



# CERTIFICATION TEST REPORT

**Report Number :** 11776542-E1V5

**Applicant :** Whizspace Pte. Ltd.  
77 Ayer Rajah Crescent, #02-30  
Singapore - 139954

**Model :** WMPI-01

**FCC ID :** 2AOQ9WMP-ID6

**EUT Description :** TVWS Fixed Wireless Networking Radio System

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART H

**Date of Issue:**  
February 14, 2019

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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	1/16/17	Initial release	---
V2	2/01/18	Updated section 6.5	C. Susa
V3	8/31/18	Updated Sections 6.6 and 11	F. de Anda
V4	1/15/19	Updated Sections 6.6, 10.1 and 10.5	F. de Anda
V5	2/14/19	Updated section 9.2 and 9.3	F. de Anda

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Whizspace Pte. Ltd.  
77 Ayer Rajah Crescent, #02-30  
Singapore - 139954

**EUT DESCRIPTION:** TVWS Fixed Wireless Networking Radio System

**MODEL:** WMPI-01

**SERIAL NUMBER:** WZWMPI000002

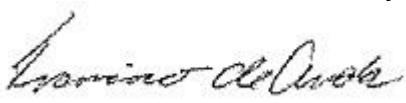
**DATE TESTED:** November 15, 2017 – November 21, 2017 and August 13 – August 14, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART H	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

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## 2. SCOPE

This report documents the results of RF, emissions and database tests. This report will demonstrate compliance to the applicable rules in Part 15 Subpart H – White Space Devices.

## 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 15 Subpart H, KDB 416721 D01 v03, and ANSI C63.10-2013.

## 4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
<input checked="" type="checkbox"/> Chamber A	<input type="checkbox"/> Chamber D
<input type="checkbox"/> Chamber B	<input type="checkbox"/> Chamber E
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F
	<input type="checkbox"/> Chamber G
	<input type="checkbox"/> Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

## 5. CALIBRATION AND UNCERTAINTY

### 5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 5.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable} \\ &\quad \text{Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

Uncertainty figures are valid to a confidence level of 95%.

## 6. EQUIPMENT UNDER TEST

### 6.1. DESCRIPTION OF EUT

The EUT is a TVWS Fixed Wireless Networking Radio System with internal antenna. The EUT is a commercial product.

### 6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum output power as follows;:

Frequency Range (MHz)	UHF BAND			
	Conducted		EIRP	
	Output Power (dBm)	Output Power (mW)	Output Power (dBm)	Output Power (W)
515-695	6.36	4.33	12.76	0.02

### 6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a patch antenna, with maximum gain of 6.4dBi

### 6.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was version 3.1

### 6.5. WORST-CASE CONFIGURATION AND MODE

For below 30MHz, above 1GHz radiated emissions and power line conducted emissions were performed with the EUT set to transmit at the channel with the highest power and worst-case data rate as worst-case scenario.

For 30Mhz to 1GHz radiated emissions were performed with the EUT set to transmit at L/M/H channels at highest power and worst-case data rate as worst-case scenario.

Preliminary baseline tests were performed to determine worst case data rate. The worst case data rate was determined to be BPSK.

All final radiated testing was performed with the EUT in the normal orientation.

## 6.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	Serial Number
PoE Switch	TP-LINK	TL-SG1008P(UN) Ver:2.0	2174015003316
PoE AC/DC adapter	TP-LINK	T480125-2-DT	-
Laptop	HP	13-D11TU	CND6254576

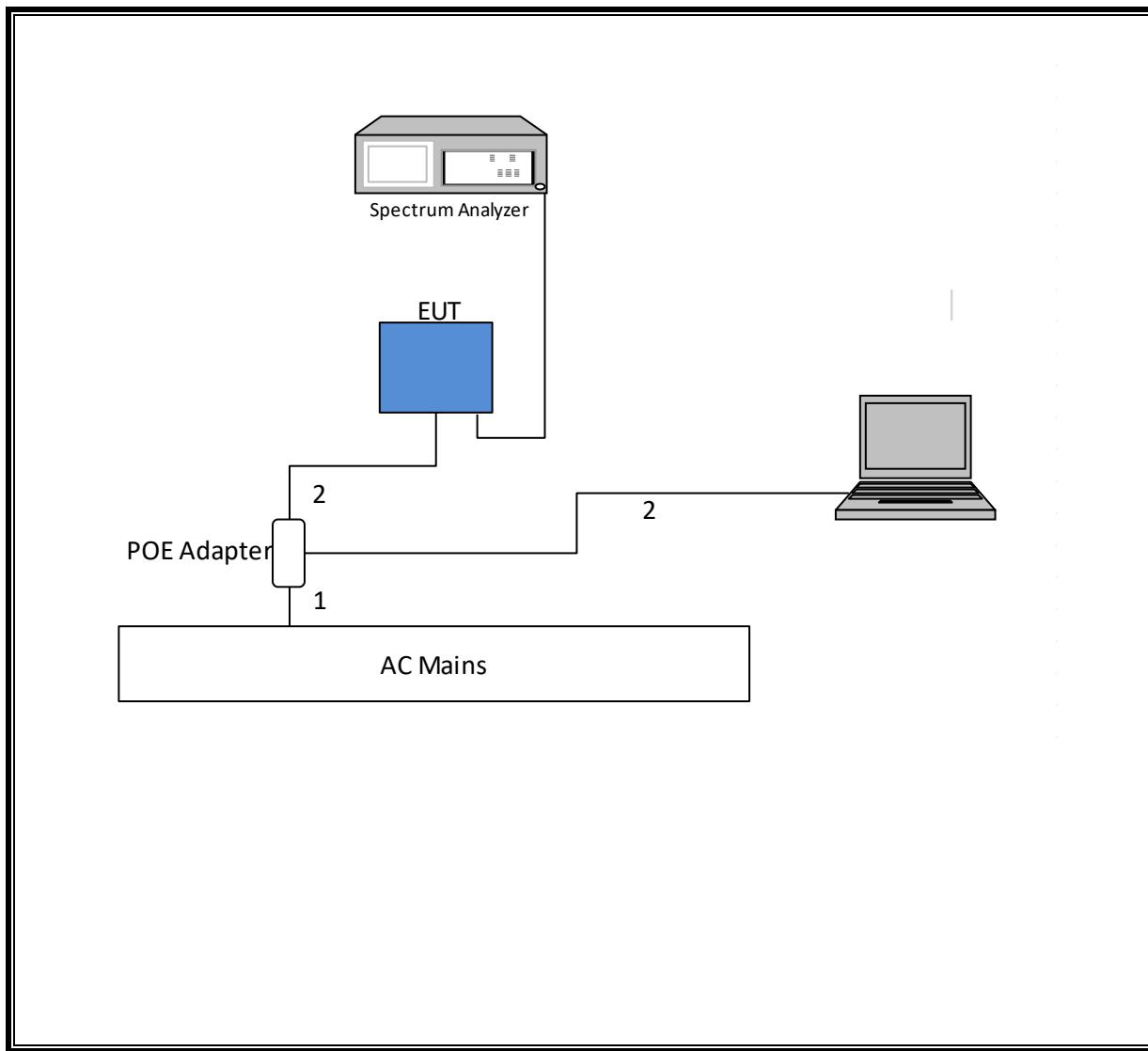
### I/O CABLES

I/O CABLE LIST						
Cable No.	Port	No. of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	3-Prong	unshielded	1	
2	Ethernet/PoE	1	RJ45	unshielded	1	
3	DC	1	Barrel	unshielded	0.8	

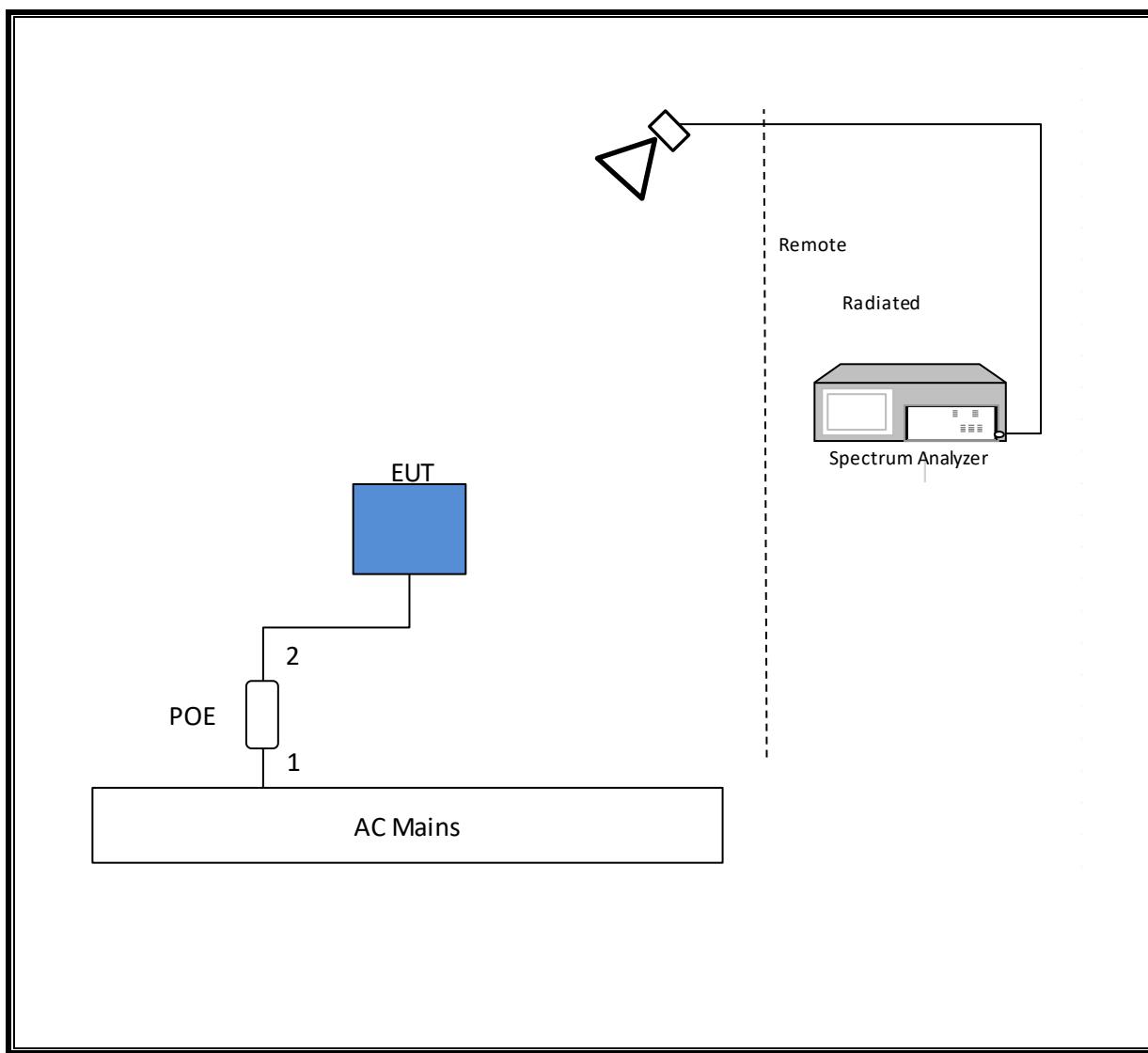
### TEST SETUP

The EUT was installed in a typical configuration. The customer provided test software to exercise the EUT during test. Refer to the following diagram.

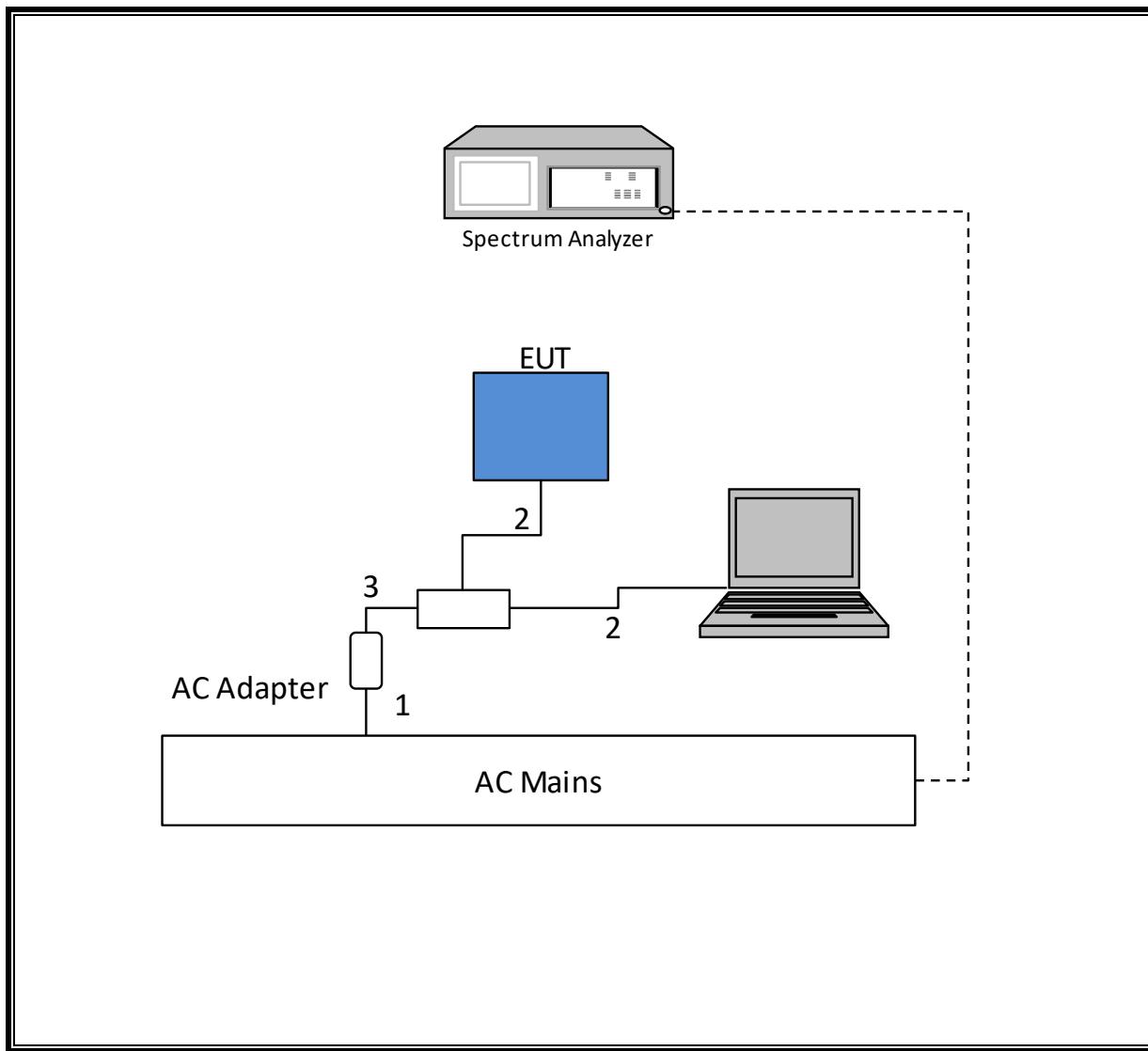
**SETUP DIAGRAM FOR ANTENNA PORT TESTS**



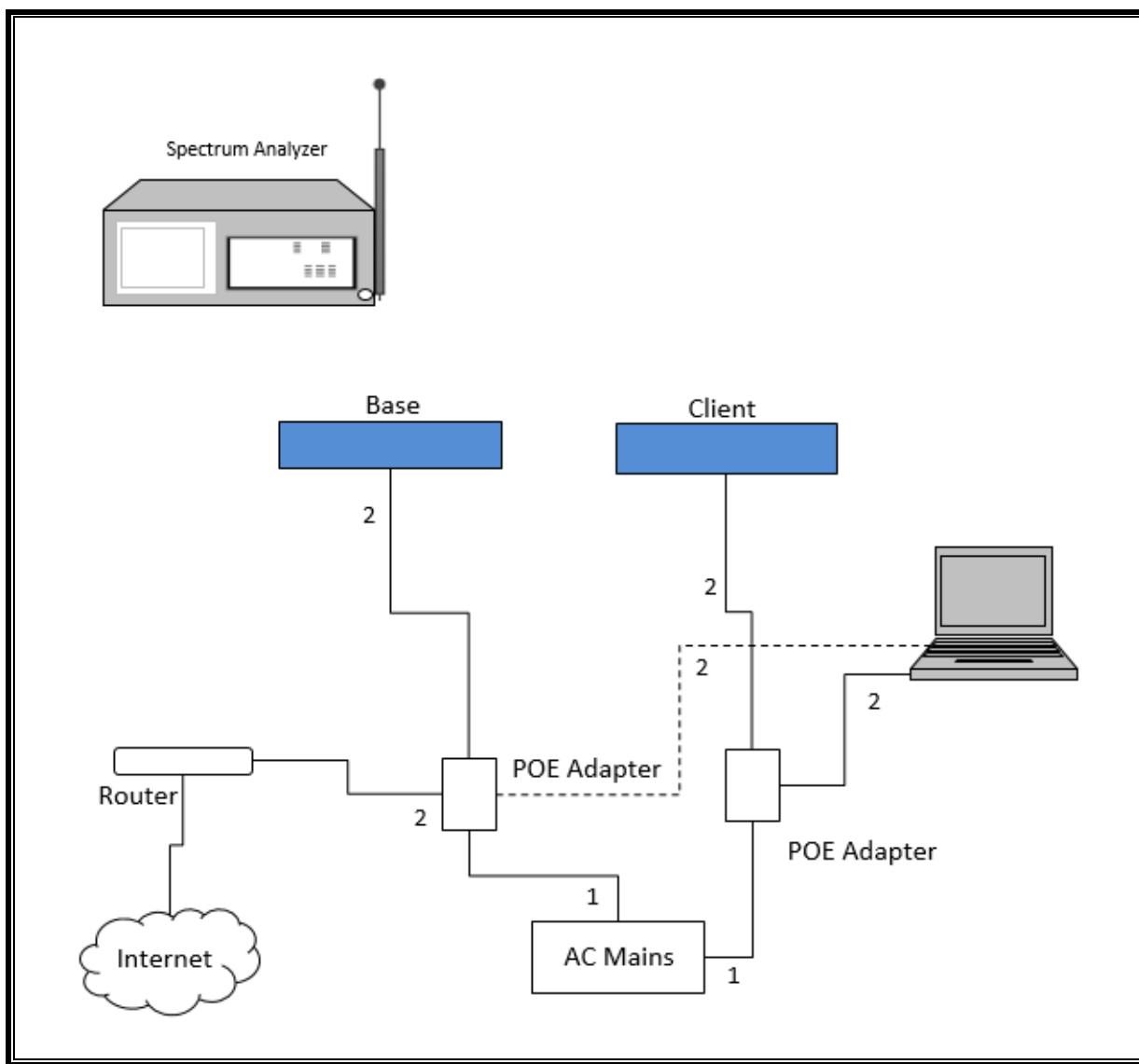
**SETUP DIAGRAM FOR RADIATED TESTS**



**SETUP DIAGRAM FOR AC LINE CONDUCTED TESTS**



**SETUP DIAGRAM FOR DATABASE TESTS**



## 7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

November 15th, 2017 – November 21st, 201

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	T130	10/16/17	10/16/18
Antenna, Horn, 1-18GHz	ETS Lindgren	3117	T862	06/09/17	06/09/18
RF Preamplifier, 10kHz - 1GHz	Keysight	8447D	T15	08/14/17	08/14/18
RF Preamplifier, 1 - 8GHz	Miteq	AMF-4D-01000800-30-29P	T1573	06/24/17	06/24/18
Spectrum Analyzer	Keysight	N9030A	T1466	04/11/17	04/11/18
Antenna, Active Loop 9KHz to 30MHz	Com-Power	AL-130R	T1866	10/10/17	10/10/18
EMI Receiver	Rohde & Schwarz	ESR	T1436	01/06/17	01/06/18
LISN	Fischer Custom Communications	FCC-LISN-50/250-25-2-01	T1310	06/15/17	06/15/18
Filter, Notch, 515MHz	EWT Products	EWT-14-0348	T241	04/27/17	04/27/18
Filter, Notch, 587MHz	EWT Products	EWT-14-0338	T239	04/27/17	04/27/18
Filter, Notch, 695MHz	EWT Products	EWT-14-0339	T238	04/27/17	04/27/18
Radiated Software	UL	UL EMC	Ver 9.5, December 01, 2016		

August 13, 2018 – August 14, 2018

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
EMI Receiver	Rohde & Schwarz	ESR	T1436	02/23/18	02/23/19
LISN	Fischer Custom Communications	FCC-LISN-50/250-25-2-01	T1310	06/19/18	06/19/19

## 8. MEASUREMENT METHODS

Output Power & Power Spectral Density (Fixed WSD): KDB 416721 D01 v03 Section II, (2)(c)( i).

Band-Edge Measurement: KDB 416721 D01 v03 Section II (2)(d)(i)

Adjacent Channel Emissions: KDB 416721 D01 v03 Section II (2)(d)(ii)

Beyond Adjacent Channel Emissions: ANSI C63.10, Section 6.5 and 6.6.

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

## 9. ANTENNA PORT TEST RESULTS

### 9.1. OUTPUT POWER AND POWER SPECTRAL DENSITY

#### LIMITS

##### §15.709 (b)(1) Fixed White Space Device

For operation at EIRP levels of 36 dBm (4000 mW) or less, fixed white space devices may operate at EIRP levels between the values shown in the table provided that the conducted power and the conducted power spectral density (PSD) limits are linearly interpolated between the values shown and the adjacent channel emission limit of the higher value shown in the table is met. Operation at EIRP levels above 36 dBm (4000 mW) shall follow the requirements for 40 dBm (10,000 mW).

