Testing Tomorrow's Technology

Application
For

Part 2, Subpart J, Paragraph 2.907 Equipment Authorization of Certification for an Intentional Radiator per Part 15, Subpart C, paragraphs 15.207, 15.209 and 15.247

And

Innovation, Science, and Economic Development Canada
Certification Per
IC RSS-Gen General Requirements for Radio Apparatus
And
RSS-247Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

For the

StreamLabs, Inc

Model Number: SLFP-1000

FCC ID: 2AHFE-SLFP1000
IC: 21143-SLFP1000

UST Project: 23-0016
Issue Date: February 7, 2024

Total Pages: 111

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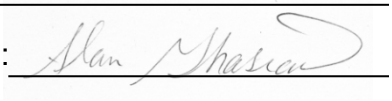
I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: 

Title: Compliance Engineer – President

Date: February 7, 2024

NVLAP LAB CODE 200162-0

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MEASUREMENT TECHNICAL REPORT

COMPANY NAME: StreamLabs, Inc
MODEL: SLFP-1000
FCC ID: 2AHFE-SLFP1000
IC: 21143-SLFP1000
DATE: February 7, 2024

This report concerns (check one): ☒Original grant □Class II change

Equipment type: 2.4 GHz WiFi transmitter Device

Technical:
IEEE Std. 802.11 b/g/n
2412 MHz - 2462 MHz (Channels 1-11)
Type of modulation:
IEEE 802.11b- DSSSS/ IEEE 802.11g- OFDM/ IEEE 802.11n (20MHz)- OFDM
Data/Bit Rate:
802.11b= 1-11 Mbps, 802.11g= 6-54 Mbps, 802.11n= MCS0-7
Antenna Gain: +0.97 dBi (Trace Antenna)
Maximum Output Power: +10.1 dBm
Software used to program EUT: TI UniFlash
EUT firmware number: version: 3.4.1.00012
Power setting: Max level

Report prepared by:
US Tech
3505 Francis Circle
Alpharetta, GA30004

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1 General Information

1.1 Purpose of this Report

This report is prepared as a means of conveying test results and information concerning the suitability of this exact product for public distribution according to IC RSS-247 and FCC Rules and Regulations Part 15, Section 247.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on February 8, 2023 in good operating condition.

1.3 Product Description

The Equipment under Test (EUT) is the StreamLabs, Inc Model SLFP-1000. The SLFP-1000 is a device designed to be used to monitor for water leakage, spillage and also records and sends temperature and humidity data to a cloud network. The end user can check on the status of the device via the cloud network. The EUT is battery operated. The EUT can be used in both residential and commercial environments.

The EUT incorporates Wi-Fi technology. This report is an assessment of the Wi-Fi transmitter compared to FCC Part 15 Subpart C limits.

The WiFi radio details include:

Antenna Gain: +0.97 dBi (Trace Antenna)
Bandwidth: 20 MHz bandwidth modulation
Maximum Output Power: +10.1 dBm

1.4 Configuration of Tested System

The Test Sample was tested per *ANSI C63.10:2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices* for the intentional radiator aspect of the device and *ANSI C63.4:2014, Methods of Measurement of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2014)* for the unintentional radiator aspect of the device as well as FCC subpart B and C of Part 15 and per FCC KDB Publication number 558074 v03r05 for Digital Transmission Systems Operating Under section 15.247.

Digital RF conducted and radiated emissions data below 1 GHz were taken with the measuring receiver (or spectrum analyzer's) resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements performed above 1.0 GHz were made with a RBW of 1 MHz. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was set to 3 times the RBW or as required per the standard throughout the evaluation process.

A list of EUT and Peripherals is found in Table 1. A block diagram of the tested system is shown in Figure 1. Test configuration photographs for spurious and fundamental emissions are provided in separate Appendices.

1.5 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its designation number is US5301. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 9900A-1.

1.6 Related Submittal(s)/Grant(s)

The EUT is subject to the following FCC Equipment Authorizations:

a) Certification of the transmitter incorporated within the EUT, see test data presented herein.

Table 1. EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC/IC ID	CABLES P/D
EUT/ StreamLabs, Inc	SLFP-1000	Engineering Smaple	FCC ID: 2AHFE-SLFP1000 (Pending) IC: 21143-SLFP1000 (Pending)	PU/DU
AC Adaptor Yingjiao	YS6-0331200	None	None	PU
Antenna See antenna details	--	--	--	--

S= Shielded, U= Unshielded, P= Power, D= Data

2 Tests and Measurements

2.1 Test Equipment

The table below lists test equipment used to evaluate this product. Model numbers, serial numbers and their calibration status are included herein.

Table 2. Test Instruments

TEST INSTRUMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE
Spectrum Analyzer	Agilent	E4407B	US41442935	9/21/2024 2 yr.
Spectrum Analyzer	Rigol	DSA815	DSA8A180300138	1/6/2024 2 yr.
Spectrum Analyzer	Hewlwtt-Packard	8593E	3205A00124	2/28/2024 2 yr.
Spectrum Analyzer	Advantest	U3772	1806001039	1/25/2025 2 yr.
Rf Preamp 100 Khz To 1.3 Ghz	Hewlett-Packard	8447D	1937A02980	6/9/2023
Preamp 1.0 Ghz To 26.0 Ghz	Hewlett-Packard	8449B	3008A00480	2/11/2023
Loop Antenna	ETS Lindgren	6502	9810-3246	12/7/2024 2 yr.
Biconical Antenna	EMCO	3110B	9306-1708	8/17/2023 2 yr.
Log Periodic Antenna	EMCO	3146	9110-3236	12/13/2023 2 yr.
Horn Antenna	EMCO	3115	9107-3723	4/28/2024 2 yr.
High Pass Filter	Microwave Chircuits	H3R020G2	001DC9528	8/1/2023
LISN X 2	Solar Electronics	9247-50-TS-50-N	955824 and 955825	2/14/2023

Note 1: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.
Note 2: All testing conducted before May 07, 2020.

2.2 Modifications to EUT Hardware

No modifications were made by US Tech to bring the EUT into compliance with FCC Part 15.247 or IC RSS-210 requirements.

2.3 Number of Measurements for Intentional Radiators (15.31(m), RSS-Gen 6.8)

Measurements of intentional radiators or receivers shall be performed and reported for each band in which the device can be operated, with the device operating at the number of frequencies in each band specified in Table 3.

Table 3. Number of Test Frequencies for Intentional Radiators

Frequency Range over which the device operates	Number of Frequencies	Location in the Range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near the top 1 near the bottom
Greater than 10 MHz	3	1 near top 1 near middle 1 near bottom

Because the EUT operates over 2.412 GHz to 2.462 GHz, 3 test frequencies will be used.

2.4 Frequency Range of Radiated Measurements (Part 15.33, RSS-Gen 6.13)

2.4.1 Intentional Radiator

The spectrum shall be investigated for the intentional radiator from the lowest RF signal generated in the EUT, without going below 9 kHz to the 10th harmonic of the highest fundamental frequency generated or 40 GHz, whichever is the lowest.

2.4.2 Unintentional Radiator

For the digital device, an unintentional radiator, the frequency range shall be 30 MHz to 1000 MHz, or to the range specified in 2.4.1 above, whichever is the higher range of investigation.

2.5 Measurement Detector Function and Bandwidth (CFR 15.35, RSS-Gen 6.9, 6.13)

The radiated and conducted emissions limits shown herein are based on the following:

2.5.1 Detector Function and Associated Bandwidth

On frequencies below 1000 MHz, the limits herein are based upon measurement equipment employing a CISPR Quasi-peak detector function and related measurement bandwidths (i.e. 9 kHz from 150 kHz to 30 MHz and 120 kHz from 30 MHz to 1000 MHz). Alternatively, measurements may be made with equipment employing a peak detector function as long as the same bandwidths specified for the Quasi-peak device are used.

2.5.2 Corresponding Peak and Average Requirements

Above 1000 MHz, radiated limits are based on measuring instrumentation employing an average detector function. When average radiated emissions are specified there is also a corresponding Peak requirement, as measured using a peak detector, of 20 dB greater than the average limit. For all measurements above 1000 MHz the Resolution Bandwidth shall be at least 1 MHz.

2.6 EUT Antenna Requirements (CFR 15.203, RSS-Gen 6.7)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. Only the antenna(s) listed in Table 4 will be used with this module.

Table 4. Allowed Antenna(s)

REPORT REFERENCE	MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dB_i	TYPE OF CONNECTOR
Antenna	StreamLabs, Inc	PCB Trace	Inverted F type	+0.97	PCB Antenna

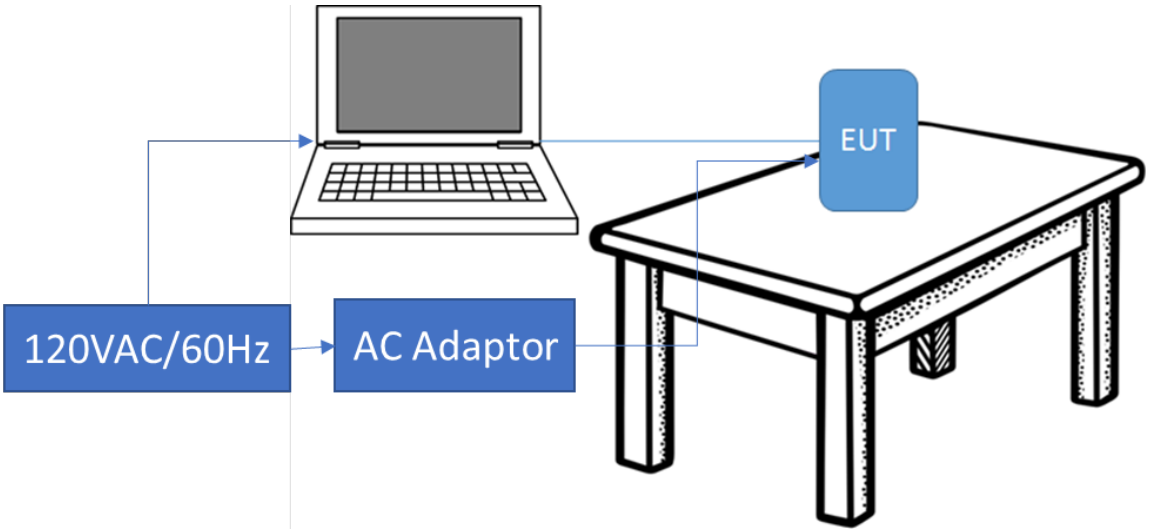


Figure 1. Block Diagram of Test Configuration

Note: PC used to program EUT for intentional spurious emissions

2.7 Restricted Bands of Operation (Part 15.205, RSS-Gen 8.10)

Only spurious emissions can fall in the frequency bands of CFR 15.205. The field strength of these spurious cannot exceed the limits of 15.209. Radiated harmonics and other Spurious are examined for this requirement see paragraph 2.10.

2.8 Transmitter Duty Cycle (Part15.35 (c), RSS-Gen 6.10)

The EUT employs pulse transmission however for testing purpose the EUT was programmed to transmit at a rate >98%. The pulse transmission requirements of this subpart were acknowledge and considered during testing.

When the radiated emissions limit is expressed as an average value, and the transmitter is pulsed, the measured field strength shall be determined by applying a Duty Cycle Correction Factor based upon dividing the total ON time during the first 100 ms period by 100 ms (or by the period if less than 100 ms). The duty cycle may also be expressed logarithmically in dB.

2.9 Antenna Conducted Intentional and Spurious Emissions (CFR 15.209, 15.247(d)) (IC RSS 247, 5.5))

The EUT was put into a continuous-transmit mode of operation and tested per ANSI C63.10-2013 for conducted out of band emissions emanating from the antenna port over the frequency range of 30 MHz to ten times the highest clock frequency generate or used in this case, 25 GHz. A conducted scan was performed on the EUT to identify and record spurious signals that were related to the transmitter. Antenna Conducted Emissions of a significant magnitude that fell within restricted bands were then measured as radiated emissions in the EMC Chamber. The conducted emissions graphs are found in the figures below. The limit for antenna conducted power is 1 Watt (30 dBm) per 15.247 (b)(3).

For Conducted RF antenna tests, the RBW was set to 100 kHz, video bandwidth (VBW)> RBW, scan up through the 10^{th} harmonic of the fundamental frequency. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band.

Figure 2. Bench Test Setup

Test Date: February 13, 2023

Tested By
Signature: Name: Gabriel Medina

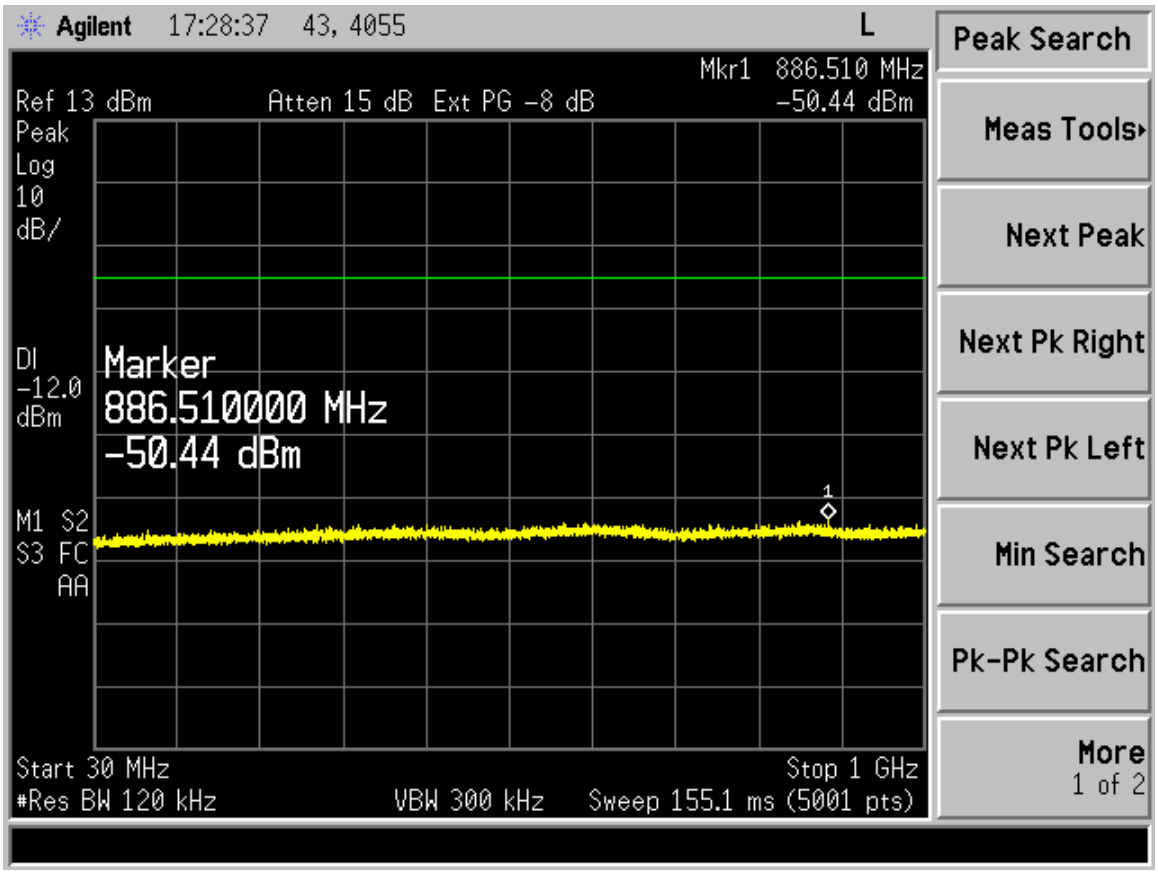


Figure 3. 802.11b, Channel 1, 30-1000 MHz

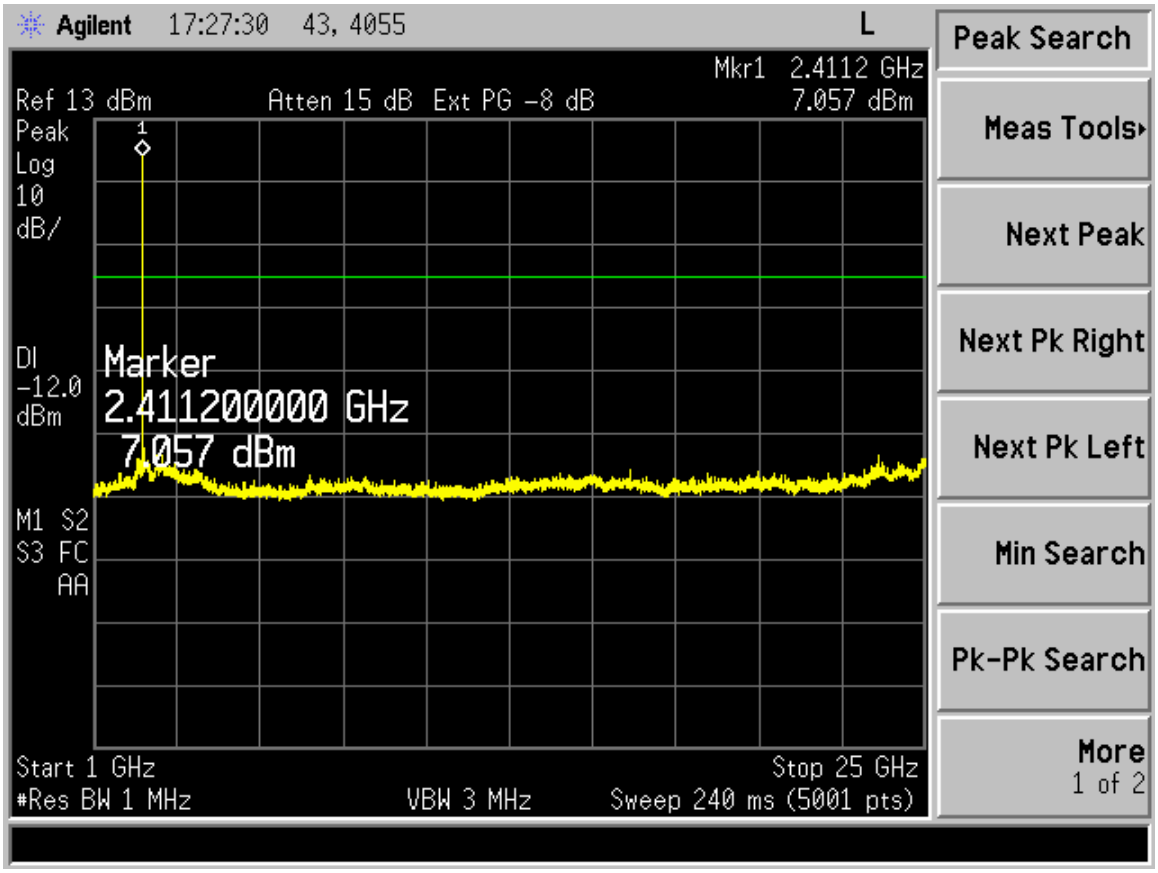


Figure 4. 802.11b, Channel 1, 1 – 25 GHz

(Note: Intentional Emission seen for radio operating at 2412 MHz)

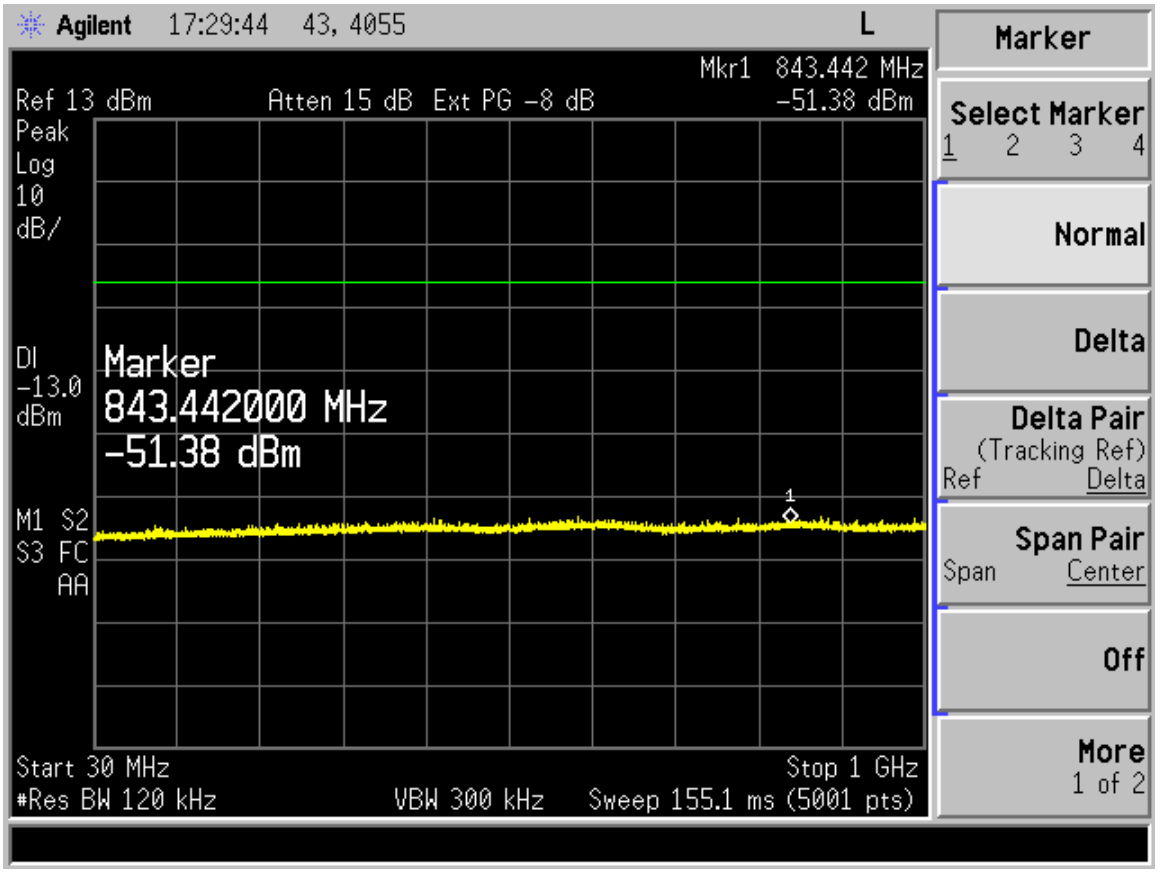


Figure 5. 802.11b, Channel 7, 30-1000 MHz

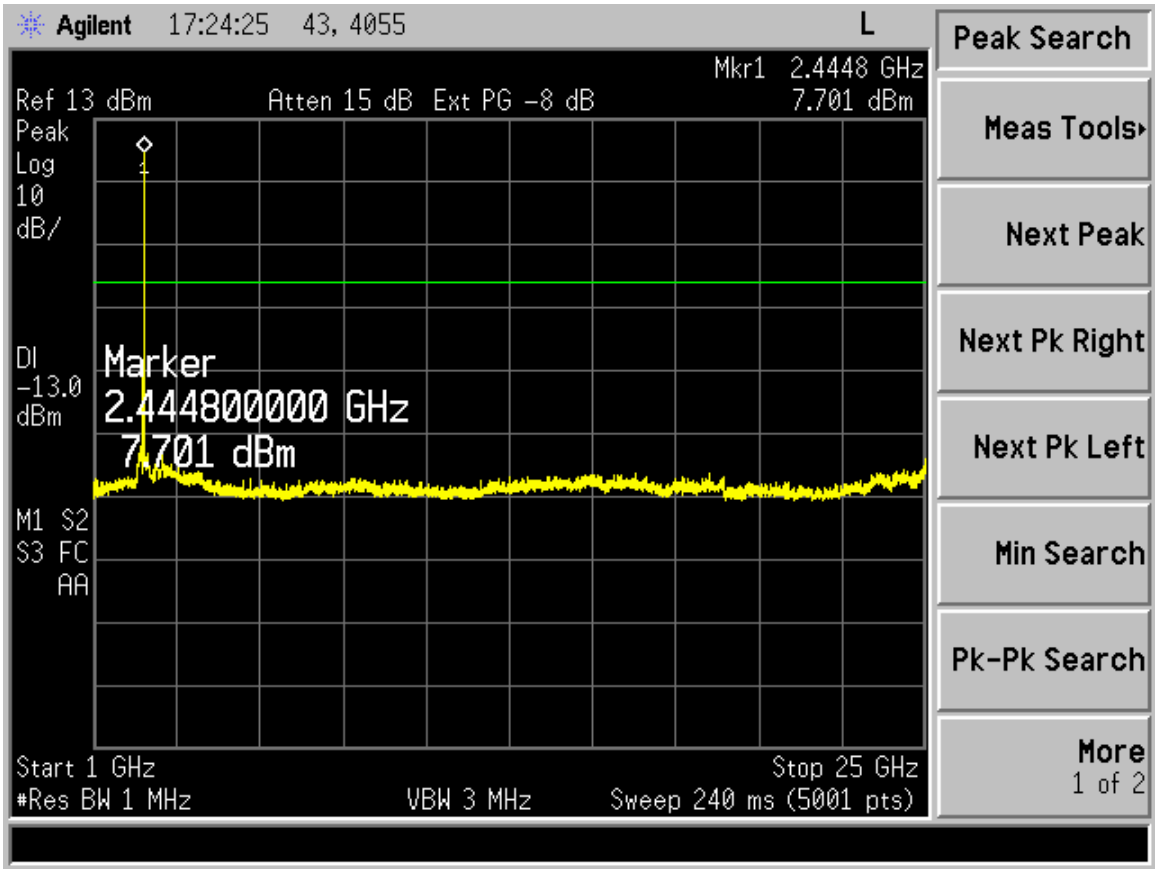


Figure 6. 802.11b, Channel 7, 1 – 25 GHz

(Note: Intentional Emission seen for radio operating at 2442 MHz)

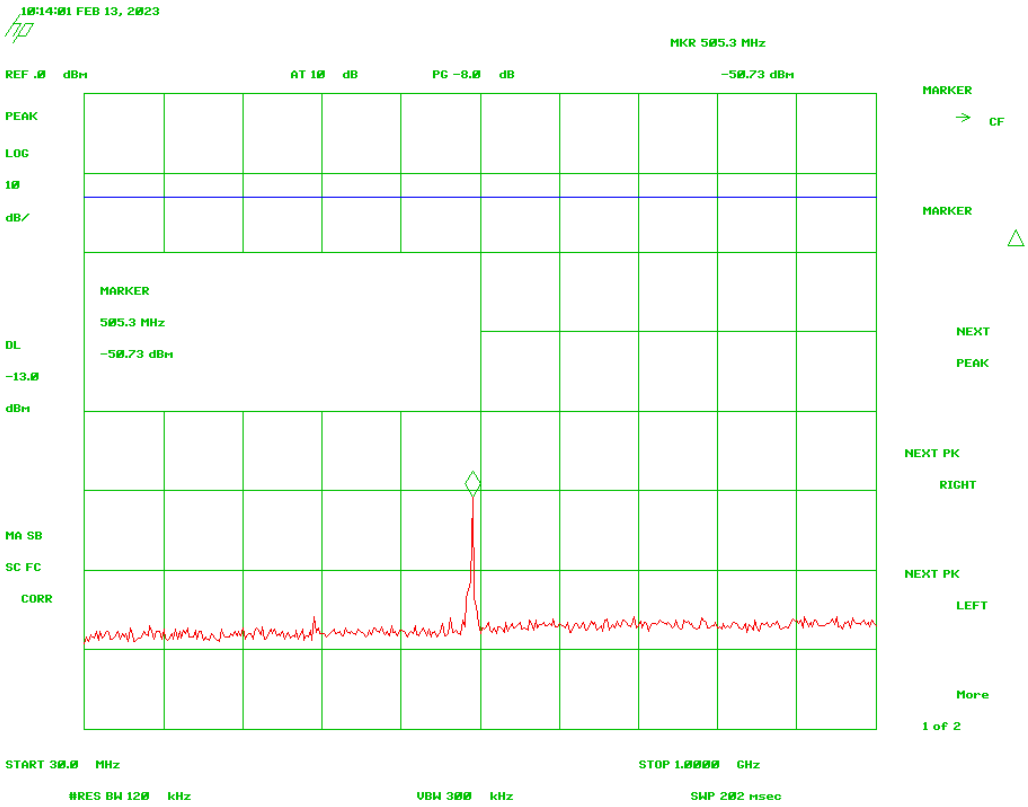


Figure 7. 802.11b, Channel 11, 30-1000 MHz

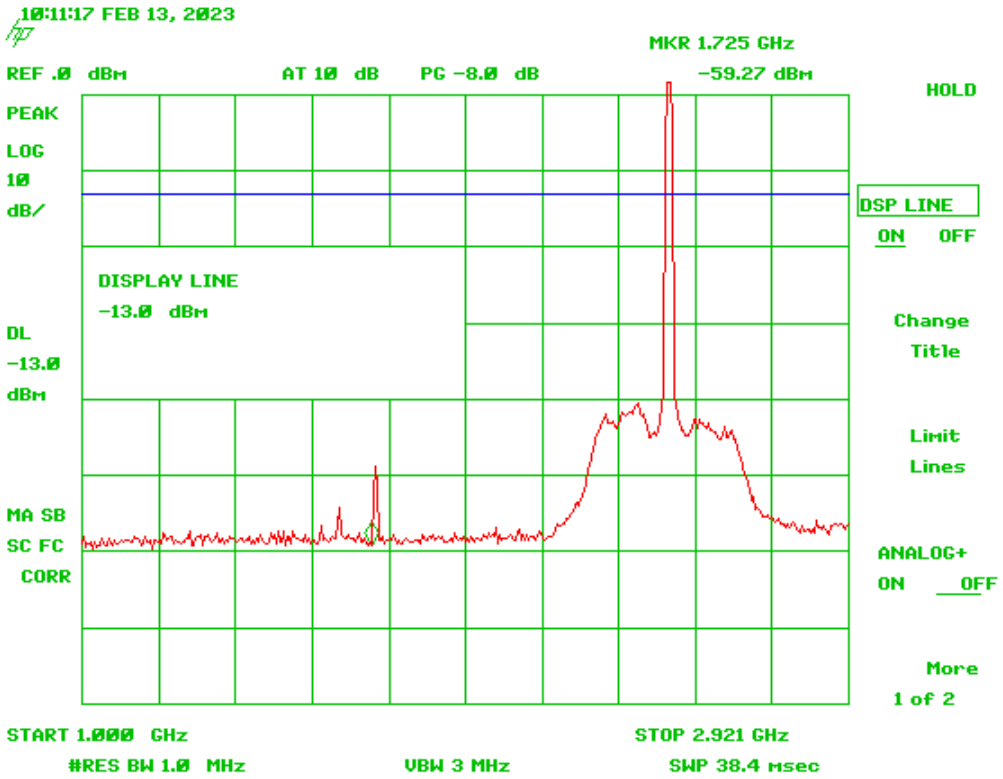


Figure 8. 802.11b, Channel 11, 1 – 2.9 GHz
(Note: Intentional Emission seen for radio operating at 2462 MHz)

