

*Testing Tomorrow's Technology*

## **Application**

**For**

**Part 2, Subpart J, Paragraph 2.907 Equipment Authorization of Certification for an Intentional Radiator per Part 15, Subpart C, paragraphs 15.207, 15.209 and Part 15, Subpart F, paragraph 15.510**

**For the**

**Camero tech**

**Model: XAVER100**

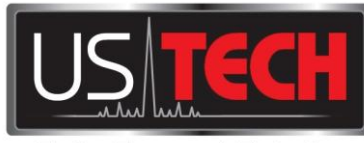
**FCC ID: 2AACLX100FW**

**UST Project: 15-0219**

**Issue Date: October 19, 2015**

Total Pages in This Report: 29

**3505 Francis Circle Alpharetta, GA 30004  
PH: 770-740-0717 Fax: 770-740-1508  
[www.ustech-lab.com](http://www.ustech-lab.com)**



*Testing Tomorrow's Technology*

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

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: 

Title: Compliance Engineer – President

Date October 19, 2015



NVLAP LAB CODE 200162-0

**This report shall not be reproduced except in full. This report may be copied in part only with the prior written approval of US Tech. The results contained in this report are subject to the adequacy and representative character of the sample provided. This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the Federal Government.**

**3505 Francis Circle Alpharetta, GA 30004  
PH: 770-740-0717 Fax: 770-740-1508  
[www.ustech-lab.com](http://www.ustech-lab.com)**

US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVER100

## MEASUREMENT TECHNICAL REPORT

**COMPANY NAME:** Camero tech  
**MODEL:** XAVER100  
**FCC ID:** 2AACLX100FW  
**DATE:** October 19, 2015

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

Equipment type: UWB Transmitter, through D-wall imaging system

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes\_\_\_\_\_ No X

If yes, defer until: N/A  
date

agrees to notify the Commission by N/A  
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

US Tech  
3505 Francis Circle  
Alpharetta, GA 30004

Phone Number: (770) 740-0717

Fax Number: (770) 740-1508

## **Table of Contents**

<b><u>Paragraph</u></b>	<b><u>Title</u></b>	<b><u>Page</u></b>
<b>1</b>	<b>General Information .....</b>	<b>6</b>
1.1	Purpose of this Report.....	6
1.2	Characterization of Test Sample .....	6
1.3	Product Description .....	6
1.4	Configuration of Tested System .....	7
1.5	Test Facility .....	7
1.6	Related Submittals .....	7
<b>2</b>	<b>Tests and Measurements .....</b>	<b>9</b>
2.1	Test Equipment .....	9
2.2	Modifications to EUT Hardware .....	10
2.3	Frequency Range of Radiated Measurements (Part 15.33, 15.521(h)) .....	10
2.3.1	Intentional Radiator .....	10
2.4	Measurement Detector Function and Bandwidth (CFR 15.35) .....	10
2.4.1	Detector Function and Associated Bandwidth .....	10
2.4.2	Corresponding Peak and Average Requirements .....	11
2.5	EUT Antenna Requirements (CFR 15.203) .....	11
2.6	Restricted Bands of Operation (Part 15.205) .....	12
2.7	Intentional Radiator, Power Line Conducted Emissions (CFR 15.207) .....	12
2.8	Intentional Radiator, Radiated Emissions (CFR 15.510 (a,d), 15.521 (g)) .....	12
2.9	UWB bandwidth (CFR 15.503(a,b,c,d), 15.521(e)) .....	15
2.10	UWB Purpose, Part 90 License, and Coordination (CFR 15.510 (b)) .....	17
2.11	Systems with UWB below 960 MHz (CFR 15.510 (c)) .....	17
2.12	Radiated emissions at or below 960 MHz (CFR 15.510 (d), 15.209)) .....	17
2.13	Radiated Emissions above 960 MHz (CFR 15.510 (d), 15.521(d,g,h)) .....	19
2.14	Radiated Emissions in the GPS band (CFR 15.510 (e), 15.521(g)) .....	21
2.15	Unintentional Radiator, Radiated Emissions (CFR 15.209, 15.521 (c)) .....	27
2.16	Operator Statement (CFR 15.510 (e)) .....	29
2.17	Unintentional Radiator, Powerline Emissions (CFR 15.207, 15.521 (j)) .....	29
2.18	Measurement Uncertainty .....	29
2.18.1	Conducted Emissions Measurement Uncertainty .....	29
2.18.2	Radiated Emissions Measurement Uncertainty .....	29

US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVER100

### **List of Figures**

<b><u>Figures</u></b>	<b><u>Title</u></b>	<b><u>Page</u></b>
Figure 1.	Block Diagram of Test Configuration .....	11
Figure 2.	Pulse Repetition Frequency .....	14
Figure 3.	UWB F <sub>L</sub> Frequency .....	15
Figure 4.	UWB F <sub>H</sub> Frequency .....	16
Figure 5.	Peak Emissions 1164 – 1240 MHz Vertical .....	23
Figure 6.	Peak Emissions 1559- 1610 MHz Vertical .....	24
Figure 7.	Peak Emissions 1164 – 1240 MHz Horizontal .....	25
Figure 8.	Peak Emissions 1559- 1610 MHz Horizontal .....	26

### **List of Tables**

<b><u>Table</u></b>	<b><u>Title</u></b>	<b><u>Page</u></b>
Table 1.	EUT and Peripherals .....	8
Table 2.	Test Instruments .....	9
Table 3.	Allowed Antenna(s) .....	11
Table 4.	Peak Intentional Radiated Emissions (CFR 15.510 (d)5 ) .....	13
Table 5.	Radiated Emissions Test Data Below 960 MHz .....	18
Table 6.	Radiated Emissions above 960 MHz, CFR 15.510 (d), 15.521(g) .....	19
Table 7.	Radiated Emissions from Transmitter Test Data Above 960 MHz .....	20
Table 8.	Radiated Emissions in the GPS band (CFR 15.510 (e), 15.221(g)) .....	21
Table 9.	Worst Case Radiated Emissions Test Data In The GPS Bands .....	22
Table 10.	Unintentional Radiator, Peak Radiated Emissions (CFR 15.209), .....	28

### **List of Attachments**

Agency Agreement  
Application Forms  
Letter of Confidentiality  
Equipment Label(s)  
Block Diagram(s)  
Schematic(s)  
Test Configuration Photographs  
Internal and External Photographs  
Antenna Photographs  
Theory of Operation  
RF Exposure  
User's Manual

US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVR100

---

## **1 General Information**

### **1.1 Purpose of this Report**

This report is prepared as a means of conveying test results and information concerning the suitability of this exact product for public distribution according to the FCC Rules and Regulations Part 15, Section 510.

This test report covers the UWB transmitter portion of the Xaver100 product.

### **1.2 Characterization of Test Sample**

The sample used for testing was received by US Tech on September 30, 2015 in good operating condition.

