H.B. Compliance Solutions

Intentional Radiator Test Report

For the

AFLglobal

FOCIS LTNG

Tested under

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

Digitally Transmitting Sequence

Prepared for:

AFLglobal

16 Eastgate Park,

Belmont, NH 03220

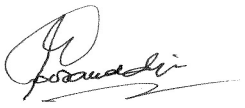
Prepared By:

H.B. Compliance Solutions

5005 S. Ash Avenue, Suite # A-10

Tempe, Arizona 85282

Reviewed By:



Hoosamuddin Bandukwala

Cert # ATL-0062-E

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

Report Status Sheet

Revision #	Report Date	Reason for Revision
Ø	December 11, 2018	Initial Issue

Table of Contents

EXECUTIVE SUMMARY 4

1. Testing Summary 4

EQUIPMENT CONFIGURATION 5

1. Overview 5
2. Test Facility 6
3. Description of Test Sample 7
4. Equipment Configuration 7
5. Support Equipment 7
6. Ports and Cabling Information 7
7. Method of Monitoring EUT Operation 7
8. Mode of Operation 8
9. Modifications 8
10. Disposition of EUT 8

Criteria for Un-Intentional Radiators 9

1. Radiated Emissions 9

Emissions Tests Calculations 10

Criteria for Intentional Radiators 14

2. Conducted Emissions 14
1. Occupied Bandwidth 16
2. RF Power Output 21
3. Conducted Spurious Emissions 24
4. Radiated Spurious Emissions and Restricted Band 32
6. Emissions At Band Edges 35
7. Power Spectral Density 38

I. Test Equipment 42

8. Measurement Uncertainty 43

EXECUTIVE SUMMARY

1. Testing Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15.247. All tests were conducted using measurement procedure from ANSI C63.10-2013, FCC Public Notice 558074 DTS Guide April 09, 2013 as appropriate.

Test Name	Test Method/Standard	Result	Comments
Unintentional Radiated Emissions	15.109	Pass	
A/C Powerline Conducted Emissions	15.207	N/A	Battery powered device.
Occupied Bandwidth	15.247(a)(2)	Pass	
Peak Output Power	15.247(b)	Pass	
Conducted Spurious Emissions	15.247(d)	Pass	
Radiated Spurious Emissions & Restricted Band	15.247(d), 15.209(a), 15.205	Pass	
Emissions At Band Edges	15.247(d), 15.209(a), 15.205	Pass	
Power Spectral Density	15.247(e)	Pass	

EQUIPMENT CONFIGURATION

1. Overview

H.B Compliance Solutions was contracted by AFLglobal to perform testing on the FOCIS LTNG under the purchase order number 563744.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the AFLglobal, FOCIS LTNG.

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

Product Name:	FOCIS
Model(s) Tested:	LTNG
FCC ID:	2ANTH-FLGHTN18
Supply Voltage Input:	Primary Power: 5 Vdc
Frequency Range:	2412 – 2462 MHz
No. of Channels:	11
Necessary Bandwidth	N/A
Type(s) of Modulation:	OFDM, DSSS
Range of Operation Power:	0.0826 W
Emission Designator:	N/A
Channel Spacing(s)	None
Test Item:	Pre-Production
Type of Equipment:	Mobile
Antenna Requirement (§15.203) :	Type of Antenna Connector: Integrated (Chip Antenna) Gain of Antenna: 3.0dBi
Environmental Test Conditions:	Temperature: 15-35°C Humidity: 30-60% Barometric Pressure: 860-1060 mbar
Modification to the EUT:	None
Evaluated By:	Staff at H.B. Compliance Solutions
Test Date(s):	11/07/2018 till 11/19/2018

2. Test Facility

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

Test facility at H.B. Compliance Solutions is an ANAB accredited test site. The ANAB certificate number is L2458. The scope of accreditation can be found on ANAB website www.anab.org. Canada Test Site Number is 9481A

In accordance with §2.948(a)(3), a complete site description is contained at H.B. Compliance Solutions.

3. Description of Test Sample

The AFLglobal, FOCIS LTNG is a Fiber Optic connector inspection system. It inspects connectors on patch cords and in bulkhead adapters. It auto-focuses, captures and centers the end-face image, applies pass/fail rules and wireless transfers image and results to a paired device.

4. Equipment Configuration

Ref. ID	Name / Description	Model Number	Serial Number
# 1	FOCIS	LTNG	N/A

Table 1. Equipment Configuration

5. Support Equipment

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

Ref ID	Name / Description	Manufacturer	Model #	Serial #
-	-	-	-	-

Table 2. Support Equipment

6. Ports and Cabling Information

Ref ID	Port name on the EUT	Cable Description	Qty.	Length (m)	Shielded? (Y/N)	Termination Box ID & Port ID
# 2	Power	2 wire	1	2	N	DC Power

Table 3. Ports and Cabling Information

7. Method of Monitoring EUT Operation

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

8. Mode of Operation

The EUT will be configured to transmit at maximum power level. Customer provided a custom GUI menu to control the device. Special commands were set to change the channels and to turn on and off the modulation. This allowed test various test modes which allowed to select the lower, middle and upper band of the device. These commands allowed the selection of the channel, Random Data and CW mode for all three channels. These settings were created for testing purpose only.

9. Modifications

9.1 Modifications to EUT

No modifications were made to the EUT

9.2 Modifications to Test Standard

No Modifications were made to the test standard.

10. Disposition of EUT

The test sample including all support equipment submitted to H.B Compliance Solutions for testing will be returned to AFLglobal upon completion of testing & certification

Criteria for Un-Intentional Radiators

1. Radiated Emissions

Test Requirement(s):	§15.109	**Test Engineer(s):**	Jerry M.
Test Results:	Pass	**Test Date(s):**	Nov/14/2018

Test Procedures:

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

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

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

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

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

Table 4. Radiated Emissions – Measurement Bandwidth

Emissions Tests Calculations

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

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

FS = RA + AF + (CF –AG)

Where: FS = Field Strength

RA = Receiver (indicated) Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

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

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

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

FS = 32 dBuV/m

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

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

Test Setup:

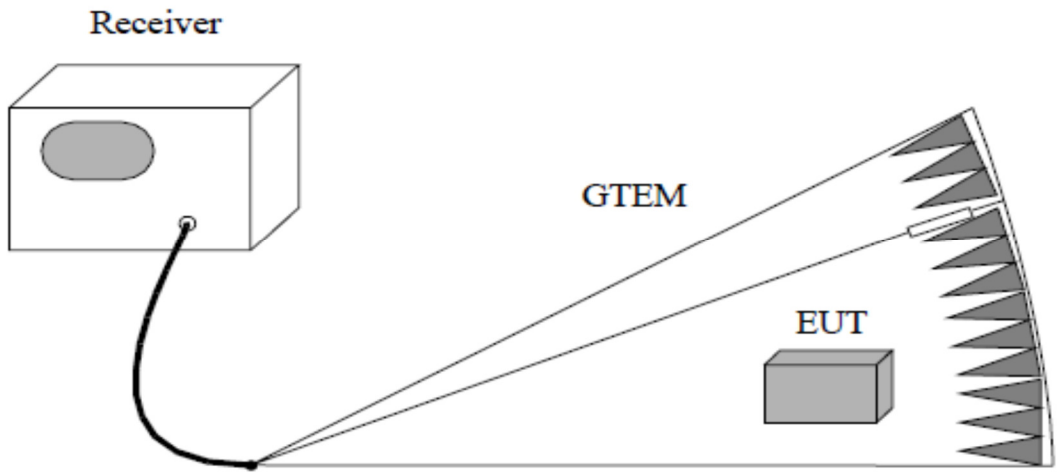
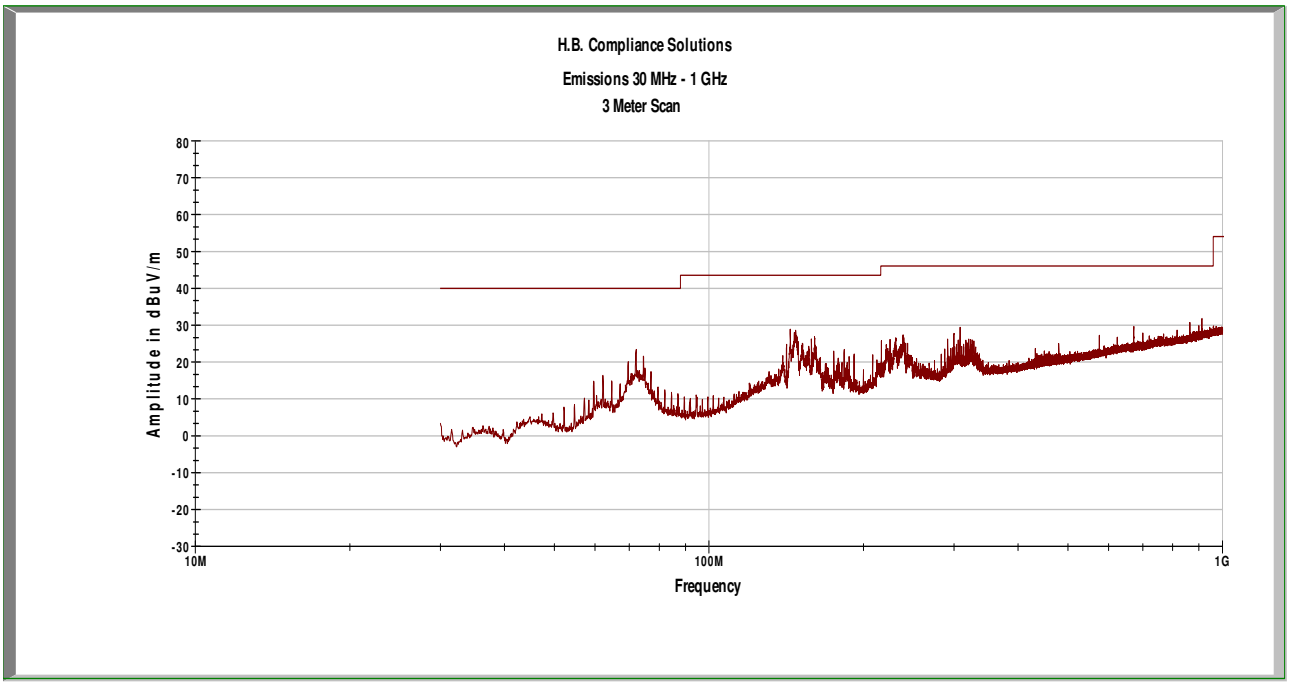
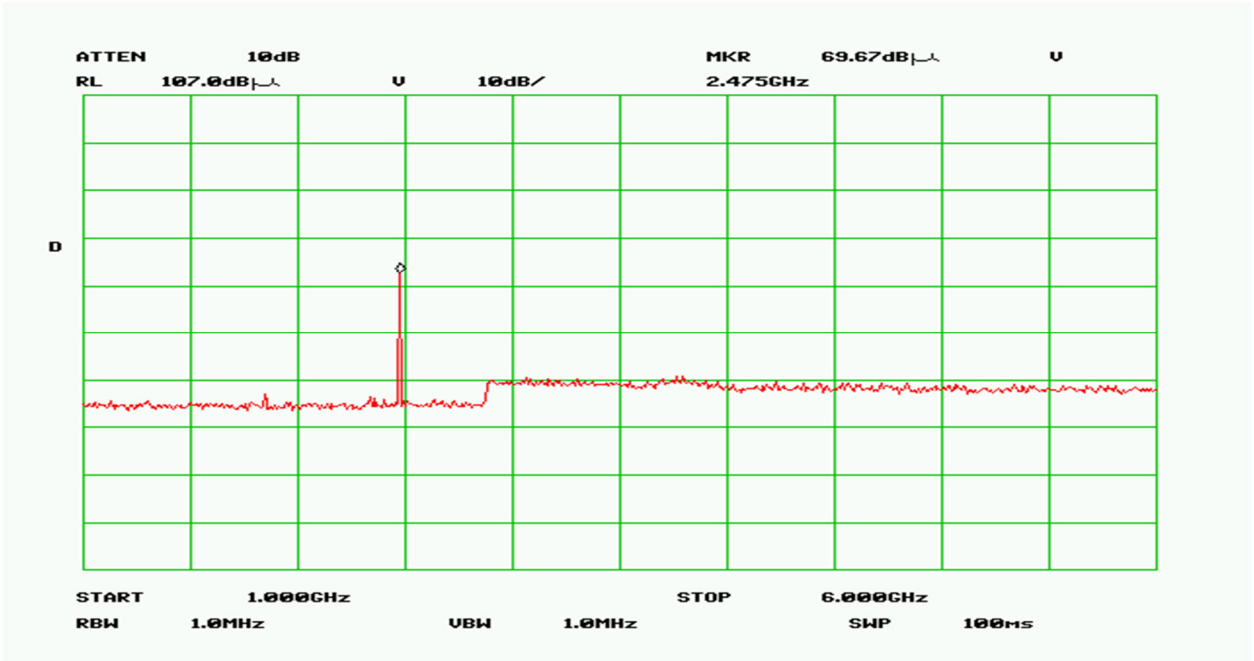


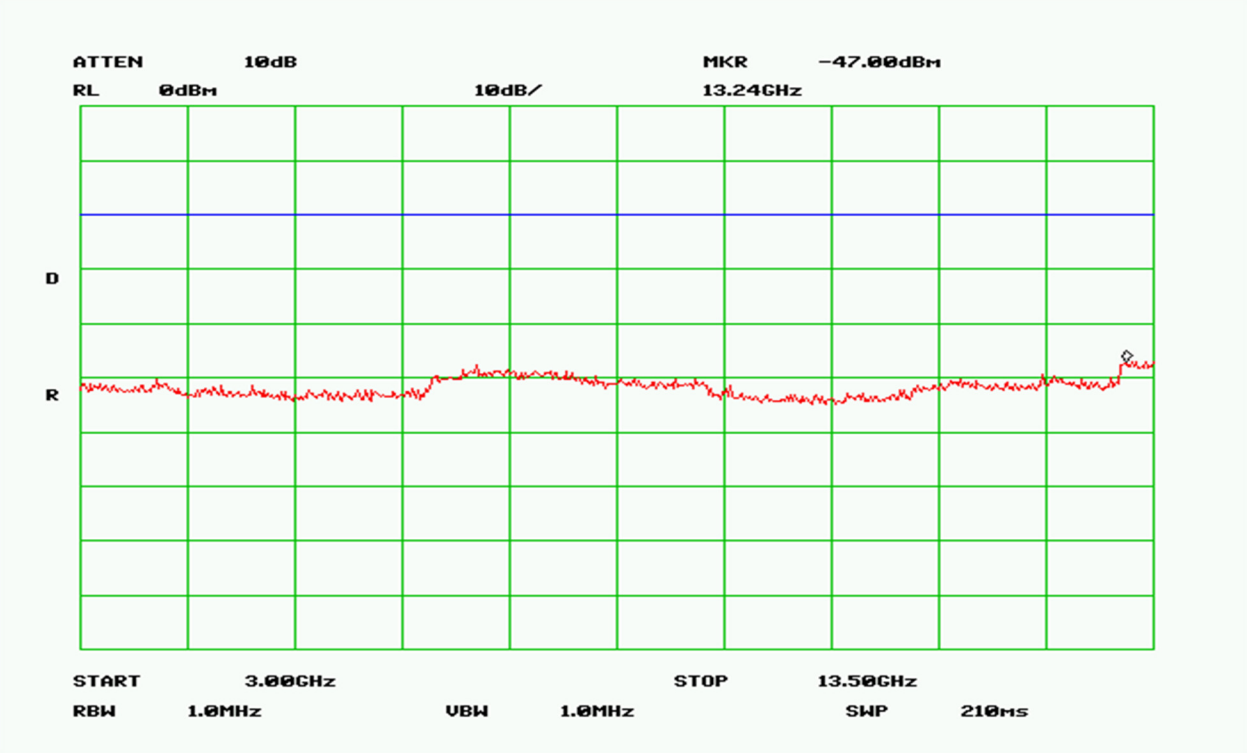
Figure 1. Radiated Emissions Test Setup (30MHz – 1GHz)



Plot 1 – Radiated Emissions – 30MHz to 1GHz



Plot 2 – Receiver Emissions (Conducted) – 1GHz to 6 GHz (For Industry Canada RSS-GEN)



Plot 3 – Receiver Emissions (Conducted) – 1GHz to 12.5 GHz (For Industry Canada RSS-GEN)

Frequency (MHz)	Measured Level (dBuV/m)	Limit (dBuV)	Margin (dB)
72.2	23.4	40.0	-16.6
144.0	28.8	43.5	-14.7
308.3	29.2	46.0	-16.8

Table 5. Final Measurement Results for Radiated Emissions

2. Conducted Emissions

Test Requirement(s):	§15.207	Test Engineer(s):	None
Test Results:	N/A	Test Date(s):	None

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

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

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

Table 6. Conducted Emissions – Measurement Bandwidth

Frequency Range (MHz)	15.107(b), Class A Limits (dBuV)		15.107(a), Class B Limits (dBuV)	
	Quasi-Peak	Average	Quasi Peak	Average
0.15 – 0.5	79	66	66 - 56	56 - 46
0.5 – 5.0	73	60	56	46
5.0 – 30	73	60	60	50
Note 1 – The lower limit shall apply at the transition frequencies.				

