



**FCC 47 CFR PART 15 SUBPART E**

**CERTIFICATION TEST REPORT**

**FOR**

**INTELLIGENT BACKHAUL RADIO, UNII 5.6GHz Band**

**MODEL NUMBERS: IBR-1300-NA and IBR-1301-NA**

**FCC ID: 2AAEH-107**

**REPORT NUMBER: 15U21741-E4V2**

**ISSUE DATE: February 26, 2016**

*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**<sup>®</sup>

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2/15/16	Initial Issue	F. de Anda
V2	2/26/16	Updated section 5.1 with QAM4 reference	F. de Anda

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## 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

**MODELS:** IBR-1300-NA and IBR-1301-NA

**SERIAL NUMBER:** Proto 1

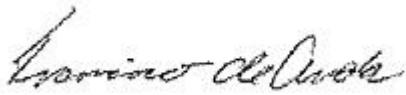
**DATE TESTED:** January 15, 2016 – February 5, 2016

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:



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FRANCISCO DE ANDA  
PROGRAM MANAGER  
UL Verification Services Inc.

Tested By:



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CHRIS XIONG  
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, ANSI C63.10-2013, FCC KDB 789033, FCC KDB 662911 and FCC 06-96.

## 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 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 checked="" 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. 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.

The EUT uses 40, 20 and 10 MHz nominal bandwidths with QAM4, QAM16, QAM64, QAM256 modulation. The EUT can be powered by Power over Ethernet (PoE) or AC.

For operation in the U-NII-2C band, EUT drives two cross polarized antennas.

### 5.2. MANUFACTURER'S DESCRIPTION OF MODEL DIFFERENCES

There are two power options available for the EUT;

The PoE powered model is identified as:

- Model: IBR-1300-NA
- FCC ID: 2AAEH-107

The AC mains powered model is identified as:

- Model: IBR-1301-NA
- FCC ID: 2AAEH-107

### 5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

#### 5.6 GHz BAND

Bandwidth (MHz)	Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
<b>5.6 GHz Band, 2TX</b>				
Straddle(10Mhz)	5725	FDD	10.43	11.04
10	5480 - 5725	FDD	10.92	12.36
Straddle(20MHz)	5725	FDD	13.00	19.95
20	5485 - 5725	FDD	13.48	22.28
Straddle(40MHz)	5725	FDD	14.63	29.04
40	5495 - 5725	FDD	14.82	30.34

### 5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a dipole array antenna, with a maximum gain of 15 dBi.

### 5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 1.6.8.

The test utility software used during testing was Tera Term, version 4.76.

## 5.6. 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 38.4 Msamples/s for all bandwidths.

## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	Latitude E5420	CN-0H5TG2-75900-162-0089 A01	N/A
AC/DC Adapter	Dell	DAP130PE1-00	CN-0JU012-48661-14C-55WB-A04	N/A
POE	Tycon	TP-POE-HP-56G-FBN	157000258ARC00	N/A

### I/O CABLES

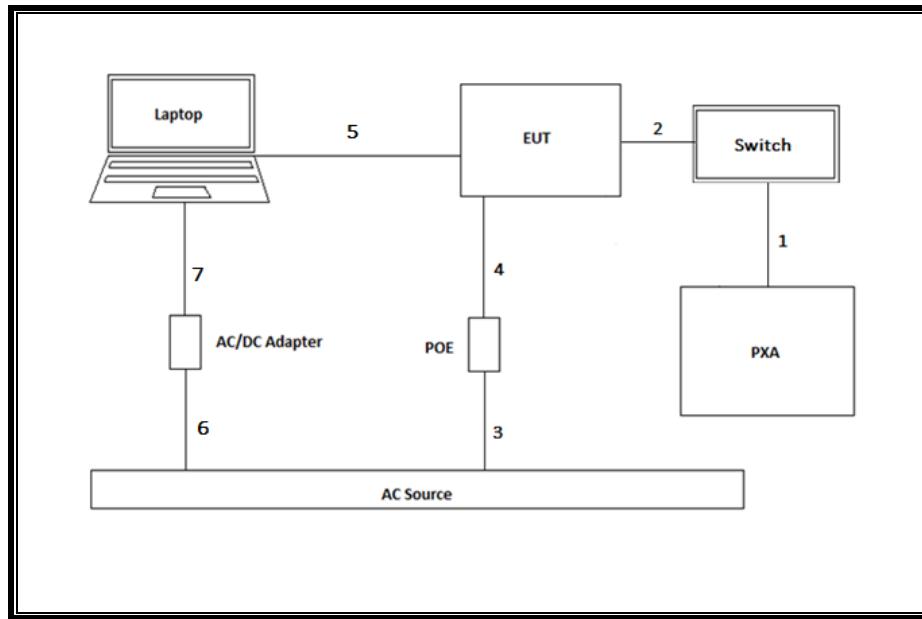
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF Input	1	SMA	Shielded	1	To Analyzer
2	Antenna	4	SMA	Shielded	1	EUT to switch
3	AC	1	3 Prong	Un-Shielded	1	N/A
4	POE/LAN	1	RJ45	Shielded	20	N/A
5	USB/SERIAL	1	USB/10 pins	Shielded	1.5	USB to Laptop/Serial to EUT
6	AC	1	3-Prong	Un-Shielded	0.5	N/A
7	DC	1	Barrel	Un-Shielded	1.5	N/A
8	AC	1	Barrel	Un-Shielded	1.5	To EUT

### TEST SETUP

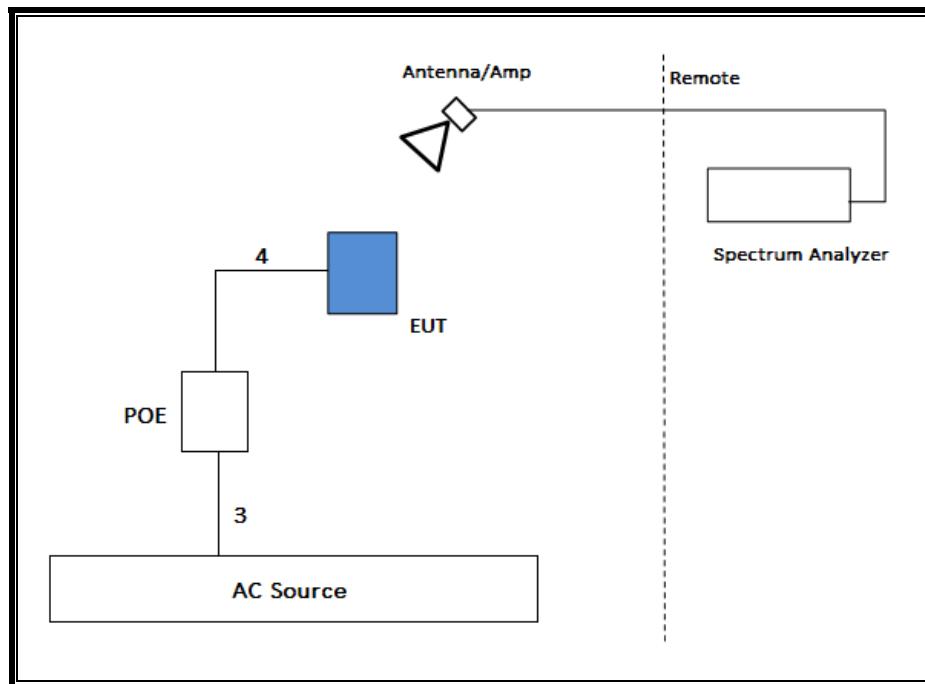
The EUT is a P-P outdoor radio used as a stand-alone device. Test software exercised the radio module.

**SETUP DIAGRAM FOR TESTS**

**CONDUCTED**

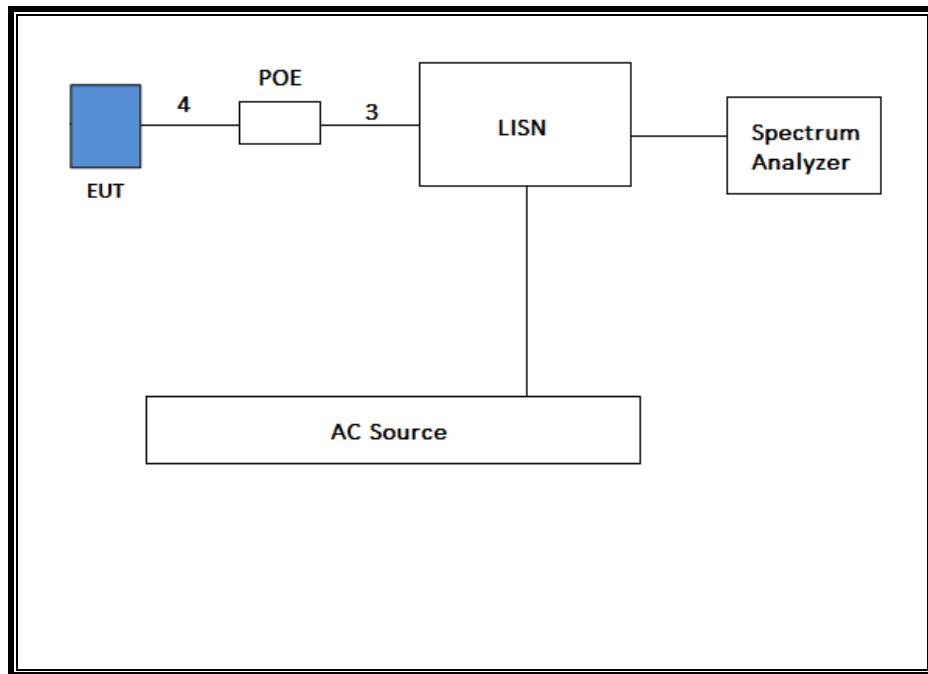


**RADIATED**

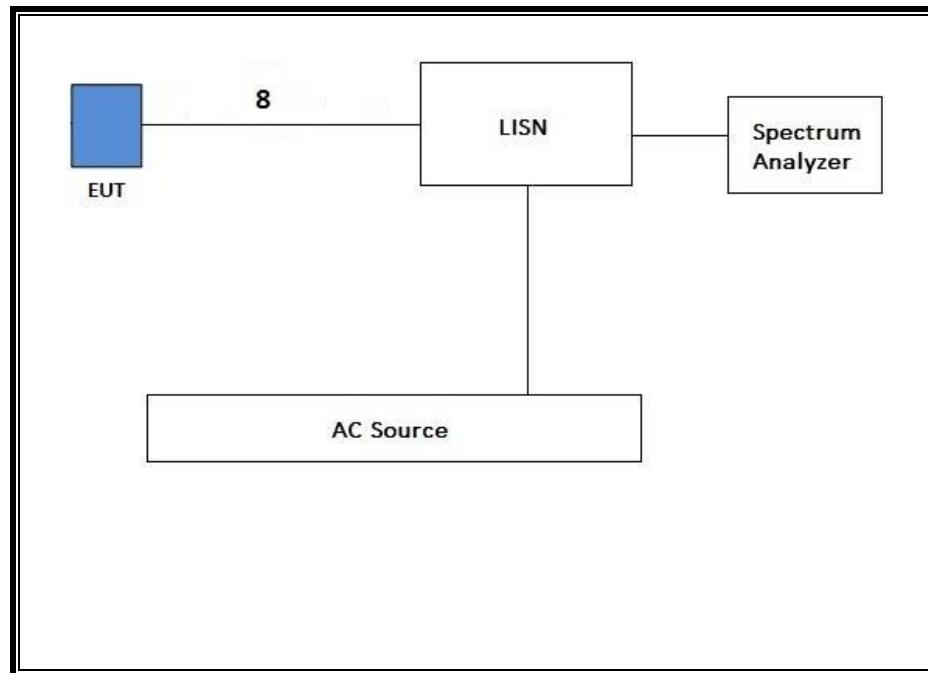


**AC LINE CONDUCTED**

**Model IBR-1300-NA (PoE Option)**



**Model IBR-1301-NA (AC Option)**



## 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 Due
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014	
Conducted Software	UL	UL EMC	Ver 3.9.1, December 28, 2015	
Spectrum Analyzer 9kHz - 26.5GHz	Keysight	N9030A	PRE0123763	12/09/16
Antenna, Horn 1-18GHz	ETS Lindgren	3117	863	04/10/16
Antenna, Broadband Hybrid, 30MHz - 2000MHz	Sunol Science	JB3	900	04/10/16
Amplifier, 1-18GHz	Miteq	ASF42-00101800-25-S-42	495	10/22/16
Amplifier, 10KHz-1GHz, 32dB	Sonoma	310N	835	06/06/16
Amplifier, 1-8GHz, 35dB	Miteq	AMF-4D-01000800-30-29P	782	10/22/16
Spectrum Analyzer, 40GHz	Hewlett-Packard	8564E	106	08/14/16
Antenna, Horn 18-26GHz	ARA	MWH-1826	447	05/12/16
Antenna, Horn 40GHz	ARA	MWH-2640/B	90	07/28/16
Amplifier, 1-26GHz	Keysight	8449B	404	06/29/16
Amplifier, 26-40GHz	Miteq	NSP4000-SP2	88	04/07/16
EMI Test Receiver, 10Hz-7GHz	Rohde & Schwarz	ESR7	1436	12/19/16
LISN, Conducted Emissions CISPR-16	Fischer	FCC-LISN-50/250-25-2-01-CISPR16	1310	09/16/16
Switch, SP6T Coaxial Switch	Keysight	87106C	836	06/26/16

## 7. MEASUREMENT METHODS

26 dB Emission BW: KDB 789033 D02 v01r1, Section C.

Conducted Output Power: KDB 789033 D02 v01r1, Section E.2.c (Method SA-1 Alternative).

Power Spectral Density: KDB 789033 D02 v01r1, Section F.

Unwanted emissions in restricted bands: KDB 789033 D02 v01r1, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v01r1, Sections G.3, G.4, and G.5.

KDB 662911 D01 Multiple Transmitter Output v02r01

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.

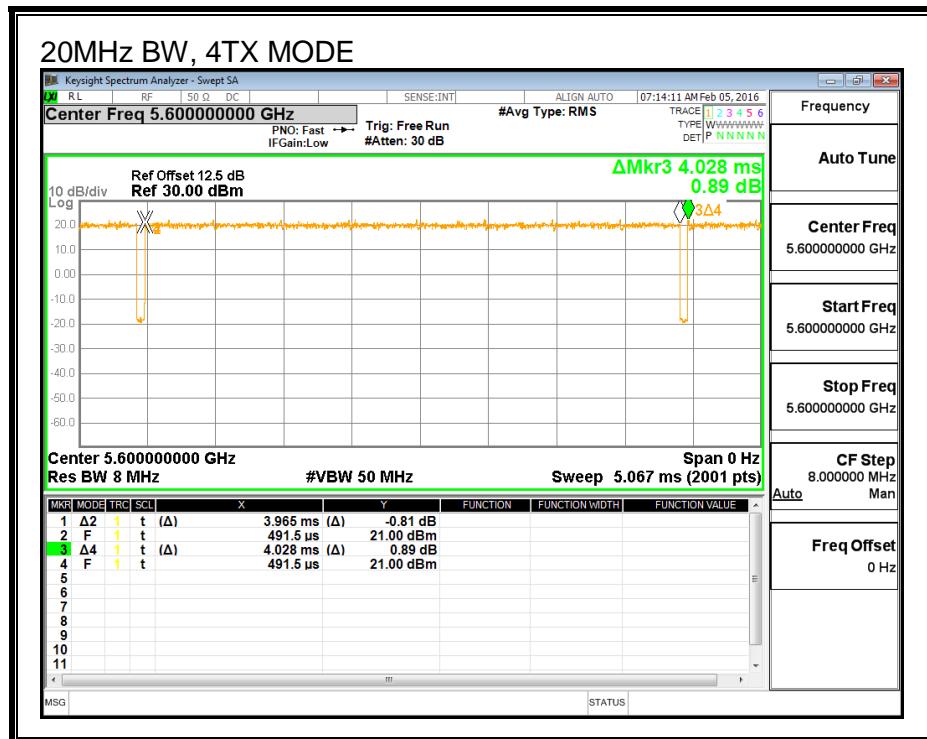
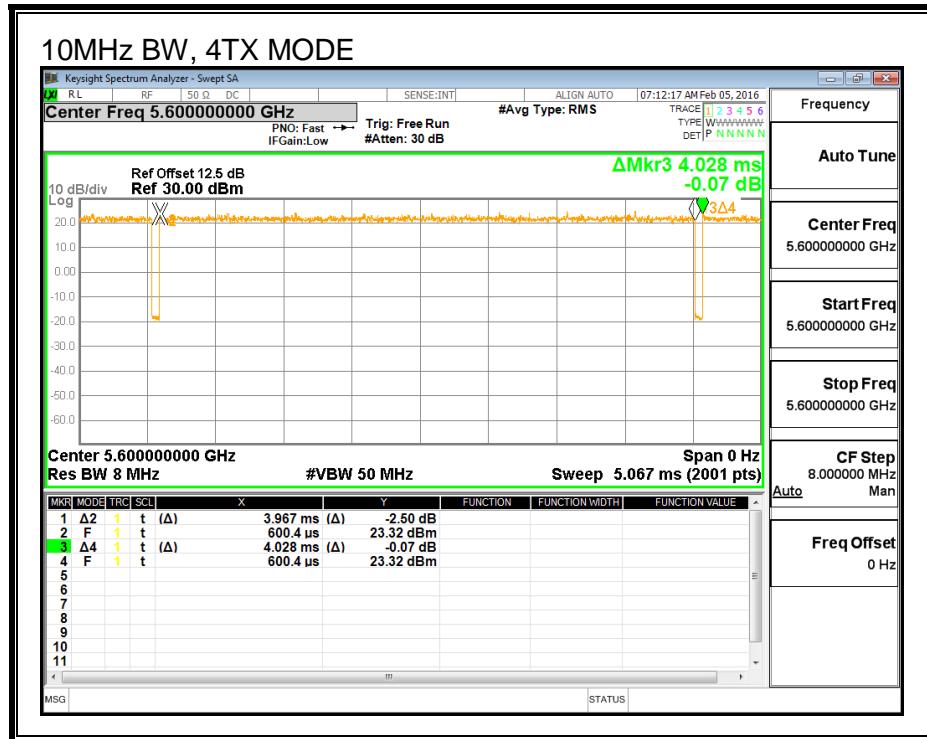
#### PROCEDURE

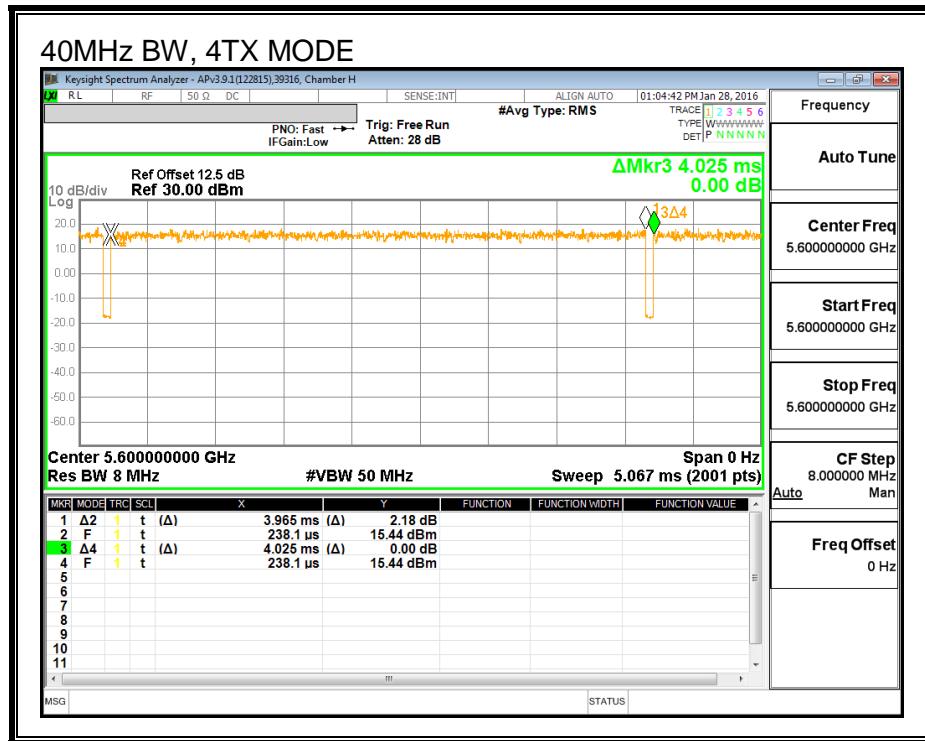
KDB 789033 Zero-Span Spectrum Analyzer Method.

#### 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)
10MHz BW, 4TX	3.967	4.028	0.985	98.49%	0.00	0.010
20MHz BW, 4TX	3.965	4.028	0.984	98.44%	0.00	0.010
40MHz BW, 4TX	3.965	4.025	0.985	98.51%	0.00	0.010

## DUTY CYCLE PLOTS





## 8.2. 10MHz BW 2TX MODE IN THE 5.6 GHz BAND

### 8.2.1. 26 dB BANDWIDTH

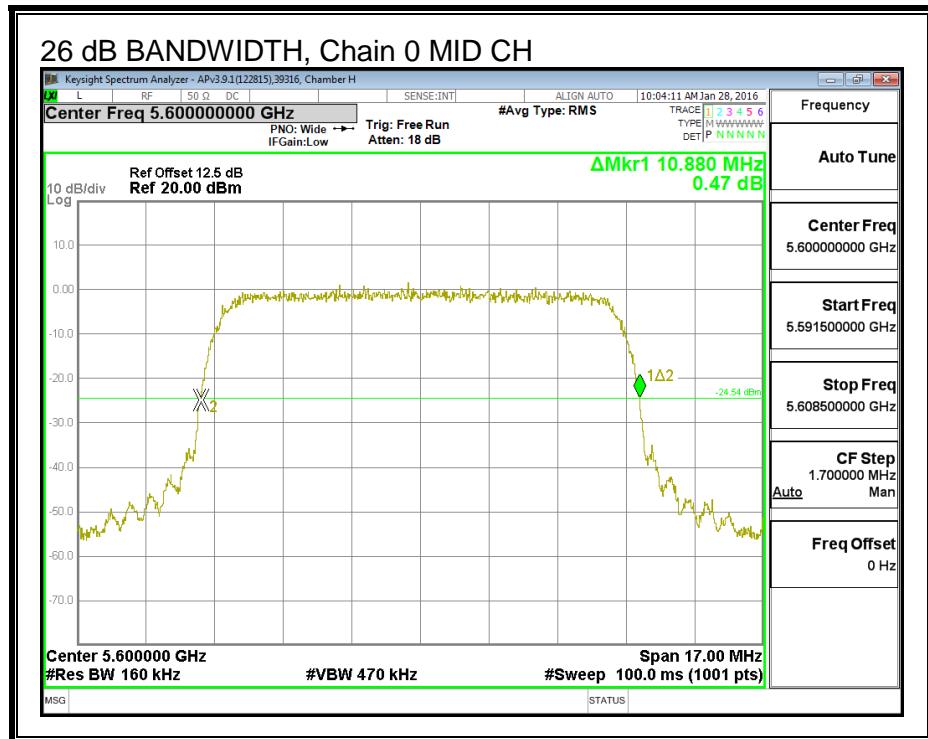
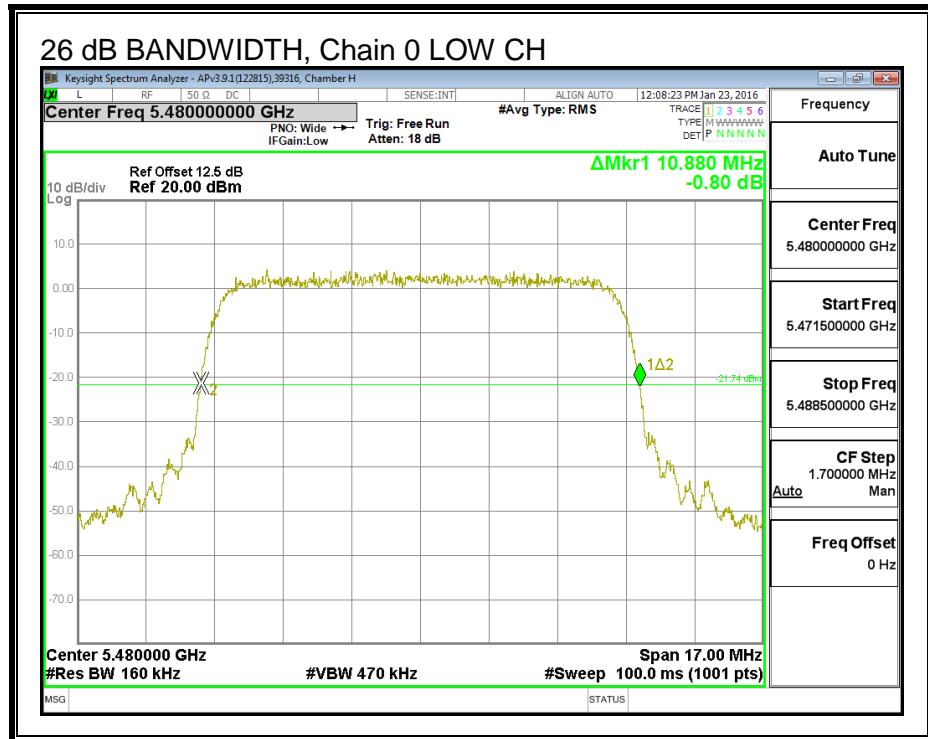
#### LIMITS

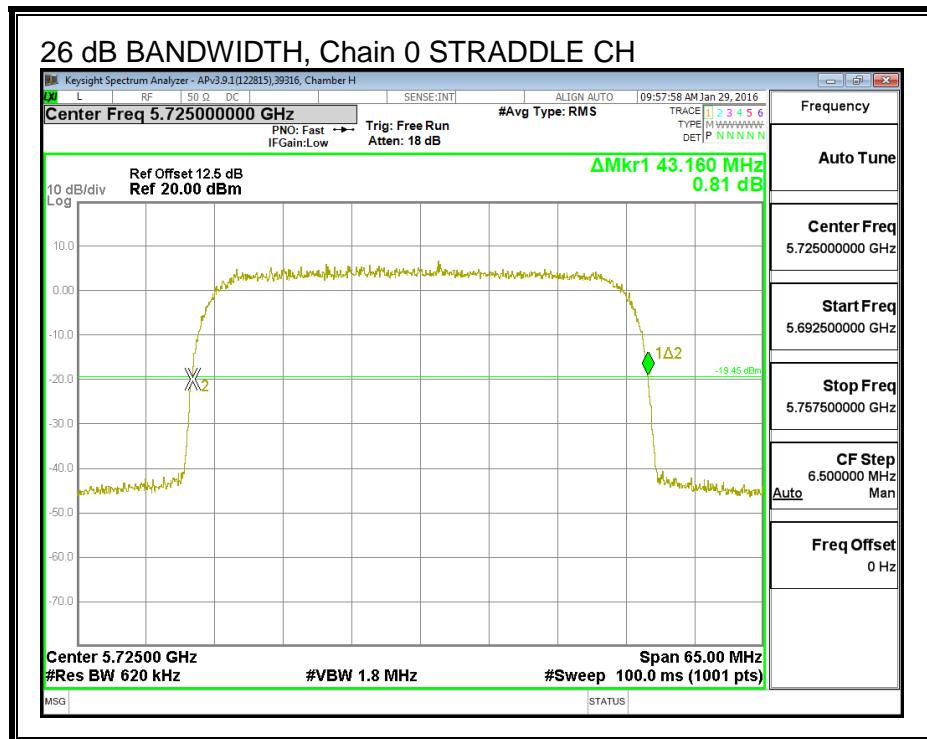
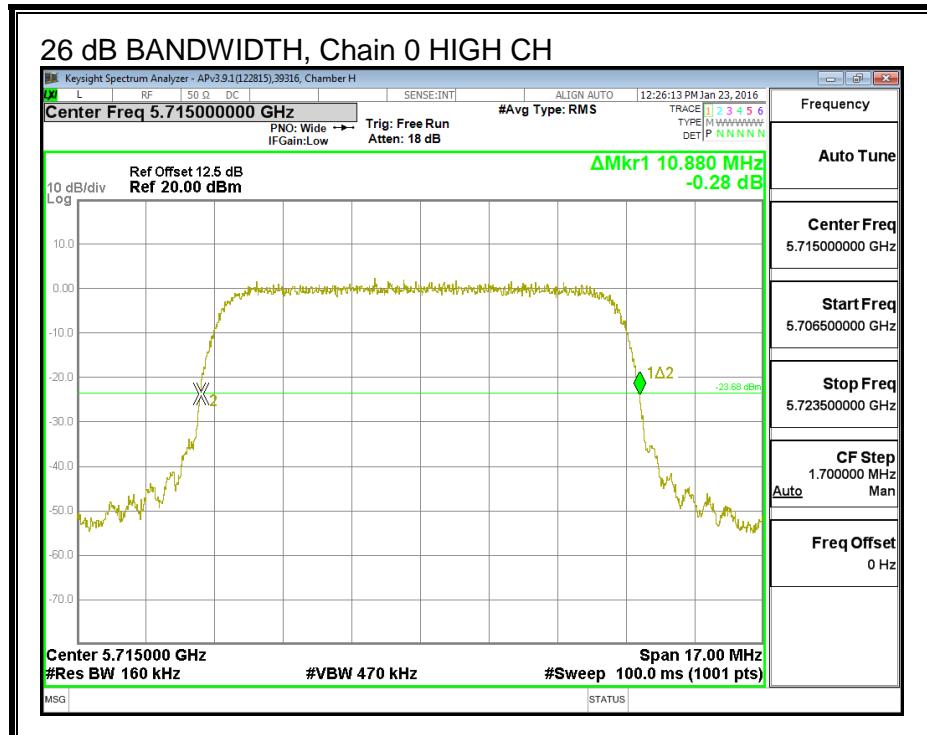
None; for reporting purposes only.

#### RESULTS

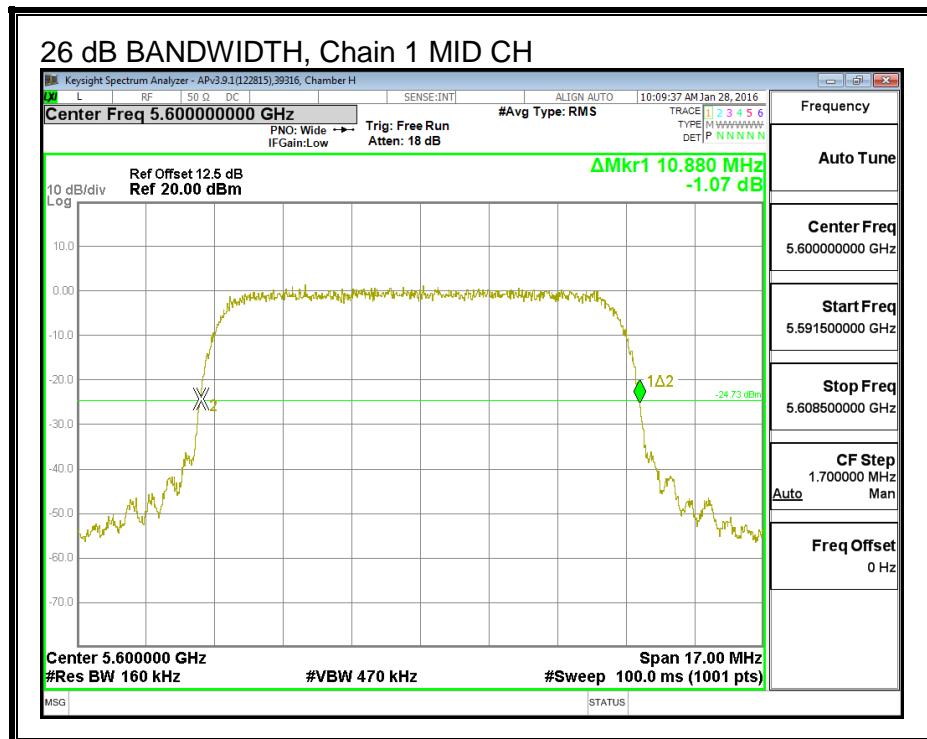
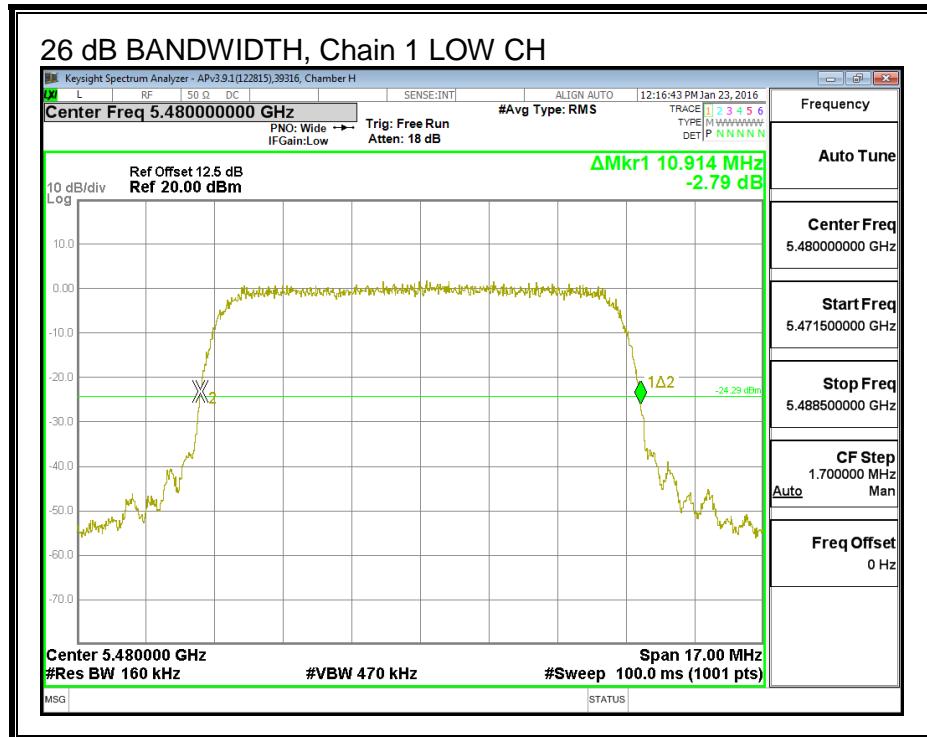
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5480	10.88	10.91
Mid	5600	10.88	10.88
High	5715	10.88	10.91
Straddle	5725	10.91	10.90

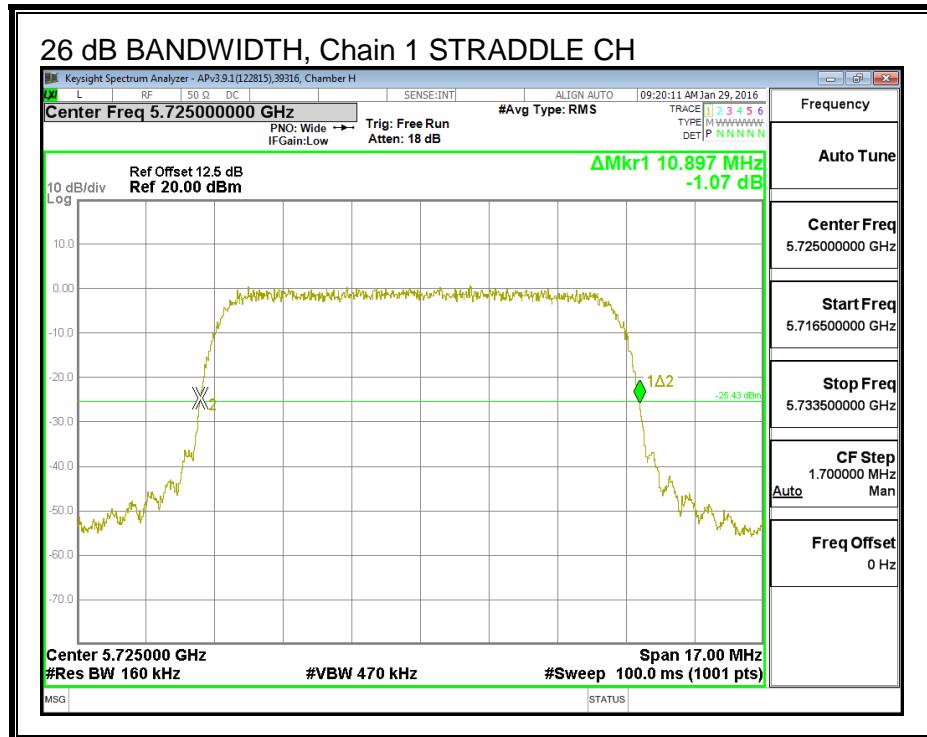
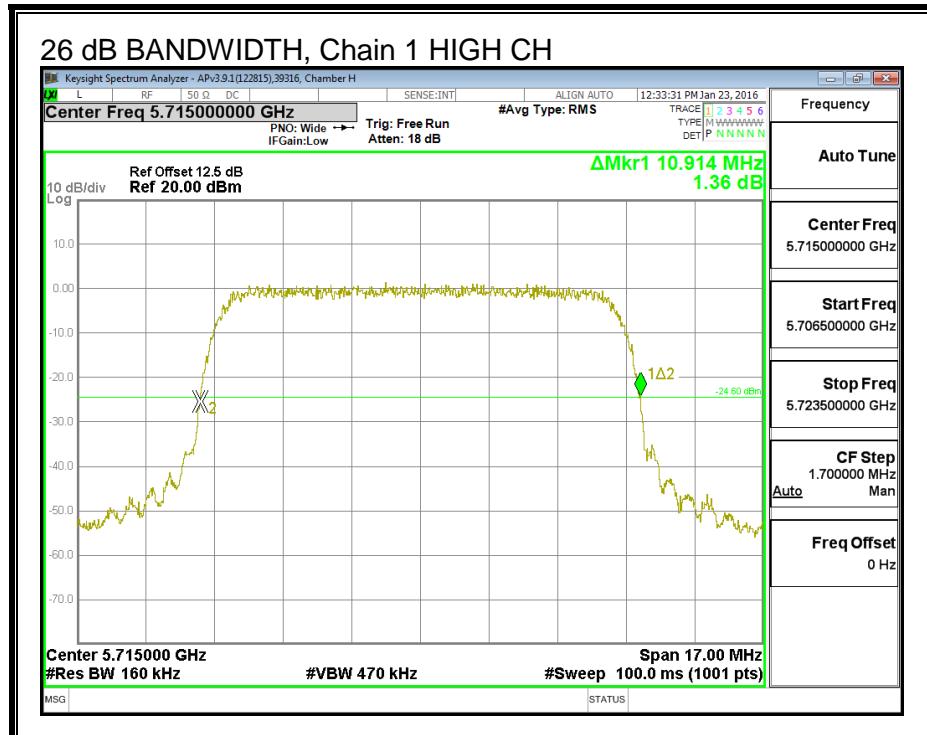
**26 dB BANDWIDTH, Chain 0**





**26 dB BANDWIDTH, Chain 1**





## 8.2.2. OUTPUT POWER AND PSD

### LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak 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)
15.00	15.00	15.00

## RESULTS

### Bandwidth, Antenna Gain and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5480	10.88	15.00	15.00	12.37	2.00
Mid	5600	10.88	15.00	15.00	12.37	2.00
High	5715	10.88	15.00	15.00	12.37	2.00
Straddle	5725	10.90	15.00	15.00	12.37	2.00

