

Testing Tomorrow's Technology

Application

For

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

For the

Camero tech

Model: Xaver400 Wireless Module

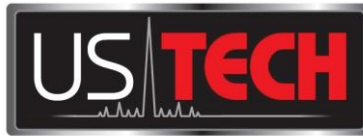
FCC ID: 2AACLX400FWM

UST Project: 15-0221

Issue Date: October 19, 2015

Total Pages in This Report: 47

3505 Francis Circle Alpharetta, GA 30004
PH: 770-740-0717 Fax: 770-740-1508
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I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: *Alan Ghasiani*

Title: Compliance Engineer – President

Date October 19, 2015



NVLAP LAB CODE 200162-0

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MEASUREMENT TECHNICAL REPORT

COMPANY NAME: Camero tech
MODEL: Xaver400 Wireless Module
FCC ID: 2AACLX400FWM
DATE: October 19, 2015

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

Equipment type: 906 -920 MHz Transmitter Module

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

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Application Forms
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Test Configuration Photographs
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Theory of Operation
RF Exposure
User's Manual

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1 General Information

1.1 Purpose of this Report

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

1.2 Characterization of Test Sample

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

1.3 Product Description

The Equipment Under Test (EUT) is the Camero tech, Model Xaver400 Wireless Module. The Xaver400 Wireless Module is a 900 MHz band transmitter used for wireless data communication. It can be installed into the Xaver400. The Xaver400 is a through wall imaging device designed for rapid deployment in tactical operation. The system is compact, lightweight, and capable of achieving high resolution real-time two dimensional imaging of people behind walls. When the Xaver400 Wireless Module is installed in the Xaver400, it allows the user to wirelessly view the images from the Xaver400 on a companion tablet device. The Xaver400 has already been certified under CFR 15.510 with FCC ID A42X400F.

Frequency and Operation: 906 MHz to 920 MHz

Antenna Type: Monopole Antenna

Antenna Gain: 0 dBi

Modulation Type: OQPSK-250

Data Rate: 250 Kbps

Packet Type: 90 bytes per packet, 20 packets per second

1.4 Configuration of Tested System

The Test Sample was tested per *ANSI C63.4:2009, Methods of Measurement of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2009/2014)*, ANSI C63.10.2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and per FCC KDB Publication number 558074 D01 v03r03 D01 v03r03 for Digital Transmission Systems Operation Under section 15.247.

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 15.247 as a transmitter.
- b) 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.

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Table 1. EUT and Peripherals

PERIPHERAL MANUFACTURER.	MODEL NUMBER	SERIAL NUMBER	FCC ID: IC:	CABLES P/D
Wall Imaging Device Camero tech	Xaver400	300604	FCC ID: A42X400F	N/A
Wireless Transmitter Camero tech (EUT)	Xaver400 (ZigBee)	Engineering Sample	FCC ID: 2AACLX400FWM (pending)	N/A
Wireless Transmitter Camero tech	XaverNET USB Dongle	08335140020	FCC ID: 2AACLXNETUSB (pending)	N/A
Power Adapter CINCON ELECTRONICS	TR70A15	70150- 0054234	N/A	1m P
Antenna See antenna details	--	--	--	--

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

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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	1/27/2015 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
LISN x 2	9247-50-TS-50-N	SOLAR ELECTRONICS	955824 and 955825	12/30/2014

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 C Intentional Radiator Limits for the transmitter portion of the EUT or the Subpart B Unintentional Radiator Limits (Receiver and Digital Device) Requirements.

2.3 Number of Measurements for Intentional Radiators (15.31(m))

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

Table 3. Number of Test Frequencies for Intentional Radiators

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

Because the EUT operates at 906 MHz to 920 MHz, 3 test frequencies were used.

2.4 Frequency Range of Radiated Measurements (Part 15.33)

2.4.1 Intentional Radiator

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

2.4.2 Unintentional Radiator

For the digital device, an unintentional radiator, the frequency range shall be 30 MHz to 1000 MHz, or to 5 times the highest internal clock frequency.

2.5 Measurement Detector Function and Bandwidth (CFR 15.35)

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

2.5.1 Detector Function and Associated Bandwidth

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

2.5.2 Corresponding Peak and Average Requirements

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

2.5.3 Pulsed Transmitter Averaging

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

NOTE: If the transmitter was programmed to transmit at >98% duty cycle, then, wherever applicable (where the detection mode was AVG), the duty cycle factor calculated will be applied.

2.6 EUT Antenna Requirements (CFR 15.203)

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

Table 4. Allowed Antenna(s)

REPORT REFERENCE	MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dBi	TYPE OF CONNECTOR
UWB Antenna	Camero tech	UWB Flat Antenna	AN0002	N/A	N/A
Zigbee Antenna	SAMWOO	Monopole Antenna	SMAP-900-1	0	SMA

