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

Reliance Worldwide Corporation

StreamLabs Control

Model Number: UFCV-1000

FCC ID: 2AHFE-UFCV1000
IC: 21143-UFCV1000

UST Project: 19-0040
Issue Date: March25, 2019

Total Pages:94

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Testing Tomorrow's Technology

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: March 25, 2019

TESTING
NVLAP LAB CODE 200162-0

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MEASUREMENT TECHNICAL REPORT

COMPANY NAME: Reliance Worldwide Corporation
MODEL: UFCV-1000
FCC ID: 2AHFE-UFCV1000
IC: 21143-UFCV1000
DATE: March 25, 2019

This report concerns (check one): Original grant [X]
Class II change

Equipment type: Atmospheric Monitoring/Sensor Device

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No X

If yes, defer until:_____N/A_____
date
agrees to notify the Commission by N/A
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

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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 February18, 2019in good operating condition.

1.3 Product Description

The Equipment Under Test (EUT) is the Reliance Worldwide Corporation Model UFCV-1000 atmospheric monitoring/sensor device.The EUT contains an onboard radio chipset, WiFi (802.11b,g,n). It has its own RF antenna port and antenna. The radio chip is located on a single board. This device will collect data and wirelessly send the data to base stations or hubs.

The EUT operates in the 2.400 Ghz to 2.475 Ghz ISM Band and is based on 802.11 b/g/n standards with channels spaced at 5 Mhz intervals in the ISM Band. The EUT is powered by an external 12 VDC power supply and the radio runs off a regulated 3.3 VDC provided by the meter board.

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 Cof Part 15 and per FCC KDB Publication number 558074 v05 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 below. 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, GA30004. This site has been fully described and registered with the FCC.Itsdesignation 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

MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC/IC ID	CABLES P/D
Reliance Worldwide Corporation (EUT)	UFCV-1000	CND	FCC: 2AHFC-UFCV1000 IC: 21143-UFCV1000	--
CUI Inc. (Power Adapter)	CND	SWI12-12-N	n/a	1.0 m UP
Dell (Laptop)	E6510	266BYNI	Unknown	--
Dell (Power Supply Adapter)	PA-1900-02D	CND	Not Applicable	1.2 m UP
Antenna See antenna details	Inverted F PCB	None	Not Applicable	--

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

2 Tests and Measurements

2.1 Test Equipment

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

Table 2. Test Instruments

TEST INSTRUMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	CALIBRATION DUE DATE
SPECTRUM ANALYZER	E4407B	AGILENT	US41442935	8/17/2020 2 yr.
SPECTRUM ANALYZER	DSA815	RIGOL	DSA8A18030 0138	10/11/2019
SPECTRUM ANALYZER	8593E	HEWLETT-PACKARD	3205A00124	10/25/2019
RF PREAMP 100 kHz to 1.3 GHz	8447E	HEWLETT-PACKARD	1937A01828	3/7/2019
PREAMP 1.0 GHz to 26.0 GHz	8449B	HEWLETT-PACKARD	3008A00480	2/28/2019
LOOP ANTENNA	SAS-200/562	A. H. Systems	142	1/22/2020 2 yr.
BICONICAL ANTENNA	3110B	EMCO	9307-1431	5/2/2019 2 yr
LOG PERIODIC ANTENNA	3146	EMCO	9305-3600	5/1/2019 2 yr
HORN ANTENNA	3115	EMCO	9107-3723	11/28/2020 2 yr
HIGH PASS FILTER	H3R020G2	MICROWAVE CHIRCUITS	001DC9528	3/08/2019
LISN x 2	9247-50-TS-50-N	SOLAR ELECTRONICS	955824 and 955825	3/19/2019

Note: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.
(*)= used for power line conducted emissions testing

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))

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 2.4 GHz to 2.4835 GHz, 3 test frequencies were used.

2.4 Frequency Range of Radiated Measurements (Part 15.33)

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)

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 CISPRQuasi-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)

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	Reliance Worldwide Corporation	Trace/PCB	Inverted F CB	+0.97	U.FL

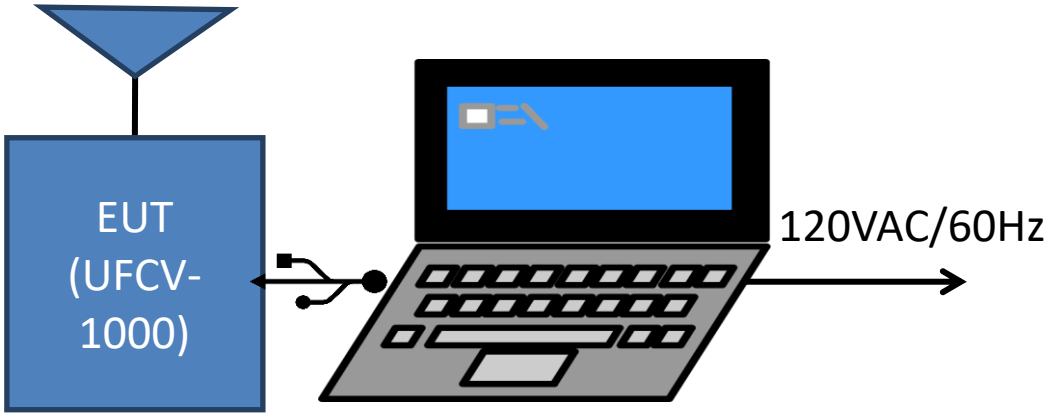


Figure 1. Block Diagram of Test Configuration

Note: The laptop is used for programming the radio module only.

2.7 Restricted Bands of Operation (Part 15.205)

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))

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 andSpuriousEmissions(CFR 15.209, 15.247(d)) (IC RSS 210, A2.9 (a))

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 on theOATS.The conducted emissions graphs are found in 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.