Table 7. Conducted Emissions Limits – FCC Limits from Section 15.107(a)(b)

Test Setup:

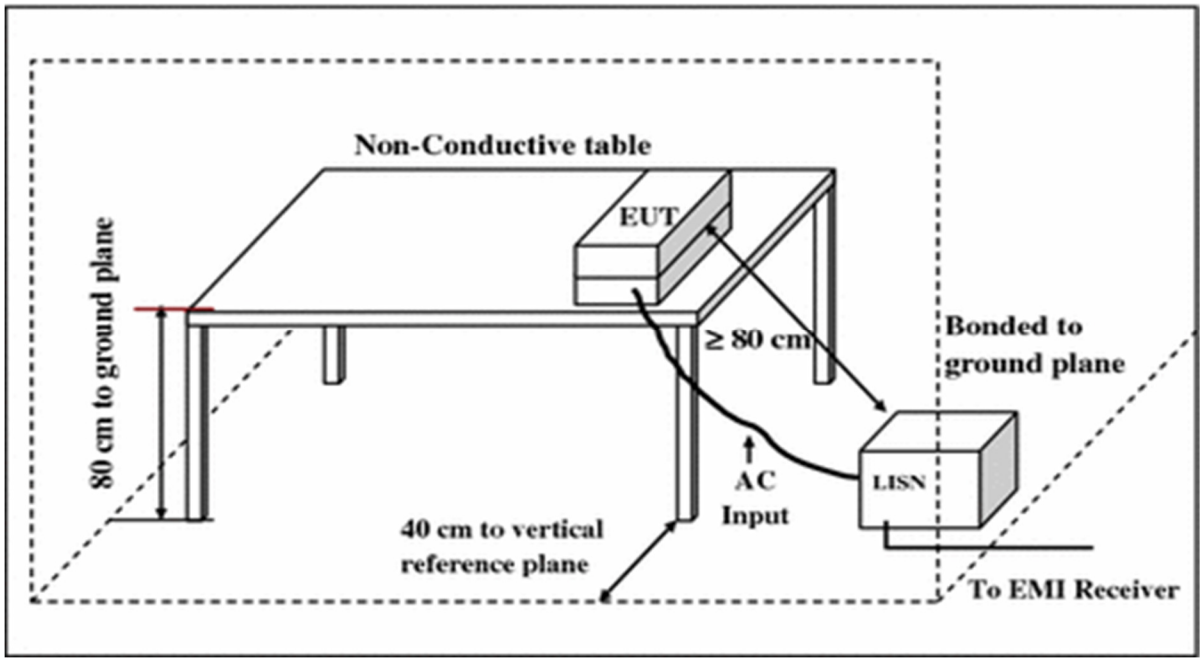


Figure 2. Conducted Emissions Test Setup

1. Occupied Bandwidth

Test Requirement(s):	15.247(a)(2), ANSI C63.10	**Test Engineer(s):**	Keith T.
Test Results:	Pass	**Test Date(s):**	Nov/07/2018

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

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

Frequency (MHz)	Recorded Measurement	Specification Limit	Comment
2412	13.945 MHz	≥ 500 KHz	DSSS
2438	14.013 MHz	≥ 500 KHz	DSSS
2462	14.010 MHz	≥ 500 KHz	DSSS
2413	16.601 MHz	≥ 500 KHz	OFDM
2438	16.599 MHz	≥ 500 KHz	OFDM
2462	16.542 MHz	≥ 500 KHz	OFDM

Table 8. Occupied Bandwidth Summary, Test Results

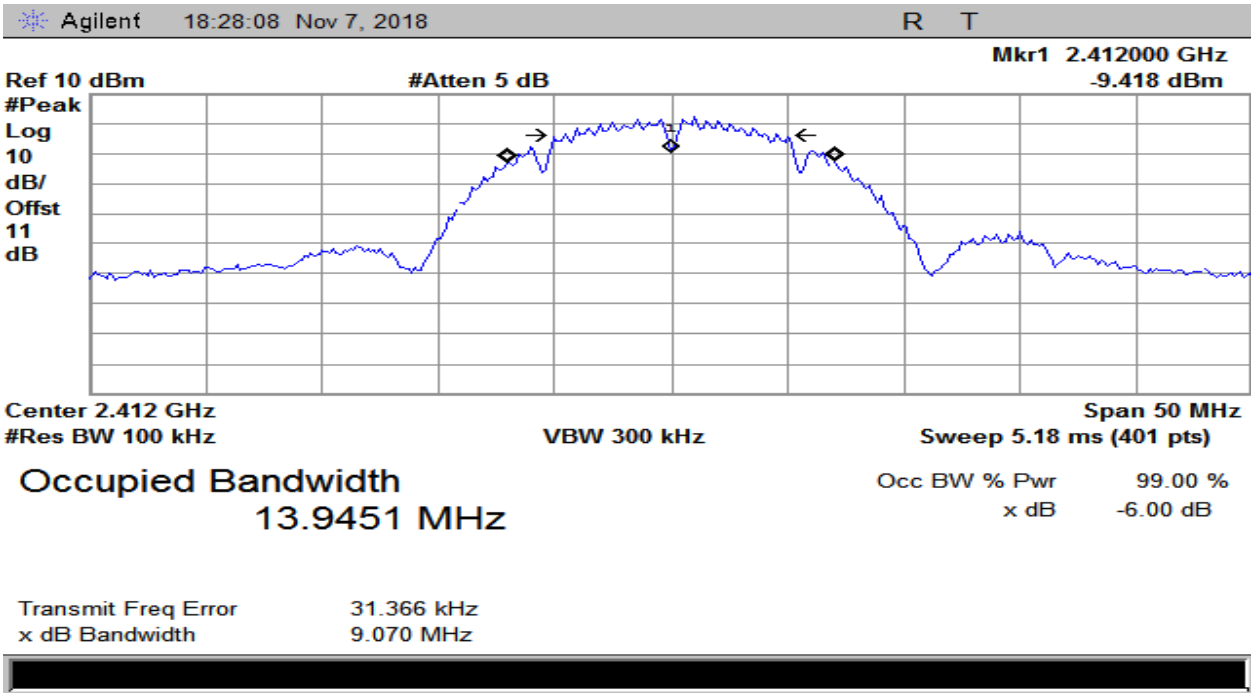
Frequency (MHz)	Recorded Measurement	Comment
2412	13.945 MHz	DSSS
2438	14.013 MHz	DSSS
2462	14.010 MHz	DSSS
2413	16.531 MHz	OFDM
2438	16.573 MHz	OFDM
2462	16.538 MHz	OFDM

Table 9. 99% Bandwidth, Test Results

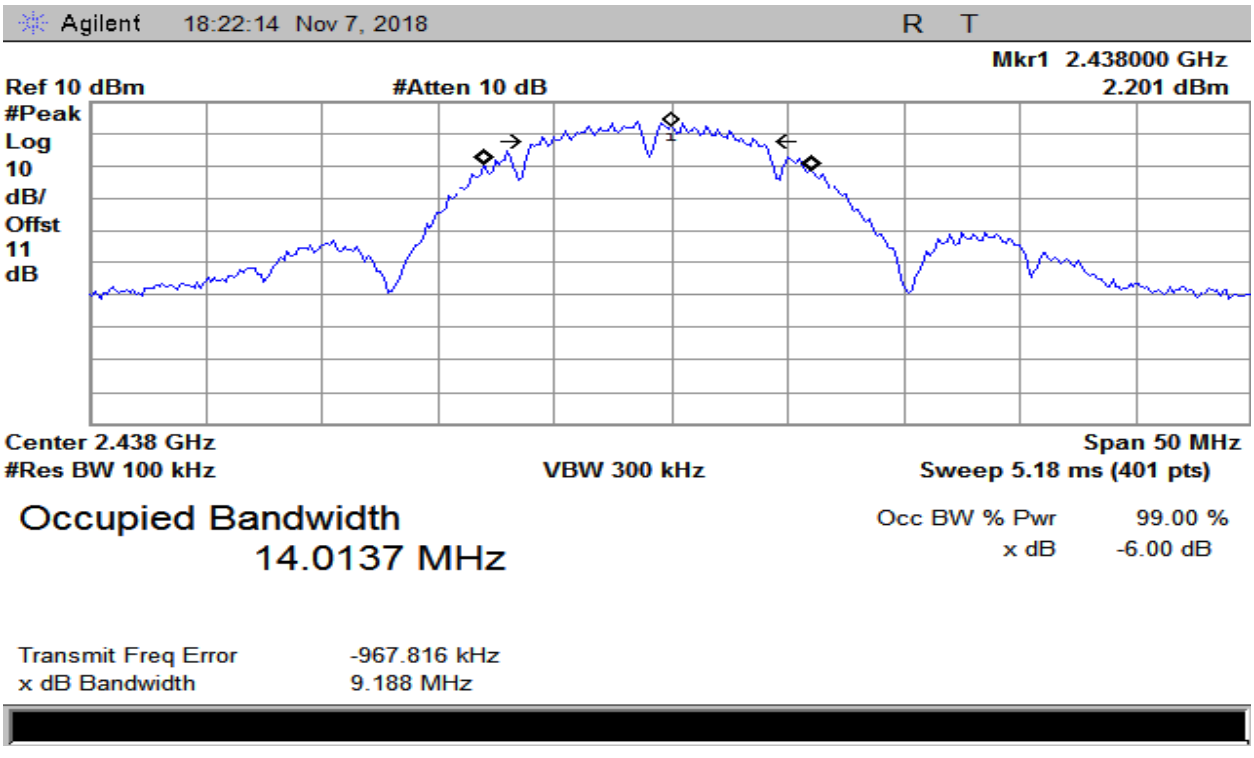
Test Setup:

Figure 3. Occupied Bandwidth Test Setup

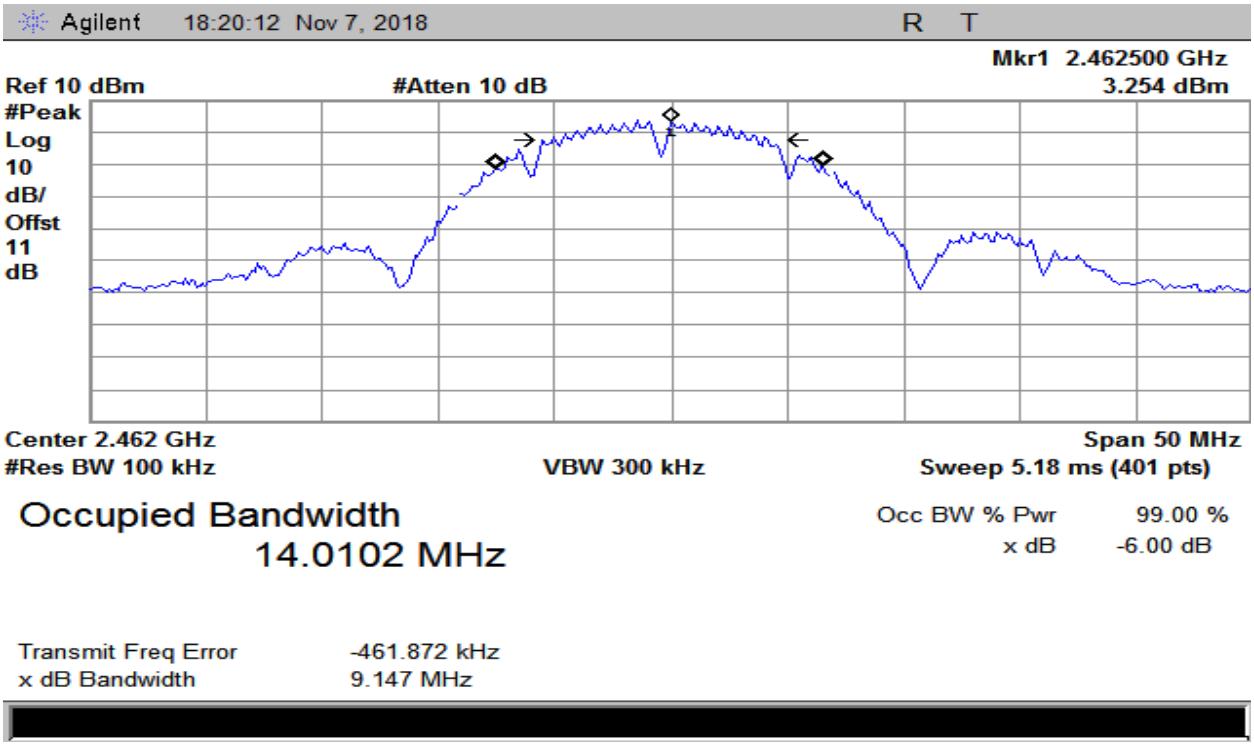
The following pages show measurements of Occupied Bandwidth plots:



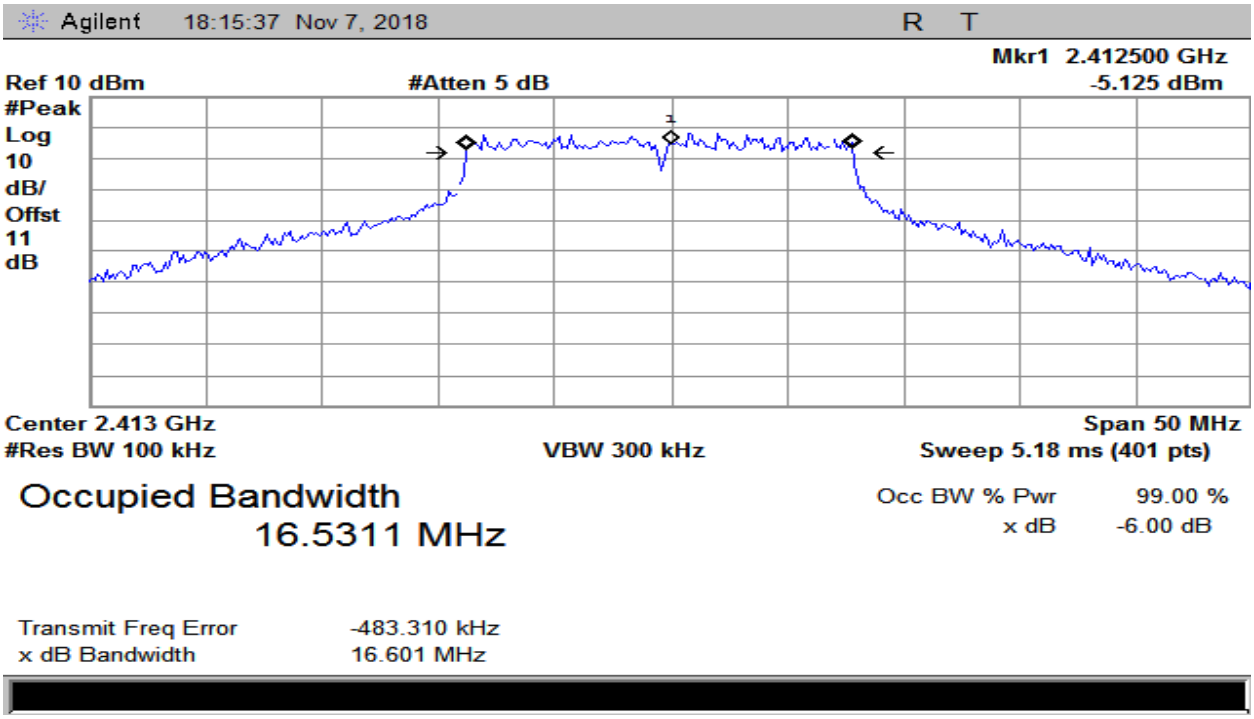
Plot 4 – Lowest Channel – 6dB BW



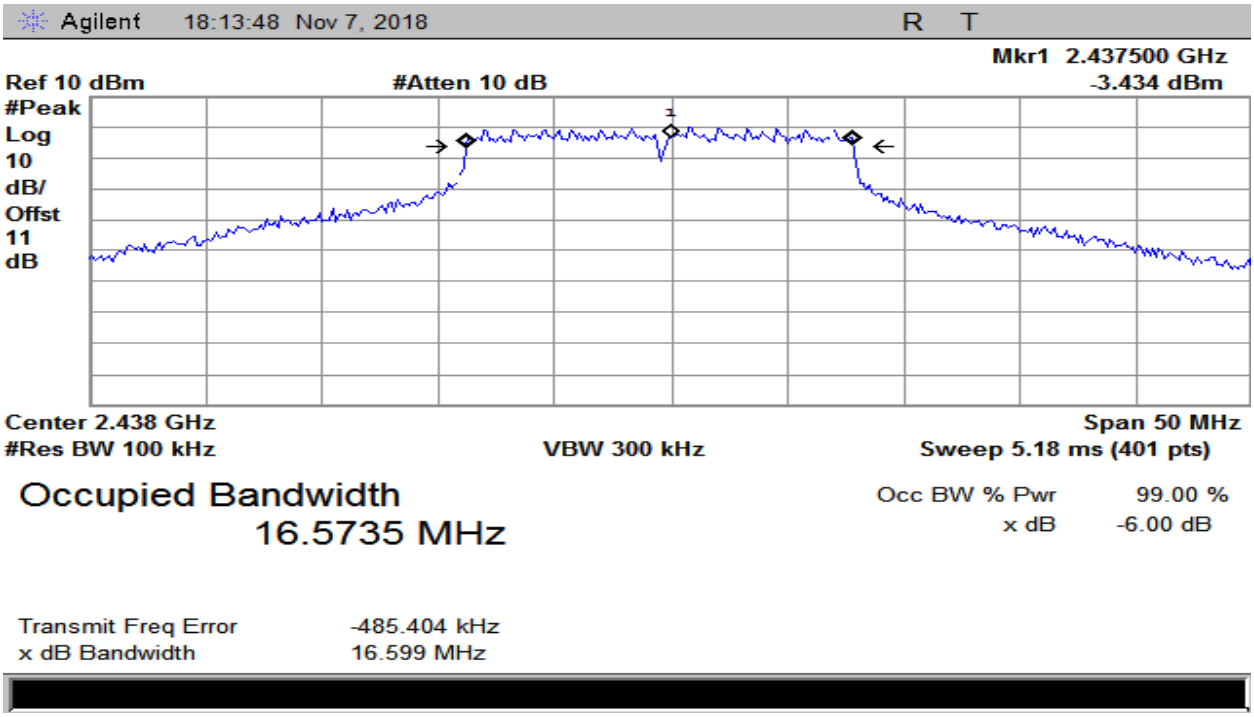
Plot 5 – Middle Channel – 6dB BW



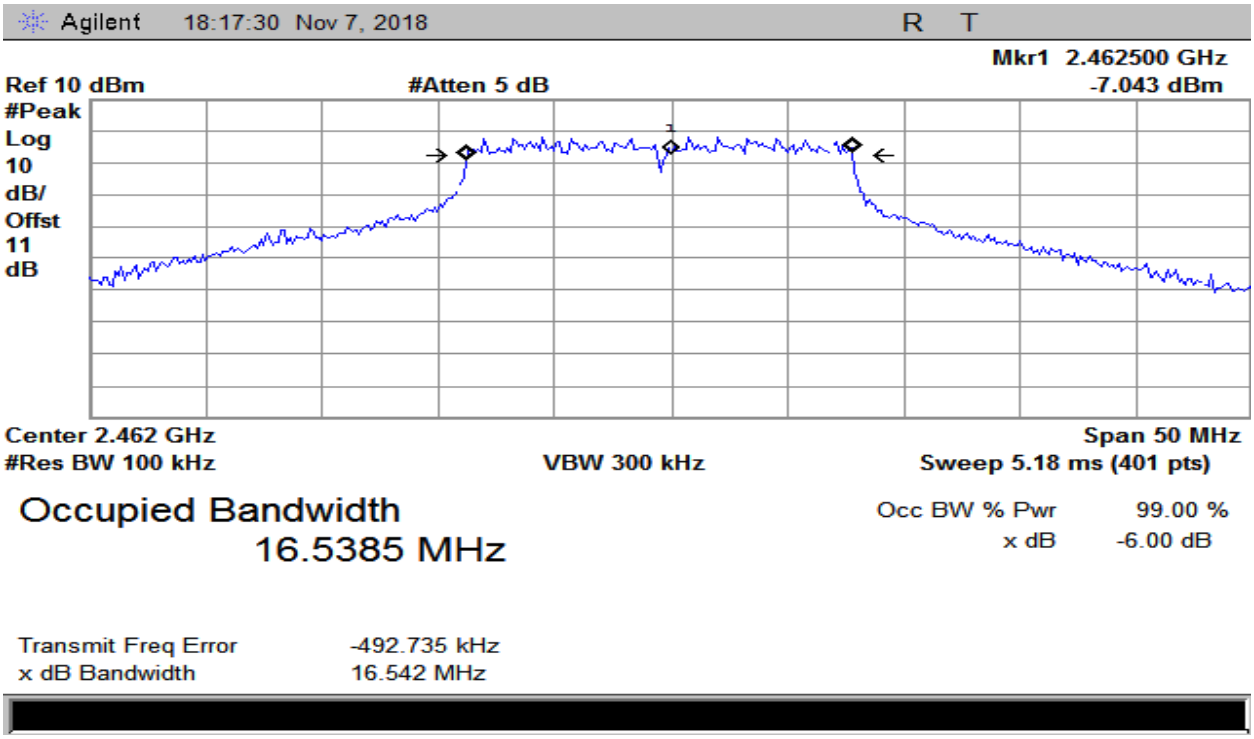
Plot 6 – Highest Channel – 6dB BW



Plot 7 – Lowest Channel – 6dB BW (OFDM)



Plot 8 – Middle Channel – 6dB BW (OFDM)



Plot 9 – Highest Channel – 6dB BW (OFDM)

2. RF Power Output

Test Requirement(s):	§15.247(b)(3)	Test Engineer(s):	Keith T.
Test Results:	Pass	Test Date(s):	Nov/07/2018

Test Procedures: As required by 47 CFR 15.247(b)(3), RF Power output measurements were made at the RF output terminals of the EUT. DTS Procedure 9.2.2.2 was used for Average measurements

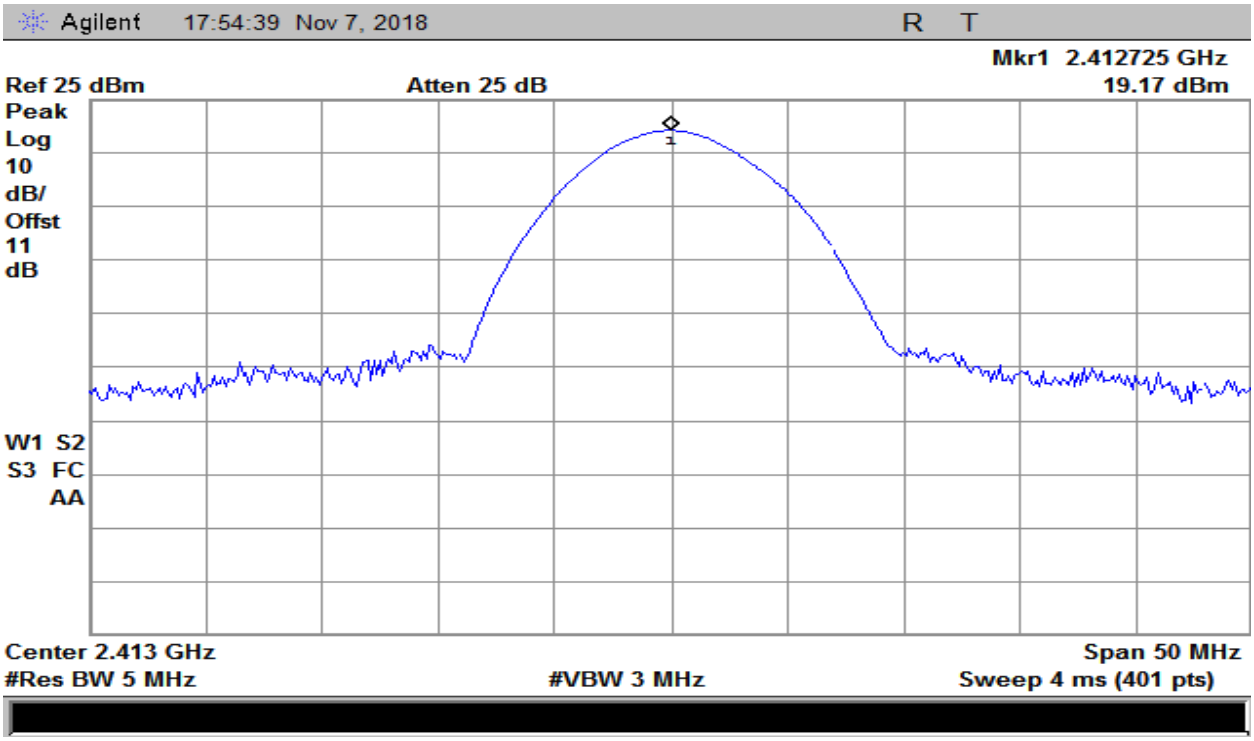
Customer provided a test mode to control the EUT RF modulation, and frequency channel. The EUT was connected through an attenuator to a Spectrum Analyzer capable of making power measurements. Measurements were made at the low, mid, and high channels of the entire frequency band.

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Specification Limit	Mode
2413	19.17	0.0826	1W	DTS
2438	18.98	0.0790	1W	DTS
2463	18.58	0.0721	1W	DTS

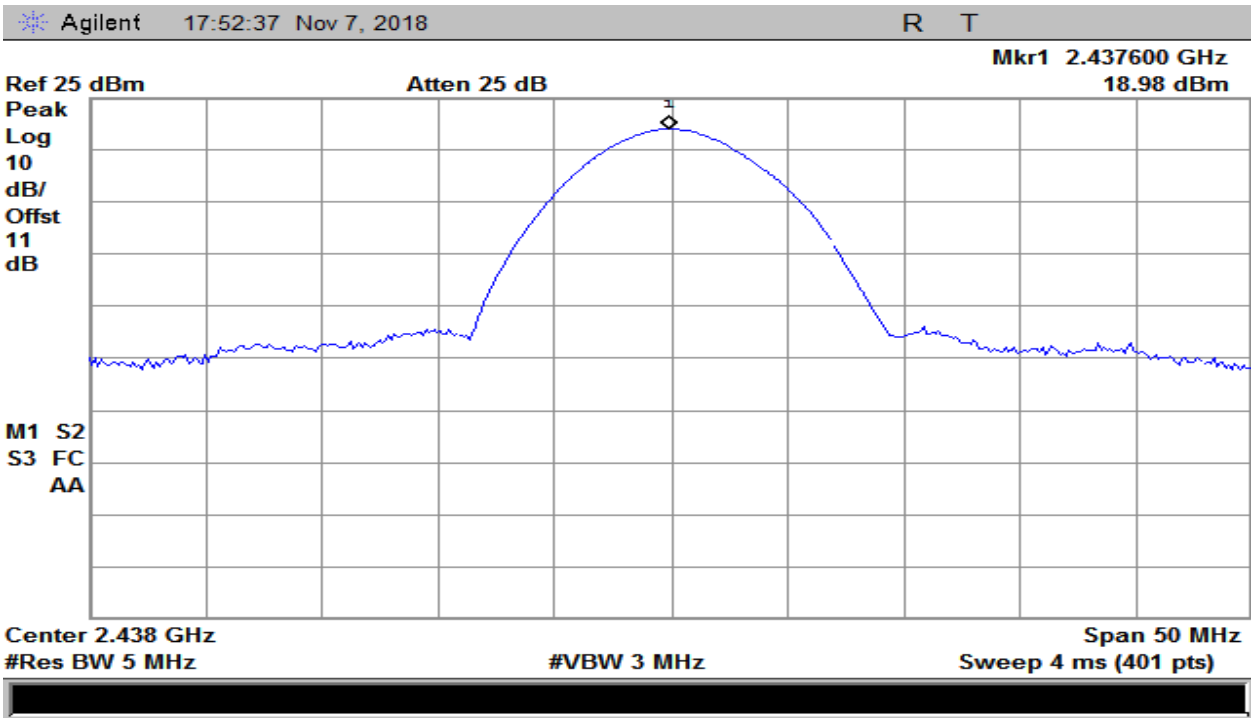
Table 10. RF Power Output, Test Results

Test Setup:

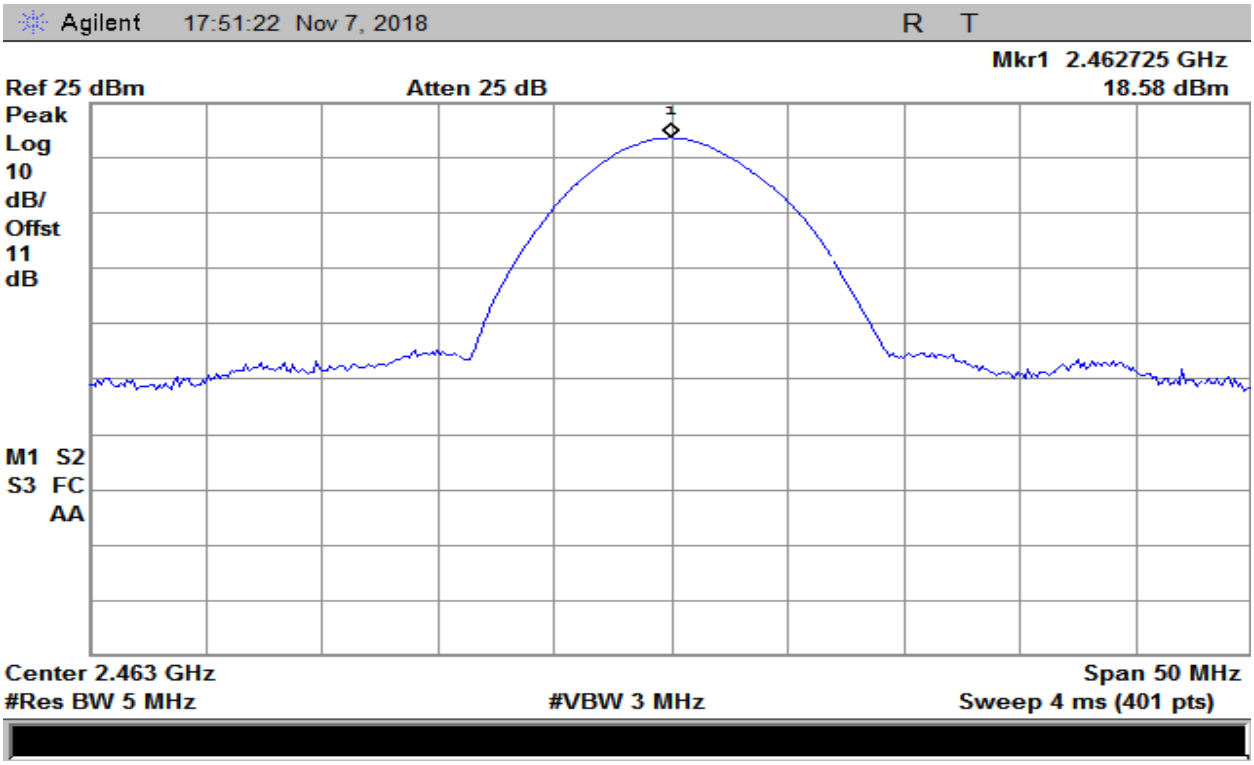
Figure 4. RF Power Test Setup



Plot 6 – Output Power – Low (Channel # 1)



Plot 7– Output Power – Mid (Channel # 6)



Plot 8 – Output Power – High (Channel # 11)

3. Conducted Spurious Emissions

Test Requirement(s):	§15.247(c)	**Test Engineer(s):**	Keith T.
Test Results:	Pass	**Test Date(s):**	Nov/07/2018

Test Procedures:

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

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

Test Setup:

Figure 5. Conducted Spurious Emissions Test Setup

Test Data:

Frequency (MHz)	Measured Level (dBm)	Limit (dBm)
2325.00	-28.01	-1.0

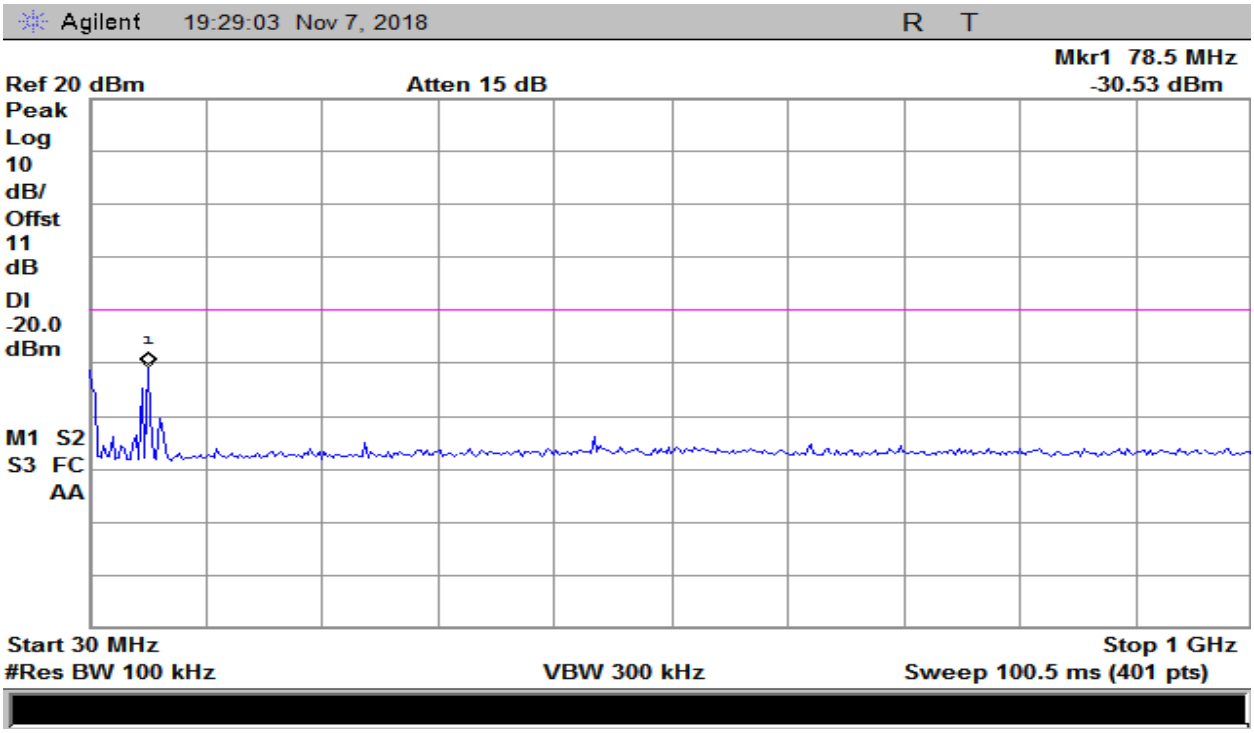
Table 11. Lowest Channel – Conducted Spurious Emissions, Test Results

Frequency (MHz)	Measured Level (dBm)	Limit (dBm)
2350.00	-27.5	-1.0

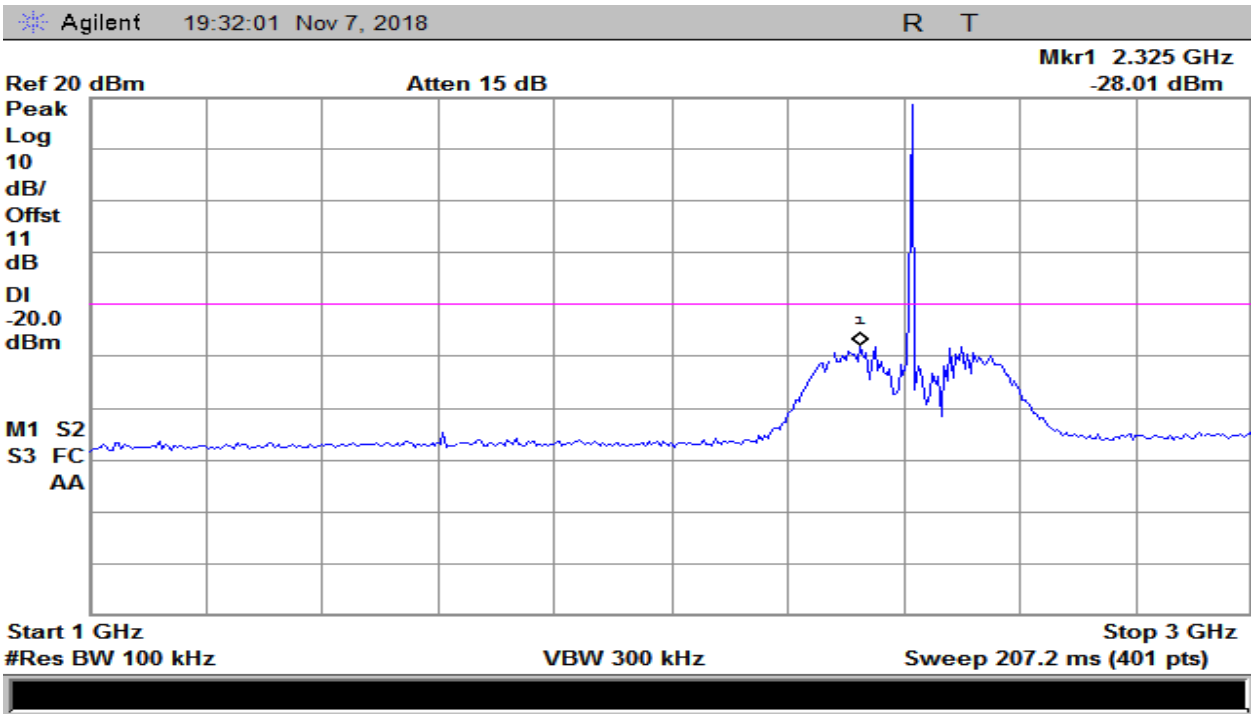
Table 12. Middle Channel – Conducted Spurious Emissions, Test Results

Frequency (MHz)	Measured Level (dBm)	Limit (dBm)
2375.00	-26.7	-1.0

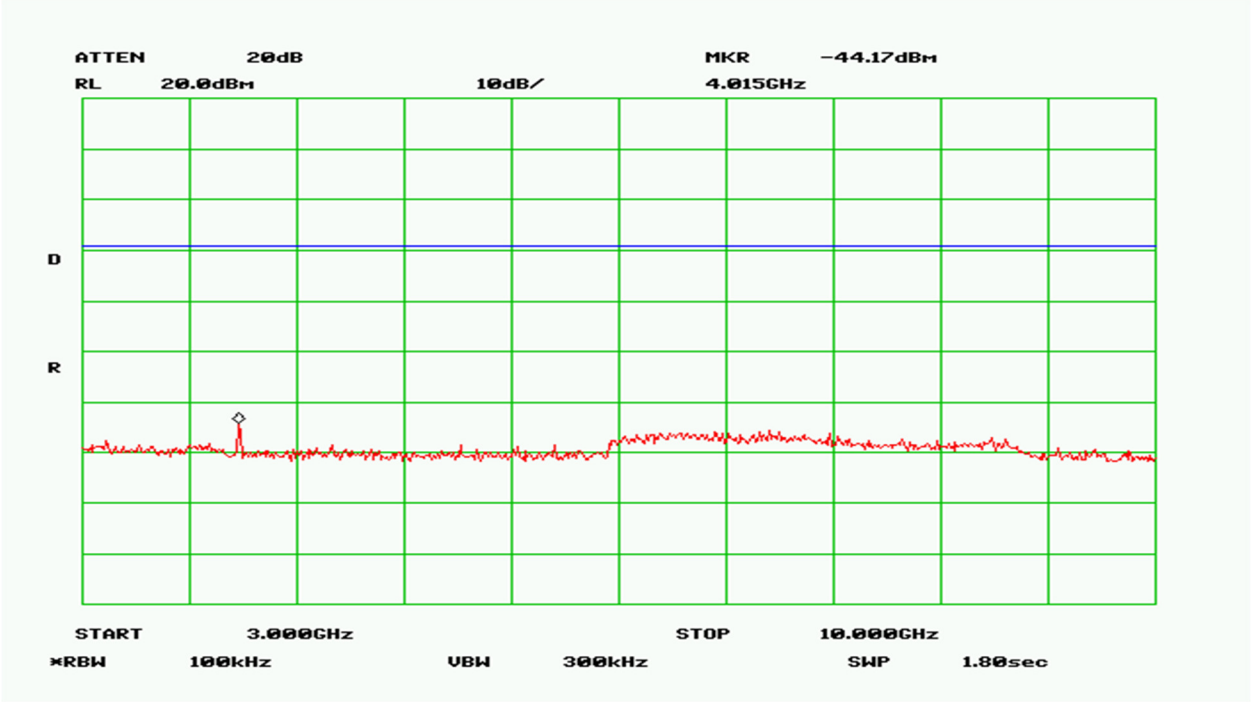
Table 13. Highest Channel – Conducted Spurious Emissions, Test Results