EIRP (6 MHz)	Conducted power limit <sup>1</sup> (6 MHz)	Conducted PSD limit (100 kHz)	Conducted adjacent channel emission limit (100 kHz)
16 dBm (40 mW)	10 dBm (10 mW)	-7.4 dBm	-62.8 dBm
20 dBm (100 mW)	14 dBm (25 mW)	-3.4 dBm	-58.8 dBm
24 dBm (250 mW)	18 dBm (63 mW)	0.6 dBm	-54.8 dBm
28 dBm (625 mW)	22 dBm (158 mW)	4.6 dBm	-50.8 dBm
32 dBm (1600 mW)	26 dBm (400 mW)	8.6 dBm	-46.8 dBm
36 dBm (4000 mW)	30 dBm (1000 mW)	12.6 dBm	-42.8 dBm
40 dBm (10000 mW)	30 dBm (1000 mW)	12.6 dBm	-42.8 dBm

<sup>1</sup>The conducted power spectral density from a fixed white space device shall not be greater than the values shown in the table when measured in any 100 kHz band during any time interval of continuous transmission, except that a 40 mW fixed white space device operating in a four megahertz channel within a seven megahertz guard band must comply with a conducted power spectral density limit of -5.4 dBm.

The conducted power, PSD and adjacent channel limits for fixed white space devices operating at up to 36 dBm (4000 milliwatts) EIRP shown in the table in paragraph (b)(1) of this section are based on a maximum transmitting antenna gain of 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The conducted power, PSD and adjacent channel limits for fixed white space devices operating at greater than 36 dBm (4000 milliwatts) EIRP shown in the table in paragraph (b)(1) of this section are based on a maximum transmitting antenna gain of 10 dBi. If transmitting antennas of directional gain greater than 10 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 10 dBi.

#### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

#### RESULTS

### 9.1.1. UHF BAND

Tested By:	11/16/17
Test Date:	37699 CS

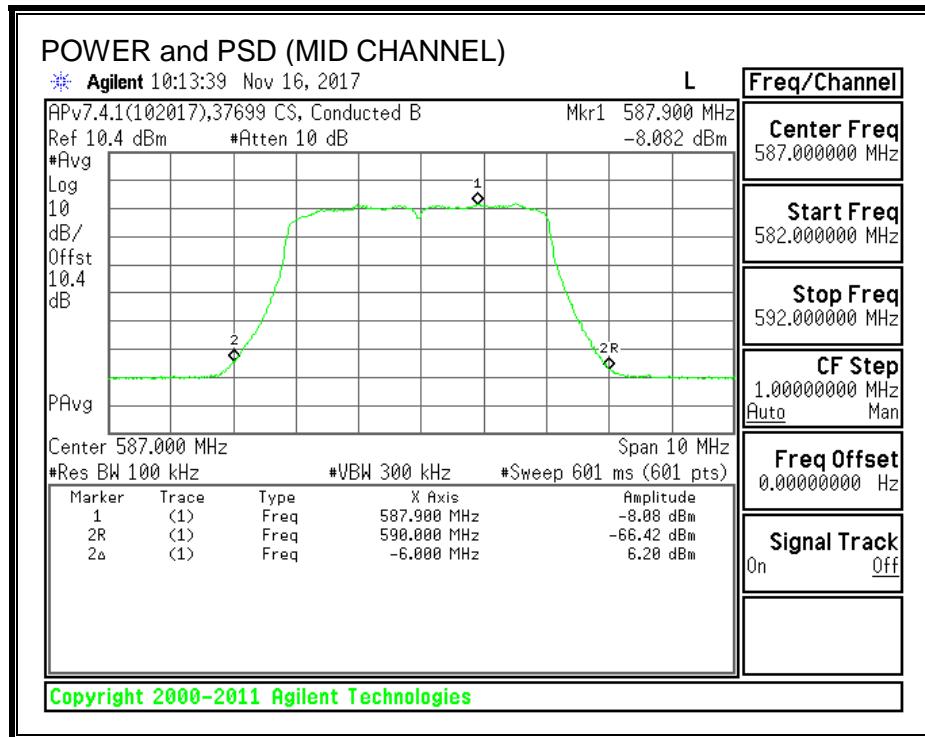
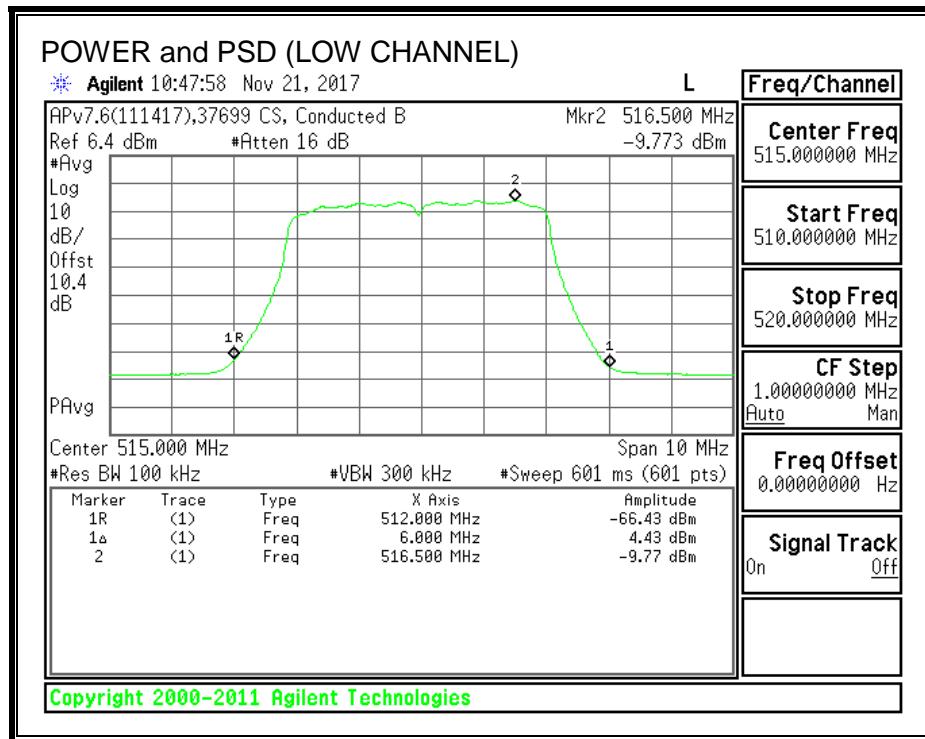
Antenna Gain (dBi)	6.40
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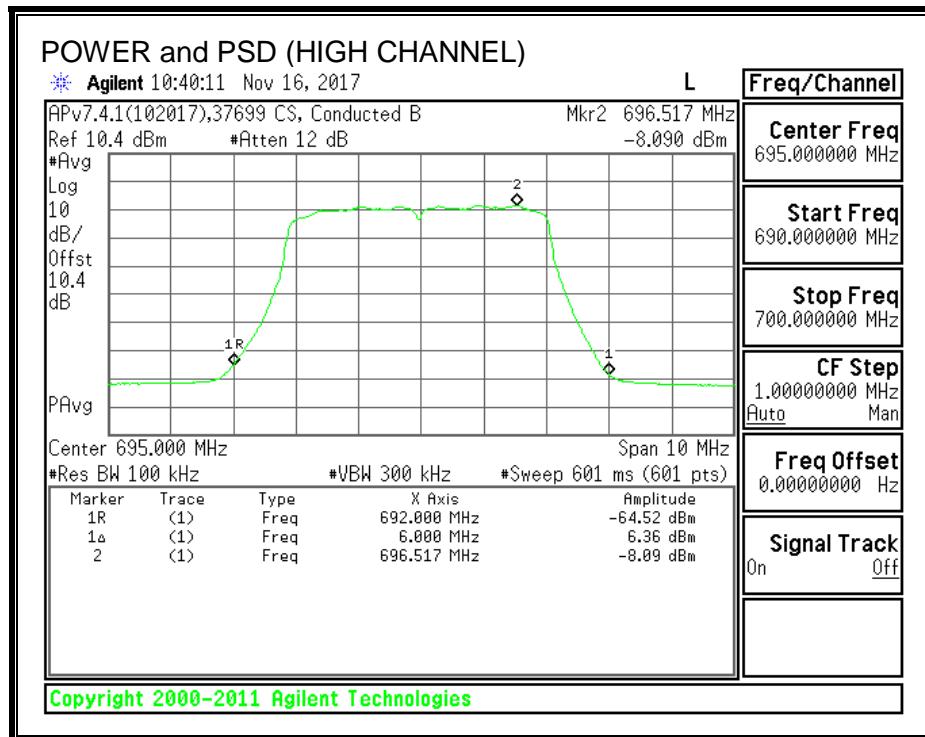
#### Output Power Results

Channel	Frequency (MHz)	Measured Output Power Chain 0 (dBm)	Measured Total Output Power (dBm)	Measured Total EIRP (dBm)	Conducted Power Limit (dBm)	Margin (dBm)
Low	515	4.43	4.43	10.83	9.60	-5.17
Mid	587	6.20	6.20	12.60	9.60	-3.40
High	695	6.36	6.36	12.76	9.60	-3.24

#### PSD Results

Channel	Frequency (MHz)	Measured Output PSD Chain 0 (dBm)	Measured Total PSD Power (dBm)	Conducted PSD Limit (dBm)	Margin (dBm)
Low	515	-9.77	-9.77	-7.80	-1.97
Mid	587	-8.08	-8.08	-7.80	-0.28
High	695	-8.09	-8.09	-7.80	-0.29





## 9.2. BAND-EDGE

### LIMITS

#### §15.709 (b)(1) Fixed White Space Device

For operation at EIRP levels of 36 dBm (4000 mW) or less, fixed white space devices may operate at EIRP levels between the values shown in the table provided that the conducted power and the conducted power spectral density (PSD) limits are linearly interpolated between the values shown and the adjacent channel emission limit of the higher value shown in the table is met. Operation at EIRP levels above 36 dBm (4000 mW) shall follow the requirements for 40 dBm (10,000 mW).

EIRP (6 MHz)	Conducted power limit <sup>1</sup> (6 MHz)	Conducted PSD limit (100 kHz)	Conducted adjacent channel emission limit (100 kHz)
16 dBm (40 mW)	10 dBm (10 mW)	-7.4 dBm	-62.8 dBm
20 dBm (100 mW)	14 dBm (25 mW)	-3.4 dBm	-58.8 dBm
24 dBm (250 mW)	18 dBm (63 mW)	0.6 dBm	-54.8 dBm
28 dBm (625 mW)	22 dBm (158 mW)	4.6 dBm	-50.8 dBm
32 dBm (1600 mW)	26 dBm (400 mW)	8.6 dBm	-46.8 dBm
36 dBm (4000 mW)	30 dBm (1000 mW)	12.6 dBm	-42.8 dBm
40 dBm (10000 mW)	30 dBm (1000 mW)	12.6 dBm	-42.8 dBm

<sup>1</sup>The conducted power spectral density from a fixed white space device shall not be greater than the values shown in the table when measured in any 100 kHz band during any time interval of continuous transmission, except that a 40 mW fixed white space device operating in a four megahertz channel within a seven megahertz guard band must comply with a conducted power spectral density limit of -5.4 dBm.

The conducted power, PSD and adjacent channel limits for fixed white space devices operating at up to 36 dBm (4000 milliwatts) EIRP shown in the table in paragraph (b)(1) of this section are based on a maximum transmitting antenna gain of 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The conducted power, PSD and adjacent channel limits for fixed white space devices operating at greater than 36 dBm (4000 milliwatts) EIRP shown in the table in paragraph (b)(1) of this section are based on a maximum transmitting antenna gain of 10 dBi. If transmitting antennas of directional gain greater than 10 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 10 dBi.

### RESULTS

### 9.2.1. UHF BAND

Tested By:	37699 CS
Test Date:	11/16/17

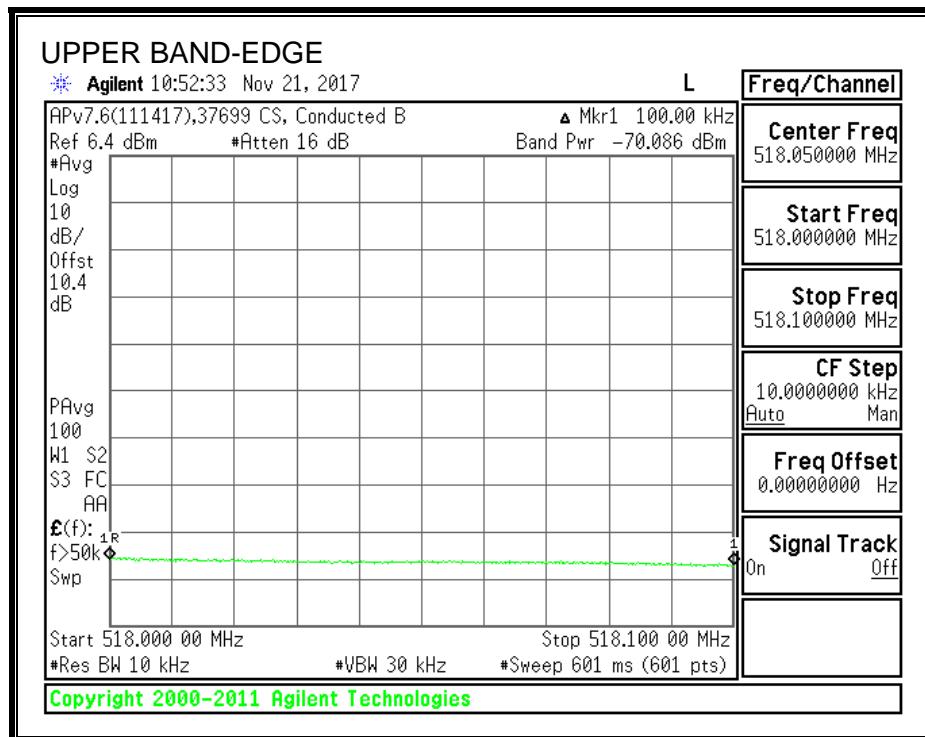
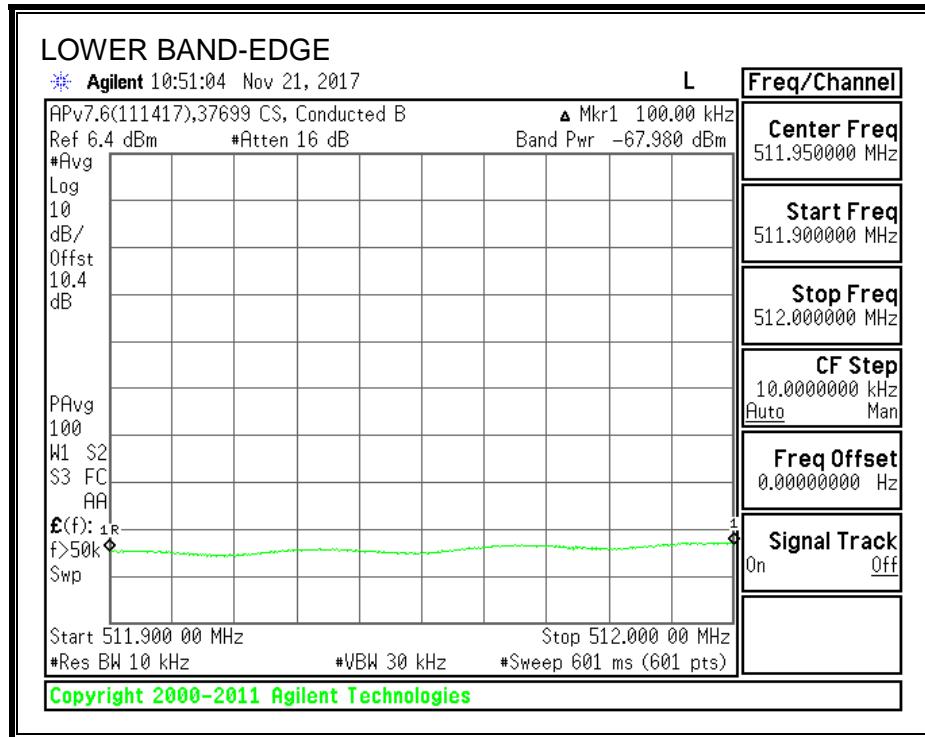
#### Lower Band-Edge Emissions

Channel	Frequency (MHz)	Measured Emission Chain 0 (dBm)	Measured Total Emission (dBm)	Emissions Limit (dBm)	Worst Case Margin (dBm)
Low	515	-67.98	-67.98	-63	-4.98
Mid	587	-66.40	-66.40	-63	-3.40
High	695	-65.98	-65.98	-63	-2.97

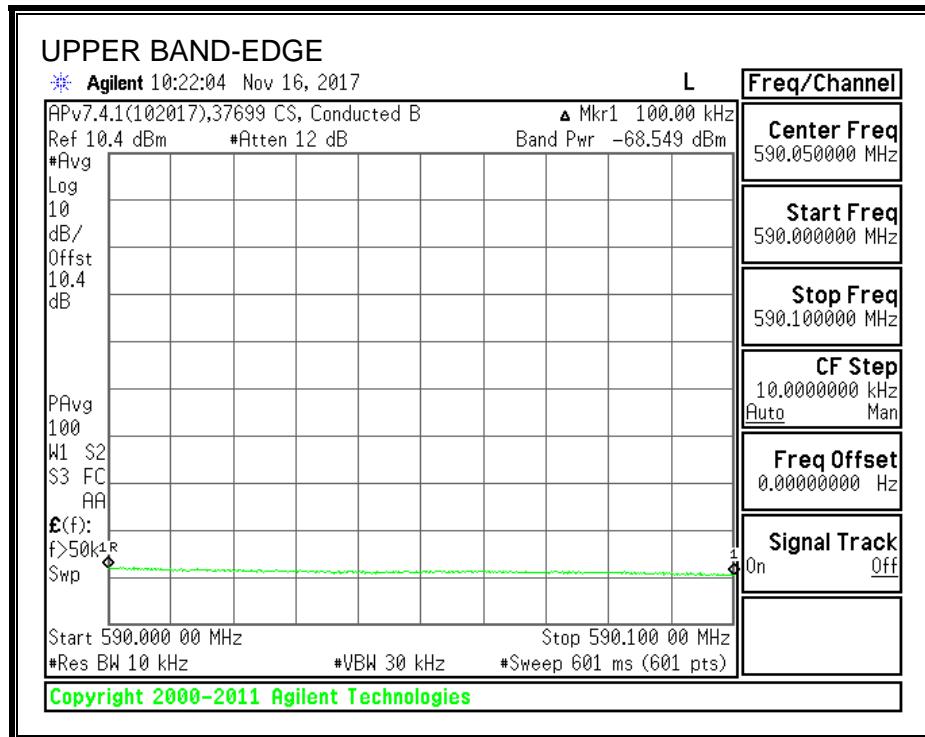
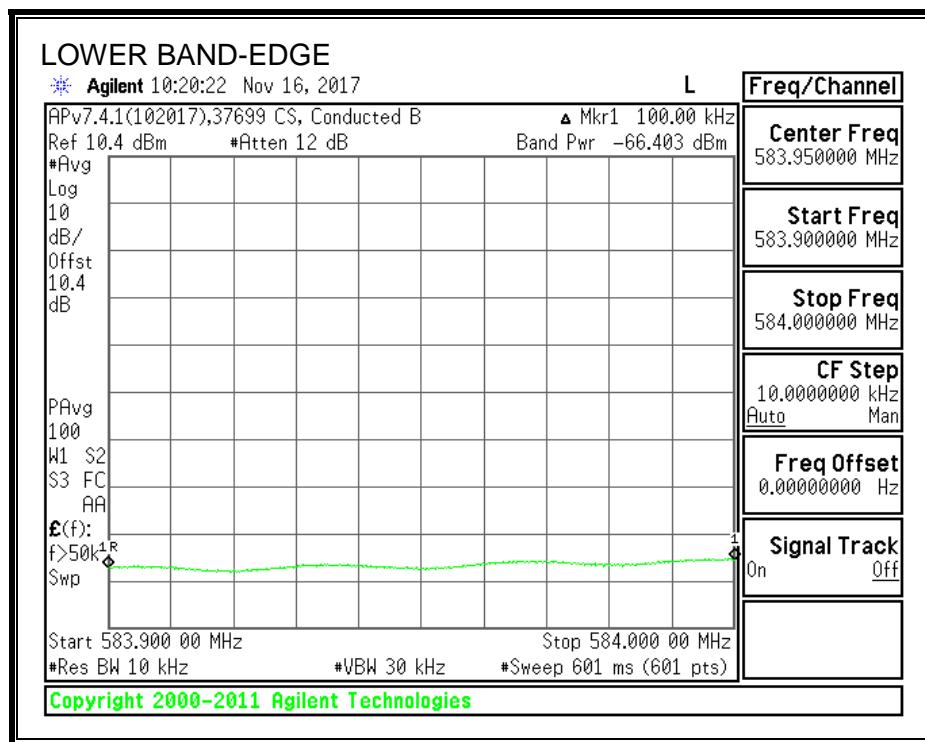
#### Upper Band-Edge Emissions

Channel	Frequency (MHz)	Measured Emission Chain 0 (dBm)	Measured Total Emission (dBm)	Emissions Limit (dBm)	Worst Case Margin (dBm)
Low	515	-70.09	-70.09	-63	-7.09
Mid	587	-68.55	-68.55	-63	-5.55
High	695	-68.96	-68.96	-63	-5.96

