



TÜVRheinland®
Precisely Right.

Emissions Test Report

EUT Name: USB Wireless Audio Transmitter

Model No.: Ear Force Stealth 420X+ TX

CFR 47 Part 15.247:2016 and RSS 247:2015

Prepared for:

Voyetra Turtle Beach, Inc.
100 Summit Lake Drive, Suite 100
Valhalla, New York 10595 USA

Prepared by:

TUV Rheinland of North America, Inc.
1279 Quarry Lane
Pleasanton, CA 94566
Tel: (925) 249-9123
Fax: (925) 249-9124
<http://www.tuv.com/>

Report/Issue Date: May 24, 2016
Report Number: 31661416.001
Revision Number: 1
Project Number: 0000139457

Statement of Compliance

Manufacturer: Voyetra Turtle Beach, Inc.
100 Summit Lake Drive, Suite 100
Valhalla, New York 10595 USA

Requester / Applicant: Tim Blaney
(530) 277-3482

Name of Equipment: USB Wireless Audio Transmitter

Model No. Ear Force Stealth 420X+ TX (TB300-2571-01)

Type of Equipment: Intentional Radiator

Application of Regulations: CFR 47 Part 15.247:2016 and RSS 247:2015

Test Dates: April 26, 2016 to May 3, 2016

Guidance Documents:

Emissions: ANSI C63.10: 2013, KDB 558074 D01 DTS Measurement Guidance v03r05

Test Methods:

Emissions: ANSI C63.10: 2013, KDB 558074 D01 DTS Measurement Guidance v03r05

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

This report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government. This report contains data that are not covered by A2LA accreditation. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.



Jeremy Luong May 24, 2016
Test Engineer Date



David Spencer May 24, 2016
Laboratory Signatory Date



Industry Canada Industrie Canada

Testing Cert #3331.02

US5254

2932M-1

Table of Contents

1	Executive Summary.....	6
1.1	Scope.....	6
1.2	Purpose.....	6
1.3	Summary of Test Results.....	6
1.4	Special Accessories.....	7
1.5	Equipment Modifications.....	7
2	Laboratory Information.....	8
2.1	Accreditations & Endorsements.....	8
2.1.1	US Federal Communications Commission	8
2.1.2	NIST / A2LA	8
2.1.3	Canada – Industry Canada	8
2.1.4	Japan – VCCI.....	8
2.1.5	Acceptance by Mutual Recognition Arrangement	9
2.2	Test Facilities	9
2.2.1	Emission Test Facility	9
2.2.2	Immunity Test Facility.....	9
2.3	Measurement Uncertainty.....	9
2.3.1	Sample Calculation – radiated & conducted emissions	10
2.3.2	Measurement Uncertainties	11
2.4	Calibration Traceability.....	11
3	Product Information.....	12
3.1	Product Description	12
3.2	Equipment Configuration	12
3.3	Operating Mode	12
3.4	Unique Antenna Connector.....	13
3.4.1	Results	13
4	Emissions	14
4.1	Output Power Requirements	14
4.1.1	Test Method.....	14
4.1.2	Results	15
4.2	Occupied Bandwidth	19
4.2.1	Test Method.....	19
4.2.2	Results	20
4.3	Out-of-Band Emissions.....	24
4.3.1	Test Method.....	24
4.3.2	Test Result	25
4.4	Peak Power Spectral Density	29
4.4.1	Test Method.....	29
4.4.2	Results	30
4.5	Maximum Permissible Exposure	33

Table of Contents

4.5.1	Test Methodology	33
4.5.2	FCC KDB 447498 D01 – General SAR Test Exclusion Guidance	33
4.5.3	EUT Operating Condition.....	34
4.5.4	Classification	34
4.5.5	SAR Test Exclusion Threshold.....	34
4.6	Transmitter Spurious Emissions	35
4.6.1	Test Methodology	35
4.6.2	Transmitter Spurious Emission Limit	36
4.6.3	Test Results.....	36
4.6.4	Sample Calculation	48
4.7	AC Conducted Emissions	49
4.7.1	Test Methodology	49
4.7.2	Test Results.....	49
5	Test Equipment List.....	54
5.1	Equipment List.....	54
6	EMC Test Plan.....	55
6.1	Introduction.....	55
6.2	Customer.....	55
6.3	Equipment Under Test (EUT)	56
6.4	Test Specifications.....	59

Index of Tables

Table 1: Summary of Test Results.....	6
Table 2: Summary of Uncertainties	11
Table 3: RF Output Power at the Antenna Port – Test Results.....	15
Table 4: Occupied Bandwidth – Test Results	20
Table 5: Out of Band Emissions – Test Results.....	25
Table 6: Peak Power Spectral Density – Test Results	30
Table 7: Transmit Spurious Emission at Band-Edge Requirements	37
Table 8: AC Conducted Emissions – Test Results.....	49
Table 9: Customer Information.....	55
Table 10: Technical Contact Information	55
Table 11: EUT Specifications	56
Table 11: Interface Specifications.....	57
Table 13: Supported Equipment.....	57
Table 14: Description of Sample used for Testing.....	57
Table 15: Description of Test Configuration used for Radiated Measurement.	57
Table 16: Final Test Mode for 2403.35 MHz to 2477.35MHz Band.....	58
Table 17: Test Specifications	59

1 Executive Summary

1.1 Scope

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.247:2016 and RSS 247:2015 based on the results of testing performed on April 26, 2016 through May 3, 2016 on the USB Wireless Audio Transmitter Model Ear Force Stealth 420X+ TX manufactured by Voyetra Turtle Beach, Inc.. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

1.3 Summary of Test Results

Table 1: Summary of Test Results

Test	Test Method ANSI C63.4: 2014 / ANSI C63.10:2013	Test Parameters	Measured Value	Result
Spurious Emission in Transmitted Mode	CFR47 15.209, RSS-GEN Sect.8.9	Class B	-5.16 dB (Margin)	Complied
Restricted Bands of Operation	CFR47 15.205, RSS-GEN Sect.8.10	Class B		Complied
AC Power Conducted Emission	CFR47 15.207, RSS-GEN Sect.8.8	Class B	-9.33 dB (Margin)	Complied
Occupied Bandwidth	CFR47 15.247 (a2), RSS 247 Sect.5.2.1	≥ 500 kHz	1.593 MHz	Complied
Maximum Transmitted Power	CFR47 15.247 (b3), RSS-247 Sect.5.4.4	30 dBm w/ 6 dBi antenna	-0.33 dBm	Complied
Peak Power Spectral Density	CFR47 15.247 (e), RSS-247 Sect.5.2.2	8 dBm/ 3 kHz	-25.54 dBm	Complied
Unwanted Emissions	CFR47 15.247 (d), RSS-247 Sect.5.5	-30 dBm	-15.25 dB (Margin)	Complied
Unwanted Emissions	CFR47 15.247 (d), RSS-247 Sect.5.5	-30 dBm	-15.25 dB (Margin)	Complied

Note: Since EUT is a portable device where the end user will have the direct contact as head wear device, RF Exposure/SAR requirements are calculated for human head and body, and EUT met FCC KDB 447498 SAR exclusion. See Section 4.5 of this report

1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

1.5 Equipment Modifications

None.

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission



TUV Rheinland of North America at 1279 Quarry Lane, Ste. A., Pleasanton, CA 94566, is accredited by the commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC. The laboratory scope of accreditation includes: Title 47 CFR Parts 15, 18, and 90. The accreditation is updated every 3 years.

2.1.2 NIST / A2LA



TUV Rheinland of North America is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Guide 17025:1999 and ISO 9002 (Lab Code US5254). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 Canada – Industry Canada



TUV Rheinland of North America at the 1279 Quarry Ln, Pleasanton, CA 94566 address is accredited by Industry Canada for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by Industry Canada (File Number 2932M). This reference number is the indication to the Industry Canada Certification Officers that the site meets the requirements of RSS 212, Issue 1 (Provisional). The accreditation is updated every 3 years.

2.1.4 Japan – VCCI



The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 has been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0031

VCCI Registration No. for Santa Clara: A-0032

2.1.5 Acceptance by Mutual Recognition Arrangement



The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at 1279 Quarry Ln, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / A2LA accreditation will be accepted by each member country.

2.2 Test Facilities

All of the test facilities are located at 1279 Quarry Lane, Ste. A, Pleasanton, California 94566, USA. The 2305 Mission College, Santa Clara, 95054, USA location is considered a Pleasanton annex.

2.2.1 Emission Test Facility

The Semi-Anechoic chamber and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2009, at a test distance of 3 and 5 meters. The site is listed with the FCC and accredited by A2LA (Lab Code US5254). The 3/5-meter semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2009, at a test distance of 3 meter and 5 meters. A report detailing this site can be obtained from TUV Rheinland of North America.

2.2.2 Immunity Test Facility

ESD, EFT, Surge, PQF: These tests are performed in an environmentally controlled room with a 3.7 m x 4.8 m x 3.175 mm thick aluminum floor connected to PE ground.

For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of 10^9 Ohms/square on a 1.6 m x 0.8 m x 0.8 m high non-conductive table with a 3.175 mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470-k Ω resistors. The Vertical Coupling Plane consists of an aluminum plate 50 cm x 50 cm x 3.175 mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470-k Ω resistors.

For EFT, Surge, PQF, the HCP and VCP are removed.

RF Field Immunity testing is performed in a 7.3m x 4.3m x 4.1m anechoic chamber.

RF Conducted and Magnetic Field Immunity testing is performed on a 4.8m x 3.7m x 3.175mm thick aluminum ground plane.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The *Combined Standard Uncertainty* is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

The *Expanded Uncertainty* defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand. The fraction may be viewed as the coverage probability or level of confidence of the interval.

2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{RAW} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: RAW = Measured level before correction (dB μ V)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu\text{V/m} = 10^{\frac{\text{dB}\mu\text{V} / \text{m}}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable Loss=Radiated Emissions (dB μ V/m)

$$25 \text{ dB}\mu\text{V/m} + 17.5 \text{ dB} - 20 \text{ dB} + 1.0 \text{ dB} = 23.5 \text{ dB}\mu\text{V/m}$$

2.3.2 Measurement Uncertainties

Table 2: Summary of Uncertainties

	U_{lab}	U_{cispr}
Radiated Disturbance		
30 MHz – 25,000 MHz	3.2 dB	5.2 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	2.4 dB	3.6 dB
Disturbance Power		
30 MHz – 300 MHz	3.92 dB	4.5 dB

Note: U_{lab} is the calculated Combined Standard Uncertainty
U_{cispr} is the measurement uncertainty requirement per CISPR 16.

Measurement Uncertainty Immunity

The estimated combined standard uncertainty for ESD immunity measurements is $\pm 4.1\%$.
The estimated combined standard uncertainty for radiated immunity measurements is $\pm 2.7\text{dB}$.
The estimated combined standard uncertainty for conducted immunity measurements is $\pm 1.4\text{dB}$.
The estimated combined standard uncertainty for damped oscillatory wave immunity measurements is $\pm 8.8\%$.
The estimated combined standard uncertainty for harmonic current and flicker measurements is $\pm 0.45\%$.

Measurement Uncertainty – Radio Testing

The estimated combined standard uncertainty for frequency error measurements is $\pm 3.88\text{ Hz}$
The estimated combined standard uncertainty for carrier power measurements is $\pm 1.59\text{ dB}$.
The estimated combined standard uncertainty for adjacent channel power measurements is $\pm 1.47\text{ dB}$.
The estimated combined standard uncertainty for modulation frequency response measurements is $\pm 0.46\text{ dB}$.
The estimated combined standard uncertainty for transmitter conducted emission measurements is $\pm 4.01\text{ dB}$

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Guide 17025:2005.

3 Product Information

3.1 *Product Description*

The Ear Force Stealth 420X+ Wireless Gaming System consists of two main communication modules, the Stealth 420X+ RX (“Headset”) and the Stealth 420X+ TX (“Transmitter”). These two modules comprise a closed-loop wireless audio gaming system that utilize a proprietary 2.4 GHz communication technology to offer wireless streaming audio and chat/talkback capabilities.

3.2 *Equipment Configuration*

A description of the equipment configuration is given in Test Plan Section. The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with its intended use. The EUT was connected to rated power and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of a EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.3 *Operating Mode*

A description of the operation mode is given in Test Plan Section. In the case of a EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum radiation.

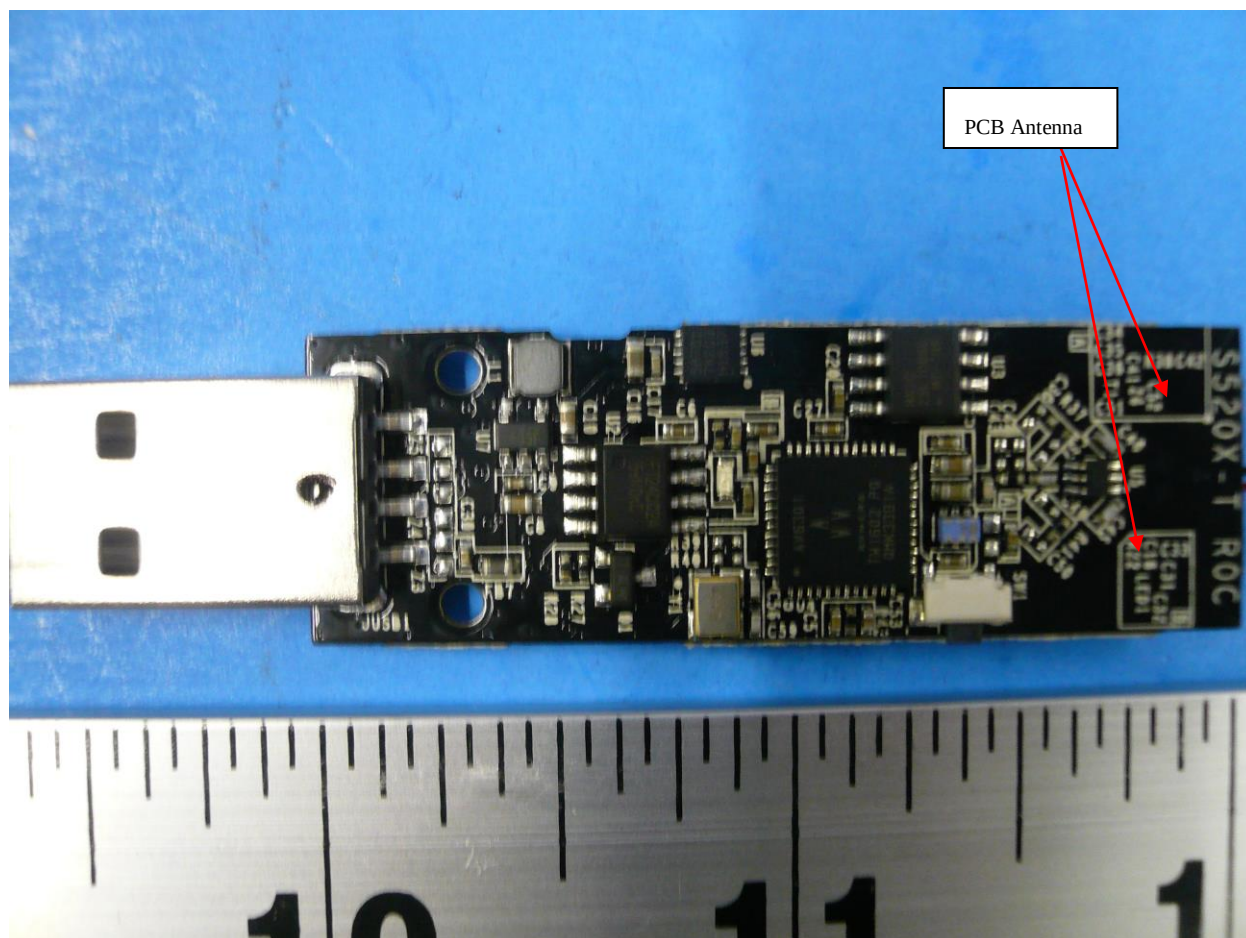
The final operating mode was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.4 Unique Antenna Connector

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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of CFR47 Parts 15.211, 15.213, 15.217, 15.219, or 15.221.

3.4.1 Results

The Ear Force Stealth 420X+ TX uses the permanently attached PCB trace antennas inside the device. See EUT Photo for details.



4 Emissions

Testing was performed in accordance with CFR 47 Part 15.247:2016 and RSS 247:2015. These test methods are listed under the laboratory's A2LA Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in ANSI C63.10: 2013 were used.

4.1 Output Power Requirements

The maximum peak output power requirement is the maximum equivalent isotropic radiated power delivering at the transmitting antenna under specified conditions of measurements in the presence of modulation.

