



**FCC 47 CFR PART 15 SUBPART E**

**CERTIFICATION TEST REPORT**

**FOR**

**Intelligent Backhaul Radio**

**MODEL NUMBER: IBR-121x-38-NA**

**FCC ID: 2AAEH-106**

**REPORT NUMBER: 14U18830-1 Revision B**

**ISSUE DATE: JANUARY 29, 2015**

*Prepared for*

**CBF NETWORKS, INC., DBA FASTBACK NETWORKS  
2460 N. FIRST STREET, SUITE 200  
SAN JOSE, CA 95131, USA**

*Prepared by*

**UL VERIFICATION SERVICES INC.  
47173 BENICIA STREET  
FREMONT, CA 94538, U.S.A.  
TEL: (510) 771-1000  
FAX: (510) 661-0888**



**NVLAP LAB CODE 200065-0**

Revision History

Rev.	Issue Date	Revisions	Revised By
--	1/9/15	Initial Issue	F. de Anda
A	1/13/2015	Updated high frequency for 10/20/40MHz to clear 5250MHz edge.	C. Xiong
B	1/29/2015	Updated section 5.2.	F. de Anda

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>5</b>
<b>2. TEST METHODOLOGY .....</b>	<b>6</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>6</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>6</b>
4.1. MEASURING INSTRUMENT CALIBRATION .....	6
4.2. SAMPLE CALCULATION .....	6
4.3. MEASUREMENT UNCERTAINTY.....	6
<b>5. EQUIPMENT UNDER TEST .....</b>	<b>7</b>
5.1. DESCRIPTION OF EUT .....	7
5.2. MAXIMUM OUTPUT POWER.....	7
5.3. DESCRIPTION OF AVAILABLE ANTENNAS .....	7
5.4. SOFTWARE AND FIRMWARE.....	7
5.5. WORST-CASE CONFIGURATION AND MODE.....	7
5.6. DESCRIPTION OF TEST SETUP.....	8
<b>6. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>11</b>
<b>7. MEASUREMENT METHODS .....</b>	<b>12</b>
<b>8. ANTENNA PORT TEST RESULTS .....</b>	<b>13</b>
8.1. ON TIME AND DUTY CYCLE.....	13
8.2. 10MHz 2Tx MODE IN THE 5.2 GHz BAND.....	15
8.2.1. 26 dB BANDWIDTH.....	15
8.2.2. OUTPUT POWER AND PSD .....	19
8.2.3. OUT-OF-BAND EMISSIONS .....	24
8.3. 20MHz 2Tx MODE IN THE 5.2 GHz BAND.....	27
8.3.1. 26 dB BANDWIDTH.....	27
8.3.2. OUTPUT POWER AND PSD .....	32
8.3.3. OUT-OF-BAND EMISSIONS .....	38
8.4. 40MHz 2TX MODE IN THE 5.2 GHz BAND .....	43
8.4.1. 26 dB BANDWIDTH.....	43
8.4.2. OUTPUT POWER AND PSD .....	49
8.4.3. OUT-OF-BAND EMISSIONS .....	57
<b>9. RADIATED TEST RESULTS.....</b>	<b>64</b>
9.1. LIMITS AND PROCEDURE .....	64
9.2. TRANSMITTER ABOVE 1 GHz.....	65
9.2.1. TX ABOVE 1 GHz 10MHz 2 TX MODE IN THE 5.2 GHz BAND .....	65

9.2.2.	TX ABOVE 1 GHz 20MHz 2 TX MODE IN THE 5.2 GHz BAND .....	71
9.2.3.	TX ABOVE 1 GHz 40MHz 2 TX MODE IN THE 5.2 GHz BAND .....	79
9.3.	<i>WORST-CASE BELOW 1 GHz</i> .....	89
9.4.	<i>WORST-CASE 18 to 26 GHz</i> .....	91
9.5.	<i>WORST-CASE 26 to 40 GHz</i> .....	92
10.	<b>AC POWER LINE CONDUCTED EMISSIONS .....</b>	<b>93</b>
11.	<b>SETUP PHOTOS .....</b>	<b>98</b>

## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** CBF NETWORKS, INC., DBA FASTBACK NETWORKS  
2460 N. FIRST STREET, SUITE 200  
SAN JOSE, CA 95131, USA

**EUT DESCRIPTION:** Intelligent Backhaul Radio

**MODEL:** IBR-121x-38-NA

**SERIAL NUMBER:** 40314380088 (conducted) 40314390023 (radiated)

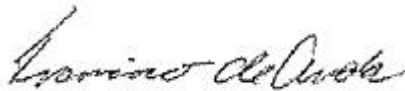
**DATE TESTED:** October 21, 2014 – January 8, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Pass

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.

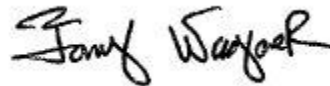
**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. 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 any government.

Approved & Released For  
UL Verification Services Inc. By:



Francisco deAnda  
PROJECT LEAD/ PROGRAM MANAGER  
UL VERIFICATION SERVICES INC.

Tested By:



Tony Wagoner  
EMC ENGINEER  
UL VERIFICATION SERVICES INC.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033, ANSI C63.10-2009.

## 3. 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 type="checkbox"/> Chamber A	<input type="checkbox"/> Chamber D <input checked="" type="checkbox"/> Chamber G
<input type="checkbox"/> Chamber B	<input type="checkbox"/> Chamber E <input checked="" type="checkbox"/> Chamber H
<input type="checkbox"/> Chamber C	<input checked="" type="checkbox"/> Chamber F

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. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. 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.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

### 4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.52 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 dB

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

Fixed Point-to-Point radio in 5.2GHz unlicensed band with a proprietary communication management interface Intelligent Backhaul Radio.

This device uses 40MHz, 20MHz and 10MHz bandwidths with QAM4, QAM16, QAM64, QAM256 modulation. It transmits dual stream uncorrelated MIMO.

### 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

#### 5.2 GHz BAND

Bandwidth (MHz)	Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
<b>5.2 GHz Band, 2Tx</b>				
10	5166-5240	FDD	25.09	322.85
20	5181-5235	FDD	27.96	625.17
40	5190-5225	FDD	29.48	887.16

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Dipole array antenna, with a maximum gain of 14.5 dBi.

### 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Build SVN Revision: 5287

The test utility software used during testing was Micro monitor 1.6.0

### 5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

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

Based on the baseline scan, the worst-case data rates were:

10MHz bandwidth QAM 4  
20MHz bandwidth QAM 4  
40MHz bandwidth QAM 4  
Data rate 30 Msamples/s for all bandwidths

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	Think Pad	R9-D497T 11/04	QDS-BRCM 1046
POE	PHIHONG	POE36U-1AT-R	P21601123D1	N/A
AC/DC Adapter	Lenovo	N/A	11S45N0113Z1ZH819P0FN	N/A

### I/O CABLES

I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	U.FL	Shielded	0.3	N/A
2	AC	2	3 Prong	Un-Shielded	1	N/A
3	POE/LAN	1	RJ45	Shielded	1	N/A
4	USB	1	USB	Shielded	0.3	N/A
5	Serial	1	9 Pin Sub D	Shielded	1	N/A
6	AC	2	3 Prong	Un-Shielded	1	N/A
7	DC	1	Barrel	Un-Shielded	1	N/A

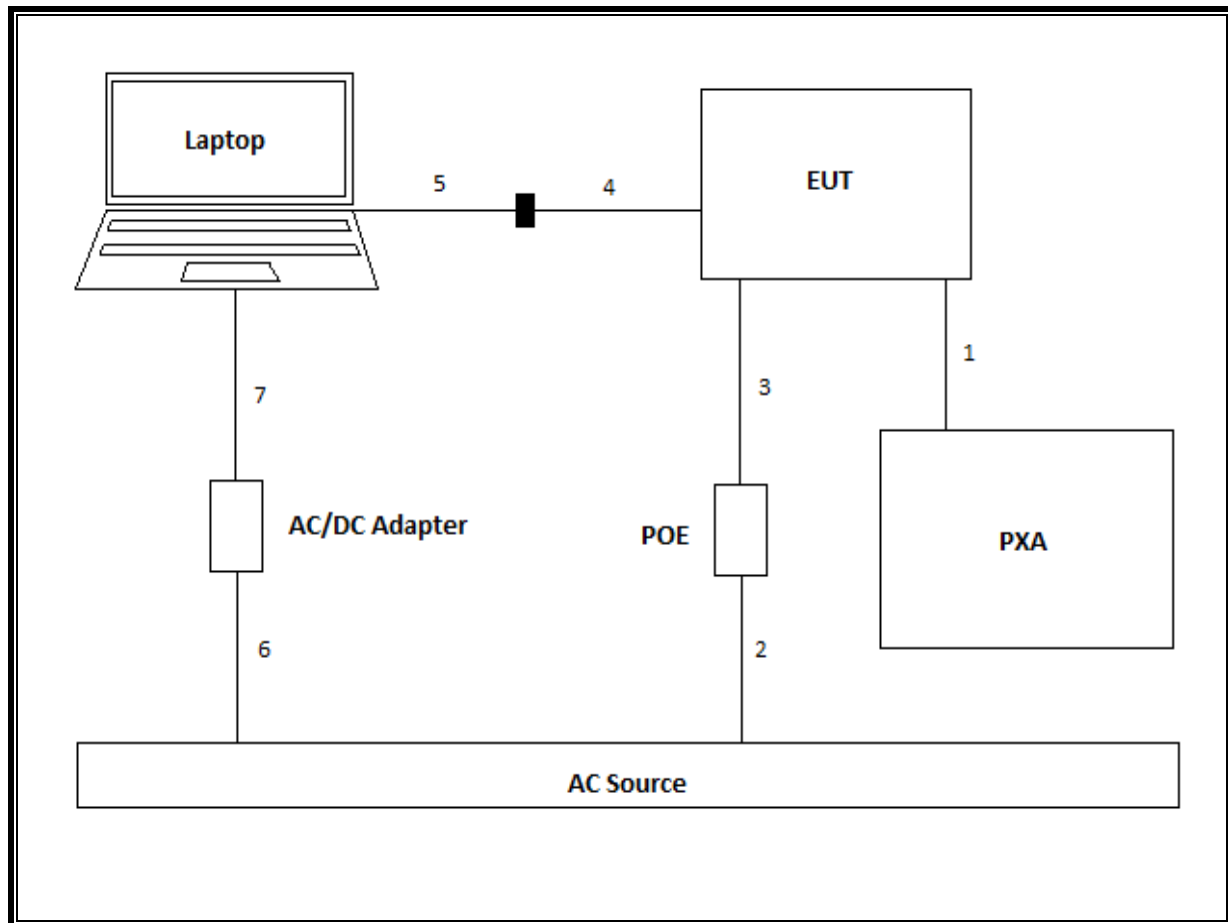
### TEST SETUP

The EUT is a P-P outdoor radio used as a stand-alone device. Test software exercised the radio module

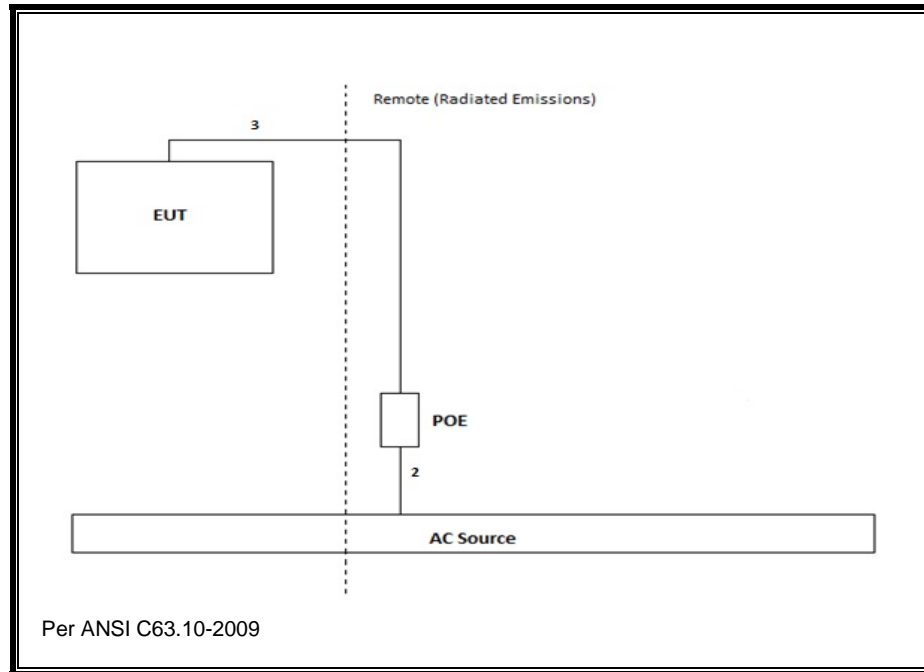


**SETUP DIAGRAM FOR TESTS**

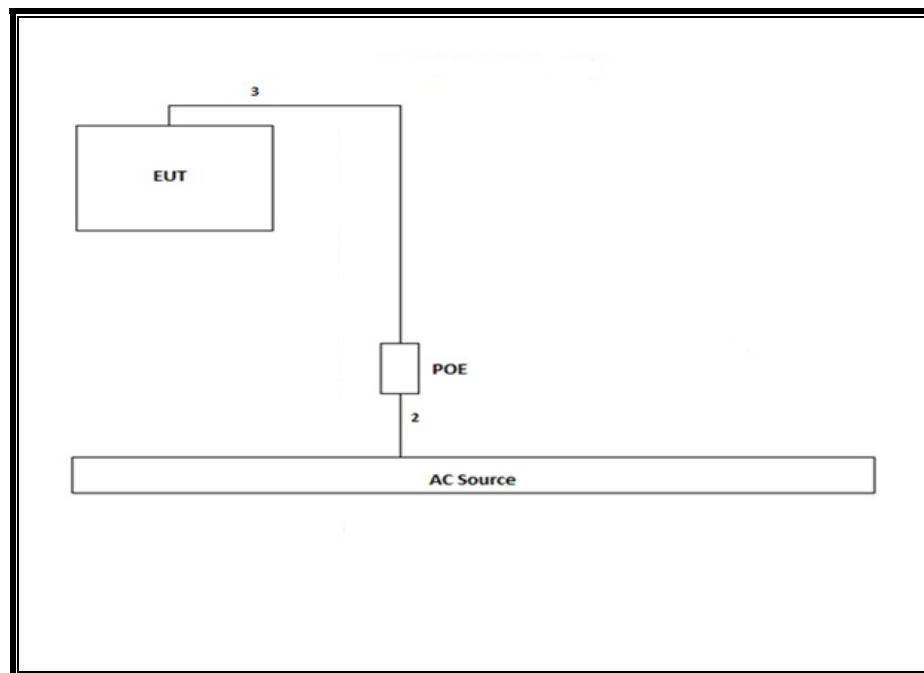
**CONDUCTED**



**RADIATED**



**AC LINE CONDUCTED**



## 6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	Manufacturer	Model	T No.	Cal Date	Cal Due
<b>Chamber F</b>					
Antenna, Horn 18 GHz	ETS Lindgren	3117	120	03/20/14	03/20/15
Antenna, Biconolog, 30MHz-1GHz	Sunol Sciences	JB1	122	04/22/14	01/28/15
High Pass Filter, fc: 3.0GHz, 50 Ohms	Micro-Tronics	HPM17543	427	01/20/14	01/20/15
Low Pass Filter, fc: 5GHz, 50 Ohms	Micro-Tronics	LPS17541	421	01/20/14	01/20/15
High Pass Filter, fc: 6GHz, 50 Ohms	Micro-Tronics	HPS17542	425	01/20/14	01/20/15
RF PreAmplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	742	01/20/14	01/20/15
Preamp, 1000MHz	Sonoma	310N	173	06/07/14	06/07/15
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	341	02/12/14	02/12/15
<b>Chamber G</b>					
Antenna, Horn 18 GHz	ETS Lindgren	3117	862	04/14/14	04/14/15
Antenna, Biconolog, 30MHz-1GHz	Sunol Sciences	JB3	899	05/14/14	04/27/15
High Pass Filter, fc: 3.0GHz, 50 Ohms	Micro-Tronics	HPM17543	898	05/13/14	05/13/15
Low Pass Filter, fc: 5GHz, 50 Ohms	Micro-Tronics	LPS17541	892	05/13/14	05/13/15
High Pass Filter, fc: 6GHz, 50 Ohms	Micro-Tronics	HPS17542	893	05/14/14	05/13/15
RF PreAmplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	491	05/15/15	06/05/15
Preamp, 1000MHz	Sonoma	310N	834	05/16/15	06/05/15
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	905	05/17/15	05/17/15
<b>Chamber H</b>					
Antenna, Horn 18 GHz	ETS Lindgren	3117	863	04/14/14	04/14/15
Antenna, Biconolog, 30MHz-1GHz	Sunol Sciences	JB3	900	05/14/14	04/27/15
High Pass Filter, fc: 3.0GHz, 50 Ohms	Micro-Tronics	HPM17543	897	05/14/14	05/13/15
Low Pass Filter, fc: 5GHz, 50 Ohms	Micro-Tronics	LPS17541	891	05/13/14	05/13/15
High Pass Filter, fc: 6GHz, 50 Ohms	Micro-Tronics	HPS17542	894	05/13/14	05/13/15
RF PreAmplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	495	06/05/14	06/05/15
Preamp, 1000MHz	Sonoma	310N	835	06/05/14	06/05/15
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	906	05/07/14	05/07/15
<b>Conducted</b>					
Spectrum Analyzer	Agilent	E4440A	189	05/09/14	05/09/15
Power Meter, P-series single channel	Agilent	N1911A	382	04/09/14	04/09/15
Power Sensor, Peak and average, 50 MHz to 6 GHz, 5 MHz BW	Agilent	E9323A	400	05/02/14	05/02/15
Power Meter, P-series single channel	Agilent	N1911A	385	04/30/14	04/30/15
Power Sensor, Peak and average, 50 MHz to 18 GHz, 5 MHz BW	Agilent	E9327A	117	05/15/14	05/15/15
LISN for Conducted Emissions CISPR-16	FCC	50/250-25-2	24	01/17/14	01/17/15
Rohde & Schwarz	ESCI 7	100773	212	08/14/14	08/14/15

Test Equipment List (cont.)					
Description	Manufacturer	Model	T No.	Cal Date	Cal Due
Above 18GHz					
Antenna, Horn 18 to 26.5GHz	ARA	SWH-28	T125	05/09/14	05/09/15
Amp. 26GHz	Agilent	8449B	T404	03/25/14	03/25/15
Antenna, Horn 26 to 40GHz	ARA	MWh-2640	T90	07/15/14	07/15/15
Amp. 26 to 40GHz	Miteq	NSP4000-SP2	T88	09/03/14	09/03/15
Spectrum Analyzer, 40 GHz	HP	8564E	T106	08/06/14	08/06/15

## 7. MEASUREMENT METHODS

26 dB Emission BW: KDB 789033 D02 v01r, Section C.

Conducted Output Power: KDB 789033 D02 v01, Section E.2.b (Method SA-1).

Power Spectral Density: KDB 789033 D02 v01, Section F.

Unwanted emissions in restricted bands: KDB 789033 D02 v01, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v01, Sections G.3, G.4, and G.6.

KDB 662911 D02 MIMO with Cross-Polarized Antennas v01

## 8. ANTENNA PORT TEST RESULTS

### 8.1. ON TIME AND DUTY CYCLE

#### LIMITS

None; for reporting purposes only.

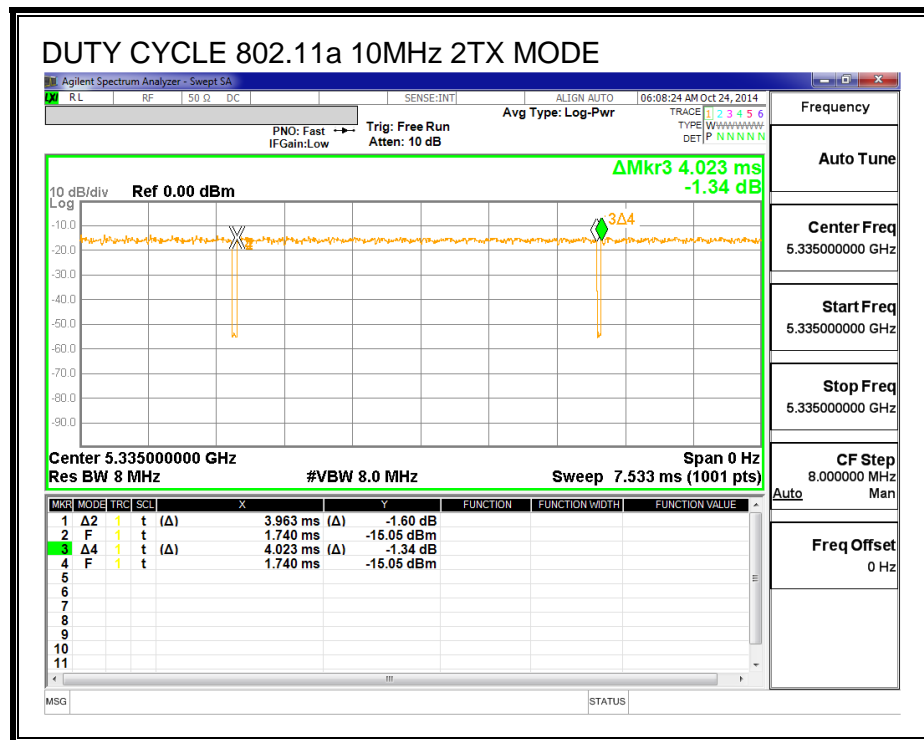
#### PROCEDURE

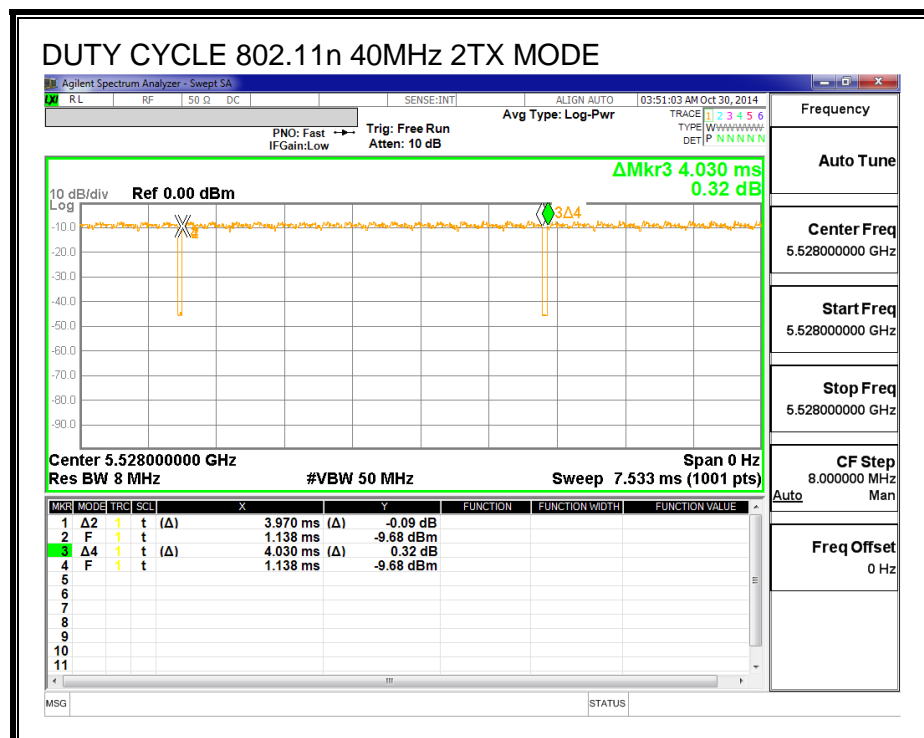
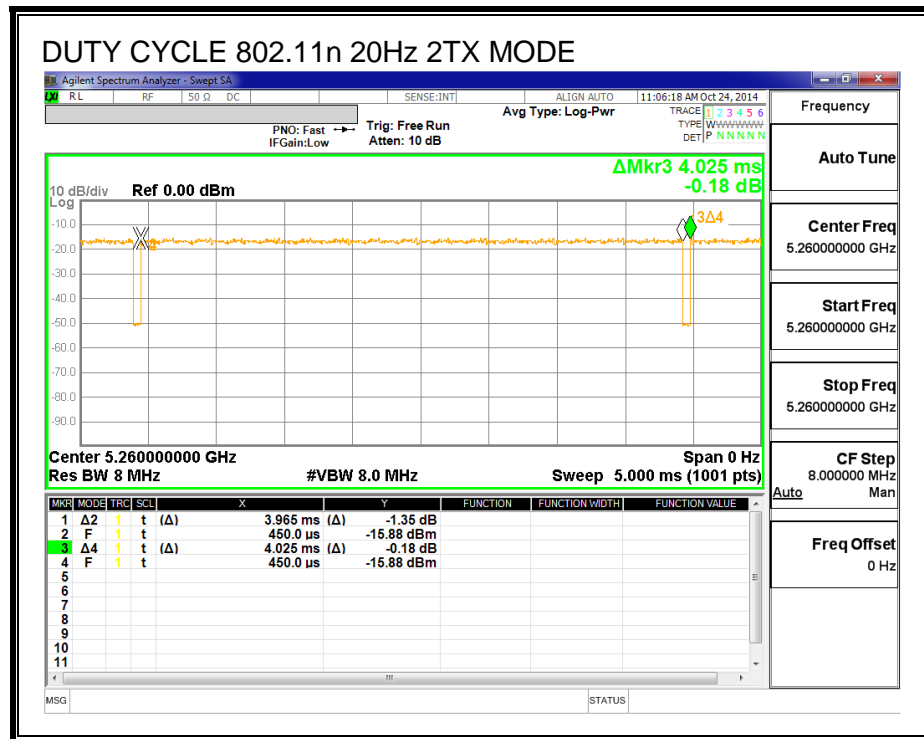
KDB 789033 Zero-Span Spectrum Analyzer Method.

#### ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11a 10MHz 2TX	3.963	4.023	0.985	98.51%	0.00	0.010
802.11n 20MHz 2TX	3.965	4.025	0.985	98.51%	0.00	0.010
802.11n 40MHz 2TX	3.970	4.030	0.985	98.51%	0.00	0.010

#### DUTY CYCLE PLOTS





## 8.2. 10MHz 2Tx MODE IN THE 5.2 GHz BAND

### 8.2.1. 26 dB BANDWIDTH

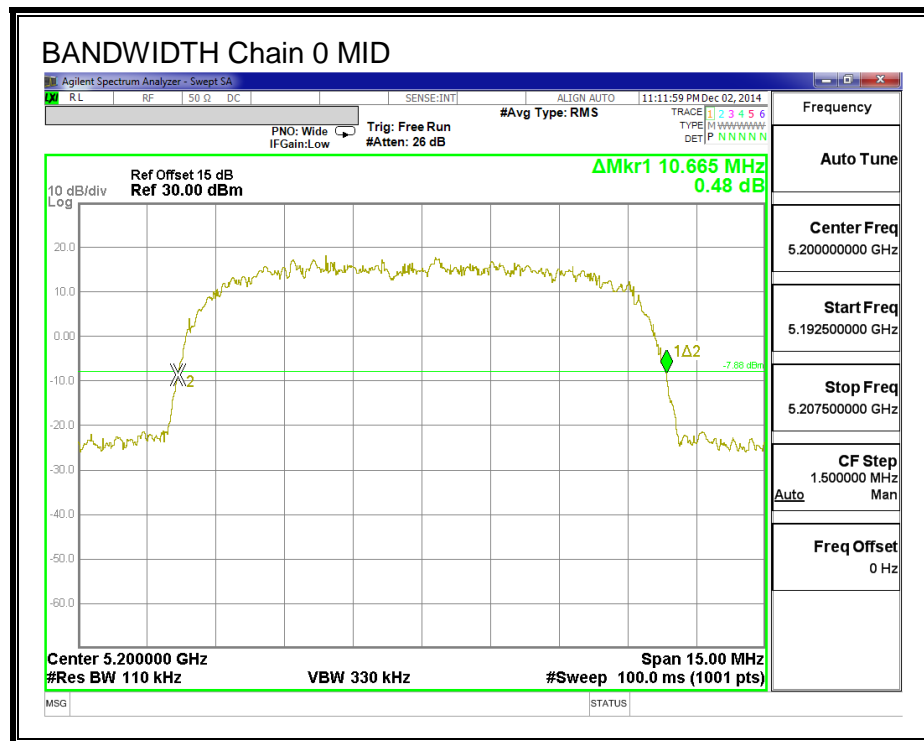
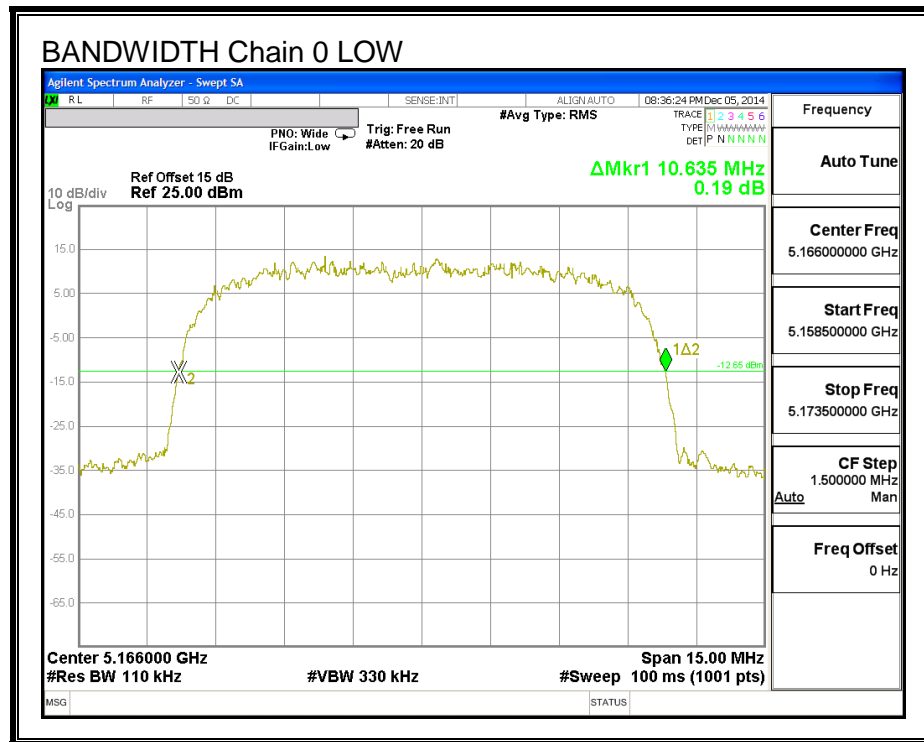
#### LIMITS

None; for reporting purposes only.

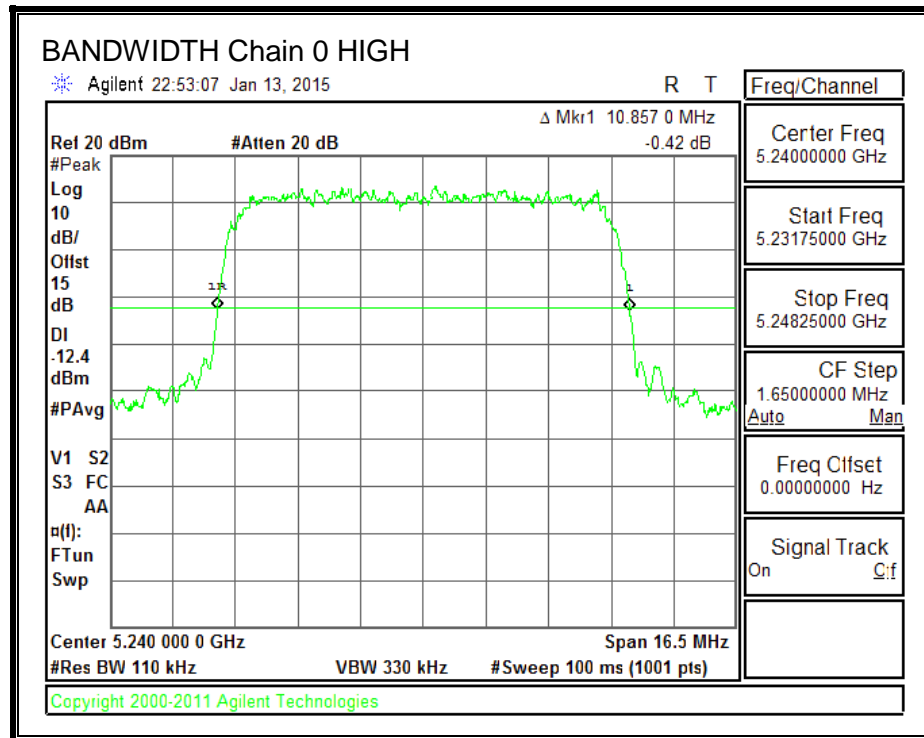
#### RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5166	10.64	10.67
Mid	5200	10.67	10.67
High	5240	10.86	10.89

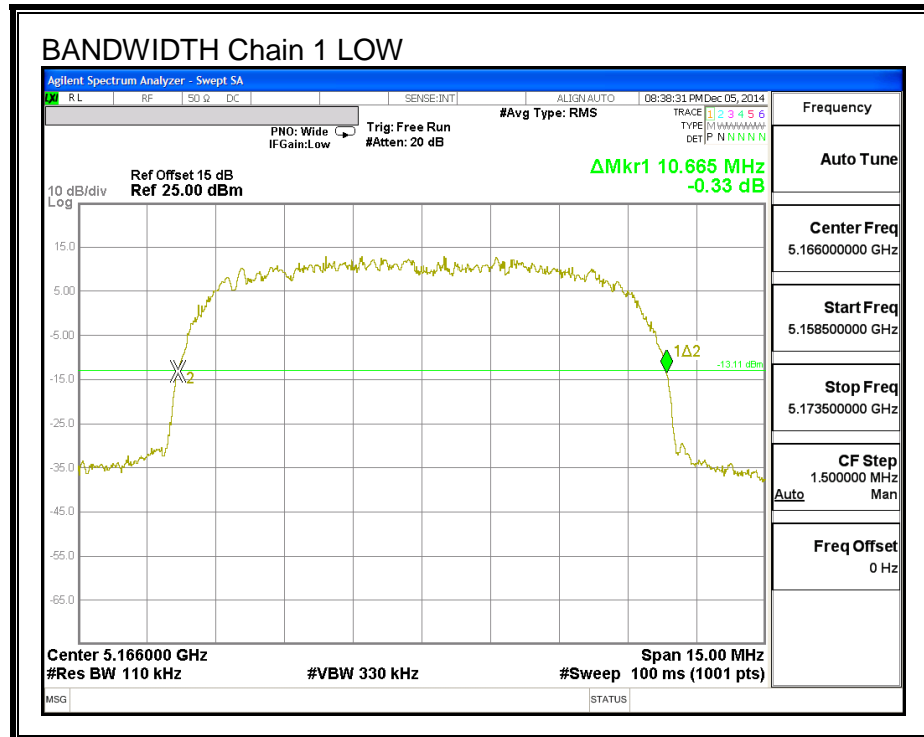
**26 dB BANDWIDTH, Chain 0**

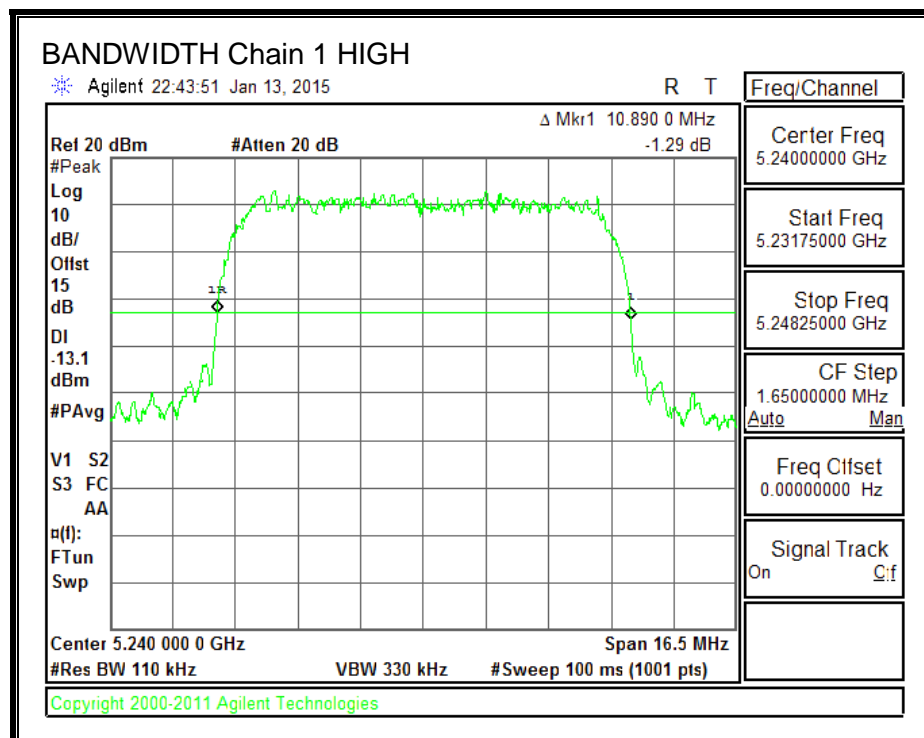
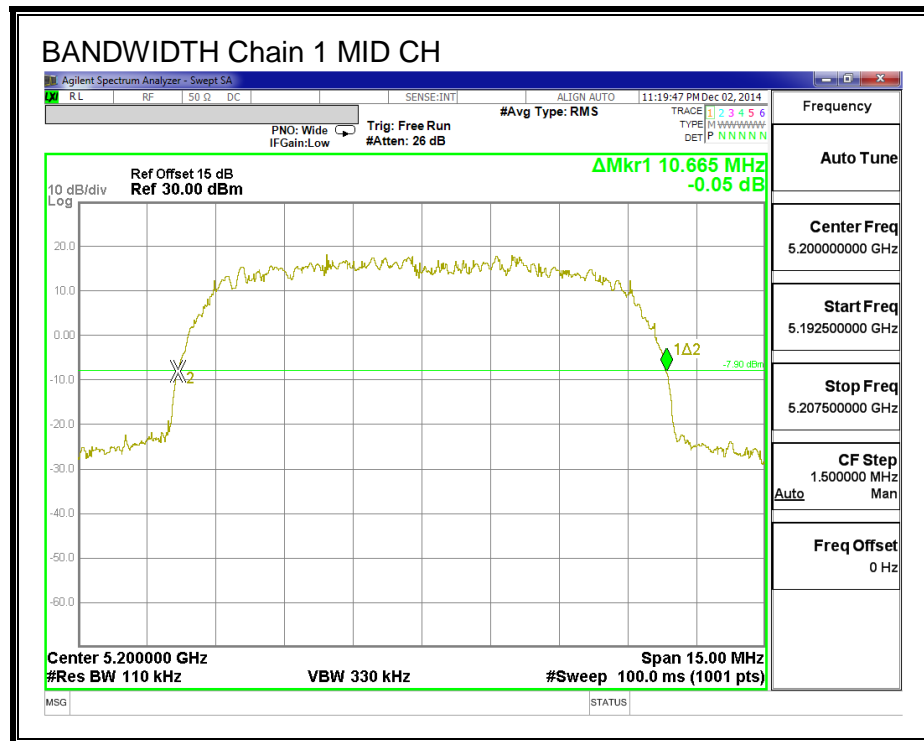