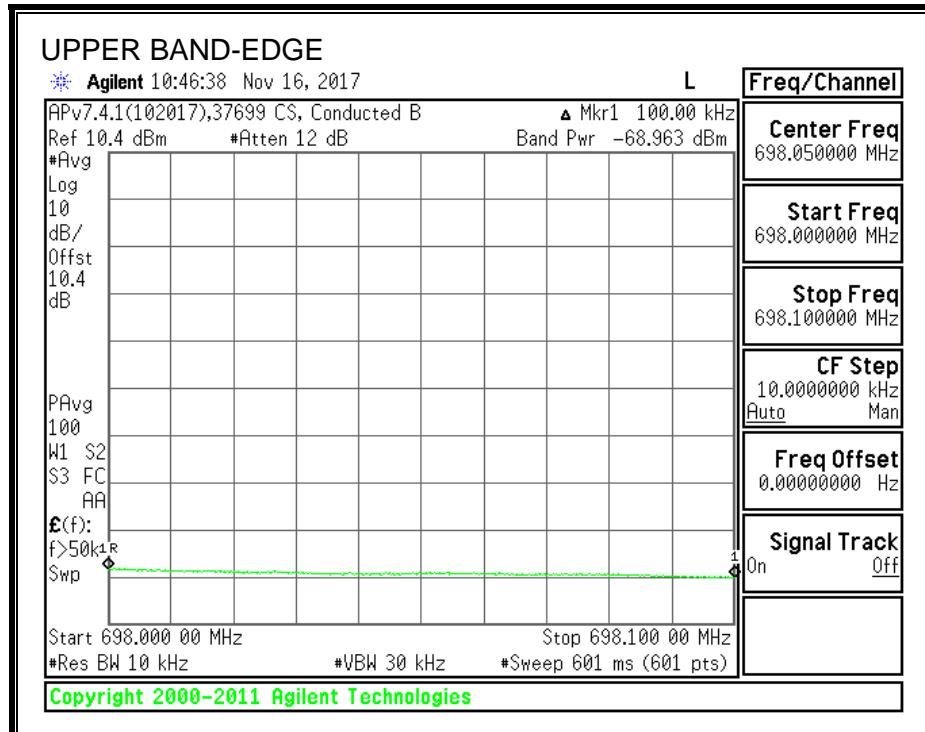
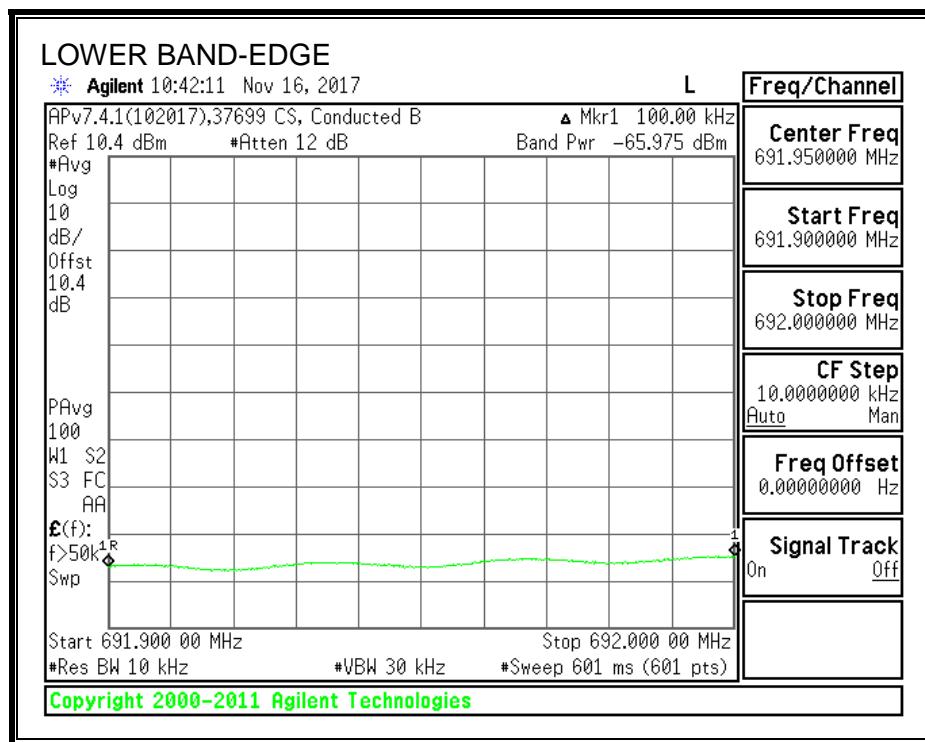
LOW CHANNEL



**MID CHANNEL**



**HIGH CHANNEL**



### 9.3. ADJACENT CHANNEL EMISSIONS

#### LIMITS

##### §15.709 (b)(1) Fixed White Space Device

For operation at EIRP levels of 36 dBm (4000 mW) or less, fixed white space devices may operate at EIRP levels between the values shown in the table provided that the conducted power and the conducted power spectral density (PSD) limits are linearly interpolated between the values shown and the adjacent channel emission limit of the higher value shown in the table is met. Operation at EIRP levels above 36 dBm (4000 mW) shall follow the requirements for 40 dBm (10,000 mW).

EIRP (6 MHz)	Conducted power limit <sup>1</sup> (6 MHz)	Conducted PSD limit (100 kHz)	Conducted adjacent channel emission limit (100 kHz)
16 dBm (40 mW)	10 dBm (10 mW)	-7.4 dBm	-62.8 dBm
20 dBm (100 mW)	14 dBm (25 mW)	-3.4 dBm	-58.8 dBm
24 dBm (250 mW)	18 dBm (63 mW)	0.6 dBm	-54.8 dBm
28 dBm (625 mW)	22 dBm (158 mW)	4.6 dBm	-50.8 dBm
32 dBm (1600 mW)	26 dBm (400 mW)	8.6 dBm	-46.8 dBm
36 dBm (4000 mW)	30 dBm (1000 mW)	12.6 dBm	-42.8 dBm
40 dBm (10000 mW)	30 dBm (1000 mW)	12.6 dBm	-42.8 dBm

<sup>1</sup>The conducted power spectral density from a fixed white space device shall not be greater than the values shown in the table when measured in any 100 kHz band during any time interval of continuous transmission, except that a 40 mW fixed white space device operating in a four megahertz channel within a seven megahertz guard band must comply with a conducted power spectral density limit of -5.4 dBm.

The conducted power, PSD and adjacent channel limits for fixed white space devices operating at up to 36 dBm (4000 milliwatts) EIRP shown in the table in paragraph (b)(1) of this section are based on a maximum transmitting antenna gain of 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The conducted power, PSD and adjacent channel limits for fixed white space devices operating at greater than 36 dBm (4000 milliwatts) EIRP shown in the table in paragraph (b)(1) of this section are based on a maximum transmitting antenna gain of 10 dBi. If transmitting antennas of directional gain greater than 10 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 10 dBi.

#### RESULTS

### 9.3.1. UHF BAND

Tested By:	37699 CS
Test Date:	11/16/17

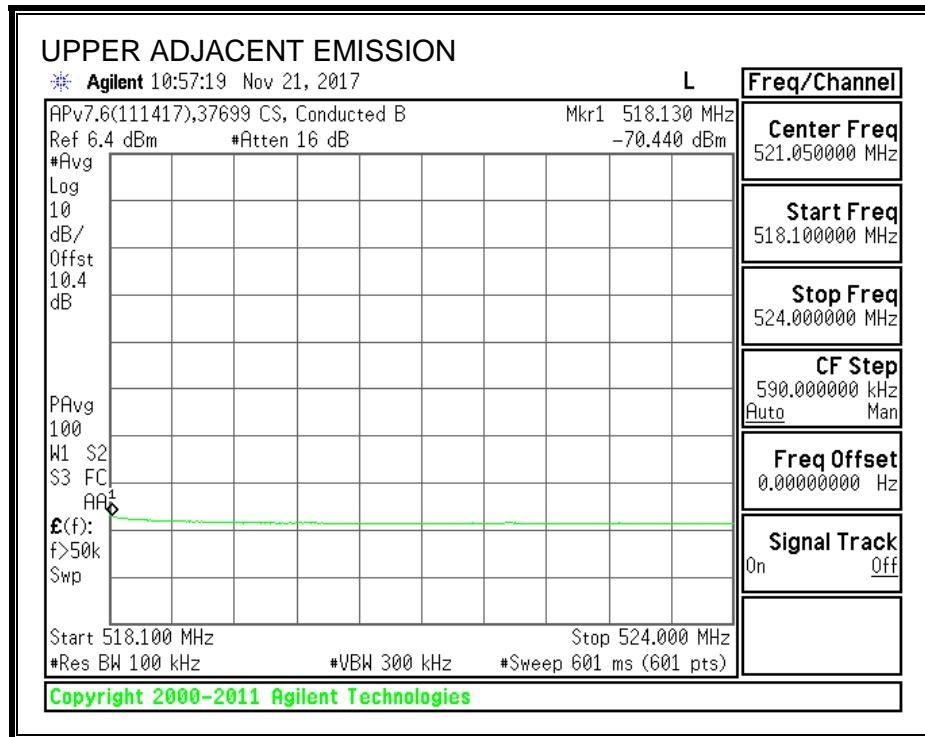
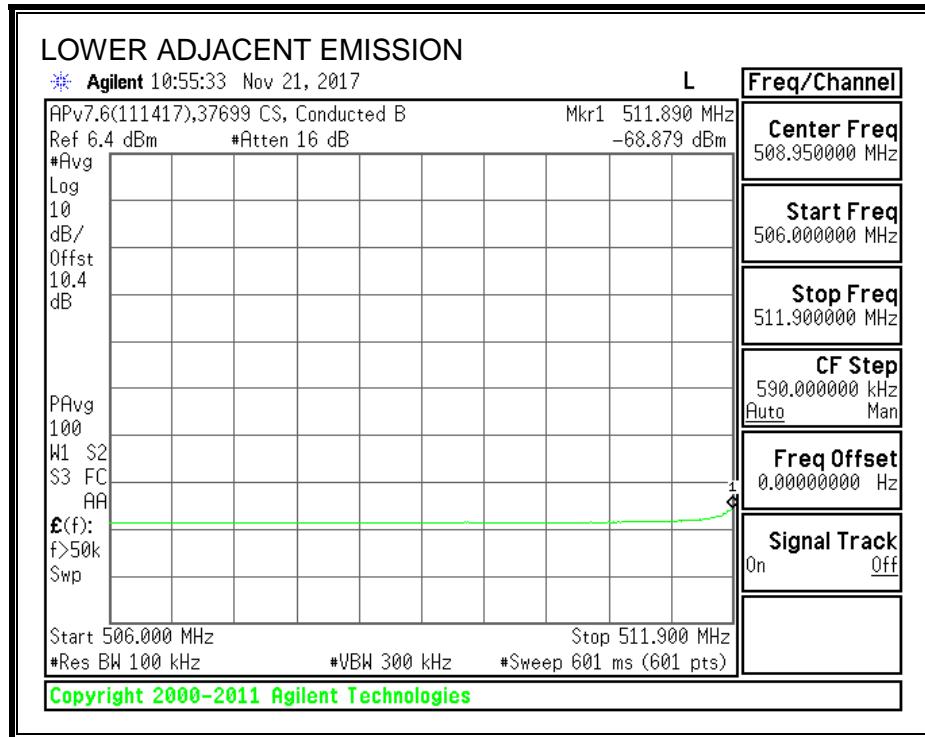
#### Lower Adjacent Channel Emissions

Channel	Frequency (MHz)	Measured Emission Chain 0 (dBm)	Measured Total Emission (dBm)	Emissions Limit (dBm)	Worst Case Margin (dBm)
Low	515	-68.88	-68.88	-63	-5.88
Mid	587	-67.26	-67.26	-63	-4.26
High	695	-66.88	-66.88	-63	-3.88

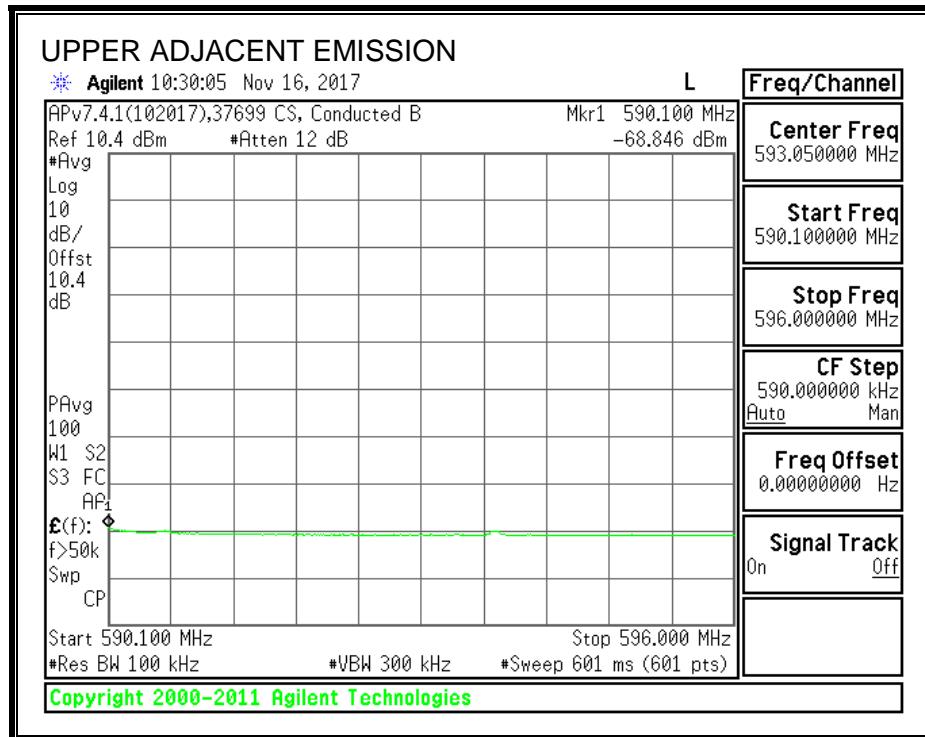
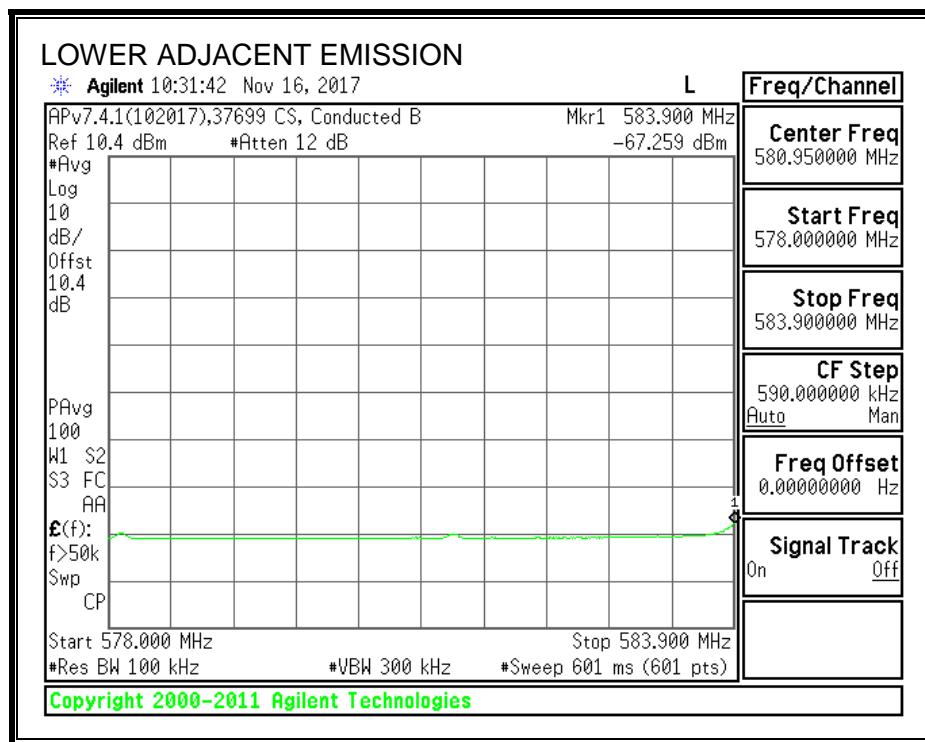
#### Upper Adjacent Channel Emissions

Channel	Frequency (MHz)	Measured Emission Chain 0 (dBm)	Measured Total Emission (dBm)	Emissions Limit (dBm)	Worst Case Margin (dBm)
Low	515	-70.44	-70.44	-63	-7.44
Mid	587	-68.85	-68.85	-63	-5.85
High	695	-69.33	-69.33	-63	-6.33

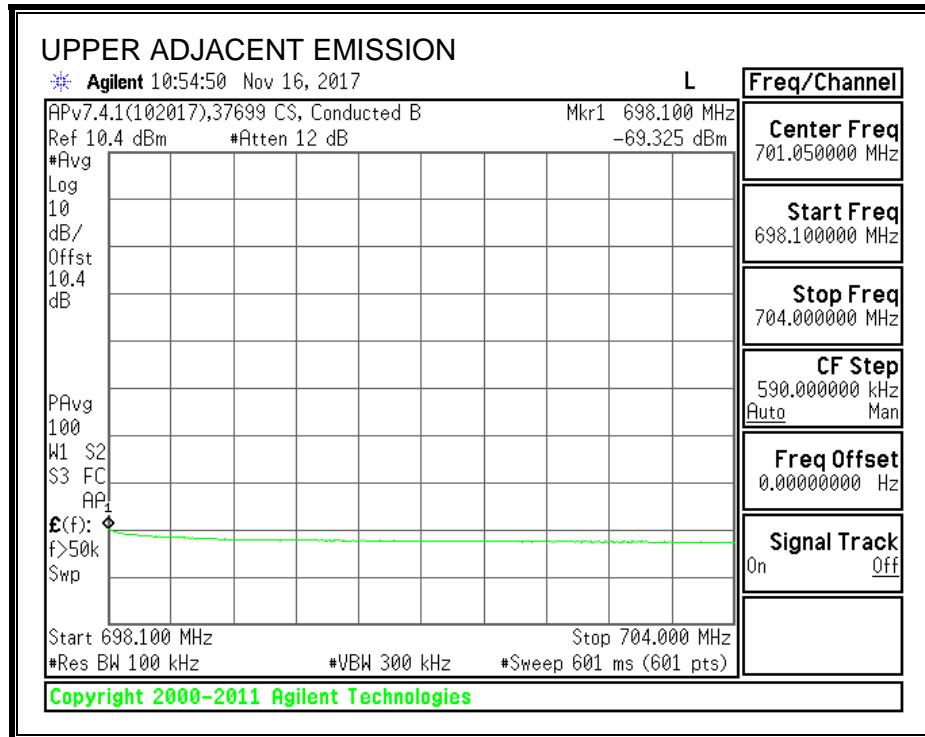
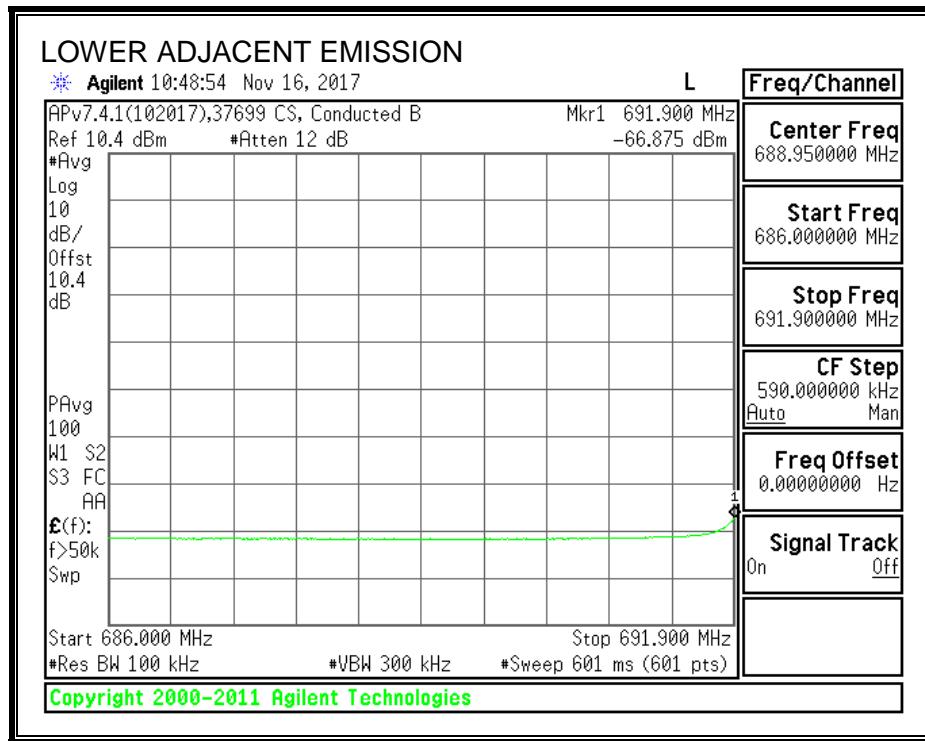
LOW CHANNEL



**MID CHANNEL**



**HIGH CHANNEL**



## 10. RADIATED EMISSIONS

### BEYOND ADJACENT CHANNEL EMISSION LIMITS

FCC §15.709 (d) (2) At frequencies beyond the six megahertz channel immediately adjacent to each white space channel or group of contiguous white space channels in which the white space device is operating the white space device shall meet the requirements of §15.209.

The DUT must comply with radiated emission limits for a Class B digital device, except that authorization as a Class A device may be considered with appropriate justification for non-residential use.

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	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

### TEST PROCEDURE

ANSI C63.10-2013.

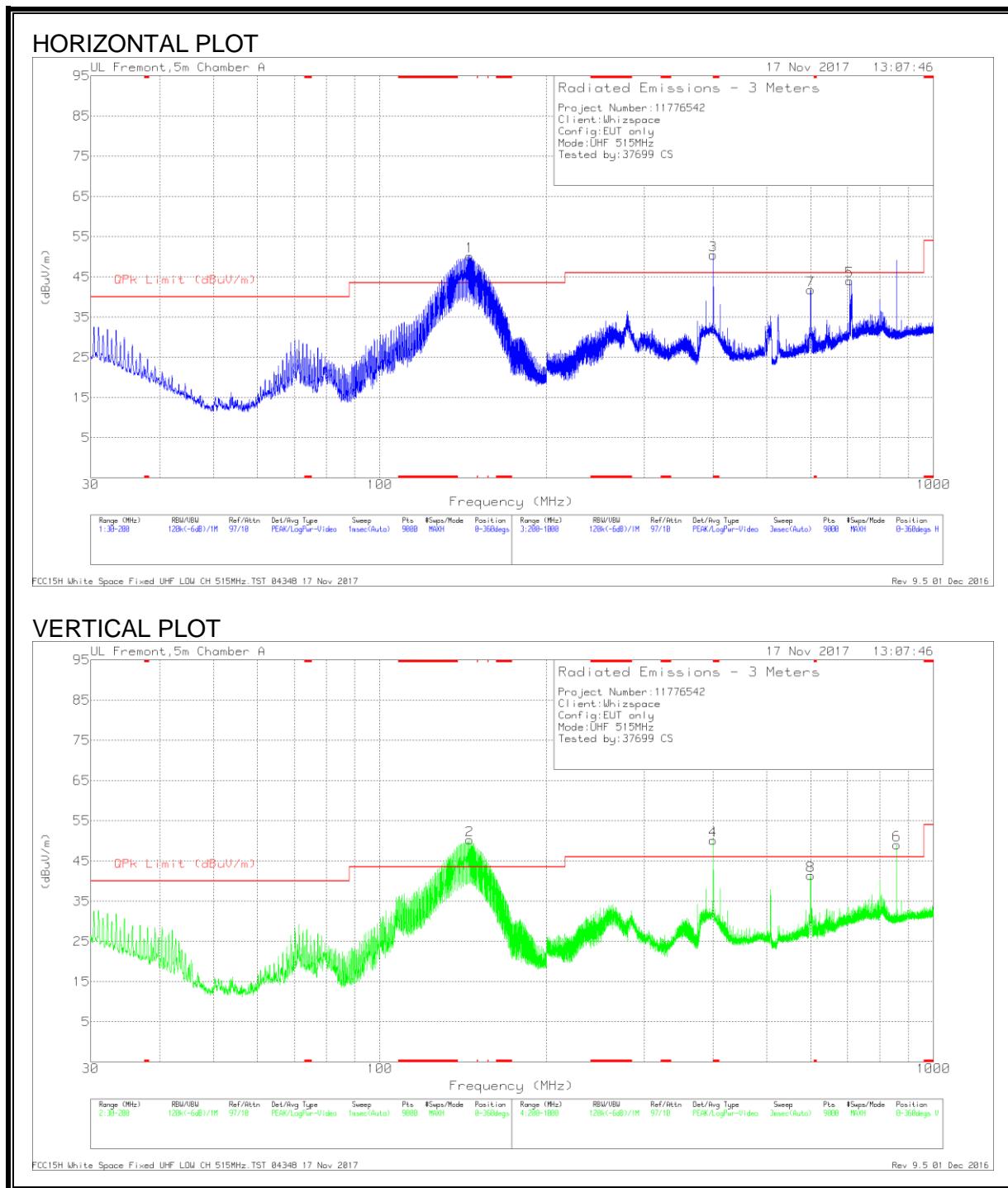
The EUT is set to transmit in a continuous mode.