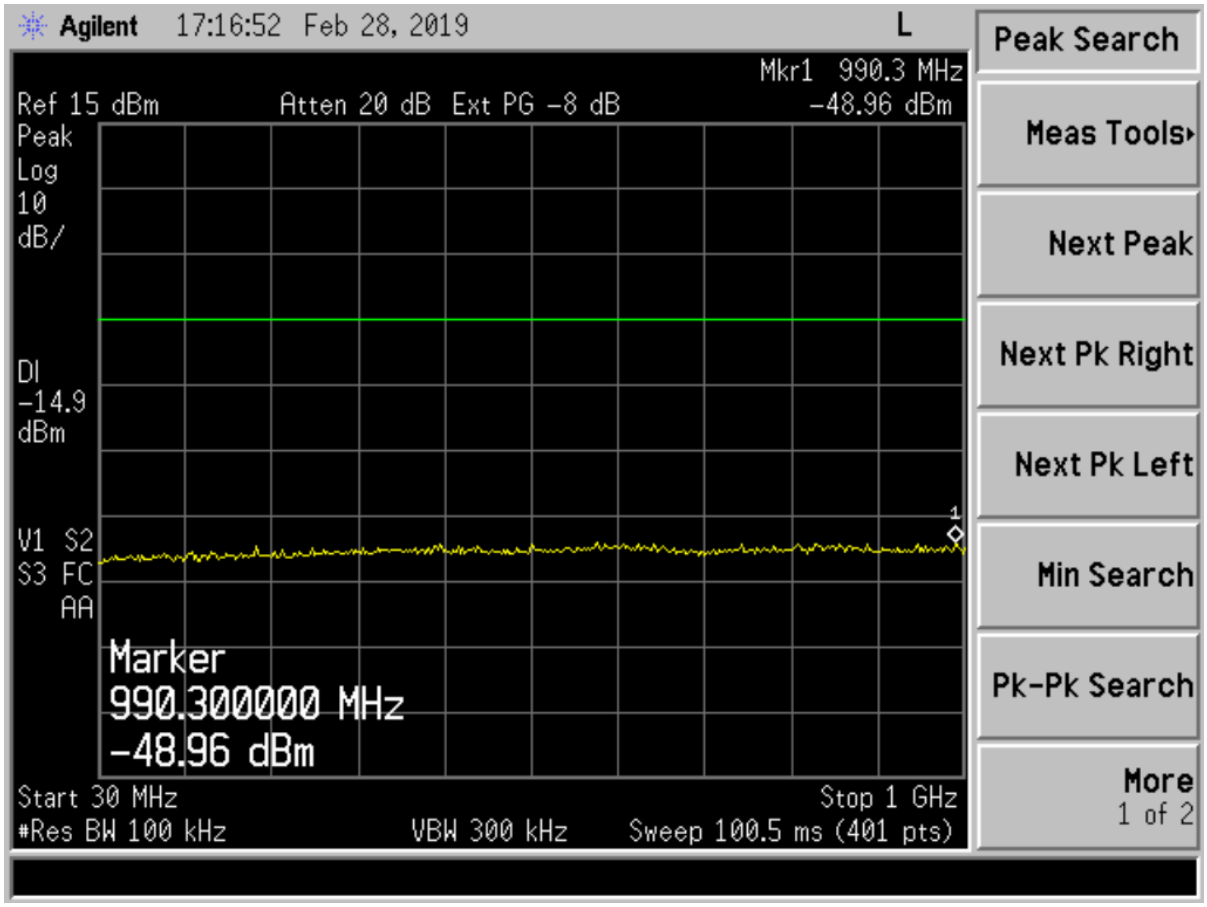


Figure 2. 802.11b, Channel 1, 30 - 1000 MHz

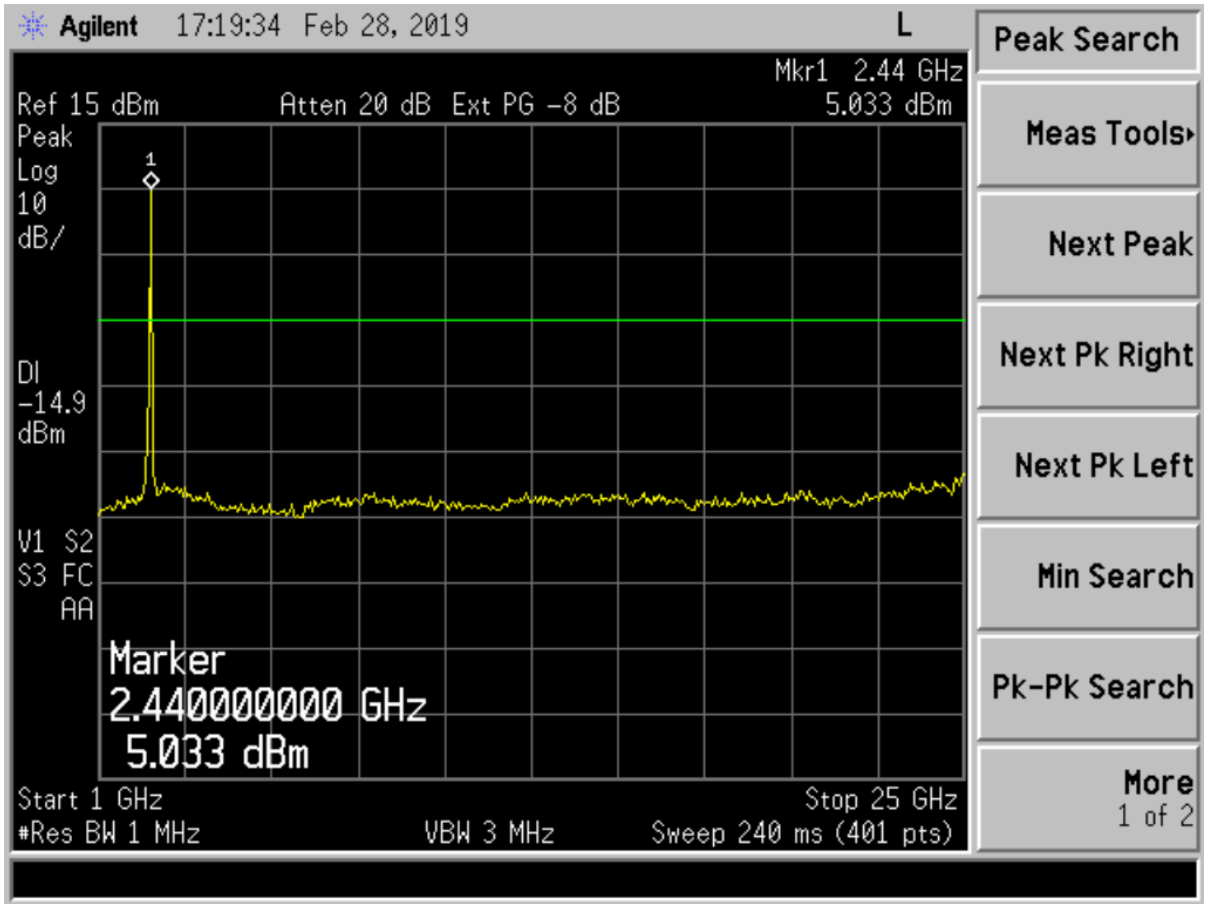


Figure 3. 802.11b, Channel 1, 1 – 25 GHz

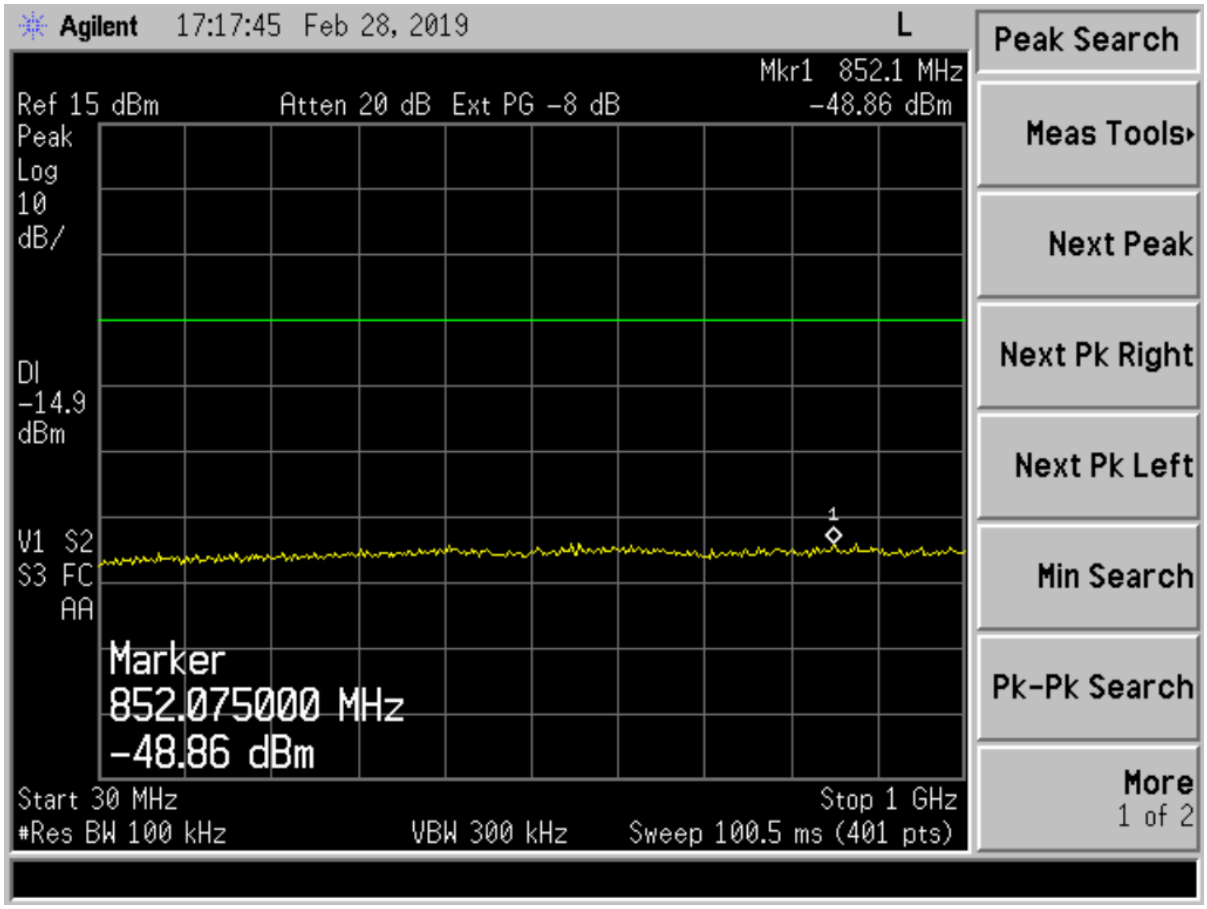


Figure 4. 802.11b, Channel 7, 30-1000 MHz

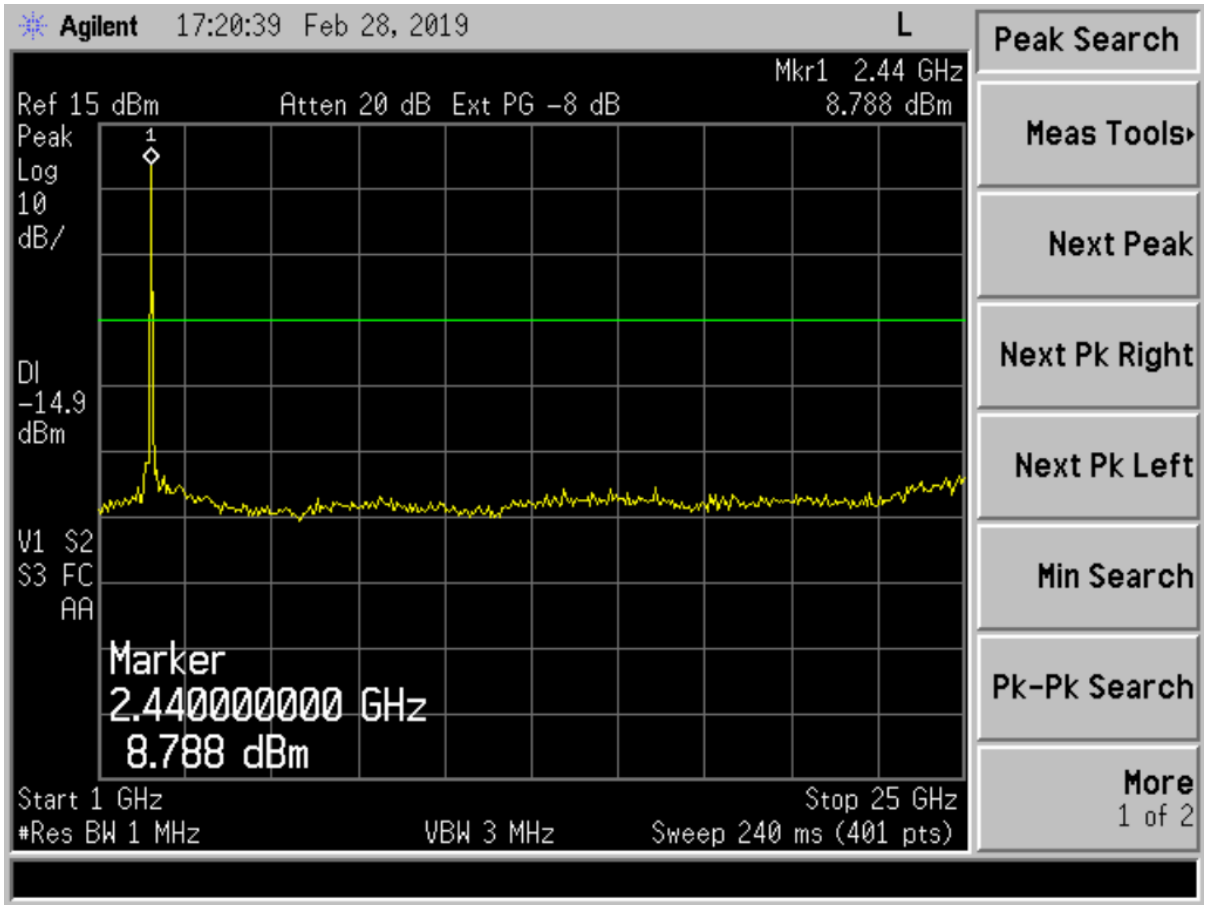


Figure 5. 802.11b, Channel 7, 1 – 25 GHz

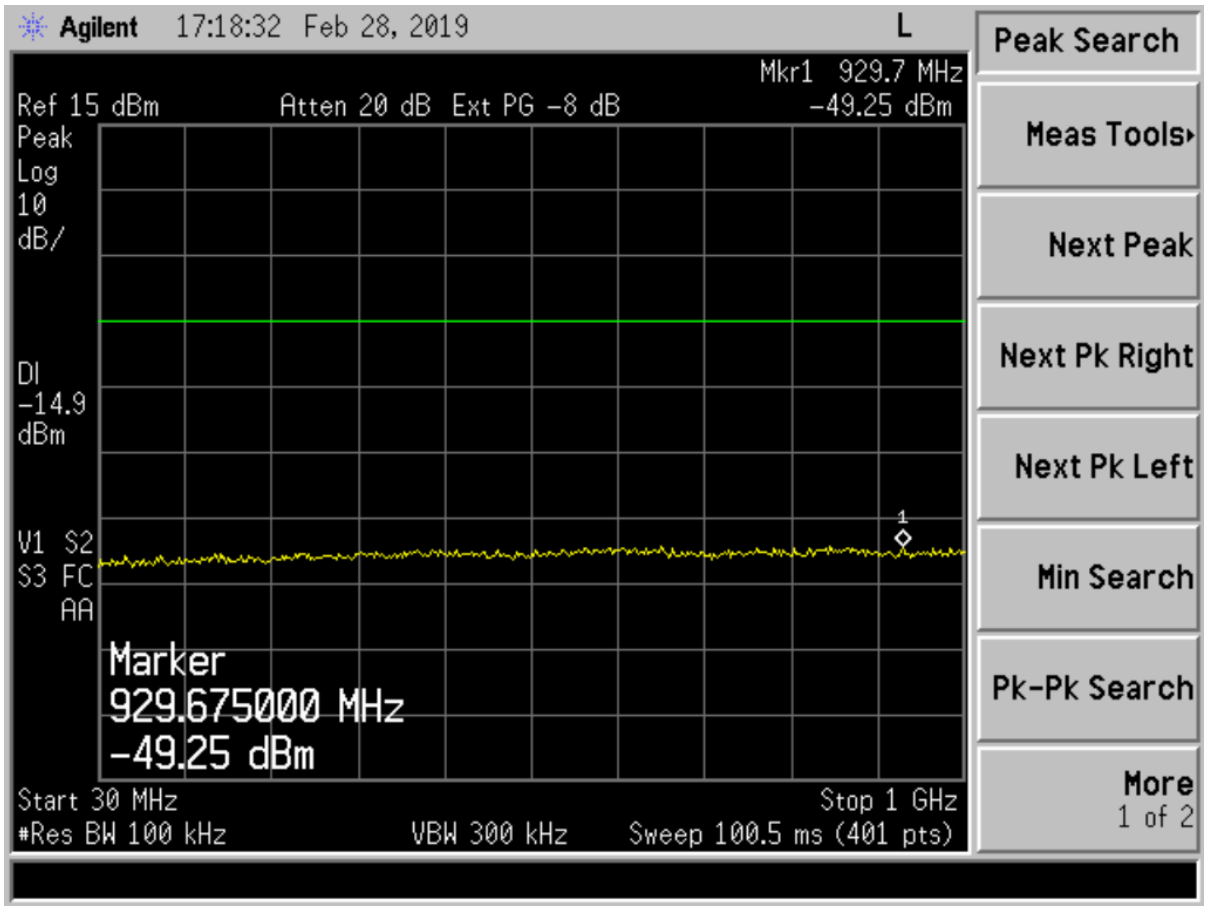


Figure 6. 802.11b, Channel 11, 30-1000 MHz

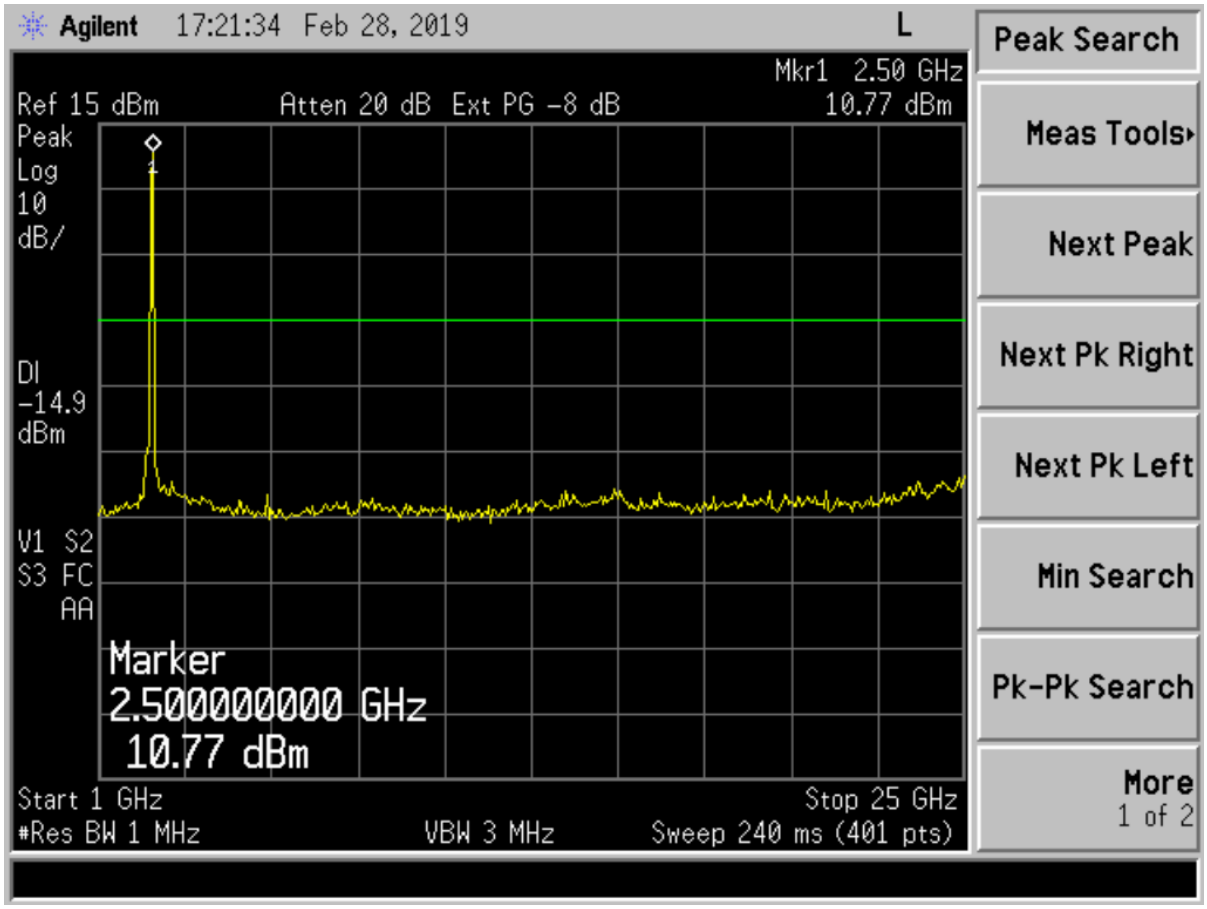


Figure 7. 802.11b, Channel 11, 1 –25 GHz

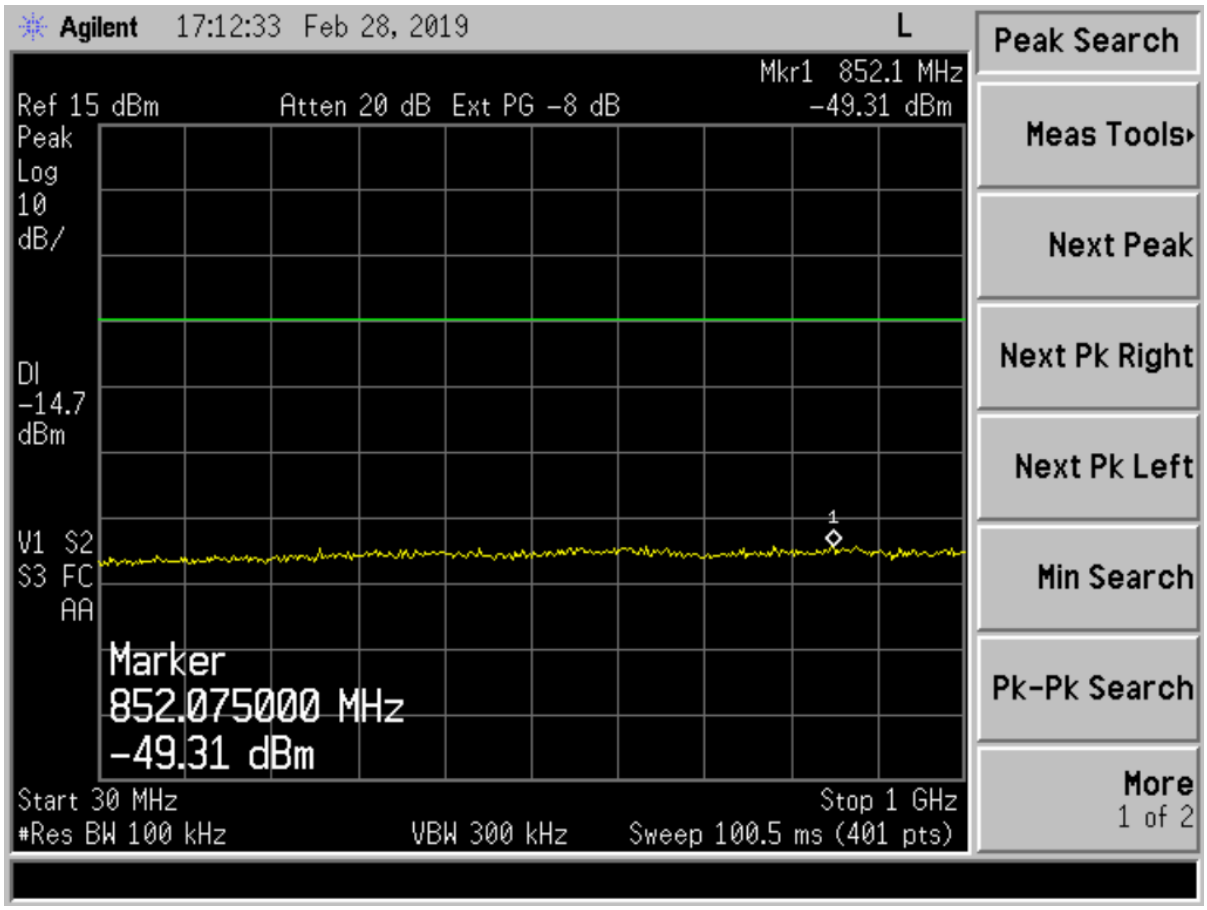


Figure 8. 802.11g, Channel 1, 30- 1000 MHz

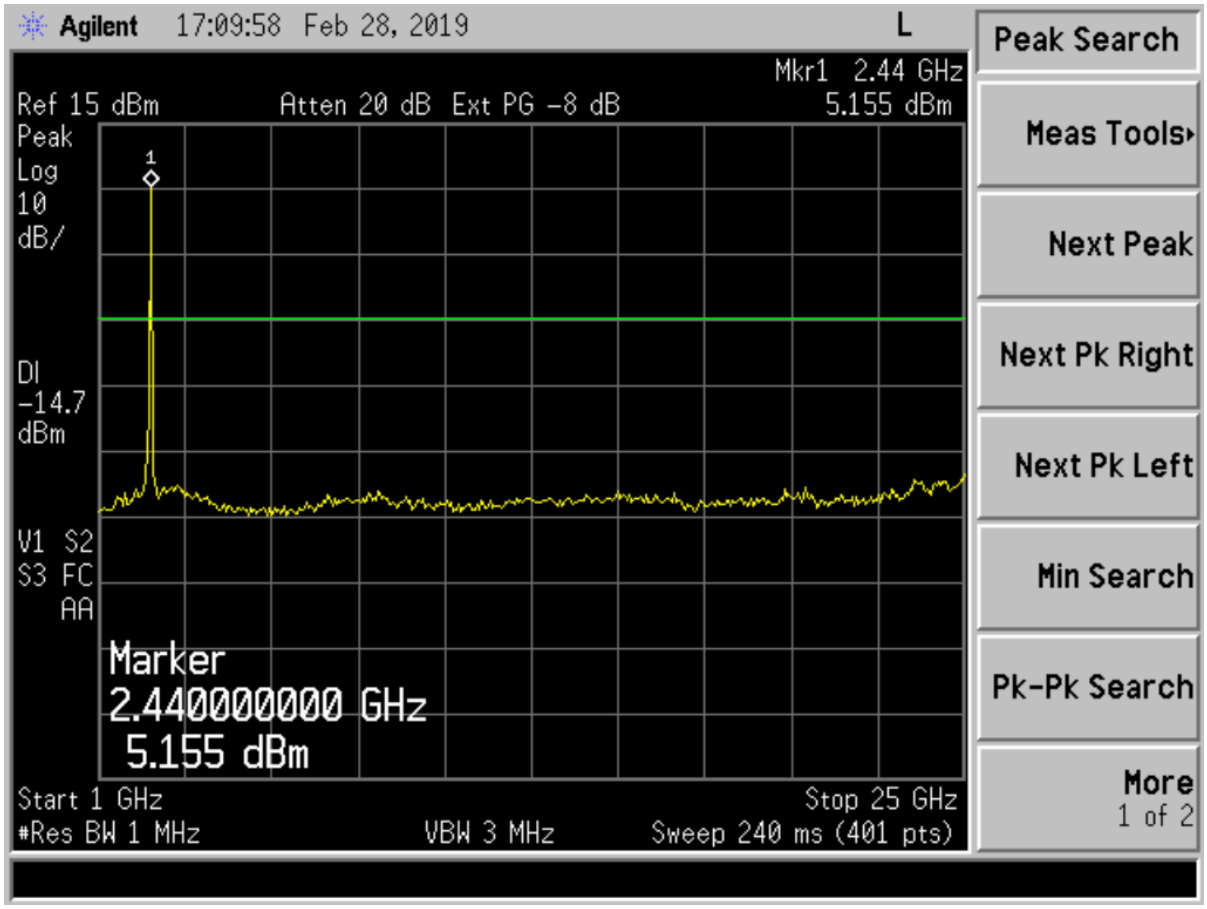


Figure 9. 802.11g, Channel 1, 1 – 25 GHz

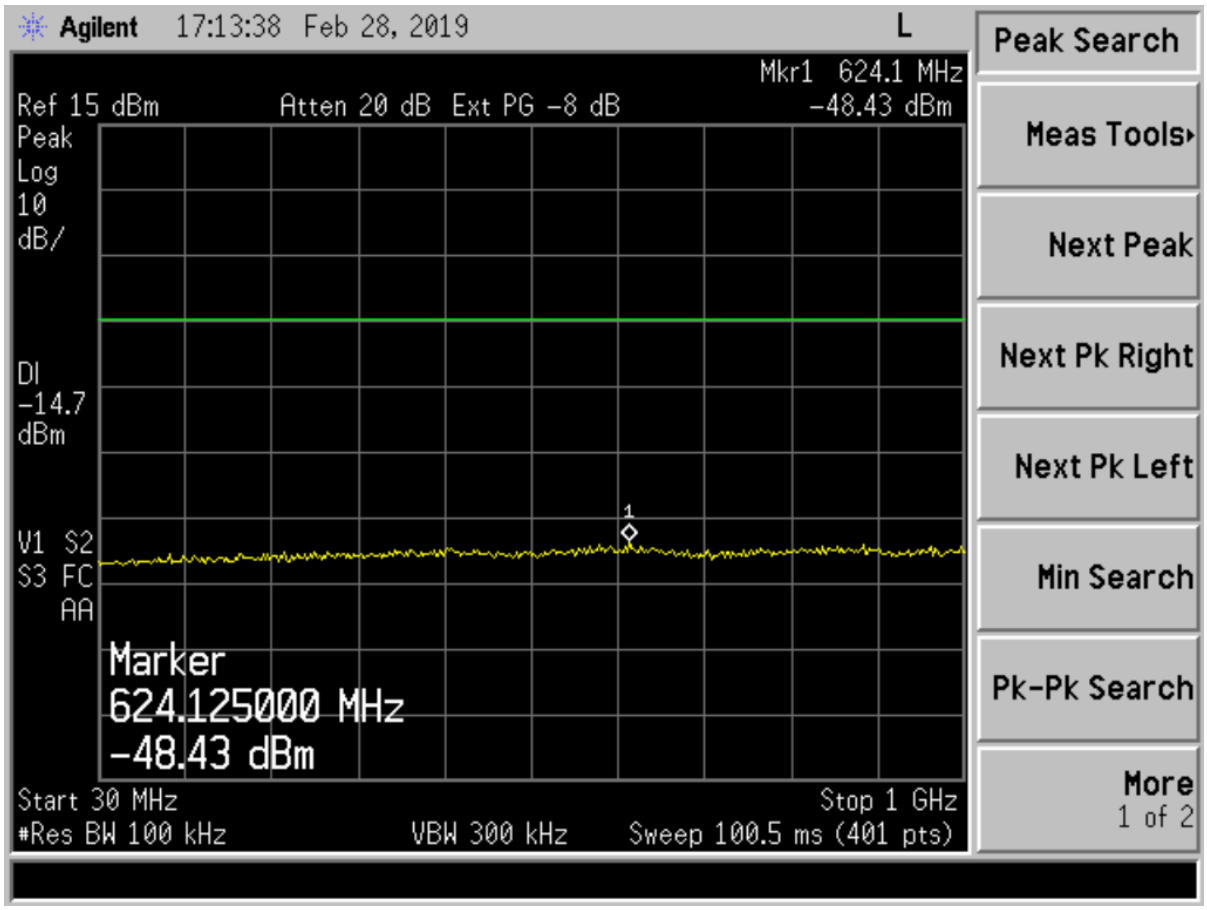


Figure 10. 802.11g, Channel 7, 30-1000 MHz

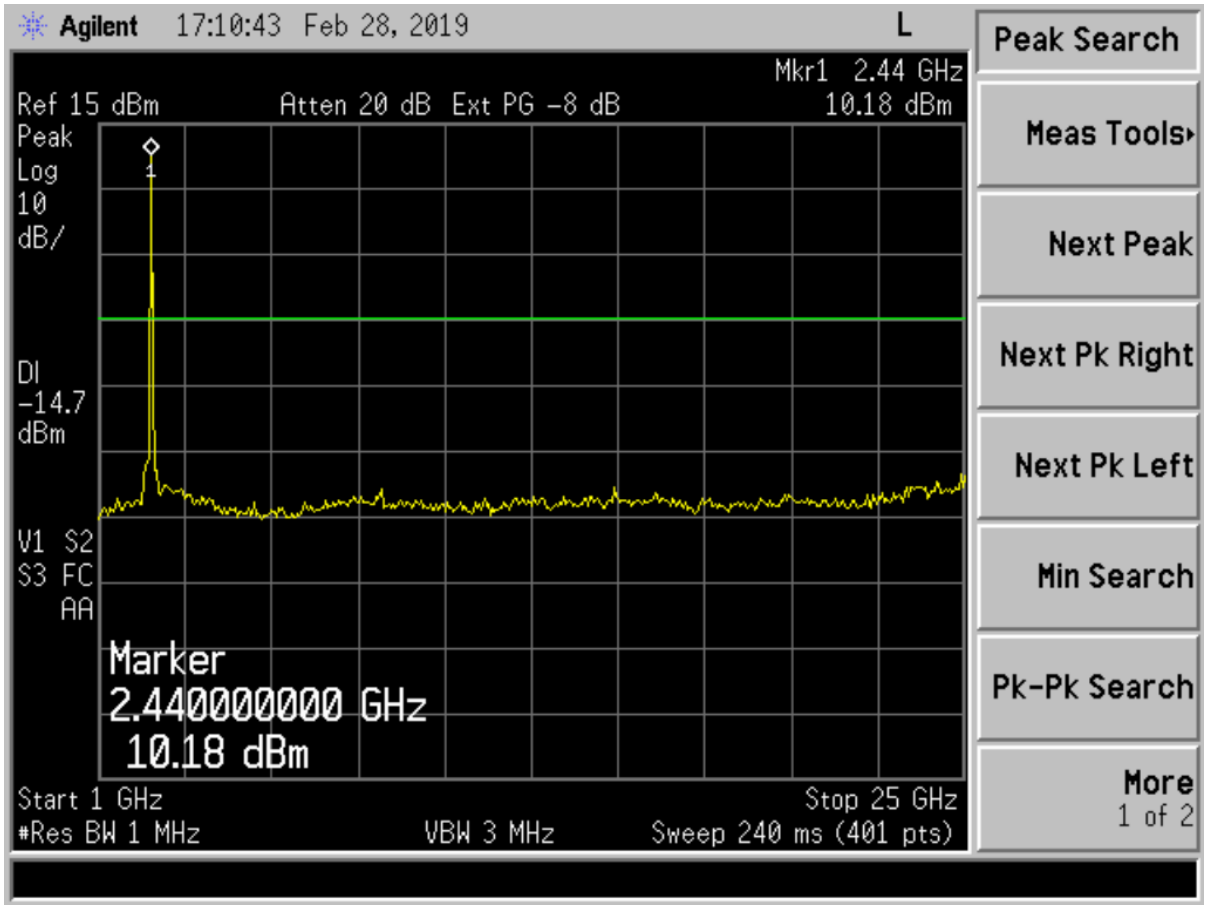


Figure 11. 802.11g, Channel 7, 1 –25 GHz

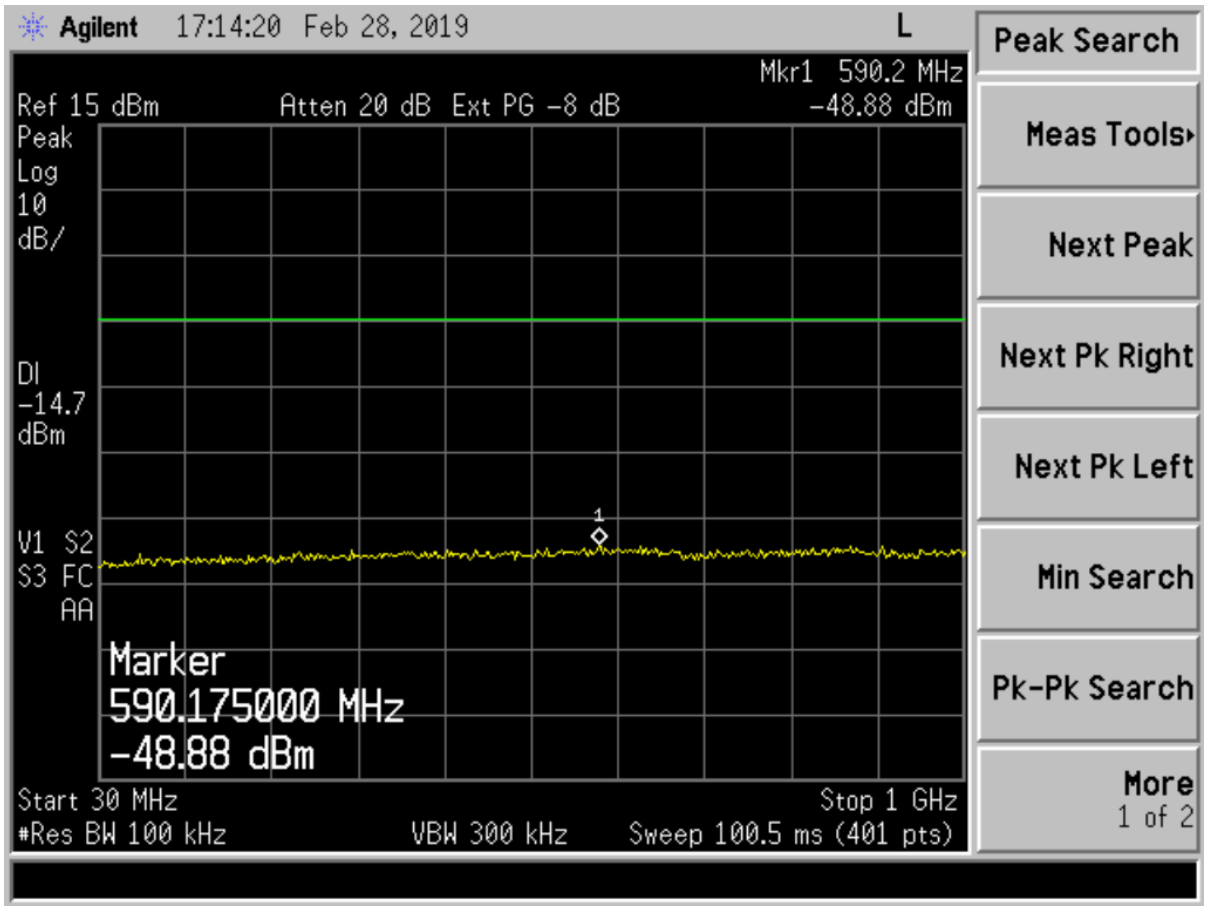


Figure 12. 802.11g, Channel 11, 30-1000 MHz

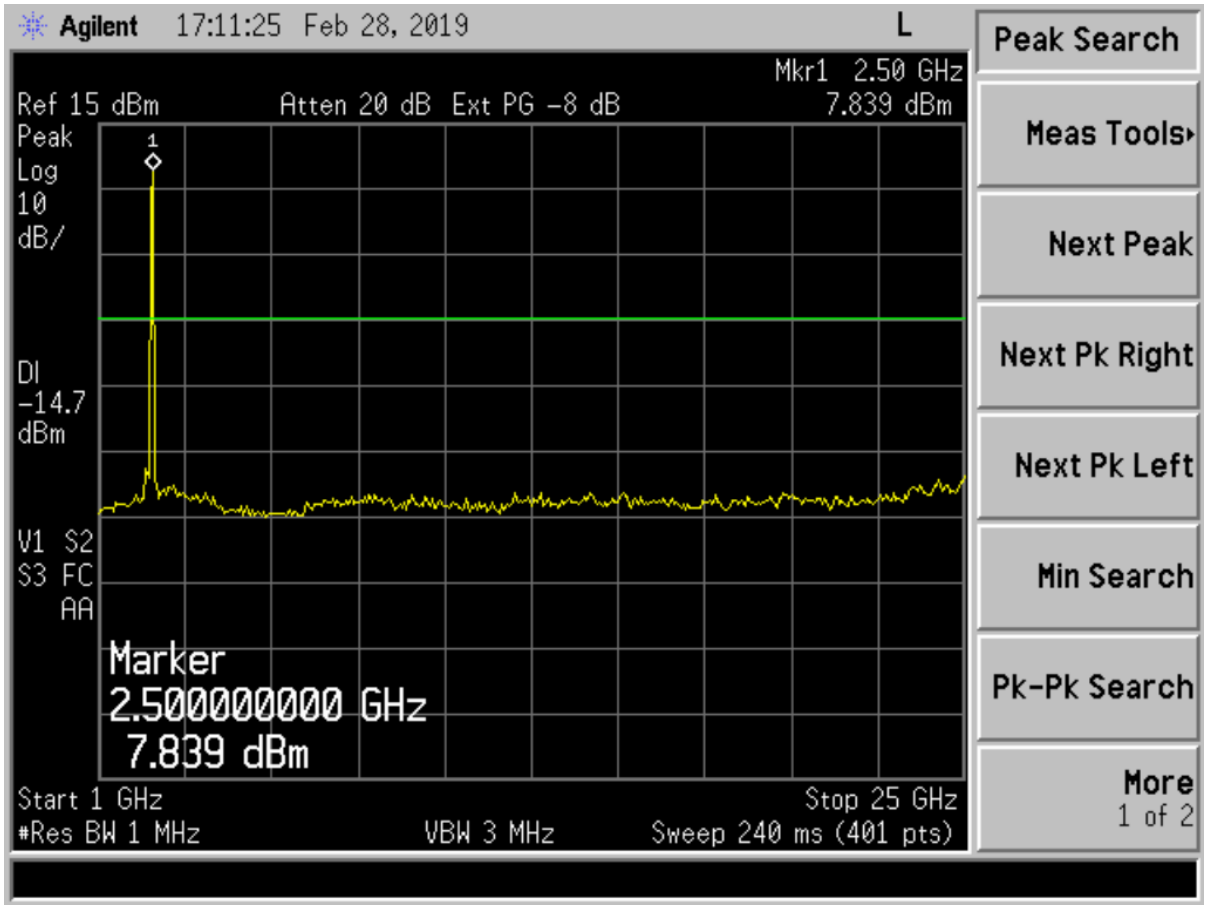


Figure 13. 802.11g, Channel 11, 1 – 25 GHz

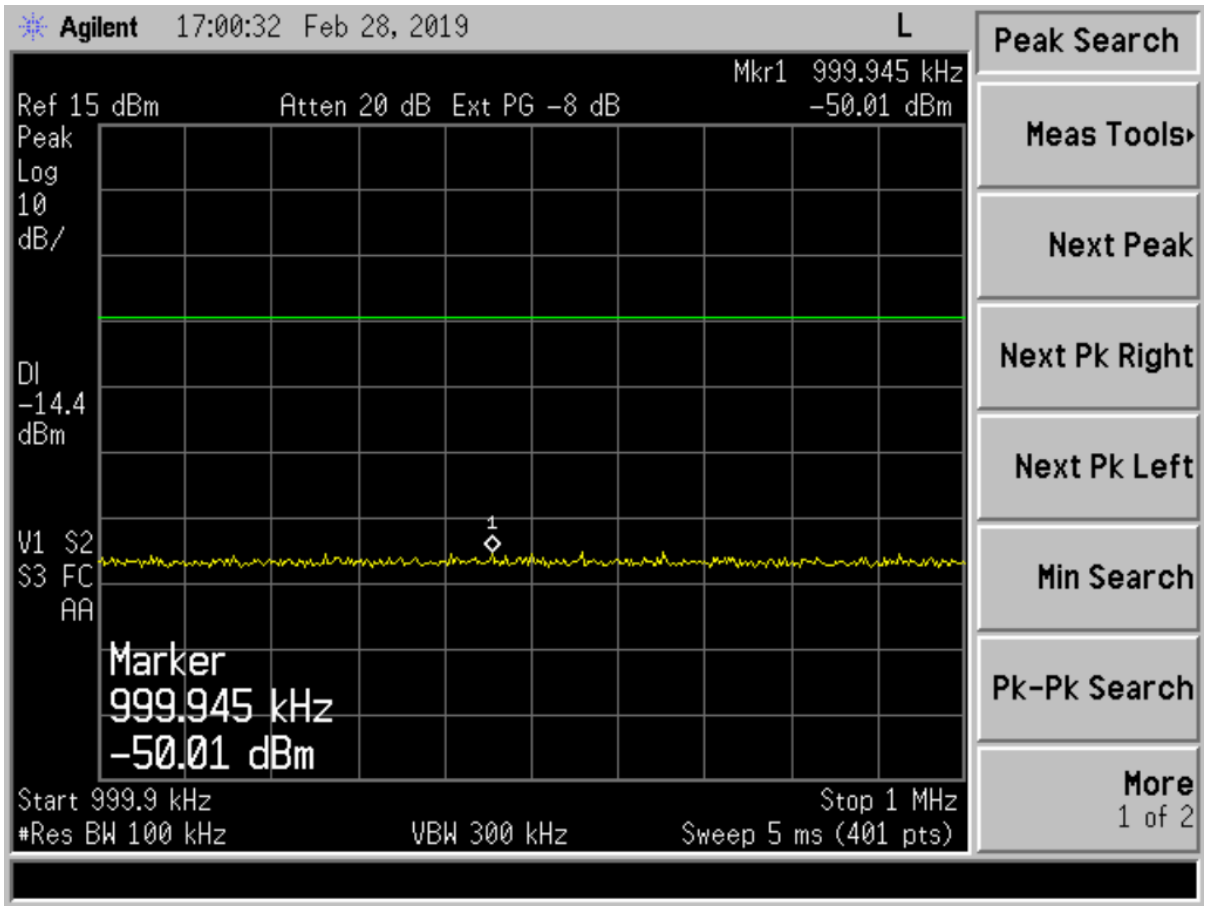


Figure 14. 802.11n, Channel 1, 30-1000 MHz

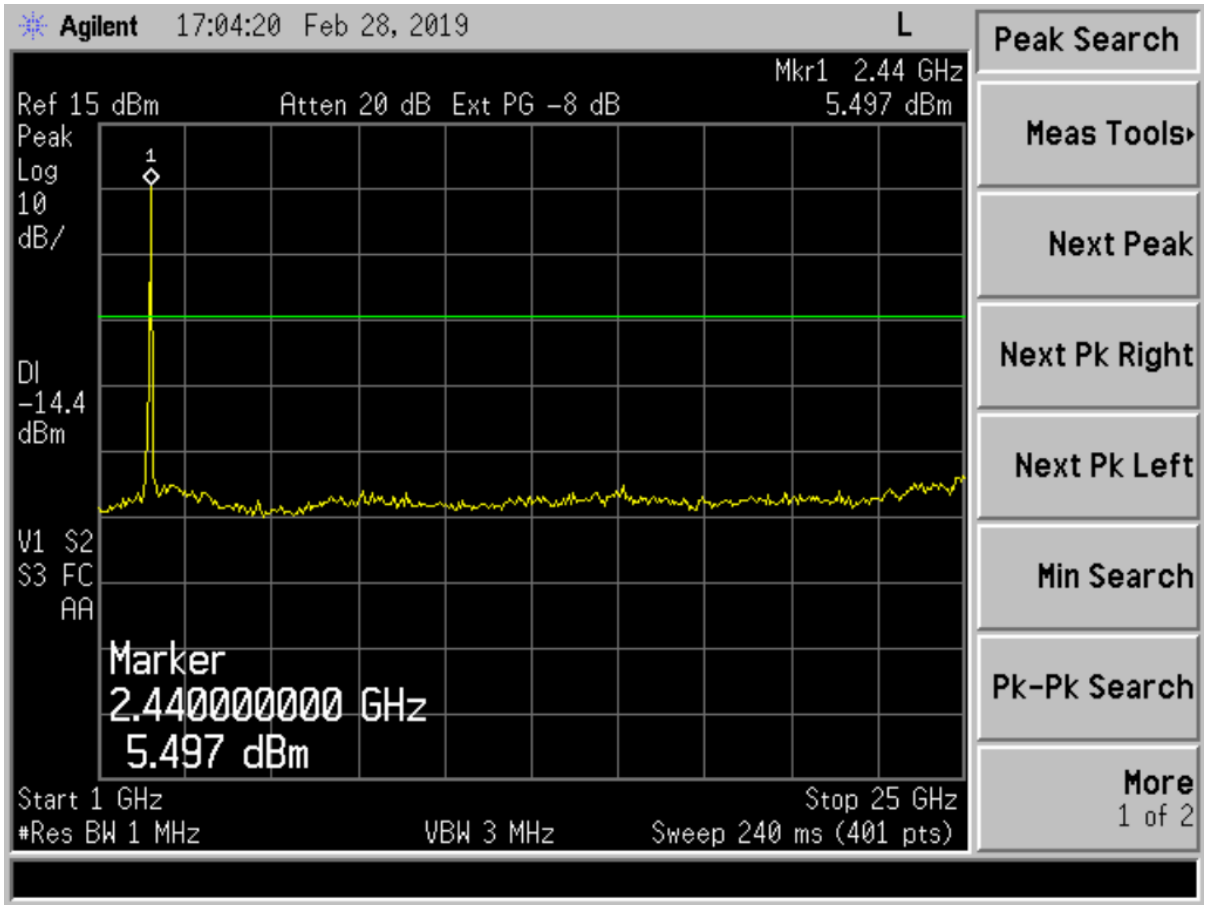


Figure 15. 802.11n, Channel 1, 1 - 25 GHz

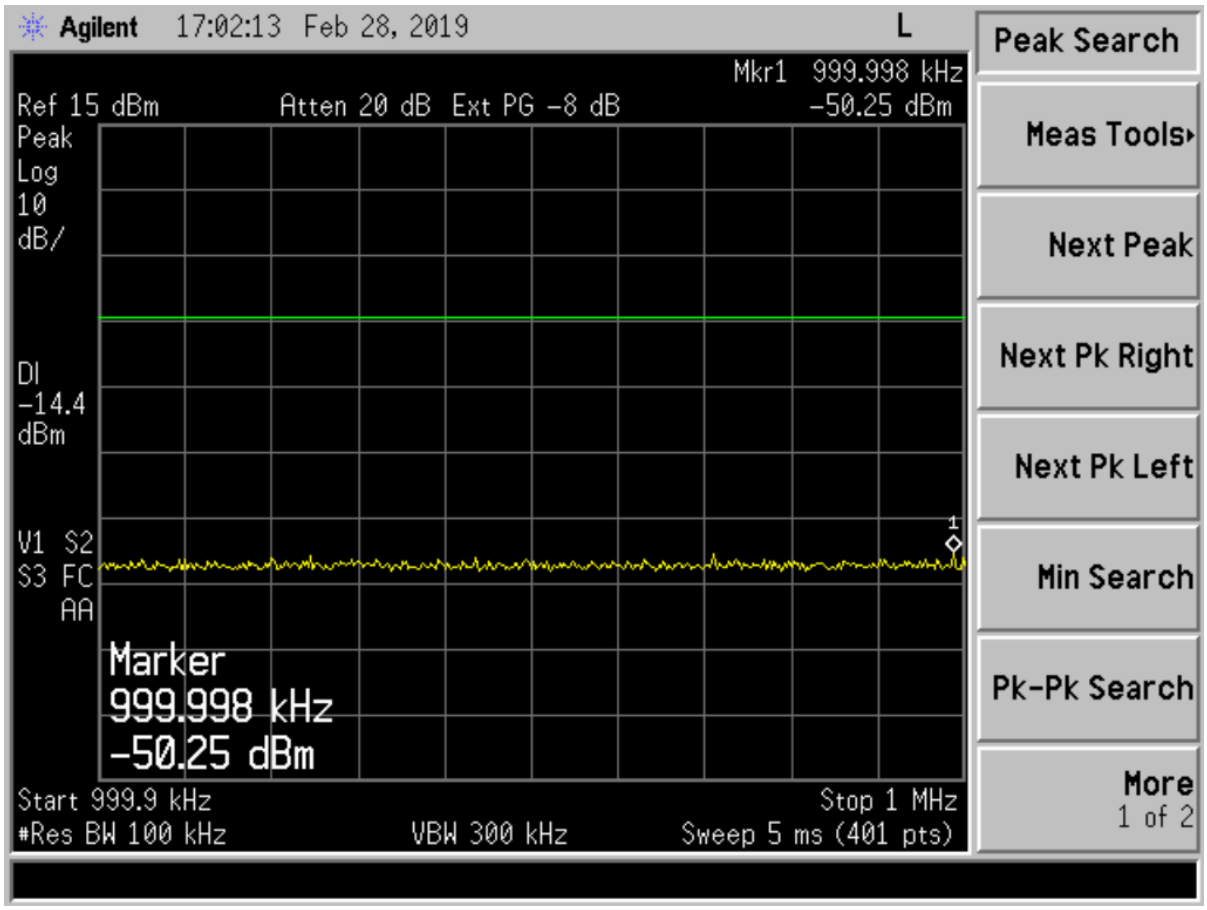


Figure 16. 802.11n, Channel 7, 30-1000 MHz

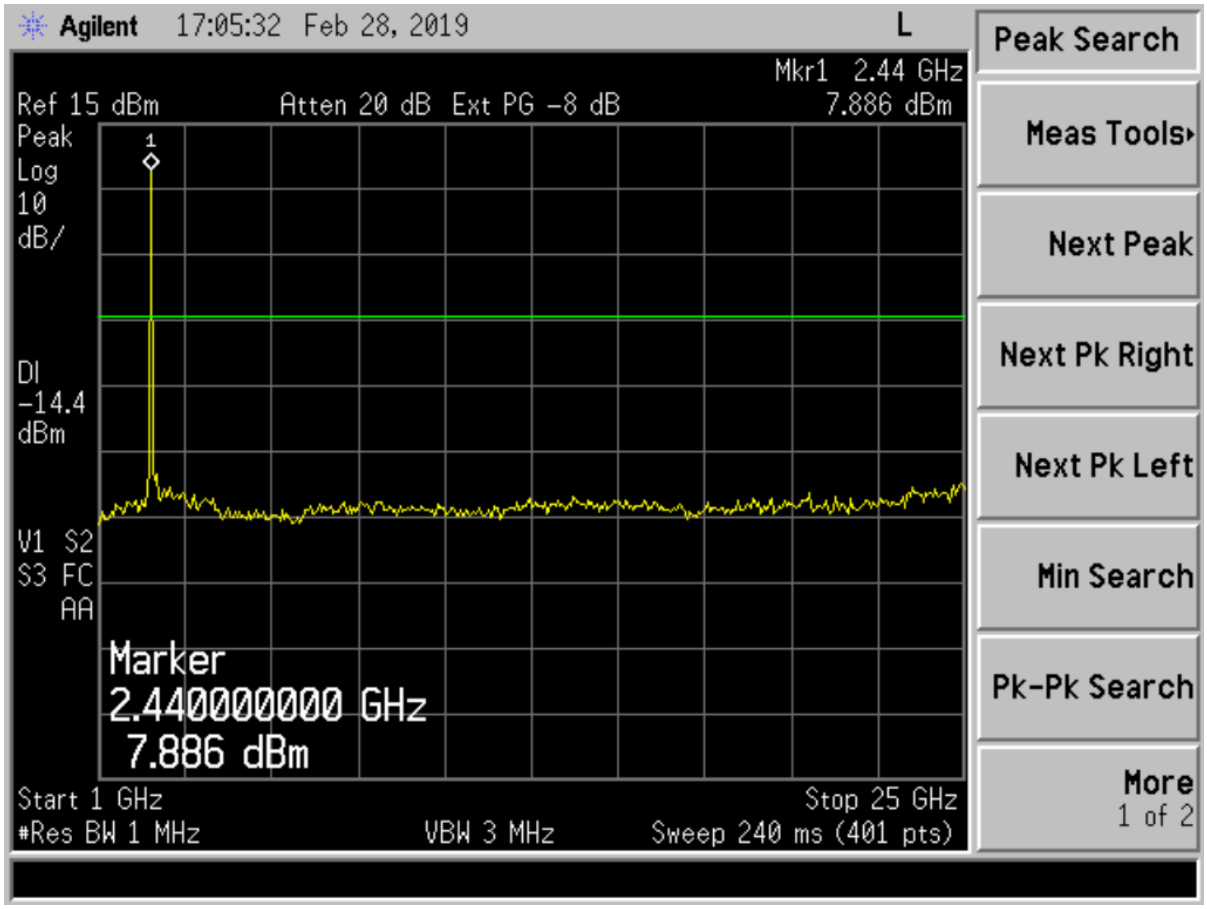


Figure 17. 802.11n, Channel 7, 1 – 25 GHz

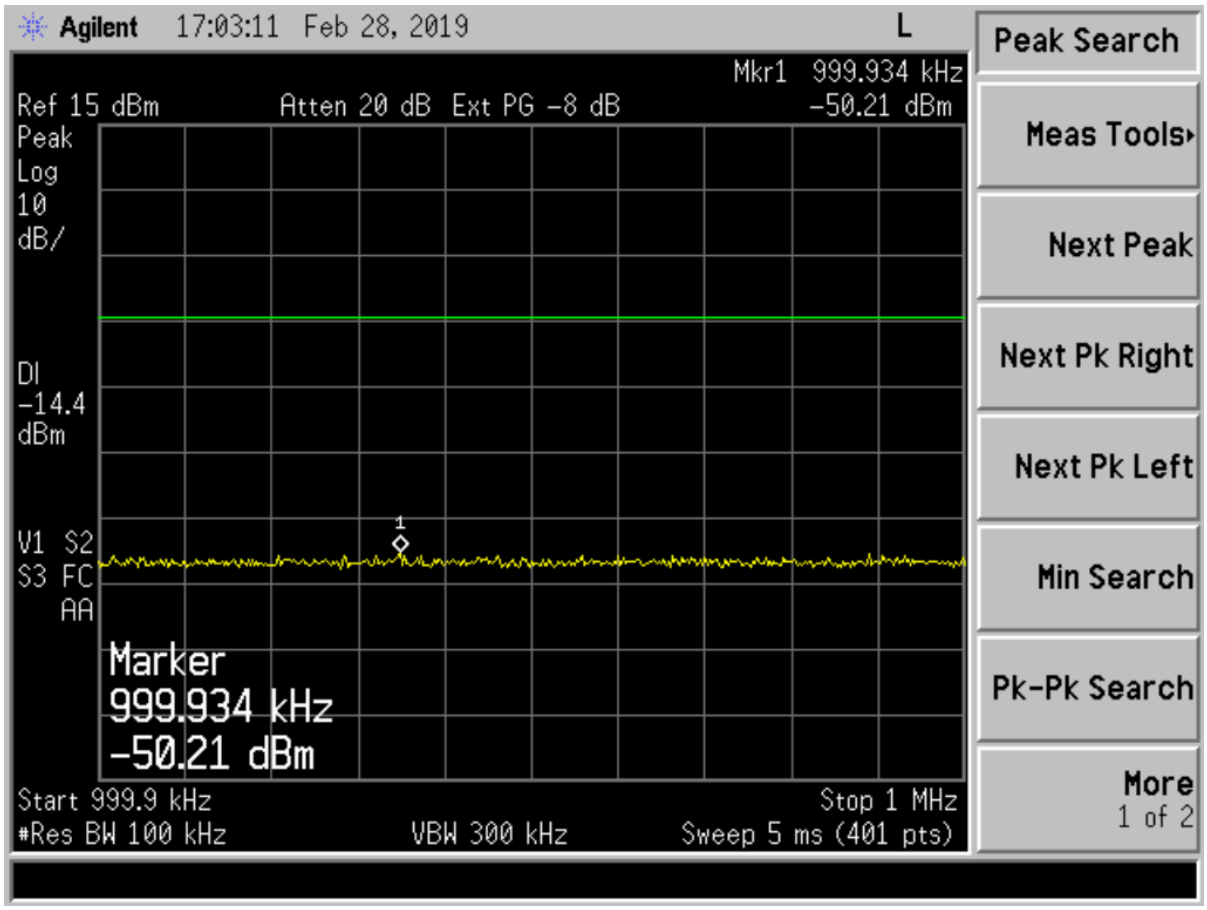


Figure 18. 802.11n, Channel 11, 30-1000 MHz

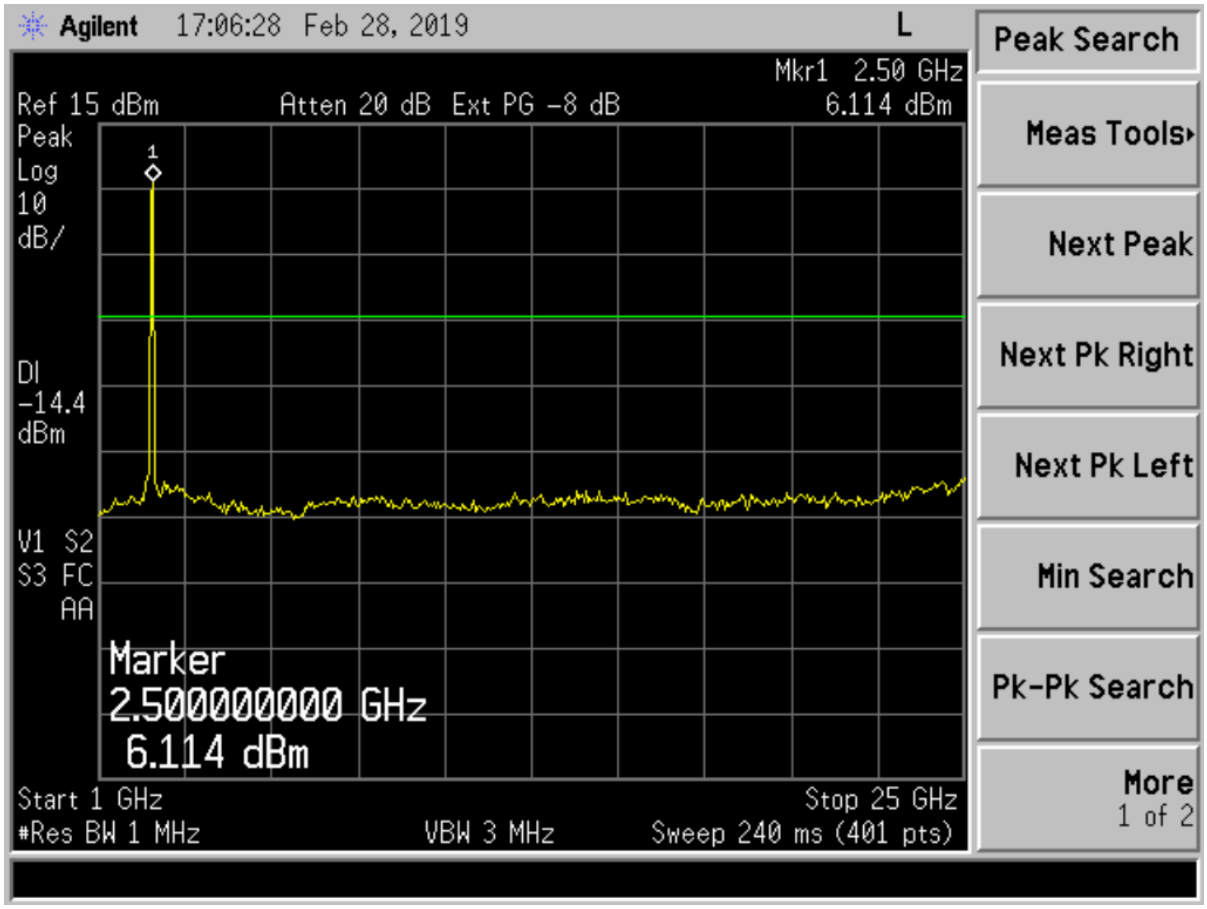


Figure 19. 802.11n, Channel 11, 1 – 25 GHz

2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.247(d))

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 inTable 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.

Table 5.BMode - Peak Radiated Fundamental & Harmonic Emissions

Tested By: AF	Test: FCC Part 15,247(d)	Client: Reliance Worldwide Corporation
	Project: 19-0040	Model: UFCV-1000

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								
2412.00	77.85	0.00	32.85	110.70	--	3.0m./HORZ	--	**PK**
*4824.00	49.89	0.00	4.57	54.46	74.0	3.0m./HORZ	19.5	**PK**
*7236.00	50.31	-9.50	11.25	52.06	74.0	1.0m./HORZ	21.9	**PK**
Mid Channel – PEAK								
2442.00	75.51	0.00	34.05	109.56	--	3.0m./HORZ	--	**PK**
*4884.00	50.03	0.00	6.46	56.49	74.0	3.0m./HORZ	17.5	**PK**
*7326.00	50.17	-9.50	16.35	57.02	74.0	1.0m./HORZ	17.0	**PK**
High Channel– PEAK								
2462.00	74.72	0.00	34.42	109.14	--	3.0m./HORZ	--	**PK**
*4924.00	50.81	0.00	7.64	58.45	74.0	3.0m./HORZ	15.6	**PK**
*7386.00	50.68	-9.50	15.51	56.69	74.0	3.0m./HORZ	17.3	**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

Sample Calculation at 2412.00 MHz:

Magnitude of Measured Frequency	77.85	dBuV
+Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	32.85	dB/m
Corrected Result	110.70	dBuV/m

Test Date: February25, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

Table 6. B Mode- Average Radiated Fundamental & Harmonic Emissions

Tested By: AF	Test: FCC Part 15,247(d)				Client: Reliance Worldwide Corporation			
	Project: 19-0040				Model: UFCV-1000			
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								
2412.00	61.51	0.00	32.85	94.36	--	3.0m./HORZ	--	**AVG**
*4824.00	29.02	0.00	4.57	33.59	54.0	3.0m./HORZ	20.4	**AVG**
*7236.00	29.50	-9.50	11.25	31.25	54.0	1.0m./HORZ	22.8	**AVG**
Mid Channel–Average								
2442.00	58.33	0.00	34.05	102.07	--	3.0m./HORZ	--	**AVG**