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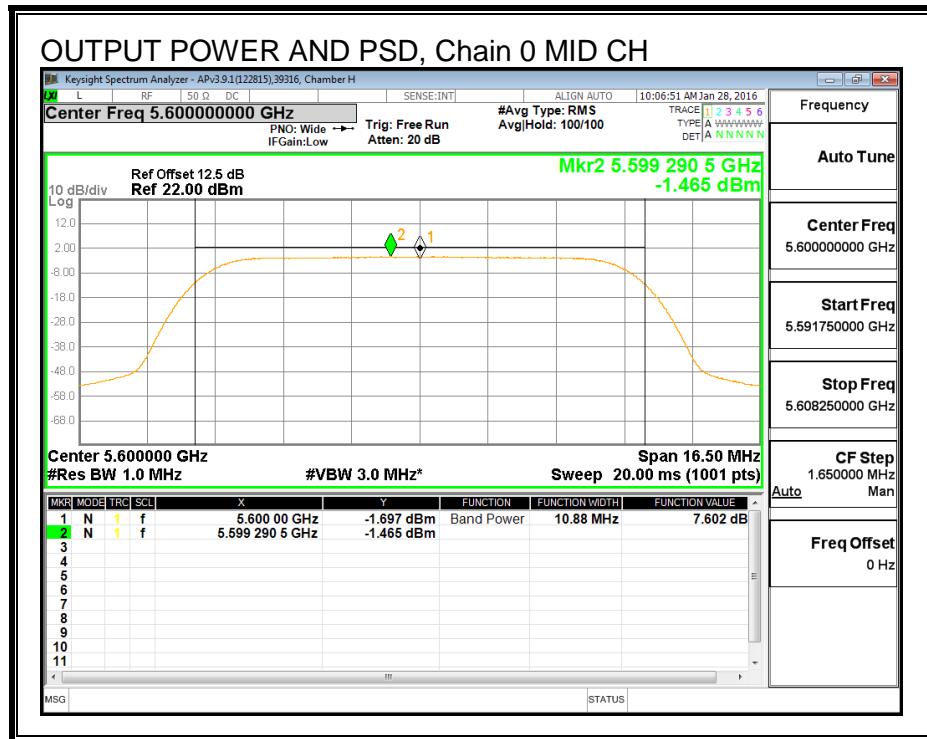
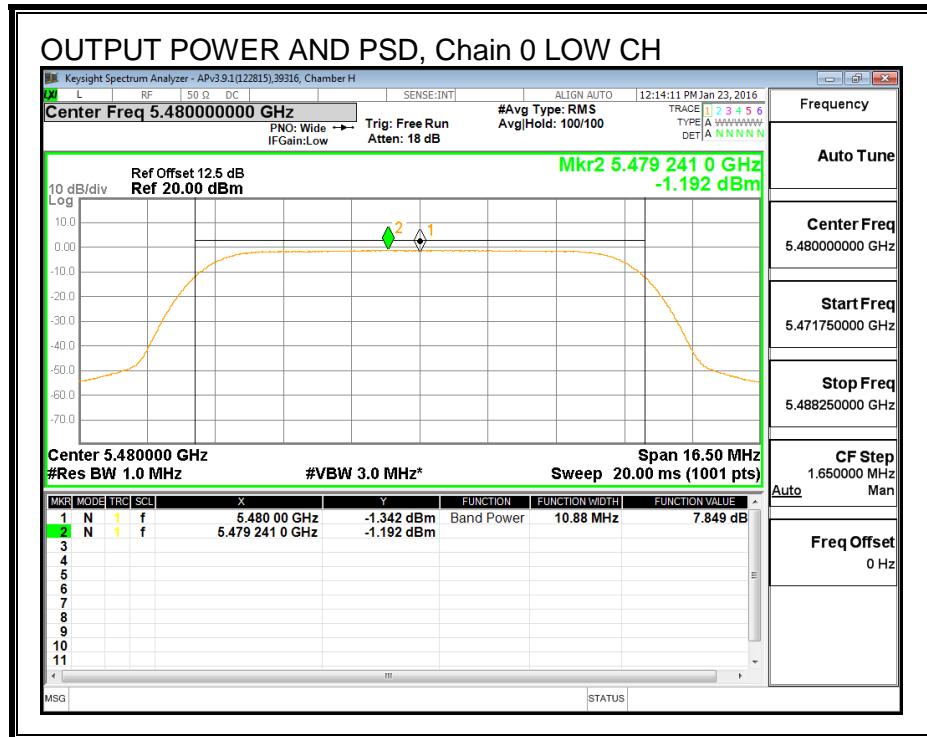
### Output Power Results

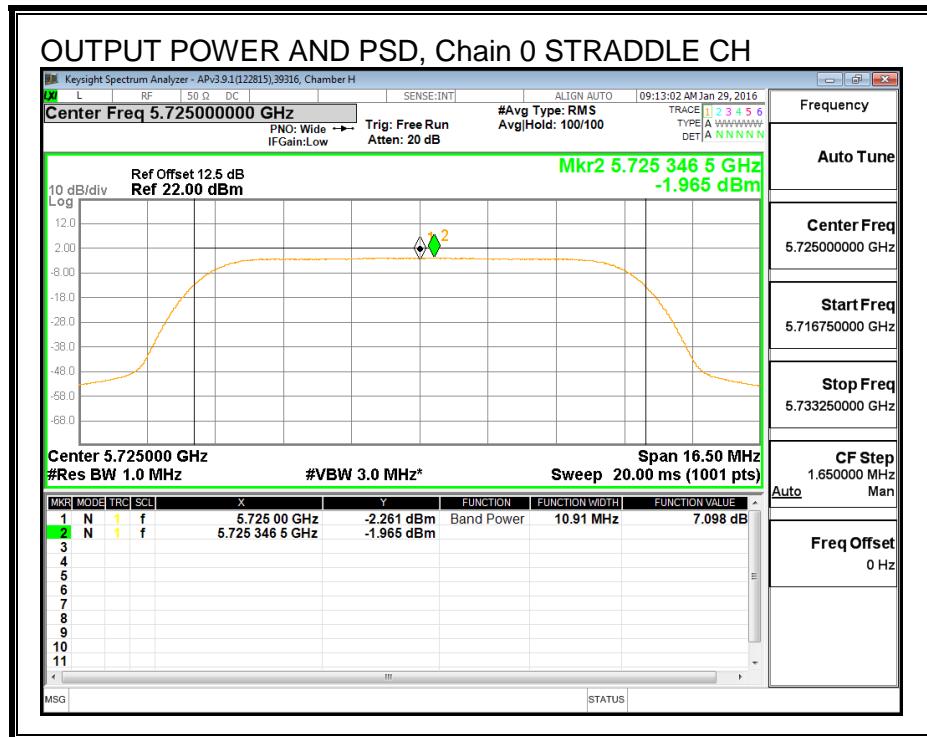
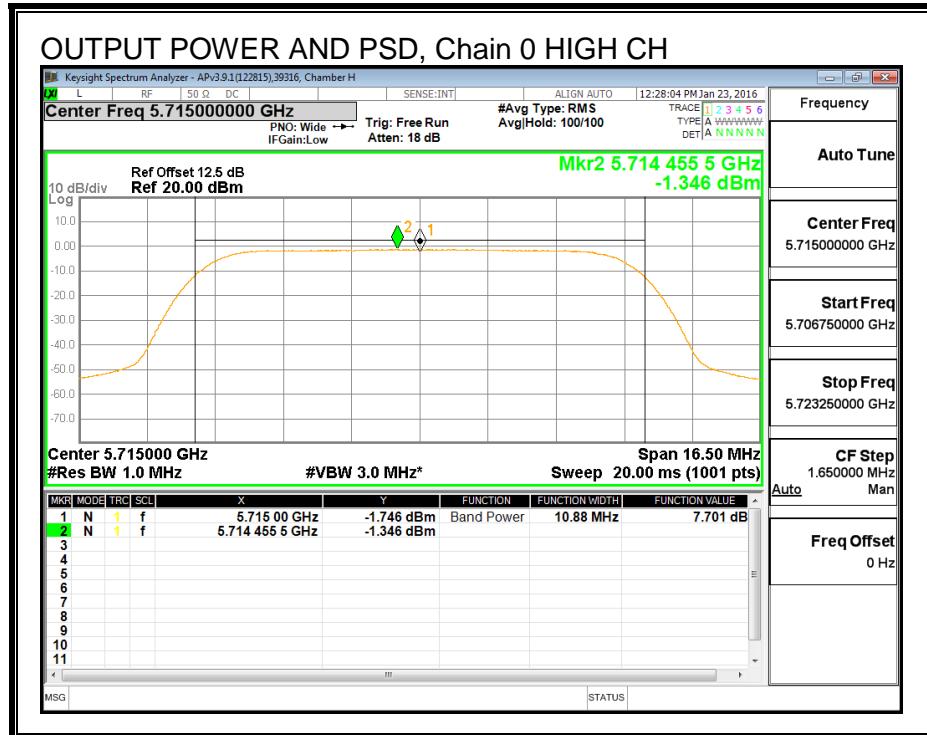
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5480	7.85	7.97	10.92	12.37	-1.45
Mid	5600	7.60	8.08	10.86	12.37	-1.51
High	5715	7.70	7.91	10.82	12.37	-1.55
Straddle	5725	7.10	7.72	10.43	12.37	-1.94

### PSD Results

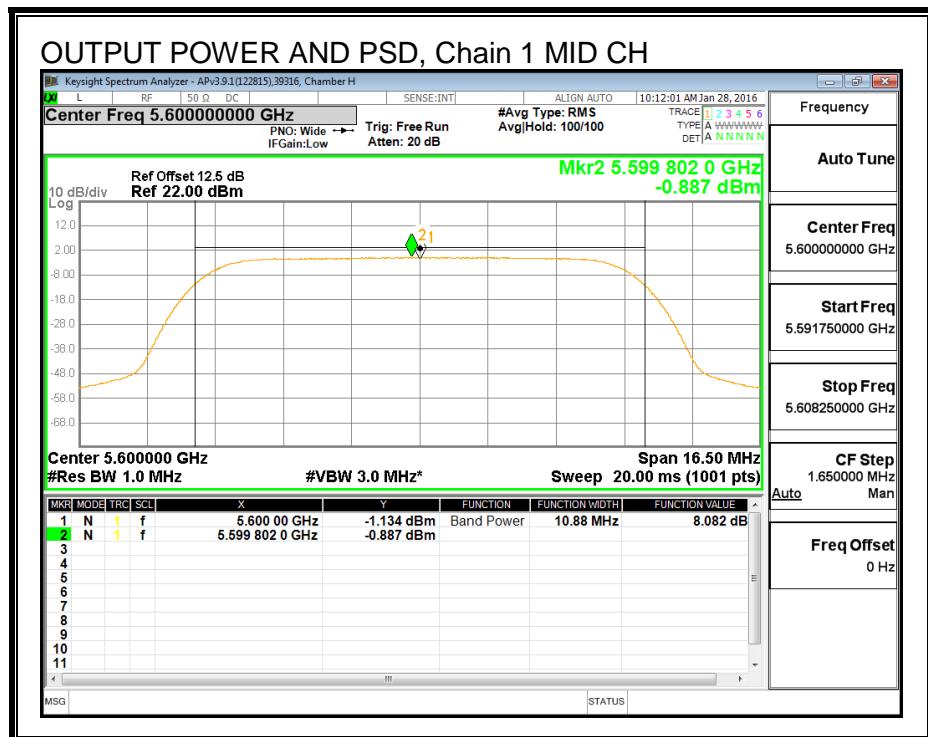
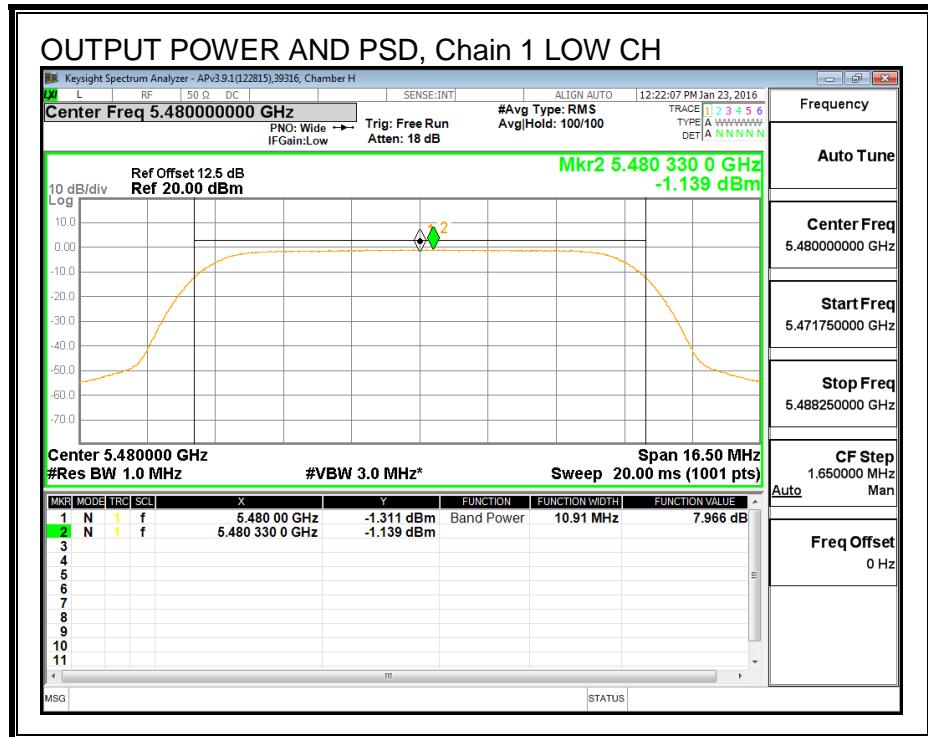
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5480	-1.19	-1.14	1.84	2.00	-0.16
Mid	5600	-1.47	-0.89	1.84	2.00	-0.16
High	5715	-1.35	-1.20	1.74	2.00	-0.26

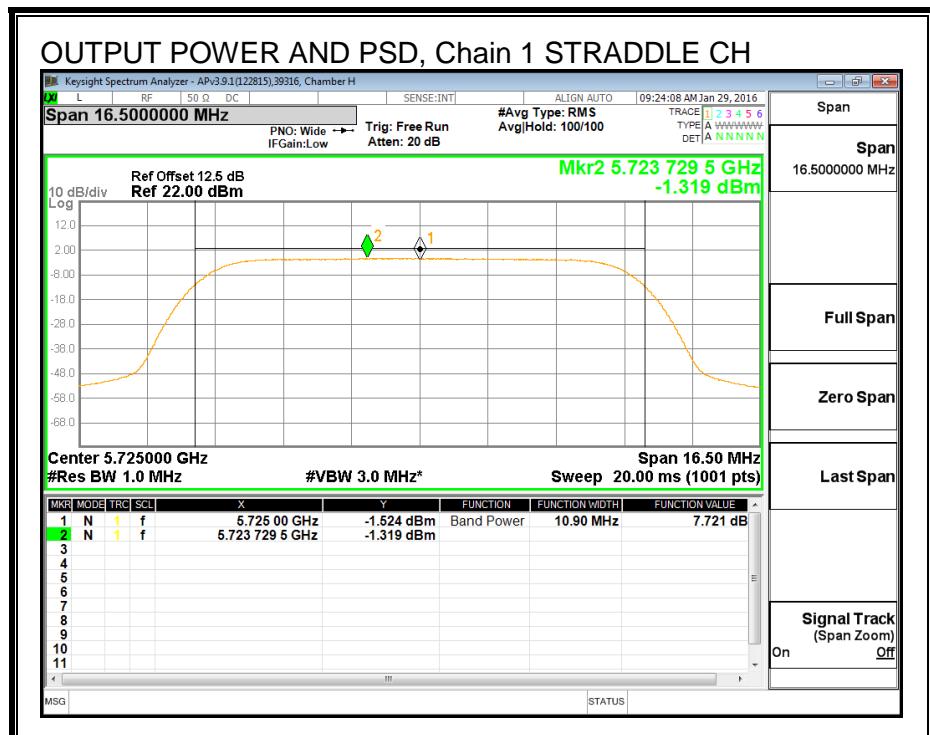
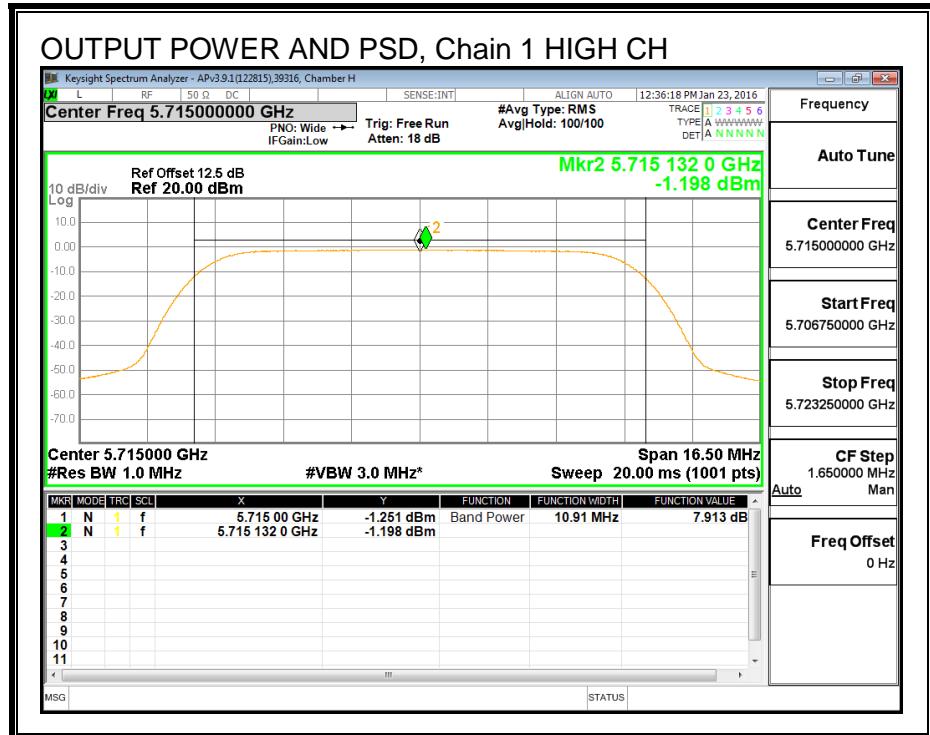
## OUTPUT POWER AND PSD, Chain 0





## OUTPUT POWER AND PSD, Chain 1





### 8.2.3. STRADDLE CHANNEL RESULTS

#### UNII-2C BAND

##### Bandwidth and Antenna Gain

Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
5725	5.45	15.00	15.00

##### Limits

Frequency (MHz)	FCC Power Limit (dBm)	PPSD Limit (dBm)
5725	9.36	2.00

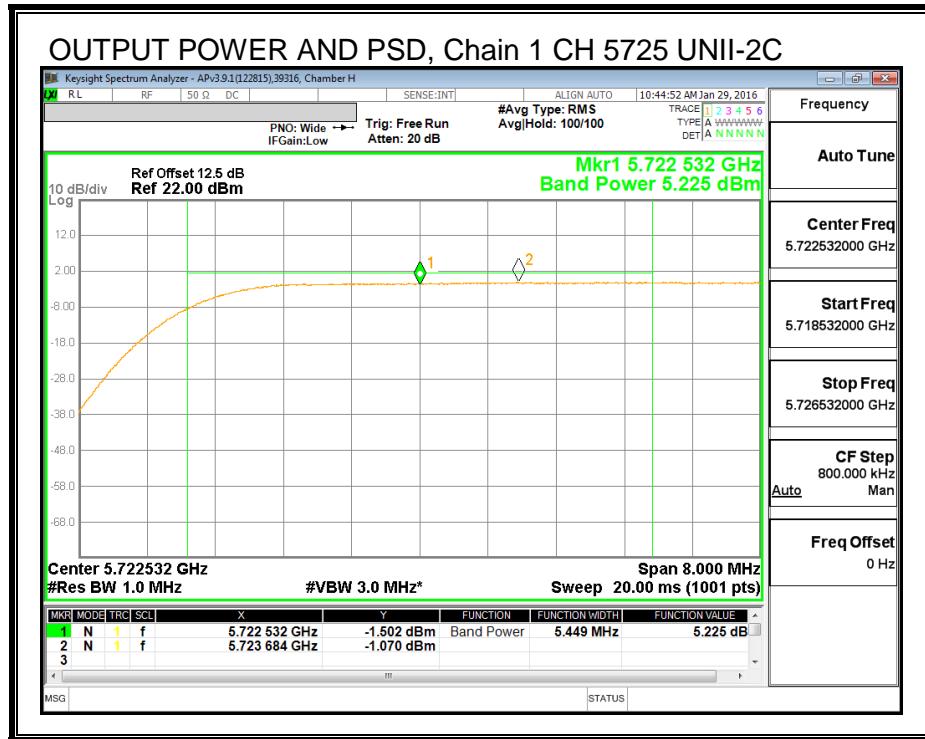
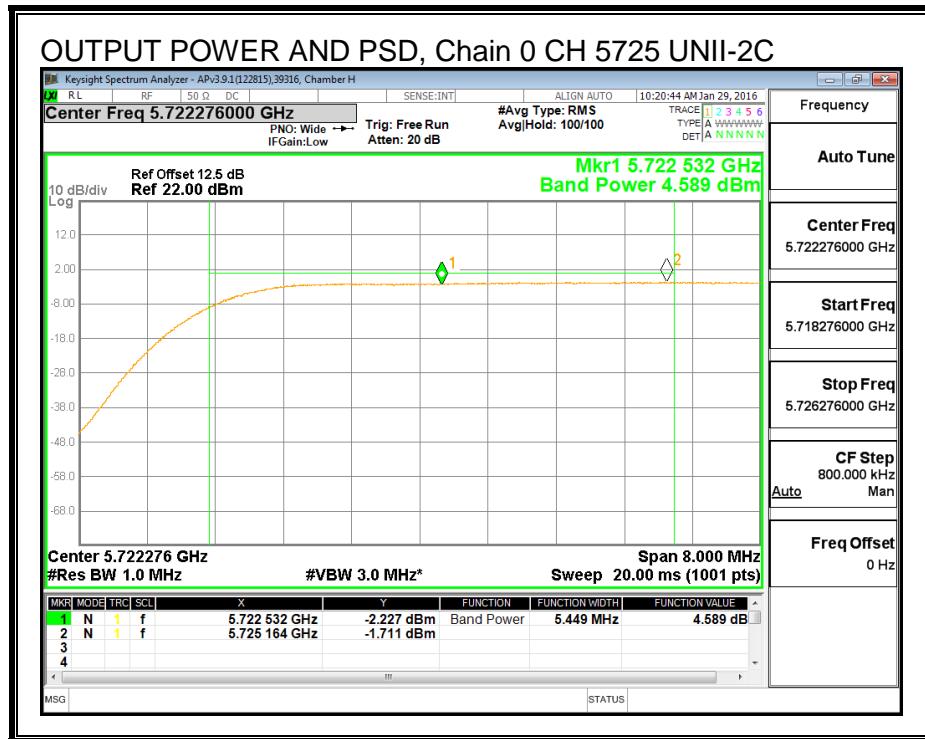
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD
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##### Output Power Results

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5725	4.59	5.23	7.93	9.36	-1.43

##### PPSD Results

Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
5725	-1.71	-1.07	1.63	2.00	-0.37



**UNII-3 BAND**

**Bandwidth and Antenna Gain**

Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
5725	5.45	15.00	15.00

**Limits**

Frequency (MHz)	FCC Power Limit (dBm)	FCC PPSD Limit (dBm)
5725	30.00	30.00

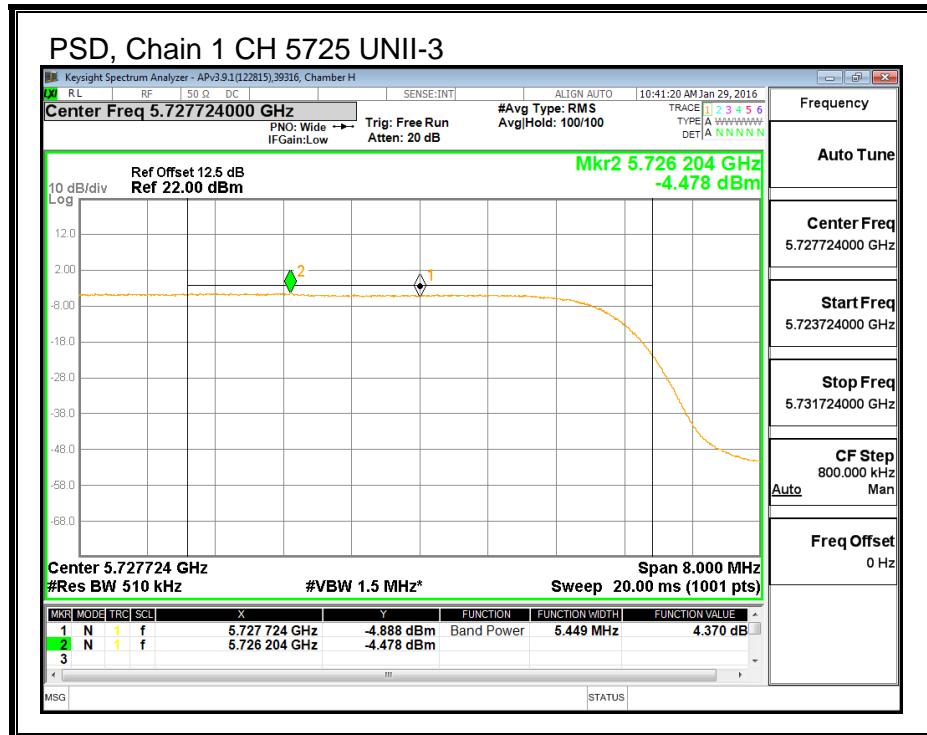
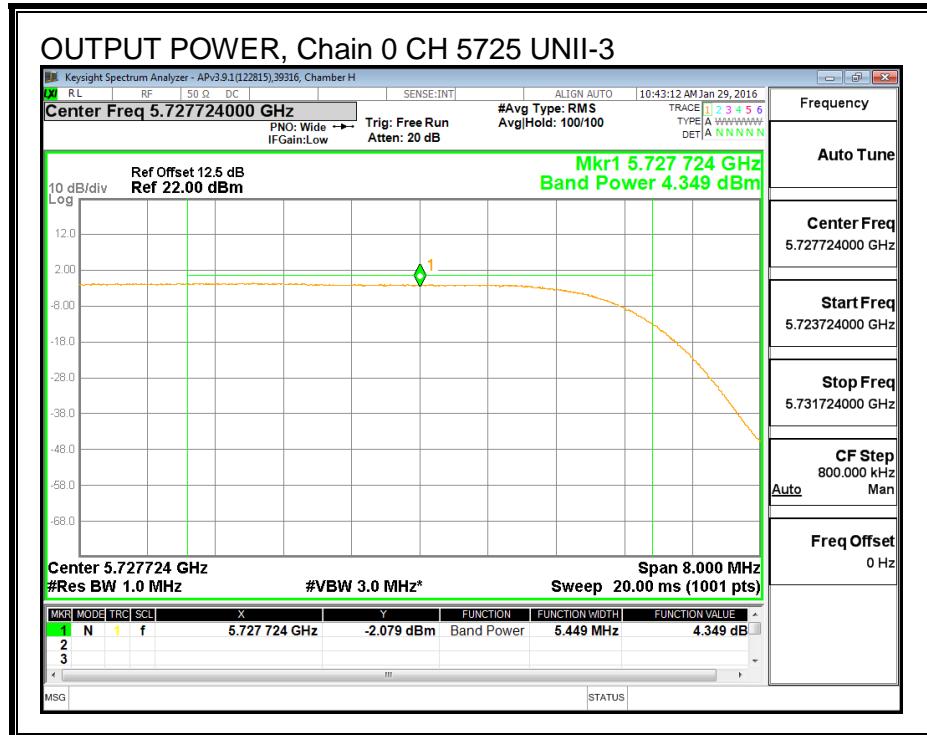
<b>Duty Cycle CF (dB)</b>	0.00	<b>Included in Calculations of Corr'd Power &amp; PPSD</b>
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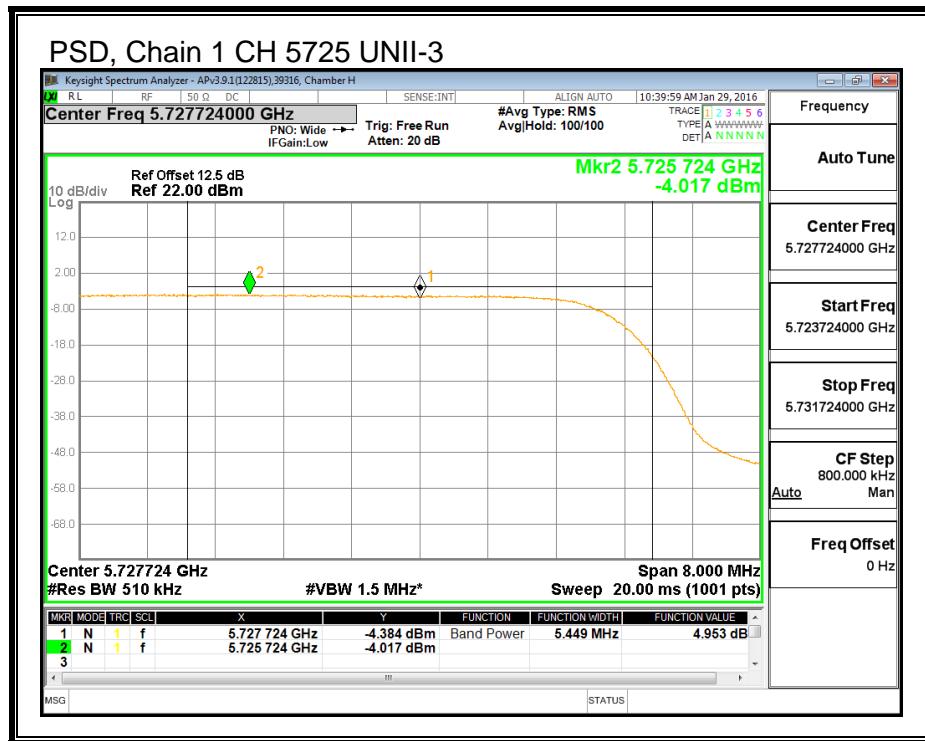
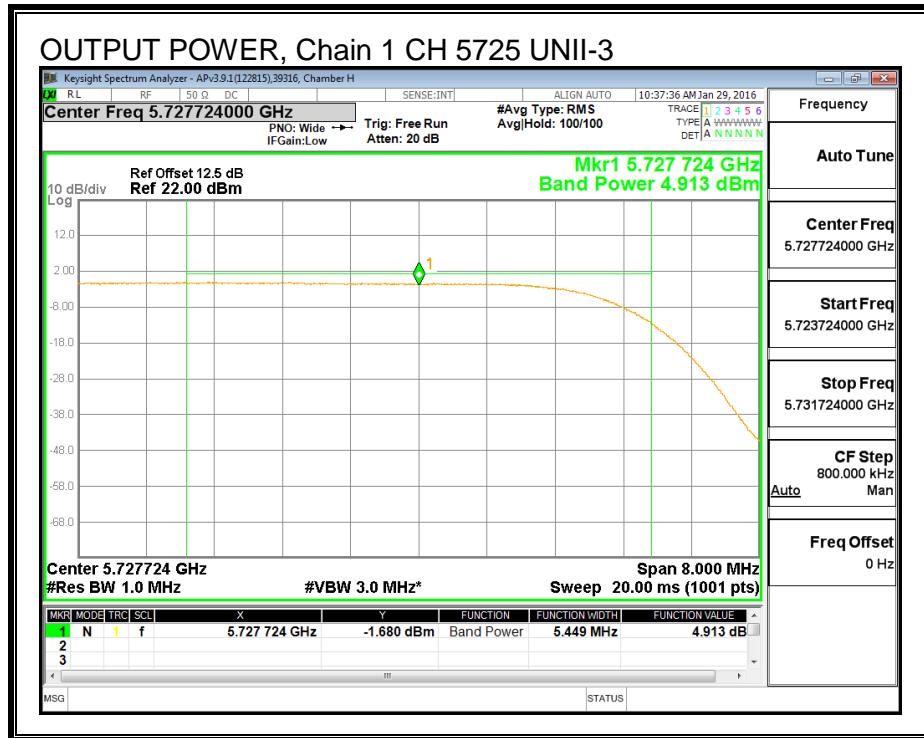
**Output Power Results**

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5725	4.35	4.91	7.65	30.00	-22.35

**PPSD Results**

Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
5725	-4.48	-4.02	-1.23	30.00	-31.23





## 8.2.4. CONDUCTED BANDEDGE

### LIMITS

FCC §15.205 and §15.209

PART 15, SUBPART E

Radiated LIMIT:

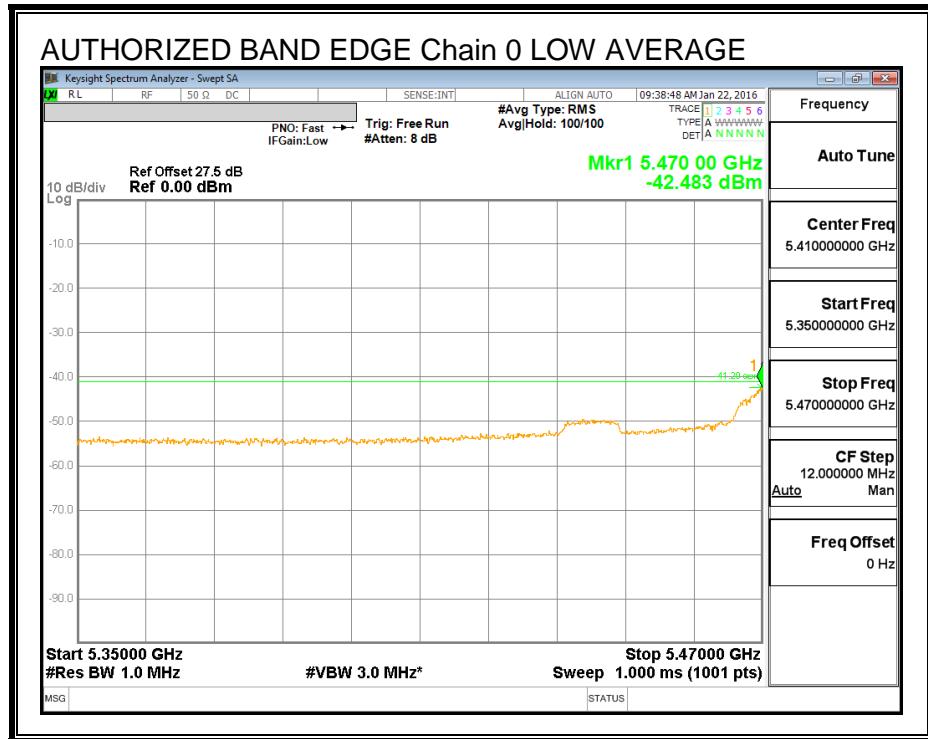
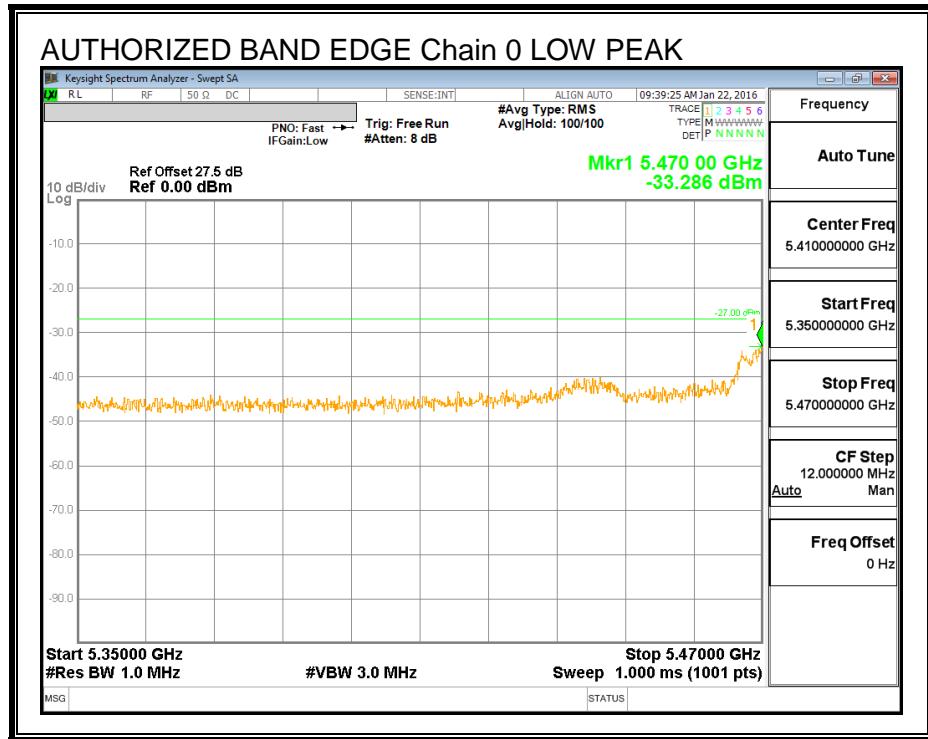
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

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

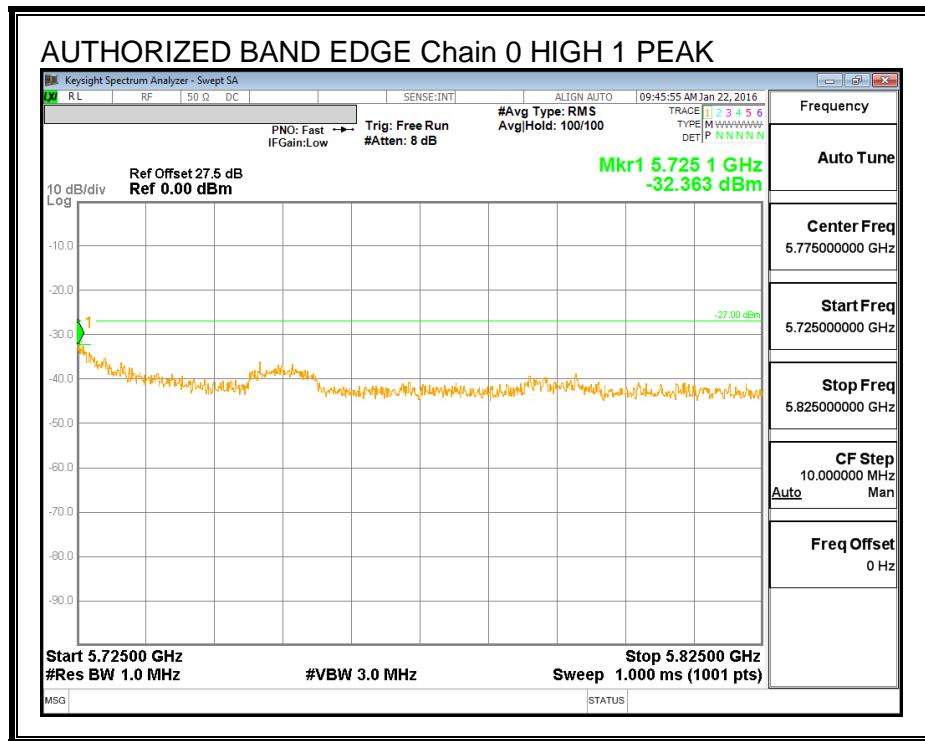
Conducted measurements are being used to demonstrate compliance with the spurious limits in the restricted band (all other spurious emissions are measured using the radiated test method with the antennas connected). The limits are 54 dBuV/m average and 74 dBuV/m peak, which are equivalent to eirp of -41.2 dBm and -21.2 dBm respectively. The plots include an offset to account for the EUT antenna gain and external attenuation between EUT antenna port and spectrum analyzer. As the two antenna chains feed cross polarized antennas with un- correlated signals the two chains are treated independently and the emissions do not need to be summed.

