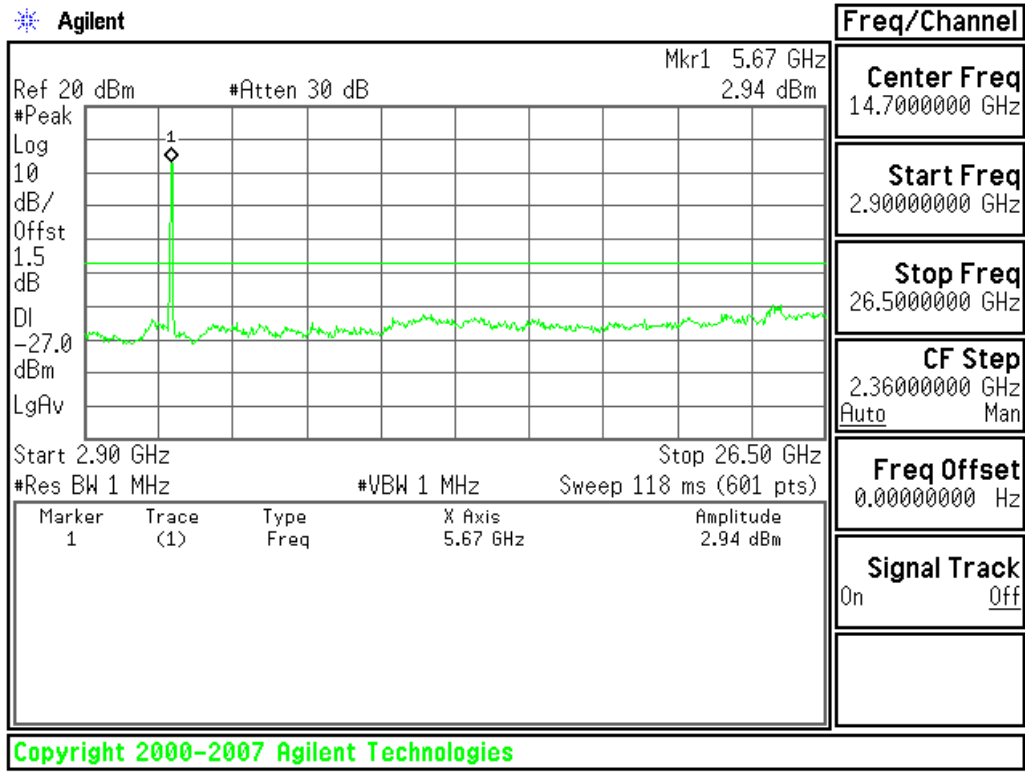
CH Mid





CH High



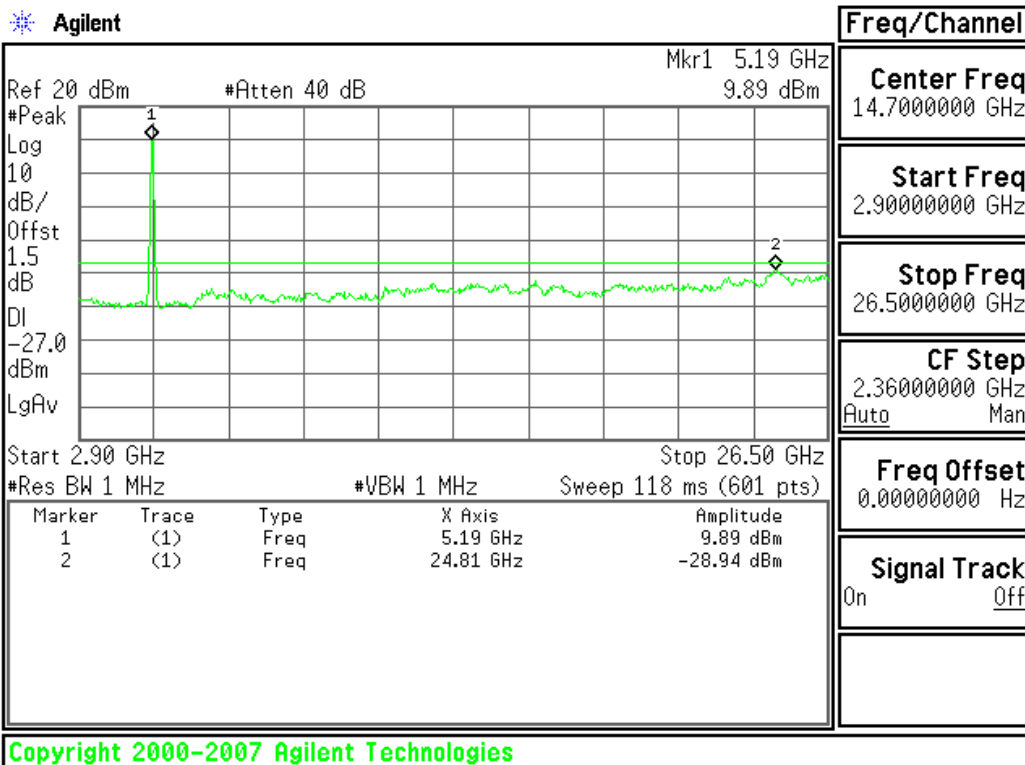
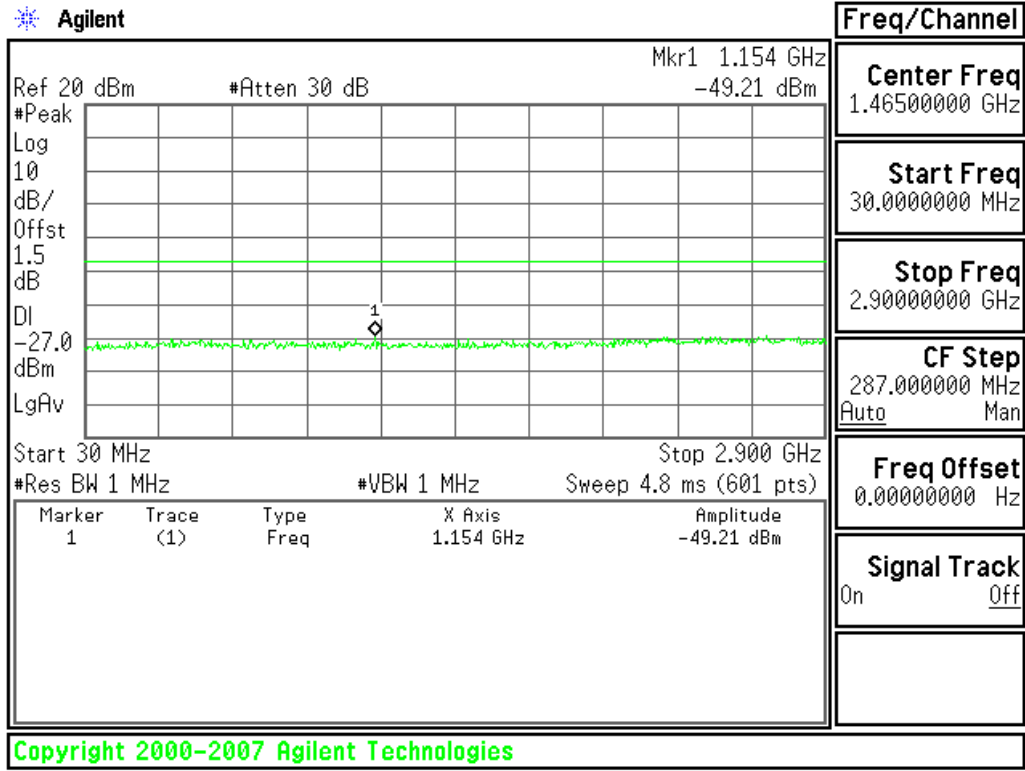


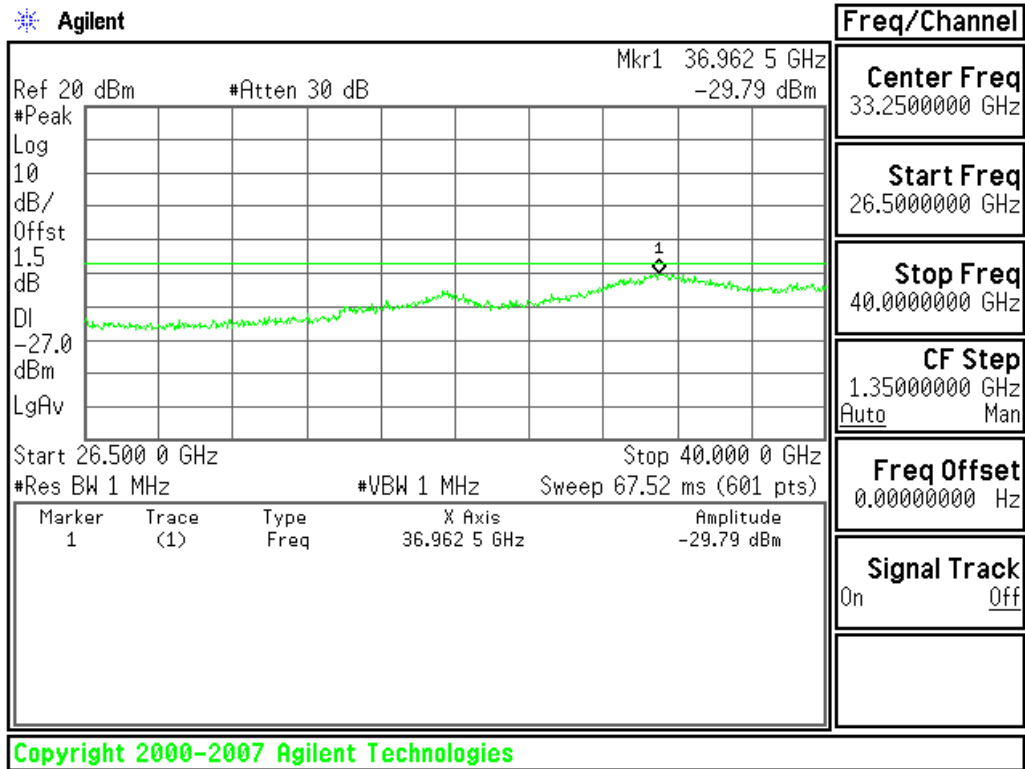


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 2:

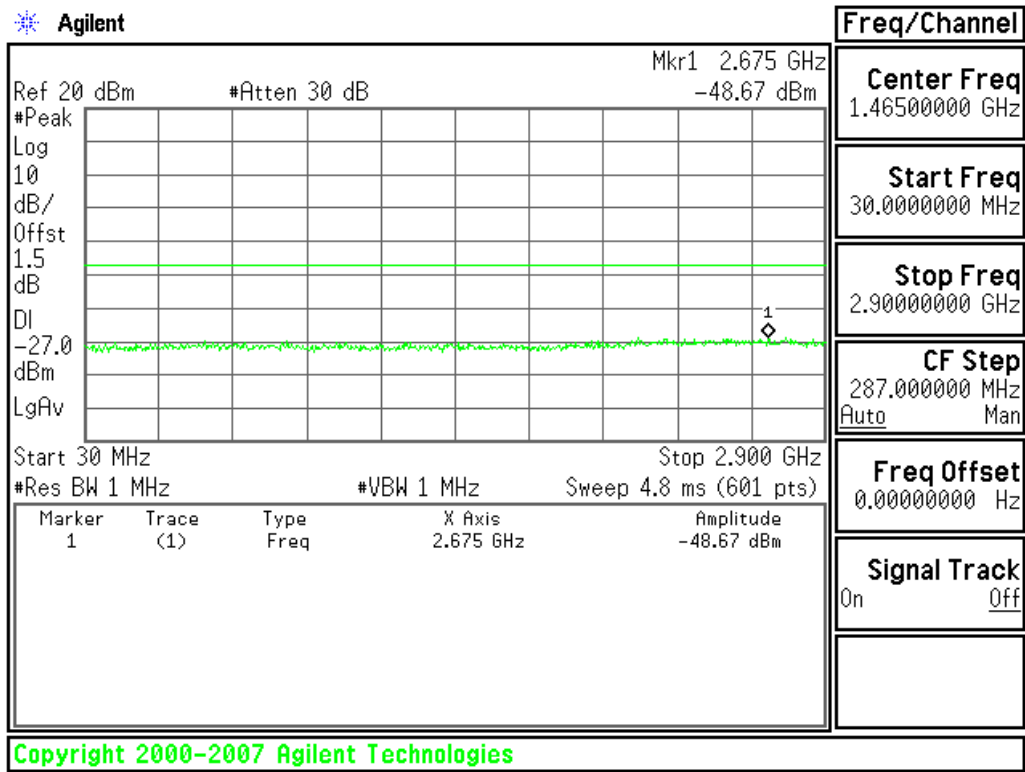
5150~5250MHz

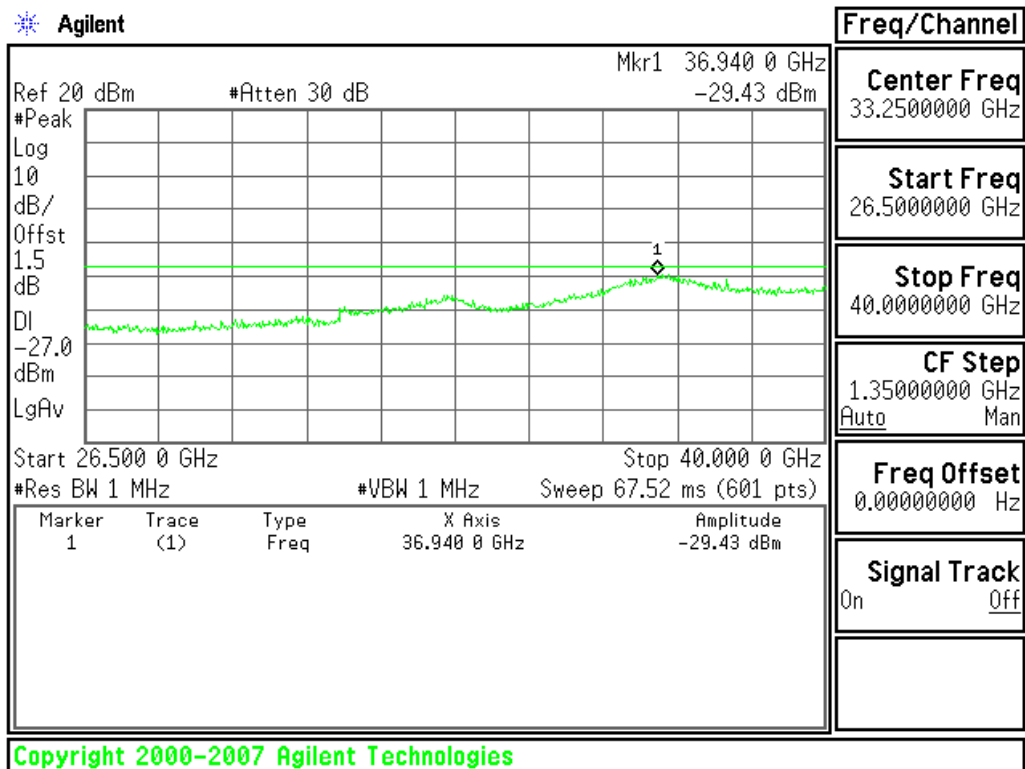
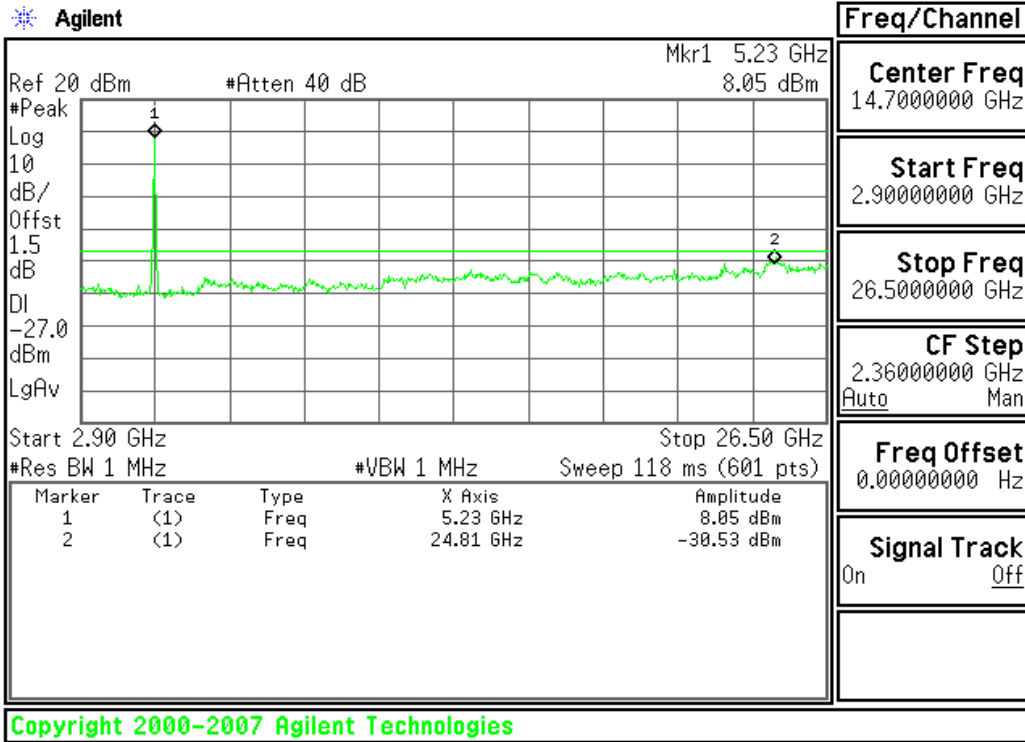
CH Low





CH High

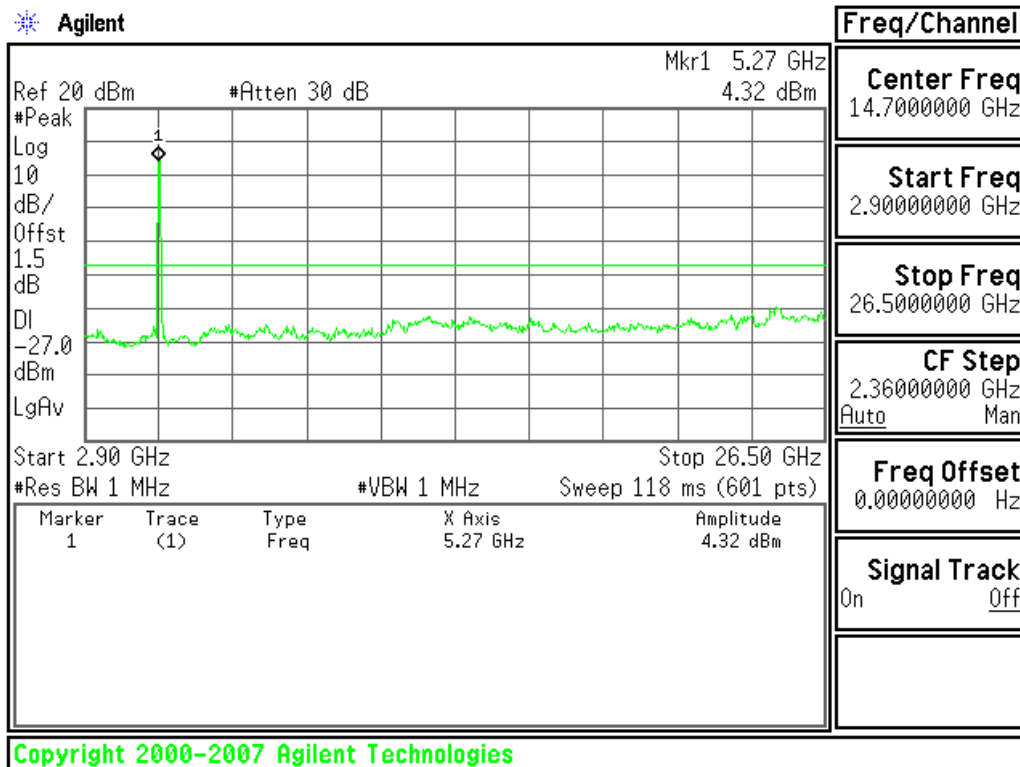
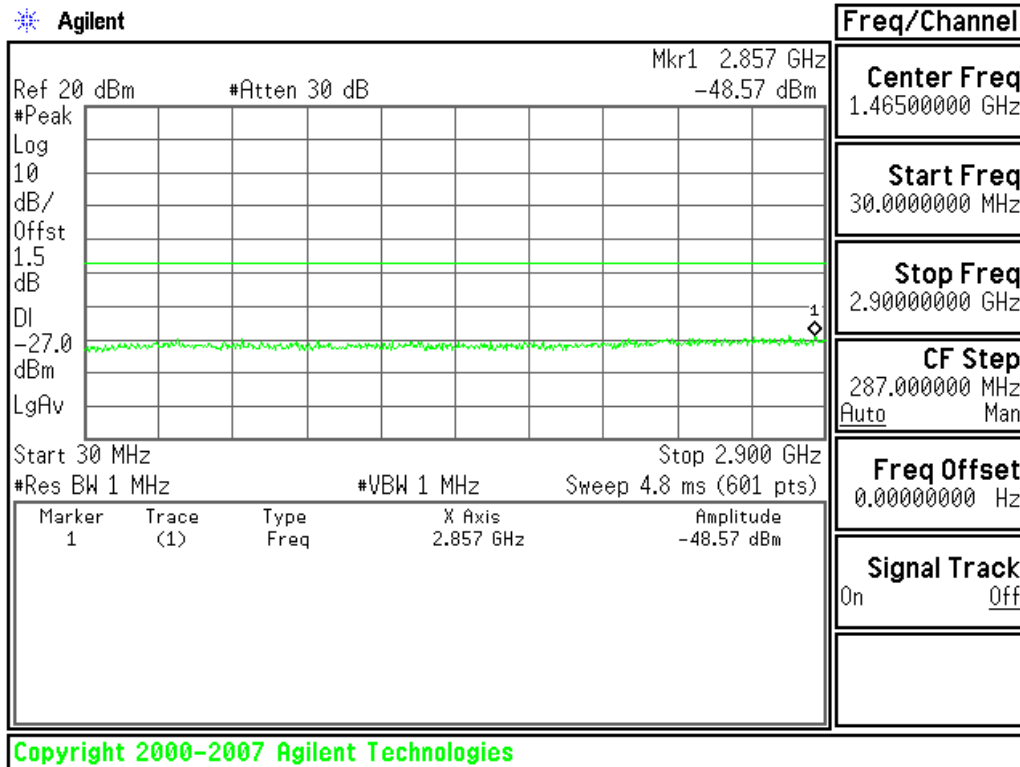


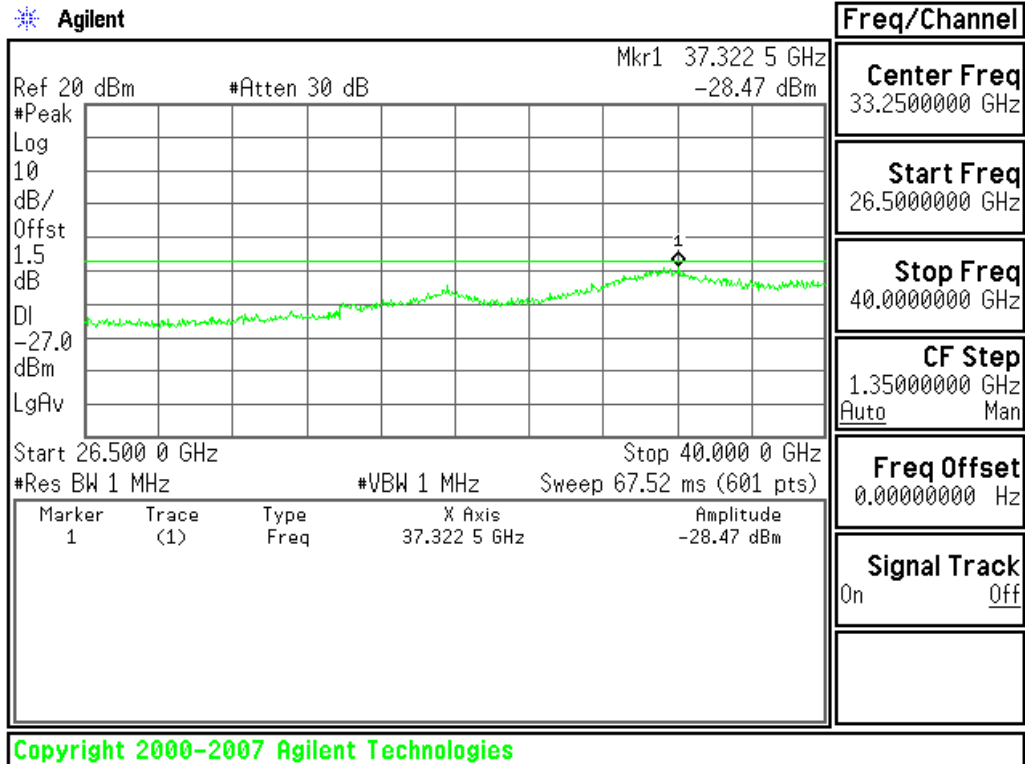




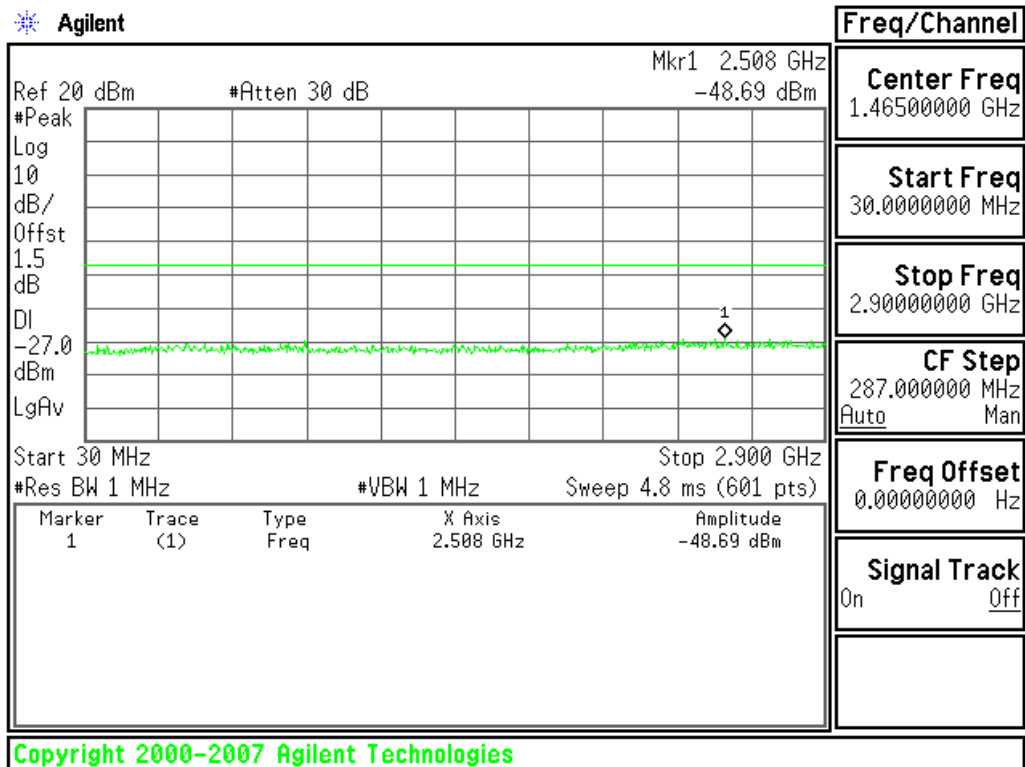
5250~5350MHz

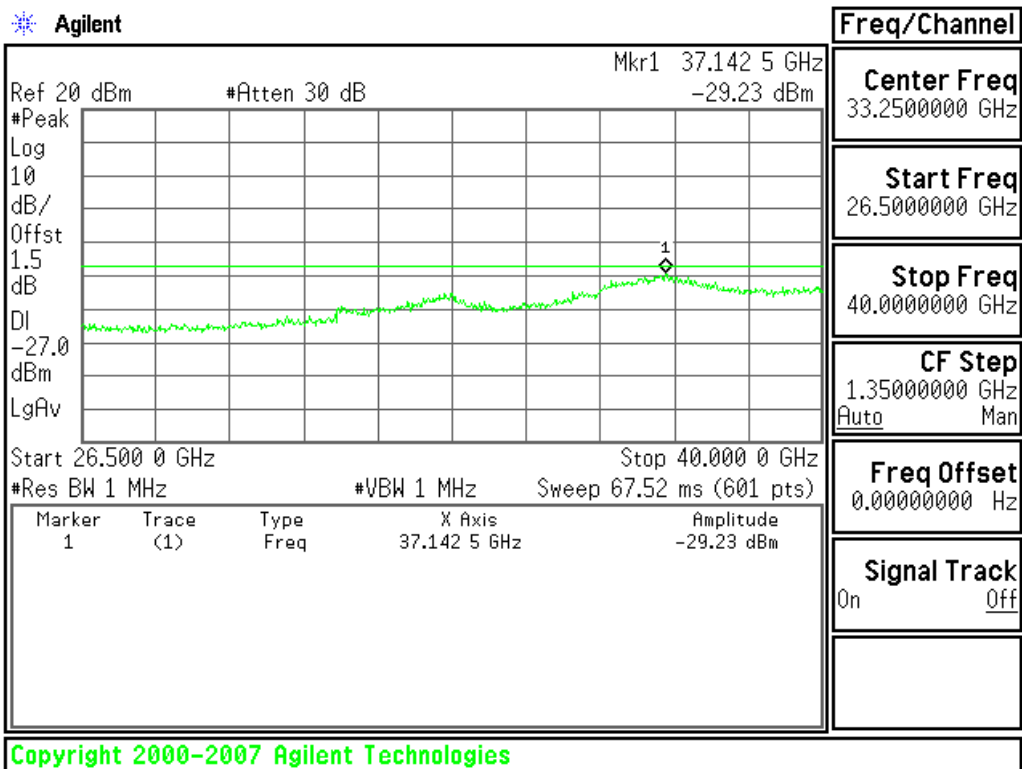
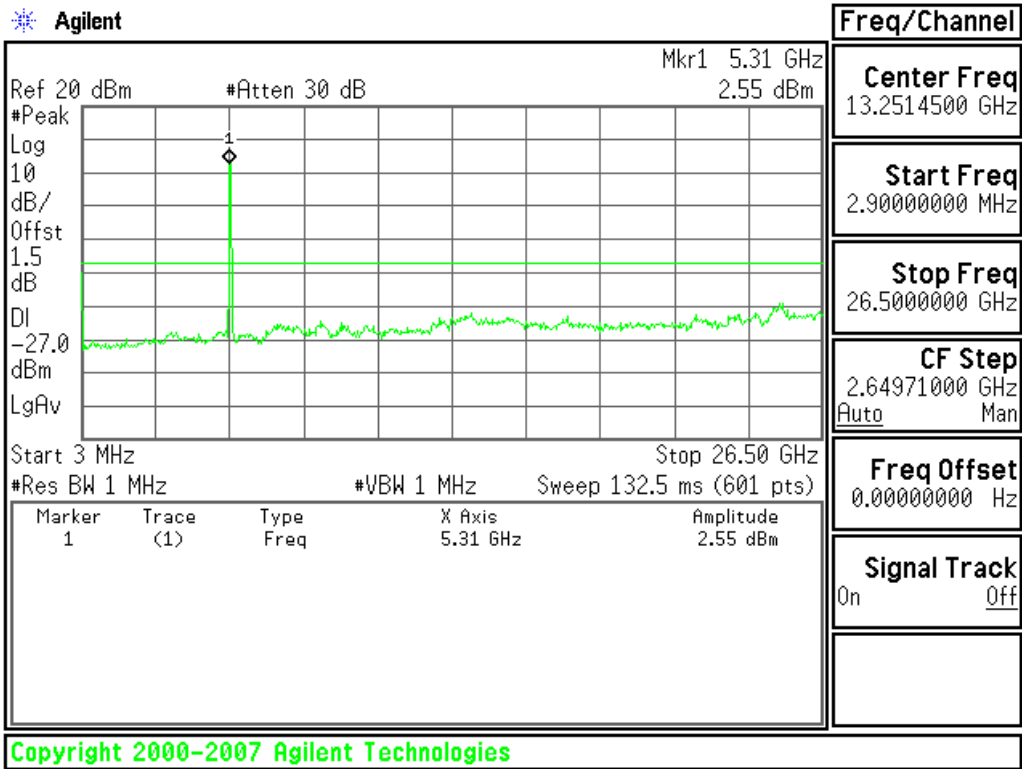
CH Low