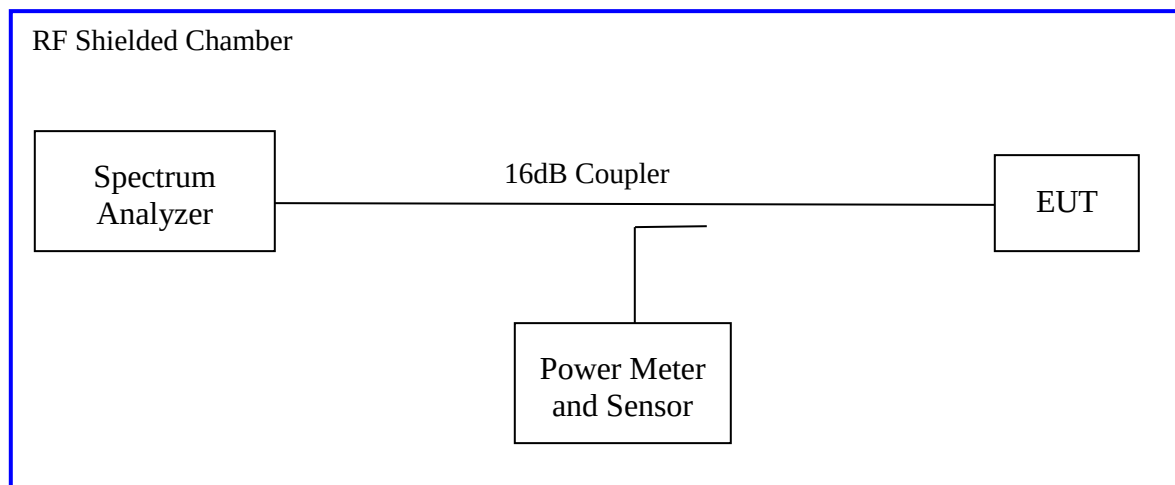
The maximum output power and harmonics shall not exceed CFR47 Part 15.247 (b3):2016 and RSS-247 Sect.5.4.4: 2015

The maximum transmitted power is +30 dBm or 1 Watt.

4.1.1 Test Method

The conducted method was used to measure the channel power output according to ANSI C63.10:2013 Section 11.9.2.2.2. The measurement was performed with modulation per CFR47 Part15.247 (b3):2016 and RSS-247 Sect.5.4.4: 2015. This test was conducted on 3 channels of Sample Stealth 420X+ TX, S/N PP #1. The worst mode result indicated below.

Test Setup:



Method AVGSA-1 of "KDB 558074 – DTS Measurement Guidance v03r05" applies since the Ear Force Stealth 420X+ TX continuously transmits with duty cycle greater than 98%.

4.1.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 3: RF Output Power at the Antenna Port – Test Results

Test Conditions: Conducted Measurement			Date: April 29, 2016		
Antenna Type: Integrated			Power Setting: 0 dBm		
Antenna Gain: -0.5 dBi			Signal State: Modulated at 100%		
Ambient Temp.: 23 °C			Relative Humidity:38%		
USB Wireless Audio Transmitter					
Frequency (MHz)	Limit [dBm]	Output [dBm]	Duty Cycle [dB]	Σ Power [dBm]	Margin [dB]
2403.35	+30.00	-0.45			-30.45
2441.35	+30.00	-0.33			-30.33
2477.35	+30.00	-1.00			-31.00
Note: The Transmitter transmitted at 100% duty cycle.					

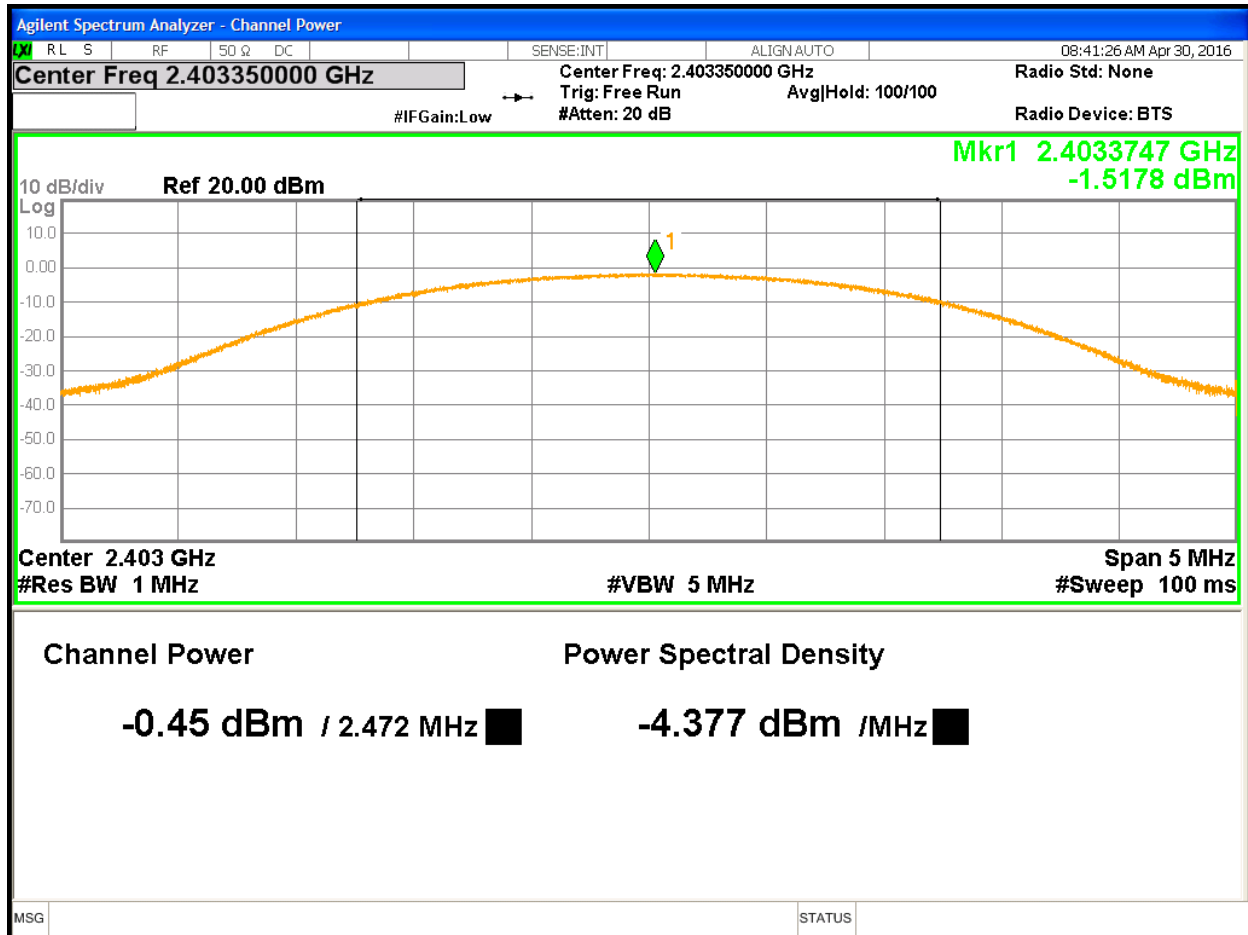


Figure 1: Maximum Conducted Output Power at 2403.35 MHz – Transmitter



Figure 2: Maximum Conducted Output Power at 2441.35 MHz - Transmitter

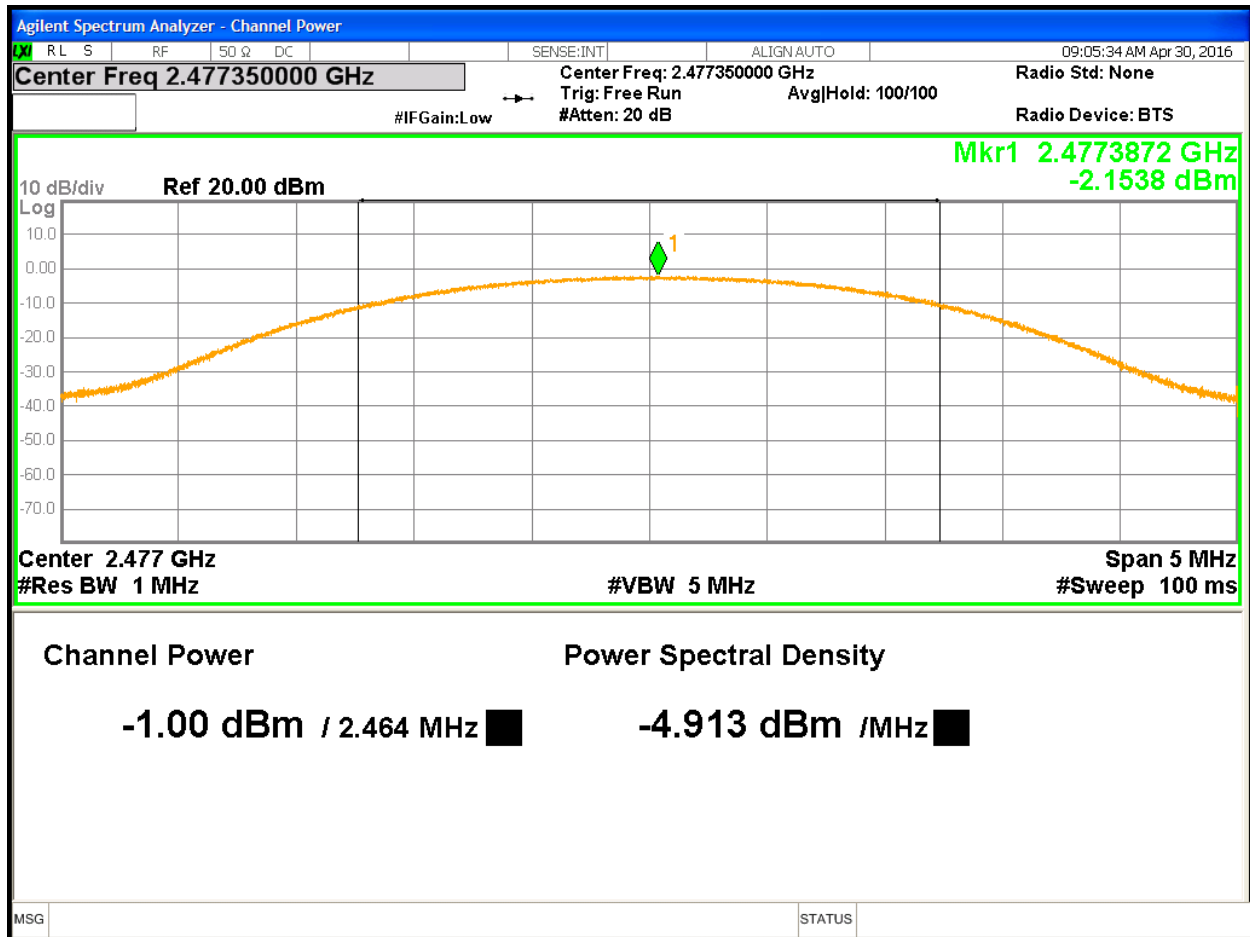


Figure 3: Maximum Conducted Output Power at 2477.35 MHz - Transmitter

4.2 Occupied Bandwidth

The occupied bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.

The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.

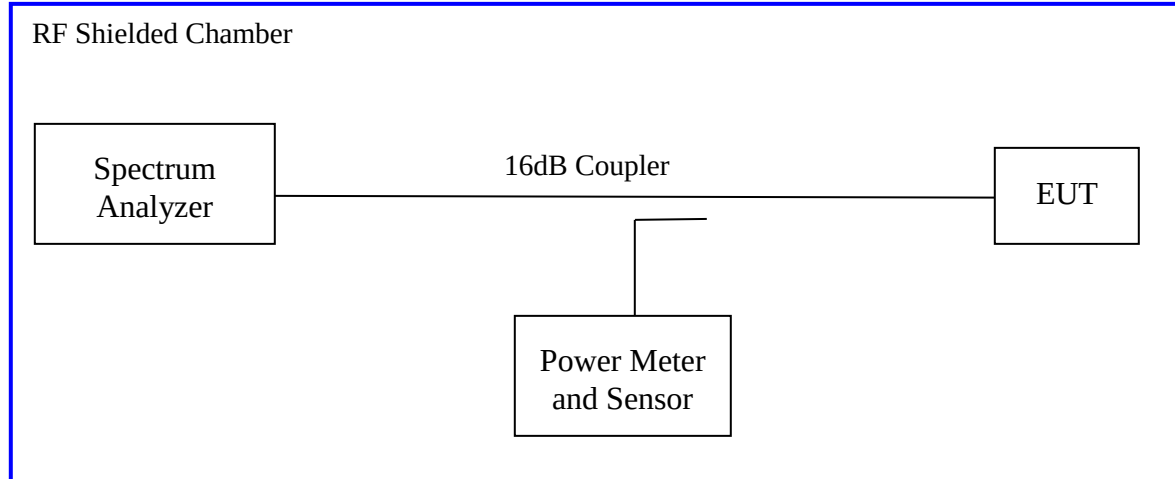
The 6dB bandwidth is defined the bandwidth of 6dB from highest transmitted level of the fundamental frequency.

The bandwidth shall be at least 500 kHz per Section CFR47 15.247(a2) 2016 and RSS 247 Sect.5.2.1: 2015.

4.2.1 Test Method

The conducted method was used to measure the occupied bandwidth according to ANSI C63.10:2013 Section 11.8.1. The measurement was performed with modulation per CFR47 15.247(a2) 2016 and RSS 247 Sect.5.2.1:2015. This test was conducted on 3 channels in each mode of Sample Stealth 420X+ TX, S/N PP #1. The worst sample result indicated below.

Test Setup:



4.2.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 4: Occupied Bandwidth – Test Results

Test Conditions: Conducted Measurement		Date: April 29, 2016		
Antenna Type: Integrated		Power Setting: 0 dBm		
Antenna Gain: -0.5 dBi		Signal State: Modulated at 100%		
Ambient Temp.: 23 °C		Relative Humidity: 38%		
Bandwidth (MHz) for USB Wireless Audio Transmitter				
Frequency (MHz)	Limit (kHz)	99% Bandwidth	6 dB Bandwidth	Results
2403.35	500	1.920	1.606	Pass
2441.35	500	1.918	1.593	Pass
2477.35	500	1.916	1.593	Pass
Note: The bandwidth was measured at 100% duty cycle				