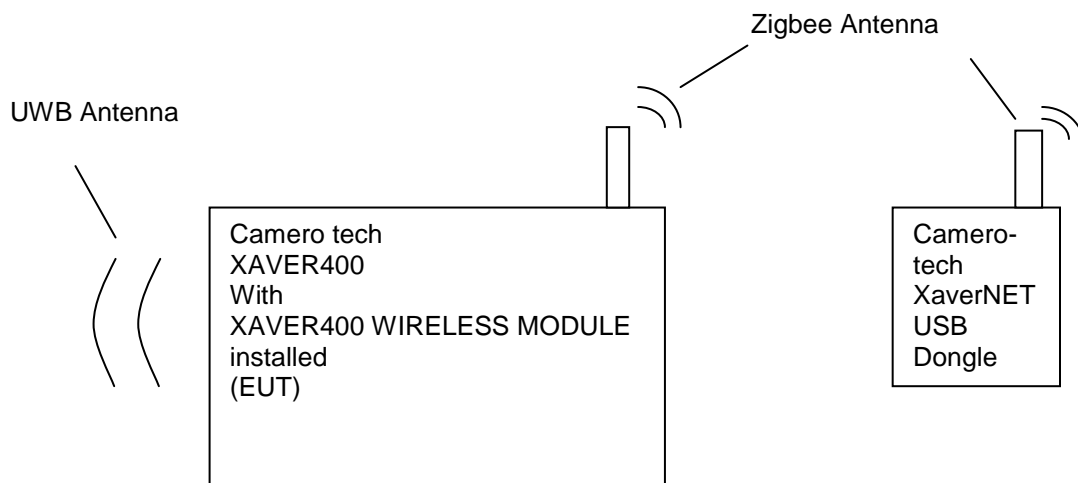


Figure 1. Block Diagram of Test Configuration

2.7 Restricted Bands of Operation (Part 15.205)

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

2.8 Transmitter Duty Cycle (CFR 35 (c))

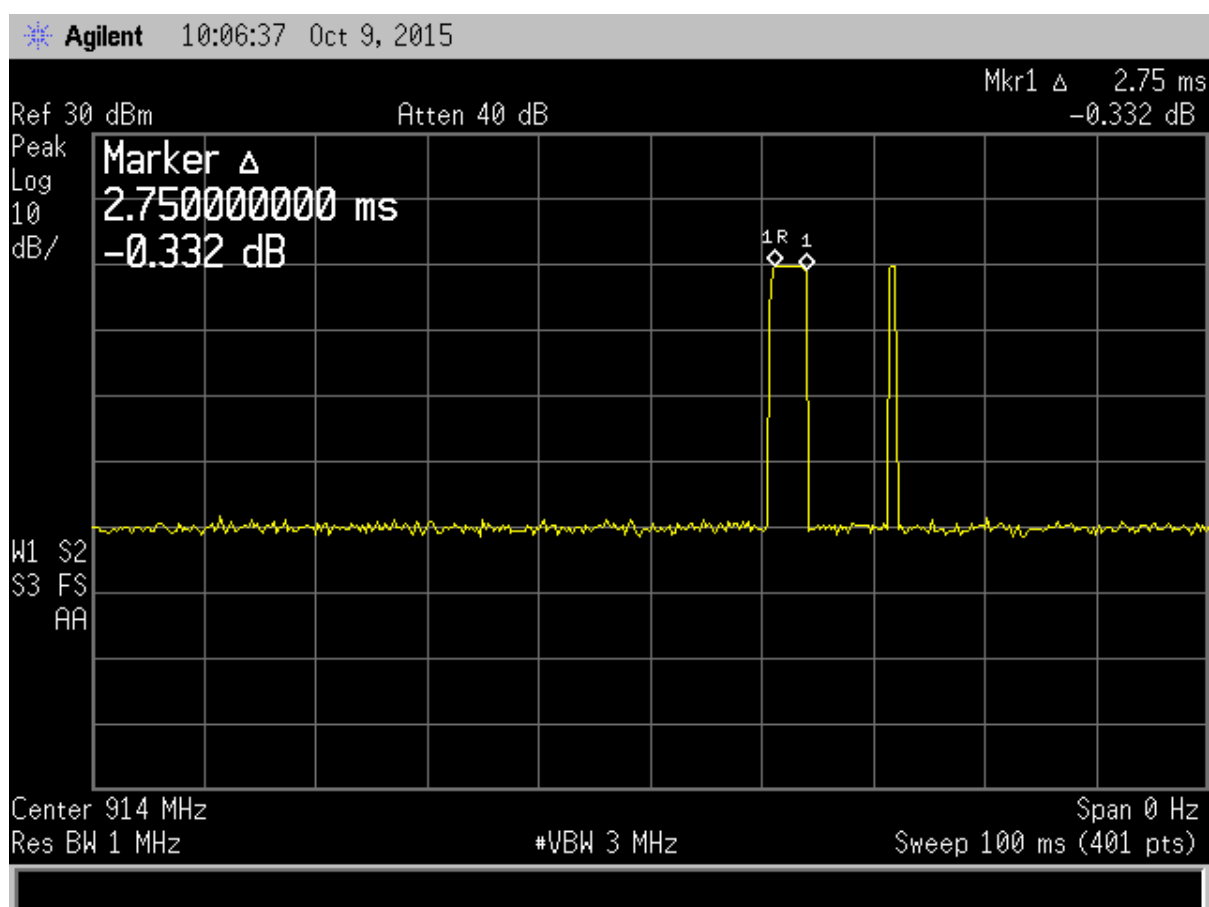


Figure 2. Pulse Width # 1

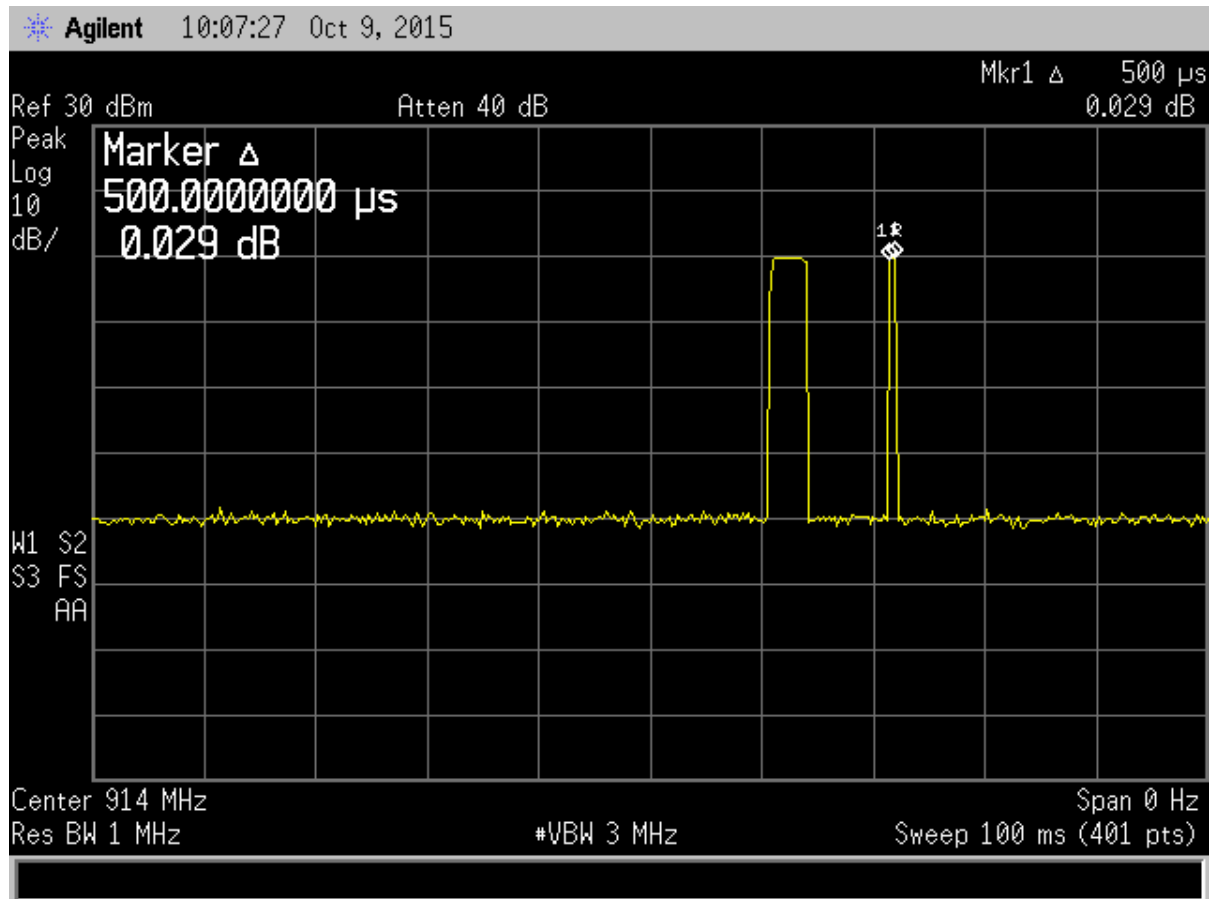


Figure 3. Pulse Width #2

TOTAL Time On from Figures 2 and 3 = 3.25 ms

$$(3.25 \text{ ms Total Time On}) / (100 \text{ ms Total Pulse Train}) = 0.033 \text{ Numeric Duty cycle}$$
$$\text{Duty Cycle} = 20 \text{ Log } (0.033) = \boxed{-29.76 \text{ dB}}$$

NOTE: The transmitter was programmed to transmit at >98% duty cycle, therefore wherever applicable (where the detection mode was AVG), the duty cycle factor calculated above will be applied.

2.9 Intentional Radiator, Power Line Conducted Emissions (CFR 15.207)

The EUT is battery powered. 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 connected to AC mains to charge the Battery; therefore this test was performed with the battery charging. See the test data presented in section 2.15, Table 12 below.

2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.247(d)) (IC RSS 247, 5.4)

Radiated Spurious measurements: the EUT was placed into a transmit mode of operation and tested per FCC KDB Publication 558074 D01 v03r03 and ANSI C63.10:2013. A preliminary scan was performed on the EUT to find signal frequencies that were caused by the transmitter part of the device. To obtain worse case results the EUT was tested in X, Y, and Z axes or in the orientation of normal operation if the device is designed to operation in a fixed position.

Radiated measurements were then conducted between the frequency range of 9KHz (or lowest frequency used/generated by the device) up to the tenth harmonic of the device (no greater than 40 GHz). In the band below 30 MHz a resolution bandwidth (RBW) of 9 kHz was used, emissions below 1 GHz were tested with a RBW of 120 KHz and emissions above 1 GHz were tested with a RBW of 1 MHz. All video bandwidth settings were at least three times the RBW value.

The EUT was investigated to CFR 15.209, General requirements for unwanted spurious emissions. The conducted spurious method as described below was use to investigate all other emissions emanating from the antenna port.

Conducted Spurious measurements: the EUT was put into a transmit mode of operation and tested per FCC KDB Publication 558074 D01 v03r03 for conducted out of band emissions emanating from the antenna port over the frequency range of 30 MHz to 25 GHz. A conducted scan was performed on the EUT to identify and record spurious signals that were related to the transmitter. All spurious emission found must comply with the requirements of 15.247(d).

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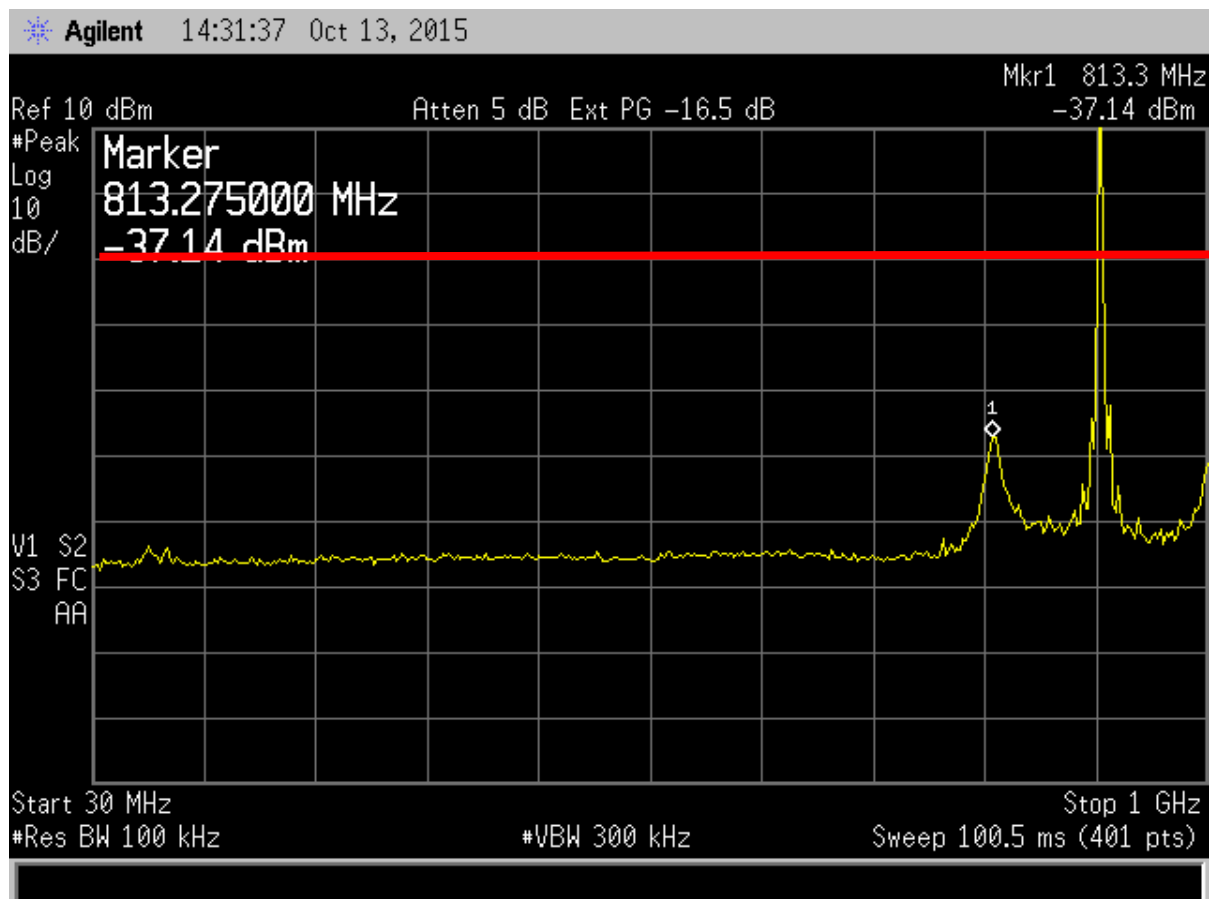


Figure 4. Antenna Conducted Emissions Low Channel, Part 1

Note: The Ext PG is used to correct for cable loss and attenuator used. The reference level was set to the PSD value of the fundamental with a 100 kHz RBW. The red line is 20 dB down from the measured fundamental. The large emission seen is the fundamental carrier.

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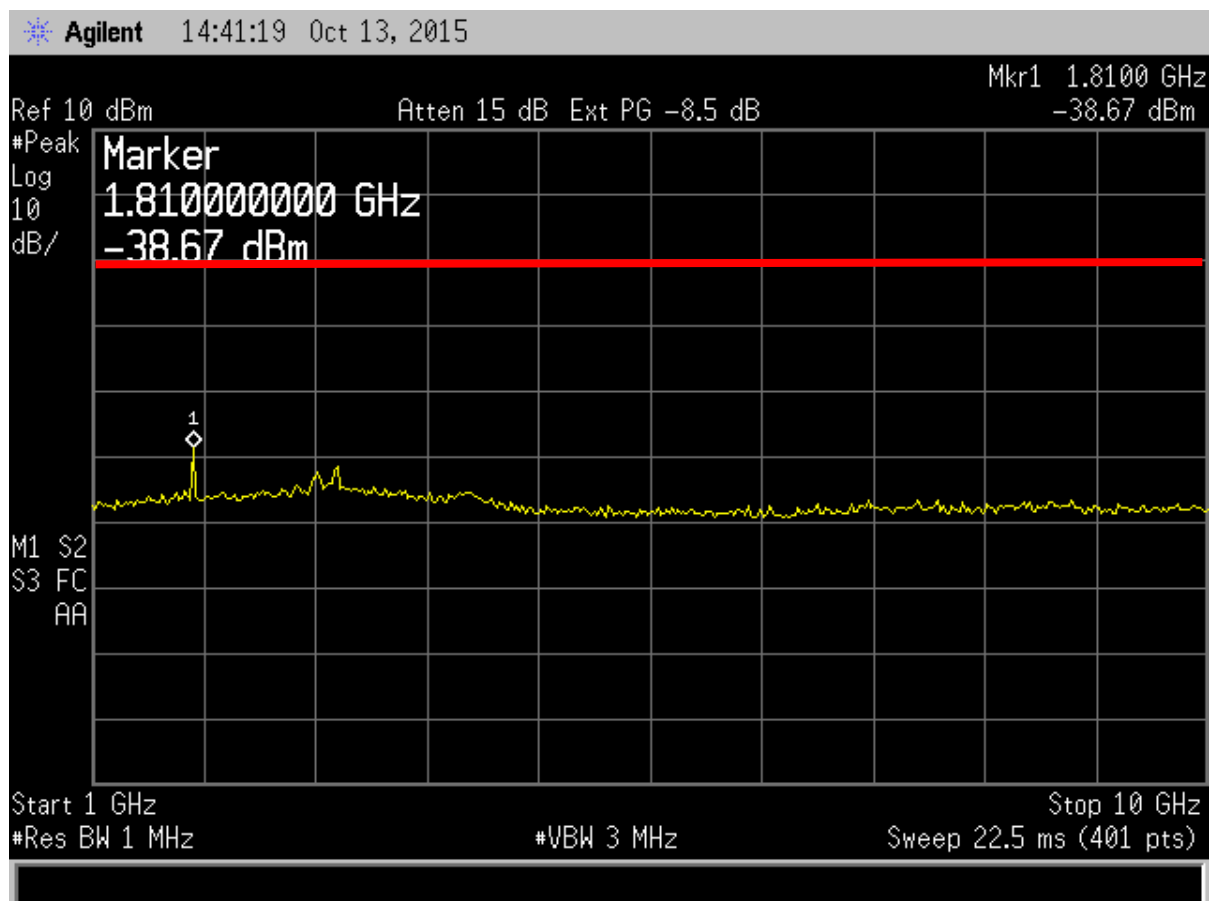


Figure 5. Antenna Conducted Emissions Low, Part 2

Note: The Ext PG is used to correct for cable loss and attenuator used. The reference level was set to the PSD value of the fundamental with a 100 kHz RBW. The red line is 20 dB down from the measured fundamental.