## 26 dB BANDWIDTH, Chain 1





## 8.2.2. OUTPUT POWER AND PSD

### LIMITS

FCC §15.407 (a) (1)

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple colocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
14.50	14.50	14.50

### RESULTS

#### Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5166	14.50	14.50	30.00	17.00
Mid	5200	14.50	14.50	30.00	17.00
High	5240	14.50	14.50	30.00	17.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PSD
--------------------	------	--

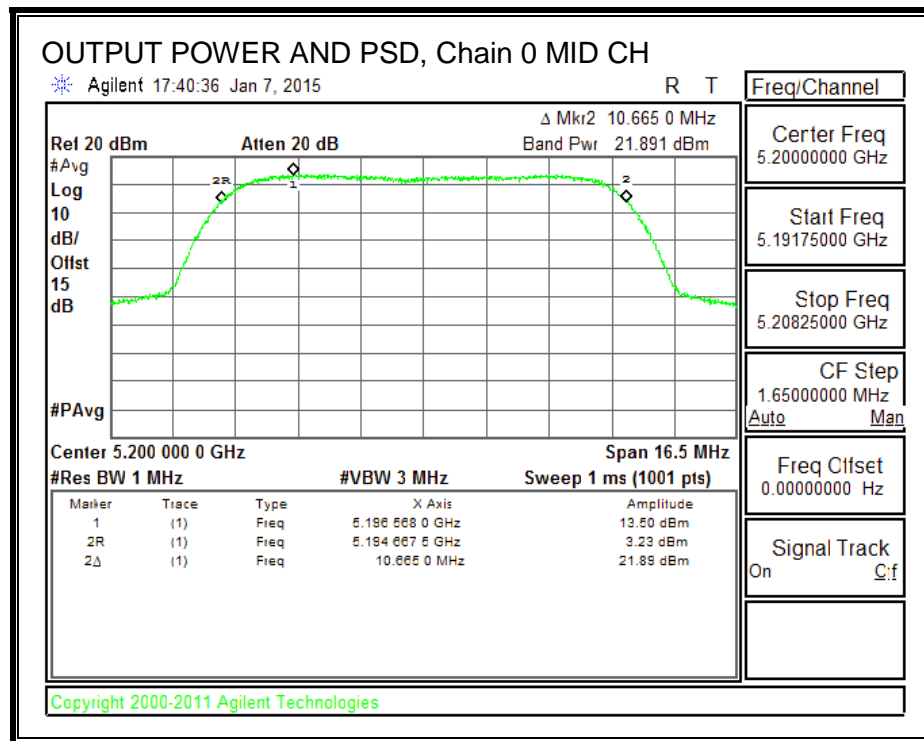
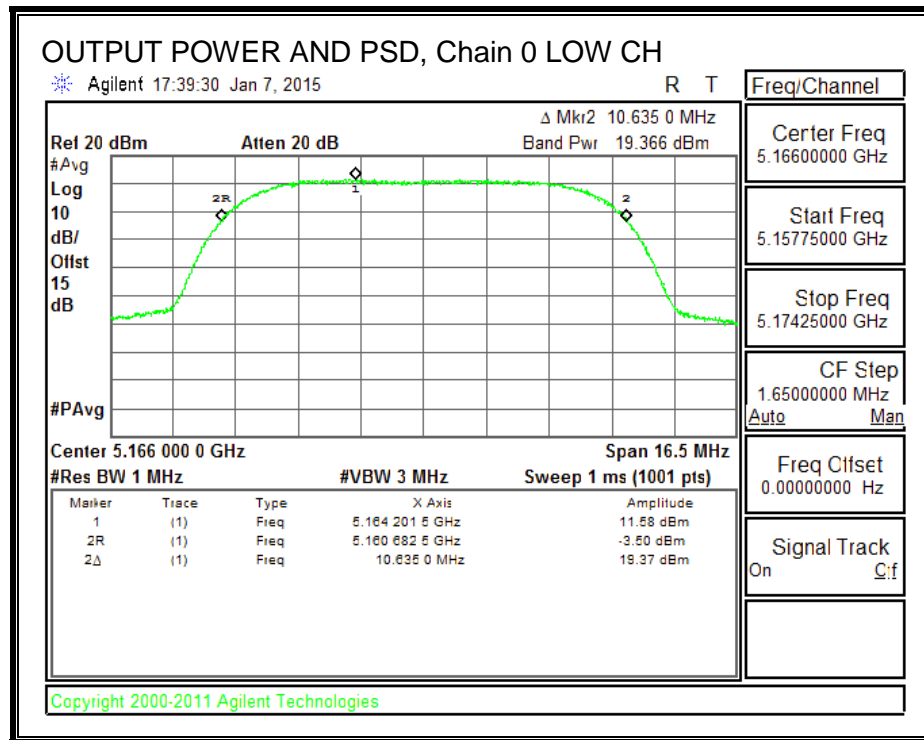
#### Output Power Results

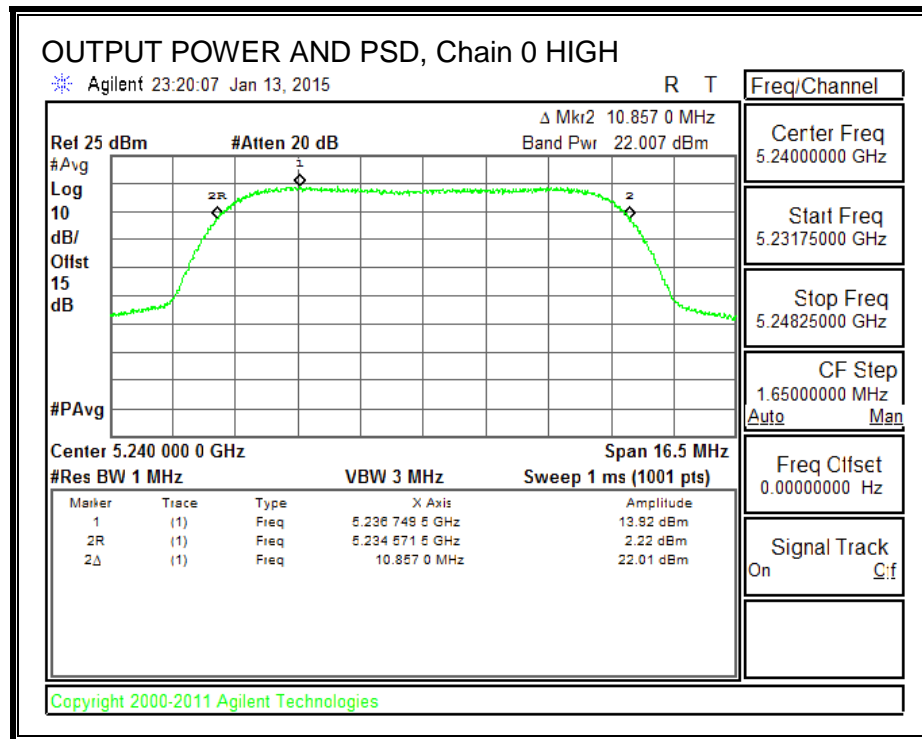
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5166	19.37	19.26	22.32	30.00	-7.68
Mid	5200	21.89	21.14	24.54	30.00	-5.46
High	5240	22.01	22.15	25.09	30.00	-4.91

#### PSD Results

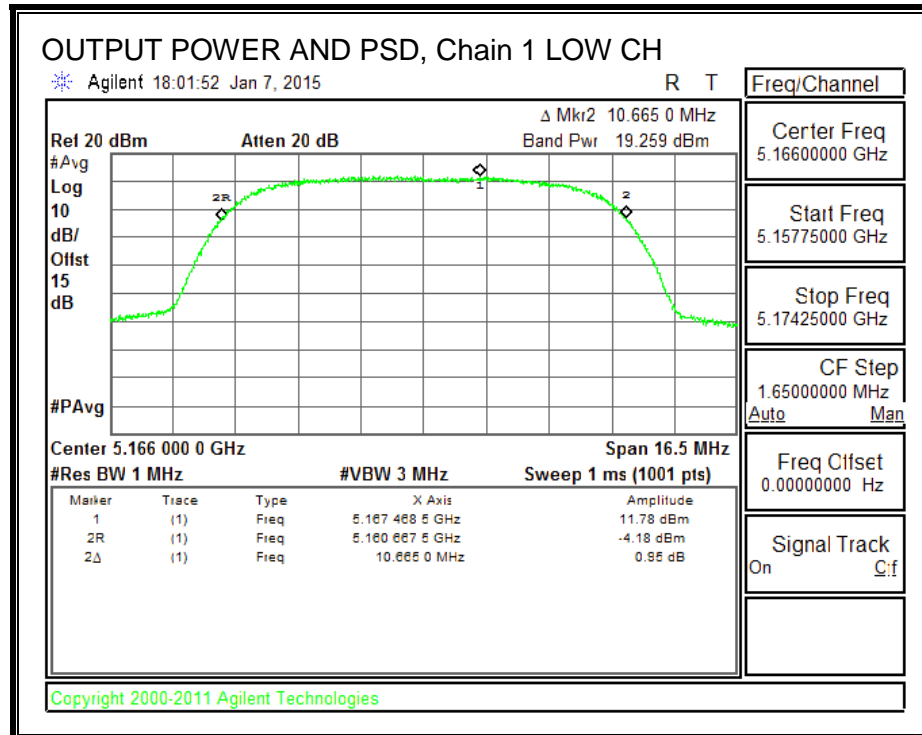
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5166	11.58	11.78	14.69	17.00	-2.31
Mid	5200	13.50	12.73	16.14	17.00	-0.86
High	5240	13.92	13.91	16.93	17.00	-0.07

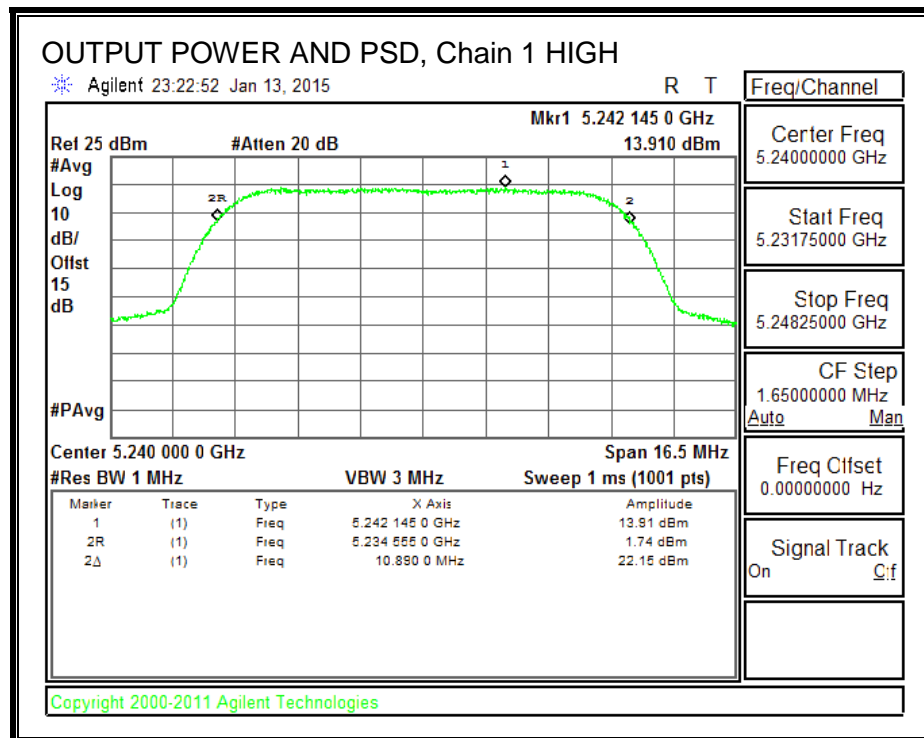
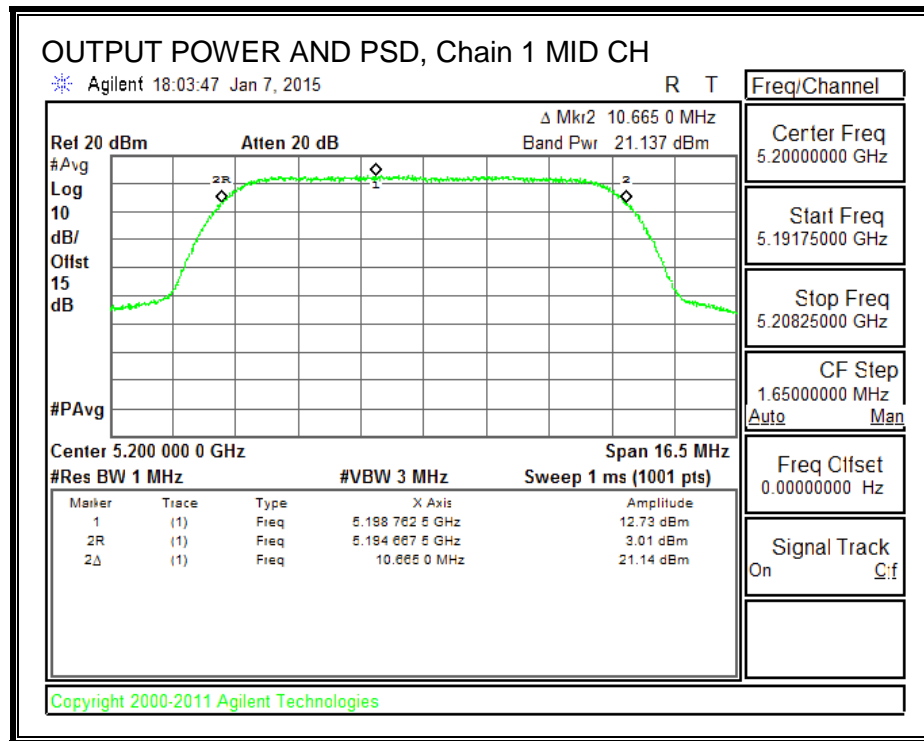
**OUTPUT POWER AND PSD, Chain 0**





**OUTPUT POWER AND PSD, Chain 1**





### **8.2.3. OUT-OF-BAND EMISSIONS**

#### **LIMITS**

FCC §15.205 and §15.209

PART 15, SUBPART E

Radiated LIMIT:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

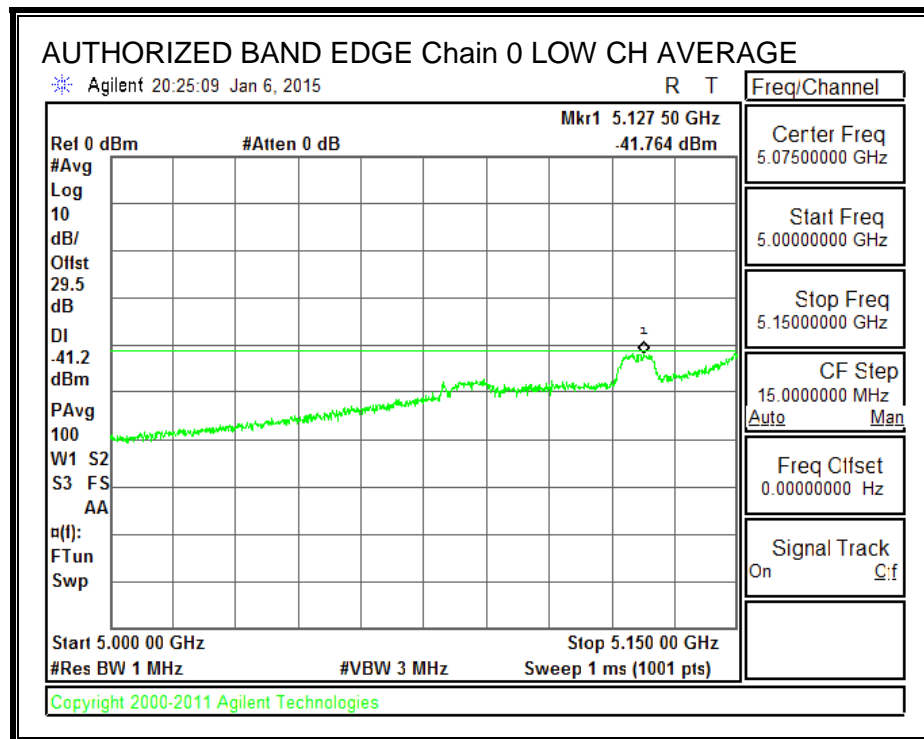
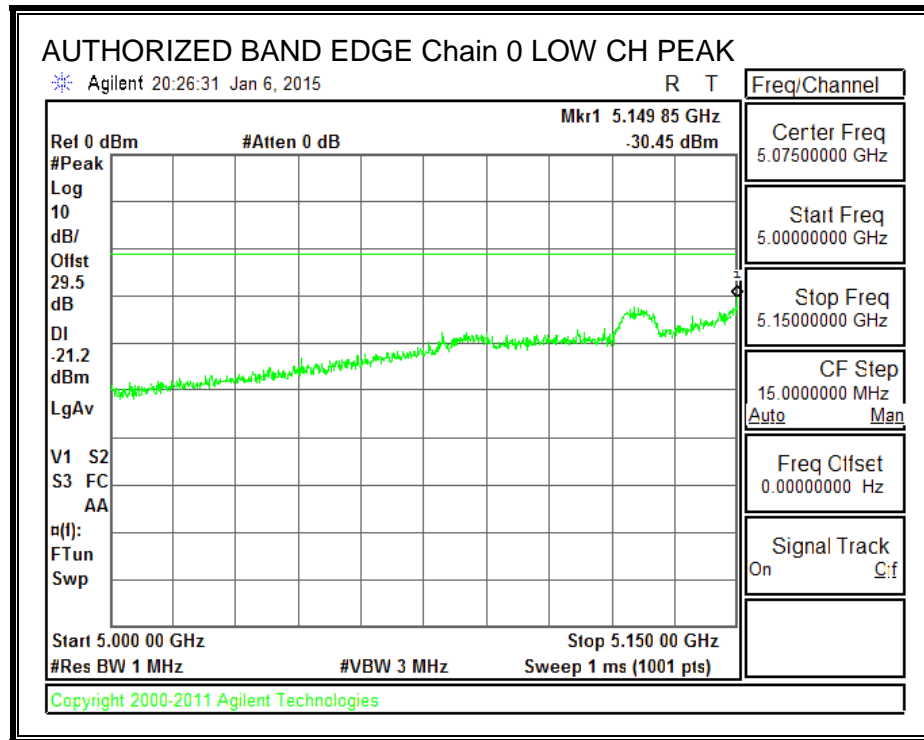
#### **Procedure**

KDB 789033 D02 General UNII Test Procedures New Rules v01, Section II, G5, G6

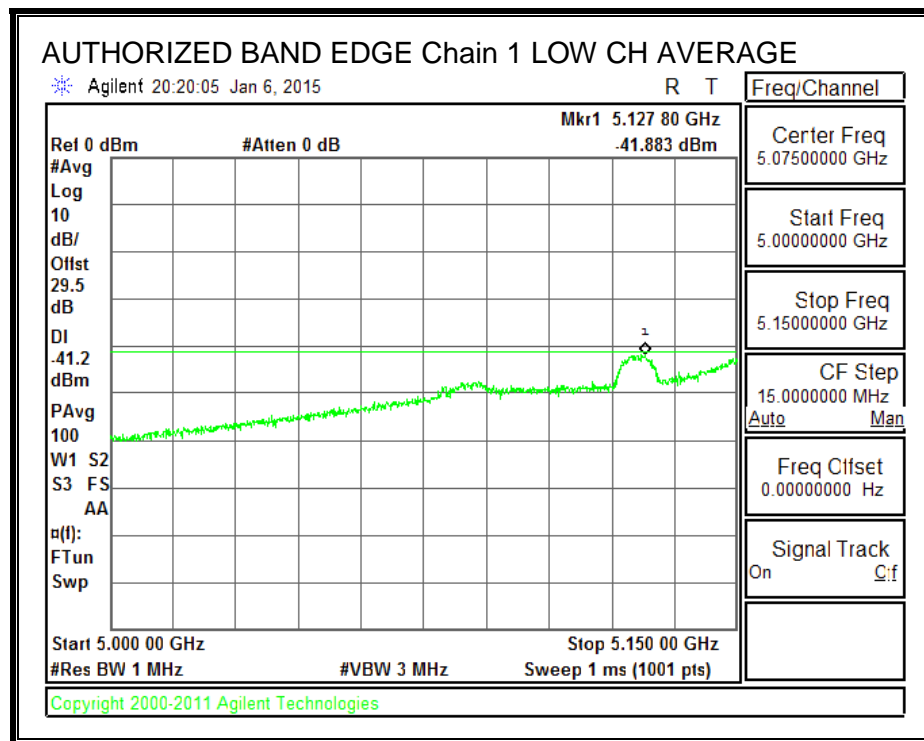
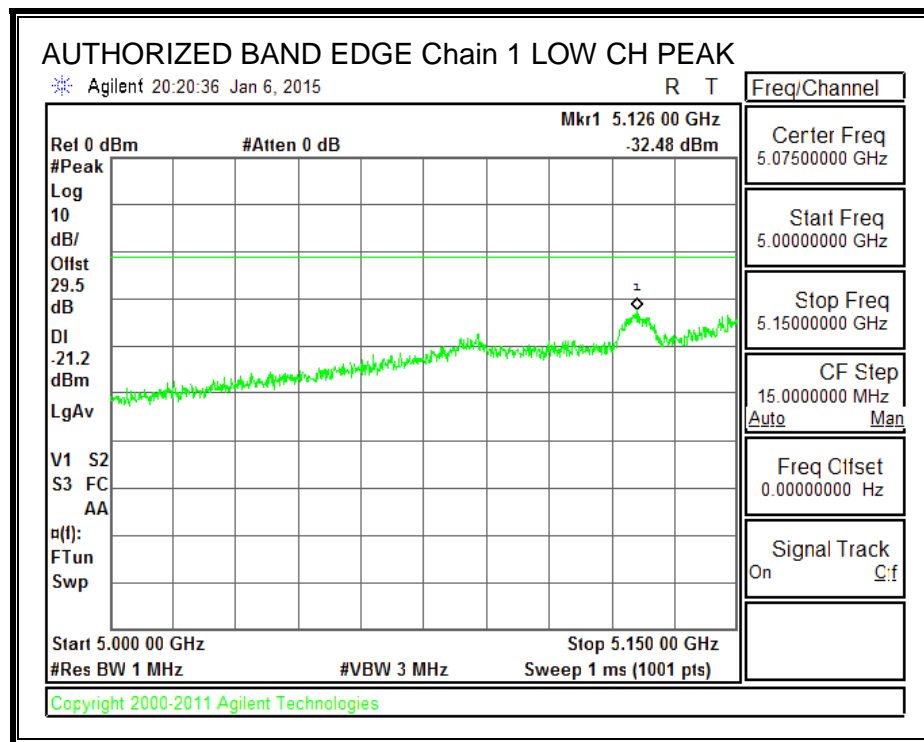


## RESULTS

### LOW CHANNEL BANDEDGE, Chain 0



**LOW CHANNEL BANDEDGE, Chain 1**



### 8.3. 20MHz 2Tx MODE IN THE 5.2 GHz BAND

#### 8.3.1. 26 dB BANDWIDTH

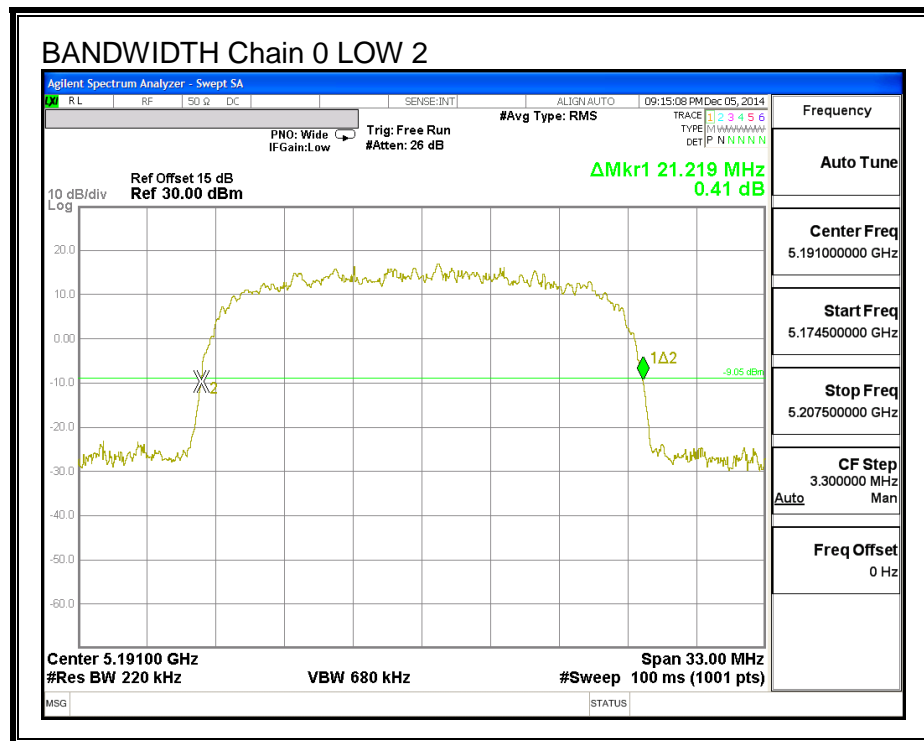
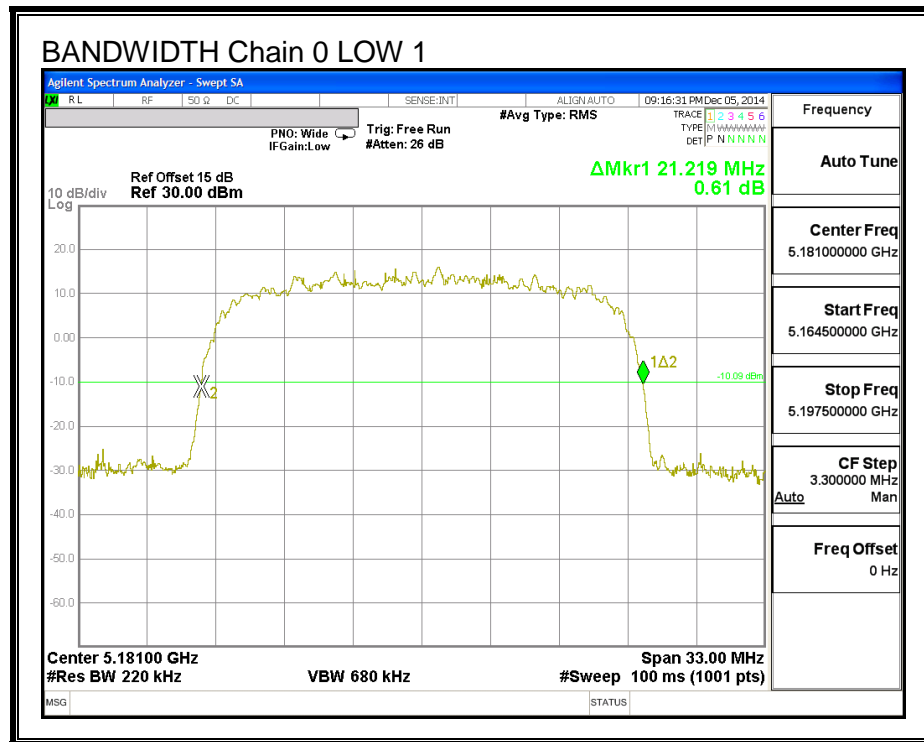
##### LIMITS

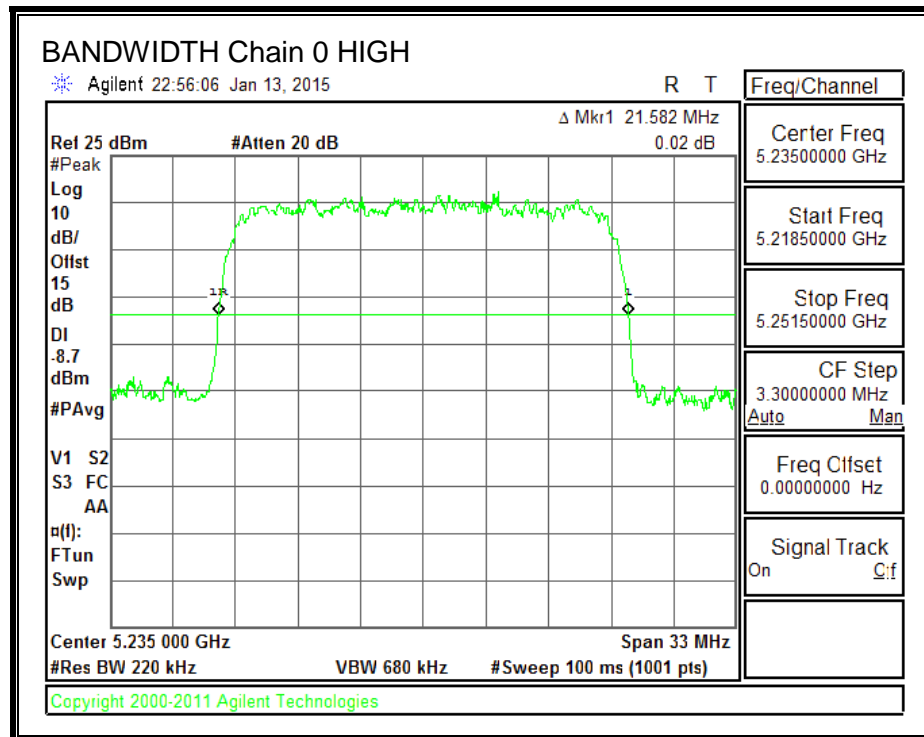
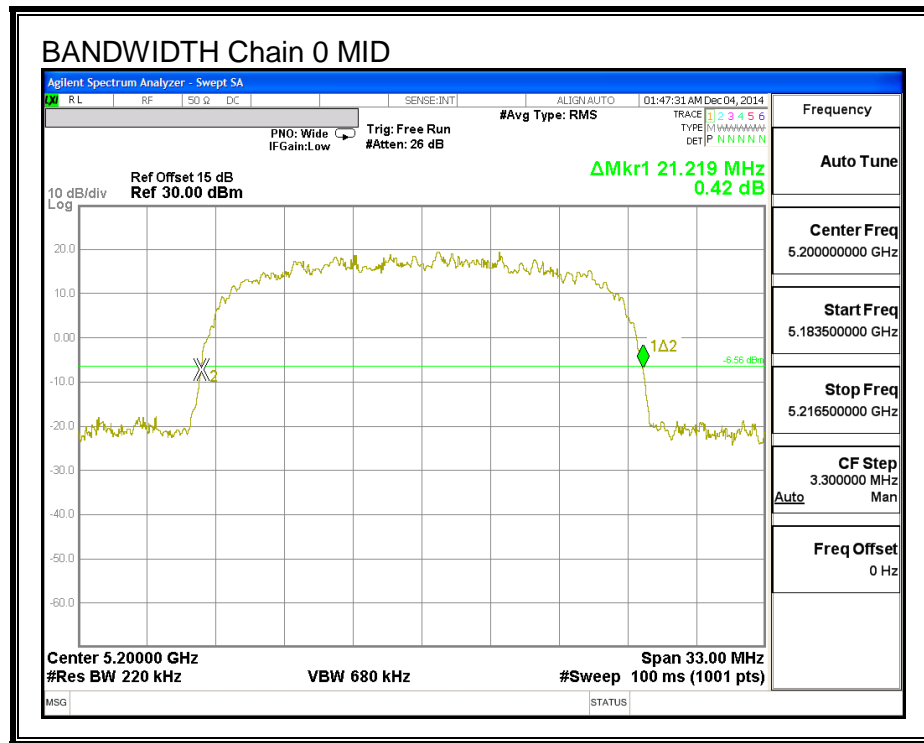
None; for reporting purposes only.