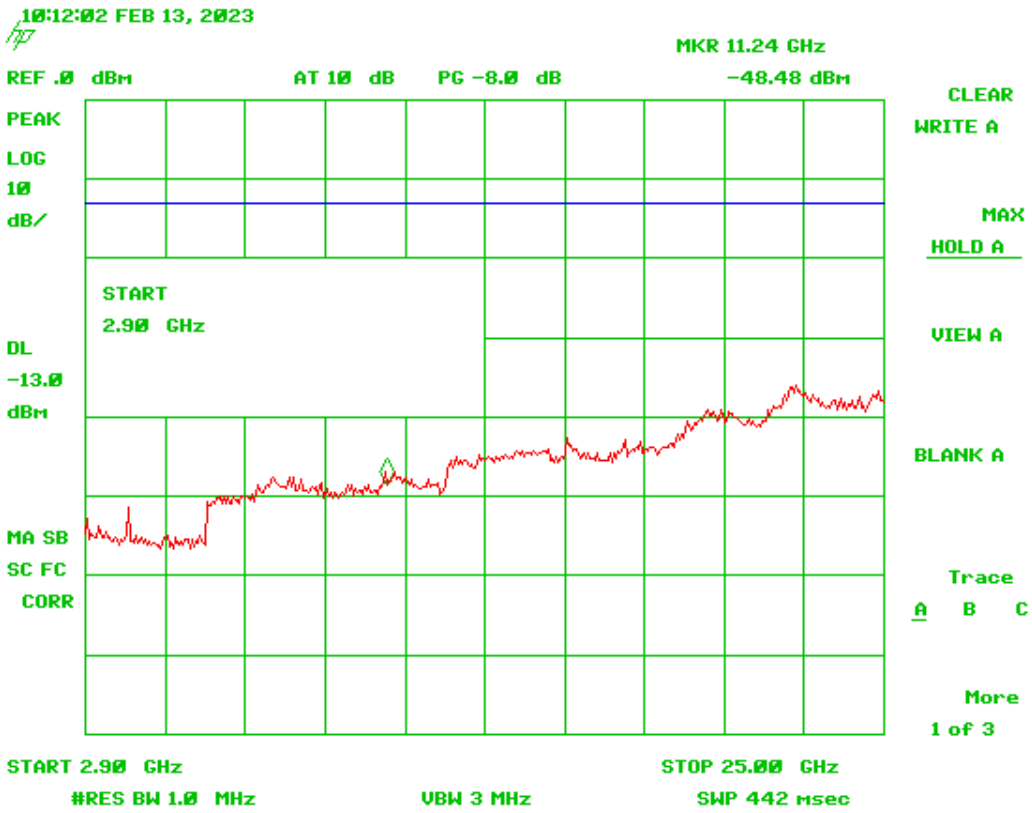


Figure 9. 802.11b, Channel 11, 2.9 – 25 GHz

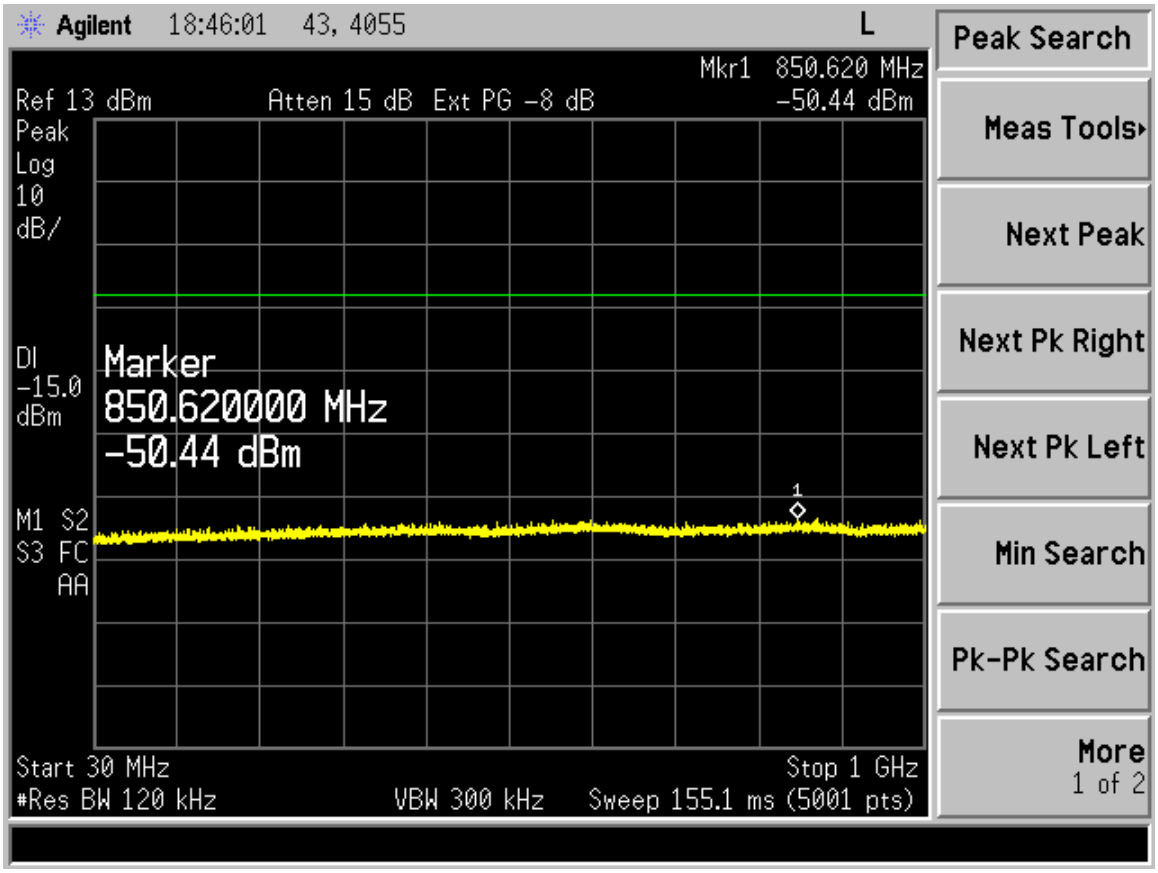


Figure 10. 802.11g, Channel 1, 30-1000 MHz

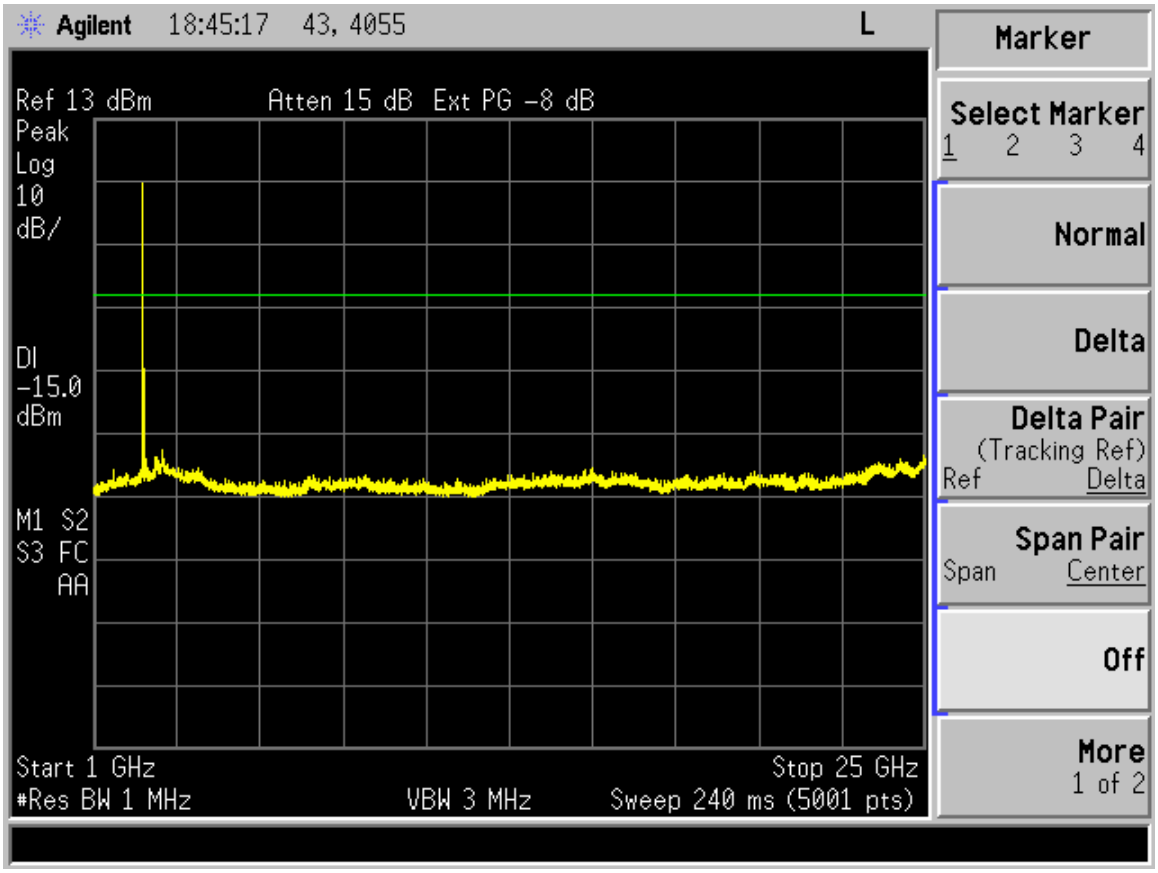


Figure 11. 802.11g, Channel 1, 1 – 25 GHz

(Note: Intentional Emission seen for radio operating at 2412 MHz)

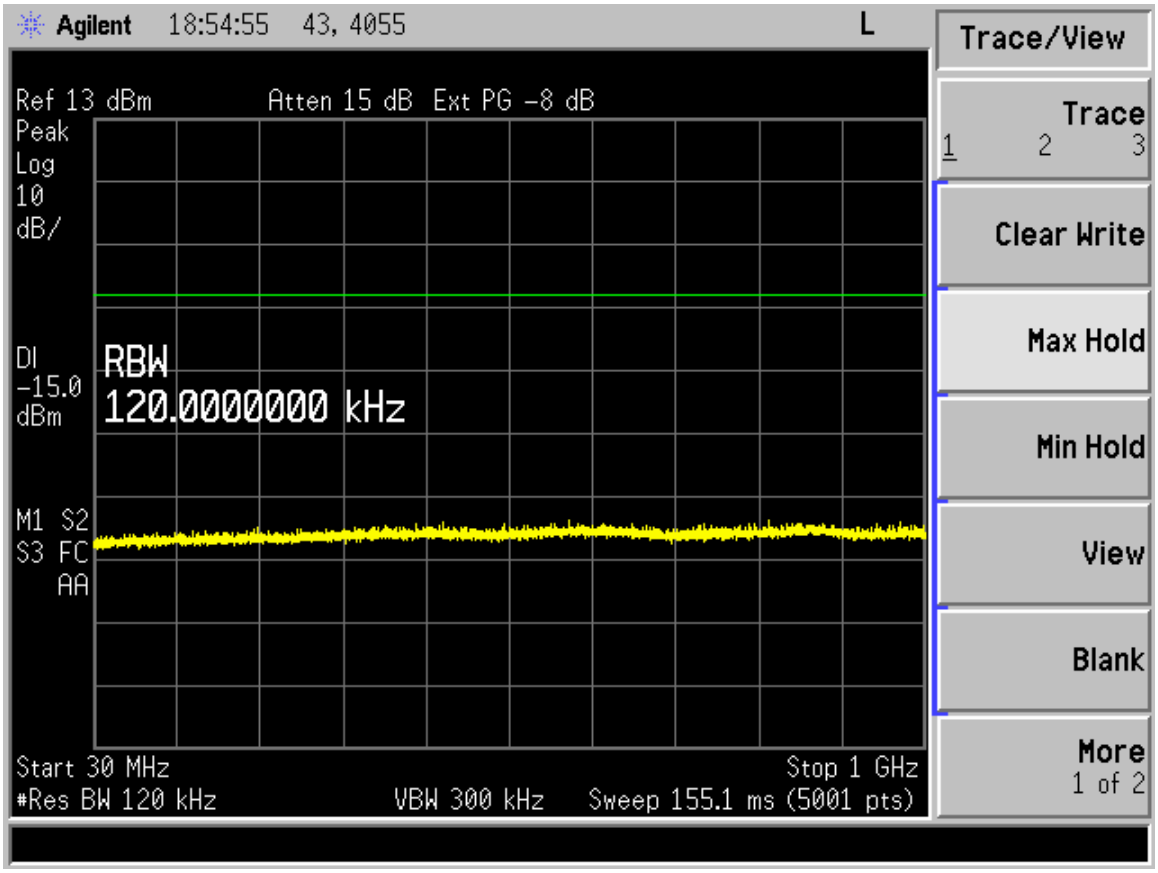


Figure 12. 802.11g, Channel 7, 30-1000 MHz

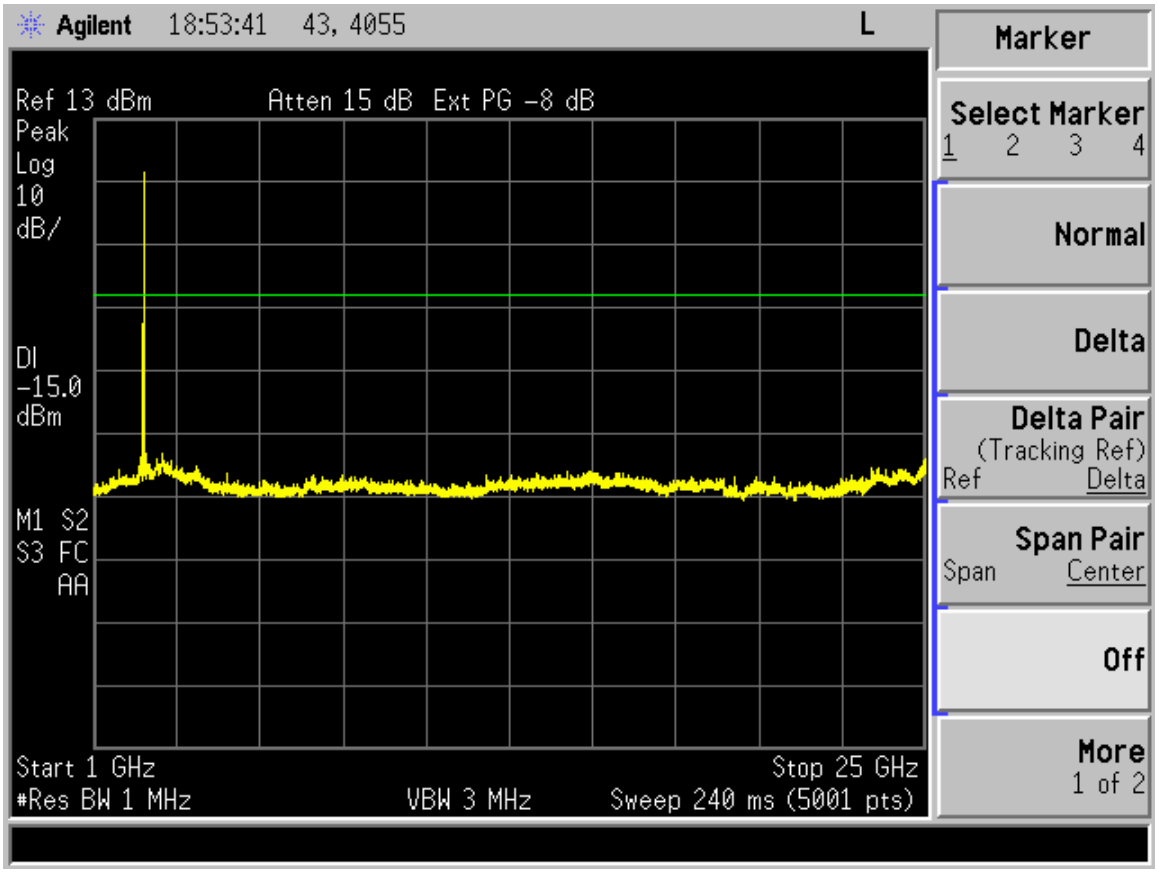


Figure 13. 802.11g, Channel 7, 1 - 25 GHz

(Note: Intentional Emission seen for radio operating at 2442 MHz)

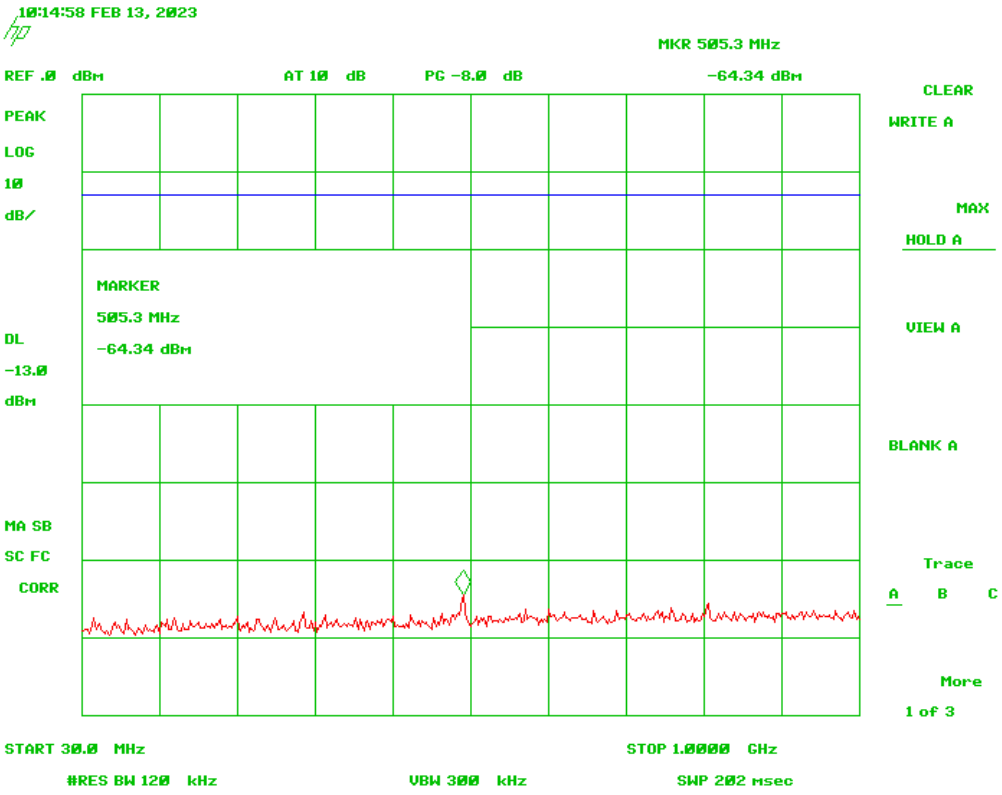


Figure 14. 802.11g, Channel 11, 30-1000 MHz

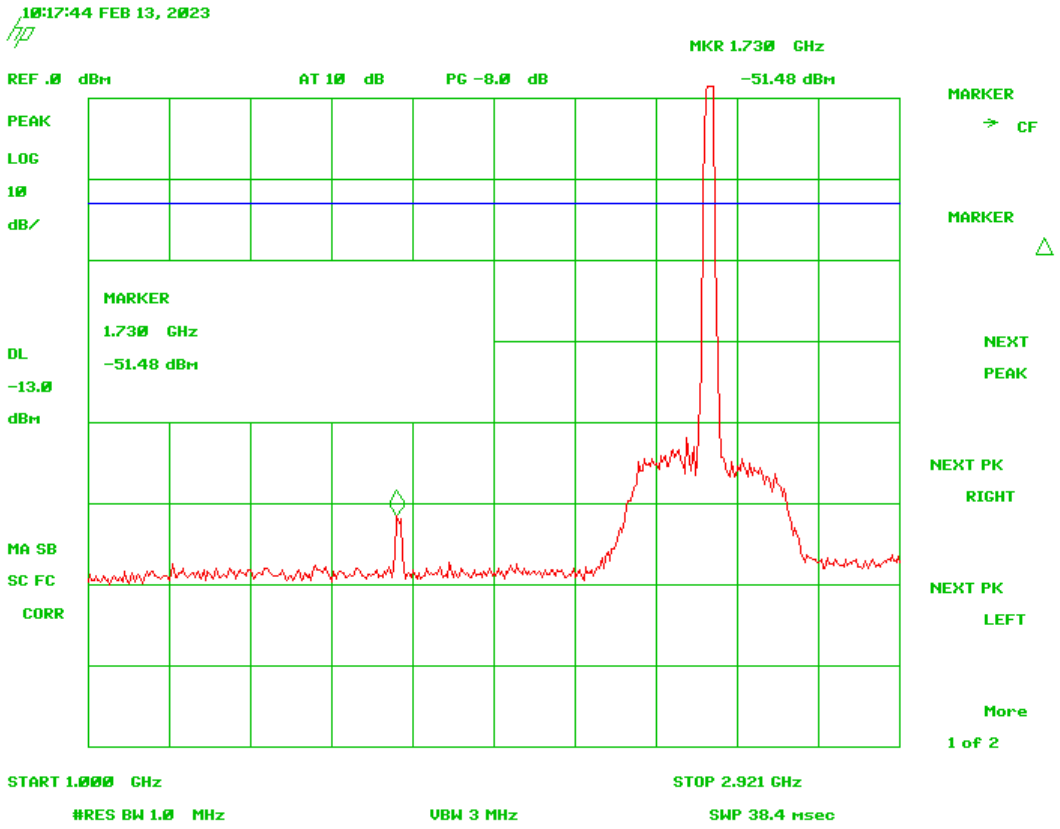


Figure 15. 802.11g, Channel 11, 1 – 2.9 GHz

(Note: Intentional Emission seen for radio operating at 2462 MHz)

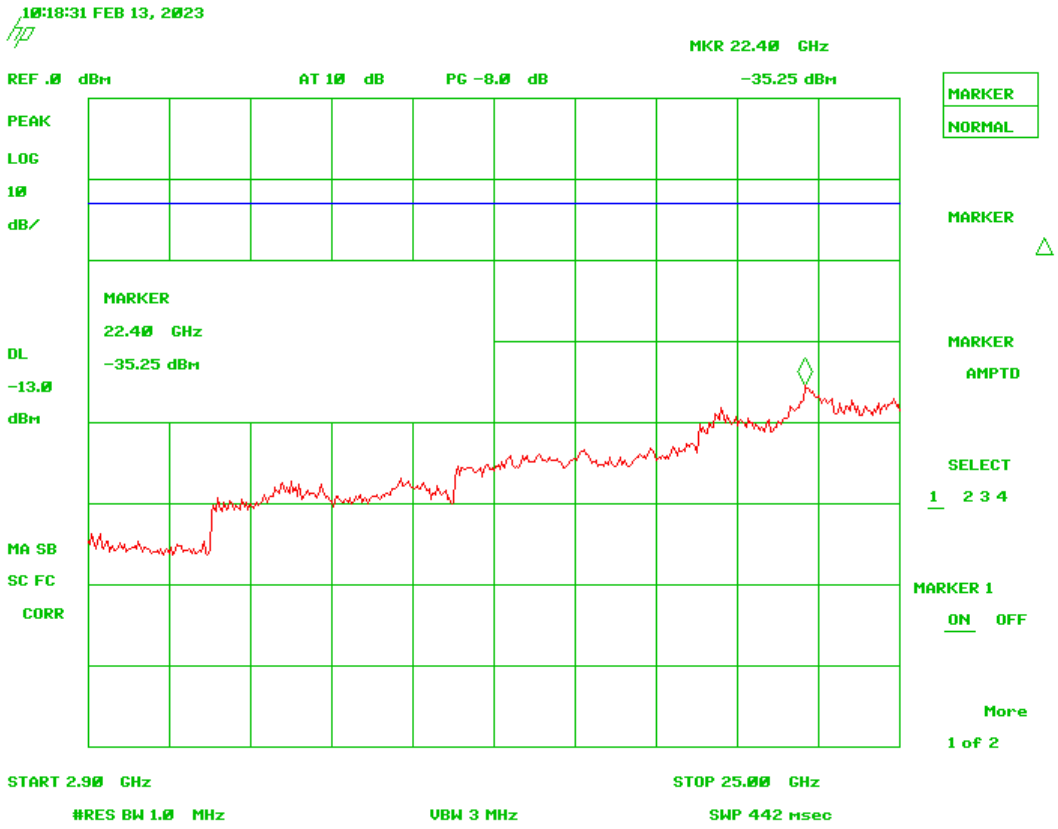


Figure 16. 802.11g, Channel 11, 2.9 – 25 GHz

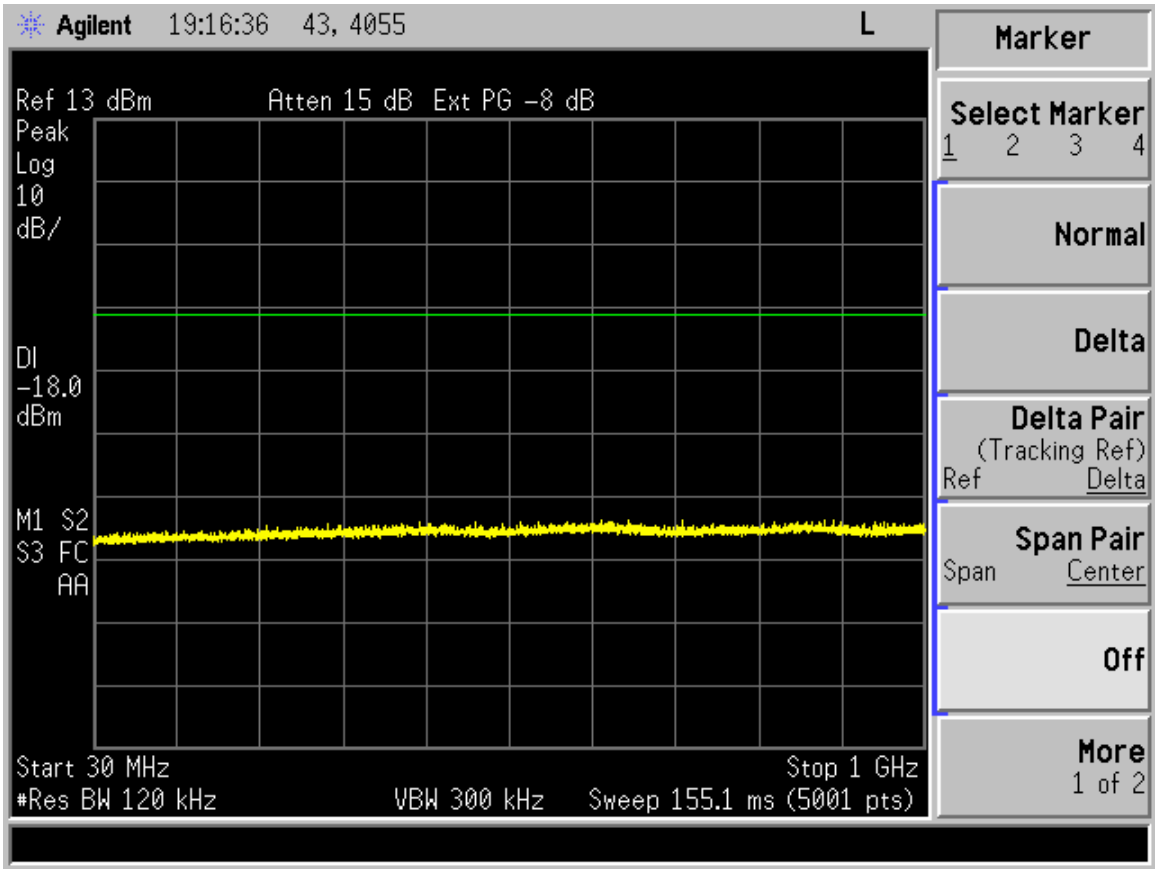


Figure 17. 802.11n, Channel 1, 30-1000 MHz

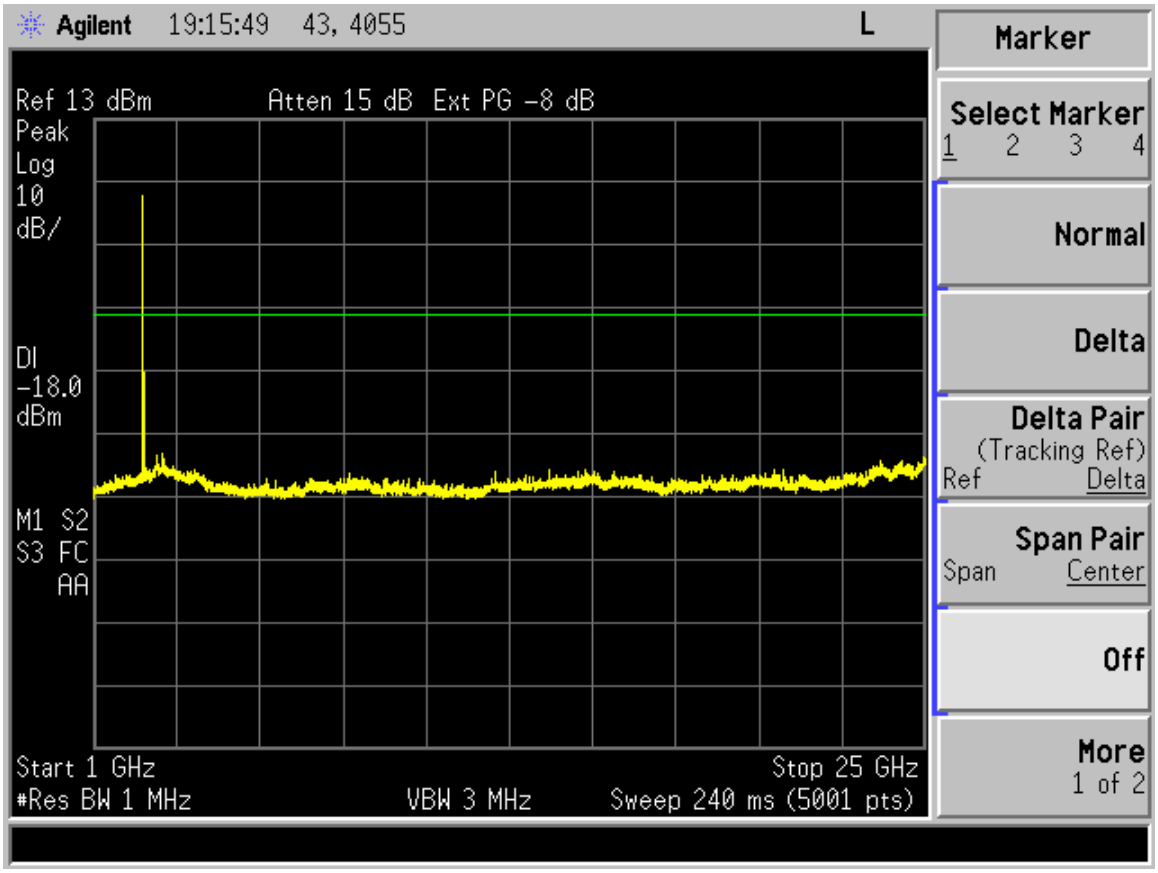


Figure 18. 802.11n, Channel 1, 1- 25 GHz

(Note: Intentional Emission seen for radio operating at 2412 MHz)

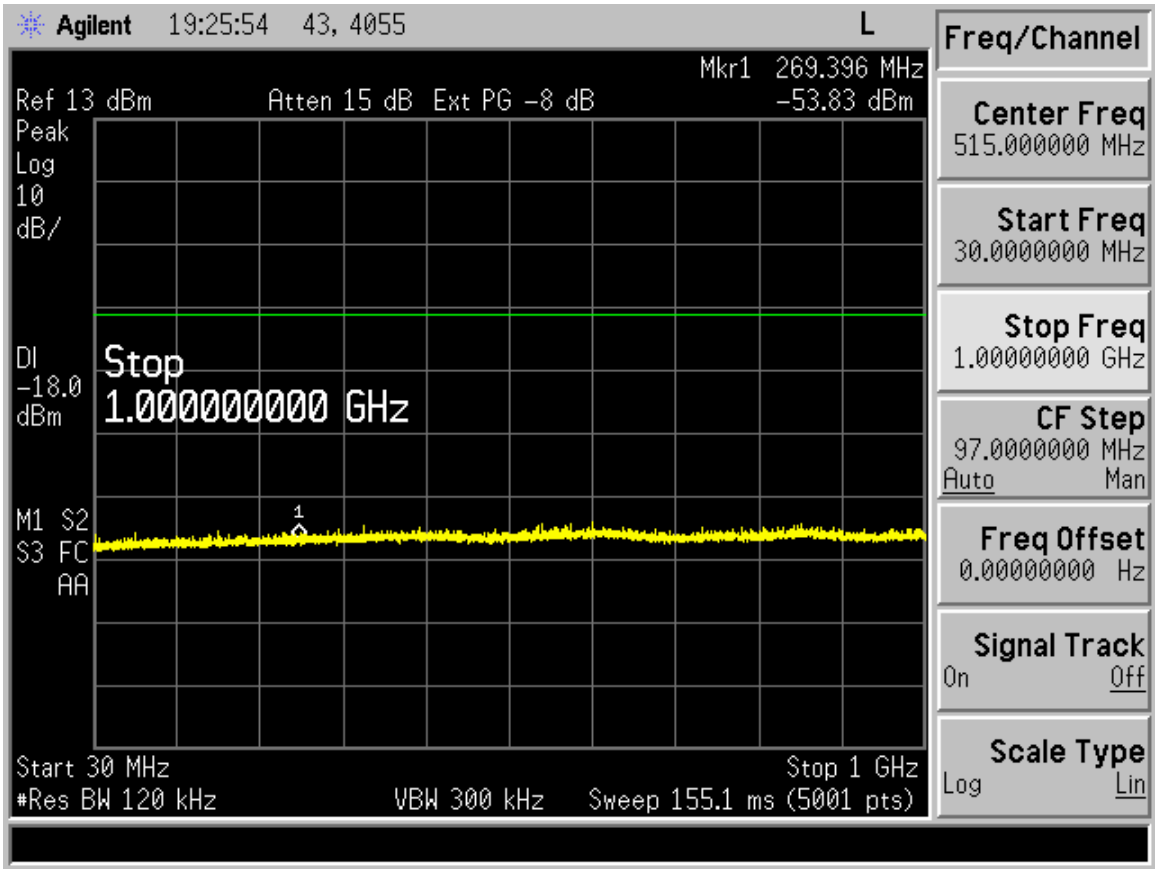


Figure 19. 802.11n, Channel 7, 30-1000 MHz

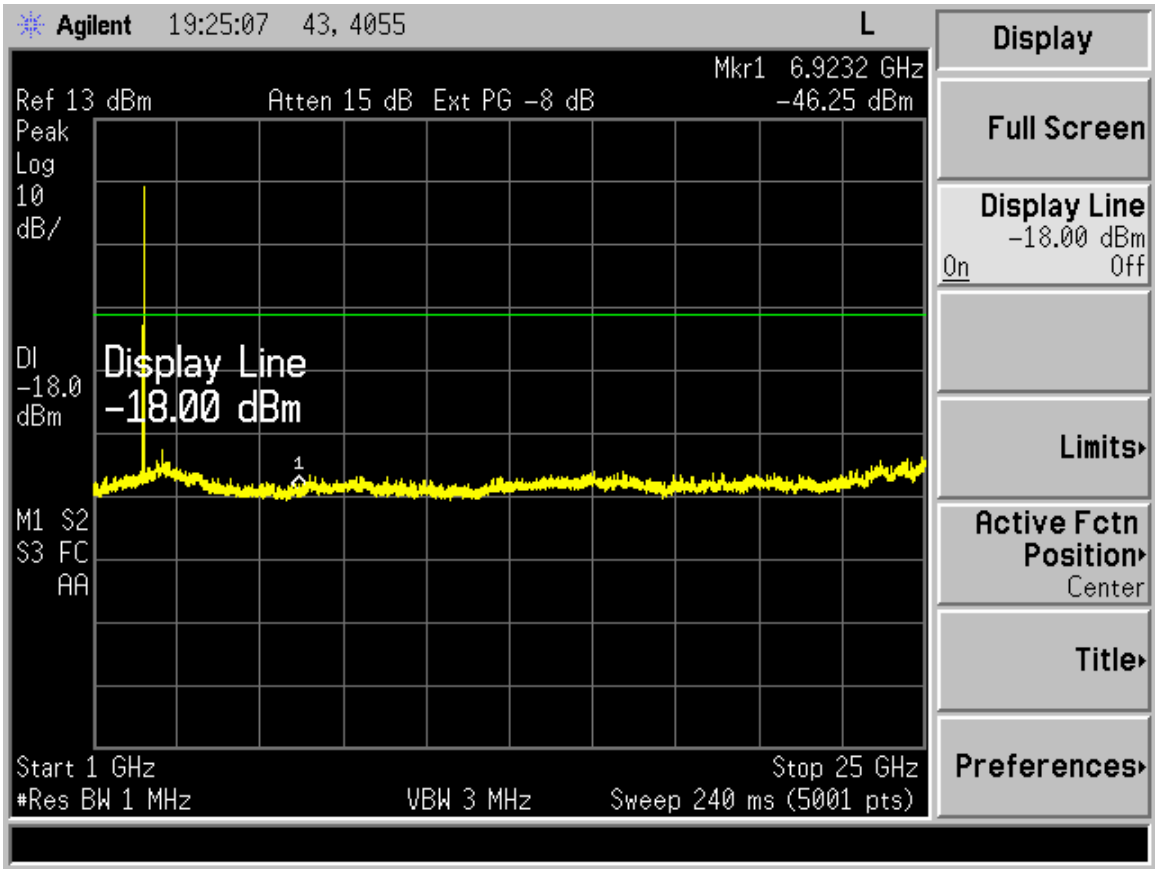


Figure 20. 802.11n, Channel 7, 1 – 25 GHz

(Note: Intentional Emission seen for radio operating at 2442 MHz)

