H.B. Compliance Solutions

Intentional Radiator Test Report

For the

Inergy Systems

SEMS

Tested under

The FCC Rules contained in Title 47 of the CFR, Part 15.247 for

Digitally Transmitting Sequence

Prepared for:

Inergy Systems

1475 N Scottsdale Rd, Suite 200

Scottsdale AZ, 85257

Prepared By:

H.B. Compliance Solutions

5005 S. Ash Avenue, Suite # A-10

Tempe, Arizona 85282

Reviewed By:

Hoosamuddin Bandukwala

Cert # ATL-0062-E

Engineering Statement: The measurements shown in this report were made in accordance with the procedure indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurement made, the equipment tested is capable of operation in accordance with the requirements of Part 15 of the FCC Rules under normal use and maintenance. All results contained herein relate only to the sample tested.

Report Status Sheet

Revision #	Report Date	Reason for Revision
Ø	December 7, 2022	Initial Issue

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EXECUTIVE SUMMARY

1. Testing Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15.247. All tests were conducted using measurement procedure from ANSI C63.10-2013 and FCC Guidance document 558074 D01 v05r02 as appropriate.

Test Name	Test Method/Standard	Result	Comments
Unintentional Radiated Emissions	15.209	Pass	
A/C Powerline Conducted Emissions	15.207	Pass	
Occupied Bandwidth	15.247(a)(2)	Pass	
Peak Output Power	15.247(b)	Pass	
Conducted Spurious Emissions	15.247(d)	Pass	
Radiated Spurious Emissions & Restricted Band	15.247(d), 15.209(a), 15.205	Pass	
Emissions at Band Edges	15.247(d), 15.209(a), 15.205	Pass	
Power Spectral Density	15.247(e)	Pass	
Time of Occupancy (Dwell Time)	15.247(a)	N/A	
Number of Hopping Channels	15.247(a)	N/A	
Carrier Frequency Separation	15.247(a)	N/A	

EQUIPMENT CONFIGURATION

1. Overview

H.B Compliance Solutions was contracted by Inergy Systems to perform testing on the SEMS under the purchase order number 2000.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Inergy Systems, SEMS.

The tests were based on FCC Part 15 Rules. The tests described in this document were formal tests as described with the objective of the testing was to evaluate compliance of the Equipment Under Test (EUT) to the requirements of the aforementioned specifications. Globalstar should retain a copy of this document and it should be kept on file for at least five years after the manufacturing of the EUT has been permanently discontinued. The results obtained relate only to the item(s) tested.

Product Name:	SEMS
Model(s) Tested:	IH40
FCC ID:	2A93L-SEMS
Supply Voltage Input:	Primary Power: +5 VDC
Frequency Range:	802.11b/g/n20: 2412MHz - 2462MHz 802.11n40: 2422MHz – 2452MHz
No. of Channels:	802.11b/g/n20: 11, 802.11n40: 7
Necessary Bandwidth	N/A
Type(s) of Modulation:	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n (HT20/HT40): OFDM (64QAM, 16QAM, QPSK, BPSK)
Range of Operation Power:	0.184W
Emission Designator:	N/A
Channel Spacing(s)	None
Test Item:	Pre-Production
Type of Equipment:	Portable
Antenna Requirement (§15.203):	Type of Antenna: Internal PCB Patch Gain of Antenna: 2.8dBi
Environmental Test Conditions:	Temperature: 15-35°C Humidity: 30-60% Barometric Pressure: 860-1060 mbar
Modification to the EUT:	None
Evaluated By:	Staff at H.B. Compliance Solutions
Test Date(s):	11/21/2022 till 12/6/2022

2. Test Facility

All testing was performed at H.B. Compliance Solutions. This facility is located at 5005 S. Ash Avenue, Suite # A-10, Tempe AZ-85282. All equipment used in making physical determination is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a GTEM chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at H.B. Compliance Solutions.

Test facility H.B. Compliance Solutions is an ANAB accredited test site. The ANAB certificate number is L2458. The scope of accreditation can be found on ANAB website www.anab.org

3. Description of Test Sample

The SEMS is a smart home automation device focused on energy management. The device contains multiple radios and interfaces (wired Ethernet, W-Fi, Z-wave, Zigbee, LTE cellular) to communicate to various smart devices in the home including energy meters, load switches, thermostats, and sensors.

4. Equipment Configuration

Ref. ID	Name / Description	Model Number	Serial Number
# 1	SEMS (Sample #1 for Conducted Testing)	IH40	20041341
# 2	SEMS (Sample #2 for Radiated Testing)	IH40	20041333
# 3	SEMS (Sample #1 for Unintentional Emissions Tests)	IH40	20041339

Table 1. Equipment Configuration

5. Support Equipment

All support equipment supplied is listed in the following Support Equipment List.

Ref ID	Name / Description	Manufacturer	Model #	Serial #
# 4	AC/DC Power Supply	CUI Inc	SWI15-5-N	-
# 5	Laptop Computer	Acer	Swift SF314-52	-
# 6	USB/Ethernet Adapter	Plugable	USB3-E1000	-

Table 2. Support Equipment

6. Ports and Cabling Information

Ref ID	Port name on the EUT	Cable Description	Qty.	Length (m)	Shielded? (Y/N)	Termination Box ID & Port ID
# 7	Power	2 Wire	1	2	N	AC Outlet
# 8	LAN	RJ45	1	1.8	N	# 6

Table 3. Ports and Cabling Information

7. Method of Monitoring EUT Operation

A test receiver will be used to monitor the data transmission from the EUT.

8. Mode of Operation

To support FCC testing, a GUI was provided to allow configuration of the data rates, transmission channel, power level, modulation bandwidth, and to switch between single tone and full modulation for worst case emissions. Pretesting was performed across all operational modes to determine the data rate for each that provided the worst-case emissions.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2422
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

Table 4. Operational Channels for 802.11b/g/n20

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	7	2422
4	2427	8	2447
5	2432	9	2452
6	2437		

Table 5. Operational Channels for 802.11n40

Operational Mode	Data Rates	Worst Case used for testing
802.11b	1/2/5.5/11 Mbps	1 Mbps
802.11g	6/9/12/18/24/36/48/54 Mbps	6 Mbps
802.11n (20 MHz)	6.5/13/19.5/26/39/52/58.5/65 Mbps (MSC0-MSC7)	6.5 Mbps (MSC0)
802.11n (40 MHz)	13.5/27/40.5/54/81/108/121.5/135 Mbps (MSC0-MSC7)	6.5 Mbps (MSC0)

Table 6. Data rates for operational modes

9. Modifications

9.1 Modifications to EUT

No modifications were made to the EUT

9.2 Modifications to Test Standard

No Modifications were made to the test standard.

10. Disposition of EUT

The test sample including all support equipment submitted to H.B Compliance Solutions for testing will be returned to Inergy Systems at the completion of testing & certification.

Criteria for Un-Intentional Radiators

1. Radiated Emissions

Test Requirement(s):	§15.209	**Test Engineer(s):**	Sean E.
Test Results:	Pass	**Test Date(s):**	12/6/2022

Test Procedures:

The final radiated emissions test was performed using the parameters described above as worst case. That final test was conducted at a facility that meets the ANSI C63.4 NSA requirements. The frequency range noted in the data sheets was scanned/tested at that facility. Emissions were maximized as specified, by varying table azimuth, antenna height, and manipulating cables.

Using the mode of operation and configuration noted within this report, a final radiated emissions test was performed. The frequency range investigated (scanned), is also noted in this report. Radiated emissions measurements were made at the EUT azimuth and antenna height such that the maximum radiated emissions level will be detected. This requires the use of a turntable and an antenna positioner. The preferred method of a continuous azimuth search is utilized for frequency scans of the EUT field strength with both polarities of the measuring antenna. A calibrated, linearly polarized antenna was positioned at the specified distance from the periphery of the EUT.

> *Note: The specified distance is the horizontal separation between the closest periphery of the EUT and the center of the axis of the elements of the receiving antenna. However, if the receiving antenna is a log-periodic array, the specified distance shall be the distance between the closest periphery of the EUT and the front-to-back center of the array of elements.*

Tests were made with the antenna positioned in both the horizontal and vertical polarization planes. The measurement was varied in height above the conducting ground plane to obtain the maximum signal strength. Though specified in the report, the measurement distance shall be 3 meters. At any measurement distance, the antenna height was varied from 1 meter to 4 meters. These height scans apply for both horizontal and vertical polarization, except that for vertical polarization the minimum height of the center of the antenna shall be increased so that the lowest point of the bottom of the antenna clears the ground surface by at least 25 cm.

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
30 MHz to 1 GHz	120 kHz	120 kHz	N/A
1 GHz to 11 GHz	1MHz	N/A	1MHz
Measurements were made using the bandwidths and detectors specified. The video filter was at least as wide as the IF bandwidth of the measuring receiver.			

Table 7. Radiated Emissions – Measurement Bandwidth

Emissions Tests Calculations

In the case of indoor measurements, radiated emissions measurements are made by the manipulation of correction factors using TILE4 software. This is done automatically by the software during the final measurement process.

In both cases, the level of the Field Strength of the interfering signal is calculated by adding the Antenna Factor, Cable Factor and by subtracting the Amplifier Gain from the measured reading. The basic equation is as follows:

FS = RA + AF + (CF –AG)

Where: FS = Field Strength

RA = Receiver (indicated) Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

This laboratory uses an approach of combining the CF and AG using an end-to-end measurement of the entire cabling system, including the test cable, any in-line amplifiers, attenuators, or transient protection networks, all measured in-situ.

For a sample calculation, assume a receiver reading of 52.5 dBuV is obtained. With an antenna factor of 7.4 and a combined cable factor (CF + AG) of -27.9:

FS = 52.5 + 7.4 + (-27.9) = 32 dBuV/m

FS = 32 dBuV/m

If desired, this can be converted into its corresponding level in uV/m:

FS = 10^((32 dBuV/m)/20) = 39.8 uV/m

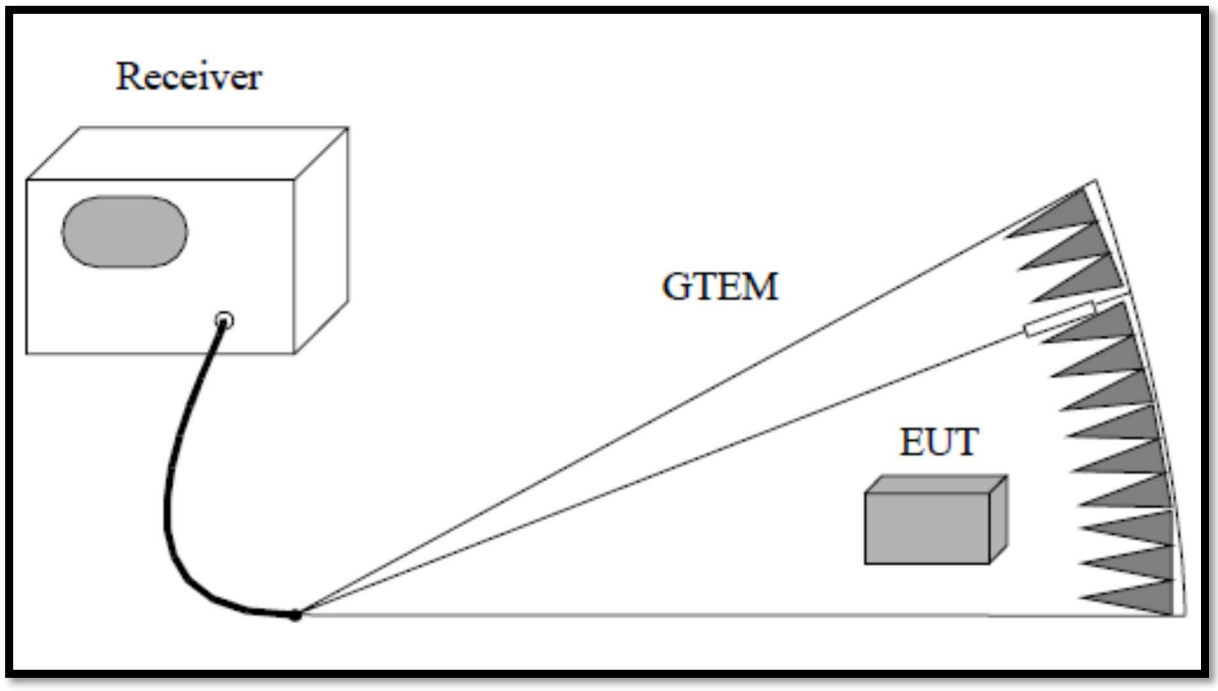
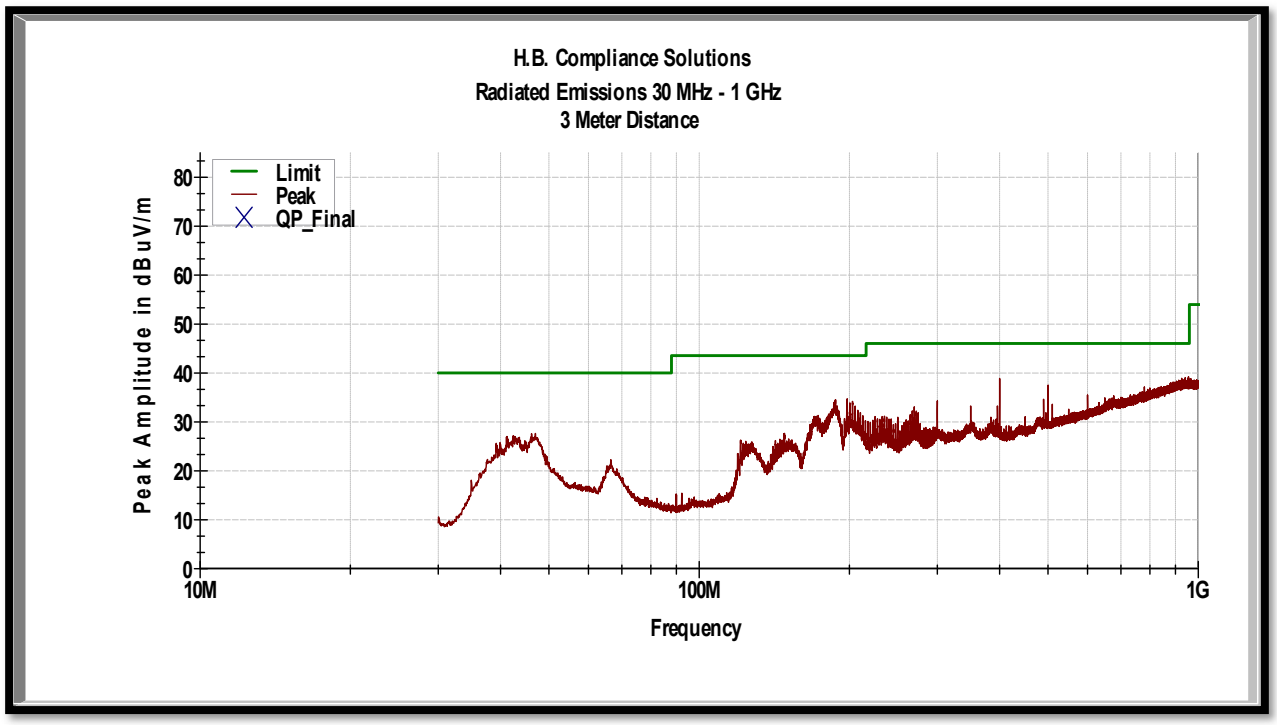
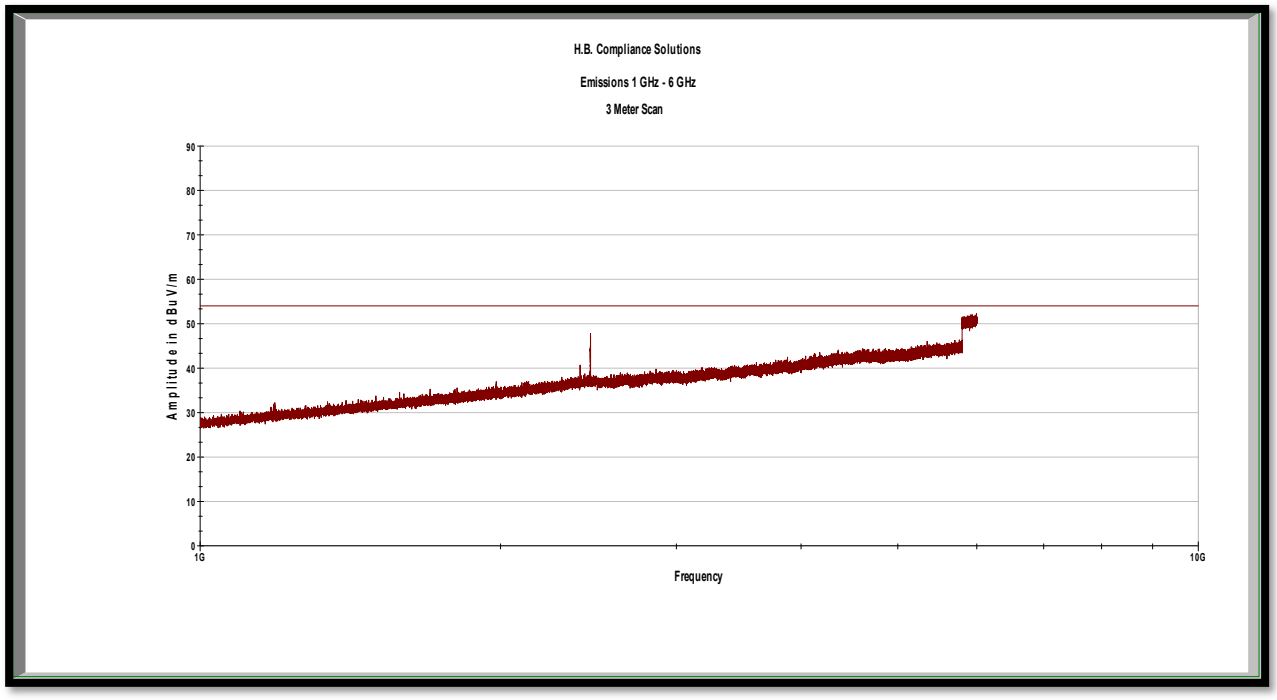


Figure 1. Radiated Emissions Test Setup (30MHz – 1GHz)



Plot 1 – Radiated Emissions – 30MHz to 1GHz



Plot 2 – Radiated Emissions – 1GHz to 6GHz

2. Conducted Emissions

Test Requirement(s):	§15.207	Test Engineer(s):	Sean E.
Test Results:	Pass	Test Date(s):	11/22/2022

Test Procedures: The EUT was placed on a non-metallic table, 80cm above the ground plane inside a shielded enclosure. The EUT was powered through a 50Ω/50µH LISN. The conducted emissions tests were performed using the mode of operation and configuration noted within this report. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are the same as those cords normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically, those measurements are made using a LISN (Line Impedance Stabilization Network). All 50 Ohm measuring ports of the LISN are terminated by 50 Ohms, either by the 50 Ohm EMI receiver or a 50 Ohm resistive load.

Refer to the Emissions Tests Calculations section in the Radiated Emissions section for sample calculations. For the purposes of the conducted emissions test, the Antenna Factor (AF) is replaced by the LISN correction factor.

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.150 - 30	9.0	9.0	9.0
Measurements were made using the bandwidths and detectors specified. No video filter was used.			

Table 8. Conducted Emissions – Measurement Bandwidth

Frequency Range (MHz)	15.207(a), Limits (dBuV)	
	Quasi Peak	Average
0.15 – 0.5	66 - 56	56 - 46
0.5 – 5.0	56	46
5.0 – 30	60	50

Table 9. Conducted Emissions Limits – FCC Limits from Section 15.207

Test Setup:

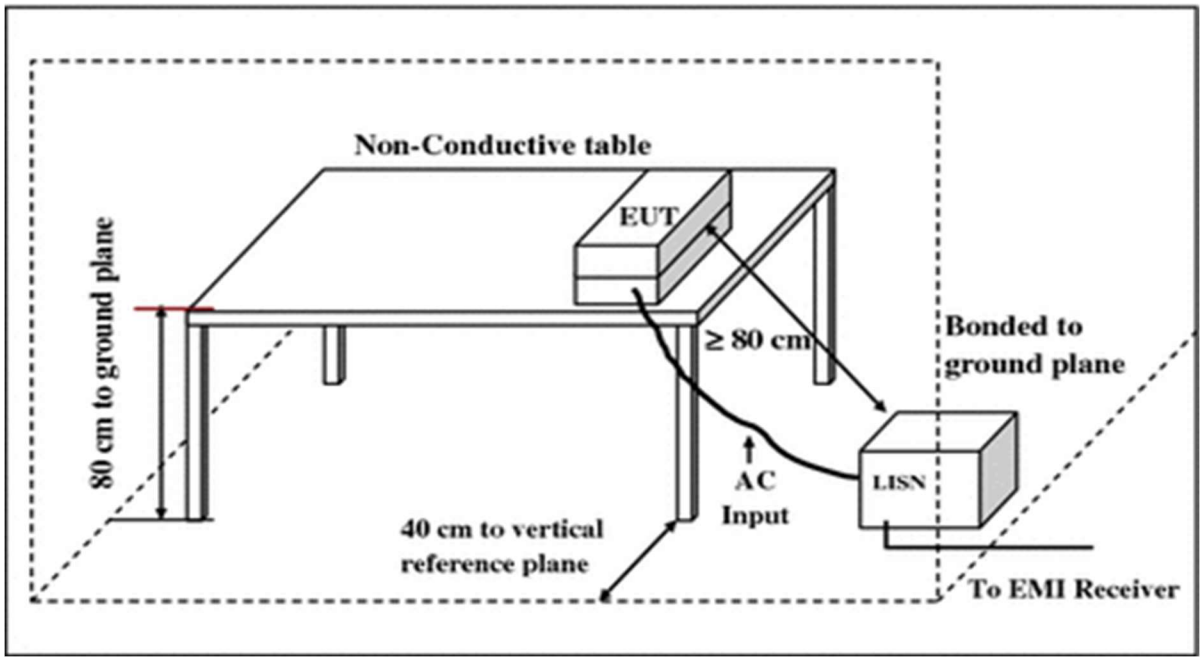
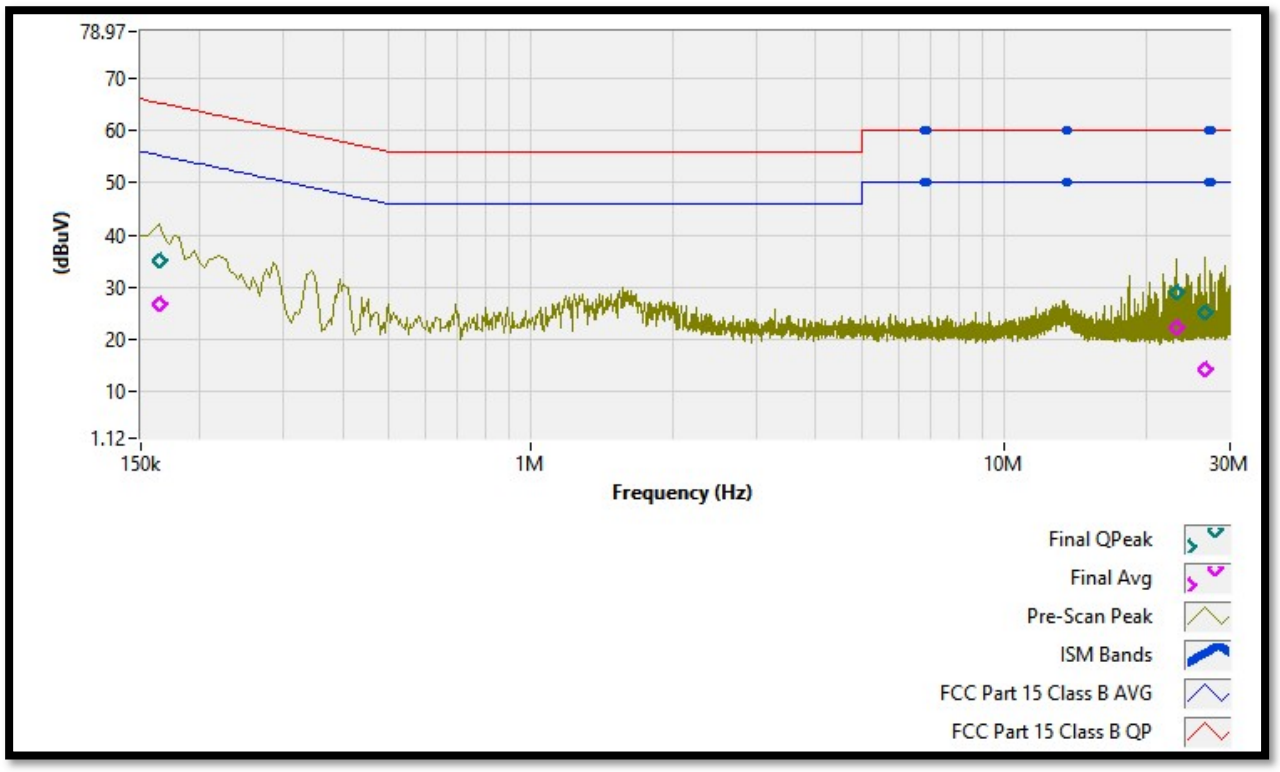


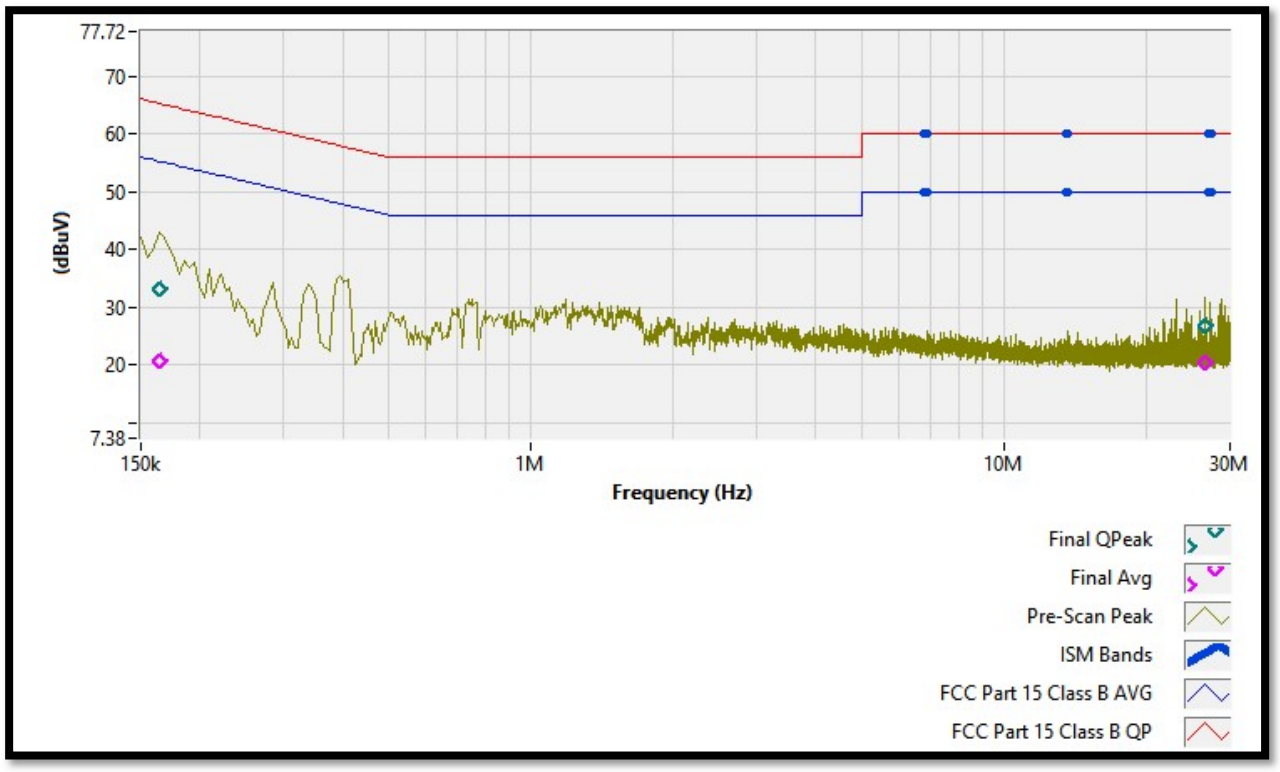
Figure 3. Conducted Emissions Test Setup



Plot 2 – Conducted Emissions – Line Side

Frequency (Hz)	Detector	Measured Level (dBuV)	Limit (dBuV)	Margin (dB)
163.534k	Peak	42.271	--	--
	QPeak	35.111	(2) 65.283	-30.171
	Avg	26.881	(1) 55.283	-28.401
23.13M	Peak	35.394	--	--
	QPeak	28.904	(2) 60	-31.096
	Avg	22.364	(1) 50	-27.636
26.613M	Peak	35.571	--	--
	QPeak	25.281	(2) 60	-34.719
	Avg	14.101	(1) 50	-35.899

Table 10. Measurement Results Summary



Plot 3 – Conducted Emissions – Neutral Side

Frequency (Hz)	Detector	Measured Level (dBuV)	Limit (dBuV)	Margin (dB)
163.534k	Peak	42.991	--	--
	QPeak	33.041	(2) 65.283	-32.241
	Avg	20.641	(1) 55.283	-34.641
26.487M	Peak	31.566	--	--
	QPeak	26.826	(2) 60	-33.174
	Avg	20.326	(1) 50	-29.674

Table 11. Measurement Results Summary

Criteria for Intentional Radiators

1. Occupied Bandwidth

Test Requirement(s):	15.247(a)(2), ANSI C63.10	**Test Engineer(s):**	Sean E.
Test Results:	Pass	**Test Date(s):**	11/21/2022

Test Procedure: As required by 47 CFR 15.247(a)(2) System using digital modulation techniques may operate in the 902-928MHz, 2400 – 2483.5MHz, and 5725 – 5850MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

Customer provided a test mode internal to the EUT to control the RF modulation, and frequency channel. The EUT was connected through an attenuator to a Spectrum Analyzer. The measured highest peak power was set relative to zero dB reference. The RBW of the Spectrum Analyzer was set to 100kHz and VBW>RBW. Measurements were carried out at the low, mid and high channels of the TX band at the output terminals of the EUT.