CH High

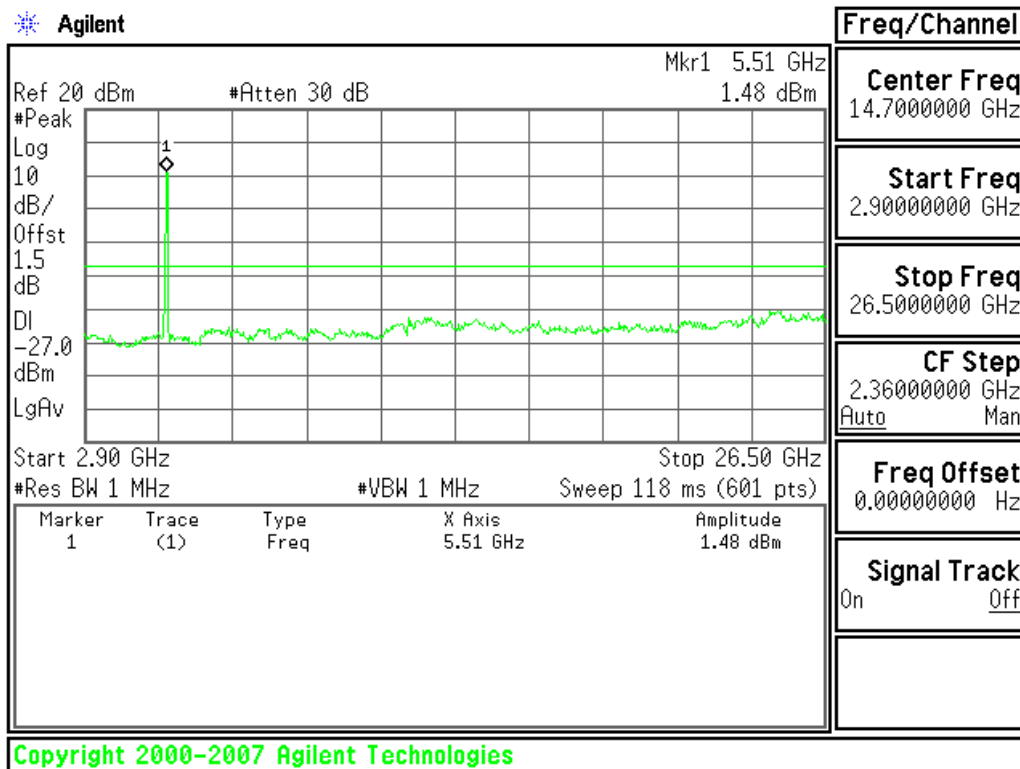
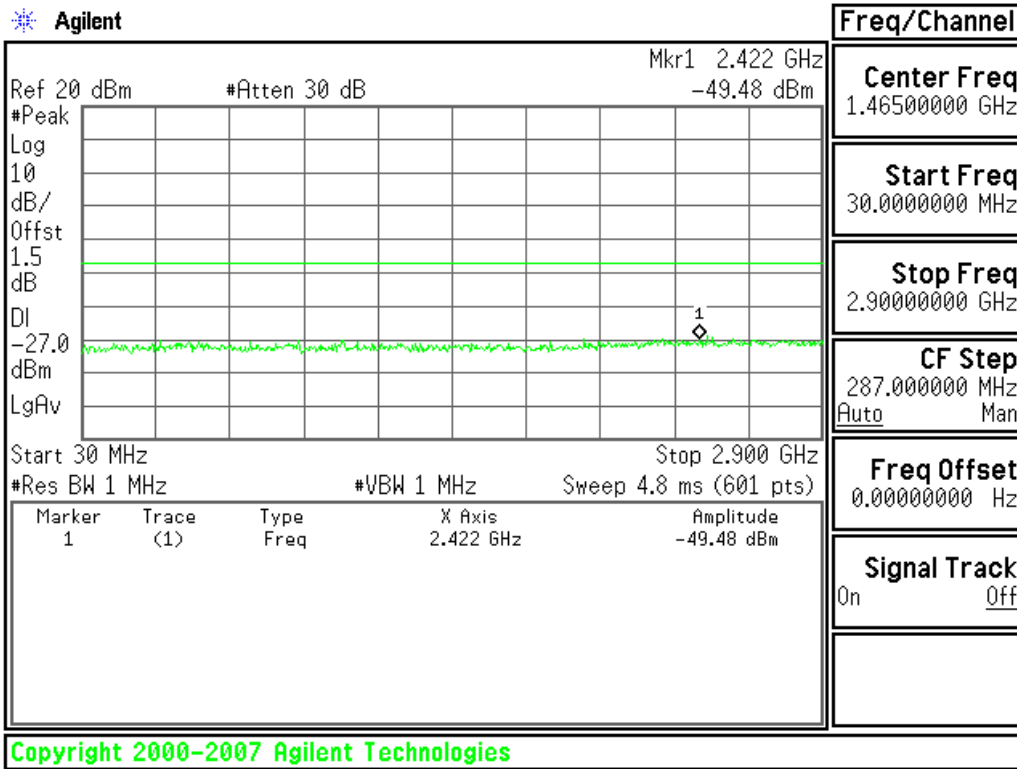


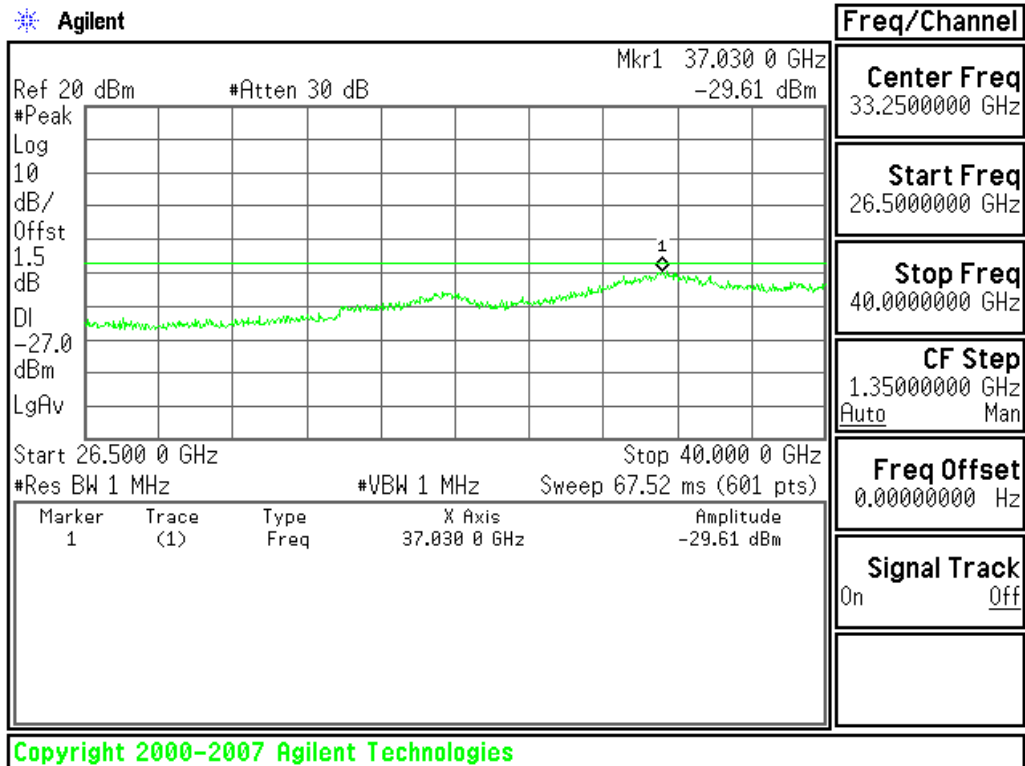


5470~5725MHz

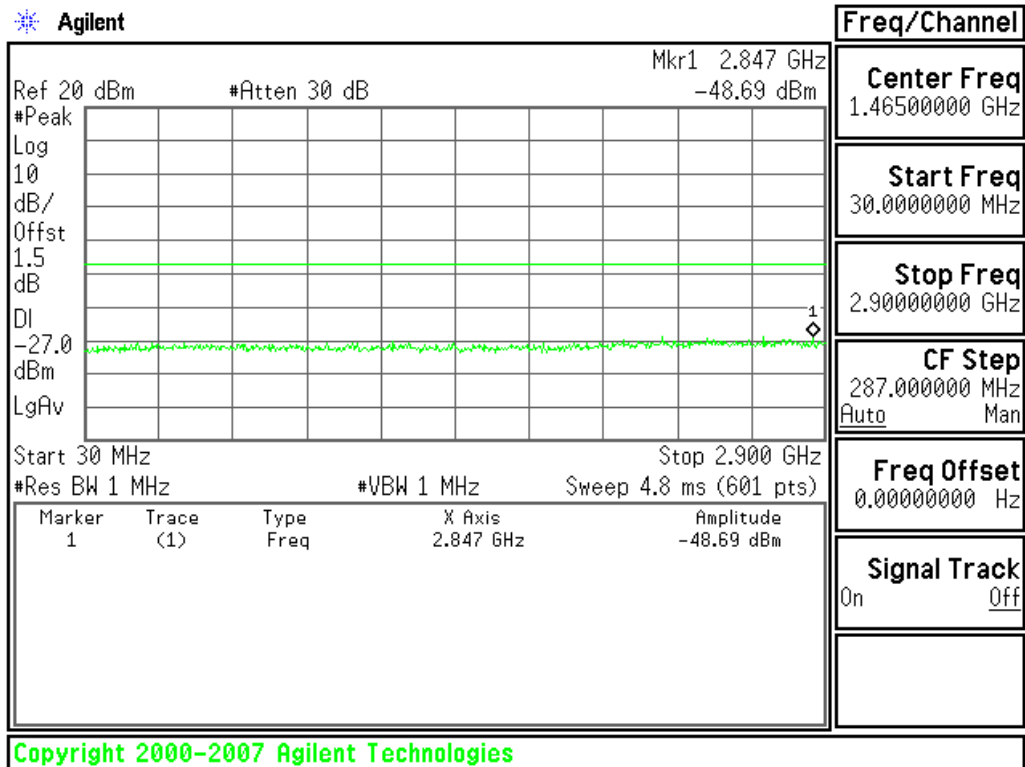


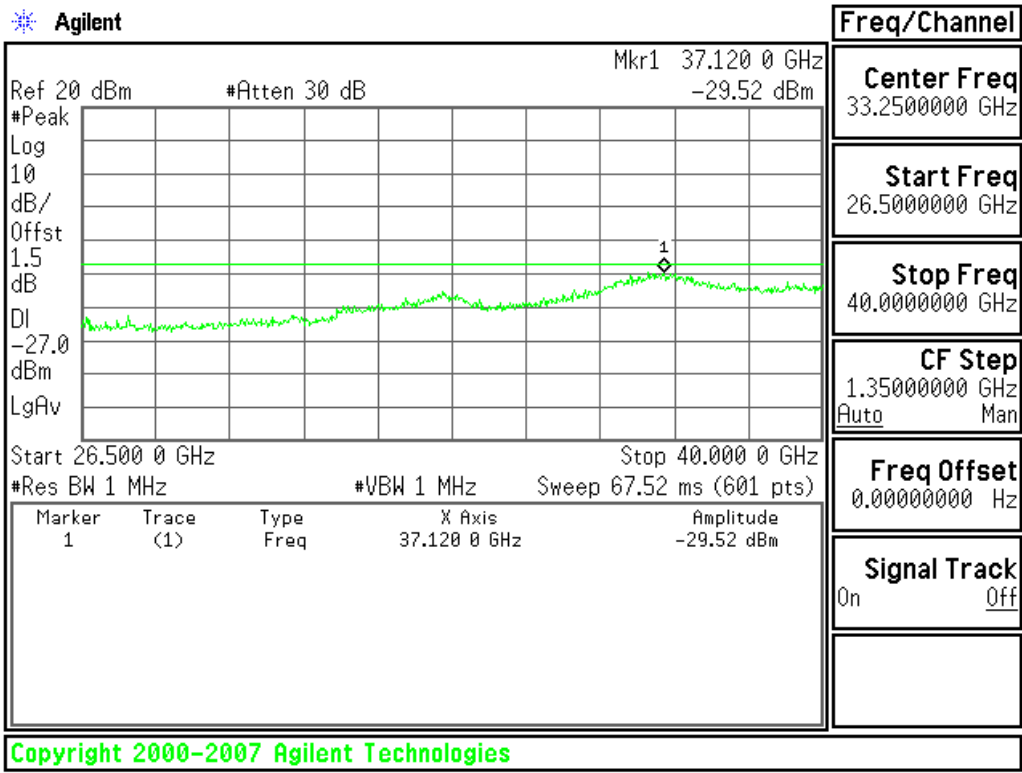
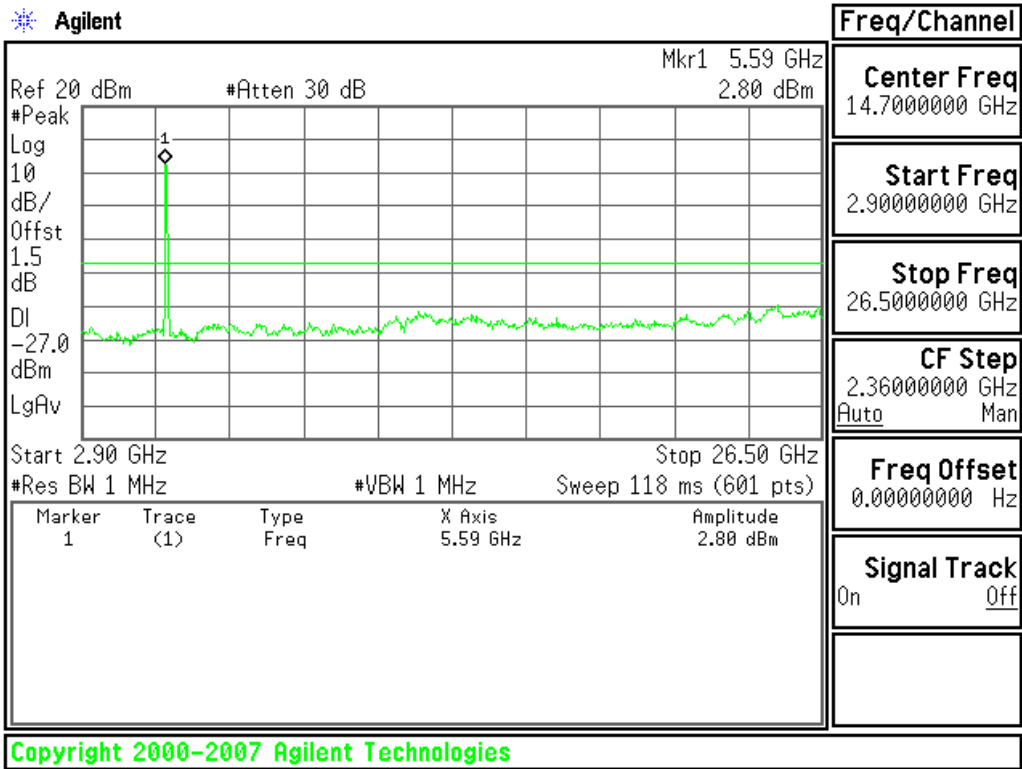
CH Low





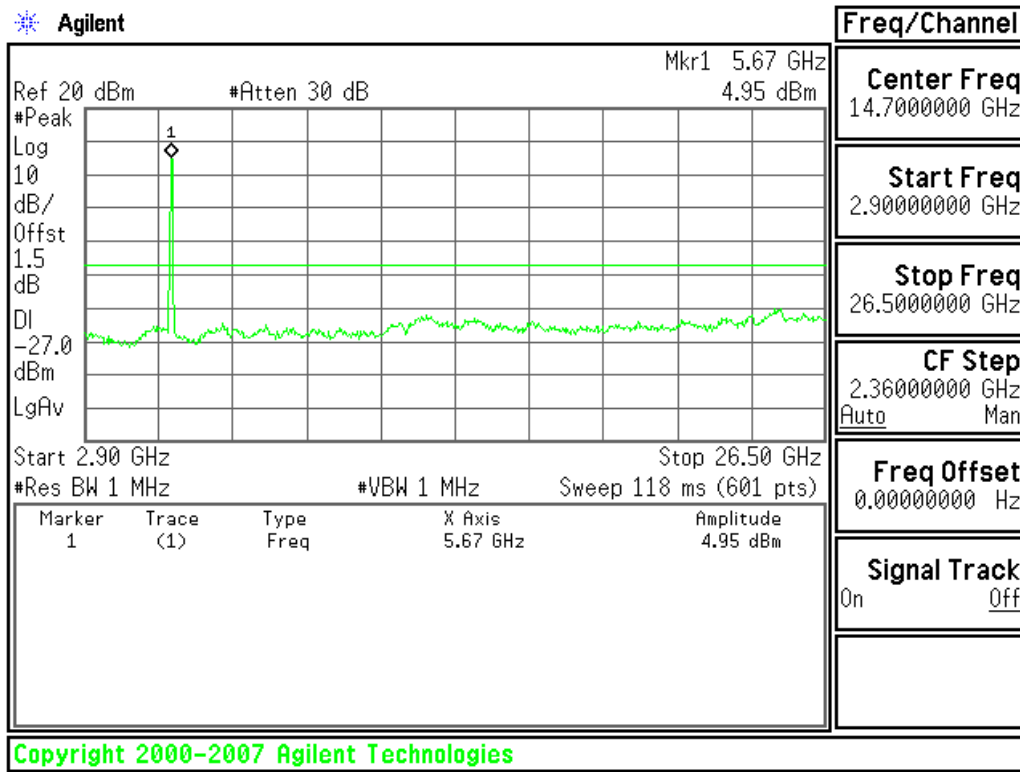
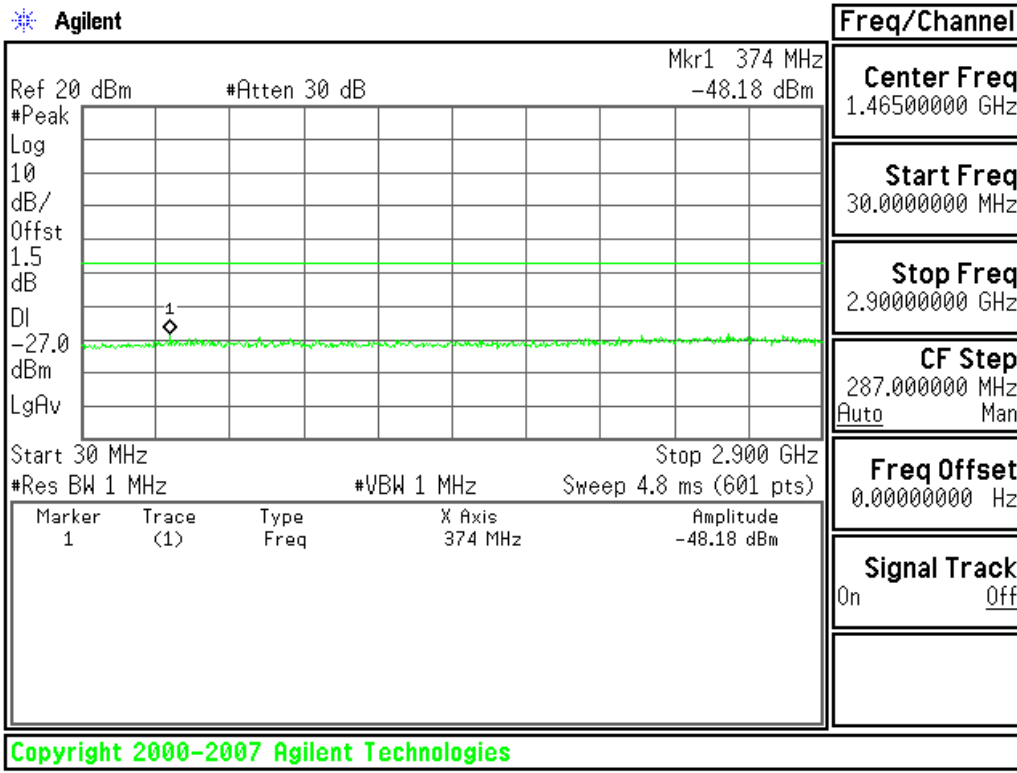
CH Mid