High-Q Cavity Notch filters are used to reduce the amplitude of the intentional transmitter and prevent overload of the system preamplifier.

## 10.1. TRANSMITTER BELOW 1GHz

### 10.1.1. UHF BAND

#### BEYOND ADJACENT CHANNEL (LOW CHANNEL)



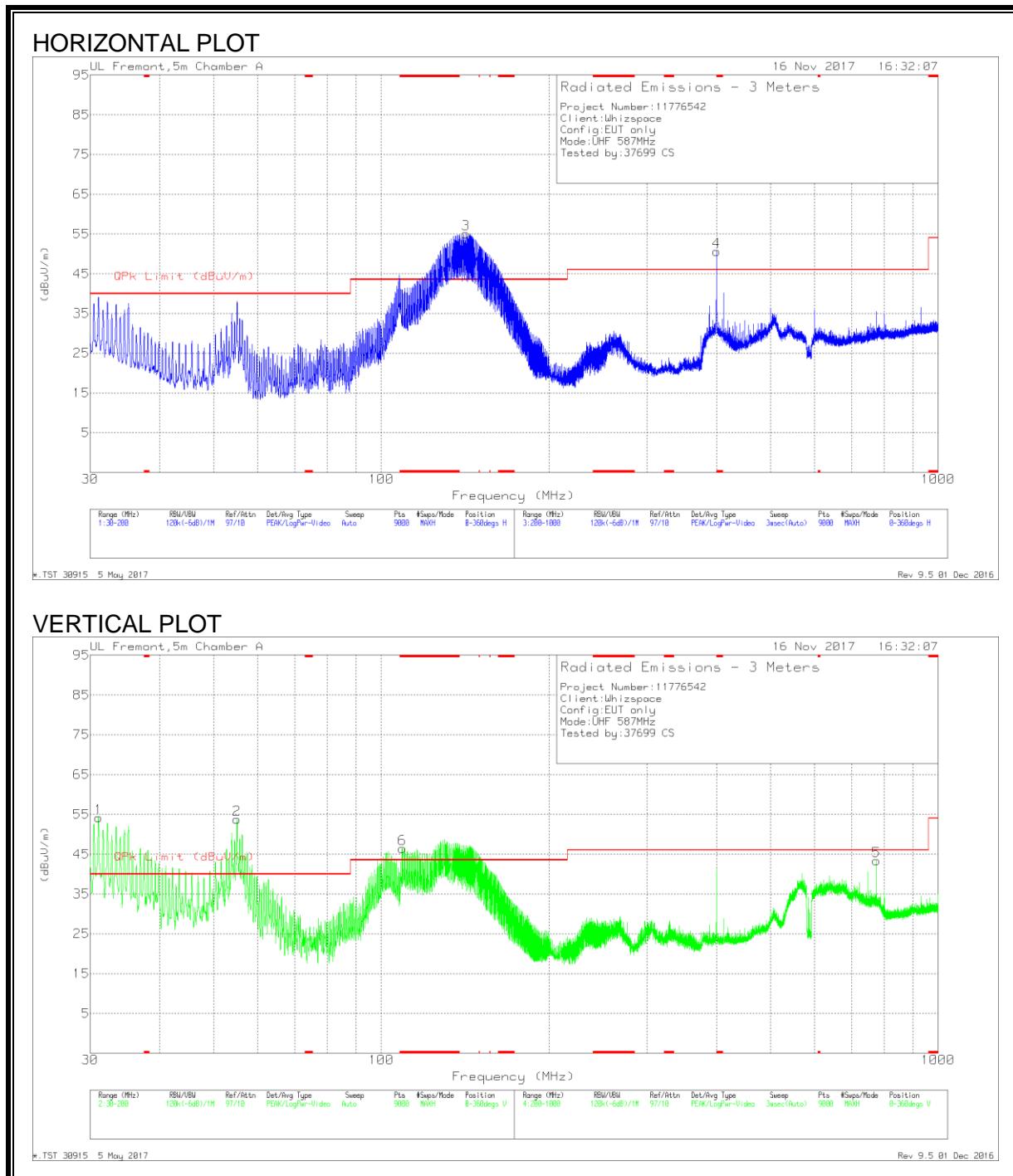
## LOW CHANNEL DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 399.993	55.36	Qp	19.6	-25	.1	50.06	-	-	128	104	H
4	* 400.0031	55.2	Qp	19.6	-25	.1	49.9	-	-	127	151	V
1	* 145.2371	62.55	Qp	16.8	-25.9	.1	53.55	-	-	232	129	H
2	* 145.2702	62.52	Qp	16.8	-25.9	.1	53.52	-	-	243	140	V
7	599.9657	42.53	Qp	22.3	-25	.1	39.93	46	-6.07	54	228	H
8	600.0065	43.83	Qp	22.3	-25	.1	41.23	46	-4.77	96	222	V
5	704.8879	25.93	Qp	24.3	-24.4	.1	25.93	46	-20.07	160	370	H
6	858.4906	42.32	Qp	25.8	-23.3	.1	44.92	46	-1.08	159	395	V

\* - The emissions noted by \* were observed during the digital device (Part 15 Subpart B) measurements with the transceiver disabled and are therefore subject to the Part 15 B limits. This is a Class A digital device and the digital device emissions comply with the Class A limits.

Qp - Quasi-Peak detector

**BEYOND ADJACENT CHANNEL (MID CHANNEL)**



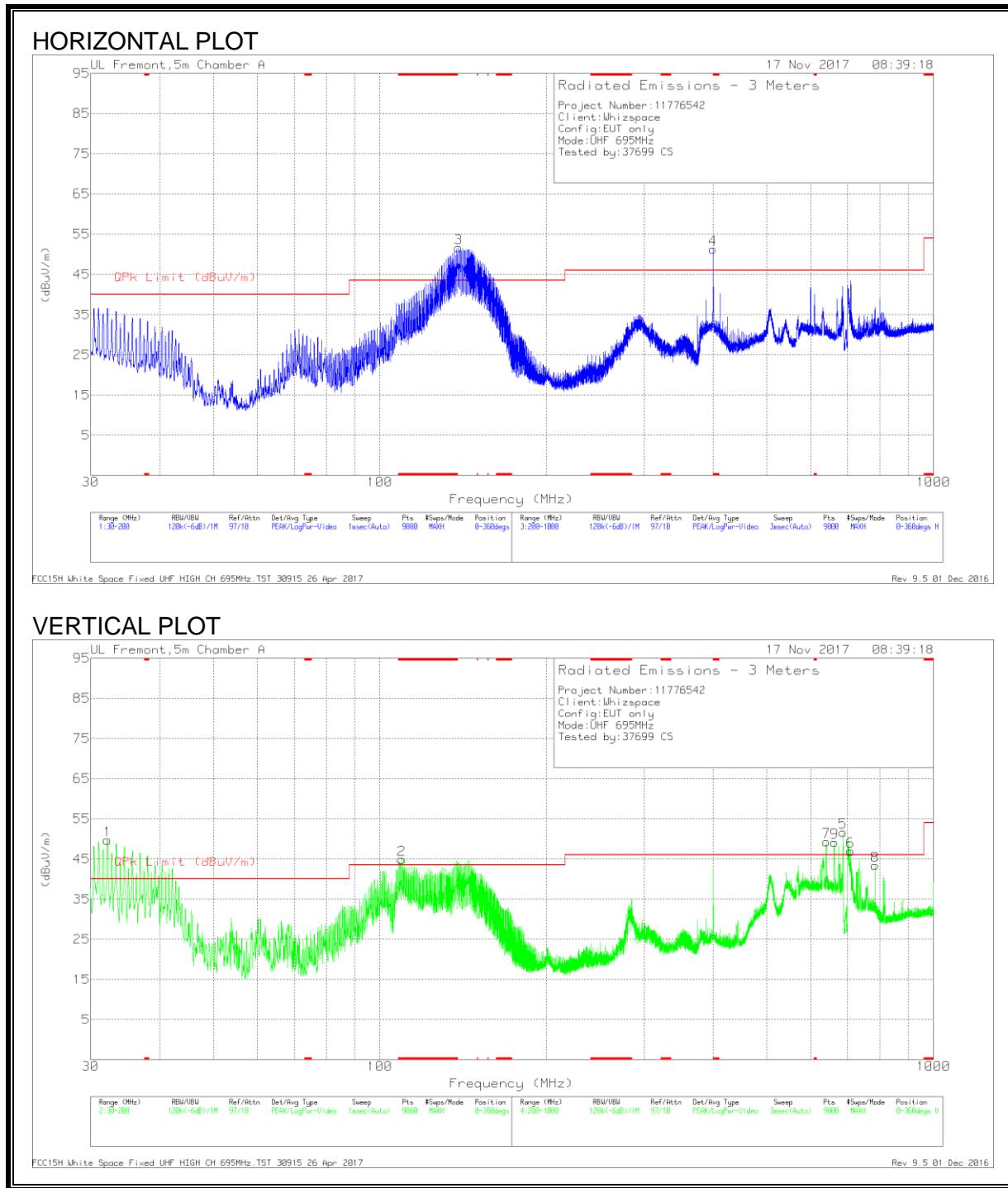
### MID CHANNEL DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 108.9756	55.24	Qp	16.5	-26.3	.2	45.64	-	-	336	102	V
4	* 399.993	55.65	Qp	19.6	-25	.2	50.45	-	-	127	221	H
1	* 31.0567	56.05	Qp	24.5	-27.3	.2	53.45	-	-	110	100	V
2	* 55.0809	68.8	Qp	11.1	-26.9	.2	53.2	-	-	283	100	V
3	* 141.7825	64.05	Qp	17	-25.9	.2	55.35	-	-	244	212	H
5	774.4927	44.03	Qp	25	-23.8	.2	45.43	46	-.57	112	132	V

\* - The emissions noted by \* were observed during the digital device (Part 15 Subpart B) measurements with the transceiver disabled and are therefore subject to the Part 15 B limits. This is a Class A digital device and the digital device emissions comply with the Class A limits.

Qp - Quasi-Peak detector

**BEYOND ADJACENT CHANNEL (HIGH CHANNEL)**



## HIGH CHANNEL DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 109.5337	52.09	Qp	16.6	-26.3	0	42.39	-	-	360	110	V
4	* 400.0074	55.73	Qp	19.6	-25	0	50.33	-	-	116	187	H
1	* 32.2135	56.74	Qp	23.6	-27.3	0	53.04	-	-	101	100	V
3	* 138.8364	62.66	Qp	17.3	-26	0	53.96	-	-	222	224	H
7	640.3527	29.11	Qp	23.6	-24.9	0	27.81	46	-18.19	170	170	V
9	662.0492	22.86	Qp	23.8	-24.7	0	21.96	46	-24.04	29	283	V
5	686.5314	22.84	Qp	24	-24.6	0	22.24	46	-23.76	336	208	V
6	708.8879	24.62	Qp	24.4	-24.4	0	24.62	46	-21.38	175	196	V
8	784.5176	41.7	Qp	25.2	-23.9	0	43	46	-3	114	125	V

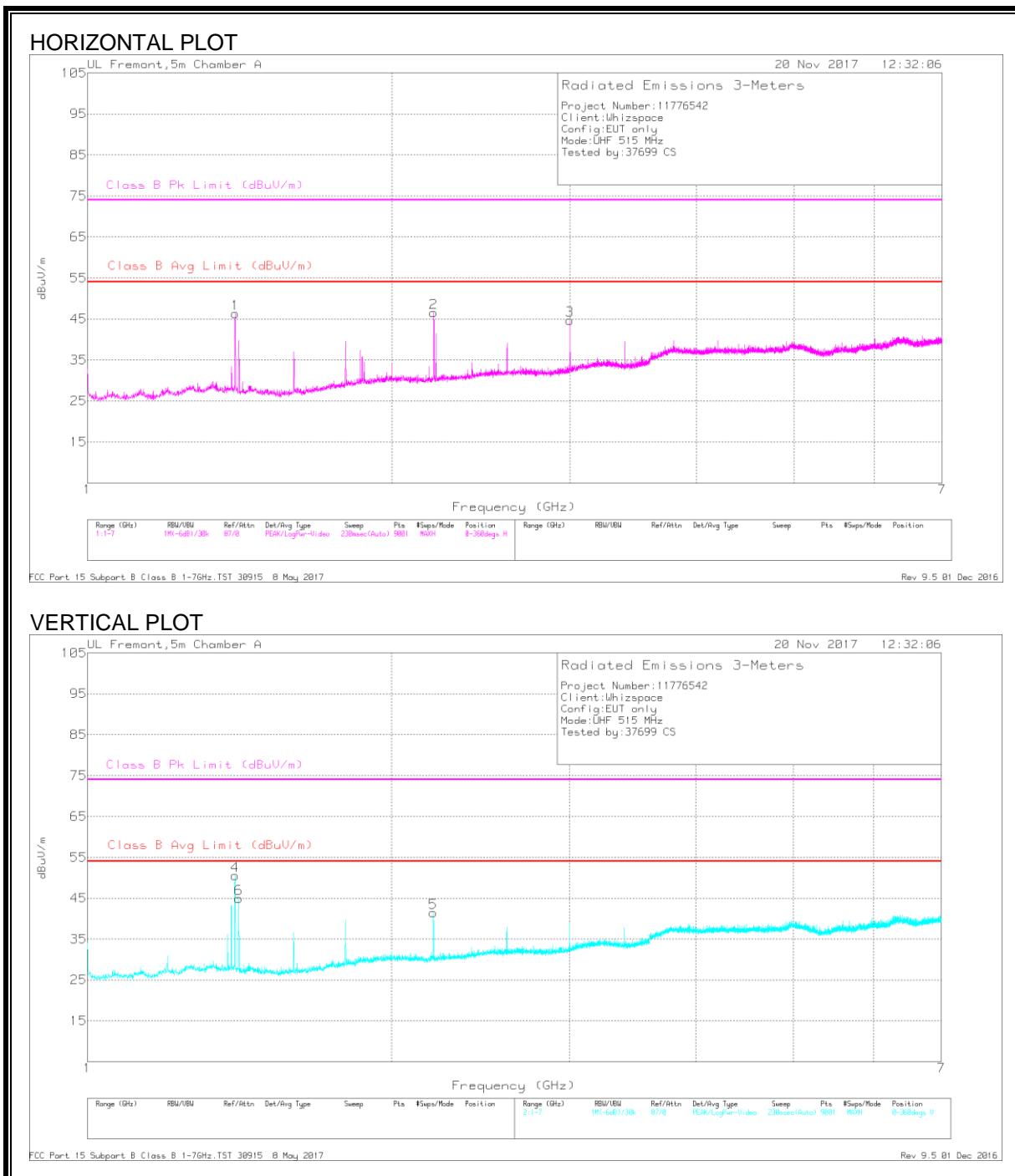
\* - The emissions noted by \* were observed during the digital device (Part 15 Subpart B) measurements with the transceiver disabled and are therefore subject to the Part 15 B limits. This is a Class A digital device and the digital device emissions comply with the Class A limits.

Qp - Quasi-Peak detector

## 10.2. TRANSMITTER ABOVE 1GHz

### 10.2.1. HARMONICS AND SPURIOUS EMISSIONS IN THE UHF BAND

#### LOW CHANNEL



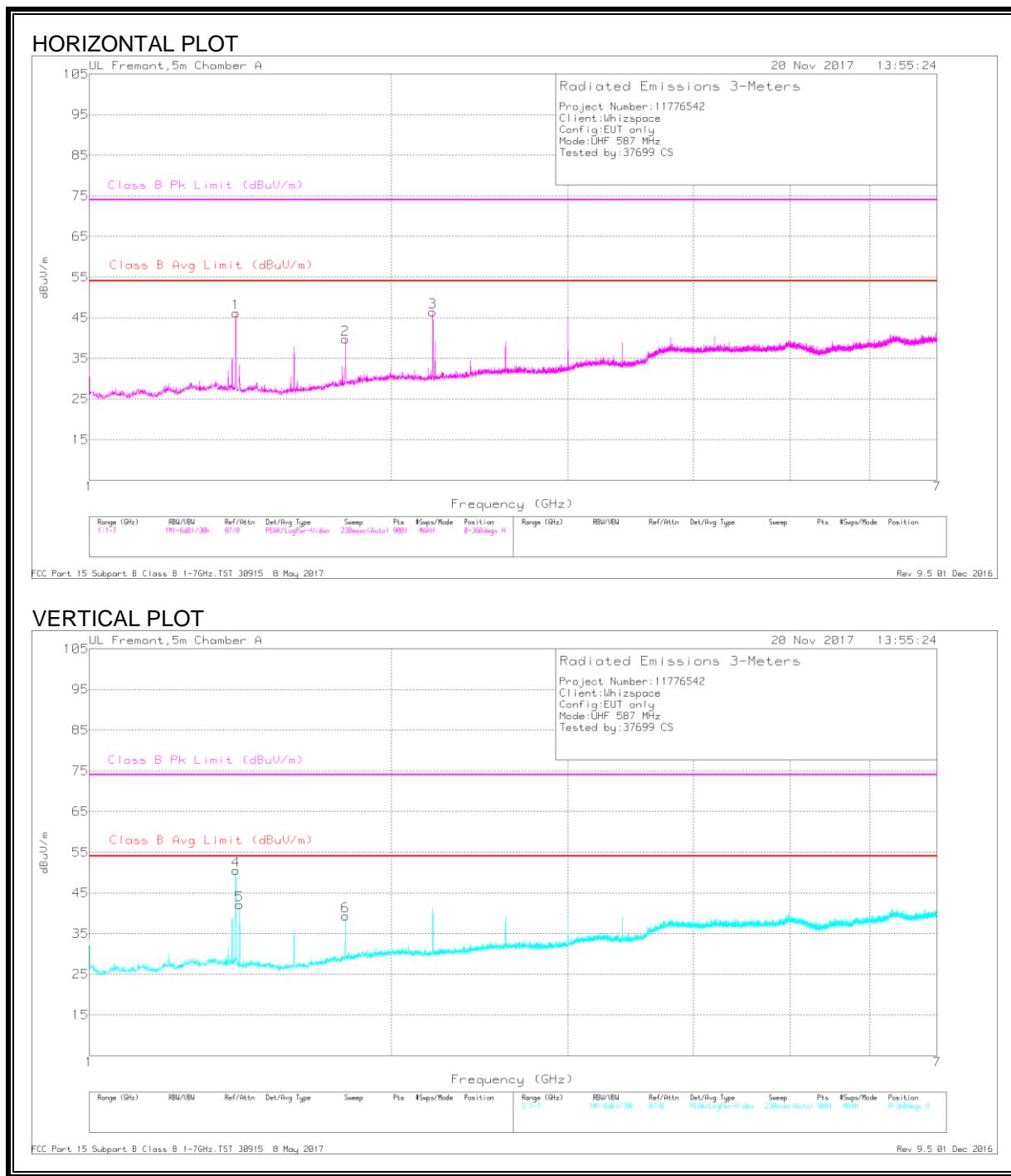
## LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb/Fltr/Pad (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av Margin (dB)	Class B Pk Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.4	44.47	Pk	28.6	-23.3	49.77	-	-	74	-24.23	202	247	H
	1.4	42.54	Av	28.6	-23.3	47.84	54	-6.16	-	-	202	247	H
4	1.4	46.95	Pk	28.6	-23.3	52.25	-	-	74	-21.75	151	119	V
	1.4	45.4	Av	28.6	-23.3	50.7	54	-3.3	-	-	151	119	V
6	1.412	41.11	Pk	28.6	-23.3	46.41	-	-	74	-27.59	159	151	V
	1.412	18.93	Av	28.6	-23.3	24.23	54	-29.77	-	-	159	151	V
2	2.2	42.49	Pk	31.1	-23.4	50.19	-	-	74	-23.81	188	243	H
	2.2	39.35	Av	31.1	-23.4	47.05	54	-6.95	-	-	188	243	H
5	2.2	38.23	Pk	31.1	-23.4	45.93	-	-	74	-28.07	199	103	V
	2.2	33.44	Av	31.1	-23.4	41.14	54	-12.86	-	-	199	103	V
	3	38.32	Pk	32.3	-21.5	49.12	-	-	74	-24.88	137	103	H
	3	33.61	Av	32.3	-21.5	44.41	54	-9.59	-	-	137	103	H