Test Setup:

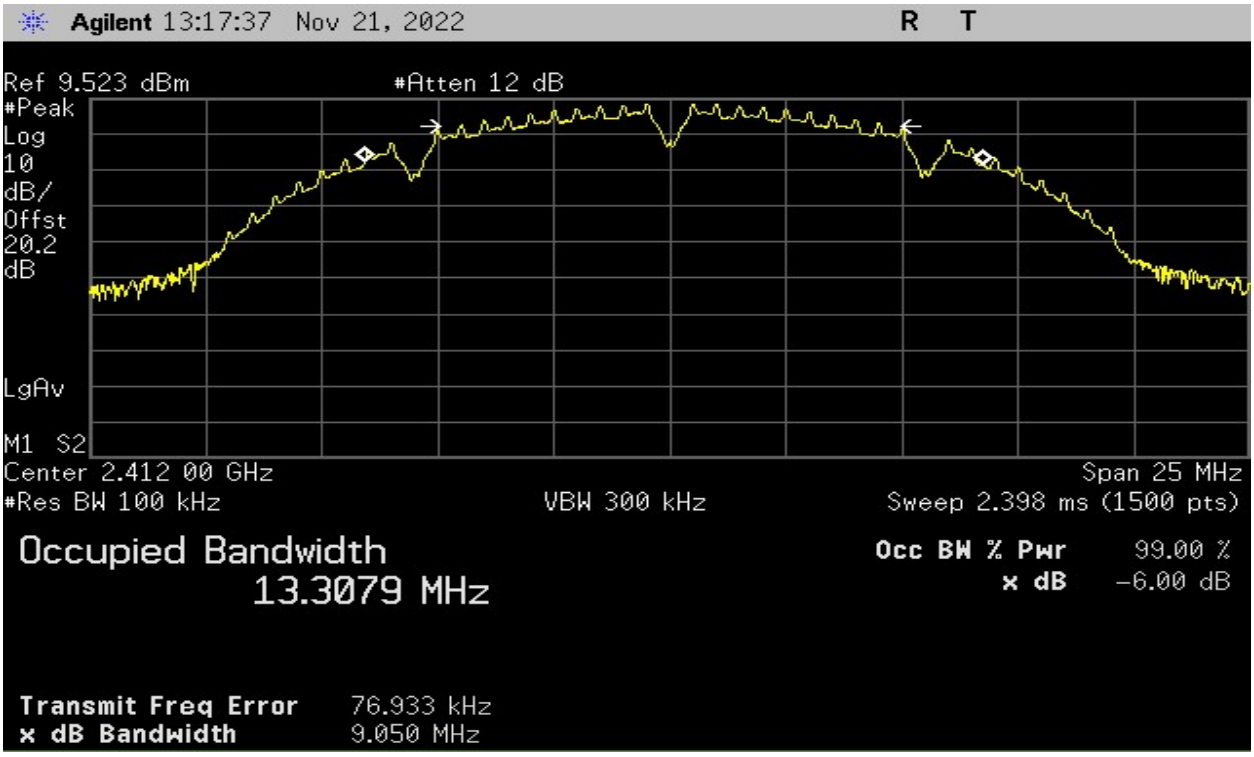
Figure 2. Occupied Bandwidth Test Setup

Test Results:

Operational Mode	Frequency (MHz)	Recorded Measurement	Specification Limit
802.11b	2412	9.05 MHz	≥ 500 KHz
	2437	9.05 MHz	≥ 500 KHz
	2462	9.01 MHz	≥ 500 KHz
802.11g	2412	16.36 MHz	≥ 500 KHz
	2437	16.39 MHz	≥ 500 KHz
	2462	16.36 MHz	≥ 500 KHz
802.11n (20 MHz)	2412	17.37 MHz	≥ 500 KHz
	2437	17.34 MHz	≥ 500 KHz
	2462	17.32 MHz	≥ 500 KHz
802.11n (40 MHz)	2422	35.54 MHz	≥ 500 KHz
	2437	36.10 MHz	≥ 500 KHz
	2452	35.84 MHz	≥ 500 KHz

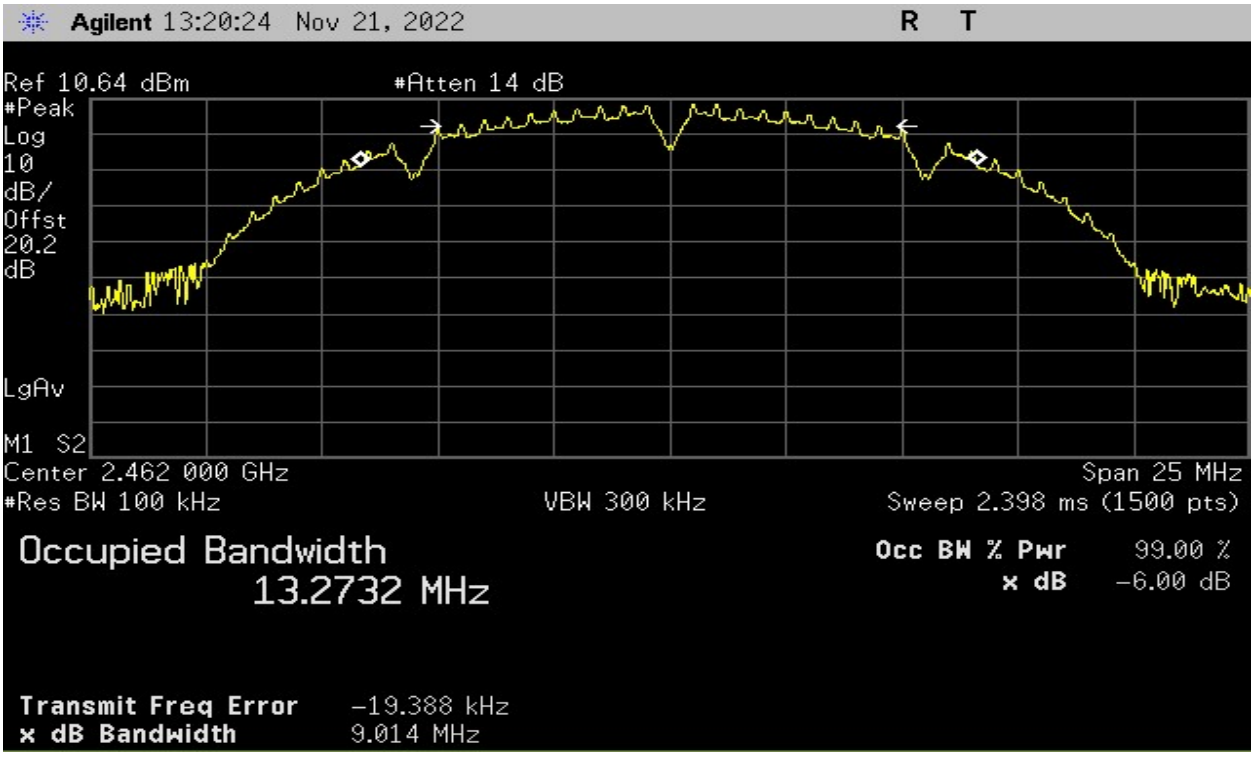
Table 12. Occupied Bandwidth Summary, Test Results

The following pages show measurements of Occupied Bandwidth plots:

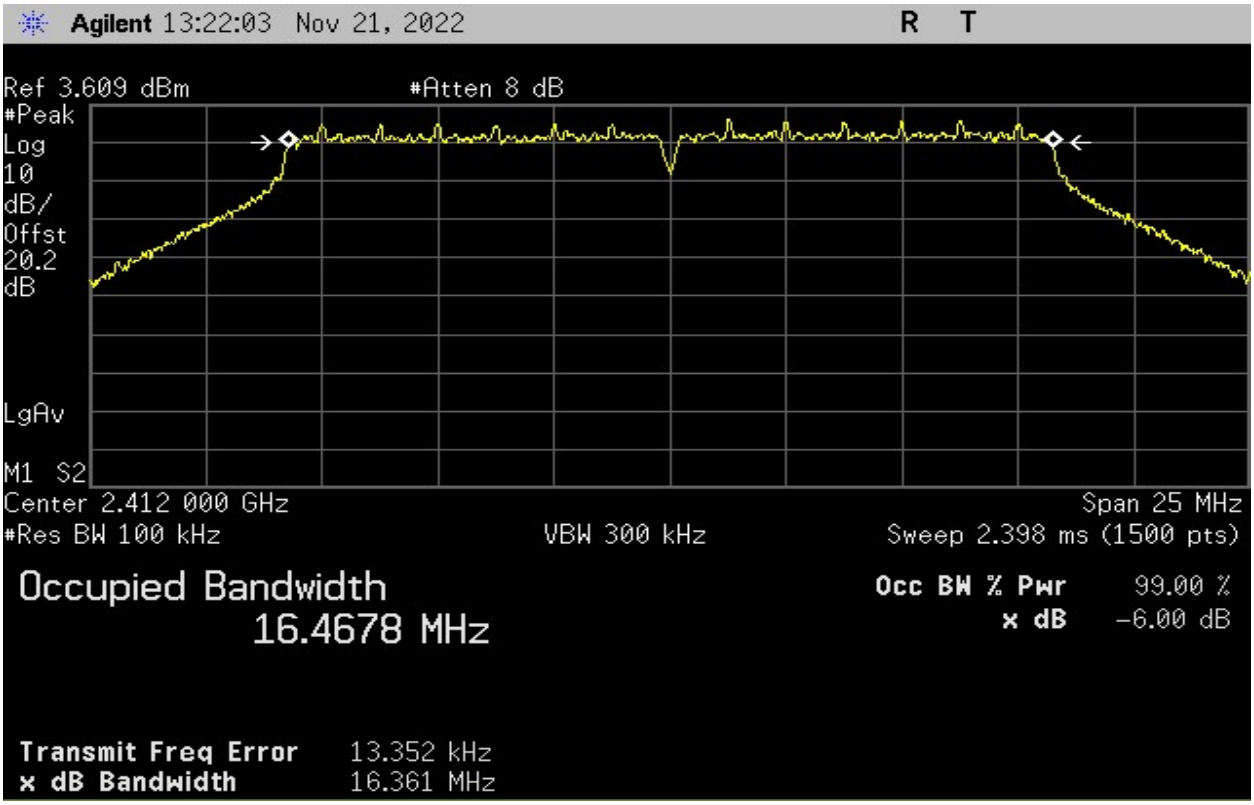


Plot 3 – 802.11b Lowest Channel – 6dB BW

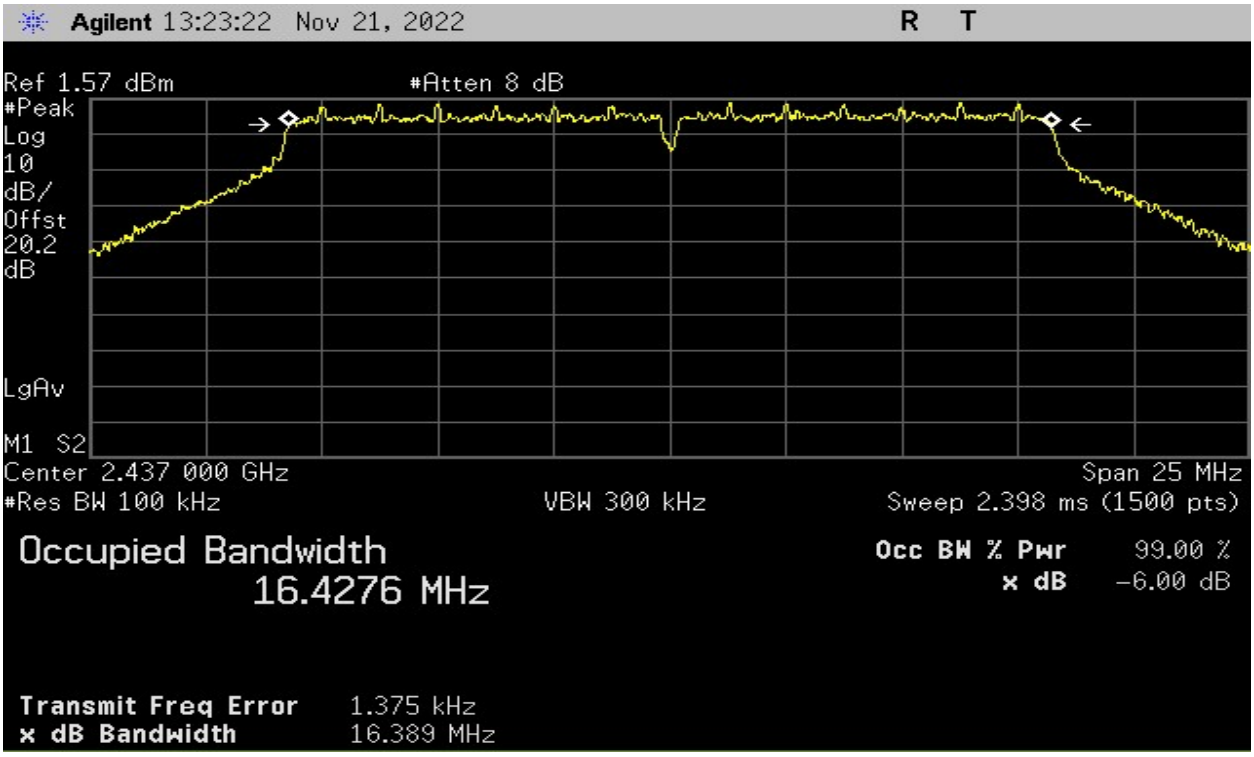
Plot 4 – 802.11b Middle Channel – 6dB BW



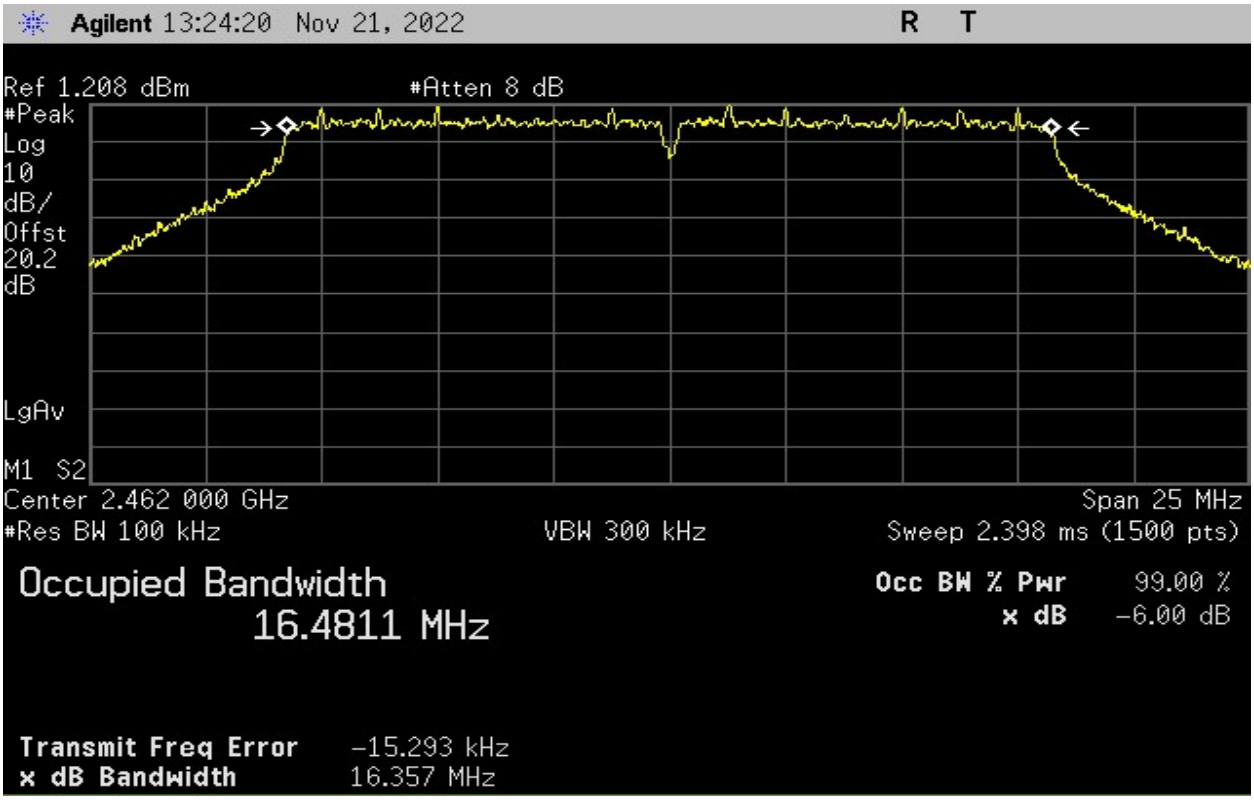
Plot 5 – 802.11b Highest Channel – 6dB BW



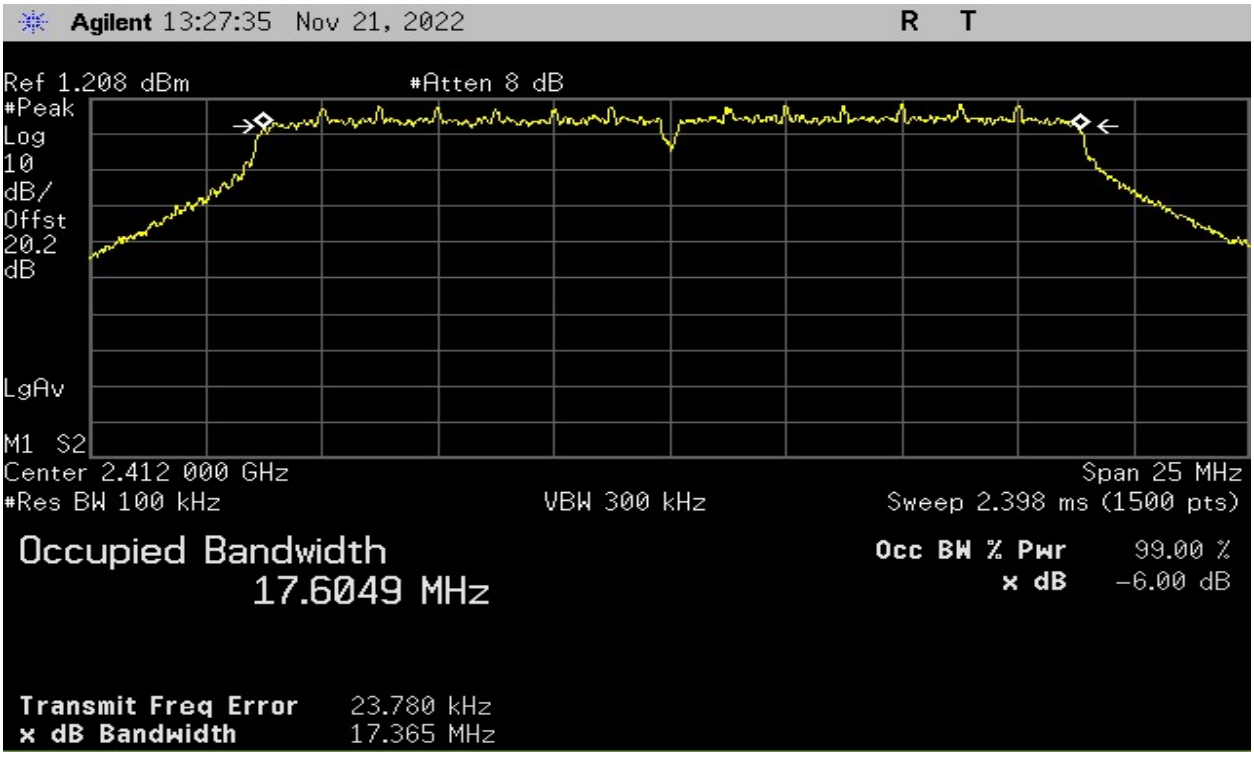
Plot 6 – 802.11g Lowest Channel – 6dB BW



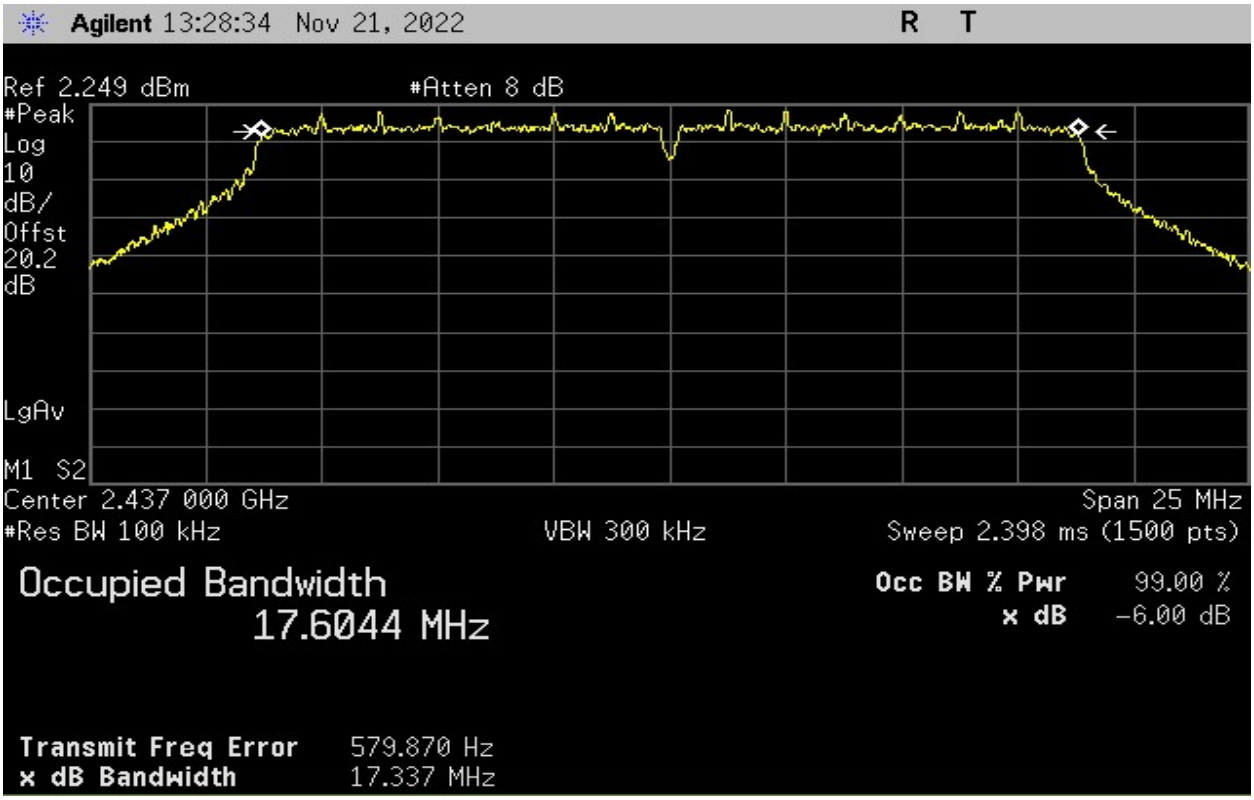
Plot 7 – 802.11g Middle Channel – 6dB BW



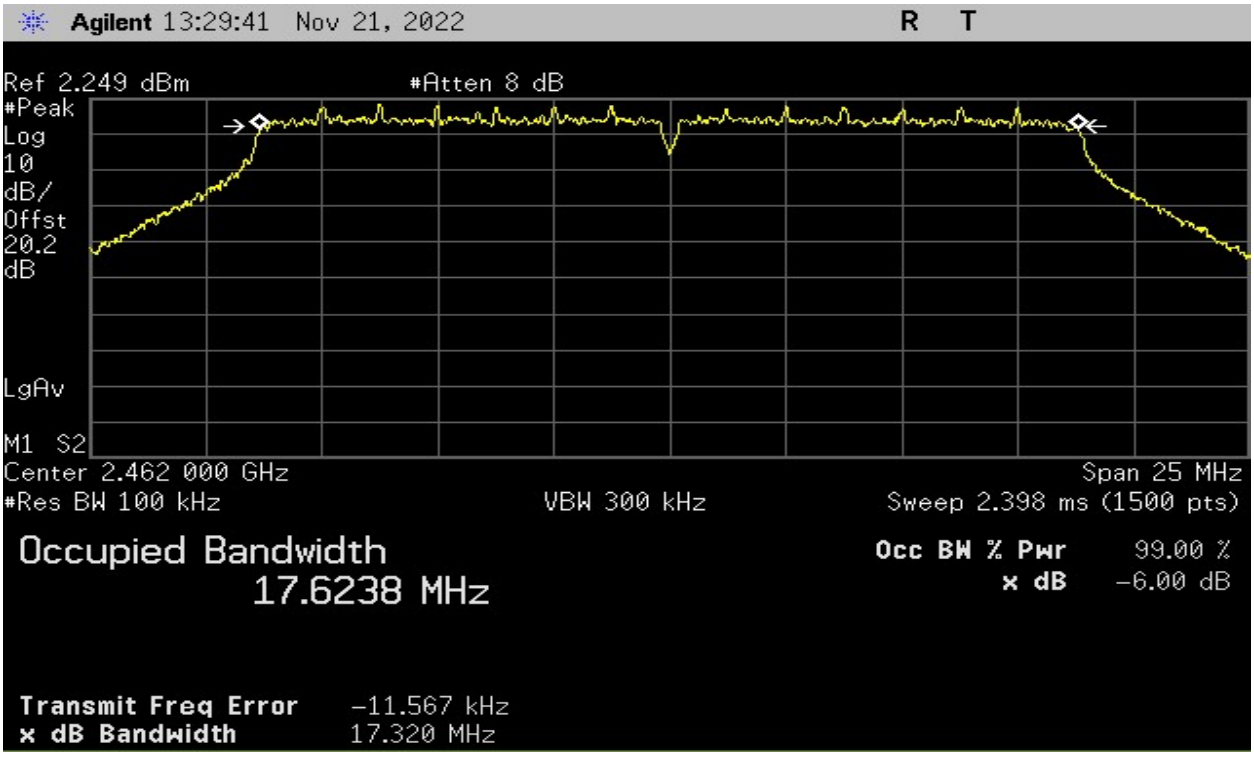
Plot 8 – 802.11g Highest Channel – 6dB BW