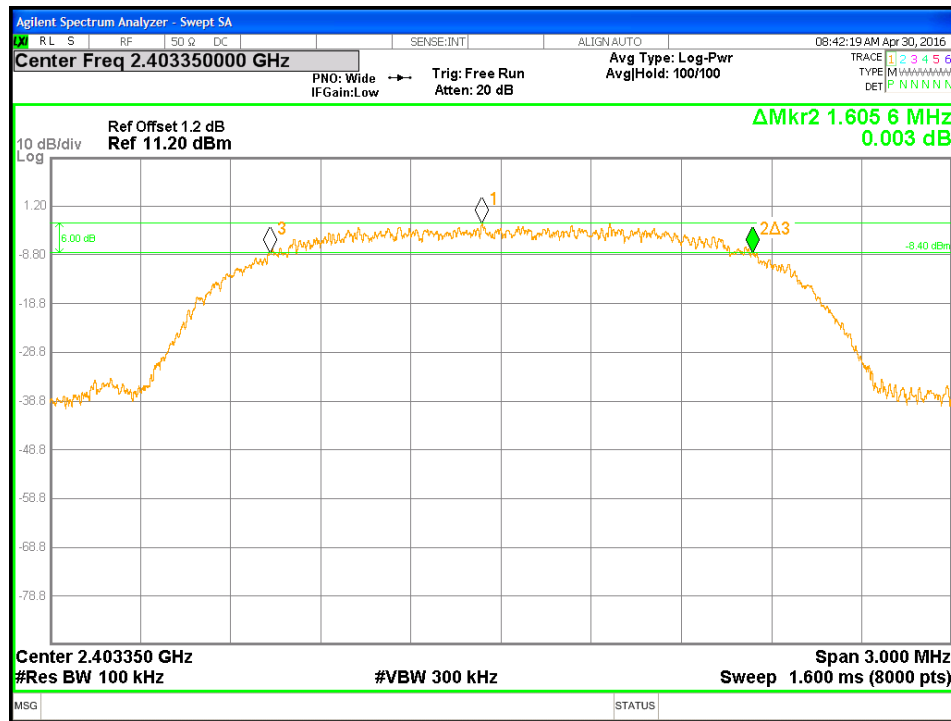


Figure 4: DTS Bandwidth-Transmitter -2403.35 MHz

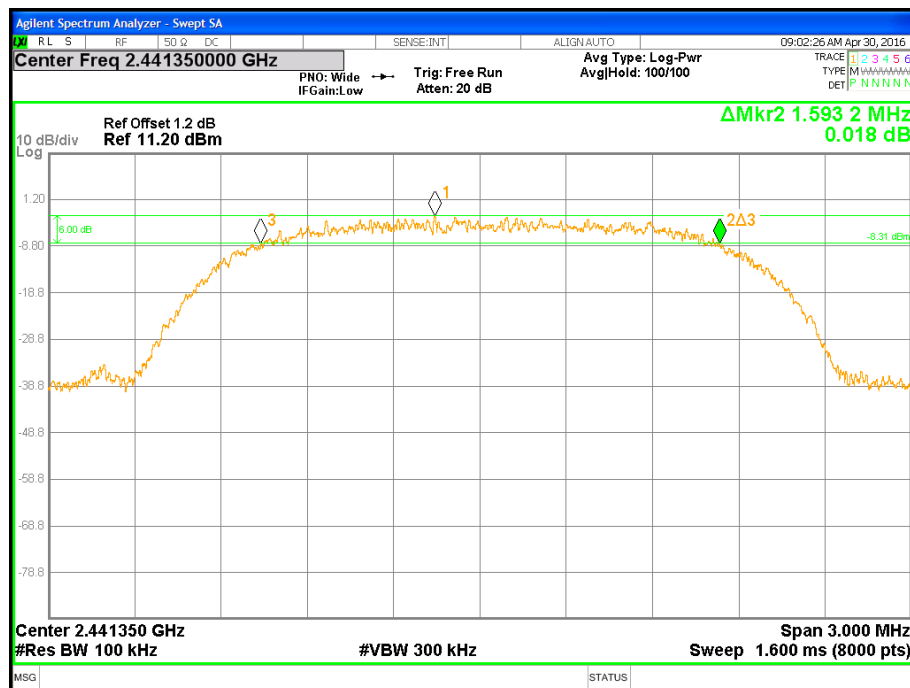


Figure 5: DTS Bandwidth-Transmitter -2441.35 MHz

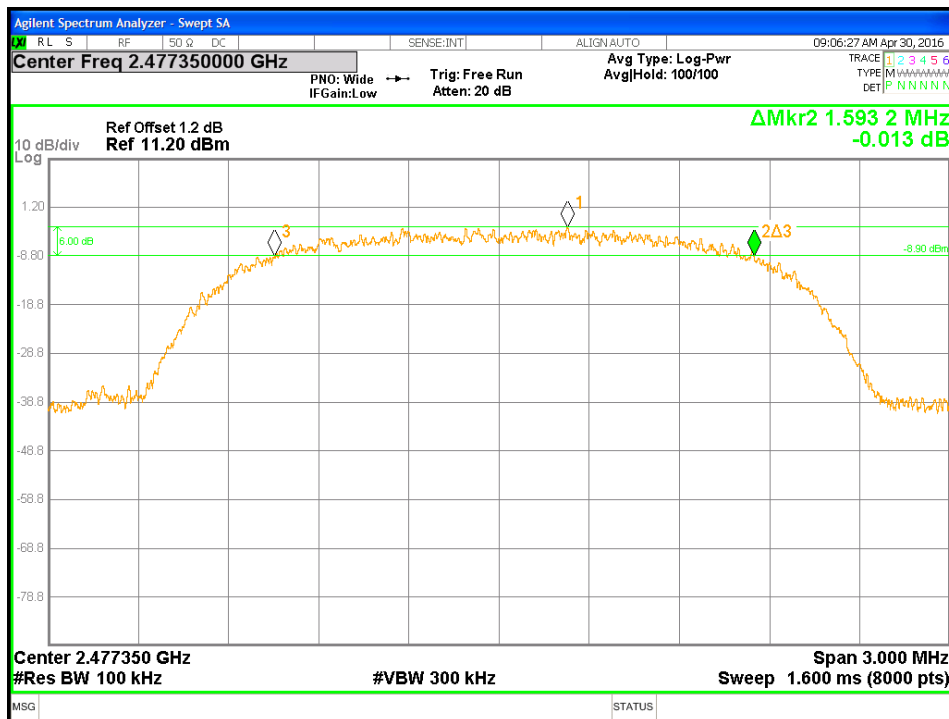


Figure 6: DTS Bandwidth-Transmitter -2477.35 MHz

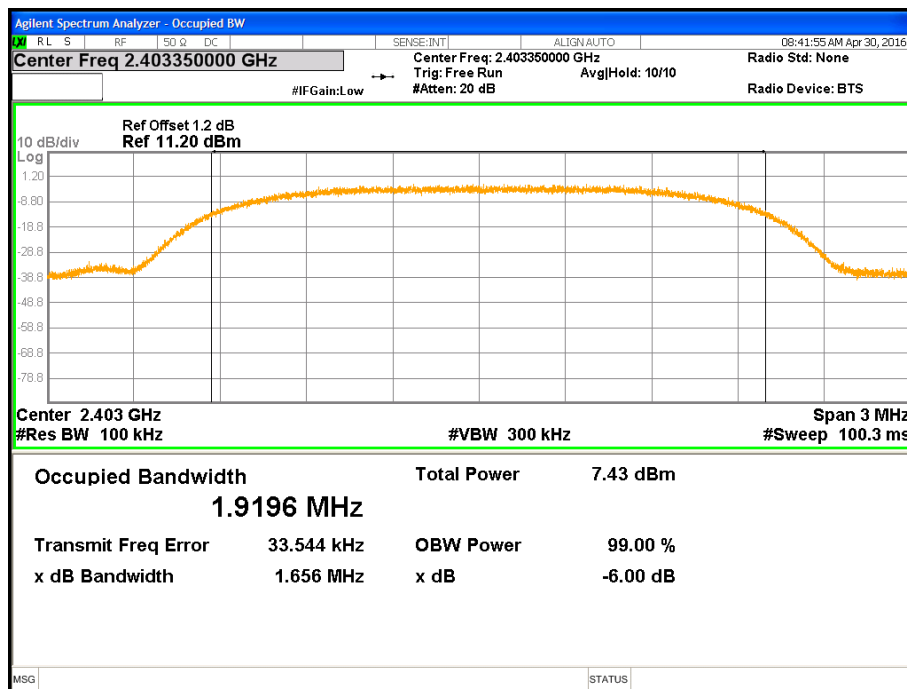


Figure 7: 99% Bandwidth-Transmitter -2403.35 MHz

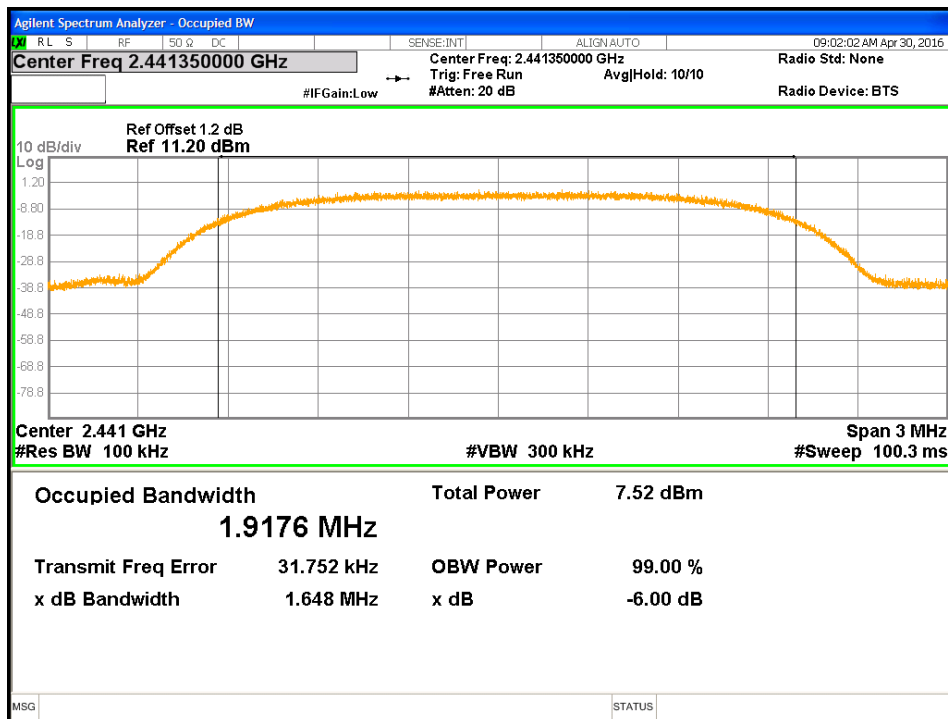


Figure 8: 99% Bandwidth-Transmitter -2441.35 MHz

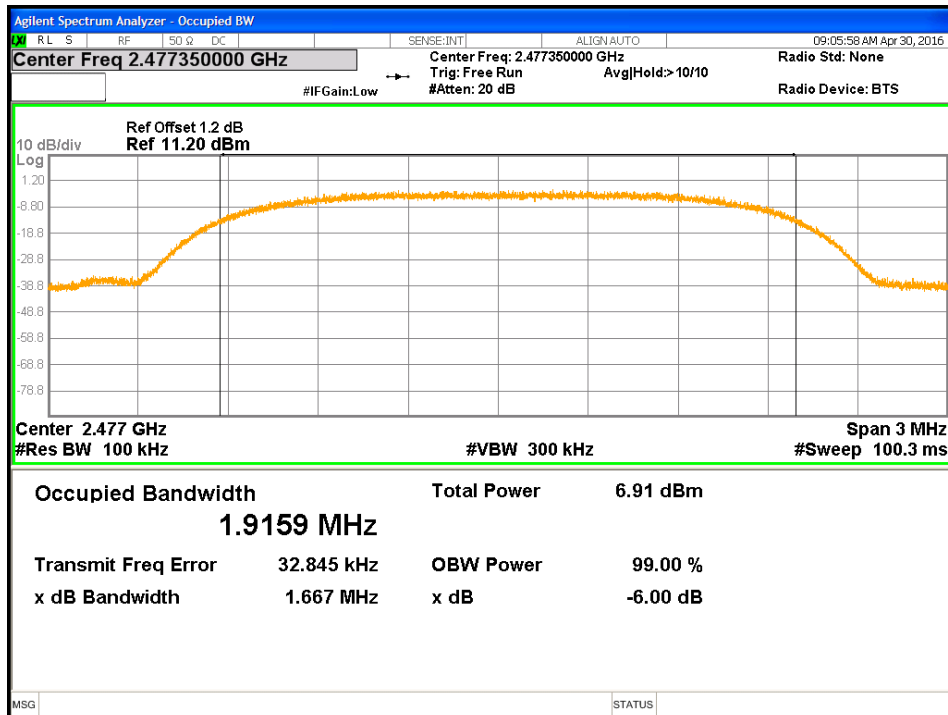


Figure 9: 99% Bandwidth-Transmitter -2477.35 MHz

4.3 Out-of-Band Emissions

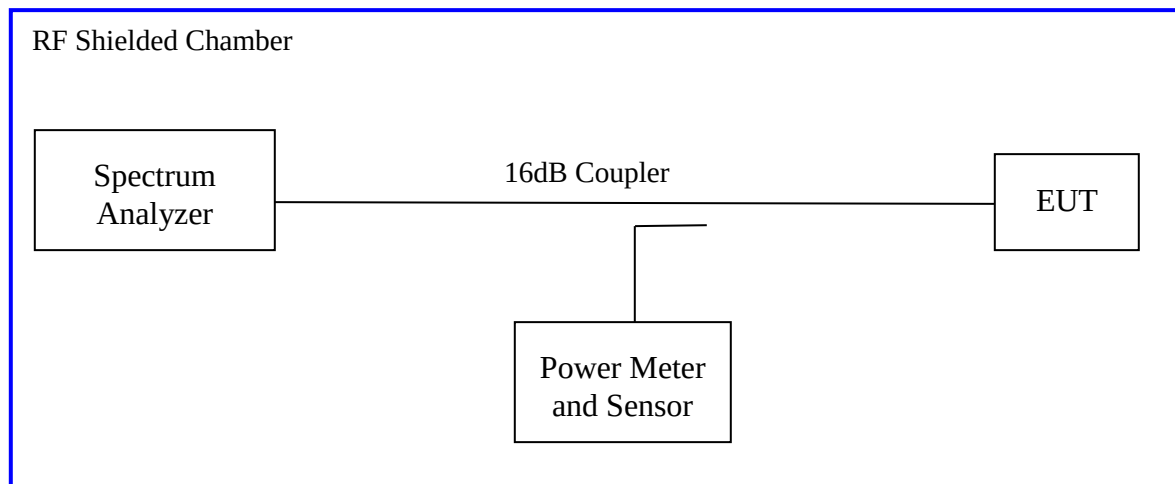
The setup was identical to RF output power measurement. Intentional radiators operating under the alternative provisions to the general emission limits, must be designed to ensure that the 20 dB or 30 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If the frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Since the transmitter complies with the conducted power limits base on the use of RMS averaging per CFR47 Part 15.247(b)(3), any frequency outside the band of 2400MHz to 2483.5MHz, the power output level must be below 30db from the in-band transmitting signal; CFR 47 Part 15.215, 15.247(d) and RSS-247 Sect.5.5.

4.3.1 Test Method

The conducted method was used to measure the out-of-band emission requirement. The measurement was performed with modulation per CFR47 15.247(4) (d) 2016 and RSS-247 Sect.5.5: 2015. This test was conducted on 3 channels of Sample Stealth 420X+ TX, S/N PP #1. The worst sample result indicated below.

Test Setup:



4.3.2 Test Result

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 5: Out of Band Emissions – Test Results

Test Conditions: Conducted Measurement		Date: April 29, 2016	
Antenna Type: Integrated		Power Setting: 0 dBm	
Antenna Gain: -0.5 dBi		Signal State: Modulated at 100%	
Ambient Temp.: 23 °C		Relative Humidity:38%	
Out of Band Results for USB Wireless Audio Transmitter			
Operating Channel	Out of Band Level (dBm)	30 dBr Level (dBm)	Margin (dB)
2403.35 MHz	-48.19	-31.94	-15.25
2441.35 MHz	-48.47	-32.22	-16.25
2477.35 MHz	-48.28	-32.72	-15.56
Note: The band-edge level must be lower than the 30dBr level. The maximum out of band emission on each individual output is at least 30 dB below the maximum in-band PSD on that output. (*) The band-edge is compared to the highest -30dBr level of the test mode.			