Pk - Peak detector

Av - Average detection

## MID CHANNEL



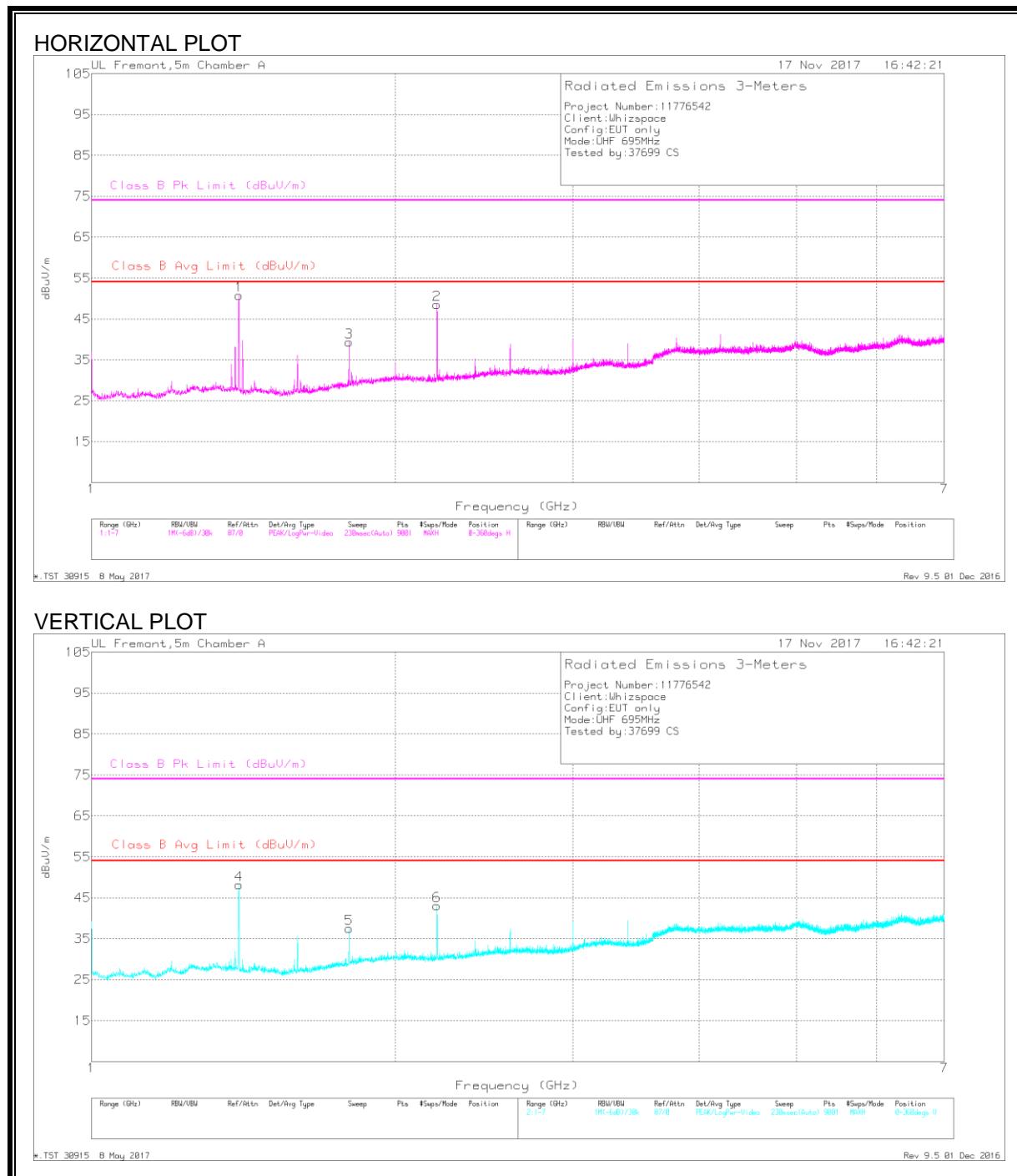
### MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Class B Avg Limit (dBuV/m)	Av Margin (dB)	Class B Pk Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.4	44.61	Pk	28.6	-23.3	49.91	-	-	74	-24.09	200	244	H
	1.4	42.42	Av	28.6	-23.3	47.72	54	-6.28	-	-	200	244	H
4	1.4	46.91	Pk	28.6	-23.3	52.21	-	-	74	-21.79	151	119	V
	1.4	45.38	Av	28.6	-23.3	50.68	54	-3.32	-	-	151	119	V
5	1.412	39.96	Pk	28.6	-23.3	45.26	-	-	74	-28.74	179	152	V
	1.412	18.59	Av	28.6	-23.3	23.89	54	-30.11	-	-	179	152	V
2	1.8	37.14	Pk	30.2	-23.3	44.04	-	-	74	-29.96	157	104	H
	1.8	32.12	Av	30.2	-23.3	39.02	54	-14.98	-	-	157	104	H
6	1.8	38.95	Pk	30.2	-23.2	45.95	-	-	74	-28.05	125	357	V
	1.8	34.79	Av	30.2	-23.2	41.79	54	-12.21	-	-	125	357	V
3	2.2	42.38	Pk	31.1	-23.4	50.08	-	-	74	-23.92	188	251	H
	2.2	39.46	Av	31.1	-23.4	47.16	54	-6.84	-	-	188	251	H

Pk - Peak detector

Av - Average detection

## HIGH CHANNEL



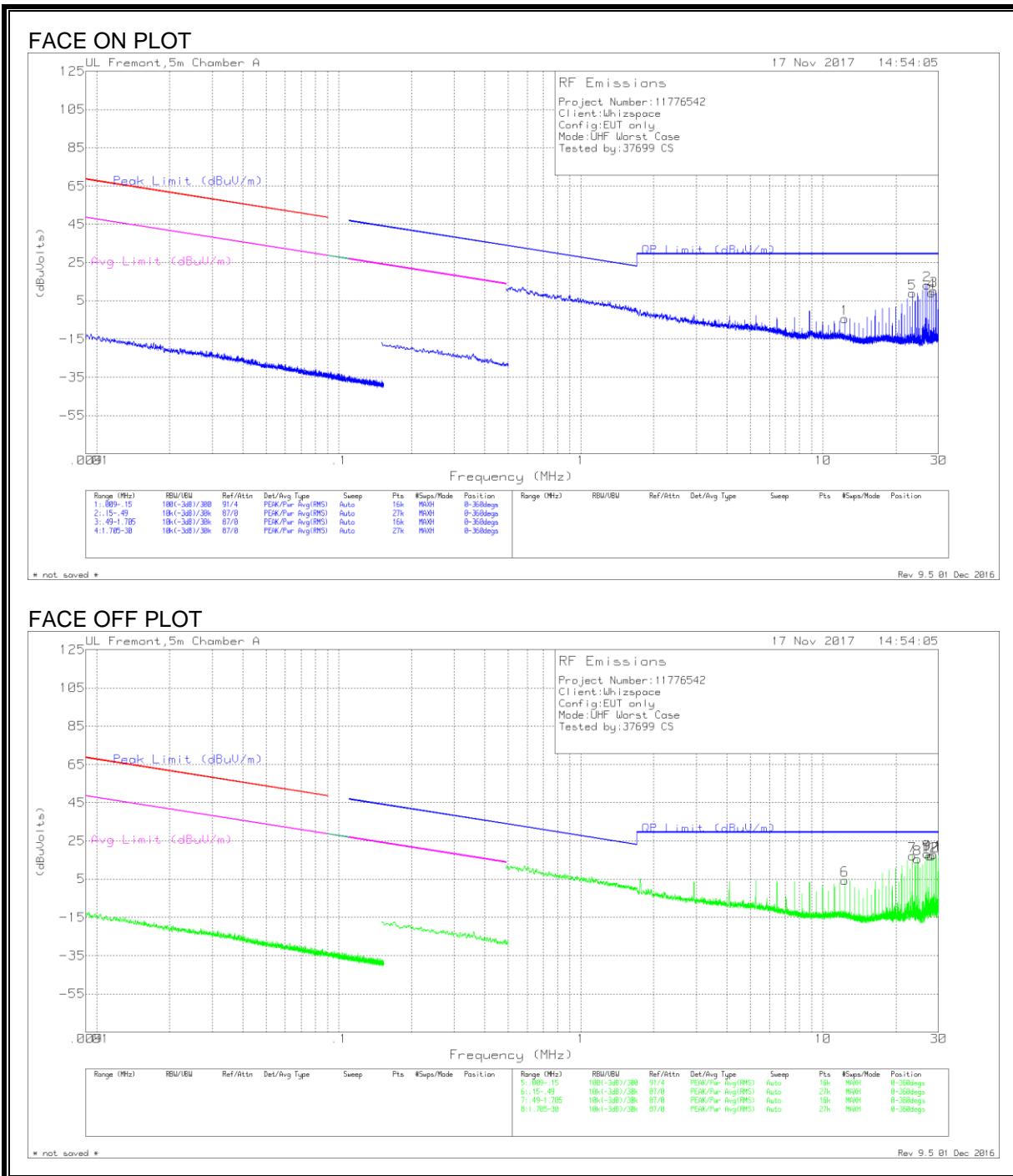
## HIGH CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Class B Avg Limit (dBuV/m)	Av Margin (dB)	Class B Pk Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.4	48.03	Pk	28.6	-23.3	53.33	-	-	74	-20.67	187	160	H
	1.4	45.9	Av	28.6	-23.3	51.2	54	-2.8	-	-	187	160	H
4	1.4	47.63	Pk	28.6	-23.3	52.93	-	-	74	-21.07	150	327	V
	1.4	44.68	Av	28.6	-23.3	49.98	54	-4.02	-	-	150	327	V
3	1.8	38.07	Pk	30.2	-23.3	44.97	-	-	74	-29.03	192	147	H
	1.8	33.31	Av	30.2	-23.3	40.21	54	-13.79	-	-	192	147	H
5	1.8	39.68	Pk	30.2	-23.3	46.58	-	-	74	-27.42	134	301	V
	1.8	36.08	Av	30.2	-23.3	42.98	54	-11.02	-	-	134	301	V
2	2.2	43.67	Pk	31.1	-23.4	51.37	-	-	74	-22.63	172	190	H
	2.2	41.17	Av	31.1	-23.4	48.87	54	-5.13	-	-	172	190	H
6	2.2	40	Pk	31.1	-23.4	47.7	-	-	74	-26.3	158	238	V
	2.2	36.23	Av	31.1	-23.4	43.93	54	-10.07	-	-	158	238	V

Pk - Peak detector

Av - Average detection

### 10.3. WORST-CASE TRANSMITTER BELOW 30MHz



**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	12.30447	20.54	Pk	14.7	.5	-40	-4.26	29.5	-33.76	0-360
6	12.305	29.34	Pk	14.7	.5	-40	4.54	29.5	-24.96	0-360
5	23.43476	34.85	Pk	13.5	.7	-40	9.05	29.5	-20.45	0-360
7	23.43738	42.95	Pk	13.5	.7	-40	17.15	29.5	-12.35	0-360
8	24.60694	41.79	Pk	13	.7	-40	15.49	29.5	-14.01	0-360
9	26.94975	44.45	Pk	13	.8	-40	18.25	29.5	-11.25	0-360
2	26.95237	39.45	Pk	13	.8	-40	13.25	29.5	-16.25	0-360
12	27.5361	43.37	Pk	13.1	.8	-40	17.27	29.5	-12.23	0-360
4	28.11984	35.43	Pk	13.1	.8	-40	9.33	29.5	-20.17	0-360
10	28.12246	43.17	Pk	13.1	.8	-40	17.07	29.5	-12.43	0-360
11	28.70777	44	Pk	13.2	.8	-40	18	29.5	-11.5	0-360
3	28.70882	36.33	Pk	13.2	.8	-40	10.33	29.5	-19.17	0-360

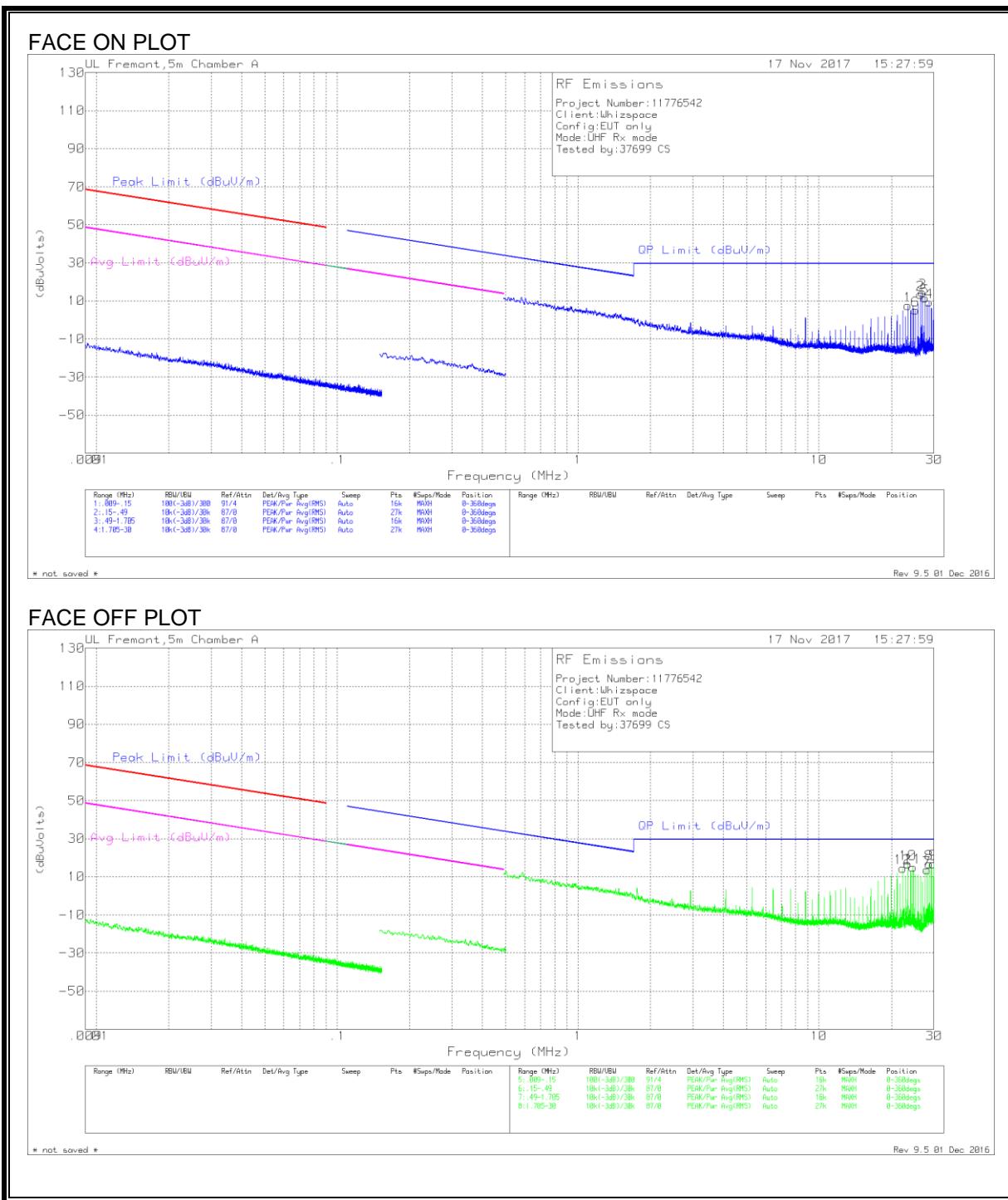
Pk - Peak detector

NOTE: KDB 414788 OATS and Chamber Correlation Justification;

Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

-OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

## 10.4. WORST-CASE RECEIVER SPURIOUS BELOW 30MHz



**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV /m)	Margin (dB)	Azimuth (Degs)
12	22.26152	39.8	Pk	14.1	.7	-40	14.6	29.5	-14.9	0-360
1	23.43423	33.47	Pk	13.5	.7	-40	7.67	29.5	-21.83	0-360
10	23.43476	42.68	Pk	13.5	.7	-40	16.88	29.5	-12.62	0-360
11	24.6059	41.3	Pk	13	.7	-40	15	29.5	-14.5	0-360
6	25.19435	31.62	Pk	12.9	.7	-40	5.22	29.5	-24.28	0-360
2	26.36549	39.76	Pk	12.9	.8	-40	13.46	29.5	-16.04	0-360
3	26.94975	40.64	Pk	13	.8	-40	14.44	29.5	-15.06	0-360
5	27.53401	37.72	Pk	13.1	.8	-40	11.62	29.5	-17.88	0-360
7	28.11879	39.88	Pk	13.1	.8	-40	13.78	29.5	-15.72	0-360
4	28.70882	35.32	Pk	13.2	.8	-40	9.32	29.5	-20.18	0-360
8	28.70986	42.78	Pk	13.2	.8	-40	16.78	29.5	-12.72	0-360
9	29.87943	43.19	Pk	13	.8	-40	16.99	29.5	-12.51	0-360

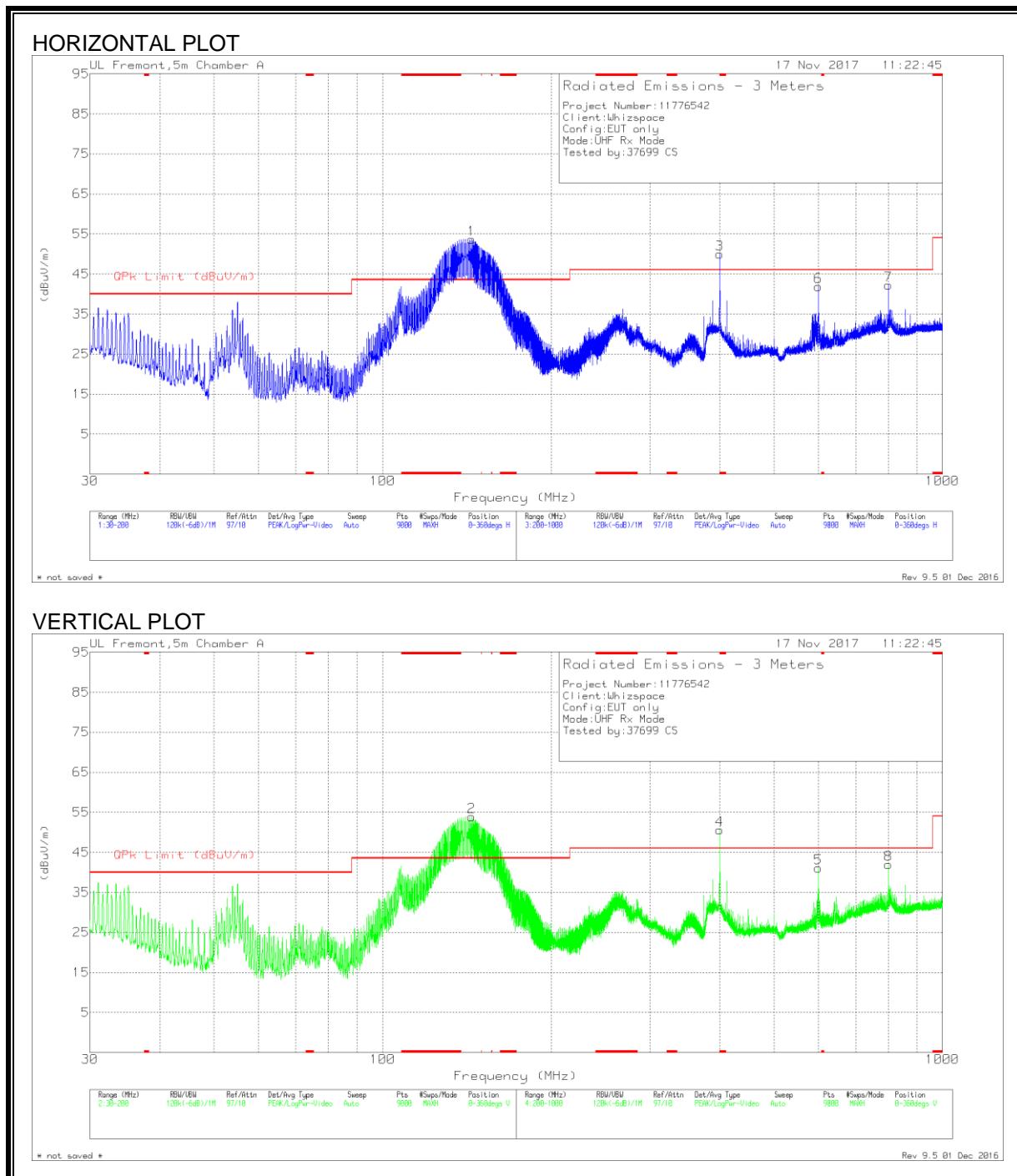
NOTE: KDB 414788 OATS and Chamber Correlation Justification;

-Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

-OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

## 10.5. WORST CASE RECEIVER SPURIOUS EMISSIONS BELOW 1 GHz

### 10.5.1. UHF BAND



**DATA**

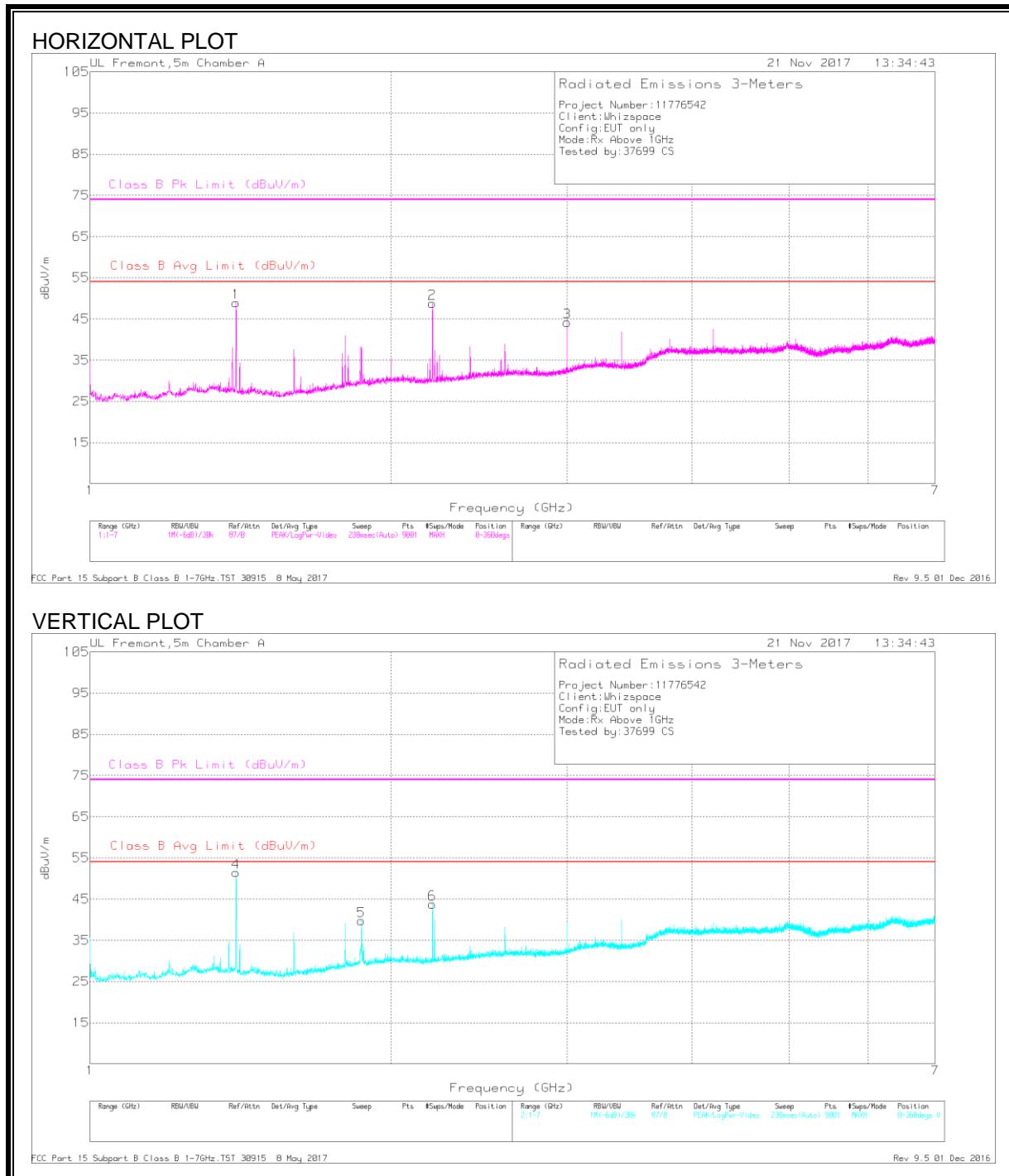
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Fltr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 399.9978	55.43	Qp	19.6	-25	.1	50.13	-	-	128	318	H
4	* 399.9849	54.98	Qp	19.6	-25	.1	49.68	-	-	134	104	V
1	*144.1435	62.58	Qp	16.9	-25.9	.1	53.68	-	-	243	119	H
2	*144.1514	62.59	Qp	16.9	-25.9	.1	53.69	-	-	236	117	V
6	599.9398	36.08	Qp	22.3	-25	.1	33.48	46	-12.52	54	116	V
5	599.9451	37.36	Qp	22.3	-25	.1	34.76	46	-11.24	84	253	H
7	799.9861	34.79	Qp	25.4	-23.8	.1	36.49	46	-9.51	140	224	V
8	799.9919	34.96	Qp	25.4	-23.8	.1	36.66	46	-9.34	159	318	H

\* - The emissions noted by \* were observed during the digital device (Part 15 Subpart B) measurements with the transceiver disabled and are therefore subject to the Part 15 B limits. This is a Class A digital device and the digital device emissions comply with the Class A limits.