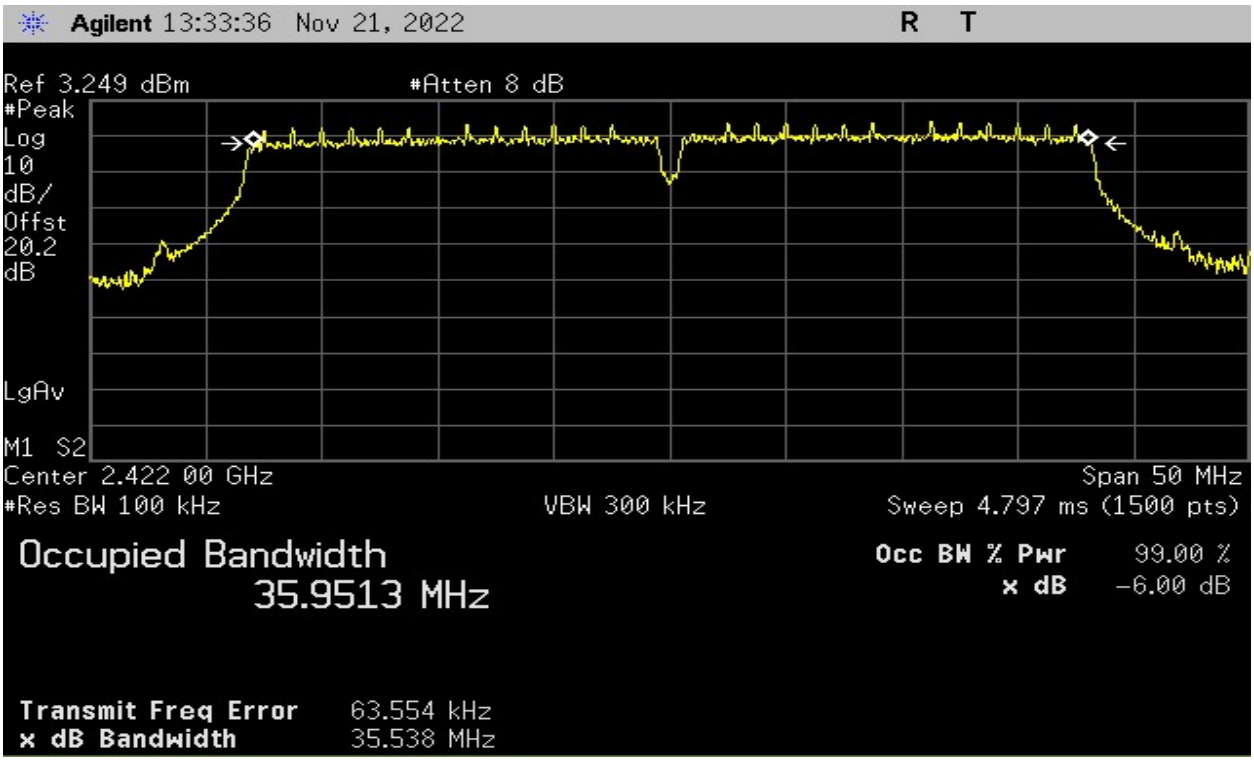
Plot 9 – 802.11n (20 MHz) Lowest Channel – 6dB BW



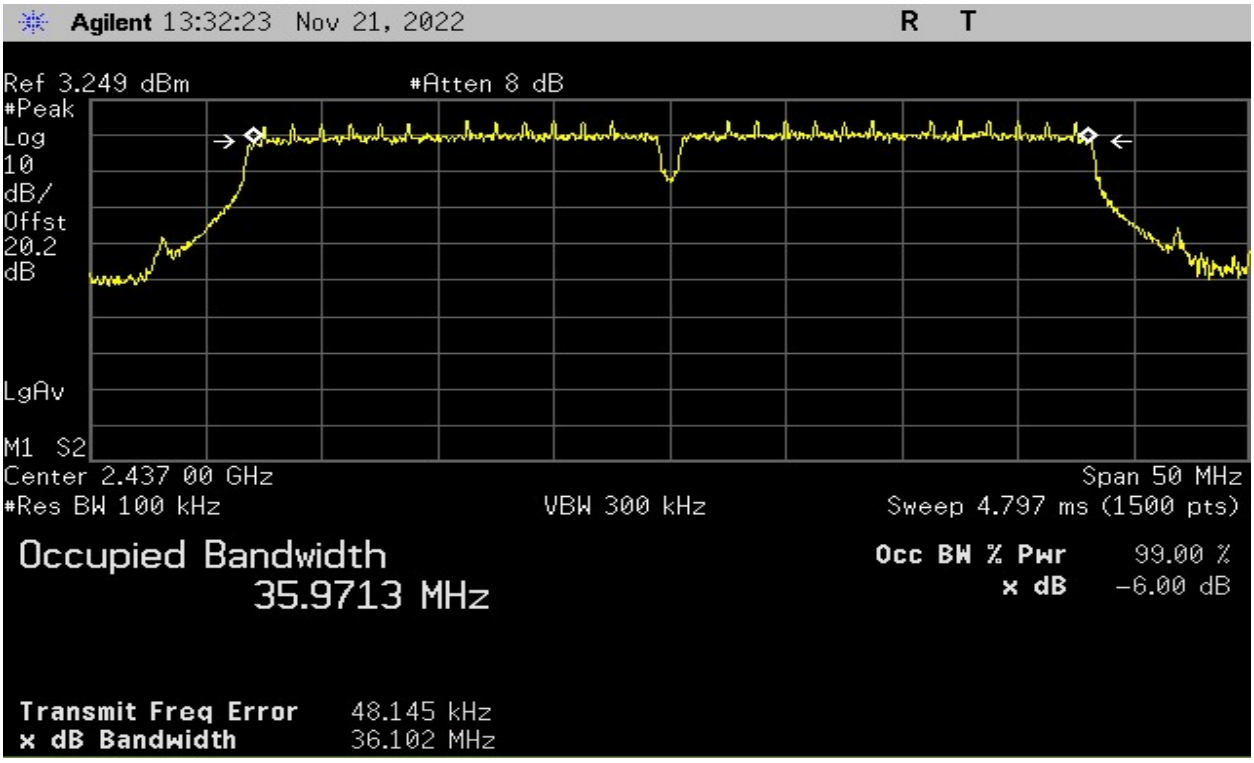
Plot 10 – 802.11n (20 MHz) Middle Channel – 6dB BW



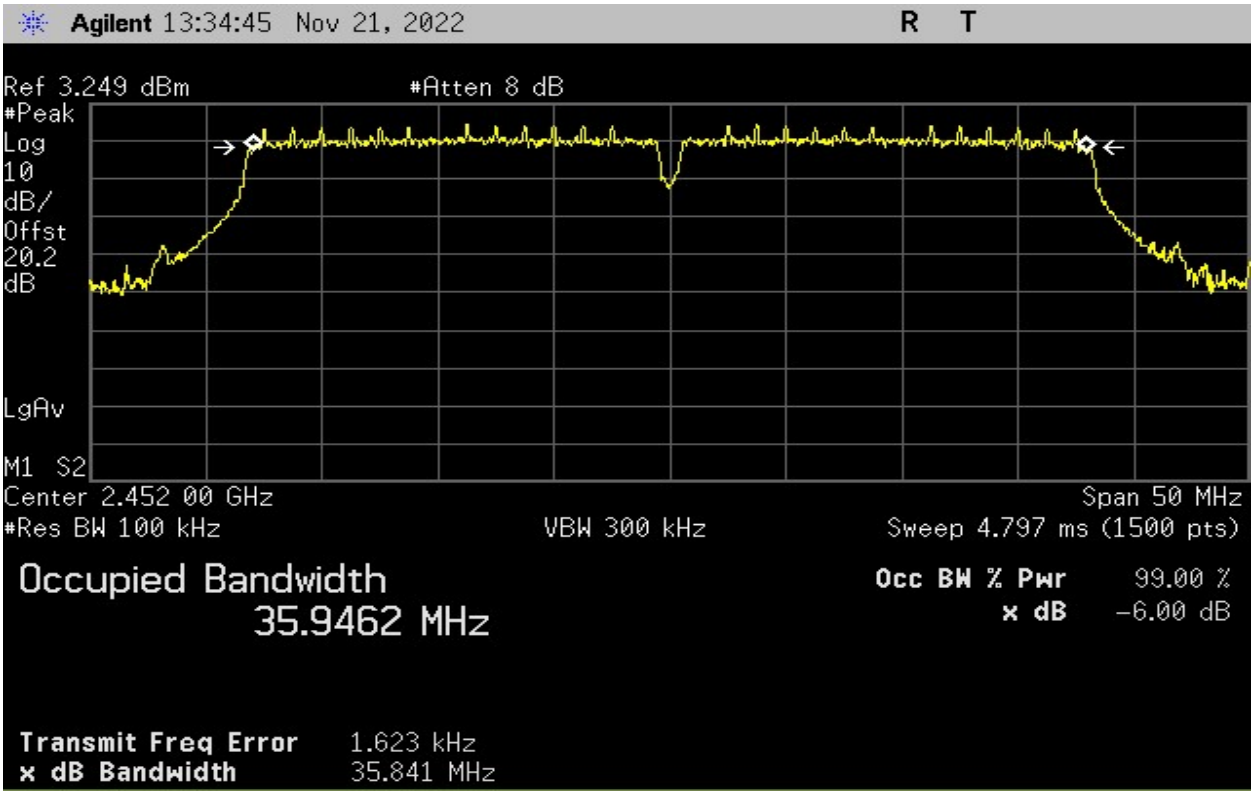
Plot 11 – 802.11n (20 MHz) Highest Channel – 6dB BW



Plot 12 – 802.11n (40 MHz) Lowest Channel – 6dB BW



Plot 13 – 802.11n (40 MHz) Middle Channel – 6dB BW



Plot 14 – 802.11n (40 MHz) Highest Channel – 6dB BW

2. RF Power Output

Test Requirement(s):	§15.247(b)(3)	Test Engineer(s):	Sean E.
Test Results:	Pass	Test Date(s):	11/21/2022

Test Procedures: As required by 47 CFR 15.247(b)(3), RF Power output measurements were made at the RF output terminals of the EUT

Customer provided a test mode internal to the EUT to control the RF modulation, and frequency channel. The EUT was connected through an attenuator to a Power Sensor capable of making power measurements. Measurements were made at the low, mid, and high channels of the entire frequency band.

Test Setup:

Figure 3. RF Power Test Setup

Test Results:

Operational Mode	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watts)	Specification Limit
802.11b	2412	19.86	0.0968	1W
	2437	19.74	0.0942	1W
	2462	20.02	0.1005	1W
802.11g	2412	20.39	0.1094	1W
	2437	20.3	0.1072	1W
	2462	20.33	0.1079	1W
802.11n (20 MHz)	2412	20.52	0.1127	1W
	2437	20.87	0.1222	1W
	2462	20.95	0.1245	1W
802.11n (40 MHz)	2422	22.15	0.1641	1W
	2437	22.57	0.1807	1W
	2452	22.65	0.1841	1W

Table 13. RF Power Output Test Results

3. Conducted Spurious Emissions

Test Requirement(s):	§15.247(c) and RSS-247 5.5	**Test Engineer(s):**	Sean E.
Test Results:	Pass	**Test Date(s):**	11/22/2022

Test Procedures:

As required by 47 CFR 15.247(c): In any 100kHz bandwidth the frequency band in which the spread spectrum or digitally modulation intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either and RF conducted or a radiated measurement. Conducted spurious emissions at antenna terminal measurements were made at the RF output antenna terminal of the EUT.

Customer provided a test mode internal to the EUT to control the RF modulation, and frequency channel. The EUT was connected through an attenuator to a Spectrum Analyzer with RBW set to 100kHz and VBW ≥ RBW. The Spectrum Analyzer was set to sweep from 30MHz up to 10th harmonic of the fundamental or 40GHz whichever is the lesser. Measurements were made at the low, mid and high frequency of the transmit band.

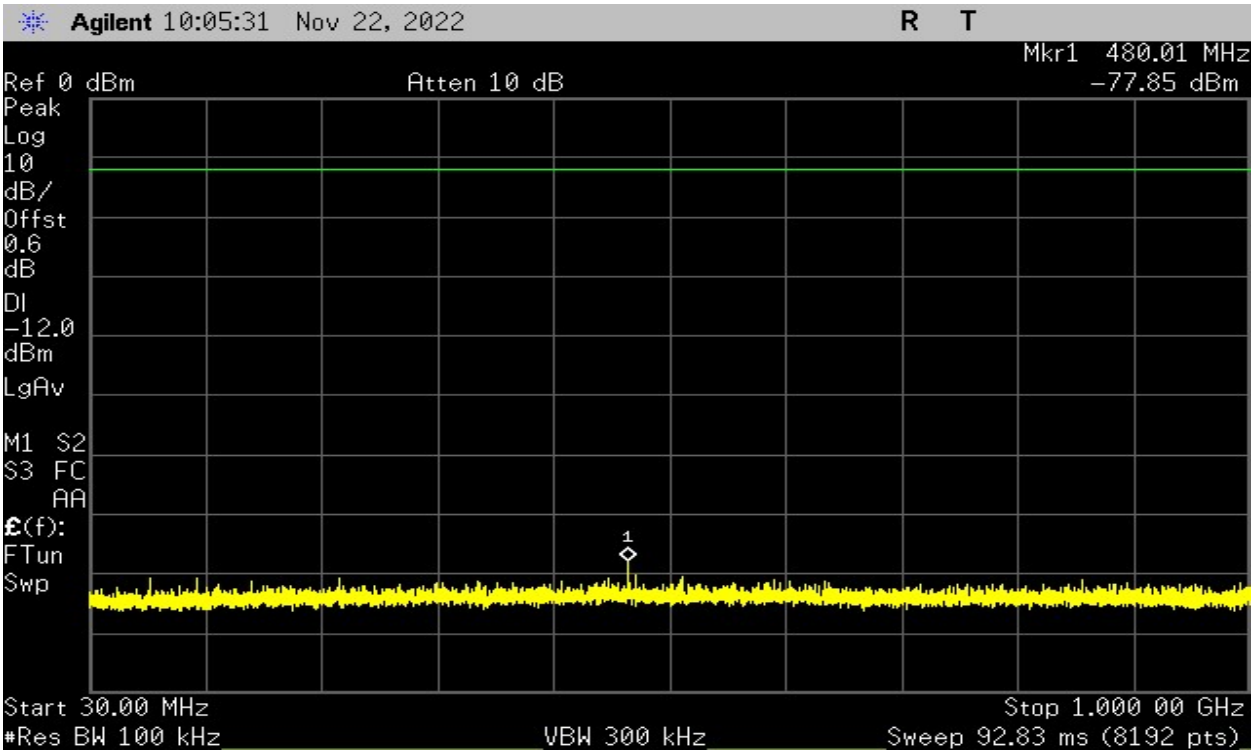
Test Setup:

Figure 4. Conducted Spurious Emissions Test Setup

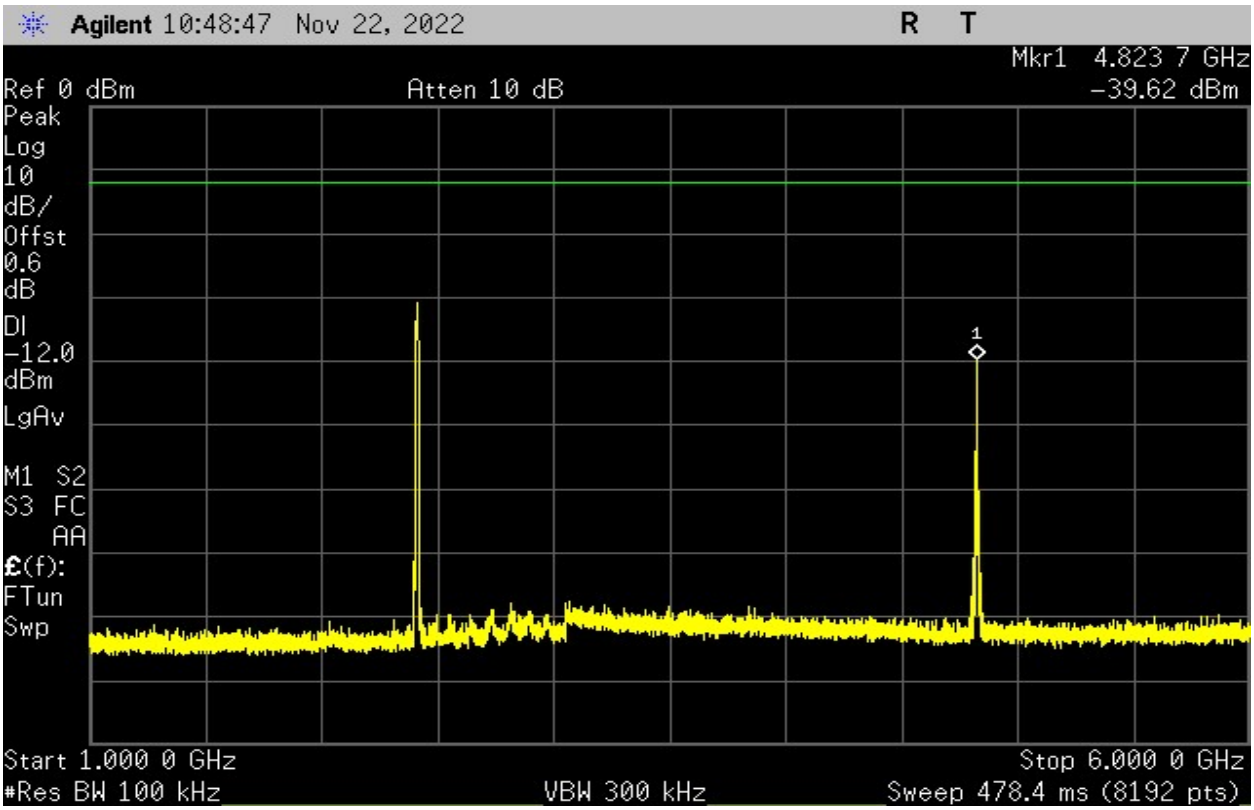
Test Results:

Operational Mode	Transmit Frequency (MHz)	Measured Frequency (GHz)	Measured Level (dBm)	Limit (dBm)
802.11b	2412	4.824	-39.62	-12.0
		9.650	-58.67	-12.0
	2437	4.874	-43.39	-12.0
		9.750	-61.33	-12.0
	2462	4.924	-43.65	-12.0
		7.390	-60.33	-12.0
802.11g	2412	4.818	-58.35	-20.0
		9.650	-62.00	-20.0
	2437	4.874	-60.61	-20.0
		9.750	-63.00	-20.0
	2462	4.925	-58.17	-20.0
802.11n (20 MHz)	2412	4.817	-57.35	-21.0
		9.650	-62.33	-21.0
	2437	4.877	-62.05	-21.0
		9.750	-62.50	-21.0
	2462	4.923	-60.54	-21.0
802.11n (40 MHz)	2422	4.843	-60.55	-23.0
		9.690	-61.50	-23.0
	2437	4.875	-59.42	-23.0
		9.770	-62.83	-23.0
	2452	4.906	-58.98	-23.0

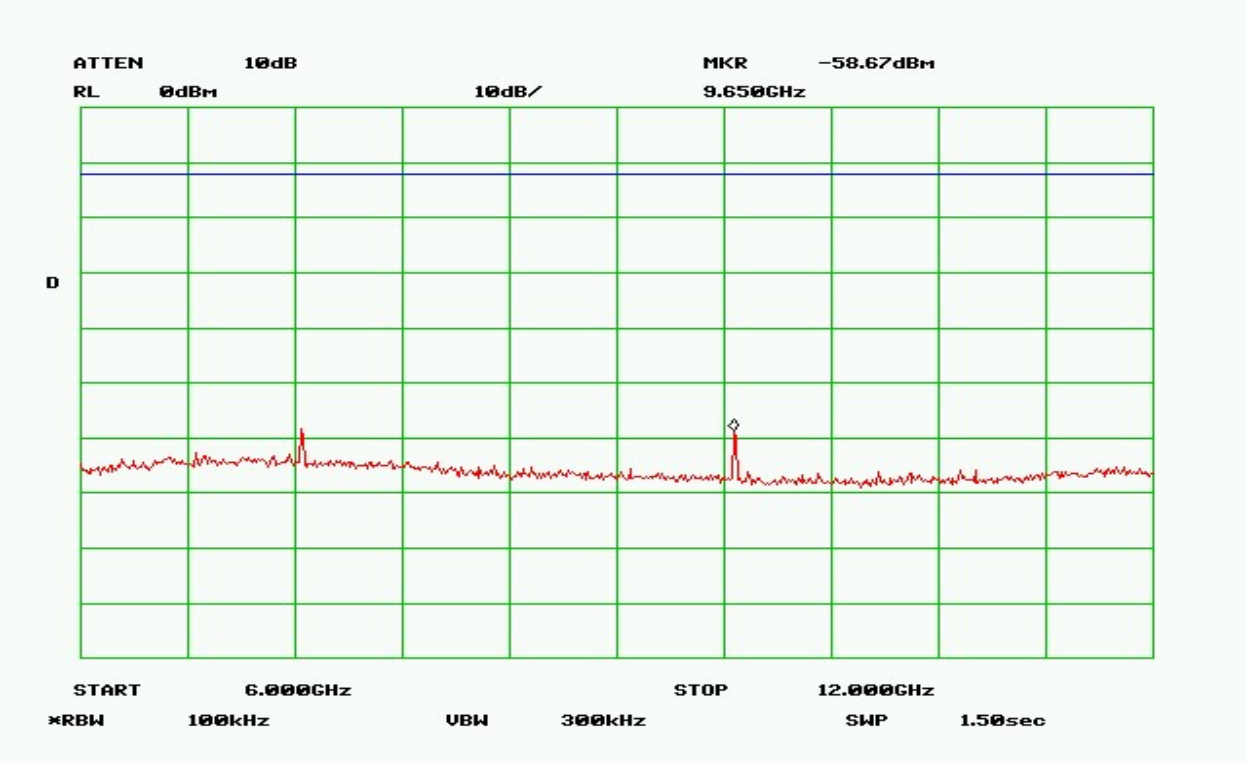
Table 14. Conducted Spurious Emissions, Test Results



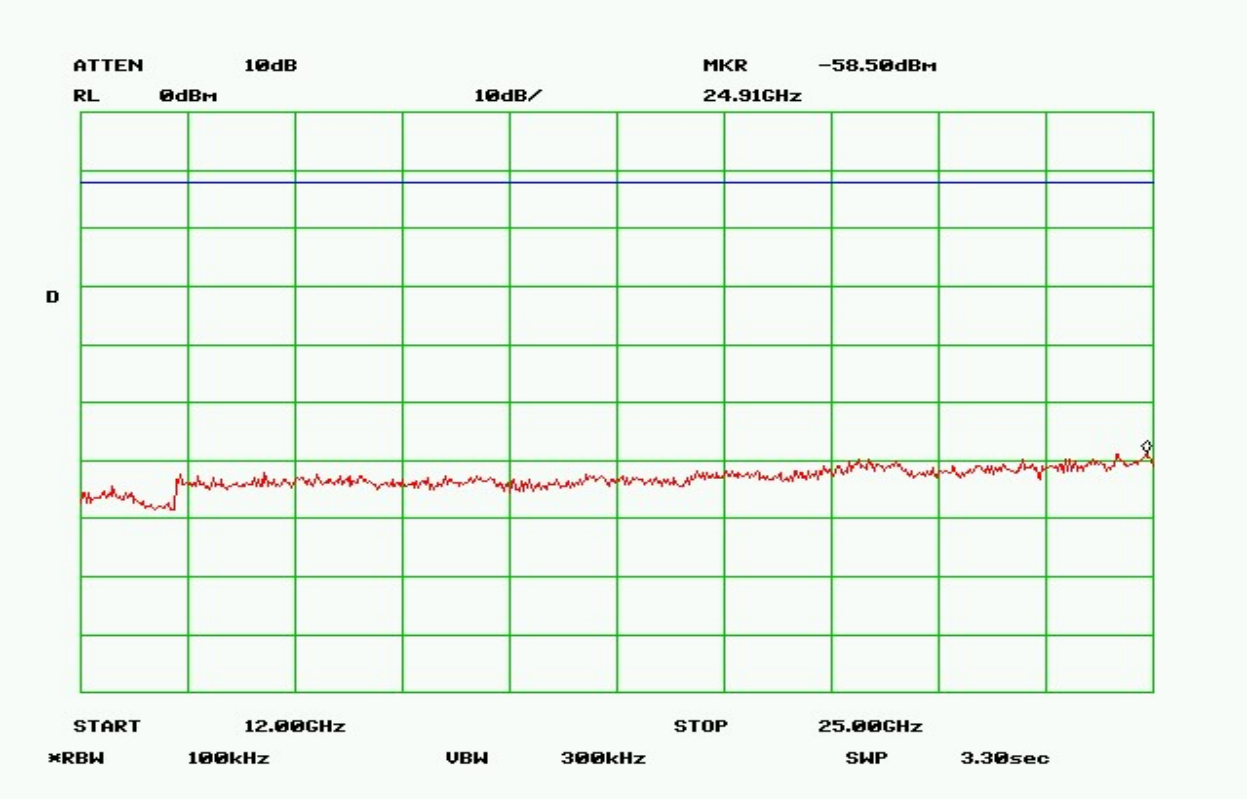
Plot 15 – 802.11b Lowest Channel – 30MHz to 1000MHz