*4884.00	27.89	0.00	6.46	34.35	54.0	3.0m./HORZ	19.6	**AVG**
*7326.00	28.32	-9.50	16.35	35.17	54.0	1.0m./HORZ	18.8	**AVG**
High Channel–Average								
2462.00	56.89	0.00	34.42	91.31	--	3.0m./HORZ	--	**AVG**
*4924.00	28.17	0.00	7.64	35.81	54.0	3.0m./HORZ	18.2	**AVG**
*7386.00	28.01	-9.50	15.51	34.02	54.0	3.0m./HORZ	20.0	**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. Duty cycle applied where applicable.

Sample Calculation at 2412.00MHz:

Magnitude of Measured Frequency	61.51	dBuV
+Additional Factor (filter + duty cycle)	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain – Duty Cycle	32.85	dB/m
Corrected Result	94.36	dBuV/m

Test Date: February 25, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

Table 7. GMode - Peak Radiated Fundamental & Harmonic Emissions

Tested By: AF	Test: FCC Part 15,247(d)			Client: Reliance Worldwide Corporation				
	Project: 19-0040			Model: UFCV-1000				
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								
2412.00	72.06	0.00	32.85	104.91	--	3.0m./HORZ	--	**PK**
*4824.00	49.97	0.00	4.57	54.54	74.0	3.0m./HORZ	19.5	**PK**
*7236.00	50.64	-9.50	11.25	52.39	74.0	1.0m./HORZ	21.6	**PK**
Mid Channel – PEAK								
2442.00	72.65	0.00	34.05	106.70	--	3.0m./HORZ	--	**PK**
*4884.00	50.06	0.00	6.46	56.52	74.0	3.0m./HORZ	17.5	**PK**
*7326.00	35.76	-9.50	16.35	57.00	74.0	1.0m./HORZ	17.0	**PK**
High Channel– PEAK								
2462.00	71.68	0.00	34.42	106.10	--	3.0m./HORZ	--	**PK**
*4924.00	50.21	0.00	7.64	57.85	74.0	3.0m./HORZ	16.2	**PK**
*7386.00	50.16	-9.50	15.51	56.17	74.0	3.0m./HORZ	17.8	**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

Sample Calculation at 2412.00 MHz:

Magnitude of Measured Frequency	72.06	dBuV
+Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	32.85	dB/m
Corrected Result	104.91	dBuV/m

Test Date: February 25, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

Table 8. GMode - Average Radiated Fundamental & Harmonic Emissions

Tested By: AF	Test: FCC Part 15,247(d)			Client: Reliance Worldwide Corporation				
	Project: 19-0040			Model: UFCV-1000				
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								
2412.00	40.08	0.00	32.85	72.93	--	3.0m./HORZ	--	**AVG**
*4824.00	27.98	0.00	4.57	32.55	54.0	3.0m./HORZ	21.5	**AVG**
*7236.00	50.15	-9.50	11.25	29.90	54.0	1.0m./HORZ	24.1	**AVG**
Mid Channel –Average								
2442.00	39.81	0.00	34.05	73.86	--	3.0m./HORZ	--	**AVG**
*4884.00	27.92	0.00	6.46	34.38	54.0	3.0m./HORZ	19.6	**AVG**
*7326.00	27.94	-9.50	16.35	34.79	54.0	1.0m./HORZ	19.2	**AVG**
High Channel–Average								
2462.00	39.75	0.00	34.42	74.17	--	3.0m./HORZ	--	**AVG**
*4924.00	27.99	0.00	7.64	35.63	54.0	3.0m./HORZ	18.4	**AVG**
*7386.00	27.94	-9.50	15.51	33.95	54.0	3.0m./HORZ	20.0	**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. Duty cycle applied where applicable.

Sample Calculation at 2412.00 MHz:

Magnitude of Measured Frequency	40.08	dBuV
+Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	32.85	dB/m
Corrected Result	72.93	dBuV/m

Test Date: February 25, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

Table 9. N Mode - Peak Radiated Fundamental & Harmonic Emissions

Tested By: AF	Test: FCC Part 15,247(d)			Client: Reliance Worldwide Corporation				
	Project: 19-0040			Model: UFCV-1000				
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								
2412.00	71.29	0.00	32.85	104.14	--	3.0m./HORZ	--	**PK**