##### RESULTS

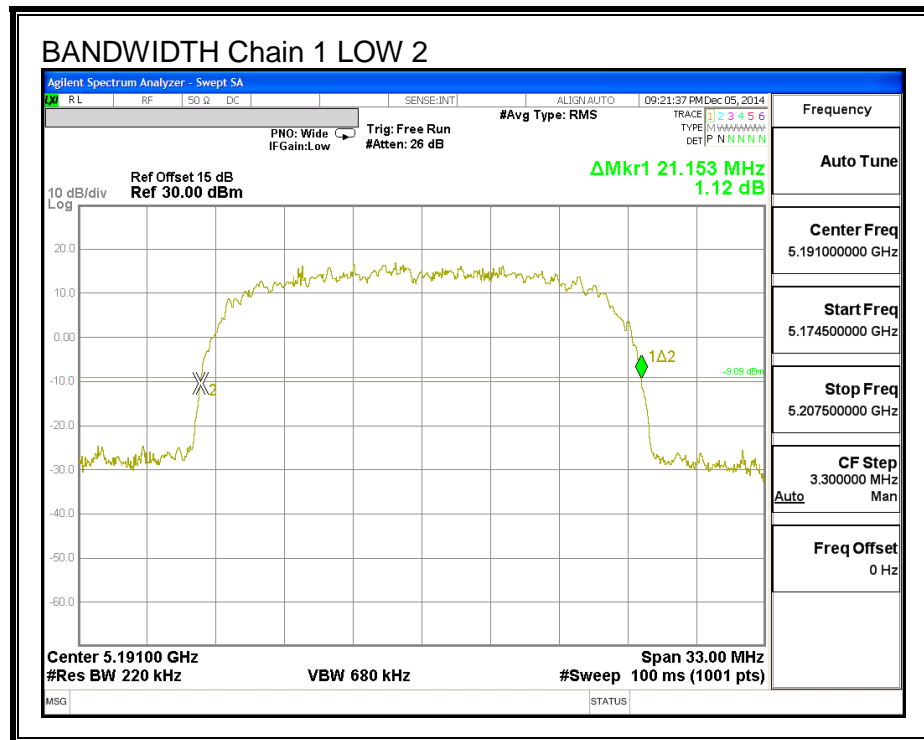
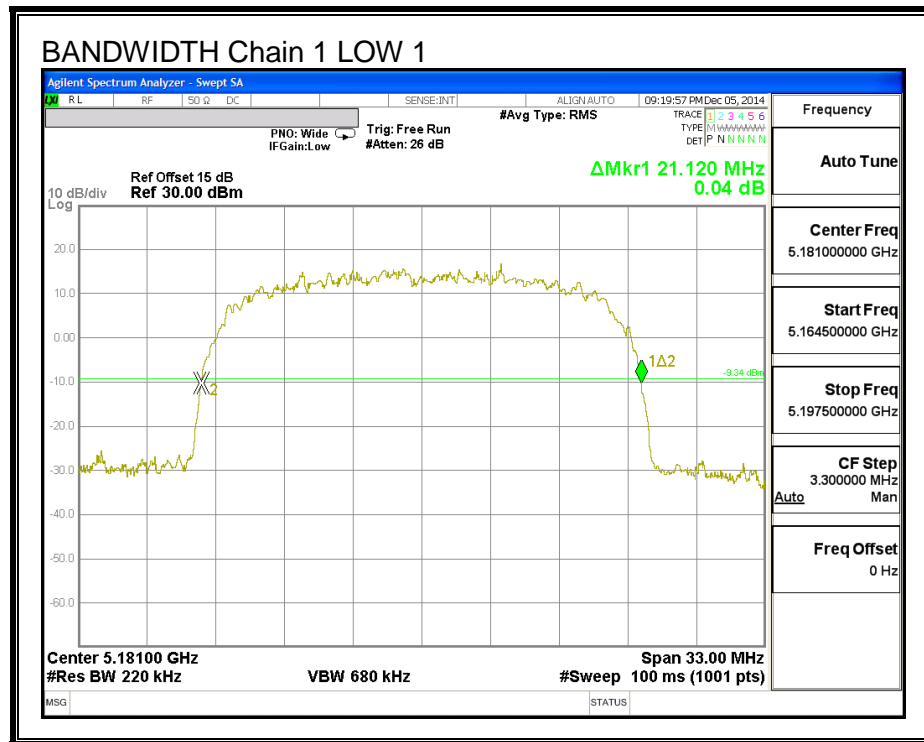
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low 1	5181	21.22	21.12
Low 2	5191	21.22	21.15
Mid	5200	21.22	21.19
High	5235	21.58	21.62

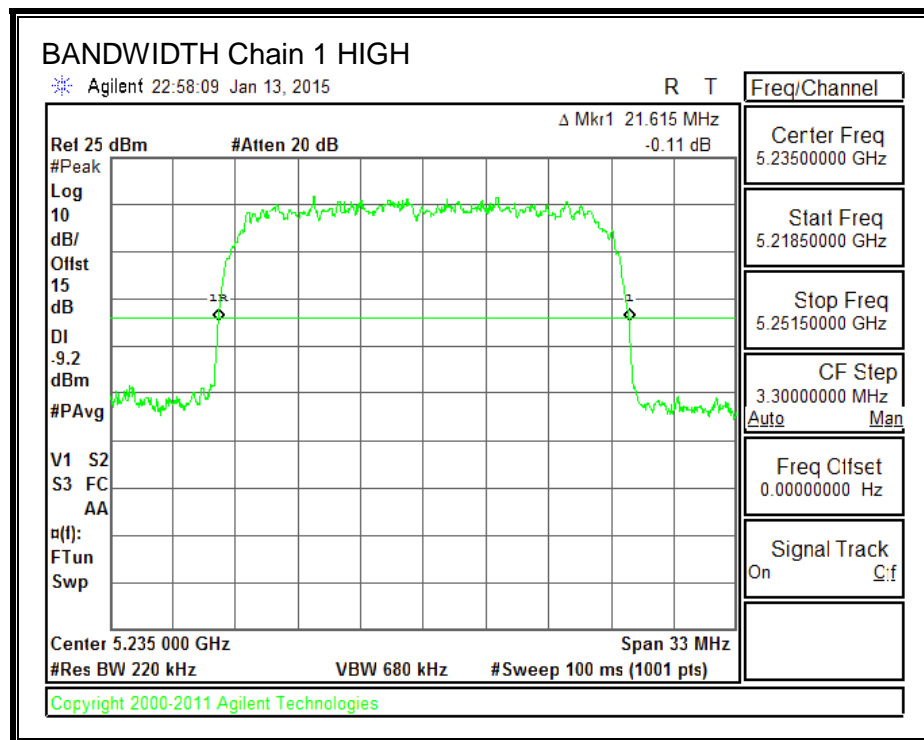
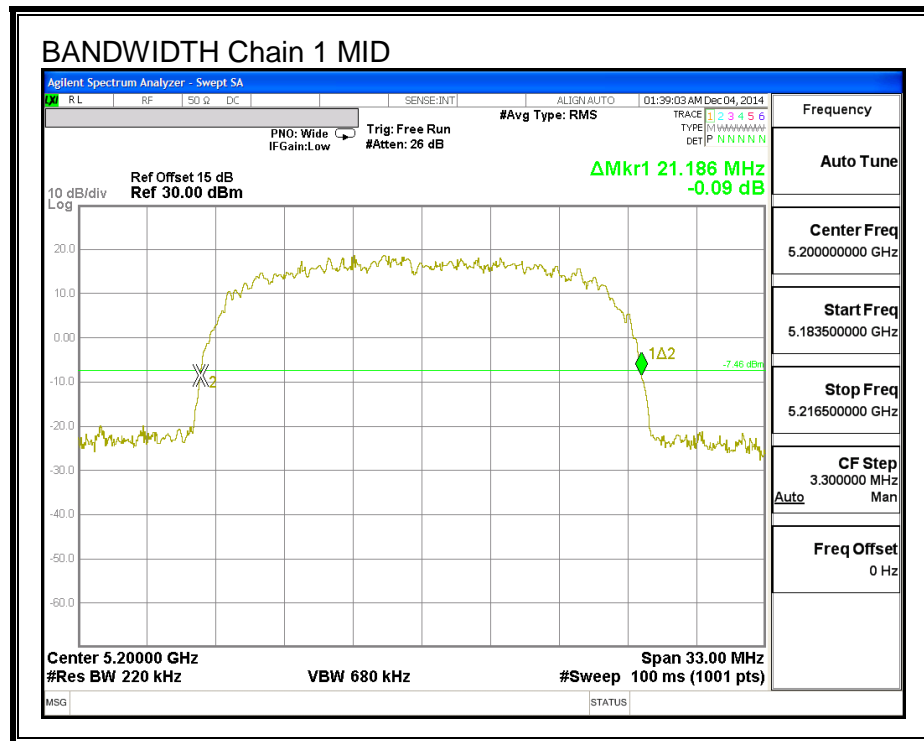
**26 dB BANDWIDTH, Chain 0**





**26 dB BANDWIDTH, Chain 1**





### 8.3.2. OUTPUT POWER AND PSD

#### LIMITS

FCC §15.407 (a) (1)

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



### **DIRECTIONAL ANTENNA GAIN**

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
14.50	14.50	14.50

### **RESULTS**

#### **Antenna Gain and Limits**

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low 1	5181	14.50	14.50	30.00	17.00
Low 2	5191	14.50	14.50	30.00	17.00
Mid	5200	14.50	14.50	30.00	17.00
High	5235	14.50	14.50	30.00	17.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PSD
--------------------	------	--

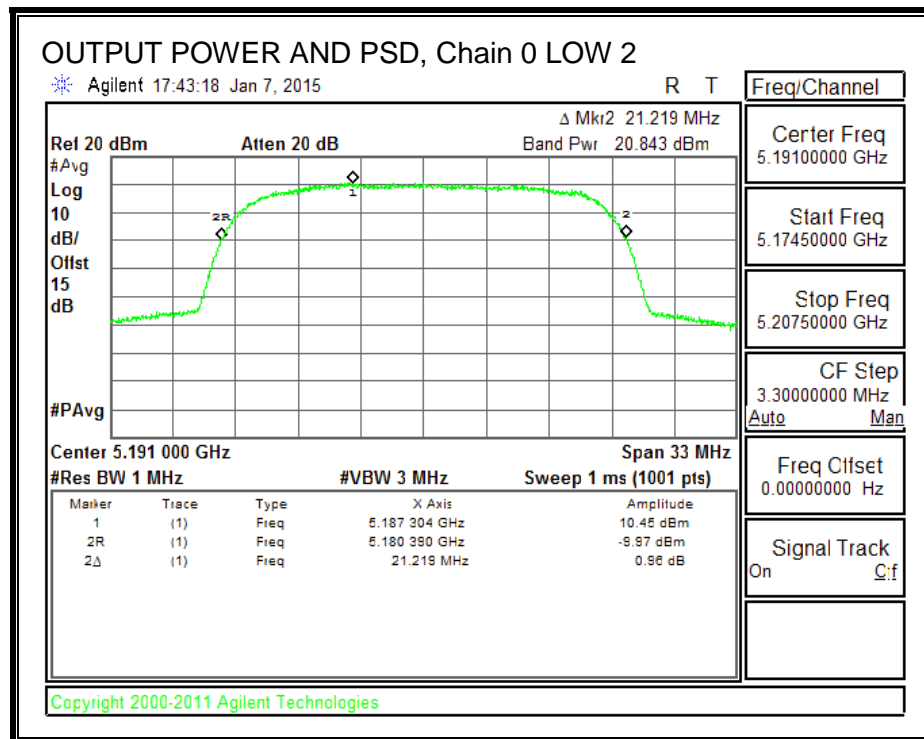
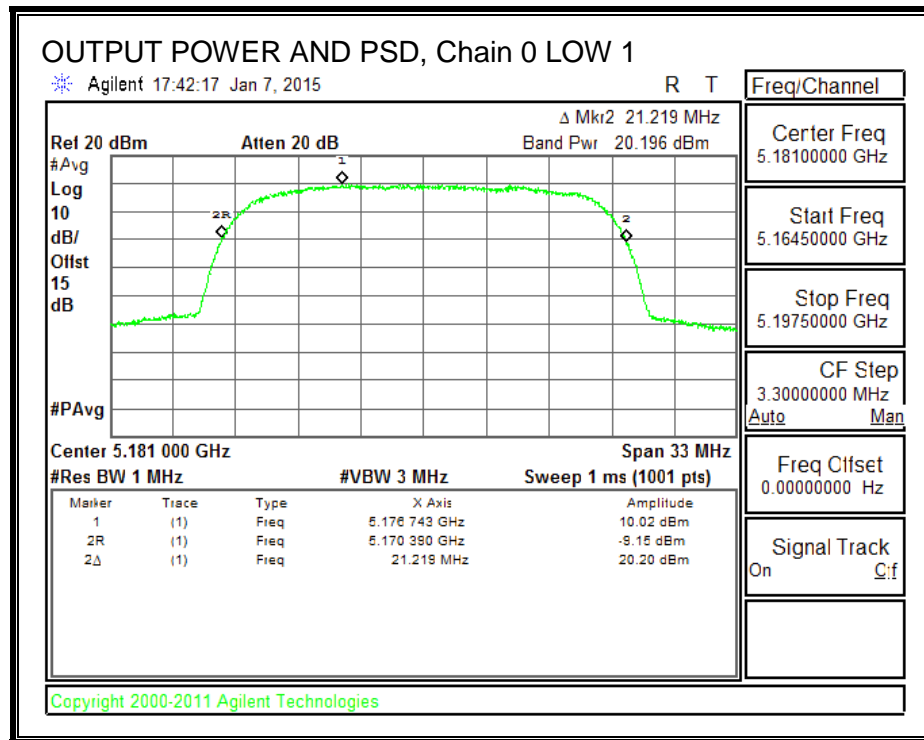
#### **Output Power Results**

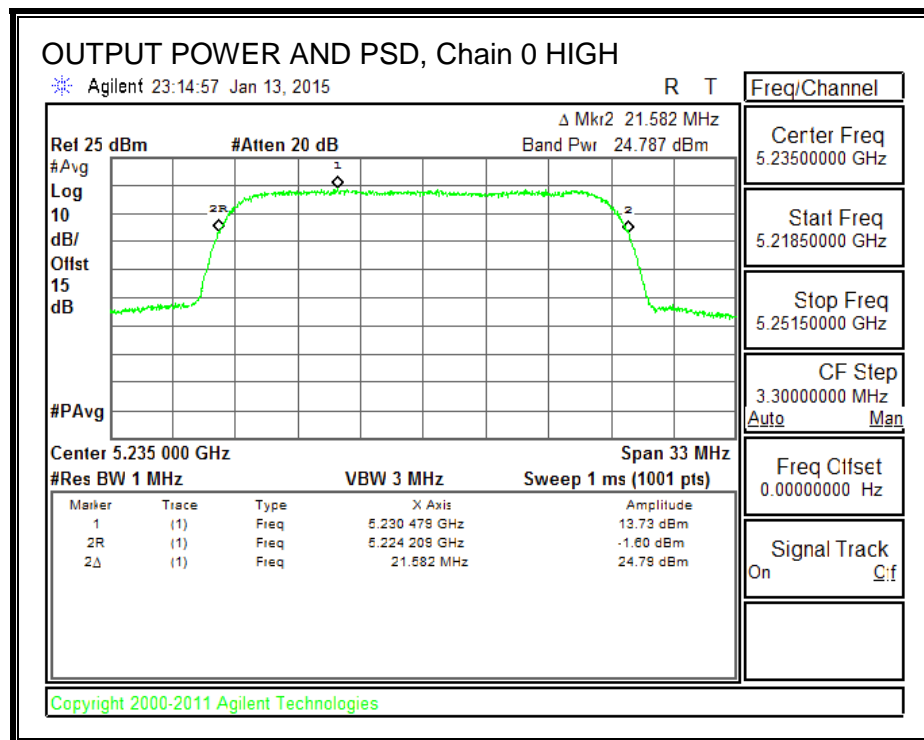
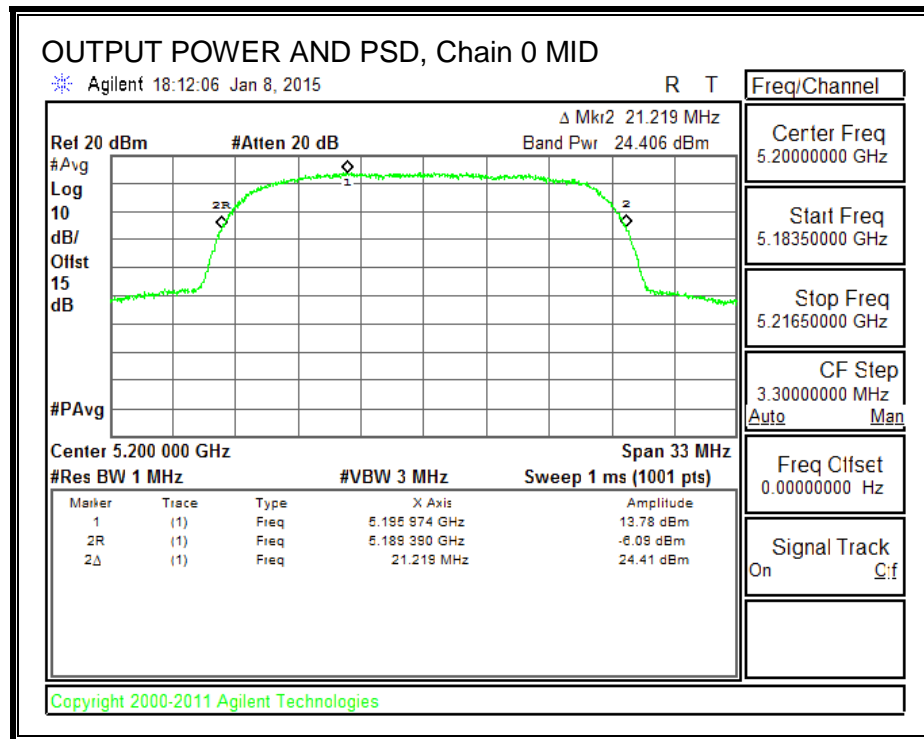
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low 1	5181	20.20	20.11	23.16	30.00	-6.84
Low 2	5191	20.84	20.95	23.91	30.00	-6.09
Mid	5200	24.41	24.31	27.37	30.00	-2.63
High	5235	24.79	25.11	27.96	30.00	-2.04

#### **PSD Results**

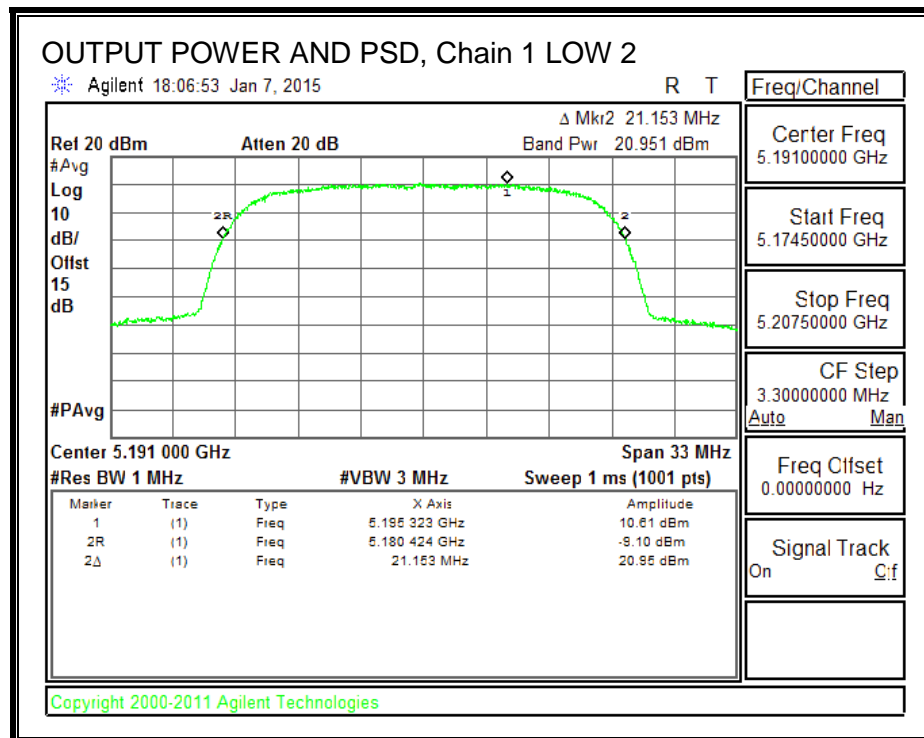
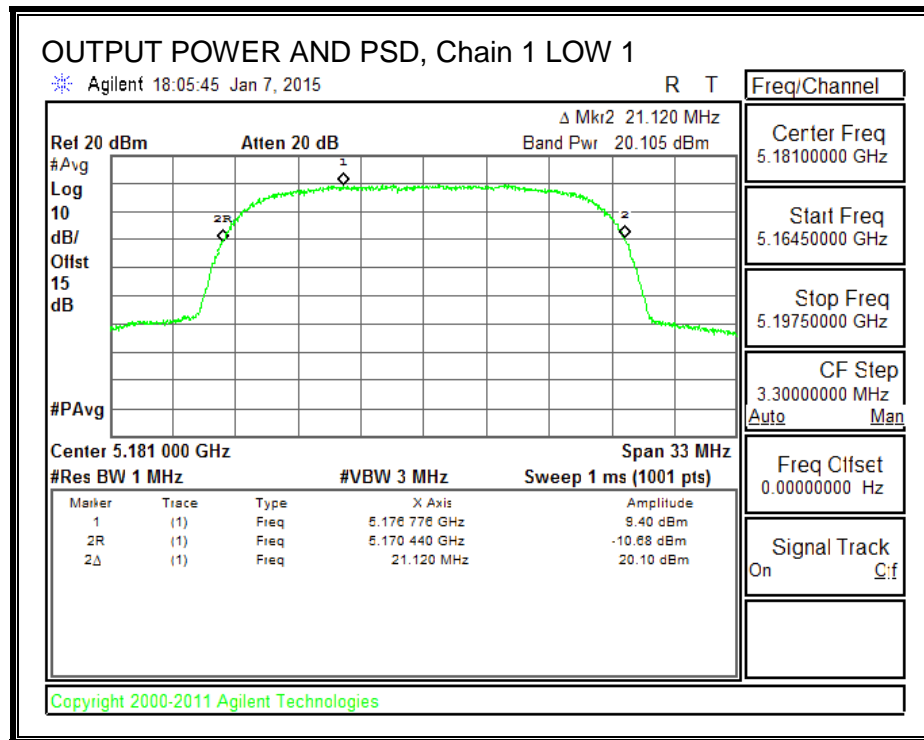
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low 1	5181	10.02	9.40	12.73	17.00	-4.27
Low 2	5191	10.45	10.61	13.54	17.00	-3.46
Mid	5200	13.78	13.79	16.80	17.00	-0.20
High	5235	13.73	13.82	16.79	17.00	-0.21

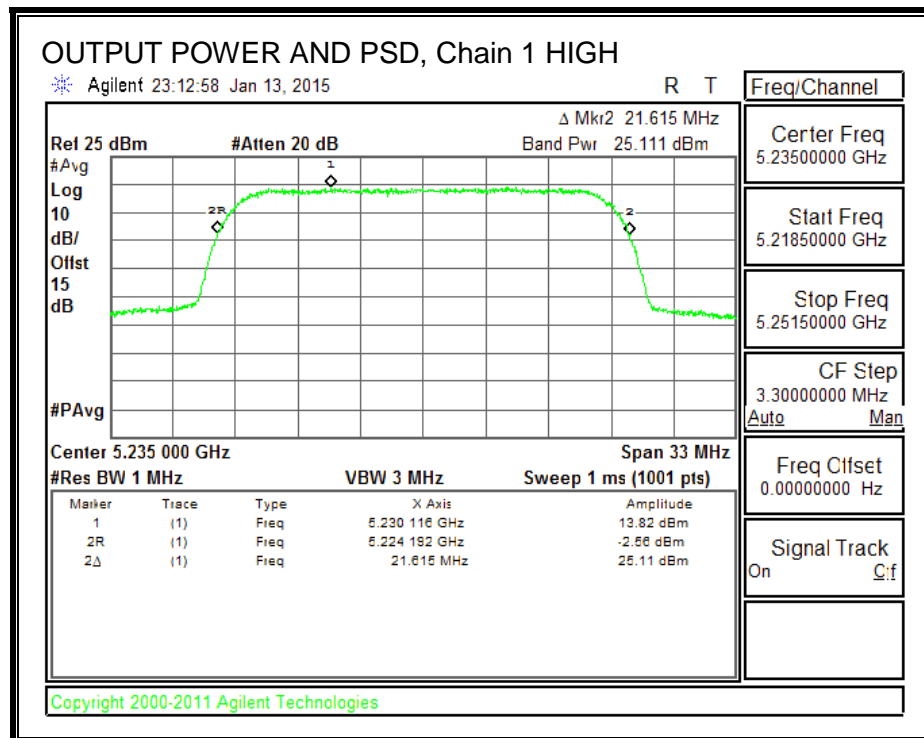
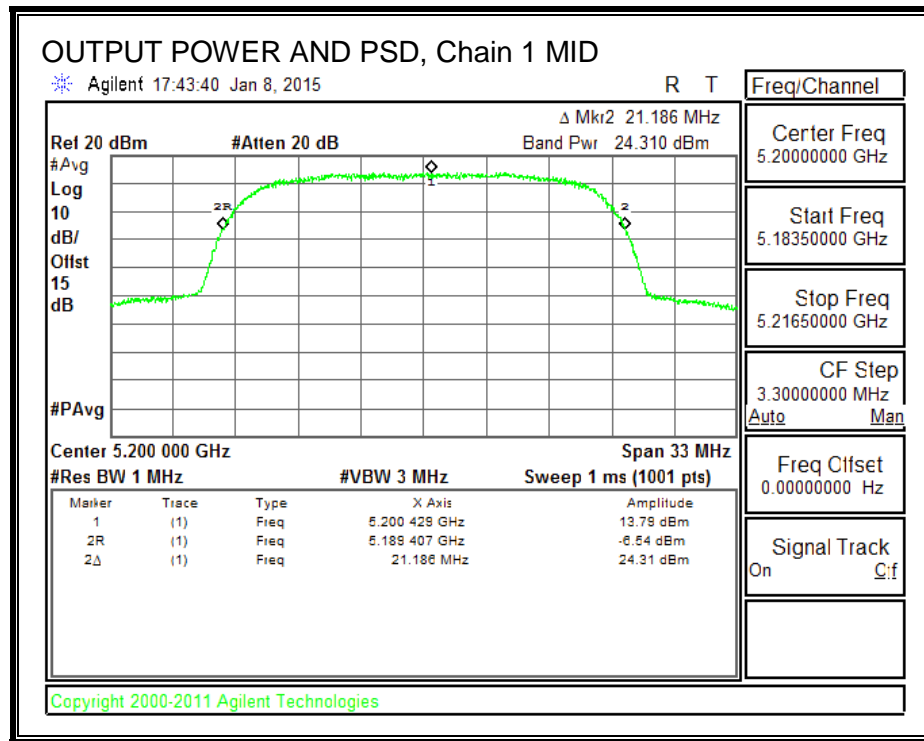
**OUTPUT POWER AND PSD, Chain 0**





**OUTPUT POWER AND PSD, Chain 1**





### **8.3.3. OUT-OF-BAND EMISSIONS**

#### **LIMITS**

FCC §15.205 and §15.209

PART 15, SUBPART E

Radiated LIMIT:

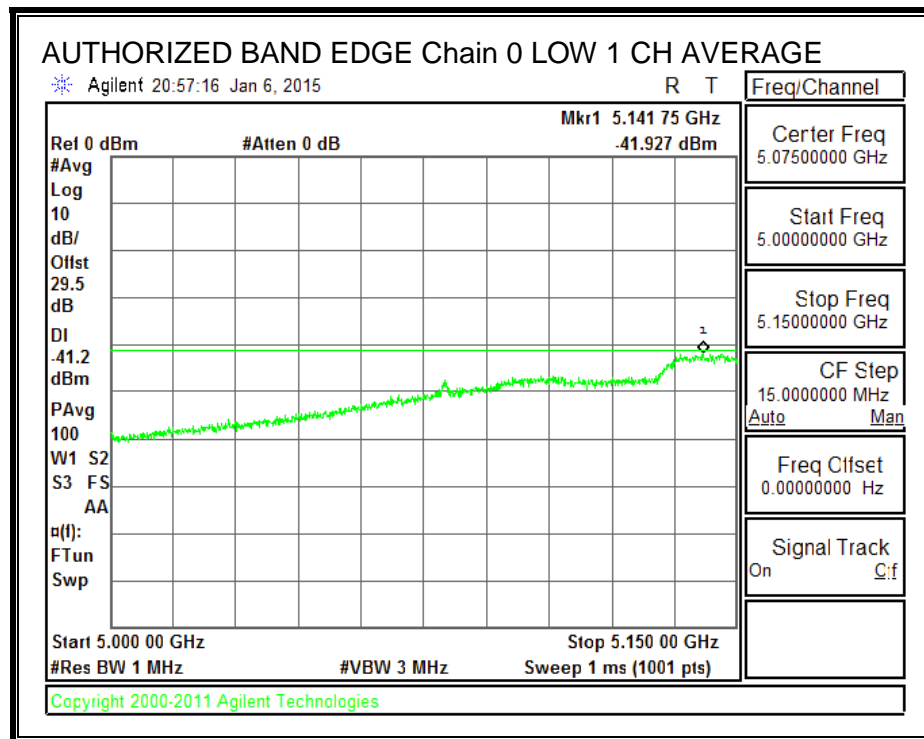
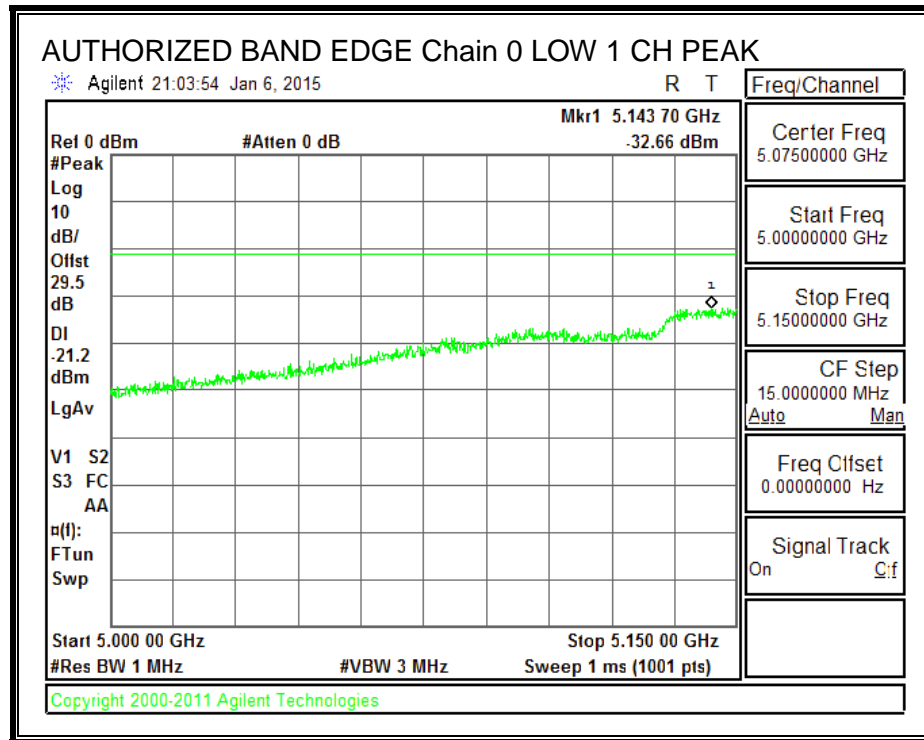
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

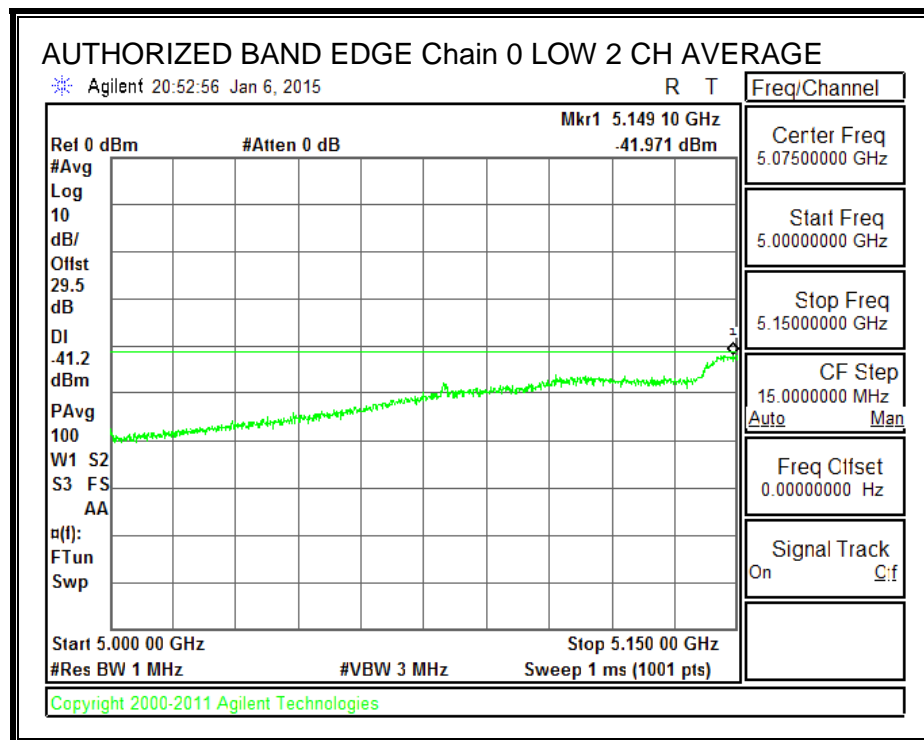
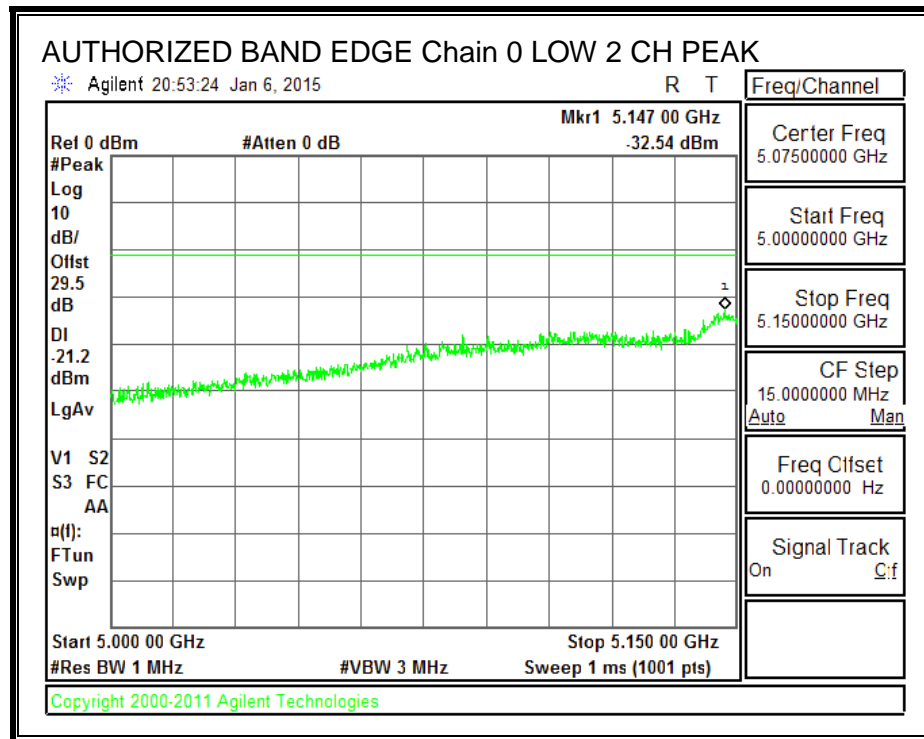
#### **Procedure**