### **1.3 Product Description**

The Equipment Under Test (EUT) is the Camero tech Model Xaver100. The Xaver100 is a through wall imaging device designed for rapid deployment in a tactical operation. The system is compact, lightweight, and capable of achieving high resolution real-time single dimensional imaging of people behind walls. The EUT also contains a Zigbee radio for remote viewing. The Zigbee radio has been tested and results detailed in a separate test report (see US Tech report 15-0220).

Frequency of operation: 1336 MHz to 4079 MHz  
Center Frequency: 2708 MHz  
Number of channels: 1  
Antenna Type: UWB Flat (PCB trace antenna)

US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVER100

---

## **1.4 Configuration of Tested System**

The Test Sample was tested per *ANSI C63.10:2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (2013)* and per FCC Part 15 Subpart F.

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

## **1.5 Test Facility**

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its designation number is 186022. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 9900A-1.

## **1.6 Related Submittals**

The EUT is subject to the following FCC authorizations:

- a) Certification under section 15.510 as a transmitter.
- b) Certification under section 15.247 as a transmitter.
- c) Verification under 15.101 as a digital device and receiver.

The Verification requirement shares many common report elements with the Certification report. Therefore, though this report is mostly intended to provide data for the Certification process, the Verification authorization report (part 15.107 and 15.109) for the EUT is included herein.

US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVER100

**Table 1. EUT and Peripherals**

PERIPHERAL MANUFACTURER.	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
UWB.Wireless Transmitter Camero tech	XAVER100	500046	Pending: FCC ID: 2AACLX100FW	N/A
Wireless Transmitter Camero tech	XaverNET USB Dongle	0833140020	Pending FCC ID: 2AACLXNETUSB	N/A
Antenna See antenna details	--	--	--	--

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



US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVER100

## 2 Tests and Measurements

### 2.1 Test Equipment

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

**Table 2. Test Instruments**

TEST INSTRUMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	DATE OF LAST CALIBRATION
SPECTRUM ANALYZER	E4407B	AGILENT	US41442935	1/28/2015
LOOP ANTENNA	SAS-200/562	A.H. Systems	142	9/30/2015 2 yr.
BICONICAL ANTENNA	3110B	EMCO	9306-1708	11/24/2014 2 yr.
LOG PERIODIC ANTENNA	3146	EMCO	9110-3236	11/19/2014 2 yr.
HORN ANTENNA	SAS-571	A.H. Systems	605	8/25/2015 2 yr.
HORN ANTENNA	3116	EMCO	9505-2255	01/27/2015 2 yr.
PRE-AMPLIFIER	8449B	HEWLETT-PACKARD	3008A00480	12/5/2014
PRE-AMPLIFIER	8477E	HEWLETT-PACKARD	1145A00307	11/21/2014
PRE-AMPLIFIER	8447D	HEWLETT-PACKARD	1937A02980	12/4/2014

Note: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.

## **2.2 Modifications to EUT Hardware**

No physical modifications were made by US Tech in order to bring the EUT into compliance with FCC Part 15, Subpart F Intentional Radiator Limits for the transmitter portion of the EUT.

## **2.3 Frequency Range of Radiated Measurements (Part 15.33, 15.521(h))**

### **2.3.1 Intentional Radiator**

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

The highest frequency used to determine the frequency range over which measurements are made shall be based on the center frequency (fc). If the center frequency is less than 10 GHz there is no requirement to measure beyond 40 GHz.

## **2.4 Measurement Detector Function and Bandwidth (CFR 15.35)**

The radiated and conducted emissions limits shown herein are based on the following: FCC Part 15.207, 15.209, 15.510

### **2.4.1 Detector Function and Associated Bandwidth**

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

## 2.4.2 Corresponding Peak and Average Requirements

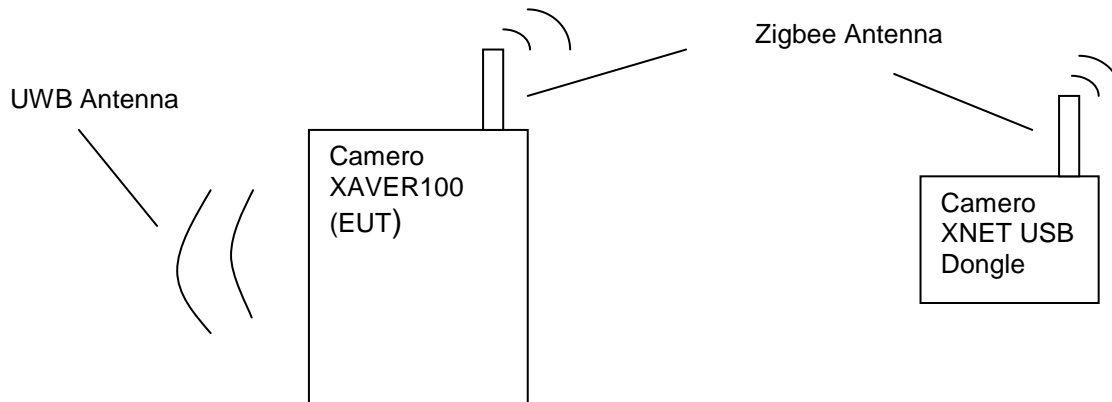
Above 1000 MHz, radiated limits are based on measuring instrumentation employing an average detector function. When average radiated emissions are specified there is also a corresponding Peak requirement, as measured using a peak detector, of 20 dB greater than the average limit. For all measurements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

## 2.5 EUT Antenna Requirements (CFR 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. Only the antenna(s) listed in Table 3 will be used with this module.

**Table 3. Allowed Antenna(s)**

REPORT REFERENCE	MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dBi	TYPE OF CONNECTOR
UWB Antenna	Camero tech	UWB Flat Antenna	AN002	N/A	N/A
Zigbee Antenna	SAMWOO	Monopole Antenna	SMAP-900-1	0	SMA (permanently Connected)



**Figure 1. Block Diagram of Test Configuration**

## 2.6 Restricted Bands of Operation (Part 15.205)

Only spurious emissions can fall in the frequency bands of CFR 15.205. The field strength of these spurious cannot exceed the limits of 15.209. Radiated harmonics and other Spurious are examined for this requirement see paragraph 2.1

## 2.7 Intentional Radiator, Power Line Conducted Emissions (CFR 15.207)

During normal operation the EUT is battery powered and will not be operated while directly or indirectly connected to the AC mains. The EUT can be operated with either four CR123 or two AA batteries. There is no significant difference in the EUT's operation or emissions with the EUT operating with either type of battery. This test was not applicable.

## 2.8 Intentional Radiator, Radiated Emissions (CFR 15.510 (a,d), 15.521 (g))

UWB devices where the highest radiated emission,  $F_M$  (the frequency at which the highest radiated emission occurs), is between 1190 and 10600 MHz. The limit on the peak level of the emission within a 50 MHz bandwidth is 0 dBm EIRP. A smaller RBW was used, therefore the peak emissions limit was adjusted per CFR 15.521 (g). The limit was also converted to peak field strength at 3 meters.