*4824.00	49.96	0.00	4.57	54.53	74.0	3.0m./HORZ	19.5	**PK**
*7236.00	50.19	-9.50	11.25	51.94	74.0	1.0m./HORZ	22.1	**PK**
Mid Channel – PEAK								
2442.00	70.62	0.00	34.05	104.67	--	3.0m./HORZ	--	**PK**
*4884.00	50.12	0.00	6.46	56.58	74.0	3.0m./HORZ	17.4	**PK**
*7326.00	49.32	-9.50	16.35	56.17	74.0	1.0m./HORZ	17.8	**PK**
High Channel– PEAK								
2462.00	70.29	0.00	34.42	104.71	--	3.0m./HORZ	--	**PK**
*4924.00	50.65	0.00	7.64	58.29	74.0	3.0m./HORZ	15.7	**PK**
*7386.00	49.97	-9.50	15.51	55.98	74.0	3.0m./HORZ	18.0	**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

Sample Calculation at 2412.00 MHz:

Magnitude of Measured Frequency	71.29	dBuV
+Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	32.85	dB/m
Corrected Result	104.14	dBuV/m

Test Date: February 25, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

Table 10. NMode – Average Radiated Fundamental & Harmonic Emissions

Tested By: AF	Test: FCC Part 15,247(d)			Client: Reliance Worldwide Corporation				
	Project: 19-0040			Model: UFCV-1000				
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								
2412.00	40.81	0.00	32.85	73.66	--	3.0m./HORZ	--	**AVG**
*4824.00	29.43	0.00	4.57	34.00	54.0	3.0m./HORZ	20.0	**AVG**
7236.00	29.55	-9.50	11.25	31.30	54.0	1.0m./HORZ	22.7	**AVG**
Mid Channel –Average								
2442.00	40.41	0.00	34.05	74.46	--	3.0m./HORZ	--	**AVG**
*4884.00	29.64	0.00	6.46	36.10	54.0	3.0m./HORZ	17.9	**AVG**
*7326.00	29.46	-9.50	16.35	36.31	54.0	1.0m./HORZ	17.7	**AVG**
High Channel–Average								
2462.00	40.80	0.00	34.42	75.22	--	3.0m./HORZ	--	**AVG**
*4924.00	29.68	0.00	7.64	37.32	54.0	3.0m./HORZ	16.7	**AVG**
*7386.00	29.54	-9.50	15.51	35.55	54.0	3.0m./HORZ	18.4	**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. Duty cycle applied where applicable.

Sample Calculation at 2412.00 MHz:

Magnitude of Measured Frequency	40.81	dBuV
+Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	32.85	dB/m
Corrected Result	73.66	dBuV/m

Test Date: February 25, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

2.11 Band Edge Measurements – (CFR 15.247 (d))

Band Edge measurements are made following the guidelines in ANSI C63.10-2013 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. Radiated measurements are performed to demonstrate compliance with the requirement of 15.247(d) that all emissions outside of the band edges be attenuated by at least 20 dB when compared to its highest in-band value (contained in a 100 kHz band). Because these frequencies occur above 1000 MHz they have both a peak and average requirement.

To capture the band edge set the Spectrum Analyzer frequency span large enough (usually around 10 MHz) to capture the peak level of the emission operating on the channel closest to the band edge as well as any modulation products falling outside of the authorized band of operation.

The screen shots are presented below.

Test Date: February 26, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

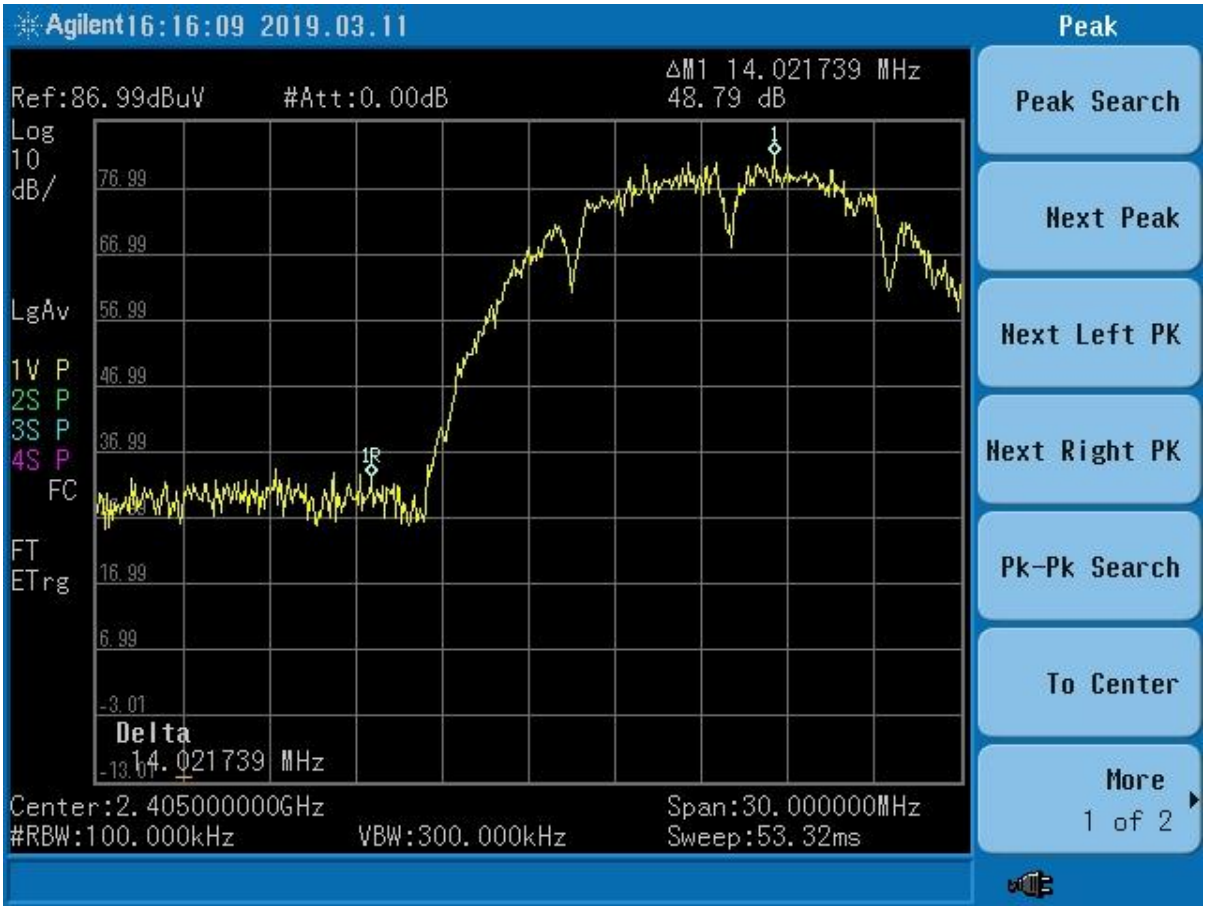


Figure 20. Band Edge Compliance – B Mode Low Channel Delta

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

Measured Result	48.79	dB
Band Edge Limit	20.00	dB
Band Edge Margin	28.79	dB

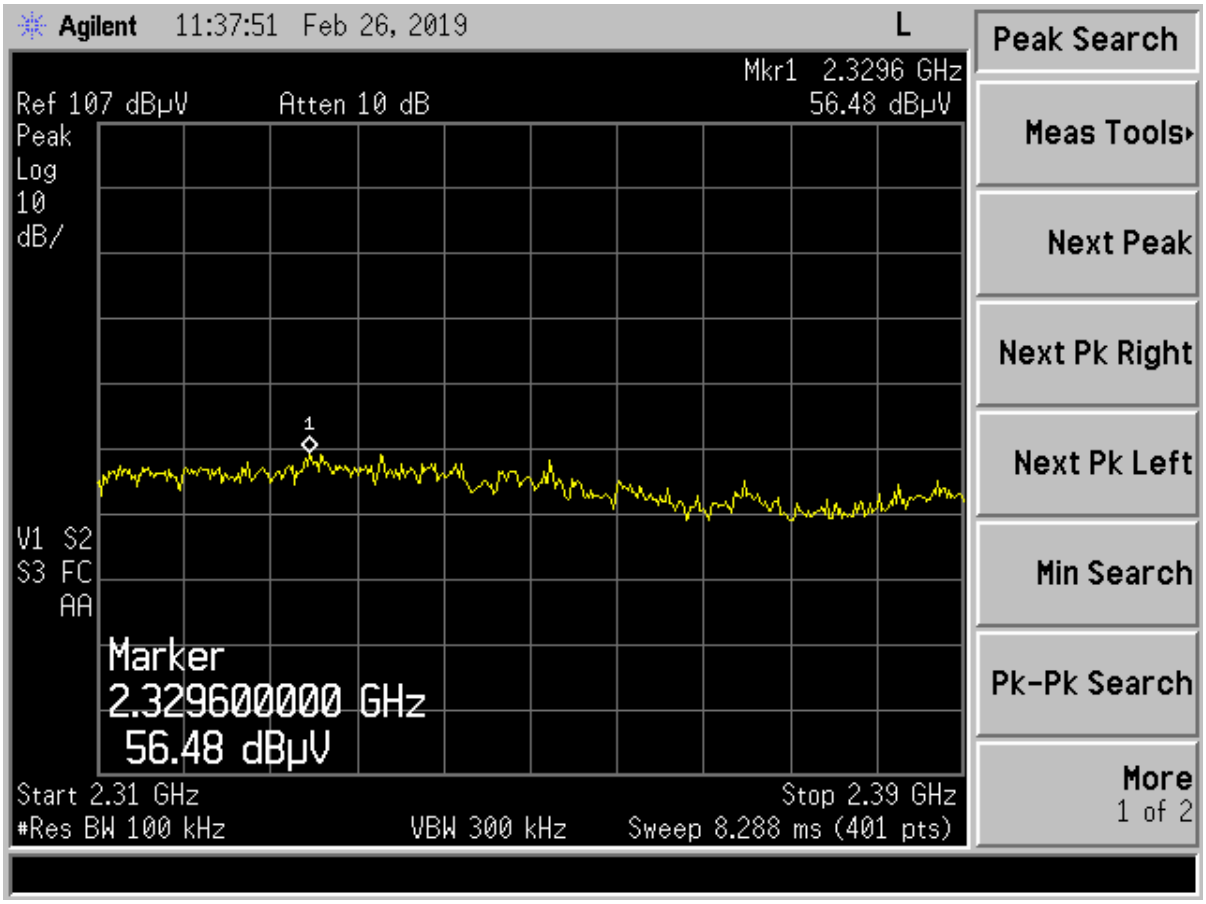


Figure 21. B Mode Low Channel Restricted Band - Peak

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
2329.60	56.48	-2.63	53.85	74.0	3.0m./HORZ	20.1	**PK**