KDB 789033 D02 General UNII Test Procedures New Rules v01, Section II, G5, G6

## RESULTS

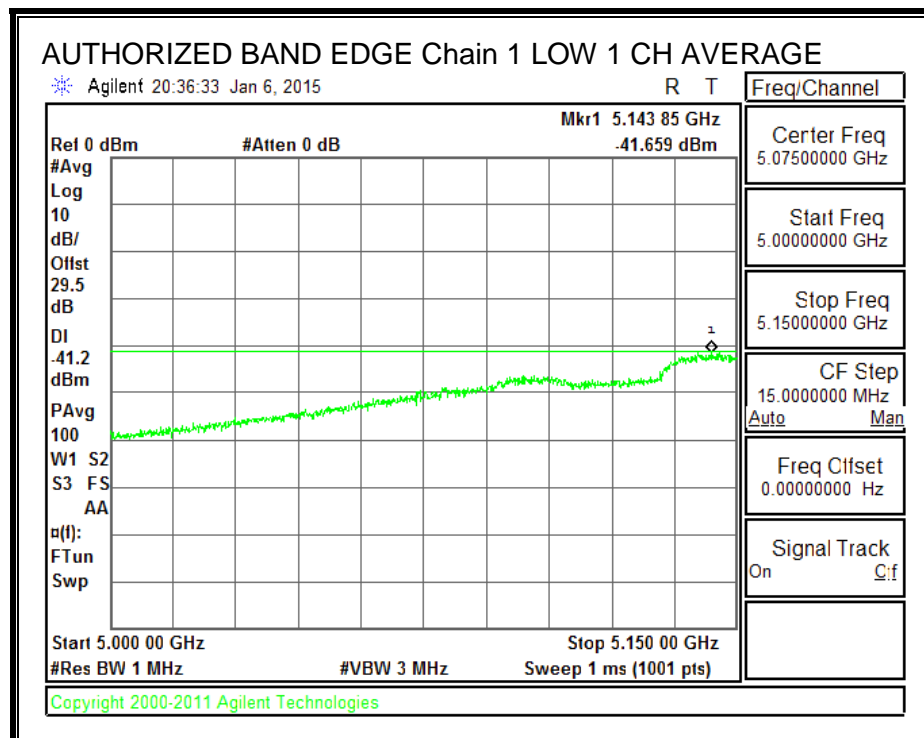
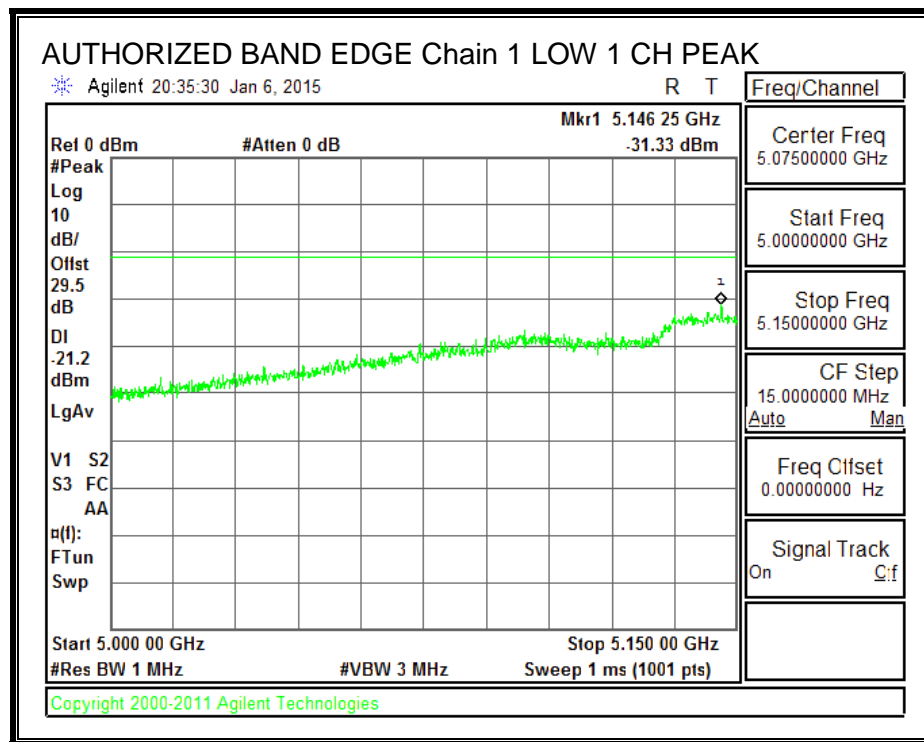
### LOW CHANNEL BANDEDGE, Chain 0

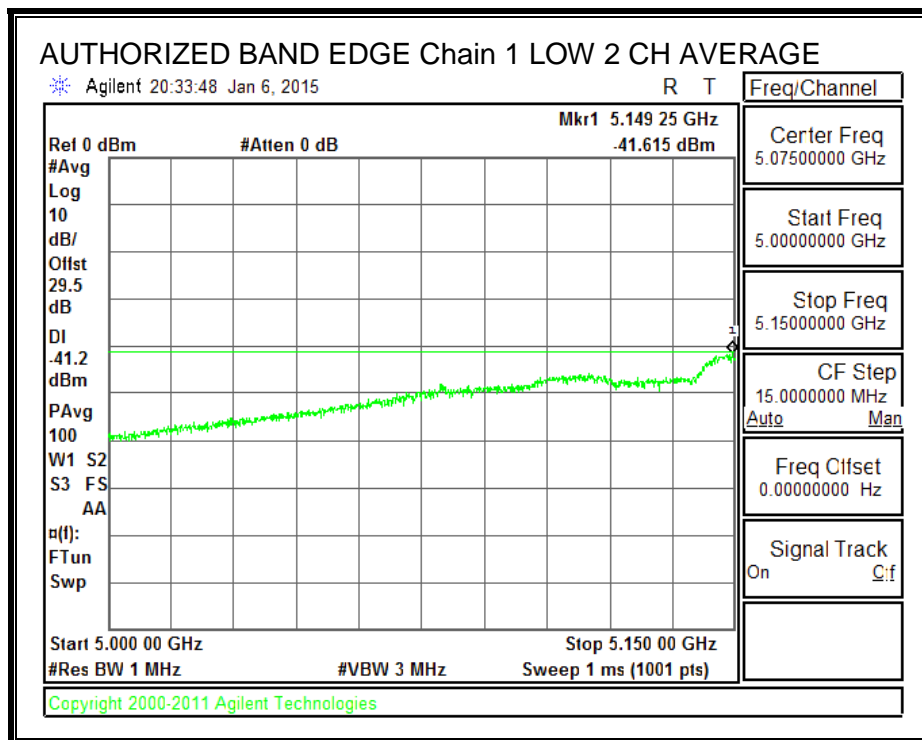
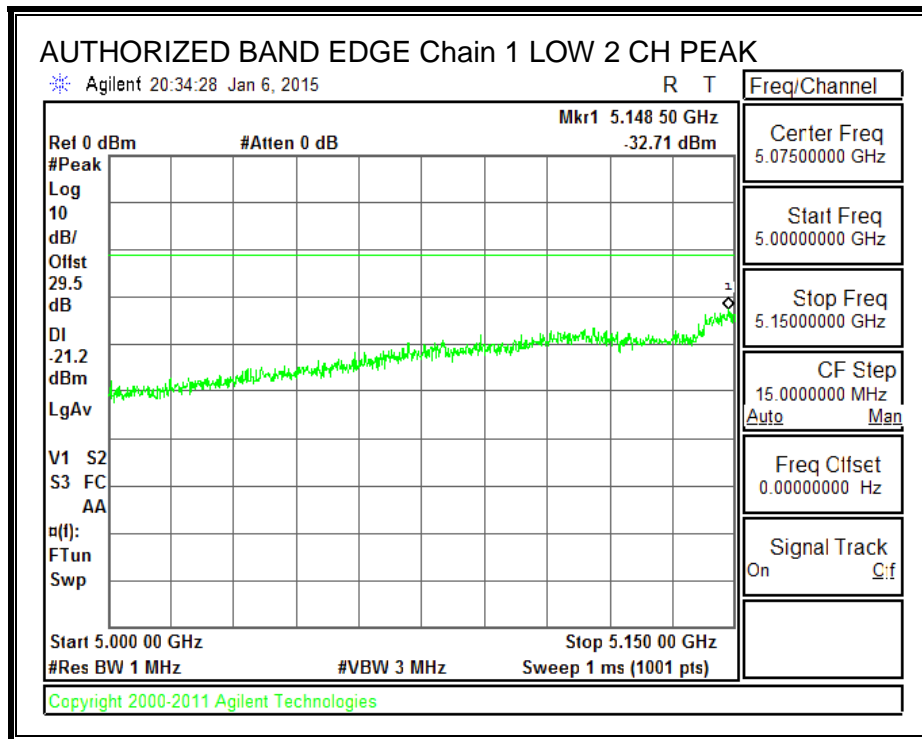






**LOW CHANNEL BANDEDGE, Chain 1**





## 8.4. 40MHz 2TX MODE IN THE 5.2 GHz BAND

### 8.4.1. 26 dB BANDWIDTH

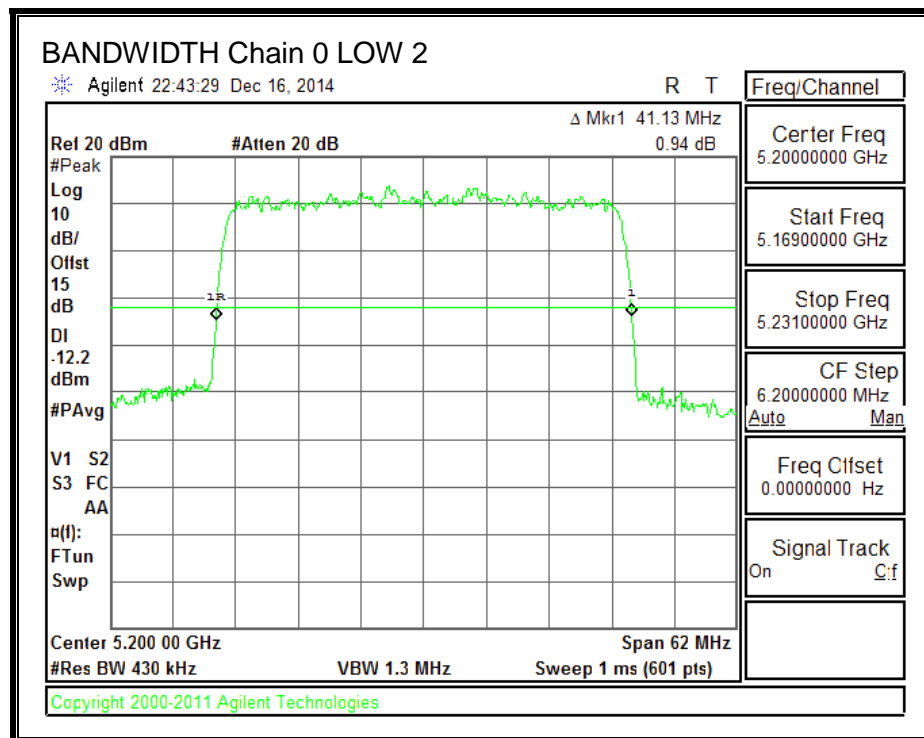
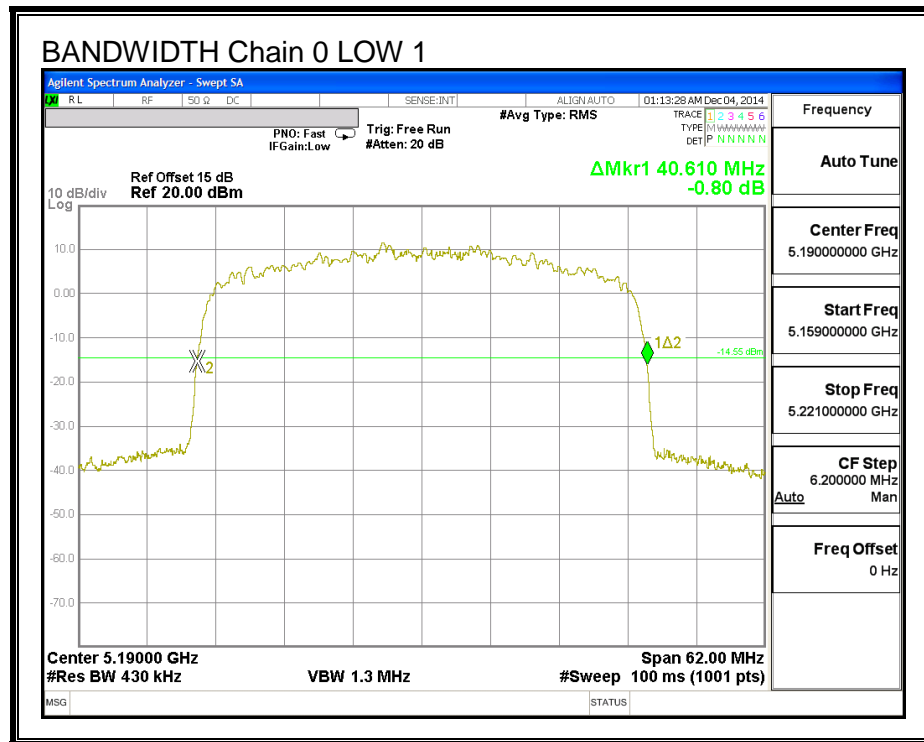
#### LIMITS

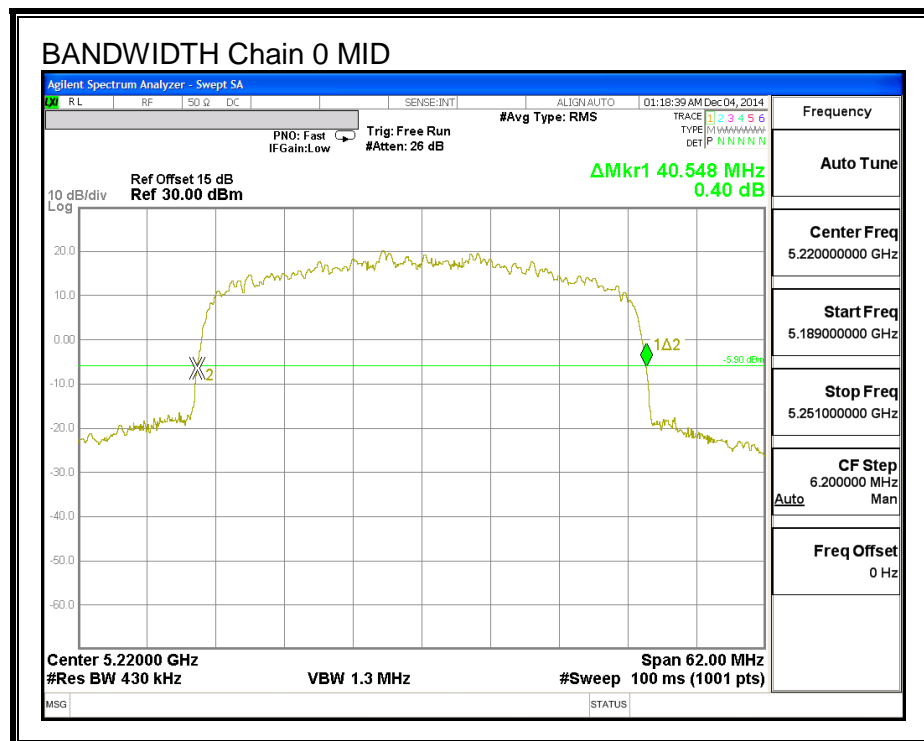
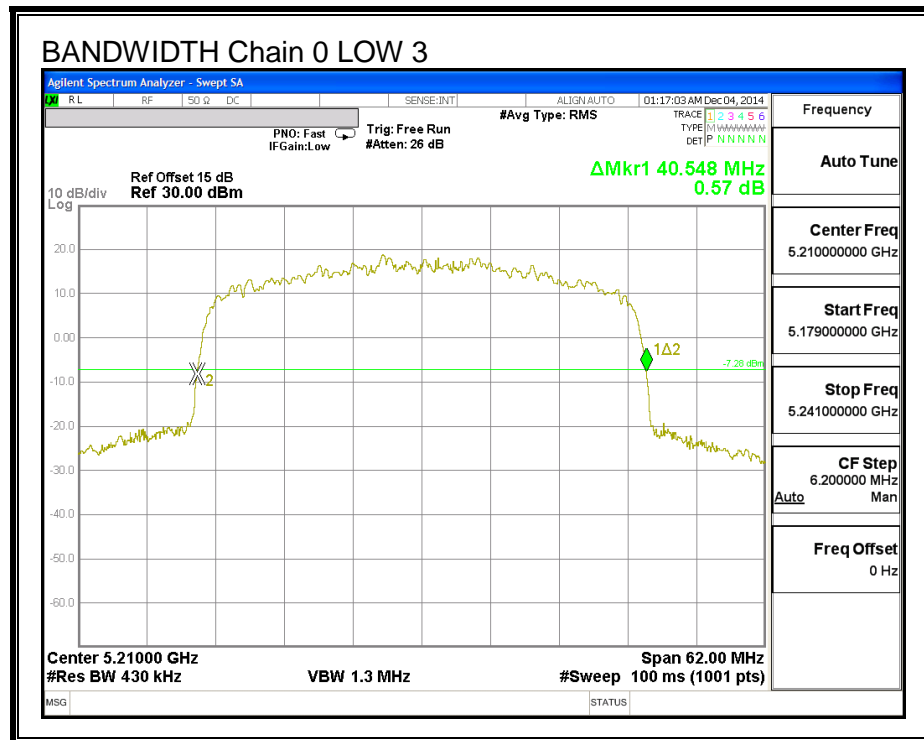
None; for reporting purposes only.

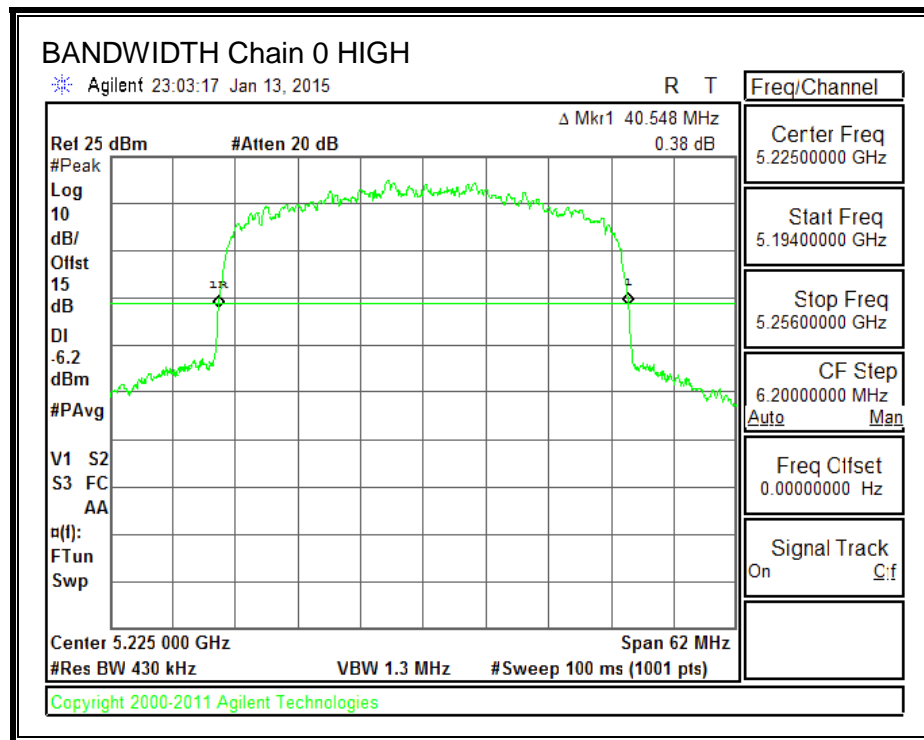
#### RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low 1	5190	40.610	40.424
Low 2	5200	41.130	41.130
Low 3	5210	40.548	40.424
Mid	5220	40.548	40.424
High	5225	40.548	40.362

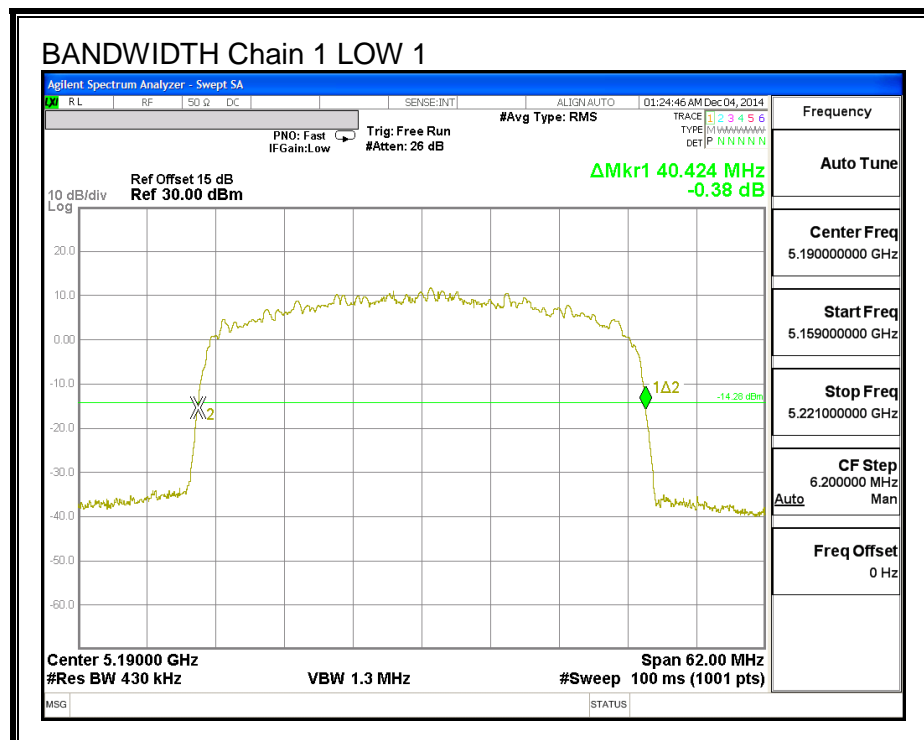
**26 dB BANDWIDTH, Chain 0**

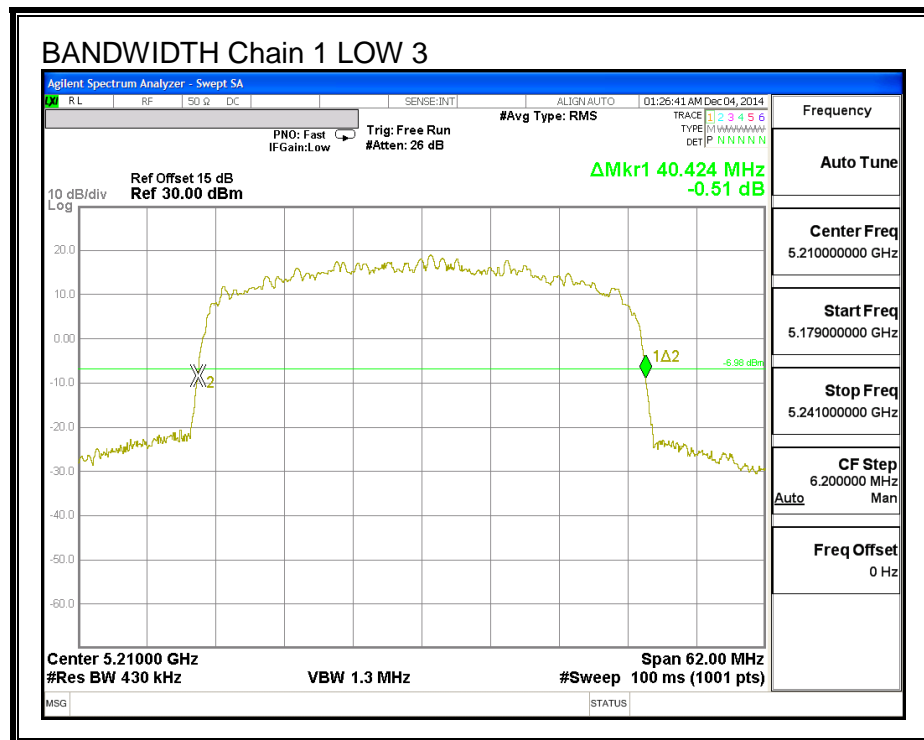
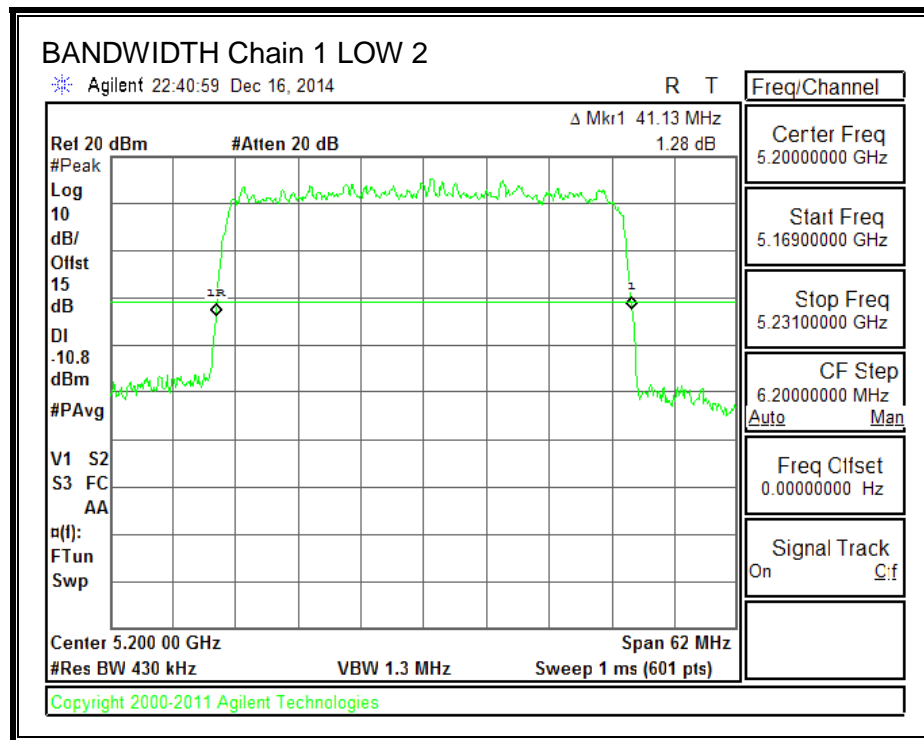


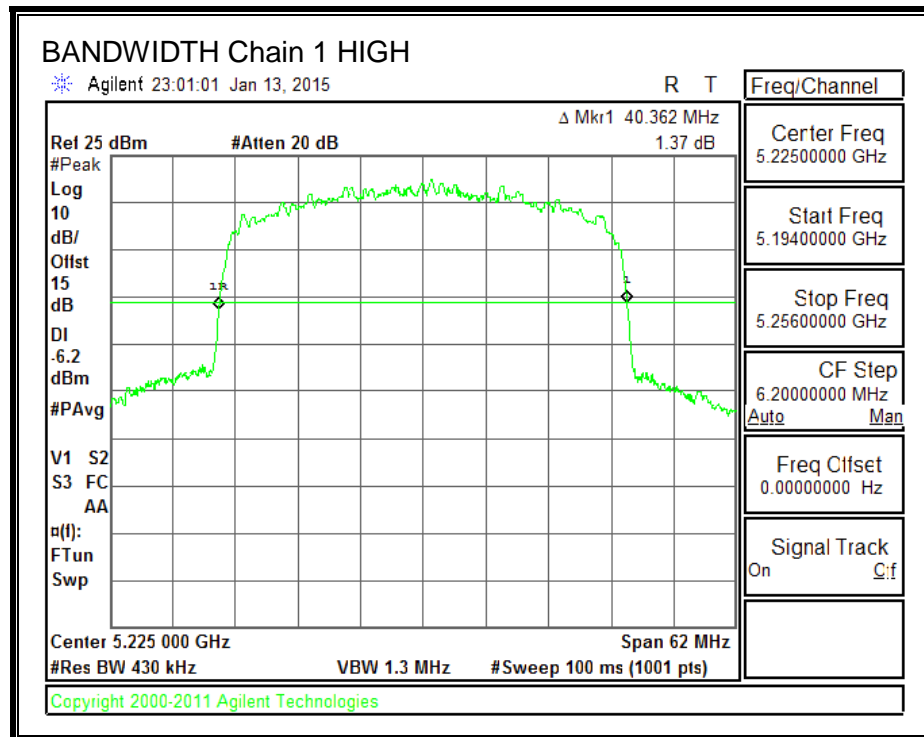
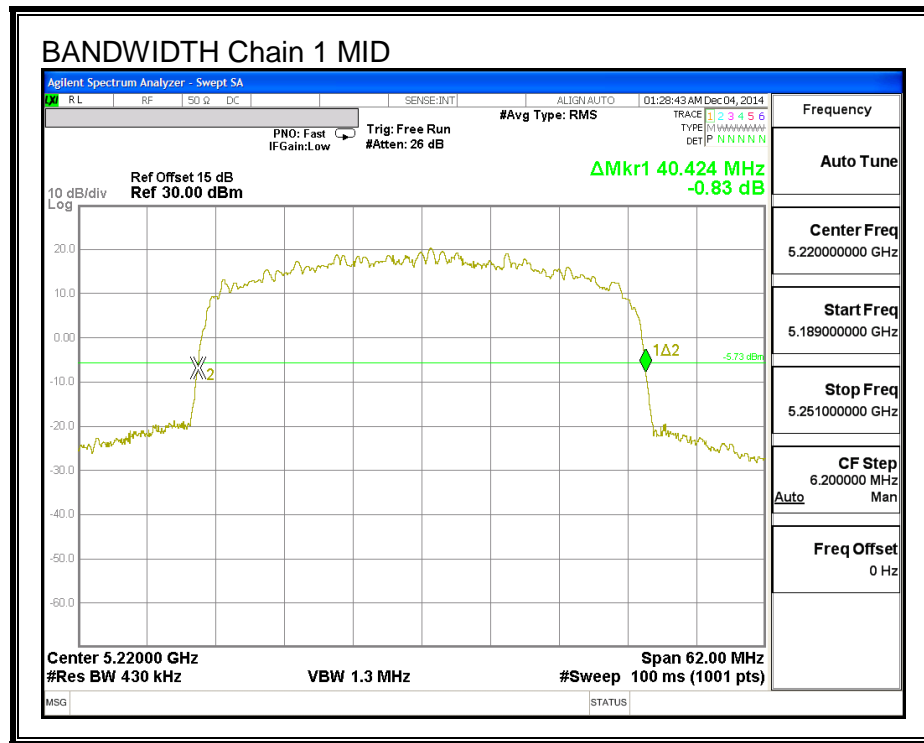




**26 dB BANDWIDTH, Chain 1**









## 8.4.2. OUTPUT POWER AND PSD

### LIMITS

FCC §15.407 (a) (1)

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**DIRECTIONAL ANTENNA GAIN**

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

<b>Chain 0 Antenna Gain (dBi)</b>	<b>Chain 1 Antenna Gain (dBi)</b>	<b>Uncorrelated Chains Directional Gain (dBi)</b>
14.50	14.50	14.50

## RESULTS

### Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low 1	5190	14.50	14.50	30.00	17.00
Low 2	5200	14.50	14.50	30.00	17.00
Low 3	5210	14.50	14.50	30.00	17.00
Mid	5220	14.50	14.50	30.00	17.00
High	5225	14.50	14.50	30.00	17.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PSD
--------------------	------	--

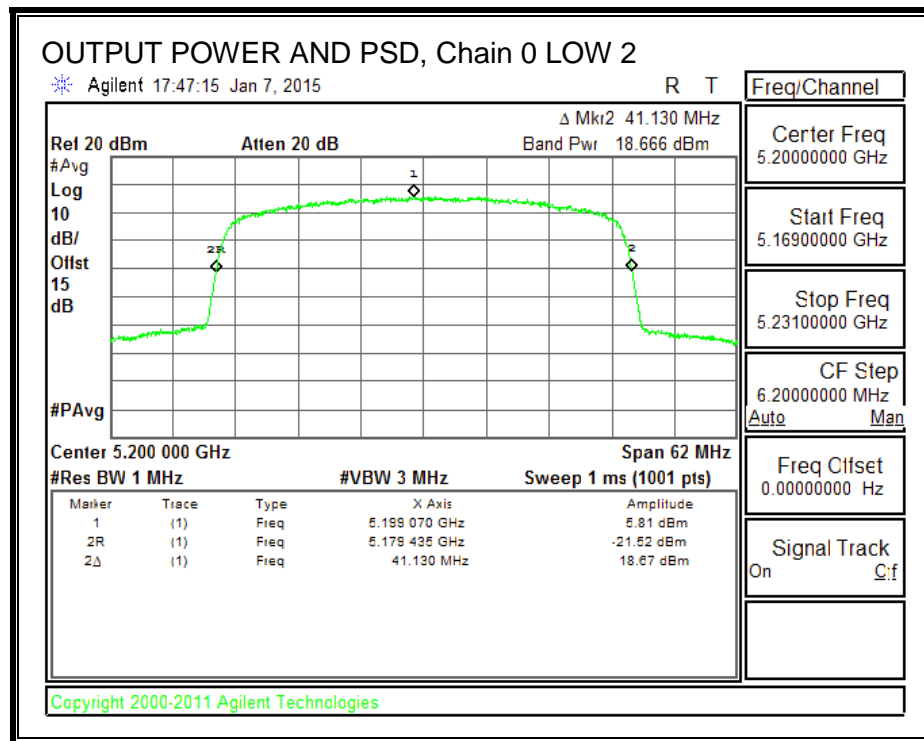
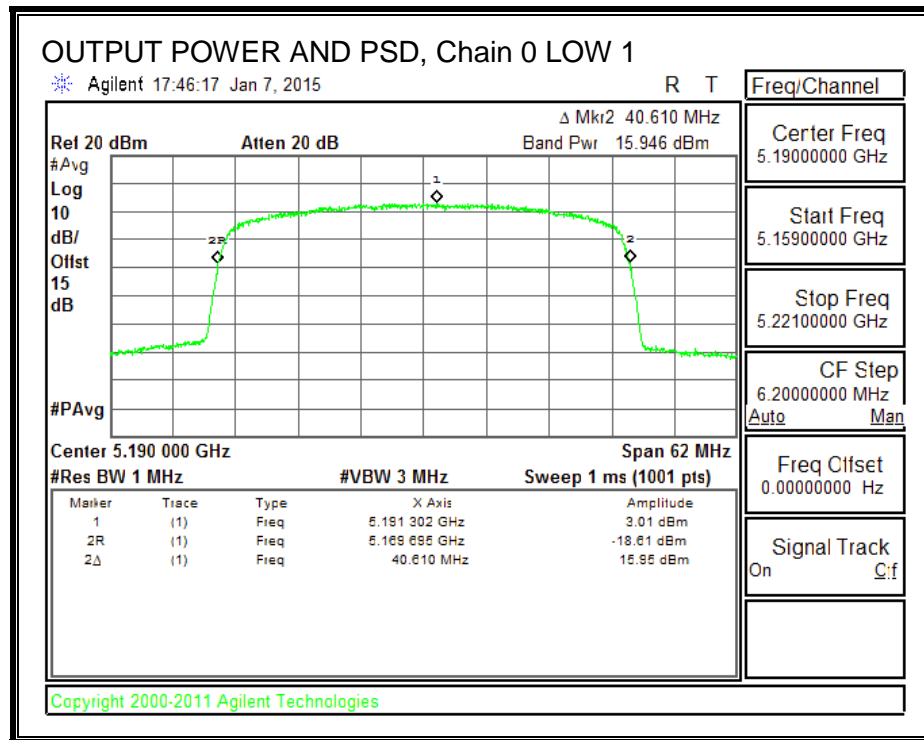
### Output Power Results