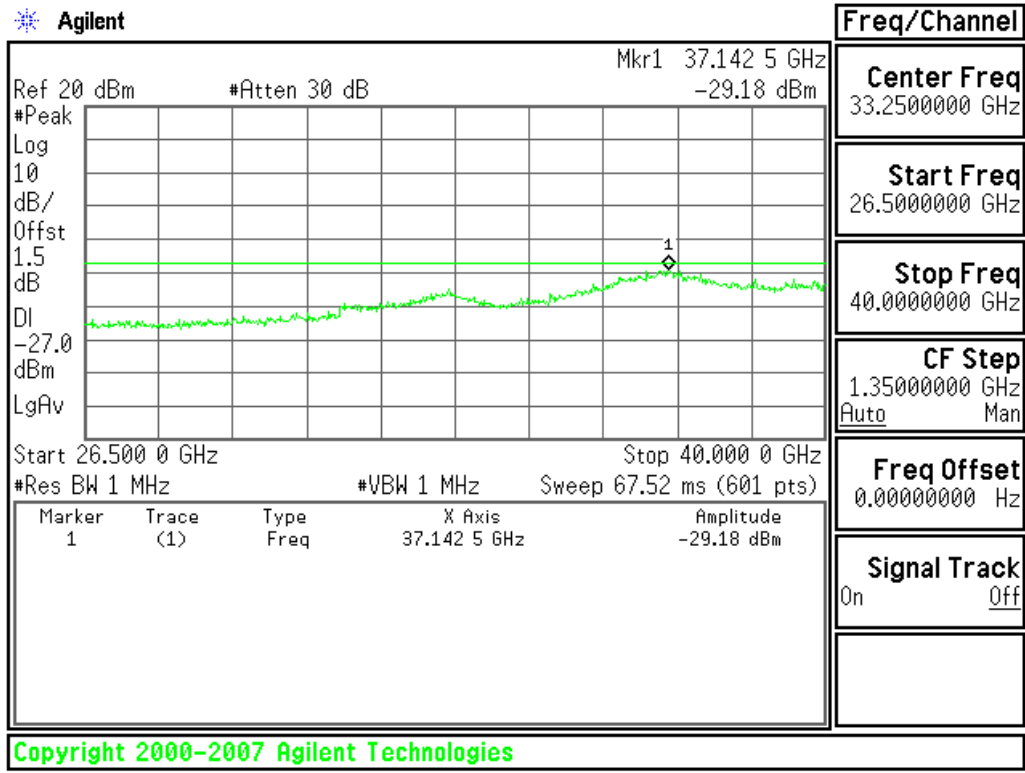






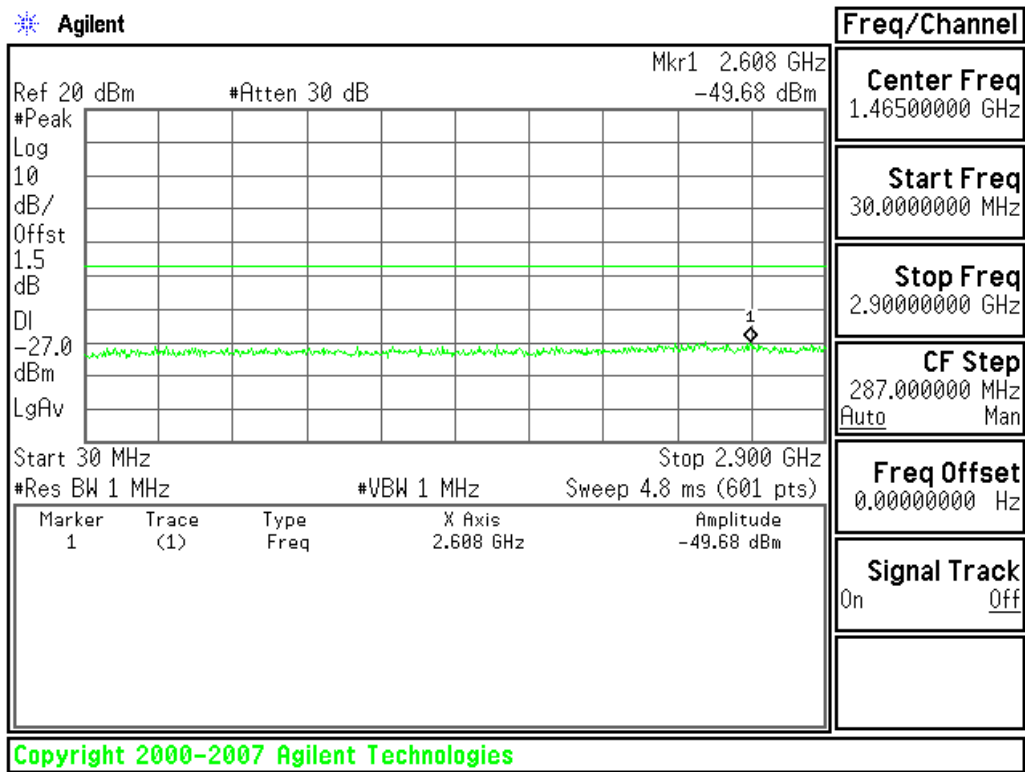
CH High

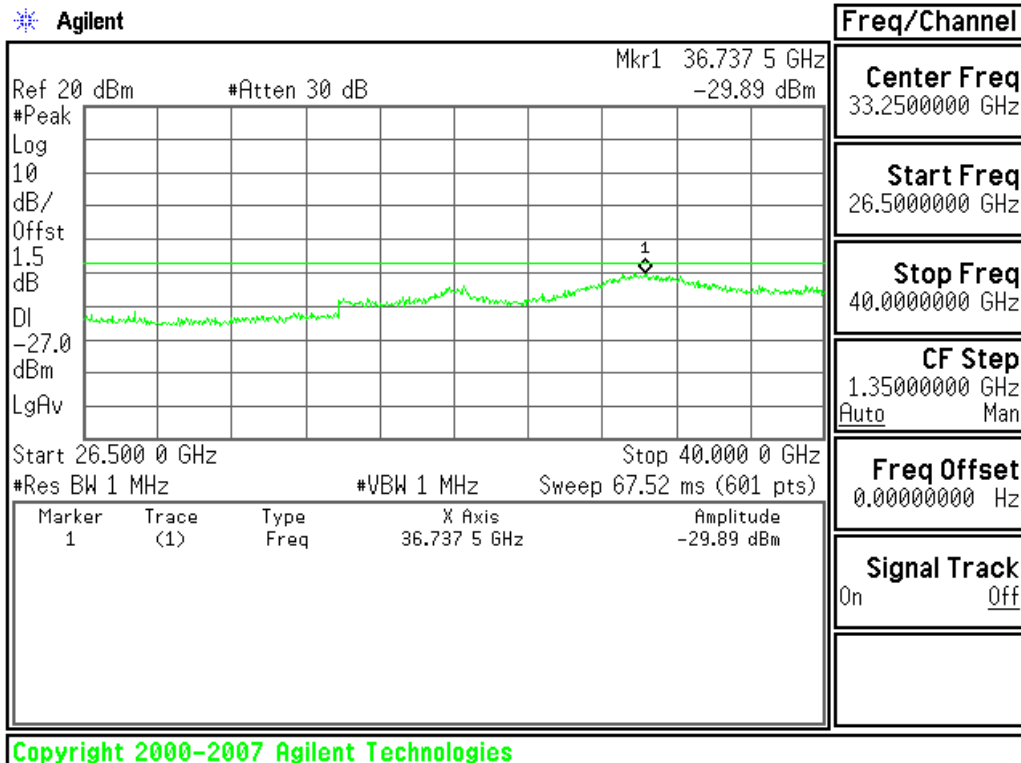
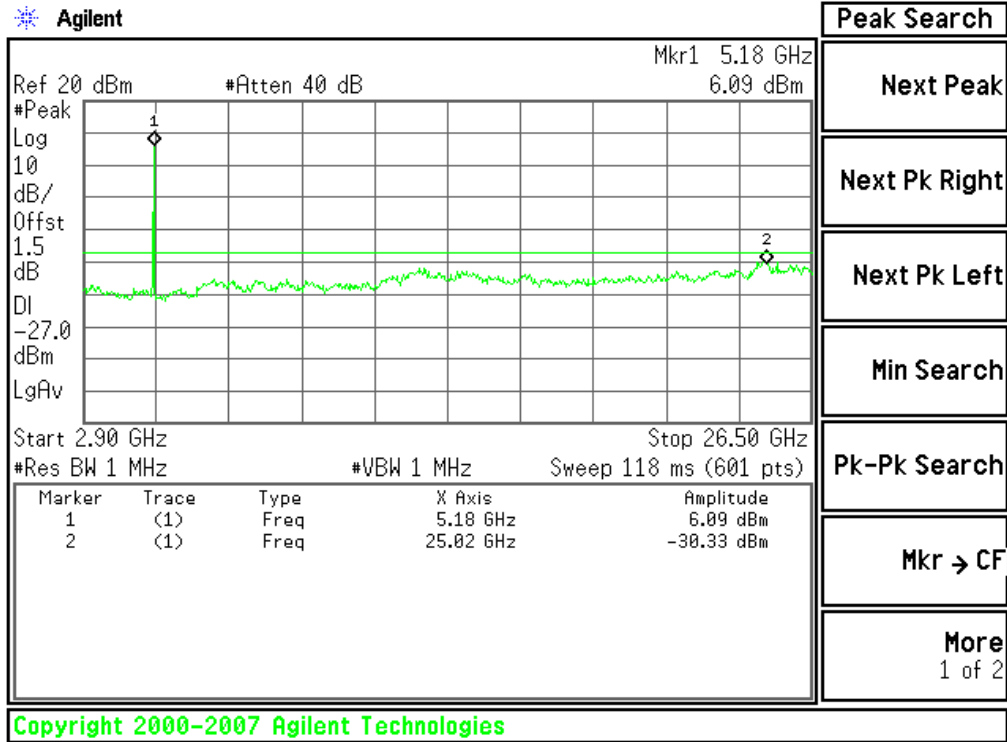




**Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0+ Chain 1+ Chain 2:
5150~5250MHz**

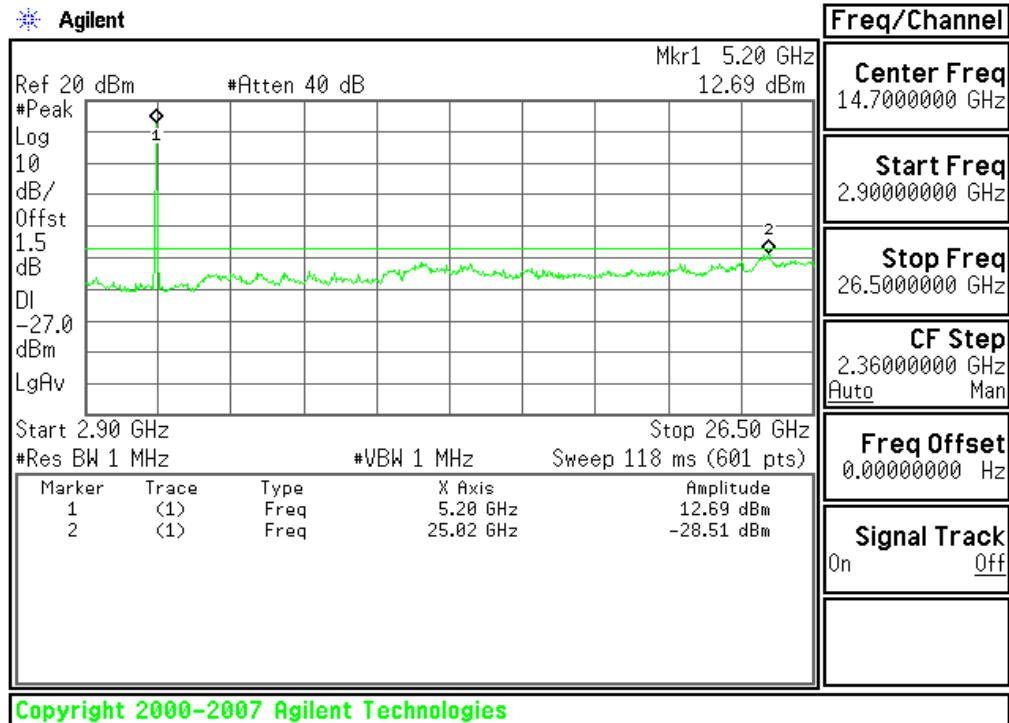
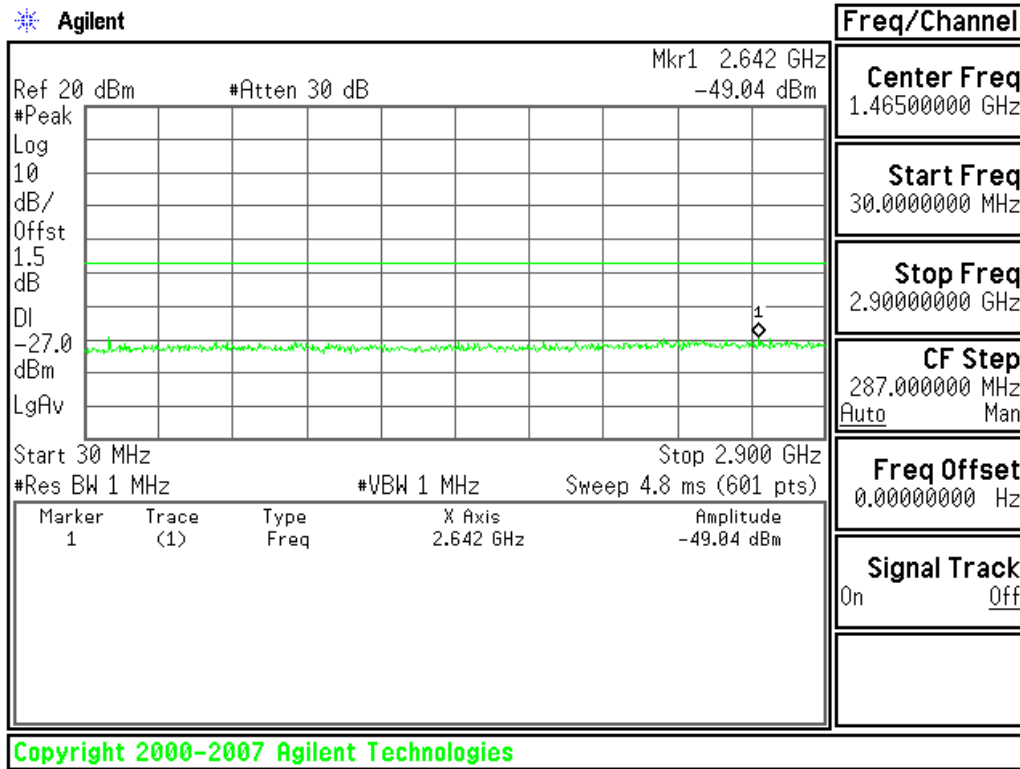
CH Low

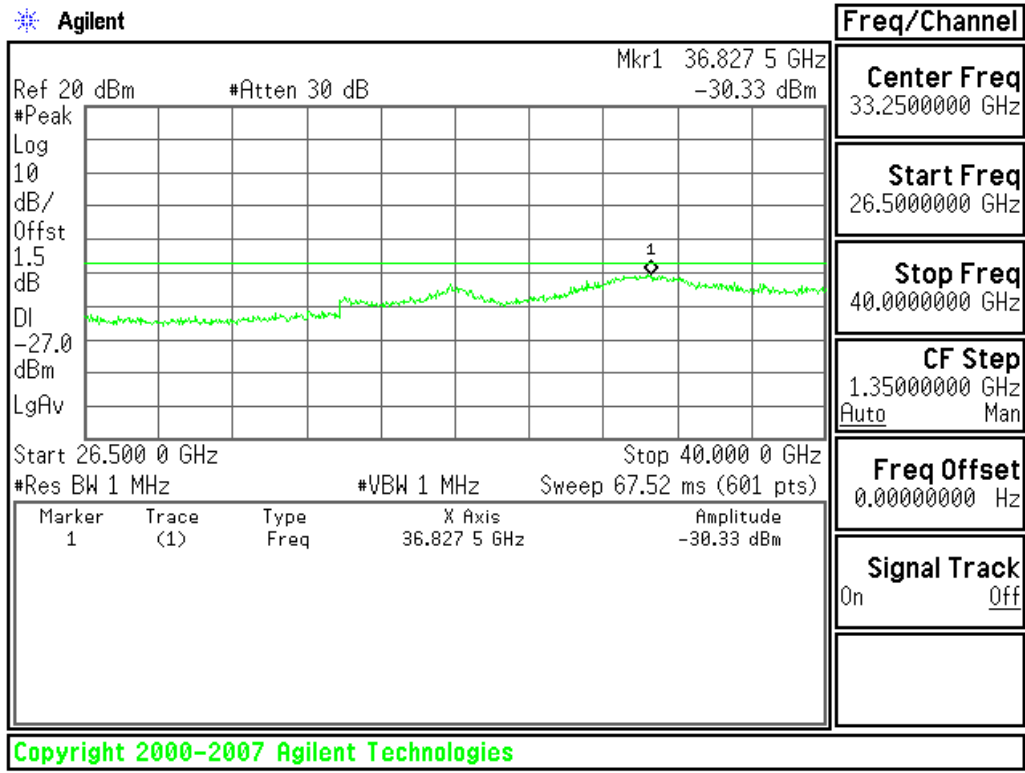






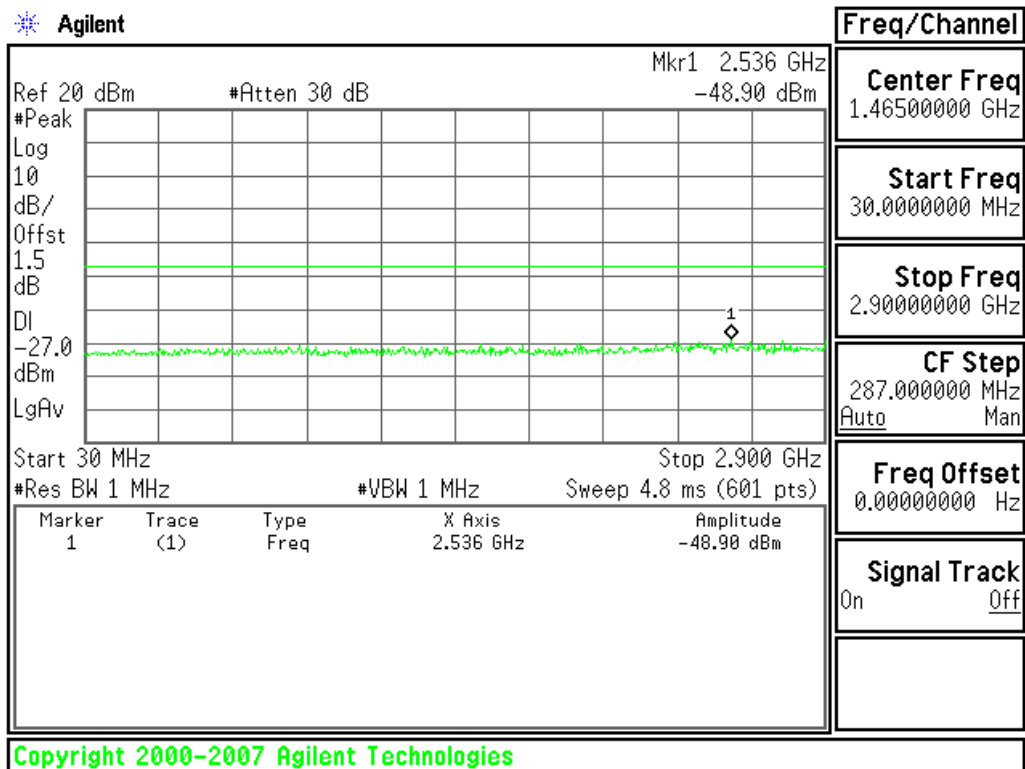
CH High

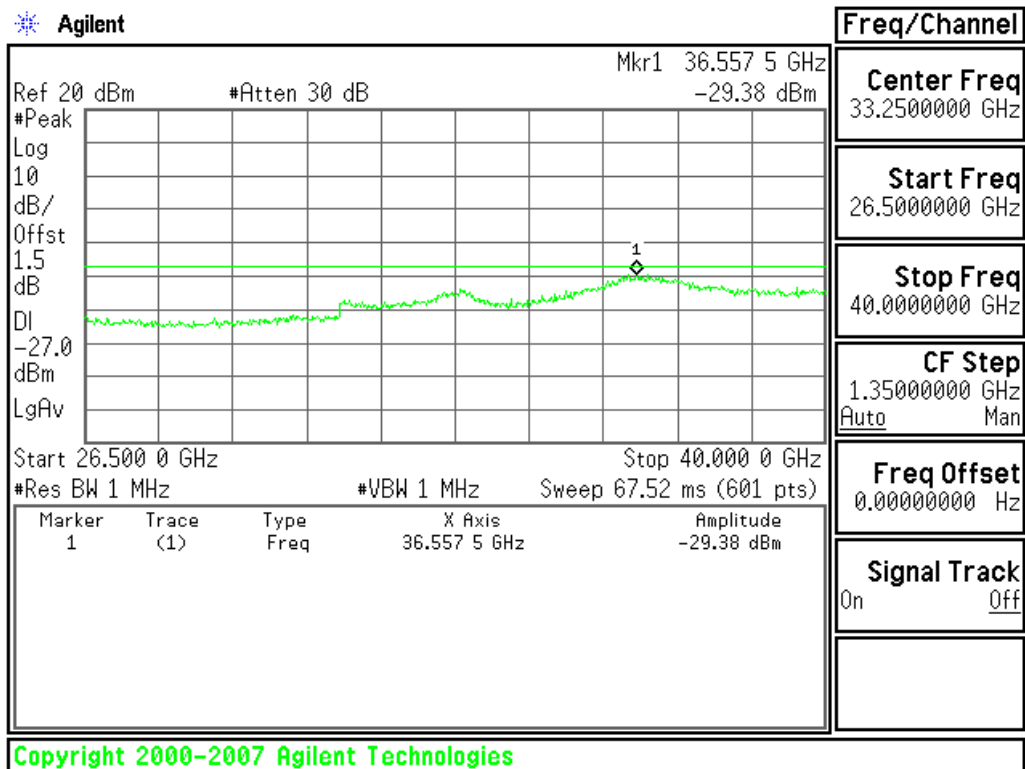
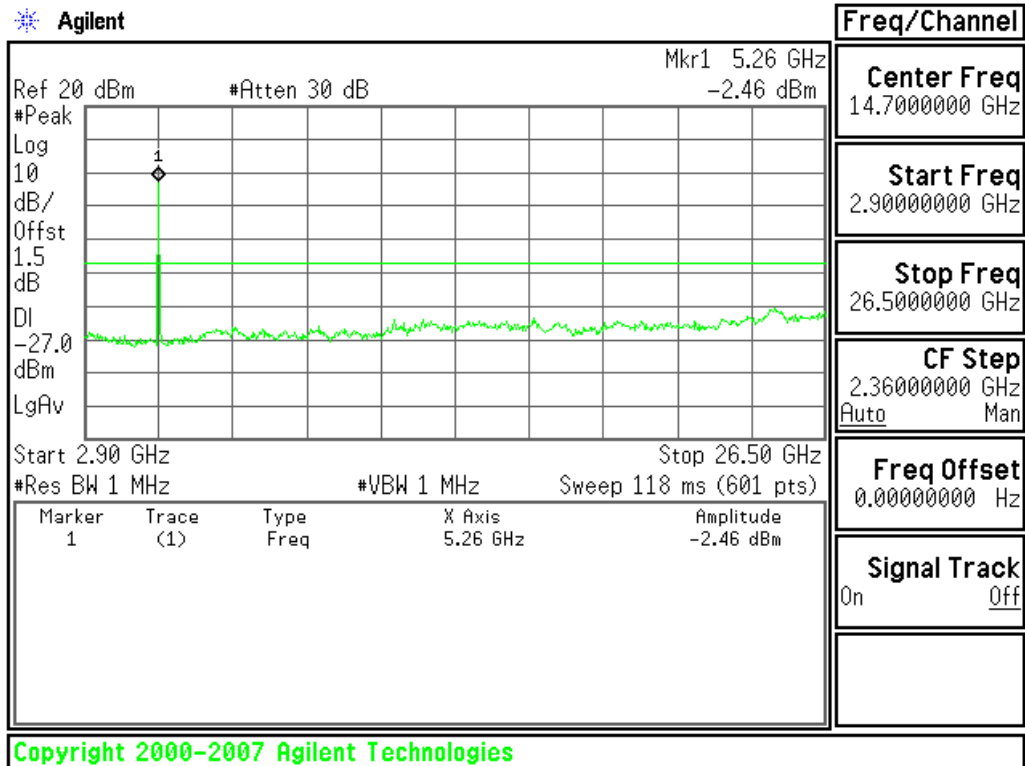




5250~5350MHz

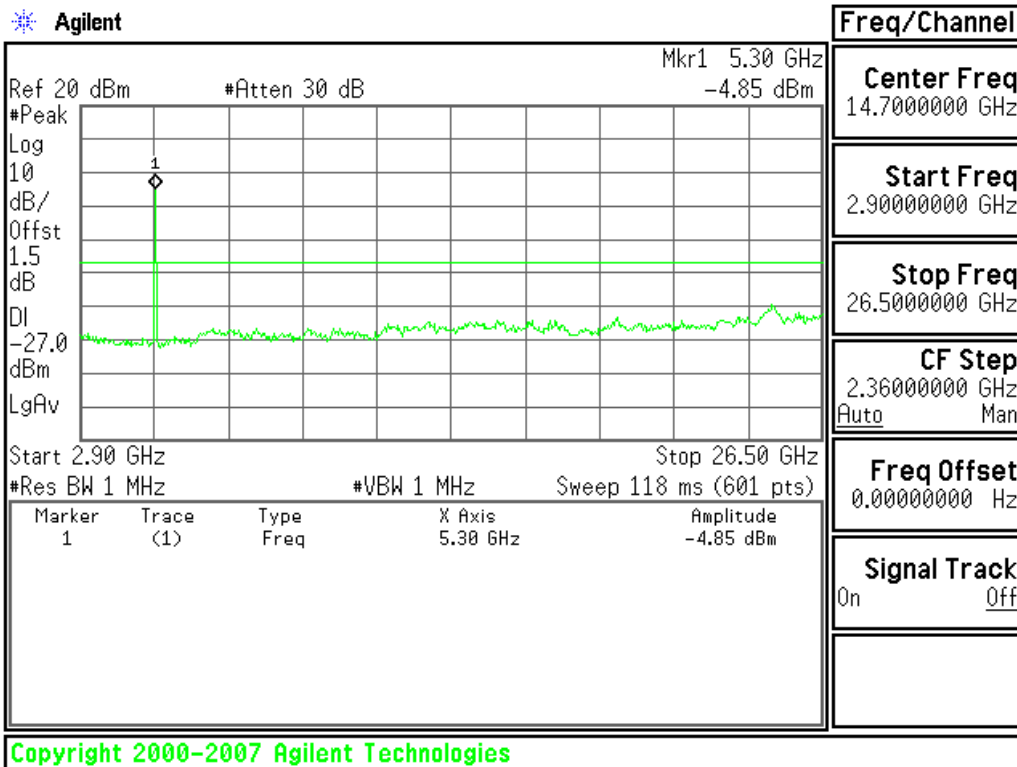
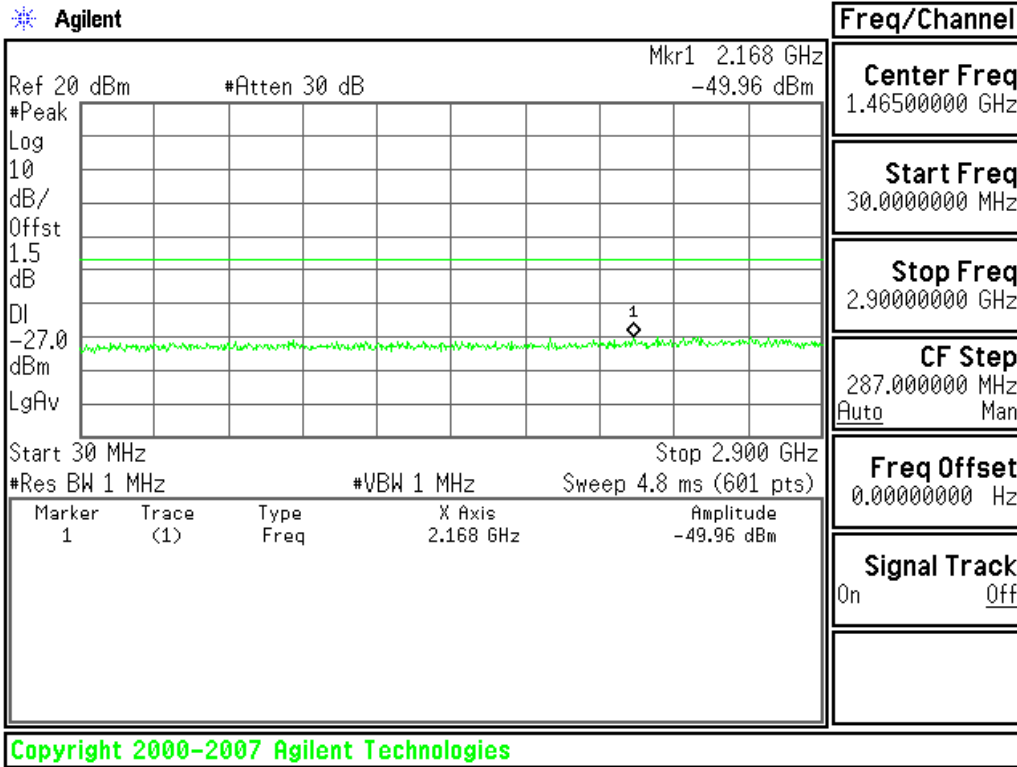
CH Low