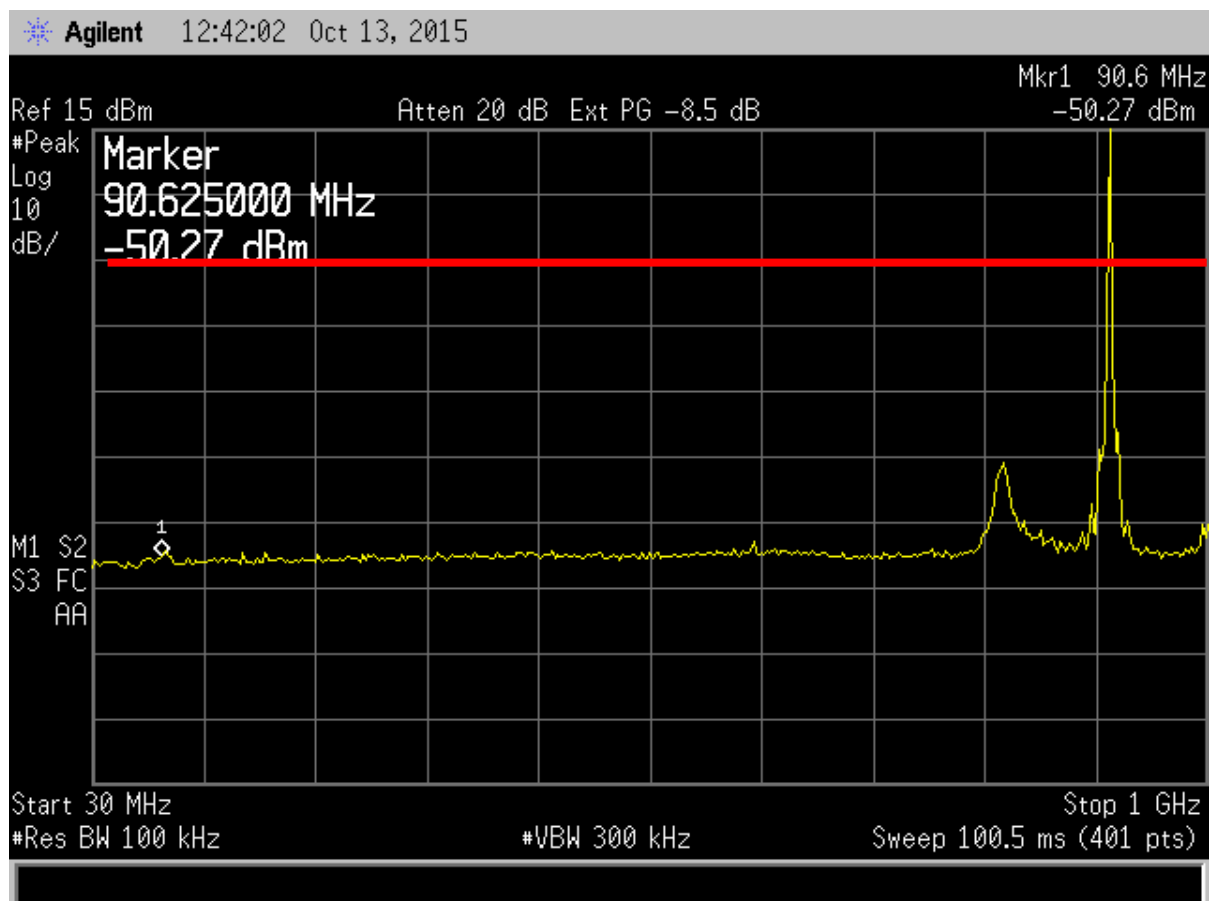


Figure 6. Antenna Conducted Emissions Mid, Part 1

Note: The Ext PG is used to correct for cable loss and attenuator used. The reference level was set to the PSD value of the fundamental with a 100 kHz RBW. The red line is 20 dB down from the measured fundamental. The large emission seen is the fundamental carrier.

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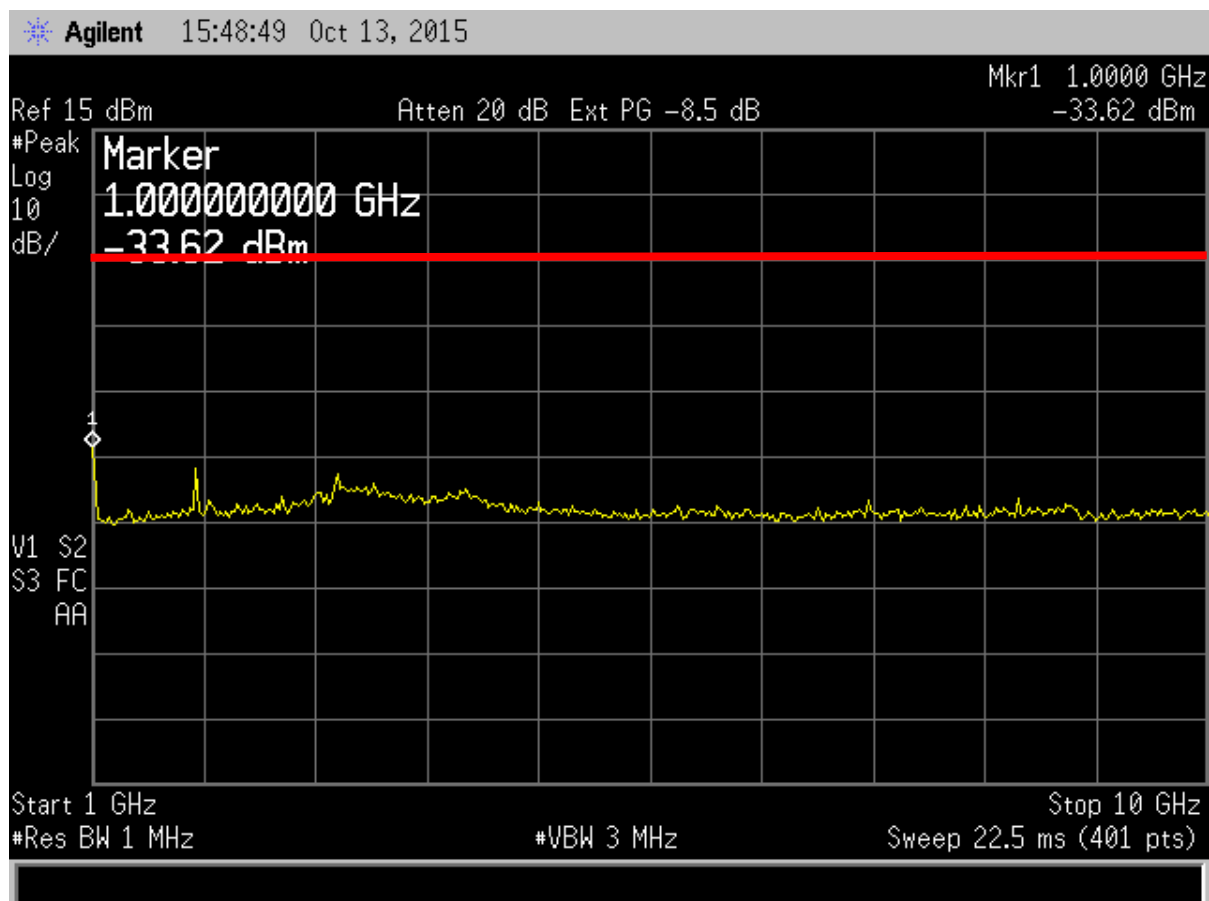


Figure 7. Antenna Conducted Emissions Mid, Part 2

Note: The Ext PG is used to correct for cable loss and attenuator used. The reference level was set to the PSD value of the fundamental with a 100 kHz RBW. The red line is 20 dB down from the measured fundamental.

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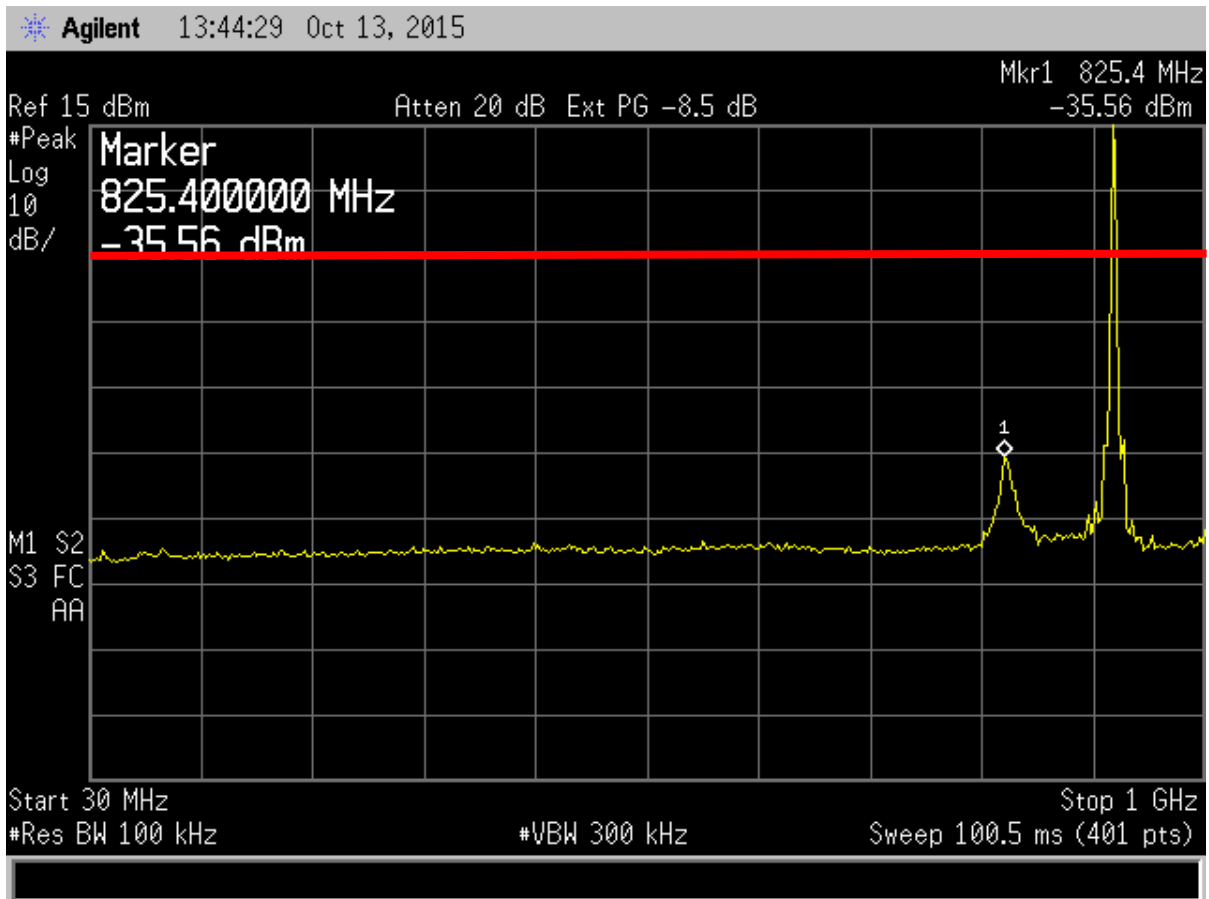