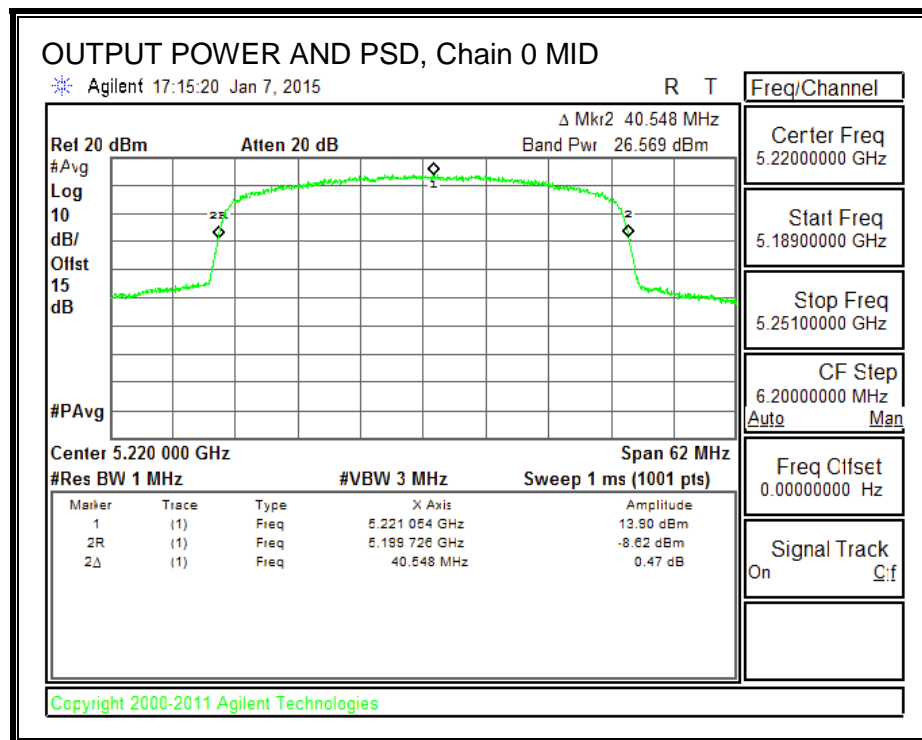
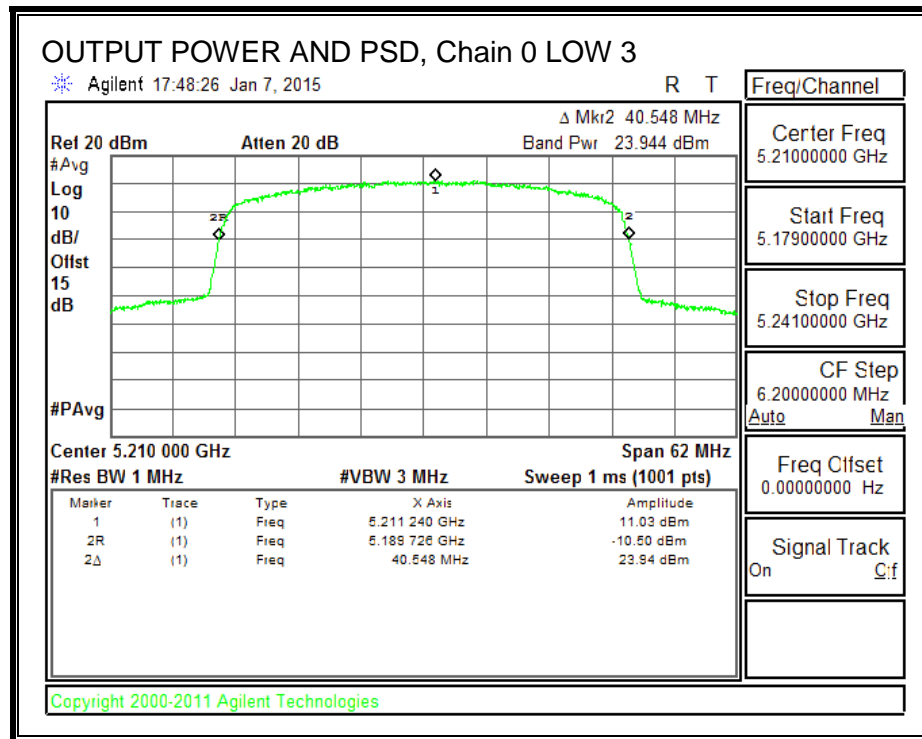
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low 1	5190	15.95	15.93	18.95	30.00	-11.05
Low 2	5200	18.67	18.90	21.79	30.00	-8.21
Low 3	5210	23.94	23.95	26.96	30.00	-3.04
Mid	5220	26.57	26.37	29.48	30.00	-0.52
High	5225	26.77	26.11	29.46	30.00	-0.54

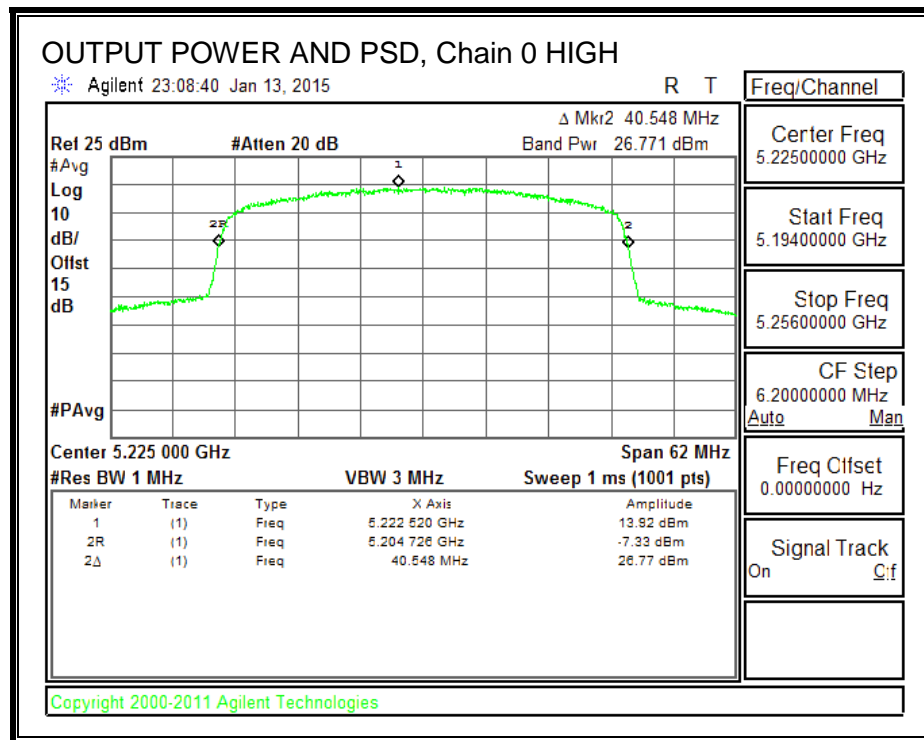
### PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low 1	5190	3.01	3.36	6.20	17.00	-10.80
Low 2	5200	5.81	5.99	8.91	17.00	-8.09
Low 3	5210	11.03	11.61	14.34	17.00	-2.66
Mid	5220	13.90	13.67	16.80	17.00	-0.20
High	5225	13.92	13.87	16.91	17.00	-0.09

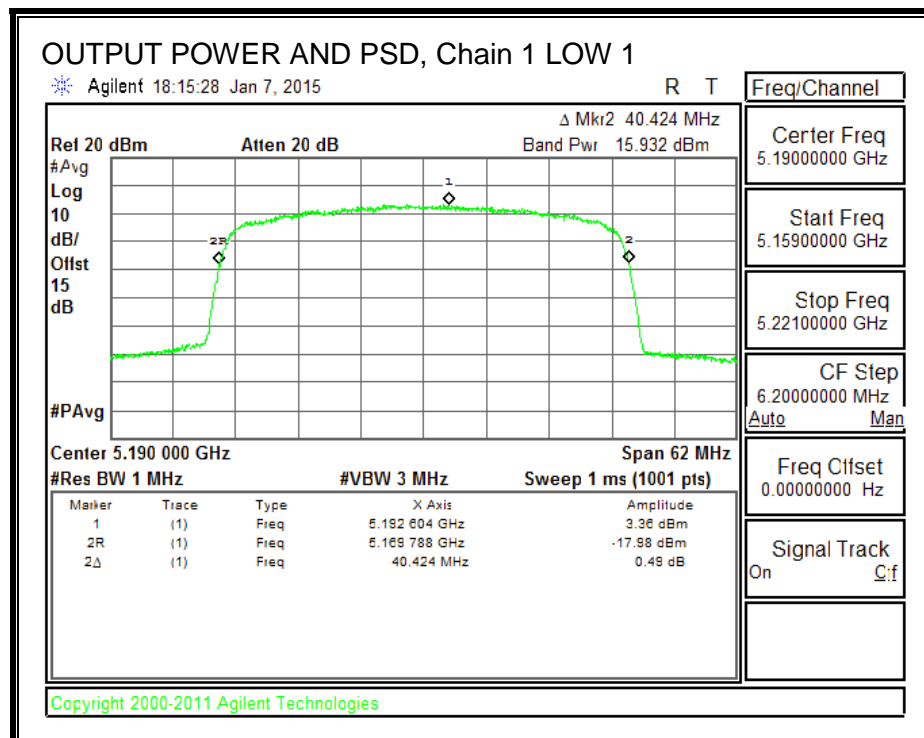
**OUTPUT POWER AND PSD, Chain 0**

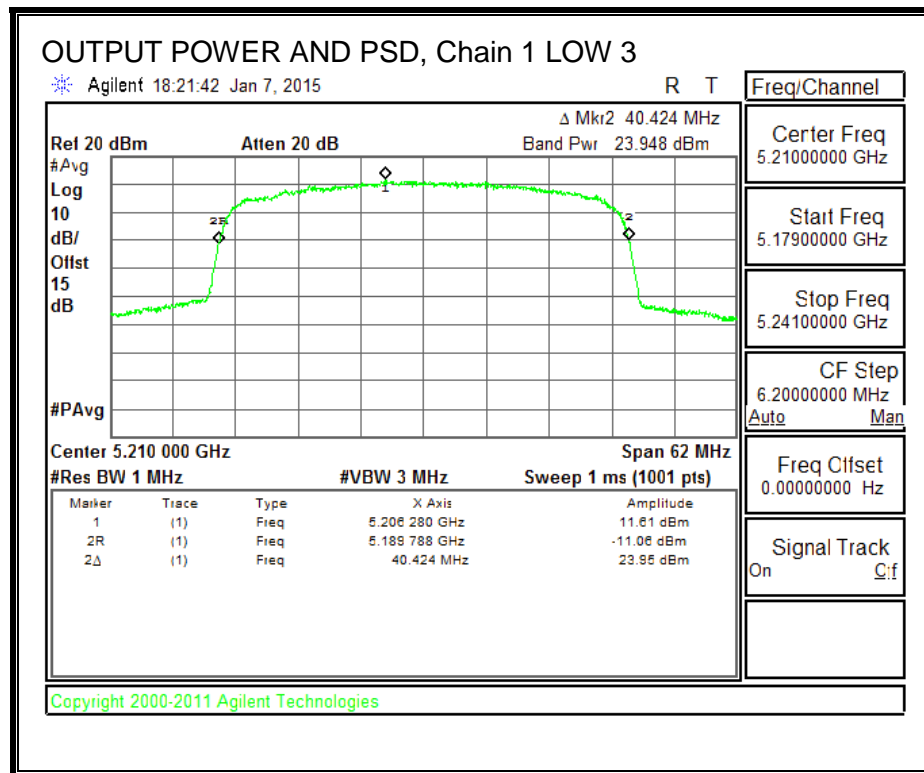
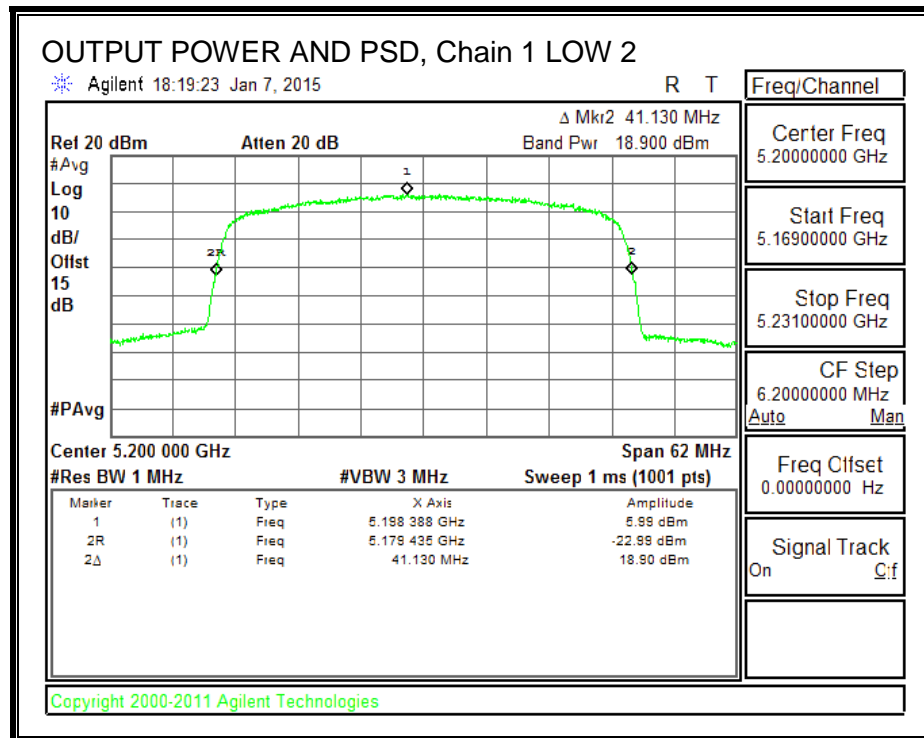


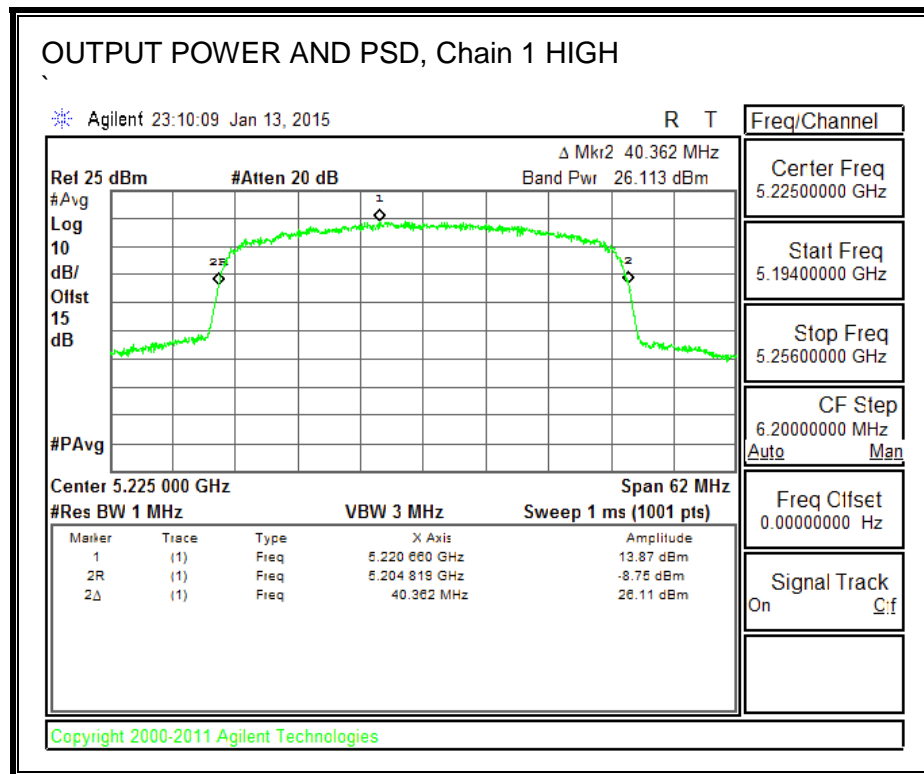
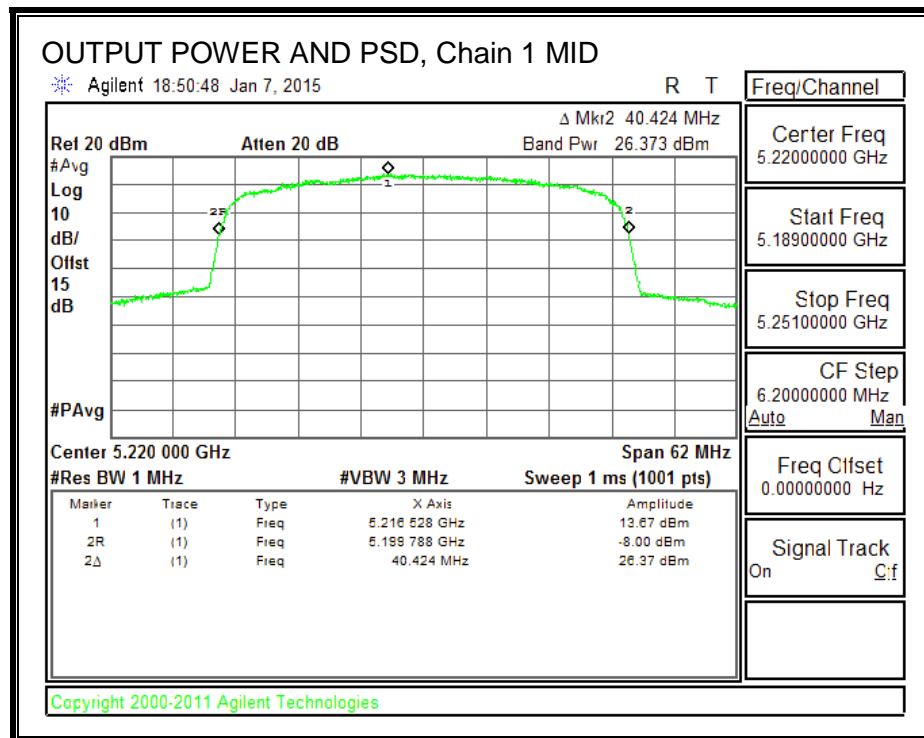




**OUTPUT POWER AND PSD, Chain 1**









### **8.4.3. OUT-OF-BAND EMISSIONS**

#### **LIMITS**

FCC §15.205 and §15.209

PART 15, SUBPART E

Radiated LIMIT:

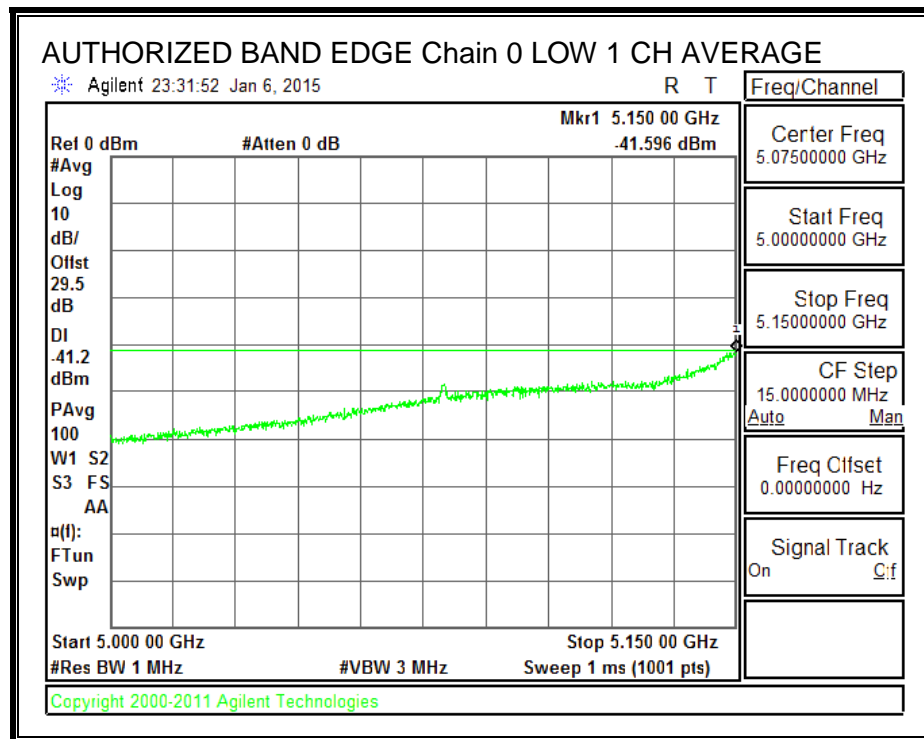
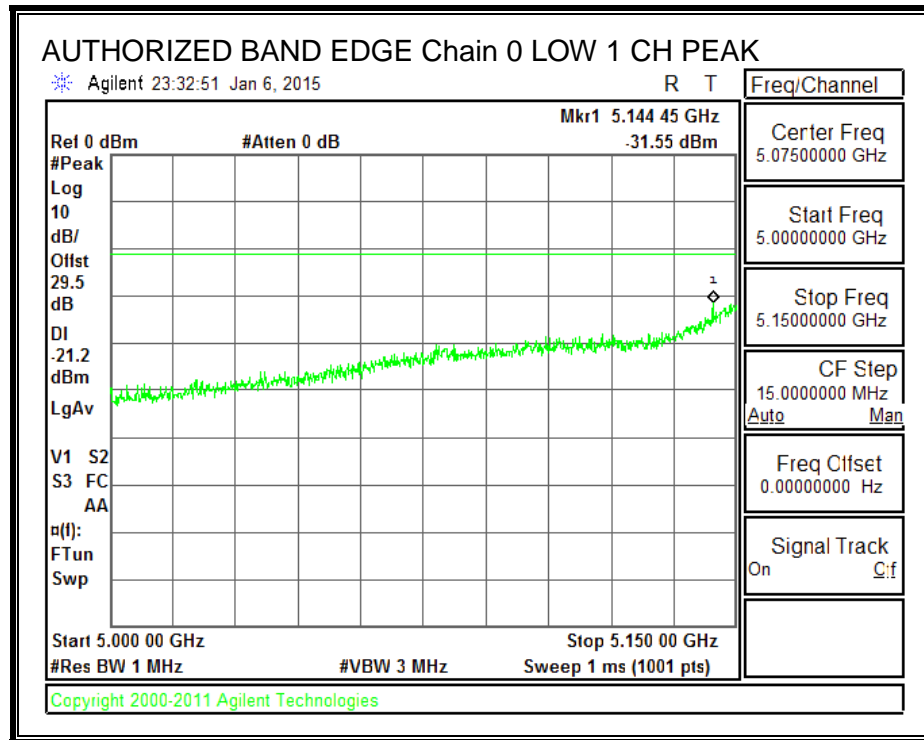
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

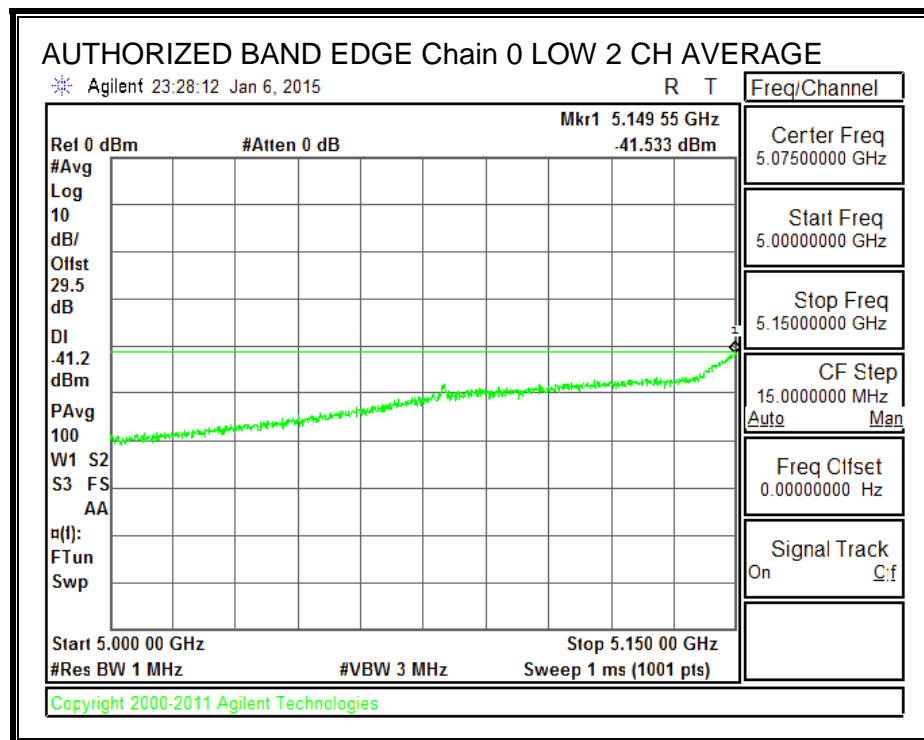
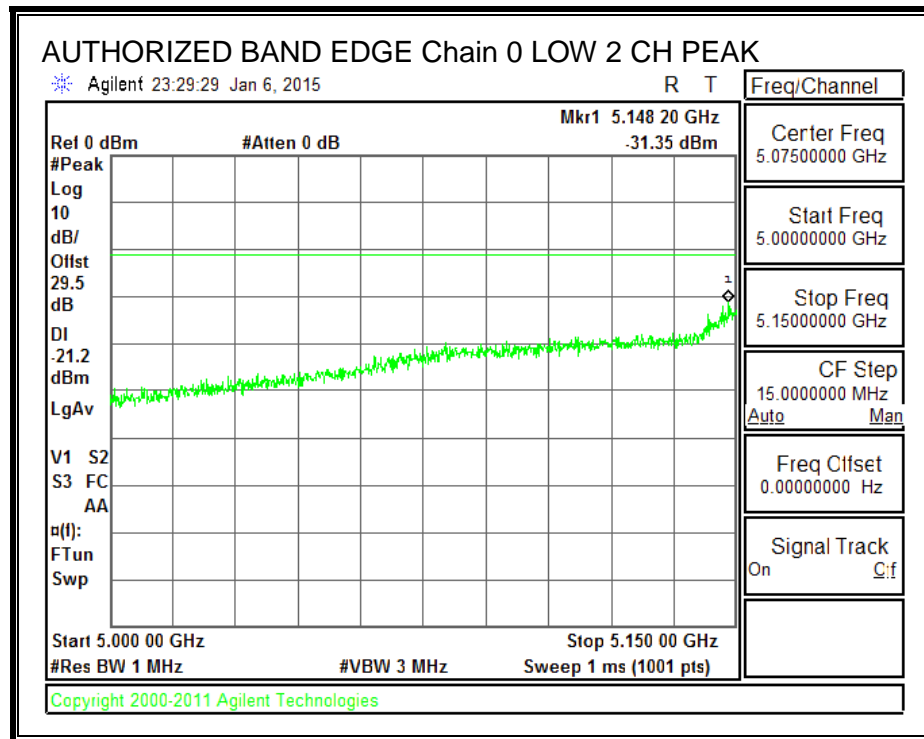
#### **Procedure**

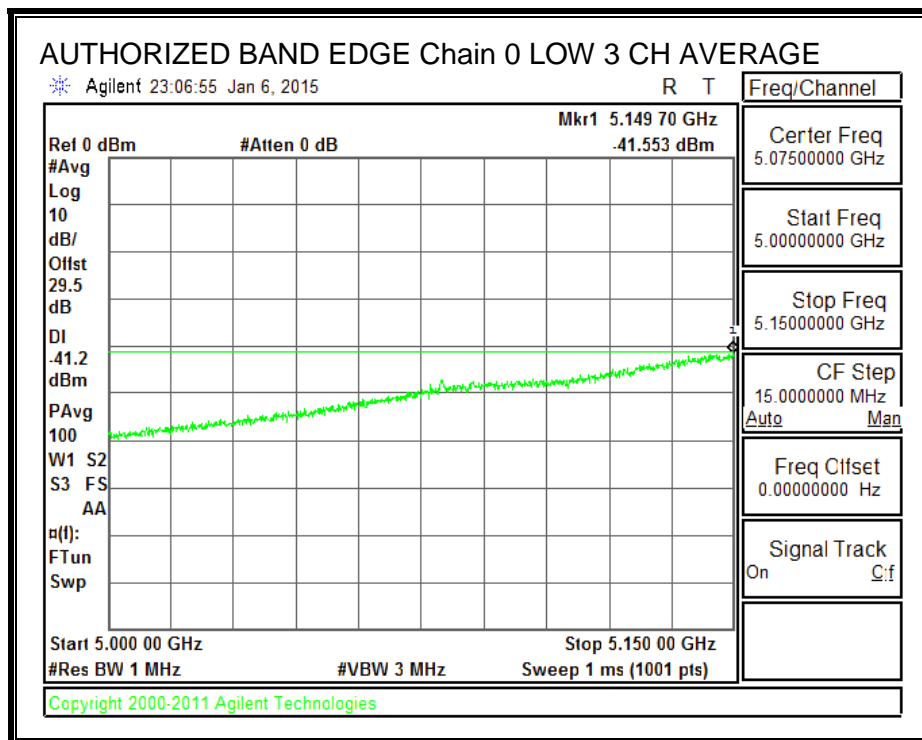
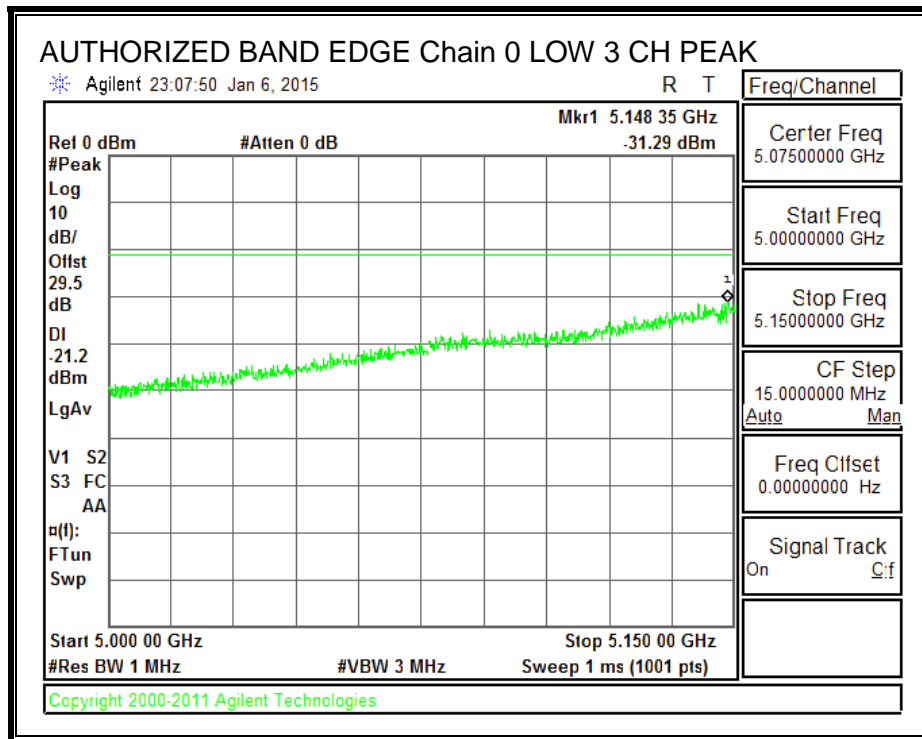
KDB 789033 D02 General UNII Test Procedures New Rules v01, Section II, G5, G6

## RESULTS

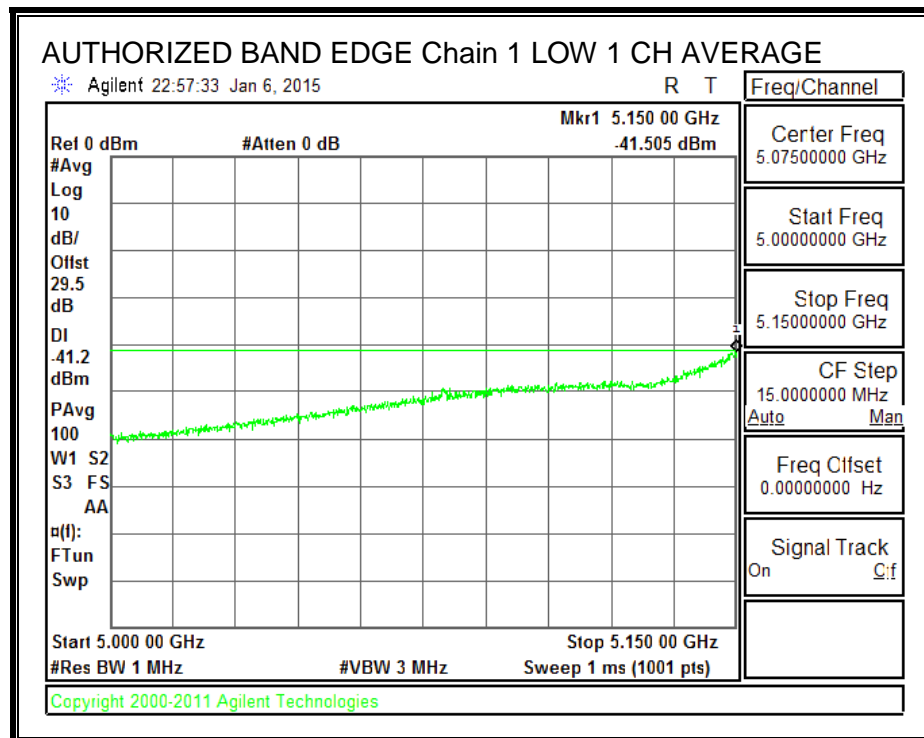
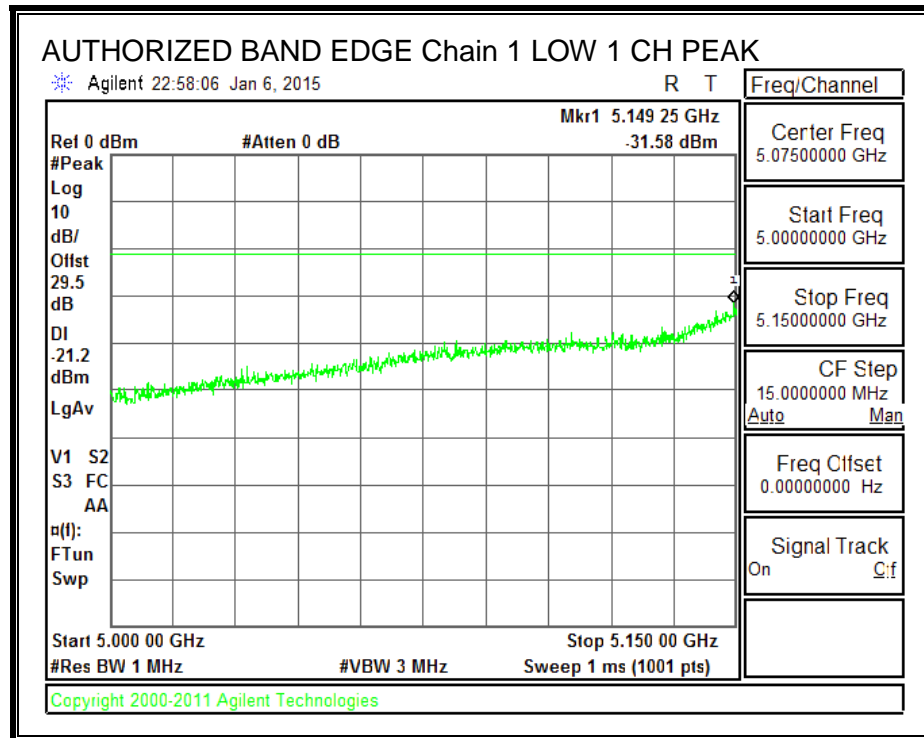
### LOW CHANNEL BANDEDGE, Chain 0

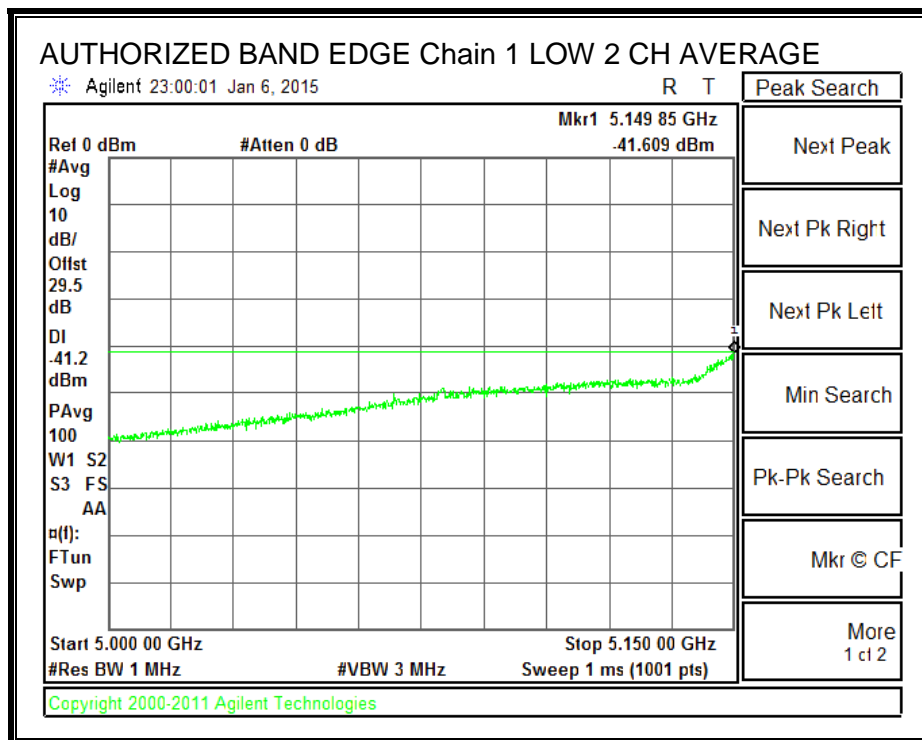
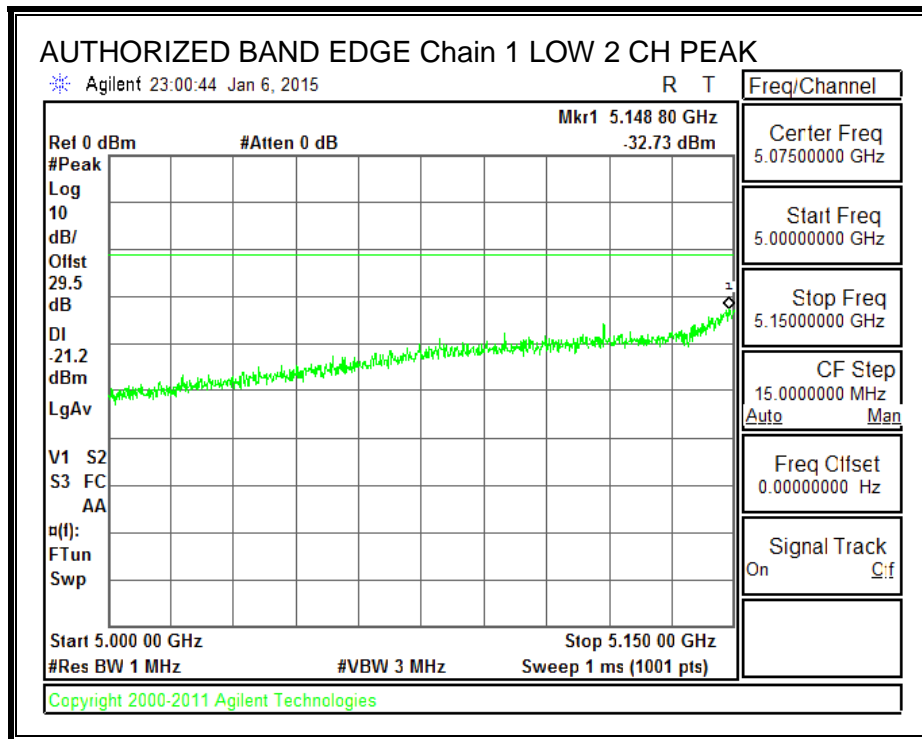