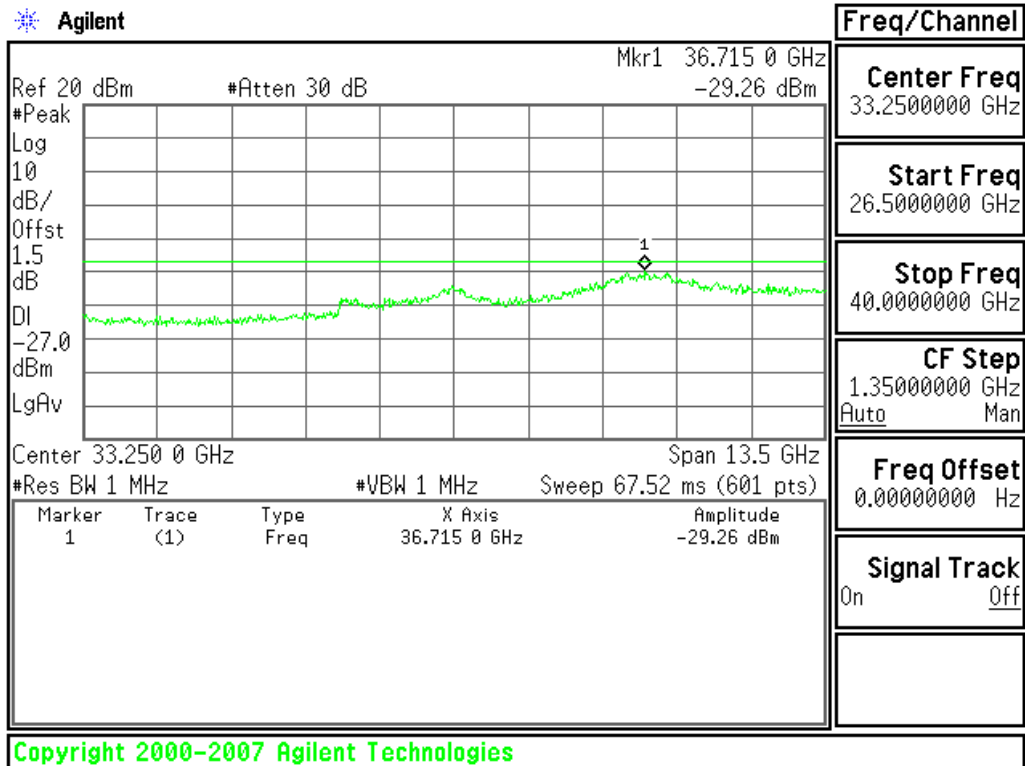




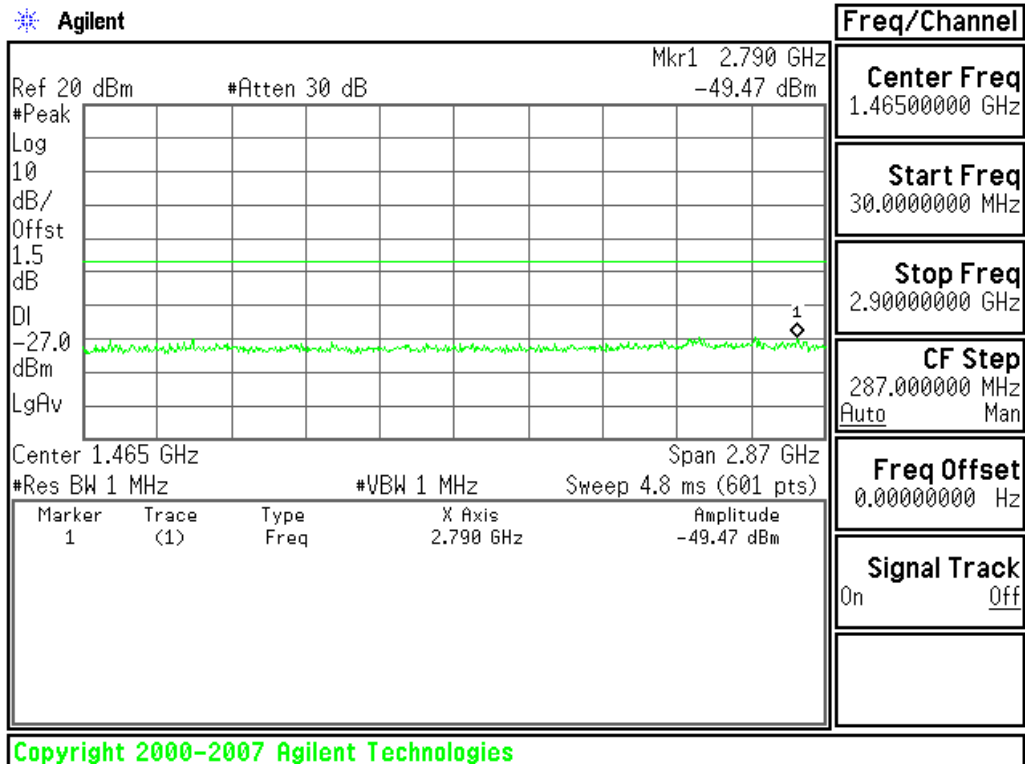


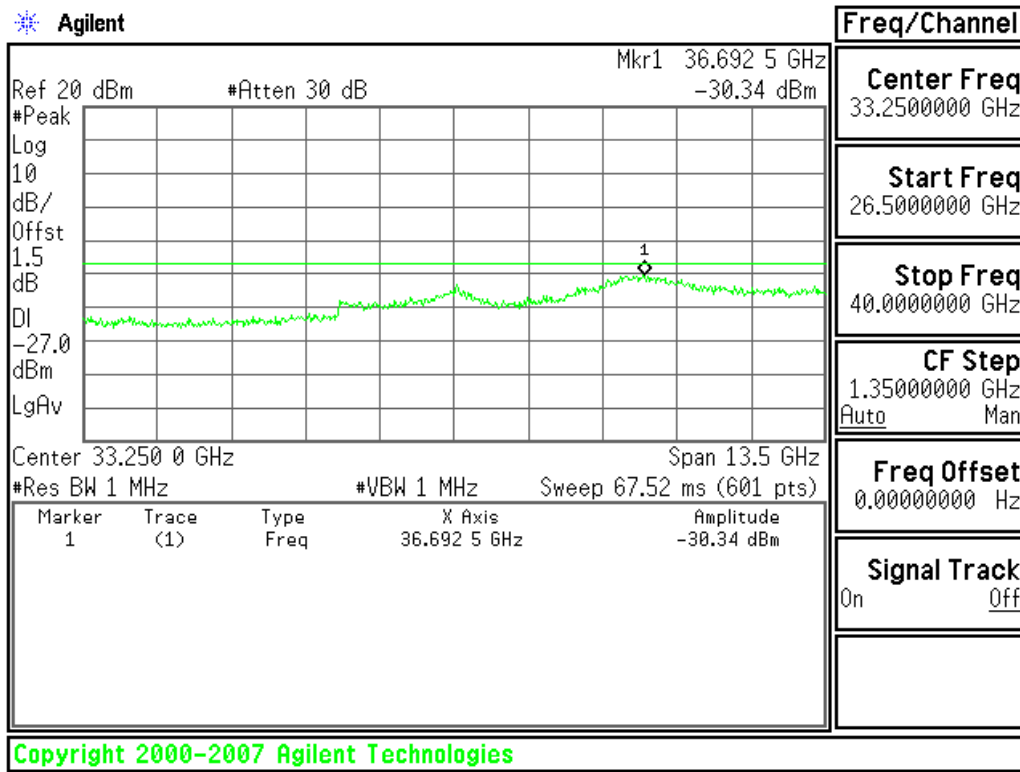
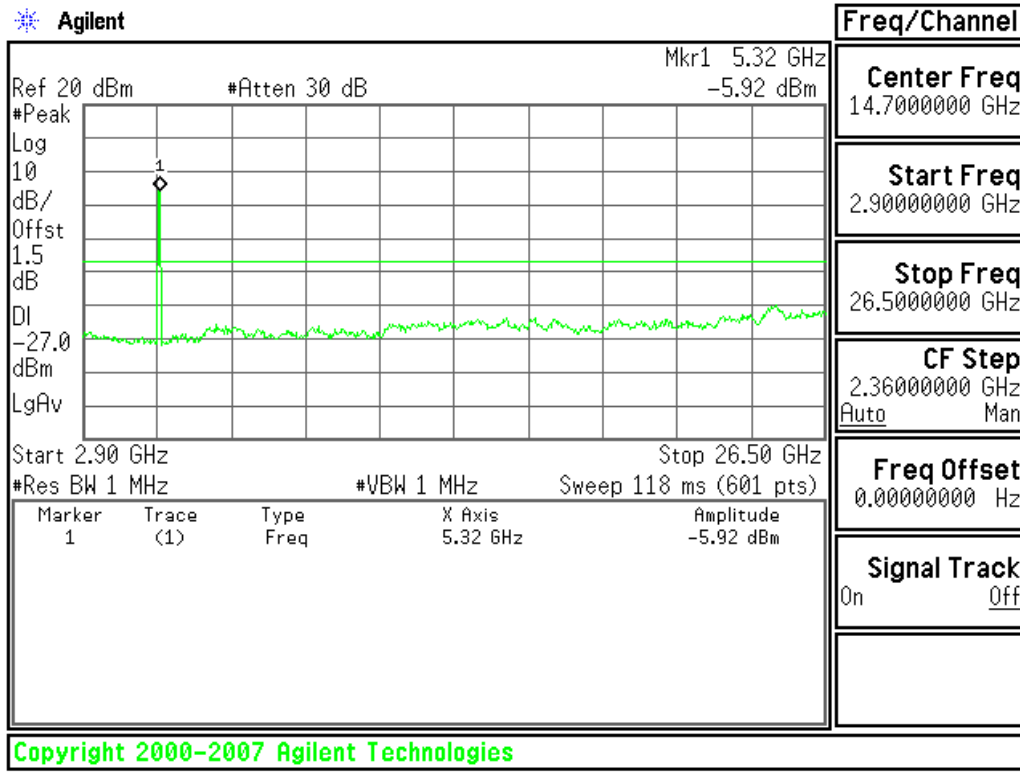
CH Mid





CH High

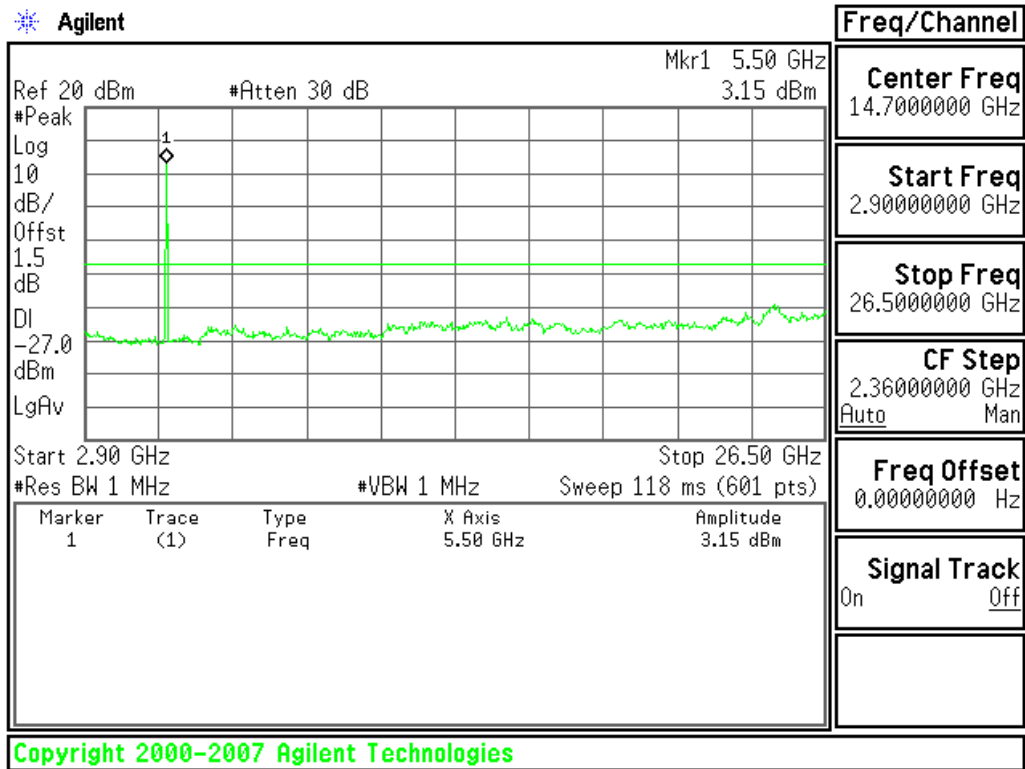
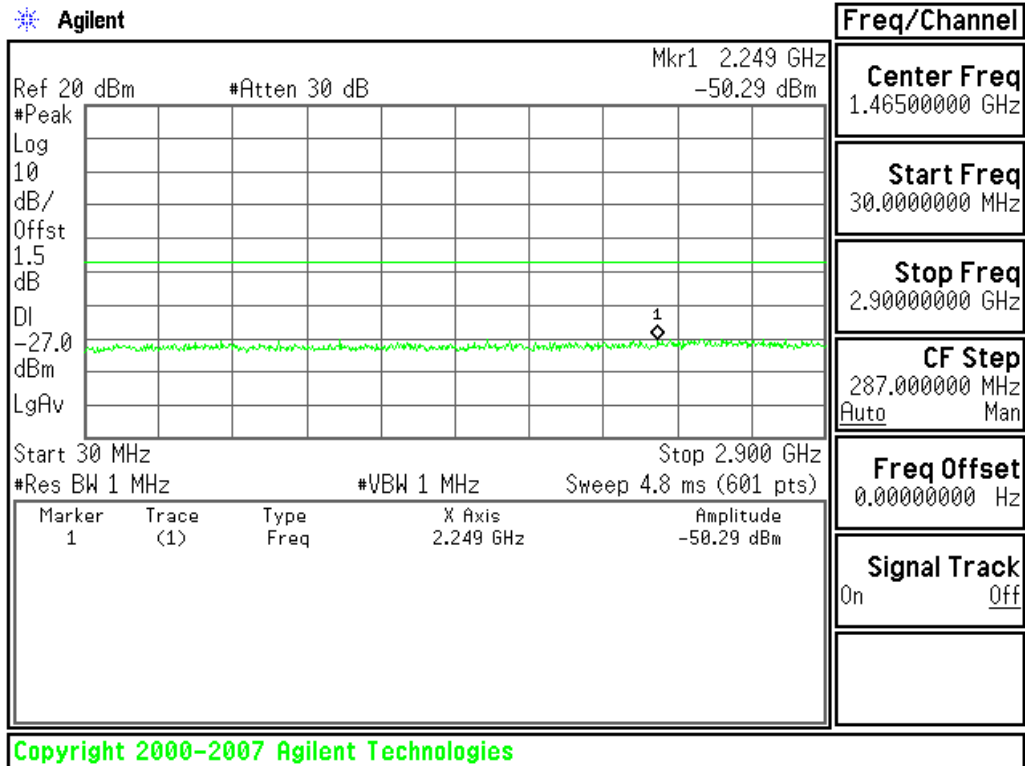


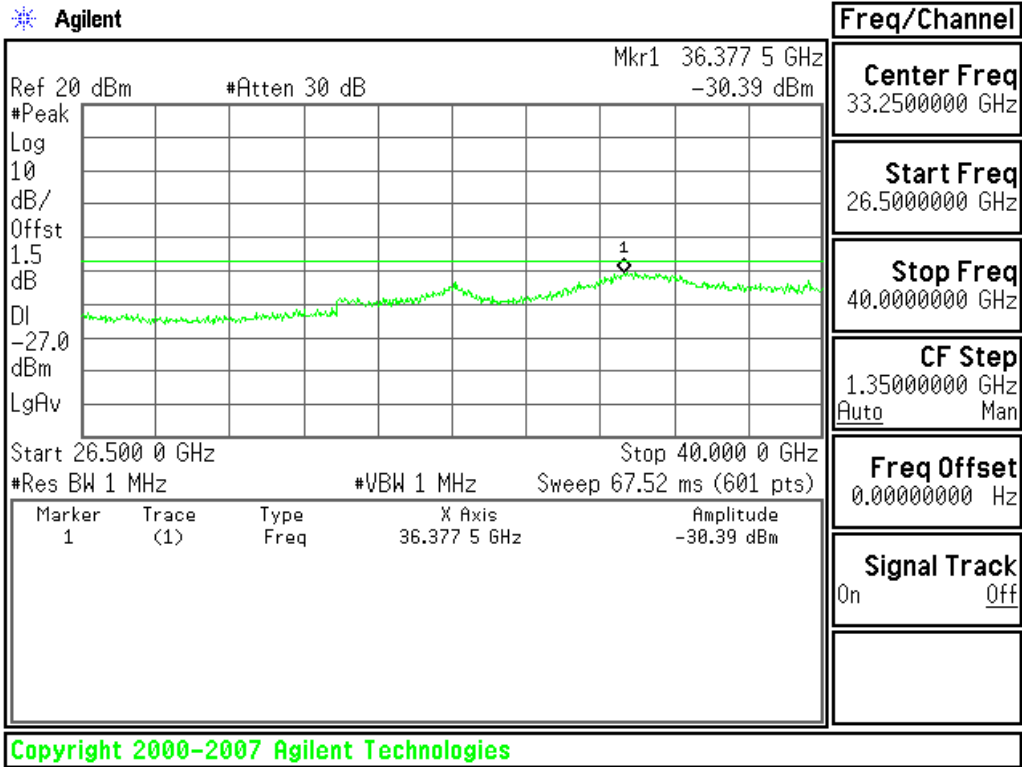




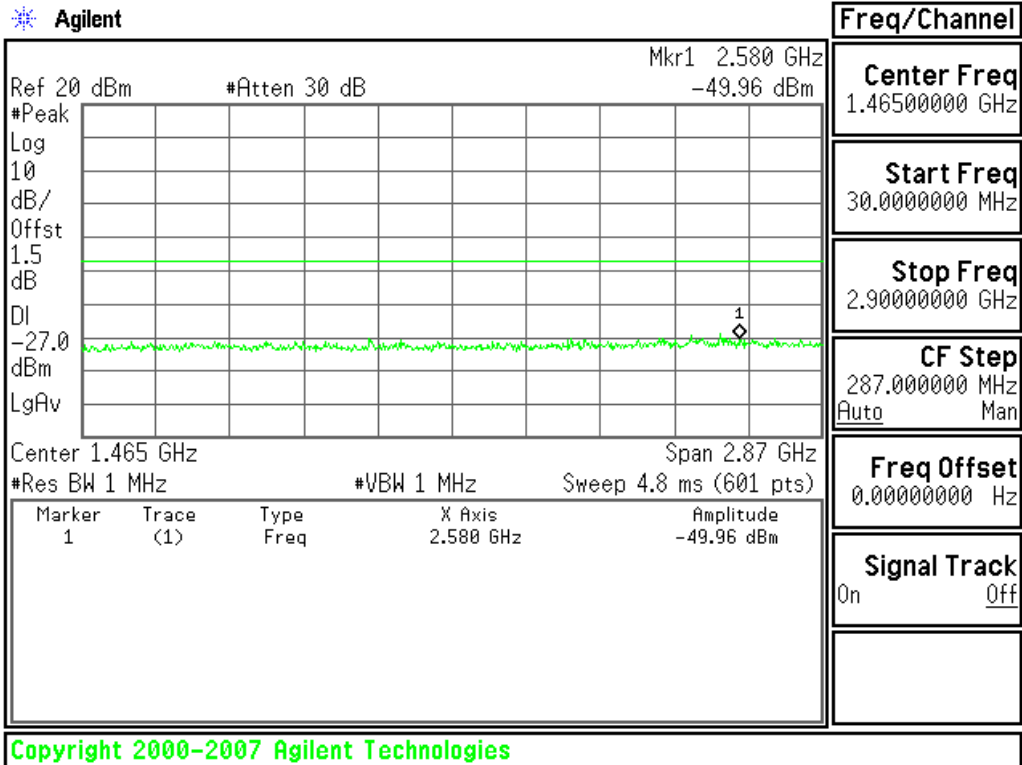
5470~5725MHz

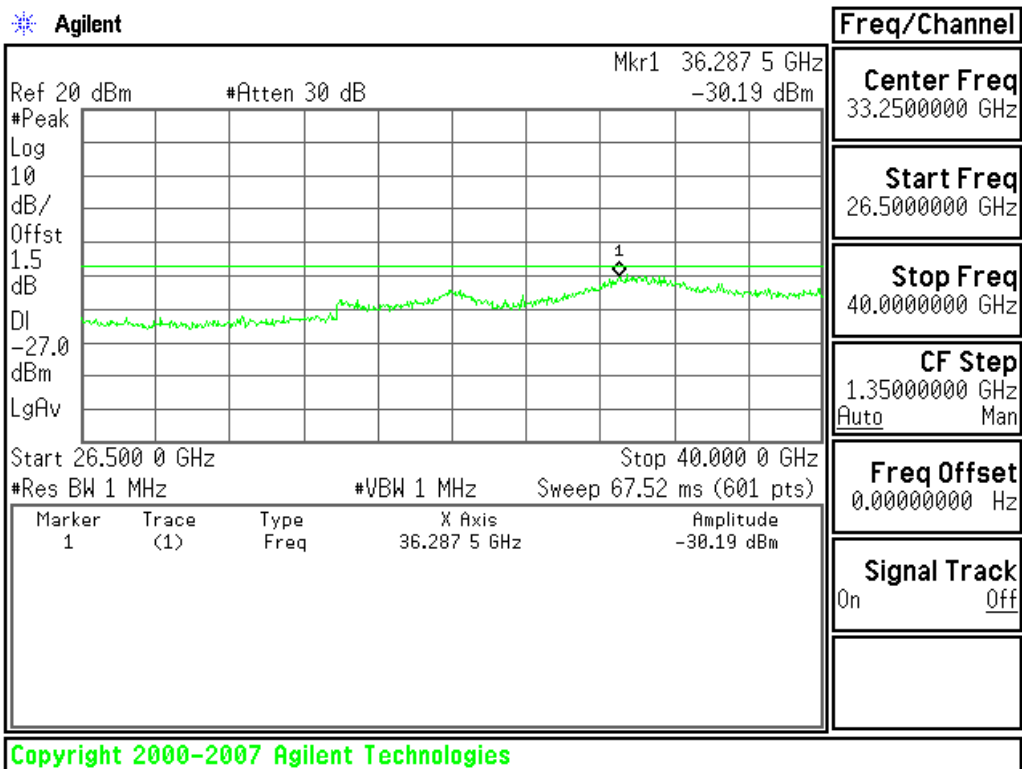
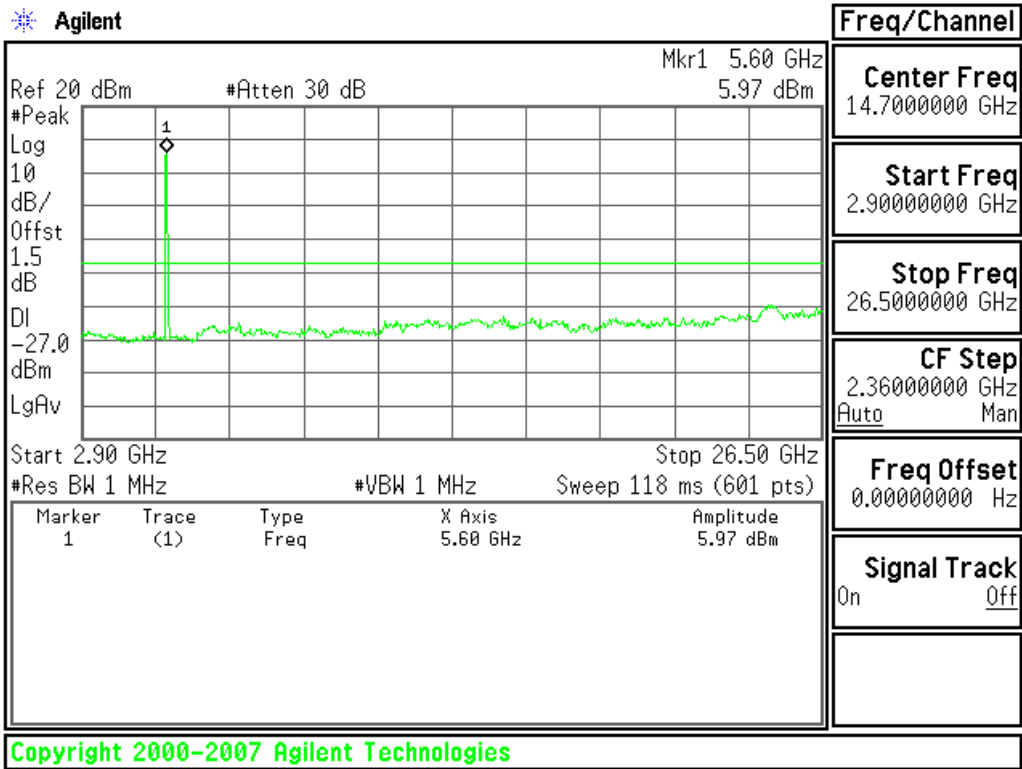
CH Low





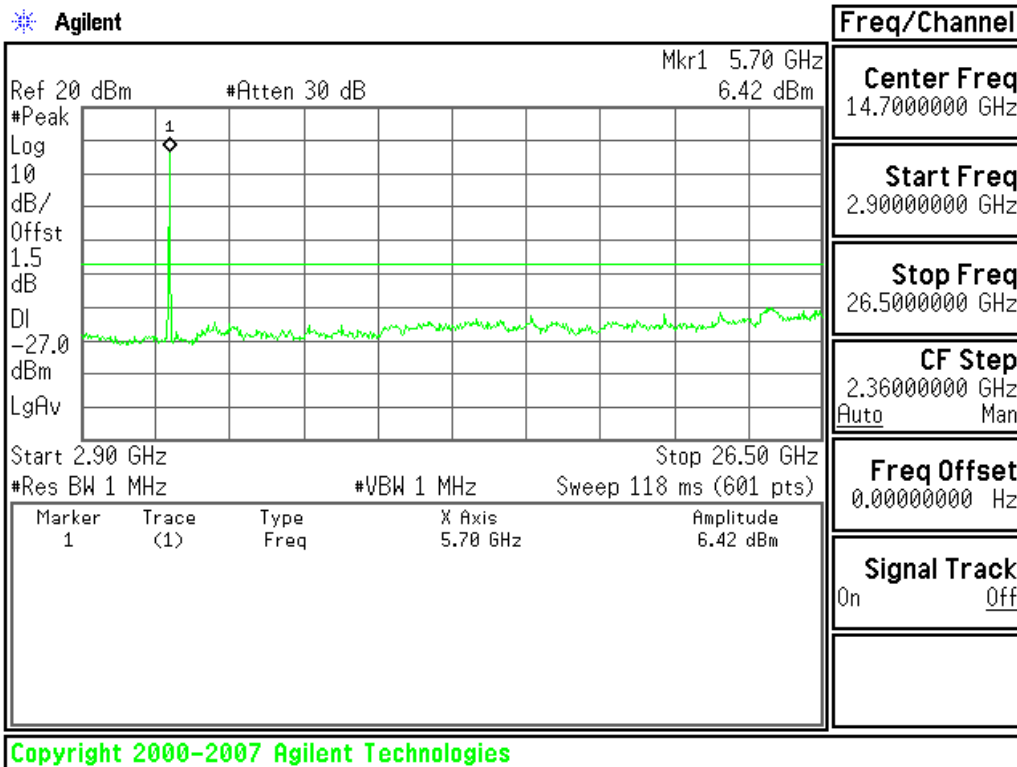
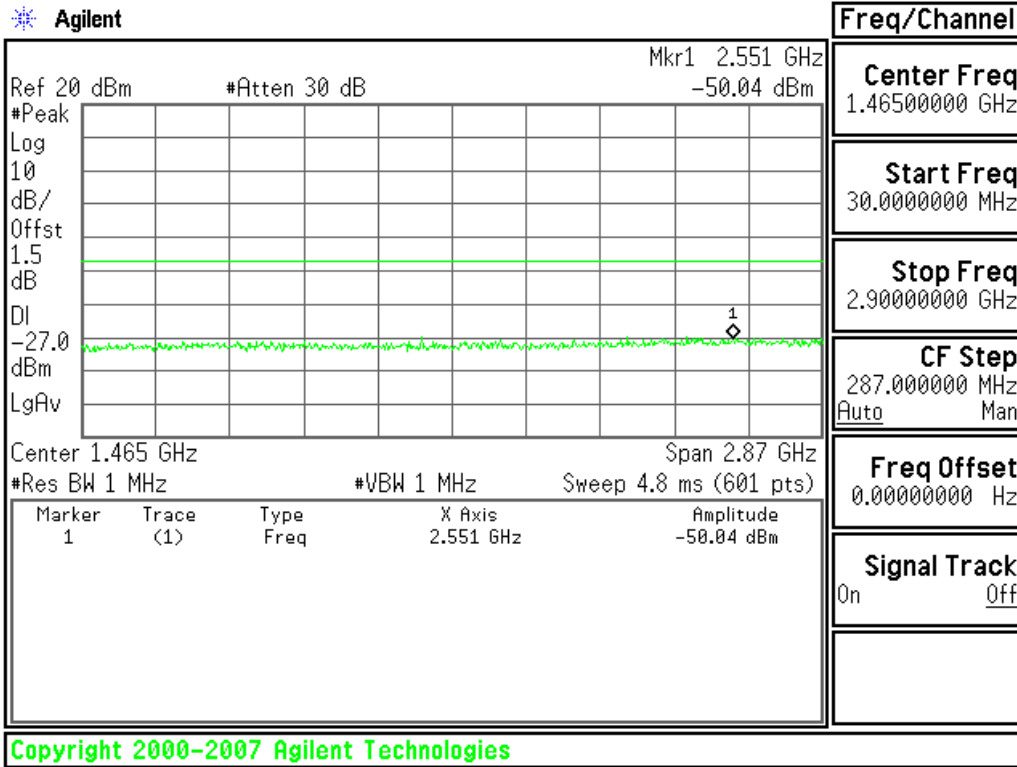
CH Mid