Figure 8. Antenna Conducted Emissions High, Part 1

Note: The Ext PG is used to correct for cable loss and attenuator used. The reference level was set to the PSD value of the fundamental with a 100 kHz RBW. The red line is 20 dB down from the measured fundamental. The large emission seen is the fundamental carrier.

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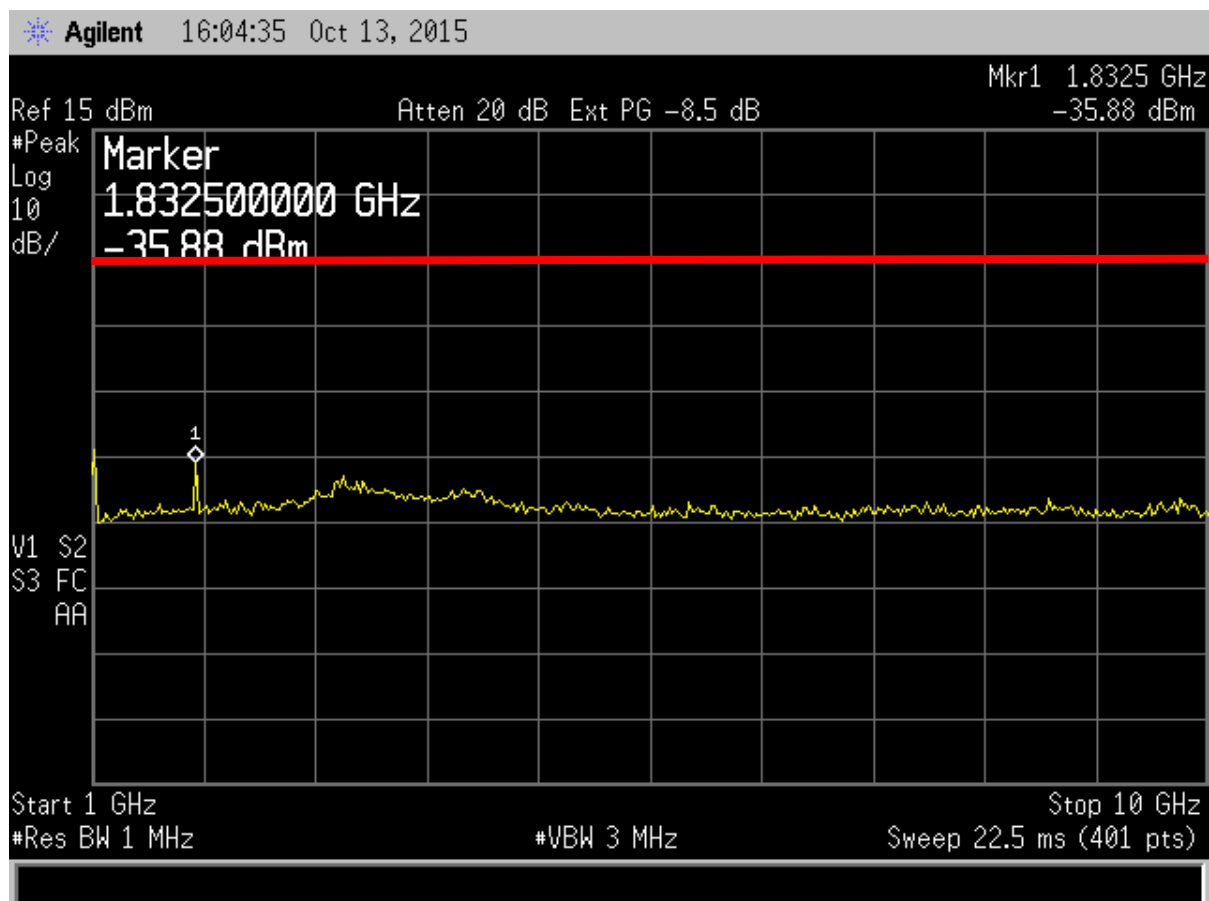


Figure 9. Antenna Conducted Emissions High, Part 2

Note: The Ext PG is used to correct for cable loss and attenuator used. The reference level was set to the PSD value of the fundamental with a 100 kHz RBW. The red line is 20 dB down from the measured fundamental.

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Table 5. Spurious Radiated Emissions below 30 MHz

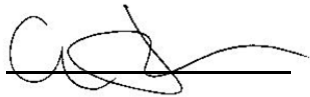
9 kHz to 30 MHz, 15.209 limits							
Test: Radiated Emissions				Client: Camero tech			
Project: 15-0221				Model: Xaver400			
Frequency (MHz)	Test Data (dBuv)	AF+CA-AMP (dB/m)	Results (dBUV/m)	AVG Limits (dBUV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or AVG
No emissions higher than 20 dB from the applicable limit between the lowest clock frequency and 30 MHz were detected.							

SAMPLE CALCULATION: N/A

Test Date: October 14, 2015

Tested By

Signature:



Name: Carrie Ingram

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Table 6. Spurious Radiated Emissions, 30 MHz to 1000 MHz

30 MHz to 1000 MHz, 15.247 limits							
Test: Radiated Emissions				Client: Camero tech			
Project: 15-0221				Model: Xaver400			
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
Low Channel							
814.08	48.82	5.52	54.34	65.4	3m./VERT	11.06	PK
813.07	48.62	5.52	54.14	65.4	3m./VERT	11.26	PK
Mid Channel							
819.86	50.40	5.66	56.06	64.1	3m./VERT	8.04	PK
818.86	49.21	5.66	54.87	64.1	3m./VERT	9.23	PK
High Channel							
825.0	51.24	5.98	57.22	65.4	3m./VERT	8.18	PK
824.00	49.67	5.98	55.65	65.4	3m./VERT	9.75	PK

Note: Limits were determined by 20 dB from the Fundamental carrier see Table 8 below. If emissions fell into a restricted band, then restricted band limits were used.

Sample Calculation at 814.08 MHz:

Magnitude of Measured Frequency	48.82	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	5.52	dB/m
Corrected Result	54.34	dBuV/m

Test Date: October 12, 2015

Tested By

Signature:



Name: Carrie Ingram

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Table 7. Peak Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15, Para 15.209, 15.247(d)					Client: Camero tech			
Project: 15-0221					Model: Xaver400			
Frequency (MHz)	Test Data (dBuV)	Factor (dB)	AF+CA -AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
Low Channel								
906	80.77	-	24.60	105.37	-	3m./VERT	-	PK
1812	54.28	-	-8.33	45.95	85.4	3.0m./VERT	39.4	PK
2718	56.44	-	-3.12	53.32	74.0	3.0m./VERT	20.7	PK
Mid Channel								
914.00	79.64	-	24.50	104.14	-	3m./VERT	-	PK
1828.00	56.02	-	-8.33	47.69	84.1	3.0m./VERT	36.4	PK
2742.00	56.13	-	-3.12	53.01	74.0	3.0m./VERT	21.0	PK
High Channel								
920.00	80.89	-	24.50	105.39	-	3m./VERT	-	PK
1840.50	58.98	-	-8.09	50.89	85.4	3.0m./VERT	34.5	PK
2760.00	57.27	-	-3.22	54.05	74.0	3.0m./VERT	19.9	PK

- (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation for peak measurements of CFR 15.35.
- No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
- (~)Measurements taken at 1 meter were extrapolated to 3 meter using a factor of (-9.5 dB).
- The EUT was placed in three orthogonal positions and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.

Sample Calculation at 906.00 MHz:

Magnitude of Measured Frequency	80.77	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	24.60	dB/m
Corrected Result	105.37	dBuV/m

Test Date: October 8, 2015

Tested By

Signature:



Name: Carrie Ingram

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Table 8. Average Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15, Para 15.209, 15.247(d)					Client: Camero tech			
Project: 15-0221					Model: Xaver400			
Frequency (MHz)	Test Data (dBuV)	Factor (dB)	AF+CA -AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
Low Channel								
906	80.77	-20.00	24.60	85.37	-	3m./VERT	-	PK
1812	54.28	-20.00	-8.33	25.95	65.4	3.0m./VERT	39.4	PK
2718	56.44	-20.00	-3.12	33.32	54.0	3.0m./VERT	20.7	PK
Mid Channel								
914.00	79.64	-20.00	24.50	84.14	-	3m./VERT	-	PK
1828.00	56.02	-20.00	-8.33	27.69	64.1	3.0m./VERT	36.4	PK
2742.00	56.13	-20.00	-3.12	33.01	54.0	3.0m./VERT	21.0	PK
High Channel								
920.00	80.89	-20.00	24.50	85.39	-	3m./VERT	-	PK
1840.50	58.98	-20.00	-8.09	30.89	65.4	3.0m./VERT	34.5	PK
2760.00	57.27	-20.00	-3.22	34.05	54.0	3.0m./VERT	19.9	PK

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

Sample Calculation at 906.00 MHz:

Magnitude of Measured Frequency	80.77	dBuV
-Duty Cycle Correction Factor	-20.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	24.60	dB/m
Corrected Result	85.37	dBuV/m

Test Date: October 8, 2015

Tested By

Signature:



Name: Carrie Ingram

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

Band Edge measurements are made following the guidelines in FCC KDB Publication No. 558074 D01 v03r03 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. Radiated measurements are performed to demonstrate compliance with the requirement of 15.247(d) that all emissions outside of the band edges be attenuated by at least 20 dB when compared to its highest in-band value (contained in a 100 kHz band).

To capture the band edge, the Spectrum Analyzer frequency span is set to 2 MHz to capture the peak level of the emission operating on the channel closest to the band edge as well as any modulation products falling outside of the authorized band of operation. Conducted measurements are performed with RBW = 100 kHz. In all cases, the VBW is set \geq RBW. See figure and calculations below for more detail.