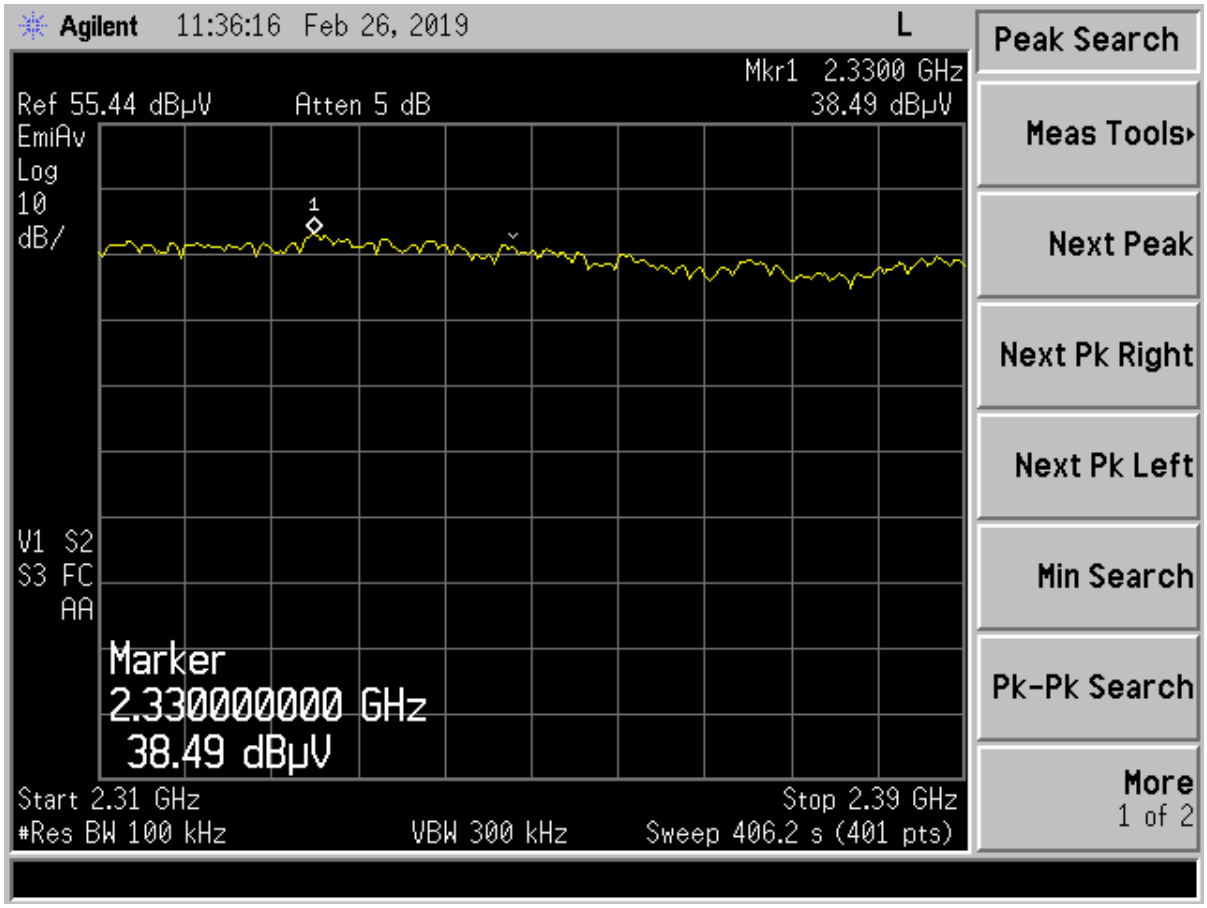


Figure 22. B Mode Low Channel Restricted Band–Average

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
2330.00	38.49	-2.63	35.86	54.0	3.0m./HORZ	18.1	**AVG**

Figure 23. Band Edge Compliance – B Mode High Channel Delta

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

Measured Result	51.74	dB
Band Edge Limit	20.00	dB
Band Edge Margin	31.74	dB

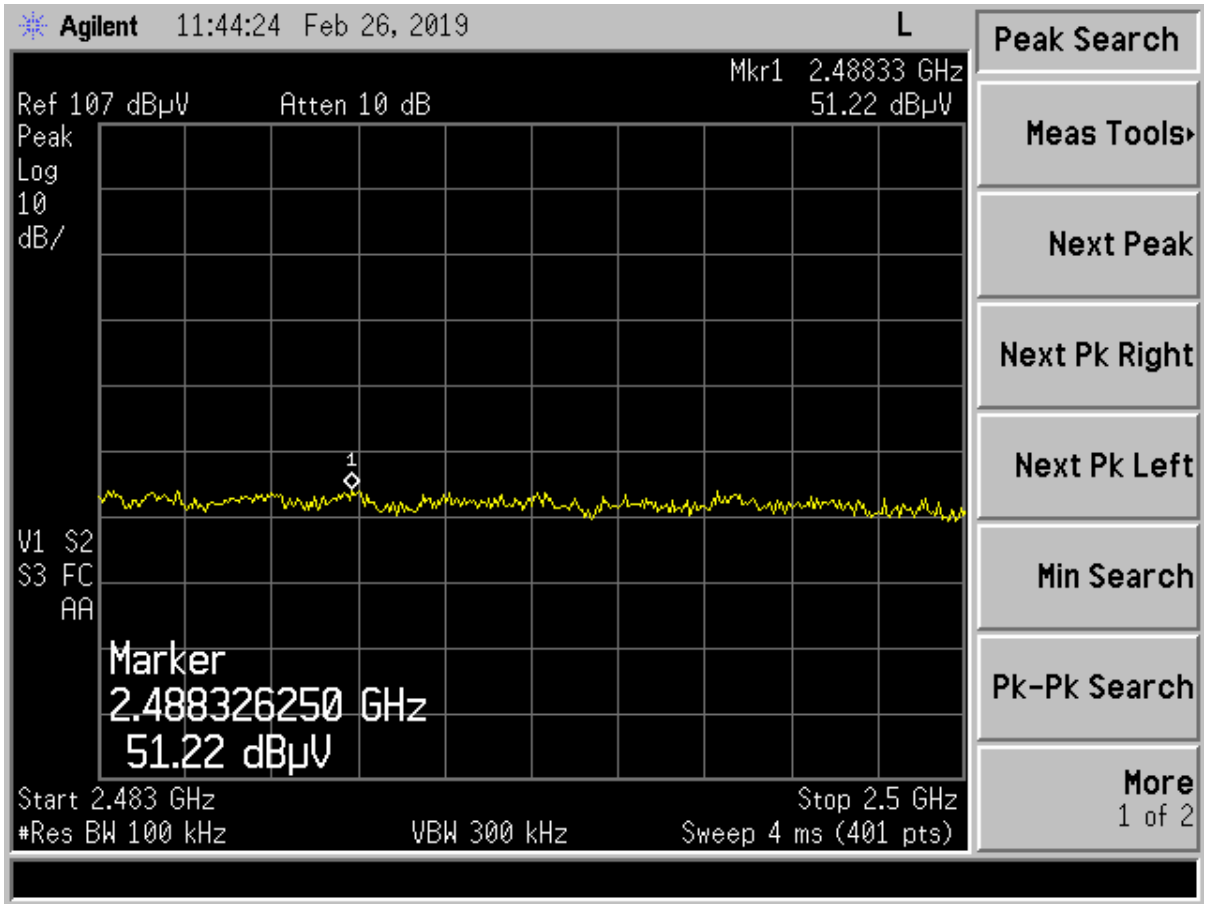


Figure 24. B Mode High Channel Restricted Band –Peak

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
2488.33	51.22	-1.63	49.59	74.0	3.0m./HORZ	24.4	**PK**

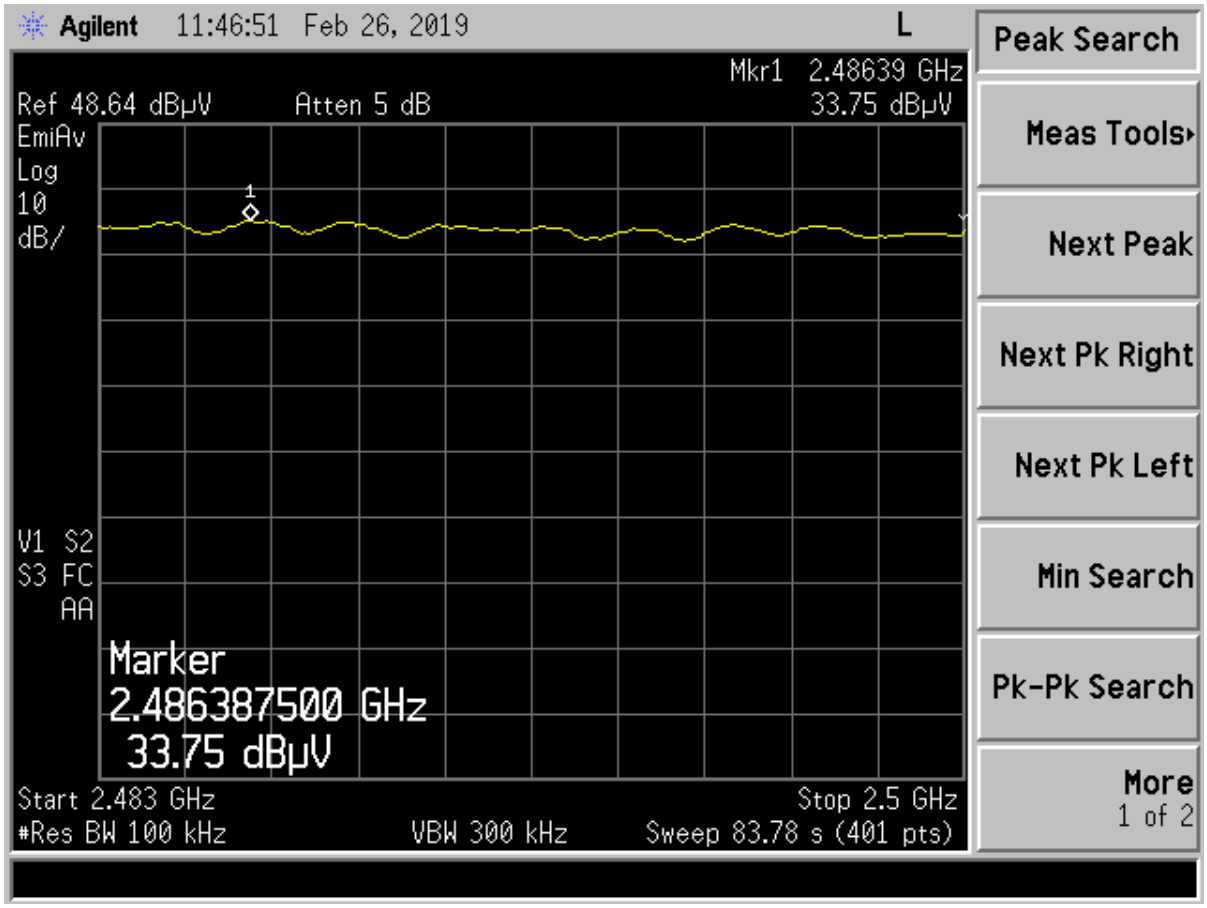


Figure 25. B Mode High Channel Restricted Band –Average

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
2486.39	33.75	-1.63	32.12	54.0	3.0m./HORZ	21.9	**AVG**

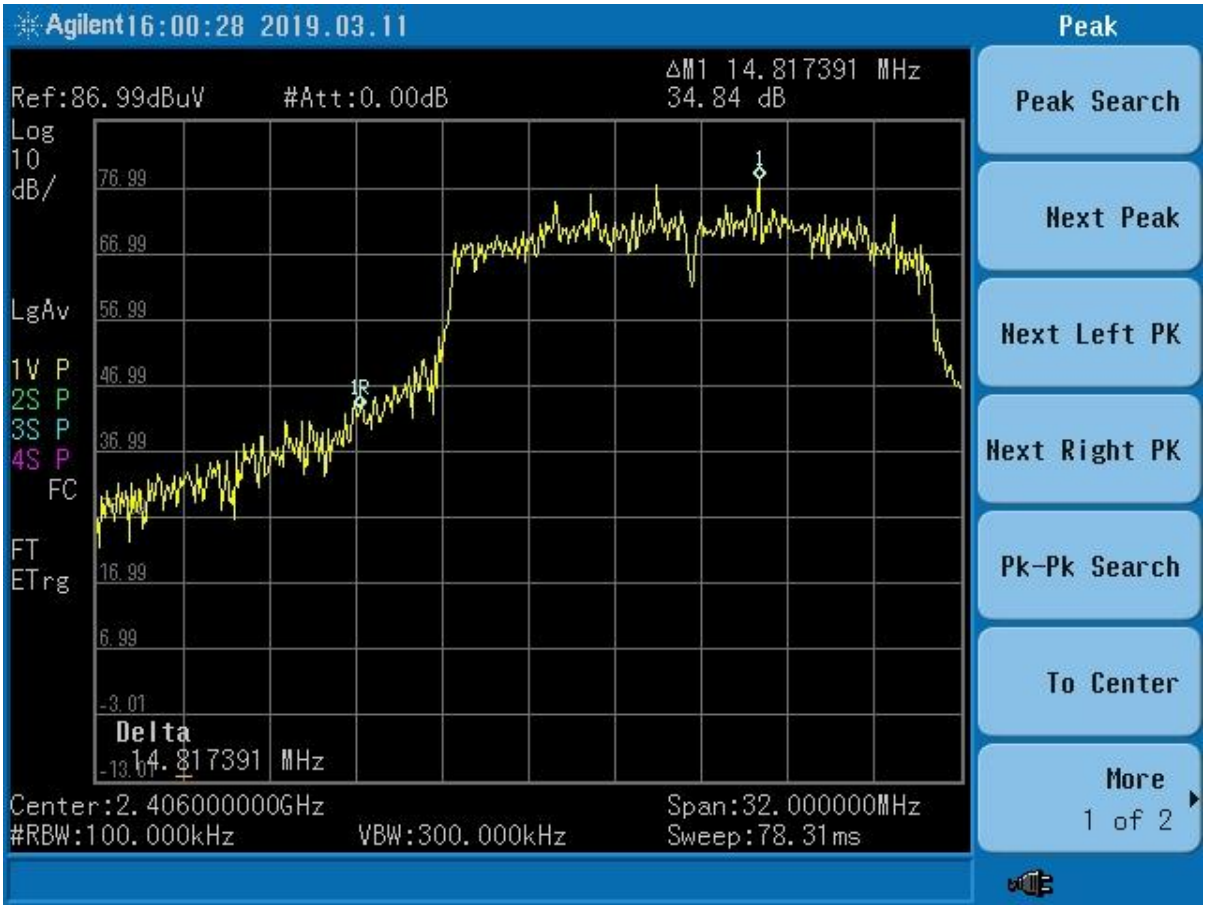


Figure 26. Band Edge Compliance – G Mode Low Channel Delta

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

Measured Result	34.84	dB
Band Edge Limit	20.00	dB
Band Edge Margin	14.84	dB

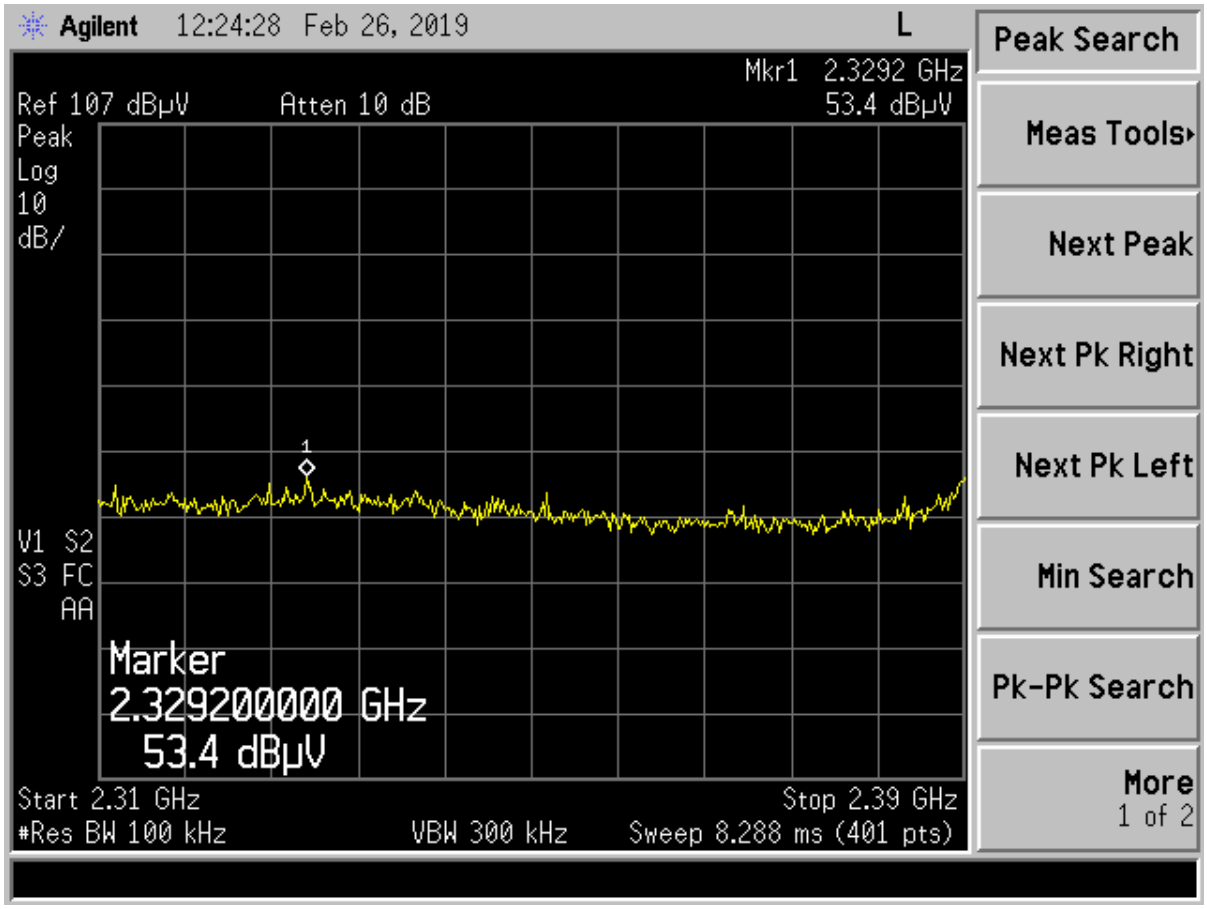


Figure 27. G Mode Low Channel Restricted Band – Peak

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
2329.20	53.40	-2.63	50.77	74.0	3.0m./HORZ	23.2	**PK**

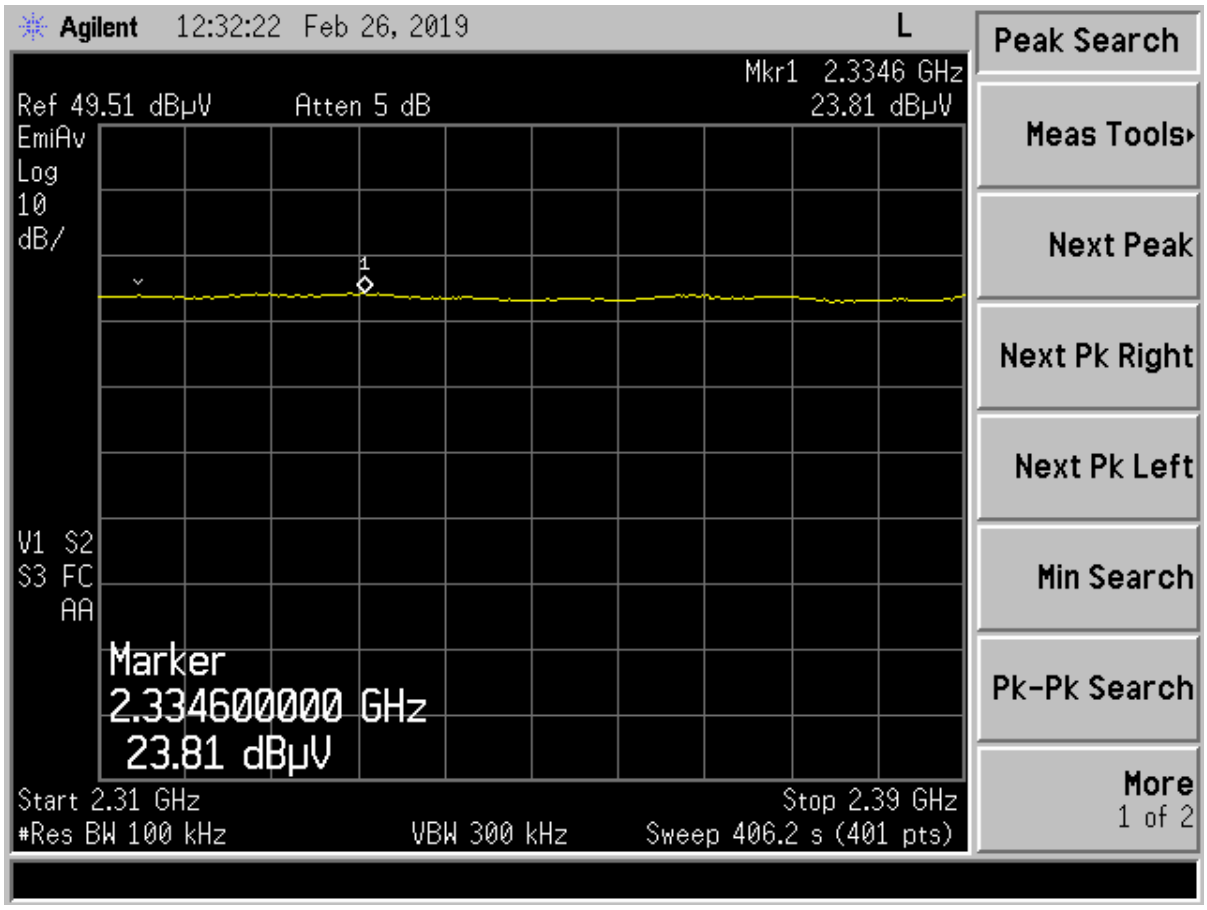


Figure 28. G Mode Low Channel Restricted Band – Average

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
2334.60	23.81	-2.63	21.18	54.0	3.0m./HORZ	32.8	**AVG**

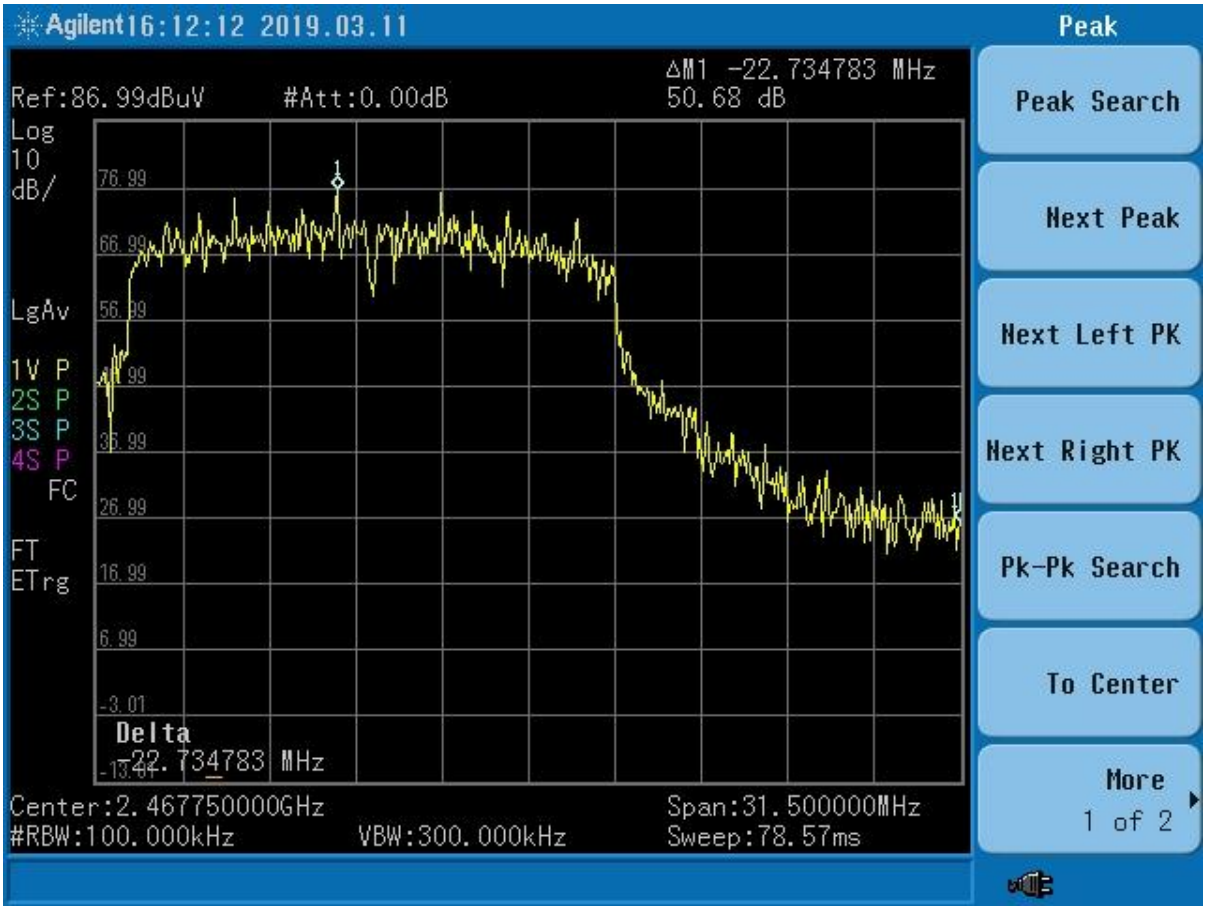


Figure 29. Band Edge Compliance – G Mode High Channel Delta

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

Measured Result	50.68	dB
Band Edge Limit	20.00	dB
Band Edge Margin	30.68	dB

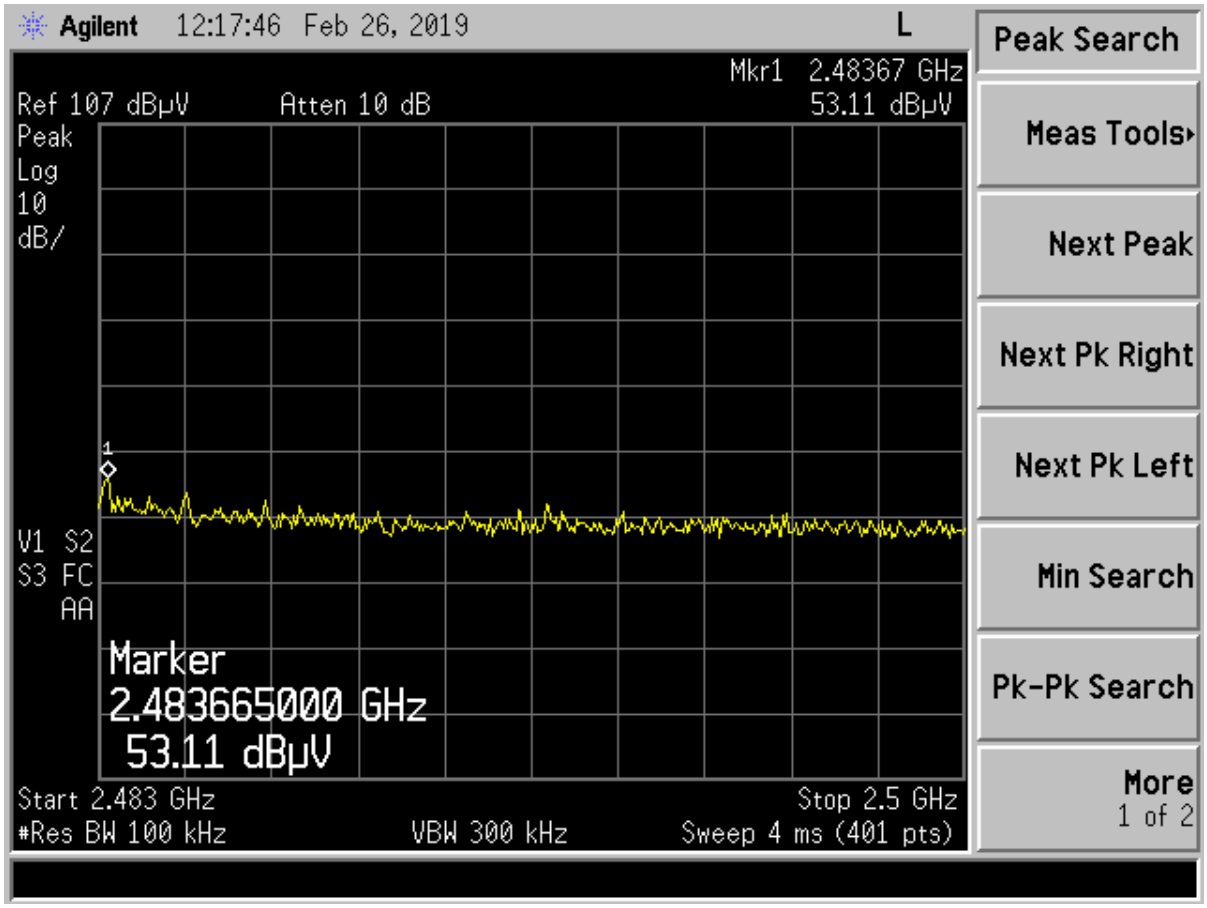


Figure 30.G Mode High Channel Restricted Band – Peak

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
2483.67	53.11	-1.63	51.48	74.0	3.0m./HORZ	22.5	**PK**