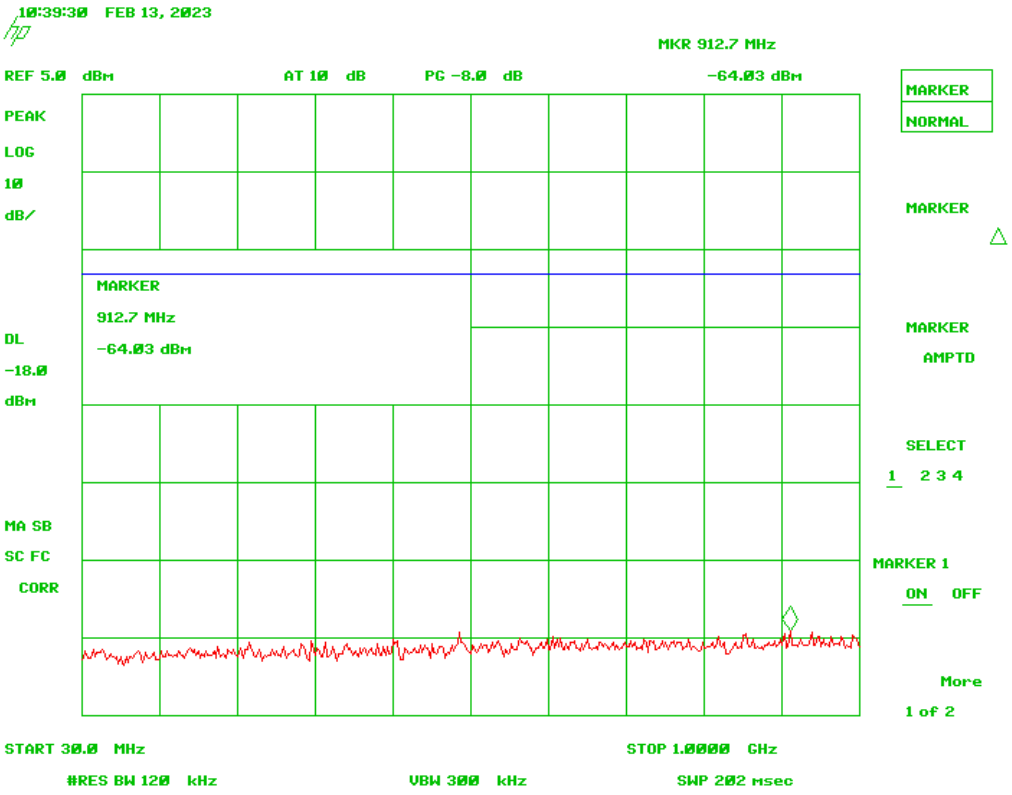


Figure 21. 802.11n, Channel 11, 30-1000 MHz

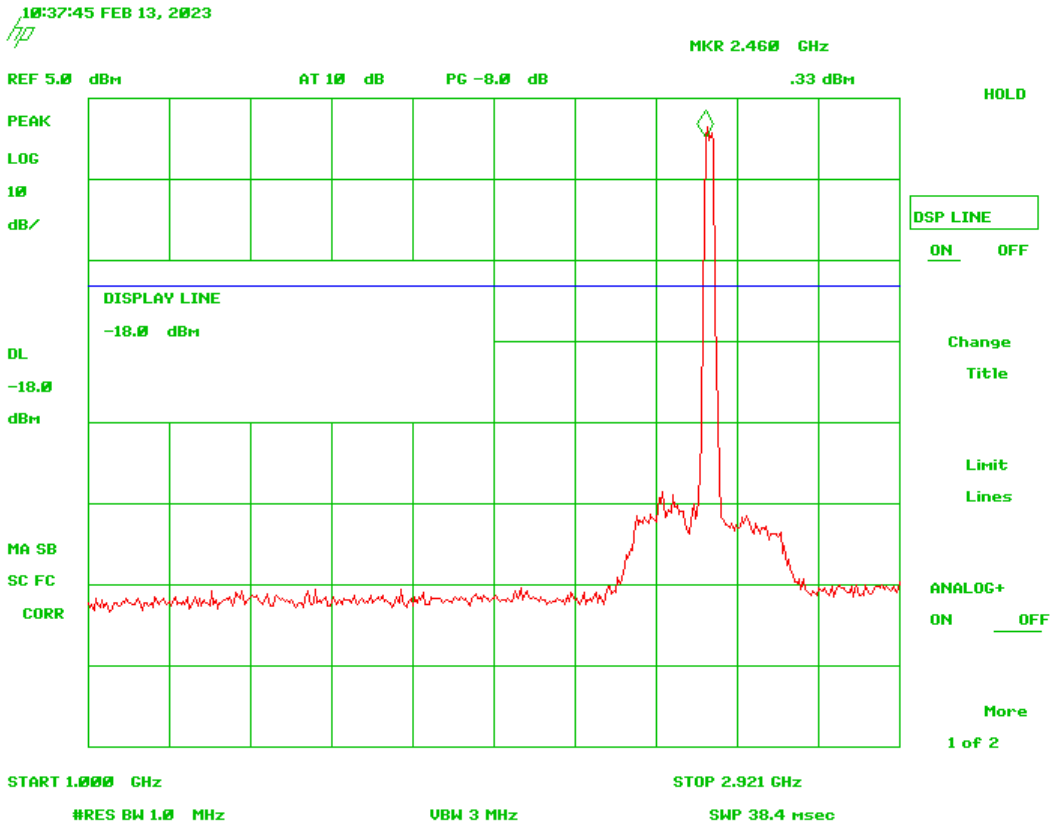


Figure 22. 802.11n, Channel 11, 1 – 2.9 GHz

(Note: Intentional Emission seen for radio operating at 2462 MHz)

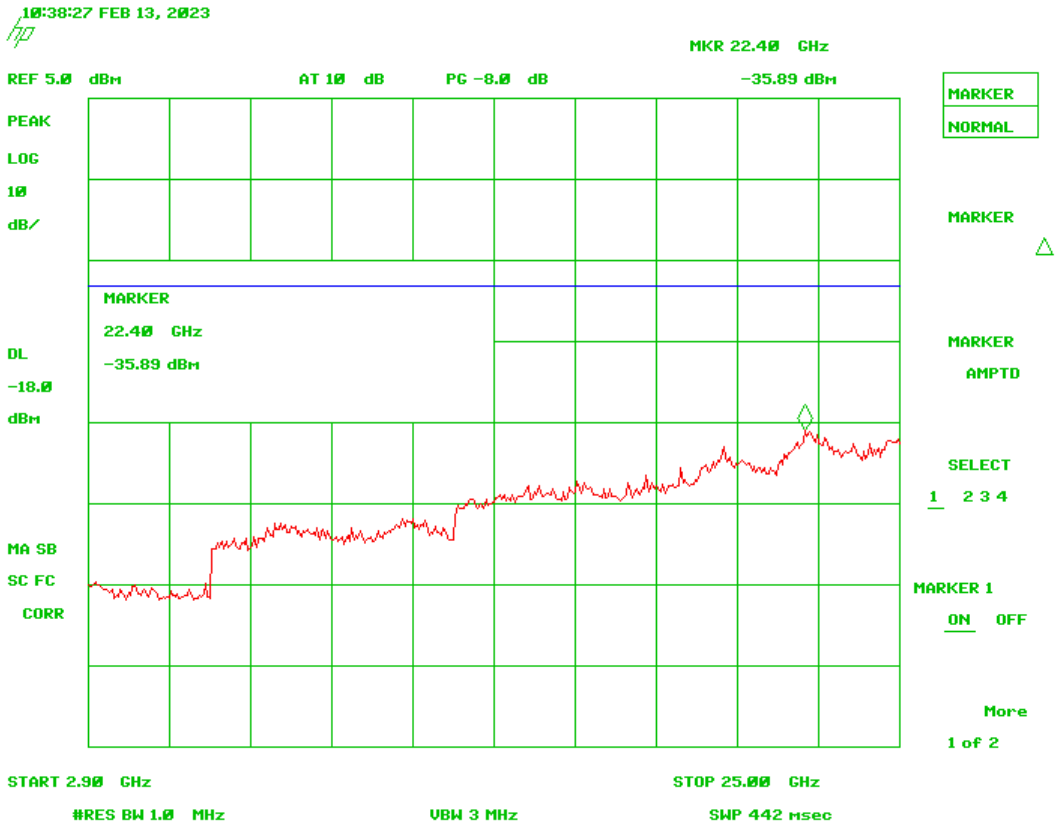


Figure 23. 802.11n, Channel 11, 2.9 – 25 GHz

2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.247(d), RSS-247, 5.5)

On the test site, the EUT was placed on top of a non-conductive table, 80 cm above the floor for measurements below 1 GHz and 150 cm above the floor for measurements > 1 GHz. The EUT was also evaluated in three orthogonal positions to determine the worst case position. The front of the EUT faced the measurement antenna located 3 meters away. Each signal measured was maximized by raising and lowering the receive antenna between 1 and 4 meters in height while monitoring the ever changing spectrum analyzer display (with channel A in the Clear-Write mode and channel B in the Max-Hold mode) for the largest signal visible. That exact antenna height where the signal was maximized was recorded for reproducibility purposes. Also, the EUT was rotated about its Y-axis while monitoring the Spectrum Analyzer display for maximum. The EUT azimuth was recorded for reproducibility purposes. The EUT was measured when both maxima were simultaneously satisfied.

For radiated measurements, the EUT was set into a continuous transmission mode. Below 1 GHz, the RBW of the measuring instrument was set equal to 120 kHz. Peak measurements above 1 GHz were measured using a RBW = 1 MHz, with a VBW ≥ RBW. The results of peak radiated spurious emissions falling within restricted bands are given in Table 6below.

For Average measurements above 1 GHz, the emissions were measured using RBW = 1 MHz and VBW = 10 Hz or the duty cycle correction factor was applied to the Peak recorded value.

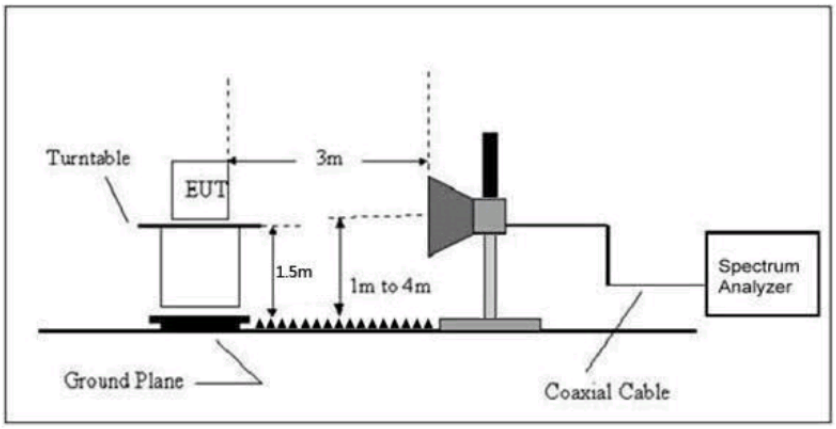


Figure 24. Radiated Emissions Setup (Fundamental and Harmonics)

Table 5. 802.11b-Peak Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15,247(d)								
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factor**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**Detector**
Low Channel - PEAK								
2413.00	71.78	0.00	32.01	103.79	--	3.0m./HORZ	--	**PK**
*4819.00	51.27	0.00	1.68	52.95	74.0	3.0m./HORZ	21.1	**PK**
*7244.00	51.83	-9.50	7.34	49.67	74.0	1.0m./HORZ	24.3	**PK**
Mid Channel – PEAK								
2443.00	74.74	0.00	32.11	106.85	--	3.0m./VERT	--	**PK**
4898.00	51.40	0.00	1.49	52.89	74.0	3.0m./VERT	21.1	**PK**
7337.00	53.47	-9.50	7.56	51.53	74.0	3.0m./VERT	22.5	**PK**
High Channel– PEAK								
2463.00	72.97	0.00	32.35	105.32	--	3.0m./HORZ	--	**PK**
4926.00	50.85	0.00	1.59	52.44	74.0	3.0m./HORZ	21.6	**PK**
7394.00	50.79	-9.50	7.11	48.40	74.0	3.0m./HORZ	25.6	**PK**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209& 15.247.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. The EUT was placed in three orthogonal positions, tested while broadcasting from each antenna, and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.
4. Measurement at 1 meters corrected using inverse extrapolation factor of -9.5 dB to correct the value for 3 meter.

Sample Calculation at 2412.00 MHz:

Magnitude of Measured Frequency	71.78	dBuV
+Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	32.01	dB/m
Corrected Result	103.79	dBuV/m

Test Date: February 8-9, 2023

Tested By
Signature: 

Name: Gabriel Medina

Table 6. 802.11b-Average Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15,247(d)								
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factor**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**Detector**
	Low Channel - Average							
2413.00	42.69	0.00	32.01	74.70	--	3.0m./HORZ	--	**AVG**
*4819.00	32.26	0.00	1.68	33.94	54.0	3.0m./HORZ	20.1	**AVG**
*7244.00	31.93	-9.50	7.34	29.77	54.0	1.0m./HORZ	24.2	**AVG**
	Mid Channel–Average							
2443.00	45.09	0.00	32.11	77.20	--	3.0m./VERT	--	**AVG**
4898.00	33.16	0.00	1.49	34.65	54.0	3.0m./VERT	19.3	**AVG**
7337.00	39.01	-9.50	7.56	37.07	54.0	3.0m./VERT	16.9	**AVG**
	High Channel–Average							
2463.00	44.16	0.00	32.35	76.51	--	3.0m./HORZ	--	**AVG**
4926.00	33.01	0.00	1.59	34.60	54.0	3.0m./HORZ	19.4	**AVG**
7394.00	32.24	-9.50	7.11	29.85	54.0	3.0m./HORZ	24.1	**AVG**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. The EUT was placed in three orthogonal positions, tested while broadcasting from each antenna, and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.
4. Measurement at 1 meters corrected using inverse extrapolation factor of -9.5 dB to correct the value for 3 meter.

Sample Calculation at 2412.00MHz:

Magnitude of Measured Frequency	42.69	dBuV
+Additional Factor (filter + duty cycle)	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain – Duty Cycle	32.01	dB/m
Corrected Result	74.70	dBuV/m

Test Date: February 8-9, 2023

Tested By
Signature: 

Name: Gabriel Medina

Table 7. 802.11g-Peak Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15,247(d)								
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factor**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**Detector**
	Low Channel - PEAK							
2417.00	68.22	0.00	32.01	100.23	--	3.0m./HORZ	--	**PK**
*4817.00	50.81	0.00	1.68	52.49	74.0	3.0m./HORZ	21.5	**PK**
*7237.00	51.15	-9.50	7.34	48.99	74.0	1.0m./HORZ	25.0	**PK**
	Mid Channel – PEAK							
2445.00	70.25	0.00	32.02	102.27	--	3.0m./HORZ	--	**PK**
*4892.00	51.05	0.00	1.48	52.53	74.0	3.0m./HORZ	21.5	**PK**
*7322.00	51.79	-9.50	8.07	50.33	74.0	1.0m./HORZ	23.7	**PK**
	High Channel– PEAK							
2464.00	69.39	0.00	32.35	101.74	--	3.0m./HORZ	--	**PK**
*4922.00	53.87	0.00	1.59	55.46	74.0	3.0m./HORZ	18.5	**PK**
*7394.00	53.84	-9.50	7.11	51.45	74.0	3.0m./HORZ	22.5	**PK**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209& 15.247.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. The EUT was placed in three orthogonal positions, tested while broadcasting from each antenna, and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.
4. Measurement at 1 meters corrected using inverse extrapolation factor of -9.5 dB to correct the value for 3 meter.

Sample Calculation at 2417.00 MHz:

Magnitude of Measured Frequency	68.22	dBuV
+Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	32.01	dB/m
Corrected Result	100.23	dBuV/m

Test Date: February 8-9, 2023

Tested By
Signature: 

Name: Gabriel Medina

Table 8. 802.11g-Average Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15,247(d)								
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factor**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**Detector**
	Low Channel–Average							
2417.00	24.77	0.00	32.01	56.78	--	3.0m./HORZ	--	**AVG**
*4817.00	32.59	0.00	1.68	34.27	54.0	3.0m./HORZ	19.7	**AVG**
*7237.00	32.28	-9.50	7.34	30.12	54.0	1.0m./HORZ	23.9	**AVG**
	Mid Channel –Average							
2445.00	25.02	0.00	32.02	57.04	--	3.0m./HORZ	--	**AVG**
*4892.00	32.48	0.00	1.48	33.96	54.0	3.0m./HORZ	20.0	**AVG**
*7322.00	32.43	-9.50	8.07	31.00	54.0	1.0m./HORZ	23.0	**AVG**
	High Channel–Average							
2464.00	24.74	0.00	32.35	57.09	--	3.0m./HORZ	--	**AVG**
*4922.00	31.79	0.00	1.59	33.38	54.0	3.0m./HORZ	20.6	**AVG**
*7394.00	31.67	-9.50	7.11	29.28	54.0	1.0m./HORZ	24.7	**AVG**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. The EUT was placed in three orthogonal positions, tested while broadcasting from each antenna, and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.
4. Measurement at 1 meters corrected using inverse extrapolation factor of -9.5 dB to correct the value for 3 meter.

Sample Calculation at 2417.00 MHz:

Magnitude of Measured Frequency	24.77	dBuV
+Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	32.01	dB/m
Corrected Result	56.78	dBuV/m

Test Date: February 8-9, 2023

Tested By
Signature: 

Name: Gabriel Medina

Table 9. 802.11n-Peak Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15,247(d)								
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factor**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**Detector**
Low Channel - PEAK								
2416.00	66.06	0.00	32.01	98.07	--	3.0m./HORZ	--	**PK**
4822.00	51.26	0.00	1.68	52.94	74.0	3.0m./HORZ	21.1	**PK**
7233.00	42.05	-9.50	6.84	48.89	74.0	1.0m./HORZ	25.1	**PK**
Mid Channel – PEAK								
2439.00	68.07	0.00	32.02	100.09	--	3.0m./HORZ	--	**PK**
4891.00	50.23	0.00	1.48	51.71	74.0	3.0m./HORZ	22.3	**PK**
7335.00	50.69	-9.50	7.61	48.91	74.0	1.0m./HORZ	25.1	**PK**
High Channel– PEAK								
2466.00	66.63	0.00	32.35	98.98	--	3.0m./HORZ	--	**PK**
4923.00	51.03	0.00	1.59	52.62	74.0	3.0m./HORZ	21.4	**PK**
7390.00	51.02	-9.50	7.70	49.22	74.0	1.0m./HORZ	24.8	**PK**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209& 15.247.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. The EUT was placed in three orthogonal positions, tested while broadcasting from each antenna, and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.
4. Measurement at 1 meters corrected using inverse extrapolation factor of -9.5 dB to correct the value for 3 meter.

Sample Calculation at 2416.00 MHz:

Magnitude of Measured Frequency	66.06	dBuV
+Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	32.01	dB/m
Corrected Result	98.07	dBuV/m

Test Date: February 8-9, 2023

Tested By
Signature: 

Name: Gabriel Medina

Table 10. 802.11n-Average Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15,247(d)								
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factor**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**Detector**
	Low Channel - Average							
2416.00	24.89	0.00	32.01	56.90	--	3.0m./HORZ	--	**AVG**
4822.00	32.26	0.00	1.68	33.94	54.0	3.0m./HORZ	20.1	**AVG**
7233.00	22.22	-9.50	6.84	29.06	54.0	1.0m./HORZ	24.9	**AVG**
	Mid Channel –Average							
2439.00	25.52	0.00	32.02	57.54	--	3.0m./HORZ	--	**AVG**
4891.00	32.75	0.00	1.48	34.23	54.0	3.0m./HORZ	19.8	**AVG**
7335.00	31.74	-9.50	7.61	30.21	54.0	1.0m./HORZ	23.8	**AVG**
	High Channel–Average							
2466.00	25.22	0.00	32.35	57.57	--	3.0m./HORZ	--	**AVG**
4923.00	32.43	0.00	1.59	34.02	54.0	3.0m./HORZ	20.0	**AVG**
7390.00	32.12	-9.50	7.70	30.32	54.0	1.0m./HORZ	23.7	**AVG**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. The EUT was placed in three orthogonal positions, tested while broadcasting from each antenna, and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.
4. Measurement at 1 meters corrected using inverse extrapolation factor of -9.5 dB to correct the value for 3 meter.

Sample Calculation at 2416.00 MHz:

Magnitude of Measured Frequency	24.89	dBuV
+Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	32.01	dB/m
Corrected Result	56.90	dBuV/m

Test Date: February 8-9, 2023

Tested By
Signature: 

Name: Gabriel Medina

2.11 Band Edge Measurements (CFR 15.247(d), RSS-247, 5.5)

Band Edge measurements are made following the guidelines in ANSI C63.10-2013 Clause 6.10 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. Restricted band and band edge test is performed as radiated measurements. The test instrument used for testing has both Peak and Average detection. In consideration of Clause 5.8 of ANSI C63.10-2013. The EUT was set to its highest rated output power level during testing. The results are collected and presented below.

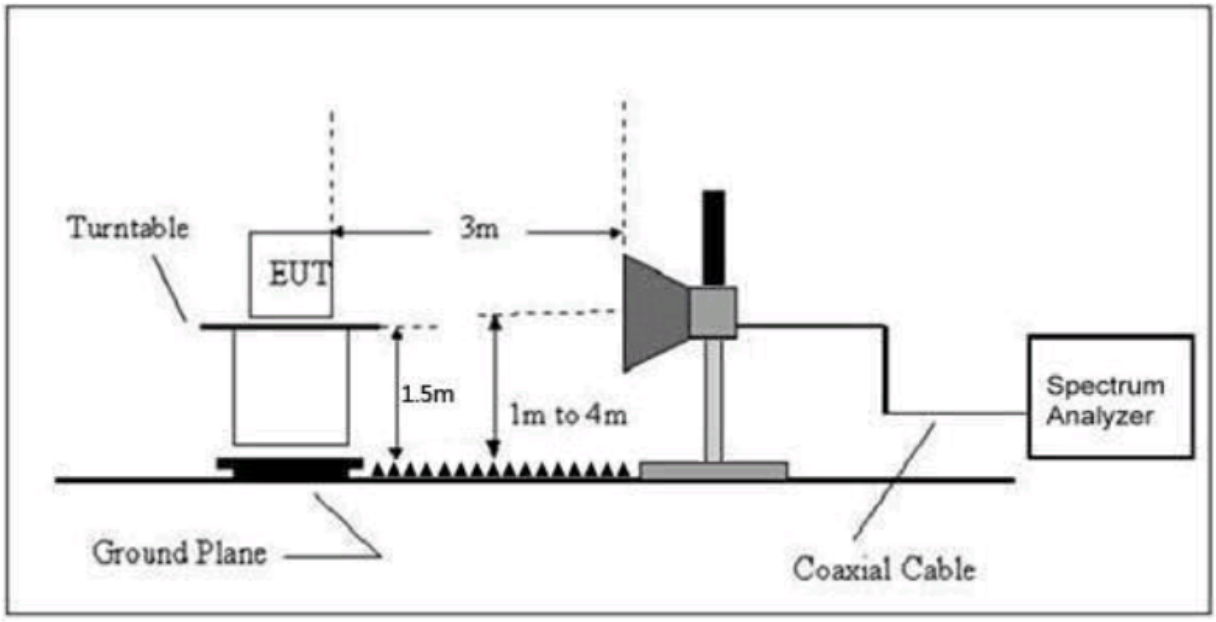


Figure 25. Radiated Emissions Setup

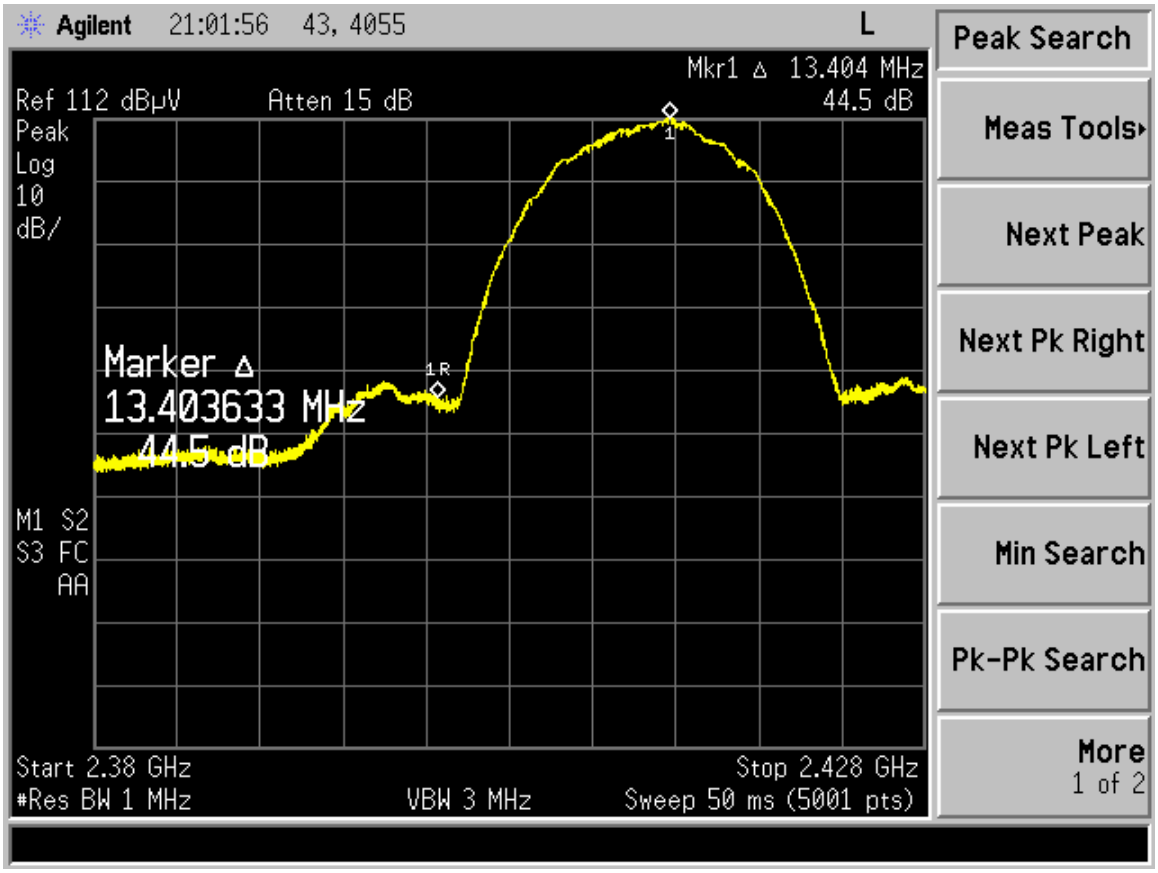


Figure 26. Band Edge Compliance – B mode Low Channel Delta - Peak

Lower band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	44.5	dB
Band Edge Limit	20.00	dB
Band Edge Margin	24.50	dB

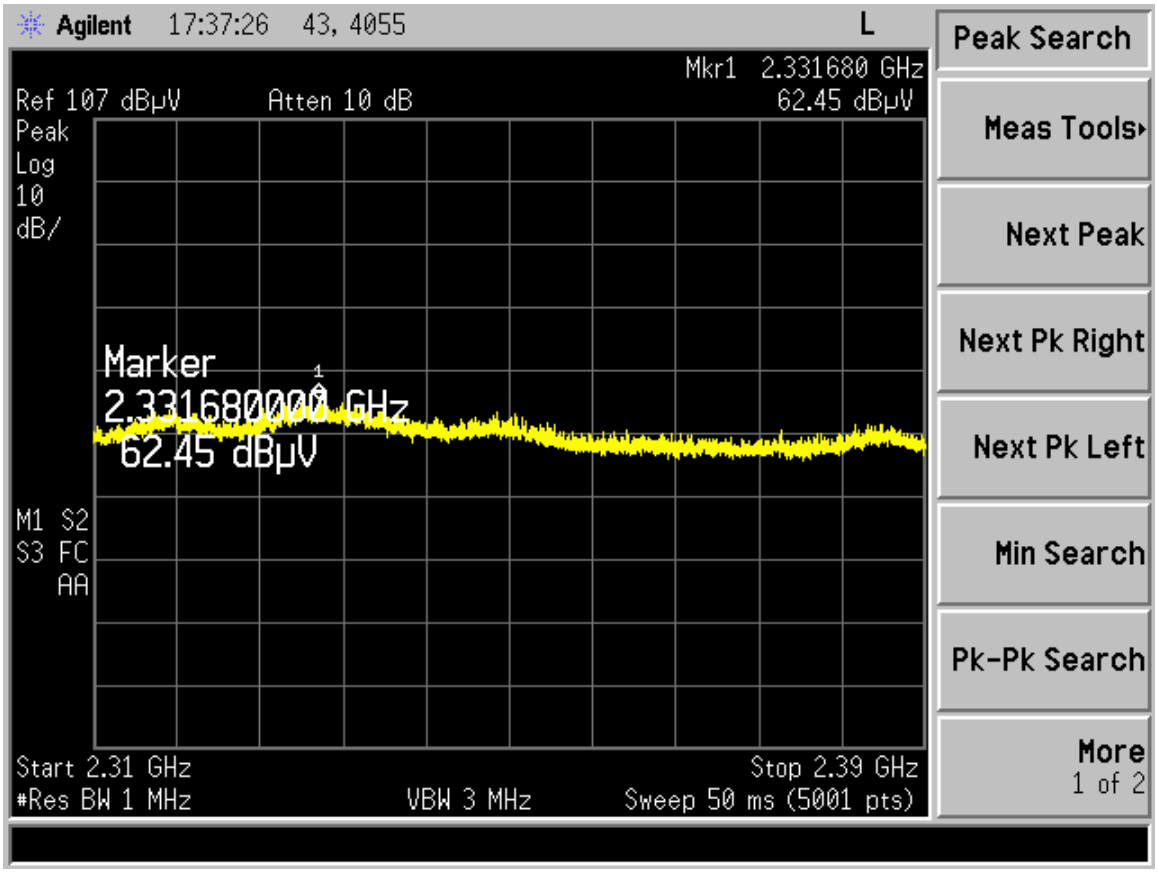


Figure 27. B mode Low Channel Restricted Band - Peak

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2331.68	62.45	-6.94	55.51	74.0	3.0m./Vert	18.5	**PK**

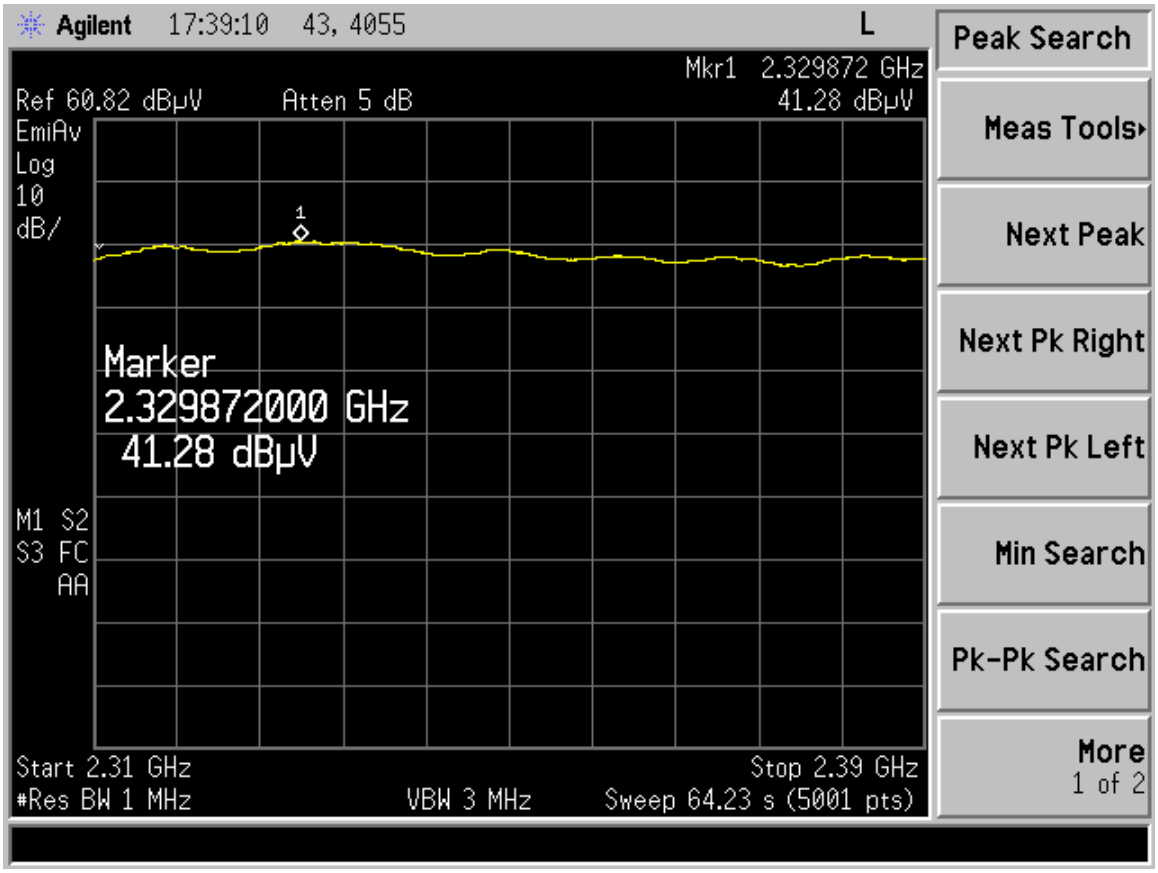


Figure 28. B mode Low Channel Restricted Band – Average

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2329.87	41.28	-7.03	34.25	54.0	3.0m./HORZ	19.8	AVG