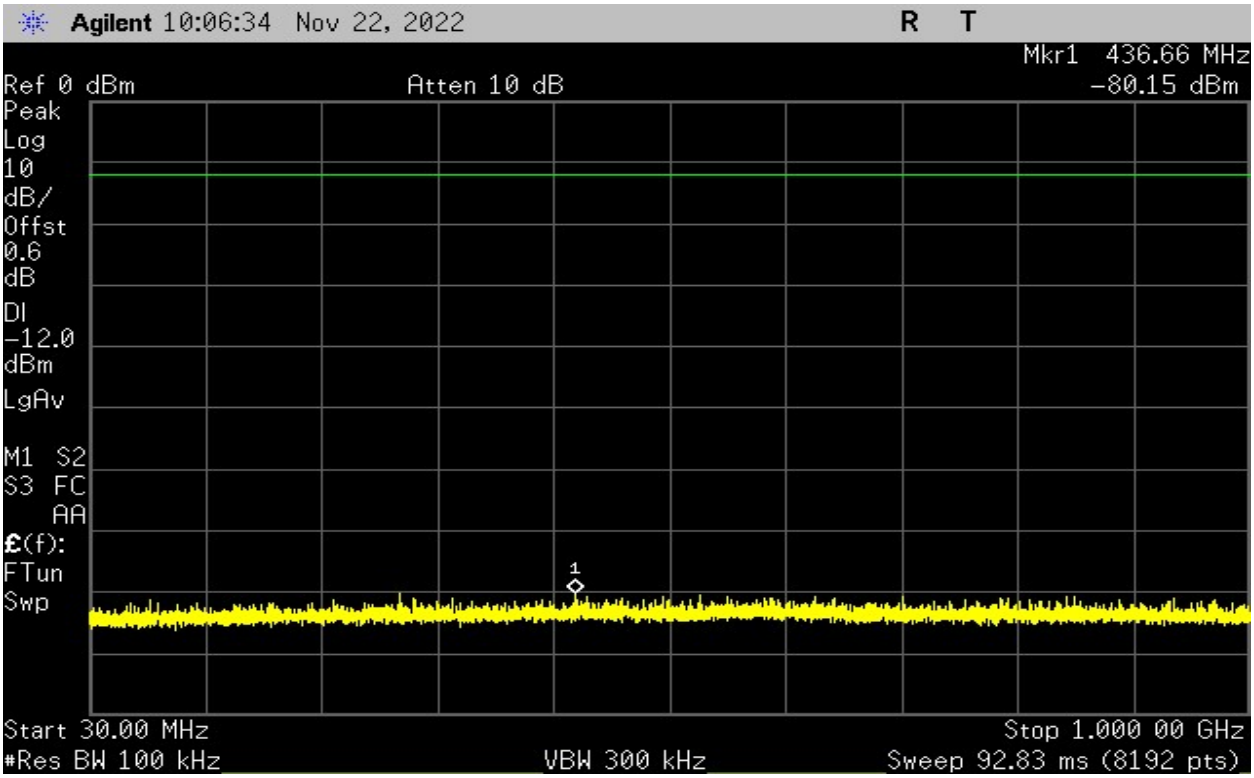
Plot 16 – 802.11b Lowest Channel – 1GHz to 6GHz



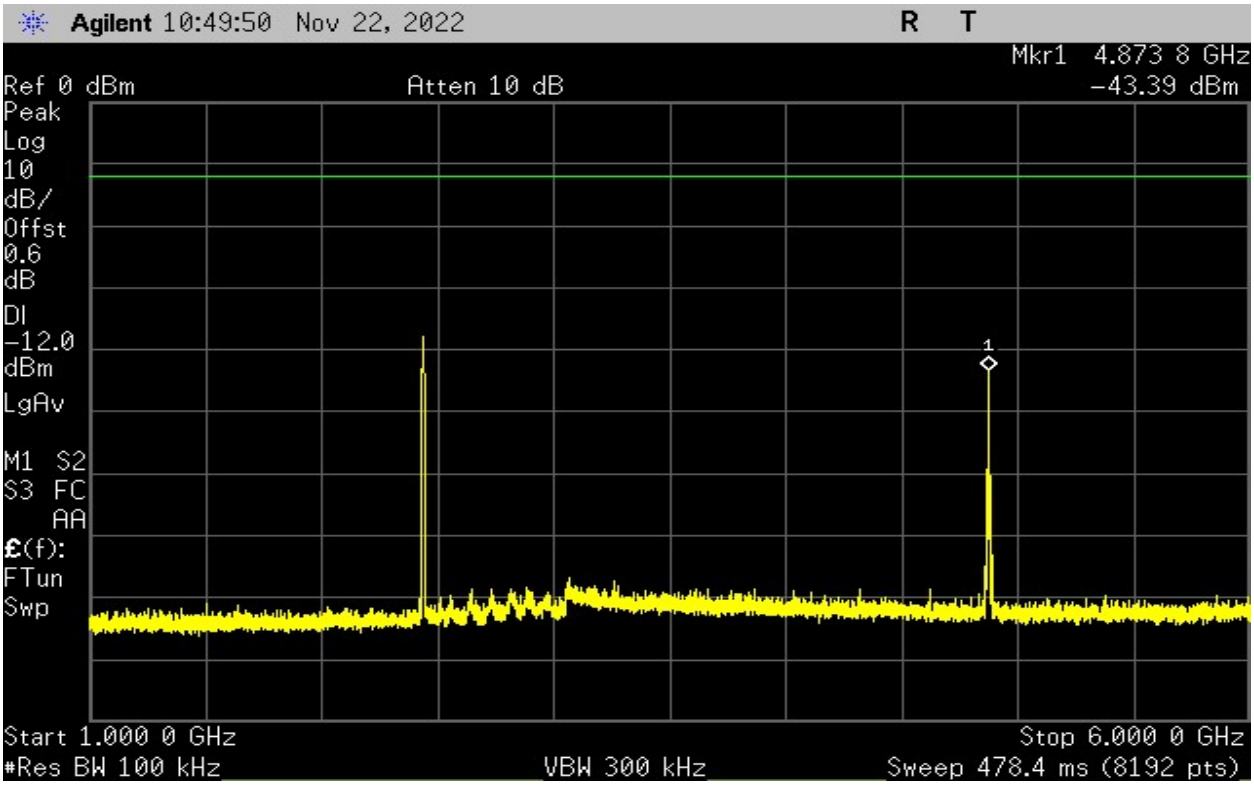
Plot 17 – 802.11b Lowest Channel – 6GHz to 12GHz



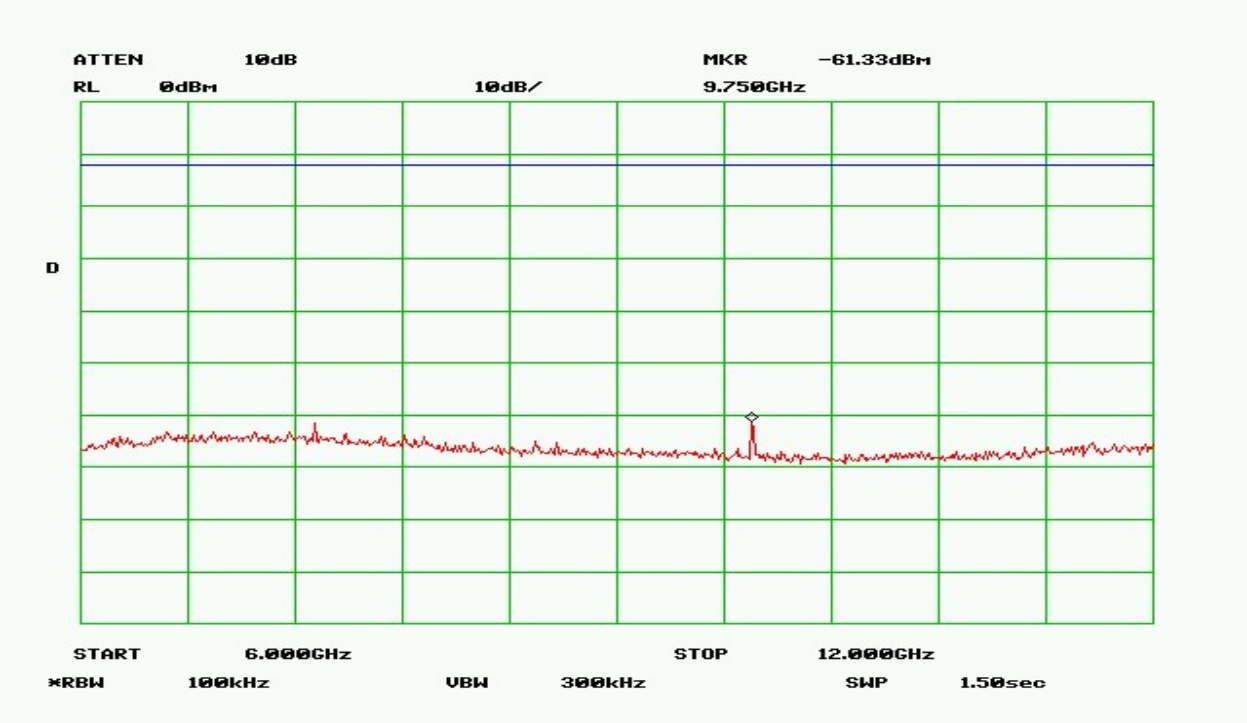
Plot 18 – 802.11b Lowest Channel – 12GHz to 25GHz



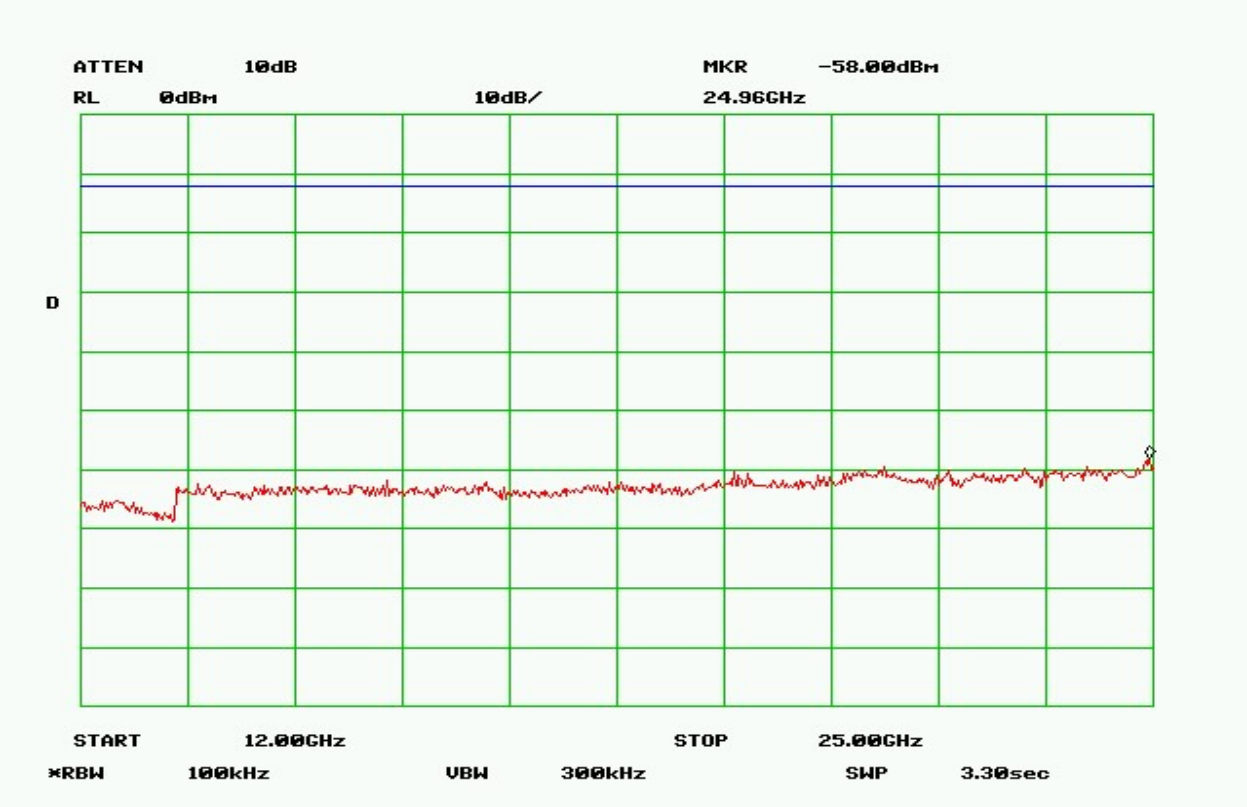
Plot 19 – 802.11b Middle Channel – 30MHz to 1000MHz



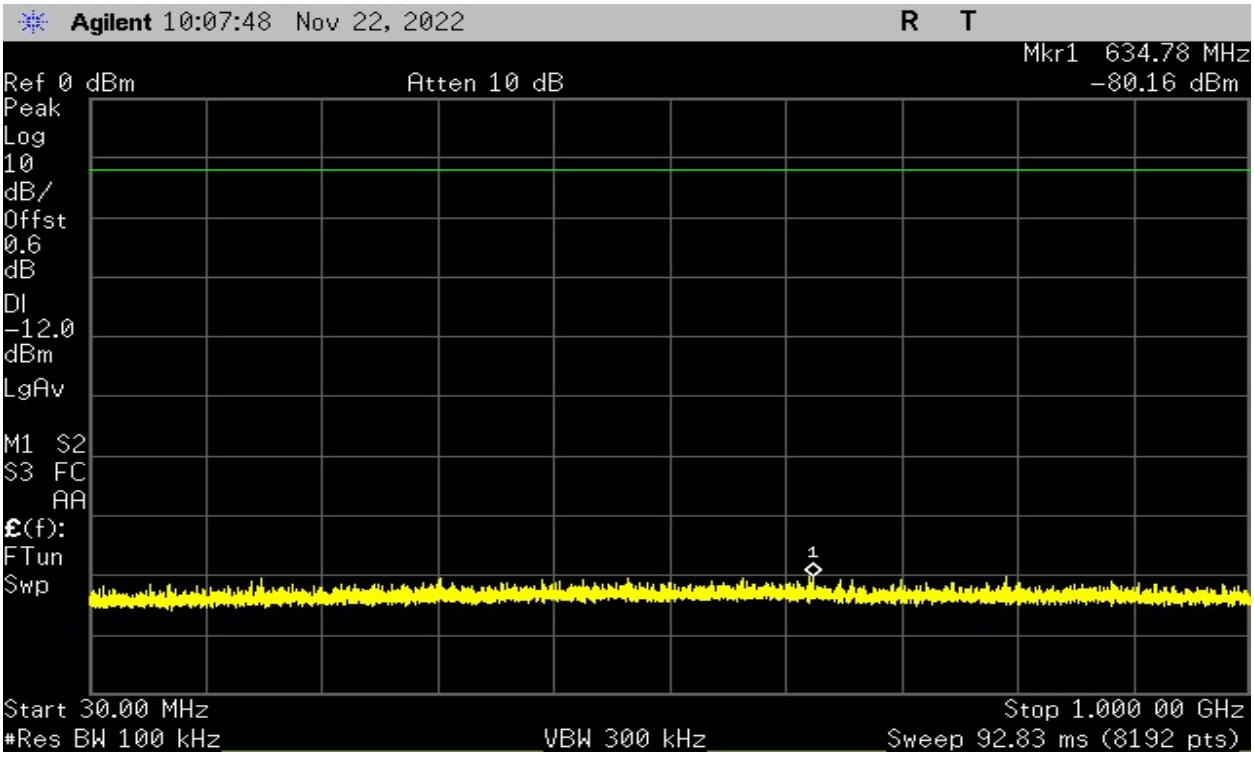
Plot 20 – 802.11b Middle Channel – 1GHz to 6GHz



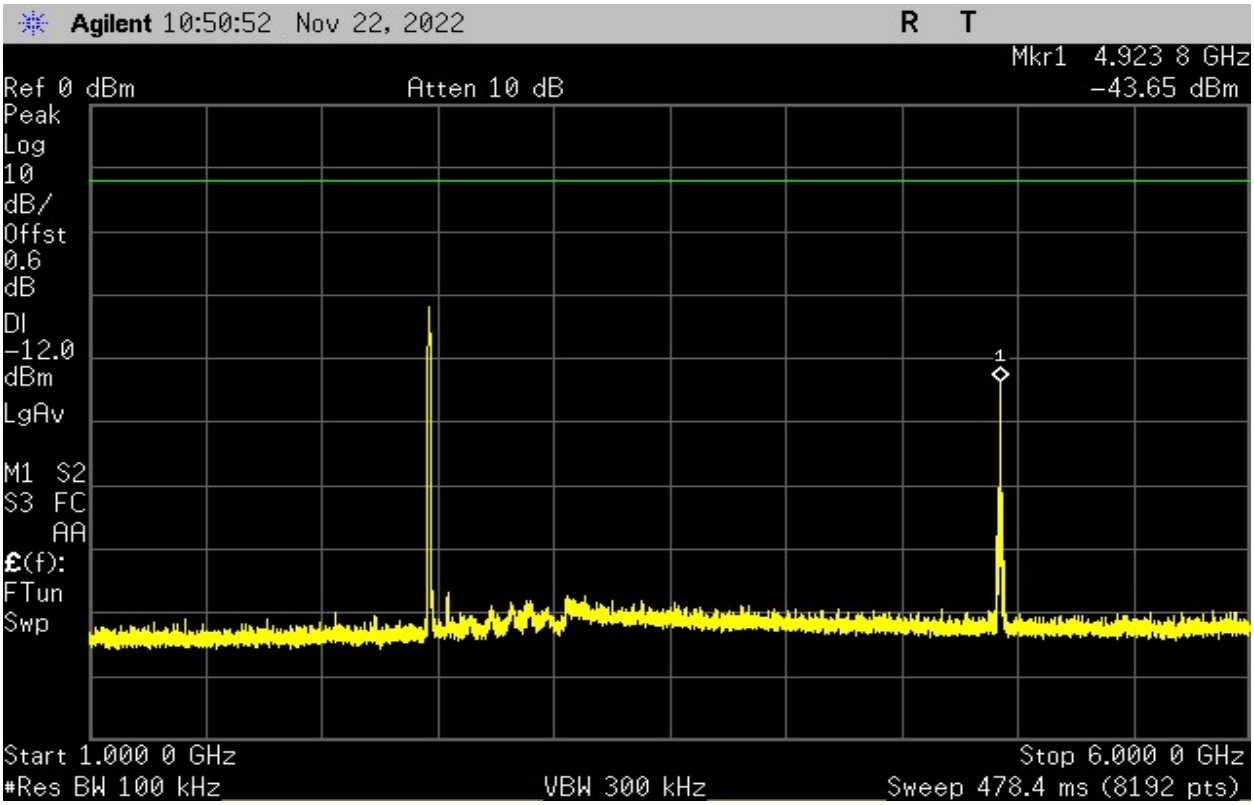
Plot 21 – 802.11b Middle Channel – 6GHz to 12GHz



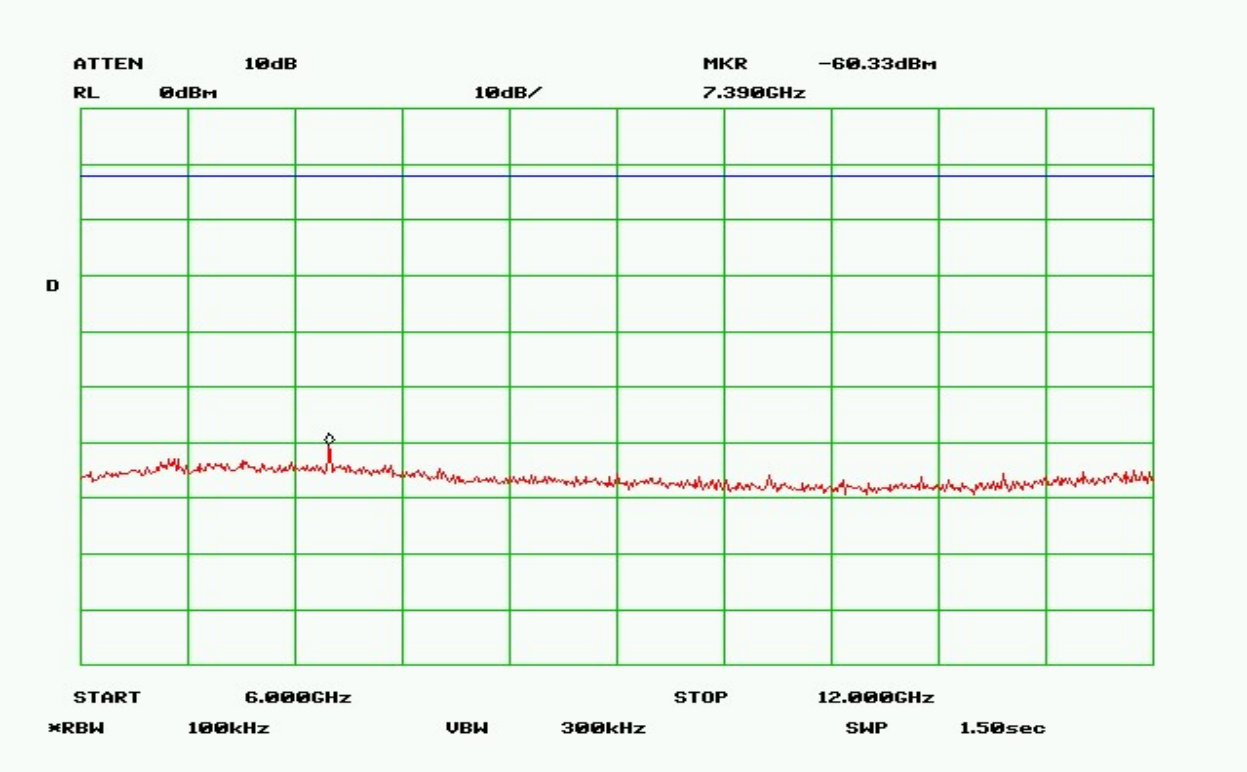
Plot 22 – 802.11b Middle Channel – 12GHz to 25GHz



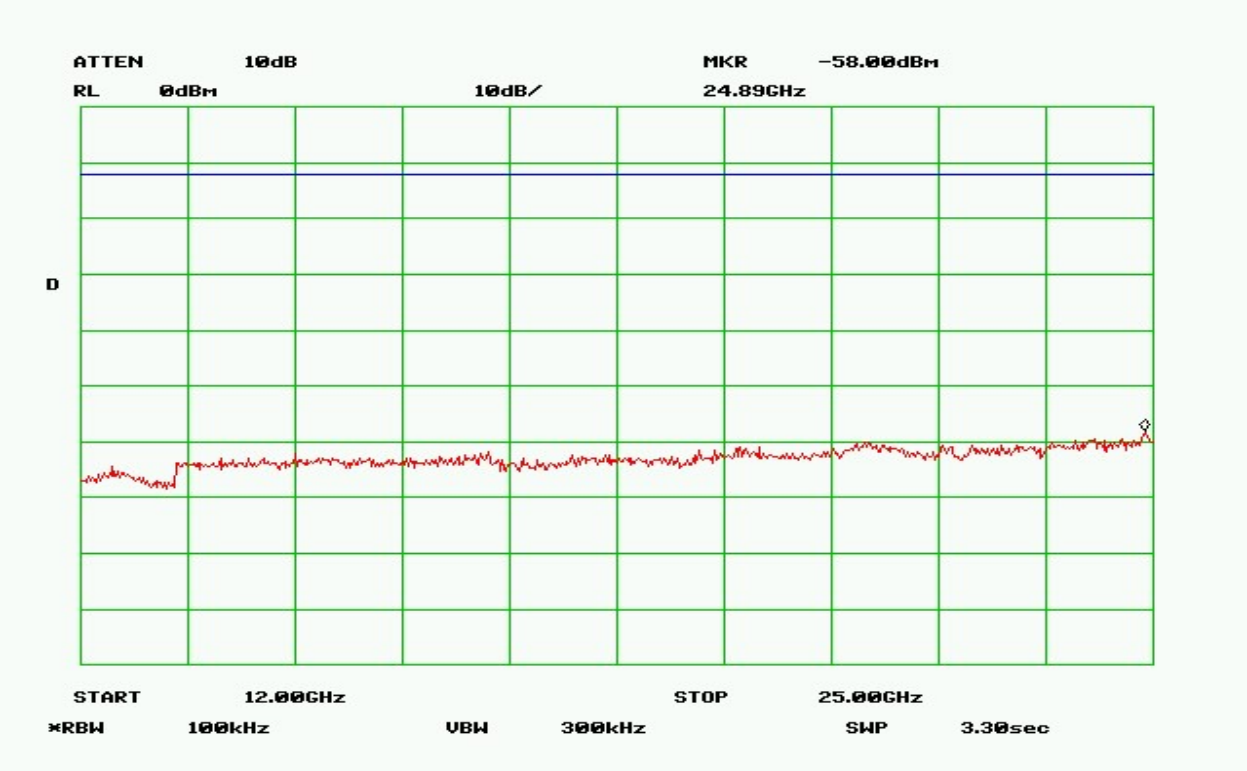
Plot 23 – 802.11b Highest Channel – 30MHz to 1000MHz



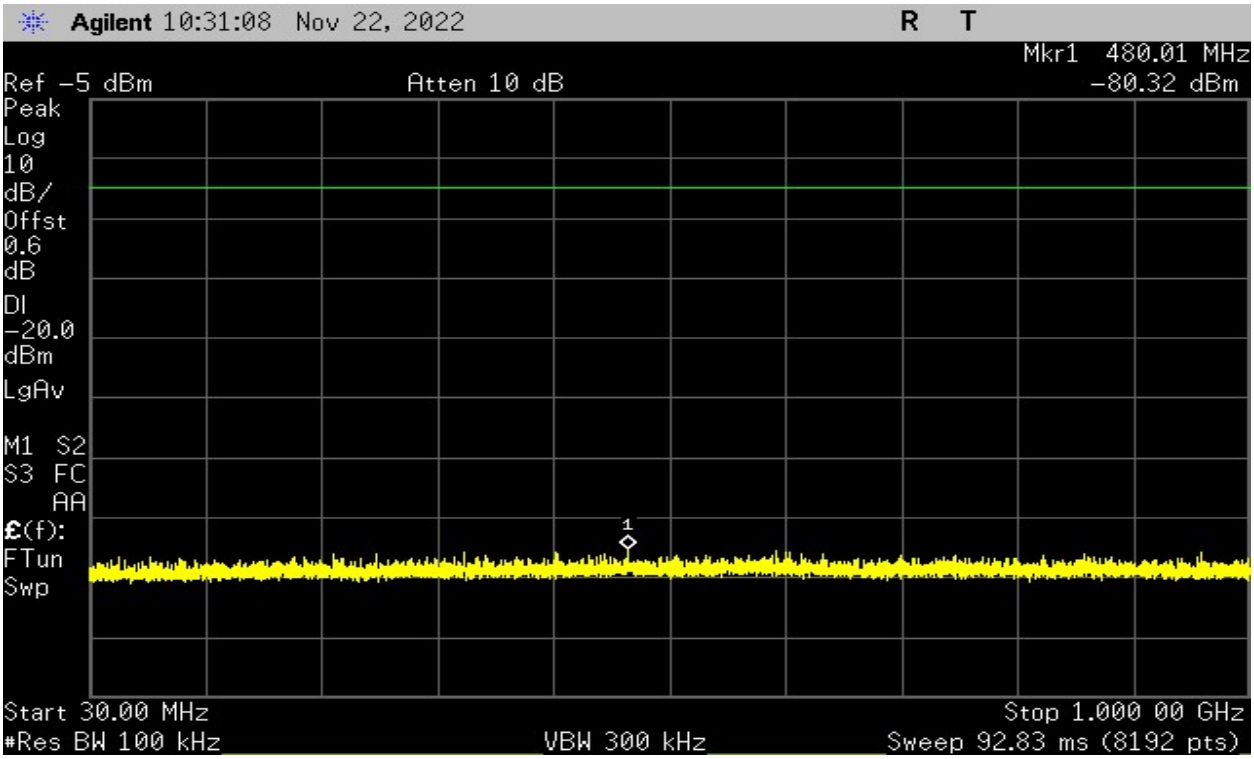
Plot 24 – 802.11b Highest Channel – 1GHz to 6GHz