The antenna was positioned as it would be in normal operation and the fundamental emission was maximized to ensure the maximum reading and measured with the receiving antenna in both horizontal and vertical positions. Below is the measured peak radiated emission at 3 meters.

RBW used: 3 MHz

$$\begin{aligned}\text{Peak EIRP Limit} &= 20 \log (\text{RBW}/50) \text{ dBm EIRP} \\ &= 20 \log (3/50) \text{ dBm EIRP} \\ &= -24.44 \text{ dBm EIRP} \\ \text{Peak Field Strength Limit} &= -24.44 \text{ dBm EIRP} + 95.2 \\ &= 70.76 \text{ dBuV/m}\end{aligned}$$

US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVER100

**Table 4. Peak Intentional Radiated Emissions (CFR 15.510 (d)5 )**


Frequency (MHz)	Distance / Polarization	Raw Test Data (dBuV)	Correction Factors (dB/m)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)
3040.40	1.0m./VERT	40.54	25.63	66.17	70.8	4.6
3469.20	1.0m./HORZ	36.49	26.22	62.71	70.8	8.1

Note: Measurements made at 1 meter were extrapolated to 3 meters using the factor 9.5 dB.

Sample Calculation at 3040.40 MHz:

Raw Test Data	40.54 dBuV
+Correction Factors	+25.63 dB/m
Results	66.17 dBuV/m

Test Date: October 7, 2015

Tested By  
Signature:  Name: Carrie Ingram

## 2.8.1 Pulse Repetition Frequency

The device employs pulse modulation and has a repetition rate of 1 MHz. The pulse signal has been verified and results are shown below.

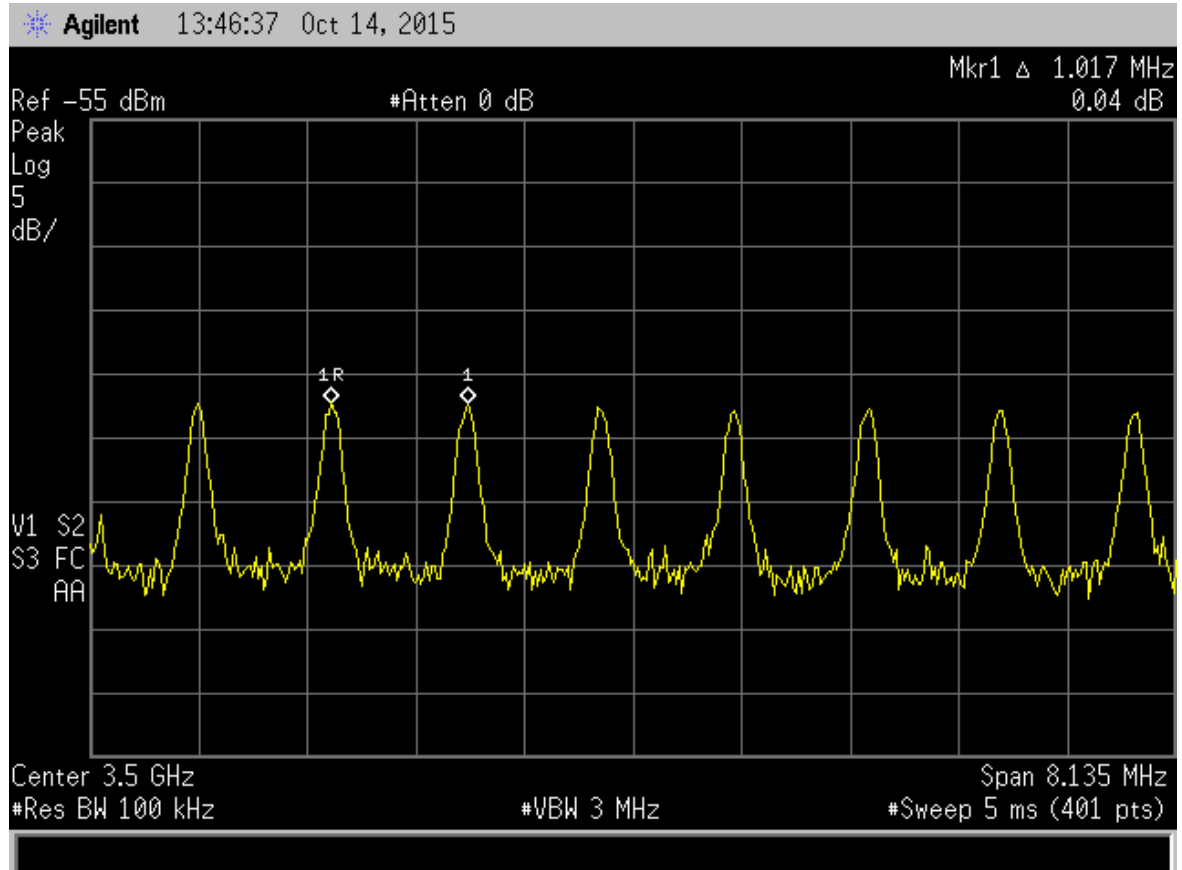


Figure 2. Pulse Repetition Frequency

## 2.9 UWB bandwidth (CFR 15.503(a,b,c,d), 15.521(e))

The bandwidth is defined by the frequencies -10 dB from the maximum emissions found in section 2.10 of this test report. If multiple bandwidths occur, then the maximum bandwidth is used.

The bandwidth was determined from a radiated measurement using the designated antenna with which EUT will operate in the final product. The RBW was set to 1 MHz or higher. The receiving antenna's height was repeatedly varied from 1 m to 4 m and the polarity was adjusted several times. The turn table on which the EUT was placed was also rotated several times. This ensured that the true bandwidth of the EUT was measured. Below is the measured UWB bandwidth with the receiving antenna horizontal and vertical.