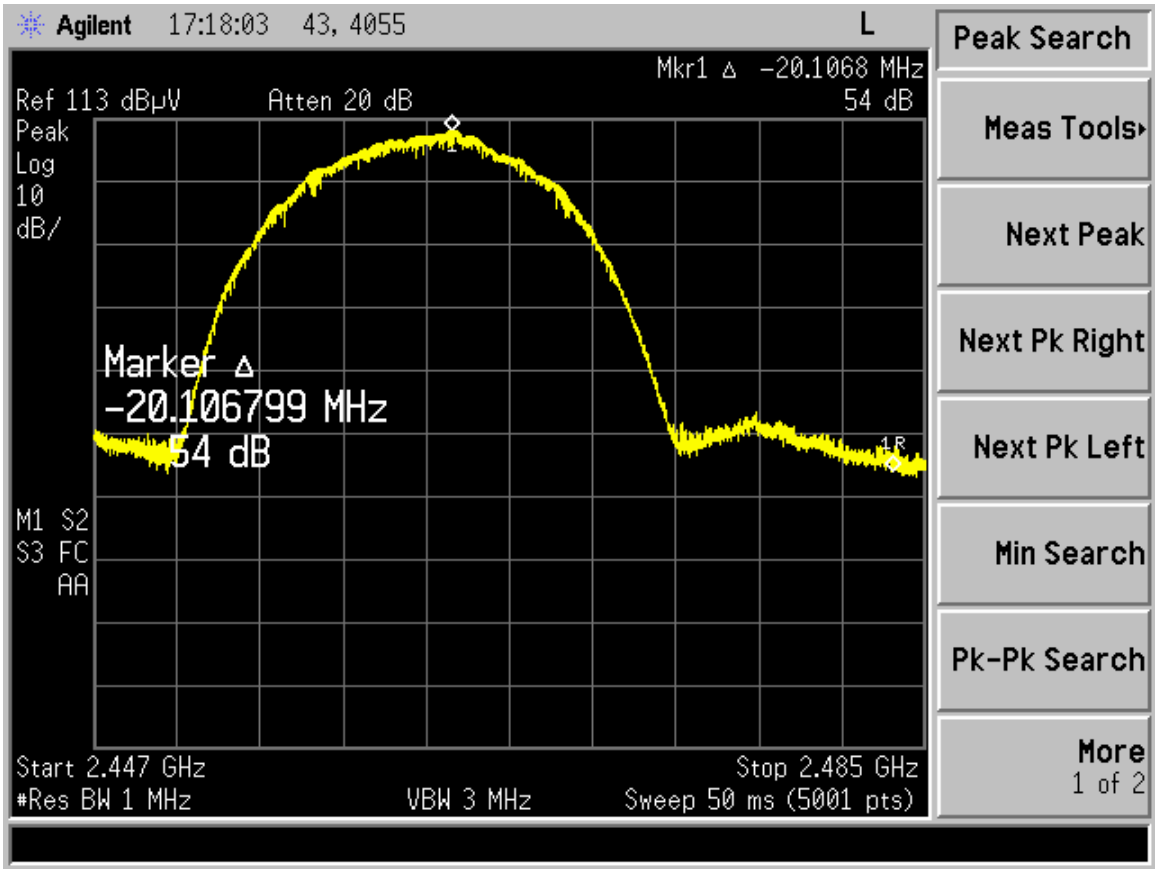


Figure 29. Band Edge Compliance – B mode High Channel Delta - Peak

Higher band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	54.00	dB
Band Edge Limit	20.00	dB
Band Edge Margin	24.00	dB

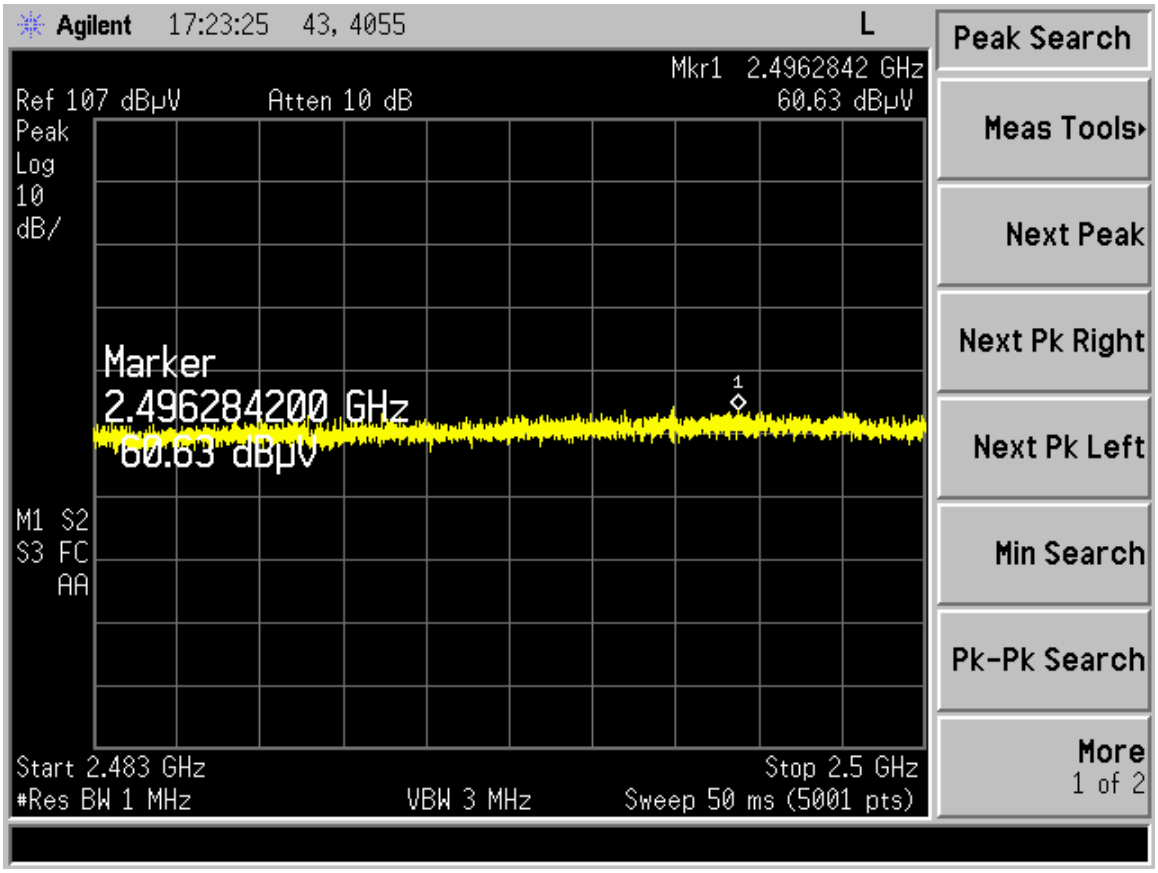


Figure 30. B mode High Channel Restricted Band – Peak

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2496.28	60.63	-6.01	54.62	74.0	3.0m./HORZ	19.4	**PK**

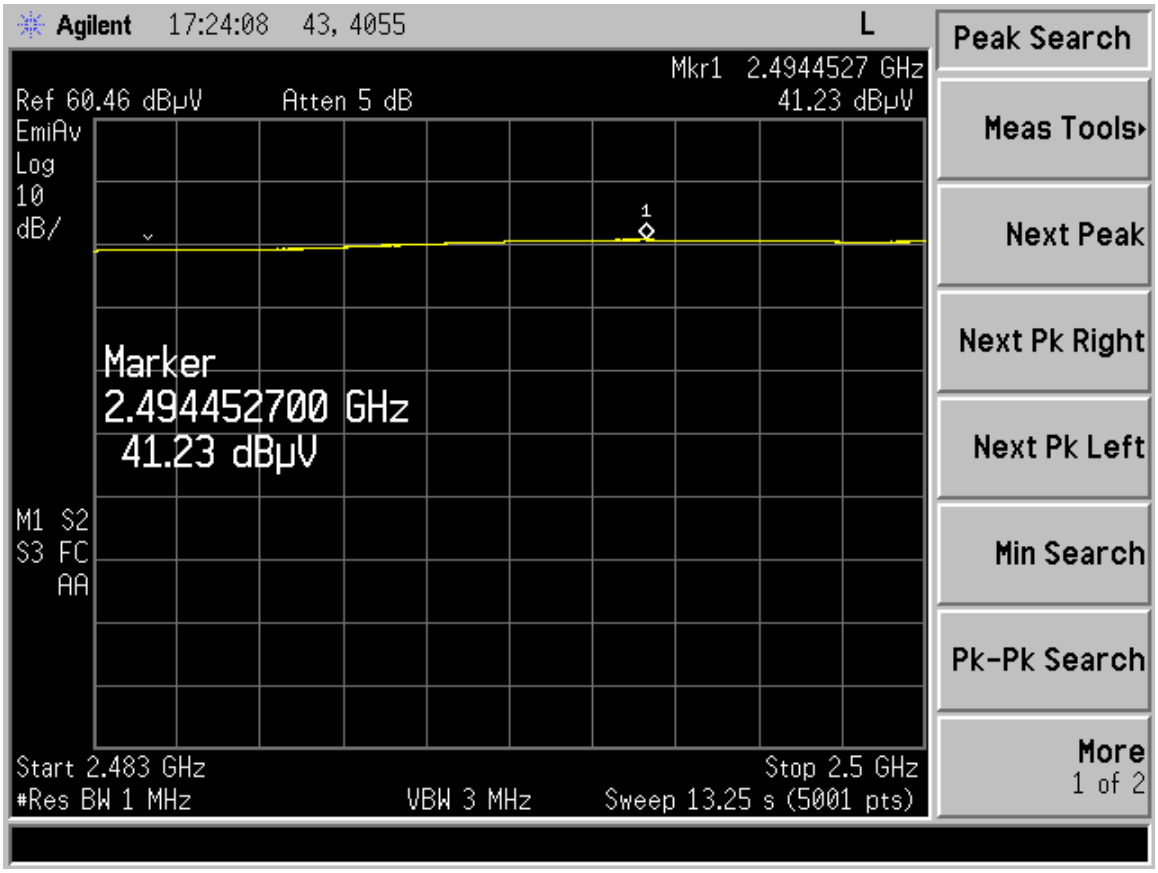


Figure 31. B mode High Channel Restricted Band – Average

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2494.45	41.23	-6.01	35.22	54.0	3.0m./HORZ	18.8	AVG

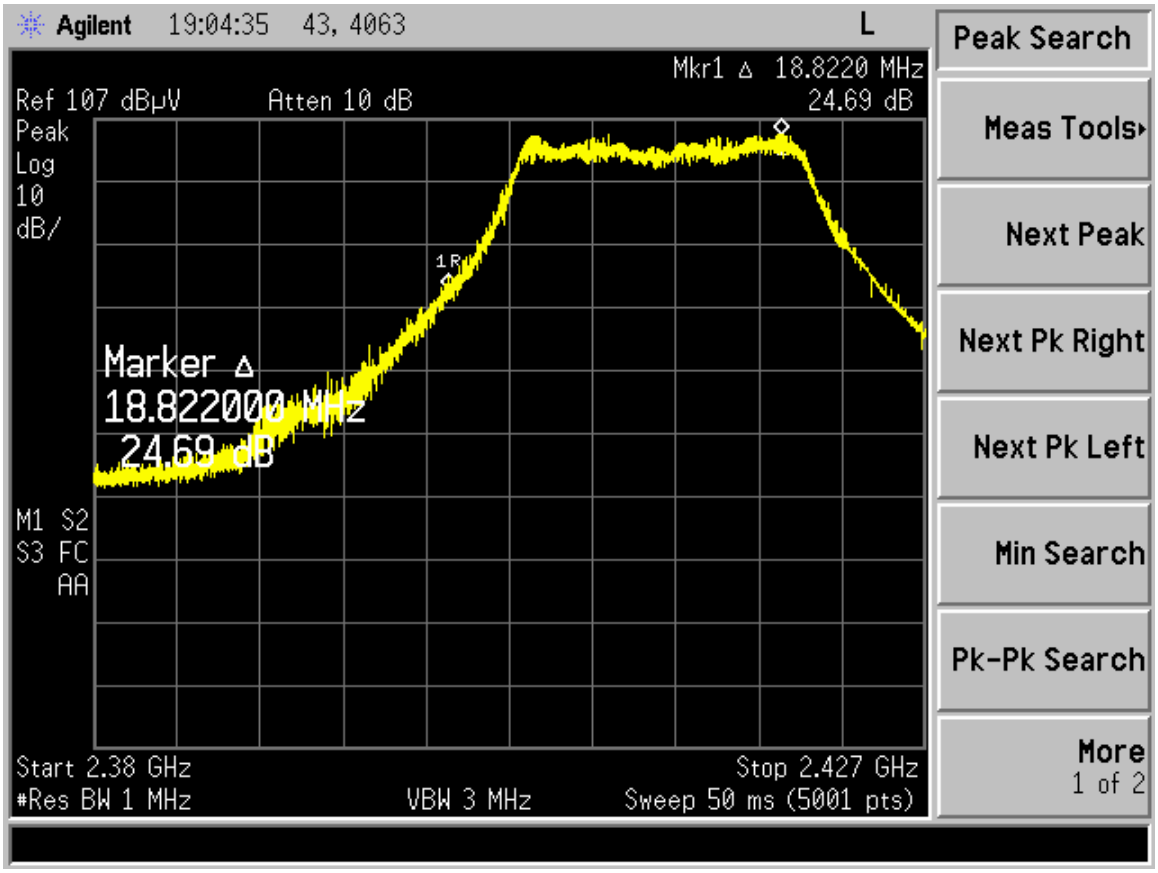


Figure 32. Band Edge Compliance – G mode Low Channel Delta – Peak

Lower band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	24.69	dB
Band Edge Limit	20.00	dB
Band Edge Margin	4.69	dB

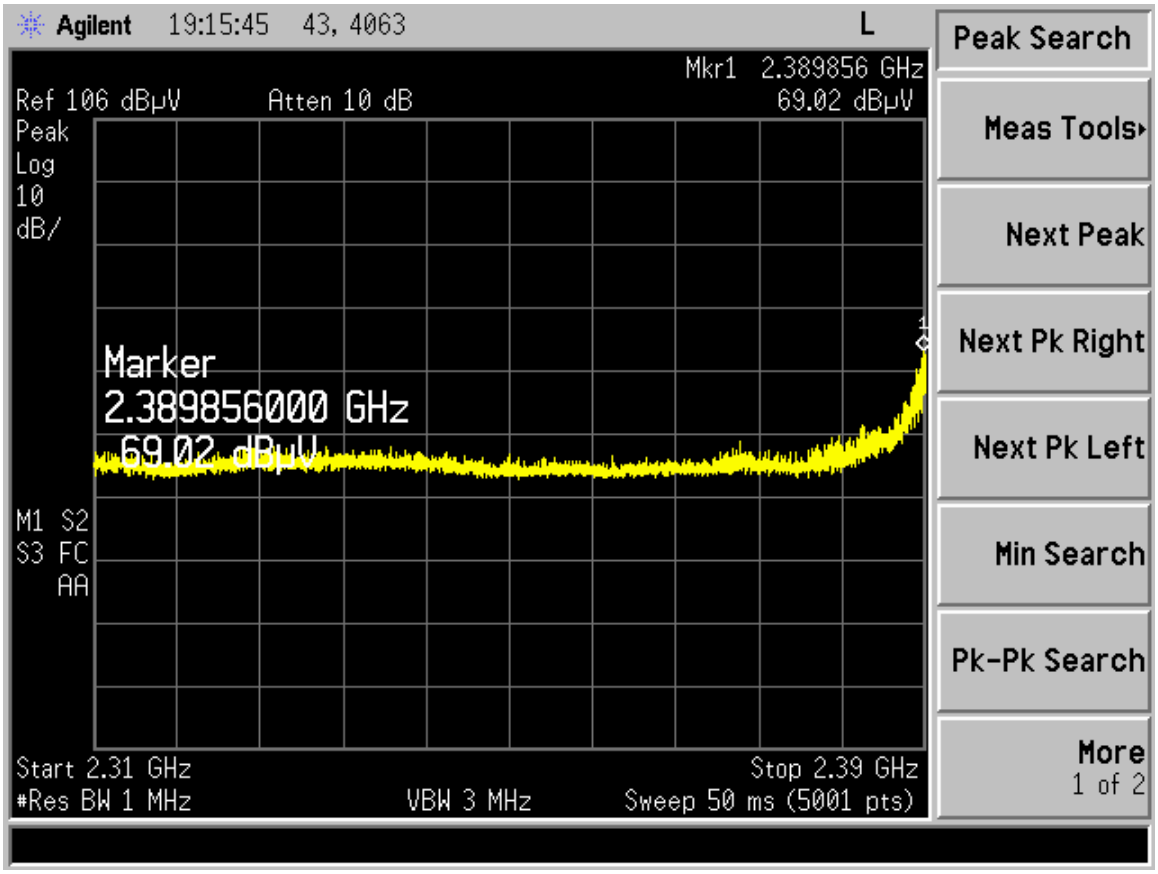


Figure 33. G mode Low Channel Restricted Band – Peak

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2389.85	69.02	-6.69	62.33	74.0	3.0m./HORZ	11.7	**PK**

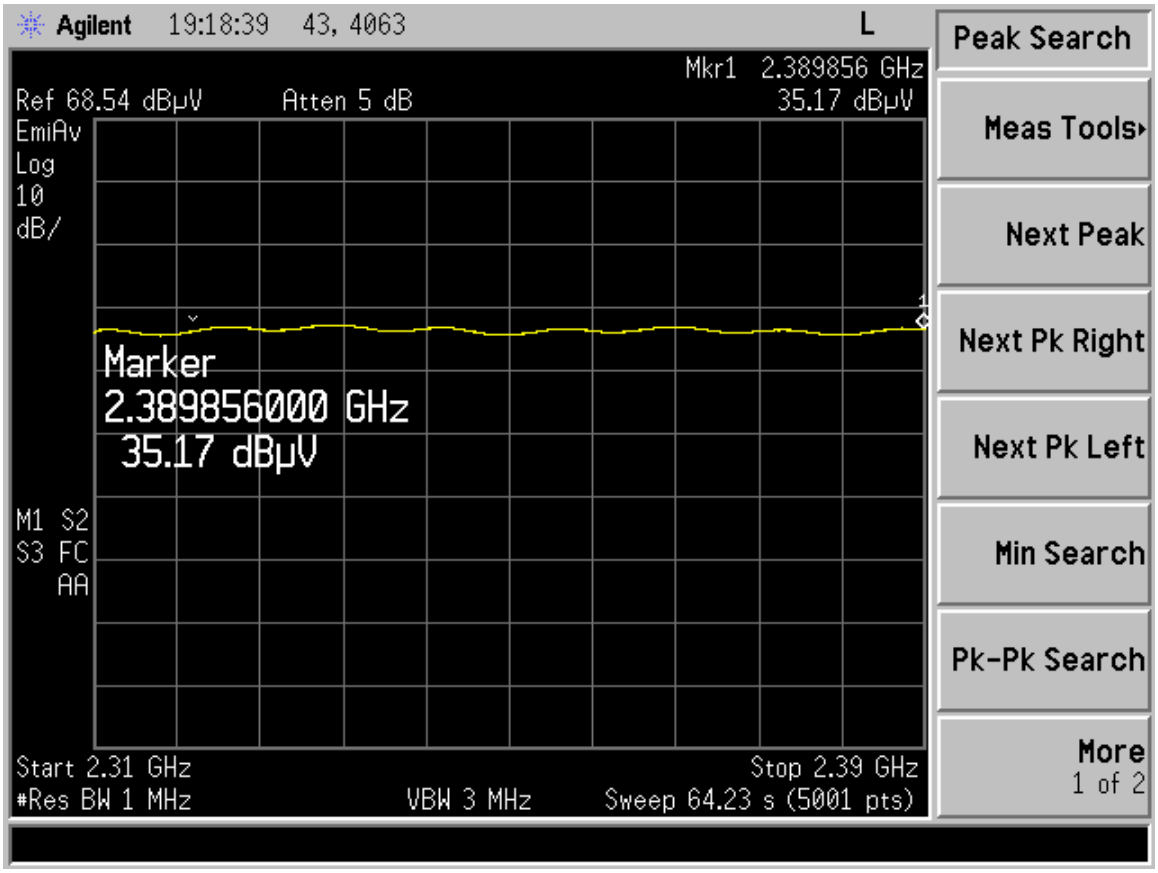


Figure 34. G mode Low Channel Restricted Band – Average

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2389.85	35.17	-6.69	28.48	54.0	3.0m./HORZ	25.5	**AVG**

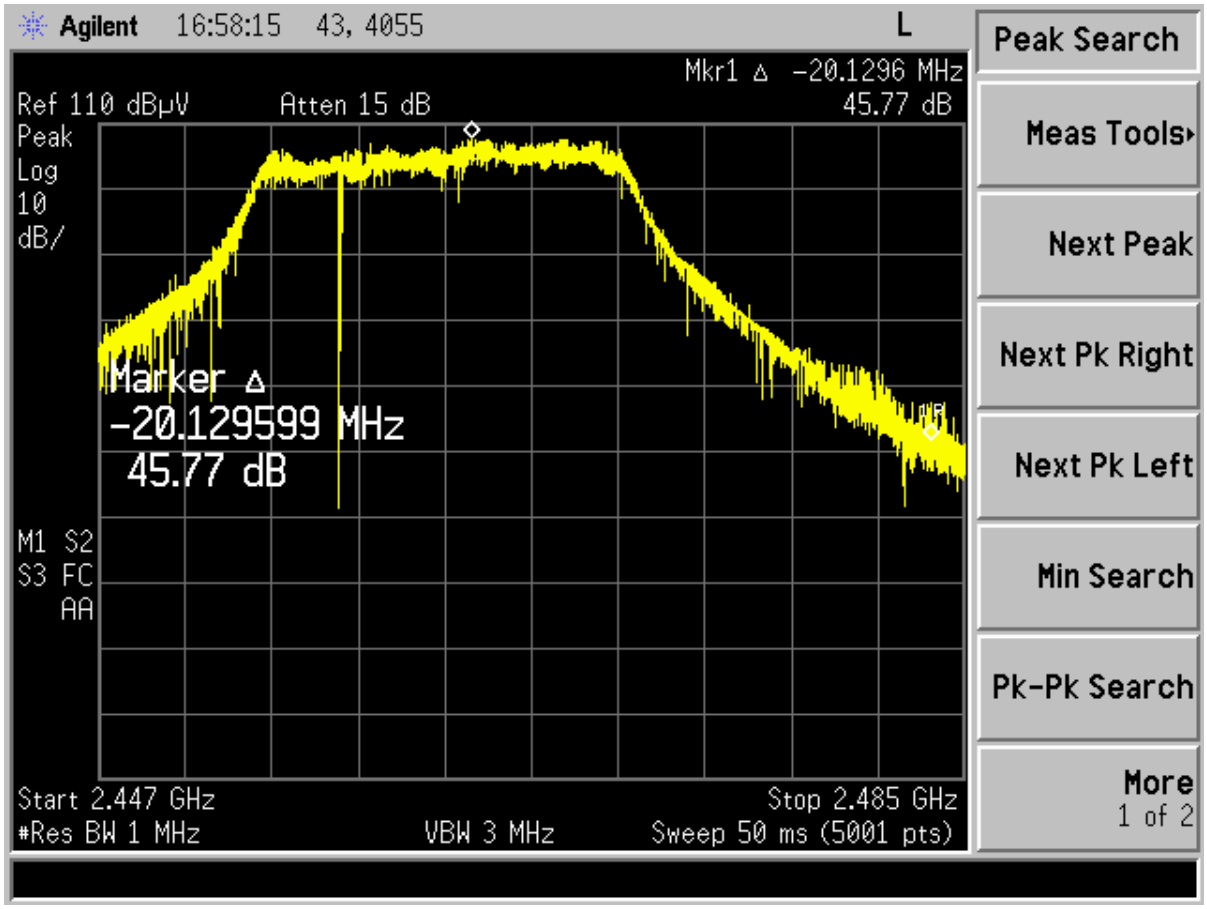


Figure 35. Band Edge Compliance – G mode High Channel Delta – Peak

Higher band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	45.77	dB
Band Edge Limit	20.00	dB
Band Edge Margin	25.77	dB

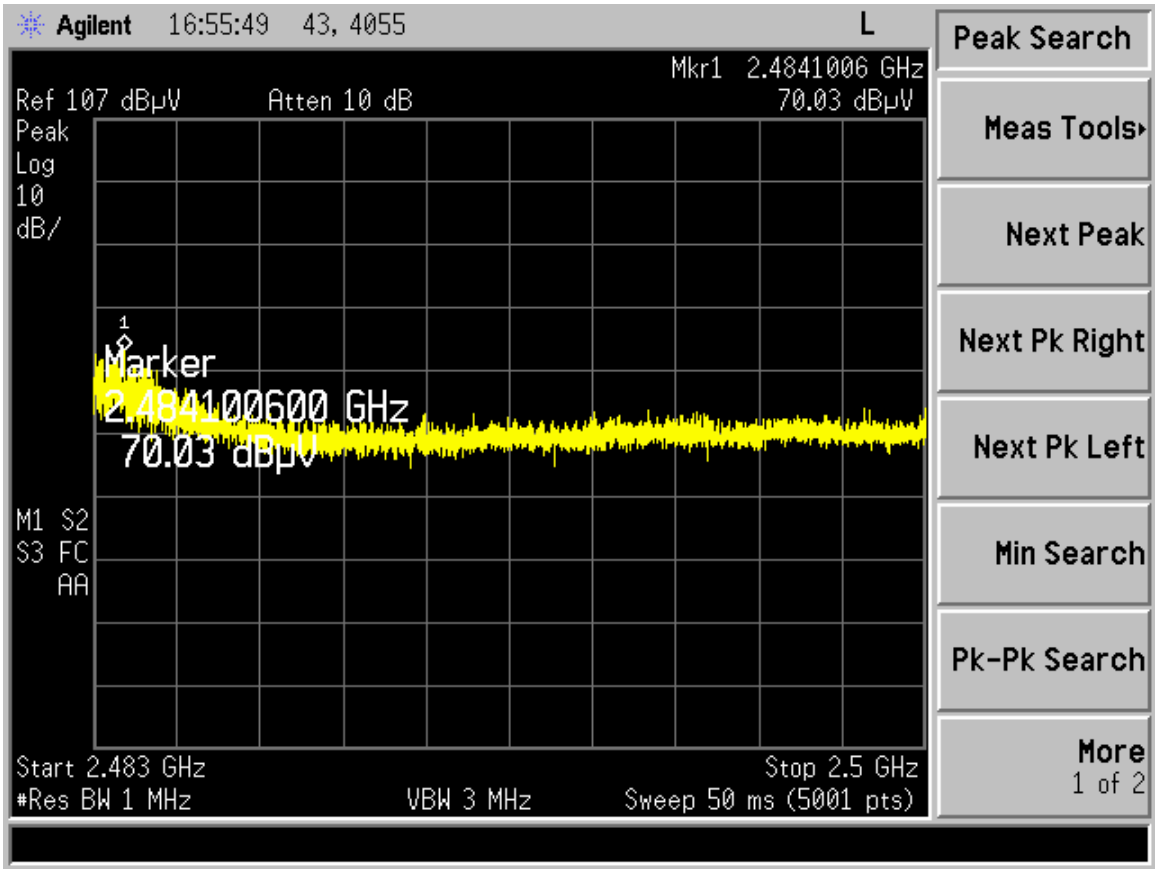


Figure 36. G mode High Channel Restricted Band – Peak

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2448.10	70.03	-6.16	63.87	74.0	3.0m./VERT	10.1	PK

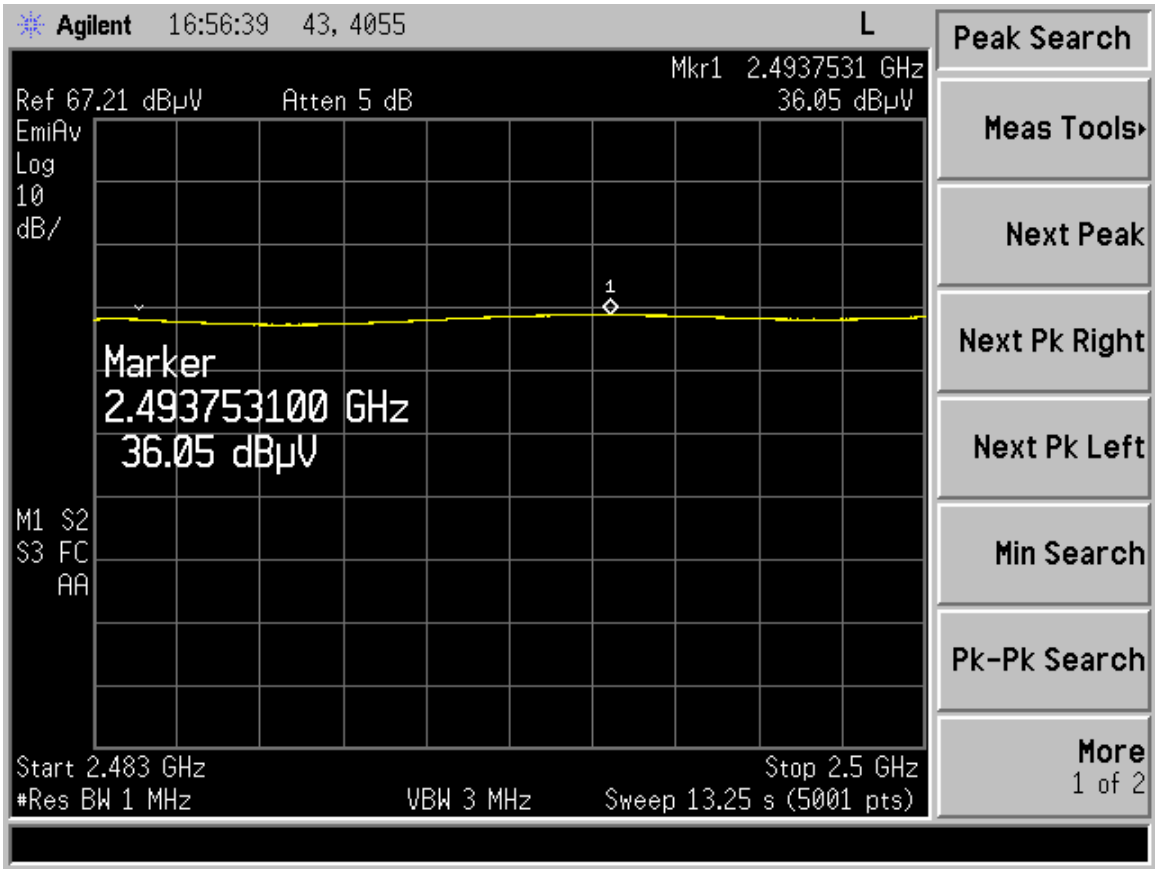


Figure 37. G mode High Channel Restricted Band – Average

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance /Polarization	Margin (dB)	Detector PK/QP/AVG
2493.75	36.05	-6.07	29.98	54.0	3.0m./VERT	24.0	AVG

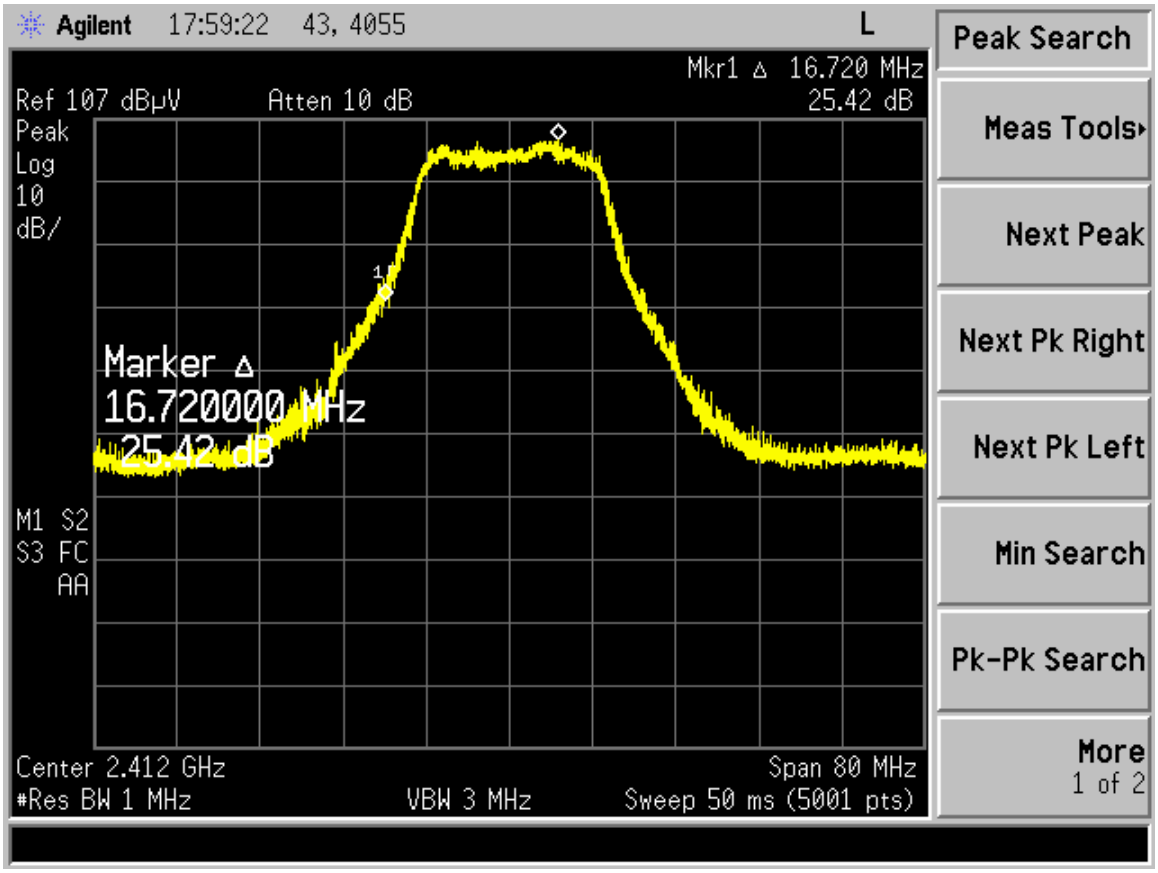


Figure 38. Band Edge Compliance – N mode Low Channel Delta – Peak

Lower band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	25.42	dB
Band Edge Limit	20.00	dB
Band Edge Margin	5.42	dB