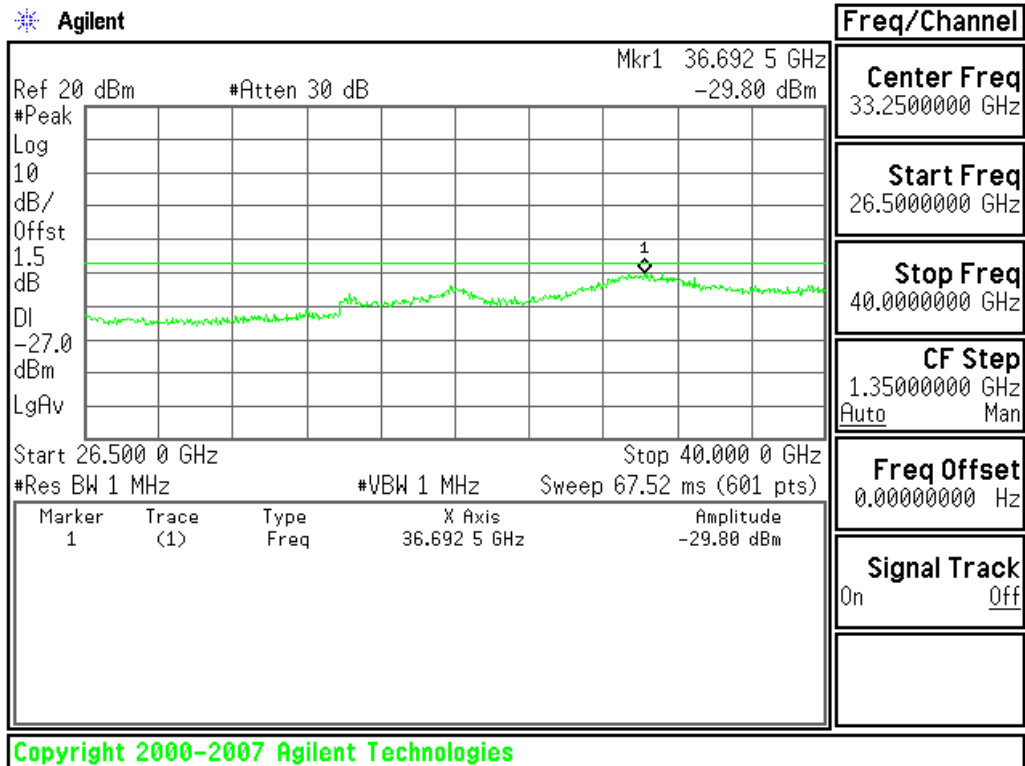




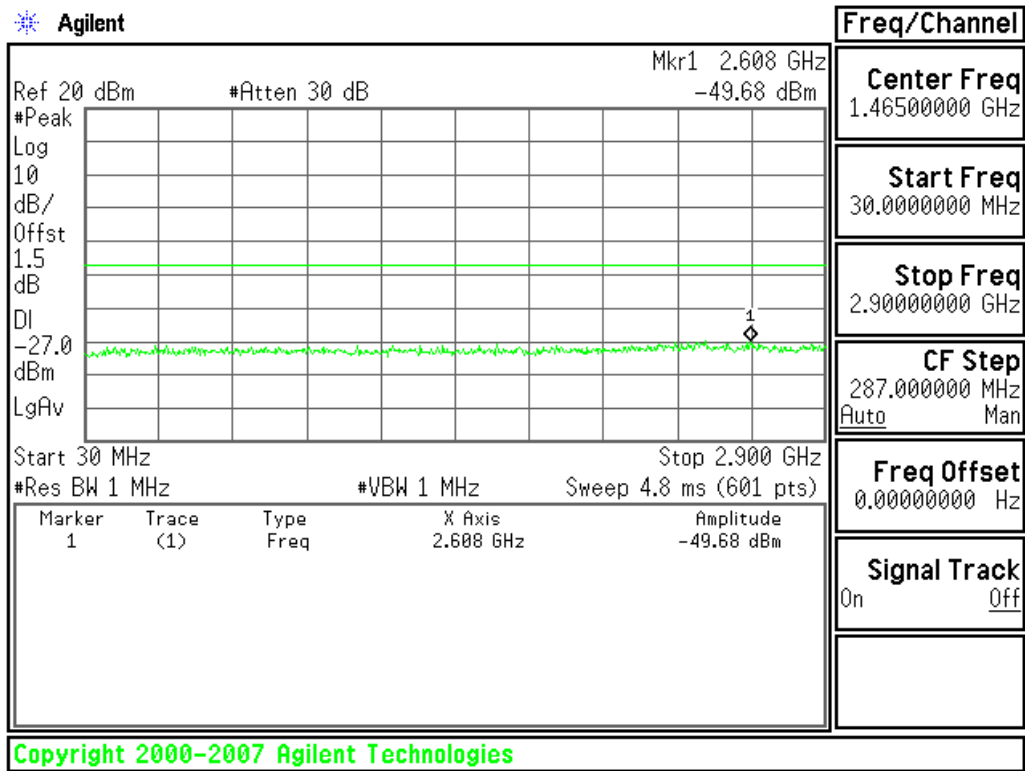


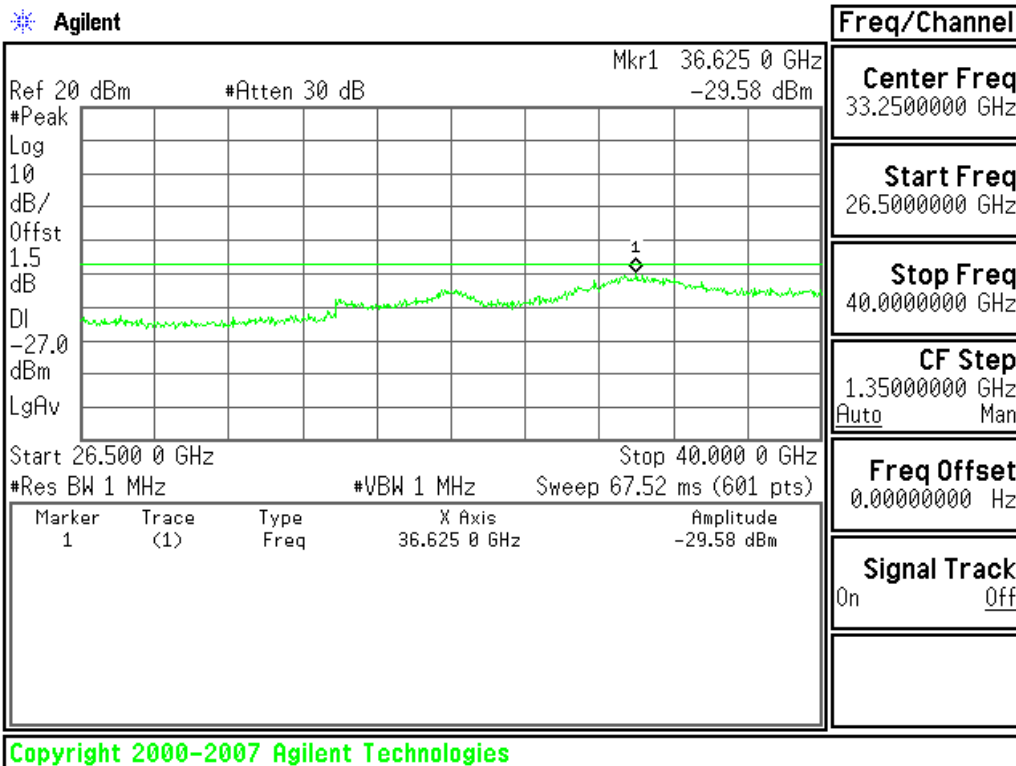
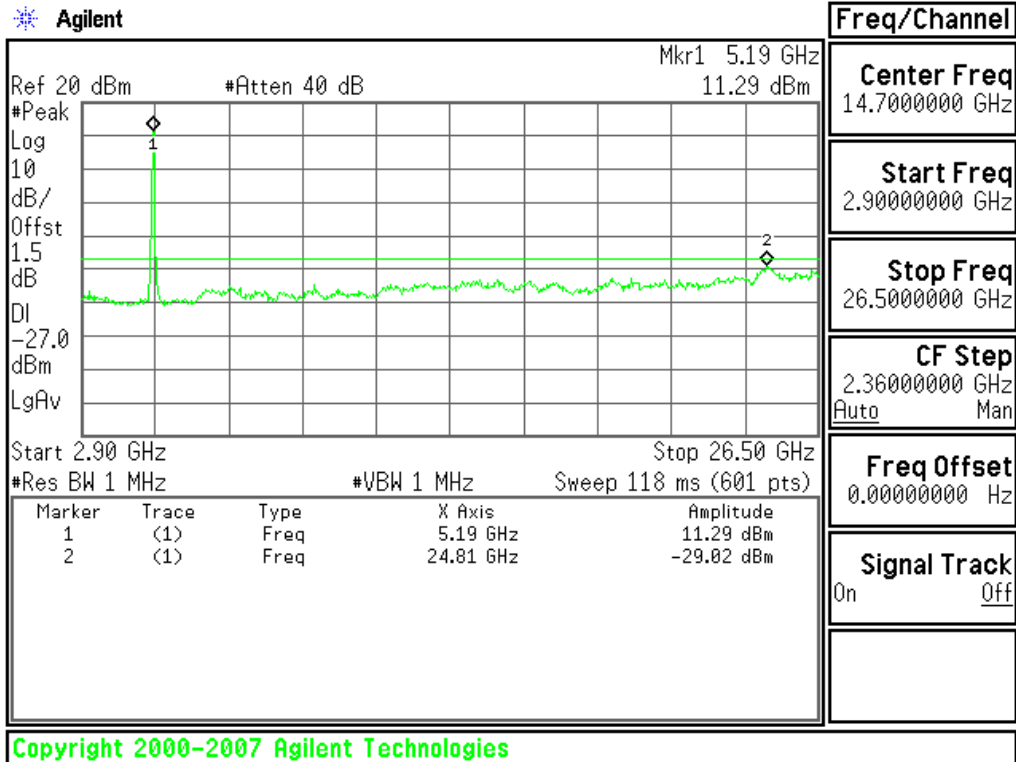
CH High





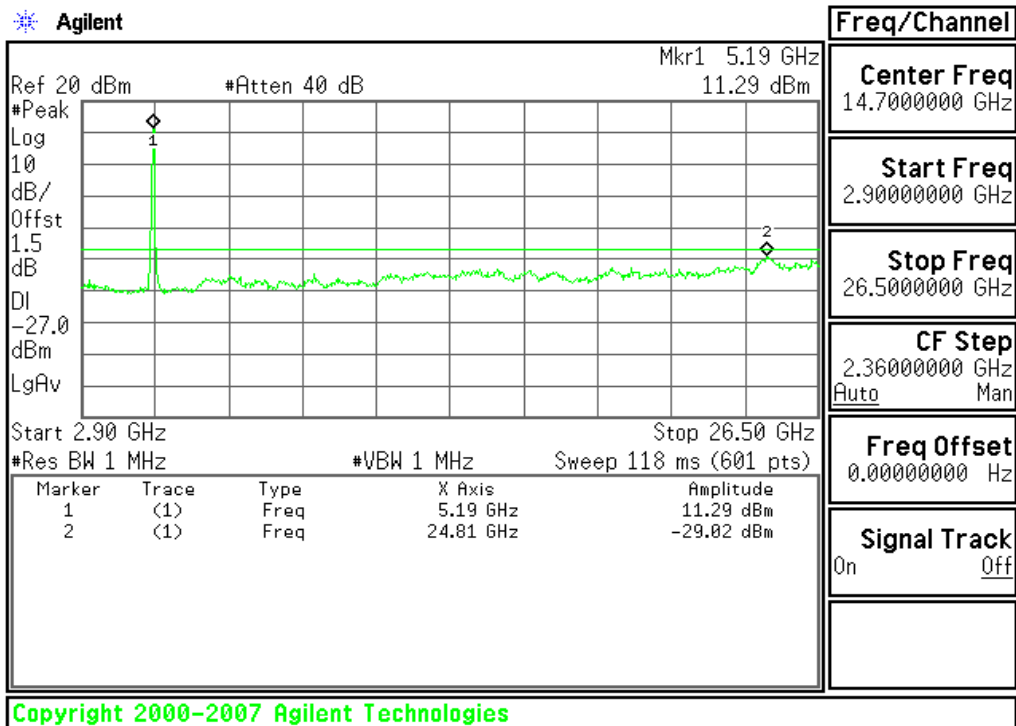
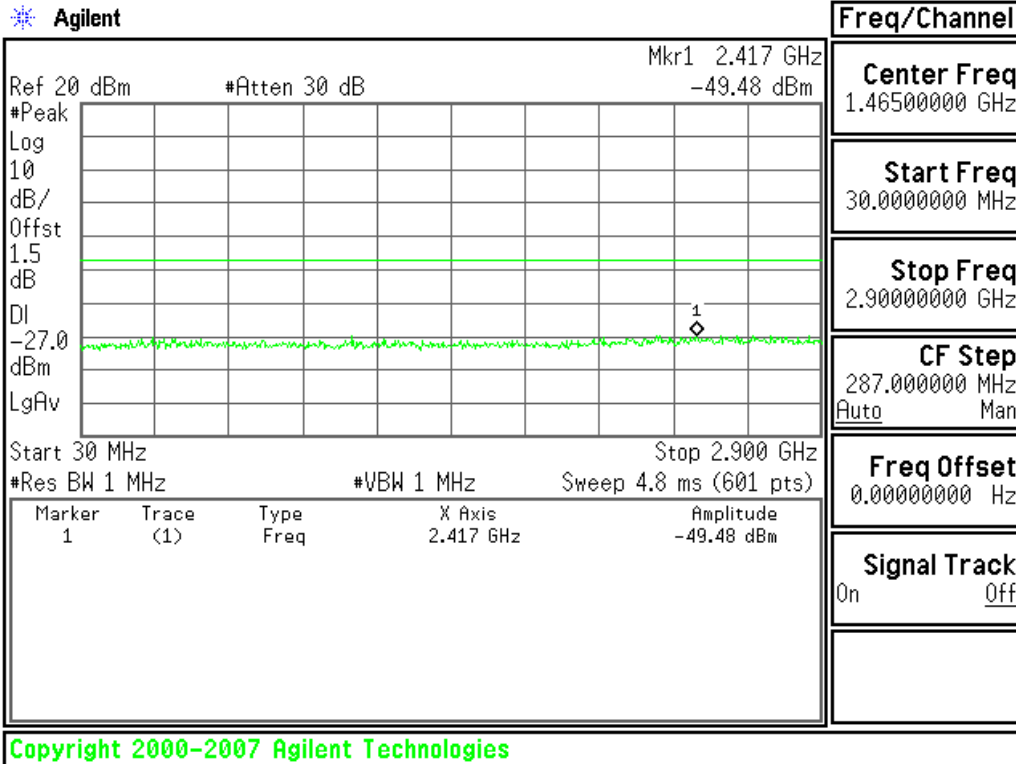
Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0+ Chain 1+ Chain 2:
5150~5250MHz
CH Low

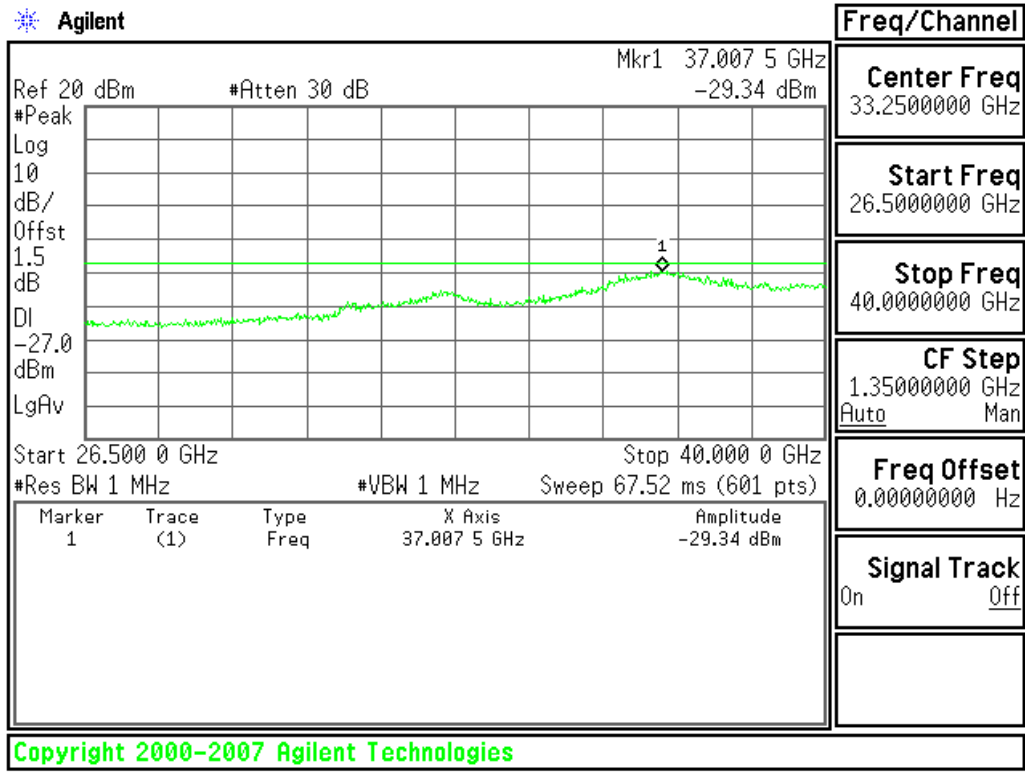






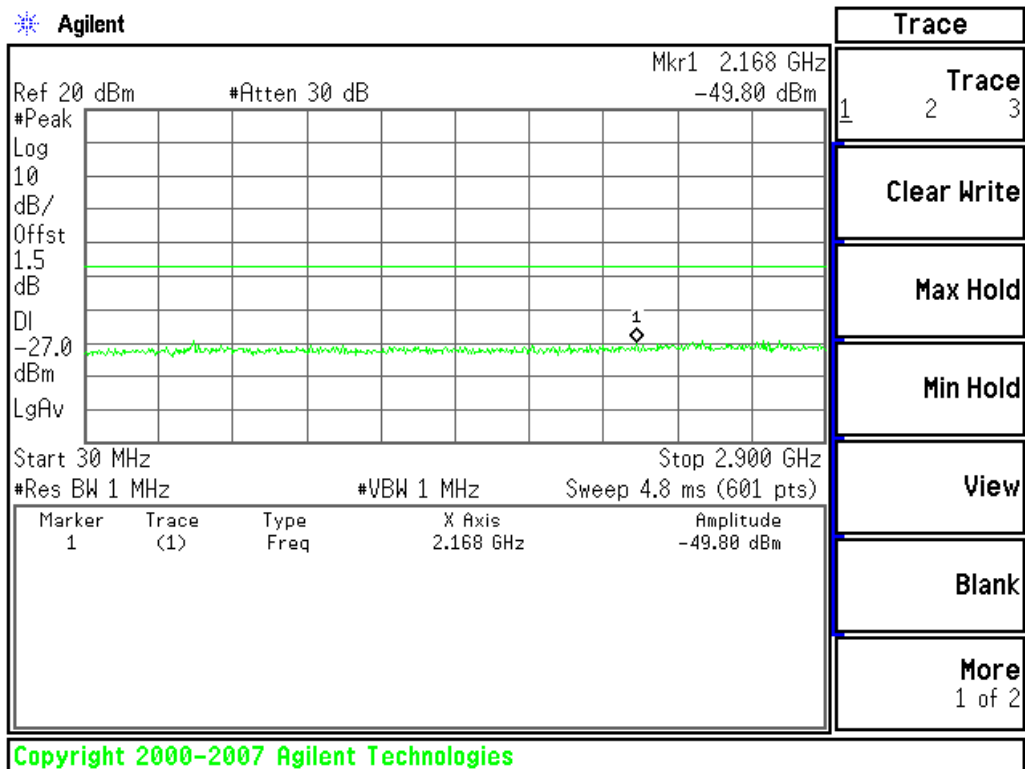
CH High

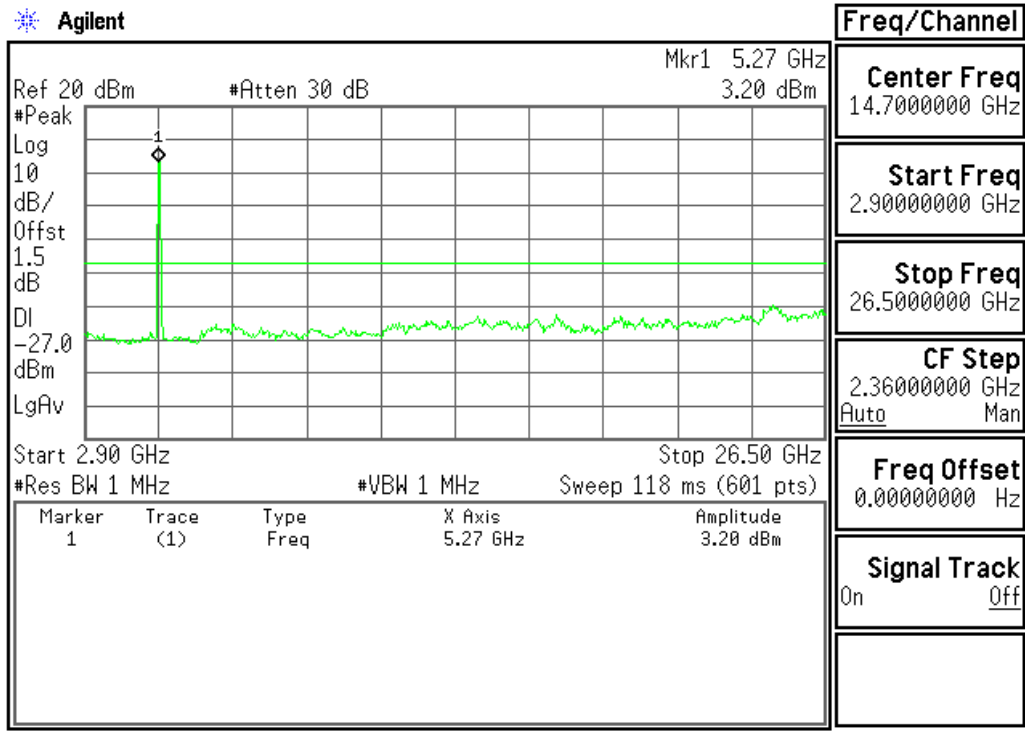




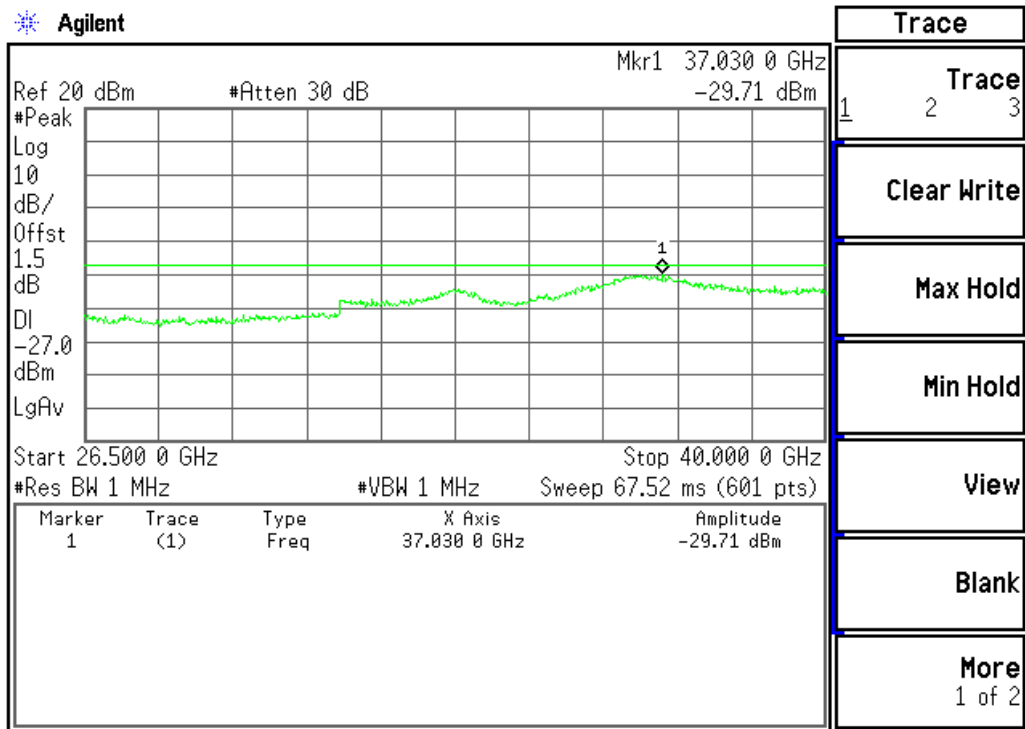
5250~5350MHz

CH Low





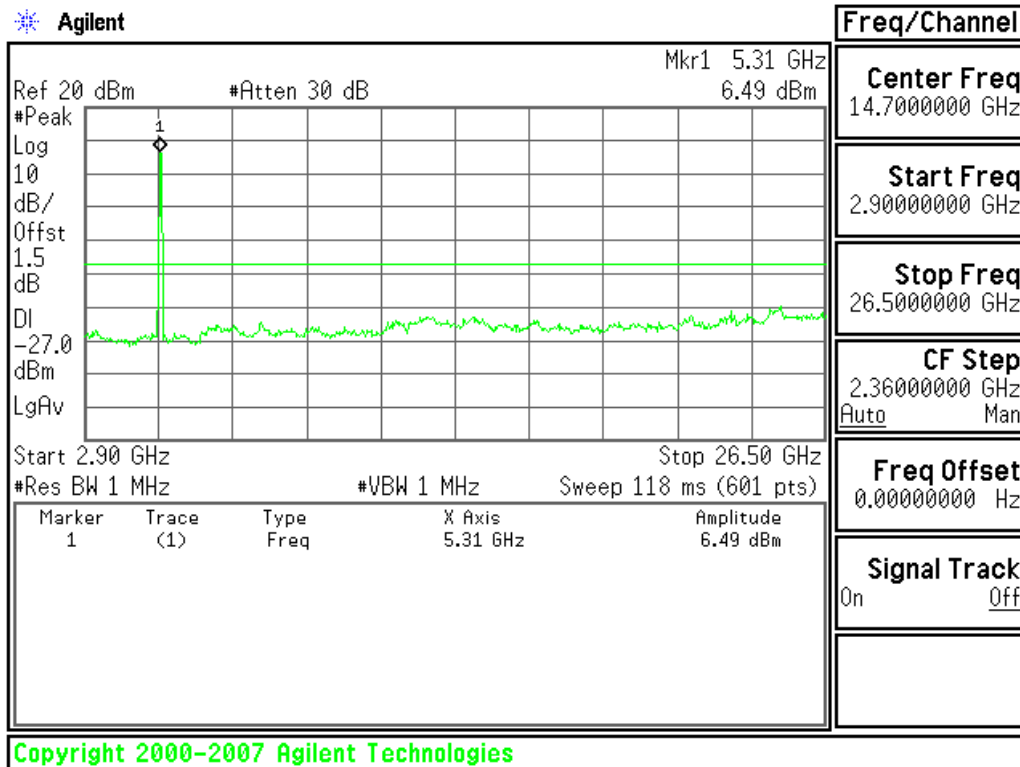
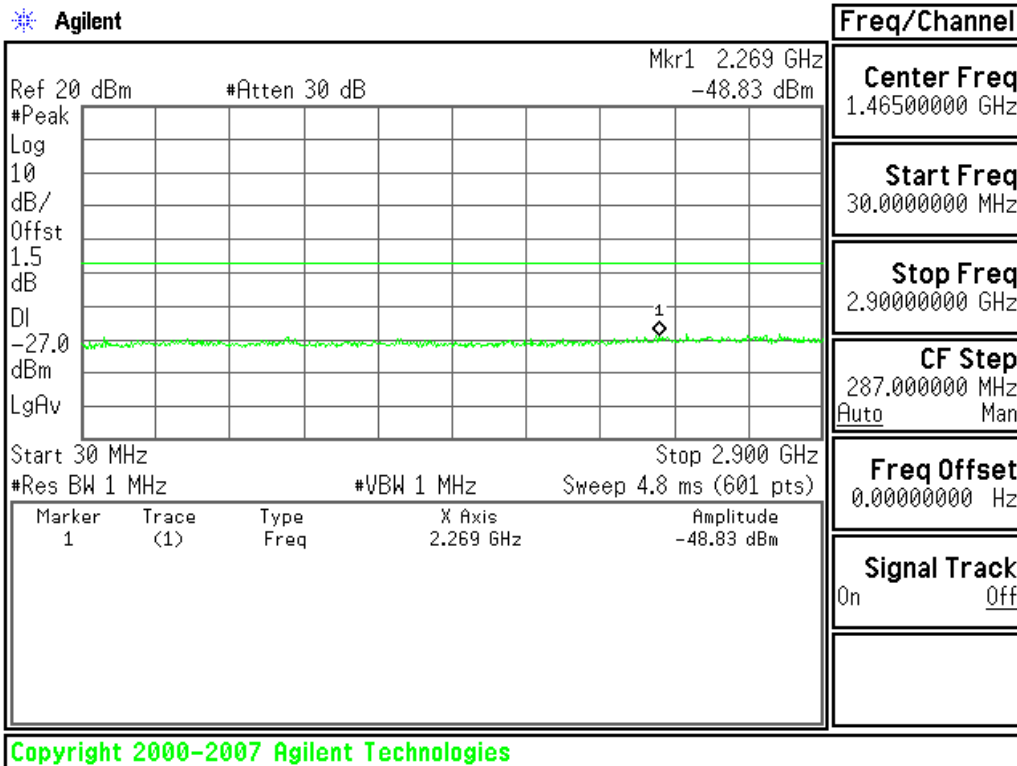
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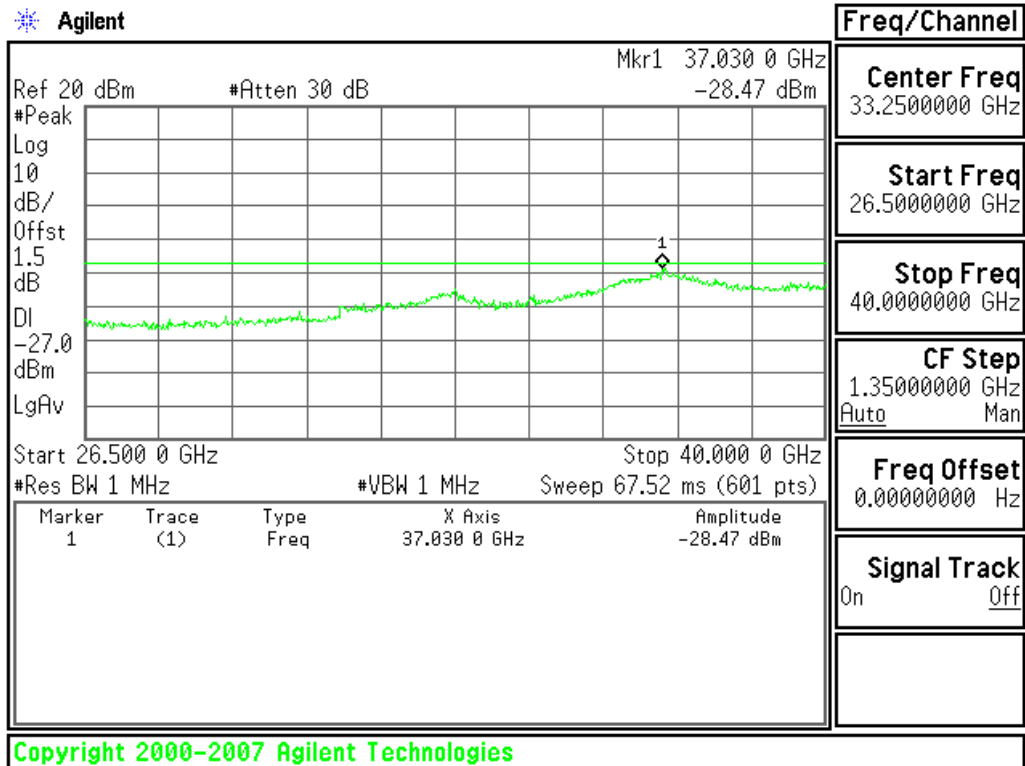