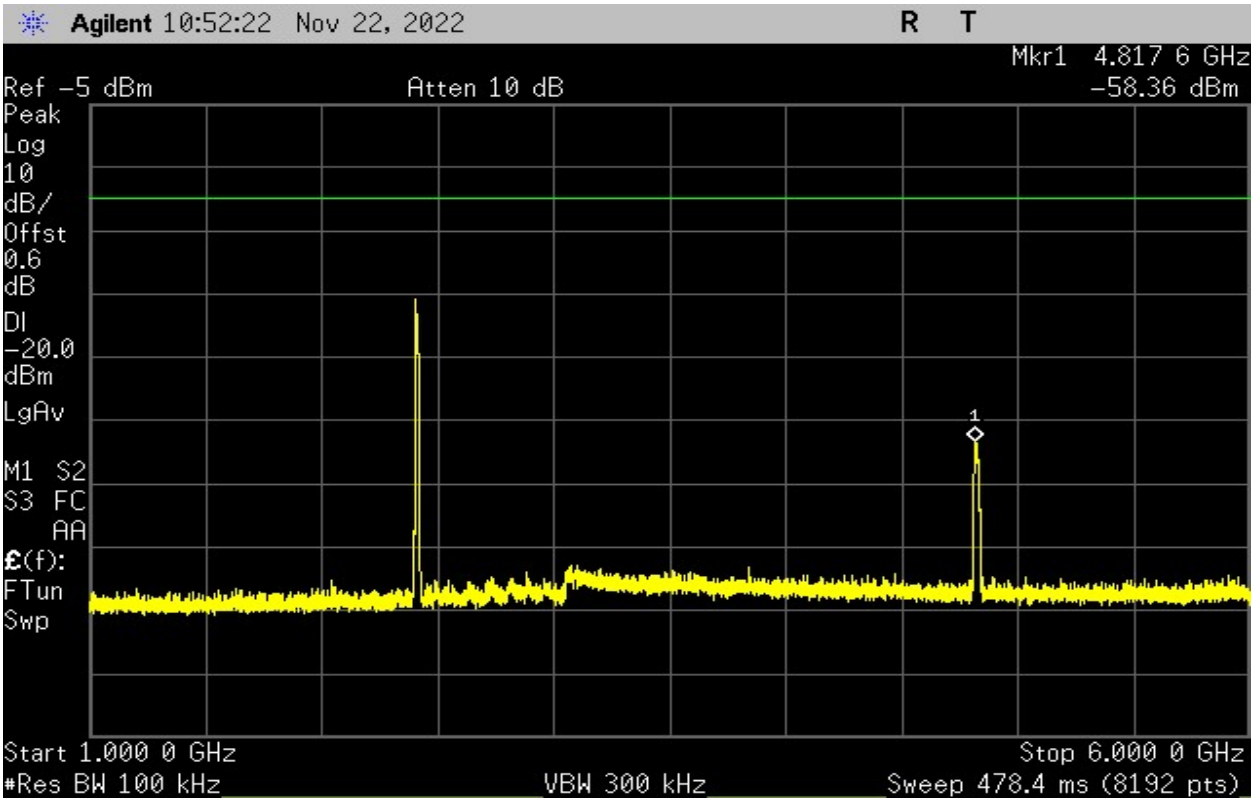
Plot 25 – 802.11g Lowest Channel – 6GHz to 12GHz



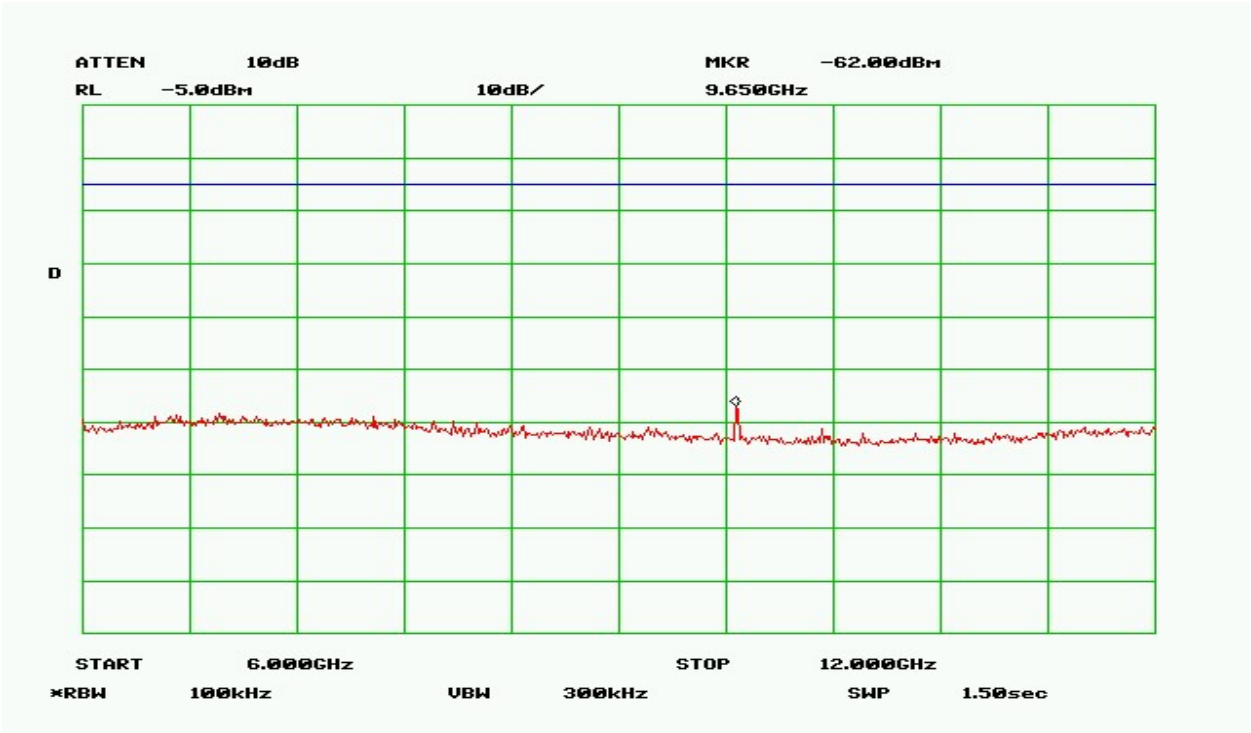
Plot 26 – 802.11g Lowest Channel – 12GHz to 25GHz



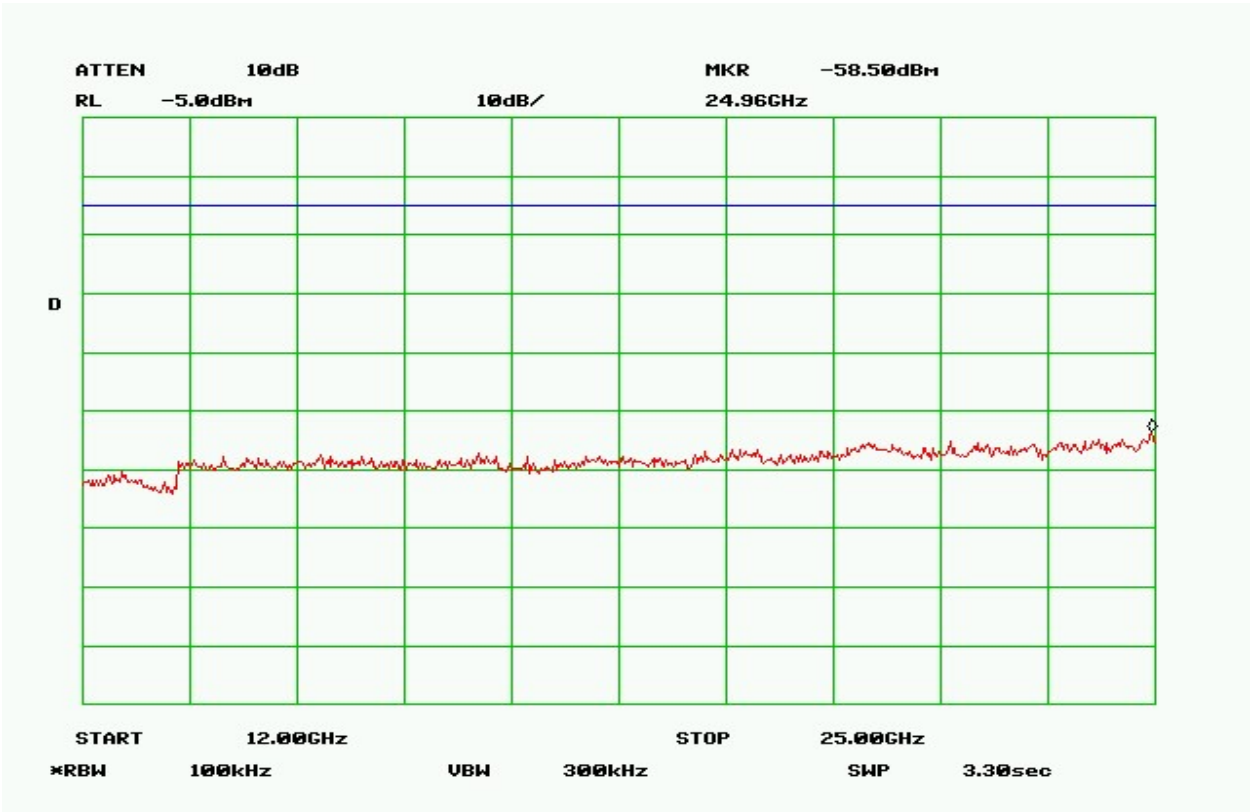
Plot 27 – 802.11g Lowest Channel – 30MHz to 1000MHz



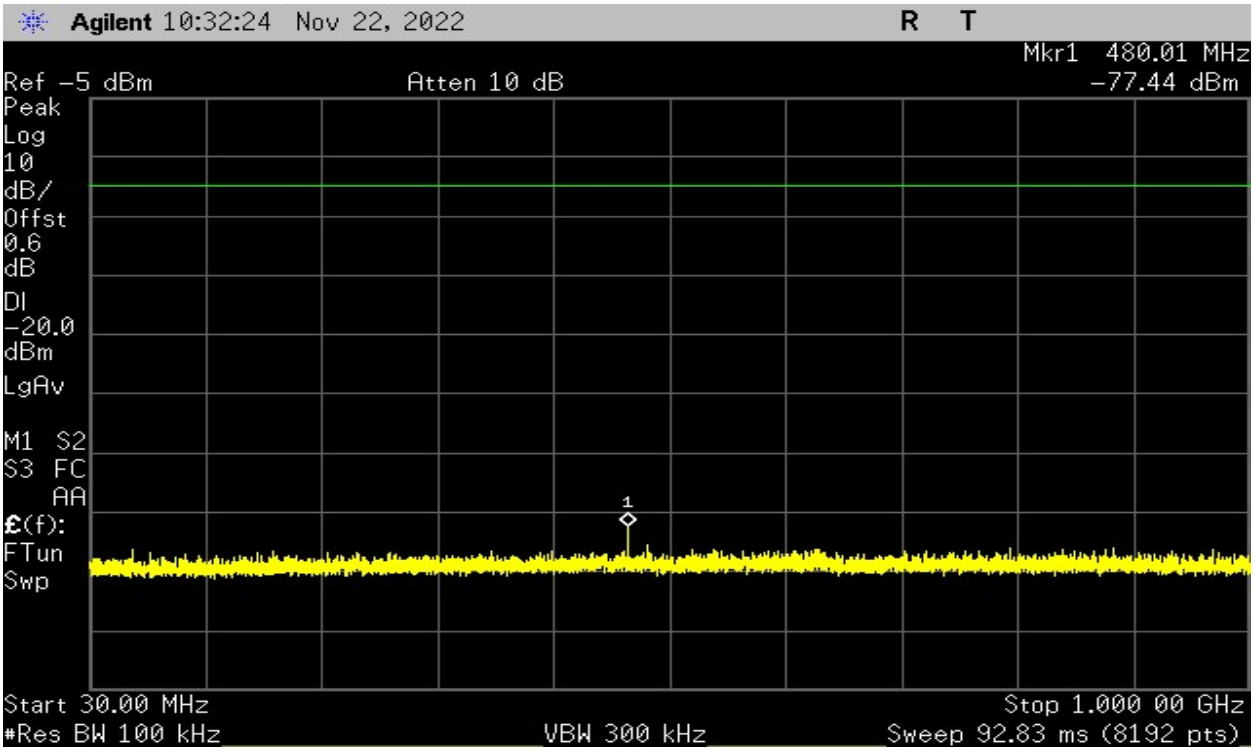
Plot 28 – 802.11g Lowest Channel – 1GHz to 6GHz



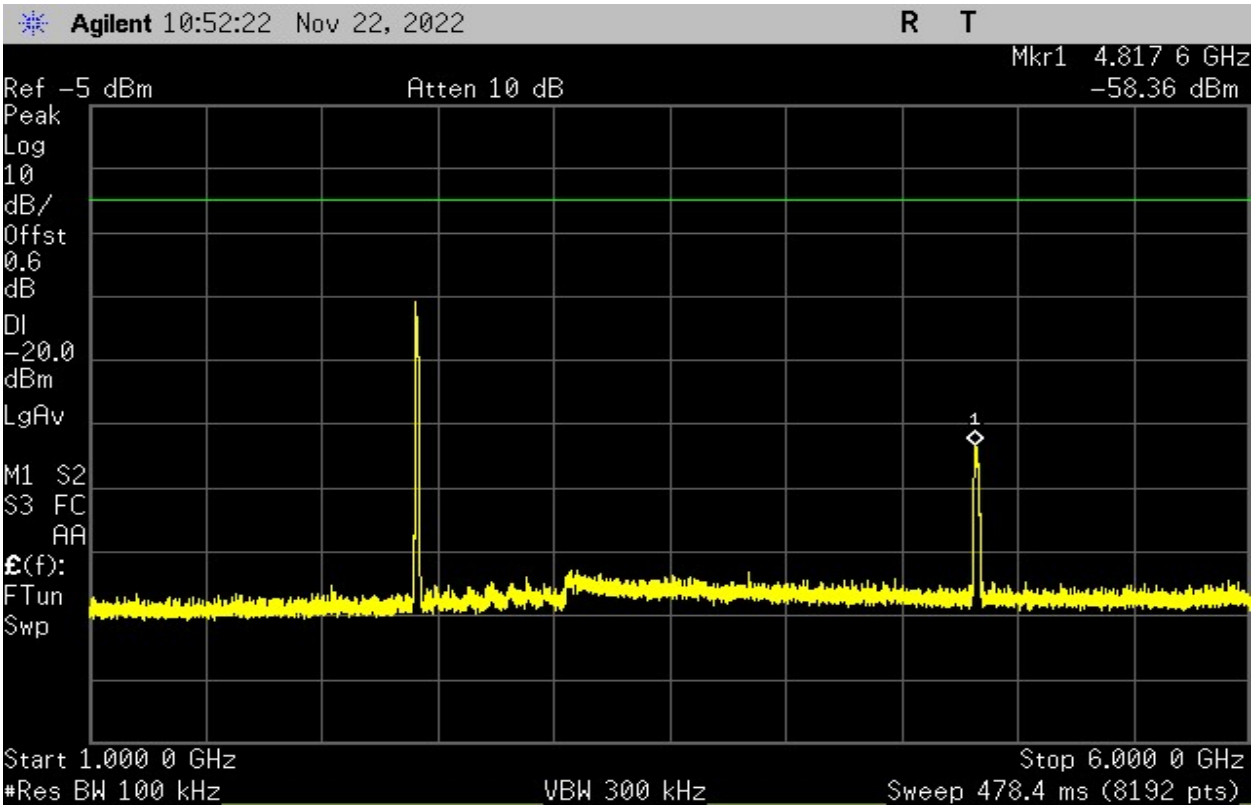
Plot 29 – 802.11g Lowest Channel – 6GHz to 12GHz



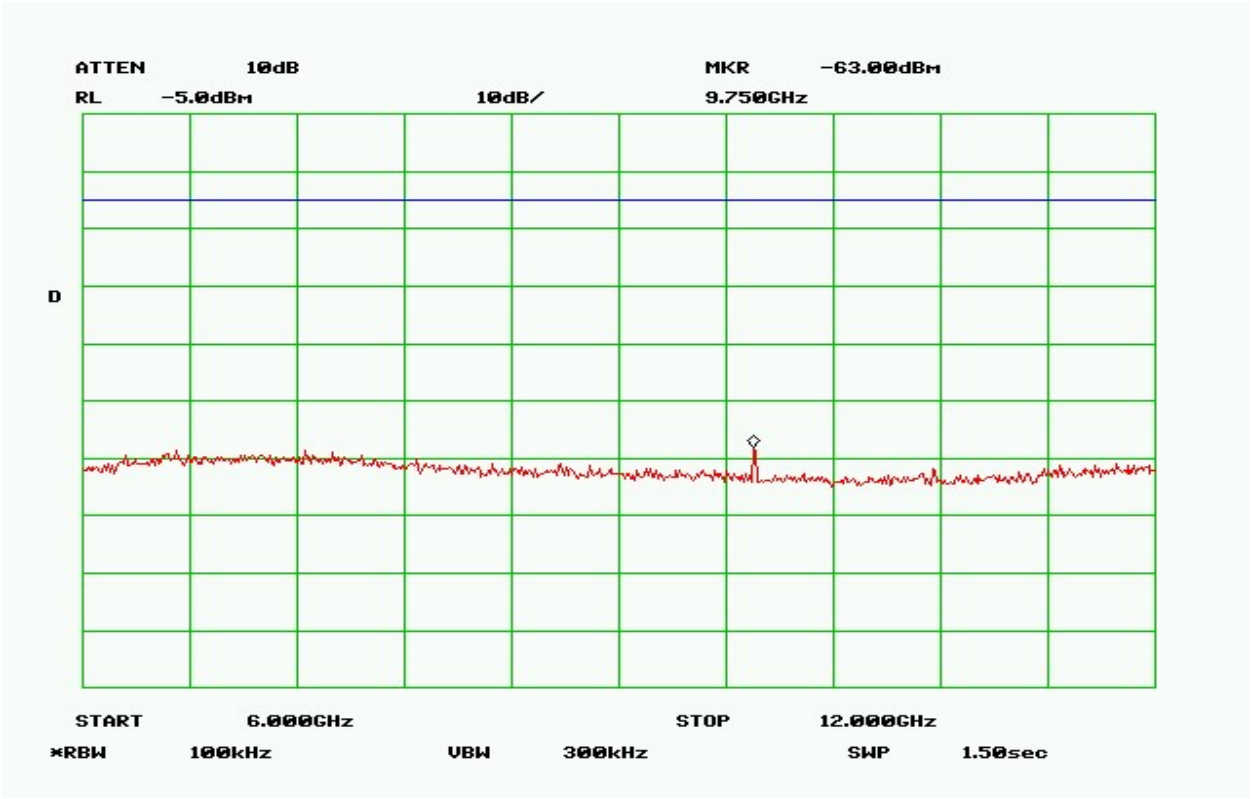
Plot 30 – 802.11g Lowest Channel – 12GHz to 25GHz



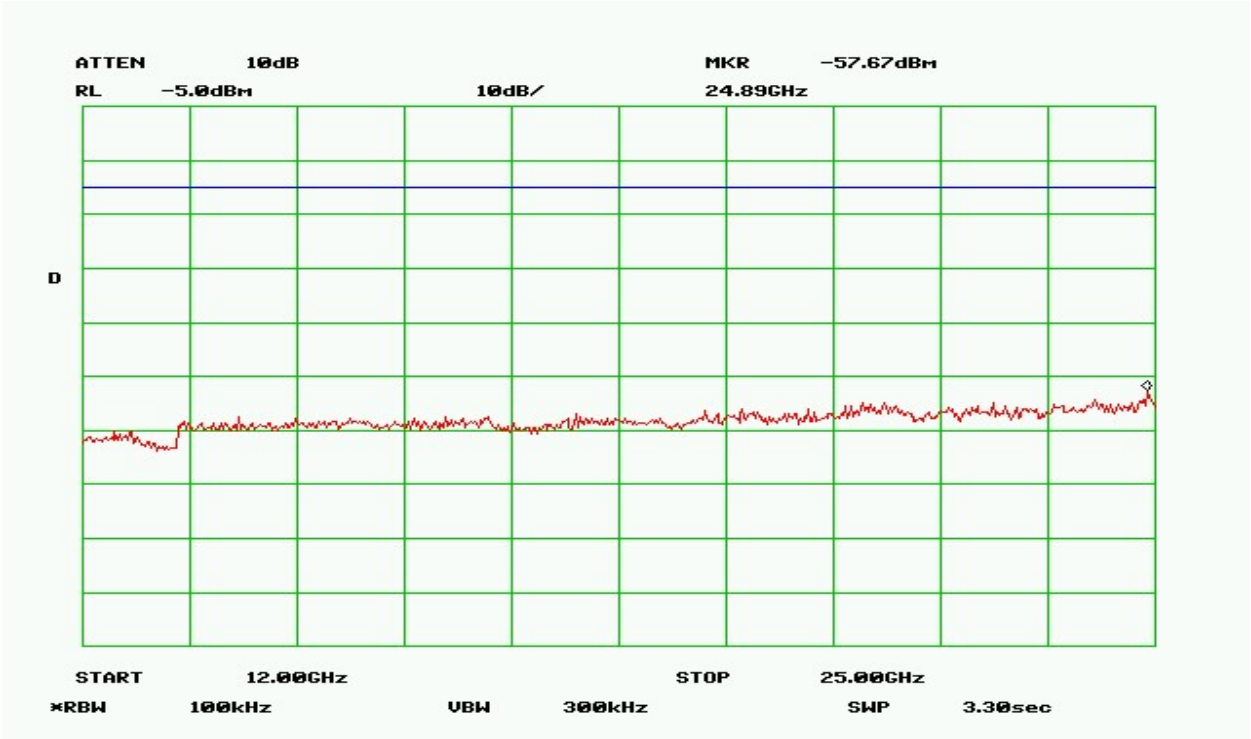
Plot 31 – 802.11g Middle Channel – 30MHz to 1000MHz



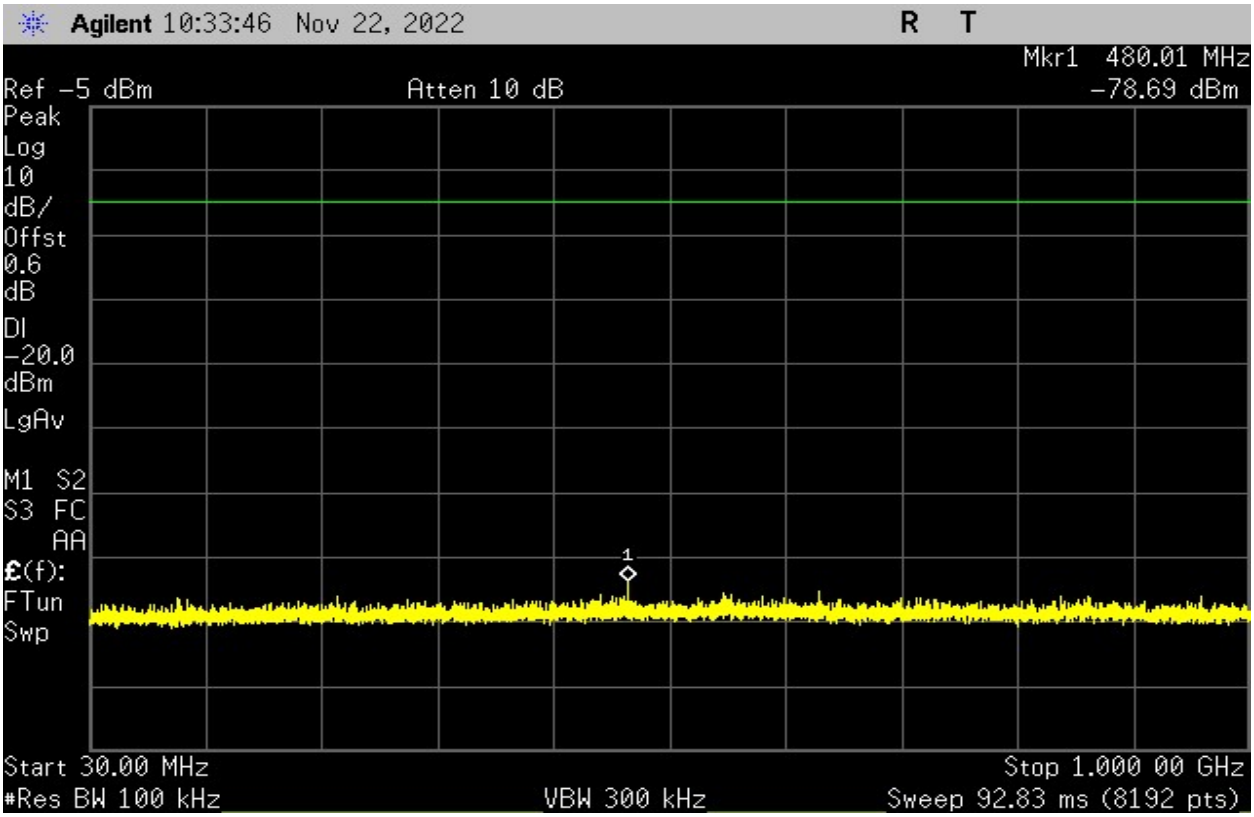
Plot 32 – 802.11g Middle Channel – 1GHz to 6GHz



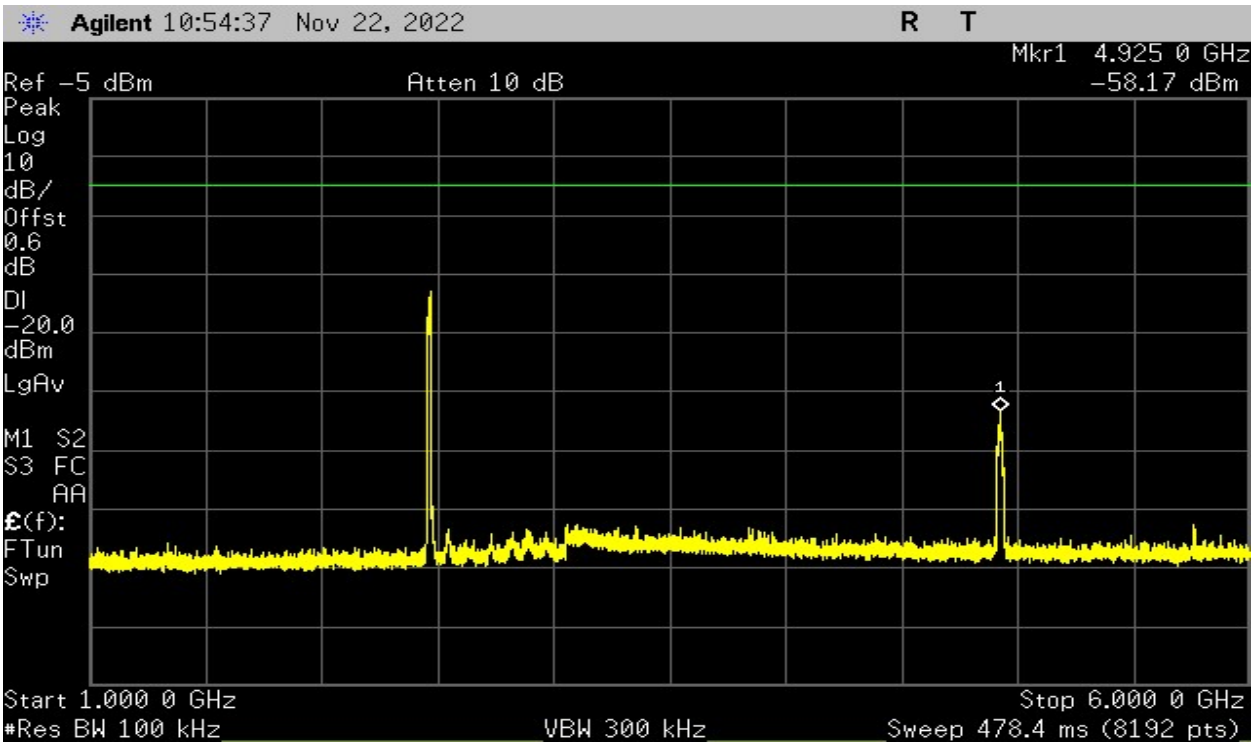
Plot 33 – 802.11g Middle Channel – 6GHz to 12GHz