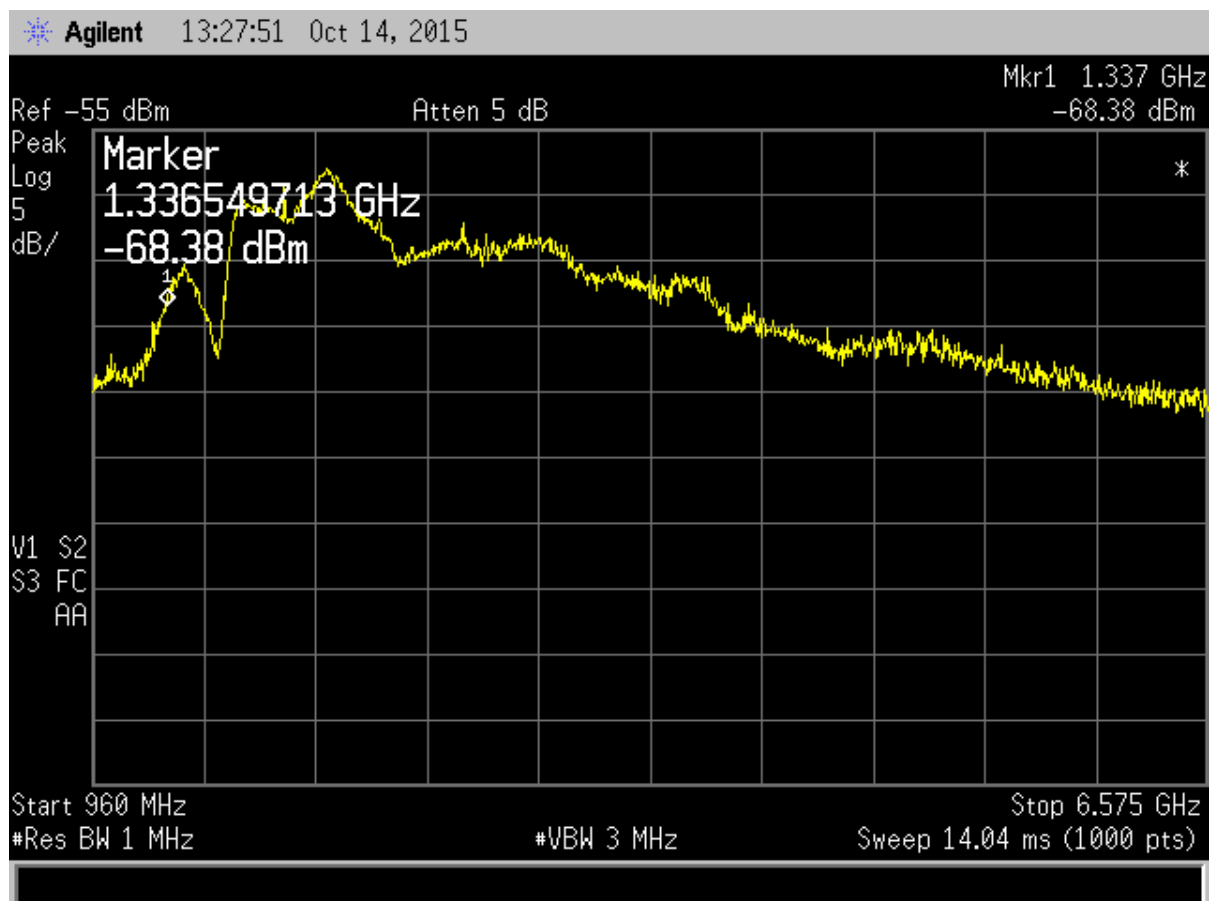
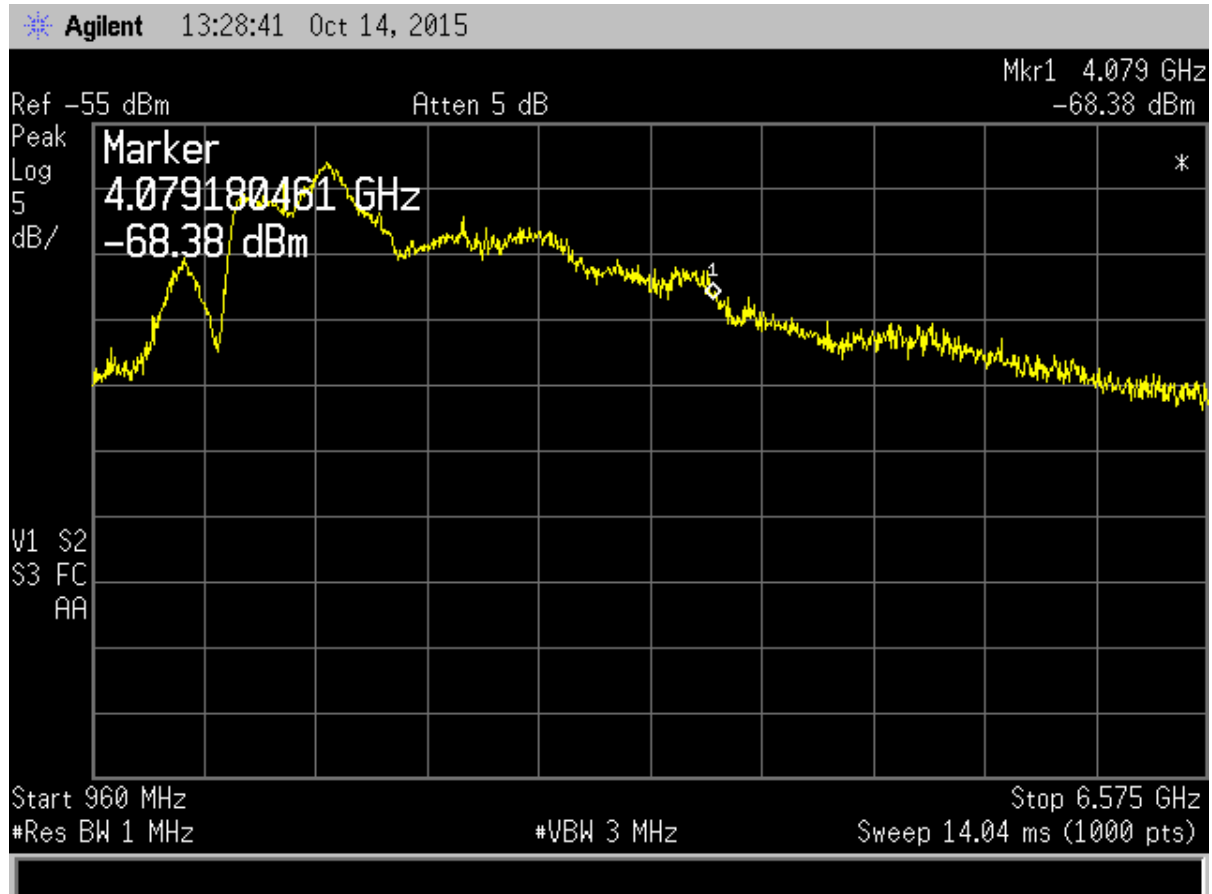


Figure 3. UWB  $F_L$  Frequency



**Figure 4. UWB  $F_H$  Frequency**

$$\begin{aligned}
 \text{UWB Bandwidth} &= F_H - F_L \\
 &= 3.05 \text{ GHz} \\
 \\ 
 \text{Fractional Bandwidth} &= \frac{2(F_H - F_L)}{(F_H + F_L)} \\
 &= \frac{2(2.8 \text{ GHz})}{(5.4 \text{ GHz})} \\
 &= 1.0 \\
 &> 0.20 \text{ (per 15.503 (c))} \\
 \\ 
 \text{Center Frequency (} F_c \text{)} &= \frac{(F_H + F_L)}{2} \\
 &= \frac{(5.4 \text{ GHz})}{2} \\
 &= 2.7 \text{ GHz}
 \end{aligned}$$

Since  $F_c$  and  $F_m$  are between 1990 MHz and 10600 MHz, 15.510 (d) limits will apply.