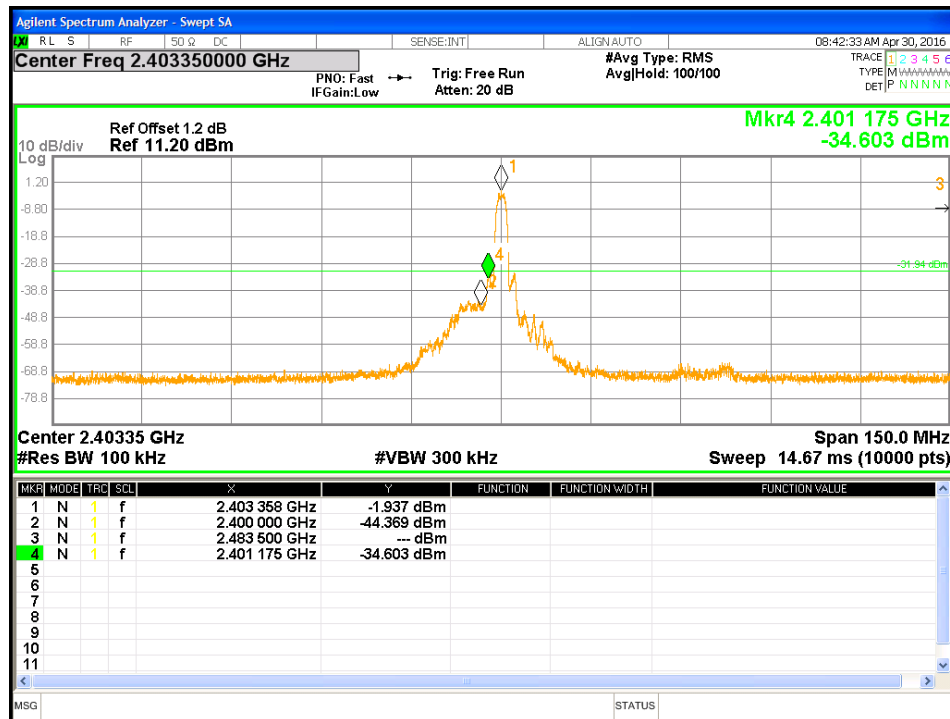


Figure 10: Conducted Band Edge at 2403.35 MHz-Transmitter

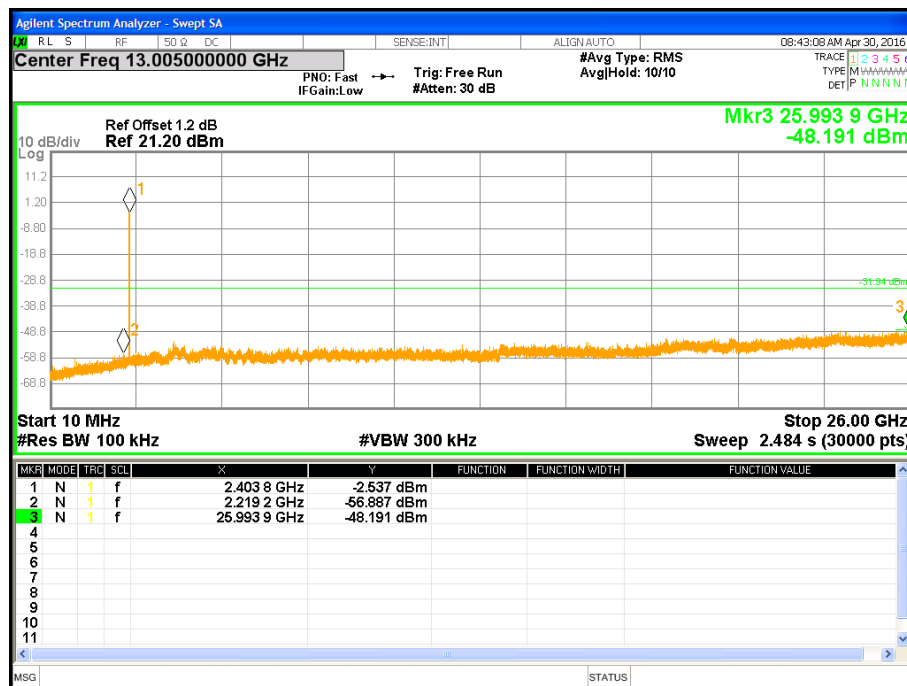


Figure 11: Out of band Emission-2403.35 MHz-Transmitter

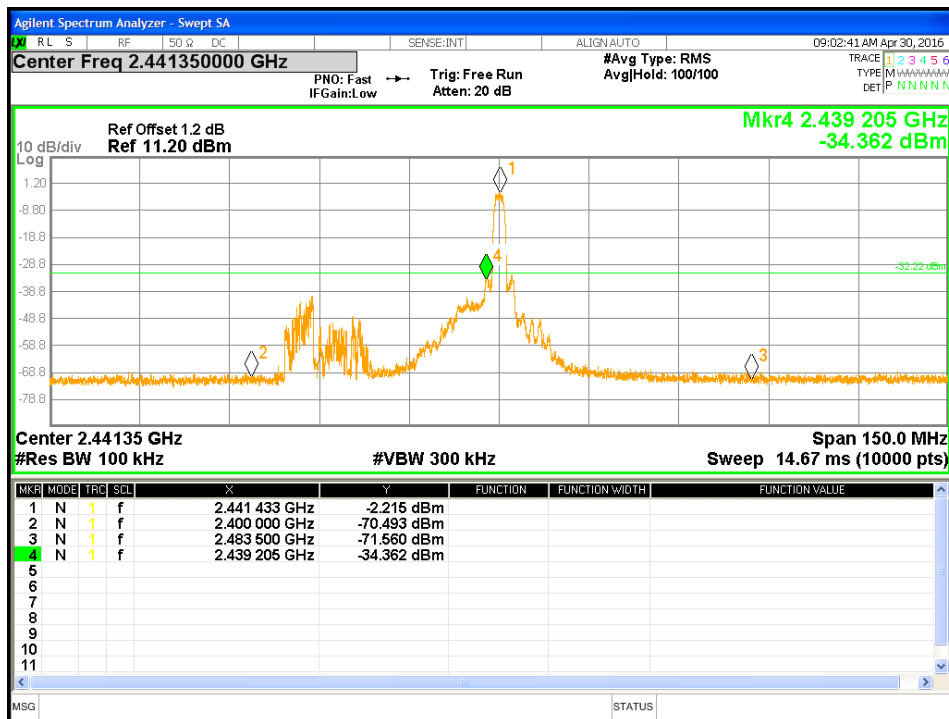


Figure 12: Conducted Band Edge-2441.35 MHz-Transmitter

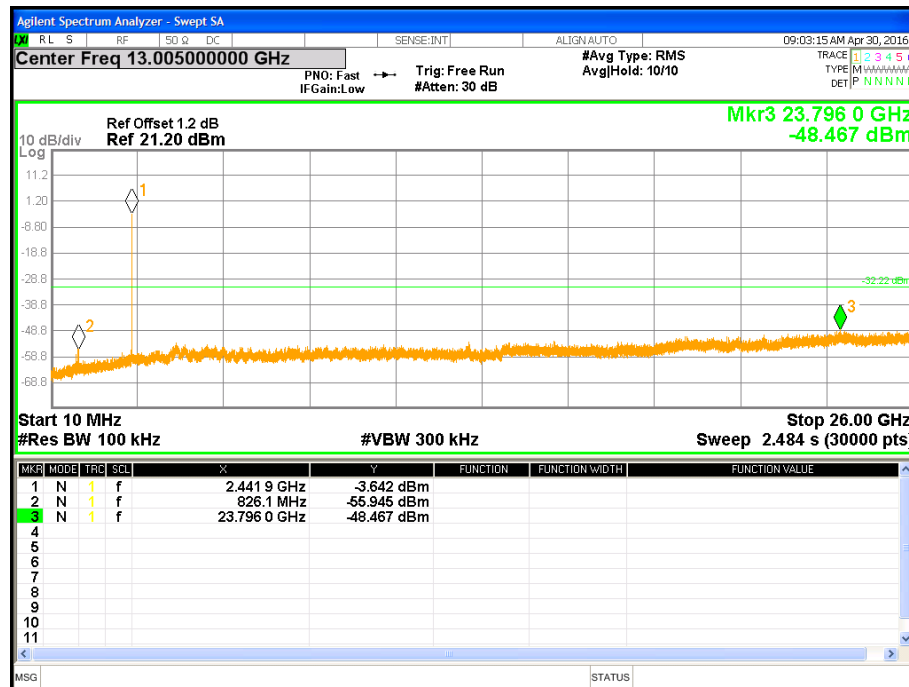


Figure 13: Out of band Emission-2441.35 MHz-Transmitter

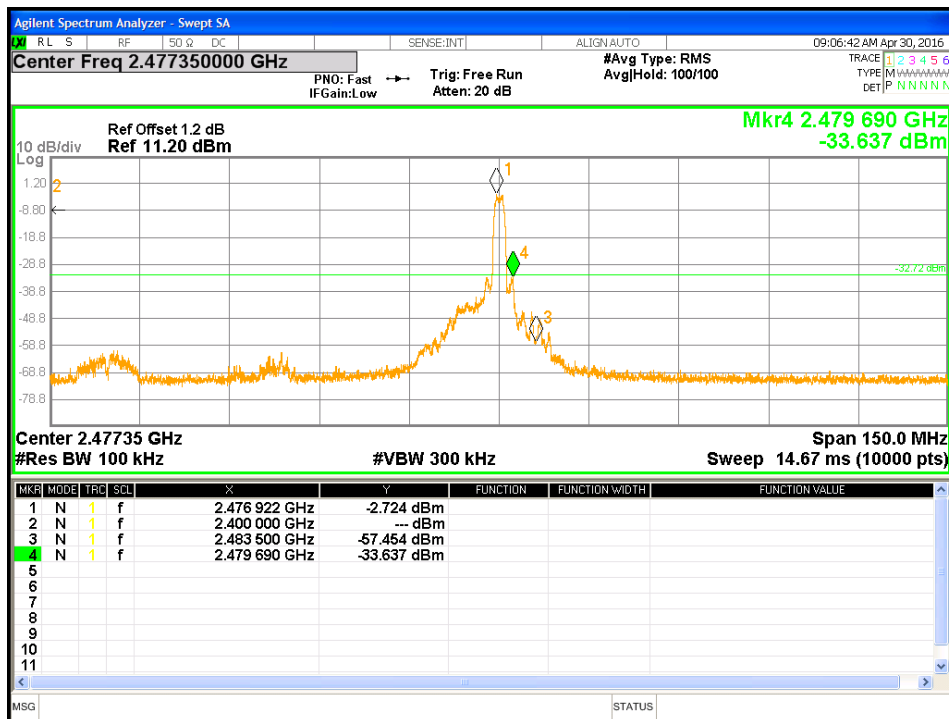


Figure 14: Conducted Band Edge-2477.35 MHz-Transmitter

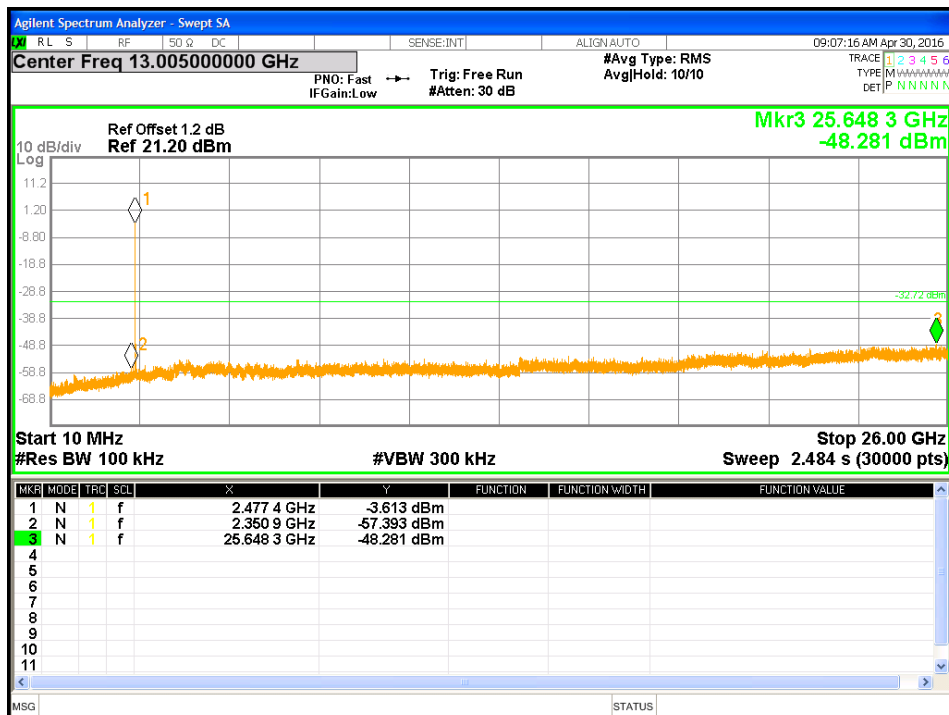


Figure 15: Out of band Emission-2477.35 MHz-Transmitter

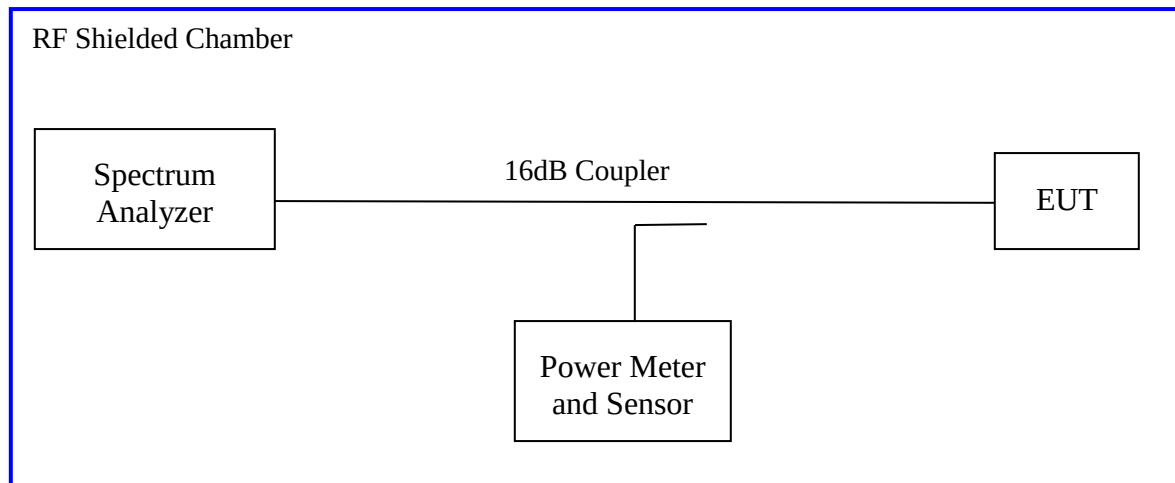
4.4 Peak Power Spectral Density

According to the CFR47 Part 15.247 (e) and RSS-247 Sect.5.2.2, the spectral power density output of the antenna port shall be less than 8dBm in any 3kHz band during any time interval of continuous transmission.

4.4.1 Test Method

The conducted method was used to measure the channel power output per ANSI C63.10:2013 Section 11.10.3. The measurement was performed with modulation per CFR47 Part 15.247 (e) and RSS-247 Sect.5.2.2. This test was conducted on 3 channels of Sample Stealth 420X+ TX, SN PP #1. The worst sample result indicated below.

Test Setup:



4.4.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 6: Peak Power Spectral Density – Test Results

Test Conditions: Conducted Measurement				Date: April 29, 2016		
Antenna Type: Integrated				Power Setting: 0 dBm		
Antenna Gain: -0.5 dBi				Signal State: Modulated at 100%		
Ambient Temp.: 23 °C				Relative Humidity:38%		
Peak Power Spectral Density						
Freq. (MHz)	Config.	Output [dBm]	CF [dB]	Max. PPSD [dBm]	Limit [dBm]	Margin [dB]
2403.35	Transmitter	-10.31	-15.23	-25.54	8.00	-33.54
2441.35	Transmitter	-10.36	-15.23	-25.59	8.00	-33.59
2477.35	Transmitter	-10.84	-15.23	-26.07	8.00	-34.07
Note: CF accounted for the measured RBW. The bandwidth ratio is 10*log (3kHz/100kHz) or -15.23 dB. Transmitter transmitted at 100% duty cycle.						