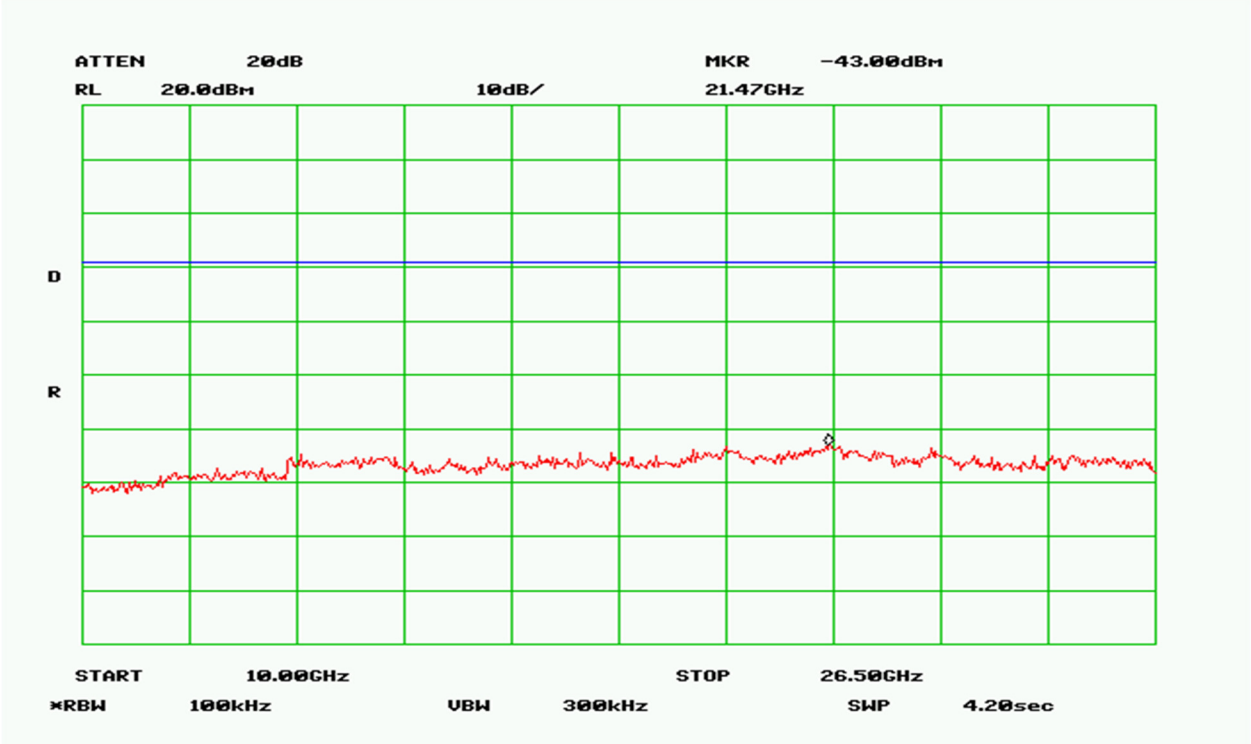
Plot 9 – Low Band – 30MHz to 1GHz



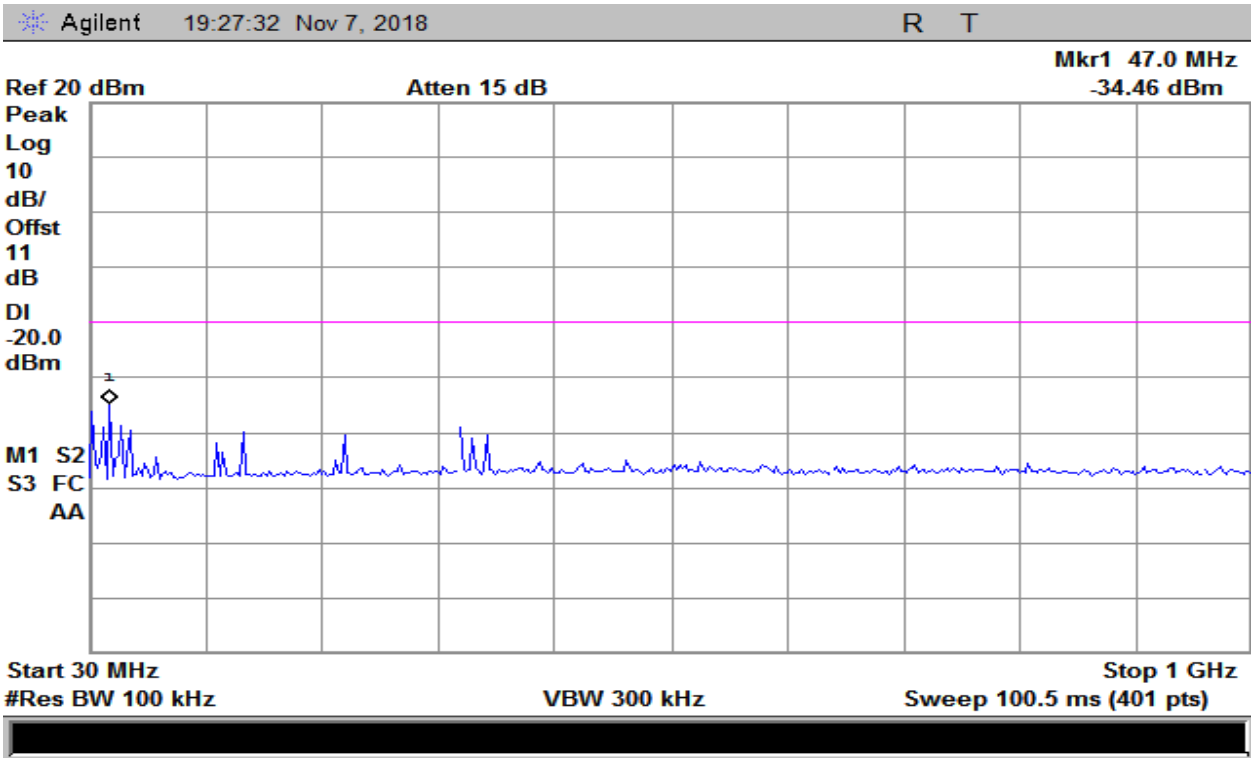
Plot 10 – Low Band – 1GHz to 3GHz



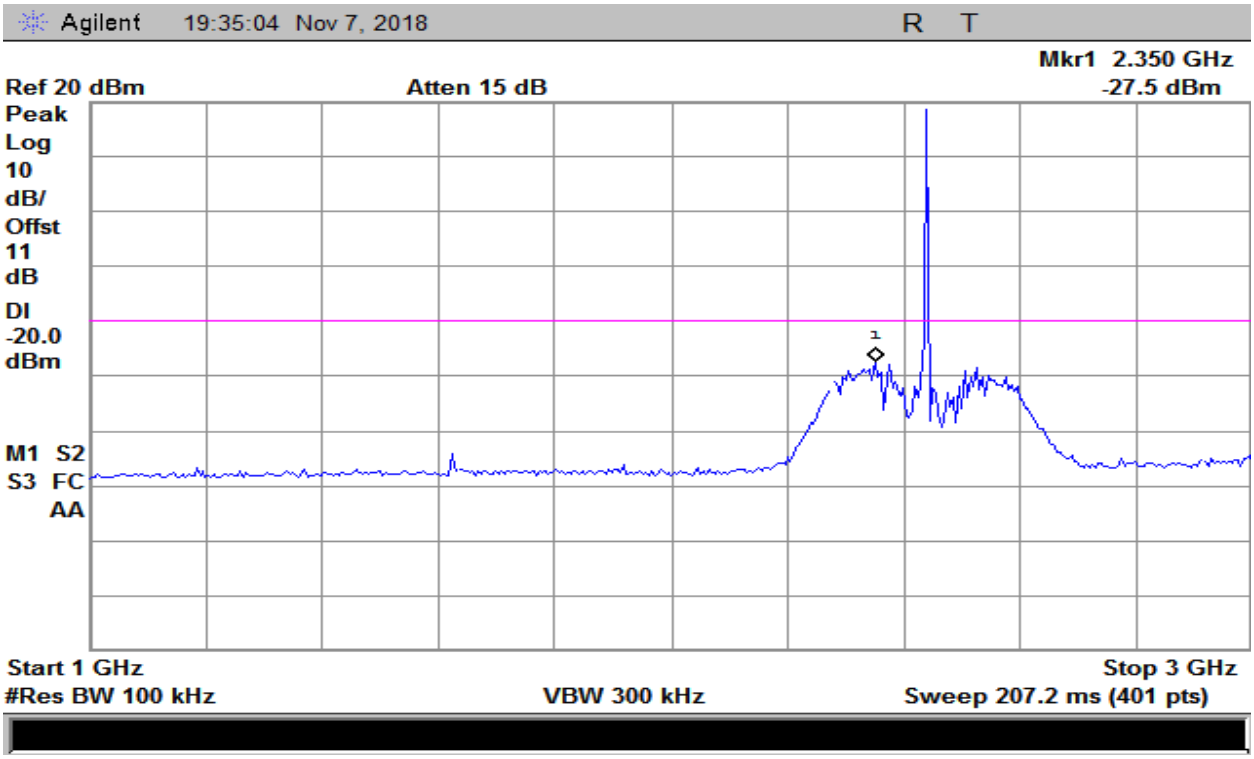
Plot 11 – Low Band – 3GHz to 10GHz



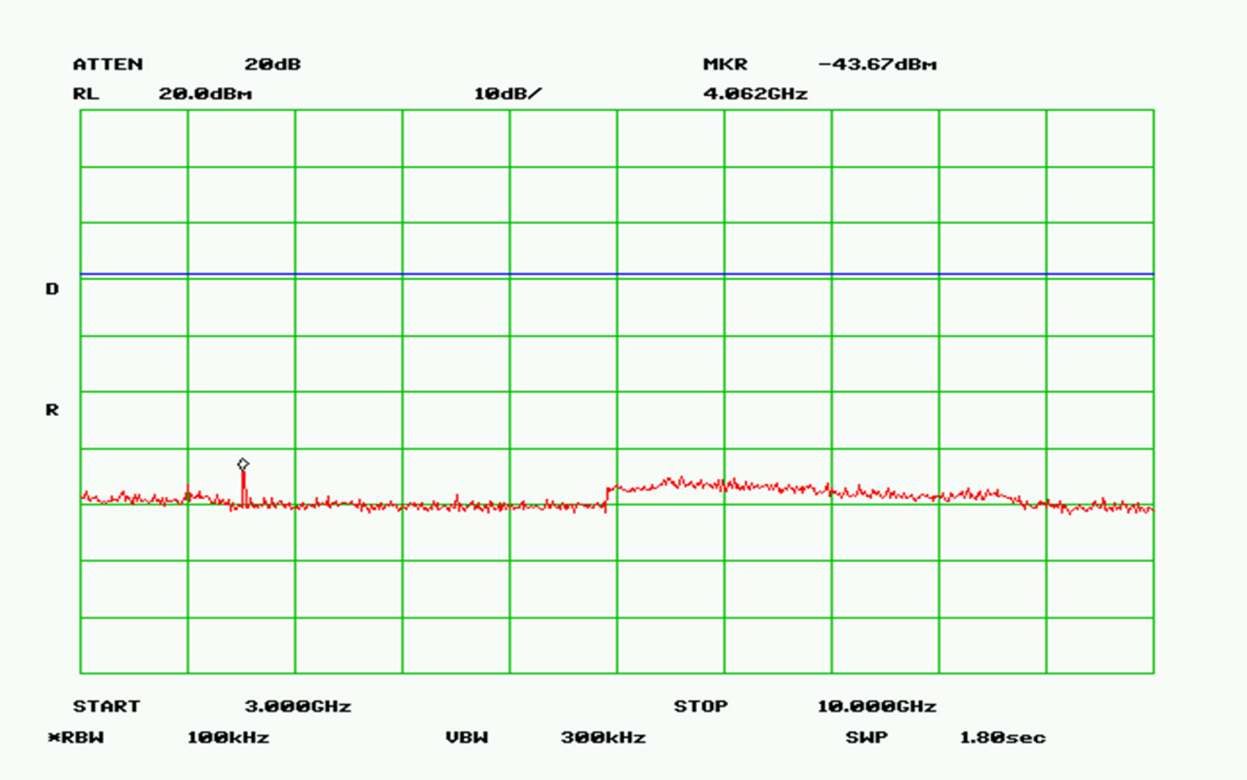
Plot 12 – Low Band – 10GHz to 26.5GHz



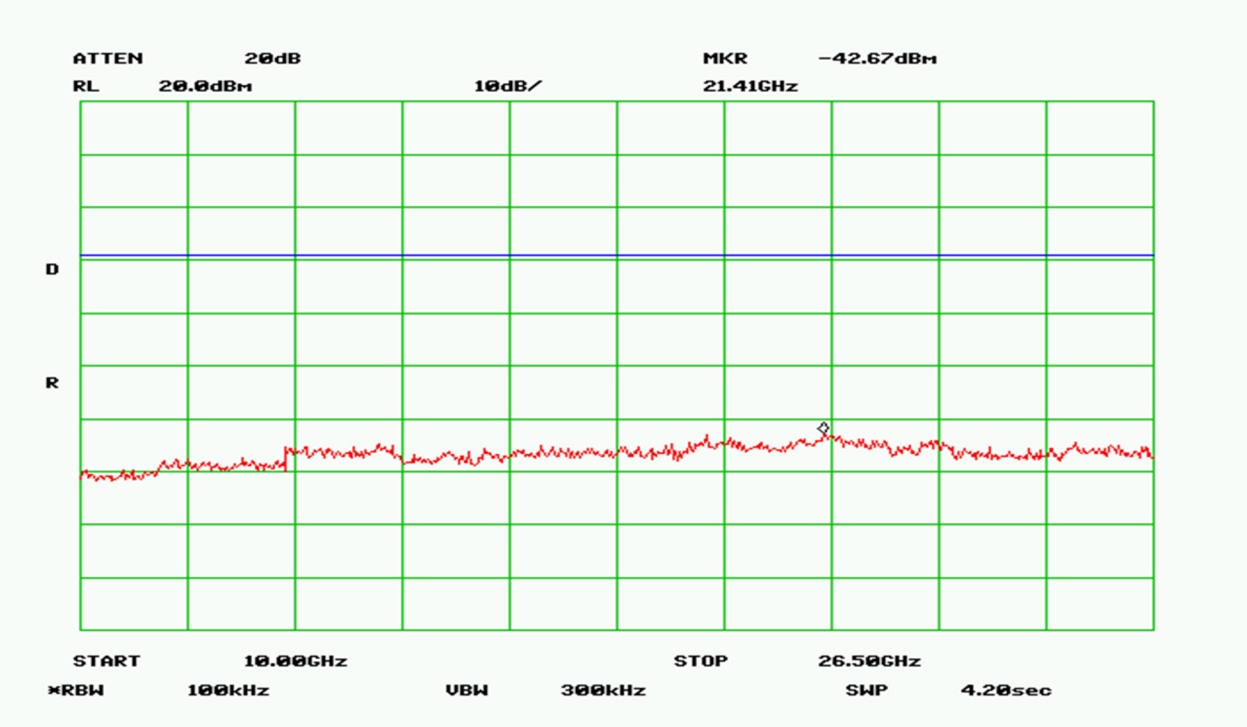
Plot 14 – Mid Band - 30MHz to 1GHz



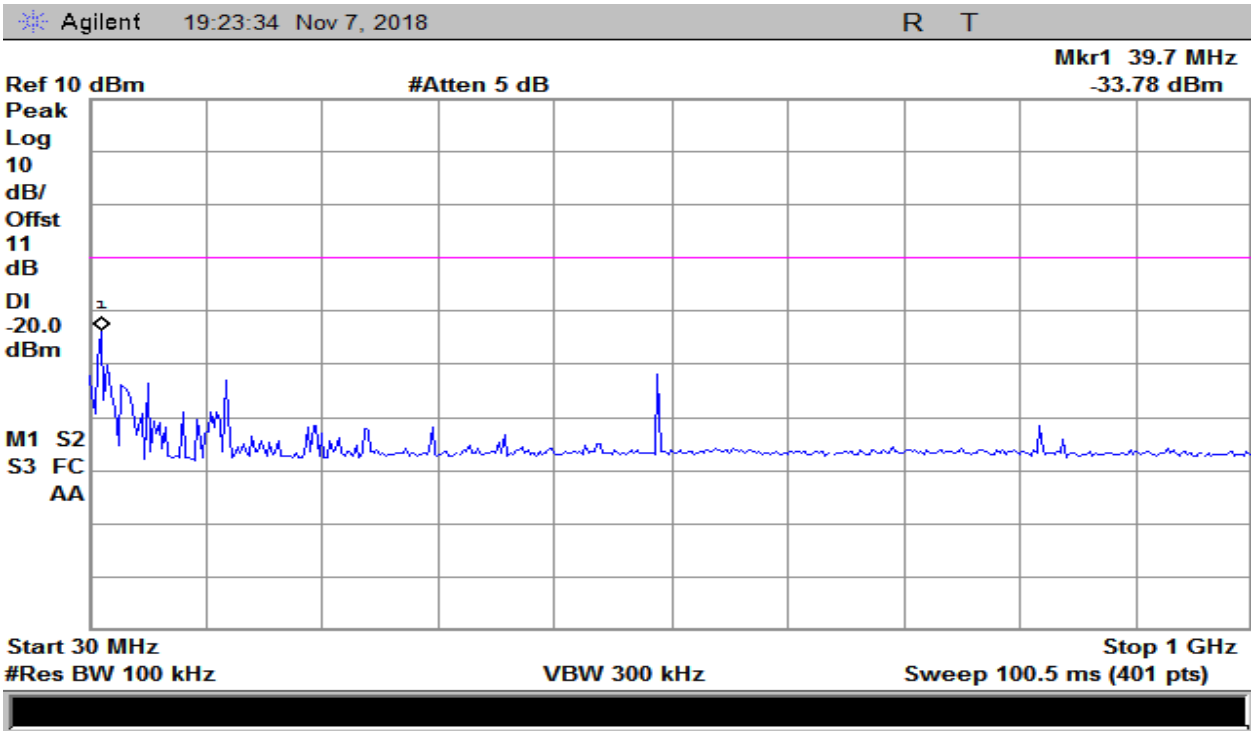
Plot 15 – Mid Band – 1GHz to 3GHz



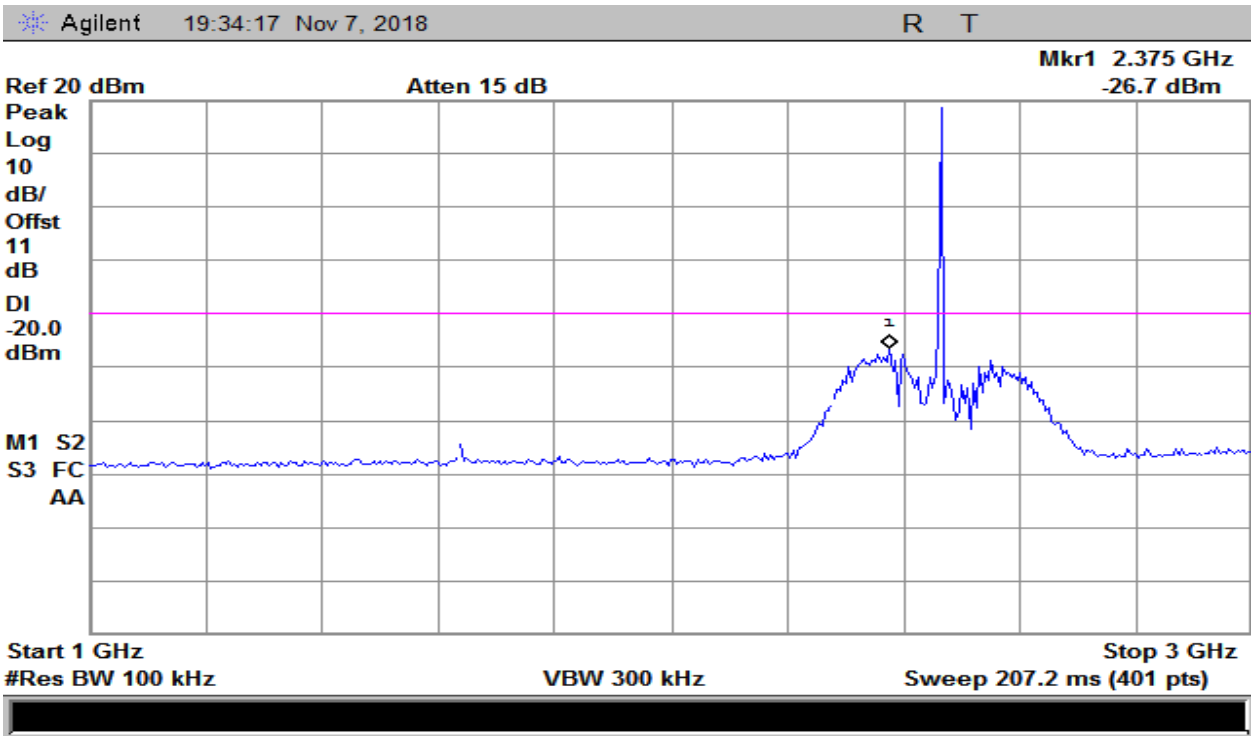
Plot 16 – Mid Band – 3GHz to 10GHz



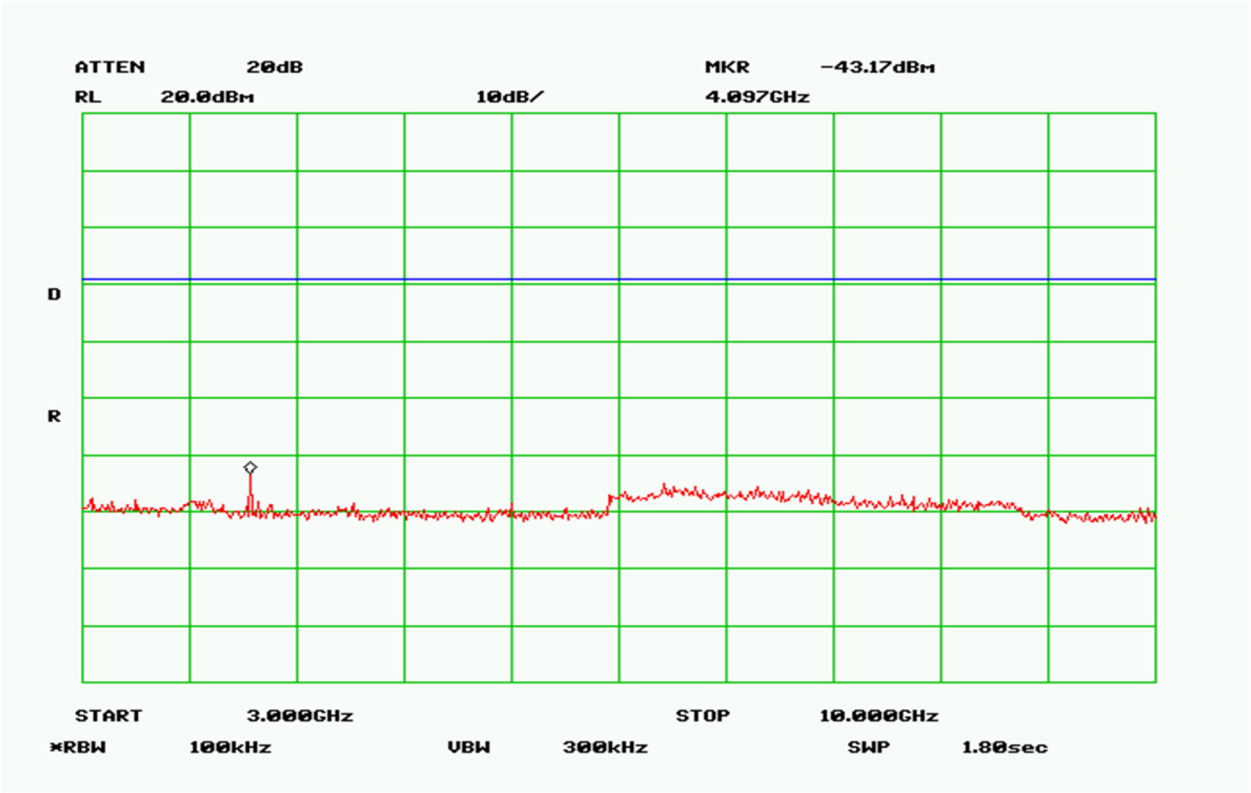
Plot 17 – Mid Band – 10GHz to 26.5GHz



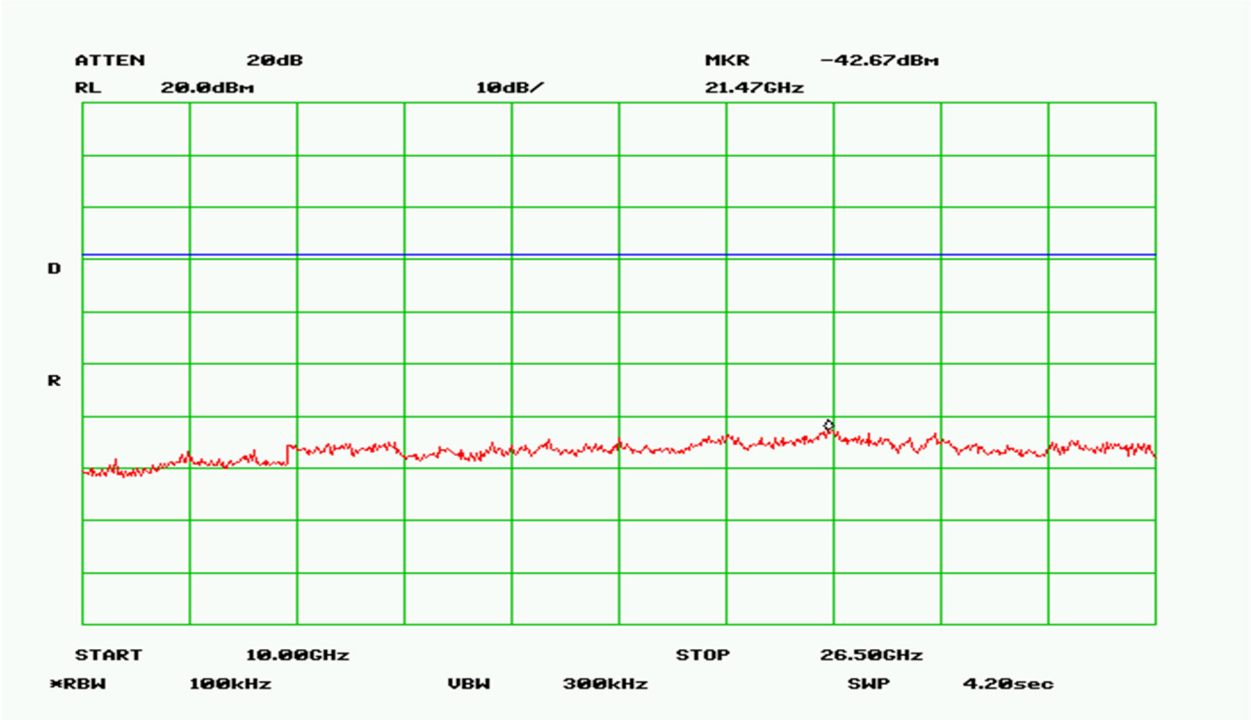
Plot 19 – High Band – 30MHz to 1GHz



Plot 20 – High Band – 1GHz to 3GHz



Plot 21 – High Band – 3GHz to 10GHz



Plot 22 – High Band – 10GHz to 26.5GHz

4. Radiated Spurious Emissions and Restricted Band

Test Requirement(s):	§15.247(d), 15.209(a), 15.205	**Test Engineer(s):**	Keith T.
Test Results:	Pass	**Test Date(s):**	Nov/15/2017

Test Procedures: As required by 47 CFR 15.247, Radiated spurious measurements were made in accordance with the procedures of the ANSI C63.10-2013.

The EUT was placed on a non-reflective table inside a 3 meter semi-anechoic room. The EUT was set on continuous transmit.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The frequency range up to the 10^{th} harmonic was investigated.