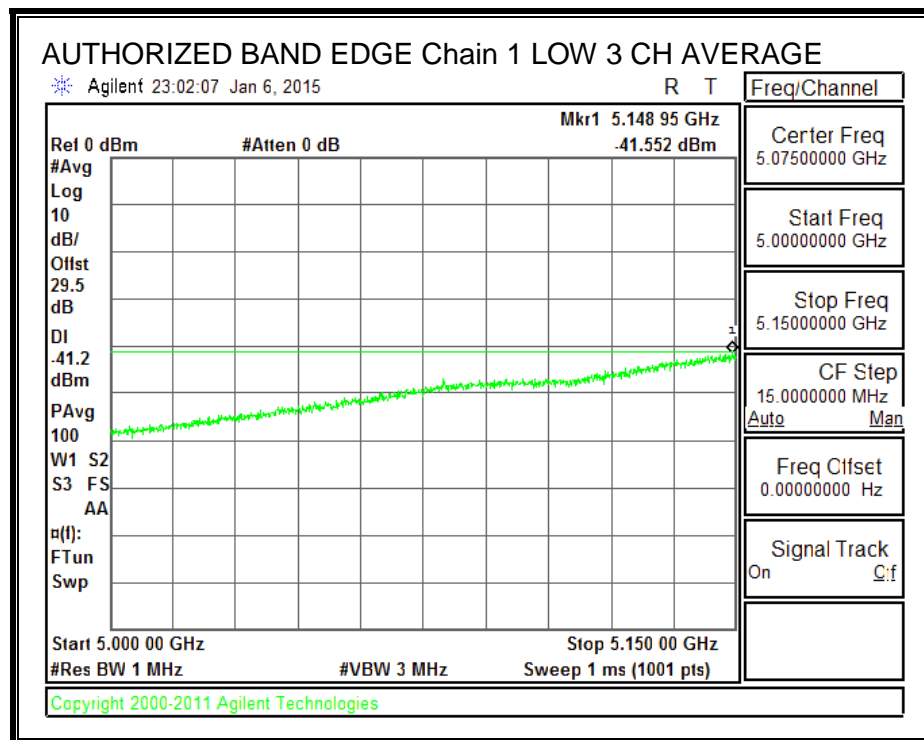
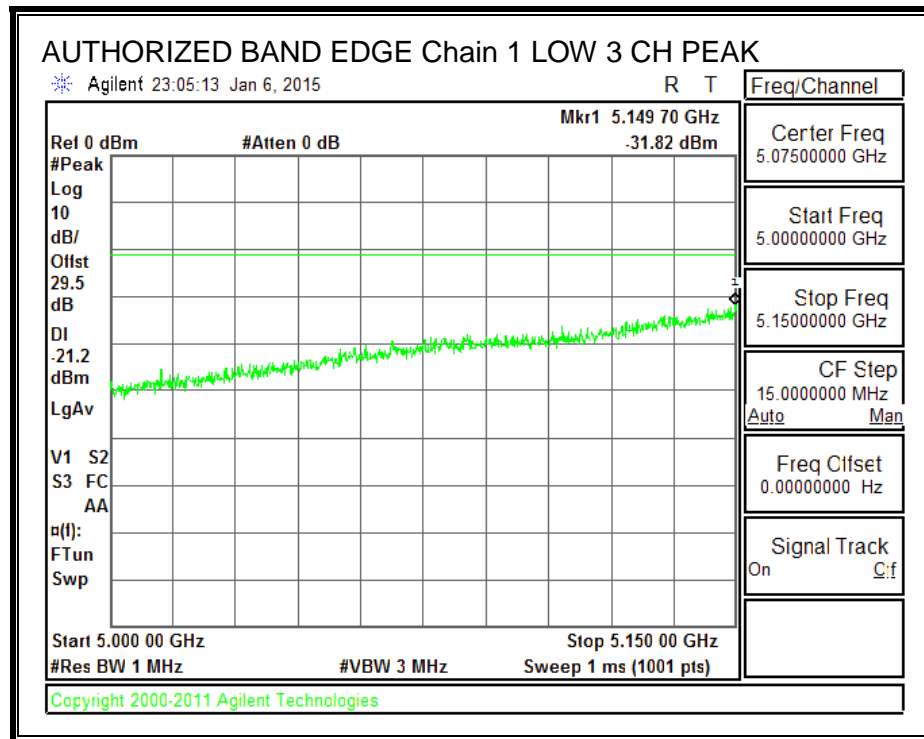




**LOW CHANNEL BANDEDGE, Chain 1**







## 9. RADIATED TEST RESULTS

### 9.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209

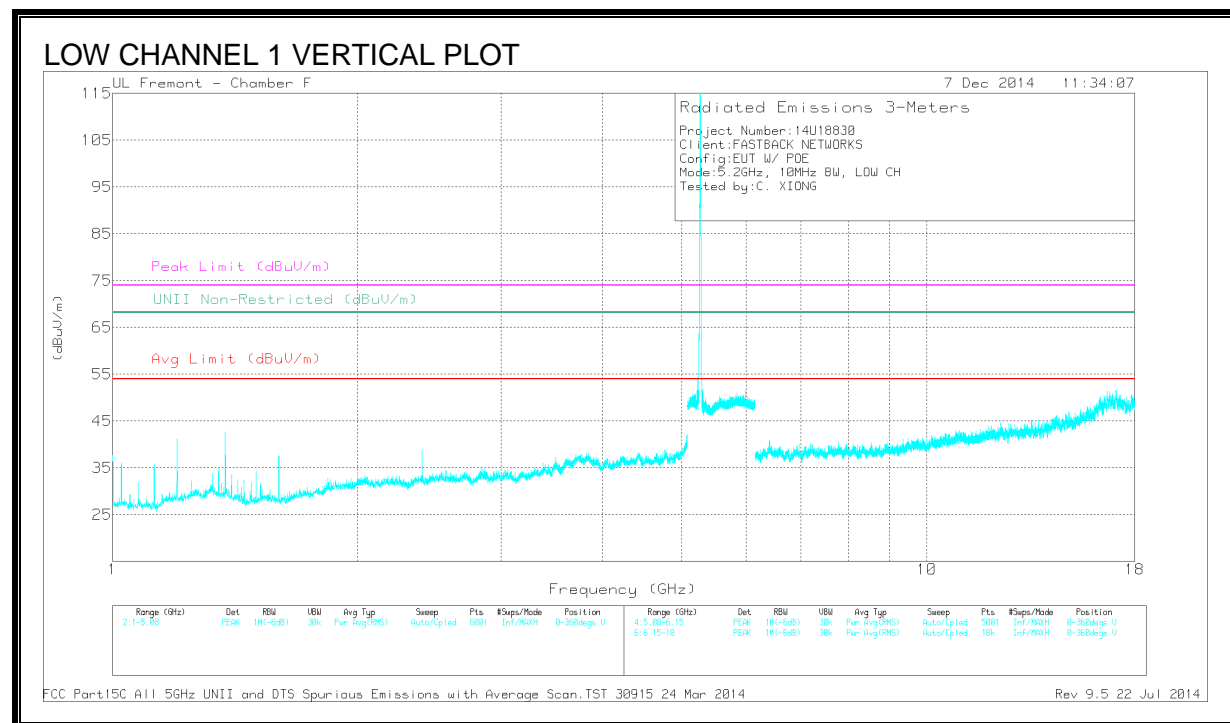
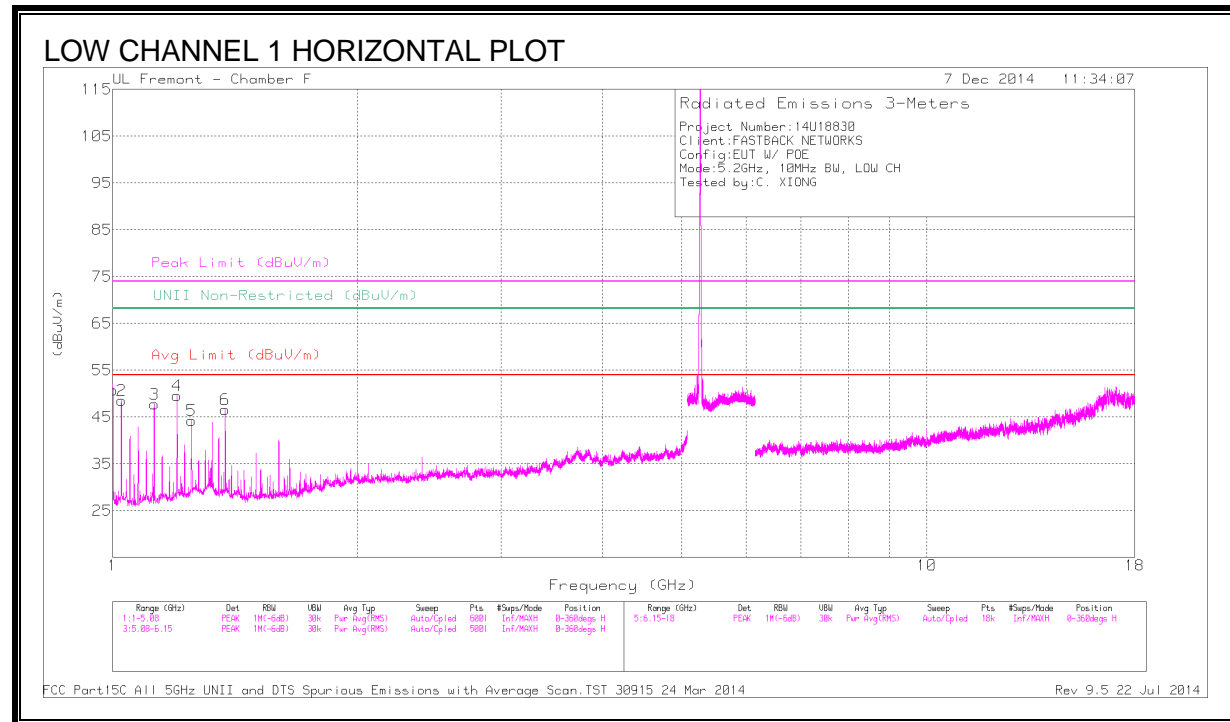
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54



## 9.2. TRANSMITTER ABOVE 1 GHz

### 9.2.1. TX ABOVE 1 GHz 10MHz 2 TX MODE IN THE 5.2 GHz BAND

#### HARMONICS AND SPURIOUS EMISSIONS



## DATA

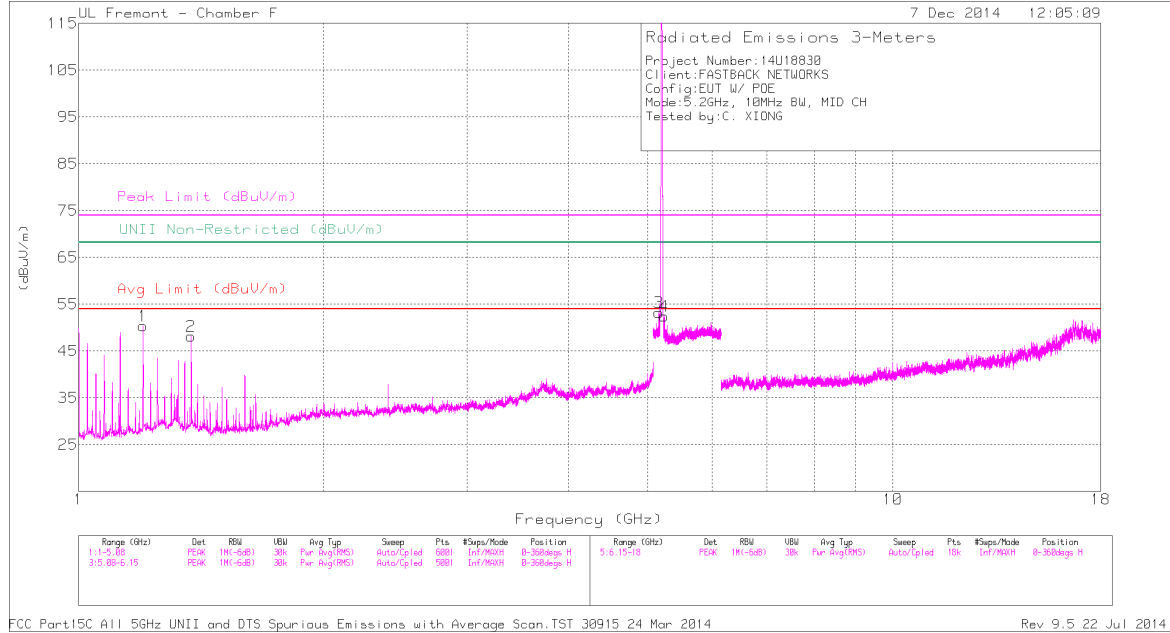
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1	60.58	PK1	27.6	-32.6	55.58	-	-	74	-18.42	-	-	345	123	H
	* 1	56.58	AD1	27.6	-32.6	51.58	54	-2.42	-	-	-	-	345	123	H
2	* 1.025	55.39	PK1	27.6	-32.4	50.59	-	-	74	-23.41	-	-	336	105	H
	* 1.025	50.09	AD1	27.6	-32.4	45.29	54	-8.71	-	-	-	-	336	105	H
3	* 1.125	50.86	PK1	27.9	-32.5	46.26	-	-	74	-27.74	-	-	65	105	H
	* 1.125	46.52	AD1	27.9	-32.5	41.92	54	-12.08	-	-	-	-	65	105	H
4	* 1.2	51.95	PK1	29	-32.5	48.45	-	-	74	-25.55	-	-	351	144	H
	* 1.2	48.83	AD1	29	-32.5	45.33	54	-8.67	-	-	-	-	351	144	H
5	* 1.25	48.12	PK1	29.5	-32.2	45.42	-	-	74	-28.58	-	-	12	102	H
	* 1.25	42.54	AD1	29.5	-32.2	39.84	54	-14.16	-	-	-	-	12	102	H
6	* 1.375	50.93	PK1	29.4	-31.9	48.43	-	-	74	-25.57	-	-	70	158	H
	* 1.375	46.9	AD1	29.4	-31.9	44.4	54	-9.6	-	-	-	-	70	158	H

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

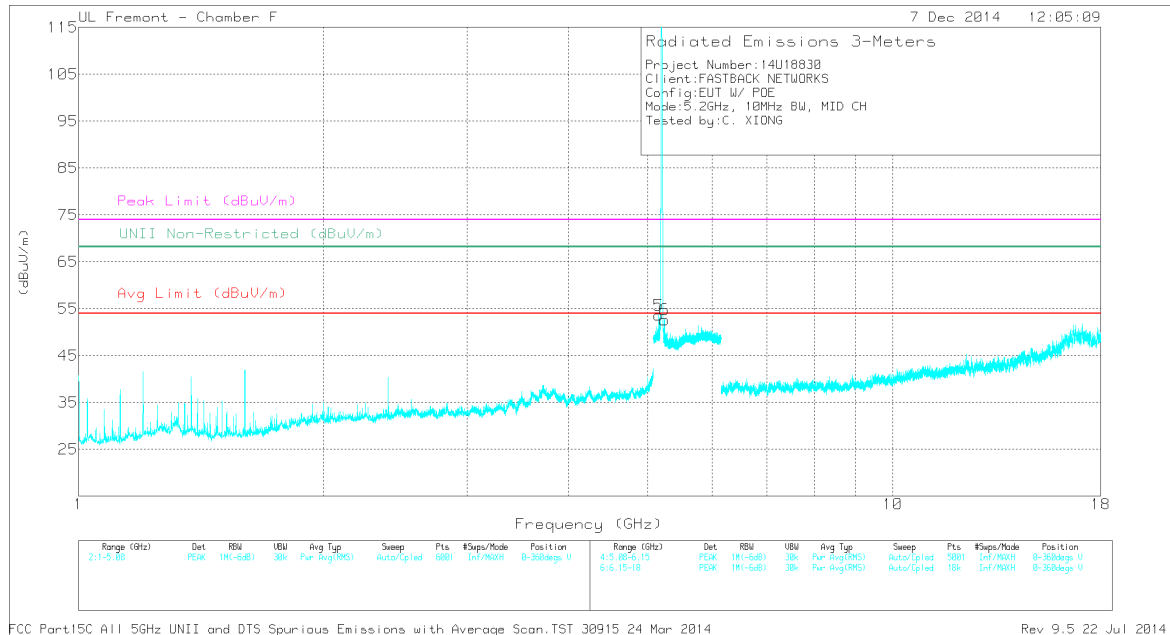
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

## MID CHANNEL HORIZONTAL PLOT



## MID CHANNEL VERTICAL PLOT



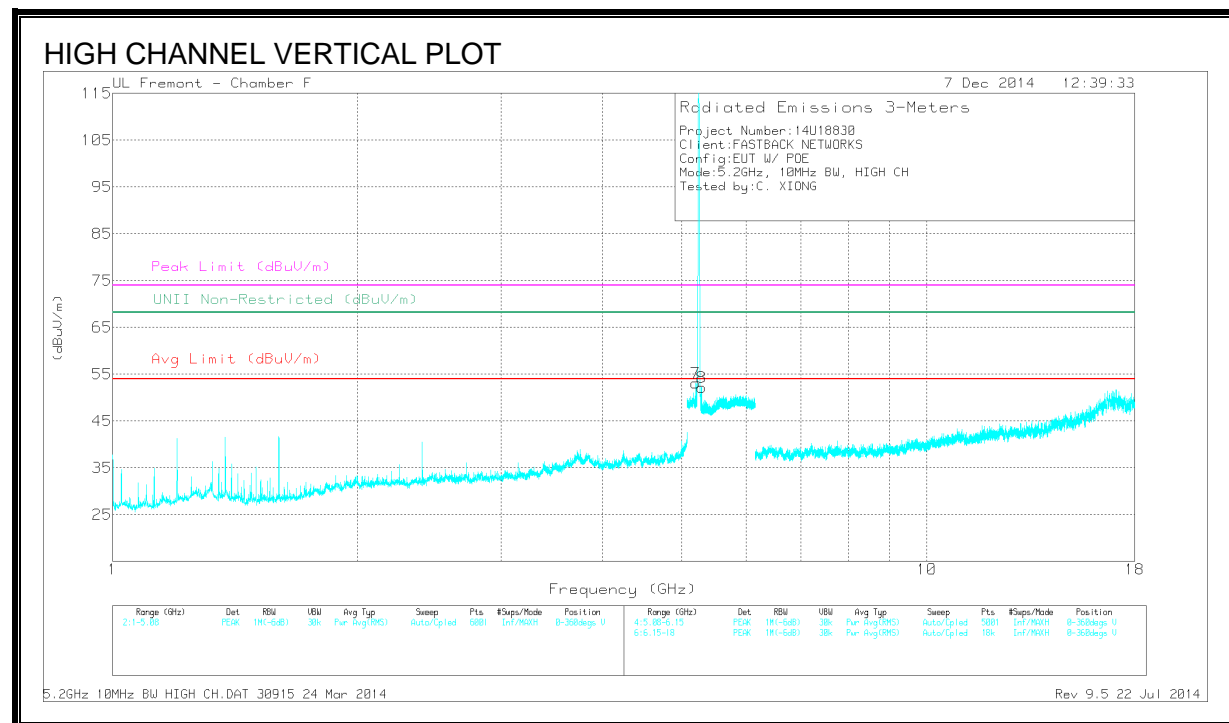
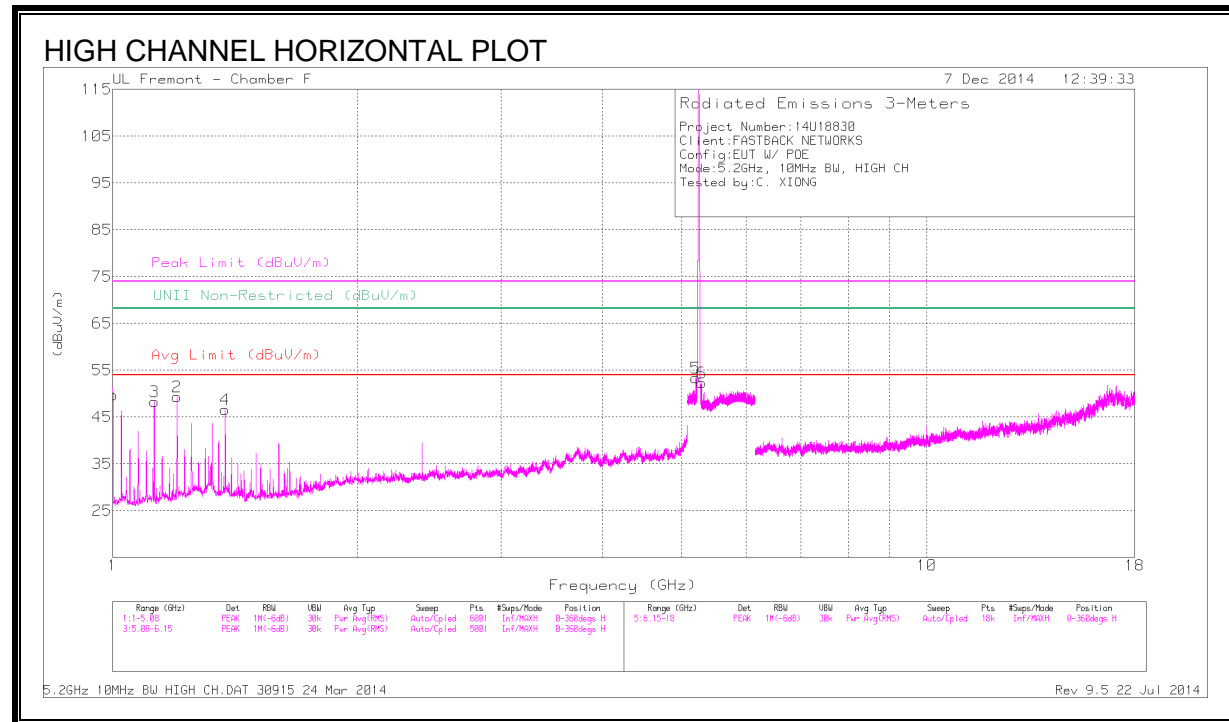
## DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fitter/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.2	55.91	PK1	29	-32.5	52.41	-	-	74	-21.59	-	-	348	144	H
	* 1.2	53.45	AD1	29	-32.5	49.95	54	-4.05	-	-	-	-	348	144	H
2	* 1.375	51.41	PK1	29.4	-31.9	48.91	-	-	74	-25.09	-	-	62	162	H
	* 1.375	47.7	AD1	29.4	-31.9	45.2	54	-8.8	-	-	-	-	62	162	H
3	5.164	46.51	PK1	34.4	-19.2	61.71	-	-	-	-	68.2	-6.49	29	103	H
4	5.239	46.81	PK1	34.5	-19.8	61.51	-	-	-	-	68.2	-6.69	33	103	H
5	5.16	47.21	PK1	34.4	-19.2	62.41	-	-	-	-	68.2	-5.79	28	100	V
6	5.242	46.88	PK1	34.5	-19.7	61.68	-	-	-	-	68.2	-6.52	23	101	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average



## DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1	57.32	PK1	27.6	-32.6	52.32	-	-	74	-21.68	-	-	328	131	H
	* 1	52.84	AD1	27.6	-32.6	47.84	54	-6.16	-	-	-	-	328	131	H
2	* 1.2	55.48	PK1	29	-32.5	51.98	-	-	74	-22.02	-	-	346	141	H
	* 1.2	52.97	AD1	29	-32.5	49.47	54	-4.53	-	-	-	-	346	141	H
3	* 1.125	49.58	PK1	27.9	-32.5	44.98	-	-	74	-29.02	-	-	11	108	H
	* 1.125	44	AD1	27.9	-32.5	39.4	54	-14.6	-	-	-	-	11	108	H
4	* 1.375	50.39	PK1	29.4	-31.9	47.89	-	-	74	-26.11	-	-	67	161	H
	* 1.375	46.48	AD1	29.4	-31.9	43.98	54	-10.02	-	-	-	-	67	161	H
5	5.206	47.17	PK1	34.5	-19.6	62.07	-	-	-	-	68.2	-6.13	29	100	H
7	5.207	45.86	PK1	34.5	-19.6	60.76	-	-	-	-	68.2	-7.44	28	103	V
8	5.283	46.47	PK1	34.5	-19.7	61.27	-	-	-	-	68.2	-6.93	32	101	V
6	5.286	45.05	PK1	34.5	-19.7	59.85	-	-	-	-	68.2	-8.35	32	100	H

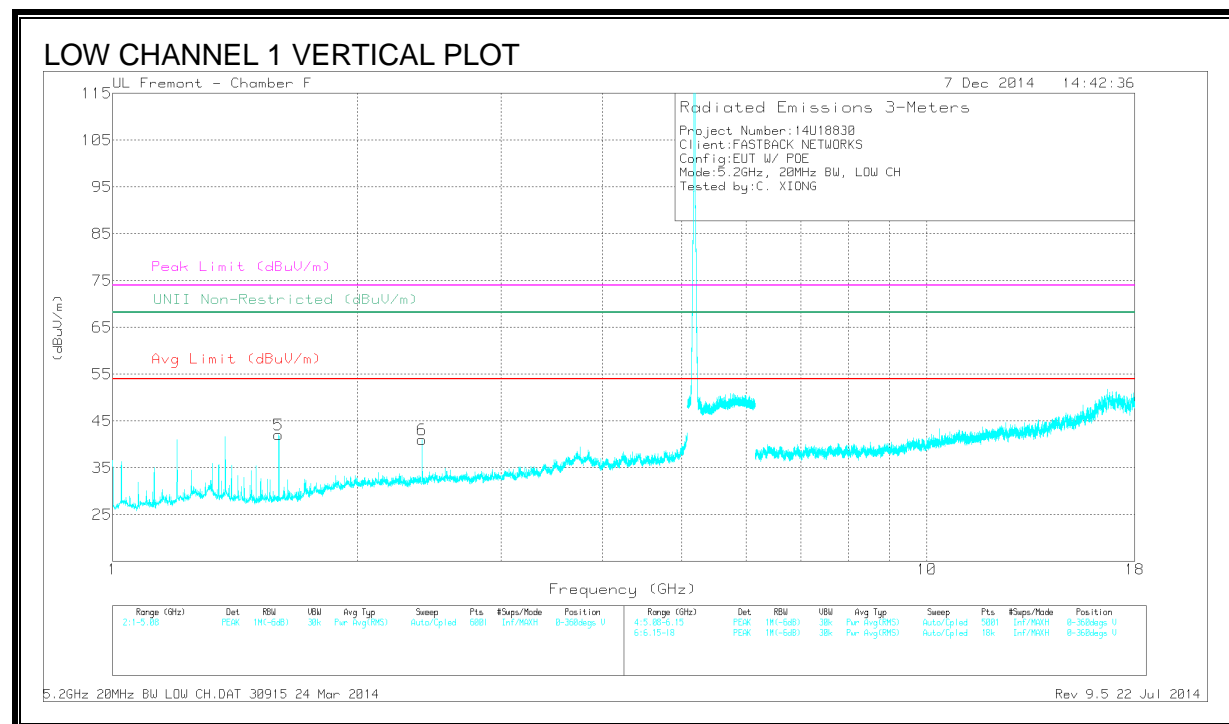
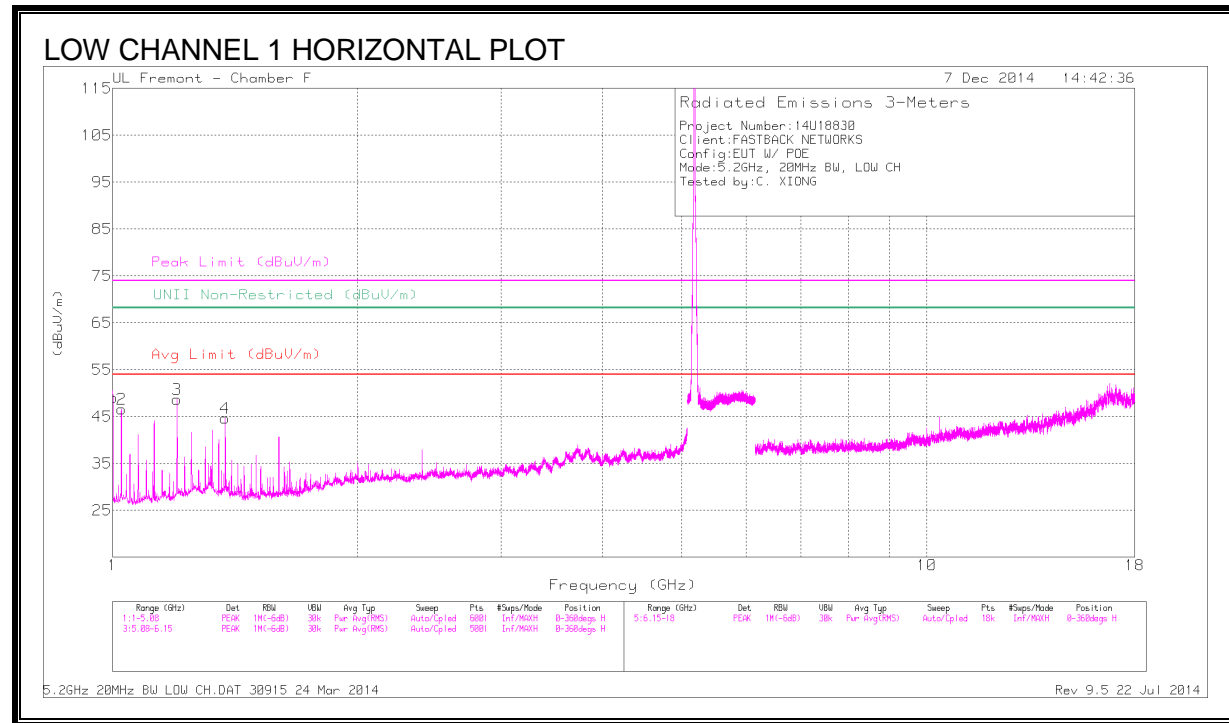
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

## 9.2.2. TX ABOVE 1 GHz 20MHz 2 TX MODE IN THE 5.2 GHz BAND

### HARMONICS AND SPURIOUS EMISSIONS



## DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fi tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1	56.85	PK1	27.6	-32.6	51.85	-	-	74	-22.15	-	-	331	131	H
	* 1	52.27	AD1	27.6	-32.6	47.27	54	-6.73	-	-	-	-	331	131	H
2	* 1.025	54.75	PK1	27.6	-32.4	49.95	-	-	74	-24.05	-	-	330	112	H
	* 1.025	50.2	AD1	27.6	-32.4	45.4	54	-8.6	-	-	-	-	330	112	H
3	* 1.2	46.43	PK1	29	-32.5	42.93	-	-	74	-31.07	-	-	352	146	H
	* 1.2	38.66	AD1	29	-32.5	35.16	54	-18.84	-	-	-	-	352	146	H
4	* 1.375	50.14	PK1	29.4	-31.9	47.64	-	-	74	-26.36	-	-	24	148	H
	* 1.375	45.29	AD1	29.4	-31.9	42.79	54	-11.21	-	-	-	-	24	148	H
5	* 1.6	47.85	PK1	28.5	-31.7	44.65	-	-	74	-29.35	-	-	327	104	V
	* 1.6	43.29	AD1	28.5	-31.7	40.09	54	-13.91	-	-	-	-	327	104	V
6	2.4	45.79	PK1	32.2	-30.8	47.19	-	-	-	-	68.2	-21.01	337	229	V

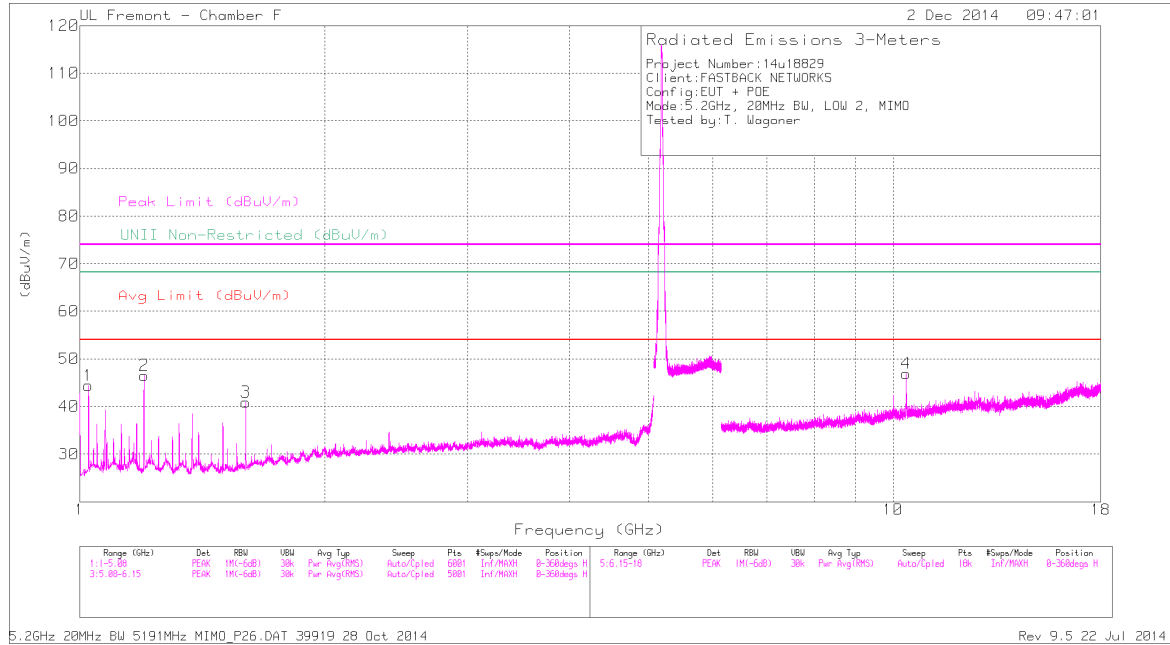
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK1 - KDB789033 Method: Peak