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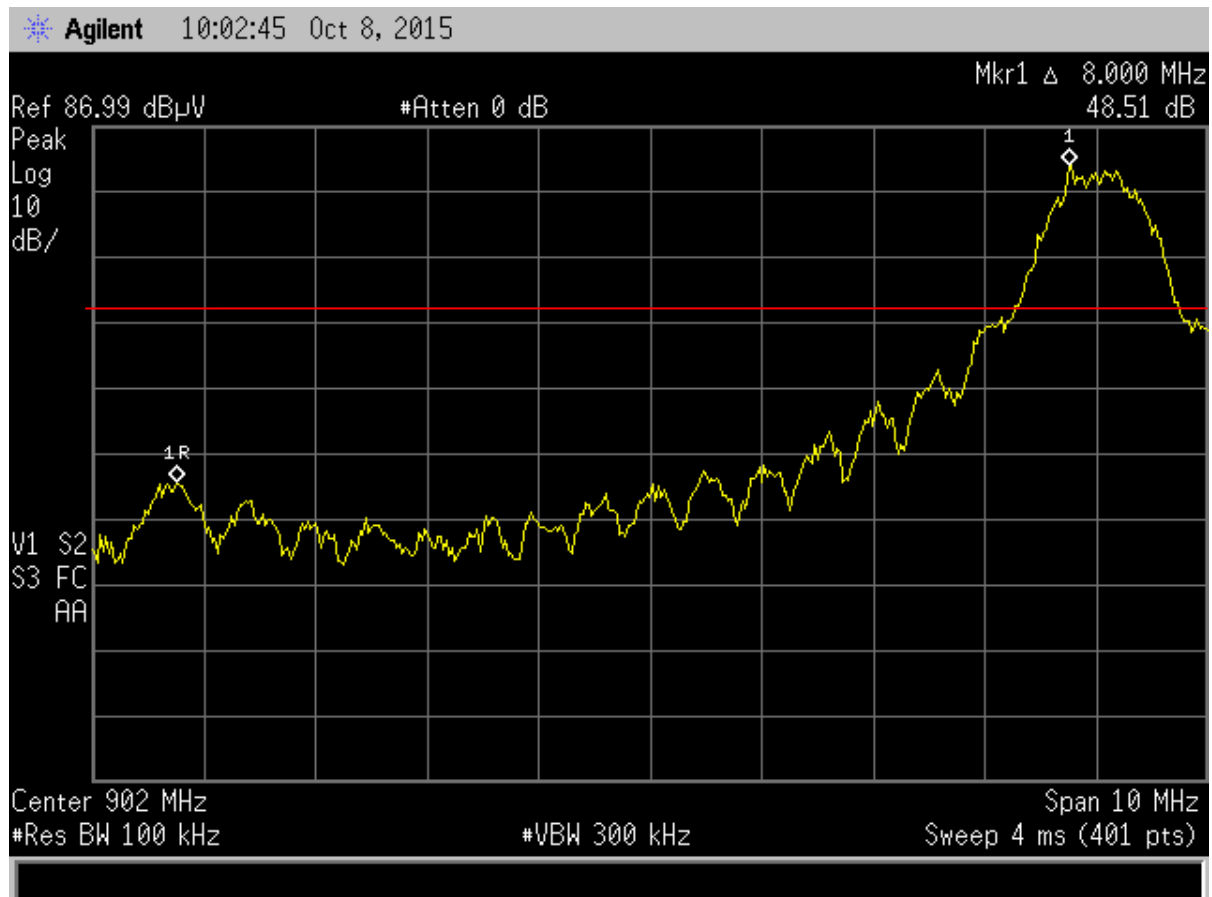


Figure 10. Band Edge Compliance, Low Channel Delta - Peak

Calculation of worst case lower band edge measurement:

Band Edge Calculated Results	48.51	dB
Band Edge Limit (20 dB from Fundamental)	20.00	dB
Band Edge Margin	28.51	dB

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Figure 11. Band Edge Compliance, High Channel Delta – Peak

Note: Circled Emission is ambient emission, and is not from the radio.

Calculation of worst case lower band edge measurement:

Band Edge Calculated Results	46.85	dB
Band Edge Limit (20 dB from Fundamental)	20.00	dB
Band Edge Margin	26.85	dB

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

The EUT antenna port was connected to a spectrum analyzer having a 50 Ω input impedance. Measurements were performed per the method of FCC, KDB Publication No. 558074 D01 v03r03 for a bandwidth of 6 dB. The RBW was set to 100 kHz and with the VBW $\geq 3 \times$ RBW. The results of this test are given in the Table below and in Figures 12 -14.

Table 9. Six (6) dB Bandwidth

Frequency (MHz)	99 % Bandwidth	6 dB Bandwidth (MHz)	Minimum FCC Bandwidth (MHz)
906	1.30	.780	0.500
914	1.30	.780	0.500
920	1.30	.830	0.500

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Tested By

Signature: 

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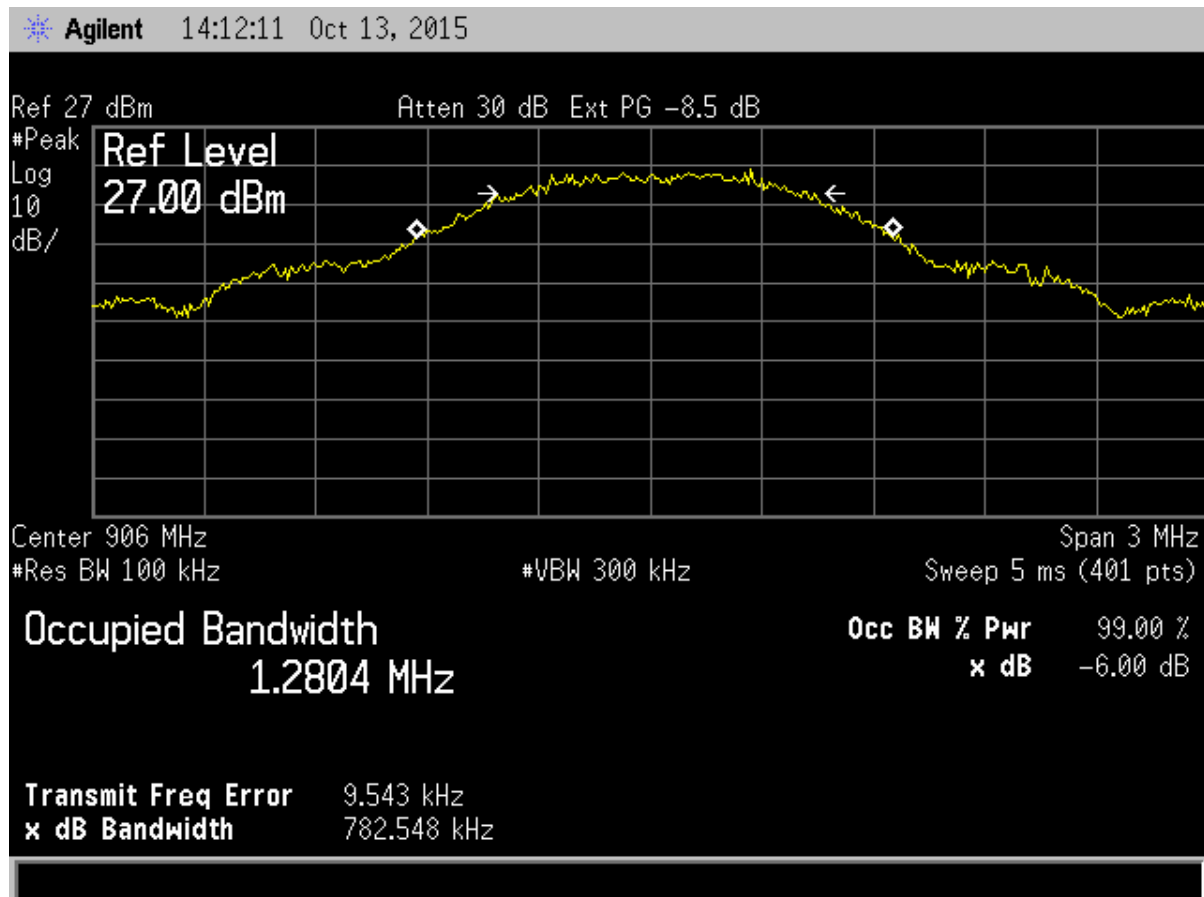


Figure 12. Six dB Bandwidth - 15.247 - Low Channel

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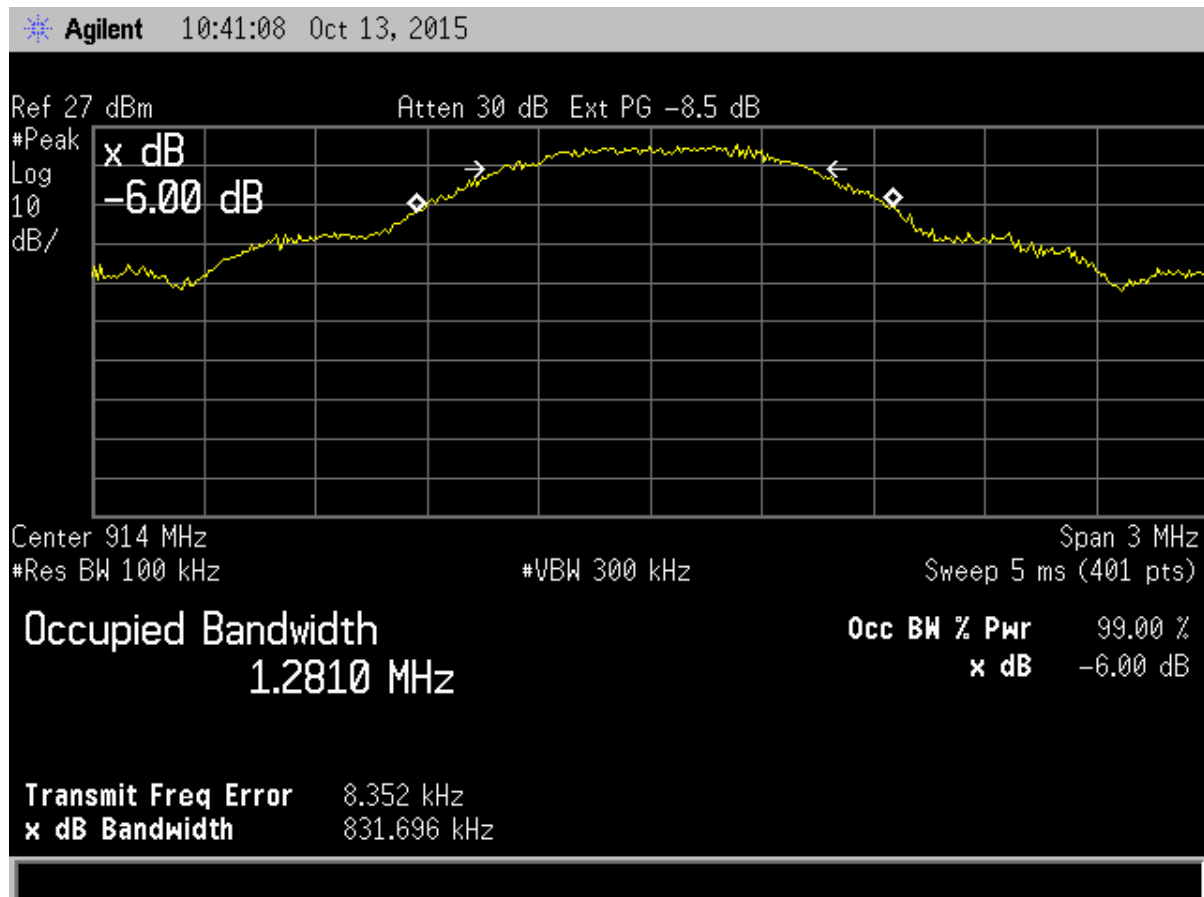