Detector Setting	Resolution Bandwidth	Video Bandwidth	Span
Peak	1MHz	1MHz	As necessary
Average	1MHz	10Hz	0 Hz

Table 14. Analyzer Settings

Test Setup:

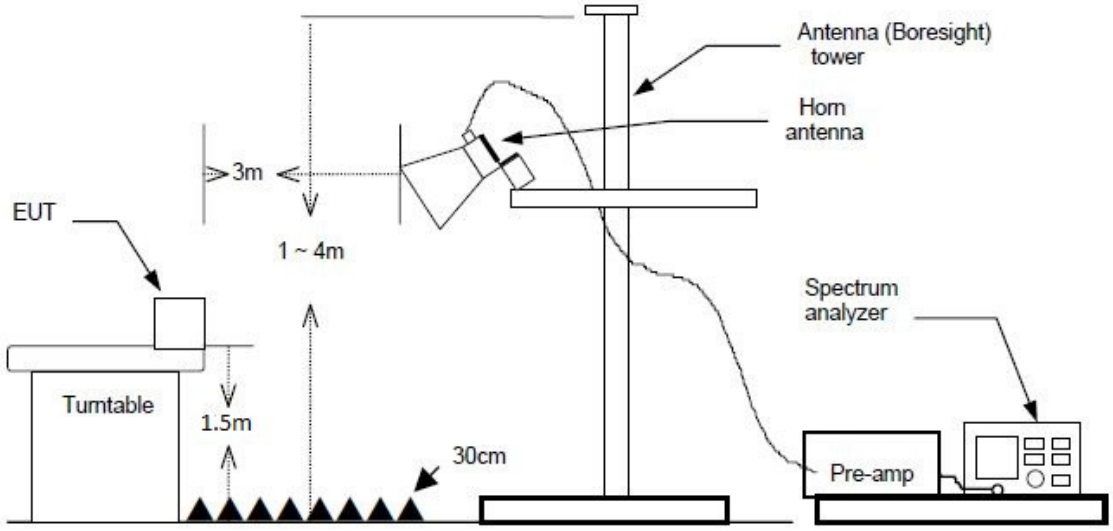


Figure 6. Radiated Emission Above 1GHz Test Setup

Frequency (MHz)	Peak Amplitude (dbuV/m)	Peak Limit (dBuV/m)	Average Amplitude (dBuV/m))	Average Limit (dBuV/m)
4825	47.0	115.5	-	95.5
7237.5	49.0	115.5	-	95.5
9650	45.0	115.5	-	95.5

Table 15 - Spurious Radiated Emission Data – Low Band –

Frequency (MHz)	Peak Amplitude (dbuV/m)	Peak Limit (dBuV/m)	Average Amplitude (dBuV/m)	Average Limit (dBuV/m)
4875	46.0	115.5	-	95.5
7312.5	48.0	115.5	-	95.5
9750	47.0	115.5	-	95.5

Table 16 – Spurious Radiated Emission Data – Mid Band -

Frequency (MHz)	Peak Amplitude (dbuV/m)	Peak Limit (dBuV/m)	Average Amplitude (dBuV/m)	Average Limit (dBuV/m)
4925	46.0	115.5	-	95.5
7387.5	48.0	115.5	-	95.5
9850	52.0	115.5	-	95.5

Table 17 – Spurious Radiated Emission Data – High Band -

NOTE 1: There were no detectable emissions. Above levels are system Noise Floor level

6. Emissions At Band Edges

Test Requirement(s):	§15.247(d)	**Test Engineer(s):**	Keith T.
Test Results:	Pass	**Test Date(s):**	Nov/13/2018

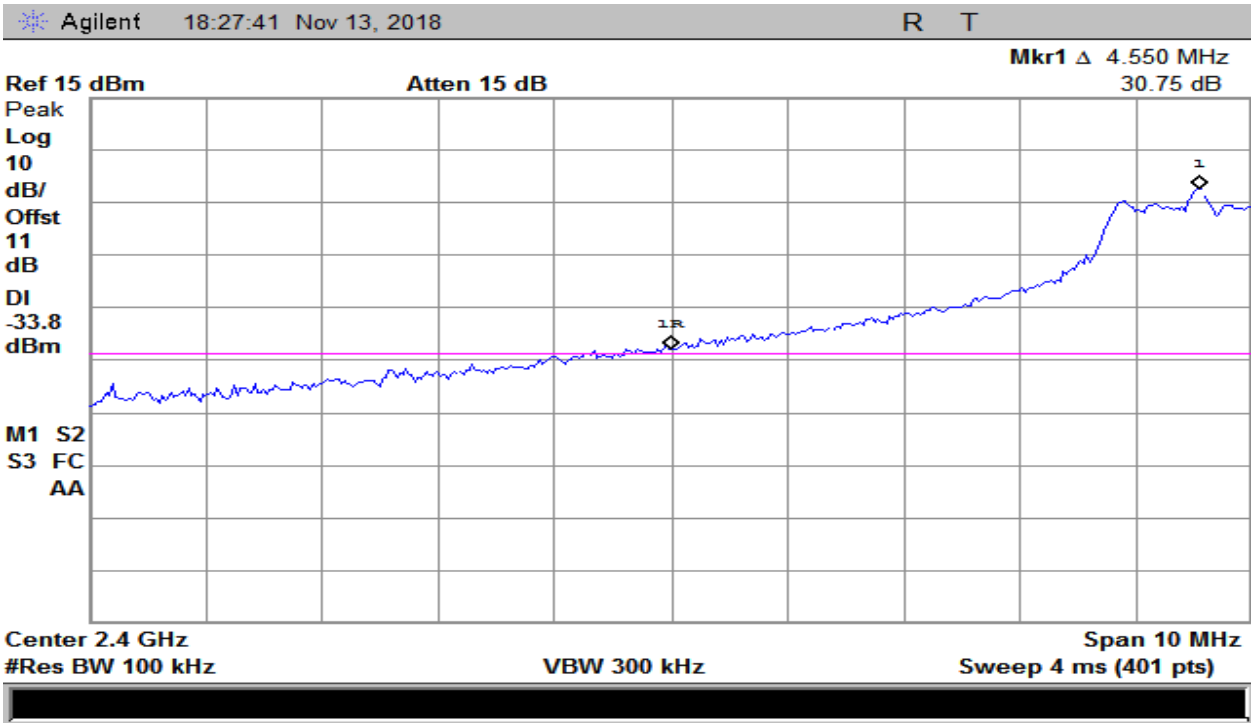
Test Procedures: As required by 47 CFR 15.247, Band edge radiated emissions measurements were made at the RF antenna output terminals of the EUT using the marker-delta method.