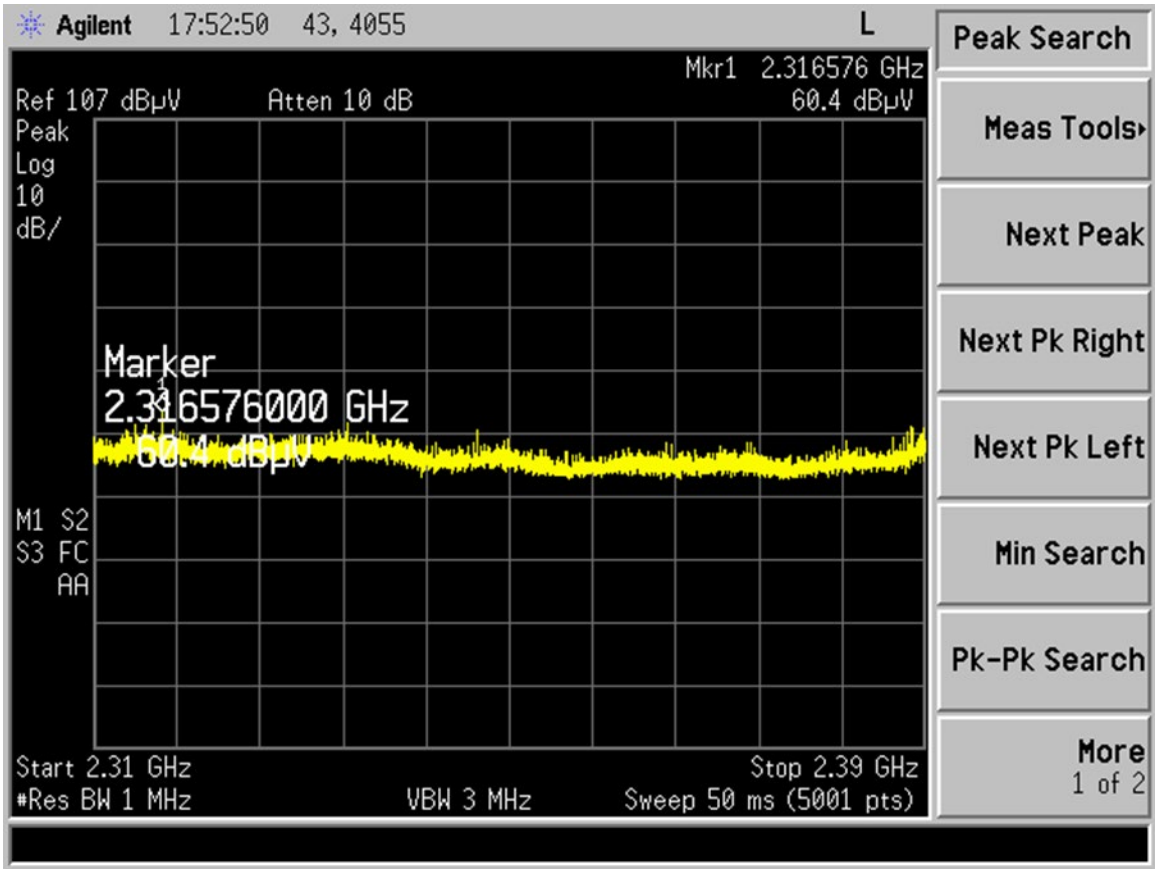


Figure 39. N mode Low Channel Restricted Band – Peak

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2316.57	60.4	-7.07	53.33	74.0	3.0m./HORZ	20.7	**PK**

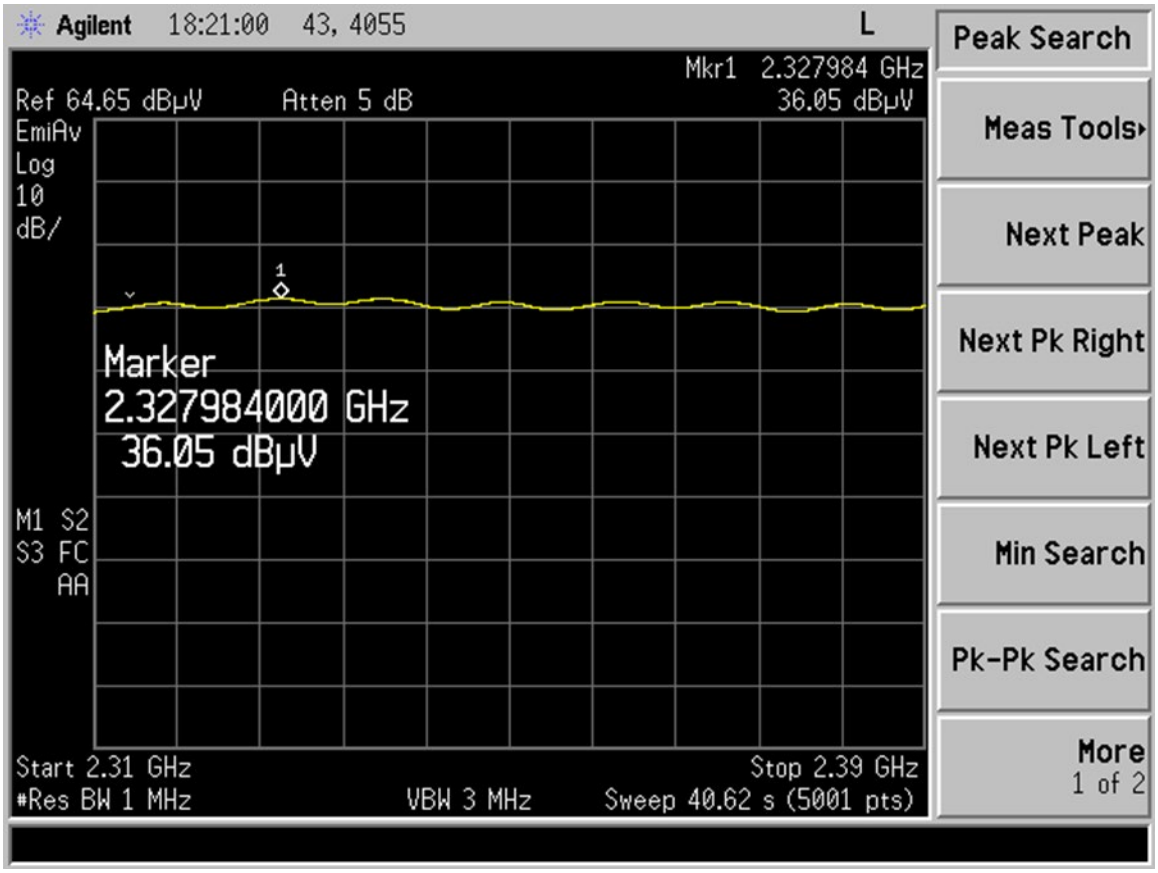


Figure 40. N mode Low Channel Restricted Band – Average

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2389.60	36.05	-7.03	29.02	54.0	3.0m./HORZ	25.0	**AVG**

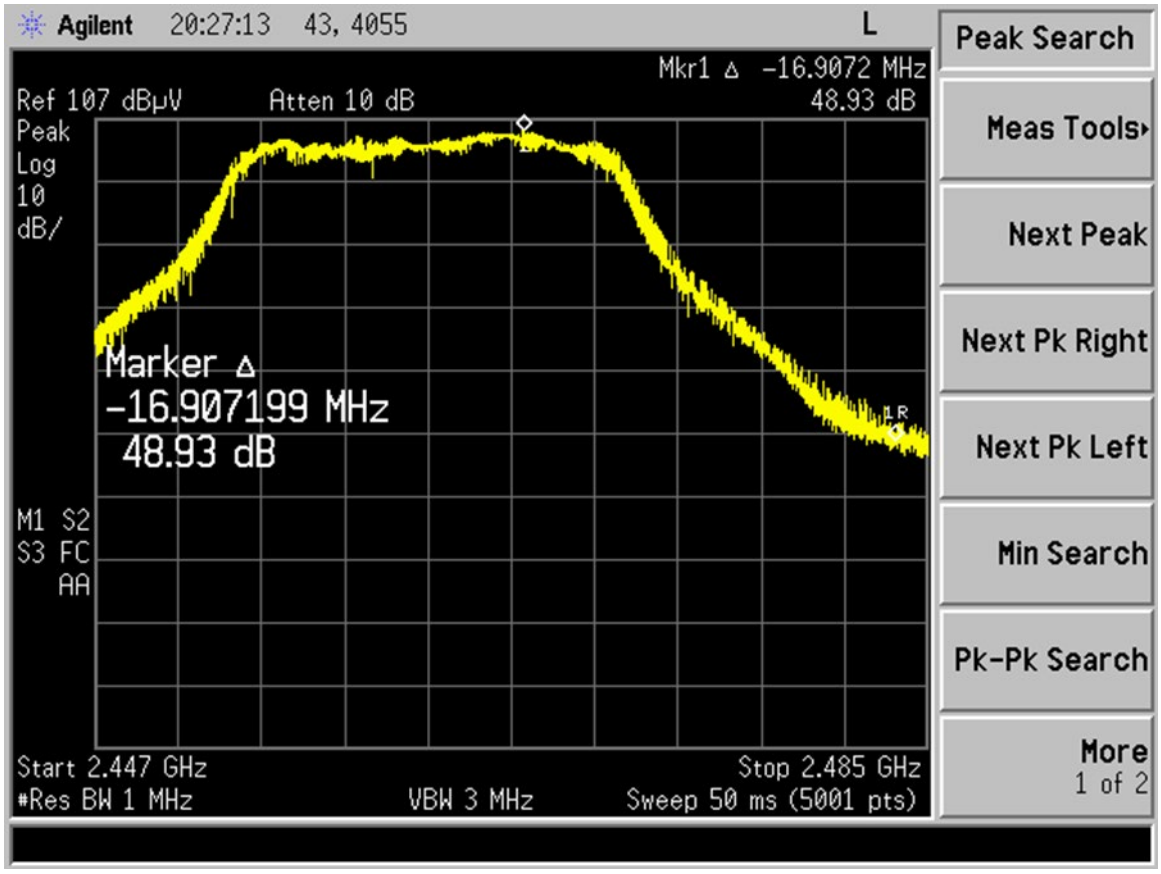


Figure 41. Band Edge Compliance – N mode High Channel Delta – Peak

Higher band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	48.93	dB
Band Edge Limit	20.00	dB
Band Edge Margin	28.93	dB

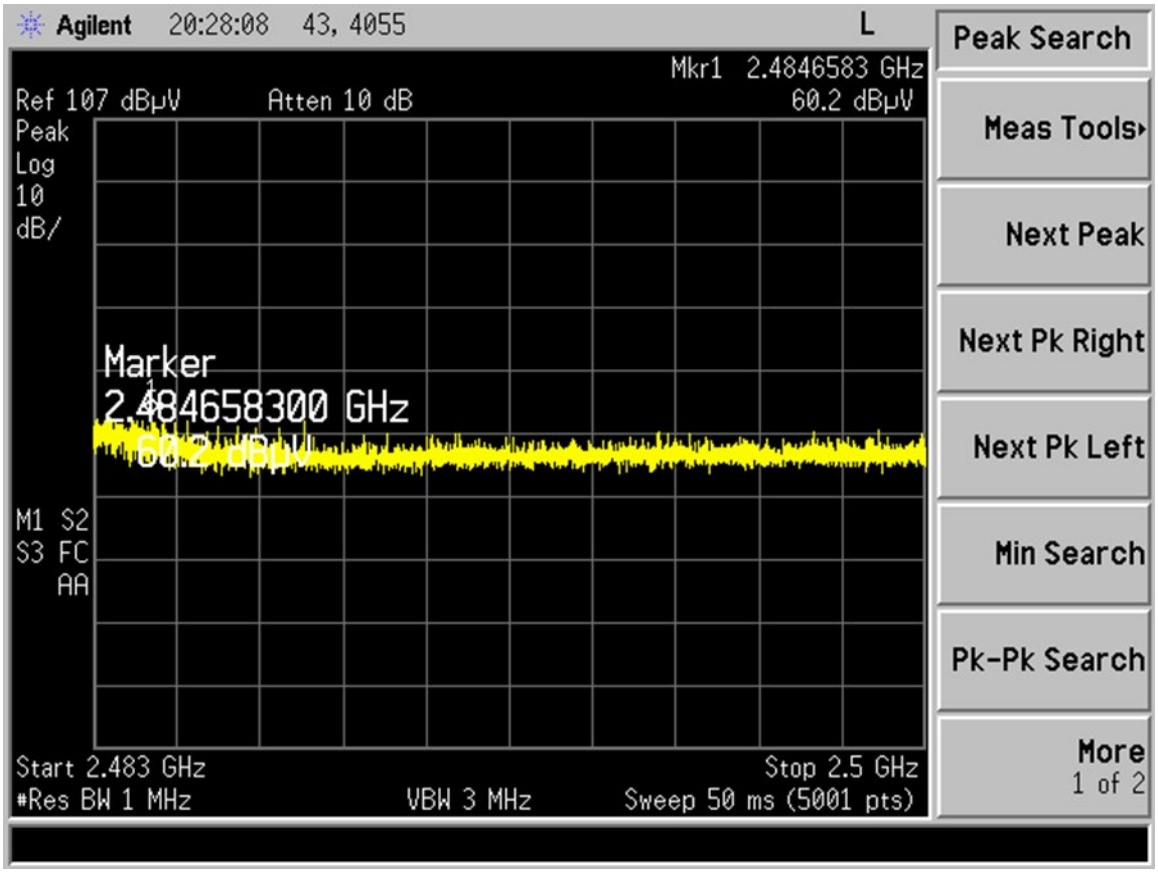


Figure 42. N mode High Channel Restricted Band – Peak

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2484.65	60.20	-6.01	54.19	74.0	3.0m./HORZ	19.8	**PK**

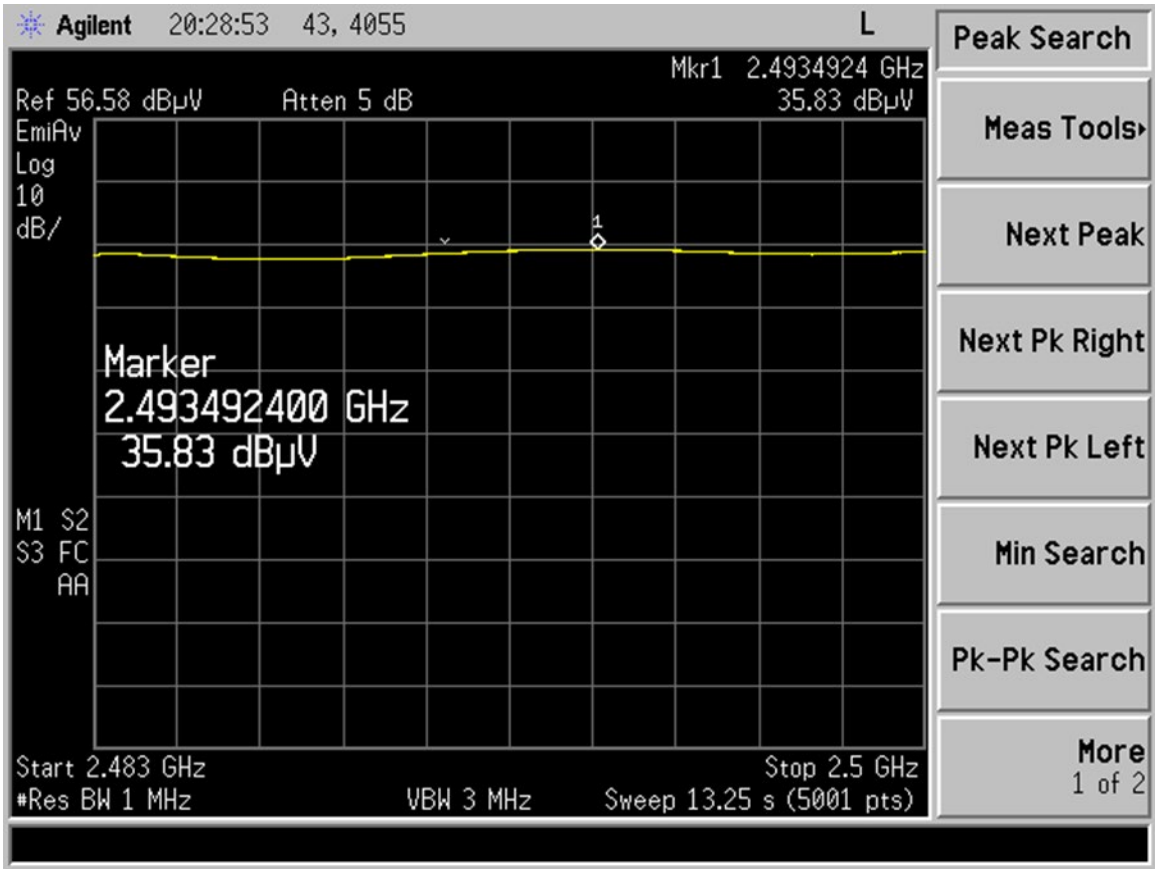


Figure 43. N mode High Channel Restricted Band – Average

Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2493.49	35.83	-6.01	29.82	54.0	3.0m./HORZ	24.2	**AVG**

2.12 Six (6) dB Bandwidth (CFR 15.247(a)(2), RSS-247, 5.2(a))

The EUT antenna port was connected to a spectrum analyzer having a 50 Ω input impedance. Measurements were performed per ANSI C63.10-2013, clause 11.8. The RBW was set to 100 kHz and the VBW ≥ RBW. The results of this test are given in the table below and figures below.

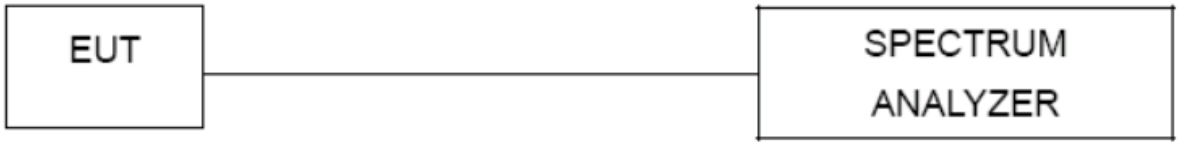
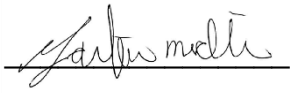


Figure 44. Bench Test Setup

Table 11. Six (6) dB Bandwidth

Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum FCC Bandwidth (MHz)	Mode (IEEE 802.11)
2412	9.64	0.5	b
2442	9.17	0.5	b
2462	9.25	0.5	b
2412	16.30	0.5	g
2442	16.41	0.5	g
2462	16.65	0.5	g
2412	17.57	0.5	n
2442	17.56	0.5	n
2462	17.55	0.5	n