US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camera tech  
XAVER100

---

## **2.10 UWB Purpose, Part 90 License, and Coordination (CFR 15.510 (b))**

The EUT, operating under CFR 15.510, is limited to through-wall imaging systems operated by law enforcement, emergency rescue or firefighting organizations that are under the authority of a local or state government.

## **2.11 Systems with UWB below 960 MHz (CFR 15.510 (c))**

Since the operating UWB bandwidth is above 960 MHz, this section was deemed inapplicable.

## **2.12 Radiated emissions at or below 960 MHz (CFR 15.510 (d), 15.209)**

The radiated emissions at or below 960 MHz from the transmitter shall not exceed the emissions levels in CFR 15.209. Furthermore the emissions due to the digital circuitry of the EUT must also comply with the limits for 15.209.

The worst-case radiated emission for the EUT in the range of 30 MHz to 960 MHz was 6.6 dB below the limit at 668.34 MHz. All other radiated emissions were at least 10.0 dB below the CFR 15.209 limits. This data can be found in the table below.

US Tech Test Report:  
 FCC ID:  
 Test Report Number:  
 Issue Date:  
 Customer:  
 Model:

FCC Part 15 Certification  
 2AACLX100FW  
 15-0219  
 October 19, 2015  
 Camero tech  
 XAVER100

**Table 5. Radiated Emissions Test Data Below 960 MHz**

30 MHz to 960 MHz							
<b>Test:</b> Radiated Emissions				<b>Client:</b> Camero tech			
<b>Project:</b> 15-0219				<b>Model:</b> XAVER100			
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	QP Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or QP
62.73	29.18	-10.84	18.34	40.0	3m./VERT	21.7	QP
146.87	40.05	-6.59	33.46	43.5	3m./HORZ	10.0	QP
204.31	34.12	-6.99	27.13	43.5	3m./HORZ	16.4	QP
668.34	35.93	3.51	39.44	46.0	3m./HORZ	6.6	QP

Sample Calculation at 62.73 MHz:

Magnitude of Measured Frequency	29.18 dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	-10.84 dB/m
Corrected Result	18.34 dBuV/m

Test Date: October 9, 2015

Tested by  
 Signature: 

Name: Carrie Ingram

US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVER100

### **2.13 Radiated Emissions above 960 MHz (CFR 15.510 (d), 15.521(d,g,h))**

The radiated emissions above 960 MHz from the transmitter shall comply with the AVG limits in Table 6 when measured using a resolution bandwidth of 1 MHz. The following are the worst case emissions with the receiving antenna in both horizontal and vertical polarities. The emissions were maximized using a Peak Detector, and the final measurement was taken using an Average Detector.

**Table 6. Radiated Emissions above 960 MHz, CFR 15.510 (d), 15.521(g)**

<b>Frequency Range (MHz)</b>	<b>EIRP Limit (dBm)</b>	<b>Field Strength Limit at 3 meters (dBuV/m)</b>
960 -1610	-46.3	48.9
1610 – 10600	-41.3	53.9
Above 10600	-51.3	43.9

The worst-case radiated emission for the EUT in the range above 960 MHz was 1.2 dB below the limit at 7300.0 MHz. All other radiated emissions were at least 1.8 dB below the CFR 15.510 limits. This data can be found in the table below.

US Tech Test Report:  
 FCC ID:  
 Test Report Number:  
 Issue Date:  
 Customer:  
 Model:

FCC Part 15 Certification  
 2AACLX100FW  
 15-0219  
 October 19, 2015  
 Camero tech  
 XAVER100

**Table 7. Radiated Emissions from Transmitter Test Data Above 960 MHz**

Above 960 MHz							
Test: Radiated Emissions				Client: Camero tech			
Project: 15-0219				Model: XAVER100			
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	AVG Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or AVG
1035.50	14.89	16.31	31.20	48.9	1.0m./HORZ	17.7	AVG
2454.90	14.99	23.60	38.59	53.9	1.0m./HORZ	15.3	AVG
2832.40	16.19	24.27	40.46	53.9	1.0m./HORZ	13.4	AVG
2968.30	16.57	24.71	41.28	53.9	1.0m./HORZ	12.6	AVG
4010.20	15.66	28.16	43.82	53.9	1.0m./HORZ	10.1	AVG
5009.00	13.30	31.62	44.92	53.9	1.0m./HORZ	9.0	AVG
5820.50	13.12	31.45	44.57	53.9	1.0m./HORZ	9.3	AVG
960.00	14.94	16.26	31.20	48.9	1.0m./VERT	17.7	AVG
1111.00	15.47	16.83	32.30	48.9	1.0m./VERT	16.6	AVG
1277.10	16.46	17.53	33.99	48.9	1.0m./VERT	14.9	AVG
1443.20	19.56	18.28	37.84	48.9	1.0m./VERT	11.1	AVG
1835.80	19.89	20.37	40.26	53.9	1.0m./VERT	13.6	AVG
2228.40	21.89	22.29	44.18	53.9	1.0m./VERT	9.7	AVG
2651.20	21.23	24.60	45.83	53.9	1.0m./VERT	8.1	AVG
2968.30	21.41	24.73	46.14	53.9	1.0m./VERT	7.8	AVG
3421.30	21.27	26.16	47.43	53.9	1.0m./VERT	6.5	AVG
3934.70	20.53	28.01	48.54	53.9	1.0m./VERT	5.4	AVG
5595.70	14.98	31.02	46.00	53.9	1.0m./VERT	7.9	AVG
6305.40	13.81	32.85	46.66	53.9	1.0m./VERT	7.2	AVG
6790.00	16.71	34.06	50.77	53.9	1.0m./VERT	3.1	AVG
7300.00	17.08	35.66	52.74	53.9	1.0m./VERT	1.2	AVG
7935.00	16.74	35.34	52.08	53.9	1.0m./VERT	1.8	AVG

Sample Calculation at 1035.50 MHz:

Magnitude of Measured Frequency	14.89 dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	+16.31 dB/m
Corrected Result	31.20 dBuV/m

Test Date: October 7, 2015

Tested by  
 Signature: 

Name: Carrie Ingram

## 2.14 Radiated Emissions in the GPS band (CFR 15.510 (e), 15.521(g))

In addition the radiated emissions limits from CFR 15.510 (d), the transmitter shall not exceed the following average limits, in Table 8, when measured using a resolution bandwidth of no less than 1 kHz.

**Table 8. Radiated Emissions in the GPS band (CFR 15.510 (e), 15.221(g))**

Frequency Range (MHz)	EIRP Limit (dBm)	Field Strength Limit at 3 meters (dBuV/m)
1164-1240	-56.3	38.9
1559-1610	-56.3	38.9

In each of these bands, the emissions from the transmitter were maximized using a larger bandwidth and the peak detector, then the resolution bandwidth was decreased and the final measurement was taken using the average detector, if the emissions with the peak detector failed. The worse case emissions are seen below.