The EUT was placed on a wooden table inside a 3 meter semi-anechoic chamber. The EUT was set on continuous transmit.

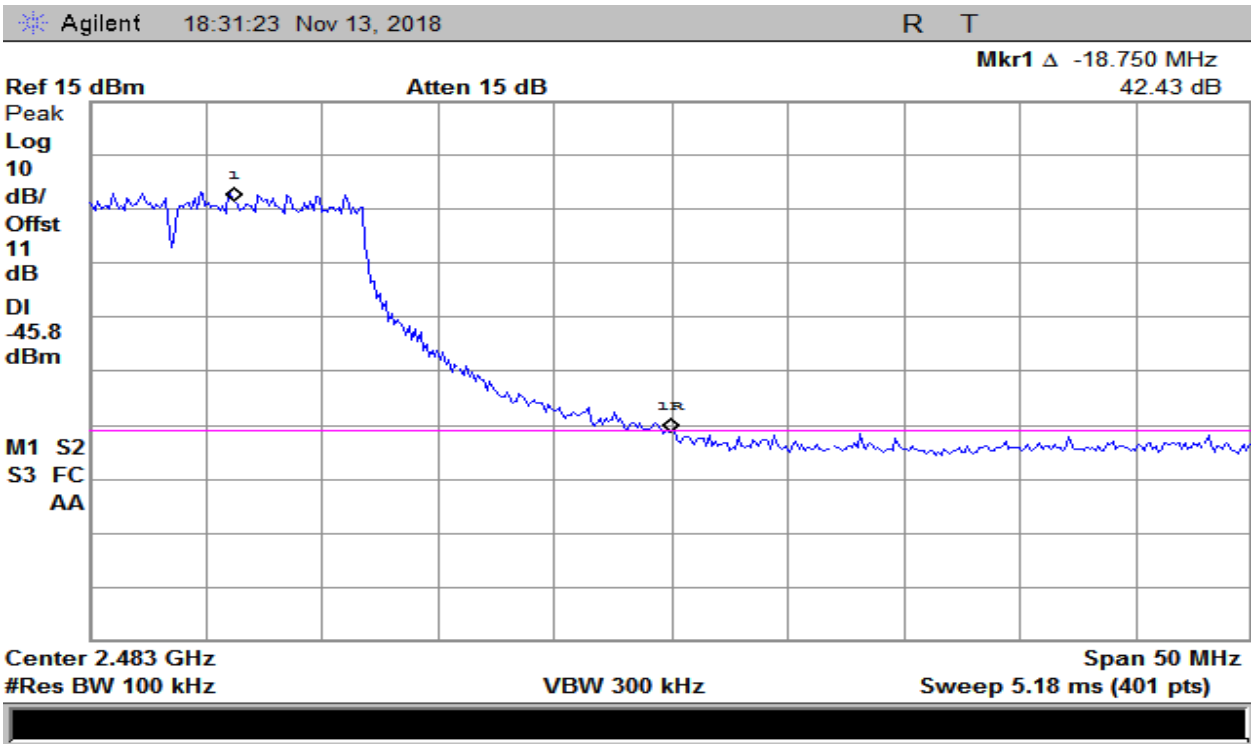
The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The EUT was set up at maximum power, first on the lowest operating channel, then on the highest operating channel of the transmit band.

Frequency (MHz)	Measured Level	Detector	Limit	Comment
2400	-30.75dB	Peak	-20dBc	OFDM
2483.5	-42.43dB	Peak	-20dBc	OFDM
2400	-51.25dB	Peak	-20dBc	DSSS
2483.5	-51.23dB	Peak	-20dBc	DSSS

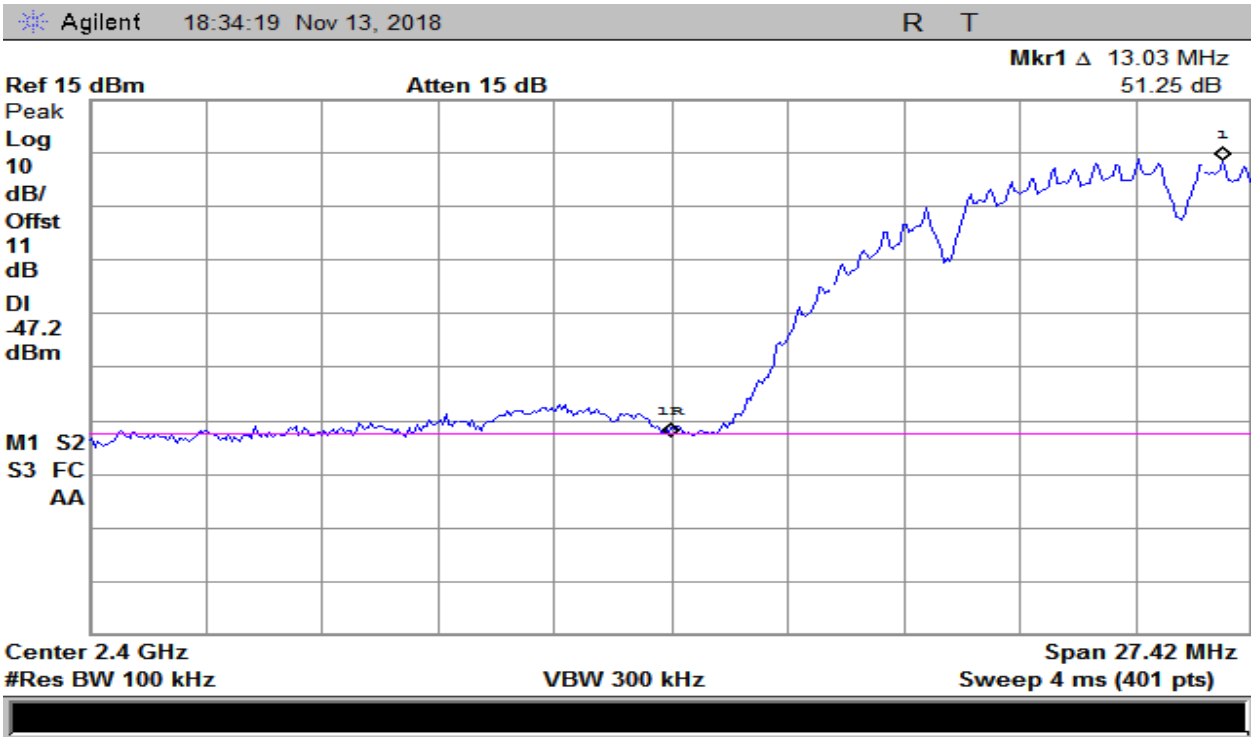
Table 18 – Band Edge Emissions Summary –



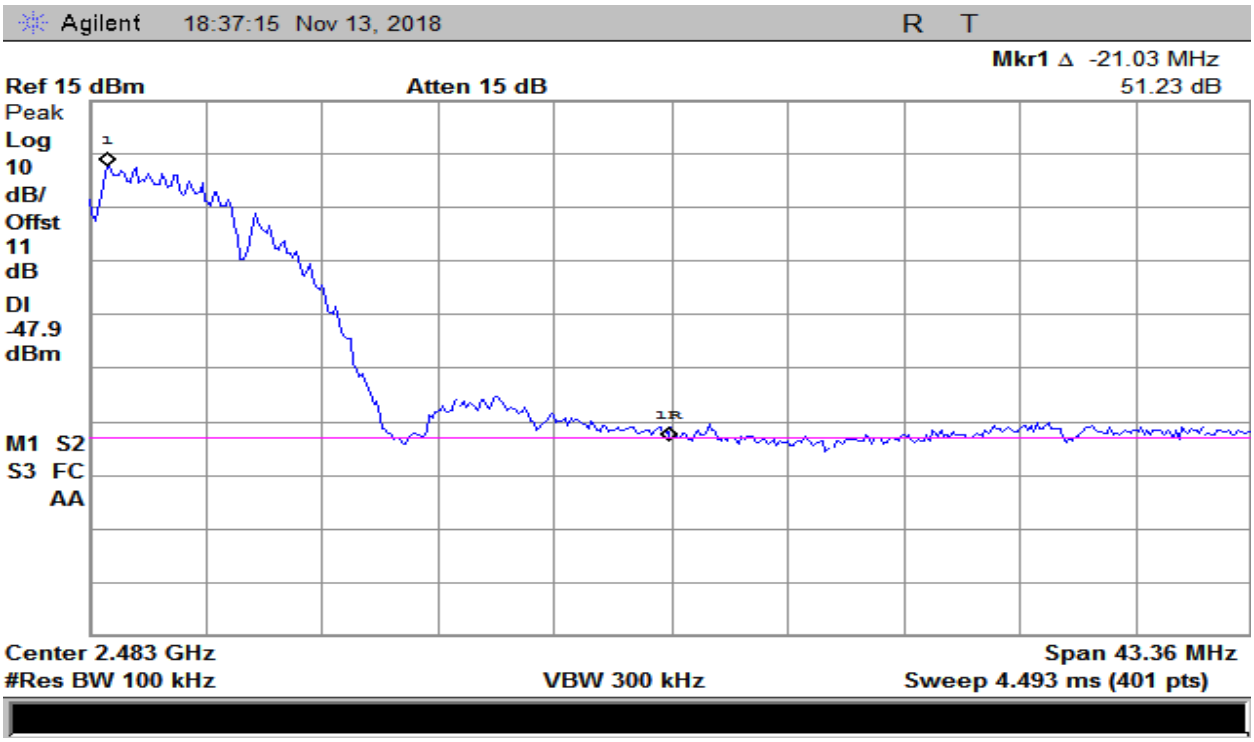
Plot 24 - Band Edge – Low Channel (OFDM)



Plot 25 – Band Edge - High Channel (OFDM)



Plot 25 – Band Edge - Low Channel



Plot 25 – Band Edge – High Channel

7. Power Spectral Density

Test Requirement(s):	§15.247(d)	Test Engineer(s):	Keith T.
Test Results:	Pass	Test Date(s):	Nov/08/2018

Test Procedures: As required by 47 CFR 15.247(d), For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3kHz band during any time interval of continuous transmission. Power spectral density measurements were made at the RF antenna output terminals of the EUT using the DTS methods section 10.2 was used for DTS mode and section 10.3 was used for Hybrid mode.

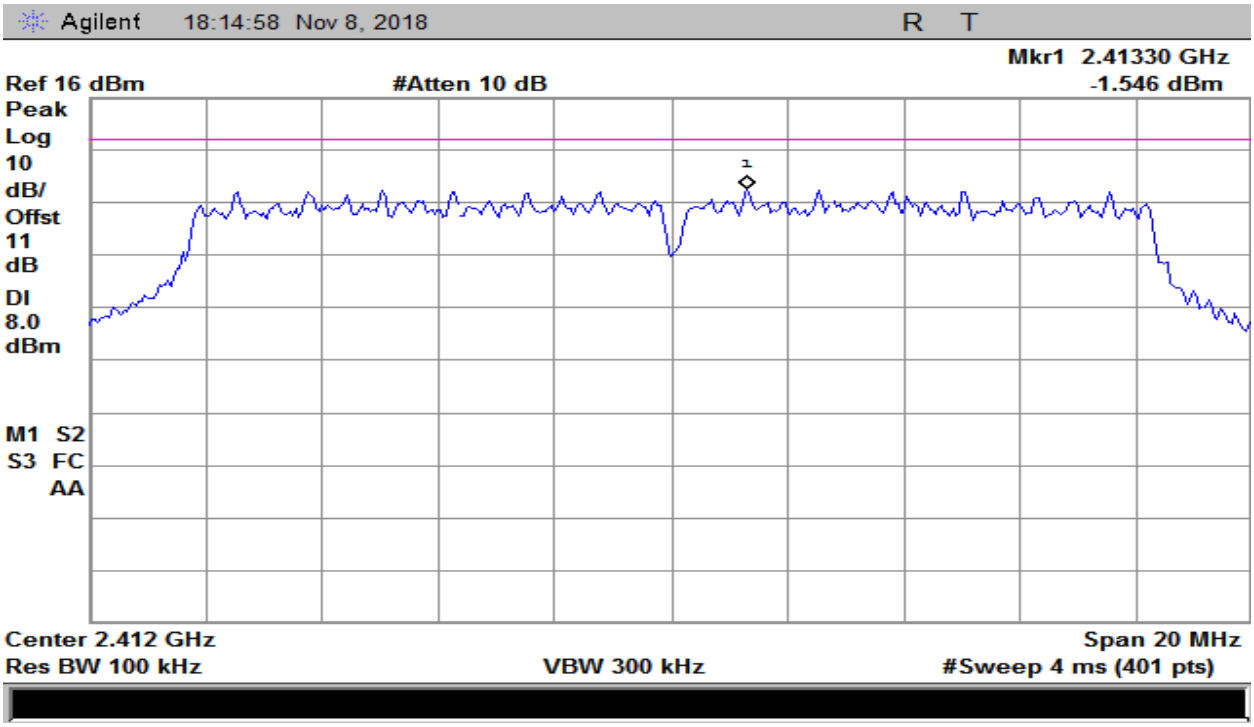
The EUT output was connected directly to the spectrum analyzer through an attenuator. The measurements were made at the RF antenna output terminals of the EUT.