Test Date: February 10-13, 2023

Tested By
Signature:  Name: Gabriel Medina

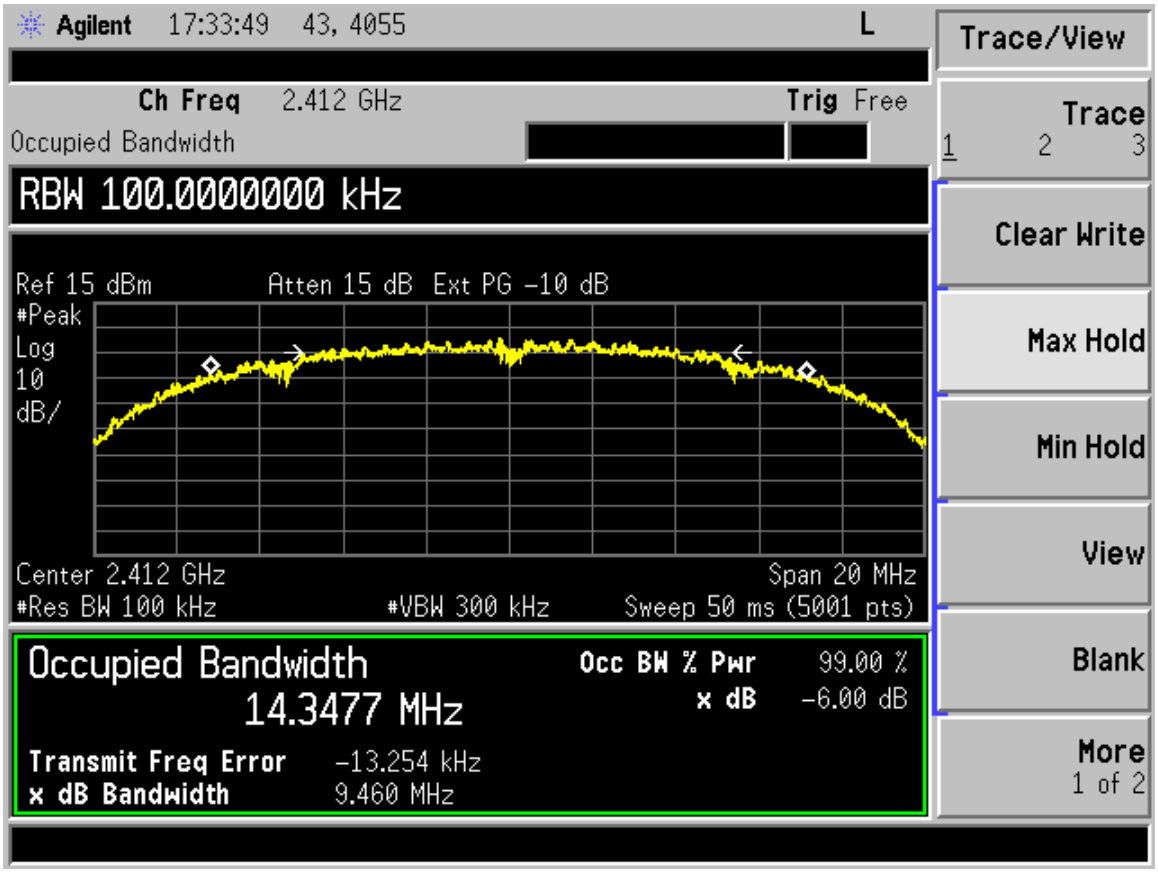


Figure 45. 6 dB Bandwidth b mode Low Channel

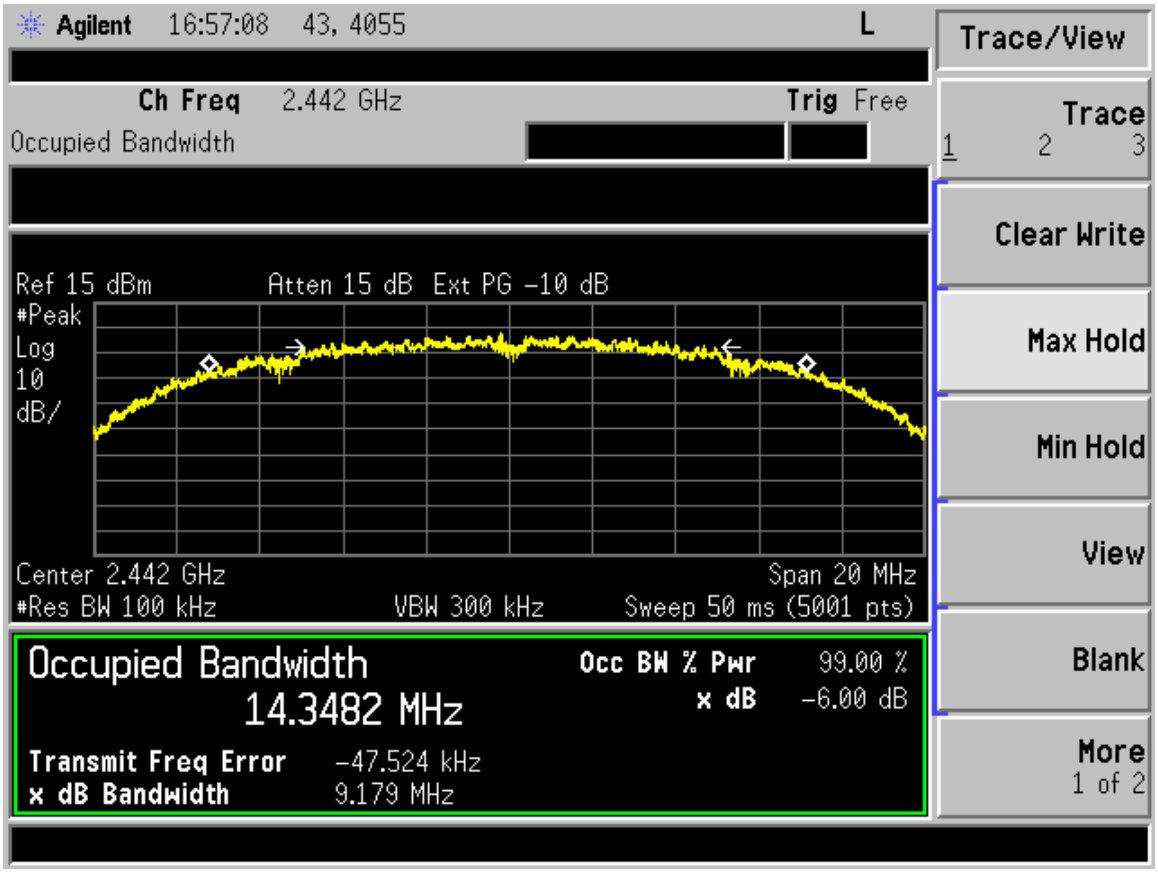


Figure 46. 6 dB Bandwidth b mode Mid Channel

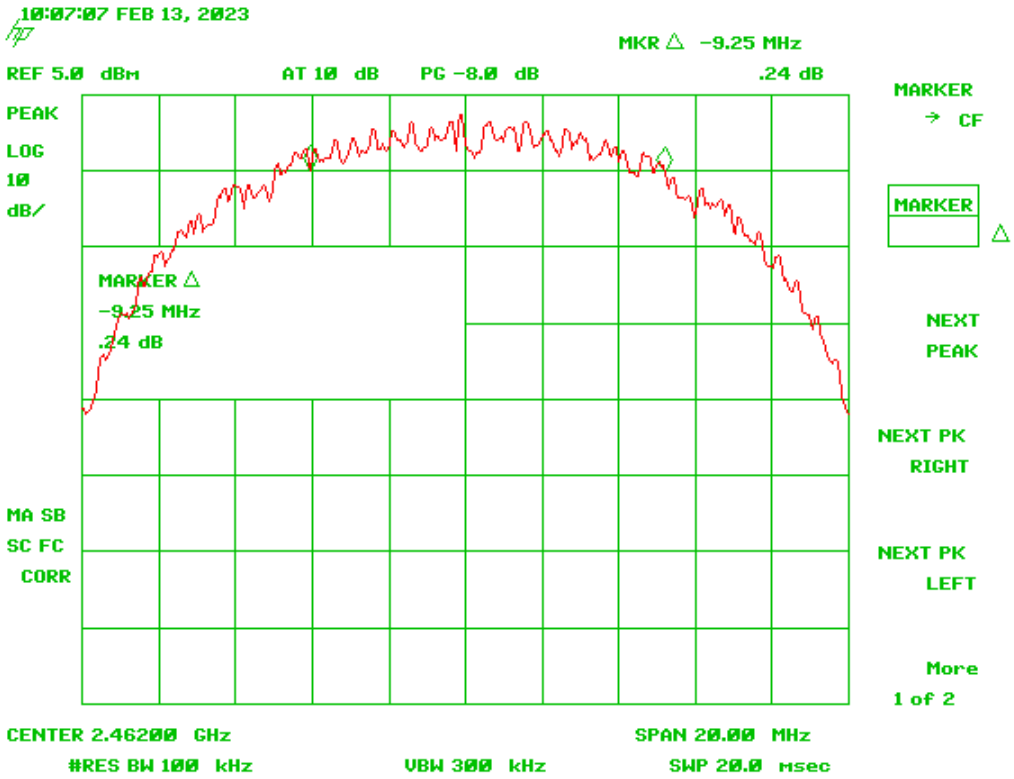


Figure 47. 6 dB Bandwidth b mode High Channel

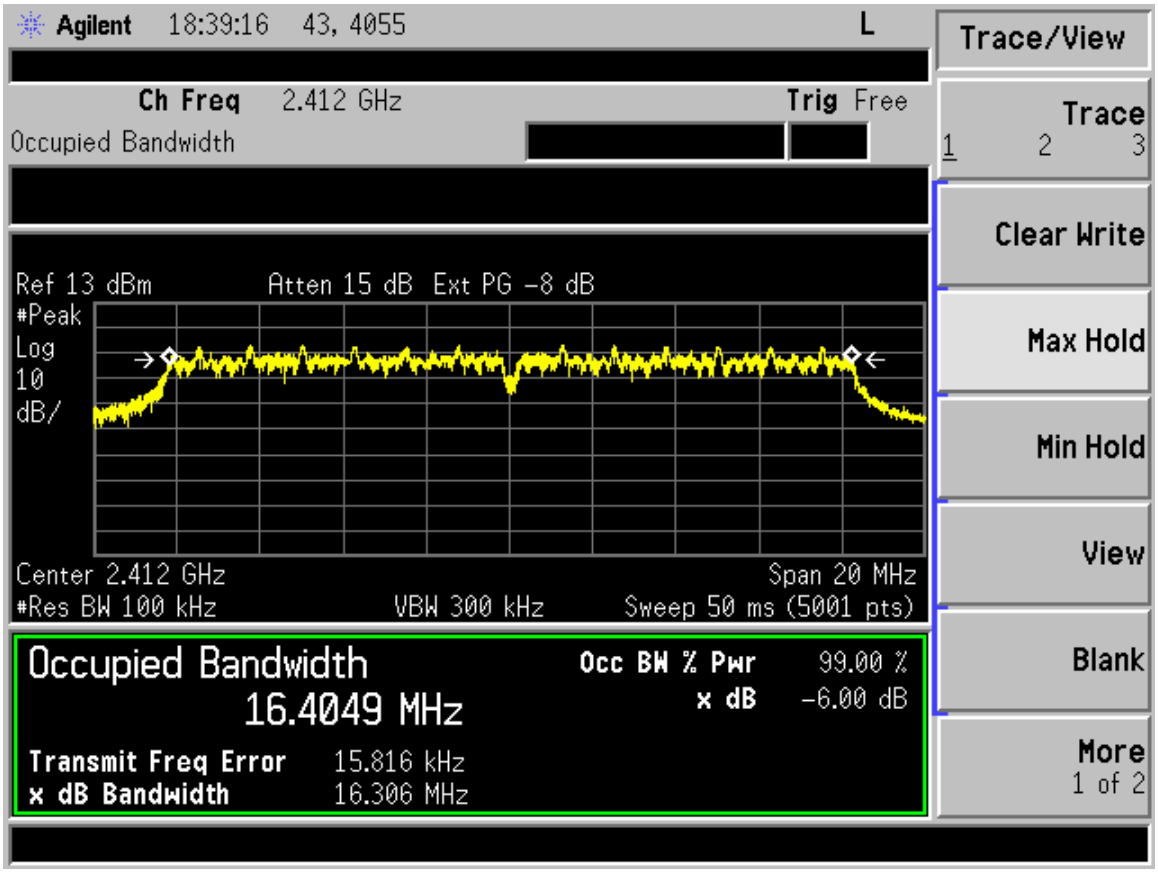


Figure 48. 6 dB Bandwidth g mode Low Channel

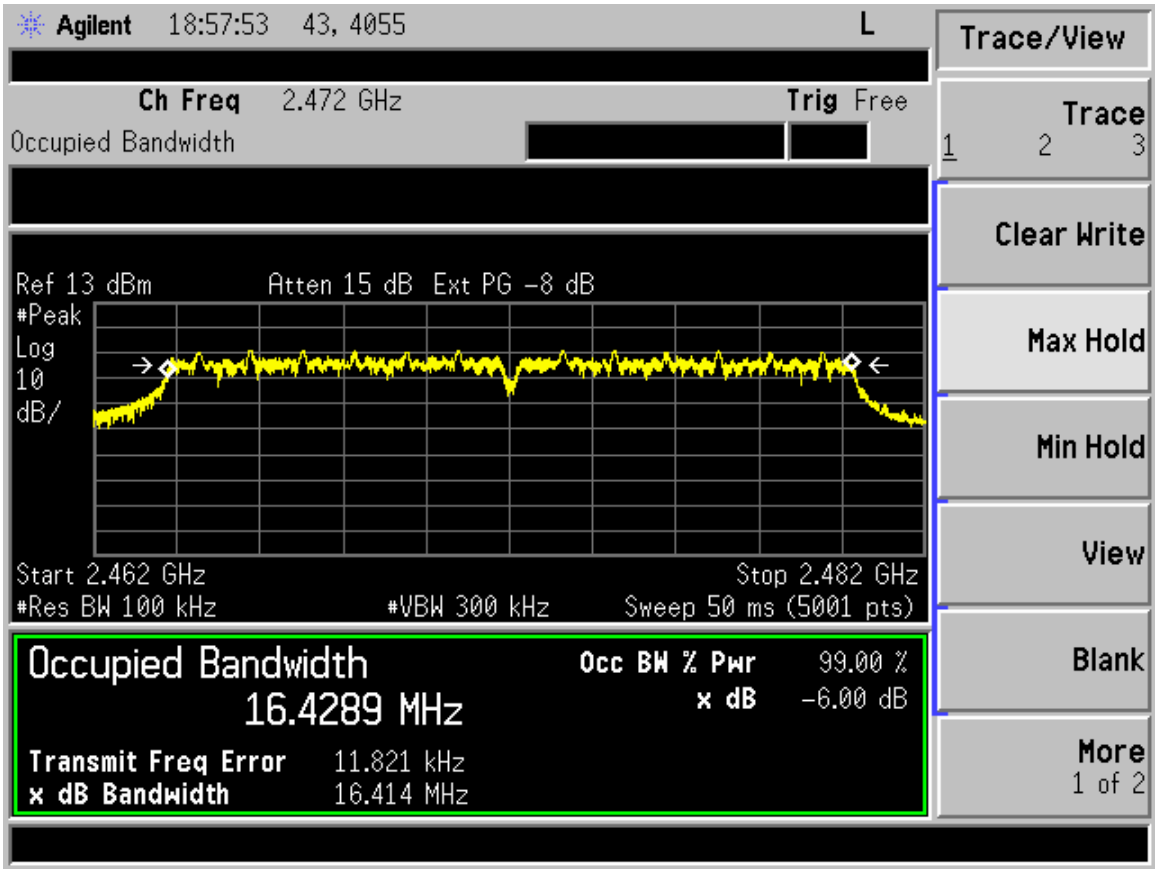


Figure 49.6 dB Bandwidth g mode Mid Channel

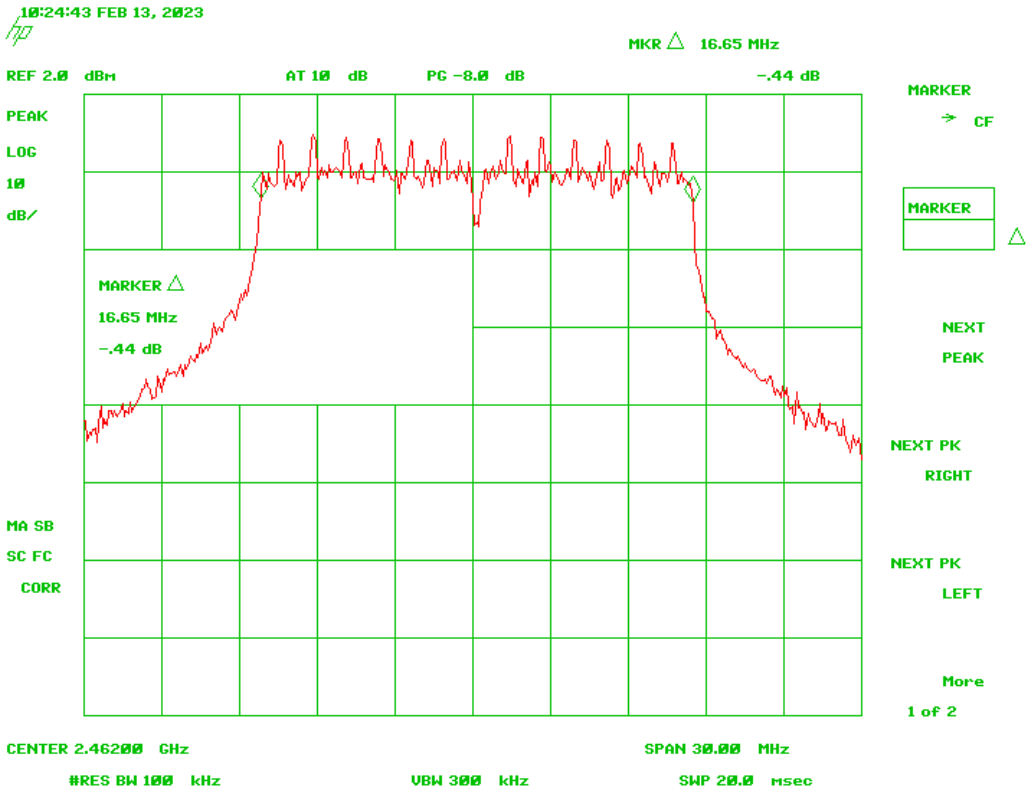


Figure 50. 6 dB Bandwidth g mode High Channel

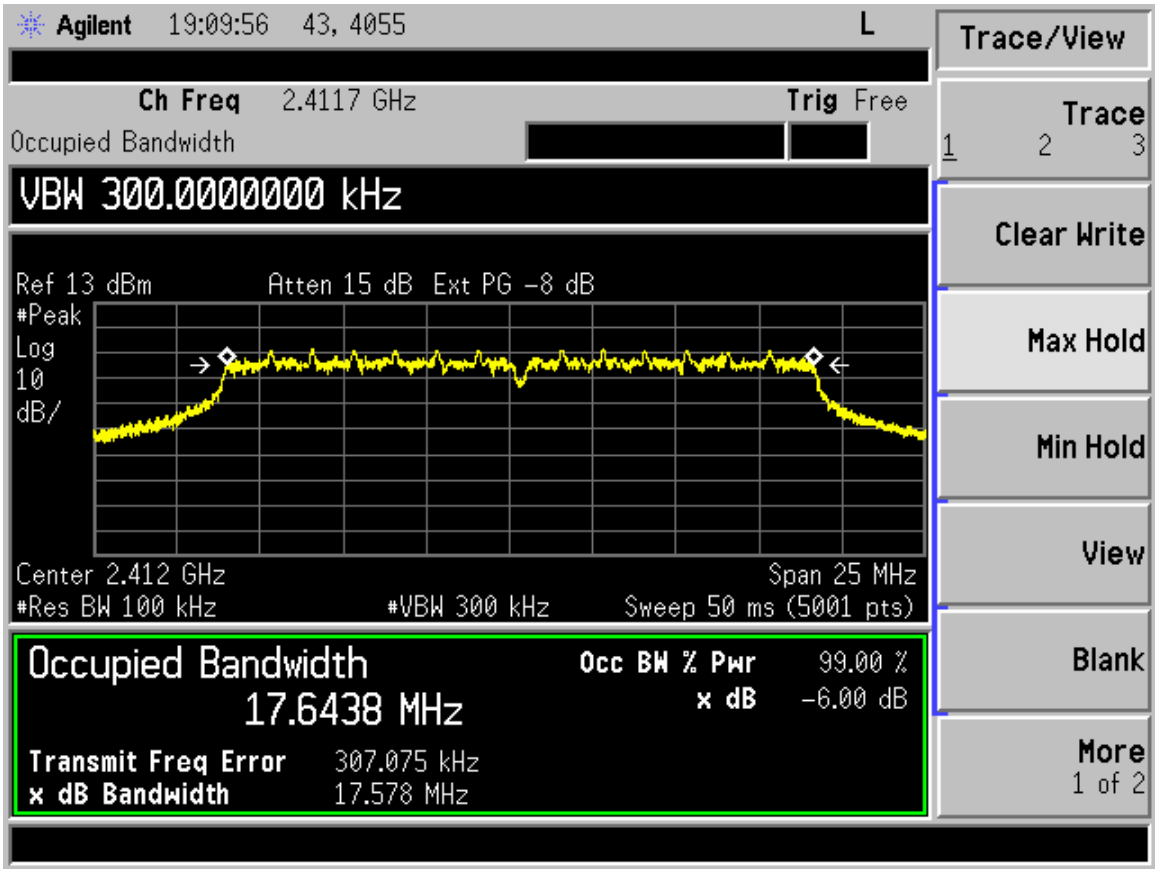


Figure 51. 6 dB Bandwidth n mode Low Channel

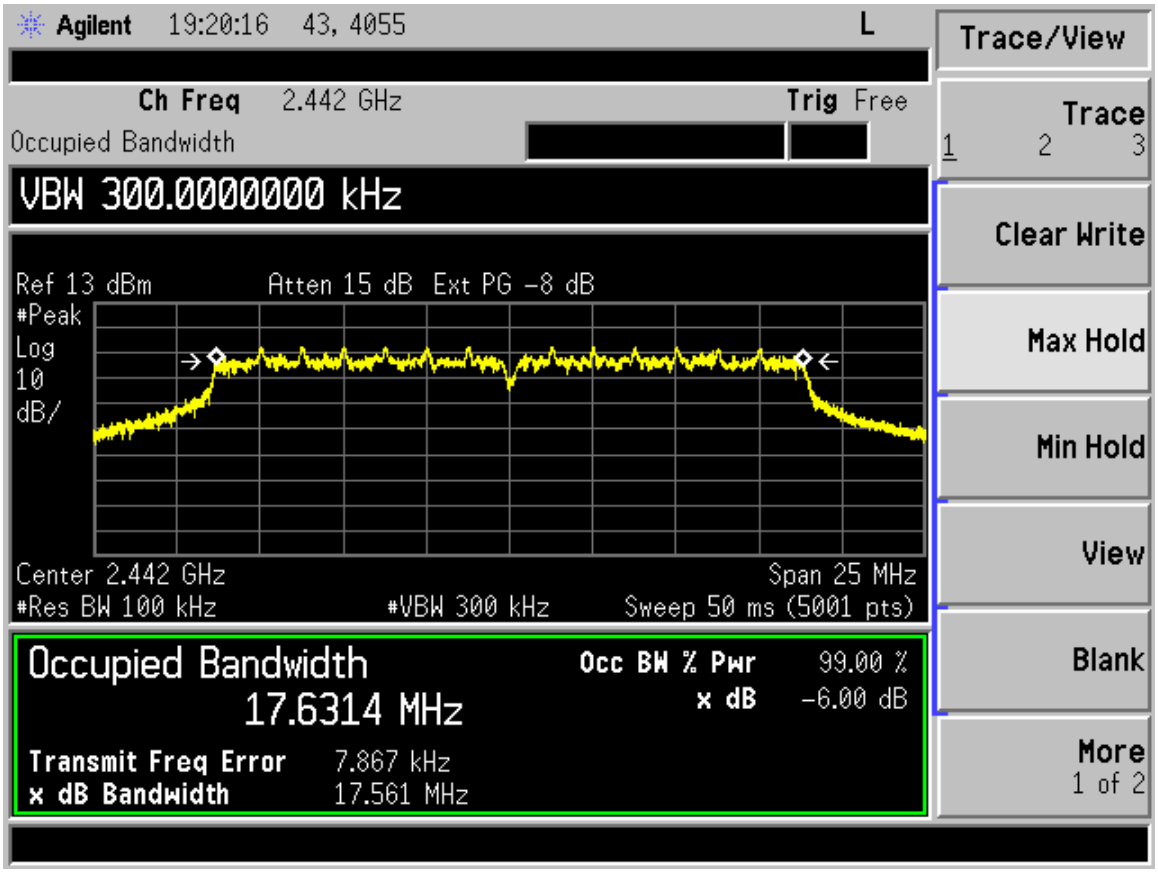


Figure 52. 6 dB Bandwidth n mode Mid Channel

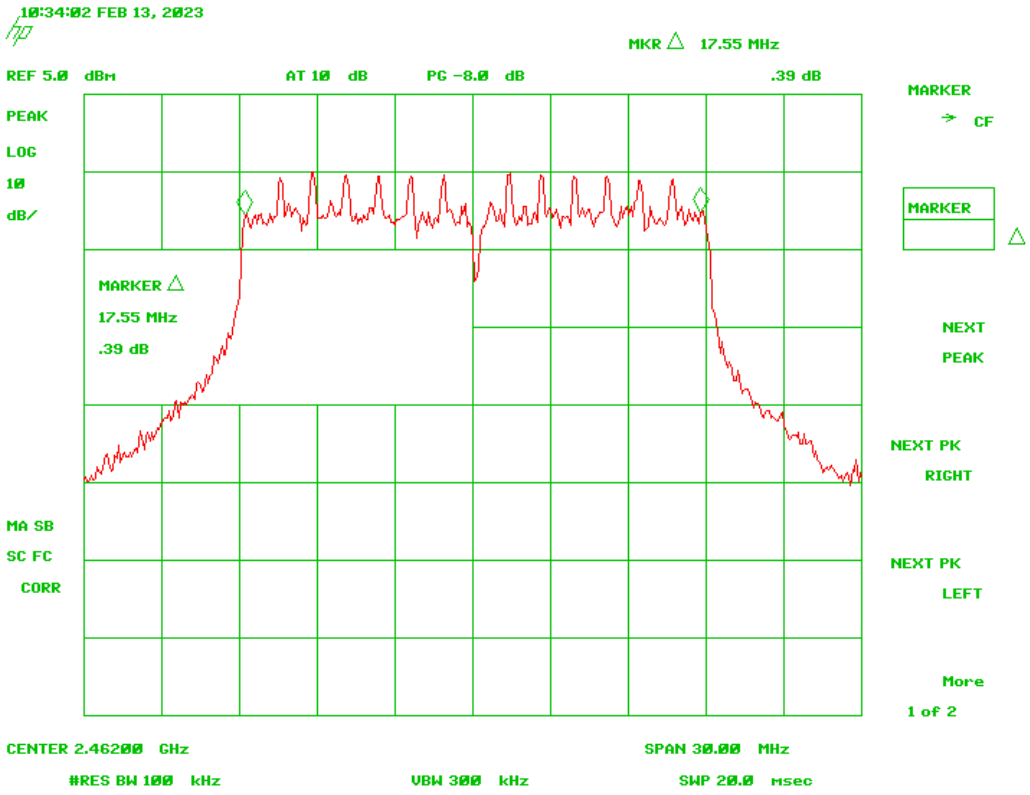


Figure 53. 6 dB Bandwidth n mode High Channel

2.13 Occupied Bandwidth, (99% bandwidth)(RSS-GEN (6.6))

The EUT antenna port was connected to a spectrum analyzer having a 50Ω input impedance. Measurements were performed similar to the method of FCC, KDB Publication No. 558074 v03r05 for a bandwidth of 20 dB. The RBW was set to approximately 1/100 of the manufacturers claimed RBW and with the VBW ≥ RBW. The results of this test are given in Table 17 and presented in the figures in section 2.12 above.

Figure 54. Bench Test Setup

Table 12. 99% Occupied Bandwidth

Frequency (MHz)	99% Occupied Bandwidth (MHz)	Mode
2412	14.34	b
2442	14.34	b
2462	14.50	b
2412	16.40	g
2442	16.42	g
2462	16.50	g
2412	17.64	n
2442	17.63	n
2462	17.55	n

Test Date: February 10-13, 2023

Tested By
Signature: Name: Gabriel Medina

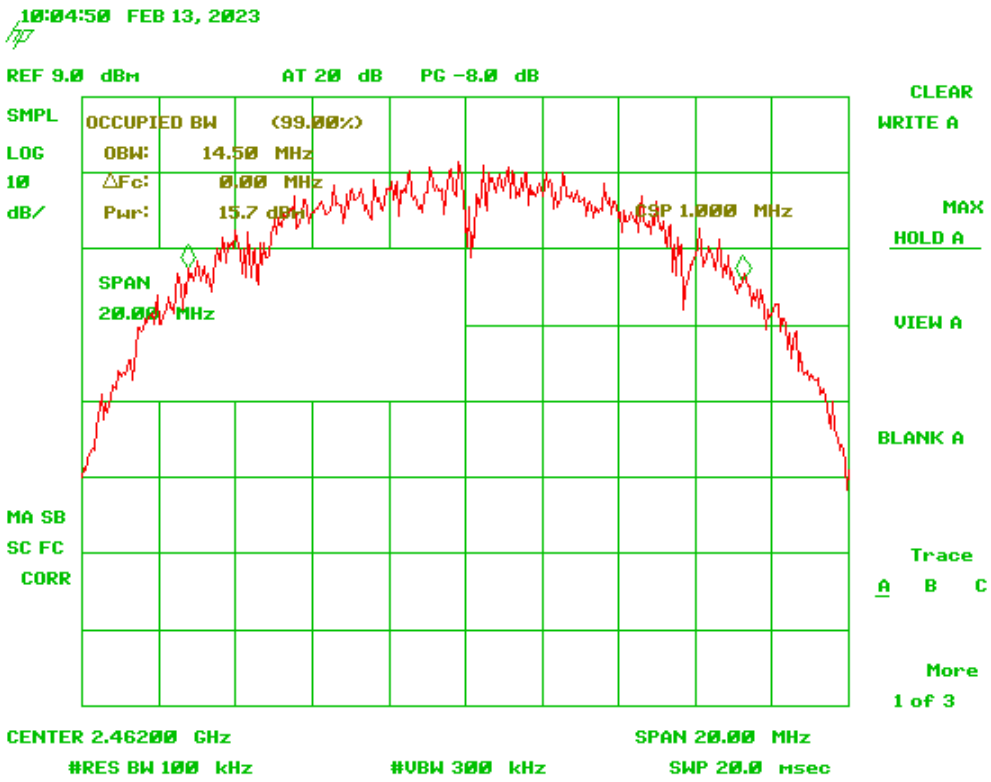


Figure 55. 99% Occupied Bandwidth b mode High Channel

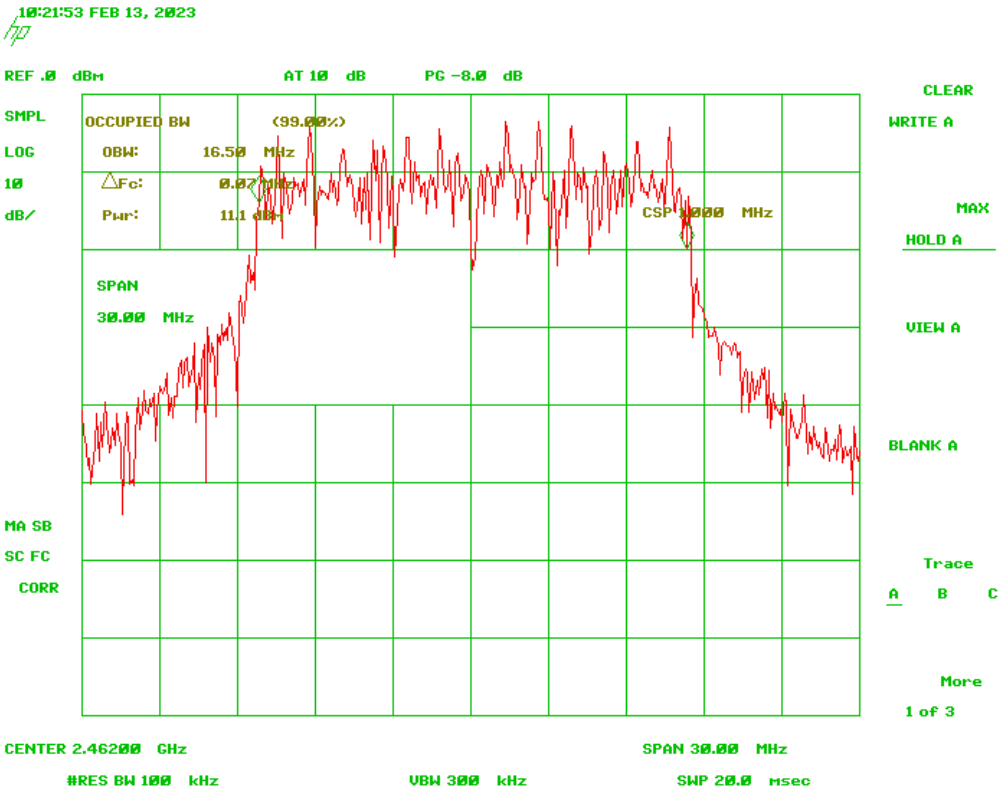


Figure 56. 99% Occupied Bandwidth g mode High Channel

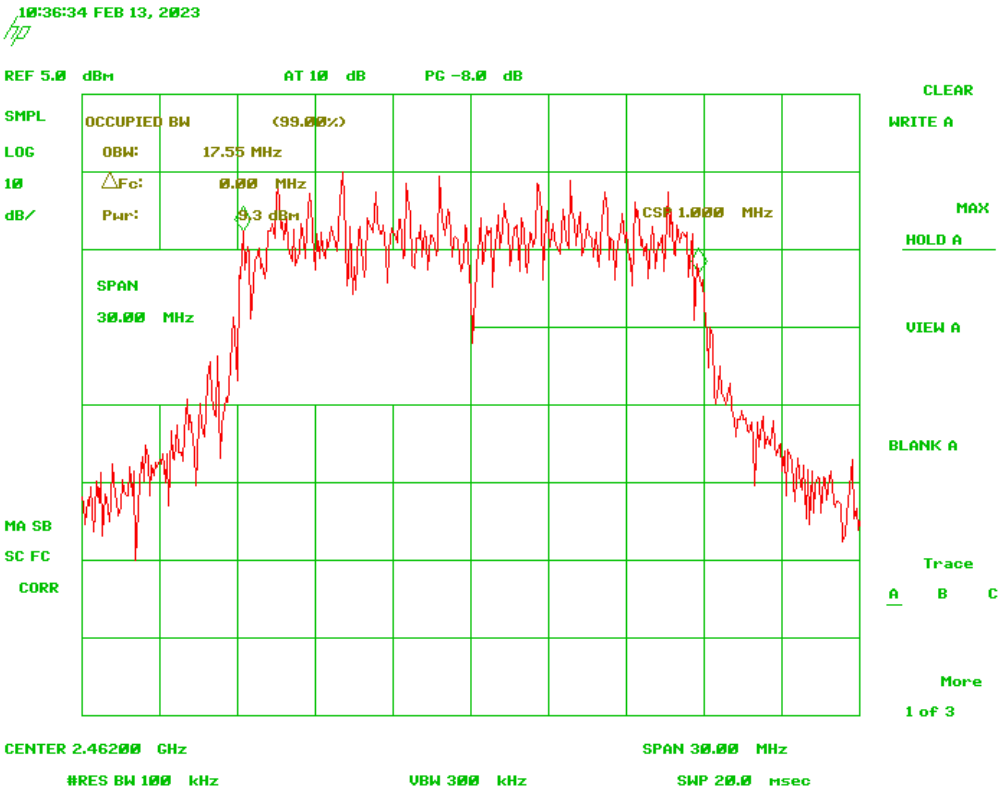


Figure 57. 99% Occupied Bandwidth n mode High Channel

2.14 Maximum Peak Conducted Output Power (CFR 15.247 (b) (3))

The transmitter was programmed to operate at a maximum output power across the bandwidth. For this test the output power of the radio was set to the maximum data rate, with 11Mbps for mode b, 54 Mbps for made g, and MSC-7 for mode n, in order to meet all test requirements.

Peak power within the band 2400 MHz to 2483.5 MHz was measured per ANSI C63.10-2013 as an Antenna Conducted test with a spectrum analyzer by connecting the spectrum analyzer directly, via a short RF cable, and attenuators to the antenna output terminals on the EUT. The spectrum analyzer was set to a RBW of1 MHz, and the VBW ≥ RBW. The integration method was used. Peak antenna conducted output power is tabulated in the table below.

Figure 58. Bench Test Setup

Table 13. Peak Antenna Conducted Output Power per Part 15.247 (b)(3)

Frequency of Fundamental (MHz)	Raw Test Data dBm	Converted Data (mW)	FCC Limit (mW Maximum)	Mode
2412	9.23	8.38	1000	b
2442	10.08	10.19	1000	b
2462	8.05	6.38	1000	b
2412	5.03	3.18	1000	g
2442	7.21	5.26	1000	g
2462	4.36	2.73	1000	g
2412	2.60	1.82	1000	n
2442	3.83	2.42	1000	n
2462	2.20	1.66	1000	n