Figure 13. Six dB Bandwidth - 15.247 - Mid Channel

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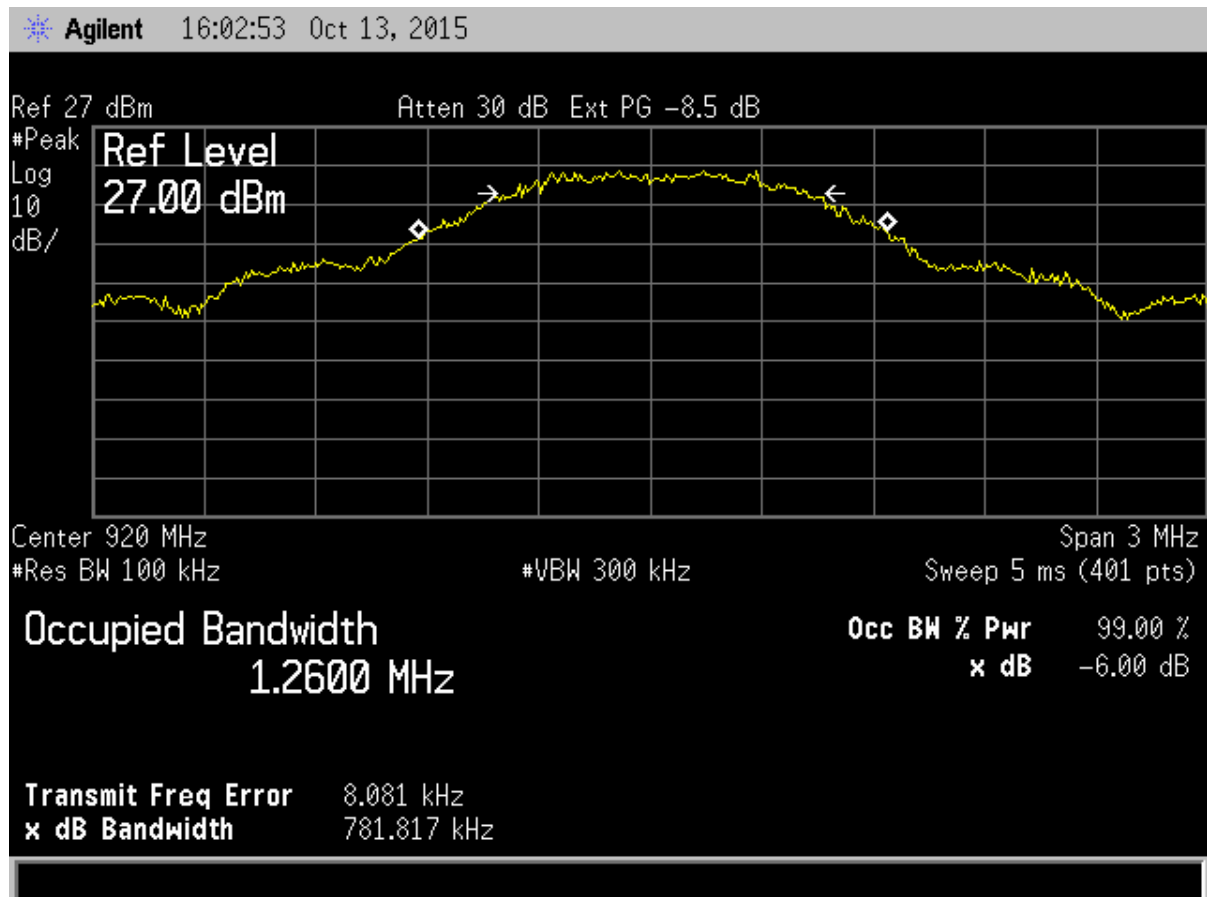


Figure 14. Six dB Bandwidth - 15.247 - High Channel

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

The transmitter was programmed to operate at a maximum output power across the bandwidth.

Peak power within the band 906 MHz to 920 MHz was measured per FCC KDB Publication 558074 D01 v03r03 as an Antenna Conducted test with a spectrum analyzer by connecting the spectrum analyzer directly, via a short RF cable, and attenuators to the antenna output terminals on the EUT. The spectrum analyzer was set for an impedance of $50\ \Omega$ with the RBW set greater than the 6 dB bandwidth of the EUT, and the VBW \geq RBW. Peak antenna conducted output power is tabulated below.

Table 10. Peak Antenna Conducted Output Power per Part 15.247 (b) (3)

Frequency of Fundamental (MHz)	Raw Test Data dBm	Converted Data (W)	FCC Limit (W Maximum)
906	17.65	0.058	1.0
914	18.04	0.064	1.0
920	17.91	0.062	1.0

Test Date: October 13, 2015

Tested By

Signature:



Name: Carrie Ingram

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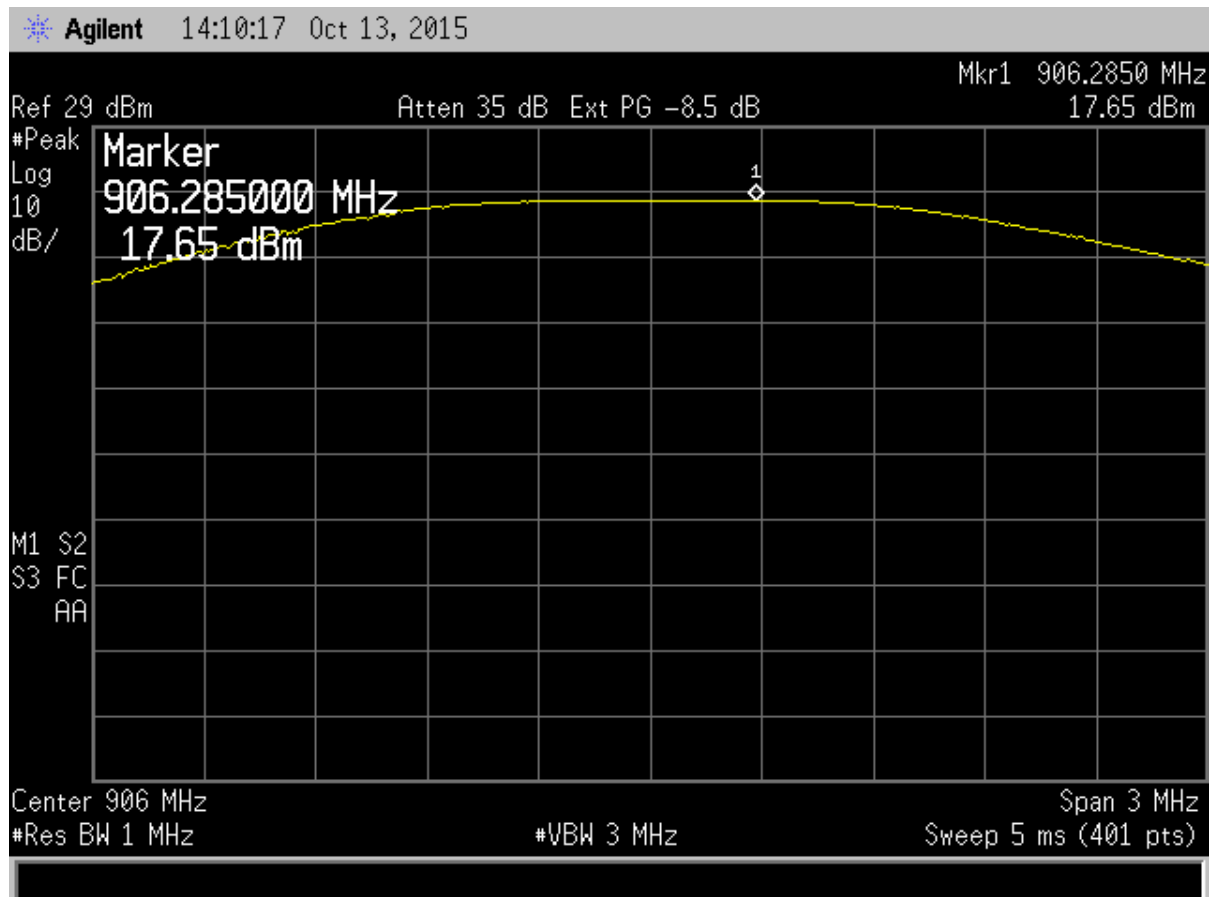


Figure 15. Peak Antenna Conducted Output Power, Low Channel

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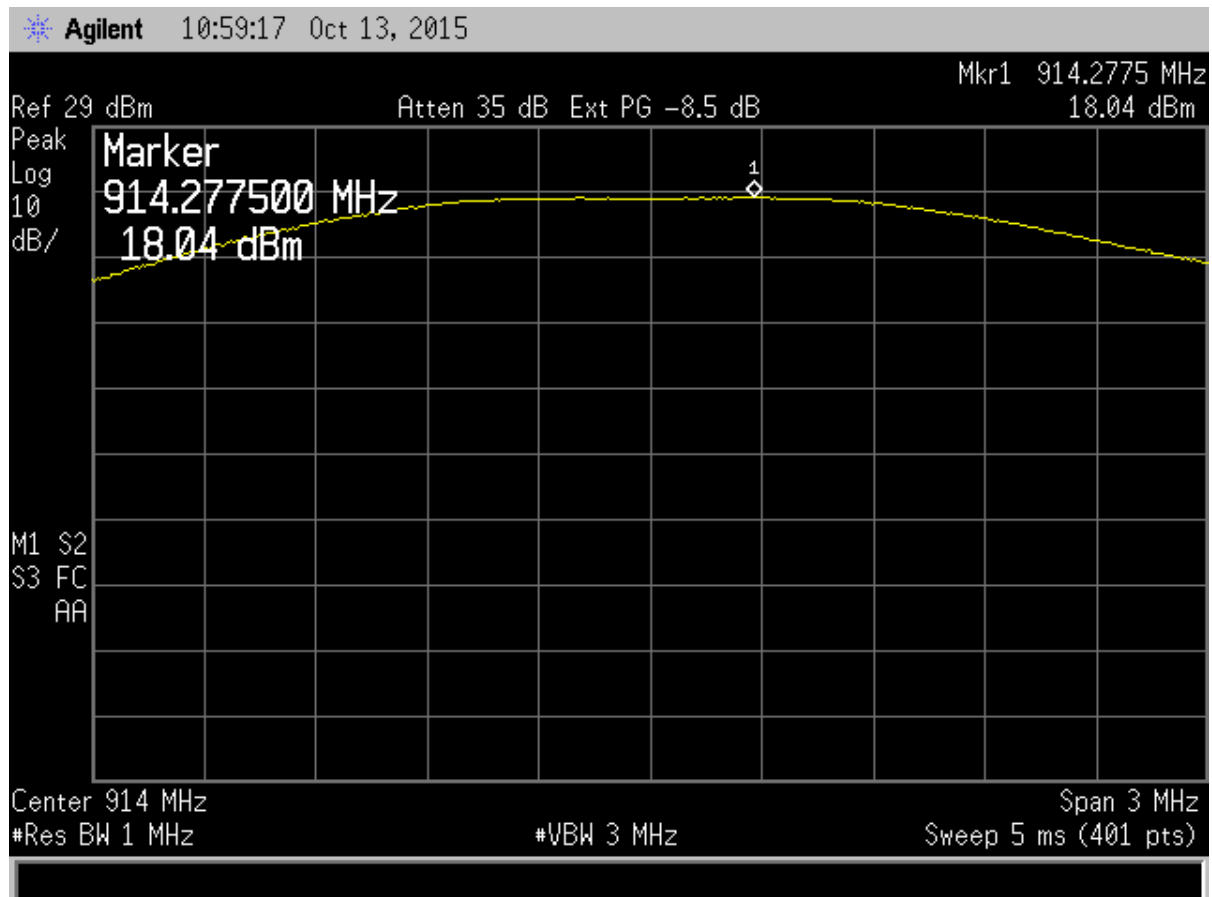