## RESULTS

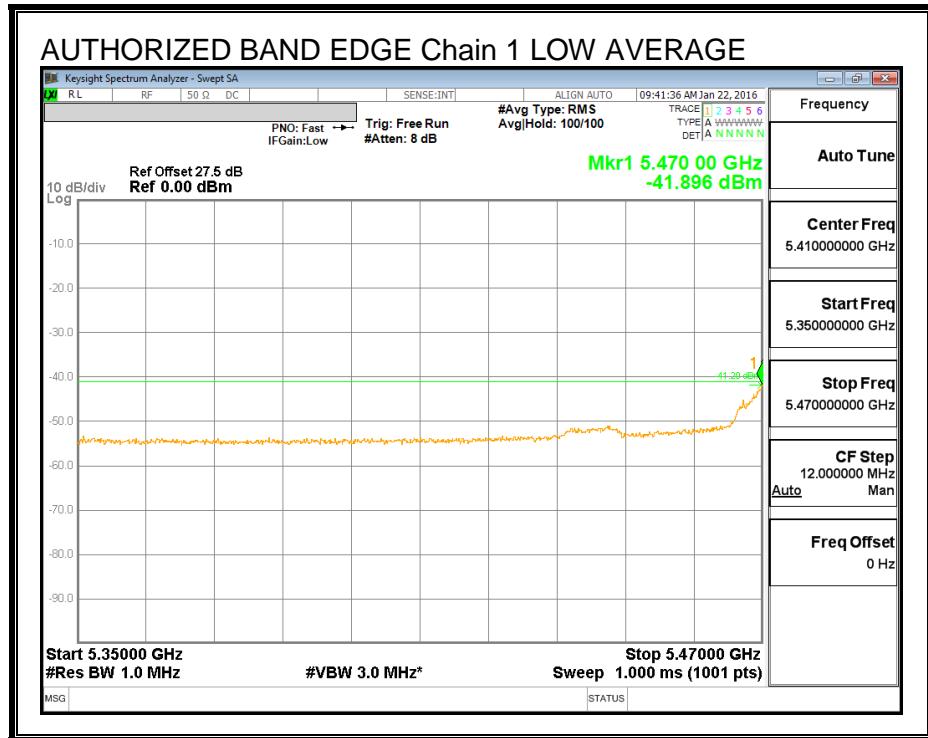
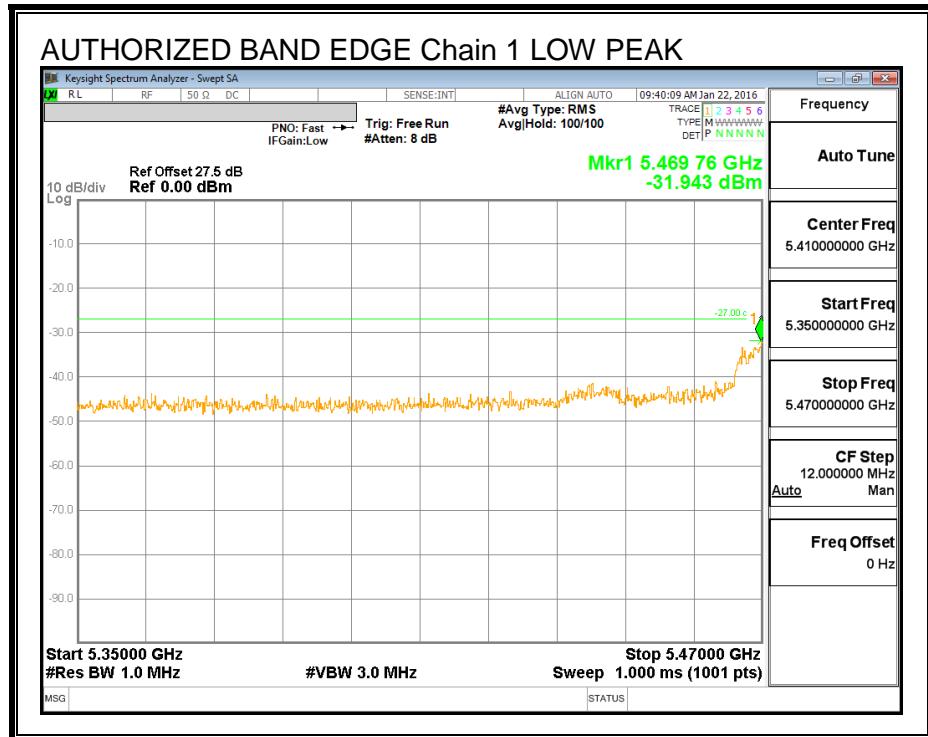
### LOW CHANNEL BANDEDGE, Chain 0



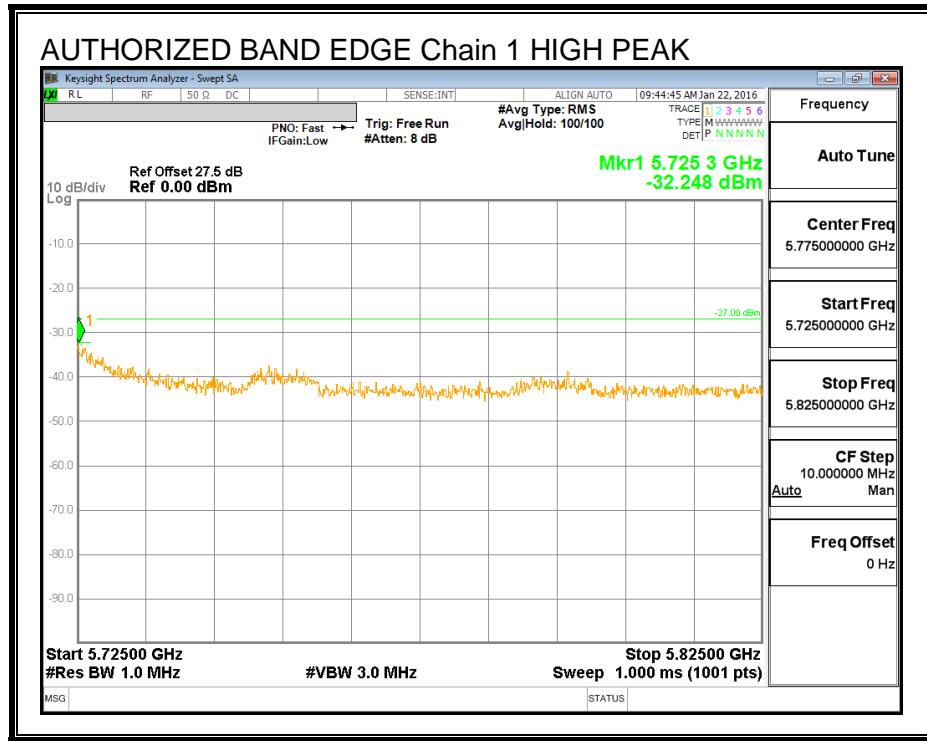
**HIGH CHANNEL BANDEDGE, Chain 0**



LOW CHANNEL BANDEDGE, Chain 1



**HIGH CHANNEL BANDEDGE, Chain 1**



### 8.3. 20MHz BW 2TX MODE IN THE 5.6 GHz BAND

#### 8.3.1. 26 dB BANDWIDTH

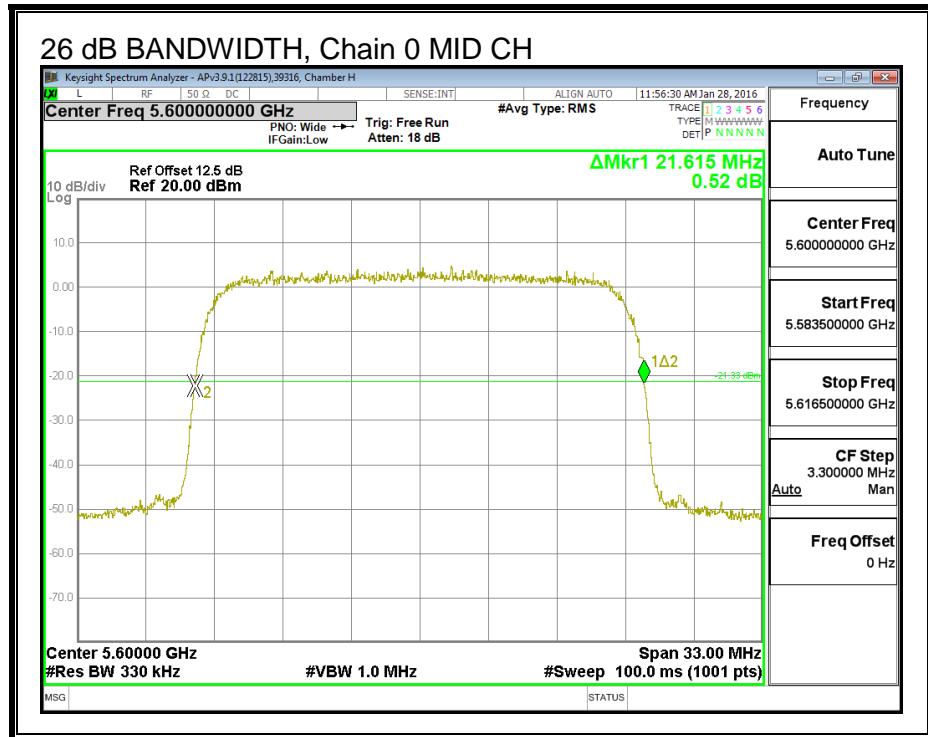
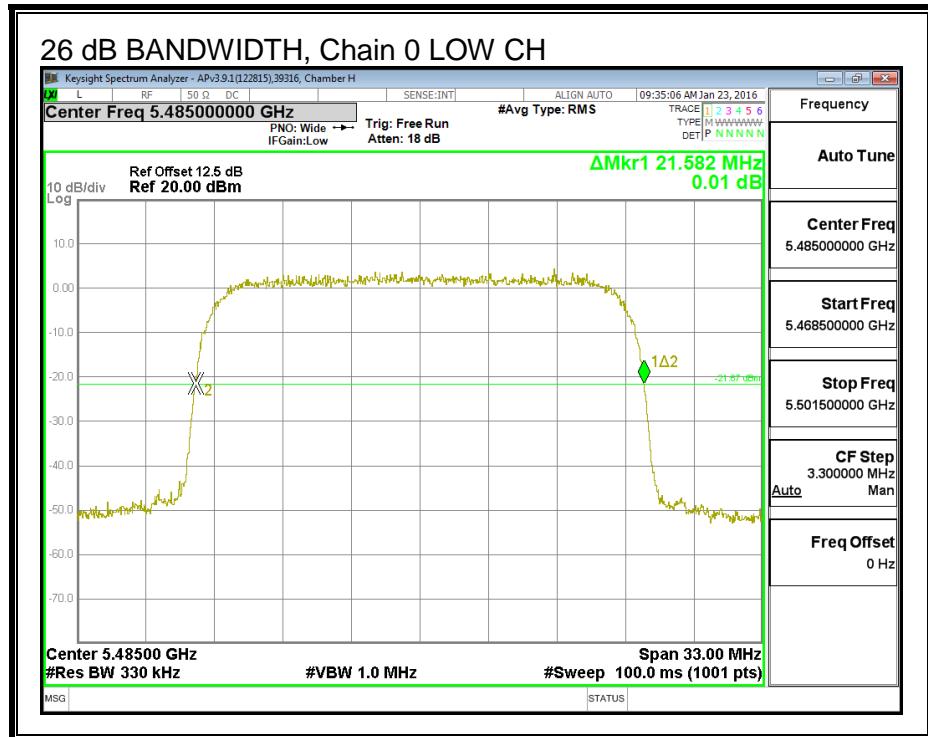
##### LIMITS

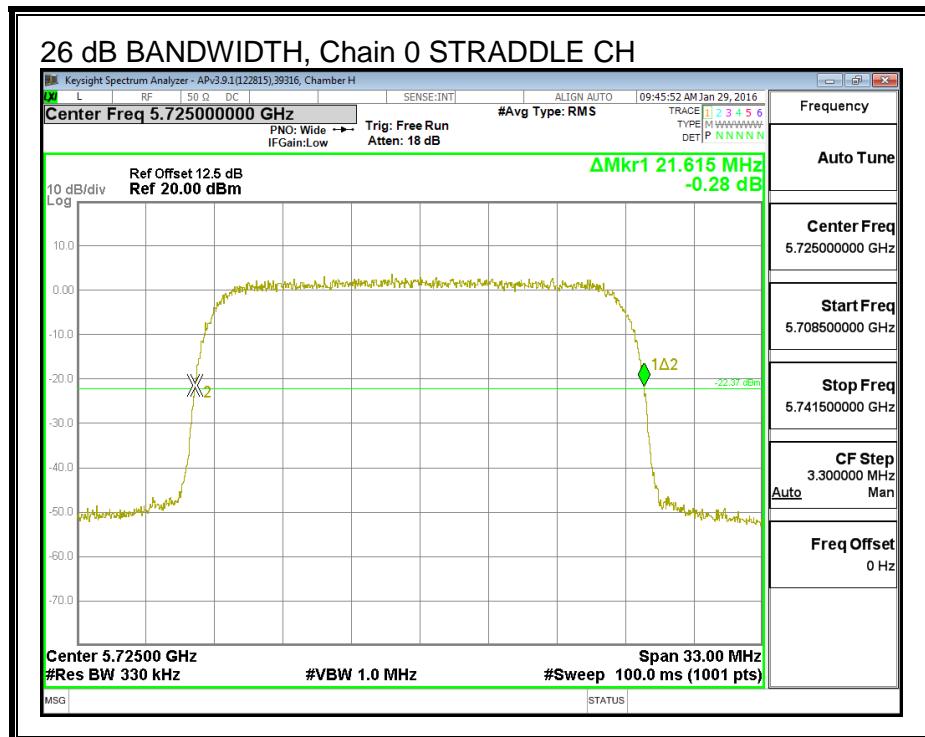
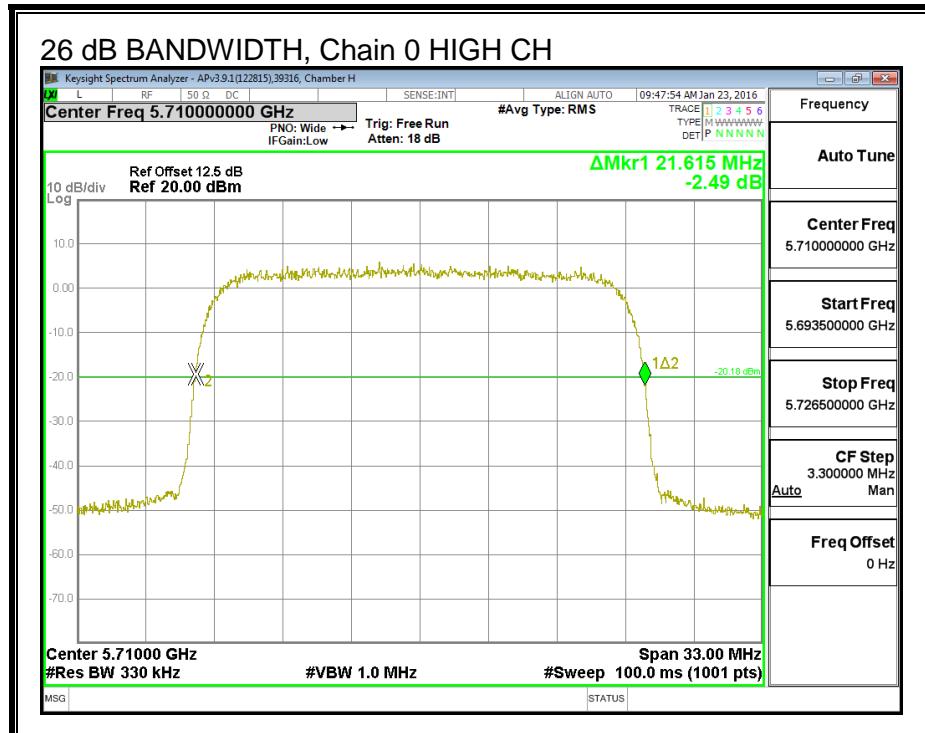
None; for reporting purposes only.

##### RESULTS

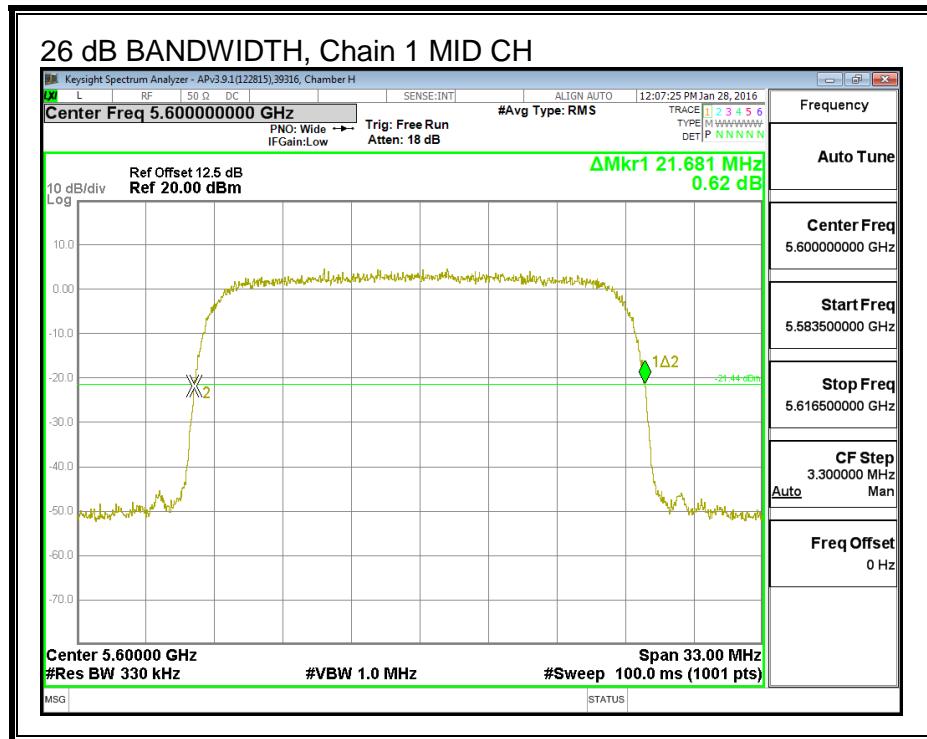
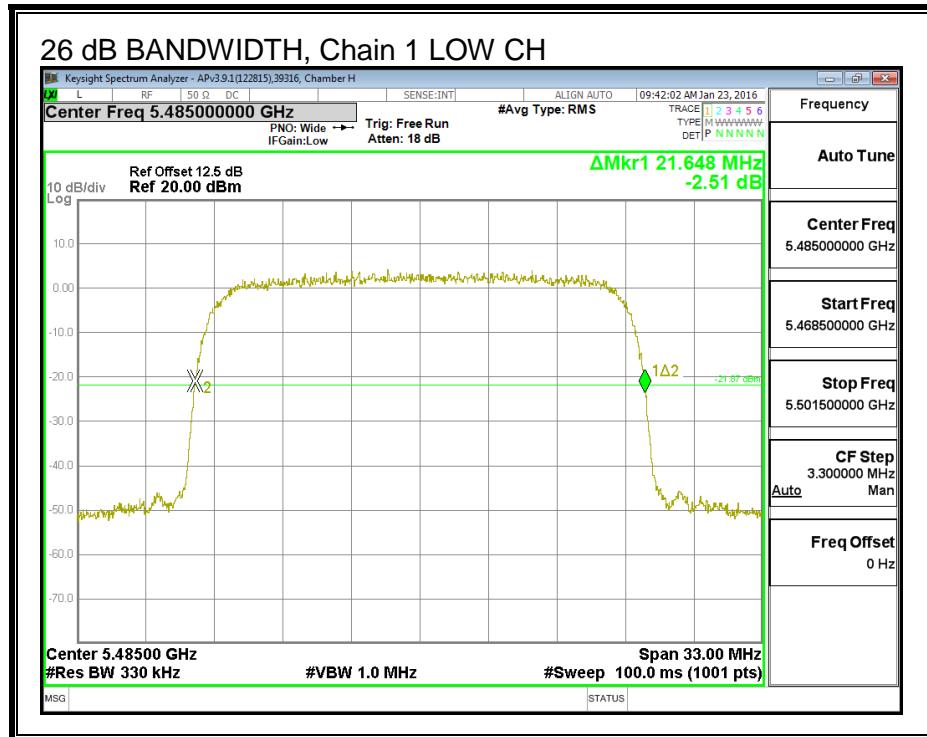
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5485	21.58	21.65
Mid	5600	21.62	21.68
High	5710	21.62	21.62
Straddle	5725	21.62	21.65

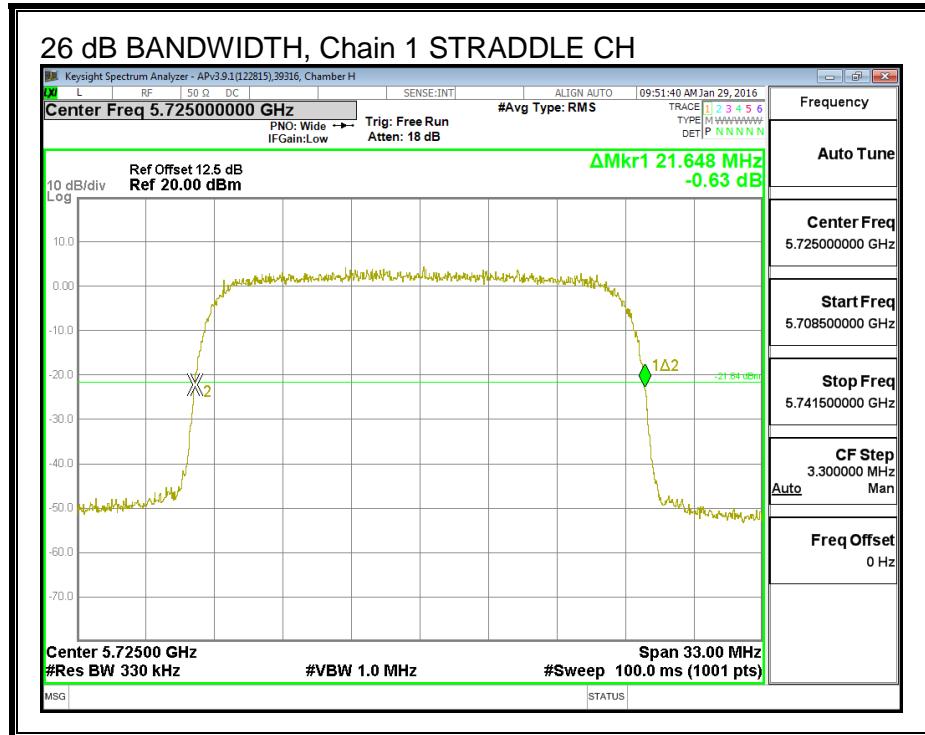
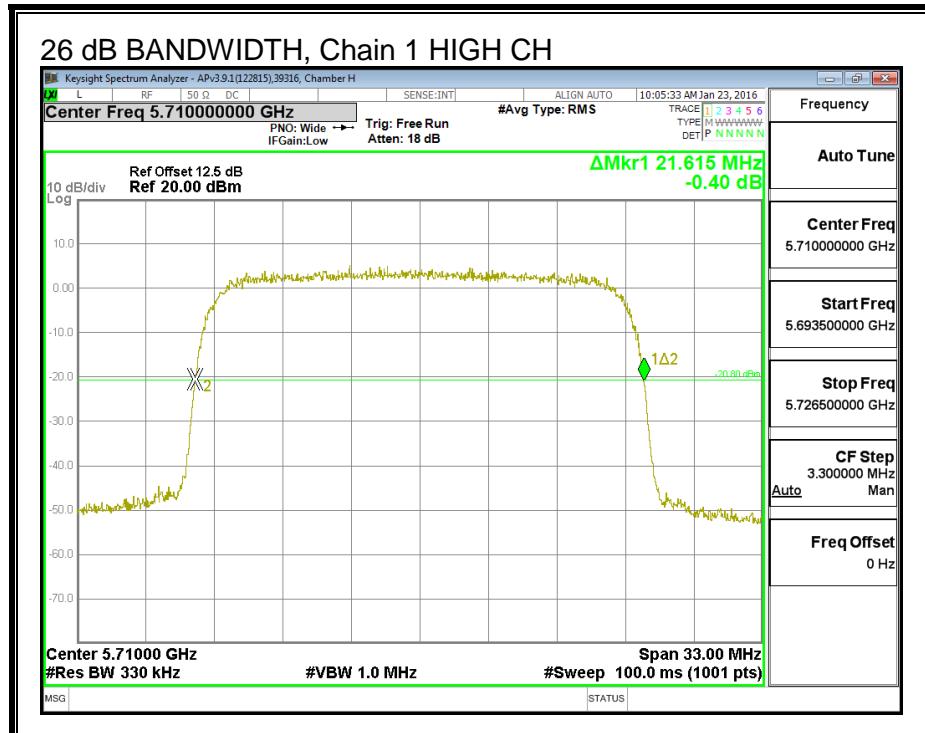
**26 dB BANDWIDTH, Chain 0**





**26 dB BANDWIDTH, Chain 1**





### 8.3.2. OUTPUT POWER AND PSD

#### LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak 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)
15.00	15.00	15.00

## RESULTS

### Bandwidth, Antenna Gain and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5485	21.58	15.00	15.00	15.00	2.00
Mid	5600	21.62	15.00	15.00	15.00	2.00
High	5710	21.62	15.00	15.00	15.00	2.00
Straddle	5725	21.62	15.00	15.00	15.00	2.00

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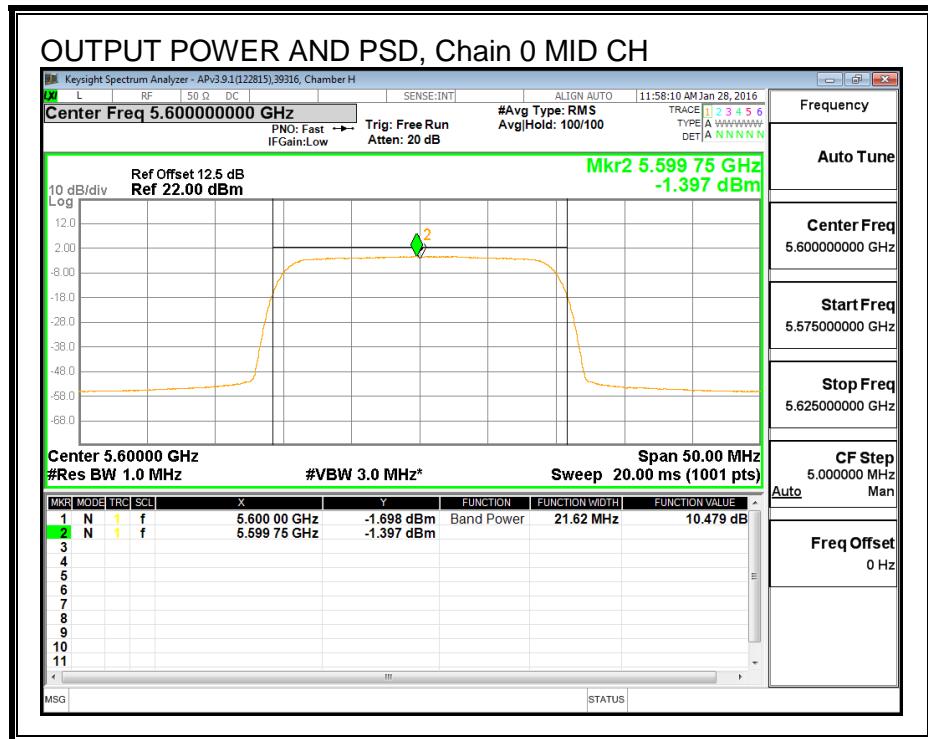
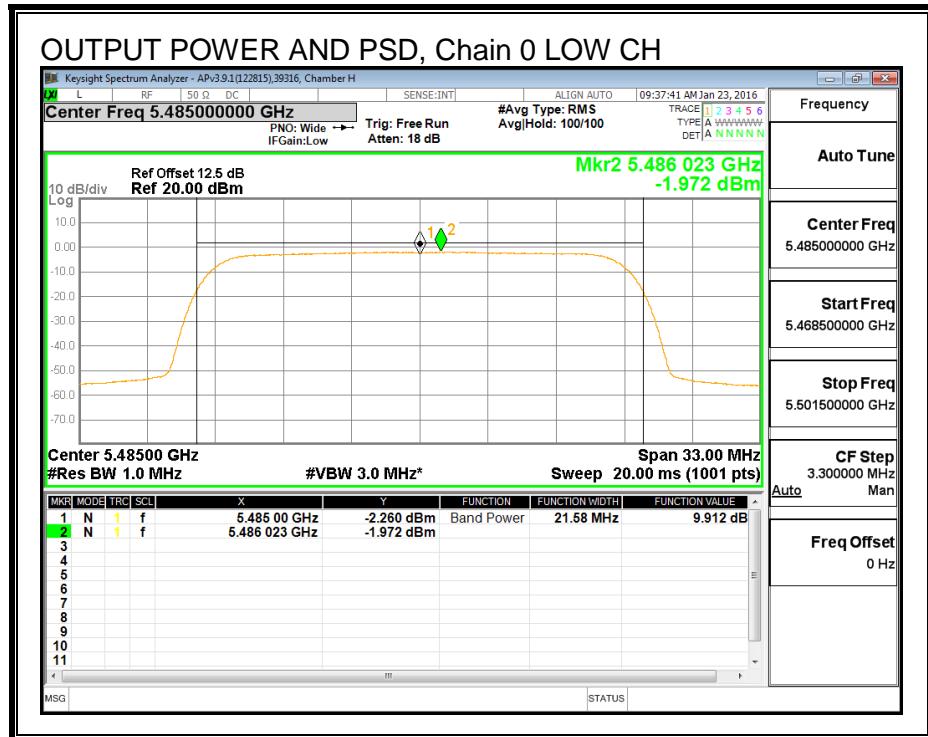
### Output Power Results

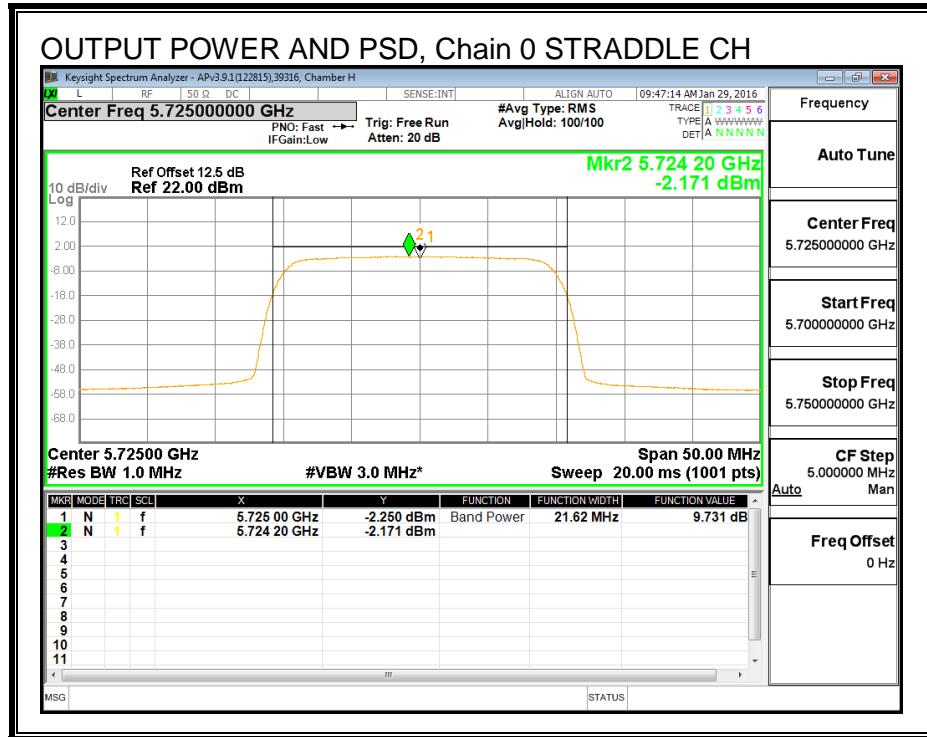
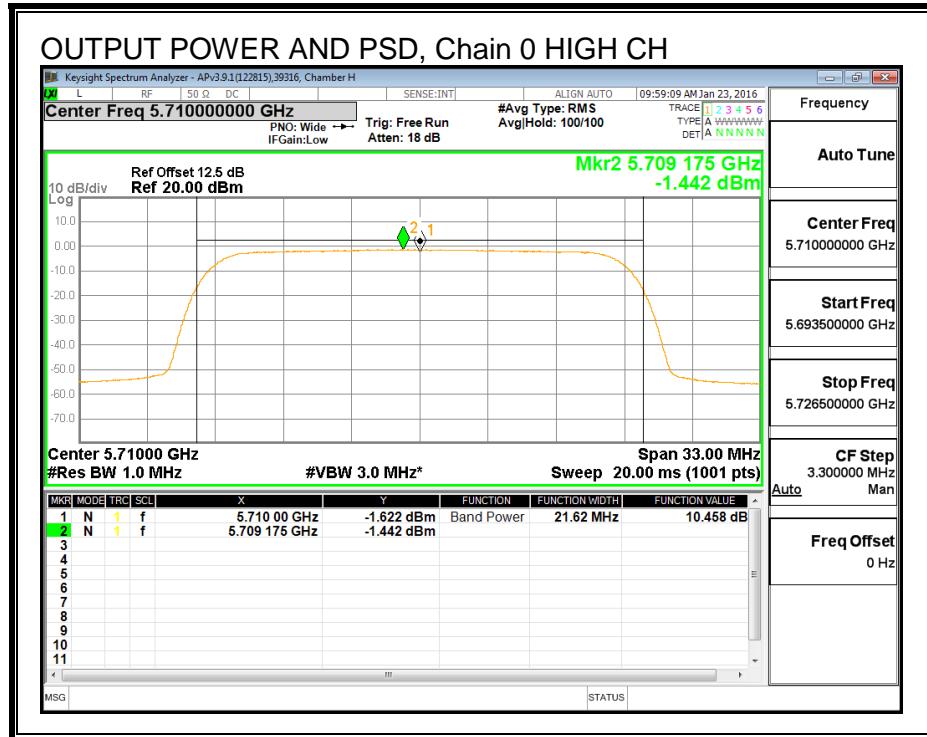
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5485	9.91	10.13	13.03	15.00	-1.97
Mid	5600	10.48	10.19	13.34	15.00	-1.66
High	5710	10.46	10.49	13.48	15.00	-1.52
Straddle	5725	9.73	10.23	13.00	15.00	-2.00

### PSD Results

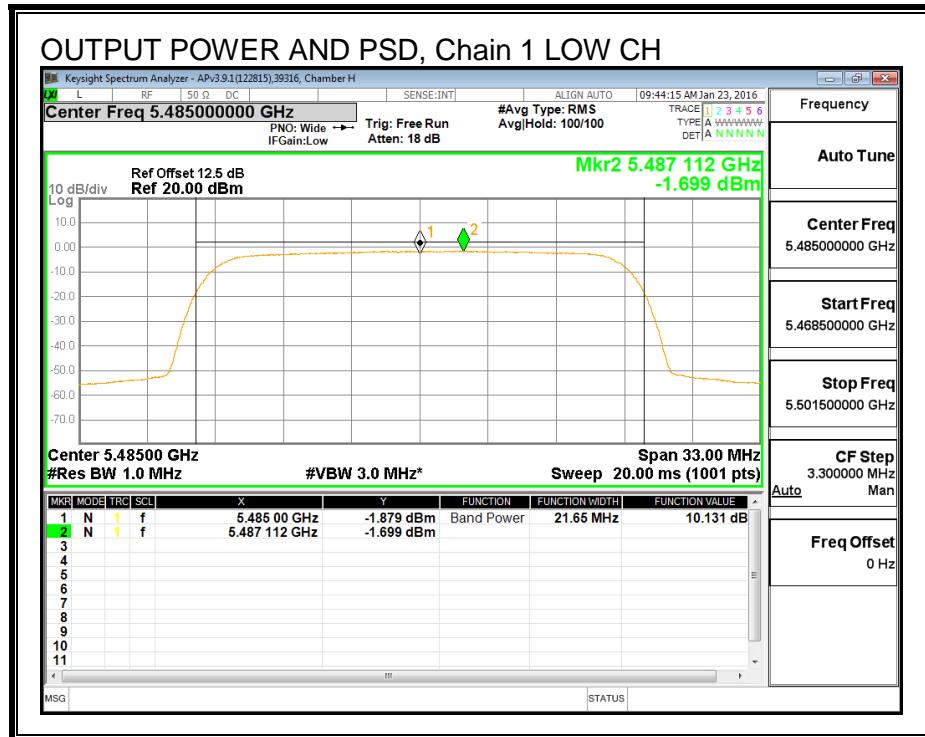
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5485	-1.97	-1.70	1.18	2.00	-0.82
Mid	5600	-1.40	-1.65	1.49	2.00	-0.51
High	5710	-1.44	-1.28	1.65	2.00	-0.35

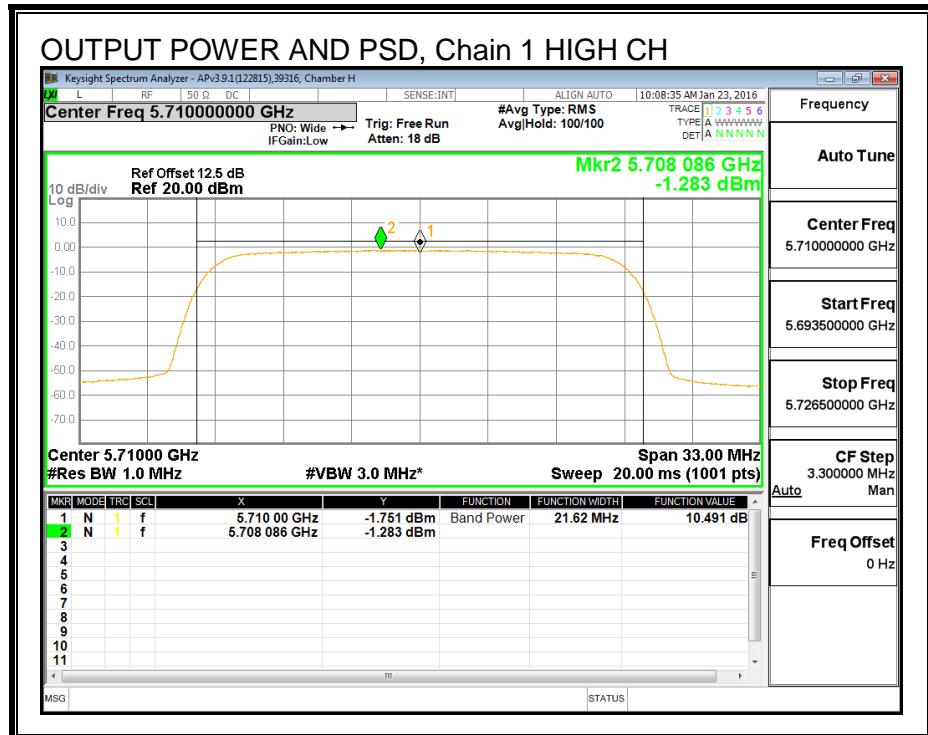
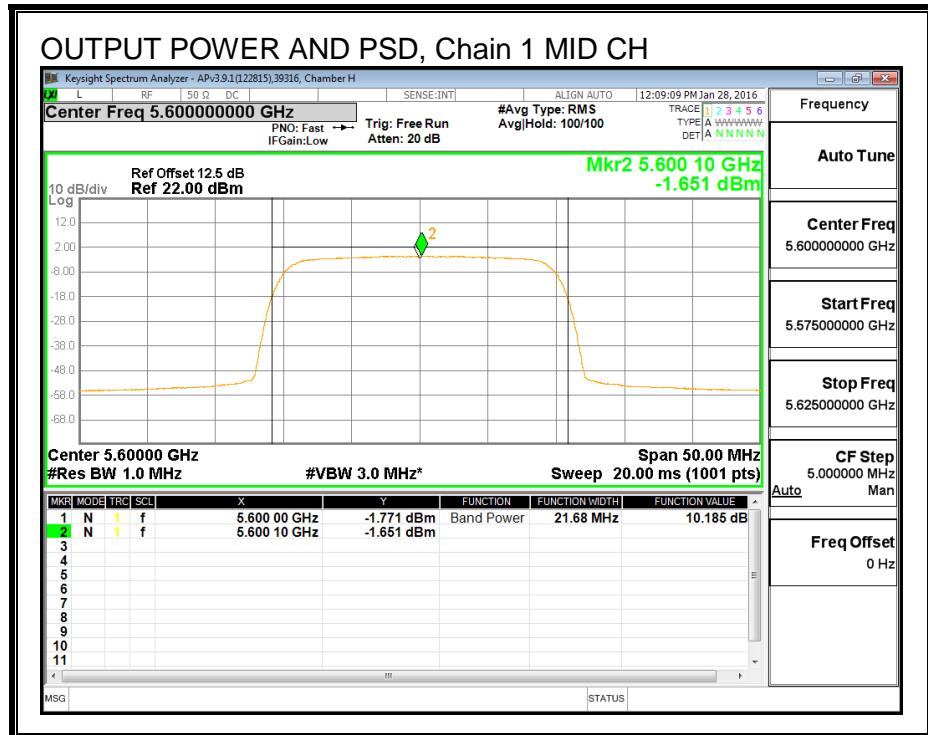
**OUTPUT POWER AND PSD, Chain 0**