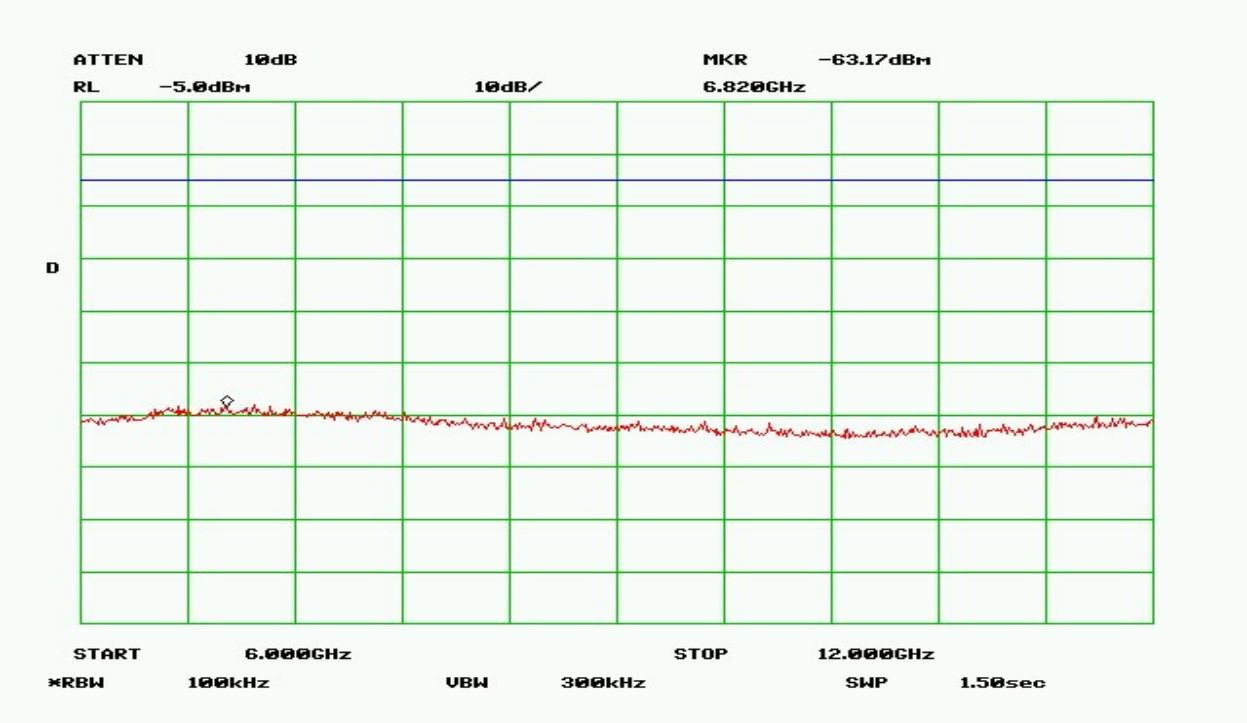
Plot 34 – 802.11g Middle Channel – 12GHz to 25GHz



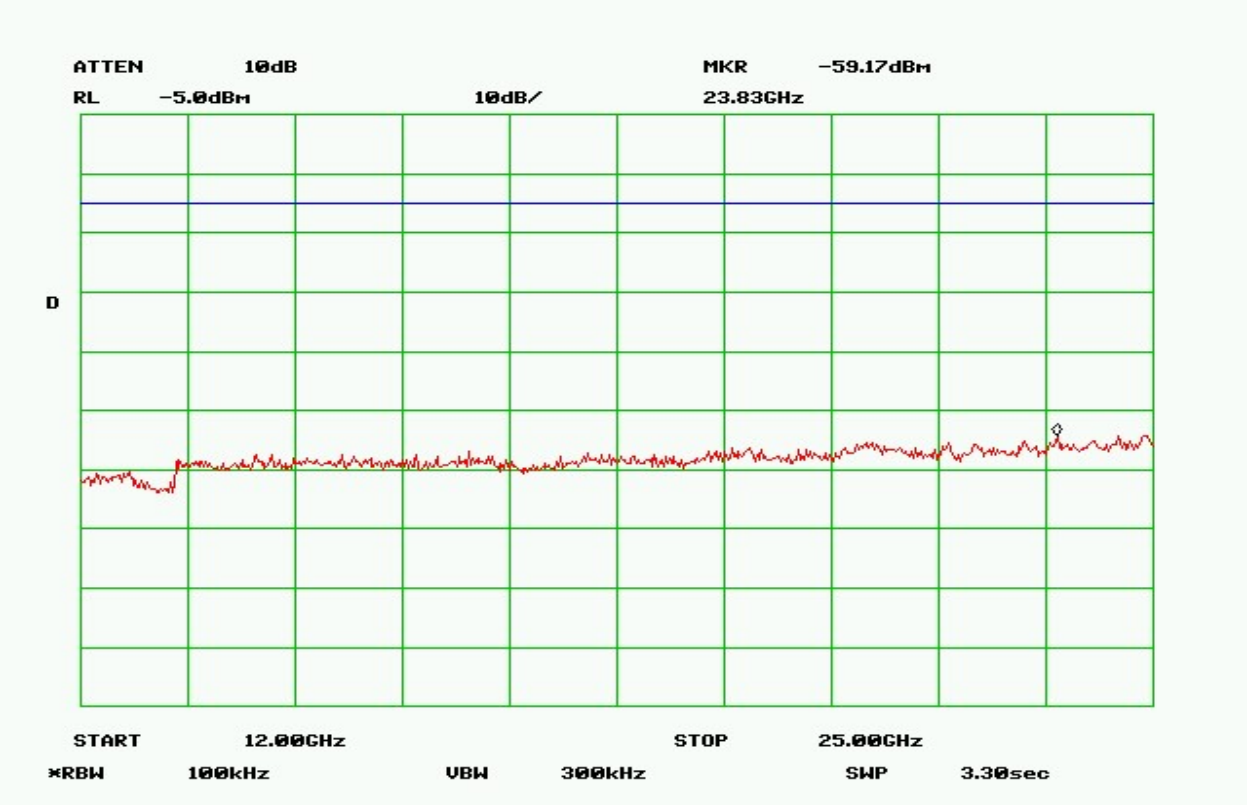
Plot 35 – 802.11g Highest Channel – 30MHz to 1000MHz



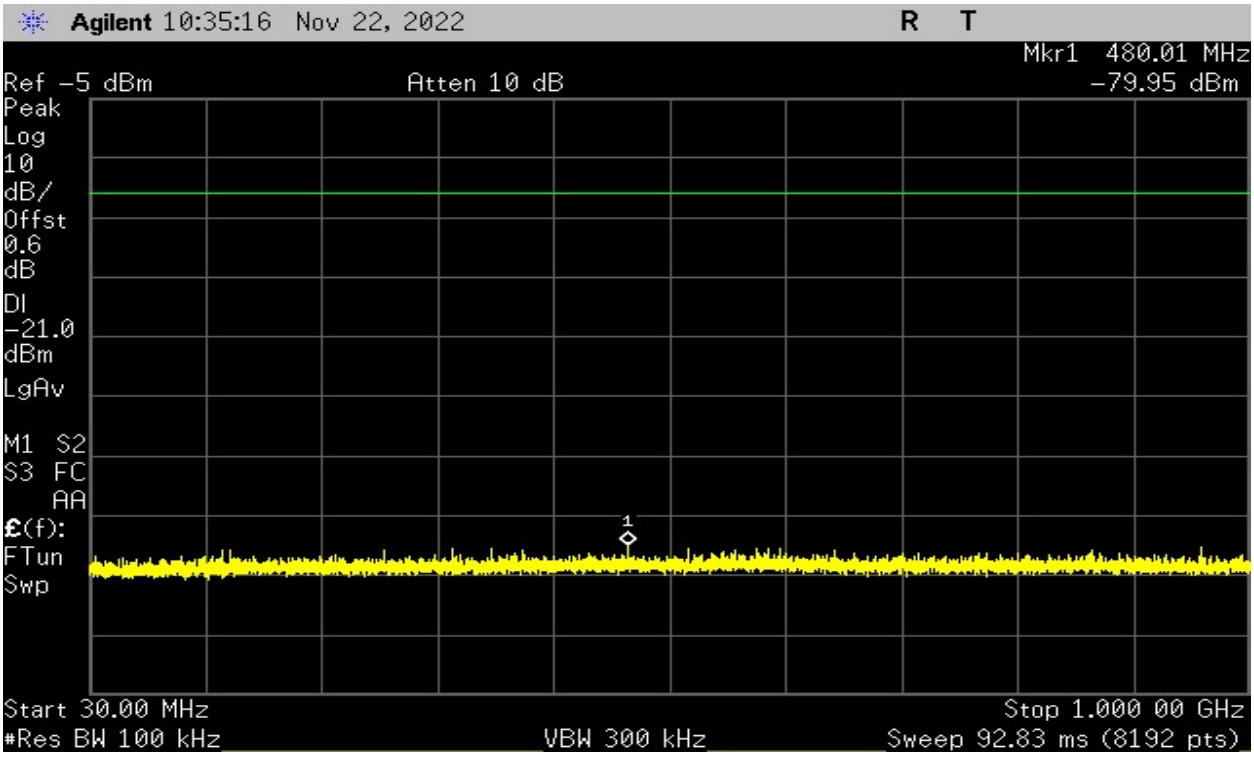
Plot 36 – 802.11g Highest Channel – 1GHz to 6GHz



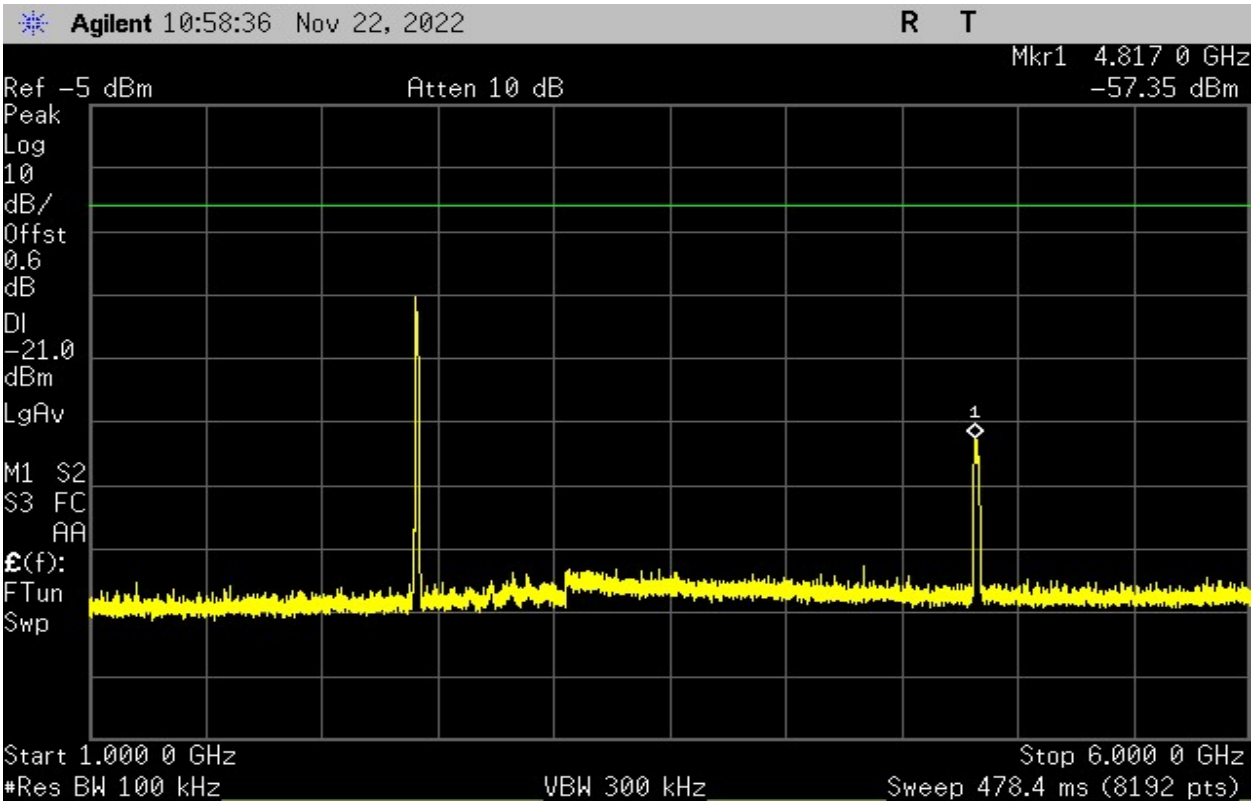
Plot 37 – 802.11g Highest Channel – 6GHz to 12GHz



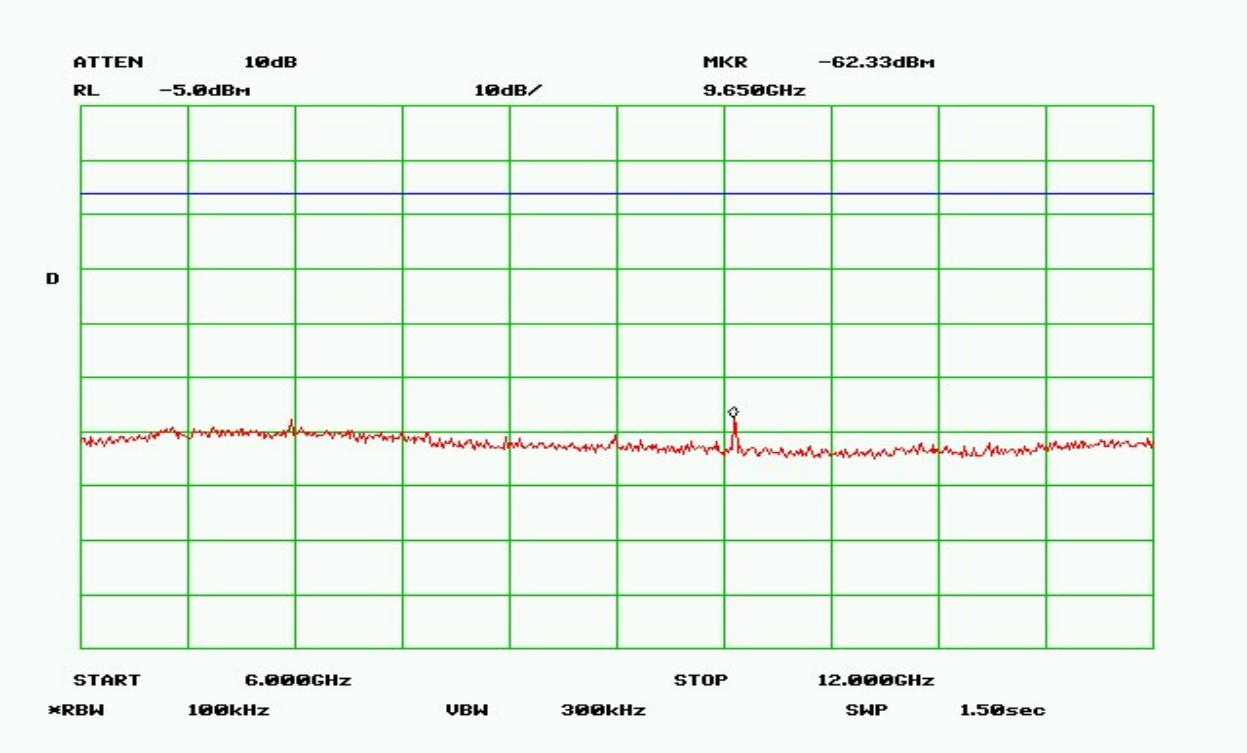
Plot 38 – 802.11g Highest Channel – 12GHz to 25GHz



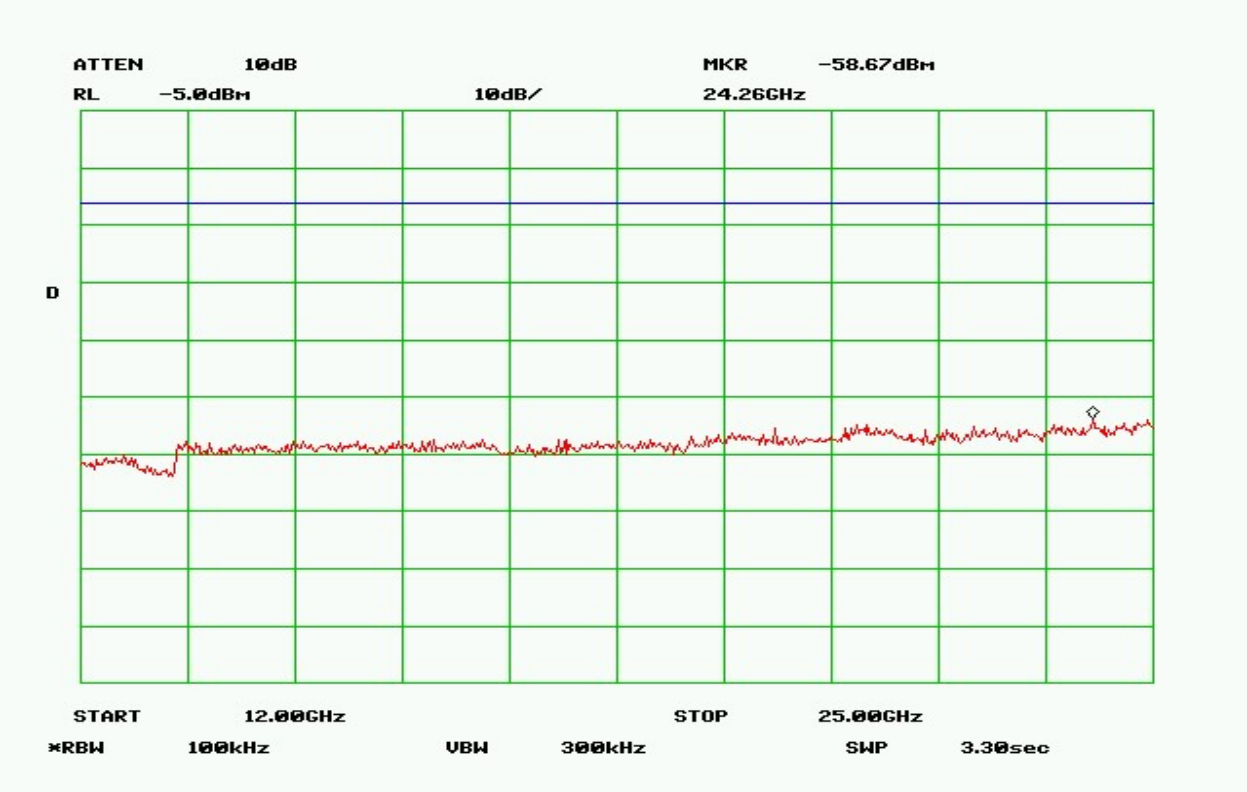
Plot 39 – 802.11n (20 MHz) Lowest Channel – 30MHz to 1000MHz



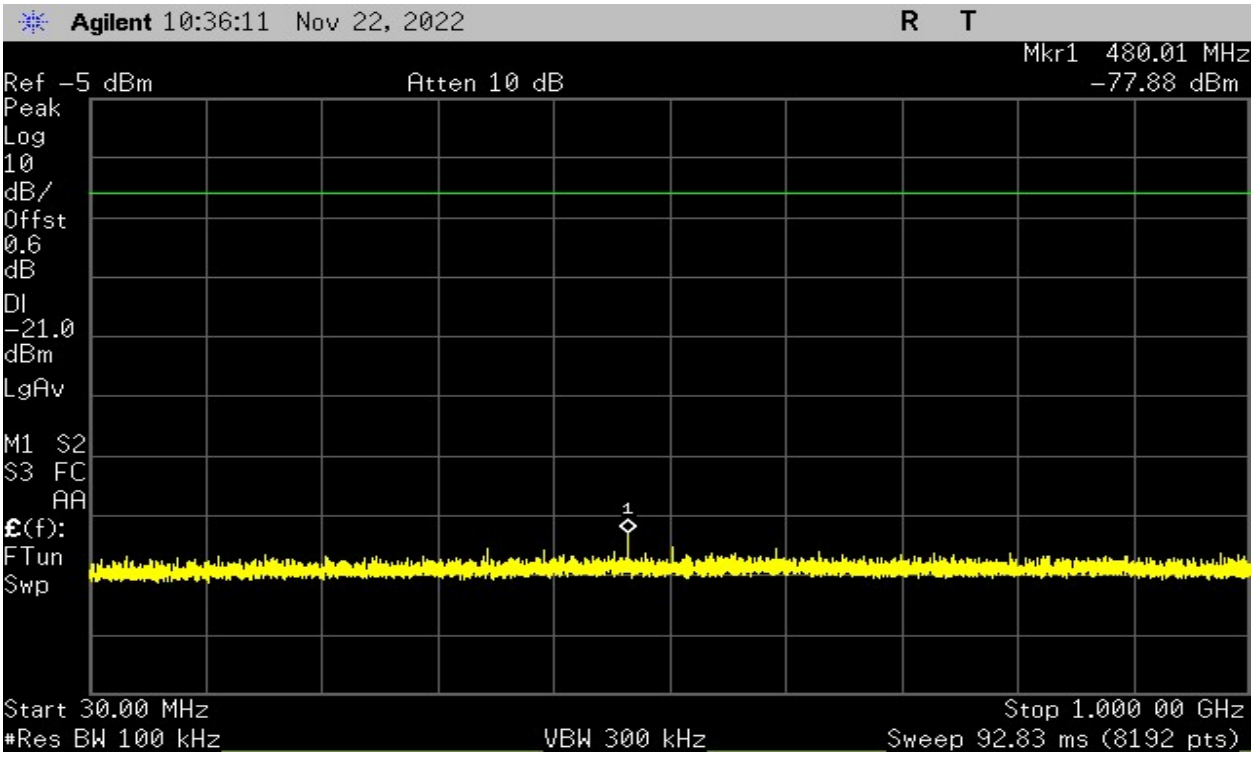
Plot 40 – 802.11n (20 MHz) Lowest Channel – 1GHz to 6GHz



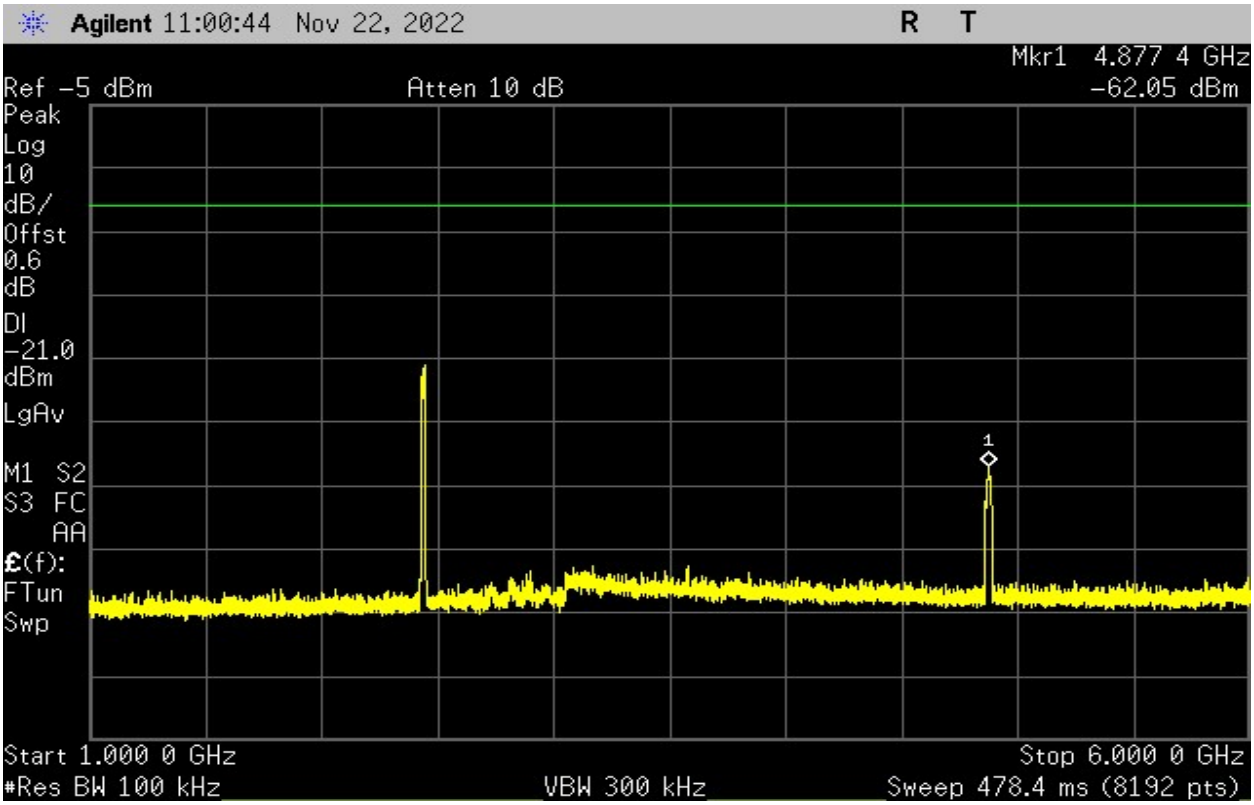
Plot 41 – 802.11n (20 MHz) Lowest Channel – 6GHz to 12GHz



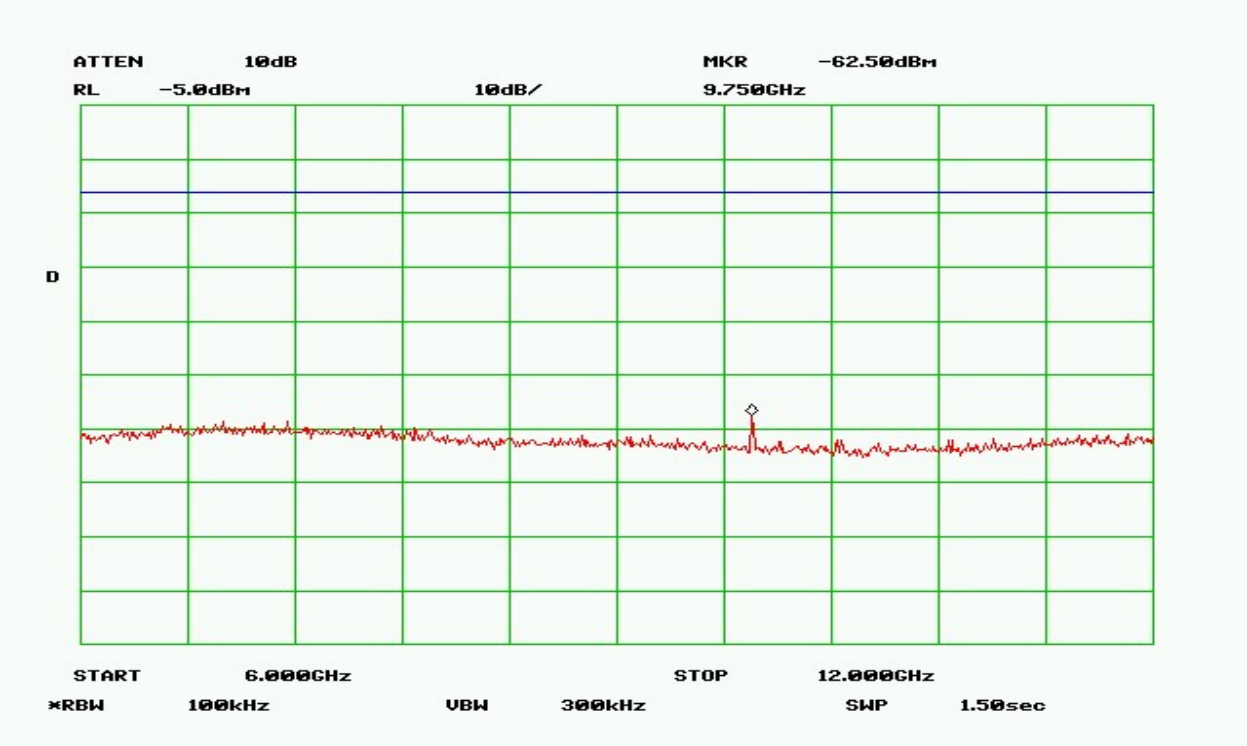
Plot 42 – 802.11n (20 MHz) Lowest Channel – 12GHz to 25GHz