Detector Setting	Resolution Bandwidth	Sweep Time	Span
Peak	3KHz to 100kHz	Auto	1.5 x DTS BW

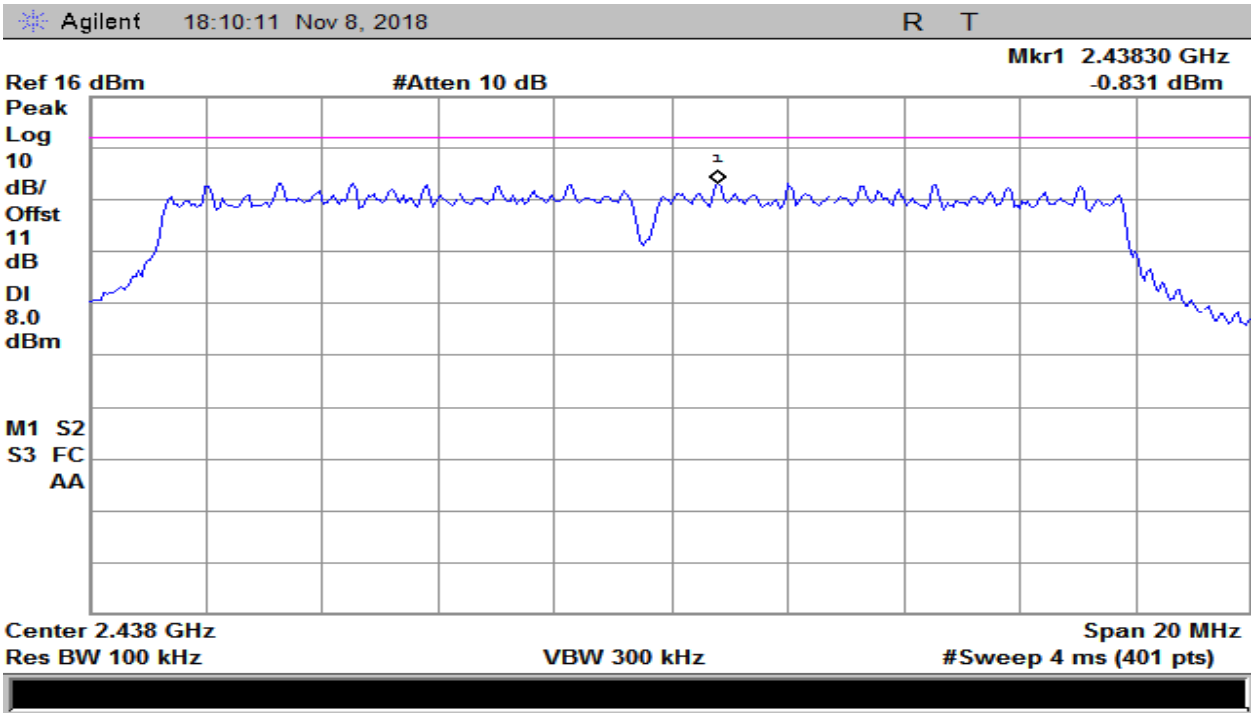
Table 19 – Analyzer settings

Frequency (MHz)	Measured Level	Limit	Comment
2412	2.80 dBm	8 dBm	DSSS
2437	4.23 dBm	8 dBm	DSSS
2462	2.56 dBm	8 dBm	DSSS
2412	-1.54 dBm	8 dBm	OFDM
2438	-0.83 dBm	8 dBm	OFDM
2462	-2.11 dBm	8 dBm	OFDM

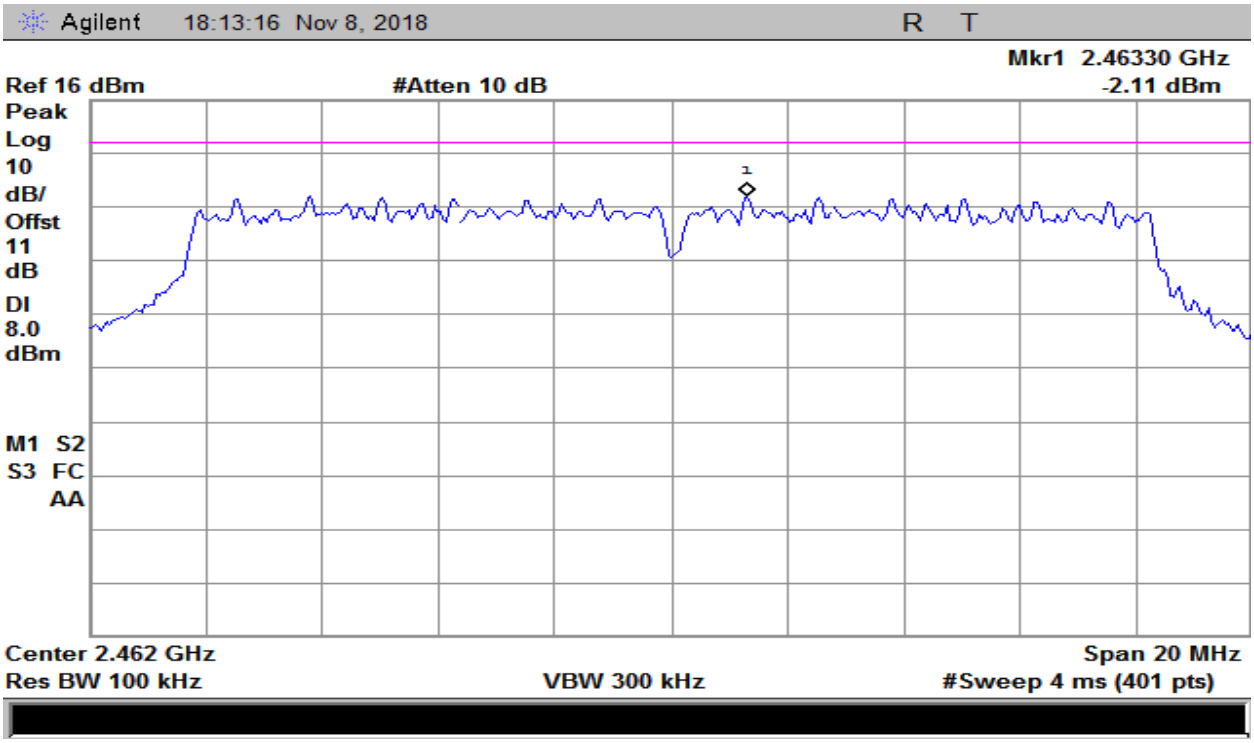
Table 20 - PSD Summary Test Result



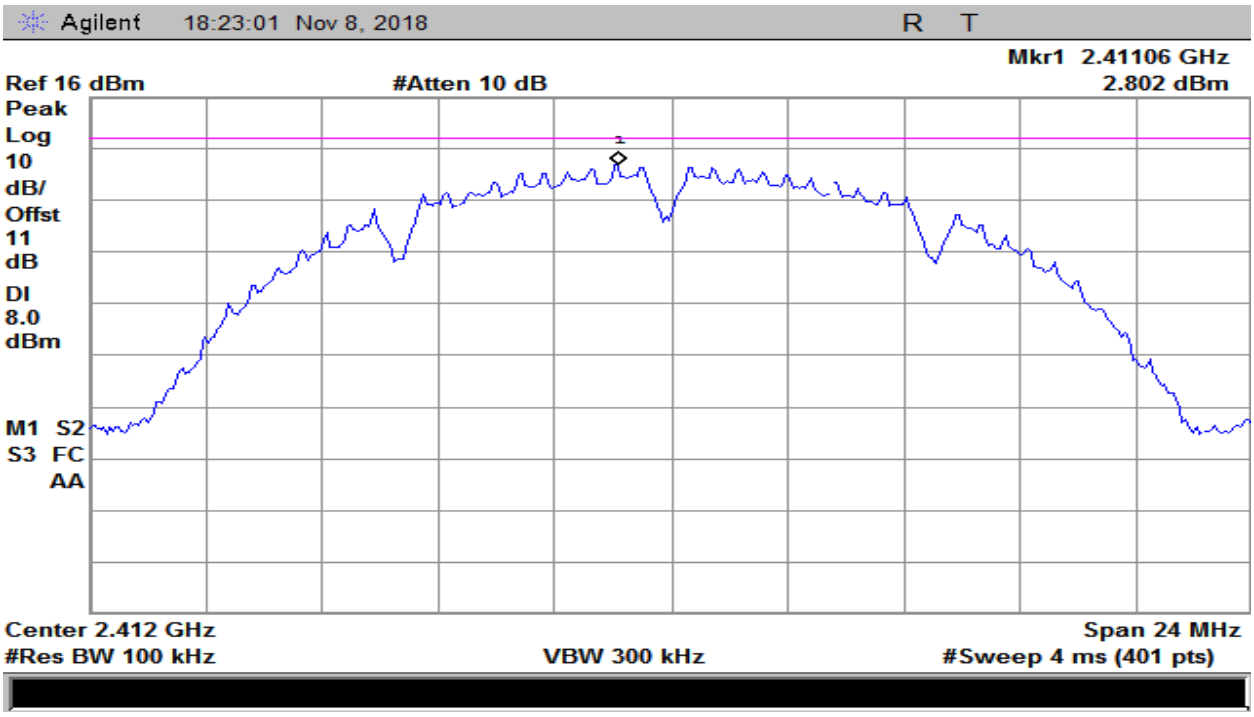
Plot 26 – Power Spectral Density – Lowest Channel (OFDM)



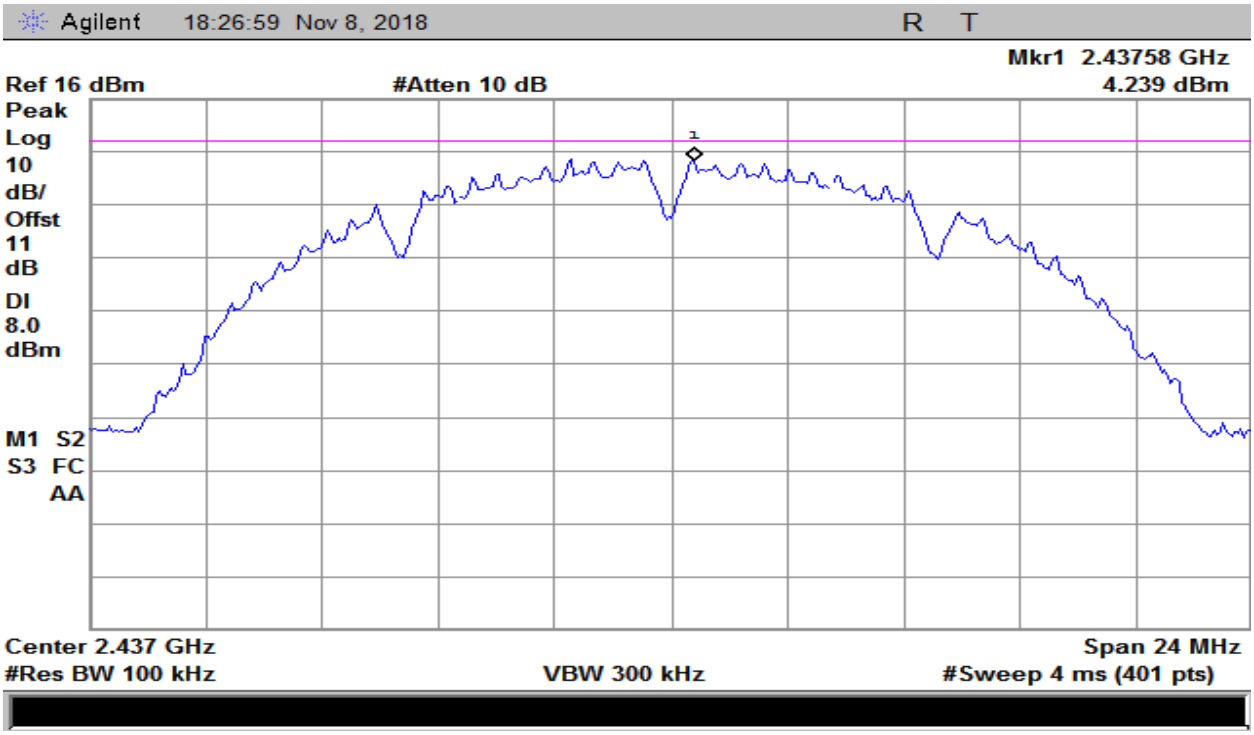
Plot 27 – Power Spectral Density – Middle Channel (OFDM)



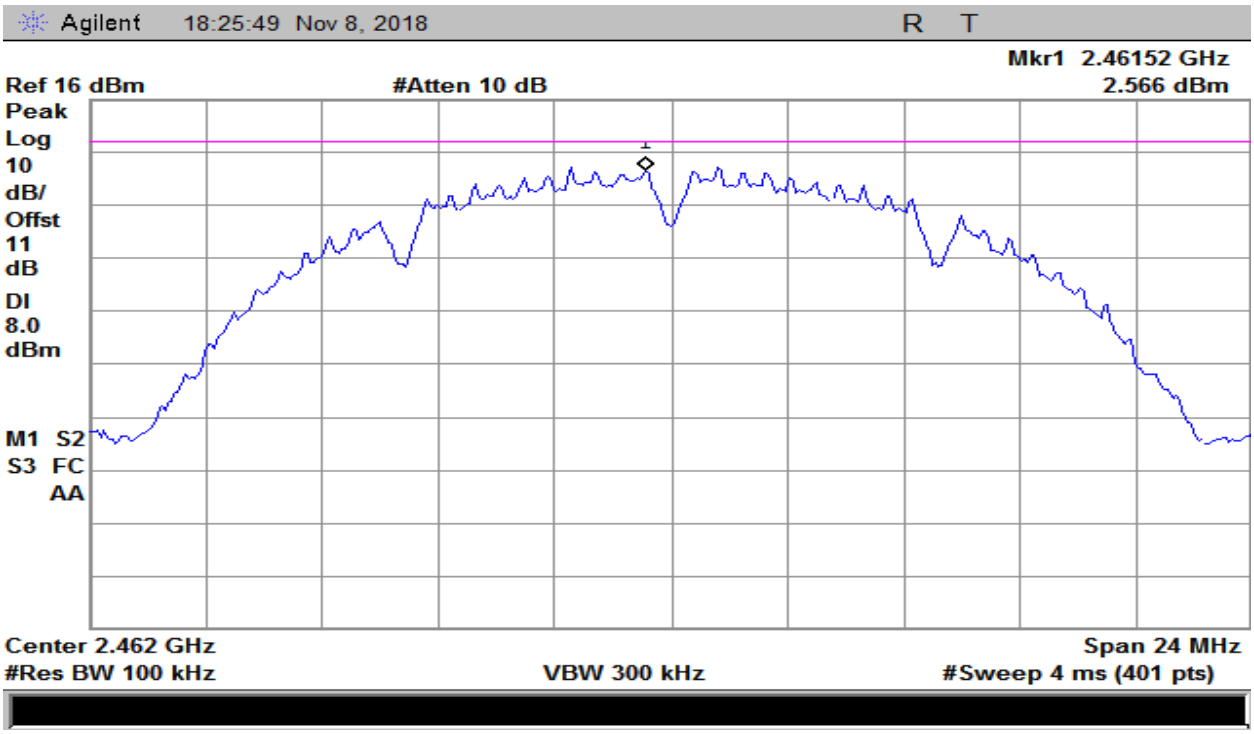
Plot 28 – Power Spectral Density – Highest Channel (OFDM)



Plot 28 – Power Spectral Density – Lowest Channel



Plot 28 – Power Spectral Density – Middle Channel



Plot 28 – Power Spectral Density – Highest Channel

I. Test Equipment

Equipment	Manufacturer	Model	Serial #	Last Cal Date	Cal Due Date
Spectrum Analyzer	Agilent	E4402B	US41192757	Mar/19/18	Mar/19/19
Spectrum Analyzer	Hewlett Packard	8563E	3821A09316	Jan/30/18	Jan/30/19
High Pass Filter	Mini-Circuits	VHF-3100+	1023	Verified	
LISN	Laplace Instruments	LISN 1600	152946	Mar-14-18	Mar-14-19
DMM	Fluke	77 III	72550270	Jan/30/18	Jan/30/20
Power Supply	Hewlett Packard	E3610A	KR83021468	Verified	
EMI Receiver	Hewlett Packard	8568B	2314A02642	Aug-08-18	Aug-08-19
Spectrum Analyzer	Hewlett Packard	8595EM	3801A00177	Mar-15-18	Mar-15-19
High Pass Filter	Mini-Circuits	VHF-1320+	1034	Verified	
Signal Generator	R&S	SMY02	1062.5502.12	Verified	
Attenuator 10dB	Huber+Suhner	6810.17.A	747300	Verified	
Horn Antenna	Com-Power	AHA-118	711150	May/10/16	May/10/19
Antenna	EMCO	GTEM 5417	1063	Verified	

Table 23 – Test Equipment List

***Statement of Traceability:** Test equipment is maintained and calibrated on a regular basis. All calibrations have been performed by a 17025 accredited test facility, traceable to National Institute of Standards and Technology (NIST)

8. Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The following measurement uncertainty values have been calculated as show in the table below:

Measured Parameter	Measurement Unit	Frequency Range	Expanded Uncertainty
Conducted Emissions (AC Power)	dBuV or dBuA	150kHz – 30MHz	± 4.3dB
Radiated Emission below 30MHz	dBuV/m	9kHz-30MHz	± 2.96dB
Radiated Emissions below 1GHz	dBuV/m	30 – 1000MHz	± 5.6dB
Radiated Emissions above 1GHz	dBuV/m	1 – 26.5GHz	± 4.1dB

The reported expanded uncertainty has been estimated at a 95% confidence level (k=2)

END OF TEST REPORT