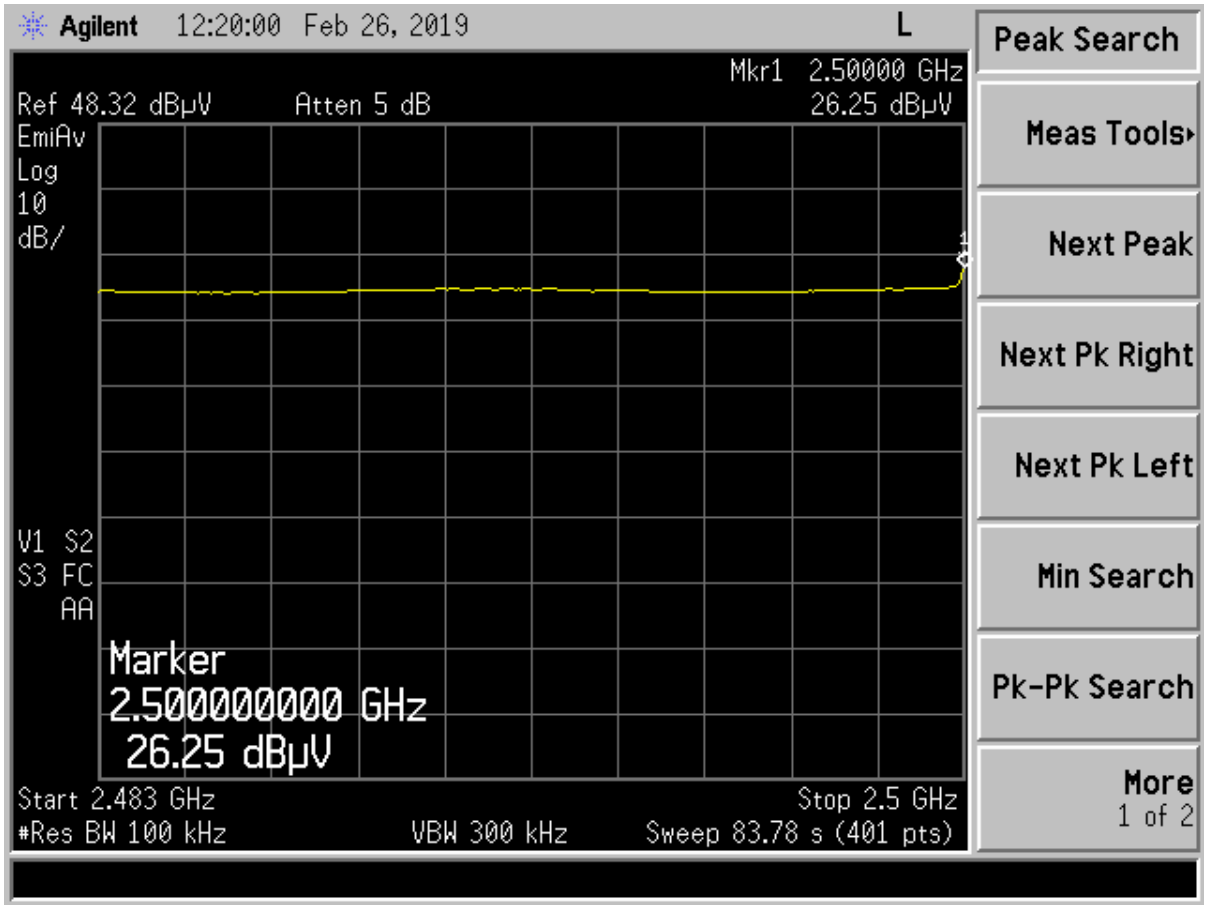


Figure 31. G Mode High Channel Restricted Band – Average

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
2500.00	26.25	-1.31	24.94	54.0	3.0m./HORZ	29.1	**AVG**

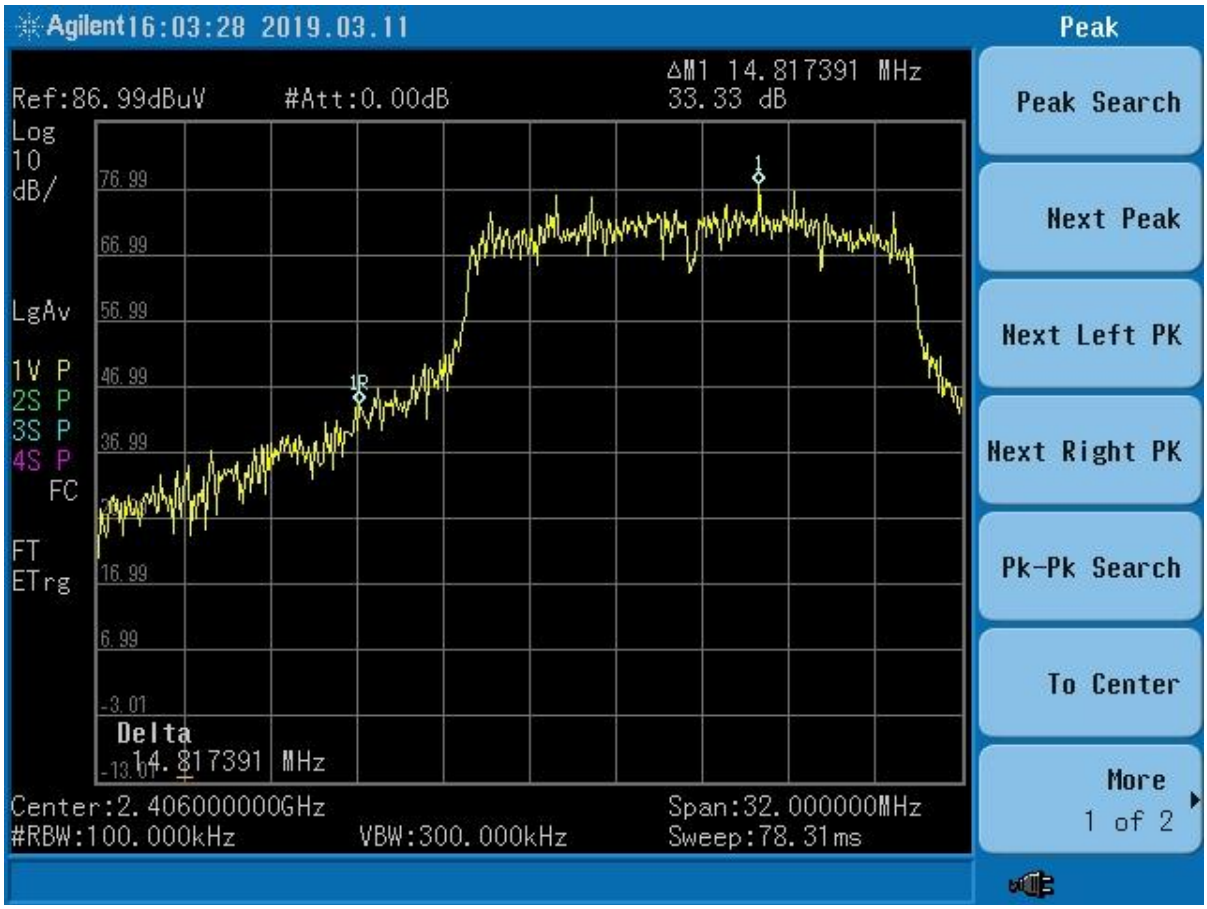


Figure 32. Band Edge Compliance – N Mode Low Channel Delta

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

Measured Result	33.33	dB
Band Edge Limit	20.00	dB
Band Edge Margin	13.33	dB

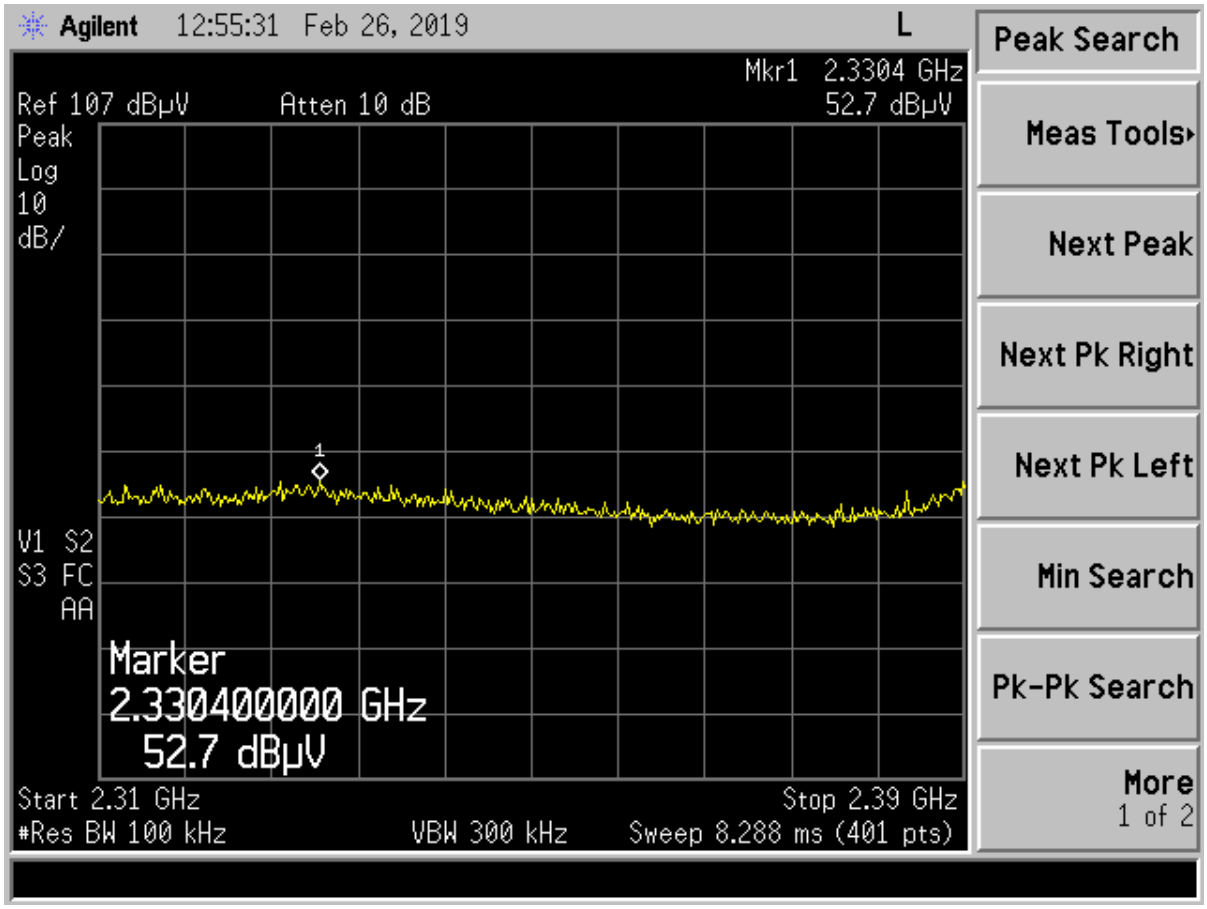


Figure 33. N Mode Low Channel Restricted Band – Peak

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
2330.40	52.70	-2.63	50.07	74.0	3.0m./HORZ	23.9	**PK**

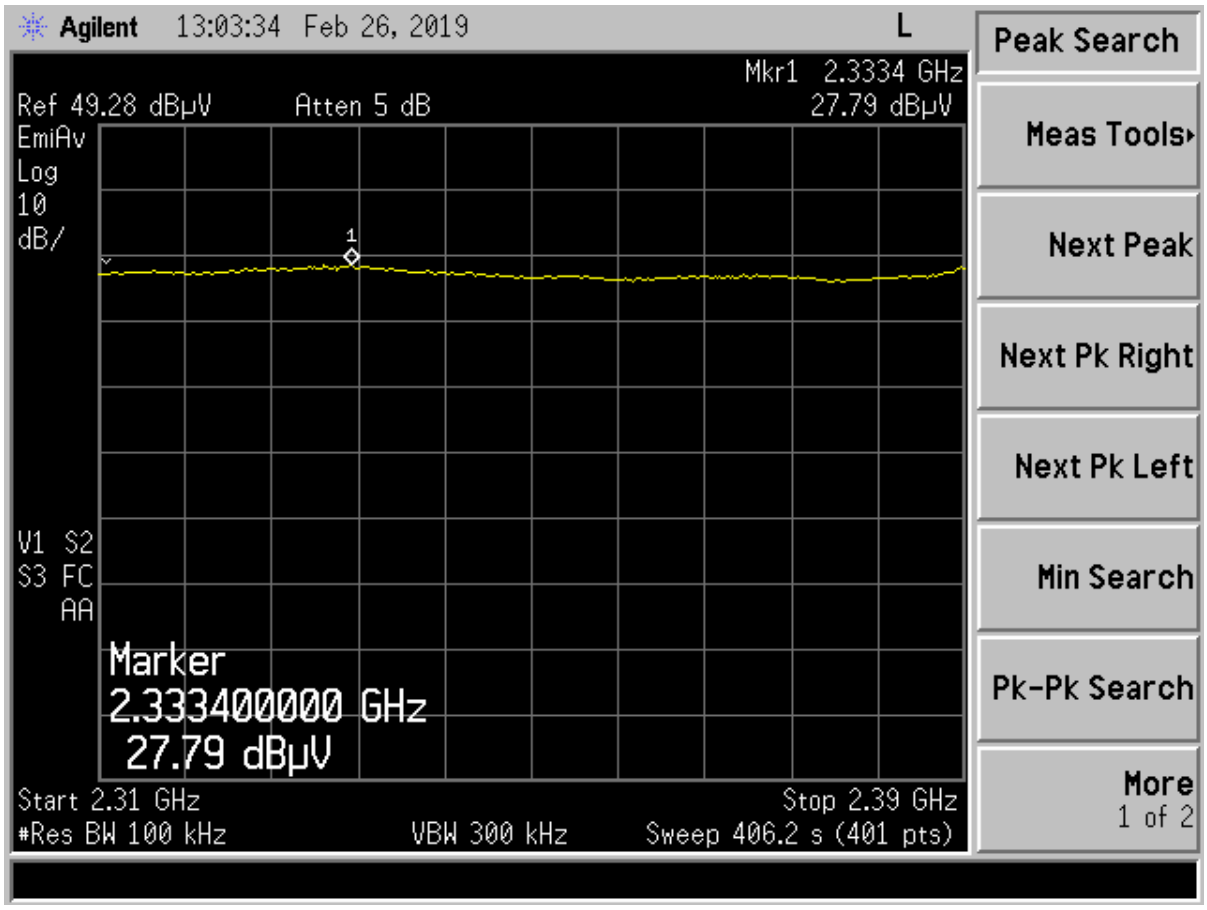


Figure 34. N Mode Low Channel Restricted Band – Average

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
2333.40	27.79	-2.63	25.16	54.0	3.0m./HORZ	28.8	**AVG**

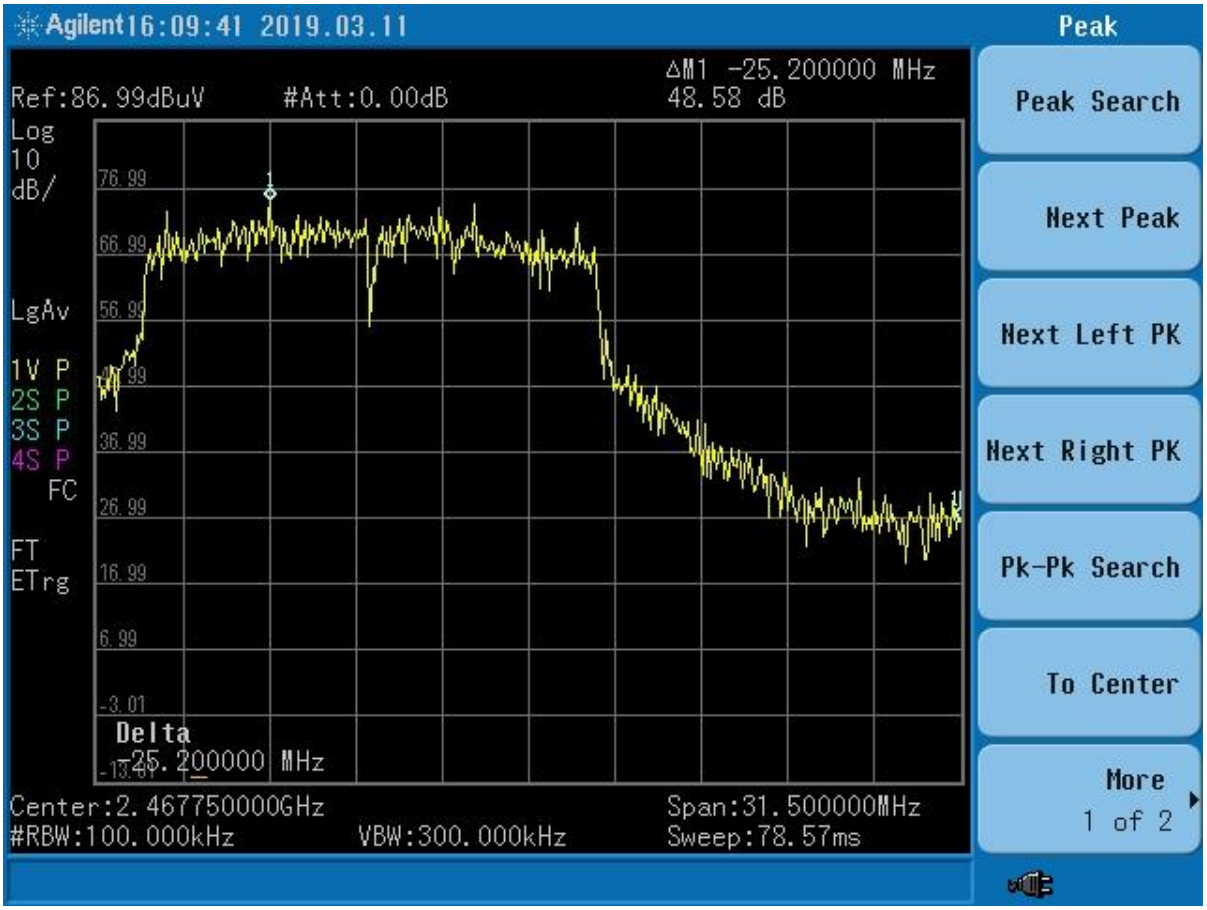


Figure 35. Band Edge Compliance – N Mode High Channel Delta – Peak

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

Measured Result	48.58	dB
Band Edge Limit	20.00	dB
Band Edge Margin	28.58	dB

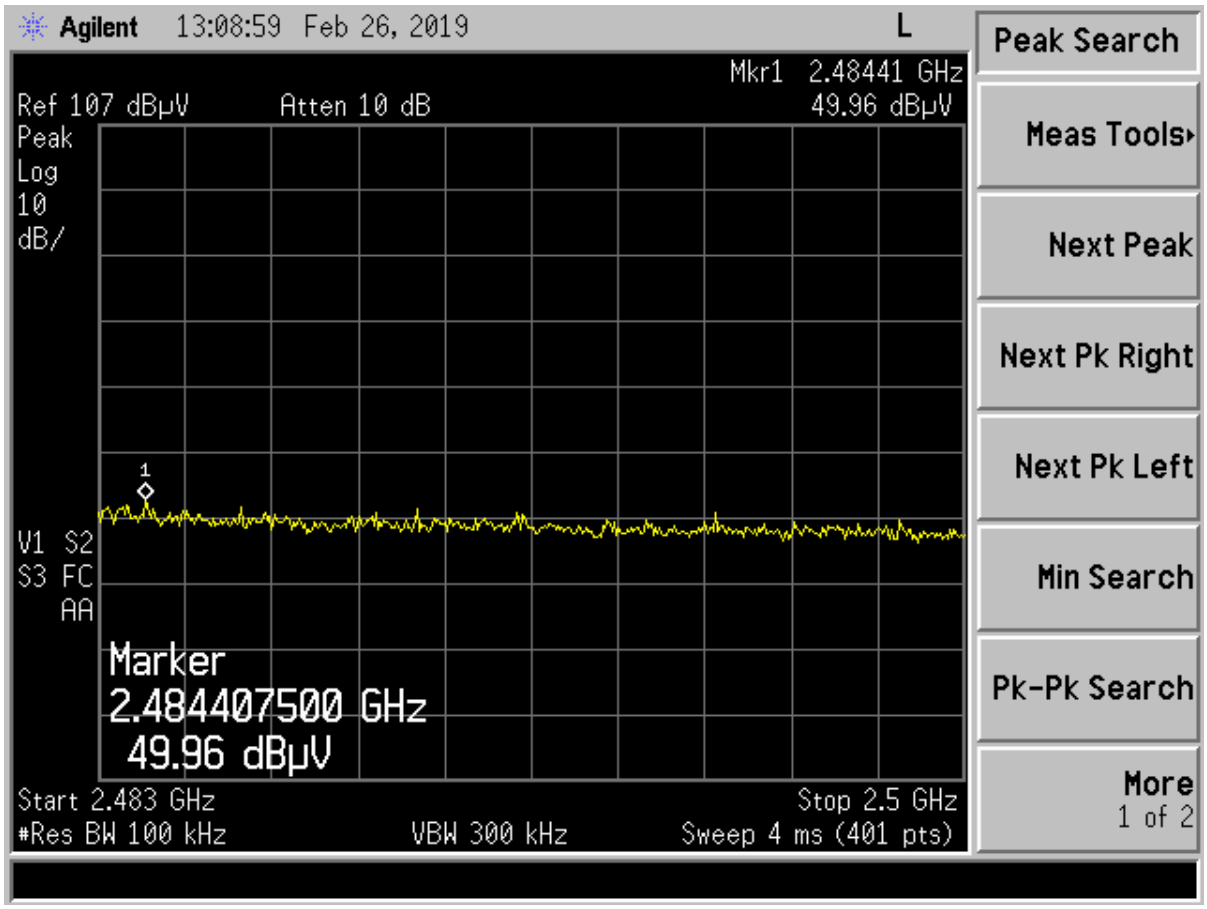


Figure 36. N Mode High Channel Restricted Band – Peak

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
2484.41	49.96	-1.63	48.33	74.0	3.0m./HORZ	25.7	**PK**

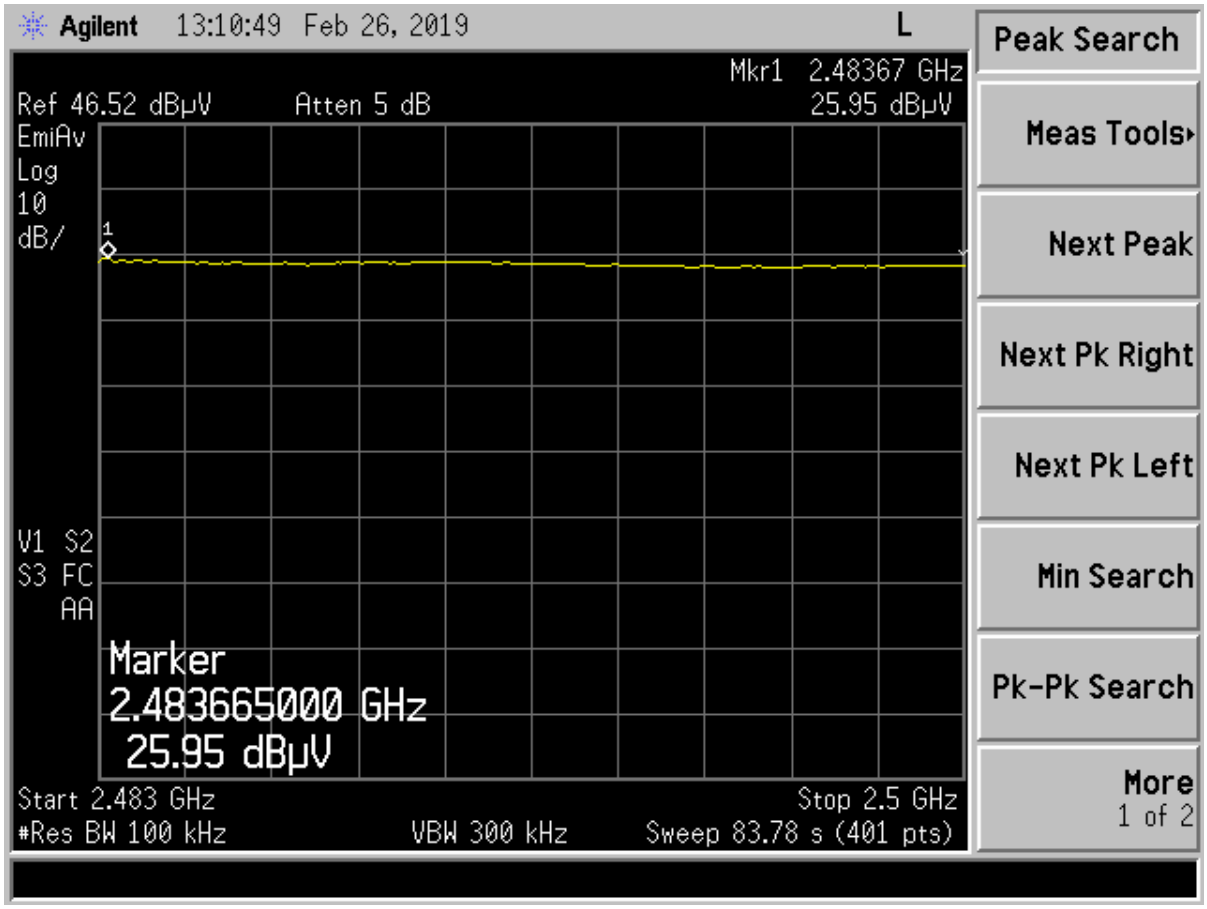


Figure 37. N Mode High Channel Restricted Band – Average

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
2483.67	25.95	-1.63	24.32	54.0	3.0m./HORZ	29.7	**AVG**

2.12 Six (6) dB Bandwidth per CFR 15.247(a)(2)

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.