US Tech Test Report:  
 FCC ID:  
 Test Report Number:  
 Issue Date:  
 Customer:  
 Model:

FCC Part 15 Certification  
 2AACLX100FW  
 15-0219  
 October 19, 2015  
 Camero tech  
 XAVER100

**Table 9. Worst Case Radiated Emissions Test Data In The GPS Bands**

1164 – 1240 MHz and 1559- 1610 MHz							
<b>Test:</b> Radiated Emissions				<b>Client:</b> Camero tech			
<b>Project:</b> 15-0219				<b>Model:</b> XAVER100			
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	AVG Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or AVG
1185.85	0.99	16.84	17.83	38.90	1.0m./HORZ	21.1	PK
1577.11	-0.11	18.55	18.43	38.90	1.0m./HORZ	20.5	PK
1240.00	11.00	17.46	28.46	38.90	1.0m./VERT	10.4	PK
1608.85	13.25	19.23	32.48	38.90	1.0m./VERT	6.4	PK

Sample Calculation at 1185.85 MHz:

Magnitude of Measured Frequency	0.99 dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	16.84 dB/m
Corrected Result	17.83 dBuV/m

Test Date: October 7, 2015

Tested by  
 Signature: 

Name: Carrie Ingram

US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVER100

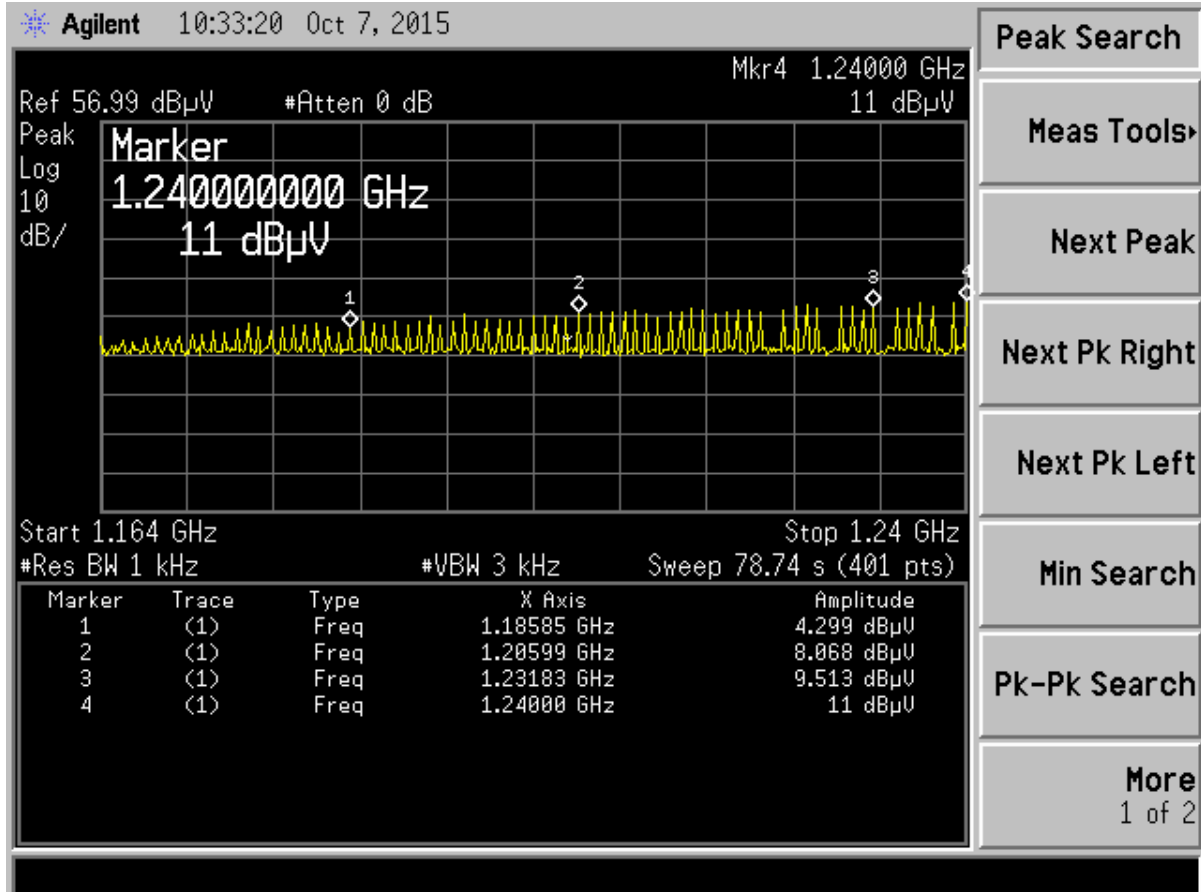


Figure 5. Peak Emissions 1164 – 1240 MHz Vertical

US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVER100

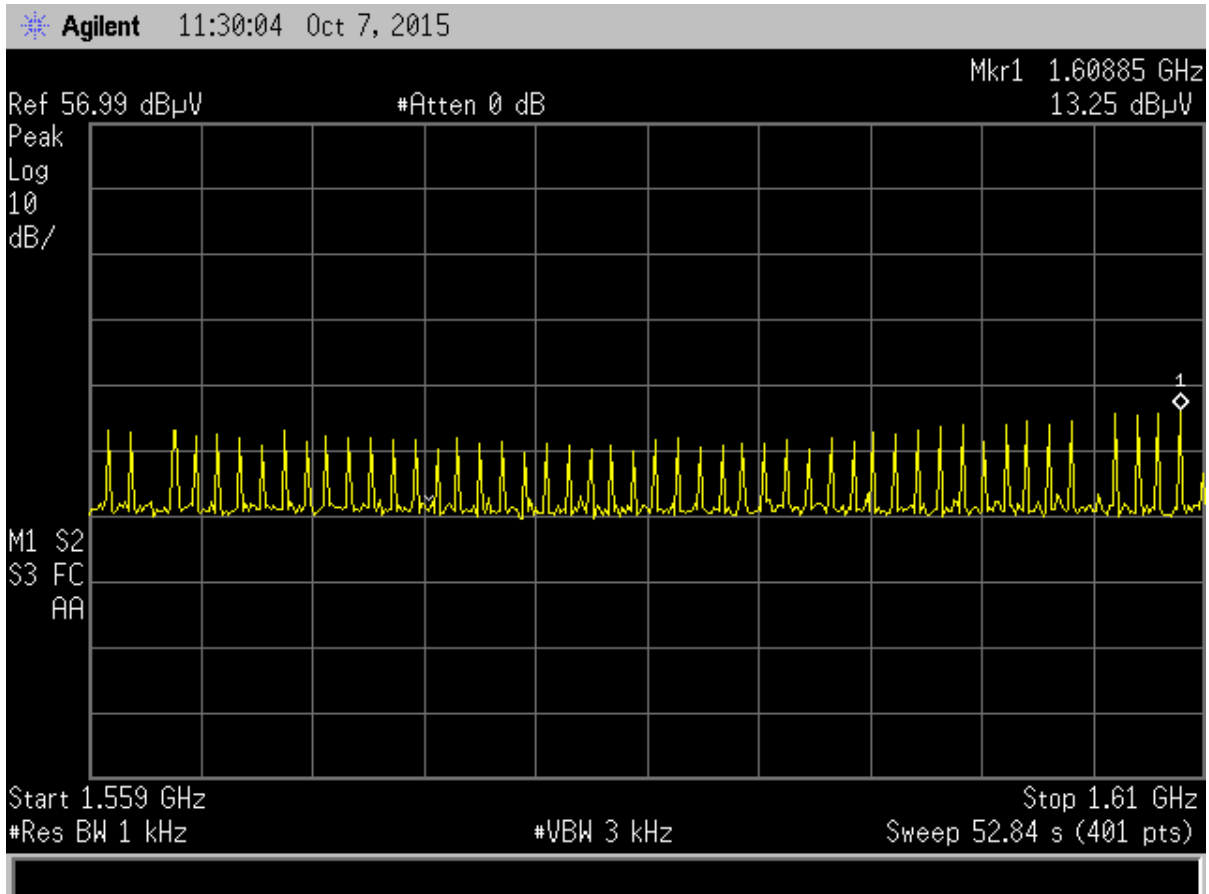


Figure 6. Peak Emissions 1559- 1610 MHz Vertical



US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVER100

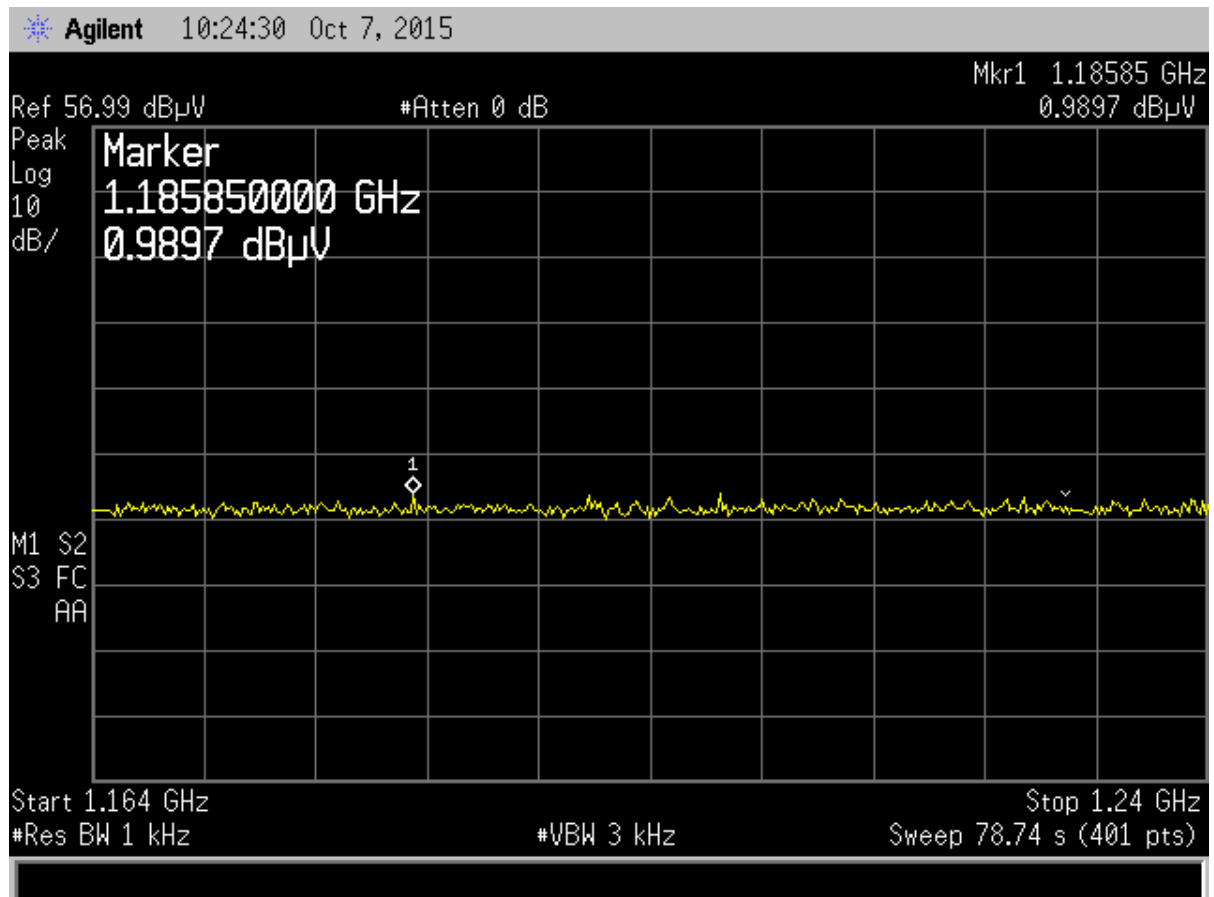


Figure 7. Peak Emissions 1164 – 1240 MHz Horizontal

US Tech Test Report:  
FCC ID:  
Test Report Number:  
Issue Date:  
Customer:  
Model:

FCC Part 15 Certification  
2AACLX100FW  
15-0219  
October 19, 2015  
Camero tech  
XAVER100