Figure 16. Peak Antenna Conducted Output Power, Mid Channel

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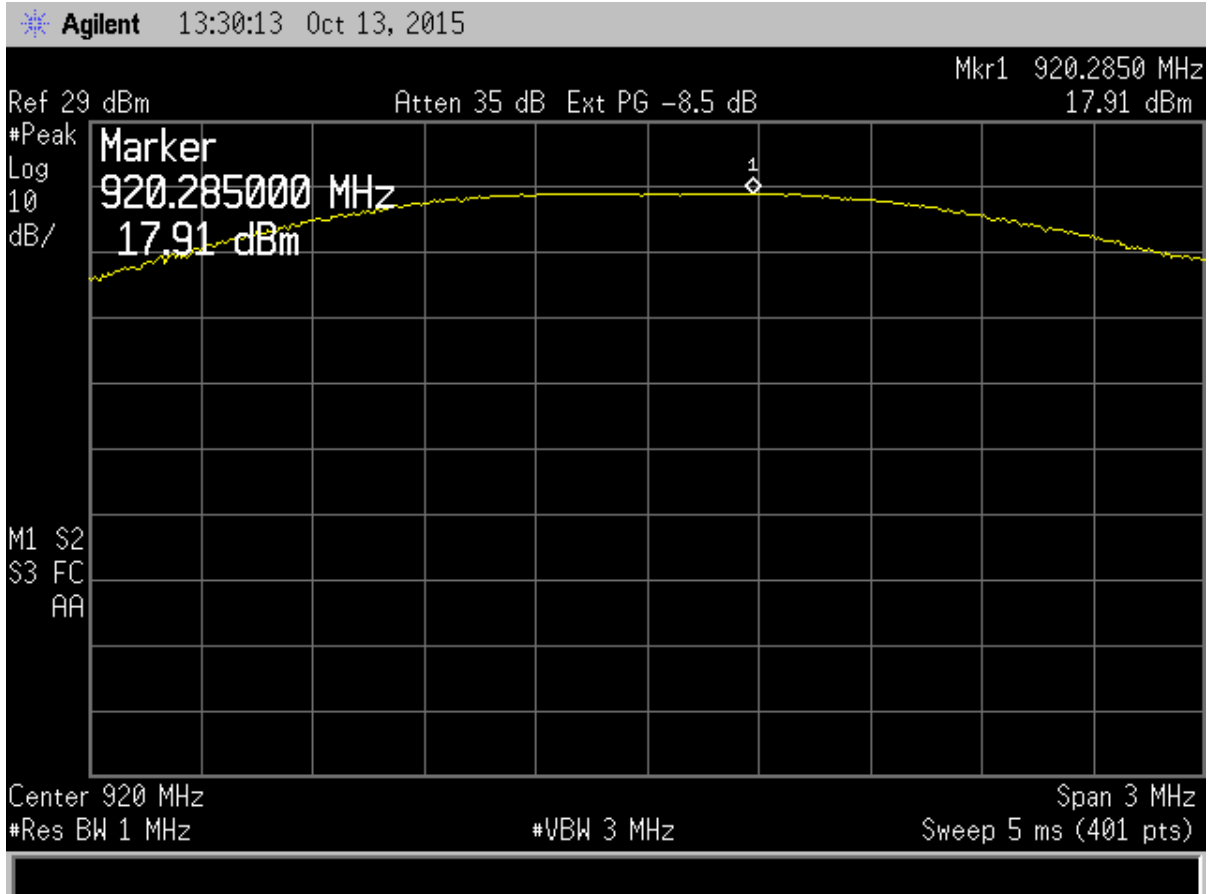


Figure 17. Peak Antenna Conducted Output Power, High Channel

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2.14 Power Spectral Density (CFR 15.247(e)) (IC RSS 247 5.1 & 5.2)

The measurements were performed per the procedures of FCC KDB Procedure 558074 D01 v03r03. The RBW was set to 100 kHz and the Video Bandwidth was set to $\geq 3 \times$ RBW. The span was set to 1.5 times the DTS OBW. Since the EUT was not able to transmit continuously, the Duty Cycle correction factor of 29.76 dB was added to the raw PSD measured value.

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

The following results show that all are less than +8 dBm per 3 kHz band.

Table 11. Power Spectral Density for Low, Mid and High Bands

Frequency (MHz)	Raw Test Data (dBm/3 kHz)	Corrected Test Data (dBm/3 kHz)	FCC Limit (dBm/3 kHz)
906	-46.60	-16.84	+8.0
914	-51.21	-21.45	+8.0
920	-52.18	-22.39	+8.0

Test Date: October 13, 2015

Tested By

Signature:  Name: Carrie Ingram

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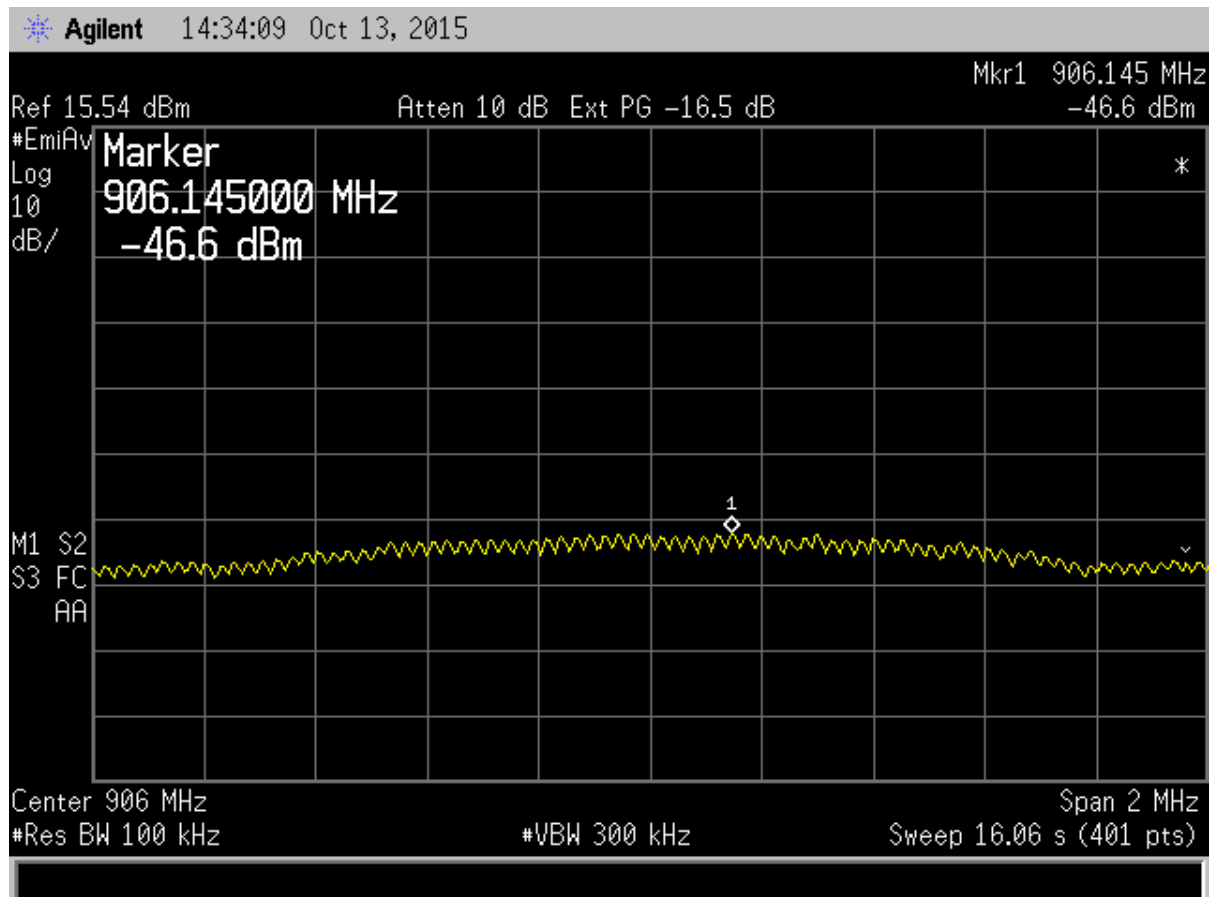