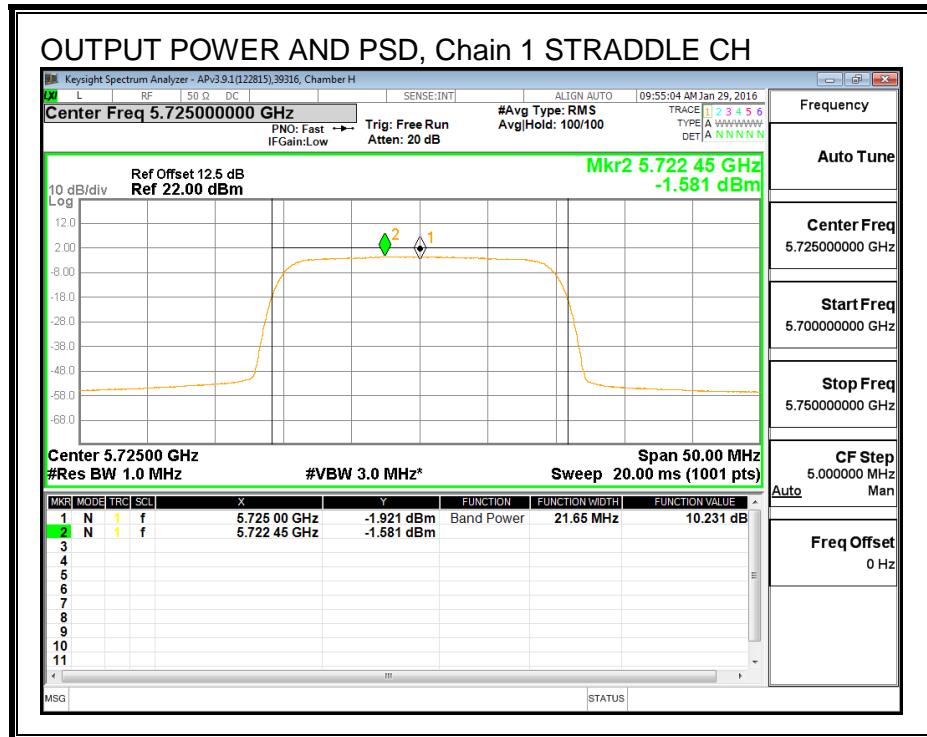




**OUTPUT POWER AND PSD, Chain 1**







### 8.3.3. STRADDLE CHANNEL RESULTS

#### UNII-2C BAND

##### Bandwidth and Antenna Gain

Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSSD (dBi)
5725	10.81	15.00	15.00

##### Limits

Frequency (MHz)	FCC Power Limit (dBm)	PPSSD Limit (dBm)
5725	12.34	2.00

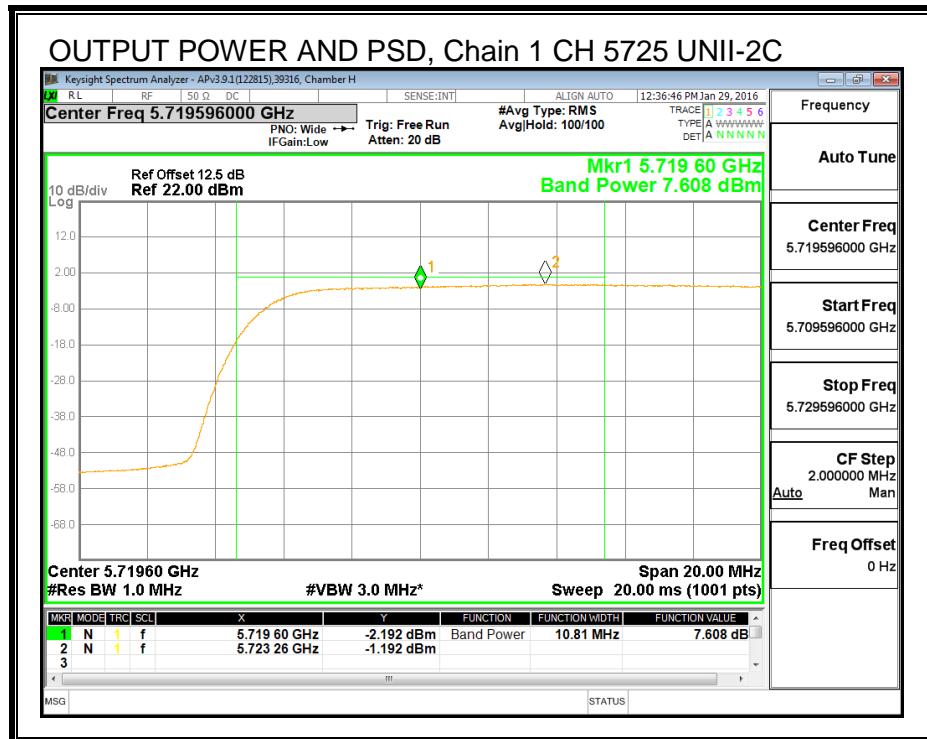
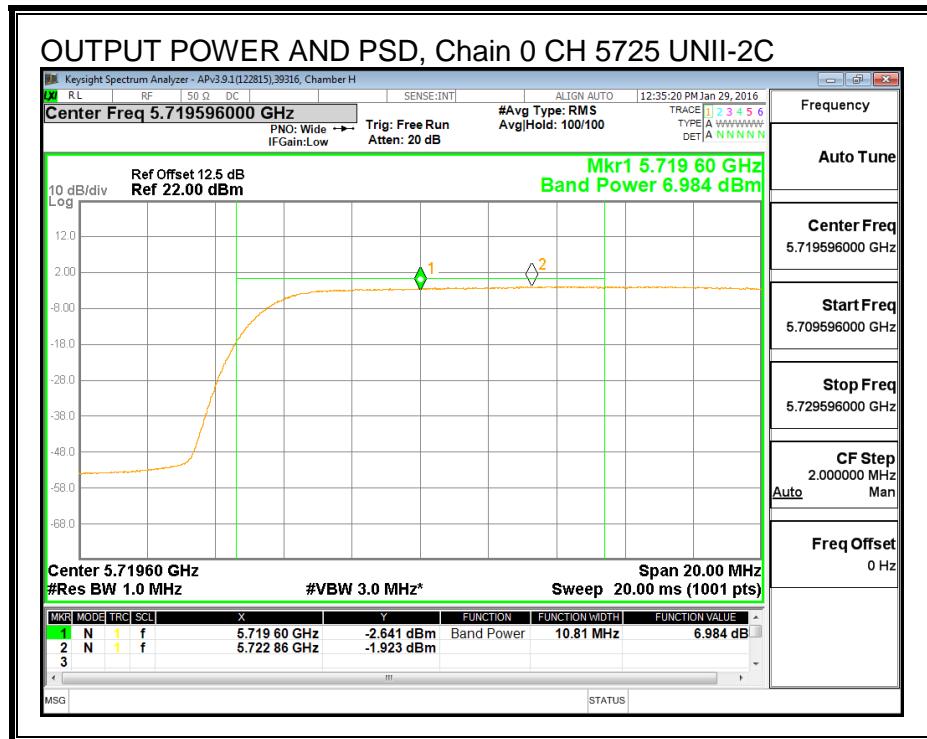
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSSD
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##### Output Power Results

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5725	6.98	7.61	10.32	12.34	-2.02

##### PPSSD Results

Frequency (MHz)	Chain 0 Meas PPSSD (dBm)	Chain 1 Meas PPSSD (dBm)	Total Corr'd PPSSD (dBm)	PPSSD Limit (dBm)	PPSSD Margin (dB)
5725	-1.92	-1.19	1.47	2.00	-0.53



**UNII-3 BAND**

**Bandwidth and Antenna Gain**

Frequency (MHz)	Min BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
5725	10.81	15.00	15.00

**Limits**

Frequency (MHz)	FCC Power Limit (dBm)	FCC PPSD Limit (dBm)
5725	30.00	30.00

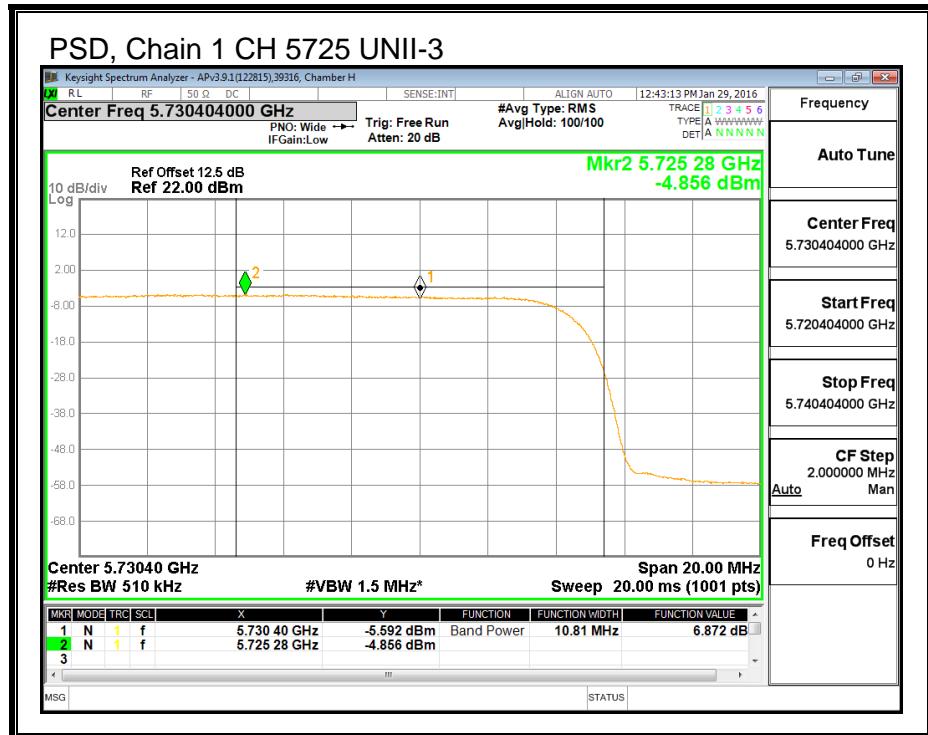
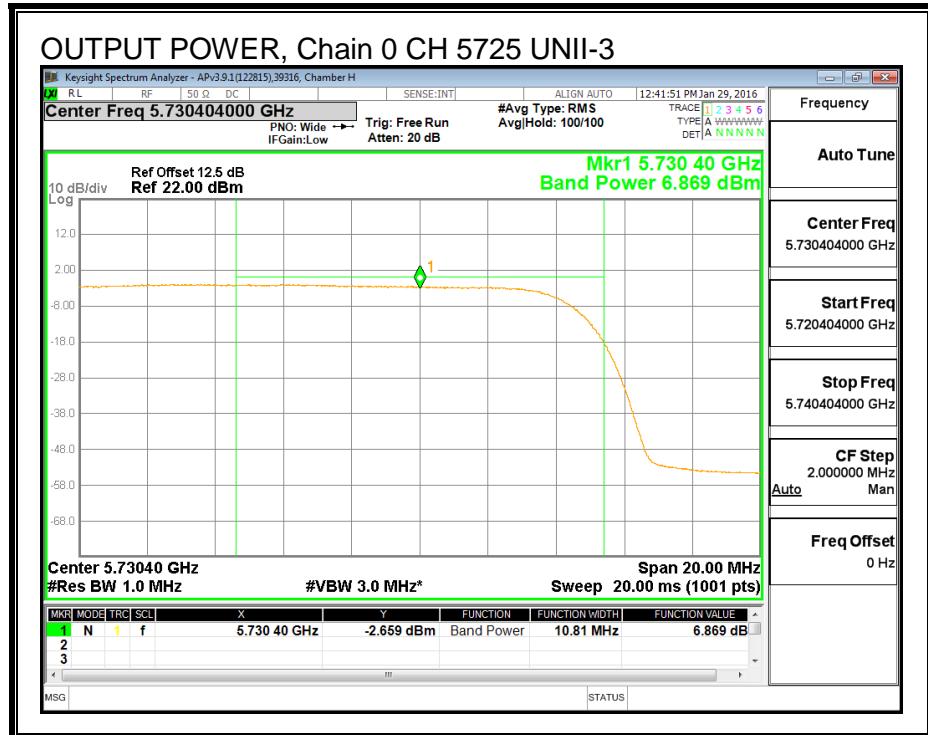
<b>Duty Cycle CF (dB)</b>	0.00	<b>Included in Calculations of Corr'd Power &amp; PPSD</b>
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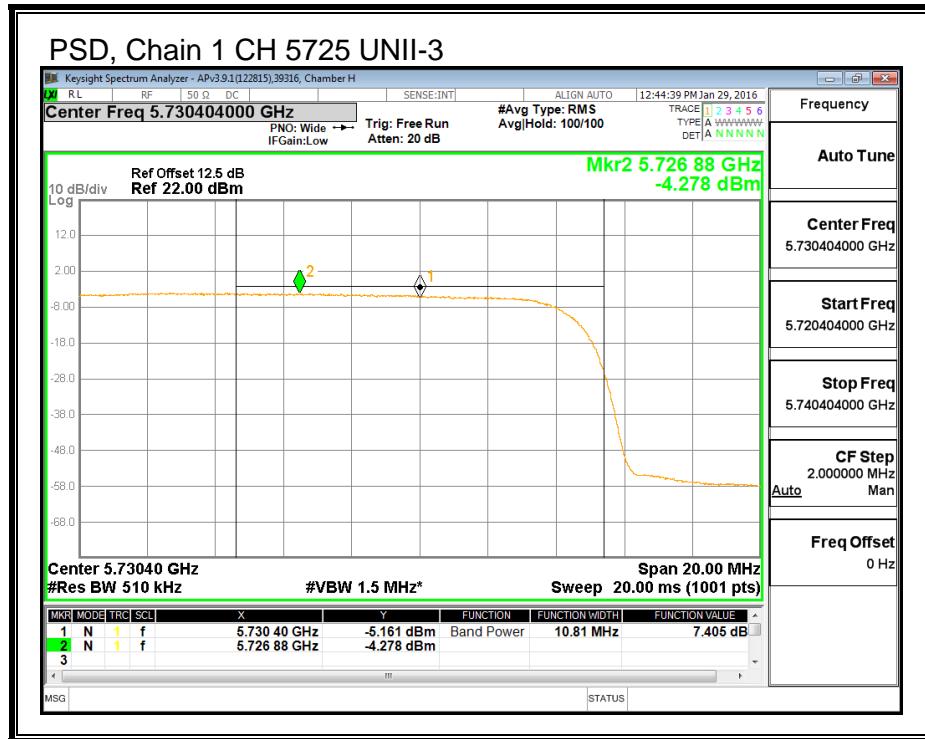
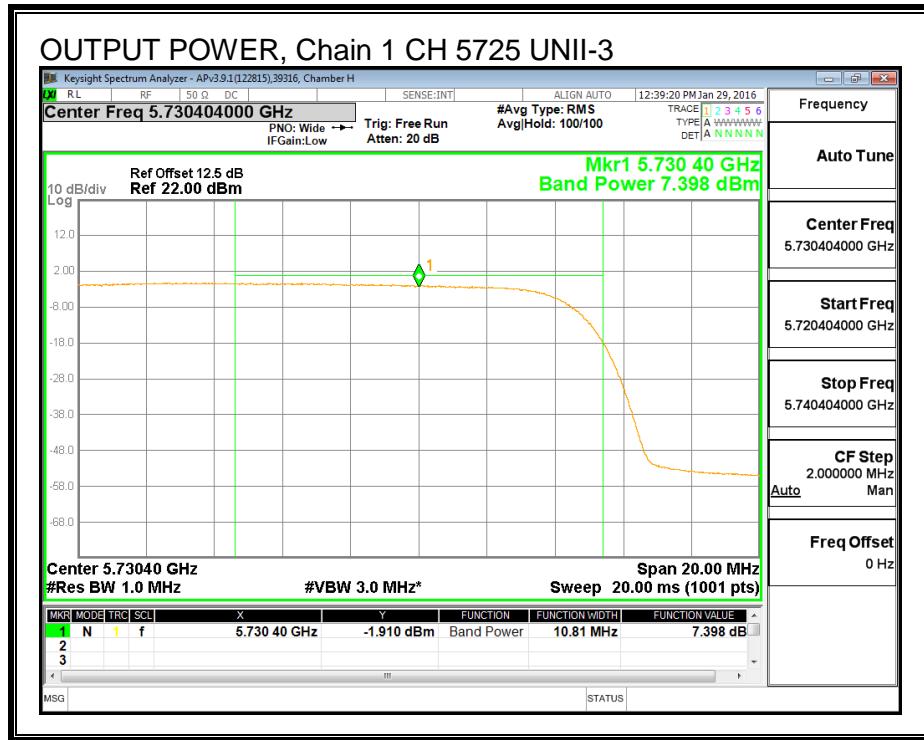
**Output Power Results**

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5725	6.87	7.40	10.15	30.00	-19.85

**PPSD Results**

Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
5725	-4.86	-4.28	-1.55	30.00	-31.55





### 8.3.4. CONDUCTED BANDEDGE

#### LIMITS

FCC §15.205 and §15.209

PART 15, SUBPART E

Radiated LIMIT:

- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

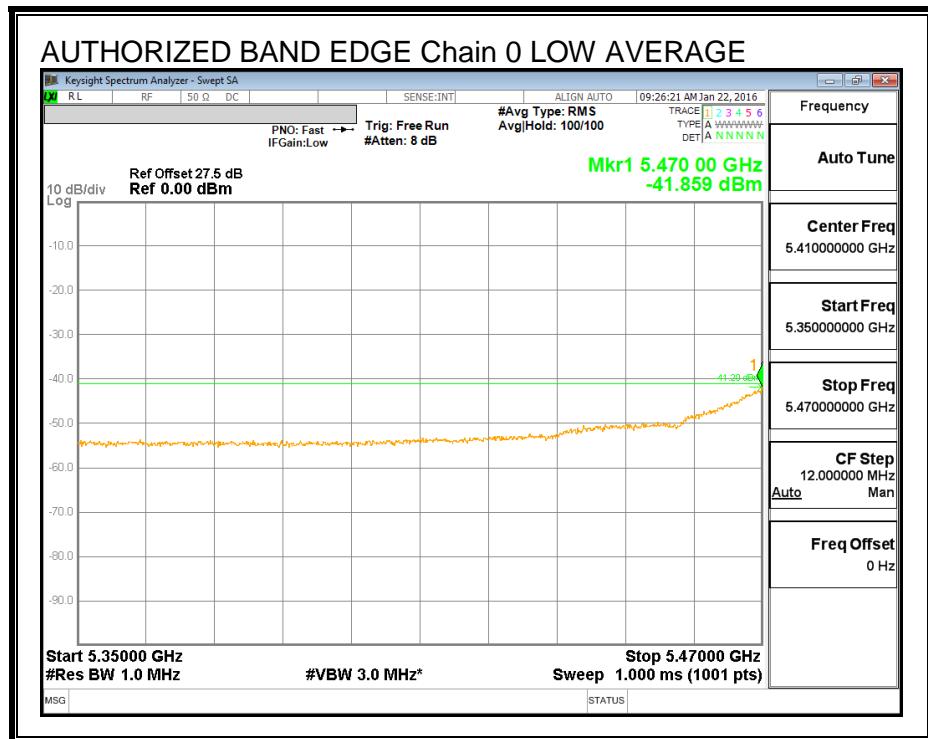
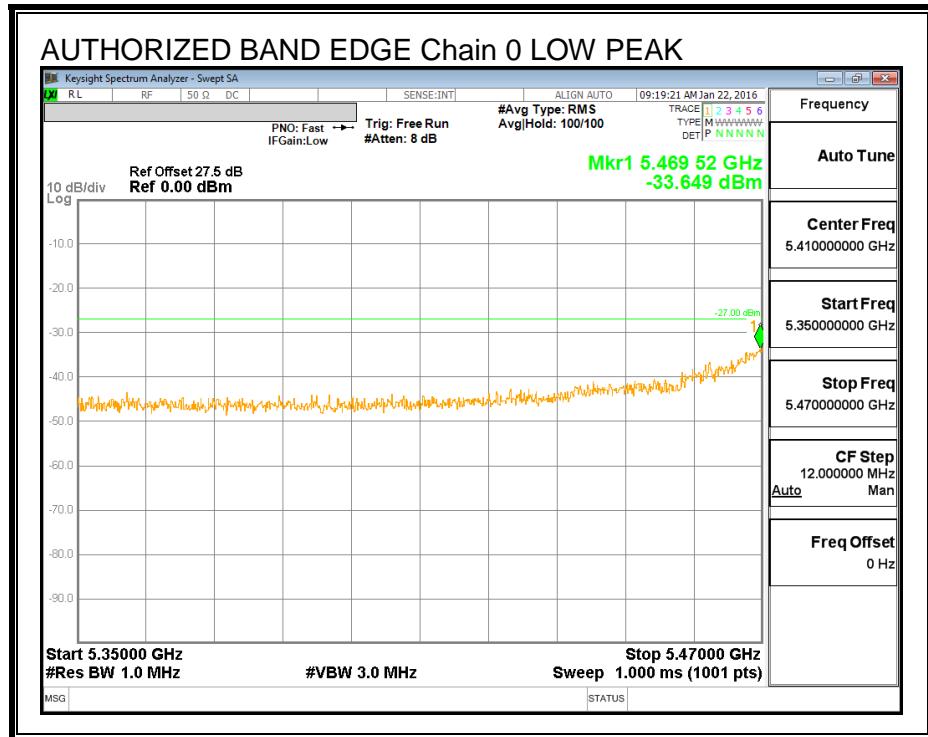
#### Procedure

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

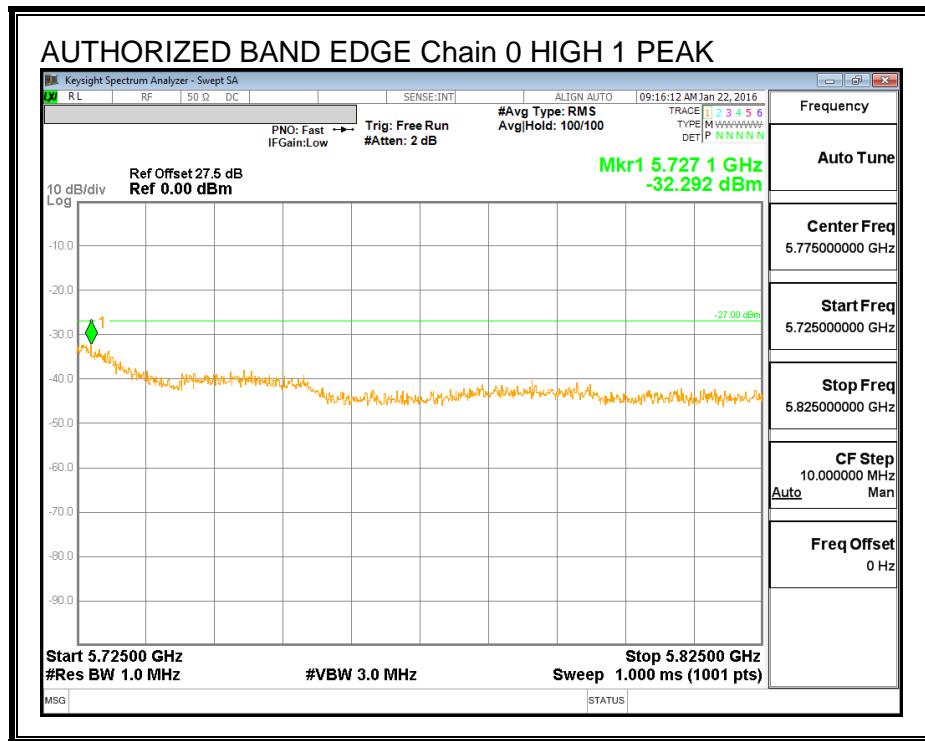
Conducted measurements are being used to demonstrate compliance with the spurious limits in the restricted band (all other spurious emissions are measured using the radiated test method with the antennas connected). The limits are 54 dB<sub>UV</sub>/m average and 74 dB<sub>UV</sub>/m peak, which are equivalent to eirp of -41.2 dBm and -21.2 dBm respectively. The plots include an offset to account for the EUT antenna gain and external attenuation between EUT antenna port and spectrum analyzer. As the two antenna chains feed cross polarized antennas with un- correlated signals the two chains are treated independently and the emissions do not need to be summed.

## RESULTS

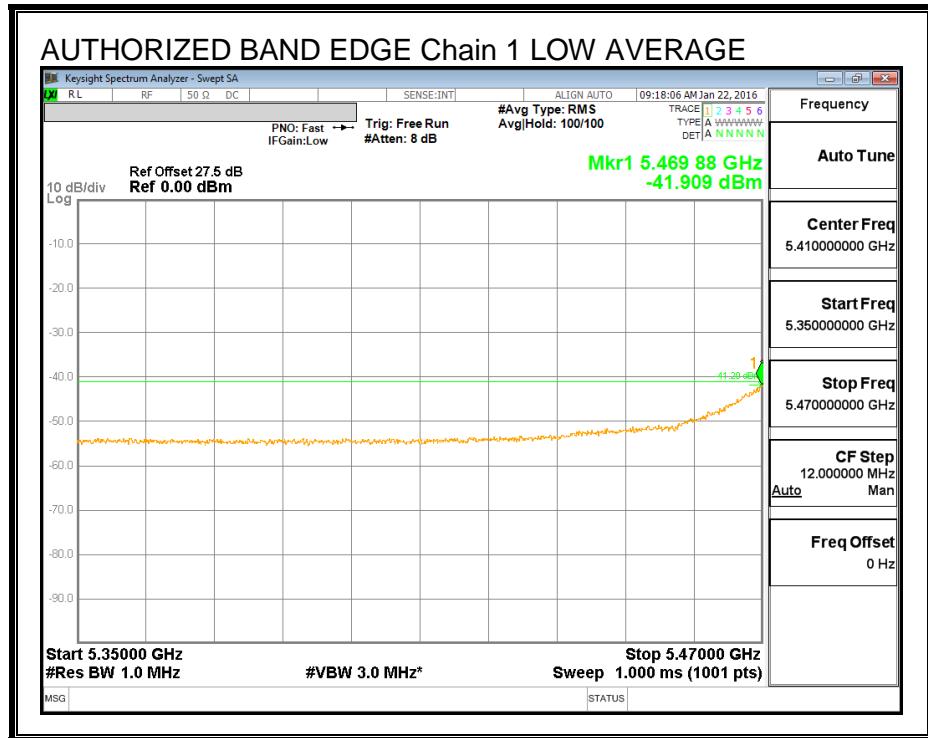
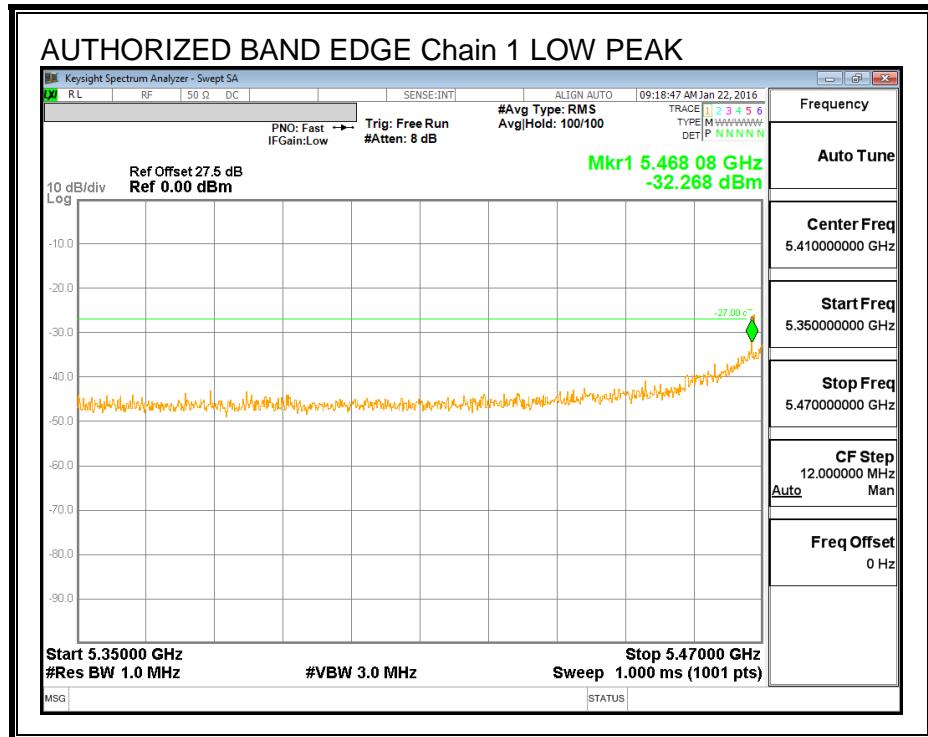
### LOW CHANNEL BANDEDGE, Chain 0



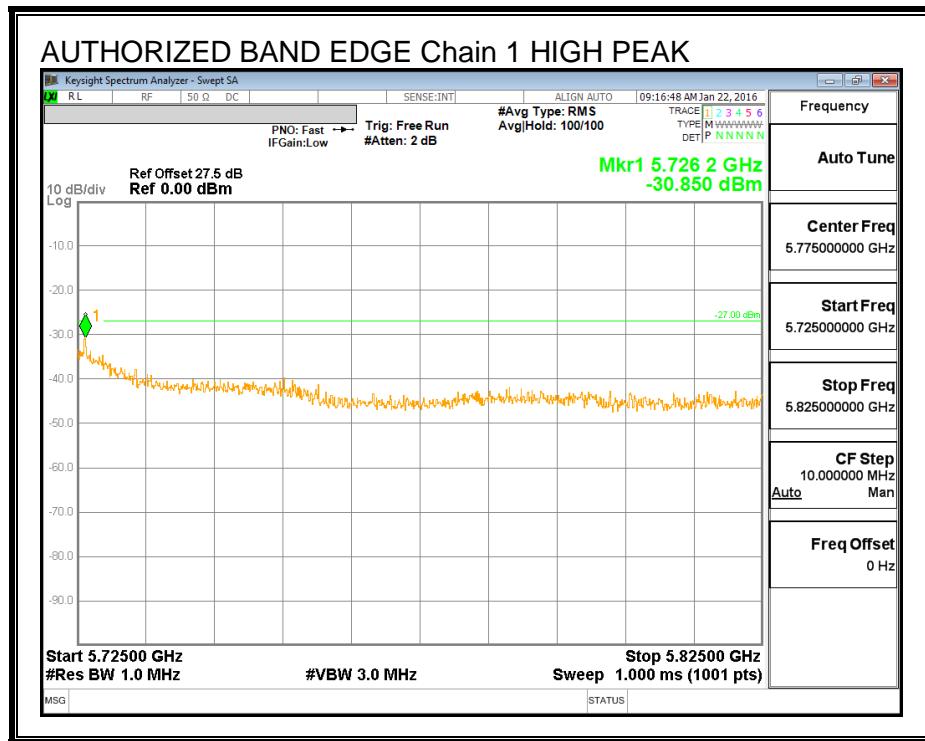
**HIGH CHANNEL BANDEDGE, Chain 0**



LOW CHANNEL BANDEDGE, Chain 1



**HIGH CHANNEL BANDEDGE, Chain 1**



## 8.4. 40MHz BW 2TX MODE IN THE 5.6 GHz BAND

### 8.4.1. 26 dB BANDWIDTH

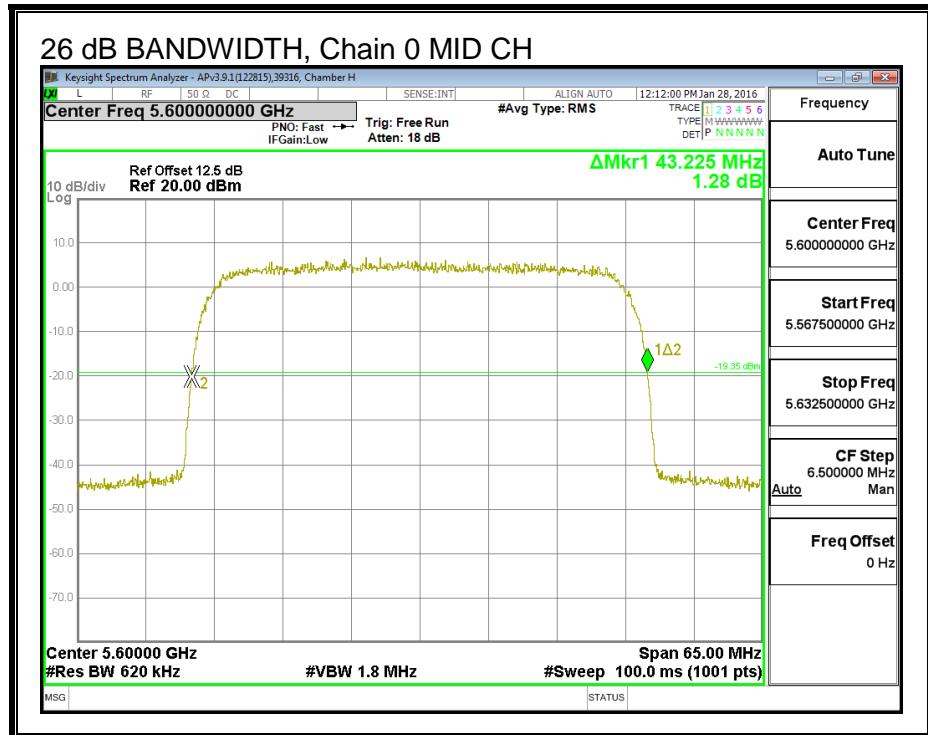
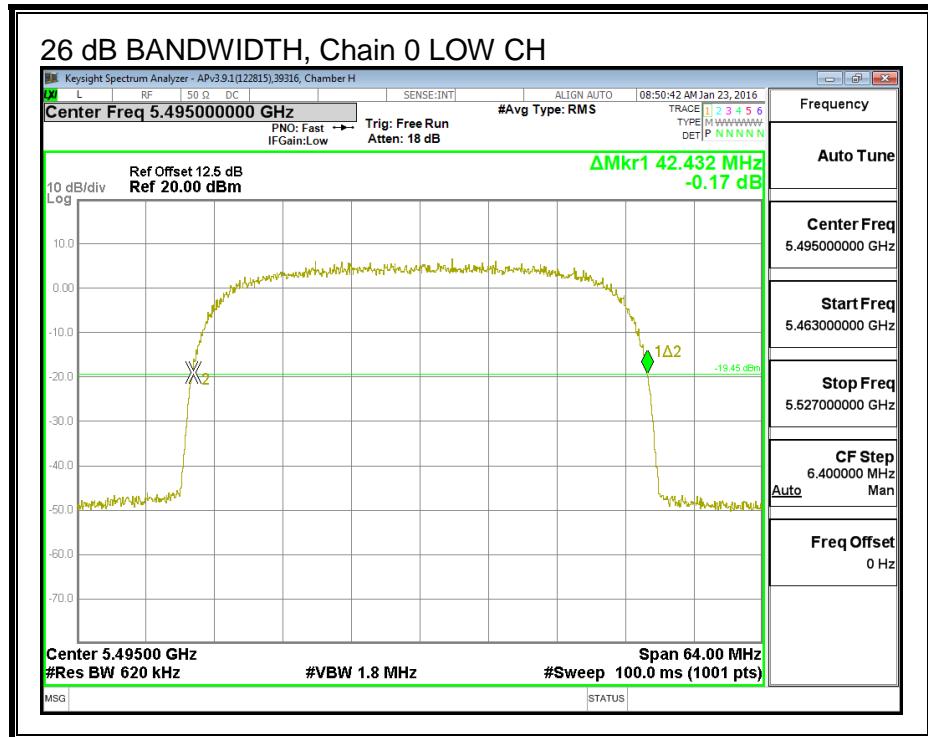
#### LIMITS

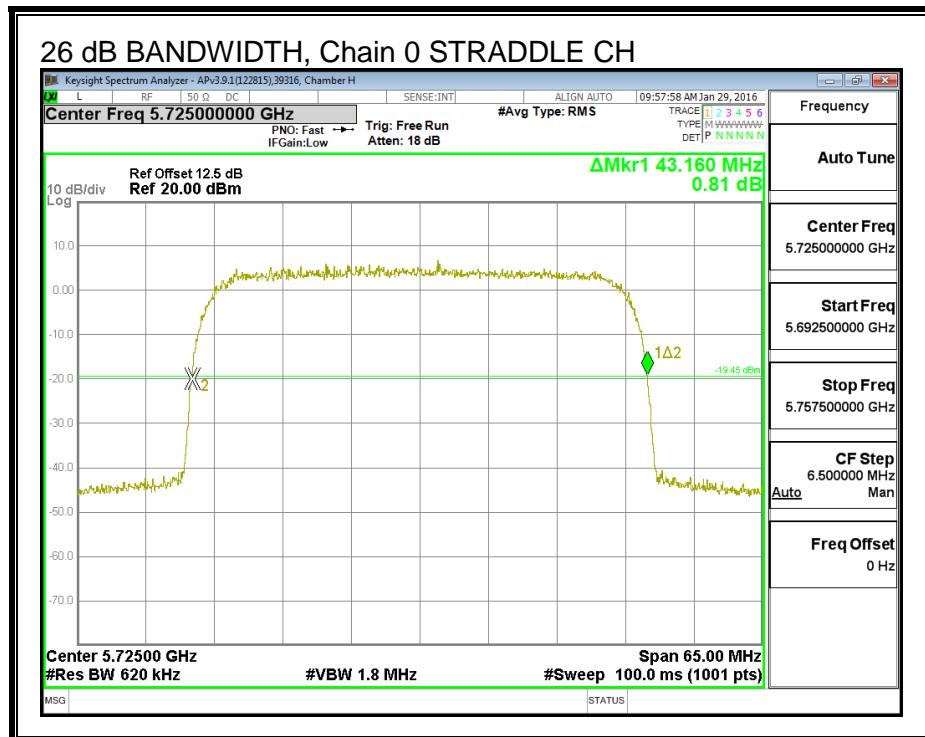
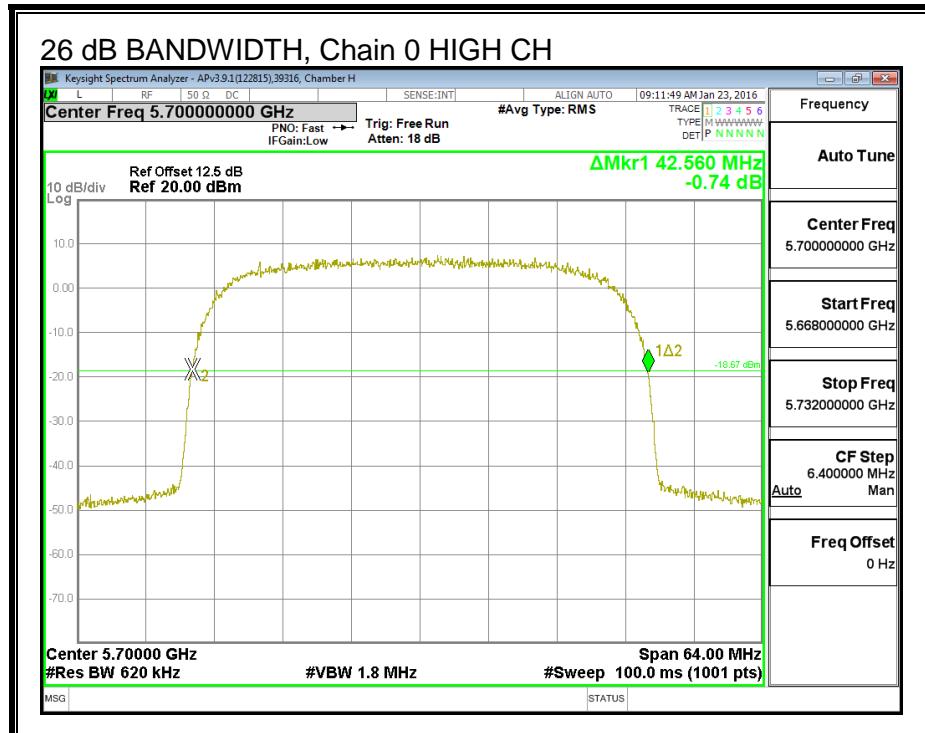
None; for reporting purposes only.