Qp - Quasi-Peak detector

## 10.6. WORST CASE RECEIVER SPURIOUS EMISSIONS ABOVE 1 GHz

### 10.6.1. UHF BAND



**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Ftr/P ad (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av Margin (dB)	Class B Pk Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.4	45.28	Pk	28.6	-23.3	50.58	-	-	74	-23.42	84	122	H
	1.4	43.39	Av	28.6	-23.3	48.69	54	-5.31	-	-	84	122	H
4	1.4	47.14	Pk	28.6	-23.3	52.44	-	-	74	-21.56	327	101	V
	1.4	45.59	Av	28.6	-23.3	50.89	54	-3.11	-	-	327	101	V
5	1.869	31.19	Pk	31	-23.2	38.99	-	-	74	-35.01	345	387	V
	1.869	18.04	Av	31	-23.2	25.84	54	-28.16	-	-	345	387	V
2	2.2	43.33	Pk	31.1	-23.4	51.03	-	-	74	-22.97	353	199	H
	2.2	40.85	Av	31.1	-23.4	48.55	54	-5.45	-	-	353	199	H
6	2.2	40.26	Pk	31.1	-23.4	47.96	-	-	74	-26.04	346	232	V
	2.2	36.72	Av	31.1	-23.4	44.42	54	-9.58	-	-	346	232	V
3	3	37.02	Pk	32.3	-21.5	47.82	-	-	74	-26.18	309	102	H
	3	32.12	Av	32.3	-21.5	42.92	54	-11.08	-	-	309	102	H

Pk - Peak detector

Av - Average detection

## 11. AC MAINS LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

### TEST PROCEDURE

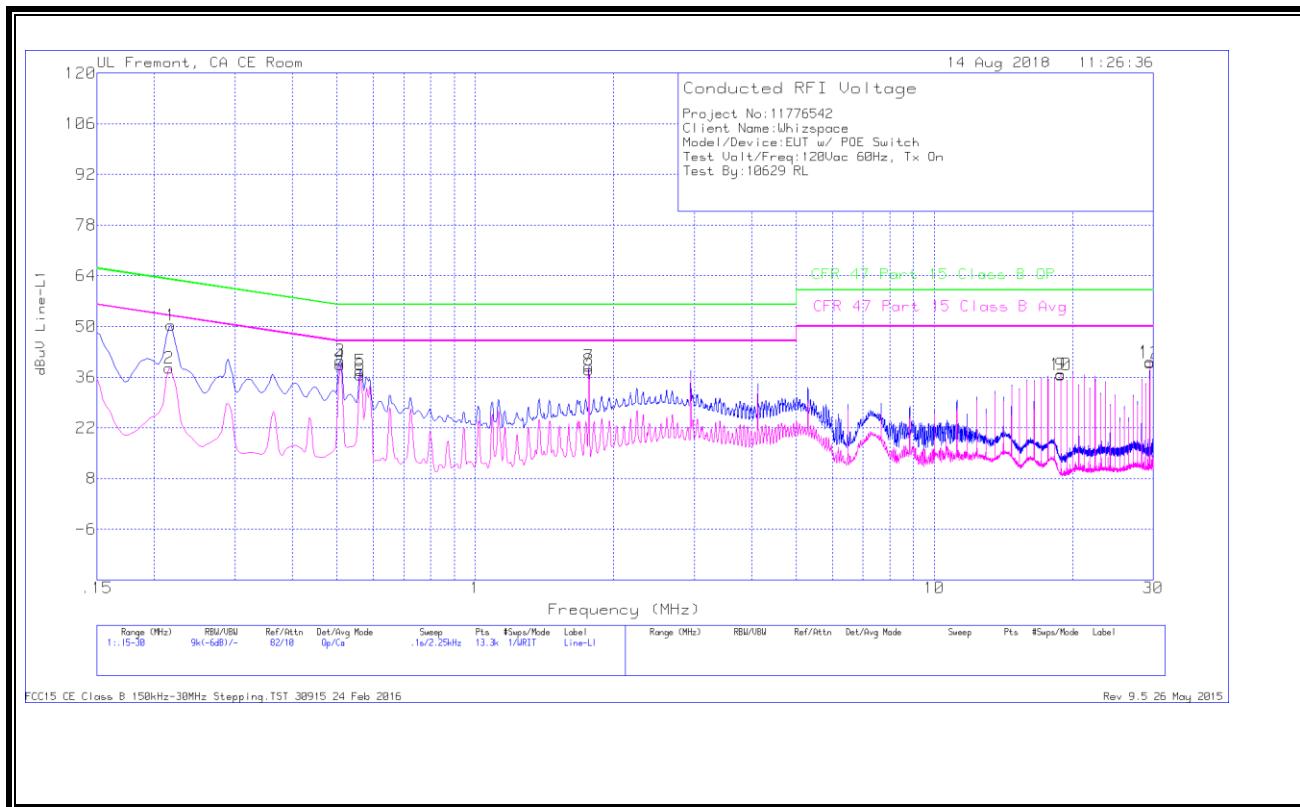
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

## 11.1. UHF MODE

### 11.1.1. LINE 1 RESULTS



## DATA

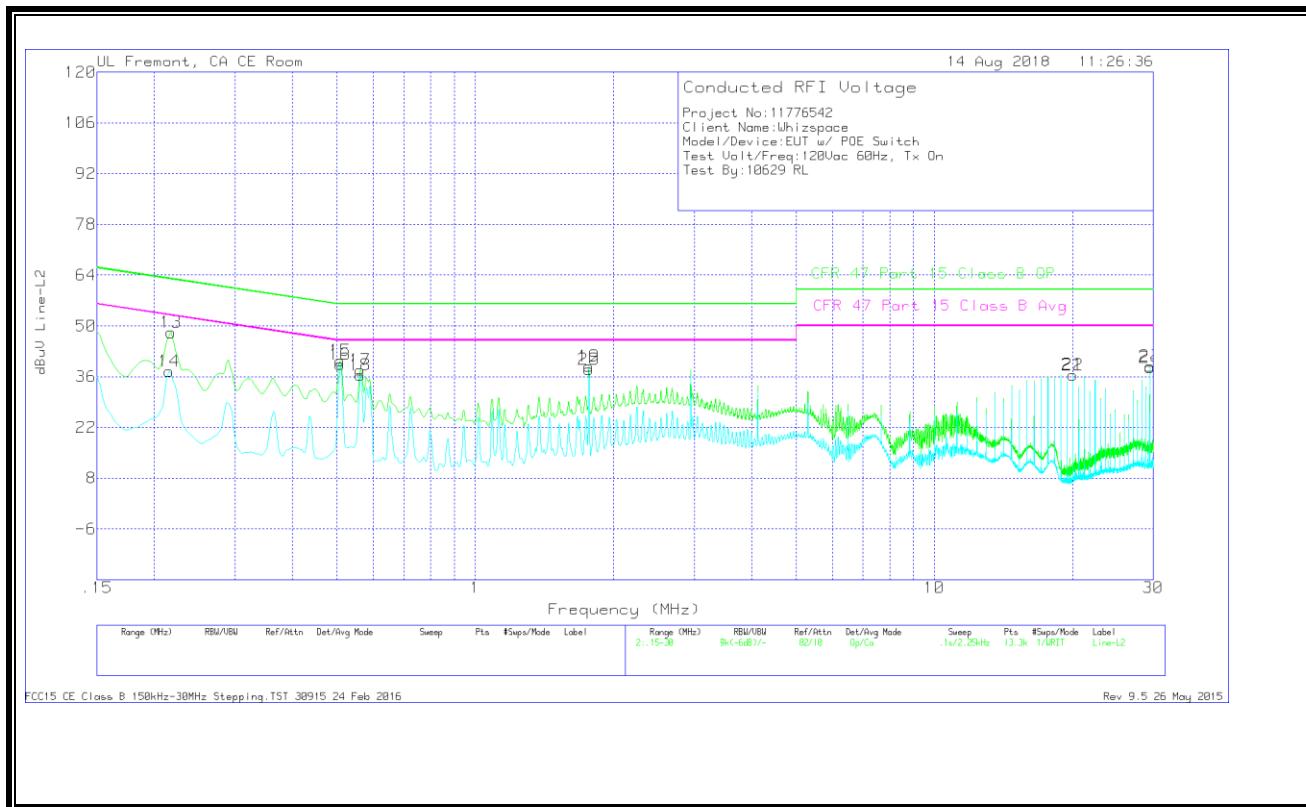
Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.2175	40.23	Qp	0	0	10.1	50.33	62.91	-12.58	-	-
2	.21525	28.41	Ca	0	0	10.1	38.51	-	-	53	-14.49
3	.50775	30.59	Qp	0	0	10.1	40.69	56	-15.31	-	-
4	.50775	29.36	Ca	0	0	10.1	39.46	-	-	46	-6.54
5	.56175	27.81	Qp	0	0	10.1	37.91	56	-18.09	-	-
6	.56175	26.46	Ca	0	0	10.1	36.56	-	-	46	-9.44
7	1.76775	28.84	Qp	0	.1	10.1	39.04	56	-16.96	-	-
8	1.76775	27.78	Ca	0	.1	10.1	37.98	-	-	46	-8.02
9	18.86325	26.13	Qp	.1	.3	10.3	36.83	60	-23.17	-	-
10	18.86325	26	Ca	.1	.3	10.3	36.7	-	-	50	-13.3
11	29.472	29.34	Qp	.1	.4	10.4	40.24	60	-19.76	-	-
12	29.472	29.05	Ca	.1	.4	10.4	39.95	-	-	50	-10.05

Qp - Quasi-Peak detector

Ca - CISPR average detection

### 11.1.2. LINE 2 RESULTS



### DATA

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.2175	38.08	Qp	0	0	10.1	48.18	62.91	-14.73	-	-
14	.21525	27.45	Ca	0	0	10.1	37.55	-	-	53	-15.45
15	.50775	30.39	Qp	0	0	10.1	40.49	56	-15.51	-	-
16	.50775	29.25	Ca	0	0	10.1	39.35	-	-	46	-6.65
17	.56175	27.69	Qp	0	0	10.1	37.79	56	-18.21	-	-
18	.56175	26.35	Ca	0	0	10.1	36.45	-	-	46	-9.55
19	1.76775	28.75	Qp	0	.1	10.1	38.95	56	-17.05	-	-
20	1.76775	27.74	Ca	0	.1	10.1	37.94	-	-	46	-8.06
21	20.0445	25.83	Qp	.1	.3	10.3	36.53	60	-23.47	-	-
22	20.0445	25.68	Ca	.1	.3	10.3	36.38	-	-	50	-13.62
23	29.4765	27.93	Qp	.1	.4	10.4	38.83	60	-21.17	-	-
24	29.4765	27.6	Ca	.1	.4	10.4	38.5	-	-	50	-11.5

Qp - Quasi-Peak detector

Ca - CISPR average detection

## 12. FIXED BASE STATION DATABASE CERTIFICATION TESTS

### Test Procedure

Both base and client software and hardware are identical the only difference is the deployment location. The test requirements were done on the base except for a few scenarios where client was also tested. Database used for this tests was SpectrumBridge (<http://whitespaces.spectrumbridge.com>).

### 12.1. Fixed WSD Registration

#### CLAUSES

- §15.713(g)(3)

#### REQUIREMENT

- The Fixed WSD must provide the required information to the database and obtain a successful registration.
- The management software must be able to collect the data listed below. Confirm that the EUT will not operate unless a successful registration notification is received from the database.
  - i. FCC ID
  - ii. Serial Number
  - iii. Location Coordinates
  - iv. Location uncertainty with 95% accuracy (covered by section 12.8 in this report)
  - v. Antenna Height AGL (must not be > 30 m)
  - vi. Contact information (Device owner and device contact)
- For a fixed WSD without a direct connection to the internet, confirm that registration through a registered fixed device takes place only on a channel available to that registered device.
- **PRE-REGISTRATION PROCESS**
- Both the Base and Client Station are registered using an authorized database via the Internet at the depot facility. Following registration a common available channel between each site is selected as the initial transmitting channel for each site. This channel will be the initial “listening” channel for the Remote Station

### 12.1.1. SUCCESSFUL REGISTRATION

#### TEST PROCEDURE

- Configure the base EUT with correct registration information:
  - The FCC ID and serial number are permanently programmed to the device and cannot be modified.
  - Known acceptable geographic coordinates, antenna height AGL and contact information were entered into the EUT.
- The base EUT automatically contacts the TVWS Database to perform device registration.
- Upon successful registration, the base EUT automatically contacts the TVWS Database to retrieve device channel list.
- Selects a channel from the channel list returned from the TVWS Database and start normal radio operation on the selected channel.
- Verify base output signal on the selected channel on the spectrum analyzer.

#### RESULTS

The EUT successfully registered when correct registration information was submitted to the TVWS Database. The EUT transmission was observed on the spectrum analyzer on the selected TV channel from the returned channel list from the TVWS Database.

Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	37699 CS	11/20/17

Successful Device Registration with Database and channel selection

**Device Capability**

**Host**

Host Address :  Host Port Number :  Regulatory Domain :  ▼

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :  Device Type :  ▼ Antenna Height Agl Meters :

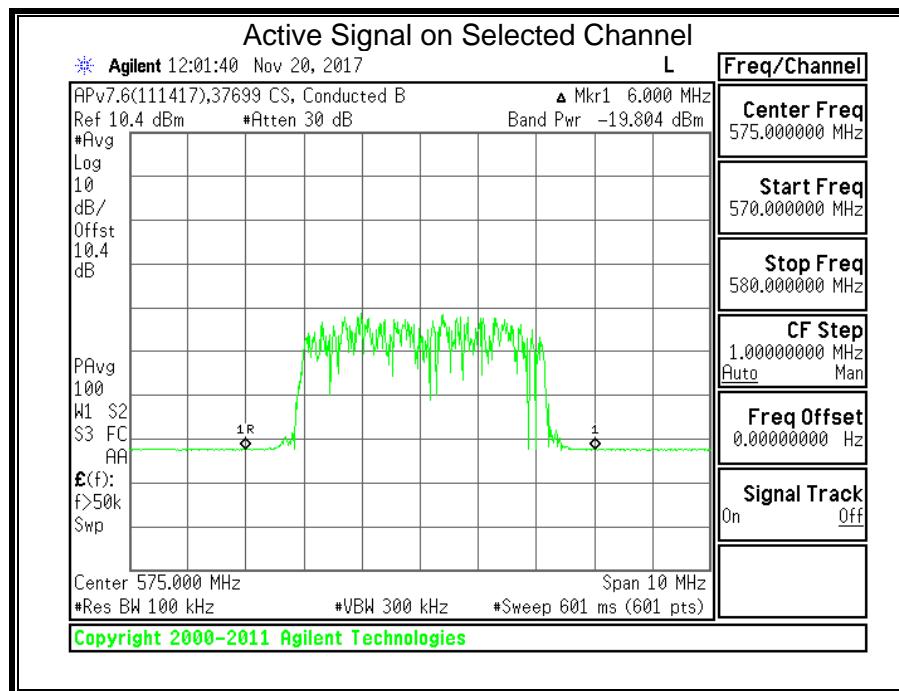
**Contact Us**

Contact City :  Contact Country :  ▼ Contact Email :  Contact Name :  Contact Phone :  Contact State :  Contact Street :  Contact Zip :  Country Code :  ▼ Device Owner :

**Database Information**

**Registration Successful!!**

Start Date :	Mon Nov 20 19:50:23 2017
Stop Date :	Wed Nov 22 19:50:23 2017
Channel Count :	21
Channel List :	2,5,6,9,13,14,15,16,29,30,31,32,33,40,41,42,43,44,49,50,51
Refresh In :	10



### 12.1.2. FAILED REGISTRATION – Location Coordinates

#### TEST PROCEDURE

- Configure the EUT with restricted coordinates: LAT=40° 34' 18.9264" (40.571924), LNG=-130° 0' 0" (-130) which is a location that is prohibited to transmit
- Observe the base EUT registration failure indicated by the database message

#### RESULT

The base EUT failed to register when restricted coordinates information were submitted to the TVWS Database.

Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	37699 CS	11/20/17

### Failed Registration

**Device Capability**

**Host**

Host Address :   
Host Port Number :   
Regulatory Domain :

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :   
Device Type :  Antenna Height Agl Meters :

**Contact Us**

Contact City :   
Contact Country : ▼  
Contact Email :   
Contact Name :   
Contact Phone :   
Contact State :   
Contact Street :   
Contact Zip :   
Country Code : ▼  
Device Owner :

**Query Configuration**

Output File :   
Preferred Channel :   
Time Interval :

**Database Information**

**Registration Failed!**

Start Date :	Mon Nov 20 18:20:03 2017
Error Type :	Registration
Error Code :	9
Error Information :	Location is outside registered domain.

### 12.1.3. FAILED REGISTRATION – ANTENNA HEIGHT AGL

#### TEST PROCEDURE

- Configure the EUT with antenna height Above Ground Level (AGL) > 30 meters.
- Observe the base registration failure indicated by the database message.

#### RESULTS

The base EUT failed to register when it is set to a location with antenna AGL above the limit.

Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	37699 CS	11/20/17

Antenna AGL > 30m

Status

Network

Wireless

Geolocation Wireless

Route

Diagnostics

Commands

Geolocation DataBase

Results

Device Capability

System

## Device Capability

---

**Host**

Host Address :

Host Port Number :

Regulatory Domain : ▼

---

**Location**

Latitude :  Longitude :

---

**Device Information**

FccID :  Mfg Serial Number :

Device Type : ▼

Antenna Height Agl Meters :

---

**Contact Us**

Contact City :  Contact Country : ▼

Contact Email :

Contact Name :

Contact Phone :

Contact State :

Contact Street :

Contact Zip :

Country Code : ▼

Device Owner :

---

**Query Configuration**

---

Status

Network

Wireless

Geolocation Wireless

Route

Diagnostics

## Database Information

**Registration Failed!**

Start Date :	Mon Nov 20 18:29:25 2017
Error Type :	Registration
Error Code :	10
Error Information :	Antenna Height is above 30m.

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### 12.1.4. FAILED REGISTRATION –CONTACT INFORMATION

#### TEST PROCEDURE

- Configure the base EUT with missing contact information, e.g. email.
- The device software cannot proceed with registration and prompts user to enter the missing information.

#### RESULTS

Software didn't proceed with registration when contact information fields are missing.

Test Results			
Pass	Fail	Tested By	Test Date
☒	☐	37699 CS	11/20/17

Contact information missing field

Device Capability

Host

Host Address : tws-test.spectrumbridge.com  
Host Port Number : 443  
Regulatory Domain : United States

Location

Latitude : 43.939      Longitude : -120.559

Device Information

FccID : WMP-B-02      Mfg Serial Number : WZWM000000C  
Device Type : Fixed      Antenna Height Agl Meters : 25

Contact Us

Contact City : Singapore  
Contact Country : Singapore  
Contact Email : oswwhizspace.com

**!** Please include an @: in the email address. 'oswwhizspace.com' is missing an @.

Contact State : SG  
Contact Street : Blk 77 Ayer Rajah Crescent  
Contact Zip : 139954  
Country Code : United States  
Device Owner : Whizspace

Query Configuration

Output File : /root/gith/log/output.xml  
Preferred Channel : 17, 15, 19, 21, 23, 25, 27, 29  
Time Interval : 6

Update

## 12.2. FIXED WSD CHANNELS OF OPERATION

### CLAUSES

- §15.711(c)(2)(ii)

### REQUIREMENT

Confirm that the device only operates on channels provided by the database

### TEST PROCEDURE

- The base EUT geographic coordinates are entered at registration time and stored in the device. The device channel list request uses the same coordinates established at registration time. No separate coordinates can be entered for channel list request.
- The device requires professional installation and device registration information including device location will be entered by the professional installer.
- Once the registration is complete, upon power cycling the device will use the stored registration location for channel list request.