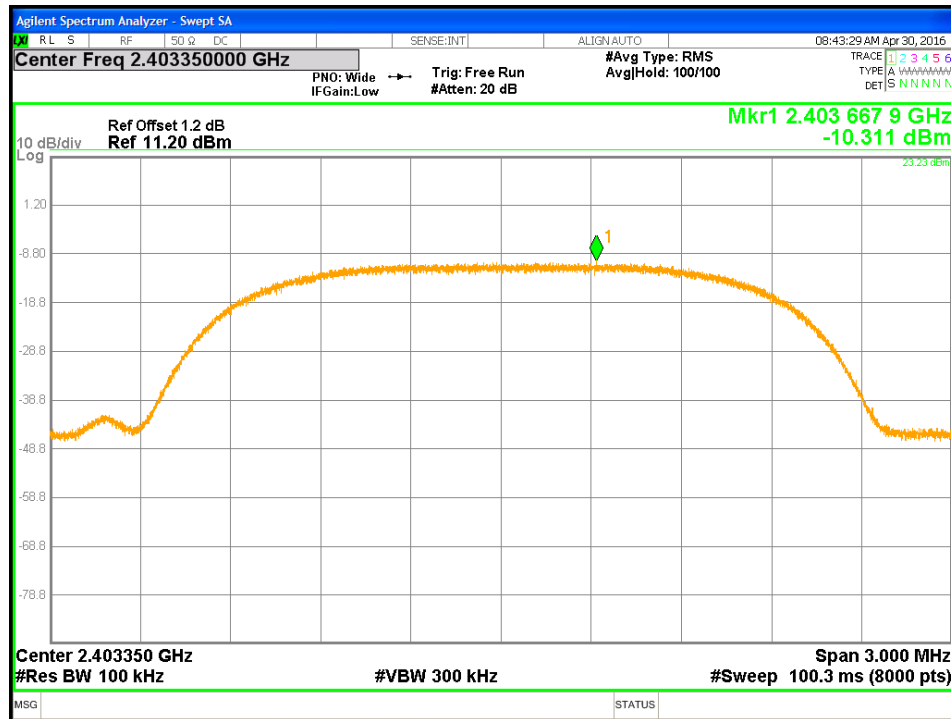


Figure 16: Maximum Power Spectral Density-2403.35 MHz-Transmitter

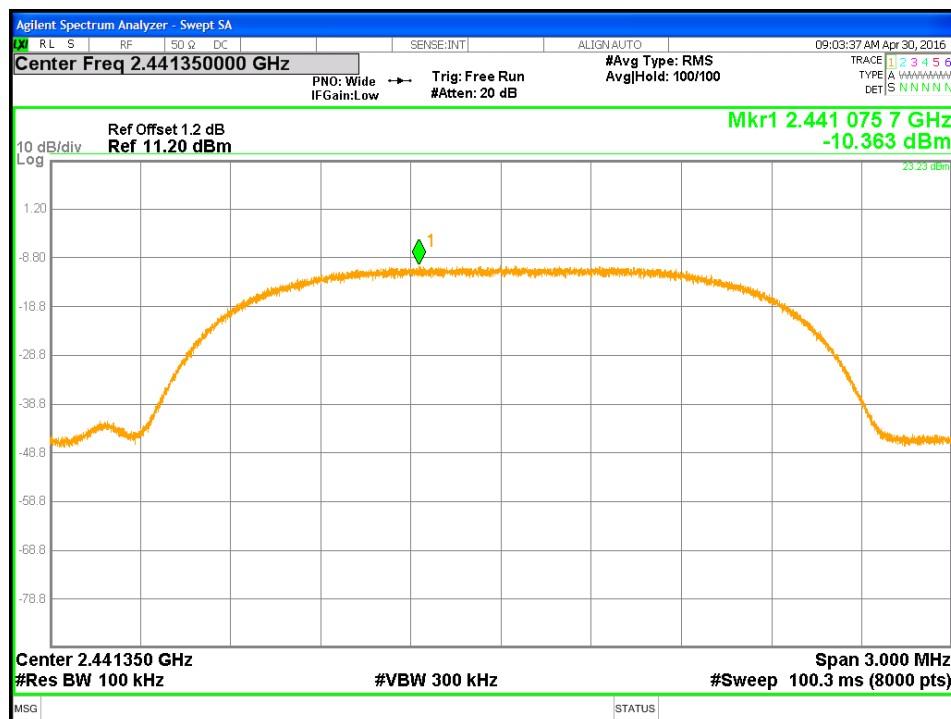


Figure 17: Maximum Power Spectral Density-2441.35 MHz-Transmitter

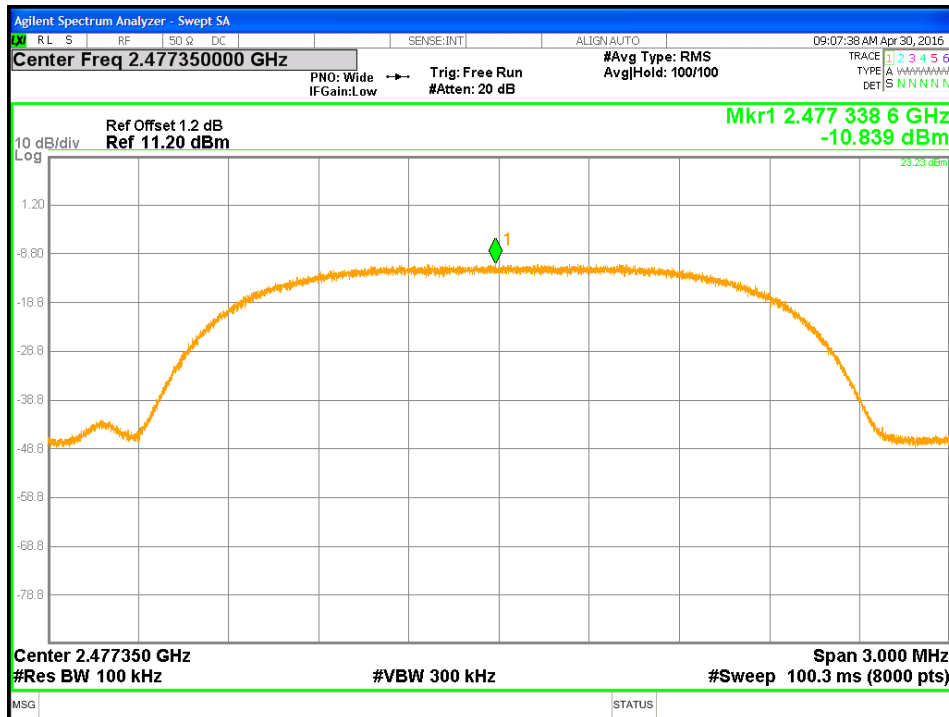


Figure 18: Maximum Power Spectral Density-2477.35 MHz-Transmitter

4.5 Maximum Permissible Exposure

4.5.1 Test Methodology

In this section, we try to prove the safety of radiation harmfulness to the human body for our product. The KDB 447498 D01 General RF Exposure Guidance is followed. The Gain of the antenna used in this calculation is declared by the manufacturer, and the maximum average power input to the antenna is measured. Using the general SAR test exclusion guidance in Section 4.3 of KDB 447498, we show the device meeting the SAR exclusion threshold.

4.5.2 FCC KDB 447498 D01 – General SAR Test Exclusion Guidance

The SAR exclusion threshold conditions are listed:

- 1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR,}^{16} \text{ where}$$
 - ☐ $f(\text{GHz})$ is the RF channel transmit frequency in GHz
 - ☐ Power and distance are rounded to the nearest mW and mm before calculation¹⁷
 - ☐ The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

- 2) At 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B:¹⁸
 - a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) $\cdot$ ($f(\text{MHz})/150$)] mW, at 100 MHz to 1500 MHz
 - b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) $\cdot$ 10] mW at > 1500 MHz and ≤ 6 GHz
- 3) At frequencies below 100 MHz, the following may be considered for SAR test exclusion, and as illustrated in Appendix C:¹⁹
 - a) The threshold at the corresponding test separation distance at 100 MHz in step 2) is multiplied by $[1 + \log(100/f(\text{MHz}))]$ for test separation distances > 50 mm and < 200 mm
 - b) The threshold determined by the equation in a) for 50 mm and 100 MHz is multiplied by $\frac{1}{2}$ for test separation distances ≤ 50 mm
 - c) SAR measurement procedures are not established below 100 MHz. When SAR test exclusion cannot be applied, a KDB inquiry is required to determine SAR evaluation requirements for any test results to be acceptable.

4.5.3 EUT Operating Condition

The software provided by Manufacturer enabled the EUT to transmit data at lowest, middle and highest channel individually.

4.5.4 Classification

The antenna of the product, under normal use condition, is less than 20cm away from the body of the user. This device is classified as a **Portable Device**.

4.5.5 SAR Test Exclusion Threshold

4.5.5.1 Antenna Gain

The transmitting antenna was integrated. The maximum antenna gain for the highest observed power was -0.5 dBi or 0.89 (numeric).

4.5.5.2 SAR Exclusion Threshold Calculation

Mode	Max. Power (dBm)	EIRP (dBm)	Min. Separation Distance (mm)	Cal. Excl. Threshold	1-g SAR Limit	10-g extremity SAR Limit	Result
Modulated	-0.33	-0.83	5	0.2604	≤3.0	≤7.5	Exempted *
Note: 1. Since EUT can operate at distance less than 50 mm, the minimum distance, 5 mm, was used for calculation per condition #1 of SAR Exclusion Threshold. 2. The maximum output power was taken from Table 3 of "Turtle Beach - Ear Force Stealth 420X+ TX - FCC 15.247 Report 31661416.001." 3. (*)The calculated threshold is less than 3.0; therefore, EUT is SAR exempted for head and body usage.							

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

4.6 Transmitter Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmitting mode; per requirement of CFR47 15.205, 15.209, 15.247(d), RSS-Gen Sect. 8.9

4.6.1 Test Methodology

4.6.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table, 80cm above the floor for 30 MHz to 1 GHz and 150cm above the floor for 1 GHz to 26 GHz. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

4.6.1.2 Final Test

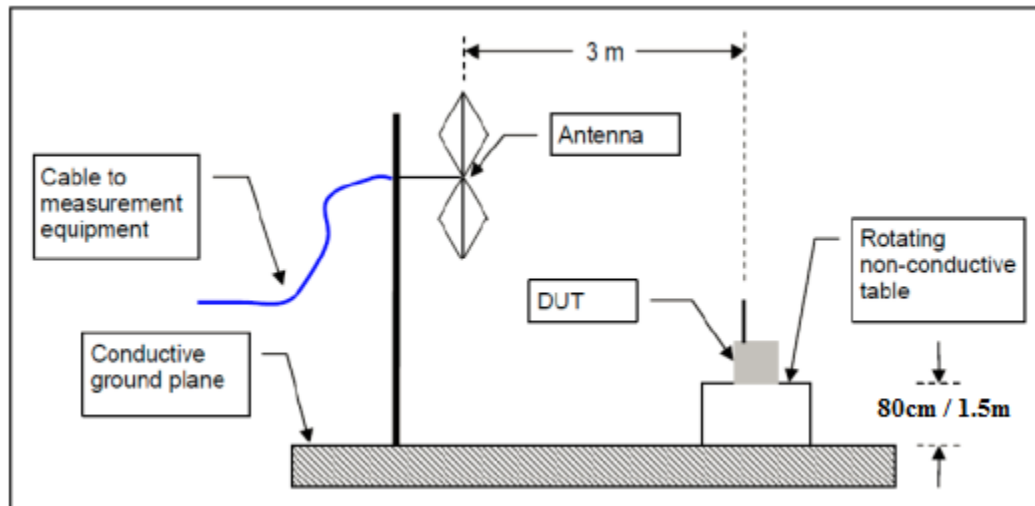
For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, then the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table, 80cm above the floor for 30 MHz to 1 GHz and 150cm above the floor for 1 GHz to 26 GHz. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

The final scans performed on the worst axis, X-Axis up, for three operating channels in each operating mode;

2403.35 MHz, 2441.35 MHz, and 2477.35 MHz

4.6.1.3 Test Setup



4.6.1.4 Deviations

None.

4.6.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209: 2016 and RSS-Gen Sect.5.5 2014.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490.....	2400/F (kHz)	300
0.490-1.705.....	24000/F (kHz)	30
1.705-30.0.....	30	30
30-88.....	100 **	3
88-216.....	150 **	3
216-960.....	200 **	3
Above 960.....	500	3

All harmonics and spurious emission which are outside of the restricted band shall be 20dB below the in-band emission.

4.6.3 Test Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and Test Plan.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 7: Transmit Spurious Emission at Band-Edge Requirements

Test Conditions: Radiated Measurement, Normal Temperature and Voltage only					Date: April 29, 2016				
Antenna Type: Integrated					Power Setting: 0 dBm				
Max. Antenna Gain: -0.5 dBi					Signal State: Modulated at 100%				
Ambient Temp.: 23 °C					Relative Humidity:38%				
Band-Edge Results									
Center Freq.	Mode	Edge Freq.	Pol.	Ant.	Table	Det.	Level	Limit	Margin
MHz		MHz	V/H	cm	Deg.	Pk/Avg	dBuV/m	dBuV/m	dB
2403.35	Transmitter – Flat	2390.00	V	151	159	Pk	59.57	74.00	-14.43
2403.35	Transmitter – Flat	2390.00	V	151	159	Ave	48.84	54.00	-5.16
2403.35	Transmitter – Flat	2390.00	V	157	195	Pk	57.65	74.00	-16.35
2403.35	Transmitter – Flat	2390.00	H	157	195	Ave	47.16	54.00	-6.84
2477.35	Transmitter – Flat	2483.50	V	40	204	Pk	57.80	74.00	-16.20
2477.35	Transmitter – Flat	2483.50	V	40	204	Ave	46.51	54.00	-7.49
2477.35	Transmitter – Flat	2483.50	H	170	179	Pk	58.10	74.00	-15.90
2477.35	Transmitter – Flat	2483.50	H	170	179	Ave	47.16	54.00	-6.84
Note: The emissions were measured at the adjacent restricted band of the fundamental signal.									