#### RESULTS

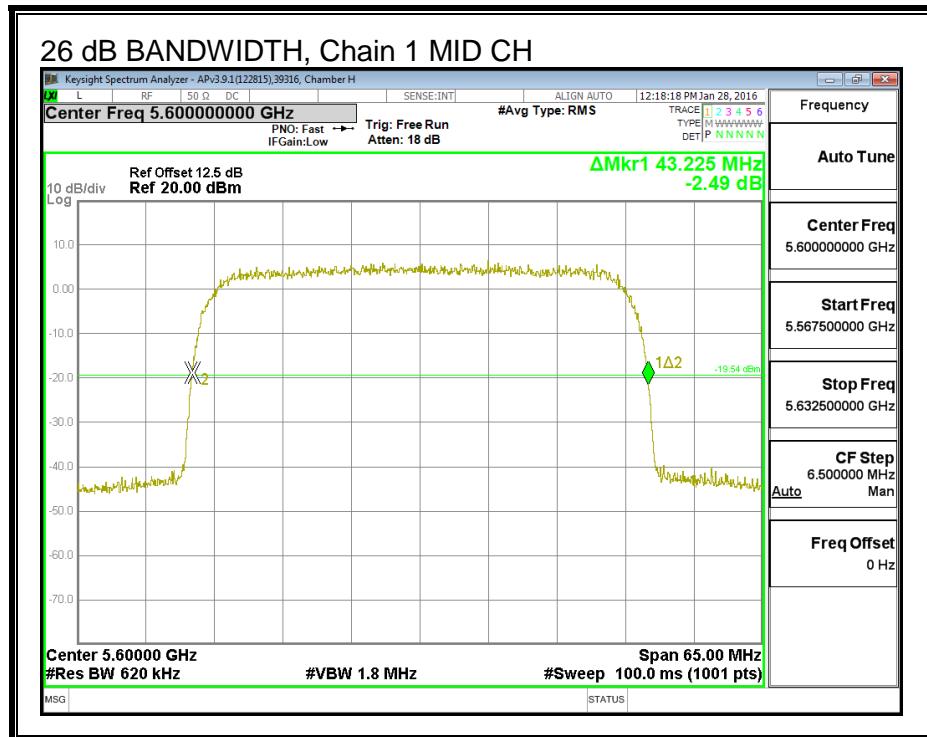
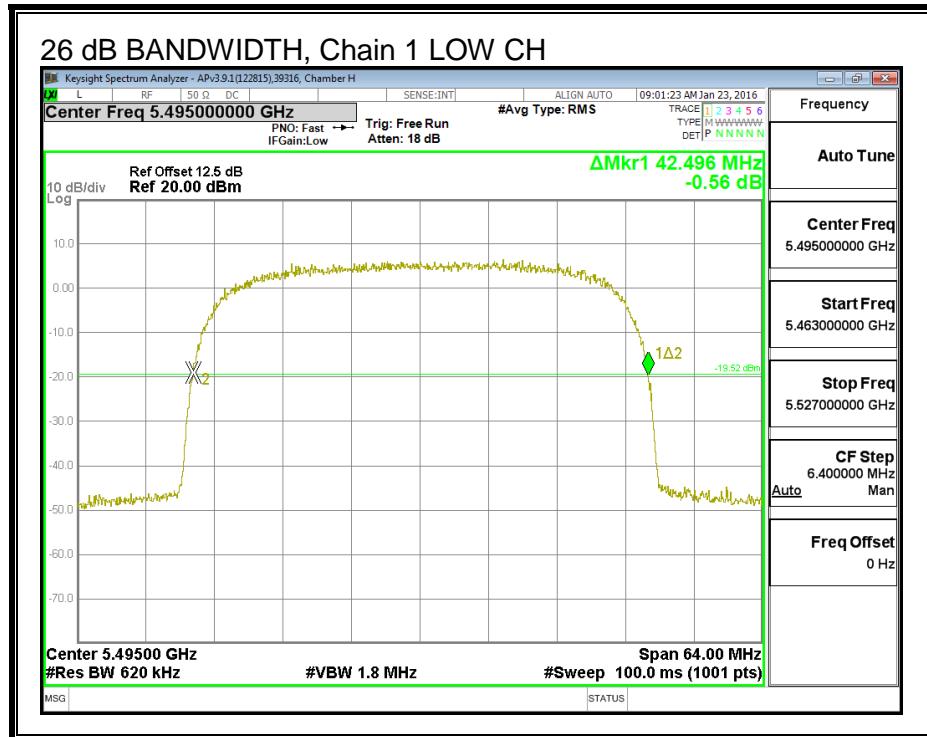
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5495	42.43	42.50
Mid	5600	43.23	43.23
High	5700	42.56	43.43
Straddle	5725	43.16	43.29

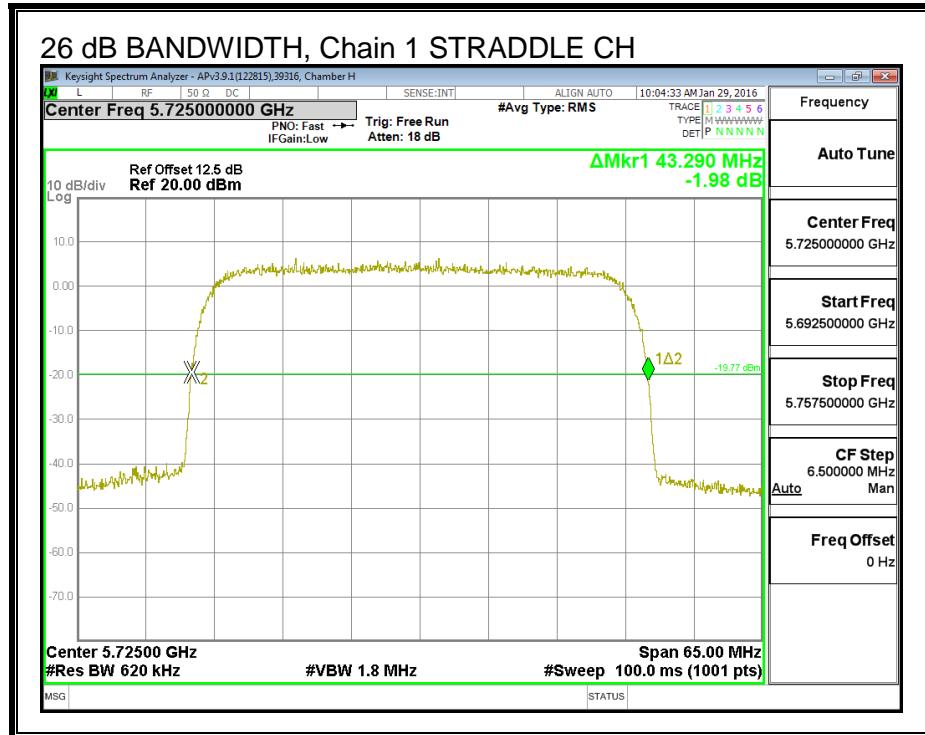
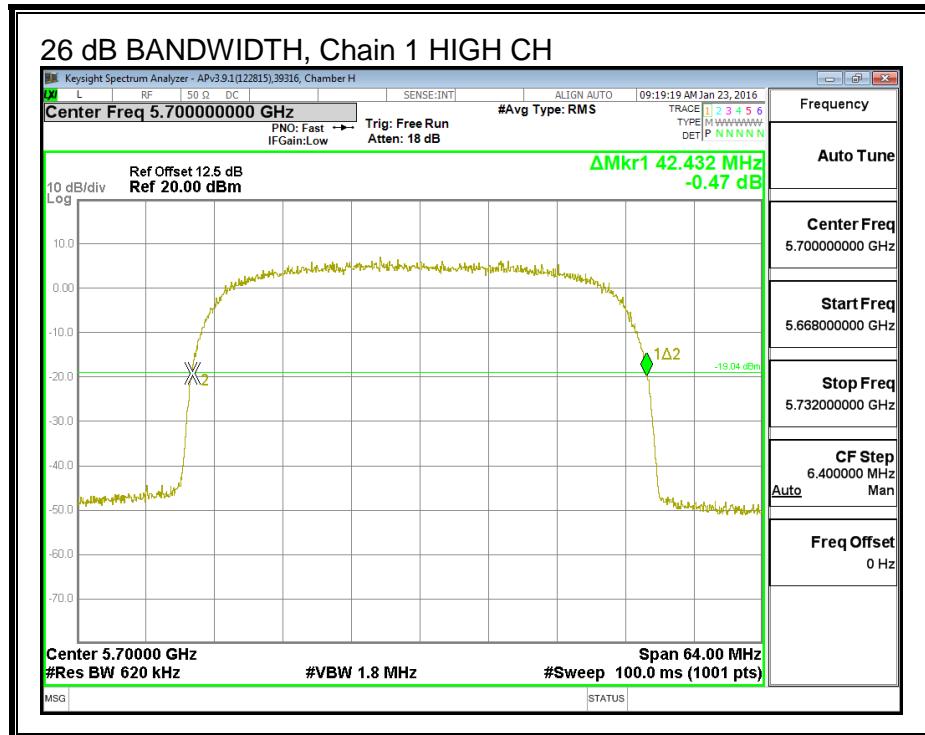
**26 dB BANDWIDTH, Chain 0**





**26 dB BANDWIDTH, Chain 1**





#### 8.4.2. OUTPUT POWER AND PSD

##### LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak 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)
15.00	15.00	15.00

## RESULTS

### Bandwidth, Antenna Gain and Limits

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5495	42.43	15.00	15.00	15.00	2.00
Mid	5600	43.23	15.00	15.00	15.00	2.00
High	5700	42.56	15.00	15.00	15.00	2.00
Straddle	5725	43.16	15.00	15.00	15.00	2.00

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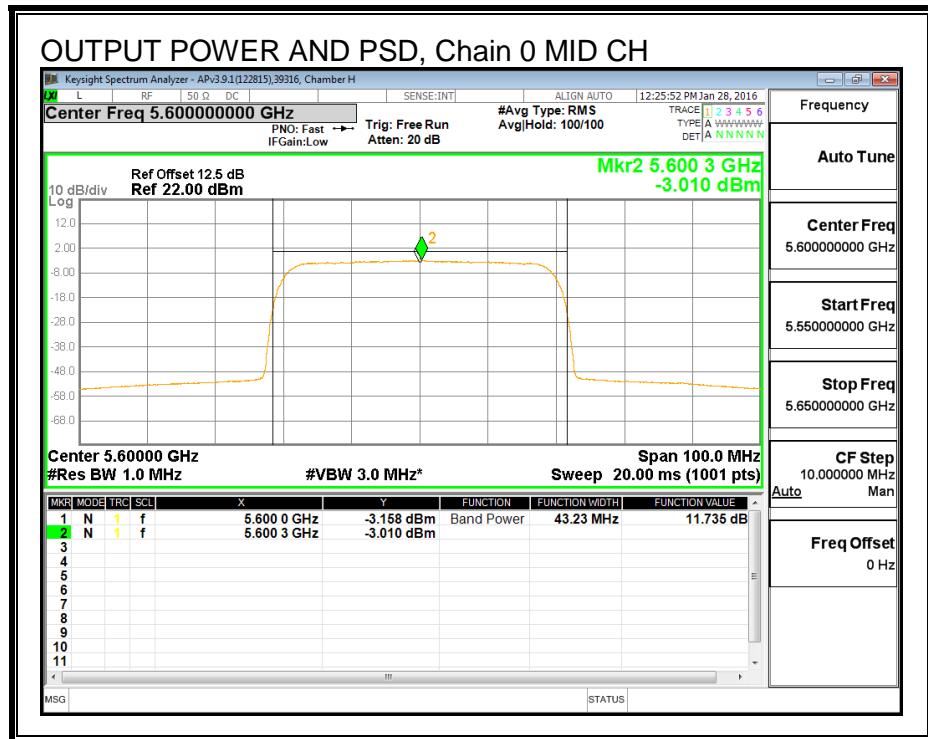
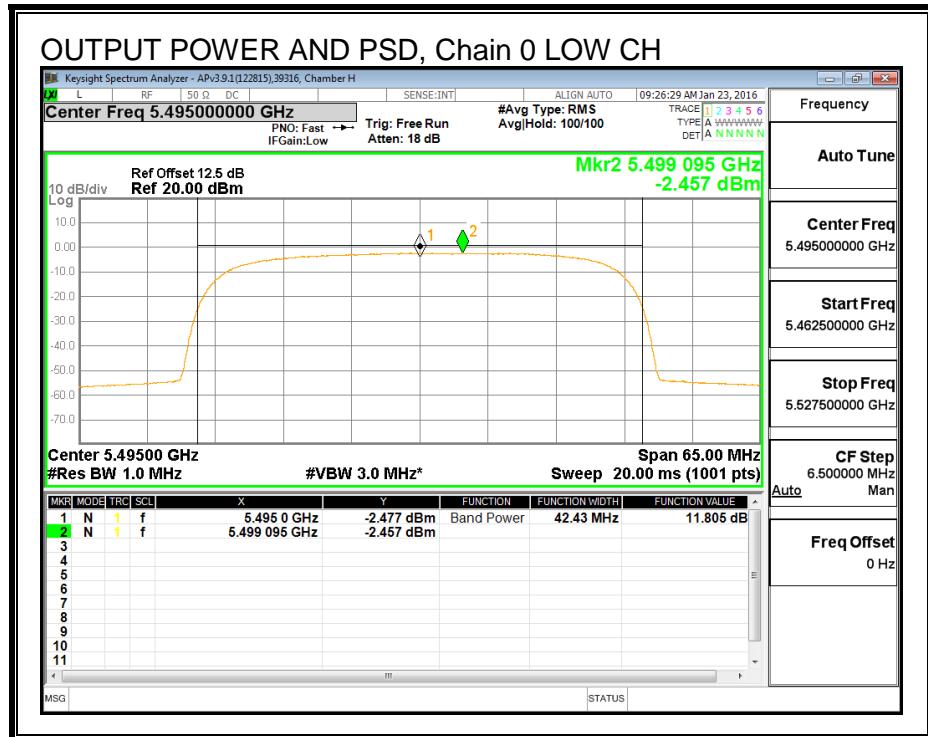
### Output Power Results

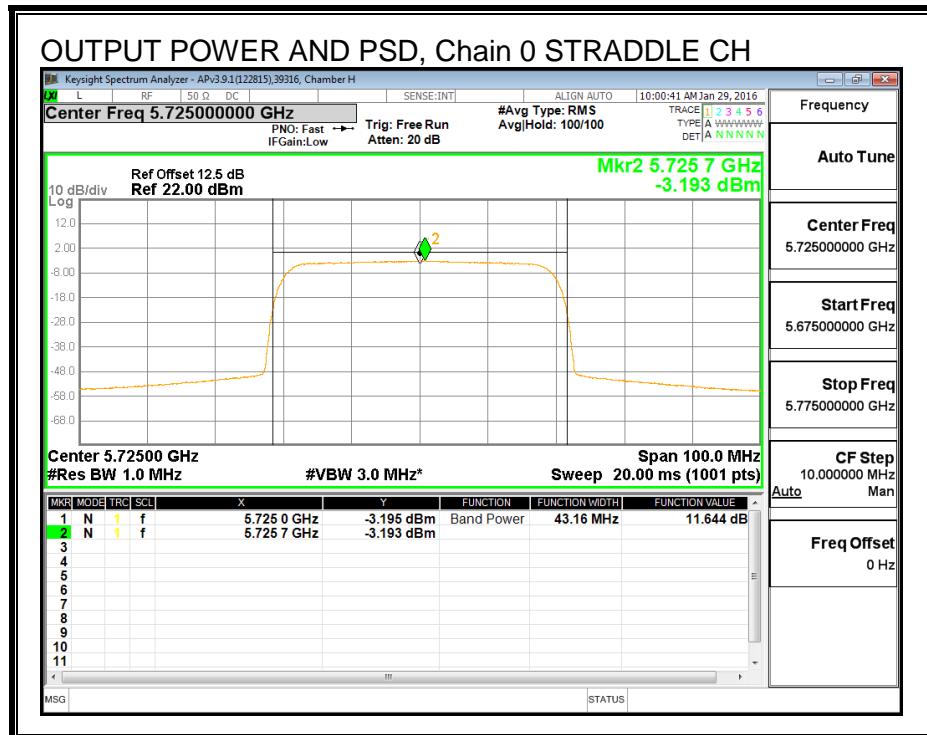
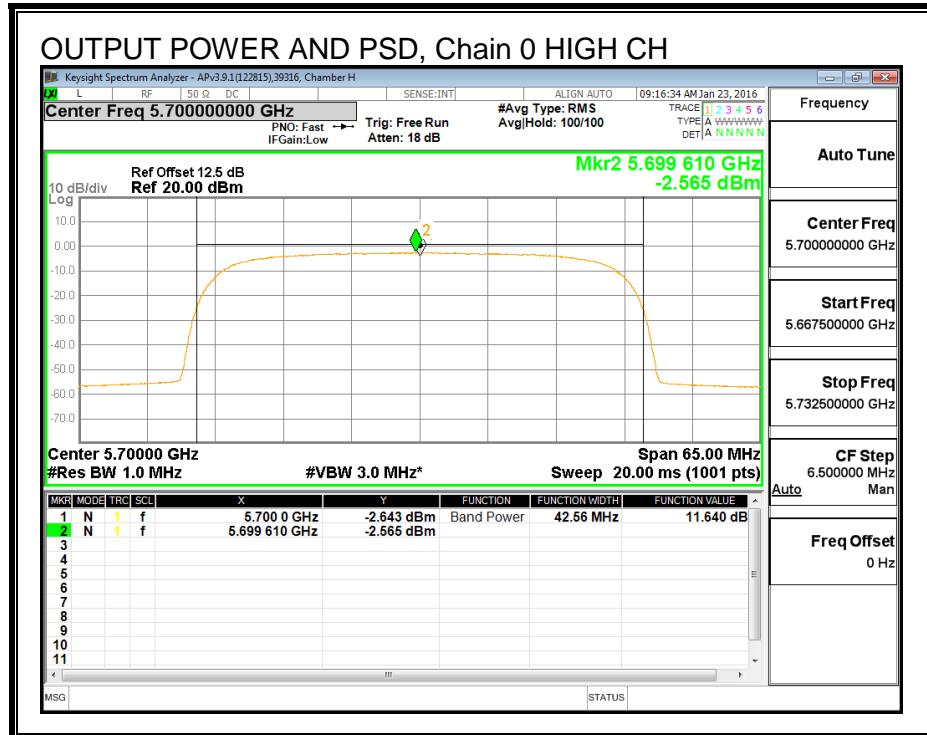
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5495	11.81	11.60	14.72	15.00	-0.28
Mid	5600	11.74	11.88	14.82	15.00	-0.18
High	5700	11.64	11.57	14.62	15.00	-0.38
Straddle	5725	11.64	11.60	14.63	15.00	-0.37

### PSD Results

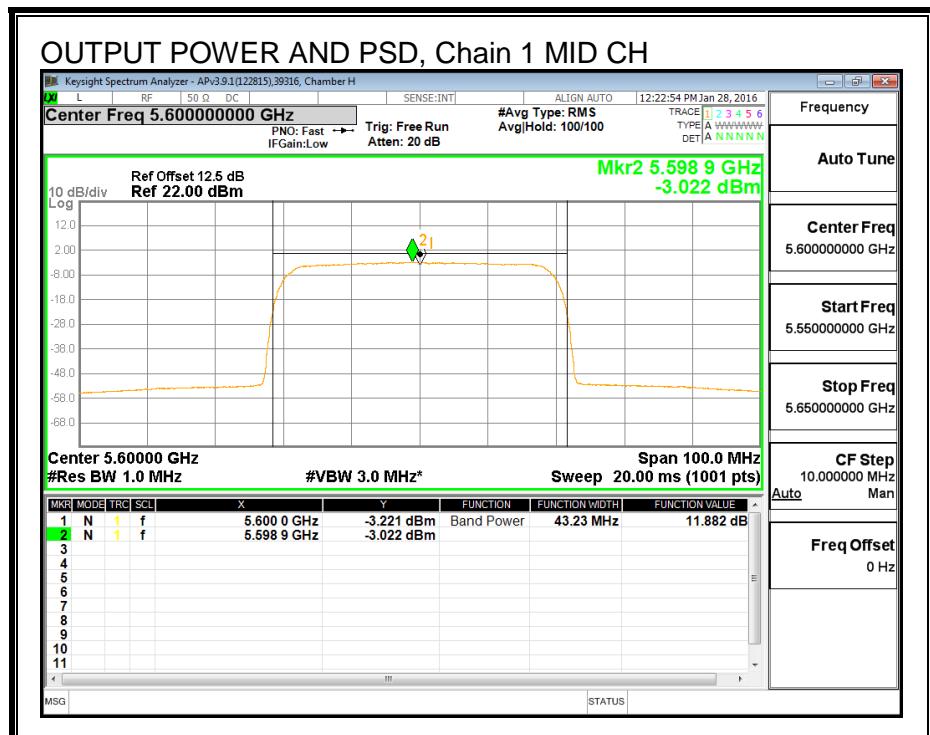
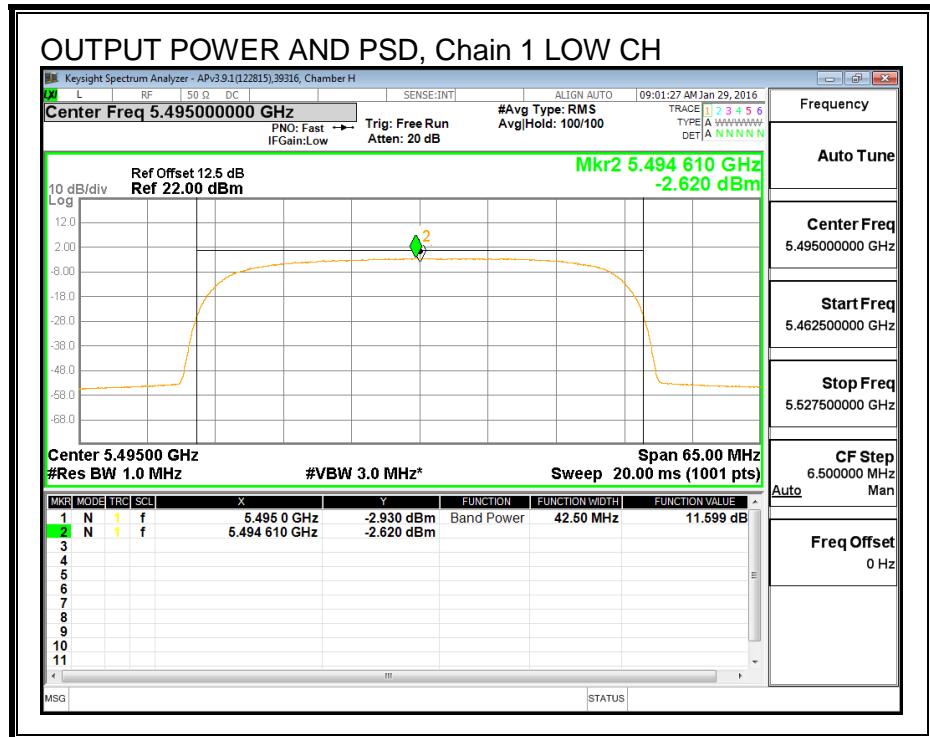
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5495	-2.46	-2.62	0.47	2.00	-1.53
Mid	5600	-3.01	-3.02	-0.01	2.00	-2.01
High	5700	-2.57	-2.62	0.42	2.00	-1.58

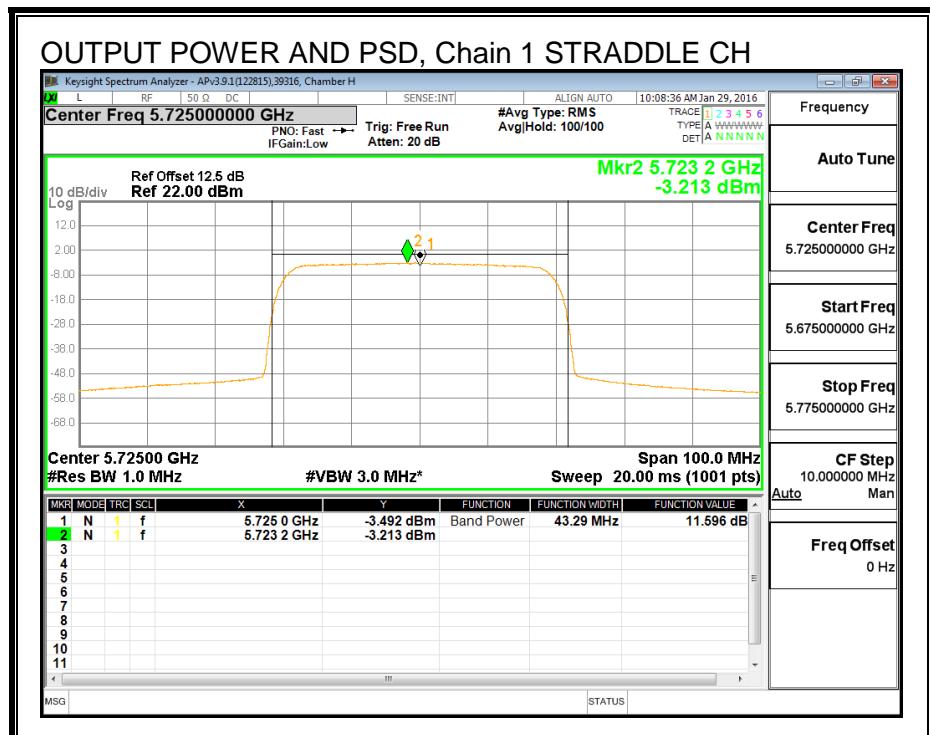
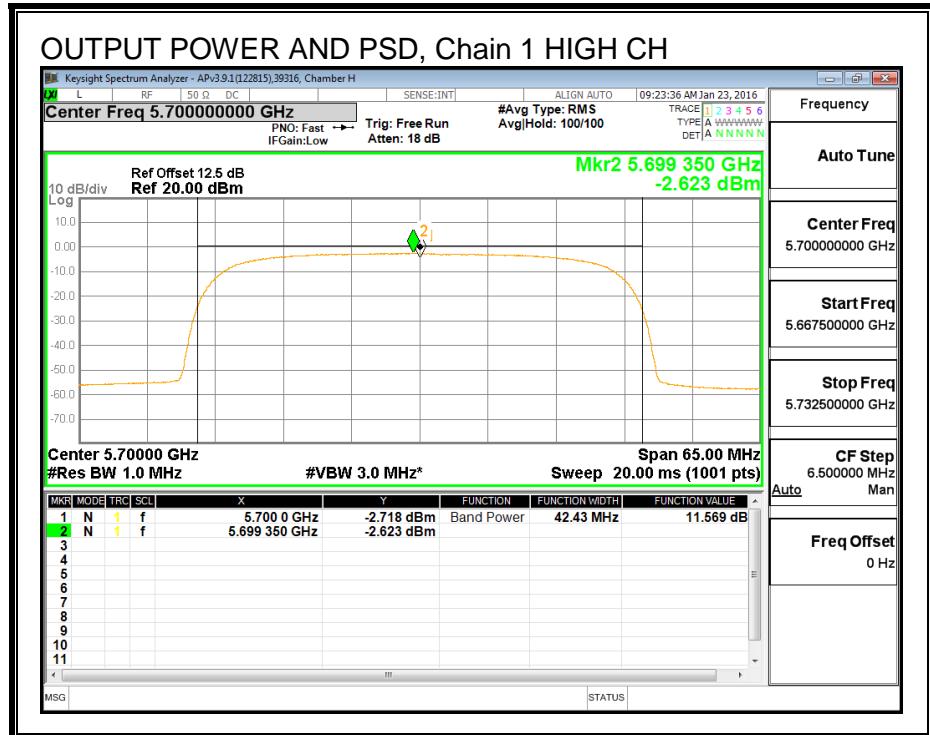
## OUTPUT POWER AND PSD, Chain 0





## OUTPUT POWER AND PSD, Chain 1





### 8.4.3. STRADDLE CHANNEL RESULTS

#### UNII-2C BAND

##### Bandwidth and Antenna Gain

Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
5725	21.58	15.00	15.00

##### Limits

Frequency (MHz)	FCC Power Limit (dBm)	PPSD Limit (dBm)
5725	15.00	2.00

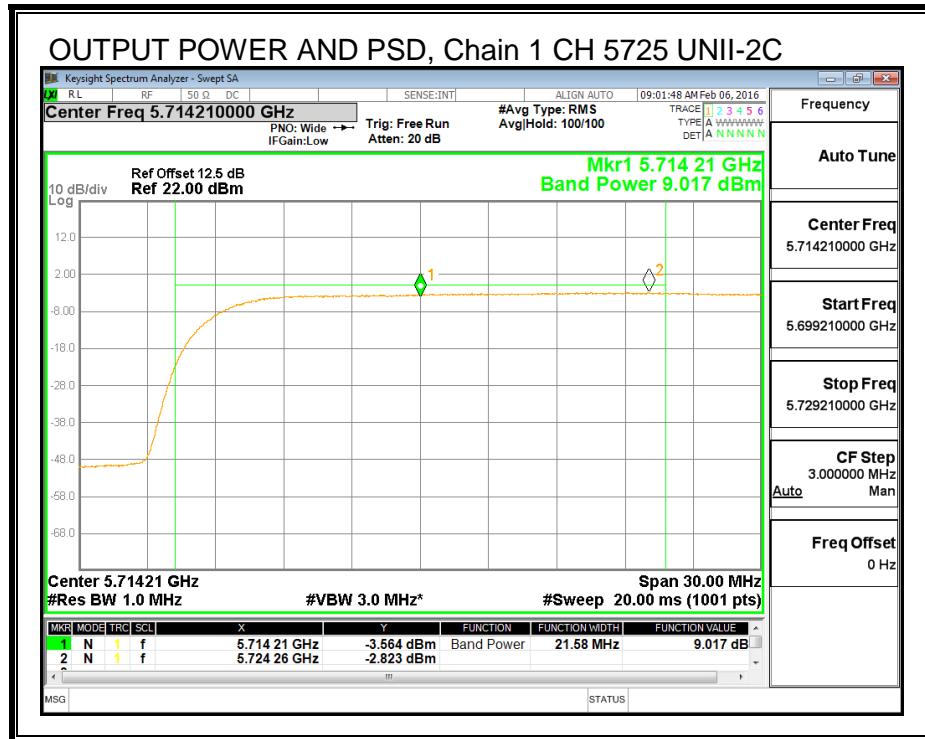
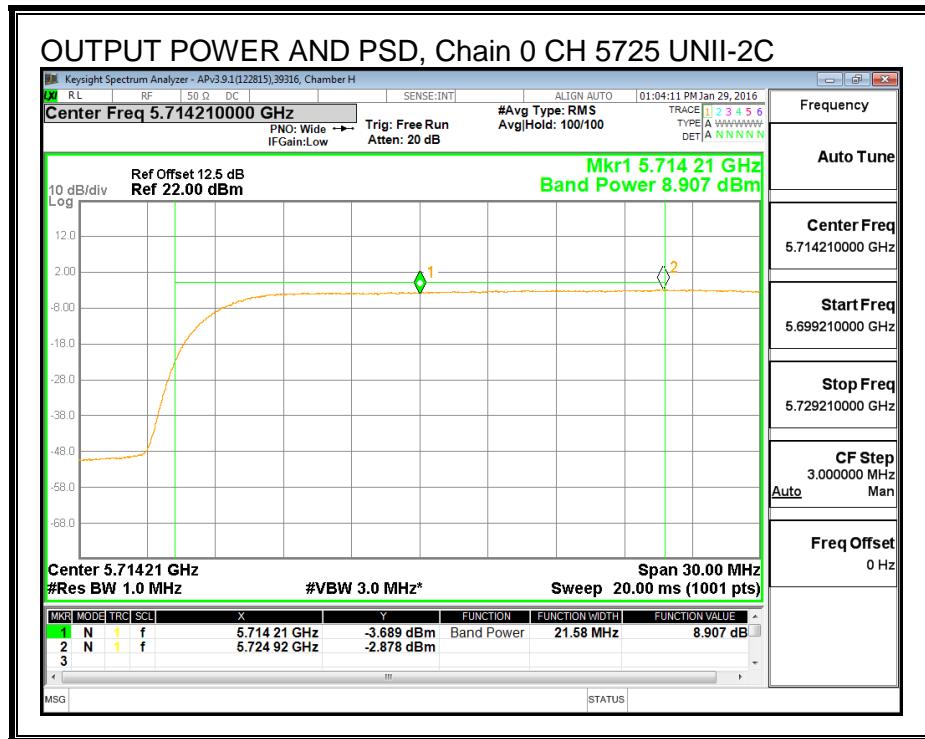
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD
--------------------	------	---

##### Output Power Results

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5725	8.91	9.02	11.97	15.00	-3.03

##### PPSD Results

Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
5725	-2.88	-2.82	0.16	2.00	-1.84



**UNII-3 BAND**

**Bandwidth and Antenna Gain**

Frequency (MHz)	Min BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
5725	21.58	15.00	15.00

**Limits**

Frequency (MHz)	FCC Power Limit (dBm)	FCC PPSD Limit (dBm)
5725	30.00	30.00

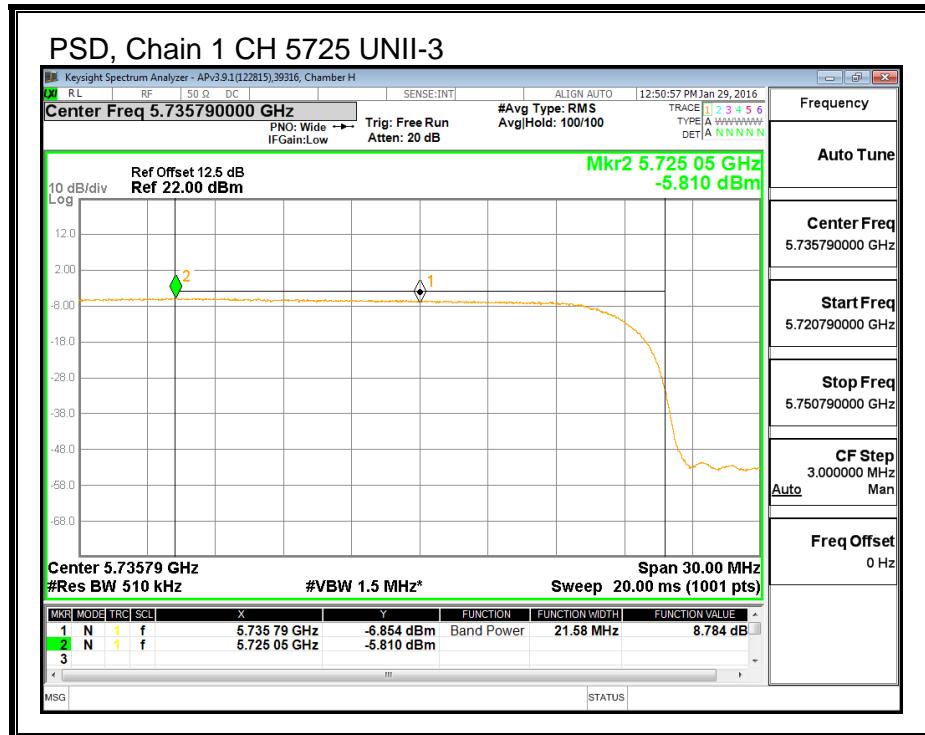
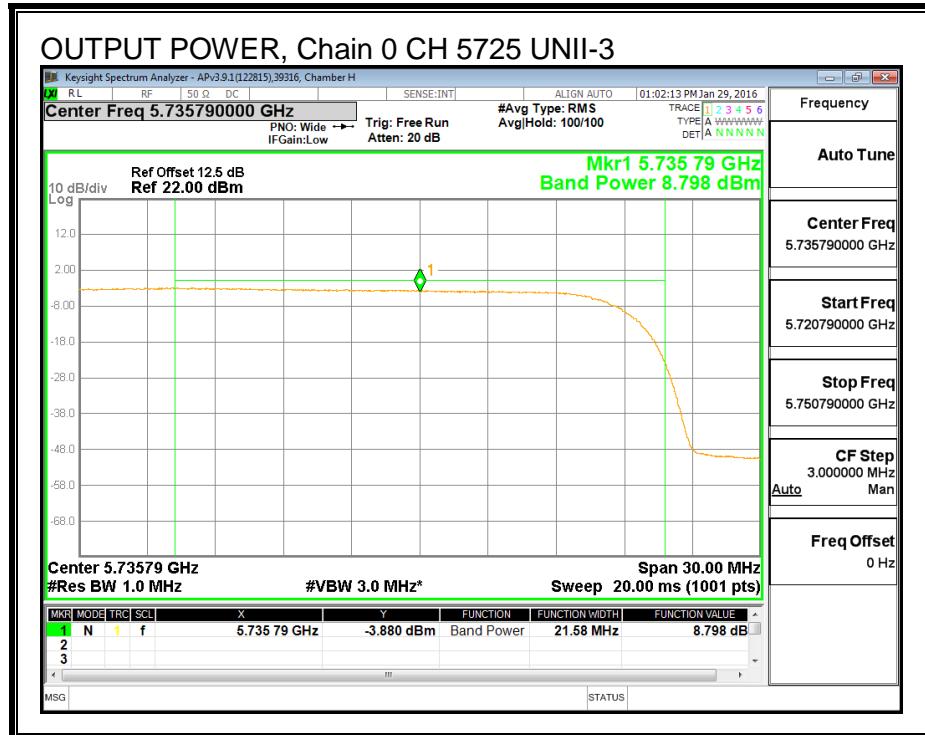
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power & PPSD
--------------------	------	---