Figure 18. Peak Power Spectral Density, Low Channel

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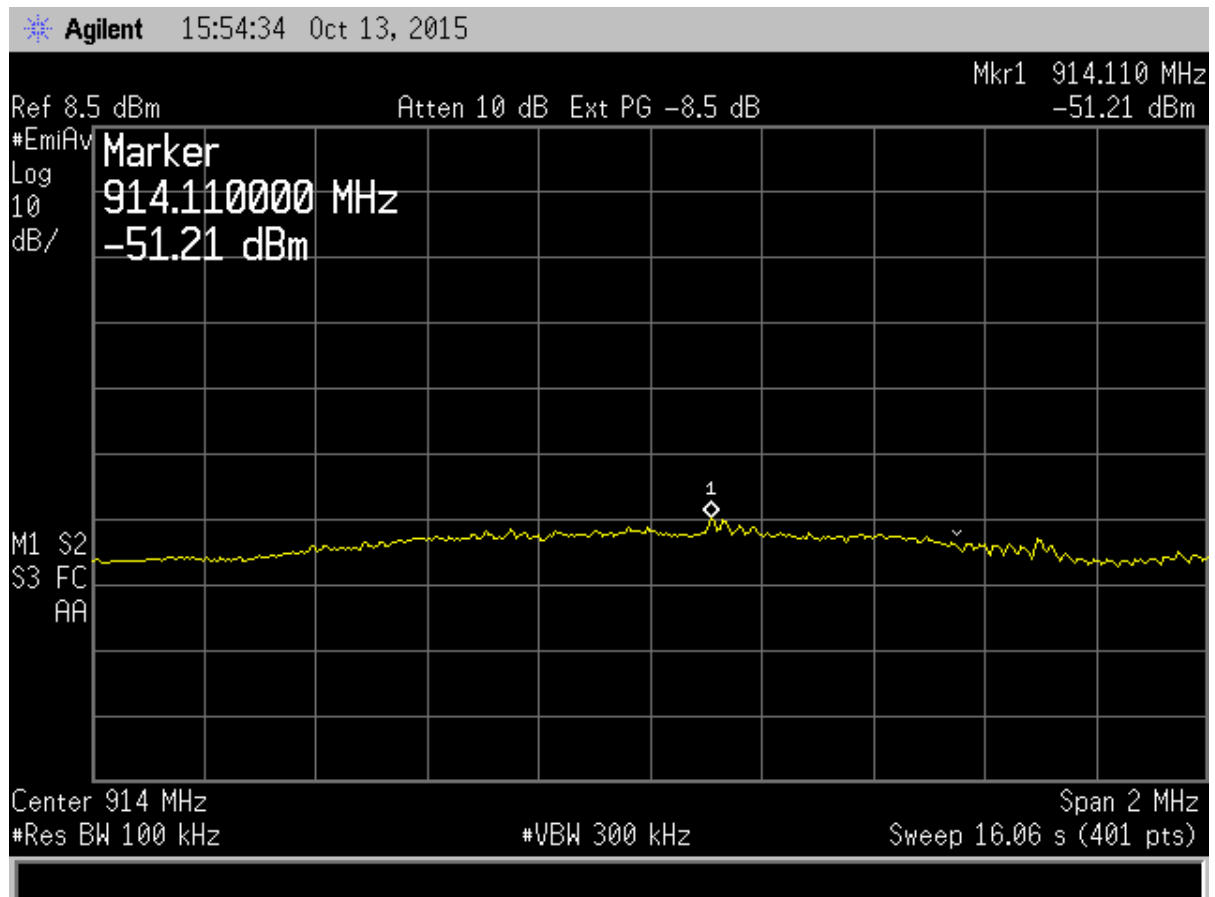


Figure 19. Peak Power Spectral Density, Mid Channel

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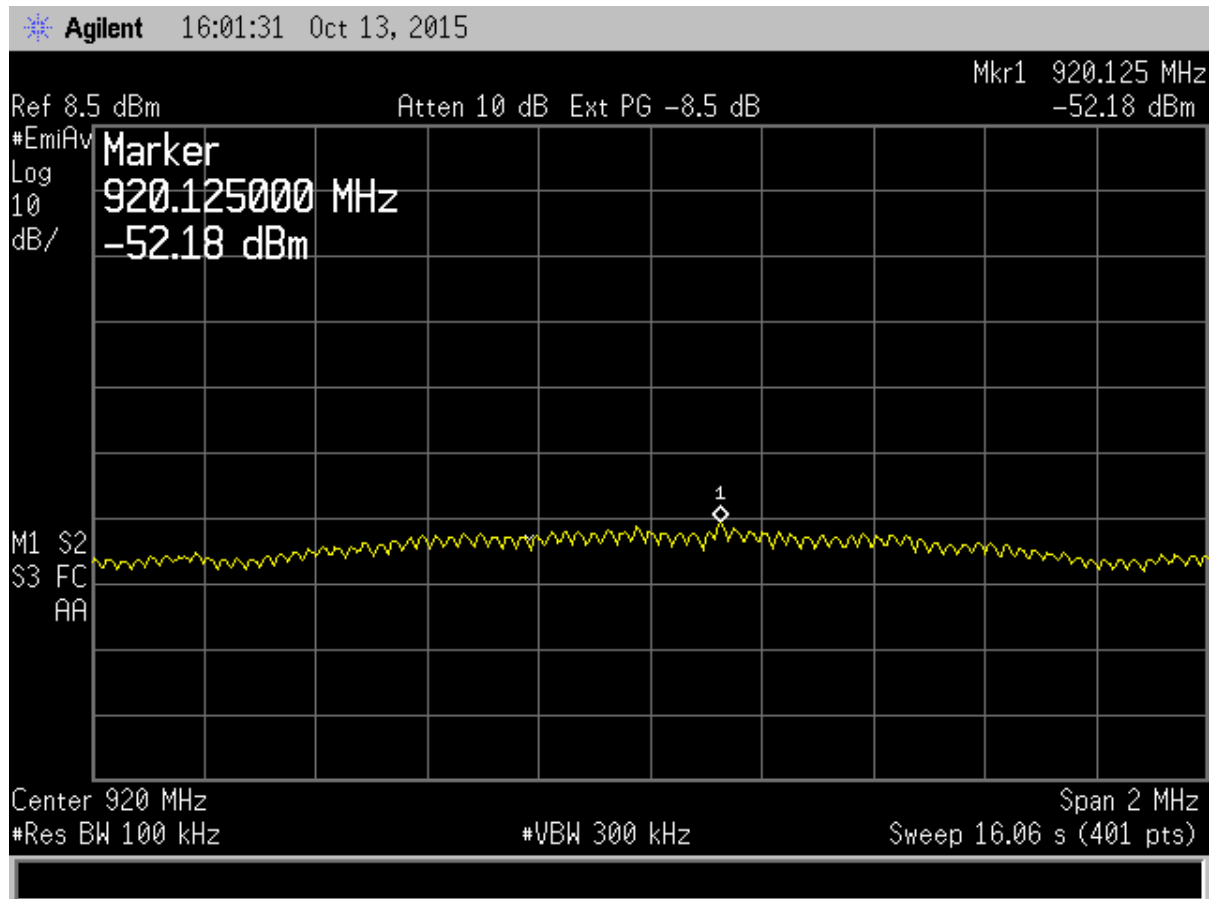


Figure 20. Peak Power Spectral Density, High Channel

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2.15 Unintentional Radiator, Powerline Emissions (CFR 15.107)

During normal operation the EUT is battery powered. The EUT can be connected to AC mains to charge the Battery; therefore this test was performed with the Battery charging.

The worst-case powerline conducted emission for the EUT was 2.2 dB below the limit at 0.51 MHz on the Phase Lead. All other conducted emissions were at least 2.9 dB below the FCC Part 15 Class B limits. The worst-case emission is found in the table below.

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

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Table 12. Conducted Emissions Data

150KHz to 30 MHz with Class B Limits						
Test: Power Line Conducted Emissions				Client: Camero tech		
Project: 15-0221				Model: Xaver400		
Frequency (MHz)	Test Data (dBuV)	LISN+CL-PA (dB)	Results (dBuV)	AVG Limits (dBuV)	Margin (dB)	Detector PK, QP, or AVG
120 VAC, 60 Hz Neutral						
0.15	54.06	1.37	55.43	66.0*	10.6	PK
0.15	14.05	1.37	15.42	56.0	40.6	AVG
0.95	44.85	0.26	45.11	56.0*	10.9	PK
0.95	42.76	0.26	43.02	46.0	3.0	AVG
1.85	44.91	0.26	45.23	56.0*	10.8	PK
1.85	42.88	0.26	43.14	46.0	2.9	AVG
5.61	44.13	0.39	44.52	50.0	5.5	PK
14.13	34.00	0.52	34.52	50.0	15.5	PK
20.30	33.46	0.47	33.93	50.0	16.1	PK
120VAC, 60 Hz Phase						
0.16	54.49	1.37	55.86	65.6*	9.8	PK
0.16	45.71	1.37	47.08	55.6	8.5	AVG
0.5	47.73	0.27	48.00	56.0*	8.0	PK
0.51	43.58	0.27	43.85	46.0	2.2	AVG
0.33	41.80	0.34	42.14	49.4	7.2	PK
5.82	37.63	0.42	38.05	50.0	12.0	PK
18.63	35.17	0.50	35.67	50.0	14.3	PK
20.08	31.23	0.50	31.73	50.0	18.3	PK

Note: (*) Indicates that the limit used is Quasi-Peak (QP)

Sample Calculation at 0.15 MHz:

Magnitude of Measured Frequency	54.06 dBuV
+Correction Factors	1.37 dB
Corrected Result	55.43 dBuV

Test Date: October 12, 2015

Tested by
 Signature: 

Name: Carrie Ingram

2.16 Unintentional Radiator, Radiated Emissions (CFR 15.109)

Radiated emissions disturbance Measurements were performed with an instrument having both peak and quasi-peak 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 EUT was mounted in the host device and tested for verification. Both the host device and EUT were active and exercising all features during this testing.

The worst-case radiated emission in the range of 30 MHz to 30 GHz was 2.1 dB below the limit at 188.99 MHz. This signal is found in Table 13. All other radiated emissions were 3.1 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.

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**Table 13. Unintentional Radiator, Peak Radiated Emissions (CFR 15.109),
30 MHz to 1000 MHz**

30 MHz to 1000 MHz with Class B Limits							
Test: Radiated Emissions				Client: Camero tech			
Project: 15-0221				Model: Xaver400			
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
188.99	32.76	-4.87	27.89	30.0	3m./HORZ	2.1	QP
898.40	24.99	8.95	33.94	37.0	3m./HORZ	3.1	QP
946.13	20.36	9.09	29.45	37.0	3m./VERT	7.6	QP
957.88	18.30	9.44	27.74	37.0	3m./VERT	9.3	QP

Tested from 30 MHz to 1 GHz

Sample Calculation at 188.99 MHz:

Magnitude of Measured Frequency	32.76 dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	-4.87 dB/m
Corrected Result	27.89 dBuV/m

Test Date: October 12, 2015

Tested by

Signature: 

Name: Carrie Ingram

US Tech Test Report:
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**Table 14. Unintentional Radiator, Peak Radiated Emissions (CFR 15.109),
1 GHz to 15 GHz**

1 GHz to 30 GHz with Class B Limits							
Test: Radiated Emissions				Client: Camero tech			
Project: 15-0221				Model: Xaver400			
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
1385.20	47.60	-8.17	39.43	54.0	3m./VERT	14.6	AVG
2200.10	40.65	-3.52	37.13	54.0	3m./VERT	16.9	AVG
2600.10	38.37	-0.76	37.61	54.0	3m./VERT	16.4	AVG
1385.20	42.81	-8.18	34.63	54.0	3m./HORZ	19.4	AVG

Tested from 1 GHz to 30 GHz

SAMPLE CALCULATION at 1385.20MHz:

Magnitude of Measured Frequency	47.60	dBuV
+ Antenna Factor+Cable Loss – Amp Gain	-8.17	dB
=Corrected Result	39.43	dBuV
Limit	54.00	dBuV
-Corrected Result	39.43	dBuV
Margin	14.60	dB

Test Date: October 8, 2015

Tested By
Signature:  Name: Carrie Ingram

2.17 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%.

2.17.1 Conducted Emissions Measurement Uncertainty

Measurement Uncertainty (within a 95% confidence level) for this test is ± 2.78 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.

2.17.2 Radiated Emissions Measurement Uncertainty

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is ± 5.39 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 ± 5.18 dB.

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