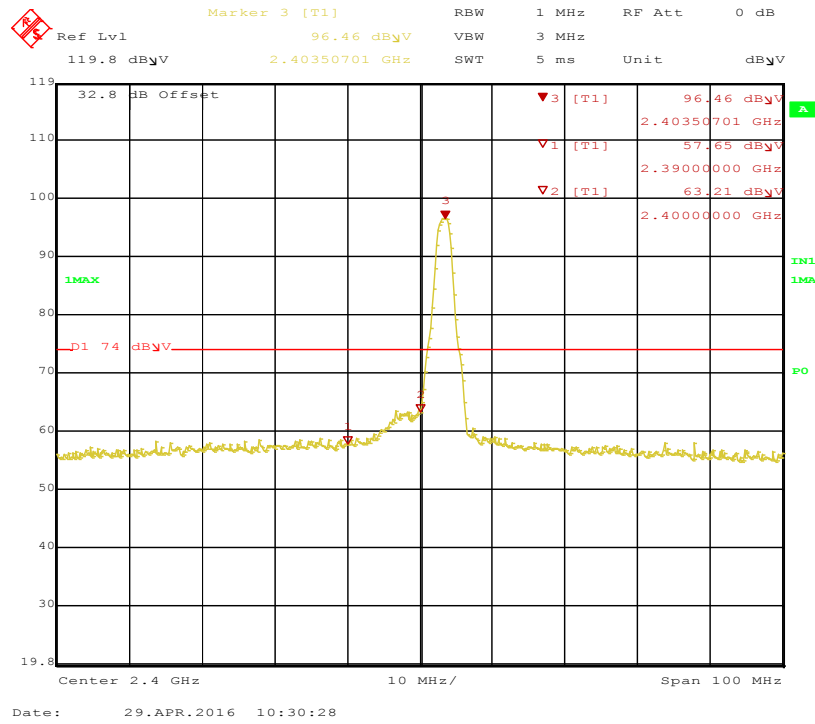


Figure 19: Bandedge-2403.35 MHz-H-Pk

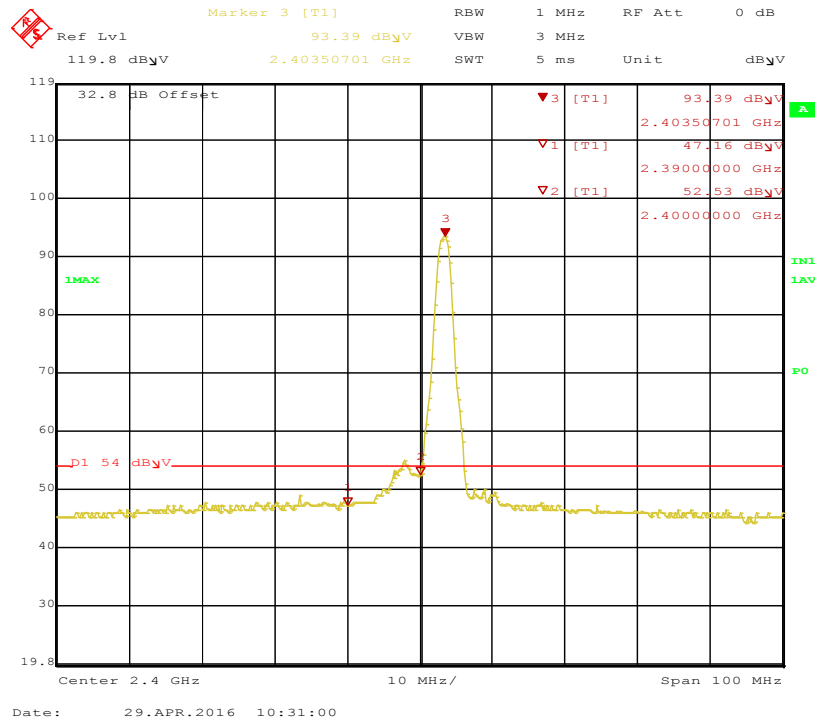


Figure 20: Bandedge-2403.35 MHz-H-Ave

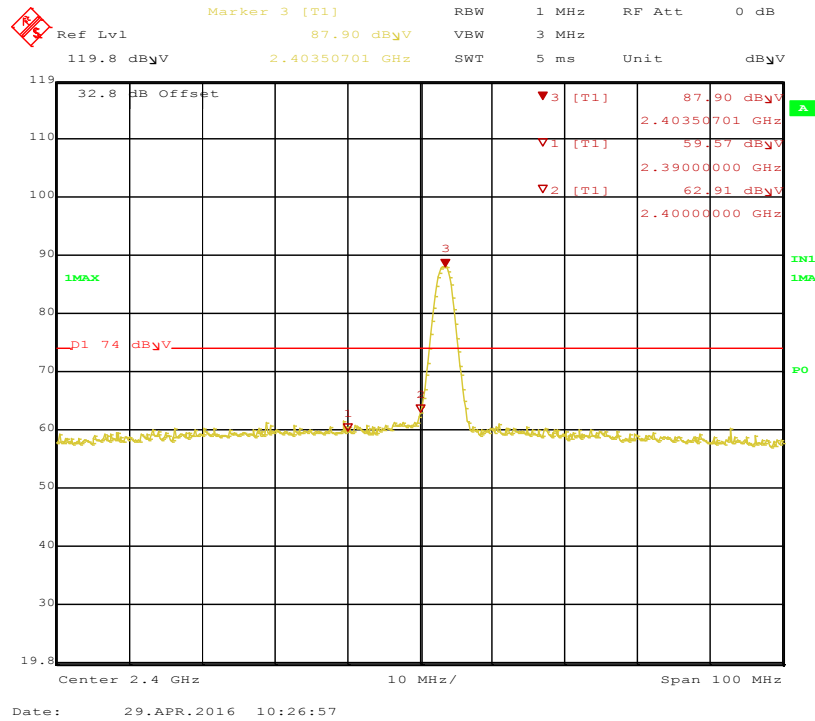


Figure 21: Bandedge-2403.35 MHz-V-Pk

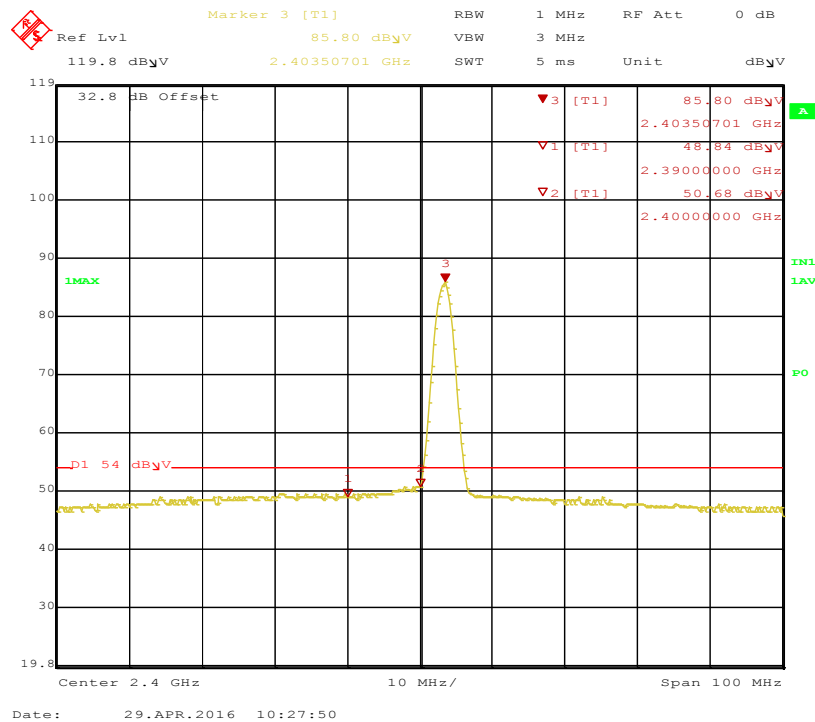


Figure 22: Bandedge-2403.35 MHz-V-Ave

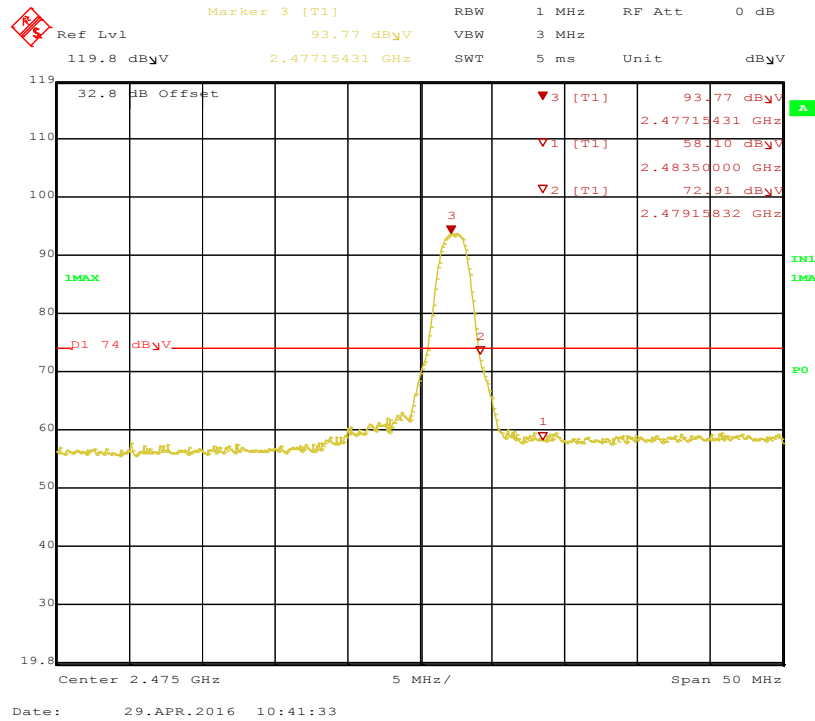


Figure 23: Bandedge-2477.35 MHz-H-Pk

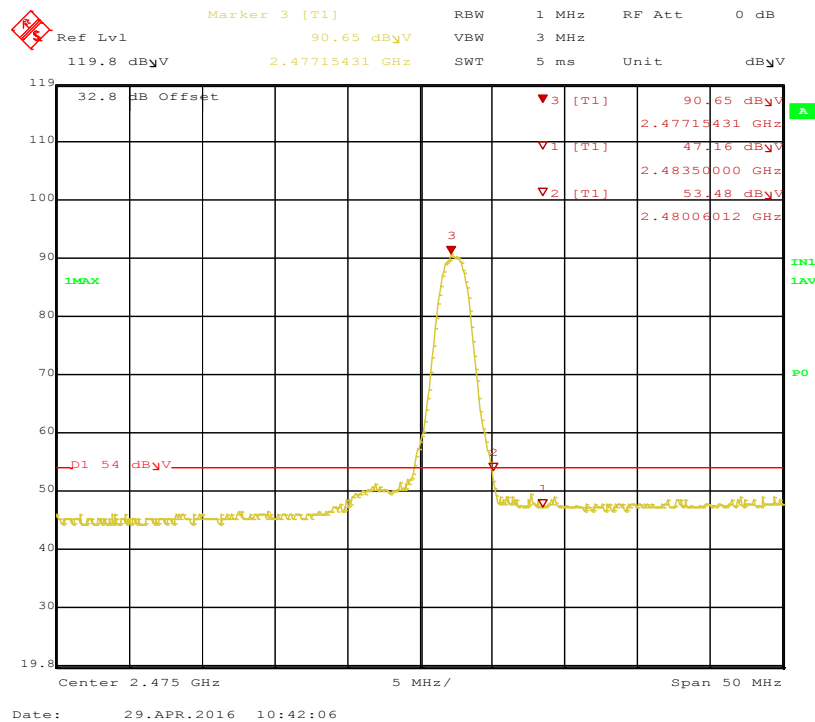


Figure 24: Bandedge-2477.35 MHz-H-Ave

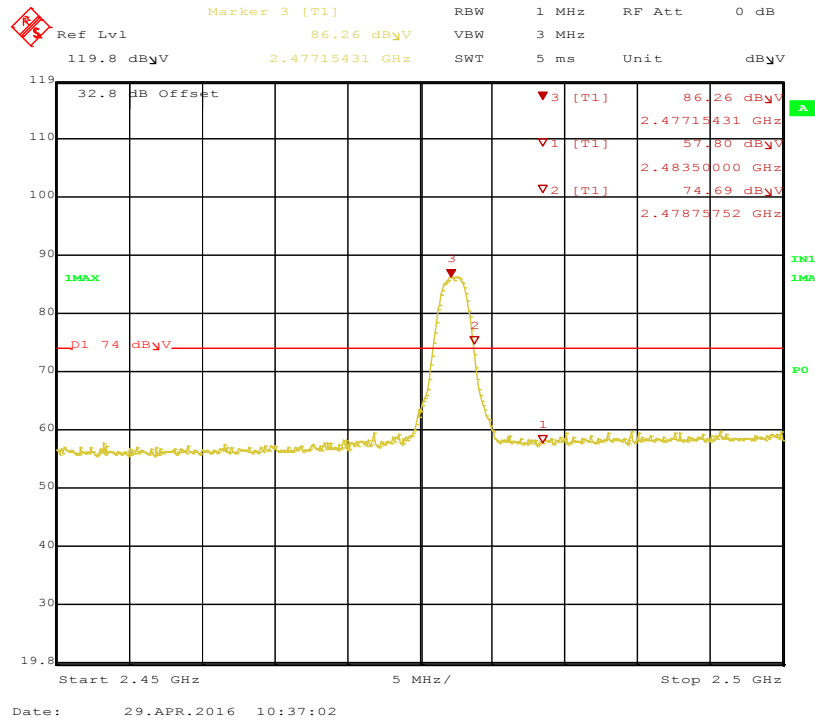


Figure 25: Bandedge-2477.35 MHz-V-Pk

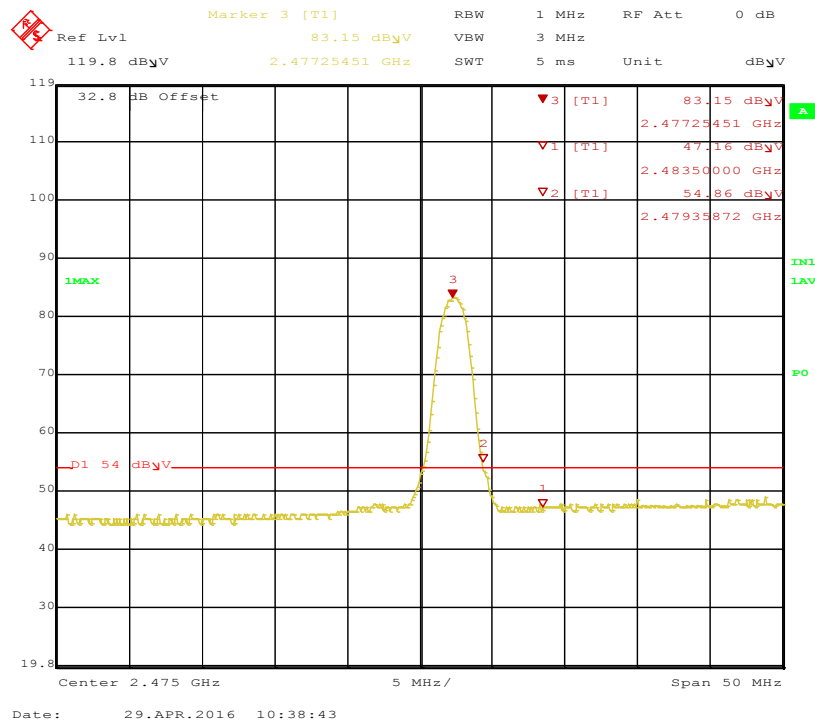


Figure 26: Bandedge-2477.35 MHz-V-Ave

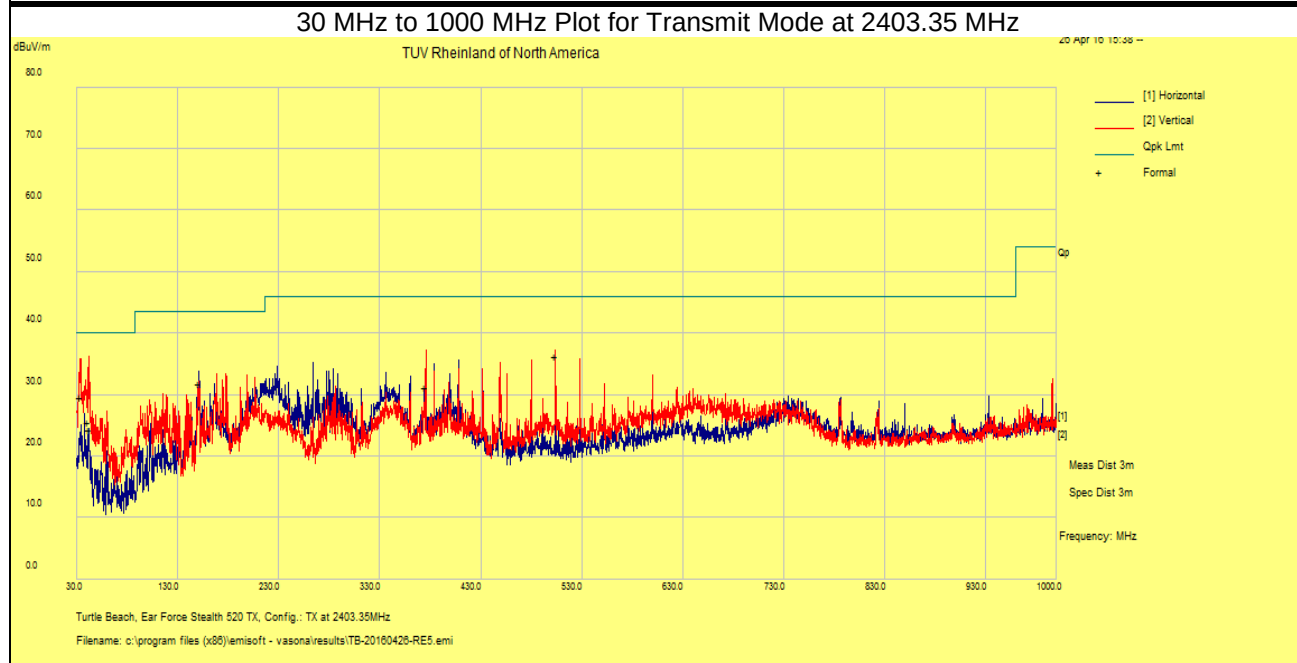
SOP 1 Radiated Emissions						Tracking # 31661416.001 Page 1 of 6					
EUT Name		USB Wireless Audio Transmitter				Date		April 26, 2016			
EUT Model		Ear Force Stealth 420X+ TX				Temp / Hum in		23°C / 38%rh			
EUT Serial		PP #2				Temp / Hum out		N/A			
EUT Config.		X-Axis				Line AC / Freq		5.0 VDC			
Standard		CFR47 Part 15 Subpart C				RBW / VBW		120 kHz/ 300 kHz			
Dist/Ant Used		3m / JB3				Performed by		Jeremy Luong			
Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Hght.	Azt	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Transmitted Data at 2403.35MHz											
151.29	48.80	2.20	-19.20	31.80	QP	H	343	300	43.50	-11.70	Pass
33.84	40.95	1.59	-12.93	29.60	QP	V	185	248	40.00	-10.40	Pass
42.02	43.12	1.65	-19.17	25.60	QP	V	141	90	40.00	-14.40	Pass
42.60	42.19	1.66	-19.57	24.28	QP	V	197	266	40.00	-15.72	Pass
375.32	44.60	2.90	-16.30	31.20	QP	V	106	361	46.00	-14.80	Pass
504.02	47.04	3.21	-13.91	36.33	QP	V	102	263	46.00	-9.67	Pass
Spec Margin = Level - Limit, Level = Raw+ Cbl+ CF ± Uncertainty											
CF= Amp Gain + ANT Factor											
Combined Standard Uncertainty $u_c(y) = \pm 3.2$ dB Expanded Uncertainty $U = ku_c(y)$ $k = 2$ for 95% confidence											
Note: The worst case emission was observed at Channel 2403.35 MHz.											
No signification emission was observed below 30MHz.											

SOP 1 Radiated Emissions						Tracking # 31661416.001 Page 2 of 6					
EUT Name USB Wireless Audio Transmitter						Date April 27, 2016					
EUT Model Ear Force Stealth 420X+ TX						Temp / Hum in 23°C / 32%rh					
EUT Serial PP #2						Temp / Hum out N/A					
EUT Config. X-Axis						Line AC / Freq 5.0 VDC					
Standard CFR47 Part 15 Subpart C						RBW / VBW 1MHz / 3MHz					
Dist/Ant Used 3m / DRH-118, 1m / RA42-K-F-4B-C						Performed by Jeremy Luong					
Freq	Raw	Cbl	AF	Level	Det	Pol	Hght	Azt	Limit	Margin	Comment
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
Transmitted Data at 2403.35MHz											
14742.90	37.94	3.39	-6.35	34.97	Ave	H	209	354	54.00	-19.03	Harmonics
17991.38	36.16	4.04	2.27	42.47	Ave	H	178	242	54.00	-11.53	Harmonics
4806.63	50.70	1.90	-17.10	35.50	Ave	V	238	92	54.00	-18.50	Harmonics
7210.69	53.10	2.30	-11.00	44.30	Ave	V	101	246	54.00	-9.70	Harmonics
9614.24	43.94	2.67	-8.09	38.52	Ave	V	229	308	54.00	-15.48	Harmonics
Transmitted Data at 2441.35MHz											
14572.71	37.75	3.41	-6.98	34.19	Ave	H	151	306	54.00	-19.82	Harmonics
17985.63	36.31	4.03	2.13	42.47	Ave	H	179	260	54.00	-11.53	Harmonics
7324.57	44.27	2.29	-10.90	35.65	Ave	V	137	274	54.00	-18.35	Harmonics
12057.11	40.55	2.94	-11.06	32.43	Ave	V	174	48	54.00	-21.57	Harmonics
Transmitted Data at 2477.35MHz											
14490.22	38.57	3.38	-7.51	34.44	Ave	H	173	361	54.00	-19.56	Harmonics
1048.08	43.01	0.79	-25.85	17.95	Ave	V	164	326	54.00	-36.05	Harmonics
12046.83	40.50	2.94	-11.05	32.39	Ave	V	154	62	54.00	-21.61	Harmonics
17990.81	36.28	4.04	2.25	42.57	Ave	V	215	342	54.00	-11.43	Harmonics
Spec Margin = Level - Limit, Level = Raw+ Cbl+ CF ± Uncertainty											
CF= Amp Gain + ANT Factor											
Combined Standard Uncertainty $u_c(y) = \pm 3.2\text{dB}$ Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence											
Notes: All emissions passed the spurious emission limit.											