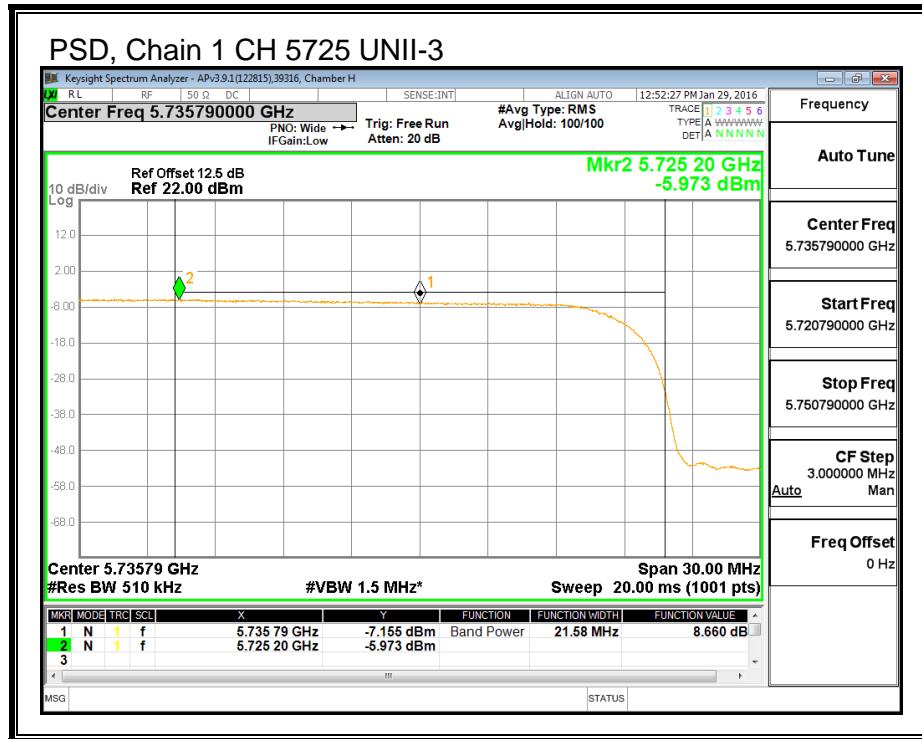
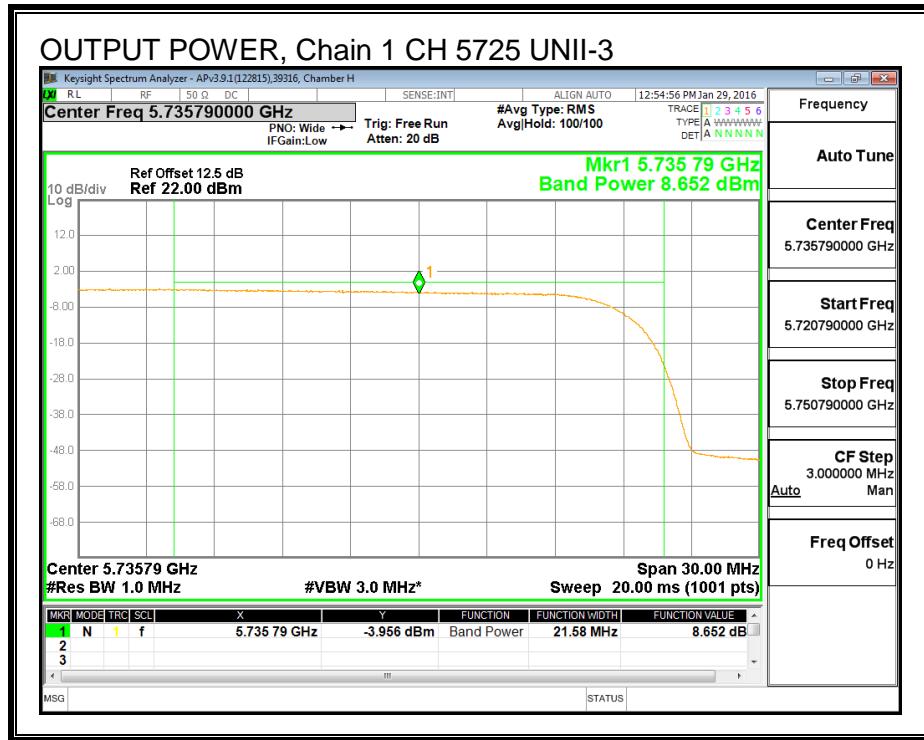
**Output Power Results**

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5725	8.80	8.65	11.74	30.00	-18.26

**PPSD Results**

Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
5725	-5.81	-5.97	-2.88	30.00	-32.88





#### 8.4.4. CONDUCTED BANEDGE

##### LIMITS

FCC §15.205 and §15.209

PART 15, SUBPART E

Radiated LIMIT:

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

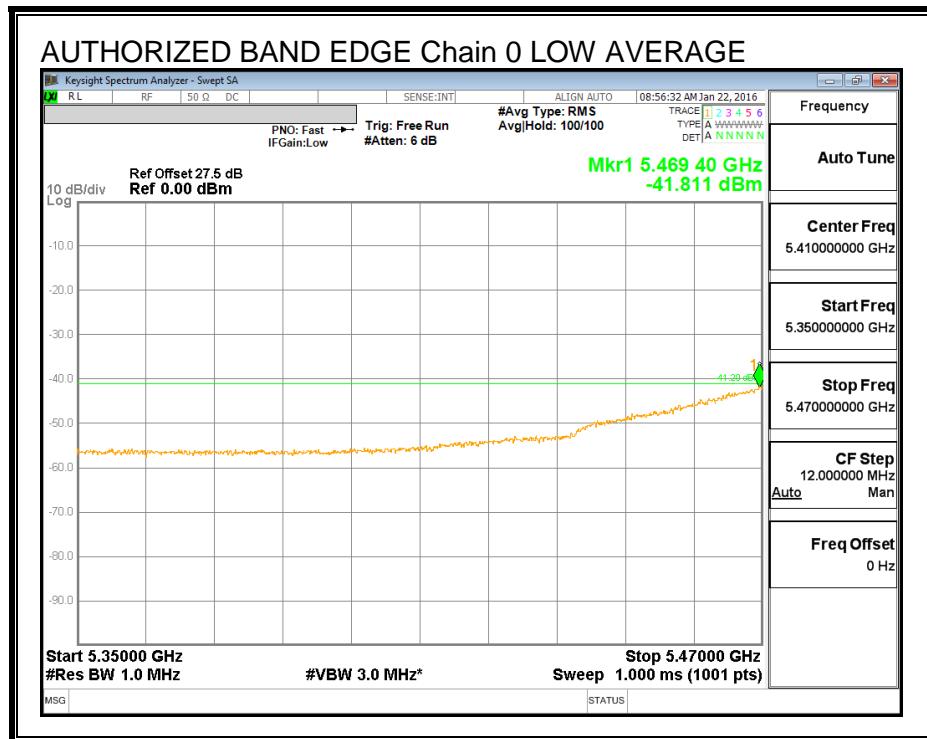
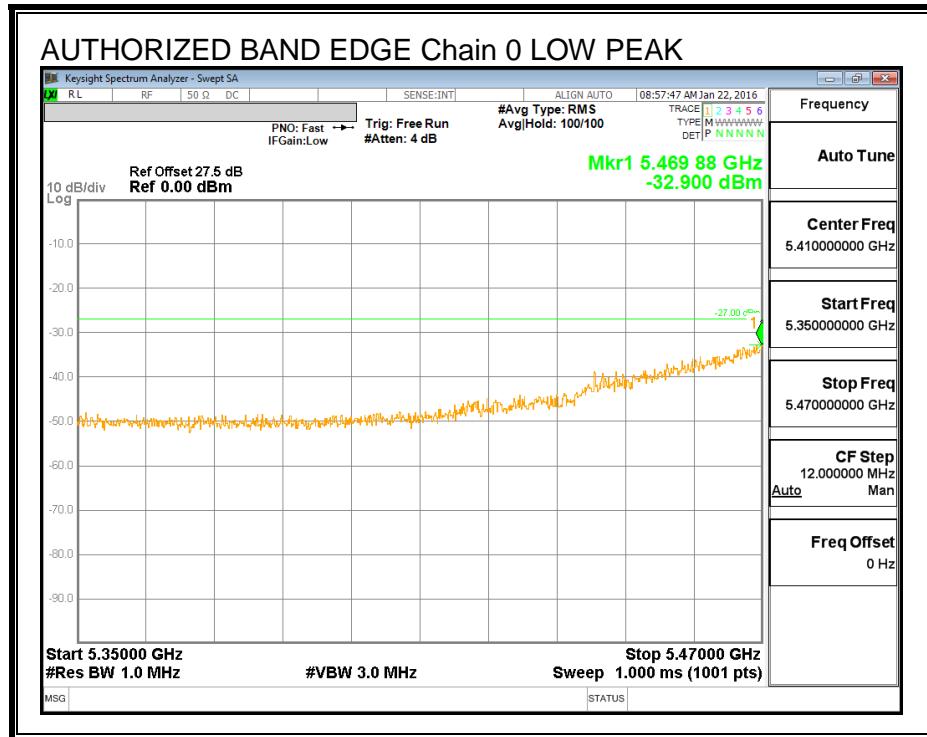
##### Procedure

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

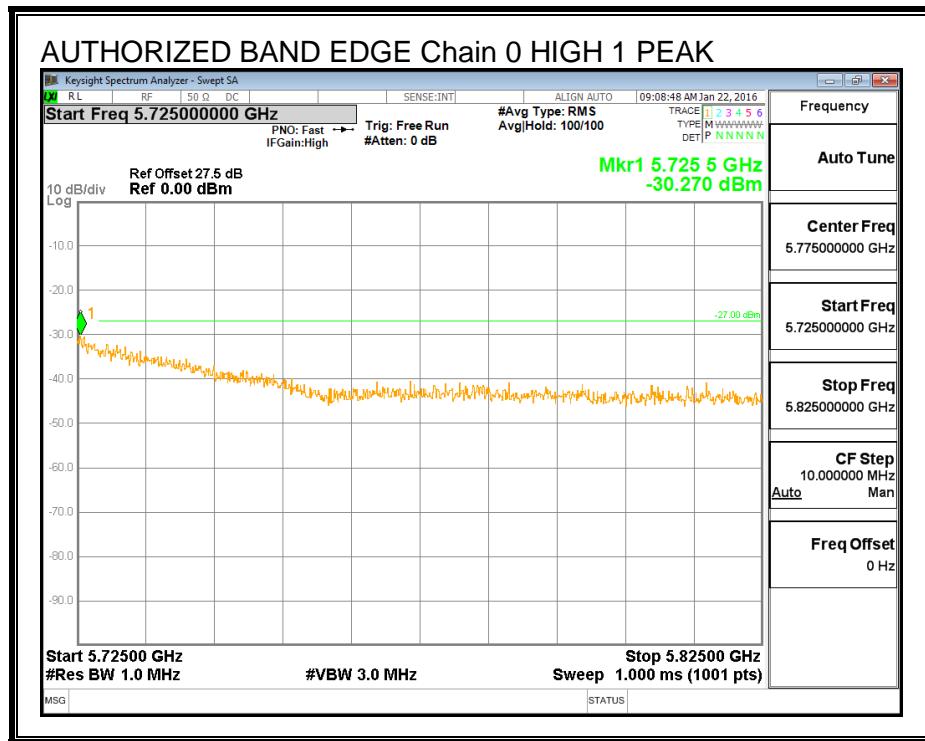
Conducted measurements are being used to demonstrate compliance with the spurious limits in the restricted band (all other spurious emissions are measured using the radiated test method with the antennas connected). The limits are 54 dBuV/m average and 74 dBuV/m peak, which are equivalent to eirp of -41.2 dBm and -21.2 dBm respectively. The plots include an offset to account for the EUT antenna gain and external attenuation between EUT antenna port and spectrum analyzer. As the two antenna chains feed cross polarized antennas with un- correlated signals the two chains are treated independently and the emissions do not need to be summed.

## RESULTS

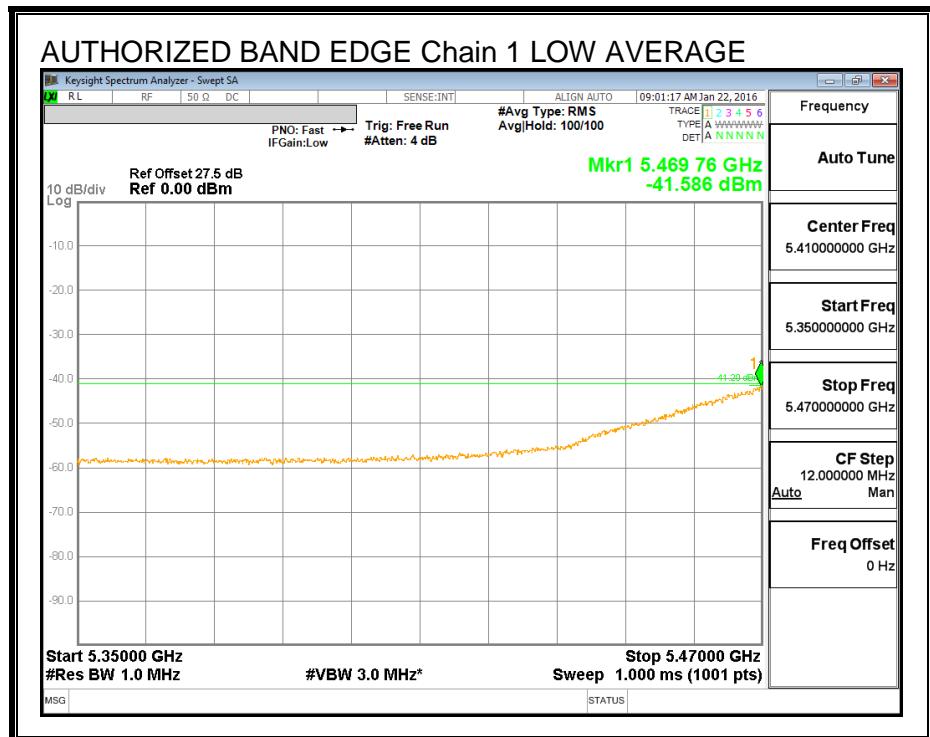
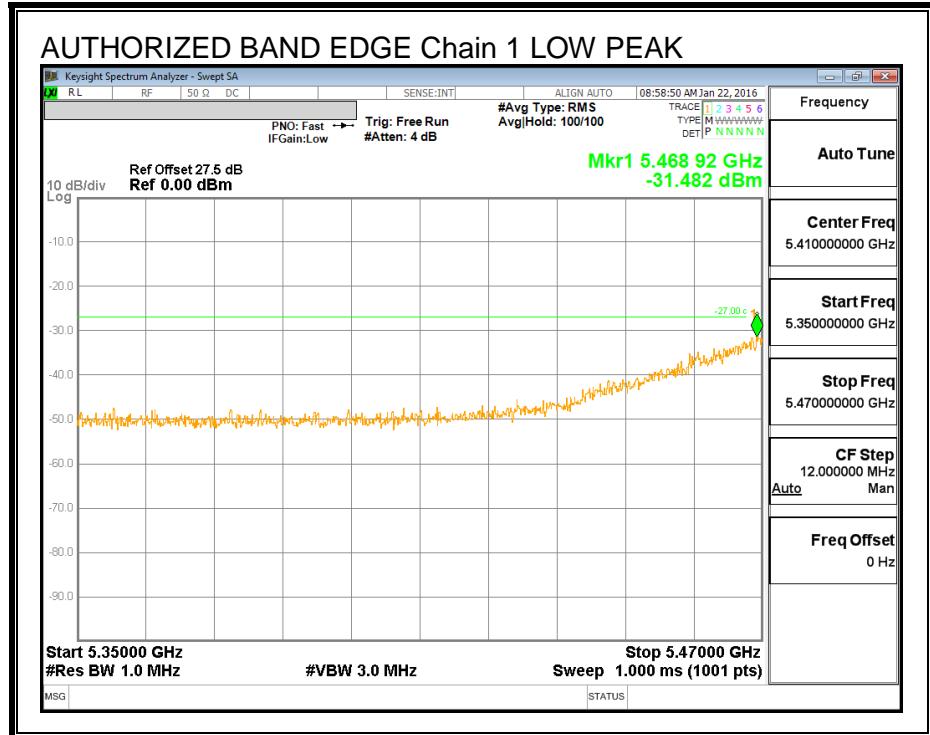
### LOW CHANNEL BANDEDGE, Chain 0



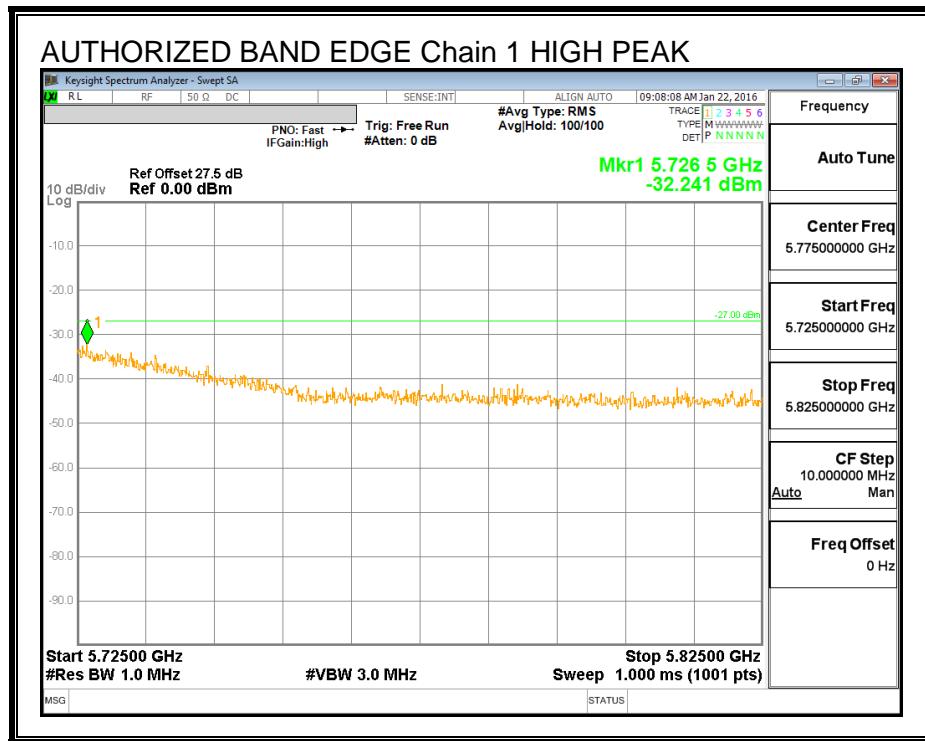
**HIGH CHANNEL BANDEDGE, Chain 0**



## LOW CHANNEL BANDEDGE, Chain 1



**HIGH 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

#### TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

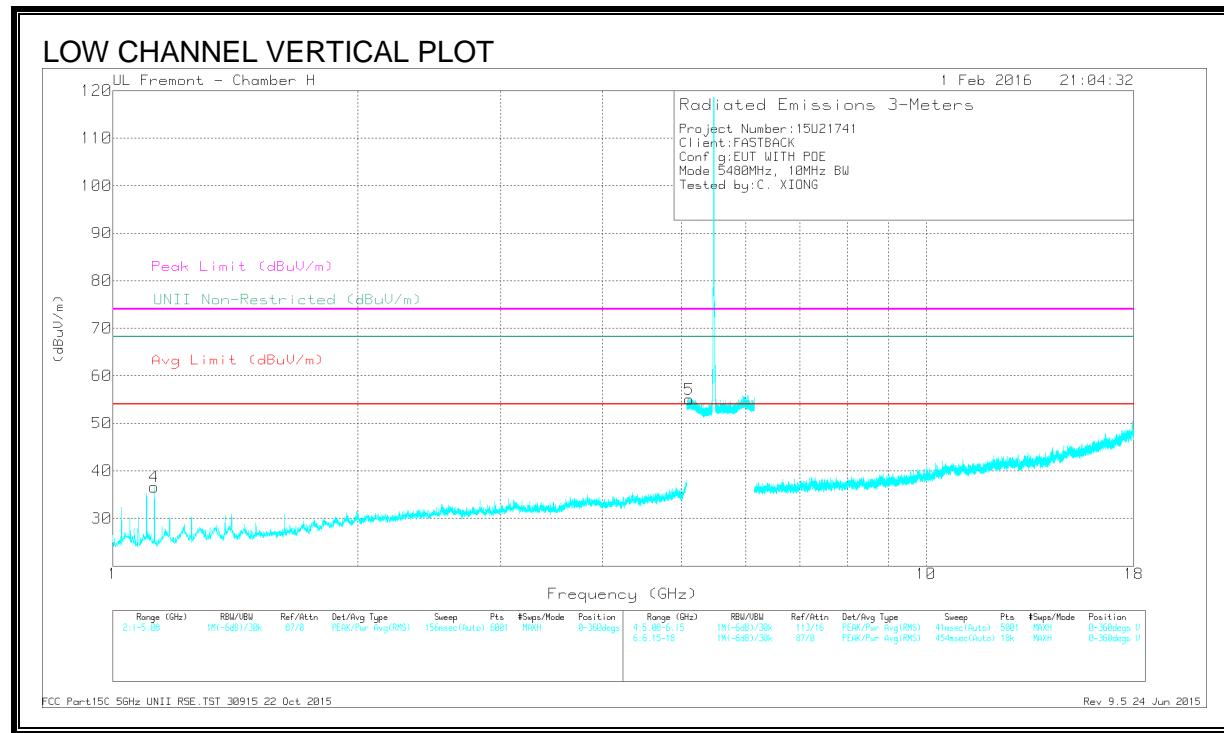
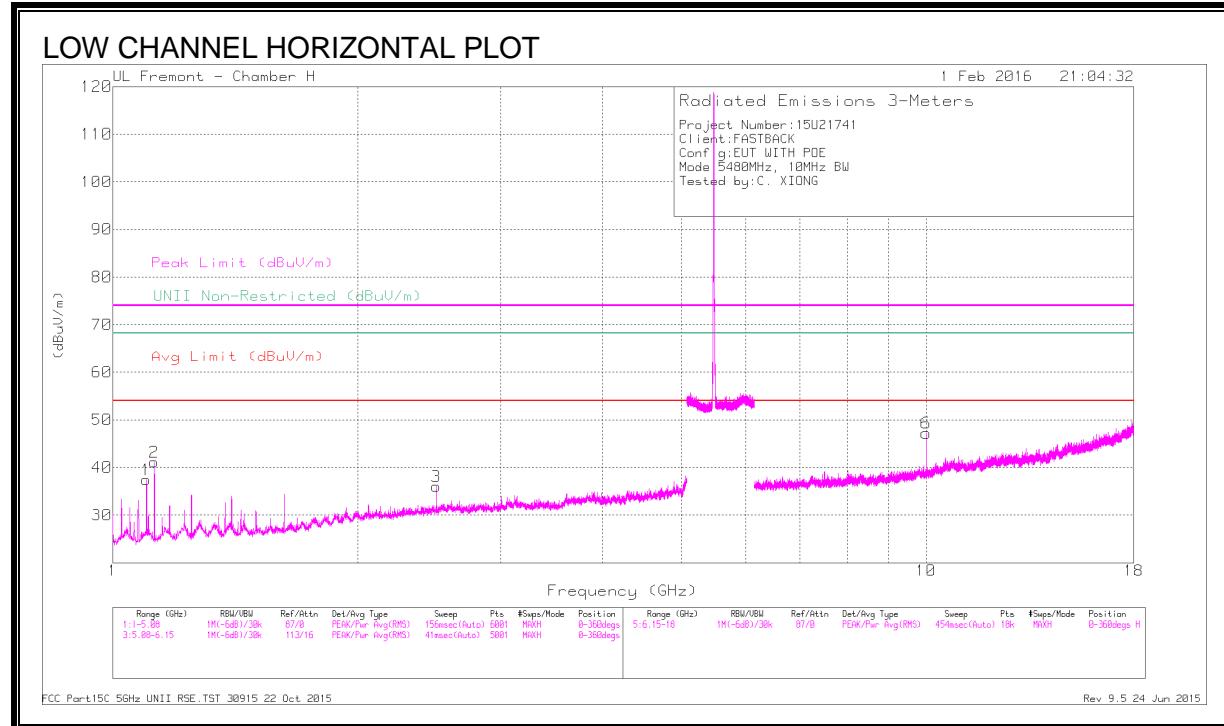
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

## 9.2. TRANSMITTER ABOVE 1 GHz

### 9.2.1. TX ABOVE 1 GHz 10MHz BW 2TX MODE IN THE 5.6 GHz BAND

#### HARMONICS AND SPURIOUS EMISSIONSHARMONICS AND SPURIOUS EMISSIONS



**DATA**

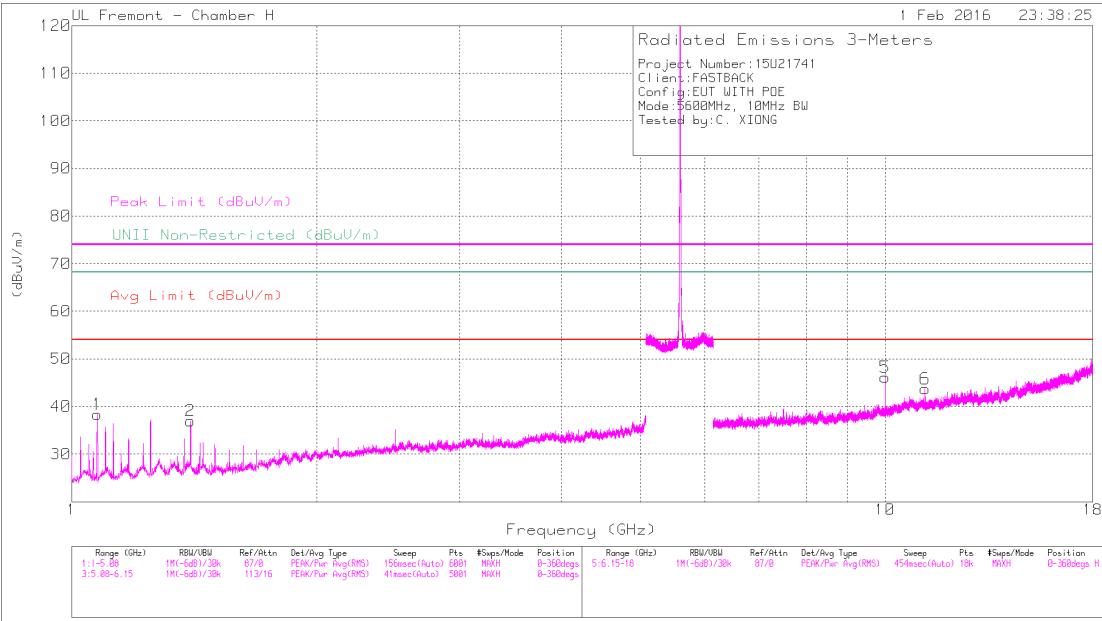
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Ft tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.1	49.78	PK-U	27.1	-34.4	42.48	-	-	74	-31.52	-	-	32	135	H
	* 1.1	43.97	ADR	27.1	-34.4	36.67	54	-17.33	-	-	-	-	32	135	H
2	* 1.125	51.13	PK-U	27.4	-34.4	44.13	-	-	74	-29.87	-	-	98	102	H
	* 1.125	45.91	ADR	27.4	-34.4	38.91	54	-15.09	-	-	-	-	98	102	H
4	* 1.125	48.96	PK-U	27.4	-34.4	41.96	-	-	74	-32.04	-	-	0	160	V
	* 1.125	41.72	ADR	27.4	-34.4	34.72	54	-19.28	-	-	-	-	0	160	V
5	* 5.116	47.38	PK-U	34.3	-18.4	63.28	-	-	74	-10.72	-	-	0	160	V
	* 5.117	35.58	ADR	34.3	-18.4	51.48	54	-2.52	-	-	-	-	0	160	V
3	2.5	44.41	PK-U	32.5	-33.3	43.61	-	-	-	-	68.2	-24.59	34	142	H
6	10	40.74	PK-U	36.9	-24.1	53.54	-	-	-	-	68.2	-14.66	73	119	H

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

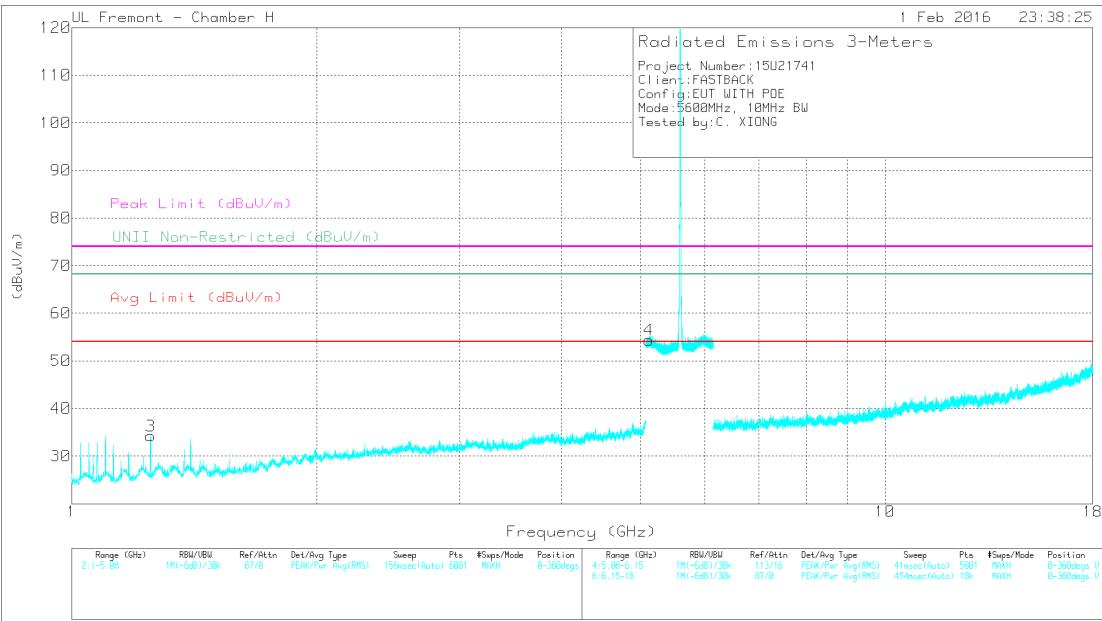
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



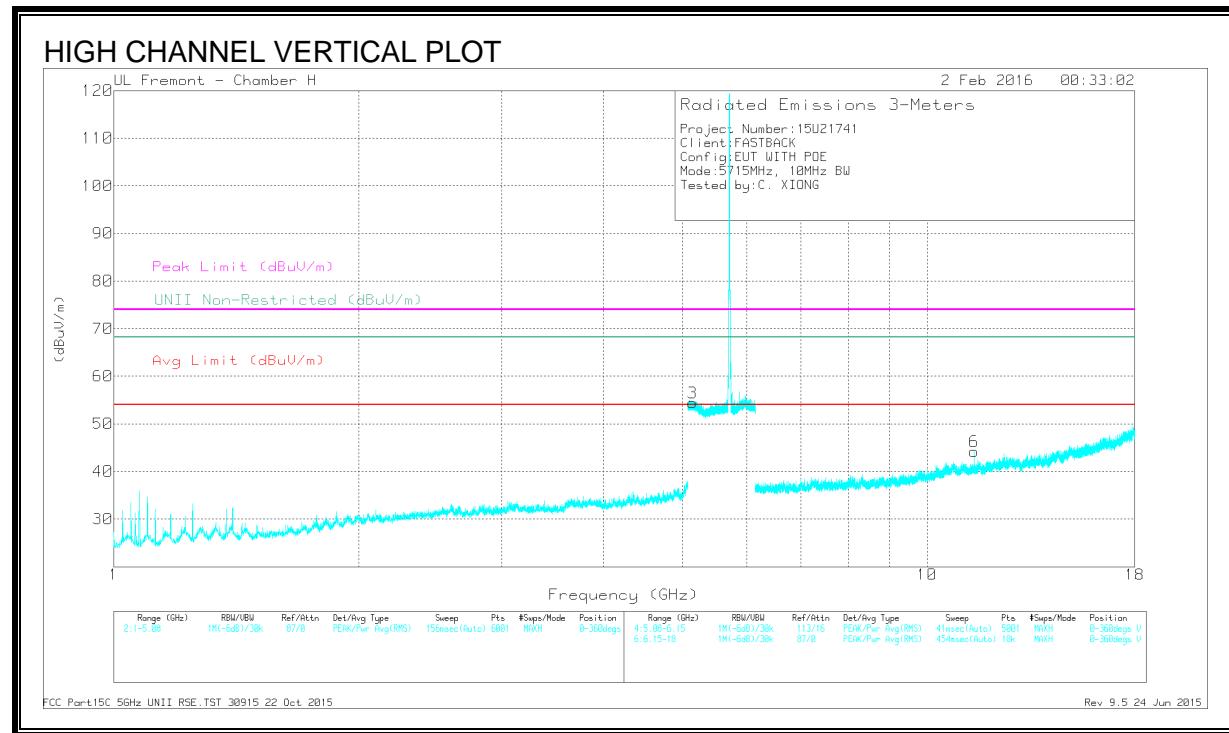
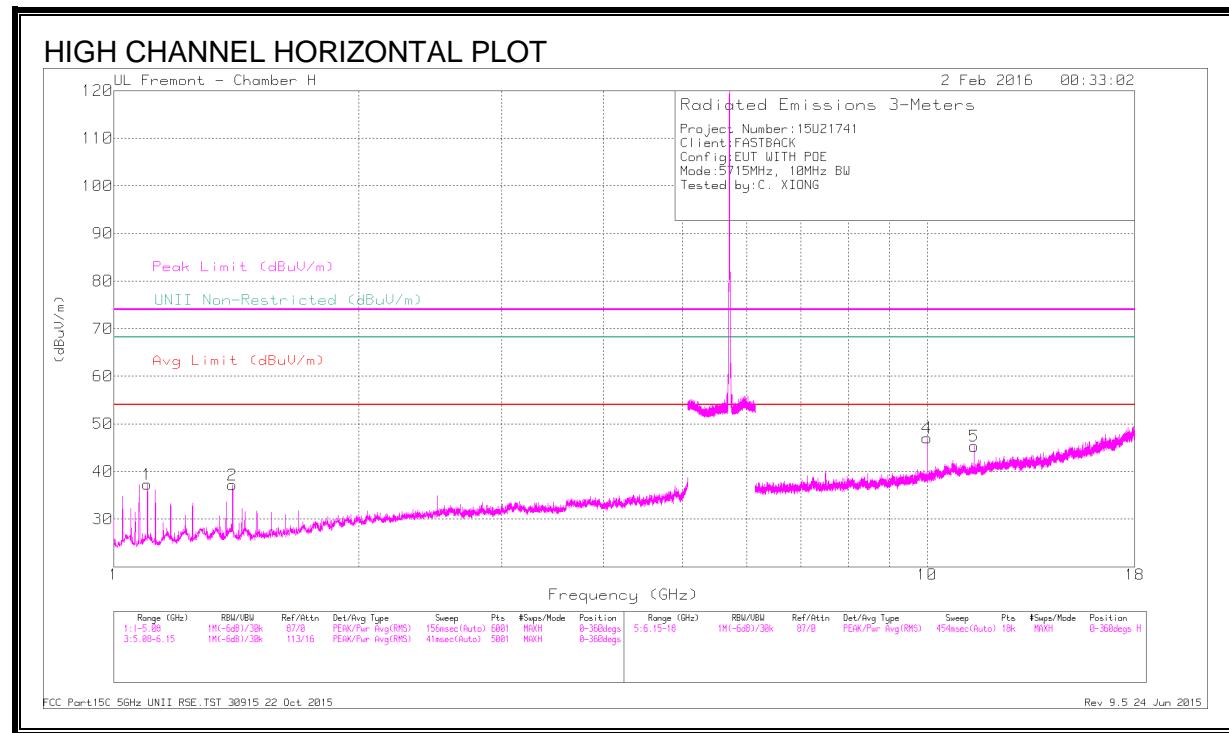
**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Ft 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	* 1.075	49.18	PK-U	27.1	-34.3	41.98	-	-	74	-32.02	-	-	30	138	H
	* 1.075	43.97	ADR	27.1	-34.3	36.77	54	-17.23	-	-	-	-	30	138	H
2	* 1.4	49.14	PK-U	28.5	-34	43.64	-	-	74	-30.36	-	-	25	100	H
	* 1.4	40.09	ADR	28.5	-34	34.59	54	-19.41	-	-	-	-	25	100	H
3	* 1.25	44.91	PK-U	28.5	-34.5	38.91	-	-	74	-35.09	-	-	57	193	V
	* 1.25	35.46	ADR	28.5	-34.5	29.46	54	-24.54	-	-	-	-	57	193	V
4	* 5.122	47.65	PK-U	34.4	-18.4	63.65	-	-	74	-10.35	-	-	57	193	V
	* 5.123	35.52	ADR	34.4	-18.4	51.52	54	-2.48	-	-	-	-	57	193	V
6	* 11.2	36.71	PK-U	37.8	-23.4	51.11	-	-	74	-22.89	-	-	91	107	H
	* 11.2	27.85	ADR	37.8	-23.4	42.25	54	-11.75	-	-	-	-	91	107	H
5	10	40.62	PK-U	36.9	-24.1	53.42	-	-	-	-	68.2	-14.78	75	103	H

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average



**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Ft 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	* 1.1	50.11	PK-U	27.1	-34.4	42.81	-	-	74	-31.19	-	-	30	134	H
	* 1.1	43.97	ADR	27.1	-34.4	36.67	54	-17.33	-	-	-	-	30	134	H
2	* 1.4	47.66	PK-U	28.5	-34	42.16	-	-	74	-31.84	-	-	30	104	H
	* 1.4	40.04	ADR	28.5	-34	34.54	54	-19.46	-	-	-	-	30	104	H
3	* 5.147	47.09	PK-U	34.4	-18.4	63.09	-	-	74	-10.91	-	-	30	104	V
	* 5.148	35.54	ADR	34.4	-18.5	51.44	54	-2.56	-	-	-	-	30	104	V
5	* 11.43	38.59	PK-U	37.9	-23.1	53.39	-	-	74	-20.61	-	-	36	171	H
	* 11.43	31.47	ADR	37.9	-23.1	46.27	54	-7.73	-	-	-	-	36	171	H
6	* 11.43	36.78	PK-U	37.9	-23.1	51.58	-	-	74	-22.42	-	-	76	102	V
	* 11.43	27.96	ADR	37.9	-23.1	42.76	54	-11.24	-	-	-	-	76	102	V
4	10	41.38	PK-U	36.9	-24.1	54.18	-	-	-	-	68.2	-14.02	71	107	H