Test Date: February 10-13, 2023

Tested By
Signature:  Name: Gabriel Medina

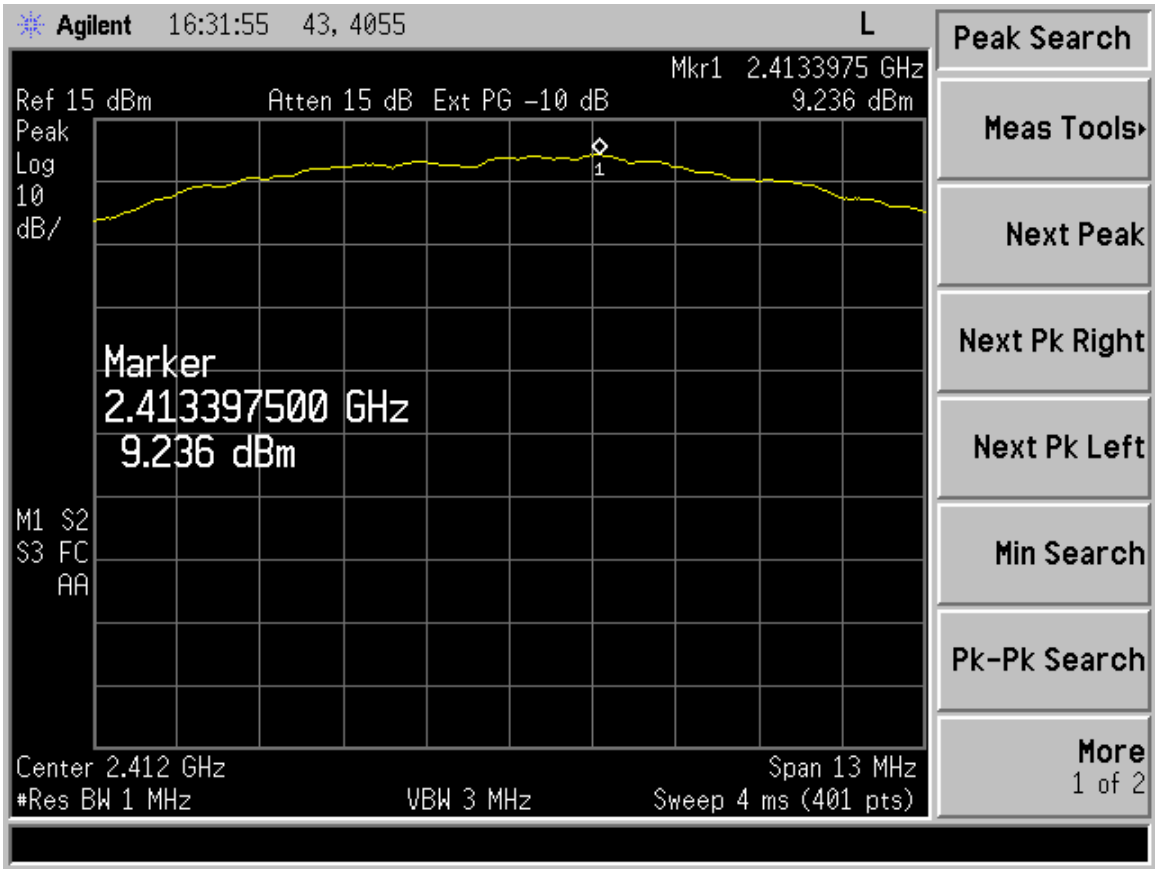


Figure 59. Peak Antenna Conducted Output Power, b mode Low Channel

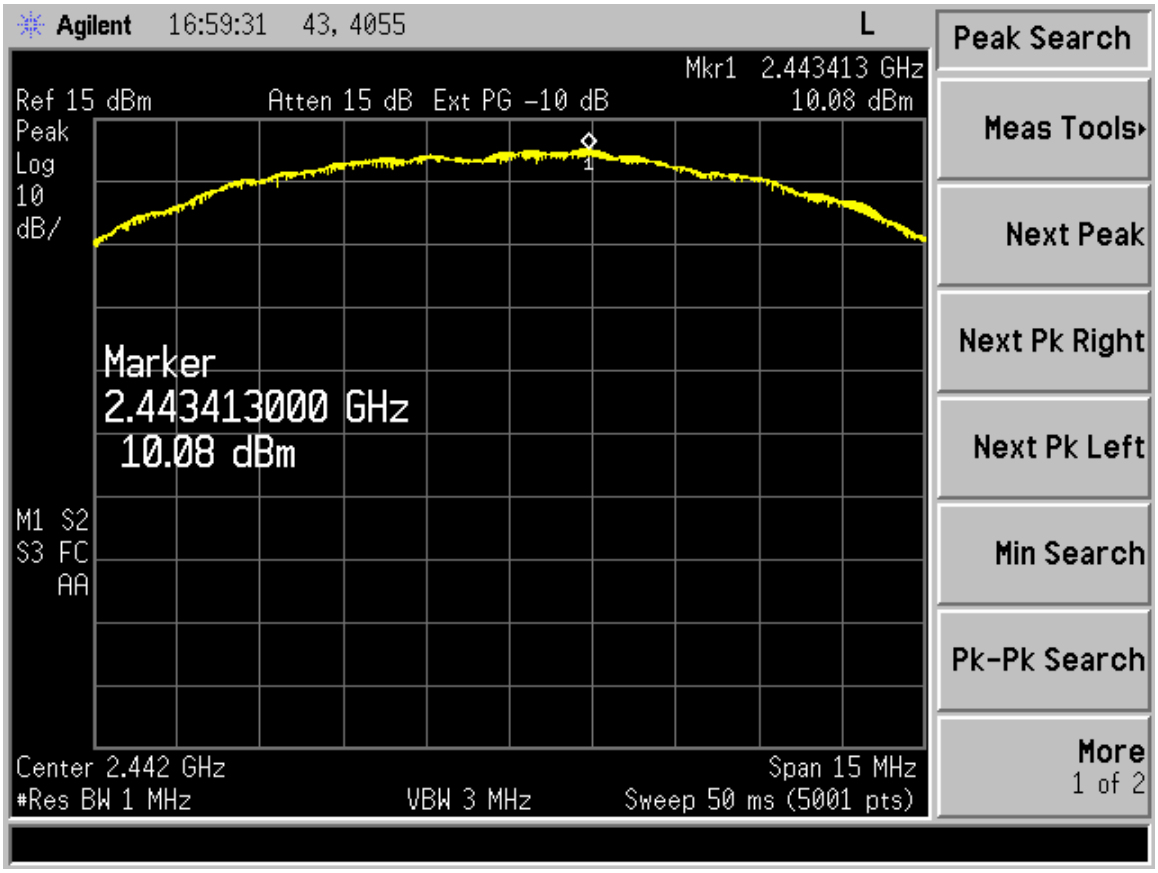


Figure 60. Peak Antenna Conducted Output Power, b mode Mid Channel

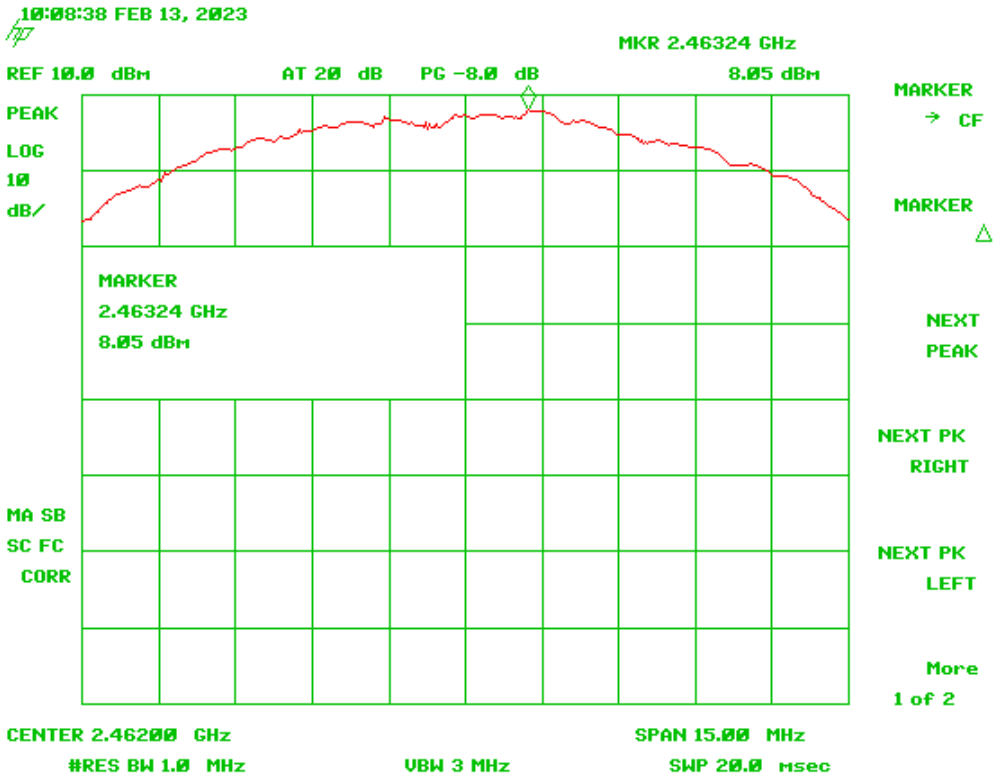


Figure 61. Peak Antenna Conducted Output Power, b mode High Channel

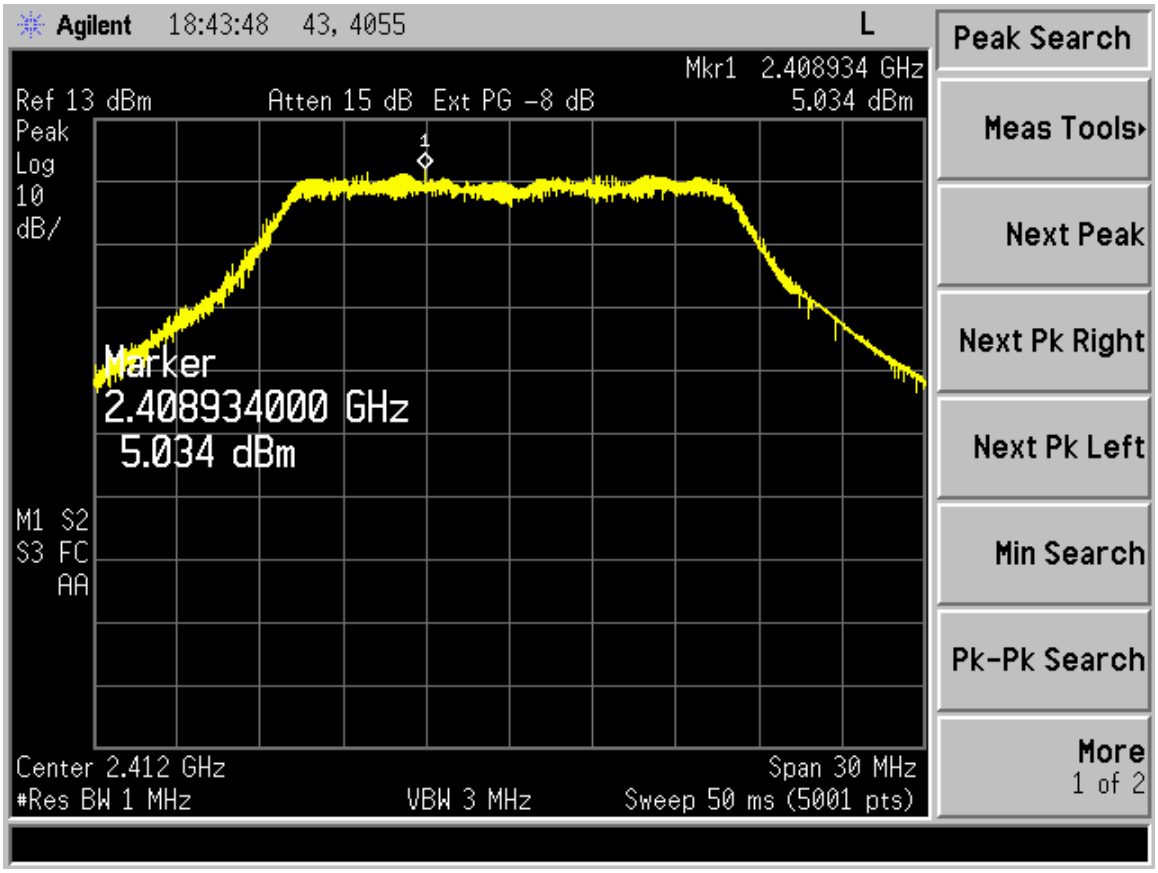


Figure 62. Peak Antenna Conducted Output Power, g mode Low Channel

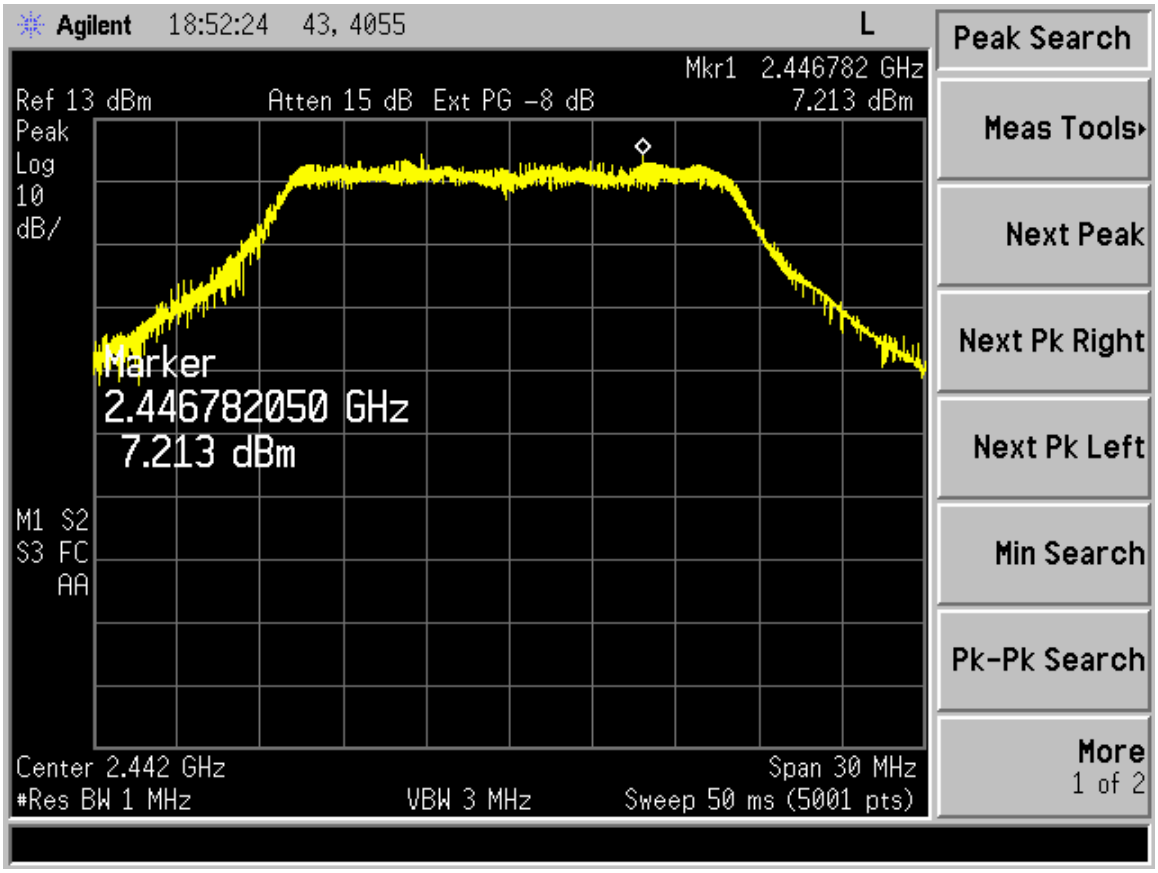


Figure 63. Peak Antenna Conducted Output Power, g mode Mid Channel

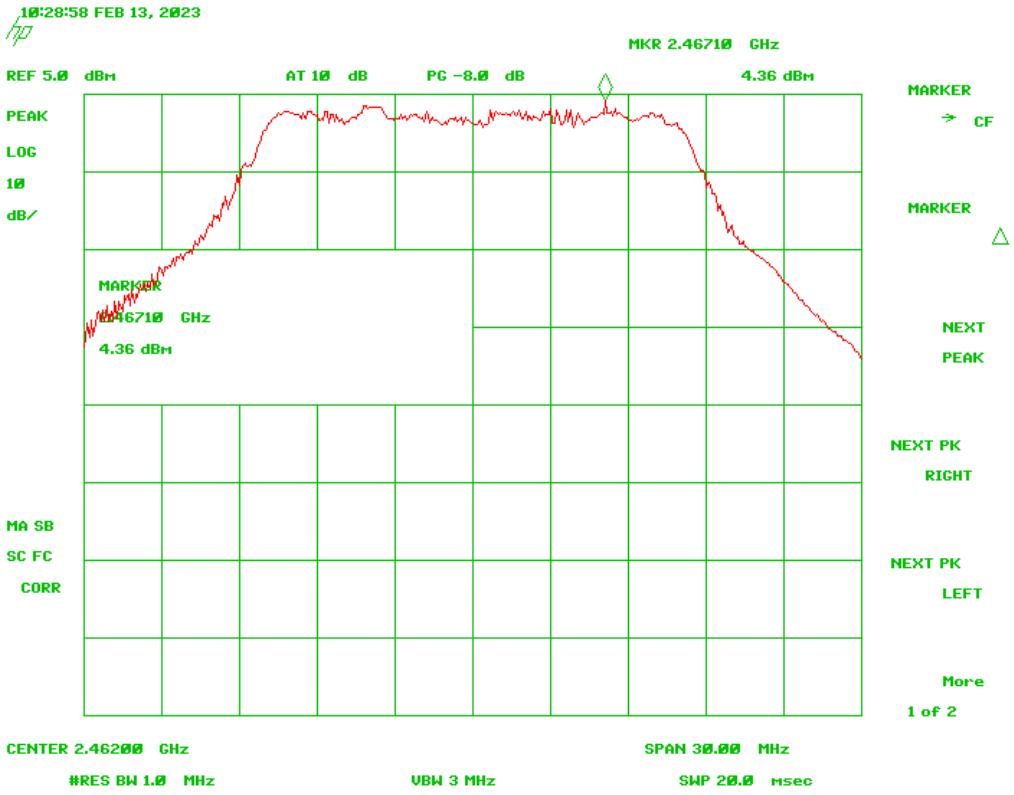


Figure 64. Peak Antenna Conducted Output Power, g mode High Channel

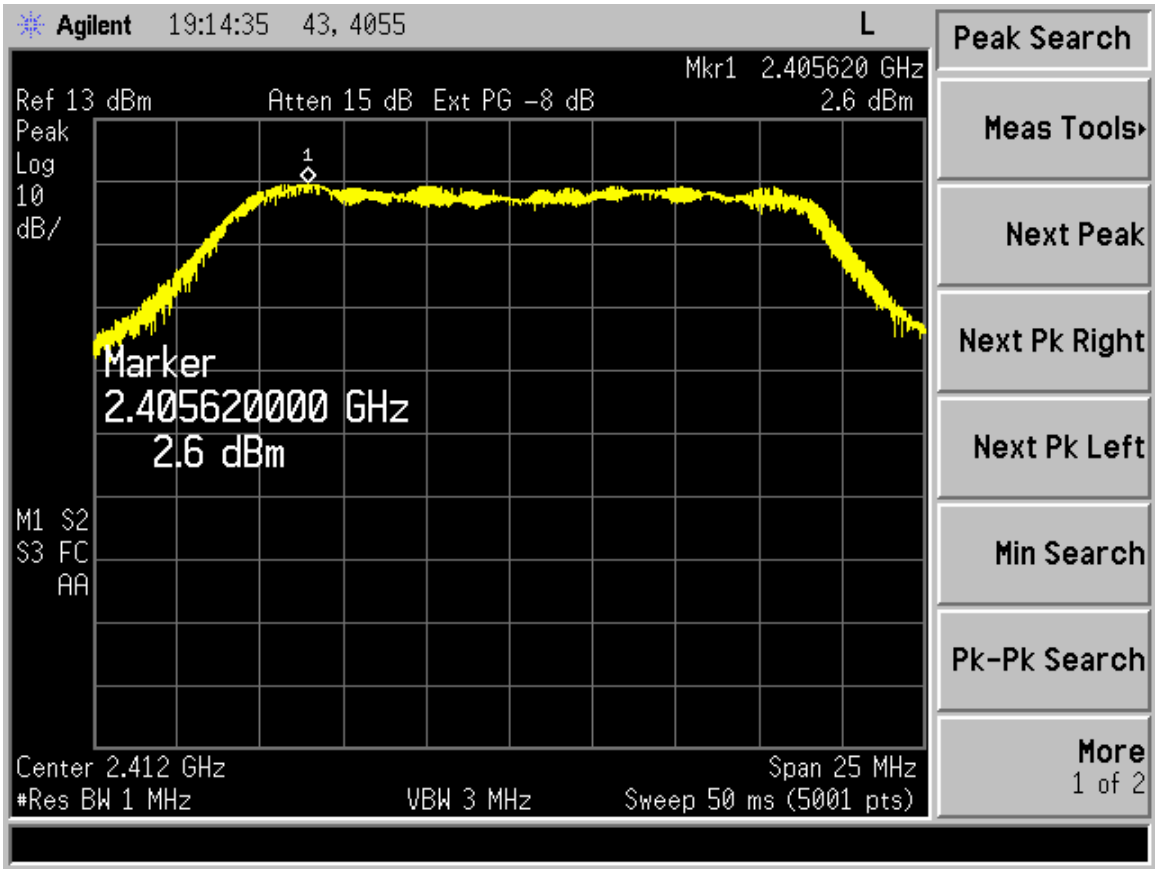


Figure 65. Peak Antenna Conducted Output Power, n mode Low Channel

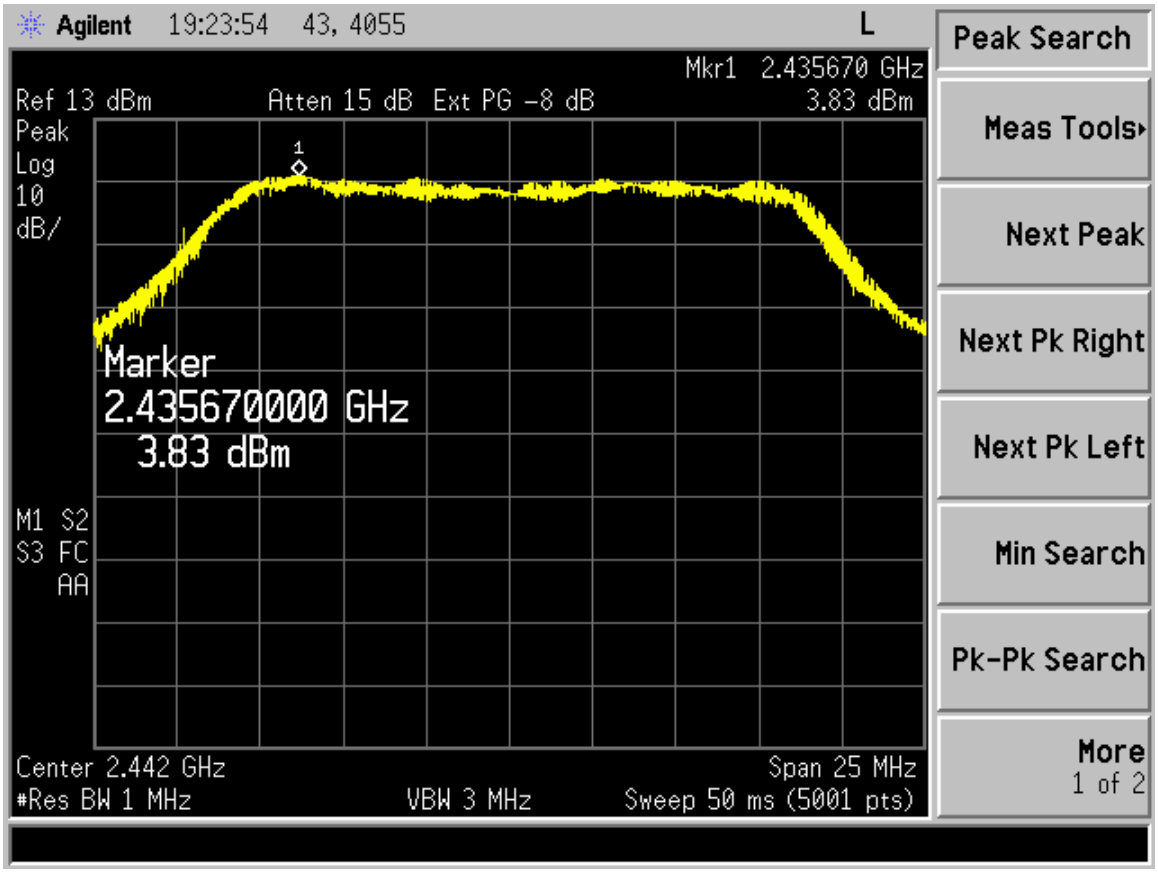


Figure 66. Peak Antenna Conducted Output Power, n mode Mid Channel

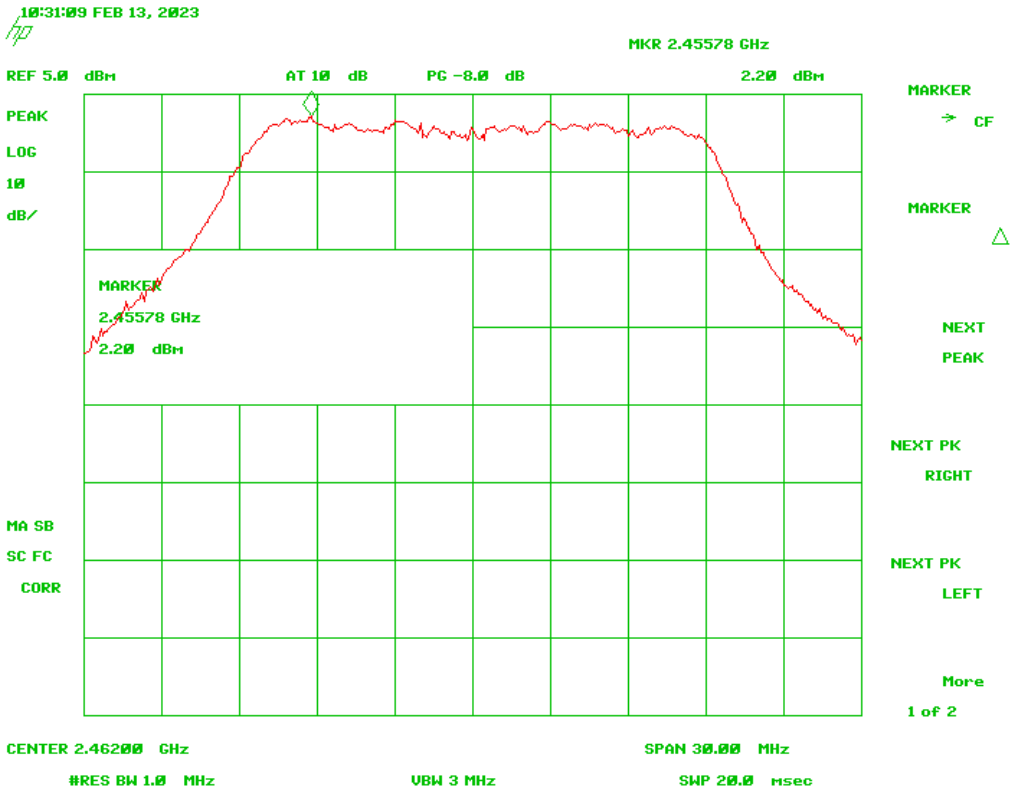


Figure 67. Peak Antenna Conducted Output Power, n mode High Channel

2.15 Power Spectral Density (CFR 15.247(e), RSS-247, 5.2(b))

The transmitter was placed into a continuous mode of operation at all applicable frequencies. The measurements were performed per the procedures of ANSI C63.10-2013. The RBW was set to 3 kHz and the Video Bandwidth was set to ≥ RBW. The trace capture time was set to (Span/3 kHz).

In accordance with 15.247 (e), the power spectral density shall be no greater than +8 dBm per any 3 kHz band.

Results are shown in the table below and figures below. All are less than +8 dBm per 3 kHz band. See figures below.

Figure 68. Bench Test Setup

Table 14. Power Spectral Density for Low, Mid and High Bands

Frequency (MHz)	Measured Result (dBm/3kHz)	FCC Limit (dBm/3 kHz)	Mode
2412	-12.27	+8.0	b
2442	-10.4	+8.0	b
2462	-12.14	+8.0	b
2412	-21.77	+8.0	g
2442	-20.91	+8.0	g
2462	-24.74	+8.0	g
2412	-22.94	+8.0	n
2442	-20.66	+8.0	n
2462	-23.14	+8.0	n

Note: dBm/Hz correct to dBm/kHz using the following formula, 10 log RBW ref/RBW measured.