### RESULTS

The device only uses its registered location for channel list request. The device registered location will be established at installation time by a professional installer and cannot be altered after installation

Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	37699 CS	11/20/17

Channel list after successful registration

**Device Capability**

**Host**

Host Address :  Host Port Number :  Regulatory Domain :

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :  Device Type :  Antenna Height Agl Meters :

**Contact Us**

Contact City :  Contact Country :  Contact Email :  Contact Name :  Contact Phone :  Contact State :  Contact Street :  Contact Zip :  Country Code :  Device Owner :

**Query Configuration**

Output File :  Preferred Channel :  Time Interval :

**Database Information**

**Registration Successful!!**

Start Date :	Mon Nov 20 18:34:25 2017
Stop Date :	Wed Nov 22 18:34:25 2017
Channel Count :	21
Channel List :	2,5,6,9,13,14,15,16,29,30,31,32,33,40,41,42,43,44,49,50,51
Refresh In :	6

## 12.3. FIXED TVDB DATABASE UPDATE

### CLAUSES

- §15.711(h)

### REQUIREMENT

If a fixed or Mode II personal/portable TVBD fails to successfully contact the white space database during any given day, it may continue to operate until 11:59 p.m. of the following day at which time it must cease operations until it re-establishes contact with the white space database and re-verifies its list of available channels.

To simulate that the device fails to successfully contact the database, block access to the database from the WSD by removing connection to the database. All other radio functions, including internet connectivity should be maintained. Confirm that the WSD ceases operation by 11:59PM on the following day

### TEST PROCEDURE

- Set the base EUT to normal operation mode:
  - Enter proper registration information on the base.
  - Base contacts the TVWS to perform registration.
  - Base contacts the TVWS to retrieve channel list.
  - Select an operating channel from returned channel list.
  - Enable base transmission.
- Observe the base EUT output signal on the spectrum analyzer.
- Use a programmable router to block the database URL.
- Observe that there is no output signal from the base after 11:59 PM on the following day.

### RESULTS

During normal operation, the base and client channel lists are updated periodically by sending channel list requests to the TVWS Database. For test purposes this time period was shortened. After the database access was blocked, the next channel list requests failed and the EUTs stopped transmission immediately.

Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	37699 CS	05/03/17

Successful registration

**Device Capability**

**Host**

Host Address :  Host Port Number :  Regulatory Domain :  ▼

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :   
Device Type :  Antenna Height Agl Meters :

**Contact Us**

Contact City :  Contact Country :  ▼  
Contact Email :   
Contact Name :   
Contact Phone :   
Contact State :   
Contact Street :   
Contact Zip :   
Country Code :  Device Owner :

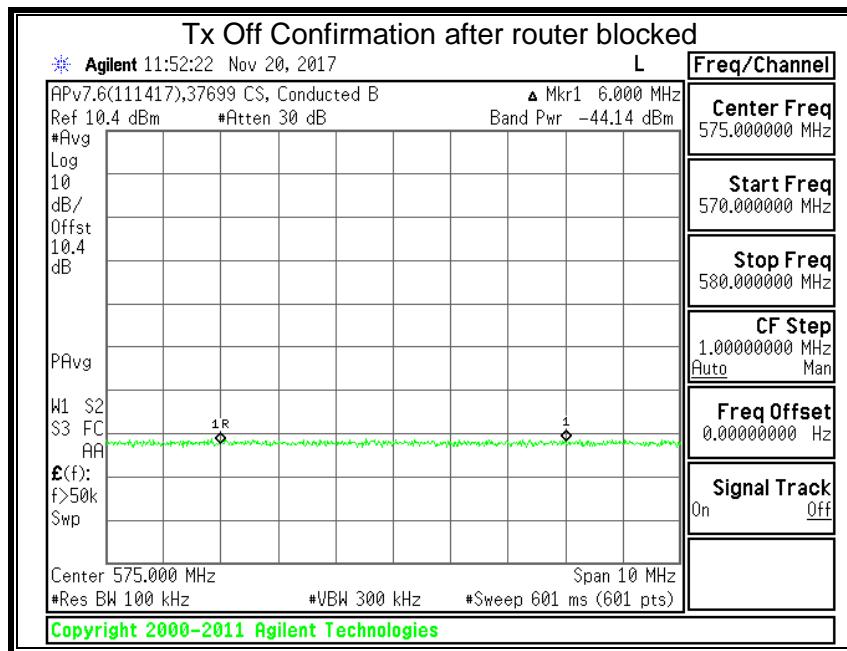
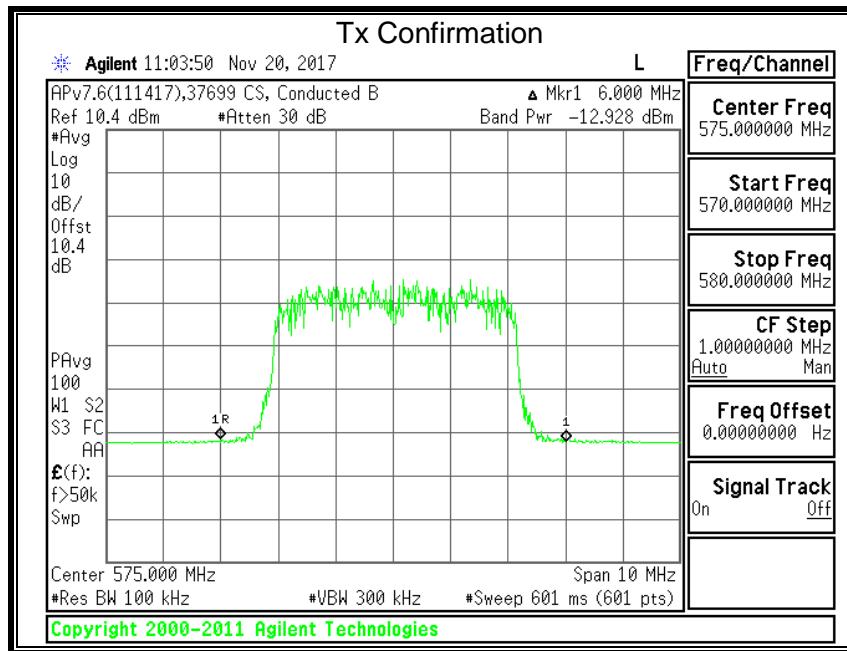
**Query Configuration**

Output File :   
Preferred Channel :   
Time Interval :

**Database Information**

**Registration Successful!**

Start Date :	Mon Nov 20 18:52:40 2017
Stop Date :	Wed Nov 22 18:52:40 2017
Channel Count :	21
Channel List :	2,5,6,9,13,14,15,16,29,30,31,32,33,40,41,42,43,44,49,50,51
Refresh In :	5



## 12.4. 48 HOUR CHANNEL SCHEDULING

### CLAUSES

- FCC §15.711(c)(2)(iii)
- FCC §15.713(a)(1)

### REQUIREMENT

Each fixed whitespace device shall access the database at least once a day to verify that the operating channels continue to remain available. Each fixed white space device must adjust its use of channels in accordance with channel availability schedule information provided by its database for the 48-hour period beginning at the time the device last accessed the database for a list of available channels.

After receiving an available channel list, register a low-power auxiliary device on the WSD operating channel to operate on an available channel and in the upcoming time period when the device will be tested. Repeat the available channel request after the update interval and in the time period when the low-power auxiliary device is scheduled to operate, and confirm that the low-power device is accounted for in the schedule. Using the system management software, confirm that the device changes channels at the scheduled time.

### TEST PROCEDURE

1. A lower power auxiliary devices are registered and scheduled for protection at both base and client locations
2. Allow the base and client EUT to enter normal operations prior to testing
3. Upon channel list request to the TVWS Database, the base EUT obtains the channel list expiration time reflecting the low power auxiliary device's registered protection period
4. The base EUT requests new channel list upon the channel list expiration time and the base EUT's current operation channel is no longer in the returned channel list
5. The base EUT ceases transmission on the protected channel immediately
6. Steps 3-5 were repeated for client EUT

Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	37699 CS	11/20/17 – 11/21/17

## 12.4.1. RESULTS FOR BASE

**Successful registration**



**Device Capability**

**Host**

Host Address :  Host Port Number :  Regulatory Domain :

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :  Device Type :  Antenna Height Agl Meters :

**Contact Us**

Contact City :  Contact Country :  Contact Email :  Contact Name :  Contact Phone :  Contact State :  Contact Street :  Contact Zip :  Country Code :  Device Owner :

**Query Configuration**

Output File :  Preferred Channel :  Time Interval :

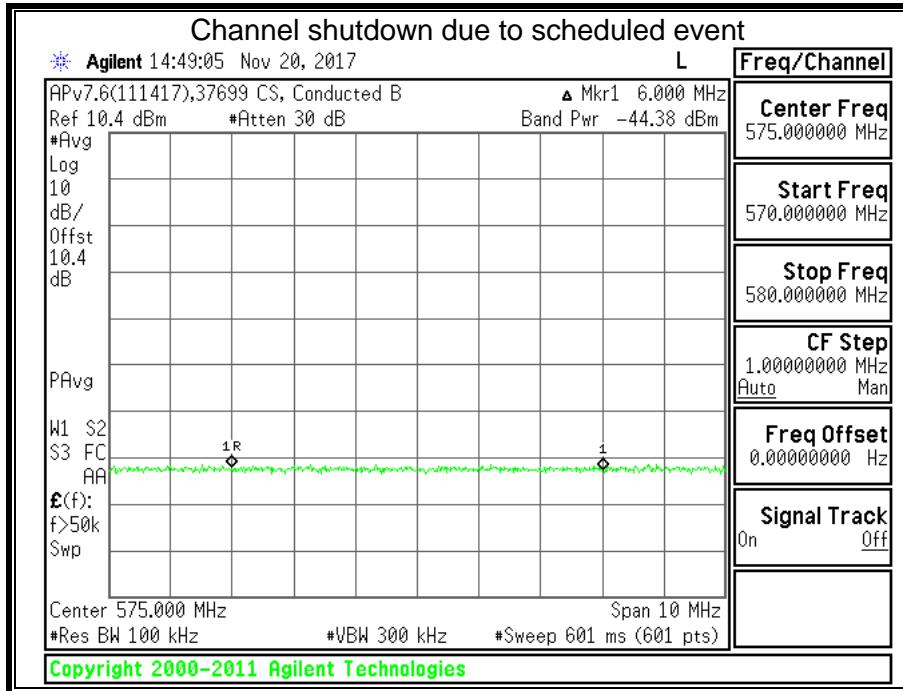
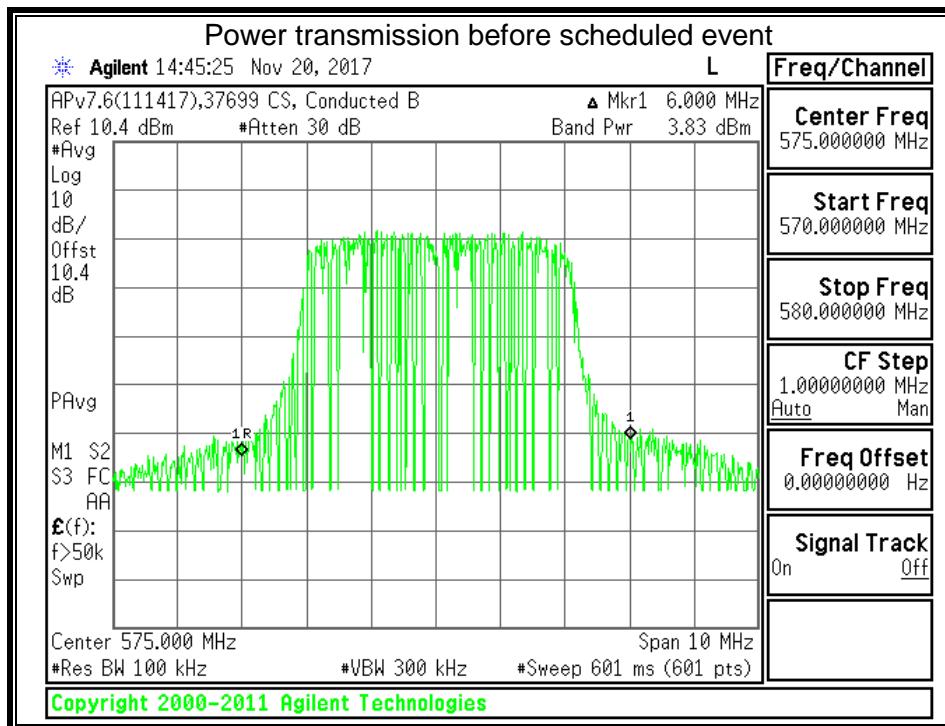
8.0.7/cgi-bin/status.cgi

**Database Information**

**Registration Successful!!**

Start Date	: Mon Nov 20 22:34:50 2017
Stop Date	: Wed Nov 22 22:34:50 2017
Channel Count	: 45
Channel List	: 2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,39,40,41,42,43,44,45,46,47,48,49,50,51
Refresh In	: 5





## 12.4.2. RESULTS FOR CLIENT

**Successful registration**



**Device Capability**

**Host**

Host Address :  Host Port Number :  Regulatory Domain :

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :  Device Type :  Antenna Height Agl Meters :

**Contact Us**

Contact City :  Contact Country :  Contact Email :  Contact Name :  Contact Phone :  Contact State :  Contact Street :  Contact Zip :  Country Code :  Device Owner :

**Query Configuration**

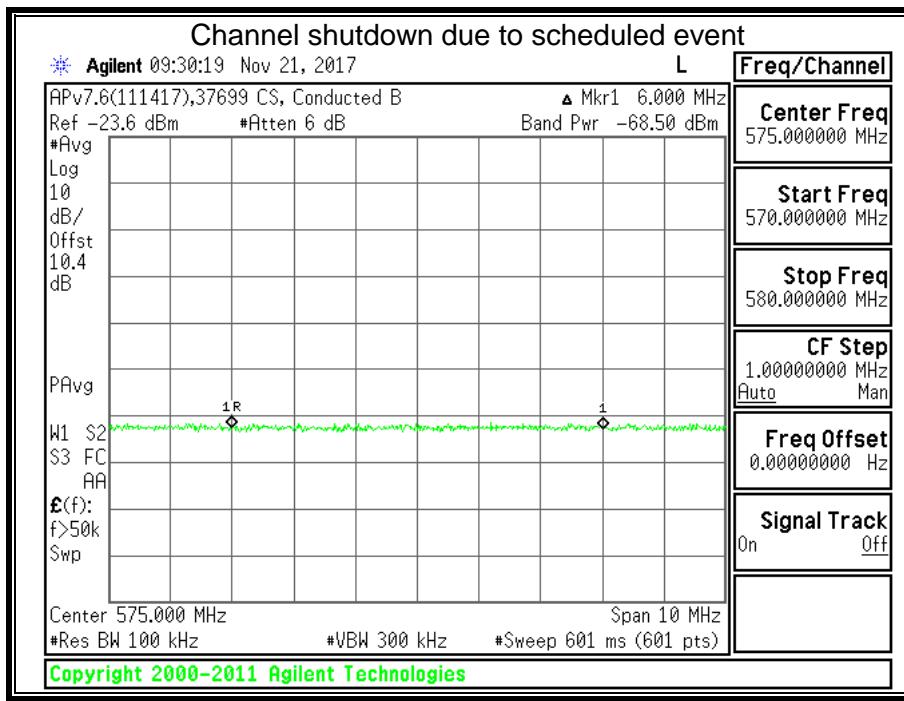
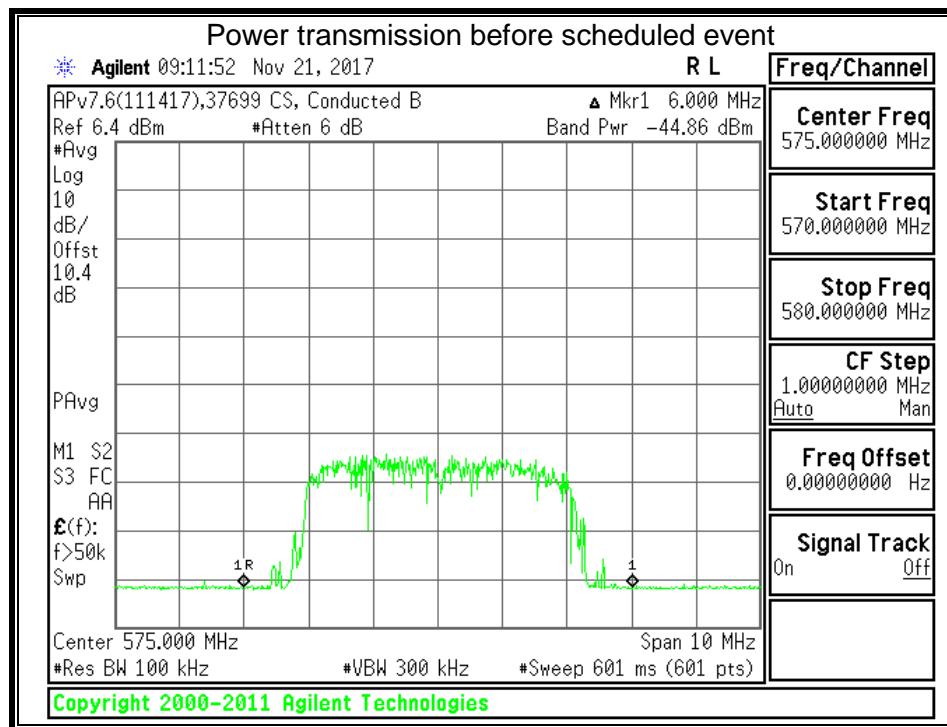
Output File :  Preferred Channel :  Time Interval :

**Database Information**

**Registration Successful!!**

Start Date :	Tue Nov 21 17:03:20 2017
Stop Date :	Thu Nov 23 17:03:20 2017
Channel Count :	21
Channel List :	2,5,6,9,13,14,15,16,29,30,31,32,33,40,41,42,43,44,49,50,51
Refresh In :	1





## 12.5. WSD CHANNEL AVAILABILITY

### CLAUSES

- FCC §15.707
- FCC §15.711(c)
- FCC §15.712

### REQUIREMENT

Confirm that WSD properly identifies itself as fixed or personal/portable to the database by comparing the channel list provided by the database with those allowable to the class of WSD under test. Confirm that the WSD is operating on a channel or channels from the list at the authorized power and cannot be made to operate on an unauthorized channel.

### TEST PROCEDURE

- Configure the base EUT with correct registration information.
- The base EUT automatically contacts the TVWS Database to perform device registration.
- Upon successful registration, base automatically contacts the TVWS Database to retrieve device channels.
- Confirm the base EUT software only allows the user to select a channel from the channel list returned from the database which are within the device operating frequency range
- Upon successful registration the database returns the allowable power according to the device type.
- Verify on the spectrum analyzer that the base EUT is operating on the selected channel

### RESULTS

The EUT operates on a channel from the authorized channel list and at the authorized power level. The EUT cannot select and operate on any channel other than those within the authorized channel list returned from the TVWS Database, which are within the device operating frequency range.

Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	37699 CS	11/20/17

Successful Device Registration with Database

**Device Capability**

**Host**

Host Address :  Host Port Number :  Regulatory Domain :  ▼

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :  Device Type :  ▼ Antenna Height Agl Meters :

**Contact Us**

Contact City :  Contact Country :  ▼ Contact Email :  Contact Name :  Contact Phone :  Contact State :  Contact Street :  Contact Zip :  Country Code :  ▼ Device Owner :

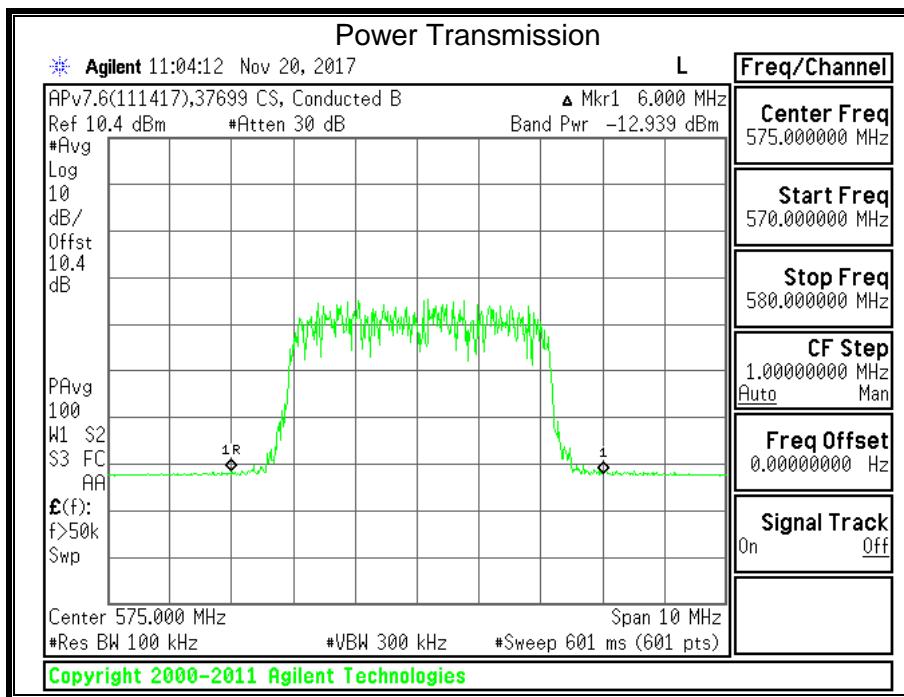
**Query Configuration**

Output File :  Preferred Channel :  Time Interval :

**Database Information**

**Registration Successful!!**

Start Date :	Mon Nov 20 18:48:34 2017
Stop Date :	Wed Nov 22 18:48:34 2017
Channel Count :	21
Channel List :	2,5,6,9,13,14,15,16,29,30,31,32,33,40,41,42,43,44,49,50,51
Refresh In :	2



Note 575MHz corresponds to Channel 31. Seen on the allowed list of operating channels.