Table 11. Six (6) dB Bandwidth

Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum FCC Bandwidth (MHz)	Mode
2412	9.080	0.5	b
2442	9.117	0.5	b
2462	9.085	0.5	b
2412	15.332	0.5	g
2442	15.149	0.5	g
2462	15.125	0.5	g
2412	15.112	0.5	n
2442	15.141	0.5	n
2462	15.124	0.5	n

Test Date: February 28, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

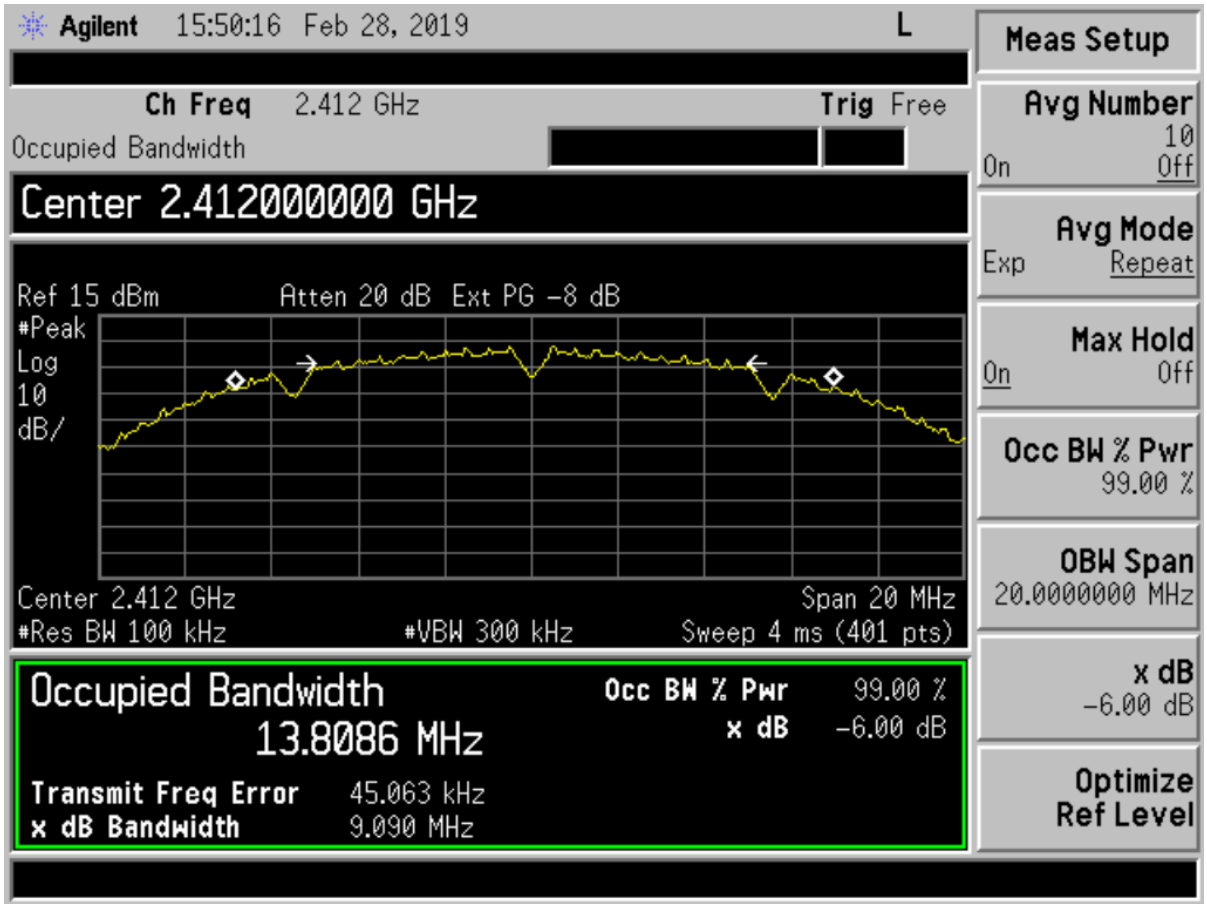


Figure 38. 6 dB Bandwidth b Mode Low Channel

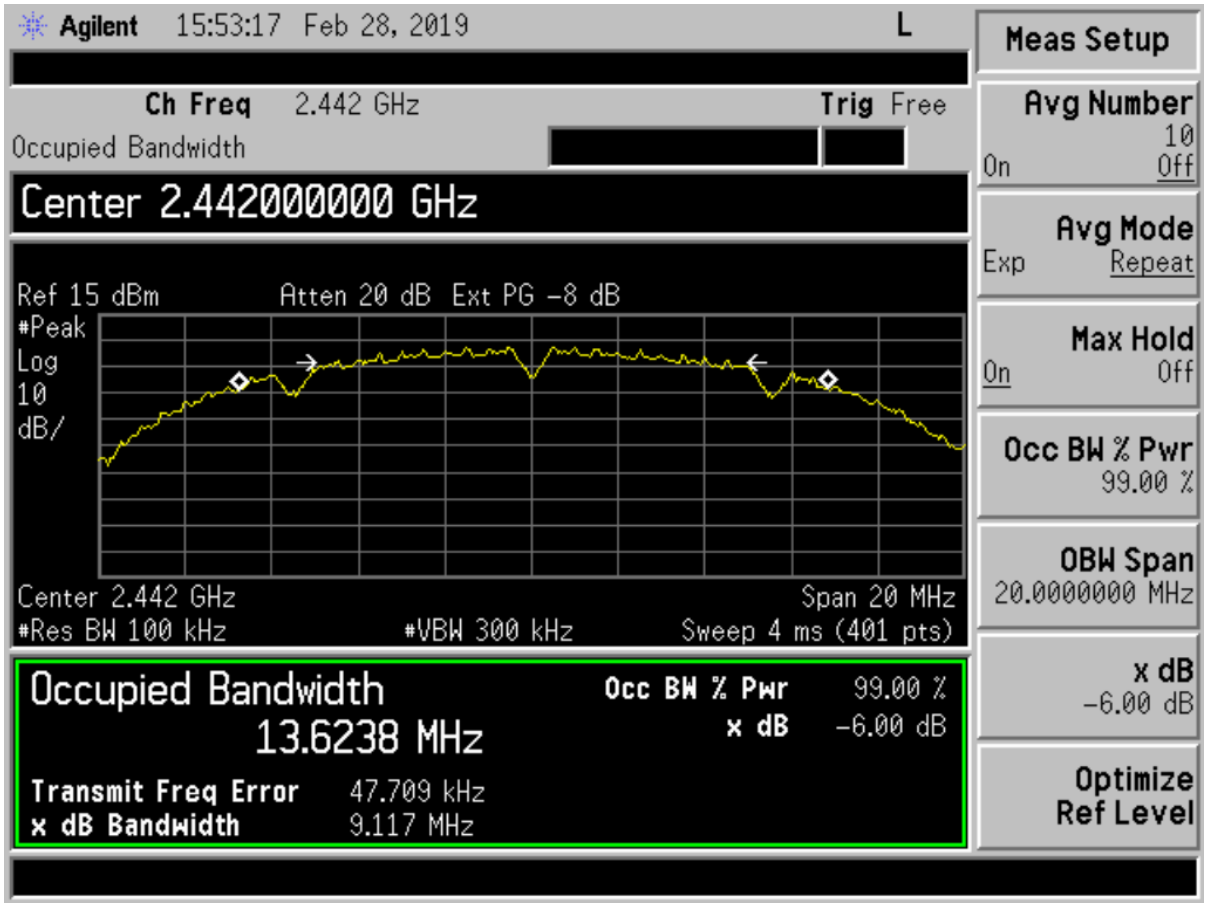


Figure 39. 6 dB Bandwidth b Mode Mid Channel

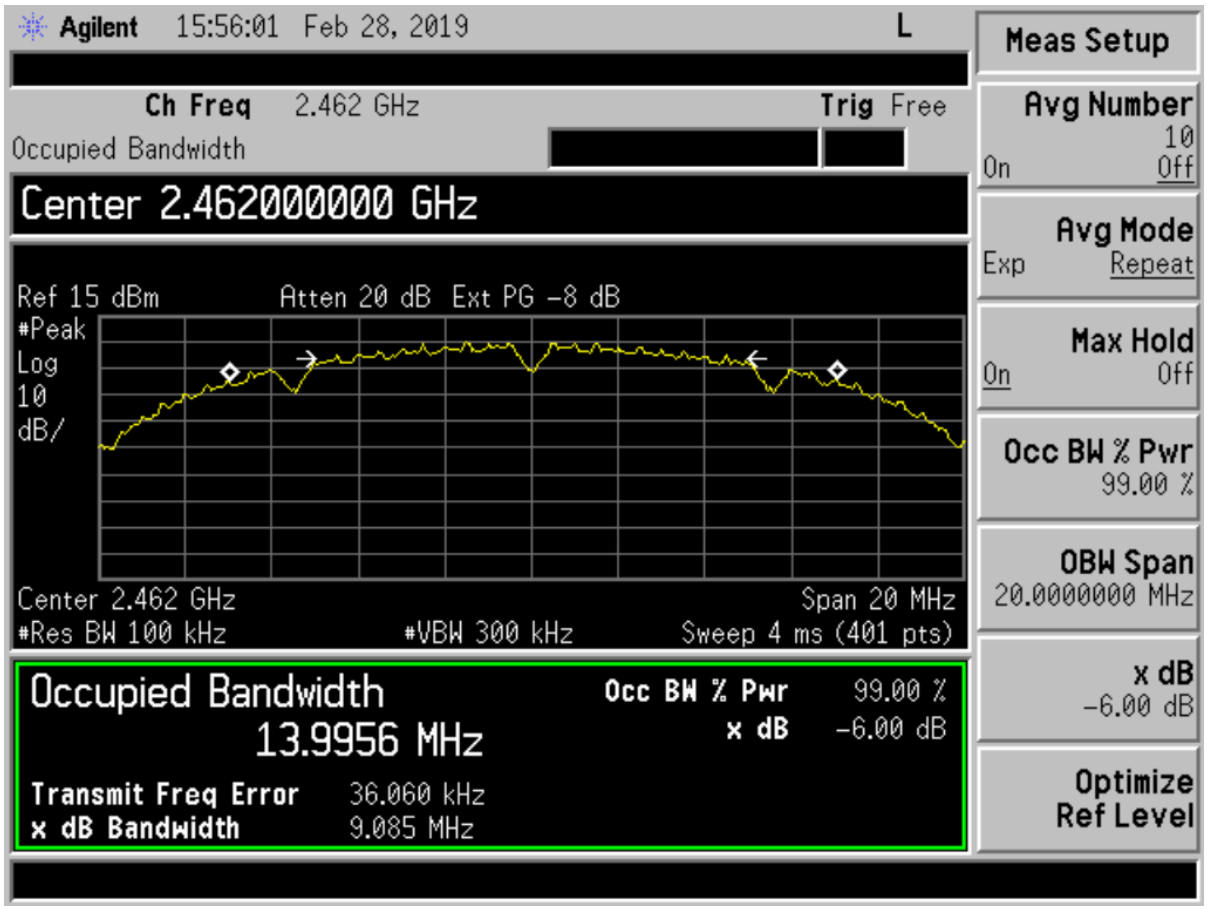


Figure 40. 6 dB Bandwidth b Mode High Channel

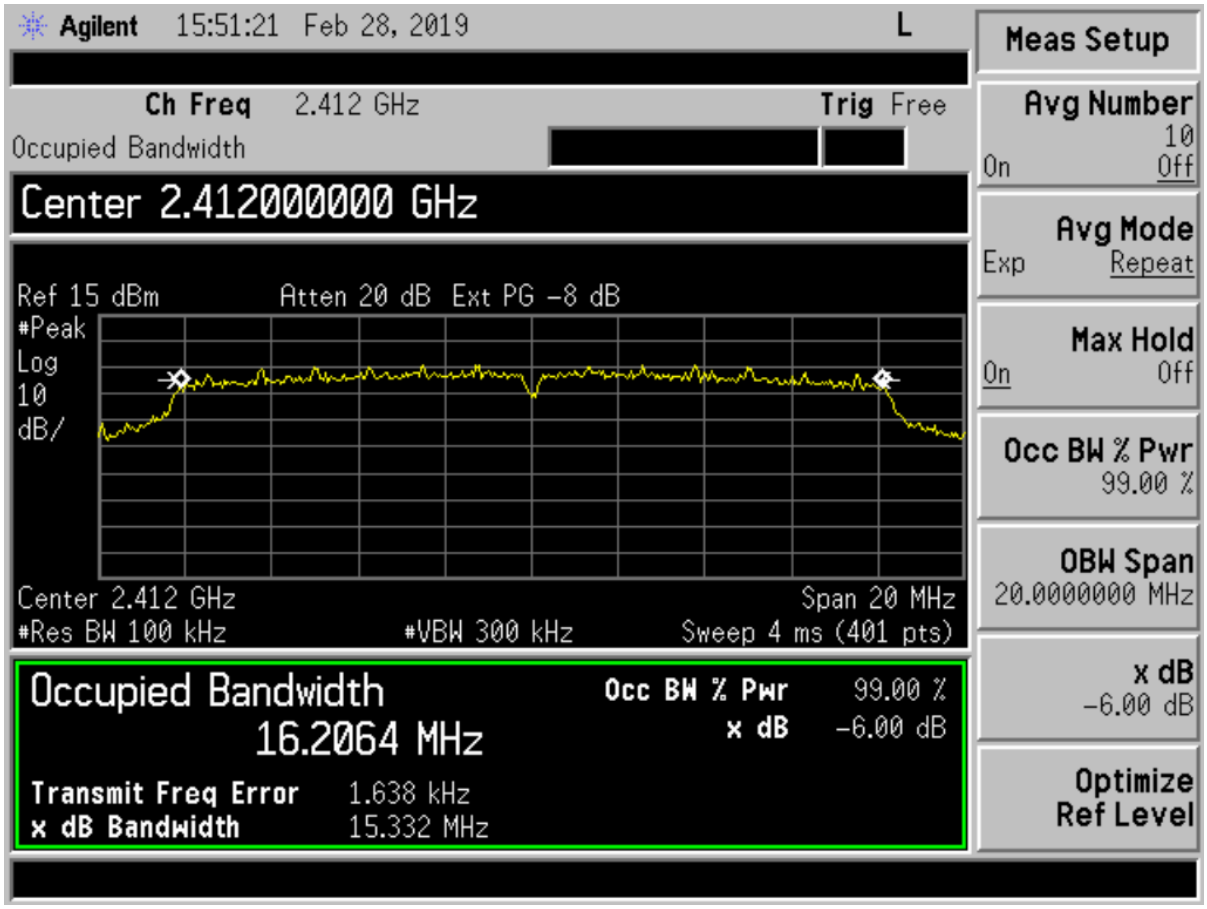


Figure 41. 6 dB Bandwidth g Mode Low Channel

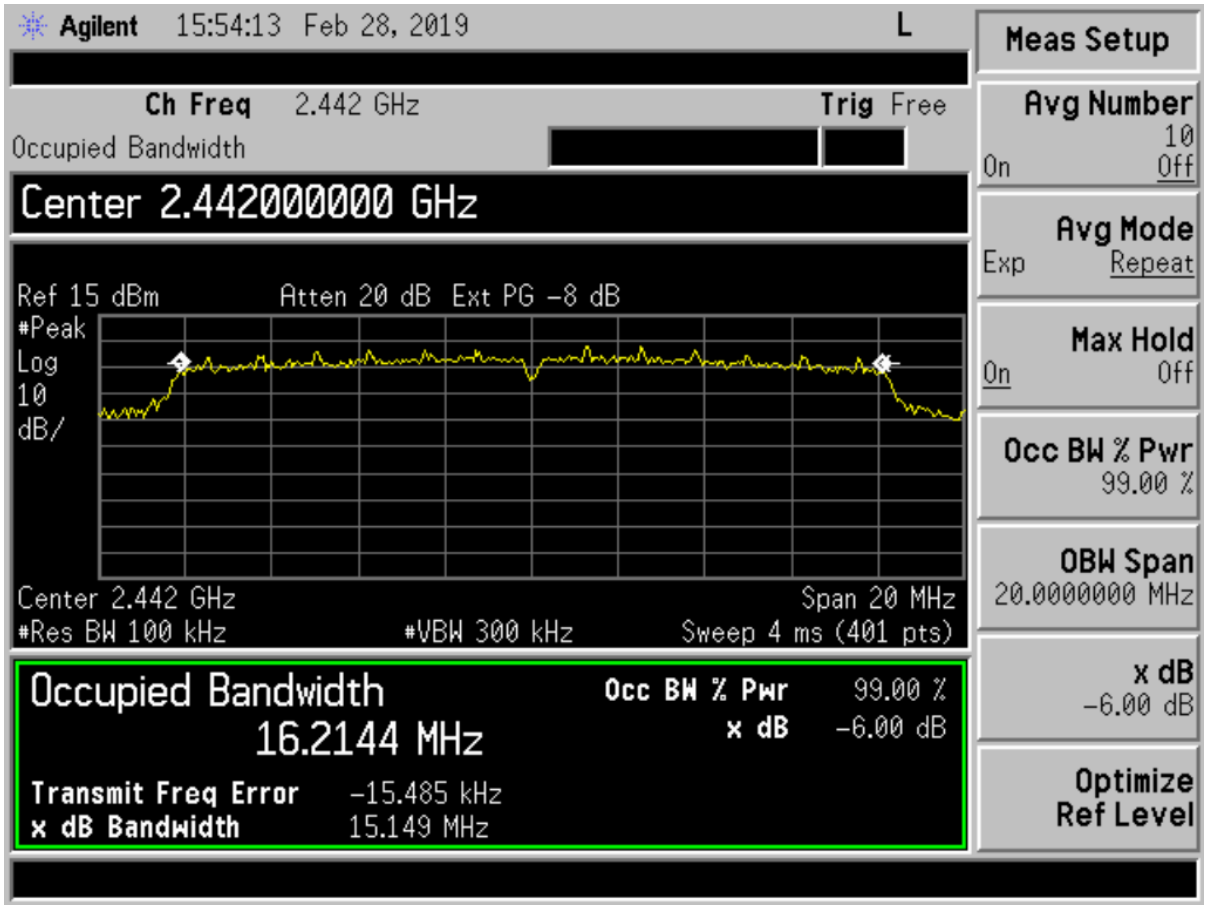


Figure 42.6 dB Bandwidth g Mode Mid Channel

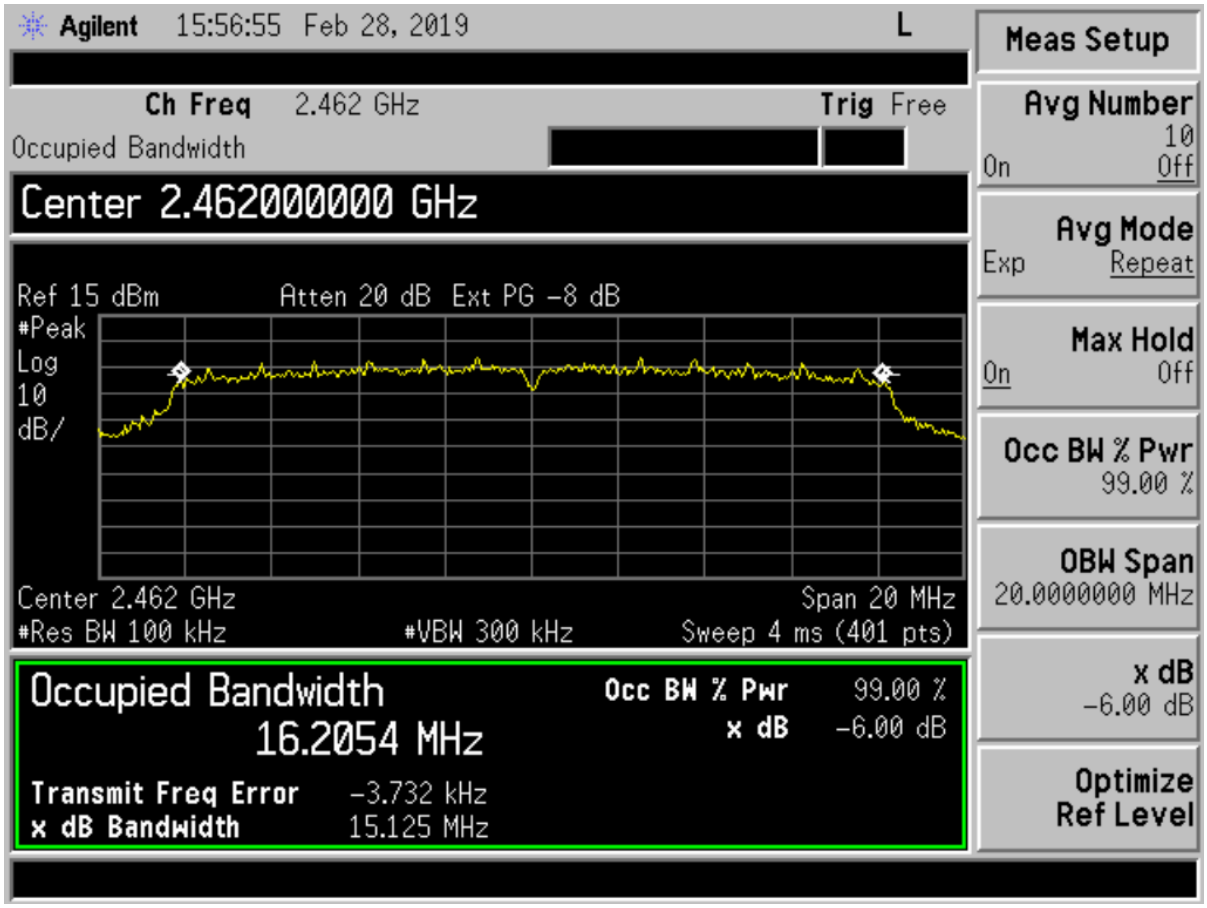


Figure 43. 6 dB Bandwidth g Mode High Channel

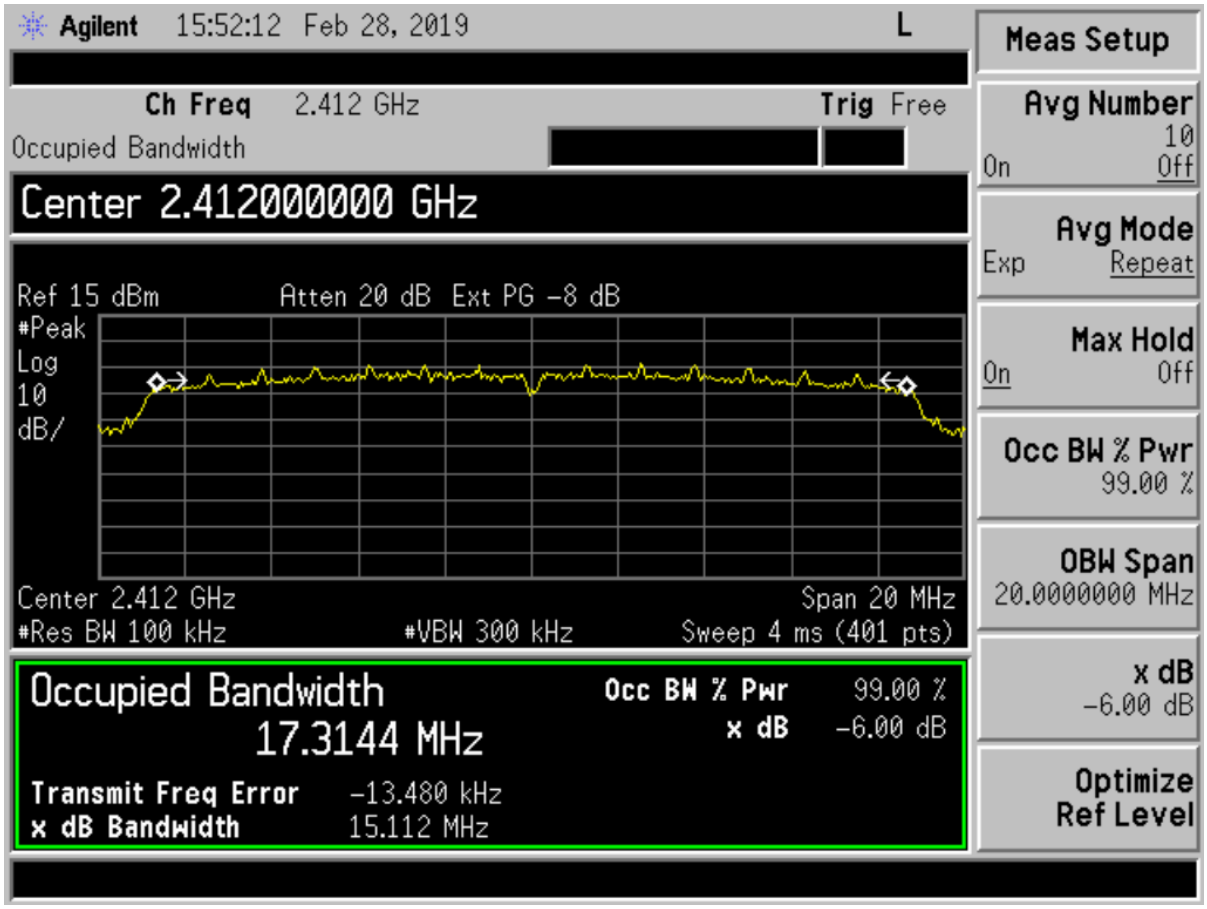


Figure 44. 6 dB Bandwidth n Mode Low Channel

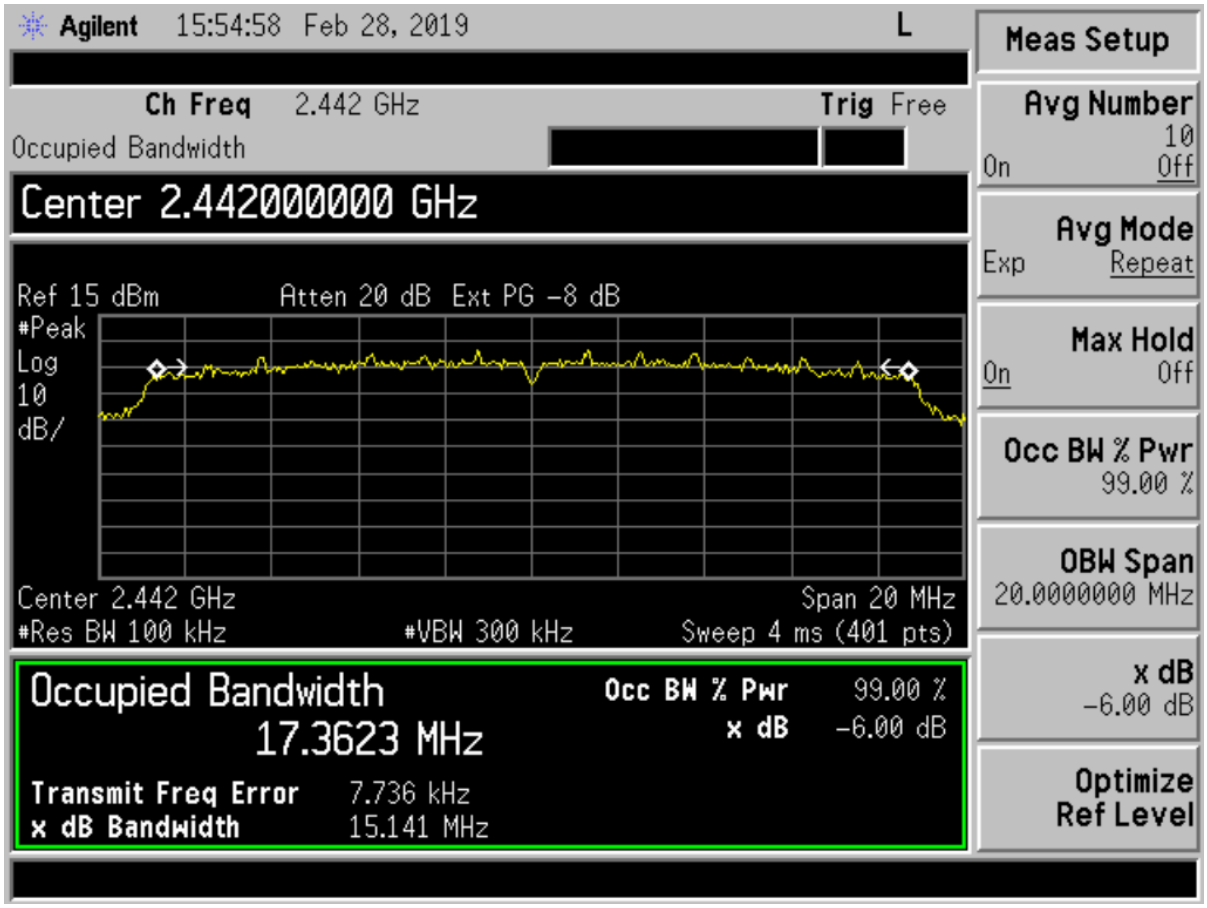


Figure 45. 6 dB Bandwidth n Mode Mid Channel

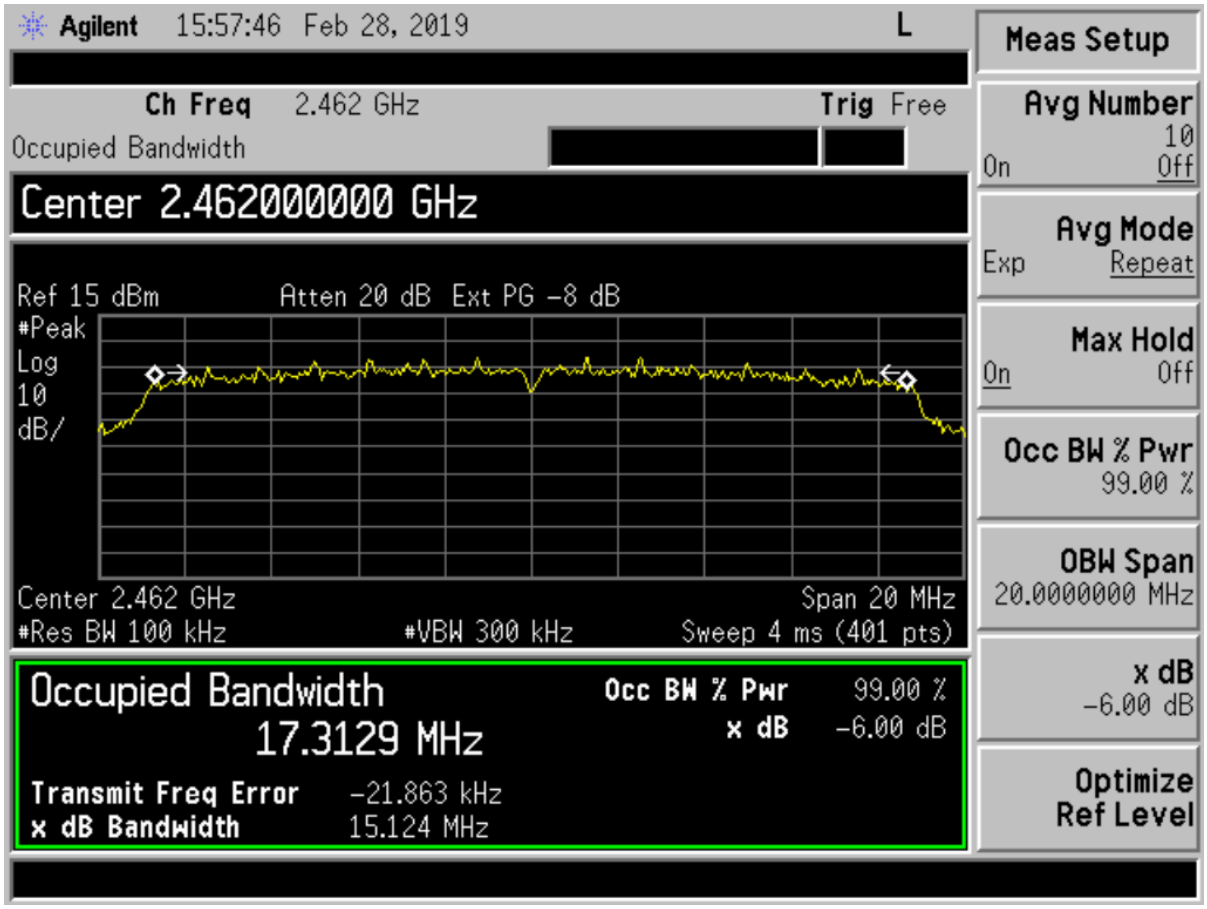


Figure 46. 6 dB Bandwidth n Mode High Channel

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. 558074v05 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 11 and presented in the figures in section 2.12 above.

Table 12. 99% Occupied Bandwidth

Frequency (MHz)	99% Occupied Bandwidth (MHz)	Mode
2412	13.809	b
2442	13.624	b
2462	13.996	b
2412	16.206	g
2442	16.214	g
2462	16.206	g
2412	17.314	n
2442	17.362	n
2462	17.313	n

Test Date: February 28, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

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**20** see example script used:tx_80211b/g/n_start.bat 4343WA1 12(com#) 1(ch#) **20**(pwr#). This is the level which the EUT was set to 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.

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	13.49	22.34	1000	b
2442	14.25	26.61	1000	b
2462	14.57	28.64	1000	b
2412	9.93	9.84	1000	g
2442	15.06	32.06	1000	g
2462	10.43	11.04	1000	g
2412	9.98	9.95	1000	n
2442	13.65	23.17	1000	n
2462	9.99	9.98	1000	n