SOP 1 Radiated Emissions

Tracking # 31661416.001 Page 3 of 6

EUT Name	USB Wireless Audio Transmitter	Date	April 26, 2016
EUT Model	Ear Force Stealth 420X+ TX	Temp / Hum in	23°C / 38%rh
EUT Serial	PP #2	Temp / Hum out	N/A
EUT Config.	X-Axis	Line AC / Freq	5.0 VDC
Standard	CFR47 Part 15 Subpart C	RBW / VBW	120 kHz/ 300 kHz
Dist/Ant Used	3m / JB3	Date	Jeremy Luong



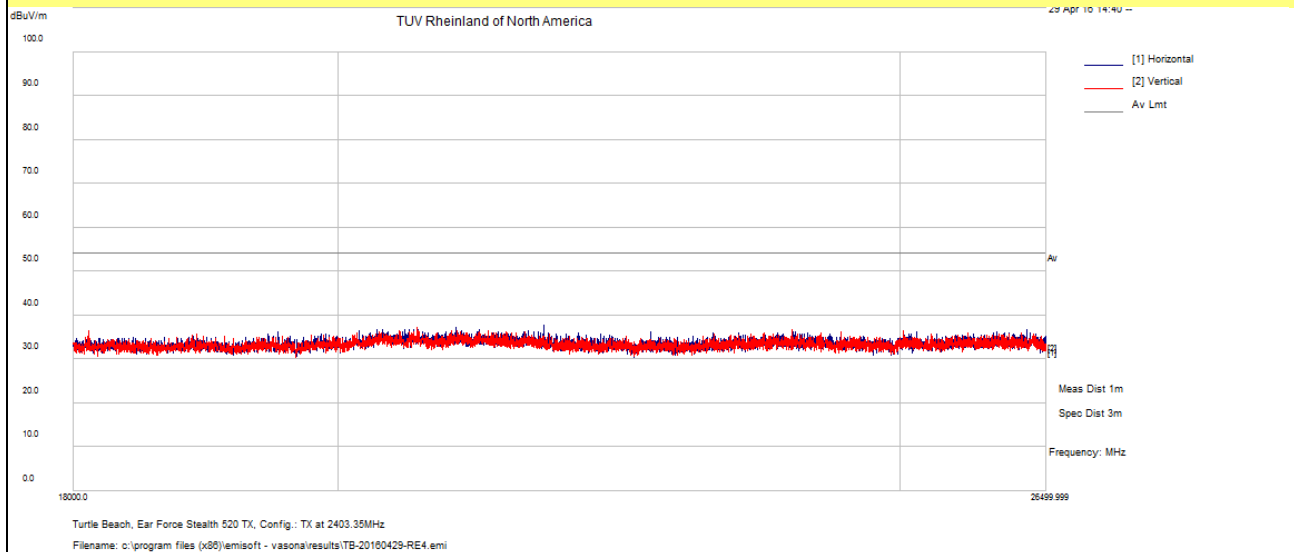
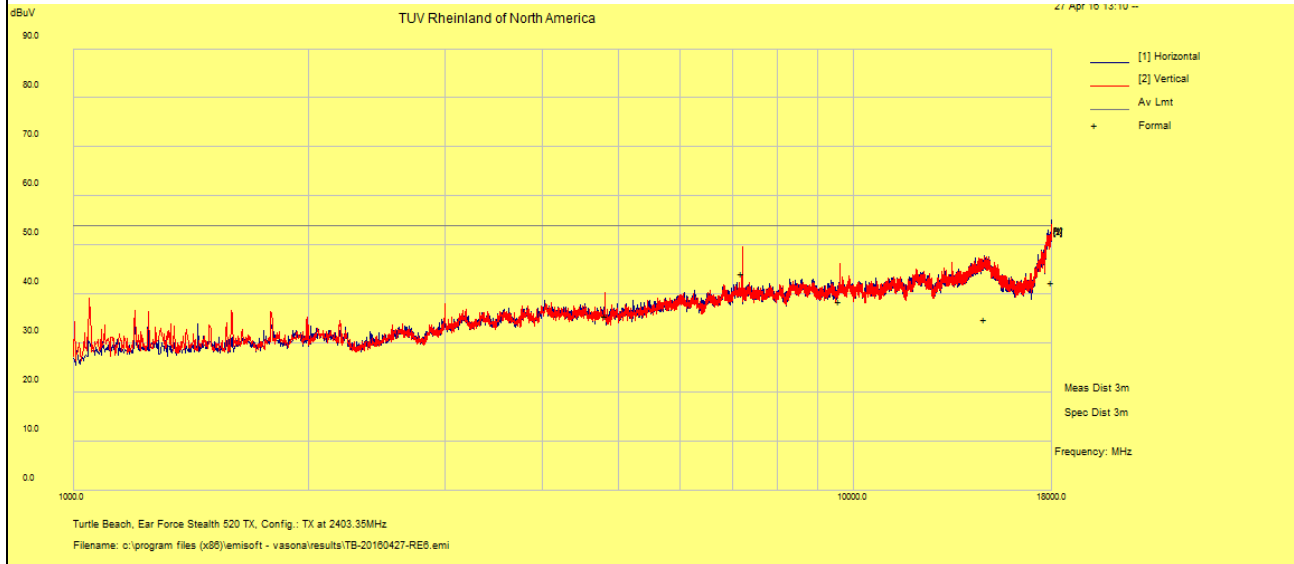
Notes: Worst case.

SOP 1 Radiated Emissions

Tracking # 31661416.001 Page 4 of 6

EUT Name	USB Wireless Audio Transmitter	Date	April 27, 2016
EUT Model	Ear Force Stealth 420X+ TX	Temp / Hum in	23°C / 32%rh
EUT Serial	PP #2	Temp / Hum out	N/A
EUT Config.	X-Axis	Line AC / Freq	5.0 VDC
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1MHz / 3MHz
Dist/Ant Used	3m / DRH-118, 1m / RA42-K-F-4B-C	Performed by	Jeremy Luong

Above 1 GHz Plots for Transmit Mode at 2403.35 MHz



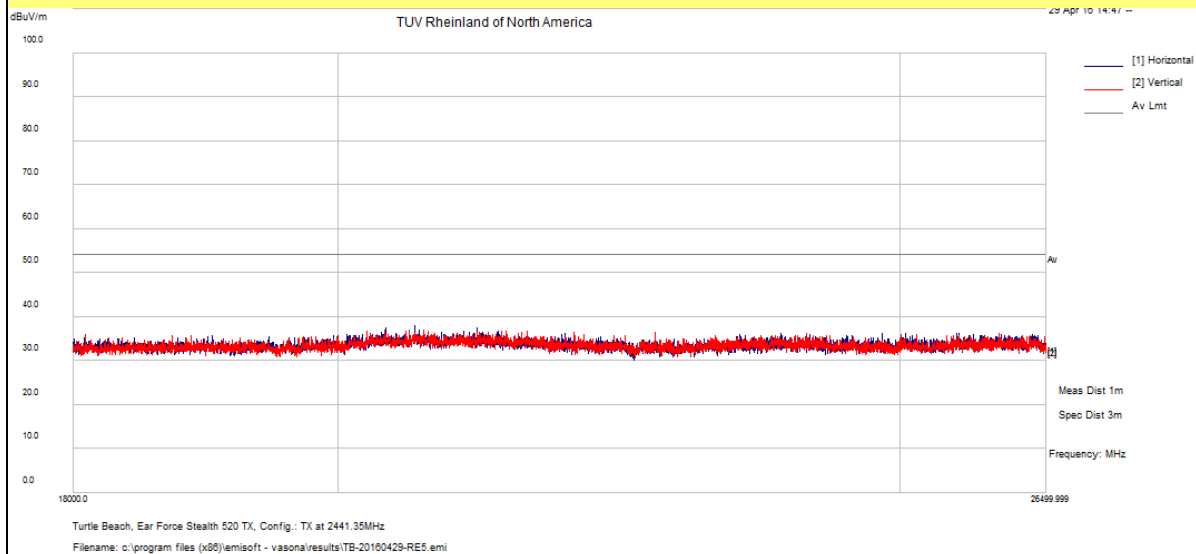
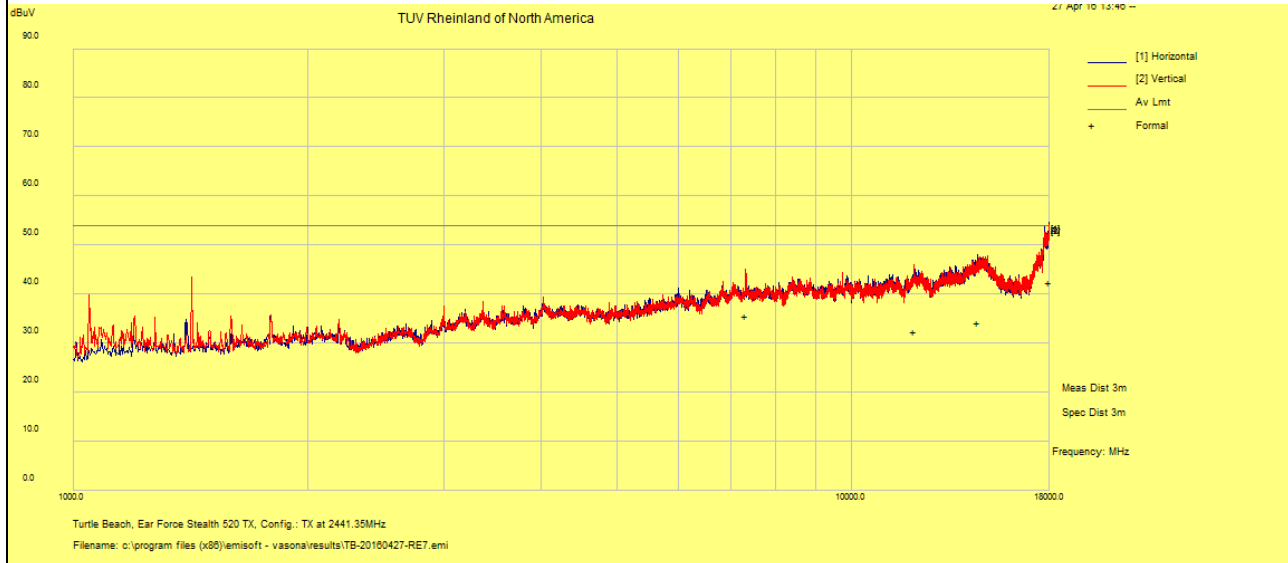
Notes: No emission was observed from 18 to 26 GHz.

SOP 1 Radiated Emissions

Tracking # 31661416.001 Page 5 of 6

EUT Name	USB Wireless Audio Transmitter	Date	April 27, 2016
EUT Model	Ear Force Stealth 420X+ TX	Temp / Hum in	23°C / 32%rh
EUT Serial	PP #2	Temp / Hum out	N/A
EUT Config.	X-Axis	Line AC / Freq	5.0 VDC
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1MHz / 3MHz
Dist/Ant Used	3m / DRH-118, 1m / RA42-K-F-4B-C	Performed by	Jeremy Luong

Above 1 GHz Plots for Transmit Mode at 2441.35 MHz



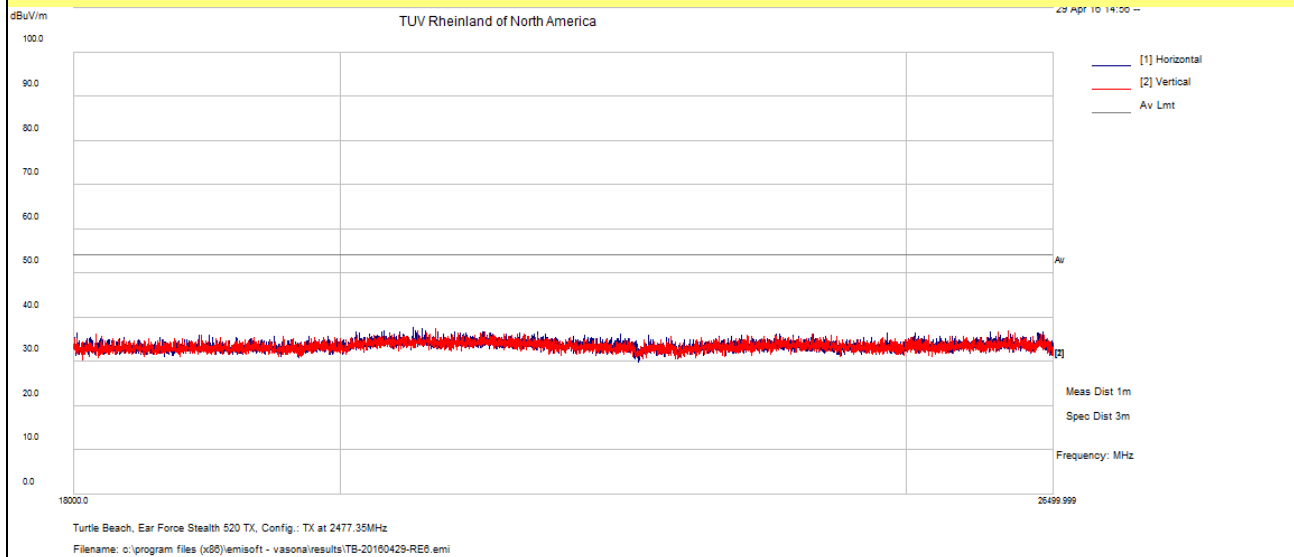
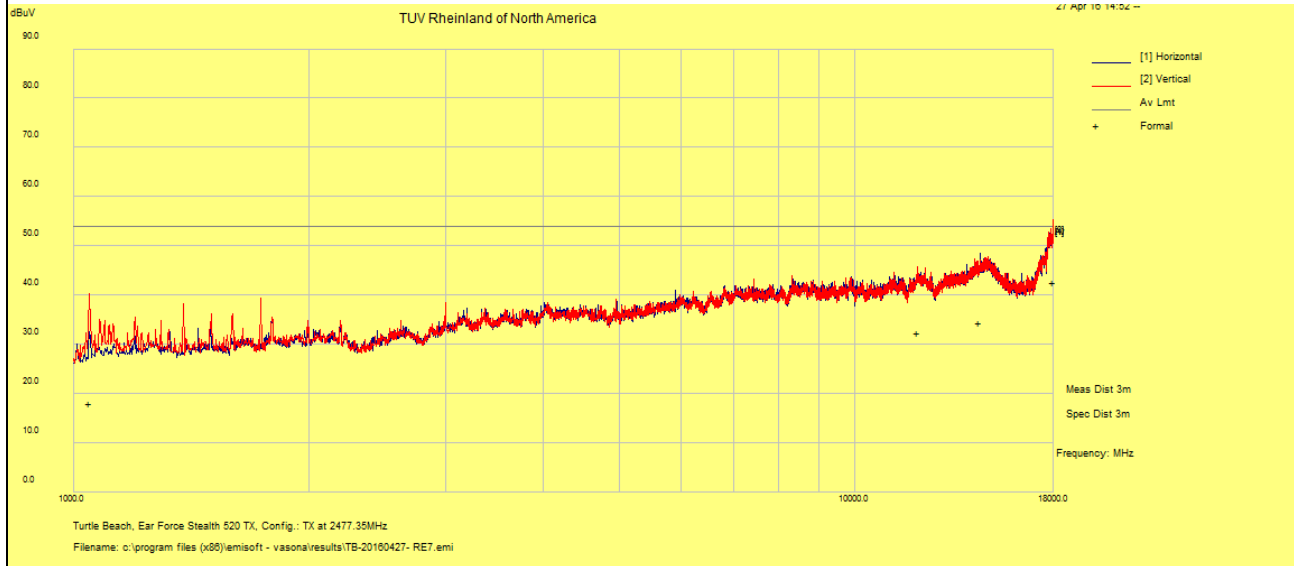
Notes: No emission was observed from 18 to 26 GHz.

SOP 1 Radiated Emissions

Tracking # 31661416.001 Page 6 of 6

EUT Name	USB Wireless Audio Transmitter	Date	April 27, 2016
EUT Model	Ear Force Stealth 420X+ TX	Temp / Hum in	23°C / 32%rh
EUT Serial	PP #2	Temp / Hum out	N/A
EUT Config.	X-Axis	Line AC / Freq	5.0 VDC
Standard	CFR47 Part 15 Subpart C	RBW / VBW	1MHz / 3MHz
Dist/Ant Used	3m / DRH-118, 1m / RA42-K-F-4B-C	Performed by	Jeremy Luong

Above 1 GHz Plots for Transmit Mode at 2477.35 MHz



Notes: No emission was observed from 18 to 26 GHz.

4.6.4 Sample Calculation

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{FIM} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: FIM = Field Intensity Meter (dB μ V)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu\text{V/m} = 10^{\frac{\text{dB}\mu\text{V} / \text{m}}{20}}$$

4.7 AC Conducted Emissions

Testing was performed in accordance with ANSI C63.4: 2014. These test methods are listed under the laboratory's A2LA Scope of Accreditation.

This test measures the levels emanating from the EUT's AC input port, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

The AC conducted emissions of equipment under test shall not exceed the values in CFR47 Part 15.207: 2016 and RSS-247: 2015.

4.7.1 Test Methodology

A test program that controls instrumentation and data logging was used to automate the AC Power Line Conducted emission test procedure. The frequency range of interest was divided into sub-ranges such as to yield a frequency resolution of 9 kHz. Each phase and neutral of the AC power line was measured with respect to ground. Measurements were performed using a set of 50 μ H / 50 Ω LISNs.

Testing is either performed in 5m Chamber. The setup photographs clearly identify which site was used. The vertical ground plane used in the semi-anechoic chamber is a 2m x 2m solid aluminum frame and panel, and it is bonded to the horizontal ground plane.

In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane. Support equipment was powered from a separate LISN.

4.7.1.1 Deviations

There were no deviations from this test methodology.