## 12.6. SECURITY

### CLAUSES

- §15.715(f)
- §15.713(i)
- §15.711(j)

### REQUIREMENT

The device operations procedures must include documentation with a detailed explanation of the following for each database the device is expected to work with:

- i. What communication protocol is used between the database and the WSD?
- ii. How are communications initiated?
- iii. How does the WSD validate messages from the database?
- iv. How does the device handle failure to communicate or authenticate the database?
- v. How does the database validate messages from a WSD?
- vi. What encryption method is used?
- vii. How does the database ensure secure registration of protected devices?

### ANSWERS

- i. *What communication protocol is used between the database and the WSD?*

HTTPS is the communication protocol used between the database and the WSD.

- ii. *How are communications initiated?*

The TV white space device will first initiate the communication by sending a registration request. The request consists of information of the location, contact and device. Once the database will validate the registration request and send a successful registration response to the device. The device will then proceed to send a channel availability request to the database, the database will reply with a corresponding channel availability response

- iii. *How does the WSD validate messages from the database?*

The TV white space device will first check for the HTTP response code. If the 200 code is not received, the device will continue to try again. If the 200 code is received, the device will proceed to check if the response from the database in correct XML format and if it is using the format that is specified by the database. As the communication is done using HTTPS protocol, the messages will be encrypted, hence it will ensure the confidentiality and integrity of data

*iv. How does the device handle failure to communicate or authenticate the database?*

The device will stop its transmission immediately if it failed to communicate or authenticate with the database

*v. How does the database validate messages from a WSD?*

The database requires the WSD to be pre-enrolled before it will send any response to request. Hence, it will first check to see if device has been pre-enrolled. Next the database will validate the message received to see if it conforms to the specification of the request definition on whether that field is mandatory or optional field. Lastly, it will validate the message content.

*vi. What encryption method is used?*

TLS is used as a support layer to HTTPS, SSLV2

*vii. How does the database ensure secure registration of protected devices?*

The database has different administrative rights for different account holders. The TV white space device is not a protected device; therefore it has different portal from the protected devices. The registration of the protected devices can only be done by an authorized account holder with access rights to protected devices portal.

## 12.7. PUSH NOTIFICATION

### CLAUSES

- §15.711(i)

### REQUIREMENT

Confirm that the WSD device changes channels (or cease operation) when it receives 'push' notification from the database.

Using system management software, register the device at (specific coordinates) and wait for the database to send a push notification. Confirm that, once the notification is received, the device responds to the new channel availability list provided by the database, which would include ceasing operation on a channel no longer available, or ceases operation.

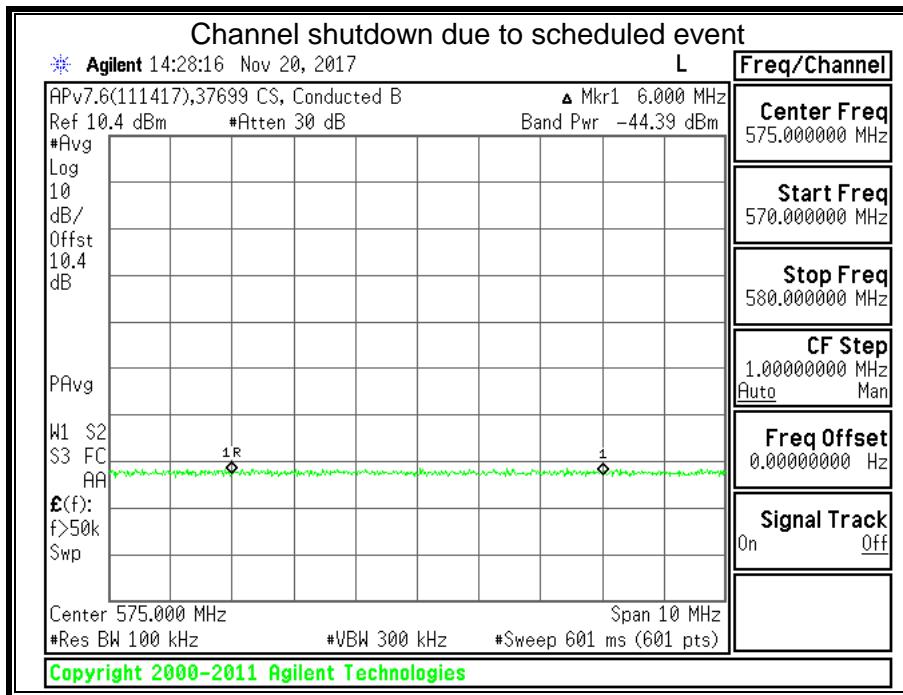
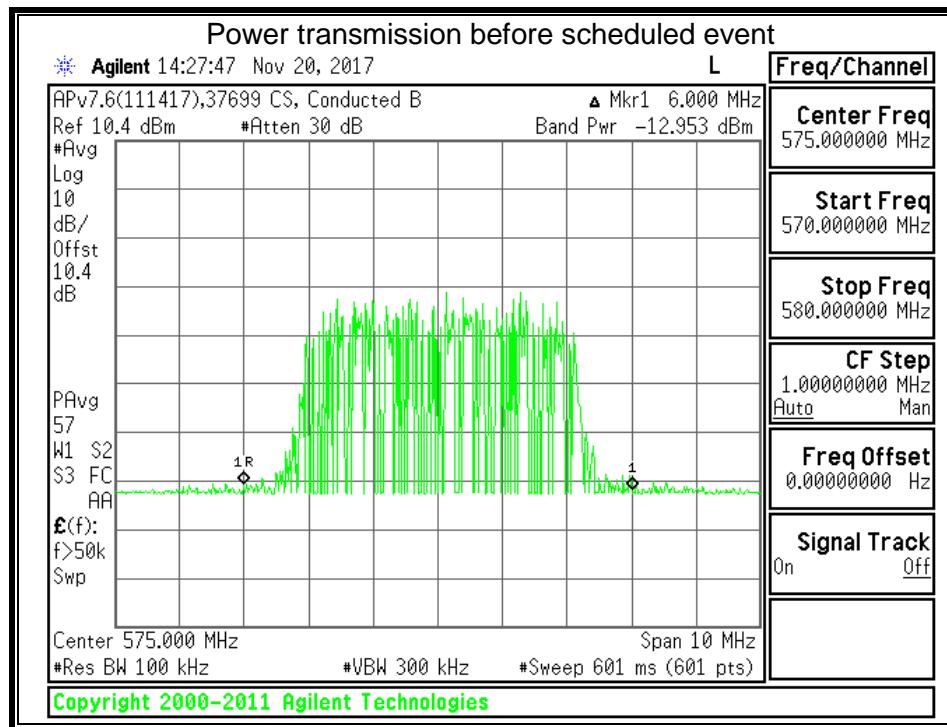
### TEST PROCEDURE

- Obtain a successful registration to the database.
- Transmit on desired channel
- Wait for database to send a push notification to cease operation on desired channel
- Confirm that once the push notification is received, a new channel availability list is provided and the desired channel ceases operation.

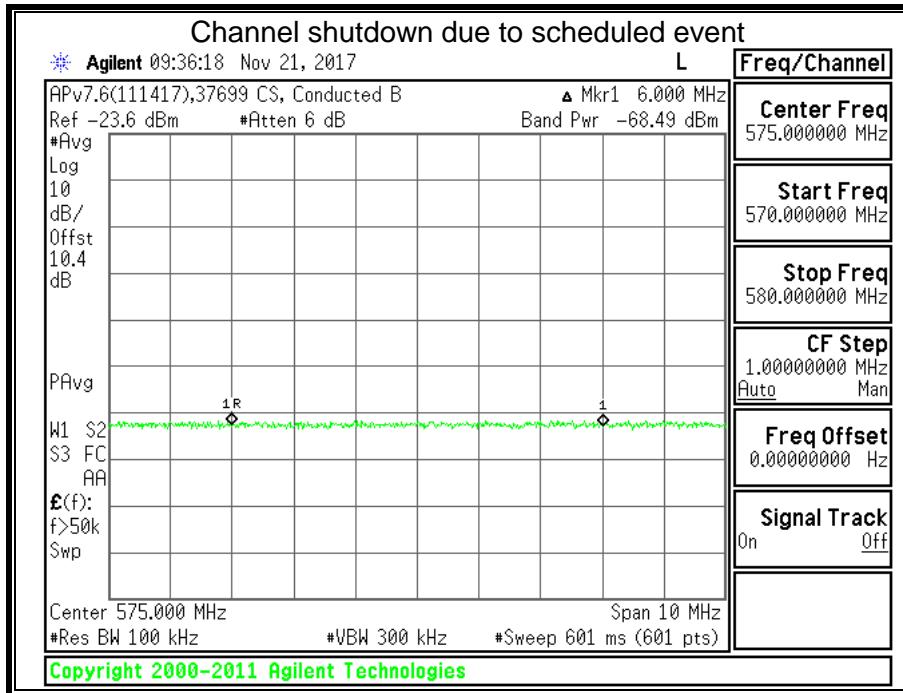
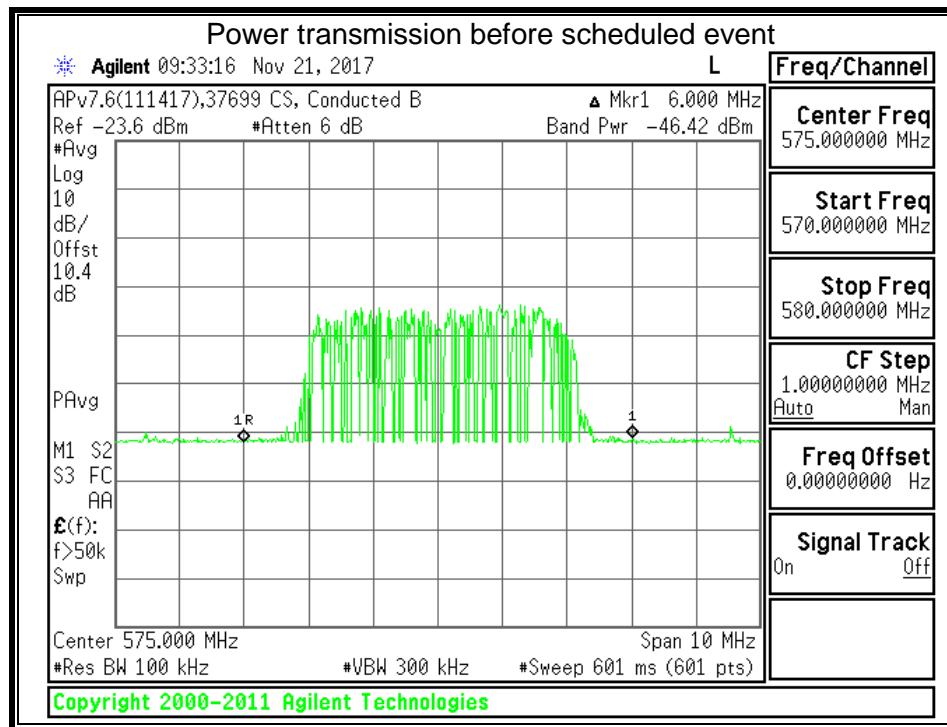
Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	37699 CS	11/20/17 – 11/21/17

Due to the push notification and 48hr channel scheduling only differing in time scheduled. The same event from the 48hr channel scheduling test was used to cover this requirement.

### 12.7.1. RESULTS FOR BASE



## 12.7.1. RESULTS FOR CLIENT



## 12.8. Location accuracy

### CLAUSES

- §15.711(b)

### REQUIREMENT

For Fixed and Mode II devices, provide details regarding the technologies used by the device to determine its location and how, in case of other than GPS technology, the location uncertainty is calculated with a 95% confidence level

### RESULTS

See theory of operations for details on Location accuracy

## 12.9. Interference protection requirement

### CLAUSES

- §15.712

### REQUIREMENT

Using system management software or database, provide different location (coordinates) so that compliance with operating channel and power level is shown under each of the scenarios outlined in §15.712. Include a sample scan showing the total channel power and adjacent channel emission settings for test coordinates.

### TEST PROCEDURE

For the scenarios listed below confirm there is no allowance of transmission on specific channels according to that particular location

#### Scenarios

- Digital television stations, and digital and analog Class A TV, low power TV, TV translator and TV booster stations
- TV translator, Low power TV(including Class A) and Multi-channel Video Programming Distributor (MVPD)
- Fixed Broadcast Auxiliary Service (BAS) links
- PLMR/CMRS operations
- Offshore Radiotelephone Service
- Low power auxiliary services including wireless microphones
- Border areas near Canada and Mexico
- Radio astronomy services
- 600 Mhz service band
- Wireless Medical Telemetry Service
- 488-494 MHz band in Hawaii

### RESULTS

<b>Scenario</b>		<b>Coordinate</b>	<b>Note</b>
a	Digital television stations, and digital and analog Class A TV, low power TV, TV translator and TV booster stations	35.775, -106.24555 (UHF)	UHF No transmission allowed
b	TV translator, Low power TV(including Class A) and Multi-channel Video Programming Distributor (MVPD)	43.80102, -111.778 (UHF)	UHF coordinate cannot transmit Ch. 23
c	Fixed Broadcast Auxiliary Service (BAS) links	41.890417, -87.623694	Cannot transmit on Ch. 28
d	PLMR/CMRS operations	18.954722, -77.004722	Cannot transmit on Ch. 17 and 18
e	Offshore Radio telephone Service	18.954722, -77.004722	Cannot transmit on Ch. 17 and 18
f	Low power auxiliary services including wireless microphones	N/A	48 hour channel scheduling requirement was based off this scenario
g	Border areas near Canada and Mexico	32.608179, -116.969585	Cannot transmit on Ch. 6 and 32
h	Radio astronomy services	35.775, -106.24555	No channels available
i	600 MHz service band	40.78698, -119.206486	Cannot transmit on Ch. 36, 37 and 38
j	Wireless Medical Telemetry Service	N/A	EUT does not support transmission in this frequency band
k	488-494 MHz band in Hawaii	20.88, -156.678611	Cannot transmit on Ch. 17

<b>Test Results</b>			
<b>Pass</b>	<b>Fail</b>	<b>Tested By</b>	<b>Test Date</b>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	37699 CS	11/20/17

### Scenario A UHF (no transmission allowed)

Status

Network

Wireless

Geolocation Wireless

Route

Diagnostics

Commands

Geolocation DataBase

Results

Device Capability

System

## Device Capability

---

#### Host

Host Address :

Host Port Number :

Regulatory Domain :

---

#### Location

Latitude :  Longitude :

---

#### Device Information

FccID :  Mfg Serial Number :

Device Type :  Antenna Height Agl Meters :

---

#### Contact Us

Contact City :  Contact Country :

Contact Email :  Contact Name :

Contact Phone :  Contact State :

Contact Street :  Contact Zip :

Country Code :  Device Owner :

Status

Network

Wireless

Geolocation Wireless

Route

## Database Information

**Registration Failed!**

Start Date	:	Mon Nov 20 21:46:17 2017
Error Type	:	ChannelRequest
Error Code	:	0
Error	:	Successful in registration.
Information	:	

Scenario B (UHF) (cannot select channel 23)

**Device Capability**

**Host**

Host Address :  Host Port Number :  Regulatory Domain :

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :  Device Type :  Antenna Height Agl Meters :

**Contact Us**

Contact City :  Contact Country :  Contact Email :  Contact Name :  Contact Phone :  Contact State :  Contact Street :  Contact Zip :  Country Code :  Device Owner :

**Database Information**

**Registration Successful!!**

Start Date :	Mon Nov 20 21:22:07 2017
Stop Date :	Wed Nov 22 21:22:07 2017
Channel Count :	24
Channel List :	2,5,6,10,11,14,15,19,20,25,26,30,31,33,34,40,41,45,46,47,48,49,50,51
Refresh In :	1

Scenario C (channel 28 missing)

## Device Capability

**Host**

Host Address :  Host Port Number :  Regulatory Domain :

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :   
Device Type :  Antenna Height Agl Meters :

**Contact Us**

Contact City :  Contact Country :   
Contact Email :  Contact Name :   
Contact Phone :  Contact State :   
Contact Street :  Contact Zip :   
Country Code :  Device Owner :

## Database Information

**Registration Successful!!**

Start Date :	Mon Nov 20 21:25:17 2017
Stop Date :	Wed Nov 22 21:25:17 2017
Channel Count :	4
Channel List :	2,7,8,9
Refresh In :	1

Scenario D/E (cannot transmit on Ch. 17 and Ch. 18)

## Device Capability

**Host**

Host Address :  Host Port Number :  Regulatory Domain :

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :   
Device Type :  Antenna Height Agl Meters :

**Contact Us**

Contact City :  Contact Country :  Contact Email :  Contact Name :   
Contact Phone :  Contact State :   
Contact Street :  Contact Zip :  Country Code :  Contact :

## Database Information

**Registration Failed!**

Start Date :	Mon Nov 20 21:29:45 2017
Error Type :	Registration
Error Code :	9
Error Information :	Location is outside registered domain.

Scenario G (cannot transmit on Ch. 6, 32)

**Device Capability**

**Host**

Host Address :  Host Port Number :  Regulatory Domain :  ▼

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :    
Device Type :  Antenna Height Agl Meters :

**Contact Us**

Contact City :  Contact Country :  ▼  
Contact Email :  Contact Name :   
Contact Phone :  Contact State :   
Contact Street :  Contact Zip :   
Country Code :  ▼ Device Owner :

**Database Information**

**Registration Successful!!**

Start Date :	Mon Nov 20 21:43:01 2017
Stop Date :	Wed Nov 22 21:43:01 2017
Channel Count :	9
Channel List :	2,12,13,14,16,44,45,46,47
Refresh In :	1

Scenario H (no channels available)

Status

Network

Wireless

Geolocation Wireless

Route

Diagnostics

Commands

Geolocation DataBase Results

**Device Capability**

System

## Device Capability

---

### Host

Host Address :

Host Port Number :

Regulatory Domain : ▼

---

### Location

Latitude :  Longitude :

---

### Device Information

FccID :  Mfg Serial Number :

Device Type : ▼

Antenna Height Agl Meters :

---

### Contact Us

Contact City :  Contact Country : ▼

Contact Email :  Contact Name :

Contact Phone :  Contact State :

Contact Street :  Contact Zip :

Country Code : ▼

Device Owner :

---

Status

Network

Wireless

Geolocation Wireless

Route

## Database Information

**Registration Failed!**

Start Date	:	Mon Nov 20 21:46:17 2017
Error Type	:	ChannelRequest
Error Code	:	0
Error Information	:	Successful in registration.

Scenario I (cannot transmit 36, 37, 38)

**Device Capability**

**Host**

Host Address :  Host Port Number :  Regulatory Domain :

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :   
Device Type :  Antenna Height Agl Meters :

**Contact Us**

Contact City :  Contact Country :  Contact Email :  Contact Name :  Contact Phone :  Contact State :  Contact Street :  Contact Zip :  Country Code :  Device Owner :

**Database Information**

**Registration Successful!!**

Start Date :	Mon Nov 20 21:49:15 2017
Stop Date :	Wed Nov 22 21:49:15 2017
Channel Count :	45
Channel List :	2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,39,40,41,42,43,44,45,46,47,48,49,50,51
Refresh In :	1

**Scenario K (cannot transmit on Ch. 17)**

**Device Capability**

**Host**

Host Address :

Host Port Number :

Regulatory Domain :  ▾

**Location**

Latitude :  Longitude :

**Device Information**

FccID :  Mfg Serial Number :

Device Type :  ▾

Antenna Height Agl Meters :

**Contact Us**

Contact City :

Contact Country :  ▾

Contact Email :

Contact Name :

Contact Phone :

Contact State :

Contact Street :

Contact Zip :

Country Code :  ▾

Device Owner :

**Database Information**

**Registration Successful!!**

Start Date :	Mon Nov 20 21:52:04 2017
Stop Date :	Wed Nov 22 21:52:04 2017
Channel Count :	26
Channel List :	5,6,14,18,19,20,21,22,26,30,31,32,33,34,35,39,40,41,42,43,44,45,46,47,48,49
Refresh In :	1

## 12.10. Fixed Power level reduction

### CLAUSES

- §15.711(c)(2)(ii)
- §15.715(e)

### REQUIREMENT

Using system management software, make a channel availability request to the database. Using the spectrum analyzer, confirm that the WSD operates at no more than the maximum power level indicated by the database and that the power level cannot be set to a higher level than indicated by the database at that specific location. If the device cannot reduce power, it must cease operation.

### TEST PROCEDURE

- Create a successful registration with the database
- Transmit at desired channel
- Confirm with spectrum analyzer that the EUT does not operate more than the max power level indicated by the database.
- Confirm power level cannot be set higher than the level indicated by the database

### RESULTS

Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	37699 CS	11/20/17

Successful registration, Channel availability and maximum allowed Power level

Status  
Network  
Wireless  
Geolocation Wireless  
Route  
Diagnostics  
Commands  
Geolocation DataBase Results  
Device Capability  
System

## Device Capability

### Host

Host Address :   
Host Port Number :   
Regulatory Domain :

### Location

Latitude :  Longitude :

### Device Information

FccID :  Mfg Serial Number :   
Device Type :  Antenna Height Agl Meters :

### Contact Us

Contact City :   
Contact Country : ▼  
Contact Email :   
Contact Name :   
Contact Phone :   
Contact State :   
Contact Street :   
Contact Zip :   
Country Code : ▼  
Device Owner :

Status  
Network  
Wireless  
Geolocation Wireless  
Route

## Database Information

### Registration Successful!!

Start Date	:	Mon Nov 20 19:50:23 2017
Stop Date	:	Wed Nov 22 19:50:23 2017
Channel Count	:	21
Channel List	:	2,5,6,9,13,14,15,16,29,30,31,32,33,40,41,42,43,44,49,50,51
Refresh In	:	10

Status  
Network  
Wireless  
Geolocation Wireless  
Route  
Diagnostics

## Wireless Configuration

Enable  Disable

ESSID :   
Channel : ▼  
Mode : ▼  
Tx Power :  dBm