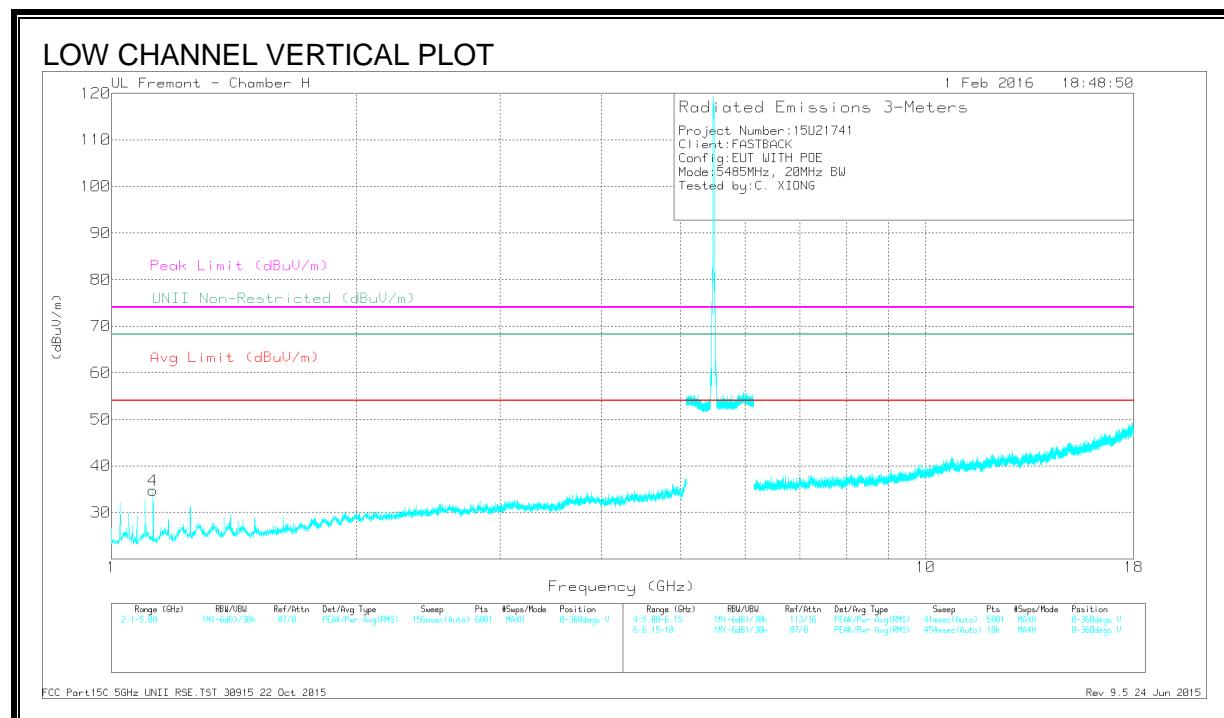
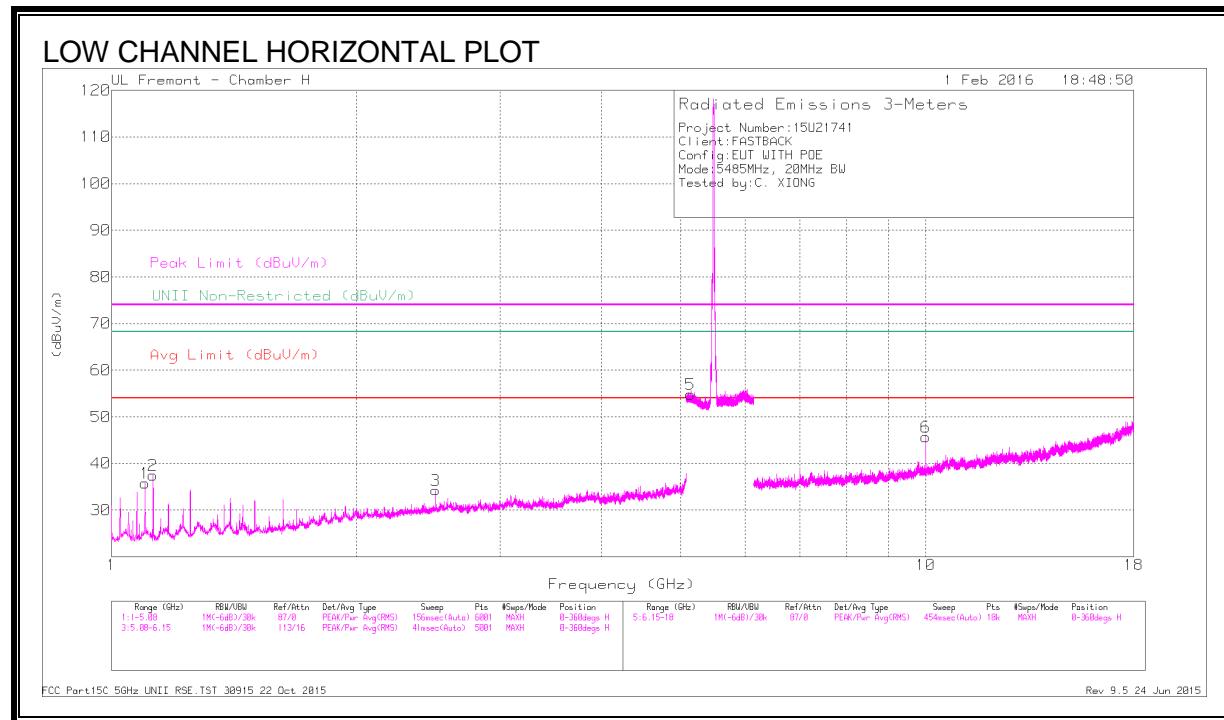
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

## 9.2.2. TX ABOVE 1 GHz 20MHz BW 2TX MODE IN THE 5.6 GHz BAND

### HARMONICS AND SPURIOUS EMISSIONS



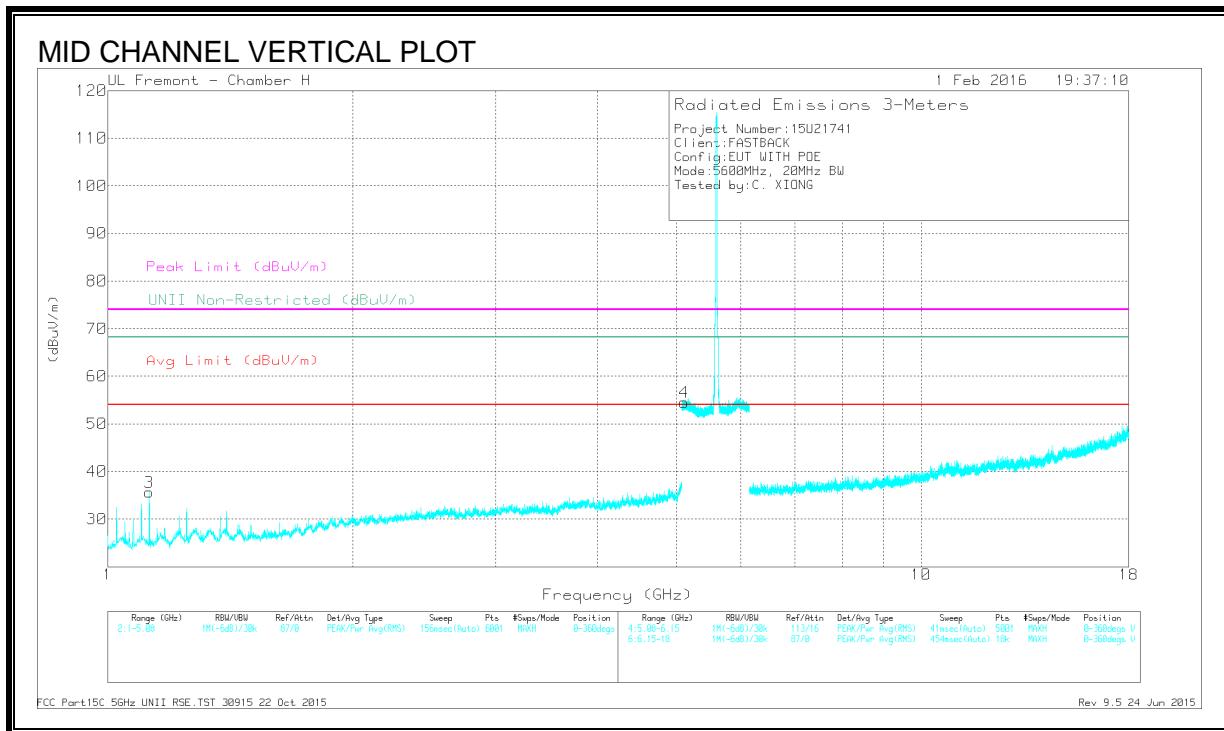
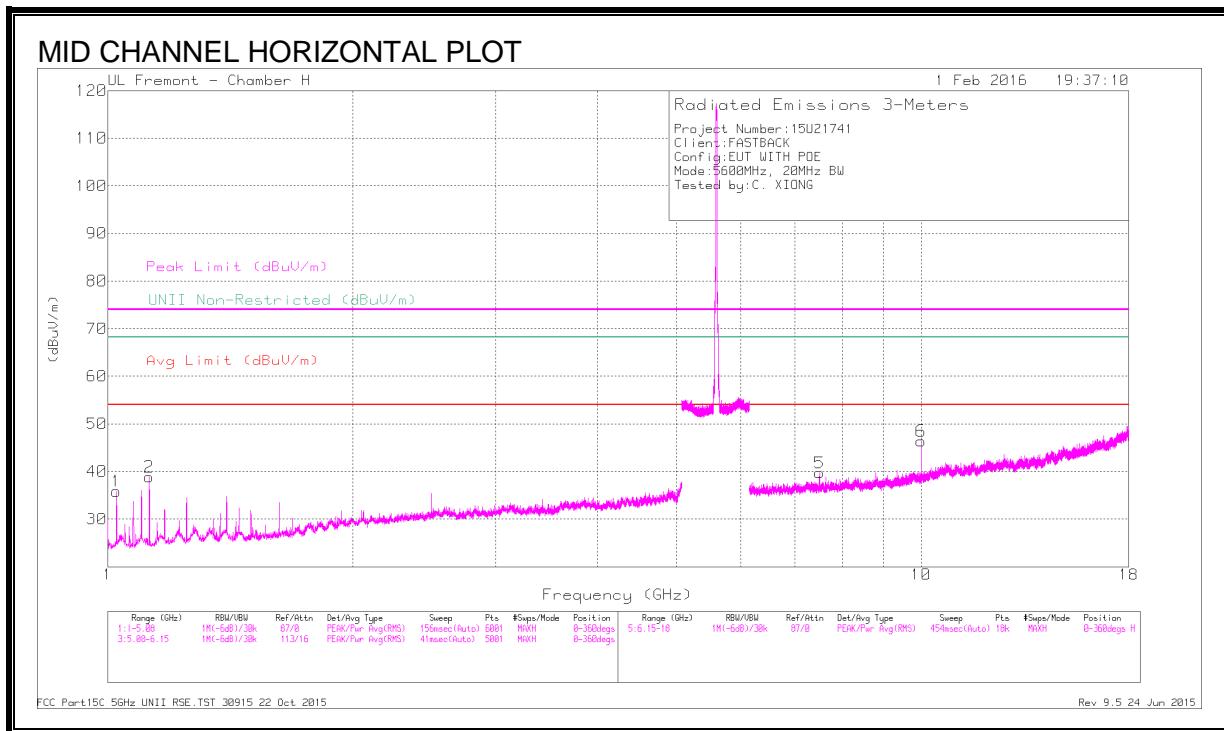
**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Ft 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	* 1.1	48.75	PK-U	27.1	-34.4	41.45	-	-	74	-32.55	-	-	30	129	H
	* 1.1	42.61	ADR	27.1	-34.4	35.31	54	-18.69	-	-	-	-	30	129	H
2	* 1.125	50.26	PK-U	27.4	-34.4	43.26	-	-	74	-30.74	-	-	100	105	H
	* 1.125	44.21	ADR	27.4	-34.4	37.21	54	-16.79	-	-	-	-	100	105	H
4	* 1.125	46.97	PK-U	27.4	-34.4	39.97	-	-	74	-34.03	-	-	360	157	V
	* 1.125	38.96	ADR	27.4	-34.4	31.96	54	-22.04	-	-	-	-	360	157	V
5	* 5.139	47.14	PK-U	34.4	-18.4	63.14	-	-	74	-10.86	-	-	360	157	H
	* 5.138	35.63	ADR	34.4	-18.4	51.63	54	-2.37	-	-	-	-	360	157	H
3	2.5	43.65	PK-U	32.5	-33.3	42.85	-	-	-	-	68.2	-25.35	35	144	H
6	10	40.31	PK-U	36.9	-24.1	53.11	-	-	-	-	68.2	-15.09	69	122	H

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average



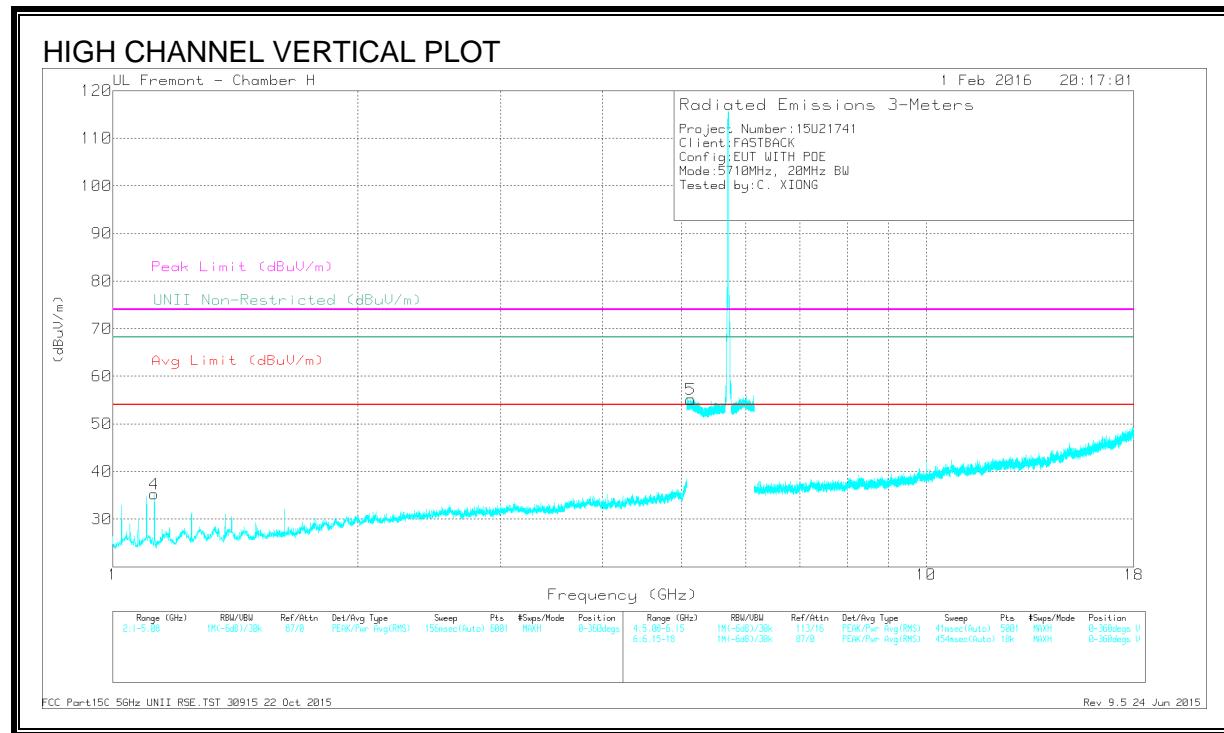
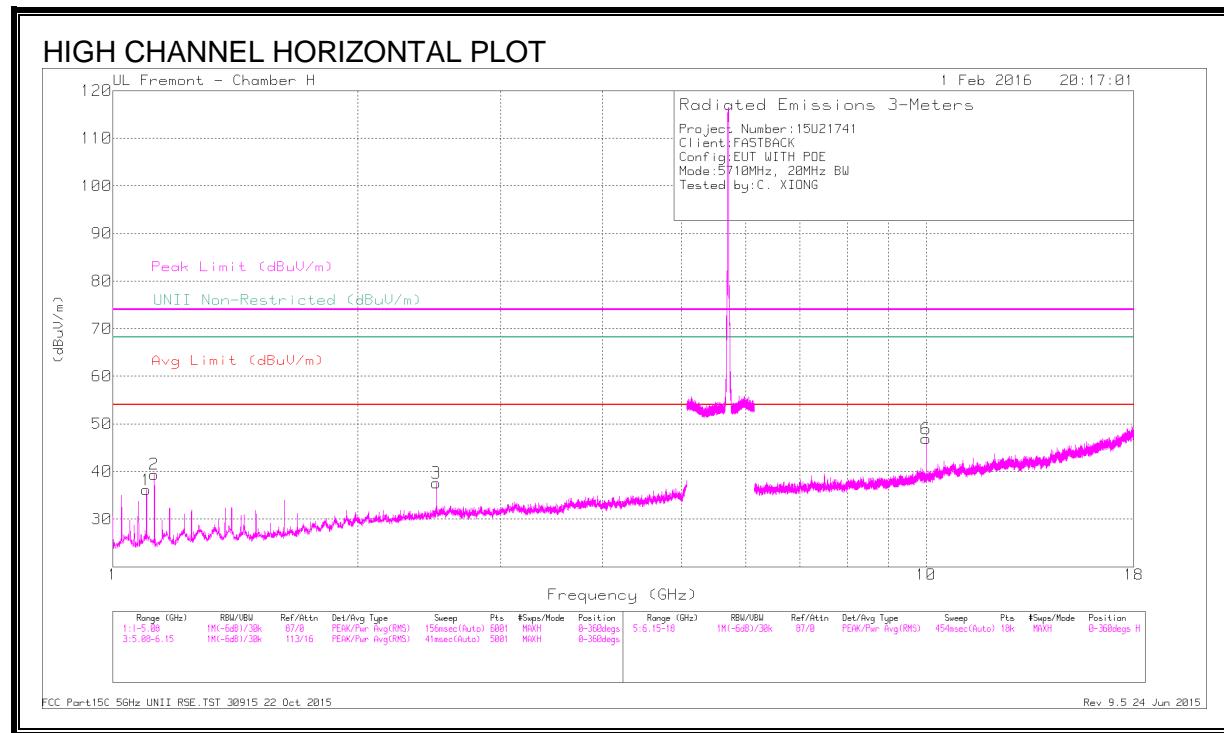
**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Ft 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	47.66	PK-U	27	-34.2	40.46	-	-	74	-33.54	-	-	26	153	H
	* 1.025	41.21	ADR	27	-34.2	34.01	54	-19.99	-	-	-	-	26	153	H
2	* 1.125	50.74	PK-U	27.4	-34.4	43.74	-	-	74	-30.26	-	-	95	105	H
	* 1.125	44.84	ADR	27.4	-34.4	37.84	54	-16.16	-	-	-	-	95	105	H
3	* 1.125	48.48	PK-U	27.4	-34.4	41.48	-	-	74	-32.52	-	-	47	205	V
	* 1.125	41.74	ADR	27.4	-34.4	34.74	54	-19.26	-	-	-	-	47	205	V
4	* 5.113	47.24	PK-U	34.3	-18.4	63.14	-	-	74	-10.86	-	-	47	205	V
	* 5.114	35.62	ADR	34.3	-18.4	51.52	54	-2.48	-	-	-	-	47	205	V
5	* 7.5	38.46	PK-U	36	-26.2	48.26	-	-	74	-25.74	-	-	47	134	H
	* 7.5	27.45	ADR	36	-26.2	37.25	54	-16.75	-	-	-	-	47	134	H
6	10	41.38	PK-U	36.9	-24.1	54.18	-	-	-	-	68.2	-14.02	74	102	H

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average



**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Ft 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	* 1.1	49.22	PK-U	27.1	-34.4	41.92	-	-	74	-32.08	-	-	38	193	H
	* 1.1	43.22	ADR	27.1	-34.4	35.92	54	-18.08	-	-	-	-	38	193	H
2	* 1.125	50.81	PK-U	27.4	-34.4	43.81	-	-	74	-30.19	-	-	97	101	H
	* 1.125	45.22	ADR	27.4	-34.4	38.22	54	-15.78	-	-	-	-	97	101	H
4	* 1.125	48.7	PK-U	27.4	-34.4	41.7	-	-	74	-32.3	-	-	52	222	V
	* 1.125	42.38	ADR	27.4	-34.4	35.38	54	-18.62	-	-	-	-	52	222	V
5	* 5.136	47.23	PK-U	34.4	-18.4	63.23	-	-	74	-10.77	-	-	52	222	V
	* 5.136	35.52	ADR	34.4	-18.4	51.52	54	-2.48	-	-	-	-	52	222	V
3	2.5	44.63	PK-U	32.5	-33.3	43.83	-	-	-	-	68.2	-24.37	34	121	H
6	10	41.47	PK-U	36.9	-24.1	54.27	-	-	-	-	68.2	-13.93	74	113	H

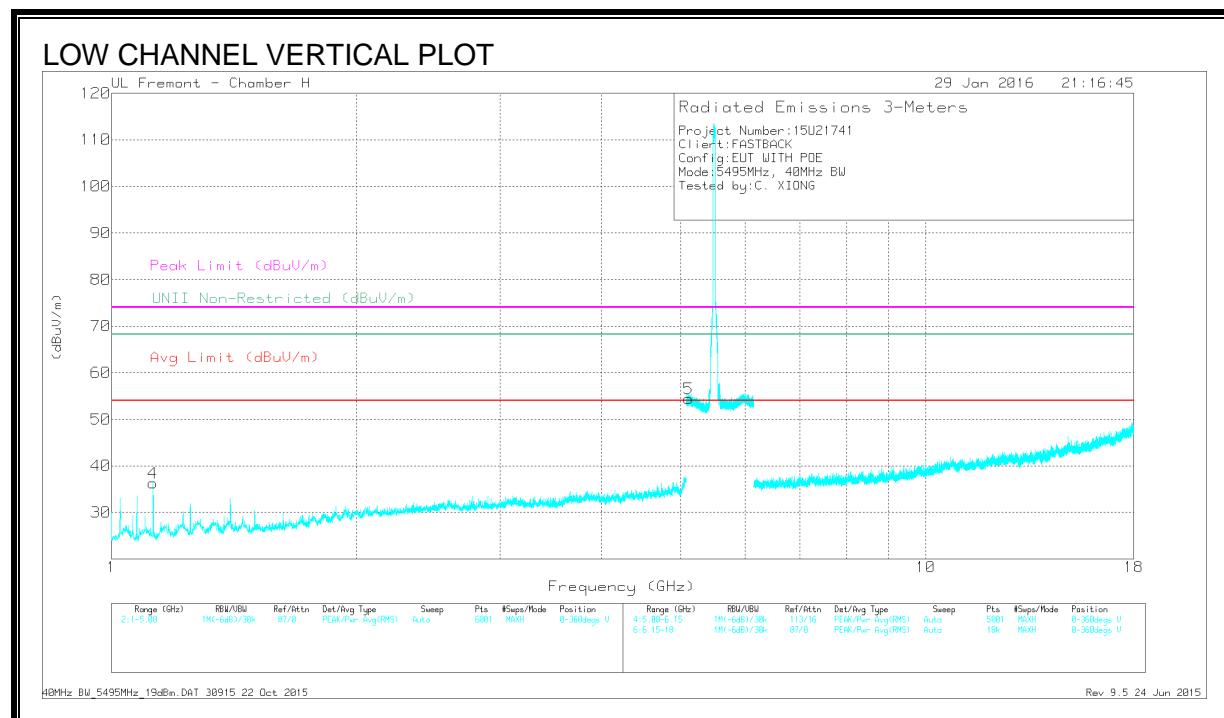
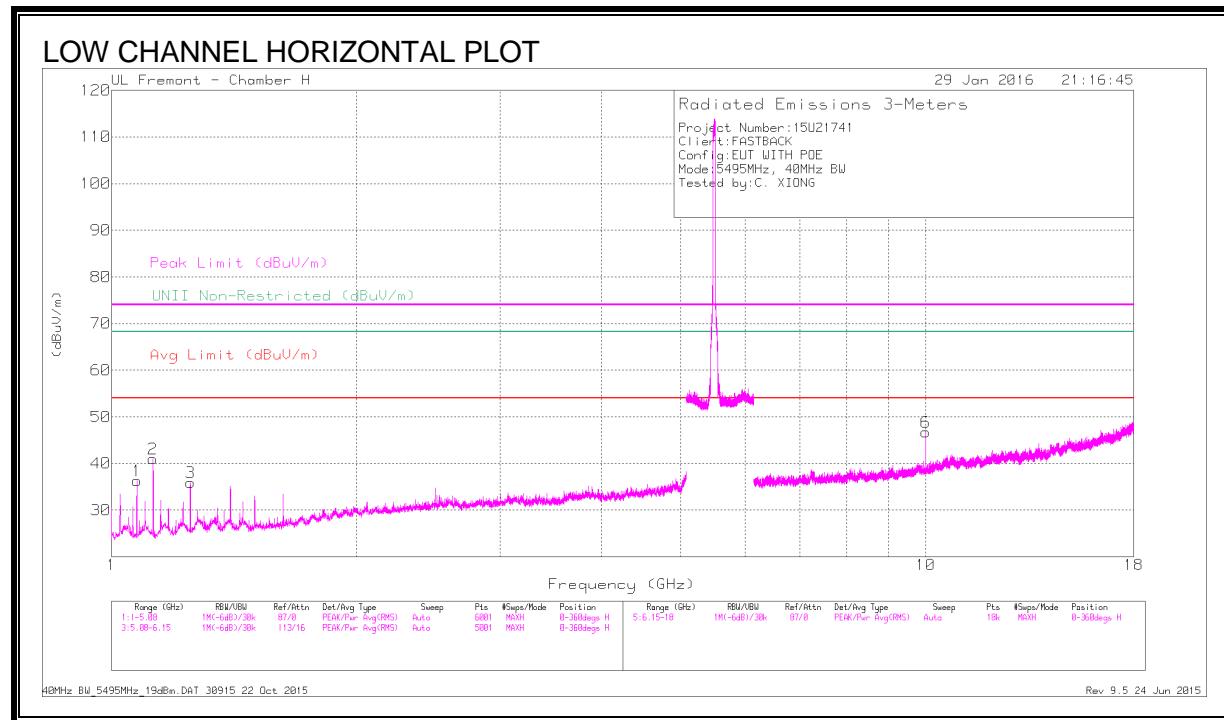
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

### 9.2.3. TX ABOVE 1 GHz 40MHz BW 2TX MODE IN THE 5.6 GHz BAND

#### HARMONICS AND SPURIOUS EMISSIONS



**DATA**

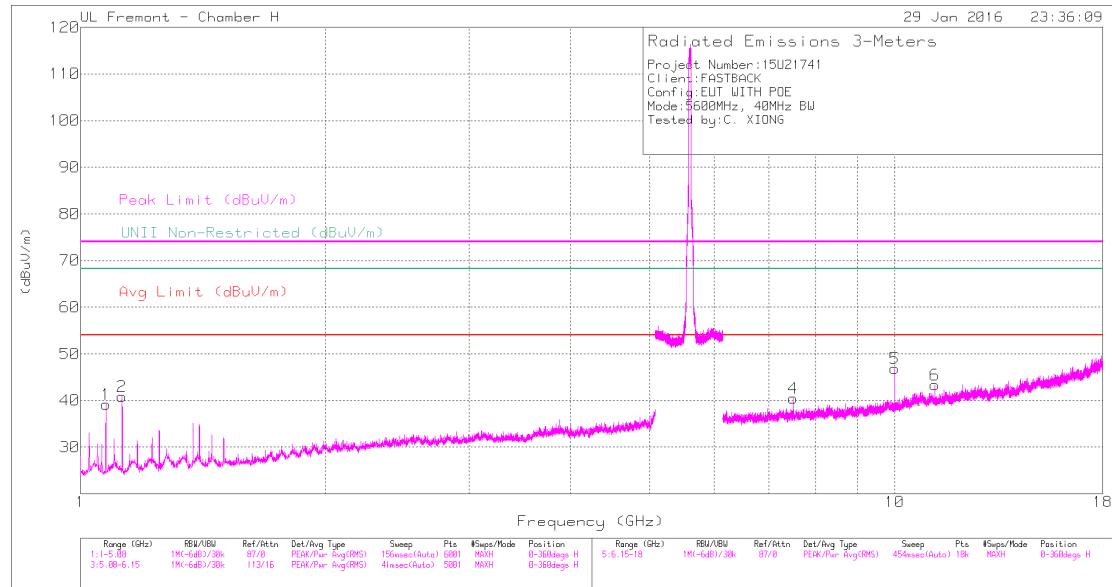
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Ft tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.075	49.69	PK-U	27.1	-34.3	42.49	-	-	74	-31.51	-	-	24	142	H
	* 1.075	44.93	ADR	27.1	-34.3	37.73	54	-16.27	-	-	-	-	24	142	H
2	* 1.125	51.68	PK-U	27.4	-34.4	44.68	-	-	74	-29.32	-	-	95	100	H
	* 1.125	46.42	ADR	27.4	-34.4	39.42	54	-14.58	-	-	-	-	95	100	H
3	* 1.25	46.72	PK-U	28.5	-34.5	40.72	-	-	74	-33.28	-	-	95	106	H
	* 1.25	39.09	ADR	28.5	-34.5	33.09	54	-20.91	-	-	-	-	95	106	H
4	* 1.125	47.37	PK-U	27.4	-34.4	40.37	-	-	74	-33.63	-	-	352	190	V
	* 1.125	40.7	ADR	27.4	-34.4	33.7	54	-20.3	-	-	-	-	352	190	V
5	* 5.113	47.51	PK-U	34.3	-18.4	63.41	-	-	74	-10.59	-	-	352	190	V
	* 5.113	35.55	ADR	34.3	-18.4	51.45	54	-2.55	-	-	-	-	352	190	V
6	10	40.57	PK-U	36.9	-24.1	53.37	-	-	-	-	68.2	-14.83	73	130	H

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

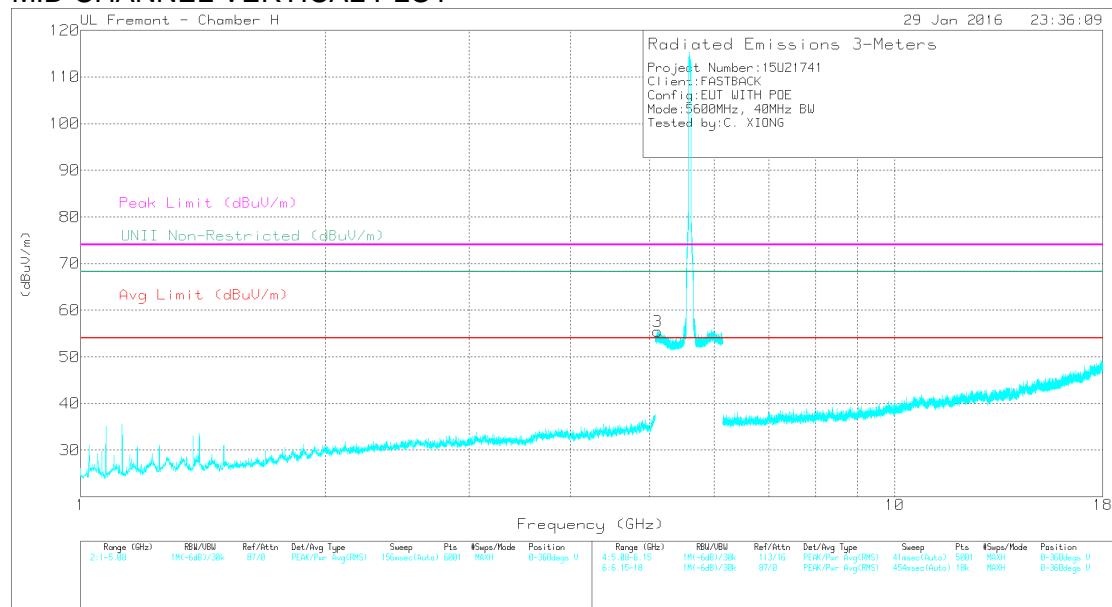
MID CHANNEL HORIZONTAL PLOT



FCC Part15C 5GHz UNII RSE.TST 30915 22 Oct 2015

Rev 9.5 24 Jun 2015

MID CHANNEL VERTICAL PLOT



FCC Part15C 5GHz UNII RSE.TST 30915 22 Oct 2015

Rev 9.5 24 Jun 2015

**DATA**

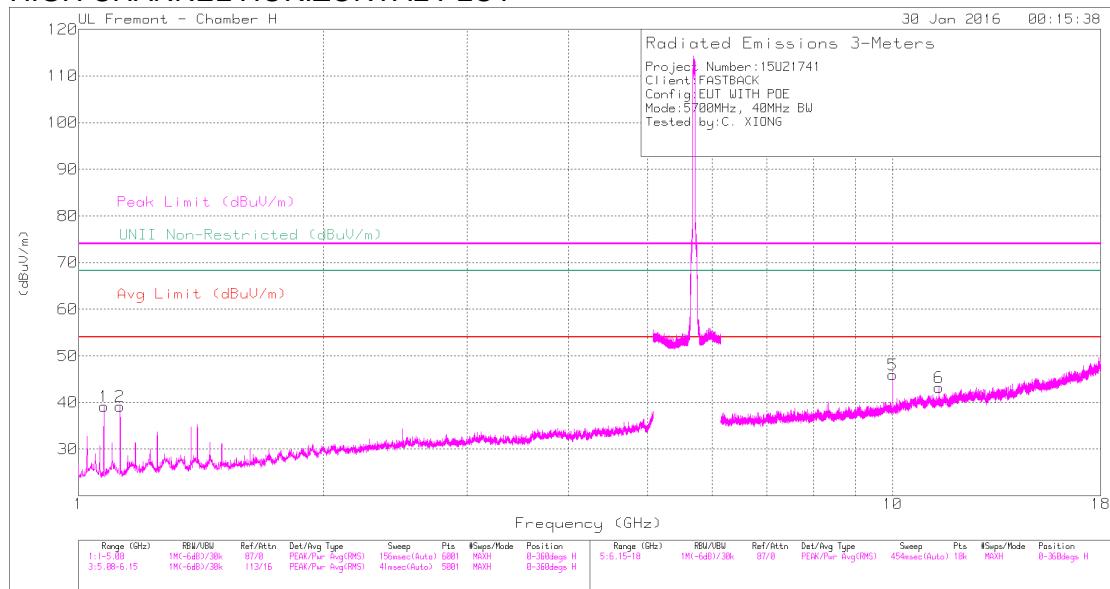
Marker	Frequency (GHz)	Meter Reading (dBuV)	Dct	AF T863 (dB/m)	Amp/Cbl/Ft tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.075	49.75	PK-U	27.1	-34.3	42.55	-	-	74	-31.45	-	-	25	100	H
	* 1.075	45.09	ADR	27.1	-34.3	37.89	54	-16.11	-	-	-	-	25	100	H
2	* 1.125	52.21	PK-U	27.4	-34.4	45.21	-	-	74	-28.79	-	-	37	138	H
	* 1.125	47.25	ADR	27.4	-34.4	40.25	54	-13.75	-	-	-	-	37	138	H
3	* 5.111	47.3	PK-U	34.3	-18.4	63.2	-	-	74	-10.8	-	-	37	138	V
	* 5.111	35.53	ADR	34.3	-18.4	51.43	54	-2.57	-	-	-	-	37	138	V
4	* 7.5	38.16	PK-U	36	-26.2	47.96	-	-	74	-26.04	-	-	47	104	H
	* 7.5	28.13	ADR	36	-26.2	37.93	54	-16.07	-	-	-	-	47	104	H
6	* 11.2	37.38	PK-U	37.8	-23.4	51.78	-	-	74	-22.22	-	-	54	113	H
	* 11.2	27.86	ADR	37.8	-23.4	42.26	54	-11.74	-	-	-	-	54	113	H
5	10	40.61	PK-U	36.9	-24.1	53.41	-	-	-	-	68.2	-14.79	79	113	H

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

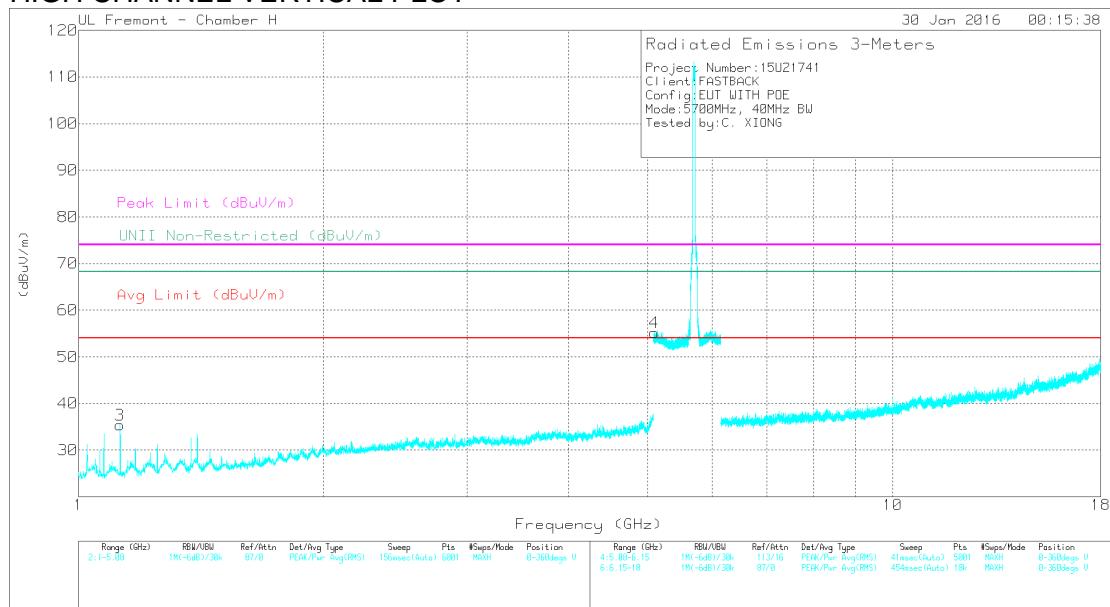
### HIGH CHANNEL HORIZONTAL PLOT



FCC Part15C 5GHz UNII RSE.TST 30915 22 Oct 2015

Rev 9.5 24 Jun 2015

### HIGH CHANNEL VERTICAL PLOT



FCC Part15C 5GHz UNII RSE.TST 30915 22 Oct 2015

Rev 9.5 24 Jun 2015

**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Ft 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	* 1.075	49.58	PK-U	27.1	-34.3	42.38	-	-	74	-31.62	-	-	25	100	H
	* 1.075	44.96	ADR	27.1	-34.3	37.76	54	-16.24	-	-	-	-	25	100	H
2	* 1.125	51.29	PK-U	27.4	-34.4	44.29	-	-	74	-29.71	-	-	36	141	H
	* 1.125	46.4	ADR	27.4	-34.4	39.4	54	-14.6	-	-	-	-	36	141	H
3	* 1.125	47.97	PK-U	27.4	-34.4	40.97	-	-	74	-33.03	-	-	353	101	V
	* 1.125	41.29	ADR	27.4	-34.4	34.29	54	-19.71	-	-	-	-	353	101	V
4	* 5.096	47.4	PK-U	34.3	-18.4	63.3	-	-	74	-10.7	-	-	353	101	V
	* 5.096	35.47	ADR	34.3	-18.4	51.37	54	-2.63	-	-	-	-	353	101	V
6	* 11.4	36.63	PK-U	37.9	-22.6	51.93	-	-	74	-22.07	-	-	40	180	H
	* 11.4	28.04	ADR	37.9	-22.6	43.34	54	-10.66	-	-	-	-	40	180	H
5	10	40.27	PK-U	36.9	-24.1	53.07	-	-	-	-	68.2	-15.13	74	118	H