4.7.2 Test Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 8: AC Conducted Emissions – Test Results

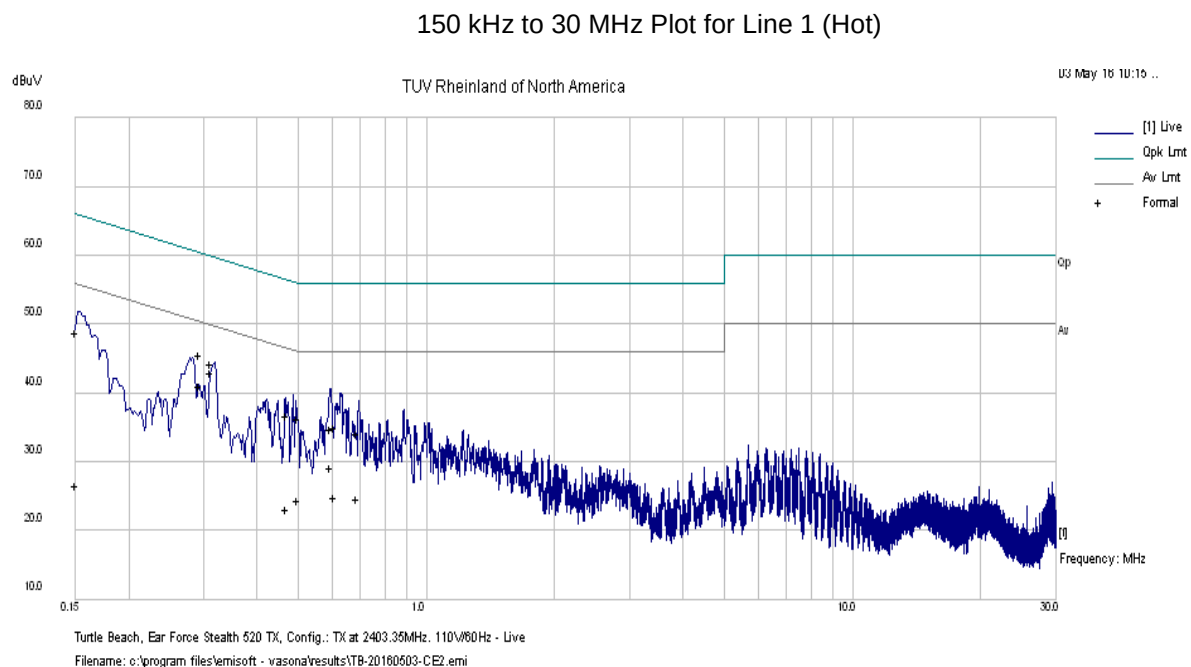
Test Conditions: Conducted Measurement		Test Date: May 3, 2016
Antenna Type: Integrated		Power Level: 0 dBm
AC Power: USB Host Computer		Configuration: Tabletop
Ambient Temperature: 23° C		Relative Humidity: 34% RH
Configuration	Frequency Range	Test Result
Line 1 (Hot)	0.15 to 30 MHz	Pass
Line 2 (Neutral)	0.15 to 30 MHz	Pass

SOP 2 Conducted Emissions						Tracking # 31661416.001 Page 1 of 4			
EUT Name	USB Wireless Audio Transmitter					Date	May 3, 2016		
EUT Model	Ear Force Stealth 420X+ TX					Temp / Hum in	23° C / 34% rh		
EUT Serial	PP #2					Temp / Hum out	N/A		
EUT Config.	Integrated Antenna					Line AC / Freq	120 Vac/60 Hz @ host PC		
Standard	CFR47 Part 15.207					RBW / VBW	9 kHz / 30 kHz		
Lab/LISN	Lab #2 /Com-Power, Line 1					Performed by	Jeremy Luong		
Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV		Line	dBuV	dB	
0.150	38.66	9.97	0.25	48.88	QP	Live	66.00	-17.12	Pass
0.150	16.28	9.97	0.25	26.50	Ave	Live	56.00	-29.50	Pass
0.294	35.54	9.99	0.13	45.67	QP	Live	60.41	-14.75	Pass
0.294	30.96	9.99	0.13	41.08	Ave	Live	50.41	-9.33	Pass
0.313	34.18	9.99	0.13	44.30	QP	Live	59.89	-15.59	Pass
0.313	32.82	9.99	0.13	42.94	Ave	Live	49.89	-6.95	Pass
0.468	26.72	10.02	0.10	36.83	QP	Live	56.54	-19.71	Pass
0.468	13.01	10.02	0.10	23.12	Ave	Live	46.54	-23.42	Pass
0.498	26.08	10.02	0.10	36.20	QP	Live	56.04	-19.84	Pass
0.498	14.24	10.02	0.10	24.36	Ave	Live	46.04	-21.68	Pass
0.598	24.63	10.03	0.09	34.75	QP	Live	56.00	-21.25	Pass
0.598	19.13	10.03	0.09	29.25	Ave	Live	46.00	-16.75	Pass
0.609	24.79	10.03	0.09	34.90	QP	Live	56.00	-21.10	Pass
0.609	14.84	10.03	0.09	24.96	Ave	Live	46.00	-21.04	Pass
0.689	24.02	10.03	0.08	34.13	QP	Live	56.00	-21.87	Pass
0.689	14.51	10.03	0.08	24.62	Ave	Live	46.00	-21.38	Pass
Spec Margin = QP./Ave. - Limit, ± Uncertainty									
Combined Standard Uncertainty $u_c(y) = \pm 2.18$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence									
Notes: EUT was setup as table top equipment and transmitted at 2403.35 MHz									

SOP 2 Conducted Emissions

Tracking # 31661416.001 Page 2 of 4

EUT Name	USB Wireless Audio Transmitter	Date	May 3, 2016
EUT Model	Ear Force Stealth 420X+ TX	Temp / Hum in	23° C / 34% rh
EUT Serial	PP #2	Temp / Hum out	N/A
EUT Config.	Integrated Antenna	Line AC	120 Vac/60 Hz @ PC
Standard	CFR47 Part 15.207	RBW / VBW	9 kHz / 30 kHz
Lab/LISN	Lab #2 /Com-Power, Line 1	Performed by	Jeremy Luong



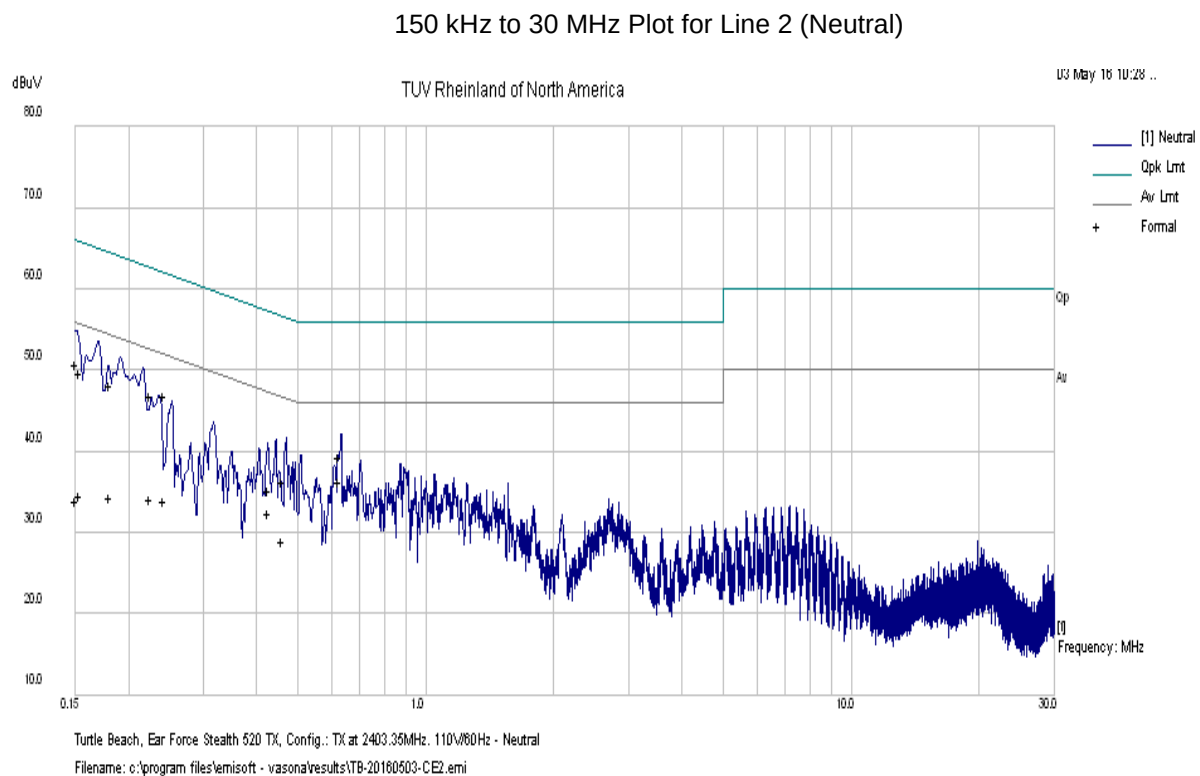
Notes: Meets FCC Class B limit.

SOP 2 Conducted Emissions						Tracking # 31661416.001 Page 3 of 4			
EUT Name	USB Wireless Audio Transmitter					Date	May 3, 2016		
EUT Model	Ear Force Stealth 420X+ TX					Temp / Hum in	23° C / 34% rh		
EUT Serial	PP #2					Temp / Hum out	N/A		
EUT Config.	Integrated Antenna					Line AC / Freq	120 Vac/60 Hz @ host PC		
Standard	CFR47 Part 15.207					RBW / VBW	9 kHz / 30 kHz		
Lab/LISN	Lab #2 /Com-Power, Line 2					Performed by	Jeremy Luong		
Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV		Line	dBuV	dB	
0.150	40.46	9.97	0.25	50.68	QP	Neutral	66.00	-15.32	Pass
0.150	23.72	9.97	0.25	33.94	Ave	Neutral	56.00	-22.06	Pass
0.154	39.55	9.97	0.24	49.76	QP	Neutral	65.78	-16.02	Pass
0.154	24.38	9.97	0.24	34.60	Ave	Neutral	55.78	-21.18	Pass
0.181	38.10	9.97	0.21	48.28	QP	Neutral	64.43	-16.15	Pass
0.181	24.23	9.97	0.21	34.41	Ave	Neutral	54.43	-20.02	Pass
0.224	36.72	9.98	0.17	46.88	QP	Neutral	62.66	-15.79	Pass
0.224	24.00	9.98	0.17	34.15	Ave	Neutral	52.66	-18.51	Pass
0.242	36.77	9.98	0.16	46.91	QP	Neutral	62.04	-15.13	Pass
0.242	23.80	9.98	0.16	33.94	Ave	Neutral	52.04	-18.09	Pass
0.426	25.15	10.01	0.10	35.27	QP	Neutral	57.34	-22.07	Pass
0.426	22.27	10.01	0.10	32.39	Ave	Neutral	47.34	-14.95	Pass
0.459	26.11	10.02	0.10	36.22	QP	Neutral	56.70	-20.48	Pass
0.459	18.87	10.02	0.10	28.99	Ave	Neutral	46.70	-17.71	Pass
0.627	29.29	10.03	0.08	39.40	QP	Neutral	56.00	-16.60	Pass
0.627	26.08	10.03	0.08	36.20	Ave	Neutral	46.00	-9.80	Pass
Spec Margin = QP./Ave. - Limit, ± Uncertainty									
Combined Standard Uncertainty $u_c(y) = \pm 2.18$ dB Expanded Uncertainty $U = k u_c(y)$ $k = 2$ for 95% confidence									
Notes: EUT was setup as table top equipment and transmitted at 2403.35 MHz									

SOP 2 Conducted Emissions

Tracking # 31661416.001 Page 4 of 4

EUT Name	USB Wireless Audio Transmitter	Date	May 3, 2016
EUT Model	Ear Force Stealth 420X+ TX	Temp / Hum in	23° C / 34% rh
EUT Serial	PP #2	Temp / Hum out	N/A
EUT Config.	Integrated Antenna	Line AC / Freq	120 Vac/60 Hz @ PC
Standard	CFR47 Part 15.207	RBW / VBW	9 kHz / 30 kHz
Lab/LISN	Lab #2 /Com-Power, Line 2	Performed by	Jeremy Luong



Note: Meets FCC Class B Limit.

5 Test Equipment List

5.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yyyy	Next Cal mm/dd/yyyy
Bilog Antenna	Sunol Sciences	JB3	A061907	07/08/2014	07/08/2016
Horn Antenna	Sunol Sciences	DRH-118	A040806	02/10/2015	02/10/2017
Antenna (18-26GHz)	Com-Power	AHA-840	105005	07/08/2015	07/08/2016
Spectrum Analyzer	Rohde & Schwarz	FSL6	100169	01/20/2016	01/20/2017
Spectrum Analyzer	Agilent	N9038A	MY51210195	01/26/2016	01/26/2017
Spectrum Analyzer	Rohde Schwarz	ESIB	832427/002	01/19/2016	01/19/2017
Spectrum Analyzer	Rohde Schwarz	FSV40	1321.3008K40	11/01/2015	11/01/2016
Amplifier	Sonoma Instruments	310	185516	01/18/2016	01/18/2017
Amplifier	Miteq	TTA1800-30-4G	1842452	01/20/2016	01/20/2017
Power Meter	Agilent	E4418A	MY45103859	01/20/2016	01/20/2017
Power Sensor	Hewlett Packard	8481A	US37295801	01/20/2016	01/20/2017
Thermometer	Fluke	52II	96480032	07/15/2015	07/15/2016
Thermo Chamber	Espec	BTZ-133	0613436	01/20/2016	01/20/2017
DC Power Supply	Agilent	E3634A	MY40004331	01/19/2016	01/19/2017
Notch Filter	Micro-Tronics	BRM50716	003	01/30/2015	01/30/2017
Signal Generator	Anritsu	MG3694A	042803	01/19/2016	01/19/2017
Signal Generator	Rohde & Schwarz	SMF100A	1167.0000K02	10/14/2014	10/14/2016
Signal Generator	Rohde & Schwarz	SMBV100A	1407.6004K02	12/04/2014	12/04/2016
Power Sensors	Rohde & Schwarz	OSP120	1420X+.9010.02	12/19/2014	12/14/2016

6 EMC Test Plan

6.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

6.2 Customer

Table 9: Customer Information

Company Name	Voyetra Turtle Beach, Inc.
Address	100 Summit Lake Drive, Suite 100
City, State, Zip	Valhalla, New York 10595
Country	USA

Table 10: Technical Contact Information

Name	Tim Blaney
E-mail	tim@commcepts.net
Phone	(530) 277-3482

6.3 Equipment Under Test (EUT)

Table 11: EUT Specifications

EUT Specification	
Package Dimensions	69.85mm (2.75") x 25.4mm (1.0") x 9.5mm (0.375")
Power Input	Transmitter Input Voltage: 5.0 Vdc (Host Computer)
Environment	Indoor
Operating Temperature Range:	0 to 50 degrees C
Multiple Feeds:	☐ Yes and how many ☒ No
Hardware Version	PP
Part Number	N/A
RF Software Version	VMI Test Software V0.5
Operating Mode	VMI RF Protocol
Transmitter Frequency Band	2403.35 MHz to 2477.35 MHz
Max. Measured Power Output	-0.33 dBm
Power Setting @ Operating Channel	0 dBm
Antenna Type	PCB Attached on board (-0.5 dBi)
Modulation Type	☐ AM ☐ FM ☒ DSSS ☐ OFDM ☐ Other describe:
Date Rate	11 kbps
TX/RX Chain (s)	1
Directional Gain Type	☒ Uncorrelated ☒ No Beam-Forming ☐ Other describe:
Type of Equipment	☐ Table Top ☐ Wall-mount ☐ Floor standing cabinet ☒ Other describe: <i>Table Top Device's accessory.</i>
Note: None.	

Table 11: Interface Specifications

Interface Type	Cabled with what type of cable?	Is the cable shielded?	Maximum potential length of the cable?	Metallic (M), Coax (C), Fiber (F), or Not Applicable?
USB	Terminated to Host USB	☒ Yes	☒ Metric:3m	☒ M

Table 13: Supported Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	Dell Computer	Latitude E6420	28353268189	Set test mode

Table 14: Description of Sample used for Testing

Device	Serial Number	Configuration	Used For
Stealth 420X+ TX	PP #2	Radiated Sample	Radiated Emissions. Conducted Emission
Stealth 420X+ TX	PP #1	Conducted Sample	Output Power, Occupied Bandwidth, Conducted Spurious Emissions, Peak Power Spectral Density
Note: The Stealth 420X+ TX and Stealth 520 TX have identical radio circuitry and layout. Evaluation performed on Stealth 520 TX samples.			

Table 15: Description of Test Configuration used for Radiated Measurement.

Device	Antenna	Mode	Setup Description
Stealth 420X+ TX	Integrated	Transmit & Receive	EUT positioned flat, normal usage.
Note: The final setup configuration used for testing.			

Table 16: Final Test Mode for 2403.35 MHz to 2477.35MHz Band

Test	Ear Force Stealth 420X+ TX
Occupied Bandwidth	2403.35, 2441.35, 2477.35 MHz @ 11 kbps
Output Power	2403.35, 2441.35, 2477.35 MHz @ 11 kbps
Peak Power Spectral Density	2403.35, 2441.35, 2477.35 MHz @ 11 kbps
Out-of-Band (-30 dBr)	2403.35, 2441.35, 2477.35 MHz @ 11 kbps
Band-Edge (Radiated)	2403.35, 2477.35 MHz @ 11 kbps
Transmitted Spurious Emission	2403.35, 2441.35, 2477.35 MHz @ 11 kbps
AC Conducted Emission	2403.35 MHz @11 kbps
Note: EUT transmits at 100% duty cycle.	

6.4 Test Specifications

Testing requirements

Table 17: Test Specifications

Emissions and Immunity	
Standard	Requirement
CFR 47 Part 15.247: 2016	All
RSS-247 Iss. 1 2015	All