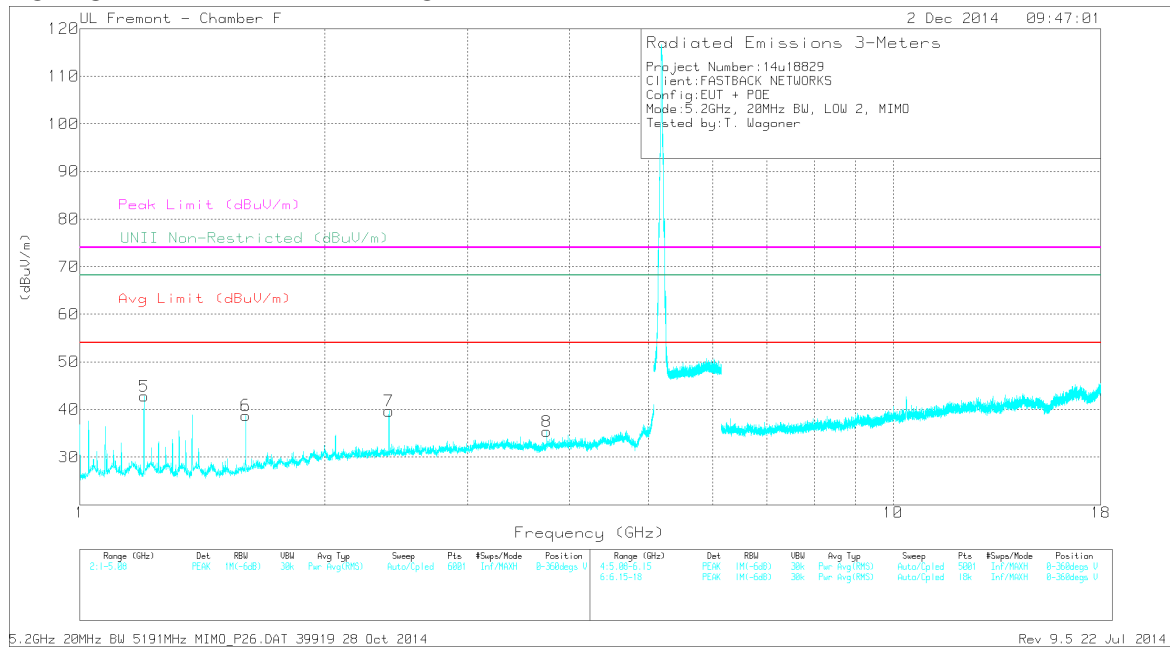
AD1 - KDB789033 Method: AD Primary Power Average



## LOW CHANNEL 2 HORIZONTAL PLOT



## LOW CHANNEL 2 VERTICAL PLOT



## DATA

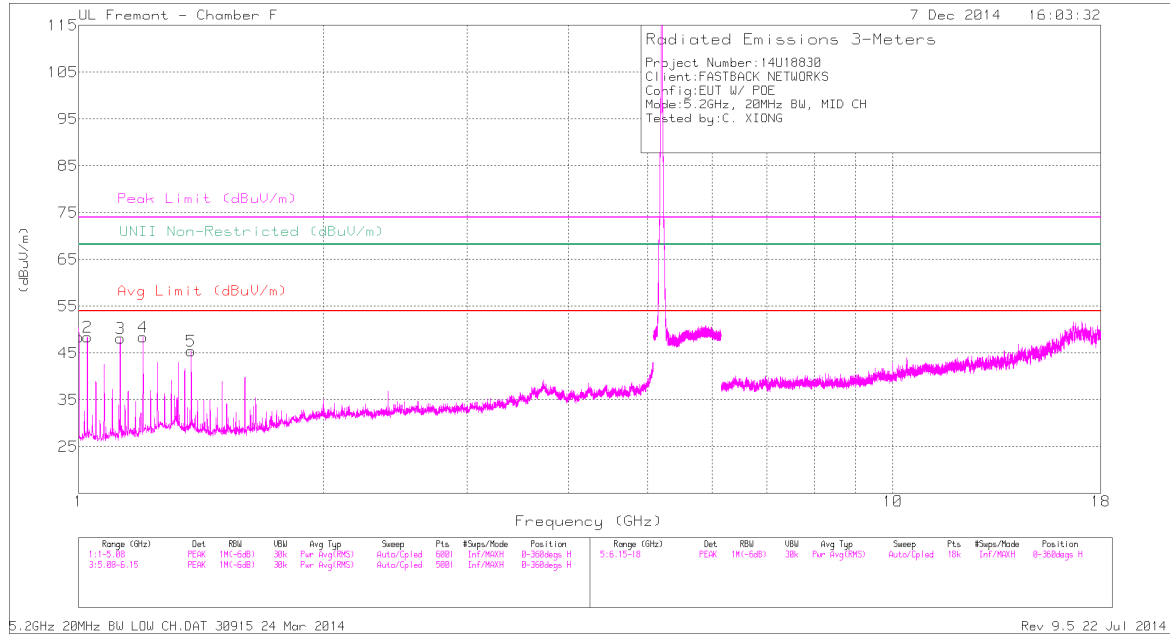
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fi tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.025	53.61	PK1	28.1	-35.9	45.81	-	-	74	-28.19	-	-	43	115	H
	* 1.025	51.71	AD1	28.1	-35.9	43.91	54	-10.09	-	-	-	-	43	115	H
2	* 1.2	54.08	PK1	29	-35.7	47.38	-	-	74	-26.62	-	-	26	187	H
	* 1.2	52.63	AD1	29	-35.7	45.93	54	-8.07	-	-	-	-	26	187	H
3	* 1.6	49.61	PK1	28.6	-35.3	42.91	-	-	74	-31.09	-	-	63	136	H
	* 1.6	47.75	AD1	28.6	-35.3	41.05	54	-12.95	-	-	-	-	63	136	H
4	10.382	39.54	PK1	37.6	-27.3	49.84	-	-	-	-	68.2	-18.36	6	110	H
	10.382	34.72	AD1	37.6	-27.3	45.02	-	-	-	-	-	-	6	110	H
5	* 1.2	53.8	PK1	29	-35.7	47.1	-	-	74	-26.9	-	-	50	244	V
	* 1.2	52.42	AD1	29	-35.7	45.72	54	-8.28	-	-	-	-	50	244	V
6	* 1.6	46.8	PK1	28.6	-35.3	40.1	-	-	74	-33.9	-	-	28	102	V
	* 1.6	44.33	AD1	28.6	-35.3	37.63	54	-16.37	-	-	-	-	28	102	V
7	2.4	45.15	PK1	31.8	-34.5	42.45	-	-	-	-	68.2	-25.75	39	108	V
	2.4	42.2	AD1	31.8	-34.5	39.5	-	-	-	-	-	-	39	108	V
8	* 3.75	38.7	PK1	32.9	-33.5	38.1	-	-	74	-35.9	-	-	334	204	V
	* 3.75	32.72	AD1	32.9	-33.5	32.12	54	-21.88	-	-	-	-	334	204	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

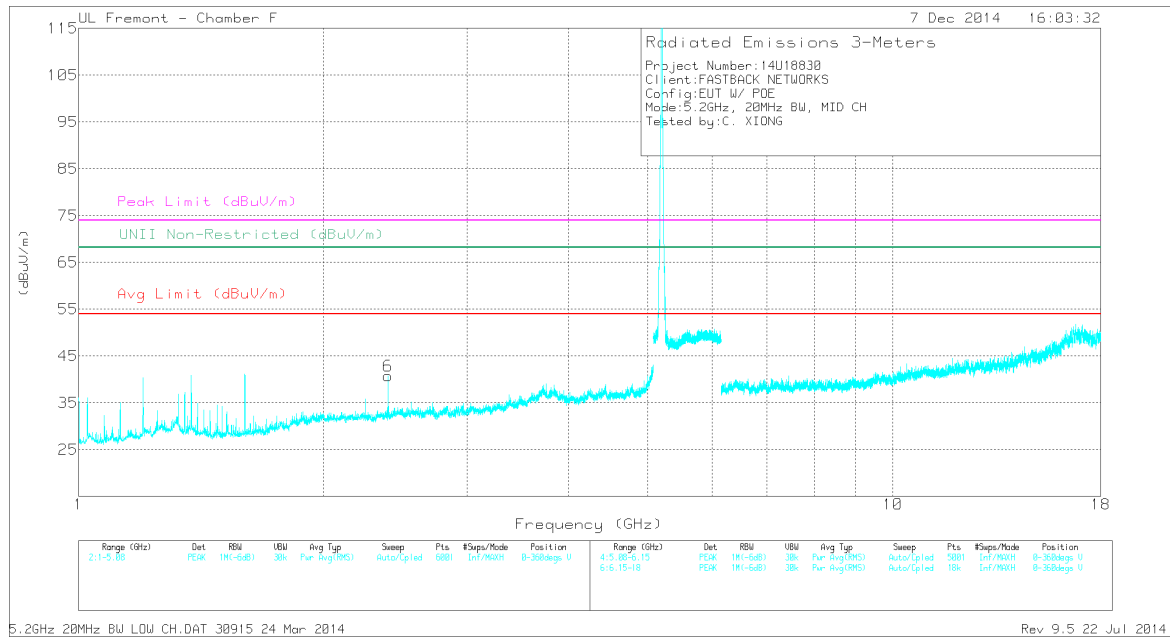
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

## MID CHANNEL HORIZONTAL PLOT



## MID CHANNEL VERTICAL PLOT



## DATA

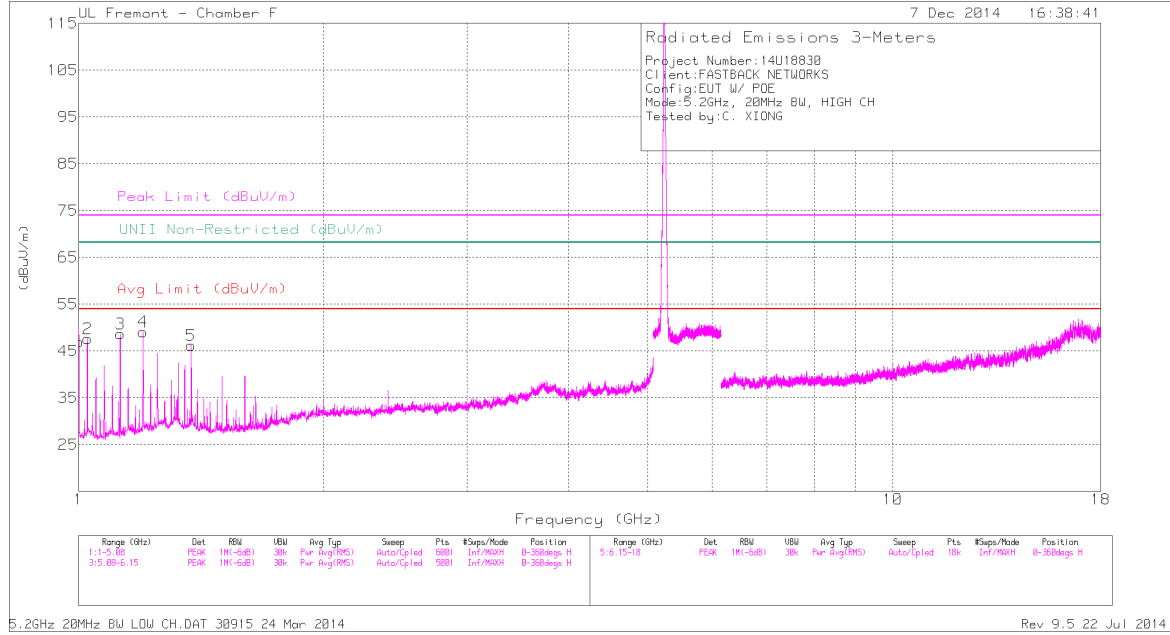
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1	58.74	PK1	27.6	-32.6	53.74	-	-	74	-20.26	-	-	316	120	H
	* 1	54.33	AD1	27.6	-32.6	49.33	54	-4.67	-	-	-	-	316	120	H
2	* 1.025	54.47	PK1	27.6	-32.4	49.67	-	-	74	-24.33	-	-	309	104	H
	* 1.025	49.24	AD1	27.6	-32.4	44.44	54	-9.56	-	-	-	-	309	104	H
3	* 1.125	52.84	PK1	27.9	-32.5	48.24	-	-	74	-25.76	-	-	29	108	H
	* 1.125	47.27	AD1	27.9	-32.5	42.67	54	-11.33	-	-	-	-	29	108	H
4	* 1.2	55.02	PK1	29	-32.5	51.52	-	-	74	-22.48	-	-	308	143	H
	* 1.2	52.23	AD1	29	-32.5	48.73	54	-5.27	-	-	-	-	308	143	H
5	* 1.375	48.6	PK1	29.4	-31.9	46.1	-	-	74	-27.9	-	-	26	154	H
	* 1.375	44.14	AD1	29.4	-31.9	41.64	54	-12.36	-	-	-	-	26	154	H
6	2.4	44.8	PK1	32.2	-30.8	46.2	-	-	-	-	68.2	-22	332	228	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

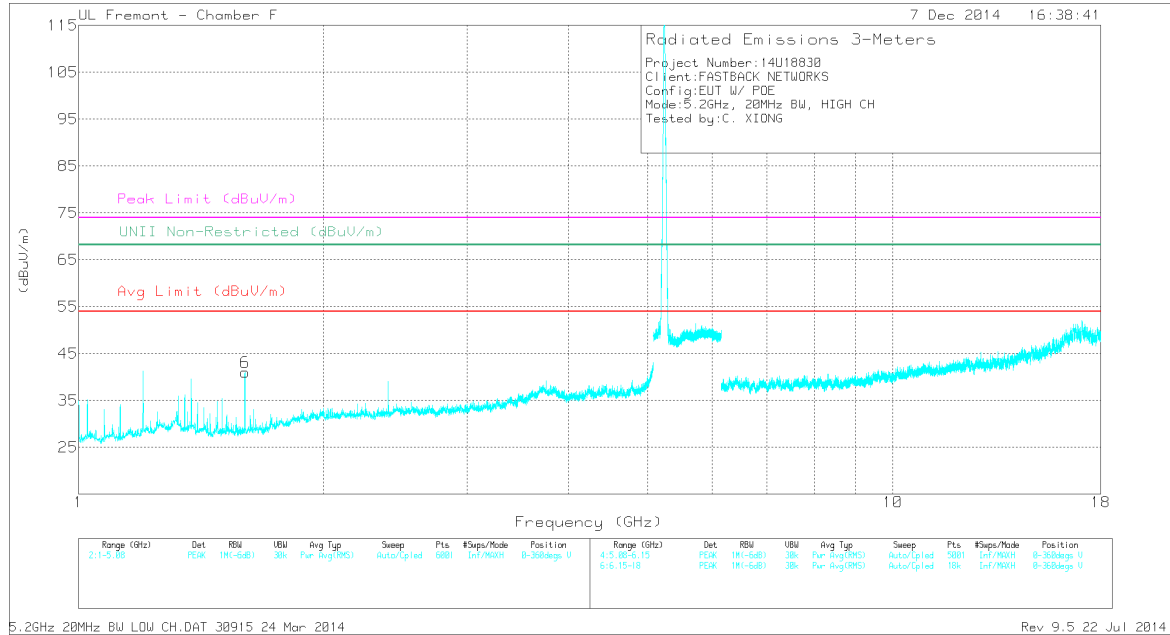
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

## HIGH CHANNEL HORIZONTAL PLOT



## HIGH CHANNEL VERTICAL PLOT



## DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fi tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1	57.95	PK1	27.6	-32.6	52.95	-	-	74	-21.05	-	-	319	123	H
	* 1	53.49	AD1	27.6	-32.6	48.49	54	-5.51	-	-	-	-	319	123	H
2	* 1.025	54.8	PK1	27.6	-32.4	50	-	-	74	-24	-	-	306	109	H
	* 1.025	49.43	AD1	27.6	-32.4	44.63	54	-9.37	-	-	-	-	306	109	H
3	* 1.125	51.77	PK1	27.9	-32.5	47.17	-	-	74	-26.83	-	-	31	109	H
	* 1.125	46.76	AD1	27.9	-32.5	42.16	54	-11.84	-	-	-	-	31	109	H
4	* 1.2	55.3	PK1	29	-32.5	51.8	-	-	74	-22.2	-	-	303	144	H
	* 1.2	52.77	AD1	29	-32.5	49.27	54	-4.73	-	-	-	-	303	144	H
5	* 1.375	50.24	PK1	29.4	-31.9	47.74	-	-	74	-26.26	-	-	26	154	H
	* 1.375	45.67	AD1	29.4	-31.9	43.17	54	-10.83	-	-	-	-	26	154	H
6	* 1.6	43.1	PK1	28.5	-31.7	39.9	-	-	74	-34.1	-	-	311	109	V
	* 1.6	34.54	AD1	28.5	-31.7	31.34	54	-22.66	-	-	-	-	311	109	V

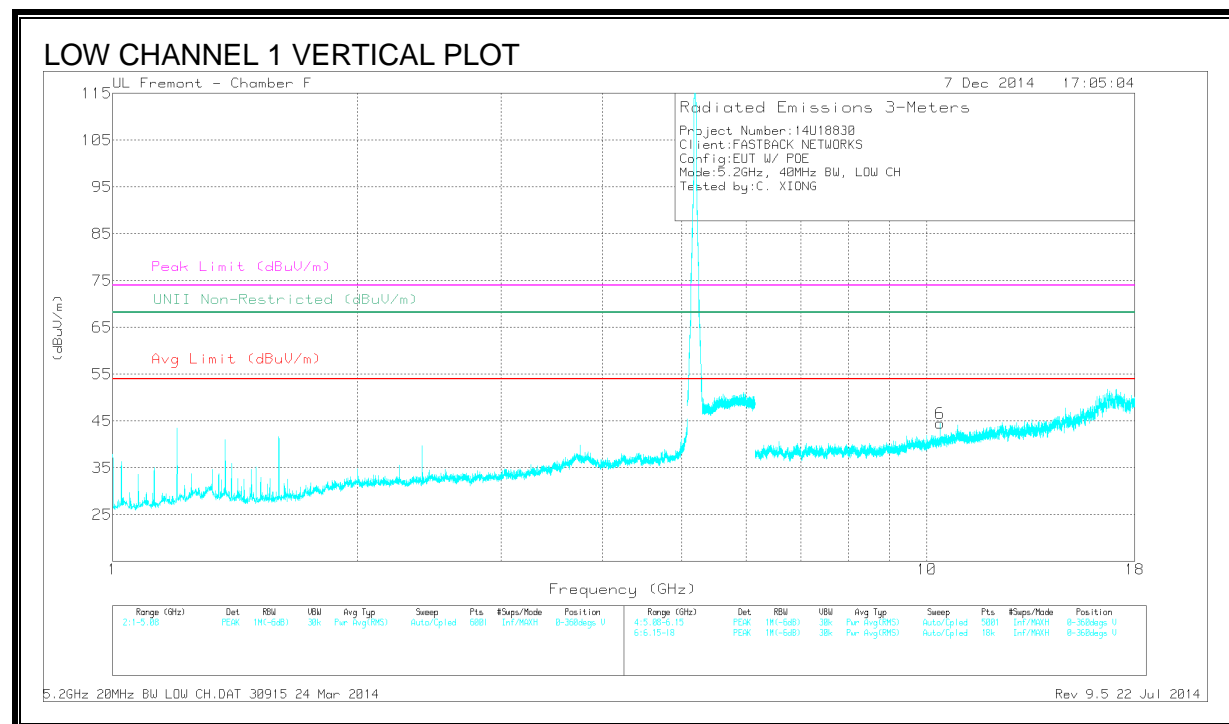
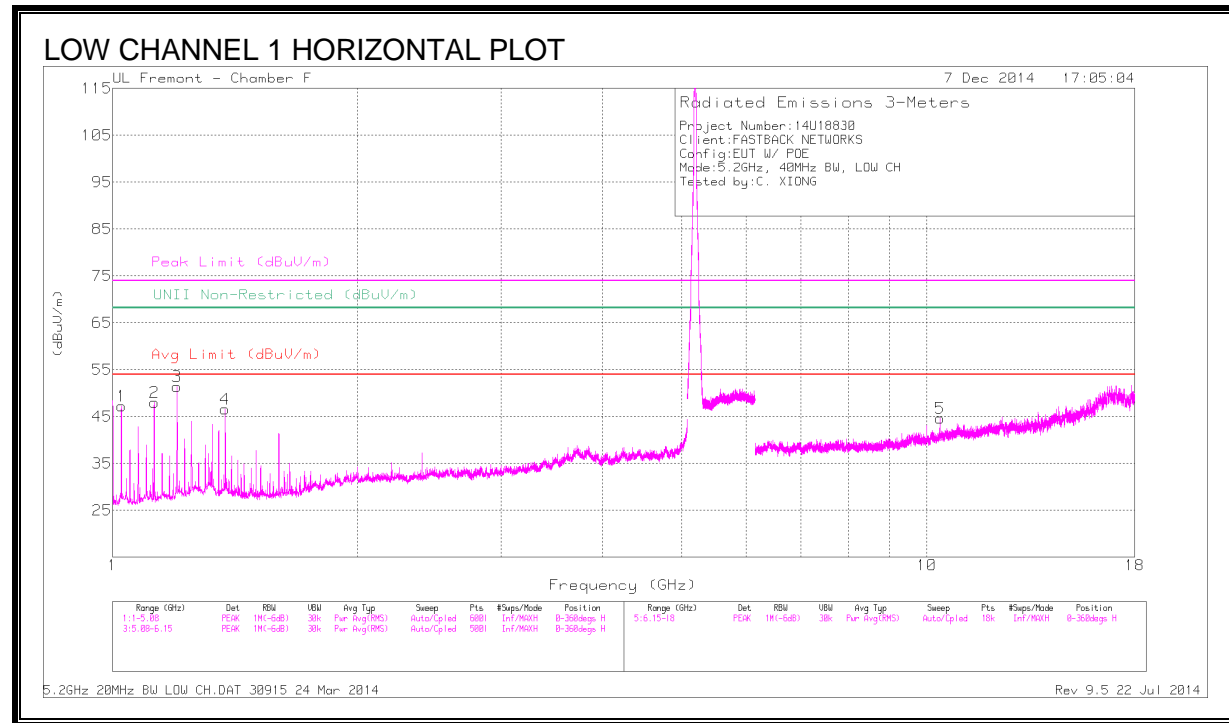
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

### 9.2.3. TX ABOVE 1 GHz 40MHz 2 TX MODE IN THE 5.2 GHz BAND

#### HARMONICS AND SPURIOUS EMISSIONS



## DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.025	53.81	PK1	27.6	-32.4	49.01	-	-	74	-24.99	-	-	308	111	H
	* 1.025	48.94	AD1	27.6	-32.4	44.14	54	-9.86	-	-	-	-	308	111	H
3	* 1.2	54.69	PK1	29	-32.5	51.19	-	-	74	-22.81	-	-	302	146	H
	* 1.2	52.02	AD1	29	-32.5	48.52	54	-5.48	-	-	-	-	302	146	H
4	* 1.375	51.04	PK1	29.4	-31.9	48.54	-	-	74	-25.46	-	-	28	156	H
	* 1.375	46.89	AD1	29.4	-31.9	44.39	54	-9.61	-	-	-	-	28	156	H
2	* 1.125	49.19	PK1	27.9	-32.5	44.59	-	-	74	-29.41	-	-	66	104	H
	* 1.125	44.25	AD1	27.9	-32.5	39.65	54	-14.35	-	-	-	-	66	104	H
5	10.38	37.26	PK1	37.3	-22.1	52.46	-	-	-	-	68.2	-15.74	68	111	H
6	10.381	33.88	PK1	37.3	-22.1	49.08	-	-	-	-	68.2	-19.12	100	139	V

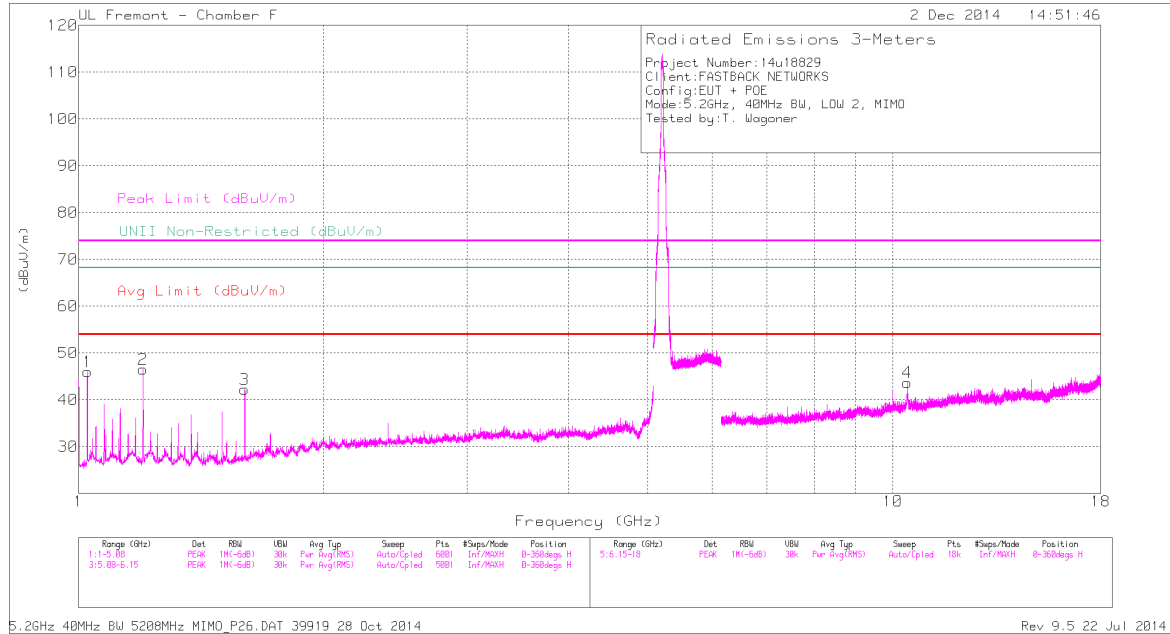
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK1 - KDB789033 Method: Peak

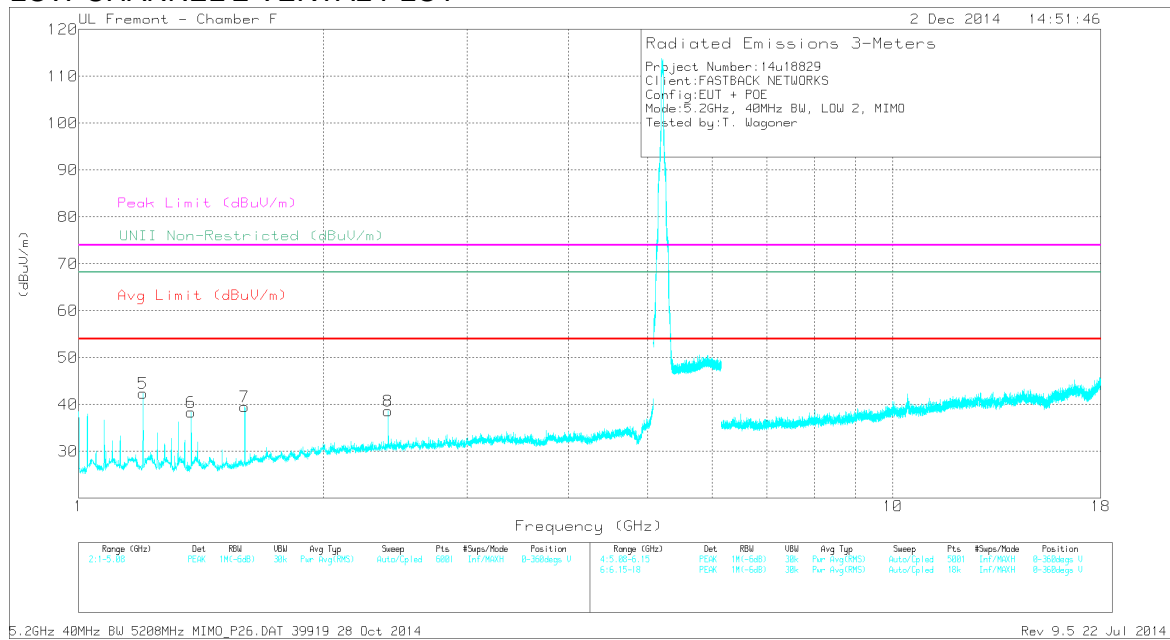
AD1 - KDB789033 Method: AD Primary Power Average



## LOW CHANNEL 2 HORIZONTAL PLOT



## LOW CHANNEL 2 VERTICAL PLOT



## DATA

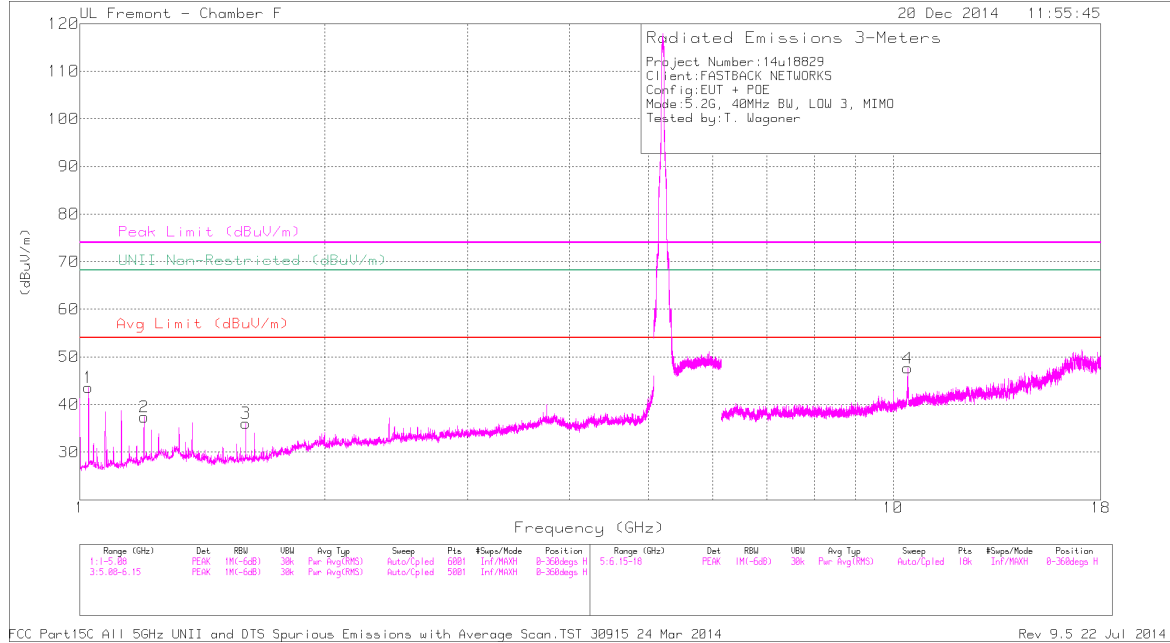
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fi tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.025	53.83	PK1	28.1	-35.9	46.03	-	-	74	-27.97	-	-	48	115	H
	* 1.025	51.7	AD1	28.1	-35.9	43.9	54	-10.1	-	-	-	-	48	115	H
2	* 1.2	53.33	PK1	29	-35.7	46.63	-	-	74	-27.37	-	-	39	198	H
	* 1.2	51.95	AD1	29	-35.7	45.25	54	-8.75	-	-	-	-	39	198	H
3	* 1.6	51.01	PK1	28.6	-35.3	44.31	-	-	74	-29.69	-	-	63	133	H
	* 1.6	49.33	AD1	28.6	-35.3	42.63	54	-11.37	-	-	-	-	63	133	H
4	10.416	39.35	PK1	37.6	-27.8	49.15	-	-	-	-	68.2	-19.05	9	101	H
	10.416	34.42	AD1	37.6	-27.8	44.22	-	-	-	-	-	-	9	101	H
5	* 1.2	53.56	PK1	29	-35.7	46.86	-	-	74	-27.14	-	-	58	246	V
	* 1.2	52.09	AD1	29	-35.7	45.39	54	-8.61	-	-	-	-	58	246	V
6	* 1.375	46.98	PK1	28.5	-35.3	40.18	-	-	74	-33.82	-	-	0	281	V
	* 1.375	44.16	AD1	28.6	-35.3	37.46	54	-16.54	-	-	-	-	0	281	V
7	* 1.6	47.73	PK1	28.6	-35.3	41.03	-	-	74	-32.97	-	-	33	102	V
	* 1.6	45.48	AD1	28.6	-35.3	38.78	54	-15.22	-	-	-	-	33	102	V
8	2.4	44.25	PK1	31.8	-34.5	41.55	-	-	-	-	68.2	-26.65	35	106	V
	2.4	40.91	AD1	31.8	-34.5	38.21	-	-	-	-	-	-	35	106	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

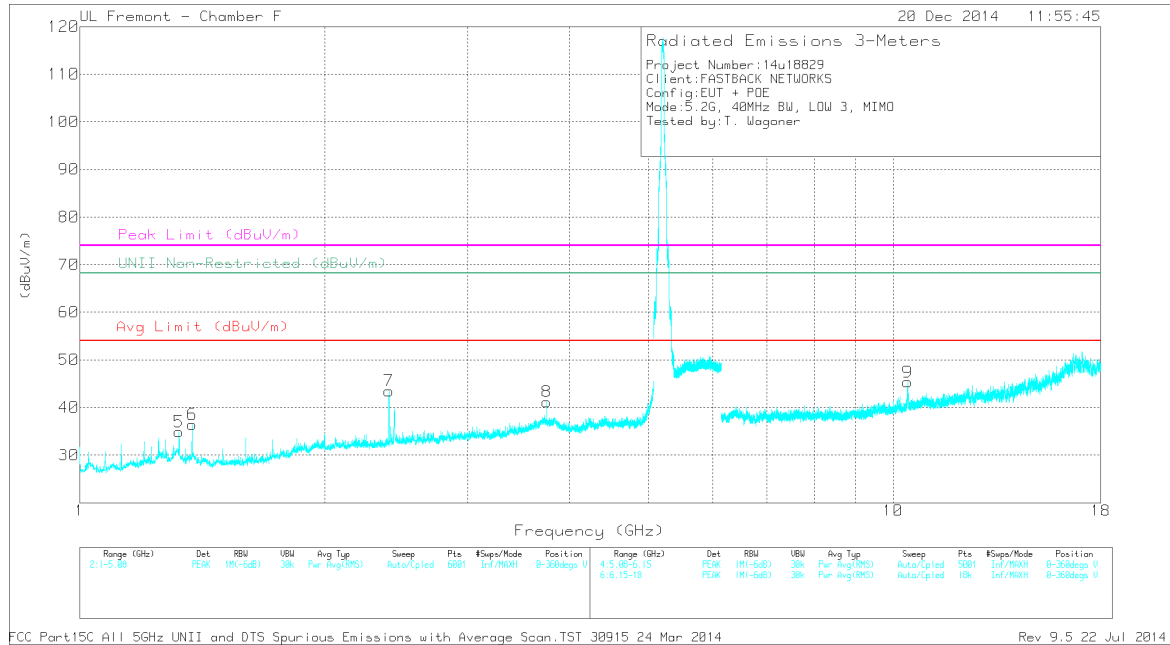
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