Copyright 2000-2007 Agilent Technologies



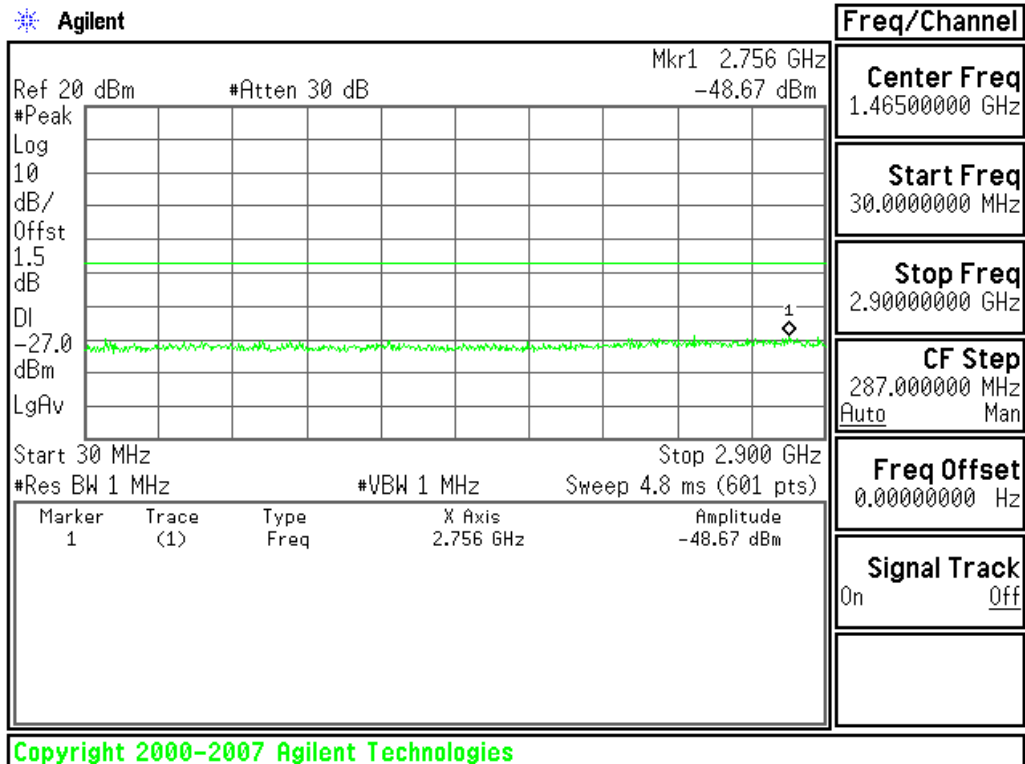
CH High

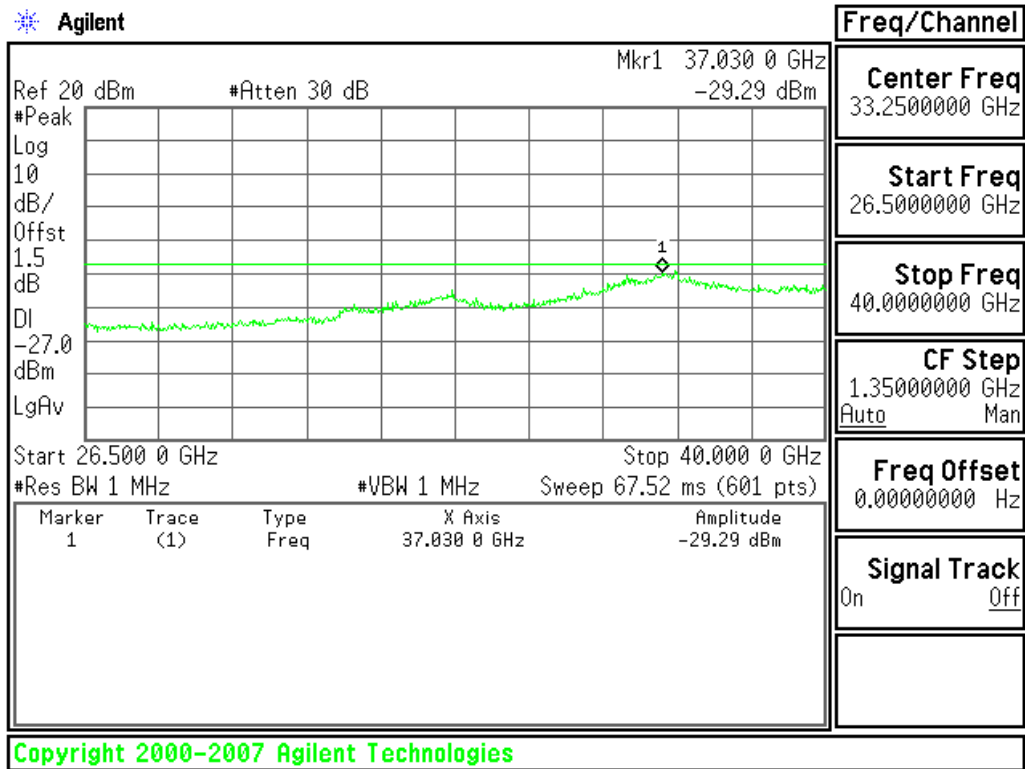
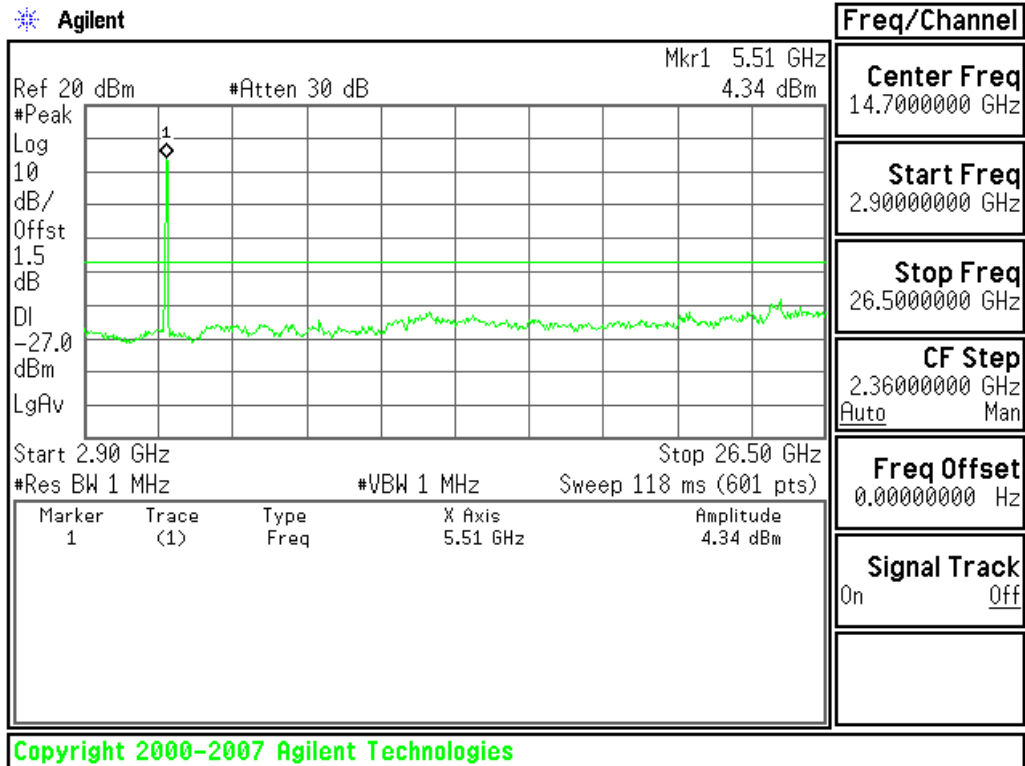




5470~5725MHz

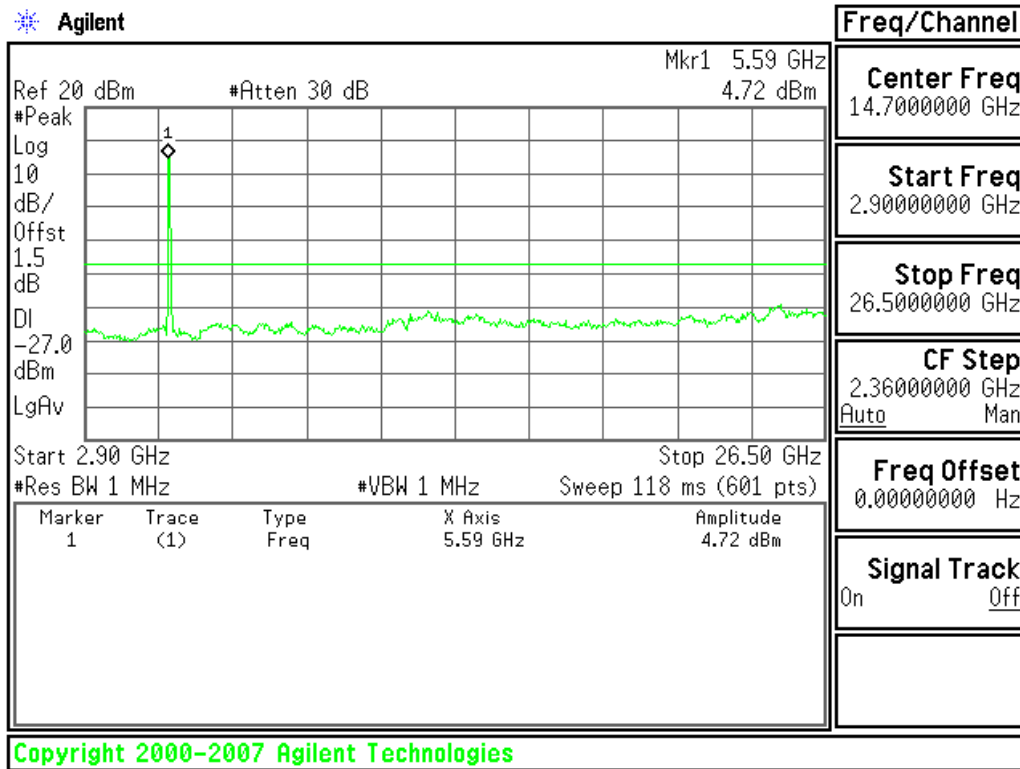
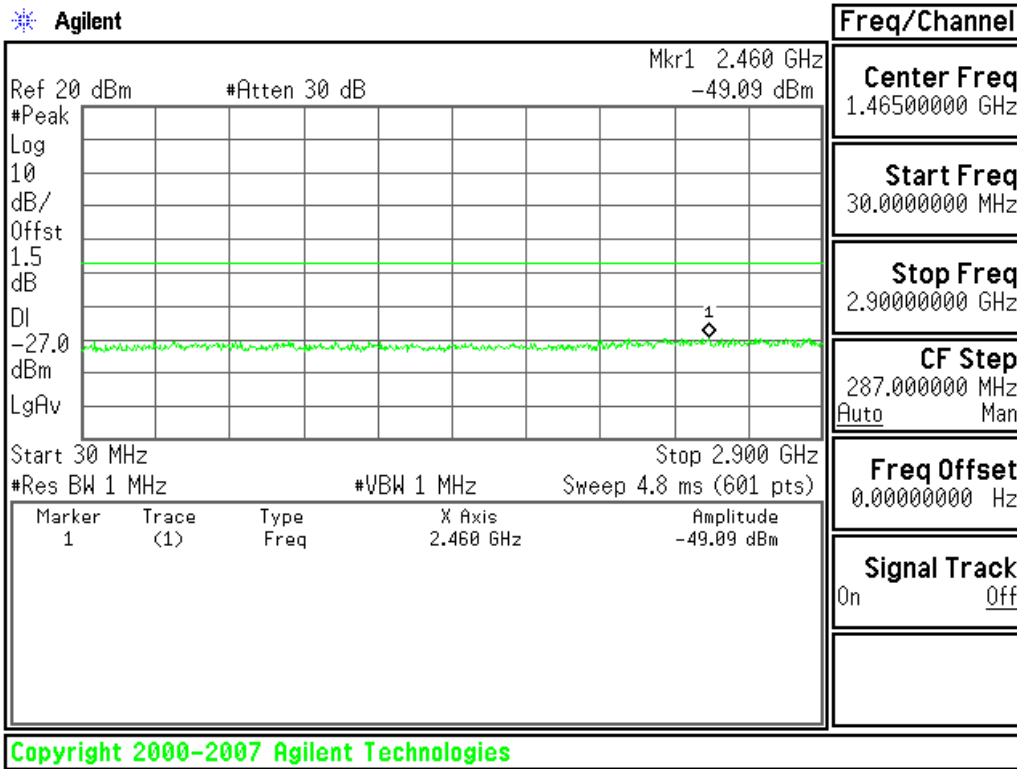
CH Low

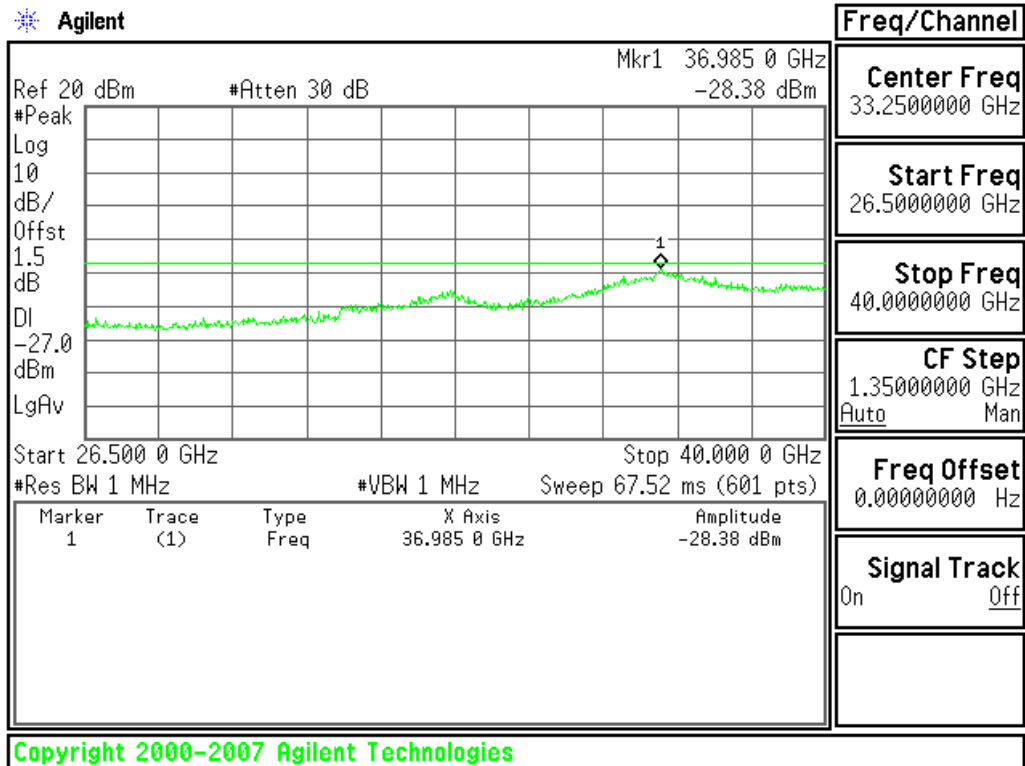




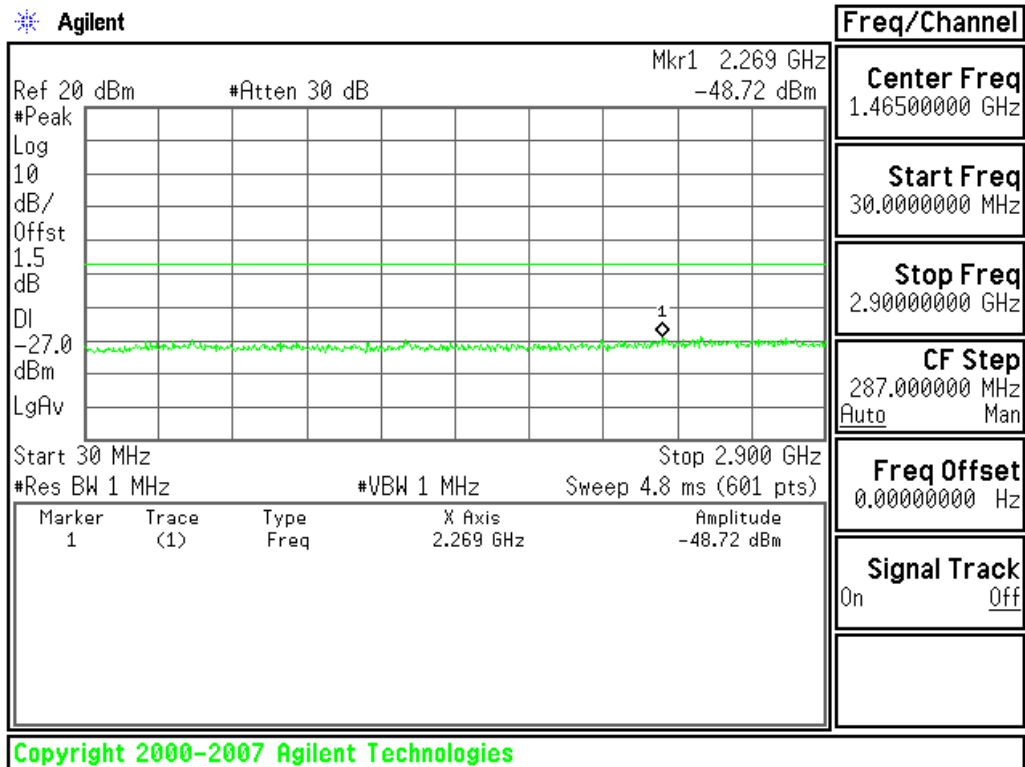


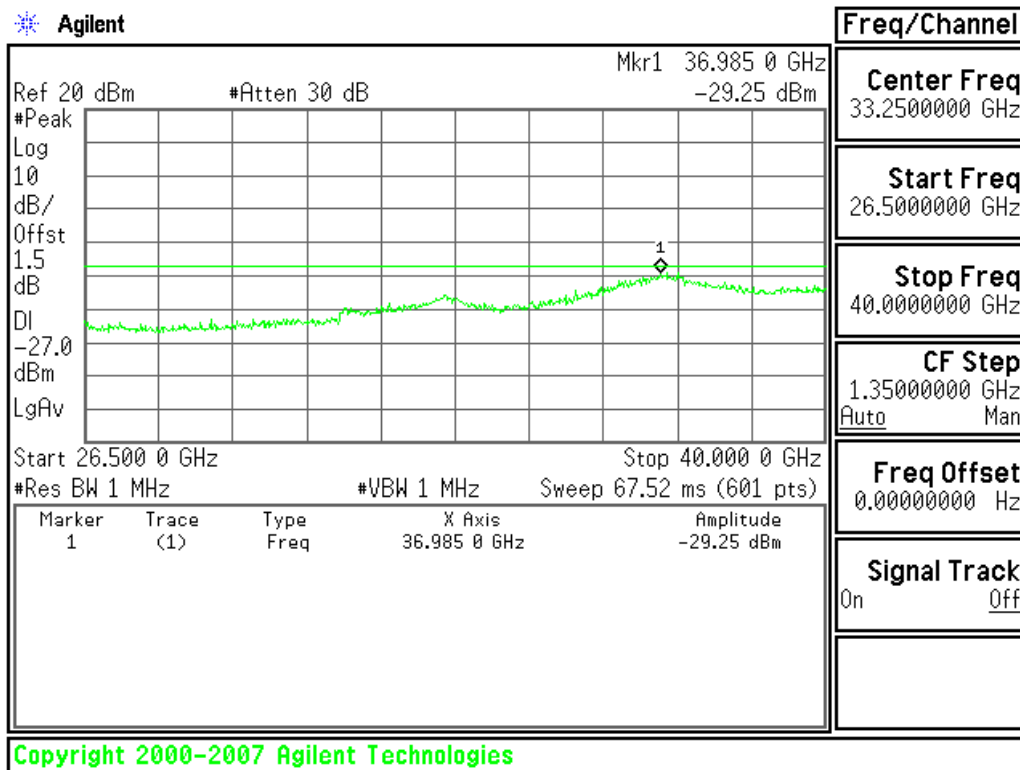
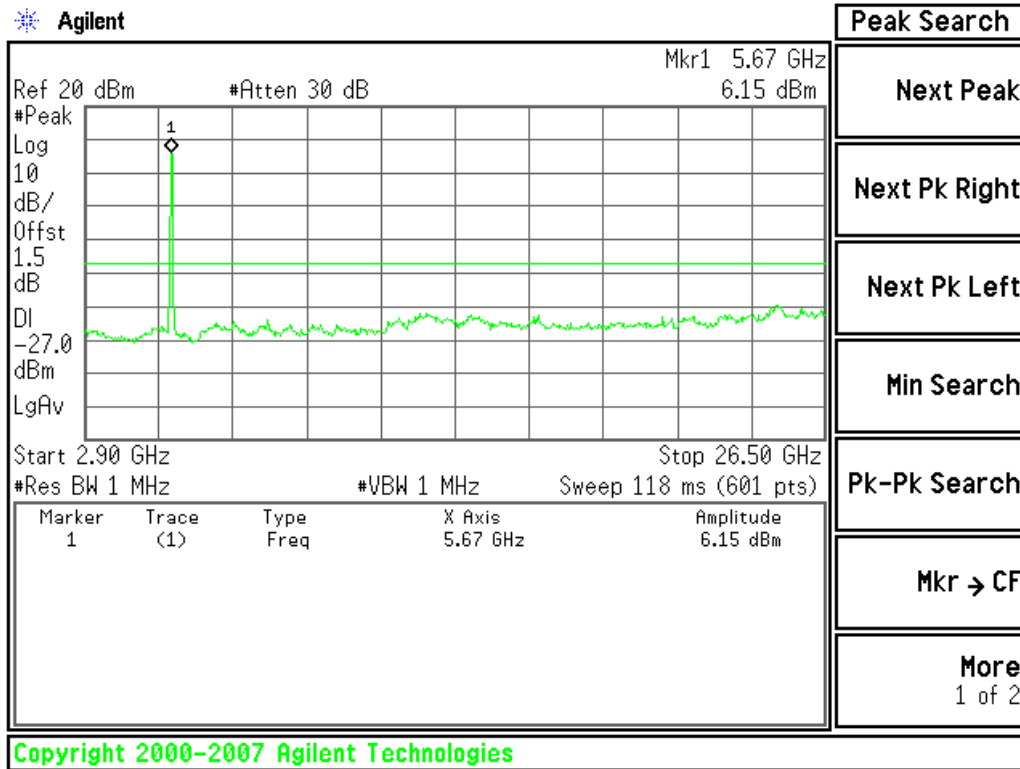
CH Mid





CH High







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	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required

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

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

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 and 5470-5725 MHz ranges.

The EUT is a Master Device without Ad-Hoc function.

The highest power level within these bands is 12.77 dBm EIRP in the 5250-5350 MHz band and 12.99 dBm EIRP in the 5470-5725 MHz band.

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 $-62 + 2 = -60$ dBm.

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.

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&40 MHz.

Test results show that the EUT requires 89.4 seconds to complete its initial power-up cycle.

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 and the same manufacturer / model Vector Signal Generator as the NTIA. The hopping signal generating system utilizes the simulated hopping method.

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, with the initial starting point randomized at run-time.

Frequency Hopping Signal Generation

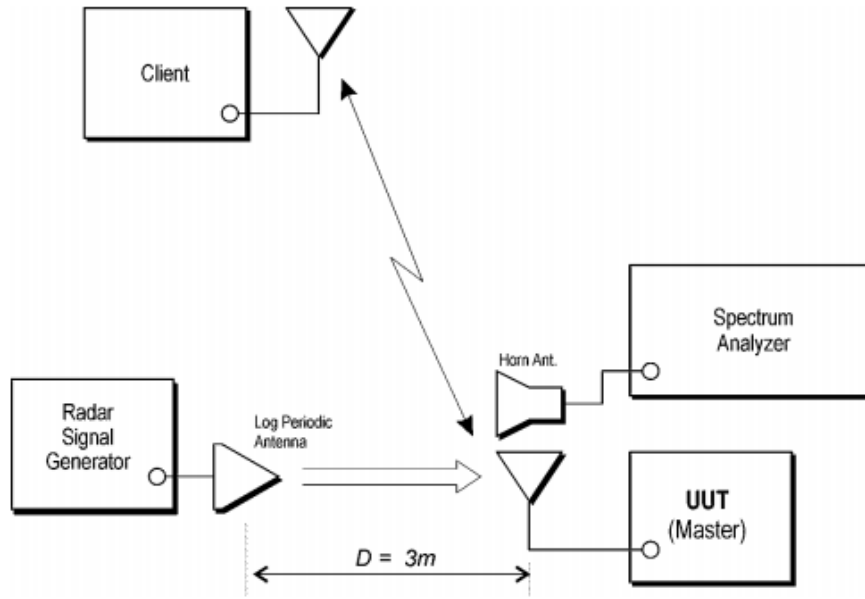
The hopping burst generator is a High Speed Digital I/O card plugged into the control computer. This card utilizes an independent hardware clock reference therefore the output pulse timing is unaffected by host computer operating system latency times.

The software selects the hopping sequence as a 100-length segment of the August 2005 NTIA hopping frequency list. This list contains 274 unique pseudorandom sequences. Each such sequence contains 475 frequencies ordered on a random without replacement basis. Each successive trial uses a contiguous 100-length segment from within each successive 475-length sequence in the list. The initial starting point within the list is randomized at run-time such that the first 100-length segment is entirely contained within the first 475-length sequence. The starting point of each successive trial 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.



Radiated Method System Block Diagram





System Calibration

Adjust the Master Step Attenuator to 10 dB, and the Slave Step Attenuator to 30 dB.

If required, disconnect the spectrum analyzer, Master Device, and Slave Device from the test system. Terminate the Common port of the Spectrum Analyzer Combiner/Divider, Port 2 of the Master Diversity Combiner/Divider, and the pad at the Common port of the Slave Combiner/Divider. Leave, or connect, the appropriate cable to Port 1 of the Master Diversity Combiner/Divider and connect the free end (Master Device end) of this cable to the spectrum analyzer.

Adjust the signal generator and spectrum analyzer to the center frequency of the channel to be measured. Set the signal generator to CW mode. Set the RBW of the spectrum analyzer to 10 kHz and the span to 100 kHz. 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, then remove the cable from Port 1 of the Master Diversity Combiner/Divider and replace this cable with a termination. 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 1 MHz, set the span to 10 MHz, and confirm that the signal is still displayed at -62 dBm.

This Reference Level Offset setting is used for all tests for which the Master Step Attenuator is set to 10 dB. 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.

The Link Step Attenuator and Slave Step Attenuator settings may be changed without affecting the System Calibration. The System Calibration process must be repeated for different settings of the Master Step Attenuator to determine the Reference Level Offset associated with each Master Step Attenuator setting.

Interference Detection Threshold Adjustment

Download the applicable radar waveforms to the signal generator. Select the radar waveform, trigger a burst manually and measure the amplitude 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 an adequate RSS 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 by changing the setting of the Master Step Attenuator and verifying that the displayed traffic level changes accordingly. Confirm that the displayed traffic does not include Slave Device traffic by changing the setting of the Slave Step Attenuator and the Link Step Attenuator and verifying that the displayed traffic level does not change. Reset all Step Attenuators to their previous settings.

If the above conditions cannot be met, use a different setting of the Master Step Attenuator, performing a new System Calibration and Interference Detection Threshold Adjustment as required for the new Master Step Attenuator setting.