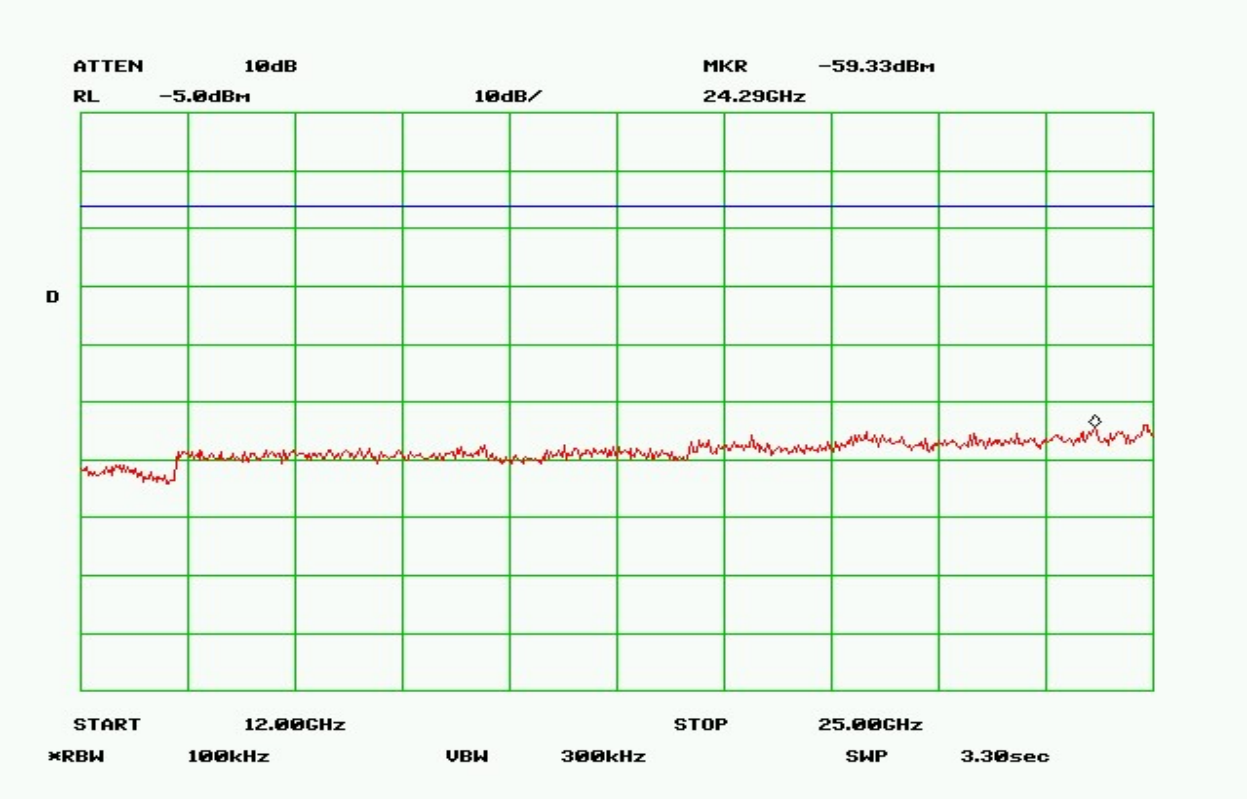
Plot 43 – 802.11n (20 MHz) Middle Channel – 30MHz to 1000MHz



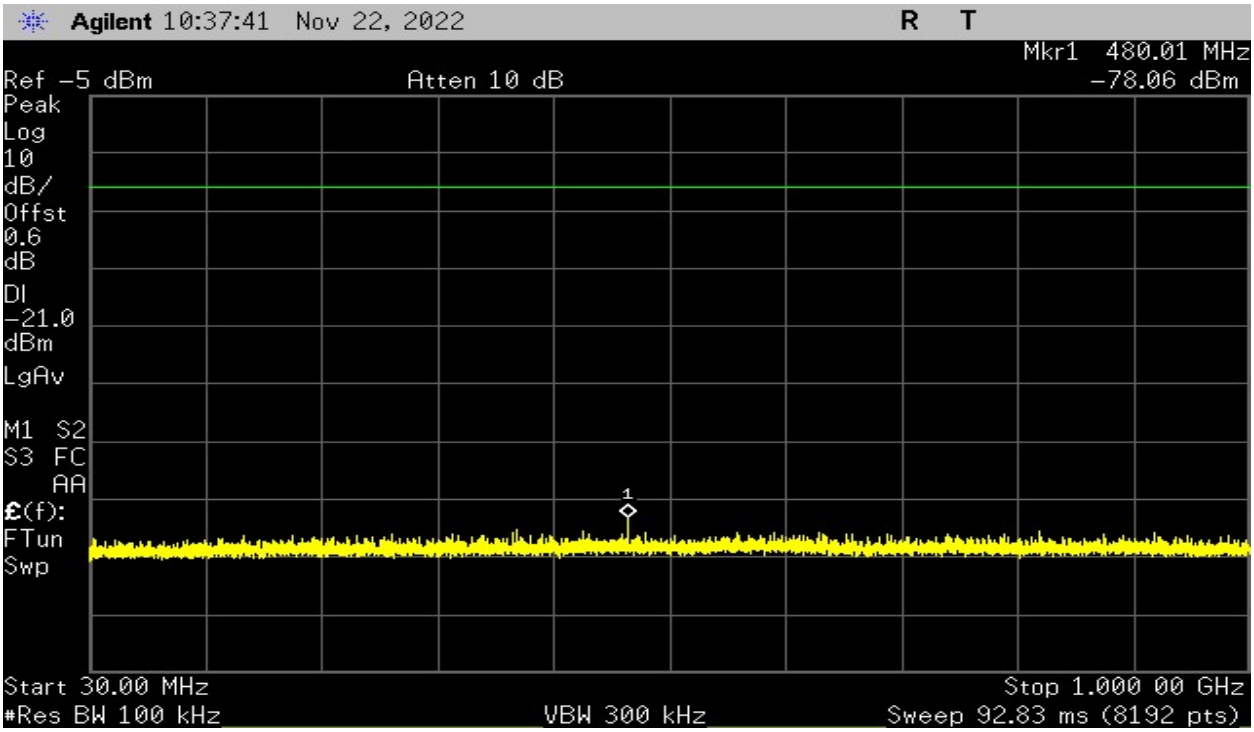
Plot 44 – 802.11n (20 MHz) Middle Channel – 1GHz to 6GHz



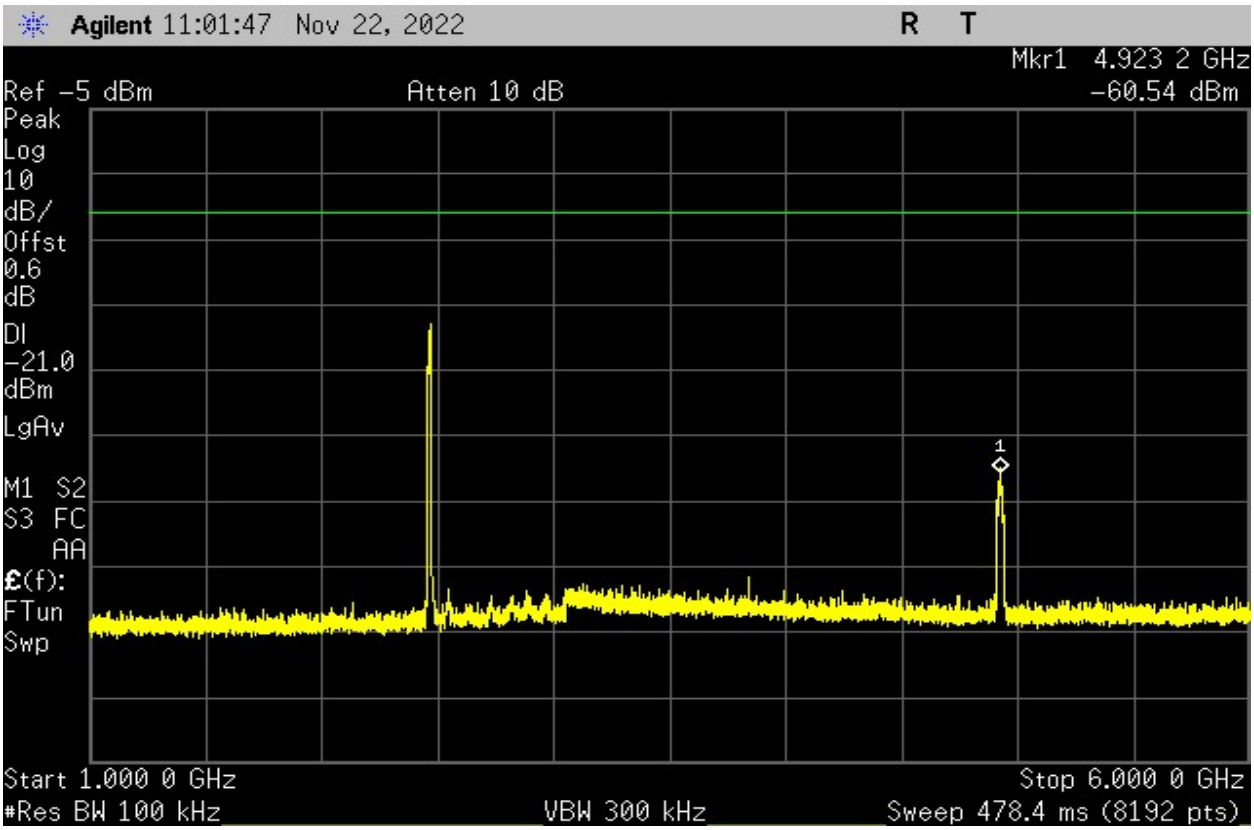
Plot 45 – 802.11n (20 MHz) Middle Channel – 6GHz to 12GHz



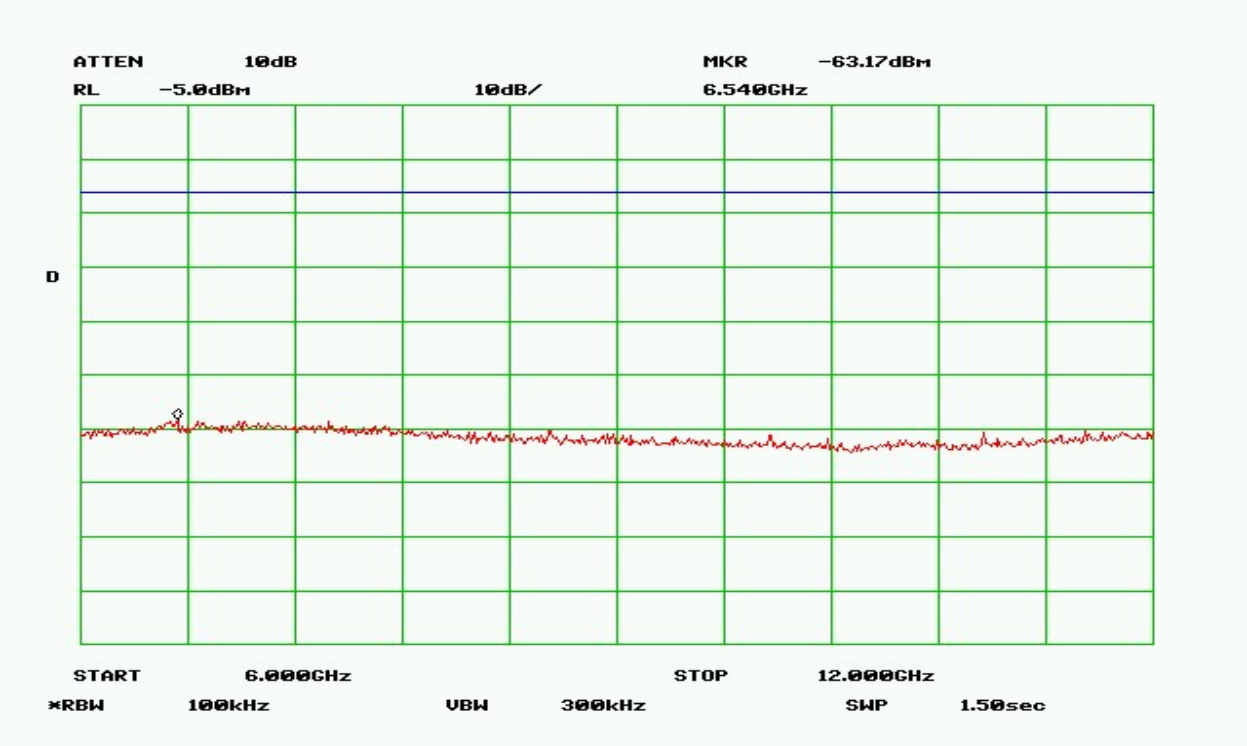
Plot 46 – 802.11n (20 MHz) Middle Channel – 12GHz to 25GHz



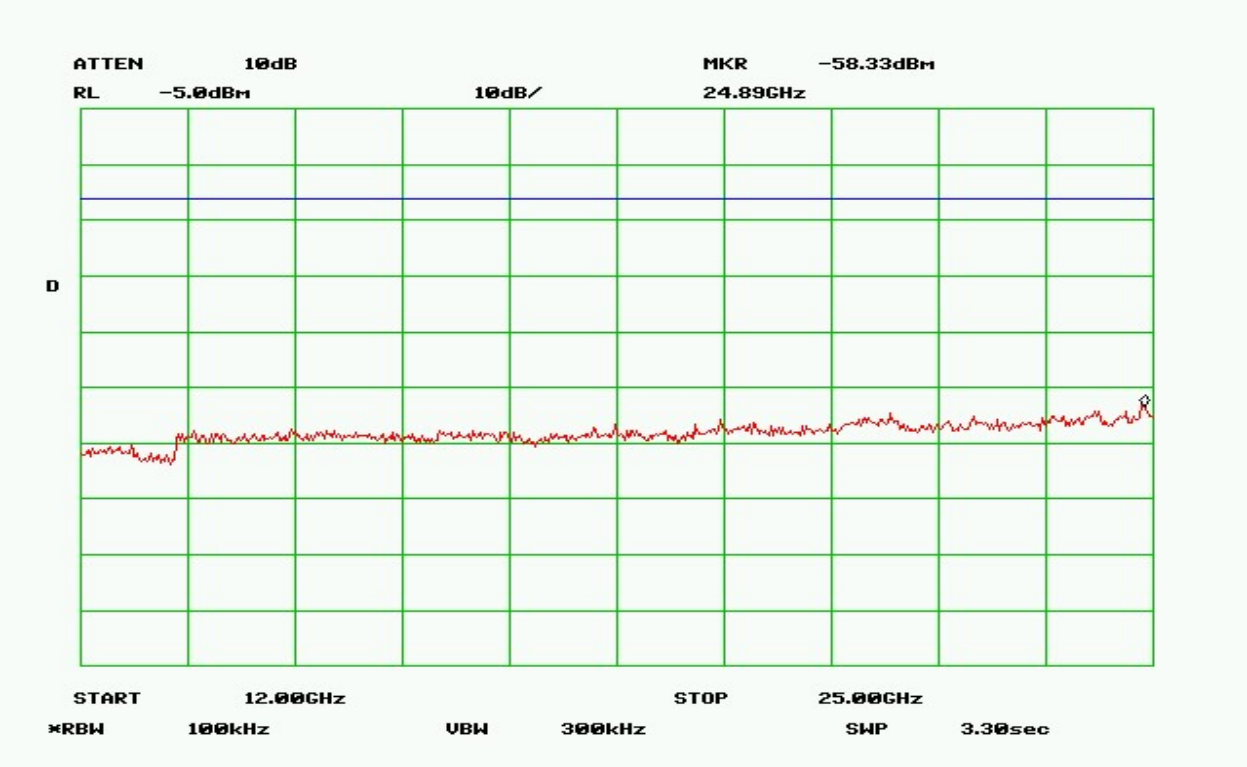
Plot 47 – 802.11n (20 MHz) Highest Channel – 30MHz to 1000MHz



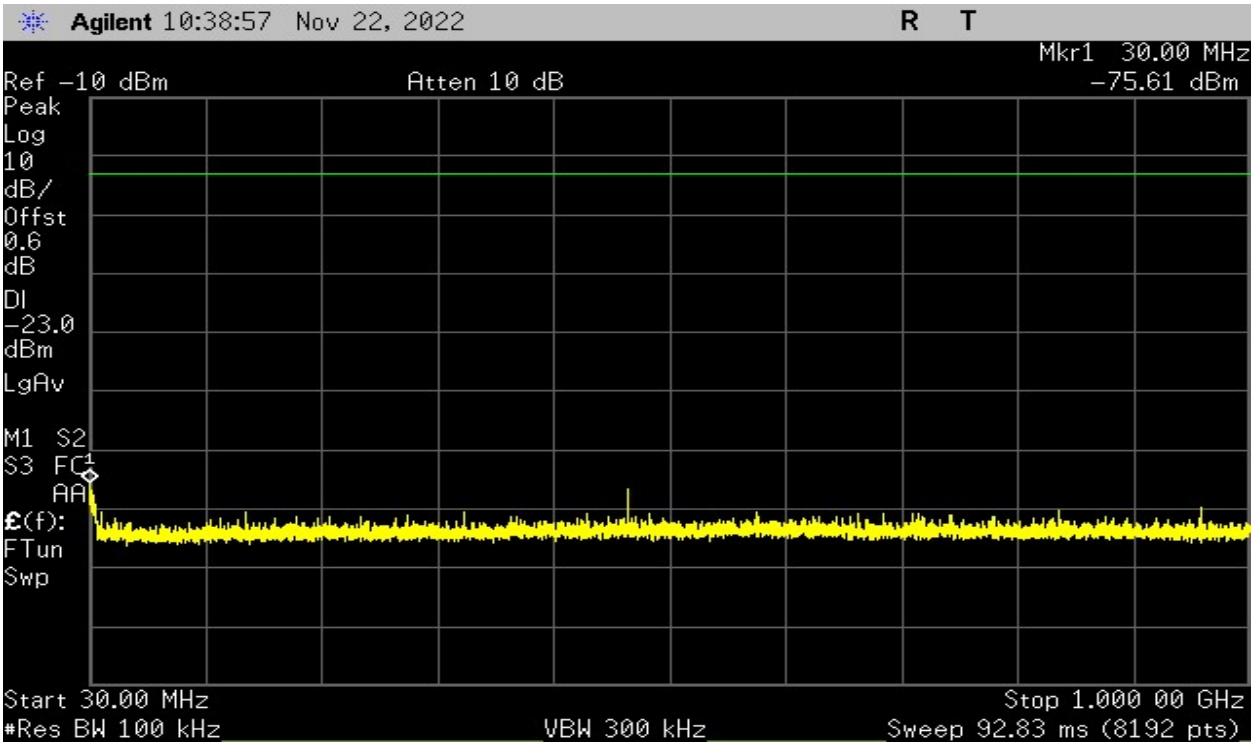
Plot 48 – 802.11n (20 MHz) Highest Channel – 1GHz to 6GHz



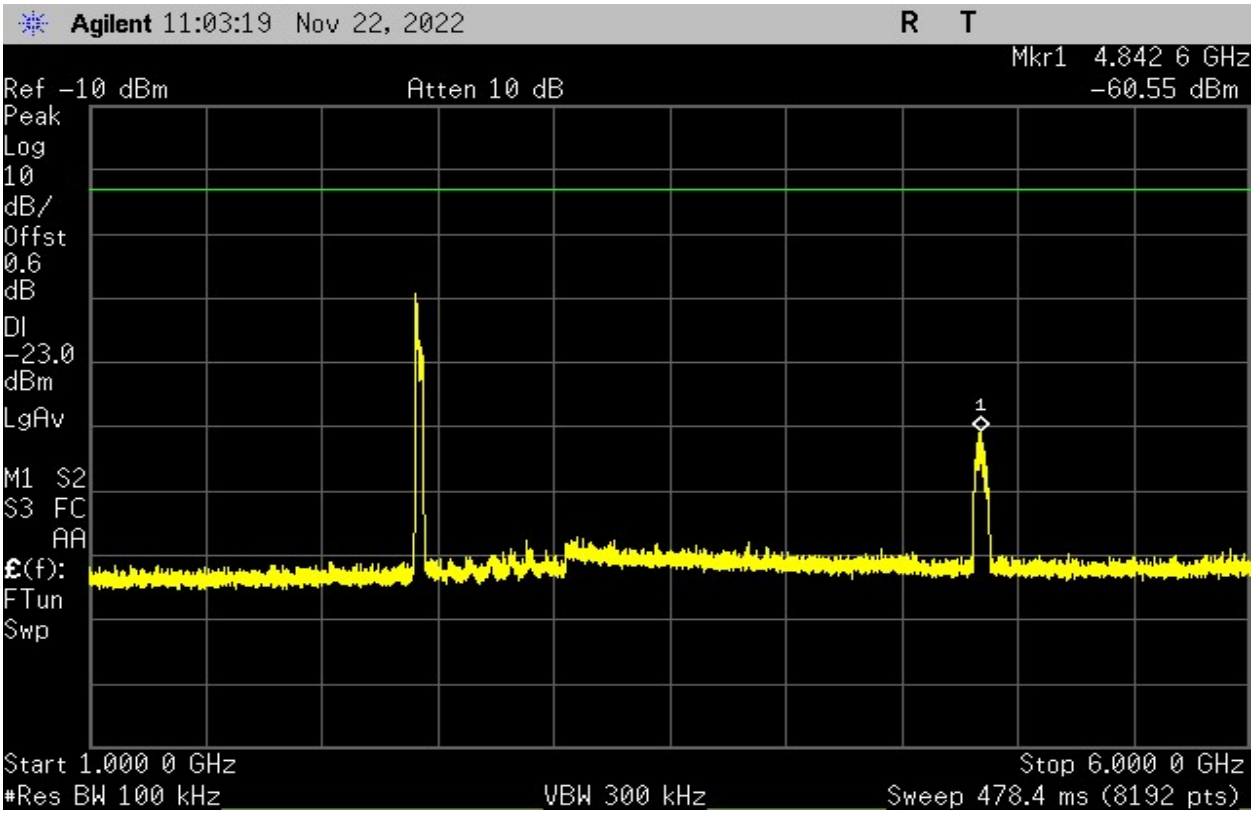
Plot 49 – 802.11n (20 MHz) Highest Channel – 6GHz to 12GHz



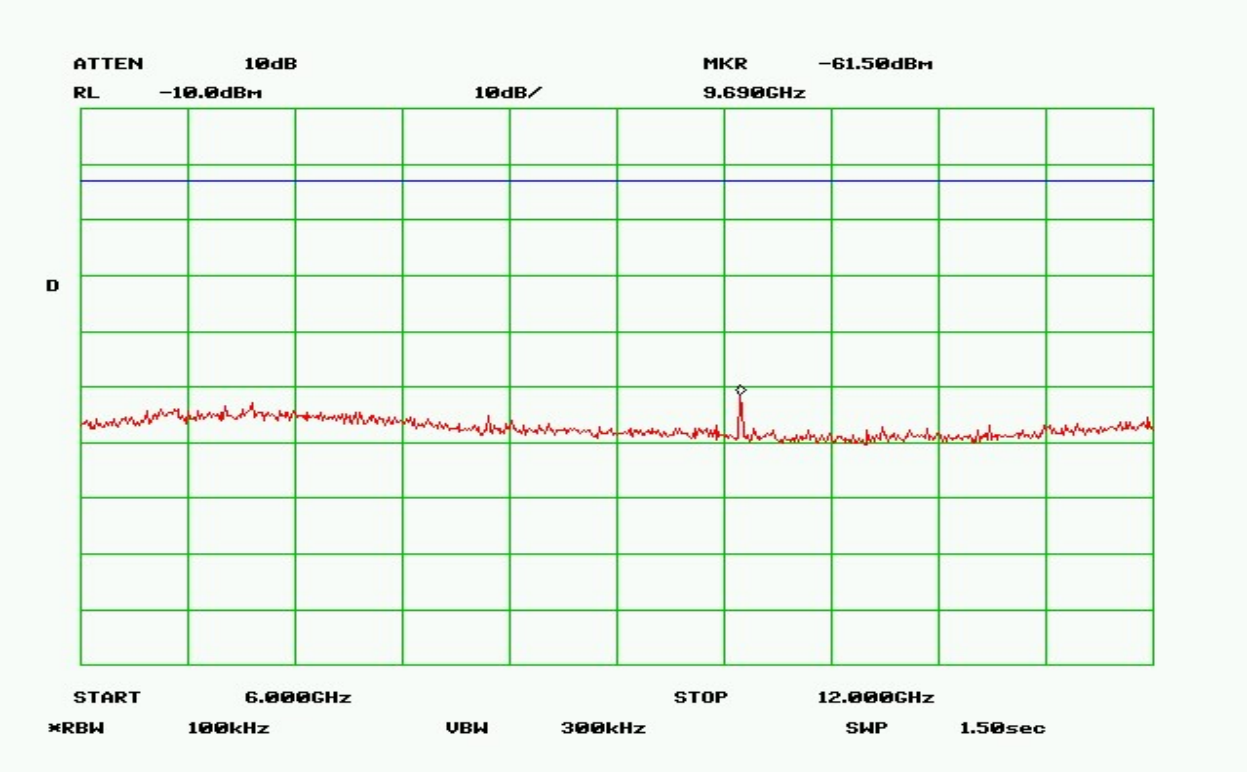
Plot 50 – 802.11n (20 MHz) Highest Channel – 12GHz to 25GHz