Test Date: Feburary 10-13, 2023

Tested By
Signature:  Name: Gabriel Medina

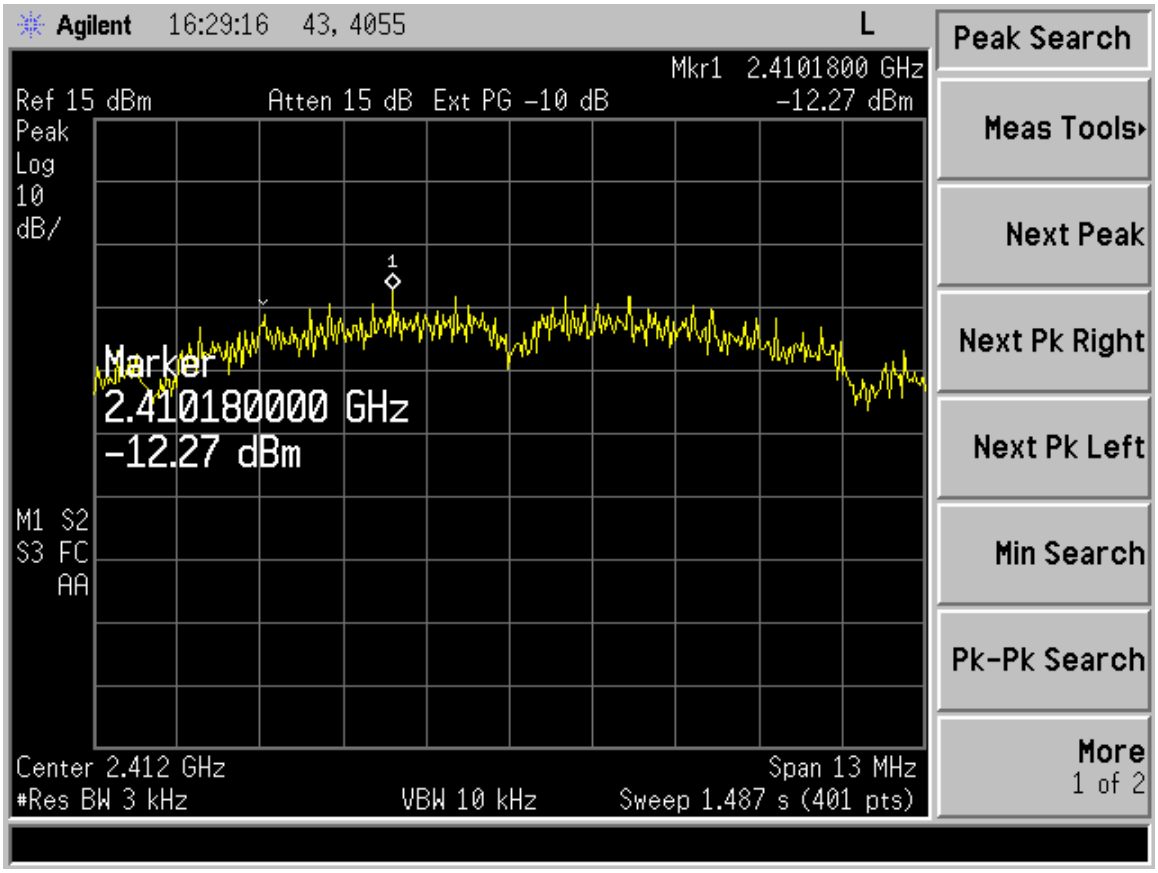


Figure 69. Power Spectral Density, b mode Low Channel

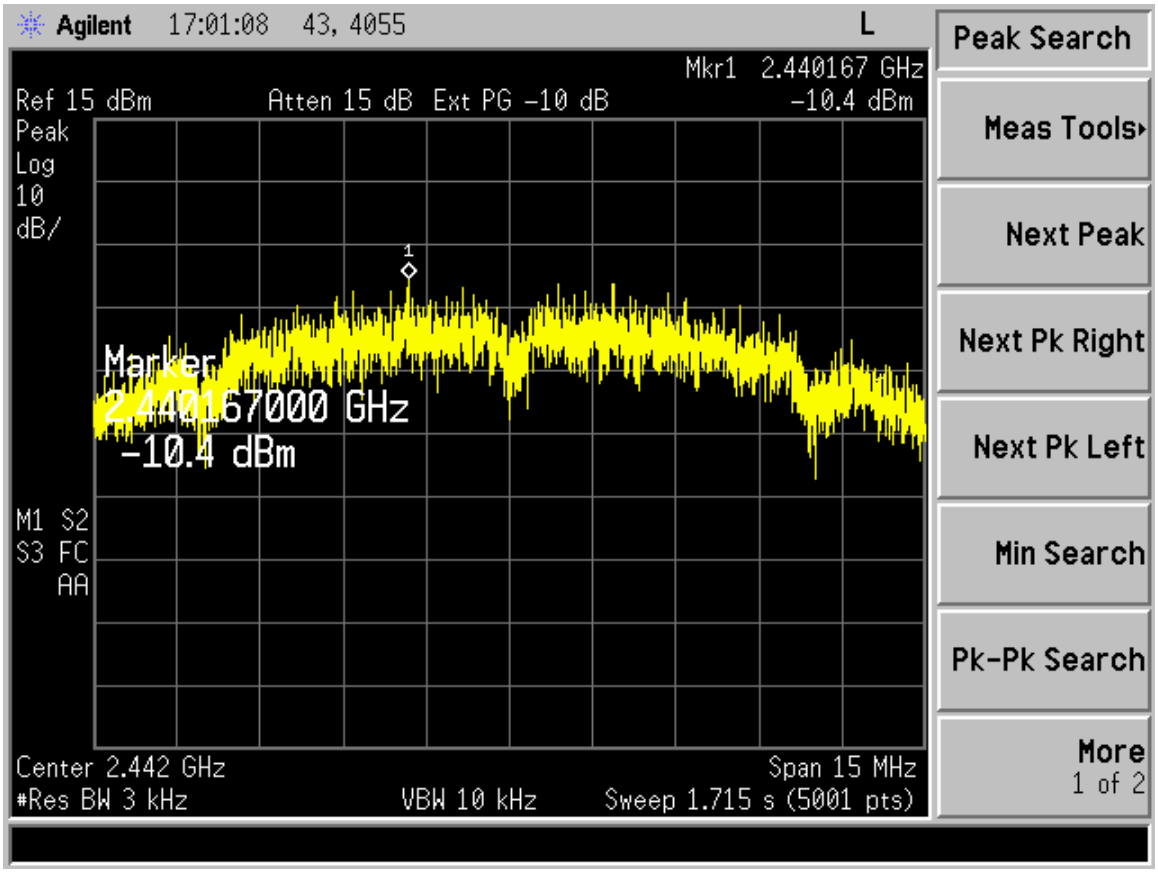


Figure 70. Power Spectral Density, b mode Mid Channel

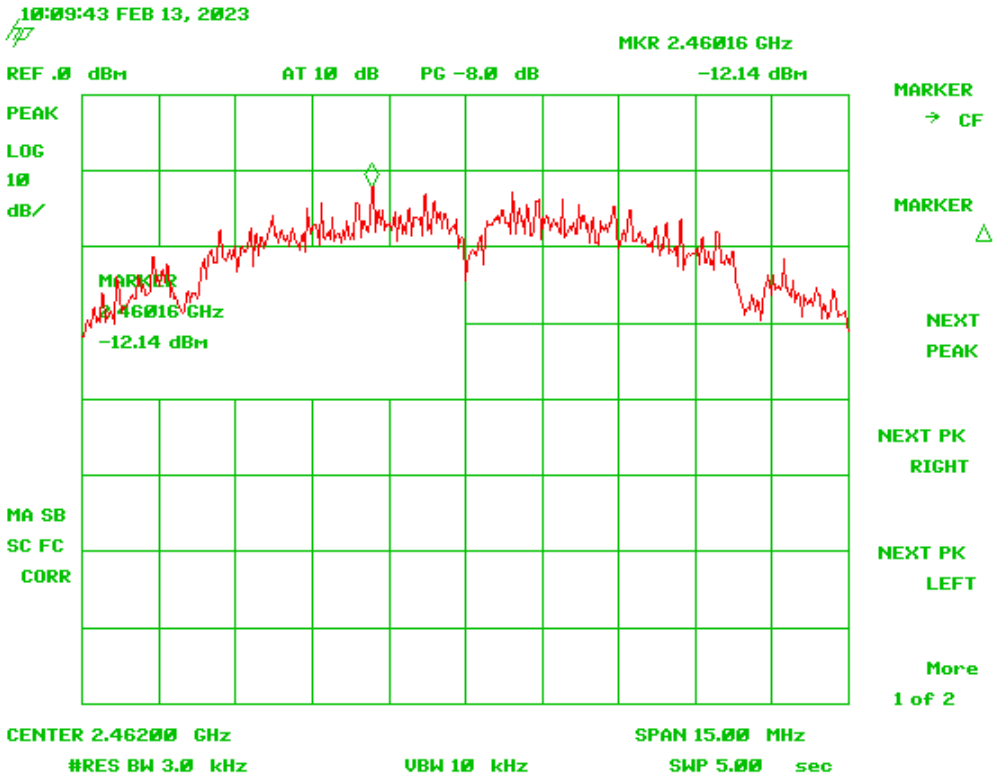


Figure 71. Power Spectral Density, b mode High Channel

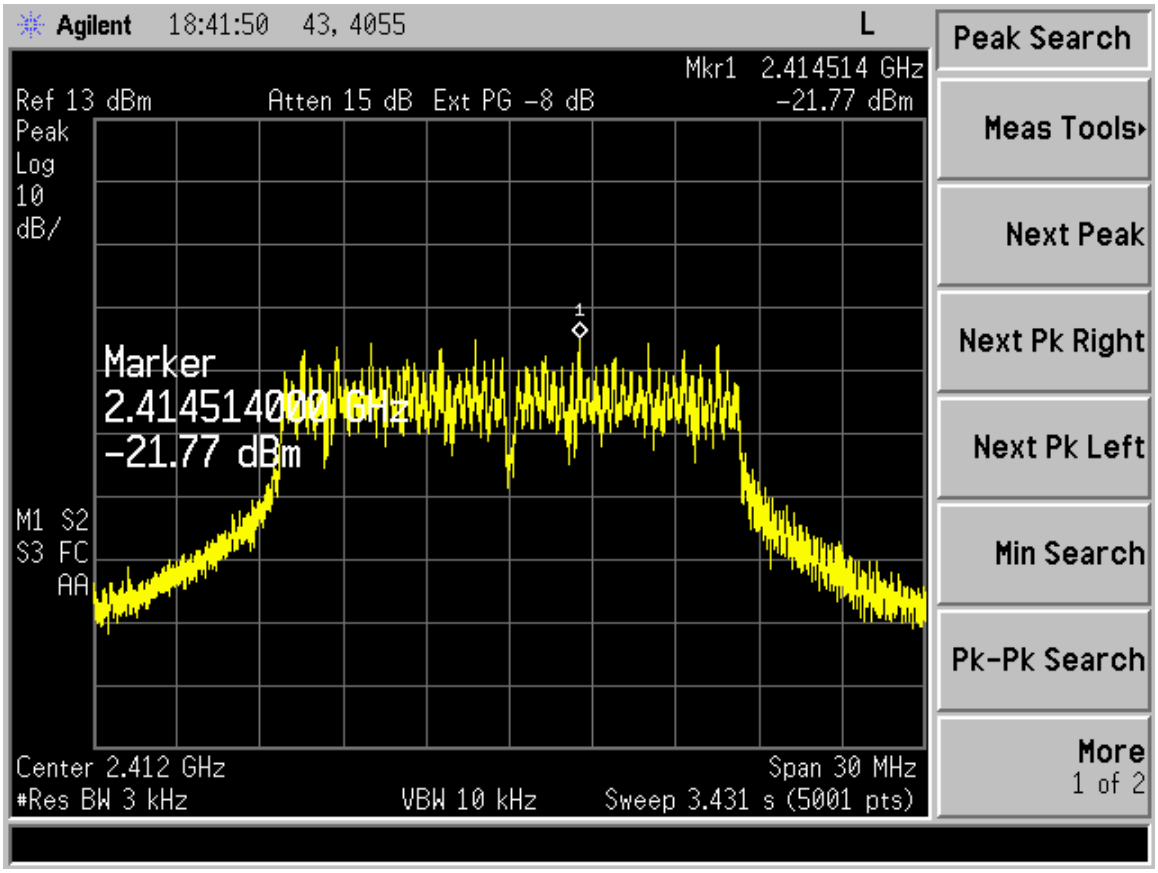


Figure 72. Power Spectral Density, g mode Low Channel

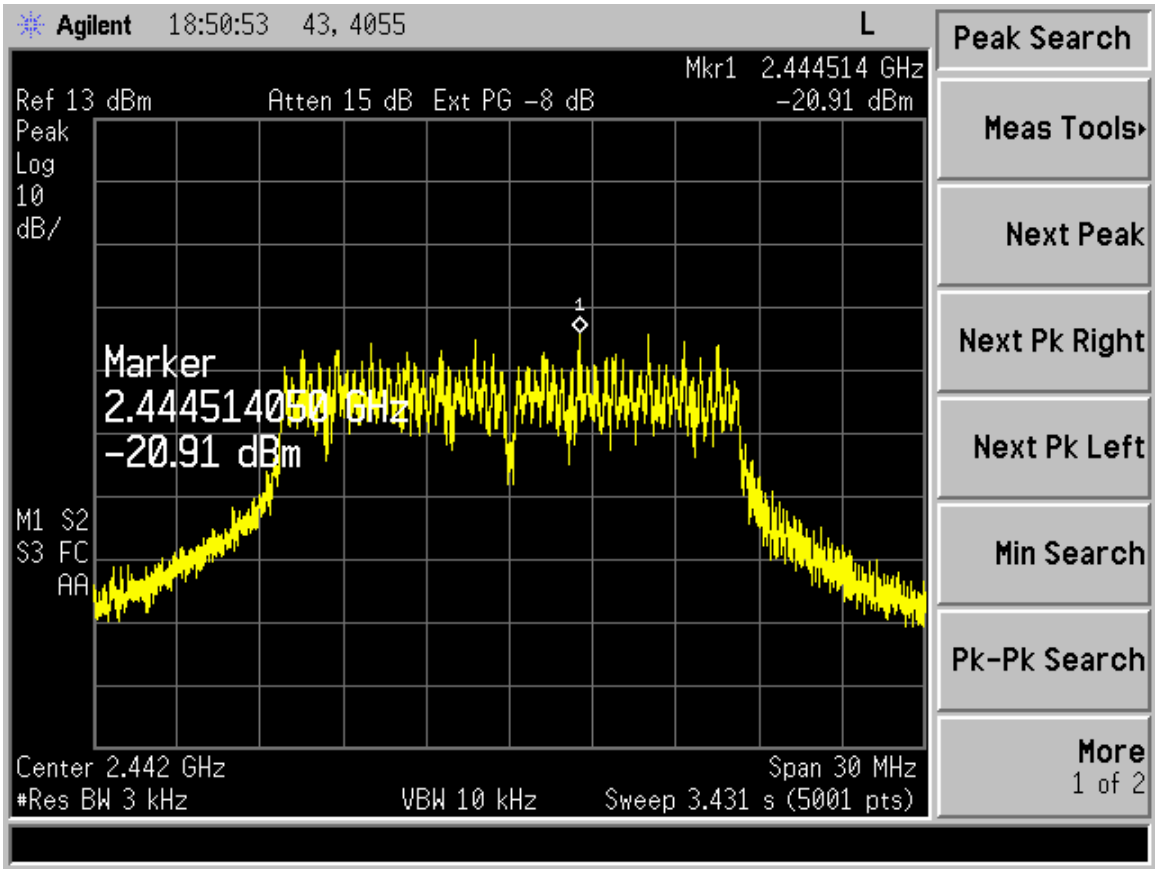


Figure 73. Power Spectral Density, g mode Mid Channel

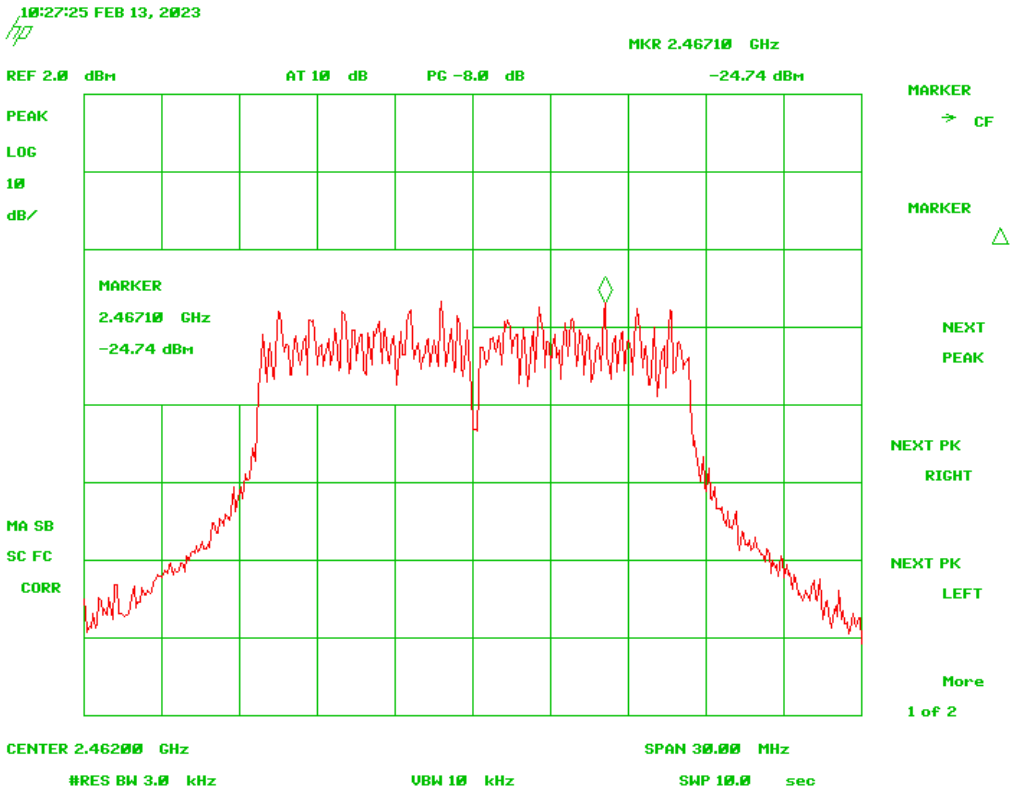


Figure 74. Power Spectral Density, g mode High Channel

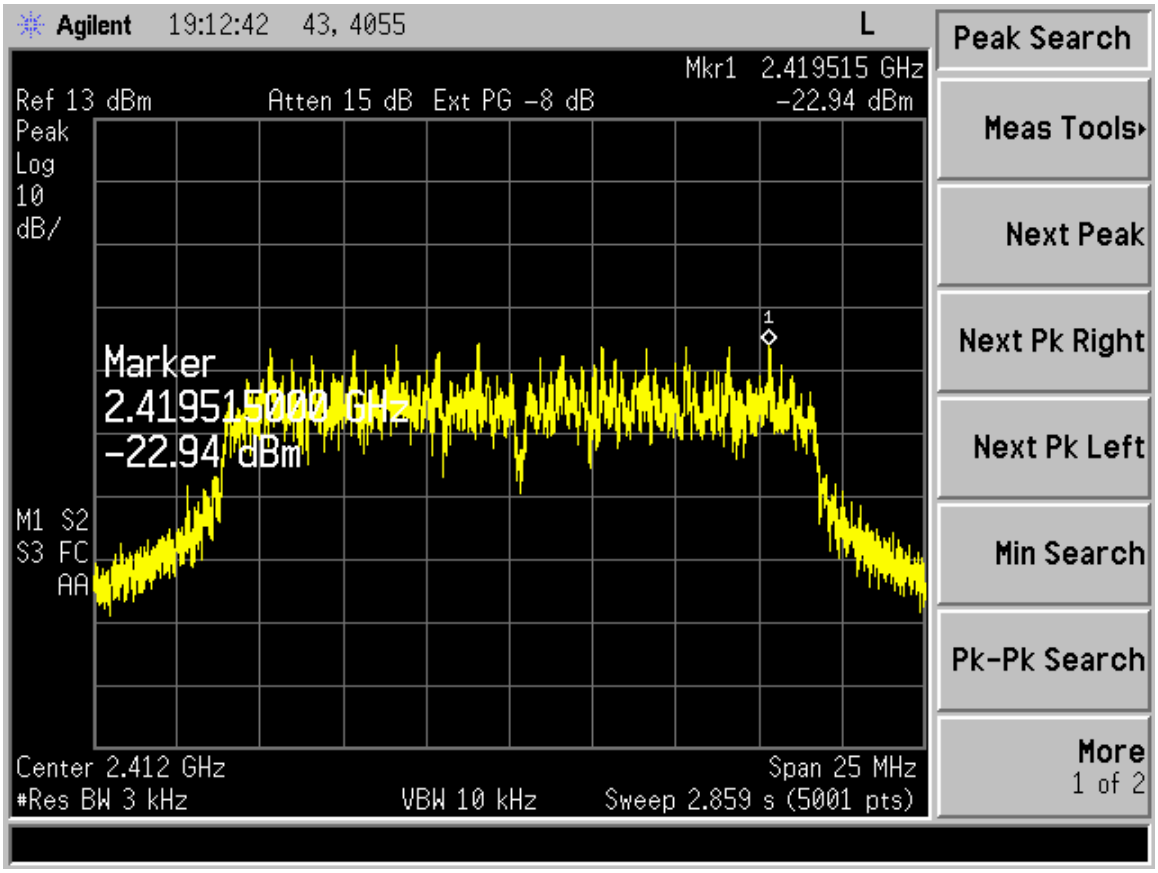


Figure 75. Power Spectral Density, n mode Low Channel

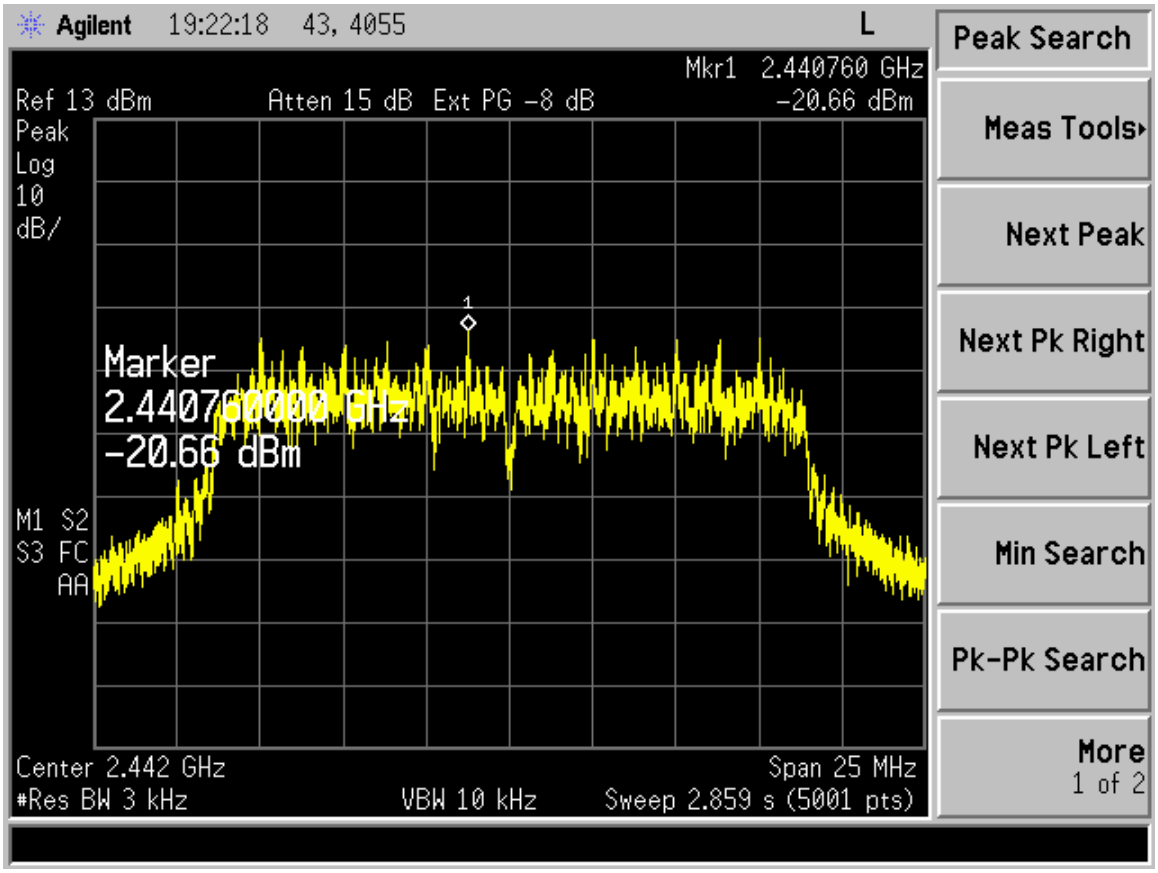


Figure 76. Power Spectral Density, n mode Mid Channel

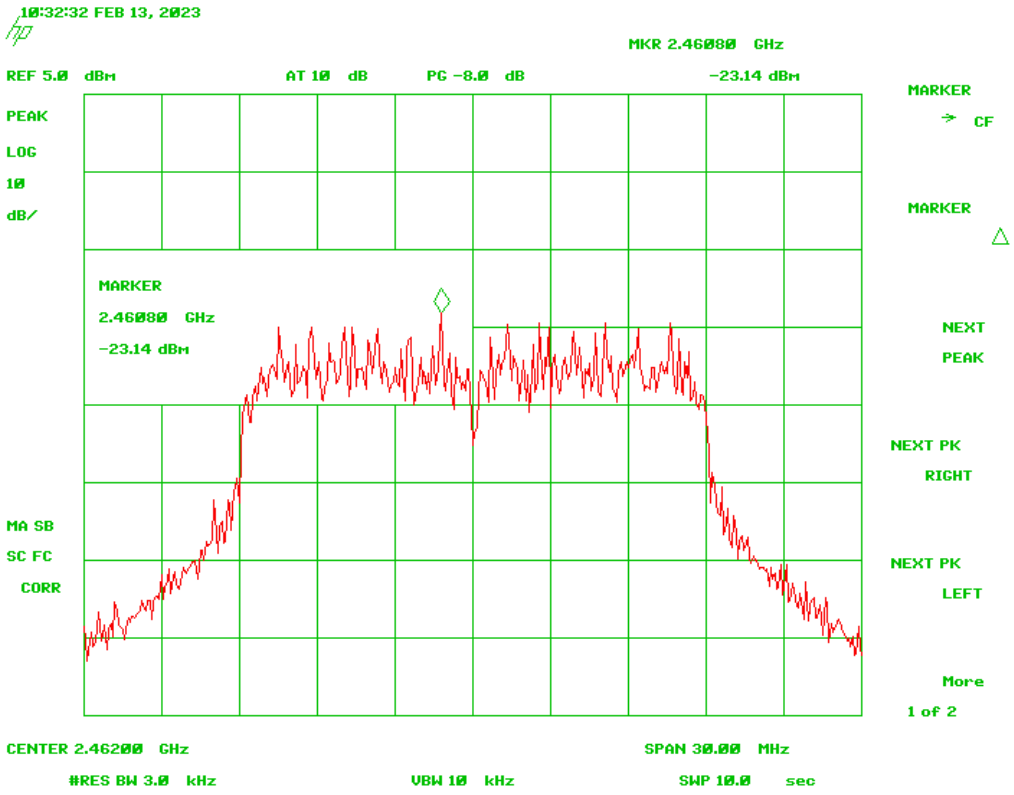


Figure 77. Power Spectral Density, n mode High Channel

2.16 Intentional Radiator Power Lines Conducted Emissions (CFR 15.207, RSS-Gen 8.8)

The power line conducted voltage emission measurements have been carried out in accordance with CFR 15.207, per ANSI C63.10:2013, Clause 6.2, with a spectrum analyzer connected to an LISN and the EUT placed into a continuous mode of transmission.

The worst-case results for conducted emissions were determined to be produced when the EUT was operating under continuous transmission. The worst-case measurement was 10.7 dB from the applicable limit. All other emissions were at least 12.2 dB from the limit. Those results are given in the table following.

Table 15. Power Line Conducted Emissions

Conducted Emissions 150 kHz to 30 MHz						
Frequency (MHz)	**Test Data (dBuV)**	**LISN+CL (dB)**	**Corrected Results (dBuV)**	**AVG Limits (dBuV)**	**Margin (dB)**	**Detector**
Phase @ 120 Vac / 60Hz						
0.2490	36.45	0.08	36.53	51.8	15.3	**PK**
0.8125	30.15	0.58	30.73	46.0	15.3	**PK**
1.1733	29.41	0.87	30.28	46.0	15.7	**PK**
5.8410	27.97	0.31	28.28	50.0	21.7	**PK**
11.3330	26.33	0.62	26.95	50.0	23.1	**PK**
20.0166	25.32	1.09	26.41	50.0	23.6	**PK**
Neutral @ 120 Vac / 60Hz						
0.1605	44.64	0.13	44.77	55.4	10.7	**PK**
0.2220	40.41	0.13	40.54	52.7	12.2	**PK**
0.9000	31.71	0.09	31.80	46.0	14.2	**PK**
1.6066	29.28	0.61	29.89	46.0	16.1	**PK**
6.1750	28.80	0.50	29.30	50.0	20.7	**PK**
13.4500	26.68	1.19	27.87	50.0	22.1	**PK**
24.9500	25.73	1.74	27.47	50.0	22.5	**PK**

Sample Calculation At: 0.2490 MHz

Magnitude of Measured Frequency	36.45	dBuV
Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	0.08	dB
Corrected Result	36.53	dBuV/m

Test Date: February 13, 2023
Tested By
Signature:  Name: Gabriel Medina

2.17 Intentional Radiator, Radiated Emissions (CFR 15.209, RSS-Gen, 8.9)

The test data provided herein is to support the verification requirement for radiated emissions coming for the EUT in a transmitting state per 15.209 and were investigated from 9kHz or the lowest operating clock frequency to 25 GHz and tested as detailed in ANSI C63.10:2013, Clause 6.4-6.6.

Radiated emissions within the band of 9 kHz to 30 MHz were investigated using a calibrated Loop Antenna and per the requirements of ANSI C63.10:2013.

Measurements were made with the analyzer's resolution bandwidth set to 120 kHz for measurements made below 1 GHz and 1 MHz for measurements made above 1 GHz. The video bandwidth was set to three times the resolution bandwidth; 1 MHz RBW and 3 MHz VBW. The test data were maximized for magnitude by rotating the turn-table through 360 degrees and raising and lowering the receiving antenna between 1 to 4 meters in height as a part of the measurement procedure.

The worst-case radiated emission was greater than 20.0 dB below the specification limit. The results are shown in the table following. These results are meant to show that this EUT has met the intentional transmitter requirements of CFR Part 15.209.

Table 16. Spurious Radiated Emissions (150 kHz-30MHz)

Test: FCC Part 15.209							
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**DETECTOR PK / QP/AVG**
All emissions were more than 20 dB below the applicable limit.							

AF = antenna factor.
CL = cable loss.
PA = preamplifier gain.

Sample Calculation: N/A

Test Date: February 6-10, 2013
Tested By
Signature:  Name: Gabriel Medina

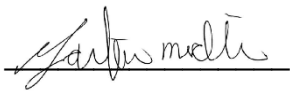
Table 17. Spurious Radiated Emissions – Receive B Mode (30 MHz – 1 GHz)

Test: FCC Part 15.109/15.209								
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factors**	**AF+CL-PA (dB)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**DETECTOR PK / QP/AVG**
72.30	47.81	-17.46	30.35	40.0	3m./HORZ	9.7	**PK**	72.30
120.00	46.23	-15.34	30.89	43.5	3m./HORZ	12.6	**PK**	120.00
288.50	46.12	-11.55	34.57	46.0	3m./HORZ	11.4	**PK**	288.50
798.50	37.88	-3.42	34.46	46.0	3m./HORZ	11.5	**PK**	798.50
937.00	37.10	-2.84	34.26	46.0	3m./HORZ	11.7	**PK**	937.00
72.08	53.79	-17.96	35.83	40.0	3m./VERT	4.2	**QP**	72.08
120.00	52.22	-14.74	37.48	43.5	3m./VERT	6.0	**PK**	120.00
212.00	43.95	-15.51	28.44	43.5	3m./VERT	15.1	**PK**	212.00
601.30	37.25	-7.49	29.76	46.0	3m./VERT	16.2	**PK**	601.30
979.50	37.08	-4.43	32.65	54.0	3m./VERT	21.3	**PK**	979.50

AF is antenna factor. CL is cable loss. PA is preamplifier gain.

Sample Calculation At: 72.30 MHz

Magnitude of Measured Frequency	47.81	dBuV
Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	-17.46	dB
Corrected Result	30.35	dBuV/m

Test Date: February 6-10, 2013
Tested By
Signature:  Name: Gabriel Medina

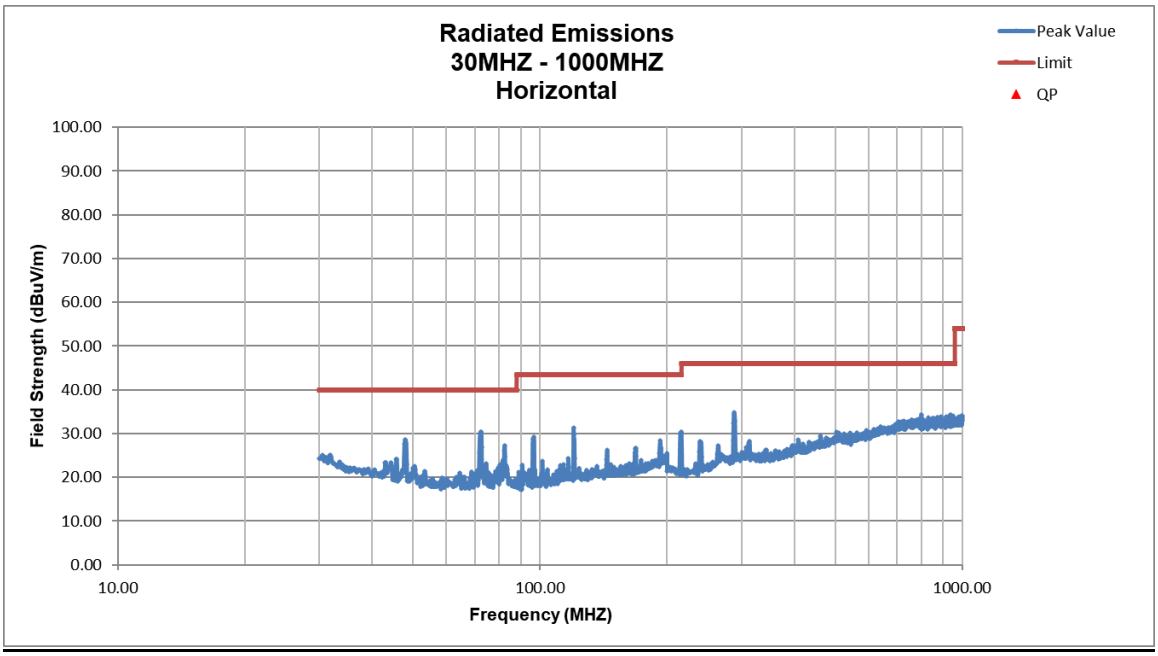


Figure 78. Radiated Emissions RX, 30 MHz - 1000 MHz – Horizontal

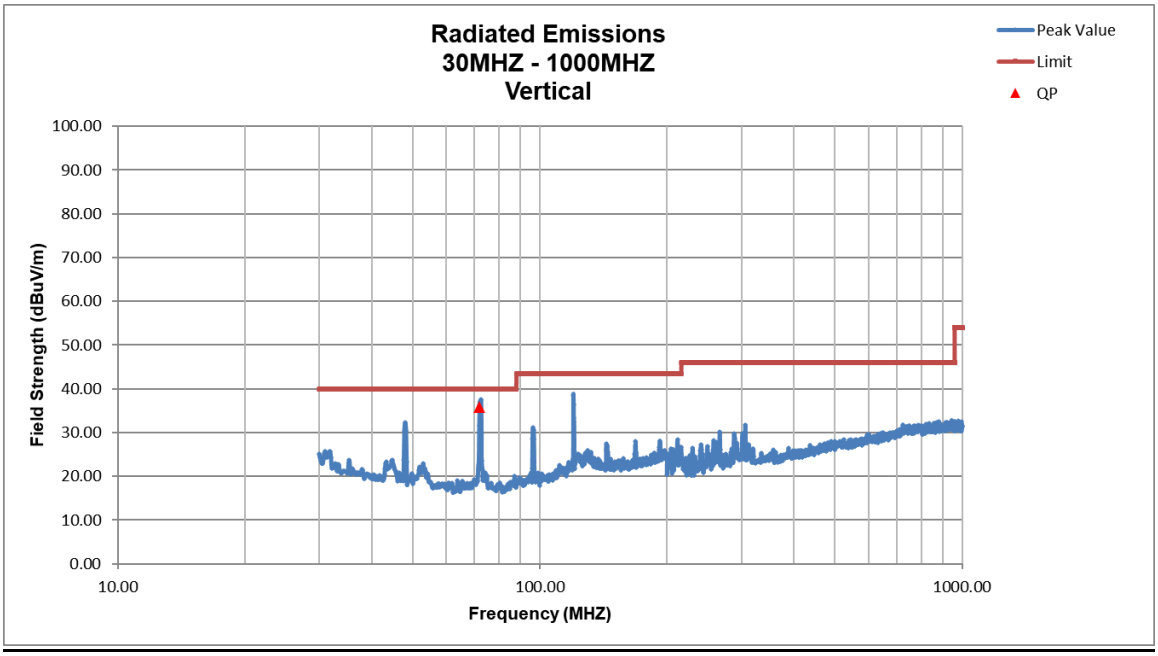


Figure 79. Radiated Emissions RX, 30 MHz - 1000 MHz - Vertical

Table 18. Spurious Radiated Emissions – Receive B Mode (Above 1 GHz)

Test: FCC Part 15.109/15.209								
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factors**	**AF+CL-PA (dB)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**DETECTOR PK / QP/AVG**
All emissions were more than 20 dB below the applicable limit.								

AF = antenna factor.
CL = cable loss.
PA = preamplifier gain.

Sample Calculation: N/A

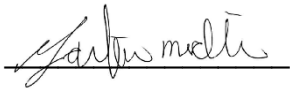
Test Date: February 6-10, 2013
Tested By
Signature:  Name: Gabriel Medina

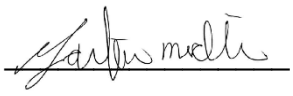
Table 19. Spurious Radiated Emissions – Transmit B Mode (30 MHz – 1 GHz)

Test: FCC Part 15.209							
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**DETECTOR PK / QP/AVG**
72.11	51.57	-17.46	34.10	40.0	3m./HORZ	5.9	**PK**
120.00	48.34	-15.34	33.00	43.5	3m./HORZ	10.5	**PK**
216.50	45.22	-14.53	30.69	46.0	3m./HORZ	15.3	**PK**
546.50	38.21	-7.05	31.16	46.0	3m./HORZ	14.8	**PK**
926.69	38.69	-2.85	35.84	46.0	3m./HORZ	10.2	**PK**
72.30	52.38	-17.96	34.42	40.0	3m./VERT	5.6	**QP**
120.00	45.10	-14.74	30.36	43.5	3m./VERT	13.1	**PK**
215.80	41.37	-9.60	31.77	43.5	3m./VERT	11.7	**PK**
767.80	38.04	-5.09	32.95	46.0	3m./VERT	13.1	**PK**
934.50	38.57	-4.44	34.13	46.0	3m./VERT	11.9	**PK**

AF is antenna factor. CL is cable loss. PA is preamplifier gain.

Sample Calculation At:72.11 MHz

Magnitude of Measured Frequency	51.57	dBuV
Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	-17.46	dB
Corrected Result	34.10	dBuV/m

Test Date: February 6-10, 2013
Tested By
Signature:  Name: Gabriel Medina

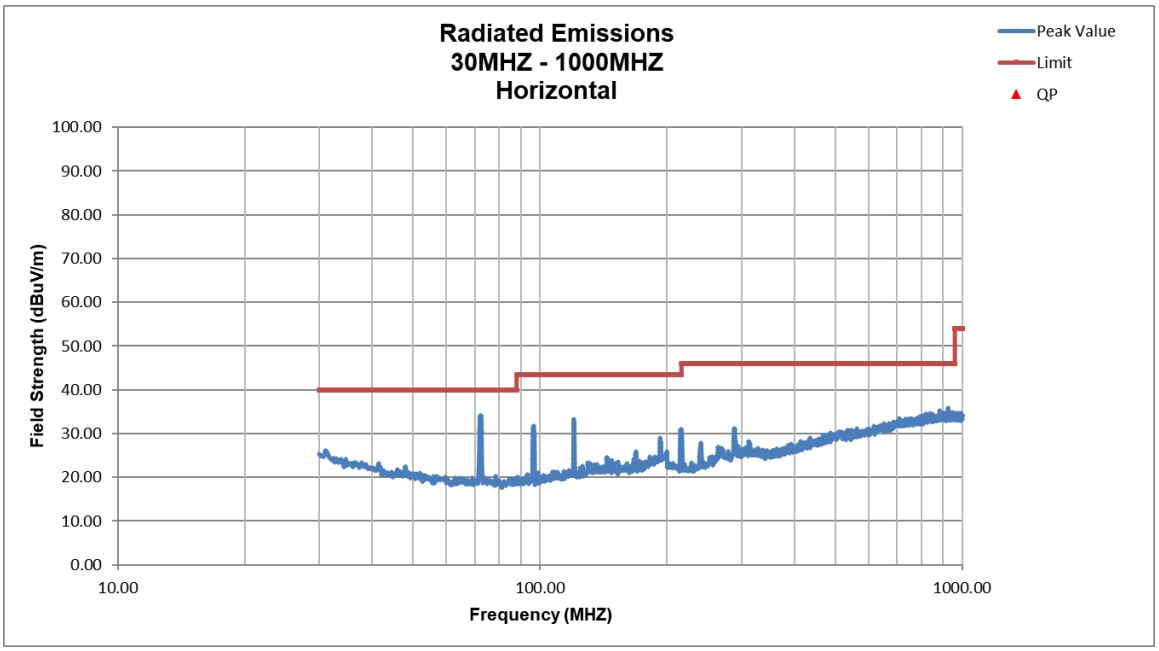


Figure 80. Radiated Emissions TX, 30 MHz - 1000 MHz – Horizontal

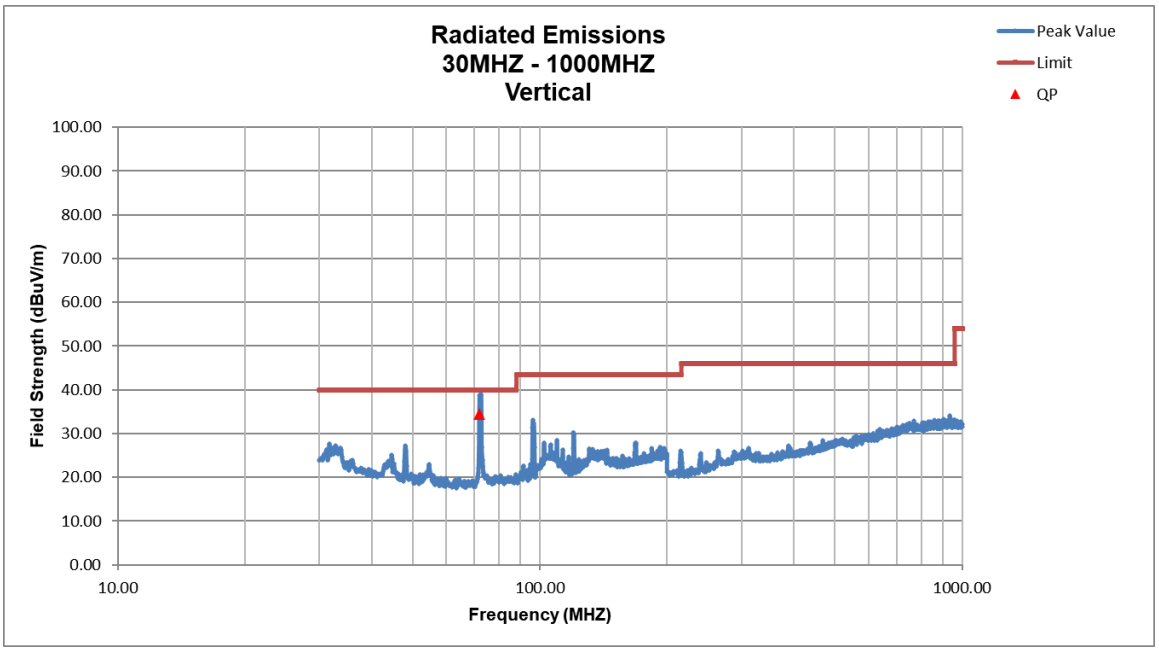


Figure 81. Radiated Emissions TX, 30 MHz - 1000 MHz - Vertical

Table 20. Spurious Radiated Emissions – Transmit B Mode (1 GHz – 25 GHz)

Test: FCC Part 15.209							
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**DETECTOR PK / QP/AVG**
1706.64	58.55	-10.38	48.17	54.0	3.0m./HORZ	5.8	**PK**
2766.00	49.19	-5.50	43.69	54.0	3.0m./HORZ	10.3	**PK**
4069.00	50.34	-2.09	48.25	54.0	3.0m./HORZ	5.7	**PK**
7820.00	42.87	5.51	48.38	54.0	1.0m./HORZ	5.6	**PK**
1709.27	58.24	-10.15	48.09	54.0	3.0m./VERT	5.9	**PK**
2766.90	49.19	-5.56	43.63	54.0	3.0m./VERT	10.4	**PK**
4069.00	50.34	-1.97	48.37	54.0	3.0m./VERT	5.6	**PK**
7820.00	42.87	5.52	48.39	54.0	1.0m./VERT	5.6	**PK**
All other emission were less than 6dB above the noise floor							

AF is antenna factor.
CL is cable loss.
PA is preamplifier gain.

Sample Calculation At: 1706.64 MHz

Magnitude of Measured Frequency	58.55	dBuV
Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	-10.38	dB
Corrected Result	48.17	dBuV/m

Test Date: February 6-10, 2013
Tested By
Signature:  Name: Gabriel Medina

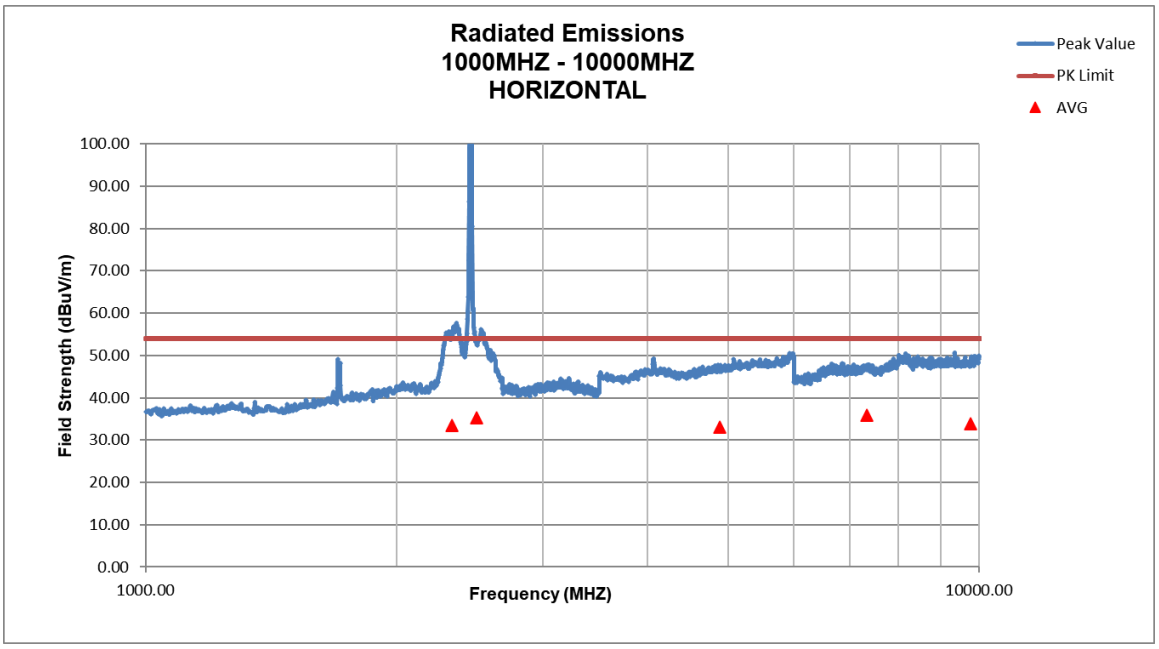


Figure 82. Radiated Emissions TX, 30 MHz - 1000 MHz – Horizontal

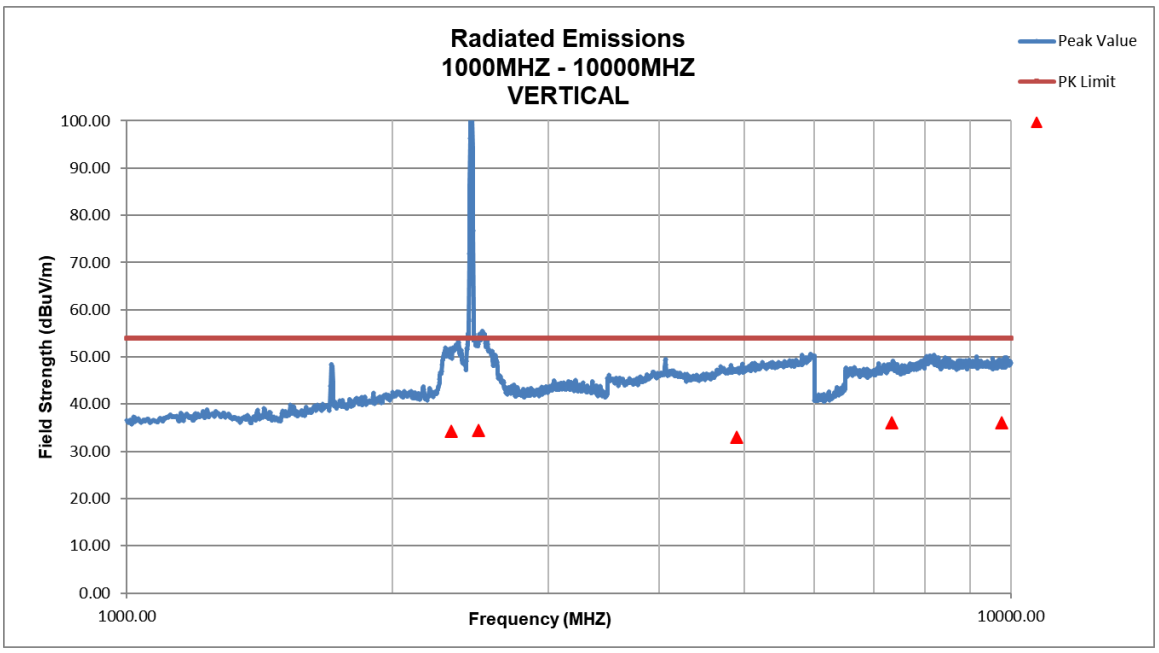


Figure 83. Radiated Emissions TX, 30 MHz - 1000 MHz - Vertical

2.18 Measurement Uncertainty

The measurement uncertainties given were calculated using the method detailed in CISPR 16-4-2:2011. A coverage factor of k=2 was used to give a level of confidence of approximately 95%.

2.18.1 Conducted Emissions Measurement Uncertainty

Measurement Uncertainty (within a 95% confidence level) for this test is ±2.85 dB.

2.18.2 Radiated Emissions Measurement Uncertainty

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is ±5.2 dB. This value includes all elements of measurement.

The measurement uncertainty (with a 95% confidence level) for this test using a Log Periodic Antenna (200 MHz to 1000 MHz) is ±5.2 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is ±5.2 dB.

3 Conclusions

The EUT is deemed to have met the requirements of the standards cited within the test report when tested as detailed in the present test report.