Test Date: March6, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

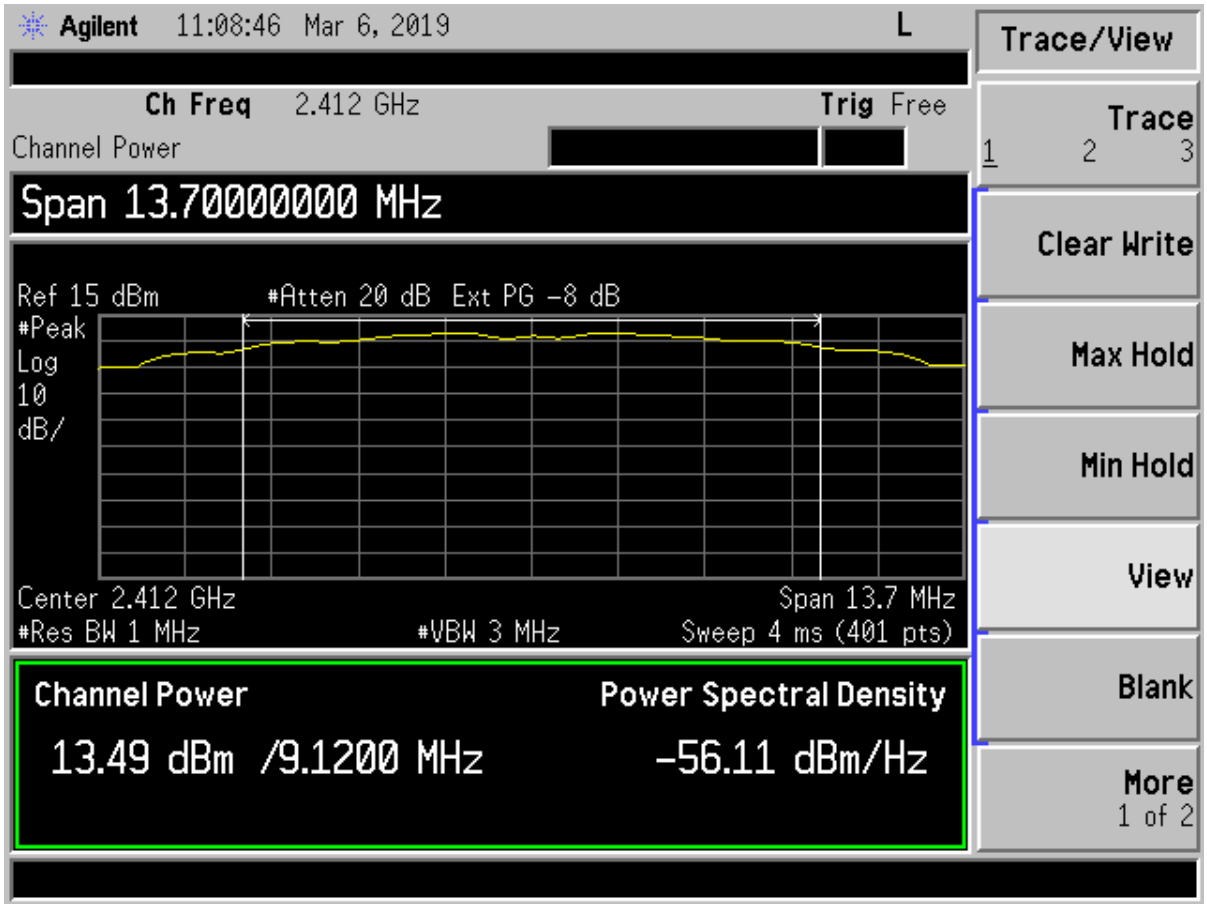


Figure 47. Peak Antenna Conducted Output Power, b ModeLow Channel

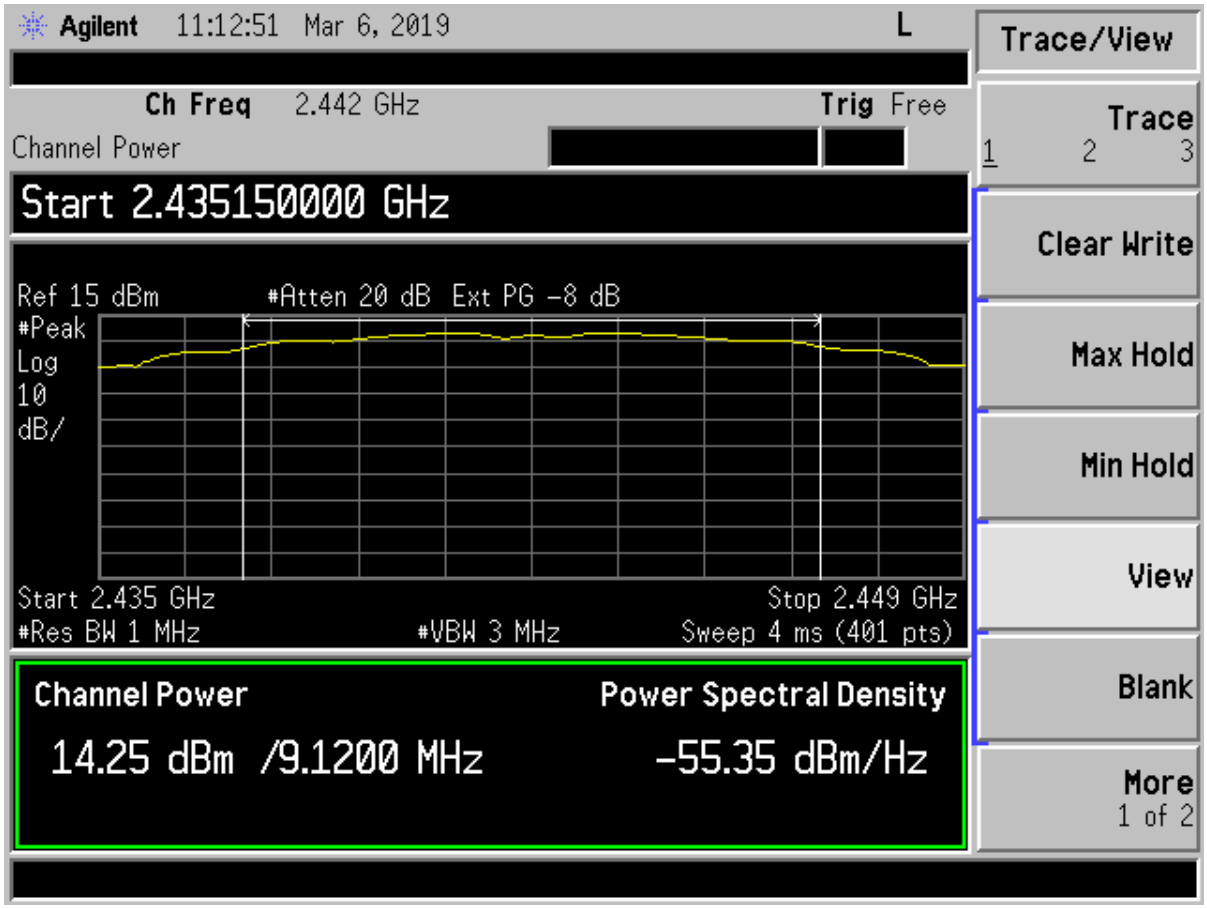


Figure 48. Peak Antenna Conducted Output Power, b ModeMid Channel

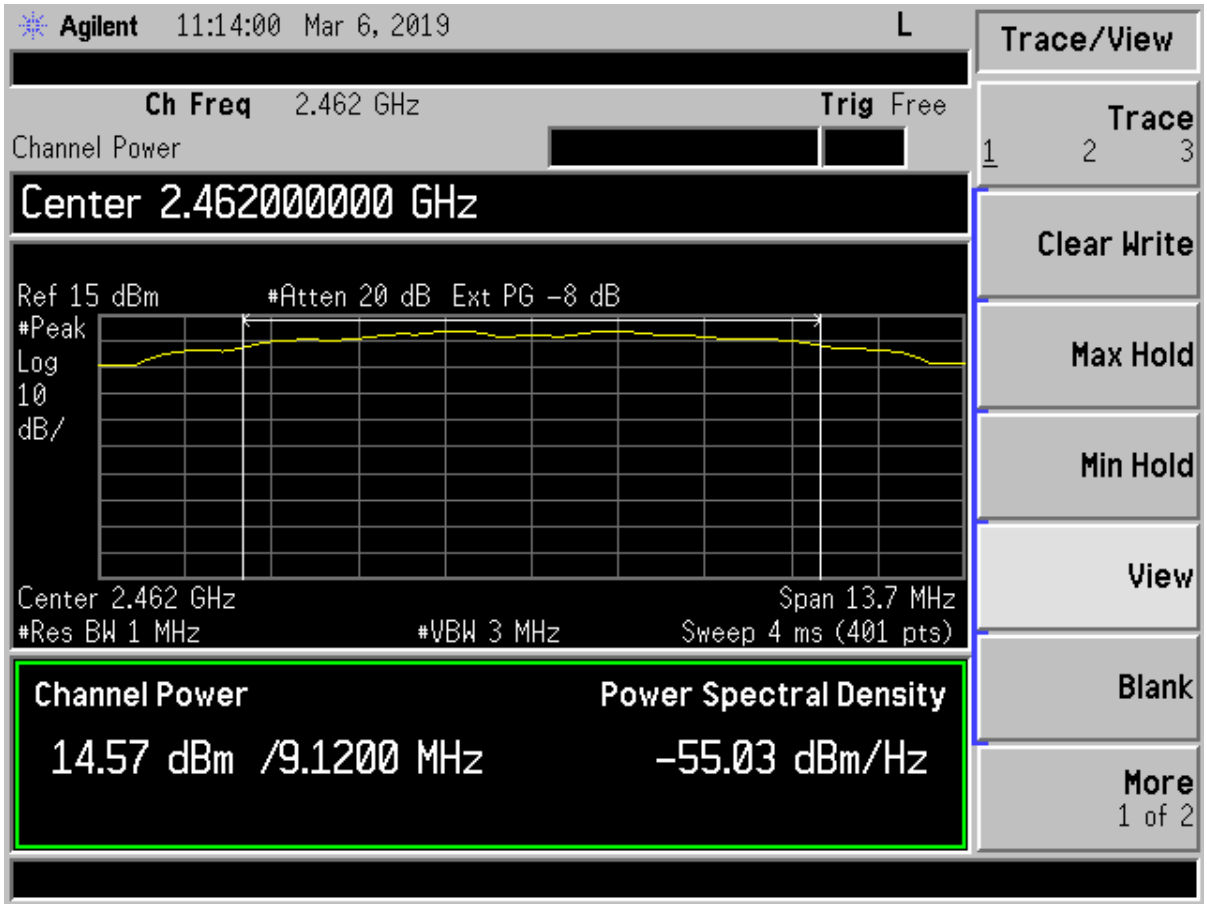


Figure 49. Peak Antenna Conducted Output Power, b ModeHigh Channel

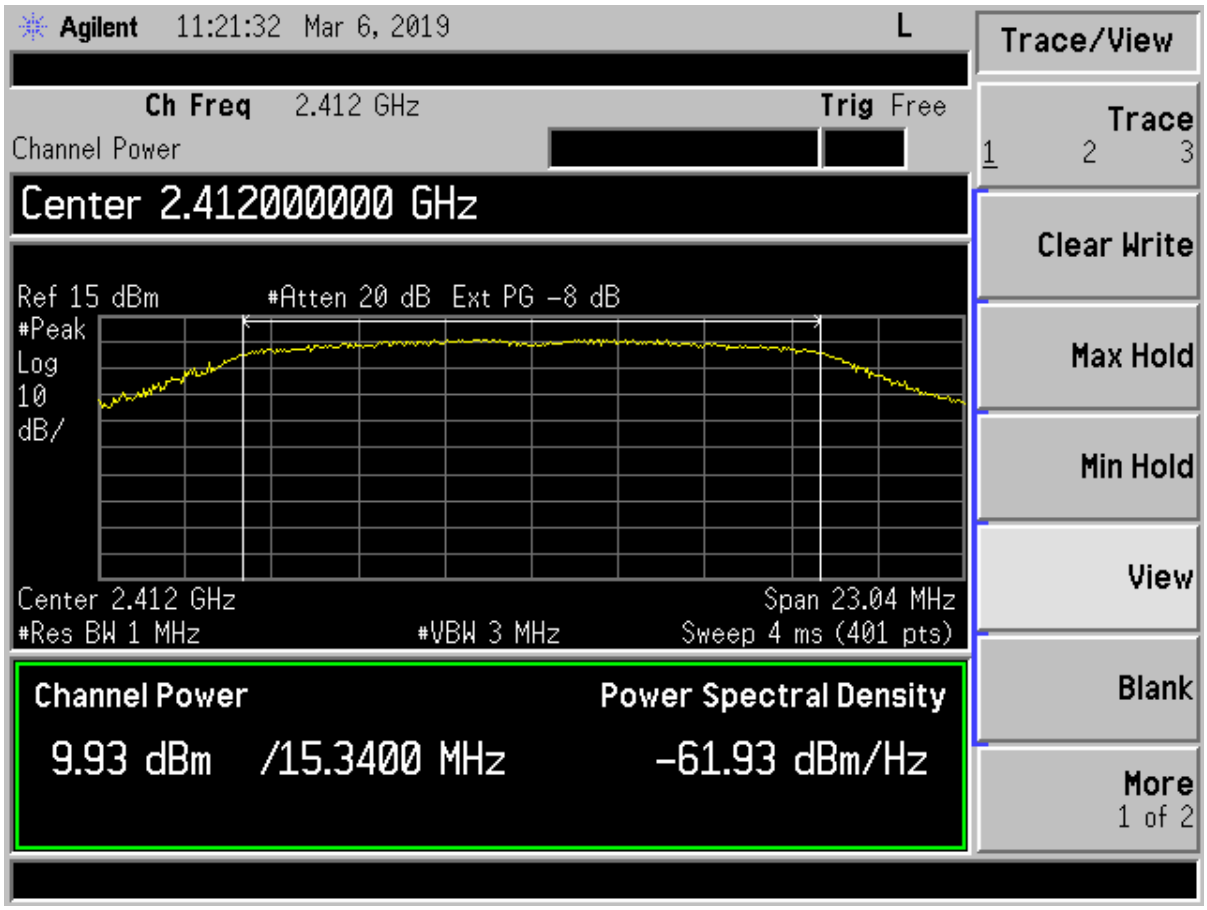


Figure 50. Peak Antenna Conducted Output Power, g Mode Low Channel

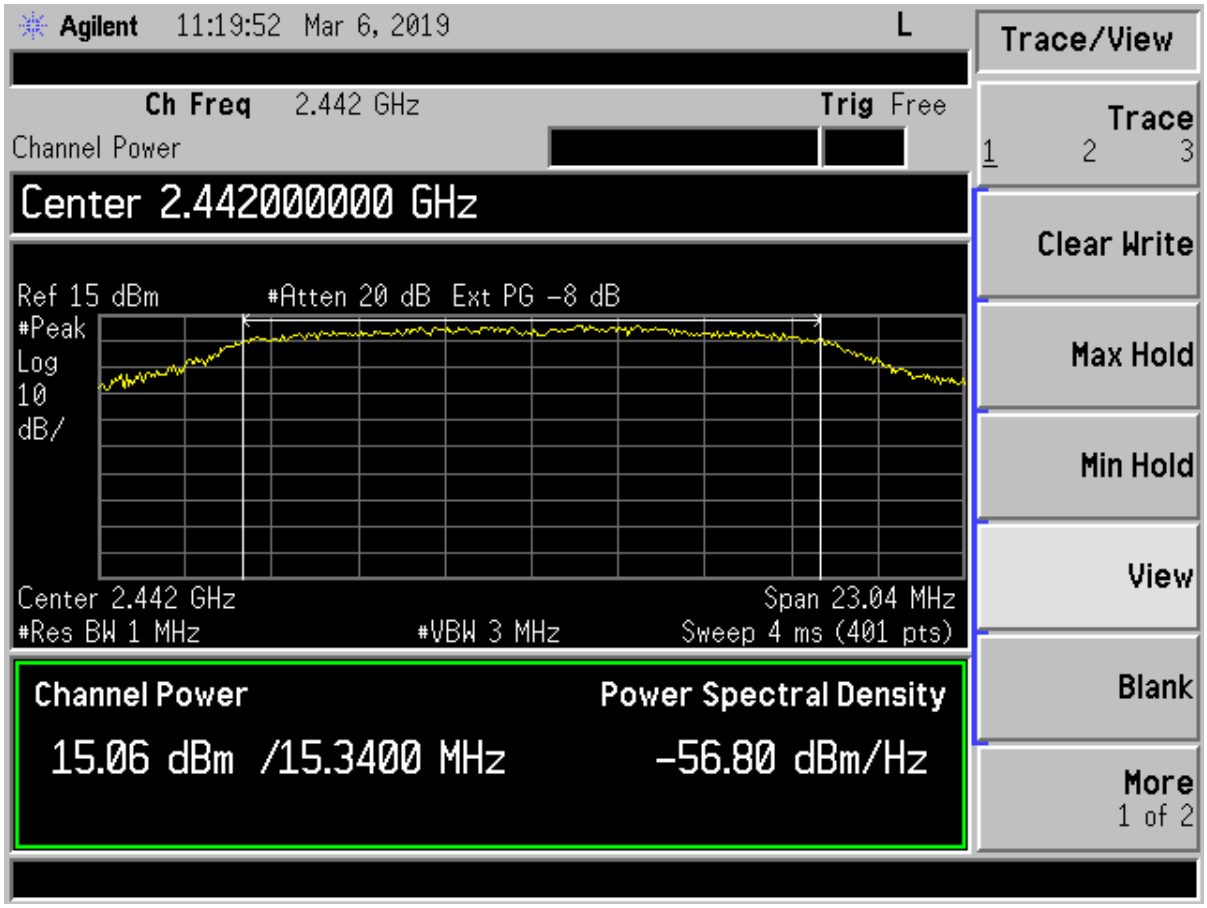


Figure 51. Peak Antenna Conducted Output Power, g Mode Mid Channel

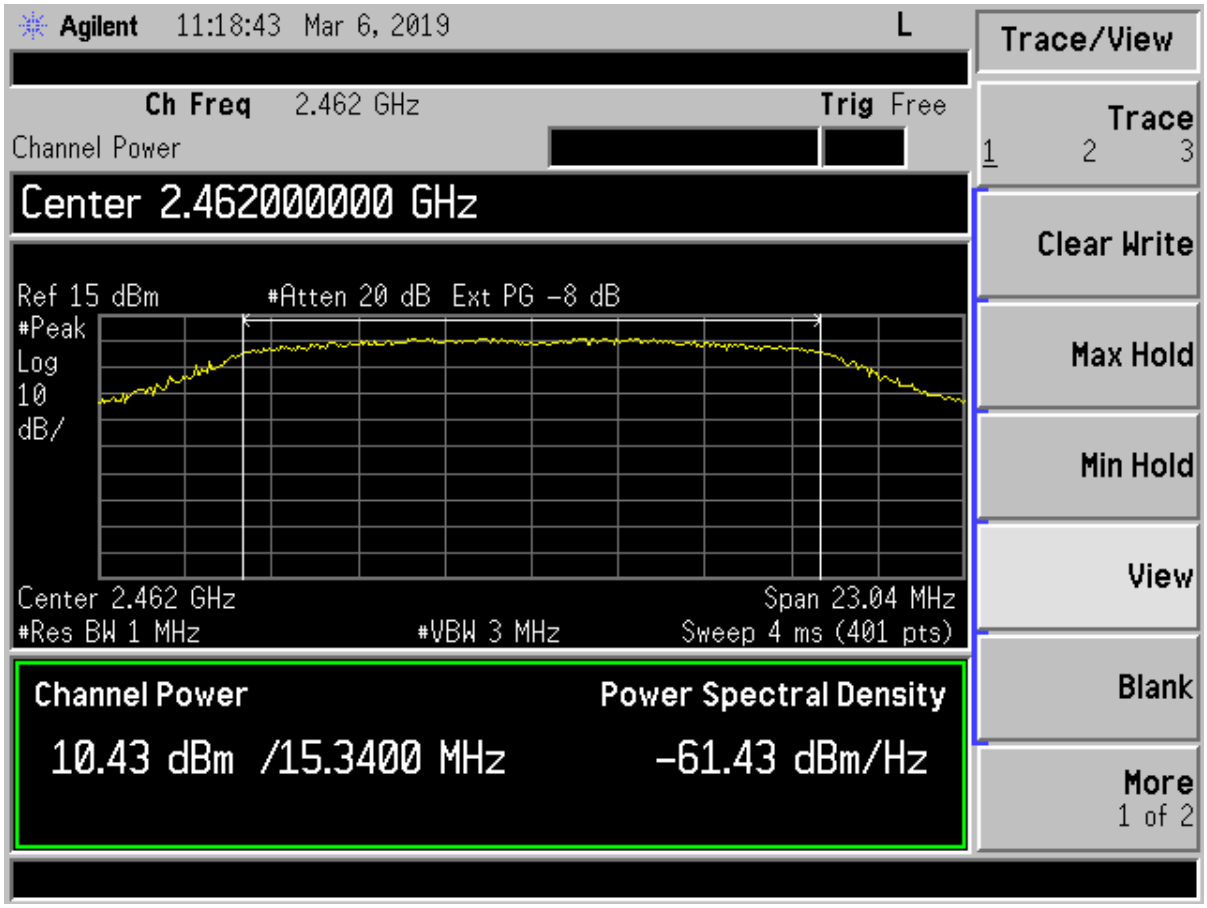


Figure 52. Peak Antenna Conducted Output Power, g Mode High Channel

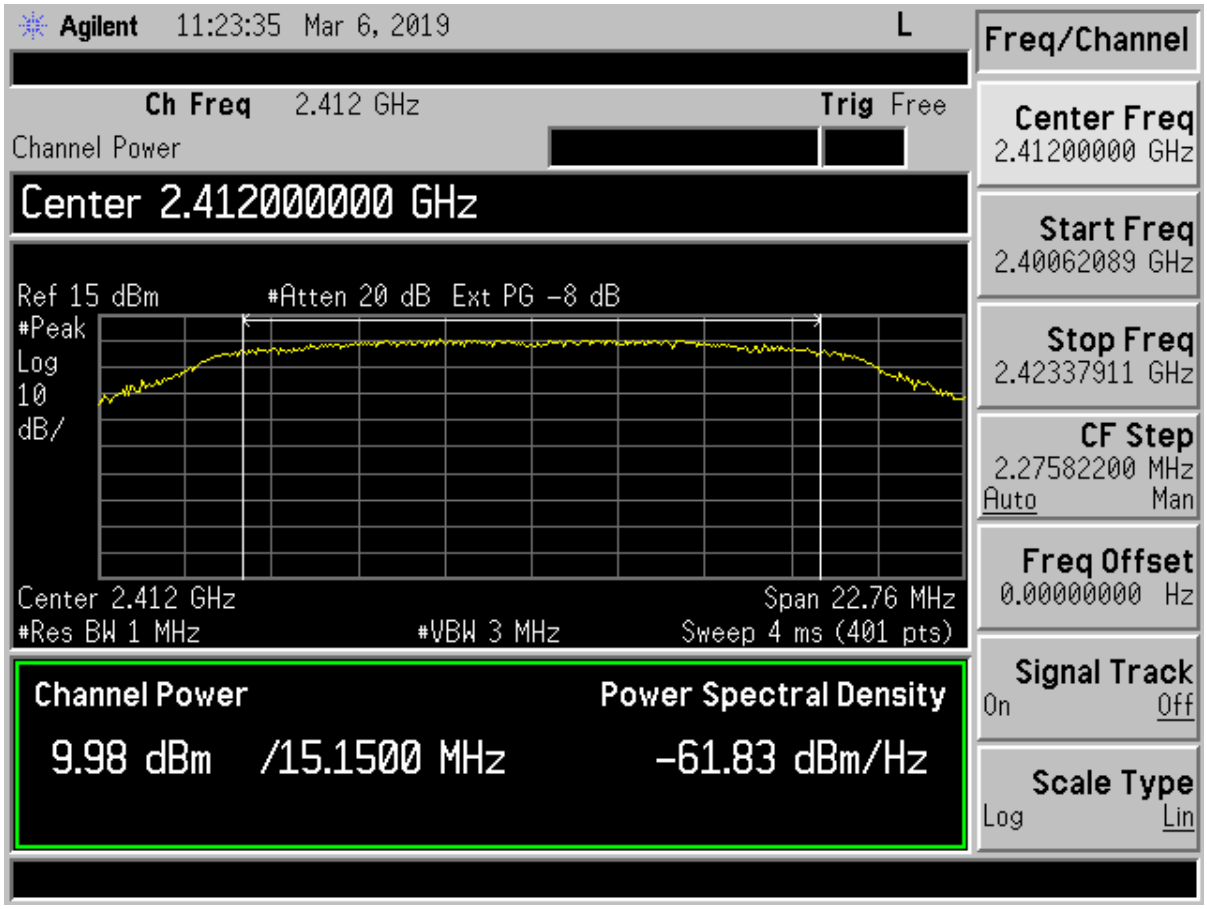


Figure 53. Peak Antenna Conducted Output Power, n Mode Low Channel

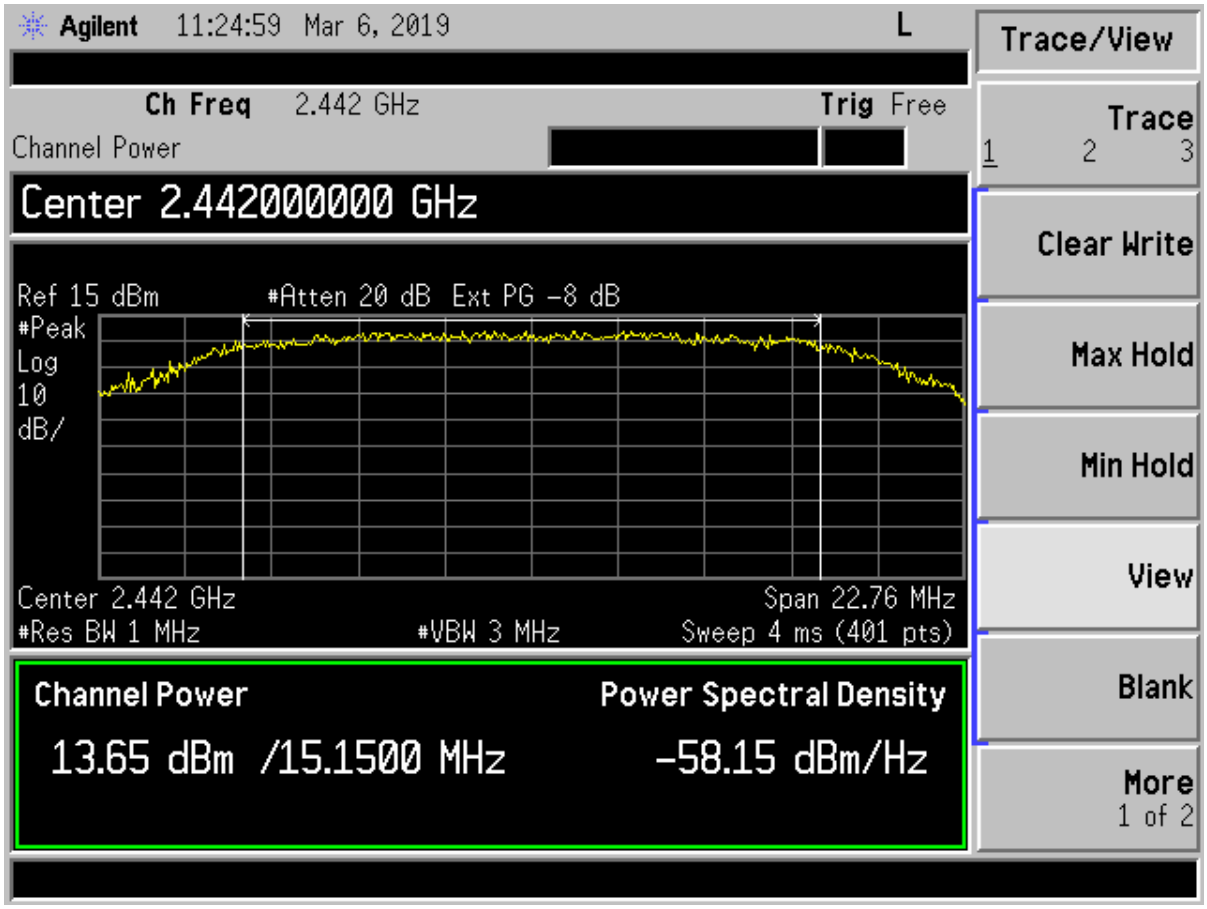


Figure 54. Peak Antenna Conducted Output Power, n Mode Mid Channel

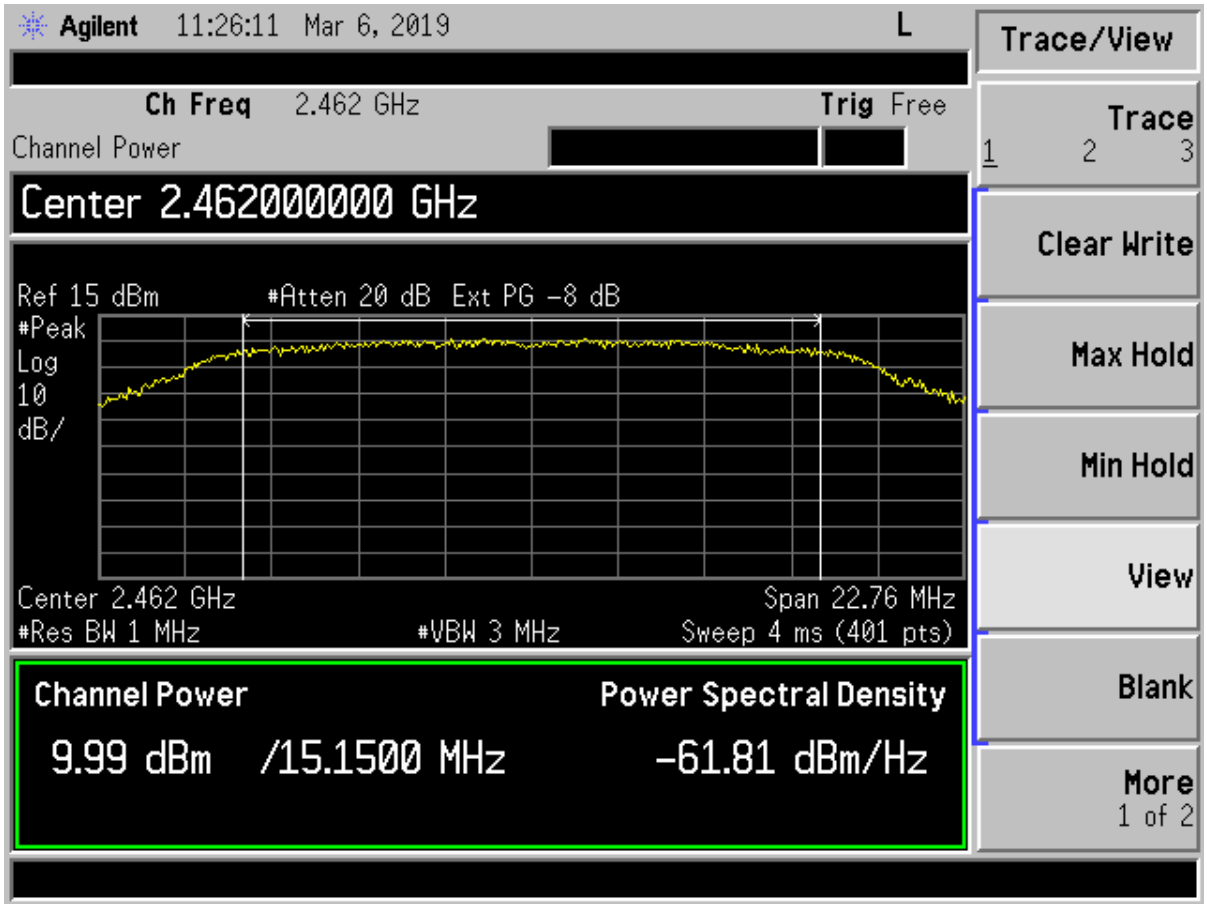


Figure 55. Peak Antenna Conducted Output Power, n Mode High Channel

2.15 Power Spectral Density (CFR 15.247(e))

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 above.

Note: dBm/Hz correct to dBm/kHz using the following formula, 10 log RBWref/RBWmeasured.

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

Frequency (MHz)	Results (dBm/kHz)	FCC Limit (dBm/3 kHz)	Mode
2412	-21.3	+8.0	b
2442	-20.6	+8.0	b
2462	-20.2	+8.0	b
2412	-27.1	+8.0	g
2442	-22.0	+8.0	g
2462	-26.6	+8.0	g
2412	-27.0	+8.0	n
2442	-23.3	+8.0	n
2462	-27.0	+8.0	n

Sample Calculation: -56.11 dB/Hz + (10*log (3000/1) = -21.3 dB/3kHz

Test Date: March 6, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

2.16 Intentional Radiator Power Lines Conducted Emissions (CFR 15.207)

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 was 5.4 dB below the specification limit at 3.207 MHz. All other measured signals were at least 5.7 dB below the specification limit.Those results are given in the table below.

Table 15.Power Line Conducted Emissions

CONDUCTED EMISSIONS 150 kHz to 30 MHz						
Tested By: AF	Specification Requirement: FCC Part 15.207		Project No.: 19-0040	Manufacturer: Reliance Worldwide Corporation Model: UFCV-1000		
Frequency (MHz)	**Test Data (dBuV)**	**LISN+CL (dB)**	**Corrected Results (dBuV)**	**Limits (dBuV)**	**Margin (dB)**	**Detector**
Phase @ 120VAC/60Hz						
0.3810	52.56	-0.14	52.42	*58.3	5.8	**PK**
0.3810	41.86	-0.14	41.72	48.3	6.5	**AVG**
0.5000	39.78	-0.16	39.62	46.0	6.4	**PK**
2.2130	40.51	-0.19	40.32	46.0	5.7	**QP**
2.2130	31.22	-0.19	31.03	46.0	15.0	**AVG**
5.4330	51.80	-0.03	51.77	*60.0	8.2	**PK**
5.4330	35.23	-0.03	35.20	50.0	14.8	**QP**
10.0830	43.57	0.13	43.70	50.0	6.3	**PK**
20.5330	40.99	0.37	41.36	50.0	8.6	**PK**
Neutral @ 120VAC/60Hz						
0.3804	52.10	0.01	52.11	*58.3	6.2	**PK**
0.3804	41.54	0.01	41.55	48.3	6.7	**AVG**
0.5100	39.70	-0.02	39.68	46.0	6.3	**PK**
3.2070	40.52	0.07	40.59	46.0	5.4	**QP**
3.2070	31.24	0.07	31.31	46.0	14.7	**AVG**
5.3750	51.80	0.11	51.91	*60.0	8.1	**PK**
5.3750	35.21	0.11	35.32	50.0	14.7	**QP**
10.0330	43.13	0.25	43.38	50.0	6.6	**PK**
20.3670	40.95	0.46	41.41	50.0	8.6	**PK**

(*) Denotes that Quasi-Peak Limits were used.

Test Date: February21, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

2.17 Intentional Radiator, Radiated Emissions (CFR 15.209)

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. Data is presented in the table below.

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 measurements were taken via B Mode at mid-channel 7 frequency for transmit and receive modes.

The worst-case radiated emission was 3.8 dB below the specification limit at 36.01 MHz. All other measured signals were at least 6.5 dB below the specification limit. The results are shown in the table below. These results are meant to show that this EUThas met the intentional transmitter requirements of CFR Part 15.209.

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

Test By: AF	Test: FCC Part 15.209			Client: Reliance Worldwide Corporation			
	Project: 19-0040 Class B			Model: UFCV-1000			
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 at least 20 dB below the applicable limit.							

No other emissions detected other than those presented in this table and the tables in section 2.10 above.
AF is antenna factor. CL is cable loss. PA is preamplifier gain.

SAMPLE CALCULATION: N/A

Test Date: February 26, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

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

Test By: AF	Test: FCC Part 15.109/15.209				Client: Reliance Worldwide Corporation			
	Project: 19-0040 Class B				Model: UFCV-1000			
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**
Tested from 30 MHz to 1 GHz								
71.05	47.39		-18.30	29.09	40.0	3m./VERT	10.9	**QP**
126.85	36.61	-	-14.29	22.32	43.5	3m./VERT	21.2	**QP**
131.05	45.76	-	-14.17	31.59	43.5	3m./HORZ	11.9	**PK**
131.05	36.18		-13.87	22.31	43.5	3m./VERT	21.2	**QP**
204.00	49.34		-14.15	35.19	43.5	3m./VERT	8.3	**PK**
730.02	34.05	-	-1.81	32.24	46.0	3m./HORZ	13.8	**QP**
All other emissions were more than 20 dB BELOW the applicable limit.								

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

SAMPLE CALCULATION AT:71.05 MHz

Magnitude of Measured Frequency	47.39	dBuV
Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	-18.30	dB
Corrected Result	29.09	dBuV/m

Test Date: February 19, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

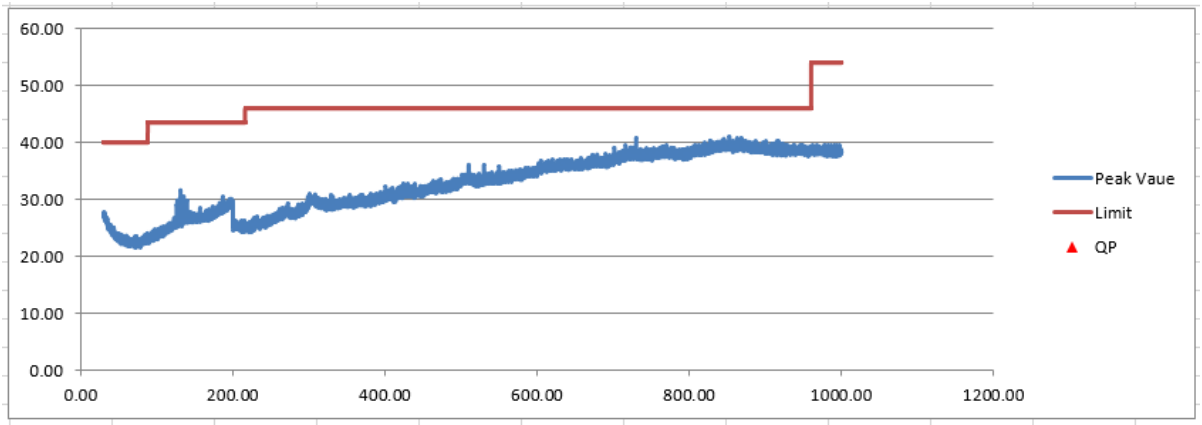


Figure 56.Radiated Emissions Graphical Data, RX, 30-1000 MHz - Horizontal

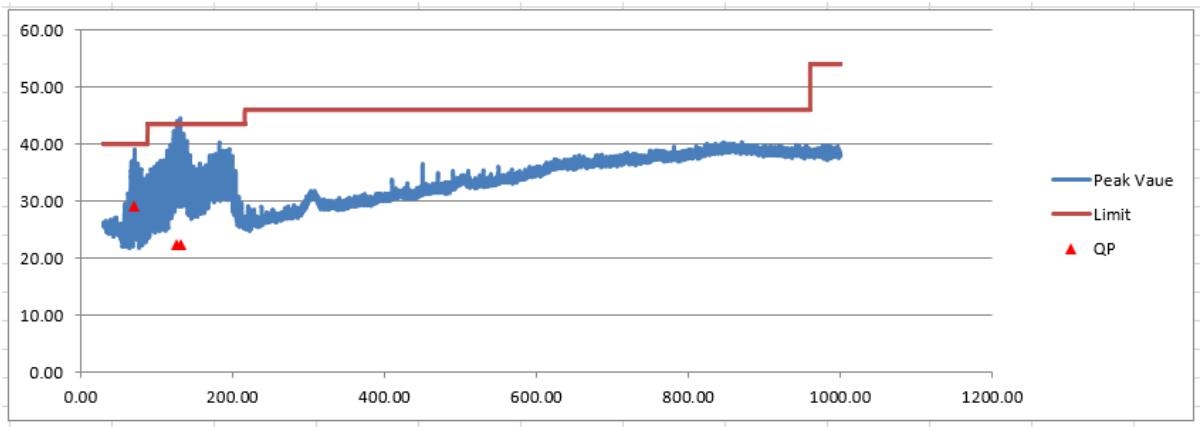


Figure 57. Radiated Emissions Graphical Data, RX, 30-1000 MHz – Vertical

Table 18. Spurious Radiated Emissions – Transmit B Mode (30 MHz – 1 GHz)

Test By: AF	Test: FCC Part 15.109/15.209				Client: Reliance Worldwide Corporation			
	Project: 19-0040 Class B				Model: UFCV-1000			
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**
Tested from 30 MHz to 1 GHz								
36.01	51.49	-	-15.28	36.21	40.0	3m./VERT	3.8	**QP**
135.47	42.67	-	-13.94	28.73	43.5	3m./HORZ	14.8	**QP**
139.67	42.68	-	-13.75	28.93	43.5	3m./HORZ	14.6	**QP**
143.86	49.35	-	-13.65	35.70	43.5	3m./HORZ	7.8	**QP**
143.98	48.48	-	-13.25	35.23	43.5	3m./VERT	8.3	**QP**
203.20	38.71	-	-14.05	24.66	43.5	3m./VERT	18.8	**QP**
204.23	50.59	-	-14.15	36.44	43.5	3m./VERT	7.1	**PK**
216.00	47.89		-13.93	33.96	43.5	3m./HORZ	9.5	**QP**
240.00	52.82		-13.32	39.50	46.0	3m./HORZ	6.5	**PK**
All other emissions were more than 20 dB BELOW the applicable limit.								

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

SAMPLE CALCULATION AT: 36.01 MHz

Magnitude of Measured Frequency	51.49	dBuV
Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	-15.28	dB
Corrected Result	36.21	dBuV/m

Test Date: February 26, 2019
Tested By
Signature: Afzal Fazal Name: Afzal Fazal

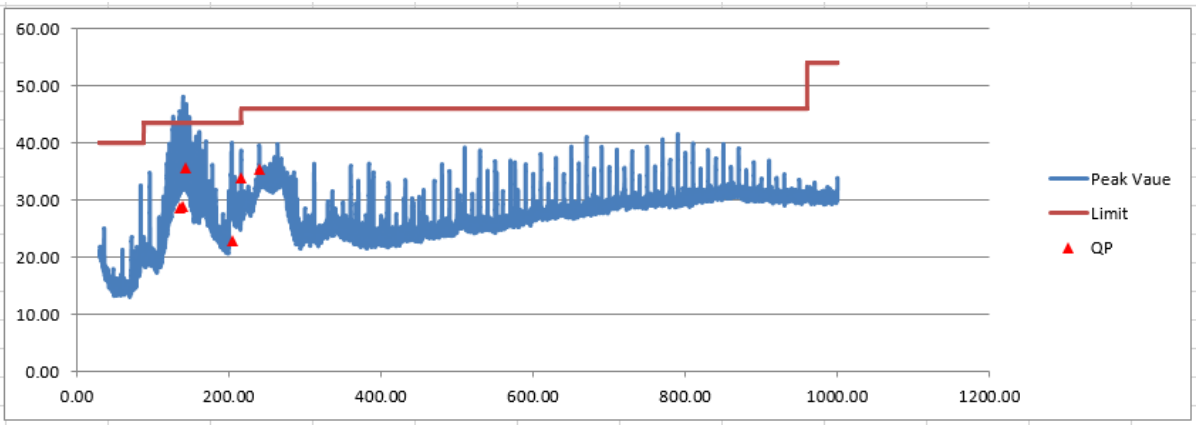


Figure 58.Radiated Emissions Graphical Data, TX, 30-1000 MHz - Horizontal

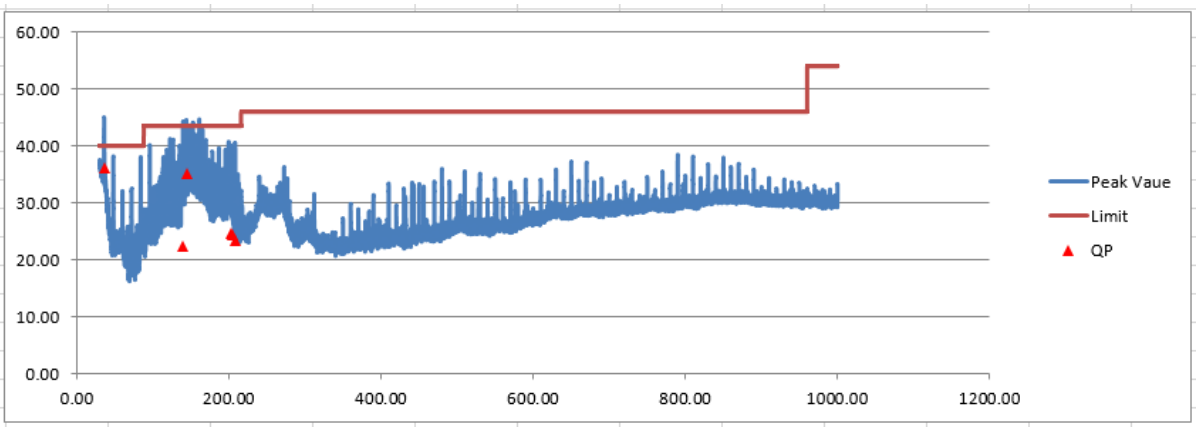


Figure 59.Radiated Emissions Graphical Data, TX, 30-1000 MHz – Vertical

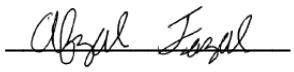
Table 19. Spurious Radiated Emissions– Transmit B Mode (1 GHz – 18 GHz)

Test By: AF	Test: FCC Part 15.109/15.209				Client: Reliance Worldwide Corporation			
	Project: 19-0040 Class B				Model: UFCV-1000			
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**
Tested from 1 GHz to 25 GHz								
6493.00	42.79	-9.50	6.00	39.29	54.0	1.0m./HORZ	14.7	**PK**
8477.00	42.91	-9.50	8.44	41.85	54.0	1.0m./VERT	12.2	**PK**
All other emissions were more than 20 dB below the applicable limit.								

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

SAMPLE CALCULATION AT:6493.00 MHz

Magnitude of Measured Frequency	42.79	dBuV
Additional Factor	-9.50	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	6.00	dB
Corrected Result	39.29	dBuV/m

Test Date: February 19, 2019
Tested By
Signature:  Name: Afzal Fazal

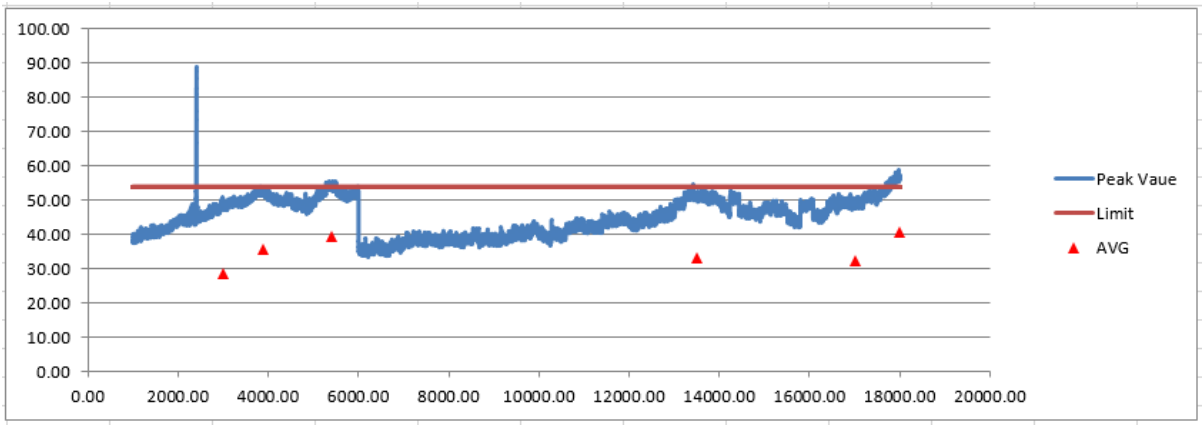


Figure 60.Radiated Emissions Graphical Data, TX, 1 -18GHz - Horizontal

Note: Intentional emission around 2.4 GHz is for WiFi transmitter.

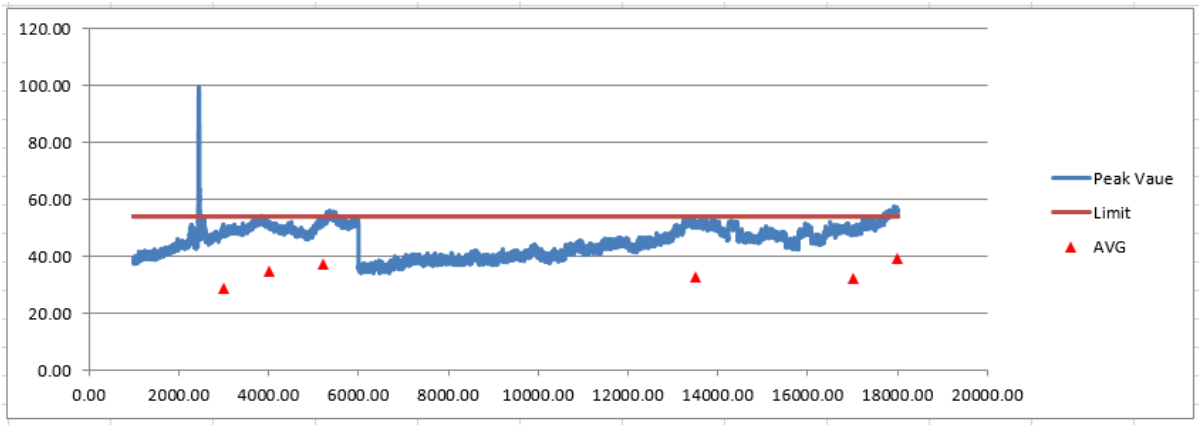


Figure 61.Radiated Emissions Graphical Data, TX, 1 -18GHz – Vertical

Note: Intentional emission around 2.4 GHz is for WiFi transmitter.

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 ±2.78 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 ±5.3 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 ±5.1 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is ±5.1 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.