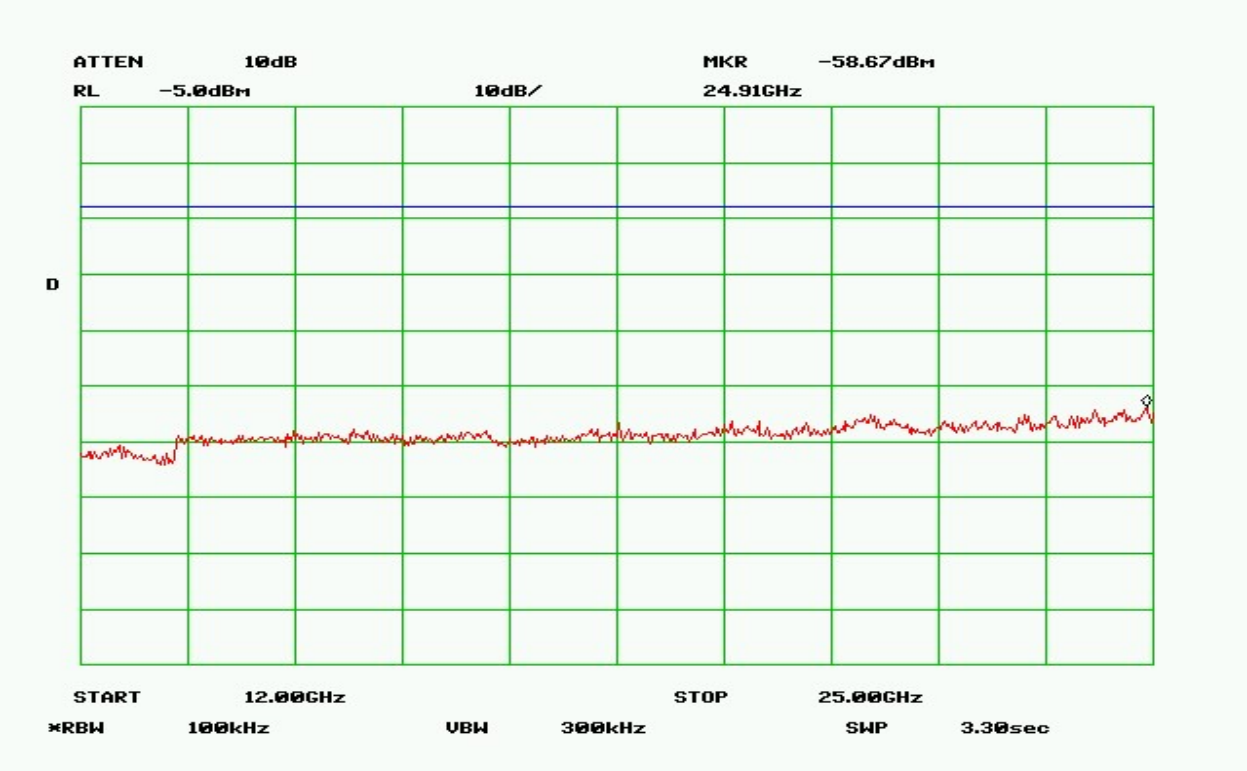
Plot 51 – 802.11n (40 MHz) Lowest Channel – 30MHz to 1000MHz



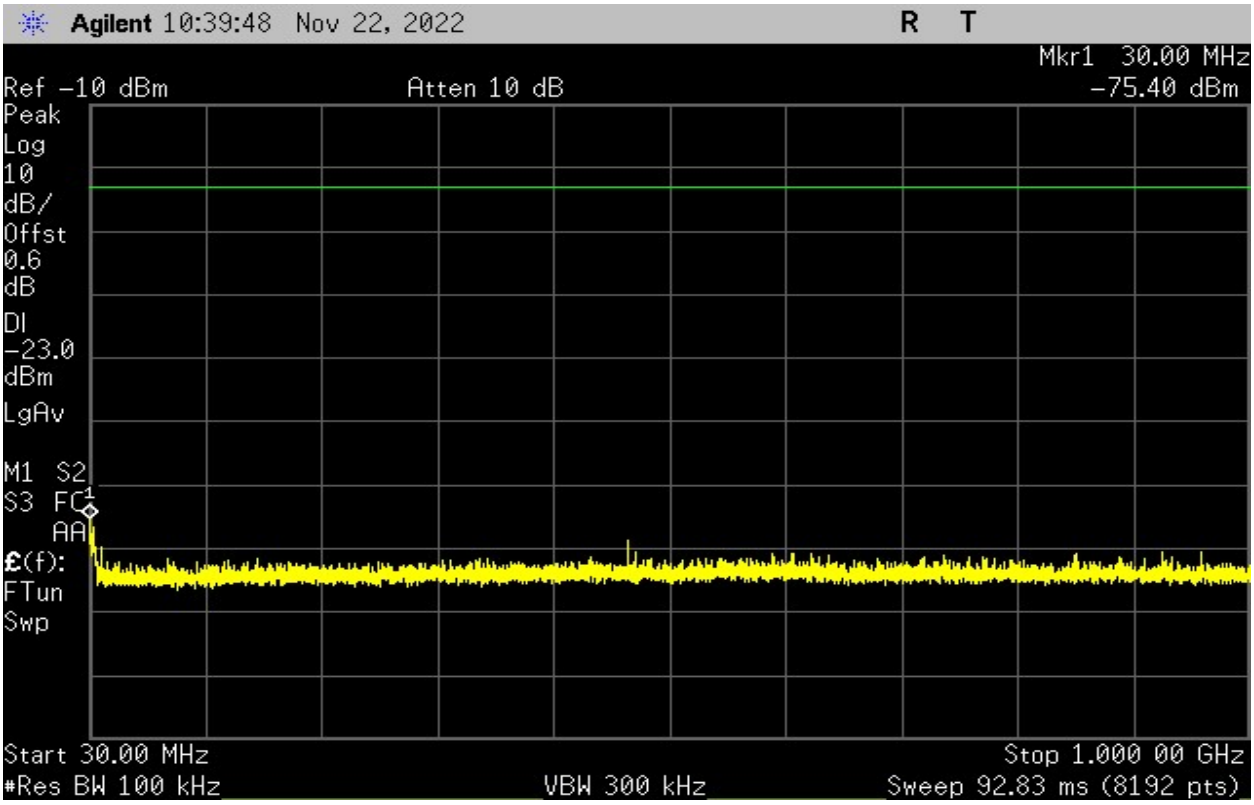
Plot 52 – 802.11n (40 MHz) Lowest Channel – 1GHz to 6GHz



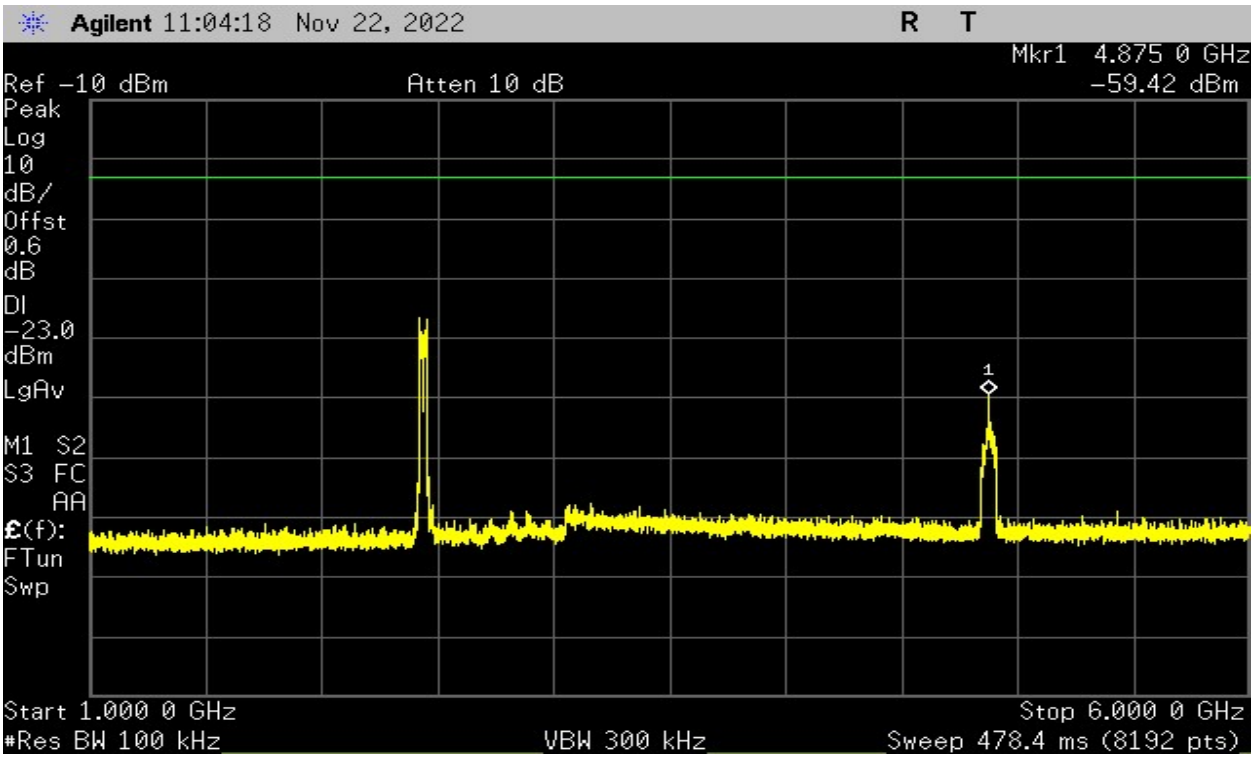
Plot 53 – 802.11n (40 MHz) Lowest Channel – 6GHz to 12GHz



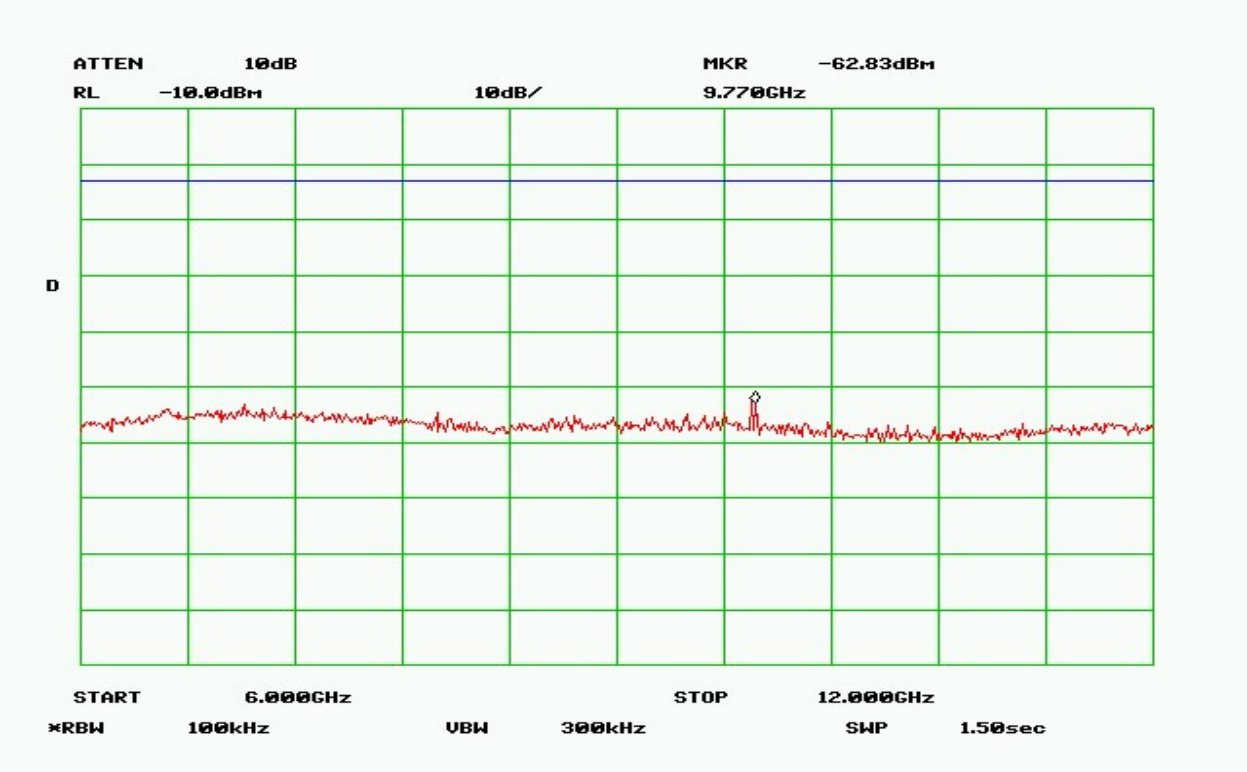
Plot 54 – 802.11n (40 MHz) Lowest Channel – 12GHz to 25GHz



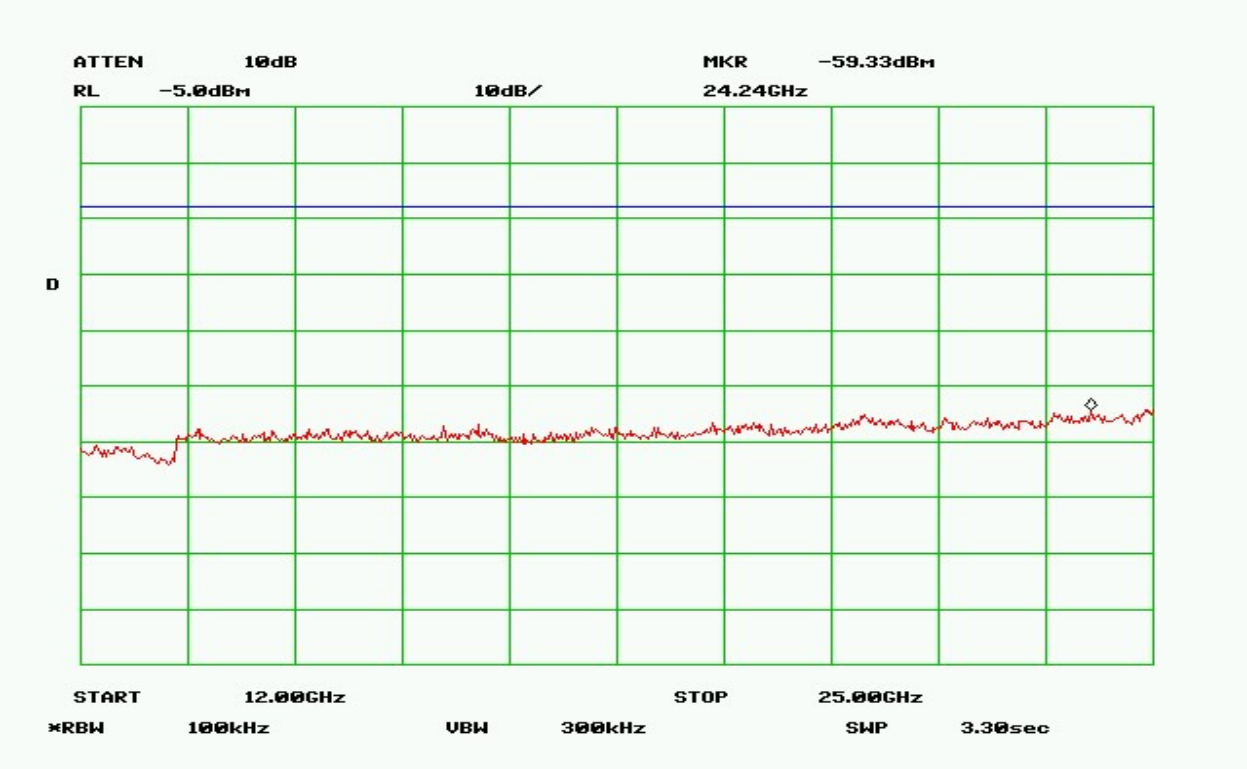
Plot 55 – 802.11n (40 MHz) Middle Channel – 30MHz to 1000MHz



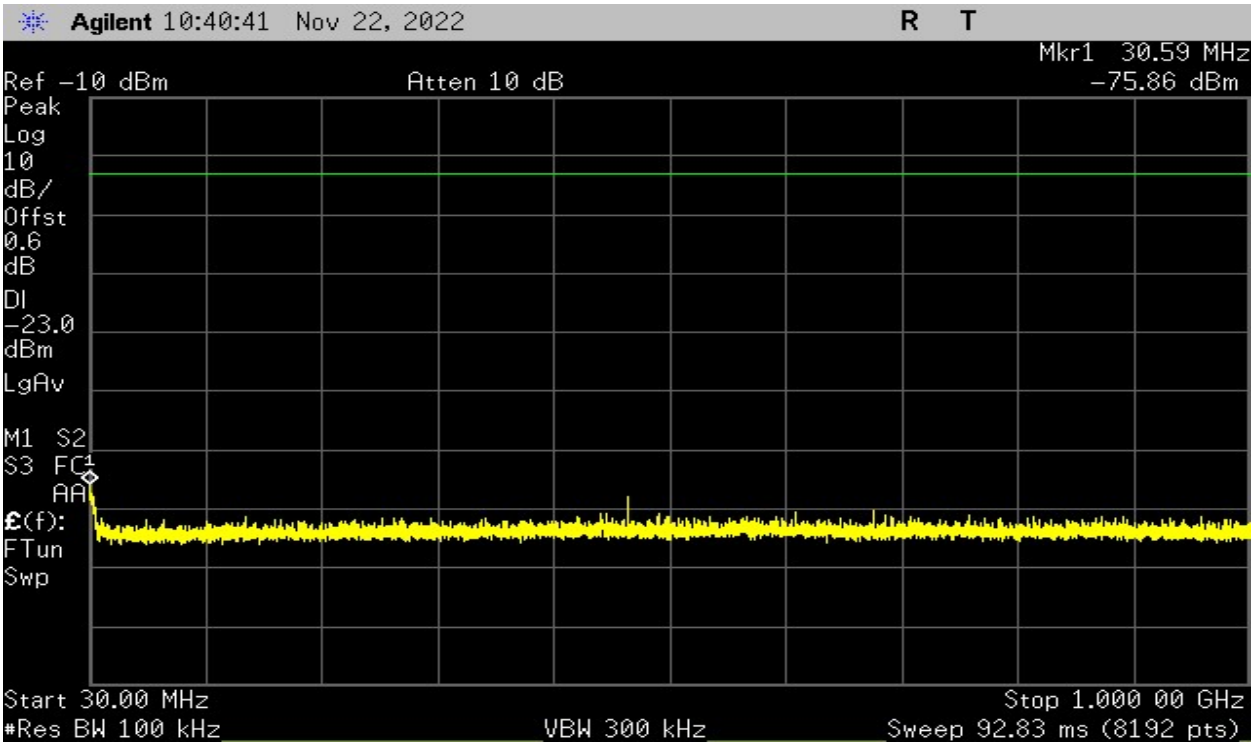
Plot 56 – 802.11n (40 MHz) Middle Channel – 1GHz to 6GHz



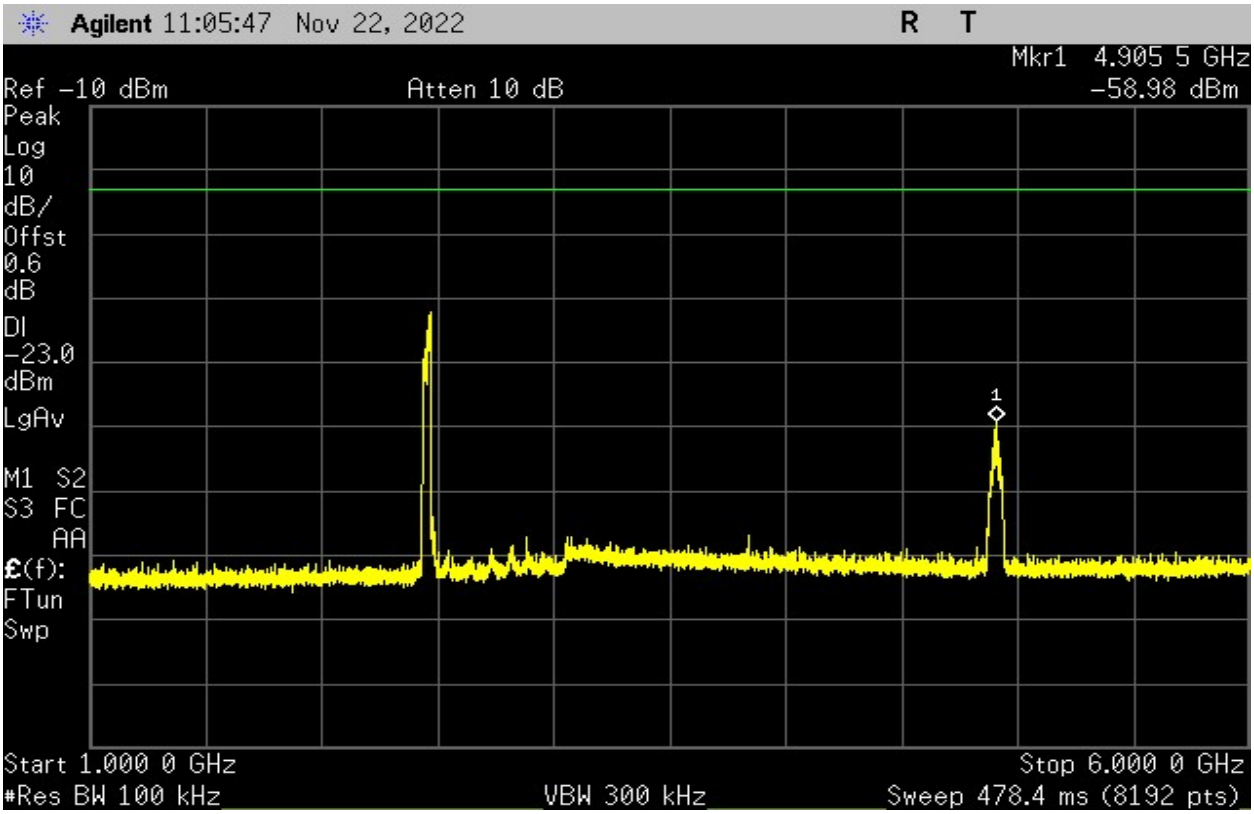
Plot 57 – 802.11n (40 MHz) Middle Channel – 6GHz to 12GHz



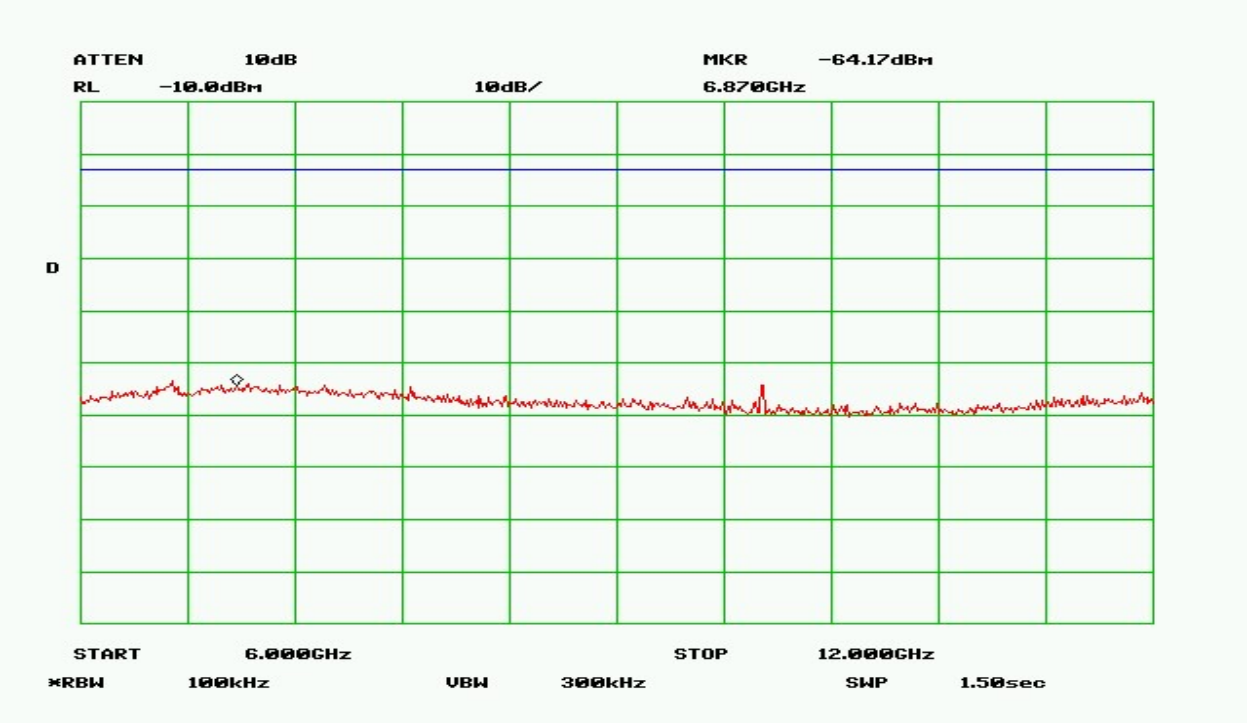
Plot 58 – 802.11n (40 MHz) Middle Channel – 12GHz to 25GHz



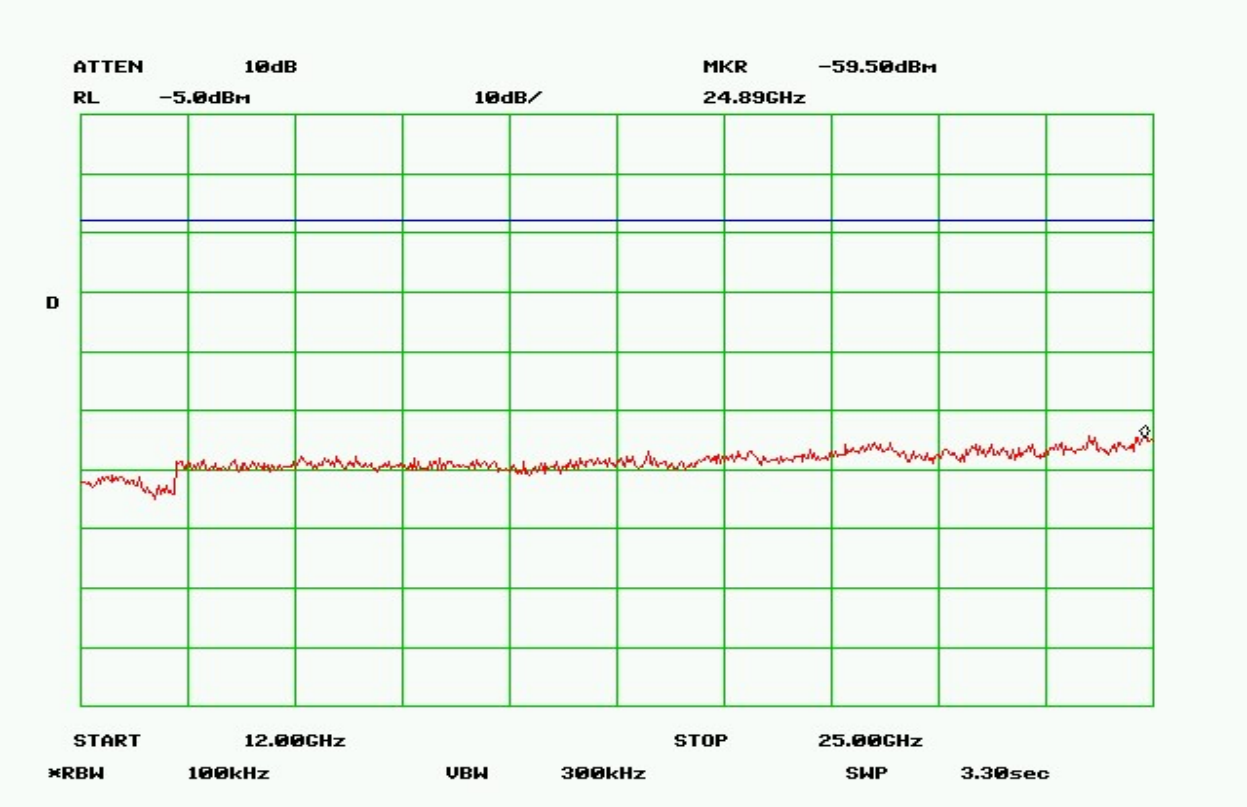
Plot 59 – 802.11n (40 MHz) Highest Channel – 30MHz to 1000MHz



Plot 60 – 802.11n (40 MHz) Highest Channel – 1GHz to 6GHz



Plot 61 – 802.11n (40 MHz) Highest Channel – 6GHz to 12GHz



Plot 62 – 802.11n (40 MHz) Highest Channel – 12GHz to 25GHz