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

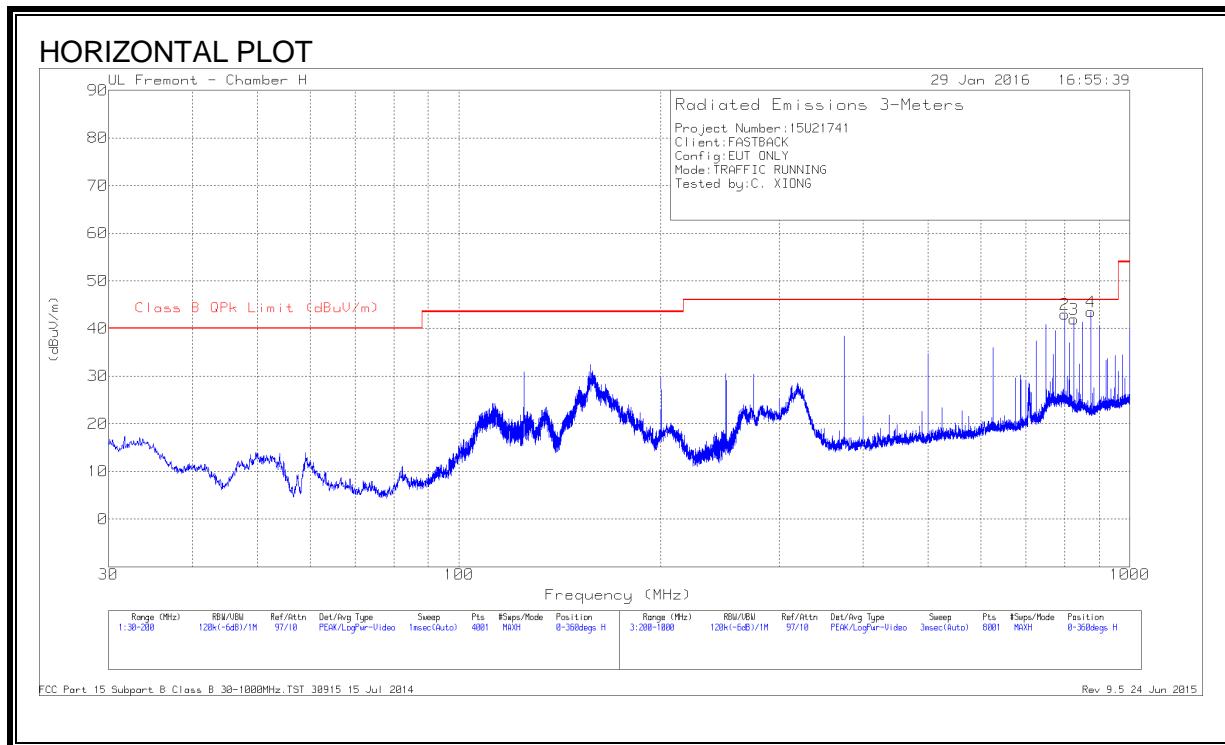
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

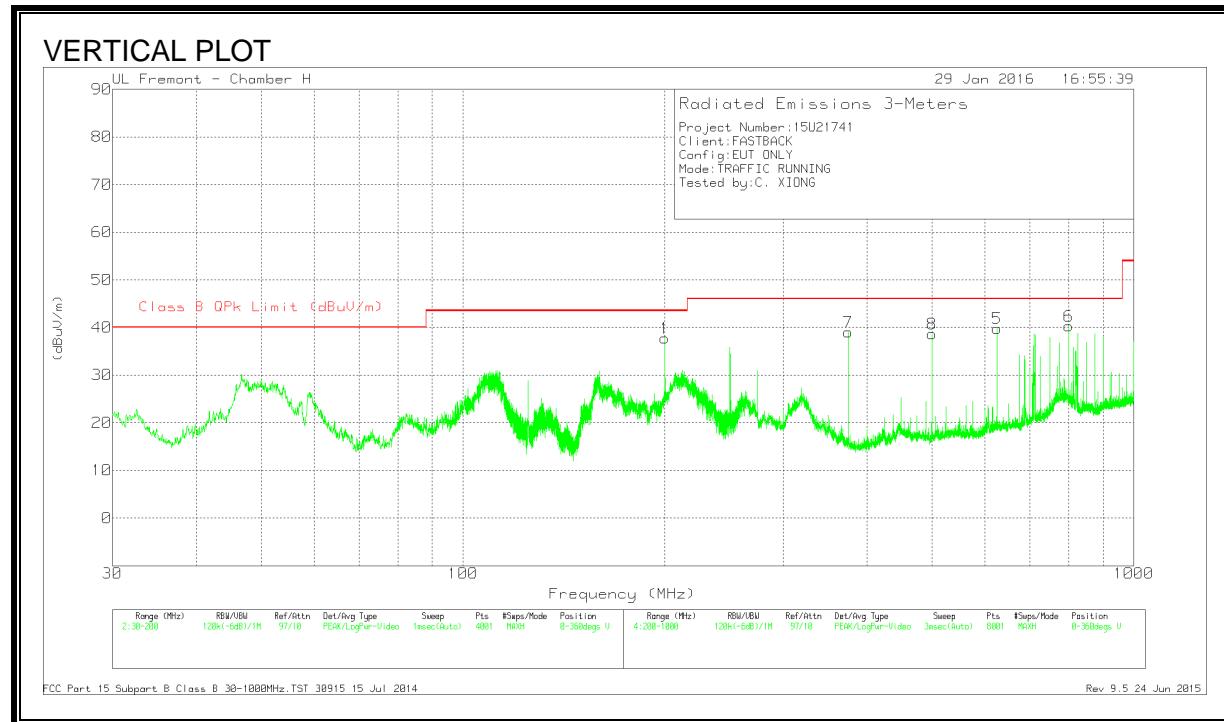
### 9.3. WORST-CASE BELOW 1 GHz

#### Model IBR-1300-NA (PoE Option) setup:

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



**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)**



**DATA**

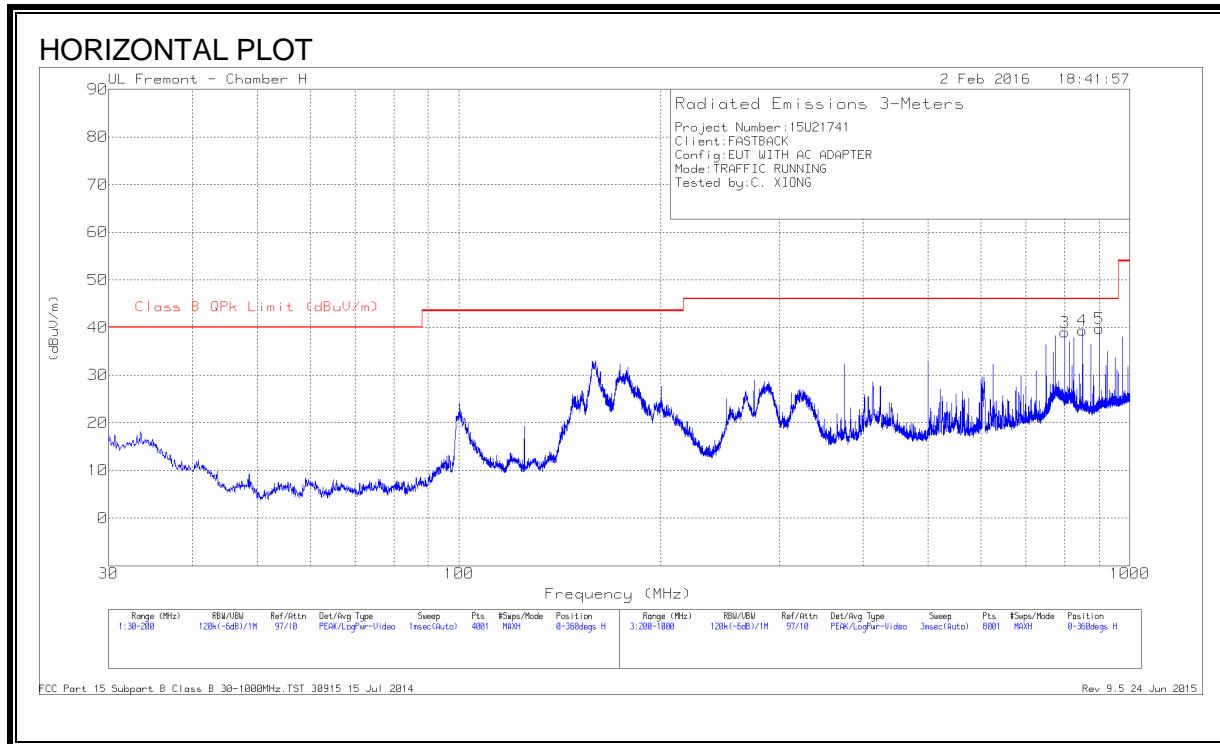
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T900 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	199.993	48	Qp	12.4	-29.8	30.6	43.52	-12.92	331	116	V
7	375	52.52	Pk	15.3	-28.8	39.02	46.02	-7	0-360	100	V
8	500	49.45	Pk	17.5	-28.3	38.65	46.02	-7.37	0-360	100	V
5	625	48.12	Pk	19.6	-27.9	39.82	46.02	-6.2	0-360	100	V
2	800.004	49.47	Qp	21.4	-27.4	43.47	46.02	-2.55	24	104	H
6	800.016	45.58	Qp	21.4	-27.4	39.58	46.02	-6.44	76	100	V
3	825.002	47.08	Qp	21.4	-27.1	41.38	46.02	-4.64	24	103	H
4	875.007	48.41	Qp	21.3	-26.7	43.01	46.02	-3.01	34	170	H

Pk - Peak detector

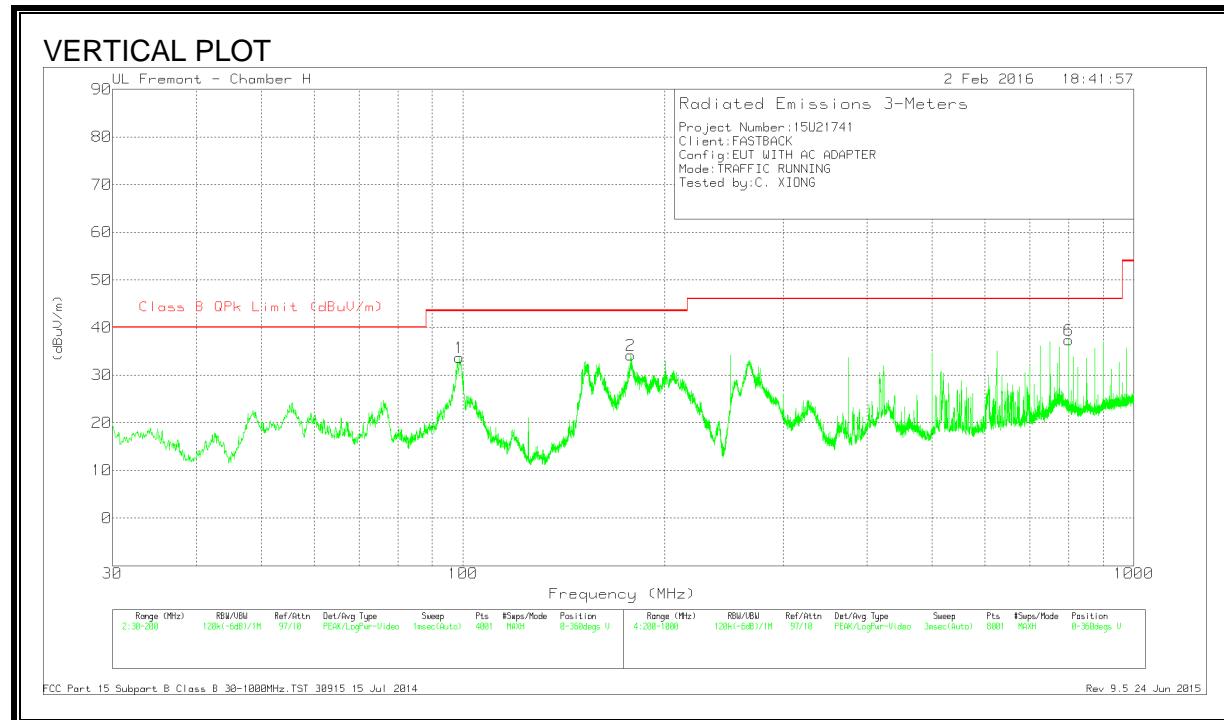
Qp - Quasi-Peak detector

**Model IBR-1301-NA (AC Option) setup:**

**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)**



**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)**



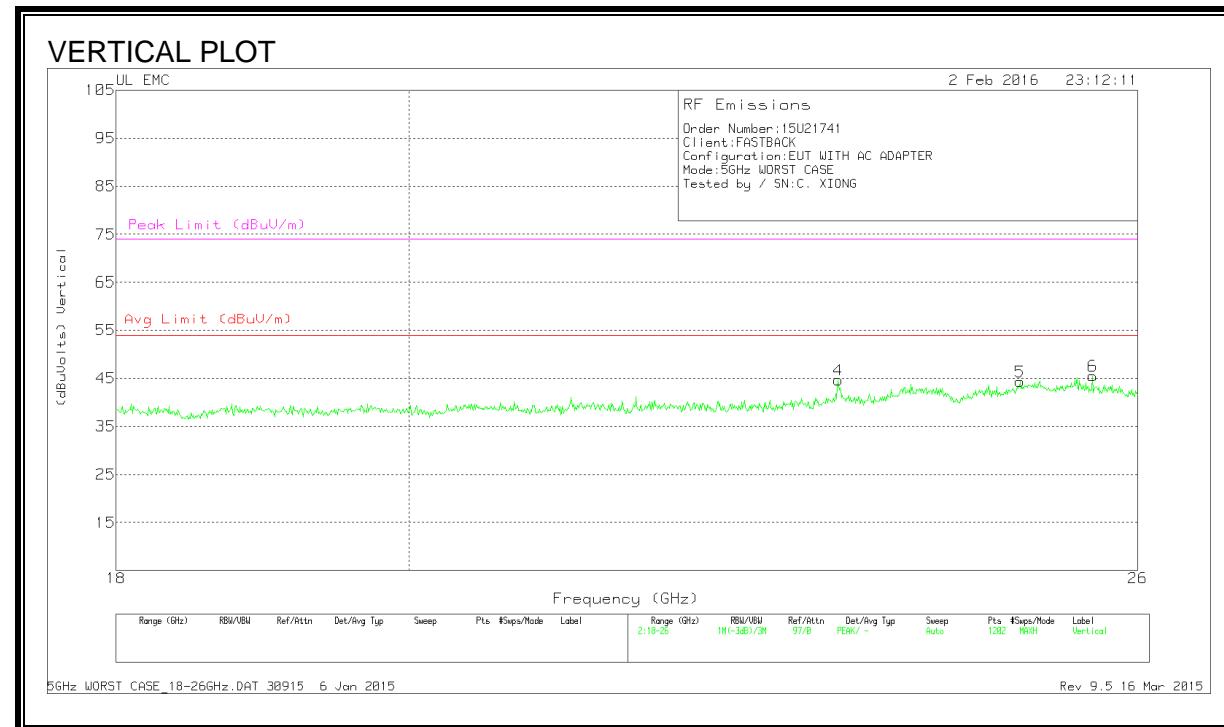
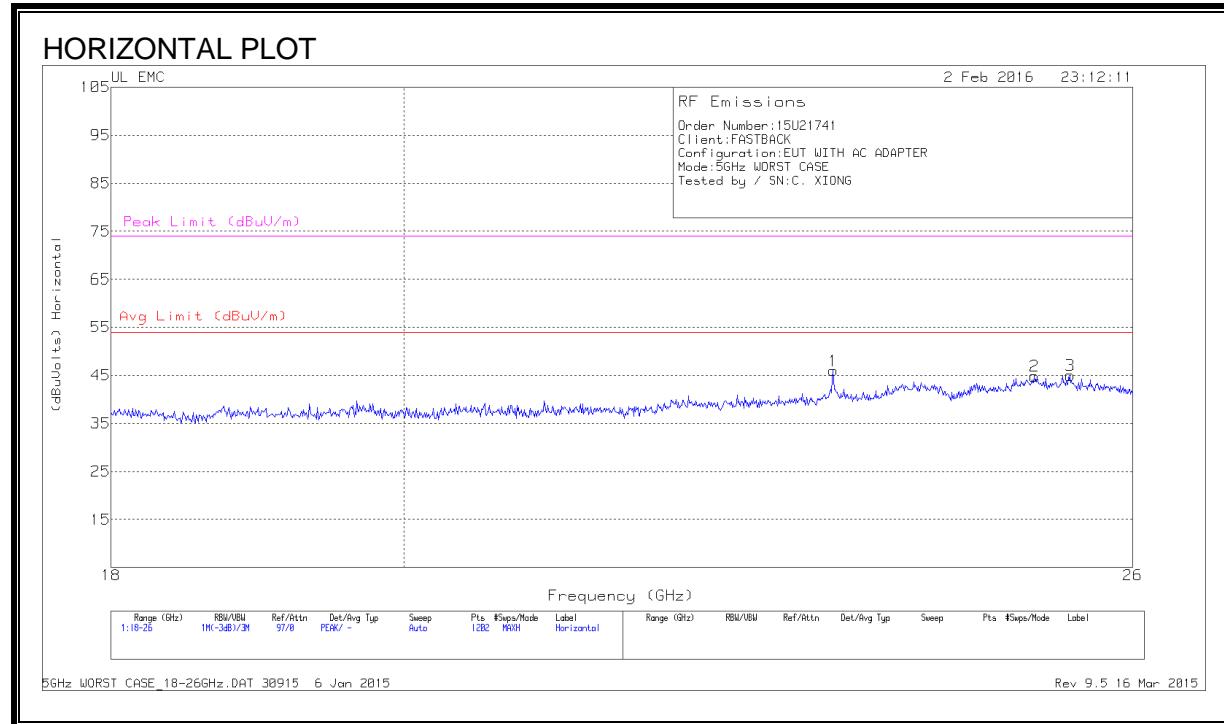
## DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T900 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	98.7225	54.34	Pk	9.8	-30.5	33.64	43.52	-9.88	0-360	100	V
2	177.985	52.54	Pk	11.5	-29.9	34.14	43.52	-9.38	0-360	100	V
3	800.3	44.96	Pk	21.4	-27.3	39.06	46.02	-6.96	0-360	201	H
6	800.3	43.25	Pk	21.4	-27.3	37.35	46.02	-8.67	0-360	100	V
4	850.3	44.37	Pk	22	-26.9	39.47	46.02	-6.55	0-360	201	H
5	900.3	44.02	Pk	22.3	-26.5	39.82	46.02	-6.2	0-360	100	H

Pk - Peak detector

## 9.4. WORST-CASE 18 to 26 GHz

### SPURIOUS EMISSIONS 18000 TO 26000 MHz (WORST-CASE CONFIGURATION)



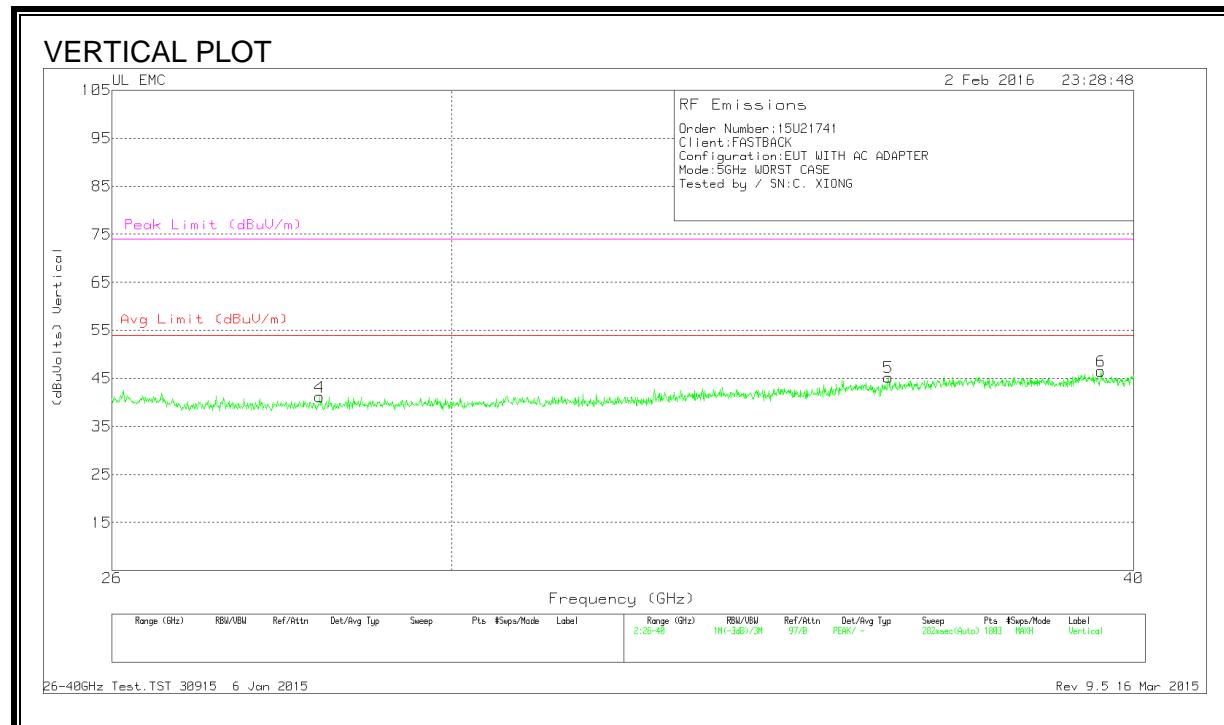
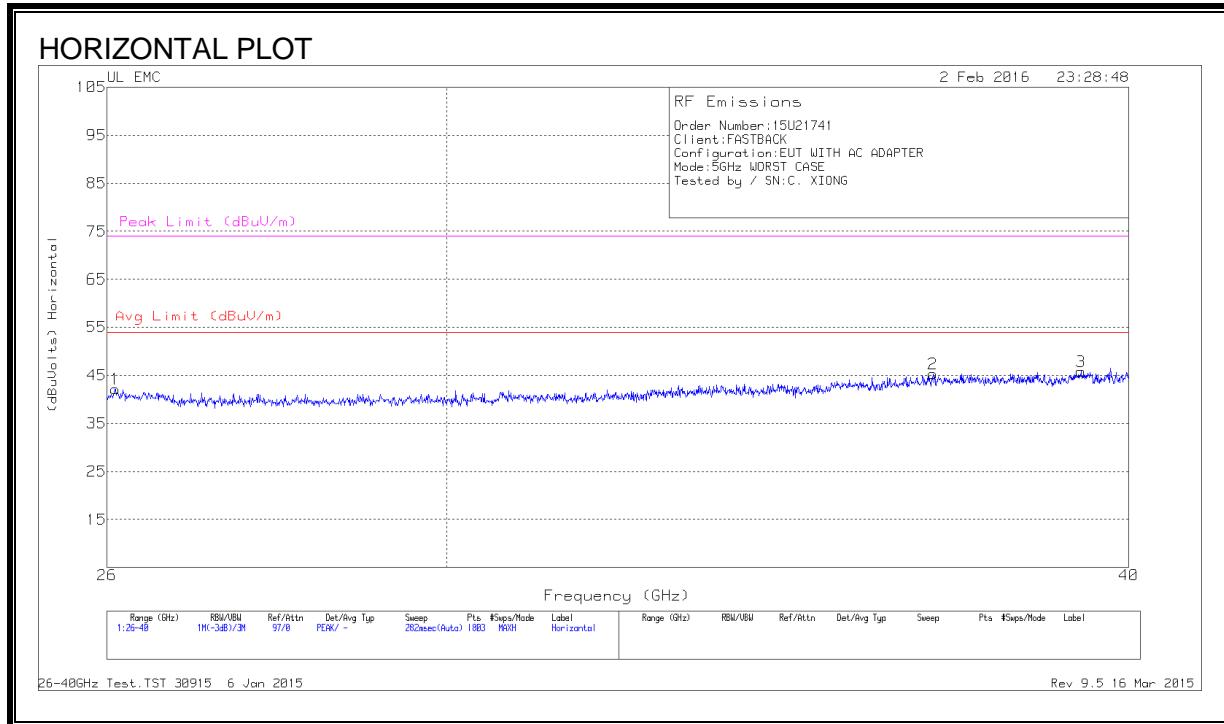
## HORIZONTAL & VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T477 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	23.342	46.7	Pk	33.7	-24.9	-9.5	46	54	-8	74	-28
2	25.094	44.63	Pk	34.2	-24.5	-9.5	44.83	54	-9.166	74	-29.16
3	25.42	44.6	Pk	34.2	-24.3	-9.5	45	54	-9	74	-29
4	23.342	45.37	Pk	33.7	-24.9	-9.5	44.66	54	-9.33	74	-29.33
5	24.921	44.03	Pk	34	-24.2	-9.5	44.33	54	-9.66	74	-29.66
6	25.58	45.8	Pk	34.3	-25.1	-9.5	45.5	54	-8.5	74	-28.5

Pk - Peak detector

## 9.5. WORST-CASE 26 to 40 GHz

## **SPURIOUS EMISSIONS 26 TO 40 GHz (WORST-CASE CONFIGURATION)**



## 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	26.089	46.27	Pk	35.6	-30.2	-9.5	42.166	54	-11.833	74	-31.833
2	36.83	50.63	Pk	37.1	-32.9	-9.5	45.333	54	-8.666	74	-28.666
3	39.2	49.23	Pk	38.3	-32.2	-9.5	45.833	54	-8.166	74	-28.166
4	28.377	46.47	Pk	35.8	-31.6	-9.5	41.166	54	-12.833	74	-32.833
5	36.069	50.57	Pk	37.2	-33.1	-9.5	45.166	54	-8.833	74	-28.833
6	39.448	50.1	Pk	37.6	-31.7	-9.5	46.5	54	-7.5	74	-27.5

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

<sup>\*</sup> 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.

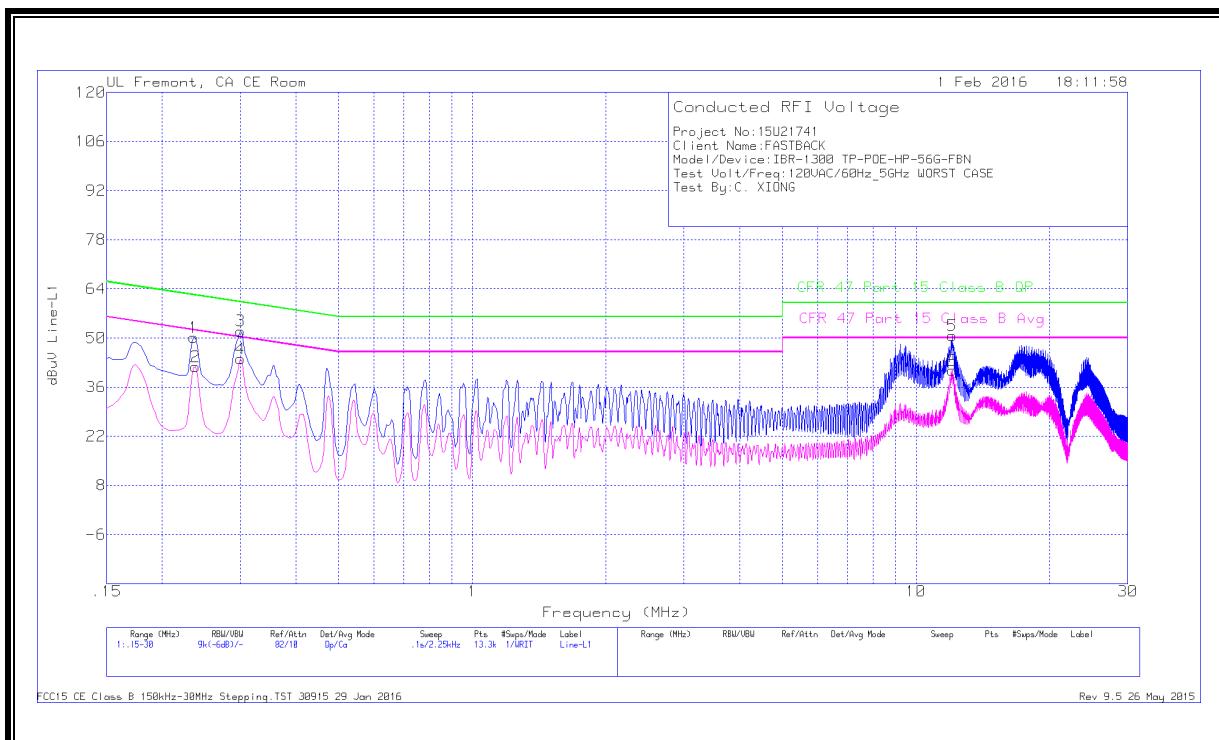
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines

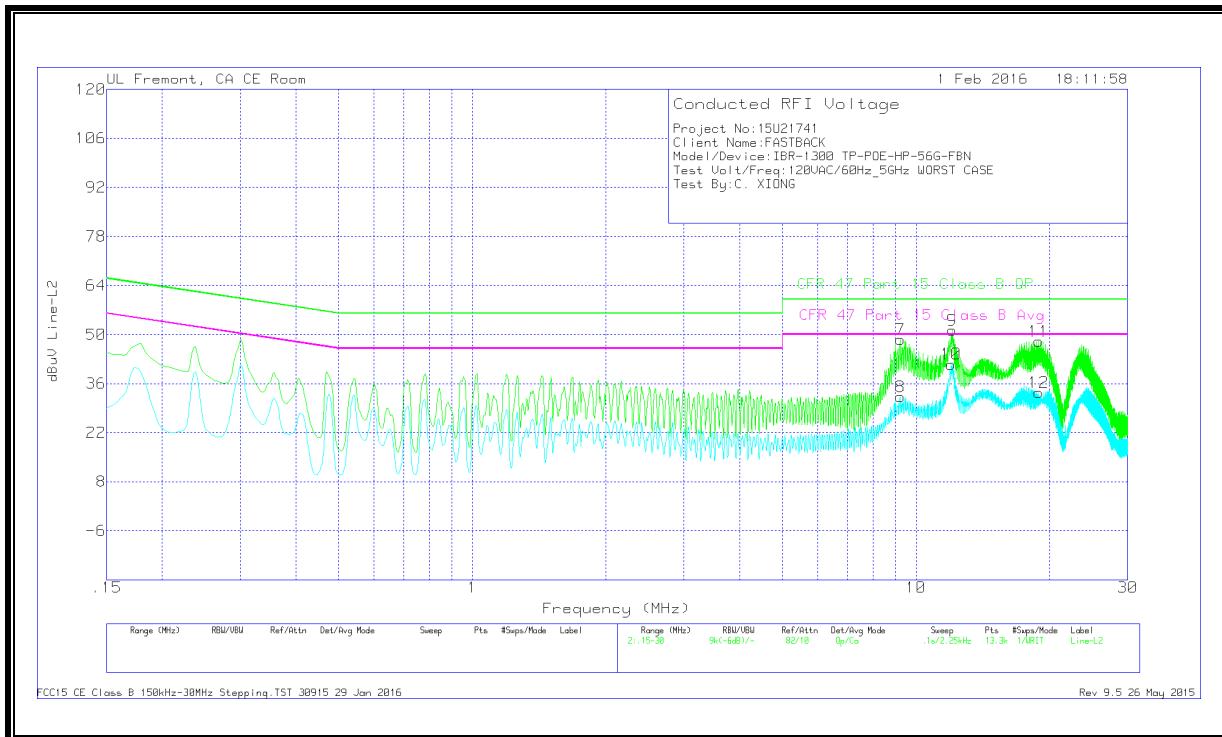
## RESULTS

### PoE setup:

### LINE 1 RESULTS



**LINE 2 RESULTS**



## DATA

### Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T1310 IL L1	LC Cables 1&3	10dB Pad	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	.2355	40.21	Qp	0	0	10	50.21	62.25	-12.04	-	-
2	.23775	31.77	Ca	0	0	10	41.77	-	-	52.17	-10.4
3	.30075	42	Qp	0	0	10	52	60.22	-8.22	-	-
4	.30075	34.05	Ca	0	0	10	44.05	-	-	50.22	-6.17
5	12.066	40.32	Qp	.1	.2	10	50.62	60	-9.38	-	-
6	12.066	30.48	Ca	.1	.2	10	40.78	-	-	50	-9.22

### Range 2: Line-L2 .15 - 30MHz

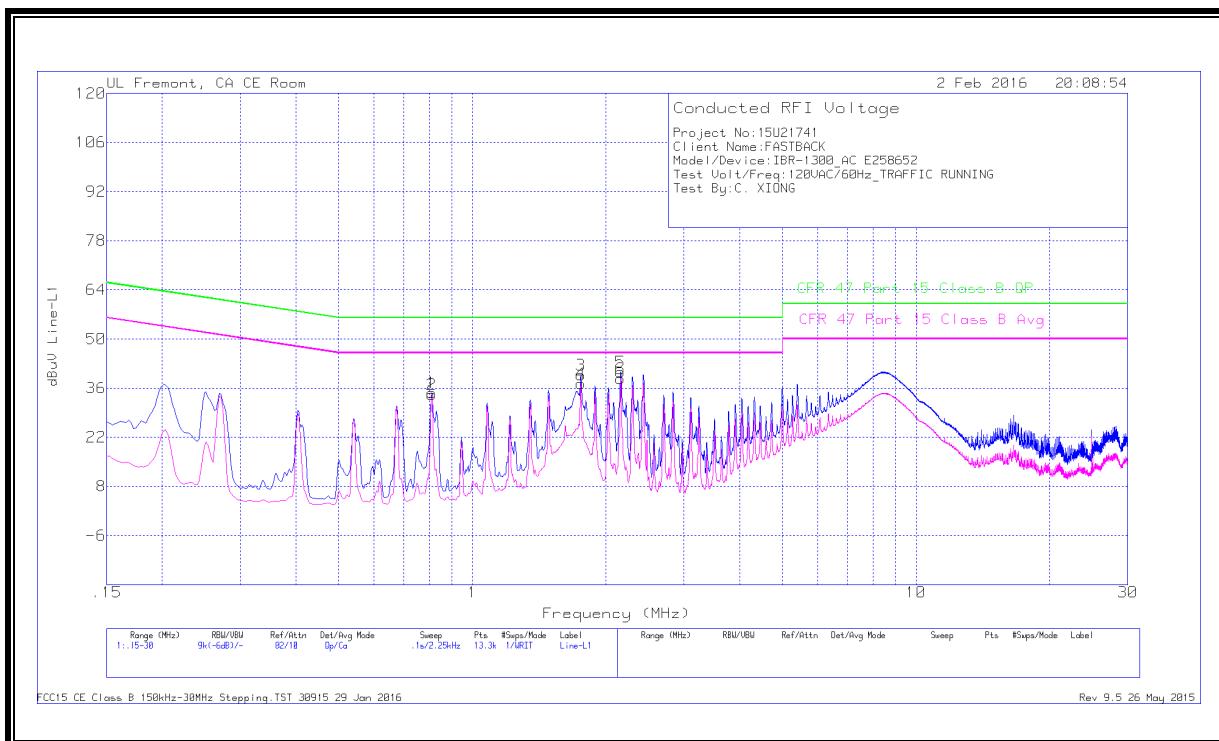
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T1310 IL L2	LC Cables 2&3	10dB Pad	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
7	9.231	38.45	Qp	0	.1	10	48.55	60	-11.45	-	-
8	9.22875	22.18	Ca	0	.1	10	32.28	-	-	50	-17.72
9	12.06375	40.98	Qp	0	.2	10	51.18	60	-8.82	-	-
10	11.994	31.37	Ca	0	.2	10	41.57	-	-	50	-8.43
11	18.88125	37.87	Qp	0	.2	10	48.07	60	-11.93	-	-
12	18.88125	23.32	Ca	0	.2	10	33.52	-	-	50	-16.48

Qp - Quasi-Peak detector

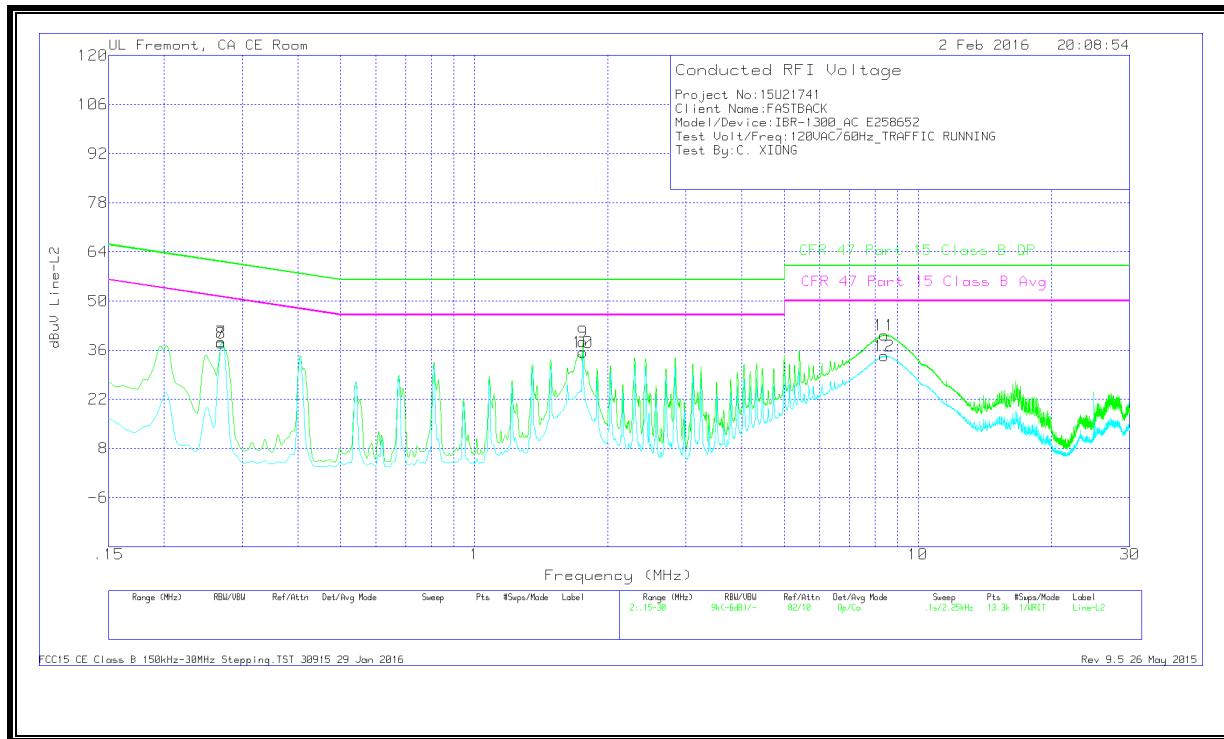
Ca - CISPR average detection

**AC mains setup:**

**LINE 1 RESULTS**



## LINE 2 RESULTS



## DATA

### Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T1310 IL L1	LC Cables 1&3	10dB Pad	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	.80925	24.7	Qp	0	0	10	34.7	56	-21.3	-	-
2	.80925	24.19	Ca	0	0	10	34.19	-	-	46	-11.81
3	1.7565	29.58	Qp	0	.1	10	39.68	56	-16.32	-	-
4	1.75425	27.18	Ca	0	.1	10	37.28	-	-	46	-8.72
5	2.15925	30.51	Qp	0	.1	10	40.61	56	-15.39	-	-
6	2.15925	28.59	Ca	0	.1	10	38.69	-	-	46	-7.31

### Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T1310 IL L2	LC Cables 2&3	10dB Pad	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
7	.26925	28.41	Qp	0	0	10	38.41	61.14	-22.73	-	-
8	.26925	27.95	Ca	0	0	10	37.95	-	-	51.14	-13.19
9	1.7565	28.21	Qp	0	.1	10	38.31	56	-17.69	-	-
10	1.7565	25.32	Ca	0	.1	10	35.42	-	-	46	-10.58
11	8.39625	30.21	Qp	0	.1	10	40.31	60	-19.69	-	-
12	8.385	24.22	Ca	0	.1	10	34.32	-	-	50	-15.68

Qp - Quasi-Peak detector

Ca - CISPR average detection

## 11. DYNAMIC FREQUENCY SELECTION

Refer to report 15U21741-E3Vx for evaluation and results.