TEST RESULTS

No non-compliance noted

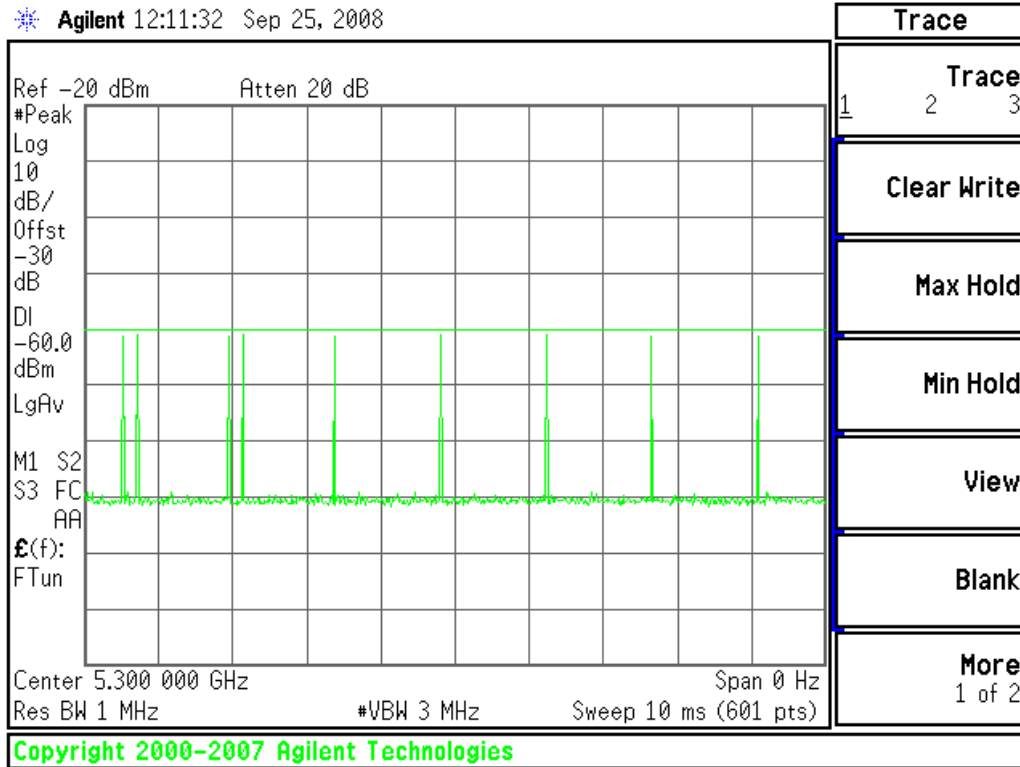


Test Plot

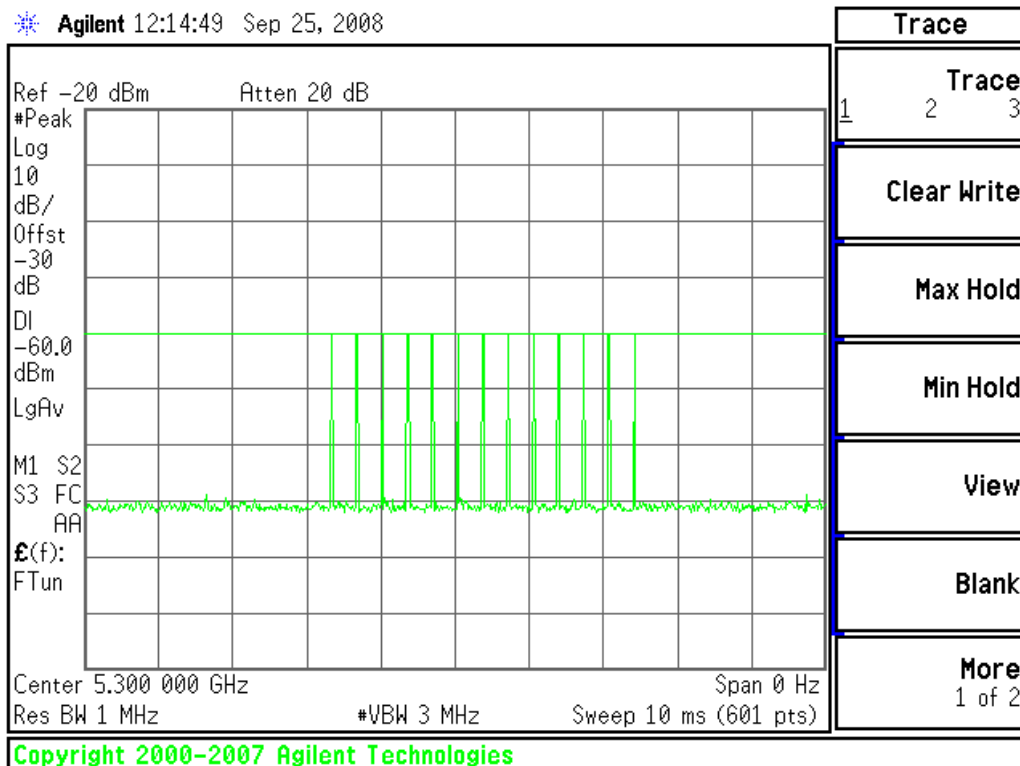
PLOTS OF RADAR WAVEFORMS, AND WLAN SIGNALS

PLOTS OF RADAR WAVEFORMS

Sample of Short Pulse Radar Type 1

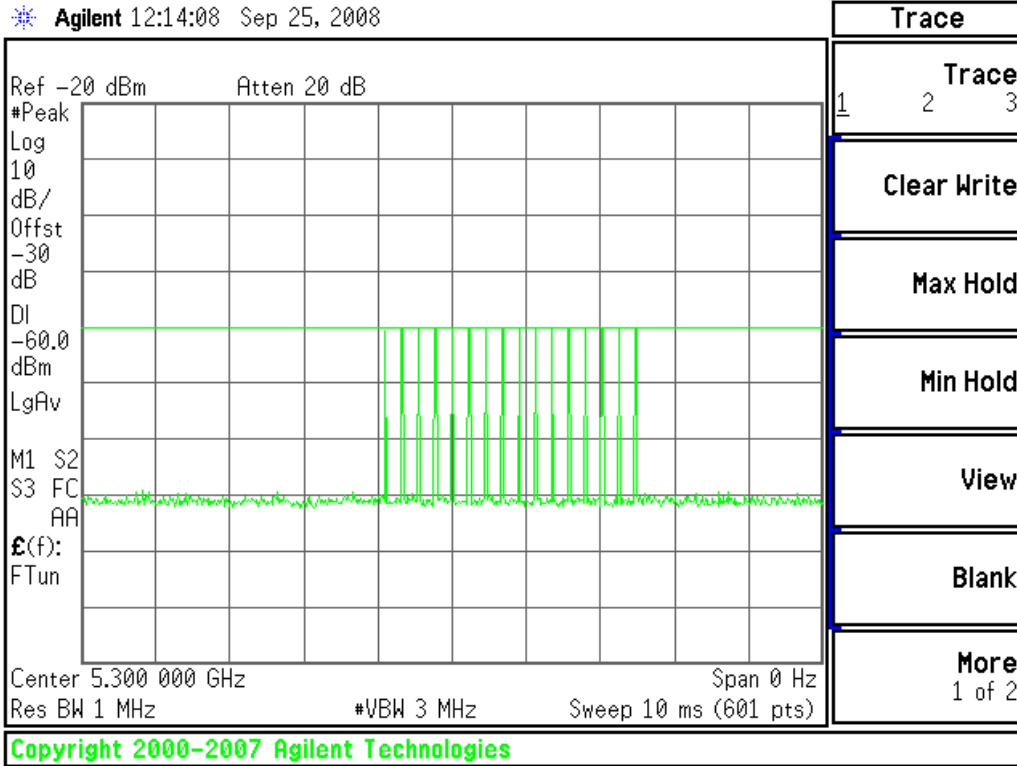


Sample of Short Pulse Radar Type 2

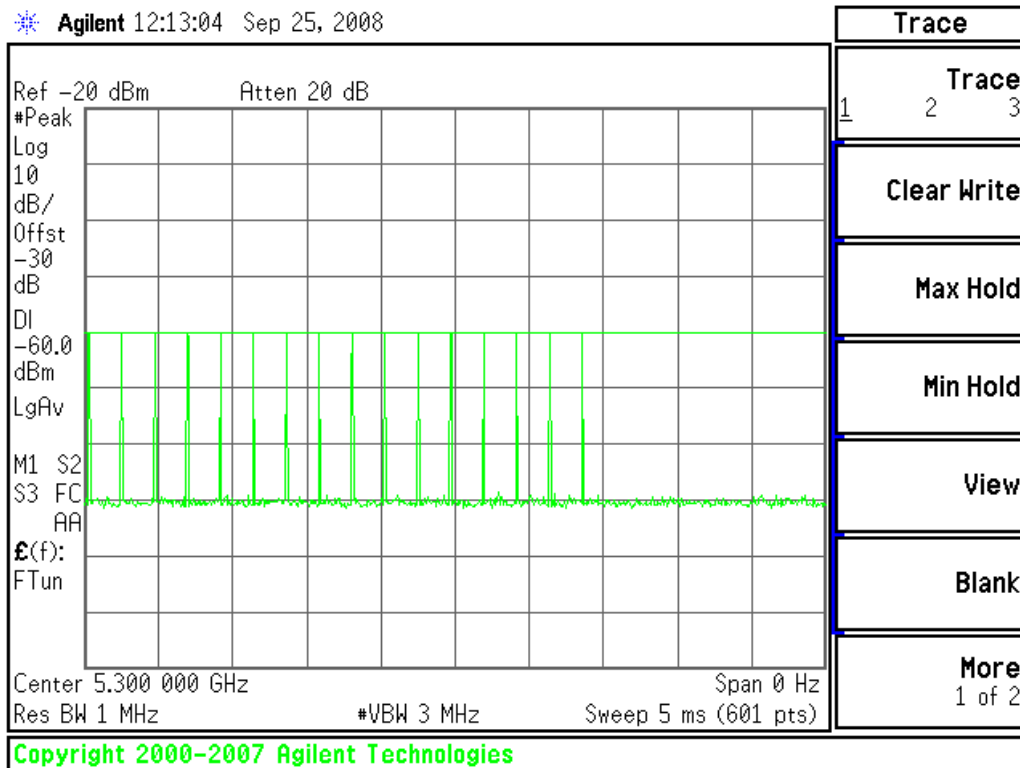




Sample of Short Pulse Radar Type 3

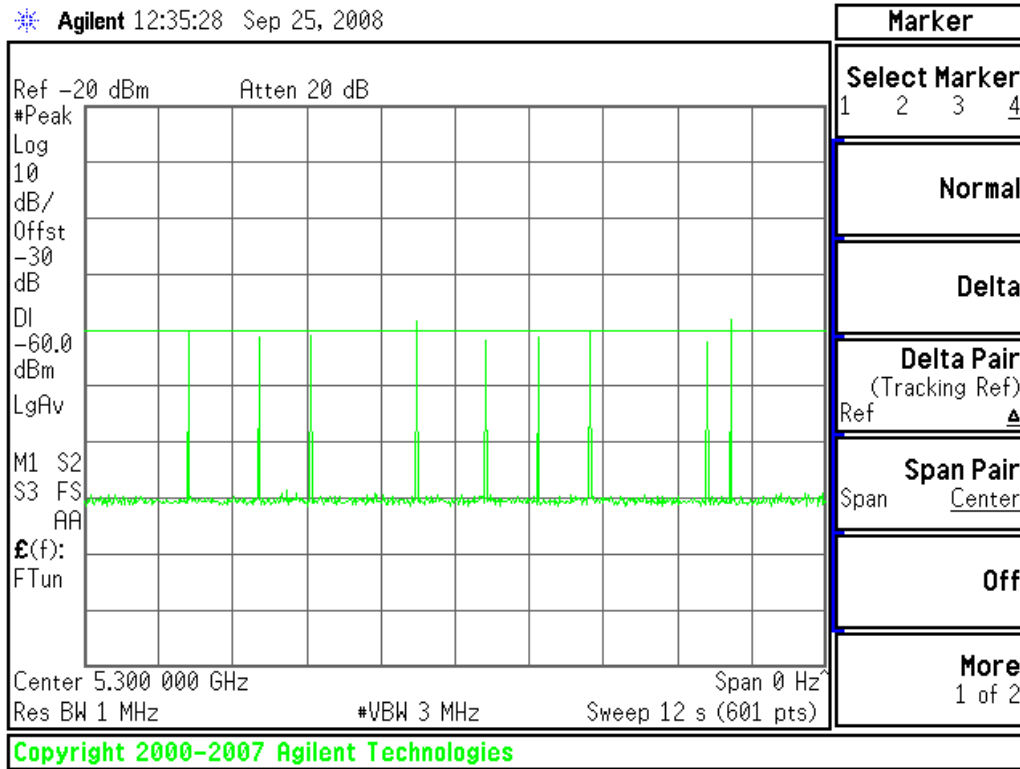


Sample of Short Pulse Radar Type 4

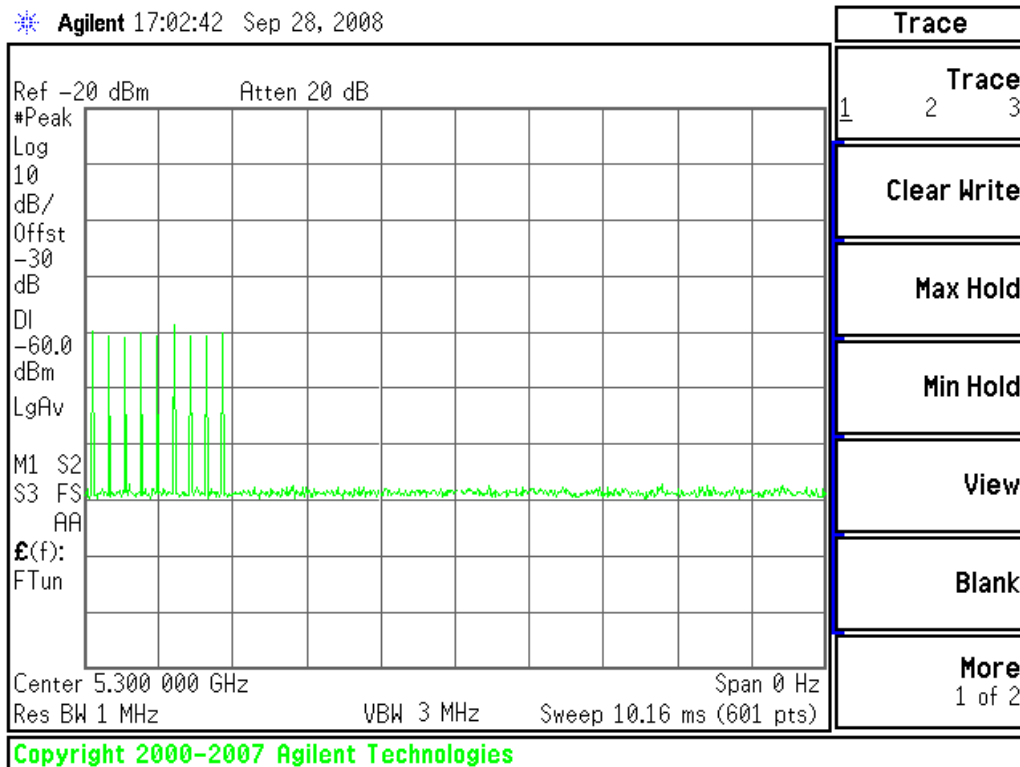




Sample of Long Pulse Radar Type 5

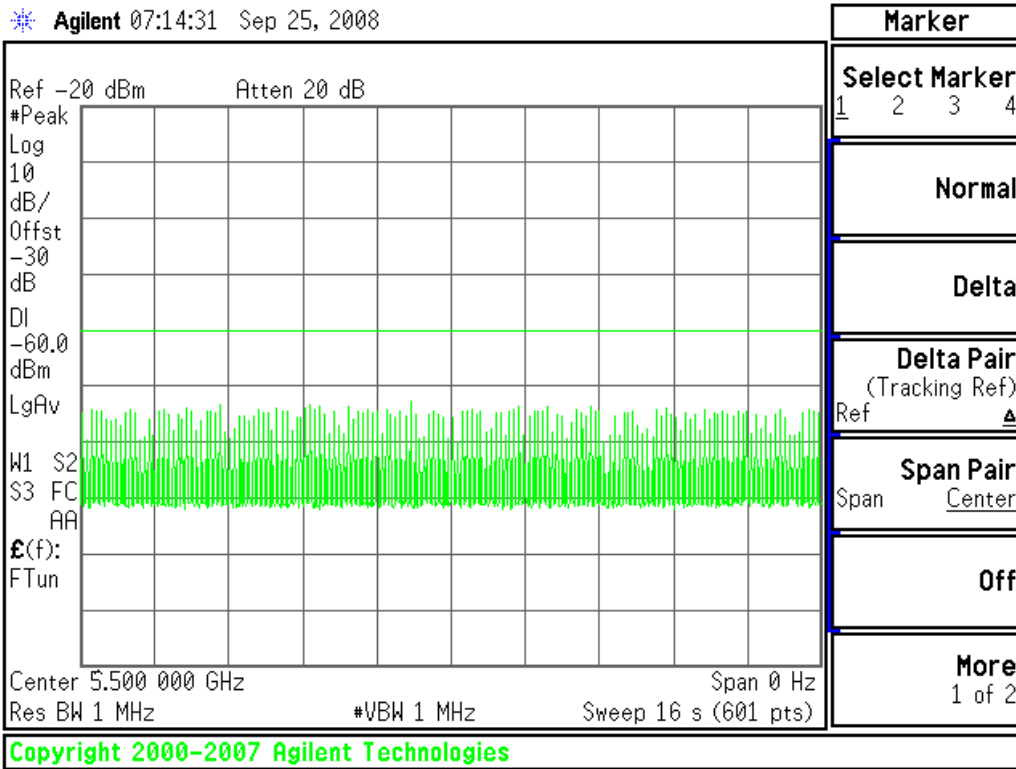


Sample of Frequency Hopping Radar Type 6





PLOT OF WLAN TRAFFIC FROM MASTER





TEST CHANNEL AND METHOD

All tests were performed at a channel center frequency of 5300 MHz utilizing a Radiated test method.

CHANNEL AVAILABILITY CHECK TIME

Test Procedure To Determine Initial Power-Up Cycle Time

A link was established on channel then the EUT was rebooted. The time from the cessation of traffic to the re-initialization of traffic was measured as the time required for the EUT to complete the total powerup cycle. The time to complete the initial power-up period is 60 seconds less than this total power-up time.

Test Procedure For Timing Of Radar Burst

With a link established on channel, the EUT was rebooted. A radar signal was triggered within 0 to 6 seconds after the initial power-up period, corresponding to the beginning of the CAC time, and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. With a link established on channel, the EUT was rebooted. A radar signal was triggered within 54 to 60 seconds after the initial power-up period, corresponding to the end of the CAC time, and transmissions on the channel were monitored on the spectrum analyzer.

Channel Availability Check Time Results

No non-compliance noted.

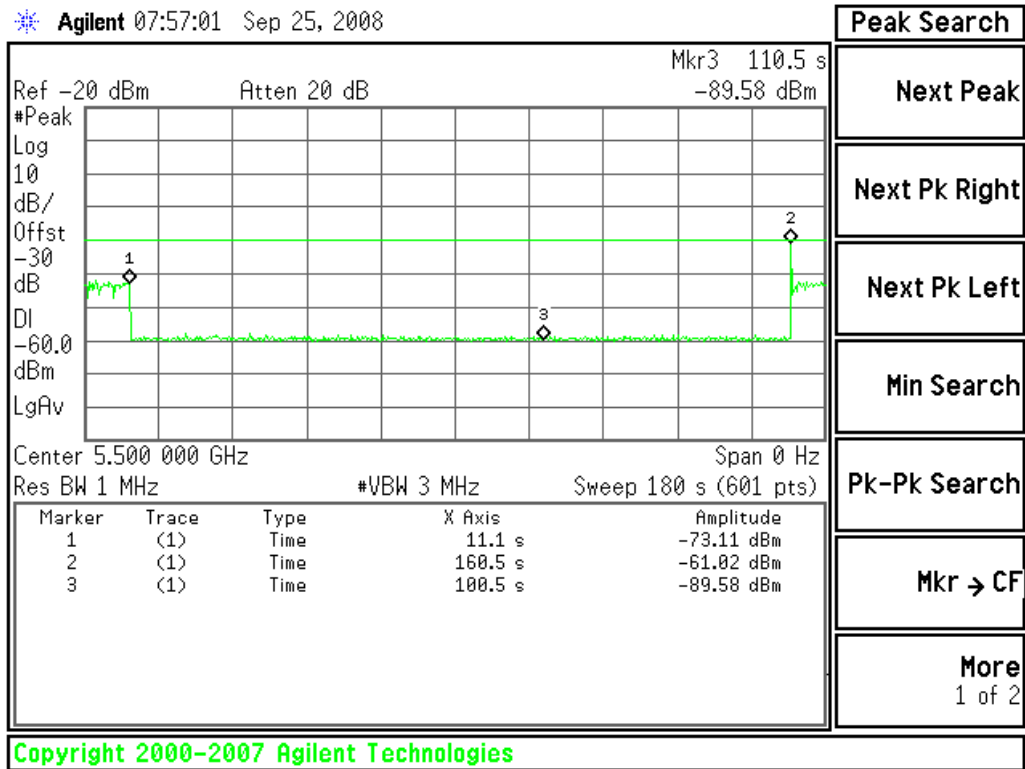
Time required for EUT to complete the initial power-up cycle (sec)
89.4

If a radar signal is detected during the channel availability check then the PC controlling the EUT displays a message stating that radar was detected.

Timing of Radar Burst	Display on EUT / PC Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT Initiates Transmissions	Transmissions begin on channel after completion of the initial power-up cycle and the 60 second CAC
Within 0 to 6 second window	EUT indicates radar detected EUT does not display any radar parameter values	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected EUT does not display any radar parameter values	No transmissions on channel



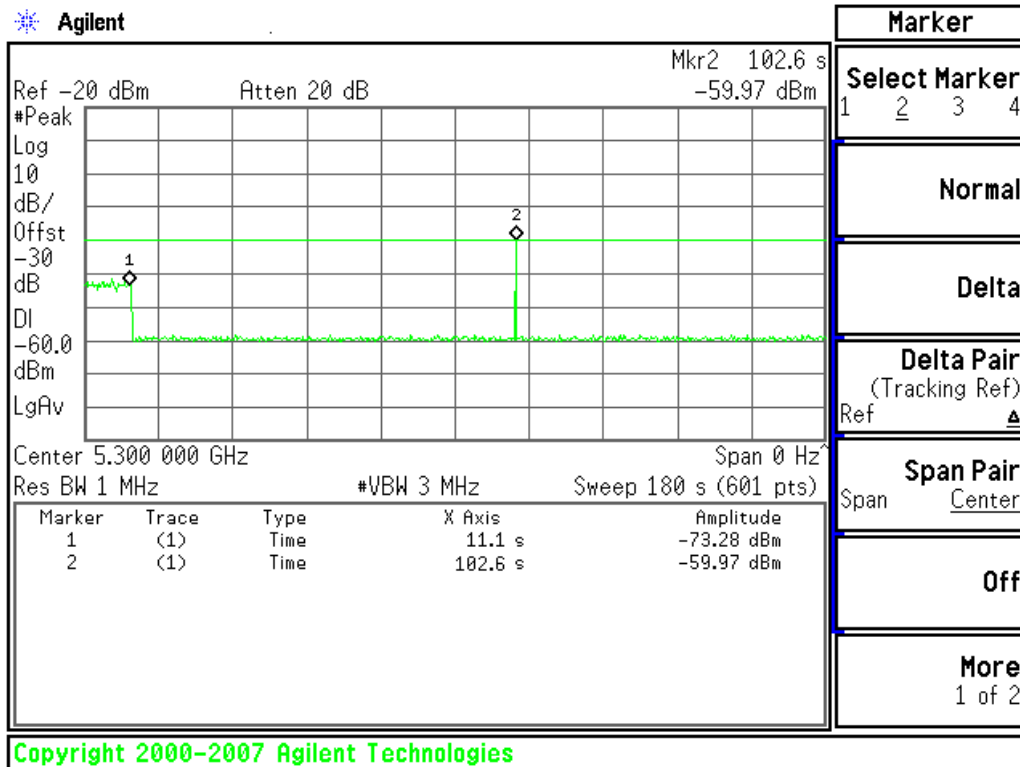
Timing Plot Without Radar During CAC



The initial power-up cycle requires $(160.5 - 11.1 - 60) = 89.4$ seconds.



Timing Plot With Radar Near Beginning Of CAC

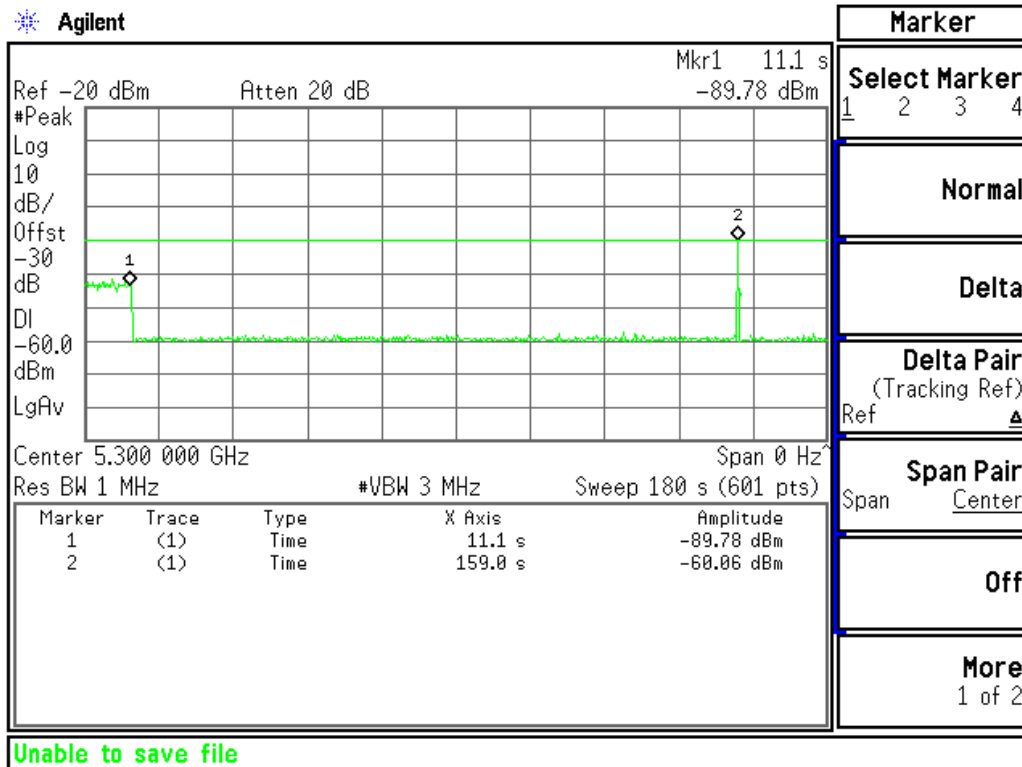


The radar signal is applied $(102.6 - 11.1) = 91.5$ seconds after reboot, which is $(91.5 - 89.4) = 2.1$ seconds after the start of the CAC period.

No EUT transmissions were observed after the radar signal.



Timing Plot With Radar Near End Of CAC



The radar signal is applied $(159.0 - 11.1) = 147.9$ seconds after reboot, which is $(147.9 - 89.4) = 58.5$ seconds after the start of the CAC period.

No EUT transmissions were observed after the radar signal.



CHANNEL MOVE TIME AND CHANNEL CLOSING TRANSMISSION TIME

General Reporting Notes

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

Type 1 Radar Reporting Notes

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 no later than (Reference Marker + 200 msec)

and

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

Type 5 Radar Reporting Notes

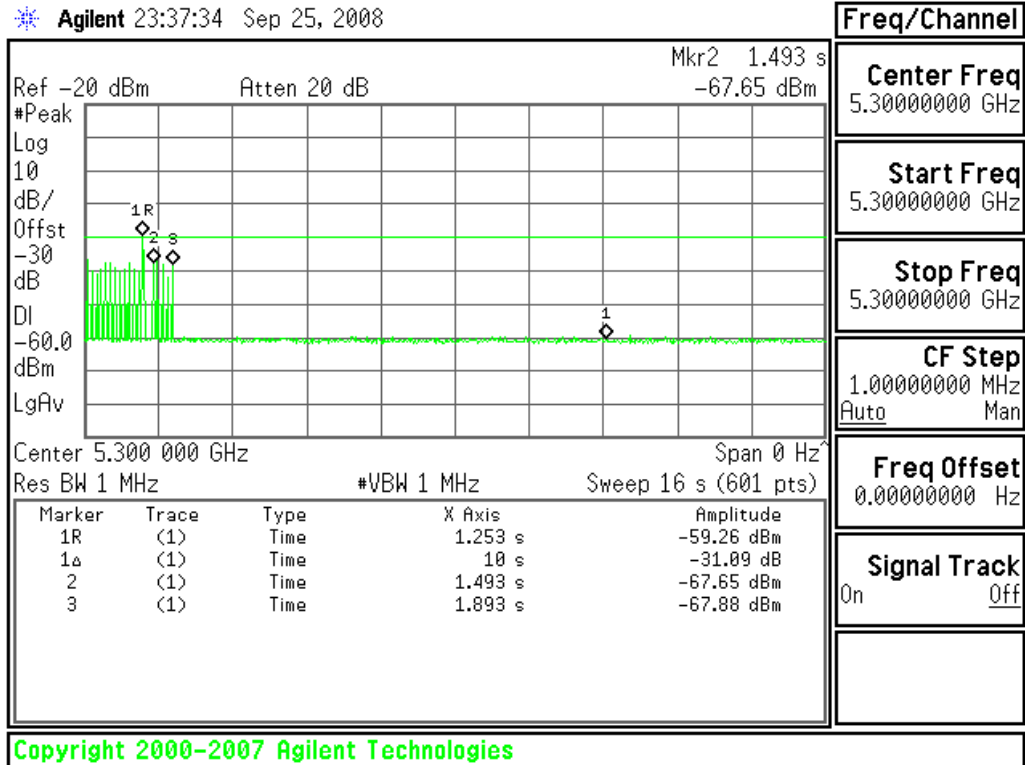
The delta marker is set to 10 seconds after the end of the radar pulse.