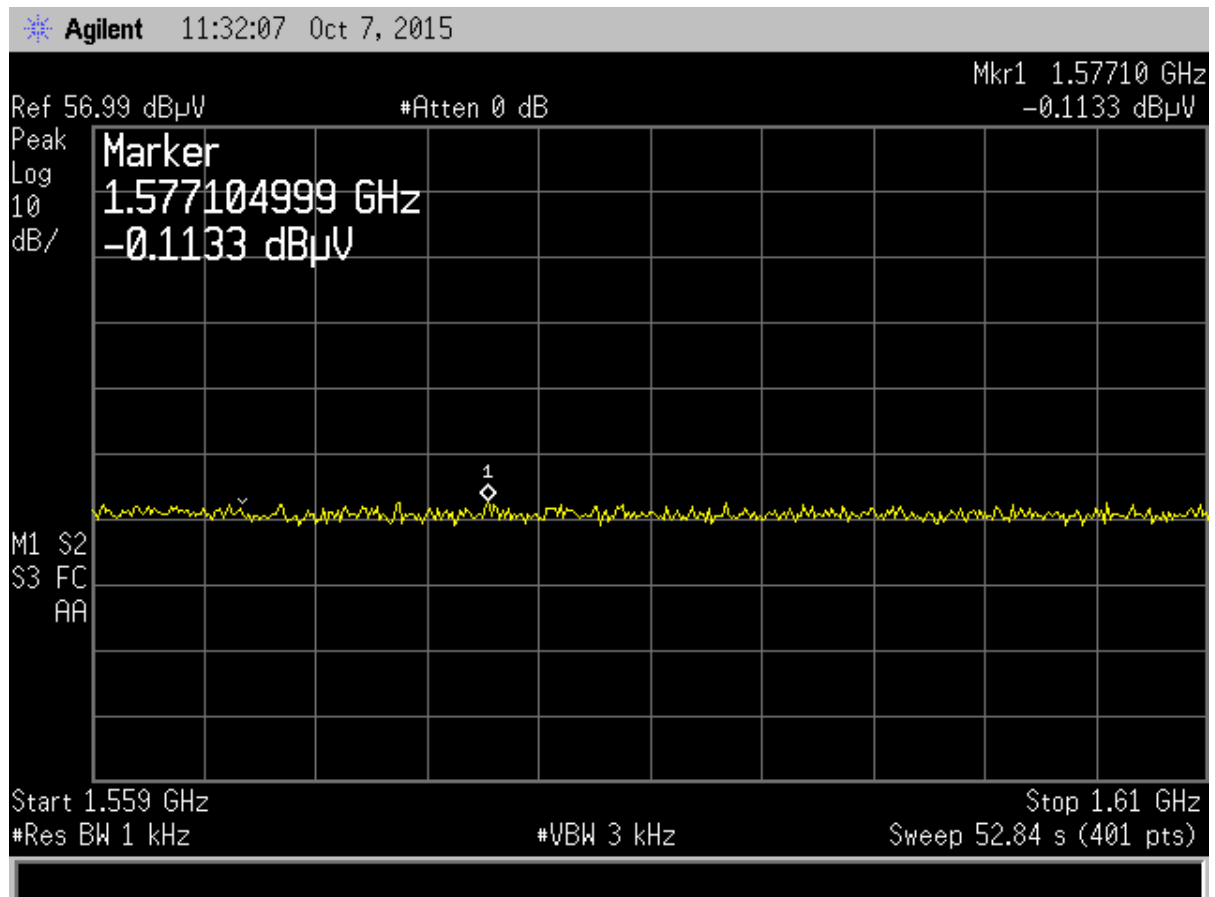


Figure 8. Peak Emissions 1559- 1610 MHz Horizontal

## **2.15 Unintentional Radiator, Radiated Emissions (CFR 15.209, 15.521 (c))**

Any radiated emissions determined to be coming from the digital circuitry of the EUT and not the transmitter, were tested to make sure that they met the limits of 15.209.

Additionally, the EUT was evaluated for co-location emissions coming from the EUT while both the UWB radio and the Zigbee radios were ON and actively transmitting as they would in normal operation.

Radiated emissions disturbance measurements were performed with an instrument having peak, quasi-peak, and average detectors over the frequency range of 30 MHz to 30 GHz. Measurements of the radiated emissions were made with the receiver antenna at a distance of 3 m from the boundary of the test unit.

The test antenna was varied from 1 m to 4 m in height while watching the analyzers' display for the maximum magnitude of the signal at the test frequency. The antenna polarization (horizontal or vertical) and test sample azimuth were varied during the measurements to find the maximum field strength readings to record.

The worst-case radiated emission in the range of 30 MHz to 30 GHz was 6.0 dB below the limit at 24937.50 MHz. This signal is found in Table 10. All other radiated emissions were 7.3 dB or more below the limit.

**NOTE: The test data provided in this section is to support the Verification and co-location requirement for the digital apparatus and the radios within.**

US Tech Test Report:  
 FCC ID:  
 Test Report Number:  
 Issue Date:  
 Customer:  
 Model:

FCC Part 15 Certification  
 2AACLX100FW  
 15-0219  
 October 19, 2015  
 Camero tech  
 XAVER100

**Table 10. Unintentional Radiator, Peak Radiated Emissions (CFR 15.209), 30 MHz to 30 GHz**

30 MHz to 30 GHz with 15.209 Limits							
Test: Radiated Emissions				Client: Camero tech			
Project: 15-0219				Model: XAVER100			
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	AVG Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or QP
For spurious emissions recorded below 960 MHz see Table 5 above.							
7562.50	29.08	9.64	38.72	54.0	3.0m./VERT	15.3	AVG
8972.50	29.95	10.66	40.61	54.0	3.0m./VERT	13.4	AVG
16920.00	29.60	8.60	38.20	54.0	1.0m./VERT	15.8	AVG
17896.00	29.52	12.25	41.77	54.0	1.0m./VERT	12.2	AVG
20152.50	31.27	13.84	45.11	54.0	1.0m./VERT	8.9	AVG
21412.50	31.24	13.84	45.08	54.0	1.0m./VERT	8.9	AVG
24937.50	34.17	13.84	48.01	54.0	1.0m./VERT	6.0	AVG
9725.00	30.88	10.83	41.71	54.0	3.0m./HORZ	12.3	AVG
20025.00	31.13	13.82	44.95	54.0	1.0m./HORZ	9.1	AVG
23610.00	32.02	13.82	45.84	54.0	1.0m./HORZ	8.2	AVG
24577.50	32.92	13.82	46.74	54.0	1.0m./HORZ	7.3	AVG

Note: the Zigbee radio was ON and operating in a normal mode during radiated emissions testing. The emissions levels from the co-located radios did not exceed the limits as presented herein.

Tested from 30 MHz to 30 GHz

SAMPLE CALCULATION at 7562.50MHz:

Magnitude of Measured Frequency	29.08	dBuV
+ Antenna Factor+Cable Loss – Amp Gain	9.64	dB
=Corrected Result	38.72	dBuV
Limit	54.00	dBuV
-Corrected Result	38.72	dBuV
Margin	15.30	dB

Test Date: October 7, 2015

Tested By  
 Signature:  Name: Carrie Ingram

## **2.16 Operator Statement (CFR 15.510 (e))**

Since the EUT is a through-wall imaging system operating under 15.510, it will display on the device, the statement, "Operation of this device is restricted to law enforcement, emergency rescue and fire fighter personnel. Operation by any other party is a violation of 47 U.S.C 301 and could subject the operator to serious legal penalties."

## **2.17 Unintentional Radiator, Powerline Emissions (CFR 15.207, 15.521 (j))**

This EUT will not have access to the AC Mains power line; therefore this requirement is not applicable.

## **2.18 Measurement Uncertainty**

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

### **2.18.1 Conducted Emissions Measurement Uncertainty**

Measurement Uncertainty (within a 95% confidence level) for this test is  $\pm 2.78$  dB.

This test is not applicable.

### **2.18.2 Radiated Emissions Measurement Uncertainty**

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is  $\pm 5.39$  dB. This value includes all elements of measurement.

The measurement uncertainty (with a 95% confidence level) for this test using a Log Periodic Antenna (200 MHz to 1000 MHz) is  $\pm 5.18$  dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is  $\pm 5.21$  dB.

The data listed in this test report does not have sufficient margin to negate the effects of uncertainty. Therefore, the EUT conditionally meets this requirement.