### LOW CHANNEL 3 HORIZONTAL PLOT



### LOW CHANNEL 3 VERTICAL PLOT



## DATA

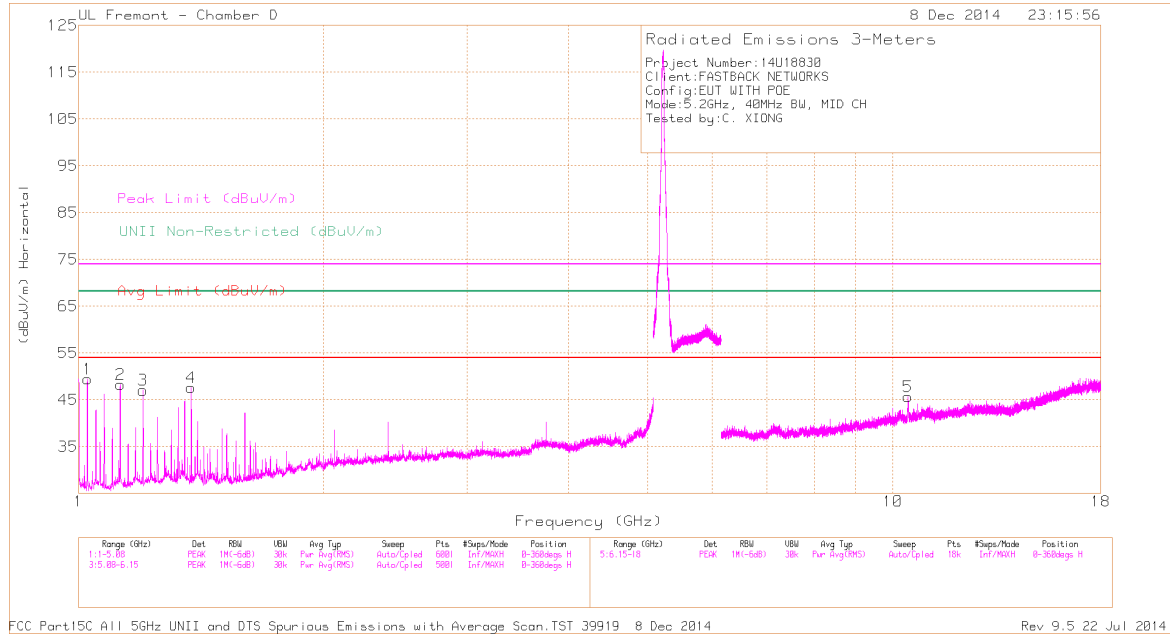
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fi tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.025	49.08	PK1	27.6	-32.4	44.28	-	-	74	-29.72	-	-	306	118	H
	* 1.025	46.87	AD1	27.6	-32.4	42.07	54	-11.93	-	-	-	-	306	118	H
2	* 1.2	45.2	PK1	29	-32.5	41.7	-	-	74	-32.3	-	-	11	112	H
	* 1.2	34.92	AD1	29	-32.5	31.42	54	-22.58	-	-	-	-	11	112	H
3	* 1.6	45.1	PK1	28.5	-31.7	41.9	-	-	74	-32.1	-	-	23	238	H
	* 1.6	38.92	AD1	28.5	-31.7	35.72	54	-18.28	-	-	-	-	23	238	H
5	* 1.325	42.97	PK1	29.9	-31.4	41.47	-	-	74	-32.53	-	-	350	204	V
	* 1.325	32.95	AD1	29.8	-31.4	31.35	54	-22.65	-	-	-	-	350	204	V
6	* 1.375	44.13	PK1	29.4	-31.9	41.63	-	-	74	-32.37	-	-	346	257	V
	* 1.375	36.32	AD1	29.4	-31.9	33.82	54	-20.18	-	-	-	-	346	257	V
8	* 3.75	40.69	PK1	34.6	-29.7	45.59	-	-	74	-28.41	-	-	2	201	V
	* 3.75	32.35	AD1	34.6	-29.7	37.25	54	-16.75	-	-	-	-	2	201	V
7	2.4	43.77	PK1	32.2	-30.8	45.17	-	-	-	-	68.2	-23.03	16	157	V
4	10.42	38	PK1	37.4	-22	53.4	-	-	-	-	68.2	-14.8	15	135	H
9	10.42	37.96	PK1	37.4	-22	53.36	-	-	-	-	68.2	-14.84	25	101	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

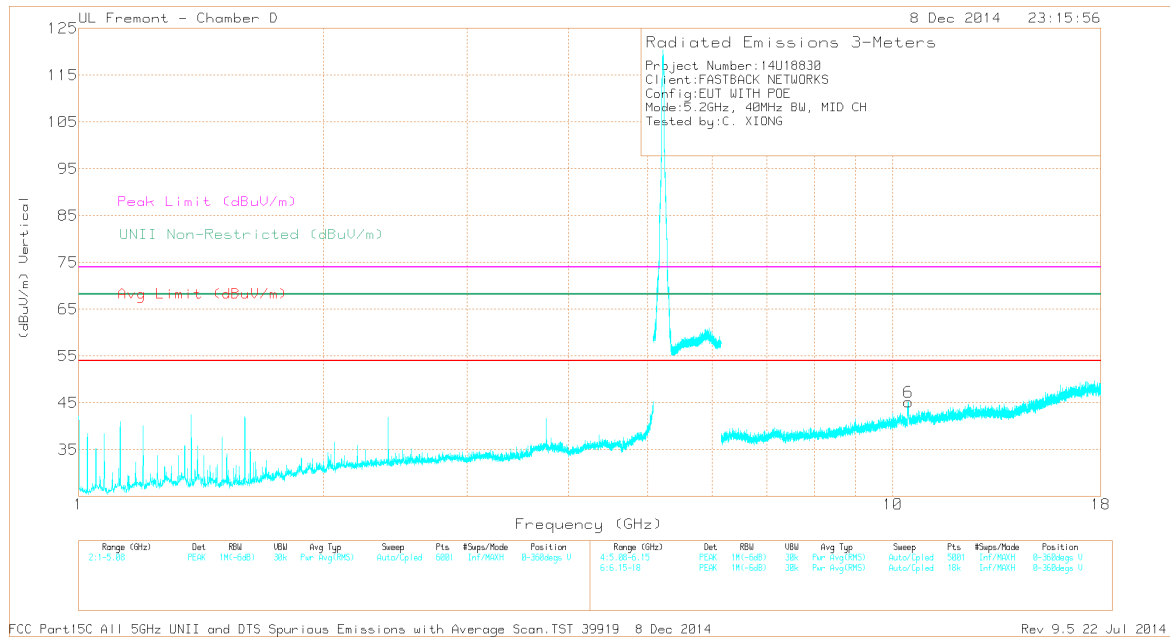
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

## MID CHANNEL HORIZONTAL PLOT



## MID CHANNEL VERTICAL PLOT



## DATA

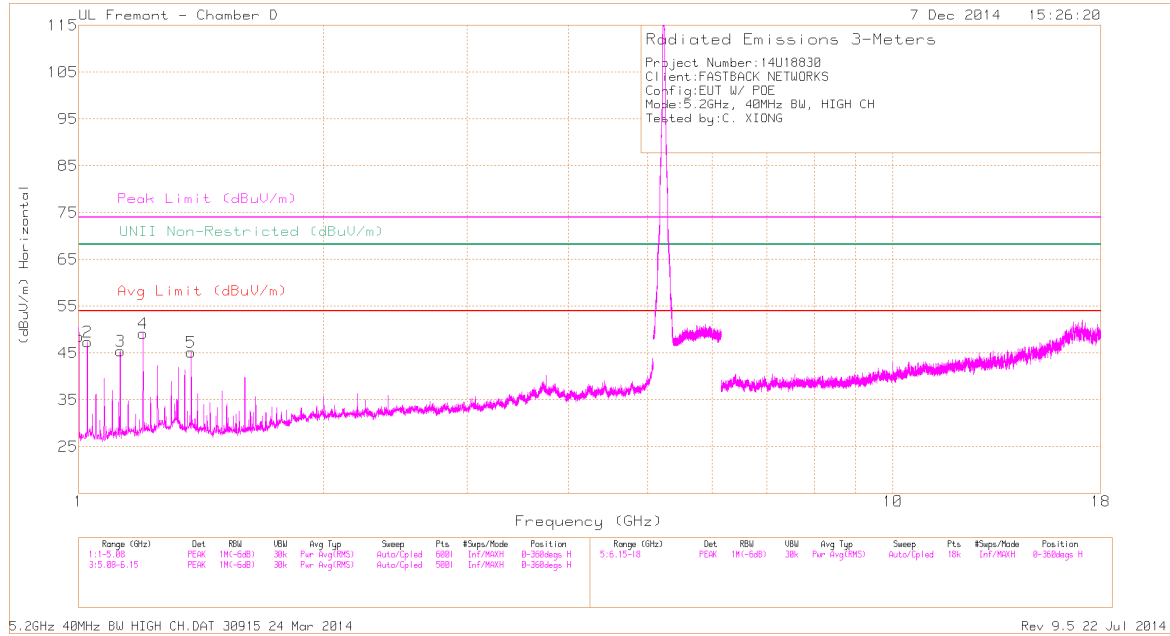
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.025	57.31	PK1	27	-32.1	52.21	-	-	74	-21.79	-	-	343	112	H
	* 1.025	53.4	AD1	27	-32.1	48.3	54	-5.7	-	-	-	-	343	112	H
2	* 1.125	54.94	PK1	27.3	-31.8	50.44	-	-	74	-23.56	-	-	69	107	H
	* 1.125	50.68	AD1	27.3	-31.8	46.18	54	-7.82	-	-	-	-	69	107	H
3	* 1.2	53.91	PK1	28.2	-32.1	50.01	-	-	74	-23.99	-	-	101	288	H
	* 1.2	50.88	AD1	28.2	-32.1	46.98	54	-7.02	-	-	-	-	101	288	H
4	* 1.375	52.12	PK1	28.6	-31.4	49.32	-	-	74	-24.68	-	-	68	101	H
	* 1.375	48.67	AD1	28.6	-31.4	45.87	54	-8.13	-	-	-	-	68	101	H
5	10.44	35.97	PK1	37.5	-21.4	52.07	-	-	-	-	68.2	-16.13	349	111	H
6	10.446	36.2	PK1	37.5	-21.3	52.4	-	-	-	-	68.2	-15.8	163	169	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

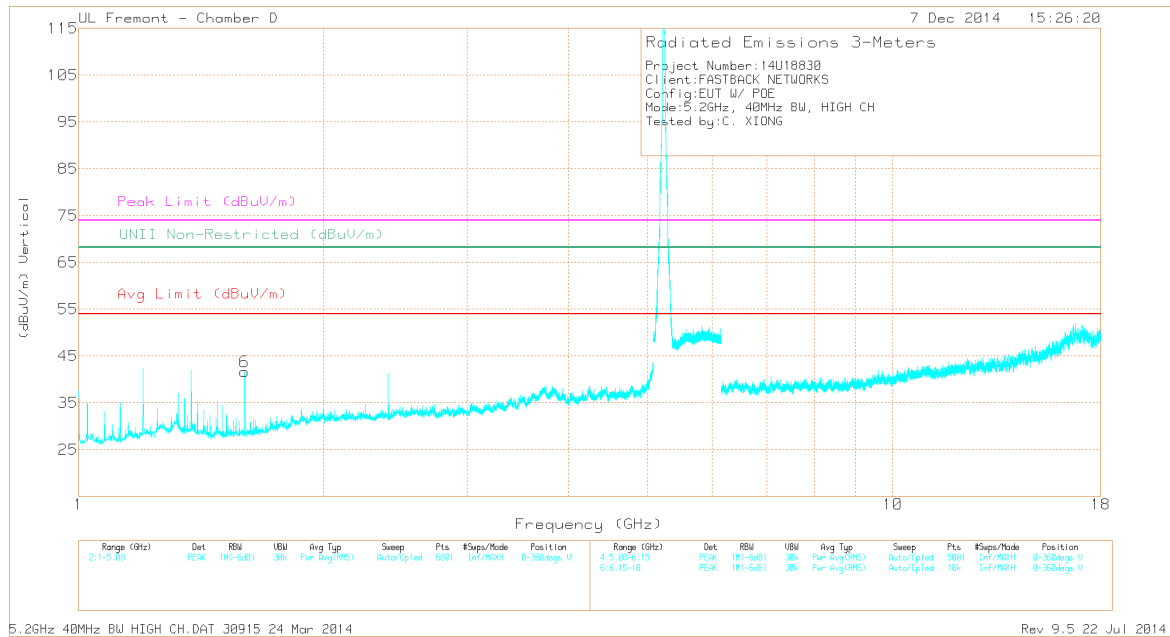
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

## HIGH CHANNEL HORIZONTAL PLOT



## HIGH CHANNEL VERTICAL PLOT



## DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fi tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1	60.14	PK1	27.6	-32.6	55.14	-	-	74	-18.86	-	-	353	120	H
	* 1	56.54	AD1	27.6	-32.6	51.54	54	-2.46	-	-	-	-	353	120	H
2	* 1.025	55.96	PK1	27.6	-32.4	51.16	-	-	74	-22.84	-	-	343	113	H
	* 1.025	52.24	AD1	27.6	-32.4	47.44	54	-6.56	-	-	-	-	343	113	H
3	* 1.125	53.66	PK1	27.9	-32.5	49.06	-	-	74	-24.94	-	-	73	113	H
	* 1.125	49.56	AD1	27.9	-32.5	44.96	54	-9.04	-	-	-	-	73	113	H
4	* 1.2	53.93	PK1	29	-32.5	50.43	-	-	74	-23.57	-	-	98	287	H
	* 1.2	51	AD1	29	-32.5	47.5	54	-6.5	-	-	-	-	98	287	H
5	* 1.375	51.51	PK1	29.4	-31.9	49.01	-	-	74	-24.99	-	-	70	103	H
	* 1.375	48.1	AD1	29.4	-31.9	45.6	54	-8.4	-	-	-	-	70	103	H
6	* 1.6	49.68	PK1	28.5	-31.7	46.48	-	-	74	-27.52	-	-	0	107	V
	* 1.6	45.19	AD1	28.5	-31.7	41.99	54	-12.01	-	-	-	-	0	107	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

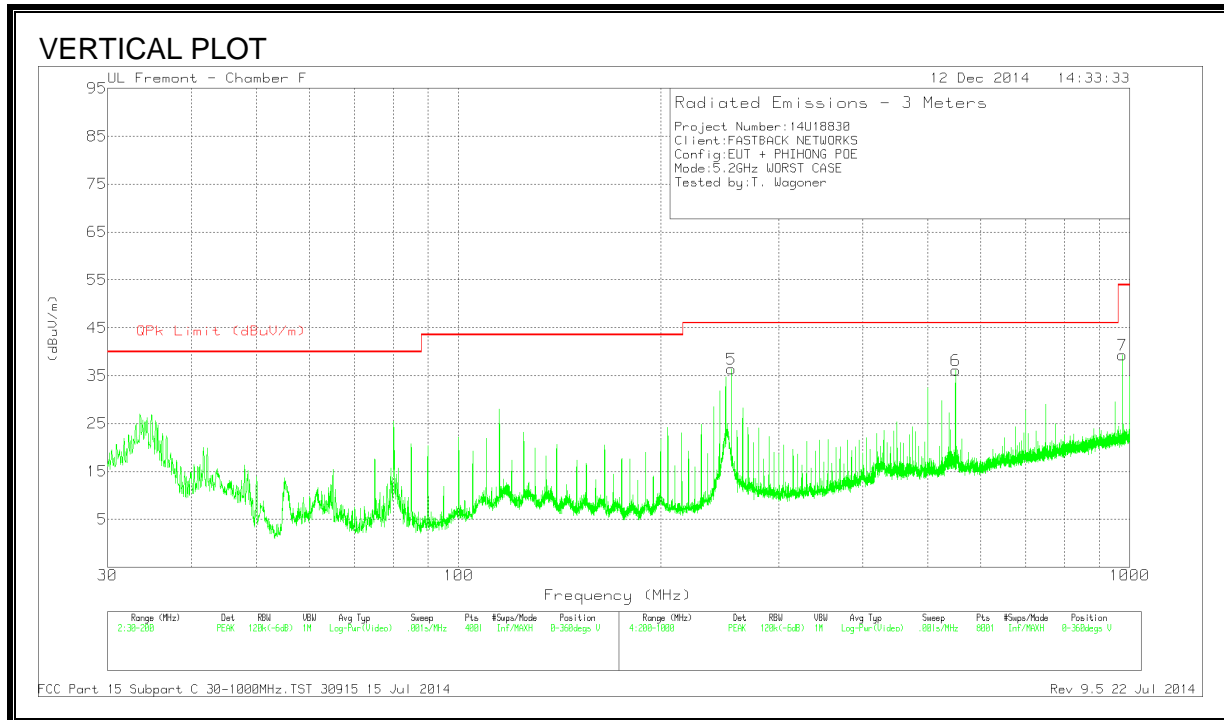
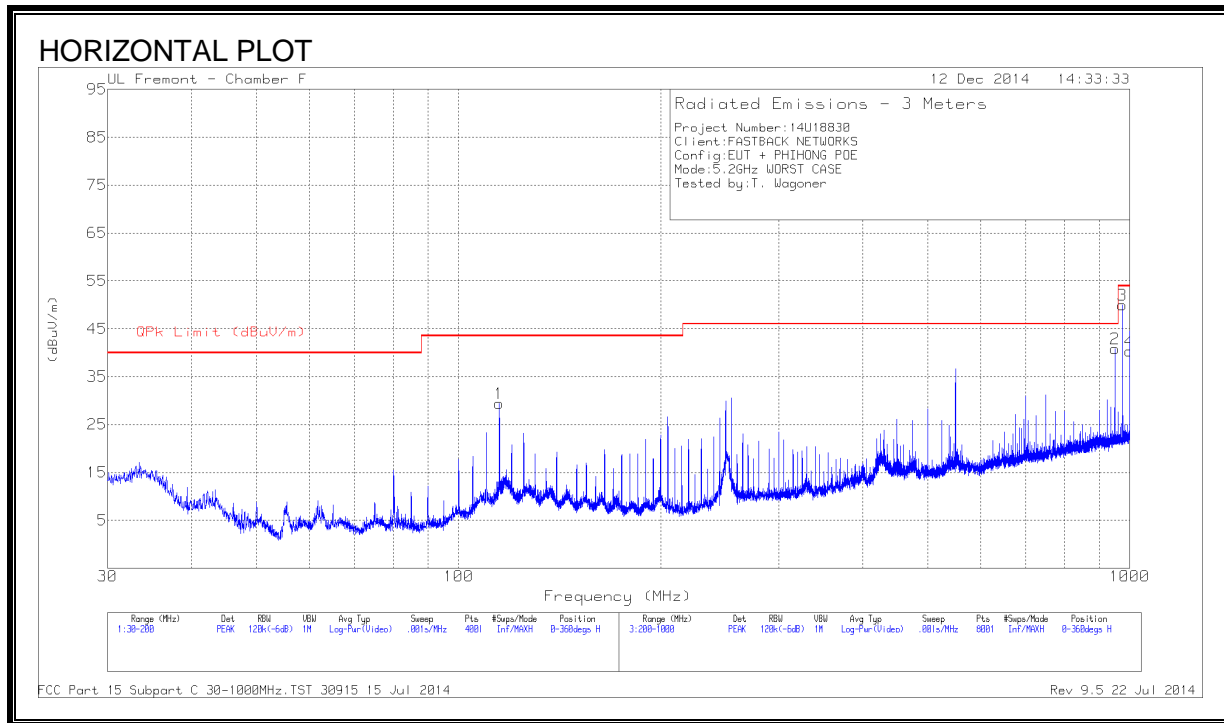
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average



### 9.3. WORST-CASE BELOW 1 GHz

#### SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



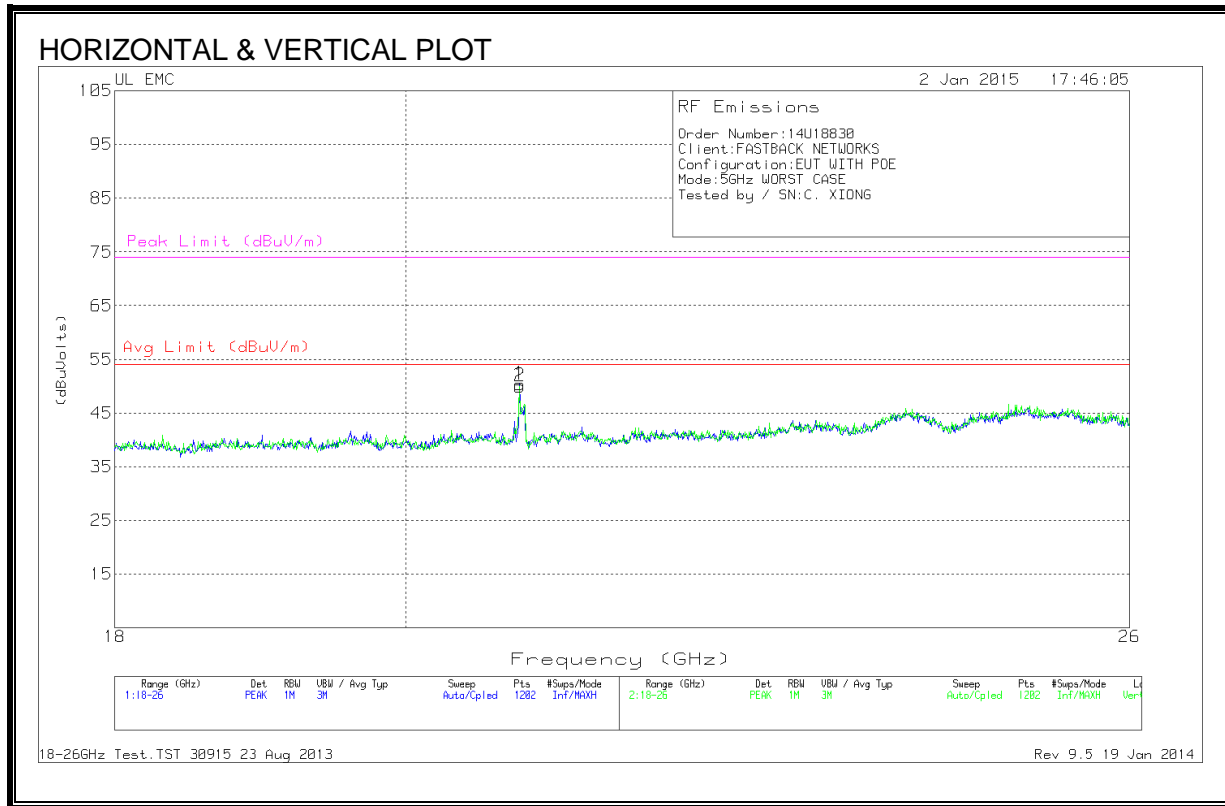
**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	115	47.37	PK	13.5	-31.5	29.37	43.52	-14.15	0-360	301	H
2	950	46.04	PK	22.9	-28.1	40.84	46.02	-5.18	0-360	201	H
	950.0106	49.24	QP	22.9	-28.1	44.04	46.02	-1.98	357	123	H
3	975	54.66	PK	23.1	-27.8	49.96	53.97	-4.01	0-360	201	H
	975.0085	56.87	QP	23.1	-27.8	52.17	53.97	-1.8	352	123	H
4	999.9	44.44	PK	23.4	-27.5	40.34	53.97	-13.63	0-360	201	H
5	255	55.65	PK	11.6	-30.9	36.35	46.02	-9.67	0-360	201	V
6	550	47.89	PK	18.3	-30.1	36.09	46.02	-9.93	0-360	100	V
7	975	43.98	PK	23.1	-27.8	39.28	53.97	-14.69	0-360	201	V

PK – Peak detector  
 QP - Quasi-Peak detector

## 9.4. WORST-CASE 18 to 26 GHz

### SPURIOUS EMISSIONS 18000 TO 26000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)



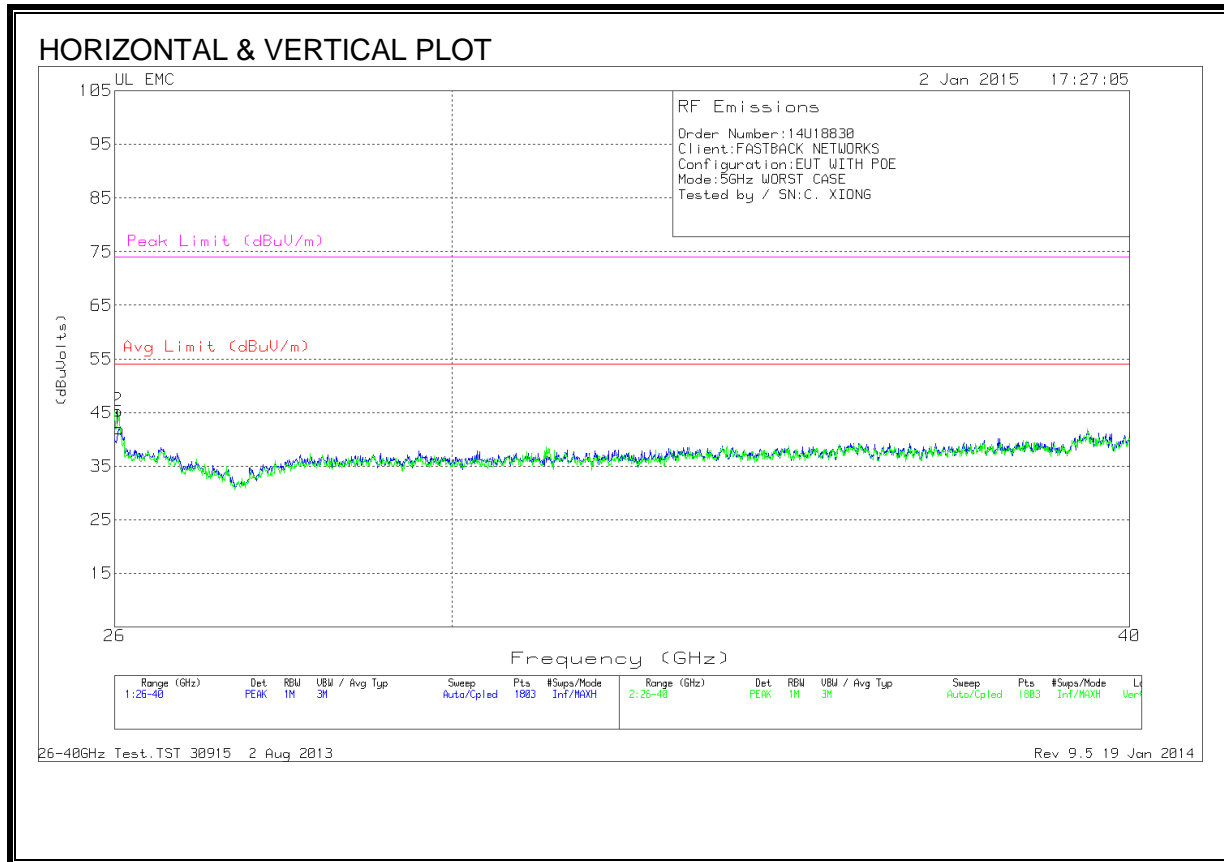
### HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	20.844	50.83	PK	33.2	-24.2	-9.5	50.33	54	-3.666	74	-23.66
2	20.844	50.5	PK	33.2	-24.2	-9.5	50	54	-4	74	-24

PK - Peak detector

## 9.5. WORST-CASE 26 to 40 GHz

### SPURIOUS EMISSIONS 26 TO 40 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)



### HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T90 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	26.043	49.8	PK	35.6	-33.9	-9.5	42	54	-12	74	-32
2	26.031	53.33	PK	35.6	-34.1	-9.5	45.33	54	-8.66	74	-28.66

PK - Peak detector

## 10. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

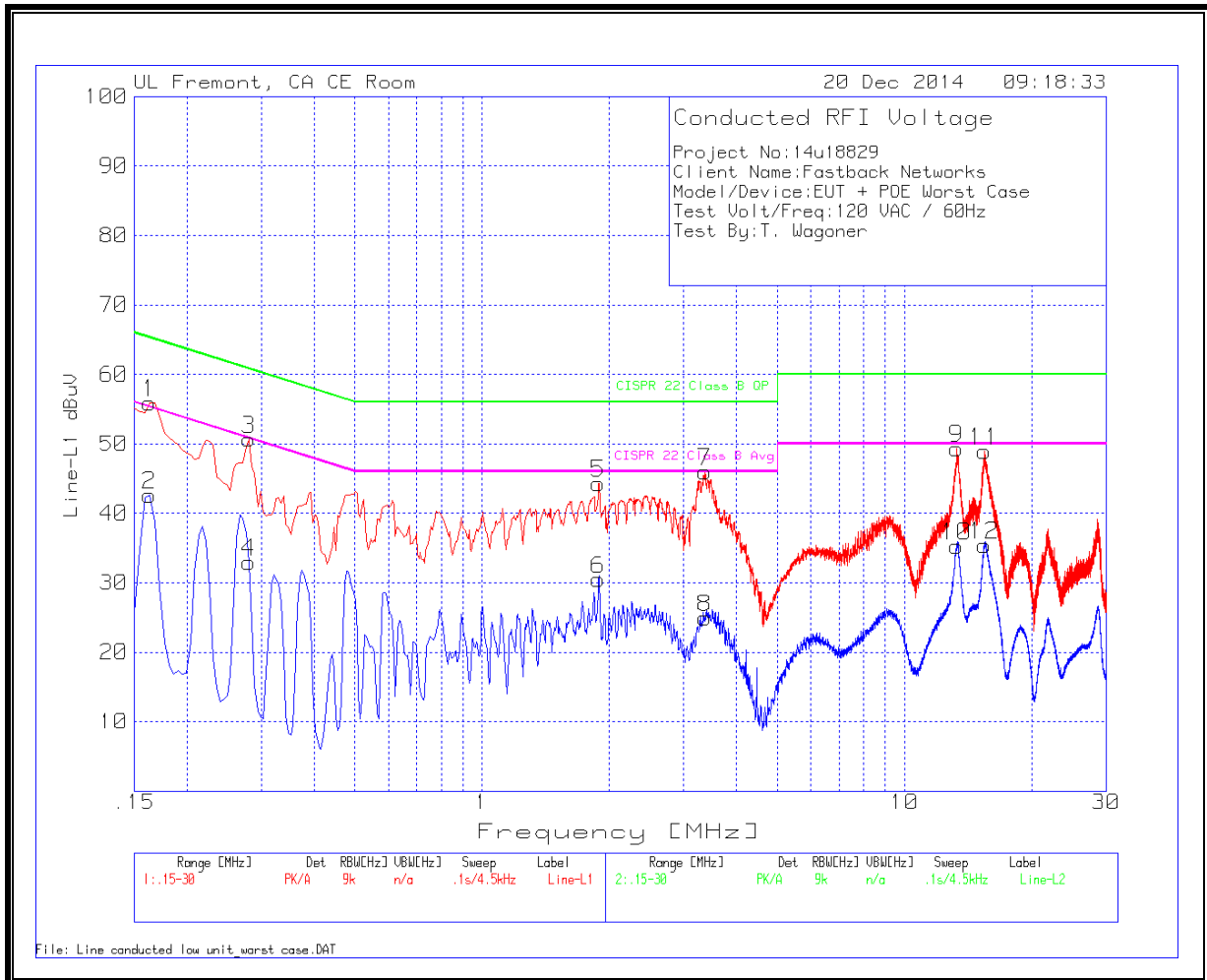
FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

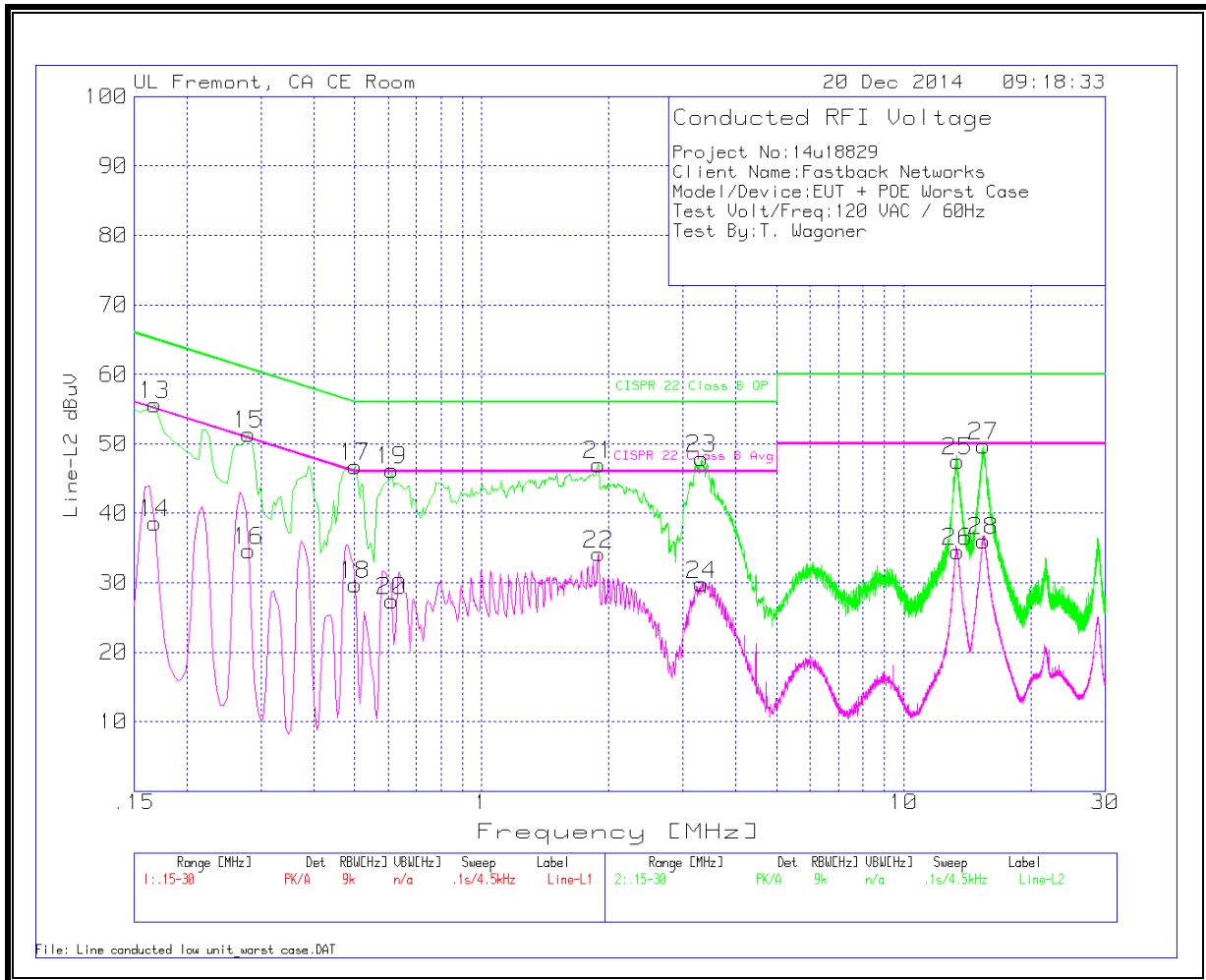
\* Decreases with the logarithm of the frequency.

## WORST CASE RESULTS

### LINE 1 RESULTS



**LINE 2 RESULTS**



**DATA**

Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
1	.1635	54.72	PK	1.2	0	55.92	65.3	-9.38	-	-
2	.1635	41.45	Av	1.2	0	42.65	-	-	55.3	-12.65
3	.2805	50.08	PK	.6	0	50.68	60.8	-10.12	-	-
4	.2805	32.33	Av	.6	0	32.93	-	-	50.8	-17.87
5	1.887	43.98	PK	.2	.1	44.28	56	-11.72	-	-
6	1.887	30.15	Av	.2	.1	30.45	-	-	46	-15.55
7	3.372	45.72	PK	.2	.1	46.02	56	-9.98	-	-
8	3.372	24.61	Av	.2	.1	24.91	-	-	46	-21.09
9	13.272	48.94	PK	.2	.2	49.34	60	-10.66	-	-
10	13.272	34.83	Av	.2	.2	35.23	-	-	50	-14.77
11	15.45	48.5	PK	.3	.2	49	60	-11	-	-
12	15.45	34.94	Av	.3	.2	35.44	-	-	50	-14.56



Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
13	.168	54.33	PK	1.3	0	55.63	65.1	-9.47	-	-
14	.168	37.38	Av	1.3	0	38.68	-	-	55.1	-16.42
15	.2805	50.79	PK	.6	0	51.39	60.8	-9.41	-	-
16	.2805	34.01	Av	.6	0	34.61	-	-	50.8	-16.19
17	.501	46.39	PK	.4	0	46.79	56	-9.21	-	-
18	.501	29.34	Av	.4	0	29.74	-	-	46	-16.26
19	.6135	45.97	PK	.3	0	46.27	56	-9.73	-	-
20	.6135	27.12	Av	.3	0	27.42	-	-	46	-18.58
21	1.8915	46.74	PK	.2	.1	47.04	56	-8.96	-	-
22	1.8915	33.88	Av	.2	.1	34.18	-	-	46	-11.82
23	3.3225	47.63	PK	.2	.1	47.93	56	-8.07	-	-
24	3.3225	29.5	Av	.2	.1	29.8	-	-	46	-16.2
25	13.3845	47	PK	.3	.2	47.5	60	-12.5	-	-
26	13.3845	34	Av	.3	.2	34.5	-	-	50	-15.5
27	15.432	49.19	PK	.3	.2	49.69	60	-10.31	-	-
28	15.432	35.61	Av	.3	.2	36.11	-	-	50	-13.89