Type 1 Channel Move Time Results

No non-compliance noted.

Channel Move Time (s)	Limit (s)
0.400	10



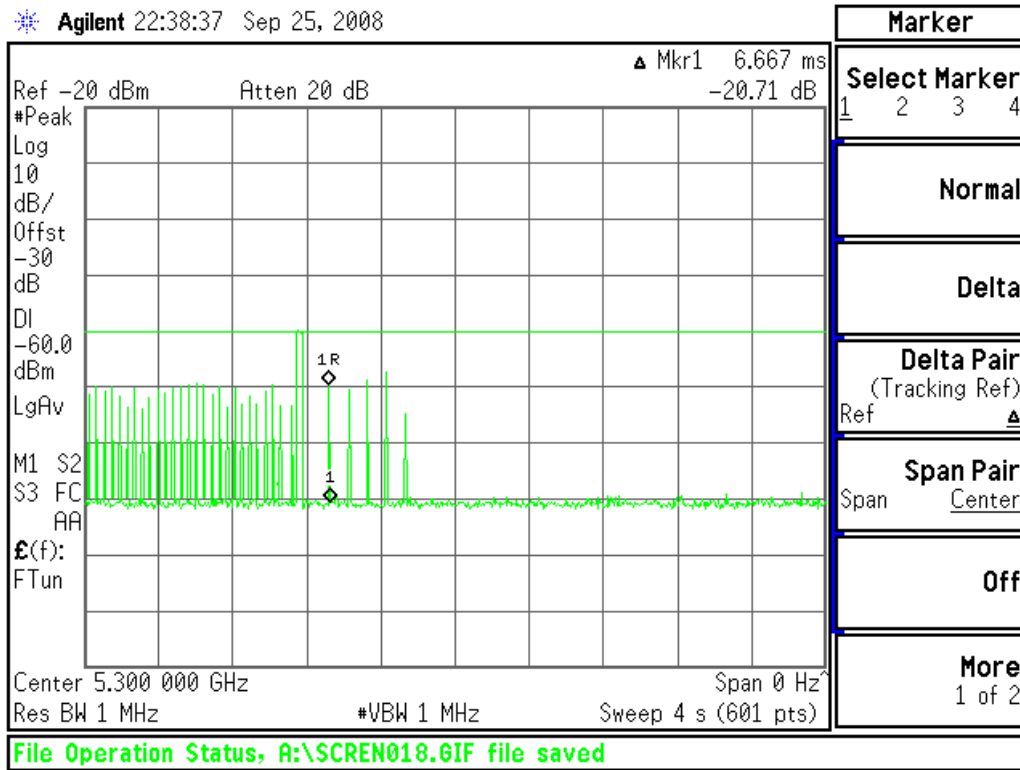


Type 1 Channel Closing Transmission Time Results

No non-compliance noted.

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
33.34	60	-26.66

Only intermittent transmissions are observed during the aggregate monitoring period.

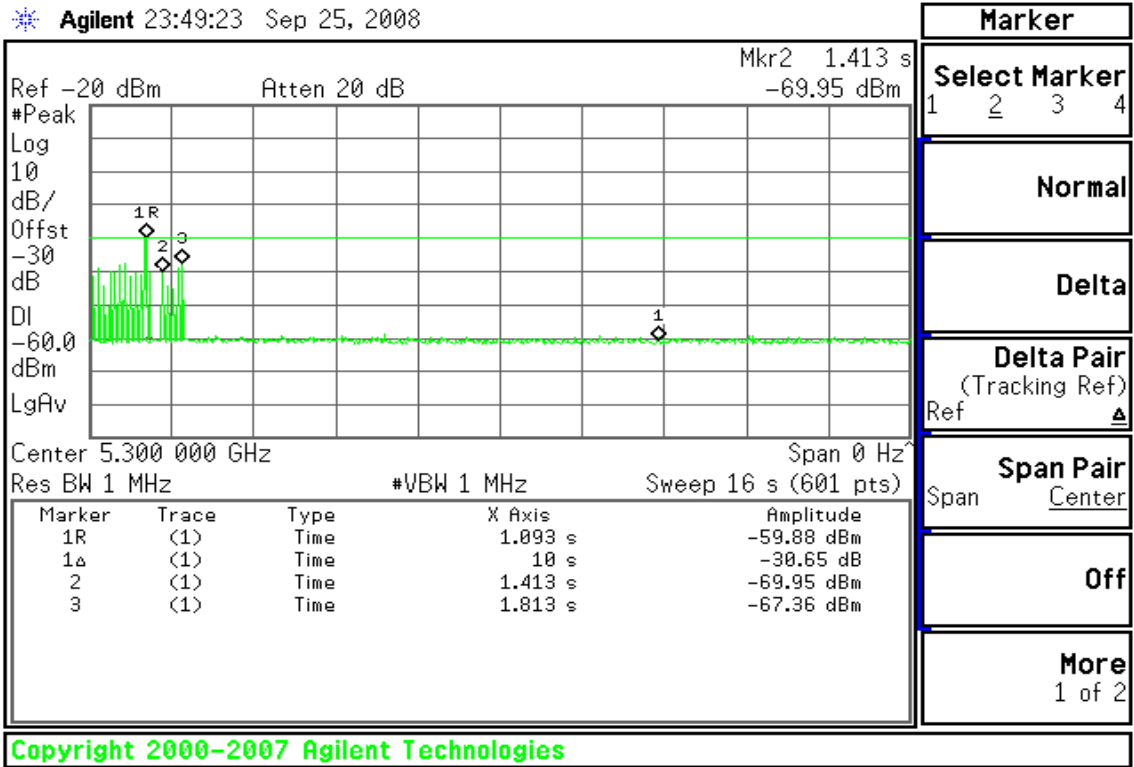




Type 5 Channel Move Time Results

No non-compliance noted.

Channel Move Time (s)	Limit (s)
0.400	10



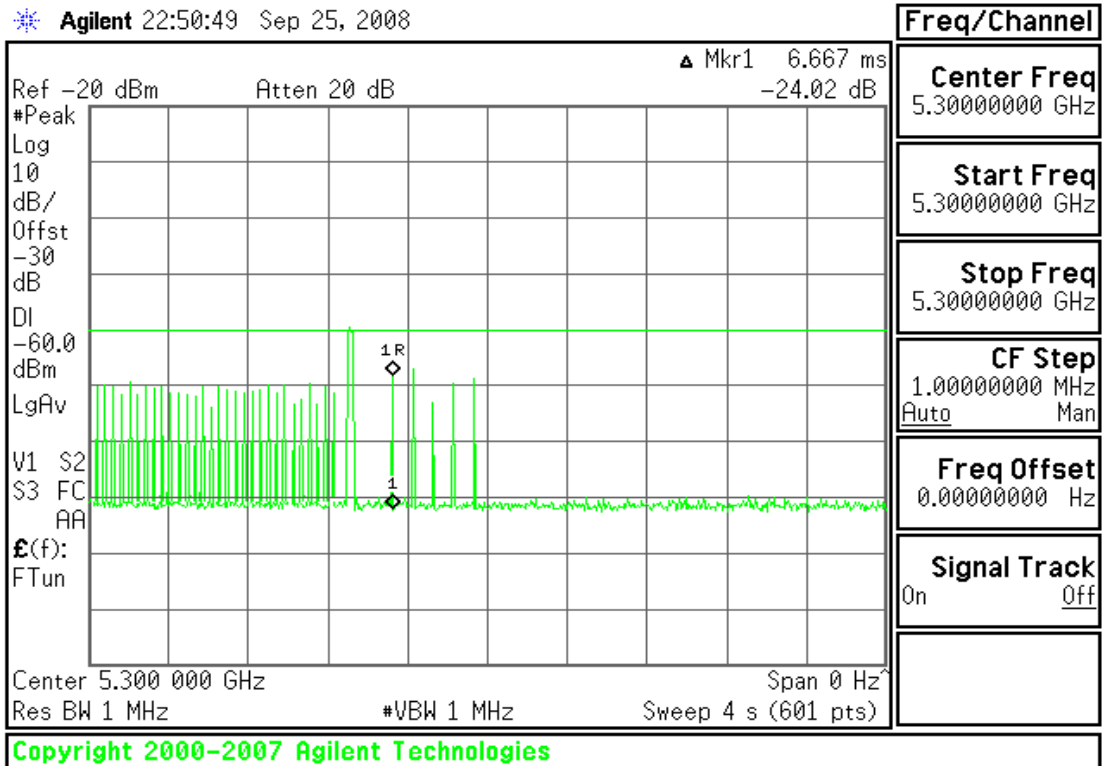


Type 5 Channel Closing Transmission Time Results

No non-compliance noted.

Aggregate Transmission Time (ms)	Limit (ms)	Margin (ms)
33.34	60	-26.66

Only intermittent transmissions are observed during the aggregate monitoring period.

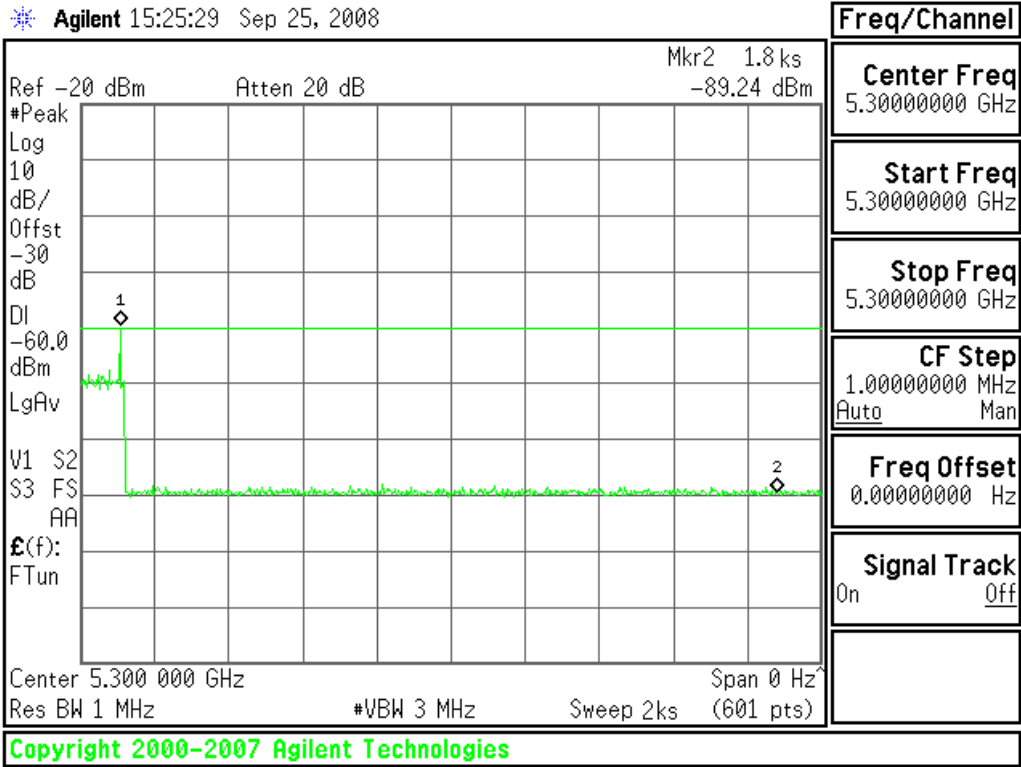




NON-OCCUPANCY PERIOD

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.





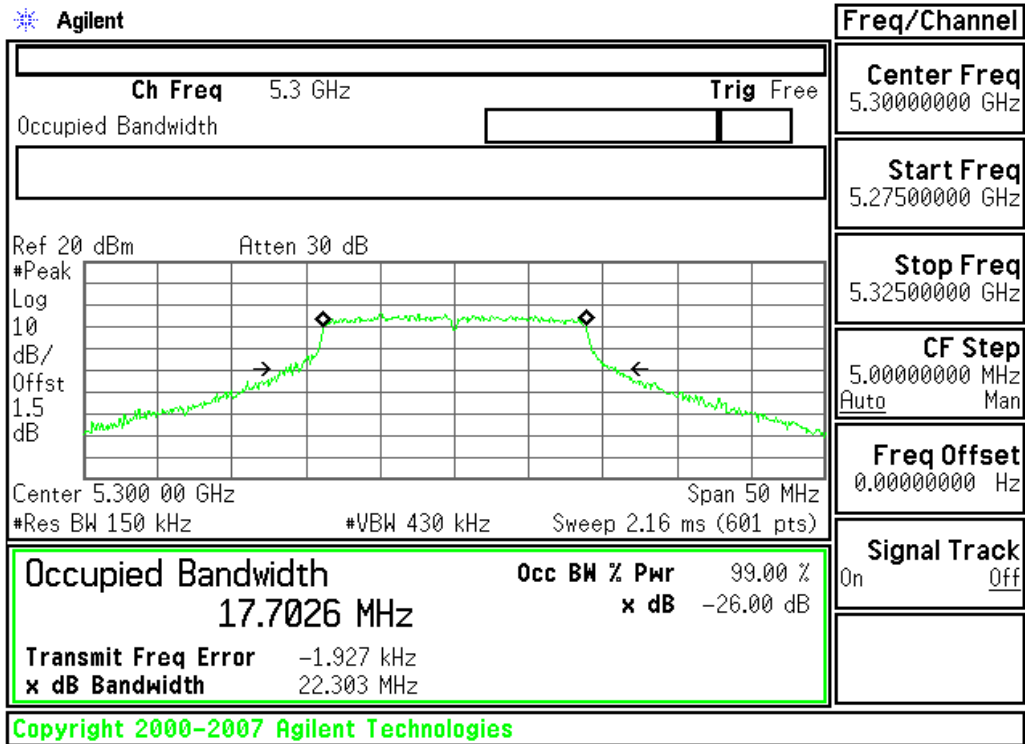
DETECTION BANDWIDTH

Test Results

No non-compliance noted.

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (MHz)	Minimum Limit (%)
5292	5307	15	17.703	84.73	80

Fixed Waveform Test Results:		Waveform Name: FCC TYPE 1		
Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5291	20	1	5.00	
5292	10	10	90.00	FL
5293	10	10	100.00	
5294	10	10	100.00	
5295	10	10	100.00	
5296	10	10	100.00	
5297	10	10	100.00	
5298	10	10	100.00	
5299	10	10	100.00	
5300	10	10	100.00	
5301	10	10	100.00	
5302	10	10	100.00	
5303	10	10	100.00	
5304	10	10	100.00	
5305	10	10	100.00	
5306	10	10	100.00	
5307	10	10	100.00	FH
5308	20	13	65.00	



Freq/Channel
Center Freq 5.30000000 GHz
Start Freq 5.27500000 GHz
Stop Freq 5.32500000 GHz
CF Step 5.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off



IN-SERVICE MONITORING

Test Results

No non-compliance noted:

SUMMARY OF DETECTION PROBABILITY

Summary of Detection Probability

Radar Type	Number of Trials	Detection (%)	Limit (%)	Pass / Fail
Short 1	30	93.33	60	Pass
Short 2	30	96.67	60	Pass
Short 3	30	83.33	60	Pass
Short 4	30	96.67	60	Pass
Aggregate of 1 to 4	30	92.5	80	Pass
Long 5	30	100.00	70	Pass
Hopping 6	30	100.00	80	Pass



Type 1 Detection Probability

Trial No.	Successful Detection (Yes.No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	No
25	Yes
26	Yes
27	No
28	Yes
29	Yes
30	Yes



Type 2 Detection Probability

Waveform No.	# Pulses per burst	Pulse Width (us)	Pulse repetition Interval (us)	Successful Detection (Yes/No)
2001	24	1.90	171	Yes
2002	27	1.30	165	Yes
2003	23	3.70	210	Yes
2004	26	4.30	208	Yes
2005	24	1.70	199	Yes
2006	26	2.20	150	Yes
2007	28	4.50	181	Yes
2008	28	4.40	176	Yes
2009	25	2.70	215	Yes
2010	24	2.30	207	Yes
2011	24	4.70	155	Yes
2012	27	4.30	229	Yes
2013	23	2.10	159	Yes
2014	23	1.00	212	Yes
2015	25	1.50	156	Yes
2016	28	1.30	184	Yes
2017	23	4.20	207	Yes
2018	27	4.20	182	Yes
2019	24	4.00	230	Yes
2020	29	2.80	173	Yes
2021	27	4.90	150	Yes
2022	27	2.10	166	Yes
2023	24	3.10	217	Yes
2024	24	2.40	160	Yes
2025	27	4.20	206	Yes
2026	29	3.30	181	Yes
2027	26	1.70	177	Yes
2028	27	2.90	211	Yes
2029	23	2.50	177	Yes
2030	23	5.00	173	Yes



Type 3 Detection Probability

Waveform No.	# Pulses per burst	Pulse Width (us)	Pulse repetition Interval (us)	Successful Detection (Yes/No)
3001	17	9.20	257	Yes
3002	17	7.40	286	Yes
3003	17	5.70	261	Yes
3004	17	8.00	493	Yes
3005	16	5.60	417	Yes
3006	17	7.00	489	Yes
3007	18	9.50	346	Yes
3008	17	6.00	487	Yes
3009	16	8.20	279	Yes
3010	18	9.80	476	Yes
3011	17	6.80	269	Yes
3012	17	5.40	432	Yes
3013	18	5.00	298	Yes
3014	17	7.40	355	Yes
3015	16	9.50	286	Yes
3016	16	6.50	288	Yes
3017	17	9.90	383	Yes
3018	17	8.20	308	Yes
3019	17	6.50	349	No
3020	16	5.50	274	No
3021	16	8.00	287	Yes
3022	17	8.00	497	No
3023	18	8.20	427	Yes
3024	16	6.10	420	Yes
3025	18	6.70	414	No
3026	16	8.70	316	Yes
3027	18	5.60	499	Yes
3028	18	7.90	393	Yes
3029	17	6.10	417	Yes
3030	18	6.00	271	No



Type 4 Detection Probability

Waveform No.	# Pulses per burst	Pulse Width (us)	Pulse repetition Interval (us)	Successful Detection (Yes/No)
4001	16	19.10	474	Yes
4002	15	19.90	446	Yes
4003	14	10.50	250	Yes
4004	13	17.00	297	Yes
4005	15	17.90	451	Yes
4006	13	18.80	432	Yes
4007	14	12.40	331	Yes
4008	15	18.20	286	Yes
4009	15	15.30	325	Yes
4010	14	11.90	408	No
4011	15	11.60	409	Yes
4012	15	18.00	309	Yes
4013	15	17.60	364	Yes
4014	13	14.70	345	Yes
4015	14	13.90	251	Yes
4016	12	12.50	465	Yes
4017	15	11.10	267	Yes
4018	14	16.40	452	Yes
4019	12	14.10	278	Yes
4020	14	11.40	265	Yes
4021	14	19.10	499	Yes
4022	14	11.50	347	Yes
4023	16	16.90	423	Yes
4024	14	19.10	255	Yes
4025	13	10.80	276	Yes
4026	15	11.10	368	Yes
4027	13	10.20	405	Yes
4028	15	13.90	407	Yes
4029	15	16.40	256	Yes
4030	13	18.40	361	Yes



Type 5 Detection Probability

Waveform No.	Successful Detection (Yes/No)
5001	Yes
5002	Yes
5003	Yes
5004	Yes
5005	Yes
5006	Yes
5007	Yes
5008	Yes
5009	Yes
5010	Yes
5011	Yes
5012	Yes
5013	Yes
5014	Yes
5015	Yes
5016	Yes
5017	Yes
5018	Yes
5019	Yes
5020	Yes
5021	Yes
5022	Yes
5023	Yes
5024	Yes
5025	Yes
5026	Yes
5027	Yes
5028	Yes
5029	Yes
5030	Yes

Note: Type 5 randomized parameters are shown in a separate document.



Type 6 Detection Probability

Table 6: Data Sheet for Hopping Signal

Trial No.	Starting Index within NTIA Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	243	5293	4	Yes
2	718	5294	2	Yes
3	1193	5295	4	Yes
4	1668	5298	1	Yes
5	2143	5297	4	Yes
6	2618	5298	2	Yes
7	3093	5299	4	Yes
8	3568	5300	2	Yes
9	4043	5301	4	Yes
10	4518	5302	3	Yes
11	4993	5303	2	Yes
12	5468	5304	3	Yes
13	5943	5305	3	Yes
14	6418	5308	1	Yes
15	6893	5293	4	Yes
16	7368	5294	4	Yes
17	7843	5295	5	Yes
18	8318	5296	4	Yes
19	8793	5297	3	Yes
20	9268	5298	5	Yes
21	9743	5299	1	Yes
22	10218	5300	2	Yes
23	10693	5301	3	Yes
24	11168	5302	2	Yes
25	11643	5303	5	Yes
26	12118	5304	3	Yes
27	12593	5305	5	Yes
28	13068	5306	3	Yes
29	13543	5293	1	Yes
30	14018	5294	1	Yes
31	14493	5295	8	Yes
32	14968	5296	3	Yes
33	15443	5297	4	Yes
34	15918	5298	3	Yes
35	16393	5299	3	Yes
36	16868	5300	4	Yes
37	17343	5301	1	Yes
38	17818	5302	3	Yes
39	18293	5303	5	Yes
40	18768	5304	6	Yes
41	19243	5305	5	Yes
42	19718	5306	5	Yes



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:** August 22, 2008
Temperature: 25°C **Tested by:** Jeff
Humidity: 55% RH

Freq. (MHz)	PEAK. Raw (dBuV)	Q.P. Raw (dBuV)	AVG Raw (dBuV)	Q.P. Limit (dBuV)	AVG Limit (dBuV)	Margin (dB)	Factor (dB)	Remark
0.204	53.21	48.61	41.01	64.47	54.47	-13.46	12.65	Line
0.348	54.46	47.28	35.78	60.33	50.33	-14.55	12.89	Line
0.414	56.48	51.41	44.58	58.46	48.46	-3.88	12.94	Line
0.482	54.37	50.83	43.42	56.51	46.51	-3.09	12.96	Line
1.565	53.87	49.83	37.72	56.00	46.00	-8.28	13.18	Line
2.158	51.31	47.48	33.68	56.00	46.00	-12.32	13.27	Line
0.205	51.99	46.77	39.16	64.43	54.43	-15.27	11.57	Neutral
0.345	51.76	45.26	33.05	60.43	50.43	-17.38	11.68	Neutral
0.411	54.66	50.08	43.93	58.55	48.55	-4.62	11.69	Neutral
0.482	52.70	49.13	41.79	56.51	46.51	-4.72	11.71	Neutral
1.046	52.34	45.46	34.08	56.00	46.00	-11.92	11.81	Neutral
2.164	51.96	47.34	33.54	56.00	46.00	-12.46	11.92	Neutral

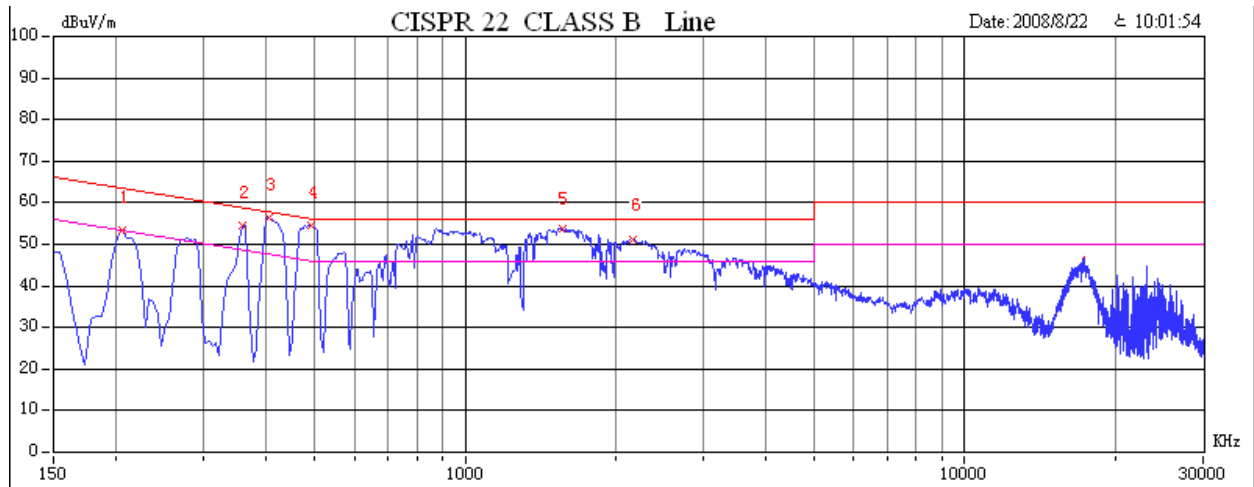
Remark:

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)

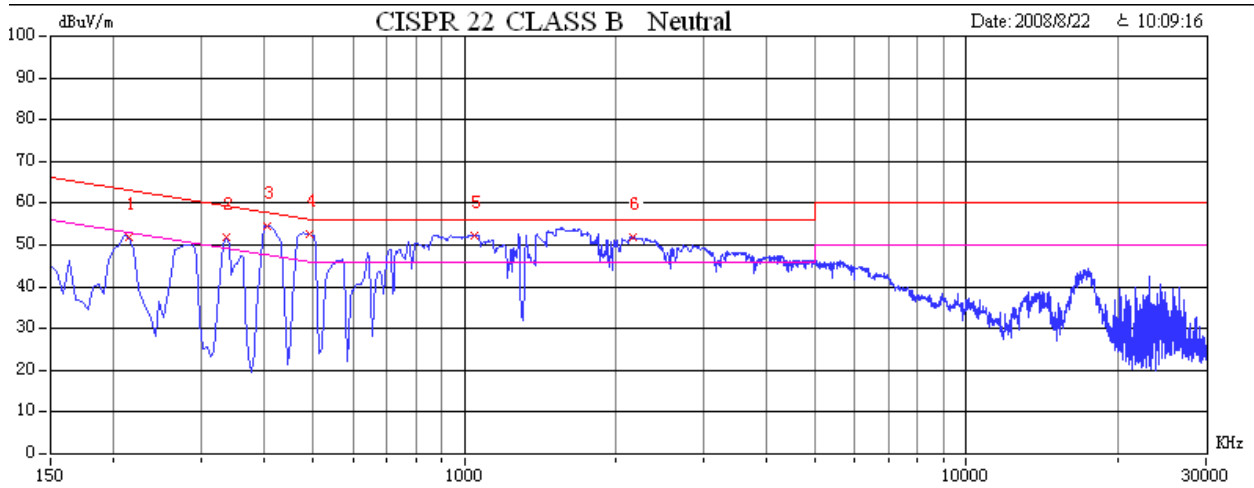


Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)





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	802.11a/b/g/n access point
Frequency band (Operating)	<input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> WLAN: 5.15GHz ~ 5.25GHz <input checked="" type="checkbox"/> WLAN: 5.25GHz ~ 5.35GHz <input checked="" type="checkbox"/> WLAN: 5.470GHz ~ 5.725GHz <input type="checkbox"/> Bluetooth: 2.402 GHz ~ 2.482 GHz <input type="checkbox"/> Others: _____
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others: _____
Exposure classification	General Population/Uncontrolled exposure ($S=1mW/cm^2$)
Antenna diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
Max. output power	IEEE 802.11a mode: 12.77dBm (18.92mW) draft 802.11n Standard-20 MHz Channel mode: 16.33 dBm (42.95mW) draft 802.11n Wide-40 MHz Channel mode: 16.60 dBm (45.71mW)
Antenna gain (Max)	2 dBi (Numeric gain: 1.58) TOTAL ANTENNA GAIN=6.77dBi(Numeric gain: 4.75)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation* <input type="checkbox"/> N/A

Remark:

1. The maximum output power is 16.60 dBm (45.71mW) at 5310MHz (with 4.75 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.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where $E =$ Field strength in Volts / meter

$P =$ Power in Watts

$G =$ Numeric antenna gain

$d =$ Distance in meters

$S =$ Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P (mW) = P (W) / 1000 \text{ and}$$

$$d (cm) = d(m) / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where $d =$ Distance in cm

$P =$ Power in mW

$G =$ Numeric antenna gain

$S =$ Power density in mW / cm²

Maximum Permissible Exposure

IEEE 802.11a:

EUT output power = 18.92mW

Numeric Antenna gain = 4.75

→ Power density = 0.0179 mW / cm²



draft 802.11an Standard-20 MHz Channel mode / Chain 0+ Chain 1 +Chain 2

EUT output power = 42.95mW

Numeric Antenna gain = 4.75

→ Power density = 0.0406mW / cm²

draft 802.11an Wide-40 MHz Channel mode / Chain 0+ Chain 1 +Chain 2

EUT output power = 45.71mW

Numeric Antenna gain = 4.75

→ Power density = 0.0432 mW / cm²

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)